EPA

Region 8 Headquarters

DENVER, CO

ZIMMER·GUNSUL·FRASCA ARCHITECTS·LLP

project tenant

Environmental Protection Agency, Region 8 Headquarters, Denver, Colorado

contacting agency

U.S. General Services Administration, Rocky Mountain Region

developer/design builder

OPUS Northwest, LLC

architect

Zimmer Gunsul Frasca Architects, LLP

completed

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site

Located on the corner of Wynkoop and 16th streets in Denver's Lower Downtown District, the new Environmental Protection Agency (EPA), Region 8 Headquarters building sits on an urban brownfield that formerly housed a U.S. Postal Annex.

Adjacent to Denver's Union Station, the building also sits at the nexus of public transportation for the region, offering EPA employees and visitors alike access to a vast array of light rail, commuter rail and bus lines, as well as regional pedestrian and recreational trails.

Moreover, the building provides a visual connection between Downtown Denver's various architectural styles and structures, sitting at the crossroads between newer downtown developments and one of the city's most historic districts.

program

The 292,000 GSF EPA building is the result of a challenging design process that sought to integrate a contemporary, high-performance, secure, and environmentally sensitive building into one of Denver's most important historic and civic districts. A key program goal was to assimilate the new facility into the urban fabric in a way that strengthens and enhances the quality of the historic neighborhood in which it is located, while establishing the building as a landmark in its own right.

Moreover, the building features a number of experimental applications that will further the body of knowledge on sustainable, integrated design, and thus the building embodies the EPA's mission to protect and enhance human health and the environment.

As a Federal building, the structure also had to meet strict security requirements, resulting in a Level 4 facility that meets stringent homeland security requirements.

building design

Consisting of 9 stories of office space, two levels of below-grade parking and ground level retail spaces, the EPA building is organized as two "L" shaped wings with a central atrium that serves both as the building's "living room" and provides daylight to the interior and exterior perimeters of the narrow floor plates.

Designed as a welcoming and invigorating public space that serves as the "hearth" of the building, the atrium acts as an informal gathering place for the EPA community, creates a focal point for the public lobby, serves as a connection between the conference rooms and offices on all nine levels of the building, and helps reduce energy use because it is a partially conditioned space that acts as a thermal buffer for the building as a whole. Moreover, analysis of local climatic conditions and the local street grid orientation led to the further refinement of the atrium into two L-shaped wings: a southeast/southwest-facing "L" with solar orientation, and a northeast/northwest-facing "L" that addresses the prevailing winds on the site.

The double "L" form also anchors the building to its location and community, with one break point between the "L"s offering views of the Rockies to the West, while the other creates the main entrance to the atrium, directly opposite Denver Union Terminal to the East.

sustainability

Anticipated to earn a Gold LEED rating and full Energy-Star compliance, the EPA building sets an example of environmental stewardship, efficiency and functionality. The building's urban location and brownfield siting, the nearby transportation options and the structure's climate responsive design as defined by the structure's "L" shaped wings are but some elements of sustainable design. Other features include:

- Construction Management & Materials: Examples of sustainable materials used in the building include corn-based fabric and wheatboard, recycled glass tile, recycled-content carpets, recycled steel, cork floors, bamboo wall panels and doors made with rice hull cores. In sum, more than 89% of the wood-based materials and products used in the building are certified in accordance with the Forest Stewardship Council's Principles and Criteria.

  Additionally, fly-ash was used in the concrete portions of the building and regional materials – those manufactured, produced or harvested within 500 miles of the building – were used for more than 50% of the structure's manufactured materials. Construction waste was also reduced, with as much as 80% of the total waste generated was recycled or diverted from local landfills.

- Water Efficiency & Water Management: High efficiency and waterless plumbing fixtures are employed throughout the building and are estimated to achieve a 44% water savings over standard buildings. Moreover, a storm water management system removes 80% of total suspended solids and 40% of total phosphorus from the water running off the building.

- Vegetated Roof: Scarcity of water in Colorado makes it a precious resource. With the help of experts from the EPA, the design team demonstrated to local authorities the effectiveness of "ecoroofs" as a means of both removing pollutants from stormwater and reducing the rate and quantity of stormwater runoff. The result is the first "green" roof in Denver used to manage stormwater.

  Populated with native, drought-tolerant plant species that minimize irrigation requirements, the 20,000 square foot vegetated roof covers three terrace levels and treats stormwater while reducing the urban heat-island effect of the building.

- Energy Efficiency: To reduce energy consumption, an under-floor air distribution system with individual controls is used throughout all office floors, as are occupancy sensors, energy-efficient lighting, optimized insulation levels, daylight responsive lighting controls, and daylight redirection and control devices optimized for daylight harvesting.

  Additionally, a rooftop photovoltaic system generates electricity for the facility and the structural materials provide thermal mass to store heat and level out the daily temperature fluctuations.

  The expected outcome of these efforts, and others, is a 40% reduction in the building's energy use and annual cost savings in excess of $100,000.

- Daylighting: Variations of a glazed curtain-wall system were designed for the different facades – the sunward (southeat and southwest) façades were designed with horizontal exterior sunshades and a system of internal light shelves designed to cut glare and solar gain. The windward façades (northeast/northwest) have a series of exterior vertical shades to cut glare from low-angle summer sun while simultaneously harvesting diffused light from the clear North Sky. The net result, 75% of workstations receive significant daylight.

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atrium sails

In addition to serving as a great “room”, the EPA building’s atrium was also developed to enhance the building’s office spaces by providing light from both sides of the office floor plates instead of from the building’s perimeter alone. However, due to the atrium’s depth and aspect ratio, directing light into the atrium proved to be a unique design challenge-a challenge that was compounded by budget constraints and a tight building schedule.

Seeking an alternative to conventional, and generally more expensive reflective devices like mirrors, and needing a solution that could be easily and economically installed, the ZGF design team began to study how light could be directed down into the atrium most effectively. A large-scale physical model was used on a heliodon (an artificial sun) to examine the possibilities.

Taking numerous measurements, photographs, and recording the shifting light patterns inside the atrium with a tiny digital video camera, the design team learned that the solution they were seeking needed to meet a number of criteria: (1) Because the ultimate design solution needed to do two jobs simultaneously; reflect light down into the atrium and shield the office occupants on the atrium’s upper floors from the glare of direct sun, the reflector system would need to hang below the glass skylight instead of stand above it; (2) The design solution required a parabolic shape (in section profile) in order redirect light hitting it from various angles into a fairly uniform downward direction; (3) The reflectors needed to be deeper at their lower, outer corners due to the atrium geometry, resulting in a distinct “butterfly” shape being applied to the reflectors.

Thus, the team began to search for a cost-effective, easily installed solution that was also elastic, easily shaped and sun resistant. Multiple materials were considered but ultimately determined to be ill-suited until a design team member who is also an accomplished sailor suggested the use of fabric and hardware – used to make sails – leading to the creation of the EPA’s Atrium Sails.

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