Precast's Versatility Aids Variety of Healthcare Needs

Healthcare facilities' wide variety of functions can be met using distinctive exteriors and high-performance structural systems

— Craig A. Shutt

Healthcare facilities require highly functional spaces, and no two are alike. Some need operating equipment, others focus on research and highly sensitive testing machinery, while others are stocked with heavy fitness paraphernalia. High performance precast concrete can help meet this range of needs with total-precast concrete structural systems and architectural precast concrete envelope systems.

As owners of healthcare facilities respond to the ramifications of the Affordable Care Act, they are finding that their needs are changing and expanding. As a result, more are reviewing their space and functional needs, as well as the image they are presenting to an expanding universe of clients.

The following projects give an indication of the range of functions being provided around the country by healthcare properties, and how high performance precast concrete is helping them meet a wide range of distinctive challenges.

University Science Building

The new Health & Biomedical Sciences Building at the University of Houston (UH) houses a variety of disciplines, highlighted by the school of optometry's diverse functions in research, surgery and eye care. To convey that focus, designers used several façade materials to convey the intricacies of light in unique ways. These included architectural precast concrete panels with sloping and rising triangular patterns in various degrees that create a multitude of peaks and valleys in horizontal bands.

The six-story, 167,000-square-foot complex serves as a touchstone for the campus' southeast corner. "The building's form and orientation maximize visibility and establish institutional identity for the academic and clinical optometry programs while signaling a visitor's arrival on campus," explains Luke Voiland, design architect at Shepley Bulfinch Inc. "The façade's design inspiration was drawn from several optical effects produced by the interaction of sunlight with the architectural materials."

'We wanted to think systematically about how to vary the appearance'

The building houses light-sensitive research facilities, academic offices and classrooms, and surgery units for cataracts and LASIK operations. Fitting these functions into the building's design was complicated by the area's tendency to flood, Voiland notes. Initial plans to put the research functions below grade were scuttled by the possibility for flooding, but locating them higher precluded the inclusion of windows on those levels. Placing HVAC equipment above ground also created the need for two interstitial levels in the center of the building that likewise would not have fenestration.

"Window placement became a key issue," Voiland notes. Patient and exam rooms required small windows, but larger windows were desired at the entry to provide a welcoming appearance. "Precast concrete's aesthetic versatility aided in creating a design that could enliven the large areas of windowless spaces while creating a strong visual effect that worked with the other materials being used."

Designers wanted to mix fritted glass, limestone banding, and geometrically shaped precast concrete panels to create illusions to light and visual effects, he explains. "Our goal was to be very interdisciplinary in choosing these materials to create a simple system that appeared complex to the eye. We wanted to create a high-design aesthetic, but on a much tighter budget."

Precast Planes Unite

The precast panels feature three planes that come together at different points to create depressions and elevations of 3 inches in either direction. The varying focal points for the planes create a variety of shadowlines as the sun moves through the sky. "We wanted to think systematically about how to vary the appearance and were worried about cost," he explains. "But the precaster explained that the face design wasn't important as long as the panel sizes and connections remained consistent. That was a big help."

The designs were created after reviewing options through three-dimensional, computer-generated layouts. Animations also were created, showing the varying effect as the sun moved across the face of each design option.

The geometric slopes were created with wooden blocks set into the forms, says Nick Faeber, project engineer at Coreslab Structures (Texas), who provided the precast. The panels were cast in 21-foot-long forms, with one form used to create pieces with 3-inch valleys while the next would provide the 3-inch peaks. At each end of the form, a transition was created

PROJECT SPOTLIGHT

University of Houston Health & Biomedical Sciences Building

Location: *Houston, Tex.*

Project Type: *University research/laboratory/medical building*

Size: *167,000 square feet*

Cost: *$54.6 million*

Architect of Record: *Bailey Architects, Houston, Tex.*

Designer: *Shepley Bullfinch, Boston, Mass.*

Owner: *University of Houston, Houston, Tex.*

Structural Engineer: *Haynes Whaley LLC, Houston, Tex.*

Contractor: *Tellepsen Builders, Houston. Tex.*

PCI-Certified Precaster: *Coreslab Structures (Texas) Inc., Cedar Park, Tex.Precast Components: 172,260 square feet of panels with custom patterns in a typical size of 6 by 21 feet*

Architectural precast concrete panels cast with a variety of sloping and rising triangular patterns in various degrees create a multitude of peaks and valleys in horizontal bands across the façade of the new Health & Biomedical Sciences Building at the University of Houston. To acknowledge the building's specialty in eye-related medical research, the façade creates optical effects as the sun passes over it during the day. Photos © Nic Lehoux.

from peak to valley or vice versa. In one instance, the precaster cast a negative of a finished piece to serve as the form for the next piece, exactly matching the shape.

"These were complicated pieces with a number of variations as to where the peaks and valleys began in each triangular slope," Faeber says. Every other floor used similar designs to improve repetition and reduce costs without creating an obvious pattern to the design. The result was a half-dozen variations in the slopes that repeated at different lengths.

Color consistency in the panels was a key concern for the designers. Bailey Architects Inc. (BAI), Architect of Record, coordinated with Shepley to develop 12-inch-square samples that evaluate color and texture. Once

approved by the UH design committee and Tellepsen Builders, the precaster provided a 48-inch-square control sample at the jobsite for review by the design team and owner's representatives. When the larger sample was approved, five panels were produced and reviewed at the plant. "Not only was the match to the control sample spot on, but the color consistency among the panels was remarkable," says Mark Boone, BAI's project manager.

The interstitial floors housing the building's HVAC equipment are 8 feet tall, providing a different banding effect at the building's mid-level. These levels include single-pane glazing installed at the owner's request. "We tried to match the transparency and reflectance of each window section despite the varying layers of glass," Voiland says. In the end, the differences add more visual complexity to the façade.

Limestone blocks were installed at the entry, providing another texture. "The contractor decided to use limestone rather than replicate it in precast concrete to provide a true texture," Voiland says. That created some challenges in aligning the pieces and added congestion to the site during the construction of the envelope. "We probably should have done it with precast concrete off-site and achieved the same goal."

The erection moved smoothly, with the panels matching up at their transition points as planned. The panels were connected column-to-column using a knife plate embedded in the cast-in-place frame, which fit into pockets cast into the back of the panels. The panels rest on the knife plates, avoiding any concerns with deflection that could disrupt the horizontal flow of the geometric slopes. The panels were stacked two at a time onto the plates and tied to the beam at their centerpoints.

Two tower cranes picked the panels from delivery trucks to erect them quickly. "It was really amazing how quickly they went up," says Voiland. The 172,260 square feet of precast panels were erected in four months.

The new science center connects to an existing masonry and precast concrete building to provide better access and flow to the new facility. A steel-frame bridge was created by removing some of the precast panels from the existing building and connecting the bridge to the structure,

Photo: Paul Brokering Photography.

Speed of construction was a key reason architectural precast concrete insulated sandwich wall panels were chosen to clad Mercy Medical Center's new Birthing Center in Williston, N.D. The design was value-engineered after owners decided to use the building to set a new aesthetic plan for its campuses. Thin brick was cast into the panels as laying brick in the short construction season with a limited labor supply would have added time and money.

PROJECT SPOTLIGHT

Mercy Medical Center Birthing Center

Location: *Williston, N.D.*

Project Type: *Hospital*

Size: *39,185 square feet*

Cost: *$15.27 million*

Designer: *Davis Partnership Architects, Denver, Colo.*

Owner: *Catholic Health Initiatives, Williston, N.D.*

Structural Engineer: *Structural Consultants Inc., Denver, Colo.*

Contractor: *J.E. Dunn Construction, Denver, Colo.*

PCI-Certified Precaster: *Stresscon Corp., Colorado Springs, Colo.*

Precast Components: *120 pieces of acid-etched, insulated wall panels in a typical size of 8 by 18 feet*

after which the panels were reconstructed around the bridge.

The result is a distinctive design that provides a different appearance throughout the day without breaking the budget—or the schedule. The designer is currently working on a project with a similar concept for its precast concrete panels for an ambulatory care center in Bridgeport, Conn., where the panels also will be insulated.

"We're making the appearance more complicated this time," Voiland says. "Now that we have some experience with what precast concrete can do in these cases, we're upping our game."

Birthing Center

The Mercy Medical Center's Birthing Center in Williston, N.D., was created to accommodate the rapidly growing community's need for a number of medical services. The 39,185-square-foot Ambulatory Care Center features both an outpatient surgery center and a birthing center, as well as an enclosed walkway that connects the freestanding building to the existing hospital. To welcome patients to this new facility, designers chose a façade featuring architectural precast concrete insulated sandwich wall panels that provided a new design style for the hospital's facilities.

"The original plan was to provide a traditional brick veneer to match the 1970s style of the existing hospital campus," explains Tina Du Mond, project architect with Davis Partnership Architects. "But the owners decided to take a new direction for the campus, and that allowed us to incorporate some Midwest style into the design."

The change opened the door to new materials, and precast concrete panels quickly became the front-runner for the façade. "We liked precast concrete because it could be erected quickly, which was a key strength due to the short construction season in North Dakota," she says. "There also is a local labor shortage and a lack of housing in the area, which would have made it extremely difficult and costly to obtain the necessary labor force to deliver the multiple trades required for a stone façade."

Accelerated construction was a key factor, as the building had to be delivered on "an extremely fast-track, 12-month construction schedule," says Chris K. Brown, the project architect who oversaw the project as it progressed. "Using precast panels manufactured off-site allowed us to enclose the entire structure in just 12 days. That facilitated a much easier construction process during the winter months, allowing us to frame the building within an already enclosed structure."

The precast concrete panels also aided with a key challenge: designing the facility's fenestration and helping to create a smooth pattern. "Windows are a huge driver in healthcare design," explains Du Mond. Regulations require them in patient rooms, while other areas work best with no light coming in. Meanwhile, access points and lobbies typically are designed to be bright and airy, requiring a balance among all the functions. The panels were fabricated by Stresscon Corp., which worked with construction manager J.E. Dunn Construction and the architect beginning early in the design process.

Designers used precast concrete's aesthetic versatility to develop three textures in the precast panels at the building's entrance, resulting in a welcoming appearance. A standard formliner texture in a 2- by 4-foot customized size was used to cast a chiseled-stone appearance that was used along the base and in one wing of the center. These panels were acid-etched and contained an integral red pigment to achieve the final stone-like look.

The main section of the center features two additional finishes, a buff tone and a darker buff color, which were created by acid-etching panels cast with a mix of white cement and special aggregates. "We achieved the design we wanted by putting no more than two colors onto the face of one panel while using three colors throughout the center," says Brown. "That made the fabrication less complicated and kept costs down." Sample panels in a 2- by 2-foot size were cast for review, with the stone formliner approved on its first iteration.

Two-story vertical fins were inset into the panels along the façade to emphasize the verticality of the space and allude to the large cross installed on the curtain wall at the center's entry. That curved glass space is flanked by precast panels, with a porch roof jutting out of the face and supported with stone columns. "The cross is the first impression visitors have as they approach the center, and we wanted to express that theme on the other façades," Brown says.

The glass and precast concrete interfaced well, with no connection issues during erection, he notes. The site had no restrictions, so the crane could move quickly to erect each piece. The 120 precast concrete panels were erected in less than three weeks.

Insulated Panels Offer Efficiency

Providing the level of energy efficiency the owners required was a key challenge. The insulated sandwich wall panels feature $2^1/_2$ inches of polyisocyanurate insulation sandwiched between two wythes of concrete, achieving an R-17 value.

"We worked closely with the architect on the insulation design to ensure there was a continuous insulation layer," says Chris Montoya, project manager for Stresscon. That was easily accomplished on the long straight planes, but corners provided more of a challenge. "We determined how to ensure the insulation turned the corner with butt joints that backed out of the panel. The plan worked very successfully to ensure there were no gaps."

Another challenge came in delivering the panels to North Dakota from the precaster's Colorado Springs, Colo., plant, a distance of more than 700 miles. Panel sizes were limited to 8 by 18 feet to avoid any restrictions during transport across several states. "It was a long distance, but the precast concrete panels delivered the highest quality product possible due to the ease of control that off-site production affords," Brown explains.

We worked closely with the architect on the insulation design to ensure there was a continuous insulation layer.'

"Timing the arrival of panels was difficult over such a long period, so the panels were staged at the site until needed, Montoya says. That helped ensure the schedule was met in the short time frame available.

"It was a great benefit to have the contractor and precaster on board early in the design process to help work out design efficiencies," says Brown. "It made it very easy to check details early on and ensure we were going in the right direction."

The project has proven successful, to the point that the precaster is working with the same construction team—owner, architect, and contractor—on another medical center and office building in Dickinson, N.D.

The owners were pleased with what the precast concrete panels could achieve, Brown notes. "The precast concrete solution for this project allowed us to deliver the project on time while accommodating the unique challenge of working in an oil-boom economy with a severe lack of labor and almost no available housing, while fully enclosing the structure before the onset of what was a harsh North Dakota winter."

Wellness Center

Health and wellness facilities are expanding beyond traditional locations and reaching deeper into neighborhoods today. Synergies among companies can add to their attractiveness. An example can be seen in the New Brunswick Wellness Plaza in New Brunswick, N.J., where a new mixed-use building comprises a fitness and health-education center, a socially responsible supermarket, and a 1,200-space parking facility above them. The building features a high performance precast concrete structural system that met the varying challenges that each function required.

Within the Wellness Plaza, the Robert Wood Johnson Fitness & Wellness Center, operated by the nearby Robert Wood Johnson University Hospital, consists of 60,000 square feet of fitness services, including cardio and strength-training equipment, fitness and dance studios, lockers and showers, sauna, steam rooms, three pools, and meeting rooms. The center provides professional fitness assessments and health-education classes as well as personal trainers. Alongside the center is a 50,000-square-foot Fresh Grocer store, which sells affordable and healthy food options. The fitness center, with its large pool area, and the supermarket are located on the first two levels, with six levels of parking above.

The holistic theme brings with it options for more healthful lifestyle choices for residents in this up-and-coming neighborhood. "Typically, urban dwellers find it difficult to access supermarkets due to infrastructure and spacing challenges," explains Glenn Kustera, structural engineer at PS&S Architecture/Engineering Inc. "The surrounding community benefits by having affordable and nutritious food options."

The designers considered a variety of framing systems for the project, but quickly realized that keeping a consistent building system for the entire structure worked to everyone's benefit. "The majority of the structure is a parking garage, and everyone is used to seeing that as precast concrete," Kustera explains. "But using a parking system, with double tees, for the supermarket and wellness centers is not as typical. It was nice that the precast concrete solution wound up being the most economical system not just for the parking, but for the first-level, two-story tall facilities."

> The precast system provided simplicity in design, long-span, column-free areas, faster erections, fewer pieces to erect, and a consistent building system.'

The precast concrete system provided a number of key advantages to all of the functions, Kustera notes. "The precast system provided simplicity in design, long-span, column-free areas, faster erections, fewer pieces to erect, and a consistent building system."

A key benefit for using the precast concrete system for the lower spaces was in the wellness center, where long-span double tees support the floor. The facility often is used for large aerobic and step classes, which could cause vibrations throughout the center. "With the precast concrete system, the double tees provided a solid floor system," Kustera says. "The owner is happy."

The spandrel panels feature a buff-colored finish with horizontal reveals used as banding. Some of the panels were stained in the plant to provide a different appearance. Upper levels feature solid panels with cut-outs to replicate windows, giving the building less of the look of a parking structure.

Helix Ramp Creates Challenge

A major challenge came in working around the variety of obstructions on the first floor to erect the higher levels. The key area of concern was around the ramp that is positioned directly over several wellness-center facilities, including an Olympic-sized pool and the Jacuzzi pool. The cast-in-place concrete helix was poured, cured, and brought up to strength before the precast concrete columns could be erected. The erectors worked in other areas as that work continued, with the intent that it would be ready when the construction reached it.

A 40-foot-deep concrete transfer girder spans the pool and supports some of the columns that support the six levels of parking above. The helix featured 2-foot-wide, V-shaped walls along its perimeter that curve along with the helix as it rises. "We had to cast and erect columns that could be positioned onto these supports that were essentially four stories in the air," explains Mike Achilles, High Concrete's northern regional sales director. "This was the most challenging part of the project by far, but it worked out well."

Kustera agrees. "If there would not have been a way to make the helix space work, it might have been a very different looking project. It was a matter of inches to make all this work within the footprint of the very tight, complex site.

The other challenge came from site restrictions caused by working within 30 feet of Amtrak railroad lines. The lines cut along one corner of the building, causing the top five levels to be erected at a skewed angle rather than come to a right angle to accommodate the tracks. Guy cables were used to direct and position components on this corner, according to Bo Kusznir, CEO/president at Precast Services, which erected the precast. "We used a crawler crane that had to

Photo: High Concrete Group LLC.

Photo: PS&S LLC.

Photo: PS&S LLC.

wick, N.J., combines a fitness and health-education center, a socially responsible supermarket, and a 1,200-space parking facility above them. A total precast concrete structural system was used to blend the functions while meeting site challenges that included nearby railroad tracks that cut off one building corner and a cast-in-place helix ramp that required precast structural components to be set above it.

PROJECT SPOTLIGHT

New Brunswick Wellness Plaza

Location: *New Brunswick, N.J.*

Project Type: *Mixed-use building with wellness c enter, supermarket and parking*

Size: *612,704 square feet*

Cost: *$60 million*

Designer/Engineer: *PS&S Architecture/Engineering Inc., Warren, N.J.*

Owner: *New Brunswick Development Corp., New Brunswick, N.J.*

Contractor: *Joseph Jingoli & Sons Inc., Lawrenceville, N.J.*

PCI-Certified Precaster: *High Concrete Group LLC, Denver, Pa.*

PCI-Certified Erector: *Precast Services Inc., Twinsburg, Ohio*

Precast Components: *Total precast concrete system, including double tees, interior and exterior columns, beams, light walls, exterior shear walls, solid slabs, stairs, and load-bearing and nonload-bearing spandrel panels.*

Photo: High Concrete Group LLC.

move down pretty narrow streets and work pretty high in the air to make it work."

To provide the required fire separation between the first-floor functions and the parking levels above, the precaster supplied double tees with a 2-hour, fire-rated flange. These were covered with a waterproofing membrane and a 3-inch wearing slab. A shock-bearing pad also was included to help mitigate vibrations further. "We've done a number of mixed-use projects, so we're familiar with the challenges of combining various functions," says Achilles.

The project has been well received—so well, in fact, that a 15-story mixed-use project including residential space is being built across the street by the same precaster. "The Wellness Center has led to more interest in the precast solutions that can help New Brunswick," says Achilles.

Adds Kustera, "The structure is a great example of a multi-use, "total-

precast" concrete building that helps the community incorporate healthy lifestyle choices into everyday life. The new facility gives the city a lift by providing residents with a sense that there is an interest in improving their community. The precast concrete system played a very important role in making this a successful project for the owners and the end-users."

Heart Hospital

Moisture management, sustainable design, accelerated construction, congestion minimization, and other benefits led designers on the Sanford Heart Hospital in Sioux Falls, S.D., to specify a high-performance, architectural, precast concrete envelope system with embedded thin brick for the façade of the hospital's new facility. The 213,000-square-foot building consolidates cardiac programs under one roof, housing physician offices, outpatient testing, surgical services, laboratories, and consultation services. It includes 58 inpatient beds, operating rooms, clinic, and outpatient services.

"The goal was to maximize convenience for patients and their families," explains Michael Kennedy, design director for AECOM. The building connects to the lobby of the existing medical center, serving as a supplement that also connects to parking via a below-ground concourse. Administrators also wanted to create an energy-efficient design that promoted sustainable design and encouraged a healthy living environment.

To achieve these goals, designers specified architectural precast con-

PROJECT SPOTLIGHT

Sanford Heart Hospital

Location: *Sioux Falls, S.D.*

Project Type: *Hospital*

Size: *213,000 square feet*

Cost: *$75 million*

Designer: *AECOM, Minneapolis, Minn.*

Owner: *Sanford Health, Sioux Falls, S.D.*

Structural Engineer: *AECOM, Minneapolis, Minn.*

Contractor: *Henry Carlson Co., Sioux Falls, S.D.*

PCI-Certified Precaster: *Gage Brother Concrete Products, Sioux Falls, S.D.*

Precast Specialty Engineer: *E-Construct, Omaha, Neb.*

Precast Components: *936 pieces including brick clad spandrels and rock-faced base panels, along with 42 pieces for the Portochere.*

A number of benefits accrued from using architectural precast concrete panels embedded with thin bricks to clad the Sanford Heart Hospital in Sioux Falls, S.D. Significant time was saved by eliminating the need for masons and scaffolding on the site, as well as by using precast concrete's casting capabilities to eliminate a complicated structural framing for the clock tower and create monolithic bay windows in the tower. Photo: Robb Williamson, AECOM.

crete panels with embedded thin brick. The panels not only helped minimize energy concerns, but their aesthetic design helped create a "Collegiate Gothic" style for the campus, and for the hospital system in general, as part of a new master plan. Initially, the owners had expected to use conventional full brick with steel-stud backup, matching other buildings. But the design suggested by precaster Gage Brothers Concrete Products provided a number of key advantages.

"It was a very tight site on a large host campus, so site disturbance and space for a masonry crew did not make sense," says Kennedy. The facility also was located at the front of the campus, near the main entrance and the trauma center, and masonry scaffolding and equipment would have created obstacles for visitors. "The owners were surprised to find that the thin-brick embedded precast concrete not only solved the site problems but substantially cut on-site work and saved the project more than $1 million."

In addition, casting the brick into the panels off-site while other work progressed cut approximately four months from the schedule, he estimates. "The panels also reduced the project's cost by not requiring the heat and shelter necessary to install traditional brick in the cold winter months."

Using monolithic panels, in a typical size of 7 by 34 feet, also improved moisture control. "The precast provided much better humidity management for the hospital. With all of the brick banding, the moisture control would have been a major challenge with a conventional system. Integrally casting the banding within the precast panel system solved this problem." Improved moisture control reduces the potential for mold and mildew, helping improve indoor environmental quality.

The masonry facing consists of a four-brick blend, says Tom Kelly, president of Gage Brothers. "The hospital campus had been added onto over 75 years, so there were a variety of bricks used," he explains. "Our goal was to find a combination that complemented the surrounding buildings overall." The brick was used for more than 95,000 square feet of panels, including the adjacent clock tower and the porte-cochere that marked the entry.

Setting Arched Windows

A key challenge in casting the panels was casting blockouts for large, arched windows into the panels and laying the brick around them. Although similar in shape, many different sizes of windows were involved, requiring form changes. The windows feature red precast concrete surrounds outlining the fenestration along with redstone banding through the infill sections between windows.

The window arches were separated by infill sections cast between them to create panels of varying lengths, Kelly explains. An 8-inch band of concrete remained consistent at the top and bottom of the panel, with sides filled in as needed. Panels were varied in length from 12 to 18 feet to maximize efficiency of infill and window shapes. More than 100 window openings were cast.

'The thin-brick embedded precast concrete not only solved the site problems but substantially cut on-site work and saved the project more than $1 million.'

"It was challenging to create the surrounds and provide sufficient infill to create an efficient panel size in all cases," he explains. "But achieving this goal cut the piece requirements by hundreds. It also saved time in erecting the pieces and in the number of joints to be caulked."

Another savings was created in the design of bay windows provided in three stories of the massive clock tower that serves as a focal point, directing visitors to the adjacent entry under a precast concrete porte cochere. Gage Brothers cast integral sides, roofs, and floors for the bay windows, nicknaming them "clamshells." The design features an 8-foot-wide face, projects out 3 feet, and required no additional backup structure.

"The precaster provided a solution that saved a month of the schedule on the clock tower structure alone," says Kennedy. "By utilizing precast, the project was able to save tons of steel that would have been required with a conventional brick-and-stud system."

Solving Tower Backup System

The free-standing clock tower structure itself created some structural issues, rising five stories and topped with a three-story belfry with $2^1/_2$-story inset arched decorative element that includes an illuminated logo. "The large, elaborate clock tower created a challenge in designing a backup system," especially with the octagonal columns at each corner, Kennedy says. The original plan was to use brick on steel studs, requiring a huge backup system that would have extended the schedule, congested the site, and added cost.

The precaster solved the problem by stacking two levels of precast concrete panels at the base and then hanging the remaining levels from a structural steel frame. "There were too many ins and outs in the structural design to stack-load all of the panels," Kelly says. Adds Kennedy, "The self-supporting spanning nature of the precast panels eliminated the need for any backup structure and resolved the issue."

Brick-embedded panels were used to clad both the interior and exterior sides of the three-sided porte cochere, with redstone accents used to outline the arch and on the thickness of the panels facing each entry. The panels in this area are load-bearing, carrying the roof system. "The entry area is an entirely self-supporting structure," says Kelly.

Despite the significant size of the project, the erection moved smoothly. The 978 pieces were fabricated in about five months, with the first pieces erected before the final pieces were cast. The erection took approximately 100 days in several phases to complete.

The finished project provides efficiency, comfort, and a higher level of service for patients while offering benefits to hospital administrators and the staff. Best of all, the benefits will continue into the future, Kennedy notes. "Precast concrete reduced the long-term, life-cycle costs of the hospital, as the owner will never have to tuck-point the brick-clad precast panels."

It also opened eyes and minds in the area, notes Kelly. "The project is a true testament to the idea that you can do any type of structure with thin brick embedded precast that could be done with full brick, and you can do it faster and more economically."

For more information on these or other projects, visit www.pci.org/ascent.