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A Model Modernization: Edith Green-Wendell Wyatt Federal Building and GSA's Mid-Century Inventory



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Abstract

Edith Green-Wendell Wyatt Federal Building (EGWW) is an 18-story federal office designed by Skidmore, Owings & Merrill and constructed in downtown Portland, Oregon, in 1975. In May 2013 the tower's owner, the U.S. General Services Administration, reopened the building after an extensive modernization spearheaded by Cutler Anderson Architects, SERA Architects, and Howard S. Wright Construction. The project's suite of passive and active sustainability strategies included replacement of the curtain wall and installation of an angled rooftop photovoltaic canopy, dramatically transforming EGWW's original drab Modernist appearance and saving taxpayers approximately \$400,000 in annual operations costs. It also encapsulates GSA's increasingly tried approach of designing a high-performance retrofit according to a building's historical merit. The new EGWW especially reflects the agency's desire to elevate its largely underwhelming mid-century inventory, in order to express the character of their communities as well as national ambition.

Keywords: Climate, Energy, Façade, Modernization, Retrofit, Sustainability

The U.S. General Services Administration (GSA) manages more than 32.9 million square meters of workspace in 9,600 buildings. Owned buildings comprise approximately 1,500 of the total number, and of that inventory more than one-third dates from between 1949 and 1979.

That a substantial portion of federally owned offices, laboratories, and other owned properties was created during the second wave of Modernism is unsurprising. GSA launched in part to develop buildings prompted by the government's New Deal expansion, which wartime had deferred. And that demand continued to grow well beyond the immediate postwar period: In the decade following the Public Buildings Act of 1959, the agency embarked on approximately 700 new projects. Due to timing—as well as policy—the buildings designed during this construction spree would embody the tenets of Modernism.

Yet in GSA's first three decades of operation, this embrace of Modernism largely yielded "look-alike clusters of uninspired concrete and glass box buildings," as Senator Robert Morgan said in 1977, looking back at that oeuvre. "There is nothing wrong with contemporary design or materials, provided their application is governed by genuine dedication and adherence to the principles of not only good taste but also a sense of national pride."

Edith Green-Wendell Wyatt Federal Building (EGWW) in Portland, Oregon, confirmed Senator Morgan's assessment. Completed in 1975, the 18-story office building emblemized the largely unremarkable quality of Modernist buildings that GSA had erected for the federal civilian workforce.

GSA's recently completed transformation of EGWW—undertaken by an intensive collaboration between Cutler Anderson Architects, SERA Architects, and Howard S. Wright Construction—proves that the missed opportunities of a previous era need not remain that way (see Figure 1). Thanks to this high-performance modernization, EGWW ranks among the most energy-efficient office towers in the United States. The renovation's outward expression of sustainability, moreover, has catapulted the building architecturally. The formerly wan Modernist work is now a national symbol of an environmentally aware government, whose buildings appeal to taxpayers' pocketbook and spirit in equal measure.

This paper charts how EGWW arrived at its initial form, details its contemporary design solutions, and links the renovation's underlying motives to GSA's ambitions for federally owned mid-century buildings overall.

A Brief History of Modernism at GSA

In its final report issued in 1949, the Hoover Commission declared, “the United States is paying heavily for a lack of order, a lack of clear lines of authority and responsibility, and a lack of effective organization in the Executive Branch.” President Truman urged Congress to establish a “central agency” as “an important contribution to the efficient and economical conduct of the Government” in parallel to the Hoover Commission’s work, and legislation establishing GSA in mid-1949 explicitly cited economy and efficiency as founding policy.

The history of federal architecture has long been characterized as an either-or between frugal delivery and uplifting expression. GSA’s inauguration, then, would seem to have resolved the skirmish. Indeed, several longstanding procedural changes—the move toward needs-based procurement, for instance, and outsourcing of design to private architects—were already propelling the predecessor of GSA’s Public Buildings Service toward an architecture of efficiency.

Modernism was poised to inform the new federal agency. Besides having achieved popular acceptance by the middle of the 20th century, the movement promised affordability and replicability: Modernism could serve a wider swath of the American people more quickly than the soaring, yet highly politicized, commissions that characterized public building until the Great Depression.

Paired with government’s embrace of new building technologies, such as air conditioning, it was natural for GSA to embrace the design language of its time. “Leaving behind the tradition of historical imagery of classical America and abandoning the pragmatic ideals of ‘economy, simplicity and comfort’ embraced during the Great Depression, the Public Buildings Service chose the new international symbol of corporate enterprise—the sleek glass curtain-walled tower—breaking down for the first time in American history the distinction between public and private design” (Eig, 1998).

But was the merely expedient architecture that disappointed senators and critics alike a foregone conclusion of GSA’s shift to Modernism? Not necessarily. Innovative federal commissions from the 1950s and early 1960s include the Skidmore, Owings & Merrill–designed U.S. Air Force Academy

Cadet Chapel and Eero Saarinen’s Washington Dulles International Airport. Accomplished contemporary works in GSA’s real estate portfolio include the U.S. Tax Court by Victor Lundy, John F. Kennedy Federal Building by Walter Gropius and The Architects Collaborative, and the Chicago Federal Center by Mies van der Rohe.

These triumphs of Modernism enjoyed a chorus of support, as well. Politicians and career federal employees championed the highest ambition in architecture. Their advocacy was encapsulated by the Guiding Principles for Federal Architecture written by Senator Daniel Patrick Moynihan (then Special Assistant to the Secretary of Labor) and authorized by President Kennedy in 1962. This statement rejected the traditional pitting of economy against quality, stating, “The belief that good design is optional, or in some way separate from the question of the provision of office space itself, does not bear scrutiny, and in fact invites the least efficient use of public money.” The guiding principle that “Major emphasis should be placed on the choice of designs that embody the finest contemporary American architectural thought” also intimated that government buildings should embody Modernism, albeit in a dignified and regionally sensitive manner.

Even so, “As GSA sought to house legions of Federal employees and to bring efficiency to the Federal building process, economy was often a stronger driving force than architectural and physical distinction. The majority of buildings GSA constructed during this period reflect typical office building design of their time. Quality of materials and overall design ranged from high to poor. Buildings constructed for general office use often put priorities on cost and efficiency, sometimes resulting in stark buildings constructed with lower-quality materials. Many buildings of this era represent a Federal office building style that is massive, severe, and disengaged from its surroundings—edifices critics have referred to as ‘debased, reductive’ versions of the Modern aesthetic.”

Edith Green-Wendell Wyatt Federal Building falls into this camp. Skidmore, Owings & Merrill (SOM) commenced design of the centrally located Portland building in 1969. After the awarding of a construction contract in 1972, though, the project team engaged in an intense value engineering exercise. A steel-frame structure on 9.1- and 12.2-meter exterior bays replaced the original concrete design. Employment of lightweight rapidly erected precast concrete facing over the steel framework produced further



Figure 1. A view of the northwest elevation of Edith Green-Wendell Wyatt Federal Building, from Terry Schunk Plaza in downtown Portland, Oregon (Source: Jeremy Bittermann)



Figure 2. The north corner of EGWW reveals that the building's shading devices are precisely customized to orientation: the northwest elevation is shielded by 18-story tall aluminum reeds, while a more standard curtain wall faces northeast. (Source: Jeremy Bittermann)

economies, as did swapping out the custom interior assembly with ceiling, lighting, and acoustical componentry.

SOM, and even GSA's internal awards program, painted these changes in a positive light at the time. The switch of structural systems permitted larger fenestration, meaning more daylight could penetrate the interior, for example; the redesign shortened window height to control solar thermal gain. Architect and client also celebrated EGWW's adjacent park as a design innovation, because the original remit for the building had allocated that outdoor space as a parking lot for 200 vehicles; the garage was interred, with the public space placed on its roof.

More recent appraisals of the 40-year-old building's first incarnation have minced fewer words. One write up in *The New York Times* called it "18 stories of concrete, glass and minimal inspiration" (Yardley, 2010).

A Renovation of Mutual Reinforcement

EGWW's MEP systems were not compromised by the 1972 budget cuts. According to a press release that SOM prepared for the ribbon cutting of the building, "Environmental systems for the building are designed to conserve and recycle energy." It added, "Dynamic computer analyses were performed to predict precise heating and air conditioning needs."

Even so, the state of the art had become obsolete within two decades, when GSA began assessing those systems in earnest. In 2005, when it prepared to break ground

on EGWW's energy-efficient upgrade, Congress shelved the undertaking, and the project would not become eligible for funding again until passage of the American Recovery and Reinvestment Act of 2009: ARRA provided GSA with \$5.5 billion to enhance employee workplaces and expand community investment; \$4.5 billion of the total funding was earmarked precisely for high-performance modernizations of existing properties.

ARRA's more stringent environmental criteria forced GSA and EGWW's modernization team to reconsider their original scope of work. (Rigorous energy- and water-conservation requirements of the Energy Independence & Security Act of 2007, or EISA, had also taken effect in interim years.) A workshop identifying sustainability strategies that would deliver the most value to taxpayers kicked off this process. Using BIM and other modeling techniques, the designer and construction professionals then produced a new scheme better suited to higher ambitions.

Instead of an occupied remodel, as formerly envisioned, cost-benefit analysis recommended vacating the building for this retrofit. Project delivery method also changed. Because ARRA required funding to be obligated no later than September 2010 and spent by the end of September 2015, the design-bid-build approach originally intended for EGWW became a general contractor/construction manager delivery with a guaranteed maximum price contract.

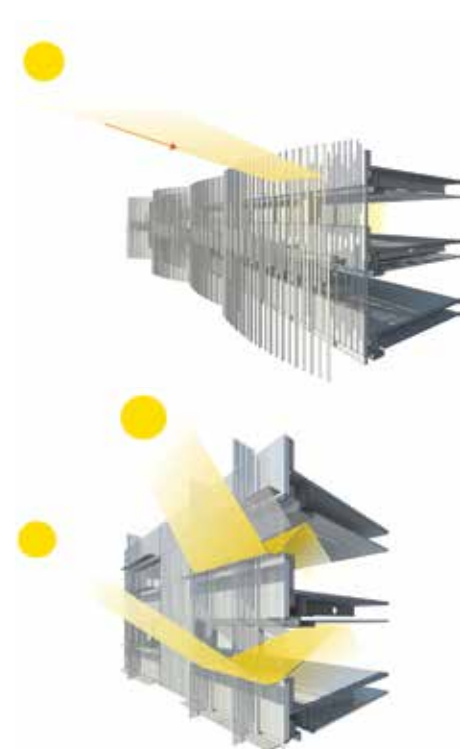
Replacement of building systems remained the highest priority of the updated scope, with a particular emphasis on removing the

original forced-air heating and cooling in lieu of a dramatically more efficient hydronic radiant heating and cooling. The system alone promised \$2 million in savings over the life cycle. As executed through ARRA, it would be supported by a suite of passive strategies.

Solar design and a thermally broken building envelope are commonly cited as the most essential features of an energy efficiency strategy, and EGWW's transformation was predicated on replacing existing uninsulated facades with a high-performance glass curtain wall, in turn. That new skin would ultimately comprise 43 percent vision glass, and incorporate sunshade elements whose size, angle, and spacing are tailored to each elevation (see Figure 2).

A pair of parametric modeling exercises analyzed possible configurations of the curtain wall. One evaluated peak cooling loads for the northwest, southwest, and southeast building elevations, using different percentages of vision glass, to confirm shading requirements; it also determined the amount of time each building face would need to be shaded. In addition to verifying that a glazed envelope required shading, a separate parametric analysis determined the relationship between a shading system and daylight harvesting.

The most visible result of this effort: the aluminum reeds mounted along the entire 18-story height of the northwest face. As



Figures 3 & 4. These diagrams illustrate how the aluminum reeds prevent solar thermal gain, as well as the daylight-harvesting capacity of the south-facing shade elements, respectively. (Source: GSA)

one local journalist described the underlying process: “To make the aluminum screens work entailed a three-way push-pull, in which Cutler would craft a design, SERA would study its metrics and daylighting ramifications, and curtainwall contractor Benson Industries would weigh in on its constructability” (Libby, 2013). Reed placement was finalized according to aesthetic and biophilic concerns, and the assembly lends the northwest facade of EGWW an entirely new silhouette. Meanwhile, integrated sunshade/light reflector systems on the southwest and southeast faces assume an orthogonal appearance more typical of high-performance tall buildings (see Figures 3 and 4).

The curtain wall’s various, highly tuned shading strategies prevented the hydronic radiant heating and cooling system from becoming overtaxed. Excessive glare would have caused discomfort among users, as well.

Multiple other renovation strategies reinforce one another sustainably, not unlike the relationship between curtain-wall performance and interior cooling load. Take the 2,323-square-meter roof canopy that today crowns EGWW (see Figure 5). Angled for maximum sun exposure, the canopy is embedded with 1,208 square meters of photovoltaics that generate 4 percent of total energy demand—while protecting the upper floors of EGWW from solar thermal gain.

The roof canopy also plays a key role in stormwater collection. During storms, the expansive surface channels precipitation into a former basement-level rifle range, which has been converted into a 624,593-liter cistern. That reclaimed stormwater is being deployed for toilet flushing and irrigation, as well as the hydronic medium for heating and cooling. Measured in concert with drought-tolerant landscaping and a more efficient mechanical cooling tower, stormwater reclamation reduces potable water consumption to beat state code by 61 percent.

Other sustainability highlights of EGWW’s modernization include a focused effort to reduce plug loads and recycling 3,027 metric tons of original precast-concrete facade into road bed, as well as installation of water-conserving fixtures and fittings, a dedicated outside air system, and a ventilator that recovers heat from exhaust air before it is released. The facility now consumes 30.6 million joules per square foot annually. This net energy use intensity represents a 71 percent reduction from the national average, and as much as \$400,000 in annual operations savings.



Figure 5. The modernization of EGWW culminates in a monumentally sized rooftop canopy integrated with 13,000 square feet of photovoltaics. The angled device is optimized solar exposure, and channels stormwater for collection (Source: Jeremy Bittermann)



Figure 6. Wallace F. Bennett Federal Building in Salt Lake City, after the mid-century building underwent a seismic retrofit project that also replaced its curtain wall (Source: www.jabphoto.com)

EGWW’s quantifiable improvements are not limited to resource metrics. Of greatest note, by replacing the precast-concrete exterior with a glass curtain wall, the building envelope was moved outward 55.9 centimeters in every direction and its floors expanded. And by converting to space-efficient hydronic HVAC distribution, GSA raised interior ceiling heights and recovered leasable area previously devoted to mechanical housing. In all, EGWW grew its leasable area by 3,066 square meters, and the much-improved space also positions the building to collect higher rents from its federal

tenant agencies. In a similar vein, removing the original precast-concrete facade reduced overall building weight enough to make seismic retrofits unnecessary.

The Portfolio Perspective

Operations savings, leasable area, and rent per square foot are terms upon which both public- and private-sector property holders can embrace the modernization of their aging assets, especially in light of the remarkable gains afforded by today’s sustainability strategies.



Figure 7. In 1999, pending modernization of the Byron G. Rogers Federal Office Building and U.S. Courthouse revealed that the Denver facility had endeared itself to the surrounding community, and GSA has since conducted historically sensitive renovations to the complex to accommodate these stakeholders' input (Source: Taylor Lednum/GSA)



Figure 8. WASA/Studio A and Michael Van Valkenburgh Associates recreated the plaza topping the rooftop garage of the Jacob K. Javits Federal Building in New York (Source: Alex Maclean)

Updated building codes and functional obsolescence require making improvements to these properties, meanwhile.

GSA also bases its reinvestment decisions in part on customer factors that are unique to the federal government, such as the ecological criteria of a legislative act like EISA or new security guidelines that arise from a national event. It takes ethical

stewardship under consideration, too, even if that concern is more difficult to codify than others: Commuting can consume as much as 137 percent more energy than building operations, for instance, so the agency pays close attention to the fact that 42 percent of current real estate inventory is located within a quarter-mile of rail transit.

For these reasons, the award-winning transformation of EGWW is but the most visible recent example of GSA's years-long effort to ensure the longevity of owned mid-century buildings.

The initiative dates at least to 1999, when the agency initiated seismic upgrade of the 1963 Wallace F. Bennett Federal Building in Salt Lake City. The project employed unbonded brace frames, in a first-ever use of the technology in a public building, and it expanded to include curtain-wall replacement creatively led by Salt Lake City-based GSBS Architects (see Figure 6). Four years later, persistent water penetration would lead to a complete exterior replacement at the Des Moines Federal Building in Iowa. GSA engaged the local architectural review board about the undertaking, and Detroit-based architect SmithGroup subsequently designed an impervious building envelope whose transparency refuted its federal Modernist roots.

The EGWW renovation's closest precedent may be the ARRA-funded modernization of the Anthony J. Celebrezze Federal Building in Cincinnati. Here, aiming for high performance makes this high-rise America's first to be entirely overlaid in a new glass facade. The second surface creates an insulating cushion of air in the gap between it and the original envelope.

Just as any number of factors can justify reinvestment in federally owned mid-century buildings, so setting the scope of an individual modernization project involves weighing the building as a cultural asset. In one case, the social importance of the Byron G. Rogers Federal Office Building (see Figure 7) in downtown Denver has led GSA to modernize that facility as a potential historic resource. Today HOK is leading the LEED-Gold modernization of the 18-story tower's structural elements and major systems, with sensitivity to its original expression. The building upgrades should reduce annual energy costs by 55 to 65 percent. The project follows on the heels of a similarly respectful 2005 renovation of the adjacent federal courthouse, which is having its windows replaced with more energy-efficient products currently.

GSA's construction of elements that surround federally owned buildings represents an exciting middle ground between modernizations like EGWW, which exercise great creative license, and the Byron G. Rogers-style interventions that weave quietly into a building's fabric. These projects do not transform a host building's visage, yet they are energetically contemporary, engaging the original architecture in point-counterpoint dialogue.

At the Jacob K. Javits Federal Building in Lower Manhattan, ARRA funds were obligated for a much-needed waterproofing of the parking structure directly beneath the plaza. In response, the GSA project team advocated expanding the project's public benefits, namely by redesigning the garage rooftop—in other words, the plaza itself. WASA/Studio A in collaboration with landscape architecture firm Michael Van Valkenburgh Associates created sweeping gestures that place the Javits skyscraper's rigorously geometric facade in stark relief (see Figure 8). The new plaza also represents the next generation of public outdoor space, as it is uniquely suited to accommodate the mobile workforce.

New security pavilions illustrate the backdrop concept particularly well. Gensler added such an entry to the Richard B. Russell Federal Building and Courthouse in Atlanta (see Figure 9). More recently, for the modernization of the Dr. A.H. McCoy Federal Building in downtown Jackson, Mississippi, Boston-based Schwartz/Silver created a pavilion whose curving glass form contrasts with the angular concrete surfaces of the tower. Both of these structures take advantage of the expansive plazas that characterize Modernist high-rises. Their insertion activates that space and resolves the relationship between building and street edge.

To be sure, federal ownership does not guarantee reuse. GSA's due diligence may result in removal from its inventory or in new replacement construction. Yet the agency's commitment to its mid-century buildings demands attention. As an entire generation



Figure 9. For the Richard B. Russell Federal Building and Courthouse in Atlanta, Gensler designed a new entry pavilion to accommodate more rigorous security procedures. The expansion complements, rather than replicates, the facility's 1970s-era visage (Source: GSA)

of tall buildings approaches functional obsolescence, GSA's various approaches to sustaining these investments—ecologically, socially, and economically—provide a roadmap to real estate owners that have thus far ignored the hard realities of modernization.

EGWW fits on a wider spectrum, then, and represents one highly legible end of it. This modernization's multidimensional green

strategies would not have been possible had the project not capitalized on the original building's lack of historical merit. The results exemplify the performance opportunities of a mid-century retrofit, for both government and private-sector owners. And for GSA in particular, EGWW shows how an entire era of architecturally indifferent buildings can be remade both in the service of efficiency and national pride.

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