City Project Case Study

Seattle Fire Station 10
Seattle Fleets & Facilities Department

Photo by Michael Burns

Square Feet: 69,497, 5 stories

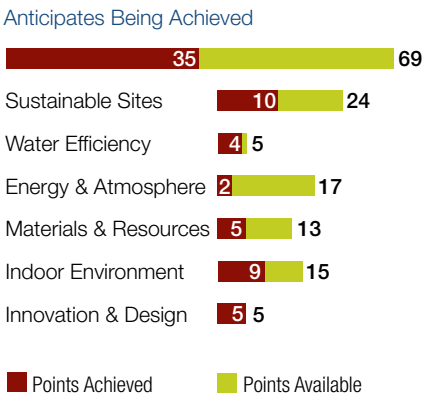
Site: 60,131 square feet

Location: Chinatown-International District

Construction Cost: $403/square feet

Completed: December 2007

LEED Facts - NC Silver



Benefits

- 18% reduction in energy
- 33% less potable water inside building
- 40% less potable water used
- 25% decrease in impervious surface on site
- 25% reduction in rate of stormwater runoff through green roof and planting area

Project Overview

The project known as Fire Station 10 is actually three facilities in one: a fire station, a fire alarm center and an emergency operations center. It also serves as the citys primary hazardous materials response unit.

The six-bay fire station operates around the clock, with decontamination facilities, living quarters for the crew and disaster supply storage. The Seattle Fire Department's Resource Management Center (RMC) is also located within this station.

The Fire Alarm Center (FAC) is staffed continuously. It includes a 911 dispatch area, sleep rooms and staff support rooms, a training room, server and radio communication equipment rooms, administrative offices and support spaces, and a police 911 back-up facility.

Art at Seattle Fire Station 10

When the City of Seattle's Office of Arts & Cultural Affairs issued the call for artists for Fire Station 10, the agency translated it into Japanese, Chinese and Vietnamese in order to reach out to communities who reflect the International District population. Eight artists were commissioned to develop proposals; Stuart Nakamura, and the team of Nancy Chew and Jacqueline Metz received commissions for the final artworks. They joined Gloria Bornstein, the design team artist for Fire Station 10, who calls her art plan *Different Voices, One Community*.

Gloria Bornstein's own site-based artwork along South Washington Street is called *Sentinels*. Eight painted steel sculptures vary in height and configuration. Their forms are derived from a combination of sources, including Asian architecture and crafts, firefighters and their equipment. Viewers can walk up to and around the figures which stand along the south side of the station.

At the entry plaza, Seattle artist Stuart Nakamura's *Call and Response* is a sculptural installation including a boulder, inlaid pavers and a cut metal screen. It reflects Fire Station 10's legacy and ties to the International District, and it draws attention to the importance of water in life and in the work of the firefighters.

Along Fifth Avenue South, Jacqueline Metz and Nancy Chew created *bamboo, luminous*, a glowing stand of resin "bamboo" shoots that occupy one end of the planting strip and mark the entry to the Emergency Operations Center. Bamboo symbolizes grace, enlightenment, strength and ability to adapt. Lit internally by energy-efficient LEDs, the slender yellow-green reeds transmit and pulse light. The effect is calm yet playful, with the color of the grove contrasting with the deeply-hued building.

All three artworks were funded by Fleets and Facilities Department, Fire Facilities and Emergency Response Levy 1% for Art funds, administered by the Office of Arts & Cultural Affairs.

Photo by Michael Burns of *Sentinels* artwork by Gloria Bornstein

The Seattle Police Department Emergency Operations Center (EOC) includes an operations floor with five break-out rooms, an executive policy room, a radio communications center, media briefing room, and media production room. During a declared emergency, the EOC will serve as the seat of Seattle City government.

A total of 48 personnel occupy the facility at a rate of 16 per shift, round the clock. About 100 people attend bi-monthly conferences for eight hours each event.

Sustainable Sites

Fire Station 10 is the simplified name chosen for this new multi-purpose emergency response building, honoring the historic fire station in Pioneer Square. The older building still serves as fire departmental headquarters for the city.

In the new building, at the edge of the Chinatown-International District, the fire station portion of the project occupies approximately 50 percent of the gross square footage. Since it must continue to serve after an emergency, the building is designed and constructed for longevity, secure operations, intense use, ease of maintenance and operational continuity after a significant seismic event.

The full-block site is bordered on the north by Yesler Way Viaduct, on the east by Fifth Avenue, on the south by South Washington Street and on the east by Fourth Avenue. A brownfield, it was most recently used for surface parking but once held a gas station. It was chosen, in part, because it is seismically stable relative to alternative sites, including the old Fire Station 10.

Extensive abatement of soil contamination took place before construction of the new building.

Despite its very specialized use, the building was designed to complement the neighborhood aesthetic. Community input was sought regarding site development and layout, landscaping, the building facade, art, security, and off-site improvements. The project kicked off with an eco-charrette that brought together the design team and stakeholders to consider site conditions and green strategies that could be used on the project.

Prior to construction, the site was almost 100 percent impervious. There is now 7,338 square feet of open space, much of it covered with native plants, and a decrease in impervious surface of 25 percent for the site. A 15,000-square-foot green roof also slows water before it enters the storm system, and reduces heat radiating from the building. Irrigation for the project comes from harvested stormwater and process water from fire department drills, so no potable water will be used to irrigate landscaped areas.

Although tightly constrained by the program and the available site area, the project incorporates outdoor space in a secure portion of the facility. Approximately half of the facility is covered with a green roof.

Exterior lighting design minimized light pollution. An art installation along South Washington Street will be illuminated during the evening. The light fixtures were chosen and aimed so that light is captured

Photo by Michael Burns of *Call and Response* artwork by Stuart Nakamura

Photo by Michael Burns including the artwork *bamboo, luminous* by Jacqueline Metz and Nancy Chew

by the building facade and site, and does not shine into the sky.

The City's facility maintenance department developed a measurement and verification program to incorporate the energy and water use projections made during design so they can respond if resource consumption is outside of the baseline conditions. The plan includes measurement and verification of water use, HVAC unit operation, lighting systems and controls, and other energy consumption.

The site is within easy walking distance of King Street Station, Seattle's multi-modal transportation terminal, and also lies near two major bus rapid transit corridors.

Water Efficiency

The building has a high need for water to conduct fire drills and to wash fire response vehicles. A combination of the site landscaping and fire facility activities is expected to use nearly 13 million gallons per year.

Spillover from drills and washing, as well as stormwater from roofs and non-drivable hardscape, will be collected in a below-grade holding system with pumps. This system, in turn, will supply both irrigation needs and "process water" for drills and washing, through a hose bib connection. With a modest level of treatment, this system is expected to supply 100 percent of the water used for irrigation as well as a substantial amount of the "process water" required at the site.

Water closets have dual-flush (1.1/1.6 GPF) valves. Ultra-low-flow lavatories (0.5 GPM) and low-flow kitchen faucets (1.8 GPM) are specified for the building. In addition, 1.8 GPM showerheads are used. Overall, these water saving fixtures are projected to reduce potable water use by more than 156,000 gallons/year.

Energy & Atmosphere

Fire Station 10 is an energy-intensive building. The EOC requires extra security systems and goal capability of 72-hour operations under emergency conditions. Critical systems must be identified and built to a higher standard. Part of this capability includes on-site generation (via conventional backup generator) to support operations in case of a power failure.

Aside from these specialized systems, a combination of wall insulation, windows and heating, ventilation and air conditioning (HVAC) specifications is expected to save 20 percent over the Seattle city energy code baseline for the building, and this represents a savings of 30,700 kilowatt hours and 9,700 therms per year.

Heating and cooling efficiency is gained through the use of variable air volume boxes and variable speed drives, which provide heating and cooling based on demand. Carbon dioxide sensors trigger the HVAC equipment to increase the amount of outside air provided to high occupancy spaces such as conference rooms, training rooms and the operations centers, increasing indoor air quality. Likewise, carbon monoxide sensors monitor air quality in the apparatus bays. A direct digital control (DDC) system controls HVAC equipment to efficiently maintain space temperatures and ventilation rates. Free cooling is achieved through the use of outside air, variable air volume and variable frequency drives for supply and return fans. High efficiency filters and waterside economizers on the computer.

Materials & Resources

High-recycled content steel and concrete was specified and used throughout the building, for a total of 40 percent recycled content in project building materials. An estimated 68 percent of construction materials were sourced locally, and 19 percent were harvested within 500 miles.

Three tons of asphalt from demolishing the existing parking lot for site construction was recycled by a local company.

During construction a comprehensive construction waste management plan was implemented by the general contractor. Steel, auger cast piles, and shotcrete rebound were sorted and recycled individually. Other construction waste was placed into a co-mingled recycling stream and recycled by a local vendor. A total of 80 percent of construction waste was diverted from landfills.

This project included a unique materials selection program to evaluate and specify materials that minimize persistent bioaccumulative toxins (PBTs). The PBTs evaluated for this project included mercury, dioxins, and polybrominated diphenyl ethers (PBDEs). These PBTs were selected because they provide the best opportunity for reductions in the immediate future and have high toxicity

Photo by Michael Burns

profiles. As a result of this evaluation, portions of the electrical conduit were specified to be rigid metal instead of polyvinyl chloride (PVC) and the irrigation piping is polypropylene (PP).

Indoor Environment

Fire Station 10 was designed with cleanable hard surfaces, including concrete floors, resilient flooring (relatively firm but with give and bounce back qualities) and minimal carpet. In addition, high efficiency particulate air (HEPA) filtration was installed in the on-site EOC so that it can be used as a command center in the event of a terrorist incident or natural disaster that would impact the air of downtown Seattle.

In addition, special attention was given to toxic content in all materials. In addition to the general evaluation of persistent bioaccumulative toxincs (PBTs) and substitution of alternative materials (see Materials and Resources, above), indoor environmental strategies include: specify low-mercury fluorescent lamps; select and install mechanical equipment based on specific (low) sound level targets; implement a non-smoking policy for the building; use nontoxic cleaning products; commission mechanical and electrical systems prior to occupancy; and use a comprehensive commissioning process to ensure that design intent is realized. The high-efficiency air filtration system was fitted with prefilters and final filters. UVC germicidal lights in air handlers improve indoor air quality as well as coil cleaning.

An air quality management plan covers the operation of air handlers, storage of absorptive materials, and use of filtration media. Low-volatile adhesives, sealants, and coatings will be applied during construction.

Innovation & Design

- Process water reduction
- Exemplary performance in public transportation
- Green Roof monitoring and green building education
- Green housekeeping

Lessons Learned

In a shared high-level facility, it is important to align sustainability goals with the particular goals and concerns of the stakeholders. Specialized needs for energy, water, and ventilation must be considered interdependently when applying conservation strategies. This must be coupled with an enforceable commitment to sustainability goals from each user group.

The overlay of multiple controls for security and backup systems with lighting sensors and other conservation systems can come into conflict. In this instance, testing and commissioning is especially important to resolve functional issues.

When facilities are co-housed, it is a special challenge for design and construction subcontractors in various specialties to maintain a sense of the whole project, yet this is very important in implementing goals.

It is important to coordinate sustainability goals with the selected LEED rating goal and application early in the process. This is most easily achieved if the application process is concurrent with design from the first stages.

December 2008

Rating & Awards

U.S. Green Building Council LEED® for New Construction Silver Rating - Anticipated

2006 National AIA - Justice Facilities Review Design Citation

2005 Seattle Design Commission Design Excellence Award

The Team

Owner
Seattle Fleets and Facilities Department
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Architect
Architect, Weinstein A|U
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Associate Architect, RossDrulis Cusenbery
www.rossdrulis.com

Consulting Architect, TCA Architecture-Planning, Inc.
www.tca-inc.com

Mechanical Engineer
Notkin
www.notkin.com

Landscape Architect
Gustafson Guthrie Nichol
www.ggnltd.com

Civil & Structural Engineer
Magnusson Klemencic Associates
www.mka.com

Electrical Engineer
Sparling
www.sparling.com

Lighting Designer
Candela
www.candela.com

Contractor
Hoffman Construction Co
www.hoffmancorp.com

Owner's Representative
Sheils Obletz Johnsen
www.sojpdx.com

Sustainability Consultant
Paladino & Company
www.paladinoandco.com

To Learn More

City Green Building is making green building standard practice in Seattle through education, technical assistance and incentives. www.seattle.gov/dpd/greenbuilding

LEED® is the national benchmark for high performance green buildings developed by the U.S. Green Building Council. www.usgbc.org

Office of Arts & Cultural Affairs promotes the value of arts and culture in and of communities throughout Seattle. www.seattle.gov/arts

Seattle Public Utilities provides customers with reliable and cost-effective water, sewer, drainage and solid waste services, while protecting public health and balancing social and environmental responsibilities to the community. www.seattle/gov/util/services