



Photo: Ed Asmus Photography

Alder Creek Middle School Truckee, California

“We discovered that working to build a green school is practical and beneficial. Using a whole-building approach makes sense as it enables us to understand the impacts of each system on all of the others, and the ultimate impacts on the students, teachers, and staff.”

—Rob Samish, Architect
Lionakis Beaumont Design Group

A School that Maximizes its Natural Environment

Alder Creek Middle School in Truckee, California, is located in a rural area in the Lake Tahoe Basin, a region that experiences extreme temperatures. This could have been a hurdle for some projects. However, using an integrated approach, key stakeholders working on the Alder Creek Middle School project—including members of the school district, architects, designers, and engineers—set about discussing, designing, and constructing a building that utilizes the natural elements that surround it. Working together, they made the decision to build the school on a sloped site to maximize the earth’s thermal insulation properties.

The school is a demonstration school for the Collaborative for High Performance Schools (CHPS), one of only a handful of schools in the nation to achieve this distinction. CHPS creates healthy and comfortable environments by combining the best of today’s design strategies and building technologies to ease maintenance and operation costs and conserve natural resources.

Project Details

Demonstration project for Collaborative for High Performance Schools.

Building: Two stories; 87,080 square feet plus nine portable classrooms, for a total of 95,720 square feet

Completed: 2004

Grades served: 6–8

Funding:

- Measure C school bond: \$31 million
- California Energy Commission: \$250,000 grant
- Truckee Donner Public Utility District: \$60,000 ground-source heat pump grant

Total project cost: \$31 million, \$321 per square foot (construction cost = \$23,645,000)

Initial capacity: 700 students

Designed capacity: 1,000 students

Energy performance and savings:

- 58% energy savings with geothermal GSHP compared to typical boiler/chiller system
- 20% below Title 24 requirements from combination lighting and HVAC design
- Photovoltaic system energy savings tracked on Web site and by students

Alder Creek Middle School is a showcase of cost-effective and high-performance strategies, including:

- Daylighting—Orientation of the structure maximizes solar delivery so electric fixtures are needed for supplemental lighting only; skylights and windows are designed to reflect incoming light to the white ceiling, eliminating glare and shadows; motion sensors automatically turn off lights when rooms are not in use.
- Energy efficiency—ground-source heat pumps (GSHP): 288 wells were drilled 315 feet beneath the soccer field to circulate water that is pumped into the school to heat or cool classrooms; a backup high-efficiency boiler kicks in if the supply drops below 42°F.
- Water conservation—Low-flow water fixtures decrease water usage; storm water is collected from the roof and other impervious surfaces and funneled into the local groundwater aquifer.
- Sustainable materials—Recycled low-maintenance building materials made

from low-volatile organic and nontoxic compounds are used throughout the structure.

- Preventative maintenance—Southern exposure reduces snow and ice buildup, and hydronic snowmelt at all entry areas reduces removal time.
- Waste reduction—Students run a school-wide recycling program, collecting, sorting, and placing waste out for pickup by the local disposal company.

“I am very excited about the green technology that was used in Alder Creek Middle School. It helps us contribute to saving energy and reduces our carbon footprint. I also think it’s very important that the teachers understand how it can enhance the learning experience and pass that knowledge on to the students and the community.”

—Rob Koster, Project Manager
Truckee Tahoe Unified School District



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This typical classroom shows its daylighting and lighting systems. Light fixtures are 60 percent uplight and 40 percent downlight.

Alder Creek Middle School—EnergySmart Choices	
Feature	Benefit
Building envelope	Concrete masonry unit; steel.
Windows	Low-emissivity vertical glazing; dual-pane; thermally broken window frames; operable to provide natural ventilation.
HVAC	GSHP with high-efficiency pumps; 300 ton system uses 288, 6 in. diameter by 315 ft. deep wells; backup boiler if supply loop drops below 42°F.
Water	Low-flow fixtures; dedicated domestic boiler for hot water; storm water is collected from the roof and from other impervious surfaces filtered before entering storm drain system to recharge the local groundwater aquifer.
Site orientation	Elongated east-west axis to take advantage of daylighting and winter passive solar gain.
Daylighting	Low-e with dual glazing; blinds inside windows act as light shelves; skylights in classroom wing stairwell.
Lighting	Lighting power density 0.7 W/ft² T-5 40% direct/60% indirect in classrooms and offices; T-5 HO in gymnasium and cafeteria; T-8 in all other areas; metal halide lamps in parking lot.
System controls	Room occupancy sensors; temperature controls; carbon dioxide sensors in the gym and cafeteria.
Roof	R-19 insulation; cool roof; high reflectance, high emissivity; ENERGY STAR® compliant.
Walls	R-19 insulation.
Recycling	Recycled materials used in construction; student recycling program.
Boiler plant	High-efficiency boiler.



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Recycled low-maintenance building materials made from low-volatile organic and nontoxic compounds are used throughout the school.



A greenbelt was maintained on the south and west sides of the building to reduce the impact of the school on the surrounding neighborhood.

Alder Creek Middle School—Lessons Learned

Goal	Project Outcome
Maximize daylighting throughout the campus	The classrooms, library, and common areas have maximum daylight. Opaque windows in the gymnasium and cafeteria eliminate glare and hot spots from the east- and west-facing areas.
Provide operable windows wherever possible	All rooms with exterior walls have operable windows.
Use alternative energy sources	GSHP with high-efficiency pumps are used for heating.
Reduce energy and operating costs	<ul style="list-style-type: none"> The combination of lighting and HVAC design indicates the school is 20% below Title 24 requirements. Energy costs are evaluated annually.
Reduce maintenance costs and simplify snow removal operations	<ul style="list-style-type: none"> High-impact sheet rock, exposed block, and plastic laminate panels in all high-traffic areas reduce annual maintenance needs. Polished concrete and linoleum floors in hallways and common areas reduce day-to-day maintenance. Hydronic snowmelt at all entry areas reduces snow removal time.
Take advantage of sunlight	<ul style="list-style-type: none"> The south-facing windows will allow sunlight into the classrooms. The southern exposure will reduce snow and ice buildup.
Preserve the natural environment	<ul style="list-style-type: none"> During construction, many large trees east of the building were preserved to provide a buffer between the school and Highway 89. A greenbelt was maintained on the south and west sides of the building to reduce the impact of the school on the surrounding neighborhood. All of the areas disturbed by construction were hydroseeded with native seeds to return the area to its preconstruction condition.

Financing

The California Energy Commission provided a \$250,000 demonstration facility grant to Alder Creek. The Truckee Donner Public Utility District provided a \$60,000 grant for installing a GSHP system. A \$10,000 “A-Plus for Energy” grant from BP and an additional \$9,000 from local residents and businesses paid for a photovoltaic system consisting of solar panels mounted on a pole with a tracking device following the sun’s movement throughout the day. The system is an educational tool and is tied to the electrical panel to reduce energy used on site.

Measure C, a \$31 million school bond, funded the construction of the school.

Results

Alder Creek Middle School conserves energy, water, and natural resources. It is cost effective and provides a healthy indoor environment for students, teachers, and staff. The school saves thousands of dollars each year with its GSHP underground system.

In addition to its verified recognition as a “Collaborative for High Performance School,” Alder Creek Middle School has also received the Sustainable Design Merit Award from the U.S. Green Building Council and is a standard-setting facility in its climate zone for the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE).

A Model for the Community

Alder Creek Middle School serves as a teaching tool; its exposed structural system and a bathymetric depth measurement of Donner Lake are visible as students and visitors enter the lobby. Students run a school-wide recycling program that collects, sorts, and places recyclables in proper receptacles for pickup. A number of local conservation organizations have used the building for symposiums highlighting its success.

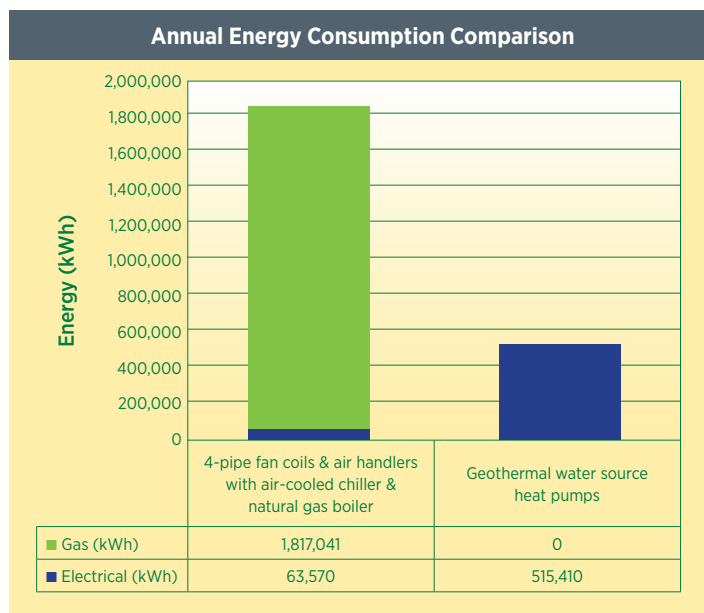


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Alder Creek Middle School's exposed structural system and a bathymetric depth measurement of Donner Lake are visible as students and visitors enter the lobby.

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