MID ATLANTIC JOURNAL OF

TRENCHLESS TECHNOLOGY 2025

OFFICIAL PUBLICATION OF THE MID ATLANTIC SOCIETY FOR TRENCHLESS TECHNOLOGY

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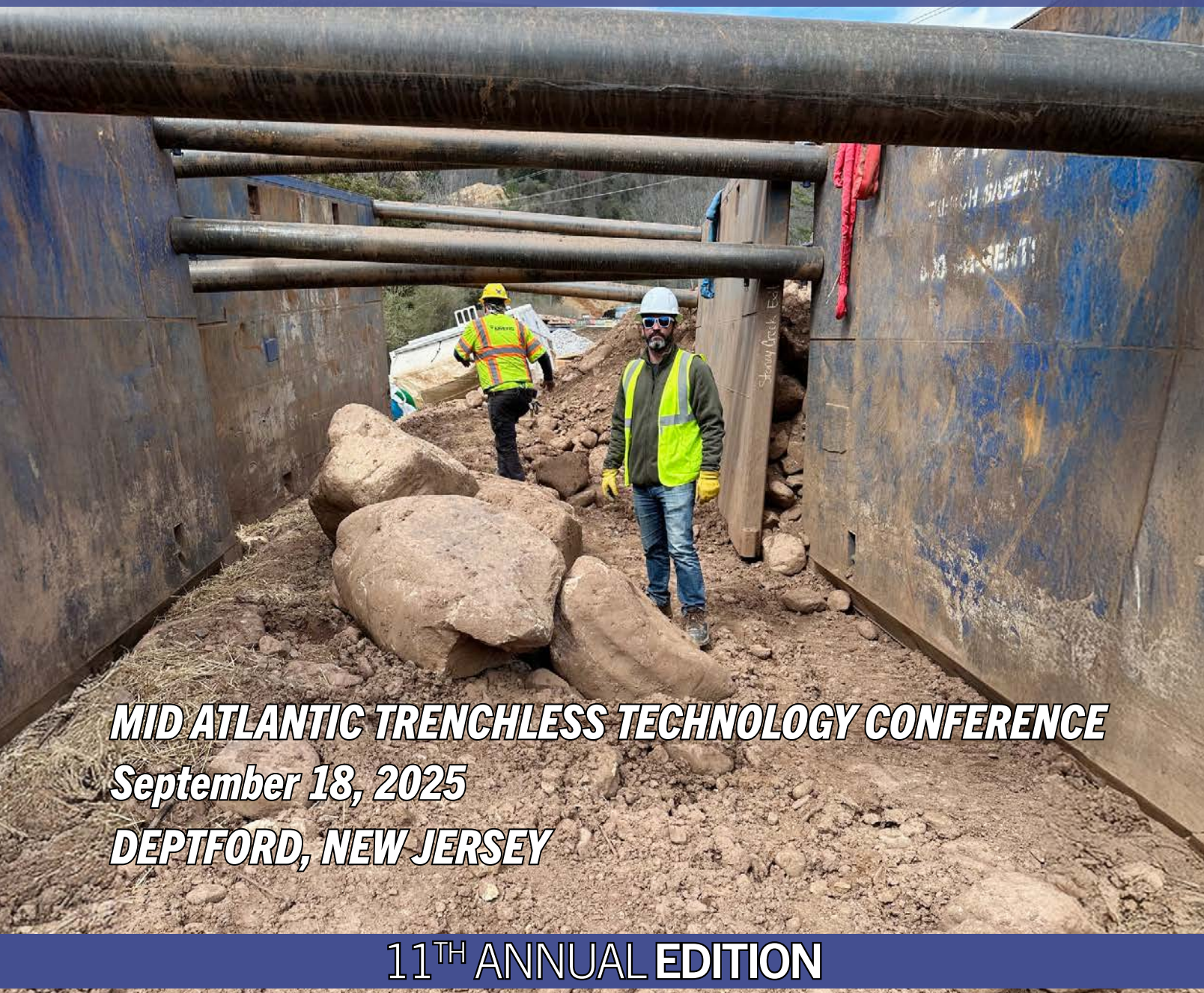

MID ATLANTIC TRENCHLESS TECHNOLOGY CONFERENCE

September 18, 2025

DEPTFORD, NEW JERSEY

11TH ANNUAL **EDITION**

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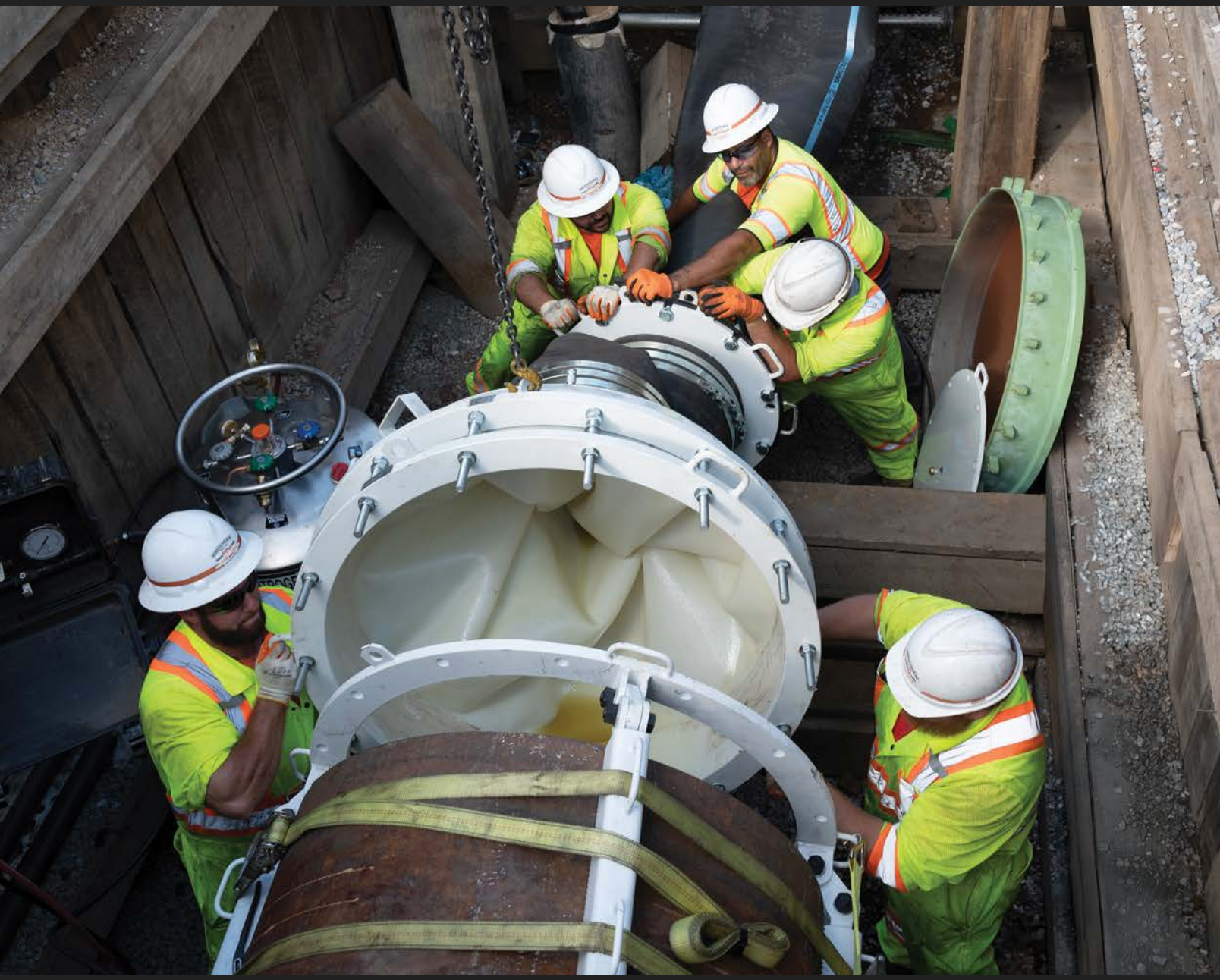

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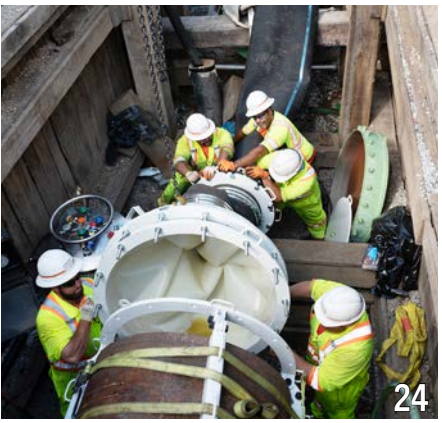

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MESSAGE FROM THE MASTT CHAIR

Dennis M. Walsh, P.E., MASTT Chair

Dear Mid-Atlantic Chapter Members: Well, It was a great 2024 for MASTT as we embarked on our new volunteer led chapter. We held our first seminar at Rutgers University with over 70 attendees. We had 15 vendors exhibiting. Thank you all for being there. Let me also take this opportunity to thank Professor Nenad Gucunski for hosting and Todd Kilduff for co-chairing the event with Professor Nenad.

As for 2025 and beyond, we will continue our mission of educating the world on trenchless technology and how it can improve the quality of life. We have an exciting Board with now 12 impressive individuals. Welcome back Tom Tolive, Nenad, and welcome to Jason Newman of J. Fletcher Creamer, Inc. We will look to continue our efforts on our communication with our chapter members, now over 160 strong and looking to grow even more, especially in the municipal area. We will again team up with Andrew Pattison of A to B Publishing for our chapter magazine. Also, most important to us, we will look to continue to partner with our student chapter at Rutgers University and look to expand that mission with other universities in the Mid-Atlantic region. On September 18, 2025, we will have our annual seminar at Adelphia Hall in Deptford, NJ. It promises to feature great papers and vendors with a 2-hour networking session the night before. Todd Kilduff and Professor Nenad Gucunski will lead that effort. Registration is now open so sign up. Plus, also mark your calendars for No Dig 2026 in Palm Springs, CA March 29 – April 2, 2026.

Moving to an all-volunteer operation has been a challenge but well worth the time and effort. We hope we can count on all of you. So, on this note, it's going to be another great and challenging year. If any of you want to get more involved in the chapter and help us, please email me at **denbowal2003@gmail.com**

"THANK YOU AND LET'S KEEP "NO DIGGING!!!"

or call me at 908-839-9307. Sign up a new member of you can too.

Thank you all, have a great 2025, and let's keep "no digging!!!"

Dennis M. Walsh

Dennis M. Walsh, P.E.
Chair, MASTT CHAPTER

MASTT SITE

HDPE PE4710 PIPE

The Best Choice for Water Systems

	TOP 10 Features & Benefits	HDPE	D. Iron	Sample References
1	**Applications:** Potable Water (Lead Free), Raw Water, Reclaimed Water, and Wastewater	✓	✓	AWWA C901, C906, C151, and NSF 61 + Health Effects of HDPE Pipes and Fittings for Potable Water Applications, NSF 2024
2	**Open Cut Construction**: Design and install per AWWA Standards and Manuals eliminating thrust blocks.	✓	✓	AWWA M55, M41 + MAB-3, MAB-6
3	**Trenchless Construction**: Material of choice for HDD, Pipe Bursting, Sliplining, and Compression Fit	✓	✗	ASTM F585, F1962, F3508 + MAB-5, MAB-7, MAB-11
4	**Fully Restrained Joint-Free System:** Minimize need for fittings to facilitate horizontal and vertical deflections.	✓	✗	AWWA M55, M41
5	**Longevity & Corrosion:** Pipes, Fittings, and Joints have the least potential for corrosion or tuberculation	✓	✗	Durability and Reliability of Large Diameter HDPE Pipe for Water Main Applications, EPA/WRF/WERF 2015 + The Critical Need for Corrosion Management in the Water Treatement Sector, NACE 2019 + PPIPPACE.com + Long-Term Aging of Polyethylene Pipes, UKWIR 2020
6	**Flow Capacity:** New pipes have similar flow capacity per AWWA Standards and Manuals	✓	✓	AWWA M55, M41 + PPIPACE.com
7	**Water & Energy Conservation**: Fused joints have zero allowable water leakage and zero infiltration	✓	✗	AWWA M55, M41 + ASTM F2620, F3190, F3565 + MAB-1, MAB-2, MAB-8
8	**Cost Effective:** Has the lowest initial cost, lowest life cycle cost, and lowest restoration cost for trenchless installations	✓	✗	Life Cycle Analysis of Water Networks, CSIRO 2008 + Annual Drinking Water Quality Report for 2014, Kittery Water District, 5/31/2015
9	**Resilient**: Ability to resist ground movements due to droughts, freeze/thaw, earthquakes, hurricanes, with ability for flow control/squeeze off	✓	✗	Recent Earthqaukes: Implications for U.S. Water Utilities, WRF 2012 + Polyethylene Pipeline Performance Against Earthquake, Kubota 2018 + MAB-9
10	**Permeation/BTEX:** Pipes and elastomeric joints need to be properly engineered for contamined conditions	✗	✗	AWWA C901/C906 and C111/C151, Sec. 4

Additional information including MAB-3 Model Spec Guide can be found at www.plasticpipe.org/mabpubs

HDPE MUNICIPAL ADVISORY BOARD

MESSAGE FROM NASTT CHAIR

Greg Tippett, P.Eng., NASTT Chair

Dear Mid Atlantic Chapter Members & Supporters

As Chair of the NASTT Board of Directors, I want to take a moment to thank you for your continued commitment to the trenchless industry and your active engagement within your regional community. Our success as a society depends on the strength of our Regional Chapters, and the Mid-Atlantic region continues to lead by example.

One of the most inspiring aspects of our organization is the dedication of our volunteers. Whether you're serving on a committee, mentoring a young professional, organizing local events, or simply showing up to lend a hand at chapter activities, your time and energy are what make this society thrive. Your expertise, generosity, and passion for trenchless technology are the heartbeat of our mission, and I want to express my deep appreciation for everything you do.

Looking ahead, we're thrilled about the upcoming **2025 Mid-Atlantic Trenchless Conference**, which will be held in **Deptford, New Jersey on September 18**. This event is a fantastic opportunity for our local trenchless professionals to connect, learn, and share best practices. The agenda is shaping up with a strong lineup of technical presentations, networking sessions, and regional project spotlights that reflect the ingenuity and diversity of our field. I encourage all members, whether you're a long-time veteran or new to the industry, to attend and take full advantage of what this regional gathering has to offer.

While our regional events are essential to strengthening local networks, NASTT also provides you with opportunities to engage with trenchless leaders on a global scale. First up is the **2025 No-Dig North & ISTT International No-Dig**, taking place in **Vancouver, British Columbia, October 27-29**. This combined conference will bring together trenchless professionals from around the world, offering a unique platform to showcase North American innovation alongside global advancements. It's a rare and valuable chance to learn from international peers and share the outstanding work being done across our region.

> ***"ONE OF THE MOST INSPIRING ASPECTS OF OUR ORGANIZATION IS THE DEDICATION OF OUR VOLUNTEERS!"***

Then, in 2026, we'll head to **Palm Springs, California for the NASTT 2026 No-Dig Show, March 29-April 2**. Palm Springs promises to be an exciting and memorable destination, and our team is already hard at work planning a world-class event with technical sessions, networking opportunities, and the unmatched energy that makes the No-Dig Show such a cornerstone of our industry calendar. If you've ever considered presenting, volunteering, or exhibiting at a national level, now is the perfect time to start planning for your involvement.

These events, local, national, and international, are only made possible by the engagement and leadership of members like you. As we grow and expand our impact, I encourage you to consider how you might get involved in the months ahead. Whether it's submitting a paper, nominating a deserving peer for an award, supporting student and young professional programming, or participating in one of our many outreach initiatives, your voice matters and your presence makes a difference.

On behalf of the entire Board of Directors, thank you for being a valued member of the Mid-Atlantic region and the larger NASTT family. Your contributions help move our industry forward, one innovative, trenchless step at a time. I hope you'll join the Chapter in Deptford this fall, and perhaps in Vancouver or Palm Springs soon after!

Greg Tippett

Greg Tippett, P.Eng.
NASTT Board of Directors Chair

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2025-2026 MASTT BOARD OF DIRECTORS

Dennis Walsh P.E. – *Chair*

Dennis M. Walsh, P.E. is retired from Public Service Electric & Gas in New Jersey where he was a Senior Project Manager – Horizontal Directional Drilling. He also was a Senior Engineer for Kilduff Underground Engineering in Red Bank, New Jersey.
Dennis is a 1972 graduate of the University of Dayton, Ohio with a B.S. in Civil Engineering and a 2002 graduate of the Polytechnic University of New York with a M.S. in Technology. He previously retired from KeySpan Energy Company in 2005 after a 28-year career in the gas utility field with a background in engineering, operations, construction, Quality Assurance and HVAC. He led KeySpan's efforts to expand the use of trenchless technology in the early 1990s to decrease its main and service installation costs. Past experience also includes consulting engineering in the natural gas industry.
Dennis is a past Board member for NASTT, and a Board member for the NASTT Mid-Atlantic Chapter. He has designed numerous HDD installations for various utilities; including a 1,800-foot HDD for a 30 inch gas main under a tidal basin in Brooklyn, NY; a 2,000-foot 12-inch HDD under an environmental sound in south NJ; a 400-foot long Jack & Bore installation in Newark, NJ; and a 1900-foot HDD of a 30 inch steel pipeline for a 69kV electric system. Dennis is a licensed Professional Engineer in New Jersey. When he is not involved in trenchless projects, he enjoys traveling, and trying to play golf.

John Seibert – *Vice Chair*

John Seibert is the Vice President of Trenchless at Haugland Group LLC. John holds a B.S. in Petroleum and Natural Gas Engineering from Penn State. He was hired directly out of school by Aaron Enterprises, Inc. as an entry level engineer and spent 8 years with the company. Over his time at Aaron, he has gained experiences in jack and bore, pipe ramming, guided auger boring, microtunneling, TBM, pipe jacking and tunneling, pit excavations, shaft excavations, slip lining, pipe rehabilitation, grouting, dewatering and large HDD work which is his primary focus. He was hired by Haugland to expand the companies' trenchless capabilities. He has been involved in over 200 large HDD installs to date along with all other forms of trenchless installation. In addition, he is well versed in design work having worked over 50 designs, many of which his team has installed. He has also authored two papers on trenchless techniques for ACSE. His main goal is to continue to grow the team and provide world class trenchless services. He enjoys golf, working out and hanging out with friends outside of work.

Jennifer Leister – *Secretary*

Jennifer Leister serves as Executive Director of the Upper Montgomery Joint Authority (UMJA), bringing more than 16 years of experience in the wastewater industry.
Since joining UMJA in 2012 as a Laboratory Technician, she has steadily advanced through the organization—demonstrating exceptional technical skill, leadership, and a deep commitment to public service.
Her early work in wastewater analysis laid a strong foundation for her promotion to Assistant Superintendent, where she managed a 13-member team and oversaw daily plant operations. In 2018, Jennifer was appointed Executive Director at a transformative time for UMJA, as the Authority launched a $28 million upgrade to its treatment facility. Under her leadership, the project was successfully executed, significantly enhancing the plant's capacity and efficiency. She also directed the comprehensive rehabilitation of 35 miles of the Authority's collection system, serving the boroughs of Pennsburg, Red Hill, and East Greenville.
In her current role, Jennifer oversees all facets of UMJA's operations, including regulatory compliance, plant performance, infrastructure maintenance, and system inspections. Most recently, she has led the development of a solar farm to generate environmentally friendly power for the treatment plant, reinforcing UMJA's commitment to sustainable energy solutions. In addition, she is overseeing a newly approved biosolids upgrade project, which will enhance the system's long-term efficiency and environmental sustainability.
A strong advocate for employee development, Jennifer fosters a collaborative and supportive workplace culture. She is equally committed to community engagement, working to build trust and transparency with residents and local stakeholders.
Outside of her professional life, Jennifer enjoys gardening, traveling, and photography—pursuits that reflect her creativity, curiosity, and appreciation for nature and new experiences.

2025-2026 MASTT BOARD OF DIRECTORS

Mike Hoffmaster – *Treasurer*

Mike Hoffmaster is a seasoned professional in the trenchless technology industry, with over four decades of experience in underground infrastructure and rehabilitation. A 1987 graduate of Shepherd University with a Bachelor of Science degree, Mike began his career in the precast concrete manufacturing sector, where he dedicated 24 years developing foundational expertise in infrastructure solutions.

His career advanced with leadership roles at Reline America and Pleasants Construction, where he spent 14 years driving growth and technical excellence in pipeline rehabilitation and trenchless services. He also contributed his industry knowledge at Vortex Companies before joining OBIC three years ago. As Vice President at OBIC, Mike currently leads the company's global expansion initiatives, focusing on strategic partnerships, market development, and advancing the adoption of cutting-edge polymeric coating systems for water and wastewater infrastructure.

Mike is an active member of several industry organizations, including NASSCO (National Association of Sewer Service Companies), NASTT (North American Society for Trenchless Technology), and the Water Environment Federation (WEF), among others. His involvement reflects a deep commitment to innovation, collaboration, and professional standards across the trenchless technology field.

Outside of his professional life, Mike enjoys cooking, traveling, and photography. He also has a passion for exploring wineries, breweries, and distilleries, often combining his love for travel with discovering new culinary and cultural experiences.

MID ATLANTIC SOCIETY FOR TRENCHLESS TECHNOLOGY – BOARD OF DIRECTORS 2025-2026

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Thursday, September 18, 2025
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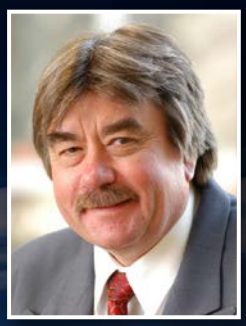
Mid Atlantic 2025 Trenchless Conference

Mid-Atlantic Society of Trenchless Technology
Thursday, September 18, 2025
Adelphia Restaurant & Event Center - 1750 Clements Bridge Road, Deptford, NJ 08096

Conference Event Schedule			Time
Thursday, September 18, 2025			
Welcome Reception		Wed. September 17, 2025 at Adelphia	5:00 - 7:00 pm
Registration and Breakfast		Adelphia Atrium	8:00 - 9:00 am
Welcoming Remarks		Dennis Walsh, MASTT Chapter Chair	9:00 - 9:15 am
Presentations		**Speakers**	
	Session 1	Room: [Room Name]	Time
1.1	Innovations & Lessons Learned from a World Record Length, Large Dia. Subaqueous HDD Crossing Project in VA	Dave Sackett (Brierley Associates)	9:15- 9:45
1.2	Understanding Design Criteria When Utilizing Polymerics for Vertical Structures	Mike Hoffmaster (OBIC LLC)	9:45- 10:10
1.3	HDD Design with Construction in Mind	Cole Byington (BOND Civil & Utility)	10:10-10:35
Break 10:40 - 11:00 am			
	Session 2	Room: [Room Name]	Time
2.1	Optimizing Noise Management in HDD Projects: Accuracy, Feasibility and Cost Efficiency	Matthew Cott (Envmnt Noise Control)	11:00-11:25
2.2	Deep Learning-Based Acoustic & Visual Data Fusion for Early Detection of Pipe Anomalies in Urban Infrastructure	Parsa Heydarpour (COWI)	11:25-11:50
2.3	(FFRP) Trenchless Rehabilitation of Pennsylvania's 9,100-foot Raw Water Transmission Main	Ahmed Hassan (JF Creamer & Sons)	11:50 - 12:15
Lunch 12:15 - 1:15 pm Mike Hoffmaster MASTT Chapter			
	Session 3	Room: [Room Name]	Time
3.1	Ducking Pitfalls at West Windsors New 48-inch Interceptor	Matthew Milgrom (Kilduff Underground Engineering)	1:15 - 1:40
3.2	Guidelines for HDD – ASTM F1962 vs. MAB-7 What's the Difference?	Lawrence M. Slavin	1:40 - 2:05
3.3	Calculating and managing buoyancy during annular grouting	Kirk Roberts (CJ Geo)	2:05 - 2:30
Break 2:30 - 2:55 pm			
3.3	Removing the Mystery around Styrene Effects at POTWS	Chris Garrett (NASSCO)	2:55 - 3:20
3.4	Horizontal Hammer Boring Provides New Solution to Old Problem	Scott Murray (NE Remsco)	3:20 - 3:45
Closing Remarks		Nenad Gucinski, Todd Kilduff	3:45 - 4:00

INNOVATIONS & ADVANCEMENTS IN TRENCHLESS TECHNOLOGY:



Mid Atlantic Trenchless Technology Conference Keynote Address December 12, 2024

By: George Ragula, RAGULATECH

Good Morning – Appreciate the invitation to be here and spend some time speaking with you at this inaugural, new and improved Chapter conference. I take great pleasure in speaking to a group that has recently reorganized, refocused and frankly rejuvenated itself under a new leadership team. Your time has finally come, and I applaud you all on your firm determination, hard work, and efforts.

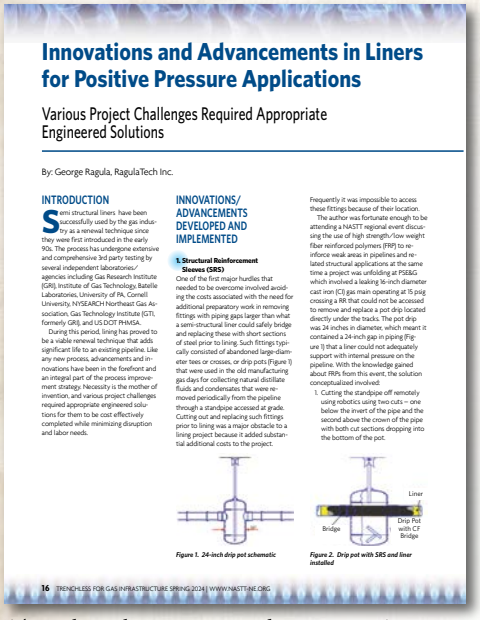
Let me start out with a phrase that all of us here today as solution providers to unique & challenging projects are familiar with, and that is: "Necessity is the mother of invention".

In terms of my background, I've been involved with trenchless since the mid-80s & joined NASTT on April 1, 1993, after staying abreast of ISTT activities in trenchless on the global scene that sparked my interest. For those of you who know & remember Mike Willmets, former ED of NASTT & his great sense of humor, he constantly reminded me that I joined NASTT on April Fool's Day! Little did I know at that time that I was given the opportunity to make a difference.

> ***"I APPLAUD YOU ALL ON YOUR FIRM DETERMINATION, HARD WORK, AND EFFORTS."***

My career has varied in many different disciplines of the gas utility business. Eventually that led me to a focus in the R&D area, where after I learned the business, I could apply myself towards developing unique technical solutions to challenging practical day-to-day problems. As it turned out, my trenchless interests, background, expertise & strengths dovetailed very nicely with R&D, which ultimately became a primary area of focus. In many respects, I became a trenchless pioneer in the gas industry, and as the old saying goes "Pioneers get arrows up the derriere" and I've had my share of those.

HDD & Pipe Splitting were just starting out then & were in their infancy. Naturally there was a relentless focus by industry champions, such as yourselves for improvements, innovations & advancements that have brought these methods to the forefront. HDD continues to be growing in the construction area as noted by multiple issues throughout the



Innovations and Advancements in Liners for Positive Pressure Applications

Various Project Challenges Required Appropriate Engineered Solutions

By: George Ragula, RagulaTech Inc.

INTRODUCTION

Semi structural liners have been successfully used by the gas industry as a renewal technique since they were first introduced in the early 90s. The process has undergone extensive and comprehensive 3rd party testing by several independent laboratories/agencies including Gas Research Institute (GRI), Institute of Gas Technology, Batelle Laboratories, University of PA, Cornell University, NYSEARCH Northeast Gas Association, Gas Technology Institute (GTI, formerly GRI), and US DOT PHMSA.

During this period, lining has proved to be a viable renewal technique that adds significant life to an existing pipeline. Like any new process, advancements and innovations have been in the forefront and an integral part of the process improvement strategy. Necessity is the mother of invention, and various project challenges required appropriate engineered solutions for them to be cost effectively completed while minimizing disruption and labor needs.

INNOVATIONS/ ADVANCEMENTS DEVELOPED AND IMPLEMENTED

1. Structural Reinforcement Sleeves (SRS)

One of the first major hurdles that needed to be overcome involved avoiding the costs associated with the need for additional preparatory work in removing fittings with piping gaps larger than what a semi-structural liner could safely bridge and replacing these with short sections of steel prior to lining. Such fittings typically consisted of abandoned large-diameter tees or crosses, or drip pots (Figure 1) that were used in the old manufacturing gas days for collecting natural distillate fluids and condensates that were removed periodically from the pipeline through a standpipe accessed at grade. Cutting out and replacing such fittings prior to lining was a major obstacle to a lining project because it added substantial additional costs to the project.

Frequently it was impossible to access these fittings because of their location.

The author was fortunate enough to be attending a NASTT regional event discussing the use of high strength/low weight fiber reinforced polymers (FRP) to reinforce weak areas in pipelines and related structural applications at the same time a project was unfolding at PSE&G which involved a leaking 16-inch diameter cast iron (CI) gas main operating at 15 psig crossing a RR that could not be accessed to remove and replace a pot drip located directly under the tracks. The pot drip was 24 inches in diameter, which meant it contained a 24-inch gap in piping (Figure 1) that a liner could not adequately support with internal pressure on the pipeline. With the knowledge gained about FRPs from this event, the solution conceptualized involved:

1. Cutting the standpipe off remotely using robotics using two cuts – one below the invert of the pipe and the second above the crown of the pipe with both cut sections dropping into the bottom of the pot.

Figure 1. 24-inch drip pot schematic

Figure 2. Drip pot with SRS and liner installed

Throughout the years many advancements & innovations have been implemented

years of Trenchless Technology magazine with forecasts that this installation technique will continue to expand. We've migrated towards longer and larger diameter bores with greater dependability, and higher success rates. The use of Direct Pipe – a break-through technology in my view, has augmented the viability of HDD under adverse soil conditions, and yet we are still refining & improving the overall process thru active R&D efforts working on obstacle detection & preventing cross bores to further advance the process. That's real progress we should all be proud of.

Likewise, in the old days of pipe splitting or bursting, certain fittings could not be split, which has also now been successfully alleviated for the most part. We've expanded the process with appropriate tooling to include plastic pipe slitting & have witnessed tremendous progress in that area.

Live CCTV inspection has also progressed exponentially from the old black & white camera days with limited lighting when I got involved at the ground floor level, to expanded color picture systems with automated drive components. In the case of the gas industry, such systems served as a natural platform for the successful development

"ALL OF US HERE TODAY ARE SOLUTION PROVIDERS TO UNIQUE & CHALLENGING PROJECTS."

& eventual commercialization of robotic systems that can perform NDT on unpiggable transmission systems under live conditions.

Positive pressure liners have been a long staple in the gas industry since the early 90s having come in as a breakthrough technology. Their continued development & refinement have now made them more appealing to the water industry as a breakthrough technology from that industry's perspective and other positive pressure applications. Throughout the years many advancements & innovations have been implemented to enable use in more challenging piping geometries, enhanced cleaning equipment, optimization of vacuum systems, curtain grouting & expanded use of epoxies to supplement the process…….. And yes, longer renewal distances and larger diameter pipe where capacity is critical have been successfully addressed. I've been fortunate enough to be a leader & champion in this area.

Right now, I think SIPP is on the cusp of becoming a breakthrough technology for positive pressure applications from

New World Record CIPL Achieved with Planning, Experience and Networking

Challenging Renewal of 42-Inch Trunk Gas Main under the Garden State Parkway in East Orange, NJ Sets New World Record

By: George Ragula, Public Service Electric & Gas

INTRODUCTION

Technical innovations gained from previous experience, detailed planning, field innovations, and the knowledge base provided by industry research and development were key elements in helping us achieve a new world record last summer lining the largest diameter gas pipeline ever renewed using CIPL.

The new world record diameter milestone set on July 19, 2019 lining 573 feet of 42-inch high pressure cast iron (CI) gas main crossing under the Garden State Parkway at the Central Avenue Bridge in East Orange, New Jersey was accomplished because of the lessons learned by ourselves and lining contractor Progressive Pipe Management (PPM) of Wenonah NJ, in overcoming challenges on previous CIPL projects renewing progressively larger diameter CI gas mains. This breakthrough milestone was achieved with help and expert advice from NASTT industry colleagues.

Records are made to be broken, and surpassed with even greater achievements.

"A tremendous win from a well-engineered plan!"

-David Wickersham, President/CEO, Progressive Pipeline Management

Research and development, based on acquired experience, provides the foundation for this effort. Two years ago in September 2017 we set a new world record, and a major breakthrough for CIPL at the time, when we lined 2,000 LF of 36-inch CI feeder main in nearby South Orange. Largest diameter ever back then, it was one of the most challenging projects I'd ever faced. The lessons we learned lining the 36-inch pipe became invaluable in planning future projects with larger diameters and longer inversions. The obstacles we overcame on this landmark 36-inch project in 2017 were instrumental in driving the new technical innovations that were crucial in setting the new milestone World Record 42-inch CIPL in summer 2019

World record 42-inch CIPL was accomplished because of lessons learned on previous projects.

Longer renewal distances and larger diameter pipe where capacity is critical have been successfully addressed

a repair and renewal perspective as it pertains to difficult piping geometries. It has the real potential for augmenting positive pressure liner applications with difficult geometries combined with the presence of unusual fittings. I recall working on spray-in-place concepts over 25 years ago, and like most concepts the chemical technology simply was not there to effectively repair piping with corrosion holes in it and passing a pressure test. Today's SIPP capabilities have advanced as the chemical industry has advanced and there appears to be success on repairing smaller diameter house piping leaks downstream of the meter. These leaks are commonly small joint or pinhole leaks but the real holy grail is repairing underground distribution piping, many times involving corrosion holes, joint leaks and so forth.

If you take a step back, all these techniques & many other technologies I've not specifically mentioned fit the category of breakthrough technologies when initially introduced. The ongoing

GEORGE RAGULA, NOTED TRENCHLESS AUTHORITY, INDUCTED INTO 2018 NASTT HALL OF FAME

George Ragula thanks audience members at 2018 NASTT No-Dig Show in Palm Springs

At the NASTT 2018 No-Dig Show in Palm Springs, March 25 - 29, NASTT-NE Chapter member George Ragula, Distribution Technology Manager at Public Service Electric & Gas, was inducted into the 2018 NASTT Hall of Fame after an extensive career encompassing 40 years of experience in gas industry engineering, operations, construction, research/development/deployment and management.

George is a noted authority on trenchless technology applications for the gas industry, with 30 years specifically focused on the development and application of various trenchless technology methods for use in the gas industry. Responsible for evaluating cutting-edge technologies that increase efficiency and effectiveness of gas operations and construction, George has been directly involved in the development and implementation of numerous innovative technologies now utilized by the gas industry.

He received his B.S. in Mechanical Engineering from Polytechnic Institute of Brooklyn in New York. George is a past Chair of NASTT and serves on the NASTT No-Dig Show Program Committee. He also teaches several NASTT courses on various trenchless technology topics, including CIPL for the Gas Industry. George has published over 30 papers and reports and has presented numerous papers, including several articles for the *NASTT Northeast Journal of Technical Practices*, most recently describing the important "World Record 36-Inch Gas Main Renewal in South Orange NJ".

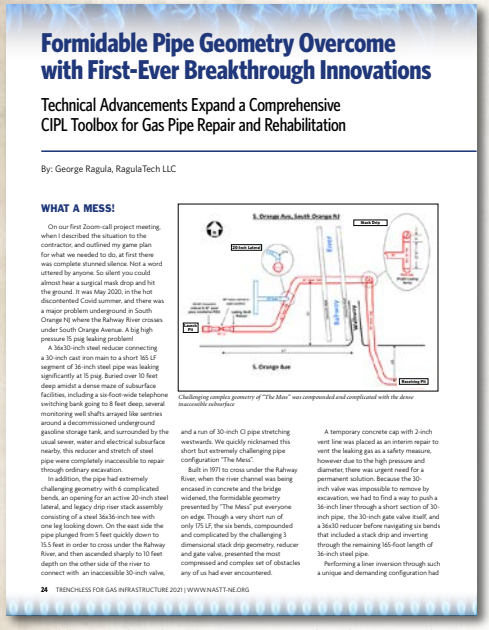
George has also been honored with several American Gas Association awards including the 2000 Milton W. Heath Sr. Memorial Award for his contributions in the field of leak detection, the 2004 Distribution Achievement Award to recognize his outstanding contributions to the science and art of gas distribution, the 2006 Acker Medal and Award for his outstanding paper and presentation, "Robotics Technology Goes "Live" for Repairing Gas Mains"; and the 2009 John B. McGovern Sr. Research Award for his R&D contributions to the gas industry. These gas industry awards were all in recognition for the outstanding contributions George has made towards the utilization of various trenchless technology applications in gas distribution operations and construction.

George Ragula accepts NASTT 2018 Hall of Fame Induction (+/-) Frank Fiveking, NASTT Chair, George Ragula, Distribution Technology Manager, PSE&G, Mike Willmets, NASTT Executive Director, Derek Potvin, Past NASTT Chair

In his spare time, George is an avid technical diver, enjoys skiing and is a corvette collector where he competes in amateur racing. Congratulations again George on your induction into the NASTT Hall of Fame in recognition of your lifetime contributions towards applying trenchless technology methods to the gas industry!

NASTT NORTHEAST REGIONAL CHAPTER

A trenchless pioneer & leader in the gas industry



Formidable Pipe Geometry Overcome with First-Ever Breakthrough Innovations

Technical Advancements Expand a Comprehensive CIPL Toolbox for Gas Pipe Repair and Rehabilitation

By: George Ragula, RagulaTech LLC

WHAT A MESS!

On our first Zoom-call project meeting, when I described the situation to the contractor, and outlined my game plan for what we needed to do, at first there was complete stunned silence. Not a word uttered by anyone. So silent you could almost hear a surgical mask drop and hit the ground. It was May 2020, in the hot discontented Covid summer, and there was a major problem underground in South Orange NJ where the Rahway River crosses under South Orange Avenue. A big high pressure 15 psig leaking problem!

A 36x30-inch steel reducer connecting a 30-inch cast iron main to a short 165 LF segment of 36-inch steel pipe was leaking significantly at 15 psig. Buried over 10 feet deep amidst a dense maze of subsurface facilities, including a six-foot-wide telephone switching bank going to 8 feet deep, several monitoring well shafts arrayed like sentries around a decommissioned underground gasoline storage tank, and surrounded by the usual sewer, water and electrical subsurface nearby, this reducer and stretch of steel pipe were completely inaccessible to repair through ordinary excavation.

In addition, the pipe had extremely challenging geometry with 6 complicated bends, an opening for an active 20-inch steel lateral, and legacy drip riser stack assembly consisting of a steel 36x36-inch tee with one leg looking down. On the east side the pipe plunged from 5 feet quickly down to 15.5 feet in order to cross under the Rahway River, and then ascended sharply to 10 feet depth on the other side of the river to connect with an inaccessible 30-inch valve, and a run of 30-inch CI pipe stretching westwards. We quickly nicknamed this short but extremely challenging pipe configuration "The Mess".

Built in 1971 to cross under the Rahway River, when the river channel was being encased in concrete and the bridge widened, the formidable geometry presented by "The Mess" put everyone on edge. Though a very short run of only 175 LF, the six bends, compounded and complicated by the challenging 3 dimensional stack drip geometry, reducer and gate valve, presented the most compressed and complex set of obstacles any of us had ever encountered.

A temporary concrete cap with 2-inch vent line was placed as an interim repair to vent the leaking gas as a safety measure, however due to the high pressure and diameter, there was urgent need for a permanent solution. Because the 30-inch valve was impossible to remove by excavation, we had to find a way to push a 36-inch liner through a short section of 30-inch pipe, the 30-inch gate valve itself, and a 36x30 reducer before navigating six bends that included a stack drip and inverting through the remaining 165-foot length of 36-inch steel pipe.

Performing a liner inversion through such a unique and demanding configuration had

Challenging complex geometry of "The Mess" was compounded and complicated with the dense inaccessible subsurface

Trenchless technology continues to develop & evolve

constant refinement & improvement process, almost an evolutionary process that naturally occurs has brought them to where they are today and will continue to make them better as technology continues to develop & evolve.

So logically speaking, what does the future hold from a fortune tellers perspective? What is in our horizon? Based on the few examples I cited, technology advancements & innovations will continue to take place, particularly as we are able to take advantage of technologies developed in other business sectors outside of trenchless– like NASA and the space industry, defense industry, medical industry & information technology to name a few. These can be potentially transferred & adapted to our trenchless needs.

But these industry sectors & others will also provide an opportunity & plant the seed for the conceptualization and inevitable development of additional breakthrough technologies in the areas of:

1. AI & its innate ability to perhaps take judgement, individual experience, & interpretation out of the equation.
2. Live robotics for simultaneous inspection, maintenance & repair activities.
3. Internal NDT under live conditions for distribution systems
4. Internal Leak Detection under live conditions
5. 3rd party damage detection/reduction
6. Materials/equipment improvements using high-tech composites.
7. Electric conduit rehabilitation and renewal

Just to name a few.

There are a lot of opportunities out there for our growing industry, but with opportunities come challenges. Many are experiencing the influx of a new, relatively inexperienced workforce. That could be a double-edged sword if you consider that such a group may not tend to cling on to the construction methods of the past, but instead be more eager to try new and different construction methods. On the other hand, that same group by virtue of its inexperience may not know any better and resort to the way its always been done. Technology transfer, training and education play a key role here. Remember that with relatively shallow facilities, the easiest replacement method that requires the least amount of coordination and scheduling is open-cut relay. Within reason (or weather-permitting) you start the job whenever you want, energize the system whenever you want, disconnect and reconnect the services whenever you want, and then abandon the old facility whenever you want. It doesn't get any simpler or better than that as compared with a trenchless project that on a comparative basis requires considerably more planning, scheduling and coordination. A major consideration that may steer people to trenchless under certain circumstances are the restoration specifications and related costs which are constantly expanding with increasing requirements by the jurisdictions having authority. But is that enough to further drive trenchless when the $ is not coming out of your pocket but the company's budget instead?

The emphasis on GHG emissions certainly is positive reinforcement for the use of trenchless techniques due to the smaller construction equipment footprint, combined with overall less disturbance of the surrounding area, including reduced trucking, dumping, restoration, etc. leading to significantly less disturbance to our natural resources.

> ***"THERE ARE A LOT OF OPPORTUNITIES OUT THERE FOR OUR GROWING INDUSTRY."***

Can I please see by a showing of hands how many owners are out there in the audience? While we are strong in industry champions and trenchless education and training; increased owner involvement and participation is a major key to our success. When I look back at it in 1993 when I first joined NASTT and was an owner... working for a gas utility no less... which was really an anomaly, I think deeply about what drew me into trenchless and what made me want to be a leader in this area for my particular industry. I was already a gas industry leader and champion in the R&D area from a development and technology perspective, so it seemed like a logical fit for me from that viewpoint and it certainly was challenging. It was just another form of technology adaptation and transfer to gas applications in a sense. But how do other owners see or perceive it? How do we take it to the next level to get greater owner interest and involvement? Owners are at the center hub of the wheel and the remainder of us are simply spokes providing support to that wheel. As such, owners are key to championing technology, serving as change agents, and being the custodians of risk to some extent. Unfortunately, the easiest thing to do as a result of peer pressure is to maintain the status quo as far as change is concerned... there is zero risk that way and little to be held accountable for since you did it the way its always been done in the past.

In short, there is a critical value and continued need for continued innovations and advancements in trenchless, with the ultimate goal of continued development and successful introduction of breakthrough technologies if we are to be successful in our mission into the future.

Thank you!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CRITICAL CROSSING FOR MOUNTAIN VALLEY PIPELINE COMPLETED WITH HORIZONTAL HAMMER BORING

Herculean Task Completing Route through Mountainous Terrain

By: Richard Revolinsky, Geonex Inc, (GEO)

Mountain Valley Pipeline (MVP), a 42-inch diameter steel natural gas pipeline began construction in 2018. The herculean task of completing the nearly 303-mile route from northern West Virginia to southern Virginia through mountainous terrain deployed a variety of trenchless technologies, specifically chosen for their ability to mitigate environmental disturbance as well as overcome the adverse and challenging ground conditions.

By spring of 2023 contractors had completed approximately 282 miles of pipe installation and right-of-way restoration, but the final 21 miles of pipeline wouldn't be complete and the pipeline in service until June 2024. Part of the final push to

A variety of trenchless technologies were chosen to overcome the challenging ground conditions

"ENVIRONMENTAL CONCERNS WERE A TOP PRIORITY."

completion include crossing of the Stoney Creek in Ripplemead VA.

The 320-foot-long Stoney Creek Crossing required the installation of 42-inch steel pipe. The bore would begin with crossing a 105-foot right-of-way below an active section of Norfolk Southern (NSF) rail line through cobbles and boulders. Once out of the NSF right-of-way, the installation would then continue below the Stoney Creek which serves as habitat for the Candy Darter, a U.S. Fish & Wildlife classified threatened species. After crossing the creek, the installation would continue until terminating outside the limits of adjacent creek braids where crews could tie-in to the open cut section of the pipeline.

The installation was completed utilizing a GEONEX™ Horizontal Hammer Boring (HHB) system by means of Atlantic Underground, a trenchless construction contractor located in Deltaville, VA. Familiar with the ground conditions of the area, Mike Kidd of Atlantic Underground was confident in the GEONEX™ system and HHB to be successful and offered several risk mitigating factors proven beneficial to this critical crossing.

Horizontal Hammer Boring shares several characteristics with other new installation trenchless methods, combining them in a manner making the complete solution extremely effective in a variety of subsurface conditions. The pneumatic hammer of the HHB method is located within the lead piece of casing. The hammer accelerates a full-face cutting head forward to break the rock and simultaneously engage an internal steel collar that pulls the casing along the bore path. Instead of pushing from the rear which often leads to deviations in a path of least resistance, pulling the casing along the path created by the cutting head results in highly predictable results.

Carbide buttons on the cutting head create pin-point fracturing of the rock, and the linear breaking action improves penetration rates through cobbles which tend to roll when utilizing other bore methods that rely on a rotating head to cut and break the material. With each stroke of the pneumatic hammer, compressed air is released through the cutting head which conveys the cuttings into the casing pipe where they are then carried back to the launch pit by hollow-stem rotating auger.

Monitoring and adjusting the operating parameters is crucial to the success of HHB. The GEONEX™ system offers remote control operation with real-time display and adjustment of rotation torque, forward thrust and control of air flow. Along with other features of the system, the umbilical style allows for completely hydraulic and pneumatic operation in the launch pit which is beneficial when the installation is below

The cobbles and boulders encountered required a search for an effective trenchless method

Horizontal Hammer Boring is extremely effective in a variety of subsurface conditions

the ground-water table and the risk of flooding in the excavation is high.

HHB was not the first choice for the Stoney Creek Crossing. Previous attempts included auger boring and pipe ramming. Auger boring proved ineffective due to the cobbles and boulders despite the variety of cutting heads utilized. Additionally concern regarding the potential for an in-rush of water from the saturated ground below the creek could damage the diesel-engine of the auger bore machinery in the launch pit.

The length of the installation and ground formation proved difficult for pipe-ramming as well. Attempts by previous contractors varied in success. The pipe-ramming method only fragments the material encountered by the steel pipe and does not fragment the entire cross-sectional area of the pipe being installed. While ultimately, pipe-ramming was able to install a small diameter steel casing, damage and deflection of the casing required abandonment of the casing, and a search for an alternate method.

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Extensive analysis of the HHB method, GEONEX™ experience and the potential risk and risk-mitigating factors was performed prior to the ultimate selection and deployment of the GEONEX™ HHB system.

Familiarity with the method in North America while growing remains limited. HHB is more common in Europe where the bulk of GEONEX™ systems operate and serves as home to the Finish based company who can boast of more than 200,000 meters installed. Today in North America there are 17 GEONEX™ systems which range in capacity from 5-1/2- to 48-inches diameter, of which only (3) contractors own the (5) HZR1200 machines capable of performing the 42-inch installation exist.

Environmental concerns regarding the Candy Darter and potential contamination of the Stoney Creek were a top priority. A special, non-petroleum based biodegradable oil was required to be used to lubricate the pneumatic hammer. Furthermore, the release of compressed air below the creek could potentially lead to turbidity in the creek which posed risk for the Candy Darter, so strict controls were put into place to prevent disturbance to the creek.

In March 2024, Atlantic Underground and GEONEX received notice to proceed. Expedited delivery of equipment and seamless coordination among the parties involved enabled the installation to begin within 3 weeks of notice. Once in place, the first 105 feet of the NSF ROW was completed within 18 hours. By the end of the 6th day of work, the complete 320 feet of 42-inch casing was installed.

Upon completing the 320-foot installation, MVP crews excavated the receiving pit and removed the peripheral portion of the cutting head, allowing complete retraction of the auger string, hammer and cutting face through the casing. The GEONEX™ equipment was removed from the launch pit at which time consecutive sections of product pipe were welded onto the end of the installed steel casing. A pipe-ram was used to advance the installation of the product pipe while pushing out the steel casing, providing the new complete length of product pipe installation in a little less than 3 weeks.

After completion of the installation, an MVP representative indicated that the project included over 350 bores in the same type of ground, stating "Knowing what we know now about the Horizontal Down-Hole Hammer Boring method and GEONEX, we could have utilized this method on several challenging bores and saved months on the project."

ABOUT THE AUTHOR:

***Richard Revolinsky** is the North American Operations Manager for Geonex Inc. He has served the trenchless industry for the past 10 years in various roles as Project Manager for Auger Boring and HDD projects and material sales. He is committed to furthering the Trenchless Construction industry with viable innovative solutions.*

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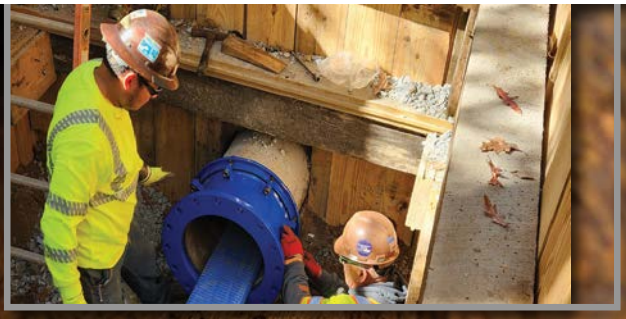

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WHEN TOPOGRAPHY AND PROFILE MATTER

Pennsylvania 9,100-Foot Raw Water Transmission Main Primus Line System Trenchless Rehabilitation

By: Ahmed Hassan, J. Fletcher Creamer & Son, Inc.

This article underlines why the Primus Line System is the best trenchless rehabilitation solution for pressure pipelines with complex profiles, where site topography is particularly challenging, and when severe environmental conditions impose a limited timetable.

Since its installation in 1943, the pipeline has been transferring raw water from the pump station's intake at the creek to a reservoir near the treatment plant. It continuously replenishes the water supply that is being treated before entering the distribution system that serves customers in Chester and Lancaster Counties, Pennsylvania.

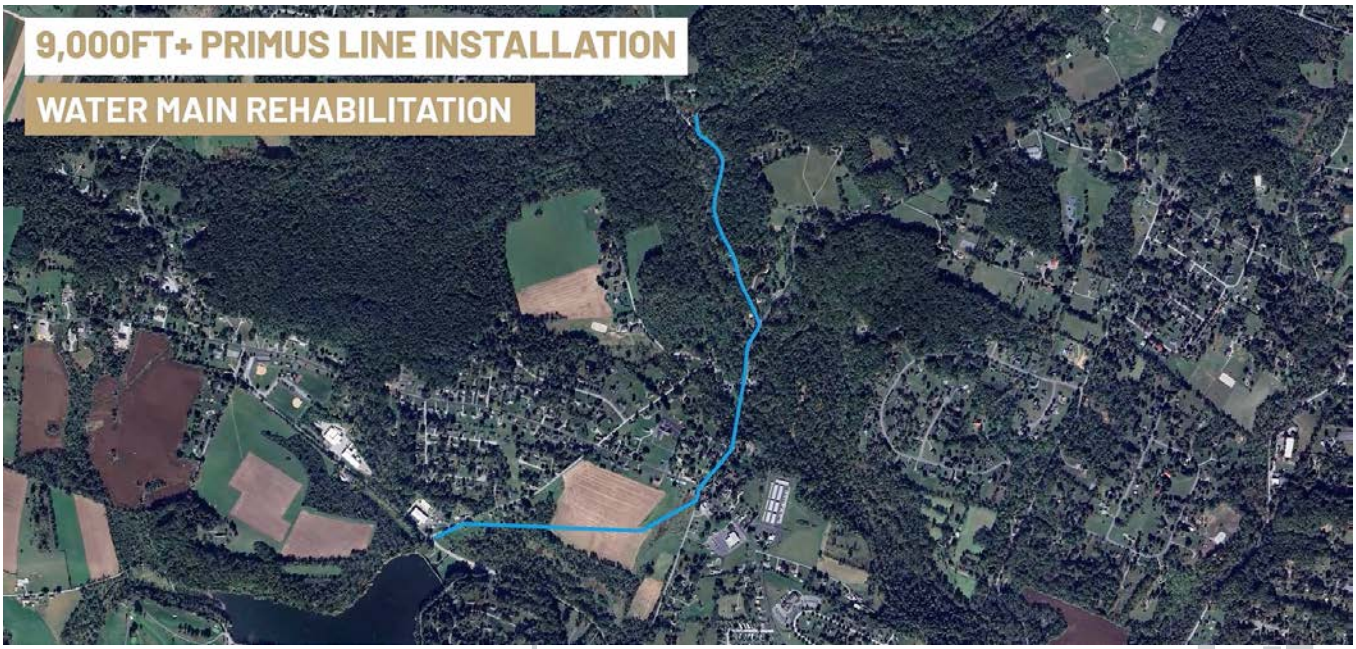
The Cast Iron transmission main traversed across arduous topography featuring hilly terrains, and narrow winding roads. It consisted of a 4,650-foot 16-inch pipeline segment, transitioning to a 12-inch segment at a valve vault that extended another 4,450 linear feet.

Overall, its elaborate profile included thirteen horizontal bends varying in angles between 15 and 52 degrees, three intermediate air release valves, steep slope differentials measuring up to one hundred feet, and sections buried as deep as fifteen feet.

In 2024 after eight decades in service, multiple leaks and significant degradation in system performance demanded a specific rehabilitation solution that will accommodate a very restricted timetable due to a two-month long historic drought heightened by forest fire risk.

Landforms characteristics and the complexity of the pipelines profile posed substantial construction challenges. Furthermore, limited access to a crop field added other logistical difficulties.

Thorough design review of all project aspects, and collaboration between J. Fletcher Creamer, Primus engineering team and the customer; lead to selecting the Primus Line System as the best rehabilitation solution. Its uniquely engineered design accommodates multiple bends and can be installed in single runs up to 8,200 feet, thus requiring much



Uniquely engineered liner design accommodates multiple bends

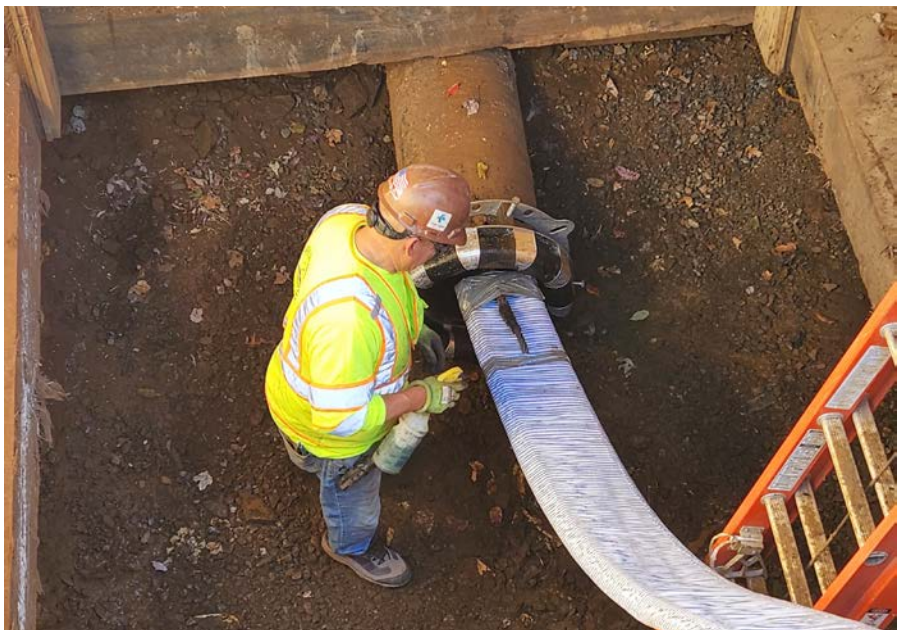
Rehabilitation and pressure-testing of the entire raw water main was successfully completed in under two months

fewer access pits and drastically reducing total construction period. Capping such project dynamics, the customer required that the water main must be back in service no later than the end of October.

In mid-September, the Creamer team started the meticulous planning and management of the rehabilitation project, including site preparation, specialized equipment mobilization, excavation, and transportation of machinery and materials up the winding narrow roads.

In addition to, constantly coordinating with the customer and local DOT to ensure the safety of area community and minimize social and landscape disruptions.

The construction required excavating only "eleven" access pits and installing "seven" Primus liner runs. Four 16-inch liner runs measuring 580, 1,350, 1625, and 1,085 linear feet; and three 12-inch liner runs measuring 650, 1,250 and 2,100 linear feet.



Liner requires fewer access pits and drastically reduces total construction time

In less than two-month period, Creamer successfully completed the rehabilitation and pressure-testing of the entire raw water main, marking October 29th its official back-to-service date.

The excellent teamwork, dedication to excellence, reciprocal support, and shared values of the customer and Creamer teams, culminated in yet another sustainable and environmentally oriented Primus Line System rehabilitation that will extend the service life of this raw water transmission main for decades to come.

ABOUT THE AUTHOR:

Ahmed Hassan *has been the Trenchless Technology Lead at J. Fletcher Creamer & Son, Inc. since October 2022 in the areas of Spray-in-place Pipe (SIPP Epoxy and Cement lining), and Flexible Fabric Reinforced Pipe (FFRP) modified slip-lining. He has over 25 years of experience in pumps and pumping systems, serving numerous water and wastewater markets and clients. Ahmed is a member of NASTT & NASCO.*

LINING A 42-INCH GAS MAIN DELIVERS COST SAVINGS & MINIMIZES DISRUPTION

Successful Rehabilitation in the Heart of Baltimore in Under Three Weeks

By: Thomas Nestoras, Progressive Pipeline Management
Edward Gravely, Baltimore Gas and Electric (BGE)

In the heart of urban Baltimore, a critical 42-inch cast iron gas main was successfully rehabilitated using the STARLINE® Cured-in-Place-Lining (CIPL) in under three weeks. Baltimore Gas and Electric (BGE) chose the trenchless lining solution to avoid the high costs, extensive disruption, and complex permitting associated with full pipe replacement.

Project: Starline® Cured-In-Place-Lining Of 42-Inch Cast Iron
Location: Baltimore, MD
Client: Baltimore Gas and Electric (BGE)
Contractors: Progressive Pipeline Management (PPM), Miller Pipeline

BACKGROUND & SITUATION

A 42-inch cast iron main in urban Baltimore had been repaired over 75 times with internal clamps/mechanical seals. The large diameter original main, a critical gas source, dated back to the 1900s. Buried more than 10 feet deep, the natural gas pipeline segment ran beneath industrial businesses, an elementary school and residential areas. It also crossed underneath a railroad bridge overpass. In the fall of 2024, Baltimore Gas and Electric (BGE) selected Progressive Pipeline Management (PPM) to rehabilitate the 840-foot segment with Starline® Cured-in-Place-Lining (CIPL).

BGE ruled out replacing the gas main for multiple reasons. Replacement estimates

The project team

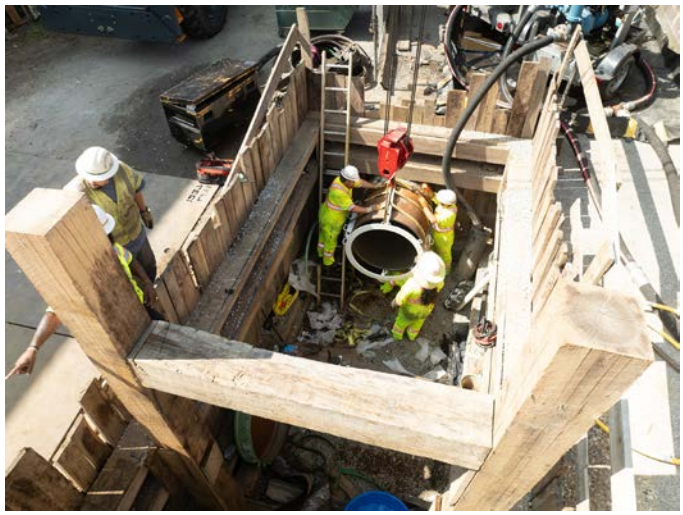
> ***"THE DECISION TO LINE RESULTED IN SIGNIFICANT COST AND TIME SAVINGS."***

The 42-inch cast iron internal pipe surface was cleaned and prepared using grit and a spin blaster

were very high, there would have been significant disruption and a complex permitting process. Full 'trench and replace' strategy would have required road closures, excavation over every one of the 75 connecting joints, and the use of expensive steel pipe. Excavation at that depth would be very costly, taking months to complete. Multiple permits would have been needed to dig under the railroad bridge. Traffic rerouting would have caused disruption to businesses, residents and the K-12 school for months.

After the planning and preparation phases, PPM and Miller Pipeline completed Starline® Cured-in-Place-Lining (CIPL) of the cast iron main in approximately three weeks. Two separate inversions were conducted with the use of three excavation pits and specialized equipment. CIPL proved to be a cost-effective and critical strategy for BGE's leak reduction initiatives. It allowed the utility to take advantage of adding 100+ years of service life to the aging pipeline.

The Starline® CIPL drum, liner and transfer hose moving into the pit for lining



Inside the pit, the 42-inch pipe is being prepared to receive the liner

SCOPE

Once project plans were set, the utility and the excavation contractor excavated three access pits, and organized shutdowns and diversion to the gas service lines. Miller Pipeline removed the 75 internal clamps and mechanical seals that had been installed to prevent leaks.

The project was divided into two segments. The first, 208 feet long, was not straight and included four 90-degree vertical bends and two 45-degree vertical bends. After the first 90-degree bend, a 42-inch drip pot located about 18.5 feet deep required special consideration. A bridge of stainless steel was built and installed by Miller Pipeline to support the path of inversion and protect against any future unintended over-pressurization within the annular space of the drip pot fitting.

The second segment, 532 feet long, included three 45-degree bends and a 16-inch service tee that was being abandoned, leaving a void in the pipe. Before lining, PPM installed a high strength carbon fiber Structural Reinforcement Patch (SRP) inside the pipe to cover over the void at the tee fitting.

As part of the standard procedure, PPM inspected both segments for anomalies or unaccounted for structural defects. Both traditional CCTV crawlers and advanced multi-camera models were used to allow the operator to navigate and traverse the multiple pipe offsets.

The internal pipe surface was cleaned and prepared using grit and a special tool called a spin blaster. Two high-CFM rated dust collecting vacuum units, creating over 50mph airflow, were deployed to reclaim the grit. Once the cleaning was completed, a second CCTV inspection confirmed the segment was clean and ready for lining.

The installation process began by loading the large diameter material into a large remotely steerable pressure drum. The liner was pneumatically inverted and maneuvered through the pipeline while maintaining 8-psi during the ambient temperature curing. A bluetooth/cellular remote pressure device provided real-time pressure readings of the internal curing along with any possible fluctuations.

With the use of a newly designed anchoring device, PPM increased the work-flow efficiency and preserved workspace within the center excavation. While segment one was curing, the crew simultaneously cleaned and lined the second segment. Each segment's cleaning, inspection, lining and curing took approximately three days.

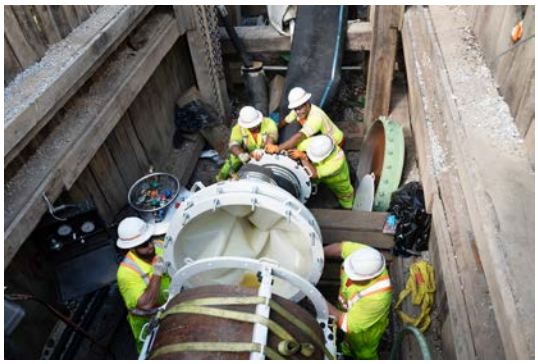
After curing, the liner was depressurized, and the ends were cut out. Post-lining CCTV inspection confirmed full adhesion of the liner to the host pipe. BGE then performed a standard 25-lb, 24-hour pressure test before restoring the main to service and beginning road and curb restorations.

CHALLENGES

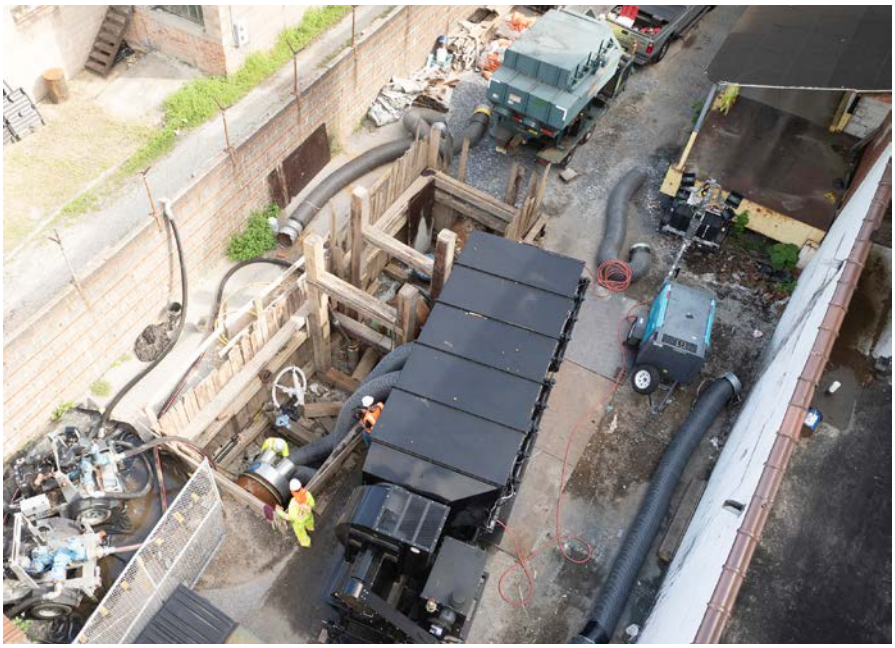
A major challenge was working within the confined space of the lining pit, located in an alley behind an industrial business. The excavated pit was 15 feet deep and 25 feet long, bordered by a brick foundation wall and a loading dock. There was extremely tight spacing for the heavy vehicles and crews required for cleaning, sand blasting and lining. Fast-moving crews had to have access to move, set up and operate the equipment. To lift equipment in and out of the constrained space, BGE brought in a crane.

Ensuring environmental and safety compliance was also critical. The geometry of the pipe and the depth of the pits meant that crews were working up to 8 hours a day inside a trench. Safety protocols and confined space entry procedures for BGE and PPM were put in place to protect the crews performing the clamp removals inside the pit.

Another major concern was water infiltration. The pipeline and excavations were below the water table for Baltimore. Water from a nearby culvert was deemed a significant contamination risk. As


Inside the transfer hose, the liner was pneumatically inverted and moved through the pipeline



A crane was used to lift equipment in and out of the constrained space in the pit

a safety precaution, BGE employed an environmental subcontractor to keep pumps running 24/7, preventing flooding and protecting the nearby stormwater system.

OUTCOMES & RESULTS

Due to careful planning and coordination among BGE, Miller Pipeline, and PPM, the lining was successfully completed ahead of schedule. Community disruption was minimal. Excavation and trenching did not extend into the roadway and traffic flowed with minimal interruptions.

Rehabilitating the 42-inch pipeline with 3 pits in total over three weeks proved far more viable than full replacement. The decision to line resulted in significant cost and time savings. Had BGE opted for replacement of the main, deep pits would have been excavated every twelve feet. Excavating under the railroad bridge may have been nearly impossible because of the embedded steel pillars. The road would have been shut down for months, disrupting nearby businesses, residences and the school. The associated costs of the materials, excavations and environmental compliance would have been extraordinary.

ABOUT THE AUTHORS:

***Thomas Nestoras**, the PPM Chief Operations Officer has specialized in innovative infrastructure renewal for over twenty years. His career in construction started from the ground up, giving him a unique perspective on all aspects of construction, project management and the technology used to recondition pipelines. From "job walk" assessments of projects to handing the finished product back to the client, he is known for identifying process improvements to reduce time and costs. He is an integral part of project management and innovations at PPM which often includes new technologies.*

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***Edward Gravely**, is the Senior Project Manager, Gas Program Management for Baltimore Gas and Electric (BGE), the largest Electric and Natural Gas Utility in Central Maryland. Committed to powering a cleaner, brighter future, BGE serves more than 1.3 million electric customers and 700,000 gas customers in a diverse, 2,300-square-mile area encompassing Baltimore City and all or part of 10 central Maryland counties.*

TYPICAL CRITERIA	HDD	Direct Steereable Pipe Thrusting	Microtunneling	Pilot Tube B
Pipe Diameter	2 - 48 inches	30 - 60 inches	30 - 120 inches	4 - 48 inche
Depth Range	15 - 200 feet	25 - 130 feet	15 - 100 feet	8 - 30 feet
Length Range	200 - >10,000 feet	500 - 4,000 feet	200 - 3,000 feet	50 -300 feet
Maximum Length	>10,000 feet	>5,000 feet (7,500 feet maximum)	2,000 feet with intermediate jacking stations	+/- 400 feet
Minimum Depth of Cover	>25 feet	As low as 2X pipe diameter	As low as 2X pipe diameter	As low as 4(
Design Angles	Entry: 8 to 14 degrees / Exit: 8 to 16 degrees	Launch: 0 to 8 degrees / Reception: 2 to 10 degrees	Typically < 2.5%	Typically < 2
Entry/Launch Approach	Surface entry	Near surface launch	Shaft launch	Shaft launch
Min. Install Radii	Governed by installation & operating stresses	Governed by installation & operating stresses	Generally flat or sloped	Generally fl
Pit/Shaft Design	Shallow pit, non-engineered	Engineered shoring for shallow launch pit; shallow, non-engineered reception pit	Engineered shoring for launch & reception shaft	Engineered launch & re
Foundation	Traditional deadman	Engineered for site conditions & anticipated loads	Engineered for site conditions & anticipated loads	Engineered conditions & loads
Pipe Stringing	Typically exit side	Launch side	Pipe segment storage on launch side	Pipe segmer launch side
Installation Stresses	Tension, bending, hydrostatic buckling & combined	Compression, bending, & combined; column buckling	Compression & buckling	Compressio
Annular Pressures	Hydrostatic drilling fluid pressure & cutting transport pressure	Hydrostatic lubricating pressure & slurry over pressure	Hydrostatic lubricating pressure & slurry over pressure	Hydrostatic pressure
Gravel, Cobbles and Boulders	High risk of failure for > ~30-40% gravel	Can negotiate limited rocks up to 1/3 size of the cutterhead, and up to ~30 - 40% gravel	Can negotiate limited rocks up to 1/3 size of the cutterhead, and up to ~30 - 40% gravel	High risk of
Clay Soils	Risk of hydraulic fracture	Low risk of hydraulic fracture	Low risk of hydraulic fracture	Low risk of fracture
Relative Cost	$$	$$$$	$$$$	$$

GY OVERVIEW GUIDE: NEW INSTALLATIONS

Guided Auger oring	Auger Boring	Pipe Ramming	Pipe Jacking	Hand Mining/ Tunneling
s	12-72 inches	12 - 120 inches	42 - 144 inches	42 - 144 inches
	8 - 30 feet	5 - 25 feet	10 - 40 feet	10 - 40 feet
t	50 - 300 feet	50 - 300 feet	200 - 1,000 feet	100 - 600 feet
	+/- 500 feet w/ guidance	+/- 400 feet w/ guidance	1,500 feet with intermediate jacking stations	1,000+ feet
0-inches	As low as 2X pipe diameter	As low as 1X pipe diameter	As low as 2X pipe diameter	As low as 2X pipe diameter
2.5%	Typically < 2.5%	Typically < 2.5%	Typically < 2.5%	Typically < 2.5%
n	Shaft launch	Shaft launch	Shaft launch	Shaft launch
at or sloped	Generally flat or sloped	Generally flat or sloped	Generally flat or sloped	Generally flat or sloped
shoring for ception shaft	Engineered shoring for launch & reception shaft	Engineered shoring for launch & reception shaft	Engineered shoring for launch & reception shaft	Engineered shoring for launch & reception shaft
for site & anticipated	Engineered for site conditions & anticipated loads	Engineered for site conditions & anticipated loads	Engineered for site conditions & anticipated loads	Engineered for site conditions & anticipated loads
nt storage on	Pipe segment storage on launch side	Pipe segment storage on launch side	Pipe segment storage on launch side	Tunnel liner segment storage on launch side
n & buckling	Compression & buckling	Compression & buckling	Compression & buckling	Compression & buckling
lubricating	Hydrostatic lubricating pressure	Hydrostatic lubricating pressure	Hydrostatic lubricating pressure	Hydrostatic lubricating pressure
failure	Can negotiate up to 1/3 size of the cutterhead	Casing can be sized to swallow up cobbles & boulders	Medium risk of failure. Can access tunnel heading for removal of obstructions	Medium risk of failure. Can access tunnel heading for removal of obstructions
hydraulic	Low risk of hydraulic fracture	Low risk of hydraulic fracture	Low risk of hydraulic fracture	Low risk of hydraulic fracture
	$	$$	$$$	$$$

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BENEATH THE FROST:

Trenchless Technology for Winter Resilience

By: Cole Byington, PE, Bond Civil & Utility & Jesse Lubbers, National Grid

INTRODUCTION

National Grid owns and operates a product storage facility in the Northeast. As the current heating elements beneath an active product storage tank were reaching the end of their useful life, National Grid engaged Bond Civil & Utility (BOND) to provide a turnkey operation to install supplemental heating measures.

As part of the overall scope, BOND's Trenchless Division was called in to complete fourteen 150-foot-long bores beneath the active tank installing 4-inch steel casing to support the temporary heating measures. The bores needed to be accurate with inches of tolerance, requiring the utilization of accurate boring methodologies. BOND utilized its guided boring machine to complete all installations accurately within tolerance as an accurate pilot hole could be established.

The primary factor contributing to this challenging project was the loose granular soils consisting of gravel and cobbles which required the fabrication of a special pulling assembly to ensure successful installations. Additionally, the Project faced challenges resulting from tight spatial constraints, vibration requirements beneath the active tank, and dewatering.

PROJECT BACKGROUND

The National Grid tank facility includes multiple cryogenic tanks that must be kept at a consistent internal temperature. Each tank has a foundation heating system, which maintains the temperature of the tank foundation and surrounding soils.

Freezing beneath the tank can lead to frost heave, where the soil moves upward and outward due to the formation of ice. This movement can potentially damage the outer bottom of the tank if not properly addressed. Therefore, National Grid needed to explore various options to ensure the continued operability of the heating system.

Overall, there are three different zones, requiring 42 total conduits be installed to house the heating system. The initial phase discussed in this article focuses on the 14 bores in Zone 2.

PROJECT CONSTRAINTS

The BOND project team had to work within various parameters and scheduled stoppages outlined by National Grid. These constraints impacted the overall operation plan for the civil and trenchless works, but not the specific trenchless methodology selected to complete this project.

The integrity of the tank foundation was critical, so vibrations as a result of operations and potential settlement had to be minimal. The foundation itself consisted of concrete across the bottom of the tank, with a deep ring foundation along the outer edge. Within

Figure 1. Rig in Pit

the ring foundation was engineered fill and foamglass insulation on top of concrete and sand pads that included the existing heating coils as seen in Figure 2. Vibrations and settlement needed to be kept to a minimum in order to mitigate any potential impact to this detailed foundation arrangement.

CROSSING DETAILS

The project included 14 crossings spaced 3 feet apart to be completed at depths of approximately 8 feet beneath the ground surface. Each bore was to accommodate a 4-inch steel casing that would house two smaller 1-inch conduits.

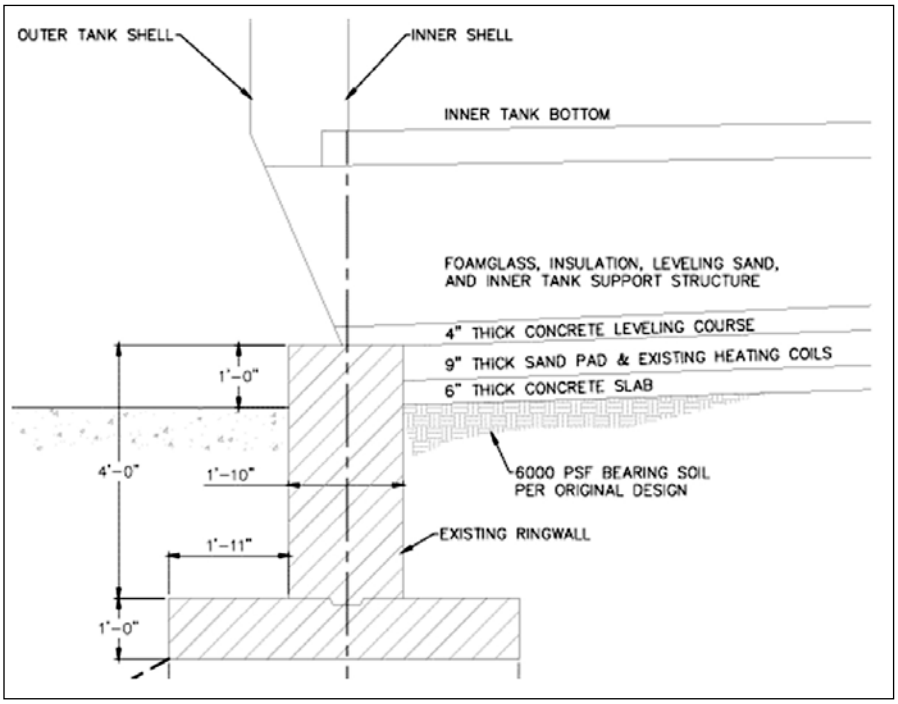


Figure 2. Tank Foundation Detail

Finally, each conduit had to be installed within a 6-inch window, effectively making the tolerance 6 inches left, right, up, and down. Therefore the methodology selected had to be accurate while having minimal vibratory impact.

The casing would then be filled with thermal grout.

Each bore was approximately 150 feet long and had to meet the aforementioned 6-inch tolerance due to the even heating distribution required beneath the existing tank. As pit space was limited, the product pipe had to be pulled back in 10-foot joints as opposed to thrusted through the existing borehole.

Based on the crossing parameters and the constraints outlined above, BOND had to select the optimal installation method to ensure the best outcome for National Grid.

Subsurface Conditions

The installation depth placed the bores beneath the ring foundations and engineered fill into layers of granular fill and glacial outwash deposits over marine clay. The bores themselves were located primarily within a dense sand and silt with gravel and dense gravel with sand layers.

As is typical with glacial outwash and other similar soil strata, cobbles and boulders were also expected to be encountered. This expectation was confirmed as the pits were excavated for the test installations as seen in Figure 3.

Groundwater was encountered at approximately 7 feet deep. Due to the size of the pits and volume of groundwater intrusion, BOND had to prepare for up to 120,000 gallons of water per day to be pumped out of the pit and disposed of.

TRENCHLESS METHODOLOGIES CONSIDERED

The BOND trenchless teamed proposed three potential trenchless methodologies for this project. Each methodology would need a test bore to be completed prior to

Figure 3. Cobbles and Boulders from Pit Excavation

being selected for the project. The three methods considered were guided boring, guided pneumatic hammering, and a down the hole horizontal hammer. To ensure the best outcome for National Grid, each method was evaluated based on accuracy, vibration measured, settlement potential, and required pit size.

Figure 4. GBM in Operation

Figure 5. GBM Steering Display

Guided Boring

The guided bore method consisted of completing a guided pilot beneath the tank and pulling the pipe back towards the launch pit utilizing an Akkerman 240A Guided Boring Machine (GBM). The leading piece of the downhole assembly is a tri-hawk head, specifically meant for varying geology. Using a theodolite with advanced remote-controlled optics set to the desired line and grade, the GBM operator visually tracks the position of the steering head of the pilot tube in real-time. Essentially, a target and crosshair are utilized to ensure the pilot advances towards the fixed exit point. This is typically achieved with inches by the rig operator.

> ***"THE BORES NEEDED TO BE ACCURATE WITH INCHES OF TOLERANCE."***

Guided Hammer

The guided air hammer utilized pneumatics to progress through the soil and mitigate the risk due to the cobbles and boulders. Prior to engaging the hammer, BOND utilized the GBM to advance as far as possible. When an obstacle was encountered, the guided pilot assembly was tripped back towards the launch pit to change from the dirt tri-hawk bit to the hammer assembly. This left a temporary void beneath the tank, which increased settlement risk beyond National Grid's tolerance. Typically, air hammers are mainly used in rock boring applications as they tend to slowly drop each joint in soft soils due to the assembly's weight. While the trial was completed successfully and within tolerance, due to the temporary void left due to tripping operations, this method was not deemed as the most optimal for the application.

Down the Hole Hammer

Finally, the down the hole hammer option was utilized in a successful trial installation. Down the hole hammers can handle varying conditions including boulders or hard rock without issue, making it an appealing option for this application. The primary reason this methodology was not utilized was that while typically accurate, the down the hole hammer has no method of steering or guidance that could guarantee the tight tolerances previously mentioned.

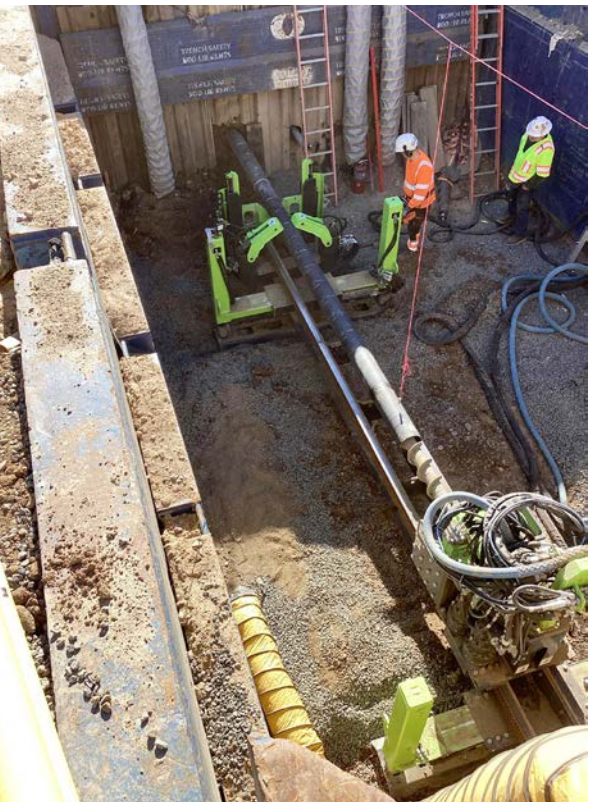


Figure 6. Down the Hole Hammer Machine in Pit

Trial Installation Results

Trial installations were completed successfully with all tested methods, but ultimately the conventional guided pilot bore was selected as the most optimal methodology. This methodology was the most accurate on a consistent basis and not only met the requirements noted above but did not require tripping back, leaving a void beneath the tank.

The primary benefits related to the GBM method was the lack of vibrations, minimal to no cuttings, and the highly accurate and steerable nature of the methodology.

BORING PITS

Pits were excavated on each side of the existing tank. Each pit length was sized to accommodate all 14 bores, resulting in a 47-foot-wide pit. The length had to stay at 12 feet, due to spatial constraints. Another reason the GBM was utilized was due to it fitting snugly within the narrow pit. As a result of the narrow pit, instead of thrusting the product pipe in the borehole as is typical, the pipe had to be pulled back, one 10-foot joint at a time.

GUIDED PILOT OPERATIONS

Once the boring machine was set up, a survey was conducted to confirm the appropriate alignment of the machine. The GBM utilizes a laser target and crosshair system for steerability. The crosshair and target inside the pilot tube will be aligned and secured to ensure that this point is fixed throughout the duration of the pilot pass.

The guided pilot is advanced approximately 3 feet at a time as each pilot tube is pushed forward into the front face of the launch pit. As the pilot is advanced, the GBM operator steers based on the steering display above the controls. In utilizing this methodology, BOND had the best opportunity to meet

"METHODOLOGY SELECTED HAD TO BE ACCURATE WHILE HAVING MINIMAL VIBRATORY IMPACT."

the tight tolerances required for this project.

The primary difficulty related to the guided pilot and specifically the accuracy, was the presence of cobbles and boulders beneath the tank. If hit at a slight angle, the obstruction would push the pilot tube off course, requiring the GBM operator to make corrections to the pilot. The GBM operator knew as soon as an obstruction was encountered, allowing adjustments such as lowering thrust, increasing rotation or lubrication, and letting the bit "chew" on the obstruction as opposed to pushing around it. These adjustments had to be made as there was limited potential to trip back and make corrections. Additionally, minor amounts of bentonite-based fluid were pumped for lubrication which assisted in keeping the hole accurate.

Bottom Hole Assembly (BHA)

For the pilot process, BOND utilized a Tri-Hawk bit as opposed to the alternative pilot tube "paddle" bit that could also have been used. The tri-hawk bit was utilized as it's ideal for the mixed ground conditions encountered in this project. The two bits are shown in Figure 7.

PULLBACK OPERATIONS

Once the pilot was completed, BOND connected the leading edge of the product pipe to the pulling assembly. Due to pit size constraints, one 10-foot-long joint of pipe was pulled in at a time. After each joint was installed, operations paused for welding and inspections prior to continuing.

Pulling Assembly

Initially, BOND's pulling assembly consisted of a swivel shackled to pad eyes connected to the pilot tube and product pipe. While the initial pullbacks were successfully completed using this assembly, on the third installation, a boulder fell into the gap between the swivel and pad eye, resulting in abnormally high pulling loads and a failure in the swivel. To combat this, BOND fabricated a shroud that encompassed the entire pulling assembly, eliminating the gap, and mitigating the risk of a boulder interfering entirely (Figure 8).

The main difficulty when sizing the pullback assembly was finding a swivel with a diameter of 4 inches or less while having as high a tensile capacity as possible. Ultimately, a swivel was utilized that was 3 inches in diameter and had an ultimate tensile load of 90,000 lbs.

Figure 7. Tri-Hawk (Left) and Pulling Assembly (Right)

Figure 8. Shrouded Pulling Assembly

CONCLUSIONS

As a whole, the project was a success with one pullback being completed on average every week. One of the more engaging exercises was trialing the different trenchless methodologies and selecting the optimal one for this specific project through a collaborative effort with National Grid.

The lessons learned, such as the shrouded pulling assembly, will be utilizing on the following phases of the project to optimize efficiency and increase the overall success of the project. BOND will be utilizing what was learned on this phase in the following phases of this project.

"THE GBM WAS UTILIZED WAS DUE TO IT FITTING SNUGLY WITHIN THE NARROW PIT."

ABOUT THE AUTHORS:

Cole Byington, PE *is a well-versed and experienced Trenchless Engineer. He is tasked with oversight and completion of Trenchless Engineering projects and construction-based engineering support. Cole brings a decade of Trenchless Engineering experience that includes Design-Build projects, Horizontal Directional Drilling, Jack and Bore, Direct Pipe and general engineering and construction project management across various sectors and regions.*

Jesse Lubbers*, is a seasoned Project Manager with 20 years in engineering consulting, specializes in energy infrastructure. At National Grid, he serves as the leader of trenchless technology for NY Transco's Propel NY Energy Project, managing major crossings for subsea and terrestrial cables. His work enhances New York's grid resilience and energy delivery.*

OVER 33 YEARS OF BIOGENIC PROTECTION IN HRSD SPLITTER BOX WITH IMERYS SEWPERCOAT®

By: Thomas Tolive and Remy Vawter, Imerys

The Hampton Roads Sanitation District (HRSD) operates 14 award-winning wastewater treatment plants that service 1.9 million people in 20 cities/counties. Combined these plants have a total treatment capacity of 225 million gallons per day (MGD). One of these plants is the James River Treatment Plant; it contributes 16 MGD to this and will serve as the first full-scale plant for the Sustainable Water Initiative for Tomorrow (SWIFT) program, which aims to provide up to 16 MGD of drinking water quality SWIFT Water to the Potomac Aquifer by 2026.

Over a 7-year period, HRSD identified over 3 inches of corrosion in a 6-foot by 6-foot splitter box at the James River Treatment Plant (Figure 1). The splitter box was tested and shown to have a pH of 1.5 with hydrogen sulfide (H_2S) levels exceeding 30 ppm at the time of inspection. This extreme environment caused biogenic corrosion that exposed the concrete's aggregate as well as the reinforcing steel bar (rebar).

Figure 1: Damaged OPC showing exposed aggregates and prepped with new rebar to begin coating

> ***"BIOGENIC CORROSION SHOULD NOT BE CONFUSED WITH CHEMICAL CORROSION."***

HRSD researched available products that would address the corrosion and damage found within the splitter box and chose Imerys SewperCoat® 2000HS as the trial product. The properties of SewperCoat®, a 100 percent calcium aluminate mortar solution, provides the unique ability to neutralize acid, inhibit bacterial activity, while also allowing early return to service. SewperCoat® 2000 HS was dry gunned over newly installed welded wire mesh to a thickness of 3 inches and returned to service the following day. From Day 1, SewperCoat® began providing long term protection against biogenic, H_2S, corrosion (Figure 2). The splitter box is currently still in service 33 years after the initial rehabilitation and continues to perform, showing no signs of H_2S corrosion.

Biogenic corrosion should not be confused with chemical corrosion. Pure chemical corrosion is commonly tested by immersing specimens in a dilute acid solution, frequently referred to as the Pickle Jar Test. The dilute acid attack only involves a sudden chemical reaction, where protons from acid decompose the cement paste's alkaline hydrates. This acid-base reaction precipitates salts that could be dissolved back into the solution or washed away in a dilute acid test. Whereas, biogenic corrosion involves numerous other parameters including: temperature, humidity, biomass, flow turbidity, and more. This reaction occurs in ambient humid conditions through a gradual feed of H_2S into the moist biofilm growing on surfaces above the flowline. The driving force of acid production by bacteria, the biogenic corrosion mechanism, is dependent on bacterial population and activity, the availability of H_2S, the concrete's reactivity to acid as well as the kinetics of the various dissolution-

Figure 2: Finished SewperCoat® 2000HS surfaced sprayed 3 inches thick

precipitation reactions. This mechanism and its gradual process is not addressed in the dilute acid test.

Since the initial coating in 1991, representatives of HRSD and SewperCoat® have continued to monitor the performance of SewperCoat® 2000HS. This was its initial use in an active wastewater facility and has been used as a key reference for the performance, durability, and sustainability of the SewperCoat® line of products available today. The James River splitter box has been inspected at 3, 6, 9, 11, 31, and 33 years of service (Figures 3a-6). The results show SewperCoat® raises the in-situ pH to

"SEWPERCOAT® IS STILL PERFORMING FLAWLESSLY TO THIS DAY SHOWING UNSURPASSED PERFORMANCE."

acceptable levels where corrosion is no longer a mitigating factor for the 100 percent calcium aluminate coating (Table 1).

Years of Service	SewperCoat, pH	Existing Structure Steel Ring, pH	H_2S, ppm
0	NA	1.5	>30
3	>3.0	NA	30
6	>3.0	NA	>100
11	4.0	1.0	NA
31	4.5	1.0	45

Table 1: Evolution of the pH in HRSD structure

Figure 3b: 3-year evaluation close-up

Figure 3a: 3-yr evaluation - Hard surface with no corrosion

Figure 4: 6-yr evaluation - Hard surface with no corrosion; sparked when hit with a pick

Figure 5: 11-yr evaluation- SewperCoat® continues to perform even as the surrounding iron frame begins to deteriorate

Figure 6: 31-Yr Evaluation – SewperCoat® still hard and corrosion free

SewperCoat® works when bacteria colonize on the surface of new concrete, the sulfuric acid attack begins first by a chemical neutralization reaction from the calcium aluminate phases. Calcium aluminate hydrates (Ca + Al + H_2O) are dissolved and react with H_2SO_4 to precipitate both calcium sulfate ($CaSO_4 \cdot 2H_2O$) and hydrated alumina (AH_3). Figure 7 shows the basic neutralization capacity of a unit weight of calcium aluminate is significantly greater than Ordinary Portland Cement by around 40 percent for low pH, i.e. more acid is needed to dissolve the same quantity of CAC. Keep in mind that SewperCoat® is made 100 percent of CAC, so all of the product reacts, not just the cement binder portion.

The result of the first acid attack, the hydrated alumina AH3, precipitates on the surface in the form of a dense amorphous layer. This hydrated alumina layer is very important because it is chemically stable down to a pH around 3-4 (Figure 7). In fact, AH_3 precipitation creates a physical barrier of a few hundred microns to the sulfuric acid penetration as long as the pH remains higher than 3-4. This is the second line of defense of SewperCoat®.

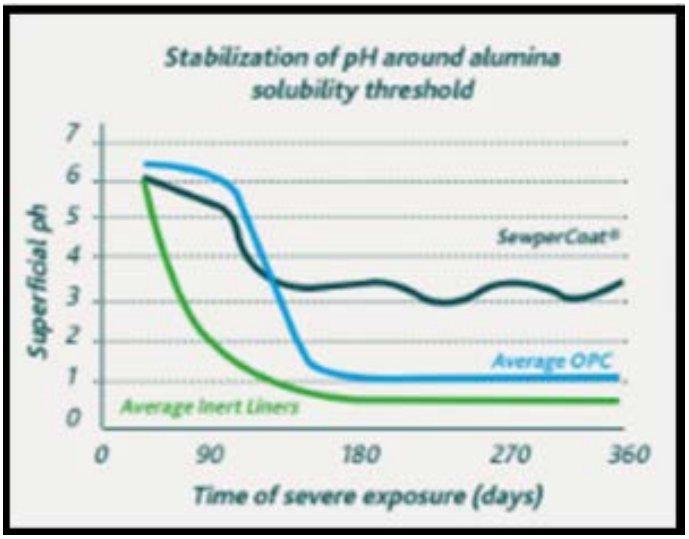


Figure 7: pH Stabilization over time

The essential outcome of the bacterio-static effect of SewperCoat® is that the surface pH stabilizes around the hydrated alumina solubility threshold, i.e. around 3-4. This means that once the hydrated alumina barrier is created, it will last for a very long time. The continuous cycle of alumina is constantly replenished by additional calcium aluminate. Even as some hydrated alumina is dissolved over time to maintain the bacterio-static conditions, the acid concentration remains 100 to 1000 times lower compared to typical sewer surfaces where a pH of 1 is measured. A higher pH implies much less aggressive conditions and a much longer life of the hydrated alumina barrier.

Imerys is the world's leading supplier of mineral-based specialty solutions for the industry with $4.17 billion in revenue and 12,400 employees in 40 countries in 2024. The Group offers high value-added and functional solutions to a wide range of industries and fast-growing markets such as solutions for the energy transition and sustainable construction, as well as natural solutions for consumer goods. Imerys draws on its understanding of applications, technological knowledge, and expertise in material science to deliver solutions which contribute essential properties to customers' products and their performance. As part of its commitment to responsible development, Imerys promotes environmentally friendly products and processes in addition to supporting its customers in their decarbonization efforts.

This first use of SewperCoat® in 1991 at the HRSD James River Treatment Plant is still performing flawlessly to this day showing the unsurpassed performance, long term durability, and the sustainable benefit of using a 100 percent calcium aluminate mortar. SewperCoat® is used daily throughout the world to protect wastewater structures for decades to come.

ABOUT THE AUTHORS:

Thomas Tolive *is the Infrastructure Technical Support Manager for Imerys' Refractory, Abrasives, and Construction Division in North America. Thomas has been in the cementitious industry for over 27 years while specializing in Infrastructure for the last 5 years. During this time, Thomas has worked both in the laboratory optimizing formulations and, in the field, working directly with customers to get the most out of their experience using the current product lines. Thomas is a member of NASTT, ASTM, VWEA, ASA, and ACI; as well as being a Board Member of MASTT.*

Remy Vawter *has over 15 years of experience working with calcium aluminate cements and is currently working for Imerys as the Infrastructure Sales Manager for the Northeast region and Indiana. Starting her career as a Quality Laboratory Technician at Kerneos, she advanced through roles in product development and was promoted to Quality Supervisor. Remy majored in chemistry and earned her Bachelor of Science degree from Old Dominion University.*

811 PA ONE CALL LEGISLATIVE CHANGES

Case Study: Mandatory Damage Reporting in Pennsylvania Helps to Minimize Damages to Utility Assets

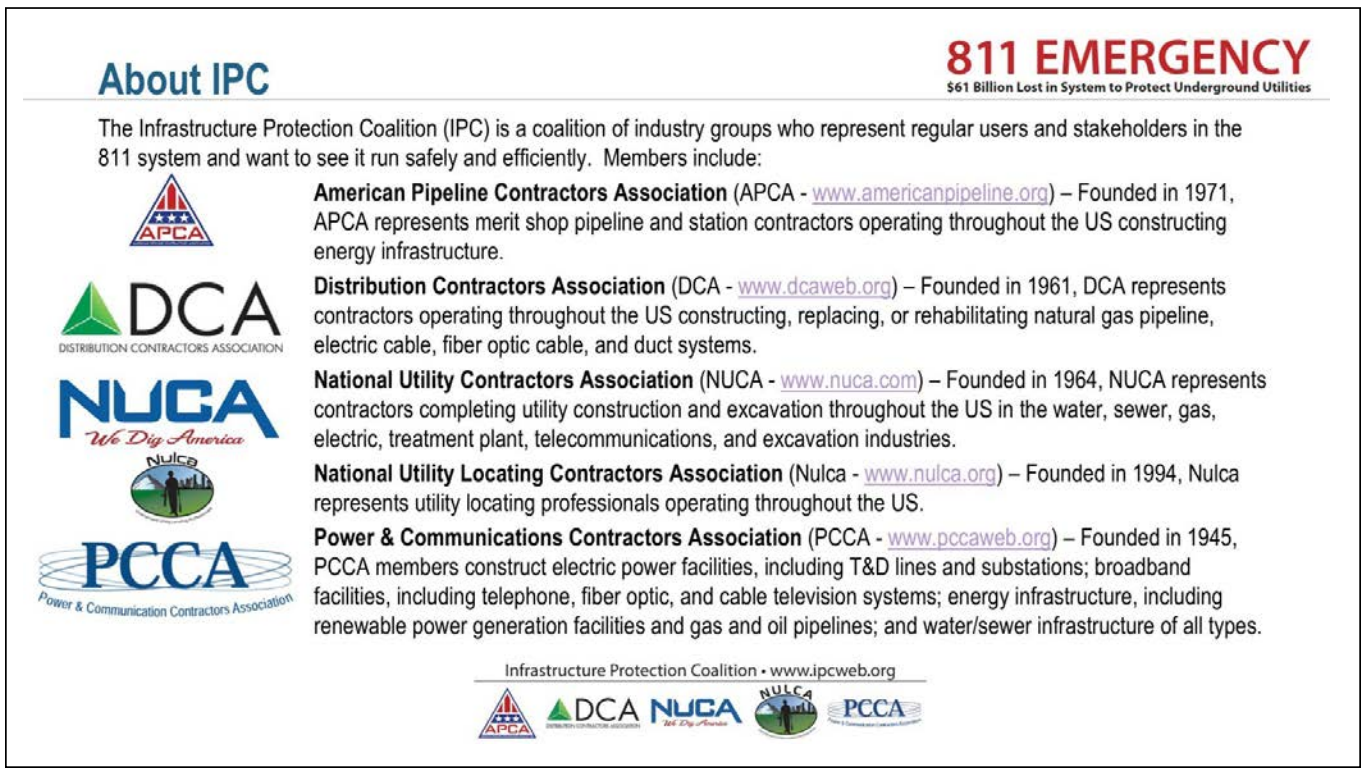
By: Jay Rendos, Continuum Capital

INTRODUCTION

The Pennsylvania One Call Law, also known as the Underground Utility Line Protection Law, is a cornerstone of excavation safety throughout the Commonwealth. It requires excavators and designers to notify utility operators before digging, ensuring that underground utilities are marked and protected from accidental damage. The law has been refined and updated at least 10 times in the last 20+ years. In 2017, one of these updates occurred through Senate Bill 242 (SB 242) was introduced and signed into law in 2018, bringing forth sweeping reforms to the One Call Law with the aim of improving safety, accountability, and efficiency. One component of the changes implemented was a mandatory reporting requirement of all damages by all parties involved in the excavation. Prior to this point, the majority of damage reporting occurred through the asset or facility owner or the locator working on behalf of the asset or facility owner. This particular requirement increased dramatically the reporting on each incident, allowed for more accurate root cause analysis, and resulted in a change in perception on contribution to damage.

CHALLENGE: MANDATORY DAMAGE REPORTING

Historically many states do not require Mandatory Damage Reporting by all parties involved in the excavation. In states without Mandatory Damage Reporting, the information describing the damage and root cause is dominated by asset or facility owner or the locator working on behalf of the asset or facility owner yielded results indicating that the root cause of damage existed primarily (more than 50% of the instances) with excavator/excavation non-compliance or poor performance. In



the absence of more regular and detailed reporting around any damage, primarily from contractors perspective, there is an absence of comprehensive reporting on each incident, inaccurate root cause analysis, and a lack of comprehensive perception on contribution to damage.

SOLUTION: 811 PA ONE CALL LEGISLATIVE REFORM

In 2017, Senate Bill 242 (SB 242) was introduced and signed into law by Governor Wolf and became effective on February 28, 2018. The Law brought forth sweeping reforms to the One Call Law with the aim of improving safety, accountability, and efficiency. One of the major changes of the 2017 One Call Law was to improve transparency and oversight through "Enhanced Recordkeeping and Reporting". The law requires:

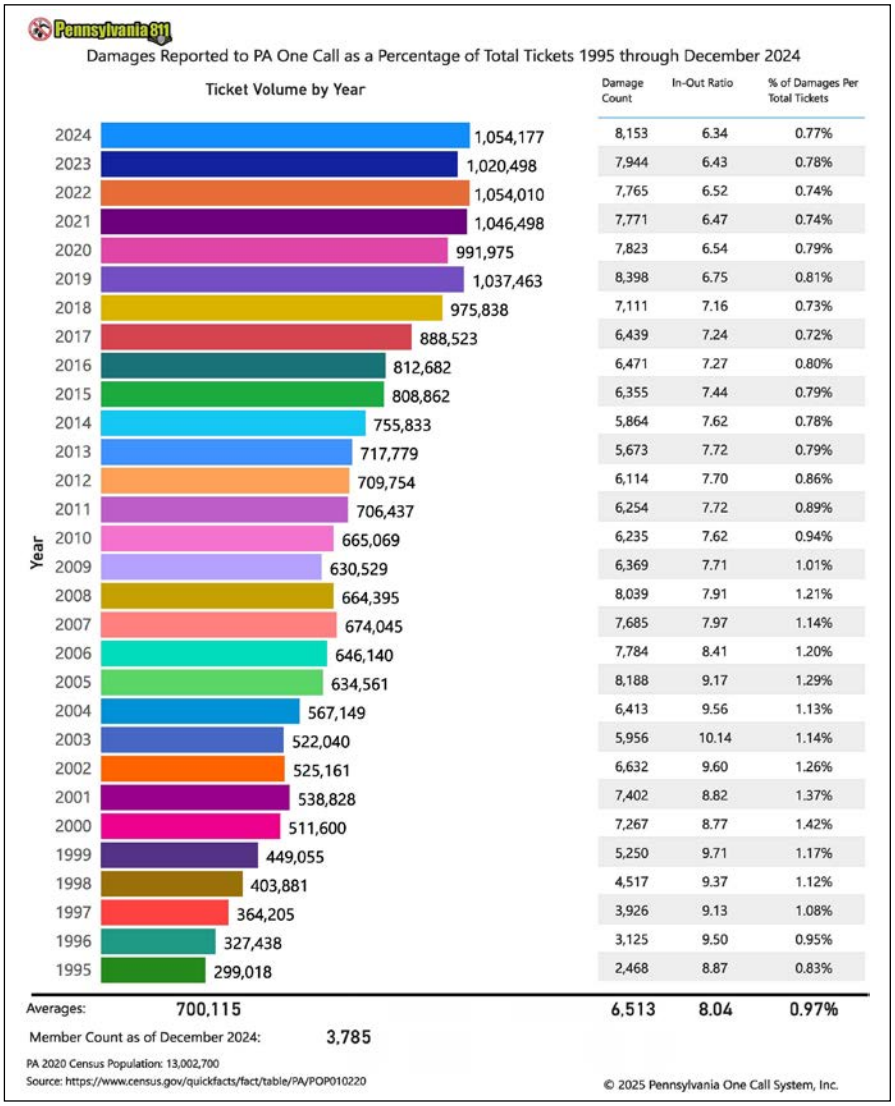
- Detailed recordkeeping of notifications, responses, and excavation activities.
- Mandatory reporting of incidents and damages to the Pennsylvania Public Utility Commission (PAPUC).
- Annual reporting on enforcement activities, violations, and trends.

Before the legislation passed, the prior enforcement authority was the Pennsylvania Department of Labor and Industry. In the 2017 law change, the enforcement authority was transferred to the PAPUC and is consistent with the current regulatory obligations assigned to the commission. The PAPUC has oversight over many underground facilities of utilities operating in Pennsylvania and conducts safety inspections of underground lines. The PAPUC is dedicated to reducing the number of annual line hits thereby reducing damage to utility facilities that can result in property damage and injuries.

The Mandatory Reporting Requirement enables the PAPUC to provide consistent enforcement, the application of a tiered penalty structure, with higher fines for repeat or egregious violations. First-time offenses result in warnings or moderate fines, but repeated or willful disregard for the law can incur substantial penalties. The enforcement actions of the PAPUC are possible through the additional data and perspectives obtained as part of the Mandatory Reporting Requirement. These measures serve as a deterrent and emphasize the seriousness of compliance.

RESULTS: INCREASED DAMAGE REPORTING & DECREASED DAMAGES PER TICKET VOLUME

The Mandatory Reporting Requirement yielded balanced reporting among asset or facility owner or the locator and contractors enabled the PAPUC to provide consistent enforcement, yielded results indicating that the root cause of damage existed primarily (more than 50 percent of the instances) with owner or locator participation/compliance, map accuracy, locator performance or marking accuracy. Since SB 242 was signed into law in 2018, the ticket volume has increased approximately 8 percent from 2018 to 2024 while the damage rate has remained steady below 0.80 percent. (See: "Damages Reported to PA One Call as a Percentage of Total Tickets 1995 though December 2024")



Damages Reported to PA One Call as Percentage of Total Tickets 1995 through December 2024

CONCLUSION

The "811 Emergency" study published by the Infrastructure Protection Coalition (IPC) highlighted $61 billion annually in waste and excess costs embedded within the underground utility locate process. The report identified 13 Recommendations designed to dramatically reduce the waste and excess costs, including Recommendation 2 - Mandatory Damage Reporting. The IPC recommendation is highly aligned with both the Mandatory Reporting Requirement within SB 242 and the process followed by the PAPUC for enforcement. Refinements to the dig law accomplished the following:

- Increased dramatically the consistent reporting on each incident
- Streamlined the damage reporting process via electronic reporting
- Allowed for more accurate root cause analysis
- Resulted in a change in perception on contribution to damage

All states should follow Pennsylvania's example of Mandatory Damage Reporting to make possible the achievement of increased reporting on each incident, more accurate root cause analysis, and change perception on contribution to damage.

ABOUT THE AUTHOR:

***Jay Rendos** is a consultant with Continuum Capital, which provides management consulting, training, and investment banking services to the worldwide energy, utility, and infrastructure construction industry. Jay brings over thirty years of experience and works primarily with gas/electric utilities, power generators, pipeline companies, and energy companies to support the planning, design, construction, and operation of capital assets. He is a recognized expert in both natural gas utility construction, operations, and maintenance along with power generation facility construction and operations including very specialized experience in reduced and no carbon emission facilities powered by natural gas, nuclear, or renewable sources.*

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COORDINATE PA IS THE NEXT GENERATION OF UTILITY COORDINATION

Coordinate PA is a web application developed by Pennsylvania One Call System to support public works, utility project planning and utility coordination within the Commonwealth of Pennsylvania. Users utilize a spatial, map-based system to view underground utility and public works projects, identifying opportunities for coordination and collaboration when projects overlap in space and time.

Coordinate PA Benefits:

- Define projects using a web application (No special software required!) Store project data and records in a secure repository
- Gather and disseminate information to a broader range of stakeholders beyond project planners and public works officials
- Coordinate and collaborate on projects outside your scope of responsibility, saving money and improving service for all parties
- Request meetings and upload documents associated with a complex project

RICHMOND LARGE DIAMETER SEWER REHABILITATION WITH GEOPOLYMER

Geopolymer Lining System (GLS) Significantly Reduces Community Impacts

By: Scott Naiva, P.E., MBA, GeoTree Solutions

INTRODUCTION

In 2024 the city of Richmond bid out its second large scale Geopolymer Sewer Rehabilitation project (24GSR). A Geopolymer Lining System (GLS) is intended for use between 30-inch to 30-foot diameter storm and sanitary sewer pipes and manholes. The 24GSR scope included ~6,200 LF of CSO pipe rehabilitation located at 10 different sites around the city ranging from 24 inches wide x 42 inches tall brick egg up to 72 inches wide x 106 inches tall stone arches and manhole lining.

Municipal and Contactors Sealing Products (MCSP) is both the GC and Geopolymer Lining System (GLS) contractor. Their winning bid came in at $4,331,000. Construction is due for completion in the fall of 2025.

GEOPOLYMER LINING SYSTEM (GLS) SELECTED

For the GLS, MCSP is currently applying GeoTree's LOCTITE GeoSpray HCE (Highly Corrosive Environment) geopolymer mortar to build a structurally independent, corrosion resistant new "pipe within a pipe". The geopolymer contains fibers used to control shrinkage. Richmond's 24GSR project scored the highest on the city's rating criteria and Richmond, along with their engineering consultant, Dewberry, chose to specify a GLS for many of the same reasons Richmond did on their initial 2018 project. The GLS was calculated to have the best life cycle cost at half the expense of spiral pipe and 2X the lifespan, and one-half the liner thickness of Ordinary Portland Cement (OPC) Concrete. In addition, when compared to CIPP, a GLS does not require insertion pits, has a much smaller construction footprint, can eliminate bypass road crossings with an internal bypass and does not have any styrene smell. Contractors still need to mitigate / control minor GLS nuisance dust, but overall GLS significantly reduces community impact.

Figure 1. Site Map showing location of June 2025 construction

PROJECT AREA

Figure 1 shows a map of MCSP's June 2025 construction operation set up for lining 1.5-inch geopolymer on 277 feet of 66-inch diameter brick pipe on Shields Way between Maplewood Ave and Lakeview Ave south of Richmond.

The sanitary flow arrives in 48-inch pipes from the east and west into manholes A1 and A2 and merges at MH B where the pipe increases to 66-inch brick and flows south 277 feet to MH C, then crosses the street to MH D and off site.

For this project area, MCSP lined it from the two set up locations indicated on the map. Figure 2 shows the small construction footprint at setup 1 (@MH-B). Notice one flatbed can carry a generator,

Figure 2. Small construction footprint minimizes community impacts

Figure 3. Generator, compressor, water tank, geopolymer pallets and mixer are carried on one flatbed

Figure 4. Travel lane on Lakeside Ave was kept open throughout construction

compressor, water tank, geopolymer pallets and mixer. This can all be removed from the flatbed if necessary. Figures 3 and 4 show the construction set up 2 (@MH C). Notice one travel lane on Lakeside Ave is still open and across the street in the grassy area is MH D in the background.

Depending on pump equipment, GLS pumping distances can range from 500 to 1000 feet and in addition, a specialized flowable geopolymer can be used to pump 5,000 feet. In this case, even though MCSP could line the whole 277 feet of pipe from one set up location, they chose to work from both MH B and C to shorten the pumping distance, decreasing wear and tear on the equipment. It is also less labor intensive when workers don't have to manage / drag the mortar hoses as far.

The MCSP team feeds the geopolymer and water into the mixer on the flatbed and then dumps and pumps the geopolymer into the pipe for spray lining (See Figure 7). Water is kept above 16 percent so it will pump, and below 20 percent so it will stick. This makes it "self-regulating". Typically, all GLS lining include setting up either internal or external bypass, pre-inspection and CCTV, cleaning with 3,500 psi pressure washing, stopping infiltration with grout, and a GLS application using either centrifugal or hand shotcrete methods. Compression and flexural strength QA/QC testing are completed, and post-rehabilitation inspection / CCTV finalizes the project. MCSP used a wet shotcrete method for all pipe linings


Figure 5: Typical Brick Pipe missing mortar prior to shotcrete of geopolymer

with geopolymer. Note that most people associate 'shotcrete' as hand spraying OPC Concrete. However, technically, shotcrete is not a material, it is a hand spray process. Contractors can shotcrete OPC concrete and shotcrete geopolymer mortar.

Prior to the GLS shotcrete lining application, set screws are placed in the walls of each segment just below the proposed GLS liner thickness. (See Figure 6) This is used as a means of double checking that the proper liner thickness is applied. The screws are covered on the final pass.

FLOW CONTROL

The inherent flexibility of GLS operations means only the dry weather flow must be maintained during lining operations. Should

Figure 6:

1. Depth screws

2. Lateral flow to invert

3. Completed GLS

an unexpected wet-weather event arise, lining operations would cease until the storm passes. For the first portion of the project from MH B to C the lateral flows and dry weather flow are permitted to continue flowing inside the pipe. **See Figure 6 middle picture**. MCSP lined the entirety of the pipe except the laterals and below the invert flow line completing the first 75 percent of the project. This meant MCSP had to control only the lateral and invert flows at the end of the project. For this project location the last 25 percent of the job used an external bypass from the high side of MH B to the low side of MH C (see solid yellow line **Figure 1**). It was very convenient to use a lay flat hose and run it along the gutter line without impacting traffic. However, if a road crossing had been necessary, MCSP could easily have used an internal bypass which is a significant cost saving over temporary bypass pipe burial below a road. If CIPP had been used, the **Figure 1** pink dashed line depicts the additional bypass requiring suction intake at MH 1A and 1B and discharge at MH D which adds two road crossings on the north and one on the south. In addition, the CIPP bypass would need to carry the wet weather flow, often with a second set of backup pumps on standby if needed. Note in some municipalities such as Washington DC, when a pavement is damaged by having to remove a manhole cover for CIPP insertion, or a bypass pipe is buried, the contractor is required to re-pave the entire intersection adding tremendous cost to the project.

ANALYSIS

In the Shields Way location the savings in bypass cost alone definitely favored GLS. It is important to recognize there will be instances where that is not always the case. The larger the pipe is, typically economics will tend to favor GLS vs CIPP. However, in some instances a very large diameter pipe may have to be CIPP if it is unsafe to enter for GLS. Dry weather vs wet weather flow impacts the best technology as well. There are many known and unknown variables that can influence what makes sense. For example, a trenchless contractor may have in-house capabilities for both CIPP and geopolymer and may prefer to do the job with geopolymer, but they may have all their geopolymer crews tied up and therefore utilize CIPP if that is an option on the plans and specs.

As diameters approach the lower GLS 30-inch limit, CIPP can start to close the economic gap. One should consider specifying multiple technologies on the same project, if each provides an acceptable comparable life cycle and acceptable level of impact to the community. There are many tools in the trenchless toolbox, the challenge is enabling the use of them in a contractual format that is on an equal playing field. If, for example, you have a 10,000 linear foot, 30-inch diameter rehab project with the first 5,000 feet in a congested urban commercial restaurant district and the final 5,000 feet in a more rural setting with minimal human impact possibly along a river, should a geopolymer (GP) mortar be used to rehabilitate all 10,000 LF?

Figure 7. Geopolymer and water blended in mixer, dumped and pumped

Sometimes the answer is yes, and sometimes the answer is no. Perhaps the solution is to mandate only GLS in the first 5,000 feet, so the styrene smell does not impact the restaurant district and then open the contract up to GLS and or CIPP in the last 5,000LF of rural area. If there is low flow volume and easy access, perhaps this will favor CIPP. However, if flows are high and it is required to build access roads for CIPP, which are not necessary for flowable geopolymer that can be pumped 5,000LF, then this may favor GLS. You won't truly know the best economic option until you put it to a fair bid test. If your goal is to quantify the last 5,000 feet of GLS vs CIPP total system cost, then to compare apples to apples you can't just have one line item for bypass. You may need to have a GLS bypass and a CIPP bypass bid item because as demonstrated above, these will be two completely different values. Also, to not be contractually biased for one technology over another, it is important that the contract not mandate a GLS base bid with the prime contractor required to do the base GLS work and CIPP that a sub could do as an alternate. This can add 15 percent to the sub CIPP price. The contract documents should be set up so either-or technology can be the prime contractor.

Richmond DPU plans on utilizing GLS technology on other large diameter sewer projects in the future. The city also recognizes GLS as just one of the many tools in their trenchless toolbox.
The key to getting the most economical future project is to structure the bid package on a level playing field and allow economic forces to do their job to keep each acceptable technology competitive.

ABOUT THE AUTHOR:

Scott Naiva, P.E., MBA
is Northeast Region Manager at GeoTree Solutions (Henkel Co.).
He is a former MASTT board member with 36 years of experience in consulting and trenchless rehabilitation.

SHUTTLEMOLE TCSM RETRACTABLE AND RE-DEPLOYABLE TRENCHLESS TECHNOLOGY

An Update from Japan

By: Paul Wilkinson, Kilduff Underground Engineering (KUE)
Tetsuaki Muroi, Iseki Poly-Tech, Inc. (IPT)

Iseki Poly-Tech (IPT) developed the TCSM Shuttlemole machine in the mid 90s to answer demands from their highly successful pipe-roof construction company to have machines that firstly allowed smooth connection to previously installed adjacent pipe roof steel casings one of the indispensable requirements of the pipe-roof construction method and secondly for MTBMs that were recoverable down the installed tunnel line to minimise or in the case of blind-hole-drilling eliminate pipe-roof recovery shaft construction costs without leaving sacrificial cutter heads or cutter head components in the ground.

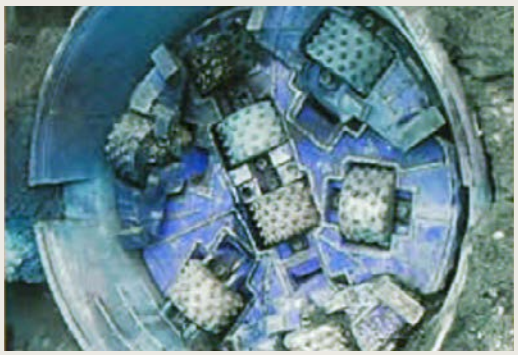
Design of the new machine was based on the proven Unclemole Super technology coupled with a newly developed cutter head incorporating remotely activated hydraulically extending and retracting peripheral cutters.

The machine was installed within a "docking" casing attached to the lead casing of the pipe string and, on completion of the bore the peripheral cutters could be remotely retracted and following disengagement from the docking casing the machine could be winched down the installed tunnel casing for recovery.

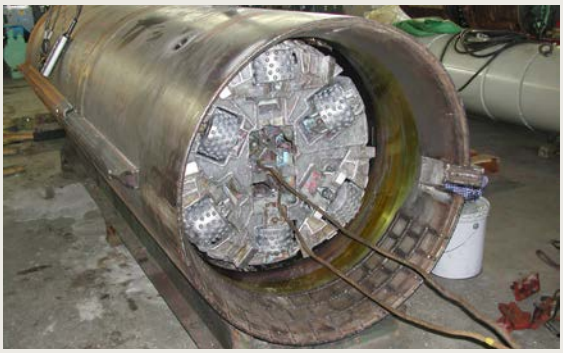
The first prototype 810mm OD machine, designed to install 36-inch (914mm) outer diameter steel casings, was used facilitate construction of a subway under a national highway in the city of Kyoto, Japan where 29 154-foot (47m) long interlinked steel casings formed a 4,471-foot (1,363m) three-sided inverted "U" shaped pipe-roof to provide ground support for excavation of a subway through sand and gravel and clayey sand ground conditions.

Following this early success, IPT moved on to refine and develop the Shuttlemole brand producing a range of machines to install

Peripheral cutters extended for operation



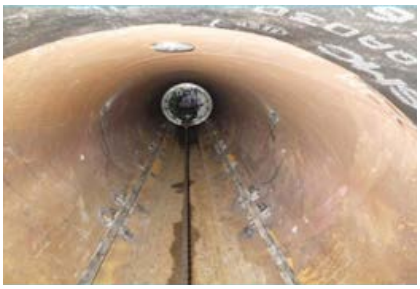
Peripheral cutters retracted to faciltate tunnel recovery



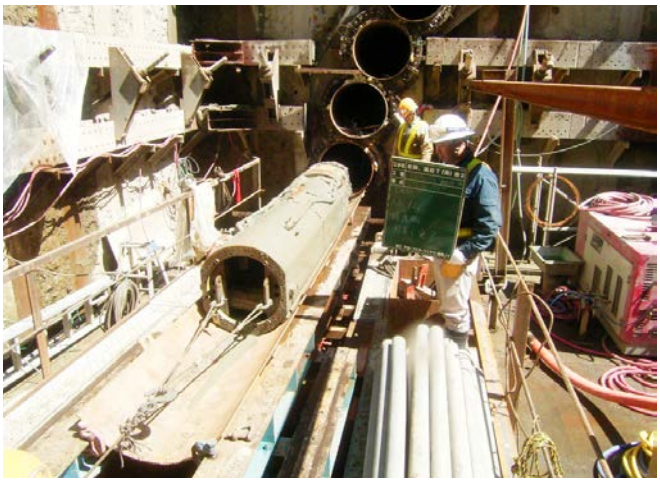
Shuttlemole TCSM recovery process

20-inch (508mm) to 48-inch (1220mm) steel casings for pipe-roof construction projects within Japan and, Singapore.

Utilization of the TCSM machine highlighted the concept and brand had additional benefits in not only being able to be retracted and recovered down an installed tunnel but with the introduction of additional modifications that included the use of Charged-Couple-Device (CCD) audio/visual cameras to identify and inspect tunnel face conditions together with injection ports located in the docking casing to stabilize ground at the tunnel face. This meant that where obstructions were encountered the obstruction could be identified and, where required, the ground could be treated allowing the machine to be disengaged and winched back to the launch shaft to facilitate man-entry access to the tunnel face to remove the obstruction.



TCSM tunnel recovery



TCSM recovered to launch shaft

On removal of the obstruction slurry lines are used to jack the TCSM back to the docking casing where it is reengaged to allow micro-tunnelling operations to continue.

Obstruction confirmed

Removing obstruction

Being re-deployable led to the machine being named the TCSM Shuttlemole some of the substantive brand benefits relating to, reduced risks and widened operational capabilities of this unique system are outlined below:

TCSM prepared for redeployment

TCSM returning to the face

BENEFITS / REDUCED RISKS / REDUCED COSTS

- **No need for RECOVERY SHAFTS**
  - TCSM is retractable down the installed tunnel casing

- **Greatly <u>REDUCES RISKS</u> from Unforeseen ground conditions and obstructions.**
  - Obstructions can be identified Charge Couple Camera (CCD) / Audio
  - Tunnel face ground can be treated where required
  - Obstructions can be removed.
  - Shuttlemole can be re-deployed

- **Shuttlemole can be recovered in almost <u>EVERY</u> situation**
  - Including drive abandonment or mechanical failure.
  - Concept can be used to recovery aborted conventional MTBMs

- **Can <u>REDUCE PROJECT COSTS</u>**
  - No recovery shafts
  - Reduced project schedules
  - Reduced equipment and construction insurance
  - Reduced cost impact of construction claims.

- **Method maintains <u>CASED TUNNEL LINING</u> as compared with other retractable trenchless methods.**

"THE EQUIPMENT AND TECHNOLOGY CAN SAFELY BE VIEWED AS TRIED AND TESTED."

- **In-drive CUTTER CHANGES without man entry access to the face**
  - Cutters can be changed on small diameter / non-man-entry size machines
  - Improved health and safety, cutters are changed on the surface
- **Shuttlemole TCSM Intersections.**
  - Existing manholes, building basements, tunnels
- **Allows for many more APPLICATIONS not previously possible with conventional Micro-Tunneling systems.**

Shuttlemole developments have not stopped, machines can now be supplied to install reinforced concrete (RCP) and polymer resin (PRP) jacking pipes in the range of DN 1000 to DN1650. To date Iseki Poly-Tech have manufactured seventy (70) Shuttlemole machines that have been used to install some 40,000 km (25 miles) +/- of micro-tunnelled lines principally in Japan and Singapore, as such the equipment and technology can safely be viewed as tried and tested.

Iseki Polytech do not merely seek to sell the technology; they realize the brand is more complex than conventional micro-tunnelling systems that involves a learning curve. IPT therefore reach out to work with Owners, Engineers and Contractors in the North American market to establish channels for appropriate technology transfer, assess the viability for successful deployment of the brand on potential projects and ultimately enter joint venture partnerships for delivering successful micro-tunnelling projects utilizing Shuttlemole technology.

ABOUT THE AUTHORS:

***Paul Wilkinson** is a Senior Consultant who has been associated with Kilduff Underground Engineering (KUE) from its onset in 2014 and brings 35 years of Microtunnelling experience to the company. Formerly serving as General Manager for Iseki in Europe, Middle East & Africa Paul has personally overseen the installation of over 120 KM of micro tunnel, on over 200 projects in 27 countries. With KUE, Paul provides consulting on complex Microtunnelling and trenchless projects in North America.*

***Tetsuaki Muroi** joined Iseki Poly-Tech, Inc. in December 2020 as an international sales representative, supporting clients in successfully executing their projects. Since July 2025, he has been part of the Project Management Department, focusing on process automation, data integration, and digital workflow optimization. He has traveled to 60 countries and lived in four.*

VILLAGE OF HAMLER MANHOLE REHABILITATION PROJECT

By: Lee Drugan, OBIC Products

PROJECT SNAPSHOT

Location: *Hamler, OH*

Overview: *Facing severe hydrogen sulfide (H2S) corrosion and excessive groundwater infiltration, the Village of Hamler needed a solution to stop extreme water intrusion into its manholes, which was straining the lagoon system and causing potential compliance issues with the EPA. OBIC's high-performance lining solutions provided an effective and long-lasting fix.*

OBIC Products Used: *• OBIC 2210 Leak Stop Grout • OBIC Armor Lining System*

Certified Installer: *Advanced Rehabilitation Technology*

Job Completion: *25 of 100 manholes rehabilitated in 2022-2023*

SITUATION

The Village of Hamler is a small rural community in Northwest Ohio with aging wastewater infrastructure, including over 100 manholes that serve its sewer system. Many of these manholes had deteriorated over time due to environmental exposure, heavy rain events, and corrosive gases, making infiltration control a growing concern for municipal leaders.

The Village was experiencing extreme infiltration due to deteriorating manholes, leading to 168,000 gallons per day of excess water entering the lagoon system during rain events. This overwhelmed the system, preventing proper retention times and creating the risk of EPA compliance violations. The village needed a durable and cost-effective solution to reduce infiltration and extend the life of its wastewater infrastructure.

Infiltration and inflow (I&I) are serious concerns for municipalities with aging sewer systems. During heavy rain events, cracked manholes and failing pipe connections allow stormwater and groundwater to enter the sanitary system, reducing treatment efficiency and increasing operating costs. In Hamler's case, infiltration was significant enough to dilute and disrupt the biological treatment process at the lagoon facility, pushing the system closer to non-compliance with Ohio EPA discharge permits. Local officials knew that continued inaction could result in expensive fines or emergency repairs, which made it imperative to act proactively.

Severe I&I captured in a manhole in the Village of Hamler

> ***"LOCAL OFFICIALS KNEW IT WAS IMPERATIVE TO ACT PROACTIVELY."***

SOLUTION

To address the problem, Hamler turned to Advanced Rehabilitation Technology (ART), an OBIC-certified installer, to rehabilitate 25 of its 100 manholes. The project was completed in increments of about 10 manholes at a time, allowing for real-time monitoring of improvements.

During the initial phase, the ART team discovered:

- Severe H2S corrosion deteriorating concrete structures.
- Water gushing around pipes and pipe boots.
- Groundwater infiltration overwhelming the lagoon system.

Manhole successfully lined with OBIC products to stop I&I

Each manhole rehabilitation began with a detailed inspection to identify structural damage and active leaks. The ART team used OBIC 2210 – a fast-acting, hydrophilic chemical grout – to seal visible infiltration points. The grout expands upon contact with water, making it ideal for live-flow conditions and high-volume leaks. For particularly severe leaks, the team drilled multiple ports around pipe penetrations to allow for a more complete grout injection and to ensure long-term stability.

After grouting, the surfaces were cleaned and prepped for lining. The OBIC Armor system was then applied in multiple layers, creating a flexible, corrosion-resistant lining that adheres directly to the concrete substrate. The multi-layer system includes a primer, structural layer, and protective topcoat, each designed to handle the demands of high-hydrogen sulfide environments and ongoing moisture exposure. Because the system is spray-applied, it conformed tightly to the existing structure, sealing off weak points and extending the useful life of the asset.

"THE VILLAGE SAW IMPROVEMENTS IN OPERATIONAL EFFICIENCY AND LONG-TERM MAINTENANCE PLANNING."

BENEFITS

The impact of the rehabilitation was immediate and measurable:

- **Significant Reduction in Infiltration:** Within the first week of completing just 10 manholes, infiltration was reduced by **30,000** gallons per day. By the end of the project, total daily infiltration during rain events dropped from **168,000 gallons to 75,000 gallons**.
- **EPA Compliance Restored:** With reduced excess water, the lagoon system could function properly, alleviating compliance concerns.
- **Long-Term Infrastructure Protection:** OBIC Armor's SWAT-tested durability and 10-year warranty ensured long-lasting results.
- **Cost Savings:** By opting for rehabilitation instead of full replacement, the village avoided a far more expensive infrastructure overhaul.

After the project completion, infiltration was reduced by 30,000 gallons per day

The success of the project provided more than just immediate infiltration relief. With the system no longer burdened by excessive stormwater intrusion, the village saw improvements in operational efficiency and long-term maintenance planning. Fewer emergency responses were needed during rain events, and the treatment plant could operate closer to its intended design parameters.

In addition, the manhole rehabilitation project became a model for other rural communities in the region facing similar issues. By demonstrating the cost-effectiveness and reliability of OBIC's trenchless solutions, the Village of Hamler's experience highlights the importance of proactive infrastructure investment—even in small municipalities. With 75 manholes still to address, the village now has a proven, phased approach it can use to continue modernizing its underground assets over time.

This successful project reinforces OBIC's commitment to helping small communities tackle big infrastructure challenges through innovative, long-lasting, and cost-effective solutions.

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Ravan Supply continues to highlight innovations that drive the industry forward, this year, presenting a spotlight on a groundbreaking advancement in Horizontal Directional Drilling (HDD) that promises unparalleled accuracy and efficiency. Hailing from Europe, the new Kormee Nanodrill 3004 with MIPO1005 mud-mixer is a one-of-a-kind machine that has already begun demonstrating its remarkable capabilities with impressive results on US soil.

This Nanodrill isn't just another addition to the trenchless toolkit; it's a paradigm shift for precision utility installations. This ultra-compact, highly portable solution is designed to attach to a mini excavator and is easily transported in a pickup or trailer, making it a viable option for projects previously deemed too small or cost-prohibitive for conventional HDD.

What truly sets the Nanodrill apart is its commitment to true directional control, offering nano-level pilot hole accuracy that dramatically reduces the risk of striking existing utilities—a critical advantage over unguided methods such as "hole hogs" or "missiles". This enhanced control not only safeguards infrastructure but also streamlines operations, enabling cable and utility crews to overcome obstacles, avoid costly open trenching and complete intricate installations with unparalleled speed, efficiency and reduced environmental impact. This exceptional precision technology significantly reduces the need for costly re-drills and ensures the integrity of your pipeline installations from the outset.

Designed with a heavy-duty, sealed construction, this Nanodrill is built for extremes, ensuring maximum uptime even in the harshest underground environments. Its seamless integration with leading HDD guidance systems, such as the DCI Falcon transmitter and DCI Falcon locator, allows for enhanced steering, enabling tighter radii and complex bore profiles. Coupled with an ergonomic design and intuitive controls, operator fatigue is reduced, further improving precision and efficiency.

True directional control offering nano-level pilot hole accuracy

"THE NEW KORMEE NANODRILL 3004 WITH MIPO1005 MUD-MIXER IS A ONE-OF-A-KIND MACHINE."

The Kormee Nanodrill is an indispensable tool for complex HDD projects across vital sectors of the utility infrastructure market. This includes installations for natural gas, water, sewage, telecommunications and corrosion mitigation.

The Nanodrill 3004 is designed for seamless integration with select accessories, ensuring unparalleled tracking and guidance. The included MIPO1005 is the essential, high-pressure mud-mixer expertly designed for efficient Bentonite mixing and pumping, ensuring optimal drilling fluid management throughout the HDD operation.

The DCI Falcon XS 6-IN Transmitter fits directly into the

Ultra-compact, highly portable solution is designed to attach to a mini excavator

A viable option for projects previously deemed too small or cost-prohibitive

drill head providing comprehensive data (depth, pitch, roll, temperature, frequency) for accurate tracking even in challenging conditions.

To complete the system, the DCI Falcon Series Locator (F2 or F5) tracks the Falcon XS transmitter in real-time, displaying drill head location, depth and orientation. Crucially, these locators feature active interference management ensuring precise guidance, which is vital for drilling operations in congested urban areas.

"A PARADIGM SHIFT FOR PRECISION UTILITY INSTALLATIONS."

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