



Award Category

Overall Sustainable Design- Major Renovation

Green Features

75% of construction waste diverted from landfill

14% reduction in water consumption

Daylighting and access to views

High recycled content materials and furnishings

All materials are formaldehyde-free and low-VOC

Annual Energy Savings

32% greater energy efficiency than Title 24 standards

\$80,000

Size

11,000 ft²

Cost

\$4 million

Completion Date

April 2004

UC San Francisco Health Sciences Lab Renovation

The success of the Health Sciences West lab renovation is rooted in foresight and communication. The design team's efforts to integrate sustainability principles early in the design process and consult with end users has produced a lab that will have a longer useful life and require fewer resources to operate.

The new laboratory on the sixth floor of Health Sciences West is designed to readily accommodate changes in technology and staff. The lab's flexible design will lengthen the useful life of the space and reduce the need for major renovations in the future. This lays a solid foundation for the project's sustainability goals because it enables the campus to avoid undertaking another remodel that would require significant resource inputs and generate waste.



Views to the exterior are provided for all spaces. Photo: ©2004 BlakeDrucker Architects; taken by Bonnie Blake-Drucker.

To create a more effective laboratory the project team took time to study and learn from the design of the existing space. The architect enlisted the expertise of four lead researchers in the department and surveyed over 300 pieces of equipment used in the lab. Collaborating with individuals that use the space daily helped the project team improve the flexibility and adaptability of the lab.

The floor below was under construction during the design phase for the lab, which offered the project team an opportunity to examine the existing building systems. Observing the exposed waste pipe runs allowed the team to shorten the length of the sixth floor's pipes. This adjustment saved money and resources by reducing the amount of piping material used in the project.

In addition to these site investigations, the design team consulted with the campus's facilities maintenance staff to discuss how the design could improve the maintenance of the space. The dialogue revealed that inaccessible valves and filters located behind research desks were less likely to be replaced on schedule. The design team addressed this by locating these pieces of equipment in walkways where they can be easily accessed without disturbing researchers. This convenient design helps ensure maintenance procedures are conducted regularly.

As the project progressed into the construction phase a waste diversion rate was set at 50 percent. However, strong contractor participation raised the actual rate to 75 percent. The existing carpet was recycled by the specified carpet manufacturer, Shaw Carpet, and all existing furniture and cabinetry were recycled or reused in other laboratories on campus.

An annual survey by Carpet America Recovery Effort found that 224.6 million pounds of carpet were diverted from U.S. landfills in 2005, representing 4.5% of the total post-consumer carpet discarded that year.

All ducts were covered during construction to prevent particulates and moisture from collecting in airways. This practice promotes high indoor air quality, which contributes to a healthful and comfortable workspace.

To further improve indoor environmental quality, the design team specified green materials and took great care to ensure that these products were actually installed in the construction phase. All materials on the sixth floor are formaldehyde-free, and all sealants, insulation, floor adhesive, and paint are low-VOC. The team also installed a CO₂ monitoring system in the ductwork. This system adjusts the ventilation rate to ensure an optimal level of supply air circulates throughout the space.

BEST PRACTICES

Additional Awards

LEED-CI Certified

Contacts

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Team

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Degenkolb Engineers

Mechanical Engineer:
Affiliated Engineers

Contractor:
N.V. Heathorn

More Information

pub.ucsf.edu/today/cache/news/200601131.html

www.bdarch.com/projects/laboratories_ucsf_craniofacial.html

www.carpetrecovery.org/
www.usgbc.org

Views to the outdoors are provided for all spaces on the sixth floor. This orients building occupants to the time of day and to their location on the campus. Daylight entering through the windows contributes to a pleasant indoor environment and has been shown to increase productivity when designed correctly. To allow deeper light penetration and enable sharing of views, doors to laboratory areas are made of glass. This also creates a sense of openness by allowing interior spaces an uninterrupted view of the laboratories and the outside environment.

The level of energy savings possible for the project was largely determined by the existing sixteen-story constant volume HVAC system, which provides once-through air. In this system, outside air introduced to the labs



The lighting system allows occupants to respond to the level of available daylight. Photo: ©2004 Blake-Drucker Architects, taken by Jane Lidz.

is exhausted without being recirculated to reduce risks of contamination. Large volumes of fresh air must be continually filtered and conditioned, which requires more energy than systems that recirculate air. Despite having to work within the constraints of an existing system, the project surpassed the Title 24 energy code by 32 percent. This was accomplished by installing variable air volume control boxes that adjust the ventilation rate depending upon the temperature reading in each space.

The lighting system is equipped with occupancy sensors and simple user controls to reap additional energy savings. The three-lamp fixtures have switches that allow users to turn off either one lamp or a group of two lamps, given the level of available daylight. This user-friendly, straightforward system gives occupants control of their space and reduces unnecessary electricity consumption. Energy saving measures on the sixth floor reduce the building's utility bills by \$80,000 annually.

Eliminating cup sinks typically found in lab bench tops and installing wall sinks with flow restrictors helped the floor achieve water savings of 14%.

The sixth floor renovation was a pilot project in the U.S. Green Building Council's LEED® for Commercial Interiors (CI) rating system. While LEED-CI was not crafted to encompass laboratory renovations specifically, it was the closest match of the LEED programs available at the time. The lab received a LEED-Certified award.

LESSONS LEARNED

Some LEED-CI credits were incompatible with this project because spaces are assumed to have recirculated air while the laboratory has once-through air. The design team installed a CO₂ monitoring system to be consistent with the LEED-CI framework, however there is little need for it with the existing HVAC configuration. While CO₂ sensors are practical in some applications, project teams should avoid pursuing LEED points that add cost without benefits.

In some instances, however, incurring additional costs is advantageous. While the first-cost of the VAV boxes was considerable, the energy cost savings fully recovered the initial investment within two and a half years of operation. Expensive energy-saving technologies may require design teams to revise the project budget, but investing in the right equipment can achieve long-term benefits for the client.

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