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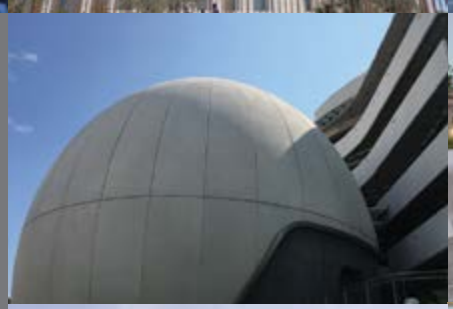

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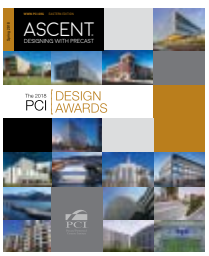


On the cover: 2018 PCI Design Awards.
Photo: MB Piland Advertising + Marketing LLC.

FEATURES

The 2018 PCI DESIGN AWARDS

DEPARTMENTS

BRIAN MILLER, PE, MBA, LEED AP
GLOBAL MARKETING DIRECTOR, PRECAST, MANUFACTURED AND DECORATIVE CONCRETE, GCP APPLIED TECHNOLOGIES
BRIAN.D.MILLER@GCPAT.COM

How Do You Build? Are You Stuck in a Routine, Missing Out on Possibilities?

Have you ever gotten into a routine that blinds you from seeing other possibilities? Our lives are so busy today and overloaded with stress, distraction, and noise that it seems to be more challenging to break the status quo—slowing down, thinking differently, and trying new things. It's easy to become complacent and comfortable with our routines. However, this can prevent us from finding better solutions.

My wife and I love to eat out. I've noticed that when we go to some of our favorite restaurants, we always seem to order the same things. It's interesting, because restaurants typically have several items on the menu, but I tend to have that one special item I go there for. Of course, I haven't tried other things, so how would I know if there was something better? I'm probably missing out on my next favorite thing.

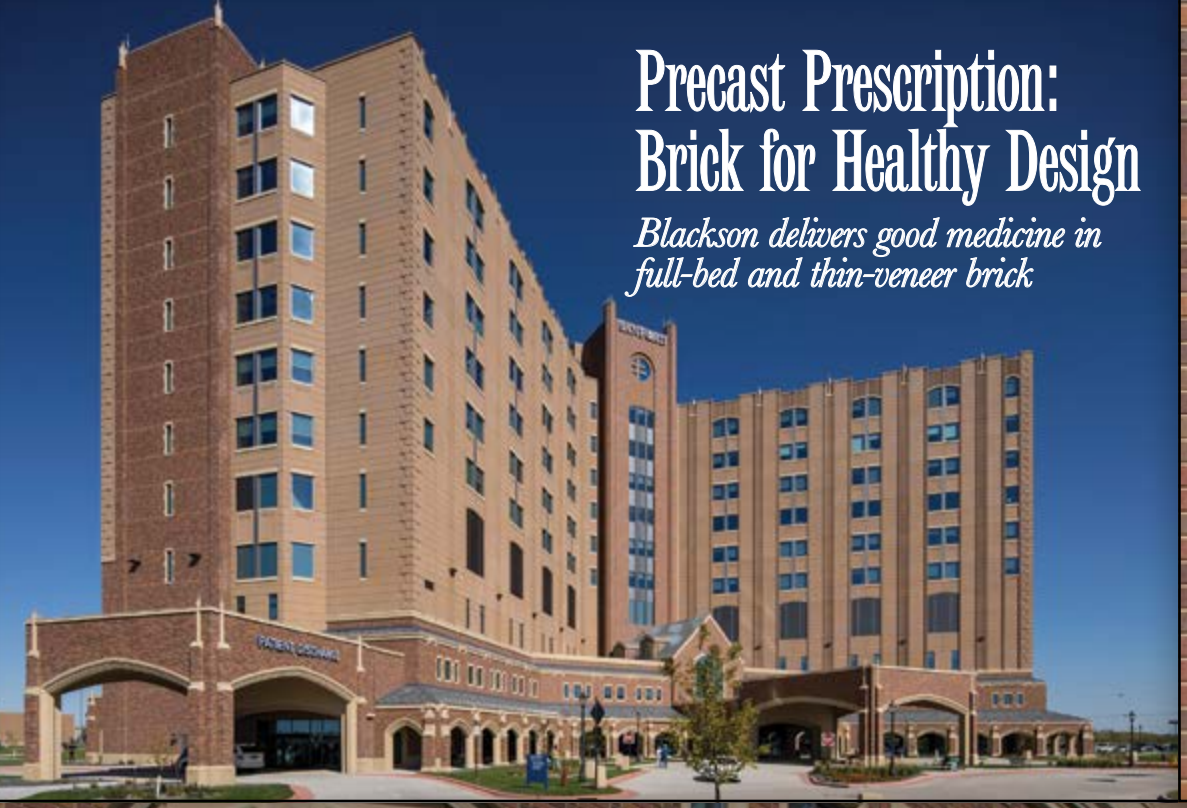
This can be the same in construction. Are we building from routine? Or are we continuously trying to improve and build with the most innovative and high-performance materials and systems of today? For example, my construction company used concrete masonry units to build foundations for years. Then we tried cast-in-place concrete, which afforded us many advantages, as well as added value for our customers. It was definitely worth the investment of time to explore something new. Later, we moved to precast concrete foundations, which again improved efficiency, and provided even more value to our customers. Of course one size doesn't fit all, but it's more about not being complacent to the point that we miss out on opportunities for growth and improvement. This often results in added value and benefits, especially when we are designing and building structures.

When you think of precast concrete, what comes to mind? What do you use it for? Have you ever tried to use it in a different way? Precast concrete is one of the few high-performance materials that offers a huge array of attributes and benefits, from aesthetic versatility to resiliency, and everything in between. And it is used in almost any type of structure from low-rise to high-rise, from commercial to residential, from structural to aesthetic applications. However, I often meet designers who only use it for one or two applications, missing out on the true potential to be gained.

This issue of *Ascent*® showcases the PCI Design Award winners. These projects are some great examples of how designers have gotten out of their "routines" and used precast concrete in innovative ways. The results are some amazing projects that provide more value to all stakeholders.

As you look at your next project, consider using precast concrete, maybe in ways you haven't considered before. Make sure to really explore all of the various attributes and benefits that using precast can provide. Don't overlook the versatility, efficiency, or resiliency that precast concrete inherently offers. This is how precast builds!

INSIGHT



Precast Prescription: Brick for Healthy Design

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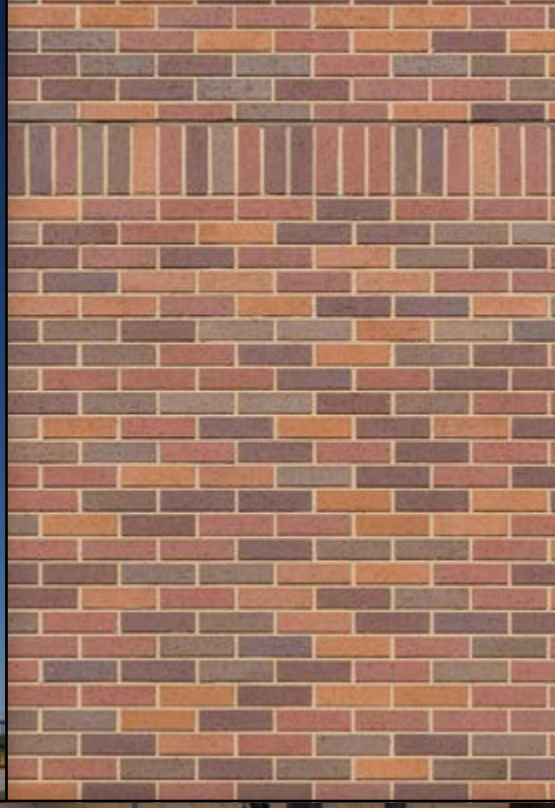

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Suffolk College Adds Precast Wellness Center

LONG ISLAND, NEW YORK

The new Health & Wellness Center at Suffolk County Community College provides an open, welcoming atmosphere in which to conduct physical education classes and encourage students to take part in recreational activities, including swimming and sports activities. The center, which also will be available to local residents, was clad with precast concrete insulated sandwich wall panels.

The 43,250-ft^2 facility (including a mezzanine for heating, ventilation, air conditioning, and mechanical equipment) includes an eight-lane swimming pool, basketball/volleyball courts, a weight-training room, and a rock-climbing wall, as well as two classrooms, faculty offices, and locker rooms with adjacent toilet/shower facilities. The facility was designed by iKon.5 in Princeton, N.J., with Seacrest Construction in Freeport, N.Y., serving as general contractor.

The precast concrete panels feature 4 in. of insulation sandwiched between two wythes of concrete. In all, 108 precast concrete panels, encompassing 24,000 ft^2, were cast and erected by Coreslab Structures (CONN) Inc. in Thomaston, Conn.

To complement the building's surroundings in the Central Pine Barrens, the architects created a vertical appearance, with the tall panels separated by narrow windows. To emphasize the verticality, 2-in. vertical reveals along with fins that protrude from the face were cast into the panels. Interior panel faces feature a lightly sandblasted finish, matching that of the solid panels used on interior spaces.

Panel erection was completed in December 2017, with the center planned to open in the fall of 2018.

Clemson Adds Precast Dormitory Complex

CLEMSON, SOUTH CAROLINA

Clemson University is building a $212-million residential village to help house new students as enrollment increases to 25,000 students (from 18,000). The Douthit Hills Student Dormitories, scheduled for completion this summer, comprises seven residential buildings in two groupings along with a student hub. The seven dormitories feature all–precast concrete structural systems, consisting of insulated wall panels, columns, beams, slabs, and flooring systems.

The development is planned to make "a bold statement that tells students and visitors they've arrived at one of the nation's top schools," the university said. It is reportedly the largest undertaking in both size and cost in Clemson's history.

All eight buildings will be LEED silver certified and contain sustainable features such as directional, nonintrusive LED parking-area lighting that can be remotely programmed to shut off when not in use. The precast concrete components, provided by Metromont Corp., are aiding that effort through a variety of inherent energy-efficient attributes.

General contractor Holder Construction had seen work completed by the precast concrete producer on a student-housing project at the Savannah College of Art & Design and realized that the total–precast concrete system would aid the winning bid by providing competitive pricing and a fast schedule for completion.

Metromont worked closely with the two architectural firms on the project, The Boudreaux Group (east side) and Clark Nexsen (west side) to rework the layout to achieve an open feel. Horizontally stacked wall panels allowed the precast concrete producer to incorporate more punchouts for windows and doorways without compromising the structural load-bearing ability.

The precast concrete framing system for each building took between 5 and 10 weeks to be completed, depending on the building's size. The first building's precast concrete envelope was completed in 2015, with the other six following through 2016. Finishes are being installed and all of the buildings will be open this summer.

New PCI Design Handbook Edition Released

CHICAGO, ILLINOIS

The eighth edition of the *PCI Design Handbook: Precast and Prestressed Concrete* can now be purchased online at www.pci.org/bookstore. The design information and recommendations contained in the new edition are based on the latest research and a consensus of engineers in practice, according to Tim Salmons, chair of the PCI Industry Handbook Committee.

The Handbook provides easy-to-follow design procedures, numerical examples, and new and updated design aids using the American Concrete Institute's (ACI's) *Building Code Requirements for Structural Concrete (ACI 318-14) and Commentary (ACI 318R-14)*, ASCE 7-10 *Minimum Design Loads for Buildings and Other Structures,* the *2015 International Building Code,* and other current industry standards.

Submit your headline news for consideration in a future issue of Ascent to Becky King at bking@pci.org.

Offices Renovated, Expanded With Precast Panels

CAMBRIDGE, MASSACHUSETTS

The existing one-story building at 35 Cambridge Park Drive in Cambridge, Mass., is being renovated and expanded with the addition of four smaller stories on top of the existing one. Developed by The Davis Companies for Class-A office and laboratory space, the 140,000-ft^2 building has been gutted to its structural framing, with 47,139 ft^2 of additional space created on four stories above. The entire building is being clad with precast concrete panels in three finishes used in patterns randomly placed over the face.

Strescon Ltd. was brought in during the design phase to work with the architect, SGA in Boston, and the construction manager, John Moriarty & Associates Inc. in Winchester, Mass. They helped troubleshoot issues, including color selection, levels of sandblasting, ribbing texture, and panel optimization. Once the documents were released for bid, Strescon's bid was accepted.

The key challenge resulted from the staggered placement of windows and the mixture of three finishes on the narrow rectangular panels making up the larger panels. Strescon worked closely with the steel fabricator to determine connection details and create a casting schedule for the variety of panels needed with variations in finishes and window locations.

The panels cover three façades, with curtain wall on the fourth. Each panel features patterns of long, narrow rectangular panels with one of three finishes: light and heavy levels of sandblasting to reveal different amounts of aggregate offset by a third finish featuring tight rows of reveals. The combination creates patterns of textures and colors, with no two areas, including column covers between windows, using the same sequence.

The panels were erected in a vertical format, dictated by the inherited structural grid of the existing building. Accomplished with a tower crane, the erection moved smoothly and was completed in February 2018. The building is planned for occupancy in 2019.

Spancrete Taps Brown as Newnan GM

NEWNAN, GEORGIA

Randall Brown has joined Spancrete as the general manager of its precast, prestressed concrete plant in Newnan, Ga. He will provide general oversight, including implementing operational systems, driving performance improvement, and optimizing overall business management.

Brown has more than 30 years of concrete and construction experience throughout the South and holds a bachelor of science in civil engineering technology from Southern Polytechnic State University in Marietta, Ga.

Spancrete Expands Preconstruction Services

WAUKESHA, WISCONSIN

Kelly Weis has been hired as director of preconstruction and construction at Spancrete's corporate headquarters. He will collaborate with stakeholders during the preconstruction process and manage estimating, bidding, and coordinating project schedules and general construction-installation requirements.

Spancrete's preconstruction service team consists of 20 professionals with varying backgrounds in the construction industry, covering finance, design, and operations. Weis has led more than 1000 retail and construction projects throughout the United States in the past 13 years and holds a bachelor of arts in business administration from the University of Wisconsin–Milwaukee.

PCI Foundation Adds CSU to Roster

FORT COLLINS, COLORADO

The PCI Foundation has accepted an education-program proposal from Colorado State University in Fort Collins, Colo. The program will be directed by CSU assistant professor Mohammed S. Hashem M. Mehany, who will work with Rocky Mountain Prestress and Encon United in Denver, Colo., to create a group study course on precast/prestressed concrete for construction management and engineering students.

The course will be part of the "boot camp" program the school provides that lets students work closely with industry groups. The five-week class will meet once a week and allow students to earn one credit. It will expose students to state-of-the-art software and processes taught by industry experts currently using them in the field.

King Named PCI Marketing Manager

CHICAGO, ILLINOIS

Becky King, who joined PCI in October 2016 as marketing assistant, was promoted last fall to marketing coordinator. She has been promoted again to serve as PCI's marketing manager. In her new role, she will continue managing a variety of marketing and marketing communication projects, including the PCI Design Awards program. She will be working to improve social and digital communications programs, as well as helping with marketing planning and providing support and training to PCI chapter executives for their marketing activities.

Submit your headline news for consideration in a future issue of Ascent to Becky King at bking@pci.org.

Mixed-Use Project Features Precast Parking

PITTSBURGH, PENNSYLVANIA

The Lumiere, an 86-unit, nine-floor condominium tower now under construction, rests on a base of ground-floor retail and seven levels of parking constructed with a precast concrete structural framing system. The 650-car parking structure was completed in late 2017 and opened for business as construction of upper levels continued, with 100 spaces reserved for condominium owners.

The parking structure was designed by Churches Engineering in Washington, Pa., with Carl Walker Construction serving as general manager. As the project developed, the condominium total was increased from 77 units to 86 units on nine stories rather than six, an indication of how demand was growing in the city, according to local reports. Construction on the condominium levels began early this year.

The precast concrete components were fabricated and erected by Sidley Precast Group. Retail spaces, encompassing 25,000 ft^2 on the first floor, are being finished, with Brazilian steakhouse Fogo de Chao the first to sign on.

Clark Pacific Opens New California Plant

ADELANTO, CALIFORNIA

Clark Pacific's new fabrication facility in Adelanto, Calif., expands the company's Southern California capacity from 45 acres to more than 135 acres and will serve the region's growing demand for prefabricated building systems. The plant, which will fabricate architectural, structural, and modular systems, complements Clark Pacific's existing plant in Fontana, Calif.

Submit your headline news for consideration in a future issue of Ascent to Becky King at bking@pci.org.

Four Precast Divisions Upgrade Airport Building

BUFFALO, NEW YORK

The emergency generator runway light-control facility at Buffalo's International Airport has been upgraded and clad with custom precast concrete wall panels. The upgrade included the installation of an FAA Approach Lighting System for one of the airport's gates, provided by CNS Communications LLC in Scottsdale, Ariz.

Four divisions of Oldcastle Precast participated in the project, comprising plants in Newnan, Ga. (project lead) and Easton, Pa. (wall panels), the Building Systems Division in Selkirk, N.Y. (roof panels), and construction management handled by the firm's Modular Group.

The 32- by 44-ft generator building was constructed by erecting the 6-in.-thick insulated wall panels and topping them with 8-in.-thick precast concrete hollow-core. Oldcastle also outfitted the building with interior wall, floor, and ceiling finishes as well as doors and openings; heating, ventilation, and air conditioning environmental systems; exhaust/intake air systems; lighting; and alarms.

Gate Adds Three to Kissimmee Staff

KISSIMMEE, FLORIDA

Gate Precast Co. has named Venkatesh Seshappa as its new engineering manager in Kissimmee, Fla., while David Baker and Phil Dorsch have returned as design-assist sales and management representative and project manager, respectively.

Seshappa offers more than 30 years of design experience, most recently as director of engineering, research, and development for 12 years at Thermomass in Boone, Iowa. Baker will work with design teams, while Dorsch will work with contractors to ensure cost-effective best practices are used.

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Precast Design Excellence

Harry H. Edwards Industry Advancement and Best Government and Public Building

The Phillip and Patrica Frost Museum of Science
Miami, FL
Grimshaw Architects
Rodriguez and Quiroga Architects

Miami In Focus, Inc.

Grimshaw Architect's dream to create a three-dimensional façade and the country's only self-supported planetarium dome comes true with an architectural precast concrete solution. Frost Museum of Science, now among the world's most innovative and sustainable museums, showcases fresh, uninhibited concepts and moves the precast industry forward.

Best Religious Building

Church of Jesus Christ of Latter-Day Saints Temple
Gilbert, AZ | Architekton

BIM's collaboration capabilities were beneficial in the design of this complex temple that features limestone-like detailed patterns of indigenous plants and arched windows. Architekton took full advantage of precast concrete's inherent capability to take any shape to any level of detail.

Phebus Photography | Ross Tarrant Architects

Best Stadium

Kroger Field Renovation/Expansion
Lexington, KY | Ross Tarrant Architects

The stadium expansion utilizes both structural seating elements and an architectural façade that features multiple finishes adding an interesting nuance that gives the look of a smaller panel design with two distinct colors. This solution allowed Ross Tarrant to keep the budget and schedule in line reducing pieces and structure.

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Marvin Hartsfield

President, Hartsfield & Associates, Springboro, Ohio

Marvin Hartfield formed Hartsfield & Associates in 2005, where he provides consulting services to building owners, architectural design and construction professionals, and precast concrete producers/manufacturers. His firm has consulted in numerous architectural precast concrete cladding projects throughout the United States

Prior to opening his own firm, Hartsfield began his career in architectural precast concrete in 1978 as a design engineer for Concrete Technologies Inc. Over the years, he worked on hundreds of projects, moving steadily up the ladder. He was eventually elected president and COO of the company. Hartsfield has also been an active member of PCI for more than 40 years. He received his bachelor's degree in civil engineering and master's degree in civil/structural engineering from the University of Cincinnati.

Sean Nohelty

Principal, David M. Schwartz Architects, Washington, D.C.

Sean Nohelty is a principal at David M. Schwarz Architects and serves as corporate secretary and project manager. He joined the firm in 1997, shortly after receiving his bachelor of architecture degree from the University of Notre Dame School of Architecture. Sean is a registered architect in the District of Columbia and in Texas, and holds LEED AP BD+C accreditation.

Outside the office, Nohelty is actively involved in the Institute of Classical Architecture & Art and the American Institute of Architects. He has also served two terms as a member of the Notre Dame School of Architecture Advisory Council.

Moses Vaughan

Associate senior architect at WRNS Studio, San Francisco, Calif.

Moses Vaughan is an associate senior architect at WRNS Studio in San Francisco. With almost 30 years of experience, he has built his practice of design on the idea that a comprehensive understanding of the tools and methods of construction always results in a more evocative architecture. A strong proponent of empirical and iterative design, he often builds hand-crafted prototypes, which lead to formal mock-ups and more detailed vendor-produced samples, all intended to prove (or refute) the validity of specific design solutions.

Vaughan helped develop innovative curtain wall envelopes for SOM, Ellerbe Beckett, and others prior to joining WRNS Studio. He has woven these into many high-profile projects, including new work for Adobe, UCSF Mission Bay, Intuit, Dolby, and the Trust for Public Land. He is a licensed architect in California, and received his bachelor of architecture from Cornell University College of Architecture, Art and Planning.

Keauhou Lane Honolulu, Hawaii

Photos: hi•arch•y llp.

Hawaii is known for its commitment to sustainable energy, agriculture, and building practices. So it's no surprise that this year's Sustainable Design Award goes to Keauhou Lane, a six-story mixed-use precast concrete building in Honolulu that is home to restaurants, retail, and affordable residential units.

"This project represents the first LEED-certified affordable rental mixed-use project delivered in the state of Hawaii," says Jennifer Camp, principal of hi•arch•y llp, the Honolulu-based architect. This project is special because it proves that green buildings can be accomplished with limited resources.

From the start, the project faced serious budget constraints that were exacerbated by rising labor prices in the market, Camp says. Her team looked at several material options to meet the budget requirements, and the estimating analysis showed precast concrete delivered a significant savings over other approaches. "Precast was able to offer a stable product that was fairly insulated from the chaotic swings we were seeing in other deliverable structural systems," she says. "The bulk of the deliverable product could be single-sourced from a reputable supplier who utilized in-house labor and was willing to work with the team to hold budgetary estimates through design until a firm contract was locked down." Using precast concrete also shaved months off the erection time and allowed rough-in and finishes to commence sooner than any of the other options available.

"The affordability of the precast approach literally made this project viable." Jennifer Camp, hi•arch•y llp

A NEW KIND OF DOUBLE TEE

Despite the many cost-saving benefits of precast concrete, the project faced ongoing financial challenges. Early in the design process, the team went through a round of value engineering where the schematic design was stripped of many key features, and some worried whether the project would ever be completed. However, through close collaborations with GPRM Prestress, Camp's team was able to gain new efficiencies through the use of repetitive shear panels and by maximizing the use of hollow-core slabs to span three separate units. In doing so, the unit count and the construction efficiency increased, which benefitted the development and reduced construction costs, she says. "Without the savings that were ultimately realized through the design team's collaboration with the precast team, the project might not have made it beyond design."

OWNER:
Gerding Edlen, San Francisco, Calif.

PCI-CERTIFIED PRECAST CONCRETE PRODUCER:
GPRM Prestress, Kapolei, Hawaii

PRECAST CONCRETE DETAILER:
DesignCast LLC, Broomfield, Colo.

ARCHITECT:
hi•arch•y llp, Honolulu, Hawaii

ENGINEER OF RECORD:
Allison-Ide Structural Engineering LLC, Honolulu, Hawaii

GENERAL CONTRACTOR:
Hawaiian Dredging Construction Company, Honolulu, Hawaii

PROJECT COST:
$54.16 million

PROJECT SIZE:
80,430 ft²

The precast concrete producer and designers also worked together to develop a hybrid precast concrete double tee with lowered outwings on the flanges, which could structurally engage the double-loaded corridors while providing increased headroom and space for mechanicals and piping. “We created a brand-new shape to meet the requirements of the project,” says Les Kempers, vice president of GPRM in Kapolei, Hawaii. The new design, dubbed the “low-winged double tee,” allowed utility and waste stack penetrations to occur through the flanges, saving significant time and expense.

To help ease the disappointment over losing many of the architectural attributes due to budget constraints, GPRM created a series of triangular fin walls in critical locations, which allowed the precast concrete interior walls to protrude to the exterior of the building and replicate the aluminum fins that had previously been valued-out of the project. “It was a game-changer from a design standpoint,” Kempers says. “It kept the budget in check while providing a desired design feature, which made the designers and the owners happy.” Precast concrete erection was completed on March 28, 2017, and the grand opening occurred in late November 2017.

While the project team had originally planned to pursue LEED gold certification, thanks to the extensive collaboration between the designer, contractor, and precast concrete producer, they exceeded their sustainability goals and are now pursuing LEED platinum—the highest rating for these structures. “The use of precast concrete for this project, which was all locally sourced and fabricated within a short drive from the jobsite, helped the team to pursue LEED platinum,” Camp says. It will also help the team secure points for innovative design, environmentally preferable products, off-site fabrication, and construction waste reduction.

Camp argues that this is more than just a LEED success story. It is proof that LEED can be done on a budget. “It represents a new standard in being able to deliver a product that is both affordable and sustainable, which is something every community sorely needs.”

Key Project Attributes

- Precast concrete helped meet very tight budget constraints with a sustainable design.
- Hollow-core slabs span three separate units, adding further savings.
- The project expects to achieve LEED platinum, the highest certification possible.

Project and Precast Concrete Scope

- Build a six-story, 180,000-ft^2 mixed-use building with affordable housing.
- Precast concrete elements include 2221 pieces, totaling over 280,000 ft^2.
- Project was completed in 18 months, and precast concrete erection was completed in nine months.

The Phillip and Patricia Frost Museum of Science Miami, Fla.

Photos: Gate Precast Company.

This year's winner of the Harry H. Edwards Industry Advancement Award proves that precast concrete can be used to deliver even the most complicated design ideas in a high-performance, cost-effective package. Designers of the Phillip and Patricia Frost Museum of Science in Miami, Fla., wanted to create a structure that would surprise and delight patrons before they even walk through the door. Their solution was to create a three-dimensional façade and construct a massive, dome-shaped planetarium with cutting-edge acoustics and a surface so smooth it can be used as a movie screen.

The resulting six-story museum features open-air parking covered by five stories of museum comprising approximately 250,000 ft² of interior and exterior space. The most prominent element of the design is the freestanding 67-ft-diameter dome, which houses the planetarium theater. While designers hadn't initially considered precast concrete for any part of the project, their early research determined it was the most flexible and durable solution, particularly for the dome.

"After looking at a steel structure to support cladding panels of different materials, and considering a shotcrete dome, self-supporting spherical precast concrete structural panels proved to be the most cost effective solution," says James Palma, senior project manager at Rodriguez and Quiroga Architects Chartered. "It provided the density required for acoustics, the durable structure, and a light sandblast finish that was the perfect projection surface."

"I have successfully completed many projects in my career that used precast concrete cladding as the exterior building enclosure system, but I am especially proud of the unique way we used it in the Frost Museum of Science project."
Jim Palma, Rodriguez and Quiroga Architects Chartered

HOME OF THE DOME

Once other cladding options were abandoned, the designers worked closely with Gate Precast Company to develop the concept using precast concrete as cladding and as the

OWNER:
The Phillip and Patricia Frost Museum of Science, Miami, Fla.

PCI-CERTIFIED PRECAST CONCRETE PRODUCER:
Gate Precast Company, Kissimmee, Fla.

PRECAST CONCRETE SPECIALTY ENGINEER:
eConstruct, Omaha, Neb.

ARCHITECT:
Rodriguez and Quiroga Architects Chartered, Coral Gables, Fla.

EXECUTIVE ARCHITECT:
Grimshaw Architects, New York, N.Y.

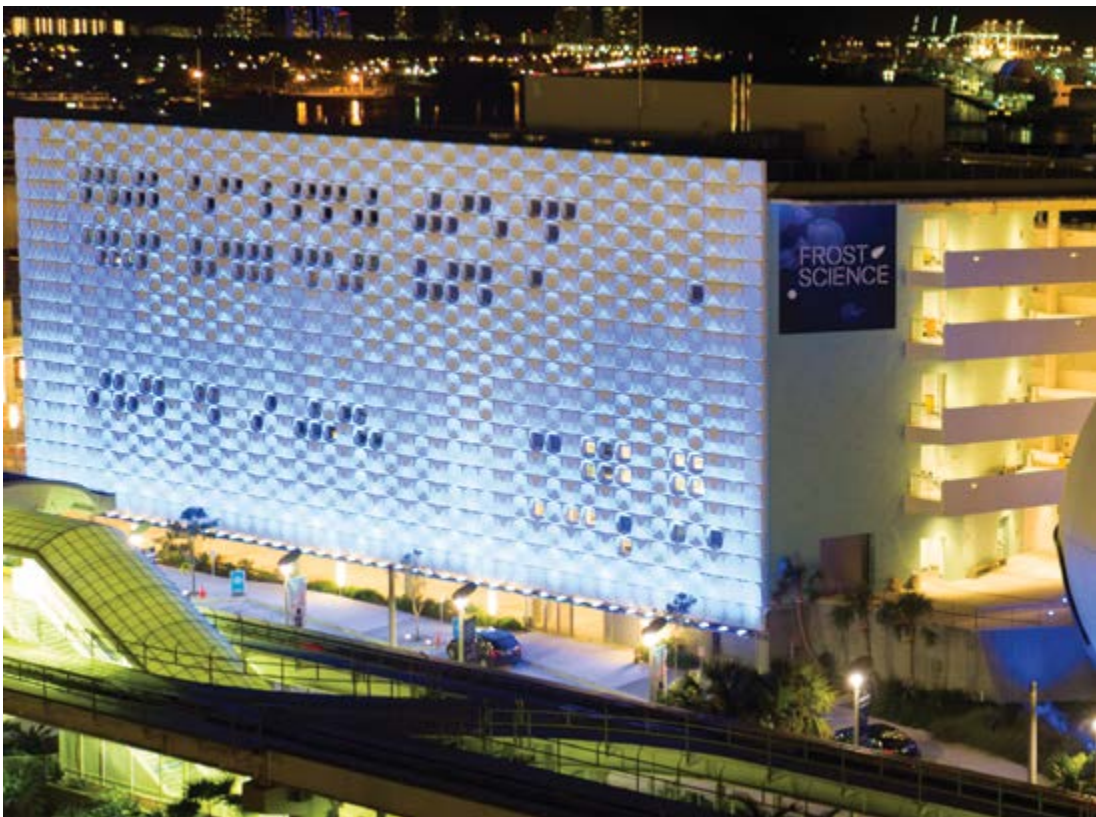
STRUCTURAL ENGINEER OF RECORD:
Donnell Duquesne & Albaisa, Miami, Fla.

MEP ENGINEERS:
Fraga Engineers, Coral Gables, Fla.

GENERAL CONTRACTOR:
Skanska, Fort Lauderdale, Fla.

PCI-CERTIFIED ERECTOR:
Specialty Concrete Services Inc., Umatilla, Fla.

PROJECT SIZE:
250,000 ft²



dome's structure. The use of three-dimensional modeling was vital to ensuring every piece fit perfectly, and addressing any errors in design before construction began, Palma says.

The dome cap, dubbed the Arctic Circle, was formed from two cap pieces combined to make a 30-ft-diameter keystone. The fabrication and quality assurance teams used a laser total station for layout and verification to achieve the perfectly round design. The cap was then made by placing concrete successively around the outer perimeter of the mold once the backform was in place. Each cap piece required 17 yards of architectural concrete.

The dome panels were cast exterior-face-down, with a top interior face form to address the significant curvature. Each panel has a continuous ledge at the bottom to allow it to be set on the cast-in-place foundation wall, which was also curved to match the dome curvature. To eliminate cracking during any of the stages of production and construction, monostrand post-tensioning anchored at the top and bottom of the panel was used.

To avoid damage in shipping and erection, jobsite conditions were mimicked at the plant, including lifting pieces off the truck, and tilting and hanging them from a crane. Due to the requirement that no embeds were allowed for handling on the exterior face, steel-rope cables were attached to the underside of the pieces and wrapped on the sides. This innovative solution allowed the lifting device to fit in the gap between peel panels and then to be removed after all of the panels were installed.

Once on the jobsite, the precast concrete cap was installed first, supported by a temporary custom shoring tower, then the spherical sections were installed and welded together "once the scaffolding was removed, making the dome completely self-supporting," Palma says.

Along with the dome, patrons also love the unique geometric three-dimensional relief pattern on the façade of the north and west buildings. Gate created the design by combining 16 different geodesic shapes in various configurations on 95 panels. "The random patterning meant that almost no two panels are the same", Palma says.

The Phillip and Patricia Frost Museum of Science is now among the world's most innovative and sustainable science museums. "Miami has a rich history of using precast concrete in its civic architecture," Palma says. "This design adds the most unique use of precast to this rich collection."

Key Project Attributes

- Precast concrete was used to create a massive, free-standing dome, 67 ft in diameter.
- The dome cap mold had no square edges, requiring fabrication and quality assurance teams to use a laser total station for layout and verification.
- The three-dimensional façade features 16 different geodesic shapes combined in various configurations to reflect elements from nature.

Project and Precast Concrete Scope

- Precast concrete components include cladding panels for the museum's north and west buildings, and dome segments connected by two precast concrete cap pieces to complete a full-sphere planetarium.
- The dome features a sandblasted finish suitable for projection.
- The project was submitted for LEED gold certification and museum operators plan to share data on its sustainability with visitors.

OWNER:
City of Roseville, Roseville, Calif.

PCI-CERTIFIED PRECAST CONCRETE PRODUCER:
Clark Pacific, West Sacramento, Calif.

ARCHITECT:
LPAS Architecture + Design, Sacramento, Calif.

ENGINEER OF RECORD:
Buehler & Buehler Structural Engineers Inc., Sacramento, Calif.

GENERAL CONTRACTOR:
DPR Construction, Sacramento, Calif.

PROJECT COST:
$21 million

PROJECT SIZE:
82,944 ft²

Roseville City Hall Annex Roseville, Calif.

The new City Hall Annex in Roseville, Calif., is the first precast concrete building ever built in this rapidly growing city, and the first to be accredited by the U.S. Resiliency Council (USRC) for its seismic capacity.

But its strength is not the only attribute that makes this structure special. As the most prominent building downtown, the owners wanted a structure that would convey a sense of stability and stature appropriate for an important civic building, without overshadowing the City Hall next door. It was also important to demonstrate responsible use of public funds.

Like many award-winning projects this year, design of the annex did not initially include precast concrete. However, during schematic design, the project team determined that switching from steel to a precast concrete structure would result in multiple benefits for the city. "Precast concrete was a building material that provided durability, structural reliability, sustainability, and provided the presence of a stable and permanent civic structure," says Curtis Owyang, vice president and principal at LPAS Architecture + Design in Sacramento, Calif.

"The level of performance associated with the USRC platinum rating is not something every building can achieve, but this project met that standard." Farid Ibrahim, Clark Pacific

During the design phase, the precast concrete producer presented value-engineering ideas that removed columns and used double tees to create 56-ft spans, with hollow-core slab for the remaining 28-ft span. That concept reduced costs and helped get precast concrete within the cost range of the steel system, while lowering long-term maintenance costs. The panels used integral colored concrete with three different levels of sandblast to mimic the architecture of City Hall, says Farid Ibrahim, director of preconstruction services at Clark Pacific in West Sacramento, Calif. "The recessed windows set in the precast exterior also recall the pattern, proportions, and detailing of City Hall." The use of precast concrete also helped meet the tight 12-month deadline.

Photos: Clark Pacific.

STRONGER THAN STEEL

One of the most unique attributes of this project was the use of a precast hybrid moment frame for seismic resistance. This system uses precast concrete column and beam elements connected with reinforcing bars and post-tensioning to absorb energy caused by movement of the joint while simultaneously holding the joint together during an earthquake. "It has the unique ability to self-right after a major seismic event," Ibrahim says. Internally, the use of the precast hybrid moment frame system also allowed for the elimination of two lines of columns, opening up the space and providing more flexibility for planning.

No less than 538 precast concrete pieces, including panels, columns, beams, walls, double tees, and hollow-core slabs, were manufactured off-site in just 10 weeks. Casting the pieces off-site helped ease congestion and allowed for "just-in-time" delivery of pieces to the jobsite. The carefully scheduled delivery process kept the project on track, and the entire structure was erected in just 38 days. "Precast construction was efficient from a material use standpoint as well," Ibrahim says. "By fabricating the building parts in a controlled facility, a higher degree of precision can be attained while minimizing wasted material and time."

The result is an efficient, functional, resilient, and cost-effective building that effortlessly fits into the fabric of the community. Referring to the project, Mike Isom, development services manager at City of Roseville, says: "We have an obligation to our local taxpayers that we're being as efficient as possible with the resources we have available. Clark Pacific has gone a long way in helping us to do that."

Key Project Attributes

- Precast concrete design cost the same as steel, but delivered a more durable and lower-maintenance solution.
- Precast hybrid moment frame design led to a platinum rating by USRC.
- Architectural façade doubles as a redundant structural system, providing enhanced economic performance.

Project and Precast Concrete Scope

- Construct an all–precast concrete, four-story, 82,000-ft^2 civic building.
- Precast concrete elements comprise 538 pieces, including 55 column covers, 46 girders, 33 spandrels, 48 moment beams, 201 slabs, 103 tees, 17 walls, 16 moment columns, and 19 gravity columns.
- Precast concrete structure was erected in just 38 days.

Port of Juneau Cruise Ship Terminal Concrete Pontoons Juneau, Alaska

The cruise ship terminal in Juneau, Alaska, is essential for the city's economy. However, the recent evolution of Panamax and post-Panamax cruise ships, which can be more than 1000 ft long, was overwhelming the port. The capacity of the old pile-supported timber dock was limited to simultaneous berthing of one 800-ft-long and one 1000-ft-long cruise ship, preventing larger ships from docking simultaneously.

As a solution, the harbor owners wanted a replacement dock with floating berths that created enough space to accommodate simultaneous berthing of one 1000-ft-long and one 1100-ft-long cruise ship, explains Yeliz Firat, senior engineer at BergerABAM in Federal Way, Wash. "The floating nature of the pontoons provided the added value of being able to load and unload passengers even during significant tidal fluctuations, without the need for complex operations."

"I love the fact that I can demonstrate to those who are in disbelief that a concrete box of significant size can indeed float." Yeliz Firat, BergerABAM.

Photos: BergerABAM.

1000 NAUTICAL MILES

The owners needed a low-maintenance solution that would remain durable for 50 years, which first led them to precast concrete. Unlike steel berths, which are highly dependent on periodic dry-dock maintenance, precast concrete requires minimal effort, Firat notes. "The maintenance of concrete pontoons is minimized by using appropriate concrete cover, detailing, materials, and corrosion-prevention measures during design and construction,"

The precast concrete pontoons could also meet strict criteria for the design freeboard, which is the vertical distance at the ship's side between the waterline and the deck. Freeboard requirements were set at 8 ft, with a tolerance of just plus or minus 1 in. "The freeboard is governed by the weight and the height of the pontoons, so the geometry and thickness of the hull plating had to be monitored and controlled diligently," Firat says. "Precasting the walls and the deck panels in a controlled environment was instrumental in controlling the weight."

OWNER:
City and Borough of Juneau, Alaska

PCI-CERTIFIED PRECAST CONCRETE PRODUCER:
Concrete Technology Corporation, Tacoma, Wash.

ENGINEER OF RECORD:
BergerABAM, Federal Way, Wash.

GENERAL CONTRACTOR:
Manson Construction Company, Seattle, Wash.

PROJECT COST:
$54 million

PROJECT SIZE:
300 and 400 ft

Precast concrete also lent itself to constraints of the jobsite. The project had to be completed between October 2015 and May 2017, with no disruptions to terminal operations from May through September. The two all–precast concrete pontoons—measuring 300 and 400 ft in length—were fabricated simultaneously in the dry-dock of Concrete Technology Corporation's precast plant in Tacoma, Wash., then towed 1000 nautical miles to Juneau to meet the designated timeline for on-site installation. "Simultaneous fabrication of both pontoons in the dry dock not only enabled meeting the critical towing schedule and favorable towing conditions, it also made the construction of two pontoons of significant size cost-effective by optimizing mobilization," says Firat. Both pontoons were completed and launched from the dry dock in February 2016.

In May of 2016, the Juneau Cruise Ship Terminal completed installation of the all–precast, prestressed concrete floating pontoons that now serve as loading berths for the one-million-plus tourists who pass through the Alaskan harbor every year. Both the designers and owners are pleased with the results of this novel use of precast concrete. "We love the concrete pontoons because they are aesthetically pleasing and not obtrusive along our waterfront," says Gary H. Gillette, port engineer for the city and borough of Juneau. Along with providing the harbor with two sturdy, durable, and non-slip structures that are stable in all sea conditions, the wide, open docks have become a gathering spot for Juneau residents and home to events throughout the year.

Key Project Attributes

- Each pontoon is a precast, prestressed concrete box beam internally divided into 18 watertight cells through interior bulkheads.
- The precast concrete pontoons were fabricated in Washington State and towed 1000 nautical miles to the jobsite.
- Precasting both pontoons simultaneously enabled replacement of the 2000-ft-long berth within schedule.

Project and Precast Concrete Scope

- Build two floating precast concrete berths to accommodate Panamax and post-Panamax cruise ships.
- South-berth pontoon is 300 ft long and 50 ft wide; the north-berth pontoon is 400 ft long and 50 ft wide.
- In-situ weights are 1500 kip for the south-berth pontoon and 15,500 kip for the north-berth pontoon.

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Bill Blanski

Design principal, HGA, Minneapolis, Minn.

Bill Blanski is a nationally recognized architect and design principal at HGA who focuses on designing environments that inspire people to be creative, innovative, and professionally productive.

For more than 20 years, he has designed award-winning projects for arts, education, health-care, corporate, and government clients. He approaches each project from the client's perspective to design solutions that accomplish their goals effectively and creatively.

Blanski was awarded the prestigious Ralph Rapson Traveling Fellowship in 1999. He received his bachelor of architecture degree from the University of Minnesota.

Beth Broome

Managing editor, *Architectural Record* magazine, Brooklyn, N.Y.

Beth Broome is managing editor of *Architectural Record* magazine, the 125-year-old, award-winning publication from McGraw-Hill that features a mix of current work, design trends, news, building science, and business strategies. In her role, Broome oversees the day-to-day operations, planning, and production of the print magazine and website. She also edits and writes on a range of projects, events, and issues, and participates in juries and forums at academic institutions and for professional organizations.

A native of Boston, Mass., Broome lives in Brooklyn, N.Y., and is a former managing editor of *The New York Observer*. She received her degree from Tufts University in 1991

Matt Graf

Executive vice president, International Concrete Products, Germantown, Wis.

Matt Graf, executive vice president of International Concrete Products, encountered his first piece of precast concrete in 1977 while working during summers before college, and he never looked back. Over the past 35 years, he has held numerous jobs in the architectural precast concrete industry, including building forms, tying reinforcing steel, placing and patching concrete, dispatching, overseeing field finishing, and ultimately managing projects. His firsthand experience in these roles has given him a thorough understanding of the product and the knowledge to overcome many of the challenges project teams regularly face in this industry. He is a firm believer that the customer is always right and that we need to be fair and honest to deliver the highest quality and best products available to our customers.

Graf received his bachelor's degree in structural engineering from the University of Wisconsin–Milwaukee.

Marty Huie

Senior projects architect, Jacobs Engineering Group, Dallas, Tex.

As a senior projects architect and code and life-safety firm-wide resource for Jacobs Engineering Group, Marty Huie frequently challenges established concepts and synthesizes complicated and often conflicting requirements from clients and the construction trade industry. With the ability to truly listen and then respond with outside-the-box thinking, he has the bold ambition to alter the industry. He works closely with his clients to navigate the regulatory requirements for health-care facilities, communicate their impact on the design of these facilities, and generate innovative design solutions.

He educates clients and the design community through in-person and association presentations nationally, as well as writing for recognized industry publications. Huie has served as a National Fire Protection Association (NFPA) Healthcare Subcommittee member since 2004, and has actively debated code issues on the floor at the NFPA national committee meeting. He received his bachelor of architecture degree from Louisiana Tech University.

Capitol Federal Hall, University of Kansas

Lawrence, Kans.

Building on the momentum of its national ranking and increasing enrollment, the University of Kansas School of Business in Lawrence, Kans., wanted to build a brand-new facility that would represent its commitment to a campus-wide culture of entrepreneurship. The architects of the 166,500 ft², four-story building wanted the design to reflect the entrepreneurial and collaborative spirit of the School of Business while making broader connections to the campus through geometry and sectional properties. They also wanted a structure that could be constructed quickly with minimal disruption to the busy college campus. To achieve these goals, they chose a combination of glass, steel, and precast concrete to create a soaring, modern structure that suggests strength, durability, and connectivity through its design.

"This entrepreneurial spirit inspired the design to promote multiple manifestations of "connectivity" through building shape, programmatic relationships, and spatial weaving." Dirk McClure, Enterprise Precast Concrete Inc.

PLAYS WELL WITH OTHERS

The building consists of two wings linked by an expansive four-story glass atrium, which serves as a connector between the building's major program elements and a variety of informal spaces. "The visual flexibility and modular nature of precast made it a natural choice for the majority of the exterior façade," says Dirk McClure, regional director of sales and business development for Enterprise Precast Concrete Inc. in Omaha, Neb.

A key design decision made early on was to use a series of insulated panels in place of more traditional architectural cladding, to take advantage of the high-performance characteristics of precast concrete, McClure says. The primary design is broken up as a 4-4-4 panel; however, portions of the surface wythe protrude as much as 10 in. at the apex of a "V" pattern in the design.

OWNER:
The University of Kansas, Lawrence, Kans.

PCI-CERTIFIED PRECAST CONCRETE PRODUCER & PRECAST CONCRETE SPECIALTY ENGINEER:
Enterprise Precast Concrete Inc., Omaha, Neb.

ARCHITECT:
Gensler & Associates Inc., Chicago, Ill.

ARCHITECT OF RECORD:
GastingerWalker&, Kansas City, Mo.

ENGINEER OF RECORD:
Bob D. Campbell and Company, Kansas City, Mo.

GENERAL CONTRACTOR:
JE Dunn Construction, Kansas City, Mo.

PROJECT COST:
$70.5 million

PROJECT SIZE:
166,500 ft²

Photos: Enterprise Precast Concrete Inc. and Jacia Phillips Photography.

The predominantly cream-colored precast concrete panels are accented by a series of copper panels to break up the look of the façade. The slight inset of the panels further creates a shadow effect that varies as the sun moves. “Combined with the glass and steel, this is truly an example of precast playing well with other materials,” McClure says.

From a structural standpoint, insulated spandrels span column-to-column and hang off steel haunches. “Through careful planning and coordination, a lot of weight was able to be braced back to the structure as it was suspended off the steel,” McClure says. Short insulated panels spanned long spans, transferring the loads back to the columns.

Going with an exposed precast concrete design added durability and reduced maintenance requirements, while also giving all the energy efficiency benefits of an insulated precast concrete panel.

Along with delivering a beautiful and durable design that will serve the campus for decades, the project came in ahead of schedule and under budget. This was due in part to the extensive use of building information modeling during preconstruction for coordination of overhead services, McClure reports. “It resulted in zero ceiling height changes and reduced the overhead mechanical, electrical, and plumbing rough-in work from 40 days to 25 days per floor per wing.”

Key Project Attributes

- Unique tapered panel design features portions of the surface wythe protruding as much as 10 in. at the apex.
- A sharp slope at the end of the cladding creates a striking cantilever.
- Insulated spandrels span column to column, hanging off steel haunches.

Project and Precast Concrete Scope

- Create a glass, steel, and precast concrete design for a four-story university building.
- The project features 49,165 ft^2 of precast concrete, varying from 18 in. to 12 ft.
- Precast concrete installation was completed in just four months.

University of Chicago Campus North Residential Commons Chicago, Ill.

Photo: International Concrete Products.

The Gothic architecture of the University of Chicago, Ill., founded in 1890, was chosen specifically to convey a sense of history, seriousness, and intellectual fortitude. Over the years, the university has remained committed to the Gothic and neo-Gothic design aesthetic, creating a community defined by its pointed arches, vaulted ceilings, and light, airy interiors.

When Studio Gang Architects was hired to design a three-building, multistory addition to house 800 students on campus, they knew it had to stay true to the style. "The biggest challenge was how to respond to the University of Chicago's architectural context in a contemporary way," says Emily Licht, a design team member in Studio Gang's Chicago office.

They needed a material that could mimic the look of carved stone but could also be delivered on a tight timeline and within a limited budget. These demands led them to precast concrete. "The precast concrete panels allowed the design to emulate the collegiate Gothic tradition, updating this traditional architecture through form, rhythm, verticality, and scale," Licht says. "They were also an affordable option that were able to be produced not too far away, in Wisconsin, expediting the delivery schedule."

"The precast concrete panels allowed the design to respond to the collegiate Gothic architectural context of the university, reinterpreting the tracery and depth of the carved limestone buildings without the cost or labor that stone would have required." Emily Licht, Studio Gang

The goal of the new project was to create a gateway connecting the campus and community with plazas, gardens, walkways, courtyards, and retail space. The housing would include shared entryways, lounges, reading rooms, classrooms, and dining commons, as well as outdoor spaces meant to encourage interactions between students.

"The precast concrete panels serve as the primary visual element of the entire project," Licht says. The façade of the new structures features brilliant white precast concrete panels that have an added sparkle, which plays off the coloration of the surrounding limestone architecture. Each panel has an acid-etch finish with subtle arcs that come to a point and twist up and down each of the three buildings in varying directions. "The arcs pay tribute to the university's history of architecture," she says.

OWNER:
University of Chicago, Chicago, Ill.

PCI-CERTIFIED PRECAST CONCRETE PRODUCER:
International Concrete Products Inc., Germantown, Wis.

PRECAST CONCRETE ENGINEER:
Midwest Structure Engineering, West Allis, Wis.

ARCHITECT:
Studio Gang, Chicago, Ill.

ENGINEER OF RECORD:
Magnusson Klemencic Associates, Chicago, Ill.

GENERAL CONTRACTOR:
Mortenson Construction, Itasca, Ill.

PCI-CERTIFIED ERECTOR:
Creative Erectors LLC, Rockford, Ill.

PROJECT COST:
$148 million

PROJECT SIZE:
400,000 ft²

Photo: Tommy Harris Photography.

Photo: Tommy Harris Photography.

The depths on the panels provide the sun shading and the thermal mass necessary for a radiant slab heating and cooling system. To achieve thermal performance, spray foam insulation was applied to the backs of the precast concrete panels, which helped eliminate the need for a rain screen system. The design of the precast concrete panels and window system also allows maximum natural light and fresh air into the building, Licht says. "The precast concrete panels provide the durability necessary for a building designed to be a long-lasting home for hundreds of students each year."

MOCK-UP USED AS TRAINING TOOL

To ensure the precast concrete elements would exactly meet the specifications of the architect, a two-story mock-up was produced prior to construction. "The mock-up not only provided the architect with a visual of how the building would look, but it provided a training session for all trades to practice how the building was going to come together," says Therese Hurley, business development manager for International Concrete Products.

The precast concrete producer then created 156 custom molds to produce more than 1000 panels. Because of the unique shapes and the fact that they had to be stored and shipped facedown, special cradles were produced to keep the sharp points and arcs safe during transport. "The cradles were so unique that they were later incorporated as benches in the garden on campus," Hurley says.

The final design met all of the owner's and architect's goals, and fits seamlessly with surrounding structures. "The panels helped the building fit comfortably within the Gothic tradition of the campus, complementing the university's past without competing with it," Licht says. "It serves as a beacon and portal that anchors the northeast edge of the campus, creating a new front door for the university."

Key Project Attributes

- Precast concrete easily mimics the Gothic architecture of the university campus.
- Precast concrete panels offer solar shading and provide thermal mass for a two-way radiant heating slab system.
- The weatherproof features of precast concrete eliminated the need for a rain screen.

Project and Precast Concrete Scope

- 156 custom molds were used to produce 1033 panels, 61 of which were unique in shape.
- The project used 148,448 ft^2 of precast concrete.
- Precast concrete erection was completed in nine months.

OWNER:
Hospitality 3, New York, N.Y.

PCI-CERTIFIED PRECAST CONCRETE PRODUCER & PRECAST CONCRETE SPECIALTY ENGINEER:
Universal Concrete Products, Stowe, Pa.

ARCHITECT:
DIGSAU, Philadelphia, Pa.

ENGINEER OF RECORD:
DeSimone Consulting Engineers, New Haven, Conn.

GENERAL CONTRACTOR:
P. Agnes, Philadelphia, Pa.

PCI-CERTIFIED ERECTOR:
Jemco Erectors, Shamong, N.J.

PROJECT COST:
$50 million

PROJECT SIZE:
149,000 ft^2

The Study at University City Philadelphia, Pa.

The Study at University City is a 10-story luxury hotel at the intersection of two world-class universities in the heart of Philadelphia, Pa. "The owner of the project envisioned a high-quality, robust structure that reflected the traditions of the buildings in Philadelphia," says Jeff Goldstein, principal at DIGSAU, the Philadelphia-based architecture firm.

The challenge: erecting this sophisticated piece of architecture on a tight jobsite, in a busy urban environment, and on a short schedule.

Initially, brick emerged as the most appropriate material to convey the owner's design aesthetic. However, a fully brick structure would have been time- and cost-intensive to construct, which conflicted with the timeline. "The team was motivated to enclose the structure as quickly as possible to allow for interior finish work to begin," Goldstein says.

"The precast concrete panels are a nod to both the tradition and culture of bricklaying, while reflecting more modern building methods such as panelization and mass production."
Jeff Goldstein, DIGSAU

Instead, the designers went with precast concrete, designing panels faced with thin brick to provide the look and feel of brick in a more time- and cost-effective package. "Choosing precast satisfied the design and performance requirements of the project, and minimized expensive field labor working on the tight urban site," he says. The precast concrete panels are also a lighter envelope solution than traditional brick masonry, which was important for managing the vertical and lateral loads imposed on a cast-in-place concrete structural frame.

Photos: DIGSAU.

BRICK, ONLY BETTER

The final design features a façade composed of solid precast concrete panels containing ironspot thin brick in a three-dimensional garden-wall bond pattern, which is a popular architectural theme in many of Philadelphia's historic buildings. The precast concrete producers used bricks of multiple thicknesses, which required custom formliners to produce a highly textured and stealthily repetitive design. "The ability to generate a unique, three-dimensional brick bond allowed the precast wall assembly to take on a crafted, hand-made quality that greatly contributes to the building's presence and character," Goldstein says.

The panels were stacked in an offset pattern at corners, and custom brick shapes were used to wrap the exposed jambs and soffits of the panels. Metal trim was incorporated along select vertical joints to obscure the stacked arrangement of the panels. High-density mineral wool insulation with foil facing was incorporated into the panels to provide a continuous thermal barrier behind the panels and across joints.

"We really got excited about the opportunity to work within the tried-and-true methods of fabricating precast panels," Goldstein says. The use of cast thin-brick precast concrete panels balanced the contextual references and provided a cost-effective façade solution. "It gave us a way to create something that reflected the hands of the skilled craftspeople who contributed to their creation."

Key Project Attributes

- Thin-brick veneer delivered the look and feel of brick for a lower cost and with speedier erection.
- High-density mineral wool insulation with foil facing ensured a continuous thermal barrier.
- The use of custom formworks maximized the interchangeability and appearance of the complex and dynamic façade.

Project and Precast Concrete Scope

- Create a façade of solid precast concrete panels with thin-brick veneer for a 10-story 145,000 ft^2 hotel.
- Six custom oversized forms were used to form over 500 panels.
- The precast concrete exterior wall panels are supported by a cast-in-place concrete frame.

Universal Alloy Light Press Plant

Ball Ground, Ga.

Photos: Metromont Corp.

In the last half century, many manufacturing buildings have been constructed using precast concrete. However, despite the incredible versatility in color, texture, and detail that can be achieved with precast concrete designs, these buildings tend to be simple, utilitarian boxes with little design flair. "Most designers are not given the support to take advantage of the unique properties of precast concrete to add enhanced architectural details," says George Spence, business development manager for Metromont Corp. in Hiram, Ga.

That was the not the case with the new 110,348-ft^2 Universal Alloy light press plant in Ball Ground, Ga. This plant is an example of how an innovative designer can create a beautiful, detailed design using precast concrete in a way that adds virtually no additional costs to the project, Spence says. "Yet it yields an eye-catching façade that is truly handsome."

"The durable, high-strength concrete used in casting these wall panels provides the owner with a maintenance-free wall system that was delivered at a very economical cost per square foot." George Spence, Metromont Corp.

BIG AND BEAUTIFUL

The design for the plant, which will manufacture high-strength extrusions for the aircraft industry, included 106,000 ft^2 of manufacturing space, along with a 90-ft-high bay for vertical heat treat equipment, and three 75-ft-deep pits for loading and quenching the aluminum extrusions.

OWNER:
Universal Alloy Corp., Atlanta Ga.

PCI-CERTIFIED PRECAST CONCRETE PRODUCER:
Metromont Corp., Hiram, Ga.

PCI-CERTIFIED ERECTOR:
Precision Stone, Hiram, Ga.

ARCHITECT:
Querkraft Architects, Vienna, Austria

ENGINEER OF RECORD:
Haines, Gipson & Associates, Lawrenceville, Ga.

GENERAL CONTRACTOR:
Choate Construction Company, Atlanta, Ga.

ADDITIONAL TEAM MEMBERS:
Wakefield Beasley & Associates, Alpharetta, Ga.

PROJECT COST:
$16 million

PROJECT SIZE:
110,348 ft^2

The owner and design team chose load-bearing precast concrete panels to avoid weather delays during construction, and to take advantage of the superior structural advantages. They went with 12-ft-wide, full-height panels to reduce the piece count and erection duration, which improved the overall job schedule and reduced the number of trades on site. “The decision to use insulated wall panels immediately provided a complete wall assembly that was load-bearing, finished on both sides, and waterproof with an air and moisture barrier,” Spence says.

The panels included C-Grid carbon-fiber mesh, which is equivalent to welded-wire fabric but without the thermal bridging, which meant they could be insulated to meet the energy code and still be designed as a composite structural element. The panels also span structurally from the foundation to the roof structure, which eliminated the need for additional wind braces, further benefitting the cost and schedule.

Spence is quick to point out that the benefits of precast concrete on this project expand beyond performance and durability. It is also beautiful to look at, thanks to a façade that appears to be three-dimensional (3-D), an effect achieved through the innovative use of color, texture, and design. “Painted vertical accent stripes on the panels in combination with saw-tooth tops create a 3-D illusion that the panels project in and out like an accordion, adding architectural pizzazz to this rectangular manufacturing plant,” Spence says. “I’ve been in the precast concrete business for 45 years, and this is one of the most fascinating projects I’ve been involved in building.”

Key Project Attributes

- Sandwich panels with carbon-fiber grid provide the strength to withstand wind loads and carry roof loads.
- Novel use of striping creates a 3-D accordion effect on the façade.
- Piece count and erection duration were reduced with 12-ft-wide, full-height panels.

Project and Precast Concrete Scope

- Project included 65,886 ft^2 of carbon-cast high-performance insulated wall panels.
- The tallest panel is 46 ft 10 in. and the heaviest panel weighs 51,502 lb.
- Both wythes of the insulated panels are prestressed to give them beam strength and load-bearing capacity.

4260 Cortex St. Louis, Mo.

The Cortex Innovation Community is home to a vibrant 200-acre innovation hub and technology district in the historic Central West End of St. Louis, Mo. When the owners decided to build an additional mixed-use structure that could act as a gateway to the hub, they turned to CannonDesign in St. Louis to create a building that would measure up to the nationally ranked universities and medical centers in the surrounding neighborhood, while achieving pedestrian scale to invigorate a walkable community. "CannonDesign had a very specific idea of what they were looking to achieve aesthetically very early on in this process," says Dirk McClure, regional director of business development for Enterprise Precast in Overland, Kans.

However, they faced challenges in how to construct the building in the busy urban environment. The project site was flanked on three sides by heavily trafficked streets, says Craig Norman, vice president at CannonDesign. The construction schedule was also aggressive, set to meet tenant move-in date commitments, which put added emphasis on enclosing the building quickly. "Precast was selected as an enclosure material as it could be fabricated remotely under quality conditions and installed quickly to expedite construction, while minimizing impact to surrounding site and roadways," Norman says.

"Precast was selected because it affords the flexibility of utilizing varied patterns, textures, and colors within a singular building material." James Gordon, CannonDesign

SHADOW AND LIGHT

The architect's design consists of two stacked box forms, with the upper projecting out beyond the lower. The first floor uses charcoal-colored precast concrete with a horizontally striated formliner, while

OWNER:
Cortex, St. Louis, Mo.

PCI-CERTIFIED PRECAST CONCRETE PRODUCER:
Enterprise Precast Concrete, Omaha, Neb.

PRECAST CONCRETE SPECIALTY ENGINEER:
Enterprise Properties Engineering, Omaha, Neb.

PCI-CERTIFIED ERECTOR:
Florida Builders Group, Miami, Fla.

ARCHITECT & ENGINEER OF RECORD:
CannonDesign, St. Louis, Mo.

GENERAL CONTRACTOR:
Tarlton, St. Louis, Mo.

PROJECT COST:
$14 million

PROJECT SIZE:
60,000 ft²

the upper volume is clad in white acid-etched precast concrete panels that contrast with the dark precast concrete and glass base. The upper floor features window openings that are varied in size and staggered. “This reinforces the idea of motion and resembles large-scale cast stonework between openings,” says Andrew Gilles, former senior associate with CannonDesign, now at Mackey Mitchell Architects.

One notable aspect of this project was that the linear formliner pattern, which ran vertically, was turned 90 degrees so that the fine, textured lines ran horizontally, McClure says. “This occurs at eye level on the first floor, so great care was taken in making the pattern line up perfectly from panel to panel.”

The use of curtainwall glazing on the north and south elevations and the first level volume frames impressive views, but more importantly acts as billboards to showcase the creative activities taking place within and enliven a once-vacant streetscape.

Along with providing a visually appealing structure, the precast concrete design also offers a low-maintenance, cost-efficient solution. “Panels are integrally colored to avoid long-term repainting costs, and double sealant joints and polyurethane foam insulation create a highly energy-efficient envelope,” Gordon says. Fly ash was also cast into the concrete mixture to help meet sustainability goals.

The precast concrete façade complements buildings of similar scale and material located within the district, which was a key goal of the owner, adds James Gordon, senior vice president at CannonDesign. “As the architect, what I love most about this project is seeing how it brought the district to life and created a real sense of community.”

Key Project Attributes

- Designers rotated a traditionally vertical formliner to achieve a horizontal striated look.
- L-shaped panels at the upper levels cut erection time and number of precast concrete pieces.
- Double sealant and an internally applied polyurethane foam insulation create a highly energy-efficient envelope.

Project and Precast Concrete Scope

- Design a façade for a three-story, 60,000-ft^2 mixed-use structure.
- The project included 2700 ft^2 of precast concrete, totaling 155 pieces.
- The average size per piece was 80 ft^2. The heaviest piece was about 9500 lb.

Photos: CannonDesign and Architectural Imageworks LLC.

Honor Credit Union Operations Office

Berrien Springs, Mich.

In September 2014, Honor Credit Union in Berrien Springs, Mich., broke ground on a new three-story, 37,000-ft² operations center. The new building would provide centralized support, offices, and technological services for the entire credit union network—and the owners wanted it up and running in just 12 months.

"The biggest challenges began with the construction schedule, timing, and winter," says Jeff Klymson, founding principal at Collective Office in Chicago, Ill., the architect on the project. Berrien Springs is on the east coast of Lake Michigan, which is known for its long, snowy winters, so the team had to work fast to get the building enclosed before the cold set in.

Their solution: make the entire cladding using only two precast concrete panels, and get them into production as early as possible. "That way, only the interior trades were working in the coldest months of the year," Klymson says.

"The harsh winter wind and snow in this region of southwest Michigan requires an exterior that is very durable. This precast solution is performing well and will continue to do so for years to come." Jeff Klymson, Collective Office

OWNER:
Honor Credit Union, Berrien Springs, Mich.

PCI-CERTIFIED PRECAST CONCRETE PRODUCER:
Kerkstra Precast, Grandville, Mich.

PCI-CERTIFIED ERECTOR:
G2 Inc., Cedar Springs, Mich.

ARCHITECT:
Collective Office, Chicago, Ill.

STRUCTURAL ENGINEER OF RECORD:
Louis Shell Structures Inc., LaGrange, Ill.

GENERAL CONTRACTOR:
E.C. Moore of Berrien County Inc., Berrien Springs, Mich.

PROJECT COST:
$10 million

PROJECT SIZE:
40,000 ft²

Photos: Collective Office/Jeff Klymson. Mike Schwart Photography.

ONE PANEL DOES MOST OF THE WORK

The final exterior design, which Klymson refers to as "quietly modern and timeless," alternates between full-floor solid and glass using nine unique panels for the entire building; however, 80% of the panels were identical in size. To break up the design, the architect alternated the direction of the rectangular panel from floor to floor. They also integrated tall, narrow glass modules between the panels to provide more light in the building and in the individual offices at less square footage than smaller strip windows. "It created great efficiency for cost and manufacturing," he says.

To link the new structure to the rest of the Union's retail branches, the designers had 13,000 modular Black Manganese Ironspot bricks and 900 corner pieces cast into the face of the panels. "The brick holds a rich unique color with an incredible sheen, and it is the standard for all Honor Credit Union branches," Klymson says. Precast concrete was also used on the interior flooring, where approximately 44,000 ft^2 of 8-in. slab and 118 brick-clad precast concrete panels were installed.

Along with providing a cost-effective, interesting design, the precast concrete panels offer a low-maintenance solution, which is critical for a corporate office maintenance program. "This is an owner-occupied building, and therefore was meant to be an economical project in every way possible," Klymson says.

The client loves the modern, elegant design and the highly efficient nature of the building. "The objective was to create an open, welcoming, but industrial feel to the project," he says. "Using precast concrete delivered on this goal."

Key Project Attributes

- One panel design was used for 80% of the façade, providing time and cost savings and manufacturing benefits.
- Black Manganese Ironspot bricks were cast into the façade to mimic the Union's retail design aesthetic.
- The precast concrete solution allowed for rapid enclosure of the structure, which was key in the harsh Michigan winter.

Project and Precast Concrete Scope

- 118 precast concrete wall panels with brick facing totaling 12,000 ft^2.
- 470 hollow-core floor slabs totaling 44,000 ft^2.
- Precast concrete erection was completed in less than four months.

Photos: George Spence.

OWNER:
City of Alpharetta, Alpharetta, Ga.

PCI-CERTIFIED PRECAST CONCRETE PRODUCER & PRECAST CONCRETE SPECIALTY ENGINEER:
Metromont Corp., Hiram, Ga.

ARCHITECT:
Smallwood, Reynold, Stewart, Stewart & Associates, Inc Atlanta, Ga.

ENGINEER OF RECORD:
Uzun & Case Engineers, LLC, Atlanta, Ga.

GENERAL CONTRACTOR:
Choate Construction Company, Atlanta, Ga.

PROJECT COST:
$5.44 million

PROJECT SIZE:
140,500 ft^2

Alpharetta City Center Parking Deck

Alpharetta, Ga.

Alpharetta, Ga., is a fast-growing southern city, with restaurants, shops, and office spaces that are attracting a growing population of citizens and tourists. This growth has been great for the local economy, but it was creating increasing traffic concerns. So in 2012, city leaders decided they needed a new downtown parking structure to accommodate the flow.

"The high-strength structural concrete used in this project will give the owner a parking deck with a long, durable, low-maintenance life that will be appreciated for years to come." George Spence, Metromont Corp.

The new 40,500-ft² five-level parking deck is a supporting component of the master-planned Civic and Government Center and accommodates 455 cars, dramatically easing the demand for parking in the area. But this structure had to be more than a temporary warehouse for cars. "The City of Alpharetta wanted a showcase parking deck with an architectural design to match the new City Hall in its new city complex," says George Spence, business development manager for Metromont Corp. in Hiram, Ga. But it had to be done on a fixed budget.

The architectural team chose precast concrete to address these dual needs. Precast concrete ensured the structure would be aesthetically compatible with the traditional Georgian architecture of the adjacent City Hall building, while still accommodating the schedule, budget, and structural needs of the deck, he says. "The ease of casting intricate and repetitive shapes in precast concrete panels allowed an economical way to incorporate the high level of detail required to effectively coordinate with the surrounding municipal buildings."

HIGH-END DESIGN ELEMENTS

To further accommodate the budget, the designers wanted to minimize the number of precast concrete pieces used on the project, without compromising the design aesthetic.

To achieve these goals, they worked with the precast concrete producer to develop a panelization system featuring a joint pattern that would eliminate individual spandrel panels supported on columns, which reduced the number of façade pieces by 30%.

To add visual appeal and structural support, they created a tall "tree" column design with branches extending to each side. The branches feature architectural details and are able to receive double-tee loads on the back side. "The resulting layout fulfilled the architectural intent, the structural requirements, and kept the project in budget," Spence says.

For the façade, the precast concrete producer cast thin-brick insets with buff-colored exposed and sandblasted concrete to mimic the cast stone pieces on City Hall. The entry and exit points and elevator towers have a reveal pattern that simulates cut limestone block construction, suggesting a grand entrance for approaching cars and pedestrians. The structure is capped with a precast concrete cornice, accented with bands of bullnose projections at each floor level. A series of cast-in medallions was also included, some inserted directly into the brick façade and others framed in shadow boxes in the limestone-colored precast concrete spandrel.

Achieving these monumental details in a structural parking deck was no small feat, but it was worth the time spent on planning and collaboration to get it right. "Although this is a parking deck, the façade has the architectural complexities of high-end institutional building," Spence says. "In my opinion, the Alpharetta City Center Parking Deck has the best architectural design of any parking deck anywhere."

Key Project Attributes

- Panelized system cut the number of precast concrete pieces by 30%.
- A façade joint pattern was developed to eliminate individual spandrel panels supported on columns.
- Thin-brick insets mimic the adjacent City Hall's cast-stone pieces.

Project and Precast Concrete Scope

- The project included 99 pieces of precast concrete, including 27 architectural detailed panels and 61 flat panels.
- 11,000 ft² of thin-brick veneer was cast in the panels.
- The heaviest panel was 22,862 lb, with the average panel weighing 18,000 lb.

Church of Jesus Christ of Latter-Day Saints Temple

Gilbert, Ariz.

Photos: Gate Precast Company.

When the team at Architekton was selected to design the new Church of Latter-day Saints in Gilbert, Ariz., they wanted to create a structure that would stand out, with a soaring façade, detailed patterns, and arched window openings to support crafted art glass. They knew the intricate design would be challenging to achieve, particularly on a fast-track schedule and limited budget, which is why they chose precast concrete.

"You can do anything with precast," says Dane Astle, senior associate architect with Architekton. "We had very minor limitations in the level of detail we could achieve, which allowed us to create a very ornate building."

"Precast is an interesting material. It is long-lasting and has a similar look and feel to stone, yet you can form it into any design, pattern, thickness, or panel size."
Greg Lambright, Architekton

THREE-DIMENSIONAL DESIGN MAKES FOR A PERFECT FIT

The design of the church features nearly 1000 precast concrete panels made with 73 forms. The sizes range from a single square foot to 262 ft^2, with the heaviest piece weighing more than 25,000 lb. The Architekton team, which was led by principal Greg Lambright, used three-dimensional (3-D) modeling to design the intricate patterns into each panel. "The ability to view the drawings in 3-D was beneficial on this complex project," Lambright says. The precast concrete producer used the 3-D drawings to cast full-scale master molds and custom formliners.

"Special attention was also paid to the mix design and finishes," Lambright says. The owner wanted the temple to look and feel like natural stone, which they achieved by choosing a light buff color with a medium sandblast and including a white aggregate in the mixture that sparkles when the sun hits it.

OWNER:
Church of Latter-day Saints, Gilbert, Ariz.

PCI-CERTIFIED PRECAST CONCRETE PRODUCER:
Gate Precast, Hillsboro, Tex.

PRECAST CONCRETE SPECIALTY ENGINEER:
Precast Technical Services Group, North Kansas City, Mo.

PCI-CERTIFIED ERECTOR:
IMS Masonry, Lindon, Utah

ARCHITECT:
Architekton, Tempe, Ariz.

ENGINEER OF RECORD:
Paragon Structural, Phoenix, Ariz.

GENERAL CONTRACTOR:
Okland Construction, Tempe, Ariz.

PROJECT COST:
$3.36 million (for precast concrete)

PROJECT SIZE:
85,326 ft^2

The designers met weekly with the contractor and the precast concrete producer's engineering department to ensure the panels could be replicated in the forms, and to determine the best size and shape of each panel. "We spent an incredible amount of time with Gate discussing how to break the panels into management pieces, and how they would be attached once they were at the site," Astle says. This was critical, as the project site was more than 1000 miles away from the plant, so everything had to be done right the first time.

The long distance also added shipping challenges, as the precast concrete producer had to ensure the ornate precast concrete panels were protected during the long haul. "It was very complicated, and we were always nervous until they actually arrived on site," Astle says. Thanks to precise calculations on weight distribution, all of the panels arrived safely with only minor damage to a few, despite the very long journey.

The project was completed in January 2014, and the owners love the way it looks like intricately carved stone, Astle says. "We gave them the look and feel that they wanted without having to go through the difficulty and expense of using stone."

Astle notes that not enough architects are aware of the versatility and cost-effectiveness of precast concrete. "You can achieve so many aesthetics with precast that are similar to other materials, but at a much lower cost," he says. "Architects should spend more time understanding how this material can be used."

Key Project Attributes

- Precast concrete façade features limestone-like finish with intricate artistic patterns of indigenous plants.
- Use of building information modeling ensured pieces were perfectly aligned for erection.
- Panels had to be trucked 1073 miles to the jobsite via 175 separate loads.

Project and Precast Concrete Scope

- Project includes 988 panels ranging in size from 1 to 262 ft^2.
- Precast concrete mixture includes white aggregate to add sparkle and stone-like quality to the façade.
- Precast concrete producers used 3-D models to cast full-scale master molds and 73 custom forms.

Kroger Field Renovation/Expansion Lexington, Ky.

Photo: Phebus Photography.

When the University of Kentucky set out to renovate its iconic Commonwealth Stadium (now Kroger Field), the owners knew they wanted to reinvent every corner of the space to make it feel more authentically Kentucky. It was a big challenge for a project that had to be completed while the stadium was open for football season, according to Greg Hosfield, architect and project manager for Ross Tarrant Architects in Lexington, Ky. That was one of the many reasons the team chose precast concrete for the exterior.

"The use of precast helped in allowing the exterior façade to be constructed quickly with minimal disruption to the game day experience," he says. It also provided a completely new aesthetic to the façade of the stadium, while keeping the budget and schedule in line.

MASSIVE PANELS BRING COST SAVINGS

The façade was cast in 87 massive 8-in.-thick architectural precast concrete panels. "The large size allowed us to reduce the number of pieces and bearing points, which lowered the overall cost of the project," says Kevin Locke, senior principal with Ross Tarrant Architects. To make the pieces feel smaller and more detailed, the larger panels were divided into smaller sections with reveals and two finishes: a heavy and light sandblast in a random pattern to emphasize the smaller panel design. "With the two finishes, one mix was able to be utilized, which gave two distinct looks while saving cost," he says.

To ensure the variations in the finish were consistent, the design team worked closely with Gate Precast to alter the finish of small sections of each panel to help blend the entire façade together. "This required a great deal of design collaboration, as well as ongoing coordination and adjustments during manufacturing and construction to achieve the intended final product," Hosfield says. "The process was challenging and required an innovative approach, but it yielded great results."

"The university and Wildcat Football fans have commented on the stadium's sophisticated, clean look. The impact of the curved precast façade on the exterior of the stadium is very striking." Greg Hosfield, Ross Tarrant Architects

OWNER:
University of Kentucky, Lexington, Ky.

PCI-CERTIFIED PRECAST CONCRETE PRODUCER & PRECAST CONCRETE SPECIALTY ENGINEER:
Gate Precast Company, Winchester, Ky.

ARCHITECT:
Ross Tarrant Architects, Lexington, Ky.

SPORTS DESIGNER:
HNTB Architecture Inc., Kansas City, Mo.

ENGINEER OF RECORD:
Brown and Kubican, Lexington, Ky.

GENERAL CONTRACTOR:
Skanska/Congleton-Hacker, Lexington, Ky.

PROJECT COST:
$114.5 million

PROJECT SIZE:
191,545 ft² (addition); 292,664 ft² (renovation)

Photo: Gate Precast Company.

The massive weight of the panels and assembly crane also caused concerns regarding their impact on the drainage system. To mitigate that risk, the project team built a dedicated path and crane pad with timbers to prevent any damage. The project remained on schedule, and caused minimal disruption, even as the 2015 football season began before construction was complete.

The result is an attractive, durable, high-performance design that more than met the expectations of the university and Wildcat Football fans. “The goals for this project included transforming the appearance of the existing stadium and enhancing the fan and athlete experience,” Locke says. “The use of precast concrete was instrumental in achieving these goals.”

Key Project Attributes

- Curved precast concrete façade provides a new aesthetic to an old stadium.
- Envelope performance, recycled content, and regional production contribute to LEED silver certification.
- A dedicated crane pad made from timbers was built to protect the field and drainage system during construction.

Project and Precast Concrete Scope

- Design a comprehensive renovation and addition to a university football stadium.
- The project required a 191,545 ft^2 addition and 292,664 ft^2 of renovations.
- Precast concrete elements include 287 architectural precast concrete panels and 210 structural pieces.

Photo: Gate Precast Company.

Corning Museum of Glass Contemporary Art + Design Wing Corning, N.Y.

Photos: Guy Nordenson and Associates and Richard Barnes.

The Corning Museum of Glass Contemporary Art in Corning, N.Y., is a not-for-profit museum dedicated to one thing: showcasing the beauty, versatility, and artistry of glass.
When the museum decided to expand the space in 2015, adding a 100,000 ft² addition, including 26,000 ft² of gallery space, they relied on another versatile material: precast concrete.

"The new design wing showcases the high-quality finish and tight fabrication tolerances that can be achieved with precast concrete," says Lucile Walgenwitz, associate at Guy Nordenson and Associates in New York, N.Y.

STRONG AND THIN

One of the museum's most prominent design features is the high-performance precast concrete long-span roof joists to support a series of gabled skylights, which filter light into the galleries below. To extend that aesthetic, the architects designed a series of 200 thin, closely spaced precast concrete roof joists, ranging from 6 to 55 ft, that span north to south between perimeter steel and interior concrete wall elements to support additional skylights. A system of thin steel purlins runs east-west over the top of the precast concrete roof joists to provide lateral bracing to the joists.

"The innovation in this project lies in the slender geometry of the precast concrete roof joists," says Erich Oswald, associate partner at Guy Nordenson and Associates. The extremely thin profile of the precast concrete joists, coupled

"We love the smooth yet rich texture of the precast concrete roof joists, and how they contrast with the white-washed serpentine walls below. And of course, we are in awe at their extreme thinness." Erich Oswald, Guy Nordenson and Associates

OWNER:
Corning Museum of Glass, Corning, N.Y.

PCI-CERTIFIED PRECAST CONCRETE PRODUCER:
BPDL – Bétons Préfabriqués du Lac, QC, Canada

PRECAST CONCRETE SPECIALTY ENGINEER:
Guy Nordenson and Associates, New York, N.Y.

ARCHITECT:
Thomas Phifer and Partners, New York, N.Y.

ENGINEER OF RECORD:
Guy Nordenson and Associates, New York, N.Y.

GENERAL CONTRACTOR:
Gilbane-Welliver Joint Venture, Albany, N.Y.

PROJECT COST:
$64 million

PROJECT SIZE:
100,000 ft²

Photo: Guy Nordenson and Associates.

with the long spans and roof loading requirements, demanded detailed analysis of expected cracked sections and lateral torsional buckling modes. “Complex structural calculations had to be performed to confirm lateral stability, taking into account many different loading configurations and geometrical variations across the roof,” he says.

The absence of architectural finishes also meant that the whole roof structure was exposed to view. So in addition to meeting the load demands and negotiating the complex geometry, the connections had to complement the overall architectural design intent. “Using precast concrete allowed us to embed connection material such as sleeves and anchors within the joists and minimize the need for additive components that may have detracted from the architecture,” he says.

Walgenwitz notes that prefabricating the pieces off-site allowed the team to achieve the high compressive strength without any problems. “Tight tolerances and high strength were both key, given the slender geometry of the roof joists.”

Despite the complexity of the design, the erection process went quickly without any major problems, which Oswald attributes to close coordination between the design team, general contractor, fabricators, and erectors. “This allowed the schedule to progress without interruption… and helped the project to be completed on time.”

Key Project Attributes

- Extremely long and thin joists, up to 55 ft in span, support an array of gabled skylights.
- Exposed structural members require a high-quality stainless-steel finish.
- Connections use solid stainless-steel pins placed through stainless-steel pipe sleeves cast into the ends of the precast concrete joists.

Project and Precast Concrete Scope

- Project includes 206 roof joists ranging in length from 6 to 55 ft.
- Precast concrete pieces meet 10 ksi (70 MPa) compression strength.
- Joists are pinned at both ends and braced at 9 ft 6 in. by roof purlins.

Cleveland Public Square Cleveland, Ohio

Photos: Tectura Design.

For years, the heart of downtown Cleveland, Ohio, was home to a neglected 10-acre civic space that was bisected by two of the city's busiest streets, limiting its community value. But a 15-month, $50-million renovation has transformed the space into a park-like destination that now provides a centerpiece to the city's ongoing redevelopment efforts.

The redevelopment project involved reorganizing streets, rerouting traffic, and creating a lush green center for the city's growing population. However, delivering the designer's vision in just 15 months in a city known for its harsh winters and heavy traffic was no easy task, says Veronica Rivera, associate architect at James Corner Field Operations in San Francisco, Calif.

The need for speed, durability, and versatility in the design made it a perfect fit for precast concrete. "The utilization of precast concrete allowed us to continue installation throughout the year with the precision and quality desired," Rivera says. "It would not have been possible to achieve with any other construction methodology."

"With a highly nuanced and customized design, precast concrete was utilized to unify the design while making each space a unique experience." Veronica Rivera, James Corner Field Operations

800 CUSTOM MOLDS

The project included 1300 individual precast concrete elements, including low linear walls to frame the perimeter gardens, and continuous, sinuous walls reaching up to 8 ft in height to frame the "Key Bank Promenade" at the center of the square. The precast concrete walls were also used to create artificial topography, which "framed critical design features while articulating an otherwise flat site," Rivera says.

OWNER:
Group Plan Commission, Cleveland, Ohio

PCI-CERTIFIED PRECAST CONCRETE PRODUCER:
Tectura Designs, a Wassau Tile Inc. brand, Rothschild, Wis.

PRECAST CONCRETE SPECIALTY ENGINEER:
J3 Engineering, Mequon, Wis.

ARCHITECT:
James Corner Field Operations, New York, N.Y., and San Francisco, Calif.

ENGINEER OF RECORD:
Osborn Engineering, Cleveland, Ohio

GENERAL CONTRACTOR:
Donley's Inc., Cleveland, Ohio

PROJECT COST:
$50 million

PROJECT SIZE:
10 acres

To ensure that all of the various pieces would fit together seamlessly, the precast concrete producer created 800 custom molds, including one to support a 9-ft-tall, 20,000-lb precast concrete piece. The design also included special aggregates, pigments, and admixtures, incorporating 1200 pieces of concrete weighing in at over two million pounds, Rivera reports. “The utilization of precast concrete allowed us as the designers to have absolute control over the finish and concrete design mix.”

The finished park, which opened in time for the July 2016 Republican Convention, now provides a beautiful setting for the people of Cleveland that surpassed the expectations of the planning commission and showcases the many benefits of choosing precast concrete for this type of project, she says. “Precast was used both for its flexibility in design and customization, as well as for its long-term durability and low maintenance in what is now the central civic space for the city of Cleveland.”

Key Project Attributes

- 800 custom molds were created to achieve the custom design of this city square.
- Speed of erection achieved by using precast concrete was key for meeting the 15-month deadline.
- Styrofoam molds were compacted and recycled for reuse.

Project and Precast Concrete Scope

- Manufacture and erect more than 1200 pieces of precast concrete in a busy Cleveland public center.
- Precast concrete elements included 2 million lb of precast concrete in 800 custom shapes.
- Shipping and erection was completed in just 12 months.

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Photos courtesy of U.S. Department of Energy

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Dedicated Service
We're with you for every step: from preliminary design, to panel detailing, to installation, and final walk-through. That is dedication that no other company can deliver.

Concrete Results
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SPOTLIGHT

NREL Energy Systems Integration Facility

The Energy Systems Integration Facility (ESIF) at the U.S. Department of Energy's National Renewable Energy Laboratory (NREL) is a state-of-the-art facility for the research, development, and demonstration of advanced strategies and components in modern, clean energy technologies.

The ESIF's LEED™ Platinum certified design includes energy saving features like natural ventilation, enhanced daylighting, radiant heating and cooling, and Thermomass-insulated precast concrete panels.

Using edge-to-edge System NC insulation, Thermomass helped the ESIF project meets its goal of a 40 percent greater performance efficiency than the baseline ASHRAE 90.1 building standard. The integral insulation also provides for a strong, durable building envelope, ideal for use in areas where new, unproven, or potentially hazardous equipment and processes are under evaluation.

thermomass®

Photo: Gage Brothers.

Owner:
Office of the Governor and Lt Governor, St. Paul, Minn.

PCI-Certified Precast Concrete Producer:
Gage Brothers, Sioux Falls, S.Dak.

Architect:
BWBR, St. Paul, Minn.

Engineer of Record:
Ericksen Roed & Associates, St. Paul, Minn.

General Contractor:
Mortenson Construction, Minneapolis, Minn.

Project Cost:
$89.6 million

Total Size:
293,000 ft²

GOVERNMENT AND PUBLIC BUILDING HONORABLE MENTION

Minnesota Senate Building, St. Paul, Minn.

Designing a government building to house a state's elected officials requires a delicate balance of creating something sophisticated and stately while making prudent use of taxpayer dollars. The new $90-million, four-story Minnesota Senate Building in St. Paul achieved that balance with an elegant precast concrete and glass design with a massing that gently curves to maximize views back to the neighboring capitol.

The precast concrete façade was specifically chosen to help keep costs under control while delivering a durable structure on an inflexible deadline. Even with the design-build method and accelerated schedule, construction did not start until August 2014, but the precast concrete was completed in ample time to host the 2016 legislative term.

The designers made extensive use of models and mock-ups to hone the design and ensure they made the most effective use of stone and color, as well as avoiding problems during construction.

The final iteration of the design made use of native, locally sourced stone embedded in precast concrete panels across the entire south façade, which faces the capitol. A complementary architectural precast concrete panel with light sandblast was used on the other three sides. Strong horizontal reveals in the precast concrete panels create additional shadow lines and reliefs around the building. Given the radial shape of the building, there were many L-shaped precast concrete panels, often with articulation, resulting in fairly complex forms. The mock-up allowed the design team to study the atypical panel shapes and end conditions to eliminate any potential breaking on-site.

As part of the project, extensive measures were taken to reduce long-term energy consumption. An energy model created to validate the energy measures showed the building actually exceeded energy consumption goals by 37%. The structure is expected to achieve B3 benchmarking standards, which is the state's equivalent of LEED.

Key Project Attributes

- Use of precast concrete façade supported on-time delivery for 2016 legislative session.
- Ample energy efficiency features meet B3 benchmark standards, comparable to LEED.
- Mock-ups and modeling were used to hone design and prevent breaking.

Project and Precast Concrete Scope

- Build a three-story, nearly 300,000-ft² government building for Minnesota legislators.
- Precast concrete components include architectural precast concrete panels, landscape precast concrete walls, and stone-clad precast concrete pieces.
- Precast concrete erection occurred from May through July 2015.

Photo: Wells Concrete.

STADIUM AND AREA STRUCTURE HONORABLE MENTION

U.S. Bank Stadium, Minneapolis, Minn.

Owner:
Minnesota Vikings Football LLC
Minnesota Sports Facilities Authority,
Minneapolis, Minn.

PCI-Certified Precast Concrete Producer and PCI-Certified Erector:
Wells Concrete, Maple Grove, Minn.

Precast Concrete Specialty Engineer:
The Consulting Engineers Group Inc.,
Mt. Prospect, Ill.

Architect:
HKS Inc., Dallas, Tex.

Engineer of Record:
Thornton Tomasetti,
Kansas City, Mo.

General Contractor:
Mortenson Construction,
Minneapolis, Minn.

Project Cost:
$1.1 billion

Project Size:
1,752,000 ft.^{2}

As the fourth most expensive National Football League venue ever built, the U.S. Bank Stadium in Minneapolis stadium is considered an architectural landmark for the State of Minnesota. The construction of the stadium, which seats up to 70,000 people, set a new standard for sports facilities. It was built in just two and a half years, thanks to the dedication of 8,000+ workers who committed more than four million hours to bringing this project in six weeks early and on budget.

The extensive use of precast concrete and the innovative solutions achieved by the design team played an important role in the successful delivery of this iconic stadium.

The final design features more than 5000 precast concrete elements that would stretch 27 miles laid end to end. All of these pieces were cast at a local Minnesota plant and shipped to the jobsite in more than 1500 truckloads. Long precast concrete beams were used to minimize the need for columns and beam lines, ensuring great sight lines from all seats. Risers were created to meet a high natural frequency, eliminating the risk of bouncing even with the largest crowds. Because the suites and platforms on top of the precast concrete risers were designed to be pulled out to make room for additional seating, the precast concrete producer had to factor increased load requirements into the design.

During construction, the sequence of precast concrete erection was adapted to accommodate multiple trades on-site. The precast concrete producer erected the upper bowl first, then followed with the lower bowl due to the crane location, reaching the last/highest piece of precast concrete. A night shift crew was used to better coordinate with steel erection during the day.

The designers note that stadium projects require versatility, resiliency, and speed to meet tight deadlines. The high-performance precast concrete used on this project met these challenges and provided superb value to all stakeholders.

Key Project Attributes

- Designing stadium sections at a length of 65 ft with a 4.6-Hz natural frequency/bounce requirement.
- Signal risers were cast upside-down, allowing the walking surface to have a more durable form finish.
- The upper bowl was erected first, followed by the lower bowl, to accommodate crane location.

Project and Precast Concrete Scope

- Provide 1,752,000 ft.^{2} of precast concrete pieces for the U.S. Bank Stadium in Minneapolis.
- Project included 5096 precast concrete elements.
- Construction was completed in two and a half years.

Photo: Wells Concrete.

ALL–PRECAST CONCRETE SOLUTION HONORABLE MENTION

Higher Ground Saint Paul, St. Paul, Minn.

Owner:
Catholic Charities of St. Paul and Minneapolis, Minneapolis, Minn.

PCI-Certified Precast Concrete Producer and PCI-Certified Erector:
Wells Concrete, Maple Grove, Minn.

Precast Concrete Specialty Engineer:
Ericksen Roed & Associates, St. Paul, Minn.

Engineer of Record:
Mattson Macdonald Young, Minneapolis, Minn.

Architect:
Cermak Rhoades Architects, St. Paul, Minn.

General Contractor:
Watson-Forsberg Co., Minneapolis, Minn.

Cost:
$40 million

Total Size:
111,261 ft^2

Higher Ground Saint Paul is an emergency shelter and supportive living space in St. Paul, Minn., that provides people in need with a dignified, safe place to call home. It was the first phase of the Dorothy Day Place project to prevent homelessness in the community, and is the largest public-private partnership in state history. The facility is meant to be an architectural representation of the path from homelessness to hope and permanent stability, and precast concrete enabled that goal.

This all–precast concrete residential facility was designed to be extremely durable, able to withstand decades of abuse by a challenging resident population, while also providing cutting-edge sustainability features, including reduced energy consumption, recycled content, and indoor environmental quality.

Kirk Davis, Minnesota partner for Mattson Macdonald Young Inc., points to several benefits that led his team to choose an all–precast concrete solution. “The desire for integrated finishes, the winter construction schedule, avoiding interior columns on the upper floors by using a 40-ft slab span, the need for a durable and robust construction, and the familiarity with the team and their capabilities, made precast the obvious choice,” he says.

In the design, the precast concrete panels provide architectural finish while meeting load-bearing structural requirements and serving as a truss elements to efficiencies to the project. The wall panels are load-bearing, but also provide an exterior acid-etched, colored architectural finish, and one of the vertical sections features deep returns with windows surrounded by thin-brick-covered precast concrete panels and spandrels supported off the returns. Hollow-core floors are covered with a sound mat and polished concrete topping.

One of the most innovative design features is on the second-floor roof area, where horizontal, architectural-finished precast concrete panels covering the third-floor work as trusses spanning 40 ft and resting on columns below. At their bottoms, the panels support hollow-core slabs to one side that form a second-level roof deck and support the interior slabs of the third floor. At the top of the panels, a bearing angle picks up the hollow-core slabs forming the fourth-floor level.

The designers worked in close collaboration with the precast concrete fabricator during the design phase to find efficiencies in span lengths, piece complexity, and piece to drive down cost, while delivering a durable and dependable solution.

Key Project Attributes

- Long-span truss spandrels keep floors below open for programming.
- Precast concrete panels designed for future skyway accommodation.
- Project met B3 guideline stainability requirements for site, water, energy, indoor environment, materials, and waste.

Project and Precast Concrete Scope

- Build a five-story emergency shelter and residential facility in downtown St. Paul, Minn.
- Precast concrete pieces include 38 beams, 34 columns, 54 solid slabs, 824 hollow-core slabs, and 341 wall panels.
- Erection was completed in just two months.

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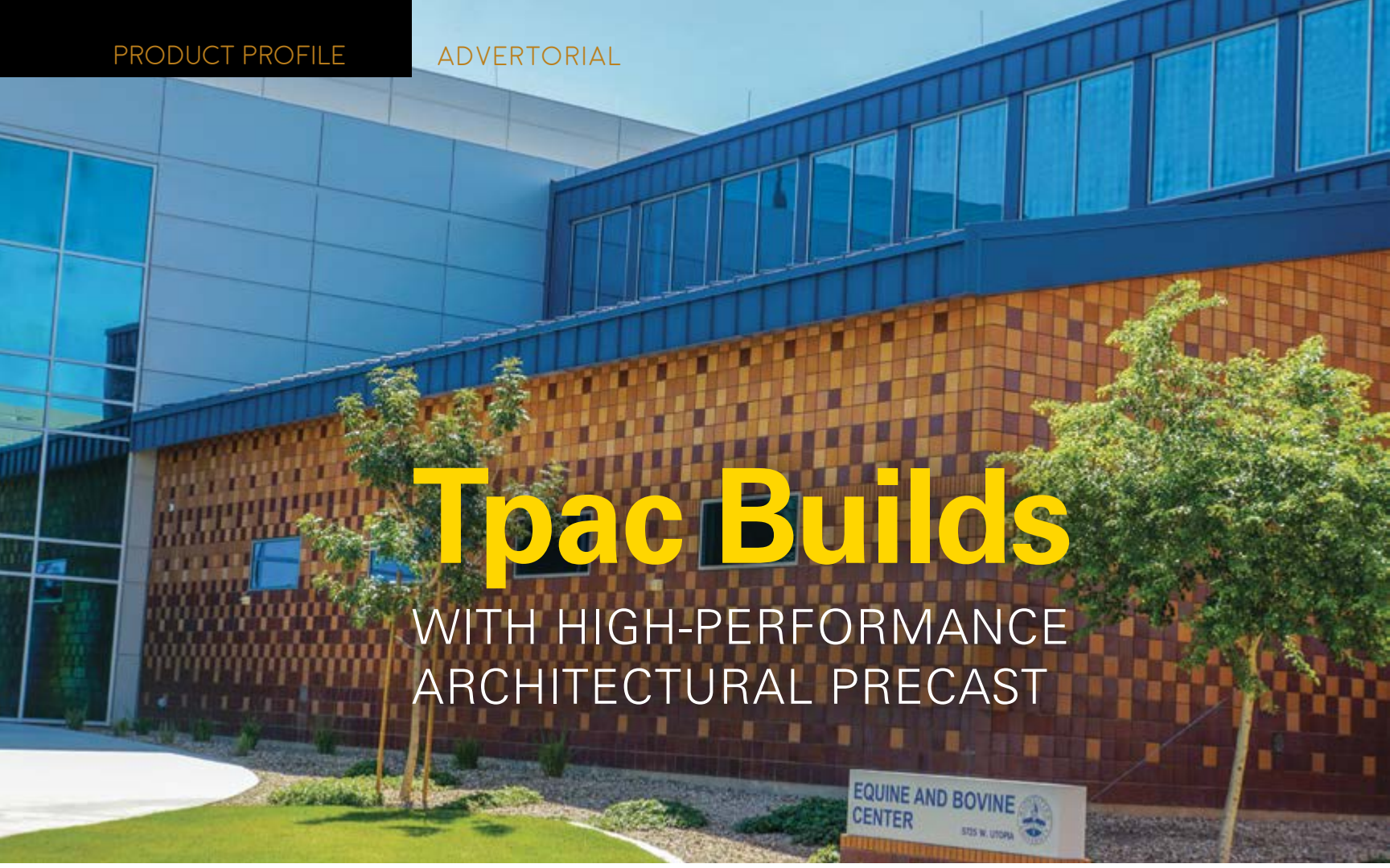

Tpac Builds

WITH HIGH-PERFORMANCE ARCHITECTURAL PRECAST

Photos: Tpac.

Midwestern University's College of Veterinary Medicine, Equine and Bovine Center's newest facility is a state-of-the-art medical and rehabilitation facility, and is the third facility of the Veterinary Medicine program. The 70,000 square foot facility is a community resource, and a center for veterinary education, research, and pathology. The University, as an educational institution, is able to provide affordable veterinary services, and hired faculty and students can continue to engage in equine and bovine medicine and practices to benefit Arizona's livestock owners. The new center includes teaching workshops, stalls and paddocks, treatment areas, and anesthesia and recovery areas, housing for 20 cows and 20 horses, and support structures for feed, bedding and storage. Midwestern University's College of Veterinary Medicine is the first and only veterinary medical college in Arizona, and the facility is providing and promoting hands-on experience and teaching, helping to bring new professionals to the region.

Extensive coordination among the design, engineering and precast teams was necessary to ensure that the College of Veterinary Medicine's rigorous project requirements were met. With the majority of the structure comprised of precast components, an onsite crane for erection and installation, a project team facilitating installation and construction, and the current University facilities open for classes and services, the project activities had to avoid any potential disruption and meet an expedited schedule. Tpac provided all precast products and completed the crane erection of the facility in a 28-day period.

Tpac's precast scope consisted of 289 architectural and structural pieces that played a large role in the project design and construction. Precast used in this project includes hollow core, insulated walls, solid walls, architectural panels, and architectural brick inlay panels. The precast, prestressed wall panels were cast with custom tile size thin brick, providing the owner with the benefits of cost- and time-savings over full-size, hand-laid brick.

A special architectural color scheme and mixed brick pattern enhances this aesthetically pleasing project, and coordinates with the same design on existing University buildings including the Auditorium, Wellness Recreation Center, and Animal Companion Clinic. The buildings incorporate elements from local colors and styles, and are a study in architectural design. All wall panels and the required architectural face were mixed to a specific brick color match.

While the campus buildings retain many standard educational qualities, a higher level of architectural treatment was applied to the design. The wall panels feature reveal work that adds depth and visual appeal to the buff sandblast finish. The panels are also topped with a cornice for additional architectural detail. The roof level features a reveal and recess pattern that mimics the window design and pattern, to create an upward aesthetic. The building features several wall and side panels that are sloped, incorporating distinctive angles to the project.

Three different colors of brick created the pattern blends that compose the architectural skin of the facility. Of the project's 37,161 square feet of exterior wall area, 39% consisted of inset thin brick. The distinct combination of brick colors includes Desert Ironspot Light, Coppertone, and Medium Ironspot #46. Additional detailed design effort is shown by the soldier course brick line across the top of the panels, as well as the visual soldier line in the center that creates a visual break, softens the lines, and captures the unique design pattern.

Multiple forms were used to create different textures and variations in the project. The form pattern stacks and alternates the six brick colors in a gradual blend from lightest hue to darkest, moving the tints and shades downward, creating an aesthetic visual draw showcasing native Arizona colors. The brick design pattern required extensive collaboration between DWL Architects + Planners, Phoenix, Arizona, and the Tpac team to ensure the aesthetic detail of the project was given careful consideration. Specific diagrams were produced by the architect, and the determined pattern was then precisely followed. Similar as they are unique, the campus buildings share a design concept, yet each is a one-of-a-kind creation.

The architectural exterior of the structure, designed to complement the earth tones and muted colors of the state, is comprised of a combination of buff, reddish-brown and dark red colored pieces. Striking variations of colors and textures were achieved by adding recesses and reveals. Integral sills and cornices were also incorporated into the complementary structural panels as additional design elements. The roof spandrels on all four sides of the structure are a complementary gray color and feature a distinctive square design that mimics the window shapes for an upward aesthetic.

Various sizes of wall panels were produced on a long-line production facility, allowing the walls to maximize the structural capacity and create an economical, architectural wall panel. The wall panels are designed to meet ASHRAE energy requirements, project economies and insulation requirements. The University decided to create a total precast structure incorporating an architectural sandblast cornice to minimize future maintenance costs. The owners stressed the need for superior quality with astute attention to detail, as well as the need for rapid construction. The entire project, from design to erection and finishing, was completed in 20 months.

Tpac, an EnCon Company, is a recognized regional leader in the design, manufacture and erection of total precast concrete structural systems. With a longstanding history of over sixty years serving as a specialty contractor providing engineered concrete products and services to local construction communities, Tpac manufactures a wide range of architectural and structural building components. Tpac is located on an approximately 60-acre production facility, and serves Arizona, Southern California, Nevada, Utah, New Mexico and West Texas. Our decades of experience, combined with time-tested technology, make Tpac a leader in providing economical solutions and a rapid delivery system to meet today's construction environment.

Photo: Marty McIntyre.

Georgia Tech Students

BRING MUSICALITY TO PRECAST

— Marty McIntyre
PCI Foundation

The School of Architecture at Georgia Tech has a focus on the relationship between research, teaching, and practice. While the design faculty is diverse, it emphasizes transforming the relationship between conceptual design and real-world construction via advanced technologies and material systems. Its curriculum development grant from the PCI Foundation will support teaching and research in the School of Architecture for a period of four years to support innovation on the leading edge of precast concrete, and to promote fundamental design knowledge and competence for graduates entering the architecture, engineering, and construction industry.

The program began in the fall of 2017. Each year, the fall semester is a jointly taught architectural design studio in the third year of the graduate program, with additional student participation from the school's master of science program in Digital Design and Fabrication. The studio is taught by Professor Tristan Al-Haddad; Professor Russell Gentry serves as the primary engineering consultant within the studio. Industry partners are from Georgia/Carolinas PCI, Metromont Precast, Tindall Precast, Gate Precast, and US Formliners.

The spring workshop is structured as a technical development, engineering, and prototyping workshop that advances and develops the best design from the fall studio. The spring semester workshop is a collaboration with the civil engineering Capstone course, where the engineering students partner directly with the architecture students to produce a full set of design calculations and details. Professor Gentry will lead the civil Capstone students and will collaborate with Professor Al-Haddad on overall project planning. The end result of each year is a collection of concrete design proposals and one full-scale prototype of the most promising design from the fall to be fabricated by Gate Precast Company.

PROJECT WILL BE BUILT

The students will work with Gate Precast to develop a detailed building information model of the design and full specifications from which Gate Precast will build the forms and cast the structure. The body of work is exhibited at Georgia Tech in the summer and will travel as a scaled version to the Fab City Summit in Paris in July 2018. Fab City is the gathering event of the international Fab City network, a global initiative to develop locally productive and globally connected cities.

The project that the students developed during the first semester workshop is a precast concrete folly for the Beltline in Atlanta, Ga., a 33-mile network of multiuse trails and public space around the city. The student-designed structure serves not only as a decorative threshold, but is also designed to create music as a xylophone.

"I think the project is really magical because people will walk up to it and they won't think it is concrete," says architecture student Jane Ilyasova. "It is a really inviting experience for people of Atlanta coming to the Beltline, which is a really big spot for visitors. When they do come, it is an eye opening experience—and they will think, 'Oh wow! I can't believe concrete can really be like this.' I think it is really cool. And the shadows it's going to create will help make it an instrument in more than one way."

STUDENTS CHOOSE DUCTILE

To begin the creation, the students worked a lot with materials, which is where they tried to bring in much of the innovation on the project, according to Al-Haddad. In the end, the students settled on using a product called ductile. Ductile is an ultra-high-strength concrete that is six to eight times stronger than convention concrete and contains metal fibers that makes it ductile.

"We were really inspired by this sheet of ductile that we have in our fabrication lab; when you tap on, it sounds so metallic," says Ilyasova. "Hopefully, we can create a similar experience that everyone can be a part of in a more public place."

Designing a project that will actually be fabricated and erected is an exciting prospect for the students in the program. Not only do they focus more on the engagement with the community, but also on how the structure will be fabricated. "Our initial idea was to create an instrument for the community," says student Sean Miller. "It would create both a shelter and a sense of space. It will also create some community engagement through music. We decided on this idea of a xylophone. Each band in the project has a different length, which will create a different resonance, so when you proceed through this structure you will get a series of higher notes until you progress down where the length increases and you get a lower resonance. That is where ductile really came in. The density of the material is almost a metallic resonance when you tap it, unlike typical concrete which sounds hard when you hit it. The ductile produces actual notes. That is our next phase of research: looking at the cross section versus length and determining the notes we can actually produce."

"I think the project is really magical because people will walk up to it and they won't think it is concrete"

Geometry and formwork will play a large role in the second semester of this project. "The students are working with rubber molds, and the intent is that the geometry of each one of the forks is a section which transforms from a rectangle at the base, which becomes post-tension," says Al-Haddad.

"We will create a jig so we can move the molds and create a variety of shapes with as little formwork as possible to create the whole installation," says Ilyasova.

The students have gone as far as creating a virtual reality (VR) model that allows one to experience walking through the instrument. They had the VR model on hand during a recent showcase at the PCI Convention. "Since Georgia Tech is such a technical school, we decided to create the VR as a way for people to interact with the project while we are here and hopefully get more people excited about what we are excited about," says student Katie Koski.

BRINGING EDUCATION RIGHT TO YOU
PCI conducts lunch-and-learn presentations and seminars on an ongoing basis.

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PCI is a registered continuing education provider with the American Institute of Architects (AIA), and the National Council of Examiners of Engineers and Surveyors (NCEES). PCI also has registered programs with the International Code Council (ICC). PCI's educational offerings include a variety of programs to fit your schedule and preferred learning environment, such as webinars, seminars, lunch-and-learns, and online education. To learn more, visit **pci.org**.

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> PCI ELEARNING CENTER

The PCI eLearning Center is the first education management system dedicated to the precast concrete structures industry. This free 24-hour online resource provides an opportunity for architects and engineers to earn continuing education credits on demand. Each course includes a webinar presentation recording, reference materials, and a quiz.

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UPCOMING SEMINARS AND WORKSHOPS:

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Photo: Gate Precast Company.

PRECAST/PRESTRESSED CONCRETE

Design Resources

PCI develops, maintains, and disseminates the Body of Knowledge for designing, fabricating, and constructing precast concrete structures and systems. It is from this Body of Knowledge that building codes, design guides, education, and certification programs are derived. Please visit www.pci.org for all of these design resources and more.

Architectural Precast Concrete Color and Texture Selection Guide, 2nd Edition (CTG-10)

The "Architectural Precast Concrete—Color and Texture Selection Guide" has been reprinted with 12 new color and texture pages, plus identification pages with mixture designs. This includes nine new color pages with two new colors per page, two pages of new formliners, and one page of new clay brick-faced precast. The numbers in the guide have not been changed, so that there is no confusion between the old and the new versions. This is a visual guide to assist architects in the initial selection of color and texture for architectural precast concrete. Illustrating more than 500 colors and textures for enhancing the aesthetic quality of precast concrete panels, the guide is an extension of the information included in the architect-oriented Architectural Precast Concrete manual (MNL-122). Cements, pigments, coarse and fine aggregates, and texture or surface finish with various depths of exposure were considered in creating the 287 6.75- by 11-in. color plates, the majority of which display two finishes on the same sample. The materials used to produce the samples are identified in the back of the guide for handy reference. The three-ring binder has removable inserts.

Architectural Precast Concrete, 3rd Edition (MNL-122)

This fully revised edition includes new sections on sustainability, condensation control, and blast resistance. You'll get extensive updates in the areas of color, texture, finishes, weather, tolerances, connections, and windows, along with detailed specifications to meet today's construction needs. Includes full-color photographs and a bonus DVD.

Precast Prestressed Concrete Parking Structures: Recommended Practice for Design and Construction, 3rd Edition (MNL-129-15; e-pub)

Decades of research have proven that precast, prestressed concrete is a cost effective, durable solution for parking structures. Over 140 pages present the latest concepts in design and construction, including 16 pages of full-color photography and many details and design examples. This is the most comprehensive publication of its kind.

Designer's Notebooks – Free

The PCI Designer's Notebooks provide detailed, in-depth information on precast concrete relevant to specific design topics such as acoustics, mold, and sustainability.

Visit www.pci.org for the most up-to-date listing of PCI-Certified Plants.

When it comes to quality, why take chances?

When you need precast or precast, prestressed concrete products, choose a PCI-Certified Plant. You'll get confirmed capability—a proven plant with a quality assurance program you can count on.

Whatever your needs, working with a plant that is PCI-certified in the product groups it produces will benefit you and your project.

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- Using quality products, construction crews can get the job done right the first time, keeping labor costs down.
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Guide Specification

To be sure that you are getting the full benefit of the PCI Plant Certification Program, use the following guide specification for your next project:

"***Manufacturer Qualification:*** The precast concrete manufacturing plant shall be certified by the Precast/Prestressed Concrete Institute Plant Certification Program. Manufacturer shall be certified at time of bidding. Certification shall be in the following product group(s) and category(ies): [Select appropriate groups and categories (AT or A1), (B1,2,3, or 4), (C1,2,3, or 4), (G)]."

Product Groups and Categories

The PCI Plant Certification Program is focused around four groups of products, designated A, B, C, and G. Products in Group A are audited to the standards in MNL–117. Products in Groups B and C are audited to the standards in MNL–116. Products in Group G are audited according to the standards in MNL–130. The standards referenced above are found in the following manuals:

- MNL–116 *Manual for Quality Control for Plants and Production of Structural Precast and Prestressed Concrete Products*
- MNL–117 *Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products*
- MNL–130 *Manual for Quality Control for Plants and Production of Glass Fiber Reinforced Concrete Products*

Within Groups A, B, and C are categories that identify product types and the product capability of the individual plant. The categories reflect similarities in the ways in which the products are produced. In addition, categories in Groups A, B, and C are listed in ascending order. In other words, a plant certified to produce products in Category C4 is automatically certified for products in the preceding Categories C1, C2, and C3. A plant certified to produce products in Category B2 is automatically qualified for Category B1 but not Categories B3 or B4.

GROUPS

> GROUP A – ARCHITECTURAL PRODUCTS

CATEGORY AT – ARCHITECTURAL TRIM UNITS

Wet-cast, nonprestressed products with a high standard of finish quality and of relatively small size that can be installed with equipment of limited capacity such as sills, lintels, coping, cornices, quoins, medallions, bollards, benches, planters, and pavers.

CATEGORY A1 – ARCHITECTURAL CLADDING AND LOAD-BEARING UNITS

Precast or precast, prestressed concrete building elements such as exterior cladding, load-bearing and nonload-bearing wall panels, spandrels, beams, mullions, columns, column covers, and miscellaneous shapes. This category includes Category AT.

> GROUP B – BRIDGES

Please note for Group B, Category B1: Some precast concrete products such as highway median barriers, box culverts, and three-sided arches are not automatically included in routine plant audits. They may be included at the request of the precast concrete producer or if required by the project specifications.

CATEGORY B1 – PRECAST CONCRETE BRIDGE PRODUCTS

Mild-steel-reinforced precast concrete elements that include some types of bridge beams or slabs, sheet piling, pile caps, retaining-wall elements, parapet walls, sound barriers, and box culverts.

CATEGORY B2 – PRESTRESSED MISCELLANEOUS BRIDGE PRODUCTS

Any precast, prestressed element excluding super-structure beams. Includes piling, sheet piling, retaining-wall elements, stay-in-place bridge deck panels, and products in Category B1.

CATEGORY B3 – PRESTRESSED STRAIGHT-STRAND BRIDGE MEMBERS

Includes all superstructure elements such as box beams, I-beams, bulb tees, stemmed members, solid slabs, full-depth bridge deck slabs, and products in Categories B1 and B2.

CATEGORY B4 – PRESTRESSED DEFLECTED-STRAND BRIDGE MEMBERS

Includes all products covered in Categories B1, B2, and B3.

GROUP BA – BRIDGE PRODUCTS WITH AN ARCHITECTURAL FINISH

These products are the same as those in the categories within Group B, but they are produced with an architectural finish. They will have a form, machine, or special finish. Certification for Group BA production supersedes Group B in the same category. For instance, a plant certified to produce products in Category B2A is also certified to produce products in Categories B1, B1A, and B2 (but not certified to produce any products in B3A or B4A).

> GROUP C – COMMERCIAL (STRUCTURAL)

CATEGORY C1 – PRECAST CONCRETE PRODUCTS

Mild-steel-reinforced precast concrete elements including sheet piling, pile caps, piling, retaining-wall elements, floor and roof slabs, joists, stairs, seating members, columns, beams, walls, spandrels, etc.

CATEGORY C2 – PRESTRESSED HOLLOW-CORE AND REPETITIVE PRODUCTS

Standard shapes made in a repetitive process prestressed with straight strands. Included are hollow-core slabs, railroad ties, flat slabs, poles, wall panels, and products in Category C1.

CATEGORY C3 – PRESTRESSED STRAIGHT-STRAND STRUCTURAL MEMBERS

Includes stemmed members, beams, columns, joists, seating members, and products in Categories C1 and C2.

CATEGORY C4 – PRESTRESSED DEFLECTED-STRAND STRUCTURAL MEMBERS

Includes stemmed members, beams, joists, and products in Categories C1, C2, and C3.

GROUP CA – COMMERCIAL PRODUCTS WITH AN ARCHITECTURAL FINISH

These products are the same as those in the categories within Group C, but they are produced with an architectural finish. They will have a form, machine, or special finish. Certification for Group CA production supersedes Group C in the same category. For instance, a plant certified to produce products in Category C2A is also certified to produce products in C1, C1A, and C2 (but not certified to produce any products in C3 or C4A).

> GROUP G – GLASS-FIBER-REINFORCED CONCRETE (GFRC)

These products are reinforced with glass fibers that are randomly dispersed throughout the product and are made by spraying a cement/sand slurry onto molds. This produces thin-walled, lightweight cladding panels.

Visit www.pci.org for the most up-to-date listing of PCI-Certified Plants.

> ALABAMA

Forterra Building Products B4, C4
Pelham, (205) 663-4681

Gate Precast Company A1, C4, C4A
Monroeville, (251) 575-2803

> ARIZONA

Coreslab Structures (ARIZ) Inc. A1, B4, C4, C4A
Phoenix, (602) 237-3875

Rocla Concrete Tie Inc. C2
Tucson, (520) 447-8257

Stinger Bridge & Iron B4
Coolidge, (520) 723-5383

Tpac, An EnCon Company A1, B4, C4, C4A
Phoenix, (602) 262-1360

> ARKANSAS

Coreslab Structures (ARK) Inc. C4, C4A
Conway, (501) 329-3763

> CALIFORNIA

Bethlehem Construction Inc. C3, C3A
Wasco, (661) 391-9704

Clark Pacific A1, C3, C3A, G
Fontana, (909) 823-1433

Clark Pacific C4, C4A
Adelanto, (626) 962-8751

Clark Pacific A1, B3, C4, C4A, G
Woodland, (530) 207-4100

Con-Fab California, LLC B4, C4
Lathrop, (209) 249-4700

Con-Fab California, LLC B4, C4
Shafter, (661) 630-7162

Coreslab Structures (LA) Inc. A1, B4, C4, C4A
Perris, (951) 943-9119

KIE-CON Inc. B4, C3
Antioch, (925) 754-9494

Midstate Precast, L.P. A1, C3, C3A
Corcoran, (559) 992-8180

Oldcastle Precast Inc. B4, B4A, C2, C2A
Perris, (951) 657-6093

Oldcastle Precast Inc. C2
Stockton, (209) 466-4215

Precast Concrete Technology Unlimited dba CTU Precast A1, C3, C3A
Olivehurst, (530) 749-6501

StructureCast A1, B3, C3, C3A
Bakersfield, (661) 833-4490

Universal Precast Concrete Inc. A1, B1, C1
Redding, (530) 243-6477

Walters & Wolf Precast A1, G
Fremont, (510) 226-9800

Willis Construction Co. Inc. A1, C1
Hollister, (831) 623-2900

Willis Construction Co. Inc. A1, C1, G
San Juan Bautista, (831) 623-2900

> COLORADO

EnCon Colorado B4, C3
Denver, (303) 287-4312

Plum Creek Structures B4, C3, C3A
Littleton, (303) 471-1569

Rocky Mountain Prestress LLC Architectural Plant A1, C3, C3A
Denver, (303) 480-1111

Rocky Mountain Prestress LLC Structural Plant B4, C4
Denver, (303) 480-1111

Rocla Concrete Tie Inc. C2
Pueblo, (719) 569-4003

Stresscon Corporation A1, B4, B4A, C4, C4A
Colorado Springs, (719) 390-5041

> CONNECTICUT

Blakeslee Prestress Inc. A1, B4, C4, C4A
Branford, (203) 481-5306

Coreslab Structures (CONN) Inc. A1, B1, C1
Thomaston, (860) 283-8281

Oldcastle Precast B2, C2, C2A
Avon, (860) 673-3291

United Concrete Products Inc. B3, C3
Yalesville, (203) 269-3119

> DELAWARE

Concrete Building Systems of Delaware Inc. B3, C4
Delmar, (302) 846-3645

Rocla Concrete Tie Inc. C2
Bear, (302) 836-5304

> FLORIDA

Cement Industries Inc. C3
Fort Myers, (800) 332-1440

Colonial Precast Concrete LLC C2
Placida, (941) 698-4180

Coreslab Structures (MIAMI) Inc. A1, C4, C4A
Medley, (305) 823-8950

Coreslab Structures (TAMPA) Inc. A1, B3, C3, C3A
Tampa, (813) 626-1141

Dura-Stress Inc. A1, B4, B4A, C4, C4A
Leesburg, (352) 787-1422

Finfrock Industries Inc. A1, C3
Apopka, (407) 293-4000

Gate Precast Company A1, B4, C3, C3A
Jacksonville, (904) 757-0860

Gate Precast Company A1, C3
Kissimmee, (407) 847-5285

International Casting Corporation C4
Hialeah, (305) 558-3515

Metromont Corporation A1, C3, C3A
Bartow, (863) 440-5400

Precast Specialties LLC C4
Fort Pierce, (772) 266-5701

Skanska USA Civil SE B3
Pensacola, (757) 578-4147

Spancrete C2
Sebring, (863) 655-1515

Stabil Concrete Products LLC A1
St. Petersburg, (727) 321-6000

Standard Concrete Products Inc. B4, C3
Tampa, (813) 831-9520

Structural Prestressed Industries Inc. C4
Medley, (305) 556-6699

> GEORGIA

Atlanta Structural Concrete Co. C4, C4A
Buchanan, (770) 646-1888

Coreslab Structures (ATLANTA) Inc. C2
Jonesboro, (770) 471-1150

Metromont Corporation A1, C3, C3A
Hiram, (770) 943-8688

Spancrete C2
Newnan, (770) 252-8944

Standard Concrete Products Inc. B4
Atlanta, (404) 792-1600

Standard Concrete Products Inc. B4, C4
Savannah, (912) 233-8263

Tindall Corporation, Georgia Division C4, C4A
Conley, (404) 366-6270

> HAWAII

GPRM Prestress LLC A1, B4, C4, C4A
Kapolei, (808) 682-6000

> IDAHO

Forterra Structural Precast A1, B4, C4
Caldwell, (208) 454-8116

Teton Prestress Concrete LLC B4, C3
Idaho Falls, (208) 552-6606

> ILLINOIS

ATMI Precast A1, C3, C3A
Aurora, (630) 896-4679

AVAN Precast Concrete Products Inc. A1, C3
Lynwood, (708) 757-6200

County Materials Corporation B3, B3-IL
Champaign, (217) 352-4181

County Materials Corporation B4, B4-IL, C4
Salem, (618) 548-1190

Dukane Precast Inc. A1, B3, B3-IL, C3, C3A
Aurora, (630) 355-8118

Dukane Precast Inc. A1, C3A
Naperville, (630) 355-8118

Dukane Precast Inc. A1, C3A
Plainfield, (815) 230-4760

ICCI Illini Concrete LLC B3, B3-IL
Tremont, (309) 925-2376

Illini Precast LLC B4, B4-IL, C3
Marseilles, (815) 795-6161

Lombard Architectural Precast Products Co. A1, C2, C2A
Alsip, (708) 389-1060

Mid-States Concrete Industries, LLC A1, B3, B3-IL, C3, C3A
South Beloit, (815) 389-2277

Spancrete of Illinois, Inc. C2
Crystal Lake, (815) 215-8230

St. Louis Prestress Inc. B3, B3-IL, C3
Glen Carbon, (618) 656-8934

Utility Concrete Products LLC B1, B1A, C1, C1A
Morris, (815) 416-1000

> INDIANA

ATMI Indy, LLC A1, C2, C2A
Greenfield, (317) 891-6280

Coreslab Structures (INDIANAPOLIS) Inc. A1, C4, C4A
Indianapolis, (317) 353-2118

Hoosier Precast LLC B3, C1, C1A
Salem, (815) 459-4545

Precast Specialties A1, B1
Monroeville, (260) 623-6131

Prestress Services Industries LLC B4, B4-IL, C4, C4A
Decatur, (260) 724-7117

StresCore Inc. C2
South Bend, (574) 233-1117

> IOWA

Advanced Precast Co. A1, C1, C1A
Dyersville, (563) 744-3909

Forterra Pipe & Precast B4, C4, C4A
Iowa Falls, (641) 648-2579

MPC Enterprises Inc. A1, C3, C3A
Mount Pleasant, (319) 986-2226

PDM Precast Inc. A1, C3, C3A
Des Moines, (515) 243-5118

Rail One USA C2
Clinton, (563) 522-2795

> KANSAS

Coreslab Structures (KANSAS) Inc. B4, C4
Kansas City, (913) 287-5725

Crossland Prefab LLC C1
Columbus, (620) 249-1414

Fabcon Precast, LLC C3, C3A
Pleasanton, (913) 937-3021

Prestressed Concrete Construction LLC A1, B4, C4, C4A
Newton, (316) 283-2277

Stress-Cast Inc. C3, C3A
Assaria, (785) 667-3905

> KENTUCKY

Bristol Group Precast A1, B3, B3A, C3, C3A
Lexington, (859) 233-9050

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Forterra Pipe & Precast B3, C3
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Gate Precast Company A1, C3, C3A
Winchester, (859) 744-9481
Prestress Services Industries LLC A1, B4, C4, C4A
Lexington, (601) 856-4135
Prestress Services Industries LLC B4, C3
Melbourne, (859) 441-0068

> LOUISIANA

Alfred Miller Contracting C3
Lake Charles, (337) 477-4681
Atlantic Metrocast Inc. C2
New Orleans, (504) 941-3152
Boykin Brothers LLC A1, B4, C3, C3A
Baton Rouge, (225) 753-8722
dp Concrete Products LLC B2, C2
Vinton, (337) 515-7368
F-S Prestress LLC B4, C4
Princeton, (318) 949-2444
Fibrebond Corporation A1, C1, C1A
Minden, (318) 377-1030

> MAINE

Superior Concrete LLC B2, C1
Auburn, (207) 784-1388

> MARYLAND

Atlantic Metrocast Inc. B2, C2
La Plata, (301) 870-3289
Larry E. Knight Inc. C2
Reisterstown, (410) 833-7800

> MASSACHUSETTS

Oldcastle Precast Inc. B4, C3
Rehoboth, (508) 336-7600
Precast Specialties Corp. A1
Abington, (781) 878-7220
Unistress Corporation A1, B4, C4, C4A
Pittsfield, (413) 629-2039
Vynorius Prestress Inc. B3, C2
Salisbury, (978) 462-7765

> MICHIGAN

International Precast Solutions LLC A1, B3, C3, C3A
River Rouge, (313) 843-0073
Kerkstra Precast Inc. A1, B3, C3, C3A
Grandville, (616) 224-6176
M.E.G.A. Precast Inc. A1, C3, C3A
Shelby Township, (586) 294-6430
Mack Industries Inc. A1, B4, C3, C3A
Kalamazoo, (330) 635-5945
Mack Industries Inc. B3A, C3
Saginaw, (989) 755-4348
Peninsula Prestress Company B4, C1
Grand Rapids, (517) 206-4775

> MINNESOTA

Crest Precast Inc. B3, B3A, C3, C3A
La Crescent, (800) 658-9045
Fabcon Precast LLC A1, B1, C3, C3A
Savage, (952) 890-4444
Forterra Pipe & Precast B4, C2
Elk River, (763) 441-2124
Molin Concrete Products Co. C3, C3A
Lino Lakes, (651) 786-7722
Molin Concrete Products Co. A1, C1, C1A
Ramsey, (651) 786-7722
Taracon Precast C3, C3A
Hawley, (218) 216-8260
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Wells Concrete C3
Rosemount, (507) 380-6772
Wells Concrete A1, C4, C4A
Wells, (800) 658-7049

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Gulf Coast Pre-Stress Inc. B4, C4
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Moss Point, (228) 246-0800

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Coreslab Structures (MISSOURI) Inc. A1, B4, C4, C4A
Marshall, (660) 886-3306
County Materials Corporation B4
Bonne Terre, (573) 358-2773
Mid America Precast Inc. A1, B1, C1
Fulton, (573) 642-6400
Prestressed Casting Co. C4
Ozark, (417) 581-7009
Prestressed Casting Co. A1, C3, C3A
Springfield, (417) 869-7350

> MONTANA

Forterra Building Products B4
Montana City, (406) 442-6503
Forterra Pipe & Precast B4, C3
Billings, (406) 656-1601
Missoula Concrete Construction A1, B3, C3, C3A
Missoula, (406) 549-9682

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American Concrete Products Co. B1, B1A, C1, C1A
Valley, (402) 331-5775
Concrete Industries Inc. B4, C4, C4A
Lincoln, (402) 434-1800
Coreslab Structures (OMAHA) Inc. A1, B4, C4, C4A
LaPlatte, (402) 291-0733
Enterprise Precast Concrete Inc. A1, C2, C2A
Omaha, (402) 895-3848

> NEVADA

Western Pacific Precast B4, C2
Sloan, (702) 623-4484

> NEW HAMPSHIRE

Newstress Inc. B3, C3
Epsom, (603) 736-9000

> NEW JERSEY

Boccella Precast LLC C2
Berlin, (856) 767-3861
Jersey Precast B4, C4, C4A
Hamilton Township, (609) 689-3700
Northeast Precast A1, B3, C3, C3A
Millville, (856) 765-9088
Precast Systems Inc. B4, C4
Allentown, (609) 208-1987

> NEW MEXICO

Castillo Prestress, a division of CRMC, Inc. B4, C4
Belen, (505) 864-0238
Coreslab Structures (ALBUQUERQUE) Inc. A1, B4, C4, C4A
Albuquerque, (505) 247-3725

> NEW YORK

David Kucera Inc. A1, G
Gardiner, (845) 255-1044
Lakelands Concrete Products Inc. A1, B3, B3A, C3, C3A
Lima, (585) 624-1990
Oldcastle Precast B3, C3, C3A
Selkirk, (518) 767-2116
The Fort Miller Company Inc. B1, B1A, C1, C1A
Greenwich, (518) 695-5000
The L.C. Whitford Materials Co. Inc. B4, C3
Wellsville, (585) 593-2741

> NORTH CAROLINA

Coastal Precast Systems LLC B4, C2
Wilmington, (910) 604-2249
Gate Precast Company A1, C3
Oxford, (919) 603-1633
Metromont Corporation A1, C3, C3A
Charlotte, (704) 372-1080
Prestress of the Carolinas B4, C4
Charlotte, (704) 587-4273
Utility Precast Inc. B3, B3A
Concord, (704) 721-0106

> NORTH DAKOTA

Wells Concrete C4, C4A
Grand Forks, (701) 772-6687

> OHIO

DBS Prestress of Ohio C3
Huber Heights, (937) 878-8232
Fabcon Precast LLC A1, C3, C3A
Grove City, (952) 890-4444
High Concrete Group LLC A1, C3, C3A
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Mack Industries Inc. C3
Valley City, (330) 460-7005
Mack Industries Inc. B3A,C3
Vienna, (330)638-7680
Prestress Services Industries of Ohio LLC (I-Beam) A1, B4, C3
Mt. Vernon, (740) 393-1121
Prestress Services Industries of Ohio LLC (Box Beam) B3, C3
Mt. Vernon, (740) 393-1121
Rocla Concrete Tie Inc. C2
Sciotoville, (740) 776-3238
Sidley Precast Group, A Division of R.W. Sidley Inc. A1, C4, C4A
Thompson, (440) 298-3232

> OKLAHOMA

Arrowhead Precast LLC A1, C3, C3A
Broken Arrow, (918) 995-2227
Coreslab Structures (OKLA) Inc. (Plant No.1) A1, C4, C4A
Oklahoma City, (405) 632-4944
Coreslab Structures (OKLA) Inc. (Plant No.2) B4, C3
Oklahoma City, (405) 672-2325
Coreslab Structures (TULSA) Inc. B4, C4
Tulsa, (918) 438-0230

> OREGON

Knife River Prestress A1, B4, C4, C4A
Harrisburg, (541) 995-4100
R.B. Johnson Co. B4, C3
McMinnville, (503) 472-2430

> PENNSYLVANIA

Architectural Precast Innovations Inc. A1, C3, C3A
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Brayman Precast LLC B3, C1
Saxonburg, (724) 352-5600
Concrete Safety Systems LLC A1, B3, B3A, C3, C3A
Bethel, (717) 933-4107
Conewago Precast Building Systems A1, C3,C3A
Hanover, (717) 632-7722
Dutchland Inc. C3
Gap, (717) 442-8282

Fabcon Precast LLC A1, B1, B1A, C3, C3A
Mahanoy City, (952) 890-4444
High Concrete Group LLC A1, B3, C3, C3A
Denver, (717) 336-9300
J & R Slaw Inc. A1, B4, C3, C3A
Lehighton, (610) 852-2020
Nitterhouse Concrete Products Inc. A1, C4, C4A
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Northeast Prestressed Products LLC B4, C3
Cressona, (570) 385-2352
PENNSTRESS,
a division of MacInnis Group, LLC A1, B4, C4
Roaring Spring, (814) 695-2016
Say-Core Inc. C2
Portage, (814) 736-8018
Sidley Precast Group C3
Youngwood, (724) 755-0205
Universal Concrete Products Corporation A1, C3, C3A
Stowe, (610) 323-0700

> RHODE ISLAND

Hayward Baker Inc. C2
Cumberland, (401) 334-2565

> SOUTH CAROLINA

Florence Concrete Products Inc. B4, C3, C3A
Sumter, (803) 775-4372
Metromont Corporation A1, C4, C4A
Greenville, (864) 605-5000
Metromont Corporation C3
Spartanburg, (864) 605-5063
Tekna Corporation B4, C3
Charleston, (843) 853-9118
Tindall Corporation, South Carolina Division A1, C4, C4A
Spartanburg, (864) 576-3230

> SOUTH DAKOTA

Forterra Pipe & Precast (Rapid City) B4
Rapid City, (605) 343-1450
Gage Brothers A1, B4, C4, C4A
Sioux Falls, (605) 336-1180

> TENNESSEE

Construction Products Inc. of TN B4, C4
Jackson, (731) 668-7305
Gate Precast Company A1, C3, C3A
Ashland City, (615) 792-4871
Mid South Prestress LLC C3
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Ross Prestressed Concrete Inc. B4, C4
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> TEXAS

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Dallas, (214) 631-7006
Coreslab Structures (TEXAS) Inc. A1, C4, C4A
Cedar Park, (512) 250-0755
CXT Inc. B1, B1A, C1, C1A
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GFRC Cladding Systems LLC G
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Heldenfels Enterprises Inc. B4, C4
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Rocla Concrete Tie Inc. C2
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Texas Concrete Partners LP B4, C4
Elm Mott, (254) 822-1351
Texas Concrete Partners LP B4, C4
Victoria, (361) 573-9145
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Houston, (713) 455-6098
Valley Prestress Products Inc. B4
Eagle Lake, (979) 234-7899

> UTAH

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Harper Precast B2, C1
Salt Lake City, (801) 326-1016
Olympus Precast A1, B3, B3A, C3, C3A
Bluffdale, (801) 571-5041

> VERMONT

Joseph P. Carrara & Sons Inc. A1, B4, B4A, C4, C4A
Middlebury, (802) 775-2301
S.D. Ireland Concrete Construction Corp. B1, C1
Williston, (802) 863-6222
William E. Dailey Precast LLC A1, B4, B4A, C3, C3A
Shaftsbury, (802) 442-4418

> VIRGINIA

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Portsmouth, (757) 397-2317
Bayshore Concrete Products Corporation B4, C4
Cape Charles, (757) 331-2300
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Chesapeake, (757) 545-5215
Hessian Company LTD
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Midland, (540) 439-3266
The Shockey Precast Group A1, C4, C4A
Winchester, (540) 667-7700
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Petersburg, (804) 861-8447

> WASHINGTON

Bellingham Marine Industries Inc. B3, C2
Ferndale, (360) 380-2142
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Cashmere, (509) 782-1001
Concrete Technology Corporation B4, C4
Tacoma, (253) 383-3545
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Spokane, (509) 921-8766
CXT Inc., Rail Division B2, C2
Spokane, (509) 921-7878
EnCon Northwest LLC B1, B1A
Camas, (360) 834-3459
Oldcastle Precast Inc. A1, B4, C4
Spokane Valley, (509) 536-3300
Wilbert Precast Inc. B3, C3, C3A
Yakima, (509) 325-4573

> WEST VIRGINIA

Carr Concrete a division of CXT Inc. B4, C3
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Eastern Vault Company Inc. B3, C3
Princeton, (304) 425-8955

> WISCONSIN

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County Materials Corporation B4, C3
Roberts, (800) 426-1126
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Germantown, (262) 242-7840
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Burlington, (708) 562-7770
MidCon Products Inc. A1, C1
Hortonville, (920) 779-4032
Spancrete A1, B4, C3, C3A
Valders, (920) 775-4121
Stonecast Products Inc. A1, C1
Germantown, (262) 253-6600
Wausau Tile Inc. AT
Rothschild, (715) 359-3121

> WYOMING

voestalpine Nortrak Inc. C2
Cheyenne, (509) 220-6837

> MEXICO

Dura Art Stone Inc. A1, C1A
Tecate, (800) 821-1120
PRETECSA, S.A. DE C.V. A1, G
Estado de Mexico 52, (555) 077-0071
Willis De Mexico S.A. de C.V. A1, C1, G
Tecate BC, MX 52, (665) 655-2222

> CANADA

BRITISH COLUMBIA

APS Precast, a Division of
C&S Group Operations Ltd. A1, B4, C3, C3A
Langley, (604) 888-1968
Armtec A1, B4, C3
Richmond, (604) 214-3243

NEW BRUNSWICK

Strescon Limited A1, B4, C4, C4A
Saint John, (506) 633-8877

NOVA SCOTIA

Strescon Limited A1, B4, C4, C4A
Bedford, (902) 494-7400

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Artex Systems Inc. A1
Concord, (905) 669-1425
Global Precast Inc. A1
Maple, (905) 832-4307
Prestressed Systems Inc. B4, C4
Windsor, (519) 737-1216

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Betons Prefabriques Trans. Canada Inc. A1, B4, C3, C3A
St-Eugene De Grantham, (819) 396-2624
Betons Prefabriques (Bombadier Plant), A1, C2
Alma, (418) 668-6161
Betons Prefabriques (Papeterie Plant), A1, C3, C3A, G
Alma, (418) 668-6161
Prefab de Beauce Inc. A1, C3
Sainte-Marie-de-Beauce, (418) 387-7152
Saramac 9229-0188 Quebec, Inc. A1
Terrebonne, PQ, (450) 966-1001

> UAE

Arabian Profile Company Glass
Reinforced Product LLC G
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Guide Specification

To be sure that you are getting an erector from the PCI Field Certification Program, use the following guide specification for your next project:

"***Erector Qualification:*** The precast concrete erector shall be fully certified by the Precast/Prestressed Concrete Institute (PCI) prior to the beginning of any work at the jobsite. The precast concrete erector shall be certified in Structure Category(ies): [Select appropriate groups and categories S1 or S2 and/or A1]."

Erector Classifications

The PCI Field Certification Program is focused around three erector classifications. The standards referenced are found in the following manuals:

- MNL–127 *Erector's Manual - Standards and Guidelines for the Erection of Precast Concrete Products*
- MNL–132 *Erection Safety Manual for Precast and Prestressed Concrete*

GROUPS

> CATEGORY S1– SIMPLE STRUCTURAL SYSTEMS

This category includes horizontal decking members (e.g. hollow-core slabs on masonry walls), bridge beams placed on cast-in-place abutments or piers, and single-lift wall panels.

> CATEGORY S2– COMPLEX STRUCTURAL SYSTEMS

This category includes everything outlined in Category S1 as well as total–precast, multi-product structures (vertical and horizontal members combined) and single- or multistory load-bearing members (including those with architectural finishes).

> CATEGORY A– ARCHITECTURAL SYSTEMS

This category includes non-load-bearing cladding and GFRC products, which may be attached to a supporting structure.

> ARIZONA

Coreslab Structures (ARIZ) Inc. A, S2
Phoenix, (602) 237-3875

RJC Contracting Inc. S2
Mesa, (480) 357-0868

Steel Girder LLC dba Stinger Bridge & Iron S1
Coolidge, (502) 723-5383

Tpac, An EnCon Company A, S2
Phoenix, (602) 262-1333

> CALIFORNIA

MidState Precast L.P. A, S2
Corcoran, (559) 992-8180

Walters & Wolf Precast A
Fremont, (510) 226-5166

> COLORADO

EnCon Field Services LLC A, S2
Denver, (303) 287-4312

Gibbons Erectors Inc. A, S2
Englewood,, (303) 841-0457

Industrial Manufacturing & Installation Inc. S2
Littleton, (303) 791-4455

Rocky Mountain Prestress LLC A, S2
Denver, (303) 480-1111

> CONNECTICUT

Blakeslee Prestress Inc. S2
Branford, (203) 481-5306

> FLORIDA

Concrete Erectors Inc. A, S2
Altamonte Springs, (407) 862-7100

Coreslab Structures (MIAMI) Inc. A, S2
Medley, (305) 823-8950

Florida Builders Group Inc. S2
Miami Gardens, (305) 278-0098

Pre-Con Construction Inc. A, S2
Lakeland, (863) 688-4504

Prestressed Contractors Inc. S2
West Palm Beach, (561) 741-4369

Specialty Concrete Services Inc. A, S2
Umatilla, (352) 669-8888

Toronto, LLC S2
Apopka, (407) 293-4000

W.W. Gay Mechanical Contractor Inc. A, S2
Jacksonville, (904) 388-2696

> GEORGIA

Bass Precast Erecting Inc. S2
Cleveland, (706) 809-2718

Jack Stevens Welding LLP S2
Murrayville, (770) 534-3809

Precision Stone Setting Co. Inc. A, S2
Hiram, (770) 439-1068

Rutledge & Sons Inc. S2
Canton, (770) 592-0380

Southeastern Precast Erectors Inc. (SPE Inc.) A
Roswell, (770) 722-9212

> IDAHO

Precision Precast Erectors LLC A, S2
Post Falls, (208) 981-0060

> ILLINOIS

Area Erectors Inc. A, S2
Rochelle, (815) 562-4000

Mid-States Concrete Industries S2
South Beloit, (815) 389-2277

> INDIANA

Chicago Steel Construction, LLC S2
Merrillville, (219) 947-3939

> IOWA

Cedar Valley Steel Inc. A, S2
Cedar Rapids, (319) 373-0291

Industrial Steel Erectors S1
Davenport, (563) 355-7202

Northwest Steel Erection Inc. S2
Grimes, (515) 986-0380

US Erectors Inc. A, S2
Pleasant Hill, (515) 243-8450

> KANSAS

Carl Harris Co. Inc. A, S2
Wichita, (316) 267-8700

Crossland Construction Company Inc. S2
Columbus, (620) 442-1414

Griffith Steel Erection Inc. A, S2
Wichita, (316) 941-4455

> LOUISIANA

Alfred Miller Contracting S2
Lake Charles, (337) 477-4681

> MAINE

Reed & Reed Inc. S2
Woolwich, (207) 443-9747

> MARYLAND

DLM Contractors LLC A, S2
Upper Marlboro, (301) 877-0000

E & B Erectors Inc. A, S2
Pikesville, (410) 360-7800

E.E. Marr Erectors Inc. A, S2
Baltimore, (410) 837-1641

EDI Precast LLC A, S2
Upper Marlboro (301) 877-2024

L.R. Willson & Sons Inc. A, S2
Gambrills, (410) 987-5414

> MASSACHUSETTS

Prime Steel Erecting Inc. A, S2
North Billerica, (978) 671-0111

> MICHIGAN

Assemblers Precast & Steel Services Inc. A, S2
Saline, (734) 368-6147

Construction Specialties of Zeeland Inc. S1
Holland, (616) 772-9410

G2 Inc. S2
Cedar Springs, (616) 696-9581

Midwest Steel Inc. A, S2
Detroit, (313) 873-2220

Visit www.pci.org for the most up-to-date listing of PCI-Certified Erectors.

Pioneer Construction Inc. A, S2
Grand Rapids, (616) 247-6966

> MINNESOTA

Amerect Inc. A, S2
Newport, (651) 459-9909

Fabcon Precast LLC S2
Savage, (952) 890-4444

Molin Concrete Products Company S2
Lino Lakes, (651) 786-7722

Wells Concrete A, S2
Maple Grove, (800) 658-7049

> MISSISSIPPI

Bracken Construction Company A, S2
Ridgeland, (601) 922-8413

> MISSOURI

JE Dunn Construction A, S2
Kansas City, (816) 292-8762

Prestressed Casting Co. S2
Springfield, (417) 869-7350

> NEBRASKA

Central Nebraska Steel LLC S2
Kearney, (308) 627-6683

M&M Steel Erection Inc. S2
La Vista, (402) 614-0988

Moen Steel Erection Inc. A, S2
Omaha, (402) 884-0925

Patriot Steel Erection A, S1
Omaha, (402) 431-2744

Topping Out Inc. dba Davis Erection–Omaha A, S2
Gretna, (402) 731-7484

> NEW HAMPSHIRE

American Steel & Precast Erectors A, S2
Greenfield, (603) 547-6311

Newstress Inc. S1
Epsom, (603) 736-9000

Pinnacle Precast & Steel Erectors Inc. S2
Manchester, (603) 493-1669

> NEW JERSEY

CRV Precast Construction LLC S1
Eastampton, (609) 261-7325

J. L. Erectors Inc. S2
Blackwood, (856) 232-9400

JEMCO-Erectors Inc. A, S2
Shamong, (609) 268-0332

Jonasz Precast Inc. A, S2
Westville, (856) 456-7788

Kenvil United Corp. S1
Kenvil, (973) 927-0010

> NEW YORK

Koehler Masonry Corp. S2
Farmingdale, (631) 694-4720

Oldcastle Building Systems Div./Project Services A, S2
Selkirk, (518) 767-2116

Tutor Perini Corporation Civil S1
New Rochelle, (914) 739-1905

> NORTH DAKOTA

Comstock Construction Inc. S2
Fargo, (701) 892-7236

Magnum Contracting Inc. A, S2
Fargo, (701) 235-5285

Midwest Precast Services A, S2
Fargo, (701) 893-0188

PKG Contracting Inc. S2
Fargo, (701) 232-3878

> OHIO

Precast Services Inc. A, S2
Twinsburg, (330) 425-2880

Sidley Precast Group, A Division of R.W. Sidley Inc. S2
Thompson, (440) 298-3232

> OKLAHOMA

Allied Steel Construction Co. LLC S2
Oklahoma City, (405) 232-7531

> PENNSYLVANIA

Century Steel Erectors S2
Kittanning, (724) 545-3444

Conewago Precast Building Systems A, S2
Hanover, (717) 632-7722

High Structural Erectors LLC A, S2
Lancaster, (717) 390-4203

Kinsley Construction Inc. t/a Kinsley Manufacturing S2
York, (717) 757-8761

Maccabee Industrial Inc. A, S2
Belle Vernon, (724) 930-7557

Nitterhouse Concrete Products Inc. A, S2
Chambersburg, (717) 267-4505

> SOUTH CAROLINA

Davis Erecting & Finishing Inc. A, S2
Greenville, (864) 220-0490

Florence Concrete Products Inc. S2
Florence, (843) 662-2549

Steel Clad Inc. A, S2
Greenville, (864) 246-8132

Tindall Corporation A, S2
Spartanburg, (864) 576-3230

> SOUTH DAKOTA

Fiegen Construction Co. A, S2
Sioux Falls, (605) 335-6000

Henry Carlson Company A, S2
Sioux Falls, (605) 336-2410

> TENNESSEE

Mid South Prestress LLC S1
Pleasant View, (615) 746-6606

> TEXAS

Coreslab Structures (TEXAS) Inc. A, S2
Cedar Park, (512) 250-0755

Derr and Isbell Construction LLC A, S2
Euless, (817) 571-4044

Gulf Coast Precast Erectors LLC S2
Hempstead, (832) 451-4395

Precast Erectors Inc. A, S2
Hurst, (817) 684-9080

S 'N' S Erectors Inc. S2
Arlington, (817) 823-8016

> UTAH

Forterra Structural Precast A, S1
Salt Lake City, (801) 966-1060

IMS Masonry A
Lindon, (801) 796-8420

OutWest C & E Inc. S2
Bluffdale, (801) 446-5673

> VERMONT

CCS Constructors Inc. S2
Morrisville, (802) 888-7701

> VIRGINIA

The Shockey Precast Group S2
Winchester, (540) 667-7700

> WISCONSIN

International Erectors Inc. S2
Kenosha, (262) 656-7009

J. P. Cullen & Sons Inc. S2
Janesville, (608) 754-6601

Miron Construction Co. Inc. A, S2
Neenah, (920) 969-7000

Spancrete A, S2
Valders, (920) 775-4121

The Boldt Company S2
Appleton, (920) 225-6212

SPECIFY PCI CERTIFICATION

THERE IS NO EQUIVALENT

Photo courtesy of USC/Gus Ruelas.

PCI
Precast/Prestressed Concrete Institute

The Precast/Prestressed Concrete Institute's (PCI) certification is the industry's most proven, comprehensive, trusted, and specified certification program. The PCI Plant Certification program is now accredited by the International Accreditation Service (IAS) which provides objective evidence that an organization operates at the highest level of ethical, legal, and technical standards. This accreditation demonstrates compliance to ISO/IEC 17021-1.

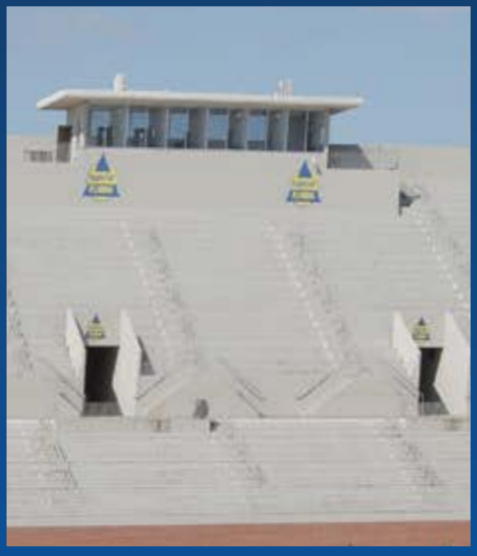
PCI certification offers a complete regimen covering personnel, plant, and field operations. This assures owners, specifiers, and designers that precast concrete products are manufactured and installed by companies who subscribe to nationally accepted standards and are audited to ensure compliance.

IAS ACCREDITED
Management Systems Certification Body

To learn more about PCI Certification, please visit

www.pci.org/certification

HIGH PERFORMANCE TOTAL PRECAST SYSTEMS AND ENCLOSURES



EnCon owns and operates nine entities dedicated to the construction industry, and serves customers in over 20 states through its manufacturing locations in Atlanta, Colorado Springs, Denver, Phoenix and Portland. As a certified member of the Precast/Prestressed Concrete Institute, and a member of Altus-Group®, EnCon is recognized among the leading precast companies in the United States.

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ATLANTA STRUCTURAL CONCRETE
An *EnCon* Company

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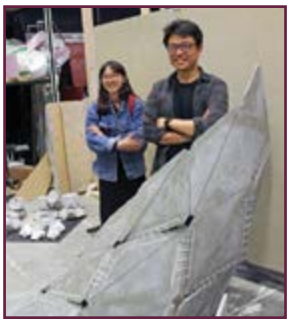
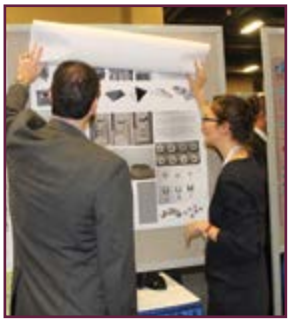
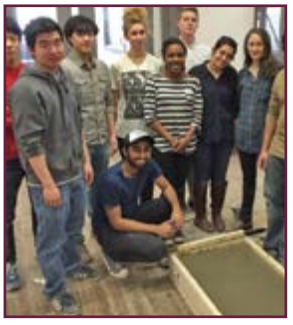
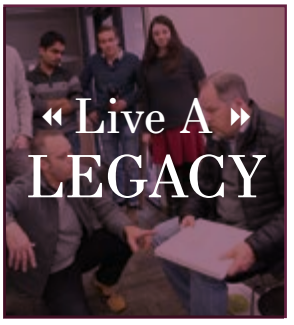
Email: sales@Atlanta-Structural.net
www.Atlanta-Structural.net









A gift in your will takes a simple designation and costs you nothing during your lifetime.

Please contact the PCI Foundation at (708) 386-3715 or email info@pci-foundation.org to inform the PCI Foundation of your gift and become a member of the Legacy Society.

PCI Foundation

HIGH PERFORMANCE ARCHITECTURAL PRECAST SYSTEMS AND SOLUTIONS

The EnCon Companies are specialty contractors and maintain nine manufacturing facilities nationwide to provide precast/prestressed concrete systems and services to the construction industry. Recognized as one of the leading precast companies in the United States, EnCon is pioneering the use of the latest technology for design and fabrication of precast structures. Visit www.EnCon United.com for more information.

Tpac
Architectural and Structural Precast Concrete
An *EnCon* Company

Phone: 602.262.1391
Email: sales@TpacAZ.com
www.TpacAZ.com

"High Concrete saw our design as a wonderful opportunity to really show off their skills, talents and products. It has been a sincere joy to work with a group of precasters who are as engaged as they have been, willing to roll up their sleeves to work on solutions rather than seeing obstacles, and I am sure that they are proud of their efforts as much as we are."

Kai-Uwe Bergmann, *AIA, RIBA, partner, BIG—Bjarke Ingels Group*

Photograpy © Rasmus Hjortshøj—COAST

THE NEW SHAPE OF PRECAST

1200 Intrepid at the Philadelphia Navy Yard is the newly completed precast concrete work of art designed by world-renowned starchitect Bjarke Ingels Group (BIG). The front entrance façade gently curves inward while stretching outward creating a startling and gravity-defying visual that mimics the curved bows of the nearby battleships. The unique engineering requirements of the project meant that the gravity loads flowed directly to the ground and were not tied to the steel frame. Almost every piece of the front entrance façade is unique. This very complicated project presented a challenge that required an innovative solution using technical, engineering and creative expertise, and would not have been possible without the use of BIM and 3D modeling. For more information on this project and others visit us at www.highconcrete.com/news.

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