



# PRECASTING — A CONCRETE SOLUTION FOR HOUSING ARTISTIC TALENT

## BARBARA A. MARSHALL RESIDENCE HALL AT KANSAS CITY ART INSTITUTE

**Housing future artists, the Barbara A. Marshall Residence Hall at Kansas City Art Institute is an award-winning example of how a controlled approach to constructing the enclosure can achieve an aesthetically pleasing, efficiently constructed, and high-performing building.** Three C's — concrete, collaboration, and color — contribute to a residence hall that appreciates aesthetic design, thermal performance, and job site efficiency. Both the residence hall's occupants and the timetable for construction helped inform the decision to build with precast concrete panels.

Early collaboration between architect Helix Architecture + Design, contractor JE Dunn Construction, and Enterprise Precast Concrete led to a design that provides visual impact and the "wow factor," an important consideration when designing a building for artistic occupants. Project management and labor considerations also factored heavily into the design strategy, as the aggressive timeline and efforts to efficiently schedule team members' time on the job site presented challenges. And of course, the building had to be thermally efficient given the Midwest's frigid winters and sweltering summers.

### **The efficiencies, performance, and control of a precast approach**

Design and material choice worked hand-in-hand to meet efficiency and performance goals. The residence hall's frame is comprised of cast-in-place concrete. Project team members selected an Altus Group CarbonCast C-GRID carbon fiber grid, contributing to the resilience and thermal efficiency of the enclosure. Sandwiched between two wythes of concrete is a 4-inch layer of Owens Corning FOAMULAR® 250 extruded polystyrene (XPS) insulation. From a thermal perspective, including XPS insulation within the panels provides a continuous insulation without thermal bridges.

"The facility team was interested in a complete wall panel solution that an insulated precast sandwich offered," said Dirk McClure, Business Development Director at Enterprise Precast Concrete. In total, 222 precast wall panels were installed. Large-panel sizes minimized the number of pieces transported on-site. The panels were fabricated in the controlled conditions of an indoor production facility, then transported by flatbed truck to the job site and placed by crane into the concrete cast-in-place frame. This process allowed for the cohesive building envelope to be achieved in a panelized, modular approach, integrating the thermal barrier into a strong and simple solution. McClure notes that, compared to a traditional wall assembly requiring multiple components (steel substrate behind curtain wall, batts, drywall, etc.), this design is much more efficient.

Careful thought was given to the logistics, sizing, and movement of components on the job site. All panel sizes were shipped vertically and were light enough to be picked up by a tower crane — the heaviest piece weighed in at about 17,500 pounds. The project team developed a diagram to illustrate how the crane would manage to swing all the panels from one location.

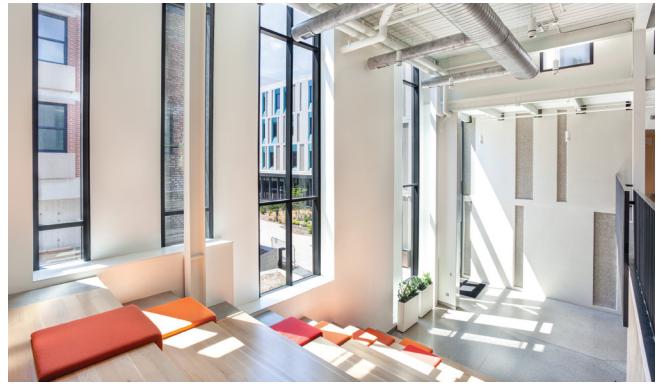
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### **Artistic considerations for arts-minded occupants**

While concrete is well known for its strength and resilience, it also serves as a design element in the Barbara A. Marshall Residence Hall. Using concrete for the precast panels was a natural complement to the campus ethos. The Museum of Art to the West, an older student living center to the east, and a notable sculpture north of the residence hall use concrete as the primary material. The utilitarian design intent, promoting “honesty of materials,” was significantly fostered through the use of precast panels, which allowed the interior concrete face to be left exposed. Any other assembly would have required an additional “aesthetic” surface to be added to the interior to recreate this look and feel. The decision to use a precast assembly delivered an added benefit of leveraging fabrication to introduce a level of texture and complexity in a controlled environment not subject to environmental stressors.

The insulated panels can absorb the severe taper of exterior windows, which provide a defining design statement to the residence hall’s façade. Pops of color applied with a fluid-applied stain, in combination with a multi-finished precast exterior created with a combination of acid etching and a retarder finish, deliver a striking visual effect. As the exposed sandblasted precast reduces the amount of painted space indoors, the design also contributes to sustainability efforts and reduces the use of VOCs.

The honesty of materials theme continues in the residence hall’s interior. The interior wythe of concrete is largely structural gray and left exposed with a sandblast finish. This sandblast effect is employed in the corridor, study alcoves, gym area, and on the interior walls of students’ suites/rooms and echoed by exposed concrete in various open spaces, select interior walls, and a vibrant fireplace space. As a home away from home, the interior cultivates a sense of comfort — evoking a warm and cozy ethos in winter and a cool and relaxing vibe in the summer. Integral color precast panels are interspersed throughout the interior, providing a sense of continuity yet orientation through color between interior and exterior. This effect is seen most vividly in the panel on the back wall of the grandstand tiered seating area.



### **Designing for the “new normal”**

Sustainable design is increasingly integrated into construction at the outset of a construction project. “Project team members, including LEED and WELL accredited professionals, sought to make the building as healthy and sustainable as possible within the constraints of the site and project budget,” said McClure. Sefaira energy modeling informed processes to optimize energy performance. The selection of pre-cast concrete and XPS insulation delivers high thermal insulation value, recycled content, and no waste. A stormwater basin helps manage stormwater run-off while native plants reduce the need for water and provide further stormwater management support.

Reflecting on the importance of logistics that support efficiency, Brad Hulse of JE Construction credits much of the success to communication that started early in the process. “Early preconstruction efforts with all parties — architect, contractor, and precaster — allowed the project to stay on track and achieve success metrics. We thought it went great, and the outcome reflects why we partnered early on,” Hulse says.

David Fincham, Sales Leader, Market Development Specialist at Owens Corning, says that collaboration and communication between the company’s XPS team and Enterprise Precast contributed to a successful project. “Design integrity and construction efficiency must work hand-in-hand, and that’s where a trusted partnership between the project managers at Enterprise Precast and Owens Corning really shined,” says Fincham. He noted that learnings from previous collaborations — such as the timing of insulation deliveries to the production facility — allowed the project to stay on a very aggressive casting schedule. “While this residence hall is a great example of insulation delivering thermal performance, it also demonstrates how precast concrete supports an efficient, high-performing approach to façade construction and a higher degree of control and predictability regardless of weather,” Fincham says.

The residence hall’s construction speaks to job site practices that are likely to continue in the future. One ongoing trend is a continued effort to have fewer workers on job sites and to get workers in different trades on and off the job site as quickly as possible. “With a crew of about a half-dozen people — a superintendent, foreman, some ironworkers, and a crane — you can install an entire building façade,” McClure says. The project also highlights the importance of efficiency and precision scheduling. Fabricated components, such as pre-cast construction, allow production to proceed even during cold or inclement weather. As long as the footings and foundation are in place, precast panels can be installed all year round.

Though the Barbara A. Marshall Residence Hall is remarkable when looked at through the lens of efficiency and sustainability, it is also impressive when viewed through the eyes of critics – or judges, to be more precise. The project has received numerous accolades, including AIA 2020 Kansas City 2020 Project of the Year.

While art is often associated with the “abstract,” the Barbara A. Marshall Residence Hall at the Kansas City Art Institute presents a concrete solution for merging design aesthetics, thermal performance, and project management. Remarking on the residence hall honoring her mother’s contributions to the arts, Margaret Silva stated, “My mother always had a deep appreciation for artists. She respected the artist and their process as highly as the work itself. Her respect for the mission of the college brought her to want to help create an environment to nurture students and develop their creative talents. Through the generosity of so many, KCAI now has world-class facilities to do that.”