

Energy Efficiency Goal Makes New Museum Wing a Teaching Tool

The new Morgridge Family Exploration Center lets the Denver Museum of Nature & Science cross a lot of things off its wish list.

For one thing, the museum now has – for the first time in its century-plus history – a centralized storage area that is climate controlled to preserve almost 1.5 million specimens and artifacts.

Then, the new 126,000-square-foot, \$56.5 million wing built by GH Phipps Construction Companies includes a space called the Discovery Zone, dedicated education space for young people scheduled to open June 7. There also is expanded temporary exhibition space in the new Anschutz Gallery, which, through a reconfiguration of walls during construction, can be combined with the existing Phipps Gallery in the old building for use as one space, or two.

But the most important attribute of this building is the fact that it is on track to become one of the first LEED Platinum certified buildings owned by the City and County of Denver, and, with the additional goal of cutting energy use by 50 percent, to become one of the most energy-efficient buildings in Denver.

If the phrase “location,

location, location” often is used to explain housing prices, it also applies to how the museum is able to utilize geothermal exchange technology to target such ambitious savings. The secret: tapping into Denver Water’s recycled water pipeline near the neighboring City Park to heat and cool the new wing via a ground source heat pump system. However, the museum did not implement the traditional approach, which entails finding the space to bore wells that utilize earth’s fairly constant ground temperature to heat and cool water flowing back into the museum’s mechanical system.

“When we began to plan this building, we had two goals,” said Dave Noel, vice president of facilities and capital projects and chief sustainability officer for the museum. “We wanted LEED Platinum, and we wanted 50 percent more energy efficiency than another code-compliant building.”

For those familiar with museum requirements and environments, that was a tall order: Museums must incorporate energy-dependent climate-controlled storage and exhibition technology. They are open long hours and weekends, serving thousands of people daily. Museums use specialized exhibition lighting, and often have the high ceilings necessary



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for flexibility in installing a show.

But Noel believed the goals were attainable. He applied for a grant from the U.S. Department of Energy, which was interested in finding demonstration and research projects, which required a ground source heat pump system in excess of 100 tons.

“Our project requires 225 tons of cooling equivalent capacity,” said Noel. “But what made our system different is that no one had ever used recycled water to sink the heat from the system.

We have set out to prove that if you have a recycled water supply nearby, there’s no need to drill bore holes. They gave us the grant to build the system and collect data, and Denver Water agreed to collaborate with us on the project.”

The DOE grant was for \$2.6 million, requiring a match. The grant was funded by ARRA money from the American Recovery and Reinvestment Act of 2009, which President Obama had signed into law during a visit to the museum.

So in one of the new wing’s lower levels sit seven heat pump units, each one with two compressors. Noel said the ground/earth temperature is about 60 degrees, with recycled water flowing through buried pipes to the museum to heat and cool it. The water exits cooler in winter, warmer in summer. Three heat exchangers have steam service from the existing building’s central plant, which can be used to supplement heating needs or respond if the museum loses recycled water flow. The heat pump system was turned on several months ago, and is being commissioned. The grant requires monitoring – “probably indefinitely,” Noel said. “We have a measurement and verification plan.”

Additional sustainable technologies in the new

wing include an emphasis on daylighting where feasible, automated shade louvers on windows on the south side, electrochromatic glass that automatically tints to reduce solar loading on the west-facing glass, occupancy-sensing lights, and high-efficiency LED lighting. Additionally, the museum has installed solar collectors on the roof of the new building to heat the domestic water used by the new wing. Over the past few years, the museum has installed photovoltaic solar panels on the roof of the existing building. These help offset up to 200 kWhr of electricity used by the new wing, in addition to the energy savings provided by the solar hot water system.

The process of LEED certification for the new wing is ongoing, he says. The scorecard for design of the wing holds points that exceed the platinum level, and once all documentation is assembled, the museum will seek LEED Platinum for the new wing. At some point in the future, the museum also plans to apply for LEED Platinum EB: O&M (or equivalent) for the old building.

A place that houses so many teaching tools – gems and birds and mastodon bones and more – is now a teaching tool in itself, a large-scale energy demonstration project for the future.

INSPIRE LEAD DELIVER



New wing at the Denver Museum of Nature & Science takes flight

Congratulations are in order! The new Morgridge Family Exploration Center and Rocky Mountain Science Collections Center open a world of possibilities:

- Underground space for collection storage
- Three above-ground levels of expanded exhibition and educational space
- On track to achieve LEED Platinum certification
- Aims to reduce energy use by 50%
- Will serve the museum’s 1.3 million visitors each year
- New storage will preserve almost 1.5 million artifacts and specimens

The project was designed by klipp | a division of gkkworks, and funded by Better Denver bonds and private donations.

Photos courtesy of the Denver Museum of Nature & Science



The Morgridge Family Exploration Center



The Science atrium soars three stories



A portion of the new collections storage facility

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