Assignment 06 | Edith Green-Wendell Wyatt Federal Building [EGWW]

PennDesign
Environmental Systems I
Fall 2017
Andrew Matia

45.52° N | 122.67° W

Edith Green-Wendell Wyatt Federal Building [EGWW]

// design architect

Cutler Anderson Architects

// executive architect

SERA Architects

// completion date

May 2013

// project category

Adaptive Reuse

// location

Portland, Oregon, USA

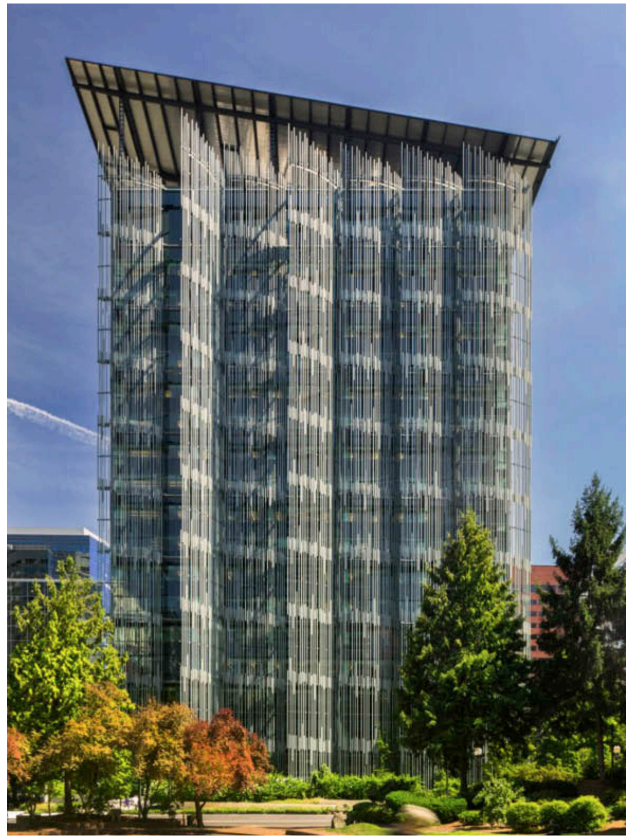
// climate

Portland experiences a temperate climate with both oceanic and Mediterranean features. It is characterized by warm, dry summers and cool, rainy winters. The precipitation pattern is distinctly Mediterranean, with little to no rainfall occuring during the summer months and more than half of annual precipitation falling between November and February. Accoring to the Köppen climate classification, Portland falls within the dry-summer mild temperate zone (Csb), referred to as a warm-summer Mediterranean climate. On the Trewartha climate classification, the city falls within the oceanic zone (Do), like much of the Pacific Northwest and Western Europe. Average max. and min. temperatures range from 47°F max // 36°F min in January to 81°F max // 58°F min in July.

[left]

EGWW Federal Building Mid-Construstion

Edith Green-Wendell Wyatt Federal Building [EGWW]



// design intent

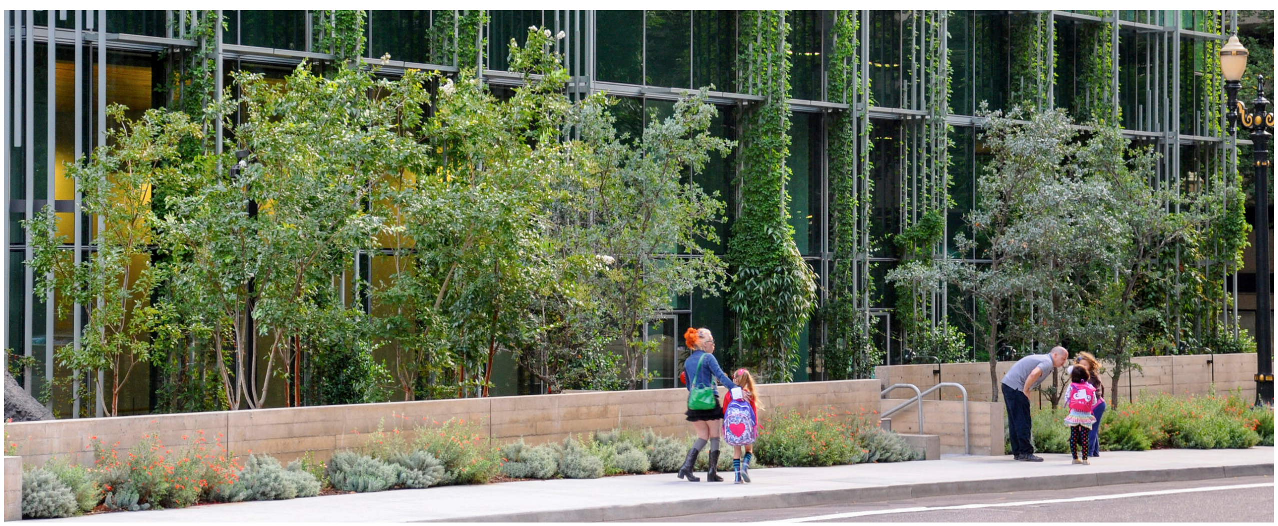
The primary design goal for the Edith Green-Wendell Wyatt (EGWW) Federal Building was to transform the existing building from an aging, energy hog into a premiere, environmentally-friendly building. Starting with a High Performance Green Building (HPGB) Workshop that identified a variety of potential Energy Conservation Measures (ECM's), the design team spent 3 months analyzing which measures brought the best value using physical, virtual and energy models. After the team completed the analysis, the architects translated the data into a synthesized aesthetic expression. The focus was to communicate the sustainability measures on both an emotional and physical leve, inside and out. The building was certified LEED Platinum after completion for its environmentally conscious design approach.

[clockwise from top left]

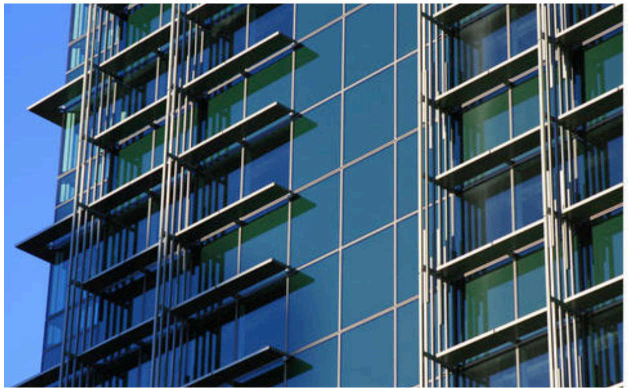
Before Renovation

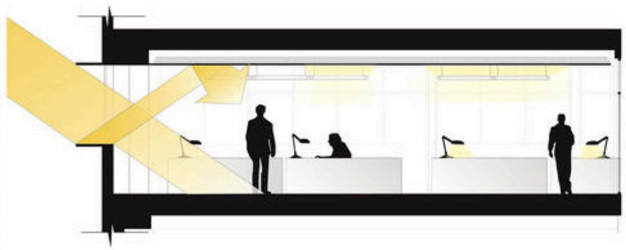
After Renovation

Street Elevation on SW Jefferson St.

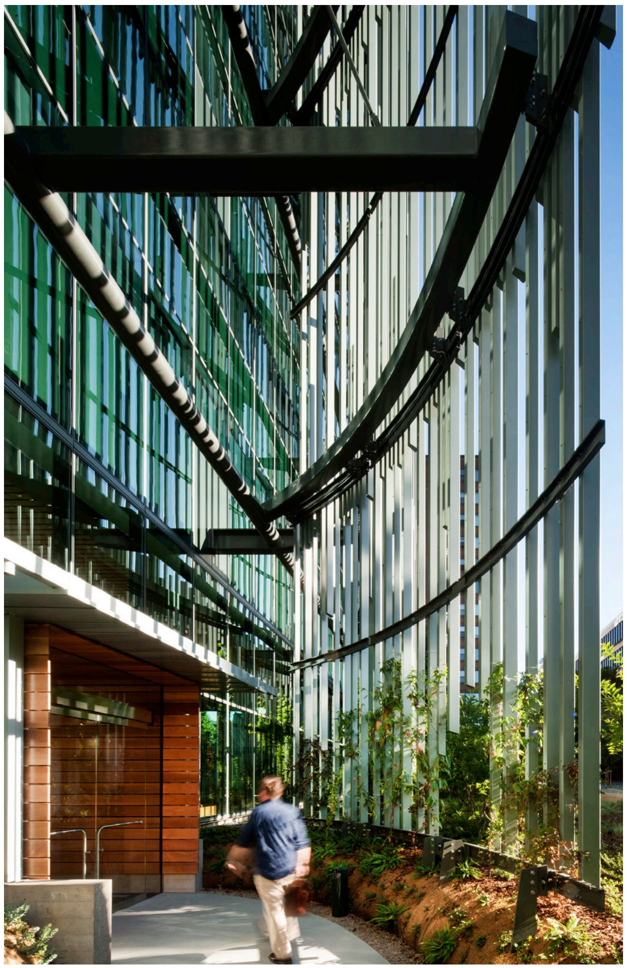


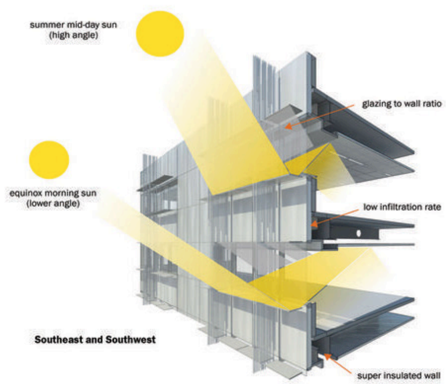
Q = + Solar ± Conduction ± Ventilation ± Infiltration ± Evaporation + Internal Gains + ...

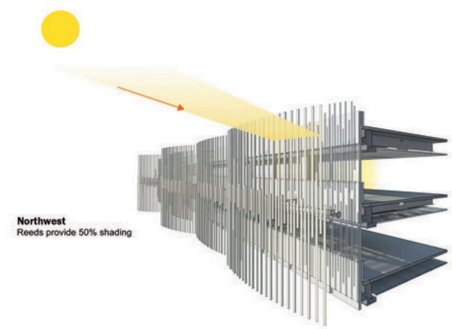




Daylight Section

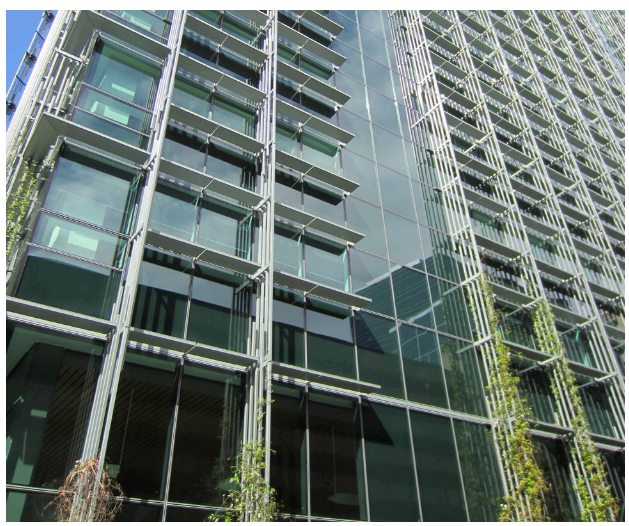


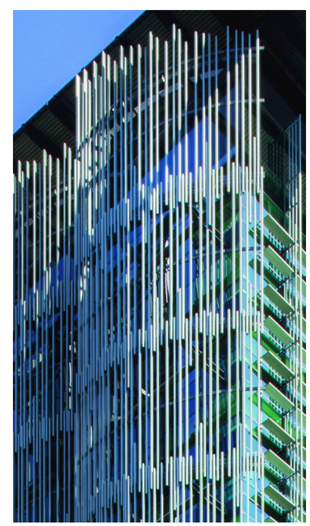




± solar

The building's facades are tuned to respond to solar gain on each face of the building. Horizontal light shelves mitigate solar heat gain on the south and east sides while vertical 'reeds' provide shade on the west. A mixture of evergreen and deciduous vegetation weave through the reeds to provide shade in the summer and optimize daylight during the winter months. The exterior light shelves, which bounce daylight 16 feet toward interior spaces, are combined with occupancy sensors and task lighting to reduce overall energy loads. Additionally, the spandral glass is coated with a low infiltration film to minimize solar heat gain. The overall care and attention that was given to the facade allows the EGWW Building to perform extremely well with regard to the solar component of the heat flow equation minimizing solar heat gain in the summer months.





// metrics

Daylighting at levels that allow lights to be off during daylight hours: **51%**

Views to the Outdoors: **96%**

Within 15 feet of an operable window: **0%**

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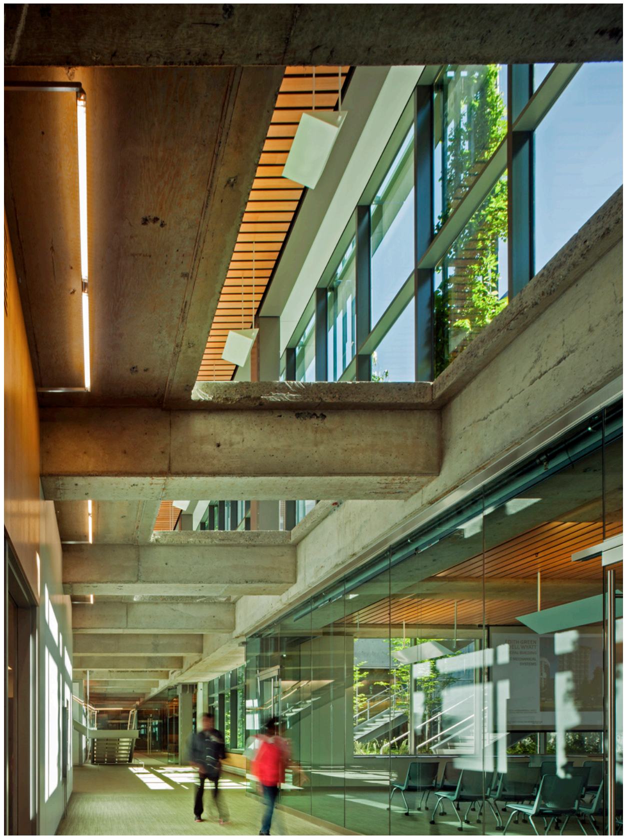

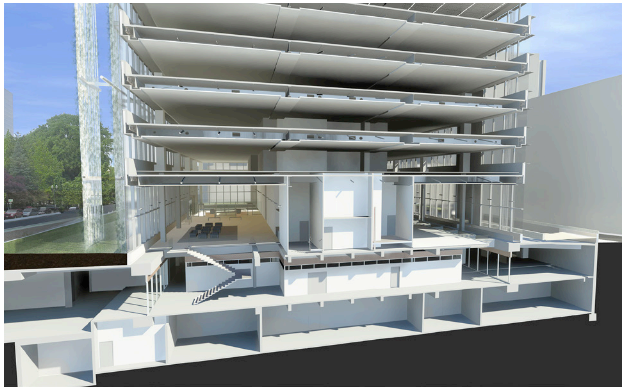

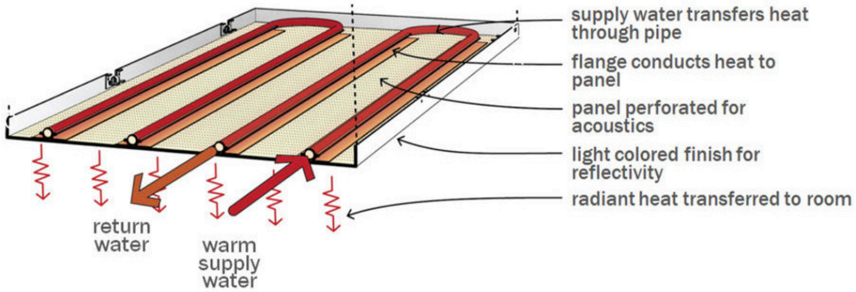

± conduction // ventilation

The shading strategies employed on the facade of the building, which provide solar control while enhancing daylighting thereby minimizing cooling load, were integral to the success of the project's primary energy conservation measure (ECM): a hydronic radiant ceiling heating and cooling system. The radiant system offers a low energy model for heating and cooling the building but its efficiency is predicated on a high performance building envelope. Whole building energy models during the design phase predicted energy metircs that far exceeded EISA perfomance goals. The building also provides enhanced indoor quality though use of a 100% dedicated outdoor air system, resulting in above-code ventilation with excellent filtration.

// metrics

Total pEUI: **30 kBtu/sf/yr**

Net pEUI: **29 kBtu/sf/yr**

Percent Reduction from National Median EUI for Building Type (predicted): **55%**

Lighting Power Density: **0.60 watts/sf**

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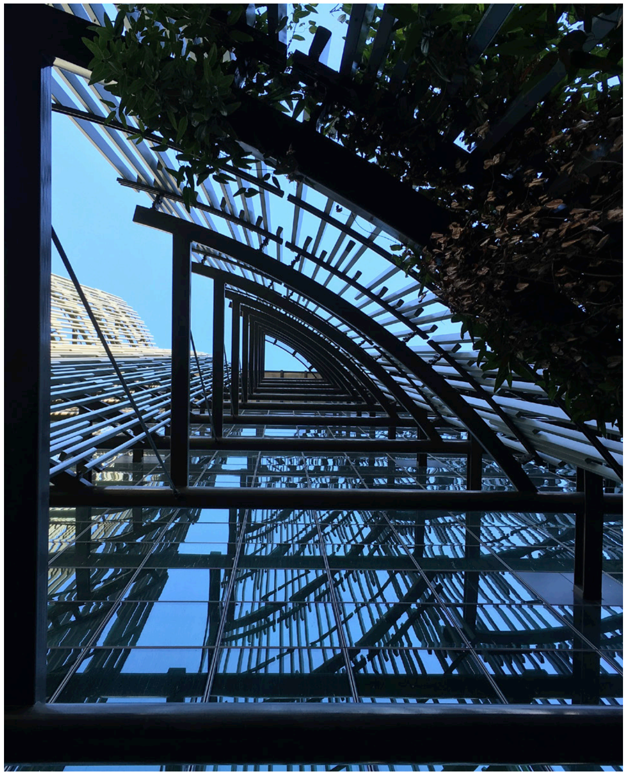

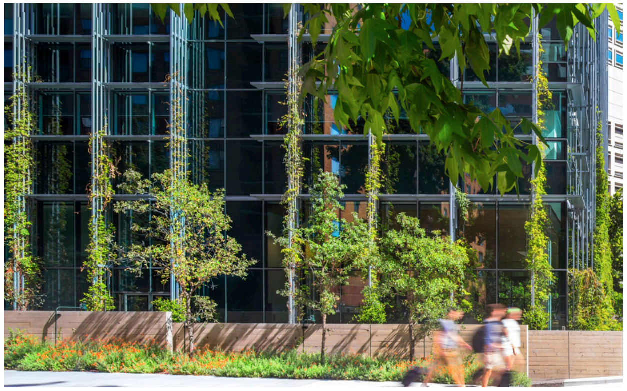

// improvements

Overall, the Edith Green-Wendell Wyatt Federal Building is a compelling example of an adaptive reuse project that successfully utilizes passive design strategies to lower overall energy consumption and improve their coefficients for the heat flow equation. It seems like a majority of the design was aimed at mitigating solar heat gain, which is successfully accomplished, but my concern is that there was not enough attention given to other components of the equation. A primary area of improvement would be to resolve issues of ventilation and internal gains by allowing some operable windows; currently the building has none. Such an addition would allow heat diffusion to the outside environment as there are more cooling degree days in Portland in the course of a year. This phenomenon is due to internal heat gain as the mean, yearly high and low temperature is 63.3°F and 45.7° F, respectively.