

New San Francisco Federal Building a Model of Sustainable Architecture

The purpose of this nomination is to highlight the many different environmental, financial, and social benefits of the latest flagship of sustainable design and federal architecture: the new San Francisco Federal Building, which was completed February 28, 2007. The building's innovative design has been lauded by the Federal Government, industry leaders, local government, non-governmental organizations (NGO's), professional organizations, and academics nationwide as being a model for sustainable buildings.

The new San Francisco Federal Building, located at 90 Seventh Street, is 18 stories - 240 feet - tall and 65 feet wide in the tower. The construction cost was \$144 million, and the size of the building is 652,000 gross square feet with 523,000 rentable square feet of space. The building houses approximately 1,500 federal employees of the Departments of Labor, Health and Human Services, Agriculture, and Defense, Social Security Administration, and Office of Personnel Management. The GSA San Francisco Service Center will move into the building in 2008. Agencies began moving in March 2007, and the formal dedication/opening ceremony took place to great fanfare in July 2007.

The USGBC's LEED™ certification program dominates the discussion regarding sustainable design today. The system is highly respected for attempting to quantify the nebulous idea of "sustainable buildings," and has helped catalyze the sustainable building movement. Although the building is anticipated to become LEED-Silver, there are many socially beneficial effects that the building has that are unfortunately not recognized by the certification system.



Situated south of Market Street at the south end of the San Francisco Civic Center, the project is part of a process of urban renewal in a transitional neighborhood. Leading the way for local government to spend money on infrastructure and services, the new federal presence has become a dominant force that helps bring much needed attention to the neighborhood landscape of run-down buildings, struggling local businesses, and assault-crimes. Streets and

sidewalks have been re-paved and private developers are starting to develop the area (note the tower crane in the above image, which was associated with a condominium project next door that is now complete). The public benefits from a large, protected, sun-filled plaza (below) paved with a permeable, decomposed granite surface that allows rainwater to percolate back into the earth as nature intended. This prevents city sewers from being overloaded with surface-generated runoff pollutants that would otherwise drain into the San Francisco Bay.

The building is designed to be highly accessible to the general public, and empowers the local and regional community with a sense of ownership of this Federal property that would otherwise be off-limits, were it not for unique programmatic and design decisions. Unlike at other federal properties, one does not need to go through a magnetometer to visit the building's cafe, thereby appealing to everyday consumers. The gem of all these public amenities is the Skygarden, an open-air, covered informal gathering space on the 11th floor of the building.



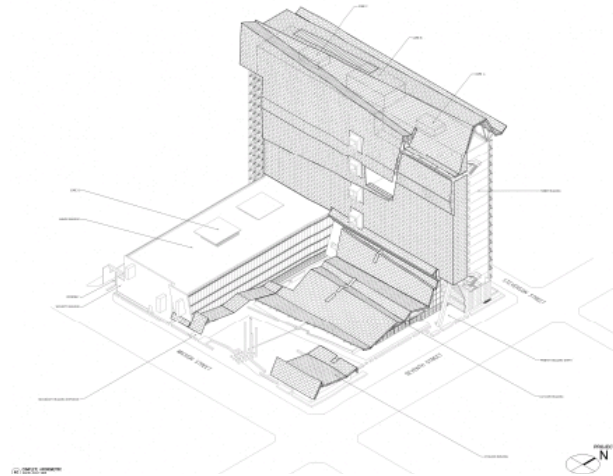
The carefully executed balance between security concerns and public freedom makes the physical presence of the federal government transparent and accessible in this building, which contributes to the idea of social justice and sustainability. Thomas Jefferson once wrote that there is “no safe depository of the ultimate powers of the society but the people themselves,” explaining that when people take ownership of the “ultimate [social] power,” government, they keep it safe and preserve it. The San Francisco Federal Building is a local, functional and symbolic manifestation of government that people sustain through exercising their freedom to physically take control of it.



Not only is the building good for society and the general public, but it enhances occupants' health and welfare as well. A daycare facility allows federal workers with small children to still be near them while at work, which sustains the family connection for many employees, and is also open to the public. Only low- or zero-toxicity building materials were used during construction, and after construction was completed a “green-cleaning” custodial contract that forbids the use of toxic cleaning solvents from being used in the building was implemented. Express, “skip-stop” elevators stop at every third floor of the building, forcing approximately $\frac{2}{3}$ ^{rds} of the tenants to walk up or down one flight of stairs to get to their office. Since there are fewer stops, service is faster and consumes less energy than a comparable traditional elevator system. As an added benefit, tenants improve their health by getting a little more exercise than they otherwise might. Finally, throughout the building are informal gathering spaces like the Skygarden which enable and encourage chance encounters

and a variety of meeting spaces. These features sustain both social connectivity and the physical health of occupants in the building.

The innovative sunscreen (seen right), is perhaps the most visibly pronounced sustainable design feature. It wraps the south façade to carefully regulate the amount of direct sunshine that enters the building. The sunscreen absorbs a large portion of that solar energy before it has a chance to enter occupied spaces and heat them up. In doing so, the screen itself absorbs and then conducts heat energy into the immediate airspace around it. This heated air rises alongside the building and helps draw exhaust air out of it through computer-controlled windows.



Normally in a building of its size, heat from sunlight that enters all-glass facades is a major strain on such a building's cooling system. In this building however, the innovative sunscreen turns lemons into lemonade by using that normally burdensome solar energy to essentially fuel a passive heat pump that helps cool the building. This not only greatly reduces the cooling load, but also modulates light in the revolutionary open-office space to the extent that minimal electrical lighting is ever needed. Light sensors detect light levels within the space, and computers automatically dim or brighten lights so that the ideal amount of light is produced, eliminating wasted energy spent on lights that are not needed.

The workstations in the office tower are located right next to the all-window facades, while executives' offices are located in the middle. This inverted floor plan is also only about 60' wide, and was designed that way to allow natural light to penetrate through the workstations and into the central offices. This democratization of external views and the access to natural light and fresh air for all occupants could not have been made possible without the support of those executives accustomed to having the exclusivity and cachet of traditional corner-offices. Providing natural light and fresh air for everyone in the office becomes a form of social justice within the built environment.



The building's narrow floors take advantage of San Francisco's naturally moderate climate by allowing fresh air to flow through the entire width of the tower through operable windows. Occupants have the ability to open or close windows as needed, giving them direct control over their microenvironment. The natural ventilation system is so effective that air conditioning was entirely eliminated in those spaces. Other sustainable building features:

- ✓ Drip irrigation and dual-flush valves on all toilet fixtures reduce potable-water consumption by over 30%, saving over \$50,000 per year in water utility bills.
- ✓ All on-site parking is underground, eliminating unsightly surface parking and

reducing the urban heat-island effect that adversely affects the local climate of urban environments. Surface parking would have also been an eyesore for local businesses and the community.

- ✓ Prior to becoming new building materials, over 13% of the total value of construction material on the project was post-consumer or post-industrial waste.
- ✓ During construction, over 90% of construction waste was diverted from landfill through on-site separation, saving about \$1.3 million in potential dumping fees.
- ✓ At least 50% of all electricity purchased in the building will come from renewable energy sources like wind or solar power.
- ✓ Approximately 50% of the Portland cement used in the concrete is blast-furnace slag, which is a by-product of steel manufacturing. Substituting blast-furnace slag in concrete not only sequesters the pollutant from the environment, but reduces the amount of Portland cement needed to be produced to build the building. For every ton of cement generated, one ton of CO₂ is released into the atmosphere. As a result, approximately 5,000 tons of CO₂ were effectively prevented from being released into the atmosphere.
- ✓ Since July 2007, 18.3 tons of mixed paper were recycled.



In conclusion, the new San Francisco Federal Building helps define the notion of what sustainable buildings are and can be. The building features many well-known, highly-integrated, tried-and-true green-building techniques that render significant energy, water, and material efficiencies. It proves how a building can sustain and even improve peoples' health and livelihoods not only within the building, but beyond its walls as well. As the building nears its first full year of occupancy, GSA is keenly studying its performance. The building was designed to consume one-third the energy of a typical California office building, approximately 30,000 BTUs per square foot per year. The total estimated utility-bill savings to the Government as a result are approximately \$500,000 per year. If the building performs as designed, it will save enough energy - 6.9 million kilowatt hours - to power 600 homes or take 830 cars off the road for one year. Another way of putting it is that the reduced energy to run this building will prevent the potential release of about 8,150 tons of greenhouse gas emissions into the atmosphere per year. Moreover, we estimate that the Government will save approximately \$500,000 a year on utility bills. Whatever the actual numbers, the new San Francisco Federal Building will be the topic of discussion, in terms of architectural beauty, sustainable performance and community improvement, for years to come.