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Thomas Jefferson Visitor Center and Smith Education Center

Mechanical/Electrical Engineering Highlights

The design of the Thomas Jefferson Visitor Center and Smith Education Center at Monticello features a closed-loop geothermal system and several water- and energy-conserving measures.

The new **Thomas Jefferson Visitor Center and Smith Education Center** at Monticello, Jefferson's mountaintop home near Charlottesville, Virginia, provides an educational and inspiring "gateway" experience for visitors as they arrive to tour one of the country's most famous residences. Composed of five pavilions set on a sloping, hillside site around a central courtyard, the three-level structures house four major exhibitions, a small theater, a gift shop, cafe, classrooms, and the new Griffin Discovery Room—an interactive, educational environment for children.

Embracing Technology

The architectural and engineering team, led by **Ayers/Saint/Gross** with the mechanical/electrical engineering firm of **Mueller Associates**, incorporated a host of environmentally friendly concepts into the 42,000-SF center, which has been awarded LEED®-Gold certification. Although traditional geothermal heat pump systems are not frequently used in museum settings, the team employed a highly efficient geothermal chiller/heater system at Monticello. "The foundation members felt that geothermal technology was something that Jefferson would have embraced," says Todd Garing, PE, project manager for Mueller. "It's an innovative yet organic approach that optimizes use of the land." Garing points out that a geothermal system provides the energy efficiency of a chilled water system but eliminates the need for a cooling tower or condensers that require screening.

In order to install the system, contractors had to drill 72 bore holes down through 500 feet of granite. "This is a unique well field site, but it offers an advantage in terms of heat extraction," says Garing. "We were able to backfill with the local river stone rather than grout. The pipes are essentially set in water that is moving through the aquifers, and that provides a much more efficient heat transfer."

Conserving Resources

The Mueller team worked closely with Ayers/Saint/Gross on a number of other sustainable design aspects, including optimization of the building envelope, wall insulation, use of high-performance glass and external shading, and the incorporation of three green roofs. Additional measures include use of water-conserving fixtures and an on-site wastewater treatment plant that feeds a drip irrigation field. The geothermal chiller/heater system also saves approximately 850,000 gallons of water a year in comparison to the use of a water-cooled chiller.

Many of the electrical design elements are designed to conserve power while providing optimum comfort to visitors and staff. Features include central lighting controls with occupancy sensors and the introduction of minimal site lighting in order to reduce light pollution and energy use.

Mechanical Engineering Highlights

- 9 geothermal heat recovery chiller/heaters
- 72 bore holes; 500-feet deep
- VAV reheat system
- Demand controlled ventilation
- Exhaust air energy recovery
- Green roof
- Waterless urinals
- Dual flush toilets
- Energy savings 32% lower than the ASHRAE Std. 90.1 energy code
- Water savings 43% lower than with standard plumbing fixtures

Electrical Engineering Highlights

- Interior lighting features energy-efficient sources, including linear and compact, low-mercury fluorescent lamps
- Lighting control systems throughout, can be centrally programmed or individually controlled
- Controls for dimming lights, AV systems, motorized shades, and exterior lighting are integrated into a common control interface
- Exterior and landscape lighting features "Dark Sky" approach, minimizing light pollution
- 350k W diesel engine generator serves life safety and other standby loads