



URBAN FORESTRY PROGRAM MANUAL

County of Los Angeles Department of Parks and Recreation



June 2011

(Adapted from the City of Los Angeles Recreation and Parks Department Urban Forest Program, 2004)



COUNTY OF LOS ANGELES
DEPARTMENT OF PARKS AND RECREATION
"Creating Community Through People, Parks and Programs"

Russ Guiney, Director

June 30, 2011

Thank you for your interest in the Urban Forestry Program Manual.

The County of Los Angeles Department of Parks and Recreation (DPR) is honored to oversee the County of Los Angeles (County) parks and recreation system, which includes 63,000 acres of parks, lakes, trails, natural areas, and gardens. These recreational opportunities have been identified as essential to the quality of life among Americans. Sometimes though, in our fast paced world, it's easy to take things for granted. I have worked in Parks my entire career and obviously the trees in parks were a given. However, with the advent of global warming and the urgency to conserve resources, a closer examination of the "urban forest" that is the County park system was warranted. We needed to stop and take a look at how we managed and maintained the trees in the parks and identify any practice that needed improvement or updating.

The result was the Urban Forestry Program Manual. This Manual provides guidelines and standards for the planning, protection, preservation, maintenance, and sustainability of the Department's urban forest. The preparation of this document is the result of a Department wide effort that solicited input from the Regional Agency Tree Trimming Division, all Agency Construction and Maintenance Divisions, Information Technology Division and the Planning Division.

I would also like to give credit to the City of Los Angeles, Department of Recreation and Parks who graciously allowed us to adapt their *2004 Urban Forestry Manual* to the needs of the County park system. With resources being as limited as they are, we didn't have the means to "start from scratch" on a manual but with the City's cooperation, the task was accomplished.

Additionally, thanks to technology, there is software that can quantify the environmental benefits of trees such as carbon sequestration, stormwater capture and energy savings. An exacting tree inventory was conducted at five parks and the inventory information was loaded into the iTree © program. The results are included in this document. Now, knowing that trees provide not only an aesthetic benefit, but also a quantifiable environmental benefit, we are better equipped to manage this enormous resource.

The Department, over time, will review and revise this manual as needed. As always, we welcome your input.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Russ Guiney', is written over a white background.

Russ Guiney
Director

RG:JR

Executive Offices • 433 South Vermont Avenue • Los Angeles, CA 90020-1975 • (213) 738-2961

ACKNOWLEDGEMENTS

This document has been adapted from the *Urban Forest Program* document prepared for the City of Los Angeles Recreation and Park Department in 2004. This updated version includes updated arboriculture information from sources such as the International Society of Arboriculture (ISA), the Western Chapter of the International Society of Arboriculture (WCISA), CalFire and California ReLeaf. The updated document has also relied heavily on input from the Department's Tree Trimming Division, Agency Construction Managers and Grounds Maintenance Supervisors as well as its Planning and Development Agency for procedural guidance and recommendations.

CONTRIBUTORS

Executive Staff

Russ Guiney, Director
John Wicker, Chief Deputy Director
Robert Maycumber, Administrative Deputy Director
Norma E. Garcia, Deputy Director- Planning and Development Agency
Frank Gonzales, Deputy Director-North Agency
Joe Mendoza, Deputy Director-South Agency
Frank Gonzalez, Deputy Director-East Agency
Hayden Sohm, Deputy Director-Regional Facilities Agency

Information Technology Services

Melissa Brown-Information Technology Supervisor

Tree Trimming Division

Selestino Mercado – Tree Trimming Division Supervisor, Certified Tree Worker
Mark Miltko – Tree Trimmer Working Supervisor
Kevin Kane - Certified Arborist

Departmental Agency Construction / Grounds Maintenance Supervisors

North Agency- Don Houston / Rod Wallace
South Agency- Dwight LaCroix / Bob Gonzalez
East Agency- Michael Ralston / Bill Hottran
Regional Facilities Agency- Guillermo Najjar

Trails Crew

Ralph Beltran- Trails Crew Supervisor

Planning and Development Agency

Larry Hensley-Chief of Planning
Joan Rupert-Section Head, Environmental
Bryan Moscardini-Departmental Facility Planner I
Ansley B. Davies-Associate Curator
Julie Yom-Park Planner

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Urban Forestry Program Manual

1.0 INTRODUCTION

The Department of Parks and Recreation (Department) owns and maintains over 150 facilities across the County, ranging from community parks to vast regional facilities, pocket parks to wildlife sanctuaries, performing arts venues to arboreta as well as an extensive 330 mile trail system and seventeen golf courses. All of these facilities have one thing in common, trees. They are our greatest asset in combating global warming, cooling our patrons, capturing stormwater runoff and pollution, reducing heat islands and cleaning the air we breathe. Our urban forest is an integral component of the larger southern California ecosystem which continues to evolve and adapt. The Department is tasked with maintaining this valuable component, which is susceptible to growth, decay and disease. To sustain the urban forest we must know how, when, and why to intervene in its processes. This document will help guide the Department's forestry efforts through the implementation of maintenance, preservation, and protection methods and procedures.

The benefits of our small urban forests have not been able to be fully appreciated until recently, as urban forestry now has quantifiable benefits. Coupled with a standard tree maintenance inventory, programs such as iTree© can be utilized to quantify urban forestry benefits in not only pounds of particulates or acre feet of stormwater captured, but also monetarily. The program associates urban forestry benefits with cost savings due to less fuel consumed to heat or cool, fewer air quality related health care claims and expenses, as well as stormwater maintenance costs. For example, Carolyn Rosas Park in Rowland Heights contains roughly 140 trees over 6+acres. Using a tree inventory collected with a GPS unit, iTree© can assess that 24,000 pounds of carbon dioxide (CO₂) are sequestered annually and 175,000 gallons or 4 acre-feet of stormwater are captured (see full iTree© report in Appendix K). Pollutant capture and energy benefits are also be determined with iTree©.

Tree planting contributes to air quality improvement, provides a cooling effect during summer heat and provides cover during extreme weather. Trees provide a comfort zone both physically and psychologically and serve as a respite to park patrons.

Sound urban forest management is to plant desirable, sustainable trees in the urban environment. In Los Angeles County the ideal park tree:

1. Is a shade tree with minimum susceptibility to wind damage and branch drop
2. Does not require frequent pruning
3. Produces slight litter
4. Requires low water, is deep rooted and tolerant of varied irrigation regimens
5. Has few serious insect and disease problems
6. Tolerates a wide range of soil conditions
7. Reflects the variety of Southern California native plant materials

“A Society grows great when old men plant trees whose shade they know they shall never sit in”

- Greek Proverb

2.0 DEFINITIONS

The Definitions section is a list of arboricultural and construction-related terms and their definitions. They serve to outline uniform concepts and provide an understanding of events that may be discussed in this document.¹

Aeration - In soil, the process by which air from the atmosphere is brought into the soil; usually to reverse loss of macro pores resulting from compaction.

Adventitious Buds and Suckers - Lateral buds whose growth was previously suppressed by an auxin (growth hormone) produced by the dominant leader or side branch. As the suppressing chemicals become weaker, adventitious buds produce a large quantity of new sprouts or sucker growth near the point of the pruning cut or wound break.

Aging - Orderly changes of an organism over time, or its parts as it is genetically designed. In trees, the ratio between volume of wood with living cells being walled off to volume of wood with living cells being generated.

Allelopathy - Chemical inhibition of growth and development of one plant by another.

Amendment (Soil) - Any substance other than fertilizers, such as lime or sulfur. For example, gypsum and sawdust are used to alter the chemical or physical properties of soil, generally to make it more productive.

ANSI A300 - American National Standards Institute - reference source for standards for pruning trees and shrubs.

ANSI Z133.1 - American National Standards Institute - reference source for standards for arboricultural operations.

Apical Dominance - Apical Dominance, or upright growth, is one of the ways a tree attempts to regain its natural form when limbs or branches are removed through pruning, disease, or accident.

Arboriculture - The science and art of caring for trees, shrubs, and other woody plants in a landscape setting.

Branch - A secondary shoot or stem arising from the main stem or trunk.

Branch Collar - Trunk tissue (usually marked by a swelling or collar) that forms around the base of a branch between the main stem and the branch or a branch and a lateral. As a branch decreases in vigor or begins to die, the collar usually becomes more pronounced and more completely encircles the branch.

¹ City of Los Angeles, Urban Forest Program (Rev. 2004), Tree Care Manual, Definitions, Page 1

Branch Bark Ridge - A ridge of bark in a branch crotch that marks where branch and trunk tissues meet. This ridge often extends down the trunk.

Caliper - Synonym for trunk diameter used to measure the size of nursery stock.

Callus - Undifferentiated tissue initially formed by the cambium around and over a wound.

Cambium -The tree cell generator. A layer of cells between the inner bark and wood. By the cell division a **cork cambium** forms the outer tissue of the tree's bark; on the inside a **vascular cambium** divides in an outward direction producing phloem and on the inner side xylem (see Image 1 following).

Canopy - The part of the tree composed of leaves and small twigs.

Certified Arborist - Individual who obtained arborist certification from the International Society of Arboriculture based on knowledge and competence, and who receives on regular basis continuing education administered by the ISA.

Certified Tree Worker - Individual who has obtained tree worker certification from the International Society of Arboriculture based on knowledge and competence, and who receives on regular basis continuing education administered by the ISA

County Arborist - Parks and Recreation employee who possesses current certification from the International Society of Arboriculture.

County Certified Tree Worker - Parks and Recreation employee who possesses current certification from the International Society of Arboriculture.

Circling roots - Roots that grow around the trunk in a circular manner, rather than laterally away from it.

Compaction - Breaking down soil particles by mechanical means, resulting in loss of soil macropores and leading to lack of oxygen and water in soils. A major cause of death of tree roots. See also Soil Compaction.

Compartmentalization - Physiological process that creates the chemical and physical boundaries that act to limit the spread of disease and decay organisms.

Compost - Organic residues or mixture of organic residues and soil, that have been piled, moistened, and allowed to undergo biological decomposition.

Conifer - Plant that bears seeds in a cone.

Crotch - The angle formed at the attachment between a branch and another branch, leader or trunk of a woody plant.

Crown - The above ground parts of the tree, including the trunk.

Crown Cleaning - Crown cleaning refers to the removal of dead, dying, diseased, crowded, weakly attached, and/or low-vigor branches from a tree crown.

DBH – Diameter at breast height

Decay - Process of degradation of woody tissues by fungi and bacteria through the decomposition of cellulose and lignin.

Deciduous - Perennial plant that loses all its leaves at one time during the year.

Decurrent - Round-headed or spreading plant with no main leader to the top of the plant. Example: coast live oak.

Disturbance - Various activities from construction or development that may damage trees.

Dripline -The width of the crown, as measured by the lateral extent of the foliage.

Drop-Crotch - Reduction cut which reduces the length of a branch or stem back to a live lateral branch large enough to assume apical dominance- this is typical at least one-third the diameter of the cut stem. Branches are selectively pruned or removed at varying distances resulting in a thinning out of the tree canopy.

Endemic - A species that is unique to that place or region, found naturally nowhere else; (differentiated from indigenous_which is a species that is native, but also native to other geographic locations).

Epicormic Shoot - Shoots growing from mature branches or near large pruning wounds. Most of these shoots arise from latent buds and seldom firmly attached to the stem from which they arise.

Evergreen - Plant that retains its leaves for more than one growing season.

Excurrent -Tree with cone-shaped crown with a central leader that outgrows and subdues lateral branches. Example: liquidambar.

Final Cut -The last cut made on a limb. It could be the only cut, or the last cut in a series. Final cuts should be made a minimal distance from the parent stem just outside of the branch collar.

Flush Cut - Pruning technique in which both branch and stem tissue are removed; generally considered poor practice.

Grading - Altering existing terrain and elevation of land, usually performed by the use of large equipment.

Growth Ring (Annual Ring) - Width of secondary xylem (wood) produced by the stem in 1 year.

Hazard Tree (Hazardous Tree) - Any tree or tree part that poses a high risk of failure or fracture that causes damage to property or injury to people.

Heading - Cutting a currently growing or 1-year old shoot back to a bud, or cutting an older branch to a stub or a tiny twig not sufficiently large enough to assume the terminal role. This technique is rarely appropriate on established trees and should not be used to reduce the height or size of trees.

Heartwood - Nonliving xylem in the center of a trunk or branch; wood is darker in color and may be a site for storage; provides structural strength to a tree.

Included Bark - Bark that occurs in a crotch between branch and trunk or between co dominant stems. Included bark usually:

- prevents the trunk from growing around a branch.
- occurs on defective V-shaped crotches in which the bark grows inward and on itself, causing a physical weakness where the co-dominant leaders meet.

Indigenous Plants - Plants occurring or living naturally in an area; not introduced; native.

Lateral - A branch or twig growing from a parent branch or stem

Leader - A dominant upright stem, usually the main trunk. There can be several leaders in one tree.

Limb - Same as branch, but usually larger and more prominent.

Mature Trees - Trees that have reached at least 75 percent of their typical final height and spread.

Mycorrhizae Treatment - Soil injection with mycorrhizae spores to increase symbiotic relationship of tree roots and beneficial fungi.

Mulching - Any material such as sawdust, woodchips, leaves, plastic film, gravel, and loose soil that is spread on the surface of the soil to protect the soil and roots from the effects of raindrops, soil crusting, freezing, and evaporation. This may aid in reducing soil compaction.

Parent Branch or Stem -The tree trunk; or, the larger limb from which lateral branches grow.

Permanent Branches (Permanent Limbs) - Branches that will remain on a tree for many years, perhaps until maturity.

Phloem - The food conducting tissue of trees. Formed by the division of the outside layer of the vascular cambium. New phloem is produced yearly; older cells are crushed and compacted (see Image 1 following).

Protected Trees -Trees protected by the R&P Tree Preservation Policy.

Pruning - Systematic removal of branches of a plant, usually a woody perennial.

Root Buffer - A temporary layer of material to protect the soil texture and roots. See section 4.20.5-B for details.

Root Collar -The junction between the root of a plant and its stem, often indicated by the trunk flare.

Sapwood - Functional, conductive and youngest layer of secondary xylem positioned next to the bark tissues; transports and stores water, mineral elements, and carbohydrates.

Scaffold - In decurrent trees a large limb that is or will be part of the permanent branch structure of a tree.

Soil Compaction - Compression of soil particles that may result from the movement of heavy machinery and trucks, storage of construction materials, structures, paving, etc. within the tree drip line.

Species (Tree Species) - Group of plants that resemble each other closely and that interbreed freely.

Sucker - Vigorous upright epicormic shoot that arises from latent buds below soil level or the graft union.

Sustainability - Maintenance of ecological, social, and economic functions and benefits over time.

Taper -The thickening of a stem (trunk) or branch toward its base.

Target - People or property potentially affected by tree failure.

Temporary Branch - A branch that will remain on the tree for only a short period; not a permanent limb. Usually lower temporary branches are left on young trees to encourage taper and sturdy trunk development.

Thinning - Pruning technique in which branches are removed at their point of origin.

Topping - Pruning technique to reduce height by heading of large branches. Generally considered poor practice. See also heading.

Tree Protection Zone - Area identified by County Arborist in which no soil disturbance is permitted and activities are restricted. Usually the area of a temporary fenced tree enclosure.

Trenching - Any excavation to provide irrigation, install foundation, utility lines, services, pipes, drainage or other property improvements below ground.

Undercut - Cutting partway through the underside of a limb to prevent the bark from tearing. Failure to make an undercut can cause the bark of a tree to tear down.

Watersprout - Vigorous, upright, epicormic shoots that grow from latent buds in older wood. Reciprocal are suckers that arise above the soil level or graft union. Seldom firmly attached to the stem from which they arise.

Wound - An opening that is created when the tree's protective bark covering is penetrated, cut, or removed, injuring or destroying living tissue. Pruning a live branch creates a wound, even when the cut is properly made.

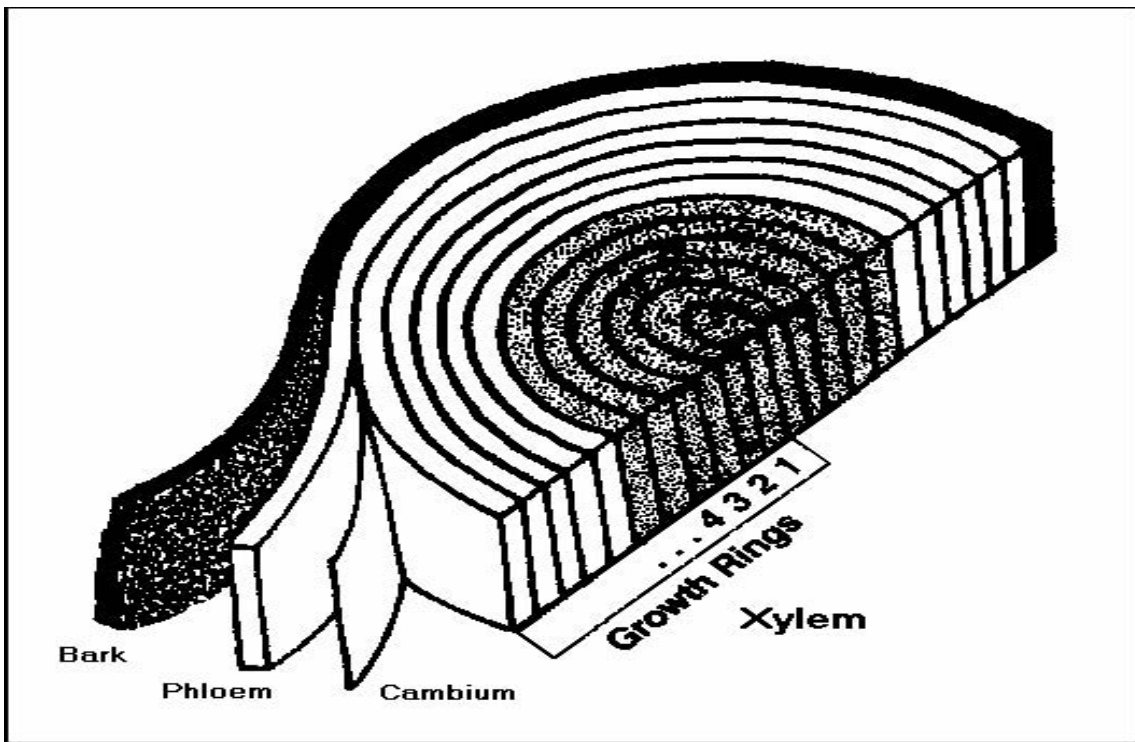
Wound Closure - The closing of a wound, necessary for the continued health of the tree. Wounds do not *heal* (return to restore to original condition or integrity) because wounding breaks or destroys the cambium; they *close*.

Woundwood - Differentiated woody tissue that forms after initial callus has formed around the margins of a wound. Wounds are closed primarily by woundwood.

Vertical Mulching - Technique designed to increase aeration of compacted soils. Holes are drilled into the ground and coarse textured or organic materials are added to replace the removed soil.

Xeriscape - Style of landscape design, construction, and maintenance focused on minimizing the need for supplemental irrigation.

Xylem - Cells formed by the division of the vascular cambium. Xylem cells function to transport and store water and mineral elements as well as provide mechanical support (see Image 1 following).



ISA, 1998. *Tree Climber's Guide*

Image 1 Cross Section of trunk

3.0 TREE MAINTENANCE GUIDELINES

3.10 County Tree Preservation Policy

The Oak Tree Ordinance (Ordinance) has been established to recognize oak trees as significant historical, aesthetic, and ecological resources. The goal of the ordinance is to create favorable conditions for the preservation and propagation of this unique and threatened plant heritage. By regulating this part of the development process, healthy oak trees will be preserved and maintained. The Ordinance applies to all unincorporated areas of the County. Individual cities may have adopted the County ordinance or their own ordinance which may be more stringent.

In 1982 (amended 1988) The County adopted the Oak Tree Ordinance protecting all oaks of the *Quercus* genus with a diameter at breast height (dbh) of eight inches or greater, or twelve inches or greater for multiple trunks (combination of two largest trunks). The County Forestry Division's Environmental Review Unit (Unit) works with the County Department of Regional Planning in implementing existing environmental ordinances. The Unit personnel review all County Oak Tree Permit applications submitted to the Department of Regional Planning and develop recommendations for implementation. Additionally, the Unit personnel produce environmental documentation and recommendations such as non-significant impact documents, negative declarations and mitigation measures consistent with the California Environmental Quality Act (CEQA) mandates for construction projects and developments. The **Environmental Review Unit** ensures that the statutory responsibilities of the County Fire Department-Forestry Division are addressed in the project planning phase. The unit can be reached at **(818) 890-5719, Monday - Friday, 7:30 a.m. to 5:00 p.m., or online at: <http://fire.lacounty.gov/Forestry/Forestry.asp>**

While the Department adheres to the Ordinance, the Planning and Development Agency has also operated with a "no net loss" of trees in County parks. Trees that are removed due to irreparable damage, disease, hazardous conditions or development are reported to the respective field Agency for eventual replacement. This is listed within "Recommendations", at the end of this document (Section 9).

3.20 Department Pruning Standards

Pruning means the removal of leaves or dead parts of plants, especially branches, to achieve the following:

1. To maintain or direct the plant form
2. To enhance health and appearance
3. To influence flowering, fruiting, and vigor
4. To regulate growth
5. To control plant size
6. To invigorate declining plants

Trees and other woody plants respond biologically to pruning (wounding) in specific and predictable ways. Careful study of these responses has led to pruning practices that can best develop, preserve, and enhance the structural integrity, beauty and functional value of trees. The Department's trees are maintained by a staff of tree trimming professionals that not only trim trees but also oversee contracted work performed by International Society of Arboriculture (ISA) licensed tree care companies.

3.20.1 Industry Standards

The American National Standards Institute (ANSI) A300-2001-Pruning (document) presents performance standards for the care and maintenance of trees, shrubs, and other woody plants (Appendix C). Best Management Practices-Tree Pruning is the companion publication to the ANSI-A300-2001 (Appendix B).

3.20.2 Types of Pruning

The Department uses several types of pruning including but not limited to structural pruning, crown cleaning, thinning, raising, reducing, restoration, and pruning of palms and conifers.

Climbing spikes must not be used to climb park trees or palms for the purpose of pruning. Instead, climbing spikes may be used to rescue an injured worker or remove dead dying or hazardous trees.

The Department's Tree Trimming Division evaluates trees from the ground before determining the type of pruning.

Considerations are based on tree species and may include the following:

1. Species and growth characteristics
2. Time of year
3. Tree form (example: excurrent or decurrent)
4. Tree condition (health)
5. Tree structure- the presence of defects or weaknesses

The Tree Trimming Division determines from the ground what limbs need to be removed to achieve or enhance a tree's structural integrity, appearance, or desired size.

Pruning for Structure

Structural Pruning is the removal of live branches and stems to influence structural integrity. It usually follows four procedures:

1. Canopy cleaning by removing dead, broken, diseased and dying branches
2. Development or re-establishment of a dominant leader
3. Establishment of the lowest permanent scaffold limb

4. Establishment of scaffold limbs by removing competing stems or branches.

Pruning to Clean

Cleaning is the selective removal of dead, diseased, detached, rubbing and broken branches. This type of pruning is done to reduce the risk of branch failure and reduce the transmission of decay, insects and disease.

Pruning to Thin

Thinning is the selective removal of live branches to reduce crown density. Pruning should not exceed 25% in a single year. Excessive removal of small branches on the lower two-thirds of a branch or stem is called lion tailing and may have an adverse effect on the tree; it is not an accepted practice.

Pruning to Raise

Raising is the selective removal of branches to provide vertical clearance. Caution must be taken not to remove too many lower branches. This can cause slow development of trunk taper, cause cracks or decay in the trunk, or transfer too much weight to the top of the tree.

Pruning to Reduce (Drop Crotch)

Reduction is the selective removal of branches and stems to decrease the height and/or spread of a tree. This type of pruning is done to minimize the risk of failure, to reduce the height or spread, for utility clearance, to clear vegetation from buildings or other structures, or to improve tree appearance and/or integrity. Crown reduction is accomplished with reduction cuts rather than heading cuts.

Pruning to Restore

Restoration is the selective removal of branches, sprouts, and stubs from trees that have been topped, severely headed, vandalized, lion tailed, broken during a storm, or otherwise damaged. Full restoration usually requires several prunings over many years.

Pruning Palms

Palm pruning primarily removes dead and chlorotic fronds. Green fronds growing at an angle of more than 45 degrees from horizontal must be retained.

Pruning Conifers

Conifers are primarily pruned to control the density of branching, the shape of young trees, and the size of older ones. They are mostly intolerant of topping or heading. Conifers typically have an excurrent growth habit, which is usually maintained throughout the lifespan of the tree. Thinning by the selective removal of small branches is the most

appropriate method when pruning conifers.²

3.20.3 Pruning Cuts

Proper pruning (Image 2 below) cuts cause little injury to the adjoining stem when pruning cuts are properly made. A ring of wound wood forms around the wound during the growing seasons after the cut. Pruning cuts are not covered with wound dressings or sealants. The Department uses two types of cuts; 'Branch Removal Cuts' (thinning cuts) are at the bark branch collar and 'Reduction Cuts' (drop crotch cuts) are done at lateral branches. Flush cuts, or cuts made "flush" with the parent stem, remove chemical barriers that counter decay. Flush cutting is not an accepted practice.³

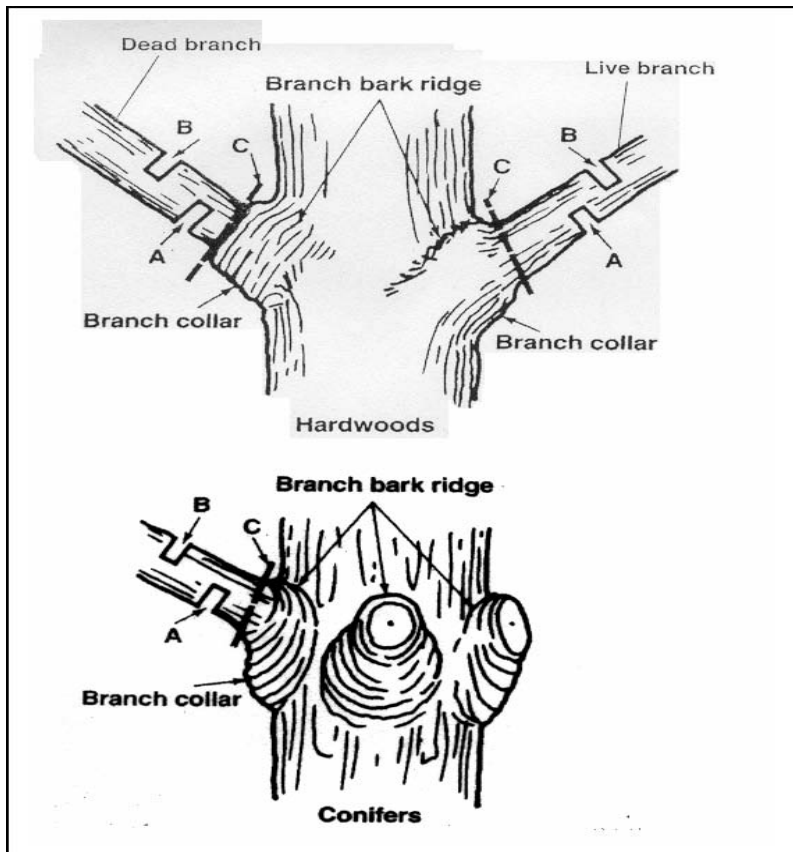


Image 2 - University of Illinois at Urbana-Champaign, *Plant Health Care for Woody Ornamentals*

Image 2 - The first cut (A) undercuts the limb. The second cut (B) removes the limb. The final cut (C) should be just outside the branch collar to remove the resulting stub. A pruning cut that removes a branch at its point of origin shall be made close to the trunk or parent limb, without cutting into the branch bark ridge or collar, or leaving a stub. Branches too large to support with one hand must be precut to avoid splitting of the wood or tearing of the bark.

² City of Los Angeles, Tree Maintenance Guidelines, Page 4

³ Ibid

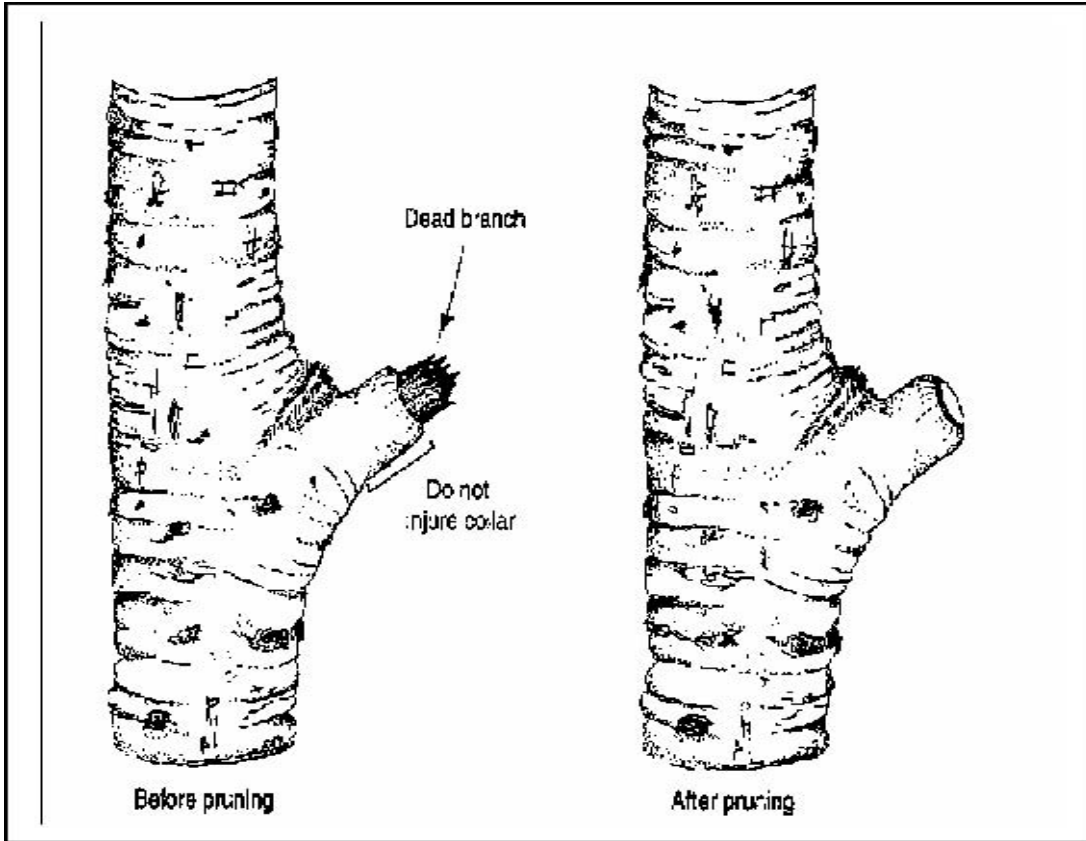


Image 3 - Gilman, E.F. 2002. *An Illustrated Guide to Pruning*

Image 3 - When removing a dead branch, do not cut into the swollen collar growing around the dead branch, even if it is large. Removing the collar from around the dead branch will injure the trunk since this is composed of trunk wood.

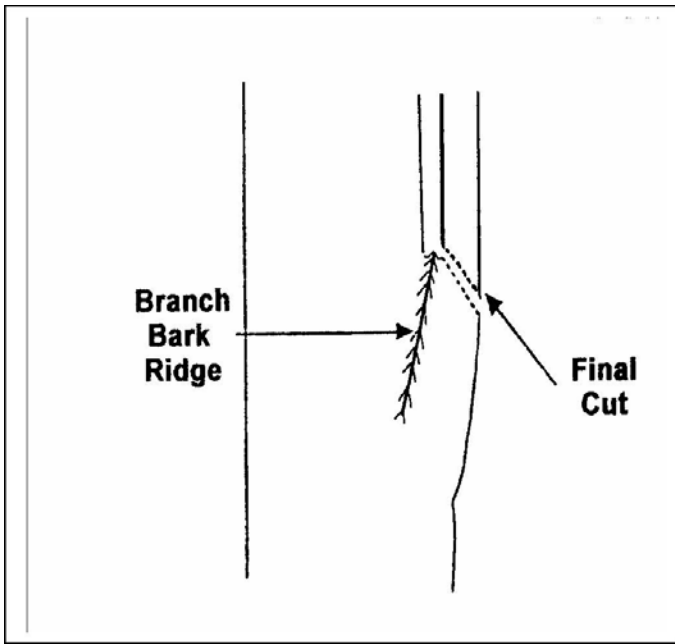


Image 4 - ANSI A300

Image 4 - A final cut that removes a branch with a narrow angle of attachment should be made from the outside of the branch to prevent damage to the parent limb.

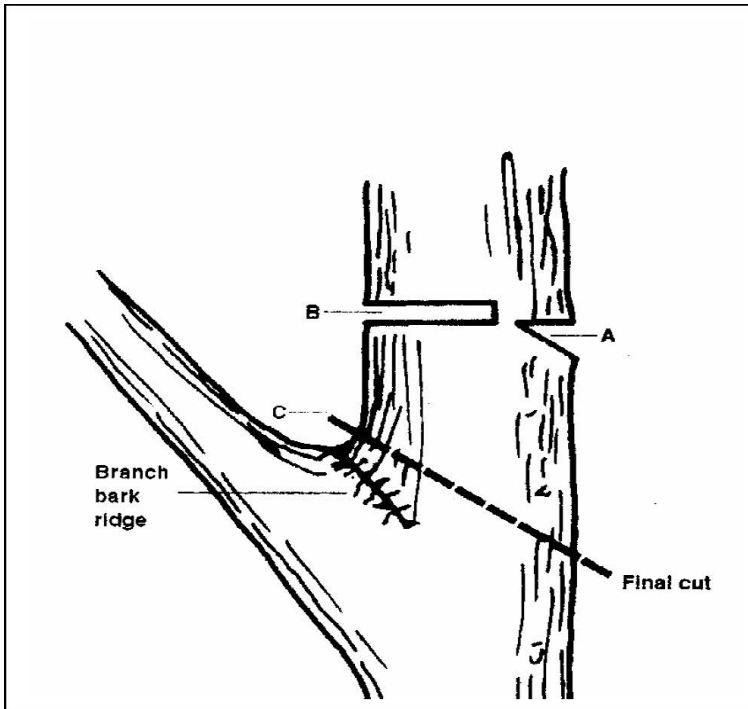


Image 5 - University of Illinois at Urbana-Champaign, *Plant Health Care for Woody Ornamentals*

Image 5 - A reduction cut shortens a stem back to a lateral branch. The exact location of the final cut will vary from branch to branch

3.20.4 Timing of Pruning

Hazardous trees of any species may be pruned and/or removed any time of the year. Removal of dying, diseased, broken, rubbing, or dead limbs can be accomplished at any time with little negative effect on the tree. Light pruning can be preformed safely on most species at any time providing the trees are in good health.

Plant development can be slowed and plant size maintained if pruning takes place soon after growth is complete for the season. Such pruning should not be so severe or so early as to encourage new shoot growth. If maximum dwarfing is desired, most plants should be pruned in the period from early to mid-summer. This will reduce the leaf area for the longest period

Most deciduous plants can be pruned during the dormant period between leaf fall to the end of winter with similar growth results. Try to avoid pruning broadleaf trees in early to late spring. Evergreens will be set back the least if they are pruned in late winter. This also minimizes bark beetle attack on conifers.

Pruning when trees are dormant can minimize the risk of pest problems associated with wounding (attracting insects to fresh wounds), and can allow trees to take advantage of the full growing season to close and compartmentalize a wound.

Corrective pruning may be easier during the growing season. Branches that hang too low from the weight of leaves or fruit can be thinned and dead, weak limbs can be more easily spotted for removal. It is a recommended practice to evaluate each tree before pruning. If necessary, alternate the pruning schedule to respond to the specific conditions. To prevent trees from the attack of boring insects, pruning should be preformed during the least favorable time for these insects to relocate, commonly in cooler winter months.⁴

During bird nesting season (generally March to September, but can be as early as January for tall trees which would hosts raptors) the Tree Trimming Division must take special precautions to watch for signs of bird activity on the ground and scout trees for occupied nests before beginning pruning projects. The Audubon Society's "Tree Trimming Manual" (Appendix I) must be consulted prior to any tree trimming within the nesting season.

3.20.5 Pruning Stressed Trees

Pruning is cutting into a tree's life tissue. Therefore, it is important to apply pruning practices that do not compound stress. This is especially true if pruning is preformed on trees that are already stressed from various other factors. When a tree is stressed its defense system is weakened and when weakened and a pathogen is present, infection usually takes place which may result in tree

⁴ City of Los Angeles, Tree Maintenance Guidelines, Page 7

decline.

- If the tree is stressed from receiving inadequate care, prune moderately to clean the crown, thin and reduce end weight, or restore the entire crown.
- If the tree has been recently damaged by injury or disturbance, remove all broken branches. If necessary, restore the crown to preserve structural integrity.

3.20.6 Pruning Young Trees

The average life expectancy for trees growing in urban environments is largely dependent on early care, and in particular, early pruning. Pruning trees early can improve tree vitality and preserve structural integrity which would improve a young tree's survival in a potentially harsh environment.

Trees may be pruned at planting time and up to 5 years into the establishment period to remove unwanted branching and to establish a tree's permanent framework. However, the following should be immediately pruned:

1. Broken, dead, and diseased branches
2. Sucker growth arising from the base of the tree or waterspouts growing vertically from a branch or stem
3. Crossing or rubbing branches

The goal of pruning young trees is to develop trees with one dominant leader, strong and balanced scaffolding branches, and to correct weaknesses such as included bark or co-dominant stems. These early pruning cuts establish a cohesive set of temporary branches that will remain with the tree for the first 3-5 years.

After the removal of the abovementioned offending material, a determination must be made as to which other branches should be removed, based on the following criteria:

1. Size of branch in relation to the main stem - Large branches greater than 1/2 the diameter of the main stem should receive close evaluation for removal. The suppression of such stems increases the overall strength of the main stem (or trunk).
2. Narrow branch angle - Removal of co-dominant stems should be a top priority in pruning young trees.
3. Low on the main stem - Branches too low to be permanent should be managed as temporary limbs, gradually removed as the tree matures. Staff should avoid lifting the canopy too quickly in the early life of the tree. These branches support leaves which are the photosynthetic

energy manufacturing sites of the tree. Selectively retain some low small branches to improve stem taper by allowing the stem to increase in girth.

4. Conflicting and competing branches of low priority - Selectively remove branches that are clustered at a node or compete for the same position in the canopy.

After scaffold development and suppression of competing stems is completed, cuts are made to thin the numbers of laterals in the crown which allows the remaining branches and laterals to become more vigorous. It improves light and wind penetration through the crown. Thinning in this step refers only to removal of laterals that arise from branches or other laterals. Scaffold development pertains to branch removal from the main stem.

The final stage of pruning young trees is perimeter reduction. Perimeter reduction is to remove growth that extends beyond a uniform perimeter by shortening branches and laterals. This step pertains primarily to the lower 1/3 – 1/2 of the crown. Tips may be drop crotched back to a lateral that is usually upward growing. The canopy can be further elevated at this stage by removing downward growing laterals. Subtle pruning cuts have a dramatic effect on the future structure of a tree.

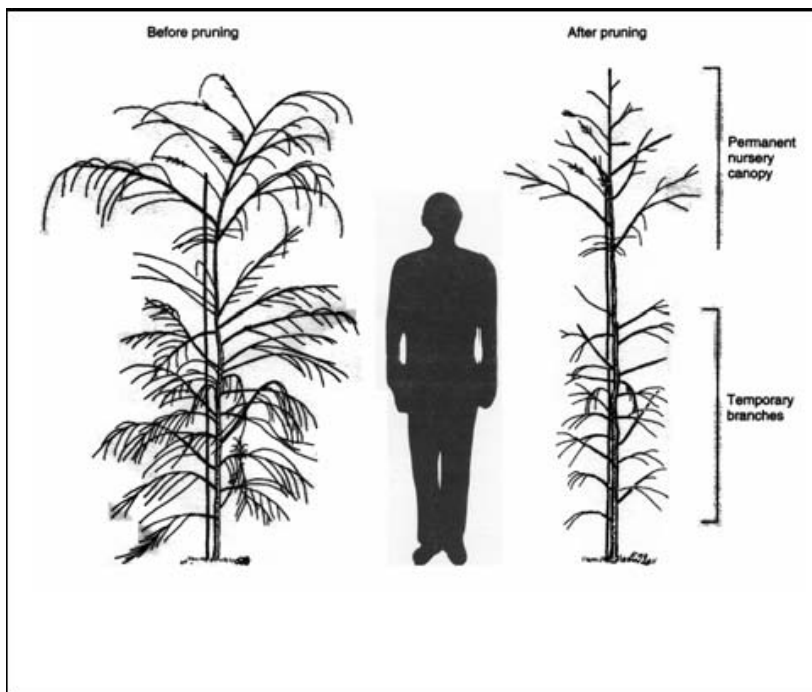


Image 6 - Gilman, E.F. 2002. *An Illustrated Guide to Pruning*

Image 6 - Temporary branches on the lower part of the trunk are to remain for 3-5 years after planting. These branches will nourish the trunk, build caliper, and prevent over extension of the leader. Be sure to shorten any temporary branches growing into the permanent canopy.

Temporary branches on the lower part of the trunk are to remain for 3-5 years after planting. They allow for the flow of photosynthates, nutrients, and water between the trunk and the temporary branches and leaves. Temporary branches aid in the development of a robust, tapered trunk, and can result in a tree that withstands greater stress from wind, stands erect, and is better equipped to support a crown mass at maturity.

3.20.7 Guidelines for Requests for Tree Work

Currently, tree care performed by the Tree Trimming Division by demand, as the Department has not established a pruning cycle. Field staff must call the Call Center/Maximo at any time tree pruning inspection is required. Trees by nature shed bark and drop leaves, fruits, seeds, and small branches. In many instances, the Tree Crew will not be able to solve tree litter problems by pruning. It is important for field staff to evaluate tree pruning needs before calling in a work order. Incomplete or misleading information coupled with requisitioning of regular tree pruning needs as emergency requests can result in an inefficient use of the Tree Crew. Below are guidelines for regular job order requests and emergency request for tree work.

3.30 Regular Work Requests

Regular work requests are for all tree maintenance that does not fall under the Tree Emergency categories. These types of request include pruning of trees not posing an immediate hazard to human life or property or for large scale projects which require a work order submitted through the Call Center/Maximo.

3.40 Emergency Work Requests

The following is a list of possible tree emergencies in priority order:

High priority:

1. Trees or limbs that have fallen and could cause accidents or personal injury.
2. Trees or limbs that have fallen and caused damage to vehicles or structures.
3. Trees or limbs which are in immediate danger of falling or breaking.
4. Broken or hanging limbs adjacent to structures, roads, or in picnic or play areas.
5. Trees or limbs that are blocking streets, roads, or walkways.

Medium to Low Priority:

1. Trees or limbs that have fallen and are not an immediate hazard.
2. Trees or limbs that have fallen that are not blocking streets, roads, or walkways.
3. Hanging tree limbs that may not be in immediate danger of falling.

4. Dead or severely declining trees without a target present.

3.50 Prohibited Acts

1. Topping and Heading
2. Handling and/or dumping of hazardous material within root zone
3. Storage of heavy materials for prolonged periods
4. Flush cutting
5. No dumping of pest infested wood chips or trimmings in a park. Trimmings (including stump) or chips are to be immediately removed from the park and disposed of at an assigned dumping station.

3.50.1 Excessive Pruning

1. Pollarding - Practice of regular pruning at a predetermined height, resulting in swollen growth nodes.
2. Surface root trimming -Trimming surface roots for pathway clearance

3.60 Maintaining Tree and Turf Association

Trees and turf are not a naturally occurring relationship. Trees in natural settings usually will drop leaf litter, mulching themselves while disallowing natural grasses to establish. Trees and grass lands are separate in nature. Parks are where they come together and are implemented and maintained for the benefit of the patron. Aeration, mowing, irrigation and fertilization are the tools by which we maintain this key recreation element.

3.60.1 Aeration

Aeration can be performed on a bi-annual basis throughout park turf areas using mechanical or manual techniques. Aeration greatly improves the irrigation absorption and the exchange of gases for a plants root system. This no different for trees, however manual aeration is the preferred method so as not to damage tree roots at the drip line. Aeration is an established method to improve the health of certain ailing trees. Backfilling the aeration core with sand and/or fertilization can greatly supplement the practice.

3.60.2 Mulching as a Turf Alternative

Mulching can provide a low-dose sustained feeding as well as weed suppression when used as a turf alternative for trees. Ideally, a tree's own leaf litter would be used for mulch, but any mulch that has been leached for tannins and allowed to compost is an acceptable practice. There are certain exceptions to mulch materials which should not be used as mulch for other species (Cal. Bay Laurel under oaks, or tree debris that had been chipped as a result of a pest infestation-Golden Spotted Oak Borer, Eucalyptus Longhorn Borer, etc.).

3.60.3 Mowing and Other Equipment

Mowers are to be kept sharp and in good working order. Tire inflation should be kept to the minimum PSI to lessen soil compaction, especially at the drip line of trees.

3.60.4 Fertilizing Standards and Mycorrhizae Treatments

Fertilization of trees is to be kept to a minimum to avoid nutrient run-off during irrigation or rain events. Fertilization and mycorrhizal treatments are usually administered during the establishment phase but can also be prescribed to address a deficiency or a desired outcome such as flowering or fruiting.

3.70 Watering Practices

Irrigation for trees is usually emphasized during the establishment phase. However, when irrigating all trees, application at a low sustained rate is preferred in that it allows water to percolate deeper into and below the root zone to discourage surface rooting.

3.80 Soil Condition and Drainage

Soils in parks face a wide range of challenges. Foot traffic, maintenance vehicle trips, event equipment, parking and even previous site uses are a few of the issues that compact, pollute and alter soils and their structure. Avoid driving vehicles over the drip line and into the root zone of established trees. If necessary to do so, deflate tires slightly to distribute vehicle weight. If prolonged vehicle trips are expected, place up to 6" of mulch and/or plywood over the root zone to prevent excessive compaction.

Avoid mixing of concrete or handling or hazardous materials over a tree's root zone. If this is unavoidable, place a drop cloth under the equipment or workspace to capture any fallen or spilled material.

Maintain the established drainage pattern of a site around a tree and avoid pooling of water or sediment around the root crown. Aerate with hand tools if drainage around a tree is a less than desired.

3.90 Insect and Disease Control

Every effort will be made to address tree infections by disease and pests. The Department's Certified Arborist or other qualified staff from the Tree Trimming Division may confer with other concerned plant pathologists and colleagues to diagnose and treat impacted trees. If there is a cost effective means to address an infection, either chemical or biological, it will be considered and implemented by those certified to do so.

3.90.1 Training Materials

This Urban Forestry Program Manual, along with publications produced by the International Society of Arboriculture (ISA), and the Low Impact Design Ordinance (LID, 2008) will be made available on the County intranet for reference and guidance.

3.90.2 Tree Inventory

An element of preservation, the Department's tree inventory is a collaborative effort between the Planning Division and the Regional Agency Tree Trimming Division. The Planning Division's interest in the inventory is a qualitative effort toward research, with a goal of quantifying the Department's Urban Forestry assets, as it pertains to environmental benefits.

Currently an inventory of five (5) parks has been done. A pilot inventory program of one park per Supervisorial District (City Terrace Park, Col. Leon Washington Park, El Cariso Park, Carolyn Rosas Park and Arcadia Park) was performed by the Planning Division's Certified Arborist. This five park inventory has been analyzed for environmental benefits using the iTree© software analysis application. A "benefits model" has been produced for this document based on the five park pilot inventory; it can be found in Appendix K. Future inventory methods will be compatible with the iTree© application suite.

4.0 PROTECTION OF TREES DURING CONSTRUCTION

4.10 Planning for All Projects

When planning a new landscape plan for a new construction project, there are many things to consider. Underground utility lines, knowledge of a site's soil composition through a soil analysis and site hydrology are important items to explore before plant selection and layout. The Department's "Parkland Design Guidelines" must also be considered for guidance with respect to tree selection and layout. A project's planting compendium should also be checked against the State's California Invasive Plant Council (Cal-IPC) guidelines.

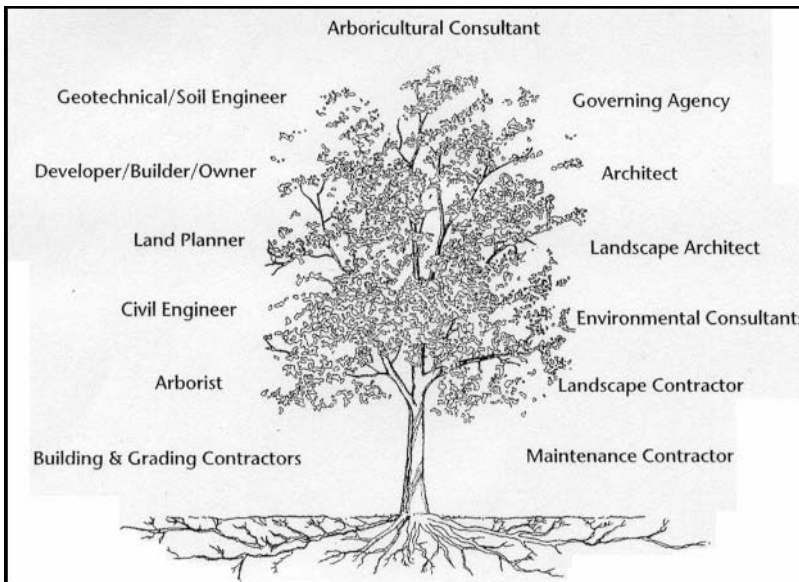


Image 7 - Matheny, N.P. and Clark, J.R. 1998. *Trees and Development*

Image 7 - Tree Preservation during development requires the commitment of everyone involved in the project's planning, design, construction, and management

4.20 Pre-Construction Requirements – Tree Protection and Preservation Plan

Prior to the commencement of a development project, a tree preservation plan including clearly identified tree protection zones, must be prepared and agreed upon by planners, construction staff and a Department certified arborist or qualified member of the Tree Trimming Division. A Tree Protection and Preservation Plan should include:

1. Site Plan
2. Protective tree fencing
3. Signage
4. Soil compaction and damage preventative measures
5. Tree maintenance schedule

4.20.1 Site Plan

For all projects, site plans must accurately indicate tree locations and the drip line areas of all trees or groups of trees to be preserved within the development area. Trees should be identified by botanical name and include a DBH measurement and overall health assessment at the commencement of construction. Clearly defined *tree protection zones* should be specified and indicated on the Site Plan. Photographic documentation of protected trees is essential at this time.

4.20.2 Verification of tree protection

The project contractor, consultant or project manager will collaborate with the project arborist or qualified staff from the tree trimming division to verify in writing that all pre-construction tree preservation conditions have been met as follows.

1. Tree fencing installed
2. Erosion control secured
3. Tree pruning completed
4. Soil compaction preventative measures installed
5. Tree maintenance schedule established

The construction project manager must sign and distribute this verification to the responsible parties.

4.20.3 Pre-construction Meeting

A Department arborist and/or qualified staff member from the Tree Trimming Division must attend pertinent pre-construction meetings to ensure that all parties involved are aware of the tree protection measures and procedures to be employed. These measures include, but not limited to fencing, restrictions on vehicular traffic, site staging and storage, concrete and other material handling, dust control and irrigation.

4.20.4 Tree Protection Zone

Protection of trees during construction activities involves creating a visual barrier around the root zone of a tree and restricting activities within this zone. A protective fence or brightly colored staked boundary will be placed five feet beyond the established drip-line of a protected tree. While this does not ensure total coverage of a tree's root zone, it is the distance established by the Oak Tree Ordinance for protection of oaks. There is to be no driving of heavy machinery or vehicles within this protected zone. Mixing of concrete, handling of hazardous materials, heavy materials storage or deposition of construction runoff in a storm event is also prohibited within this zone. The protected zone should have an erosion control plan comprised of sandbags and/or fiber rolls to maintain site

drainage through construction. If a site requires excavation within the protected zone, hand tools should be used as not to disturb the established roots.

4.20.5 Tree Pruning and Removal

Trees may be removed or trimmed to prepare for park construction projects. However, mature oaks (with a DBH of 8" or more for single trunks or 12" or more for multi-trunks, consisting of the DBH of the two largest trunks) must be permitted to do so. An Oak Tree Permit must be issued by the Planning Commission after initial inspection by the Fire Department, Fire-Forestry Division. Contracted personnel must not prune trees within a construction zone without prior consultation with a Department Arborist or qualified staff member from the Tree Trimming Division.

4.30 Soil and Root Zone protection

Avoidance and mitigation measures are required for all construction projects near and under trees. Contracted personnel must be made aware of the impacts and consequences of working within this protected zone.

4.30.1 Soil Compaction

Avoid driving vehicles over the drip line and into the root zone of established trees. If vehicle trips are unavoidable, deflate tires slightly to distribute vehicle weight. If prolonged vehicle trips are expected, place up to 6' of mulch and/or plywood over the root zone to prevent excessive compaction.

4.30.2 Grading Limitations within the Tree Protection Zone

1. Grade changes within the Tree Protection Zone (TPZ) are not permitted
2. Grade changes outside the TPZ must not significantly alter existing grade and/or drainage
3. Grade changes under specifically approved circumstances allow for no more than 4 inches of cut or fill within the TPZ and will incorporate appropriate mitigation (aeration system and/or permeable surface for fill and retaining wall and/or transition grading for cut).⁵

4.30.3 Trenching, Excavation and Equipment Use

1. Roots Severance - Roots no greater than 2 inches may be cut without approval of a Department arborist or designated representative however tunneling under roots is a preferred method. If cutting is unavoidable, a clean cut must be made with a sharp saw to sound wood, flush with the trench site.
2. Excavation by hand-digging, hydraulic or pneumatic excavation is only

⁵ City of Los Angeles, Protection of Trees During Construction, Page 8

permitted within the TPZ. Heavy equipment may only be used for excavation if stationed outside of the TPZ.

3. Heavy equipment is not permitted within the TPZ without approval of a Department arborist or designated representative; a protective root buffer is required.⁶

4.30.4 Tunneling and Directional Drilling

Trenching, pipe or conduit installation within the TPZ must either be cut by hand, air spade, or by mechanically boring a tunnel under the roots with a horizontal directional drill (hydraulic or pneumatic air excavation). Install the pipe immediately, backfill with the excavated soil and irrigate within the same day. Tunneling under a root system can greatly reduce damage to both the tree as well as the cost of replacing landscaping or other features impacted during trenching. Tunneling may not be a reasonable alternative however, when working in rocky or sloped areas.

4.30.5 Alternative Methods for Hardscape to Prevent Root Cutting

These methods are to be considered as alternatives to severing tree roots:

1. Grinding of a raised walkway of concrete pad
2. Ramping a walkway surface over exposed tree roots or lifted slab with pliable paving (crumb rubber from recycled tires).
3. Routing a new walk way around roots if space allows
4. Permeable materials such as decomposed granite, interlocking or flagstone pavers can be used to navigate exposed tree roots

4.30.6 Using Alternative Base Course Materials

Engineered structural soil mixes can be used as an alternative to traditional hardscape materials.

4.40 Tree Maintenance During Construction

Trees are to be maintained if prolonged construction interferes with normal tree care. Avoid compaction of soil within root zone (see 4.30.1)

4.40.1 Irrigation

During construction, irrigation is very important and should be administered to replace the soil moisture lost due to site excavation. A tree should receive the amount of irrigation similar to its normal allocation; light frequent watering should be avoided. A temporary six inch berm (ring), covered with up to six inches of mulch should be built around a protected tree and irrigated to promote deep and thorough watering within the top two to three feet of the root zone.

⁶ City of Los Angeles, Protection of Trees During Construction, Page 9

4.40.2 Soil Compaction Mitigation

Protective fencing and soil compaction mitigation materials such as mulch, plywood or gravel must be in place through the duration of a project. Entering into the TPZ or moving the protective fencing requires approval by a Department arborist or other qualified staff from the Tree Trimming Division.

4.40.3 Dust Control

Tree trunks, limbs and foliage must be sprayed periodically to remove accumulated construction dust.

4.50 Damage to Trees

Any damage to trees as a result of construction activities must be reported to the Project Manager as soon as possible. It should also be reported to the Agency Grounds Maintenance Supervisor to monitor the tree's progress or recovery. Damage to roots and/or limbs must be repaired immediately by the responsible party, under the direction of the Department's arborist or their designated representative.

If a tree is damaged beyond repair due to construction activities, the responsible party is required to install a replacement tree of similar size, quantity and variety. If a damaged tree cannot be replaced, the contractor or responsible party is required to pay damages to the County based on the Trunk Formula Method.⁷

4.60 Documents to be Included in all Projects

The following document must be included in all project related instructions or specifications:

1. *"Tree Protection Guidelines for Designers and Project Managers"* (Appendix E)
2. *"Instructions to Prevent Damage to Trees During Construction"* (Appendix F)

⁷ Council of Tree and Landscape Appraisers, Guide for Plant Appraisal, 9th Edition (2000)

5.0 TREE REMOVAL, REPLACEMENT, AND PLANTING

5.10 Tree Removal

Trees in Departmental facilities may be removed under conditions specified by a certified arborist or other qualified tree maintenance staff. These conditions must be prepared in writing and are subject to review. Conditions for tree removal are that the tree is:

1. Dead or dying
2. Diseased
3. Damaged to the extent that it is likely to die or become diseased
4. Hazardous
5. A nuisance
6. Needing removal to enhance the health or appearance of other trees in the immediate area

Nuisance trees are indicated when any part of the tree(s) causes or is about to cause impairment of park operations or damage to buildings, or permanent infrastructure lines that cannot be re-located or, in the opinion of the Department arborist, has been pruned to a point that the tree's structure has been severely compromised.

5.10.2 Notification Protocol for Tree Removal Projects

When a tree is to be removed, the Notification Protocol must be followed. This protocol assures that information is communicated to the park patrons and to Departmental management. When a tree is scheduled to be removed, the Tree Trimming Manager will prepare a report detailing the justification for the removal, the tree type and location, and the approximate timing of the removal. If there is a mitigation plan included, details of that plan should be included.

Tree Removal Notification Protocol

1. The Tree Trimming Division will notify the Superintendent of the respective park and Agency as well as the Contracts Division if a Concessionaire is involved and the Public Information Officer within one week of the project being identified.
2. The Tree Trimming Division will notify the aforementioned parties of the scheduled removal dates at least two weeks prior to the commencement of the project.
3. The Department will inform the appropriate Board Offices and impacted community organizations, including the Park Advisory Boards.

4. A work order invoice will be generated through Maximo or equivalent program.
5. Impacted historic or heritage trees will require additional pre-removal procedures and/or permitting, including seed or acorn collection, cloning by grafting, cuttings or tissue culture as well as documentation and/or interpretive signage.
6. The Tree Trimming staff will post the following notice of on each tree targeted for removal at least one week prior to the start of the project.

INFORMATION
(Park Name)

THIS SECTION OF THE PARK

WILL BE CLOSED ON

Dates: From _____ to _____

DUE TO: (DEAD TREE REMOVALS)

**WE APOLOGIZE FOR THE
INCONVENIENCE**

**FOR MORE INFORMATION PLEASE CALL:
(213) 738-____ or (213) 738-____
County of Los Angeles
Department of Parks and Recreation**

5.20 Tree Planting Guidelines for Park Trees

The following guidelines should be applied when planting or replanting trees.

For 15 gallon and 24 inch box containers:

1. Dig hole twice the width of the root ball and to the same depth as the soil in each container.
2. Once the tree is carefully freed from its container, any swirling roots should be loosened, or cut vertically, to eliminate girdling.
3. The tree should be carefully set into its hole and situated for balanced vertical and lateral growth.
4. The tree crown and root fan (base of trunk as it meets the soil) should be slightly elevated 1-2 inches above the surrounding ground surface.
5. Backfill holes with up to 20% amended native soil (existing) and compact with normal hand or foot pressure.
6. A 3 - 4 inch tree well or saucer must be formed at or beyond the excavated hole circumference to retain irrigation water during establishment. The well will naturally break down over time, rejoining with natural site grade.
7. If planting a standard tree (5 feet of vertical trunk topped with a canopy) two 3 inch lodge pole stakes must be driven into the ground beyond the original root ball, on opposite sides of the tree for support. The poles will be placed perpendicular to the prevailing winds. The tree must be secured to the poles with rubber ties or soft-coated metal braces

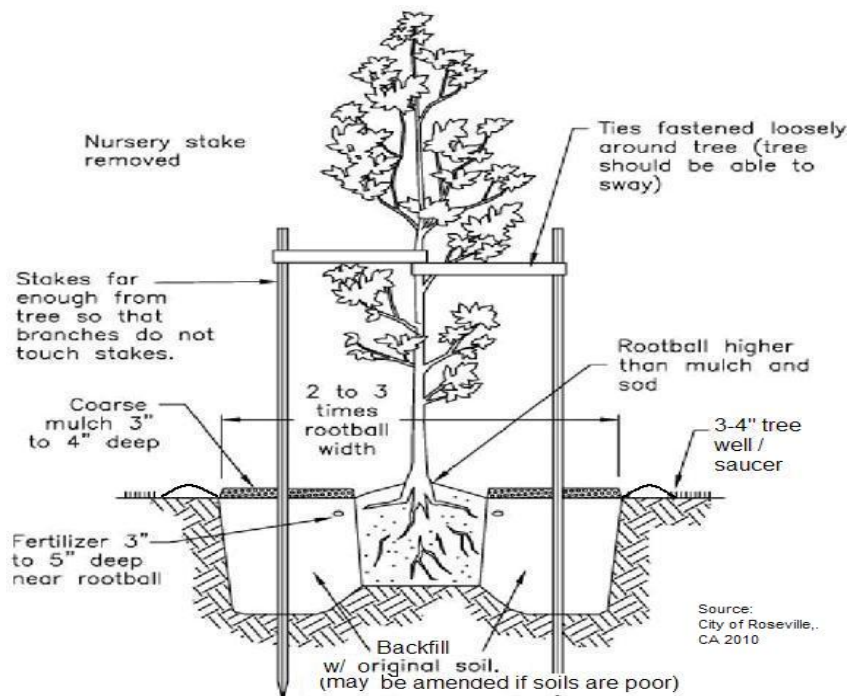


Image 8- Planting Detail, City of Roseville, CA 2010

5.20.1 Proposed Plant Palette for Tree Farm

A Grower's Plan (Appendix J) will address the Department's arboriculture, native and low-water plant needs. Trees and shrubs can be grown that have been identified as suitable replacement trees. The trees and shrubs will be groomed and readied for fall/winter plantings so that they can establish as easily and naturally as possible in their respective park application.

This compendium includes, but is not limited to:

Trees

Common Name	Botanical name
Acacia or Wattles*	<i>Acacia spp.</i>
African Sumac*	<i>Rhus lancea</i>
Alder	<i>Alnus rhombifolia</i>
Assorted Pine	<i>Pinus spp</i>
Australian Willow*	<i>Geijera parviflora</i>
Black Walnut	<i>Juglans californica</i>
Blue oak	<i>Quercus douglasii</i>
Blue Palo Verde*	<i>Cercidium floridum</i>
Calif Bay Laurel	<i>Umbellularia californica</i>
Calif. Box Elder	<i>Acer negundo californicum</i>
Calif. Buckeye	<i>Aesculus californica</i>
California Ash	<i>Fraxinus dipetala</i>
California Sycamore	<i>Platanus racemosa</i>
Catalina Cherry	<i>Prunus lyonii</i>
Cedar*	<i>Cedrus spp</i>
Chitalpa*	<i>Chitalpa tashkentensis</i>
Coast Live Oak	<i>Quercus agrifolia</i>
Cottonwood/Poplar	<i>Populus fremontii</i>
Crape Myrtle*	<i>Lagerstroemia indica</i>
Desert Willow	<i>Chilopsis linearis</i>
Elderberry	<i>Sambucus caerulea, mexicanus</i>
Gooding's Black Willow	<i>Salix goodingii</i>
Holly Oak	<i>Quercus ilex</i>
Hopseed Bush*	<i>Dodonaea viscosa, pupurea</i>
Jacaranda*	<i>Jacaranda mimosifolia</i>
London Plane Tree*	<i>Platanus x acerifolia</i>
Madrone	<i>Arbutus menziesii</i>
Mountain Mahogany	<i>Cercocarpus betuloides</i>
Mulberry-Fruitless*	<i>Morus alba</i>
Peppermint Willow*	<i>Agonis flexuosa</i>
Redbud	<i>Cercis occidentalis, canadensis</i>
Valley Oak	<i>Quercus lobata</i>

Shrubs / Groundcover

Acacia (ground cover)*	<i>Acacia redolens</i>
Agave	<i>Agave spp.</i>
Arroyo Willow	<i>Salix lasiolepis</i>
Bush Anemone	<i>Carpenteria californica</i>
California Lilac	<i>Ceanothus spp.</i>
Coffeeberry	<i>Rhamnus californica</i>
Currant or Gooseberry	<i>Ribes spp.</i>
Deer Grass	<i>Muhlenbergia rigens</i>
Giant Wild Rye	<i>Leymus condensatus</i>
Grevillea*	<i>Grevillea spp.</i>
Hopseed Bush*	<i>Dodonaea viscosa</i>
Lemonade Berry	<i>Rhus integrifolia</i>
Mulefat	<i>Baccharis salicifolia</i>
Penstemon	<i>Penstemon spp</i>
Rockrose*	<i>Cistus spp.</i>
Rosemary*	<i>Rosmarinus officinalis</i>
Sage	<i>Salvia spp</i>
Sugar Bush	<i>Rhus ovata</i>
Sumac	<i>Malosma laurina (Rhus)</i>
Toyon	<i>Heteromeles arbutifolia</i>
Verbena*	<i>Verbena spp</i>
Westringia*	<i>Westringia fruitcosa</i>
Wooly Blue Curls	<i>Trichostema lanatum</i>
Yucca	<i>Yucca spp.</i>
Assorted Succulents	

* Non-Native

Nursery labor can be supplemented by court referrals. Four referrals working four hours a day, four to five days a week could:

1. Move and mix small quantities of soil
2. Plant and move containers
3. Water containers
4. Weed the growing grounds

5.20.2 Nursery Specifications for Park Trees

When selecting container stock for planting at parks, designers should refer to the following guidelines provided by the Urban Tree Foundation, in partnership with CalFire, California ReLeaf, and the Western Chapter of the International Society of Arboriculture.

Guideline Specifications for Nursery Tree Quality



Revision 2009

BACKGROUND

This document is a revision of a previous publication entitled *Guideline Specifications for Nursery Tree Quality*, published by the Urban Tree Foundation, which was developed by a committee of horticulture professionals from the nursery, landscape, municipal, consulting, and academic sectors. The original publication has been posted online at the Foundation's Web site (<http://www.urbantree.org/specs.asp>) since 2002 and has been used by public, private, and nonprofit groups to select and specify quality nursery trees. Recommendations for improvements to the document received in the past 5 years have been incorporated in this 2009 revision.

The following people worked on the original *Guideline Specifications for Nursery Tree Quality*:

David Burger, UC Davis Department of Plant Sciences
Barrie Coate, Consulting Arborist, Los Gatos
Larry Costello, UC Cooperative Extension, Half Moon Bay
Robert Crudup, Valley Crest Tree Company, Sunol
Jim Geiger, US Forest Service, Pacific South West Region
Bruce Hagen, California Department of Forestry and Fire Protection, Santa Rosa, Retired
Richard Harris, Professor Emeritus, UC Davis Department of Plant Sciences
Brian Kempf, Urban Tree Foundation, Visalia
Jerry Koch, City of Berkeley Division of Urban Forestry, Retired
Bob Ludekens, L. E. Cooke Company, Visalia
Greg McPherson, US Forest Service, PSW Research Station, Center for Urban Forest Research
Martha Ozonoff, California ReLeaf, Davis
Ed Perry, UC Cooperative Extension, Stanislaus County
Markio Robert, Caltrans LDA Maintenance Division, Oakland
Illustrations by Edward F. Gilman, Professor, Environmental Horticulture Department, IFAS, University of Florida. Adaptions from *Arboriculture: Integrated Management of Landscape Trees, Shrubs and Vines*, 4th ed., by R. W. Harris, J. R. Clark, and N. P. Matheny (Prentice Hall, 2003).

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Urban Tree Foundation
115 S. Dollner Ave.
Visalia, Ca 93291

www.urbantree.org
brian@urbantree.org

Introduction

This document provides specifications for selecting and specifying quality nursery trees in California, with a focus on container stock. Key traits of nursery trees are identified and described to provide growers and buyers with the information they need to distinguish good-quality stock from poor-quality stock. Structural and health characteristics are described, as well as labeling, compliance with laws and regulations, and inspection of nursery stock. If a particular defect or substandard element can be corrected easily, appropriate remedies should be applied as agreed upon by both parties.

I. GENERAL SPECIFICATIONS

A. Proper Identification: All trees shall be true to name as ordered or shown on planting plans and shall be labeled individually or in groups by species and cultivar (as appropriate).

B. Compliance: All trees shall comply with federal and state laws and regulations requiring inspection for plant disease, pests, and weeds. Inspection certificates required by law shall accompany each shipment of plants. Clearance from the local county agricultural commissioner, if required, shall be obtained before planting trees originating outside the county in which they are to be planted. Even though trees may conform to county, state, and federal laws, the buyer may impose additional requirements.

C. Inspection: The buyer reserves the right to reject trees that do not meet specifications as set forth in these guidelines or as adopted by the buyer. If a particular defect or substandard element can be corrected easily, appropriate remedies shall be applied. If destructive inspection of a root ball is to be done, the buyer and seller should have a prior agreement as to the time and place of inspection, number of trees to be inspected, and, financial responsibility for the inspected trees.

D. Delivery: The buyer shall stipulate how many days prior to delivery that delivery notification is needed. Buyer shall stipulate any special considerations to the nursery prior to shipment.

II. HEALTH AND STRUCTURE SPECIFICATIONS

These specifications apply to deciduous, broadleaf evergreen, and coniferous species. They do not apply to palms. Note that leaf characteristics will not be evident on deciduous trees during the dormant season.

A. Tree Health

1. Crown: The form and density of the crown shall be typical for a young specimen of the species or cultivar. Changes in form caused by wind, pruning practices, pests, or other factors shall not substantially alter the form for the species or cultivar.

2. Leaves: The size, color, and appearance of leaves shall be typical for the time of year and stage of growth of the species or cultivar. Trees shall not show signs of prolonged moisture stress as indicated by wilted, shriveled, or dead leaves.

3. Branches: Shoot growth (length and diameter) throughout the crown should be appropriate for the age and size of the species or cultivar. Trees shall not have dead, diseased, broken, distorted, or otherwise injured branches.

4. Trunk: The tree trunk shall be relatively straight, vertical, and free of wounds (except properly made pruning cuts), sunburned areas, conks (fungal fruiting bodies), wood cracks, bleeding areas, signs of boring insects, galls, cankers, girdling ties, or lesions (mechanical injury).

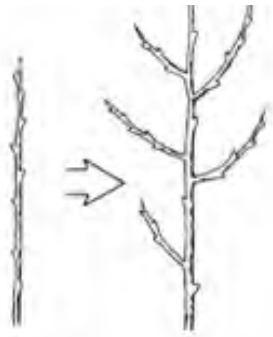
5. Roots: The root system shall be substantially free of injury from biotic (e.g., insects and pathogens) and abiotic (e.g., herbicide toxicity and salt injury) agents. Root distribution shall be uniform throughout the container substrate, and growth shall be appropriate for the species or cultivar. At time of inspection and delivery, the root ball shall be moist

throughout. Roots shall not show signs of excess soil moisture conditions as indicated by stunted, discolored, distorted, or dead roots.

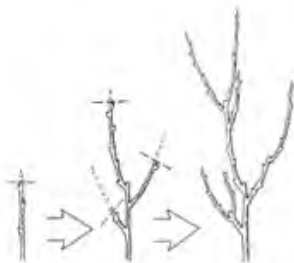
B. Tree Crown

Note: Crown specifications do not apply to plants that have been specifically trained in the nursery as topiary, espalier, multistem, clump, or unique selections such as contorted or weeping cultivars.

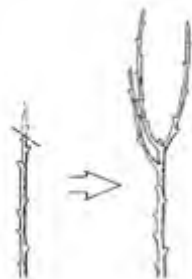
1. Trees shall have a single, relatively straight central leader. They shall be free of co-dominant stems and vigorous, upright branches that compete with the central leader. If the original leader has been headed, a new leader at least one-half of the diameter of the original leader shall be present.



Not topping is desirable



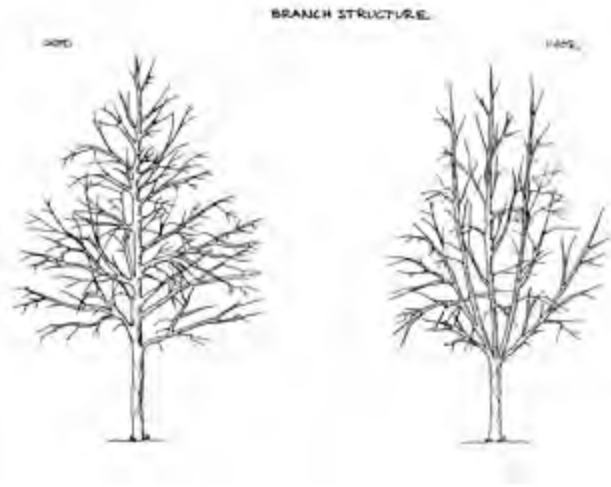
Topping and retaining a leader is desirable.



Topping without retaining a leader is not desirable.



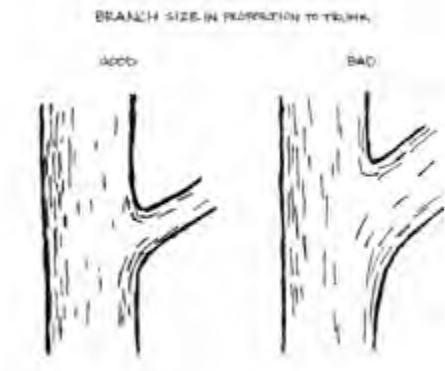
2. Main branches shall be well distributed along the central leader not clustered together. They shall form a balanced crown appropriate for the cultivar/species.



Desirable

Not Desirable

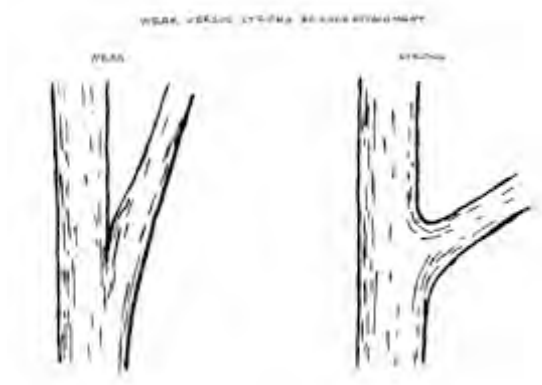
3. Branch diameter shall be no larger than two-thirds (one-half is preferred) the diameter of the central leader measured 1 inch above the branch.



Desirable

Not Desirable

4. The attachment of the largest branches (scaffold branches) shall be free of included bark.



Not Desirable

Desirable

5. Temporary branches, unless otherwise specified, should be present along the lower trunk below the lowest main (scaffold) branch, particularly for trees less than 1 inch in caliper. These branches should be no greater than 3/8 inch diameter. Clear trunk should be no more than 40% of the total height of the tree.



Desirable



Not Desirable

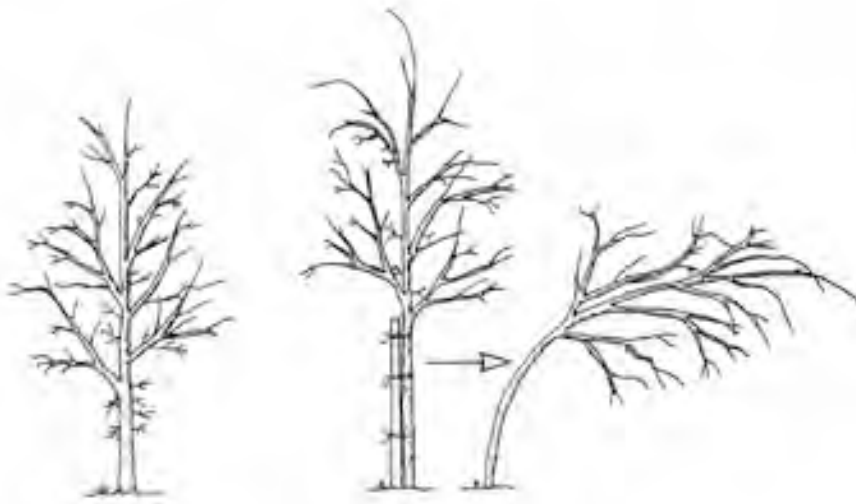
C. Trunk

1. The trunk shall be free of wounds (except properly-made pruning cuts), sunburned areas, conks (fungal fruiting-bodies), wood cracks, bleeding areas, signs of boring insects, galls, cankers and/or lesions.

2. Trunk caliper and taper shall be sufficient so that the tree will remain vertical without a stake. Trunk caliper at 6 inches above the soil media (substrate) surface shall be within the diameter range shown for each container size below:

Container Size -----Trunk Diameter

5.....0.5" to 0.75"
 # 15.....0.75" to 1.5"
 24-inch box.....1.5" to 2.5"



Desirable

Not Desirable

D. Roots

1. The uppermost roots or root collar (root crown) shall be within the upper 2 inches of the soil media (substrate).
2. The root collar and the inside portion of the root ball shall be free of defects, including circling, kinked, and stem girdling roots. . Soil removal near the root collar may be necessary to inspect the aforementioned root defects



Desirable



Not Desirable



3. Roots on the periphery and bottom of the root ball shall be less than 1/4 inch in diameter (1/8 inch is preferred). The maximum acceptable root diameter on the periphery should be indicated.



Desirable



Not Desirable

4. The tree shall be well rooted in the soil media (substrate). Root distribution shall be uniform throughout the container media. Structure and growth shall be appropriate for the species/cultivar. When the container is removed, the root ball shall remain intact. When the trunk is lifted both the trunk and root system shall move as one.

5. At the time of inspection and delivery, the root ball shall be moist throughout. The crown shall show no signs of moisture stress as indicated by wilted, shriveled, or dead leaves or branch dieback. The roots shall show no signs of excess soil moisture as indicated by poor root growth, root discoloration, distortion, death, or foul odor.

III. INSPECTION

The buyer reserves the right to reject trees that do not meet specifications as set forth in these guidelines or as adopted by the buyer. If a particular defect or substandard element or characteristic can be easily corrected, appropriate remedies are encouraged. If destructive inspection of a root ball or balls is to be done, the buyer and seller should have a prior agreement as to the time and place of inspection, minimum number of trees to be inspected or percentage of a species or cultivar, and financial responsibility for the inspected trees.

VI. DELIVERY

The buyer should stipulate how many days prior to delivery that notification is needed.

GLOSSARY:

Caliper. Trunk diameter measured 6 inches from the ground; if caliper is greater than 4 inches, the caliper measurement is taken at 12 inches from the ground.

Central leader. A continuation of the main trunk located more or less in the center of the crown, beginning at the lowest main branch (scaffold) and extending to the top of the tree. Also referred to as the **dominant leader**.

Circling roots. One or more roots whose diameter is greater than 10% of the trunk caliper circling more than one-third of the trunk.

Clear trunk. The portion of the trunk below the crown lacking lateral branches; this includes the portion of the trunk with shortened temporary branches that are below the main crown.

Codominant. Two or more vigorous, upright branches or stems of relatively equal size that originate from a common point, usually where the leader was lost or removed.

Crown. The portion of a tree beginning at the lowest main (scaffold) branch extending to the top of the tree.

Cultivar. A named plant selection from which identical or nearly identical plants can be produced, usually by vegetative propagation or cloning.

Included bark. Bark embedded in the union between a branch and the trunk or between two or more stems that prevents the formation of a normal branch bark ridge.

Kinked root. A main mother root that is sharply bent.

Leader. The dominant stem that usually develops into the main trunk.

Photosynthate. Sugar and other carbohydrates that are produced by the foliage and stems during photosynthesis.

Root collar. The base of a tree where the main roots and trunk meet. Also referred to as the **root flare**.

Scaffold branches. Large main branches that form the main structure of the crown.

Stem-girdling root. A circling, bent, or straight root that touches or rests on the trunk or root flare that can become a permanent root.

Temporary branch. A small branch that is temporarily retained along the lower trunk of young trees.

Trunk. The main stem of a tree, beginning at the root collar and ending at the lowest main scaffold branch.

Taper. The thickening of a trunk or branch toward its base.

5.20.3 Spacing of newly planted trees

Observe proper spacing of trees, with attention to the future spread of not only the canopy but also the supporting root system. Avoiding the crowding of trees can help prevent future ill effects of stressed tree growth and the transfer of disease from other trees resulting in premature removal of the tree that could have been avoided with proper spacing guidelines.

6.0 TREE EVALUATION FOR HAZARD AND ECONOMIC VALUE

6.10 Hazardous Trees

Trees can be assessed for hazardous conditions and documented using the ISA Tree Hazard Evaluation Form, found in Appendix I.

6.10.1 Emergency Removal of Hazardous Trees

A tree may be a candidate for removal if the Department arborist or qualified tree maintenance staff person deems the tree a hazard. Uneven growth, compromised footing due to a shallow and/or cramped root zone, disease, or a combination thereof are problems which would justify an emergency removal.

6.10.2 Criteria for Determining Hazardous Trees

Two factors contribute to a tree being deemed as hazardous:

1. The tree has a defect that creates an unreasonable risk of branch, stem or root failure
2. A tree's potential failure could result in striking a target, resulting in injury, damage to property or death.

6.20 Tree Appraisals

There are three methods of tree appraisal - Replacement, Repair and Cure.

1. Replacement - To appraise for replacement, the **Trunk Formula** can be used. When a tree is too large to be equally replaced, this method is used. This method can also be applied when a combination of a smaller specimen replacement and penalty is prescribed. This formula determines a tree's basic value (replaceable size cost), then adjust for size, condition and location. (**Appraised Value = Basic Value X Condition X Location**).
2. Repair - When a tree has been damaged but not to the point where it needs to be removed or replaced, the **Cost of Repair** method can be

calculated by a sum of all treatments including corrective pruning, fertilization, irrigation, aeration, alleviation of soil compaction and any pest or disease treatments.

3. Cure - Similar to Cost of Repair, the **Cost of Cure** method calculates the additional expense of returning a damaged tree to as close to its original condition as possible.

7.0 SAFETY STANDARDS

7.10 ANSI Safety Standards for Tree Care Industry

ANSI Z133.1-2000 – American National Standard Institute-Standard for Arboricultural Operations – Pruning, Repairing, Maintaining, and Removing trees and Cutting Brush – Safety Requirements.

The publication can be obtained from the International Society of Arboriculture (ISA), P.O. BOX3129, Champaign, IL 61826-3129
Phone: (217) 355-9411, Fax: (217) 355-9516
1-888-ISA-TREE
www.isa-arbor.com

7.20 Safety Practices to Secure Work Area including Flagging

Flagging is used at jobsites to reduce accidents, maintain vehicular or pedestrian traffic and reduce damage to property (public or private, including project elements and equipment). Safe work area practices such as flagging also help maintain public relations and project an image of proper and safe working practices.

7.30 Rigging

Rigging is the assemblage of tackle by which a tree worker uses lines, pulleys, gear and other specialized equipment to maneuver, hoist, lower, hinge/pivot or pull while working within the tree canopy.

7.40 Knotting or Knot-tying

Knotting allows a tree worker or “surgeon” to perform necessary safe tree operations. The functional knotting techniques are used to affix, secure a manipulate tree limbs and facilitate climbing and repelling. Workers must inspect climbing lines and other equipment for signs of excessive wear or potential failure. If excessive wear is observed, the line must be removed from service, cut up, disposed of and replaced by a new line.

8.0 SUSTAINABILITY PLAN

The long-term goal of an Urban Forestry Plan is urban forest sustainability. This describes the maintenance of social, recreational, ecological and economic functions of trees and their benefits over time. Stewardship of naturally occurring and planted trees is a central element in forest sustainability. The following elements are integral to a sustainable urban forest:

1. Tree health and structure
2. Preservation during development and redevelopment
3. Species and site protection
4. Quality of planting stock
5. Maintenance practices
6. Recycling or mulching clean tree trimmings

Land development is a complex process and even more challenging when trees are involved. Construction is one of the major causes of mature tree decline in urban areas. Tree protection must precede construction and occurs when designers, construction personnel, and project managers are committed to maintaining standards of tree protection throughout the design/build process. These construction “players” should all have a familiarity with the rudimentary aspects of tree growth and development in order to understand the relationship between tree survival and the construction process. The goal is to keep injury to trees to a minimum and allow building projects to proceed at the same time.

A tree preservation program acknowledges that conflicts between trees and development may sometimes result in the removal of some trees and recognizes the detrimental effect to the project when trees die after construction. All trees cannot and should not be preserved. Trees that are structurally unstable, in poor health, or unable to survive effects of construction become a liability to the project and should be removed. Successful tree preservation occurs when construction impacts to trees are minimized or avoided altogether. The challenge is to develop a system of evaluation and protection so that trees in the landscape can flourish long after construction is completed.

Another aspect to sustainability is proliferation and propagation of native and endemic species. Seed and acorn collection as well as active propagation of healthy native and endemic species are also means of achieving sustainability. In addition to the informal Marshall Canyon Tree Farm tree preservation collection, the Arboretum is a potential candidate to protect genotypes of local species through seed banking and active propagation.

Other aspects of sustainability may pertain to operation procedures and practices. Maintaining equipment to perform at the highest levels of efficiency, or replacing old equipment with more efficient models is a way to help achieve sustainability. In the field, mulching of newly cut tree trimmings at a job site will not only keep nutrients on-site, but mulching will assist in soil moisture retention but will also save additional fuel and staff time spent hauling trimmings off-site.

9.0 RECOMMENDATIONS

The following is a list of suggested recommendations that will help develop, expand and sustain the Department's Urban Forestry Program:

1. Develop an expanded tree preservation policy to protect, preserve or replace other native trees, including but not limited to: California Sycamore (*Platanus racemosa*), California Buckeye (*Aesculus californica*), White Alder (*Alnus rhombifolia*), California Black Walnut (*Juglans californica*), California Bay Laurel (*Umbellularia californica*), Western Cottonwood (*Populus fremontii*), Black Cottonwood (*Populus trichocarpa*), Arroyo Willow (*Salix lasiolepis*) and Gooding's Black Willow (*Salix goodingii*). Currently there is no other genus other than *Quercus* (oak) of trees or shrubs protected by ordinance in the County. Other municipalities such as the Cities of Los Angeles and Pasadena have passed expanded tree preservation policies, which the County's forestry assets would benefit from.
2. Improve and expand nursery operations (Appendix R) at the Department's Tree Farm in Marshall Canyon to provide trees and shrubs for enhancement of all County parks. The Department's Parkland Design Guidelines contains an expanded potable and recycled water plant compendium (Page 49).
3. Continue the inventory of Department park trees for analysis and environmental benefit modeling in iTree©.
4. Adopt a "no net loss of trees" policy in County parks. Any loss of trees, either due to development, disease or other actions would be replaced by at least a one- to-one ratio with a Department approved plant palette. At the Department's discretion, the ratio can be higher. The Project Process Feasibility Study provides an early opportunity to raise a tree replacement ratio issue.
5. Develop a tree-to-park-acreage development ratio to achieve a predetermined stormwater and air pollutant capture goal as well as a carbon sequestration and storage goal.
6. Establish a pruning cycle.

10.0 APPENDICES

- A. County Oak Tree Ordinance
- B. ANSI A300 (part 1)-2001 Pruning
- C. Best Management Practices, Tree Pruning (Tree Trimming Job Order Contract and Agreement)
- D. ANSI Z133.1-2000 Safety Requirements
- E. Tree Protection Guidelines for Designers and Project Managers
- F. How to Prevent Damage to Trees During Construction
- G. ISA Hazard Evaluation Form
- H. Los Angeles County Low Impact Design Ordinance
- I. Audubon Tree Trimming Guide
- J. Tree Farm / Nursery Plan
- K. Pilot iTree© Inventory Report
(5 County Parks: City Terrace Park, Col. Leon Washington Park, El Cariso Park, Carolyn Rosas Park, Arcadia Park)

References/ Credits

1. City of Los Angeles Department of Recreation and Parks-Forestry Division *Urban Forestry Program* (2004). James K. Hahn-Mayor; John Kirk Mukri-General Manager-DRP; City Board of Commissioners-Mike Roos-President, Christina Sanchez-Camino-Vice President, Christopher W. Hammond-Member, May Luevano-Member, Candy Spelling-Member.
2. Urban Tree Foundation, in partnership with CalFire, California ReLeaf, and the Western Chapter of the International Society of Arboriculture (WCISA), *Guideline Specifications for Nursery Tree Quality* (2009).
3. Council of Tree and Landscape Appraisers, Guide for Plant Appraisal, 9th Edition, 2000.
4. McPherson, E. Gregory, James R. Simpson, Paula J. Peper, Scott E. Maco, Shelley L. Gardener, Shawna K. Cozad, Quingfu Xiao, Center for Forest Research, USDA Forest Service-Pacific Southwest Research Station, City of Minneapolis, *Municipal Tree Resource Analysis Technical Report to City of Minneapolis: Ralph Seivert and Jim Hermann (Forestry Section-Minneapolis Parks and Recreation Board, (2005).*

Image Credits

Image

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2. University of Illinois at Urbana-Champaign, Plant Health Care for Woody Ornamentals, 1997
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10. (*Quercus lobata* –Valley Oak on cover) Br. Alfred Brousseau, Saint Mary's College of California, 1995.

APPENDIX A- Oak Tree Ordinance

APPENDIX A - Oak Tree Ordinance

Part 16 OAK TREE PERMITS (from the Los Angeles County Code)

22.56.2050 Established--Purpose.

The oak tree permit is established (a) to recognize oak trees as significant historical, aesthetic and ecological resources, and as one of the most picturesque trees in Los Angeles County, lending beauty and charm to the natural and manmade landscape, enhancing the value of property, and the character of the communities in which they exist; and (b) to create favorable conditions for the preservation and propagation of this unique, threatened plant heritage, particularly those trees which may be classified as heritage oak trees, for the benefit of current and future residents of Los Angeles County. It is the intent of the oak tree permit to maintain and enhance the general health, safety and welfare by assisting in counteracting air pollution and in minimizing soil erosion and other related environmental damage. The oak tree permit is also intended to preserve and enhance property values by conserving and adding to the distinctive and unique aesthetic character of many areas of Los Angeles County in which oak trees are indigenous. The stated objective of the oak tree permit is to preserve and maintain healthy oak trees in the development process. (Ord. 88-0157 § 1, 1988: Ord. 82-0168 § 2 (part), 1982.)

22.56.2060 Damaging or removing oak trees prohibited--Permit requirements.

A. Except as otherwise provided in Section 22.56.2070, a person shall not cut, destroy, remove, relocate, inflict damage or encroach into a protected zone of any tree of the oak genus which is (a) 25 inches or more in circumference (eight inches in diameter) as measured four and one-half feet above mean natural grade; in the case of an oak with more than one trunk, whose combined circumference of any two trunks is at least 38 inches (12 inches in diameter) as measured four and one half feet above mean natural grade, on any lot or parcel of land within the unincorporated area of Los Angeles County, or (b) any tree that has been provided as a replacement tree, pursuant to Section 22.56.2180, on any lot or parcel of land within the unincorporated area of Los Angeles County, unless an oak tree permit is first obtained as provided by this Part 16.

B. "Damage," as used in this Part 16, includes any act causing or tending to cause injury to the root system or other parts of a tree, including, but not limited to, burning, application of toxic substances, operation of equipment or machinery, or by paving, changing the natural grade, trenching or excavating within the protected zone of an oak tree.

C. "Protected zone," as used in this Part 16, shall mean that area within the dripline of an oak tree and extending there from to a point at least five feet outside the dripline, or 15 feet from the trunks of a tree, whichever distance is greater. (Ord. 88-0157 § 2, 1988: Ord. 82-0168 § 2 (part), 1982.)

22.56.2070 Exemptions from Part 16 applicability.

The provisions of this Part 16 shall not apply to:

A. Any permit, variance or tentative map for a subdivision, including a minor land division, approved prior to the effective date of the ordinance codified in this Part 16 by the board of supervisors, regional planning commission or the planning director;

B. Cases of emergency caused by an oak tree being in a hazardous or dangerous condition, or being irretrievably damaged or destroyed through flood, fire, wind or lightning, as determined after visual inspection by a licensed forester with the department of forestry and fire warden;

C. Emergency or routine maintenance by a public utility necessary to protect or maintain an electric power or communication line or other property of a public utility;

D. Tree maintenance, limited to medium pruning of branches not to exceed two inches in diameter in accordance with guidelines published by the National Arborists Association, (see Class II), intended to insure the continued health of a protected tree;

E. Trees planted, grown and/or held for sale by a licensed nursery;

F. Trees within existing road rights-of-way where pruning is necessary to obtain adequate line-of-sight distances and/or to keep street and sidewalk easements clear of obstructions, or to remove or relocate trees causing damage to roadway improvements or other public facilities and infrastructure within existing

road rights-of-way, as required by the Director of Public Works. (Ord. 93-0018 § 1, 1993; Ord. 88-0157 § 3, 1988; Ord. 82-0168 § 2 (part), 1982.)

22.56.2080 Application--Filing--Repeated filings.

Any person desiring an oak tree permit, as provided for in this Title 22, may file an application with the director, except that no application shall be filed or accepted if final action has been taken within one year prior thereto by the hearing officer or director or the commission on an application requesting the same or substantially the same permit. (Ord. 85-0195 § 12 (part), 1985; Ord. 82-0168 § 2 (part), 1982.)

22.56.2090 Application--Information and documents required.

An application for an oak tree permit shall include the following information and documents:

- A. The name and address of the applicant and of all persons owning any or all of the property proposed to be used;
- B. Evidence that the applicant:
 - 1. Is the owner of the premises involved, or
 - 2. Has written permission of the owner or owners to make such application;
- C. Location of subject property (address or vicinity);
- D. Legal description of the property involved;
- E.1. A site plan drawn to a scale satisfactory to, and in the number of copies prescribed by the director, indicating the location and dimension of all of the following existing and proposed features on the subject property:
 - a. Lot lines,
 - b. Streets, highways, access and other major public or private easements,
 - c. Buildings and/or structures, delineating roof and other projections,
 - d. Yards,
 - e. Walls and fences,
 - f. Parking and other paved areas,
 - g. Proposed areas to be landscaped and/or irrigated,
 - h. Proposed construction, excavation, grading and/or landfill. Where a change in grade is proposed, the change in grade within the protected zone of each plotted tree shall be specified,
 - i. The location of all oak trees subject to this Part 16 proposed to be removed and/or relocated, or within 200 feet of proposed construction, grading, landfill or other activity. Each tree shall be assigned an identification number on the plan, and a corresponding permanent identifying tag shall be affixed to the north side of each tree in the manner prescribed by Section 22.56.2180. These identifications shall be utilized in the oak tree report and for physical identification on the property where required. The protected zone shall be shown for each plotted tree,
 - j. Location and size of all proposed replacement trees,
 - k. Proposed and existing land uses,
 - l. Location of all surface drainage systems,
 - m. Other development features which the director deems necessary to process the application,
- 2. Where a concurrent application for a permit, variance, zone change, tentative map for a subdivision, including a minor land division or other approval, is filed providing the information required by this subsection E, the director may waive such site plan where he deems it unnecessary to process the application;
- F.1. An oak tree report, prepared by an individual with expertise acceptable to the director and county forester and fire warden, and certified to be true and correct, which is acceptable to the director and county forester and fire warden, of each tree shown on the site plan required by subsection E of this section, which shall contain the following information:
 - a. The name, address and telephone number during business hours of the preparer,
 - b. Evaluation of the physical structure of each tree as follows:
 - i. The circumference and diameter of the trunk, measured four and one-half feet above natural grade,
 - ii. The diameter of the tree's canopy, plus five feet, establishing the protected zone,
 - iii. Aesthetic assessment of the tree, considering factors such as but not limited to symmetry, broken branches, unbalanced crown, excessive horizontal branching,
 - iv. Recommendations to remedy structural problems where required,
 - c. Evaluation of the health of each tree as follows:

- i. Evidence of disease, such as slime flux, heart rot, crown rot, armillaria root fungus, exfoliation, leaf scorch and exudations,
 - ii. Identification of insect pests, such as galls, twig girdler, borers, termites, pit scale and plant parasites,
 - iii. Evaluation of vigor, such as new tip growth, leaf color, abnormal bark, deadwood and thinning of crown,
 - iv. Health rating based on the archetype tree of the same species,
 - v. Recommendations to improve tree health, such as insect or disease control, pruning and fertilization,
 - d. Evaluation of the applicant's proposal as it impacts each tree shown on the site plan, including suggested mitigating and/ or future maintenance measures where required and the anticipated effectiveness thereof,
 - e. Identification of those trees shown on the site plan which may be classified as heritage oak trees. Heritage oak trees are either of the following: any oak tree measuring 36 inches or more in diameter, measured four and one-half feet above the natural grade; any oak tree having significant historical or cultural importance to the community, notwithstanding that the tree diameter is less than 36 inches,
 - f. Identification of any oak tree officially identified by a county resource conservation district.
2. The requirement for an oak tree report may be waived by the director where a single tree is proposed for removal in conjunction with the use of a single-family residence listed as a permitted use in the zone, and/or such information is deemed unnecessary for processing the applications;
- G. The applicant shall provide an oak tree information manual prepared by and available from the forester and fire warden to the purchasers and any homeowners' association. (Ord. 88-0157 § 4, 1988; Ord. 82-0168 § 2 (part), 1982.)

22.56.2100 Application--Burden of proof.

- A. In addition to the information required in the application by Section 22.56.2090, the application shall substantiate to the satisfaction of the director the following facts:
- 1. That the proposed construction of proposed use will be accomplished without endangering the health of the remaining trees subject to this Part 16, if any, on the subject property; and
 - 2. That the removal or relocation of the oak tree(s) proposed will not result in soil erosion through the diversion or increased flow of surface waters which cannot be satisfactorily mitigated; and
 - 3. That in addition to the above facts, at least one of the following findings apply:
 - a. That the removal or relocation of the oak tree(s) proposed is necessary as continued existence at present location(s) frustrates the planned improvement or proposed use of the subject property to such an extent that:
 - i. Alternative development plans cannot achieve the same permitted density or that the cost of such alternative would be prohibitive, or
 - ii. Placement of such tree(s) precludes the reasonable and efficient use of such property for a use otherwise authorized, or
 - b. That the oak tree(s) proposed for removal or relocation interferes with utility services or streets and highways, either within or outside of the subject property, and no reasonable alternative to such interference exists other than removal of the tree(s), or
 - c. That the condition of the oak tree(s) proposed for removal with reference to seriously debilitating disease or danger or falling is such that it cannot be remedied through reasonable preservation procedures and practices;
 - 4. That the removal of the oak tree(s) proposed will not be contrary to or be in substantial conflict with the intent and purpose of the oak tree permit procedure;
- B. For purposes of interpreting this section, it shall be specified that while relocation is not prohibited by this Part 16, it is a voluntary alternative offering sufficient potential danger to the health of a tree as to require the same findings as removal. (Ord. 88-0157 § 5, 1988; Ord. 82-0168 § 2 (part), 1982.)

22.56.2110 Application--Filing fee.

When an application for an oak tree permit is filed, it shall be accompanied by the filing fee as required in Section 22.60.100. (Ord. 82-0168 § 2 (part), 1982.)

22.56.2120 Application--Denial for lack of information.

The director may deny without further action an application requesting an oak tree permit if such application does not contain the information required by this Part 16. The director may permit the applicant to amend the application. (Ord. 82-1068 § 2 (part), 1982.)

22.56.2130 Application--Notice requirements.

Notification pertaining to an application for an oak tree permit shall be provided as follows:

- A. Where an application for a permit, variance, zone change or tentative map for a subdivision, including a minor land division, is concurrently filed, notice that an oak tree permit will also be considered shall be included in required legal notices for such permit, variance, zone change or tentative subdivision map;
- B.1. Where no concurrent application is filed as provided in subsection A of this section and except as otherwise expressly provided in subsection C, the director not less than 20 days before the date of public hearing shall cause notice of such filing to be published once in a newspaper of general circulation in the county of Los Angeles available in the community in which such oak tree permit is proposed.
 - 2. Such notices shall include the statement: "Notice of Oak Tree Permit Filing." Also included shall be information indicating the location of the subject property (address or vicinity), legal description of the property involved, the applicant's request, and the time and place of the proposed public hearing. The notice shall also provide the address and telephone number of the department of regional planning, and state that the department may be contacted for further information;
- C. Notwithstanding the other provisions of this section, publishing shall not be required where removal or relocation of not more than one tree is proposed in conjunction with the use of a single-family residence listed as a permitted use in the zone. (Ord. 88-0157 § 6, 1988; Ord. 82-0168 § 2 (part), 1982.)

22.56.2140 Review of oak tree report by county forester and fire warden.

- A. On receipt of an application for an oak tree permit, the director shall refer a copy of the applicant's oak tree report as required by Section 22.56.2090 to the county forester and fire warden. The county forester and fire warden shall review said report for the accuracy of statements contained therein, and shall make inspections on the project site. Such inspections shall determine the health of all such trees on the project site and such other factors as may be necessary and proper to complete his review, a copy of which shall be submitted in writing to the director and/or commission within 15 days after receipt from the director;
- B. The county forester and fire warden may at his option also suggest conditions for use by the hearing officer or the director or commission pursuant to Section 22.56.2180.
- C. When the county forester determines that replacement or relocation on the project site of oak trees proposed for removal is inappropriate, the forester may recommend that the applicant pay into the oak forests special fund the amount equivalent to the oak resource value of the trees described in the oak tree report. The oak resource value shall be calculated by the applicant and approved by the county forester according to the most current edition of the International Society of Arboriculture's "Guide to Establishing Values for Trees and Shrubs."
- D. Funds collected shall be used for the following purposes:
 - 1. Establishing and planting new trees on public lands;
 - 2. Maintaining existing oak trees on public lands;
 - 3. Purchasing prime oak woodlands;
 - 4. Purchasing sensitive oak trees of cultural or historic significance.
- E. Not more than seven percent of the funds collected may be used to study and identify appropriate programs for accomplishing the preceding four purposes. (Ord. 93-0017 § 1, 1993; Ord. 88-0157 § 7, 1988; Ord. 85-0195 § 12 (part), 1985; Ord. 82-0168 § 2 (part), 1982.)

22.56.2150 Application--Commission consideration when concurrently filed.

When an application for a permit, variance, zone change or tentative map for a subdivision, including a minor land division, is concurrently filed with an application for an oak tree permit as provided by this Title 22, the hearing officer or the commission shall consider and approve such application for an oak tree permit concurrently with such other approvals. The hearing officer or the commission, in making their findings, shall consider each case individually as if separately filed. (Ord. 85-0195 § 10 (part), 1985; Ord. 82-0168 § 2 (part), 1982.)

22.56.2160 Application--Public hearing required when.

Where no concurrent consideration is conducted by the hearing officer or the commission pursuant to Section 22.56.2150, a public hearing shall be held pursuant to the procedure provided in Part 4 of Chapter 22.60 subject to the notice requirements of subsection B of Section 22.56.2130; provided, however, that no hearing shall be required for a filing in conjunction with the use of a single-family residence when publishing is not required by said subsection C of Section 22.56.2130. (Ord. 2008-0043 § 12, 2008; Ord. 85-0195 § 10 (part), 1985; Ord. 82-0168 § 2 (part), 1982.)

22.56.2170 Application--Grant or denial conditions.

The hearing officer or the director or commission shall approve an application for an oak tree permit where the information submitted by the applicant and/or brought to their attention during public hearing, including the report of the county forester and fire warden, substantiates that the burden of proof set forth in Section 22.56.2100 has been met. The hearing officer or the director or commission shall deny such application where the information submitted fails to substantiate such findings. (Ord. 85-0195 § 12 (part), 1985; Ord. 82-0168 § 2 (part), 1982.)

22.56.2180 Additional conditions imposed when.

The hearing officer or the director or commission, in approving an application for an oak tree permit, shall impose such conditions as are deemed necessary to insure that the permit will be in accord with the findings required by Section 22.56.2100. These conditions may involve, but are not limited to, the following:

- A. The replacement of oak trees proposed for removal or relocation with trees of a suitable type, size, number, location and date of planting. In determining whether replacement should be required, the hearing officer or the director or commission shall consider but is not limited to the following factors:
1. The vegetative character of the surrounding area,
 2. The number of oak trees subject to this Part 16 which are proposed to be removed in relation to the number of such trees currently existing on the subject property,
 3. The anticipated effectiveness of the replacement of oak trees, as determined by the oak tree report submitted by the applicant and evaluated by the county forester and fire warden,
 4. The development plans submitted by the applicant for the proposed construction or the proposed use of the subject property,
 5. The relocation of trees approved for removal shall not be deemed a mitigating factor in determining the need for replacement trees,
 - 6.a. Required replacement trees shall consist exclusively of indigenous oak trees and shall be in the ratio of at least two to one. Each replacement tree shall be at least a 15-gallon size specimen and measure at least one inch in diameter one foot above the base. The hearing officer, director or commission may, in lieu of this requirement, require the substitution of one larger container specimen for each oak tree to be replaced, where, in its opinion, the substitution is feasible and conditions warrant such greater substitution,
 - b. Replacement trees shall be properly cared for and maintained for a period of two years and replaced by the applicant or permittee if mortality occurs within that period,
 - c. Where feasible replacement trees should consist exclusively of indigenous oak trees and certified as being grown from a seed source collected in Los Angeles or Ventura Counties,
 - d. Replacement trees shall be planted and maintained on the subject property and, if feasible, in the same general area where the trees were removed. The process of replacement of oak trees shall be supervised in the field by a person who, in the opinion of the county forester and fire warden, has expertise in the planting, care and maintenance of oak trees;
- B. A plan for protecting oak trees on the subject property during and after development, such as, but not limited to, the following requirements:
1. The installation of chain link fencing not less than four feet in height around the protected zone of trees shown on the site plan. Said fencing shall be in place and inspected by the forester and fire warden prior to commencement of any activity on the subject property. Said fencing shall remain in place throughout the entire period of development and shall not be removed without written authorization from the director or the forester and fire warden,
 2. Where grading or any other similar activity is specifically approved within the protected zone, the

applicant shall provide an individual with special expertise acceptable to the director to supervise all excavation or grading proposed within the protected zones and to further supervise, monitor and certify to the county forester and fire warden the implementation of all conditions imposed in connection with the applicant's oak tree permit,

3. That any excavation or grading allowed within the protected zone or within 15 feet of the trunk of a tree, whichever distance is greater, be limited to hand tools or small hand-power equipment,
4. That trees on other portions of the subject property not included within the site plan also be protected with chain link fencing thus restricting storage, machinery storage or access during construction,
5. That the trees on the site plan be physically identified by number on a tag affixed to the north side of the tree in a manner preserving the health and viability of the tree. The tag shall be composed of a noncorrosive all-weather material and shall be permanently affixed to the tree. The tree shall be similarly designated on the site plan in a manner acceptable to the director,
6. That corrective measures for trees noted on the oak tree report as requiring remedial action be taken, including pest control, pruning, fertilizing and similar actions,
7. That, to the extent feasible as determined by the director, utility trenching shall avoid encroaching into the protected zone on its path to and from any structure,
8. At the start of grading operations and throughout the entire period of development, no person shall perform any work for which an oak tree permit is required unless a copy of the oak tree report, location map, fencing plans, and approved oak tree permit and conditions are in the possession of a responsible person and also available at the site. (Ord. 93-0018 § 2, 1993; Ord. 88-0157 § 8, 1988; Ord. 85-0195 § 12 (part), 1985; Ord. 82-0168 § 2 (part), 1982.)

22.56.2190 Notice of action--Method of service.

A. The director shall serve notice of action upon:

1. The applicant, as required by law for the service of summons or by registered or certified mail, postage prepaid, return receipt requested; and
2. All protestants testifying at the public hearing who have provided a mailing address, by first class mail, postage prepaid.

B. Where the hearing officer or the commission has concurrently considered a permit, variance, zone change or tentative map for a subdivision, including a minor land division, notice shall be included in the notice of action required for such concurrent actions. (Ord. 85-0195 § 10 (part), 1985; Ord. 82-0168 § 2 (part), 1982.)

22.56.2200 Appeal--From director's decision--Procedures.

Any person dissatisfied with the action of the director may file an appeal of such action with the secretary of the commission within the time period set forth in, and subject to all of the other provisions of, Part 5 of Chapter 22.60. (Ord. 2008-0026 § 19, 2008; Ord. 96-0026 § 8, 1996; Ord. 82-0168 § 2 (part), 1982.)

22.56.2220 Appeal--Hearing procedures.

In all cases where the commission sets the matter for public hearing, it shall be held pursuant to the procedure provided for public hearings in Part 4 of Chapter 22.60. (Ord. 85-0195 § 46, 1985; Ord. 82-0168 § 2 (part), 1982.)

22.56.2240 Effective dates of decisions.

The decision of:

- A. The director shall become final and effective as set forth in Part 5 of Chapter 22.60 unless an appeal is timely filed pursuant to the provisions of said Part 5 of Chapter 22.60;
- B. The commission shall be final and effective on the date of decision. Appeal of an oak tree permit to the board of supervisors is only allowed where an oak tree permit is concurrently considered with a permit, variance, zone change or tentative map for a subdivision, including a minor land division, and such oak tree permit shall be appealable only as a part of an appeal on the concurrent entitlement. Said appeal must be made within the applicable time period and shall be subject to the applicable procedures

established for appealing the concurrent entitlement. (Ord. 2008-0026 § 22, 2008: Ord. 82-0168 § 2 (part), 1982.)

22.56.2250 Expiration date for unused permits.

An approved oak tree permit which is not used within the time specified in the approval or, if no time is specified, within one year after the granting of such approval, becomes null and void and of no effect; except that, where an application requesting an extension is filed prior to such expiration date, the director may extend such time for a period of not to exceed one year. (Ord. 82-0168 § 2 (part), 1982.)

22.56.2260 Enforcement.

In interpreting the provisions of Section 22.04.090 as they apply to this Part 16, each individual tree cut, destroyed, removed, relocated or damaged in violation of these provisions shall be deemed a separate offense. (Ord. 82-0168 § 2(part), 1982.)

The Environmental Review Unit ensures that the statutory responsibilities of the County of Los Angeles Fire Department-Forestry Division are addressed in the project planning phase (818) 890-5719, Monday-Friday, 7:30 a.m. to 5:00 p.m.).

APPENDIX B- ANSI A300 (Part 1) - 2001 Pruning

APPENDIX B- ANSI A300 (Part 1) - 2001 Pruning

ANSI A300 (Part 1)-2001 Pruning – American National Standard Institute Standard for Tree care Operations – Tree, Shrub, and Other Wood Plant Maintenance – Standard Practices.

The publication can be obtained from:

International Society of Arboriculture (ISA),

P.O. BOX3129, Champaign, IL 61826-3129

Phone: (217)355-9411, Fax: (217)355-9516

Order toll-free 1-888-ISA-TREE

www.isa-arbor.com

**APPENDIX C-Tree Trimming Job Order Contract (JOC)
Agreement Language**

APPENDIX C-Tree Trimming Job Order Contract (JOC) Agreement Language

PRUNING STANDARDS FOR TREES COUNTY OF LOS ANGELES PARKS AND RECREATION

Pruning can either help or hurt trees. When appropriate practices are used, pruning can provide significant benefits. When inappropriate practices are used, significant harm can follow. For the long-term health and structural stability of trees for the County of Los Angeles Parks and Recreation, it is critical that pruning practices conform to professional standards established by the tree care industry.

This document identifies basic standards for tree pruning for the County of Los Angeles Parks and Recreation. These standards apply to all those working on Los Angeles County Parks and Recreation trees including Los Angeles Parks and Recreation employees, managers, private contractors and sub contractors.

Foundation for the Standards

The County of Parks and Recreation recognizes the following benchmark standards for tree pruning and maintenance:

1. International Society of Arboriculture (ISA) Tree Pruning Guidelines
2. ISA Best Management Practices: Tree Pruning
3. American National Standards Institute (ANSI) A300 Pruning Standards

In the Los Angeles County Parks and Recreation, there is a great diversity of trees, including conifer, broadleaf evergreen and deciduous species. For each species, there exists substantial variation in age, size, condition, and structure of individual trees. This species diversity and tree variation creates challenges with regard to tree care practices, and in particular for pruning. Pruning needs can vary substantially depending on these factors: some trees will need little or no pruning, while others will need substantial pruning. It is important to have a clear understanding of the specific needs of the tree and the objectives for pruning. Pruning objectives include the following:

- Improve structural strength and reduce failure potential (including dead branch removal)
- Improve tree health
- Improve aesthetic characteristics
- Provide clearance for pedestrians, vehicles, and structure
- Improve safety and security for park patrons and visitors
- Repair tree damage
- Reduce maintenance costs
- Improve a view
- Influence flowering and fruiting of some species

Pruning Cuts

Pruning cuts cause some level of injury to trees. It is important to make pruning cuts that minimize injury, or the potential for injury. For instance, cuts should be made on branches such that they accelerate the formation of callus tissue over the wound and reduce the potential of wood decay.

Note that flush cuts increase the potential for decay and reduce the formation of callus tissue. In some cases, flush cuts can stimulate vigorous but incomplete callus development. Conversely, leaving branch stubs prevents wound closure and increase the potential for decay. These types of pruning shall be avoided.

All pruning cuts shall conform to ANSI and ISA Standards.. Do not make flush cuts or leave branch stubs.

Amount of Pruning

Removal of live branches and associated leaf area can have a negative impact on the health of trees. When relatively large amounts of leaf area are removed, the capacity of a tree to grow and maintain adequate protective systems can be substantially compromised. **Pruning should be limited to that amount needed to accomplish the pruning objective.** In some cases, it may be best to complete pruning over a two- or three-year period rather than do all that's needed in one year.

In addition, excessive pruning or over thinning stimulates water sprout development in many species. Water sprouts are weakly attached and prone to breaking at the point of attachment. Crown density can increase substantially due to water sprout production, resulting in a loss of tree form and reduction in light and air penetration. Also, excessive pruning can lead to sunburn injury to bark tissue of branches and tree trunk.

Not more than 25% of the crown should be removed within an annual growing season, unless specified by the Los Angeles County Parks and Recreation Tree Division Supervisor. The percentage of foliage removed shall be adjusted according to age, health, and species considerations. Stressed trees are less tolerant of pruning and leaf area removal should be minimal. In cases where more than 25% of the crown needs to be removed (e.g., to reduce failure potential), a representative from Los Angeles Parks and Recreation in the Tree Division shall make an assessment of the amount of pruning to abate the hazard.

Wound Treatments

Over the years, wound dressings and paints have been used to treat or cover pruning wounds. There is no scientific evidence to indicate that these treatments reduce decay or accelerate wound closure, however. Until scientific studies find clear benefits to using these materials, pruning wound treatments are viewed as being unnecessary.

Pruning wound treatments (dressings and paints) shall not be used.

Pruning Equipment (pruners, saws, and spikes)

To promote callus development and wound closure, **it is important to make clean pruning cuts. Bark surrounding the cut should not be torn, shredded, stripped away, or otherwise separated from the wood.** This can be accomplished by using equipment that is sharp and sized appropriately for the job.

In addition, injury to bark tissue can occur from the use of climbing spikes. Wounds resulting from spike use can lead to localized bark death and wood decay, and can serve as entry courts for insects and pathogens.

Pruning equipment shall be sharp and sized appropriately for the pruning cut. Avoid the use of any pruning equipment that may cause damage to bark tissue.

Heading and Heading Cuts

Heading is defined as “cutting a currently growing or one-year-old shoot back to a bud, or cutting an older branch back to a stub or lateral branch not sufficiently large to assume the terminal role. It is also referred to as a “topping” or “lopping”.

When pruning mature trees, heading cuts should be avoided for the following reasons:

- Vigorous shoots can be stimulated to grow just below the heading cut. Typically, these shoots are weakly attached and, therefore, have a high failure potential.
- Wood decay can develop in the cut branch or stem. Often, decay extends well into the branch or stem and reduces its structural strength. This increases failure potential.
- The tree’s natural form can be lost in many cases, particularly when relatively large diameter cuts are made.

In very limited cases, heading cuts may be appropriate for mature trees, such as to:

- Reduce tree height or branch end weights. Note: This approach should be employed **only** in cases where there is a high risk of structural failure and thinning cuts (reduction cuts) cannot be used. Also, follow-up pruning to minimize risk associated with weakly-attached shoots will be needed.
- Achieve a specialty-pruning form, such as through pollarding or topiary.

Heading cuts should not be used when pruning mature trees, except in very limited cases, or when specified by a County of Los Angeles Division Tree trimming Supervisor. Whenever possible, use reduction cuts to reduce height and thinning cuts

to reduce branch end weights. When reduction and thinning cuts are not possible (such as when interior lateral branches are not present) and tree hazard potential is high, then heading cuts may be needed, but their use should be minimized.

Stressed Trees

Old and unhealthy trees require special pruning consideration. These trees will not respond to pruning either as quickly or as vigorously as unstressed trees. Removal of live branches and associated leaf area should be minimized or avoided. Generally, pruning should be limited to the removal of dead branches and significant structural defects.

For old and unhealthy trees, pruning should be limited to the removal of dead branches and structural defects. Removal of live branches should be avoided or minimized.

Utility Pruning

Pruning trees to maintain clearance from high voltage transmission lines is a requirement for the local utility (Pacific Gas and Electric, PG&E). This is a highly specialized area of pruning that requires extensive training in safe work practices and appropriate pruning practices.

Safety

Care shall be taken for park patron while on Los Angeles Parks and Recreation property. All contractors and sub contractors shall have appropriate safety signs, safety cones, cautions tape and is to be used as specified by a County representative while conducting tree trimming for Los Angeles Park and Recreation.

All pruning will be conducted per ISA and or (ANSI) A300 Pruning Standards. Upon infraction of non compliance to the pruning practice mentioned above you will receive (1) one written warning and immediately rectify all aspects for which the infraction was given. Upon a second infraction, a stop notice will be issued to you. A meeting will be conducted and damages to trees will be assessed, possible tree replacement of same size same species may be required by contractor. If there are any violations of these previous prescribed procedure it can lead to canceling of contract and Los Angeles County can seek damages up to including banning you from future contracts.

Fine Pruning is recommended for premium quality work with an emphasis on aesthetic considerations, in addition to structural integrity.

1. *Crown Cleaning*— remove cross or running branches, dead, dying, diseased and broken branches 1/2” in diameter or larger within the crown.
2. *Crown Thinning*— reduce density by selectively removing interfering, crossing or running branches, objectionable obstructing or weak branches, and water sprouts. The purpose of crown thinning is to reduce weight, improve structural integrity and to increase light penetration and air movement through the crown.
3. May include *Crown Raising* and/or *Crown Restoration*

Standard Pruning is recommended for general tree maintenance where tree health and structural integrity are the primary concern.

1. *Crown Cleaning*—remove cross or running branches, dead, dying, diseased, decayed and broken branches 1” in diameter or larger within the crown.
2. May include *Crown Raising* and/or *Crown Restoration*

Hazard Pruning is recommended where safety considerations are paramount.

1. *Crown Cleaning* to remove dead, dying, diseased, and broken branches 2” in diameter or larger within the crown.
2. May include *Crown Raising* and/or *Crown Restoration*

Crown reduction reduces the height and/or spread of a tree. This practice is undertaken where there has been significant crown dieback or in cases where, due to storm damage or prior incorrect pruning it is appropriate for safety or aesthetic reasons.

This technique is not the same as the unacceptable practice of “topping” which endangers the health and structural integrity of the tree.

Crown reduction can apply to the whole canopy or to individual limbs as needed. It is recommended where the top or sides of individual limbs are reduced in size and spread or the parent limb or dominant leader is removed at the point of attachment of a lateral branch. This practice is sometimes referred to as “Cutting Back” or “Drop Crotch Pruning”

Crown Restoration

Crown restoration consists of selective pruning to improve the structure, form and appearance of trees that have sprouted vigorously after storm damage, topping or severely pruning using heading cuts. Crown restoration may require several pruning applications over a number of years to achieve the desired results.

Crown Raising

Crown raising consists of the removal of lower branches to provide crown elevation clearance for traffic, open vistas, and improve sunlight penetration. It is also used to clear for building and other structures by targeting specific primary and/or secondary branches.

APPENDIX D - ANSI Z133.1-2000 Safety Requirements

APPENDIX D - ANSI Z133.1-2000 Safety Requirements

ANSI Z133.1-2000 – American National Standard Institute Standard for Arboricultural Operations – Pruning, Repairing, Maintaining, and Removing trees and Cutting Brush – Safety Requirements.

The publication can be obtained from:

International Society of Arboriculture (ISA)
P.O. BOX3129
Champaign, IL 61826-3129

Phone: (217) 355-9411
Fax: (217) 355-9516
Order toll-free 1-888-ISA-TREE
www.isa-arbor.com

APPENDIX E -Tree Protection Guidelines for Designers and Project Managers

APPENDIX E –Tree Protection Guidelines for Designers and Project Managers

These specifications shall be made a part of all construction documents. They were developed in order to protect all trees that have either direct or indirect encroachment into their driplines during construction within County parks.

A Parks and Recreation Arborist (or their designated representative) shall be invited to the Kickoff Meeting and also notified 48-hours prior to construction.

GENERAL REQUIREMENTS

1. No equipment is to be operated or parked under a tree, nor is any material to be stored within the dripline of a tree or leaned against a tree trunk. Do not pile or compact soil within a dripline.
2. In areas of construction, protect soil surface from traffic compaction with 3" of mulch or overlapping 3/4" plywood sheets.
3. No surface irrigation shall be installed within the dripline of a tree.
4. All work shall be in accordance with the County of Los Angeles DPR Tree Preservation Policy.
5. No chemical herbicides are to be used within 100 ft. of a tree's dripline.
6. Do not nail grade stakes or anything else to trees.
7. Encroachment from paving or structures within the dripline of a tree shall be permitted only with written authorization from the Department's Arborist. No encroachment within 10' of a tree trunk will be permitted under any circumstances.
8. Do not strip topsoil around trees. Any vegetation to be removed should be removed by cutting at ground level rather than pulling out by equipment.
9. Use a pneumatic drill to excavate under woody roots larger than 2" in diameter. Do not cut any root larger than 2" diameter. If roots must be severed, cuts are to be made by an arborist and soil backfilled immediately.

TYPICAL WORK PROCEDURES

All work around any existing oak trees and all trees designated to remain and to be protected shall follow this work procedures program. This program has been developed to minimize the impacts to each tree and protect them from unscheduled damage.

1. All work within a tree's root zone shall follow the DRP Tree Care Manual.
2. The extent of all work affecting any protected tree shall be staked by field survey and reviewed with the Recreation and Parks Arborist prior to construction.
3. A Parks and Recreation Arborist, Tree Trimming Supervisor or their designated representative shall approve any pruning of protected trees prior to the start of construction.
4. Hand dig the vertical trench at the final cut line and to the final grade; cleanly cut roots

behind torn ends. There is no need to apply any kind of pruning seal, since roots will form their own internal barriers to decay.

5. Type I, II, or III tree protection fencing shall be constructed at the limit of approved work to protect the trees from unauthorized damage. It shall remain in place until landscape work commences.

6. No further work within the root zone shall be done beyond that which was approved without obtaining written approval from the Recreation and Parks Arborist, prior to proceeding.

7. The area within the chain link fence shall not be used for material or equipment storage, or parking during construction.

8. During construction, the impacted trees should be closely monitored for symptoms of shock. The contractor should be prepared to provide temporary water to irrigate and if needed, wash dust from foliage. Irrigation should wet the top 2-3 feet of soil to replicate similar volumes and normal seasonal distribution. Contact a Recreation and Parks Arborist if a decline in tree condition is noted.

DAMAGES

If a tree designated to remain is removed or irreversibly damaged as determined by the Department Arborist or Tree Trimming Division, a contractor may be required to install a replacement tree matching in size, quality and variety, using a contractor designated by the Department Arborist or Tree Trimming Division Supervisor. If an acceptable replacement tree is not available, the contractor may be required to pay damages to the County for the value of the damaged tree in accordance with the guidelines set forth in the Guide for Plant Appraisal, 9th Edition, using the Trunk Formula Method.

APPENDIX F - How to Prevent Damage to Trees During Construction

APPENDIX F – How to Prevent Damage to Trees During Construction

Land development is a complex process and even more challenging when trees are involved. Construction is one of the greatest causes of tree decline and death in urban areas. The long-term goal of the Forestry Division is urban forest sustainability. The Division seeks to maintain social, recreational, ecological and economic functions of trees and their benefits over time. Stewardship of naturally occurring and planted trees is a central element in forest sustainability. Concerns integral to a sustainable urban forest are tree health and structure, preservation during development and redevelopment, species and site selection, quality of planting stock, standards of performance, maintenance practices in our parks, and recycling.

Tree protection should not begin subsequent to construction. If preservation measures are delayed or ignored until construction begins, the trees may be destined to fail. Since in most cases construction affects to trees cannot be completely eliminated, the goal for our parks planners and designers is to keep injury to trees to a minimum and allow building projects to proceed at the same time. Successful tree preservation occurs when designers, construction personnel, and project managers are committed to tree preservation. All members of the project team must be familiar with the rudimentary aspects of tree growth and development in order to understand the relationship between tree survival and construction practices.

Myths about how trees grow:

Above ground parts of trees are not a “mirror” of what lies below ground. In actuality, typically four to eleven large roots radiate from the base of a tree’s trunk. These “buttress” roots extend from the root crown and sometimes are visible when the trunk flares away from the root crown or collar. These large roots decrease in taper rapidly and branch repeatedly so that at distances of ten feet or more from the trunk they are about ½ inch in diameter or smaller. These roots grow horizontally through the soil and depending on the tree can extend 40 feet or more beyond the branch tips. These smaller roots are primarily responsible for water and mineral absorption. There can be hundreds of roots in a cubic inch of soil—thus any removal of soil or root severance forces a tree to compromise its physiological processes to sustain the loss.

All trees cannot and should not be preserved. Trees that are structurally unstable, in poor health, or unable to survive effects of construction become a liability to the project and should be removed. A realistic tree preservation program acknowledges that conflicts between trees and development may sometimes result in the removal of some trees and recognizes the detrimental effect to the project and community when trees die after construction is completed. Successful tree preservation occurs when construction impacts to trees are minimized or avoided altogether. The challenge is to determine when impacts will be too severe for the tree to survive, not only in the short term, but also in the long term. There are no quantitative methods to calculate this critical level.

Determining the optimum tree protection zone provides a guideline, although trees often survive and flourish with smaller protection areas.

The following are the three guiding principles for tree preservation:

- The acknowledgement that not all trees are in excellent health or have good structural stability.
- Tree preservation cannot be the responsibility of the Forestry staff alone. Each development participant must understand that his or her activities and decisions influence the success of tree preservation efforts.
- The ability of an arborist to cure construction injury is very limited, so the focus of preservation efforts is the *prevention* of damage.

Following the above principles will increase the chance for success and reduce the possibility that trees will die. The Forestry Division conforms to the International Society of Arboriculture guidelines and would like to extend our knowledge in the field of forestry for protecting the urban forest from preventable damage. Many times, destruction of trees can be easily avoided if information on tree protection reaches the appropriate staff. Furthermore, we would like to extend an offer to meet with your staff to carefully review these guidelines.

HOW TO PREVENT TREES FROM DAMAGE DURING CONSTRUCTION

An arborist should be called in as a consultant to the construction site before any work is started. The arborist will recommend the removal of trees that are not likely to survive construction activities regardless of the scope of work. In general, the contractor is responsible for preventing trees from damage. The construction and maintenance staff must make the best effort to avoid unnecessary activities within the dripline of trees.

- **FENCES** Construction fences shall be erected around trees that are to remain. The fences should be placed as far from the trunk as possible in order to protect the above ground portion of the trees as well as the root system.
- **STORING AND PILING** Leaning objects against tree trunks and piling soil over the root zone is prohibited.
- **PRUNING** Pruning for vertical clearance of buildings, traffic, and construction equipment shall be performed by an arborist only, and not by construction or maintenance personnel.
- **COMPACTION** Driving equipment and walking within the dripline causes soil compaction and is a serious cause of tree decline and death, and usually manifests long after construction is complete. Fences around trees reduce unnecessary traffic. If traffic cannot be avoided, it is recommended to spread a 6-12 inch thick layer of mulch to reduce compaction. As an added precaution, placing large plywood sheets over the mulch can disperse weight.

- **EXCAVATION** Excavation causes major damage to trees. Digging and trenching should be planned ahead to minimize the root loss. When roots must be severed, clean cuts shall be made and sealed by an arborist. The soil shall then be backfilled immediately to minimize drying of the roots.

- **TREE MAINTENANCE** Abruptly terminating regular tree maintenance is another cause for tree decline. Provide supplemental irrigation to replicate similar volumes and normal season distribution.

APPENDIX G- Tree Hazard Evaluation Form



A Photographic Guide to the Evaluation of Hazard Trees in Urban Areas
TREE HAZARD EVALUATION FORM 2nd Edition

Site/Address: _____
 Map/Location: _____
 Owner: public _____ private _____ unknown _____ other _____
 Date: _____ Inspector: _____
 Date of last inspection: _____

HAZARD RATING:						
_____	+	_____	+	_____	=	_____
Failure Potential		Size of part		Target Rating		Hazard Rating
_____						Immediate action needed
_____						Needs further inspection
_____						Dead tree

TREE CHARACTERISTICS

Tree #: _____ Species: _____
 DBH: _____ # of trunks: _____ Height: _____ Spread: _____
 Form: generally symmetric minor asymmetry major asymmetry stump sprout stag-headed
 Crown class: dominant co-dominant intermediate suppressed
 Live crown ratio: _____ % Age class: young semi-mature mature over-mature/senescent
 Pruning history: crown cleaned excessively thinned topped crown raised pollarded crown reduced flush cuts cabled/braced
 none multiple pruning events Approx. dates: _____
 Special Value: specimen heritage/historic wildlife unusual street tree screen shade indigenous protected by gov. agency

TREE HEALTH

Foliage color: normal chlorotic necrotic Epicormics? Y N Growth obstructions:
 Foliage density: normal sparse Leaf size: normal small stakes wire/ties signs cables
 Annual shoot growth: excellent average poor Twig Dieback? Y N curb/pavement guards
 Woundwood development: excellent average poor none other _____
 Vigor class: excellent average fair poor
 Major pests/diseases: _____

SITE CONDITIONS

Site Character: residence commercial industrial park open space natural woodland/forest
 Landscape type: parkway raised bed container mound lawn shrub border wind break
 Irrigation: none adequate inadequate excessive trunk wetted
 Recent site disturbance? Y N construction soil disturbance grade change line clearing site clearing
 % dripline paved: 0% 10-25% 25-50% 50-75% 75-100% Pavement lifted? Y N
 % dripline w/ fill soil: 0% 10-25% 25-50% 50-75% 75-100%
 % dripline grade lowered: 0% 10-25% 25-50% 50-75% 75-100%
 Soil problems: drainage shallow compacted droughty saline alkaline acidic small volume disease center history of fail
 clay expansive slope _____° aspect: _____
 Obstructions: lights signage line-of-sight view overhead lines underground utilities traffic adjacent veg. _____
 Exposure to wind: single tree below canopy above canopy recently exposed windward, canopy edge area prone to windthrow
 Prevailing wind direction: _____ Occurrence of snow/ice storms never seldom regularly

TARGET

Use Under Tree: building parking traffic pedestrian recreation landscape hardscape small features utility lines
 Can target be moved? Y N Can use be restricted? Y N
 Occupancy: occasional use intermittent use frequent use constant use

The International Society of Arboriculture assumes no responsibility for conclusions or recommendations derived from use of this form.

TREE DEFECTS

ROOT DEFECTS:

Suspect root rot: Y N Mushroom/conk/bracket present: Y N ID: _____

Exposed roots: severe moderate low Undermined: severe moderate low

Root pruned: _____ distance from trunk Root area affected: _____% Buttress wounded: Y N When: _____

Restricted root area: severe moderate low Potential for root failure: severe moderate low

LEAN: _____ deg. from vertical natural unnatural self-corrected Soil heaving: Y N

Decay in plane of lean: Y N Roots broken Y N Soil cracking: Y N

Compounding factors: _____ Lean severity: severe moderate low

CROWN DEFECTS: Indicate presence of individual defects and rate their severity (s = severe, m = moderate, l = low)

DEFECT	ROOT CROWN	TRUNK	SCAFFOLDS	BRANCHES
Poor taper				
Bow, sweep				
Codominants/forks				
Multiple attachments				
Included bark				
Excessive end weight				
Cracks/splits				
Hangers				
Girdling				
Wounds/seam				
Decay				
Cavity				
Conks/mushrooms/bracket				
Bleeding/sap flow				
Loose/cracked bark				
Nesting hole/bee hive				
Deadwood/stubs				
Borers/termites/ants				
Cankers/galls/burls				
Previous failure				

HAZARD RATING

Tree part most likely to fail: _____

Inspection period: _____ annual _____ biannual _____ other _____

Failure Potential + Size of Part + Target Rating = Hazard Rating

_____ + _____ + _____ = _____

Failure potential: 1 - low; 2 - medium; 3 - high; 4 - severe

Size of part: 1 - <6" (15 cm); 2 - 6-18" (15-45 cm);

3 - 18-30" (45-75 cm); 4 - >30" (75 cm)

Target rating: 1 - occasional use; 2 intermittent use

3 - frequent use; 4 - constant use

HAZARD ABATEMENT

Prune: remove defective part reduce end weight crown clean thin raise canopy crown reduce restructure shape

Cable/Brace: _____ Inspect further: root crown decay aerial monitor

Remove tree: Y N Replace? Y N Move target: Y N Other: _____

Effect on adjacent trees: none evaluate

Notification: owner manager governing agency Date: _____

COMMENTS

APPENDIX H - Low Impact Development Standards

APPENDIX H - Low Impact Development Standards

Title 12 ENVIRONMENTAL PROTECTION

Chapter 12.84 LOW IMPACT DEVELOPMENT STANDARDS

12.84.410 Purpose.

The purpose of this chapter is:

A. To require the use of low impact development (“LID”) standards in developments. LID encourages site sustainability and smart growth in a manner that respects and preserves the characteristics of the County’s watersheds, drainage paths, water supplies, and natural resources. LID builds on conventional design strategies by utilizing every softscape and hardscape surface in a development to perform a beneficial hydrologic function by retaining, detaining, storing, changing the timing of, or filtering stormwater and urban runoff. LID encompasses the use of structural devices, engineered systems, vegetated natural designs, and education in order to distribute stormwater and urban runoff across a development site. LID reduces the impact from the development and provides the benefits of:

1. Replenishing groundwater supplies;
2. Improving the quality of surface water runoff;
3. Stabilizing natural stream characteristics;
4. Preserving natural site characteristics; and
5. Minimizing downstream impacts.

B. The provisions in this Chapter 12.84 shall be construed to augment any county, state, or federal ordinance, statute, regulation, or other requirement governing the same or related matter, and where a conflict exists between a provision in this Chapter 12.84 and such other ordinance, statute, regulation, or requirement, the stricter provision shall apply to the extent permitted by law. (Ord. No. 2008-0063 § 1 (part), 2008.)

12.84.420 Definitions.

The following definitions shall apply to this chapter:

A. “Beneficial Use” means the existing or potential use of receiving waters as designated by the Los Angeles or Lahontan Regional Water Quality Control Boards in their respective basin plans for the County.

B. “Best management practices (BMPs)” are the methods, measures, and/or practices designed and selected to reduce or eliminate the discharge of pollutants to surface waters from point and nonpoint source discharges, including stormwater.

C. “County” means the County of Los Angeles.

D. “Development” means activity requiring discretionary or non-discretionary land use or construction approval from the County that results in the creation, addition, modification, or replacement of impervious surface area, which replacement is not part of routine maintenance activity. Development includes, but is not limited to, land subdivisions; the construction, installation, addition, or replacement of a building or structure; expansion of a building footprint; and land-disturbing activities related to structural or impervious

surfaces. Development shall not include routine maintenance of original lines and grades and/or hydraulic capacity.

E. "Director" means the Director of Public Works.

F. "Drainage system" means a conveyance or system of conveyances, including paths, drives, roads, streets, alleys, catch basins, curbs, gutters, ditches, man-made channels, or storm drains designed or used to collect or convey urban runoff and stormwater. G.

"Excess Volume" means the additional volume of stormwater caused by development; excess volume is determined by calculating the difference in the volume of runoff under undeveloped and post-developed conditions, using the water quality design storm event.

H. "Hardscape" means any durable pervious or impervious surface material, including paving for pedestrians and vehicles.

I. "Hydromodification" means the alteration of a natural drainage system through a change in the system's flow characteristics.

J. "Low impact development ("LID")" means technologies and practices that are part of a sustainable stormwater management strategy that controls stormwater and urban runoff on site.

K. "Natural drainage system" means any unlined or unimproved (not engineered) creek, stream, river, or similar waterway.

L. "Pollutants of concern" means chemical, physical, or biological components of stormwater that impair the beneficial uses of receiving waters, including those defined in the federal Clean Water Act Section 502(6) (33 United States Code Section 1362(6)), and incorporated by reference into California Water Code Section 13373.

M. "Public Works" means the Los Angeles County Department of Public Works.

N. "Softscape" means the horticultural elements of a landscape, such as soil and plants.

O. "Stormwater" means runoff that occurs as the result of rainfall.

P. "Urban runoff" means dry weather surface flows emanating from urban development.

Q. "Water quality design storm event" means any of the volumetric or flow rate based design storm events for water quality BMPs identified in the National Pollutant Discharge Elimination System Municipal Stormwater Permit for the County of Los Angeles. (Ord. No. 2008-0063 § 1 (part), 2008.)

12.84.430 Applicability.

A. This chapter shall become effective on January 1, 2009, and shall apply to all development within the unincorporated areas of the County after that date except for the following:

1. Any development where a complete discretionary or non-discretionary permit application was filed with the Los Angeles County Department of Regional Planning, Public Works, or any County-controlled design control board, prior to January 1, 2009;
2. Any development involving emergency construction activities required to immediately protect public health and safety; or
3. Public road and flood control infrastructure developments, which shall be subject to Public Works' design standards that incorporate LID principles.

B. Unless excluded by subsection A above, any development that alters an existing impervious surface area shall comply with this Chapter 12.84 as follows:

1. Where the development results in an alteration of at least fifty (50) percent of the impervious surfaces of an existing developed site, the entire site shall be brought into

- compliance with the standards and requirements of this Chapter; and
2. Where the development results in an alteration of less than fifty (50) percent of the impervious surfaces of an existing developed site, only such incremental development shall meet the standards and requirements of this Chapter; and
 3. Where a development results in an alteration of less than fifty (50) percent of the impervious surfaces of an existing developed site consisting of four (4) or fewer residential units, the development shall be exempt from this Chapter. (Ord. No. 2008-0063 § 1 (part), 2008.)

12.84.440 Low Impact Development Standards.

A. The LID standards of this Chapter are:

1. Mimic undeveloped stormwater and urban runoff rates and volumes in any storm event up to and including the “50-year capital design storm event,” as defined by Public Works;
2. Prevent pollutants of concern from leaving the development site in stormwater as the result of storms, up to and including a water quality design storm event; and
3. Minimize hydromodification impacts to natural drainage systems.

B. The Director shall prepare, maintain, and update, as deemed necessary and appropriate, a manual (“LID Standards Manual”), which shall include urban and stormwater runoff quantity and quality control development principles and technologies for achieving the LID Standards described in subsection A of this Section. The LID Standards Manual shall also include technical feasibility and implementation parameters, as well as other rules, requirements and procedures as the Director deems necessary, for implementing the provisions of this Chapter 12.84.

C. To meet the standards described in subsection A of this Section, developments shall install and maintain minimum site design features as follows:

1. A development consisting of four (4) or fewer residential units shall implement at least two LID BMP alternatives listed in the LID Standards Manual, which alternatives include, but are not limited to, disconnecting impervious surfaces, using porous pavement, downspout routing, a dry well, landscaping and irrigation requirements, and a green roof.
2. A development consisting of five (5) or more residential units, or a nonresidential development, shall comply with the following requirements:
 - a. The excess volume from each lot upon which such development is occurring shall be infiltrated at the lot level, or in the alternative, the excess volume from the entire development site, including streets and public right-of-way, shall be infiltrated in sub-regional facilities. The tributary area of a sub-regional facility shall be limited to five (5) acres, but may be exceeded with approval of the Director. When infiltration of all excess volume is not technically feasible, on-site storage, reuse, or other water conservation uses of the excess volume is required and shall be implemented as authorized by the Director in accordance with the requirements and provisions in the LID Standards Manual.
 - b. The runoff from the water quality design storm event associated with the developed site hydrology must be treated to the satisfaction of the Director before discharge. (Ord. No. 2008-0063 § 1 (part), 2008.)

12.84.450 Site Plan/LID Plan Review.

Compliance with the LID standards of this Chapter 12.84 shall be shown through a site plan review described in subsection A, below, and a LID plan review described in subsection B, below.

A. Site plan review.

1. The County Department of Regional Planning shall conduct a site plan review in accordance with Title 22 of the Los Angeles County Code to determine compliance with this Chapter 12.84. The site plan submitted for the development shall clearly depict any and all LID standards that will be incorporated into the development. Regional Planning shall approve compliance with these standards in concept only, subject to the setback and development standards in Title 22. Final approval of such compliance shall be made by Public Works in conjunction with its review and approval of the LID plan described in subsection B.
2. The same site plan shall be used to show compliance with this Chapter 12.84, the green building requirements of Part 20, Chapter 22.52, and the drought-tolerant landscaping requirements of Part 21, Chapter 22.52, to the extent these other requirements apply to the development.
3. In any case where a site plan for a development has been or will be concurrently filed with an application for a permit, variance, zone change, development agreement, or other discretionary approval under Title 22, or with an application for a subdivision under Title 21, the site plan procedure set forth in this Section 12.84.450 shall not apply and instead, the Exhibit "A," tentative map, or other site plan required for such other approval shall be used to show compliance with this Chapter 12.84.

B. LID plan review.

In addition to the site plan required by subsection A of this Section, the applicant shall also submit a LID plan to the Director for review and approval that provides a comprehensive, technical discussion of how the development will comply with this Chapter 12.84 and the LID Standards Manual. A deposit and fee to recover the costs associated with LID plan review shall be required. The time for obtaining LID plan approval shall be as follows:

1. For subdivisions, the LID plan shall be approved prior to the tentative map approval;
2. For any development requiring a conditional use permit ("CUP") or other entitlement required under Title 22 of the Los Angeles County Code, the LID plan shall be approved prior to the issuance of any such CUP or other entitlement; and
3. For all other development, the LID plan shall be approved prior to issuance of a grading permit for such development, and when no grading permit is required, prior to the issuance of a building permit for such development. (Ord. No. 2008-0063 § 1 (part), 2008.)

12.84.460 Additional Requirements.

Compliance with this Chapter 12.84 shall also require a development to satisfy the following:

- A. All grading and/or site drainage plans for the development shall incorporate the features of the approved LID plan described in subsection B of Section 12.84.450.
- B. The development's LID features shall be maintained and shall remain operable at all times and shall not be removed from the development unless and until such features have been replaced with other LID features in accordance with this Chapter 12.84. A

covenant or agreement shall be recorded in the office of the Los Angeles County Registrar-Recorder/County Clerk indicating that the owner of the subject development is aware and agrees to the requirements in this subsection B. The covenant or agreement shall also include a diagram of the site indicating the location and type of each LID feature incorporated into the development. The time to record such covenant or agreement shall be as follows:

1. For any subdivision, prior to final map approval; and
2. For any other development, prior to issuance of a grading permit for the development, and when no grading permit is required, prior to the issuance of a building permit for the development. (Ord. No. 2008-0063 § 1 (part), 2008.)

APPENDIX I – Audubon Nesting Season Tree Trimming

nesting seasons pg 5



LOS ANGELES
AUDUBON

Los Angeles Audubon Society
PO Box 931057
Los Angeles, California 90093-1057

Telephone: 323-876-0202
Fax: 323-876-7609
www.laaudubon.org



*This booklet has been reviewed by the
California Department of Fish and Game*

Printed on
Recycled Paper Using Soy Inks

March 2009

**Guide to Bird-Friendly
Tree and Shrub
Trimming and Removal**



*When one tugs at a single thing in nature, he finds it
attached to the rest of the world. -- John Muir*



BIRDS BUILD HOMES TO RAISE YOUNG MUCH LIKE PEOPLE DO

Birds build homes in which to raise their young just as humans do, although their site selections are more varied and often in obscure, hidden places. It is common to think of nests being in tree branches. But some birds build nests on the ground, in bushes and cavities; some build on the sides and eaves of houses, as well as on other man-made structures. They use natural substances and materials to do the job: mud, saliva, spider webs, caterpillar silk, leaf mold, twigs, grasses, and certain other plant fibers. The nest protects the bird's eggs from adverse weather and predators, and keeps eggs and nestlings warm.

THE BIRDS OF LOS ANGELES COUNTY: MORE THAN MEETS THE EYE!

What comes to mind when most people think about city birds are pigeons, mockingbirds, crows, and sparrows. Yet these birds are but a small portion of the more than 120 species that reside in Los Angeles County year round. Annual migration brings in additional species to the area, including more than 60 other breeding species (such as orioles and kingbirds). In total, 350+ species live, nest, or pass through the Los Angeles Basin during any one year. Most of them rely on trees, shrubs, and brush for food, cover, nesting, and rest.

Birds generally choose lush locations, such as city parks, schools, business parks, and neighborhoods with high tree density; however, nothing 'typical' should be assumed.

LAWS PROTECTING BIRDS



Los Angeles County Municipal Code:

Sec. 53.48. SONG BIRDS – KILLING

No person shall kill any song bird or destroy or rob the nest of any such bird.

California State Code:

3503. It is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto.

3503.5. It is unlawful to take, possess, or destroy any birds in the orders Falconiformes or Strigiformes (birds of prey) or to take, possess or destroy the nest or eggs of any such bird except as otherwise provided by this code or any regulation adopted pursuant thereto.

Title 14, Chapter 1, Section 251.1. Harassment of Animals

Except as otherwise authorized in these regulations or in the Fish and Game Code, no person shall harass, herd or

During the spring and summer, many birds, including some migrants, nest in Los Angeles County. Unfortunately this is also the time of year that cities and residents tend to trim trees, prune shrubs, and clear brush. Severely cutting, trimming, and topping trees and other greenery in the spring and summer can destroy nests and may eliminate valuable nest sites.

There are laws that protect birds, their nests, eggs, and young from being removed, destroyed or harassed. A summary of these laws are contained in this booklet. It is worthwhile mentioning that violating any of these laws may result in fines and imprisonment.

Los Angeles Audubon has created these guidelines to inform city authorities, tree trimming contractors, and the general public about the impact on birds by trimming during the times of the year when they are nesting. With your help, great numbers of birds may be spared the destruction of their nests and young each year. In turn, our birds can achieve healthy populations, and continue to provide ecological and aesthetic benefits to humans. More importantly, it will ensure that future generations will be able to enjoy the bounty of birds that call Los Angeles County home.

IMPORTANT PHONE NUMBERS

To report bird harassment, killing, and/or destruction of bird nests:
CALIFORNIA DEPARTMENT OF FISH AND GAME: 888-334-2258
For nesting surveys: 858-467-4201

For advice on nesting birds or referrals for nest surveys:
LOS ANGELES AUDUBON: 323-876-0202
Monday – Thursday, 10 AM – 4 PM

To report bird harassment, killing, and/or destruction of bird nests in county parks:
L.A. COUNTY PARKS & RECREATION: 213-738-2961
Emergency After Hours: 213-974-1234

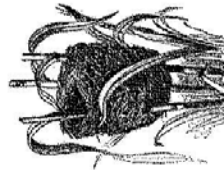
To report nest disturbance, inappropriate trimming in the City of Los Angeles:
L.A. URBAN FORESTRY DIVISION: EMERGENCY: 311

To report nest disturbance, inappropriate trimming in the coastal zone:
CALIFORNIA COASTAL COMMISSION
Enforcement officer: 562-590-5223

drive any game or non-game bird or mammal or mammal or furbearing mammal. For the purposes of this section, harass is defined as an intentional act which disrupts an animal's normal behavior patterns, which includes, but is not limited to, breeding, feeding or sheltering. This section does not apply to a landowner or tenant who drives or herds birds or mammals for the purpose of preventing damage to private or public property, including aquaculture and agriculture crops.

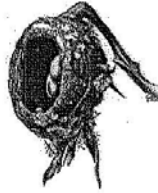
Federal Migratory Bird Treaty Act

703. Taking, killing, or possessing migratory birds unlawful.
 "...it shall be unlawful at any time, by any means or in any manner, to pursue, hunt, take, capture, kill, attempt to take, capture, or kill, possess, offer for sale, sell, offer to barter, offer to purchase, deliver for shipment, ship, export, import, cause to be shipped, exported, or imported, deliver for transportation, transport or cause to be transported, carry or cause to be carried, or receive for shipment, transportation, carriage, or export, any migratory bird, any part, nest, or eggs of any such bird, or any product, whether or not manufactured, which consists, or is composed in whole or part, of any such bird or any part, nest, or egg thereof..."



4

IMPORTANT FACTS ABOUT NESTING BIRDS



The Time of Year that Birds Typically Nest

Many species nest between March 1 and August 31. California Department of Fish and Game often requires surveys for raptors from January 15 to September 15. But nesting birds, especially hummingbirds, hawks and owls, may be found at any time of year, depending on the species. However there are several species that court and nest outside this time frame, for example, some herons and egrets, many raptors (birds of prey), and most hummingbirds. See Appendix B for guidance on safe times for trimming near heron and egret nests. Consult an independent qualified biologist for safe trimming times upon discovering any large nest.*

*NOTE: Certain species such as hawks, owls, herons, egrets, crows, and ravens also often re-use nests. If a large nest made of twigs is encountered, even if unoccupied, assume that it belongs to one of these birds and do not disturb it.

Types of Birds that Nest in Los Angeles County

There are a great variety of species that call Los Angeles County home. The following is a brief list of species, but please note that it is not all-inclusive:

- herons, egrets, cormorants*
- hawks, falcons, owls
- pigeons, doves
- hummingbirds, swallows
- woodpeckers
- crows, ravens, jays
- wrens, bush tits, mockingbirds, orioles, sparrows, finches

*NOTE: SEE APPENDIX B FOR SPECIAL CONSIDERATIONS FOR HERONS, EGRETS AND CORMORANTS.

5

What To Do Before Trimming

It is best to avoid the nesting season altogether and do your tree trimming between September and February. At any time the area should be carefully inspected before you begin your operation. For larger areas and sensitive habitats such as areas of native plants, dense brush, stream sides and stands of trees, it is best to hire a trained biologist to conduct the survey.* Laypersons may attempt to conduct their own nest survey; however in most cases this is not possible or practical. Most birds conceal their nests carefully and will not be visible to the average observer; but they do give obvious clues of their whereabouts. There are several ways to detect bird nests: 1) look on the ground for concentrations of white-colored droppings, then check the vegetation above; 2) as you walk through an area, look for birds flying out of vegetation close to you and intensely scolding you; they may have a nest nearby; 3) sit quietly and watch for birds that may be bringing nest material or food repeatedly to one place. Birds tend to place their nests just on the undersides of the tree canopy and where branches join together.

*See Appendix A for detailed nest descriptions

When an Active Nest is Found – STOP TRIMMING!

All work that has the potential to disturb or destroy the nest should cease in the immediate vicinity (50 ft is a good rule of thumb for songbirds, 500 ft for raptors). The nest should not be touched or moved. A qualified biologist or the California Department of Fish and Game can assist in making determinations on how far away to remain from the nest and other measures to avoid disturbing or destroying it. Ideally the nest should remain undisturbed until the young have fledged (left the nest on their own) or the nest is abandoned.

Advice on Finding Nests: Professional Nest Surveys

If you are not comfortable or able to perform a nest survey prior to your project, qualified biological consultants can be found online, or the California Department of Fish and Game may be able to assist you. Either one can perform a nest survey of the trees, shrubs, brush, or other vegetation in question. As stated previously, nests are not easy to spot or to identify. Special care needs to be taken to survey the project area if it includes trees, abandoned buildings, brush, vacant lots, and deadfall.

How Finding Nests May Affect a Project

If the nest contains unatched eggs or young, work within 50 feet or more of the nest may need to be delayed depending on the species involved. When the species is identified California Department of Fish and Game or Los Angeles Audubon may be able to provide the amount of time until the eggs hatch and nestlings fledge. If the nest is voluntarily abandoned or depredated (and again depending on species) work probably can be continued. However, a precise determination can only be made by an expert such as a consulting biologist or the California Department of Fish and Game.

Why Nests Can't be Disturbed or Moved to Another Location

The parents choose the nest location for specific reasons: proximity to food and water sources; protection from predators and the elements. Birds may abandon their nest (which may already include eggs or young) if it is disturbed or if the parents are harassed. Moving a nest requires special permission from the U.S. Fish and Wildlife Service and is usually only granted for human health and safety reasons.

What You Can Do If You Witness Tree Trimmers Disturbing or Destroying Nests

Ask them to stop, and make them aware it is against the law. Then a call should be placed to the California Department of Fish and Game. [See 'Important Phone Numbers'] Be prepared to provide the exact location of the activity. Specifically note address and cross streets as well as a vehicle license plate number or name of the company doing the trimming.

Why We Should Care About

Protecting Birds' Nests

First and foremost, it is the law. Second, birds provide numerous beneficial activities, such as eating many thousands of insect pests, which may eliminate some of the need for toxic pesticides. They also disperse seeds over wide areas, ensuring plant health and biodiversity. Finally, many bird populations nationwide are plummeting primarily due to the impact of human activities. Birds are creatures of the earth, a family of animals with which we share this planet and its limited resources. Our positive, cumulative actions can make the difference in ensuring their long-term survival.

IMPORTANT FACTS TO CONSIDER WHEN PLANNING A PROJECT

- Trimming or removal of trees can only be conducted safely outside of the breeding seasons for the bird species inhabiting the area. A qualified independent biologist or the California Department of Fish and Game should be retained by the City and/or project manager to conduct focused nest surveys prior to any work.
- All persons under contract should be made fully aware of the laws protecting birds and the proper protocols when encountering active nests.
- Hire an arborist that is ISA (International Society of Arborists) certified, a licensed landscaper, or a qualified tree trimmer who knows and cares about a tree's health. Avoid hiring 'bargain' tree trimmers or handymen, as they are generally inexperienced and may cause more harm than good to the trees.
- Most trees in Southern California are trimmed excessively and inappropriately, especially around apartment complexes and condominiums. This is not only to the detriment of the trees, but it leaves fewer habitats for birds to thrive in. Examples of unnecessary tree trimming are:
 - Thinning out pine trees and conifers to the point that you can see through them;
 - Sycamore trees—they do not need pruning because they don't drop limbs;
 - Removing dead palm fronds that drape down around the trunks of palm trees, which provide valuable nest sites for orioles and kingbirds.
- Choose tree varieties wisely. Put the right tree in the right place to prevent the need to severely trim or remove trees because they are too big, no longer 'work', or are causing problems for plumbing, uprooting sidewalks, growing into electrical lines, etc.
- Please Remember: Trees are not ornaments; they are living organisms and will naturally become a host for other living things.

APPENDIX A

TYPES OF BIRD NESTS

- Birds as small as hummingbirds and as large as herons nest on tree branches; so do hawks, owls, and crows. The nests may be found at every level of the tree, from the crown to the understory; they may be near the crotch, between branch and trunk, or out toward the end of a branch. Birds may use maples, pines, junipers, oaks, sycamore, and palm trees for nesting.
- Some birds, such as some species of sparrow, use grassland and brushy areas, making the nest on the ground.
- Species such as wrens, juncos, and finches may build their nests in bushes and shrubs with dense, compact foliage, or on the ground below them.
- Some swallows and flycatchers build mud nests attached to the sides of buildings, under eaves, and the eaves of houses.
- Woodpeckers, wrens, some species of owls, sapsuckers, and swallows use cavities that they either excavate themselves or use after another has abandoned it. They will use holes found in live and dead trees, stumps, cacti, and sides of old buildings.

The types of nests that birds construct are as varied as the birds themselves. A few of the major examples are:

- **Scrape nests** are simple depressions in the ground (sometimes with a few stones or leaves added), or in the leaf litter. Such nests are used by shorebirds, gulls, terns, nighthawks, vultures, and other species.
- **Burrow nests** are very effective at protecting eggs and young from predators and maintaining an appropriate microclimate for eggs and young. Some birds, like Bank Swallows and Belted Kingfishers, usually construct their own burrows, while others, such as Burrowing Owls, may use the burrows constructed by other species.

- **Cavity nests** are used by numerous passerines, woodpeckers, owls, parrots, and some waterfowl. Woodpeckers construct their own cavity nests and are referred to as primary cavity nesters. Species that use natural cavities or cavities constructed by primary cavity nesters are called secondary cavity nesters.
- **Platform nests** are relatively flat nests that may be located on the ground, in a tree, or on the tops of rooted vegetation or debris in shallow water.
- **Cupped nests** are, of course, cup shaped. Such nests may be constructed of various materials and in a variety of locations. Noted ornithologist Olin Sewall Pettingill subcategorized cup nests as follows:
 - **Supported cupped nests:** nests located in the crotches and branches of trees and shrubs, supported mainly from below. Many passerines and hummingbirds build such nests.
 - **Suspended cupped nests:** nests not supported from below but from the rims, sides or both:
 - **Pensile:** nests suspended from the rims and sides; rather stiff (e.g. those of kinglets and vireos).
 - **Adherent nests:** cupped nests whose sides are attached by an adhesive substance (e.g. mud or saliva) to a vertical surface, like those of swifts and some swallows.
 - **Ground nests:** cupped nests on the ground; sides are sometimes extended upward and arched over the top making a domed structure. Several passerines, particularly those that occupy open habitats like grasslands and tundra, build ground nests.

[Information on nests courtesy of Prof. Gary Ritchison, Ornithologist, Dept. of Biological Sciences Eastern Kentucky University
[<http://people.eku.edu/ritchison/birdnests.html>]

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APPENDIX B

SPECIAL CONSIDERATION: HERONS & EGRETS (Species includes Great Blue Heron, Great Egret, Snowy Egret, Green Heron and Black-crowned Night Heron)

Heronries or nesting colonies of herons are frequently located in areas isolated from human disturbance, such as riparian corridors, marshes, and groves of trees adjacent to water bodies or on islands. However, some herons have adapted minimally to human activity and may build their nests in trees near apartment and condo complexes, ports, and harbors that have large trees planted in their greenscape.

Herons are especially vulnerable to human disturbance and habitat destruction during pair formation and the breeding season (mid-November to September of the following year) when large numbers of birds are concentrated in a rather confined area. Herons are delicate and tend to desert nests and entire colonies if disturbed during periods of pair forming (starting mid-November), nest construction (starting in January) or early egg laying (as early as January). Herons continue to be sensitive to disturbance after hatching and up until the young fledge (up to late-September). In some cases, colonies have even been deserted after destruction or alteration of their habitat during the non-nesting season. Even if herons relocate after deserting a colony, consequences of disturbance include fragmentation of breeding populations, total reproductive failure in colonies, reduced number of breeding pairs, and reduced reproductive output per pair. Ultimately this can affect the stability of the entire regional population (Bowman & Siderius, 1984).

Herons are unpredictable in their response to disruption of a colony and the severity of the response does not always correspond to the magnitude of the disturbance (seemingly innocuous activities can produce serious results). The most important factors to consider when evaluating these effects are the timing of the disturbance in relation to critical periods of the nesting season and the degree to which the birds are able to adjust to human activities (degree of exposure-induced habituation). Herons are sensitive to humans and mammals moving around under their nesting trees.

When conducting surveys or inventories, individuals should take caution to avoid walking into heronries, especially under nesting trees (indicated by the ring of white guano around the base of the tree). Should they find themselves within a heronry, one should quietly and quickly leave by the same route they entered.

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Density of vegetation within and surrounding the colony can influence the impact of disturbances. The removal of vegetation near a colony can open paths into the herony that would not only enable intrusion by humans and predators, but would result in an increased number of exposed nests. Maintaining the vegetation, including trees and shrubs, around a colony provides alternate nest sites and a buffer against disturbance. **Furthermore, tree trimming should generally not remove more than the minimum of foliage necessary for human health and safety, and should be done, where it is permitted, in a manner that does not unnecessarily discourage herons and egrets from returning to their altered (trimmed) habitat during the next breeding cycle.**

HERON & EGRET BREEDING ACTIVITY:

Great Blue Heron: Mid-November to end of September*

Great Egret: Late February to end of August*

Snowy Egret: Early April to late July*

Green Heron: Early April to early August*

Black-crowned Night Heron: Mid-January to end of September*

SPECIAL CONSIDERATION: CORMORANTS

The Double-crested Cormorant, another colonial nesting species, occupies similar habitat and nesting areas as herons. They also need the protection of buffer zones while nesting, but they appear to be less sensitive to human disturbance than herons.

CORMORANT BREEDING ACTIVITY:

Late March to mid-October (especially in Marina del Rey) *

*Information on breeding activity from *Los Angeles County Breeding Bird Atlas and from breeding bird atlas records from San Diego, Orange Counties, and the Salton Sea.*

[PLEASE NOTE: Some of the information on herons and cormorants is adapted from "Special Management Practices for Herons", courtesy of the government of Nova Scotia. Although the information below was provided by biologists in Nova Scotia, it is relevant to these species in most locales. For purposes of these guidelines, local biologists and ornithologists were consulted and relevant dates modified to fit conditions in Los Angeles County. The PDF document in its entirety can be found at: [http://www.gov.ns.ca/natr/wildlife/Thp/heronsmp.pdf]

APPENDIX J - Growers Plan

APPENDIX J - Growers Plan

The Department's Tree Farm in upper La Verne is eight (8) acres of clear growing space, a water source and sufficient labor (provided by court referrals).



Recommendations for effective/efficient use of the Tree Farm for a larger scale nursery operation:

1) The irrigation system should be refurbished to efficiently administer drip irrigation to each container.



2) The soil mixing and storage area will need more organization and some level of confinement as well as site Best Management Practices (BMP's) to prevent site runoff of soils and organic leachate.



A Focused **Grower's Plan** will address the Department's arboriculture, native and low-water plant needs. Trees (and shrubs) will be grown that have been identified as suitable replacements for candidates identified in the Succession Plan. The trees and shrubs will be groomed and readied for fall/winter plantings so that they can establish as easily and naturally as possible in their respective park application.

This compendium includes, but not limited to:

Trees

Common Name	Botanical name
Acacia or Wattles*	<i>Acacia spp.</i>
African Sumac*	<i>Rhus lancea</i>
Alder	<i>Alnus rhombifolia</i>
Assorted Pine	<i>Pinus spp</i>
Australian Willow*	<i>Geijera parviflora</i>
Black Walnut	<i>Juglans californica</i>
Blue oak	<i>Quercus douglasii</i>
Blue Palo Verde*	<i>Cercidium floridum</i>
Calif Bay Laurel	<i>Umbellularia californica</i>
Calif. Box Elder	<i>Acer negundo californicum</i>
Calif. Buckeye	<i>Aesculus californica</i>
California Ash	<i>Fraxinus dipetala</i>
California Sycamore	<i>Platanus racemosa</i>
Catalina Cherry	<i>Prunus lyonii</i>
Cedar*	<i>Cedrus spp</i>
Chitalpa*	<i>Chitalpa tashkentensis</i>
Coast Live Oak	<i>Quercus agrifolia</i>
Cottonwood/Poplar	<i>Populus fremontii</i>
Crape Myrtle*	<i>Lagerstroemia indica</i>
Desert Willow	<i>Chilopsis linearis</i>
Elderberry	<i>Sambucus caerulea, mexicanus</i>
Gooding's Black Willow	<i>Salix goodingii</i>
Holly Oak	<i>Quercus ilex</i>
Hopseed Bush*	<i>Dodonaea viscosa, pupurea</i>
Jacaranda*	<i>Jacaranda mimosifolia</i>
London Plane Tree*	<i>Platanus x acerifolia</i>
Madrone	<i>Arbutus menziesii</i>
Mountain Mahogany	<i>Cercocarpus betuloides</i>
Mulberry-Fruitless*	<i>Morus alba</i>
Peppermint Willow*	<i>Agonis flexuosa</i>
Red Flowering Gum*	<i>Eucalyptus ficifolia</i>
Red Ironbark	
Eucalyptus*	<i>Eucalyptus sideroxylon</i>
Redbud	<i>Cercis occidentalis, canadensis</i>
Silver Dollar Gum*	<i>Eucalyptus polyanthemos</i>

Valley Oak	<i>Quercus lobata</i>
<u>Shrubs / Groundcover</u>	
Acacia (ground cover)*	<i>Acacia redolens</i>
Agave	<i>Agave spp.</i>
Arroyo Willow	<i>Salix lasiolepis</i>
Bush Anemone	<i>Carpenteria californica</i>
California Lilac	<i>Ceanothus spp.</i>
Coffeeberry	<i>Rhamnus californica</i>
Currant or Gooseberry	<i>Ribes spp.</i>
Deer Grass	<i>Muhlenbergia rigens</i>
Giant Wild Rye	<i>Leymus condensatus</i>
Grevillea*	<i>Grevillea spp.</i>
Hopseed Bush*	<i>Dodonaea viscosa</i>
Lemonade Berry	<i>Rhus integrifolia</i>
Mulefat	<i>Baccharis salicifolia</i>
Penstemon	<i>Penstemon spp</i>
Rockrose*	<i>Cistus spp.</i>
Rosemary*	<i>Rosmarinus officinalis</i>
Sage	<i>Salvia spp</i>
Sugar Bush	<i>Rhus ovata</i>
Sumac	<i>Malosma laurina (Rhus)</i>
Toyon	<i>Heteromeles arbutifolia</i>
Verbena*	<i>Verbena spp</i>
Westringia*	<i>Westringia fruitcosa</i>
Woolly Blue Curls	<i>Trichostema lanatum</i>
Yucca	<i>Yucca spp.</i>
Assorted Succulents	

*** Non-Native**

Nursery labor can be supplemented by court referrals. Four referrals working four hours a day, four-five days a week can:

- Move and mix small quantities of soil
- Plant and move containers
- Water containers
- Weed the growing grounds

APPENDIX K - Pilot iTree © Inventory Report (5 Parks)

APPENDIX K – Pilot iTree © Inventory Report (5 Parks)

The following iTree report depicts the importance of County Parks and the tree canopy within it. iTree is a suite of applications for use by not only arboriculture professionals and municipalities, but is also available to the public as freeware.

An existing five-park tree inventory has provided the basis for the following benefits report. The iTree 3.0 “Streets” application was used to analyze tree inventory data (collected previously with a GPS unit) by means of a GIS-based collection platform. One park per County Supervisorial District was selected with input from the Tree Trimming Division as well as the Department Grounds Maintenance Supervisors.

The five County parks below are the five “zones” in which the reports are based upon.

Zone	Park	Acreage	City
1	City Terrace Park	14	Los Angeles
2	Col. Leon Washington Park	13	Los Angeles
3	El Cariso Park	79	Sylmar
4	Carolyn Rosas Park	6	Rowland Heights
5	Arcadia Park	52	Arcadia

Air Quality, Stormwater Capture, Carbon Dioxide Sequestration and Storage, Energy benefits as well as Aesthetic benefits are analyzed in iTree and are reported in both units of measurement and in terms of dollars saved. For an explanation of how the benefits are valued, the following methodology is applied (from the *City of Minneapolis Municipal Tree Resource Analysis-2005*).

Air Quality benefits

Urban trees improve air quality in five main ways:

1. Absorbing gaseous pollutants (ozone, nitrogen oxides) through leaf surfaces.
2. Intercepting particulate matter (e.g., dust, ash, dirt, pollen, smoke).
3. Reducing emissions from power generation by reducing energy consumption.
4. Releasing oxygen through photosynthesis.
5. Transpiring water and shading surfaces, resulting in lower local air temperatures, thereby reducing ozone levels.

In the absence of the cooling effects of trees, higher air temperatures contribute to ozone formation. On the other hand, most trees emit various biogenic volatile organic compounds (BVOCs) such as isoprenes and monoterpenes that can contribute to ozone formation. The ozone-forming potential of different tree species varies considerably (Benjamin and Winer 1998). The contribution of BVOC emissions from city trees to ozone formation depends on complex geographic and atmospheric interactions that have not been studied in most cities.

Energy benefits

Trees modify climate and conserve energy in three principal ways:

1. Shading reduces the amount of radiant energy absorbed and stored by built surfaces.
2. Transpiration converts moisture to water vapor and thus cools the air by using solar energy that would otherwise result in heating of the air.
3. Wind-speed reduction reduces the movement of outside air into interior spaces and conductive heat loss where thermal conductivity is relatively high (e.g., glass windows) (Simpson 1998).

Trees and other vegetation within building sites may lower air temperatures 5°F (3°C) compared to outside the green space (Chandler 1965). At the larger scale of urban climate (6 miles or 10 km square), temperature differences of more than 9°F (5°C) have been observed between city centers and more vegetated suburban areas (Akbari et al. 1992). The relative importance of these effects depends on the size and configuration of trees.

Stormwater Capture benefits

According to federal Clean Water Act regulations, municipalities must obtain a permit for managing their stormwater discharges into water bodies. Each city's program must identify the Best Management Practices it will implement to reduce its pollutant discharge. Trees are mini-reservoirs, controlling runoff at the source because their leaves and branch surfaces intercept and store rainfall, thereby reducing runoff volumes and erosion of watercourses, as well as delaying the onset of peak flows. Healthy urban trees can reduce the amount of runoff and pollutant loading in receiving waters in three primary ways:

1. Leaves and branch surfaces intercept and store rainfall, thereby reducing runoff volumes and delaying the onset of peak flows.
2. Root growth and decomposition increase the capacity and rate of soil infiltration by rainfall and reduce overland flow.
3. Tree canopies reduce soil erosion and surface transport by diminishing the impact of raindrops on barren surfaces.

When averaged over the entire street tree population, certain species are much better at reducing stormwater runoff than others. Leaf type and area, branching pattern and bark, as well as tree size and shape all affect the amount of precipitation trees can intercept and hold to avoid direct runoff.

Carbon Dioxide Sequestration and Storage benefits

Urban forests can reduce atmospheric CO₂ in two ways:

1. Trees directly sequester CO₂ as woody and foliar biomass while they grow.

2. Trees near buildings can reduce the demand for heating and air conditioning, thereby reducing emissions associated with electric power production and consumption of natural gas.

On the other hand, CO₂ is released by vehicles, chain saws, chippers, and other equipment during the process of planting and maintaining trees. Eventually, all trees die and most of the CO₂ that has accumulated in their woody biomass is released into the atmosphere through decomposition unless the wood is recycled.

Aesthetic benefits

Many benefits attributed to urban trees are difficult to translate into economic terms. Beautification, privacy, shade that increases human comfort, wildlife habitat, sense of place and well-being are products that are difficult to price. However, the value of some of these benefits may be captured in the property values of the land on which trees stand. To estimate the value of these “other” benefits, research that compares differences in sales prices of houses was used to estimate the contribution associated with trees. The difference in sales price reflects the willingness of buyers to pay for the benefits and costs associated with trees. This approach has the virtue of capturing what buyers perceive as both the benefits and costs of trees in the sales price. Some limitations to using this approach in Los Angeles County include the difficulty associated with

- 1) Determining the value of individual street trees adjacent to private properties and
- 2) The need to extrapolate results from front-yard trees on residential properties to street trees in various locations (e.g., commercial vs. residential).

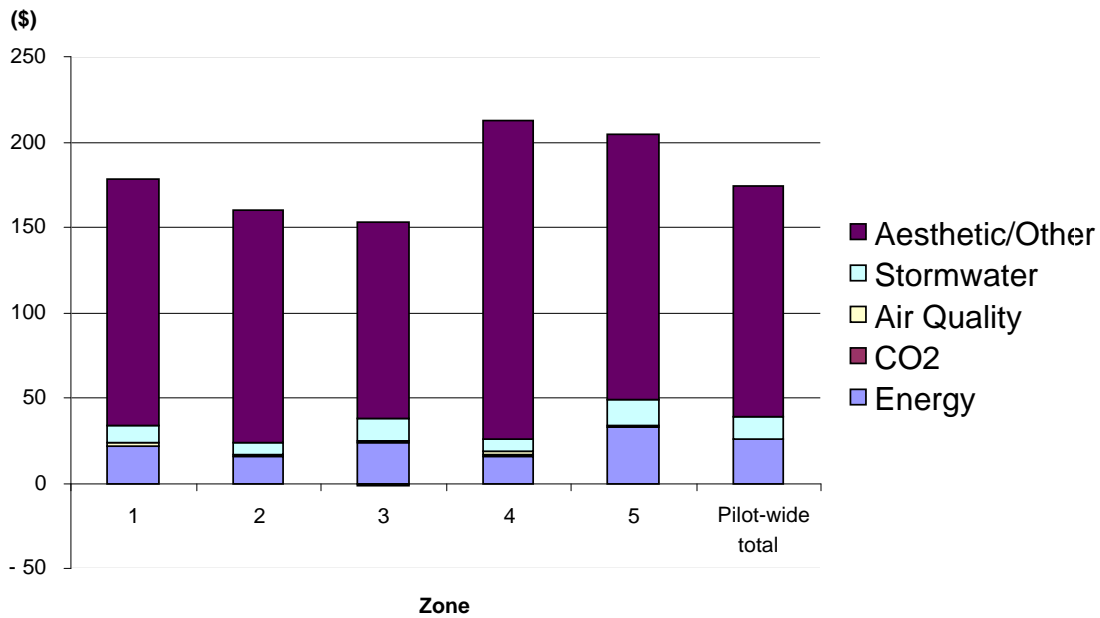
Sources:

1. McPherson, E. Gregory, James R. Simpson, Paula J. Peper, Scott E. Maco, Shelley L. Gardener, Shawna K. Cozad, Quingfu Xiao, Center for Forest Research, USDA Forest Service-Pacific Southwest Research Station, (2005), **City of Minneapolis Municipal Tree Resource Analysis Technical Report to City of Minneapolis: Ralph Seivert and Jim Hermann (Forestry Section-Minneapolis Parks and Recreation Board. 16-21.**
2. Benjamin, M.T. and A.M. Winer. 1998. **Estimating the ozone forming potential of urban trees and shrubs.** Atmos. Environ.32: 53-68.
3. Simpson, J.R. 1998. **Urban forest impacts on regional space conditioning energy use: Sacramento County case study.** Journal of Arboriculture 24(4): 201-214.
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5. Akbari, H.; Davis, S.; Dorsano, S.; Huang, J.; Winnett, S., eds. 1992. **Cooling Our Communities: A Guidebook on Tree Planting and Light-Colored Surfacing.** Washington, DC: U.S. Environmental Protection Agency. 26 p

iTree Benefit Report- Five Park Pilot Program

- Zone 1 City Terrace Park
- Zone 2 Colonel Leon Washington Park
- Zone 3 El Cariso Park
- Zone 4 Carolyn Rosas Park
- Zone 5 Arcadia Park

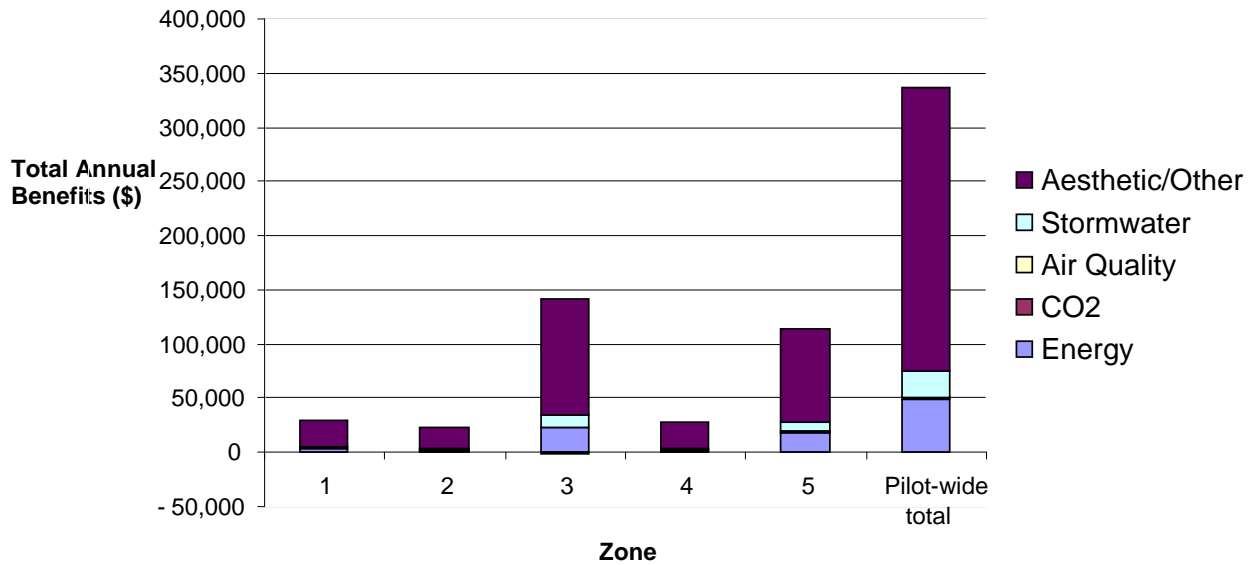
The bar graph below represents the **Average Annual Benefits of all Trees by Zone (\$/tree)**. The bars are a total of the benefit costs analyzed in iTree. (CO2 benefits are so minute that they do not show in the graph below)



The table below represents the **Average Annual Benefit Cost of all Trees by Zone**.

Zone	Energy	CO2	Air Quality	Stormwater	Aesthetic/Other	Total
1	21.25	0.73	1.84	9.96	144.87	178.65
2	15.39	0.62	1.03	7.17	136.18	160.41
3	24.22	0.66	- 1.12	13.06	115.11	151.93
4	16.15	0.74	1.98	7.22	186.90	212.99
5	32.91	1.00	0.42	15.08	154.75	204.17
Pilot wide Avg (\$/tree)	\$25.27	0.77	- 0.04	12.53	135.74	\$174.26

Total Annual Benefits of Public Trees by Zone (\$)



The table below represents the Total Annual Benefits of park trees for all the zones in the pilot program.

Benefits	Total (\$)	\$/tree
Energy	48,737	25.27
CO2	1,485	0.77
Air Quality	- 82	- 0.04
Stormwater	24,176	12.53
Aesthetic/Other	261,839	135.74
Total Benefits	336,155	174.26

The table below represents Electricity Saved in units (MWh) and dollars (\$). Natural gas does not display the same cost savings as electricity due to the parks surveyed as being predominantly covered with evergreen trees. An increase in deciduous trees would allow more winter sunlight to warm buildings, requiring less natural gas for heat.

Zone	Total Electricity (MWh)	Electricity (\$)	Total Natural Gas (Therms)	Natural Gas (\$)	Total (\$)	% of Total Tree Numbers	% of Total \$	Avg. \$/Tree
1	17.35	3,495.18	- 47.99	- 32.09	3,463.09	8.45	7.11	21.25
2	11.26	2,268.52	- 31.29	- 20.92	2,247.60	7.57	4.61	15.39
3	112.08	22,573.42	- 257.46	- 172.16	22,401.26	47.95	45.96	24.22
4	10.85	2,185.38	- 31.21	- 20.87	2,164.51	6.95	4.44	16.15
5	92.57	18,644.16	- 273.89	- 183.15	18,461.02	29.08	37.88	32.91
Pilot-wide total	244.12	49,166.67	- 641.83	- 429.19	48,737.48	100.00	100.00	25.27

The table below represents **Total Rainfall Intercepted** by trees in the pilot parks. The total acreage for the five-park pilot is 164 acres. (4,395,404 Gallons = 100.9 Acre feet)

Zone	Total rainfall interception(Gal)	Total (\$)	% of Total Tree Numbers	% of Total \$	Avg. \$/tree
1	295,194.00	1,623.68	8.45	6.72	9.96
2	190,360.67	1,047.06	7.57	4.33	7.17
3	2,195,667.69	12,077.01	47.95	49.95	13.06
4	175,782.38	966.87	6.95	4.00	7.22
5	1,538,399.31	8,461.78	29.08	35.00	15.08
Pilot-wide total	4,395,404.05	24,176.40	100.00	100.00	12.53

The table below represents **Total Pounds of Carbon Stored** in the trunk, roots and leaves of all trees within the pilot.

Zone	Total stored CO2 (lbs)	Total (\$)	% of Total Tree Numbers	% of Total \$	Avg. \$/tree
1	350,605.73	1,157.00	8.45	5.31	7.10
2	138,405.16	456.74	7.57	2.10	3.13
3	2,712,762.82	8,952.12	47.95	41.07	9.68
4	164,079.42	541.46	6.95	2.48	4.04
5	3,238,712.29	10,687.75	29.08	49.04	19.05
Pilot-wide total	6,604,565.42	21,795.07	100.00	100.00	11.30

The table below represents the **Carbon Sequestered** on an annual basis in the pilot.

Zone	Sequestered (lb)	Sequestered (\$)	Decomp. Release (lb)	Maint. Release (lb)	Total Release (\$)	Avoided (lb)	Avoided (\$)	Net Total (lb)	Total (\$)	Avg. \$/tree
1	26,531.44	87.55	- 339.03	- 1,287.82	- 5.37	11,264.30	37.17	36,168.89	119.36	0.73
2	21,342.05	70.43	- 136.71	- 874.65	- 3.34	7,311.00	24.13	27,641.69	91.22	0.62
3	124,405.68	410.54	2,634.00	- 8,671.57	37.31	72,749.77	240.07	185,849.88	613.30	0.66
4	24,174.54	79.78	- 160.39	- 894.49	- 3.48	7,043.05	23.24	30,162.71	99.54	0.74
5	118,681.32	391.65	3,113.45	- 5,581.44	28.69	60,086.53	198.29	170,072.96	561.24	1.00
Pilot-wide total	315,135.03	\$1,039.95	6,383.57	- 17,309.96	\$78.19	158,454.65	\$522.90	449,896.14	1,484.66	0.77

The table below represents the **Air Quality Benefits** on an annual basis in the pilot. Most trees emit various biogenic volatile organic compounds (BVOCs) such as isoprenes and monoterpenes that can contribute to ozone formation. The ozone-forming potential of different tree species varies considerably. The species recorded within the pilot greatly contribute to the BVOC's and have an overall adverse affect on air quality. However, the benefits of carbon dioxide absorbed and oxygen released remains the greatest benefit of trees.

Zone	Deposition O3 (lb)	Deposition NO2 (lb)	Deposition PM10 (lb)	Deposition SO2 (lb)	Total Deposition (\$)	Avoided NO2 (lb)
1	101.64	38.33	55.98	3.93	806.21	22.57
2	60.23	23.35	33.20	2.43	480.60	14.65
3	691.36	261.86	381.38	26.61	5,490.83	146.28
4	59.10	22.05	32.49	2.27	467.59	14.10
5	585.22	219.27	322.07	22.48	4,635.05	120.20
Pilot-wide total	1,497.55	564.87	825.12	57.72	11,880.28	317.79

(continued)

Zone	Avoided PM10 (lb)	Avoided VOC (lb)	Avoided SO2 (lb)	Total Avoided (\$)	BVOC Emissions (lb)	BVOC Emissions (\$)	Total (lb)
1	5.54	5.54	44.16	230.27	- 383.23	- 735.80	- 105.54
2	3.60	3.60	28.66	149.45	- 249.49	- 479.02	- 79.77
3	35.84	35.83	285.18	1,489.46	- 4,174.23	- 8,014.53	- 2,309.88
4	3.47	3.47	27.61	143.92	- 180.39	- 346.35	- 15.83
5	29.56	29.56	235.54	1,227.52	- 2,930.65	- 5,626.85	- 1,366.76
Pilot-wide total	78.01	77.99	621.15	3,240.62	- 7,917.99	- 15,202.54	- 3,877.79

The table below represents the **Aesthetic Benefit of Park Trees** in each zone. Aesthetic value is generally determined by the difference of comparable home value/sales near or adjacent to parkland and those removed from this area.

Zone	Total (\$)	% of Total Tree Numbers	% of Total (\$)	Avg \$/tree
1	23,613.93	8.45	9.02	144.87
2	19,882.42	7.57	7.59	136.18
3	106,481.13	47.95	40.67	115.11
4	25,044.36	6.95	9.56	186.90
5	86,817.19	29.08	33.16	154.75
Pilot-wide total	261,839.03	100.00	100.00	135.74