Eugene A. Obregon Park

GREEN PILOT PROJECT

Model Conservation Park Design

Collaborative Section Goals developed by:

Architecture & Design Section

Water & Conservation Planning Section

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"The future will be green, or not at all. This truth lies at the heart of humankind's most pressing challenge: to learn to live in harmony with the Earth on a genuinely sustainable basis"

- Sir Johathon Porritt, Chairman, UK Sustainable Development Commission

Chapter One – Project Orientation

Introduction

The Eugene A. Obregon Park GREEN PILOT PROJECT is a joint 2009 Section Goal Project of the Parks and Recreation Development Division's Architecture & Design and Water and Conservation Planning Sections. The project was developed in collaboration with the East Field Agency who manages and maintains the park.

The Goal of the GREEN PILOT PROJECT was to create a conceptual site design for an existing Los Angeles County park, incorporating environmentally responsible practices to reduce the County's "Carbon Footprint" and promote environmental stewardship as directed in the 2009 County of Los Angeles Strategic Plan.

Park sites are unique in the opportunities they present for environmental efficiencies. The research portion of the project explores efficiencies suitable for the County park system – both new parks and existing park upgrades, in three major categories, including:

- **Building and Site Efficiencies** – Park buildings are typically under 10,000 square feet in size and can be designed or retrofitted to include a number of environmental efficiencies including; energy and atmosphere, materials and resources, indoor environmental quality, water efficiencies, sustainable sites components and an educational component. The careful analysis of a project site and the construction budget must be considered in the successful implementation of energy efficiencies. When properly designed, the conservation and cost savings utilizing building efficiencies can be significant.
- **Potable Water Reduction Efficiencies** - Potable water efficiencies come in the form of low flow fixtures inside buildings and new planting strategies and irrigation equipment technologies in the landscape which can bring significant savings in water usage.

  In addition to exploring efficiencies in irrigation systems utilizing potable water, the use of reclaimed water to irrigate park sites provides current cost savings from 15%-50% depending on the water purveyor. As potable water costs increase, the cost savings of reclaimed water could be much more significant.
- **On-site Stormwater Management Efficiencies** - On site stormwater management techniques to manage rainfall and irrigation run-off by incorporating stormwater best management practices (BMP) such as a bio-swale(s), vegetated swale(s), dry creek(s), French drain(s), detention basin(s), cisterns/rain barrel(s), and pervious pavement. The retention of water on-site reduces the flow of water in the stormwater system and recharges local groundwater reservoirs.

Green Pilot Project

The Eugene A. Obregon Park was originally developed in 1966. Upon Analysis of the park infrastructure, the project team determined the benefits of upgrading this particular site would promote environmental responsibility and replace an inefficient aging infrastructure.

The project team conducted research in each area of efficiency to establish design opportunities best suited to the entire County Park system. These design opportunities were then applied to the Obregon Park site to determine which were suitable to the particular park site based on site suitability, environmental benefits and associated costs.

The team worked collaboratively to develop the design utilizing the following design process:

- Completion of a site analysis of the Obregon Park site to identify potential site opportunities and constraints to determine suitable efficiencies identified in the research portion of the project.
- Develop a conceptual park renovation design that meets the following criteria:
  - The efficiency upgrades must maintain the functional needs of park users
  - Materials and design techniques were to be utilized to reduce the park's carbon footprint and incorporate environmental responsibility
  - The design must include an educational component to promote environmental practices throughout the community
  - The park must provide a beautiful public space for the enjoyment of the community

Next Steps

The research and recommendations included in this project will serve to inform the Park Design Guidelines currently under development to insure all future Los Angeles County Park development incorporate environmentally responsible practices wherever possible. These guidelines are intended for use in the development of all new parks and the upgrade of all existing parks.

The following next steps will need to be addressed to advance the "Pilot Project":

- A detailed cost estimate for the proposed project will need to be developed by the Department of Public Works or a third party estimator.
- A public education and signage program will be developed to educate the public on "green" sustainable features that can be implemented at all County Parks.
- Finally, the team will seek to identify funding opportunities to advance the project and implement the concepts described in the "pilot project."

The future implementation of the recommendations developed for this project will provide a model "green" park upgrade for the County of Los Angeles.

Chapter Two – Project Research: Conservation Efficiencies

Building and Site Efficiencies

1. **Objectives:**

The management of energy efficiencies and to promote resource conservation.

2. **Description:**

Design guidelines and source material that this study will incorporate:

- LEED 2009 for Existing Buildings: Operations and Maintenance, Apr. 2009 Edition
- U.S. Department of Energy, "Energy Efficiency and Renewable Energy" website, and other pertinent websites.

3. **Research:**

Water Efficiency

Minimum Indoor Plumbing Fixture and Fitting Efficiency.

- Reduce potable water use within the building, as outside, to reduce the burdens on potable water supply and wastewater systems by replacing existing fixtures and fittings with high-efficiency or dry fixture and control technologies.
- Use high-efficiency water heating systems or on-demand systems.
- Common Plumbing Fixtures:
  A quick summary of the typical plumbing fixtures found in a park building includes:
  1. Water closets. In park buildings, most water closets have valves that utilize water-line pressure to meter out a set volume of water. Current valves provide flush volumes of 1.6 gallons per flush (gpf); their older counterparts provide more than double that flow.
  2. Urinals. Similar to water closets, urinals in park buildings typically utilize water-line pressure valves. Current valves provide flush volumes of 1 gallon per flush (gpf); their older counterparts may provide more than twice that amount.
  3. Sinks and lavatories. Sinks, such as those in break rooms, often do not have flow-restricting aerators installed. At a minimum, aerators restricting flow to 2.5 gpm should be installed. Lavatories, especially older installations, often have flow restrictors installed that are rated well above the current 0.5 gpm maximum requirement.
  4. Showerheads. Current showerheads are now restricted to 2.5 gpm. For older, compliant showerhead models, the flow stream was not always very effective. More current models provide a steady stream that has a much better delivery.

Applicability: Any park, new design or upgrade

Environmental Benefits: Very High - Reduces potable water usage and uses less energy

Fiscal Benefits: Minimal to Moderate

Fiscal Impacts: Moderate

Maintenance Impacts: None (generally met through standard practices)

Energy & Atmosphere

Increase levels of operating energy performance, and reduce environmental and economic impacts associated with excessive energy use.

- *Employ Building Automation Systems (BAS)* for energy savings, and performance optimization of heating, cooling, ventilation, and lighting systems. BAS's can also link lighting, security, fire safety and other systems together to make a building operate even more efficiently and effectively. They can save an average of 10 percent to 30 percent of overall building energy consumption.

  Applicability: Community / Senior Buildings, Gymnasiums, new design or upgrade

  Environmental Benefits: Very High

  Fiscal Benefits: High

  Fiscal Impacts: Considerable

  Maintenance Impacts: Moderate, staff training required

- *Employ Off-Site Renewable Energy Sources* to reduce environmental and economic impacts associated with fossil fuel energy use. Green Power may be procured from a Green-e Energy-certified power marketer, an accredited utility program, or certified tradable renewable energy certificates (REC) or the equivalent.

  Applicability: Any County park

  Environmental Benefits: Very High

  Fiscal Benefits: None

  Fiscal Impacts: Minimal

  Maintenance Impacts: None

- *Employ On-Site Non-Polluting Renewable Technologies* to contribute to the total energy requirements of the site. These may include solar, geothermal, wind, biomass, and biogas technologies.
  1. Flat-plate solar collectors, both liquid (with a storage tank) and air-type for solar water-heating systems in buildings and pools, and solar space heating. Active systems use electric pumps and controllers to circulate water or other heat-transfer fluids in or adjacent to the absorber plate. Passive systems rely on gravity and the tendency for water to naturally circulate as it is heated, known as thermo-siphoning.

     Flat plate collectors are typically capable of heating carrier fluids up to 82°C (180°F). Their efficiency in making use of the available energy varies between 40 and 80 percent, depending on the type of collector.

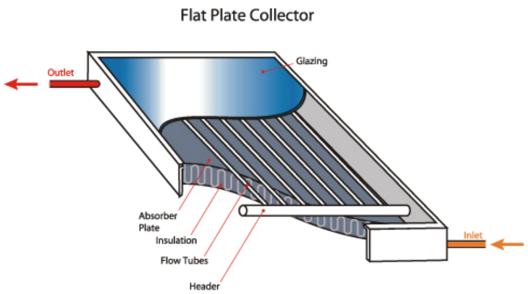
Applicability: Community / Senior Buildings, Gymnasiums, Pool Buildings, new design or upgrade

Environmental Benefits: Very High – Use a renewable energy source rather than fossil fuel.

Fiscal Benefits: Moderate to High

Fiscal Impacts: Moderate

Maintenance Impacts: Minimal - occasional cleaning, inspection



2. Evacuated-Tube Solar Collectors for high-efficiency heating and cooling applications. They can achieve extremely high temperatures (170°F to 350°F), and are more expensive (2x) than flat-plate collectors. The collectors are usually made of parallel rows of transparent glass tubes.

Applicability: Community / Senior Buildings, Gymnasiums, Pool Buildings, new design or upgrade in selected cases

Environmental Benefits: High Efficiency can be used to power solar heating and cooling systems. Reduces fossil fuel use.

Fiscal Benefits: Moderate

Fiscal Impacts: Expensive

Maintenance Impacts: Minimal - occasional cleaning, inspection

3. Integral Collector-Storage Systems are simple and reliable water-heating devices in areas of mild climate. They consist of one or more black storage tanks or tubes placed in an insulated box with a glazed side facing the sun. Circulating liquid transfers the heat to a conventional backup water heater.

Applicability: Basic system, used selectively for restrooms and janitor room water heating

Environmental Benefits: Off-sets electrical or gas use for water heating

Fiscal Benefits: Moderate

Fiscal Impacts: Low

Maintenance Impacts: Minimal - occasional cleaning, inspection

4. Photovoltaic cells (PV) arranged in an array for power production in a power grid-interactive system. These reduce the burning of fossil fuels and the production of $C0_2$. Additionally, they produce no noise. PV cell production involves only a minimal amount of toxic chemicals such as cadmium and selenium. Recycling methods are being developed by the industry for PV panel disposal. . PV systems come in two basic designs:

Flat-Plate and Concentrator Systems. Cells with conversion efficiencies greater than 30 percent are now available.

They have a low energy payback time (EPBT) and an assumed life expectancy of 30 years. Production has been doubling every two years.

Applicability: Community / Senior Buildings, Gymnasiums, Maintenance Buildings, new design or upgrade

Environmental Benefits: Very High

Fiscal Benefits: High, A Grid-Interactive System can return net-credit to the County of Los Angeles while reducing energy costs

Fiscal Impacts: High Initial Cost with low Energy Payback Time

Maintenance Impacts: Moderate- Frequent cleaning is required or efficiency drops.

- *Building-Integrated Photo Voltaic (BIPV)* is one of the fastest growing segments of the photovoltaic industry. They are typically incorporated into the roof or walls of a building as a principal or ancillary source of electric power. Transparent solar panels where a tin oxide coating is deposited on the inner surface of glass, and photovoltaic roof tiles and shingles have opened new possibilities and uses. On the extreme end, photovoltaic systems have been utilized in experimental road surfaces.

Applicability: Community / Senior Buildings, Gymnasiums, Maintenance Buildings, new design or upgrade

Environmental Benefits: Very High, can be part of a Grid-Interactive System.

Fiscal Benefits: Moderate to High

Fiscal Impacts: High Initial Cost with low Energy Payback Time.

Maintenance Impacts: Moderate- Frequent cleaning is required or efficiency drops.

- *Solar Pool Heating* requires a collector area 50% to 100% of the pool area. This technology typically uses inexpensive, unglazed, low-temperature collectors.

  A pool cover or blanket significantly reduces heat-loss in a cost-effective manner.

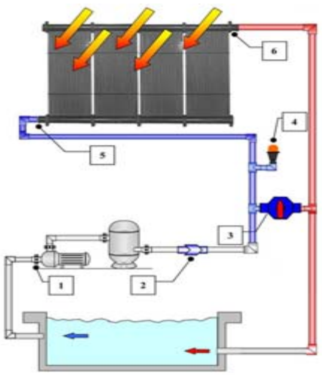
  Applicability: Existing and new pools located with an adjacent building structure with sufficient suitable roof space and configuration is suitable for solar collectors. All pools will benefit from solar blankets.

  Environmental Benefits: High - Off sets electrical or gas use for water heating

  Fiscal Benefits: Very High

  Fiscal Impacts: High Initial Cost with low Energy Payback Time

  Maintenance Impacts: Minimal - occasional cleaning, inspection



- *Solar Ventilation Preheating* heats outside air before it enters a building using a south-facing solar-collector to warm the air. Any additional heating is performed by the building's conventional heating system. During summer months, intake air bypasses the solar collector, keeping the air from being preheated. The system requires almost no maintenance. There are no liquids and no moving parts other than the ventilation system fans. These systems are practical for large structures such as gymnasiums, and are easily added as retrofits. One square foot of collector area will heat 4-10 cubic feet of air per minute.

  Applicability: Large Park buildings, i.e.: Gymnasiums, new design or upgrade

  Environmental Benefits: High - Off sets electrical or gas use for Space Heating

  Fiscal Benefits: Moderate to High

  Fiscal Impacts: Moderate Initial Costs with payback

  Maintenance Impacts: Minimal – Occasional cleaning and fan maintenance

- *A Solar Space Heating System* can consist of a passive system, an active system, or a combination of both. Passive systems are typically less costly and less complex than active systems. When retrofitting a building, active systems may be the only option for obtaining solar energy. This type of system could be used to effectively heat a community or classroom building.

  Applicability: Community / Senior Buildings, Gymnasiums, Maintenance Buildings, new design or upgrade

  Environmental Benefits: High - Off sets electrical or gas use for Space Heating

  Fiscal Benefits: Moderate to High

  Fiscal Impacts: Moderate Initial Costs with payback

  Maintenance Impacts: None

- *Passive Solar Space Heating* takes advantage of warmth from the sun through design features. Large south-facing windows and materials in the floors and walls that absorb warmth during the day release that warmth at night when it is needed most. A sunspace or greenhouse is a good example of a passive system for solar space heating. Passive solar design systems usually have one of three designs:

  1. Direct Gain where the materials collect the warmth of the sun shining directly on them.
  2. Indirect Gain where the materials are in a wall between the sun and the space to be heated.
  3. Isolated Gain collects solar energy remotely from the location to be heated then it is distributed to other areas.

  Applicability: Community / Senior Buildings, Gymnasiums, Maintenance Buildings, new design or upgrade

  Environmental Benefits: High - Off sets electrical or gas use for Space Heating

  Fiscal Benefits: Moderate to High

  Fiscal Impacts: Moderate Initial Costs with payback

  Maintenance Impacts: None

- *Active Solar Space Heating* systems consist of collectors that collect and absorb solar radiation combined with electric fans or pumps to transfer and distribute the solar heat. Active systems also generally have an energy storage system to provide heat when the sun is not shining. The two basic types of active solar space heating systems use either liquid or air as the heat-transfer medium in their solar energy collectors.

  Applicability: Community / Senior Buildings, Gymnasiums, Maintenance Buildings, new design or upgrade

  Environmental Benefits: High - Off sets electrical or gas use for Space Heating

  Fiscal Benefits: Moderate to High

  Fiscal Impacts: Moderate Initial Costs with payback

  Maintenance Impacts: Minimal – maintenance of fans and pumps

- *Air-Based Solar Heating Systems* usually employ an air-to-water heat exchanger to supply heat to the domestic hot water system, making the system useful in the summertime. An auxiliary or backup system provides heat when storage is discharged. *They typically provide 30% to 70% of heating, or heating and hot water requirements.*

  Applicability: Community / Senior Buildings, Gymnasiums, Maintenance Buildings, new design or upgrade

  Environmental Benefits: High - Off sets electrical or gas use

  Fiscal Benefits: High

  Fiscal Impacts: Moderate

  Maintenance Impacts: Minimal – maintenance of fans and pumps

- *Space Cooling* can be accomplished using Thermally Activated Cooling Systems (TAGS) driven by solar energy. These systems are sized to *provide 30% to 60% of a building's cooling requirements using solar*. The remainder is usually dependent on TAGS fueled by natural gas. The TAGS available for solar-driven cooling include absorption systems and desiccant systems.

  1. Solar Absorption Systems use the thermal energy from a solar collector to separate a binary mixture of an absorbent and a refrigerant liquid. The refrigerant is condensed, throttled, and evaporated to yield a cooling effect, which is then re-absorbed to continue the cycle. Because of the high temperature requirements of absorption cooling systems, evacuated-tube or concentrating collectors are typically used.

     Applicability: Community / Senior Buildings, Gymnasiums, Maintenance Buildings Selectively used – Sophisticated system

     Environmental Benefits: Very High - Off sets electrical or gas use

     Fiscal Benefits: High – 30% to 60% savings

     Fiscal Impacts: High Initial Costs with payback

     Maintenance Impacts: Minimal to none

  2. Solar Desiccant Systems use thermal energy from the solar collector to regenerate desiccants that dry ambient air; they then use that dry air in indirect and/or direct evaporative stages to provide cooled air to the load. The solar heat is used to regenerate the desiccant, driving off the absorbed water. This is a low-energy-consumption, continuously repeating cycle.

     Applicability: Community / Senior Buildings, Gymnasiums, Maintenance Buildings Selectively used – Sophisticated system

     Environmental Benefits: Very High - Off sets electrical or gas use

     Fiscal Benefits: High

     Fiscal Impacts: High Initial Costs with payback

     Maintenance Impacts: Minimal to none

- *Geothermal Cooling and Heating* using Earth sheltering cooling tubes take advantage of the ambient temperature of the Earth to reduce or eliminate conventional air conditioning requirements. A geothermal heat pump (GHP) operating in cooling mode lowers indoor temperatures by transferring heat from inside a building to the ground outside or below it. A heat pump's process can be reversed. In winter, a GHP can extract heat from the ground and transfer it inside.

  Applicability: Community / Senior Buildings, Gymnasiums, Maintenance Buildings - Selectively used – Sophisticated system, new design or upgrade

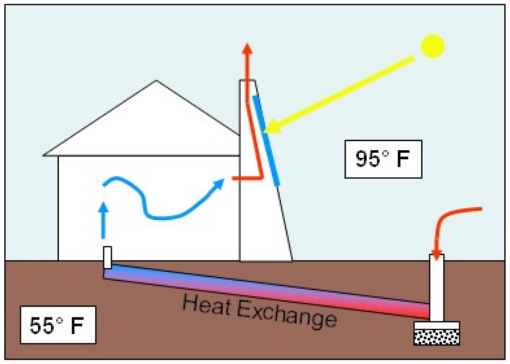
  Environmental Benefits: Very High - Off sets electrical or gas use

  Fiscal Benefits: Moderate to High

  Fiscal Impacts: Moderate to High Initial Costs with payback

  Maintenance Impacts: Minimal heat pump maintenance

- *A Solar Chimney* is a way of improving the natural ventilation of a building by using convection of air heated by passive solar energy. This concept has been used for centuries, particularly in the Middle East, as well as by the Romans. During the day solar energy heats the chimney and the air within it, creating an updraft of air. The suction created at the chimney's base can be used to ventilate and cool the building below. To further maximize the cooling effect, geothermal cooling tubes may be incorporated. Solar chimneys can improve a building's ventilation rate on even hot, windless days. Reliance on wind and wind driven ventilation can be reduced or eliminated.



  Applicability: Community / Senior Buildings, Gymnasiums, Maintenance Buildings, new design or upgrade

  Environmental Benefits: Very High – Off sets electrical use

  Fiscal Benefits: Moderate to High

  Fiscal Impacts: Moderate to High Initial Costs with payback

  Maintenance Impacts: None

- *A Passive Down-Draft Cooltower* is a technology closely related to the solar chimney. The principle is to allow water to evaporate at the top of a tower, either by using evaporative cooling pads or by spraying water. Evaporation cools the incoming air, causing a downdraft of cool air that will bring down the temperature inside the building. Airflow can be increased by using a solar chimney on the opposite side of the building to help in venting the hot air to the outside. This concept has been used at the Visitor Center in Zion National Park.

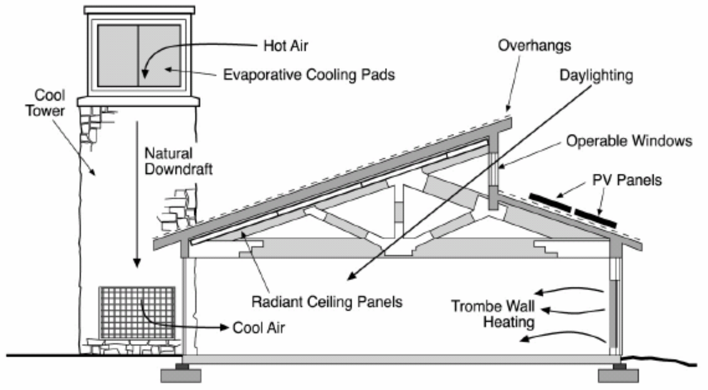
  Applicability: Community / Senior Buildings, Gymnasiums, Maintenance Buildings, new design or upgrade

  Environmental Benefits: Very High – Off sets electrical use

  Fiscal Benefits: Moderate to High

  Fiscal Impacts: Moderate to High Initial Costs with payback

  Maintenance Impacts: None



Source: NREL and NPS drawings.

- *Trombe Wall* is a sun-facing wall built from materials that can act as a thermal mass (such as stone, metal, concrete, adobe, or water tanks), combined with an air space, insulated glazing, and vents to form a large solar collector. Heated air flows by convection into the building interior. The vents have one-way flaps which prevent convection at night. An exhaust vent near the top is opened to vent to the outside during summer. Such venting makes the Trombe Wall act as a solar chimney pumping fresh air through the building during the day, even if there is no breeze.

  Applicability: Community / Senior Buildings, Gymnasiums, Maintenance Buildings -Selectively used, new design or upgrade

  Environmental Benefits: Very High - Off sets electrical or gas use

  Fiscal Benefits: Moderate to High

  Fiscal Impacts: Moderate to High Initial Costs with payback

  Maintenance Impacts: None

Sustainable Sites

Building Exterior and Hardscape Management

- Encourage environmentally sensitive building exterior and hardscape management practices that provide a clean, well-maintained and safe building exterior while supporting high-performance building operations.

  Applicability: All park building types, management practice

  Environmental Benefits: High

  Fiscal Benefits: None

  Fiscal Impacts: None (generally met through standard practices)

  Maintenance Impacts: Moderate to high- hands-on training and guidance

- Employ Best Management Practices (BMP's) which reduce harmful chemical use, energy waste, water waste, air pollution, solid waste, and chemical runoff when cleaning a building exterior, painting and sealing the exterior, and cleaning sidewalks, pavement, and other hardscape.

  Applicability: All park sites

  Environmental Benefits: High

  Fiscal Benefits: None

  Fiscal Impacts: None (generally met through standard practices)

  Maintenance Impacts: Moderate to high- hands-on training and guidance

- Replace conventional gas-powered maintenance equipment and vehicles with electric-powered equivalents.

  Applicability: All park sites

  Environmental Benefits: High

  Fiscal Benefits: Reduced Petrochemical dependence

  Fiscal Impacts: Moderate

  Maintenance Impacts: Moderate

Heat Island Reduction

- Use to minimize impacts on microclimates, human and wildlife habitats.
- Place parking spaces under cover with a roof having a Solar Reflectance Index (SRI) of at least 29, or a vegetated roof, or covered by solar panels.
- Use native or adapted trees and large shrubs, vegetated trellises, or other exterior structures supporting vegetation to shade paved areas.
- Use coatings or integral colorants for asphalt to achieve light-colored surfaces which reflect more heat. Dark pavements are quite warm, and the increase in albedo decreases the pavement temperature by about 8°F for a change in albedo of 0.1.
- Use other natural site elements beyond vegetation that maintain or restore the ecological integrity of the site, including; water bodies, exposed rock, unvegetated ground or other features that are part of the historic natural landscape within the region and provide habitat value.

  Applicability: All park sites, new design or upgrade

  Environmental Benefits: Very High

  Fiscal Benefits: Reduced maintenance

  Fiscal Impacts: Low to Moderate

  Maintenance Impacts: None

Light Pollution Reduction

- Reduce light spilling from the building and the site to increase night sky visibility, improve nighttime vision through glare reduction, and to reduce the impact from lighting on nocturnal environments.
- Non-emergency interior luminaires controlled to turn off during after-hour periods. Provide manual override capability for after hours use.
- Partially or fully shield all exterior fixtures so that they do not directly emit light into the night sky.
- Use light-colored, high-albedo roof surfaces to reduce heat absorption.
- Clean roof surfaces at least every 2 years to maintain good reflectance.

Applicability: All park sites

Environmental Benefits: High- reduces heat absorption and provides needed shade.

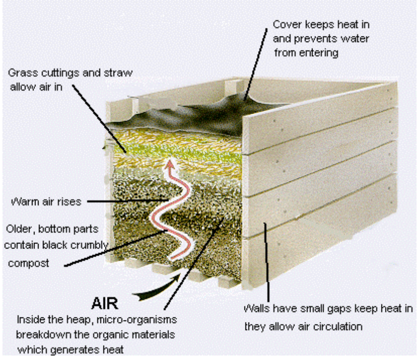
Fiscal Benefits: None

Fiscal Impacts: Moderate to high (expensive paving materials and structures)

Maintenance Impacts: Minimal

Integrated Pest Management, Erosion Control, and Landscape Management

- Use of least toxic chemical pesticides, minimum use of chemicals, used only in targeted locations, and use only for targeted species.
- Use measures which prevent erosion and sedimentation, prevent air pollution from dust or particulate matter, and restore eroded areas.
- Divert landscape waste from the waste stream via mulching, composting, or other low-impact maintenance practices.
- Minimize chemical fertilizer use.



Applicability: Incorporate into all park site management practices

Environmental Benefits: Very High- a cleaner environment and less burden on landfills by re-using organic materials in the parks.

Fiscal Benefits: Reduced Petrochemical dependence, reduced waste stream impact

Fiscal Impacts: None (generally met through standard practices)

Maintenance Impacts: Moderate to high- hands-on training and guidance

Materials and Resources

- *Implement a Sustainable Purchasing Policy* for Durable Goods, Facility Alterations and Additions, and Reduced Mercury in Lamps. Evaluate the items that are purchased for the buildings, identify more environmentally friendly alternatives, and establish a policy to purchase these alternatives when economically feasible. Work with suppliers to identify environmentally preferable products that meet the needs of the buildings.
  - Try to use products which contain at least 10% postconsumer and/or 20% postindustrial material.
  - Products should contain at least 50% rapidly renewable materials.
  - Products should contain at least 50% materials harvested and processed or extracted and processed within 500 miles of the project.
  - Purchases should consist of at least 50% Forest Stewardship Council (FSC)-certified paper products.
  - Batteries purchased should be rechargeable.
  - Equipment should be ENERGY STAR qualified.

Applicability: All park sites

Environmental Benefits: Very High

Fiscal Benefits: Moderate

Fiscal Impacts: Low Initial Cost

Maintenance Impacts: Moderate to high- hands-on training and guidance

- *Implement a Solid Waste Management Policy* to facilitate the reduction of waste generated by building occupants that head to disposal in landfill facilities.
- *Encourage and facilitate the composting*, re-use, and recycling of items where possible.
- Identify markets for salvaged materials.
- *Divert demolition and construction debris from disposal in landfills*. Redirect recyclable recovered resources and reusable materials to appropriate locations.

Applicability: All new park sites and park upgrades

Environmental Benefits: Very high

Fiscal Benefits: Low

Fiscal Impacts: Low initial cost

Maintenance Impacts: Moderate to high- hands-on training and guidance

Indoor Environmental Quality

- *Establish minimum Indoor Air Quality (IAQ) performance* to enhance indoor air quality in buildings, thus contributing to the health and well-being of the occupants.
  - Implement and maintain an HVAC system maintenance program to ensure the proper operations and maintenance of HVAC components as they relate to outdoor air introduction and exhaust.
  - Test and maintain the operation of all building exhaust systems.

- The EPA's *"Guidelines for HVAC System Maintenance"* provides guidance on developing, implementing, and maintaining HVAC system components as they relate to IAQ.
- Encourage the use of natural, non-mechanical ventilation where possible.

Applicability: All existing park building HVAC systems

Environmental Benefits: High

Fiscal Benefits: None

Fiscal Impacts: Minimal

Maintenance Impacts: Moderate to high- hands-on training and guidance

- *Encourage the use of natural Daylight and Views* to establish a connection between indoor spaces and the outdoors.
  - Provide sunlight redirection and/or glare control to ensure daylight effectiveness.
  - Achieve skylight roof coverage of between 3% to 6% of the roof area.
  - Establish a minimum daylight illumination level of 25 foot-candles.

Applicability: All new park building design, and park upgrades where feasible

Environmental Benefits: High

Fiscal Benefits: None

Fiscal Impacts: Moderate

Maintenance Impacts: None

- *Establish a written Green Cleaning Policy addressing SOP's*, sustainable products and equipment, chemical handling and storage, and staff training.
  - Use chemical concentrates with appropriate dilution systems to minimize chemical use wherever possible.
  - Use sustainable cleaning materials, products, and equipment.
  - Where possible, use battery-powered equipment, which is ergonomically designed to minimize vibration, noise, and user fatigue.

Environmental Benefits: High

Fiscal Benefits: None

Fiscal Impacts: Minimal

Maintenance Impacts: Moderate to high- hands-on training and guidance

Educational Component

- *Provide public educational signage* and displays to address and educate about "Energy Efficiency" systems used, and methods applied.
  - To provide effective information
  - To encourage learning experiences
  - To help maintain the image of the park

Applicability: All park sites

Environmental Benefits: High – Education of the public about "Green" technologies and exposure to some they might not know about.

Fiscal Benefits: None

Fiscal Impacts: Minimal

Maintenance Impacts: None

4. Conclusion:

The aforementioned technologies and practices are all applicable in our County Parks. Some require little or no fiscal outlay to implement, with a realignment of existing policies and practices. Others technologies may take a moderate to high capital expense.

Alternative "Green" technologies have a payback if implemented. For example, grid-interactive Solar Photovoltaic can have a direct payback or credit. Other technologies offset the use of fossil fuels, and may not provide a direct savings, however they have a positive environmental benefit. The time is right for the County to take a leadership role and implement green technologies where possible. The public will be educated and informed by seeing these at work in our County Parks.

The Technologies and Practices recommended for implementation at Obregon Park are as follows:

- **Minimum Indoor plumbing fixture and fittings efficiency**.
  - Replace existing inefficient fixtures with current efficiency standards models.
  - This will reduce indoor potable water use which has a high environmental benefit with a low fiscal benefit.
- **Photovoltaic Array**
  - A Minimum system would be to locate a 50 kW PV array on the existing Gym roof.
  - PermaCity Construction Corp's. estimate indicates the installation would result in a 40% savings offset in daily electrical use. Payback time with this system is approximately eleven years.
  - Net cost after rebates would be about $281,000.
  - The system could be expanded to offer more savings by locating additional arrays on the existing Multi-Purpose and Senior Buildings. This could account for an additional 40% or more savings.
- **Solar Pool Heating System**
  - 16,844 Therm System would heat the Pool.
  - The PermaCity estimated cost for this system is approximately $83,000.
  - Anticipated payback is six years.
- **Solar Water Heating System**
  - A 2,500 Therm System would heat water for 200 showers in the Pool Building. This would be coupled with a conventional backup system.
  - The PermaCity estimated cost for this system is approximately $92,000.

- The anticipated payback for this system is long-term, but would result in a high environmental benefit.

- **Passive Down-Draft Cooltowers (2)**
  - Located at the Northeast corner and South exterior wall of the existing Gymnasium Building.
  - This system will significantly increase airflow and ventilation inside the Gym.
  - Moderate to high initial costs with an off-set to electrical usage.
  - Will improve indoor air quality with a passive solar energy source.
- **Solar Site Lighting**
  - Moderate initial cost with immediate returns.
  - This system could be implemented with periodic maintenance repair and upgrades.
  - Improved environmental benefits.
- **Heat Island Reduction**
  - Two existing parking lots could be improved with the installation of “Green” shaded parking roofs. These would also provide addition area for the installation of PV panels if an expanded system is desired.
  - Implement with low-albedo permeable paving as outlined in the Stormwater Management Efficiency.
  - A simpler system would be to provide more trees in the parking areas to provide additional shade. However, the minimal on-site parking precludes eliminating parking spaces to create planted islands.
  - High initial cost would not be offset by energy savings, but would provide environmental benefits.
- **Bicycle Racks**
  - Provide for alternate commuting patrons
  - Low initial cost with environmental benefits.
- **Sustainable Purchasing**
  - Implement a Sustainable Purchasing Policy for Durable Goods and Facility Alterations and Additions.
  - Implement as part of regular management practices.
  - Large environmental benefit using renewable and sustainable materials.
- **Solid Waste Management Policy**
  - Diversion of materials from the waste stream and landfills.
  - Recycling Center implemented in the park following DPW guidelines.
  - Composting Center implemented in the park following DPW guidelines.
  - Public Educational Component tie-in.
- **Green Cleaning Policy**
  - Implement sustainable and environmentally friendly material purchase.

1. Objective:

The objective of the Site Efficiencies Potable Water Reduction Study is to:

- Evaluate alternative methods of planting, state-of-the-art irrigation devices and related practices for potable water reductions.
- Evaluate reclaimed water as an alternative cost effective water source.
- Use the project study findings to inform the development of Los Angeles County Park Design Guidelines.
- To create awareness of the potential economic, environmental and social benefits of using sustainable practices in park design.

2. Description:

This project seeks to minimize site related water consumption through a combination of planting and irrigation techniques.

The goals of this research study are to:

1. Quantify water savings resulting from turf replacement (where appropriate) with drought tolerant plants.
2. Understand water saving strategies found in California State Assembly Bill 1881 Model Water Efficient Landscape Ordinance[1]
3. Quantify water savings resulting from the replacement of the existing antiquated irrigation system with a new efficient system.
4. Quantify potential dollar savings resulting from irrigating with reclaimed water.

3. Research:

The Landscape models will:

- Demonstrate the technique of hydrozoning; grouping plants with similar water requirements on common zones each with a dedicated valve. Demonstrated in our conceptual design.

- Explore the amount of turf needed for active recreation areas, passive picnicking areas and develop criteria to determine where shrub material is most suitable.

- Explore creating a watering schedule based on the plant's water needs, and the precipitation rate of the irrigation heads in each zone.

- Explore the potential financial savings of upgrading an existing irrigation system using the latest technologies, devices and methods that improved efficiency.

- Analyze the water saving potential of an adjusting irrigation schedule supported by an ET controller with a rain sensor produced water savings.

- Explore the water savings and dollar saving potential of irrigating with recycled water

- Explore the potential impact on soil and plant material as a result of irrigating with recycled water.

- Explore potential water savings using the state of California *Maximum Applied Water Allowance (MAWA)*[2]*,* the following models will be explored:

  1. Potable water irrigation

     - A percentage of turf reduction with a substitution of drought tolerant plant material.
     - Using Warm season turf grass on active recreational fields.
     - Replacing the existing irrigation system with a new efficient irrigation system.

- Explore the requirements set in California State Assembly Bill 1881 Model Water Efficient Landscape Ordinance[3] Chapter 2.7, Sections 490 through 495, proposed Regulations In Division 2, Title 23, California Code of Regulations[4],

Research Details

Automatic Irrigation Systems and Plant Water Needs

Automatic irrigation systems are responsible for significant water use in all developed landscape settings. While automatic irrigation systems can reduce labor costs, they often increase resource costs. In the best cases, the maximum total efficiency of most existing irrigation system is approximately 70%. This means, of the water that comes out of the irrigation heads, no more than 70% makes it to the plant's root zone. At least 30% and more often, over 50% of the water applied is lost to a wide variety of factors including wind, evaporation, the system design, installation methods, maintenance and scheduling. It is common for a single system to have problems with all these factors.

There are several components that increase the efficiency of an irrigation system. They are; using matched precipitation irrigation heads, choosing low-volume low-angle spray head or rotors for lawn areas, selection of heads that fit the size and shape of the areas to be watered, and head to head coverage.

The Plant Selection and Watering Schedule Connection

Of the factors that lead to an inefficient irrigation, water scheduling is one of the most prominent. An irrigation water schedule based on science. An efficient irrigation system watering schedule is determined by the plant coefficient factor, defined as; the amount of water the specific plant needs to survive determined by the plant species, the plant density and the local microclimate. For example, plant species with medium water needs have a species factor of 0.5 when planted inland. The same plant installed in a coastal environment will have low water needs a coefficient factor of about 0.3.

Hydrozoning

Hydrozoning (grouping plants together with the same water requirements) is one of the best strategies for water reduction. When combined with irrigation design isolating the different hydrozones, each zone can be irrigated separately for the appropriate amount of time for the plants in a particular zone, preventing the

[1] http://www.owue.water.ca.gov/docs/WaterOrdIndex.cfm

[2] http://www.owue.water.ca.gov/docs/WaterOrdSec492.cfm

[3] http://www.owue.water.ca.gov/docs/WaterOrdIndex.cfm

[4] State of California Water Code http://www.leginfo.ca.gov/cgi-bin/calawquery?codesection=wat&codebody=

overwatering of low water requiring plants to provide sufficient water to high water requiring plants. For example, one group of plants may need watering for 20 minutes, while another group of plants may need only 10 minutes.

The standard source of information about the plant species coefficient factor related to area is **WUCOLS** which stands for ***Water Use Classifications of Landscape Species***.[5]

Evapotransporation (ET)

Plants need the amount of water that is lost through evapotransporation (ET) "evaporation and transpiration" and ET needs vary with plant type. Historically, the irrigation season in the Pacific Southwest is May through September, with a small amount of water needed in October. July and August are the months of highest ET, with water needs in May, June or September amounting to less than half the water needed in July or August. In order for efficient watering to occur, the system must be programmed to apply the amount of water needed – which as explained above is the amount of ET replacement – in an even distribution pattern. This involves at least approximate tracking of the weather (actual ET is calculated according to five weather-related variables, including temperature, wind speed, solar radiation, dew point and relative humidity)**.** The plant root zone must also receive the water applied. If soil is compacted or heavy, much of the water applied may run off before it reaches the roots, or even the soil surface.

Rain is a Factor

Often, a system is turned on at the first sign of good weather and turned off again when fall rains begin, with the irrigation schedule adjustments made on a "best guess" basis. In such cases, much of the water applied during the "shoulder" months of May or June and September would be wasted since the base watering schedule is usually set to what is needed to keep the landscape green during the hottest summer weather. Similarly, if the water distribution pattern is not uniform, the entire landscape may be over-watered to ensure no brown spots occur in problem areas in the lawn.

Using an ET controller (Smart Controller) with a rain sensor has the potential to produce significant water savings. This type of controller is connected to a local weather station. In this condition, the controller changes the watering schedule twice daily according to current weather conditions.

Note the ET controller and rain sensor produce more savings than the ET controller alone. The rain sensor device has a 24 hour rain delay, which keeps the controller from coming back on for 24 hours after the sensor signals it to stop.

Plant Selection, ET, Rain and how it works in a Watering Schedule

In the example **Exhibit 1**; the first table calculation illustrates a non-scientific "rule of thumb" water schedule. The example is based on, watering 4000 square feet of Cool season grasses, the controller would be set for 35-45 min. based on previous experience and it would probably remain the same all year round.

The second table calculation shows an efficient system with a smart controller watering the same 4000 square feet of cool season grasses; this example produces a net savings of 43,000 gallons a year.

The third table calculation shows the same 4000 square feet with the same efficient system, and replacing the cool season grasses with drought tolerant plants, we have a savings of 133,000 gallons a year.

[5] The department of Water Resources State of California web site: http://www.owue.water.ca.gov/landscape/faq/faq.cfm

Conclusion:

The water savings resulting from increasing the amount of planted area in a park with drought tolerant planting (where appropriate) along with an efficient irrigation system is quantifiable.

First Table

REGULAR PRECIPITATION RATE IRRIGATION SCHEDULE BASED ON 4 DAYS /WK	
	VALUE 1 @ 25 GPM
WINTER /WK	35 MIN.
SPRING /WK	35 MIN.
SUMMER /WK	35 MIN.
FALL /WK	35 MIN.
140 MIN. X 4 /WK = 560 MIN. X13 WKS = 7280 MIN.	
TOTAL WATER YEAR 182,000 GAL.	

Second Table

HIST. (potential) ETo + PLANT FACTOR .8 THIRSTY LAWN GRASS IRRIGATION SCHEDULE BASED ON 4 DAYS /WK	
	VALUE 1 @ 25 GPM
WINTER 0.53 /WK 19 MIN. X.8	16 MIN.
SPRING 1.05 / WK 31 MIN. X.8	29 MIN.
SUMMER 1.38 /WK 48 MIN X.8	38 MIN.
FALL 0.87 /WK 30 MIN. X.8	24 MIN.
107 MIN. X 4 /WK = 428 MIN. 456 MIN. X13 WKS = 5564 MIN.	
TOTAL WATER YEAR 139,100 GAL.	

Third Table

HIST. (potential) ETo + PLANT FACTOR .3 LOW DROUGHT TOLERANT PLANTS IRRIGATION SCHEDULE BASED ON 4 DAYS /WK	
	VALUE 1 @ 25 GPM
WINTER 0.53 /WK 19 MIN. X.3	6 MIN.
SPRING 1.05 / WK 31 MIN. X.3	9 MIN.
SUMMER 1.38 /WK 48 MIN X.3	14 MIN.
FALL 0.87 /WK 30 MIN. X.3	9 MIN.
38 MIN. X 4 / WK = 152 MIN. 136 MIN. X13 WKS = 1976 MIN.	
TOTAL WATER YEAR 49,400 GAL.	

Exhibit 1

Warm Season Turfgrasses Option

Warm season turfgrasses such as bermudagrass, zoysiagrass, buffalograss, St. Augustinegrass and seashore paspalum use at least 20% less water than the cool season grasses. These grasses have a higher efficiency during the photosynththesis process, which results in the warm season grass having a lower transpiration rate requiring less water. Although these grasses have a potential benefit regarding water savings, understanding the year round appearance of this grass is crucial. Warm season grasses undergo dormancy period during the colder winter months. The length and degree of dormancy are affected by temperature that in turn is affected by factors such as proximity to the ocean and altitude. Another challenge with maintaining warm season grasses, especially on sites heavily populated with trees, is poor shade tolerance that is compounded by heavy traffic[6]. Despite there being no perfect turfgrass species for California, warm season species are the future of landscapes and remain a viable option for our parkland.

A feasible Option for Warm Season Grasses

Warm season grasses should be installed in all sunny active fields and areas where there is little shade.

Locally, there is a species of Hybrid Bermudagrasses available through Pacific Sod. This warm season turfgrass was developed specifically for recreational fields. These species are;

[6] Jim Baird, Assistant Specialist in Cooperative Extension, University of California, Riverside California, Department of Botany and Plant Science and J. Michael Henry, Farm Advisor, Cooperative Extension Riverside County California.

- Tough & durable - more durable than Fescue or Bluegrass
- Highly tolerant to heat and heavy traffic
- Excellent wear recovery
- Thrives in full sun conditions
- High Salt Tolerance

GN-1 A product of the Greg Norman Turf Company, GN-1 sod is well suited for sports turf, and golf courses. This sod has a dormancy of 75% for a period of approximately 3 months. Currently it is installed at Hollywood Park where it is irrigated with recycled water.

Assembly Bill 325 and 1881 Model Water Efficient Landscape Ordinance Requirements

Landscape water conservation offers more potential for water savings than any other action California water users can take. To help achieve these savings and to improve the efficiency of water use in new and existing urban irrigated landscapes, the State of California Department of Water Resources developed AB 325 the Model Local Water Efficient Landscape Ordinance which took affect in January 1993. Because of the severe drought in 1991, the County of Los Angeles authored the "County-of-Los-Angeles-Anti-Waste Ordinance", which terminated in 1993.

As a result of the increasing current California drought, water reserves are extremely low. In response to these conditions California has developed a new plan aimed to achieve a 20 percent reduction in water use per capita, statewide by 2020. To achieve this goal the California Urban Water Conservation Council (CUWCC) requested that a stakeholder task force, composed of public and private agencies convene and evaluate the existing ordinance. A comprehensive set of 43 recommendations, to the Model Local Water Efficient Landscape Ordinance was begun in 2006. In October 7, 2008 the County of Los Angeles Board of Supervisors unanimously adopted a water conservation urgency ordinance for the unincorporated County areas.

The updated Model Local Water Efficient Landscape Ordinance is in the final draft stage and the State of California Department of Water Resources was scheduled to adopt the updated Model Water Efficient Landscape Ordinance by January 1, 2009. Local agency (cities and counties including charter cities or charter counties) are required to adopt the updated Model Ordinance or adopt its own local landscape ordinance that is at least as effective as the updated state ordinance until January 1, 2010.

In light of this, the County of Los Angeles may choose to adopt the new state's ordinance or further update the "urgency ordinance" to have the same force and effect as the new state's ordinance.

This ordinance applies to all of the following landscape projects:

- new construction and rehabilitated landscapes for public agency projects and private development projects with a landscape area equal to and greater than 2,500 square feet; requiring a permit, plan check, or design review;

- new construction and rehabilitated landscapes which are developer-installed in single-family and multi-family residential projects with a landscape area equal to and greater than 2,500 square feet requiring a permit, plan check, or design review;

- new construction and rehabilitated landscapes which are homeowner-provided and/or homeowner-hired landscaping in single-family and multi-family residential projects with a landscape area equal to and greater than 2,500 square feet requiring a permit, plan check, or design review.

- existing landscapes with a landscape area equal to or greater than 2,500 square feet

- cemeteries, with recognition of the special landscape management needs of cemeteries

This ordinance does not apply to:

- Registered local, state or federal historical sites;

- Ecological restoration projects that do not require a permanent irrigation system;

- Mined-land reclamation projects that do not require a permanent irrigation system;

- Projects with a landscaped area less than 2,500 square feet,

- Botanical gardens and arboretums open to the public.

Provisions for Existing Landscapes

All existing landscaped areas to which the County provides potable water of one acre or more, including golf courses, green belts, and parks the local agency are to administer programs that may include, but not limited to irrigation water use analyses, irrigation surveys and irrigation audits to meet the existing landscape Maximum Applied Water Allowance.

A Tool for Parks and Recreations

Provisions for Special Landscape Area (SLA)

Special Landscape Area (SLA) is an area of the landscape dedicated solely to edible plants, areas irrigated with recycled water, water features using recycled water and areas dedicated to active play such as parks, sports fields, golf courses, and where turf provides a playing surface. This provision allows us to use additional water for our active recreational fields.

Alternative Methods of Water Conservation - Recycled Water

It is well-known that many species of turfgrass and trees and shrubs are quite tolerant of recycled water. Some species of trees and shrubs, however, are susceptible to certain attributes of recycled water, especially after several years of exposure. The question facing the County now and into the future is not whether recycled water should be used to irrigate landscapes, but rather how do we best manage landscapes using recycled water.

Water quality for trees and shrubs is important in determining whether plants will thrive. Generally, in the context of landscape irrigation, six aspects of water govern its quality: soluble salts (salinity), sodium, bicarbonate, pH, nutrient elements and potentially harmful levels of chloride. The water source prior to recycling is an important factor in the salinity and concentration of other constituents that can adversely affect trees and shrubs.

Salinity is an indication of the concentration of dissolved salts in irrigation water. Salinity is the most important measure of water quality for trees and shrubs. When excess salts are added to the soil, they can cause a buildup of salts in and on plants foliage. Most commonly dissolved salts in recycled water are associated with sodium and bicarbonate.

Irrigating with water that is high in sodium can change soil structure, resulting in poor permeability. As sodium accumulates in the soil, it attaches to soil particles, forming a crust which impedes drainage. Poor drainage stresses plants and depletes the soil of needed oxygen for root growth.

Irrigating with water that has a high bicarbonate level can change soil structure. Recycled water high in bicarbonate will precipitate calcium and magnesium from soil water as the soil water or solution concentrates through evapotranspiration. This results in a higher proportion of sodium.

The pH of irrigation water can affect the availability of nutrient elements. Deficiencies or excesses of certain elements cause stress. For example, consistently high pH causes an iron and/or manganese deficiency in foliage, resulting in yellowing (chlorosis), which ultimately causes leaves and twigs to die.

Typically, the nutrient levels in recycled water are more than adequate for trees and shrubs. This has the added benefit of potentially reducing the need for fertilization. Nitrogen, phosphorus, potassium and sulfur are the nutrient elements of greatest benefit through the use of recycled water.

Plant Selection

Generally, turfgrasses are tolerant of recycled water either through built-in resistance or because turfgrass is mowed frequently, preventing salts and toxic levels of elements from accumulating. Most annual and perennial plants are quite tolerant because the plant dies back or is removed at the end of the growing season, thereby preventing a buildup of salts and toxic levels of elements in the stems and foliage.

Plants most affected are trees, especially conifers or evergreens such as spruces, pines and firs. Some species, such as pinon pine and upright junipers are very tolerant. Deciduous trees are much more tolerant than conifers because they lose their leaves each fall, thereby preventing a buildup of harmful constituents from season to season. To a large extent, the landscape manager or grounds superintendent must rely on observation and experience when determining the susceptibility of plants to salts and other potentially harmful constituents in water. The Salinity Management Guide website address below provides list of plants including trees, shrubs, ground covers and vines that are tolerant of recycles water. [7]

Soil Quality

Soil quality and drainage can influence plant health when using recycled water. Heavy soils, poor drainage and compaction can create conditions that cause an accumulation of salts. Sandy soil with good drainage is better than clay soil with poor drainage for recycle water irrigation. The best way to eliminate high salt levels is leaching, which requires adequate irrigation and good drainage or percolation rates. Aerating the soil on a regular basis is one practice that will help increase and maintain drainage in the root zone of plants.

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[7] Salinity Management Guide by WateReuse Foundation
http://salinitymanagement.org/Salinity%20Management%20Guide/cp/cp_7.html

A Landscape Plant Salt Tolerance Selection Guide For Recycled Water Irrigation by Lin Wu and Linda Dodge 2005, Department of Plant Sciences, University of California, Davis CA 95616
http://groups.ucanr.org/slosson/Landscape_Plant_Selection_Guide_for_Recycled_Water_Irrigation/

Other sources;

- *Landscape Plant Lists for Salt Tolerance Assessment*, by S. Miyamoto, I. Martinez, M. Padilla, A. Portillo, and D.Ornelas, 2004. Agricultural Research and Extension Center of El Paso, Texas Agricultural Experiment Station, Texas A&M University System; report, 12 p.
- *Landscape Plant Salt Tolerance Selection Guide for Recycled Water Irrigation*, by Lin Wu and Linda Dodge, 2005. A Special Report for the Elvenia J. Slosson Endowment Fund, University of California, Davis; article, 40 p.
- Salinity and turfgrass culture, by M. Ali Harivandi, Jack D. Butler, and Lin Wu, in *Turfgrass* — Agronomy Monograph no. 32, by D. V. Waddington, R. N. Carrow, and R. C. Shearman (eds.), 1992. American Society of Agronomy, Madison, WI; book chapter, 22 p.
- *Abiotic Disorders of Landscape Plants: A Diagnostic Guide*, by Laurence R. Costello, Edward J. Perry, Nelda P. Matheny, J. Michael Henry, and Pamela M. Geisel, 2003. University of California Division of Agriculture and Natural Resources, Oakland, California, Publication 3420; softbound, 242 p. To order a copy of the book, visit the publisher's website (http://anrcatalog.ucdavis.edu).

Most trees and shrubs tolerate a relatively wide range in soil pH. As the soil pH rises above 7.0, however, some plants develop deficiencies in elements such as iron and manganese, causing foliage to turn yellow. Soil pH can be lowered by periodically applying sulfur above that provided by recycled water. Or, individual plants can be treated with iron or manganese to alleviate the problem and improve health.

Obregon the Pilot Project - Project Data

Although the microclimate of our parkland's landscaped areas vary over the County of Los Angeles, Obregon Park has been used to estimate water needs to illustrate potential site potable water efficiency potentials.

Existing Irrigation

Currently the irrigation scheduling is determined by sight inspection. Rain control is manually accomplished by operational staff stationed at Belvedere Park; the park irrigation is turned off as needed or by weather forecast, this requires additional man hours of monitoring and driving.

The irrigation system is the original system, installed when the park was developed (1960s). The lateral pipes are made of galvanized materials which have deteriorated over the years; this galvanized system continues to break down requiring additional man hours in repair.

There is less than 50 pounds per square inch of pressure for the irrigation systems' operation. The combination of pressure and gallons per minute available through the existing system prevents successfully running more than one valve at a time. The result is an insufficient watering window during hours when the park is closed.

Currently, large areas of brown spots are present in the turf and areas with failed plant material exist on the site. The following exhibits are photographs of failed turf areas taken of the site. The greatest concern the maintenance personal has regarding this existing system is the need to increase the water schedule for the summer months and possibly having to run the irrigation system during the time the park is opened to the public. See Image **A and Images B**

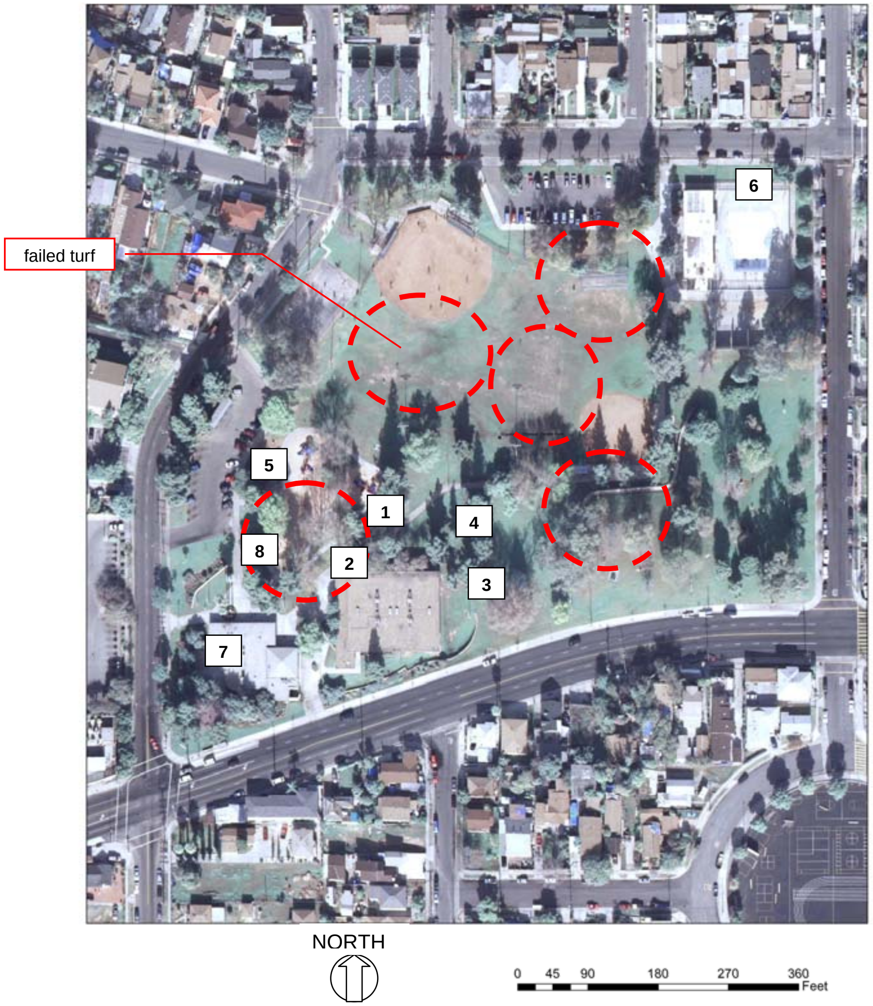

Image A

Image B

Potable Water Irrigation System Study

Actual Landscape Water Use at Obregon Park

The average amount of water currently use for landscape irrigation at Obregon is

10,606 (100) cubic feet per year; the costs for landscape irrigation per year has been $20,400.99 = $1.92 per 100 cubic feet.

The goal for site irrigation water usage is to not exceed the Maximum Applied Water Allowance (MAWA) provided in the state's Model Water Efficient Landscape Ordinance, while supporting a healthy landscape.

The MAWA Calculation for Obregon Park is;

MAWA = (ETo)(0.62) [0.7 x LA+ 0.3 x SLA]

(50.1)(0.62) [0.7 x 313,632.0 sf +0.3 x 123,620 sf] =
7,971,379 gal. per year/ 748
= 10,657 (100) cubic feet per year

Definitions
(MAWA) = Maximum Applied Water Allowance
(ETo)= Reference Evapotraspiration
(0.7) = ET Adjustment Factor
(LA) = Landscape Area
(0.62) = Conversion Factor
(SLA)= Special Landscape Area
(0.3) = Additional ET adjustment for SLA
ETWU = Estimated Total Water Use

The calculated MAWA is slightly over the current water use at Obregon Park. This calculation is misleading, although the current irrigation system operates within the state guidelines, the systems inefficiency prohibits applying the necessary amount of irrigation to support healthy plants and turf.

The Estimated Total Water Use (ETWU) is calculated by summing the irrigation schedules. ETWU is the amount of water the plant material requires for healthy growth on that specific site. Another method is by summing the hydrozones. With this method we can also estimate the savings of water determined by the amount of turf is replaced by drought tolerant plants.

ETo x 0.62 x Plant Factor x Hydrozoned Area / irrigation efficiency + SLA. We have given the existing irrigation system an efficiency level of 50%

Obregon with entire site with planted with cool season turf 304,223 square feet turf (97%) and 9,408 plant material (3%).

Hydrozone A 97% turf

50.1 x 0.62 x 0.8 x 304,223.0 / 0.5 + 0 = 15,119639 gal. per year = 20,213 (100) cubic feet per year

Hydrozone A 3% plant material

50.1 x 0.62 x 0.5 x 9,408.0 / 0.5 = 292,231 gal. per year = 391 (100) cubic feet per year

Current effective precipitation 15.0 cubic inches per year = 15.0 x 313,632 gal. per year 27.0 (100) cubic feet per year

ETWU for Obregon Park = 20,604 - 27.0 =20,577 (100) cubic feet per year

The water cost for this option would average = $39,508 per year.

The existing Obregon landscape of 97% cool season turf and 3% plant material requires a total of 20,577 (100) cubic feet per year to maintain the current landscape healthy and green. **See image C**

Image C

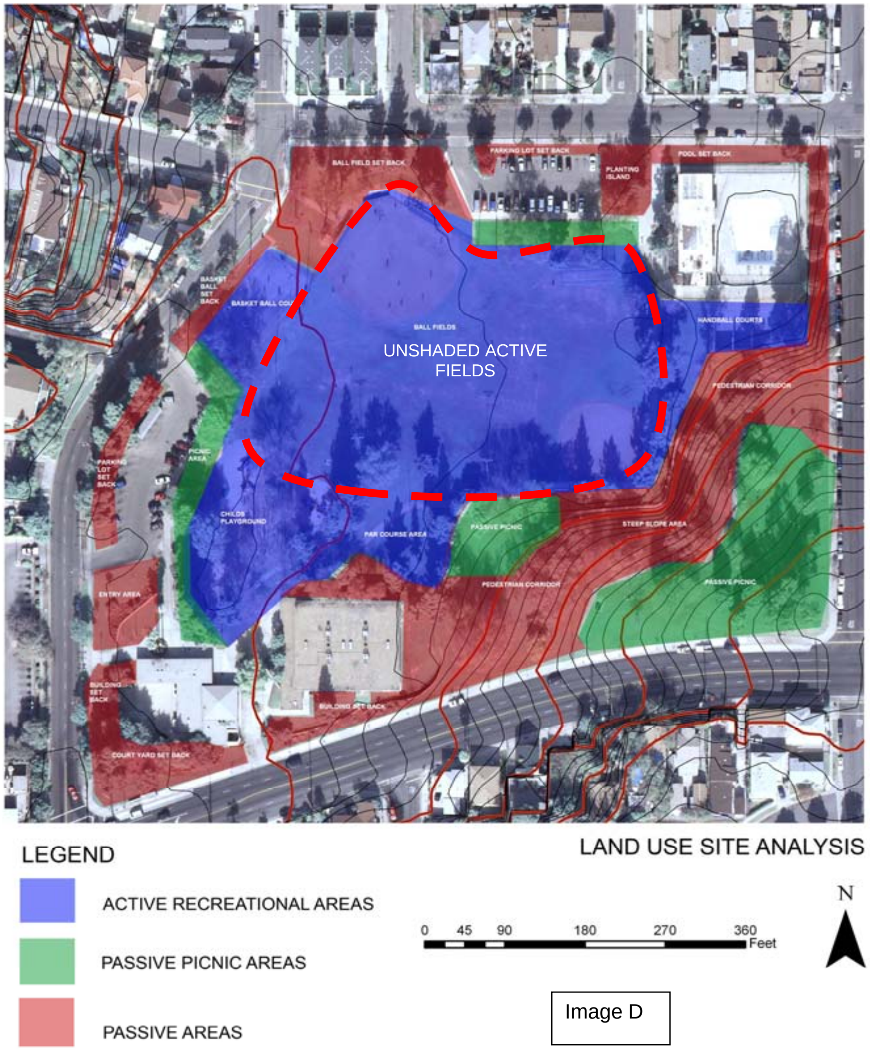

Image D

Evaluation of Active Recreational Areas, Passive Picnic Areas and Passive Areas

In effort to conform to the MAWA we need a clear understanding of where there is opportunity to remove turf, to accomplish this we developed a land use analysis. We separated the land uses into 3 categories active recreational areas (where turf is necessary), passive picnic areas (where turf is required) and passive non-pedestrian areas (where turf is not required). **Image D**

We systematically replaced the turf with warm season grasses and drought tolerant plant material and recalculated the "Estimated Total Water Use". We found in order to achieve our goal we would have, at minimum, approximately 75% turf (40% warm season grasses 35% cool season grasses) and 25% drought tolerant plant material.

Obregon Park planted with 75% turf (40% warm season grasses on sunny active fields and 35% cool season grasses in shaded areas) 25% drought tolerant moderate water loving plant material with an 85% efficient irrigation calculation below.

Hydrozone A - 40% warm season grasses

50.1 X 0.62 x 0.6 x 105,077 / 0.85 = 2,303,930 gal. per year = 3,080 (100) cubic feet per year

Hydrozone B - 35% cool season grasses

50.1 x 0.62 x 0.8 x 109,771 / 0.85 = 2,727,765 gal. per year = 3,647 (100) cubic feet per year

Hydrozone C - 25% drought tolerant plant

50.1 x 0.62 x 0.5 x 78,408 / 0.85 = 1,432,652.0 gal. per year = 1,915 (100) cubic feet per year

ETWU for Obregon Park = 8,642 - 27.0 =8,615 (100) cubic feet per year.
The water cost for this option would average = $16,540 per year

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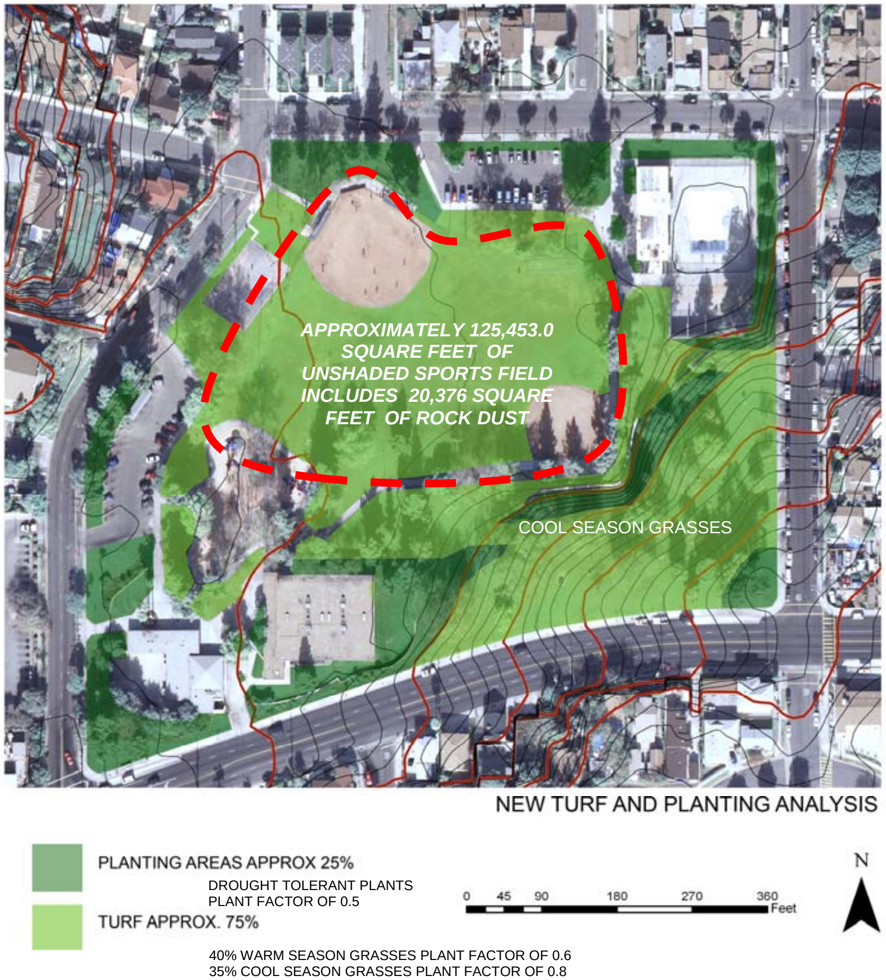


Image E

Our Planting Strategy

Cool season grasses remain on the slope in the picnic areas and where there is shade beneath the mature trees. Groundcovers replace the turf on the steepest part of the slope where little or no foot traffic is expected. Drought tolerant plant material is placed along the majority of the perimeter and adjacent to the buildings. Warm season grass is installed on the active recreational field.

With 75% turf (40% warm season and 35% cool season), 25% drought tolerant plant material and an efficient irrigation system the new Obregon landscape would require a total of 9212.0 (100) cubic feet per year to maintain the current landscape healthy and green . This option keeps us successfully below the MAWA, and provides a water and dollar savings as well as allows us to keep all the turf green and all plant material in good health. **See image E.**

The State of California Department of Water Resources references a comparison study of a high water use landscape project, and a landscape project using limited amounts of water on their website.

A study during the lifetime of the two landscape projects concluded the following findings:

- Both operational and maintenance costs (such as energy, water, fertilizers, pesticides, labor, fuel etc.) represented over 80% of the total cost, while the design and construction represented less than 20%.
- Both annual operational and maintenance costs were less than half in the low water-use landscape project compared to the higher water-use landscape project.
- The money saved each year as net savings in operational/maintenance costs in the low water-use landscape project generated financial cost savings.[8]

[8] http://www.owue.water.ca.gov/landscape/faq/faq.cfm

Alternative Methods of Water Conservation - Recycled Water

The County of Los Angeles Dept. of Parks and Recreations has begun efforts to irrigate all their park land using recycled water. Parks are selected by the proximity to the existing trunk lines belonging to the recycle Water Providers. Obregon is considered to be approximately 5-6 years away from a recycled water line connection. **Image F**

Option 1 *This option represents the existing landscape conditions at Obregon Park. The potable irrigation water is replaced with recycled water in the calculation below.*

ETo x Plant Factor x Hydrozoned Area x irrigation efficiency. We have given the existing irrigation system an efficiency level of 50%

Obregon with entire site with planted with turf 304,223 square feet turf (97%) and 9,408 plant material (3%).

Hydrozone A 97% turf

50.1 x 0.62 x 0.8 x 304,223 / 0.5 + 0 = 15,119639 gal. per year = 20,213 (100) cubic feet per year

Hydrozone A 3% plant material

50.1 x 0.62 x 0.5 x 9,409 / 0.5 = 292,262 gal. per year = 391 (100) cubic feet per year

ETWU for Obregon Park = 20,604 - 27.0 =20,577 (100) cubic feet per year

The water costs for this option would an average $33,582 per year; this includes 15% recycled water savings.

Option 2 *Obregon Park planted with 95% turf (40% warm season grasses on sunny active fields and 55 % cool season grasses in shaded areas) and 5% drought tolerant plant with an 85% efficient irrigation calculation below.*

Hydrozone A - 40% warm season grasses

50.1 X 0.62 x 0.6 x 105,077 / 0.85 = 2,303,930 gal. per year = 3,080 (100) cubic feet per year

Hydrozone B - 55% cool season grasses

50.1 x 0.62 x 0.8 x 172,498 / 0.85 = 5,042,948 gal. per year = 6,742 (100) cubic feet per year

Hydrozone C - 5% drought tolerant plant

50.1 x 0.62 x 0.5 x 15,682 / 0.85 = 286,538 gal. per year = 383 (100) cubic feet per year

ETWU for Obregon Park = 10,205 - 27.0 = 10,178 (100) cubic feet per year

The water costs for this option would an average $16,611 per year; this includes 15% recycled water savings.

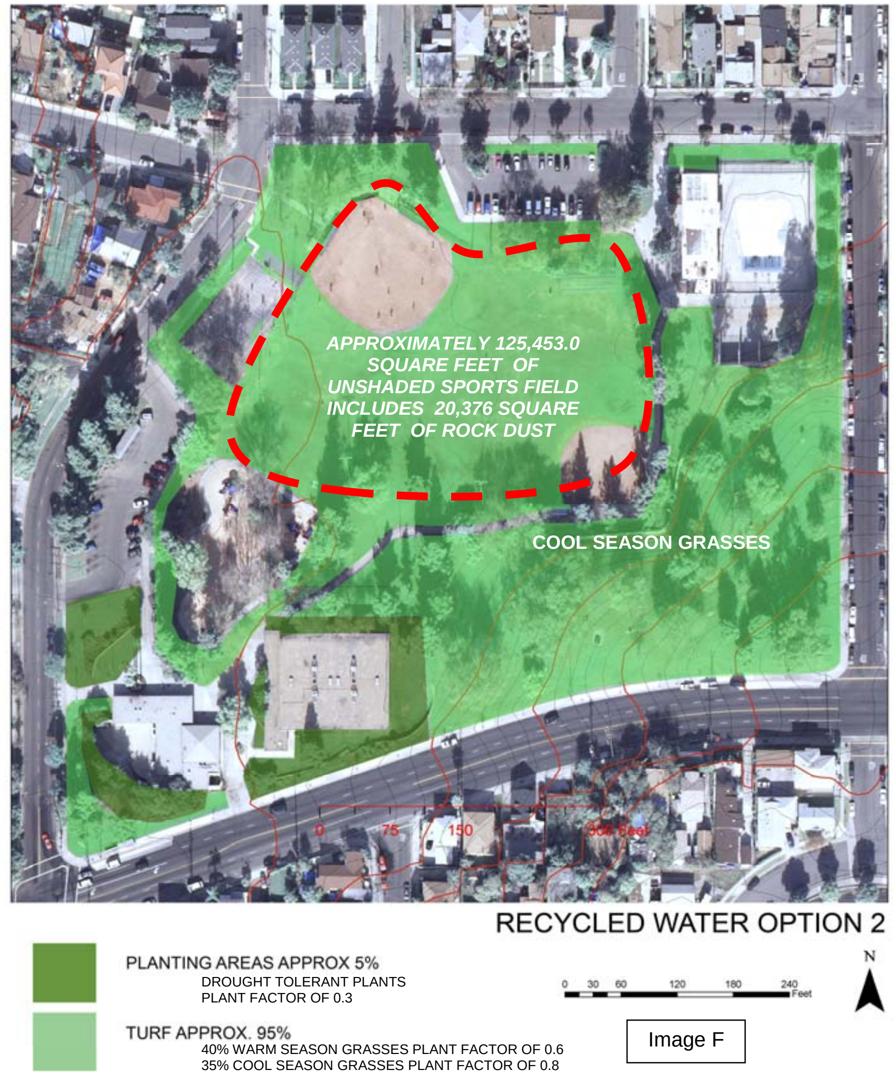


Image F

Cost Benefits Analysis						
	Potable Water System			Recycled Water System		
	Existing System Current Water Use 97% cool season Grass 3% Planted Area	Redesigned Irrigation System Irrigated to meet water requirements landscape o the existing landscape 97% cool season Grass 3% Planted Area	Proposed Irrigation system and planting 40% warm season grass 35% cool season grass 25% drought tolerant plants	Existing System Current Water Use 97% cool season Grass 3% Planted Area	Redesigned Irrigation System Irrigated to meet water requirements landscape o the existing landscape 97% cool season Grass 3% Planted Area	Proposed Irrigation system and planting 40% warm season grass 55% cool season grass 5% drought tolerant plants
Water Usage (100 cubic feet)	10,606	20,577	8,615	10,606	20,577	10,178
Cost	$20,400	$39,508	$16,540	$17,340*	$33,582*	$16,611 *
Savings	N/A	$0	$22,968	N/A	$0	$16,971
		0%	55%		0%	50%
* Includes reclaimed water costs savings of 15% and possibly more in the future.						

4. Conclusion:

Irrigated with Potable Water Option- Reduction of 55% in Potable Water and Costs Saving

The new Model Water Efficient Landscape Ordinance provides us with a valuable tool for developing a mathematical model for landscape water use, the "Maximum Applied Water Allowance" or MAWA. This mathematical model or MAWA is the basis for the planting and irrigation strategies for Obregon Park.

To not exceed Obregon Park's MAWA the turf areas would reduced to 75% (40% warm season turf on the sunny active fields and 35% cool season turf in shaded areas). The planting areas would increase to 25%, an irrigation system using "Smart" components would be design and installed. This allows us to water the entire site efficiently keeping the turf and all plant material in good health while saving water, man hours and consequently costs.

Applicability: Possibly all parks with verification of water use, land use and condition of irrigation system.

Environmental Benefits: High

Fiscal Benefits: Will very site to site.

Fiscal Impacts: Will very site to site.

Maintenance Impacts: Although drought tolerant plant material and warm season grasses require less maintenance, there is a need for on going maintenance field training.

Irrigated with Recycled Water Option – Reduction of 100% in Potable Water and Costs Saving

_Recycled water is an abundant, cost-effective source of water for irrigating parks, and golf courses. Its potential negative impact on new and established trees and shrubs will be negligible if proper planning and management techniques are implemented. As a prudent practice, landscape architects, park and golf course superintendents and other landscape professionals should be aware of potential negative factors when using recycled water. Factors such as physical conditions of the soil, salt tolerance of plant species, nature of planting sites, soil types and plant health care practices should be considered when making decisions related to planning and managing landscapes irrigated with recycled water. The timeline of connection to the recycle water trunk line for Obregon Park is a minimum of 5 years. **See Image G**

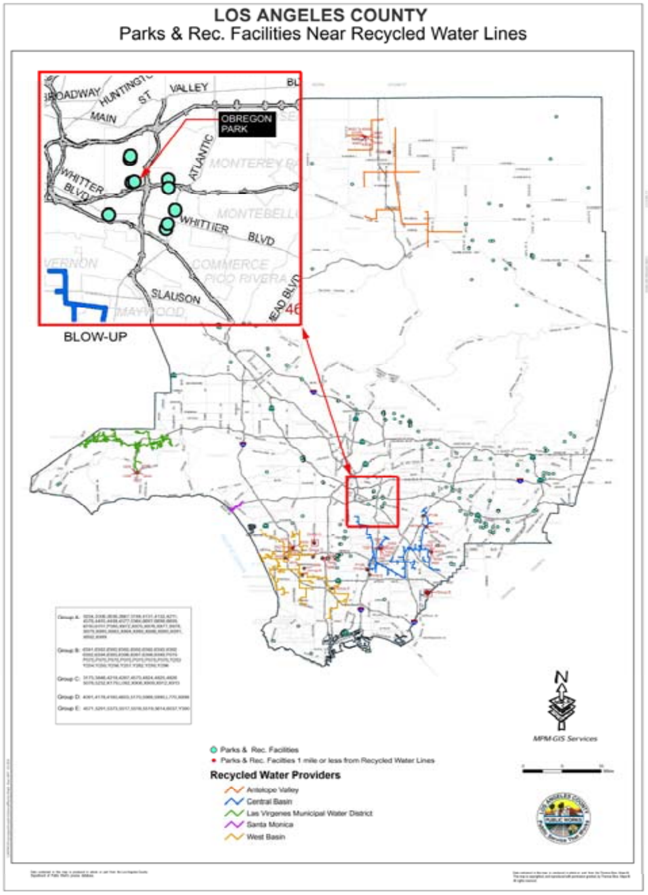
Applicability: Park in close vicinity to a recycle water trunk-line

Environmental Benefits: 100% Reduction of potable water, care should be taken to study site suitability prior to proceeding with reclaimed water.

Fiscal Benefits: Current cost savings 15%-50% less than potable water depending on the water district.

Fiscal Impacts: TBD

Maintenance Impacts: Moderate as determined in



Stormwater Management Efficiencies

1. Objective:

The Stormwater Management Efficiency objective is to manage rainfall and stormwater runoff by incorporating state of the art water quality improvement methods and water conservation techniques through Low Impact Development (LID) practices.

The problems to be addressed at Eugene A. Obregon Park:

- Reduce volume of stormwater runoff
- Property damage as a result of flooding
- Health and safety risks from water ponding
- Improve water quality
- Erosion Control

The following are desirable outcomes:

- Implement highly efficient, cost-effective stormwater management features throughout project site.
- Manage on-site stormwater.
- Direct run-off from impervious surfaces to pervious areas for infiltration and recharge.
- Reuse rainwater for non-potable applications i.e., irrigation.
- Promote stormwater management awareness through LID practices.
- Create environmental benefits through stormwater management.
- Enhance aesthetic value of the park creating livable communities.

2. Description:

The following steps will be taken to meet the objective:

- Utilize the County of Los Angeles Low Impact Development Standards Manual, the California Stormwater Management BMP handbook, and other stormwater management guidelines for creating conceptual designs.
- Research various stormwater practices for possible implementation.
- Develop a tier prioritization system to aid in the implementation of applicable stormwater management practices.

3. Research:

The objectives will be met through:

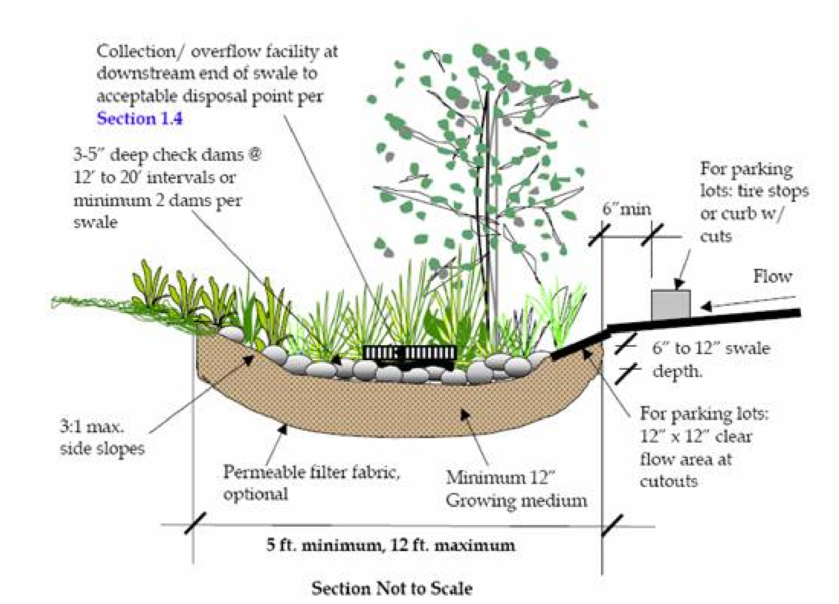
- Researching existing conditions including hydrology report, geotechnical report, percent impervious surfaces and site concerns and issues.
- Researching LID requirements, opportunities and constraints including infiltration, drainage, storage, recharge, maintenance, utility placement and feasibility.

The following LID practices were studied for applicability to the site:

Vegetated Swale

Description:

Vegetated swales are open, shallow channels with vegetation covering the side slopes and bottom that collect and slowly convey runoff flow to downstream discharge points. They are designed to treat runoff through filtering by the vegetation in the channel, filtering through a subsoil matrix, and/or infiltration into the underlying soils. Swales can be natural or manmade. They trap particulate pollutants (suspended solids and trace metals), promote infiltration, and reduce the flow velocity of stormwater runoff. Vegetated swales can serve as part of a stormwater drainage system and can replace curbs, gutters and storm sewer systems.



Applicability: All parks

Environmental Benefits: High

Fiscal Benefits: None

Fiscal Impacts: Minimal

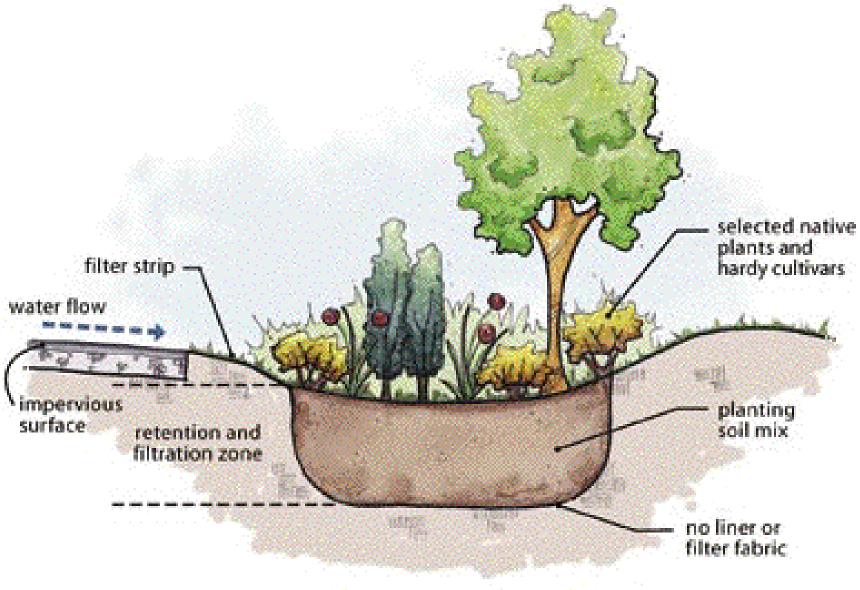
Maintenance Impacts: Low - The maintenance objectives for vegetated swale systems include keeping up the hydraulic and removal efficiency of the channel and maintaining a dense healthy vegetated cover.

Bioretention

Description:

The bioretention best management practice (BMP) functions as a soil and plant-based filtration device that removes pollutants through a variety of physical, biological, and chemical treatment processes. These facilities normally consist of a grass buffer strip, sand bed, ponding area, organic layer or mulch layer,

planting soil, and plants. The runoff's velocity is reduced by passing over or through buffer strip and subsequently distributed evenly along a ponding area. Exfiltration of the stored water in the bioretention area planting soil into the underlying soils occurs over a period of days.



Applicability: All parks

Environmental Benefits: High

Fiscal Benefits: None

Fiscal Impacts: Minimal

Maintenance Impacts: Low –

Routine maintenance includes, debris removal, inspection to observe function under wet weather conditions, repairing small eroded areas and ruts by filling with gravel, and overseed bare areas to reestablish vegetation.

Cisterns/Rain Barrels

Description

One method of addressing roof runoff is to direct roof downspouts to cisterns or rain barrels. A cistern is an above ground storage vessel with either a manually operated valve or a permanently open outlet. Roof runoff is temporarily stored and then released for irrigation or infiltration between storms. The number of rainbarrels needed is a function of the rooftop area. Some low impact developers recommend that every house have at least 2 rain barrels, with a minimum storage capacity of 1000 liters. Roof barrels serve several purposes including mitigating the first flush from the roof which has a high volume, amount of contaminants, and thermal load.

Applicability: All parks

Environmental Benefits: High

Fiscal Benefits: None

Fiscal Impacts: Minimal

Maintenance Impacts: Low -

Maintenance is minimal and consists of inspection of the unit as a whole and any of its parts. Inspect regularly during wet season for mosquitoes.

Dry Ponds

Description:

Dry extended detention ponds (a.k.a. dry ponds, extended detention basins, detention ponds, extended detention ponds) are basins whose outlets have been designed to detain the stormwater runoff from a water quality design storm for some minimum time (e.g., 48 hours) to allow particles and associated pollutants to settle. Unlike wet ponds, these facilities do not have a large permanent pool. They can also be used to provide flood control by including additional flood detention storage.

Applicability: Limited to parks with large open space

Environmental Benefits: High

Fiscal Benefits: None

Fiscal Impacts: Minimal to moderate depending on topography

Maintenance Impacts: Moderate –

If basins are used in a recreational multi-use area, they must be inspected after every storm to ensure aesthetics and public safety are not compromised.

Dry Wells

Description:

Roof downspouts can be directed to dry wells or infiltration trenches. A dry well is constructed by excavating a hole in the ground and filling it with an open graded aggregate, and allowing the water to fill the dry well and infiltrate after the storm event. An underground connection from the downspout conveys water into the dry well, allowing it to be stored in the voids. To minimize sedimentation from lateral soil movement, the sides and top of the stone storage matrix can be wrapped in a permeable filter fabric, though the bottom may remain open. A perforated observation pipe can be inserted vertically into the dry well to allow for inspection and maintenance. In practice, dry wells receiving runoff from single roof downspouts have been successful over long periods because they contain very little sediment. They must be sized according to the amount of rooftop runoff received, but are typically 4 to 5 feet square, and 2 to 3 feet deep, with a minimum of 1-foot soil cover over the top (maximum depth of 10 feet). To protect the foundation, dry wells must be set away from the building at least 10 feet. They must be installed in solids that accommodate infiltration. In poorly drained soils, dry wells have very limited feasibility.

Applicability: All parks

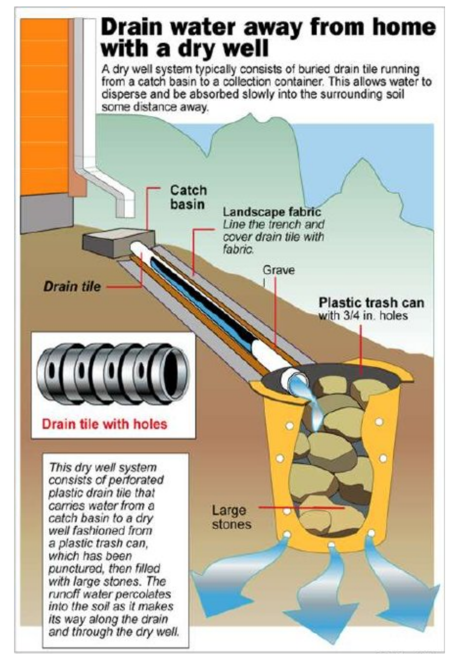
Environmental Benefits: High

Fiscal Benefits: None

Fiscal Impacts: Minimal

Maintenance Impacts: Moderate –

Infiltration of the dry well will include frequent inspections to ensure that water infiltrates into the sub-surface completely within the recommended infiltration time.



AP/Stan Kohler

Engineered Wetlands

Description:

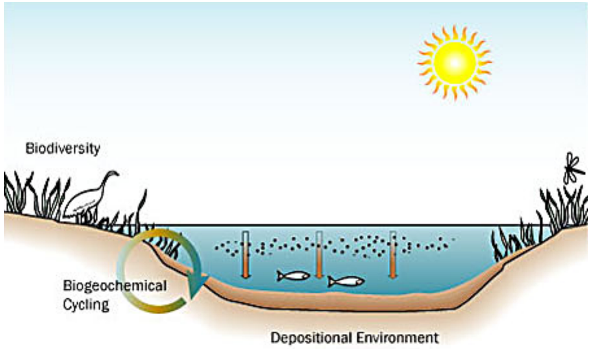
Constructed wetlands are constructed pools that retain water throughout the year. They are shallower than wet ponds, but have a greater vegetative cover. It is important to note that natural wetlands are not recommended for stormwater treatment as natural wetlands should be conserved.

Constructed wetlands are developed for the purpose of stormwater management.

Additionally, constructed wetlands provide habitat and are aesthetically pleasing,

making them widely accepted in communities. Treatment occurs through sedimentation and biological uptake. Many different designs for constructed wetlands exist, however, one of the most

often used includes an initial detention pond for settling and increased storage capacity.



Applicability: Limited to large parks with non-programmed open space

Environmental Benefits: High

Fiscal Benefits: None

Fiscal Impacts: Moderate

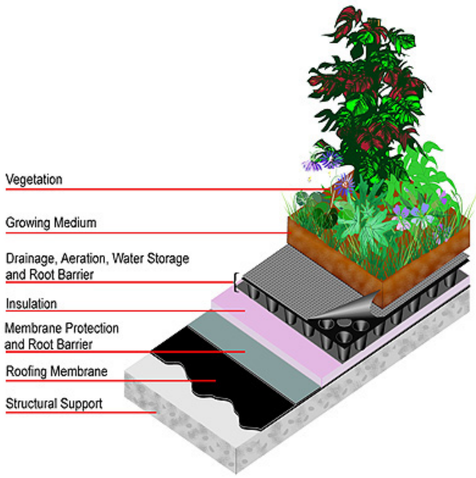
Maintenance Impacts: High–

Maintenance is critical if the stormwater wetland basins are to function as originally designed. A specific maintenance plan shall be developed for each facility outlining the schedule and scope of operation and maintenance. Please refer to the County of Los Angeles Dept of Public Works Stormwater Best Management Practice Design and Maintenance Manual.

Green Roofs

Description:

A green roof is a heavy weight roof system of waterproofing material with a thick soil/vegetation protective cover. The green roof can be used in place of a traditional roof to limit impervious site area. The green roof captures and then evapotranspirates 50 to 100 percent of precipitation depending on the season. Green roofs attempt to mimic predeveloped hydrology, thereby reducing postdeveloped peak-runoff rates to near predeveloped rates. They help mitigate runoff temperatures by keeping roofs cool and retaining most of the runoff in warm seasons. Green roofs should not be used on slopes greater than 10 percent. A drain system and overflow to an approved conveyance and destination/disposal method will be required. There are two types of green roofs: extensive and intensive systems. Intensive green roofs have larger depths of soil and require more maintenance and irrigation. Extensive green roofs feature very thin planting mediums and require little maintenance.



Applicability: Feasibility Analysis required at each specific site to determine applicability

Environmental Benefits: High

Fiscal Benefits: None

Fiscal Impacts: High

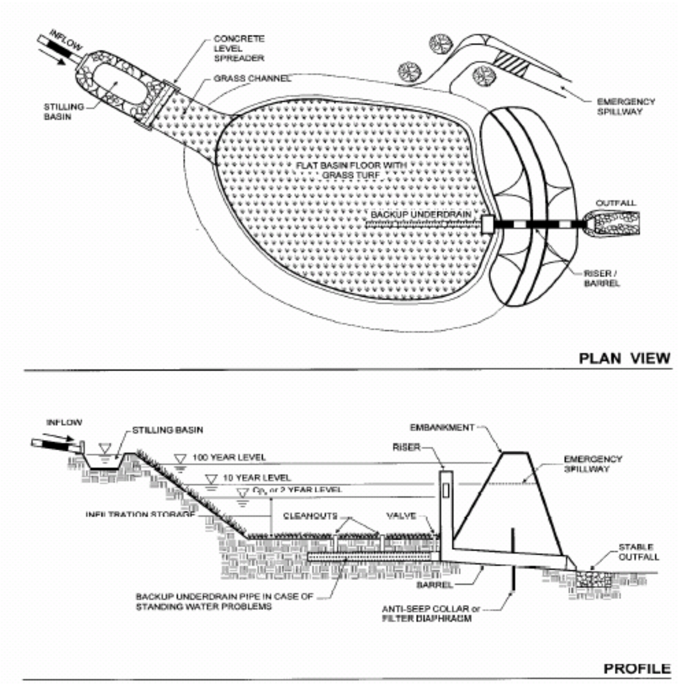
Maintenance Impacts: High -

Proprietary green roof applications must comply with the vendor's guidelines for installation and maintenance.

Infiltration Basin

Description

An infiltration basin is a shallow impoundment that is designed to infiltrate stormwater. Infiltration basins use the natural filtering ability of the soil to remove pollutants in stormwater runoff. Infiltration facilities store runoff until it gradually exfiltrates through the soil and eventually into the water table. This practice has high pollutant removal efficiency and can also help recharge groundwater, thus helping to maintain low flows in stream systems. Infiltration basins can be challenging to apply on many sites, however, because of soils requirements. In addition, some studies have shown relatively high failure rates compared with other management practices.



Applicability: Feasibility analysis required to determine soil porosity and applicability

Environmental Benefits: High

Fiscal Benefits: None

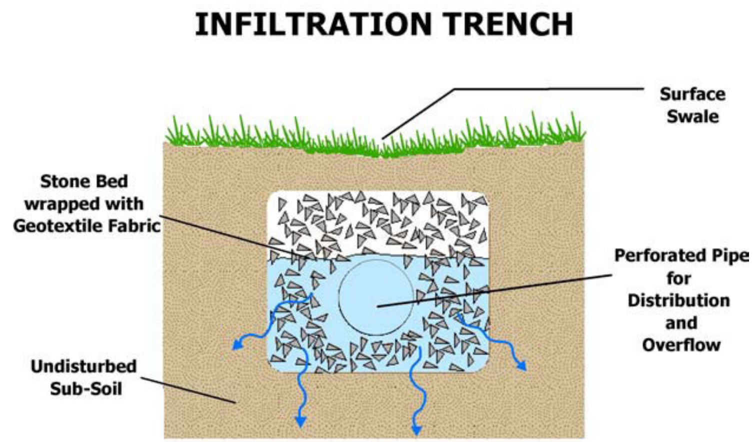
Fiscal Impacts: High

Maintenance Impacts: High – Infiltration facility maintenance should include frequent inspections to ensure that water infiltrates into the sub-surface completely within the recommended infiltration time. For further detail, refer to the County of Los Angeles Dept of Public Works Stormwater Best Management Practice Design and Maintenance Manual.

Infiltration Trenches

Description:

An infiltration trench is a long, narrow, rock-filled trench with no outlet that receives stormwater runoff. Runoff is stored in the void space between the stones and infiltrates through the bottom and into the soil matrix. Infiltration trenches perform well for removal of fine sediment and associated pollutants. Pretreatment using buffer strips, swales, or detention basins is important for limiting amounts of coarse sediment entering the trench which can clog and render the trench ineffective.



Applicability: Feasibility Analysis required at each specific site to determine applicability

Environmental Benefits: High

Fiscal Benefits: None

Fiscal Impacts: Minimal to moderate

Maintenance Impacts: Moderate –

Infiltration facility maintenance should include frequent inspections to ensure that water infiltrates into the sub-surface completely within the recommended infiltration time. For further detail, refer to the County of Los Angeles Dept of Public Works Stormwater Best Management Practice Design and Maintenance Manual.

Planter Boxes

Description:

There are two types of planter boxes: contained planters and infiltration planters. Contained planters are used for planting trees, shrubs, and ground cover to be placed over impervious surface. The planter may be a prefabricated pot of various dimensions or may be constructed in place and have an infinite variety of shapes and sizes. Contained planters are placed on impervious surfaces such as sidewalks, plazas, and rooftops. Drainage is allowed through the bottom of the planter. Infiltration planters are structural landscaped reservoirs used to collect, filter, and infiltrate stormwater runoff allowing pollutants to settle and filter out as the water percolates through the planter soil and infiltrates into the ground. In addition to providing pollution reduction, flow rates and volumes can also be managed with infiltration planters. Planters can be used to reduce the total impervious area and should be integrated into the overall site design. Numerous design variations of shape, wall treatment, and planting scheme can be used to fit the character of a site. An overflow to an approved conveyance and disposal method will be required.

Applicability: All parks

Environmental Benefits: High

Fiscal Benefits: None

Fiscal Impacts: Minimal to moderate

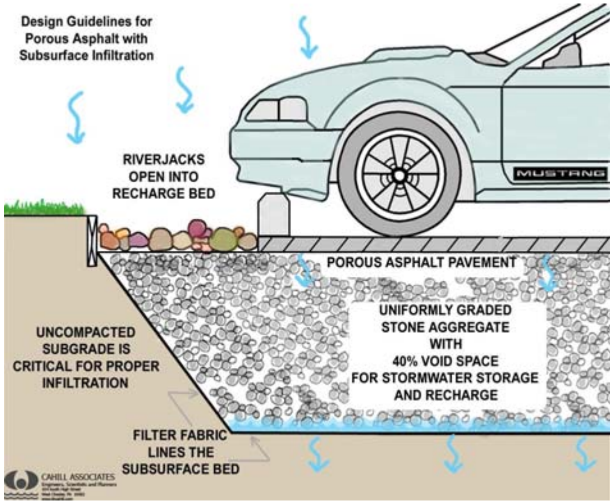
Maintenance Impacts: Low -

Regular maintenance of plant material and inspection to ensure that downspouts flow unimpeded, debris should be removed routinely, and damaged pipe shall be repaired upon discovery

Pervious Pavement

Description:

Pervious paving is used for light vehicle loading in parking areas. The term describes a system comprising a load-bearing, durable surface together with an underlying layered structure that temporarily stores water prior to infiltration or drainage to a controlled outlet. The surface can itself be porous such that water infiltrates across the entire surface of the material (e.g., grass and gravel surfaces, porous concrete and porous asphalt), or can be built up of impermeable blocks separated by spaces and joints, through which the water can drain. This latter system is termed ‘permeable’ paving. Advantages of pervious pavements is that they reduce runoff volume while providing treatment, and are unobtrusive resulting in a high level of acceptability.



Applicability: Only applicable for low traffic volume areas

Environmental Benefits: High

Fiscal Benefits: None

Fiscal Impacts: Moderate

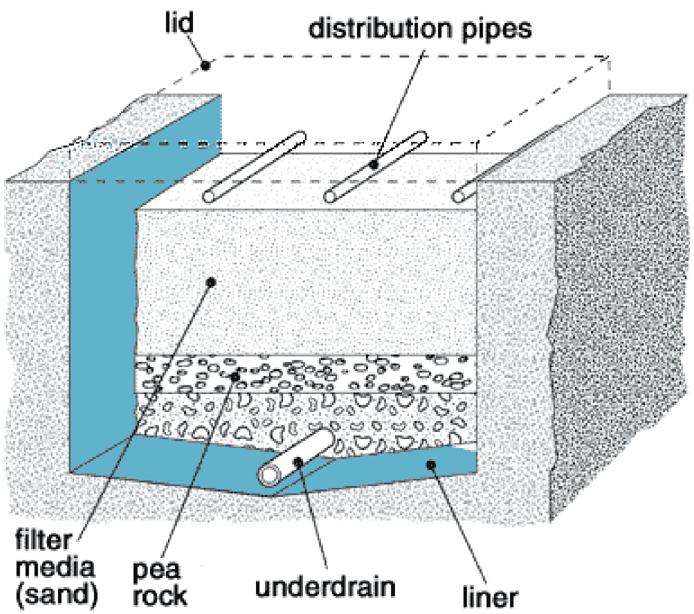
Maintenance Impacts: High-

Maintenance includes and regular sweeping, inspections for falling debris.

Media filters

Description:

Stormwater media filters are usually two-chambered including a pretreatment settling basin and a filter bed filled with sand or other absorptive filtering media. As stormwater flows into the first chamber, large particles settle out, and then finer particles and other pollutants are removed as stormwater flows through the filtering media in the second chamber. There are a number of design variations including the Austin sand filter, Delaware sand filter, and multi-chambered treatment train.



Applicability: Feasibility analysis required to determine soil porosity and applicability

Environmental Benefits: High

Fiscal Benefits: None

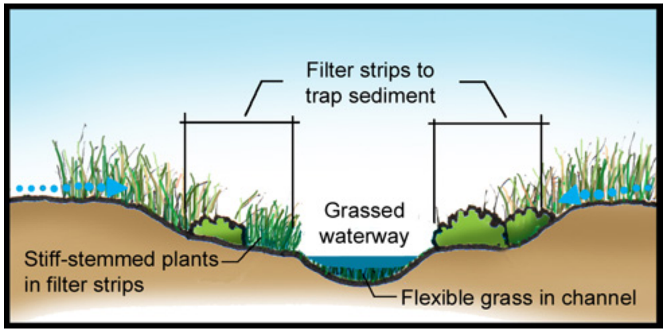
Fiscal Impacts: High

Maintenance Impacts: High – Based on research, operations and maintenance shall be handled by an outside agency such as the County of Los Angeles Dept of Public Works.

Vegetated Buffer Strip

Description

Grassed buffer strips (vegetated filter strips, filter strips, and grassed filters) are vegetated surfaces that are designed to treat sheet flow from adjacent surfaces. Filter strips function by slowing runoff velocities and allowing sediment and other pollutants to settle and by providing some infiltration into underlying soils. Filter strips were originally used as an agricultural treatment practice and have more recently evolved into an urban practice. With proper design and maintenance, filter strips can provide relatively high pollutant removal. In addition, the public views them as landscaped amenities and not as stormwater infrastructure. Consequently, there is little resistance to their use.



Applicability: All parks

Environmental Benefits: High

Fiscal Benefits: None

Fiscal Impacts: Minimal

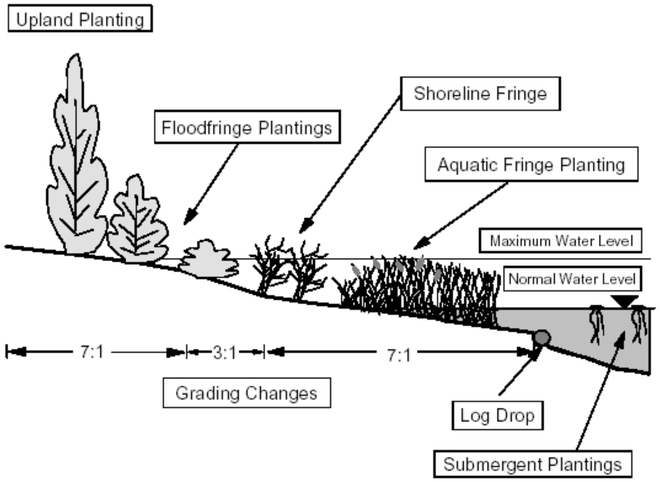
Maintenance Impacts: Low –

The maintenance objectives for vegetated buffer strips include keeping up the hydraulic and removal efficiency of the channel and the overflow drain while maintaining a dense healthy vegetated cover.

Wet Ponds

Description

Wet ponds (a.k.a. stormwater ponds, retention ponds, wet extended detention ponds) are constructed basins that have a permanent pool of water throughout the year (or at least throughout the wet season) and differ from constructed wetlands primarily in having a greater average depth. Ponds treat incoming stormwater runoff by settling and biological uptake. The primary removal mechanism is settling as stormwater runoff resides in this pool, but pollutant uptake, particularly of nutrients, also occurs to some degree through biological activity in the pond. Wet ponds are among the most widely used stormwater practices. While there are several different versions of the wet pond design, the most common modification is the extended detention wet pond, where storage is provided above the permanent pool in order to detain stormwater runoff and promote settling. The schematic diagram is of an on-line pond that includes detention for larger events, but this is not required in all areas of the state.



Applicability: Limited to large parks with non-programmed open space

Environmental Benefits: High

Fiscal Benefits: None

Fiscal Impacts: Minimal

Maintenance Impacts: High –

Maintenance is critical if the stormwater wetland basins are to function as originally designed. A specific maintenance plan shall be developed for each facility outlining the schedule and scope of operation and maintenance. Please refer to the County of Los Angeles Dept of Public Works Stormwater Best Management Practice Design and Maintenance Manual.

Research Cont…

- Stakeholder involvement including Department of Public Works Watershed Management and East Agency. Community groups and outside agencies will be identified at a later stage.
- Operation and Maintenance – According to DPW, the primary maintenance requirement for bioretention basins is the regular inspection and repair or replacement of the treatment area's components. Generally, this involves nothing more than the routine periodic maintenance that is required of any landscaped area. Native plant species should be selected for use in the bioretention basins, reducing fertilizer, pesticide, water, and overall maintenance requirements. In addition, regular maintenance is required for the site including trash removal and graffiti abatement. Further research will be done for the additional LID practices.
- Stormwater Management Benefits identified:

Although there aren't financial / cost benefits to utilizing LID stormwater management techniques/methods, there are environmental benefits such as water conservation, energy conservation, reduction in heat island effect, recreation, aesthetics, public relations, use of recycled materials and education.

Obregon Park is a component of the LID stormwater system that will serve both an urban park and a sub-system that will handle increased stormwater runoff. It is an open space, a teaching environment, a recreational area, a potential educational wetland and an urban gathering space.

In the densely populated area of East Los Angeles, the park will provide a unique approach to water resource management in the urban context and an educational element that will demonstrate and showcase opportunities for filtration and reuse of stormwater.

The following table provides a brief examination of the beneficial impacts that stormwater management efficiencies can provide.

Lid Technology	Reduce Runoff Volume	Reduce Peak Runoff Rates	Water Quality	On-Site Reuse/ Water conservation	Reduce Heat Island Effect	Ground Water Recharge	Habitat	Pollution Reduction
Bioretention Basin	X	X	X			X	X	
Educational Cistern/ Rainbarrel	X			X				
Eliminate Curb/Gutters	X	X	X					
Permeable Concrete/ Unit Pavers	X		X		X			X
Vegetated Swale/ Buffer	X	X	X			X	X	X
Infiltration Basin/Media Filter	X	X	X	X		X		X

4. Conclusion:

After the research and analysis phase was completed, four tiers were developed for the "Obregon Pilot Project" in order to evaluate all the potential stormwater alternatives and determine which would be the most effective. Four tiers were created to guide the evaluation process and to help prioritize the possible alternatives. The following table shows a brief description of the four tiers:

	Stormwater Management Tier Alternatives	
Tier One	Addresses immediate on site concerns utilizing low impact development standards	Low to Moderate Cost – Low Impact to site
Tier Two	Addresses enhancements to the site utilizing low impact development standards	Low to Moderate Cost – Low Impact to site
Tier Three	Addresses full capture of on site stormwater	High Cost – High Impact to Site
Tier Four	Addresses full capture of on and off-site stormwater	High Cost – High Impact to Site

Tier One

Description: Addresses immediate concerns / issues on the site such as water ponding, damage to property caused by water, health and safety concerns that may arise from standing water. Low Impact Development Standards developed by Regional Planning would be applied to address the immediate concerns by implementing the least impactive devices such as: vegetated swales, vegetated buffers, re-directing drainage flow by re-grading, adding trench drains, and adding dry ponds.

Constraints/Concerns: Constraints and concerns that must be further evaluated involve soil testing to evaluate the percolation and to determine whether the selected areas are feasible for these devices. Devices must be evaluated to examine what the maintenance requirements would be. Also, devices must be vandal proof.

Tier Two

Description: Addresses enhancements to the site utilizing LID standards that would serve as an environmental benefit. Examples of devices that could be used are: vegetated swales, vegetated buffers, impervious pavers, educational cisterns/rain barrels, permeable concrete at parking lots, dry wells, bioretention basins, educational bioretention gardens, educational signage.

Constraints/Concerns: Constraints and concerns that must be further evaluated involve soil testing to evaluate the percolation and to determine whether the areas are feasible for these devices. Devices must be evaluated to examine what the maintenance requirements would be. Also, devices must be vandal proof.

Tier Three

Description: Addresses more impactive devices such as disconnecting all on-site water from conventional systems / stormdrains and diverting it to an infiltration basin. This method would reduce runoff volume and runoff peak by directing runoff into distributed LID systems.

Constraints/Concerns: The constraints and concerns associated with tier three methods involve more elaborate soils testing / borings to determine percolation and feasibility. These tests can be very costly. Also, maintenance and operation of such devices must be evaluated for feasibility and fiscal impacts.

Tier Four

Description: This tier addresses the most impactive devices such as diverting water away and disconnecting from conventional systems / stormdrains within the park and beyond the park. Stormwater Infiltration basins to capture the stormwater from the surrounding storm drains would entail costly analysis and testing. This method would reduce runoff volume and runoff peak by directing runoff from within the park and the surrounding storm drains into a large elaborate infiltration basin. This tier would evaluate the potential use of detention devices and addressing pollutants of concern both on and off site.

Constraints/Concerns: The constraints and concerns associated with tier four methods involve more elaborate soils testing / borings to determine percolation and feasibility. These tests can be very costly. Also, maintenance and operation of such devices must be evaluated for feasibility and fiscal impacts. This tier would require further study/evaluation by outside entities such as the Department of Public Works.

A collaboration of the City of Los Angeles Stormwater Program, the Los Angeles County Department of Public Works and the not-for-profit Tree-People has developed a large-scale sustainable watershed management demonstration project in a 4.4 square mile area of the San Fernando Valley watershed known as Sun Valley. This is an example of the Tier Four storm water management method.

The Sun Valley Park Multiuse Project takes a non-traditional approach by collecting stormwater from a 24-acre community upstream and routing it through a treatment train that removes suspended solids and heavy metals. The runoff is then directed into two large underground infiltration basins where the water is naturally filtered and ultimately recharges the aquifer. Buried beneath playing fields at Sun Valley Park, these two basins work silently while soccer and softball teams play on the fields above. Vegetated swales using California native plants and dry wells treat stormwater runoff from the park's 21 acres.

A view of the infiltration system recently constructed below Sun Valley Park.

"This pilot project is an example of a paradigm shift away from conventional flood control solutions," said Ammar Eltawil, Civil Engineering Associate IV with the City's Watershed Protection Division.

“Stormwater runoff will recharge the aquifer instead of flooding Sun Valley’s streets.” In addition, recreational enhancements and interpretative kiosks provide an important opportunity for residents to learn about the Sun Valley watershed and the sustainable solutions hard at work while they play in the park.

The project serves as a model in demonstrating the effectiveness of nontraditional stormwater management techniques that will be implemented throughout the Sun Valley watershed. “This project is the first of its kind in the nation, and it will serve as a model for several other watershed management projects planned to mitigate stormwater quality concerns and assist with meeting the Total Maximum Daily Load (TMDL) regulations,” continued Eltawil.

Recommendations:

For the purposes of this pilot project we are recommending that Tiers One and Two be implemented at Obregon Park. The elements from these tiers would provide low impact development strategies to demonstrate the possibilities and environmental benefits to the site. Also, these strategies would not be cost prohibitive and could be easily achieved. Though tiers three and four are extremely beneficial in addressing storm water, water quality, groundwater recharge, the environment and pollutants of concern, more study and testing would be necessary to evaluate feasibility.

The Department of Public Work’s Watershed Management Division is actively identifying funding opportunities in order to fund a detailed study that would provide the information necessary to determine costs and feasibility of the tier four infiltration basin.

Next Steps

The next steps in the process would require developing LID strategies and Design Criteria Guidelines that could be applied to every park in the County System. The guidelines would be developed using a holistic approach to stormwater management and would take many factors into consideration such as financial, aesthetic, community, and the overall improvement of stormwater and rainfall specific to each site. The following elements would be further studied and developed:

- Create LID guidelines that are specific to parks for stormwater and rainfall management
- Optimize the use of the urban infrastructure for stormwater management
- Create a sustainable and functional urban landscape
- Improve water quality
- Divert water away and disconnect from conventional systems / stormdrains
- Reduce runoff volume and runoff peak
- Direct runoff into distributed LID systems
- Disconnect impervious areas
- Water Conservation
- Energy conservation
- Sense of place and aesthetics
- Develop Education signage and programs

References: California Stormwater Best Management Practice Handbook; County of Los Angeles Low Impact Development Standards Manual, 2009; District of Colombia Community Stormwater Management Guidelines

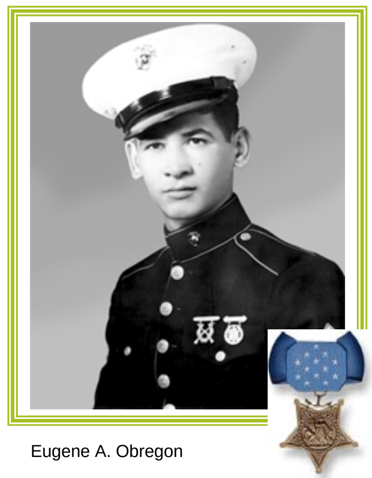
Chapter Three – Obregon Site Concept Design

Park History

Eugene A. Obregon Park is located at 4021 East First Street in the unincorporated area in Los Angeles, California. Obregon Park is an 11 acre neighborhood park which offers a friendly environment for families of the community to participate in many recreational activities. On October 3, 1961, the Board of Supervisors began the efforts of purchasing land of what was then a housing development and now today is Eugene A. Obregon Park. Named in honor of a Marine Korean War Hero and Congressional Medal of Honor recipient, Eugene A. Obregon Park officially opened on May 26, 1966.

Things to do in the park include: Adult Ceramics, After School Club, Computer Club, Day Camps, Exercise and Fitness Programs, H.E.A.T. Club, Summer Swimming, Tiny Tots Toy Loan, Water Fitness Programs (Seniors and Adults), Youth Cheerleading, and Youth Sports.

Obregon Park has many facilities to offer in its 11 acres of park space. These include: Baseball and Softball Fields, BBQ's, Ceramic Room, Children's Play Areas, Community Recreation Center, Computer Room, Gymnasium, Picnic Area, Seasonal Outdoor Swimming Pool, Social Hall, Tiny Tot Room, and Weight Room.



Eugene A. Obregon

The Location

East Los Angeles (often shortened to East L.A. or East Los or in Spanish El Este de Los Ángeles) is an unincorporated area in Los Angeles County. It lies directly east of downtown Los Angeles. According to the United States Census Bureau, the community has a total area of 7.4 square miles. East Los Angeles is bounded by the city of Los Angeles to the west, the unincorporated area of City Terrace to the northwest, the city of Monterey Park to the northeast, the city of Montebello to the east, and the city of Commerce to the south. It forms part of the East Los Angeles region. The unincorporated area of East Los Angeles was once known as "Maravilla" and also "Belvedere Gardens".

Gold Line Eastside extension Maravilla station under construction as of December 2008 with King Taco in the background

As of the 2000 census, the area had a total population of 124,283. The CDP area includes the separate community of City Terrace. East Los Angeles is represented by Gloria Molina in the Los Angeles County Board of Supervisors. This community receives its police service from the Los Angeles County Sheriff's Department and fire service is provided by the Los Angeles County Fire Department.

Demographics

As of the census of 2000, there were 124,283 people, 29,844 households, and 25,068 families residing in the community. The population density was 16,697.4 people per square mile. There were 31,096 housing units at an average density of 4,177.8/sq mile. The racial makeup of the community was 6.77% non-Hispanic White, 4.52% Black or African American, 1.29% Native American, 0.77% Asian, 0.06% Pacific Islander, 54.01% from other races, and 4.22% from two or more races. 87.92% of the population are Hispanic or Latino.

There were 29,844 households out of which 51.7% had children under the age of 18 living with them, 53.1% were married couples living together, 21.7% had a female householder with no husband present, and 16.0% were non-families. 12.5% of all households were made up of individuals and 6.4% had someone living alone who was 65 years of age or older. The average household size was 4.15 and the average family size was 4.42.

The age distribution of the community was as follows: 34.6% under the age of 18, 12.6% from 18 to 24, 30.7% from 25 to 44, 14.2% from 45 to 64, and 7.9% who were 65 years of age or older. The median age was 26 years. For every 100 females there were 101.6 males. For every 100 females age 18 and over, there were 99.2 males.

The median income for a household in the community was $28,544, and the median income for a family was $29,755. Males had a median income of $21,065 versus $18,475 for females. The per capita income for the community was $9,543. About 24.7% of families and 27.2% of the population were below the poverty line, including 35.0% of those under age 18 and 13.5% of those age 65 or over. East Los Angeles has a very large Latino population that consists of Mexicans, Guatemalans, Salvadorans, and Hondurans.

Design Approach

Upon completed the research and site analysis of the Obregon Park site for applicability of their respective areas of research, the Project Team came together to develop a comprehensive site design incorporating as many conservation efficiencies as possible, while maintaining the current park uses. The Team found there were many areas of compatibility in planting and stormwater management design solutions. For example; the site analysis for the reduction of potable water included an evaluation of park activities to determine areas suitable for turf and areas suitable for drought tolerant plants. The stormwater management analysis evaluated the site to correct existing drainage issues and identify opportunities for on-site retention of stormwater. When the Team stacked transparent overlays for each area of conservation, they found the areas identified for drought tolerant plants and the areas for on-site stormwater retention to be largely the same areas, providing considerable opportunity for the expression of both conservation efforts.

EXISTING PARK DESIGN

EXISTING PARK PROGRAMS

- ADULT CERAMICS
- ARTS AND CRAFTS PROGRAMS
- AFTER SCHOOL CLUB
- COMPUTER CLUB
- DAY CAMPS
- FITNESS AND WELLNESS PROGRAMS
- H.E.A.T. CLUB
- MUSIC AND DANCE PROGRAMS
- NATURE AND OUTDOOR PROGRAMS
- SUMMER PROGRAMS
- SUMMER SWIMMING
- SPECIAL COMMUNITY EVENTS
- TEEN PROGRAMS
- TINY TOTS TOY LOAN
- WATER FITNESS PROGRAMS (SENIORS AND ADULTS
- VOLUNTEER OPPORTUNITIES
- YOUTH CHEERLEADING
- YOUTH SPORTS

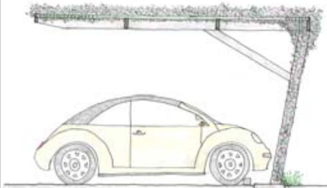
EXISTING PARK AMENITIES

- COMMUNITY RECREATION CENTER WITH:
  - SOCIAL HALL
  - COMPUTER ROOM
  - TINY TOT ROOM
  - CRAFT'S ROOM WITH KILN
  - WEIGHT ROOM
- GYMNASIUM WITH:
  - INDOOR BASKETBALL
  - DRESSING ROOMS
  - SHOWERS
- POOL BUILDING
- SEASONAL OUTDOOR SWIMMING POOL
- SOFTBALL FIELDS
- BATTING CAGE
- BASKETBALL COURT
- HANDBALL COURTS
- CHILDREN'S PLAY AREA
- OUTDOOR EXERCISE EQUIPMENT
- PICNIC SHELTERS
- PICNIC AREAS
- BBQ'S

PARK ACREAGE:	11 ACRES
PARKLAND CLASSIFICATION:	NEIGHBORHOOD PARK
SUPERVISORIAL DISTRICT:	1st DISTRICT

OBREGON PARK GREEN PILOT PROJECT

EXISTING SITE PLAN



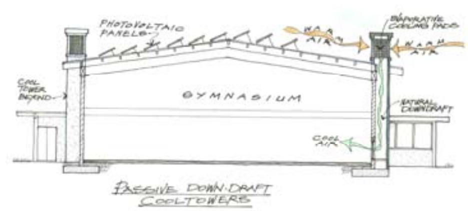
PARKING SHADE COVER

BUILDING AND SITE EFFICIENCIES

LEGEND	EFFICIENCY	ENVIRONMENTAL CONSERVATION IMPACT	COST IMPACT	MAINTENANCE IMPACT
1	PHOTOVOLTAIC ARRAY	HIGH	HIGH*	LOW
2	PASSIVE DOWN-DRAFT COOLTOWERS	HIGH	HIGH	LOW
3	SOLAR POOL HEATING SYSTEM / SOLAR WATER HEATING	HIGH	MEDIUM**	LOW
4	PLUMBING FIXTURE AND FITTING EFFICIENCY	MEDIUM	LOW	NONE
5	"GREEN" SHADE STRUCTURE WITH POSSIBLE ADDITIONAL PHOTOVOLTAIC TILES	HIGH	MEDIUM	LOW
6	SOLAR SITE LIGHTING	HIGH	HIGH	LOW
7	RELOCATED TRASH BINS	LOW	LOW	NONE
8	RECYCLING BINS AND EDUCATIONAL SIGNAGE	HIGH	LOW	LOW
9	COMPOSTING BINS AND EDUCATIONAL SIGNAGE	HIGH	LOW	LOW
10	BICYCLE RACKS	HIGH	LOW	LOW
11	BUILDING AND SITE EFFICIENCIES EDUCATIONAL SIGNAGE	MEDIUM	LOW	LOW
12	GREEN CLEANING POLICY	MEDIUM	NONE	NONE
13	SUSTAINABLE PURCHASING	MEDIUM	LOW	NONE

* ANTICIPATED COST BREAK EVEN - 11.4 YEARS

** ANTICIPATED COST BREAK EVEN - 5.89 YEARS

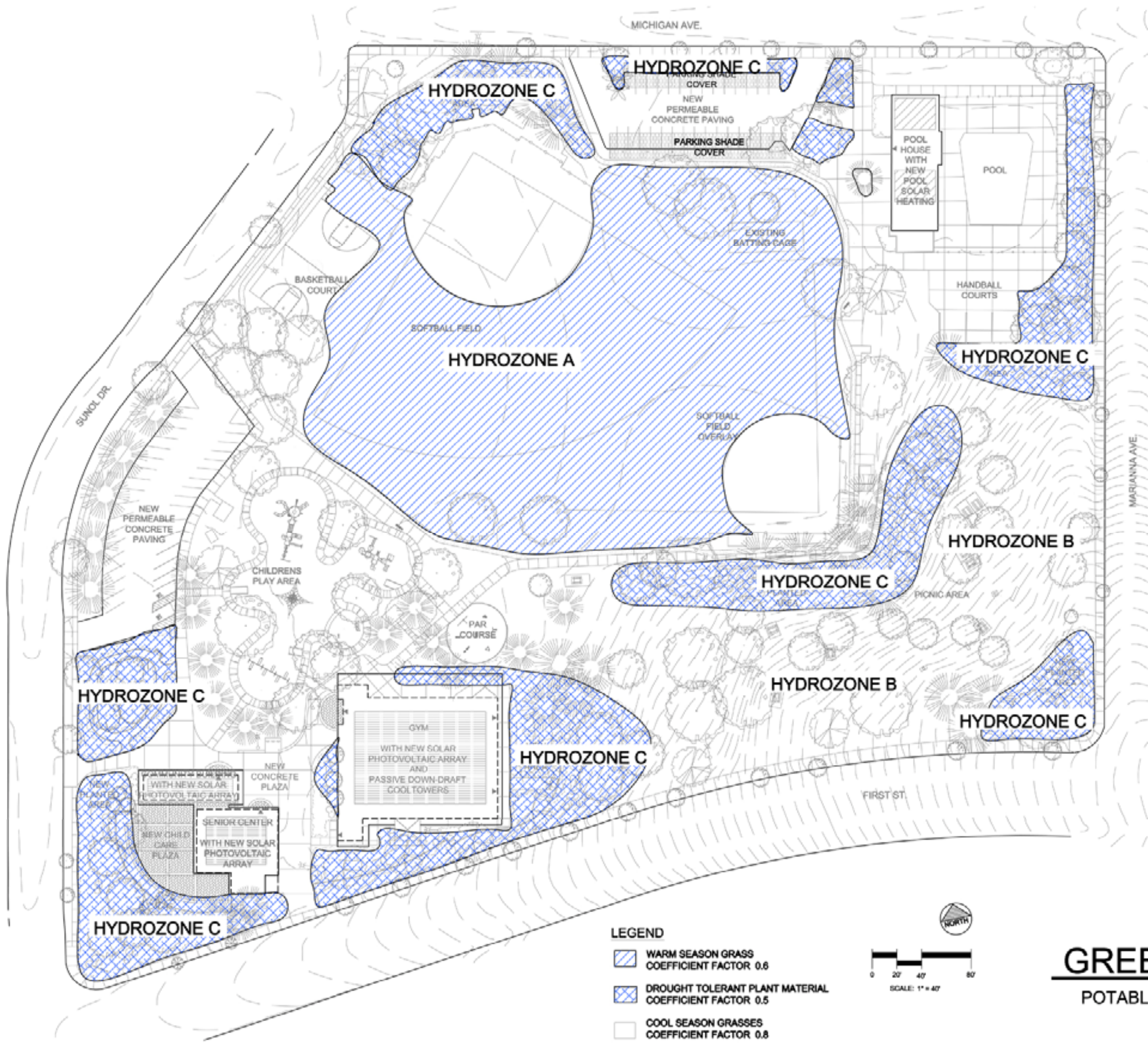


PASSIVE DOWN-DRAFT COOLTOWERS AT GYMNASIUM

OBREGON PARK GREEN PILOT PROJECT

BUILDING AND SITE EFFICIENCIES
CONCEPTUAL SITE PLAN

June 2009



POTABLE WATER IRRIGATION EFFICIENCIES

EFFICIENCY	ENVIRONMENTAL CONSERVATION IMPACT	COST IMPACT	MAINTENANCE IMPACT
NEW IRRIGATION SYSTEM	HIGH	HIGH*	REDUCTION
NEW SITE PLANTING	HIGH	HIGH*	LOW
* CURRENT PLANING LAYOUT - WATER USAGE NECESSARY TO PROPERLY IRRIGATE THE SITE	20,577 (100 cubic feet)		
*NEW PLANTING LAYOUT - WATER USAGE NECESSARY TO PROPERLY IRRIGATE THE SITE	8,615 (100 cubic feet)		

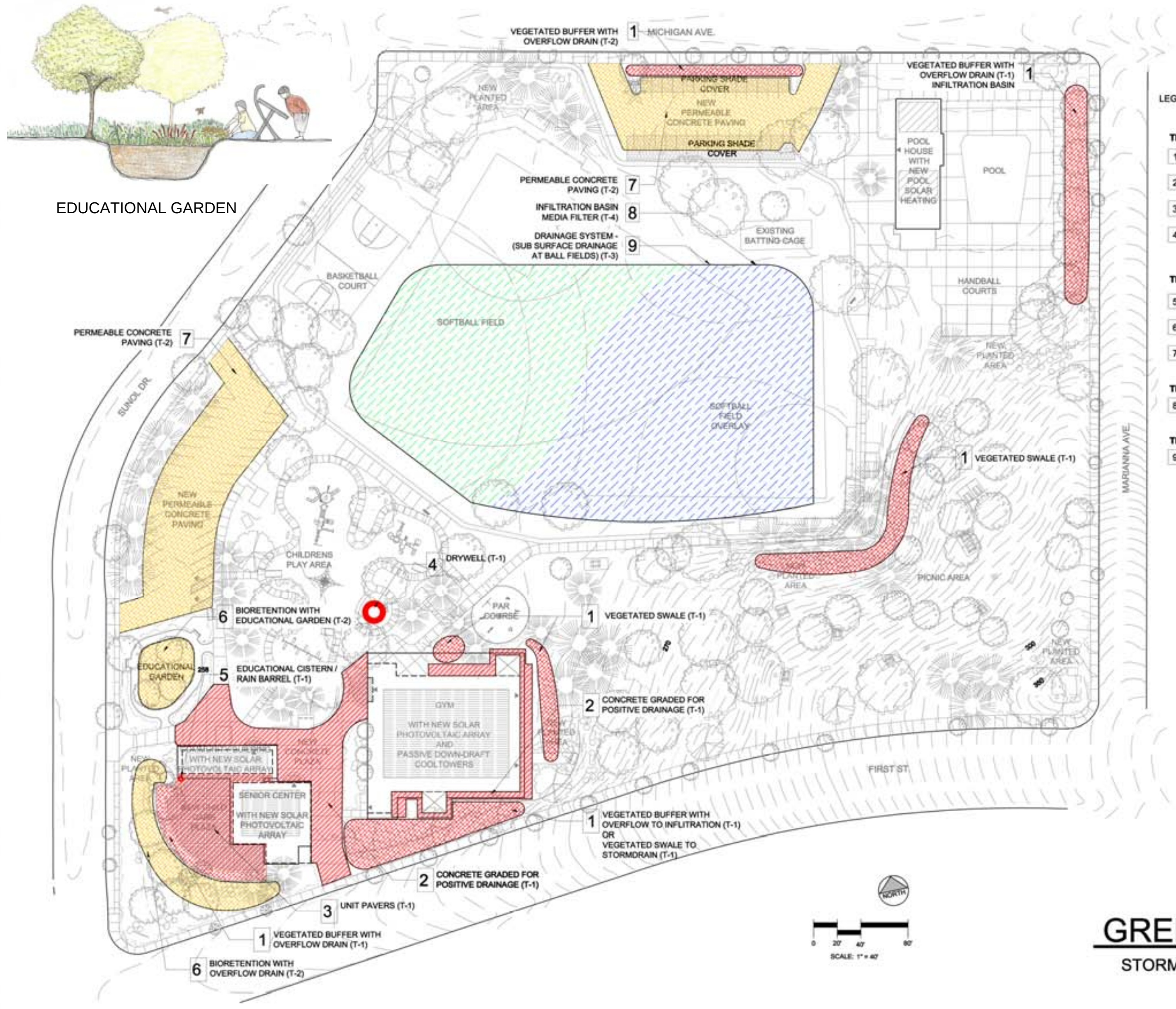
PROPOSED PLANT PALETTE

	GENUS	COMMON NAME	COEFFICIENT FACTOR
TREES/ LARGE	FRAXINUS UHDEI	EVERGREEN ASH	0.5
TREES/ SMALL	PRUNUS LYONII	CATALINA CHERRY	0.5
SHRUBS	ADENANTHOS X CUNNINGHAMII	ALBANY WOOLYBUSH	0.5
	AGAVE ATTENUATA 'NOVA'	BLUE FOX TAIL AGAVE	0.3
	CISTUS SALVIIFOLIUS 'PROSTRATUS'	SAGELEAF ROCKROSE	0.5
	COLEONEMA PULCHELLUM 'SUNSET GOLD'	GOLDEN BREATH OF HEAVEN	0.5
	DIETES IRIDIOIDES 'JOHN'S RUNNER'	JOHN'S RUNNER FORT NIGHT LILLY	0.5
	DODONAEA VISCOSA 'PURPUREA'	PURPLE-LEAFED HOP-BUSH	0.3
	FESTUCA GLAUCA 'ELIJAH BLUE'	ELIJAH BLUE FESCUE	0.3
	GREVILLEA LANIGERA 'COASTAL GEM' (UCSC) (UCSC INTRODUCTION)	COASTAL GEM GREVILLEA	0.5
	LEYMUS CONDENSATUS 'CANYON PRINCE'	CANYON PRINCE WILD RYE	0.5
	PHORMIUM "JACK SPRATT"	JACK SPRATT FLAX	0.5
	PHORMIUM TENAX 'ATROPURPUREUM'	BRONZE FLAX	0.5
	PHORMIUM 'YELLOW WAVE'	YELLOW WAVE FLAX	0.5
	PITTOSPORUM CRASSIFOLIUM 'COMPACTUM'	DWARF KARO	0.5
	PITTOSPORUM CRASSIFOLIUM	MOCK ORANGE	0.5
	PITTOSPORUM TENUIFOLIUM 'SILVER SHEEN'	NCN	0.5
	SENECIO SERPENS	BLUE CHALKSTICKS	0.5
	PHORMIUM "JACK SPRATT"	JACK SPRATT FLAX	0.5
	WESTRINGIA FRUTICOSA	COAST ROSEMARY	0.5
GROUNDCOVERS	COTONEASTER DAMMERI 'CORAL BEAUTY'	BEARBERRY COTONEASTER	0.5
	GERANIUM INCANUM	CARPET GERANIUM	0.5
	LANTANA CAMARA	TRAILING LANTANA	0.3
	LANTANA MONTEVIDENSIS	TRAILING LANTANA	0.3
	MYOPORUM PARVIFOLIUM 'PINK'	PINK *GROUNDCOVER* MYOPORUM	0.5
	ROSMARINUS OFFICINALIS IRENE	TRAILING BLUE ROSEMARY	0.5

OBREGON PARK
GREEN PILOT PROJECT

POTABLE WATER IRRIGATION EFFICIENCIES
CONCEPTUAL SITE PLAN

June 2009



STORMWATER MANAGEMENT EFFICIENCIES

LEGEND	EFFICIENCY	ENVIRONMENTAL CONSERVATION IMPACT	COST IMPACT	MAINTENANCE IMPACT
TIER ONE				
1	VEGETATED BUFFER WITH OVERFLOW DRAIN	HIGH	HIGH	LOW
2	CONCRETE GRADED FOR POSITIVE DRAINAGE	HIGH	HIGH	LOW
3	UNIT PAVERS	HIGH	HIGH	LOW
4	DRYWELL	HIGH	HIGH	LOW
TIER TWO				
5	EDUCATIONAL CISTERN / RAIN BARREL	HIGH	HIGH	LOW
6	BIORETENTION WITH OVERFLOW DRAIN	HIGH	HIGH	LOW
7	PERMEABLE CONCRETE AT PARKING LOTS	HIGH	HIGH	LOW
TIER THREE				
8	INFILTRATION BASIN	HIGH	HIGH	LOW
TIER FOUR				
9	MEDIA FILTER - DRAINAGE SYSTEM	HIGH	HIGH	LOW

STORMWATER MANAGEMENT TIER SYSTEM LEGEND

TIER ONE	Addresses immediate on site concerns utilizing low impact development standards	Low to Moderate Cost - Low Impact to the Site
TIER TWO	Addresses enhancements to the site utilizing low impact development standards	Low to Moderate Cost - Low Impact to the Site
TIER THREE	Addresses full capture of on site stormwater	High Cost - High Impact to the Site
TIER FOUR	Addresses full capture of on and off-site stormwater	High Cost - High Impact to the Site

OBREGON PARK
GREEN PILOT PROJECT

STORMWATER MANAGEMENT EFFICIENCIES
CONCEPTUAL SITE PLAN

June 2009

Project Conceptual Scope of Work

Date: June 30, 2009

Project Location: Eugene A. Obregon Park
4021 East First Street
Los Angeles, CA 90065

Project Scope: To create a conceptual site design for Obregon Park incorporating environmentally responsible practices to reduce the County's "Carbon Footprint" and promote environmental stewardship as directed in the 2009 County of Los Angeles Strategic Plan.

Concept Scope of Project Building and Site Efficiency Components:

1. Photovoltaic Array at Gymnasium
   a. The system locates a 58.32 kW DC PV array on the Gymnasium roof. This is estimated to provide 40% of the park's daily electrical usage.
   b. This system includes 270 Sharp ND-216U1F 216W Multisilicon Modules, (CEC = 190.5); 1-SATCON 50 kW 480 VAC Three Phase Utility Interactive Inverter 95.5 eff.; Energy ReCommerce System Monitoring; all anodized Aluminum and Stainless Steel low-profile mounting hardware, or an equivalent system.
   c. This system must also include system installation, system performance monitoring, the balance of the system components, sales tax, freight, permit processing, Engineering services, drawings, start-up and commissioning, on-site training, 10 year inverter and 25 year PV warranty, 10-year system warranty, and project management and support.
   d. County of Los Angeles shall receive a CSI Performance-based Incentive (Government/ Non-Profit) Rebate, and any Federal Tax Credit as part of the cost of the system.

2. Photovoltaic Array at Community Building
   a. An expanded system at the Community Building shall include a PV array to be also located on the Community Building roof, as well as a maximum possible coverage on the Gymnasium roof.
   b. The system design shall be developed for 2,550 s.f. of roof surface.
   c. This system must also include system installation, system performance monitoring, the balance of the system components, sales tax, freight, permit processing, Engineering services, drawings, start-up and commissioning, on-site training, 10 year inverter and 25 year PV warranty, 10-year system warranty, and project management and support.
   d. County of Los Angeles shall receive a CSI Performance-based Incentive (Government/ Non-Profit) Rebate, and any Federal Tax Credit as part of the cost of the system.

3. Solar Pool Heating system
   a. A 16,844 Therm system is estimated for 3,780 s.f. pool heating.
   b. 73- 12'x4' Techno-Solis Pool Modules are required, or an equivalent system.
   c. The system includes a tank-less water heater, all return lines, sensors, direct to roof mounting, valves, and actuators, piping to connect the absorber array to the existing filtration system via the existing pump, piping, and balance of system components.
   d. System shall include flush-mount installation to asphaltic composition roof, design, drawings, permit processing, system installation, sales tax, freight, project management, support, start-up and commissioning, orientation, completion package, 10-year parts and labor warranty on pool modules, and a 2-year parts and labor warranty on a tank-less water heater / recirculation plumbing.

4. Solar Water Heating system for 200 Showers / hour
   a. This system includes 30 Schuco Slim V flat plate solar thermal collectors, or the equivalent.
   b. Also included are 4- 119 gallon solar highest quality steel / enamel storage tanks, Schuco Solar Control Stations, racking, piping, balance of parts and system components, flush-mounted installation to composition roof, design, drawings, permit processing, system installation, sales tax, freight, project management, support, start-up and commissioning, tie solar tank system into existing tank and boiler system, purge, test, commission, orientation, and completion package.
   c. System shall include 10-year warranty on Schuco Slim-V collectors, 5-year parts and labor warranty on all Schuco system installation and storage tank, 2-year parts and labor on tank less water heater / recirculation plumbing.
   d. County of Los Angeles shall receive a CSI Performance-based Incentive (Government/ Non-Profit) Rebate, and any Federal Tax Credit as part of the cost of the system.

5. Minimum Indoor Plumbing Fixture and Fittings Efficiencies
   a. Replace existing toilets with a WaterSense Standards high efficiency, low consumption flush (1.28 gpf / 4.8 Lpf) model. Sloan Crown Flushometer model 111-1.28 or equivalent.
      i. Number of toilets in the Community Building = 8.
      ii. Number of toilets in the Gymnasium = 4.
      iii. Number of toilets in the Pool Building = 4.
   b. Replace existing urinals with a WaterSense Standards high efficiency, low consumption flush (1/8 gallon / 0.5 Lpf) model. Zurn model Z5798 EcoVantage, High Efficiency Urinal (HEU) System or equivalent.
      i. Number of urinals in the Community Building = 5.
      ii. Number of urinals in the Gymnasium = 2.
      iii. Number of urinals in the Pool Building = 3.
   c. Replace existing lavatories and faucets with a WaterSense Standards high efficiency, low consumption (0.5 gpm / 1.9 Lpm) model. Zurn Aquaspec model Z86300 Series, Single Basin Metering, or equivalent.
      i. Number of lavatories in the Community Building = 4.
      ii. Number of lavatories in the Gymnasium = 3.
      iii. Number of lavatories in the Pool Building = 4.
   d. Replace shower heads and valves in Pool Building with WaterSense Standards high efficiency, low consumption (1.5 – 2.0 gpm) models.
      i. Number of showers in Pool Building = 7.

6. Replace H.I.D. Lighting Fixtures in Gymnasium with Induction Lighting
   a. Confirm wattage of existing fixtures to specify equivalent Induction fixtures.
   b. Number of current fixtures at Gym = 38.
   c. U.S. Lighting Tech Induction Fixtures – 200 watt, 17,000 Mean Lumens used for cost basis.

7. Install a Passive Down-Draft Cooltower and a Solar Chimney at the Gymnasium
   a. Design and determine size based on volume of Gym space which = 201,348 cubic feet.
   b. Specify fractional horsepower pump for water misting of cooling pads.
   c. System includes foundation, structural framing, and spot repair of Gym interior and exterior where towers adjoin Gym, interior and exterior shaft finishes, cooling pads at Cooltower, misting pump at Cooltower, and metal grilles at interior of Gym.

8. Solar Site Lighting
   a. Replace existing parking and site lighting fixtures with solar powered fixtures – Sepco Shoebox Fixture (SB).
   b. System includes foundation, pole, fixture, solar panel, storage batteries, and all control electronics.

Project Conceptual Scope of Work, cont.

9. <u>On-Site Stormwater Management</u>
   a. Grading and Drainage improvements include modifications incorporating conservation techniques through Los Impact Development (LID) practices.
   b. The project scope includes improvements broken into three distinct categories.
      i. Tier 1 Improvements correct existing stormwater issues and include the design and installation of:
         1. Vegetated buffers with overflow drains
         2. Replacement of Existing Concrete to provide positive drainage
         3. Concrete unit pavers as indicated on the site plan
         4. Drywell in the children's play area as indicated on the site plan.
      ii. Tier 2 Improvements include low impact storm water capture and include the design and installation of:
         1. Educational Cistern/Rain Barrel as indicated on the site plan.
         2. Bioretention areas with overflow drains
         3. Permeable concrete parking lots.
      iii. Tier 3 Improvements include components for complete on-site storm water capture and include the design and installation of one infiltration basin located at the existing ballfields.

10. <u>Potable Water Reduction in the Landscape</u>
   a. Replacement of irrigation system. 313,632 s.f. system to include:
      i. Smart weather-based controller
      ii. Rain sensor
      iii. Backflow preventer
      iv. Master valve and flow sensor
      v. All new remote control valves, lateral lines, and heads
      vi. Booster pump
   b. Planting, includes the replacement of all plant material as follows:
      i. 106,000 s.f. Warm Season Grasses – GN-1 Hybrid Bermuda Grass by Pacific Sod
      ii. 110,000 s.f. Cool Season Grasses
      iii. 4 – 24" box plants
      iv. 6,320 - 1 gal. plants
      v. 3,160 – 5 gal. plants
      vi. 732 cu. Yds. Mulch
      vii. 79,000 s.f. soil conditioning

11. <u>Heat Island Reduction – Michigan Avenue Parking Lot Green Roof Shade Structure</u>
   a. Dimensions = 1 Shade Structure at 2,560 s.f., and 1 Shade Structure at 2,932 s.f.
   b. Specify steel materials and column locations.
   c. System includes Greenscreen panels and components, structural metal columns, beams, braces, column foundations, plant materials, soil mix and amendments.

12. <u>Bicycle Racks</u>
   a. Specify manufactured racks.
   b. System includes new concrete pad / finish surface, and bike rack components.

13. <u>Relocated Trash Enclosure at West Parking Lot</u>
   a. Field investigation has determined an appropriate location at the North end of the Sunol Drive Parking Lot.
   b. Design / Detail C.M.U. enclosure construction
   c. System includes new foundation, concrete pad, enclosure materials, gate materials, curb cut / driveway apron.

14. <u>Recycling Center at Demonstration Garden</u>
   a. Specify manufactured bins.
   b. System includes new concrete pad, commercially-available bins, and instructional / educational signage.

15. <u>Composting Bins at Retaining Wall East of Gymnasium</u>
   a. Specify manufactured bins.
   b. System includes new commercially-available bins, and instructional / educational signage.

PROJECT EFFICIENCIES

LEGEND	EFFICIENCY	ENVIRONMENTAL CONSERVATION IMPACT	COST IMPACT	MAINTENANCE IMPACT
BUILDING				
1	PHOTOVOLTAIC ARRAY	HIGH	HIGH*	LOW
2	PASSIVE DOWN-DRAFT COOLTOWERS	HIGH	HIGH	LOW
3	SOLAR POOL HEATING SYSTEM / SOLAR WATER HEATING	HIGH	MEDIUM**	LOW
4	PLUMBING FIXTURE AND FITTING EFFICIENCY	MEDIUM	LOW	NONE
SITE				
5	"GREEN" SHADE STRUCTURE WITH POSSIBLE ADDITIONAL PHOTOVOLTAIC TILES	HIGH	MEDIUM	LOW
6	SOLAR SITE LIGHTING	HIGH	HIGH	LOW
7	NEW IRRIGATION SYSTEM	HIGH	HIGH	REDUCTION
8	NEW SITE PLANTING	HIGH	HIGH	LOW
9	RELOCATED TRASH BINS	LOW	LOW	NONE
10	VEGETATED BUFFER WITH OVERFLOW DRAIN	HIGH	HIGH	LOW
11	CONCRETE GRADED FOR POSITIVE DRAINAGE	HIGH	HIGH	LOW
12	UNIT PAVERS	HIGH	HIGH	LOW
13	DRYWELL	HIGH	HIGH	LOW
14	EDUCATIONAL CISTERN / RAIN BARREL	HIGH	HIGH	LOW
15	BIORETENTION WITH OVERFLOW DRAIN	HIGH	HIGH	LOW
16	PERMEABLE CONCRETE AT PARKING LOTS	HIGH	HIGH	LOW
17	INFILTRATION BASIN	HIGH	HIGH	LOW
18	MEDIA FILTER - DRAINAGE SYSTEM	HIGH	HIGH	LOW
19	RECYCLING BINS AND EDUCATIONAL SIGNAGE	HIGH	LOW	LOW
20	COMPOSTING BINS AND EDUCATIONAL SIGNAGE	HIGH	LOW	LOW
21	BICYCLE RACKS	HIGH	LOW	LOW
22	BUILDING AND SITE EFFICIENCIES EDUCATIONAL SIGNAGE	MEDIUM	LOW	LOW
MANAGEMENT				
	GREEN CLEANING POLICY	MEDIUM	NONE	NONE
	SUSTAINABLE PURCHASING	MEDIUM	LOW	NONE

* ANTICIPATED COST BREAK EVEN - 11.4 YEARS

* ANTICIPATED COST BREAK EVEN - 5.89 YEARS

OBREGON PARK GREEN PILOT PROJECT

CONCEPTUAL SITE PLAN

June 2009