THE EDITH GREEN - WENDELL WYATT FEDERAL BUILDING
SERA ARCHITECTS + CUTLER ANDERSON ARCHITECTS
PORTLAND, OR

Vertical reeds, Nic Lehoux
Conceived as a model project for the U.S. General Services Administration, the LEED Platinum Edith Green-Wendell Wyatt (EGWW) Federal Building is among the lowest energy use buildings in the nation.

EGWW is an existing 18-story, 512,474 sf office tower located in downtown Portland. Completed in 1974, the building’s MEP systems were worn out and outdated. Goals for the modernization of the building included upgrading its systems, updating the work environments and improving accessibility. The design also needed to meet the energy and water conservation requirements of the U.S. government’s Energy Independence and Security Act of 2007, comply with federal standards for blast resistant design and provide new code compliant egress stairs, entries and rest rooms. Altogether, the architects transformed the aging building into a modern, healthy workplace for 16 federal agencies - and in a remarkable 39 months.

Completed in 2013, EGWW is both a premier federal office space and an energy efficient renovation project for the 21st century.
EGWW pushes the boundaries for innovation in high performance building.

From the beginning, the design team spent three months analyzing which measures brought the best value using physical, virtual, and energy models. After the team completed its analysis, they began the process of translating the data into a synthesized aesthetic expression. Their goal was to transform the existing building from an aging, energy hog to one of the premiere environmentally-friendly buildings in the nation.

Unique features resulting from the design studies is a façade of ‘reeds’ and shades tuned for each façade to reduce solar gain; a roof canopy to support the 180 kW photovoltaic array while collecting rainwater; and tenant programming based on solar orientation.
REGIONAL + COMMUNITY DESIGN

Early in the design process a decision was made to renovate the existing building instead of erecting a new building in the suburbs. This was arguably the greenest decision the project team made, as the existing EGWW site is less than two blocks from Portland’s bus mall and is within walking distance to four light rail lines, which combined deliver a possible 283 trips per day. This proximity to transit allows the building’s 1,200 federal workers to not be reliant on automobiles for transportation.

The area surrounding EGWW is rich with services that also reduce workers’ need to drive for lunch or errands. The building has a Walkscore rating of 97, a Transit Score of 92, and a Bike Score of 94.
In addition to providing the necessary shading, the vertical reeds also support plant growth and provide a native ecosystem around the building. Selected from the bio-region for their qualities of beauty, drought tolerance, soil adaptability, and compatibility with security guidelines, the planting scheme is a lush, robust landscape that provides a unique setting for the re-birth of this urban building. A tapestry of climbing vines, unique to each solar exposure, connects the façade to the ground plane and surrounding landscape. The vines are deciduous to allow winter light into the building and provide autumn interest. The plants used on and around the building are a mixture of evergreen and deciduous vines, creating different habitats for a variety of species.
Key to the building’s energy efficient design was transforming the existing, un-insulated façade to a high-performance curtain wall with elevation-specific shading devices. Reeds stretch up the entire 18-story height of the west face, while integrated shade and light reflectors create balance on the south and east faces. These shading strategies are integral to the success of the project’s primary energy conservation measure, a new radiant heating and cooling system.

To arrive at the optimum combination of shading and daylighting, a parametric analysis evaluated peak cooling loads for each orientation to confirm shading requirements. Three glazing percentages (40%, 50% and 57%) with and without shading were modeled for a typical space. After determining which façades need shading (west, south and east) and which did not (north), the next step was to determine the percentage of time each façade would need to be shaded. The depth and spacing of the shading devices were varied to arrive at the performance metrics the designer used to derive the building’s aesthetic expression. A large canopy on the top of the building, provides additional shading for the taller 18th floor, as well as supporting optimally angled photovoltaics and providing a water collection area.
Because of the importance daylighting plays in human health and comfort, the project optimized daylighting in the perimeter zone utilizing a task/ambient approach to lighting. This resulted in a 50-60% reduction in lighting energy, while providing occupants with a valuable connection to the outdoors.
Sixty percent water savings was achieved at EGWW through a dual strategy of incorporating water conserving plumbing fixtures together with a rainwater system.

By repurposing an underground rifle range into a 165,000 gallon tank, rainwater collected at the roof is stored and used for toilet flushing, irrigation, and mechanical cooling tower makeup water. The tank also supports another project goal, mitigating the negative effects of urban runoff. Landscape water use was reduced by over 50% through use of drought resistance landscaping and incorporating subsurface irrigation.

Ultimately the EGWW building saves over 2,000,000 gallons of water annually - enough water to fill three Olympic-sized swimming pools. In addition, the water collecting canopy supports a 180 kW solar array that provides 4% of the building’s total energy.
EGWW achieves a 60% reduction in energy use compared to the existing building as a result of an integrated design process that prioritized occupant comfort and energy performance. Exterior shading, tuned by façade orientation, provides solar control while enhancing daylighting, thereby minimizing cooling load (and peak electric load) and improving thermal comfort. These integrated strategies allowed the prime energy conservation measure, a radiant ceiling heating and cooling system. The building also provides enhanced indoor air quality through use of 100% dedicated outdoor air system, resulting in above-code ventilation with excellent filtration. After building occupation, the team incorporated a series of aftercare measures to monitor energy use and help building operators tune the building to achieve its goals.
To limit materials being landfilled, the project team initially focused on resource conservation and material reuse. Careful demolition eliminated more than $1 MIL in contingency, which was used to buy sustainable design features on the priority add-back list. More than 3,337 tons of precast concrete was reused as road bed and 3,500 tons of material were given new life through reuse and repurposing.

After demo was complete, the team’s focus shifted to the selection of new materials based on a decision-making flowchart that emphasized buy-American requirements and durability. The result was the selection of regional materials (11.9%) with high recycled content (29.8%). Indoor air quality was also considered through the selection of low-emitting adhesives, floor systems and composite wood and Agri-fiber products.

To further reduce the building’s environmental impacts, the property management team has incorporated the General Services Administration’s green leasing and operation policy and has created a program to educate tenants about the building’s green features and the impact they have.
LONG LIFE, LOOSE FIT

EGWW employed two major design solutions to maximize the building’s future lifespan.

The first innovation was to make a significantly lighter weight building. By re-cladding and removing 3,330 tons of precast concrete, the building’s weight was reduced so dramatically that a seismic upgrade wasn’t needed. This is a tremendous benefit to the federal tenants, whose requirements mandate they operate from a seismically compliant structure.

The new curtain wall also permitted a stronger connection to the building frame, supporting another special requirement for EGWW, blast resistance. The high strength glass and a thicker lamination layer are anchored at the extended floor plates, which was not possible with the old façade.

The second innovation was to design the radiant panel ceiling system as a kit of parts, reusable in future tenant improvements. By aligning the inactive panels to the curtain wall mullions, these inactive panels can be dismantled with a new partition wall installed without requiring the complete demolition of the ceiling. Active panels can be interchanged throughout the building by changing the piping configuration.