Enterprise turns abandoned building into art museum

The FLOOD project in Omaha, Neb., is a distinctive example of how precast concrete can be used to transform an empty early-20th-century building into a community space to educate the community about design, art, architecture, and manufacturing. Unlike permanent museums, which can require large budgets to build and maintain, the FLOOD project used existing urban infrastructure to create a temporary exhibition space.

What is unusual about the project is that six ultra-thin precast concrete panels serve as the canvas for the urban industrial art. The panels were provided by Omaha-based Enterprise Precast Concrete.

Three of the panels are 9 × 7 ft (2.7 × 2.1 m), each weighing 1134 lb (515 kg), and three are 12 × 9 ft (3.7 × 2.7 m), each weighing 1500 lb (681 kg). All of the panels, which are only 1.5 in. (38 mm) thick, were custom designed to meet the needs of the project and are between one-third and one-half the weight of thicker traditional architectural precast concrete panels.

Because of their unique design and manufacturing, they provide levels of strength, durability, and crack resistance comparable to other precast concrete panels. The panels, made with a 5000 psi (34 MPa) concrete, feature prestressed, corrosion-resistant stainless steel wire cables that are spaced 4 in. (101 mm) apart throughout the panel interiors. "These thin prestressed cable allow us to manufacture a thinner precast panel," says Shawn Wentworth, director of business development for Enterprise Precast. "They are placed at four-inch intervals, which allows the pieces to be cut to size due to the redundancy of the cables."

Reinforced, ultra-thin precast concrete panels from Enterprise Precast Concrete were turned into art for the FLOOD exhibit in Omaha, Neb. Courtesy of Dan Schwalm.

Wentworth says that one challenge they faced was transitioning the panels into the building, where they were to be installed on two floors. "The panels that had to be hoisted to the second-floor level were fit through the upper-story fire escape windows," he says. "This would not have been possible with traditional precast due to weight limitations." The precast concrete erector used a forklift with a boom extension to lift the panels up to and through the windows.

Once the panels were in the building, they were laid flat on the floor for the artist to begin his work. The artist placed a ½ in. (12.7 mm) thick steel plate frame around the border of each panel and applied black waterproofing by hand as the art to the canvas. After applying the waterproofing, the team dragged a 10 ft (3 m) wide steel plate across each panel, creating an individual and unique texture for each panel.

Once the waterproofing cured, the erection team raised the panels into position. The precast concrete panels were supported from ⅜ in. (9.5 mm) diameter cable loops that extended from the top of the panel and attached to the steel beams above. The installation took only one day, and the exhibit opened to the public the following day.

The result is a concrete panel installation that appears to float in midair within this historic structure.

The key to success, Wentworth says, was coordination among the precast concrete manufacturer, the building owner, the installer, and the artist. "The team met several times to coordinate the details so everything could run smoothly and in a timely manner," he says.

—William Atkinson

Reinforced precast concrete wave wall protects university athletics center near lake

Northwestern University in Evanston, Ill., is located on the western shore of Lake Michigan, and the shoreline is the perfect location for the university's new Ryan Fieldhouse and

Water Athletics Center, offering students and visitors panoramic views of the lake.

However, being exposed to the relentless waves from the lake, as well as freezing conditions during the winter, posed fundamental problems for the structure. To solve these problems, architects specified a precast concrete water-facing wall, a structure that not only provides protection for the building but also provides a number of aesthetic features.

The resulting 366 ft (111.6 m) long, 20 ft (6.1 m) tall wave wall structure not only prevents damage to the building's foundation from the force of the waves but also shields pedestrians passing along the lake side of the building on a multiuse path. Precast concrete also made sense because of the tight timeline for the project, as well as the regulations that placed limits on the type of construction activities that could occur adjacent to the lake.

The design of the wave wall mirrors the naturally curved layout of the beach, with a rolled face and varying height elevations. The inner side of the wall features a bench shape, where students and visitors can sit and relax.

In all, the project consists of 109 segments that are 5 ft (1.5 m) wide, some of which weigh up to 38,000 lb (17,252 kg) each. To ensure the maximum protection from wave action and freezing conditions in the winter, the precast concrete wall features precise placement of epoxy reinforcement, embedded stainless steel angles, and hot-dipped galvanized/epoxy connectors.

There were several challenges during the project, says Tom Heraty, vice president of sales and engineering for Utility Concrete Products (UCP) in Morris, Ill., which was selected for the precast concrete work. One was related to the design. "Because the wall segments were not symmetrical, they would not be stable when installed upright on the foundation below," he says. To address this, UCP used column shoes with a threaded rod on the back side of the wall to permit each wall segment to be set and, upon tightening a few nuts, allowed installers to pick up the next segment.

There were also challenges during manufacturing. "The unique shape of the segments, with multiple curves in plan and section view, proved difficult to form," he says. "However, our experience with 3-D modeling allowed us to model the unique pieces to help our supplier manufacture the formwork." Another manufacturing challenge was making sure there were no air pockets on the form finish. "The owner was very concerned about water from the waves freezing and spalling the concrete," Heraty says. UCP used innovative pouring techniques to prevent this problem.

During delivery, the segments had to be shipped on edge and rotated on their sides. UCP's computer modeling provided center-of-gravity information to allow the company to locate the lifting anchors such that they would permit the unit to rotate and stabilize for installation.

—William Atkinson

Northwestern University's precast concrete curving wave wall in Evanston, Ill., protects it from Lake Michigan's potentially destructive forces using precise placement of epoxy reinforcement, embedded stainless steel angles, and hot-dipped galvanized/epoxy connectors. Courtesy of Utility Concrete Products LLC.

Workers install one of the 109 precast concrete segments that make up Northwestern University's precast concrete wave wall. Utility Concrete Products used column shoes with a threaded rod on the back side of the wall to help with setting and picking up the next segment. Courtesy of Utility Concrete Products LLC.