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JUNE 2023

CHALLENGES AND OPPORTUNITIES

FOR TODAY'S UTILITIES

**Funding, Workforce Issues
Continue to Impact System Owners**

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FEATURE

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TODAY'S YOUNG TRENCHLESS
PROFESSIONALS

FEATURE

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ON THE COVER

How utilities and
systems owners
handle challenges
and opportunities.

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CHALLENGES & OPPORTUNITIES FOR TODAY'S UTILITIES

We asked some utilities/system owners for insight into what they
face each day — the challenges and opportunities.

By Sharon M. Bueno

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TODAY'S YOUNG TRENCHLESS PROFESSIONALS

They are premier leaders of companies, divisions or
projects who are making their mark in the trenchless
industry right now. They are enthusiastic advocates of
trenchless technology, as well as unabashed fans of the
people who make up this vital and vibrant sector of the
construction industry. Let's meet them!

By Sharon M. Bueno

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Pacific Northwest to network with peers and learn about
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With thousands of miles of buried water mains providing
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By TT staff

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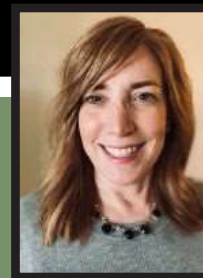
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FROM THE PUBLISHER

A SHOUT TO SYSTEM OWNERS

By Kelly VanNatten



In this issue, *Trenchless Technology's* editor, Sharon Bueno, chatted with five water/wastewater system owners about challenges their system faces.

After reading through the article, I was reminded that managing our nation's water/wastewater systems comes with enormous responsibility. In this country alone we have thousands of miles of pipe conveying billions of gallons of water & wastewater every day.

While each system has its own challenges, a common issue among all the system owners interviewed was funding. With that in mind, I wanted to share information about our sister publication, *Water Finance & Management* (waterfm.com) and the Water Finance Conference, Aug. 8-9, in Cleveland. Two great resources for finance/funding solutions.



The Water Finance Conference is a one-of-a-kind event that will help you create a water financing program that works, set affordable rates that fund your projects, do more with your water revenue and help you plan for tomorrow. Session topics include Regional Financial Trends and Preferences in the U.S. Water Industry, Financial Capability Assessment Guidance, IIA Funds for Lead Service Line Replacement in Cleveland, and more. For information/registration, visit: waterfinanceconference.com.



Remember to mark your calendar for our industry's big day of celebration - World Trenchless Day - on Sept. 28! Trenchless in-

dustry organizations are invited to submit a World Trenchless Day video message to be shared with Trenchless Technology followers on World Trenchless Day. For more ideas on how you can celebrate World Trenchless Day, visit worldtrenchlessday.org.

As always, the *Trenchless Technology* staff is here to serve you, our readers. Please feel free to reach out to me at kvannatten@benjaminmedia.com or 234-380-3030 if you have any suggestions or comments. Interested in contributing editorial? Contact Sharon Bueno, editor at sbueno@benjaminmedia.com.

Until next month!

Kelly VanNatten
Publisher,
Trenchless Technology

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Trenchless Pioneers: Tom Iseley

Trenchless Pioneers is a special monthly series sharing with readers the trailblazers who grew and expanded the trenchless industry.

When thinking of people who were early advocates and educators in the trenchless industry, D. Thomas Iseley, Ph.D., P.E., Dist. M. ASCE, PWAM, is likely at the top of many lists.

Iseley has long been known as an underground infrastructure educator through his work at Louisiana Tech University and the Trenchless Technology Center (TTC), Purdue University and through organizations like the American Society of Civil Engineers (ASCE) and its Utility Engineering & Surveying Institute (UESI) and the North American Society for Trenchless Technology (NASTT).

Even at 77, Iseley is not ready to stop educating the next generation of trenchless technologists and underground infrastructure experts. He is a professor of engineering practice, construction engineering and management at Purdue University and a Beavers Heavy Construction Distinguished Fellow.

Iseley grew up with first-hand exposure to underground infrastructure construction, watching his father and grandfather who were water and sewer pipeline contractors in the Carolinas. "At 12 years old, I spent the summer helping my brother and father build brick manholes," Iseley recalls. "This was my first paid job in the industry. I worked my way through college, working for a consulting engineer designing water and sewer treatment plants and conveyance systems."

In 1979, he and his father started a utility construction company that owned some boring equipment but most of their work remained open cut. It wasn't until Iseley found himself at Purdue University pursuing his doctorate that he was made aware of the beginnings of what we now refer to as trenchless technologies.

"In 1986, I was conducting a research project for the Indiana DOT and, during my literature review, I obtained a copy of the 1985 No-Dig Conference proceedings,"



Iseley says. "I was amazed at what was being developed on a global basis. After reading through it several times, I had to learn more; so, I started traveling to meet anyone and everyone I could to learn as much as I could."

Iseley notes that this experiential learning process launched a commitment to doing what he could to advance the science and practice of trenchless technology. "Much of the motivation for my commitment goes back to my early days working with my father and grandfather wishing that they could see what our underground infrastructure industry had evolved to," he says.

"Having been an assistant professor at Mississippi State University for four years prior to going to Purdue to pursue a Ph.D., I was already in academia when I became aware of the beginnings of the industry," Iseley says. "I realized that most of the major developments were taking place outside the USA and realized that more research was needed in America."

This idea led to the TTC. Iseley helped establish the industry-university cooperative research center after he relocated to LA Tech in 1988. Officially established in 1990, the first major research project was in 1991 with the U.S. Corps of Engi-

neers. Iseley also notes that he was one of the founding five who helped establish NASTT.

As important as the TTC is to trenchless education and research, when asked about his legacy, Iseley points to his work with Mayor Shirley Jackson in Atlanta in 2003.

"I was charged with assisting how to achieve the Mayor's vision of transforming the water program to be first-in-class. This helped me realize that having access to the greatest technical solutions and having the most effective condition assessment technology will not achieve her vision," Iseley says. "My experience working with Mayor Franklin's administration allowed me to establish the Buried Asset Management Institute-International (BAMI-I). So, I would like to think that my legacy would recognize the accomplishments of BAMI-I helping water utilities develop and implement asset management plans."

To this day, Iseley continues to lead the growth and development of BAMI-I. A lot has happened since he first joined the trenchless world, so what are Iseley's thoughts about the growth of the trenchless industry over the years?

He replies, "The growth of the trenchless technology industry has been remarkable. In the initial phase, the industry pulled together to form a support structure through the NASTT and ISTT organizations. The technical envelope for most of the solutions expanded at a rapid rate. Education, training and research programs expanded to meet the needs. Now we are realizing how asset management will help utility owners make sure that they are spending the right amount of money at the right place at the right time. This helps make sure that the rates users pay are the right rates."

Mike Kezdi is the managing editor of *Trenchless Technology*.

MICROTUNNELING SHORT COURSE 2023

Held in Scottsdale

The 2023 Microtunneling Short Course – the 30th anniversary of the course – was held April 12-14 in Scottsdale, Arizona, with 166 people in attendance. The venue was Scottsdale Stadium, the spring training home of the San Francisco Giants. It was the second straight year that the course was held at this venue, with the previous courses being held in Colorado.

The course was founded in 1993 by Tim Coss (Microtunneling Inc.), Levent Ozdemir (Ozdemir Associates) and Bernie Krzys (Benjamin Media/*Trenchless Technology*) as the only event focused on the then-emerging installation technology. It continues to be the largest gathering of professionals dedicated to microtunneling technology, attracting attendees and presenters from across North America and Europe. This year's course boasted 166 attendees from five countries.

The course itself covers all aspects of tunneling from leading experts in the field, covering design, construction, equipment, case histories and more. This year's course opened with a presentation from Paul Nicholas of AECOM, reflecting on the history of microtunneling. Nicholas and Glenn Boyce of Delve Underground, who gave a case history presentation, were also presenters at the inaugural course held in 1993.

One of the highlights of the agenda was a contractor's panel discussion, organized by the North American Microtunneling Association (NAMA), an organization of contractors heavily involved in microtunneling that formed in 2012. Brenden Tippetts (Nada Pacific), was the moderator, with Pete Schraufnagel (Super Excavators), Dave Ellett (BRH Garver), Ray Post (Huxted), and Adam Stremcha (Michels) as panelists.

Other highlights of the course included many networking events, including



a 30th anniversary rooftop reception at the Canopy by Hilton on April 10, a welcome reception at the stadium on April 11, the annual banquet dinner at the Museum of the West on April 12, and a special networking reception at the Brat Haus sponsored by Tunnel Services Group on April 13. The banquet features the presentation of the annual Microtunneling Achievement Awards.

The event featured 31 sponsors with Trinity Products, Northwest Pipe Co., United Underground Precast and Tunnel Service Group comprising the main event sponsors. Other sponsors included Bothar, Hobas, Vadnais Trenchless/Primoris Services Corp., Tunnel24, Derrick Corp., Lowers Welding, Dr. Mole Inc., DSI Underground, Down2Earth, Michels, Akkerman, Herrenknecht, Jack-control, Bradshaw Construction Corp.,

Northeast Remsco, Huxted Trenchless, Super Excavators, Schnabel Engineering, VMT, Delve Underground, Olson Construction Law, Brierley Associates, Stiver Engineering, BTrenchless, Kilduff Underground Engineering, Thompson Pipe Group and Roetzel.

Microtunneling Achievement Awards

Each year, in conjunction with the Microtunneling Short Course, individuals who have made lasting impacts on the industry are honored with the Microtunneling Achievement Awards. The awards are presented during the annual Banquet dinner, which was held April 12 at the Museum of the West in Scottsdale.

This year's winners were Buck Bergstrom, BT Construction/BTrenchless, Bijan Khamanian, Hobas, and Ray Post, Huxted Trenchless.

Buck Bergstrom

CEO
BT Construction/BTrenchless

Buck Bergstrom began his 40-plus year career with Colorado-based BT Construction in 1980, when his father Bob Bergstrom co-founded the company with John Turner. Bergstrom bought out his father's ownership in the company in 1996, at a time when BT was evolving as a leading trenchless contractor in



TRENCHLESS NEWS



the Rocky Mountain region. In 2005, BT Construction launched a new division — BTrenchless — to focus on the burgeoning market. Today, BTrenchless provides an array of services including microtunneling, pipe jacking, auger boring, hammer, sliplining, tunneling, pipe bursting, HDD, potholing and hand tunneling.

Bijan Khamanian

Division Manager - North and Canada
Hobas Pipe USA

Bijan Khamanian is a division manager Hobas Pipe responsible for technical and sales support for Hobas fiberglass pipes. Khamanian has presented numerous papers on the use of fiberglass reinforced polymer mortar pipes in trenchless installations at the ASCE Pipelines, CWEA, HWEA and the Microtunneling Short Course. Prior to joining Hobas, he worked as applications engineer and sales and specifications engineer for Ameron Fiberglass Pipe Division from 1990-1997. Since 1993, Khamanian has resided in Orange County California. He is a native of Iran and is fluent in Farsi (Persian) and Azeri (Turkish) languages.

Ray Post

Vice President
Huxted Trenchless

Ray Post has more than 30 years of experience in the microtunneling and tunneling industry. He has worked in all phases of the industry including executive management, project management, estimating, design and inspection services, and sales. He has experience in the construction of EPB segmental tunnels, microtunnels, rib-and-board tunnels, and jack-and-bore operations with construction values ranging from \$500,000 to \$440 million and diameters ranging from 10 in. to 21.5 ft. Post has a B.S. degree from Louisiana Tech in Construction Engineering and holds Contractor licenses in California, Louisiana, Georgia and Florida.

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Founded in Denver in 2014, Kilduff Underground Engineering is an underground design and construction management firm specializing in the design and construction of large tunnels and trenchless methodologies, as well as support of excavation, geotechnical engineering, instrumentation and monitoring, and claims support. In 2020, KUE opened an office in Red Bank, New Jersey, to support the growth of the company in the New York City metropolitan area and Eastern seaboard.

"KUE is proud to be recognized as a Certified DBE, MBE, and SBE after a very thorough certification process with several certifying agencies," said KUE owner and president Todd Kilduff. "We are very excited about the growth this will bring to the company and the boost it will give us to attract talented engineers and surveyors from diverse backgrounds to come to work with us. We are thankful that we can

help our clients fulfill their supplier diversity goals and meet our own commitment to working with minority-owned businesses through the networking opportunities supported by

these respected agencies."

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RECAPPING DCA'S 2023 ANNUAL CONVENTION



Accepting the Arthur T. Everham Safety Awards on behalf of the winning companies were (from left): Levi Lamp, R&R Pipeline; Steve Balkcom, ARB; Pete Fojtik, Michels Utility Services; and Jim Lagios, Atlas Trenchless.

The Fontainebleau resort in Miami Beach provided the backdrop for the 62nd annual DCA Convention earlier this year.

Day One kicked off with the Membership Committee, noting that a record 62 convention first-time attendees were in attendance. Much of the discussion at the meeting centered around re-engaging lapsed members via the Strategic Vision Committee's Membership Reinstatement Project.

The committee urged more members to take the equipment survey, as the current 41 percent participation rate is inadequate for associate members to predict future equipment needs.

Next, Rob Darden, executive vice

president, opened the Town Hall and Business Session with the Treasurer's and Membership reports, along with a recap of recent DCA activities.

DCA President Kevin Parker, Mears Holdings, then recognized retiring members from the Board of Directors, followed by the presentation of the Arthur T. Everham Safety Awards by Bill Colson, Pretec Directional Drilling, and Randy Bunch, Aaron Enterprises, co-chairs of the Safety/Risk Management Committee.

Day Two included a keynote speech from Ret. Lt. Col. Dan Rooney, who covered many topics, but most importantly his charitable organization, Folds of Honor, which provides schol-

arships to the children of veterans wounded or killed in service to their country. He has given out more than 44,000 scholarships worth over \$200 million. Darden presented Rooney with a \$50,000 donation to Folds of Honor in the DCA-LMCT Trust's name.

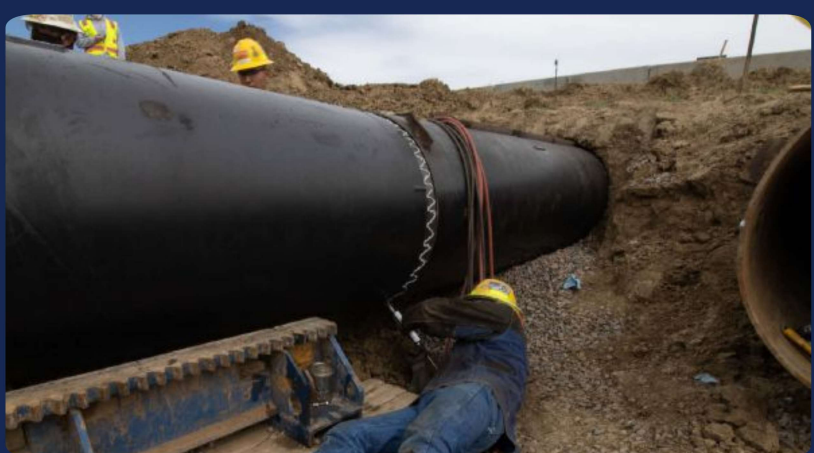
The day also included an update on DCA's trenchless initiatives. Dr. Sam Ariaratnam, Arizona State University, opened the Trenchless Committee meeting with an update on his activities as a member of the Gas Pipeline Advisory Committee (GPAC) under the Department of Transportation (DOT). GPAC is a statutorily mandated advisory committee that provides recommendations to the Pipeline and Hazardous Materials Safety Administration (PHMSA) and the DOT Secretary regarding proposed standards for gas and liquid pipelines and facilities.

GPAC is also currently involved in a lawsuit against OSHA over banning pipe wrenches on directional drilling sites. When asked if the committee felt pressure from the Biden administration to "kill gas," Ariaratnam answered, "Not directly." Grady Bell, Bell Trenchless, introduced the new HDD Association to the audience and Trenchless Committee co-chairs Nate

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Eastway, Gabe's Construction Co.; and Alan Goodman, HammerHead Trenchless, reviewed the new HDD guidelines publication and upcoming events in collaboration with AGA, NASTT and more.

Day Two also included the silent and live auctions, which raised a grand total of \$632,000 for industry scholarships, industry events and staff support continuing the auction's rebound toward pre-pandemic levels.

Day Three opened with breakfast and the announcement of the recipients of the Dale R. Michels and Curtis Allen scholarship awards, which totaled \$145,000 this year. It also highlighted the association's newest honorary member, Gary Lawson, of Ditch Witch.

Eben Wyman kicked off the Government Relations Committee meeting with a recap of 2022 activities and 2023 goals.

The committee's top priority remains the Pipeline Safety Reauthorization and pushing for criminal penalties for criminal protesting; there has been some debate over including penalties for damage to equipment. The committee continues to push for three things: incentivizing use of GIS mapping, opposing mandates for SMS, and keeping the focus on damage prevention.

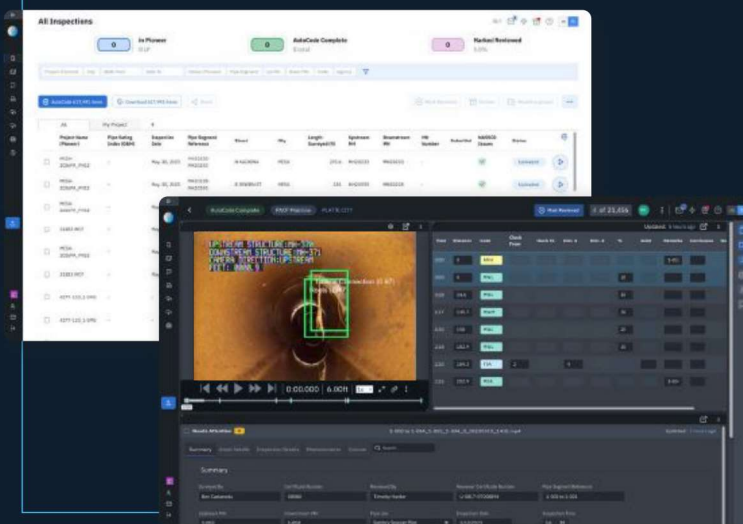
The final business meeting from the Workforce Development Committee co-chairs Stephanie Krabbe, InfraSource, and Matt Dvorak, Groebner, charted out the goals for 2023: to introduce the second BuildWitt video series, encourage engagement with SkillsUSA, participate in the next DCA/AGA panel, and hold a Leadership Development conference. After a brief review of the upcoming DCA & AGA Utility Contractor

Workshop and the "Success Looks Like This" marketing campaign, the idea was put forth to start a Job & Career Fair Subcommittee. The subcommittee would be responsible for handling requests for presence at fairs and working with members to make sure DCA is well represented.

Closing out the event, DCA rented the entire LIV nightclub, one of Frank Sinatra's favorite hangouts. In the only formalities of the evening, Kevin Parker turned over the DCA presidency to Ray Swerdfeger, K.R. Swerdfeger Construction, and then the music kicked into overdrive.

The DCA will convene next for the Mid Year Meeting at The Lodge at Spruce Creek in Stowe, Vermont, July 24-27. Next year's convention will be held in Hawaii.

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CHALLENGES & OPPORTUNITIES for Today's Utilities

By Sharon M. Bueno

North America's underground infrastructure has been under siege for years. Take your pick: age, condition, increasing costs of rehabilitation and construction, available funding and an experienced workforce are just a small part of what today's system owners and utilities face every day their boots hit the ground.



But among the sea of challenges come just as many points of opportunity — new innovative and enhancing technologies, funding options and a more advanced, next-generation workforce ready to tackle daily challenges with tenacity and vigor.

There are approximately 2.2 million miles of underground pipes delivering safe drinking water to millions of customers in the United States. On the wastewater side, we have more than 16,000 wastewater treatment plants, which, on average, on at 81 percent of their design capacities, with 15 percent having reached or exceeded that

capacity. According to ASCE's 2021 Infrastructure Report, the state of our drinking water graded out at a C-, while our wastewater received a D+ — not terrific grades but since the previous report in 2017, strides have been made in upgrades and financial options to address the utilities' needs.

We asked some utilities/system owners for insight into what they face each day. Below are their responses, which are edited for space; however, the entire conversation can be found on the *Trenchless Technology* website at trenchlesstechnology.com/challenges-for-todays-utilities-extended-version

Participating in our Utilities Roundtable are:

1. DC Water
2. City of Galveston (Texas) Public Works & Utilities Department
3. City of Hull (Massachusetts) Public Works
4. Pinellas County (Florida) Utilities
5. City of Vancouver (Washington) Public Works Department

Sharon M. Bueno is editor of *Trenchless Technology*.

Describe the area you cover and the type of system you have.

DC Water: DC Water distributes drinking water and collects and treats wastewater for about 700,000 residents and 21 million visitors in the District of Columbia. DC Water also provides wholesale wastewater treatment services for 1.6 million people in surrounding counties. To distribute drinking water, DC Water operates more than 1,300 miles of pipes, 44,000 valves, and 9,500 public hydrants. To collect wastewater, DC Water operates 1,900 miles of sanitary and combined sewers. The average age of our distribution and sewer systems is approximately 80 years old. We have used many types of trenchless technologies. Cured-in-place pipe (CIPP) is the most common when measured by length of installation. We have also used chemical/mechanical root control, chemical grout, cementitious lining, sliplining, spiral-wound pipe, shotcrete, geopolymer, repointing, tunneling, and microtunneling. The predominant issues are structural degradation in the sewer system and water quality and water main breaks in the water system.

City of Galveston, TX: The City of Galveston Public Works & Utilities Department maintains all street, traffic, drainage, water and wastewater infrastructure throughout Galveston Island. Our Water utility serves ~28,000 connections over 412 miles of pipe. Our utility manages a 37 million gallons of storage capacity and a 21 million gallon/day water supply. Additionally, we maintain 65 miles of storm mains, 256 miles of sanitary sewer mains and four wastewater treatment plants with a max capacity 24,550,000 million gallons. Our city has the full gambit of pipe materials known to our industry, and every challenge that comes with each material type. Our city has used pipe bursting, boring, CIPP, pipe patches, CUES-locks, chemical grout injection, and root control. On manholes our city has used cementitious materials, mortars, epoxy coatings, polyurethane liners, polyurea liners and fiberglass inserts, and composite manholes covers (super covers).

City of Hull, MA: Hull is a small coastal

town, on a peninsula, just south of Boston. The collection system is 42 miles of a series of pipes ranging in size from 6- to 36-in. in diameter, seven pump stations, siphons and depressed sewers. Most of the sewers were installed in the late 1970s and early 1980s, with some dating back to 1860. The early era sewers served mostly the hills in the town and were 6- to 8-in. clay pipe, connected to the storm drainage system as combined sewers and discharged to the ocean and the bay. The 17,500 lf of 30- to 36-in. diameter interceptor was installed in the late 1970s and rehabilitated between 2005 and 2019 with CIPP. The collection system built in the 1980s consists of mostly PVC and some asbestos cement pipe. The force mains are ductile iron. Overall, we have had remarkable success with trenchless technologies within our systems. It has proven to be faster, less expensive and reduced surface impacts compared to a conventional dig-and-replace approach.

Pinellas County, FL: Pinellas County Utilities (PCU) is a public utilities department under the Board of County Commissioners. Overall, PCU provides drinking water, wastewater, and reclaimed water services to more than 700,000 residents and 6.7 million annual visitors in Pinellas County. PCU provides services to customers in unincorporated Pinellas County and to 19 municipalities in Pinellas County. PCU spans over 1,700 miles of potable water, 1,100 miles of sanitary sewer and 400 miles of reclaimed water.

City of Vancouver, WA: The City's Public Works Department provides wastewater collection and treatment services to an area of approximately 62 sq miles and serves approximately 200,000 customers. The sewer system network (about 790 miles of wastewater collection pipe) collects and conveys to two wastewater treatment plants before being discharged to the Columbia River. The estimated replacement value of all sewer assets is nearly \$1.1 million. Our pipes range from brand new to over 100 years old with an average age of about 31 years. Vancouver's first sewer pipes were built in downtown Vancouver in the late 1890s using vitrified clay pipe. The next projects built in downtown were after 1905, with one 115-year-old

section still in use today. Early manholes on these sewers were constructed of bricks, with some having been rehabilitated and still in use. Although early systems were also used for surface water drainage, Vancouver's sewer and drainage systems are now separate. Records show that at least ten types of pipe materials have been used at different times, with over 90 percent of the system being built of either concrete or PVC pipe. As far as trenchless work, we do inhouse trenchless spot repair and manhole rehabilitation. We have done CIPP and UV CIPP for trenchless repairs. In 2017, Jacobs completed a comprehensive assessment of our interceptor pipes with a 10-year plan for rehabbing them based on condition assessment.

What are the main challenges that your system faces?

DC Water: Our primary issues are repair of structural defects. On the sewer side, we have many defects with a NASSCO defect grade of 5. Some of our sewers are attacked from the outside as well as the inside. Fixing these sewers in areas that are difficult to access require construction of paths (see photos). On the water side, the drivers of our replacement program are customer complaints about water discoloration and watermain breaks. Our capital program includes replacement of 1 percent of our watermains every year (increasing to 1.5 percent in FY28) and rehabilitation of 1 percent of local sewers every year. With this capital investment, we expect a reduction of the backlog of Grade 5 defects, water discoloration complaints, and watermain breaks. Maintenance will always be an ongoing effort and we have effective programs in place for maintenance.

City of Galveston, TX: Our island is flat and surround by water. Our groundwater table is very high, making construction and repair efforts very difficult and time consuming. I&I is a major issue on the island. Storm drainage issues on the island contributes to heavy ponding over sanitary sewer manholes, contributing to our I&I issues. The age of our infrastructure is a major contributor to asset failures.

Pinellas County, FL: One of our focus areas currently is to target Inflow and Infiltration (I&I) into our wastewater system. Defective private sanitary sewer laterals allow a significant amount of I&I into the wastewater collection system, and therefore, Pinellas County Utilities (PCU) created a Private Sewer Lateral Program. Reducing the I&I will increase available capacity within the PCU wastewater service area, aid in reducing the risk of SSOs, reduce flows to the treatment facilities, and reduce the need for new or expanded infrastructure system-wide.

City of Hull, MA: Sea Level Rise/Climate Change Vulnerability: The vulnerable location of the facility in the lowest, narrowest portion of Hull, with the Atlantic Ocean to the northeast and Hull Bay to the south, experience with past storm events, and the recognition that extreme storm events are becoming more common and severe, we have incorporated sea level rise, storm surge, and future climate change criteria in all our projects. For the collection system, use of watertight manhole frames and covers and being aggressive with I&I reduction will preserve capacity for future storm events. Preventive Maintenance: As typical in the industry, we have learned that preventive maintenance is much less expensive than reactive or replacement of non-functioning equipment. As we upgrade and replacement equipment and systems, it is imperative that we instill this philosophy in all workers and conduct ongoing maintenance programs from the start of any new equipment. Reducing Infiltration/Inflow: We are no different than any other sewer system. I&I reduction can be elusive and diligent efforts are needed to be effective. We are a small utility and get diverted in many directions so keeping attention on I&I becomes more difficult. Quarterly monitoring and use of outside consultants is hoped to maintain the attention needed so that as excessive leakage or inflow sources are identified, they can be fixed.

City of Vancouver, WA: We have some I&I issues but our bigger issue would be H₂S damage in our larger interceptors. One of the biggest maintenance chal-

lenges is root intrusion. We now have a team dedicated to continuous root foaming of our system. Our goal is to treat in problem areas every two years.

What are the most concerning challenges that utilities today face?

DC Water: Funding is one of our biggest challenges. Our board has been supportive of rate increases when necessary; we demonstrate the need and show responsible use of the money, but affordability remains a primary concern when evaluating rate increases. Taking full advantage of federal programs, such as the Bipartisan Infrastructure Law, is key to keeping rates as low as possible. In Washington, D.C., we have a wide range of economic statuses, and those who can least afford water still need water for basic hygiene and health. Attracting talent is another constant challenge. Everything we do is about people. We succeed because of the talent of our people including employees, contractors, and consultants. We usually receive many more applicants than we have openings, so we tend to have strong candidates to choose from. Our contractor pool would benefit from more competition and a wider breadth of available trenchless technologies. Similarly, even our best engineering consultants have had a hard time retaining high-quality staff lately, and competition for hiring staff has been fierce for the last year or two.

City of Galveston, TX: Funding is a major challenge for utilities today. Covid initiated current supply chain issues which led to increase costs for materials, as well as project delays. Employees are harder to find, and demand higher wages further pushing costs. These challenges are for pushing utilities to become creative with all their efforts. This higher a utility raises customer rates to overcome current costs, the greater the divide becomes between the utility and the customer. The longer a utility refrains from raising the rates, the higher the probability of infrastructure failure and customer dissatisfaction. Environmental issues are contributing to our city's challenges. Every weather or climate event impacts our island. Recent freezes cripple and drain

our potable water supply, rising tides increase or expose I&I issues, storms and hurricanes destroy our infrastructure effectively resetting our issues.

City of Hull, MA: Aging Infrastructure: The treatment facility has been in service nearly 45 years and was set back significantly due to flooding during the Blizzard of 1978, just before the start-up. This delayed start-up by two years and had a serious impact on all operating systems because of saltwater corrosion that continues to this day. Other systems are much older and some are only just beginning assessment and rehabilitation work. Aging Work Force/Contract Operator Staffing: Our contract operator has been faced with retiring employees, relocating employees, and general lack of skilled work force. To maintain required staff levels, they share staff among nearby facilities and supplement staffing with specialists when needed. Greater Needs than Funds Available: As evidenced by the lengthy list of capital improvements needed, it is evident that we have difficulty completing projects even with availability of funding. Positioning for Infrastructure Funding: We have been successful in receiving \$4.3 million in grant funds to help with the capital improvement program and have another \$5 million pending with the FEMA Hazard Mitigation Grant. Changing Regulations & Reporting: Permitting for projects seems to be more extensive than in the past. More significantly, more stringent water quality and sludge testing in terms of frequency and parameters will affect how we do business in the future years. This is especially true for PFAS chemical testing in both water and sludge samples. Costs associated with PFAS will significantly impact user costs.

Pinellas County, FL: Our biggest challenge continues to be our workforce. Right now, we are embarking on programs to leverage expertise from different sectors while offering viable opportunities to those seeking public sector careers. Our second challenge is the pace at which the regulatory landscape is changing in Florida for water and wastewater systems. There are big goals on the horizon

for improving water quality throughout the state while also meeting the increasing water demands for our growing population. Water is so vital to our state because it is what attracts people from all over the world, and is at the center of our economic vitality. This is both a challenge and an opportunity. With so much emphasis on improving our systems, we as utility leaders in our industry can leverage this enhanced focus on water to pave the way for our future. We need to be advocates and champions for our infrastructure, and we need to work together to make sure it gets the attention it deserves – and that includes adequate funding but it also includes adequate workforce.

City of Vancouver, WA: Environmental permitting, especially related to projects near waterways and natural areas has become much more complex in the last 20 years, requiring permitting and coordination with multiple local, state and federal agencies. Material costs and supply chain issues are still an issue that drag project delivery out. Additionally, the community and city leadership demand considerations for seismic stability and community impacts during both project construction and continued operation in the citywide pursuit of safe and resilient utilities. Related to our wastewater treatment plant, two big unknowns related to regulatory is the whole PFAS issue (will we need to treat for it) and we may need to replace our Fluid Bed Furnace within 10 years. That is a multi-million dollar project, which will have significant funding considerations and we are not sure if we will be allowed to replace. Due to the economic situation 10 years ago, funding was extremely limited for repairs and maintenance, so a lot of needed improvement was on hold for several years. We now have our program adequately funded and the main challenge is designing and construction management due to limited staff. Our engineering and construction capital project has grown but we also need to grow our engineering and construction staff. Right now, I believe that the biggest challenge is recruiting experienced and quality persons.

What do you see as the biggest opportunities for utilities today?

DC Water: As a trenchless industry, we are very innovative. Technological improvements for CIPP in drinking water, trenchless identification of lead services, and installation of sewer wye cleanouts are specific innovations I am hoping will benefit our customers in the very near future. Another opportunity we have is our Capital Improvement Program which will benefit our rate payers, not just via the projects that make the system more reliable and resilient, but also via employment. Washington, DC is better serviced when people in the metro area become experts on the technologies we need and provide repeat services to us and our sister agencies in the surrounding area. Working with our contracting partners DC Water has made significant strides hiring residents, disadvantaged businesses, and women-owned businesses.

City of Galveston, TX: Training opportunities: Our industry has seen a large number of retirements and some turnover, which has provided an opportunity to introduce newer minds and different talents into the maintenance equation. What we have witnessed here in Galveston, is our new staff is embracing the new technologies for maintenance, construction and data collection. The attempts to effectively use the tools is there. It also allows our staff to learn our system am excited to see what the near future looks like. Excellence in customer service: the infrastructure is in bad shape in some areas and it does impact our customers negatively. The presence of our staff and contractors working on the rehabilitation of the infrastructure shows our customers that we are there, and that we do care. It allows an opportunity of us to connect with the community and establish a customer first relationship.

City of Hull, MA: Positive things to us are the continued focus to achieve reliability of operations, redundancy of equipment and processes, and resilience against future sea level rise and climate change conditions. Opportu-

nities are available if anyone is open to try new and different approaches, think differently how projects could get done, seek outside expertise as needed, and be aggressive in finding funding sources for the work. By doing so, trenchless approaches or technologies associated with trenchless, e.g., assessment methods, may be appropriate and and be beneficial to a project.

Pinellas County, FL: Our biggest opportunity is educating and partnering with the public on issues facing our water and wastewater systems. When people see firsthand what we do, they are surprised and fascinated at the magnitude of infrastructure it takes to deliver the services they have. Education is large component of what we are trying to do in Pinellas County. Once of the areas which we excel in is our school-aged education program. It has been a tremendous success at incorporating the principles of water resources into the classroom combined with a tour program. Another opportunity is technology. We have so many exciting technologies that can help address the aging infrastructure issues that we face in a more efficient and effective manner. However, one of our constraints is the speed at which local governments operate. The rapid deployment of advanced technologies is going to require a different approach to traditional procurement methods but will still need to meet the public expectations of fairness and transparency. The current paradigm just isn't structured in a way to adopt technologies with any urgency or speed.

City of Vancouver, WA: The new technology provides for more construction options in areas where standard dig/replace may not be the best method. Also, the low emission or concerns with curing smells appears to be addressed with some of the new technology.

Responses were edited for space.
The entire conversation can be found on the *Trenchless Technology* website at trenchlesstechnology.com/challenges-for-todays-utilities-extended-version.

RAPIDVIEW IBAK NORTH AMERICA – HISTORY & INNOVATION



RapidView knew IBAK would be the perfect match since 1991 when they began their journey in the sewer inspection industry. Seeing many similarities between themselves, RapidView and IBAK came together in 2004 to form a partnership that has become known as the industry's premium brand. The relationship between RapidView and IBAK has helped evolve the pipeline inspection industry across North America. Many of IBAK's sewer inspection technologies have become standards over the years as the tools for pipeline inspection have evolved.

Founded in 1945, IBAK Helmut Hunger GmbH & Co. is the biggest manufacturer and supplier of pipeline inspection systems in the world today, as well as a leader of firsts and the oldest company in the industry. After many years of research and development, IBAK presented the first sewer TV inspection system in the world in 1957. From there, they've gone on to be the first to design and implement many more products. In 1993, IBAK invented the first lateral launching system for inspecting laterals from the mainline, and the first always-upright pan & tilt camera. The first pan

& tilt camera for 4" and push systems was later introduced in 2000. In 2002, IBAK introduced the truly revolutionary 360° PANORAMO technology for mainline inspection, and in 2006 this technology was adapted for manhole inspections with the debut of the PANORAMO SI. In 2013, IBAK introduced the first fully integrated, completely digital HD inspection systems utilizing the benefits of the fiber optic cable as well as the first in a series of integrated rehabilitation cutters and grinders. In 2016, 3D GeoSense was released to the market allowing users to track their camera's position and map their inspections in three-dimensional space providing them with accurate data regarding pipe position and orientation. In 2018, the PANORAMO technology advanced even further with the introduction of the high resolution 4K PANORAMO mainline and



manhole inspection systems.

For more than 70 years, customers all over the world have benefited from the great experience of IBAK. As technology continues to advance, IBAK continues to design and manufacture pipeline inspection systems with features that are unique in terms of function and technology. RapidView IBAK North America imports, distributes, and services the complete IBAK inspection and rehabilitation product line throughout the country out of their facility in Rochester, Indiana, and has grown into the largest pipeline inspection equipment company in North America.

RapidView IBAK North America specializes in the highest quality pipeline inspection and rehabilitation equipment in the industry, including push cameras, mainline, lateral launch, high definition, 3D mapping, 360° pipe and manhole scanners, portable systems, cutters, software, and fully converted vehicles with complete system mounts. If you are a municipality looking to improve your city with cost effective equipment, or a contractor wanting a reliable fleet of equipment that will keep your business moving, then RapidView has you covered.



FLORIDA COMMUNITY ENHANCES FIRE PROTECTION WITH WATER MAIN UPGRADE VIA HDD USING CERTA-LOK®

Westlake
Pipe & Fittings

The Midway Water System near Gulf Breeze, Florida, needed to upgrade the water main along Hickory Shores Boulevard to support fire services. Instead of going with the initially planned trench excavation, they determined that horizontal directional drilling (HDD) would be more cost-effective and efficient.

Firefighters in Gulf Breeze, Florida, reported reduced water volumes insufficient to support their efforts when responding to emergencies involving active fires. Midway Water System serves the community and with 8,119 connections in the area, they looked for a solution that would allow them to retrofit the older neighborhoods with larger, more modern water pipes.

The traditional, open cut method was the expected application for the project, however, Evans Contracting responded with horizontal directional drilling (HDD) as a more cost-effective solution. The municipal engineers who evaluated the proposals determined HDD was a suitable alternative. HDD minimizes excavation to the entry and exit points, which results in a more efficient and environmentally friendly installation reducing the impact on roadway access. This was an essential consider-



ation for Hickory Shore Boulevard, an area bordered by a large body of water, lined with a natural landscape and waterfront homes.

For the HDD project, the product selected was 10,955 feet of 6-inch DR18 AquaSpring™ C900 Certa-Lok® RJIB PVC Pipe manufactured by Westlake Pipe & Fittings.

The project officially started in November 2021. It featured new 6-inch PVC water lines, 11 tapping sleeves and valves, 14 gate valves, 18 fire hydrants, and 13 road crossings with steel casings. With the pilot hole drilled, to begin the pullback process, an initial 20-foot length of pipe was attached to the puller head and drill stem. As the driller began pulling the pipe in, the contractor utilized the cartridge style assembly method to join the Certa-Lok pipe one stick at a time. These innovative joints can be assembled in less than 1 minute per

joint, engaging each joint as the pipe is in motion working seamlessly with the pullback operation. This process continued for the entire project length of 10,995 feet using multiple drill shots with a maximum drill length of 2,500 feet. The contractor also seamlessly upgraded the existing water system by incorporating a 6-inch fire protection line integrated with the pre-existing infrastructure through a series of valves and connections.

“There was no concern pulling the pipe to the maximum drill length of 2,500 feet.” Keith Chavis, construction manager at Evans Contracting Inc., explained. “Construction time was also decreased, and we were able to install the runs in fewer hours with less equipment than traditional open-cut technologies.”

With the project's success, Midway Water System asked Evans Contracting to continue improving fire protection systems in other surrounding roadways by installing another 6,000-8,000 feet of Certa-Lok water main via HDD.

To learn more about this case study and how Westlake Pipe & Fittings can be the solution for your next HDD project, visit westlakepipe.com/HDD.

IT PIPES

For over 50 years, Insituform has been rehabilitating pipelines all over the world using its flagship, CIPP process. When their existing CCTV inspection software was no longer planning to meet industry needs, the company chose to partner with ITpipes. While Insituform's workflow would start underground, ITpipes would bring it to the cloud.

With a large fleet of trucks and offices across North America, Insituform could have hundreds of projects in any given week, creating a colossal amount of data. This data would often move in batches via physical hard drives and create large ebbs and flows. ITpipes recognized that this was a common issue for contractors in the industry. That's why in 2018,

ITpipes moved to a SaaS model and rolled out new, efficient tools to help contractors (and municipalities) move data more efficiently.

Insituform's implementation began with installing ITpipes Mobile on the field vehicles. Since many of these CCTV vehicles would be on the road for weeks or months, Insituform IT staff worked to get every vehicle online. This allowed operators in the field to upload their inspections daily or hourly to ITpipes Web, instead of just at the end of a project. Inspections were no longer siloed on a vehicle's PC. Instead, they were now available for immediate reviewing by office staff.

Adding to the efficiency, this connectivity between the field and office is bi-directional. So PMs can not only



receive but also push assignments to the field. This allows an operator to see what pipe is assigned to them, click on it, and immediately begin the inspection. With the ITpipes platform configurability, an inspection can now be assigned from the office, completed in the field, and data can arrive back in the office – anywhere in North America – within minutes.

"ITpipes has helped us realize so many efficiencies in the process. Reducing errors, office labor hours, and client delivery time has helped us keep a competitive edge," said Frank Kendrick, Senior Project Manager, Insituform.



REHABILITATION OF PRESSURE PIPES UNDER RIVERS AND LAKES



Flexible, fiber-reinforced pipelines (FFRP) are the optimal solution for the challenging rehabilitation of pressure pipelines under rivers and lakes: they combine stability and flexibility, require only a short rehabilitation time and protect the environment and surroundings.

River crossings are often characterized by long lengths with bends in their course and difficult access. This pushes many trenchless rehabilitation methods to their limits. New construction is time-consuming, disruptive, costly and often associated with geotechnical and hydrogeological problems as well as construction risks.

Primus Line, the trenchless rehabilitation technology from Germany, is based on a multi-layer, flexible liner and specially developed connectors. The Primus Liner can be pulled into pressure pipeline sections up to 8,200 feet and pass through bends of up to 45 degrees. MTC, an Aegion Group company, serves the North American water market from a comprehensive stock of Primus Line products in Batesville, Mississippi.

TRENCHLESS TECHNOLOGY

PIPE RELINING GUIDE

A Valuable Resource for Pipe Relining Project Stakeholders.

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TrenchlessTechnology.com/pipe-relining-guide

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UNVEILING THE POWERFUL IMPACT OF AI COMPUTER VISION, CLOUD, AND PHOTOGRAMMETRY IN THE TRENCHLESS SPACE

By SewerAI



More than one third of US wastewater utilities lack proactive asset management, leading to increased sewer overflows, sinkholes, pipe collapses, and storm events. Traditional condition assessment methods are costly and time-consuming, requiring manual review and annotation of inspection videos. However, the emergence of AI computer vision tools has revolutionized sewer inspection. These AI tools reduce costs, accelerate data collection and analysis, and improve the accuracy and consistency of condition assessment data.

The City of Houston, facing a \$6 billion expenditure over 15 years to address sewer overflow issues, has integrated AI into its assessment and capital planning workflow. They selected SewerAI, a California-based company, for its cloud-based platform called PIONEER, which utilizes computer vision tools for sewer inspection. Independent analysis shows that SewerAI's AutoCode has a high accuracy rate of 97% in coding identified defects, and surpassing the accuracy of contractors by as much as 8x.

Combining computer vision and cloud technologies with emerging photogrammetry methods, which use digital images to create 3D geometric models of sewers, offers further opportunities. Affordable 360 action cameras have disrupted the industry by replacing expensive legacy MH scanning systems. These technologies make assessment capabilities more accessible, more af-

fordable, while addressing workforce issues such as skilled worker shortages.

By leveraging AI and the cloud, operators no longer need to be experts in condition assessment, making roles more accessible to newcomers.

SewerAI has conducted hundreds of thousands of assessment surveys over the past several years throughout North America, providing insights about pipe deterioration, trenchless rehab methods, utility conflicts, and construction practices.

Analyzing this data at scale allows for proactive rehabilitation using trenchless technologies, preventing critical failures and emergency open-cut methods. Cloud platforms enable the aggregation and sharing of anonymized data, facilitating national benchmarking and providing unprecedented insights and decision support to asset owners, consulting engineers, and contractors.

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Today's Young Trenchless Professionals

We're Taking a Look
at Today's Generation
of Trenchless
Technologists
Leading the Industry

By Sharon M. Bueno

Don't let the title of this special package of Young Trenchless Professionals fool you. These are not the typical fresh out-college, up-and-comers. But for an industry that's started its third generation, these trenchless technologists are part of the current wave of trenchless professionals, firmly established in an industry they love. They are leaders of construction, manufacturing and engineering companies and are already giving back to ensure the trenchless technologists of tomorrow are ready to take over.

Who is this group? They are premier leaders of companies, divisions or projects who are making their mark in the trenchless industry right now. They are enthusiastic advocates of trenchless technology, as well as unabashed fans of the people who make up this vital and vibrant sector of the construction industry.

Let's meet them!

- **Justin Akkerman**, President, Akkerman Inc.
- **Geoff Britnell**, Business Development Manager, FER-PAL Inc.
- **Mary Neher, P.E.**, Senior Project Engineer/Project Manager, Bennett Trenchless Engineers
- **Matt Smith**, President, Michels Trenchless
- **Madison Veggian, P.E.**, Associate Principal/Technical Manager, Woodard & Curran
- **Leslie Weist**, Vice President of Operations, Michael Byrne Mfg.

Sharon M. Bueno is editor of *Trenchless Technology*.

Justin Akkerman, President Akkerman Inc.

Even though the Akkerman name is synonymous with the trenchless technology, choosing to make his career a part of the industry that his family helped to build wasn't a given. In fact, growing up, Justin Akkerman wasn't sure what he wanted to do.

His family has been at the forefront of new installation trenchless equipment — Akkerman Inc. is a tunneling equipment manufacturer and its equipment is used on auger boring, microtunneling, pilot-tube microtunneling, pipe jacking, utility tunneling and sliplining applications around the globe. The Brownsdale, Minnesota company was founded by Justin's grandfather, Don, in 1973 and later run by his father, Maynard. Justin became Akkerman president in 2020.

"I chose the trenchless industry because it's been a big part of my family growing up," Justin says. "[But] after high school, I wasn't quite sure what I wanted to do but I knew I wanted to do my own thing."

He graduated in 2006 from the University of Minnesota with a bachelor's degree in civil engineering, with an emphasis on structural. While in

college, he worked two summers as a laborer in California on tunneling projects. He later interned at CAN Consulting Engineers in Minneapolis, a firm that happened to specialize in underground design projects. "During my time as a staff engineer on tunneling projects, this assured me that this where I wanted to be," Justin remembers. "It was on a multi-tunnel project of smaller crossings in Davenport, Iowa, as an inspector, that I had my 'A-Ha' moment. I spent quite a bit of time with the tunneling crew, which happened to be using an Akkerman TBM system. Seeing how the crew took pride in their work and how the equipment was a part of their success made me want to eventually move back home and work for the family business."

He moved his family home to the Brownsdale area in 2014 and began his career at Akkerman Inc. as an operations manager. And he hasn't looked back. "The trenchless industry is ever-evolving with new technology, which is fun to be a part of," he says. "It still amazes me, showing up to a jobsite and visualizing the planned alignment and looking past the reception shaft on the other side and being confident in the technology and contractors that we can do this. When we explain to others outside of the industry what exactly we do, everyone is genuinely amazed and oftentimes have no idea this technology exists."

He's in awe of what the trenchless industry offers in terms of technology and opportunity — and, most importantly, the people, who fuel his trenchless drive. "Being part-owner of a company that provides solutions to the trenchless industry, drives me to be successful since I have employees and their families at the top of my mind," Justin says. "Seeing our customers successful and coming back to Akkerman for solutions also drives me."

And he gets to interact and learn



from seasoned vets, drinking in their knowledge about problem solving, identifying risks — jobsite savvy you can't find in books. "I've learned, as my time as an engineer, listen to and observe the operators and crews on these projects. There is a lot to learn from them that can't necessarily be taught in a classroom, and I feel sometimes this is overlooked," Justin says.

He's proud to be a third-generation business owner and part of the growing next generation of trenchless technologists making their mark. He credits those innovators who came before him, creating this industry. "The pioneers of this industry had a vision and through their hard work and determination, the industry has become what it is today," Justin says. "We owe it to them to keep progressing and educating other engineers, owners and contractors on the technology and tools this industry has to offer."

Justin also encourages young professionals to consider a career in the trenchless industry, no matter the sector, citing the people and opportunities trenchless affords. "What we all do in the trenchless technology industry is pretty amazing," Justin says.

Geoff Britnell,**Business Development Manager****FER-PAL Inc.**

If you would have asked Geoff Britnell a decade ago what he thought about a career in trenchless technology, he likely would have answered: What is trenchless technology?

Geoff graduated from Bishop's University in Lennoxville, Quebec, Canada, in 2011, with a degree in political studies; however, he decided not long after to pursue something different but didn't know what that something was. He joined FER-PAL in 2012 and, today, is national business development manager. He works with utilities, consultants and governments on education and the growth of CIPP lining for potable water mains, specifically with the ALTRA Water Solutions liner and manages six team members spread across Canada and the United States.

His venture into trenchless came when he was at a crossroads professionally and was looking at his options. Geoff knew FER-PAL president and CEO Shaun McKaigue and he told Geoff that he was looking to fill a business

development/client relations role. "I would be lying if I didn't admit that he had to convince to join; however, once I started in the industry, there's been no looking back," he says.

Geoff has since grown into a fervent advocate for trenchless rehabilitation, as cities, towns and municipalities across North America continue to address their aging underground infrastructure. He loves the industry's innovative nature when it comes to developing technologies and describes the trenchless industry, specifically the potable water sector, to be on the precipice of incredible growth. "From a potable water standpoint, the industry is teetering on the edge of accelerated growth, like the expansion the sewer market previously experienced," Geoff says. "We are seeing a greater rate of adoption and tolerance for change [regarding potable water rehabilitation] than we have seen previously."

Key to that growth is a greater investment in public drinking water systems, he says. "My generation has reached a point where the trust for bottled water is greater than a public system," Geoff says. "I take pride in being part of the solution to drive for more funding for our systems so that water is clean and affordable."

Part of the excitement and energy he has for the trenchless industry was born out of the relationships he has forged with so many trenchless vets, who have shared their knowledge and experience with Geoff when he entered the industry as a blank slate; now he's part of the next wave of trenchless technologists who are paying it forward. "Most of what I have learned has come directly from trenchless innovators and pioneers, such as Kamran Sarrami, Ian Doherty, Kevin Bainbridge and Shaun McKaigue," he says. "It's our job to take the information they have passed on and further the industry even more."

Biggest takeaway from the vets — calculated risk. "Risk is shared



between a client and contractor in the hopes to improve. That means both client and contractor have to be in a position where the potential of failure is understood and agreed to," Geoff says. "Without this, we would still be replacing pipes the traditional way."

And it's that thinking — reflexively choosing to replace aging pipes with non-trenchless methods — that keeps Geoff motivated every day. "A large part of the drive is to change the existing way of thinking," he says. "There is still resistance to change how we replace pipes, yet the common practice to do so is the same as a century ago. There is a better way to do it and it is being done successfully across North America."

Along with being a member of several industry-related organizations, Geoff is also a member of the American Public Works Association (APWA), which connects him and trenchless to the public works sector.

"The trenchless industry has provided me with a great career path and one I didn't foresee myself in a decade ago," he says. "The changes the industry is pushing for are improving the way we replace and rehab our aging infrastructure. As that infrastructure continues to require investment to renew it, the need for technologies that do so quickly and responsibility grows. I am excited to be a part of the solution."

Mary Neher, P.E.,

Senior Project Engineer/Project Manager
Bennett Trenchless Engineers

Mary Neher found out that being at the right place at the right time can lead to a career in trenchless technology — or, in her case, her parents were in the right place at the right time.

Mary earned her bachelor's degree in mechanical engineering from the University of California, Berkeley, in 2007, and her master's degree in civil/geotechnical engineering from the University of California, Davis, in 2011. She joined Bennett Trenchless Engineers in 2007 and is a senior project engineer and project manager. Her focus is new installations and she works on every phase of a project from the alignment study/feasibility study all the way through construction.

"I ended up working in the trenchless industry due entirely to a serendipitous encounter," she relates. "As an

undergraduate student in mechanical engineering, I had no idea that trenchless technologies even existed. But, during the last year of my undergraduate program as I was trying to figure out what I was going to do with my shiny, new degree, my parents happened to sit at the same table as David Bennett at an event. While making small talk, my parents mentioned my upcoming graduation and since he was looking for a new hire, [he] suggested that I contact him."

Mary did and met with the Bennett Trenchless team at the No-Dig Show in San Diego — she was immediately fascinated by the people and the industry. Simply put, she was hooked. "I love that every trenchless job brings with it a fresh set of challenges to think about and address. There is always something new and interesting on every project, whether it's the geotechnical conditions, the site constraints or the logistical challenges," she says. "Also, the industry moves at such a rapid pace that there is always a new technology or evolving technique to learn about and to incorporate into our practice."

She also is proud to be a part of this "next wave of trenchless technologists," making a difference, even though she finds this position to be a bit daunting at the same time. "We are following in the footsteps of the trailblazers and luminaries who established the trenchless industry in the United States," Mary explains. "Given the reach of the industry today, it's amazing to think that it was only in the 1980s that microtunneling and CIPP first came to the U.S. and HDD really started taking off. I'm thrilled to be a part of the generation that is taking up the torch to keep things moving forward."

Among the lessons she has learned from working with trenchless veterans, such as David Bennett, is to keep an open mind to any situation. "No matter how much experience the



most experienced people have, they've shown me again and again that there is always something new to learn," Mary says. "That's another one of the fun things about working in this industry, there's generally no single, right answer to solving a problem and everyone brings different and helpful knowledge to the table."

During the course of her trenchless career, Mary has become an active member of NASTT as an instructor for its HDD Good Practices Course and a session leader/moderator at its No-Dig Show, as well as aiding in the development of one of ASCE's trenchless manuals of practice. "I view [this participation] as a great way to give back and helping to sustain and grow the industry," she says.

An industry, she says, that is in a fantastic position for growth, especially on the design side. "There's so much work to be done for many reasons[, including] the age of a great deal of the country's most current underground infrastructure and the interest in increasing the use of recycled water in big portions of the West, to name just a few," Mary notes. "Given utility corridor congestion, concerns about impacts to communities, environmental sensitivity and all the other myriad reasons that trenchless techniques are used, I'm very optimistic about where we are headed."

She adds, "The best part of being a member of the trenchless technology industry is being part of building infrastructure that helps people while getting to solve interesting problems."

Matt Smith,

President Michels Trenchless

Matt Smith's turn as a summer laborer for Michels Corp. in 2009 gave him a glimpse into what would become his chosen career path and passion. He hasn't looked back.

Today, Matt is president of Michels Trenchless Inc., overseeing a team responsible for designing and performing trenchless new installation and rehabilitation operations, such as horizontal directional drilling, Direct Pipe, microtunneling, tunneling, cured-in-place pipe (CIPP), UV-CIPP, spray-in-place pipe (SIPP) and sliplining. And it all started as a summer gig.

"Although I didn't know it at the time, I was already getting acclimated to trenchless construction. I learned about auger boring systems and their role in the oil and gas industry," Matt remembers. "Initially, I wasn't looking for a career in trenchless simply because I was not too aware of it. As soon as I

started learning about the industry, its growth and Michels' history in it, I saw tremendous opportunity for what trenchless could become."

Matt graduated from Gonzaga University in 2011 with a bachelor's degree in business administration with a focus on international business. He interned the previous year with his future employer, working on a five-mile, 12-ft, 10-in. tunnel under the San Francisco Bay. After graduating, he joined the Michels team as a full-time project engineer, working on microtunneling projects and later Direct Pipe projects. He loves his work, which brings new challenges and opportunities with each day.

"As larger, more complex projects come to the marketplace, it unlocks the potential to explore what else is possible," Matt says, noting that his team continues to expand the possibilities for combining multiple trenchless technologies. "We think it's very exciting and satisfying to partner with our customers to cross obstacles that would have seemed impossible just a few years ago."

And for Matt, the customers are always at the forefront of his mind when diving into projects. "The stakes are high, the projects are demanding and the world is watching," he says. "We must also continue to explore what this industry can accomplish. There are always new and more challenging obstacles to cross. We must determine the most likely, safest ways to bring projects to fruition."

Working on some major projects has afforded Matt to learn from some of industry's pioneers, noting that he has been able to work alongside Michels veterans such as the late Robert Westphal, as well as Bob Osborn and Tim McGuire. "I credit all my success to the seasoned vets who taught me so much about trenchless construction, customer relationships, leadership and how to treat people," says Matt. "I learned the importance of taking calculated risks, knowing what can or cannot be accomplished and the importance of collaborating with customers and de-



sign partners to come up with the best possible option. I learned trenchless construction is a team sport."

And it's been that relationship with these trailblazers that drives Matt to continue to better the industry and build on its enduring strength — and that includes paying it forward to the trenchless generation coming after him. "I also have a responsibility to build the next generation of trenchless professionals through internships, mentoring, empowering and collaborating," he says. "It is important that, like the first generation of trenchless pioneers [that] we learn from the past and continue to challenge the norms."

For Matt, the pioneers built this industry from the ground up, and now it's up to today's trenchless technologists to add another layer. "I have already seen a significant amount of change in the industry, particularly the growth in what trenchless construction can do," he says. "I have been involved in completing projects that had previously been considered impossible. I have had opportunities and continue to have opportunities to work with people who are literally pioneers in this industry."

Matt is excited about what the future holds for trenchless technology. "I've been inspired by Michels' willingness to push the limits of HDD and other trenchless technologies and by our customers' willingness to explore trenchless construction options," he says. "The industry is challenging, exciting and satisfying to find ways to improve life aboveground by performing nearly all our work beneath the surface, beneath cities and beneath the sea."

Madison Veggian, P.E.,

Associate
Principal/
Technical Manager
Woodard & Curran

For Madison Veggian, P.E., working in the trenchless industry offers her a unique opportunity to combine the green and minimal disruptiveness of trenchless with her personal, green lifestyle standards to leave a similar footprint in her daily life.

As a civil and environmental engineering undergraduate student at San Jose State University, Madison interned with the South Bay Water Recycling (SBWR) program for the City of San Jose, California, and later joined Kennedy/Jenks in 2011, working as a construction manager for a package of recycled water retrofit projects. While there, a project introduced her to trenchless technology that used a pilot-tube guided system. In 2013, she joined RMC Water and Environment, which became Woodard & Curran in 2016 via acquisition.

“Woodard & Curran’s mission revolves around protecting water resources and the environment. It’s a good fit for me because I strive to make decisions that reduce my impact on our planet, such as being vegan, opting for reusable materials and driving less,”

Madison says. “Extending my own standards into my work, I see that opting for trenchless solutions often reduces waste, allows us to use existing assets and significantly reduces the impact on the environment, including habitats and wildlife.”

To date, Madison has completed condition assessment on approximately 54,000 ft of pipe and designed more than 61,000 ft of pipe, including 37,000 ft using trenchless rehabilitation, replacement and new installation methods.

“My work since has focused almost exclusively on conveyance system planning, condition assessment and design, leveraging trenchless elements for most projects,” Madison says. “I prefer to design large diameter pipes but have no specific preference for rehab vs. new installation — I find elements of each to be interesting and challenging.”

She describes the people in the trenchless industry to be “innovated, driven and eager to teach and mentor young professionals” and the technology and projects cutting edge and make a difference in the world we live. “The evolving technology is fascinating and I am grateful to industry leaders who are creating new solutions that we can implement in our design work,” she notes.

Madison appreciates the work of those who came before her, creating the trenchless industry and laying the groundwork for where it stands today — and is proud to be part of today’s generation of trenchless technologists. “Many projects require us to take a historical look back at decisions engineers made 50 years or more ago. As we plan and design solutions that leverage trenchless technology, I must pause and wonder what engineers 50 or more years from now will think about the decisions we make,” she says.

Working and learning alongside industry veterans has been key to Madison’s success. She specifically points to colleague Jennifer Glynn, P.E., who has served as a tremendous mentor to her — in an industry dominated by males.



“Learning in an academic environment is one thing, but gaining experience from Jen and other colleagues on the job is unmatched,” Madison says. “Their transfer of knowledge and experience has helped me in working with clients and explaining trenchless approaches to project work. They have helped me to better manage projects, anticipate unforeseen circumstances, deliver work on budget and schedule and collaborate with other experts to ensure we deliver well-rounded designs.”

She further credits Glynn for helping to navigate her entry into being a working mom and maintaining that work and home balance.

Madison also appreciates the benefits of being in the trenchless niche of the construction industry as it affords a more intimate professional community. “The trenchless industry is still a small, niche field. I have always been drawn to smaller teams, working within tight-knit groups,” she explains. “So, being a member of the trenchless industry right now really suits my work style. Despite the size of the industry, it is well established.”

And the industry is in such a great position, particularly for condition assessment technology and rehab solutions, Madison says. “Folks in this industry have their pulse on current problems and are developing ultramodern solutions that address everything from small footprint construction to technology designed for outside the pipeline industry,” she says. “It seems as though more people are starting to consider how trenchless technology can help in many applications, such as improving the way we examine existing large diameter trunk sewers.”

Leslie Weist,

**Vice President of
Operations
Michael Byrne
Mfg.**

For Leslie Weist, there wasn't any hesitation when it came to joining her family's Mansfield, Ohio-trenchless manufacturing business five years ago.

Michael Byrne Mfg. founder and industry pioneer Mike Byrne passed away in late 2022 at age 99, leaving the continued legacy of his company — a manufacturer of new installation equipment for the auger boring, micro-tunneling and horizontal directional drilling markets — in the capable hands of his son-in-law Jim Weist and granddaughter Leslie Weist.

"Michael Byrne Mfg. was founded by my grandfather, so it has always been in my blood," says Leslie. "The opportunity to work in the construction equipment manufacturing industry with our family business was hard to pass up. I was very close with my grandfather and the thought of continuing to grow and evolve the business he started was very appealing."

Leslie graduated from The Ohio State

University in 2013, with a bachelor of science in industrial and integrated systems engineering. Afterward, she worked for John Deere in customer and product support of agricultural, construction and mining equipment, where her interactions with customers and a variety of construction fields, fueled her passion for the construction industry. But there was a natural pull to the trenchless industry and she joined Michael Byrne Mfg., in 2018, as its vice president of operations, supporting its engineering and manufacturing operations.

She loves the innovation and challenges that trenchless projects present on a daily basis, as well as the bright state of today's trenchless industry — she simply loves what she does. "In the underground business, each job presents different challenges and characteristics. To tackle these challenges, contractors, manufacturers and engineers collaborate on new products and methods that drive our industry forward ... the state of the industry is strong, in particular in the auger boring sector. There is a huge need to update and expand the infrastructure in the United States and around the globe. Auger boring plays a significant role in accomplishing that," Leslie says.

Leslie draws her energy from the people of the trenchless industry, whether they are customers, co-workers or the seasoned trenchless veteran contractors. She believes each adds a layer to an already exciting industry — something can be learned from each, she says. "There is so much to be learned from industry veterans, their work ethic and can-do attitude is a big one," Leslie says. "Working with our contractors, both seasoned and new to the industry, taught me to think outside the box when trying to tackle difficult problems and not to lose faith if the first plan doesn't work out."

Taking it one step further, Leslie says, as a member of this next generation of trenchless professionals,



she feels a sense of responsibility to moving the industry, that was created on the backs of the many pioneers, forward. "We have a responsibility to keep pushing for improved, safer and more efficient solutions, just like the many trenchless professionals have done before us," she notes.

Another way she following in the footsteps of her family is through her active involvement with groups, including NUCA of Ohio, NUCA National and NASTT — organizations that provide a platform for networking, educating and bettering the construction industry on individual and company levels. "My father, Jim Weist, has been very involved with NUCA for over 15 years and Michael Byrne is a National Partner. He passed on the importance of advocating and participating in the trenchless industry," Leslie says.

What is the best part of being a part of the trenchless industry? For Leslie, the answer is twofold. "[It's] the people," she says. "It's inspiring to work with people who are very passionate about they do. Most trenchless professionals are very open to helping people new to the industry and sharing their own experiences."

Also, "I believe there are a great many years ahead for the trenchless industry, as we play a critical role in supporting and expanding infrastructure throughout the world," she adds. "I look forward to seeing what the future holds for our industry and I am very grateful to be a part of it."

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NASTT 2023 NO-DIG SHOW RECAP

ROSE CITY WELCOMES THE TRENCHLESS COMMUNITY

Portland, Oregon served as the epicenter of trenchless thought leadership from April 30 to May 4 for the NASTT 2023 No-Dig Show. Based on crowded technical sessions rooms and a bustling exhibit hall, it's clear that face-to-face conference events are back.

Matthew Izzard, North American Society for Trenchless Technology (NASTT) executive director, notes that final attendee numbers came in at just over 1,700, which marked an increase from Minneapolis in 2022. He also notes that local engagement with the event was higher than anticipated.

"A record 186 Municipal & Public Works Scholarships were awarded for Portland. The interest in having a greater understanding of the potential to utilize trenchless technology on the many utility pipeline projects in the area was reflected in packed technical programs," Izzard says. "It was also great to see the Student Program back to full delivery with over 100 students attending. Networking also forms a central part of the No-Dig Show program and the Casino Royale was a huge success."

The NASTT No-Dig Show served as an opportunity for *Trenchless Technology* to formally honor our 2022 *Trenchless Technology* Project of the Year winners, as well as Dr. John Matthews, our 2023 *Trenchless Technology* Person of the Year.

Eschewing the Gala Dinner for a new and more interactive event, NASTT launched its Casino Royale event night. The ticketed event served as an opportunity to honor the 2023 NASTT Hall of Fame inductees and the NASTT Chair Award For Distinguished Service.

"I am always amazed at the positive energy that No-Dig Show builds in creating real opportunities for everyone," says Izzard. "One of the fundamentals of a good conference is the ability to present. Presentations bring new ideas or research to a new audience in a shared experience."

Looking ahead, Izzard notes that NASTT's 2024 No-Dig Show will include a focus on renewable energy and continue the theme of "Green Above, Green Below," as the show heads to Providence, Rhode Island, April 14-18. More information about the NASTT No-Dig Show can be found at nodigshow.com.



Trenchless Technology publisher Kelly VanNatten and brand ambassador Dan Sisko presented Dr. John Matthews (middle) with the 2023 *Trenchless Technology* Person of the Year Award.



Above, *Trenchless Technology*'s Sharon M. Bueno (right) and Mike Kezdi (left) presented the 2022 *Trenchless Technology* New Installation Project of the Year to Justin Taylor, CCI & Associates and Ted Folz and Matt Smith, Michels Corp. Below, the 2022 *Trenchless Technology* Rehabilitation Project of the Year with Ragu Nednur with the City of Houston and and Steve Henning with Vortex Companies.





The ceremonial ribbon cutting heralded the opening of the exhibit hall.



Winner of the Abbott Innovative Product Award for New Installation was Ditch Witch for its AT120 All-Terrain Horizontal Directional Drill.



Winner of the Abbott Innovative Product Award for Rehabilitation was Sunbelt Rentals and its PumpSentri telemetry system.



NASTT Hall of Fame Inductees (left) Steven R. Kramer, P.E., FASCE, and (right) Kevin Miller, with Matthew Izzard, NASTT executive director.



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REHABbing AN AGING INLET PIPE

By Michael Andrews

The Fuqua Gardens located inside of Westover Memorial Park has a history dating back to the early 1900s. Built as reflection garden with seven separate hand laid stone ponds, this high-profile location is directly behind the 13th hole of the National Golf Club across Reyes Creek and beside The Augusta Country Club.

This park at one time was a destination location for patrons of the famous golf championship. With its rolling hills, delicate ponds, and small streams the park served as a place for families to gather not only for remembrance, but this historic garden was also built as a place for family picnics, pictures, and even weddings. Over time the park's drainage system failed thus causing the park to be lost to the depths of retained rainwater that eventually made one large water retention area. The garden slowly fell into disrepair and erosion issues reared their ugly heads.

At this point the Fuqua Foundation, in conjunction with Westover Memorial Park, put a plan into place



to revitalize the garden. After several high-profile jobs in the cemetery successfully completed by Civil Solutions, the call was put out about the ability to drain and rehabilitate the main storm line, as well as the area's pond and creek system, headed by Augusta Industrial project manager Matt Christopherson.

After years of overgrowth and flooding, the 10-in. inlet pipe had been buried 4 ft down under large tree roots, earth and debris. The hydro-excavation truck was employed to remove as much as possible before the shovels, saws and hand digging were introduced into the area to finally expose the pipe. Due to the complexity of lining such a fragile pipe along with a hand-built small diameter catch basin, and the route of the storm sewer going under several burial plots at the garden entrance, the need for a highly skilled and motivated company was apparent.



About Augusta Industrial Services

Augusta Industrial Services began as Budget Sewer Service, a one-person sewer service company in 1977 by Clyde Pilcher. Forty-plus years later, the company has grown to the leading nuclear, industrial, civil and environmental service provider located in Augusta. As time moved forward, this hard-working man acquired sewer jetting equipment, pump trucks and finally hydro blasters. Being the go-to company for service, response and quality work, the company incorporated in 1986 as Augusta Industrial Services.

After many years of dedicated service, it was decided to sell the company to the employees, forming an Employee Stock Ownership Plan (ESOP). The company's motto "WE OWN IT!" came as a battle cry for holding high standards and service with employee enthusiasm promoting these ideals with a high level of quality work. Since that

time, Augusta Industrial Services has grown to a fleet of 66 pieces of equipment that include everything from hydro excavation, pump, combo trucks, video inspection vans, manhole rehab trailers, and CIPP lining equipment including The Shooter from Emagineered Solutions. With more and more contractor and municipal jobs coming in, it was decided to start a "Civil Division" to accomplish the growing business. With the growth came the need for new and advanced equipment.

With the purchase of the Shooters due to the reputation and past use by some of the lining crew with it, the new equipment helped make the startup an instant success. The ease-of-use and the ability to maneuver both units into locations where the manholes are restricted is a defining characteristic that is paramount to proper installation of liner.

The notable advantages of both units without a doubt would be the hand truck design and agility of the trailer unit to be put into area where others would simply not fit. The ease-of-movement and setup by one crewmember makes an efficient and cost-effective part of the team. Each unit has multiple

advantages from the longer life lips with no bladders, improved automatic oiling system, and the knife gate for the second half of the install. The Shooter 12 also has an available 15-in. conversion kit that allows for larger diameter lining shots in much tighter spaces. With such a tight basin, The Shooter was able to adjust the angle of the liner being blown into the basin and down the pipe.

With working in such a historical site and the limited amount of area that was allowed to be accessed without disturbing the ceremonies became a feat in itself. The garden's originator, Mrs. Fuqua, wanted the design to resemble a Japanese garden and with no expense spared in the topography of a sloping landscape to the pond and stream placement. Even the foliage was dictated by her design. This is where the drainage problem arose. At that time in history, infrastructure for the outgoing pipe was minimal. The lower area of the park simply took over the drainage area until it became completely lost. With the garden's outfall pipe now relined, new inlet drainage box installed, the area landscaped and all the ponds vacuumed out to pristine conditions, it once again became a place of beauty and a visitor's paradise.

After many jobs being completed on time and within budget, the Shooters have proven to be valuable, reliable and quality equipment that Augusta Industrial Services is proud to own and operate. The customer base has been impressed by the close quarters' setup, cleanliness, and minimal impact on work areas with equipment ranging from camera vans, jet/vac trucks, robotic root cutters, and lining equipment. The small footprint and decreased amount of time of installation within historical and residential areas is by far one of the most important attributes for the company.

Michael Andrews is project and safety manager of civil solutions of Augusta Industrial Services.



PRESSURE PIPE REHAB ADVANCEMENT

the Premier Solution for Challenging Projects

By Steve Soldati

With thousands of miles of buried water mains providing drinking water to its communities and the wastewater pipelines forcibly moving raw sewage to treatment plants, it is important to maintain operation of these pipelines and build a resilient network of pipelines to accommodate the high demand from our society.

Time and stress on the pipe system causes our infrastructure to naturally deteriorate overtime, albeit at different rates. What we see when looking at population growth and aging infrastructure is two diverging trends that are inevitably bound together. This population growth increases the demand on our pipelines and, in turn, puts additional stress on the existing system. In many areas today, we are putting more stress on a weaker pipe as compared to when that pipeline was installed.

There are many great innovative rehabilitation solutions that the trenchless industry has developed and commercialized over the years. However, each one naturally has its own technical envelope from pressure rating, install lengths, work zone dimensions, installation duration, downtime, etc. However, what happens when an owner has a pipeline that has project parameters that fit with the technical envelope of some solutions but not others in differ-

ent areas of the project. For example, what if an owner has minimal intermediate access along a long pipe length with multiple bends? What about a pipeline with an unusually high operating and surge condition to consider?

With the trenchless industry being technology-based, there are always advancements to the continual development of innovative solutions to address our aging infrastructure. One major challenge is responding quickly and cost-effectively to recently failed pipelines or a failure is eminent. The country's sprawling population growth, historical landmarks, environmentally sensitive areas, and wetlands have made it difficult to address these failing pipelines in a timely manner, within a reasonable budget, and with minimal disruption to other infrastructure and the local community using traditional pipe replacement methods. Fortunately, there are innovative solutions that are readily available for addressing these failing pipelines and it is these rehabilitation solutions that are the key to getting pipelines fixed and back in service. The advancement of a flexible fabric reinforced pipe lining system has provided the opportunity to review another "tool in the toolbox" for finding the best fit solution for each scenario.

Flexible Fabric Reinforced Pipe (FFRP) is an important innovative development within the industry to provide a technical envelope that can adapt to more challenging projects when the project requirements such as pressure rating, intermediate access constraints, and schedule all become equally important for the project. When evaluating the applicability of FFRP for a project, it's paramount to understand what FFRP is providing for the project. Factors such

as how the liner interacts with the host pipe, rigidity to internal operating pressures impacting longevity of the liner, and design service life based on testing are critical to the review and application of FFRP to various pressurized pipelines.

There is an array of different emergency repair solutions available when responding to a water main break whether the pipeline is buried, bridge-mounted, or other pipe locations. The failure mode of the pipeline may be different requiring certain types of solutions such as being caused by either failing joints, isolated deterioration, or damage to the pipeline from nearby work. The following two case studies showcase the reasons why FFRP was chosen for each project. Each project had unique situations where there were multiple challenges needing to be tackled and there was an effort to find a solution that could address these challenges equally.

Case Study #1

A municipality in Missouri had two parallel ductile iron sewer force mains (12- and 18-in. diameter) that had a history of pipe ruptures and failure leading to multiple point repairs needed in an existing concrete pavement roadway. The smaller diameter pipeline serves as the discharge during the dry season and larger in tandem with the smaller diameter, would be capable of full flow capacity during the wet season.

Due to the various operational needs throughout the year, the owner was needing a solution that had the high-pressure rating of the system but not reduce the final internal diameter to negatively impact the flow capacities. Due to the location of the pipeline within the limits of a concrete pavement roadway, reducing intermediate

access points through excavation pits would further reduce the total cost and impact of the project.

Since there were parallel pipelines, the project was split up into two separate installations to allow for the other pipe to be used as a bypass while each pipe was shut down for rehabilitation.

Case Study #2

Bridges are not only an efficient way of connecting two land masses or span over other major infrastructure features for transport of people and goods but also serves as the main support for pressurized pipelines. When these bridges are built, the proper support features are installed to accommodate different diameter and type of pipelines.

Although this is a great secondary use of a bridge, the mounted and exposed pipeline can create quite a scene when the pipeline has an abrupt failure. Typically, these failures are both seen and heard for those nearby. As a result,

a strong sense of urgency is placed on the owner and their team of engineers, contractors, and operators to address the failed pipeline. However, many times these spectacular failures can be avoided when the existing condition of the pipeline is identified by routine inspection.

A municipality in Florida had experienced an unfortunate joint failure on a 1,400-lf long, 12-in. ductile iron water main suspended beneath a bridge. After isolating the main and performing additional inspections, the owner determined that the remaining joints were susceptible to future failure. The owner approached the trenchless industry for innovative feasible solutions.

With the pipeline length at approximately 1,400 lf and mounted underneath to a four-lane bridge, intermediate access along the length and at the ends were extremely limited. There was not much space to mobilize larger equipment or set up a work zone around each pipe end. Combining the requirements for a long installa-

tion, pressure rated lining system, and limited work space, there are not many solutions that can meet these parameters. However, FFRP was an excellent application that could address the failure mode of the pipeline and accommodate the tight site constraints.

Concluding Thoughts

As our nation's water and wastewater infrastructure continues to deteriorate and it is important more than ever to continue developing innovative solutions that can keep up with the two diverging trends between the deteriorating infrastructure and population growth. The higher demands on our weakening pipelines results in more frequent failures and constitutes a stronger urgency to address our aging infrastructure.

Steve Soldati, P.E., is commercial manager of pressure pipe at Aegion Corp.



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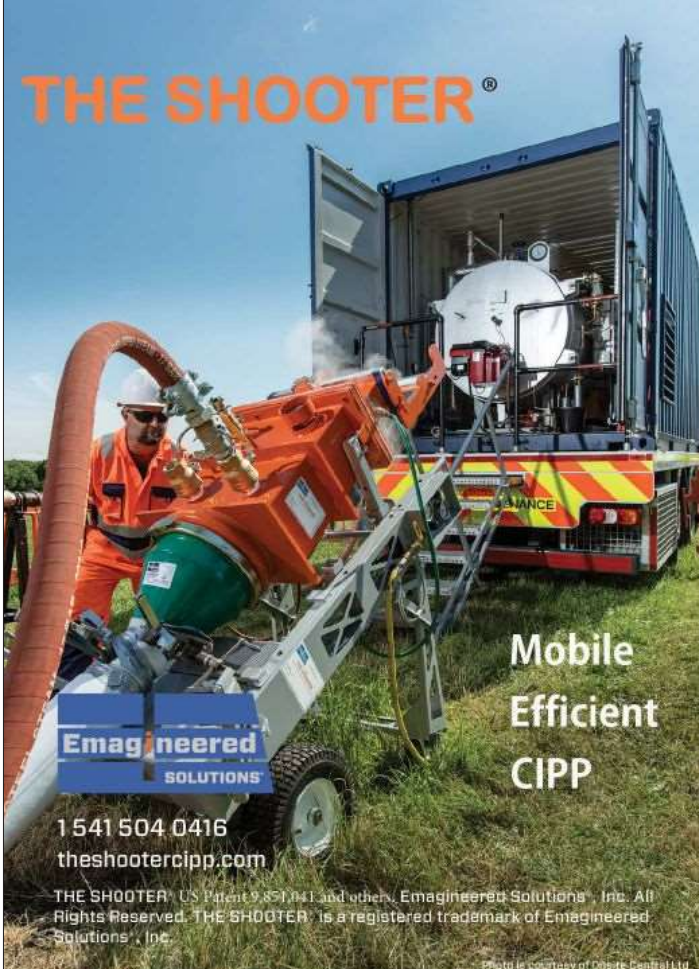
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TTC COMPLETES PHASE 3 OF STEAM-CURED CIPP STUDY



website, along with findings from other organizations such as the Styrene Information and Research Center (SIRC). The recent webinar produced by *Trenchless Technology* brought together styrene and CIPP experts, and the greatest take-away for me was the length of time that styrene has been studied – 50 years, according to panelist from SIRC,” says NASSCO executive director Sheila Joy. “It is critical that we come together to share information on the topic and – of critical importance – to follow recommendations in the field such as those proposed by TTC.”

Phase 1 of the NASSCO emission study was completed in the spring 2018 by a team of researchers led by the Center for Underground Infrastructure Research and Education (CUIRE) at the University of Texas at Arlington.

Phase 1 of the project focused on reviewing CIPP emission study literature and found that of the 21 papers reviewed, previous studies have “defective methodologies” that do not evaluate CIPP emissions (Najafi et al., 2018). The CUIRE team then developed a scope of work for capturing and analyzing CIPP emissions data (Najafi et al., 2018).

Phase 2 of the project was awarded

In April, the Trenchless Technology Center (TTC) at Louisiana Tech University has released the NASSCO CIPP Emissions Phase 3 “Evaluation of Styrene Emissions Associated with Various CIPP Coatings in Refrigerated Storage” Final Report.

“For the past several years NASSCO has worked hard to learn everything we can about styrene emissions used in the CIPP process, and all of our discovery has been shared with the public on our

Published reports in recent years have questioned the safety of emissions from the cured-in-place pipe (CIPP) process when using styrenated resin. In response, NASSCO spearheaded a three-phase emission study, to ensure workers and communities stay healthy by understanding these claims through the funding of comprehensive, third-party, objective research.



to a team of researchers at TTC. The Phase 2 team also collaborated with experts at the U.S. Army Corps of Engineer Research and Development Center (ERDC) on the study. Phase 2, which was completed in February 2020, indicated that preliminary data that elevated styrene emissions inside trucks storing uncured liners was worth further investigation.

Based on this finding and to better understand the buildup of emissions inside liner storage and transport trucks, a Phase 3 project was developed and implemented. The project's scope was to better understand CIPP styrene emissions associated with storing uncured liners prior to installation.

TTC's Phase 2 and Phase 3 Reports include important safety recommendations for field workers:

Phase 3 Study "Evaluation of Styrene Emissions Associated with Various CIPP Coatings in Refrigerated Storage" April 2023

Phase 3, which began in 2021, included testing in two steps:

The styrene emissions generated inside and around a "test" CIPP storage unit to develop a baseline for monitoring in actual CIPP storage units.

The styrene emissions generated inside and around actual CIPP storage units based upon the findings of step one, while considering CIPP liner sizes, resin weight, liner stacking and liner coatings.

Based on the results of the study, TTC has made the following recommendations to NASSCO:

Once doors are opened and styrene thresholds reduce to below regulatory agencies' limits for the planned exposure time of workers, the truck can safely be entered for that amount of time with minimal PPE. Please refer to the latest exposure guidelines for styrene for full guidance.

If durations must be exceeded, manufacturers could consider using thicker coatings, more impermeable coatings, wrapping the liners with impermeable materials to reduce the release of styrene in the cold storage trucks, additional PPE appropriate for the higher

styrene thresholds, etc.

The results of this research will be evaluated and compared to other studies running in parallel with the NASSCO Phase 3 study. The resulting data generated from these concurrent studies will be used to determine if NASSCO should conduct further testing

beyond the items described above.

To read the full reports, download specification guidelines, and review important videos and webinars, NASSCO encourages anyone interested in the topic of styrene and CIPP to visit the NASSCO website at NASSCO.org/safety/styrene-safety.



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INSPECTION ADVANCEMENTS FOR PCCP PIPES: ADDRESSING THE MODE OF FAILURE

By Kristopher Embry

In spring 2022, the patent for wire break detection inspection methods quietly expired. This method is known as the ‘Near Field Testing Electromagnetic Technique.’

This should be great news for private companies and public utilities, as we are beginning to see sole source agreements end and competition begin. The two most common and accepted electromagnetic techniques used for municipal pressure pipe inspections are ‘Near Field Testing’ (NFT) and ‘Remote Field Testing’ (RFT). Electromagnetic techniques are defined by the location of the detector and receiver coils, which are the core components performing the inspections. While there is considerable literature on the deployment of NFT in PCCP pipelines, there has been little published on the deployment of RFT.

Near Field Testing and Remote Field Testing

For NFT, the detecting solenoid and exciting solenoids are within in the same pipe diameter, so there is no axial separation. For RFT, the detecting solenoid and exciting solenoids are two to three pipe diameters apart. Below are the patent illustrations for both techniques:

NFT requires less power, due to the proximity of the sensors and is a



Image showing the assembly of the RFT tool inside the test bed and the reapplication of compression on the cylinder after removal of the prestressing wires.

simpler technique. NFT is adept and proven at finding and quantifying prestressing wire breaks in “AWWA C301 Prestressed Concrete Cylinder Pipe, Steel-Cylinder Type.” NFT cannot effectively scan the cylinders of pipes and it cannot identify the clock position of wire breaks/defects. There are usually only one or two detectors on NFT tools, so they can therefore be quite small due to requiring less power and less detectors.

RFT used to be called Remote Field Eddy Current (RFEC) or Remote Field Transformer Coupling (RFTC) but was standardized as RFT by ASNT several years ago. Since the tools must, by definition, have axial separation between the excitor and receiver coils by two to three pipe diameters and need to cover the circumference with detectors, the tools are by definition larger. RFT Tools can scan the cylinder of all ferromag-

netic cylinder type pipes (Steel, DIP, CIP) as well as concrete pressure pipes (PCCP, BWP). RFT can also sense wire breaks in PCCP pipes.

Inspecting PCCP by Focusing on Modes of Failure

Now that we have covered the tech, let’s focus back on PCCP inspections at a high level. Traditionally, PCCP has been inspected with NFT to identify wire breaks, fiber optics for wire break monitoring as well as visual and sounding inspections (usually via manned entry). These options have served well to date, as utilities have seen sharp declines in pipeline failures (which can be quite catastrophic from PCCP pipelines). There are additional tools that we at PICA Corp. use for PCCP inspections such as LiDAR sensors, RFT for cylinder

inspection and handheld EM Bracelet Probe devices. LiDAR can quantify spalling and joint separation conditions, RFT scans the cylinder and a handheld EM scanner can scan closer to the pipe joints and at butterfly valves that can interfere with scan coverage. The aforementioned inspection methods cover several common failure mechanisms, but that is not the same as the failure mode. The failure mode of PCCP is loss of the pipe's ability to act in compression.

In May 2023, PICA Corp. released the findings of a years' long, R&D effort for PCCP inspection. This research and development was funded by (University of Tennessee, WRF, Trinity River Authority, San Diego County Water Authority, GLWA, TRWD). By scanning the entire cylinder accurately with an RFT method, we not only identify and locate defects such as localized corrosion, but we can also identify a loss of preload in the cylinder. We performed four different phases of RFT tests 1) test bed experiments, 2) expanded test bed experiments, 3) application of measurement model to buried pipe and 4) destructive testing. See Study Phase Table:

Study Phase	Study Action/Purpose
Phase #1	We cut wires and soldered at different quantities at the same clock position and scanned from baseline in quantities of five wires to observe potential changes in the cylinder.
Phase #2	Prestressing wires were welded instead of soldered (reducing contact resistance) and strain gauges were installed and concrete was removed separately from cutting wires. Loss of preload was observed from both concrete removal and wire breaks.
Phase #3	We compared test bed results and data in buried pipe with similar amounts of wire breaks and found very similar results in both buried and exhumed pipe.
Phase #4	Lastly, we performed destructive testing on PCCP pipes in which loss of preload was identified. The results of the destruction correlated with our preload callouts.

The conclusion of our study and experiences inspecting prestress taught us several things. Preload is detectable and is another data set available for PCCP asset owners. Corroded wires are typically at one clock position, whereas hydrogen embrittled wires tend to not be grouped

together. Hydrogen embrittled breaks may not result in a loss of preload (a mode of failure). RFT can differentiate between corroded and hydrogen embrittled wires.

Kristopher Embry is vice president of client services at PICA Corp.

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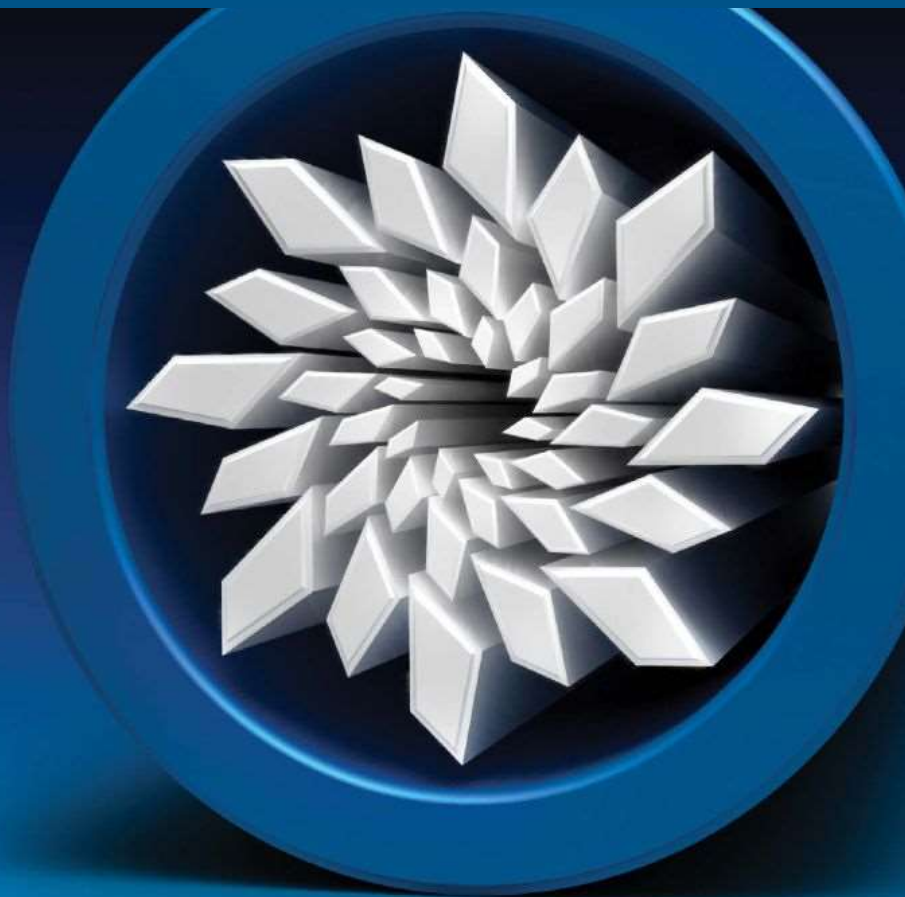
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PIGGING ISN'T JUST FOR PIPELINES

Ice Pigging vs Water Flushing

By Shane Garner



All drinking water pipes, in all water distribution pipes around the world will, over time, require cleaning due to potential buildup of sediment, biofilm, iron, manganese and trihalomethanes (THMs).

Although many forms of sediment may not initially cause any harm to the quality of the water or the end user (the general public), added to the fact that disinfection treatment can help to kill off any bad bacteria, nevertheless over time biofilms are likely to grow exponentially, forming a slimy substance within the pipe. In turn, THMs (which are a byproduct of the use of chlorine in potable water systems), may become an issue. Depending on the source of the water supply, manganese or iron may be quite prevalent in the water causing



discolored water issues and complaints.

For most water companies and municipalities, the preferred solution to eradicate these issues, is flushing.

What's Flushing?

Flushing is a term used in the water sector, whereby, a water operator or technician will go from hydrant to hydrant systematically opening the

valves one at a time and allow the water to discharge, usually to waste down a nearby storm water drain. The operator will do this for a certain amount of time, usually based on the flow rate, to allow a pre-determined amount of water to be discharged, in the hope that the velocity of the rushing water will be high enough to pick up any loose sediment that has built up in the line.

This is where the problem lies, because the simple fact is that water alone provides a relatively low shear on the inside of the pipe wall. In other words, the scouring power is poor and, therefore, the water must be allowed to travel at high velocity to increase the shear on the pipe wall. Quite often though, these velocities are not achievable due to several factors, including limited system pressures, tuberculation or scale build up restricting the flow, or, simply, insufficient volumes.

A technique called Uni-Directional Flushing, (UDF) is an enhanced means of flushing, often thought to be more effective than “standard” flushing. These UDF programs are designed to maximize the potential velocities and thereby, remove greater amounts of sediment from the mains. However, the fact remains, that water provides low shear (or scouring power) and so even the best thought out UDF plan is often insufficient to remove all the sediment from the system.

Even when the velocity in a main is at an acceptable level, there is then the (very serious) factor of water wastage. It is generally thought by water consultants around the world that at least four to five volumes of the pipe being cleaned, needs to be flushed out of the line before the flushing is at all effective. To put that number into perspective, that represents almost 69,000 gallons of water in just one mile of 8-in. water main (about 10 blocks), or 108,000 gallons (enough to fill five- to six-average size in-ground swimming pools), in a mile of 10-in. water main. Many smaller communities or municipalities don't even have the luxury of large storage reservoirs sufficient to provide the required amount of water and then in many states in the United States, severe droughts have led to heavy restrictions on the waste of precious water. In any case, ask yourself, “Why would you pay to collect water, pay to store it, pay to treat it and then just flush it away before it gets to the end customer?”

This is where a relatively new, advanced pipe-cleaning technique called ice pigging comes to the fore.



Using Ice Pigging

Ice pigging uses a slush ice — or ice slurry — injected into the main, where it then flows through the line using normal system flows and pressures and is discharged out at a pre-determined point. As it flows through the main, the ice crystals pick up the sediment by scouring the pipe walls, carrying it in the body of the ice and out of the line at the discharge point, where it can be safely disposed.

Simply by turning water into ice crystals, you can achieve up to 1,000 times more shear (scour power) on the inside of the pipe wall than flushing plain water. The ice even has the ability to do this at much slower velocities than water, so for those situations where the desired velocity is not achievable, ice pigging will obtain a far superior clean.

Although it is inevitable that some water may be wasted during an ice pigging operation, it will be up to 70 percent less wastage than a similar flushing project and yet the cleaning efficacy will be so much superior.

Let's Talk Money

Although ice pigging may initially appear to be more costly, a recent study carried out in Australia found that while ice pigging is more expensive on a ‘\$ per foot’ basis, when using the

indicator of ‘\$ per lb. of sediment removed’, it is approximately six times cheaper. The study also found that ice pigging removed up to 17 times more sediment from the mains compared to

flushing, while using half the amount of water.

It is hypothesized that the superior clean achieved by ice pigging will result in less discolored water complaints and, therefore, lead to cost savings in the reduction of unscheduled flushing programs and the frequency of mains cleaning of water supply zones (P. Dang et al., 2014).

Another finding from the study indicated that ice pigging a water supply zone improves penetration of chlorine residuals.

It should be noted that due to the success of this study, the water company involved commenced a full-scale program to ice pig approximately 250 miles of water mains each year for the following five years.

Benefits of Ice Pigging over Flushing

- Lower velocities required
- Smaller volumes required
- Superior clean
- Drought Friendly (Less waste)
- Shorter downtimes
- Cheaper when using the indicator of \$ per lb. of sediment removed

Case Study to Explain a Bit

In 2022, a comparison test was carried out at an ice pigging project for a large Idaho city. This included certain ‘problem’ areas that were flushed by means of a UDF program followed the next day by ice pigging, with the aim of determining how much additional sediment was able to be removed. You can clearly see from the photos below of samples taken at the ice discharge hydrant, how much sediment was actually removed. Note the ‘clear’ sample in each picture is a sample of the discharge before the ice arrives (essentially flushing water), then how the samples darken with the amount of sediment suspended in the ice slurry, a clear indication of the superior cleaning effect of the ice pig.

Shane Garner is project manager at American Pipeline Solutions.



GETTING CONNECTED

Via HDD

Strategic Partnership Brings Fiber Optic to Rural America as Need for Access to Reliable Internet Increases



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According to a 2021 study from BroadbandNow, there are at least 42 million Americans without access to broadband internet. Access to affordable and reliable broadband in the 21st century is a critical infrastructure necessity, just like transportation, electricity and water. Extending broadband to rural America is crucial for nurturing robust economic growth, enriching educational opportunities, expanding access to health care through telemedicine, improving public services and safety and increasing civic engagement.

The need for fiber connectivity in rural America has only been exacerbated by the COVID-19 pandemic. Nearly every element of day-to-day life turned virtual. Those without access to reliable internet have been left out since March 2020. But how do communities make the jump to fiber when coaxial cable internet connections from the 1990s and 2 megabits-per-second download speeds are often their only option available?

Providing Quality for All

Most major telecom providers overlook rural parts of the United States where there are not enough people to sustain a robust network. These providers don't want to risk cutting their margins by making investments in smaller communities. This means that for the roughly 60 million people – or one in five Americans – that live in rural America, there is generally only one, if any, internet provider option. In fact, BroadbandNow released an interactive National Broadband Map that shows the disparities in access to broadband providers between rural and urban communities across the United States.

This gap is where Bluepeak comes in. Bluepeak is a cable internet provider with a plan to bring fast, reliable internet access to rural America. Bluepeak offers top-tier technology, so customers in small to mid-size communities have competitive provider options. “The size of the



community shouldn't determine the quality of the technology,” said Jesse Granger, director of communications at Bluepeak.

Several members of the Bluepeak executive team grew up in rural communities yet spent their careers building fiber networks across urban areas of the United States, and even the world. With the gap COVID-19 created, now felt like the perfect time to go into small communities and bring fiber to those who need it most. “There are a lot of underserved communities in

Oklahoma. It's antiquated technology. A lot of people had been promised the moon,” explained Joel Deason, director of construction and engineering at Bluepeak, as he illustrated the impetus of Bluepeak's decision to build their fiber network in rural America.

Over the course of 2022, Bluepeak is working to launch fiber in nearly 20 markets across Oklahoma alone. The first of which is Perry, Oklahoma, home of Ditch Witch. Desi Stoops, vice president of market development at Bluepeak and a Perry native, said the team looked throughout the state of Oklahoma and realized there were anchor markets – or centralized places from which the service provider could reach multiple markets – that weren't connected to Oklahoma City and Tulsa, two of which being Stillwater and Enid. Perry happens to fall right in between those two, making it an ideal location for the first rural America fiber project.

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Building Community Partners in Perry

With the decision made to bring fiber to rural America, Bluepeak needed a strategic construction partner to make this vision a reality. But Bluepeak did not want to solely focus on the speed at which a partner could install fiber optic. With a project of this size and magnitude, they knew that they needed a collaborator who would truly be a partner to these tight-knit communities. With this at the top of mind, Bluepeak partnered with Mears Group, a family-owned, community-focused construction infrastructure contractor.

To ensure that the community input is incorporated into every project, Bluepeak and Mears representatives work closely with local community members before the team even breaks ground on the project. A key part of this community engagement involves Bluepeak and Mears hosting forums where residents can hear directly from project leaders to learn more about the project and get their questions answered. These meetings help community members to understand the scope of the project, construction impacts during project development and the benefits that the project will provide once completed. It also allows for community members to provide insight and input into the project to ensure that it best fits their wants and needs.

In addition to meeting with community leaders, Bluepeak and Mears make it a priority to ensure that they are good neighbors by minimizing community disruption. This involves developing construction plans that limit damage to property and hazards in the community. In doing so, Bluepeak and Mears work together to ensure their construction plans properly anticipate and communicate any activities that may impact community members, such as planned outages or road closures due to construction. "When we're in the neighborhoods, we want to be good neighbors. Not just their construction partners...it's one big team," explained Deason.

To further enhance community

engagement, Mears makes it a priority to hire local talent to help complete the project. To accomplish this, Mears works with staffing agencies or hosts job fairs to hire talented operators to work on projects that directly impact their own family, friends, neighbors and community.

Being a good neighbor and building community partnerships is what sets this fiber connectivity project apart from others. In particular, the project in Perry, Oklahoma, has a seemingly never-ending knot of community ties. When Bluepeak partnered with Mears as their construction contractor, it was only fitting to use Ditch Witch machines – a legendary brand that has had strong community roots since it was started in Perry over 70 years ago.

For Bluepeak installations, the Mears team generally uses equipment on the smaller side – like Ditch Witch's JT20, AT30 and stand-on skid steers – so they can easily maneuver through residential areas without compromising power and productivity. After an installation has been completed, Mears works closely with the local government to ensure proper restoration of the jobsite. In Perry, for example, Mears laid 69,000 ft of underground fiber-optic cable, all of which was covered when the job was complete, making it seem to the community and visitors that construction had not even happened.

Connecting Rural Communities in Action

One of the many Perry community members who has taken advantage of Bluepeak's fiber internet is Spencer Tetik, a motion designer and video editor who works for an agency based out of Kansas City. In this position, Tetik depends on fast internet speeds to upload and download large graphics or videos.

"With my previous internet provider, speeds just weren't there and it made things a bit of a struggle. Sometimes uploads or downloads would time out which made it challenging to do graphic design work with subpar internet," said Tetik. "When I heard that Bluepeak was coming, I immediately started looking into it to increase my upload speed.

With Bluepeak, I can upload and download materials almost instantly. It's done before I even have time to think about it, it's great."

Spencer lived in Kansas City for nearly 10 years before he decided he wanted to move back to his hometown to be closer to family. "Access to fast internet allows people who work for bigger companies the opportunity to work from smaller cities like Perry – giving them room to grow and to welcome in different kinds of people here in town."

With the option for remote work and access to fast, reliable internet, people can now work from anywhere, including rural communities like Perry, Oklahoma. The internet capabilities that Bluepeak, Mears and Ditch Witch have brought to rural communities across the country has helped to keep them on the map. Involving the community every step of the way has allowed for a smooth transition to fiber and ensured that this critical infrastructure is easily accessible to more rural communities.

Increasing Access to Endless Possibilities

The partnership has produced outstanding results. Mears Group program director David Owen, explained that the effort is reaching on average 5,000 households per month, with the capacity to reach nearly 12,000 in warmer summer months. "Bluepeak really rewrote the book on speed to market. It's pretty impressive," he said. "They are moving like I've never seen a company move before."

Not only are Bluepeak and Mears able to bring fiber internet to thousands of rural households at an affordable rate and fast pace, but they're doing so with the community at the forefront of every project. Perry, Oklahoma, is just the tip of the fiber revolution for rural America. Bluepeak and Mears currently have about four to five years' worth of projects in the pipeline, and it's only growing. The access and opportunities these projects are bringing to rural communities are truly endless.

This article was provided by Ditch Witch.



MUD RECLAIMING

on Mid-Size and Large-Diameter HDD Projects

By Amy Olsen

Over the last decade, reclaimers (recyclers, mud recycling systems) have become a staple for mid-sized to large-diameter horizontal directional drilling (HDD) installation work. Traditionally, pairing drills and reclaimers happened on heavy pipeline projects involving maxi rigs, but in recent years, this combination has become more common on bores involving mid-size drills.



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According to John Cope, application engineer at Vermeer, a general rule of thumb that many HDD contractors apply today is that if bores require more than 8,000 gallons of drilling fluids per day, recycling used drilling slurry may be a better choice than pumping and dumping it. “There are a lot of factors that weigh into when and where to employ a reclaimer, but the expense of drilling fluid additives and water, plus transporting and dumping used slurry, has certainly resulted in more widespread usage of this option in rural and urban areas,” he says.

Sizing

As reclaimers have made their way into the mid-sized HDD market, so has the number of models available for contractors to choose from. To determine which size to use, Cope said contractors need to consider the maximum rate they will be pumping fluid down the drill string. Knowing that, they then will be able to pick out a reclaimer that can keep up with the particular HDD model they are using. For example, a Vermeer D100x140 S3 Navigator horizontal directional drill has an onboard pump with a maximum flow of 230 gallons per minute, so a Vermeer R250C reclaimer, which can clean up to 250 gpm of fluid, would be the best match.

For projects that require higher fluid volume, Vermeer recently introduced the R600T reclaimer, which is capable of cleaning up to 600 gpm of used drilling fluid per minute. “This model is designed to keep pace with maxi rigs using high-pressure mud pumps like a Vermeer SA400 high pressure mud pump, which can pump up to 550 gpm,” explained Cope. “These two Vermeer reclaimer models do a good job of covering the needs of most mid-size and maxi rig drills.”

On massive projects that exceed the capacities of the R600T, running a pair of reclaimers is becoming common practice for contractors. “A significant amount of thought is put into how used drilling slurry gets moved around on long boring projects,” said Cope. “One way or another, slurry or clean

drilling fluids need to be transported back to the drill from the exit side. So, when higher volumes of fluid need to be cleaned, contractors will place a reclaimer on the bore’s exit side with larger screen sizes to quickly clean material on that side of the bore. Then, they will pump it back to the entry side, where it will be recycled again with slurry from the entry pit for a deeper cleaning. The fluid coming for the exit side helps dilute the slurry on the entry, which helps maximize the drill side reclaimer’s cleaning efficiency.”

Placement

Since no two jobsites are the same, contractors need to be flexible about the right drill and reclaimer setup that will best suit their jobsite conditions. Cope said the number one consideration when it comes to determining the correct configuration for a job is the available space. “In rural areas where there is plenty of space, crews can arrange their equipment however they want,” he explained. “However, in urban areas, sites are often much tighter — sometimes there isn’t room for a reclaimer on the drill side, so it needs to be positioned on the exit side. The entrance pit’s slurry would then need to be transported to the other side of the job before being pumped or hauled back to the drill. Other times, there may not be any room for the reclaimer on either side, so a separate site would need to be established and all of the drilling fluids would have to be transported back and forth to the job.”

After determining the jobsite conditions, the next step contractors should look at is where their nearest available water source is, as well as review what equipment they have available to them. “Whether it’s moving water or drilling fluid, there can get to be a lot of equipment involved with transportation,” said Cope. “Pumping fluid instead of trucking it is almost always more efficient. So, if the closest water source is located on one side or the other, and the drilling fluid will either need to be dumped or diluted frequently, it probably makes sense to position the reclaimer on that side of

the site.”

Cope went on to say that if crews can have some control over the direction of their returns, they can further reduce the transportation of drilling fluid. “A growing number of contractors have started to avoid punching out on the pilot bore and using push-reaming methods to send the bulk of their returns to the entry side where the reclaimer sits,” Cope explained. “This method isn’t always possible, especially if higher downhole pressure is required or the ground conditions don’t support it, but when possible, it can certainly help minimize the movement of slurry.”

When there is no compelling reason to choose the drill side or the exit side for placing the reclaimer, Cope recommends that contractors consider pump and piping requirements. “It is a lot easier to pump clean drilling fluid back to the drill than heavy slurry,” he said. “So, a contractor may be able to get by with using a smaller pump and smaller-diameter pipe to move the clean fluid back to the drill if the reclaimer is placed on the exit side. However, they will likely have to have a holding tank on the drill side for temporary storage.”

Flexibility

With so many variables and factors to consider for recycling used drilling fluid, Cope recommended that contractors evaluate every project’s conditions ahead of time and then develop a mud management plan to address the job’s particular needs. “As with any work, people tend to employ certain methods and setups because it’s the way they’ve always done it. So, if a crew has always positioned their reclaimer in the same place on every job, they may end up spending a substantial amount of resources trying to create that same arrangement on the next project, when it may be much quicker and more effective to move the reclaimer. Those types of details can have a real impact on production rates, which is why being flexible with their equipment arrangement is so important.”

Amy Olsen is brand experience lead for infrastructure equipment at Vermeer.

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Resin Considerations for Your CIPP Project

Cured-in-place Pipe (CIPP) is one of the more commonly used tools in the “Trenchless Toolbox” when it comes to rehabilitating deteriorated pipelines. However, how do you go about picking the right tool? After all, a 3/8-in. wrench is not going to do you a lot of good if you really need a 7/8-in. wrench.

CIPP covers a wide spectrum of products. There are variations in resins, liner materials, and curing methods. While all play important roles in the overall construction, we will focus primarily on resin for this article.

Resin systems have become quite diverse, but for CIPP, they will typically be a thermosetting resin. This broad category encompasses many variations, including polyesters, vinyl esters, epoxies and silicate resins. When choosing the proper system, one of the first things to consider is the application. On typical sanitary or storm-water mainlines, a polyester is generally used as it will often be the most economical system that still meets the requirements outlined in the various ASTM tests associated with CIPP. However, some rehabilitations may require a more specialized resin. Styrene-free systems are available if that is a requirement. If the environment is more corrosive or has higher heat requirements, such as in an industrial setting, a vinyl ester or epoxy may need to be considered. In cases of potable water, an epoxy or specially modified vinyl ester may be the system of choice. These systems also tend to be well suited for pressure applications since they are often designed for superior fatigue re-

sistance and give a synergistic relationship with the reinforced liners required for elevated pressures. When minimal shrinkage is needed, an epoxy or silicate system may be the proper starting point.

Once the application is known, it is important to consider how the liner will be cured. Resins will normally have a curing agent or initiator added (sometimes called a “catalyst”). The most common systems are designed to be cured with hot water or hot air. Considerations should be given to the size of the liner, making certain the equipment available can provide enough energy to give a proper cure. Occasionally, the initiator level may need to be adjusted to give the contractor enough time to install a liner. Sometimes the installer may choose to use an ambient cure system, designed to cure at lower temperatures. These systems will have limited working time, so are typically reserved for smaller liners such as lateral lines or point repairs. Another energy source that is becoming more widely used is ultraviolet (UV) light or LED light. These systems use similar resins as their heat cured counterparts, but have initiators designed to cure when exposed to specific wavelengths of light. It is therefore very important to ensure the resin selected is designed to be cured at the same wavelength at which the light train is operating.

We are often asked to explain why an enhanced (often called “filled”) resin may be used instead of a neat (“non-filled”) resin. As with most things, there are several variables to consider. The enhanced systems tend to have slightly higher flexural modulus properties, which are key values used in design equations. This could result in a

thinner liner which is still capable of meeting the required design parameters. A thinner liner may result in a slightly larger pipe volume and possibly a lower cost, since less resin is needed to obtain similar properties. However, the enhanced systems tend to be more dense (higher weight), often have lower exotherms (which can be positive or negative, depending on specific circumstances), and do not wet out reinforced liners as well as their neat counterparts. Enhanced systems do not perform as well with UV curing methods since the “filler” limits the depth to which the UV light can penetrate, and thus cure, the liner.

One final thing to consider is customer support. Resin suppliers can often work with you to help determine which resin may work best for a particular application. They should be able to supply various testing results that will help the engineer with their design. Although testing requirements may vary depending on the environment or application, some of the more common testing requirements are long-term corrosion and creep retention. While it is important to have representative data on the system being used, consideration should also be given to the time required to complete this testing, especially long-term testing. Working together is the best method to make sure all the requirements are addressed.

So, next time you go to that trenchless toolbox, make sure you grab the correct tool (including resin) for the particular job.

Jason Schiro is business manager—pipeline remediation polymers at Interplastic Corp.



GEOPOLYMER REHABILITATION OF STORM DRAIN, CHULA VISTA, CALIFORNIA

When it comes to pipe rehabilitation several options are available to asset owners, including cured-in-place pipe (CIPP), sliplining, spray-applied pipe liners (SAPL), FRPs and spiral wound. Each method has its advantages and disadvantages depending on the pipe being rehabilitated. The decision regarding which method is best depends on several factors such as pipe size, length, access locations, hydraulics, environmental issues, distribution to surrounding area, overall cost, operation of the system, bypass consideration and so on.

SAPLs are becoming widely used for sanitary and storm sewer rehabilitation of pipes larger than 36-in. diameter as manufacturers can demonstrate technical performance data, verification testing, design methodology (with direct field data to show the asset owner and engineering community that this method has been vented), that it is a conservative approach, can achieve performance predictability requirements, and ensures the system will operate for another 50-plus years.

A project in the City of Chula Vista, located in Southern California, was on a 720-lf section of 66-in. CMP storm drain that experienced a rapid deterioration of the structure including the corrosion of invert, ovality of the pipe and ground water infiltration.

National Plant Service from Long Beach, California, was the successful bidder on the project after it provided a design thickness calculation, material to be used, verification testing reports and a list of past projects using the material, as required in the bid submittal package. This evidence proved to the

City of Chula Vista that the pipe, once rehabilitated, would meet the City's quality standards.

National Plant Service's project manager Daniel Solano led the team, carrying out the rehabilitation. The following steps took place:

New Manhole Installation

The City required two new manholes be installed to allow for easier future maintenance and inspection access. The manholes were cast-in-place, and the site was excavated down to the crown of the pipe. Formwork was installed in stages before backfilling upon completion of each section.

Cleaning the Pipe

There was a significant layer of debris covering the invert of the pipe along the entire length. Approximately 8 cubic yds of material was removed.

Invert Repair

Cleaning of the storm drain revealed that the invert was severely corroded, and approximately one to two feet width of the CMP pipe was missing throughout the entire 720-ft reach. A new concrete invert was poured to fill the voids and bridge the gaps in the CMP pipe. Locally sourced 3,250-psi concrete was used and allowed to cure.

Injection Grouting to Stop Infiltration

As typically occurs when an invert repair is made, water that used to flow under the failed invert can no longer escape the backfill and builds up around the exterior of the pipe. The water can then find its way

through any gaps in the CMP pipe. Acrylamide grout is effective in stopping infiltration into pipelines as it binds with the surrounding backfill to provide a waterproof collar around the outside of the pipe, preventing further infiltration. Manual grouting was performed whereby holes were drilled through the pipe wall where infiltration was present, and an injection port was inserted to introduce the two-component grout mix, which fills behind the pipe, binding with the soil to stop future infiltration.

Spin-Casting of the Geopolymer Structural Mortar Lining

After grouting was complete, and infiltration was stopped, the pipe was ready for spin-casting. The pumper/mixer assembly was placed near the access manhole along with pallets of pre-mixed dry material supplied in 50-lb bags. Concrete hoses were run from the pump into the manhole and through the pipe to the spinner sled at the far end of the pipe segment to be lined. The geopolymer dry mix was mixed with a measured amount of water as it left the pump and traveled through the hoses to the spinner sled. A winch was used to pull the spinner sled back at a controlled speed to ensure the correct amount of geopolymer was released. Multiple passes, or lifts of material, are usually required to reach the design thickness, with an initial thinner lift often required in CMP to allow for better bonding of future, thicker, lifts.

Joe Royer, PhD, is vice president of R&D at Critica Infrastructure and a member of the NASSCO Pipe Rehabilitation Committee.



By Steph Aldock



THE FUTURE OF WATER:

IN THE CHALLENGES, LIE THE OPPORTUNITIES

W

hen we think about the water industry, many of the challenges are not new. It feels like every year, the American Society of Engineers gives U.S. water infrastructure a failing grade. These age-old issues are compounded by short-term pressures such as recessionary fears, high material prices, not to mention a retiring utility workforce.

With a growing focus on infrastructure, drinking water quality, and sustainability, water is in the spotlight more than ever. That's not necessarily a bad thing. In fact, some of our greatest achievements have centered on water, including the positive impact on health from centralized wastewater treatment and the Clean Water and Safe Drinking Water acts.

While there are many challenges facing the water sector today, it is these challenges that will continue to drive water market opportunities going forward.

Federal funding dedicated specifically to water to address aging water infrastructure

It may have taken a drinking water crisis in Flint, Michigan (among other U.S. cities) and multiple power outages in Texas, but the U.S. federal government is now investing in water infrastructure. The Infrastructure Investment and Jobs Act (IIJA) presents an historic opportunity which will influence water utility spend for years to come. The IIJA explicitly allocates \$55 billion of new funding for drinking water, wastewater, and stormwater infrastructure through 2026. This bipartisan law represents an overdue and much needed investment in the nation's infrastructure and will be the highest inflation-adjusted levels of federal funding directed at water infrastructure over a five-year period since the late 1970s.

Major water priorities outlined in the funding include lead service line replacement, per- and polyfluoroalkyl substances (PFAS) remediation, water reuse, Indian water rights and infrastructure improvements, and investments in water

technology innovation, resiliency, and underserved communities. As of April 20, 2023, total announced funding for water infrastructure projects associated with the legislation had reached \$24.1 billion. This is approximately 44 percent of the funding for water infrastructure projects to be distributed through 2026.

While there are details to be worked out (i.e., delivery of funds, state definitions of a disadvantaged community), passage of a federal infrastructure bill and an influx of needed capital to the water sector is a significant catalyst for growth.

New drinking water quality regulations drive opportunities for water service providers

It seems like every day PFAS — also referred to as forever chemicals and emerging contaminants — and their impact on drinking water quality are featured in news headlines. Chemical companies, including 3M and Chemours, are facing lawsuits, and regulators are now taking action.

To date, 45 states have legislated a range of policy mechanisms to limit PFAS contamination in drinking water. Twelve of those states have implemented or proposed drinking water standards, otherwise known as maximum contaminant levels (MCLs), and the state landscape continues to accelerate. In parallel, the EPA has proposed federal MCLs for six PFAS that will be finalized by the end of this year.

In response to this legislation, Bluefield currently forecasts \$5.8 billion in drinking water remediation technology spend from 2023–2030 in the United States, alone. The IIJA includes US\$10 billion devoted specifically to addressing PFAS and other emerging contaminants.

While drinking water has garnered the lion's share of attention by regulators, more complex wastewater and associated biosolid management strategies for PFAS are receiving increased regulatory scrutiny. Biosolids are often utilized for fertilizer, thereby propagating groundwater contamination. As such, an emerging group of water technology vendors are positioning to capitalize.

A focus on climate is driving water investment decisions

Corporations are now realizing that water will impact their bottom line and are adjusting their strategies accordingly. Nestlé announced plans to recycle wastewater at its coffee creamer plant in Arizona, a state plagued by water scarcity, and Amazon plans to “return more water than it uses” from its water-intensive data centers. As corporations more pro-actively their water demand, water utilities will face less pressure to meet supply.

Awareness is the first step. We have already seen companies across water-intensive industries highlight their water usage to help quantify water risk. Of 11 industries evaluated by Bluefield — food and beverage, beauty, pharmaceutical, automotive, oil and gas, and semiconductors — six achieved 100 percent water use reporting among top companies.

From electric vehicles to semiconductors, no industry is immune to water risk. Sustainability targets and recent water-related investments signal the corporate sector's growing focus on water through M&A and more efficient water management. As industries like tech and food and beverage drive demand for industrial water, greenfield development (in the form of new facilities) will offer opportunities to meet ESG targets. Corporate strategies will continue to drive partnership opportunities for water management solution providers.

The Bottom Line

The mature water sector is an attractive opportunity for companies looking for less volatility. Investors and Wall Street are now paying attention. Let's seize on this time when water is in the spotlight to address these industry challenges and capitalize on water market opportunities. The challenges are many, but the time for water is now.

Steph Aldock is senior marketing director at Bluefield Research. Bluefield Research helps companies advance their water market strategies.

TRENCHLESS EVENTS CALENDAR

2023

***All events are current as of May 2.
Please check the event's website for updates.**

****RED BOX DENOTES NOTABLE EVENTS****

JUNE

- 11-14 ACE23**
Toronto, Ontario
Web: awwa.org/ace
- 11-14 RETC2023**
Boston, Massachusetts
Web: retc.org
- 27-29 Stormwater Summit**
Kansas City, Missouri
Web: wef.org/events/conferences/upcoming-conferences/stormwatersummit
- 28-30 Collection Systems Conference 2023**
Kansas City, Missouri
Web: wef.org/events/conferences/upcoming-conferences/collectionsystems

JULY

- 24-27 DCA Mid Year Meeting**
Stowe, Vermont
Web: dcaweb.org

AUGUST

- 2-5 2023 PCCA Mid-Year Meeting**
Incline Village, Nevada
Web: pccaweb.org

- 8-9 2023 Water Finance Conference**
Cleveland, Ohio
Web: waterfinanceconference.com

- 12-16 UESI Pipelines 2023 Conference**
San Antonio, Texas
Web: pipelinesconference.org

- 14-17 2023 DoD Corrosion Prevention Technology and Innovation Symposium**
Tucson, Arizona
Web: dodcorrcon.org

- 22-24 The Water Expo**
Miami, Florida
Web: thewaterexpo.com

- 22-24 The Energy Expo**
Miami, Florida
Web: theenergyexpo.com

- 27-30 PWX 2023**
San Diego, California
Web: pwx.apwa.net

SEPTEMBER

- 11-13 Breakthroughs in Tunneling Short Course**
Denver, Colorado
Web: tunnelingshortcourse.com

- 11-15 IPLOCA 2023 Convention**
Vancouver, British Columbia
Web: iploca.com

- 24-26 Tunnelling Asscoaiton of Canada 2023 Conference**
Toronto, Ontario
Web: tac2023.ca

- 26-28 The Utility Expo**
Louisville, Kentucky
Web: theutilityexpo.com

- 28 World Trenchless Day**
Global Celebration
Web: worldtrenchlessday.org



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