Student Union Addition Green Building Profile

BUILDING INFORMATION

Location	Durango, CO
Square Footage	39,924 gsf
Building Population	38 FTE, 603 peak transient users
Construction Dates	May 2009 - August 2010
Owner	Fort Lewis College
Architect	Perry Dean Rogers | Partners Architects
Local Architect Landscape Architect	Janet Wiley Architects, P.C. Wenk Associates, Inc.
Mechanical, Electrical, & Plumbing Engineers	Henderson Engineers, Inc.
Civil Engineer	Goff Engineering & Surveying, Inc.
Structural Engineer	LeMessurier Consultants
Construction Manager	Okland Construction Conmpany
Commissioning Agent	Engineering Economics, Inc.
Sustainability Consultant	Earthly Ideas LLC
Code Consultant	Rolf Jensen & Associates, Inc.
Energy Modeling & LEED Consultant	Architectural Energy Corporation
Architectural Lighting	Tillotson Design Associates
Audio Visual, Acoustics, & Information Tech.	Acentech Inc.
Food Service Consultant	Ricca Newmark Design

PROJECT NOTES

The Student Union Addition is the third Leadership in Energy and Environmental Design (LEED) certified facility at Fort Lewis College. The LEED® Green Building Rating System™ is a voluntary, consensus-based national standard for developing high-performance, sustainable buildings administered by the U.S. Green Building Council. Pursuit of LEED for New Construction certification for Berndt Hall is an outcome of former President Brad Bartel's signing of the American College and University President's Climate Commitment in April 2007.

Durango, located in southwestern Colorado between the San Juan Range of the Rocky Mountains and the high desert, is at 6,513 feet in elevation and has a four-season climate. Fort Lewis College (FLC) is located on College Mesa approximately 300 feet above Durango's downtown. The Student Union Addition is located to the south of the existing Student Union, connected by a one-story link. The addition is built into the existing topography, with one story embedded in the slope, and two stories above grade. The addition houses the main dining hall, a group dining/event space, the Rocket Grille, an industrial kitchen, servery, and support spaces for the food service activities. The building occupies a footprint of 25,700 square feet with a total gross square footage of 39,924.

The Student Union Addition incorporates numerous integrated green building strategies including a vegetated roof, solar thermal and solar photovoltaic systems, solar shading through proper building orientation, overhangs, and massing, demand controlled ventilation, variable speed kitchen hood exhaust fans, energy demand sub-metering, extensive use of daylight, water-conserving fixtures and equipment, and sustainable ma-

terials use. Below are some of the specifics of the project's green building strategies and features:

SUSTAINABLE SITES

- Orientation: The design team worked with the site to connect the addition with the existing building while providing for daylight and solar access. A simple overhang at the south façade of the upper level effectively shades the glazing to allow solar gain in the winter but mitigates solar trespass in the summer. The building mass extends into the landscape at its southwest corner to shade west-facing glazing that opens from the San Juan Dining area onto the outdoor plaza.
- Site Selection: Development did not impact farmland, endangered species habitat, parkland, or wetlands.
- Community Connectivity: Within half mile radius of on-campus housing and at least 10 community services and amenities.
- Alternative Transportation: Addressed by proximity to 3 bus routes with stops within .25 miles, installing 33 bicycle storage spaces, inclusion of shower/changing room for staff, implementation of a campus wide Green Permit program for low-emitting and fuel-efficient vehicles, and not adding any new parking spaces.
- Protect or Restore Habitat: The total site area is 145,133 sf, of which the building footprint occupies 25,700 sf. Of the remaining site area (119,433 sf), 51% is dedicated to native, adaptable plants (55,890 sf at grade, and 4,700 sf on the vegetated roof).
- Open Space: Area preserved in the John F. Reed Natural Area equal to twice the building footprint, which earned an innovation credit for the project.
- Heat Island Effect: Roofing and paving materials reject solar heat to reduce thermal gradient differences between developed and undeveloped areas minimizing impact on microclimate and habitat. A combination of white roof membrane, white pedestal pavers at Hermosa Terrace, and vegetated roof for the roof and white pavers and concrete paving for the site serve to minimize the heat island effect.
- Stormwater: One hundred percent of the site runoff either flows across a vegetated area to reach an area drain or flows in a bioswale before discharging to its receiving waterway. Locating the majority of drain inlets in pervious areas allowed for as much infiltration as possible. See Vegetated or Green Roof below for its contribution to water quality.
- Vegetated or Green Roof: The planted area of the roof serves a variety of purposes: stormwater management, heat island mitigation, habitat value, and an aesthetic amenity space for the campus, especially when dining on Hermosa Terrace. It is an intensive green roof consisting of 6 to 14 inch soil depths utilizing engineered soils to minimize the weight of the planting beds. The deeper soil made it possible to include a wider variety of plant species. The team chose xeric and adapted species of ornamental grasses (like feather reed grass, maiden grass, and little bluestem grass) and perennials (like Shasta daisy, Russian sage, black-eyed Susan, and purple coneflower).

WATER EFFICIENCY

- Landscaping: In keeping with its Tree Relocation/Replacement policy, the College invested significant financial and human resources to move trees and other vegetation from the building site prior to the start of construction. In April 2009, the College held a plant harvest for the Buzzy Berndt Demonstration Natural Area that was open to the public. Contractors used a crane to relocate three large caliper trees outside Animas Hall. This included the Gypsy Tree, a 180-year-old Rocky Mountain Juniper that the College moved previously in 1996 to make needed Americans with Disability Act improvements between the Student Union and the Library. Forty-one other trees and shrubs found new homes around campus. The project's new landscaping includes trees, shrubs, perennials and ornamental grass such as side oats grama, Indian ricegrass, western wheatgrass, blue grama, Arizona fescue, blue flax, rocky mountain penstemon, and dwarf lupine.
- Irrigation: Overall, the project's landscaping uses 99.23% non-potable water. The City of Durango Water Treatment Plant provides raw, untreated water to FLC for majority of its irrigation needs and the Student Union Addition used this water for the at-grade landscaping. Irrigation systems serving this landscaping are managed by the overall campus irrigation water and control system, which is based on real-time evapotranspiration (ET) data collected from a campus weather station. The irrigation system is properly zoned to serve the various landscape hydrozones and microclimates and employs appropriate, efficient delivery methods and equipment to serve the various plant material types. The vegetated roof uses potable water for its irrigation needs due to the functional necessity of utilizing the building's water source.
- Water Usage in the Building: Selection of ultra low-flow and low-flow toilets, ultra-low flow urinals, low-flow faucets with automatic sensor operation, and low-flow showerheads resulted in more than 42.5 percent savings over baseline fixture performance requirements of the Energy Policy Act of 1992. Exceeding 40 percent reduction earned an innovation credit for the project.

ENERGY AND ATMOSPHERE

- Energy: Whole building energy simulation model indicates 33.9 percent reduction in energy cost between the design building model and the base building model prescribed in ASHRAE 90.1-2004.
- Lighting: The interior lights are controlled by a combination of occupancy sensors, daylight sensors, and dimmers with override switches. Light fixtures consume 1.06 watts per square foot to meet the lighting needs of the building while exceeding the project goal of being 15% below the ASHRAE 90.1-2004 requirements. The lighting design combines the latest and most appropriate technology, with economical equipment, in a style to appeal to and meet the needs of the students and staff of the College. It employs linear T5 standard output fluorescent lamps, compact fluorescent lamps, metal halide lamps, and long life halogen lamps. Low maintenance, LED lights illuminate the steps and paths around the building.
- Commissioning: Employed as a quality-control process to ensure the fundamental building systems are designed, installed, and calibrated to operate as intended by the design team for the FLC's long term benefit.
- Building Envelope: Double-glazed low-e windows, building overhangs, proper building orientation, metal framed walls with continuous insulation, and continuous insulation above the concrete roof deck were used to improve the building's envelope and set a path for long-term energy efficiency.
- Heating, Ventilation, and Air Conditioning (HVAC): The building is conditioned with a high efficiency condensing boiler for heating and an added chiller to supplement the existing chiller for cooling. A variable volume ventilation system reacts to the activity in each room of the building to maintain comfort or idle at minimum airflows to save energy. Variable speed kitchen hood exhaust fans with infrared sensors ramp up and down as needed to support food preparation. Evaporative cooling and air and water side economizers serve to improve efficiency. The building automation system, augmented by energy demand sub-metering for measurement and verification, controls these complex HVAC systems and monitors the building energy use and production.
- Renewable Energy: A 32-panel, 275 MBH solar thermal system is used to heat water for both domestic needs and kitchen requirements. An 18.1KW solar photovoltaic system is used to offset electrical consumption. These two systems were funded by a grant received by Fort Lewis College from the Colorado Department of Local Affairs (DOLA) Energy and Mineral Impact Assistance Program for $300,000. These systems offset 7.82 percent of the annual energy usage.
- Ozone Protection: Designers worked to reduce ozone depletion and support early compliance of the Montreal Protocol while minimizing direct contributions to global warming by specifying HVAC equipment refrigerants that minimize or eliminate the emission of compounds that contribute to these global issues.
- Measurement and Verification: Through the use of sub-meters, Fort Lewis College will be able to systematically monitor building energy usage on an ongoing basis and compare this to a simulated energy model and energy usage baseline. This provides the ability to characterize building energy usage, document operating efficiencies, and fine-tune the performance of the building based on building operating problems, condition changes, or systems modifications. To provide accountability to energy goals, FLC will implement a plan to measure and analyze energy consumption and building performance for one year of post-construction occupancy.
- Food Service: The design team reduced overall energy use by the commercial kitchen equipment and associated exhaust and ventilation systems by:
  - > Locating heavy-duty equipment in the middle of the cook line and minimized island-style hoods.
  - > Utilizing ENERGY STAR appliances for 58% of the food service equipment including fryers, heated cabinets, and refrigerators.
  - > Commissioning custom-designed Capture Jet hoods, which reduce the effective net exhaust volumes while improving extraction and containment of heat and emissions.
  - > Employing external supply plenum hoods that allow for a larger capture tank for effective containment, which reduces exhaust air volumes.
  - > Using a variable kitchen exhaust air system with a matching varying make-up air system to reduce exhaust and makeup air volumes during off peak times.

  In addition, the team reused as much existing food service equipment as possible. For information on water savings initiatives related to Food Service, see Water-Using Equipment and Appliances under Innovation and Design Process below.

MATERIALS AND RESOURCES

- Reuse of Existing College Union Building, now called the Student Union: Although the decision to renovate the existing building and add to it instead of constructing a completely new building was driven by budgetary constraints, it conserved resources, reduced waste and environmental impact and extended the life cycle of existing campus building stock.
- Occupant Recycling: Easily accessible containers and separate storage areas serve the recycling needs of the entire building, allowing for the recycling of the following materials: paper, corrugated cardboard, glass, plastics, and metals.
- Recycled Content Materials: To reduce the impacts from the extraction and processing of virgin materials and support closing the loop for recycling, recycled content materials included: reinforcing steel, fly ash in concrete, stone anchors, structural steel, metal decking, metal framing, metal stairs, medium density fiberboard, insulation, hollow metal doors and frames, wood doors, overhead coiling doors and grilles, aluminum window framing, door hardware, gypsum board, glass tile, acoustical ceiling tile (fiber, metal, and wood) and grid, carpet tile, and louvers.
- Regionally Extracted Materials: To reduce transportation impacts and support regional businesses, regionally extracted materials (those manufactured and whose raw materials are extracted within a 500-mile radius of the jobsite) included: concrete, reinforcing steel, concrete pavers, stone benches, topsoil, soil conditioner, sod, landscape plantings, architectural precast concrete, stone veneer, base course aggregate, concrete masonry units, structural steel, miscellaneous metal fabrications, batt insulation, and gypsum board.
- Certified Wood: To encourage environmentally responsible forest management, wood products certified by the Forest Stewardship Council included: some of the rough carpentry lumber and plywood, exterior plywood sheathing, ipe benches, acoustical wood wall panels, plywood sub-tops for solid surface countertops, maple veneer panels, interior trim, maple coiling doors, and wood fiber ceiling tiles.
- Construction Waste Management: A successful waste management program diverted more than 81 percent of the demolition and

construction waste from landfills. Recycled materials included concrete and masonry, cardboard, metal, wood, aluminum cans, copper, and drywall.

- Furniture: The team made many furniture selections because of sustainable production and materials incorporation, including recycled metal and FSC-certified wood products. The manufacturer's cradle-to-cradle certification (a multiple-attribute eco-label that assesses a product's safety to humans and the environment and design for future life cycles) was a consideration for the selection of some of the office and meeting room furniture. Our efforts encouraged Colorado Corrections (the supplier of all State-facility furniture) to provide more green options.

INDOOR ENVIRONMENTAL QUALITY

- Outdoor Air Delivery Monitoring: Permanent monitoring and feedback of ventilation system performance help sustain long-term occupant health and well-being.
- Construction Indoor Air Quality (IAQ) Management Plan: To help sustain the comfort and well-being of construction workers and building occupants, the construction team implemented a combination of housekeeping, HVAC protection, source control, moisture control, and scheduling measures.
- Low-Emitting Materials for IAQ: Low-toxicity building products such as adhesives and sealants, paints and coatings, and carpeting were used to reduce the quantity of indoor air contaminants.
- Pollutant Source Control: Entryway grille systems or roll out mats installed at each exterior entry point will be maintained on a regular basis. Areas with chemical use (storage, custodial closets) are physically separated from other spaces and have appropriate ventilation.
- Air Filtering: Air quality is enhanced by use of permanent air filters with air cleaning efficiencies above normal market installations.
- Controllability of Systems: For individual occupant spaces, all workstations have individual overhead local lighting controls. Each individual occupant space is provided with a thermal control device to allow the workstation occupant to set the comfort level for his/her area. Multi-occupant spaces' lighting is controlled based on occupancy with local manual control and programmed through a centralized control system. Multi-occupant spaces have multiple thermal control devices on a space-by-space basis.
- Thermal Comfort: The HVAC system is designed to make each space as comfortable as possible to each occupant. A temperature sensor in every room allows the automation system to adjust the amount and temperature of air supplied to condition individual spaces. In addition, the building's envelope and HVAC system work together to mitigate uncomfortable drafts.
- Daylighting and Views: Generous and judiciously placed windows coupled with clerestory windows and tubular skylights provide daylight and views to regularly occupied spaces. The clerestory windows that compose the light monitors over the main servery and San Juan Dining supply consistent, even, daylight levels in the heart of the floor plan.

INNOVATION AND DESIGN PROCESS

- Green Building Education: The Student Union project will educate its students, faculty, and staff and the public about sustainable design and the impacts of buildings on the environment. In addition to case studies like this one, a comprehensive signage program was developed.
- Water Using Equipment and Appliances: The team extended water efficiency measures to the process water used in the building. Refrigeration equipment does not use once-through cooling with potable water. Dishwashers, ice machines, pre-rinse spray valves, and a washing machine meet performance requirements for low water usage. Instead of being water-cooled, the ice machines utilize air-cooled condensers that are located outdoors to avoid adding heat to the building. In lieu of garbage disposals and to reduce waste volume, a pulper grinds up food service waste and an extractor removes moisture to produce a semi-dry pulp. Excess water is recovered and reused by the pulper. This combination of strategies for reducing process water usage resulted in an innovation credit for the project.
- LEED Accredited Professionals: The majority of principal participants of the project team have successfully completed one of the LEED Accredited Professional exams.

AWARDS AND HONORS

The Student Union Addition earned LEED Gold (48 points) in August 2011, making it the third building on Fort Lewis College's campus to earn LEED certification.