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Focus: SUSTAINABLE DESIGN

Harker LEEDs by Design

Science and tech center sets example

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GREEN TEAM: Project manager Casper Wagner, left, of XL Construction Corp. and Harker School facilities manager Mike Bassoni stand in front of newly constructed multimillion-dollar science and tech center.

BY BETH HOBBS

The Harker School in San Jose opened its fall semester with a new $25.4 million science and technology center that maximizes green technologies to reduce energy consumption.

The 52,000-square-foot structure, known as Nichols Hall and located on the Saratoga Avenue upper school campus, is the latest in a 10-year, $60 million expansion and renovation plan to add a high school to the private school's K-8 program.

Named for and driven by former head of school and lifetime trustee Diana Nichols' passion for sound environmental policies, the new center achieved Leadership in Energy and Environmental Design, or LEED, certification by incorporating a range of features from bio swales for runoff water to an evaporative cooling system.

"The best way to educate students is by example," says Nichols, who owned a solar electric car as far back as 1989. "Therefore, we feel that any building we build should be made as green as possible."

The science and technology center has a glass and steel framed two-storey rotunda, where an infinite pendulum tracks the Earth's rotation over a granite floor recreation of a nautical compass.

"It is the jewel of the building," says Casper Wagner, project manager for the general contractor XL Construction Corp. of Milpitas.

The majority of the center is tilt-up construction featuring two large gathering spaces, 15 classrooms, a long-term studies room for research projects, a robotics room with roll-up doors, a multimedia room de-

AT-A-GLANCE

Name: The Harker School
Project: Nichols Hall Science and Technology Center
Cost: $25.4 million
Size: 52,000 square feet
LEED Certification: Silver certification pending
General Contractor: XL Construction Corp., Milpitas
Location: 500 Saratoga Ave., San Jose

HARKER: $25.4 million green project has state-of-the-art technology

signed for interdisciplinary use and two teacher prep areas.

One of two large spaces in the building is the 200-seat auditorium with tablet-arm seating, a 12-by-12-foot screen and movable podium housing the audio-visual control and designed to accommodate Harker's research symposium and speaker series.

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LIVING ROOF: Harker School students walk on a portion of rooftop designed to absorb heat and reduce runoff.

Energy saving system

One major feature of the project is a system known as direct/indirect evaporative cooling, or DIEC, installed by Western Allied Mechanical.

"It is the single biggest energy-saving feature of the building," says Harker facilities manager Mike Bassoni, who began looking into the system two years ago. "It was a quantum leap for the school. At that time, there were only four of these systems functioning in the Bay Area."

Shunning conventional compressor-and-freon systems, DIEC cools water in a closed-loop system, then circulates it into zone coils where a fan blows the cooled air to individual rooms controlled by zonal thermostats. A roof-mounted fan and gravity vents change the air within the building six times per hour, while sensors monitor the indoor pressure.

The DIEC uses one-eighteenth the electricity of a conventional system. This translates to a $30,000 per year electrical savings, says Bassoni. The DIEC system installation was $1.1 million with a 20-year life expectancy, whereas a conventional cooling system would have been $680,000.

The greatest challenge was the auditorium, Bassoni says. A lot of air is being cooled by a lot of evaporation. During high-heat, high-humidity days, DIEC cooling efficiency may drop off, and there was some concern about the comfort level in a filled auditorium.

"We were willing to compromise on a few days of less than optimum comfort for the huge energy savings," he says.

Part of the compromise included the construction of a $100,000 green roof over the auditorium to absorb heat and reduce runoff. Sloped and visible from the school entrance, a series of 2-by-2-foot trays were planted with different species of perennial plants in a color pattern to aid in cooling the auditorium underneath and provide an attractive look.

The white roof has a high solar reflective index and houses $50,000 of solar panels that will generate 2 percent of the electricity required for the building. When funding is available, the infrastructure is in place to install enough solar panels to provide 25 percent of the building's electricity. The school considered fuel cells to supply electricity, Head of School Chris Nikoloff says, but chose to wait.

"We will maximize the roof space in increments due to cost and rapid changes in technology," Nikoloff says. " It makes sense not to get locked into one technology."

Harker is also investigating third-party options for solar generation on campus.

A place to socialize

The second large space, dubbed The Forum, is the result of input from students who wanted a place to hang out. The room features a scored concrete floor with embedded radiant, boiler-generated heat which cost $60,000 more than conventional systems but requires minimal electricity. The Kalwall curvilinear roof system is an arcing, double cell, polycarbonate roof that provides light combined with insulating properties. A 42-inch LCD screen continually tracks the power produced by the photovoltaic system and registers the amount of sulfur and hydrocarbons being kept out of the atmosphere.

The use of concrete as the final flooring surface eliminates the need for petroleum-based linoleum or carpet in most areas and helps cool the building. Referring to the heat waves during the summer, Wagner says, "We were very pleased that the building stayed at 70 degrees while the outside was 105 degrees. The thermal envelope of the building is very efficient."

LEED concepts utilized in the science and technology center:

- Direct/Indirect Evaporative Cooling system that reduces electricity consumption
- White reflective paint on roof to reflect heat
- Plants on auditorium roof to reduce heat and produce oxygen
- Bio swales to remove particles from runoff water
- Photovoltaic panels which will produce 2 percent of required electricity (eventually 25 percent)
- Plumbing fixtures designed for 40 percent reduced water usage from baseline
- Dedicated parking for high-efficiency vehicles
- Exterior light fixtures designed with photometric layout to reduce light pollution
- 95 percent of construction debris diverted away from landfills
- No Volatile Organic Compounds emissions from carpet or paint
- Low Volatile Organic Compounds emissions from wood
- Occupancy sensors on interior lighting
- Glazing on windows that minimizes solar heat transfer
- Structural steel contains 80 percent recycled content
- Turf Cell roadways to eliminate hardscape