Specifier Q&A / Multi-Use Precast Garages / Ohio River Bridges

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ON THE COVER:
Parking in Style: The North Main Corona Metrolink Parking Structure in Corona, Calif., features more than 700 architectural precast concrete panels. Each panel was manufactured with two colors and three depths of etch and reveals, giving the structure striking visual flair. Learn more about how precast is contributing to the construction of aesthetically pleasing, multi-use parking facilities across the country on page 16.

Photo courtesy of StructureCast.

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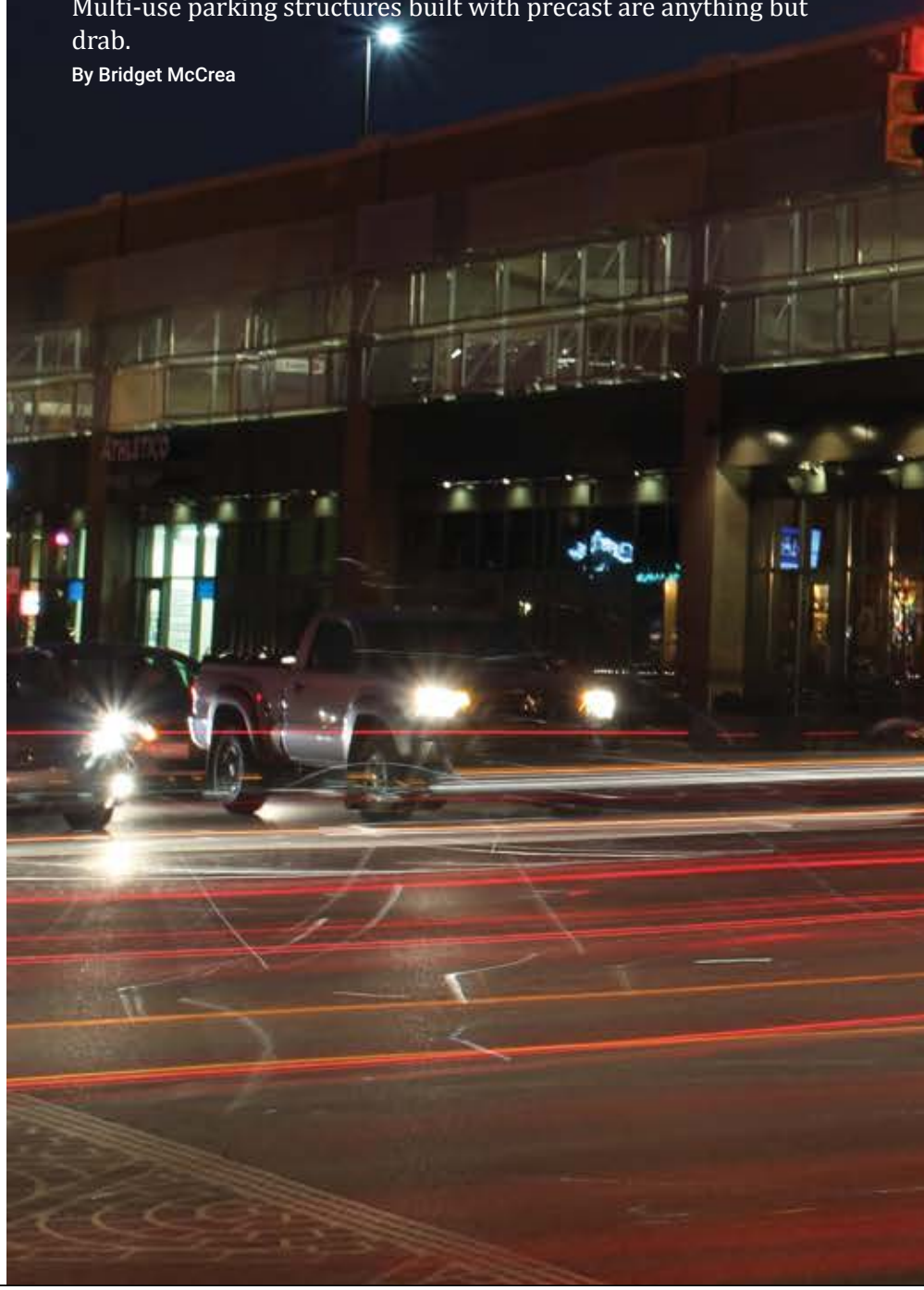
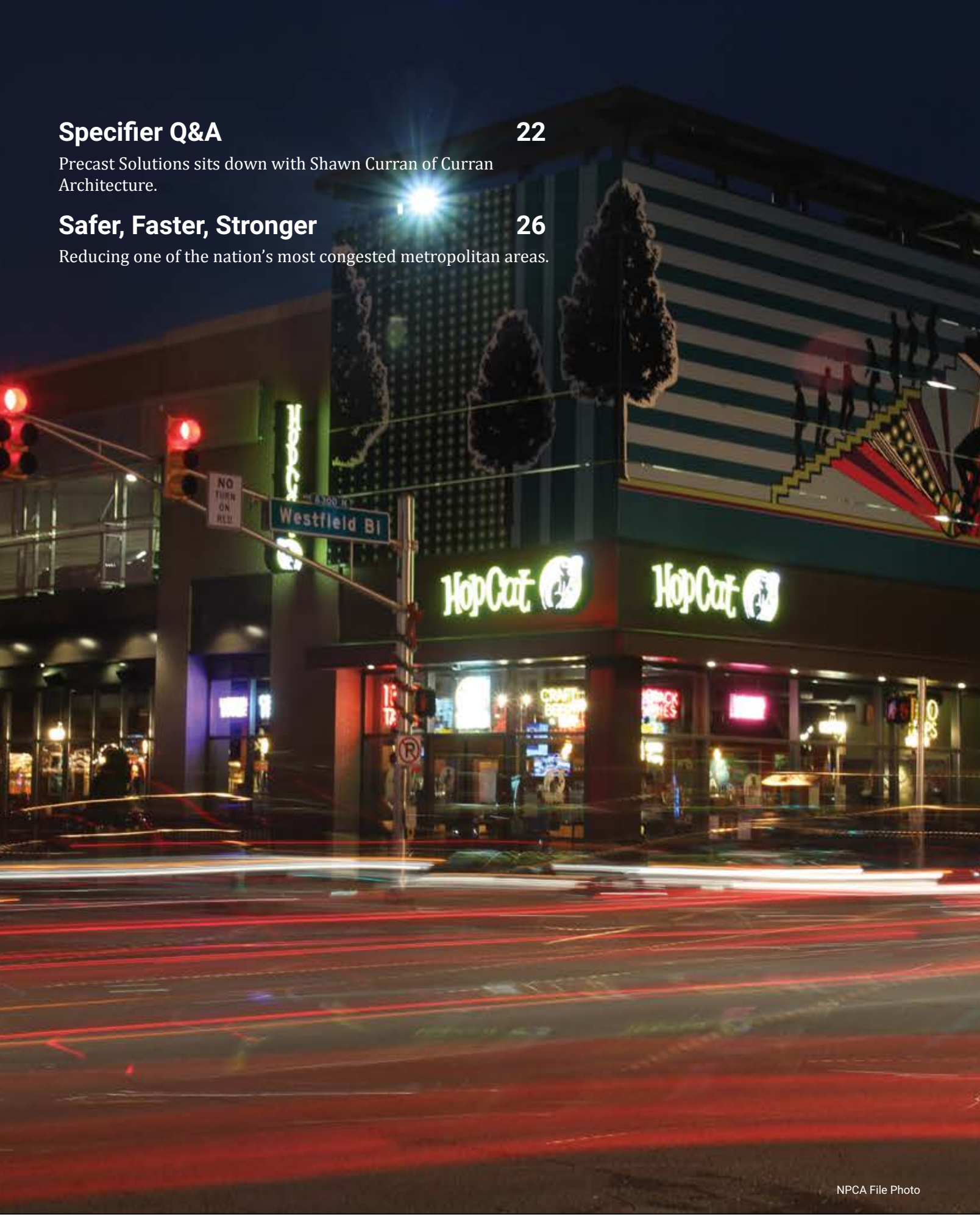
WHAT'S INSIDE





NPCA File Photo

Coming Untied

Tieless modular track systems built with precast concrete are gaining recognition for their durability, low maintenance and ease of construction.

By Shari Held

The clanging of the bell. The whistle announcing the approach. The rumbling of the train as it barrels down the tracks. Who hasn't fallen under the spell of the railroad? Railroads have been a part of human history since the 18th century. And like other institutions that have survived over the years, they are changing.

Traditional railroads use a tie-ballast system to support the track. But over time, ties give way, ballasts deteriorate and rails shift off-gauge. The result: everything from bumpy rides to accidents.

These systems need continual maintenance to stay running. But shutting down a railroad crossing or track creates logistic nightmares and generates long-term maintenance costs.

Photo courtesy of Oldcastle Precast

Photo courtesy of Oldcastle Precast

Replacing more than 250 track feet of railroad ties with a new precast concrete system in Urbana, Ill., took less than 10 days.

PERFORMANCE PLUS

As a result, rail companies and municipalities are adopting tieless precast concrete railroad systems. Compared to traditional tie-ballast systems, precast systems offer a speedy, less labor-intensive installation and require little to no maintenance. Precast units are also highly adaptable and factory-produced to ensure quality control.

"Precast tieless railroad systems are starting to take hold more every day," said Wayne Weszka, vice president of rail products for Calabash, N.C.-based Premier Modular Railroad Crossings, Inc. "The ride quality for vehicular traffic is the best around. If it's blacktopped properly, vehicles don't even know they're going across a railroad crossing."

Oldcastle Precast's StarTrack system has been on the market for more than 20 years. It has successfully passed performance tests at the Transportation Technology Center in Pueblo, Colo.

"Modules can be customized to radius configurations so they work for any track layout," said Jim Baker, vice president and national products manager for Atlanta, Ga.-based Oldcastle Precast. "We've installed over 200,000 feet of track and never had a structural failure."

IVES (Intelligent, Versatile, Efficient, Solid), a new precast slab track system developed by Rhomberg Sersa Rail Group, has been

on the market for about two years. IVES test tracks have been laid in the U.K. and a Switzerland test is upcoming. The German Federal Rail Authority recently approved IVES.

"IVES has raised a lot of interest because of its installation method and the fact that the precast elements can be produced locally," said Tariq Al-Thuwainy, project manager for Rhomberg Rail Consult, a department of track system technology for Rhomberg Sersa.

Installation of IVES systems is fast and economical because the rail isn't fixed until the last step, allowing installers to "work rough" until that point.

Here's a look at the aforementioned products on the job site.

"**Precast tieless railroad systems** are starting to take hold more every day,"

– Wayne Weszka, *vice president of rail products, Premier Modular Railroad Crossings, Inc.*

N. LINCOLN AVENUE AND U.S. 150 – URBANA, ILL.

This Norfolk Southern railroad crossing, located a few blocks south of the University of Illinois campus, is situated at a high-density traffic intersection. In the past, it required high maintenance and was continually shut down for repairs, presenting a difficult situation for the city.

"Over the years, they'd experimented with different materials," Baker said. "Finally they got tired of dealing with it and turned to us."

That was late summer 2012. The project called for removing 262 1/2 track feet of rubber inlay-topped railroad ties and replacing them with Oldcastle's tieless StarTrack II system.

Fifteen precast panels – each 14 inches thick, 8 feet wide and 17 1/2 feet long – were cast in custom steel molds at Oldcastle's Topeka, Kan., plant. The 6,000-psi, steel rebar-reinforced precast panels weighed 22,500 pounds each.

Once the contractor removed the old crossing, installation was quick and easy.

"It was pretty straightforward," Baker said. "Norfolk Southern was there to assist and we had site representation there as well."

The contractor prepared the subgrade, achieving the correct grade. After setting the panels in place, the contractor installed the rail, attached it to the precast elements and repaved the asphalt approaches. The entire process took less than 10 days.

The crossing no longer "makes your fillings almost fall out." On rainy days, the diamond-plate, anti-skid surface makes the crossing safer for vehicles, bikes and pedestrians. The city will realize future savings since the crossing will remain maintenance free for years to come.

"It was a quick turnaround on the installation, and a high-quality, long-term solution for a crossing that had continual maintenance issues," Baker said.

Workers installed approximately 800 feet of IVES precast slab track at Asfordby Tunnel in the U.K.

ASFORDBY TUNNEL – U.K.

At Asfordby Tunnel in the U.K., Rhomberg Sersa laid 803 feet of IVES precast slab track and 410 feet of cast-in-place slab track in a trial project for Network Rail, the British rail authority.

"Railway construction is a lot about logistics, especially in tunnels," Al-Thuwainy said. "In general, our experience is the less cast in-situ concrete you have, the better."

Each IVES precast element measured 8 feet long, 2 feet wide and approximately 1 foot high, weighing about 1 ton.

"The elements are very simple compared to conventional, traditional ties," Al-Thuwainy said. "Other than the concrete quality, the only thing that needs accuracy is the recesses for grouting in the rail fixation units."

The first step of the installation – laying the base layer of asphalt – challenged the Rhomberg Sersa team. Network Rail had moved the installation site farther from the job site a few days prior to the project start. With the longer route to the job site, the asphalt cooled substantially, making it difficult to spread.

Once the base was ready, the team used a two-way excavator to place the precast elements. They then fitted the rail fasteners into the recesses of the elements, positioned the track panel and filled the voids between the rail fastenings and the precast elements with high-strength mortar. The grout used for the project required a curing time of approximately 24 hours before the team could remove the formwork and finish the job.

The Asfordby trial project, which took about two weeks, was completed in March 2014. The experience confirmed that precast solutions for rail applications are more practical than their cast-in-place counterparts. Not only did the cast-in-place concrete require a lengthier cure time, but the logistics of bringing in additional machinery to manufacture the components on site were also difficult to manage given the space constraints.

MAIN STREET – BUFFALO, N.Y.

In Buffalo, N.Y., Premier's modular railroad crossing system won the bid over cast-in-place for Phase I and II of a downtown project. It encompassed two tracks – for a total of 4,000 track feet – and took nearly two years to complete both phases.

"This track was going straight down Main Street with traffic running up and down it," Weszka said. "It took a lot of coordination with the Niagara Frontier Transportation Authority and the city of Buffalo."

NFTA purchased the product from Premier and hired a contractor to install it. Weszka spent a week showing the

Photo courtesy of Premier Modular Railroad Crossings, Inc.

A modular precast track system provided the perfect solution for residents of Buffalo, N.Y.

contractor, who had no experience with the product, the tricks of the trade. According to Weszka, he did a great job and had no issues.

The project used both standard three-piece (base and two centers), 8-feet-wide, 8-feet-high, 13-inches-thick precast modules and custom modules that measured a foot wider. The custom pieces specified box holes to accommodate the looped cables and wiring and tucked down sides that would match up with the sidewalk. Tolerances were tight at +/- 3/8 inch.

Forterra Pipe & Precast, which produces the modules for Premier, manufactured the precast elements in its North Carolina plant. The company used steel forms and a 7,000-psi concrete mix, which was necessary to meet the required tolerances.

The two main challenges were the tight tolerances and getting the modules to the job site on time. Each standard-sized module weighed 10,000 pounds. The custom modules weighed even more. And very few of the pieces could be stored on site because the second track was operational.

To install the Premier system, the contractor established the centerline, positioned the rail, dropped in the two center panels and installed the anchor bolts. Because the crossing was located in the theatre section, modules were placed on "big hockey pucks" to keep the noise and vibrations to a minimum.

"Once they got the old track out and set the grade, they were rolling," Weszka said. "They laid close to 240 feet per day or better. That's how quick it can be. The trains are running, the traffic's running and everybody's happy."

GOOD FOR THE LONG HAUL

Tieless precast systems are ideal for nearly every application thanks to their ease of installation, low maintenance and longevity.

"We installed some in Portland, Ore., 40 years ago," Weszka said. "They're still in service and doing what they're supposed to do." **PS**

Shari Held is an Indianapolis, Ind.-based freelance writer who has covered the construction industry for more than 10 years.

Just Keep Swin

nming

Precast concrete is the ideal building material for constructing fish passageways in sensitive environments.

By Mark Crawford

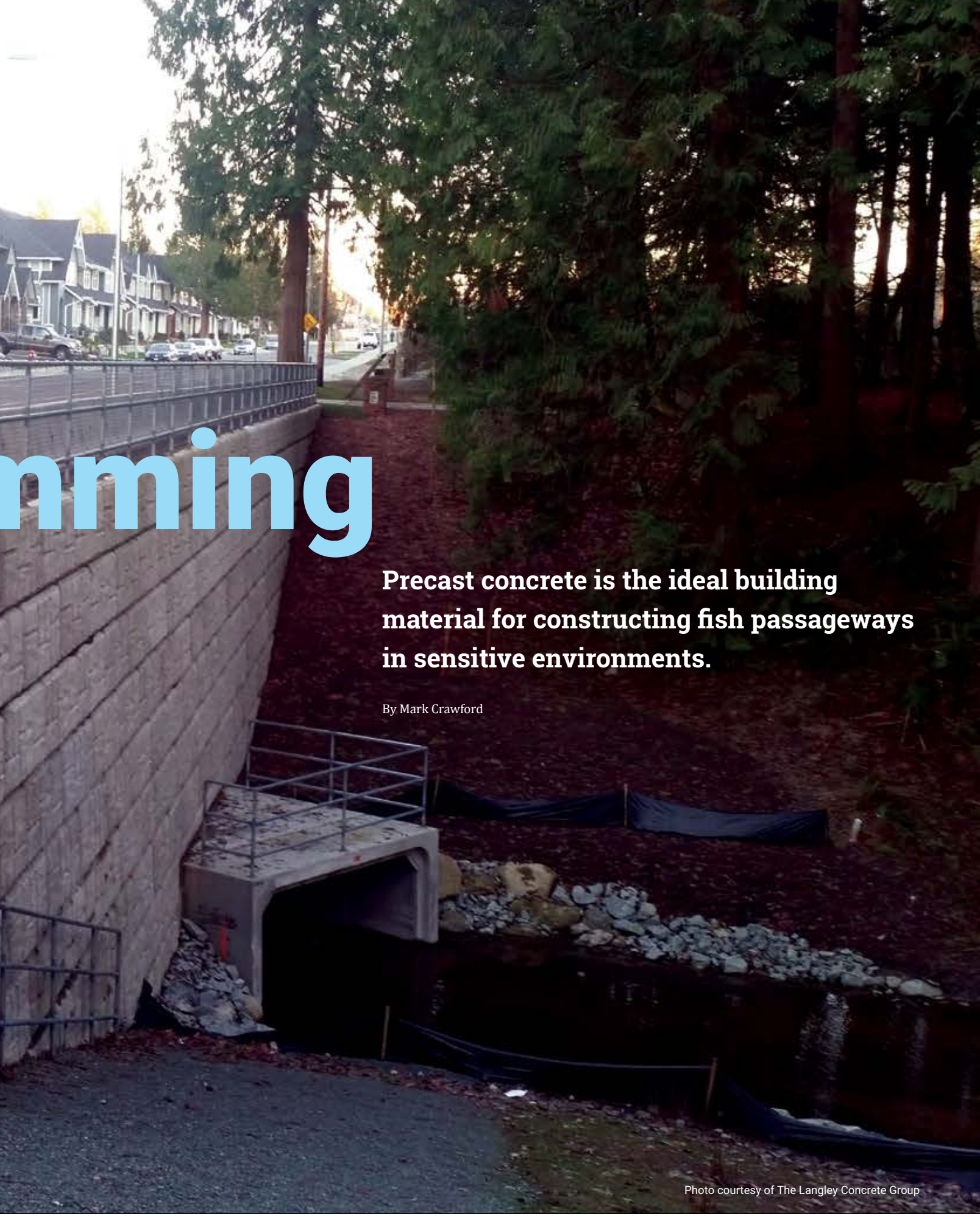


Photo courtesy of The Langley Concrete Group

Photo courtesy of Lindsay Precast

Photo courtesy of Lindsay Precast

Development often brings change to natural landscapes that impacts wildlife's migration patterns. In particular, dams, locks, bridges and culverts can prevent fish from migrating upstream to spawn, reducing their population numbers. Fish passageways – routes specially designed to bypass man-made barriers – allow fish to continue their journey. Passageways are designed so the current flows fast enough to attract the fish, but slow enough to not exhaust them or wash them back downstream.

Precast concrete is often the material of choice for constructing fish passageways because it installs quickly in stream settings, saving time and minimizing surface disturbance when compared to cast-in-place or metal components. It's also easier to create natural features with precast, such as fish steps with embedded rock-like shapes.

Depending on project needs, there are a variety of passageway configurations to choose from, including fish ladders and culverts with baffles. For two recent fish passageway projects, precast structures played a key role in protecting and restoring fish populations and their natural habitats.

PROTECTING THREATENED FISH IN COLORADO

In 2014, Lindsay Precast's plant in Colorado Springs, Colo., worked with Colorado Springs Utilities to develop straight and bend sections for a local fish passageway on Fountain Creek. CSU's goal for the project was to help preserve the Arkansas darter and the flathead chub, both species of special concern in Colorado.

"The fish ladder could be bid as precast or cast-in-place," said Paul Sook, vice president of Wildcat Construction, the project's general contractor. "We elected to go with precast. We felt we could control quality much more easily than cast-in-place.

"It was also a more cost-effective and faster solution. We were going to be working in the active stream and wanted to get in and out as quickly as possible, to minimize any environmental impacts."

Another reason for speed was the timing of the project. Construction was scheduled for the fall and winter months, when Colorado weather can be unpredictable. With guidance from CSU, Lindsay Precast designed the precast elements.

"Of critical importance was the simulated streambed and rock features required to help the fish swim through the structure," said Randy Lindsay-Brisbin, vice president and director of Lindsay Precast. "CSU also consulted a fish expert to design the streambed features for the precast segments."

Lindsay Precast first manufactured a non-textured section of the fish ladder. Production workers then grouted rocks and streambed features by hand to the section and evaluated the product to ensure fish-friendly flow patterns. Once the layout of the rock features was approved, Lindsay Precast obtained the formliners.

"From a manufacturing perspective, the development and

Lindsay Precast's Colorado Springs, Colo., plant manufactured fish ladders designed to protect two species of special concern in the area.

procurement of a cost-effective formliner and forming system was key to this project," said Lindsay-Brisbin. "Lindsay Fabrication, our in-house form fabrication division, manufactured the form components. Scott System, a concrete formliner firm in Denver, partnered with our project team to develop a random stream bottom/boulder design to meet the ecological requirements of the project."

Precast elements for the fish ladder consisted of 20 straight-trough sections and nine curved-end sections. Wildcat Construction poured the foundation and piers for the structure in place. The precast segments were then placed on the substructure and tied together with small closure pours. Lindsay Precast also manufactured additional precast rocks it used at the transitions at the top and bottom of the passage. Each straight section is 14 feet, 9 inches long and approximately 4 feet wide, weighing 6,200 pounds. Each bend section is a 100-inch semicircle weighing 3,400 pounds.

"We elected to go with precast. We felt **we could control quality much more easily** than cast-in-place."

– Paul Sook, *vice president, Wildcat Construction*

The project was completed in November 2014. Monitoring equipment will be installed in early 2016 to track fish traffic and document the effectiveness of the structure over time.

"We are proud to play a role in developing and executing these kinds of environmental projects," Lindsay-Brisbin said. "The Fountain Creek fish passage is another example of projects that benefit and protect our natural resources."

Photo courtesy of The Langley Concrete Group

The Langley Concrete Group's precast fish baffle system allows local salmon to continue their journey upstream.

PASSING THE IMPASSABLE IN BRITISH COLUMBIA

For the past decade, salmon travelling up Yorkson Creek in Langley Township, B.C., encountered an impassable culvert, preventing them from spawning. Working with the township, McElhanney Engineering designed a fish baffle system for the stream bed, enabling the salmon to continue their migration upstream.

"We chose a precast option because it allowed the precast contractor to be in the creek for a shorter duration of time, reducing the risk of disturbing the sensitive fish habitat," said Joel Grams, project manager for Mainland Civil Site Services, the general contractor on the project. "A cast-in-place option presented a bigger risk because it would have required us to form, pour, place, finish and cure the slab, walls, baffles and roof."

Joel Shimozawa, technical marketing engineer for the Langley Concrete Group in Chilliwack, B.C., stressed the importance of moving quickly on the project.

"In British Columbia, there is a fisheries construction window for completing in-stream works," he said. "The window generally runs between July 15 and Aug. 15, but varies depending on the species of fish and weather."

Langley Concrete produced the 12-foot-by-7-foot box culvert at Yorkson Creek using dry cast concrete. V-notch baffles were installed as a secondary pour with a wet cast mix.

"If a large number of baffles is required, we use a rapid-setting additive so we can complete up to three weir baffles using one form per day," Shimozawa said.

A few weeks after completion of the project, wild coho salmon returned to the creek and began swimming through the culvert,

Photo courtesy of The Langley Concrete Group

which also provides protection from predatory bald eagles.

"The success of the project and the return of spawning salmon make us proud of the positive environmental impacts we can have as precast producers," Shimozawa said.

NOTHING FISHY ABOUT PROTECTING WILDLIFE

Precast concrete is an excellent building material due to its myriad advantages, including durability and ease of installation. For time-sensitive projects that can have an impact on the environment, these attributes play an even bigger role, allowing project owners and contractors to successfully complete the work and attain maximum impact with minimal site disturbance. PS

Mark Crawford is a Madison, Wis.-based freelance writer who specializes in science, technology and manufacturing.

SAVING THE TOADLETS

Langley Concrete Group donated a 6-foot-by-3-foot box culvert to create a toad crossing in Chilliwack, B.C., saving thousands of toadlets from heavy vehicle traffic on Elk View Road.

In the spring, western toads mate and lay eggs in the wetlands around Chilliwack. By summer, the baby toads are ready to migrate to the nearby forest – but they must first cross a busy Elk View Road. The Fraser Valley Conservancy, in partnership with Lafarge Construction and the Langley Concrete Group, designed a toad-friendly tunnel under the road.

"The toads do not enter a space that is dark, so we had to let light into it," explained David Redfern, vice president and general manager for Lafarge Construction in Vancouver. "We had to develop a grate that would be structural and still let enough light in to have the toads accept it as an environment."

The project cost about $120,000, with most of the materials and labor donated by participating companies – including Langley Concrete Group.

"We are a family-run business and are proud to supply products for communities to build on," Shimozawa said.

You could say the project has been a hopping success: more than 8,000 toads passed through the tunnel last summer.

Parking + Commerce

Precast concrete is helping transform America's drab parking structures into attractive, multi-use facilities.

By Bridget McCrea

Photo courtesy of Gate Precast

Photo courtesy of Keystone Construction Corp.

Precast concrete panels allowed designers to match the Sunset Avenue Parking Garage's aesthetic with nearby structures.

With 253 million passenger vehicles currently on U.S. roadways – up 1.5% from 249.3 million in 2014 – developing functional-yet-aesthetic parking structures has become a common goal among project owners and specifiers alike.[1]

Precast concrete is playing an increasingly important role in the creation of attractive parking structures, including many that incorporate multi-use functionality on their ground floors. Whether the driving force is historic preservation, the need to "fit in" with an urban setting or building without destroying existing architectural context, precast's versatile, economic nature is taking center stage on projects across the country.

"Historically, parking structures have been these massive and mundane structures," said William Pearson, formerly with Stantec and current president and CEO of Ekose'a Homes in San Francisco. "Why not make them more architecturally interesting and aesthetically pleasing? Precast has allowed us to do that."

BUTLER UNIVERSITY'S SUNSET AVENUE GARAGE

Butler University's Sunset Avenue Garage opened last year in Indianapolis and is home to restaurants with names like "Scotty's Dawghouse" and the "The Pita Pit." The structure accommodates 1,038 vehicles and includes 15,000 square feet of restaurant and retail space on the main floor. Designed by CSO Architects of Indianapolis, the structure incorporates both precast concrete and embedded brick to match the surrounding area and create an attractive, functional facility for vehicles, pedestrians and customers alike.

Randy Schumacher, lead design principal at CSO, said the architectural firm teamed with Keystone Construction in a design-build arrangement. The university wanted the 60,000-square-foot garage to blend well with both the existing limestone buildings and the adjacent, all-brick Hinkle Fieldhouse. Challenged with developing a large structure that would fit nicely with the surrounding context, CSO and Keystone worked together to devise a viable solution.

"We had to break the new garage down so that it wouldn't look like one massive, intimidating structure on Sunset Avenue," Schumacher said.

To achieve that goal, the design-build team decided to separate the building into three different pieces and then incorporate numerous design elements that matched Butler's existing architectural approach. Those elements included gabled limestone tower elements and window openings and thin-brick precast panels.

"We used precast for all it was worth and in so many different ways on this project, including as a backup material for limestone," Schumacher said. "It helped us build very economically and on schedule while also achieving the aesthetics we needed to blend this garage into the campus fabric."

Mike Patarino, Keystone's senior vice president, said the versatile nature of the thin-brick precast panels allowed the team to create a multi-use facility that matches both sides of campus.

"Early in the design process, we decided to do a building wrap around the garage that would link both architectural types together," Patarino explained. "The final result was a structure that included red brick designs in some areas and limestone in others."

In addition to providing and supporting a flexible parking garage design, precast concrete offered economic and time-saving benefits as well.

More than 700 architectural precast panels make up the North Main Corona Metrolink Parking Structure in Corona, Calif.

"We were able to work through the winter and even handle the installation via crane during the colder months," Patarino said. "We didn't need to have a team of employees standing out there in the cold, pouring concrete and hand-laying everything."

Chris Kelly, project manager with Gate Precast in Winchester, Ky., said his company used four different finishes on the job, including thin brick, stone, faux brick and as-cast precast. Of the 470 precast pieces used for the project, a number were very large, including one 40-foot-long piece that incorporated radius step bands used for the structure's main entryway. Completed within a fairly tight, six-month timeframe, Kelly said the project lent itself to the use of precast concrete versus any other material.

"There were a number of challenging elements at play here, including the aesthetic requirements and a tight completion schedule," Kelly said. "In the end, it all worked out very well."

NORTH MAIN CORONA METROLINK PARKING STRUCTURE

Situated in the middle of the everyday hustle and bustle of busy downtown Corona, Calif., the North Main Corona Metrolink Parking Structure supports the adjacent North Main Corona station with 1,415 parking spaces. The six-story parking garage cost $25 million and spans 375,000 square feet.

According to Anna Dezember, president of StructureCast in Bakersfield, Calif., the parking structure's innovative design

Photo courtesy of Keystone Construction Corp.

Building the Broad Ripple Village Garage and Shoppes with precast helped advance construction schedules and increase efficiency.

features a concrete moment frame and four repeating colors of 3-D architectural precast concrete panels. Manufactured by StructureCast, the garage's architectural precast panels incorporate colored concrete. Each panel has two colors and three depths of etch and reveals.

For the project, correct panel color, reveal location and texture location were all critical considerations, given that each panel's final installation was directly next to another on the structure. Dezember said another project challenge was delivery to the site and erection – the job site was adjacent to a fully operational train station and one of Orange County's busiest freeways.

Using precast allowed much of the production to be completed at the StructureCast plant. As a result, the project was completed nearly three months ahead of schedule. In total, the project incorporated 740 architectural precast panels that were produced in 38 days.

"The accelerated schedule afforded by the use of precast saved the Riverside County Transportation Commission millions of dollars," Dezember said.

Designed by Stantec, the structure includes an articulate façade design and a rhythm of solids and voids using large precast panels.

"Architecturally, the precast was extremely important because it allowed us to control and customize the design across a number of different forms from which the very large panels and the smaller components could easily be replicated," said Pearson, the former Stantec architect who worked on the project.

Pearson said precast allowed the design team to effectively control the color and texture of the façade, thereby adding visual quality and uniformity. It also enabled customizations that would have been cost prohibitive with other materials.

"Let's face it, parking garages are utilitarian. In order to control the budget, you have to have some means of repetition in the work," Pearson said. "Using precast concrete, we were able to create a pattern that could be replicated. That's just one of the things that precast brought to the project, along with being very durable, weather-able and versatile."

BROAD RIPPLE VILLAGE GARAGE AND SHOPPES

As one of six designated cultural districts in Indianapolis – and the only one located outside of downtown – Broad Ripple Village is a fusion of old and new as well as commercial and creative. A vibrant center of restaurants, shops and nighttime hotspots surrounded by long-established neighborhoods, Broad Ripple Village offers a lively mix of bars and clubs, art galleries, restaurants and shopping.

With all of that activity comes the need for parking – something that's not always easy to access in a vibrant, popular area. Using vacant land that was previously occupied by a gas station, the city transformed a once-blighted property into a 160,000-square-foot,

mixed-use structure via a public-private partnership.

Today, the structure accommodates a police substation, three levels of parking with approximately 350 spaces, and 25,000 square feet of retail and restaurant space. Ratio Design of Indianapolis designed the garage, which was built in a triangular shape and comes together at a point of one of the area's major intersections. Initially, Brock Roseberry, principal, said the company considered brick as a primary material for the structure.

"It's in an area where the architectural styles range from turn of the century all the way up to modern," Roseberry said. "Brick was an initial consideration, but when we started looking at advancing construction schedules and gaining efficiencies during construction, precast concrete became a more viable option."

Corey Greika, vice president and sales manager at Coreslab Structures Inc. of Indianapolis, said his company worked closely with Ratio throughout the design and development phases, making samples and assisting with some of the "panelization" that created the appearance of hand-laid masonry. The project footprint was extremely tight, he said, with the building being constructed right up against the property lines on all sides. The project schedule was equally as tight and included winter months, something that would have made on-site masonry work difficult.

Coreslab manufactured 100 units for the project for a total of 13,100 square feet of surface precast. The parking garage incorporated three different types of panels, including 8-inch- and 6-inch-thick solid and thin-brick panels. It also included various floodwalls and retaining walls for the base of the building.

"Because the area is prone to flooding, they used precast as part of the barrier system," Greika said. "That wouldn't have been possible with field-laid masonry. The designer would have had to come up with something completely different to address that issue."

According to Patarino, whose firm constructed the garage, the project went "extremely well" despite the fact that it was built during Indiana's winter months.

"We had a pretty bad winter that year, and the precast allowed us to build the façade without worrying about the weather conditions," Patarino said, adding that the precast allowed the contractor to enhance the structure and ensure it blended well with its eclectic, urban environment. "It's already about 80% filled with retail and making money, so we're pretty happy with the result."

PRECAST'S SHINING ROLE IN PARKING GARAGES

With the number of cars on the road not expected to wane anytime soon, expect to see both public and private owners developing innovative ways to accommodate cars without blemishing or negatively impacting surrounding areas. Pearson predicts that more of these projects will incorporate precast, based on the success of garages like the North Main Corona Metrolink Parking Structure, Broad Ripple Village Garage and Shoppes, and Butler University's Sunset Avenue Garage.

"Because parking garages are basically open structures that don't have to be environmentally controlled or sealed up against water and the elements, you can window dress them in very imaginative and innovative ways," Pearson said. "You have an open palette and no limitation of a conventional building. Things can be more sculptural and whimsical, with precast concrete serving as a great medium for designers and engineers." PS

Bridget McCrea is a freelance writer who covers manufacturing, industry and technology. She is a winner of the Florida Magazine Association's Gold Award for best trade-technical feature statewide.

Endnotes

1 santanderconsumerusa.com/blog/number-light-vehicles-roads-highest-history/

Specifier Q&A

This month, Precast Solutions magazine sits down with Shawn Curran of Curran Architecture to discuss his involvement with precast concrete products and projects.

Name: Shawn M. Curran

Title: President

Company: Curran Architecture

Professional Designations: AIA

Photo courtesy of Curran Architecture.

Curran Architecture specified precast concrete for a 25,000-square-foot addition to a retail center in central Indiana.

Q: What is your field of focus and what particular products do you specialize in?

A: We consider ourselves generalists. Our clients' fields range from industrial to hospitality services and our projects involve everything from interior renovations to building additions and new construction.

Q: What are the benefits of using precast concrete products?

A: Precast concrete offers different benefits for different types of projects. For big box industrial buildings, we use precast panels because of their structural benefits and speed of erection. For office and retail projects, we use precast panels because they allow us to incorporate creative design elements that satisfy municipal architectural requirements while helping our clients stay within budget.

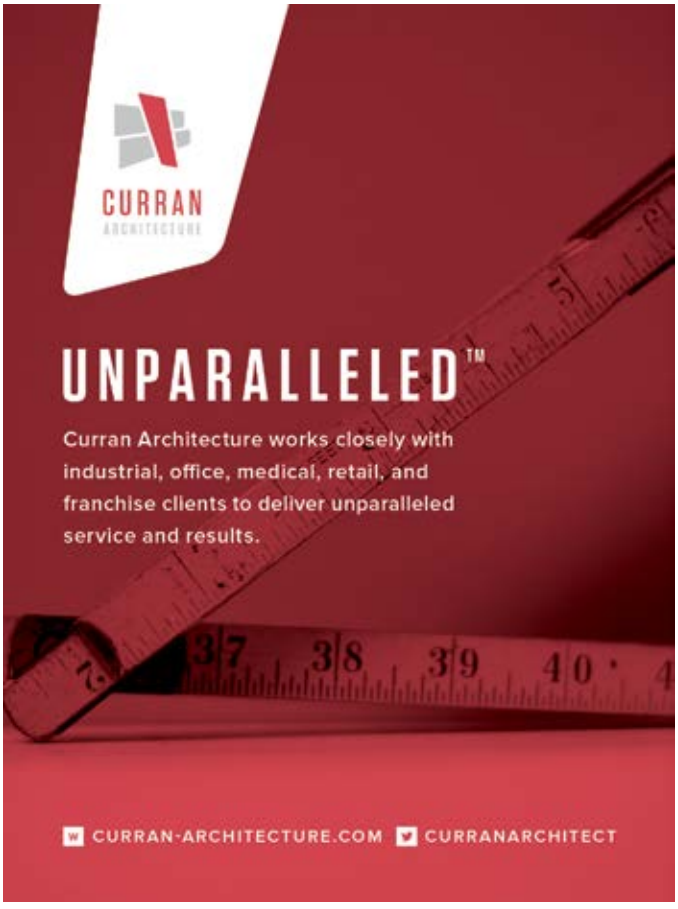
Q: What are some unique or interesting projects on which you specified precast concrete?

A: One of our clients needed an addition to a retail building a few years after we designed the original facility using conventional structural steel with brick veneer, an exterior insulation finishing system and cast stone over metal stud framing. The client asked about using precast concrete but didn't want the addition to look like an afterthought. We achieved a seamless look by using liner panels that mimicked the brick and cast stone patterning. Then, we had the contractor continue the original EIFS cornice. The precast was painted to match the brick, EIFS and cast stone. The result is a low-maintenance addition that looks just like the original building.

We also used precast concrete for a warehouse with a two-story office component. The client wanted the office to feel progressive and contemporary with plenty of natural light, but the warehouse needed to have the durability of an industrial building. Precast solutions helped us exceed the client's expectations. We

Photo courtesy of Curran Architecture.

"We use precast panels because they allow us to **incorporate creative design elements** that satisfy municipal architectural requirements while helping our clients **stay within budget.**"



used precast fins to support the second floor and roof, which allowed us to include floor-to-ceiling storefront glazing. We also included an exposed aggregate finish to give the office a professional atmosphere.

We designed a freestanding medical office in an area with very stringent architectural requirements. Brick and stone liner panels combined with cast-in reveals gave us a cost-effective precast solution that earned the municipality's architectural approval. We had the liner panels painted to look like traditional brick and stone veneer, and we did it all without a bulky structural framing system, which would have taken up too much interior space and interfered with the client's use of the building.

Q: How have you seen precast concrete evolve? How do you see it continuing to impact your work?

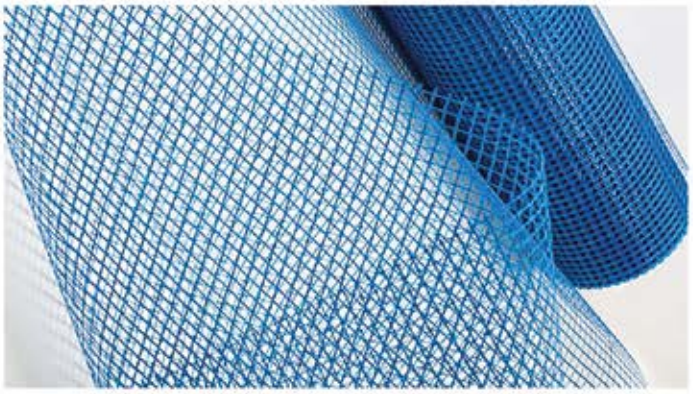
A: The introduction of liner panels has allowed us to use precast concrete solutions for projects that traditionally wouldn't be considered precast buildings. We've also started using pigmented concrete and cast-in cornices on some projects, but those are not yet as prevalent in central Indiana as they are elsewhere.

For more information on Curran Architecture and the company's projects employing precast concrete products, visit curran-architecture.com. PS

solidian non-metallic reinforcement
Shapes the Future

solidian produces non-metallic reinforcement such as rebar and grids made from alkali-resistant glass, basalt or carbon fibers. Due to their non-corrosive material properties, these reinforcement types are most suitable for concrete members. Concrete volumes can be greatly minimized, resulting in thin, lightweight and durable concrete members. solidian GRID achieves tensile strengths of about 508 ksi, which is five-to-six times higher than comparative steel reinforcement. solidian also produces the world's strongest carbon mesh: solidian GRID Q142/142-CCE-38.

solidian GRID Q142/142-CCE-38



solidian GRID Q62/62-AAS-30

solidian GRID and REBAR are used in concrete construction where lightweight or slender concrete members are needed, such as in façade construction. Panel thicknesses of 0.39 inch for small-sized ventilated panels or 1.18 inches for the walls of large-sized sandwich panels are realized in the precast construction industry today. The benefits are obvious: transportation costs can be reduced by 70% compared to steel-reinforced panels and the cost for expensive, high-quality concrete is reduced significantly.

1.18-inch-thick sandwich panels; Project Eastsite VIII, Mannheim, Germany (Dreßler Bau, www.dressler-bau.de and Fischer Architekten, www.werkstadt.com), finished in 2015.

First pedestrian bridge worldwide that is reinforced with only carbon-reinforcements and which contains no steel reinforcement or prestressing steel; Albstadt, Germany, (Max Bögl Group, www.max-boegl.de), finished in 2015.

Another reason for using solidian GRID or REBAR is for concrete members which are affected by chlorides like de-icing salt, such as parking decks, bridges or structures in maritime climates. Concrete members with steel reinforcement in these environments can corrode in only a few years. Even with thin concrete covers, solidian GRID or REBAR do not corrode and dramatically extend the structure's service life. For the building owner, this translates into reduced maintenance costs in combination with a cost-efficient and environmental friendly construction.

Learn more about our products at

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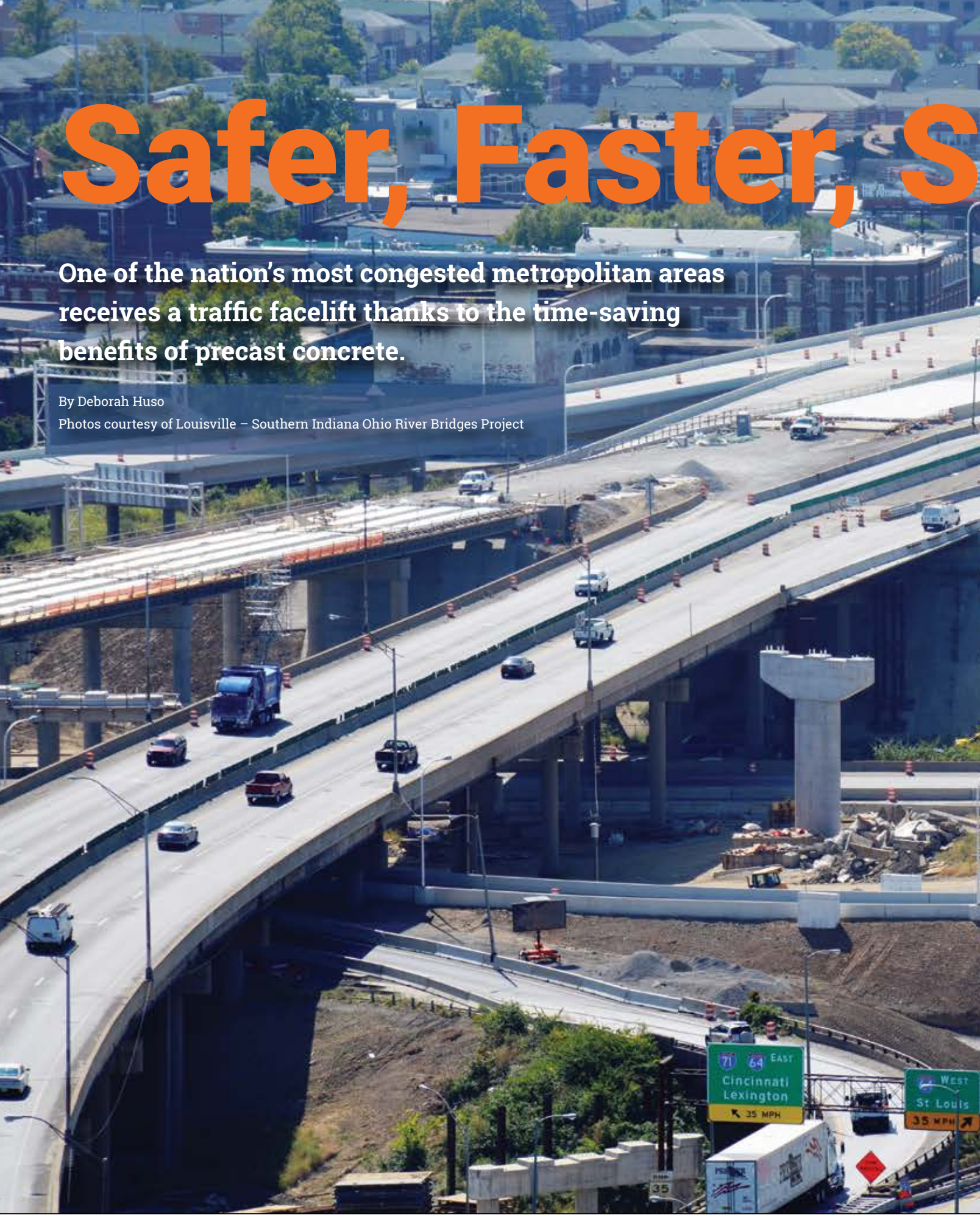
Safer, Faster, S

One of the nation's most congested metropolitan areas receives a traffic facelift thanks to the time-saving benefits of precast concrete.

By Deborah Huso

Photos courtesy of Louisville – Southern Indiana Ohio River Bridges Project



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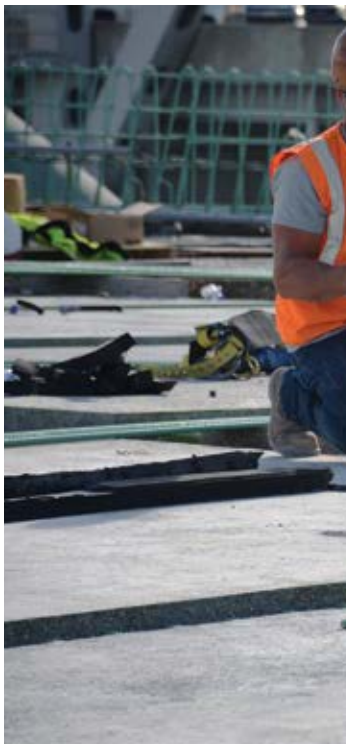


The $2.3 billion Ohio River Bridges project includes a wide variety of precast concrete products.

Project: Ohio River Bridges in Louisville, Ky., and southern Indiana

Owner: Louisville-Southern Indiana Bridges Authority

Architect: COWI (Formerly Buckland & Taylor Ltd.), North Vancouver, Canada

General Contractor: Walsh Construction Co., Chicago, Ill.

Precasters: A & T Concrete Supply Inc., County Materials Corp., Foster Supply, Gate Precast, Independent Concrete Pipe Co., Oldcastle Precast, Prestress Services Industries, S & S Precast Inc., Sherman-Dixie Concrete Industries Inc.

Structural Engineer: Jacobs Engineering Group Inc., Louisville, Ky.

Improving crossings over the Ohio River around Louisville has been on the wish lists of Kentucky and Indiana for more than two decades. Clogged bridges and interchanges have been the bane of commuters for years, but last December provided some relief with the completion of part one of the Ohio River Bridges project, which launched in 2013.

The $2.3 billion project stands at the center of Kentucky's largest urban area, connecting Louisville, Ky., with Jeffersonville, Ind. The project's goals are to decrease traffic, improve safety and encourage economic development.

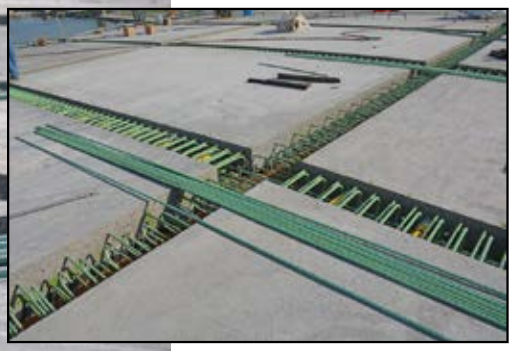
"Traffic congestion combined with tight curves and weaving issues resulted in a high volume of crashes, making public safety a primary reason for the project," said Andy Barber, project manager with the Kentucky Transportation Cabinet. "The project aims to relieve congestion and improve cross-river mobility, which is also expected to drive economic development in the region."

Powered by the use of a variety of precast concrete products, the Ohio River Bridges project will aid commuters who travel through the area when workers complete construction later this year.

PRECAST APLENTY

The Ohio River Bridges project has two major components – the Downtown Crossing, which includes bridges and associated roadways connecting Louisville, Ky., with Clark County, Ind., and the East End Crossing, which spans the Ohio River eight miles to the north.

Two bridges make up the Downtown Crossing: the new Abraham Lincoln Bridge, which carries six lanes of northbound



Interstate 65 traffic, and the refurbished Kennedy Bridge, which carries six lanes of southbound I-65 traffic. The Lincoln Bridge is the first new bridge project across the Ohio River in the region in more than 50 years.

The largest construction components of the Downtown Crossing were completed in December 2015. The East End Crossing will be complete in October 2016. When finished, workers will have installed 40 acres of mechanically stabilized earth precast panels, 17 miles of precast beams, 200,000 square feet of precast deck panels and a variety of other precast concrete products.

National Precast Concrete Association Certified Plant A&T Concrete of Fort Branch, Ind., manufactured 300,000 square feet of MSE panels for the project. Their work is ongoing.

"We produced roughly 100,000 square feet of panels on the downtown side and about 200,000 square feet on the Jefferson side," said Jim Pohl, owner. "We still have 30,000 square feet left to deliver."

According to Jeff Allen, location manager for County Materials Corp., the company's NPCA Certified Plant in Maxwell, Ind., produced many different precast components for the project, including 4-sided box culvert, inlets, reinforced concrete pipe and manholes.

THE PRECAST ADVANTAGE

Featuring 88 stay cables, the new Lincoln Bridge is 2,100 feet long. It features 120-foot-long approaches constructed from prestressed beams as well as precast concrete deck panels, manholes, culverts and control access walls.

Prestress Services Industries of Lexington, Ky., supplied the beams and panels. Marcario Bernal, quality control manager for Walsh Construction, said precast provided many advantages.

"What I liked about precast was the ease of construction," Bernal said. "It was much easier to get the precast beams in place – not as much bulking to do."

Bernal also liked that prestressed beams don't fluctuate with the weather.

"Your deck relies so much on how those beams move," he said. "With structural steel bridges, the temperature fluctuations of night and day mean pouring concrete at odd times. Precast doesn't move as much. It's set already."

For Barber, using precast meant the project could be completed with greater speed.

"Precast allowed for a very compressed construction schedule," he said. "The precaster began deck panel production while we were still casting the foundations in place."

Precast deck panels also allowed for off-site storage and just-in-time delivery, both of which were critical since Walsh Construction had to maximize space within the small footprint of the job site.

Additionally, going with other precast products helped Walsh expedite the project timeline. Sherman-Dixie Concrete Industries manufactured precast concrete pipe as well as storm drainage and sanitary structures from NPCA Certified Plants for the job. According to Bill Thompson, sales manager with Sherman-Dixie, the result has been positive.

"The folks at Walsh are great," he said. "They're ahead of schedule and everything seems to be progressing right along."

PUTTING TOGETHER THE LINCOLN BRIDGE

The Lincoln Bridge deck consists of 560 precast panels, each roughly 15 feet wide by 24 feet long. Some panels are completely solid while others have post-tensioning ducts.

Lee Hammer, quality control manager with Walsh Construction, said the design-build team never considered anything other than precast for the deck panels, adding that precast helped save substantially on cost because it allows for repetition.

Additionally, Barber noted the panels – which weigh 20 tons each – were "precast for speed, strength, durability and constructability."

To deliver the panels from PSI's plant, the design-build team took advantage of the Ohio River. Barges delivered 30-to-40 panels at a time – each stacked in placement order – to the site. It took the barges about a day to make the trek to the job site.

After the panels arrived on site, workers used a crane to lift them into position. The panels were set on top of foam padding

By selecting precast deck panels, project owners saved significantly on costs.

to provide a good bearing surface and a seal for infill concrete. Thanks to some clever design, the panels easily fit together.

"There's an 18-inch gap between panels with hairpin reinforcement cast into both sides," Hammer explained. "Adjacent panels are offset from one another so they fit together like two combs."

CHALLENGES FACED

Though the use of precast helped significantly, construction of the Lincoln Bridge presented challenges, such as a compressed timeframe.

"Some of the biggest concerns we had were logistics and schedule," Bernal said. "We had to work very closely with Prestress Services Industries to make sure they could meet the demands."

According to Hammer, another issue the construction team faced was the ever-evolving nature of the project.

"It was design-build, so that meant we were working on the fly sometimes with the design not being complete," he said.

Still, despite the challenges, the use of precast concrete for the Downtown Crossing project aided the Kentucky Transportation Cabinet in achieving success. Barber noted that when his office was reviewing the results from their request for proposals, Walsh Construction's winning bid was almost 18 months faster than the next closest submission.

"The use of precast materials helped lead to those bid results," he said.

NEXT STEPS: EAST END CROSSING

The East End Crossing, scheduled for completion in the fall, will connect east Louisville with southern Indiana, near Utica.

This portion of the project is also making use of precast concrete. According to Barber, the construction team is using full-depth precast panels on the deck of the cable-stayed spans.

Once complete, the East End bridge will consist of approximately 750 panels weighing about 22 tons each.

"Precast was chosen to avoid significant amounts of time needed for form work, rebar placement, concrete placing and concrete curing," Barber said.

AN OPTIMAL SOLUTION

When the Ohio River Bridges project is completed later this year, all parties involved – including project owners, construction workers and the motorists who regularly travel the route – will benefit from the many advantages associated with precast concrete products. With reduced congestion in the region, travel times will improve and economic development will increase. And all the while, commuters will continue to benefit from the safe, durable bridges that were constructed quickly and efficiently with precast concrete. PS

Deborah Huso is a freelance writer specializing in construction, real estate, finance and agriculture.

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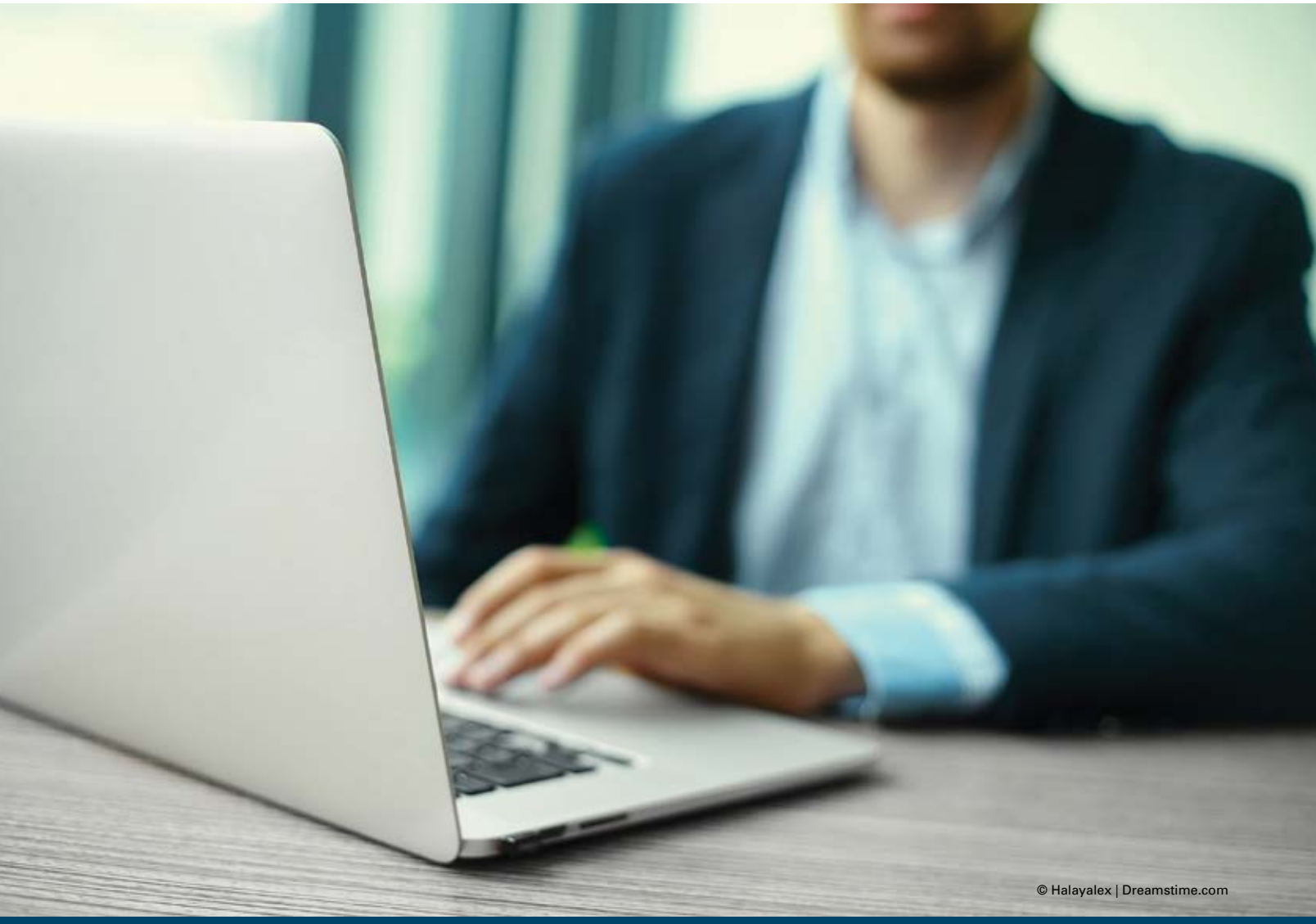

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