

**Category 13:** Best Building Project – General Contractor (Over \$70 Million)

**Contractor:** Saunders Construction

**Project Name:** Denver Art Museum Sie Welcome Center and Martin Building

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### **Project Description**

Art is often thought of as paint on canvas or clay modeled into a sculpture. At the Denver Art Museum (DAM), the project team used concrete, steel, terrazzo, wood and glass to build an artistic masterpiece of architecture. With significant annual visitor growth, DAM sought to enliven every square foot of space in the Martin Building; provide visitor-centric amenities in the Sie Welcome Center; and as expressed by DAM’s Director Christoph Heinrich, to “reinvest in this architectural gem and make it shine for the next 50 years.”

Designed by Machado Silvetti and Fentress Architects, and built by Saunders Construction, the project included a complete interior demolition and renovation to the 229,000-square-foot Martin Building and construction of a new 50,000-square-foot Sie Welcome Center. **The iconic Martin Building is the only completed structure in North America designed by renowned Italian architect Gio Ponti, originally built in 1971.** The Martin Building renovation realizes elements of Ponti’s original concept, expands gallery spaces, provides a new conservation laboratory, increases the DAM’s capacity to serve youth through educational programming, and improves campus connectivity and building systems.

In November 2017, voters approved \$35.5 million through the City and County of Denver’s (CCD) general obligation bond to help fund infrastructure and safety upgrades for the Martin Building and the DAM raised the remaining funds toward the capital campaign. With the DAM receiving financial support from CCD, Saunders met a minority and women-owned business participation goal of 20 percent, as well as piloted CCD’s first Workforce Development program resulting in 402 new hires (179 of those as apprentices) to work on the project.

### **Solutions of Special Projects**

The DAM project is a story of innovative solutions. The team collectively embraced DAM’s grand vision and articulated it throughout the project’s design and construction.

**From creating the only structure in North America of its size with an elliptically-curved structural glass façade**, building out a high-performance envelope, constructing new elevators through the existing structure, installing high-tech mechanical/electrical/fire/lighting systems, to assembling one-of-kind finishes throughout the project team tackled a myriad of challenges.

On the Sie Welcome Center, intensive work on the one-of-a-kind glass exterior started long before it came onsite. Machado Silvetti/Fentress proposed several design concepts including the 52-panel scalloped glass façade, which became the museum's preferred concept. After due-diligence on the design's feasibility, the façade scope was procured through a design-assist approach.

The high-performance structural glass, made up of three layers of 3/8-inch glass and fabricated in China, required in-person trips to verify the quality. Mock-ups were then sent to a testing laboratory to verify durability to wind and water. Every detail was thoughtfully developed, including structural strength and stiffness tolerances to the final coordination of the erection process. This effort required months of on-site meetings with designers, engineers, the manufacturer and glazing contractor. A crane using a custom-fabricated suction cup was used to lift each glass panel during installation.

The Martin Building was one of the most complex renovations ever undertaken in the Denver area. The first renovation in the building's history required structural repairs, improvements to life safety and accessibility, and historical restoration of the distinctive grey exterior glass tiles. One key element was the new elevators. The new elevators required crews to remove 1,000 square feet of concrete decking per floor, reinforce the structure with shoring braces, install the masonry core with a self-raising scaffold, and tie into the new structural steel decks.

Additionally, the building had minimal insulation hindering DAM's ability to maintain temperatures and humidity required for art preservation. The new perimeter wall features 2.5-inch foam insulation, a vapor/thermal barrier, light-gauge metal framing, full-sheet plywood, and level-5 finish drywall. The perimeter wall lowers energy use, aids in meeting humidity and temperature requirements, and provides ample backing for art.

Another challenge was working around three large art pieces that could not be moved to storage. An American Indian art collection sculpture, *Mud Woman*, required a custom climate-controlled enclosure and several careful moves using airbags. Two monumental Haida poles from this collection were too large to remove from the museum and were protected and moved inside a special encasing to ensure the artworks were not damaged during construction.

### **Excellence in Project Execution and Management/Team Approach**

“The care that was required to do the renovation was intense,” stated Andrea Fulton, DAM’s Chief Marketing Officer. Quality and craftsmanship for a LEED Silver art museum requires a high level of detail, however, a grander level is required when renovating the only Gio Ponti-designed building in the U.S. Saunders did not take this responsibility lightly and deployed a meticulous quality program. The quality program included employing full-time quality and MEP managers onsite, and staffing the project with Saunders’ best craftspeople.

The project required replacing its entire backbone with cutting-edge MEP, high-performance lighting, fire systems, and a new generator. Each gallery is equipped with digital controls to achieve custom humidity and temperature levels enabling the museum to display a wider variety of artifacts.

To mitigate leak risk, metal drip pans run under all piping in the gallery spaces. Each drip pan features water sensors, allowing the DAM to tell if any pipes over galleries are leaking before any water makes its way to the ceiling. The DAM is now able to locate the leak to within a 50-foot linear length of pan.

The fire detection system uses a very early smoke detection apparatus (VESDA) in the gallery spaces. This is an air sampling system utilizing aspirating pipes that direct air into a VESDA detection laser chamber, and provides some of the most advanced aspirating smoke detection available.

### **Construction Innovations/State-of-the-Art Advancement**

Innovation and collaboration were absolutely imperative for project success. During BIM coordination efforts, Saunders compared existing conditions to the drawings since as-built information was inaccurate. Steel and concrete were identified as scopes with significant schedule and cost impacts. After demolition, Saunders deployed laser scanning to accurately model the as-built conditions. The final point cloud was overlaid on the designer's models to identify areas of conflict. These conflicts ranged from minor steel member lengths to column locations.

Then, the team produced a detailed model to inform the steel fabricator of the variances. This ultimately saved \$60-90,000 of additional costs by avoiding these conflicts during construction — not accounting for schedule/labor savings.

For the glass façade, a two-panel mock-up was installed and tested at an off-site laboratory. This mock-up was created to test installation, structural performance, and visual quality. The team tested the use of a custom suction-cup device, verified dimensions and finishes, and recommended quality improvements. The mock-up was put through a strenuous multi-step process testing its resistance to weather penetration under a variety of simulated conditions such as light rain and wind-driven rain. The mock-up was also subjected to vertical and lateral structural loads testing its ability to perform under a range of forces. This testing enabled the team to revise and finalize design prior to panel fabrication.

The team also deployed augmented reality (AR), via the HoloLens. Routine site walks with the hard hat-mounted HoloLens verified the installation of the correct materials, in the correct locations, ultimately reducing costly rework.

### **Environmental/Safety**

The DAM is located at the heart of Denver's Civic Center with over 25,000 vehicles passing by and thousands of pedestrians walking next to the site daily. Saunders and trade partners ensured that while working in the constrained site no construction workers, DAM staff or pedestrians were injured by any operations. This was achieved by using screened fencing around the entire

site, deploying certified flaggers at major intersections, scheduling deliveries during off-peak hours, and maintaining a clean and organized site.

Safety was of the utmost importance onsite. Due to the project's complexity, multiple trades had overlapping schedules and worked in congested areas. With a peak of 250 workers onsite, daily safety communication was vital. To ensure the safety of everyone onsite, a project-specific training program exceeding OSHA requirements was developed, which included conducting daily pre-task meetings, requiring scope-specific safety training (in English and Spanish), and completing weekly safety walks to identify potential hazards. Additionally, Saunders' dedicated safety managers completed 78 internal audits to ensure safety practices and protocols were followed, with the authority to enforce any corrections. This safety program resulted in zero lost time incidents onsite.

#### **Excellence in Client Service and/or Contribution to Community**

Due to DAM's location and presence in the community, the team understood the importance of developing and implementing a comprehensive communications plan. This plan was executed in collaboration with DAM's Communications Department, Saunders, Machado Silvetti and Fentress. Tactics included a regularly updated project-specific website, email blasts, social media strategies, and key milestone news media events. The effort resulted in wide media coverage, while garnering community support.

Dr. Christoph Heinrich, Director of DAM, stated "The entire mindset of the Saunders team is different, they are personally invested in their projects. Their teams helped us navigate the often-challenging process of taking the project's vision and making it a reality within an existing structure."

With official opening in fall 2021, the DAM will be an artistic beacon in Denver providing incredible experiences to the community — while preserving and displaying important human (and construction) works for the next 50 years.









