Precast concrete replaces cast stone at Boston College

Built in 1917, St. Mary's Hall was the second building constructed on the Boston College campus. The facade of this sweeping gothic structure features graceful arches and intricate detailing replete with bas-relief panels and busts that reflect the traditional architectural style of the campus. After nearly 100 years, though, the cast stone facade had begun to wear away. Canadian precast concrete designer Béton Préfabriqué du Lac (BPDL) was brought in to help restore the building to its original glory.

The biggest challenge, says Robert Bouchard, chief executive officer of BPDL, was that all of the elements had to be restored to the way they looked 100 years ago before they could be replicated. "The original pieces had lost a lot of their profile and degree of expression over the years," he says. "Restoring and reproducing them was very intricate work."

From the beginning, the designers knew that the new facade had to be produced using precast concrete. "The original pieces were done in wet cast stone, and there was no way to do this project with anything other than precast," Bouchard says.

The project involved removing all of the cast stone so it could be measured and photographed, then shipped to the fabricator to be molded, poured, and returned to the site. In total, BPDL restored and reproduced 15,800 cast stone elements.

The arch for a window is being assembled. Courtesy of BPDL.

A precast concrete angel flies into place with a little help from a crane. Courtesy of BPDL.

To ensure that the replications were as accurate as possible, BPDL had its own artists on staff to research the building itself and the architecture of that time. They also worked with outside historical experts to ensure that the mold process for casting would reproduce an authentic look and feel.

Along with copying the historical design, timing was a concern, Bouchard says. BPDL had six full-time molders working for two years on the project, and they staggered the restoration and reproduction process to make the most of a limited schedule. Once they started pouring the molds, BPDL was able to reproduce all 15,800 elements in 18 months.

Looking back, Bouchard says that the most valuable lesson he learned on this project was about timing. Throughout the effort, he was confident that his team was ahead of schedule, but at the end, when they got to the most complex piece designs for the portico, the work took a lot longer than they expected. Adding to the challenge, this part of the project

occurred in July, when most of Quebec takes two weeks off for summer vacation.

Despite these obstacles, BPDL finished the portico with two days to spare—only because the team had gotten ahead of schedule earlier in the project. "We met the deadline, but I didn't think it would be that tight," he says. "On jobs like this, the key to success is staying in front of that schedule so you have room to address any issues that might come up."
—Sarah Fister Gale

Oregon dock goes up in time for sea lions' arrival

When you are doing any kind of construction near environmentally fragile waterways, the less time you spend in the water the better. This is one of many reasons that the designers of the 17th Street Dock in Astoria, Ore., chose precast concrete for the deck design.

"Precast was always the goal," says Howard Wells of BergerABAM in Portland, Ore., the engineer on the project. "We never considered anything else."

The 17th Street Dock is home to two 210 ft (64 m) U.S. Coast Guard cutters, along with the historic lightship *Columbia*, an exhibit that is part of the adjacent Columbia River Maritime Museum. It's also a docking spot for Columbia River tour boats and small pleasure craft, making it a popular tourist destination.

The original structure was constructed of timber, which had deteriorated so much that vehicle access had to be restricted, making it difficult to refuel and resupply the Coast Guard ships that dock there. The owners knew it needed to be replaced, but they wanted the project to be quick and minimally disruptive while having a light touch on the local environment.

The use of precast, prestressed concrete in the deck panel design addressed all of these needs.

Environmental concerns for the project team included avoiding disruption to the Steller sea lions and to fish species protected by the Endangered Species Act. Construction had to be timed to accommodate the presence of the sea lions, which usually begins in December. If the contractor were still driving piles at that time, it would have had to pay water monitors $4000 per day to canvass the area by boat to ensure that the mammals wouldn't be harmed. The in-water window for the protected fish opened in November and closed in February.

BergerABAM and Knife River worked together on the 17th Street Dock as engineer and precaster, respectively. Courtesy of Bergerson Construction.

"Fortunately, we were able to drive all of the in-water piles in November, while the deck panels were being cast," Wells says. "If we had used cast-in-place, it is very unlikely that we would have finished the in-water work within both mammal- and fish windows."

For the precaster, the biggest challenge was fit, says Zak Perkerewicz, sales manager at Knife River. "Every piece of precast had projecting rebar that had to be lined up and welded in place," he says.

To ensure that the complex design would work, Knife River's drafter created detailed drawings that carefully laid out every reinforcing bar connection, ensuring that they fit at the plant and once they were in place over the water. That extra work paid off, Perkerewicz says. "Everything lined up, and the contractor was very happy."

The newly completed dock features 125 precast concrete deck panels on steel piles, which not only enables fueling and supply vehicles to once again access the ships but also provides added capacity for forklifts and a 40-ton mobile crane to make minor repairs to the ships. The precast concrete panels also include utility trenches designed into the deck above the soffit to support all of the ships' utility needs.

The project was completed in less than a year with minimal disruption to tourists, traffic, or the rich local sea life. "The result was fantastic," Wells says. "It looks great, the city council is pleased, and the Coast Guard is delighted."

Perkerewicz says he hopes that the success of this project will demonstrate to engineers and city planners across the country how versatile and sustainable precast concrete is for over-water projects. "It's quick, it's controllable, and keeps you out of the water," he says. "The environmental benefits of a precast design can't be beat."
—Sarah Fister Gale