Edith Green Wendell Wyatt Federal Building Modernization

Yi Zhang
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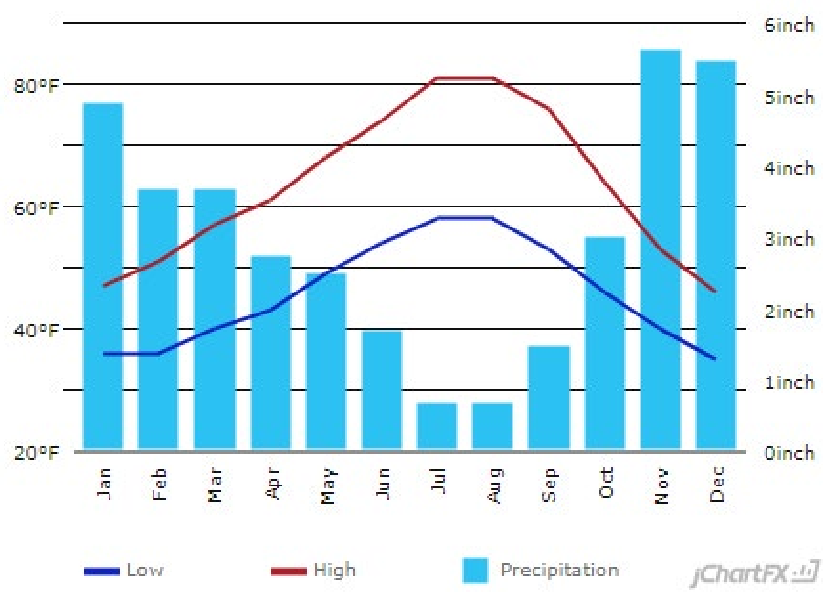
1.Basic Information

Project Owner:
General Services Administration
Location:
1220 SW 3rd Avenue
Portland Oregon 97204, United States
Submitting Architect:
SERA Architects Inc.
Joint Venture or Associate Architect:
Cutler Anderson Architects
Project Completion Date:
May, 2013
Project Category:
Adaptive Reuse
Project Site Context/Setting:
Urban
Previously Developed Land
Project Type:
Office – 100,001 or greater

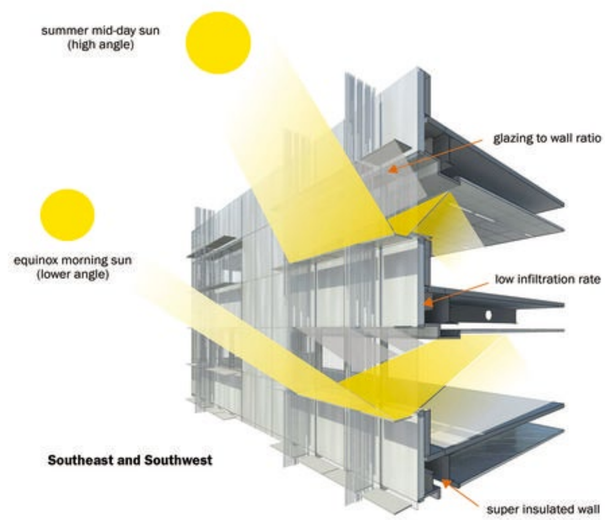
2. Climate



Summer in Portland really starts in July and ends in September. Summer temperatures average around 80 degrees but do go over a 100 for one or two days a year. Overnight temperatures average around 60 degrees. This is a 90 day period that typically has very little (and sometimes none) rain.
Portland's winter weather starts in Mid-November and lasts until mid-March. Temperatures range from daytime highs in the 50s, to low 40s. It will get below freezing several times and often into the 20s for a day or two. It rains a lot during these four months, but the temperatures

3. Design Intent

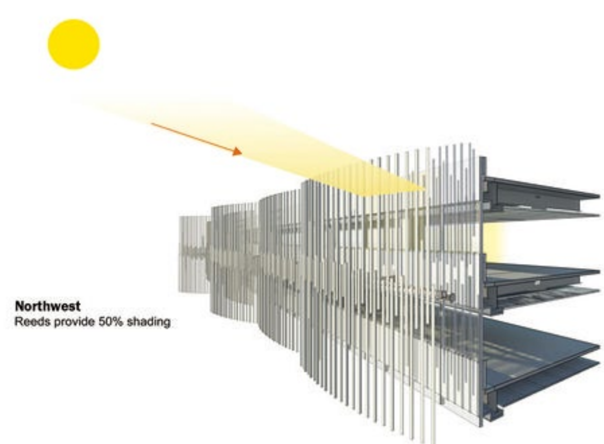
GSA’s primary design goal was to transform the existing building from an aging, uncomfortable energy hog to one of the premiere deep green retrofit projects in the nation.
Completed in 1974, the building’s MEP systems were worn out and out-dated. The project goals included upgrading building systems, updating work environments and improving accessibility, while also meeting the energy and water conservation requirements of the Energy Independence & Security Act (EISA), complying with federal standards for blast resistance, and providing new code compliant egress stairs, entries and rest rooms. The project has transformed the building into a modern, healthy workplace for 16 federal agencies, and was completed within 39 months.



3.Environmental Design Stratagies

Facade: Key to the building’s energy-efficient design was transforming the existing, uinsulated facade into a high-performance curtain wall with elevation-specific shading devices.
The facade impacts heat transfer between interior and exterior environment, reduces conduction comparing to the former unisulated wall.

Shading: On the facade there are “reeds” that stretch up the entire 18-story height of the northwest face and an integrated sunshade/light reflector on the southwest and southeast faces. These shading strategies are integral to the success of the project’s primary energy conservation measure (ECM): a hydronic radiant heating and cooling system.
Shading system on the facade utilizes sunlight, turning it into internal gain.



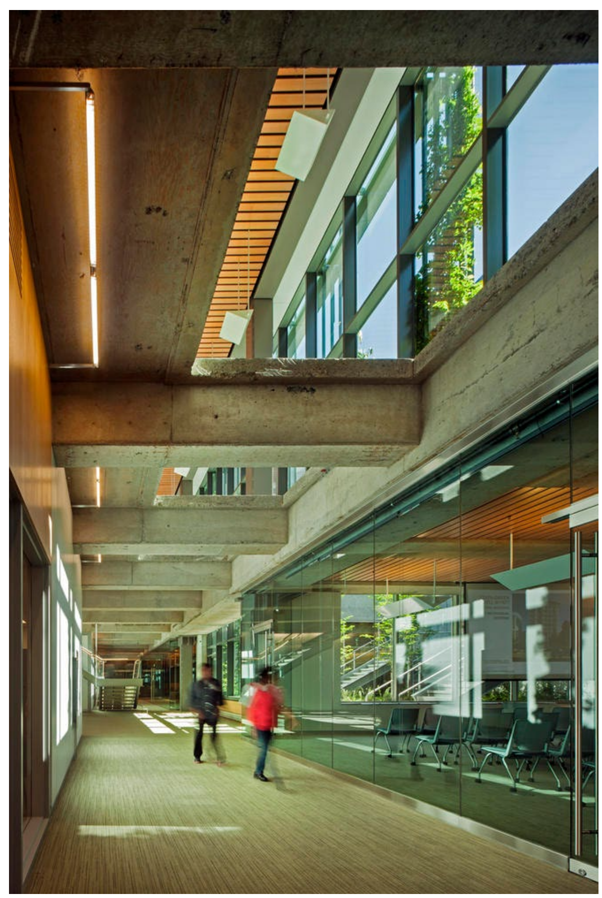
Maximize Daylighting:
Because of the importance daylighting plays in human health and comfort, the project optimized daylighting in the perimeter zone and utilized a task/ambient approach to lighting. This resulted in a 50-60% (predicted) reduction in lighting energy and provided occupants with valuable connections to the outdoors.

- 40-42% vision glazing on the tower, maximizing glazing where shading minimizes solar gain
- Full height shading devices on the northwest façade to address the potential for extensive solar gain caused by the low angle sun
- A combination of vertical and horizontal shading on the southeast and southwest facades—tuned specifically to address solar orientation.
- A light shelf reflector below the window sill to maximize daylight penetration.

By maximizing daylighting, solar intake gets higher in Heat Flow Equation.

Daylight Section

Paranetric analysis: 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 needed 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 by the designers to arrive at both the desired performance metrics and 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.



4. Change

The heat tranfered from sunlight is valuable and can be utilized more efficiently. If I were in charge of this project, I would add an interior cooling and heating system using water to transfer heat, in order to archieve thermal comfort. The water can be heated by direct sunlight, therefore save energy.