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Tahoe Science Lab Goes for Platinum-LEED

Sustainable laboratory is not an oxymoron



by Heather Livingston
Contributing Editor

For most people, a mental image of Lake Tahoe, Nev., features water sports, casinos, and snow skiing. For a select group of students, researchers, and faculty, Lake Tahoe is the site of a sustainable, state-of-the-art laboratory and research facility for studying the importance of alpine lakes and preserving their environmental quality and clarity. Nestled among the evergreens, and mere meters from the largest alpine lake in North America, the recently completed Tahoe Center for Environmental Studies (TCES) was designed by Reno-based Lundahl and Associates and is the result of a unique partnership among many players.

The early partners

Sierra Nevada College (SNC), a small liberal arts college of about 300 undergraduate students, dedicates itself

to providing its students a world-class education in a sustainable environment. The college's new campus at Incline Village sits on about 20 acres of forestland and offers dormitory facilities, classrooms, and the Prim Library and Learning Resource Center. After completion of the Prim Library in 2004, the college began its next phase in the campus plan: constructing a science building.

The University of California at Davis has conducted water research at Lake Tahoe for nearly half a century. In fact, most of the lake's conservation and use policies were put in place as the result of the university's research and analysis. To further their studies of Lake Tahoe and provide its students and faculty a world-class facility, UC Davis needed to build a new high-tech laboratory. The university completed a fund-raising drive in 2003 for its Tahoe Environmental Research Center (TERC), but UC Davis was unable to

find a suitable location at the lake for the laboratory facility.

In 2004, Sierra Nevada College approached UC Davis about partnering to create a new 45,000-square-foot laboratory and classroom building on the Incline Village campus. UC Davis would have 40 percent of the facility available for its TERC research labs, offices, and the Thomas J. Long Foundation Education Center. The remaining space would be for SNC's laboratory and classroom facilities, and for additional partners in the Tahoe Center.



Expanded partnership

Sierra Nevada College is a member of the National Science Foundation and Carnegie Mellon University's Advanced Building Systems Integration Consortium (ABSIC), an organization of university, government, and industry leaders that promotes the creation of high-performance buildings, using principles of renewable energy sources, sustainable materials, and integrated systems. Working with ABSIC, SNC has changed the Tahoe Center into a distinctive partnership between public and private institutions of higher education. In addition to providing laboratories and classrooms for UC Davis and SNC, the Tahoe Center

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also supplies facilities for the University of Nevada, Reno; the Desert Research Institute; Carnegie Mellon University; the RAND Corporation; the Scripps Institute of Oceanography; and other research partners.

"It was a real challenge designing for so many clients," says Lundahl and Associates Principal Todd Lankenau, LEED AP. "Everyone had their own portions of the building, but they all shared in the common space. You can imagine that with multiple clients you have multiple desires. To take all of those and distill them into a satisfactory program for all of them was a challenge."

Going for platinum

In early 2005, the trustees of SNC decided that the Tahoe Center should be built to the highest environmental standards and registered their project for LEED® with the goal of achieving a Platinum rating, a daunting task for a building type with high energy demands.

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"That was really one of our biggest challenges," says Lankenau. "A laboratory, just by its nature, is a very energy-consumptive building. Although we came up with a lot of innovative ways to reduce the energy consumption, had it been a normal office building or any other type of building it would've been much easier. We've calculated that we saved 64 percent of the energy from a baseline laboratory building according to ASHRAE 90.1 standards, and we also saved somewhere between 70-80 percent of the normal water consumption that



you would use in a building like this."

The building's numerous sustainable features include structural concrete with 25 percent fly ash, wheatboard cabinets and carpet tiles with recycled materials in classrooms and offices, particleboard substrate cabinetry and linoleum floors in laboratories, light shelves that refract natural light from the sun inside the building up to thirty feet and interior glass walls that pass light to the corridors, and a compressed natural gas (CNG) pump located behind the building so that SNC and UC Davis staffs can use CNG vehicles to promote environmental stewardship.

The Tahoe Center also includes a broad variety of innovative mechanical designs including induction diffusers, or chilled beams; low-flow displacement ventilation; radiant floor heating; overhead radiant heating and cooling panels; a capstone turbine with co-generation for space heating; 875 photovoltaic panels that generate approximately 10 percent of the electricity used in the building; lab-exhaust heat recovery; nighttime chilled water production with a cooling tower;

50,000 gallons of chilled water storage; direct evaporative cooling in air handlers; and a demonstration solar hot-water heater. Plumbing design features include waterless urinals, low-flow toilets, and a unique snow-melt and rainwater retention system that captures and sanitizes water for use in toilet flushing and trap primers.

According to Peter Rumsey, president of Rumsey Engineers, "one of the outstanding characteristics of this building is the number of different systems it uses and the way they interact to achieve excellent energy efficiency while delivering optimal comfort and safety for students, researchers, and other users. We're particularly happy that the laboratory is the first in the U.S. to use chilled beams, as this technology presents excellent energy saving potential for labs in the U.S."



In addition, trees harvested from the forested building site were milled in place, saving the transportation energy expenses. The milled wood was used for finishing work, and unmilled wood was shredded and used for erosion control and ground cover. "We only disrupted the area that was absolutely necessary for the building, parking areas, and the infrastructure for the site," says Lankenau. "We deliberately fenced off and protected everything else around it, so it was a very tight building site. Even though it's on a large building site, it was almost like we were building in an urban environment. We probably only

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had 15 feet around the perimeter of the entire building during the course of construction."

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A teaching tool

According to Lankenau, students at SNC were able to participate in the project by helping lay some landscaping and setting up educational displays for visitors. Exhibits were created to explain the function of the building and how the building systems work, how energy is saved, how water resources are saved, the history of Lake Tahoe, and the science that's being conducted to preserve the clarity and quality of Lake Tahoe and the surrounding environment.

"The building's really been designed as a teaching tool so that we can bring in the general public," says Lankenau. "We expect about 10,000

visitors a year to come through the building. A lot of those visitors will be students. We've geared everything in the exhibits to the broadest spectrum of interested visitors so everything is easily understandable for kindergarteners to adults. A lot of exhibits focus on the UC Davis research out in the lake and how they go about determining the lake's water quality, clarity, and nutrient loading and what can be done about it. It's a learning experience to teach how we can responsibly preserve the quality of Lake Tahoe and show visitors how to apply some of the systems we've used in the building to their own homes."

Project Team:

Architect: Lundahl and Associates

Contractor: Turner Construction Company

Mechanical Engineer: Rumsey Engineers

Electrical Engineer: Integrated Design Associates (IDeAs)

Structural Engineer: John A. Martin & Associates of Nevada

Lighting Designer: David Nelson & Associates

Acoustical Consultant: McKay Conant Brook, Inc.

Laboratory Consultant: Research Facilities Design

LEED Consultant: Architectural Energy Corporation.