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WHAT'S INSIDE

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ON THE COVER:
The Kansas City Art Institute is enveloped in precast concrete panels, creating a beautiful and long-lasting structure.

Photo courtesy of Jacia Phillips/Arch Photo KC LLC

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Specifier Q&A

This issue, Precast Solutions hears from Kimberly Kramer, P.E., SE, PhD, with Kansas State University and KDK Engineering LLC.

Photos courtesy of KDK Engineering LLC

Kimberly Kramer's specific areas of interest and research include slender reinforced concrete wall systems, behavior of reinforced concrete, restoration and rehabilitation of structures including resilient design and external strengthening of partially prestressed reinforced concrete structures with fiber reinforced polymer composites. She conducts research with both graduate and undergraduate students, serving as the major professor to 59 graduate students and guiding 15 undergraduate research projects.

Kramer has published peer-refereed journal articles with topics that include the following:

- Analytical load-deflection behavior of partially prestressed concrete girders strengthened with fiber reinforced polymers.
- Slender wall load-deflection behavior.
- Sustainable structural materials.

A past keynote speaker at the World of Concrete, in 2006, she became the director of graduate studies for architectural engineering at Kansas State. Kramer has taught 19 different undergraduate and graduate courses while at K-State, including eight she specifically developed and three via distance education or hybrid in format.

The College of Engineering granted Kramer the Charles H. Scholer Faculty Award (2015), the Dean's Award of Excellence (2015) and the Myers-Alford Memorial Teaching Award (2017). In 2015, she received the American Society of Engineering Educators Midwest Section Outstanding Service Award. She is the recipient of Women in Engineering and Science Program's Making a Difference Award (2005, 2007, 2008, 2010). In 2007, Kramer was recognized by the Welded Wire Reinforcement Institute for her teaching and technical contributions. She earned the AGC of Kansas Professorship from the Associated General Contractors of Kansas (2004, 2012, 2013, 2019).

Kramer is heavily involved in professional organizations American Concrete Institute (ACI) and Structural Engineers Association of Kansas and Missouri (SEAKM). She has acted as the faculty adviser to the Kansas State ACI and SEAKM student groups. Under her advising, the ACI team has finished in the top three six times during the last decade. Through the years, Kramer has held several chapter positions including vice president of the Oklahoma City chapter. She has been involved in many national-level committees, including ACI Education Activity Committee, ACI 551 Tilt-up Concrete Construction, ACI Construction Liaison Committee, ACI 120 History, ACI 130 Sustainability, SA03 Chester Paul Siess Award for Excellence in Structural Research, and as Chair of ACI 124 Aesthetics and ACI E702 Design of Concrete Structures. In 2015, she was promoted to the level of fellow in ACI and in 2021 earned the ACI Sustainability Award. Kramer continues to promote her passion of structural engineering, having been appointed by the governor of Kansas to the Kansas State Board of Technical Professionals in 2019 and serving as chair of the PE/PS board.

Kimberly Kramer, P.E., SE, PhD

Precast concrete was specified for the University of North Texas parking garage.

What is your background and area of expertise?

I received my bachelor's degree in architectural engineering from Kansas State in 1989. Upon graduation, I worked as a structural engineer-in-training for Leo A. Daly in Omaha; as a lead structural engineer for HTB Inc. in Oklahoma City; as a senior structural engineer for Carter and Burgess in Fort Worth, Texas; and as the director of structural engineering for GideonToal Inc., also in Fort Worth.

I was responsible for the design of building systems – from initial planning stages through final project inspection and completion. I was involved in new projects as well as renovation and restoration, including hospitals, prison facilities, long-span aircraft hangars, military facilities, education facilities, high-rise office buildings, retail facilities, dormitories, churches and parking garages. I completed my master's degree in civil engineering with an emphasis in structures and applied mechanics in 1999 and later earned a Ph.D. in civil engineering.

In January 2003, I accepted a faculty position with Kansas State in the department of architectural engineering and construction science. I am a licensed structural and professional engineer in Texas, Kansas, Georgia, Oklahoma, Missouri, Kentucky, Colorado, Indiana, Pennsylvania, South Carolina, North Carolina, Nebraska and Wisconsin. As a professor of architectural engineering and construction science, I was named the G.E. Johnson Construction Science Endowed Chair. In addition to a nine-month faculty appointment at K-State, I have the opportunity to stay current with the building industry in a consulting capacity as the co-owner of the consulting company, KDK Engineering LLC. This includes performing as a structural professional education consultant, engineering design and condition assessments.

How did you become interested in doing what you do?

It was a sixth-grade project. We had to design and build a model of a college campus in 2200. I fell in love with architecture and the built environment – specifically, structural engineering.

What types of projects do you typically oversee?

In my professional practice, a wide range of commercial projects. Specifically, the use of precast for parking structures and office buildings.

In my academic career, I currently am working on a project to develop two precast concrete courses (one construction course and one engineering course). I am working with Dr. Hayder Rasheed with Kansas State University and Dr. Mohammed Albahttiti with California State University-Chico. These courses will be cross-campus co-taught.

What are some unique or noteworthy projects on which you specified precast concrete?

- The University of North Texas east parking garage in Fort Worth, Texas. The exterior architectural precast panels with two separate finishes and circular openings were challenging for the precaster.
- The MCI Switch Facility Addition in Downers Grove, Ill. The use of hollow core planks with a live load of 250 psf and 500 psf in specific areas. The owner was insistent that the structural gravity system must match the existing system (hollow core planks) even though the existing structure only supports a standard office building load. The high live loads were for the backup battery systems. One challenging aspect of this project was the camber needed due to the high loads.
- Las Colinas Parking Garage in Irving, Texas, a four-story precast parking structure. The foundation system was approximately 100 feet deep because of expansive soils.

Above and top: The Las Colinas parking garage in Irving, Texas, is a four-story precast concrete structure.

What benefits does precast concrete offer your projects?

Outstanding quality in architectural finishes since skilled workers create the precast in a controlled environment. Precast concrete has an inherent fire resistance and is durable. Therefore, no additional fire proofing is needed. Precast concrete is a very sustainable building material.

How do you see the role of precast concrete as a building material changing in the future?

Labor efficiency. Precast concrete reduces the quantity of workers needed on the job site and during the construction process, since most of the work is done in a factory with optimization of machinery that isn't available on the job site.

Also, precast concrete is a sustainable building product for many reasons: reuse of forms, less waste material, limited weather impacts on construction and faster construction time. When examining life cycle, the higher energy efficiency of precast sandwich wall panels and lower greenhouse emissions over the long term is profoundly larger than other materials. As a reminder, concrete sequesters up to 20% of the annual calcination CO^2 emission produced by clinker.

For these reasons, the use of precast concrete will rise. PS

Precast Stands Tall, Strong

Photo by Onyx Corporation

Massive precast blocks assemble to create New England's largest precast retaining wall at the Ledges at Woburn.

By Debbie Snidermann

A massive retaining wall is installed at a new housing development in Woburn, Mass., a suburb of Boston. At 18,000 square feet, the wall is 700 feet long and roughly 52 feet high in its highest section and is the largest and tallest free-standing block wall structure in New England.

The Ledges at Woburn project is a gravity wall system built from large precast modular blocks. Because of the height of the wall and its location against a rock ledge face, it needed large blocks for the project to be successful.

"That's one thing that makes this project unique," said Eric Opachinski, vice president at MBO Precast in Carver, Mass. "In typical tall retaining wall applications, large blocks

The blocks were stripped from the molds with a bridge crane at MBO Precast.
Photo courtesy of MBO Precast

are only used on the bottom or first two courses of the wall for stability purposes. In this application, large Stone Strong 24-86 blocks were used for the entire height of the wall."

MBO Precast has a 20-year-plus relationship with Stone Strong as a dealer and representative for its products throughout New England.

"It's also unique to use a gravity wall for such a large scale wall," Opachinski said. "There is no geo grid, nothing keeping this large scale wall tied to the slope behind it, only rebar connections and concrete infill."

Stone Strong Systems of Omaha, Neb., is the licensor of the Stone Strong retaining wall system.

"Not only is it the tallest wall in Massachusetts, it's also straight up against a stone façade natural wall, covering the entire hill," Nathan Gran of Stone Strong said. "With Stone Strong, they managed to accomplish both feats in the same project."

SITE, SIZE AND SAFETY: PRECAST REQUIRED

Jefferson Apartment Group, the owners of the Ledges at Woburn project, wanted to hold the rock face up and create a safe place for parking and residents of the new community.

"There was supposed to be a free-standing blasted rock cliff," John Durkin, operations manager of contractor Onyx Corporation of Acton, Mass., said. "But as the excavation began removing rock from beneath the 80-foot towering cliff, it uncovered a degraded rotted ledge face that didn't have sufficient stability on its own, so a retaining wall had to be built."

A precast wall offered a creative solution.

"We looked at many designs that incorporated geogrid, steel mesh, rock bolts and other ballasts to support the face, but logistically, the site was tight to the property lines and none of these other solutions were viable," Durnkin said. "We didn't have enough room to give up any property on-site or parking spaces. Stone Strong was the only large precast block without geogrid that could go that high."

Given the engineering challenges of tall retaining walls, there were really no other options. Stone Strong blocks are the biggest in the industry, and the only block of its kind, with a large hollow cell to receive concrete and rebar to create the solid concrete ballast and strength needed to reach that height.

Stone Strong's patented hollow core precast block design has the ability to be filled with stone and concrete. This wall required both. About 2,500 cubic yards of concrete infill went into the large blocks' hollow cores in multiple pours in the tallest sections of the wall.

"The fact that the hollow core block doesn't have much weight allows a smaller or normal-sized machine to handle it without a crane, allowing the concrete infill to be placed later. No other manufacturer could do that and provide the strength that these blocks did," Durkin said.

The wall required a dowling system of upright rebar to create positive connection with each subsequent course as the blocks were laid on top of each other up against the rock ledge face.

"The hollow core block offered another benefit, allowing us to tie rebar into the block to incorporate into a topping slab that could be bolted into the deteriorating rock face without drilling into the rock," Durkin said. "It was faster and easier to install, like a bookend with a brace at the top holding the top of the wall."

Major safety challenges in building the wall also dictated the use of precast.

"In some places, the wall is only 6 inches off of the rock face. We had to use a crash protection box to keep the workers safe while they installed the footings and built the block, so there was no way and nowhere to pour concrete

A view of the west wall at the Ledges at Woburn.
Photo courtesy of Onyx Corporation

under the box. We had to use precast blocks," Durkin said.

The job required lots of rock removal and blasting, another reason poured fresh green concrete wasn't feasible. Precast could be built while blasting operations were ongoing.

Precast also allowed site work to continue in the winter when pouring concrete in New England is unadvisable. The costs for heating and controlling temperature of poured concrete would have been exorbitant.

HOW PRECAST MET THE PROJECT'S NEEDS

Producing 850 precast blocks for one project is a large amount from a production and cost standpoint, but that's what was needed to make the site work. The blocks were produced by MBO Precast, with more than two-thirds of them, about 575 units, being the largest 24-86 blocks, each 8 feet long, 3 feet tall, 86 inches deep and weighing 7,600 pounds. The rest were base blocks, top blocks and Stone Strong's new corner forms to finish corners on the ends.

"Typically, we have one or two molds, but to meet the project deadline and not wait years for the product, we had to go through a double pouring setup with the forms and rent an additional mold from Stone Strong to pour units twice a day," Opachinski said.

As product was made, it sat until cured and shipped to the site immediately.

"We stripped units out of the forms early, setting up forms and pouring with special batches of concrete that used accelerating admixtures, hot water, heaters and curing blankets," Opachinski said. "We did continuous double pouring production and constant delivery as the job progressed."

For precasters, pouring units daily is a standard procedure. But even though there was "nothing special" about the blocks, the pieces were in stock and it was a process MBO Precast is familiar with, there was nothing standard about producing the precast for this project.

"Double pouring is very uncommon," Opachinski said. "And, doing it every single day, for this length of time put a strain on the crew and others."

Production and delivery took roughly six months. Project discussions started in November 2020. Block shipments started in January 2021 and were completed in May 2021.

Despite the production challenges, MBO Precast produced blocks fast enough to accommodate installation of more than 1,000 square feet per day, an impressive rate of productivity, while managing other ongoing work in its standard 8- to 10-hour shift.

Compared to other materials for retaining walls, such as log walls or small residential blocks, Gran said precast blocks are pricier at first but over their lifetime of more than 100 years, they are not expensive. They are not going to fall or cause concern about safety.

"Big precast blocks are easy to install, have a faster installation time, save on production time and labor, and for how long the wall will be there, are the best option," Gran said. "The big modular block system is a new trend and better concept than smaller neighborhood residential blocks. Smaller modular blocks are not as inherently stable, and for bigger-than-life projects that required filling the blocks with concrete instead of aggregate, like this one in Woburn, no other modular system could accomplish that alone." **PS**

Debbie Sniderman is an engineer and CEO of VI Ventures LLC, an engineering consulting company. She can be reached at info@vivllc.com.

Making Art with

Photo courtesy of Michael Robinson Photography

Precast Concrete

Insulated precast concrete panels provide a long-lasting, aesthetically pleasing residence hall for students at a Midwestern art school.

By Mason Nichols

Art has the unique ability to move people. With the simple stroke of a brush or pencil, the full spectrum of human emotions are evoked. For thousands of years, art has inspired us, taking us on whimsical journeys, causing us to ponder life's many wonders and serving as a vehicle through which nearly anything is possible.

For those seeking to inspire through art, learning how to craft influential pieces requires proper training. At the Kansas City Art Institute in Missouri, college officials know that, in addition to a tailored curriculum designed to spark innovation, students need a space reserved for reflection – a place where creative thinking thrives and thoughts can flow freely. To meet this need and provide a top-notch experience for students, KCAI pursued plans to build the Barbara Marshall Residence Hall, a four-story, 75,000-square-foot facility featuring more than 200 beds, a dining center, multiple gathering spaces and more.

Construction of the residence hall was made possible by leveraging precast concrete, the only building material capable of providing the blank canvas the design and construction teams needed to generate an awe-inspiring, resilient structure that will carry KCAI students into the future.

A SIGNATURE STRUCTURE

Concrete is a prominent feature in and around KCAI's campus, with many buildings adjacent to the project site – including the nearby Kemper Museum of Contemporary Art – taking advantage of the building material within their design. For Doug Stockman, AIA, principal architect at Helix Architecture + Design, this was a major source of inspiration for the Barbara Marshall Residence Hall.

"I always draw upon the site in one way or another," said Stockman, who worked as the lead designer on the project. "In this case, the neighboring buildings and the campus were very much into the use of concrete. For both the art institute and its students, craftsmanship and the use of specific materials is critical because of the way they evoke emotion and inspiration."

The courtyard at Barbara Marshall Residence Hall.
Photos courtesy of Michael Robinson Photography

This ultimately led to Stockman and his team specifying the use of precast concrete for the residence hall's building envelope. Doing so not only provided an opportunity for the finished structure to integrate fully with its surroundings but also met KCAI officials' needs for a signature building on campus that would last. The choice also made sense from a safety and job site perspective, something general contractor JE Dunn and precaster Enterprise Precast Concrete agreed upon during the early stages of the work.

All three groups worked together extensively from the project onset, operating closely and staying in constant communication to ensure an insulated precast panel design that maximizes efficiency in response to some of the site's limitations.

"There was a building on one side and a boulevard that the city would not let us take any lanes from," said Tim Ockinga, senior project manager with JE Dunn. "As such, we were restricted to a zero crane route around the building. Working with Enterprise, we maximized the size of the panels to be as large as possible while still remaining within the capacity of our tower crane."

Dirk McClure, director of business development at Enterprise Precast Concrete, said that his team worked diligently on developing this crucial balance for the panels. Enterprise settled on a typical unit size of 12 feet tall and 14 feet long, with each of the more than 200 panels produced weighing approximately 17,500 pounds. In total, the company manufactured more than 31,000 square feet of insulated precast façade for the residence hall.

By going with a precast concrete approach, safety also was enhanced on the job site. According to McClure, this was mainly due to a consolidation of the trade contractors required, which limited the number of people actively working on-site at any given time.

"One of the reasons we wanted to go with precast was to lessen the manpower count, and obviously, this does it," Ockinga said. "We had a 4- to 5-person crew erecting this skin panel very quickly versus multiple crews doing the different layers with non-prefab."

Photo courtesy of
Michael Robinson Photography

A STUNNING DESIGN

As Stockman explained, a significant portion of the design work that went into the Barbara Marshall Residence Hall was driven by Stockman's love for concrete, something he said allowed Helix to "have some fun with the envelope" while also meeting KCAI's goals. This led to healthy interplay between Helix and the teams at Enterprise and JE Dunn as all three parties discussed how to push the boundaries of what was possible. To maintain some cost-efficiency while still generating a unique design, much of the conversation focused on the use of formliners.

"We wanted to find a unique skin profile or pattern that looked organic and abstract yet was repeatable," Ockinga said. "Using the series of formliners that we developed, we ended up with a façade that, despite being repeatable, looks as if no two segments are exactly the same."

Beyond the striking appearance of the precast concrete panels, another notable design feature is the use of color on each of the panel's insets. Both the exterior, roadway-facing side of the residence hall and the inner section facing the courtyard were treated with a stain to give the building pops of color.

On one side of the structure, the colors transition from the fluorescent shades of green typically found on trees and plants in the spring and summer to the deep oranges and reds seen during the fall. The intent was to provide the building with some visual contrast while also highlighting the all-important changing of the seasons. The courtyard side was handled with a different goal in mind.

"The art institute was very clear that they wanted the 'inner space' to be used for contemplation," Stockman said. "They wanted it to be a space where students could rest their minds and experience peace and calm. We chose what we felt was a natural color for that – blue."

In addition to becoming a campus that now serves as a natural draw for students and visitors alike, the use of precast concrete brought several more advantages to the Barbara Marshall Residence Hall. And precast allowed the project to stick to its tight schedule.

"With many materials like masonry and site-cast concrete, there's a certain window of time in which you can build," he said. "If you get too far into the winter or specific weather conditions, you have to pause work and wait for that window to open back up. With precast, as long as the footings and foundations are in place, it can literally go up in any weather."

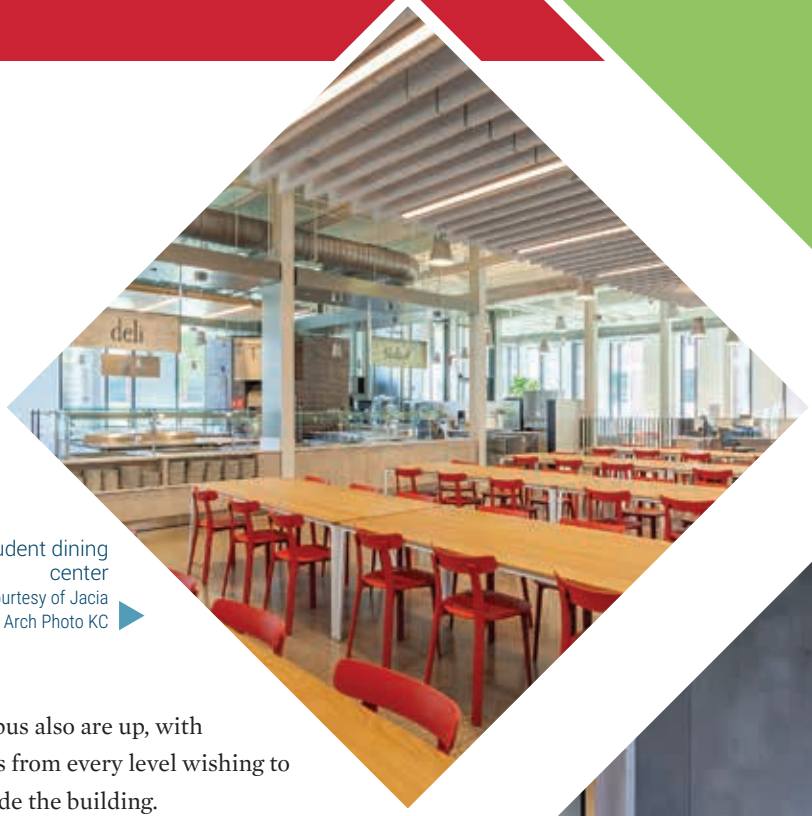
Energy efficiency and resiliency also were important considerations.

"We ran some energy models, and this by far gave us what we were looking for as far as a continuous insulation barrier on the building while only engaging one trade," Ockinga said. "The precast skin also lent itself well to the client's mandate of having a long-lasting structure in place. This is going to be a 75-year building."

A MAJOR SUCCESS

Although artwork is intended to be admired with the human eye, it also is meant to be experienced – something students at KCAI will have the pleasure of doing within the Barbara Marshall Residence Hall for years to come as they learn, create and kickstart their careers inside the space.

Thanks to the use of precast concrete, the art institute already is experiencing myriad benefits. In 2020, the building won multiple awards, including the American Institute of Architects Kansas City's Project of the Year. Occupancy numbers



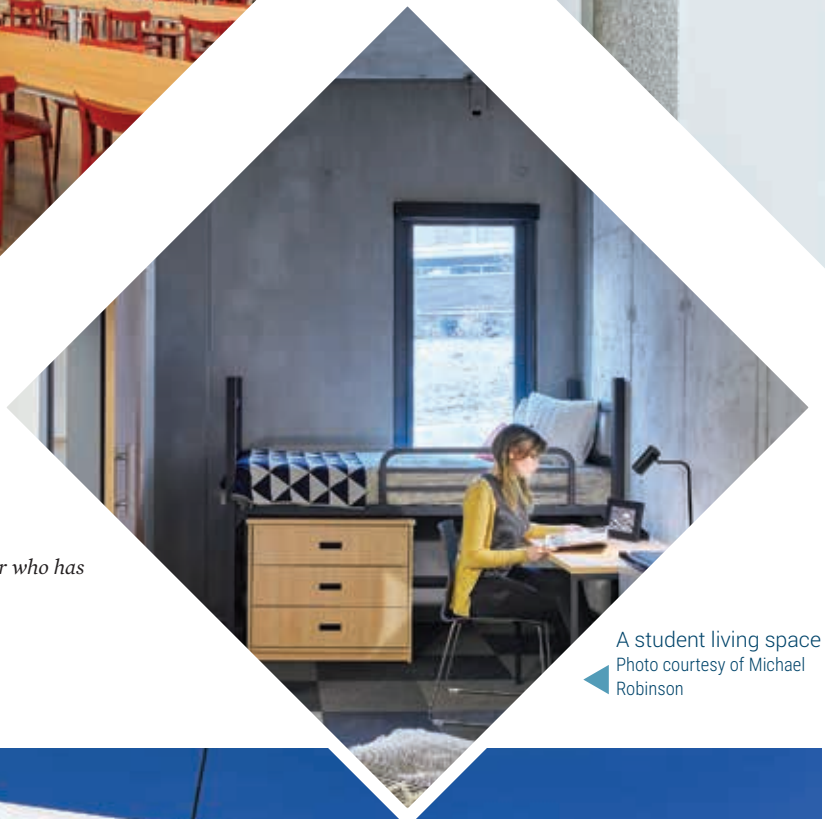
Student dining center
Photo courtesy of Jacia Phillips | Arch Photo KC

on campus also are up, with students from every level wishing to live inside the building.

Stockman referred to the project as a major success.

"There's no part of this that wasn't successful, really, and the client couldn't be more happy with the end result." PS

Mason Nichols is a Grand Rapids, Mich.-based writer and editor who has covered the precast concrete industry for nearly a decade.



A student living space
Photo courtesy of Michael Robinson

Photo courtesy Jacia Phillips | Arch Photo KC

Impossible Becomes Possible

New York City's Little Island project shows precast is an innovative and flexible solution.

By Kirk Stelsel
Photos provided by FMG

The iconic children's story "The Little Engine That Could" extolls the virtues of bravery, perseverance, optimism and dreaming big. The little engine takes on the seemingly impossible task at hand by staying focused and repeatedly building self-confidence one "I think I can" at a time.

The project team for New York City's Little Island project has demonstrated those same virtues in order to get over its proverbial mountain. The journey has not been easy. It required everyone involved to dream big and believe they could succeed in the face of seemingly endless challenges. Now, they have crested the hill and are ready to enjoy the journey down the other side.

THE VISION

Barry Diller may be best known for founding the Fox Broadcasting Company, but he also is no stranger to philanthropic endeavors. He and wife Diane von Furstenberg's work took center stage in 2013 through a bold commitment to the Hudson River Park Trust. Their gift kicked off the effort to create a beautiful park out of thin air over the Hudson River.

The area of Manhattan the park serves has an extreme shortage of parks per capita. In fact, it's the second worst "park desert" in the city. Hudson River Park Trust has been working to address this, and Little Island is its most ambitious project to date. It is a space where people can pause to play. In addition, visitors can take advantage of park's extensive gardens and amphitheater.

Diller sought the advice of leaders in art and engaged internationally renowned architects Heatherwick Studio and MNLA to dream big for what the space could be.

"This is an intricate garden that is an oasis where you step away from the city, because you cross over the water to get into it," said Celine Armstrong, ASLA, LEED AP, project executive with Little Island. "The design is very meticulous. Everything was thought out so carefully to create an experience for the visitor that is unlike anywhere else."

THE CREATION

The journey from concept to completion was not easy. The project found itself in limbo numerous times, but in the end the momentum and desire were simply too great to let it go.

One of the major design focuses was the support structures that are known as the "pots." These pots not only are the most powerful aesthetic component but an engineering marvel brought to life by Arup, a global design, planning and engineering firm, and Fort Miller, a precast concrete manufacturer in Schuylerville, N.Y.

David Farnsworth, P.E., a principal with Arup's New York office, said Arup has worked with Hudson River Park Trust for the past 20 years to redevelop the waterfront and create lasting solutions.

"We all wanted to focus on finding good, durable solutions to the challenges of building economically in the Hudson River environment, which is a saline environment," he said. "The solution we all arrived at after these 20 years is precast concrete."

Precast concrete piles have been a go-to for Arup, but the volume and complexity of the precast in Little Island far surpasses previous projects. The designers knew the pots would require a completely custom product. The island, while appearing to be square from above, undulates from 15 feet at its lowest point to 65 feet at its highest. This design protects against flooding – which was fresh on everyone's mind at the outset thanks to Hurricane Sandy – keeps the ampitheater's sound in, allows natural light to reach the marine life below, and lets visitors enter under pot structures on the southern accessway bridge.

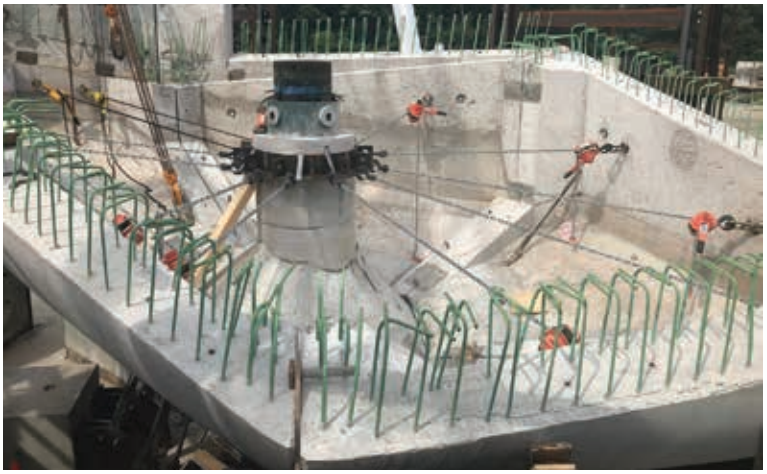
Fort Miller was chosen to manufacture the precast concrete pots, column heads and the pie-shaped planks that act as a stay-in-place form for the cast-in-place beams and mat. Coastal Precast in Chesapeake, Va., manufactured the precast/prestressed piles.

THE POTS

Joe O'Malley, sales engineer with Fort Miller, knew creating the pots would be a tough task filled with company firsts, but Fort Miller felt confident it could complete the job.

Since Fort Miller's production facility is not on the river, Arup broke the pots into petals, sized to ensure they could be transported on a flatbed to the Port of Coeymans without police escort. There, Weeks Marine assembled the petals into completed pots and barged them to the job site for placement.

The underside of some of the 132 pots installed at Little Island.



Clockwise from top left: Rebar is placed for a column head; a petal is lifted by crane; an assembled pot; and the base form for a petal.

Arup and Fort Miller worked together to create the complex shapes with the desired durability, color and finish. Arup served as the structural engineering expert, and Fort Miller was the concrete expert. Fort Miller sent many different mix designs out for testing. There was a coulomb test for the saltwater environment, a freeze-thaw test and other tests for durability and serviceability. In addition, Diller personally visited Fort Miller's plant to see two full-scale mock-ups in its yard, where each petal showed him a different finish and color. In the end, the team chose a mix design consisting of white cement, slag and a corrosion inhibitor, among other components.

Arup's 3D models were sent to Fort Miller, where each file was translated onto high-density foam using a hot wire machine to cut out the basic shape and a robotic, multi-access milling machine to create the complex, 3D curved shape. Each form was made of multiple foam pieces that were assembled and sprayed with a polyurea coating, which provided the smooth finish and enough durability for multiple uses.

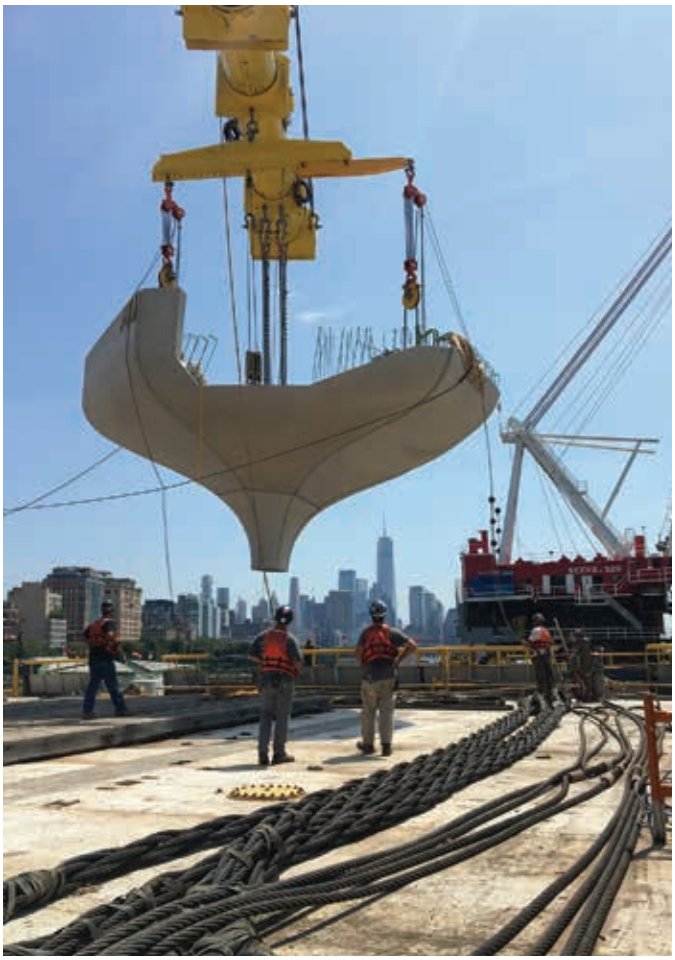
Farnsworth said the engineering team used parametric software to generate the internal shapes. This work included not only the pots, but every single piece of rebar and stainless steel embed, which were all clickable in the software to determine bends and cuts.

"Every bar had a tag on it, and we'd take all the rebar and explode it from the 3D model and lay it flat in a virtual yard with its own unique identifier," Farnsworth said. "They could go into a 2D CAD drawing that had every single bar laid flat and they could print off and measure to do the bends. They used RFID tags for every single piece of rebar that goes into the project so they could click on the bar in the 3D model or scan the tag on any of the rebar that had been built and search for that in the model."

Arup's designers grouped the pots into 39 categories, each with subcategories, to create as much repeatability as possible.

"We didn't want to have a bunch of square precast pieces, and we realized we could plan repetition by utilizing something called a Cairo pentagonal tiling pattern," Farnsworth said. "You could create this whole shape with effectively six pieces of tiles. But, of course, there's the elevational variation as well and the other tricky parts that end up being created around the unique geometry of the amphitheater and the fact that the southern accessway bridge comes under the pots."

By adjusting the petal form closure points, Fort Miller was able to cast



Top: Pot 61 is transported during the installation at Little Island.
Bottom: Pot 71 is installed near the south accessway.

the various wall heights to create the desired elevation change. While Arup made every effort to minimize the customization, in the end each petal had some unique factor.

"It was 655 petals, 132 pots and 132 column heads," O'Malley said. "Within those 39 different types, you might have six of a type-six pot, where they are all different but the basic structure is the same. Truly, there's not one petal that is identical to another."

Despite the complexity and being a first for everyone involved, including site contractors, the project ran smoothly.

"This was a true partnership between Fort Miller and Arup," O'Malley said. "They worked with us every single day when we got into the production."

The feeling was mutual across the entire team.

"We found a phenomenal partner in Fort Miller," Farnsworth said. "They were up for trying new things and brought a lot of detailed precast concrete expertise to the project. The integration and collaboration between the design engineering and the fabricators and even the erectors was really fantastic."

"I am so thankful we had Fort Miller as a partner because we needed someone who could create large elements that were beautiful," Armstrong added. "Contracts are important, but you build a job on relationships, and you need a team that understands that you will be fair, but you also expect them to step in and help out regardless of what phase you are at in the project. One of the biggest joys of being on this project was seeing all the egos checked at the door, and we all rolled up our sleeves and figured it out together."

THE RESULT

Once the piles and pots were set, the onsite contractors tied the pots back laterally to each other and then cast and installed the beams and rebar for the top layer of concrete. Landscaping, the amphitheater and other flourishes added the proverbial icing on the cake.

Armstrong, who has been a part of the project since the start and has been at the site for every milestone, could not be more excited.

"It will be a space where people will love to come together once it's safe to do so and enjoy art in the neighborhood," she said. "It's incredible to see the final product look like the rendering because in my experience that isn't always the case. To see it come together is spectacular." PS

Kirk Stelsel is the former vice president of communications and public affairs at NPCA.

Photo provided by Huffcutt

Answering the Call of Nature

Huffcutt helps Indiana parks replace aging restroom facilities with precast structures.

By Heather Bremer

In Indiana, you are never more than an hour's drive from one of the 37 Hoosier state parks.

More than 15 million people visit these dedicated natural spaces each year to hike, fish, swim, camp and explore the state's bountiful flora and fauna.

The parks system traces its history to 1916, when Col. Richard Liber recommended the creation of a state park network as part of Indiana's centennial celebration. Some of the system's structures date back just as far, earning historic designations that include strict regulations about renovations.

The parks' restroom facilities – simple structures made of wood and siding – aren't old enough or of any particular significance to be deemed historic. So, after decades of providing millions of visitors a place to answer the call of nature and plenty of guest complaints, Indiana's Department of Natural Resources decided it was time to replace them.

"Obviously, restrooms are important when you're putting a million-plus people through a park in a year," said Brandt Baughman, deputy director of operations for Indiana's DNR. "People expect to go to nice, clean restrooms now. It's not anything that came to a head. It's something that we've been hearing for a while."

RIGHT TIME, RIGHT PLACE

About the time Indiana initiated the project to replace the facilities, NPCA Producer member Huffcutt Concrete of Chippewa Falls, Wis., brought a new precast production facility online, allowing the company to create consistent, durable and accurate products in a controlled environment.

"It really gave us the opportunity to expand on what we've already done well," Huffcutt Sales Manager Jon Schroetke said. "We knew that we would have extra opportunities to produce some extra units with the newer technology and the new plant."

Huffcutt landed the deal, in part, because of the timing. The company worked alongside the Indiana government on a couple of preliminary projects, distinguishing itself from its competition with quality and service. What started as providing a few units evolved into a multi-year, multi-phased approach to supply the state with Huffcutt precast structures.

The units are built at the plant, with the floors, walls and roof all made of concrete, assembled and welded before shipment.

"It was a really nice opportunity for Huffcutt," Schroetke said. "It evolved into this grand idea."

So far, the state has replaced 106 vault toilets with precast housing and vault toilet structures. Four "comfort stations," or restroom buildings with showers, also are updated with precast facilities, with 14 more in the works. When it's all said and done, the state will replace 182 vault toilets and 18 comfort stations.

A COMPLETE PACKAGE

Huffcutt produces four lines of vault toilets, each named after a duck species – the Mallard, the Teal, the Wood Duck and the Golden Eye – at its Chippewa Falls plant. Indiana's state parks are outfitting restrooms with Golden Eye units, a popular design that is adaptable to various layouts.

The units are unisex with two seats and are roughly 12½ feet wide by 10 feet deep. Each housing weighs about 40,000 pounds, with another 12,000 to 15,000 pounds for the vault.

The units are built at the plant, with the floors, walls and roof all made of concrete, assembled and welded before shipment. They also come with all the ancillary items already installed, including toilets, mirrors, grab bars and toilet paper roll holders.

"We produce these at the plant, so that literally once they set down on site, they're almost in working order," Schroetke said. "The vault toilets are a very quick turnaround."

Even units that need plumbing or electrical work require just a few hours of final hookups by a licensed plumber or electrician. Disruption to the park is minimal, avoiding a parade of trades workers and equipment and lengthy, frustrating closures.

"It's a fantastic turnkey opportunity for any state, city, municipal or park," Schroetke said. "All we're really looking for in these vaults is for the hole to be dug. We come in with a crane. We set it. We're in and out of there within hours, not days or weeks or months, so people can enjoy it. People aren't disrupted by the continuous build for weeks on end in those busy seasons when the parks are being utilized to their full potential."

A new restroom facility was installed at Ouabache State Park near Bluffton, Ind., replacing aging wooden structures.
Photo provided by the Indiana Department of Natural Resources

And, depending on the client's needs, Huffcutt incorporates a host of other elements. That includes solar lights and exterior profiles, produced using form liners. Exterior looks range from wood grains to river rock and limestone. Huffcutt also offers the opportunity to choose from the entire Sherman Williams paint line, allowing for customization.

"Whether it is the city or local park colors, or if they wanted to go bold and do something different, we give them that option," Schroetke said.

PROTECTING NATURE

Given the units' location within Indiana state parks, measures to protect local wildlife remained vital to the project.

Cavity-nesting birds such as owls can crawl into ventilation pipes and make their way to the vault basements, where they become entrapped and die. To deter birds and other animals from entering the units, Huffcutt utilized vent screens from the Teton Raptor Center's "Poo-Poo Project" to cap the ventilation stacks.

Since 2013, the Teton Raptor Center has distributed more than 18,000 screens to more than 640 partners across all 50 states, the U.S. Virgin Islands and Canada.

"It is something that Huffcutt recognized as a great stewardship of the environment to do so," Schroetke said.

POSITIVE RECEPTION

Restroom facilities typically aren't something the general public gets excited about. But when the Indiana State Parks' Facebook page shared a post about the new facilities, Hoosiers heaped praise on the improvements.

"It's a little funny to be excited about toilets, but I definitely was," one commenter said.

That kind of praise means a lot to Huffcutt.

"To just hear the community say, 'Thank you. This is a great idea. We've been needing this for a long time,' it's bringing so much value to those communities into those spots," Schroetke said. "It's really just fun to be a part of it."

And Indiana DNR shares Hoosiers' enthusiasm. The units have aesthetic appeal. They are Americans With Disabilities Act compliant, ensuring all park guests can use the facilities. And they're easy to clean and maintain, a big plus for those without access to water.

"Cleaning (a park's facilities) can be difficult," Baughman said. "This allows us to bring in a tank ... and just go in and completely spray out and do a much better job of cleaning and in much less time."

The project's success has been good for Huffcutt's business. In addition to a multitude of praises, neighboring states have heard about what the company has done for Indiana and even visited sites where the units have been installed.

Schroetke said officials are beginning to see Huffcutt as a top supplier in the industry and are impressed by the high-quality products the company produces at a competitive price.

"We didn't get to where we are to date by not putting in the work and by not putting our best foot forward," Schroetke said. "So, when you really look at the quality differences between our building from Day 1 to 10 years from now, the proof has been noted already in a very short order that it is a superior quality product." PS

Heather Bremer is the communications manager at NPCA.

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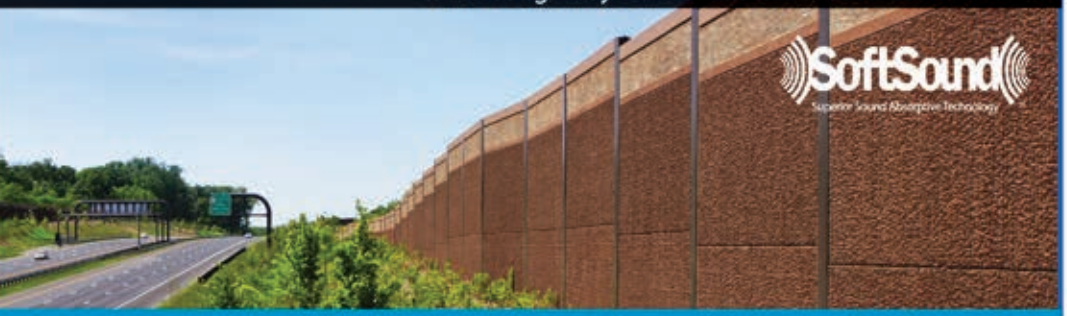

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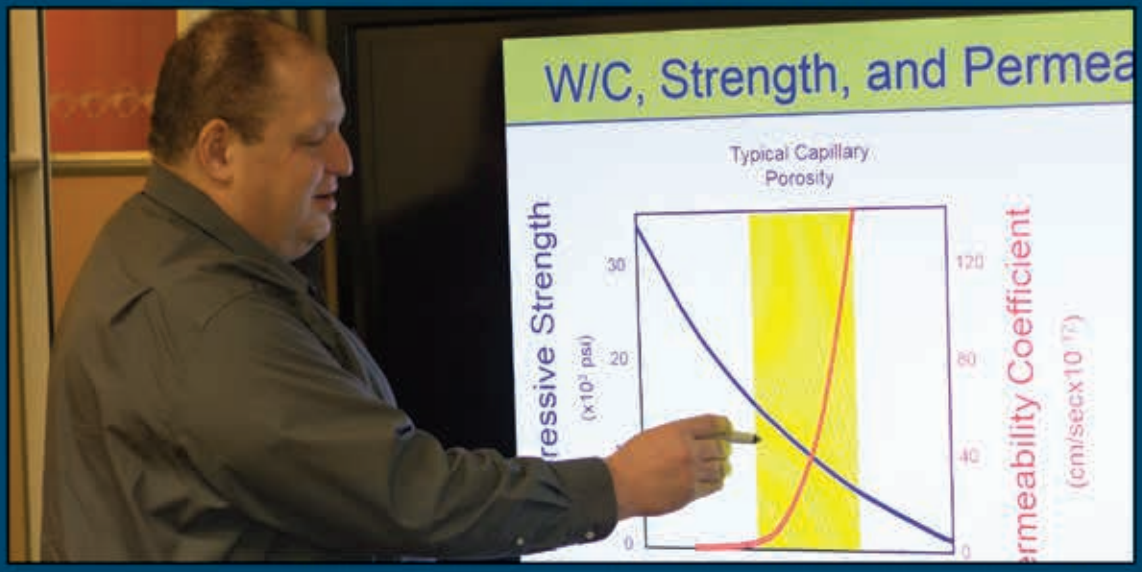

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