OC parks

LEED Certified Building:

Irvine Regional Park Maintenance Yard Office Building



BUILDING HIGHLIGHTS:

- First LEED Certified project for OC Parks and Orange County Community Resource
- The building has achieved 25% energy cost savings
- 91% of construction waste diverted from landfills
- Water use reduced by 47 % over EPA act 1992 requirements
- 296,812 kg of CO2, 3,275 kg of SO2, and 844 kg of NOx removed from the atmosphere over the 40 year study period of the building life cycle

OVERVIEW

Irvine Regional Park is the first park the County of Orange acquired in 1897. Inside Irvine Regional Parkis the first building designed to obtain a LEED Certification. Sustaining Irvine Regional Park's unique beauty into perpetuity requires a massive maintenance effort that is led by a team of dedicated, well trained maintenance personnel. To match the level of commitment put forth by the parks maintenance staff, it was decided that a first class maintenance yard and office building would be constructed to replace functionally obsolete structures, many of which were over sixty years old. Once it was decided that a new maintenance yard would be constructed, obtaining a LEED Certification became an obvious choice to insure that the new facility would be water and energy efficient, would be constructed out of sustainable materials, that the natural setting would be considered and honored, and that the indoor environment would promote optimum efficiency from the employees. An integrative design approach was adapted to ensure that the finished product is a structure that the park system will be proud of for decades to come.

The 3360 square foot maintenance office building serves as a pilot LEED project for OC Parks and Orange County Community Resources. With the success of this first LEED project, OC Parks and Orange County Community Resources plan to consider implementing LEED methodologies for future new building construction and building improvement projects. The new facility was constructed and is operated by Orange County Parks. It was designed by Ai Architecture of Foothill Ranch, CA.



PROJECT TEAM

Owner: OC Parks Occupant: OC Parks maintenance staff General Contractor: Silvercreek Construction Architect: Ai Architecture MEP: Soutwest Group Civil Engineering: Inclendo Consulting Group Structural Engineering: Salsa Steel Corp LEED Consultant & Commissioning: Alliance Project, LLC





LOCATION

The project site, Irvine Regional Park Maintenance Yard, is situated in the heart of Irvine Regional Park, located at 1 Irvine Park Road, Orange, California.

Irvine Regional Park is known for its heritage oak and sycamore trees and is nestled within Santiago Canyon beneath the Santa Ana Mountains in the City of Orange. Irvine Regional Park, the oldest regional park in California created in 1897, now occupies much of the lowermost Santiago Creek Canyon, between Santiago Creek Dam and Villa Park Reservoir. Major transportation nearby includes the Newport (55) Freeway to the west, 91 Freeway to the north, 261 Freeway to the east and 5 Freeway to the south.

DESIGN PROCESS

Ai Architecture was brought onto the project in 2010. Many of the original design elements met the requirements for LEED certification requirements because the building needed to comply with the California Green Building Code. Construction commenced in October 2012 and was completed in October 2013. LEED documentation was submitted to the USGBC in September 2011, and a certified rating was achieved in the fall of 2013.

During the schematic design phase, OC Parks project manager promoted the benefits of obtaining a LEED Ceritification and it was decided that the project would pursue a LEED Certification. The architects, engineers, commissioning agent, contractor, OC Parks maintenance staff and other consultants were present during the LEED design kickoff meeting. The team jointly decided on which LEED points the project team would pursue and to assign primary responsibility for each strategy. A communications plan was mapped out so that all the parties involved could contribute to the integrated design process. In addition, the team included green language in the construction bidding document, so that bidders were well informed of OC Parks' goal of creating a sustainable project.



BUILDING DESCRIPTION

The Irvine Regional Park Maintenance Facilities project replaces the existing dilapidated maintenance buildings with new single story pre-engineered metal buildings, and associated site improvements. Only the maintenance yard office building pursued a LEED Certification. The office building consists of offices, a staff breakroom, restrooms with showers and lockers, and a laundry/service room.

PROGRAM

The goal of this project is to achieve the following:

- To provide comfortable, productive and safe working environment for maintenance staff.
- To minimize disturbance to the natural environment of the regional park.
- To protect the native oaks and natural habitat in the area.
- Sustainable design leading to LEED Certification.

SCHEDULE

Project planning/pre-design: February 1, 2010 Schematic Design: April 1, 2010 Design Development: January 1, 2011 Construction Documents: May 1, 2011 Issued for Construction: October 1, 2012 Completion: October 1, 2013

LIFE CYCLE COST ANALYSIS

A comparative analysis was performed utilizing software provided by the Applied Economics Office Engineering Laboratory. The analysis is consistent with the Federal Life Cycle Cost Methodology and focuses on electricity and water usage. The study period for the analysis is 40 years and uses a discount rate of 3%. To run the analysis, whole building energy modeling had to first be performed to establish a baseline case and an alternate method. The energy modeling was performed by Alliance Project. The baseline case was designed to meet the minimum requirements of California Title 24. The alternative case was a design that was 16.5% more energy efficient than California Title 24 requirements. The alternative case also considered the additional cost implementing the changes. The simple payback period to recapture the cost of LEED Certification is 14 years; a discounted payback occurs in year 18.

The Life Cycle Cost Analysis that was performed did not consider other benefits that a LEED Certified building would have. These benefits are mainly in the area of improved employee productivity as it relates to the indoor environment. The use of daylighting, natural ventilation, controllability of lighting systems, and the use of low-emitting materials in the design contribute to the overall quality of the project. While it may be difficult to quantify the direct cost savings associated with implementing these elements into the design they should be considered when making the decision to pursue a LEED Certification for the project. The chances of a LEED Certified building ever being labeled as a "sick" building are virtually zero. In addition to saving electricity and water the LEED Certified building design removes 296,812 kg of CO2, 3,275 kg of SO2, and 844 kg of NOx from the atmosphere over the 40 year study period of the Life Cycle Cost Analysis.

SUSTAINABLE STRATEGIES

Sustainable Site

Alternative Transportation

Driving alternatives are provided for employees, which include preferred parking space for low-emitting and fuel-efficient vehicles, vanpools, and bicycle racks. Showers are available in the office building. These driving alternatives help to reduce single-occupancy vehicle use directly affect fuel consumption and air and water pollution from vehicle exhaust.

Maximize Open Space

19,242 square feet of open space is preserved for vegetated open space, which is more than the footprint of the LEED certified building (3360 square feet). Preserving the open space provides habitat for vegetation and wildlife, reduces the urban heat island effect, increases stormwater infiltration and provides human populations with a connection to the outdoors.

Stormwater Design

A storm water management plan has been implemented such that the post-development site runoff quantity has been reduced by 32.43% for the two-year, 24-hour design storm. In addition, the storm water runoff from 90% of the average annual rainfall is captured or treated, which removed 80% of the average annual postdevelopment total suspended solids (TSS). An infiltration trench is located at northeast corner of the site perimeter, which will reduce pollutants from the stormwater and recharge the ground water.

Heat Island Effect

89% of the total project site has existing oak trees canopy and reflective paving material. The surrounding area is filled with native oak trees and plants, which provide shade for the building and project site. In addition, 100% of the base building roof surface has a solar reflectance index of 82.15%, which greatly reduces the cooling load of the heating, ventilating and air-conditioning (HVAC) equipment thereby reducing electricity consumption.

Water efficiency

Water Use Reduction by 47%

Waterless urinals were utilized along with 1.28 GPF flush valves on the water closets and 1.5 GPM shower heads to maximize water efficiency. These fixtures, along with sensor-controlled faucets, reduce the portable water usage by 47% less than the EPA 1992 baseline.

No Irrigation System

The site does not have any irrigation system. All the existing native California Live Oak trees do not need irrigation since they are already established on the site for many years.

Stormwater Design

A storm water management plan was implemented ensuring the post-development site runoff quantity has been reduced by 32.43% for the two-year, 24-hour design storm. In addition, the storm water runoff from 90% of the average annual rainfall is captured or treated, which removed 80% of the average annual post-development total suspended solids (TSS). An infiltration trench is located at northeast corner of the site perimeter, which will reduce pollutants from the stormwater and recharge the ground water.



SUSTAINABLE STRATEGIES

Energy & Atmosphere

Energy Performance

The building has achieved 25.5% energy cost savings using ASHRAE 90.1-2007 Appendix G methodology. The building has also been designed so that the majority of fenestration is located on the northern exposure, which helps reduce solar heat gain and lessen the cooling load. Automatic off occupancy sensor are used in the offices, which will turn off the lights when no one is occupying the office after 30 minutes. Interior, ceiling-mounted photocells are used for interior lighting control in breakroom and restrooms. The photocell are wired with occupancy sensors and hot water circulation pump control such that the hot water circulation pump shall function if the lighting is off due to sufficient natural light level.

Refrigerant Management

The building does not have CFC-based refrigerants in the HVAC systems and does not use ozone-depleting substance, which eliminates the emission of compounds that contribute to ozone depletion and global climate change.

Green Power

OC Parks has purchased a 2 year renewable energy certificate (REC) from 3 Degrees for 100% energy/electricity usage for the building. 3 Degrees channels funds to recently built renewable energy facilities, encourages construction of new renewable energy projects and signals support for stronger U.S. renewable energy and climate policies. 3 Degrees is certified as green by the Green-e Energy program. The program was established by the Center for Resource Solutions to promote green electricity and provide consumers with a rigorous and nationally recognized method to identify green electricity products.

Materials & Resources

91% of Construction Waste Diverted from Landfills

A total of 91% of construction waste was diverted from landfills. Of the 1209 tons of construction waste, only 104 tons was taken to a landfill. The remaining 1105 tons was source separated and recycled. By recycling construction and demolition debris, the demand for virgin resource and the impacts to the environment are greatly reduced, which also avoid the need for expansion or new landfill sites.





SUSTAINABLE STRATEGIES

Indoor Environmental Quality

Indoor Air Quality

Indoor air quality (IAQ) was improved by increasing breathing zone outdoor air ventilation rates to all occupied spaces by more than 30% above the minimum rates required by ASHRAE Standard 62.1-2007. To conserve electricity and create natural ventilation within the building, operable windows were installed in all occupied spaces. To minimize building occupant exposure to particulates and pollutants, 4'x10' walk-off mats are placed at all entry ways to capture dirt and prevent particulates from entering the building. An IAQ management plan was implemented during the construction and pre-occupancy to promote the comfort and well-being of construction workers, and ensure healthy indoor air quality for building occupants.

Low-Emitting Materials

All adhesives, sealants, paint and building material have low or no Volatile organic compound (VOC) to reduce/eliminate the quantity of indoor air contaminants that are odorous, irritating and harmful to the comfort and well-being of installers and occupants.

Daylight and Views

The office building provides building occupants with a connection between indoor spaces and the outdoors through the introduction of daylight and views into the offices and the breakroom. Each office has a large window that is operable and allows the building users to open the windows freely for natural ventilation, daylight and views. The windows in each office provide building occupants a connection to the outdoor, which helps to reduce stress and creates a healthy working environment.

Innovation in Design

Educational Outreach

OC Parks developed an educational outreach program through the OC Parks website. The web page provides information about the LEED certified building in OC Parks, and green building resources for the public to learn about green technology and design. A case study and a brochure are available on the web page for download to inform the design of other buildings based on the successes of this project. The case study is also available on the USGBC for sharing with other projects.

FUTURE GOALS & OBJECTIVE

With the success of this first LEED project, OC Parks is discussing the possibility of pursuing LEED Certification for future new building construction and building improvement projects. Through educational outreach to both the public and OC Parks staff, we hope to raise awareness of the benefits of green building and sustainable living environment.