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#### ON THE COVER:

**On the cover:** Precast concrete and innovative construction methods were used to construct the Rodanthe Bridge in North Carolina.

Photo courtesy of Flatiron Construction.

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# **Specifier** Q&A

This issue, Precast Solutions hears from Daniel J. Kurdziel, P.E., MBA, with VS Engineering.

Photos Courtesy of VS Engineering

#### What's your background and area of expertise?

I am a professional engineer specializing in bridges. I graduated from Purdue University with a bachelor of science in civil engineering and later went on to get my MBA at Butler University. I've been passionate about bridges since a young age, when I would create and reconstruct LEGO bridges until I could stand on them.

I started in the industry as a design engineer working on major highway projects both domestic and abroad. As I developed into a project manager, I've focused on projects of all sizes for state and local clients primarily focused in the Midwest. I am currently at VS Engineering, Inc.

#### What types of projects do you typically oversee?

I focus on transportation bridge projects primarily. These projects vary in magnitude from small local waterway crossings to tens of miles of newly constructed interstate highways. The small local waterway crossings benefit from the use of precast culverts and 3-sided structures to reduce construction time. The larger interstate and highway projects benefit from precast MSE walls to reduce bridge lengths and land acquisition.

Indiana, being relatively flat, has many smaller waterway crossings, which make the quick construction of a project using precast components a perfect fit to reduce impact to Hoosiers.



Daniel J. Kurdziel

Additionally, these products can be constructed with a higher level of precision and accuracy than can be done in the field, mitigating any potential construction defects.

With Indiana being the "Crossroads of America," interstate crossings and interchanges are almost as prevalent as stream crossings. With all these interstates, there are many large interchanges that can be made possible only with the use of MSE walls. MSE walls allow us to reduce the bridge length by up to 100 feet, which has saved our clients millions. And with all the formliner options today, you also can make what used to be a bland wall into something truly ornate.

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

There is one significant project that jumps out at me. The Booneville Bypass project was a 6-mile-long project allowing coal trucks to bypass downtown. The project included a long corridor requiring a high flow ditch through the front yard of many property owners. We were able to use precast culverts to minimize disruption to the property owners. Each driveway reconstruction took less than a day, which helped keep the property owners happy.

Additionally, there was a bridge planned, spanning Carter-Trayler Ditch, which was designed to be approximately 200 feet long. During utility coordination, we found a major gas line that couldn't be covered or have its access restricted, so we needed to lengthen the bridge. With the geometries of the gas line and ditch,



By using precast concrete, crews were able to reduce construction costs and the length of the bridge

the new bridge would have had to be almost 350 feet long. With the use of precast MSE walls, we were able to reduce the length down to 300 feet, which saved millions of dollars in construction and saved us from significant land acquisition from the adjacent landowner.

## What benefits did precast concrete offer on those projects?

Precast offered mitigated disruption to property owners, reduced construction costs, reduced bridge length and reduced land acquisition costs.

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

I think as precast structures continue to become more ornate and remain a cost-effective solution, local communities will be



pushing for precast products as part of "place-making" projects. There are some newly constructed arch structures with a stone facade that are reminiscent of ancient roman architecture while benefiting from modern technology. These structures add a lot of character to an area, and I believe desire for these types of structures will become more prevalent in the near future. **PS** 



# Bridging Time and Place

Precast concrete plays an important role in replacing a historic bridge on a busy trade route while protecting area wildlife.

By Shari Held

Long X Bridge pays tribute to the Long X Ranch and Cattle Drive that epitomize the state's western heritage and culture. Built in 1959, the two-lane truss bridge spans the Little Missouri River along U.S. Highway 85, just south of Watford City. This stretch of highway is part of the heavily traveled Ports-to-Plains Corridor, which extends from Texas to Canada. It also runs through the "Bakken," one of the largest oil developments in the U.S.



#### **DESIGNING THE FUTURE**

Trucks carrying oil, agricultural products and other trade items traverse the Long X Bridge daily, and traffic counts continually increase, which has created challenges for the 61-year-old bridge. Equally problematic, the bridge's maximum allowable vehicle height isn't high enough to accommodate modern vehicles, which has resulted in the bridge being hit and closed numerous times.

"I personally get phone calls when that bridge is shut because it means a 70-mile-plus detour," said Jon Ketterling, P.E., state bridge engineer for the North Dakota Department of Transportation (NDDOT).

The go-ahead to build a wider bridge with no height restrictions was given in 2019. The \$34 million project also includes a new wildlife crossing. Work is underway on a four-lane replacement bridge approximately 25 feet east of the existing bridge, which will remain open during construction. The new bridge, which will retain the original name, will be supported by 60 precast I-beams.

The I-beams, supplied by Forterra Pipe & Precast, were designed with the ability to transport in mind. At 156 feet long, the beams were the longest the Menoken, N.D., plant had produced, but it was the sharp turns in the roadways between the plant and the construction site that presented a greater concern.

"(We had to) take into account transportation during the design phase because there can be quite a bit of torque on the beams, and longer beams are fairly flexible," said Dale Schwindt, P.E., project engineer with Forterra Pipe & Precast, Menoken, N.D.

#### **PRODUCING THE I-BEAMS**

Fabrication of the prestressed beams began in September 2019. Forterra's Elk River, Minn., plant manufactured 24 beams, and its Menoken, N.D., plant manufactured 36.

A high-strength, easy-flowing concrete mix with a specified 28-day compressive strength of 9,000 psi was used for the beams. The plant made special accommodations to take into account the cold weather. Schwindt said the plant kept the beams in the casting beds and steam cured them overnight to ensure the proper strength gain.

#### **BRINGING THE BRIDGE TO LIFE**

Safety has been top-of-mind for Tyler Davis, on-site project manager for general contractor Ames Construction, headquartered in Burnsville, Minn. The crews are working over water, around live traffic and in close proximity to the Theodore Roosevelt National Park, which means plenty of wildlife in the area.

Erecting the bridge's substructure, which includes four piers – two in the middle of the river – wasn't easy. Ames Construction had to build cofferdams and causeways so workers could access the piers. This required detailed scheduling coordination with the delivery of the I-beams to the job site, which the precaster was able to accommodate.

Forterra's Elk River plant shipped its 24 I-beams during December 2019 and January 2020. Each beam measures 81 inches tall, 156 feet long and weighs 75.6 tons. On the job site, cranes



A new bridge in North Dakota features 156-foot-long precast concrete beams.

arranged the initial 12 I-beams to create the first of five spans. The first span was installed in January 2020, prior to the winter shutdown. According to Davis, the installation went seamlessly.

#### DESIGNING THE WILDLIFE CROSSING

In addition to the bridge, the project includes a wildlife crossing. The area's bighorn sheep are the rarest North Dakota big game species. Numbering around 330, they roam the Badlands along the Little Missouri River. With the expansion from two lanes to four lanes of traffic, ensuring the safety of the bighorn sheep, along with the safety of the traveling public, is a major concern.

NDDOT partnered with Contech Engineered Solutions, headquartered in West Chester, Ohio, to create a wildlife crossing dedicated to North Dakota's bighorn sheep population. While the crossing is a first for NDDOT, Contech has extensive experience with wildlife crossings nationwide. The wildlife underpass crossing will be located about 900 yards south of the new bridge.

Timothy Miller, Structures Area Manager for Contech Engineered Solutions, worked with NDDOT, North Dakota Game and Fish and other agencies prior to the bidding process. According to Miller, factors to take into account for this specific wildlife crossing, which required a minimum 40-foot-wide-by-15foot-tall interior clearance, included topography, road dimensions, vegetation and climatic conditions.

This crossing needed to work with the road grading and the elevation on either side of the roadway. It also had to accommodate enough fill between the top of the structure and the roadway surface for sound dampening and be large enough for the sheep to use it. In addition, the location had to be one where bighorn sheep would normally cross.

#### PRECAST: THE BEST SOLUTION

A buried, three-sided bridge built with precast concrete was selected for several reasons. By using precast, the wildlife crossing can be built with a wide enough clearance that a guardrail would not be necessary. Using precast also enables the project to be built in phases. Phase 1, which consisted of 30 arch pieces (90 linear feet of structure), was installed in late April, and the area was backfilled through late May. NDDOT moved traffic to the finished half while completing the remaining portion.

Post-construction soil settlement was a big concern during the design phase, so the precast structure will rest on a driven steel pile foundation topped with cast footings that will run perpendicular to the highway.

Once completed, 50 precast elements will make up the 60-footspan-by-18-foot-rise-by-150-foot-long BEBO arch structure, with each precast piece weighing 20.4 tons. The precast arch units required a minimum compressive strength of 6,000 psi to meet the loading criteria. To create the arch, two half-arch elements are installed at opposite, parallel footings. At the peak of the arch element's rise, in the center of the span, each of the two half arches have a recessed cavity with temporarily exposed reinforcement. The elements are bolted together, and the cavity is filled with high strength concrete on-site to complete the connection. This modular approach allowed the structure to be constructed quickly. It took only three days to install the elements for Phase 1.

"The speed of installation of the arch itself is also a factor in minimizing the amount of detour time of a heavily trafficked highway," Miller said.

#### ALMOST READY FOR BUSINESS

The bridge is slated to open at the end of 2020, and the entire project, including disposal of the existing bridge, will be complete July 2021.

"The Long X Bridge has served the public well for over 60 years," Ketterling said. "As with everything, there comes a time when things need to be replaced. The new bridge will meet the needs of the traveling public and industry both now and well into the future." **PS** 

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



# **Reconstructing Illinois' Mile-Long Bridge**

Spanning 187 feet in length, giant prestressed beams play a key role in helping to ease traffic congestion on Illinois Tollway's busiest roadway.

By Bridget McCrea



County Materials manufactured the single heaviest bridge beams ever produced in the Midwest for a project in Chicago.

There isn't anything easy or straightforward about the Illinois Tollway's Mile-Long Bridge project. The job has its share of complexities, from incorporating a 1950s-era structure to extending over private property, but that hasn't stopped engineers, designers and contractors from making good progress on a project that's been in the planning stages since 2017.

Scheduled to open to traffic in 2023, the project incorporates the construction of two new, wider bridge structures plus numerous stormwater and drainage improvements. Because the state didn't own any of the land beneath the bridge, the project required extra coordination with the businesses and property owners in the area. The bridge also spans the Des Plaines River and the Chicago Ship and Sanitary Canal.

"This bridge basically has an entire 'city' underneath it, including a very busy railyard and numerous other businesses," said Lanyea Griffin, executive project engineer. "The original bridge was built in the 1950s and then added onto in the 1990s, so the two structures aren't necessarily operating in unison."

From a structural engineering standpoint, the whole idea of getting a project of this size planned out, designed, and underway was a monumental undertaking.

#### TRAFFIC RELIEF

Designed to give commuters relief from traffic congestion, the Mile-Long Bridge – which, incidentally, isn't quite one full mile in length at 4,608 total feet – is one component of a larger, \$4 billion Central Tri-State Tollway (I-294) Project. A system of five roadways, the Tollway is being reconstructed and widened to meet current and future transportation demands while also addressing regional needs. Currently, up to 150,000 vehicles use the Mile-Long Bridge on a daily basis. The bridge reconstruction also will increase its capacity from four lanes to five lanes in both directions, with inside shoulders for "flex lanes" that can be used for a variety of safety-related purposes.

The current Mile-Long Bridge includes 27 spans supported by 26 piers. The new bridge's spans will support nearly 600 beams of various lengths and will be built with fewer piers in order to reduce the environmental impact on the waterways and industrial areas below.

The prestressed concrete beams are being manufactured by County Materials. Each beam measures up to 187 feet long, up to 7-and-a-half-feet tall and weighs up to 245,000 pounds.

Gary Courneya, County Materials' prestress operations manager, said the company has worked on numerous bridge girder projects for Illinois Tollway and won this project through a competitive bid process. Prestressed concrete became the choice material thanks to its minimal maintenance over the life of the bridge.

"A concrete bridge beam not only requires less maintenance but is also a bit more user-friendly from a lead-time and cost perspective," Courneya said.

For County Materials, the biggest challenge on this project was the sheer size of the concrete beams they manufactured. In fact, Courneya noted it was a "milestone project" for the company in that the end products were the single heaviest bridge beams ever produced in the Midwest. With some of the beams weighing up to 245,000 pounds, the company had to enhance its cranes' lifting capabilities in order to accommodate that weight.

"Additional safety measures also were implemented because the size of the beams (could have introduced) new hazards for a workforce working at an elevated level," Courneya said.

The project has gone smoothly to date. Courneya noted the company is looking forward to the opportunity to participate in the second phase of this project, which will include the southbound lanes of the Mile-Long Bridge.





Concrete beams were chosen for the project for their strict, quality-controlled production and cost-effectiveness.

#### **RECONSTRUCT OVER REHAB**

Once completed, the new I-294 bridge will include two, sideby-side 4,800-foot-long structures, with improvements including water main replacements and new water retention and detention enhancements. When drawing out the plans for the overall Central Tri-State Tollway Project, engineers considered different options for the Mile-Long Bridge aspect of the project.

"We looked at what we could do with this bridge and decided to reconstruct it versus continuing to rehab it," Griffin said. "The biggest regional benefit of this project is the additional capacity that we're adding. The flex lane will potentially be able to carry transit accommodations across the bridge."

#### CONCRETE RISES TO THE CHALLENGE

While Illinois Tollway's initial plans included rehabilitation and redecking, the plan morphed into a complete reconstruction and widening initiative, and the team decided to break the project up into several different sub-projects. These included the demolition work plus the construction of the northbound and southbound bridges.

According to Griffin, the bridge designer made the decision to incorporate concrete in the new structure. Concrete made for an attractive choice because it didn't require splicing or temporary shoring. In addition, the pieces would be manufactured off-site and in a controlled environment, then shipped directly to the jobsite. "We had a group of very smart structural engineers sit down and evaluate the use of these beams," said Griffin, who was drawn to prestressed concrete for its ease of use and quality control processes. "When you've got a project that has to move really fast, it helps tremendously to have the (components) built off site; you can then just bring them in and erect it."

Cindy Williams, deputy chief of program implementation for Illinois Tollway, concurred and noted prestressed concrete supports quick turnaround from a fabrication standpoint and reduced maintenance over time.

"You don't have to clean and paint at an elevation, which is another big benefit," she said, while also noting that concrete was used for the project's new drainage system, stormwater treatment structures and retaining walls.

#### **KEEP THEM IN THE LOOP**

Speaking with project owners, designers or engineers who are overseeing major bridge or highway projects, Griffin noted early outreach goes a long way in making the overall project a success. For the Mile-Long Bridge project, Illinois Tollway held its very first pre-bid meeting to kick off the planning and design process.

"We typically use a different format, but for this one we let the contractors, sub-contractors, and precasters know what we had in mind," Griffin recalled. "Up until that point, no one really knew what we were thinking."



The entire Mile-Long Bridge project is scheduled to be complete by 2023.

From that exercise, Illinois Tollway received good bids and cooperation early on from the contracting community. During those early conversations, the tollway team discussed its material selection options and focused on finding the best solution for the Mile-Long Bridge project.

"There are some agencies, even in this area, that don't look to precast, and I'm not sure why that is," Williams said. "Maybe it's just that they're unaware of some of the benefits of other options that are out there."

#### A GOOD START

Like any extensive municipal project, the Mile-Long Bridge will take several years to complete, but Griffin said the progress to date has been good. Illinois Tollway has received the concrete beams on schedule and has been getting them erected efficiently.

"We advertised the northbound bridge last year and are anticipating completion on that toward the end of this year, with some work finishing up early next year," Griffin said. "Then the southbound bridge and a portion of the demolition is scheduled to be advertised within a month. We anticipate that will be complete by the end of 2022 or in early 2023." **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.



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# Banking on Pre The Rodanthe E

# cast: Bridge



Large-scale precast concrete products and innovative construction methods are key to the construction of 100year bridge in North Carolina.

By Mason Nichols

n August 2019, a tropical storm began developing in the central Atlantic Ocean. For days, the storm rapidly intensified, eventually gaining enough power to merit a Category 5 classification. With a maximum wind speed of 185 mph, Hurricane Dorian was a monster, packing enough punch to decimate anything in its path.

After battering the Bahamas, Dorian shifted toward the East Coast of the United States, eventually making its way to the Outer Banks, a series of barrier islands in North Carolina.

While the storm had decreased significantly in intensity, it still posed ample threat to residents, business owners and visitors. The islands experienced significant flooding and damage from Dorian, including to state Highway 12, the main roadway



More than 4,500 precast concrete products are being used to build the Rodanthe Bridge in North Carolina.

resilient enough to withstand the harsh marine environment – precast concrete.

## UP AGAINST

Constructing a bridge is rarely a straightforward task. and the \$145 million. 2.5-mile-long Rodanthe Bridge is no exception. According to Adrian Price, P.E., project manager for Flatiron Construction, the general contractor on the job, the bridge is being built over the Pamlico Sound, which contains a maximum water depth of just 4 feet. Traditional construction methods, which include the use of barges, causeways or temporary work bridges, weren't viable due to the water depth.

Moreover, the bridge's location guarantees it will constantly be subjected to

linking all the islands of the Outer Banks.<sup>1</sup>

Damage to Highway 12, unfortunately, is nothing new for the area. Many sand dunes are located directly adjacent to the roadway since the islands are so narrow. During strong storms, the dunes are often pushed onto the highway, effectively cutting off access to broad portions of the Outer Banks. To help counteract this issue near the Cape Hatteras National Seashore, the North Carolina Department of Transportation (NCDOT) set out to build the Rodanthe Bridge using the only building material strong and saltwater, high winds and an assortment of other environmental factors like submerged aquatic vegetation (SAV). A strict project requirement called for a construction approach that minimized negative impact on SAV in the area.

As NCDOT, Flatiron and design partner RK&K took these considerations into account, it became clear that precast concrete products – combined with a unique construction method – would offer the best means for addressing these issues and meeting the bridge's 100-year service life requirement. Price and the team at





Flatiron partnered with Coastal Precast Systems of Chesapeake, Va., thanks to an existing relationship, as well as Coastal Precast's proximity to the project site.

David Morgan, P.E., director of engineering for Coastal Precast, explained the benefits of the connection.

"We have a long history with Flatiron," he said. "We helped them develop their plans regarding the logistics of getting the precast pieces to the job site. It's quite a process, and our staff is very knowledgeable with the Outer Banks area and how to get our product there."

#### PLENTY OF PRECAST

A variety of precast concrete products were specified for the project, including nearly 4,000 prestressed deck panels, approximately 400 Florida I-beams and roughly 300 54-inchdiameter cylinder piles. Altogether, Coastal Precast will ship more than 4,500 products to the project site by the time the work is completed in fall 2021.

The team is using a "top-down" construction method to ship and install products since traditional construction methods are not an option. This approach uses a specialized rail system – in conjunction with the new bridge itself – to complete sections incrementally across a 2.5-mile span. Using this innovative method, Flatiron builds a section of the bridge, then uses each completed portion to deliver additional products to the rail system and install the next section. The rail system features two tracks running in tandem on either side of the structure. When pieces are delivered to the site, they are loaded onto gantry cranes and carried out to where they will be installed.

Due to their size, the cylinder piles are the most difficult component. The longest pile manufactured to date is 162 feet long, a size that requires planning and coordination across the entire manufacturing process, from production to shipping and installation. According to Bert Richardson, project manager for Coastal Precast, each of the piles is being cast with 10,000-psi concrete that includes 5% silica fume, 25% fly ash and 4 gallons of CNI, a special



Precast concrete was chosen to accelerate the project's timeline, minimize disruption to wildlife and stand up to harsh weather conditions.

anti-corrosion admixture that's formulated to withstand the fierce marine environment. As Morgan explained, that combination is built for the long haul.

"This is really the Rolls-Royce of concrete mix design," he said. "You have the highest performance as far as the properties of the concrete to resist the sulfates and the chlorides in the saltwater."

Coastal Precast also is using self-consolidating concrete for the piles and the rest of the products specified for the project. The production team can manufacture pieces free of voids and minimize the amount of finishing work required – a crucial step given the demands of the construction schedule. Richardson noted that delivery requirements call for Coastal Precast to ship six piles to the project site per week, with each pile achieving a release strength of 6,500 psi.

"Our biggest obstacle in producing these is release strength, when we can cut the prestressing strands," Richardson said. "To get to the 6,500 psi and cycle the forms, we had to accelerate the curing process."

The production team at Coastal Precast purchased and installed a steam plant, which included a boiler and associated temperature-reading devices and controllers, to meet the





demands. Each of the piles is steam cured at 155 degrees F for 12 hours, speeding up the process enough to meet the six-pile-perweek requirement. Coastal Precast also bought an additional five acres to store product at their plant.

#### QUITE A TRIP

After the piles, girders, deck slabs and other precast products are delivered to the job site, they are routed to the rail system for a special installation method using a "pile tripping frame." Flatiron partnered with Deal, an engineering and equipment manufacturer based in Italy, to design the highly specialized equipment, as well as in house on technology that would assist in the process.

"For those who are familiar with the project, the 54-inch precast pile driving operations get the most fame," said Sean O'Neal, project engineer for Flatiron. "We designed and implemented a custom pile leads system to drive the massive piles. When the operation is active, you can't drive by the bridge without it grabbing your attention."

The piles are driven with an impact hammer, an approach that only affects the environment within the pile's footprint. By installing the precast piles, Flatiron was able to reduce the size of the foundations, which also minimizes environmental impact. When the project is completed in 2021, the Pea Island National Wildlife Refuge also will benefit from another positive outcome.

"Beyond the transportation considerations, a major purpose of the bridge construction is to return private land to the refuge, allowing the land to return to its natural state," O'Neal said.

#### **ADVANTAGE: PRECAST**

By specifying a wide variety of precast concrete products, the parties involved were able to accelerate the construction process and minimize disruption to wildlife. But the biggest advantage of installing precast on the Rodanthe Bridge will be in the strength and resiliency of the finished structure.

"For projects in marine environments, precast is the obvious choice due to long-term durability," Price said. "There's also less maintenance involved."

Plus, as Richardson explained, cast-in-place concrete construction would have exposed the building materials to consistent salt spray, necessitating the use of stainless steel reinforcement, which would have increased costs significantly.

Ultimately, the Rodanthe Bridge is primed to provide residents, tourists and other Outer Banks visitors with a safe, long-term solution to traversing the islands that will not be impacted by severe weather events. By specifying precast concrete products and implementing the top-down construction method, the environment – and the people who enjoy it – will benefit mutually from this important work. **PS** 

Mason Nichols is a Grand Rapids, Mich.-based writer and editor who has covered the precast concrete industry since 2013.

#### Endnotes

<sup>1</sup> https://www.charlotteobserver.com/news/weather-news/ article234830297.html

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# Critical to

By Matt Werner Photos courtesy of Smith-Midland



Planning and coordination are crucial in the construction industry, and one Virginia project that is transforming the Washington, D.C., area is highlighting those efforts between the contractor, precaster and state officials.

As a stretch of more than 22 miles of interstate is being transformed to allow for more cars, buses and other transit options, the need for sound walls is paramount. With timelines to meet and installation needing to go as quickly and smoothly as possible, precast concrete became a key factor in the project.

#### **TRANSFORM 66**

Interstate 66 is the only interstate west of Washington, D.C., connecting to northern Virginia, carrying thousands of cars every day as commuters make their way inside the Beltway. With major congestion occurring daily on both the interstate and feeder roads, the state entered a public-private partnership to transform the critical highway.

FAM Construction LLC, a joint venture company of Ferrovial Construction US and Allan Myers, serves as the design-build contractor for the \$2.3 billion project, which isn't just expanding interstate but turning it into a multimodal corridor.

"The project will result in two new express lanes alongside three general purpose lanes in each direction, auxiliary lanes, major interchange improvements, new and expanded park-andride lots and multiple segments of a corridor-wide shared use path," said Nancy Smith, spokeswoman for FAM. "The project also will preserve the median for future mass transit expansion."

The project's success depended on the ability to produce 1 million square feet of precast concrete sound walls quickly and efficiently, and NPCA member Smith-Midland was able to meet the challenge.





Smith-Midland is manufacturing more than 1 million square feet of sound walls and retaining walls for the Transform 66 project near Washington, D.C.

#### TRANSFORM 66 OUTSIDE THE BELTWAY

The following firms were involved as part of the public-private partnership:

- Virginia Department of Transportation
- Department of Rail and Public Transportation
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#### LEAN MANUFACTURING TESTED

For Smith-Midland, a typical sound wall project is around 30,000 square feet, making this more than 3,200% percent larger than what they typically do.

"We may have 100 bays and 200 to 300 panels for a typical project," said Alex Burkhart, Smith-Midland's project manager. "With this we're talking over 50 different sound walls and thousands of panels."

Luckily, Smith-Midland was brought on early and had several preliminary conversations with FAM about when panels would be needed. Those conversations were critical for a company that prides itself on lean manufacturing techniques.

"We had about 1,000 of the 'typical' panels in production before everything really kicked off," Burkhart noted. "We knew that we were going to have a set amount of the 'typical' panels, so we went ahead and started making those to get ahead of the curve."

Being able to get a jump on production was a big benefit of using precast for the project.

"Using precast panels allowed material production to begin while the project was still in design, which helps to save time, particularly on a project of this scale," Smith said. "Additionally, using precast panels allows for better control of the finish, for adherence to the project's aesthetic plan."



Panel sizes for the project range. The typical panel is 23 feet wide and 8 feet tall, and they get as tall as 12 feet. Most panels have a vertical rib pattern finish, but some have an ashlar dry stack finish.

"In the dry stack wall, there's a sequence to it where there's 15 dry stack panels and then five panels in a row that have a dogwood flower pattern at the top," Burkhart explained. "We've done that on other projects to give a little more visual aspect to it."

In addition to the sound walls, Smith-Midland is manufacturing more than 200,000 square feet of retaining walls. The retaining wall panels exposed to public view have either a smooth or bush hammer finish to create more aesthetics.



Installation and manufacturing of the panels continues, and the project is scheduled to be complete in 2022.

#### PRODUCTION, STORAGE BOUNDARIES PUSHED

Production of the sound wall panels is ongoing with Smith-Midland manufacturing 16 panels per day, but it took some time to get to that point.

"There's always a learning curve with it," Burkhart said. "You can't just throw on the switch and start making 16 panels a day. We started slow with about four per day, then went to eight and in the span of about three weeks we had it up and running."

As the company was finishing up another large sound wall project, Burkhart said they worked to get as much optimized between the two to make production for both easier. Things like reinforcement design were matched between the two to promote lean manufacturing.

With such a large project, production space and storage space at the yard was at a premium, resulting in a five-acre expansion to Smith-Midland's yard and property.

"The expansion to the property and yard had been in the longterm plan," Burkhart noted. "This contract definitely put a little bit of feet to the fire in getting it done." Burkhart said the shop arrangement changed regularly to accommodate casting new panels and production, but it was not anything out of the ordinary.

#### INSTALLATION CONTINUES

Production on the sound wall panels began in late 2018, and product still is being shipped and installed. The target completion date for the entire project is 2022.

The job site is only about 30 minutes away from the plant, so Burkhart heads out three or four days a week at times to make sure things are going smoothly on site. Smith said the installation has been going well, and they are happy with how the project is progressing.

Once complete, the project will provide faster, more reliable travel and move 2,000 to 4,000 more people per hour. Safety will also be improved throughout the corridor, and the project sets up future transit expansion with additional bus routes, as well as 4,000 additional park-and-ride spaces. **PS** 

Matt Werner is the managing editor of Precast Solutions magazine and is NPCA's communication manager.





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