SKYLINE ENGINEERING LLC

Rapid City Central High School Addition

This project involves 154,000 SF of additions including a ninth-grade pod, science wing, and an athletic complex housing a three-court gymnasium, weight room, and wrestling room. The program also renovates existing administration and ancillary spaces as required to support the new additions.

A plate and frame heat exchanger was installed on the energy plant heating water return line to produce low temperature heating water for the new additions. This innovative approach saved substantial project cost by avoiding the need to upsize underground heating lines from the Common Energy Plant.

Project Data

Owner
Rapid City Area School District

Location
Rapid City, SD

Building Type
Educational

Building Area
154,000 square feet addition

Mechanical Systems / Features
- Campus Central Utility Plant
- Variable Air Volume w/reheat
- Full Airside Economizers
- Energy Recovery
- Supplemental perimeter heat
- Science Lab Exhausts
- Fabric ductwork in Gym

Electrical Systems / Features
- Lighting with Occupancy Controls
- DDC Lighting Control Integration
- LED Corridor/Emergency Fixtures
- Interactive Learning Whiteboards
- Campus Intercom/Phones/Class Call
- Interactive Learning Boards
- Addressable Fire Alarm
- Atomic Clock
- Security/CCTV

Construction Cost
$23,100,000

Completion Date
2012

Mechanical Engineering

Mechanical systems consist of indoor VAV air handling systems with low temperature heating coils. Controls include airflow measuring stations in the outside air duct to measure and verify adequate ventilation rates.

The Science addition air handling equipment will recover energy from the general laboratory exhaust through a total enthalpy wheel. Spaces with laboratory exhaust hoods incorporate precision airflow control valves (Phoenix system) to maintain proper space pressurization regardless of hood sash position. Laboratory hoods are manifolded at roof level and exhausted through a high plume exhaust fan.

The central indirect domestic hot water system was replaced with high efficiency gas water heaters to avoid a need to fire the Common Energy Plant boilers during the summer and provide domestic hot water for summer school activities.

Electrical Engineering

Lighting is predominately provided by high-efficiency fluorescent fixtures in the classrooms controlled by wall switches and override off by occupancy sensors. Classroom and corridor occupancy sensors for lighting control also provide DDC input for status and HVAC system control setbacks. The gymnasium multi-level lighting utilizes 6-lamp high-efficiency fluorescent high-bay fixtures. Emergency and night lighting is provided by LED technologies with 24/7 operation.

Power work includes relocation of the existing 3000A service entrance and an additional 2000 amp, 277/480v, 3-phase service entrance. Backup power for emergency lighting, etc. is served by the existing generator system.

Special systems include computer-based overhead projectors with interactive learning boards, atomic clocks, addressable fire alarm system expansion, and communications wired for a category 5e network. The telephone system with an integrated intercom system provides the classrooms; intercom, amplified sound, and class bell functions. The security systems consist of closed-circuit television (CCTV) and card access.