

Sangre De Cristo Pre K - 12 School



Project Type:	Pre K-12 School
Owner:	Sangre De Cristo School District RE-22J
Certification Goals:	LEED Schools - Gold
Construction Cost:	\$18 million (CDE/BEST)
Building Size:	80,025 sf
Site Size:	40 acres
Completion: Phase II	May 2011

Project Team:

Architect of Record:	klipp
Associate Architect:	Hutton Architecture Studio
Owner's Rep:	Catalyst Planning Group
MEP Engineer:	ME Group
Civil Engineer:	Crabtree Group
Contractor:	GE Johnson
Landscape Architect:	Design Concepts
Structural Engineer:	JVA, Inc.
Energy Consultant:	ME Group
Commissioning Agent:	Beaudin Ganze Consulting Engineers, Inc
Daylight Simulations:	Dalglish Daylighting
GEO Consultant	Ambient Energy

Information and renderings courtesy of klipp / Hutton / Ambient

integrated team + supportive community = top of class school

high performance goals

- LEED for Schools - Gold
- Decreased energy and operational costs
- Quality learning environment and community facilities

project description

The Sangre De Cristo School District serves about 350 students in the San Luis Valley. Previously, the elementary school was located in a separate town six miles away from the high school. In 2008, the district passed a \$4M bond and received a matching \$14M grant from the Colorado Department of Education (CDE). This funding enabled the design and construction of a new combined K-12 campus between the two towns that is targeted to be one of the most energy efficient schools in the state.

small district—big needs

Since 2005, the district has been working with the community and consultants to consider ways to improve the district facilities and to put money back into the classroom. Due to propane heating and poorly insulated structures, heating costs were a heavy burden for the district. A comprehensive review showed that most of the existing buildings and their systems had exceeded their operational lifespan. Further, necessary upgrades, such as ADA access, were difficult to implement.

strategic planning optimizes efforts

The district's master planning process identified that a new site and combined campus presented the best

way to achieve district and community goals. Often districts of this size do not have the bonding capacity for even minor additions or renovations, let alone an entire new campus. Fortunately, the CDE had recently started administering the Building Excellent Schools Today (BEST) program. BEST enables under funded districts to leverage local bond funds for additional grant money from the state to repair, renovate, or build high performance schools. The community supported this opportunity with a matching bond.

collaboration and the right tools enable choice

A 'whole building' design approach engaged the district, community, and project team as partners. LEED Gold was a team goal and met the sustainability requirements of the BEST grant. Early meetings involving all of the stakeholders helped the team match the design to the programmatic and community needs. Energy and daylight models assisted the project team's assessment of design choices. Aligning results from these tools with lifecycle cost analysis and constructability discussions helped the team determine the overall strategies that were best suited for the project. The GEO Consultant provided reviews of the team's energy models, project drawings, owner's requirements and strategies for the post construction measurement and verification process.

integrated building systems bring goals to reality

By considering the campus as a whole system, the project team was able to integrate high performance strategies for long term efficiency. This resulted in

a projected energy use of just 22.1 kBtu/sf/yr, which is nearly four times better than the average for Colorado schools. The building envelope serves as the foundation for this approach with careful detailing and material selection for thermal performance, moisture protection, air infiltration and durability. To optimize daylighting and passive heating, the glazing is tuned to facade orientation. Daylight is further harvested from tubular daylighting devices (TDD's), skylights, and clearstories. By using photo-cell sensors to control electric lighting levels, energy use and heat loads are further reduced. With these systems addressed, the mechanical system size could be reduced for lower construction, as well as operational, costs.

maximizing on site opportunities for water savings

The site at Sangre de Cristo will look nothing like the typical water use intensive, grass covered school yard. Instead, sod is used to its best advantage at athletic fields and play areas adjacent to the building. The remainder of the site is planted with native and drought tolerant vegetation. Rain gardens and bio-swales in these areas capture rainfall and redirect it for natural irrigation and slow release back into the natural aquifer below the site. Through a series of on-site wells and treatment systems, the aquifer efficiently provides all of the water for the campus and eliminated the need for a new municipal water main. In addition to the redirected rainfall, the aquifer is recharged when 90% of the facility's wastewater is treated on-site to a safe level and

released back to the site's ecosystem. The combined septic and sand filtration system pre-treats the wastewater to be released. After release, vegetation and soil filter the water as it returns to the aquifer. One of the on-site wells then extracts water from the aquifer and further treatment raises its quality to a potable level. A second well, without additional treatment, provides non-potable water to supplement the landscape irrigation.

high performance enhances learning environment

Many of the building's features directly benefit the learning environment. Daylighting, natural ventilation, and views to the outdoors have all been shown to benefit student performance. Low VOC adhesives, sealants, finishes, and carpeting further the indoor air quality of the classrooms. In addition, the library, gym, and cafeteria are located to readily allow community use after hours.

high performance design features

- Building envelope with spray foam insulation over metal studs with R-19 batts insulation, and durable masonry veneer or metal siding.
- Georexchange field paired with water to water heat pumps supplying baseboard hydronic heating and water to air heat pumps for displacement ventilation.
- Energy recovery ventilators provide demand-controlled fresh air to the displacement ventilation system.
- Enhanced commissioning for mechanical, plumbing, lighting controls and daylighting.

affordable energy savings with impact



This project demonstrates that high performance building within a small district's budget can be accomplished and comparable to standard construction costs. The operational savings will put dollars back into the classroom.

- **22.1 kbtu/sf/yr** projected energy use for nearly four times better than the average energy use for Colorado schools.
- **51%** energy cost savings above ASHRAE 90.1 2007.
- **80%** projected energy cost saving for the district.
- **100%** potable/non-potable on-site water.
- **100%** wastewater treated on-site to tertiary standard.
- **100%** daylighting in regularly occupied classroom spaces.

design today for energy savings tomorrow

With nine acres set aside and conduit already installed for future photovoltaics, the school has the potential of being a net zero energy building and realizing even more energy cost savings.