Sargent Junior-Senior High School

Monte Vista Colorado

Project Type:	Junior-Senior High School
Owner:	Sargent School District RE-33J
Certification Goal:	LEED Gold
Construction Cost:	$15.2 million (CDE/BEST)
Building Size:	62,463 sf
Site Size:	9.9 acres
Number of Floors:	2
Completion:	August 2010

Project Team:

Design/Build Firm:	The Neenan Company
Owner's Rep:	RLH Engineering
Mechanical/Plumbing:	Integrated Mechanical, LLC
Electrical Engineer:	Consulting Engineers, Inc.
Civil Engineer:	TST, Inc.
Commissioning Agent:	Architectural Energy Corp.
Energy Consultant:	Xcel Energy/The Weidt Group
Sustainability:	Institute for the Built Environment (IBE) at CSU

Information/photos courtesy of The Neenan Company

integrated project design yields sustainable results

high performance goals

- LEED for Schools – Gold.
- Reduced energy use.
- Decreased maintenance cost.
- High performance indoor learning environment
- Shared facilities with community
- Leverage public resources for sustainability
- Use of the building as part of the curriculum.

project description

The Sargent School District RE-33J is located in the San Luis Valley. The historic junior-senior high school has been a pillar for the students and community it serves for almost 90 years. In 2008, the district passed a $5M bond and received a $17.7M grant from CDE/BEST that enabled the design and construction of a new junior-senior high school and upgrades to the existing elementary school and high school gymnasium.

an integrated approach

The integrated project planning and design approach was already familiar to The Neenan Company through their prior design/build experience. In order to meet the LEED criteria, the project team reached out early to LEED, energy, and commissioning consultants. The sustainability consultant provided guidance on the LEED certification process and suggested high performance energy and indoor environment strategies The owner's representative, Xcel Energy, and the sustainability consultant facilitated a collaborative evaluation of cost-effective energy saving strategies. This resulted in a $40,000 incentive grant and approximately $7,000 in design assistance funds to the design team.

The commissioning agent participated in mechanical, electrical and plumbing meetings early on to assure the high performance systems would meet the needs of the district. Pre-functional documentation for testing resulted in a system that performed as designed from day one. Additionally, the district opted to pursue the LEED Enhanced Commissioning credit which will provide a further review of building operations ten months after completion.

integrated building systems

water source geoexchange:
Existing on-site well water allowed the mechanical team to design an open loop geoexchange system to meet the heating and cooling needs of the school. With this system, well water is run through a plate heat exchanger to six water source heat pumps before being returned to a second well. This system is capable of providing three to five kW of heat for every kW of electricity used.

in-floor radiant heating and cooling:
Coupled to the geoexchange system is an in-floor hydronic radiant heating and cooling system. Utilizing the mass of the concrete floor, this system provides improved thermal stratification and healthier indoor air quality for the occupants.

dedicated demand control ventilation:
This system uses carbon dioxide detectors to provide ventilation only when needed to occupied spaces. Additional efficiencies were realized by using energy recovery ventilators (ERV) to capture heat from the exhaust air and pre-condition the fresh air used to ventilate the building.

reduced thermal bridging:
Two wall systems were selected. The cafeteria, auditorium, kitchen and gym were constructed with 12" thick insulated pre-cast wall panels. This panel consisted of a layer of 5" rigid insulation sandwiched between 3-1/2" concrete. This resulted in a weighted average R-value of R-16, exceeding IECC 2006 by 40%. The classroom wing was constructed as an insulated metal framed wall assembly. The exterior surface is a 2-1/2" layer of R-15.8 continuous rigid insulation. Seams were taped with self sealing/healing fully adhered flashing. Then a 1-1/2" layer of polyurethane spray foam was applied in the stud cavity and to provide an additional R-value of R-7.5.

increased roof insulation:
The thermal performance of the roof system was increased with an R-35 closed-cell polyiso foam. This also exceeded IECC 2006 requirements by 40%. High reflectance EPDM and metal roof assemblies on 100% of the roof will reduce summer heat gain.

high performance design features

- Optimized building orientation.
- Tuned glazing, sunshades and light shelves.
- Sloped ceilings and light wall colors maximize daylight potential.
- Tubular daylighting devices (TDD) in the gym, cafeteria, and serving areas.
- Low VOC adhesives, sealants, paints, and carpeting.
- Urea Formaldahyde free composite wood products.
- IAQ management plan and building flush-out
- Multiple dry wells for water filtration and eliminating stormwater runoff.
- Vegetation and open space on 47% of the site
- High efficiency water source heat pumps coupled with an in-floor hydronic radiant heating and cooling system.

project results

- **50.1 kBtu/sf/yr** energy use (including site lighting, kitchen, computer and user loads).
- **48%** energy cost savings above ASHRAE Standard 90.1-2007.
- **91%** of construction waste diverted from landfill (1,222 tons).
- **40%** less water use than a conventional building.
- **72%** less water used for landscape irrigation.
- **100%** of wastewater treated on-site to tertiary standards.
- **93%** of occupied classroom space daylit.
- **26%** recycled content and **21%** regional content based on material costs.
- School curriculum developed to use the building for environmental education.
- Shared community use of auditorium, gym and cafeteria.