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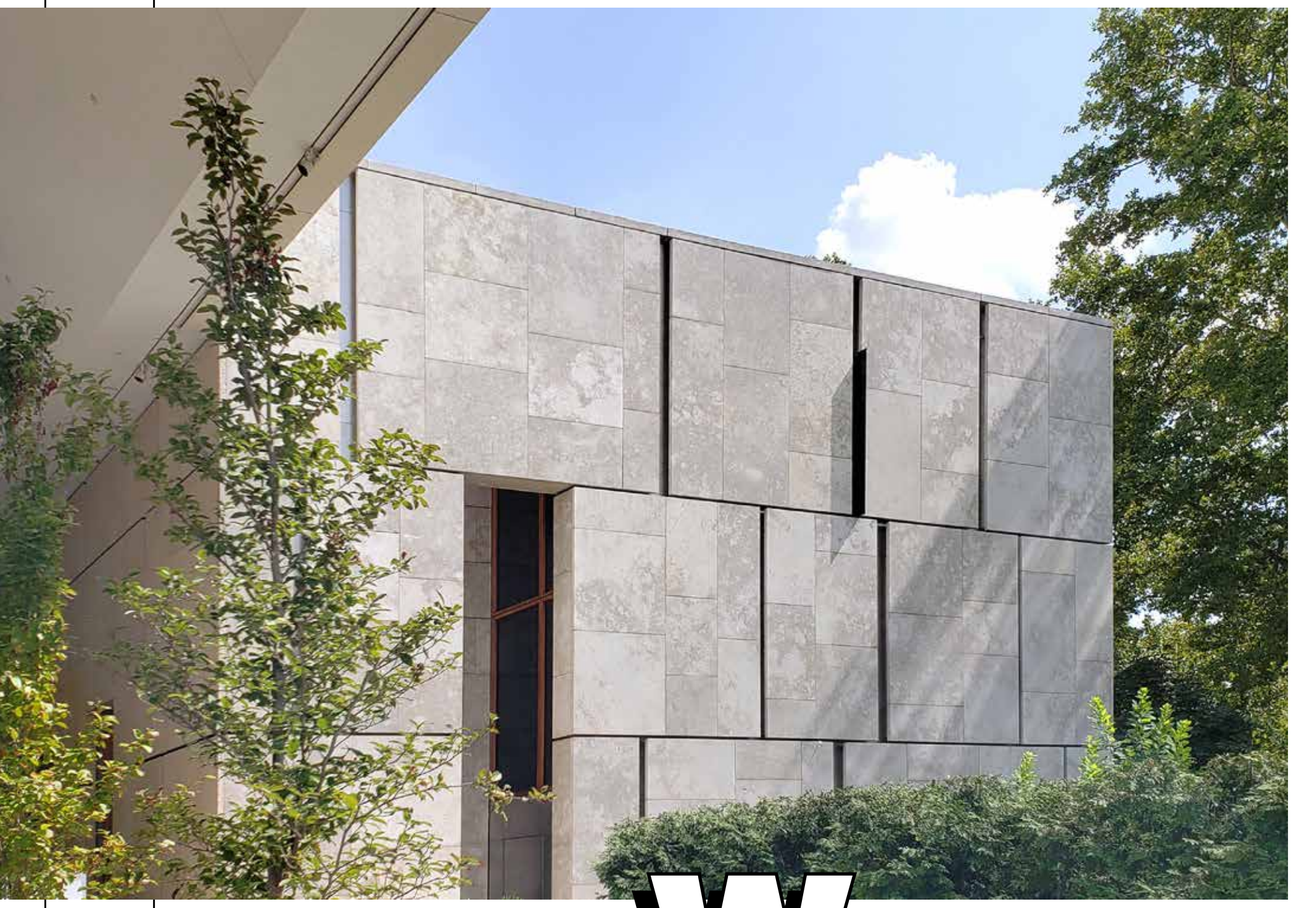

Project Details

Project
Barnes Foundation Museum

Location
Philadelphia, PA

Size
80,000 square feet

Completed
June 2012

Architects
Tod Williams Billie Tsien Architects

Awards
LEED Platinum

WORLD-CLASS SYSTEMS

Altieri helped the Barnes Foundation Museum achieve LEED Platinum.

Altieri specializes in engineering and HVAC solutions that keep cultural buildings running.

By Maia Welbel

When the **Barnes Foundation Museum** moved to Philadelphia from Merion, Pennsylvania, the foundation's staff knew they needed to create a safe environment for the collection without sacrificing elegance. So their architect commissioned the help of **Altieri**, a consulting engineering firm that specializes in leading-edge engineering systems for cultural and educational buildings. The building was designed not only to visually complement the diverse artwork inside, but also to protect it for many years to come.

The building was LEED Platinum certified thanks to its super efficient mechanical, electrical, and plumbing (MEP) solutions. "When we design a museum, we understand that the owners are going to be living with it for the next century," says **Kristen Butts**, associate principal at Altieri. "Sustainable design is central to what we do."

As a conservation-focused organization, it was important to the Barnes Foundation team that the museum was designed to minimize environmental impact. As a nonprofit, they also wanted to keep the utility bills low. The energy model constructed during design showed a 44% energy improvement over the baseline model set by LEED. Due to the museum's popularity, the occupancy far exceeded standard occupancy profiles for museums. Once the building had been in operation a few years, the energy model was revisited to more closely record its occupancy. Though the energy usage was higher than originally documented, the energy efficiency measures became more pronounced. With Altieri's design, the calibrated building model showed a 62% reduction in energy compared to the calibrated baseline, cutting back on HVAC, electrical, and water-related energy costs and resource use.

The space requires a consistent temperature of 70 degrees Fahrenheit and 50% relative humidity. This means constantly overcooling to dehumidify then reheat the building. "We discovered during the design of the project how important it was to have heat recovery chillers for this purpose," says Butts, who completed the energy model and LEED filing for the project. Heat recovery chillers simultaneously provide cooling and hot water for use in reheat coils.

Ventilation is controlled through a dedicated air processing unit fitted with enthalpy wheel heat recovery. The unit regulates the amount of outdoor air that passes into the building based on carbon dioxide levels in the space. These solutions reduce wasted energy by recovering heat and moisture from the exhaust airstream in winter, and transferring heat and moisture from the ventilation air to the exhaust air in summer, so when new air comes in it doesn't require as large of a temperature and humidity adjustment.

The art collection is housed in a 12,000-square-foot gallery alongside rotating exhibits, classrooms, indoor gardens, and serene courtyards. In non-collection areas where requirements aren't as stringent, active chilled beam systems control climate. But one of Altieri's guiding principles in designing mechanical systems for cultural institutions is to avoid using active equipment or hydronic piping systems above art exhibits or collections areas to avoid disrupting installations with maintenance.

"This approach was especially important at the new Barnes Foundation, where the arrangement of art galleries needed to replicate galleries in the original Merion building," says **Adam Trojanowski**, a principal at Altieri and the project manager for the Barnes Foundation Museum project. All zone terminal boxes had to be located remotely in a mechanical room. To minimize the space requirement, they created a large common supply plenum with two rows of vertical branch zones accessible from a common catwalk.

"A building like the Barnes Museum is itself a work of art," Butts says. The engineers, architects, construction managers, and Barnes Foundation team all worked together to come up with a design that is both inviting and highly efficient. "From the onset, it was very much a collaborative process between all the stakeholders," Trojanowski says. "I believe this ultimately contributed to the successful execution of our design."

Visitors come to the Barnes Foundation Museum to appreciate the art, not the heating and cooling systems, so Trojanoski and his team found ways to integrate them seamlessly into the fabric of the building. "We worked with world-renowned architects to help create their vision, and their vision does not include unnecessary MEP intrusions into the galleries and other public spaces," Butts says.

Altieri designs mechanical systems for cultural institutions without disruptive maintenance.

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