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VOLUME 20 | NUMBER 4

ON THE COVER:

Four 10,000-gallon septic tanks were manufactured for the Brushton-Moira school district by Camp Precast.

Photo courtesy of Tim Queior, Camp Precast.

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Rhett A. Desselle, P.E., CFM

Specifier Q&A

Rhett A. Desselle, P.E., CFM

Louisiana Department of Transportation and Development

What is your background and area of expertise?

I graduated from LSU in 1983 with a degree in civil engineering, and I have been working for the Louisiana Department of Transportation and Development (DOTD) for 38 years. My time with the Louisiana DOTD includes:

- 17 years of construction contract administration, construction project management, construction engineering and inspection, construction layout/survey and quality control/assurance for new interstate, major river crossing, major corridor expansion, bridge replacement, airport improvement and drainage improvement projects.
- 17 years of program management of highway, bridge, building, physical plant, fleet, equipment maintenance and operations, which include national bridge inspection program; bridge maintenance and repair; traffic engineering and operations; asset management and

maintenance; building and physical plant construction, repair, operations and maintenance; fleet/equipment repair, maintenance and management; project development, cost estimating and contract administration of numerous maintenance, operations and repair contracts and projects; and emergency response.

- More than 3½ years as the Louisiana DOTD chief operations officer responsible for 3,600 employees, a \$350 million operating budget, 16,600 centerline miles of highway, 8,000 bridges, 101 movable bridges, 10 rest areas, 10 ferry crossings and two toll facilities.

How did you become interested in doing what you do?

My father worked for and retired from Louisiana DOTD as a construction inspector. My experience and knowledge of his work honed my interest in the transportation industry.

What types of projects do you typically oversee?

Currently, my group handles the heavy and specialized maintenance in the Alexandria District. We regularly replace existing, short-span timber trestle bridges or deteriorated cross drains with large diameter precast RCPs or RCBs. We also use precast concrete bridge components to replace one or two longer span timber trestle bridges each year.

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

Our replacement of existing short-span timber trestle bridges with precast reinforced concrete box culverts is challenging. The work requires a large crane and track-hoe along with lots of planning, lifting calculations and deep excavations.

What benefits does precast concrete offer your projects?

Precast concrete significantly reduces the construction time involved, which minimizes the traffic disruption and exposure to the ever-changing weather in Louisiana. Additionally, precast concrete RCP or RCB, if constructed correctly, lasts and perform for decades with little operation and management costs.

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

I am hoping to see the use of precast concrete pavement panels soon in Louisiana. **PS**

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Moving Precast and Earth

**More than 20,000 precast concrete segments
power \$267 million tunnel project in Ohio.**

By Mason Nichols
Photos provided by CSI Tunnel Systems



From the smallest, most intricately designed pieces to massive components built at scale, precast concrete is the product of choice for nearly any imaginable project. In recent years, use of the versatile building material has become more widespread in the tunneling industry, where owners, engineers and general contractors require a solution that is durable, resilient and capable of being erected with speed and efficiency.

As cities across the United States seek to reduce overflows from sewer systems into nearby creeks, rivers and other waterways during storm events, officials consistently have turned to precast concrete to produce effective results. Such is the case for the Lower Olentangy Tunnel (LOT) project currently underway in Columbus, Ohio. The work, which began in April 2021, entails the installation of 20,400 precast concrete segments as tunneling contractor Granite Construction builds a combined sewer overflow system in conjunction with local precast manufacturer CSI Tunnel Systems and a slew of additional partners.

LOTS OF MOVEMENT

According to Bob Rautenberg, project executive with Granite Construction, the LOT project calls for 17,000 linear feet of tunnel and requires significant movement of earth to achieve. Specifically, while mining in the urban Columbus area, which includes operations under highways, railways and rivers, the team will encounter both soft ground and weathered rock as they conduct their work.

“The biggest difficulty on this project is the ground itself, where conditions are always changing,” Rautenberg said. “Columbus is also known for its water, which we’ll contend with along with the sands and gravels. Our operators will have to stabilize the ground as we are mining so that we don’t cause any surface settlement or heave.”

He added that Granite Construction will place additives into the ground to assist with the stabilization efforts.

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CSI Tunnel Systems will manufacture more than 20,000 precast concrete segments to line the Lower Olentangy Tunnel in Columbus, Ohio.

To install the associated precast concrete segments, Granite Construction is deploying a Herrenknecht earth pressure balance tunnel boring machine (TBM) designed and built specifically for the project. The TBM has a bore diameter of 14 feet, 7 inches, which is about 1 foot larger than the outside diameter of each ring that composes the tunnel. Deployment of the TBM is scheduled to take place in October 2022.

Once the TBM is assembled and ready to operate, Rautenberg said his team will begin work at Gowdy Field on the west side of the Olentangy River in Columbus. From this main site, Granite Construction will mine south approximately 5,000 feet – installing the precast rings that make up the tunnel along the way – then retrieve the TBM and perform the same operations to the north, mining another 12,000 feet.

A COORDINATED EFFORT

Production of the precast concrete segments that make up each tunnel ring kicked off in May 2022. Six segments make up a ring with each ring weighing 26,000 pounds. Overall, the LOT project consists of 3,400 rings totaling more than 88 million pounds. With so much precast needed to be delivered to site, transportation logistics have been an important topic of conversation between CSI Tunnel Systems and Granite Construction.

“We have a very tight site with limited shipping hours available,” Rautenberg said. “A significant portion of our coordination efforts have centered on maximizing the time and space that we have available so that the offloading process is smooth and efficient.”

The plan is for Granite Construction to receive five to eight deliveries per day from CSI Tunnel Systems out of the company’s

Macedonia, Ohio, plant, which is located roughly two hours from the project site. Each truck will contain two complete rings with shipments running from 2023 into the first quarter of 2024.

Hammering out these logistics is just one way collaboration has helped catalyze the LOT project. Reece Armitage, vice president of quality control and project relations for CSI Tunnel Systems, said that his team worked closely with the project owners and engineers to develop a tailored concrete mix design capable of meeting the needs of the tunnel.

“We’re running a highly designed concrete mix that uses cement, slag, silica fume, high-strength fiber reinforcement and a water-reducer admixture to maintain a low water/cement ratio,” he said. “The mix design gives us flowability for production along with segments that are reinforced from edge to edge. This results in less chipping and spalling and an extremely high-strength product.”

Leveraging structural fiber reinforcement in lieu of rebar cages is relatively new in the tunnel industry but is becoming more commonplace. When combined with other elements of the mix design, including a higher slag usage, the LOT will boast a life span of 100 years.

GETTING IT DONE

When the TBM goes underground at Gowdy Field, the installation process will be relatively straightforward – mine 5 feet of earth, build a precast ring, then repeat. However, the success of this approach is tied directly to the details involved. As Rautenberg said, the segments will be transported on segment cars with three segments on each car. A “quick unloader” on the TBM will pick up the segments and suspend them in the air, allowing the cars to be used for other operations. The segments then are set down, positioned onto a segment transporter and moved into the forward part of the machine to be erected.

The tunnel and precast rings will boast a 12-foot inside diameter. Rautenberg said that there also will be a 6-inch annulus around the bore of the tunnel and the outside edge of the segments. As Granite Construction performs the mining operation, the team will pump grout into that void to stabilize the segments and the adjacent ground.

According to Armitage, the installation process doesn’t only result in a resilient tunnel – it also keeps workers safe.

“Precast tunnel liners are becoming the preferred method because workers are always in a finished tunnel,” he said. “The TBM pushes off the existing tunnel to mine the 5 feet, then the precast pieces are installed, bolted and grouted into place – just like when constructing a building. As a result, the workers are always operating in a controlled environment.”

Armitage added that Granite Construction mandates that the design for projects like this be implemented in a manner that the overhead segments are installed last when building a ring. Workers always start with the bottom pieces first and then work their way up, helping ensure their safety.

As CSI Tunnel Systems manufactures segments for the LOT project through the latter part of 2023, it will take advantage of custom forms designed by its team specifically for this endeavor. And while the team had to make a few modifications to their plant – including the addition of a silo to help supply all the components needed for the mix design – they are well-equipped to handle the job, having completed more than 30 projects of similar size and scope in the past.

The relationship between CSI Tunnel Systems and Granite Construction has been key to the advancement of the project to date. Beyond coordinating logistics and collectively crafting a mix design that will support the CSO tunnel, the two teams also partnered closely to ensure that the precast components would be compatible with the TBM during erection.

Alongside the high-quality precast segments and experienced backgrounds of the major project partners involved, the work also will be spurred along by additional steps the team is taking in anticipation of the needs of the TBM.

“Plenty of maintenance on the machine will be required,” Rautenberg said. “The owner has specified 14 locations along the tunnel route that we’re calling ‘safe havens.’ These are jet-grouted ahead of time so that we can pull the TBM into them as needed and work on it under stabilized ground conditions.”

The use of precast will go a long way in benefiting the Columbus community and providing a long-lasting environmental impact to the surrounding area.

LONG-LASTING IMPACT

While much work remains before the LOT project wraps up in December 2026, many steps already have been taken to help set the tunnel work up for success. In addition to strong collaboration between Granite Construction, CSI Tunnel Systems and other partners, the use of precast will go a long way in benefiting the Columbus community and providing a long-lasting environmental impact to the surrounding area.

“This precast tunnel lining approach allows us to make a strong, durable product in a safe and controlled environment,” Armitage said. “Not only does this enable greater precision with manufacturing – it also allows us to deliver a solution that will serve the area well for the next 100 years.” **PS**

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

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Precast Earns **A⁺** in School Project

An emergency septic tank replacement incorporates multiple 10,000-gallon precast tanks, precast manholes plus an array of pumps, controls and turbines.

By Bridget McCrea

Photos provided by Tim Queior, Camp Precast

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With about 800 students in grades pre-K through 12, the Brushton-Moira Central School District (CSD) is in the northern region of New York State not far from the Canadian border. The district recently found the building housing most of its students in need of a new septic system to replace the one that was originally built in 1959.

After completing a building condition survey, the district decided to put a new parking lot over the existing septic system. The school's wastewater was flowing to a 12,000-gallon septic tank that discharged the water to five different 12-foot-by-50-foot dry wells. Brushton doesn't have city-wide septic, so the school's system was private.

Needing additional dry well space to accommodate a new wing, the school tested the system while also making sure it could hold the weight of the new parking lot. During that review and testing phase, the district learned that one of the existing silos feeding the sewage into the leach fields was filled.

"That shouldn't have been happening," said Mike Malette, director of facilities for the district. "The more we investigated, the more we realized it was time to update the septic system so that it wouldn't fail on us during the school year."

Brushton-Moira CSD contacted the New York Department of Education (DOE), which deemed the septic system replacement as an "emergency" project.

"Even the experts were telling us that our 60-plus-year-old system would fail any day," Malette said. "And you can't run a school without a septic system."

WANTED: DURABILITY AND LONGEVITY

After coming up with a few designs that were rejected by the New York State Department of Environmental Conservation (DEC), the district began working with Eric Murdock, P.E., of ONSITE Engineering to design one that would meet the school's current and



Camp Precast provided four 10,000-gallon septic tanks for the Brushton-Moira Central School District.

future needs and also would align with all environmental standards.

The surrounding soils presented an interesting challenge in that the drainage is actually "too good," according to Malette, and tends to percolate too fast. That raises the odds of the sewage potentially getting into the water table, although this has never occurred.

"We didn't want to take any chances," Malette said, "so we started looking at systems that would clean the water before it got into the leach field."

"The site is comprised of rapidly percolating soil, so we had to comply with

the DEC's nitrogen guidelines," Murdock said.

Anytime the soils move water faster than a rate of one minute per inch in New York, it's considered "fast." Even if the organic content of the wastewater is removed, the resultant water may still contain nitrogen. Because of this, septic systems in these areas have to incorporate a nitrogen-reducing compound.

Working with Murdock, the district designed a "mini sewage plant" that incorporated a number of different components plus precast concrete tanks and manholes. Murdock said that at one

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The tanks installed for the Brushton-Moira schools were set in one day.

point fiberglass was viewed as a potential option for the tank construction but was removed from the list fairly quickly due to cost. That left precast as the material of choice.

Malette said he was all in favor of precast concrete for the tank materials on this project.

“I’m pretty old school and a firm believer in using concrete for these types of projects due to its strength and durability,” he said. “The main drop tank is situated near the parking lot and takes a lot of abuse. I’m not sure if fiberglass would have withstood all of that wear and tear.”

A MINI SEPTIC SYSTEM

After meeting with the DEC, Murdock gathered the requirements and then used that information to develop a set of drawings that the department ultimately approved. The 10,000-gallon per day (GPD) system would include four 10,000-gallon precast concrete

septic tanks, two 2,500-gallon single-compartment lift stations and multiple White Knight WK-200 Microbial Inoculator Generator towers (to meet the DEC’s nitrogen-removal requirement).

The system also included numerous effluent filters and recirculation pumps, four precast manholes, air pumps, turbine fans and a control panel, among other components. Tim Queior, New York State sales rep for Camp Precast in Milton, Vt., said the company got involved with the project after learning about the RFP and successfully winning the bid for the precast portion of the septic system.

During the design phase, the precaster helped determine which tank sizes and shapes would work best for the application, knowing that the pieces would have to travel over the road about 2 1/2 hours to get from the plant to the school site. Once on-site, the tanks, manholes and other pieces would be installed by TJ Fiacco Construction of Norwood, N.Y.

Queior was on-site to handle all of the rigging and to provide direction and support throughout the project. While the undertaking was fairly straightforward for Camp Precast, there were some unique transportation and site challenges that had to be addressed.

“We had to make sure the crane was right and the site was prepared, knowing that all of the tanks were going to be set in one day,” Queior said. “We staged trailers, stacked them and got out of there because we wanted to cut the crane cost down to just one day’s work rather than two.”

The precast pieces also required special care during transport. The tank’s upper sections, for example, had to be placed on two fairly narrow walls that would be riding on the trailer across potentially bumpy, uneven road surfaces. To cushion them and avoid possible damage to the tanks, the precaster placed very dense foam under each section.

“We don’t ever like our products to be sitting tight against the trailer decks,” Queior said. “And while some trailers do have a light camber to them, each one is a bit different and we didn’t want to take any chances.”

The foam did the trick in this specific instance.

“It performed like nothing I’ve ever seen,” he said. “The precast pieces all arrived onsite in perfect condition and ready to be set in place.”

EXCEEDING EXPECTATIONS

The project went smoothly, and the school district is pleased with the outcome, having been able to both replace its aging septic system and put a new one in place that accommodates future growth.

“Everything was well thought out, and installation day went like clockwork,” said Queior, who credits the district’s choice of precast with helping to make that happen so quickly.

The material choice also lends itself to long-term success due to the durability and watertight qualities that precast concrete is known for.

“The project pictures tell a pretty good tale of how everything lined up so well,” he said. “Now, it’s just a matter of servicing and maintaining the system from the various ports of entry that we included for all of the ‘bug eater’ devices. It’s just that easy.”

ONSITE Engineering services the system four times a year, and Murdock said the setup has been performing well since it was put in place. The treatment component encompasses aerators that were installed on four of the tanks, and ONSITE services those treatment components and also handles the required compliance sampling.

“That’s all been going well since installation,” Murdock said.

Because the system handles more than 1,000 gallons of liquid per day, the DEC requires inspections by its regulators.



The modern septic system meets the school district’s needs, handling more than 1,000 gallons of liquid a day.

It also requires ONSITE to log all of its analytical results in a national database on a quarterly basis. During their onsite visits, technicians check the fans, pumps, control panels and air pumps. They also submit water quality samples to ensure compliance with subsurface discharge permit limits.

“We’ve been doing that as required, and so far the system has performed far above our expectations in terms of analytical results,” said Murdock, who added that there also is plenty of room to scale up as needed. “The system is sized so that it’s got a much greater treatment capacity than it’s being used for at this point.”

Malette also is pleased with the results and happy that Brushton-Moira CSD now has a modern septic system that’s operating well and no longer in danger of potentially failing and/or leaching nitrogen into the area groundwater. He

said the project went well and that TJ Fiocco Construction went out of its way to accommodate the district’s needs and get the job done as quickly as possible. In fact, Malette said all of the organizations involved with this project pulled their respective weight and contributed to its overall success.

“Everyone worked as a team,” said Malette, who currently is working with the contractor on a new district project. “The biggest challenge on this one was coming up with the original plans, but once we did — and once those plans were approved by the DEC — the rest of the job went very smoothly. It exceeded our expectations and is working very well for us.” **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.



Up to the Challenge

Precast concrete tanks are at the heart of a large-scale, complex septic system serving Raven Rock State Park's new campsites.

By Shari Held

Photos by Stacy Creech, Creech's Plumbing & Septic



Shoaf Precast manufactured the precast portions of the septic system for the Moccasin Branch campground at Raven Rock State Park in North Carolina.

Named for a massive bluff that rises 100 feet above Cape Fear River in North Carolina's Piedmont region, Raven Rock State Park is known for its unique 570-million-year-old bluffs, breathtaking river vistas and mature forests. The area, once home to the Siouan and Tuscarora tribes, was the perfect spot for camping, but it was missing one major component: campsites.

In a quest to provide more outdoor recreational opportunities statewide to residents, North Carolina adopted a campground model that includes up to 30 campsites – a combination of primitive sites, RV sites and cabins, with one handicapped-accessible site per campsite type – plus a bathhouse.

"It's the model that works for the state sizewise," said Robert Graham, P.E., principal engineer at the time for George Finch/Boney and Associates, headquartered in Raleigh, N.C.

In September 2019, construction began on Raven Rock's new Moccasin Branch Campground, which includes nine RV sites with full water and sewer hook-ups, a bathhouse with restrooms and hot showers, 15 campsites for tents and trailers and six rustic

cabins. This park, which typically is packed from spring through fall, was one of the first campgrounds projects commissioned by the state for this initiative.

"Raven Rock State Park is between some fairly large municipal areas such as Raleigh-Durham, Greensboro and Fayetteville, so it made sense for the state to add the campgrounds there," Graham said.

WEATHER PERMITTING

Before the project began, it faced several obstacles. One issue was that it was on a tight deadline during the busiest time of the season for local installers and many were booked for the season. In addition, the scope and complexity of the project was daunting. Ultimately, the septic system team consisted of the installer – Wilson, N.C.-based Creech's Plumbing & Septic – and the septic tank fabricator – Lexington, N.C.-based Shoaf Precast.

Everyone involved with the project knew upfront the weather would be a big challenge that they couldn't control. Work couldn't



The septic system at Raven Rock State Park was the largest project to date for Shoaf Precast and Creech Plumbing.

begin until early September, which coincided with the beginning of North Carolina's hurricane season. During that time, the area is pummeled by relentless rain and low-pressure systems.

"Once it got wet, it would take a couple of weeks before we could go back," said Stacy Creech, proprietor of Creech's Plumbing & Septic. "So, if it rained on and off again for four weeks, we'd be looking at two months before we could even go back to work."

That could be a death knell to a project with a firm deadline of 180 days from start to finish. Adding to the tight timeline woes, work crews had to comply with the park's hours of operation, which limited the hours they could work on-site.

PRECAST: THE MATERIAL OF CHOICE

This was the largest state park project that Creech's Plumbing and Shoaf Precast had worked on to date.

The septic system is sized to handle 2,655 gallons per day. It includes two 8,000-gallon tanks – a dual-compartment septic tank with a 6-inch PL-625 effluent filter and a dose tank with dual

dedicated 2 HP Hydromatic SKHS-150 sewage pumps.

Park officials requested precast concrete septic tanks.

"Precast has been their material of choice," Graham said. "They have had good experience with precast in the past, and I don't think they wanted to consider any other options. Durability and longevity of use were the primary factors for choosing precast."

ADDITIONAL CHALLENGES ALONG THE WAY

According to Graham, the rocky soil composition was the most unexpected challenge, requiring a much larger excavation for the bathroom foundation than anticipated.

"I've worked on other parks in North Carolina, and I've never seen that kind of rocky soil before," Graham said. "It made things a little more interesting, for sure."

For Creech's Plumbing, the logistics were a nightmare.

To stay within budget, park official initially requested a conventional septic system with gravel and pipe drain fields. But this type of drain field has a large footprint. More importantly,

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The logistics of the state park project required extensive planning for transport and staging.

there wasn't enough cleared space to store the massive quantity of gravel the drain fields would require.

Creech successfully negotiated replacing the gravel and pipe drain field with one that used infiltrator chambers. They could easily be transported to the job site on one truck, requiring much less space in the staging area.

Still, logistics remained an issue.

Access to the job site was via a narrow park ranger road, cut through the forest. Once Goldsboro, N.C.-based Allen Grading Co., the general contractor, cleared the trees and flagged the drain field perimeters, workers, project materials and machinery had to stay within those boundaries. They couldn't set foot in the forest, nor could they block the ranger road at any time.

"It took a lot of planning and logistics to make sure everything was on-site to work with," Creech said.

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It took just shy of four hours to assemble the tanks with the help of a 110-ton crane.

LARGE SCALE BUT ROUTINE

The 8,000-gallon commercial tanks were huge, but fabricating them wasn't anything unusual for Shoaf Precast.

"We manufacture a lot of these bigger tanks," said Phillip Shoaf, vice president of Shoaf Precast. "That's what we're set up to do. As far as the design of the project and the materials used, it was all fairly standard."

The tanks were fabricated using a 5,000 psi minimum concrete mix and were heavily reinforced with a mix of No. 4, No. 5 and No. 6 rebar. On average, the precast concrete gained full-strength capacity in 28 days. Each tank consists of three sections. The top and bottom sections weigh 21,000 pounds apiece, and the middle riser section weighs about 14,000 pounds. Shoaf Precast used a 10-foot-by-20-foot (inside dimensions) steel mold for the tanks. The company manufactured all six sections within two weeks.

"You have to make sure you pay attention to the details when you're working with such large structures," Shoaf said.

The biggest challenge from Shoaf's point of view was transporting the finished sections to the job site. Plant workers used a rough terrain crane to load the precast sections onto six wide-load trailer tractors.

"There's always some careful consideration taken when you go down the road with a piece that's 11-foot-4-inches wide and the project is 2 1/2 hours from the plant," Shoaf said.

Thankfully, they encountered no problems in transport, and the precast tank sections arrived safely.

PUTTING IT ALL TOGETHER

The septic system was installed in stages, starting with the drain fields. Rather than using a laser to mark the trenches, Creech imported the surveyor's DWG file – which had the



Each tank consisted of three sections, with the top and bottom sections weighing 21,000 pounds a piece and the middle 14,000 pounds.



drain lies already marked – into his data collector. This enabled him to lay the lines for both drain fields in one day.

“That process basically shaved two days off the project,” Creech said.

Both fields, which are 100 yards apart, consist of 14, 120-foot-long trenches on 9-foot centers. Field 1 is 1,292 feet from the septic tank, while Field 2 is 1,250 feet from the septic tank. Each field has a 3% slope, which allows effluent to gravity-flow to the chambers. Creech’s Plumbing began installing Field 1 on Oct. 2. Before starting work on Field 2, workers inspected, then covered Field 1.

“It was too large a project to leave it all open and inspect it all at one time,” Creech said. “We didn’t want to deal with any rain, settling or erosion in the trenches if we left them open.”





The project site was on a narrow ranger road and more than two hours from the Shoaf Precast plant, requiring careful planning for transportation.

After both drain fields were installed, the tanks were set on Oct. 15.

It took just shy of four hours, using a 110-ton Grove TMS 9000e crane provided by Edwards Crane of Spring Hope, N.C., to assemble the tanks. Staying within the four-hour timeframe was a priority for Creech Plumbing because crane time was purchased in increments of four hours.

“Creech’s Plumbing put all the pieces of the puzzle together, basically,” Shoaf said.

Finally, the force main – the pipelines that convey wastewater under pressure from the pump to the drain fields – was installed. The Shoaf crew tested the tanks for structural integrity and vacuum-tested them, and Creech’s Plumbing pressure-tested the pipe system using a generator for power. Once satisfied, they began covering them.

ALL’S WELL THAT ENDS WELL

It took Creech 14 workdays stretched over three months to complete the job. But the project met its deadline, finishing in December 2021. Great teamwork, coordination and communication played a big role in the project’s success.

“It was a very smooth process, smooth project,” Shoaf said. “The engineer did a great job. Creech’s Plumbing did a great job. And we had everything ready to go when he was ready. In the end, everything went as planned.”

Even the weather was on their side.

“The day after the install, a low-pressure system came through, and it rained off and on over the next four weeks,” Creech said. “If we hadn’t finished on time, it would have been the middle of the following spring before we would have concluded the job.” **PS**

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

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