NORTHEAST REGIONAL CHAPTER

NORTHEAST JOURNAL
OF TRENCHLESS TECHNOLOGY PRACTICES

Compact Pit Drilling
Track Record in Plymouth
Differing Site Conditions
Machine Sinking Phenomena

2025 SPRING EDITION

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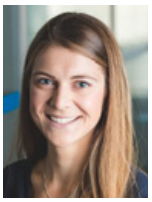
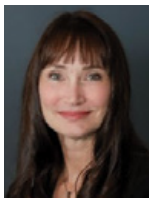


Tops at Staying on Top of the Industry

"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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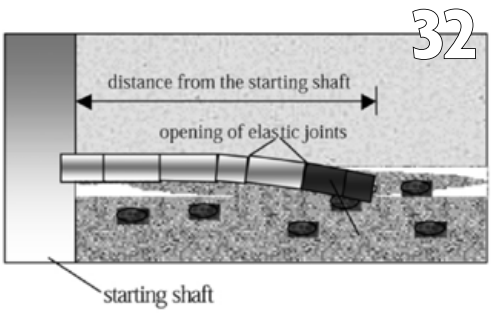

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MESSAGE FROM NASTT-NE CHAIR

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

Welcome to the 18th edition of the ***Northeast Journal of Trenchless Technology Practices***! Thank you for your support of this organization which helps make this publication possible. I hope that you find the content in this edition to be informative, interesting, and useful in your day-to-day work. The individuals who provided content for this magazine are passionate about what they do and are committed to moving the trenchless industry in a positive direction. Our Northeast Chapter of NASTT is also committed to growing the trenchless industry in our region, and I would like to thank all of our dedicated Board Members and volunteers who are constantly working hard to grow the chapter, increase trenchless awareness in the Northeast, and educate/mentor the next generation of trenchless professionals.

2024 NASTT-NE Conference Recap

The 2024 NASTT Northeast Annual Trenchless Conference, held in Sturbridge, MA, was nothing short of a success! Our annual conference, held in November each year, continues to bring together the best minds and leaders in the Northeast trenchless community. There were over 100 attendees, multiple technical presentation tracks, 32 exhibitors (8 more than last year!), and interactive indoor and outdoor demonstrations. A change in the location and setup of the vendor booths by incorporating them in the same room as the keynote speaker (and breakfast/lunch), provided much more interaction between the sponsors and attendees. Regarding the keynote speaker, Heather Blakeley, the Director of Public Works for Sturbridge, MA, gave an impassioned speech and provided a local perspective on why and how trenchless technology positively impacts her community. We also added a new wrinkle to the program this year by holding an auction for items that were graciously donated by sponsors and members alike. The Celtics tickets were a major hit, so thank you again to F.W. Webb for the generous donation. We aim to make the annual conference bigger and better each year. We believe that was accomplished in 2024, and we plan to keep our promises and do the same in 2025.

2025 NASTT-NE Conference Preview

Speaking of the 2025 NASTT Northeast Annual Trenchless Conference, it is never too early to start thinking about another fun and education opportunity to connect with industry colleagues. The 2025 conference will be the **10th annual**, which is cause for celebration! Our goal of holding this event in each of the five New England states and New York has almost been realized, as the conference will be held at the Sheraton Nashua Hotel in Nashua, New Hampshire. This will be our first conference in the Granite State, and we are excited to welcome all of you on November 11th this year. More details will be forthcoming, so keep an eye out for emails and start getting excited for the conference! We are always looking for good content for the program, so please start thinking if you have a good project or case study to present and watch out for our "Call for Papers" sometime in June.

NASTT – NEC Updates:

As we forge ahead in 2025, our group has committed to building a more diverse and dynamic chapter in the Northeast. To that end, we have been working with Quinnipiac University and Wentworth Institute of Technology to establish new student chapters to go along with our strong partnership with UMass Lowell. In addition, we will continue to expand gas-related content both in print publication and at future conferences. We have also been reaching out to our industry friends in portions of Canada that abut the Northeast to get them involved in the annual conference. Meeting Canadian contractors and manufactures while showcasing their technologies and products that cross the border into the Northeast will grow our footprint and provide more trenchless solutions for our toolbelts. Lastly, we elected to invite anyone who is interested in this Chapter to get involved as a volunteer by joining our monthly calls. This is a volunteer organization so we can use all the help we can get. If you are interested in getting more involved, please send me an email at **kunayje@cdmsmith.com** and we will add you to the monthly call list.

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 grow and develop our careers and connects us with colleagues and friends in the industry to make working in the trenchless realm that much more fun. Thank you for being a part of our Chapter's journey, have a great spring and summer, and I look forward to seeing you in Nashua towards the end of this year.

Jonathan Kunay

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

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MESSAGE FROM NASTT CHAIR

Greg Tippett, P.Eng., NASTT Chair

Hello Trenchless Champions!

NASTT-NE Members & Trenchless Advocates:

This past fall your Chapter hosted the Northeast Regional Trenchless Conference in Sturbridge, MA, which was a great success. Your participation, insights, and enthusiasm created an energetic environment that sparked innovative ideas, deepened professional relationships, and reinforced the incredible momentum within your region. From the technical presentations to the networking opportunities, it was a clear testament to the strength and dedication of the trenchless community in the Northeast.

As we look ahead, the 2025 conference will be held in Nashua, NH this fall. The volunteer committee is in planning mode and aims to build on the energy of Sturbridge with even more opportunities to connect, learn, and celebrate our achievements. Nashua's central location and growing infrastructure initiatives make it a perfect setting to continue the discussions around advancing trenchless solutions in the region.

One of our proudest accomplishments this past year has been the continued success of our Student Chapters. These Chapters have grown into vibrant hubs of curiosity, collaboration, and technical exploration. Thanks to the generosity of sponsors and members, your Chapter has been able to offer scholarships to emerging talent, helping to support the next generation of trenchless professionals. These students are not just learning – they are actively contributing, and their presence is already being felt throughout the industry.

> **"A CLEAR TESTAMENT TO THE STRENGTH AND DEDICATION OF THE TRENCHLESS COMMUNITY IN THE NORTHEAST!"**

Your work to cultivate these relationships is paying dividends. NASTT-NE is known as a region deeply committed to mentorship and innovation, creating a pipeline of skilled professionals ready to tackle the infrastructure challenges ahead. Through this, you're ensuring the long-term vitality of trenchless technology in the Northeast and all North America.

It is exciting to see the expanding footprint of trenchless solutions across your busy, densely populated region. From urban centers to suburban networks, municipalities and utilities are increasingly embracing the cost-efficiency, minimal disruption, and long-term value that trenchless methods provide. Your Chapter plays a critical role in driving awareness and implementation, thanks to the collaborative spirit and technical excellence of your members.

Thank you for your continued support and engagement. We are looking forward to seeing many of you in Nashua this fall and to continuing the incredible momentum you've built together.

Greg Tippett

Greg Tippett, P.Eng.
NASTT Chair

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

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

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CHAIR

JONATHAN KUNAY. P.E. PMP
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 more than 22 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 18 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 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 19 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.

NASTT-NE BOARD 2025 EXECUTIVE COMMITTEE

TREASURER

JOHN ALTINYUREK, P.E.
PARSONS
john.altinyurek@parsons.com

John Altinyurek is a consulting engineer with Parsons. 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.

NASTT-NE BOARD 2025 EXECUTIVE COMMITTEE

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 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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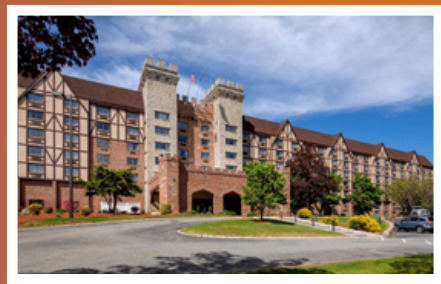

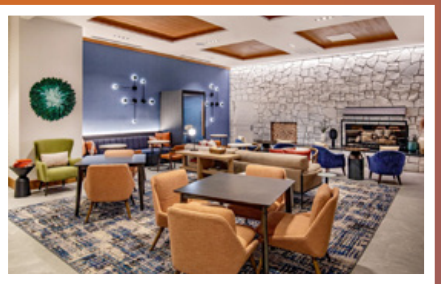


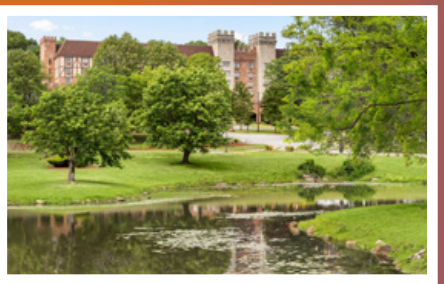

Visit www.nenastt.org
for information on future conferences

SURROUNDED BY HISTORY PART 2:

Compact Pit Launched Directional Provides Answer for 540 Sewer Lateral Installations in Sensitive Native American Settlement Area

By: Ken Traub, Hemlock Directional Boring
Bill Jeffery, TT Technologies

Bayside Sewer Project – Contract 86B

Project Timeline

Bid Date: February 2020
Start Date: March 2022
Completion Date: September 2024

Project Cost
$24 million

Project Description

- Open-cut:
  - 23,971 lf of 1 ½", 2", 3" 4", 6"
- Trenchless:
  - 29,763 lf of 2", 3", 4", 6", 8"
  - 67,189 lf of 1 ¼" Laterals to 540 homes.
- Total curb to curb overlay 53,734 lf

INTRODUCTION

Pit launched directional drilling has made a significant impact on the trenchless industry over the last decade becoming a go-to method for high production service line and lateral installations over a range of utility markets. Hemlock Directional Boring, Torrington, CT, completed a project in Warwick, Rhode Island for Bayside Sewer that highlights the production capability of the pit launched drill and the social benefits of trenchless technology.

The project included the installation of force sewer and collector mains, much of which was installed through conventional directional drilling. Additionally, 540 sewer laterals were installed using the pit launched directional drilling method. All the installations were highly scrutinized as they fell within a Native America Narragansett Indian settlement. A high level of communication and coordination was needed between the contractor, tribal elders and archaeologists during the project to ensure the proper handling of any artifacts discovered during the project.

This article will go into the details of how the application of pit launched directional drilling provide an effective solution for the installation of hundreds of sewer laterals, as well as how Hemlock Directional Boring was able to balance the need for productivity within the demands of the historical nature of the jobsite itself.

HISTORICAL AND ARCHAEOLOGICAL CONTEXT OF THE REGION

Archaeological evidence indicates that the Narragansett people have inhabited the region that would later become the colony and state of Rhode Island for over 30,000 years. Their settlements spanned the area along Narragansett Bay, from present-day Warwick to South Kingstown, making them the largest indigenous group in the region. These communities relied on hunting, fishing, and agriculture, developing organized social structures led by sachems, or "kings."

The first recorded European contact with the Narragansett occurred in 1524 when Italian explorer Giovanni da Verrazzano encountered a thriving

"A HIGH LEVEL OF COMMUNICATION AND COORDINATION WAS NEEDED."

Native American population along Narragansett Bay. The arrival of European settlers began in earnest around 1635. In 1636, Narragansett sachems Canonicus and his nephew Miantonomi granted land use rights to Roger Williams, facilitating the establishment of what would become the city of Providence. This historical relationship shaped the region's development, as subsequent European expansion led to significant changes in land use and settlement patterns.

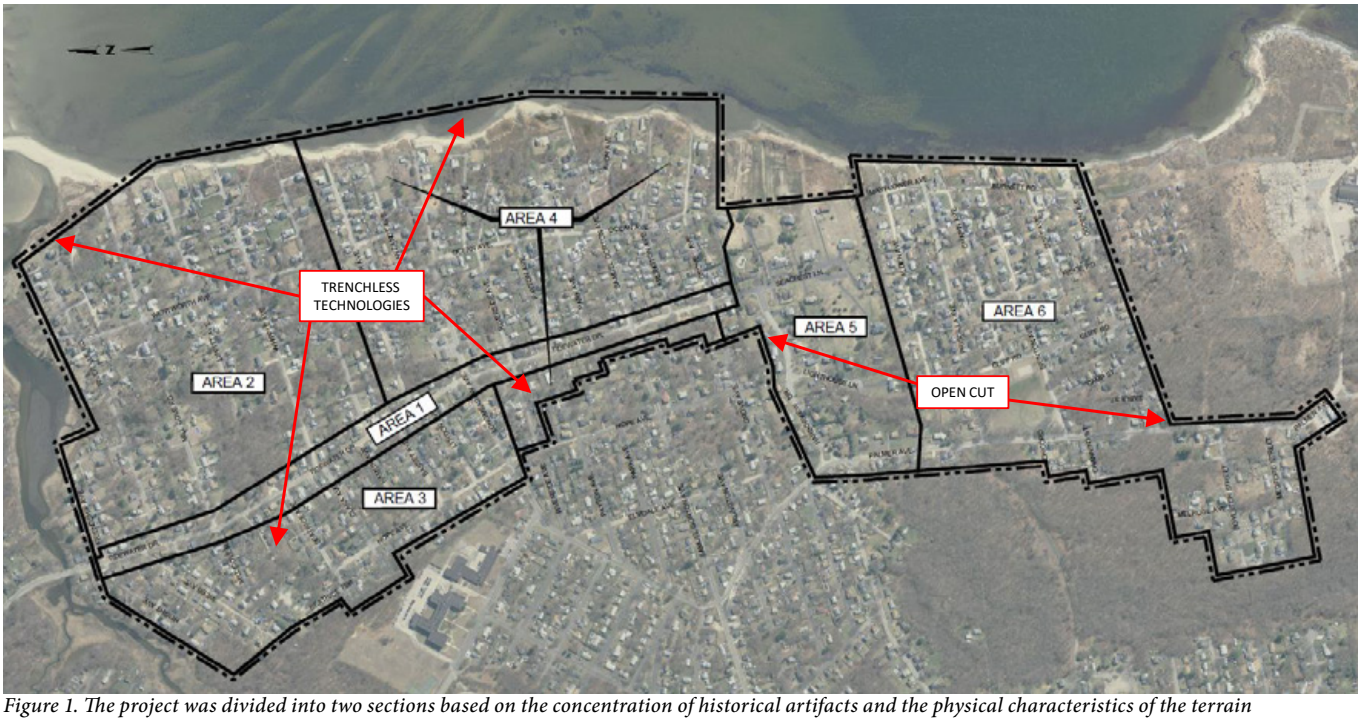

Figure 1. The project was divided into two sections based on the concentration of historical artifacts and the physical characteristics of the terrain

PROJECT BACKGROUND

In recent decades, the City of Warwick, RI, has undertaken extensive efforts to improve water quality and restore the waterways and beachfronts in the city's older areas. A key component of this initiative has been the reduction of private septic system infiltration into public waterways, a major contributor to pollution and water quality degradation.

Approximately 30 years ago, the city-initiated research to develop a sewer system targeting two major pollution-prone areas: Bayside and Apponaug. The Apponaug Area Project was completed over a decade ago and has resulted in significant improvements in local water quality. The next phase of the initiative focused on the Bayside area, requiring careful planning and historical preservation efforts due to its location within a region of significant Narragansett Indian heritage.

Figure 2. Project a part of extensive efforts to improve water quality and restore beachfronts in older areas of the city

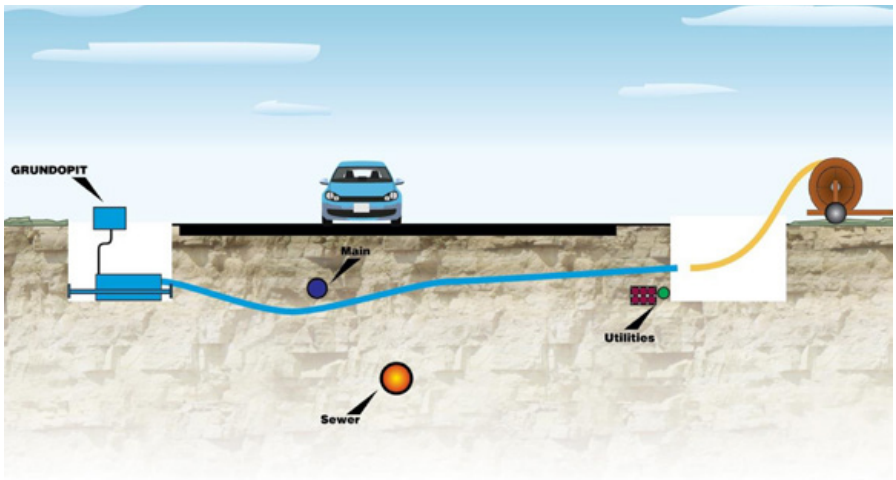

Figure 3. Typical pit-launched HDD job site configuration

ARCHAEOLOGICAL AND DESIGN CONSIDERATIONS

Given the historical presence of the Narragansett people in the area, extensive research was conducted prior to construction to identify, document, and protect cultural heritage, artifacts, and settlement sites. This investigative work spanned approximately 12 to 14 years, providing crucial information that informed the design and placement of the new low-pressure combined sewer system and individual house connections.

The $18 million project was divided into two sections based on the concentration of historical artifacts and the physical characteristics of the terrain. Sections 1-4, which consisted of lowlying areas with freshwater creeks, ponds, and direct access to Narragansett Bay, were completed using Horizontal Directional Drilling (HDD) to minimize ground disturbance and preserve sensitive archaeological sites. In contrast, Sections 5-6, situated on higher ground with extensive exposed bedrock, were constructed using the open-cut excavation method, Figure 1.

By integrating archaeological research into infrastructure planning, the City of Warwick has been able to modernize its wastewater management system while ensuring the preservation of the region's rich cultural heritage. This approach highlights the importance of balancing environmental restoration with historical conservation in urban development projects, Figure 2.

PIT LAUNCHED DIRECTIONAL DRILLING

Pit launched, mini-directional drills can be utilized for installing water services, electrical conduit, gas services, and small sewer main lines and laterals. The units are compact and functional well in tight working conditions, as shown in Figure 3. The unit utilized by Hemlock Directional Boring measures 54 inches long, 43 inches wide and 57 inches tall and provides 13,489 lbf of thrust and pulling force and 553 ft. lbs. of torque with typical bore lengths up to 150 feet. Hydraulically operated telescopic bracing supports anchor the unit allowing for proper alignment and maximum thrust and pull back capabilities. The small footprint of the unit, combined with its power and directional capabilities, made it a valuable solution for the project in Warwick.

CULTURAL ARTIFACTS

The City of Warwick retained an archaeological firm and engaged the Narragansett Indian Tribal Historic Preservation Office (NITHPO) to collaborate with project crews in identifying optimal

bore paths and determining suitable locations for completing lateral house connections. This partnership aimed to minimize disturbances to culturally sensitive areas while progressing the infrastructure project.

Work in the area was confined to pre-excavated and archaeologically cleared zones, limited to dimensions of no more than 8 by 8 feet. Any additional excavations, including terminations for house laterals, were conducted under the supervision of NITHPO and required to proceed as formal archaeological digs, Figure 4. These digs often extended up to four days and, in some cases, could not be completed due to the significant presence of cultural artifacts, Figure 5.

When an excavation could not be cleared by NITHPO, alternative locations were pursued. In some instances, as many as ten attempts were necessary to identify a site that could be utilized without compromising cultural artifacts. Artifacts discovered during the process included concentrations of seashells, food fragments, and several hundred human remains, underscoring the cultural sensitivity of the project area.

Figure 4. Careful coordination was required between contractor, tribal elders and archaeologists to prevent damage to cultural artifacts

Figure 5. Additional excavations proceeded as formal archaeological digs. Note hand shovel and sifter screen

LATERAL REPLACEMENT

The lateral replacement portion of the project involved the installation of approximately 540 house laterals. The length of each house lateral was determined based on property owners' agreements to allow access to their properties. For properties where access was denied, the lateral was terminated at the street line, with a length of approximately 20 feet. For properties

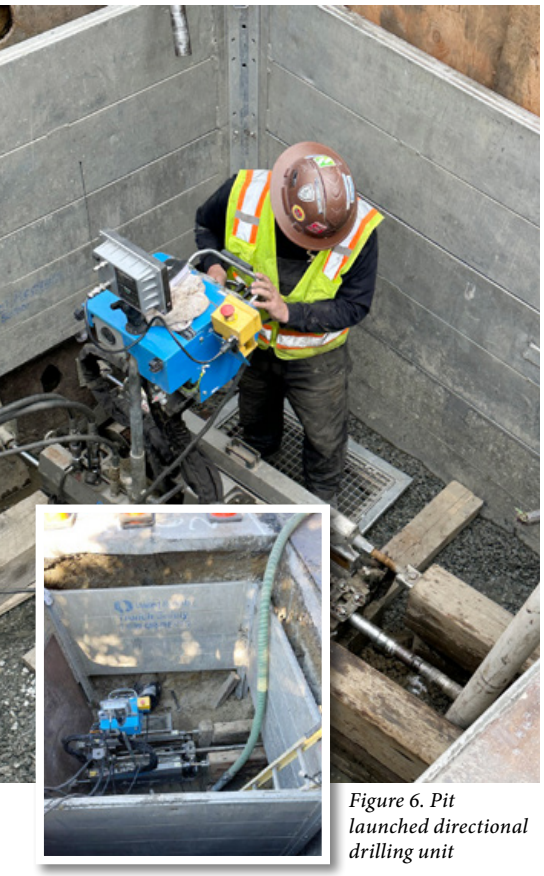

Figure 6. Pit launched directional drilling unit

where access was granted, the lateral extended to the point where the septic pipe exits the house, generally around 70 feet in length.

All laterals have been installed using a pit-launched directional drill, Figure 6. This equipment was placed within a cleared excavation and set to the desired elevation for installation, eliminating the need for a lead-in drill from a starter pit to the excavation. A lead-in bore was not feasible because the directional drill would have required placement on adjacent properties to complete each lateral. The use of the pit-launched system eliminated the need for complex and costly property access agreements, as the pit-launched drill allowed for precise installation without encroaching on neighboring properties Figure 7.

Installations included drilling a pilot bore from the launch pit to the exit point, which was either at the property line or the existing septic line, depending on the property access agreement. Next, a 1 ¼-inch HDPE pipe was pulled back from the exit pit to the collector main located at the starting pit, Figure 8. The property end of the lateral was equipped with a curb box and a shut-off valve, while the other end was connected to the collector main.

"HIGHLIGHTS THE IMPORTANCE OF BALANCING ENVIRONMENTAL RESTORATION WITH HISTORICAL CONSERVATION."

Whenever possible Hemlock crews drilled and connected multiple house laterals to the collector main from the same launch pit. This approach minimized the number of excavations and achieved the goal of minimizing disruption.

LESSONS LEARNED

The application of state-of-the-art horizontal directional drilling equipment is integral to achieving high daily production rates while minimizing tool wear and preserving the historical integrity of the project site. This ensured minimal disturbance to the surrounding area and reduced the risk of impacting embedded cultural and historical artifacts. This careful approach underscores the importance of balancing operational efficiency with the protection of sensitive sites. The pit launched drilling method completed bores up to 135 feet in sand and 87 feet in shale rock (Figure 9). The majority of the laterals took less than one hour to drill.

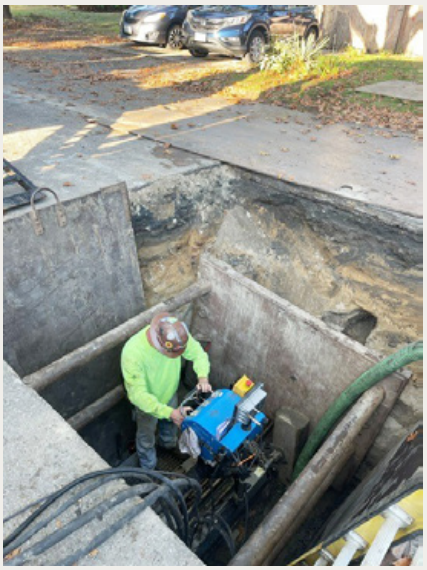

Figure 7. Pit launched drill minimized need for private property access

Figure 8. The new HDPE pipe was pulled back to theBcollector main located at the starting pit

Figure 9. Ground predominantly hard pan with large cobbles, boulders and shale

Figure 10. Site tour April 17, 2024 during the NASTT 2024 No-Dig Show in nearby Providence RI

ABOUT THE AUTHORS:

Ken Traub *founded* ***Hemlock Directional Boring*** *in 1994, one of the first companies in New England to use trenchless technology. Hemlock was the first company to successfully install ductile iron pipe via directional drilling, and has over 25 years of experience in water, sewer and underground utility installation. Ken is currently a member of the NASTT-NE Board of Directors.*

Bill Jeffery *is Northeast Regional Manager for TT Technologies, a leader in the trenchless industry. Bill has over 40 years of experience in the field and has been a board member of NASTT, Northeast Chapter since its inception.*

A TRACK RECORD OF PIPELINE ASSESSMENT AND REHABILITATION:

A 10-Year History of the Sewer Collection System Improvements through the Plymouth CMOM Program

By: Ziad F. Kary, P.E., Apex Companies, LLC
Andrew T. Grota, P.E., Apex Companies, LLC
Doug Pinard, Town of Plymouth DPW

1.0 ABSTRACT

The Town of Plymouth has a long-standing history in proactively assessing and rehabilitating sewer pipelines and manholes through its Capacity, Management, Operation and Maintenance (CMOM) program. The Town's sewer collection system contains approximately 285,000 feet of gravity sewers, resulting in approximately 57,000 feet needing to be cleaned annually. Given the Town's limited cleaning capabilities and staffing, the Town has retained Apex Companies, LLC (formerly Environmental Partners Group, LLC) annually since 2015 to clean/inspect its sewer collection system and develop a long-term plan for future improvements.

Pipeline and manhole inspections were performed annually (between 2015-2019 and 2021-2024) in accordance with NASSCO standards. These NASSCO standards were used in developing a priority list of pipelines and manholes to be rehabilitated and a list of identified pipeline deficiencies within the Town's sewer system in need of improvement. Using the information collected annually from the Town's CMOM Program, Apex has assisted the Town since 2015 with multiple sewer collection system rehabilitation and/or replacement projects involving the cleaning, inspection, and lining of sewer mains and manholes in need of repair. Over this timespan, ~7,000 feet of gravity main, ~700 feet of pressure main, and ~300 vertical feet of manholes have been cleaned, inspected, and lined (CIPP lining for pipelines; cementitious/epoxy lining for manholes). Additionally, ~3,150 feet of gravity sewer main and 25 manholes have been removed and replaced. Since 2015, the Town has spent over $8 million dollars on sewer collection system rehabilitation and/or replacement projects. With these projects, the Town has significantly improved its sewer collection system by prioritizing its investment in pipeline assessment and rehabilitation.

2.0 INTRODUCTION

The Town of Plymouth is located ~40 miles south of Boston, MA and ~40 miles east of Providence, RI. Plymouth is the largest town by area in the State of Massachusetts and has approximately 64,269 residents (2022 U.S. Census), out of which ~18,000 residents are serviced by the Town's sewer collection system. The Town's sewer collection system consists of ~56 miles of gravity mains, ~17 miles of force mains, and 17 sewer pump stations. The original system dates back to the 1870s; however, the Town has seen a significant amount of expansion over the past 50 years.

In April of 2013, the EPA issued a Clean Water Act Administrative Order requiring that the Town submit a CMOM Program Implementation Annual Report for the EPA's review and approval. The purpose of this Administrative Order was to reduce the frequency, duration, and volume of unauthorized overflows, spills, and releases from the Town's sewer collection system. As part of this Administrative Order, the Town was required to implement a proposed "Routine Cleaning Plan" that calls for cleaning of the entire sewer collection system every 5 years, which equates to ~57,000 feet of gravity mains cleaned annually. The Town submitted a Corrective Action Plan in March 2014 (later revised in December 2014) and received approval by the EPA to implement their plan beginning in 2015. The Revised Correction Action Plan is broken down into 2 Tasks:

1. Task 1 encompasses data collection for the sewer collection system including routine cleaning and inspection of all gravity sewer and manholes in the system.
2. Task 2 encompasses plan development for the sewer collection system which will identify the needs to develop a long term plan.

Since 2015, the Town has allocated money in its annual capital budget for the cleaning, inspection, rehabilitation, and replacement

of its sewer infrastructure. As part of this budget, the Town has allocated 10 percent of its annual Routine Cleaning Plan budget for unknown conditions which may require heavy cleaning, root removal, grease removal, or vactoring of water from manholes and pipelines that prevent completed inspections. The Town retained the services of Apex Companies, LLC (Apex) to implement and coordinate the completion of this Revised Correction Action Plan on an annual basis since 2015.

3.0 IMPLEMENTATION OF CMOM PROGRAM

3.1 Task 1 – Data Collection

Task 1 involved the completion of pipeline and manhole inspections performed annually (between 2015-2019 and 2021-2024) in accordance with NASSCO standards. These NASSCO standards were used in developing a priority list of pipelines and manholes to be rehabilitated and a list of identified pipeline deficiencies within the Town's sewer system. Opinions of probable cost for the identified improvements were developed and used to help the Town target areas in need of improvement. To help complete this work, Apex retained the services of National Water Main Cleaning Company for the pipeline inspection work and Duke's Root Control (formerly Midwest Water Group) for the manhole inspection work.

The pipeline inspection work involved the combination of light/heavy cleaning, root treatment (via chemical and mechanical means), and CCTV inspection. Based on this information, pipeline inspection reports were generated for each pipe segment inspected following PACP requirements. This data was then linked to the Town's GIS system and used to develop a priority list of pipelines to be rehabilitated. Additionally, a list of pipeline deficiencies was prepared, which identified "hot-spot" pipe segments that are identified by likelihood of failure (LoF) score. For pipeline inspections, Apex identified a "hot-spot" to be any pipe segment with a defect grade of 4 or higher, resulting in a LoF of 4 or greater. The LoF refers to a calculated numerical representation that denotes the probability of failure based upon an asset's physical condition. The LoF is not affected by the pipe segment length as it is derived from the highest rated condition grade scores and is not adversely skewed by the presence of multiple low condition grade scores.

The manhole inspection work involved the inspection of manholes from the surface using the Rapid View Panoramo 360 SI digital camera. This includes 360-degree digital scanning of manhole structures to perform a full Level 2 MACP (Manhole Assessment and Certification Program) of each manhole inspected. As part of these inspections, non-entry observations were made of each manhole's cover, frame, chimney, wall, bench and invert condition. The RapidView Panoramo 360 SI camera system was used in conjunction with Pipelogix Manhole software to present the inspection data in a software format that has the ability to generate manhole inspection reports. This data was then linked to the Town's GIS system and used to develop a priority list of manholes to be rehabilitated. For manhole inspections, Apex assigned a "severity" rating for all manholes inspected, where a defect rating of 2 or greater represents observed structural defects based on the asset's current physical condition.

Historically, the Town has allocated funding on an annual basis for the completion of these pipeline and manhole inspections. The work was broken into several phases (refer to Figures 1, 2 and 3) based on geographical areas in Town and available funding.

3.2 Task 2 – Plan Development

Task 2 involved the compilation of the data collected under Task 1 in order to develop a list of recommendations for further corrective action. This list included the following:

1. Update missing/mislabeled info in Town's GIS database
2. Prioritize critical areas "Hot Spots" list that require more frequent cleaning
3. Update/prioritize root treatment list
4. Provide summary list for trenchless pipe rehabilitation (i.e., spot repairs, joint sealing, CIPP lining)
5. Provide summary list for cementitious lining, and/or external grouting of manholes
6. Provide summary list for work requiring excavation (i.e., point repairs)
7. Prioritize a list based on Likelihood of Failure

Using the information obtained from the Town's CMOM program, a long-term plan was developed to fund and address sewer collection system rehabilitation and/or replacement projects. Since 2015, the Town has spent over $8 million dollars on projects that have specifically addressed rehabilitation and/or replacement of its sewer infrastructure. This work has included the rehabilitation of ~7,000 feet of gravity sewer mains, ~700 feet of pressure sewer

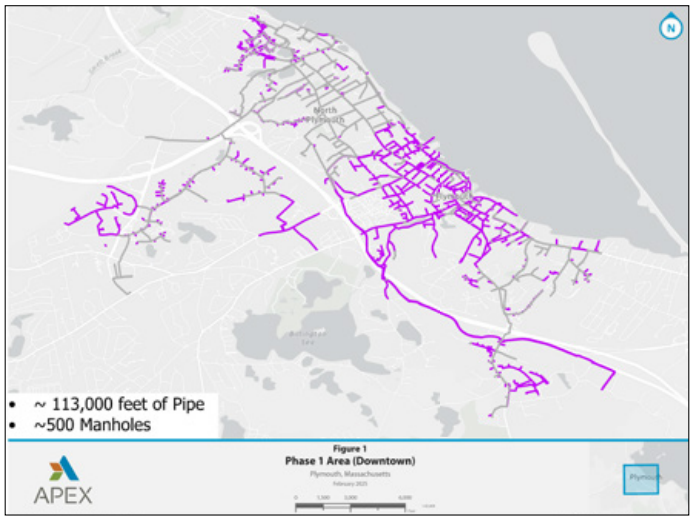

Figure 1: Phase 1 Area (Downtown Plymouth)

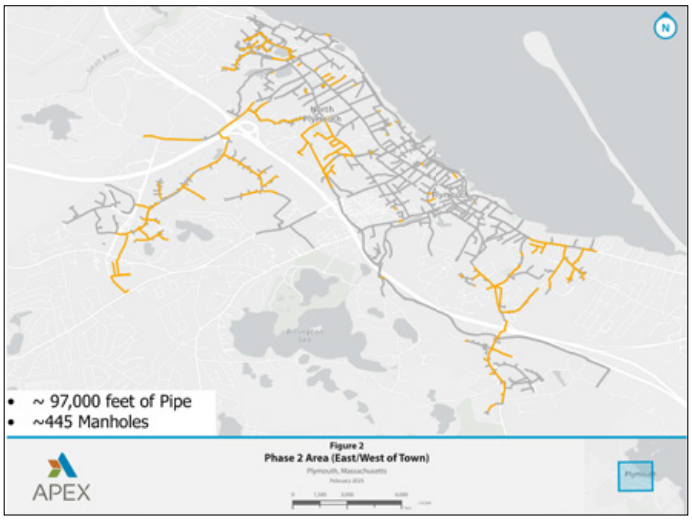

Figure 2: Phase 2 Area (East/West Plymouth)

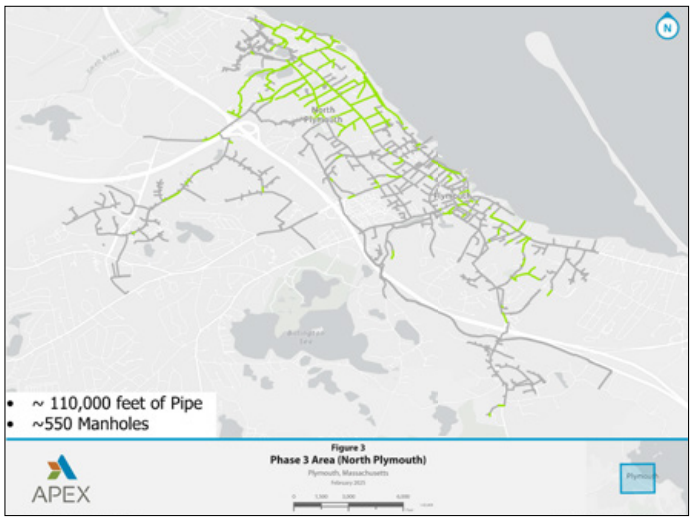

Figure 3: Phase 3 Area (North Plymouth)

mains, and ~300 vertical feet of sewer manholes. Additionally, ~3,150 feet of gravity sewer mains and 25 sewer manholes were removed and replaced. This targeted approach of prioritizing the Town's investment in pipeline assessment and rehabilitation saved the Town both time and money in upgrading its sewer collection system.

3.3 Case Studies

3.3.1 Sewer CMOM Collection System Rehabilitation (2021-2022)

In 2021, the Town retained Apex to design and oversee the rehabilitation of the Town's sewer collection system along Pleasant Street, Stafford Street, Standish Avenue and Towns Street. The scope of work consisted of the following: rehabilitation of gravity sewer mains (via CIPP lining) and gravity sewer manholes (via cementitious/epoxy lining); exterior grouting and interior crack sealing; replacement of damaged manhole frames and covers; rebuilding of manhole benches and inverts. The focus of the sewer rehabilitation work was along pipelines that had a LoF score of 5. Using the information collected as part of the Town's CMOM program, individual rehabilitation tables and GIS mapbooks were developed to identify the recommended rehabilitation improvements. The work was bid in the Fall of 2021 and completed in the Winter/Spring of 2022 at a total cost of ~$435,000. In total, the following improvements were completed under this project:

1. CIPP lining of approximately 1,842 linear feet of 8-inch pipe
2. Reinstating one hundred and nine (109) service connections with cutter
3. Grouting fifty (50) service connections
4. Chemical grouting of approximately two hundred and nine (209) gallons measured during sealing of mainline sewer pipe joints, lateral piping and lateral connections.
5. Completing two (2) point repairs at broken or collapsed pipes
6. Replacing five (5) manhole frames and covers
7. Furnishing and installing two (2) inside drop connection into an existing sewer manholes
8. Sewer manhole cementitious and epoxy lining of approximately one hundred and ninety-six (196) vertical feet
9. Exterior manhole grouting and interior crack sealing of four (4) manholes to stop leaks
10. Rebuilding bench and invert in nine (9) manholes
11. Exterior grouting and interior crack injection of seven (7) manholes

3.3.2 Holmes Point Pump Station Force Main Rehabilitation (2023-2024)

In 2023, the Town responded to a break of its 10-inch CI sewer force main leaving the Holmes Point Pump Station on Sandwich Street (Route 3A) near Downtown Plymouth. The force main was installed in the mid-1960s and, up until the date of the break, had been in near continuous service since its original installation. The Town coordinated an emergency point repair of the force main and found it had failed at the 90-degree bend leaving the Holmes Point Pump Station, which is the main station servicing the nearby Beth Israel Deaconess Hospital. The criticality of the force main, in conjunction with the force main's location on Sandwich Street (Route 3A), prompted the Town to pursue options for trenchless rehabilitation of the force main, which would be much less

Figure 4: Sandwich Street Force Main

intrusive and a much faster alternative compared to traditional dig and replace methods. Refer to Figure 4 for an overview of the work location.

The Town retained Apex to design and oversee the rehabilitation of ~700 feet of 10-inch CI sewer force main via CIPP lining. The work consisted of the excavation of two access pits to facilitate entry into the pipeline in order to clean, CCTV inspect and rehabilitate the pipeline using a Class IV structural liner. The liner system selected was a thermoset resin and felt/fiber composite system with a design thickness of 6.50 mm and a steam cured finish, which was specifically designed to handle a design operating pressure of 40 psi.

Since Sandwich Street is a critical roadway for traffic and emergency vehicles, it was imperative that one lane of alternating traffic be maintained during work hours, while making sure that all pits were backfilled/plated during non-work hours. To complete this work, a temporary bypass pumping system was installed at the Holmes Point Pump Station to convey wastewater via a temporary HDPE bypass line installed along the curbline of Sandwich Street. The work was bid in the Fall of 2024 and completed in the Winter of 2024 at a total cost of ~$517,000.

4.0 CONCLUSIONS

The Town's CMOM program has been successful in identifying and targeting areas requiring rehabilitation in the Town's sewer collection system. This proactive inspectional approach is critical to addressing future collection system issues, while helping the Town allocate funds for future sewer improvements. Based on the age and condition of the Town's sewer collection system, it is important to prioritize investment in pipeline assessment and rehabilitation, especially considering that existing sewer records for assets in a 100+ year old system can tend to be scarce or inaccurate. Using the data collected under the Town's CMOM program can be used to update GIS database information, prioritize areas requiring more frequent cleaning, identify specific asset deficiencies, and provide a list of recommended improvements that can be used as the basis for obtaining future funding.

Ultimately, it takes a collective group effort to coordinate and implement a successful CMOM program. Since 2015, the Town of Plymouth has worked with U.S. EPA Region 1 to develop and implement a Corrective Action Plan that adheres to the requirements of the EPA's Administrative Order to reduce the frequency, duration, and volume of unauthorized overflows, spills, and releases from the Town's sewer collection system. Through this targeted approach, the Town has successfully been able to reduce SSO events, while also taking significant steps to manage, maintain, repair and upgrade its sewer collection system.

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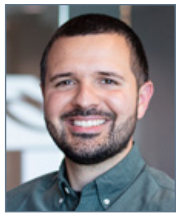
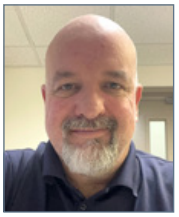
CMOM Annual Phase Inspection Areas and Aerial Overview of Holmes Point Pump Station Force Main Rehabilitation Areas of Work.

ABOUT THE AUTHORS:

***Ziad Kary** is a Senior Principal at Apex Companies (formerly Environmental Partners) with 30 years of experience in Civil Engineering, construction management, wastewater pumping stations design and construction, geotechnical engineering, sewer force main emergency response assistance, assessment, studies, permitting, construction administration and start-up and commissioning of facilities. Ziad is an active member of NBM, PCHA, and NEWEA.*



***Andrew Grota** is a Project Manager at Apex Companies with over 11 years of experience in the fields of civil engineering, construction management, drinking water, stormwater, and wastewater. Andrew is a registered civil engineer in both Massachusetts and Rhode Island and is MCPPO certified in Massachusetts.*



***Doug Pinard** is the current Wastewater Manager for the Plymouth Department of Public Works. Doug has been working in Plymouth since 2021 and has a long-standing history of working in the wastewater industry as an operator. Doug's current role as Wastewater Manager involves the management and oversight of the Town's sewer collection system that services approximately 18,000 residents.*

DIFFERING SITE CONDITIONS:

Successful Strategies to Cooperatively Resolve Claims

By: Tom Olson, Olson Construction Law

Differing Site Conditions ("DSC") are unfortunately here to stay. Project owners are often either not conducting a subgrade investigation or, if they are, not conducting an *adequate investigation*. And, even an adequate investigation can miss subgrade conditions outside of the borings. The net effect is that since there is nothing a utility contractor can do to stop encountering DSCs, contractors need to successfully identify and implement strategies to cooperatively and fairly resolve DSC claims on the jobsite. Set forth below are some battle-tested strategies. As such, all of these strategies can work for you.

1. WHEN BIDDING, EVALUATE 'RIGHT' TO RELY UPON OWNER'S SUBGRADE INVESTIGATION.

When project owners perform a subgrade investigation, they *intend* that bidders will *rely* upon the investigation in pricing the work and selecting the trenchless method. And yet, engineers regularly include contract language which purports to *limit or bar such reliance*. In response, I offer three pointers:

- First, recognize that as a matter of contract, such limiting or disclaimatory language is normally set forth in the Special or Supplemental Conditions (and sometimes in the Technical Conditions). Contractors must ensure they evaluate all of these conditions prior to bidding to assess whether such language is included.
- Second, even if the contract includes such language, contractors can still rely upon the project subgrade investigation as evidence of Type II DSC (i.e. conditions different than anticipated for the work in the geographic area), instead of a claim for a Type I DSC (i.e. conditions different than indicated in the contract documents).
- Third, as a matter of law, many jurisdictions have held that contract language which limits or bars contractors' reliance on the project subgrade investigation is *unlawful and unenforceable*.

2. WHEN BIDDING AS A SUBCONTRACTOR, STATE THE 'ANTICIPATED' SUBGRADE CONDITIONS.

To help ensure there is no dispute later whether the subgrade conditions you encountered were different than what you anticipated, state what you anticipated in your bid (e.g. full face of hard rock). This is particularly important when the owner has not performed a subgrade investigation. And, negotiate to *have your bid be incorporated into the subcontract*.

3. WHEN BIDDING AS A SUBCONTRACTOR, STATE 'RIGHT' TO PAYMENT FOR 'STAND-BY' COSTS IF DSC ENCOUNTERED

One of the common costs incurred for a DSC is 'stand-by:' waiting for a decision to be made on how to proceed. And, based on my experience, contractors fail to seek payment for stand-by costs. To help ensure a subcontractor is paid for such costs, subcontractors should state the 'right' for such payment in their bids, and then seek to have the bid incorporated into the subcontract. Make sure when negotiating your subcontract that there are not clauses which would negate this, such as a "no damage for delay" clause.

Additionally, most public contracts include such a payment right in the General Conditions. Note that this payment right is sometimes hidden in the "Suspension of Work" clause, which is the normal case when DOT Standard Specifications are used. Further, to help get a DSC claim resolved sooner, when there is a contractual right to payment for 'delay,' a contractor should so advise as part of its initial DSC claim notice.

If your iron must remain idle waiting for a decision, it is important that the engineer understand this at the outset.

4. THE CONTRACTOR SHOULD ALWAYS PROVIDE WRITTEN NOTICE OF A DSC.

Literally all public construction contracts require written notice if a contractor believes it has encountered a DSC. And, the reality is that much of the communications on site are verbal, not written. As a consequence, I have been involved on many projects *after the fact* where a contractor only provided verbal notice. While I have been successful getting around this notice failure on many occasions, it is risky business. This is true for two reasons.

First, on public construction projects, the inspector is not authorized to waive *any* contract requirements. That means that even if the inspector stated that verbal notice is sufficient, a contractor is not excused from providing written notice. Make certain you are discussing any contract changes with the person authorized to make changes, typically the engineer.

"LITERALLY ALL PUBLIC CONSTRUCTION CONTRACTS REQUIRE WRITTEN NOTICE IF A CONTRACTOR BELIEVES IT HAS ENCOUNTERED A DSC."

Second, as a matter of law throughout the country, other than on *federal projects*, a contractor is generally deemed to have *waived* its DSC claim absent written notice. That is true regardless if the contractor provided the same notice *verbally* that it would have provided in *written* form.

5. ENCOURAGE THE ENGINEER TO RE-DESIGN THE UTILITY WORK TO AVOID THE DSC.

Upon written claim notice, per standard DSC clause, a contractor is required to stop work, allow the engineer to investigate and, if the engineer determines there is or may be a DSC, evaluate how to proceed. It is good to be *paid* for DSC extra costs. It is even better to *avoid* incurring the extra costs. A strategy not typically attempted is to work with the engineer to evaluate whether the affected work can be *re-designed* to avoid being performed in the DSC.

I recently helped a contractor accomplish this. The contractor assisted the owner and engineer to further investigate the subgrade (the contractor performed some excavations while the engineer took additional borings). The investigation revealed the existence of the anticipated subgrade conditions, albeit at different vertical and horizontal locations. The design was subsequently revised to reflect the more preferable location of the utility work. As a consequence, no extra costs were incurred (other than for the additional lineal footage of pipe that was required, for which the contractor was paid).

6. CONTRACTOR SHOULD PERFORM ITS OWN SUBGRADE INVESTIGATION.

Too often, the project engineer will deny a DSC claim, notwithstanding that the engineer did not perform a subgrade investigation. This happened on a recent project. In response, we helped the contractor perform its own subgrade investigation. We retained a geotechnical engineer to substantiate the existence of a DSC, as well as the impact on the auger bore operations. We also retained the auger bore manufacturer, who confirmed that the contractor's extra costs were not caused by improper construction. The net result was the contractor was paid an acceptable amount, and did not have to pay any liquidated damages for the corresponding delay. All of this occurred on the jobsite.

As a standard business practice, if there is any question re: the existence of a DSC or its impact in time and/or dollars, the contractor should conduct its owner subgrade investigation.

7. CONTRACTORS SHOULD SEEK PAYMENT ON A REVISED UNIT BASIS.

My experience is that when an engineer acknowledges that a contractor has or may have encountered a DSC, the contractor subsequently performs the work on a force account basis. This results in the contractor being *underpaid* (e.g. Blue Book equipment rates are too low). Fortunately, contractors have a means available to potentially overcome this problem: seek payment on a *revised unit price basis*. While the engineer may say "no" to such a request, the engineer certainly cannot say "yes" unless the contractor requests this. And, as you should explain to the engineer, it is in the owner's interest to agree to a revised unit price. By doing so, the owner will know *before the work is performed* what is will cost versus waiting until *after the work is performe*d to add up all the labor and equipment hours.

8. IF THERE IS A DISPUTE ON THE EXISTENCE OF A DSC OR ITS FINANCIAL IMPACT, A CONTRACTOR SHOULD USE THE ENGINEER'S ESTIMATE.

When an engineer alleges that the contractor should have anticipated the subgrade conditions encountered and/or the financial impact, I recommend potential use of the *engineer's estimate*. I have helped contractors successfully utilize this strategy when the engineer's estimate for the DSC work is *lower than or similar to the contractor's corresponding bid amount*. This allows a contractor to powerfully state that since it did not have dollars in it bid for the DSC, then the engineer must not have either. Since neither the engineer nor the contractor had dollars in their bids for the DSC, it is fair to conclude that neither anticipated the subgrade conditions actually encountered. The same comparison can also then help establish the amount of compensable extra costs.

9. IF YOU CAN USE THE MEASURED MILE APPROACH FOR CALCULATION OF YOUR EXTRA COSTS, DO IT.

To prove the financial impact of a DSC, contractors normally compare their planned costs (i.e. what they *bid*) with their actual costs. While this strategy is acceptable, there is a better strategy. If you have successfully

"CONTRACTORS NEED TO SUCCESSFULLY IDENTIFY AND IMPLEMENT STRATEGIES TO COOPERATIVELY AND FAIRLY RESOLVE DSC CLAIMS ON THE JOBSITE."

performed work *outside* of the DSC (e.g. an earlier crossing), then a contractor can and should use production rates (and hence corresponding costs) from the *outside* area. This strategy is better for two reasons.

First, use of *actual* production rates from an area *outside* of the DSC should eliminate any question of what your production rate could have and would have been *but for the DSC*. By contrast, if you are relying upon your *bid*, the engineer can question if this is a valid baseline since it is *theoretical*, not *actual*. For the same reason, if you can't cooperatively resolve the issue on site, courts prefer use of the Measured Mile Approach when it is possible.

Second, use of actual rates should result in the contractor being paid for more extra costs. My experience is that the contractor's bid rate is normally lower insofar as it typically accounts for the impacts of utility, weather and delays as well as re-work. By contrast, comparison of actual production rates achieved outside of the DSC with those obtained within the DSC should typically be higher (i.e. there will be a greater loss of production, and hence greater extra costs recoverable).

10. A CONTRACTOR CAN SUCCESSFULLY MAINTAIN A DSC CLAIM WHEN IT ENCOUNTERS THE ANTICIPATED 'TYPE' OF SUBGRADE CONDITION WHICH 'REACTS' IN UNANTICIPATED MANNER.

It is considered a standard rule of law that a contractor cannot successfully maintain a DSC unless it encounters a subgrade condition which is different in 'type' than that shown in the owner subgrade investigation or otherwise anticipated for the work being performed in the geographic area. I am proud to share that I have successfully developed and applied another strategy. We helped a contractor get paid a significant amount of money and not pay a significant amount of liquidated damages when it encountered the anticipated 'type' of soils which 'reacted' in an unanticipated manner. We based this strategy on legal cases which we have collected over a period of decades. Notably, we helped the contractor achieve this result on the jobsite.

11. A CONTRACTOR CAN PROVE THE EXISTENCE OF A DSC ON THE BASIS OF AN ADVERSE IMPACT TO THE CONTRACTOR'S OPERATIONS.

Sometimes, a contractor cannot prove actual *physical evidence of* a DSC. This may occur because a contractor cannot collect physical samples of the actual conditions encountered. This would also be the case if, as in the project discussed above, where the contractor encountered the anticipated 'type' of subgrade conditions which 'reacted' in an unanticipated manner. To substantiate the existence of a DSC on this project, we collected evidence of how the contractor's operations were adversely affected: equipment was damaged, larger equipment was required, production rates were abysmal, and the work could not be competed as designed. Like the strategy above, we successfully based this unique strategy on legal cases which we have collected for decades. Having successfully utilized this strategy for the first time, we know it can work elsewhere.

12. IF THE CONTRACT DOES NOT CONTAIN A DSC CLAUSE, A CONTRACTOR CAN STILL POTENTIALLY SEEK PAYMENT UNDER THE EXTRA WORK CLAUSE.

Normally on public construction projects, the contract contains a DSC clause. That clause places the financial risk of DSC on the owner, not the contractor. On private projects, it is not that unusual for a DSC clause to be absent. By contrast, on limited occasions, I have been involved on public projects which did not include such a clause. That was the case on a recent public utility project. Given the absence of the DSC clause, we approached this as *extra work*. We listed the *new items* of extra work (i.e. not included in the contract) as well as the *increased quantities of contract work* (which is also properly characterized as *extra work*). This provided a contractual basis for payment. This is the referenced project on which the owner re-designed the project to avoid the DSC. I believe one important reason we were able to help facilitate this result was because the owner believed that the extra costs which would have bee incurred were compensable under the "Extra Work" clause.

In summary, remember the following:

- Owners regularly fail to adequately investigate the subgrade on trenchless projects.
- As a consequence, contractors will continue to encounter differing site conditions ("DSC").
- Contractors need effective strategies to be paid when they encounter DSC.
- There are a number of strategies which contractors can use to avoid incurring DSC-related extra costs as well as get fairly paid when a contractor does incur such costs.
- Based on the author's personal experience, these strategies have worked to cooperatively and fairly resolve DSC issues on the jobsite.
- As a consequence, each of these strategies can and should produce similar results.

ABOUT THE AUTHOR:

***Tom Olson** has helped utility contractors around the country for decades resolve issues on the jobsite, not in the courtroom. He recently helped edit and author a national trenchless manual.*

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

GY OVERVIEW GUIDE: NEW INSTALLATIONS

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

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Neither NASTT nor any of its
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North American Society for Trenchless Technology

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NASTT equips and empowers its members to thrive in their careers. NASTT provides solutions needed to grow expertise and knowledge, build professional networks, advance careers and businesses, save time and money and stay informed in a changing world.

Available for download from: https://knowledgehub.nastt.org/

MACHINE SINKING PHENOMENA IN SOFT SOIL MICROTUNNELING:

Analysis of Bearing Capacity and Prevention Methods

By: John Altinyurek, PARSONS

This technical paper presents a systematic analysis of microtunnel sinking mechanisms in soft soil conditions, emphasizing bearing capacity evaluation methodologies and preventive measures. Drawing from documented case histories and ASCE guidelines, particularly focusing on projects involving very soft soil conditions with NSPT values ranging from 0-8, this research synthesizes field observations, theoretical frameworks, and empirical data to establish comprehensive guidelines for assessing and mitigating machine sinking risks.

1. INTRODUCTION

The increasing adoption of microtunneling technology in challenging ground conditions has highlighted the critical nature of machine stability in soft soils (ASCE, 2023). Recent analyses of microtunneling projects through very soft soil conditions have demonstrated that when encountering materials with NSPT values between 0-8, particularly in lagoon deposits characterized by very soft gray fat clay, the risk of machine sinking becomes paramount (Atalah, 2013). The presence of high groundwater tables and variable soil conditions further complicates these operations, as documented in standard industry guidelines (ASCE Standard 36-15).

Comprehensive studies of microtunneling projects have revealed that successful execution requires careful consideration of multiple factors, including ground conditions, operational parameters, and monitoring systems. The challenges faced in recent projects, particularly those involving force main installations through beach sand and lagoon deposits, have emphasized the need for enhanced understanding of machine-soil interactions and improved risk mitigation strategies (Atalah, 2013).

2. GEOTECHNICAL CONSIDERATIONS IN SOFT SOILS

Soft soil conditions present unique challenges that significantly impact microtunneling operations. Field observations from projects involving very soft gray fat clay have shown that these materials, characterized by NSPT values below 8, exhibit critically low bearing capacity and high susceptibility to deformation. Industry standards emphasize that the presence of saturated cohesive soils, combined with high groundwater tables, creates conditions where traditional tunneling assumptions may not hold valid.

The theoretical bearing capacity analysis in soft soils follows established principles, expressed through the fundamental equation:

$$q_{ult} = cN_c + \gamma DN_q + 0.5\varphi BN_\varphi$$

Where;

q_ult : Ultimate bearing capacity

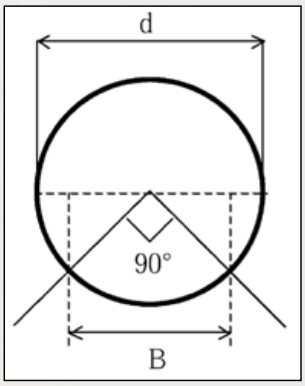
c : Soil cohesion

N factors : Bearing capacity factors

γ : Soil unit weight

B : Foundation width

For microtunneling bearing analysis, foundation width can be calculated using the logic that the bearing surface is limited to the bottom quarter where the microtunnel contacts the surrounding soil matrix:

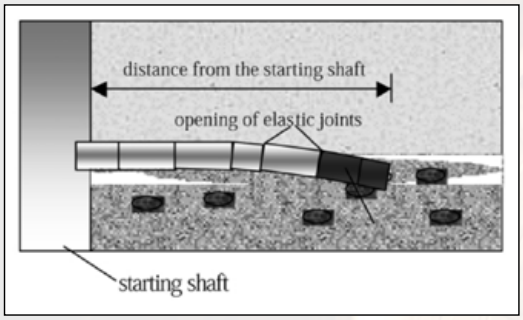


Recent case histories have demonstrated that these parameters must be carefully evaluated in the context of very soft soil conditions, particularly when dealing with lagoon deposits and saturated clays. The analysis of successful projects through challenging ground conditions has led to refined approaches in bearing capacity evaluation and risk assessment according to current industry standards.

3. MECHANICAL AND OPERATIONAL PARAMETERS

The stability of microtunneling operations in soft soils depends critically on the careful management of operational parameters. Analysis of documented case

"EFFECTIVE RISK MITIGATION IN SOFT SOIL MICROTUNNELING REQUIRES A MULTI-FACETED APPROACH."



histories reveals that face pressure control becomes particularly crucial when working in very soft gray fat clay conditions with low NSPT values. Industry standards emphasize that the complex interaction between the microtunnel boring machine (MTBM) and surrounding soil matrix demands continuous monitoring and adjustment of operational parameters to prevent sinking.

Experience from challenging ground conditions demonstrates that successful microtunneling operations require careful consideration of jacking forces, particularly when using steel casing with PVC carrier pipes through layers of beach sand overlaying soft clay deposits. The careful management of slurry pressures and the proper selection of low-density grout for annular space filling have proven crucial in preventing machine sinking.

4. PRE-CONSTRUCTION ASSESSMENT FRAMEWORK

Comprehensive pre-construction assessment forms the foundation of successful microtunneling projects in soft soils. ASCE guidelines mandate systematic soil boring patterns and detailed in-situ testing protocols. Case history analysis has demonstrated that projects in areas with complex soil stratification, particularly those involving beach sand overlaying lagoon deposits, require extensive groundwater monitoring systems throughout the construction phase.

The pre-construction phase must include detailed evaluation of soil parameters, with particular attention to zones where NSPT values fall below 8. These assessments should incorporate:

- Comprehensive soil classification
- Groundwater table monitoring
- Evaluation of potential obstructions
- Assessment of settlement risks, as demonstrated in documented case histories, these factors significantly influence machine stability and project success (ISTT, 2024).

5. BEARING CAPACITY EVALUATION METHODOLOGY

The evaluation of bearing capacity in soft soils requires a sophisticated approach combining theoretical frameworks with practical experience. Field observations from projects in very soft soil conditions have demonstrated that traditional bearing capacity calculations must be modified

to account for the dynamic nature of microtunneling operations. ASCE standards provide specific guidelines for evaluating bearing capacity in conditions where soil parameters indicate high risk of machine sinking.

Recent project experiences have shown that successful bearing capacity evaluation must consider:

- Dynamic loading conditions during tunneling
- Effects of high groundwater tables
- Impact of soil stratification
- Influence of slurry pressures

These factors have proven critical in projects involving lagoon deposits with very soft gray fat clay.

6. MONITORING AND CONTROL SYSTEMS

Implementation of comprehensive monitoring systems represents a critical component in managing machine sinking risks. Case histories of microtunneling through very soft soils emphasize the importance of continuous monitoring of machine position, face pressures, and surface settlements. Current industry standards require integrated monitoring systems that provide real-time data on:

- Machine position and orientation
- Jacking forces and face pressures
- Ground surface movements
- Pore water pressures
- Slurry system parameters

The ASCE guidelines specifically address the implementation of monitoring protocols for projects in challenging ground conditions, emphasizing the need for rapid response capabilities when indicators suggest potential stability issues.

7. RISK MITIGATION STRATEGIES

Effective risk mitigation in soft soil microtunneling requires a multi-faceted approach based on documented experiences and industry standards. Analysis of projects through very soft soil conditions has demonstrated that risk mitigation must begin with proper machine selection and configuration. The case history of the Waikiki Public Bath Force Main Replacement Project provides valuable insights into the challenges and necessary mitigation measures when dealing with soil strata consisting of beach sand overlaying very soft gray fat clay.

Key risk mitigation strategies, as outlined by ASCE, include:

- Detailed geotechnical investigation programs
- Appropriate selection of pipe materials and diameters
- Optimization of slurry systems and pressure control
- Implementation of emergency response protocols

The successful implementation of these strategies requires careful consideration of site-specific conditions, particularly in areas where NSPT values indicate extremely soft soil conditions.

8. ANALYSIS OF PREVENTION METHODS

Prevention of machine sinking relies on the integration of primary and secondary preventive measures. Case history analysis reveals that successful prevention strategies must address both pre-construction and operational phases. Primary prevention methods include:

- Comprehensive ground investigation
- Appropriate machine selection
- Optimal operational parameters
- Continuous monitoring systems

Secondary prevention measures, as outlined in ASCE standards include:

- Emergency response protocols
- Remedial grouting programs
- Machine recovery procedures
- Contingency planning

9. CONCLUSIONS

The analysis of microtunneling operations in very soft soil conditions reveals several critical factors for success. Case history evidence demonstrates that machine sinking risks can be effectively managed through careful attention to

geotechnical conditions, operational parameters, and monitoring systems. Key conclusions include:

1. The critical nature of comprehensive pre-construction investigation in identifying potential risk zones, particularly in areas with NSPT values below 8
2. The importance of real-time monitoring and control systems in managing machine stability
3. The effectiveness of integrated risk mitigation strategies in preventing machine sinking
4. The value of documented case histories in improving industry practices

10. RECOMMENDATIONS

Based on the analysis of documented experiences and current industry standards, the following recommendations are proposed:

1. Implement enhanced site investigation protocols specifically designed for very soft soil conditions
2. Develop project-specific monitoring and control systems based on successful case history experiences
3. Establish standardized risk assessment procedures incorporating lessons learned from documented projects
4. Update industry guidelines to reflect advances in technology and methodology for soft ground conditions (ASCE, 2024)
5. Maintain comprehensive documentation of project experiences to contribute to the industry knowledge base

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ABOUT THE AUTHOR:

***John Altinyurek** is a consulting engineer with Parsons. 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, utilizing tunneling, microtunneling, pipe jacking, horizontal directional drilling, and tunnel rehabilitation methods. He is currently serving as Treasurer for the NASTT-NE Chapter.*

NASTT: A CATALYST FOR GLOBAL OPPORTUNITIES AND PROFESSIONAL GROWTH

UMass Lowell NASTT Student Chapter Report

By: Godwin Akumu, UMass Lowell Student Chapter

When I joined the North American Society for Trenchless Technology (NASTT), I could never have imagined the transformative impact it would have on my academic, professional, and personal journey. Winning the prestigious Peter Eagleson Memorial Scholarship in 2024 was a defining milestone, and it is a story that ties back to the invaluable support I received from my faculty advisor, Professor Gondle RajKumar, and my first experience attending a NASTT conference. This journey not only elevated my skills and career prospects but also inspired me to bring NASTT's vision to my home country of Uganda.

A DOOR OPENS AT UMASS LOWELL

As an undergraduate student at UMass Lowell, I was fortunate to have Professor Gondle RajKumar as my professor and mentor. His unwavering dedication to trenchless technology and its transformative potential in the construction and utility sectors inspired many students, including me. Professor Gondle, as the NASTT chapter advisor at UMass Lowell, encouraged me to join the student chapter early in my academic career. His enthusiasm was infectious, and he was always eager to help students tap into the opportunities NASTT offers.

UMASS Lowell Student Chapter members with NASTT-NE Board at the NASTT 2025 No-Dig Show in Denver

> **"IT IS CLEAR THAT NASTT PLAYED A PIVOTAL ROLE IN SHAPING MY CAREER AND ASPIRATIONS."**

In January 2024, Professor RajKumar urged me to attend my first-ever NASTT conference in Rhode Island. Although I was initially hesitant, being new to the field and unsure of what to expect, he convinced me of the immense benefits that come from networking with professionals, academics, and fellow students. Looking back, I can confidently say that this decision marked the beginning of a life-changing journey.

MY FIRST NASTT CONFERENCE: A WORLD OF LEARNING

Walking into the NASTT conference in Rhode Island, I was overwhelmed by the sheer size of innovation, knowledge, and collaboration on display. It was an incredible experience to see professionals, researchers, and industry leaders come together to discuss innovative solutions for trenchless construction and utility rehabilitation.

Attending the conference sessions expanded my understanding of the field, and I was exposed to a wealth of knowledge about sustainable and cost-effective alternatives to traditional excavation. But what truly stood out were the connections I made. Through networking, I had meaningful conversations with seasoned professionals who generously shared their experiences and insights.

This exposure not only broadened my technical skill set but also allowed me to envision how trenchless technology could address infrastructure challenges in developing countries like Uganda.

THE PETER EAGLESON MEMORIAL SCHOLARSHIP

Winning the Peter Eagleson Memorial Scholarship later that year was one of the most humbling moments of my life. This prestigious scholarship honors students who excel academically and demonstrate a commitment to advancing civil engineering. For me, it was more than just a financial award, it was a recognition of my hard work, my potential, and the support of everyone who believed in me, especially Professor Gondle.

The scholarship also came with an incredible sense of responsibility. It reminded me of the importance of using the opportunities I have been given to make a difference, not just for myself, but for others as well.

FROM UGANDA TO THE WORLD: A VISION FOR TRENCHLESS TECHNOLOGY

Growing up in Uganda, I saw firsthand the challenges that come with limited access to modern infrastructure and construction techniques. Traditional excavation methods often lead to significant environmental degradation, delays, and high costs, challenges that could be addressed by adopting trenchless technology.

My experience with NASTT motivated me to share this knowledge with students in Uganda. I began reaching out to universities in Uganda to introduce them to the concept of trenchless technology and encourage them to become international delegates of NASTT. By attending NASTT events, these students could learn from global leaders in the field and bring innovative solutions back home.

> "THE NEED FOR EFFICIENT, SUSTAINABLE, AND COST-EFFECTIVE CONSTRUCTION METHODS HAS NEVER BEEN GREATER."

One of the most promising areas for trenchless technology in Uganda is the construction of pipelines for crude oil exportation. As Uganda develops its oil and gas industry, the need for efficient, sustainable, and cost-effective construction methods has never been greater. I envision a future where Ugandan engineers and entrepreneurs use trenchless technology to revolutionize infrastructure development in the region.

THE ROLE OF NASTT IN SHAPING FUTURES

Reflecting on my journey, it is clear that NASTT played a pivotal role in shaping my career and aspirations. The organization's commitment to education, innovation, and

collaboration provides students with unparalleled opportunities to grow and succeed.

For me, NASTT was not just a professional organization, it was a community that welcomed me with open arms, challenged me to think bigger, and empowered me to make a difference. Through its conferences, scholarships, and mentorship opportunities, NASTT helps students bridge the gap between academic learning and real-world application.

GRATITUDE AND LOOKING AHEAD

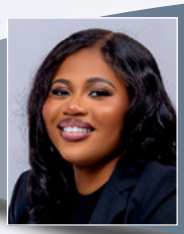
I am incredibly grateful to Professor Gondle RajKumar for introducing me to NASTT and for his guidance throughout this journey. His belief in me and my potential made all the difference. I am also thankful to the NASTT community for its support, encouragement, and investment in young professionals like me.

As I continue to pursue my career in trenchless technology, I am committed to giving back to the NASTT community and contributing to its mission. I hope to inspire more students, both in the United States and in Uganda, to explore the transformative potential of trenchless technology and to become active members of NASTT.

"NASTT HELPS STUDENTS BRIDGE THE GAP BETWEEN ACADEMIC LEARNING AND REAL-WORLD APPLICATION."

Winning the Peter Eagleson Memorial Scholarship was a proud moment, but it was only the beginning. With the skills, knowledge, and connections I gained through NASTT, I am excited to tackle the challenges ahead and make a lasting impact in the field.

To students and professionals considering joining NASTT, I can say this with confidence: the opportunities, growth, and inspiration you will find here are unparalleled. I am a living testament to the incredible power of this community to transform lives and open doors to a brighter future.



ABOUT THE AUTHOR:

Godwin Akumu *is a senior Civil Engineering student and active member of the NASTT Student Chapter at UMassLowell. She has been part of the NASTT Student Chapter since 2023 and is eager to learn even more about all aspects of trenchless technology. She is proud recipient of the prestigious 2024 Peter Eagleson Memorial Scholarship.*

ABOUT THE FACULTY ADVISOR:

Dr. Raj K. Gondle *is an Assistant 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 UMass Lowell Student Chapter. He was recognized with the 2020 UMass Lowell Departmental Teaching Excellence Award and the 2017 ASCE ExCEEd teaching fellow. His students think he's awesome!*

Peter S. Eagleson Memorial Scholarship

The intent of the Professor Peter S. Eagleson Memorial Scholarship is to provide aid to those that come from backgrounds that are under-represented in the civil engineering profession. This scholarship is overseen by the BSCES Diversity, Equity and Inclusion Committee for the benefit of eligible BSCES Student Members who are accepted for admission or enrolled in an undergraduate civil engineering program at a Commonwealth of Massachusetts college or university. This scholarship has a total value of $20,000, which will be awarded in two yearly payments of $10,000. This award may be used for tuition, books, housing, or other needs.

NASTT Michael E. Argent Memorial Scholarship Recipients: UMASS Lowell

NASTT offers six (6) Argent Memorial Scholarships in the amount of $5,000 US each to **members of one of the 19 NASTT Student Chapters, including** international students, who are also attending the annual NASTT No-Dig Show. This annual student scholarship program was established in the memory of Michael E. Argent, who is recognized as one of the industry's true visionaries and a motivating force behind the growth of trenchless technology. In 1990, Michael was one of five persons who founded NASTT. Through this scholarship program established in his memory, it is hoped that Michael's contributions to the industry will continue to inspire young trenchless professionals.

All scholarship recipients must be members of a current NASTT Student Chapter and are selected on the basis of financial need, academic achievement, demonstrated leadership including participation in school and community activities, honors achieved, work experience, goals/aspirations. The scholarship award is used solely for tuition fees, text books or other fees directly related to the recipient's educational costs.

Congratulations to UMASS Lowell Student Chapter Argent Memorial Scholarship recipients Tieren Adams (2024) and Fadilat Amisu (2025). Bright futures ahead!

Fadilat Amisu, UMASS Lowell Student Chapter, recipient of NASTT 2025 Michael E. Argent Memorial Scholarship

Tieren Adams, UMASS Lowell Student Chapter, recipient of NASTT 2024 Michael E. Argent Memorial Scholarship

EIGHTH ANNUAL NASTT-NE NORTHEAST TRENCHLESS CONFERENCE 2024 A SUCCESSFUL OUTREACH GATHERING!

Progress in Regional Trenchless Education & Networking in Central Massachusetts!

Building on previous conference successes and outreach efforts by the NASTT-NE Chapter, the eighth annual NASTT-NE Northeast Trenchless Technology Conference 2024 was held November 11 – 12 at the expansive Sturbridge Host Hotel & Conference Center. It was another productive, well-attended gathering, providing trenchless technology education and outreach in a rural setting conveniently close to Boston. Very well attended, the Conference furthered NASTT-NE Chapter efforts to expand the footprint and heighten awareness of trenchless technology applications across New England.

The Sturbridge Host Hotel & Conference Center was the site of the 8th Annual NASTT-NE Trenchless Technology Conference, November 10-11, 2024

THE NASTT-NE CHAPTER BOARD OF DIRECTORS THANKS EVERYONE FOR THEIR PARTICIPATION IN A HIGHLY SUCCESSFUL EIGHTH ANNUAL NASTT-NE NORTHEAST TRENCHLESS CONFERENCE. WE LOOK FORWARD TO SEEING YOU LATER THIS YEAR AT OUR 9TH ANNUAL CONFERENCE IN HISTORIC NASHUA NH NOVEMBER 10-11!

In conjunction with the NASTT-NE Board, the UMASS Lowell Student Chapter members keep everything running efficiently

The Northeast Trenchless Conference has become a well-established must attend opportunity for friends and colleagues, both old and new, to convene again, exchange ideas and gain knowledge of the latest innovations and advancements in trenchless technology.

More than 125 trenchless professionals, municipal attendees, industry exhibitors and students gathered together to enjoy a full day of networking and 14 peer-reviewed, presentations in two tracks, detailing environmentally friendly trenchless solutions and cost-saving opportunities for municipalities and utilities.

Conference highlight was the lunch-hour keynote address by Heather Blakeley, DPW Director, Town of Sturbridge on how the town's infrastructure challenges are being addressed with trenchless technology

Keynote speaker Heather Blakeley, DPW Director, Town of Sturbridge, receives plaque of appreciation from NASTT-NE Chair Jonathan Kunay P.E.(R) and Vice Chair Charles Tripp P.E. (L)

NASTT-NE Board Members were pleased at the conclusion of another highly successful conference, from left to right: John Altinyurek, Bill Jeffery, Jonathan Kunay, Charles Tripp, Ken Traub, Tom Loyer

There were also 25 informative trade exhibits showcasing a wide range of leading edge trenchless and condition assessment technologies. A great feature of the conference is locating the exhibits in the same room as all of the networking activities, which greatly facilitates interaction with industry vendors. Another great feature are the live outdoor field demonstrations of trenchless methods, provided at this conference by Precision Trenchless, LLC and Vari-Tech.

A highlight of the conference was the lunch-hour keynote address by Heather Blakeley, DPW Director, Town of Sturbridge on how the town's infrastructure challenges are being addressed with trenchless technology repair and renewal programs. Her speech was warmly received by the delegates, and she was presented with a plaque of appreciation by NASTT-NE Chair, Jonathan Kunay P.E. and NASTT-NE Vice-Chair, Charles Tripp P.E.

Attendees enjoyed a full day of 14 informative peer-reviewed presentations on a wide range of trenchless technology topics in two separate tracks

Networking and close personal access to industry expertise is an important aspect of the annual NASTT-NE Conference



Live field demos are a regular conference highlight

The NASTT-NE Chapter Board of Directors thanks everyone for their participation in a very successful eighth annual 2024 NASTT-NE Northeast Trenchless Conference. We wish to extend our appreciation to all our volunteers, presenters, moderators, and attendees for their participation, time and effort. A special note of thanks also goes out to our Premium Sponsors & Exhibitors. We thank you for your support!

NASTT-NE Chair Jonathan Kunay, P.E., welcomes delegates to the conference

Richard Revolinsky, GEONEX (L) and Carolyn Hook, NASTT Membership Outreach & Database Manager enjoying the conference

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BIG EASY UPGRADES WATER SYSTEM

One Phase Completed, Saving Five Million Gallons Daily; Others Fast Tracked Due to Timesaving HDPE Pipe Installation Method

HDPE is the way of the future

By: Steve Cooper, SCA Communications

Being more than 300 years old, the Crescent City has had water transmission lines ranging from hollowed-out cypress logs to more traditional materials such as cast iron, asbestos concrete, and now leak-free high-density polyethylene (HDPE) PE4710 pipe that allows for greater pressures, while providing a greater hydraulic capacity, resiliency, cost effectiveness, water conservation, and installation efficiencies.

New Orleans' aging infrastructure has led to numerous boil orders, unstable water pressure, plus damage to roads and pavement from water main breaks. To rectify those issues, the Sewerage & Water Board of New Orleans (SWBNO) launched an 11-project effort in 2023 to replace its cast iron potable water transmission mains with a modern piping system, stating that it was "using the HDPE pipe because it is more durable than traditional pipes." The utility serves more than 138,400 customers with nearly 152 million gallons of water daily using 1,600 miles of water main.

The South Claiborne Transmission Main Project, one of the 11 now on the books, aimed to stabilize water pressure in many areas of the city and improve water quality with HDPE pipe that has a design life of 100 years. Completed in the fall of 2023, it has been reported that the new pipeline is saving New Orleans five million gallons of water a day.

Using CompressionFit™ trenchless installation technology and the HDPE pipe, it has been estimated by the contracting installer that there was an overall 25 percent savings in materials, labor and time compared to other methods.

"The South Claiborne Transmission Main project illustrates the value of PE4710 HDPE pipe for cost-effective piping rehabilitation through CompressionFit," explained Camille George Rubeiz, P.E., F. ASCE, co-chair, HDPE Municipal Advisory Board (MAB), and senior director of engineering for the Plastics Pipe Institute's (PPI) Municipal & Industrial Division. PPI is the major North American trade association representing the plastic pipe industry.

The Transmission Main Program is FEMA-funded and managed by SWBNO in cooperation with the City of New

Longest pull was about 1,400 feet

Orleans as part of the Joint Infrastructure Recovery Roads (JIRR) Program. Total cost for the South Claiborne Avenue Transmission Main was budgeted at $25.5 million.

The Murphy Pipeline Contractor's (Jacksonville, FL) CompressionFit method uses the old pipeline as a path for pulling through the new pipe. Governed by ASTM F3508, CompressionFit uses HDPE pipe with an outside diameter larger in size than the inside of the existing pipe. After the HDPE pipe sections are heat fused to the desired length, the monolithic pipeline is pulled through a reduction die before entering the old host pipe. This reduces the HDPE pipe temporarily below the inside diameter of the host pipe allowing it to be inserted.

Once the pipe has finished being pulled through the length of the section, the tension reduction allows it to expand, pushing flush against the interior of the existing pipe. This technique, especially for the South Claiborne Transmission Main Project, helped reduce overall project costs, minimize traffic disruption, and simplify the installation. It was also a key component for securing project funding. Murphy is a member company of PPI's Municipal Advisory Board (MAB).

According to HDPE pipe industry expert and consultant Harvey Svetlik, P.E. "One of the principal things that this technology does is that it preserves the flow rate of the existing host pipeline and seals over holes and leaks, so you have a dual-wall composite pipeline. And the thicker HDPE pipe provides structural integrity." The wall thickness of the DR 17 HDPE pipe is 2.9 inches and is pressure rated to handle 125 psi. The city's water transmission lines run 70 to 80 psi.

HDPE pipe, according to PPI's Rubeiz, offers corrosion protection, flexibility, durability, ground movements, and best seismic resistance than any other piping materials. "Moreover, it virtually eliminates leakage plus prevents any infiltration of sediment or rainwater into the system. The pipe also has a low biofilm formation potential, highlighting its capability to preserve water and water quality while conveying it," he stated "Even the 48-inch diameter HDPE pipe with a wall thickness of nearly three inches is ideal as its properties align with the compressed fit installation method outlined in ASTM F3508."

> ***"HDPE PIPE VIRTUALLY ELIMINATES LEAKAGE PLUS PREVENTS ANY INFILTRATION OF SEDIMENT OR RAINWATER."***
>
> - Camille George Rubeiz, P.E., F. ASCE, Co-chair, HDPE Municipal Advisory Board

Two sizes of PE4710 DIP SDR 17 pipes were used: 4,400 feet of 48-inch and 1,150 feet of 30-inch diameter. The pipe was manufactured by AGRU America at its Charleston, S.C. plant. AGRU pipe is available in sizes up to 11.5 feet (OD) and

"THE NEW PIPELINE IS SAVING NEW ORLEANS FIVE MILLION GALLONS OF WATER A DAY."

seamless lengths up to 2,000 feet long. It is a member company of PPI.

The South Clairborne job was voted Project of the Year by the Municipal & Industrial Division of PPI for the year 2023. Each year the PPI membership reviews and votes on the Project of the Year for each of the five PPI divisions. The award was presented to AGRU during the association's annual membership meeting held in May 2024.

CMG Pipelines, Inc. (Kenner, LA) installed the pipe. "There's not a lot of certainty about what's in the ground in New Orleans. With directional drilling or digging trenches, who knows what you'll hit," explained CMG President Carmelo Gutierrez, P.E. "A lot of New Orleans is built on reclaimed land, using whatever they found that was cheap to throw in the hole is what they filled it up with. And when you start digging through that, it's going to be a pain. The typical trench for 48-inch pipe required here in New Orleans would be eight feet wide and five feet deep to the top of the pipe. So, you're eight feet wide, 14 feet deep for a thousand feet. Digging that is not fun. It's horrible,

The CompressionFit method helped reduce overall project costs and minimize traffic disruption

Protecting the crews is most important

horrible ground to dig in and tough. Plus, protecting our crew is most important. That's also why we suggest HDPE, because of the soil here, and the settling that we have and the water table, and all the little issues that we have in New Orleans. HDPE solves those issues."

During the 14-month long project, it took the CMG crew of 16 – two teams of eight – four months to actually install the pipe from South Claiborne and State Street to South Claiborne and Upperline Street. One team was at the entrance pit took care of fusion and moving pipe. The other one took care of prepping the holes and did the pull.

"We did 4,400 feet of 48-inch, nearly 1,200 feet of 30-inch, and some 8-inch open cut. Because we're close to Tulane University, we had to watch their football schedules, and had to pay attention to traffic," Gutierrez explained. "Our longest pull was about 1,400 feet through the old cast iron pipe. We had a couple of large control valves. We dropped one 48-inch valve and three 30-inch valves in the system to help control the flow.

"There were also sidewall fusions where we were able to use HDPE all across to do our tie-ins, plus, standard fittings, adapters and MJ adapters. That's because of HDPE's flexibility at normal ductile line pipe size, and we didn't miss a beat. We had all the fittings we needed. Basically, one day the pipe was above ground and the next day it was gone.

"Compression allowed the city to fix their lines quicker," he continued. "We didn't have to worry now about the path of the pipe, because we followed the same path. It made an otherwise tough job fun. And the utility agreed that this was the most cost-effective and time-effective method to quickly replace their mains without creating so much mess in the city.

"We believe HDPE is the way of the future. It solves a lot of check marks for the concerns of utility companies, utility owners. That's how Murphy Pipelines and CMG brought this technology to New Orleans, and SWBNO has added a new tool to its pipe replacement toolbox. Now, they're rehabilitating large diameter lines, and a few years ago that was never a thought."

"One of the things about the ASTM F3508," Svetlik explained, "is that it can be utilized not only for municipalities for gravity flow, but even more ideally for pressure pipes for water pipeline replacement, or force main replacement."

Additional information can be found at www.plasticpipe.org/mabpubs or www.plasticpipe.org/municipalindustrial

ABOUT THE AUTHOR:

The Plastics Pipe Institute, Inc. (PPI) *is the major North American trade association representing the plastic pipe industry, and is the premier technical, engineering and industry knowledge resource.*

Scan to see the Field Report video:

PIGGING A 64-INCH RAW WATER LINE

By: American Pipeline Solutions (APS)

American Pipeline Solutions (APS) and Wichita Water Partners pigged a complex, large diameter raw water line at the state-of-the-art water treatment plant launching in 2025. Multiple pigs cleared the debris and silt from the pipe before it was converted into a potable water line.

BACKGROUND & SITUATION

The Northwest Water Facility is a major water infrastructure project to provide clean drinking water to over 500,000 Wichita residents. The City of Wichita partnered with Wichita Water Partners to build the state-of-the-art water treatment plant, replacing the city's 80-year-old facility. With the capacity to treat up to 120 million gallons of clean drinking water daily, the project represents the largest capital investment in the city's history at $500 million.

The four-mile stretch of a 64-inch diameter raw water pipeline required thorough cleaning before being converted into a potable water line. The large-diameter pipeline had accumulated significant silt buildup, necessitating a specialized pigging process. Wichita Water Partners enlisted American Pipeline Solutions (APS) for their decades of expertise in pigging large-diameter pipelines.

An external pump was used to launch the pig into the pipeline until the point that it was propelled by the system water flow

SCOPE OF WORK

The pipeline segment requiring cleaning included approximately 20,000 feet (four miles) of 64-inch ductile iron and 66-inch pre-stressed concrete cylinder pipe (ECP & PCCP). In the early stages of the project, APS assessed the pipeline's condition, the type and thickness of deposits, and its geometry including bends, turns and restrictions. They proposed a series of progressive pig runs using different types of pigs to remove the debris and safely clean the pipe without causing any damage.

PREPARATIONS AND EQUIPMENT

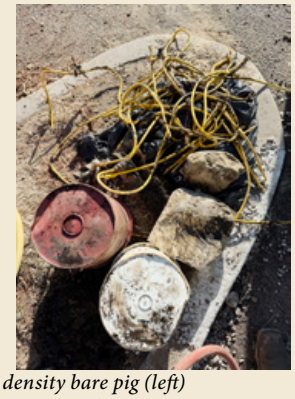
With a tight timeline of just ten weeks, APS faced immediate logistical challenges. Specialized launchers and receivers to accommodate the oversized pigs - critical to the project- had lead times of up to twenty weeks. To meet the shortened timeline, APS fabricated a launcher and receiver and made adjustments to the design.

A key preparatory step involved identifying and preparing the launch and retrieval sites. After reviewing the proposed launch point, APS agreed that it had enough space and access for the crews and equipment. Site preparations included the pipeline being brought to the surface at the launch site and attached to the modified launcher. An external pump ensured adequate flow for inserting the pig, while a snubber held the pig in place to prevent it from slipping backward.

The proposed retrieval point lacked adequate space for the receiver, equipment or filters to capture debris. The search for a new retrieval point led to an area that would require diverting the pigs from the main pipeline into a section of newly constructed pipe.

PIGGING PROCESS

APS implemented progressive pigging, a technique requiring a deep understanding of pig types and their sequential application to effectively loosen silt, flush debris, and clear the pipeline. Pigs were selected based on their size, material and aggressiveness. A series of pig runs were performed, with each run using a slightly larger and more aggressive pig than the previous one. The process involved the following steps:



Debris pushed out from the medium density bare pig (left) included 5-gallon drums, an extension cord and grout

The 90-degree turn through a tee that led to the newly constructed section of pipeline towards the retrieval point

- **Initial Cleaning with Soft Foam Swabs**
  The first pigs used were LB Light-Density Bare Swabs, designed to dislodge initial silt buildup gently. These soft foam pigs ensured safe passage through the pipeline without causing damage.
- **Medium-Density Bare Pig with Bullet Nose**
  Next, a medium-density bare pig was deployed to remove tougher accumulations. This flexible foam pig adapted to the pipeline's contours and effectively removed construction debris, including chunks of concrete, extension cords, five-gallon drums, and excess grout.
- **Medium-Density Criss-Cross Foam Pigs**
  The final pigging runs utilized medium-density criss-cross foam pigs with bullet noses. These pigs provided a more aggressive cleaning action to remove any remaining loose debris while preserving the integrity of the internal lining. The durable polyurethane elastomer crisscross coating enhanced abrasion resistance and scraping efficiency.

Each pig was inserted and secured before the system's flow rate was activated to propel it through the pipeline. Traveling

at approximately 1–2 feet per second, each pig run took four to six hours. Most of the silt and buildup was removed within the first three runs.

The pigs navigated around sharp bends, underneath the Arkansas river and maneuvered through a complex manifold system before making a final 90-degree turn at the retrieval point. Using a transmitter, pig locations were tracked to ensure pig progress. APS stationed crew members at five separate locations to monitor the progress and report on any anomalies.

CHALLENGES AND SOLUTIONS

Modifying the Retrieval Point

The proposed retrieval site in a residential neighborhood, lacked sufficient space for the equipment and crews. APS identified an alternate location that required diverting pigs into a newly constructed 2,000-foot section of pipeline that was not yet operational. The custom-built receiver was installed and the site prepared for receiving the pigs.

Flow rates were skillfully controlled for each pig to turn at a 90-degree angle through a tee into the last section of pipe. There were also 48-inch butterfly valves at the retrieval point that had to be shut to divert the pigs towards the receiver.

Pipeline Complexity

Drastic elevation changes and multiple 90-degree bends added further complications. APS stationed personnel at critical junctions to monitor the pigs' progress and ensure they successfully navigated each turn. At approximately 2,000 feet before the final retrieval point, a crew member confirmed each pig's passage through a critical turn. Water was diverted into a filter to slow the pig's movement and control its final approach.

Handling Large-Diameter Pigs

Specialized equipment and expertise were needed to manage the project. Securing suitable launchers, receivers, and the process of ensuring sufficient flow rate for pig propulsion required extensive planning and expert project leadership.

Mitch Howe, Senior Project Manager at APS with over 20 years of pigging experience, played a crucial role in guiding the project and anticipating potential obstacles. He recommended the use of an external pump to effectively launch the pig into the pipeline beyond the point the system water flow could take over and push the pig through.

Mitch's expertise was relied on to maintain optimal flow rates that ensured the pigs moved efficiently, without risk of too much pressure or excessive flow. If a pig moves too quickly, its cleaning abilities may be compromised. After each pig run, Mitch evaluated the collected debris and the pig's condition to determine the next pig type and the need for further runs.

Debris and silt were captured in filters at the retrieval point

RESULTS

Five complex pig runs were successfully executed within the ten-week deadline on the largest-diameter pipeline APS has pigged. Careful selection and sequencing of pigs, with precision management of water pressure and flow, achieved thorough cleaning and removal of debris without compromising the pipeline's integrity.

Following pigging operations, Wichita Water Partners proceeded with final pipeline preparations, including sanitizing and reinstalling butterfly valves. The pipeline was then treated and tested to meet potable water standards.

The Northwest Water Facility is currently undergoing performance testing, startup, and commissioning. It is expected to be fully operational in summer 2025, delivering clean drinking water to Wichita and surrounding areas.

ABOUT THE AUTHORS:

American Pipeline Solutions (APS) *is a leading provider of pipeline and pigging services based in New Milford, PA. With decades of experience, APS specializes in cleaning and maintaining pipelines across the water, oil, and gas industries. Utilizing state-of-the-art technology and global partnerships, APS delivers pipeline pre-commissioning, Ice Pigging™, inspection, condition assessments, and cleaning services.*

Wichita Water Partners *is a joint venture led by Burns & McDonnell, Alberici Construction, and regional partners, spearheading the development of Wichita's most ambitious water infrastructure project. Wichita Water Partners team members have worked on nearly every major water infrastructure project in Wichita over the past 30 years.*

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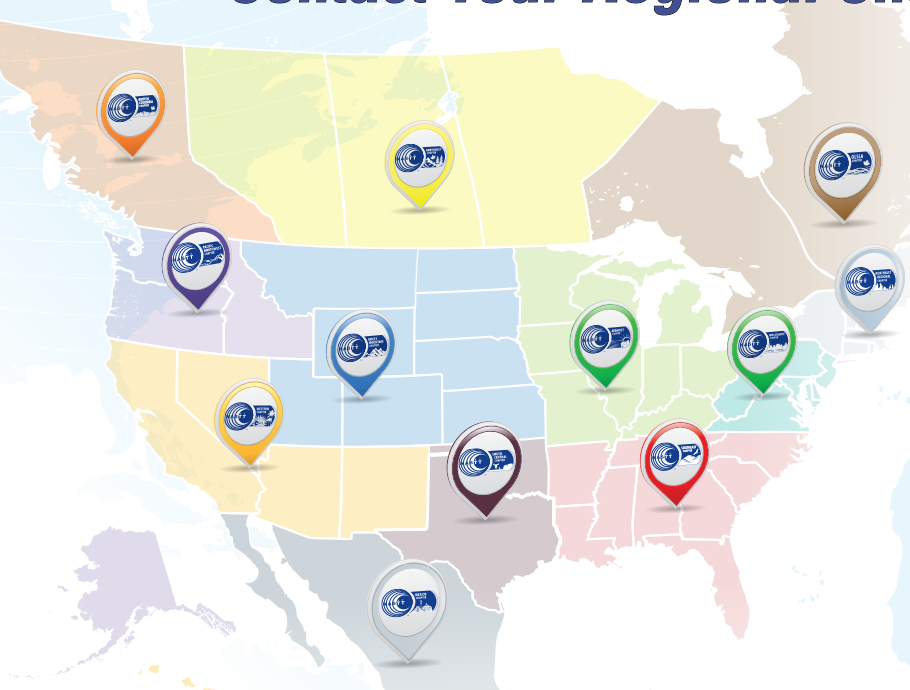

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