Coreslab manufactured the precast concrete panels for Yale New Haven Health's Park Avenue Medical Center in Trumbull, Conn. © Robert Benson.

Yale New Haven Health's Park Avenue Medical Center wraps around a central healing garden. © Robert Benson.

Precast concrete panels provide seamless integration of medical campus

Programmed, planned, and designed by Shepley Bulfinch, an architectural firm based in Boston, Mass., Yale New Haven Health's Park Avenue Medical Center is a three-story, 100,000 ft² (9300 m²) facility in Trumbull, Conn., that has transformed a disconnected medical office building and free-standing radiation/oncology facility into a seamlessly connected medical campus organized around a central healing garden. An enclosed pedestrian bridge connects the center to a new adjacent 525-car, five-level parking structure.

As part of the project, the firm opted for exterior precast concrete panels that feature crisp, light-catching folds that wrap the building.

"We used precast concrete panels from Coreslab for the facade on the two health and biomedical sciences buildings we designed for the University of Houston," says Luke A. Voiland, a principal with Shepley Bulfinch. "In Houston the undulating facade of the six-story center uses light and reflection to catch the sun as it plays across the building's surface, transforming a windowless space into a visual display that welcomes visitors to the campus. We adapted this strategy for this project but with a more pronounced precast pattern that works for northern sun angles."

The firm selected precast concrete for a number of reasons. "From a design perspective, precast is a 'plastic' material, so we knew we would have a lot of control over what it looked like," Voiland says.

Being a medical facility, high-end features were important, but cost was also a factor. "Precast was able to provide both," Voiland says. "It is not only high-end, but it is cost-effective."

With medical facility design in mind, Shepley Bulfinch developed a wall system that uses spray foam insulation on the backs of the precast concrete panels and stud walls on the insides of the buildings. "This allows a lot of flexibility for moving things around, such as connections for medical equipment, including gases," he says.

The firm also wanted the exterior of the facility to blend in well with traditional New England architecture, which features a lot of clapboard houses, where wood is overlapped. "We were able to create this overlapping feature on the medical facility by using precast panels," he says.

Finally, because much of the facility involves surgical rooms, Shepley Bulfinch knew there would be many rooms without windows. "Rather than having a building with long lengths of blank walls, we decided on precast, which we knew would be able to provide a lot of patterns."

Shaped like a boomerang curved around a central healing garden, the building faces south and features 45-degree angles. These south-facing precast concrete panels feature a relief pattern that interacts with the sun to create changing shadows over the course of the day.

"We learned a great deal about working with precast panels during the design of [the two health and biomedical sciences buildings we designed for the University of Houston]," Voiland says. "The only significant challenge we faced came during the installation process. Installing the panels on the individual facades was not a problem; however, we did require different types of connections and more steel than was anticipated where the new building connected to the old buildings on the campus."

Overall, according to Voiland, the firm and the client were impressed with the quality and the crispness of the casting. "Coreslab did a really nice job on it," he says.
—William Atkinson

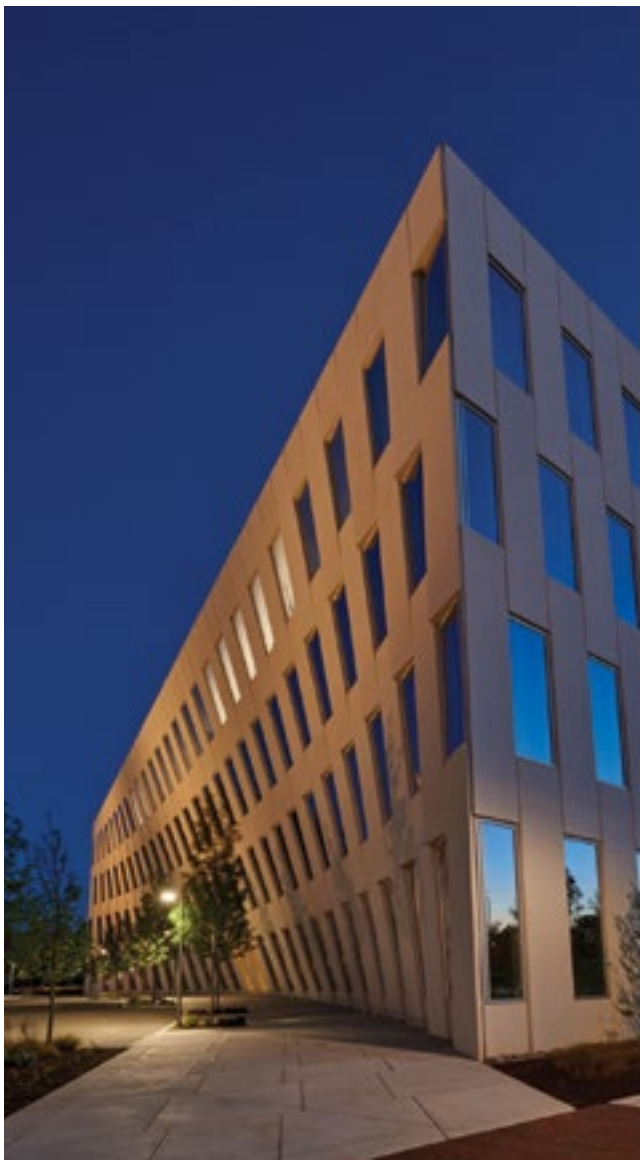
Precast concrete panels give Navy Yard offices seaworthy aesthetic

The new office building at 1200 Intrepid Ave. in the Philadelphia Navy Yard Corporate Center is a sight to behold, described by some as gravity defying in that parts of the structure are designed to replicate the shape of a ship's hull, narrow at the bottom and wide at the top. The four-story, 92,000 ft^2 (8500 m^2) building, designed by the architectural firm Bjarke Ingels Group and constructed by Turner Construction Co., is part of a Liberty Property Trust and Philadelphia Development Corp. plan.

The building facade comprises interlocked precast concrete panels with punched windows. "The use of precast elements was part of the original design," says Glenn Ebersole, market development manager for High Concrete Group LLC in Denver, Pa., the firm hired to manufacture the precast concrete panels.

The double-curved east facade was created using traditional, flat faceted precast concrete panels, and the backs of the panels were hollowed out to reduce their weight. The interlocking structural system embedded within the panels made it possible to avoid a traditional precast concrete spandrel panel design. "The development of this structure allowed for the construction of the complex geometry of the east facade," Ebersole says. "Precast joints allowed for an increased construction tolerance in which window panels were unitized and repeated in order to allow rapid and affordable window construction and avoid the logistical challenge of unique window sizes."

The design of the precast concrete facade structure had to take into account that the building's steel frame was designed to carry only lateral loads, not gravity loads. The precast concrete facade needed to transfer the gravity loads directly through the precast concrete panels to the foundations. "To achieve this, the precast engineers designed a structural steel system embedded into the precast panels," he says. "Pockets were formed into alternating panels at the spandrel areas to allow the interlocking of each panel during installation."



High Concrete Group manufactured the precast concrete panels for the 1200 Intrepid Ave. office building in Philadelphia, Pa. The building was designed to resemble a ship's hull. Courtesy of High Concrete Group.

The east facade required a different wooden form for each panel that was produced. "Each of these panels was slightly different, sometimes differing only by a quarter of an inch or a fraction of a degree," Ebersole says. "The production of these panels required skilled master carpenters to make the wooden forms." Lasers projected building information modeling (BIM) model directly onto the form bed to achieve the precise measurements needed for the panel production. The same process was also used to create one-time-use molds from High Concrete's computer numerical control form manufacturing equipment.

Yet another challenge was the installation of the panels on the east facade. First, connections had to be designed that would work with the design requirements and accommodate installation of the panels under crane hook and under structure. "The installation required some nonstandard equipment, means, and methods," Ebersole says. "Our engineering team worked closely with our erection team to develop and design connections that would work in design and in the field."

The project included 421 architectural precast concrete wall panels for a total of about 29,000 ft^2 (2700 m^2). The panels included about 710 yd^3 (540 m^3) of concrete and were manufactured at High Concrete's architectural precasting plant in Denver, Pa. Once manufactured, the panels were loaded and secured onto trailers, some with specially designed racks, and delivered to the jobsite.

—William Atkinson

Lasers projected the desired measurements directly onto the form bed for the interlocked precast concrete panels for the 1200 Intrepid Ave. office building. Courtesy of High Concrete Group.