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MESSAGE FROM THE MASTT CHAIR

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

Dear Mid-Atlantic Chapter Members: As we embark on a new year in our MASTT life, first let me thank our outgoing Executive Director Leonard Ingram and Chairman Richard Thomason for their leadership for our chapter for the past years. Both have been instrumental in our continuance through the rough COVID years, with seminars and support of No Dig. As Leonard likes to say, "I Dig No Dig", and that is so true with both. Well done gentlemen and once again, we thank you.

As for the future, we will endeavor to continue our mission of educating the world on trenchless technology and how it can improve the quality of life. We have an exciting Board with 11 impressive individuals. We will look to improve our communication with our chapter members, over 125 strong and hopefully to grow even more. We will team up with Andrew Pattison of A to B Publishing for our chapter magazine. Also, most important to us, we will look to team up with our student chapter at Rutgers University and look to expand that mission with other universities in the Mid-Atlantic region. Later, down the road in 2024, we will look to put on a seminar that will feature great papers and vendors. Todd Kilduff and Professor Nenad Gucunski will lead that effort so save the date of December 12th for our all-day seminar. Plus, mark your calendars for No Dig 2025 in Denver, CO March 30 – April 3, 2025.

Moving to an all-volunteer operation will take some time and effort. Hope we can count on you all. So, on this note, it's going to be a great and challenging year to say the least. If any of you want to get more involved in the chapter and help us, email me at dennismwalshpe@hotmail.com.

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

Dennis M. Walsh

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

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MESSAGE FROM NASTT CHAIR

Matthew Wallin, PE, NASTT Chair

Hello Mid Atlantic Regional Chapter Members!

As we roll into the Fall, I want to share some key updates and upcoming opportunities that are of importance to your chapter and our organization and industry. First and foremost, a big thank you to everyone who participated in our recent 2024 No-Dig Show held in Providence, RI. Your engagement and contributions made it a resounding success! The presentations were insightful, and the networking opportunities were invaluable. We are currently in the thick of 2025 planning and we hope you will mark your calendars for March 30-April 4 in Denver, CO! If you have any feedback or suggestions for future events, please do not hesitate to reach out to us at **info@nastt.org**.

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

"TOGETHER, WE ARE DRIVING THE FUTURE OF TRENCHLESS TECHNOLOGY FORWARD!"

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

We are also excited for the upcoming No-Dig North conference, scheduled to take place from October 28-30 in Niagara Falls, ON, Canada. This event is a premier opportunity for professionals in our field to learn about the latest innovations and best practices in trenchless technology in Canada. We encourage all members to attend and take advantage of the technical sessions, exhibits, and networking opportunities. Early bird registration is now open, so be sure to register soon to secure your spot. Visit **www.nodignorth.ca** for all the details.

NEW HEIGHTS. UNDER GROUND.

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

Matthew Wallin

Matthew Wallin, PE
NASTT Chair

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2024-2025 MASTT BOARD OF DIRECTORS

Dennis Walsh P.E. – *Chair*

Dennis M. Walsh, P.E. is retired from Public Service Electric & Gas in New Jersey where he was a Senior Project Manager – Horizontal Directional Drilling. He also was a Senior Engineer for Kilduff Underground Engineering in Red Bank, New Jersey.
Dennis is a 1972 graduate of the University of Dayton, Ohio with a B.S. in Civil Engineering and a 2002 graduate of the Polytechnic University of New York with a M.S. in Technology. He previously retired from KeySpan Energy Company in 2005 after a 28 year career in the gas utility field with a background in engineering, operations, construction, Quality Assurance and HVAC. He led KeySpan's efforts to expand the use of trenchless technology in the early 1990's to decrease its main and service installation costs. Past experience also includes consulting engineering in the natural gas industry.
Dennis is a past Board member for NASTT, a Board member for the NASTT Mid-Atlantic Chapter and on the Annual No-Dig Committee. He has designed numerous HDD installations for various utilities; including a 1,800 foot HDD for a 30 inch gas main under a tidal basin in Brooklyn, NY; a 2,000 foot 12 inch HDD under an environmental sound in south NJ; a 400 foot long Jack & Bore installation in Newark, NJ; and a 1900 foot HDD of a 30 inch steel pipeline for a 69kV electric system. Dennis is a licensed Professional Engineer in New Jersey and Massachusetts. When he is not involved in trenchless projects, he enjoys traveling, and trying to play golf.

John Seibert – *Vice Chair*

John Seibert is the Director of Trenchless at Haugland Group LLC. John holds a B.S. in Petroleum and Natural Gas Engineering from Penn State. He was hired directly out of school by Aaron Enterprises, Inc. as an entry level engineer and spent 8 years with the company. Over his time at Aaron, he has gained experiences in jack and bore, pipe ramming, guided auger boring, microtunneling, TBM, pipe jacking and tunneling, pit excavations, shaft excavations, slip lining, pipe rehabilitation, grouting, dewatering and large HDD work which is his primary focus. He was recently hired by Haugland to expand the companies' trenchless capabilities. He has been involved in over 100 large HDD installs to date along with all other forms of trenchless installation. In addition, he is well versed in design work having worked on 35 designs, many of which his team has installed. He has also authored and co-authored two papers on trenchless techniques for ACSE. His main goal is to continue to grow the company and provide world class trenchless services. He enjoys golf, working out and hanging out with friends outside of work.

Jennifer Leister – *Secretary*

Jennifer Leister has been an integral part of the Upper Montgomery Joint Authority (UMJA) since 2012. She began her journey with UMJA as a Laboratory Technician, where she honed her skills in wastewater analysis and treatment. Her dedication and expertise quickly propelled her to the role of Assistant Superintendent, where she demonstrated exceptional leadership by managing a team of 13 employees. In this capacity, Jennifer was responsible for overseeing various operational aspects of the treatment plant, ensuring that all processes ran smoothly and efficiently.
In 2018, Jennifer's exemplary performance and deep understanding of wastewater management led to her promotion to Executive Director. This transition came at a pivotal time for UMJA, as the Authority was embarking on a significant $28 million upgrade to its treatment plant. Jennifer embraced this challenge with enthusiasm and determination, successfully steering the large-scale construction project to enhance the facility's capabilities. Additionally, she oversaw the comprehensive rehabilitation of 35 miles of UMJA's Collection System, which spans across the three boroughs of Pennsburg, Red Hill, and East Greenville.
With 16 years of experience in the wastewater industry, Jennifer brings a wealth of knowledge to her role. She adeptly manages the daily operations of the treatment plant, ensuring compliance with environmental regulations and maintaining high standards of efficiency and safety. Her responsibilities also include coordinating property inspections, lateral inspections, smoke testing, and the distribution of flow meters, all of which are crucial for the effective functioning of the wastewater system.
As Executive Director, Jennifer is committed to delivering high-quality wastewater treatment services. She prioritizes the empowerment of her staff, fostering a collaborative and supportive work environment. Jennifer also places great importance on community engagement, striving to build positive relationships with residents and stakeholders.
Outside of her professional life, Jennifer enjoys a variety of hobbies. She has a passion for gardening, where she finds solace and creativity. Traveling allows her to explore new cultures and gain fresh perspectives, while photography enables her to capture and cherish memorable moments.

2024-2025 MASTT BOARD OF DIRECTORS

Mike Hoffmaster – *Treasurer*

Mike Hoffmaster is employed by OBIC as Vice President of Business Development. OBIC is a manufacturer of protective coatings and grouts for wastewater, potable water and industrial environments. His responsibilities include educating municipalities and engineering firms on the benefits of OBIC products their products, as well as increasing OBIC's market share around the world. Another key role is supporting their network of installers and recruiting new companies to install the OBIC products.

He earned a Bachelor of Science degree from Shepherd University and has over 37 years of experience in the construction industry. For the past 15 years his focus has been in trenchless construction and the previous years was spent working in a variety of roles, for precast concrete company.

Mike has played a vital role in obtaining product approvals and specification writing for products he has been associated with. In addition to serving as Treasurer for the MASTT, he is an active member of Chesapeake Water Environmental Association (CWEA), Virginia Water Environmental Association (VWEA), Maryland Rural Water Association (MRWA), Virginia Rural Water Association (VRWA), Pennsylvania Rural Water Association (PRWA) and Water Environment Federation (WEF) and a member of NASSCO. He is a recipient of the CWEA Golden Manhole Award for his contributions to the organization. In his spare time Mike enjoys cooking, photography, traveling, and is active in his community.

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SALUTING THE 10TH ANNIVERSARY EDITION OF THE MASTT MID ATLANTIC JOURNAL OF TRENCHLESS TECHNOLOGY!

Richard Thomasson, PE, Past Chair 2004 - 2023, MASTT

On the publishing of the 10th annual edition of the MASTT Journal, I thought it would be useful to reflect for a moment on the foundation of the Mid Atlantic NASTT Regional Chapter and on how far we've come in the last 20 years…

The MASTT was founded in 2004 as the Mid Atlantic Regional Chapter of the North American Society for Trenchless Technology (NASTT), and encompasses the geographical region of Virginia, West Virginia, District of Columbia, Maryland, Delaware, Pennsylvania and New Jersey. This area of six Mid Atlantic states and the DC region has a huge population and numerous municipalities, large and small, with many older water and sewer systems needing rehabilitation or replacement. In the two decades since the Chapter was founded, there has been steadily growing awareness of the benefits of using trenchless technology throughout our region.

This is now the 10th annual publication which highlights trenchless technology solutions to new and rehabilitated underground pipelines and infrastructure. These ***Mid Atlantic Journal of Trenchless Technology*** publications have raised awareness of the practical advantages of trenchless technology with public officials, engineers, utility company personnel, designers, and contractors involved with the construction, rehabilitation, and management of underground infrastructure assets throughout the Mid Atlantic region. They helped educate key decision-makers on the many social and economic benefits of using trenchless technology in their infrastructure renewal and new construction programs. Coming full circle, the inaugural 2015 edition of the ***Mid Atlantic Journal*** highlighted articles from Northeast Remsco (Washington Navy Yard), the Washington Suburban Sanitary Commission, now WSSC Water, and from current MASTT Chapter Chair, Dennis Walsh!

Over the past 20 years, MASTT has also hosted **Trenchless Technology, SSES and Buried Asset Management Seminars** in various cities across the Chapter's six state area + DC., engaging nearly 2,000 underground infrastructure professionals over this time, facilitating meaningful direct networking between industry and owner groups. These seminars over the years were coordinated by now retired MASTT Executive Director Leonard Ingram, who poured his tireless energy into running the seminars, using his wide network of industry contacts to organize informative and up to date trenchless technology presentations. Every seminar was cohosted with the local ASCE or APWA Chapter which enhanced the value of the networking and engagement, with the final one being held September 14, 2022 in Atlantic City NJ.

As we move forward into our third decade of Chapter activities, it is great to be able to build upon the solid legacy and continuity from 10 years of publishing our journal, and 20 years of seminar activity.

Our chapter's purpose remains the same, to *"advance the science and practice of Trenchless Technology for the public benefit, to promote and conduct education, training, study and research in said science and practice for the public benefit."*

Sincerely,

Richard Thomasson, PE
Past Chair, MASTT

"MASTT HAS CONDUCTED TRENCHLESS TECHNOLOGY SEMINARS THROUGHOUT THE MID ATLANTIC REGION, FULFILLING THE MID ATLANTIC CHAPTER MANDATE TO PROMOTE TRENCHLESS TECHNOLOGY THROUGH EDUCATION FOR THE PUBLIC BENEFIT"

- RICHARD THOMASSON, PE, PAST CHAIR 2004 - 2023, MASTT

MASTT has now published 10 annual magazines promoting trenchless technology!

Inaugural magazine edition featured articles from Northeast Remsco, WSSC and current MASTT Chapter Chair Dennis Walsh!

Twenty years of MASTT seminars advanced the science and practice of trenchless technology for the public benefit

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WSSC WATER FERNWOOD ROAD WATER MAIN REPLACEMENT PROJECT:

Design and Geotechnical Considerations

By: Richard Thomasson, P.E. Khalid Qadwai, P.E., PMP, EBA Engineering Inc.

BACKGROUND

The Washington Suburban Sanitary Commission (WSSC Water) was formed in 1918 by the State of Maryland legislature to handle water systems and sewer systems in Prince George's County and Montgomery County bordering Washington, DC. Mandated to provide clean drinking water and proper treatment of wastewater in these two counties, WSSC Water consolidated several preexisting smaller systems and treatment facilities. With a present-day network of 5,900 miles of drinking water pipeline and over 5,600 miles of sewer pipeline, WSSC Water has grown today to serve a population of over 1.9 million residents.

The original governance for WSSC Water was six Commissioners, three from each of the two counties, who were appointed by the Maryland State Legislature to guide and approve expenditures and regulations for WSSC Water. At a later date the Prince George's and Montgomery Counties both adopted a County Executive and County Council governance structure. After this change the six Commissioners were then appointed directly by the County Executive and approved by the County Council for each of the two counties. A General Manager and Chief Engineer were both hired to lead the daily activities for WSSC Water personnel.

WSSC Water continued to grow as the populations in the two counties grew. At one point it was the 7th largest water and wastewater utility in the United States.

"A DIRECT RESULT OF THE ASSET MANAGEMENT PLAN IN PLACE AT WSSC WATER."

Historically, WSSC Water has been led by some great General Managers and Chief Engineers providing excellent service to the public, with award-winning water and wastewater services. The organization has always been on the forefront of planning, design, construction and maintenance of water and wastewater systems. Because proper cost-effective asset management has always been a priority the WSSC Water investigated and used trenchless techniques as soon as they were known and available, using cutting edge technologies in implementing these principles. Since the 1970s the organization has dedicated a portion of its budget directly towards updating and replacing aging infrastructure.

The Fernwood Road Water Replacement project described in this article is a direct result of the asset management plan in place at WSSC Water. Under this plan, the condition assessment and problems with the waterline along Fernwood Road in Bethesda, MD, met the criteria for replacement.

With the project situated in a residential neighborhood involving a heavily trafficked State Highway nearby, and the replacement pipe alignment crossing

a wetland and through public Rights-of-Way it was important that the construction method selected had the least environmental and social impacts. Trenchless technology methods offer significant advantages in environmentally sensitive or congested urban areas because installations of infrastructure can occur without the need for extensive and disruptive excavations. Construction can be conducted with minimal impacts to the surface environment, wetlands, and disturbance to adjacent residents and businesses. For these reasons, use of the trenchless jacking and boring technique was selected for this project.

WSSC Water Headquarters in Laurel MD. Service area spans over 1,000 miles with 1.9 million residents served throughout Prince George's and Mongomery counties

PROJECT DESIGN

The Fernwood Road Water Replacement project involved installation of the following components using open cut excavations and trenchless technology methods:

- 5,649 feet of 16-inch diameter water main
- 740 feet of 12-inch and smaller water mains
- installation of 30-inch casings pipe
- fire hydrants, blow off valve, water services restoration
- re-paving of all disturbed areas

The construction engineer's initial estimate for the project was approximately $3,000,000.

Test pits were necessary to identify the locations of any other utilities ahead of time to avoid any damage or conflicts encountered during construction. Through this process, a major PEPCO duct bank was identified which could not be impacted, and the thermal sand used as special supporting fill could not be disturbed.

Extensive permitting was required to allow the project to proceed which involved a great deal of coordination and communication between state and local county agencies

A corrosion survey was also performed before construction began. This was necessary to provide the information needed to ensure proper protection of the new pipes being installed. The corrosion survey found no stray current sources in the project area. Soil testing was performed for resistivity, pH, redox potential and chloride concentration. The laboratory tests indicated "appreciable" soil corrosivity. The soil testing results recommended that the new piping be field coated on each side of the connection points to existing pipes and be poly wrapped per WSSC Water specifications.

GEOTECHNICAL REPORT

As part of the design effort for the project, a geotechnical investigation was conducted along the 16-inch water main portion of the project in order to determine the stratigraphy and engineering characteristics of the soils at the project site. The geotechnical report provided the findings from this investigation and included recommendations for the design and construction of the 16-inch water main regarding excavations, thrust blocks, pipe subgrades, groundwater control, backfill, and pavement repairs. Sample of the geotechnical findings provided by the report are shown in Table 1 below:

TABLE 1: Summary of Water Level and Cave-in Depth Observations

Boring No.	Est. Ground Surface Elev. (ft)	Measurements Water Level Depth (ft)	At Water Level Elevation (ft)	Boring Cave-in Depth (ft)	Completion Cave-in Elevation (ft)
SB-1B	221.0	13.0	208.0	16.0	205.0
SB-2	221.0	13.0	208.0	15.0	206.0
SB-3	246.0	*Dry	*Dry	3.3	242.7
SB-4	273.0	*Dry	*Dry	3.0	270.0
SB-5	287.0	*Dry	*Dry	4.0	283.0
SB-6	299.0	*Dry	*Dry	5.0	294.0
SB-7	352.0	*Dry	*Dry	6.0	346.0

(*A water level of "Dry" indicates that the borehole was dry at the cave-in depth.)

GEOTECHNICAL RECOMMENDATIONS

The new replacement water main consisted of 16-inch diameter ductile iron pipe (DIP). It was installed with a combination of open cut excavation and within a 30- inch steel casing using boring and jacking techniques between SB-1B and SB-2 (NW of the intersection of Howell Road and Bradly Boulevard) where the pipe alignment crossed under existing culverts.

Using the data from the soil borings in the geotechnical report lateral earth pressures were calculated for the design of the excavation support systems and thrust blocks. Soft loose soils were encountered in excavations for the thrust blocks which were excavated and replaced with crushed stone to ensure that trust blocks were founded against firm soil.

The contractor followed the requirements of the latest edition of the WSSC Water Standard Specifications Standard Section 02445 – Boring and Jacking for the installation of the pipes. Soil types, position of the groundwater table, and proximity of existing utilities were all considered when constructing the earth support system for the boring and jacking operations. An extensive safely engineered shoring system was used for the jacking pit, due to this depth.

At this location the depth of the bottom of the 30-inch casing ranged from about 20 to 21 feet. Groundwater control was required during the boring and jacking operation as the groundwater level was 7 feet or more above the proposed steel casing invert at this location.

Where the alignment crossed under the existing culverts, the boring and jacking operation passed through Decomposed Rock, which included large cobble to boulder-sized fragments of rock. The subsurface information obtained from the geotechnical report indicated that the consistency of the materials was hard and very dense. The moist unit weight of these materials was estimated at 130 pcf with an effective friction angle of 34 degrees.

This variation in density of the Decomposed Rock and presence of large cobble to boulder-sized fragments of rock was anticipated to cause steering and

Heavily trafficked State Highway nearby

Project was in a residential neighborhood, adjacent wetlands

Fire hydrants were replaced

"WSSC WATER HAS ALWAYS BEEN ON THE FOREFRONT OF PLANNING, DESIGN, CONSTRUCTION AND MAINTENANCE OF WATER AND WASTEWATER SYSTEMS."

alignment problems during the boring and jacking operation, as the heading would tend to follow the path of least resistance, thus being displaced into weaker material. There was concern that these subsurface conditions, if encountered, would initially prevent advancement of the boring and jacking operations. Fortunately this did not occur, and the more specialized techniques contemplated in the design, such as drilling and blasting, or the use of non-explosive chemical demolition agents, did not have to be used.

SETTLEMENT MONITORING

Because the boring and jacking operation typically causes a loosening of the ground above the casing crown, resulting in settlement of the ground surface the Contract Documents specified that a settlement grid should be established to monitor the surface and utility settlement in the vicinity of the boring and jacking operation.

The settlement monitoring nearby the boring and jacking operation consisted of the following protocol:

1. Initial Readings:

a. Obtain initial elevation readings on surface settlement markers and utility settlement markers. Obtain at least three separate and complete sets of initial readings on each instrument until consistent results are obtained. Should an inconsistent initial reading on any instrument be obtained, reread the instrument until correct and repeatable initial readings are obtained.

2. Monitoring Frequency:

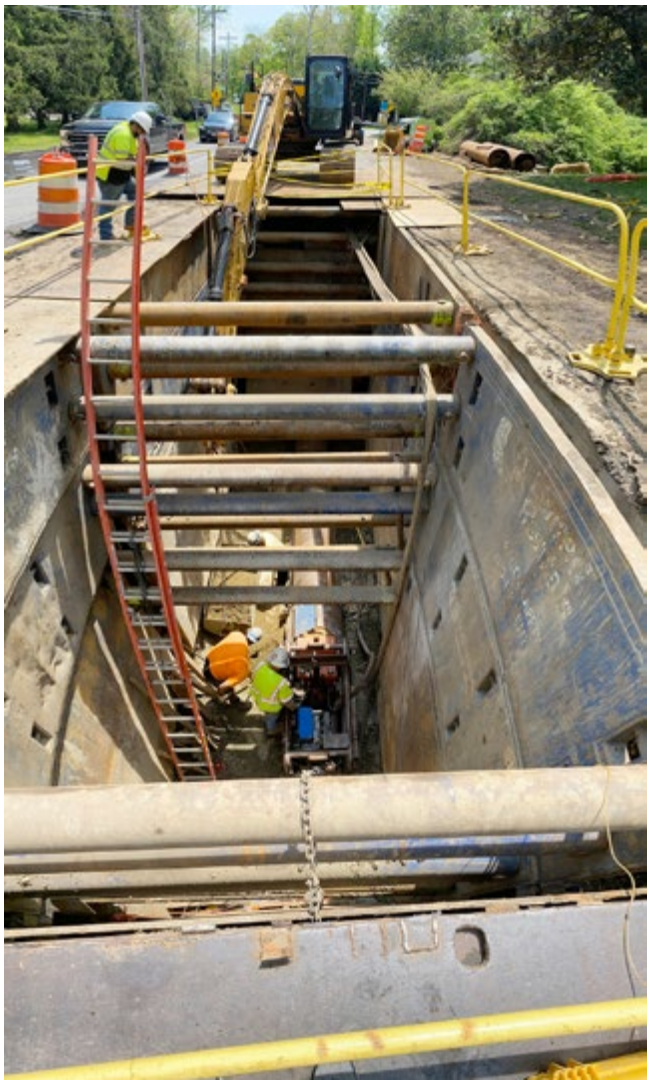
a. Monitor each marker in the settlement grid a minimum one time per week when excavation work is inactive and the instrument indicates stability.

b. Monitor each marker in the settlement grid within 50 feet of active excavation work a minimum of once daily.

3. Instrument Monitoring Threshold Limits:
threshold limits are the amounts of vertical movements which if exceeded require notifications and the implementation of remedial measures.

a. **Level 1 Threshold Limits** - Vertical movement of surface markers and utility markers of 0.04 feet from initial readings and subsequent readings.

b. **Level 2 Threshold Limits** – Vertical movement of surface markers and utility markers of 0.06 feet from initial readings and subsequent readings.



Safely engineered shoring was important considering the depth of the jacking pit

4. Exceeding threshold limits:

a. Notify the Engineer immediately when data indicates readings in excess of the Level 1 threshold limits. Double the frequency of monitoring and immediately report the results of the monitoring.

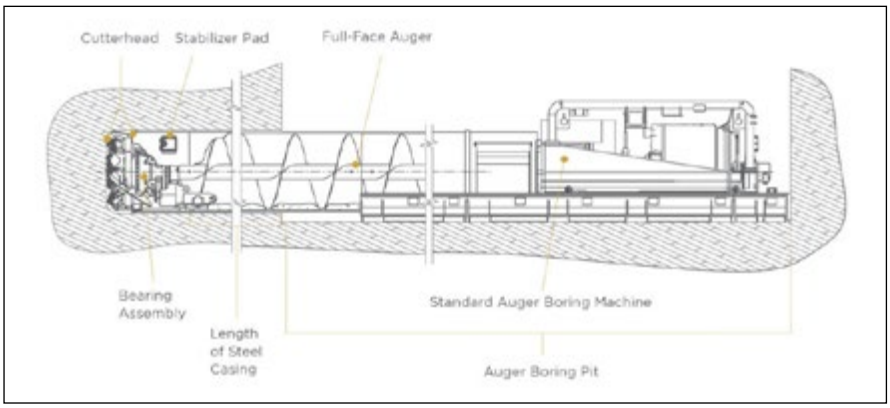
b. Notify the Engineer immediately when data indicates readings equal to or in excess of the Level 2 Threshold Limits. Stop excavation work and implement remedial measures to stop the movements and stabilize the soil and/or structures effected by the movements. Monitor the settlement grid within 100 feet of the marker exceeding Level 2 Threshold Limits continuously until the excavation and/or surface features have stabilized.

CAREFUL PLANNING PRODUCES SUCCESSFUL RESULTS

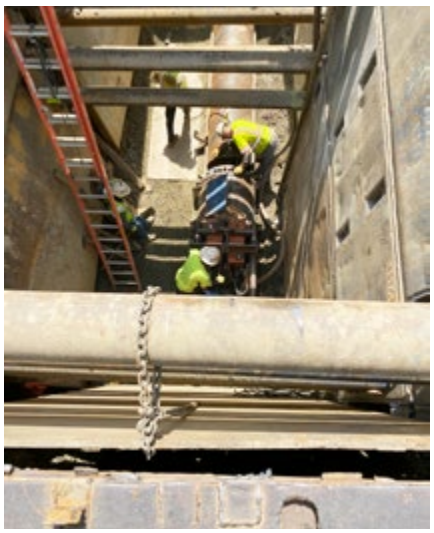
Although a replacement project like this seems simple and straightforward, there were many complicated and time consuming details involved in the Fernwood Road Water Main Replacement project. Proper planning and careful attention to the specific details allowed this project to be completed successfully. Ultimately thorough communication and a solid team concept resulted in an extremely successful project. Public interaction was extremely critical in dealing with the residents and the proper movement of the traffic during construction. Adherence to the traffic control plans in the MDOT permits provided a safe work environment for the public and the construction crews. Safety was a major focus as all construction was close to the traffic and there was a small work area for the construction site. The use of the trenchless method of jack and bore provided an environmentally sensitive method for crossing under the culverts. This saved a great deal of time and a reduction in the likelihood of damage to the culverts.

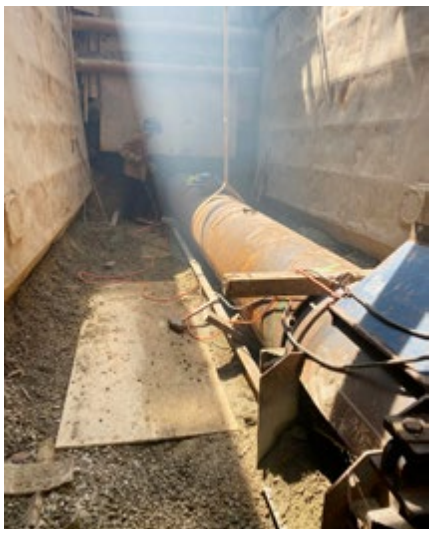
Jack and bore provided an environmentally sensitive method for crossing under the culverts

"SAFETY WAS A MAJOR FOCUS AS ALL CONSTRUCTION WAS CLOSE TO THE TRAFFIC AND THERE WAS A SMALL WORK AREA."



Auger boring is suitable for a small work area


Groundwater control was required during the boring and jacking operation


WSSC Water has a long distinguished history of using cutting-edge trenchless technologies

ABOUT THE AUTHORS:

Richard Thomasson. P.E. *has more than 54 years of experience working in the water and wastewater fields. He has been closely involved with trenchless technology for nearly his entire career. While at the Washington Suburban Sanitary Commission, he directed many uses of new trenchless technologies, retiring after 31 years as the Director of Construction. He is currently a Senior Project Manager with EBA Engineering, Inc.*

Khalid Qadwai, P.E., PMP *is an Associate at the EBA Engineering, Inc. He joined EBA Engineering, Inc. in 2008 and has over 25 years of experience in water main design and rehabilitation. He is currently managing several water and sewer projects in the Washington metropolitan area.*

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ACHIEVING DRAMATIC IMPROVEMENTS IN FLOW RATES

Upper Montgomery Joint Authority(UMJA) Credits Successful I&I Reduction Program

By: Jennifer Leister, Upper Montgomery Joint Authority

In 2010, the Upper Montgomery Joint Authority (UMJA) faced a major challenge: the Department of Environmental Protection (PADEP)'s determination that the wastewater treatment plant was hydraulically overloaded due to excessive Inflow and Infiltration (I&I).

Fast forward to today: thanks to many successful I&I reduction projects as well as considerable efforts by UMJA, dramatic improvements in flow rates during wet weather events have been achieved.

BACKGROUND

The Upper Montgomery Joint Authority is a regional sewer authority in Montgomery County, Pennsylvania, serving a population of approximately 8,300 in the boroughs of Red Hill, Pennsburg, East Greenville, and parts of Upper Hanover Township. The authority owns and operates a sanitary sewer collection system and a wastewater treatment plant (WWTP), which is permitted for an average daily flow of 2.0 million gallons per day (MGD). The plant's actual hydraulic design capacity is 2.77 MGD, but it often experiences peak flows exceeding 15 MGD during heavy wet weather events.

Since being established as hydraulically overloaded, UMJA has made significant strides in infrastructure improvements at both the treatment plant and throughout the collection system. This includes substantial upgrades to the wastewater treatment plant, culminating in a $28 million upgrade in 2022, costing over $10/gallon to construct. Throughout these efforts, the UMJA Board has been very supportive and proactive in ensuring the necessary improvements are realized.

FLOW METERING AND COLLECTION INSPECTIONS (2013)

In 2013, UMJA launched a comprehensive flow metering program and conducted inspections of manholes, mains, and laterals. Based on these inspections, it was determined that a more aggressive program would be necessary to prevent overflows, free up capacity, and accommodate new development.

REHABILITATION MATERIALS, METHODS AND ACHIEVEMENTS

Of top priority was the use of proper rehabilitation materials and methods, ensuring long-term success and value add to the system. Utilizing cured-in-place pipeliners (CIPP) manufactured by LMK, as well as applying polyurea coating manufactured by OBIC, UMJA was able to rehabilitate mains and laterals within the collection system.

<FIG 1.png> (use left hand side of composite) Figure 1. OBIC Composite Polyurea Lining System

The Mr. Manhole system was also utilized, allowing crews to quickly and easily cut out and replace manhole frames.

"THE NUMBER OF SSOS OCCURRING WAS REDUCED SIGNIFICANTLY."

Figure 1. OBIC Composite Polyurea Lining System

Figure 2. Mr. Manhole Installation System

PROGRESS AND ACHIEVEMENTS

To date, UMJA has successfully continued the rehabilitation, tackling necessary infrastructure improvements. Some achievements include:

- More than 85,000 linear feet (LF) or main line and laterals have been televised
- At least 82,000 LF of CIPP lining has been installed in 8-inch and 10-inch diameter sewer mains. (12,200 LF in 2023 alone)
- 714 laterals have been CIPP lined
- 123 manholes have been lined
- Nearly 40 manholes have been raised to grade in low-lying areas
- At least 500 properties have been inspected for illegal connections

The majority of these improvements were completed by Performance Pipelining, Inc. (PPI), with PPI completing about 90 percent of the actual rehabilitation work.

Figure3. Main sewer CIPP lining

Figure 4. Steam curing CIPP

Figure 5. CIPP Liner Installation

Figure 6. CIPP Lining System

IMPACT OF THE I&I IMPROVEMENTS

The primary goal of the UMJA I&I abatement program was to reduce, if not eliminate, bypass events at the wastewater treatment plant. As well as, eliminate sanitary sewer overflows (SSOs) occurring in the collection system.

Since 2018, UMJA has invested over $8.41 Million on the collection system in order to resolve wet weather I&I and to make its treatment plant more efficient and operationally effective. During 2018, there were 15 SSOs that occurred in the collection system. However, following the extensive I&I reduction program, the number of SSOs occurring was reduced significantly – with only one event in 2023.

Additionally, as a direct result of the substantial I&I abatement efforts since 2018, the average daily hydraulic loading to the treatment plant has decreased significantly from 1.93 MGD in 2018, to 1.08 MGD in 2023.

When interpreting the data, it is relevant to note that 2018 was a very wet year, and the elevated flows (1.93 MGD) were somewhat unique. Nonetheless, in 2019, the average daily flow decreased to 1.66 MGD, and then further decreased to 1.27 MGD in 2020 – all of these can be attributed to the I&I reduction efforts.

Year	Average Daily Flow to WWTP	Percent Reduction From Previous Year	Percent Reduction From 2018
2018	1.93 MGD		
2019	1.66 MGD	14.0%	14.0%
2020	1.27 MGD	23.5%	34.2%
2021	1.16 MGD	8.7%	39.9%
2022	1.19 MGD	-2.6%	38.3%
2023	1.08 MGD	9.2%	44.0%

The I&I reduction efforts are also evidenced by the reduction of average daily flow from 850,000 GPD (between 2018-2023) and nearly 580,000 GPD (between 2019-2023). Overall, this is a 44 percent reduction in average daily flows over the past five years.

Additionally, the three-month maximum flow in 2023 was 1.44 MGD, in comparison to 2.108 MGD in 2019, a 32 percent decrease. Furthermore, the maximum monthly flow decreased significantly – from 2.80 MGD (2018) to 1.97 MGD (2023). Totaling, an almost 30 percent reduction in maximum monthly flow in the past five years – thanks to I&I abatement efforts by UMJA.

ADDITIONAL MEASURES: SMOKE TESTING (2020)

In order to identify illicit connections within the collection system that may be contributing to the increased flows, UMJA began smoke testing within the collection system in 2020. Initial focus was on areas of the collection system that experienced sanitary sewer back-ups or SSO's – primarily areas of the Boroughs of East Greenville and Pennsburg.

Throughout September and October 2020, UMJA conducted smoke testing in approximately 22,600 LF of sewer main line, identifying 37 potential issues and/or illicit connections on private property.

Continuing the efforts, in 2022, approximately 24,752 LF (or 4.70 miles) of smoke testing was conducted throughout the area.

Smoke testing has thus far resulted in identifying cracked and/or leaking laterals, cracked or missing caps, possible connections of gutters/downspouts, storm drains, and floor drains to the sanitary system, and the possible presence of previously abandoned laterals.

Following smoke testing work, UMJA conducted additional, more thorough, investigations including lateral inspections and dye-testing for storm drains implicated. As issues have been identified, UMJA has notified property owners and has coordinated requirements to resolve the noted issues.

UMJA plans to continue smoke testing as needed, or as timing and funds allow.

Figure 7. Smoke testing in progress

CONTINUED MANAGEMENT OF REHABILITATION EFFORTS AND IMPROVEMENTS

UMJA previously worked with a consultant to develop a comprehensive Geographic Information System (GIS) database of its collection system, allowing for accurate monitoring of the rehabilitation work.

In April 2022, UMJA installed flow meters throughout the collection system. Since then, the authority has closely monitored flows throughout the years to determine baseline infiltration and identify problem areas experiencing significant inflow during wet weather events.

When improvement projects are completed, these flow meters are deployed to their previous locations in order to determine if the I&I efforts produced a successful result in terms of flow reduction.

Recently, UMJA worked with Spotts, Stevens and McCoy (SSM) to evaluate the quantities of I&I in each of the sewer sheds by calculating I&I in gallons per day per parcel. The data was normalized to remove the parcels with the highest water usage based on commercial, industrial and institutional usages. The I&I was calculated for each of the basins based on extensive flow metering data and the parcel counts for each sewer shed in order to give each basin a rating in terms of its I&I contributions.

These tools are continued resources that assist UMJA with identifying areas of high concern, and scheduling upcoming work based on priority.

OVERALL SUCCESS

Due to the extensive I&I reduction efforts by UMJA, the treatment plant was able to eliminate its wet weather bypassing operations, and treat all wastewater influent to the wastewater treatment plant.

The result of this program is that overflows within the collection system – both from an intensity and volume standpoint – have been greatly reduced. The I&I reduction efforts may have saved UMJA

"BASED ON THE INSPECTIONS, IT WAS DETERMINED THAT A MORE AGGRESSIVE PROGRAM WOULD BE NECESSARY."

millions in additional construction costs, as well as the treatment costs associated with treating the additional 850,000 GPD of wastewater. The rehabilitation work has essentially paid for itself and will continue to do so, by reducing pumping, treatment, chemical, and energy costs in addition to allowing for future development for many years to come.

Figure 9. The author with the team at UMJA – proud of their accomplishments!

ABOUT THE AUTHOR:

***Jennifer Leister** is Executive Director of the Upper Montgomery Joint Authority (UMJA). Jennifer joined UMJA in 2012, initially in the role of Laboratory Technician, and then stepping into the role of Assistant Superintendent. In 2018, Jennifer became the Executive Director as the Authority was beginning construction of a $28 million treatment plant upgrade. She jumped into leadership, navigating the large construction project as well as management of 10 operators and administrative staff. As Executive Director, Jennifer has prioritized providing high quality wastewater treatment, while empowering her staff and engaging positively with the community.*

Main FM	Tributary FM	Count of FLOWMETER	Baseline Infiltration (gpm)	Baseline Infiltration (gpd)	Baseline Infiltration per Parcel (gpd/parcel)	Average Daily Flow (ADF), gpm	Average Daily Flow (ADF), gpd	ADF per Parcel (gpd/parcel)	Highest Flow (gpm)	Highest Flow (gpd)	Inflow (gpm)	Inflow (gpd)	Inflow per Parcel (gpd/parcel)	Highest Cons. Cust. (gpd)	No. Customers	Remaining Parcels	Average Daily Flow (ADF), gpd	ADF per Parcel (gpd/parcel)	Inflow (gpd)	Inflow per Parcel (gpd/parcel)
														Data from Tab 4		Flows Minus Highest Users Customers				
G19		41	0	0	0	5	7,200	176	20	28,800	15	21,600	527	0	0	41	7,200	176	21,600	527
G301		89	5	7,200	81	30	28,800	324	450	648,000	430	619,200	6,957	1,444	1	87	27,356	314	620,644	7,134
G305		62	0	0	0	1	720	12	11	15,840	11	15,120	244	0	0	62	720	12	15,120	244
G401		95	0	0	0	6	8,640	91	75	108,000	69	99,360	1,046	2,233	1	94	6,407	68	101,593	1,081
G50		907	25	36,000	40	200	288,000	318	4,300	6,192,000	4,100	5,904,000	6,509	11,433	5	902	274,567	304	5,917,433	6,545
	G50	415												11,300	4					
	G552	17	0	0	0	1	720	42	6	8,640	6	7,920	466	0	0	17	720	42	7,920	466
	G29	54	0	0	0	10	14,400	267	360	518,400	350	504,000	9,333	0	0	54	14,400	267	504,000	9,333
	G401	95	0	0	0	6	8,640	91	75	108,000	69	99,360	1,046	2,233	1	94	6,407	68	101,593	1,081
	G100	326	50	72,000	221	150	216,000	663	640	921,600	490	705,600	2,164	0	0	326	216,000	663	705,600	2,164
G552		17	0	0	0	1	720	42	6	8,640	6	7,920	466	0	0	17	720	42	7,920	466

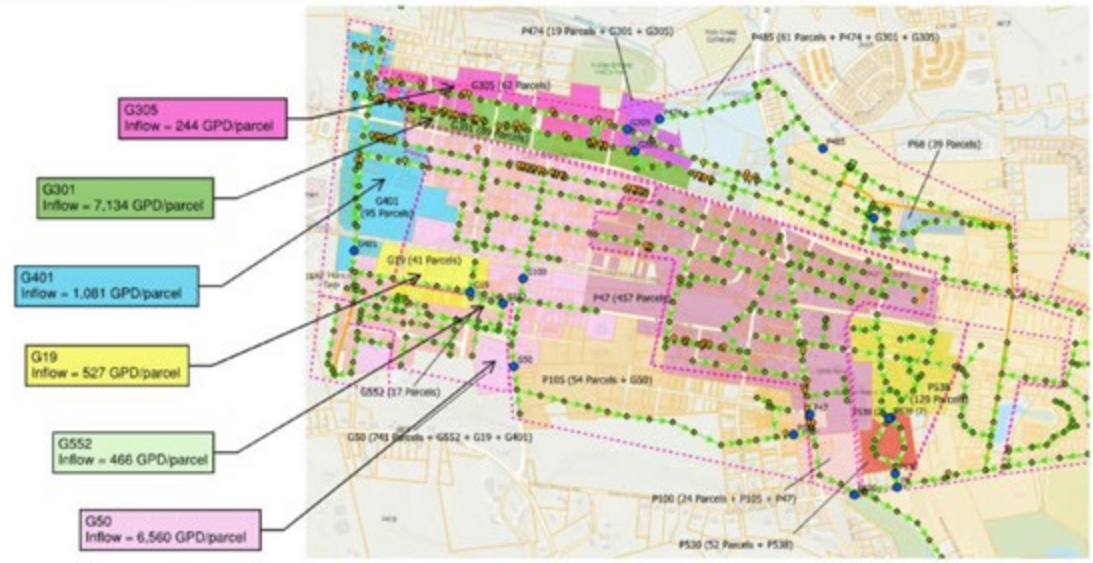

Figure 8: Flow Data per Parcel for East Greenville Borough, including Tributary Flows

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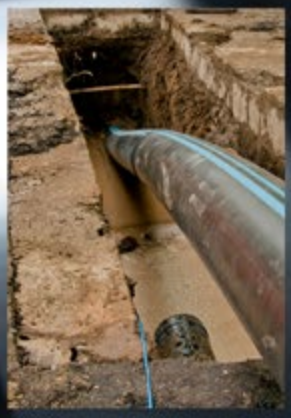

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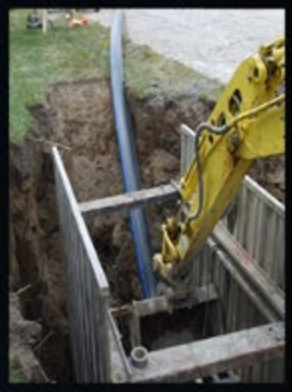

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UV CIPP RENEWS STORMWATER DRAIN AFTER OTHERS FAIL

PROGRESSIVE PIPELINE MANAGEMENT
THE INFRASTRUCTURE RENEWAL SPECIALISTS

By: Thomas Nestoras, Progressive Pipeline Management

After other methods failed, UV Cured-In-Place-Pipe (CIPP) proved an ideal solution to rehabilitate a leaking 36-inch storm drain under a heavily trafficked road at a manufacturing facility in New Jersey.

Project: 36-inch Stormwater Drain Renewal
Location: Middlesex County, New Jersey
Length: 70 feet
Client: Industrial Manufacturer
Contractor: Progressive Pipeline Management (PPM)
Method: UV Cured-in-Place-Pipe

In Middlesex County, New Jersey, a manufacturer had widened a roadway on its facility grounds to accommodate increased loading and traffic brought on by a plant expansion. Although the 36-inch storm drainpipe running under the roadway had been built with reinforced concrete pipe (RCP), the expansion material used was corrugated metal (CM). Over time, the joints between the CM and RCP weakened. When a major hurricane in 2022 created a stormwater surge of 15 feet, the joint seals and the pipe connections to the culvert at the inverts failed. Bottom line, the storm caused irreversible damage at the connections and at the culvert. Unwanted infiltration and sediment were leaking into and out of the end of the 36-inch pipe into the storm water system.

To protect the groundwater from unwanted sediment, the property owner needed to strengthen the 36-inch stormwater drain and remediate the unwanted infiltration that was straining the township's stormwater system. Their aim was to avoid tearing up the road to replace the pipe. Replacing the 70-foot length of pipe would have required a costly excavation and caused weeks of detours in and out of the facility. Delays would have impacted production at the plant.

Interestingly, the leaking stormwater drainpipe had been lined a few years prior. A 1-inch geopolymer liner had been installed in the storm drain by a different contractor. The thickness of the liner reduced the diameter of the 36-inch drainpipe and restricted flow-through capacity. Over time, and with changes in temperature and continuous heavy load conditions, the material started to weaken, contract, and shift, creating gaps between the host pipe and the liner. After the storm surge of 2022, chunks of the geopolymer liner were found floating in the culvert and the groundwater. It was determined that the previously lined infiltration points were leaking contaminants again.

Progressive Pipeline Management (PPM) was brought in to inspect the 70 feet of the 36-inch stormwater pipe and then identify an efficient and permanent way to strengthen the pipe to prevent further leakage without replacing the pipe. Any solution had to withstand the heavy weight loads and stop the previously lined stormwater pipe from leaking.

FIBERGLASS: THE CADILLAC OF MATERIAL FOR STRUCTURAL RENEWAL

PPM proposed a reinforced fiberglass, structurally sound, cured-in-place-pipe (CIPP) liner to be installed through the entire length of the 70-foot stormwater line. Reinforced fiberglass was proven to be strong enough to withstand the heavy traffic loads on the road because of its strength compared to other industry liner materials, without significant loss of flow or throughput. It is thinner (5.1mm) than other comparable geopolymer liners and is not susceptible to creeping over time from changes in temperature. The CIPP process uses a fiberglass liner mixed with a custom resin that is applied to the liner and cured with ultraviolet (UV) lights. Once cured, the fiberglass liner and host pipe would maintain shape and strength against the host pipe without any gaps. The cured liner has been tested for industry standards of 50 years of service life within the host pipe of reinforced concrete and corrugated metal.

DESIGN & CALCULATIONS

Before the project was awarded, testing submittals and design calculations were required to confirm the CIPP could withstand the heavy loads it would be subjected to as well as flood risk. Depth of the pipe, HS-20 loading and DOT Highway and Safety Vehicular Loading were addressed by the design. Water levels, various types of storm and rain events, and propensity to flooding also

> *"IN MOST INSTALLATIONS CIPP DOES NOT REQUIRE EXCAVATIONS."*

were considered. Engineering calculations were done to determine the thickness requirement for the UV CIPP material used. The exact material to be used for the project was tested by an independent lab to confirm that it complied with the design specs.

Throughout the project design and execution, PPM worked with multiple stakeholders, decision makers and inspectors. Middlesex County officials had to approve the recommended solutions and submittals along with the manufacturing client.

Once approved, the UV CIPP project took just two days to execute. On Day One, PPM mobilized and prepared the pipeline. On Day Two, PPM prepped, placed, and cured the liner. As is true in most installations, CIPP does not require excavations. Only a small working area was needed for the open-ended culvert rehabilitation.

DAY ONE: CLEAN & PREPARE THE PIPE

The first step was to flush the line clean using a water propelled JetVac system. A powerful pressure nozzle cleared the pipe completely and pulled out any debris. Then, PPM's crew conducted a CCTV inspection of the cleaned stormwater drain. There was significant evidence of structural infiltration points; the corrugated metal pipe had corroded in many locations. In some areas, portions of the liner and host pipe were missing. The deteriorated corrugated metal voids were filled with a hydrophilic seal to reduce any annular space and future inflow & infiltration (I&I) leaks. Confined space entry procedures were followed when the crew entered the 36-inch pipe to fill the rotted voids.

The CCTV inspection confirmed the pipe was clear and ready for lining.

The UV CIPP liner was dragged into place inside the drainpipe using rollers and a winch cable

DAY TWO: LINING & CURING

After inspecting the previous day's void repairs and confirming they were satisfactory, the PPM crew installed a protective layer of sliding foil plastic inside the bottom of the pipe to prevent the CIPP liner from being damaged or ripped by the rotted corrugated metal during installation.

The heavy liner, already prepared for curing, had to be moved into place inside the pipe. A system of rollers with a winch cable was attached to the liner. Using the winch and cable, PPM pulled the liner into place through the 70-foot length of pipe.

The next step was to create a seal at the open ends of the line, so that compressed air could be used to inflate the UV CIPP liner. End gate fittings were attached at

The end gate (blue) had a port on the side for pressurizing with compressed air to inflate the liner. The cable attached was used to pull the liner into place

"REINFORCED FIBERGLASS WAS PROVEN TO BE STRONG ENOUGH TO WITHSTAND THE HEAVY TRAFFIC LOADS."

the two open ends of the uncured RFG material, creating a temporary seal at both endpoints. Using compressed air, the liner was inflated and pressed up against the host pipe's inner surface to create a watertight seal. This held the liner in place for curing.

Using a sluice at the end gate, the light chain with UV light bulbs was inserted inside the 36-inch liner. As each 1000-Watt UV light bulb ignited, the chemical reaction was initiated that transformed the soft, uncured fiberglass material that was coated with custom resin into a hard, bonded liner. The light chain specially designed for large diameter pipes acted like a series of train cars. Every 10 seconds one bulb was lit, until all 8 bulbs were ignited. Approximately 2.5 feet of the liner was cured per minute. The light chain was pulled through the 70 feet of the pipe at a mechanically regulated speed. Computer readings were recorded every 10 seconds and the light chain pulled back to where it was originally inserted. Curing was completed in less than an hour.

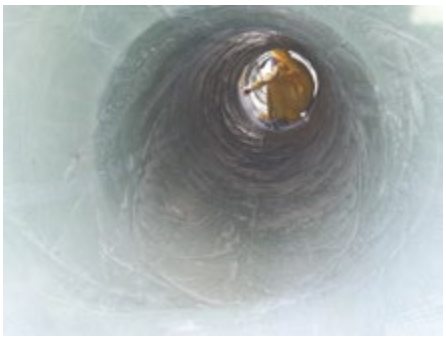
A significant advantage of UV fiberglass CIPP is that the process for curing is quick and simply done using compressed air. Felt and other liners use a styrene-based epoxy that is cured by introducing water or steam into the pipe, which then must be flushed. Water that encounters the liner, chemicals, and its surrounding fittings would have had to be treated and properly disposed. This would have added time, risk, and costs to the project.

After curing, the light chain was removed and the ends of the excess pieces of liner were cut off. A final step sealed the ends.

END SEALS TO FILL THE ANNULAR SPACE

Due to the deteriorated corrugated metal, the client was concerned about annular space forming at the ends over time. A hydrophilic ring-shaped gasket was installed between the outside of the pipe liner and the inside of the pipe at each end. End seals and grout filled in the annular space at the corroded sag points to prevent future infiltration into the system between the liner and the host pipe.

The light chain was pushed and pulled in a timed sequence to cure the inflated liner to the host pipe



Using confined space entry, the final cured liner was entered to re-instate the center manhole lateral connection

A final CCTV inspection showed the internal structure of the new liner to be clean, smooth, and flush with the host pipe.

After the CIPP was installed and cured, the crew had to open a manhole inside a channel to reinstate a lateral that took on stormwater flow. The lateral flowed into the stormwater drain system. This was done in collaboration with the municipality, as the manhole was owned by the township. A right-angle grinder was used to cut out the material.

LARGE EQUIPMENT & DIFFICULT TERRAIN

There were many challenges due to the location of the 36-inch pipe and culvert. The sloped sides of the culvert were lined with a special material that had sealers underneath it to prevent water from being absorbed into the ground. Due to the sloping terrain of the culvert and channel, there was no ready access for the necessary equipment at the exact location of the stormwater drain. The set-up and installation procedure had to be engineered to transport the liner and equipment down into the culvert with a steep grade on both sides. PPM's equipment was set up 25 feet away from the drain opening.

Before lining, the heavy liner had to be rolled into position at the opening of the drain without dragging or damaging it. A roller system was constructed and attached to a tail gate. Once the liner was situated at the opening, it was pulled

through the 36-inch drain by a winch.

Confined space procedures were carefully followed when crew members were inside the pipe and later in the manhole. OSHA and HAZWOPER training certifications were required by the client for all the site personnel. All client and company health & safety and large equipment operator requirements were met.

RESULTS

After curing and the ends were finished, a sample of the cured liner was submitted for testing by a 3rd party to ensure it met design specifications. A second sample of the liner was provided to the client and the municipality to test the thickness and integrity.

Post lining testing ensured that the thickness, material, and curing process were done to specifications without any faults. The UV CIPP technology selected was proven to be stronger and more sustainable that other liners. Additional testing and inspections confirmed to all parties that unwanted infiltration was not detected, and the new liner was structurally sound.

About Progressive Pipeline Management:

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

ABOUT THE AUTHOR:

PPM PROGRESSIVE PIPELINE MANAGEMENT
THE INFRASTRUCTURE RENEWAL SPECIALISTS

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

DELIVERING ALTERNATE SOLUTIONS

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

By: Richard Revolinsky, Geonex Inc, (GEO)

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

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

ALTERNATIVE TO AUGER BORING

In June 2023, Dunigan Brothers of Summit Twp, Michigan set out to install 140 feet of 24-inch steel casing for a 12-inch Waterline below a pair of high-speed Amtrak rail lines. Familiar with the area and observing the topography, Dunigan anticipated cobbles and wet conditions in the 14-foot deep bore. "When you look at the site, it looks like the railway is laid in an old creek bed. We knew it would be wet and sloppy but had a feeling we'd hit rock so we made sure we had a back-up plan" said Patrick Dunigan II, VP of Operations at Dunigan Brothers Inc.

During excavation of the jacking pit, Patrick's feelings were confirmed when they began pulling rounded cobbles up to 24 inches in diameter from the pit. Under the direction of the project owner, Dunigan proceeded with traditional auger boring but made it only about 13 feet before hitting the cobbles. "I reached out to GEONEX Inc. for rental pricing as a contingency plan before we even started digging. After reviewing the project details, they were certain they could be successful barring any steel obstructions. When we hit the cobbles, I confirmed pricing, presented a change to the owner, and with minimal

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

Aerial view of equipment set up to bore under the railway

delay, GEONEX Inc. was on-site with their technician and tooling to get this project back underway." explained Patrick. "We could only accommodate 10-foot casing lengths so it took a little while to make all those welds and we finished the bore in 4 days. I was impressed how well the equipment performed in the sloppy soft spots as well as through the cobbles."

ALTERNATIVE TO MICRO-TUNNELING

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

Remsco Project Manager George Gutierrez P.E. talks about the turn of events. "When we reviewed the additional information, we immediately conveyed our concerns to our client Yonkers Contracting Company. While waiting to discuss solutions with the Port Authority, we went through process of elimination for the other methods we perform; Auger Boring, HDD, Microtunneling, and pipe ramming. We've been interested in the GEONEX systems for Horizontal Down-Hole Hammer boring and began evaluating it further. A joint meeting

The face of the boring system used to pulverize the rock

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

between Remsco, GEONEX and the project owner led to a preliminary approval. Once the owner approved, GEONEX expedited production and delivery of their HZR1200 drill machine which is capable of up to 48-inch casing installations. We accepted delivery in May 2024."

Currently all 8 installations are complete. "We always want what is best for the project, and we were fortunate all involved let us employ an alternate method. Now that we have the GEONEX system, we've been looking at how it can improve success for other upcoming projects," said Gutierrez.

ALTERNATIVE TO PIPE RAMMING

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

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

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

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

After exhaustive planning, preparation, and cross-checking data, Atlantic Underground was asked to mobilized to the site by March 18. "Once the pit was excavated and trench boxes in place, the GEONEX Machine was set in the launch pit, air compressors connected, and the first

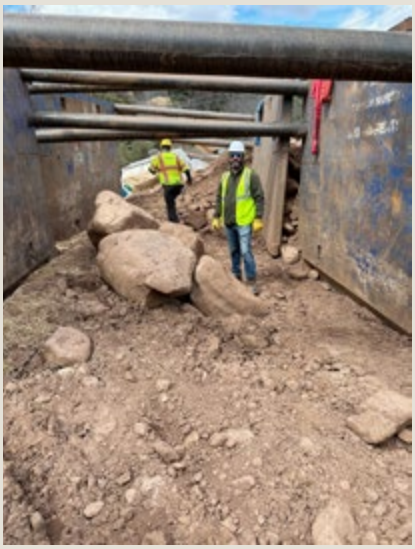
casing set to install. It took 5 days to complete the bore, with a couple of long nights to complete the 4 to 5 hours of welding per joint. 40-foot lengths of casing were installed at an average rate of 17 feet per hour, yielding 80 feet per day. Once the crossing was complete, the product pipe was slick-bored into place, said Kidd.

An Equitrans representative indicated there were over 350 bores on the project through the same type of ground. "Knowing what we know now about the Horizontal Down-Hole Hammer Boring method and GEONEX, we could have utilized this method on several challenging bores and saved months on the project."

ABOUT THE AUTHOR:

Richard Revolinsky *is the North American Operations Manager for Geonex Inc.*

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



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

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

NEW JERSEY AMERICAN WATER SOUTH WASHINGTON AVENUE BRIDGE CROSSING – PISCATAWAY, NJ

Rehabilitation of 12-inch Ductile Iron Water Main Using Flexible Fabric Reinforced Pipe (FFRP)

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

The affected 12-inch Ductile Iron potable water main is in Piscataway, New Jersey and spans 400 feet underneath the South Washington Avenue Bridge that crosses over New Market Pond and railroad tracks.

During the winter months of 2023, New Jersey American Water noticed water falling onto the pond near the south end of the bridge underside and thought to be resulting from melting snow.

However, the persisting falling water during the following spring and early summer months prompted a CCTV inspection which revealed a longitudinal crack in the water main measuring approximately 18 inches and located about 90 feet from the south end of the bridge, consequently resulting in taking the water main out of service in early July of 2023.

In April of 2024, New Jersey American Water teamed with J. Fletcher Creamer & Son, Inc. (Creamer) to rehabilitate the water main using the Primus® Line System as the best long-term solution for its unique design which provides strength and flexibility, to prevent future leaks and alleviate the constant stresses imposed on the water main caused by the bridge movement due to thermal expansion and contraction, while accommodating the maximum operating pressure independent of the host pipe.

In early June of 2024, Creamer coordinated with New Jersey American Water and Piscataway town officials to start

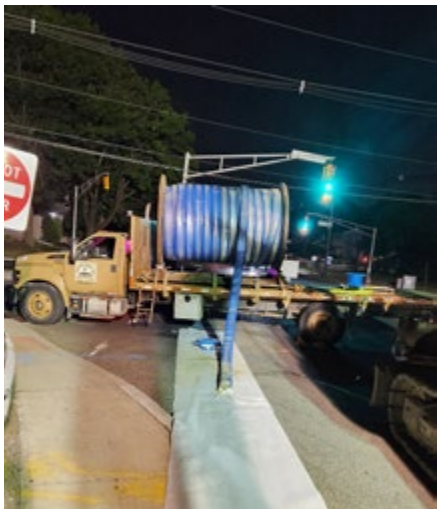
Liner inflation and pressure testing after installation

the work later in the month during night hours and by closing only the east lane on the bridge to minimize the traffic impact and inconveniences.

Starting on June 20, Creamer inspected and cleaned the water main, then an internal sleeve "Point Repair" measuring approximately three feet was installed to cover the longitudinal crack, followed by a second CCTV inspection to ensure successful point repair in preparation for the Primus® Line System installation the following night. Over the next four nights, Creamer successfully completed the rehabilitation project and all related work that included:

- Preparation of the host pipe ends.
- Liner insertion and installation of MEGAFLANGE Restrained Flange Adapters and Primus connectors' outer sleeves.
- Liner inflation and installation of Primus connectors.
- Installation of a temporary gate valve at the south end of the water main for pressure testing.
- Pressure testing of the Primus Line System installation.
- Removal of the temporary gate valve, integrating the rehabilitated section into the existing pipeline network, and site restoration.

Temporary gate valve installed for pressure testing



All work was done during night hours

Liner has a unique design providing strength and flexibility

Water was falling into a pond on the south side of the bridge

ABOUT THE AUTHOR:

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

COMPRESSION FIT HDPE PIPE – ANOTHER PROVEN PIPELINE REPLACEMENT METHOD

ASTM Standard Codifies Method for Gravity and Pressure Pipe for Both Water and Force Main Projects

By: Steve Cooper, SCA Communications

It wasn't a typical, normal sliplining job to replace a failing force main line in Sioux Falls SD. The original ductile iron pipe had deformed and had severe ovality. Hydrogen sulfide gas from the sewage flow made sulfuric acid, which collected at the top of the metal pipe and destroyed it. It was thought that pulling through a new pipe wouldn't be possible as it would hang up on the deformed inner wall of the old pipe. Reducing the diameter was not possible -- the diameter of the new pipe needed to be as close to the old one to maintain the rate of flow. The solution provided by Murphy Pipeline Contractors (Jacksonville, FL) was to use high-density polyethylene (HDPE) pipe and compress it to fit, knowing that the thermoplastic pipe would naturally reform itself.

"This is one of the inherent attributes of HDPE pipe," stated Camille George Rubeiz, P.E., F. ASCE, co-chair, HDPE Municipal Advisory Board, and senior director of engineering for the Plastics Pipe Institute's (PPI) Municipal & Industrial Division. "As well as being corrosion proof, it is flexible and ductile to go through a special die on the job site that makes it possible to be pulled inside a host pipe even when the pipe is not round. In this case, the ovality would have no affect during installation and the HDPE pipe would form a tight compression fit within the old ductile iron pipe." PPI is the major North American association representing the plastic pipe industry.

"THE THICKER HDPE PIPE PROVIDES STRUCTURAL INTEGRITY. IN THIS CASE, THE OVALITY WOULD HAVE NO AFFECT DURING INSTALLATION AND THE HDPE PIPE WOULD FORM A TIGHT COMPRESSION FIT WITHIN THE OLD DUCTILE IRON PIPE."

- HARVEY SVETLIK, P.E., HDPE PIPE INDUSTRY CONSULTANT

More than 8,700 feet of 36-inch ductile iron sewer force main was replaced with HDPE PE 4710, DR 21 pipe using Murphy's CompressionFit™ method, patent pending. The new pipe has a 100-psi operating and a 200-psi surge pressure rating, and is rated as a Class 6 solution in accordance with ASTM F3508. The sewer force main traversed under three city parks, along Covell Lake, through major commercial districts and under state highway SD 115. It was made and provided by WL Plastics (Fort Worth, TX), a member company of PPI.

Opened in 1985, the Sioux Falls system treats some 18 million gallons of wastewater daily. There are 900 miles of pipe in the system that conveys the wastewater to the city's treatment plant. There is a $215 million expansion plan underway that will increase the facility's capacity by 50 percent when completed in 2025.

"One of the questions we were asked was 'Can a 36-inch ductile iron sewer force main with severe ovality be replaced with HDPE pipe using CompressionFit?'", said HDPE pipe industry expert and consultant Harvey Svetlik, P.E. "The answer was an unequivocal 'yes'. Matter of fact, some other recent projects saw 54-inch diameter pipe with a three-inch wall thickness installed using the CompressionFit method. 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."

Svetlik has more than 40 years of experience in the plastic pipe industry,

specializing in polyethylene pipes and fittings. He is the inventor of the MJ Adapter, also known as the Harvey Adapter. An active member of PPI for 30 years, he is the author of numerous PPI technical notes, developer of ASTM/AWWA standards, and an inventor who holds 16 patents.

One of the most recent ASTM standards authored by Svetlik is ASTM F3508 for the installation of compressed fit shape memory polymer pipe. "ASTM F3508 codifies the specification of the material to use and deals with the shape memory characteristics of the material such as high-density polyethylene.

The new 36-inch HDPE pipe replaces the corroded ductile iron pipe in the Sioux Falls, SD sewer system (Photo credit: Murphy Pipeline)

"With the CompressionFit technology, instead of elongating a rubber band and letting it recover as is done with Swagelining, they basically do a lot more of radial compression. Instead of stretching it and thinning the wall, they downsize it and radially thicken the wall, such that when it goes into place it enlarges in diameter, and the radial wall thickness stands as it expands out, like rolling out pie dough."

The developer of CompressionFit is Murphy Pipeline Contractors (Jacksonville, FL). "Most cities cannot afford to relocate and replace a 16-inch diameter or larger pipeline within their vast utility network," said Todd Grafenauer, education director for Murphy. "The result of the CompressionFit HDPE pipe lining technology is that a new HDPE pipe will be 'compressive fit' inside the existing host pipe. This lining offers remarkable value over other construction methods such as an increased flow rate over sliplining, we do an average pull distance of 2,000 feet with more than a 90 percent reduction in excavation and

"IN THIS CASE, THE OVALITY WOULD HAVE NO AFFECT DURING INSTALLATION AND THE HDPE PIPE WOULD FORM A TIGHT COMPRESSION FIT WITHIN THE OLD DUCTILE IRON PIPE."

- CAMILLE GEORGE RUBEIZ, P.E., F. ASCE
CO-CHAIR, HDPE MUNICIPAL ADVISORY BOARD
SR. DIR. ENGINEERING, PPI MUNICIPAL & INDUSTRIAL DIVISION

there's no new easement documentation needed. Plus, we simply follow the existing pipe path using GIS maps." Murphy is a member company of the association's Municipal Advisory Board (MAB).

Governed by ASTM F3508, the CompressionFit HDPE pipe lining technology specifies an HDPE pipe with an outside diameter larger in size than the inside of the host pipe to be renewed. After the HDPE is butt fused to correspond to the pull distance, the pipe is pulled through a reduction die immediately before entering the host pipe. This reduces the HDPE pipe temporarily below the inside diameter of the host pipe allowing it to be inserted.

While the towing load keeps the HDPE under tension during the pull, the pipe remains in its reduced size. The HDPE remains fully elastic throughout the reduction and installation process. After installation, the pulling load is removed. The HDPE pipe expands until it is halted by the inside diameter of the host pipe. The effectively natural 'tight' or 'compression fit' is accepted as exchanging an existing failing pipeline with a composite pipe in its place.

Replacing the Sioux Falls corroded ductile iron pipe that had been eaten away by sulfuric acid caused by sewage, the HDPE pipe is inserted into the destroyed pipe using the CompressionFit method from Murphy Pipeline
(Photo credit: Murphy Pipeline)

"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

ABOUT PPI:

The Plastics Pipe Institute, Inc. (PPI) *is the major North American trade association representing the plastic pipe industry and is dedicated to promoting plastic as the materials of choice for pipe and conduit applications. PPI is the premier technical, engineering and industry knowledge resource publishing data for use in the development and design of plastic pipe and conduit systems.*
Additionally, PPI collaborates with industry organizations that set standards for manufacturing practices and installation methods.

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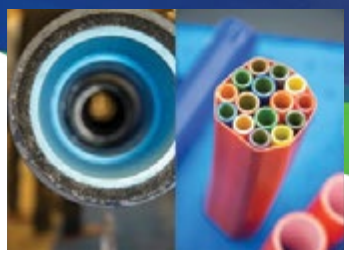

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AUGER BORING GOES AUTOMATIC

New Driveline Offers Efficiency, Precision and Reliability

By: Michael Byrne Manufacturing

Auger boring, a trenchless method for installing underground pipelines, revolutionized the construction industry from the 1950s well into the 1990s with minimal technological changes. Auger boring minimizes surface disruption and reduces environmental impact. While the auger boring method has changed regarding the size and scope of projects, the basic components of the drive line remain the same: a diesel engine to a manual transmission coupled to a planetary gearbox. Michael Byrne Manufacturing worked extensively with product development teams from Allison Transmission and John Deere to develop a new drive line integrating an Allison automatic transmission with John Deere power pack. The Byrne B-Series planetary gearbox continues to be the only gearbox designed specifically for the auger boring application.

The addition of the Allison transmission contributes efficiency, precision, and reliability. Allison Transmission is a global leader in propulsion solutions renowned for its robust and efficient transmissions designed for various heavy-duty applications. In the context of auger boring machines, Allison Transmission provides several key advantages:

1. **Power and Torque Management:** Auger boring machines require significant power and torque to drive the auger and overcome soil resistance. Allison transmissions are engineered to efficiently manage and deliver high torque at low speeds, which is essential for effective drilling through different soil conditions without stalling.
2. **Smooth Operation:** The seamless gear shifts and precise control of Allison transmissions contribute to smooth and uninterrupted drilling operations. This smooth operation is crucial for maintaining accuracy and preventing damage to the equipment or the pipeline being installed.
3. **Durability and Reliability:** Auger boring operations often occur in challenging environments, including rocky soils or areas with high groundwater levels. Allison transmissions are built to withstand these conditions, offering durability and reliability that ensure continuous operation with minimal downtime.
4. **Shift on the Fly:** Operators can operate the auger bore machine remotely and shift gears from the remote control. Ability to operate the machine and connect auger with your remote is safer and saves time. Gauges to monitor critical machine functions are available on the remote control.

The new Michael Byrne Mfg D72-1.5 Auger Bore Machine featuring the Allison Transmission drive train was recently in action at a Fredericksburg, VA job site for Ron Merzlak and his team at Rising Sun Inc. The bore had challenging conditions with a very tight area for the launch pit and crossed 455 feet under one of the busiest highways in the country, Interstate 95. The D72-1.5 has raised the bar for industry standards in torque, horsepower, and thrust.

Rising Sun Inc utilized an Akkerman 240A Guided Bore Machine that was powered by the direct connect power pack of Michael Byrne Mfg auger bore machine. The pilot bore was successfully completed in less than two days. Rising Sun Inc found the direct connect power pack to the GBM extremely valuable on this set up due to the tight confines of the launch pit.

The weld on reamer method of opening the pilot bore to the 42-inch casing diameter

was chosen by Rising Sun Inc after evaluating the soils on both sides of the bore and feedback from the pilot bore. A 24-inch reamer followed the pilot bore for 10 feet then connected to a 42-inch reamer, the final casing diameter. The bore was completed over the next 10 days as weather and lane closure restrictions resulted in some lost production days.

Ron Merzlak comments on this challenging bore; "We were training a new bore crew and chose to do it on this bore. The crew foreman had never done a bore, this was his first try at it. The MBM 72/1.5 with the Allison automatic transmission and the integrated Akkerman guided bore machine did an outstanding job on this project. Not only did the MBM machine bore without any hesitation for changing soil conditions but the fact that we were able to use the MBM integrated power pack for the Akkerman GBM system which saved us space in our very limited work area, not to mention the significant cost savings. Our new bore foreman had no difficulty in selecting the correct speed/power setting but only needed to select a general range of power, the Allison transmission with the torque converter selected and operated the system at the correct speed/power for the existing and changing soil conditions. All of this was performed using the remote control which was also part of the MBM bore machine system. The equipment that MBM provided along with the integrated Akkerman GBM we were able to meet our target point for the 452 foot bore, within 2 inches.

"We have always promoted a "Team Work" culture within our company and I must say that Jim Weist and his team demonstrated the same by providing Rising Sun Inc. with outstanding customer support on this project."

Auger boring with Allison Transmission represents a synergy of advanced engineering and practical application in the construction industry. By enhancing power delivery, ensuring smooth operation, and improving reliability, Allison Transmission will contribute significantly to the success of trenchless installation projects worldwide. As infrastructure demands grow and environmental awareness increases, the partnership between Michael Byrne Mfg auger bore machines and Allison Transmission will play a pivotal role in shaping the future of underground utility installations.

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~ Jim Murphy, UniversalPegasus International

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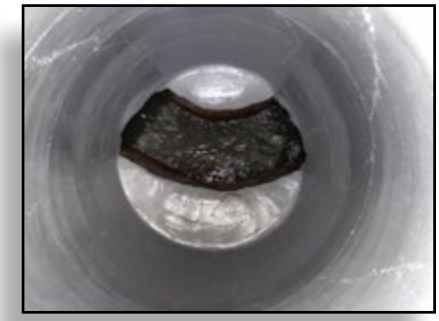

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