City Project Case Study

Justice Center
Seattle Fleets & Facilities Department

Photo by Christian Richters

Square Feet: 300,000, 13 stories

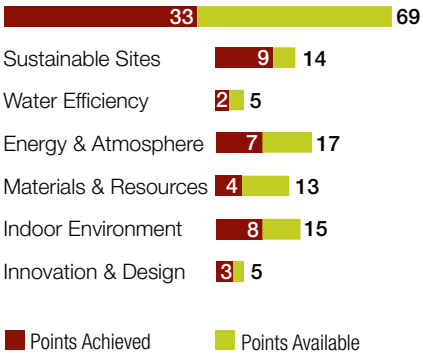
Site: 32,659 square feet

Location: Downtown Seattle

Construction Cost: $307/square feet

Completed: August 2002

LEED Facts - NC Silver



Benefits

- **19.35% reduction in energy use**
- **100% less potable water used for irrigation**
- **7% reduction in water use inside building**

Project Overview

The Justice Center serves two tenants, housing the Seattle Police Headquarters and the Seattle Municipal Court. The 13-story tower replaces the City of Seattle's Public Safety Building, which was over 50 years old and seismically deficient.

Like the other projects in Seattle's hill climb Civic Center, it is intended to last for at least a century, saving resources through durability and longevity. A flexible floor plan, with fixed elements in the center, allows for changing functions over time.

The Police Headquarters is located on the north end of the building with a stone facade that reflects the integrity, strength and tradition of the police force. The Municipal Court is located further from the curb on the south end of the building and features a public plaza and glass facade on the west side to symbolize the transparency and accessibility of justice.

During daytime hours, the Justice Center typically has about 655 occupants. Usage tends to vary by floor, with some levels used only during business hours and others occupied around the clock.

Art at the Justice Center

Through the City of Seattle's Public Art Program, lead artist Pam Beyette developed an art plan for the Seattle Justice Center that identified artwork opportunities for herself, fellow design team members Michael Davis, Norie Sato and Richard Turner, and other artists to work throughout the building. The artwork is intended to engage community members and to encourage them to think about the nature and roles of the justice and police systems.

The design team created *Points of View* in the Municipal Court lobby, a 28-foot high focal sculpture comprised of two opposing conical forms suggesting ongoing dialogues about justice, compassion, the judicial system and balance within society. The team also created *Witness and Dilemma, Levels, Weights and Measures*, in the courts stairwell, a grid of 24 bronze wall-mounted sculptures.

Artworks by other artists throughout the Municipal Court building offer individual approaches to the ideas of justice, humanity, community and personal responsibility.

Jury Assembly Room: *Day and Night*, by Anna Skibska, is comprised of 12 blue, green and gold flamed glass orbs suspended high along a wall, casting colorful shadows.

Elevator Lobbies:

Second Floor: Marita Dingus, *Contradictory Vibrations*, mixed media on pink wall.

Third Floor: - Darlene Nguyen-Ely, *Wings*, wood sculpture with photo-collage insets.

Ninth Floor: Joanne Hammer, *Common Ground*, glass mosaic panel.

Tenth Floor: Deborah Lawrence, *Justice is Served: Celebrating the People Who Work for Change*, collaged panels

Eleventh Floor: M.A. Papanek-Miller, *Listening*, mixed media on weathered paper and canvas.

Twelfth Floor: Brad. A. Miller, *112 Wristwatches*, Casio digital wristwatches and colored gel lights.

The design team of Beyette, Davis, Sato and Turner also developed a series of installations, *Codes & Protocols* for the Seattle Police Department Headquarters lobby that include two stone benches that convey permanence, weight and stability and hold symbols of police service: hat, keys, badge. The basket weave of police belts and holsters inspired the bronze sculptural panels, and a series of wall medallions show examples of police work. Together, the various elements speak to the reliability that citizens expect from the police.

Photo left by Erik Stuhaug right by Christian Richters

Sustainable Sites

The Justice Center was the first and highest building to be completed in Seattle's three-block hillclimb Civic Center, with Seattle City Hall in the block below and a civic plaza with office development and transit below that. All are connected in a related landscape plan. The Justice Center sets up the sequence with a glowing colored glass panel, reflecting pool and flowing water that reappears in the form of a water feature inside the neighboring City Hall. The landscape is visually contiguous with the Justice Center lobby, which stretches across the front of the building behind clear glass.

The pedestrian-friendly environment is enlivened by light and water in the landscape. In a reflection of the natural environment, the design celebrates the flow of water from the mountains to the Puget Sound, with the Justice Center as the headwaters. Rainwater hits the Justice Center roof canopy and drops over the edge onto the rooftop. The water merges with any overflow from the green roof system and is conveyed down through the building into a detention tank. Rainwater is stored for later use, when needed, to irrigate the landscaping on the Justice Center plaza. To add aesthetic interest, one section of the glass façade is etched to suggest water cascading down the Civic Center side of the building to the plaza.

As a civic building, the Justice Center was designed to emphasize transparency, in contrast to the hardened Public Safety Building it replaced. The largely transparent front wall also provides abundant natural light in circulation and waiting areas of the building, and brings in sweeping views of the city and of Elliott Bay.

The glass wall system is also a functional demonstration of the city's commitment to sustainable design and construction. The innovative west façade is a double-glazed thermal buffer wall that acts as a chimney to reduce heat gain and regulate temperature, while at the same time admitting abundant and diffuse natural light.

A green roof system is the first in a City of Seattle building. It was selected to demonstrate the economic and environmental benefits of the technology, which is commonly used in Europe. The layers of waterproofing membrane, root barrier, insulation, water retention liner, filter fabric, planting soil plants provide high insulation, reducing energy use for heating and cooling.

The green roof captures between 50 and 70 percent of the site's rainwater runoff, slowing it and filtering it, and reducing impact to the City's combined storm/sewer system. Evaporation also reduces the runoff. The insulating effect of the soil helps moderate interior building temperature extremes by slowing the heat transfer to the structure in the summer and reducing heat loss in the winter. This lowers the cost of heating and cooling.

The roof also reduces the "urban heat island effect" because the plants reflect solar radiation in a natural way, rather than absorbing it into the structure. The Justice Center's green roof is landscaped with plants that are heat-tolerant and drought-resistant, and will require little irrigation.



Photos left by Erik Stuhaug, middle and right by Christian Richters

Life-cycle analysis suggests the waterproofing for a green roof will last longer than a conventional roof. By protecting the waterproofing from ultraviolet degradation, mechanical puncture and temperature extremes, green roofs are less susceptible to heat damage and cracking. Sheep fescues dominate the varied plant palette.

Water Efficiency

A water harvesting system captures rainwater from the green roof, the roof rain leaders, and the paved plaza. The collection system stores the rainwater in a harvesting tank located under the entry plaza, where there is a water feature. The drip-irrigation system uses an automated controller with a soil-moisture sensor for greatest efficiency.

The design also includes a stormwater detention vault to restrict peak release rates during storms. An additional four feet of dead storage below the outlet pipe serves a dual purpose as a wet vault for sediment removal and to provide water storage for irrigation.

Low flow toilets and lavatories within the Justice Center actually save water at a rate of approximately 7 percent over code requirements. This amounts to a savings of just under 30 gallons per month, or 360 gallons per year, almost enough for an extra month of water use in the building.

Energy & Atmosphere

The innovative thermal wall, two planes of glass separated by a 30-inch air space, was designed to reduce energy consumption for lighting, heating, and cooling the building.

This air space has louvers on automatic control at the top and bottom of the wall that can either be closed to retain air, creating an insulating barrier to capture heat on cold days, or opened to vent heat from the assembly on hot days.

During the summer, solar heat gain is reduced by naturally ventilating the hot air through louvered vents at the top of the thermal wall. In the winter the louvers are closed to create a greenhouse effect and reduce heat loss by trapping warm air in the wall.

The thermal buffer wall also incorporates a light shelf located eight feet above the floor. The shelf serves two functions: it reduces glare, which is controlled by operable shades; and it directs daylight deeper into the office space, thus providing a more comfortable light and reducing the need for artificial light.

The lighting system has daylight sensors to adjust the artificial light in response to the amount of natural light that is available. The lighting design is enhanced with light colored wall and ceiling finishes.

An Energy Smart analysis qualified the project for City Light energy savings incentive programs. By evaluating the cost effectiveness of various energy-conserving measures and working with City Light staff, the project team was able to help the city to procure hundreds of thousands of dollars in utility rebates.

Submeters were installed within the building to track gas, water and electricity usage. Submeters are tied directly to the building control system, where graphical displays show utility demand and consumption.

The benefit here is that city employees can monitor utility usage in real time, spotting potential trouble spots and fixing them before they turn into big energy wasters. The meters will indicate when energy consumption departs from normal values, alerting maintenance personnel to look for things like malfunctioning valve operators or chiller controls.

Most systems maintain a constant flow of chilled water for air conditioning to avoid the possibility of water freezing inside the chillers, and new control systems can prevent freezing. Variable-flow chillers in the Justice Center save as much as 67 percent of pumping energy costs.

Another important feature in the cooling system, essential given the variable-flow chillers, involved installation of pressure-independent valves. These "smart" valves constantly self-tune and modulate flow no matter how high or low pressure might be, ensuring that the correct flow of chilled water is delivered throughout the system. This minimizes pump energy consumption and simplifies system maintenance.

Dozens of sensors monitor carbon dioxide levels and control the amount of fresh air being brought into the building. By controlling the amount of outside air to meet the actual needs of the building at any given time, the Justice Center realizes savings of about 5 percent on total heating and cooling costs.

Materials & Resources

The combined value of post-consumer content plus half of post-industrial content as a percentage of the total value of all materials amounted to 5.73 percent. The materials chiefly involved were structural steel (90% recycled), acoustical ceiling tiles (66% recycled), glass tile (100% recycled), and glass terrazzo (100% recycled).

A waste management program diverted 88.3 percent of the construction waste from landfills. The contractor combined commingled and source-separated collection and diversion methods. Dumpsters for collection were also placed around the site and serviced by waste management.

The various waste materials were diverted to local markets for recycling: wood went to Rainier Wood, metals to Seattle Iron and Metals, cardboard to various fiber mills (both domestic and foreign), and concrete to Renton Concrete & Gypsum and to GBC.

Indoor Environment

The City wanted to make the sustainable building elements visible to the public, staff and building visitors. The interior spaces are illuminated with daylight and the open space design provides views and a connection to the outdoors.

Direct solar heat is absorbed and re-radiated when trapped within the cavity of the double skin, inducing the movement of the thermal stack, the layers of warming air that drive the mechanism for ventilating the cavity.

The nine-story stack on the west side of the building is open at the bottom with actuated louver operation at the top. The louver operation is linked to the building management system. Sensors in the thermal flue open and close the louvers to assist the building's mechanical system.

Light sensors located around the perimeter dim the lights according to the amount of daylight present, while occupancy sensors in conference rooms automatically turn lights off when people leave.

With its position next to Interstate 5 on the eastern side, contaminated air is a concern for employees, jail inmates, and others who must spend long hours in the building. For this reason, high-efficiency filters were installed in the Justice Center's air handling units.

The interior design is rich and warm with a combination of colored plaster, wood panel walls and ceilings. The interior uses terrazzo floors, recycled carpet and stone, and walls and ceiling panels are made of wood. The terrazzo in the central stairwell, and on floors and countertops contain recycled amber glass.

Innovation

- Education and Outreach
- Introduce Innovative Technology
- LEED accredited professional

Lessons Learned

- The energy-saving benefits of thermal stacking in the buffer wall are difficult to quantify in isolation, because the decision to design and build this type of wall system is inseparable from other decisions about the building envelope. The desire for natural light and transparency, unusual for the building type, was matched with an extremely one-sided orientation of the footprint. Views of the city and water were on the west side and a major highway to the east. Given these pre-conditions, the buffer wall became an innovative solution that offers views and abundant natural light while mitigating heat gain and providing a high level of natural ventilation and comfort.
- Daylighting features must be balanced with glare issues. The glazed double outer wall, in addition to increased perimeter floor-to-ceiling heights, was designed to bring daylight deep into the Justice Center. In fact, glare has been a problem. The light shelf system and additional roller shades help to mitigate glare, but do not entirely eliminate the problem.
- A recycling system with collection bins clearly marked and strategically located helps building occupants to promote sustainability. This simple element emphasizes individual responsibility for recycling and makes opportunities readily accessible.

December 2008

Rating & Awards

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

2004 BEST (Businesses for an Environmentally Sustainable Tomorrow), Sustainable Building

2004 IIDA Northern Pacific Chapter INawards, Design in Mass, Best in Competition

The Team

Owner
Seattle Fleets and Facilities Department
www.seattle.gov/fleetsfacilities

Architect
NBBJ Architects
www.nbbj.com

Mechanical Engineer
CDI, Inc.
www.cdiengineers.com

Landscape Architect
Gustafson Guthrie Nichol, Ltd.
www.ggnltd.com

Civil Engineer
SvR Design Company
www.svrdesign.com

Structural Engineer
Magnusson Klemencic Associates
www.mka.com

Electrical Engineer
T.A.C.
www.tac.com

Lighting Designer
J. Miller & Associates
Daylighting Consultant
Seattle Daylighting Lab
www.daylightinglab.com

Contractor
Hoffman Construction Co.
www.hoffmancorp.com

Commissioning Agent
Engineering Economics, Inc.
www.eeiengineers.com

To Learn More

City Green Building promotes green building through education, technical assistance and incentives.
www.seattle.gov/dpd/greenbuilding

Fleets & Facilities Capital Programs provides great environments that lift the human spirit and engender public trust.
www.seattle.gov/fleetsfacilities

LEED® is the national benchmark for high performance green buildings developed by the US 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