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NORTHEAST JOURNAL

OF TRENCHLESS TECHNOLOGY PRACTICES

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2024 FALL EDITION

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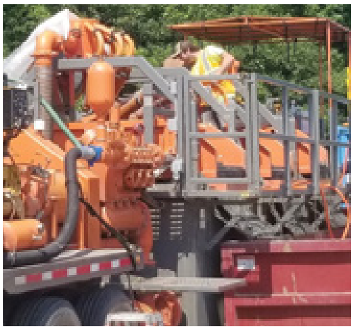
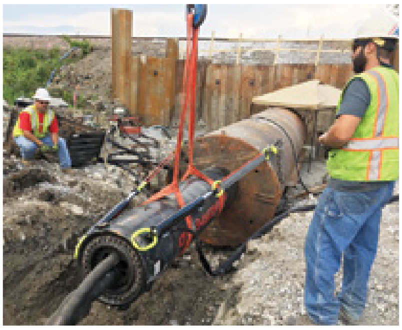


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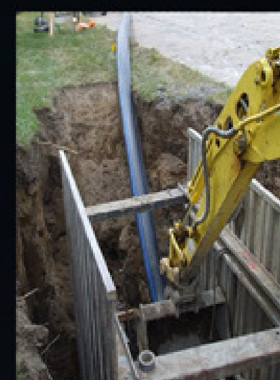

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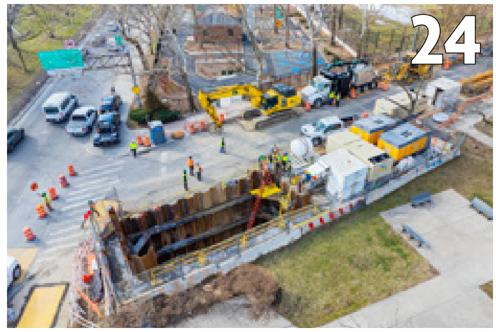

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MESSAGE FROM NASTT-NE CHAIR

Jonathan Kunay, P.E., PMP, NASTT-NE Chair

Welcome to the 17th edition of the ***Northeast Journal of Trenchless Technology Practices***! Thank you for taking the time to open this publication and check out the content that our Chapter has pulled together for this fall edition. I hope that you find the content in this publication to be forward-thinking and useful in your day-to-day work. The individuals who provided content for this edition are passionate about what they do and are committed to propelling the trenchless industry in a positive direction, consistent with industry goals.

2024 NASTT-NE Conference Preview

The 2024 NASTT Northeast Trenchless Conference is being held in Sturbridge, Massachusetts. You may even be reading this welcome message at the conference right now! If not, you are missing out on a great day of educational presentations and outdoor demos, and I encourage you to mark your calendar for November 2025, so you do not miss out again. Our annual conference, held in November each year, continues to bring together the best minds and leaders in the Northeast trenchless community. There are typically over 100 attendees, multiple technical presentation tracks, 20+ exhibitors, and interactive outdoor demonstrations. We are always looking for good content for the program, so please also watch out for our "Call for Papers" sometime next June or July.

"THE INDIVIDUALS WHO PROVIDED CONTENT FOR THIS EDITION ARE PASSIONATE ABOUT WHAT THEY DO."

Board Updates:

As we approach the end of 2024, let us take a minute to look back at the growth of our chapter over the past year. We underwent a change in leadership at the Chapter level and I have assumed the reins as Chair of the Board. My first six months have been a whirlwind as I work to fill the big shoes left behind by the past Chair, Eric Schuler. I have been fortunate to have a solid supporting cast of Charlie Tripp (Vice Chair), John Altinyurek (Treasurer) and Tom Loyer (Secretary) to keep me in line and I will work with all the esteemed members of our Board to continue to push forward the goals of increasing awareness, fostering interaction, and expanding trenchless market growth in the Northeast.

In addition to changes in leadership at the Chapter level, we have added at least six new members to our monthly calls. Since we are able to have as many volunteers as we want, I would like to encourage anyone who is interested in getting more involved with our Chapter to send me an email at **kunayje@cdmsmith.com** if you are interested in being added to the monthly call list. This is a volunteer organization so we can use all the help we can get.

Thank you for taking the time to read this publication. We are all very busy, but staying in touch with trends and topics relevant to the trenchless world is how we make ourselves better at our jobs and connects us with colleagues and friends in the industry to enhance the industry as a whole. Thank you for being a part of our Chapter's journey, have a great time at our Annual Conference in Sturbridge, MA, and get ready for the winter! Looking forward to connecting with everyone again in the Spring edition.

Jonathan Kunay

Jonathan Kunay, P.E., PMP
Chair, NASTT-NE

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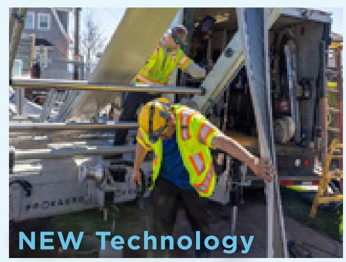
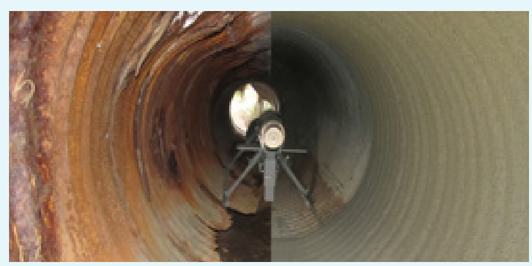
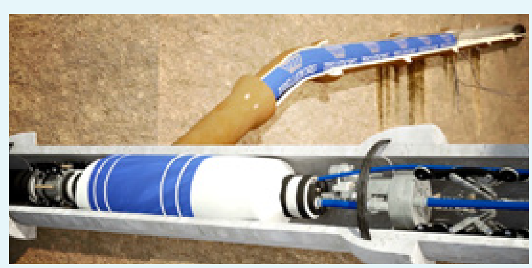


UV Pressure Pipe Lining

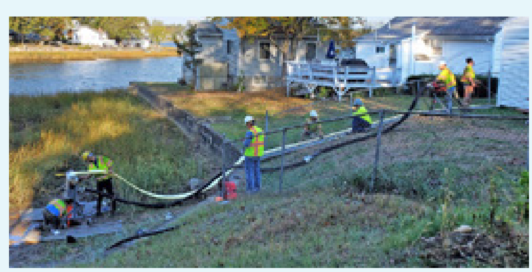
Check out the New London, CT Emergency UV Lining Project:



Spin Casting



Lateral Lining



Steam Cured CIPP Mainlining

MESSAGE FROM NASTT CHAIR

Matthew Wallin, PE, NASTT Chair

Hello Trenchless Champions!

Fall is here and I want to share some key updates and upcoming opportunities that are of importance to your chapter and our organization and industry.

I hope you are joining us for the Northeast Chapter 2024 Annual Trenchless Conference being held on November 11-12 in Sturbridge, MA. This is an exciting event dedicated to advancing the field of trenchless technology in the region. This year's conference promises to be an exceptional gathering of industry experts, innovators, and professionals, offering a unique opportunity to explore the latest trends, technologies, and best practices in the trenchless sector. Attendees will benefit from insightful presentations and valuable networking sessions. Don't miss this chance to connect with peers, gain fresh perspectives, and contribute to the future of the industry. For more information on the conference, visit our Chapter's website: **https://nenastt.org/education-and-events/upcoming-events/**

I'd like to offer a big thank you to everyone who participated in this year's 2024 No-Dig Show held in your Chapter's backyard in Providence, RI. Your engagement and contributions made it a resounding success! The presentations were insightful, and the networking opportunities were invaluable. We are currently in the thick of 2025 planning and we hope you will mark your calendars for March 30-April 4 in Denver, CO! If you have any feedback or suggestions for future events, please do not hesitate to reach out to us at **info@nastt.org**.

"THIS YEAR'S CONFERENCE PROMISES TO BE AN EXCEPTIONAL GATHERING."

We are now accepting applications for our municipal scholarship program for the 2025 conference. The NASTT No-Dig Show Municipal & Public Utility Scholarship awards employees of North American municipalities, government agencies and utility owners who have limited or no training funds with a Full Conference and Exhibition registration to the NASTT No-Dig Show. Hotel accommodations are provided for selected applicants. Recipients have full access to all exhibits and technical paper sessions. Applications received after November 1 will be added to the waitlist, so please spread the word to any eligible candidates who may benefit from this opportunity. Detailed information about the scholarship program and the application process can be found on our website at **https://nastt.org/no-dig-show/municipal-scholarships/**.

NEW HEIGHTS. UNDER GROUND.

We are excited that the fifth edition of the Horizontal Directional Drilling (HDD) Good Practices Guidelines book has been released. And by popular demand, the book is now available in a digital format you can access online from any device, as well as a print-on-demand version coming soon! The fifth edition includes updated content reflecting the latest advancements and techniques in HDD. Alongside the book, we have also updated our HDD training course to align with the new edition. These courses are designed to provide both new and experienced professionals with the knowledge and skills needed to excel in their roles. Please check our website for more details on how to purchase the book and enroll in the courses.

Thank you for your continued support and dedication to our Chapter. Together, we are driving the future of trenchless technology forward. If you have any questions or need further information on any of the topics mentioned, please do not hesitate to contact me.

Matthew Wallin

Matthew Wallin, PE
NASTT Board Chair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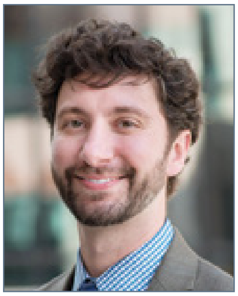

CHAIR
JONATHAN KUNAY. P.E.
CDM Smith
kunayje@cdmsmith.com

Jonathan Kunay, PE, PMP is an Associate Engineer and Conveyance Discipline Leader for CDM Smith in Boston, MA. He has 21 years of experience working as a design engineer, project manager and technical specialist on a variety of trenchless projects including infrastructure assessment with traditional and state-of-the-art investigative techniques, rehabilitation using CIPP, CCCP, HDD, microtunneling and pipe bursting, facilities and master planning, leak detection of water distribution systems, enterprise asset management and risk/criticality studies.

While trenchless technologies have been his primary focus over the past 17 years, he has also worked on civil site design for commercial developments and municipalities, navigated Consent Order driven long-term programs, designed new pumping stations and water distribution systems, and developed alternatives for sewer separation projects. Jonathan is based in New England; however, his diverse project experience has brought him many places to experience unique perspectives in the trenchless marketplace. He has worked on trenchless projects all over the United States including Arizona, California, Texas, Illinois, Tennessee, Louisiana, South Carolina, Nebraska, Virginia, Florida and Georgia. He has also implemented trenchless projects and programs internationally in the Middle East, China, South America, the Pacific Islands, Japan and Europe.

Jonathan was the project manager and design engineer responsible for helping to bring service lateral lining into the New England market in 2008 as part of a comprehensive sewer system rehabilitation program. This comprehensive model has now been adopted across the country as a proven methodology by which infiltration and inflow can be removed in large quantities from the sewer collection system. This comprehensive approach has been presented at conferences to showcase the validity of utilizing a holistic trenchless methodology when large percentages of I/I by volume must be eliminated.

Jonathan has a Bachelor of Civil Engineering and a Minor in Environmental Engineering from the University of Cincinnati, is involved in multiple committees in the National Association of Sewer Service Companies (NASSCO), is PACP, MACP and LACP certified, and is the Vice Chair of the WEFTEC Collection Systems Symposia.

VICE CHAIR
CHARLES TRIPP, P.E.
HDR Inc.
charlie.tripp@hdrinc.com

Charles Tripp, P.E. is a Pipeline Rehabilitation Technical Lead at HDR in Boston, MA. He has 18 years of experience working as a design engineer and project manager on a variety of trenchless projects including pipeline rehabilitation, condition assessment, risk modeling, and general asset management.

Charlie was first introduced to trenchless technologies through his involvement in multiple sanitary sewer rehabilitation projects. He also briefly served as a Field Engineer for a world leading CIPP construction company. This experience provided a wealth of exposure and instilled a desire to pursue and advocate for the use of trenchless technologies in projects as a way of mitigating the impacts of excavation in urbanized areas, but also as a means of cost-effective design.

Charlie studied Civil Engineering at the University of Massachusetts Amherst earning his B.S. and went on to receive his M.S. in Environmental Engineering from the Worcester Polytechnic Institute. He is a licensed professional engineer across New England and the Tri-State area. He is also PACP/MACP certified by NASSCO.

As Vice Chair for the Northeast Chapter of NASTT, a past recipient of the Trent J. Ralston Young Trenchless Achievement Award, and a qualified NASTT CIPP Good Practices Instructor, Charlie continues to capitalize on his devotion to trenchless technologies and in advocating for its use in the local construction market.

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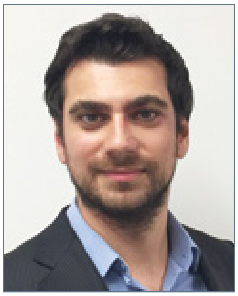

TREASURER

JOHN ALTINYUREK, P.E.
KILDUFF UNDERGROUND ENGINEERING INC.
jaltinyurek@kilduffunderground.com

John Altinyurek is a Project Engineer with Kilduff Underground Engineering, Inc. Over the course of his career in the underground industry, John has worked on major tunneling and trenchless projects in the New York Metropolitan Area. He has been involved in projects for clients such as New York City Department of Environmental Protection; the New York State Department of Environmental Conservation; NYC Department of Design and Construction; New York City MTA Transit; Port Authority of New York and New Jersey; Amtrak; and Nassau County.

For the past ten years, John has focused on trenchless construction management, design and construction of transit, water and wastewater projects, and tunnel and conveyance design projects. He has worked on various pipeline projects utilizing tunneling, microtunneling, pipe jacking, horizontal directional drilling, and tunnel rehabilitation methods.

John recognizes the importance of the NASTT NE Chapter in its promotion of the rapidly growing trenchless design and construction methods in the United States. One of John's goals as a young professional is to engage his peers in the NASTT NE Chapter to become involved in the trenchless industry early in their careers.

SECRETARY

TOM LOYER
ECI – ENGINEERS CONSTRUCTION INC.
tom@ecivt.com

Tom Loyer serves as the Vice President of the Trenchless Technologies Division at Engineers Construction Inc. (ECI) in Williston, VT, where he leads operations in directional drilling, pipe ramming, auger boring, tunneling, and pipe bursting. Since joining ECI in 2011, Tom has been instrumental in advancing underground utility construction projects and driving business development initiatives. Previously, he owned Trenchless Technologies of New England, Inc., pioneering underground utility installations and introducing pipe ramming technology to the Northeast.

Tom's expertise has been highlighted in numerous industry publications, and he has presented at national conferences, further demonstrating his influence in the field.

Beyond his professional accomplishments, Tom is deeply involved in the community. He has served on several boards, including The Associated General Contractors of Vermont as the chairman of the legislative committee and held a position on the board of directors, and as a trustee for the Fraternal Order of Eagle Aerie # 793 as well as volunteering with Shelburne Little League, CSB Youth Hockey, and the CVU Football Boosters Board.

Since 2011, Tom has been the President of The Classic Mike Loyer Foundation, a non-profit, whose primary mission is to assist Vermont families who are dealing with the accidental worksite death of a loved one.

Tom studied business at Champlain College and continues to lead and innovate in the utility construction industry, drawing on his experience and dedication to excellence. Tom, and his wife, Lori, live in Shelburne, VT.

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PAST CHAIR

ERIC SCHULER, P.E.
ONONDAGA COUNTY DEPARTMENT OF WATER ENVIRONMENT PROTECTION
ericschuler@ongov.net

Eric Schuler is a Deputy Commissioner for a public wastewater system serving a population of roughly 350,000 residents. In his leadership role, he oversees Capital Programming, Construction, Asset Management, Fleet, and Inventory Control. Mr. Schuler has nearly 15 years of experience in both the private and public sectors. He earned his Bachelor of Science in Civil Engineering degree from Clarkson University in Potsdam, NY and has primarily been involved in wastewater, drinking water, civil-site, and stormwater sectors. Eric is a licensed Professional Engineer in New York whose design, project management, and construction-related experiences have helped successfully execute many "trenchless"-focused projects.

Early in his engineering career he gained exposure to various trenchless technologies through utility evaluations and development of utility project design alternatives. He immediately started to envision great opportunities for communities plagued by utility deficiencies and construction constraints to utilize CIPP, HDD, among other trenchless technologies; and for them to be able to benefit from both social and economic perspectives. Eric has also stressed the importance for municipalities to incorporate asset management into utility system evaluations and system rehabilitation designs in order to aid development of capital projects and to determine the most suitable trenchless applications for implementation.

In addition to NASTT-NE, Eric is also on the NASTT Board, the President for the Central New York Branch of the American Public Works Association (APWA), and the Secretary of the Board for the Central New York Water Works Conference (CNYWCC). Eric continues to push for growth of trenchless technologies in upstate-New York and has trained utility owners on the use of hydraulic modeling methods for proper development of utility rehabilitation project design. He is an advocate for educating (designers & installers) of trenchless applications through proper training and increased accessibility of industry standards/guidelines to ensure successful project design and execution. The successful use and increased awareness of modern-day trenchless technologies that incorporate innovative equipment and materials are what Eric believes will continue to shape and drive the direction of the utility industry for the coming decades.

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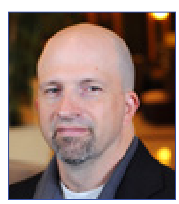

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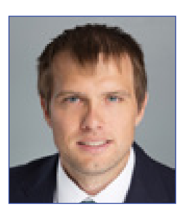

SAM WILBUR
DELVE UNDERGROUND
wilbur@delveunderground.com

NASTT Northeast Chapter Technical Sessions - Sturbridge, MA Nov. 12, 2024				
Time	**Presentation**	**Speaker**	**Presentation**	**Speaker**
7:30 AM	**Registration Desk Opens**			
7:30-8:15	**Breakfast and Networking - Vendor Area Open**			
8:15-8:30	**Opening remarks - NASTT-NE Chair**			
	AM Track 1 - HDD and Microtunneling		**AM Track 2 - Rehabilitation**	
	Moderator - Sam Wilbur		**Moderator - Raj Gondle**	
8:35am-9:00am	Bedrock Characterization Requirements for Microtunneling	*N. Strater - Brierley Associates*	Rehabilitation of Route 9 Force Main in Natick, MA with FFRP	*J. Moody - Raedliner Primusline Inc.*
9:05am-9:30am	Design with Construction in Mind - HDD Design	*C. Byington - Bond Civil and Utility Construction*	A Track Record of Pipeline Assessment and Rehabilitation: A 10-Year History of Sewer Collection System Improvements through the Plymouth CMOM Program	*A. Grota - Environmental Partners*
9:35am-10:00am	Calculating and managing buoyancy during annular grouting	*K. Roberts - CJGeo Inc.*	Emergency CIPP Repair of PCCP Process Piping at Wastewater Treatment Facility	*C. Macey & M.Webb - AECOM*
10:05am-11:35am	Live Outdoor Demonstrations Vari-Tech - Demonstration (10:05-10:50); Precision Trenchless - Demonstration (10:50-11:35)			
11:35am-12:00pm	**Break - Vendor Time**			
12:00pm-1:00pm	**Lunch** **Keynote Speaker - Heather Blakeley - Town of Sturbridge, MA Director of Public Works**			
1:00pm-1:25pm	**Break - Vendor Time**			
	PM Track 1 - HDD Continued…		**PM Track 2 - Innovative Trenchless Solutions**	
	Moderator - Bill Jeffery		**Moderator - Sahar Kunay**	
1:30pm-1:55pm	Never Give Up: Completing a Challenging 2,000 ft HDD Beneath I-495/3 That Was a Decade in the Making	*G. Lella, R. House - National Grid & A. Huli - Haley & Aldrich*	Passaic River Multiple Watermain Crossings, Kearny, NJ	*A. Hassan - J. Fletcher Creamer & Son, Inc.*
2:00pm-2:25pm	Permeation Grouting Methods & Case Studies for Trenchless Applications	*K. Roberts - CJGeo Inc.*	Canton Subarea 27 Sewer Rehabilitation Abstract	*J. Rossini - Kleinfelder, Inc.*
2:30pm-2:55pm	Down Hole Horizontal Hammer Boring for HDD Wash-over Casings Case Study for Champlain-Hudson Power Crossing Congers NY	*G. Gutierrez - JAG Companies & R. Revolinsky - GEONEX, Inc.*	Compact Pit Launched Directional Provides Answer for 540 Sewer Lateral Installations in Sensitive Native American Settlement Area	*K. Traub - Hemlock Directional Drilling*
3:00pm-3:25pm	Geological and Coastal Challenges in the Hertel-New York HDD Installation	*P. Gilliam - Bradley Marin*	Trenchless lead service replacements in Somerville, MA	*R. Golan - Kleinfelder, Inc.*

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KEYNOTE SPEAKER

***Heather Blakeley** is an accomplished engineering professional with nearly 20 years of consulting engineering experience followed by over 12 years in the public works sector. During her career, she has specialized in water and sewer treatment and distribution systems. As the Director of Public Works in two central Massachusetts municipalities, Heather has led significant projects, including asbestos water line replacement and emergency sewer main lining. Her expertise in managing these complex initiatives and pursuing government funding and support reflects her commitment to enhancing community infrastructure and ensuring public safety. Heather is passionate about applying innovative solutions to address the challenges faced in public works, particularly in water resource management. Outside of her professional endeavors, Heather enjoys experiencing New England with friends and family, including exploring local wineries, playing golf, playing soccer, and cheering on the Bruins.*

TRENCHLESS OPPORTUNITIES AND APPLICATIONS: A PERSONAL REFLECTION

UMass Lowell NASTT Student Chapter

By: Tieren Adams, UMass Lowell Student Chapter

When I first started college, it didn't occur to me that it was possible to attend professional conferences as an undergraduate. During my initial months at college, I was solely concentrated on studying for tests, labs, and researching internships; however, when student leaders of our engineering clubs introduced me to the undergraduate activities, my focus expanded. The opportunity to attend industry events (such as those organized by the North American Society of Trenchless Technology or NASTT) , was unexpected. Our club leaders explained we were always welcome to join, and from there I learned about NASTT. At first, my understanding of Trenchless Technologies was limited to basic underground utility repairs, but I gradually came to understand that it encompasses much more than that. Student participation in NASTT and its conferences is essential to broadening a future engineer's knowledge of the trenchless industry.

There were a few instances in my daily life where the applications of Trenchless Technology were obvious. As long as I can remember, it seemed as if every time my mom drove us somewhere, more workers were digging out pipes from beneath the street, holding up traffic and destroying the road. The first articles I read about Trenchless Technology didn't delve into a variety of examples, but it became clear that there was a broader array of applications beyond easing traffic congestion once I began attending No-Dig (NASTT) conferences. Being able to attend professional presentations, such as tunneling underneath former munition sites or creating new metro lines and water cisterns in France, was fascinating and helped me to recognize the sheer diversity of topics that this field contains.

At the most recent NASTT No-Dig conference a student from our university, who graduated a few years before, came to meet us. He gave us advice on how to interact with the different info-tables and what steps he took when navigating his career after college. Merely being in the conference building provided us the opportunity to observe professional-level work and to make new connections through No-Dig. Our school has accumulated enough participants over time that we now benefit from an incredible network of alumni. By supporting students, the program is making an investment in the upcoming generations, steering them into the field, helping them hone their skills early and assembling a workforce that will address complex challenges in infrastructure development.

> **"STUDENTS' INVOLVEMENT WITH NASTT PLAYS A PIVOTAL ROLE IN SHAPING THEIR UNDERSTANDING OF TRENCHLESS TECHNOLOGY."**

Furthermore, attending No-Dig conferences exposes students to the latest advancements in Trenchless Technology and how they can reduce carbon emissions, preserve habitats, and minimize air and noise pollution to improve community health. The technological abilities in this field are highly promoted when doing a brief search on the internet, but their effects on improving community health and general environmental impacts aren't as visibly celebrated to the same extent online. To people unfamiliar with the field, these technologies may seem to be marketed solely as tools of civil engineers (mainly geotechnical engineers), and the work of other professions, such as environmental engineers, may not be brought to their attention. An entire discipline and its accomplishments may go overlooked by new generations of engineers if it isn't sufficiently promoted. When students attend, they get a glimpse of cutting-edge industry tech before they graduate, such as horizontal directional drilling, microtunneling, etc. These techniques are crucial for minimizing environmental impacts, but it's possible that people do not know that this field is open to them if they are not directly involved in the NASTT community.

Our school, the University of Massachusetts Lowell, or UML, has close ties with NASTT, so there are many students in the civil

NASTT-NE Board members and UMASS Lowell Student Chapter members at the NASTT 2024 No-Dig Show in Providence RI

and environmental department involved in these activities. I am fortunate to have made an abundance of friends outside of civil engineering through this organization, specifically environmental engineers. The former president of the UML chapter, who was an environmental engineering major, encouraged me to attend my initial NASTT No-Dig conference in Portland (Oregon) my second semester in college. I've met most of my current friends and colleagues through some connection within this organization, equally split among civil and environmental majors. It is responsible for increasing my sense of belonging in my department, integrating me into the community and bringing me closer to my fellow classmates.

Participation in these conferences also increases individual connections across national and international borders. Students from UML had the chance to meet a group of environmental engineering students from Mexico City and ask them questions about their studies, university life and their home city. Most of them presented their research at the Providence No-Dig conference, and I had the opportunity to observe their work and spend time with them. I still message my former conference roommate when I have the chance to send her updates. The networks that students build now will support them later in their careers and give them platforms to climb from when they are in need of help and students can in turn give advice to friends and colleagues when they are in need. Fostering connections between people from different universities who would not otherwise meet is an achievement of these kinds of programs.

The No-Dig conference is a unique experience that can't be replicated at a university

Lastly, my classmates and I had the opportunity to walk around the Rhode Island Convention Center and explore the company networking tables. Engaging with company representatives and asking questions on their area of expertise was a delightful experience. I've been to a couple job fairs on my campus, but I benefited greatly from meeting many industry professionals for a few days at the No-Dig conference, which is not an experience that can be replicated at a university. Direct participation and engagement in these events encourages senior students to explore specializations and connect with professionals. In essence, senior students' involvement with NASTT plays a pivotal role in shaping their understanding of Trenchless Technology by equipping them with the necessary expertise, insights, and networking opportunities to become future leaders in advancing sustainable and efficient infrastructure solutions.

ABOUT THE AUTHOR:

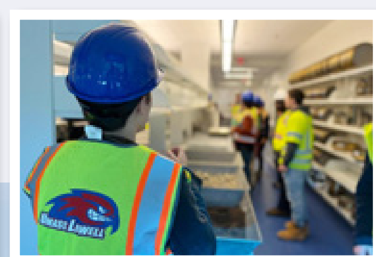
***Tieren Adams** is a senior Civil Engineering student and active member of the NASTT Student Chapter at UMassLowell. She has been part of the Student Chapter since 2022 and is eager to learn even more about all aspects of trenchless technology. She is proud recipient of the NASTT 2024 Argent Memorial Scholarship.*

HISTORY OF UMASS LOWELL NASTT STUDENT CHAPTER

By: Dr. Raj Kumar Gondle (Faculty Advisor)

Established in Fall 2016, the NASTT Student Chapter at the University of Massachusetts Lowell aims to actively engage students, faculty, and industry professionals in trenchless engineering practices and promote learning through hands-on projects, site visits, andindustry events. The chapter has continued to grow, engaging students in trenchless technology practices, industry events, and academic competitions.

The objective of the NASTT Student Chapter is to actively engage in trenchless activities and practice trenchless engineering. Students, faculty, and industry professionals are involved to promote learning of the leading-edge technologies and build opportunities to advance trenchless practices and underground engineering. Today, the UML NASTT student chapter is a long standing civil/geotechnical engineering club in the northeast focused on trenchless engineering and underground construction.



Exciting opportunities are offered as a part of experiential learning and engineering education outside of the classrooms

Prof. Raj Gondle from the Department of Civil & Environmental Engineering (CEE) initiated the student chapter with strong support from the trenchless industry. Prof. Gondle continues to serve as the faculty advisor to oversee the chapter and help as needed. Also, the Student Chapter is fortunate to have industry leaders like Dennis Doherty, a National Trenchless Practice Leader, to serve on the Industry Advisory Board and encourage students from early on to step into the world of trenchless and underground construction.

The inaugural NASTT-NE Northeast Trenchless Technology Conference was held November 17, 2016 at UMass Lowell and since then the Student Chapter has been involved in a plethora of NASTT events all over the country. The Student Chapter strives continuously to:

1) participate in conferences related to trenchless technologies and underground engineering,
(2) invite and attend guest lectures by trenchless leaders to promote the learning and understanding of different techniques,
(3) identify field projects and schedule site visits to experience trenchless methods and underground engineering,
(4) encourage students who have not yet had an experience with trenchless technologies into learning about the exciting world of trenchless technologies, and
(5) conduct trenchless research.

The chapter continues to recruit students passionate about trenchless technology and underground construction. Geotechnical aspects of trenchless engineering and activities

related to underground construction are the primary areas of interest for the Student Chapter. Site visits and experiential learning are key activities and exciting opportunities for the Chapter members.

ABOUT THE FACULTY ADVISOR:

***Dr. Raj K. Gondle** is an Associate Teaching Professor in the Department of Civil and Environmental Engineering at the University of Massachusetts Lowell (UMass Lowell). He serves as a faculty advisor for the NASTT UML Student Chapter. Through teaching and mentorship, Dr. Gondle continue to help students succeed and enter the professional practice of Civil Engineering. His awards including CEE-UML Teaching Excellence Awards (2024, 2022, 2020), 2022 BSCES College Educator Award, and 2017 ASCE ExCEEd teaching fellow speak of his academic excellence and support for students.*

FOR IMMEDIATE RELEASE

Engineers Construction, Inc. Transitions to 100 Percent Employee Ownership Through ESOP

Williston, VT – Engineers Construction, Inc. (ECI), a Vermont-based heavy civil construction company, has officially transitioned to 100 percent employee ownership through an Employee Stock Ownership Plan (ESOP).

This significant step reflects the company's commitment to its employees and community, ensuring an employee-centric future and eliminating the need for future ownership succession planning.

"Selling to the employees was something we wanted to do to let the company culture we've built live on and continue to improve," said Kenneth Pidgeon, who along with his brother Scott, purchased the company from their father Alan in 2004. "Rather than selling to the highest bidder, we wanted to do this for the employees because they helped bring us to this point."

Founded in 1965 by Alan Pidgeon, ECI has been a leader in Vermont's construction industry over the past six decades. The company, known for its technical expertise and dedication to safety and quality, employs over 200 people, including seven registered professional engineers and 50 employees with technical degrees. Its portfolio of innovative projects spans a wide range, from bridges and tunnels to ski resorts and Burlington's Downtown Transit Center. The ESOP transition marks a new chapter for the company, designed to solidify its core values and strengthen its workforce.

As part of this transition, Ben Dow, an engineer and long-time leader at ECI, will step into the role of President & CEO. Dow has been with the company since 1988, holding nearly every position in the organization throughout his tenure. Since 2004, he has played a crucial role in evolving ECI's culture from a centralized, "old school" management style to a more collaborative, team-based approach that has allowed the company to grow and take on larger projects. Notably, Dow was also instrumental in developing the company's Code of Conduct, which serves as the foundation of ECI's culture today."It's natural

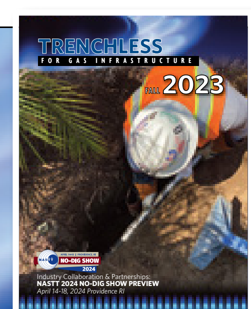
ECI's new ownership consortium celebrates for ECI to become a company that operates for the benefit of the employees because the company has already been run that way up to this point," said Dow. "The most important people in the company are not its executives but the people that are out there more than we are every day creating success for the company."

The ESOP allows each of the ECI employees to become shared owners of the company, with vesting over time, via an employee retirement plan. By combining the new ESOP with the existing 401(k) plan, ECI is providing a more stable future for its workforce.

"We have many employees who are really good with a shovel or an excavator or a transit but planning for retirement and making those hard decisions to save early on in their careers can be difficult," shared Dow, "the ESOP is a great solution for our employees who work hard, day-in and day-out in rain, wind, and snow, and, over time, the ESOP will help fund a meaningful portion of their retirement."

ECI has been actively involved with the Vermont Employee Ownership Center (VEOC) since beginning to explore employee ownership in 2019, attending VEOC's annual conferences and receiving support throughout the ESOP conversion process. "We've definitely felt that the support of VEOC and its annual conference, as well as from the ESOP companies at the conference, has been very helpful," Dow said. "It feels like joining a club that is very supportive across the board in sharing strategies on what works well and what doesn't."

ABOUT ENGINEERS CONSTRUCTION, INC:
Founded in 1965, Engineers Construction, Inc. (ECI) is a heavy civil construction company based in Williston, Vermont. Known for its technical expertise and commitment to safety, quality, and customer satisfaction, ECI provides a range of construction services for infrastructure projects throughout Vermont and the region.



MEMBERSHIP

Connect • Learn Achieve • Influence

Join to be part of an elite community of trenchless professionals!

Career Advancement Doors Opened!

"Because of NASTT, I have a pretty stacked tool belt that helps me bring innovative approaches to infrastructure concerns. My experiences with trenchless technologies gives me a 'leg-up' over others."

~ Eric Schuler, PE, Onondaga County Department Water Environment Protection

Education Second to None

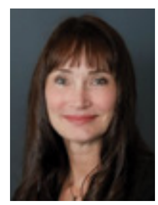
"NASTT is far and away the leading educator and networking pool in the trenchless industry. If your company plays a part in the trenchless industry, you will benefit from NASTT membership much more than you realize."

~ Joe Lane, Azuria Water Solutions

Tops at Staying on Top of the Industry

"I first joined NASTT to stay current on technological developments, best practices and market trends. Participating in NASTT committees and events and accessing its expert mentors and professionals is essential to the success of almost any project."

~ Marya Jetten, AECOM



Amazing Network

"NASTT has been the most significant vehicle relative to the industry-specific connections I've made and cultivated throughout my career."

~ Cindy Preuss, PE, CDM Smith

Membership Helps Me Strut My Stuff

"I would not be doing what I love to do without the presence and impact of NASTT. I wanted the industry to know about a record HDD project and NASTT gave me the access and opportunity to tell to the industry."

~ Jim Murphy, UniversalPegasus International

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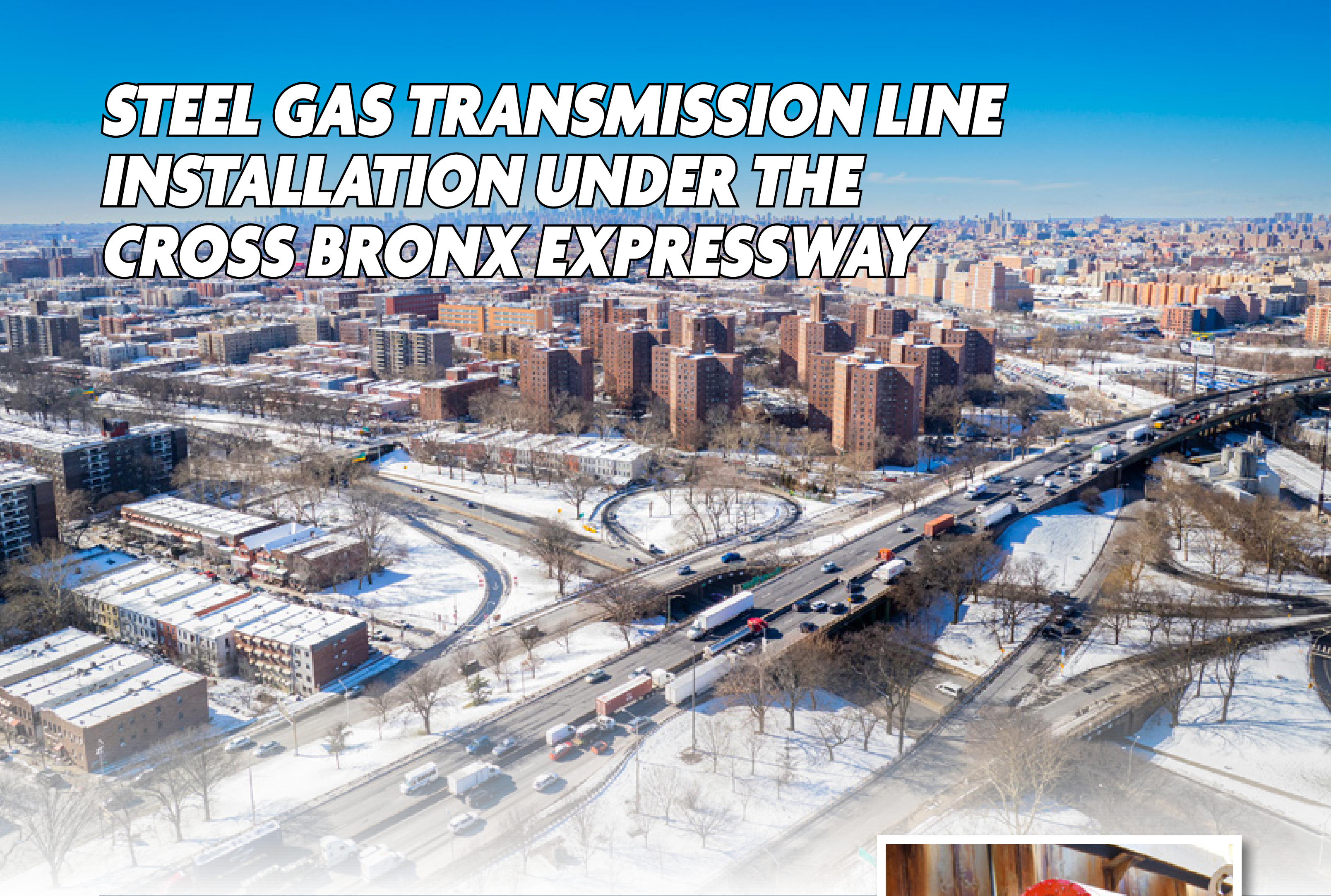


STEEL GAS TRANSMISSION LINE INSTALLATION UNDER THE CROSS BRONX EXPRESSWAY

By: Robert Titanic, Bortech Company Inc.

UTILITY TUNNEL UNDER THE I-95 CROSS BRONX EXPRESSWAY

The New York Post identifies the I-95 Cross Bronx Expressway as the most congested corridor in the United States. On average drivers waste 86 hours stuck idling in traffic on this particularly busy stretch every year. As part of a multi-year program to install approximately seven miles of 36-inch gas distribution main operating above 125 psig throughout Bronx County, Owner Con Edison (ConEd) needed to construct a 300-foot 48-Inch Steel cased utility tunnel directly under this vital roadway corridor. This challenging utility tunnel project is a small but essential part of a multi-year program to install approximately seven miles of 36-inch gas distribution main operating above 125 psig throughout Bronx County.

ConEd's overall multi-year program is intended to replace an existing 1948, 24-inch, 245 psig transmission main from the Bronx River Tunnel to the Bronx Westchester Border with a new 36-inch main. The 36-inch main will connect a new 36-inch, 350 psig main in the north from the Bronx Border to White Plains, which is already in progress, to the planned replacement of a 24-inch main located in the Bronx River Tunnel in the south. This new 300-foot 36-inch main will thereby serve as a new high pressure 36-inch connection to the entire Hunts Point 350 psig system.

The installation of this 36-inch, 350 psig Maximum Allowable Operating Pressure (MAOP) pipe is required to comply with PHMSA's Pipeline Safety rule, effective January 1, 2021. PHMSA revised the Federal Pipeline Safety Regulations to improve the safety of onshore gas transmission pipelines. The rule requires an Operator to have traceable, verifiable, and complete records necessary to establish the MAOP, per 192.619(a) including records for a hydrostatic

I-95 Cross Bronx Expressway is the most congested corridor in the US

> **"COLLABORATION AND TRANSPARENCY ARE KEY TO SUCCESSFUL PARTNERSHIPS."**

pressure test in accordance with 192.517(a). If records are not available to comply with the rule, PHMSA provided six (6) methods to reconfirm the MAOP of a main. Method 4, Pipe Replacement was the only feasible method that provided for the continual safe delivery of natural gas to Con Edison customers. New York State recently incorporated these changes into the New York State Gas Safety Regulations, 16 NYCRR 255.

As a proactive and responsible owner, ConEd recognized that the climate is changing so it originally chose to micro-tunnel a shorter route for the utility tunnel under the Cross Bronx Expressway in order to minimize the construction footprint and time required for fabrication (instead of open cutting resulting in massive traffic delays with unfavorable permit stipulations extending the schedule considerably). The benefits of using this microtunneling method included reducing the carbon footprint of mechanized equipment and hauling away overburden in addition to not having to further worsen the existing traffic congestion and idling motor vehicles. Microtunneling would also reduce the need for additional natural and fabricated resources (i.e., steel pipe).

COMPLEX GLACIATED GEOLOGY

Sometimes what you can see above the ground is a strong indicator of what is found below ground. The project location along Noble Avenue in the Bronx was a perfect example of this. Within a mere 2,000 feet of the proposed location for the utility tunnel are the New York Botanical Gardens and the Bronx Zoo. Both are highly popular and well-known destinations for tourists and local residents, and contain significant above-ground representations of the complex glaciated geology underlying much of the Northeast region.

It is important to remember that all the rocks in the Bronx were at one time many miles below the earth's surface, and that the rock masses we observe today are only remnants of great mountain ranges that formed in the region during Late Ordovician time, and continued to evolve during the Silurian and Devonian periods that followed. Most radiogenic dates derived from rocks in the New York City region record a date of Late Devonian time. This corresponds to the last significant stage of metamorphic thermal heating that the rocks in the New York City region experienced during the following Devonian Acadian Orogeny. Although Cameron's Line is mapped in the eastern portion of the Bronx, the great thrust faults associated with this continental suture probably moved oceanic crustal rocks far westward into New Jersey. Portions of the thrust sheet associated with Cameron's line may be present along the western edge of Manhattan and westward under portions of the Newark Basin region. Through the ages, the land has worn down as erosion stripped away these rocks. The resulting sediments were incorporated into sedimentary rock formations throughout the Appalachian Basin and into sediments beneath shallow seaways that existed

An erratic broken in half

Erratic boulders are scattered through the Bronx Zoo Park landscape

during much of Paleozoic time across the Midcontinent and beyond. (The term, Appalachian Basin, refers to all of the sedimentary and igneous deposits that accumulated intermittently during the Paleozoic and Early Mesozoic along the eastern margin of North America. These materials now represent the extensive rock formations that have been faulted, folded and metamorphosed, and subsequently exposed by erosion throughout the extent of the Appalachian Mountains.)

Just east of the main entrance to the New York Botanical Gardens there are several large rocky exposures of Fordham Gneiss. Outside the entrance to the "Native Plant and Rock Garden" area is an unusually large gneiss boulder, an erratic, which has been broken in half. The boulder was probably split by the growth of a tree within a small crack. As the tree grew, its roots eventually wedged the boulder into pieces, however the tree has long since vanished. A walk along Azalea Way affords views of barren rock hills comprised of Fordham Gneiss among the parkland's forest. Paths follow along the Bronx River and between botanical theme exhibits throughout the park.

Like the other parks in the city, the Bronx Zoo Park landscape has been modified to take advantage of the glaciated terrain. Most of the scattered erratic boulders have been moved or are utilized in the construction of the open-air animal staging areas. The grizzly bear site has a particularly large and scenic glacially polished and grooved outcrop strewn with glacial erratics, that with the addition of the bears makes for an interesting and very popular photo. Just outside of the World of Darkness exhibit building is a large glacial erratic named the Rocking Stone. It consists of a granitic gneiss and schist similar to the glacially polished rock it is sitting on.

Near the Pelham Parkway entrance station to the Bronx Zoo Park on the west side there are several large outcrops of granitic schist with numerous small quartz veins. Not far away on the east side of the Bronx River (in Bronx River Park on Morris Park Avenue) are outcrops of brown-weathering gneiss of the Hartland Formation. The variation of the gneisses in the botanical park, the schist in the zoo, the missing marble, and the gneiss in the park on the east side of the Bronx River suggests a complex underlying geological structure in the vicinity of the Bronx River. The north-to-south trend of the Bronx River valley presumably follows the trace of a thrust fault associated with Cameron's Line. The zone of weakness in this area in which the thrust fault moved westward may be within the softer Inwood Marble. With such complicated underlying formations, any underground work contemplated in these areas was bound to uncover some unexpected features.

CHANGE OF PLANS NECESSARY

Contrary to the preliminary boring explorations taken at the site during the design phase of the project, nested cobbles and boulders were encountered when test holes were drilled at the entry and exit locations of the proposed jacking and receiving shafts on Noble Avenue. Boulders as large as 10 feet in diameter were excavated and removed from the jacking shafts. Additional horizontal probing was performed using a guided bore method pilot tube to better understand the actual ground composition along the proposed bore path. Here, obstructions in the form of boulders were encountered at the center and outer edge of the proposed tunnel at a distance of 60 feet from the proposed tunnel face.

With these major obstructions encountered, a change in plans was

Boulders as large as 10 feet were excavated and removed from the jacking shafts


Sending pad 40 feet in length to accommodate both drill and 20-foot casing length segments

necessary. The Owner ConEd consulted with Bortech Company, Inc., to inquire about utilizing Horizontal Hammer Technology with Down the Hole (DTH) Tooling. Bortech has extensive experience with this method having built their first Horizontal Hammer system in 2004 and installing hundreds of these types of crossings over the 20 years since then. The team at Bortech Trenchless Division was convinced that the Horizontal Hammer Boring (HHB) method was the correct method of application given the obstructions, mixed and varying ground composition. Additionally, the Bortech team did not think they would be able to successfully deploy one of their MTBMs of this diameter in these difficult ground conditions. Ultimately after extensive discussions, the Con Edison Construction and Engineering departments agreed that this was the best approach to take given the underlying geology.

Bortech had been previously successful at getting the HHB method approved and permitted by the New York State Department of Transportation (NYS-DOT), with a successful tunnel installation under the Sprain Brook Parkway in White Plains NY. Using this track record Bortech was able to obtain quick approval again by submitting a history of successfully completed projects supported with acceptable settlement and vibration monitoring data.

HORIZONTAL HAMMER BORING (HHB) METHOD

The horizontal drilling rig is a rack and pinion frame powered by hydraulic motors for rotary and thrust. This drilling equipment has a variable thrust and rotary torque. Using larger hydraulic motors Bortech increased the rotary output to 110,634 ft-lbs. The diesel over hydraulic "out of pit" power pack is positioned at ground level so there is no combustion engine in the jacking pit and all functions of the drill are radio remote controlled above the jacking pit. Remote-controlled functions include drill thrust and rotary pressure and speed, DTH hammer variable pressure, water into the airstream for dust control, hammer oil volume into the airstream, hydraulic rams to adjust both line and grade and hydraulic stabilizing casing arms.

Methods were selected that could best minimize the construction footprint

Drill rig advances the casing pipe as required based on formation resistance

For the 48-inch casing needed for this project, a 34-inch class DTH Down Hole Hammer was used. Bortech used Mincons Spiral Flush Pilot Bit for their patented air control technology. Keeping the air pressure and volume inside the casing pipe and not charging the surrounding ground is Bortech's policy. Ground formation and distance into the bore hole determined the amount of air feeding, rotary pressure and speed required for optimum hammer production rates. Borehole stabilization and lubrication through the use of Foam and Polymer Hole Control injection into the air supply to the down hole hammer were used to reduce external casing friction. When clay formations became visible in the return spoils a clay thinner deflocculant was added to the air supply.

It is Bortech policy and standard operating procedure to either use whip-socks and or hose restraints on all air connections. In addition, the non-hose end was affixed to a stationary piece of equipment or structure whenever it was possible. The ring bit of the hammer is integrated into the hammer pilot bit and the pneumatic powered supply to the hammer was activated by advancing the drill carriage. This crowds the down hole hammer assembly through the air augers, which initiates the hammer action to advance the casing, pilot and ring bit against the bore path medium. The hammer action ceases when there is not enough resistance from the bore path medium, or when there is no crowding from the drill bit into the medium.

The first casing length is called "The starter casing". The starter casing for this project was 16.8125 feet in length and 48.82 inches in diameter. The starter casing contains the following: pilot bit, ring bit, weld casing shoe, DTH hammer, shock-sub, cross over, hammer shroud, air auger segment and cover skin. This assembly was collared into the ground formation and stabilized using the hydraulic casing arms. These arms secured the casing onto the rig frame and counterbalanced the hammer recoil along with the down hole shock absorbing sub. The casing pipe was supported by the frame of the rig at the desired line and grade. The rig frame was equipped with hydraulic rams adjustable in both horizontal and vertical orientations.

During drilling, the hammer assembly inside the lead casing pipe advances and is rotated by the carriage rotary and thrust functions. The drill rig advances the casing pipe as needed by the requirements of the formation resistance. The hammer pilot bit meshes with the drive shoe that is joined to the starter casing thus becoming an integral part of the starter casing assembly. The hammer action pulls the casing pipe into the borehole until the entire casing pipe is installed. Each section of casing is welded to the previously installed casing pipe. This process is repeated essentially in a cartridge installation method until the pilot bit reaches the receiving pit.

The lead casing line and grade is monitored with a total station and an electronic level. The hydraulic rams on the rig are adjusted to keep the lead casing on the desired line and grade while advancing the hammer through the ground medium. For this project, the rigidity of the 48-inch steel casing pipe and straight welded segments resulted in the best overall accuracy. Typically, obstructions like the boulders and cobbles encountered on a project like this would impact the accuracy of a conventional jack and bore method, requiring personnel entry and hand tunneling to remove the obstruction in an attempt to maintain line and grade. In comparison, the HHB hammer action breaks all forms of rocks into small fragments and flakes. Therefore, line and grade positioning are maintained while advancing through rock formations and limiting any disturbance to the medium outside of the pilot and ring bit surface areas.

CONSTRUCTION

The sending pit floor was excavated on the north side of the Cross Bronx Expressway at Noble Avenue, and a concrete pad was installed as per the owner's specification. The sending pad was 40 feet in length to accommodate both the drill and the 20-foot casing length segments. The elevation of the sending pad was placed at 3 feet below the invert of the casing to accommodate

Groundwater penetration added several days to the overall schedule

Drilling through obstructions, mixed and varying ground composition took 5 1/2 weeks

the drill frame height. This also allows for easy access for welding the bottom portion of the casing pipe.

After this initial setup, drilling began on February 22 2024, with holeout into the exit pit 5 ½ weeks later on April 1. Over the duration of the project, actual hammer bore penetration rates were 10.8 feet/hour in large boulders and competent rock and 21.1 feet/hour in mixed sand, silt clay and weathered cobbles. As discussed, ground formation was highly variable. Weathered Schist and Gneiss as well as competent hard boulders 8 to 10 feet in size, clay, silt, sand, and cobbles were all encountered in different places along the borepath.

Each 20-foot casing length segment was welded according to ConEd's specifications that produced non-defective x-ray quality pipe beveled joint welds. Welding and magnetic particle testing of each welded butt joint averaged 7 hours. There were several downtime days due to natural gas leaks detected in the ground around the project site. This is not an uncommon scenario given the age of the underground utility infrastructure in NYC. No welding could be performed until these gas leaks were resolved.

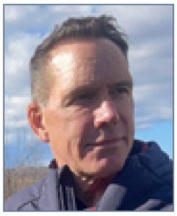
Ground water infiltrated the casing pipe through the face of the starter casing from entry point of the tunnel and ceased when reaching 93 feet. Therefore, four casing welds needed to be performed under these conditions adding several days to the overall schedule. Preliminary boring logs had not indicated the presence of any groundwater. It took time to come up with a solution as well as get the change in method approved. A new method was innovated by Bortech that prevented the water from passing the invert of the pipe during the welding and cooling process. This method is proprietary and did not require any dewatering and or well points. The groundwater penetration also added several days to the overall schedule. At 213 feet Bortech installed a hydraulic casing pusher assist to overcome any potential elevated skin friction on the casing pipe. The longer casing pipe sits without advancing, the greater potential for the ground to consolidate and increase drag on the outside of the casing pipe.

Following the installation of the 48-inch casing pipe, Bortech designed and fabricated a 36-inch push plate and front roller system to push the 36-inch gas main inside the 48-inch steel casing pipe.

CONCLUSION

At Bortech Company, Inc., we are dedicated to pioneering innovative solutions in horizontal utility tunneling. Our commitment to safety, precision, and sustainability drives us to exceed industry standards and deliver projects that enhance infrastructure while minimizing environmental impact. With a team of experienced professionals and cutting-edge technology, we tackle challenges head-on, ensuring timely and efficient execution. We believe that collaboration and transparency are key to successful partnerships, and we strive to build lasting relationships with our clients, stakeholders, and the communities we serve.

ABOUT THE AUTHOR:



Robert Titanic *is founder and CEO of BORTECH, he continues to develop evolving means and methods that result in real solutions when installing underground utility tunnels in complex and varying underground lithology. Robert is respected worldwide, not only for his thirty-year career as an engineer, but also for his inspirational leadership qualities and innovative means and methodology regarding drilling. A problem solver by nature, He continues to enjoy the industry and the hard working people who are committed to more innovative, reliable, environmentally responsible and safer approaches to constructing underground utility infrastructure.*

DIGGING UP THE PAST:

Utilizing Trenchless Methods in an Open-Cut Emergency

By: Casey Ganley, Onondaga County Department of Water Environment Protection

"REPAIRING THIS ASSET REQUIRED A UNIQUE, COLLABORATIVE, WELL-THOUGHT OUT APPROACH."

For those not working the front lines for a utility, noticing a minor depression in the road may not cause one's palms to sweat. For those working for the local sewer utility, the appearance of a minor depression (or sinkholes) trigger alarm bells and investigatory actions to determine causation. In the heart of a busy neighborhood, one such sinkhole had formed, been repaired, formed again, and repaired again in the vicinity of an 87 x 58-inch brick sewer built in 1890. This critical sanitary sewer trunk happened to be owned by the Onondaga County Department of Water Environment Protection (OCDWEP) in Syracuse, NY. This fill/repair pattern repeated itself several times over a half-decade period beginning in 2019 until investigation determined the source of failure; culminating in a $2.5 million dollar emergency sewer repair that tested the patience and resolve of all involved; the Owner, Contractors, Regulators, residents, and business owners all faced a dynamic situation with unforeseen challenges.

The Midland Trunk Sewer stands as one of the oldest sewers in Syracuse

The Midland Trunk Sewer stands as one of the oldest sewers in Syracuse, a testament to age-old construction techniques and craftsmanship in the form of a 2-course brick egg-shaped sewer, roughly 24 feet below grade to top-of-pipe. Repairing this asset in-place while minimizing downtime and disturbance in a residential neighborhood required a unique, collaborative, well-thought out approach.

ORIGINAL APPROACH (COLLABORATIVE)

OCDWEP took initial steps to verify condition of the Midland Trunk Sewer in the vicinity of the sinkhole in 2022 and again in late 2023 as a result of reappearing and migrating sinkholes. OCDWEP crews physically entered the trunk sewer and determined a large portion of shotcrete installed in 1980 had delaminated and was sitting vertically, oriented perpendicular to flow, directly across the pipe from a wet-weather regulator connection. This wet-weather regulator diverts dry-weather flows from a 54-inch trunk sewer into the Midland Trunk Sewer, and once trunk sewer flow exceeds the regulator capacity, flow overtops a weir and is discharged as a CSO. The delamination exposed the original brick surface to turbulent flow both during dry-weather due to the regulator, and surcharge conditions present in the Midland Trunk during wet-weather events. Mortar loss between the courses of brick was observed, along with a buckling condition on the wall opposing the regulator condition. Crews could not get to the exact location of failure due to safety concerns, but video and photographs were taken in order to make


Concern was high that the Trunk was bound to "unzip"

"THE TEAM COLLABORATIVELY DEVELOPED A NEW SOLUTION THAT COMBINED MULTIPLE TRENCHLESS REHABILITATION TECHNIQUES."

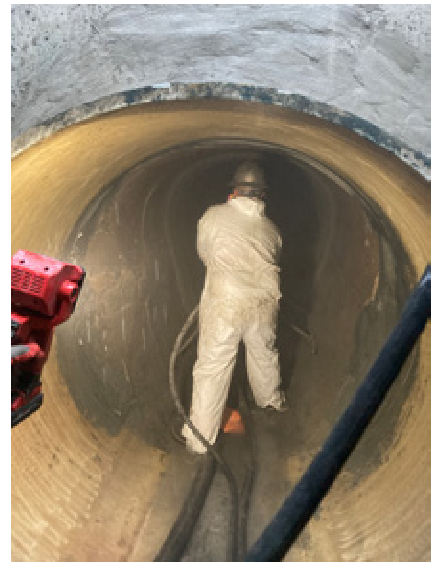
sound repair determinations. Concern was high that the Trunk was bound to "unzip".

OCDWEP staff deemed the condition an emergency, and worked on developing a repair approach utilizing in-house resources. The team's original approach was to install 3 steel-sheeted access pits; 1 pit for new bypass pump suction manholes, 1 pit for repairing the compromised sewer section, and 1 pit for bypass discharge piping back into the Midland Trunk. Geotechnical conditions, as determined by a soil boring ahead of construction, indicated groundwater at 24 feet depth with wet/loose sand, silt, and gravel to a depth of roughly 20 feet, transitioning to compact clay/silt to bottom of boring at 50 feet depth. Repair methodology focused on removing the compromised section of 87-inch brick sewer and installing sections of HOBAS pipe in its place. This repair methodology was developed jointly between OCDWEP, Marcellus Construction and Infrastructure, Inc. (Adams, NY, Owner's Emergency Contractor), John P. Stopen Engineering (Syracuse, NY, Geotechnical Engineer), and IW Construction (Parish, NY, Sheeting Contractor). Initial decision-making for purposes of scope development were made without any excavation and limited as-built information given age of infrastructure in the area, and several factors heavily influenced this decision-making process:

- **Avoidance of Utility Conflicts:** Within the potential impact limits of excavation existed a 12-inch steel high-pressure gas main, a 12-inch City of Syracuse water main, a variety of telecommunications conduits (in an already compromised clay-tile ductbank), and a 54-inch OCDWEP-owned trunk sewer. Avoiding direct conflicts with these utilities directed sheeting limits/locations; somewhat restricting where work could be performed.
- **Traffic and Road Closure:** The main excavation was located at the intersection of Midland Avenue and W. Colvin St. Both these roadways are heavily trafficked with commuter traffic, as well as serving as major arteries for public transportation and emergency services (police, fire, and EMT). The intersection itself, as well as roughly 1 block in each direction of both roadways was closed to all thru-traffic starting April 1, 2024.
- **In-Line Bypass Pumping:** The Midland Trunk serves as the main artery for sewage conveyance from most areas south of the City

Overall bypass pumping design had to be first approved by NYSDEC

The threat of Spring wet-weather, high-flow conditions was real



Centrifugally Cast Concrete Pipe (CCCP) lining was done through the delaminated portion

of Syracuse and carries on average 10MGD, with wet-weather flows of approximately 40MGD. Existing access to the trunk sewer via manholes was not sufficient to accommodate the required bypass piping, which necessitated installation of 3 new 72-inch ID manhole barrels. Bypass pumping was accomplished by way of 2x Godwin DPC-300 Dri-Prime suction lift pumps with 12-inch suction piping rated at 3,500gpm (5MGD) and 3x Godwin CDM-400M Dri-Prime suction lift pumps with 18-inch suction piping rated at 7,000gpm (10MGD), manifolded into a common 36-inch discharge pipe partially buried through the construction site. Bypass pumping design had to be approved by NYSDEC prior to moving forward with implementation.

DYNAMIC SOLUTIONS

Following sheeting and excavation of all 3 pits and identification of the exact point-of-failure, it was determined the location of the delamination and subsequent brick failure was within 3 feet laterally of the perpendicular 54-inch trunk sewer located above. Removal and replacement of the failed brick sewer as originally planned was not feasible given the inability to effectively sheet or otherwise underpin the 54-inch trunk above, resulting in a shift towards looking at a trenchless rehabilitation approach to complete the rest of the Emergency Repair. The clock could not run very long without a solution in-place as bypass pumping was running (up to $5,000/day) and the threat of Spring wet-weather, high-flow conditions was real.

All eyes turned to a Cured-in-Place Pipe (CIPP) liner to solve this complex problem. A liner of this diameter is neither an off the shelf item, nor a simple pull-in-place installation given its depth and limited access. Marcellus Construction consulted with Arold Construction, Inc. (Kingston, NY) and the team collaboratively evaluated options and developed a new solution that combined multiple trenchless rehabilitation techniques.

Confined space entry inspection was conducted by Arold Construction staff in order to obtain necessary measurements that would aid in decision-making. The first “trenchless” approach considered was to install a Centrifugally Cast Concrete Pipe (CCCP) lining through the portion of Midland Trunk in which delamination had occurred. Due to the inherent dangers of physically working in a compromised brick sewer at such depth, and unknown condition of still in-tact decades old shotcrete, the team was forced to pivot to a tactic that did not require a significant amount physical work within the compromised sewer. The second (and chosen) rehabilitation option that was evaluated included installation of a 45-LF, 2-inch-thick CIPP liner and 15LF of Centrifugally Cast Concrete Pipe (CCCP) CentriPipe PL-8000. Pre-cleaning was conducted (carefully!!!) to remove all delaminated shotcrete material and several yards of material present due to failed brick and subsequent sinkholes.

CIPP installation was roughly a 16-hour process from start to finish


Project was successful largely due to the team involved

Arold Construction staff drove straight to Florida to pickup the CIPP liner materials from their supplier in order to meet the timeline for a weekend installation back in Syracuse.

The liner serves as a fully structural solution for supporting the location of the compromised compromised brick wall, and the CentriPipe was applied on either side of the HOBAS pipe to provide a seamless transition from liner-to-HOBAS and HOBAS-to-existing brick. CIPP installation was roughly a 16-hour process from start to finish, including pull-in, 8-hour cure time, and cool down.

LESSONS LEARNED

This Project is undoubtedly one of the more complex and time-consuming emergency repairs OCDWEP has undertaken to protect the health and safety of the public and ensure reliable sewage conveyance. Start-to-finish the repair effort took 15-weeks; with final surface restoration completed by mid-October. As with any project, there were several lessons learned:

- Accuracy of Historical Record Information and Proper Record Keeping of New Infrastructure:
  - o While record keeping is challenging for any infrastructure 130 years old, we faced particular challenges as Midland Trunk was constructed prior to the formation of the Onondaga County Dept. of Water Environment Protection (originally constructed and operated by the City of Syracuse Dept. of Engineering prior to formation of The Syracuse Intercepting Sewer Board, circa 1925; the precursor to what is today OCDWEP). The installed piped dimensions varied from what was shown on available record drawings in the area, which forced the team to change pipe and liner sizes from what was originally planned. For any utility, maintaining a library of accurate records and making said records available and easily located is critical for dealing with buried infrastructure evaluation and maintenance.
- Flexibility among team members to accommodate a dynamic situation:
  - o This particular project was successful largely due to the team involved and all parties willingness to adapt to various dynamics at play. Whether the situation called for multiple site visits to discuss unforeseen circumstances, changes in project demands, willingness to interface with discouraged residents on behalf of OCDWEP, or long hours and weekend work to get the job done, teamwork was on display start to finish.
- Upfront Communication to all Stakeholders:
  - o As a public utility, OCDWEP is responsible for prompt communication of impacts to regulators, residents, and other public agencies as it relates to sewer projects. The team relayed information upfront and as it became available to the New York State Department of Environmental Conservation (NYSDEC) to ensure the regulatory agency was informed of ongoing work in an emergency situation. OCDWEP had to ensure mitigation plans were in place to prevent SSO's caused by facilitating such a significant repair.
- Willingness to Think Outside the Box:
  - o Out of necessity due to changing conditions and unforeseen challenges, utilizing trenchless rehabilitation methods in what originally looked like an open-cut emergency delivered a final product all parties are proud to have been a part of. OCDWEP and its team explored numerous other approaches and methodologies to tackle this repair, and without a willingness to entertain all available options and resources, success (or lack thereof) could have been in doubt.

ABOUT THE AUTHOR:


Casey Ganley *is currently Sewer Maintenance and Inspection Engineer with the Onondaga County Department of Water Environment Protection (WEP). Casey oversees and supports various capital improvement projects and programetric efforts focused on sanitary sewer and collection system, pump station, and forcemain rehabilitation and repair. Casey is a graduate of SUNY Environmental Science and Forestry with a B.S. in Environmental Resources Engineering, and is a member of NASTT and local chapter APWA.*

NEVER GIVE UP:

Completing a Challenging 2,000-foot HDD Beneath I-495/3 to Enhance System Reliability - A Decade in the Making

By: Abhinav Huli, Haley and Aldrich
Grant Lella, National Grid
Rob House, PE, PMP, National Grid

(NOTE: The following article is an excerpt from a paper presented at the 2024 NASTT No-Dig Show in Providence RI, April 14 – 18)

1.0 INTRODUCTION

National Grid's high-pressure natural gas infrastructure serving the greater Lowell area formerly consisted of 6-, 8- and 12-inch steel pipe. Due to the varying pipe diameters, inspection using modern, free-swimming, in-line inspection tools was not feasible. To address such issues, National Grid executed The Lowell Area Gas Modernization Project (LAGMP) which replaced approximately 2.4 miles of existing 6 and 8-inch diameter pipe with a new 12-inch main to facilitate future pigging operations, which included several challenging crossings. One of the critical crossings involved installation of one, 12-inch, approximately 2,000-foot steel pipe using horizontal directional drilling (HDD). This project was performed in challenging and variable subsurface conditions that involved drilling through soil, boulders, weathered and sound bedrock, while crossing under multiple highways and other critical infrastructure. These challenging subsurface conditions necessitated several field changes during construction. The technical challenges were further exacerbated by the logistical challenges that impacted the alignment design such as limited work area, challenges with pipe overbend, noise concerns and other stakeholder issues.

> **"DUE TO THE VARYING PIPE DIAMETERS, INSPECTION USING MODERN, FREE-SWIMMING, IN-LINE INSPECTION TOOLS WAS NOT FEASIBLE."**

2.0 PROJECT OVERVIEW, NEED & PERMIT REQUIREMENTS

The pre-existing Tewksbury Line consisted of approximately 5.9 miles of 6, 8 and 12-inch diameter natural gas pipeline originally constructed in 1956 and serves approximately 46,700 customers in the greater Chelmsford, Dracut, Dunstable, Lowell, Tyngsboro and Westford area in northeastern Massachusetts. The existing Tewksbury Line crosses Interstates 495 and 3 through a series of four cased crossings.

The Lowell Area Gas Modernization Project (LAGMP) consisted of the replacement of approximately 2.4 miles of former 6 and 8-inch diameter pipe with 12-inch diameter steel main to enable inspection with modern pipeline inspection gauges (PIGs), of which approximately 2,000 feet consisted of a horizontal directional drill beneath the I-495/3 interchange.

2.1 HDD OVERVIEW

One goal of the limited Tewksbury line replacement was to install the new line as close to the existing infrastructure as reasonably feasible and within National Grid's existing right-of-way. As such, the HDD end points were fixed at either end on private property not owned by National Grid: to the northwest by a large movie theater and associated parking lot, and to the southeast by a private property adjacent to wetlands and a water district/overhead electric right-of-way.

The presence of various surface features between the two end points such as wetlands, highways, bridges and private properties necessitated a detailed feasibility study. A feasibility study was conducted to evaluate feasible trenchless alignments between the two end points.

"CHALLENGING SUBSURFACE CONDITIONS NECESSITATED SEVERAL FIELD CHANGES DURING CONSTRUCTION."

This study resulted in (6) six possible routes, which included single alignments as well as multiple shorter trenchless alignment options. A matrix was prepared including access, cost, schedule, entry/exit considerations, etc. as well as an overall ranking; the alignment that ranked first was selected for construction. A schematic of the route alternatives evaluated as a part of the feasibility study is shown in Figure 1. The selected route and critical features are shown in Figure 2.

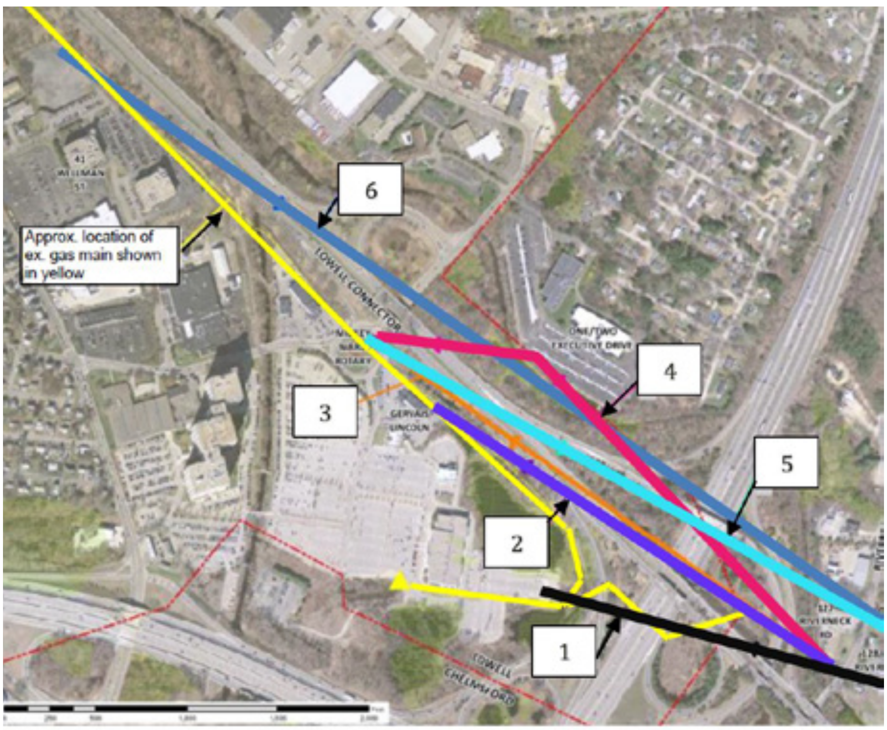


Figure 1: Various trenchless alignment alternatives evaluated as part of the feasibility study

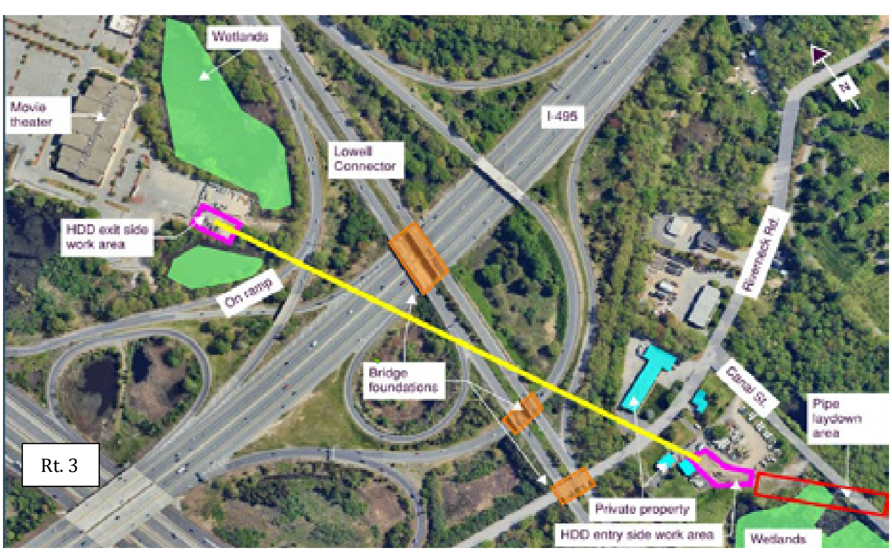


Figure 2: Overview of the final trenchless alignment selected for construction

Following review of historical borings, the subsurface exploration program was performed in two phases: initially in 2013 followed by the second phase in 2017.

Due to various constraints, the final exploration program consisted of seven borings with sampling at standard intervals (three of which were completed as groundwater observation wells), ranging from 25 to 140 feet below ground surface and the distances between the borings ranged from approximately 250 to 600 feet due to the above-mentioned surface features and accessibility constraints.

Typical subsurface stratigraphy included variable density fill (generally sand), underlain by occasional limited organics. The subsequent layers of the subsurface stratigraphy consisted of:

1) Dense to very dense glaciofluvial deposits (predominantly sand) with varying amounts of silt/gravel.
2) Discontinuous very dense glacial till consisting of dense soils, cobbles and boulders above weathered bedrock.
3) Bedrock varied from quartz biotite schist to coarse grained gneiss to very hard granite with unconfined compressive strength ranging between 6,700 to 20,200 psi and Rock Quality Designation (RQD) ranging from 87 to 25 percent at various locations along the alignment.

Based on the increasing depth to the top of bedrock surface observed during the geotechnical borings, a geophysical survey was conducted in April 2013 to better estimate top of rock surface. However, only 25 percent of the alignment could be accessed to perform the survey due to accessibility constraints. The results indicated a dip in the top of bedrock elevation along the alignment (entry to exit) of approximately 22 feet across the survey extents. Results of the survey are shown in Figure 3.

3.0 BASIS OF DESIGN

In addition to the subsurface conditions impacting the design, several logistical constrains impacted design of the drill geometry. For example, the overall depth of the middle section of the alignment was selected based on the maximum entry angle that could be achieved at the HDD entry location and the bend radius of the vertical curve. The maximum entry angle at the entry was limited to 10 degrees due to a combination of the following factors:

1) Wetlands present behind the entry side work area and in the direction of pipe laydown area meant that the pipe would have to be oriented both vertically and horizontally in the air to avoid wetlands during pullback. Having a higher entry angle would exacerbate this problem.

2) An existing tree (that could not be disturbed) belonging to a private property owner was present along the pipe pullback direction. The tree was situated next to wetlands such that it impacted the drill entry angle, and the logistics related to pipe laydown for pullback.

3) Weight and stiffness of the steel product pipe that did not allow for tight bends that could be achieved using a HDPE pipe (HDPE pipe would have been incompatible with the pipe media pressure).

Basis of design: A combination of challenging subsurface conditions and logistical constraints resulted in the HDD alignment having a drill geometry that would proceed through bedrock for approximately 600 to 800 ft of the initial section of drill and transition to soil for the remainder of the drill until the exit location. A schematic of the HDD alignment profile is shown in Figure 4.

Stakeholder concerns necessitated the implementation of logistical requirements including:

1) Erection of temporary sound walls at both entry and exit sides to decrease noise to abutters.
2) Reduced work hours.
3) Vibration monitoring at the cinema location.
4) Both ground and building settlement monitoring points of adjacent structures.

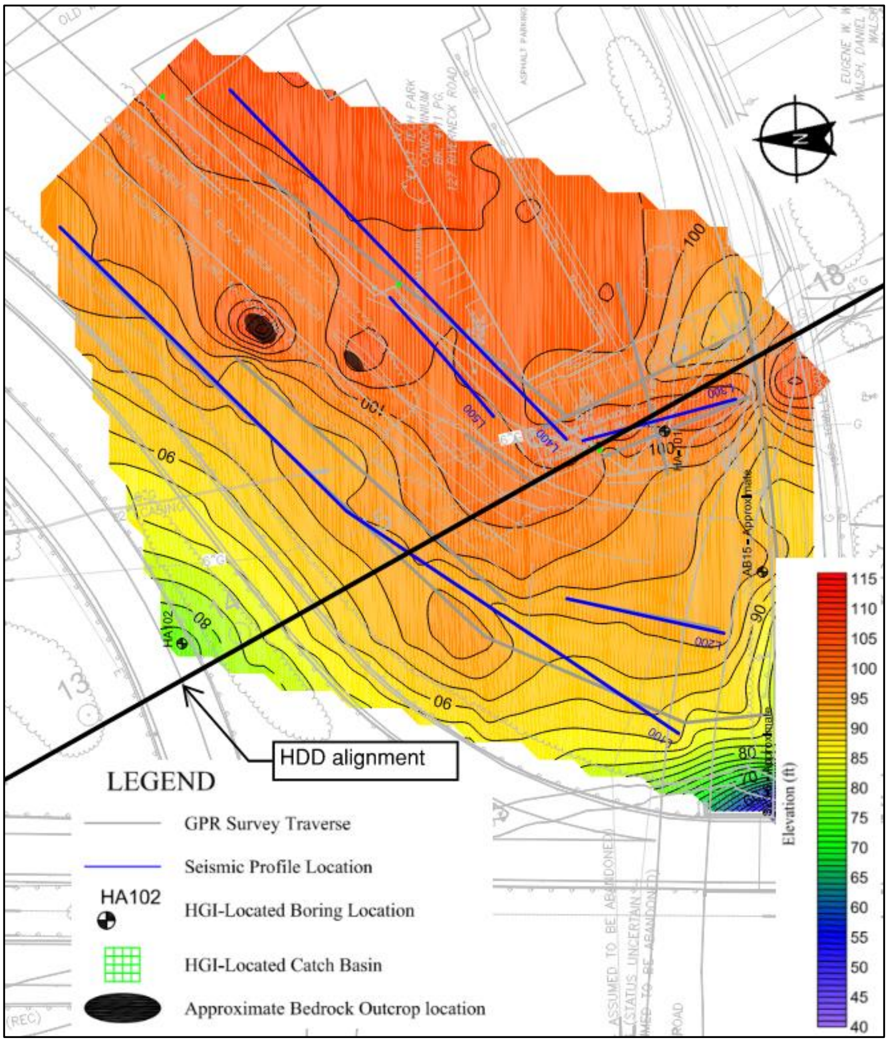


Figure 3 Geophysical investigation bedrock model

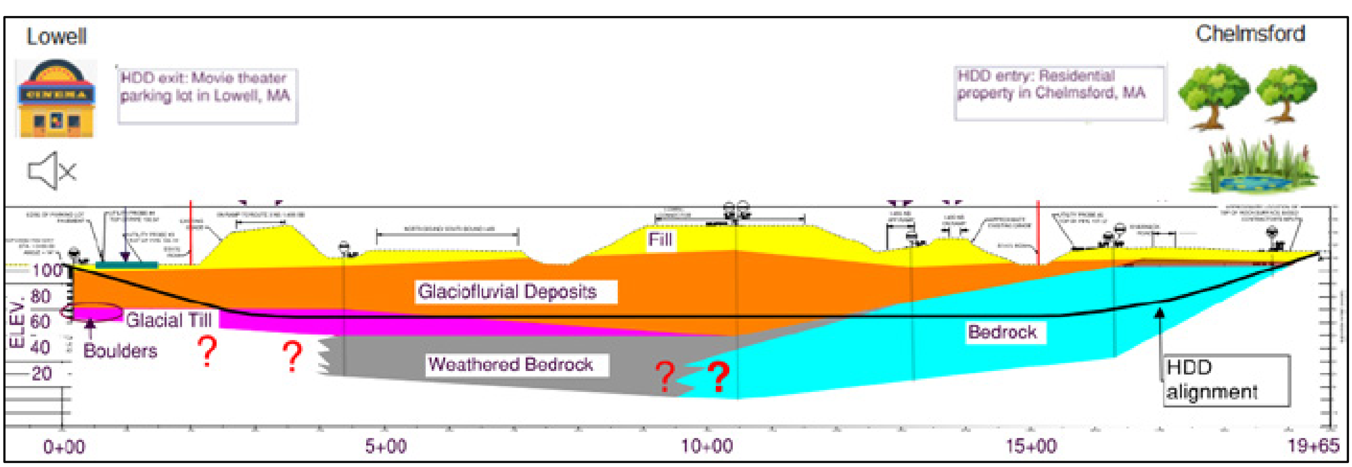


Figure 4: HDD alignment profile

Figure 5: Installation of 48-inch exit casing

Figure 6: Using hammer to excavate top of bedrock to allow the pilot drill bit to enter the bedrock at the desired entry angle

Figure 7: Installation of 16-inch steel surface casing pipe to the top of rock surface and backfill the entry pit

Additionally, project specifications required the Contractor to retain a mud engineer onsite full-time during drilling activities.

4.0 CONSTRUCTION

The construction began with the installation of a 48-inch, approximately 125 foot long, steel surface casing pipe oriented at the exit angle of 10 degrees (Figure 5), to reduce the potential for inadvertent releases (IRs). Next, on the entry side, the contractor elected to install a 16-inch steel surface casing pipe at the entry angle of 10 degrees, to the top of bedrock surface and a 9.625-inch diameter drill bit was then advanced through the 16-inch surface casing pipe to drill into the bedrock surface. However, the drill bit could not be advanced past the end of the steel surface casing and into the bedrock surface due to the hardness of the bedrock, necessitating a change in geometry.

4.1 HDD DESIGN REVISIONS

Upon discussion with the contractor, it was decided that the entry location would be pushed to the back of the work area as much as possible, and the entry angle increased to 14 degrees. However, there were three impediments to this; a tree that was present at the back of the work area in the direction of the pipe laydown and wetland area present behind the tree and the work area along the direction of pipe laydown which initially necessitated the shallow entry angle.

Ultimately, approval was obtained from the property owner to remove the tree that was in the way of the pipe pullback preventing the higher entry angle. Further, modifications in terms of equipment logistics were made to handle the pipe higher above the ground surface and while it arched over the wetland area along a compound curve, resulting in

Figure 8: View of the pipe overhang over the wetland area

a more complex pipe laydown operation during pullback.

In order to further ensure that the pilot drill had the best possible chance to penetrate the top of bedrock, a slot trench was excavated from the ground surface down to the top of rock surface and an excavator with a pneumatic hammer mount was used to modify the angle of top of rock surface to make it conducive for the pilot bit to enter the bedrock (Figure 6). A temporary steel surface casing pipe was then laid in the trench and backfilled with flowable fill to aid in the drilling process (Figure 7).

As a part of the revised design process, the increased entry angle resulted in a deeper middle section of drill while proceeding through mixed subsurface conditions varying from weathered bedrock to glacial till consisting of cobbles and possible boulders. Ultimately, the depth of the middle tangent section portion of the drill profile was increased by 40 feet due to the revised entry angle and other constructability considerations.

4.2 CONSTRUCTION CHALLENGES AND CHANGES INTRODUCED TO THE EXIT SIDE

The difficulty in drilling through the mixed subsurface conditions resulted in minor IRs. Further, the change in the drill geometry posed additional challenges relative to drilling the pilot string into the already installed steel surface casing pipe despite multiple attempts and employing various techniques. Therefore, the project team collectively decided that the 48-inch exit casing should be abandoned in-place (cut at least several feet below grade) rather than attempt to remove it around the drill.

Upon completion of the swab pass, multiple cranes were mobilized onsite and the pipe laydown plan with crane supports placed approximately 100 to 150 feet apart was implemented. This involved supporting the pipe up in the air as it arched over wetland area in a compound curve.

The project was fortunate to have plentiful space for pullback operations, however, the pipe laydown did have to cross over a private road and pass beneath overhead electric 13KV lines which were approximately 35 feet above grade

(Figure 8). Sloping grade between the entry and pipe laydown required removal of some additional trees and grading. The contractor ultimately opted for two long pipe strings and a shorter third pipe string.

5.0 RESULTS AND CONCLUSIONS

Despite best attempts, the project witnessed minor inadvertent fluid returns (IR). The IRs were quickly contained and remediated due to onsite spill containment material and a standby vac-truck, coupled with attentive monitoring during critical operations.

Although the construction duration was appreciable, no significant injuries or fatalities occurred (SIF), which we attribute to a strong safety culture and daily job briefs/job hazard assessments (JHAs).

The larger project was successfully commissioned and gassed-into service on August 11, 2023 and is currently operational.

6.0 ACKNOWLEDGEMENTS

The Authors would like to thank their respective project teams, the stakeholders and permitting agencies, as well as Bond Brothers Civil and Utility Construction and ECI Drilling, Inc. for their assistance in achieving a successful HDD project.

ABOUT THE AUTHORS:

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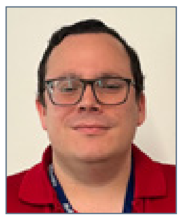
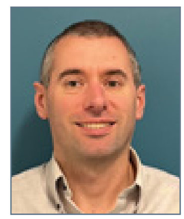


Grant Lella *is a lead engineer, certified welding/pipeline inspector at National Grid. He has served as the project engineer for the final 6 years of the 10-year LAGMP project.*



Rob House, PE, PMP *is an engineering manager for National Grid, responsible for the design of high-pressure pipelines within their Massachusetts service area, including replacements, retrofits and new installations.*

UNIVERSITY PIPE SYSTEM REHAB

PROGRESSIVE PIPELINE MANAGEMENT
THE INFRASTRUCTURE RENEWAL SPECIALISTS

A Collaborative Effort on a Historic Campus Building

By: Thomas Nestoras, Progressive Pipeline Management

Extending service life and upgrading the piping system of a University of Pennsylvania building in record time demanded tight collaboration, strategic innovation, and swift execution.

Project: Renewal of Roof Drains, Sewer Lines, Rainwater Stacks
Location: Philadelphia, Pennsylvania
Client: University of Pennsylvania (Penn)
Contractor: INTECH Construction (INTECH), Progressive Pipeline Management (PPM)
Method: Brushed-In-Place Lining (BIPP) & UV Cured-In-Place-Pipe (CIPP)

In May 2024, a collaborative effort commenced between Progressive Pipeline Management (PPM), experts in infrastructure renewal, and INTECH Construction (INTECH), the University of Pennsylvania's General Contractor. The project involved the comprehensive renovation of the piping system in a seven-story residence building on Penn's historic campus. PPM was responsible for camera inspecting, cleaning, and rehabilitating 18 vertical roof drains and 8 horizontal sewer lines using advanced Brush-In-Place Pipe (BIPP) and Cured-In-Place Pipe (CIPP) technologies. INTECH managed the overall project, coordinating with the university, architects, and on-site contractors.

Throughout the project, anticipated and unexpected challenges arose, including debris blockages, brittle pipes, and missing sections of pipe. The project had to be completed within a strict two-month window during the summer break while the building was vacant. To meet this deadline, the team utilized both traditional and innovative solutions with swift execution. INTECH's Project Manager, Kenji Matthew, facilitated continuous communication, leading weekly progress meetings to address unexpected issues and implement timely solutions. Thanks to the collaboration between INTECH's contractors and crews, the project was completed on schedule; the university could do their final preparations for the return of students.

Alex Olson, PPM's Project Lead, reflected on the collaboration: "PPM could not have completed this extensive project without the team coordination and support from INTECH. They allowed us to do our best work and maintain momentum."

BRUSH-IN-PLACE PIPE (BIPP) RECOMMENDATION

The initial plan called for the use of BIPP coating, a non-invasive method for rehabilitating small-diameter pipes. This process uses a two-part epoxy coating to restore pipe integrity, extending service life by up to 50 years. PPM recommended BIPP due to its cost-effectiveness and minimal disruption to the historic building's infrastructure. The alternative – full pipe replacement – would have

PPM observes and locates in-wall piping in preparation for rehab

CCTV and cleaning tools are applied prior to BIPP coating

required extensive demolition, including breaking through walls on every floor and excavating both concrete and hardwood flooring on the first level. This traditional approach would have been significantly more costly, highly disruptive, and nearly impossible to complete within the limited summer timeframe.

At the project's kickoff, Kenji set a collaborative tone: "We know the pipes are corroded. We don't know fully what we're dealing with until PPM gets their cameras inside the pipes. When issues come up, we will meet, come up with a strategy and agree on how to keep everyone moving forward."

INSPECTIONS & REPAIRS

The first phase began with pre-clean inspections using robotic Pan and Tilt CCTV cameras to assess the condition of the 18 vertical roof drains, which were 3 to 5 inches in diameter.

"We started by evaluating the extent of debris in the 60-foot vertical roof stacks," Alex explained. "The pipes were clogged with decades of buildup, including calcium deposits and corrosion. After cleaning, we re-scoped to check for cracks or leaks. While BIPP can seal cracks up to 1/8 inch wide, Penn preferred replacing sections with minor cracks since other trades were already on-site. Any damaged sections were replaced before coating proceeded."

Many of the pipes had cracks or leaks, sometimes spanning multiple floors. Alex continued, "Whenever we identified a leak, INTECH had a carpenter on-site to open the walls, and a plumber replaced the damaged section immediately. This allowed us to keep our crews moving forward, even as these issues emerged."

SPECIALIZED CLEANING TECHNIQUES

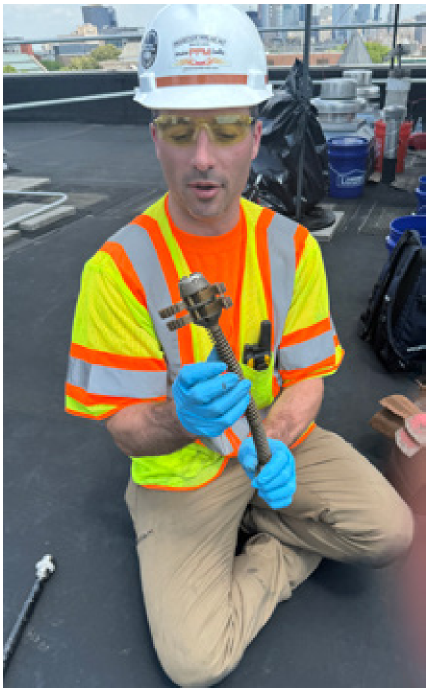
PPM used a multi-stage cleaning approach to ensure the pipes were thoroughly prepared for the BIPP coating process. This included:

- **Smart Sweeper:** A tool used to initially dislodge loose debris from pipe walls.
- **Sandpaper Fins:** Used to scrape and clear interior pipe walls.
- **3D Chains** and Chain Knockers: Aggressive cleaning tools of various sizes to tackle more stubborn debris.
- **Cyclones:** Custom-fit tools for each pipe diameter, used for the most aggressive cleaning, with the ability to clear pipes completely.

"FULL PIPE REPLACEMENT WOULD HAVE REQUIRED EXTENSIVE DEMOLITION, INCLUDING BREAKING THROUGH WALLS."

- **Hydro Blast Jetting:** High-pressure water blasting to purge remaining debris.

Once the cleaning was completed, post-clean CCTV inspections were conducted to confirm the pipes were ready for the BIPP coating. The BIPP process was primarily applied to the vertical cast iron stacks running from the roof to the first-floor ceiling. It involved three applications of a two-part epoxy, forming a protective barrier resistant to corrosion and abrasion. The entire process was carefully monitored using a robotic camera to ensure accuracy and precision.



A Smart Sweeper is a non-aggressive cleaning tool used to dislodge the debris from pipe walls

PPM crews apply Brushed-in-Place Coating (BIPP) to vertical roof drains

CHALLENGES AND INNOVATIVE SOLUTIONS

The team encountered multiple challenges and issues that had to be addressed and solved quickly to meet the tight deadline.

Extensive Vertical Stack Blockages

During the initial CCTV inspections, several pipes were found to be completely clogged, with some blockages extending up to 30 feet. Even after multiple passes with aggressive cleaning tools, stubborn debris remained caked onto many pipes. Additional cracks were revealed after cleaning was complete and clear visuals of pipe walls could be obtained. When a cleaning tool became lodged in the dense debris, Alex and his team had to innovate, ultimately developing a method to successfully dislodge the tool and continue progress.

Below-Slab Obstructions and Brittle Pipe

After completing the roof drains, the team moved to the horizontal sewer lines beneath the first floor reinforced concrete slab. The pipes, between 5 and 10 inches in diameter, were coated with heavy debris. Traditional cleaning methods were slow, and PPM feared that aggressive cleaning might damage the brittle pipes. To address this, PPM proposed switching to UV-CIPP technology, a method that didn't require extensive pre-cleaning and would avoid potential breakages. UV-CIPP uses a liner that is pre-impregnated with epoxy resin and inverted into the host pipe. Once the liner is cured with ultraviolet (UV) light, a structural, long-term 'pipe within a pipe' forms. Kenji quickly secured the necessary approvals, and the team moved forward with the alternative solution.

Missing Pipe Sections

While preparing for UV-CIPP lining, the crew discovered a missing 4-foot section of sewer pipe beneath the slab in the mechanical room, directly below high-voltage electrical equipment. Excavation to replace the missing section was nearly impossible. This was a critical moment for PPM's innovative problem-solving abilities. They installed two spot repairs to restore structural integrity, then seamlessly bridged the gap with a 6-foot UV-CIPP liner, ensuring a stable, continuous pipe structure. PPM was then able to line the entire 40-foot segment as one seamless, structurally sound pipe.

PROJECT SUCCESS

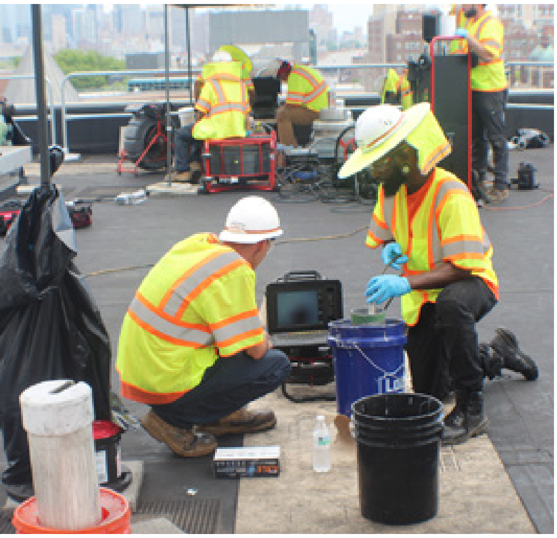
In spite of the numerous challenges and emergency scenarios, the pipe system rehabilitation was completed in July, just in time for the building's incoming occupants. The combination of BIPP and UV-CIPP technologies significantly improved the structural integrity of the pipes, extending their service life for decades.

Kenji reported that the university was pleased with both the cost savings and the outcome. "The building's pipe system is functioning properly, without any issues. When they flush, there haven't been any clogs or leaks." He added, "With the pipes put back together and the walls in, it looks as if we were never there. That is success."

COMMUNICATION & COLLABORATION

The project's success was driven not just by advanced technologies and technical expertise, but by effective communication and teamwork.

"The complexity of piping systems



BIPP coating has a two-part epoxy that forms a barrier resistant to corrosion and abrasion

in buildings should never be underestimated," Alex reflected. "Unexpected issues always arise. Kenji's open communication and collaborative approach allowed us to strategize and tackle challenges efficiently. This project stands as a testament to how traditional methods and innovative technologies can work hand-in-hand for infrastructure renewal."

ABOUT THE AUTHOR:

PPM PROGRESSIVE PIPELINE MANAGEMENT
THE INFRASTRUCTURE RENEWAL SPECIALISTS

Thomas Nestoras *has been specializing in innovative infrastructure renewal for over a decade. Tom has extensive knowledge of all phases of construction site management. His career in construction started from the ground up, giving him a unique perspective on the many facets of project management and diverse equipment used to recondition pipelines. From "job walk" assessments of projects to handing the finished product back to the client, Thomas demonstrates excellence in project management. He is constantly looking for the most effective process to get projects completed in a timely and cost-efficient way. Thomas is an integral part of keeping up with new innovations at PPM which often involve new technologies and installation processes.*

About Progressive Pipeline Management:

PPM is a full-service contractor and team of highly skilled infrastructure renewal specialists. For over twenty-one years, PPM has been improving the safety and longevity of pipeline infrastructure. PPM has a broad range of experience with underground infrastructure remediation and expertise with solutions for buildings, sewage, stormwater systems and utility pipelines. PPM is the exclusive licensee in North America for the Starline® Cured-in-place-lining technology. The team has specialized expertise including gas pipeline rehabilitation, restoration of damaged or leaking infrastructure, PIPES ACT compliance, facilities pipe renewal, and site services.

DELIVERING ALTERNATE SOLUTIONS

The Use of Down-Hole Horizontal Hammer Boring in North America

By: Richard Revolinsky, Geonex Inc, (GEO)

Expecting the unexpected is status quo for the trenchless industry. Designers and Contractors alike carefully evaluate project parameters to develop a plan utilizing the know methods to achieve success. Furthered by collaboration between equipment manufacturers and industry professionals, the approach and solutions to anticipated project hurtles is ever evolving. The unknowns, especially in trenchless construction, can be disastrous to a project plan and budget, but have led to some of the most creative solutions that were once considered to be novel, have become tried and true industry standards. In this article we'll focus briefly on a few examples of North American projects that turned to Horizontal Down-Hole Hammer Boring for success.

Horizontal Down-Hole Hammer Boring is a trenchless method for new installations which utilizes a pneumatic hammer and tooling located within the lead casing. Each stroke of the hammer accelerates heavy steel tooling forward which both pulverizes the subgrade as well as advance the casing installation by "pulling" the casing into place from the front, not pushing from the rear. Compressed air is then released, conveying the pulverized material through openings in the face of the tooling, back into the steel casing where it is carried back to the launch pit by rotating auger. This method can be successfully deployed in ground consisting of solid bedrock, intermittent cobbles as well as mixed conditions without having to change tooling for differing conditions. The diversity of conditions in which the method is successful has led to several recent projects turning to Horizontal Down-Hole Hammer Boring when traditional methods have been unsuccessful, restricted, and where anticipated risk encouraged seeking an alternative solution.

"EXPECTING THE UNEXPECTED IS STATUS QUO FOR THE TRENCHLESS INDUSTRY."

ALTERNATIVE TO AUGER BORING

In June 2023, Dunigan Brothers of Summit Twp, Michigan set out to install 140 feet of 24-inch steel casing for a 12-inch Waterline below a pair of high-speed Amtrak rail lines. Familiar with the area and observing the topography, Dunigan

Technician uses the remote control to operate the GEONEX HZR610 drill machine set up for 10-foot casing lengths

"HORIZONTAL DOWN-HOLE HAMMER BORING IS A TRENCHLESS METHOD FOR NEW INSTALLATIONS."

Aerial view of equipment set up to bore under the railway

anticipated cobbles and wet conditions in the 14-foot deep bore. "When you look at the site, it looks like the railway is laid in an old creek bed. We knew it would be wet and sloppy but had a feeling we'd hit rock so we made sure we had a back-up plan" said Patrick Dunigan II, VP of Operations at Dunigan Brothers Inc.

During excavation of the jacking pit, Patrick's feelings were confirmed when they began pulling rounded cobbles up to 24 inches in diameter from the pit. Under the direction of the project owner, Dunigan proceeded with traditional auger boring but made it only about 13 feet before hitting the cobbles. "I reached out to GEONEX Inc. for rental pricing as a contingency plan before we even started digging. After reviewing the project details, they were certain they could be successful barring any steel obstructions. When we hit the cobbles, I confirmed pricing, presented a change to the owner, and with minimal delay, GEONEX Inc. was on-site with their technician and tooling to get this project back underway." explained Patrick. "We could only accommodate 10-foot casing lengths so it took a little while to make all those welds and we finished the bore in 4 days. I was impressed how well the equipment performed in the sloppy soft spots as well as through the cobbles."

The face of the boring system used to pulverize the rock

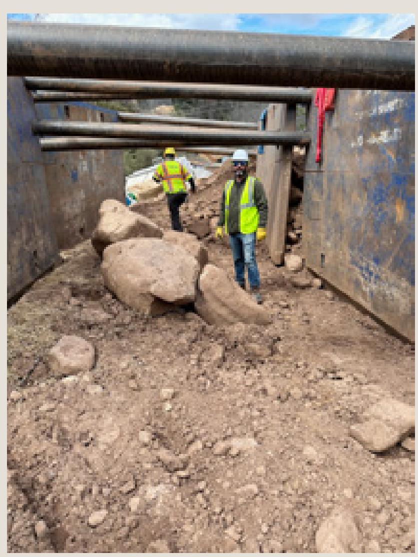
Receiving pit – showing 6 of the 8 completed installations using the DTH method

ALTERNATIVE TO MICRO-TUNNELING

For a project in Jersey City, NJ, Northeast Remsco Construction (Remsco), a JAG Company, was contracted to perform (8) parallel 36-inch diameter micro-tunnels below the NJ Transit Light Rail which would house electric conduits. While preparing the site, it was discovered the ground below the bore path consisted of vastly differing conditions that were not suitable for the MTBM. In addition to being below the water table, soft soils and occasional cobbles were revealed as well as an abandoned concrete duct bank and cast-iron water main. As the contract prohibited the used of other common methods, Remsco began evaluating the feasibility of the Horizontal Down-Hole Hammer Boring method.

Remsco Project Manager George Gutierrez P.E. talks about the turn of events. “When we reviewed the additional information, we immediately conveyed our concerns to our client Yonkers Contracting Company. While waiting to discuss solutions with the Port Authority, we went through process of elimination for the other methods we perform; Auger Boring, HDD, Microtunneling, and pipe ramming. We’ve been interested in the GEONEX systems for Horizontal Down-Hole Hammer boring and began evaluating it further. A joint meeting between Remsco, GEONEX and the project owner led to a preliminary approval. Once the owner approved, GEONEX expedited production and delivery of their HZR1200 drill machine which is capable of up to 48-inch casing installations. We accepted delivery in May 2024.”

Currently all 8 installations are complete.



BEFORE: A worker stands next to boulders retreived during excavation of the launch pit

AFTER: A pile of cuttings generated during installation by the horizontal down-hole hammer boring process

"We always want what is best for the project, and we were fortunate all involved let us employ an alternate method. Now that we have the GEONEX system, we've been looking at how it can improve success for other upcoming projects," said Gutierrez.

ALTERNATIVE TO PIPE RAMMING

In March of 2024 Horizontal Down-Hole Hammer Boring was utilized to successfully install 320 feet of 42-foot casing in the mountains of Southwestern VA. Three significant hurtles made this critical installation challenging. First, the 42-inch bore would proceed 105 feet, crossing an active NSF railway. Second, the remaining 215 feet would be below a shallow creek that is habitat to a U.S. Fish & Wildlife classified Threatened species of fish. And lastly, this installation would have to be performed through ground consisting of cobbles the size of a V8 engine block.

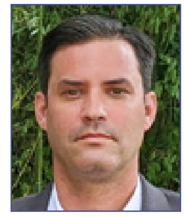
The stakes were high. Not only had the had previous attempts with roller cone auger boring heads been unsuccessful, but additional attempts utilizing small diameter pipe ramming had been unsuccessful. Additionally inadvertent returns of air from pipe ramming could create turbidity in the stream, having a significant impact and potential harm to the threatened species.

Project owner Equitrans Midstream was open to suggestions. HDD and Slurry Microtunneling were considered, however both the cobbles and potential for IRs eliminated these options. Mike Kidd of Atlantic Underground presented the idea of using Horizontal Down-Hole Hammer Boring. The method does not require bentonite, is proven successful for cobble conditions, and because the air flows back through the casing, the potential for creating turbidity in the creek was significantly reduced.

After exhaustive planning, preparation, and cross-checking data, Atlantic Underground was asked to mobilized to the site by March 18. "Once the pit was excavated and trench boxes in place, the GEONEX Machine was set in the launch pit, air compressors connected, and the first casing set to install. It took 5 days to complete the bore, with a couple of long nights to complete the 4 to 5 hours of welding per joint. 40-foot lengths of casing were installed at an average rate of 17 feet per hour, yielding 80 feet per day. Once the crossing was complete, the product pipe was slick-bored into place, said Kidd.

An Equitrans representative indicated there were over 350 bores on the project through the same type of ground. "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.*

NEW LONDON FORCEMAIN REPAIR:

Innovative CIPP Solution Preserves Coastal Waters & the Tourist Season

New London, Connecticut, a coastal community, faced a severe environmental threat

By: Hercules Anastasiadis, National Water Main Cleaning Company

In March 2024, National Water Main Cleaning Company undertook a critical emergency project in New London, Connecticut. The innovative solution enabled swift sanitary sewer repair ahead of New London's tourism season.

The task involved the rehabilitation of a failed section of a sanitary sewer force main. National Water Main Cleaning Company (NWMCC) was uniquely qualified for this job not only because of their extensive expertise, but because their advanced design-build capabilities allowed for the integration of the design and construction phases, enabling them to respond swiftly and efficiently to the emergency situation.

By installing a CIPP SAERTEX-LINER® MULTI S+ XR that was rated for high-pressure pipes, NWMCC demonstrated the importance of advanced techniques in extending the lifespan of infrastructure while mitigating environmental hazards.

THE CHALLENGE: A FAILED FORCE MAIN THREATENS COASTAL WATERS AND TOURISM

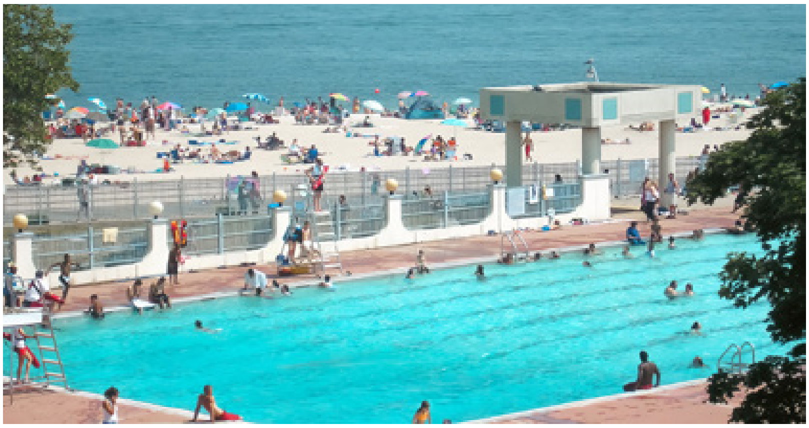
New London, a coastal community, faced a severe environmental threat when a force main sewage pipe failed. Force mains are rarely proactively inspected due to their location and pressurization, which can result in immediate and visible crises upon failure. In this case, sewage began to surface and posed a significant pollution risk to nearby coastal waters.

The urgency was heightened by the proximity of a water park, which is a major tourist attraction of New London, just as the high tourism season was approaching. Completing the repairs before the end of May was imperative to avoid severe economic repercussions for the city.

IMMEDIATE RESPONSE: TEMPORARY MEASURES AND SEARCH FOR SOLUTIONS

The city of New London promptly mobilized an emergency temporary bypass system to manage the sewage flow. Initially, the city planned to replace the pipes, but the high cost, extended timeline, and invasiveness of this option led them to reconsider.

Hearing about a possible alternative, New London reached out to NWMCC to explore a trenchless rehabilitation solution.



Urgency was heightened by the proximity of a water park and other major tourist attractions

Costs, timeframe and low impacts led New London to consider trenchless options

THE NWMCC ADVANTAGE: DESIGN-BUILD APPROACH

A significant factor that sets NWMCC apart from its competitors is their "design-build" capability. Unlike the traditional "design-bid-build" approach used by other contractors, where design and construction phases are separate, the design-build method integrates both phases. This approach allows for more streamlined communication, faster project completion and reduced costs.

Because NWMCC manages both design and construction, they can swiftly adapt to project changes and implement innovative solutions more efficiently. This capability was a key reason New London contacted NWMCC, knowing that their integrated services would better meet the urgent needs of the project, in addition to their knowledge and expertise of trenchless pipe lining methods.

THE INNOVATIVE METHOD: CURED-IN-PLACE PRESSURE PIPE LINING

Gravity pipes have been lined to extend their lifespan for many years but lining pressure pipes with a UV curing method is brand new to the industry. Gravity pipes, which rely on the force of gravity to transport sewage, face fewer stressors and can be effectively lined using established techniques that restore their structural integrity without having to withstand significant internal pressure. In contrast, pressure pipes like force mains, continuously endure high internal pressures, making their rehabilitation more complex. The lining material therefore has to be made to custom fit and also be able to withstand constant high-pressure conditions.

The failed force main in New London offered an opportunity to apply an innovative pressure pipe lining technique known as UV CIPP (Ultraviolet Cured-In-Place Pipe) lining. UV CIPP lining is a trenchless rehabilitation process that involves inserting the flexible SAERTEX-LINER® MULTI S+ XR saturated with a UV-activated resin into the damaged pipe. Once the liner is properly positioned and inflated, a special UV light source is pulled through the liner. The UV light initiates a chemical reaction in the resin, causing it to harden and cure in place.

UV CIPP lining is an innovative trenchless process for rehabilitating pressure pipe

Lining material is custom fit and designed to withstand continuous high-pressure conditions

PROJECT TIMELINE AND EXECUTION

FEBRUARY 2024

New London identified a failure in the force main and promptly mobilized an emergency bypass system to address the issue.

City officials began exploring potential solutions, including an initial consultation with NWMCC for options like trenchless rehabilitation and traditional pipe replacement. A completion date was set for May 2024, aiming to finish the project before the high tourism season began.

MARCH 2024

New London decided to proceed with the trenchless pressure pipe lining technique, considering its cost-effectiveness, timely implementation and minimal environmental impact compared to replacing the pipe.

NWMCC collaborated with city offcials to plan the project logistics and establish safety protocols. By mid-March, NWMCC began site preparation, pipe cleaning and CCTV inspection. They placed an order for a bulk quantity of specialized liner from SAERTEX multiCom® in Germany, anticipating the need to ft it to specifications on-site.

To adhere to the tight timeline, NWMCC opted for air freight to expedite delivery, ensuring the project could proceed without interruption once the liner arrived.

APRIL 2024

Because the process is trenchless, only minimal excavation occurred in the form of access pits, underground chambers designed to provide entry points to the pipeline.

The local environment and infrastructure were largely undisrupted. The materials arrived from Germany, and installation of the pressure pipe lining began a week ahead of schedule.

The lining and rehabilitation work was completed within two weeks, finishing by mid-April. This rapid response and efficient project management were crucial in mitigating the environmental and economic risks associated with the failed force main.

By late April, New London was able to conduct comprehensive system testing to confirm enhanced flow rates and pressure resistance. The project was completed ahead of schedule, ensuring that New London was fully prepared for its high tourism season.

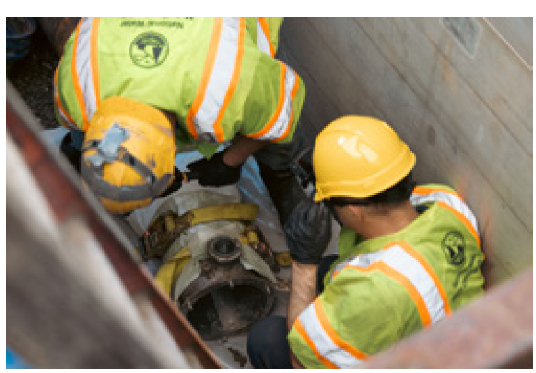
KEY TAKEAWAYS

INNOVATIVE TECHNOLOGY

As a trenchless technology, the innovative UV CIPP lining method requires little excavation, preserving the surrounding environment and infrastructure. UV curing is significantly faster than other curing methods, reducing the overall project timeline. The cured liner forms a new, seamless pipe within the old one that can withstand high internal pressures, extending the life of the existing force main.

ADAPTABILITY AND CRITICAL THINKING

NWMCC's design-build approach was pivotal in expediting the project timeline. By integrating design and construction phases, NWMCC could make swift, informed decisions such as air freighting the liner and ordering materials in



Cured liner forms a new, seamless pipe that extends the life of the existing force main

Safety was a priority, with rigorous protocols protecting workers and the public.

advance. This seamless coordination and flexibility demonstrated their critical thinking and adaptability in addressing the emergency situation efficiently.

COLLABORATION AND COMMUNICATION

Close collaboration with New London officials and clear communication throughout the process ensured the project met its tight deadline. Safety was a priority, with rigorous protocols protecting both workers and the public.

> ***"PROJECT WAS COMPLETED AHEAD OF SCHEDULE, ENSURING NEW LONDON WAS FULLY PREPARED FOR TOURIST SEASON."***

ENVIRONMENTAL PROTECTION

The rapid response and effective repair mitigated the potential for significant pollution, protecting the local environment and community.

CONCLUSION

The successful completion of the emergency pressure pipe lining project in New London by NWMCC underscores the critical role of innovative technologies and agile project management in infrastructure maintenance. This project marked NWMCC's first application of pressure pipe lining, setting a precedent for future projects and emphasizing the importance of preparedness, rapid action and advanced solutions to protect public health and the environment.

ABOUT NWMCC:

NATIONAL WATER MAIN CLEANING
A Carylon Company

***National Water Main Cleaning Company** is headquartered in Kearny, New Jersey, with offices in Canton, Massachusetts, Rockyhill, Connecticut, and Utica, New York offering a full line of environmental infrastructure inspection, cleaning, and repair services. From lateral service line inspections and sewer system maintenance to no-dig CIPP repairs, NWMCC has the resources, expertise, and decades of experience to get the toughest jobs done right.*

TRENCHLESS TECHNOLOGY IS KEY FOR THE CHAMPLAIN HUDSON POWER EXPRESS PROJECT IN NY

By Pat Pierce, Underground Solutions, Inc.

To help New York transition to clean energy power, a large underground transmission project called the Champlain Hudson Power Express (CHPE) project is currently being constructed. Clean hydropower generated by Hydro-Quebec will travel through underground HVDC cables, and make their way along an Eastern New York path, to Queens, NY. The entire underground project is about 339 miles long. This is quite an undertaking, considering the vast scope of the project, which is expected to become fully operational in early 2026. The estimated cost is approximately cost 6 billion dollars, which will be one of the largest investments in New York state history.

The Champlain Hudson Power Express will generate 1,250 megawatts (MW) of electricity, enough clean energy to provide power to 1,000,000 New York homes. As we seek to transform our electricity generating needs away from fossil fuels to green energy, this hallmark project will become a shining example of what is possible to achieve.

The installation technology consists of two parallel HVDC (high voltage direct current) powerlines, separated by a certain distance along the entire route. Using HVDC, as opposed to HVAC (high voltage alternating current), allows for minimal electrical energy losses over the long distance of the CHPE project.

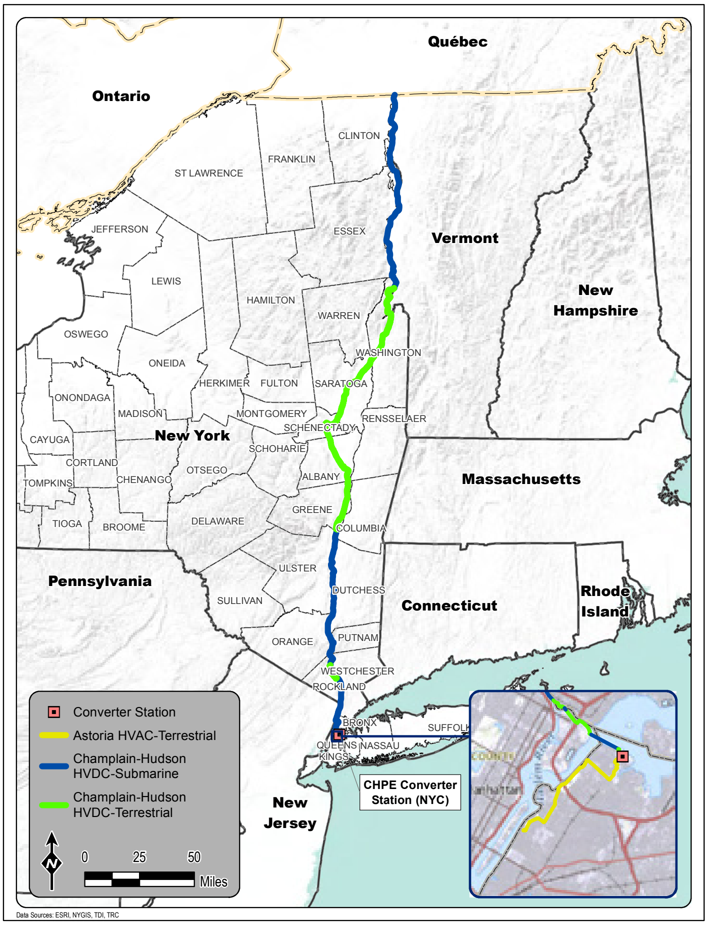


Figure 1: Long Strings of Fusible PVC®

Figure 2: Drill Rig - 600,000 pounds of force

Figure 3: Drill Rig in action

When looking at whether a large electrical transmission project uses HVDC or HVAC, the distance is usually the deciding factor. In general, when a project exceeds 35 miles in length, HVDC is the better choice. Power converting stations are needed with HVDC, which increases the cost. However, the potential electrical energy losses with HVAC over a long distance still make HVDC the better option. While this is the standard methodology for long-distance electrical projects, individual cases will always determine the best approach.

The installation method for the CHPE project consists of employing 60% of the cable buried under water, using submarine cables. The remaining 40% of the project will employ terrestrial installation methods (buried under ground), with the electrical cable placed inside conduits for the terrestrial areas. Burying the cable helps to protect it from the elements during extreme weather conditions, which is very favorable during any storms. The cable will also be out of sight, which is a desirable aesthetic and environmental outcome.

The 40% terrestrial installation component of the CHPE project is most relevant to the trenchless technology industry. The benefit of employing trenchless installation methods allows for a route that can easily avoid environmentally sensitive areas. The underground path can also traverse under existing roads, and continue along within railroad rights of way as well. Some of the terrestrial route will involve open trenching in areas that are conducive to that method of installation, while horizontal directional drilling (HDD) can be employed in remote, congested, and environmentally sensitive areas as well.

The open trench installation areas of the CHPE project will use bell and spigot PVC conduit sticks, which are glued together. The HDD locations will use fused thermoplastic conduit in those areas. The options for the directional drills were to use either a larger diameter and thicker walled HDPE conduit, or a smaller diameter Fusible PVC® conduit, which has a thinner wall and is a much stronger material for HDD applications. Fusible PVC® has twice the tensile strength of HDPE, which allows for much longer pipe string lengths for HDD projects. Using smaller diameter Fusible PVC® conduit also allows for a smaller bore hole to be drilled, which reduces the volume of material removed from the bore hole (spoils). A great additional benefit of using FPVC® is that the installation time is less, due to the reduced time that it takes to perform directional drilling with a smaller bore hole.

A project of this magnitude requires a large general contractor, with many specialties available among their internal teams. Large projects like this usually require an EPC contractor (Engineering, Procurement, and Construction). The company that was chosen to provide the complete installation service was Kiewit. Their Kiewit Infrastructure group is working on this, as well as their Kiewit Power Constructors group.

The CHPE project has over 300 HDDs. Due to the volume of directional drilling necessary for this project, multiple HDD contractors were required to perform this work as subcontractors. Due to the complexity of many of these HDDs, larger specialized directional drilling companies were needed, who own the multiple pieces of necessary drilling equipment, along with the expertise and staff required for such a large project.

There are (5) directional drilling contractors working on the trenchless portion of the CHPE project. They include Kiewit Infrastructure (based in Omaha, NE), who is self-performing

Figure 4: Mud reclaiming unit

Figure 5: Pipe Fusion Operation

some of the HDD work. Kiewit is installing both Fusible PVC® conduit and HDPE conduit. The HDD Company (their East Coast group is based in Hudson Falls, NY) is also present on site, as they are installing both Fusible PVC® conduit and HDPE conduit as well. The Haugland Group (based in Melville, NY) is installing Fusible PVC® for their portion of the HDD work. Aaron Enterprises (based in York, PA) is also installing Fusible PVC® conduit for their HDD segments. Michels Trenchless (based in Brownsville, WI) is also installing Fusible PVC® conduit for their HDD work on the project.

The first step in an HDD project is to drill the bore hole for the conduit materials. Horizontal directional drilling projects start with drilling a pilot hole to set the proper directional course for the HDD that will follow. Once a pilot bore hole is drilled, it is usually followed by multiple reaming passes to open the bore hole to the final diameter that is required for a project. Another method that can be employed is called a "poke and pull". This is when the pilot bore hole is large enough for the pipe material to be pulled in right after drilling the pilot hole. This method is a major time saver for an HDD, and was used for some locations on the CHPE project, but only with Fusible PVC®, since it has a smaller diameter than the HDPE option that was available to the drilling contractors.

During the drilling process, a "mud" mixture is used. The mud material is primarily bentonite mixed with water. This drill mud is injected through the tooling that is used (the drill rods). The mud helps to cool the tooling during the drilling operation, as heat builds up in the tooling during the drilling process. Another important function of the mud is to stabilize the bore hole, and to seal and maintain the inside hole diameter during the entire process. The mud also serves as a carrier for the spoils (the material that is removed from the bore hole during the drilling operation), as they are returned to the drilling side of the project. A mud reclaimer is usually also used on site, which separates the solids from the used drill mud so that the clean drill mud can be sent back into the bore hole.

Since the area for the HDD work along the route of this project was large (over many miles), the drilling contractors encountered a wide variety of soil conditions. Some areas had soft soil, such as clay, which made directional drilling easier. Other areas had cobble, glacial till, shale, and other harder materials, which made drilling more difficult, due to the extra time involved to bore the HDD path.

The pipe fusion process occurred at the same time as the bore holes were being drilled for most of the HDD work areas along the CHPE project. Some areas allowed for the full-length conduit strings to be laid out. In other congested population areas, the full length of conduits could not all be fused together, but required intermediate lengths to be laid out. So, for example, if one HDD area called for a 2,000-foot length of conduit to be installed, but only had 500-feet of laydown area, then there would be four individual 500-foot strings together.

When thermoplastic pipes are fused together, a bead (or ridge) develops on both the inside and outside areas of where the

Figure 6: Pipe Handling

thermoplastic pipes are joined together. For electrical conduit, a procedure is used where the bead is removed from the inside of the conduit pipes after they are fused to each other, usually after each conduit stick is fused to the next one in succession. For the intermediate strings, the critical issue was to remove the intermediate bead that developed during the fusion process, once two longer strings of conduit were fused together. For Fusible PVC®, Underground Solutions has developed a debeading robot, which can travel several hundred feet inside a conduit to remove an intermediate bead. This debeading robot proved to be a major benefit for this project.

Although the CHPE project is continuing along as of this writing, the trenchless installation of the conduit pipe materials has been highly successful. The overall scope of this work relied on the proper engineering design, along with teamwork from everyone involved.

ABOUT THE AUTHOR:

Pat Pierce *is the Regional Sales Manager covering New England and New York for Underground Solutions. He has worked in a variety of industries throughout his career, primarily focusing on manufacturing management, marketing, and sales functions. Pat holds a B.S. in Chemical Engineering and an M.B.A. from the University of Massachusetts at Amherst.*

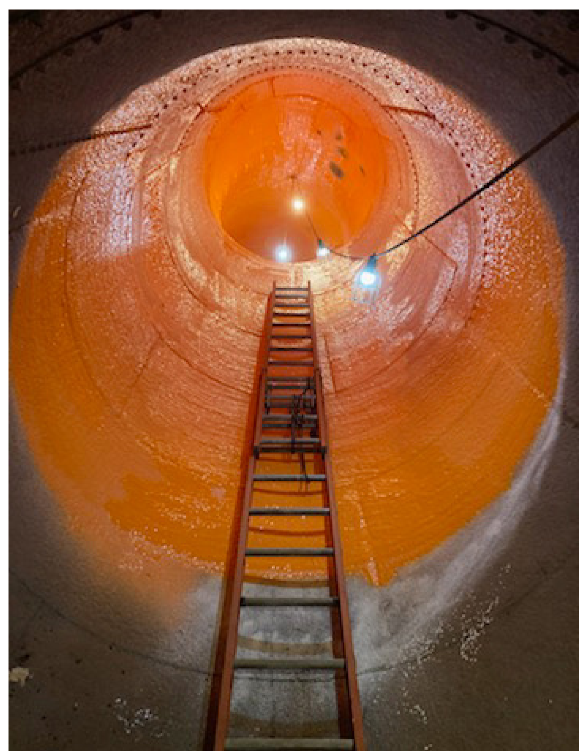
ANSWERING THE CALL

When a Coating Absolutely Must Perform it Must Be OBIC

By: Mara Kilburn, Precision Trenchless LLC

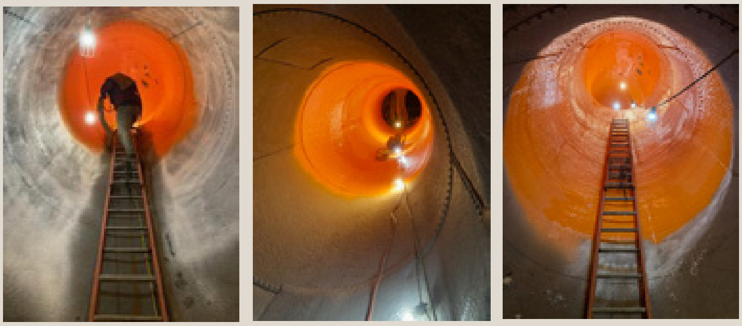
Precision Trenchless answered the call just 60 days before a consent order with heavy fines was to be enacted upon Patriot Hydro for the power generator known as Theresa Penstock. Their 84-inch diameter 150-foot steel pipe used to flow water to a large power generator had been out of service for a long period of time due to it's dilapidated condition. Over the years, multiple steel plates had been welded into the structure in an effort to mitigate the failures and another contractor had made three attempts to fix the pipe, with abysmal and unacceptable results, in the six months prior to Precision Trenchless partnering to resolve the problem.

"WE TAKE PRIDE IN OUR CREWS WHO TAKE PRIDE IN THEIR WORK."



We deliver a quality product with every install

Precision Trenchless approached this challenge with the correct protocol. Remove the coatings, clean the pipe and prepare the substrate properly to receive the OBIC 1000 polyurea coating. This can be a painstaking process that requires precision and attention to detail in order to obtain the desired results. We take pride in our crews who take pride in their work that's how we deliver a quality product with every install.



Applying the polyurea takes precision and attention to detail

Multiple steel plates had been welded into the structure in attempts to fix the pipe

OBIC coating systems are known for their fast cure

> **"THE END RESULT WAS REPAIR TO MORE THAN 80 LEAKS."**

The end result was repair to more than 80 leaks that existed when we began and a monolithic coating that was properly applied and adhered to the steel structure. The coating is a success. The duration of this project was just shy of three weeks, bringing conclusion to the project two weeks ahead of the deadline set by the consent order. OBIC coating systems known for: fast cure and therefore quick return to service, passing the freeze/thaw test eliminating cracking, and spray on system making it suitable for all structure shapes, installed by Precision Trenchless alleviated the grave concern and impending fines for this owner.

ABOUT THE AUTHOR:

***Mara Kilburn** is President and CEO of Precision Trenchless LLC, a woman-owned business. Her interests in the construction industry and environmental concerns merged when she learned about Ultra Violet Cured In Place Pipe lining. She enjoys meeting people and touting the benefits of safe and reliable methods to rehabilitate our aging pipe systems using environementally friendly methods. Mara loves the outdoors and is an avid recycler and protector of the Earth.*

SOME CONSIDERATIONS FOR TRENCHLESS RAILROAD CROSSINGS

By: Jason Heinz, P.E. & Dennis J. Doherty. P.E., F. ASCES, Terracon Consultants

INTRODUCTION

Trenchless installations have, and will, become more frequent as our population grows and our infrastructure ages. Local, state, and federal agencies, as well as owners, engineers and specialty contractors may or may not be familiar with the less typical project that includes a trenchless crossing beneath existing railways. Class I railroads have instituted review processes and construction requirements that prioritize uninterrupted operations and the safety of their trackage. Documents that present the expectations and requirements of railroad companies and their engineers vary and do not necessarily mimic American Railway and Engineering Maintenance of Way (AREMA) guidelines.

Following is an outline of the general steps for Class I railroad approvals with approximate timelines that affect project planning and scheduling, cost, and construction. Avoidance of existing railroad improvements and ground and trackage movement are major considerations that must be addressed for the rail companies' approval to begin construction in their right-of-way. Summaries of some of the companies' requirements and guidelines will be presented and compared to some standard industry practices. Contractor's construction plans and project drawings will also be discussed to highlight items within them that are required to receive construction approval.

PLANNING FOR A TRENCHLESS RAILROAD CROSSING

Projects sponsored by parties other than the railroad are required to enter into an 'agreement' with the railroad. The 'agreement' with the railroad is executed before construction is allowed to occur. The 'agreement' is generally not provided to the project owner until the required railroad forms are deemed satisfactory, and the plans, specifications, and the construction/work plan are also deemed satisfactory by the railroad and their reviewers. In some cases, however, the railroad will 'approve' the construction proposed, but further requirements will be enforced by the railroad as construction approaches. This initial 'approval' can be misleading in some cases because further reviews will be conducted by the railroad or the railroad's engineer before the contractor is allowed to be on-site. It is important to keep in mind when reviewing the railroad's flow of work that it is from their point of view and does not necessarily consider design-bid-build processes to perform new construction. The following is a general list of steps that are required to begin construction and timeframes that can be considered when planning a trenchless crossing of a railroad right-of-way: (see below)

• Subsurface Utility Engineering (informal/non-ASTM) by the Civil Engineer	4 - 6 weeks
• Development of utility/structure alignment by the Civil Engineer	2 - 3 weeks
• Initial Review of a plan and profile by the Railroad's Engineer	2 weeks
• Subsurface Exploration and Geotechnical Engineering	6 weeks
• Plans and Profiles refined by the Civil Engineer and/or Geotechnical Engineer	2 weeks
• Secondary/Tertiary Review of plans and profiles can be performed by Railroad's Engineer	2 weeks
• Design Completion (say 95 percent)	2 weeks
• Bidding and Award	3 - 6 weeks
• (Sub)Contractor under contract	2 weeks
• Construction/Work Plan by Prime and (Sub)Contractor(s) finished	2 weeks
• Geotechnical Engineer review(s)/iterations of the Construction/Work Plan	1 - 2 weeks
• Revise Geotechnical Report for consistency with Construction/Work Plan	1 week
• Submit Construction Plan w/ PnP, Specs., & Geotechnical Report to 3rd Party	1 week
• Railroad Engineer Review of Construction Plan, PnP, Specs., & Geotechnical Report	1 - 3 weeks
• Revisions to the plans and profiles and/or construction plan	1 week
• Railroad Engineer's Approval & Preparation of 'Agreement'	1 - 2 weeks
• Pre-construction Meeting w/ Stakeholders	1 - 2 weeks
• Schedule Flaggers	1 - 4 weeks
• Subsurface Utilities / Potholing	0.2 - 1 week
• Potential Timeframes to Start of Construction	6 – 12 months

RAILROAD CROSSING REQUIREMENTS

Each Class I railway publishes protocols to be allowed to perform new construction in their rights-of-way. Railroad documents have been made available on their websites. The documents present procedural flow charts in some cases, requirements for plans and alignments, and requirements for ground movements. More than one document usually needs to be referenced to understand their full set of requirements. The railroad's review engineers can have further requirements for situations that are deemed to pose additional risk of adversely impacting the right-of-way and trackage.

Whether subsurface exploration is required for a trenchless crossing of railroad right-of-way is in part dependent on the diameter of the bore proposed. Cutoffs for whether geotechnical evaluation vary and been described as:

- less than 10 or 12 inches in diameter (CN & CPKC),
- 20 inches or larger and 48 inches or larger (CSX for HDD and cased bores),
- greater than 26 inches (BNSF & UPRR), and
- 60 inches or greater or upon request (NS).

"RAILROADS HAVE INSTITUTED REVIEW PROCESSES AND CONSTRUCTION REQUIREMENTS THAT PRIORITIZE UNINTERRUPTED OPERATIONS AND SAFETY."

The required minimum embedment or cover vary by product carrier pipe type and installation method, and the levels of railroad engineering review for trenchless crossings are also dependent on the cover depth. Considering that there are more variables than noted here, communication with the local railroad representatives often proves to be valuable to meet their desired requirements. Railroad requirements are routinely updated, and new requirements can be in progress during a project that will be enforced by the railroad.

As noted previously, a primary consideration for trenchless crossings is the ground and/or trackage settlement that results from the bore. The requirements for ground/trackage movement also vary amongst the railroads but are generally small and can be fractions of settlement amounts that geotechnical engineers commonly deal with for other types of construction. Engineers and contractors must consider the small ground/trackage movement requirements of the railroad and should not assume that their 'standard' means and methods will be acceptable to the railroad's engineer and/or the geotechnical engineer. Even if the project specifications do not prescribe requirements for a bore, or reiterate the railroad's requirements, it is advisable that the contractor make themselves aware of the railroad's requirements to reduce the potential for project delays and change order requests. The following are some railroad requirements for ground/trackage settlement that are published and are based on project experience of the author. Although some of the railroad publications use the word settlement, trackage settlement and heave can have detrimental effects.

Canadian National Railway (CN)	Alert: 3/16-inch	Work Stop: 3/8-inch
Canadian Pacific Kansas City (CPKC)	Alert: 11 mm to 5 mm	Critical/Work Stop: 3/8 to 7/8-inch
Norfolk Southern (NS)	Threshold: 1/8 to ¼-inch	Shutdown: 1/4 to 1/2-inch
Union Pacific Railroad (UP)	Alert: 1/16 to 1/4-inch	Maximum: 1/8 to 1/2-inch
CSXT	Alert: project specific	Max: any movement (in agreement)

*****Note: NS and CPKC are based on track class*****

“LEVELS OF RAILROAD ENGINEERING REVIEW FOR TRENCHLESS CROSSINGS ARE ALSO DEPENDENT ON THE COVER DEPTH.”

‘Standard’ means and methods across the United States vary along with the lingo used to describe elements of a contractor’s boring setup and the method of trenchless construction in general. Contractors have gained much experience by performing work directly for railroads and have their ‘standard’ means and methods agreed upon with railroad personnel. However, when a third-party wishes to enter into an agreement with a railroad, the railroad’s requirements should be given special consideration, and the contractor should expect to provide a Construction/Work Plan that details the means and methods of their installation. If attention to detail is not given in the preparation of the contractor’s Construction/Work Plan for a third-party project, it is more likely that project delays will result.

A matter that has been observed to be overlooked is the limit placed on the overcut by the railroad. A notable number of articles have included the example that horizontal directional drilling contractors commonly bore a hole diameter of 1.5 times the diameter of the casing or carrier pipe or 4 or 6 inches greater than the diameter of the casing/pipe. The railroads generally state that if the HDD bore is greater than 2 inches larger than the carrier pipe, the annulus shall be grouted. The best practice of overcutting HDDs to facilitate carrier pipe pullback is the most common route selected, but the oversizing needed can prompt the railroad’s engineer to require settlement analyses and grouting of the annulus. This should not be thought of as a lack of sophistication by the railroads, but rather their means of protecting their operations and calling attention to their settlement requirements. Another matter that has been observed is the use of a ‘standard’ overcut for boring and jacking. As was presented earlier, stringent ground/trackage movements are required by the railroads, and therefore, the use of a ‘standard’ overcut, particularly at shallow cover depths, is not necessarily appropriate in order to limit the risk of settlement greater than that which the railroad requires for third party projects. Lastly, the use of bits that extend beyond the permanent steel casing for jack and bores introduces additional considerations compared to jack and bores that utilize flush or recessed auger arrangements. Because the ground could be unsupported along the bit, the railroad’s engineer will usually require a settlement analysis be prepared before the bore is allowed to proceed.

CLOSING

The trenchless industry has impressively developed many means to install utilities and structures without causing significant interruption to the public and the transportation network of the USA. While there have been derailments and other project subsidence caused by trenchless construction, the Class I railways have been, and remain, proactive in developing their protocols to permit third parties to encroach upon or cross their right-of-way, that includes a reported nearly 140,000 miles of track. Owners and contractors should consider that the railroad’s intention when preparing their guidelines and requirements is to institute guidelines and requirements that protect the safety of their operations and set limits to avoid interruption of their operations.

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