

## Academy of Science Construction Going Green

by Paul Burton

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As one of 10 pilot green building projects of the San Francisco Dept. of the Environment, the new and revamped buildings will use new technologies and practices in their construction and operation to be energy efficient, save water, and be a model for use of sustainable materials. They are part of a new initiative to develop models for workable, sustainable public architecture.

The new Academy is expected to receive a high rating from the U.S. Green Building Council for its building practices. It will consume 30 percent less energy than required by federal code. The buildings will achieve energy efficiency through 60,000 photovoltaic cells installed in the perimeter canopy system of the roof, supplying almost 213,000 kWh of clean energy per year, about five percent of the energy needs. This will prevent the release of more than 405,000 pounds of greenhouse gas emissions.

A live roof system will cover 80 percent of the roof surface with a variety of native plants to reduce the "heat island effect," providing a thermal insulating layer for the building to help prevent overheating during the summer months and reduce the need for air-conditioning. Other surfaces like parking lots, walkways, and plazas will be under shade.

Along with green technologies, the Academy will take advantage of traditional engineering techniques using natural light and ventilation, with at least 90 percent of regularly occupied spaces having access to daylight and outside views, reducing energy use and heat gain from electric lighting.

Also as part of the green design, the use of high-efficiency irrigation technology such as micro-irrigation systems, moisture sensors, and weather database controllers will be incorporated to reduce water usage. Indoor air quality will be

improved by use of a permanent entryway system to capture dirt, particulate matter, and pollutants entering the building at high volume entryways.

Recycled building materials are also being used, including recycled steel for 100 percent of the building's structural steel. All the demolition waste from the old Academy was also recycled, with 9,000 tons of concrete reused in Richmond roadway construction, 12,000 tons of steel recycled, and 120 tons of green waste recycled on site. At least 50 percent of the wood used will be sustainably harvested and certified by the Forest Stewardship Council.

Among the challenges for construction workers are building unique structures like the aquariums, which require complex, compound curves, waterproof concrete and massive custom acrylic windows. Webcor's Vice President Jes Pederson said that the quality control for fabrication of forms is very high as external and interior surfaces need to be completely smooth.

The contractor also uses sustainable practices in managing waste materials at the site, separating drywall, concrete, and other materials for recycling.

Between 80 and 100 construction workers are employed at the site, including members of the Carpenters, Cement Masons, Laborers, Electrical Workers, Sprinkler Fitters, Ironworkers and Operating Engineers unions. The project is being built with all union labor.

The Academy will consist of 409,178 square feet of research, exhibition, educational and office space. It includes a 5-story structural concrete research, collections, and administration building with floor-to-ceiling glass walls; a 3-story structural steel and concrete African Hall exhibit and a 3-story structural concrete building with retail, restaurant, and auditorium space. A glass enclosed Rainforest dome, a Planetarium dome, split-level basement housing the Steinhart Aquarium life support systems, and a concrete topped structural steel frame topographical garden roof are also part of the complex. The Exhibition Hall includes 53,000 square foot radiant floor to absorb and store heat.

Ironworkers Local 377 Business Agent John Rocha said that about 30 ironworkers are doing the structural core and rebar installation. Rocha said that the green building practices were, "an interesting concept, and very high-tech." Part of the high-tech innovation is use of computer animation to visualize the timeline for the construction. In a report aired on KRON-4, Webcor's Vice President Jes Pederson explained that after a computerized 3-D virtual model was made from the standard architectural plans, the contractor developed a four-dimensional model to see the various steps in the construction and plan ahead more efficiently. The 4-D model allows the contractor to see the sequence of events needed to complete each aspect of the construction.

The Project Team includes Architects Renzo Piano Building Workshop of Genoa, Italy; Chong Partners Architecture of San Francisco; Engineering and Sustainability Consulting by Ove Arup; Landscape Architecture by SWA Group; and General Contractor Webcor Builders.

During the renovation and construction of the Academy of Sciences, the Academy's exhibits, aquariums and storage tanks are held at a transitional facility at 875 Howard Street. The former warehouse was structurally upgraded by

Webcor. Its 214,000 square foot interior includes public exhibit space on the first floors.

Construction of the Academy began in November 2005, and is scheduled to open in the park in 2008. Webcor's Pederson said that construction is on schedule, with glazing expected to be done in the first quarter next year, and interior construction done in the second quarter, to be completed by next fall. .