FOSSIL RIDGE HIGH SCHOOL

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INTRODUCTION

A typical high school in Colorado costs about $1.00 per square foot per year to heat. Could a comparable school be designed and built that could be heated and cooled for half the typical cost? Could such a school also become an outstanding place for teaching and learning? These questions were among the significant challenges given to the design team for Poudre School District's recently completed Fossil Ridge High School, the fifth public high school in Ft. Collins. This article examines the major steps, features, and results that have gone into this LEED Silver Certified school.

GREENING OF THE DISTRICT

The Poudre School District (PSD) in northern Colorado is nationally recognized for its *Sustainable Design Guidelines* and its full commitment to green building. The genesis and development of the guidelines and the level of commitment lend important perspectives to the success of Fossil Ridge High School.

In 1999, acting on the vision of district architect Mike Spearnak, AIA, PSD created a "Green Team." The team was comprised primarily of members of Facilities Planning, Design and Maintenance staff and included plumbers, carpenters, custodians, HVAC technicians, electricians, painters, locksmiths, and groundskeepers. Mr. Spearnak was able to obtain some travel and consultant funding and a commitment of 1 hour per week from each team member, approved by the member's superior. Each week, the Green Team spent their allocated hour researching sustainable methods and materials for potential use in the guidelines and, ultimately, in new and existing schools.

The Green Team spent many weeks researching, documenting, and sharing their findings. In addition, several members visited notable green facilities, installations, and manufacturers of sustainable products. The educational visits were instrumental in helping the team envision how their research work could have tangible results and cemented individual and team commitment to green building practices.

As a result of the Green Team's efforts, PSD published the first version of its *Sustainable Design Guidelines* in 2000. The guidelines served as a framework for a design competition to develop a prototype elementary school. "Having a competition among three teams of design professionals really got the creative juices flowing," said Spearnak. "Our guidelines served as the platform from which to get 'outside the box,' as far as encouraging the designers to explore the leading edges of sustainable building."

The Poudre School District awarded RB+B Architects with the design contract for the prototype elementary. The District also hired the Institute for the Built Environment at Colorado State University to assist the project design team in researching and recommending emerging sustainable materials and methods. Two schools, Zach Elementary and Bacon Elementary, were designed and built between 2000–2003, and provided opportunities for the District to gain knowledge of sustainable design goals that were both cost effective and achievable.

NEXT: A NEW HIGH SCHOOL

On the heels of the immediate successes of the elementary schools, PSD commissioned an integrated team, led by RB+B, to design a new high school in 2001. The high school design team included recognized leaders in the green building industry, such as ENSAR Group, EMC Engineers, City of Fort Collins Utilities, and the Institute for the Built Environment at Colorado State University. The *Sustainable Design Guidelines* and lessons learned from the prototype elementary schools served as the foundation for the much larger and more complex Fossil Ridge High School (FRHS).

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Since the bond for capital improvements had been set prior to the decision to build green, the high school already had a fixed budget. A combination of extensive planning, the integrated design process, and good market conditions allowed Fossil Ridge to be built in the same price range as conventional high schools. The sustainable building strategies and innovative technologies promise to provide long-term benefits to students, the community, the environment, and the economic health of the school district.

INTEGRATED DESIGN PROCESS

The integrated design process requires that all parties have "ownership" of the design. Stakeholders come to the table knowing that (1) they will be heard, (2) there are no dumb ideas or questions, and (3) no ideas will be dismissed simply because "that's the way we've always done it." Furthermore, team members must communicate about their disciplines openly and early. The Mechanical Engineer actually knows the first name of the Landscape Architect! (Yes, it does matter where you plant trees when it comes to heat gain.)

The approved guidelines encourage a highly integrated design team and a decision-making process that includes building stakeholders. Early in schematic design, RB+B organized an all-day "sustainable design charrette" retreat with the full design team. This included key consultants and the Poudre School District's Green Team to brainstorm sustainable design concepts for the school. Every idea was explored, and former "rule of thumb" design models were set aside. As a result of the design charrette, the District and the design team agreed to work together on project goals such as:

- Beat ASHRAE 90.1 by 50%.
- Achieve Energy Star Rating of 90%.
- Reduce total energy cost to one-half that of the District's latest high school (see attachment A).
- Cooling load < 1 ton/1,000 SF (traditionally 2 tons/1,000 SF).
- Integrate affordable, sustainable materials as much as possible.
- Conserve water, reduce waste.
- Create a building that "teaches."

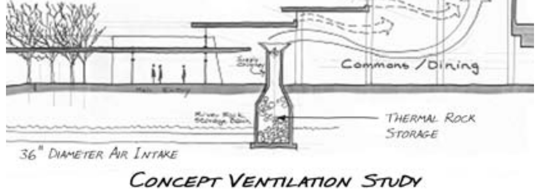
The success of the integrated design process at Fossil Ridge is a combination of the foundation set by the Green Team, the development of PSD's *Sustainable Design Guidelines,* and the follow through from the design team. As many LEED certified buildings can attest, a large measure of the success of a green building project can be attributed to the collaboration and common goal setting that is often inherent in well-integrated design processes.

THE DECISION TO SEEK LEED CERTIFICATION

Although Poudre School District considered working toward LEED Certification when the Request for Qualifications was originally announced, no reference to LEED was included in the RFQ, nor in any of the first contracts. It was only when one of the project team members came to a schematic design review meeting with a rough LEED scorecard that the school district first gave strong consideration to the notion of a LEED Certified facility.

Because the LEED agreement was not part of the initial stages of schematic design, opportunities for the inclusion of some specific LEED requirements were missed. Another issue, due to the late decision to pursue LEED, was that the consultants' contracts did not include supplying LEED documentation assistance. The school district then contracted with the Institute for the Built Environment at Colorado State University to add LEED consulting services to its standing green building research service agreement. Also, the school district obtained a state grant to help cover LEED costs and asked consultants to log their related hours for reimbursement. While final numbers are difficult to pinpoint, it is estimated that the work, fees, and associated costs directly related to LEED Certification cost roughly $50,000.

Proposed terra-cooling.

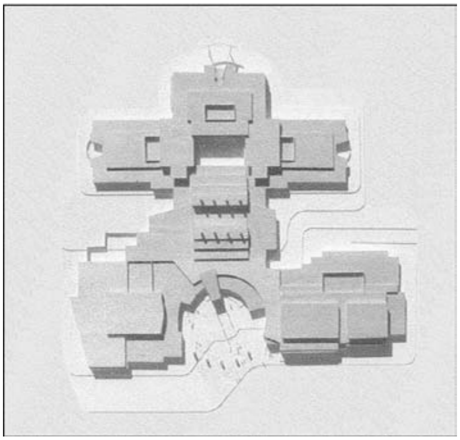


Four years after the first project team meeting, Fossil Ridge High School was awarded a LEED Silver rating. FRHS is the third public high school in the nation to achieve a LEED-NC (new construction) certification, the first in Colorado, and has received significant publicity and inquiries from school design teams and facility management departments across the United States, as well as from other countries.

FACILITY OVERVIEW

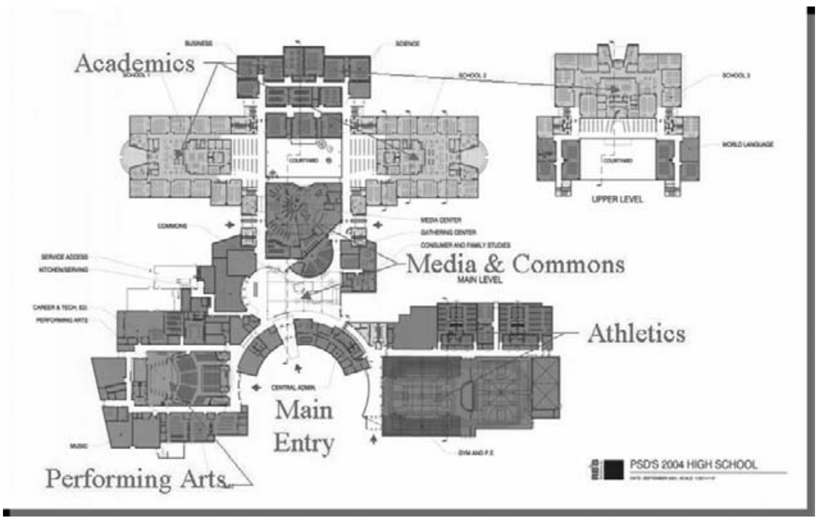
The building is laid out using the "school-within-a-school" concept. FRHS is comprised of three distinct learning communities with 600 students each. This promotes quality interaction between students and staff. The three communities can be identified in the building footprint diagram.

Study model.

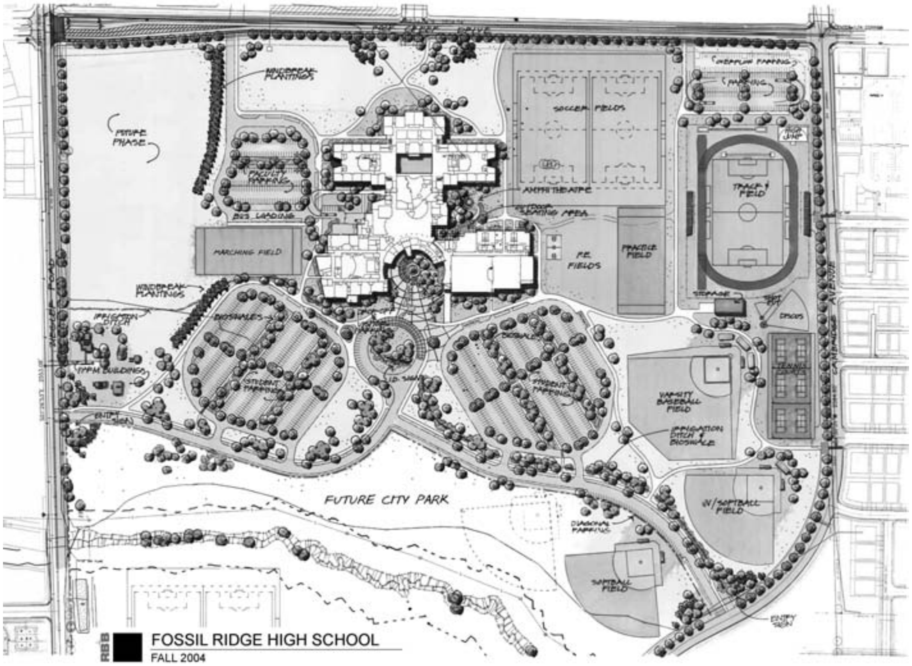


FAST FACTS

Architect:	RB+B Architects, Inc.
Principal-in-Charge:	*George A. Brelig, AIA*
Project Architect:	*Corky Bradley, AIA*
Owner:	Poudre School District
Location:	Fort Collins, Colorado
Construction Delivery:	Competitive Bid
General Contractor:	Haselden Construction, Inc.
Site Size:	85 acres
Building Size:	296,375 square feet
Number of stories:	2
Construction Budget:	$38.5 million ($135.37/SF, building and site)
Capacity:	1800 students + staff
Non-renewable energy:	Heat: natural gas; Cooling: ice storage
Power:	Wind generated electricity through the local utility
Date design began:	April 2001
Date of completion:	August 2004



Floor plan.



Site plan.

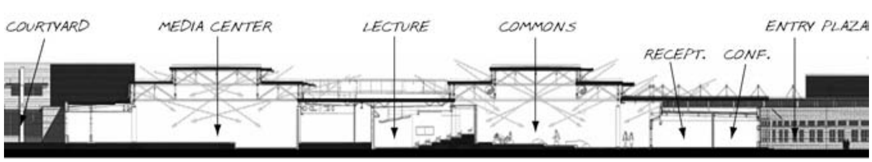
KEY SUSTAINABLE FEATURES

Sustainable Sites (obtained 7 S.S. LEED points)

- Maximized open space area and native vegetation.
- Constructed two stories to reduce overall building footprint.
- Historic 1930s farm building was preserved on the site and converted to a maintenance equipment storage facility.
- PSD partnered with the City of Ft. Collins to create shared outdoor recreation facilities and infrastructure resulting in reduced number of ball fields and tennis courts, shared parking lots, sidewalks, and outdoor lighting systems.
- The soccer field is made of artificial turf, which is comprised of recycled plastic and rubber materials. It was determined, during the water conservation charrette, that such a product would serve several project goals (water conservation, use of recycled materials, and significantly less maintenance).
- A white, reflective roof, consisting of a four ply, built-up roof with a white cap sheet, lessening the building heat island levels and lowers cooling costs.
- Bio-swales and xeriscape strategies that include native plants that assist with water conservation, stormwater management and treatment, and creation of a regionally appropriate landscape design.

Water Efficiency (obtained 1 WE point)

- Combines native and apt plantings with a highly efficient irrigation system; utilizes a weather station, computerized monitoring, and moisture sensors to reduce irrigation needs.
- Due to prolonged severe drought conditions and ongoing water issues in the West, the school district, Colorado State University, and City of Ft. Collins water officials held a water conservation charrette that focused on the Fossil Ridge site. FRHS and other regional projects are utilizing the resulting water conservation strategies.



Building section.

- Low-flow plumbing fixtures (below EPA 1992 standards) for showers and sinks.

Energy and Atmosphere (obtained 13 EA points)

- The energy model showed a 59% reduction in energy usage compared to ASHRAE 90.1 standards. Fossil Ridge High School is slightly larger than the District's most recent high school, Ft. Collins High, built in 1994 to ASHRAE 90.1 standards. The anticipated utilities savings based on energy modeling were $70,000/year.
  - This results in an estimated *monthly* savings of:
    —17.67 tons of coal
    —56,400 lbs of Carbon Dioxide (CO_2)
    —489 lbs of sulfur dioxide (SO_2)
    —226 lbs of nitrogen oxide (NO)
- The actual savings were even greater than expected—$86,000 less in energy costs in the first year of operation.
- Super efficient building envelope ("micro load").
- East-west orientation for best solar access and control.
- Extensive and effective daylighting using solar shades and light shelves. Approximately 60% of required lighting levels are achieved from controlled daylight.
- Natural ventilation—operable windows interlocked with the fan coil units allow users fresh air without taxing the HVAC system.
- Heat recovery wheels utilized to preheat and precool make up air.
- High efficiency HVAC and lighting equipment including:
  - High efficiency boilers
  - Dimmable ballasts
  - Daylighting sensors
  - Occupancy sensors
  - T-5 HO lights in gymnasiums
- Thermal energy storage system shifts peak demand for cooling loads and reduces chiller size by half.
- 5.2 kW photovoltaic system located at the main entry.
- Wind energy purchased for 100% of electrical use for at least two years.
- Full commissioning plan developed and implemented by Architectural Energy Corporation.

Ice storage tanks.

Photovoltaics shading office windows.

Photovoltaic array.

Main entry.

Daylit student commons.

Materials and Resources (obtained 5 MR points)

- The contractor, Haselden Construction, Inc., upon receiving the contract, eagerly took on the challenge of locating project materials within 500 miles of the job site. When the total materials and vendor locations were compiled, it was determined that over 50% of project materials (by cost) were manufactured regionally. Further, over 20% of the total building materials were harvested locally.
- Over 17% of project materials have post-consumer or post-industrial recycled content.
- Nearly 70% of construction waste was diverted from landfills. A regional waste hauler, Waste-Not Recycling, maintained recycling bins during construction and found places that purchased or accepted discarded building materials. Waste gypsum board from this and an adjacent project was ground on site and used as a soil amendment.
- The entire gymnasium floor is comprised of wood from a Forest Stewardship Council (FSC) certified sustainable forest. According to the construction project manager, the additional cost of obtaining a floor comprised of certified wood was negligible. The Forest Stewardship Council certification program is recognized by the USGBC for their clear, consistent methodology for certifying forests and forest products.

Indoor Environmental Quality (obtained 5 IEQ points)

- While the daylighting technologies integrated into Fossil Ridge didn't garner any direct LEED points, it is clear to building employees, students, and visitors that daylighting is one of the main reasons that the building makes such an immediate, positive impact.
- Each classroom includes operable windows which allow faculty and students to connect more directly with the exterior environment.
- Low-VOC (volatile organic compounds) and no-VOC products were selected for all adhesives, caulks, paints, finishes, and carpeting, resulting in healthy, non-toxic interior spaces.
- Precautions were taken during construction to seal duct work, materials were protected upon arrival to the site, and high amounts of outdoor air were used to keep the building's indoor air clean and healthy.
- Indoor pollutant source control measures: All walls to deck in chemical mixing areas, proper ventilation in chemistry labs, permanent entryway grates, green housecleaning program.
- Conducted a two-week building flush out prior to occupancy to reduce issues associated with off-gassing and construction debris.

Total LEED points achieved

Fossil Ridge was awarded a total of 36 LEED-NC points by the appointed U.S. Green Building Council project review team. That total included four points for various innovative strategies and one point for the active project participation of a LEED accredited professional.

SUMMARY TEXT ON OPTIMIZING ENERGY SAVINGS

Two critical factors in achieving the extraordinary energy savings are: (1) the consistent, successful employment of daylighting principles throughout the building and (2) the successful employment of the integrated design process. These combined strategies allowed for down-sizing of HVAC and electrical equipment.

Other factors that have helped the facility to achieve the extraordinary reduction in energy use, as compared to ASHRAE 90.1, are creating a "micro-load" building and a superior envelope design, selecting efficient HVAC equipment, sophisticated dimming and sensor controls, implementing building commissioning, and integrating the photovoltaic system. While numerous heating and cooling strategies were explored, the HVAC system installed in the school uses thermal ice storage, which allows ice to be produced during night-time, off-peak hours when electricity rates are lower. Chilled water is then pumped through the ice tanks and into the HVAC units when controls call for cooling.

The key strategy was to introduce controlled daylight so that the use of electric lights would be largely unnecessary. By keeping lights off or dimmed low, unwanted heat gain is significantly reduced, thus downsizing the mechanical cooling and equipment load.

In addition, heat recovery systems and other energy saving strategies were explored and modeled with the help of DOE-2 energy modeling software.

SUMMARY TEXT ON BUILDING COMMISSIONING

Building commissioning on Fossil Ridge included research and documentation assistance with energy equipment decisions, monitoring the selection and installation of all mechanical, electrical, and plumbing components, and checks, balances, and final approvals of all building systems. While costs associated with the building commissioning are substantial on a project as large and complex as Fossil Ridge, school district officials believe that the payback time can be measured in months rather than years, especially when compared to the reduction of change orders, work delays, equipment problems, and call-backs that occurred on past school projects.

West classrooms elevation. Note how windows are turned 30 degrees off true west.

SUMMARY TEXT ON DAYLIGHTING

The green building strategy that has emerged as the most significant factor in the success of the design, construction, and operation of Fossil Ridge High School is daylighting. A large reason for the degree of success of the daylighting integration was the level of understanding, by all project consultants, of how daylighting would affect many aspects of the project.

ENSAR Group led the daylighting effort and worked closely with the rest of the design team to identify specific daylighting needs and opportunities. The team paid careful attention to building orientation and shape and related glazing selection and placement. The installed clerestory glass has higher light transmittance values than the lower "view" windows in an effort to bring in more light without creating glare. Architectural controls, including overhangs and light shelves, high-reflectance materials and paint above 7 feet, and daylight sensors to control artificial lighting all contribute to the success of the school's daylighting system. The District requested that the design team give special attention to daylighting classrooms, offices, common spaces and gymnasiums. The District, through the Green Team research, came to an understanding that daylighting not only saves energy, but also improves the learning atmosphere for students and teachers.

The lumens delivered to classrooms and other spaces via daylighting allows for reduced or eliminated electrical lighting. Because electric light contributes a significant amount of heat to commercial and institutional buildings, well integrated daylighting significantly reduces the need for mechanical cooling. Much of the energy savings for Fossil Ridge can be attributed to the effective daylighting strategies. From an energy perspective alone, daylighting has multiple benefits: reduced demand for electrical lighting (usually 35% of building energy use), reduced demand for cooling load (usually 35% or more of building energy use) and subsequent reductions in mechanical equipment. The fact that Fossil Ridge was modeled, and has performed, at over 60% less energy use than ASHRAE 90.1, 1999, was due largely to the daylighting strategies.

The aesthetic qualities of daylighting enhance the overall character and experience of the school. A prevailing response from visitors and occupants alike is that the abundance of natural light helps to create a unique, exciting set of spaces. Orientation and wayfinding within the building are aided by daylighting and the spaces change character throughout the day and season, helping to establish a consistent connection with the surrounding natural environment. While these qualities do not directly affect energy savings, they add a significant uplifting, refreshing quality to the building that is hard to quantify.

It is noteworthy that the successful daylighting strategies implemented at FRHS did not qualify for the LEED daylighting and views credits in the Indoor Environmental Quality (IEQ) category. The first daylighting credit requires an average daylight factor of 2%, which is a calculation that takes into account a room's square footage, glazing square footage, and the visible transmittance (Tvis) of the glazing. The daylight factors for FRHS rooms varied between .8% and 1.5%. There are differing opinions about the appropriateness of the 2% factor and how good a measure it is of the quality of daylight, particularly in the typically sunny, high altitude climate in Colorado.

The second LEED point for daylighting requires visual access to exterior views from 90% of the regularly occupied spaces. Approximately 85% of the spaces in the school include appropriate view glass, yet, due to some space planning constraints and the large size of the building, the design team was unable to reach the 90% level. Despite the inability of the Fossil Ridge project to achieve the IEQ daylighting credit, it can be concluded that the excellent daylighting design was the leading factor in the exceptional energy savings and in gaining the maximum allotment of 10 LEED points for the Optimizing Energy credit.

OTHER GREEN STRATEGIES THAT FELL SHORT OF LEED

A number of other green building strategies were implemented that did not result in LEED points. The reasons for this vary from misinterpretation of LEED requirements to missed opportunities due to the late decision to seek LEED certification. Regardless, the LEED system became an important guide in the considerations and decisions of all the strategies, whether or not the strategies ultimately attained LEED points. Green building strategies at FRHS that fell short of attaining LEED points include:

- Construction IAQ measures and two-week building flush out that did not employ the MERV 13 filters required by LEED.
- Low-flow plumbing fixtures—a 30% reduction was originally projected, but some of the actual fixtures that were specified did not meet the low-flow standards. The total savings did not reach 20%, the required level for a LEED water reduction point.
- Reuse of reclaimed materials such as recycled asphalt and other road base materials.
- Use of Forest Stewardship Council certified wood—while the entire gymnasium floor is 100% FSC certified wood, some of the particleboard and architectural millwork did not meet the specification. The issue was complicated by a misunderstanding of the certified wood requirement (while other wood certifications exist, only FSC counts toward LEED) and by the fact that not all of the products that are stamped as "FSC" are necessarily 100% FSC content. In addition, one of the suppliers of the wood for the project went out of business before the project was completed and could not be contacted for the necessary chain-of-custody numbers.
- Renewable resources—Located at the school's entry is an array of photovoltaic panels that provide on-site generation of electricity, a public display of environmental commitment and educational opportunities for the school. While the panels supply less than 2% (LEED requires 5%) of the school's total electricity requirements, the panels send a clear message about project goals to the building's visitors, teachers, and students.
- Nearly 70% of construction waste was diverted from the landfill—early project goals included a 75% diversion rate, which would have obtained an additional LEED point.
- Additional Innovation in Design credits—All of the possible four innovation credits were achieved through exemplary performance on local and regional materials, recycled content, and green power. Additional strategies that could have counted toward additional LEED credits include: "a building that teaches sustainability," holding a water conservation charrette with regional repercussions, preserving the existing barn for equip-

ment storage, and coordinating with the City of Fort Collins to reduce the number of play fields, parking spaces, and overall infrastructure.

All of these elements contribute to the overall quality and sustainability of the building, even though they fell short of the LEED Rating System. While LEED can serve as a valuable design tool and checklist, projects should recognize and implement strategies that are inherently sustainable in nature whether or not the strategies will qualify for LEED points. It is important to keep in mind that the ultimate goal is to build healthier, integrated, high-performing, sustainable buildings—not in simply achieving a certificate.

LESSONS LEARNED: "WHAT DID WE DO RIGHT?"

A number of the sustainable design elements that were successfully integrated into Fossil Ridge High School are being replicated in subsequent schools and in other regional projects. The following FRHS elements have been replicated by RB+B and others in recent design work:

- Location of building on the site and orientation for proper daylighting
- Super Efficient Building Envelope
- Micro-loading resulting in smaller HVAC equipment
- Daylighting—maximum harvesting, minimal glare
- Occupancy sensors for lighting and HVAC
- Open window sensors that shut down HVAC system (eliminates sending conditioned air out the window!)
- Weather Station Controlled Irrigation System
- Extensive Commissioning
- Building Automation System
- Energy Modeling
- Thermal Ice Storage System—minimizing peak demand
- PV array that shades south-facing glazing and demonstrates PVs to students and visitors
- Over 50% of building materials manufactured locally
- Over 20% of building materials harvested locally
- Nearly 70% of construction waste recycled
- Buildings that Teach
- Partnering Strategies/Integrated Design

LESSONS LEARNED: "THINGS TO KEEP IN MIND"

- Start Early—Integrated design takes upfront time, many meetings, and, of course, cooperation.
- Set Specific Goals that are agreed upon by all project stakeholders.
- To LEED, or not to LEED? If the project is going for certification, start that process early and obtain "buy-in" from all parties. If not, use the LEED Checklist anyway; many good ideas will flow from it. However, simply using LEED as a checklist can be a risky strategy depending on the experience and dedication of the owners and project team. Often green building strategies are "value engineered" out of a project without regard to the broader implications to the building systems or operating budget (especially if certification is not a goal).
- Keep it Simple—While sophisticated systems may lead to outstanding energy savings, systems must (1) be easily understood by the facility maintenance personnel, (2) be easily operated by the occupants, and (3) not have so much embodied energy in the equipment and labor that it strays from green principles.
- Don't try to go "pure green" in projects similar to Fossil Ridge; compromise is often an appropriate team activity. Evaluate each product and system for cost and durability as well as sustainability. While an open mind is essential, do not approach the project with "green blinders" on.
- Give the design phase enough time—A good project design team needs adequate time, fees, and the freedom to explore options and alternatives.
- Referring to a project as "green" can evoke unintended messages from the client. "High Performance" may be more accepted and appear to be more beneficial to certain clients.
- Risk of New Technologies—Judge whether the client can take some of the risk away from the designers and engineers; let the design team test the leading (but not necessarily "bleeding") edge. Many consultants have a fear of being called back for something that isn't working just right and therefore take a very conservative approach. Relaxing those expectations in the light of sustain-

ability and potential learning will allow the ideas to flow.
- Strive for, but don't demand, perfection. Green is, after all, *natural* and nature, by definition, is organic and evolving and should not be too rigid in practice.

SAVINGS AND COSTS

All of the dedication to sustainable design is paying off in terms of energy savings, water conservation, student and staff productivity, and community pride. The most notable, of course is energy savings. According Stu Reeve, energy manager for PSD, "We are saving the taxpayers over $86,000 a year just in energy costs." He explains, "Those dollars can go right back into the classrooms for education, which is obviously the purpose of the facility in the first place."

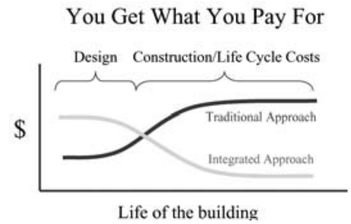
In addition to the energy savings, there are significant financial savings associated with using raw irrigation water. Raw (untreated) water arrives to the site and is stored in an on-site irrigation pond. The site rainwater also drains to this pond so that there is adequate supply of water to irrigate turf areas throughout most of the summer. Savings are even greater now that native grasses have established and no longer require watering. Overall savings in irrigation costs is almost $19,000 annually.

All of this adds up to some major savings for the school district. Reeve states, "In the first year alone, the total delta between Fort Collins High School (8183 square feet smaller than Fossil Ridge) and Fossil Ridge High School was $105,310. That's about 2.6 teachers!"

CONCLUSIONS AND ADVICE TO THE PROFESSIONALS

Green building does not inherently cost more—even in construction costs. With the super efficient envelope and the daylighting integration, the Fossil Ridge project team was able to downsize the HVAC equipment, which helped pay for the design upgrades. The engineers were able to specify equipment that was just the right size and not sized for "just in case" extra capacity. By using the Thermal Ice Storage System to make ice at night, a smaller chiller was possible. All of the reduced demand allowed PSD to work with the City of Ft. Collins Utilities to install a smaller building transformer (the permanent transformer was the same one used for temporary service for construction). By judiciously reviewing the design parameters, careful selection of materials and equipment, value was engineered into (not out of) the facility early and construction bids came in exactly where projected and budgeted. Truly integrated design should ideally result in this type of savings scenarios.

Cost of traditional vs. integrated design.

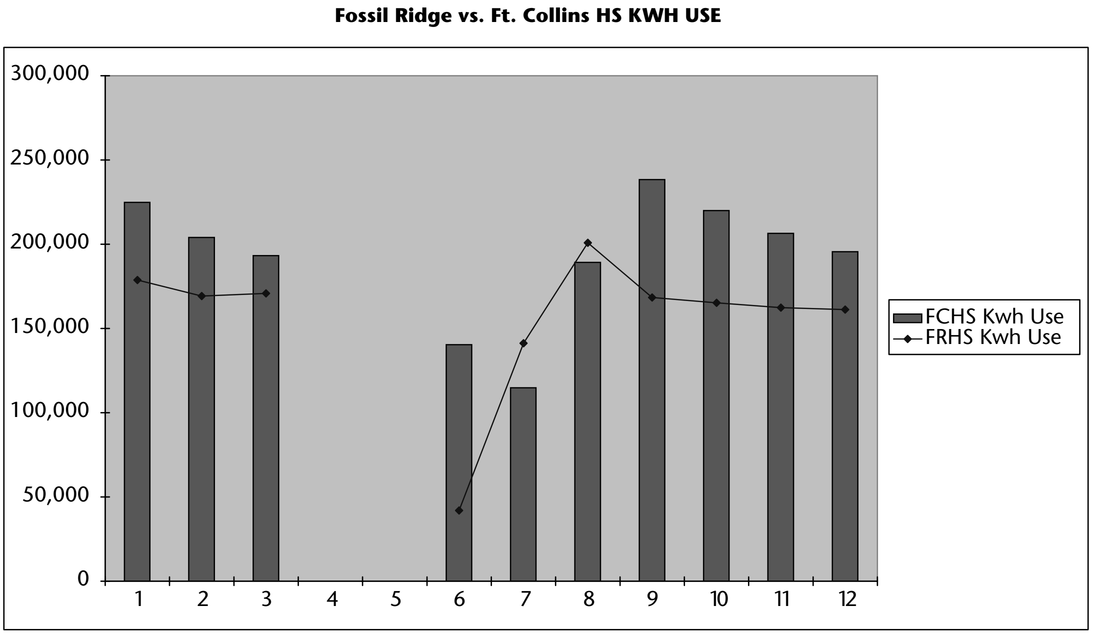


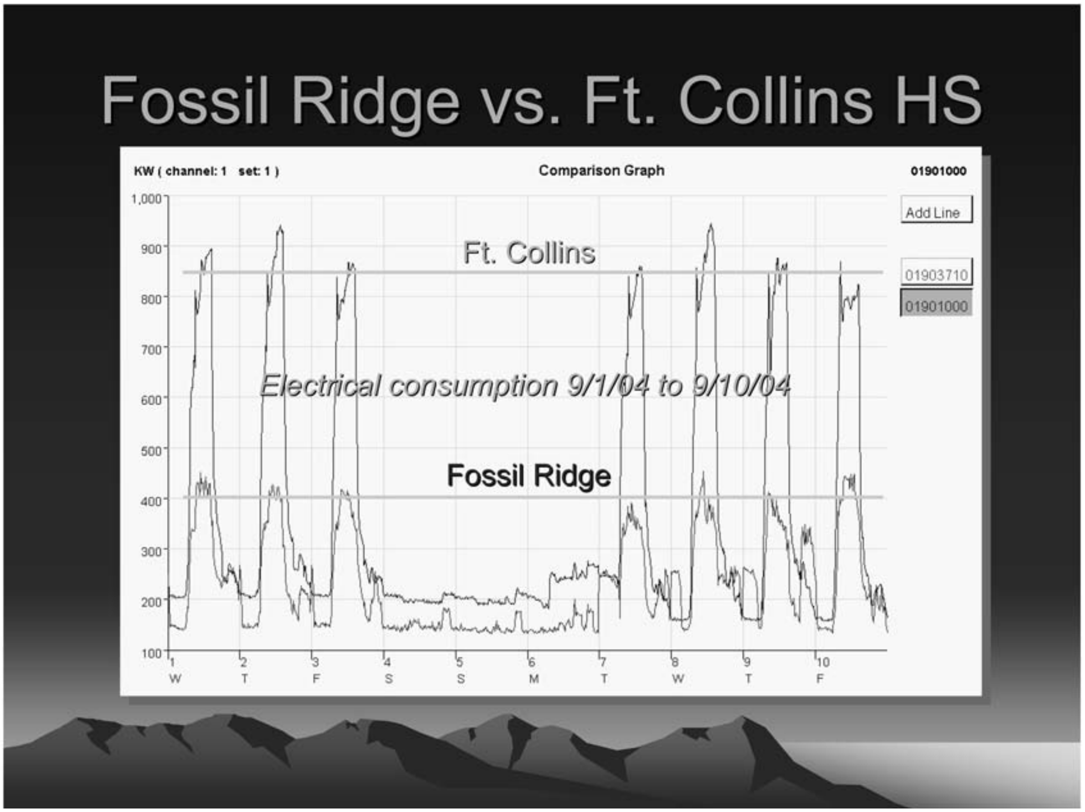
Designing in the "integrated" fashion can exhaust fees, if a design firm is not careful. The best approach is to review the strategy with the owner early in the project, making sure that there is an understanding that there will be additional hours spent on meetings, reviews, etc. PSD feels that the process adds about 1% to 2% to standard fees. Time well spent on the front end always saves the client money on the back end, not only in changes during construction, but in long term energy and maintenance costs. The owner needs to allocate adequate resources as well. Facilities staff, maintenance personnel, and project managers all need to be involved in design decisions. The challenge for most teams is to break away from the "business as usual" mindset and having the leadership and vision to explore possibilities.

The owner and project team should decide whether certification will be part of the scope from the onset of a project. It is much more difficult, costly, and often less effective to try to integrate the LEED process after schematic design. Without the existing *Sustainable Design Guidelines* and the deep commitment of PSD toward sustainable building, the decision to pursue LEED certification late in the design process would not have been possible.

When one considers the many attributes that make Fossil Ridge High School an example of a successful green building such as the daylight, materials, waste reduction, low energy and water use, support of wind power, etc., the most significant ingredient is the inte-

ATTACHMENT A





grated design process. According to Mike Spearnak, "Empowering a full team to creatively collaborate from the start and then agree on how to implement the best ideas has led to buildings that outperform expectations. We now know that the integrated design process is the key to the best buildings." Fossil Ridge High School and the Poudre School District, thanks to their Sustainable Design Guidelines and the Green Team behind the effort, provide a demonstrative example of a visionary program and the subsequent results of clear goals and a collaborative process.

ACKNOWLEDGEMENTS

Owner	Poudre School District
Construction Manager:	Ed Holder, LEED AP
District Architect:	Mike Spearnak, AIA, CEFPI
Project Manager:	John Little
Asst. Project Manager:	Greg McGaffin
Energy Manager:	Stu Reeve
Architect	RB+B Architects, Inc.
Principal-in-Charge, Lead Designer:	George A. Brelig, AIA, CEFPI
Project Architect / Project Manager:	Corky Bradley, AIA, LEED AP
Job Captain:	Matt Arabasz, AIA, LEED AP
Interior Design:	Denise Pozvek, ASID
Landscape Architect	BHA Designs
Principal-in-Charge:	Bruce Hendee, ASLA
Project Architect:	Angie Milewski, ASLA
Irrigation Design	AQUA Engineering, Inc.
Project Designer:	Darren Salvador, PE
Structural Engineering	JVA Consulting Engineers, Inc.
Food Service / Kitchen Design	SDI Consulting
Project Designer:	Stephen Young
Acoustics / Theater Technical Design	Acoda
Acoustical Designer:	Dana Hougland
Theatrics:	Jeff Geiler
Civil Engineering	Nolte Associates, Inc.
Principal-in-Charge:	Linda Hoffman, LEED AP
Project Engineer:	Tom Ochwat, PE, LEED AP
Mechanical Engineering	MKK Consulting Engineers, Inc.
Project Engineer:	Craig Watts, PE, LEED AP
Electrical Engineering	CEI Consulting Engineers, Inc.
Principal-in-Charge:	Gary Church, PE
Project Engineer:	Cary Randol, PE
Energy Modeling	EMC Engineers, Inc.
Principal-in-Charge:	Don Davenport, PE
Project Engineer:	Dennis Jones, PE, LEED AP
Daylighting Design	ENSAR Group
Project Designer:	Victor Olgyay, AIA, LEED AP
Commissioning	Architectural Energy Corporation
Project Engineer:	Erik Jeannette, PE
LEED Processing, Sustainability Support	Institute for the Built Environment, Colorado State University
Project Director:	Brian Dunbar, LEED AP
Research Assistants:	Josie Plaut, LEED AP; Katherine Pettit, LEED AP; John Mlade, LEED AP; Clare L'Esperance; Grant French, LEED AP
Roofing Consultant	RoofTech Consultants, Inc.
Project Engineer:	Ron Scott, PE
General Contractor	Haselden Construction, Inc.
Project Manager:	Bret Brouillette
Energy Partners	City of Fort Collins Platte River Power Authority Rebuild Colorado Poudre Valley REA US Department of Energy Environmental Protection Agency Xcel Energy Western Area Power Administration Berkeley Lab National Renewable Energy Lab

Poudre School District "Green Team"

Jeff Arnold, Facilities Information Specialist
Norm Bastian, Security Manager
Alan Boatright, Custodial Supervisor
Bill Franzen, Executive Director of Operations
Jerry Garretson, Resource Manager
Pete Hall, Director of Facilities
John Holcombe, Safety/Environmental Coordinator
Ed Holder, Construction Manager
Jim Knauer, Maintenance Supervisor
Jim Norgard, Master Electrician
Frank Rayder, Outdoor Services Supervisor
Stu Reeve, Energy Manager
Chris Rock, Director of Food Services
Chris Romero, Operations Office Manager
Russ Richardson, Outdoor Services Area Supervisor
Gary Schroeder, Energy Services Engineer (City of Fort Collins Utilities)
Roger Smith, Technical Foreman
Mike Spearnak, Director of Planning, Design, and Construction
John Waldo, Head Plumber
Tom Weatherly, Head HVAC Technician

POUDRE SCHOOL DISTRICT