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MIDWEST JOURNAL OF

TRENCHLESS TECHNOLOGY 2017

OFFICIAL PUBLICATION OF THE MIDWEST SOCIETY FOR TRENCHLESS TECHNOLOGY

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NASTT MIDWEST CHAPTER

MESSAGE FROM THE PRESIDENT

ADVANCING THE SCIENCE AND PRACTICE OF TRENCHLESS TECHNOLOGY

Jeff Boschert, P.E., MSTT President

We are happy to be celebrating the fifth annual publication of the Midwest Journal of Trenchless Technology, because it is evidence of your continued involvement and support.

Our History and Region: MSTT, established in 1998, is the oldest of the eleven NASTT Regional Chapters. MSTT encompasses the 9-states of Illinois, Indiana, Iowa, Kentucky, Michigan, Minnesota, Missouri, Ohio and Wisconsin.

2017 Seminars: We conducted the first of our two 2017 seminars on July 27th in downtown Milwaukee, Wisconsin. We changed our 2-day format into a longer 1-day program with 14 presentations/speakers.

The new format was well-received increasing the participation to 48 attendees and 14 exhibitors. We had 6 in attendance from City of Milwaukee and a presentation by Kevin Lyons, P.E., Engineering Design Manager of the Milwaukee Metropolitan Sewerage District who gave an overview of their tunnel program. I want to thank one of our board members, Cathy Morley, P.E., for all of her time and energy. She played an important role in making this event such a great success!

The final 2017 seminar will be held in Cincinnati Ohio in December. For more information on the seminars see pages 19 and 24.

2018 No-Dig Show: The No-Dig Show represents an annual opportunity for education, professional development and industry engagement. I encourage you to attend the 2018 show, scheduled for March 25-29, 2018 at the Palm Springs Convention Center in Palm Springs, CA. For more information on the show, education & training programs and membership, see pages 3 and 9.

MSTT:

Advancing 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.

Municipal Scholarships Available. The No-Dig Show Municipal & Public Utility Scholarship Award Program was established in 2013 to provide education and training for approximately one hundred employees of North American municipalities, government agencies and utility owners who have limited or no training funds. The 2018 No-Dig Show scholarship applications are now being accepted, to apply see https://www.nastt.org/no-dig-show/municipal-scholarships/

NASTT Member Benefits: We encourage you to join the NASTT/MSTT and get involved with one of the committees. NASTT members receive complimentary access to over 2,000 technical papers presented and published at past No-Dig Shows, glossary of terms, plus access to the Trenchless Resource Center available on the ISTT website. http://www.istt.com/

MSTT is your organization, and this is your publication, so please support us and let us hear what you think. To provide feedback, suggest a location for future event, place an ad or submit an article in next year's journal; please contact Leonard, me, or one of our directors.

Sincerely,

Jeff Boschert, P.E.
President, MSTT
(314) 229-3789
jboschert@ncpi.org

MSTT SITE

NASTT MIDWEST CHAPTER ™

GREETINGS FROM THE MSTT EXECUTIVE DIRECTOR

Leonard E. Ingram, Sr., PWAM, Executive Director, MSTT

Welcome to the 5th annual publication of the Midwest Journal of Trenchless Technology 2017. This magazine highlights some of the many trenchless projects performed around the Midwest. It shows the successes and continued rapid growth in demand for trenchless projects and presents some of the new ideas, products and innovations coming from MSTT members. Please help me thank the journal advertisers, the MSTT Board of Directors and their companies for their support throughout the year and for their effort in making this Journal a reality. The MSTT Board of Directors is listed on page 11. The list of journal advertisers is on page 47.

Since its foundation as a NASTT Chapter in 1996, the MSTT purpose has been to "promote education and development of Trenchless Technology for public benefit". I became Executive Director of MSTT in 2003 and, since then, MSTT has presented a total of 32 seminars in 14 cities throughout the Chapter's nine state area. Through this active education outreach, MSTT has engaged over 1,700 classroom attendees. Public officials, engineers, utility company personnel, designers, manufacturers and contractors involved in underground construction have all benefitted from past MSTT Trenchless Technology, SSES and Buried Asset Management seminars.

For professionals who are responsible for design, installation and maintenance of underground infrastructure, certainty is paramount and risk has to be minimized. Up to date knowledge and information on our buried assets is vitally important. As trenchless technology leaders it is our mission to educate these professionals with case studies, experiences and demonstrations showing the environmental and social benefits of using trenchless methods. This is why MSTT and NASTT conduct seminars conferences and trade shows, and why continuing education is so important. I want to thank all our exhibitors, food sponsors, presenters, guest presenters and ASCE co-sponsor members for their support. MSTT could not have had such an active successful program without them.

Recently we began a new initiative and changed the seminar format from two days to a single day event. This will make a greater number of people able to take time away from their busy schedules to attend these valuable learning and networking sessions, while reducing travel and accommodation expenses. The next MSTT seminar is planned tentatively for December 13 or 14, 2017 in Cincinnati Ohio in the new single day format. Watch for further details on the MSTT website, www.mstt.org.

I am also the Executive Director of the Southeast and Mid Atlantic Chapters. Due to the recent State of Emergency caused by Hurricane Harvey, we had to postpone the SESTT seminar originally planned for September 20 in New Orleans. It will now be held Tuesday, October 24 at the New **Orleans Downtown Marriott at the Convention Center Hotel**. The response in New Orleans has always been great and ASCE New Orleans Branch is the co-sponsor. Registration will be allowed until the same day to attend and support the seminar. The next MASTT seminar in the Mid Atlantic region is being planned tentatively for either November 1 OR November 2 in Philadelphia. There is lots of great networking and learning planned for both events.

Thanks for the support!

Leonard E. Ingram Sr.

Leonard E. Ingram, Sr., PWAM
Executive Director, MSTT

MESSAGE FROM NASTT CHAIR

Frank Firsching, NASTT Chair

Hello Midwest Chapter Members! We are well into the year, I'm excited for the future during my term as Chair of the Board of Directors. NASTT's 2017 No-Dig Show and ISTT's 35th International No-Dig in Washington, D.C. were very successful on all accounts. The exhibit hall was a sell-out once again and we experienced excellent attendance. We were thrilled to host delegates from all over the globe!

NASTT exists because of the dedication and support of our volunteers and our 11 regional chapters. There are many Midwest Chapter Members that serve on our No-Dig Show Program Committee and volunteer their time and industry knowledge to peer-review the abstracts. We're looking forward to the upcoming Show in Palm Springs, California next March. These 2018 committee members from the Midwest chapter will ensure that the technical presentations are up to the standards we are known for: Amana Arayan, Rory Ball, Larry Kiest, Dan Koo, Bernie Krzys, Marc Lehmann, Robert Martin, John Milligan, Cathy Morley, Kevin Nagle, Jon Robison, Jason Schiro, Chris Schuler, Firat Sever and Mark Wade. The Midwest Chapter is also home to some of our Session Leaders. Session Leaders are Program Committee members that have the added responsibility of managing a session of the technical program and working with the authors and presenters to facilitate excellent presentations. I would like to extent a special thank you to the Chapter Members that will also serve as Session Leaders in 2018: Mark Lehmann, Robert Martin, Jon Robison, Jason Schiro, Firat Sever and Mark Wade.

In addition to the annual No-Dig Show, NASTT provides many trenchless training courses. We are focused on trenchless education and our highly-experienced instructors and presenters are dedicated to trenchless education, providing their expertise strictly on a volunteer basis. They donate personal time to travel around North America to provide high quality training on a host of trenchless technologies. I would like to thank Chapter Member and NASTT Board of Director, Larry Kiest, for serving as a presenter this year. Larry will present our upcoming webinar on November 7: NASTT's "Sealing a Collection System". Visit nastt.org/trainings/events to register for this free webinar! And thank you to Chapter Member, Ray Sterling, for teaching NASTT's Laterals Good Practices this year.

The North American Society for Trenchless Technology is a society for trenchless professionals. Our goal is to keep our finger on the pulse of our industry and provide beneficial initiatives. To do that, we need the involvement and feedback from our professional peers. If you are interested in more information, please visit our website at nastt.org/volunteer. There you can view our committees and learn more about these great ways to stay involved with the trenchless community and to have your voice heard. Please consider becoming a volunteer – we would love to have you get more involved.

NASTT has a very promising future because of our amazing volunteers. Thank you again for your continued support and dedication to NASTT and the trenchless technology industry.

Frank Firsching

Frank Firsching
NASTT Chair

MEMBERSHIP IN NASTT

Molly Margosian, NASTT Membership Coordinator

Are you getting the most out of your NASTT membership? Taking advantage of all NASTT has to offer? As your membership coordinator, I'm happy to guide you to resources so that you can fill your trenchless toolbox with up to date industry information, webinars, events, and so much more!

Did you know NASTT has the world's largest online trenchless library, filled with technical papers focusing on a wide variety of trenchless topics? All papers are all available for download to our members compliments of NASTT. We sell industry books too!

Does your organization exhibit at NASTT's No-Dig Show? Members can enjoy discounts on training and registration at our annual No-Dig Show.

Are you hiring or searching for a new position? Being a society member allows you to view and post career opportunities on the job board on nastt.org. This complimentary membership tool houses industry specific jobs and gives members the opportunity to search for potential jobs or post positions that are needing to be filled.

Are you interested in getting to know the next generation of trenchless champions? NASTT also offers membership to students! We are proud of our 18 NASTT Student Chapters with three that have just joined us in 2016. These student members are given the opportunity to attend the No-Dig show and learn about the trenchless world while networking with potential employers. Student chapters fulfill critical roles as not only volunteers at NASTT's No-Dig Show, but are the next generation of trenchless professionals.

Does your NASTT membership also make you a member of your Regional Chapter? Yes! Take the opportunity to work your local network and get involved with your Regional Chapter. Regional Chapters offer trainings and meetings, providing you the chance to expand your regional network. NASTT Regional Chapters encourage community outreach, and are a great tool to expand your knowledgebase and meet other individuals within your industry too!

But wait, there's so much more! NASTT offers a weekly eNewsletter, blog, archived webinars on trenchless topics, and committee and volunteer opportunities for you. Now that you know a little more about what NASTT Membership has to offer, it's time to join us! Visit nastt.org and get your membership started today!

Sincerely,

Molly Margosian

MSTT BOARD OF DIRECTORS

Jeff Boschert - *President*

Jeff Boschert, P.E. is the President of the National Clay Pipe Institute (NCPI), a technical resource for sewer system managers and designers of gravity sanitary sewer lines. He holds a BSCE from Missouri University of Science and Technology. Jeff joined NCPI from Missouri DOT in 2004 to serve as the leader of NCPI's trenchless initiatives and has become a leading expert in the field of pilot tube guided boring. In 2012 he took on the added responsibility of conducting research and educational outreach and is now actively working with municipalities as they rediscover the benefits of vitrified clay pipe. In addition to his work with MSTT, he represents the industry on multiple ASCE and ASTM committees. Jeff was one of the principal authors of the new ASCE/ UESI Manual of Practice (MOP No. 133) on Pilot Tube and Other Guided Boring Methods released in August 2017. As President of NCPI, Jeff recently completed a comprehensive update of the Vitrified Clay Pipe Engineering Manual and Installation/Inspection Handbook.

John Milligan - *Secretary*

John Milligan began his career with Vermeer in 1992 as a sales liaison with Latin America and eventually the Asia Pacific region, spending his first 15 years in various international and domestic sales-management positions. After leading the quality team within the trenchless and utility product segments at Vermeer, John took over as Business Manager for the Water & Sewer Segment, responsible for coordinating and executing the sales, engineering and manufacturing efforts related to the AXIS® guided boring system. He has been with the AXIS program since before its market launch in 2009. John was born and reared in São Paulo, Brazil, and earned a double major in Business Management and Business Marketing from Cedarville University in Ohio.

Chris Shuler - Vice *President*

Chris Schuler joined Miller Pipeline in 1984 as a laborer in Indianapolis, Indiana. Over the next few years he served the company in many capacities, assuming the role of equipment operator in 1989 and foreman the following year. In 1998 Chris stepped into the role of superintendent over Kansas City and Indianapolis until 2005 when he was promoted to project manager. In 2009 he assumed his current role as general manager of the Municipal Services Division where he oversees Miller Pipeline's water/wastewater trenchless rehabilitation operations.

Chris attended Indiana University from 1983-1986 focusing on Economics and Business. He graduated from the University of Missouri with a B.A. in Commercial Economics in 2001. Chris serves as the current Miller Pipeline Representative for the Indiana Chapter of NUCA. He is also a member of the NASTT Program Committee in addition to his role as Vice President of the MSTT Board of Directors.

Ryan Poertner - *Treasurer*

Ryan Poertner is a General Manager of Ace Pipe Cleaning, Inc. and lives in St. Louis, MO. Ryan manages the St. Louis office, as well as the Cured-In-Place-Pipe (CIPP) division within APC. Ryan is directly responsible for the safety and quality of work for these divisions. His main focus is on the growing market involving lateral rehabilitation. APC is a leader in the industry providing all types of investigation and rehabilitation solutions for municipalities in need. Ryan has spent his entire professional career working in the water and wastewater rehabilitation fields. Prior to the 6 years currently with APC Ryan spent 8 years working for Insituform Technologies, Inc. in roles as Engineer, Trainer, Estimator, and Project Manager. Ryan is an active member of NASTT, NASSCO, WEF and local engineering organizations.

MIDWEST SOCIETY FOR TRENCHLESS TECHNOLOGY
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UPCOMING TRENCHLESS EVENTS

October 16 - 17, 2017
13th Annual Western Regional No-Dig Conference and Exhibition
Embassy Suites by Hilton Walnut Creek
Walnut Creek, California
Information: www.westt.org/events.html

October 24, 2017
SESTT Trenchless Technology, SSES & Buried Asset Management Seminar
New Orleans Downtown Marriott
New Orleans, Louisiana
Information: Leonard Ingram, sestt@engconco.com

November 1 or 2, 2017
MASTT Trenchless Technology, SSES & Buried Asset Management Seminar
Philadelphia, Pennsylvania
(Date may change)
Information: Leonard Ingram, mastt@engconco.com

November 8 – 9, 2017
NASTT Rocky Mountain Conference – Trenchless Elevated 2017
Double Tree Westminster
Westminster, Colorado
Information: www.nastt.org/training/events

November 8 – 9, 2017
NASTT Northwest Regional Chapter Conference
Coast Plaza Hotel
Calgary, Alberta
Information: www.nastt-nw.com

November 15 - 16, 2017
NASTT-NE Northeast Municipal Outreach Forum 2017
The Otesaga Inn
Cooperstown, New York
Information: www.nastt-ne.org/seminar-2017.html

December 13 or 14, 2017
MSTT Trenchless Technology, SSES & Buried Asset Management Seminar
Cincinnati, Ohio
(Date may change)
Information: Leonard Ingram, mstt@engconco.com

March 25 - 29, 2018
NASTT 2018 No-Dig Show
Palm Springs Convention Center
Palm Springs, California
Information: www.nodigshow.com

March 17 - 21, 2019
NASTT 2019 No-Dig Show
Donald E. Stephens Convention Center
Rosemont, Illinois
Information: www.nodigshow.com

April 5 - 9, 2020
NASTT 2020 No-Dig Show
Colorado Convention Center
Denver, Colorado
Information: www.nodigshow.com

MSTT MEMBER AMANA ARAYAN, LMK TECHNOLOGIES, HONOURED WITH 2017 NASTT TRENT J. RALSTON AWARD

(l-r): Joe Lane, NASTT Secretary, Ralston Award winner Amana Arayan, Frank Firsching, NASTT Chair

Amana Arayan accepts 2017 NASTT Trent J. Ralston Award and offers thanks to her family, friends and trenchless colleagues

At the NASTT 2017 No-Dig Show in Washington DC, April 9 - 13, MSTT Chapter member Amana Arayan, Strategic Marketing Manager, LMK Technologies, was one of two recipients honored with the **2017 Trent Ralston Award for Young Trenchless Achievement**, along with Chris Larson of C&L Water Solutions. Since 2010, this prestigious annual award has recognized a young individual demonstrating excellence in the early stages of his or her career who is making a notable contribution to the trenchless technology industry. Volunteer service to NASTT, a NASTT Regional Chapter, or NASTT Student Chapter, is a key criterion for this award.

A graduate of DePaul University's College of Commerce in Chicago, IL, Amana Arayan is currently the Strategic Marketing Manager at LMK Technologies. She is instrumental in preparing educational presentations and seminars on the benefits of trenchless cured-in-place pipe (CIPP) rehabilitation solutions and best practices as well as developing new product promotional campaigns and advertisements. Recent advertisements developed by Amana have received the Water Environment Federation's Citation of Excellence in Advertising for both Best Presentation of Information (2016) and Best Design (2014). In addition, Amana has co-authored and presented several technical papers at NASTT's No-Dig Conferences in 2015 and 2016.

Amana is also a member of the NASTT Young Professionals Committee, NASTT No-Dig Show Program Committee and the NASSCO Rehab Zone Committee. Prior to joining LMK Technologies in 2011, Amana was the Education Specialist at the Trade Show Exhibitors Association.

> *"Amana has continued to excel here at LMK by taking charge of more and more responsibilities. Her continued drive has allowed her to advance and her passion for the trenchless industry has been like a beacon for all to see. I really appreciate seeing young people advance, and working with Amana has been a personal privilege for me."*
>
> - Larry Kiest, President, LMK Technologies

Congratulations Amana on a stellar career achievement!


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LARGE DIAMETER RESTRAINED JOINT PVC PIPE HELPS CHICAGO SUBURB GET RELIEF FROM SEWER BACKUPS

Creek Crossing Pipe on Roller Cradles to Achieve Desired Angle of Entry

By: Catherine Morley P.E., RJN Group Inc.

In 2010, the City of Elmhurst, Illinois experienced a 100-year rain event that resulted in many basement backups from the sanitary sewers. The low-lying southwest part of town was most affected, particularly the area designated Basin 24. This area is comprised of approximately 650 homes tributary to a lift station which pumps to an interceptor outside the basin. Hydraulic modeling indicated that this basin was susceptible to basement backups from less than a 1-year storm event.

A Comprehensive Flooding Plan study identified the primary cause of the sewer backups to be excessive inflow and infiltration (I/I), exacerbated by the limitations of the lift station and force main capacity. While an I/I reduction plan would be implemented, only limited short term improvements could be anticipated owing to the large number of homes with foundations drain and reverse-slope driveway drain connections, which are prohibitively expensive to disconnect. Consequently, a plan was developed to provide relief to the basin with the ultimate goal of providing a 25-year level of protection against sewage backups.

These improvements – designated as the Southwest Elmhurst Wet Weather Control Facility (SWWCF) would comprise three main elements:

1 Modification to the existing pump station to include an additional wet well with stormwater pumps
2 Installation of over a mile of 18-inch wet weather forcemain to convey this excess flow to the Water Reclamation Facility (WRF)
3 Construction of a two million-gallon storage tank at the WRF, to hold flow when the WRF was at capacity.

In addition, the 18-inch sanitary interceptor to the pump station was upsized to 24 inches so that it could convey the design storm flow to the expanded pump station, and the existing aging 10-inch dry weather sanitary force main was replaced.

Creek Crossing Entry Point Looking West

This article addresses the design and construction of the 18-inch wet weather force main.

Wet Weather Forcemain Preliminary Design – Routing

The major design challenge with the wet weather force main was its routing. The pump station is located in a residential area, with many existing utilities in its vicinity. The WRF is located on the west side of Salt Creek, largely surrounded by property within another municipality, and the east side of the creek is protected by

Final Drill Routings


Overall Plan


Madison Street Crossing Option

a FEMA-certified levee. Consequently, there were only two realistic places to cross the creek – Madison Street and McKinley Avenue. The McKinley option was the most direct route, requiring only one crossing of the levee, and it would be mainly within residential areas. However, the utility conflicts along McKinley, including the City's 42-inch sanitary interceptor and a large storm sewer outfall, made this route very difficult. Conversely, the Madison Route would require crossing the levee in three locations, avoiding a 20-inch high-pressure gas main, and traversing a special management area, of which 700 feet was essentially inaccessible. As a result, it was apparent that significant stretches would have to be drilled. However, except for the gas main and two large storm sewers, the utility conflicts were far more manageable, and Madison St. was chosen as the preferred option, despite the risks inherent to that route.

Wet Weather Force Main – Construction Design

In evaluating construction methodology, trenchless construction was preferred, wherever possible. However, due to the number of utility crossings, including a 60-inch storm sewer, and the pre-existing pavement condition, open-cut construction was chosen for Adams Street, the main residential street affected by the project.

The end of Adams Street terminates at one of the levee banks, and in order to bend the force main north along Berkley to Madison, the berm would need to be crossed twice. Directional drilling would be the only available option in these locations, as excavation of a certified levee is restricted. However, this would require one drill/receiving pit within the floodway on the edge of wetlands. This drill pit was designed with specific parameters mandated by the County, and all excavated material had to be hauled and stored outside the berm.

Pullback Progressed with Few Delays

Sonde Locating in the Wetlands

The routing across the creek required the placement of the forcemain in casing at a minimum depth of five feet below creek bed. This was designed as two drills. One from the residential area to the creek, and the second to include the boring and jacking of the casing for insertion of the forcemain with spacers.

The west side of the creek presented greater challenges. Although there were no other utilities to contend with, a portion of the route was virtually inaccessible. While the first 700 feet of the route west of the creek was clear, the remaining 700 feet included wetlands, a pond, and dense woods. At this point the choice of drilling pipe became significant, as it was apparent that this challenging terrain would need to be traversed in a single directional drill.

Wet Weather Force Main – Pipe Selection

In choosing the pipe material, the drill through the wetlands area was considered the most critical, as retrieving the drill head would be almost impossible. The soil borings indicated little or no cobbles (although in northern Illinois clays, anything is possible). Of greater concern was the bearing strength of the soil and water table. The soil borings closest to the wetland indicated blow counts in the 3 to 5 range, with a potential sand seam and groundwater table varying between 6 and 8 feet. It was therefore imperative to choose a material that would be as light as possible with a slim profile to minimize the reaming diameter. The choice of PVC as opposed to HDPE was obvious – a much lighter pipe with a smaller profile would result in less excess material being reamed, and as all the material on the west side of the creek was classified as contaminated soil, this further confirmed the decision to use a PVC pipe. The force main as designed was an 18-inch pipe (approximately 16 inches internal diameter).

The initial option was to use fusible PVC, which had been successfully installed on a previous project, which was also in challenging ground conditions adjacent to the creek elsewhere in the City. However, this option would require layout space for almost 800 feet of fused pipe. Space was constrained to the north by the WRF sludge drying beds and to the south by an industrial building, which would have required bending the fused pipe beyond its tolerance. A restrained joint PVC pipe seemed to be the perfect pipe for this installation. However, there was one major drawback – when the design was originally planned, an 18-inch restrained joint PVC pressure pipe was not yet in production.

The manufacturer was contacted to see if there was any possibility to make an 18-inch pipe for this project. Although 2,000 feet was not considered a large order, it was hoped that moving other projects forward would also fuel the demand. At the time, the manufacturer offered 12-inch and 24-inch pipe but had no immediate plans to tool up for an 18-inch restrained joint PVC pressure pipe. Fortunately, as the design proceeded and the project went through permit and loan review, the manufacturer advised that an 18-inch Certa-Lok restrained joint pipe was being considered, although the date was still uncertain. Shortly before the project was bid, the company announced that they would

There was one major drawback – an 18-inch restrained joint PVC pressure pipe was not yet in production.

be able to manufacture the 18-inch PVC C905 in time for the project's needs. Subsequently, this project was the first to receive the 18-inch Certa-Lok restrained joint pipe from the factory.

Wet Weather Force Main – Installation

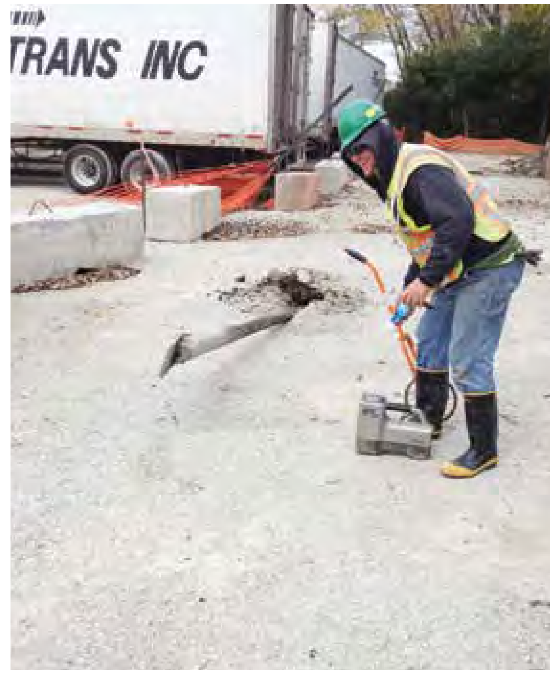
The project comprised three main drilling installations:

1. Under the berms in the residential area
2. Under the creek in casing
3. Under the wetlands/pond area

None of the three installs were without their complications:

1. **Berm Crossings:** The Contractor requested an alternate alignment for the berm crossings to avoid locating a drill pit in the floodway/wetlands area. This would have required removal and storage of all excavated material beyond the berm, resulting in multiple crossings of the berm in order to excavate and access the drill pit. The additional upside to the alternate alignment was a significantly shorter drill length. However, parts of the drilling and receiving pits would now be in front yards and driveways to avoid existing utilities within the streets and rights-of-way, and much of the drill path would now be under the berm. Consequently, if the drill head were to get stuck, retrieval would be very difficult. As an added complication, the restrained joint PVC, which was manufactured in 40-foot sticks, would have to be supplied in 20-foot lengths because of reduced layout room in the alternate alignment.
   The cost reductions to the City were attractive (even with the upcharge for special ordering the 20-foot sections and additional couplings), so this install proceeded with the modified route.
2. **Creek Crossing:** The Contractor again requested a modification to the design. Originally the project was designed as two separate installations: from the berm to the east bank of the creek, and then jacking the casing and inserting the pipe through the casing under the creek. The Contractor requested that after the casing had been installed, they pull the pipe in a single shot from the west side to the initial pit on the east side by the berm – a distance of some 800 feet.
   While the single drill would minimize the excavation and requisite dewatering of pits adjacent to the creek, the length of this drill was of great concern. The pipe within the casing was to be fixed in position with spacers for 160 feet. The concern was that the drag incurred by the spacers might exceed the tolerance for the drilling machine and/or pipe joints (this was the very last section being pulled). The drilling subcontractor indicated that the anticipated pulling forces would be within the machine's tolerance, and the pipe manufacturer also provided a design layout in which the pipe could be installed on roller cradles ahead of the insertion point to reduce the angle of deflection between the ground and the casing some 17 feet deeper.
   To minimize the pull-back time and not risk losing the borehole, the pipe was also pre-assembled in 200-foot sections before pulling. With all these precautions in place, the pull-back went ahead, and despite some small frac-outs near the east side bike path, the installation proceeded smoothly, until the section with spacers entered the casing.
   At that point, the pullback force started to increase significantly. With 65 feet left to insert, the pipe ceased its progress. It was thought that the spacers were increasing the drag on the pipe, but they could not be removed in their entirety since they were needed for placement of the forcemain in the casing. The decision was made to widen the location of the casing spacers but to ensure that spacers "bracketed" the joints. With the removal of some spacers and the addition of a

Pipe with Spacers Attached Entering Casing



Success!

machine at the insertion point to "nudge" the pipe forward, it did start to move, albeit at pressures near 67,500 lbs. – close to the maximum tolerance of the joints.

3. **Wetlands/Pond area:** This route could not be modified but was fraught with risk, particularly because of limited accessibility (it was behind industrial businesses) and in an area that was heavily wooded – essentially a "blind" drill. It was also close to the riverbank with a resultant high groundwater table. Unsurprisingly the Contractor had difficulty locating the sonde at times. In addition, the edge of the excavation for the drill was only ten feet from the adjacent municipal boundary so both horizontal and vertical alignments were constrained.

   The initial drilling proceeded slowly in order to maintain the alignment and because of the limited bearing strength of the soils. Once the pilot bore had successfully established the route, reaming proceeded over the next few days. The pullback itself progressed with only a few intermittent delays when additional pipe segments (which had been previously assembled into longer lengths) were connected. The very high pull pressures previously encountered in the drill under the creek were not a factor here.

Pipeline Completion

On completion and connection of all the pipeline sections, the 5,640 foot long 18-inch forcemain was successfully tested for both pressure (150 psi) and leakage. With the tank and the pump station complete, the system was tested for operational competency. The wet weather forcemain has now operated four times, although the tank has yet to be needed.

Conclusions

There are many pipe materials suitable for directional drilling installations. Sometimes, however, circumstances dictate a specific material and pipe type for a project. The use of PVC for this installation was predicated on the need for a lighter, smaller-profile pipe to minimize reaming diameter in ground with minimal bearing strength. In addition, the limited layout space in some locations required a pipe that would not need fusing. The 18-inch Certa-Lok restrained joint pipe was the ideal pipe for this application, and its entry into the market just in time for the project bid enabled the project's completion with minimal construction modifications.

While the pipe was successfully installed, the drag produced by the spacers during the long pull under the creek was a major obstacle which could potentially have resulted in aborting the installation. The ability to reduce the number of spacers while still positioning the pipe within the casing made the installation possible, but in hindsight, such a risk might have been avoided had the construction of an intermediate drill pit (as had originally been designed) been adhered to.

ABOUT THE AUTHOR:

Catherine Morley, P.E., *is a Senior Project Manager with RJN Group Inc. She is a licensed Professional Engineer with more than 30 years of experience in municipal underground infrastructure design and inflow and infiltration remediation. She has been actively involved in promoting the use of trenchless construction technologies for new and rehabilitation projects. Catherine holds a Bachelor of Science Degree in Civil Engineering from Imperial College, London and is a current member of the MSTT Board of Directors.*

NASTT MID ATLANTIC CHAPTER™ NASTT MIDWEST CHAPTER™ NASTT SOUTHEAST CHAPTER™

2017 SEMINAR SCHEDULE

MASTT - MID ATLANTIC SOCIETY FOR TRENCHLESS TECHNOLOGY
MSTT - MIDWEST SOCIETY FOR TRENCHLESS TECHNOLOGY
SESTT - SOUTHEAST SOCIETY FOR TRENCHLESS TECHNOLOGY

SOCIETY	PROPOSED DATE	PROPOSED LOCATION	STATUS
SESTT SEMINAR	MAR 29 – 30, 2017	RALEIGH NC	COMPLETED
MASTT SEMINAR	MAY 17 - 18, 2017	RICHMOND VA	COMPLETED
MSTT SEMINAR	JUL 27, 2017	MILWAUKEE WI	COMPLETED
SESTT SEMINAR	OCT 24, 2017	NEW ORLEANS LA	CONFIRMED
MASTT SEMINAR	NOV 1 or 2, 2017	PHILADELPHIA PA	PROPOSED
MSTT SEMINAR	DEC 13 or 14, 2017	CINCINNATI OH	PROPOSED

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For registration and updated information on the 2017 Trenchless Technology, SSES and Buried Asset Management seminars, please visit:

Mid Atlantic: www.mastt.org | Midwest: www.mstt.org | Southeast: www.sestt.org

CHANGING THE PLAN . . . AND STAYING ON BUDGET

Pilot Tube & Vitrified Clay Jacking Pipe Lowest Cost, Best Option for Clinton Township, MI

By: Steve Matheny, P.E., The Logan Clay Products Company

The worksite footprint was contained to one property

The original plan for the Little Mack Road – Sanitary Sewer Relief project called for approximately 1,000 linear feet of trenchless installation and 1,000 linear feet of open cut installation of 18-inch pipe at depths of approximately 28 feet, and the budget was set. But everything about this project (except for the budget and end goals) changed when D.V.M. Utilities, Inc. (DVM) did a pre-construction review and looked at the project from a value engineering perspective.

The Charter Township of Clinton, Michigan is located near the shores of Lake Saint Clair. The Township is the largest and one of the oldest communities in Michigan. Celebrating 200-years in 2018, Clinton Township is confronting a challenge that is common to mature communities throughout the U.S.: Aging Infrastructure. The township needed to update two lift stations and create a relief sanitary sewer. DVM, headquartered in Sterling Heights Michigan, was the low bidder on the project and was awarded the job in 2016.

The Basic Challenges

The population density of the area is over 3,800 people per square mile, the roads are narrow and lined with mature trees, the roadway has only 50 feet of public right-of-way with gas, electric, water, storm and existing sanitary sewer lines. The existing utilities included a 66-inch diameter storm drain in the center of Little Mack Road.

The tight urban setting made 20 – 30 foot long stacked trench box shafts impractical and the limited space available for job staging was going to make the open excavation portion of the project a logistical nightmare.

The geotechnical report indicated a very stiff clay with pockets of soft clay. On the toughest sections, the report indicated standard penetration test values of 50 blows per foot.

The Details

The original bid was prepared using the design criteria provided by Giffels Webster, but once the project was awarded, DVM began researching the best means and methods for the full project.

Daniel DiLegge, Owner of DVM, did the initial research and identified the Akkerman Guided Boring Machine (GBM) as the best equipment for this project because of its ability to operate within a relatively small shaft.

Based on the equipment selection, Vinay Shenoy, Estimator/Project Manager for DVM researched the pipe material options and found that NO-DIG® Pipe was the lowest cost, best option for the limited footprint of both the shaft and the jobsite.

Several methods and materials were

Longer life and expanded maintenance options provided by VCP serve the long-term interests of the community.

considered, but the space constraints meant the smaller footprint of a Pilot Tube Guided Boring Method (PTGBM) installation coupled with the shorter lengths of vitrified clay pipe (VCP) was the best solution.

"Their primary objectives were to explore viable trenchless solutions that would lower cost, decrease the construction schedule and make for a more efficient construction project," according to Jason Holden, Director of Sales for Akkerman, Inc.

But vitrified clay pipe wasn't included as an option in the original bid documents. And DVM was understandably concerned about the stiffness of the soil for a trenchless installation.

"They didn't have experience with VCP as a direct jacked material," according to Jeff Boschert, P.E., President of National Clay Pipe Institute (NCPI). "So they really did their due diligence. We've seen this same thing happen in many areas across the county. Once an objective review is completed, the pipe's jacking strength, bearing strength, longevity and maintenance options make a compelling case for clay pipe as a strong choice."

The Solution

Once the trenchless method was selected, DVM's research led them to install all 2,000 linear feet using PTGBM in a three-step process that includes the use of a powered cutter head increase tooling during the final step. The urban setting with residential homes on narrow single-family lots, mature landscaping, the presence of multiple utilities and the tight space constraints were all drivers of this decision.

The Three-Step Installation Process Utilized:

Step 1: Installation of a 4-inch diameter pilot tube from the jacking shaft to the receiving shaft

Step 2: Installation of an 11-inch reaming head followed by temporary thrust casings and augers, which increased the bore from a 4-inch pilot to an 11-inch thrust casing

Step 3: A 22.5-inch powered cutter head (PCH) advanced by the 18-inch ID clay jacking pipe.

The first length of pipe pushes the powered cutter head

The pilot tube arrives exactly on target in a pre-drilled hole

Scott Chabot, P.E. of Giffels Webster characterized it this way: "The Pilot Tube Guided Boring Method of pipe installation met the alignment and grade challenges that existed for this project. After evaluating all the present worth costs, hydraulic needs and physical challenges, this technology with the use of Vitrified Clay Jacking Pipe was the best option for this Sanitary Sewer Overflow Relief Project."

"We studied the geotechnical information, plan profiles and discussed costs associated with each method, said Holden. "Based on the culmination of that information, an Akkerman GBM 339A system was selected for the project with the primary intent to minimize the surface footprint of the jobsite."

"I looked at viable pipe options and VCP was not in my original engineering consideration," said Mary Bednar, P.E. CFM, Director of Clinton Township's Department of Public Service. "After reviewing, technological advances to joints, corrosion resistance and cost, I chose VCP for this project."

Because the Michigan Department of Environmental Quality was one of the funding agencies, their approval was also required. After extensive study, the Township and Giffels Webster provided submittals that resulted in approval of NO-DIG® vitrified clay jacking pipe for this project.

The Akkerman Model 339A Guided Boring Machine (GBM) jacking frame selected is designed for a minimum one-meter pipe installation from a nine-foot shaft, allowing DVM to limit the size of the excavation to a 13-foot diameter shaft in the right of way to accommodate the two meter pipe joints. The pilot tube steering head, capable of soil displacement in difficult ground conditions, had no problems penetrating the stiff clay.

NO-DIG® clay jacking pipe met all requirements for this PTGBM installation and was selected because the standard lengths available (1 meter & 2 meters) were much more manageable within the tight space constraints of this urban setting. Two meter pipe lengths were selected for this project.

DVM excavated the jacking pit and receiving shafts with a standard excavator. The Akkerman GBM 339A jacking frame was utilized in 13-foot diameter jacking shafts that were constructed using steel rings and lagging. The receiving shafts were 8 feet x 12 feet and were secured using stacked trench boxes. A vacuum truck was used to remove the excavated spoils in the second and third step of the installation process.

DVM chose to start the project at the down-stream manhole and push upstream first. PTGBM reliably provides rifle-straight drives with accuracy within ¼ inch in 400 feet. For this project the engineer, Township and contractor selected drive lengths of 280 to 400 feet given the site conditions. On the north end of this project, DVM needed to tie into an existing manhole. DVM cored a six-inch hole into the wall of the concrete manhole first, and then pushed the pilot tube string with a 5 ½-inch steering head 285 feet towards the opening. This was only the second time this operator had steered a PTGBM drive, but the net result could not have been more precise (as shown in the picture on the facing page of the Pilot Tube and steering head arriving in the existing manhole).

The Result

On Time – On Budget – On Target!

At completion of the project, the Township and Giffels Webster tested the 18-inch Relief Sewer that was installed by DVM Utilities. The VCP pipeline was subjected to a low-pressure air test (per ASTM C828) and televised per the Township's and Engineer's specifications. The installation passed all tests and no deficiencies were found. Line and grade specifications were also realized.

"The Akkerman GBM system not only provided cost savings for the nearly 30-foot deep alignment, the surface disruption and social impact to the homeowners along the project alignment was also minimized," according to Holden.

"We were renting the equipment when we finished this project in early spring," said Shenoy. "Less than six months later, we've purchased the equipment and we've completed two more PTGBM projects."

This project is a classic demonstration of the benefits of the smaller construction footprint made possible by PTGBM. The low-impact, high-accuracy installation method also gives the engineer and owner greater control over alignment and grade. The longer life and expanded maintenance options provided by VCP serve the long-term interests of the community. The ability to use more aggressive tools and greater jetting pressures to clean this new sanitary line are added benefits of VCP and just one more example of the long-term value realized.

ABOUT THE AUTHOR:

__Steve Matheny, P.E.,__ joined The Logan Clay Products Company in 2016 as a business development engineer after more than 30 years in the field. He started his career with Wayne County (MI) department of public service where he served as a staff engineer and project manager on various road projects. He is currently consulting on multiple pilot tube guided boring projects throughout the Midwest.

TRENCHLESS TECHNOLOGY EDUCATION & NETWORKING!

MSTT Seminars Promote Trenchless Technology across the Midwest

Mr. Allen Muehlher, P.E., Program Manager, Metropolitan St. Louis MSD, Construction Division: "Trenchless Technology: A Critical Component of the MSD Capital Construction Program"

Mr. Kevin W. Lyons, P.E., Engineering Design Manager, Milwaukee Metropolitan Sewerage District: "Milwaukee Metropolitan Sewerage District – A Tunneling Overview"

Trenchless Technology, SSES and Buried Asset Management Seminars hosted by MSTT in locations across the Midwest are gaining a solid reputation as premier educational events, with knowledgeable industry presenters on a wide range of trenchless technology topics.

As part of the MSTT mandate to "promote Trenchless Technology through education for the public benefit", the seminar programs are designed to inform public officials, engineers, utility company personnel, designers, and contractors involved with the construction, rehabilitation, and management of underground infrastructure assets, in the Midwest.

Having attended the July 2016 Trenchless Technology seminar in Detroit, Vinay Shenoy, Estimator/Project Manager at DVM Utilities Inc. in Sterling Heights MI, was impressed with the overall quality of the seminar program and value of the information provided in the sessions:

"Very informative, with lots of new techniques and products. It's always good to connect with people in the industry. We are always looking for new and better ways to overcome challenges and build projects efficiently and successfully. The instructors share a lot of practical experience from the field."

MSTT Trenchless Technology, SSES and Buried Asset Management Seminars are excellent opportunities to learn about the latest trends and technologies in trenchless underground construction. With educational and informative trenchless presentations, product demonstrations, networking and ideas, the seminars provide relevant technical knowledge with immediate value and application. Adding a little fun and excitement to the seminars, at the end of each session there is a draw for two fresh 100 dollar bills, and draws for door prizes donated by the exhibitors.

Jointly sponsored with the local ASCE section and/or branch, registration fees for the MSTT seminars include program materials, all day refreshments, breakfast pastries, lunches, networking, and a PDH Certificate. Special thanks go out to

“MSTT seminars have really helped grow the business of trenchless technology across the Midwest,”

- Leonard Ingram, PWAM, MSTT Executive Director.

Networking opportunities and social events at MSTT seminars

2017 food sponsors **National Clay Pipe Institute, PPIC, LMK Technologies, BAMI-I, Trinity Products, Trenchless Technology Center, Rapidview/IBAK USA, Akkerman, Electro Scan, Michels Corporation, CUES**.

MSTT Executive Director Leonard Ingram believes the seminar programs are essential in fulfilling the MSTT mission to promote the growth of trenchless technology in the Midwest:

“Everyone is focussed on networking and learning in a small classroom setting. Being together in the same room for a full day promotes informal networking. We’ve seen MSTT seminars have really helped grow the business of trenchless technology across the Midwest over the years. They promote greater understanding

Valuable information on construction, rehabilitation and management of underground assets

ST. LOUIS SEMINAR DECEMBER 14 – 15, 2016:

GUEST PRESENTATION

Trenchless Technology: A Critical Component of the MSD Capital Construction Program
Mr. Allen Muehlher, P.E., Program Manager
Metropolitan St. Louis MSD, Construction Division

PRESENTATIONS

Welcome Address and “Liquid Assets” Overview Video,
Leonard Ingram, PWAM, MSTT Executive Director

Overview of Trenchless Technology & NASTT Education Efforts,
Dr Tom Iseley, P.E., Louisiana Tech University

Guided Boring Using Pilot Tubes - Methodology &Case Studies,
Jeff Boschert, P.E., National Clay Pipe Institute

Repairing Laterals & the Connections: No One Solution Fits the Bill,
Pete Tortorici, LMK Technologies

Bypass Pumping For Trenchless Technology,
Joe McIntosh, Sunbelt Rentals, Inc.

Determining RUI Of Large Diameter Pipe With MSI,
Ed Diggs, Pipeline Inspection Partners Corp

“Live View” Water Main Inspections Acoustic Leak Detection & Quantifiable Asset Management,
Lisa Douglas, P.E., Ace Pipe Cleaning Inc

3-D Optical Scanning Of Manholes,
David Daake, RapidView / IBAK USA

Fold and Form PVC Liners for Sewer and Culvert Rehabilitation,
David Ohayon, IPEX USA, LLC

An Overview Of Chemical Grouting Used In Sewer Rehab,
Barry Howell, Visu-Sewer of Missouri, LLC

Slurry Microtunneling, When & Where to Use It,
Jason Holden, Akkerman Inc.

BAMI-I & Certification of Training in Asset Management (CTAM) Program,
Dr. Tom Iseley, PE, Prof. & Dir. of CEMT

TRIC Pipe Bursting,
William Seals, TRIC Tools

Pressure Pipe Rehabilitation with a Flexible Liner System,
Trey Fuller, RAEDLINGER Primus Line

The Trenchless Technology Center (TTC),
Dr Tom Iseley, P.E., Chairman & Executive Director, TTC

Current Manufacturing Process of Spiralweld Pipe Production,
A.J Griggs, Trinity Products

MILWAUKEE SEMINAR JULY 27 2017:

GUEST PRESENTATION

Milwaukee Metropolitan Sewerage District – A Tunneling Overview
Mr. Kevin W. Lyons, P.E., Engineering Design Manager
Milwaukee Metropolitan Sewerage District

PRESENTATIONS

Welcome Address
Leonard Ingram, PWAM, MSTT Executive Director

Pre & Post Pipeline Rehabilitation Inspection,
Mark Grabowski, Electro Scan, Inc

Pipe Bursting,
Sarah Malik, TT Technologies, Inc

Guided Boring Using Pilot Tubes - Methodology & Case Studies,
Jeff Boschert, P.E. National Clay Pipe Institute

The Challenges of Installing a 1,000 Linear Foot 60-Inch Diameter CIPP Liner
David Rosenberg, Michels Corporation

Fold and Form PVC Liners for Culvert Rehabilitation,
David Ohayon, IPEX USA LLC

Large Diameter Restrained Joint PVC Pipe Helps Chicago Suburb Get Relief from Sewer Backups,
Catherine Morley P.E. RJN Group, Inc.

Preliminary Design & Installation of PE4710 Per AWWA C906 & AWWA M55,
Camille George Rubeiz, P.E. F. ASCE. Plastics Pipe Institute

Infrastructure Repairs Using Chemical Grout,
Ed Paradis, BASF, Construction Chemicals

Sealing the Collection System with a Focus on Main-To-Lateral Rehabilitation,
Rick Gage, LMK Technologies

Underground Gyroscopic Mapping Tool,
Mac McGarry, CUES Mapping Services

Internal Joint Seals - Where, When and Why?
Jeremy Kieninger, Miller Pipeline

Private Property I & I Dye Flood Investigation,
Mike Blazejovsky, Visu-Sewer, Inc

Advanced Geopolymer Mortar System for the Structural Rehabilitation of Sewer & Culvert Infrastructure,
David Keaffaber, Milliken Infrastructure Solutions, LLC

"We thought that running the seminar program as a single-day event would enable many more people from around the region to attend."

– Cathy Morley, P.E., MSTT Board Member

MSTT Board Member Cathy Morley, P.E., RJN Group, Inc. describes events leading to construction of a wet weather forcemain in Elmhurst IL (see page 14 for article)

and acceptance of different trenchless applications, and underline the critical importance of systematic buried asset management."

Recently the seminar format has been changed into a more compact and accessible single day event. The new one day program was introduced on a trial basis in Milwaukee on July 27, and was very successful, based on feedback from the nearly 70 people who attended. MSTT Board Member Cathy Morley, P.E., played a key role in the successful implementation of the new format:

"We thought that running the seminar program as a single-day event would enable many more people from around the region to attend. People don't have much time to allocate from their projects, and having a more compressed format would be preferred by municipalities, utilities and other owner groups."

This year's final one-day MSTT **Trenchless Technology SSES and Buried Asset Management Seminar** is proposed tentatively for Cincinnati, Ohio on either Wednesday, December 13 or Thursday, December 14.

For information dates and locations of future MSTT Trenchless Technology, SSES and Buried Asset Management seminars planned for the Midwest, visit:

www.mstt.org

PIPELINE CONDITION ASSESSMENT AND OPERATIONS: THE DEVIL IS IN THE DETAILS

City of De Soto, Kansas, Raw Water Main Condition Assessment and Cleaning

Final Transmission Main Cleaning

By: Lisa Douglas, P.E., Carylon Water Group
Mark Wade, P.E., Blue Water Solutions Group

As asset management becomes the standard in linear infrastructure, more new tools and technologies are becoming available every day for pipeline condition assessment. While current condition is a very important part of the asset management equation, implementing tools and technologies is not always straightforward and easy, especially for non-redundant, high consequence of failure pipelines. Asset management sometimes requires a change in operations and maintenance instead of a pipeline rehabilitation approach. This was certainly the case for the City of De Soto, Kansas and its 3000 foot, 16-inch ductile iron raw water transmission main that crossed under the Kansas River from a well field on the north side of the River. The transmission main was experiencing an alarming rise in pressure.

The City owns and maintains this critical water main asset that transfers raw water from three ground water wells located north of the Kansas River to the south transmission main feeding the City's water treatment plant. It was estimated that the raw water main had been in continuous operation since the pipeline construction in 1960. Two of the original six wells on the north side of the River had been abandoned and were no longer in service.

The well field provides more than half of the City's water. Therefore, the raw water main is an asset considered as one of the City's highest priorities due to its age and function. There was no construction information available regarding the pipeline construction under the River as it pre-dated the current well field.

The observed pressure change of 70 psi between the portion of the main north of the river and the downstream portion on the south side indicated a significant problem within the pipeline. The condition under the river was unknown. It was thought the cause could possibly be from a partial collapse of the buried pipeline, or leakage under the river, or significant blockages.

To investigate the problem, the City contracted Ace Pipe Cleaning, Inc. and engineering consultant, Blue Water Solutions Group, to perform a direct insertion, live main, CCTV and leak detection inspection. The inspection was to be performed on the portion of the raw water supply line under the Kansas River, and the land approaches on both sides. The City requested these inspection services in order to assess the overall condition of the pipeline and determine the existing structural integrity and hydraulic reliability of this high priority 55 year-old asset.

Alignment of Raw Water Main

Ace Pipe Cleaning initially attempted the inspection in September 2016, when it

The source of the water for the jetting operation was taken from the River itself, eliminating the need for trucking water to the site.

was learned that the build-up of sediment in the pipeline made such an inspection impossible. A condition assessment project had to become a pipeline cleaning project instead. An approach had to be developed to clean out the raw water main under the Kansas River and allow for the inspection to take place.

To clean the raw water main Ace Pipe Cleaning first used a specialized 120 psi water-jetter truck with a warthog-type nozzle to cut and spray out the sediments that had solidified in the raw water main. There were some challenges with the cleaning, specifically accessing the pipeline under the river and providing high pressure water for the jetter nozzle in the middle of a corn field. There was also a very limited period of time that the raw water main could be taken out of service for the cleaning work. The operation had to be coordinated very closely with the City to ensure they did not run out of water, with maximum five days' worth of water supply on reserve. Ace Pipe Cleaning therefore had to work within a very short window of time to drain the pipeline and do the cleaning work.

The initial attempts at line cleaning were successful, to a point. In fact, over 1700 feet of main was successfully cleaned. The 120 psi jetter was good at cleaning the flatter sections of the transmission main that ran up to the River. However, once the jetter hose reached the steeper approach to the River continued advancement stopped. A different method of cleaning the line under the River would need to be developed. To complete cleaning the line under the river, a larger, 190 psi capacity jetter truck with a penetrator-type nozzle was used to traverse under the River and remove the remaining buildup in the transmission main. The source of the water for the jetting operation was taken from the River itself, eliminating the need for trucking water to the site.

16-Inch Diameter Ductile Iron Raw Water Main - Before and After Cleaning

A condition assessment project had to become a pipeline cleaning project.

The subsequent inspection and assessment of the pipeline at each point where the pipe had to be cut into and accessed revealed that the pipeline condition itself was excellent and several decades of useful service life still remained with this asset. A new maintenance plan of periodic cleaning will provide continued and uninterrupted service for years to come for this high priority raw water main in the City of De Soto.

ABOUT THE AUTHORS:

***Lisa S. Douglas, P.E.**, is the Division Manager of the Carylon Water Group. For more than 15 years Lisa has specialized in pipeline condition assessment technologies and consulting for both gravity and pressure pipe. She is a licensed civil engineer and a graduate of Missouri University of Science and Technology.*

***Mark Wade, P.E.**, is President of BlueWater Solutions Group. He currently provides senior-level technology and project management oversight for a number of pipeline assessment and rehabilitation projects, particularly large-diameter conveyance systems, throughout North America.*

PROVIDING VALUE IN THE WABASH VALLEY:

Midwest Mole Uses Expertise to Cut Costs and Time – Without Cutting Corners

By: Brian Brown, Midwest Mole

As the self-proclaimed capital of the Wabash Valley – a region with parts in both Illinois and Indiana – the city of Terre Haute is home to the mighty Wabash River, a 503-mile long river that flows southeast from the Indiana border in northwest Ohio, across northern and central Indiana to southern Illinois, where it feeds into the Ohio River.

In November 2016, Midwest Mole, a leading trenchless technology company based in Greenfield, Indiana was contracted by Indianapolis-based construction company F.A. Wilhelm to install the trenchless portion of a new storm water system for a utility.

The Plan: Replacing Failing Pipes

The project assigned to Midwest Mole was to replace a failing 84-inch Reinforced Concrete Pipe at two separate locations on the site. The first location of the pipe that was to be replaced was at 558 feet, while the second location was 162 feet. Midwest Mole was instructed that each location was to have three tunnels, which was bid to pipe jack steel casing and then to thread the casing with an FRP carrier.

The Problem: Changing Conditions

The project was originally bid with soil borings that showed weathered shale in some locations and wet, sandy clays in others. These borings did not provide enough information to depict where the transition occurred or how long the transition would impact tunneling operations. Once on site and prior to getting started on the project, the team at Midwest Mole conducted their own additional geotechnical exploration by using a truck-mounted drill rig that drilled directly into the ground and pulled up soil cuttings for further evaluation. As for any tunneling project, it was crucial that Midwest Mole understand the behavior of the soil as it allowed them to select the appropriate equipment to mine with, as well as the proper tunnel lining used to support the earth.

The sampling of the site's soil extracted by Midwest Mole indicated a change in the ground conditions that were going to pose significant challenges to the scope of the project and the plan that they had

View looking into the Midwest Mole tunnel from the launch pit side

To maximize efficiency, a switch system was installed to reduce wait time for dumping of the boxes

> **"the larger machine allowed for a larger tunneling lining, and hence a larger carrier pipe that had the hydraulic capacity that would allow us to install two pipes..."**
>
> **Joe Butor, Project Manager, Midwest Mole**

been tasked with. The soil borings showed problematic soils toward the end of the drive where they would need to transition from shale to very soft clay to complete the tunnel. Specifically, the project was to start off in 2,000-3,000 psi weathered shale that transitioned into soft, sandy clay with a little bit of ground water. Traditionally in the boring industry, a disc cutter machine would be used to excavate the shale material, but given the specific challenges that had arisen, the disc cutter would not be able to tolerate the soft ground conditions. Midwest Mole took in the information on-site to determine the best next steps they would need to take to ensure the project was being approached in the safest, most efficient, and cost-effective manner.

The Proposal: Value Engineering

Because Midwest Mole is always looking for opportunities to save the owner time and money, its team members are deeply committed to evaluating the project from every angle. In order to accommodate the change in ground conditions, the team at Midwest Mole felt that they could give the owner a better product and a better price by proposing value engineering.

In response to the soil findings, Midwest Mole proposed to:

- Utilize an Akkerman 720 TBM instead of a 54-inch Robbins Rockhead as it was better suited for the anticipated ground conditions.
- Upsize the tunnel to an 87.5-inch ring beam and lagging tunnel.
- Thread each tunnel with a 60-inch Hobas FRP with grouting of the annular space.

When taking the current ground

conditions into account, the proposed plan had the potential to have a significant impact – speeding up the expected time spent on the project as well as cutting costs overall.

The team at Midwest Mole used its expertise to understand that the Akkerman 720 TBM would be more useful, but knew doing so was rife with its own challenge. In order to keep costs down using the larger machine, they decided to install larger pipes which would eliminate the need for the third crossing, providing the most cost-effective solution.

"Our thought was that we had a rock machine that would no longer work, but we did have a larger mixed ground head that could be used. We knew it would cost more money to use the larger machine to put three pipes in, but the larger machine allowed for a larger tunneling lining, and hence a larger carrier pipe that had the hydraulic capacity that would allow us to install two pipes instead, which made this all possible," said Joe Butor, Midwest Mole's project manager for the Wabash River project.

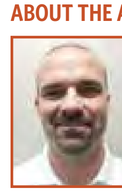
On the shorter 162-foot crossing, Midwest Mole handmined a 72-inch steel casing and lined it with a 60-inch Hobas FRP inside the tunnel lining. They grouted the annular space between the initial tunnel lining and the product pipe, and the shafts were removed to signify the end of the project.

View looking from inside of Midwest Mole tunnel to the end of tunnel

The Value of Value Engineering

Because Midwest Mole offers a full range of underground services, whereas most in the industry only specialize in one or two areas, the team's trenchless technology experts working on-site at the Plant utilized their depth of knowledge, years of experience in order to deliver a plan that fit the contractor's and client's specific needs. By applying value engineering and taking the proactive approach to the project, Midwest Mole was able to offer unique solutions to the challenges that could have easily gone undetected had they not been willing to conduct additional geotechnical exploration once on the site. Midwest Mole leveraged their resources and counted on their commitment to providing the most innovative solutions to not only get the job done safely, but also delivered it two months early and under budget. With the reputation of reliability, accessibility and ability to communicate clearly and concisely, Midwest Mole proposed a well-developed, well-researched and well-thought-out plan that proved to be successful for all parties working on the banks of the mighty Wabash.

ABOUT THE AUTHOR:

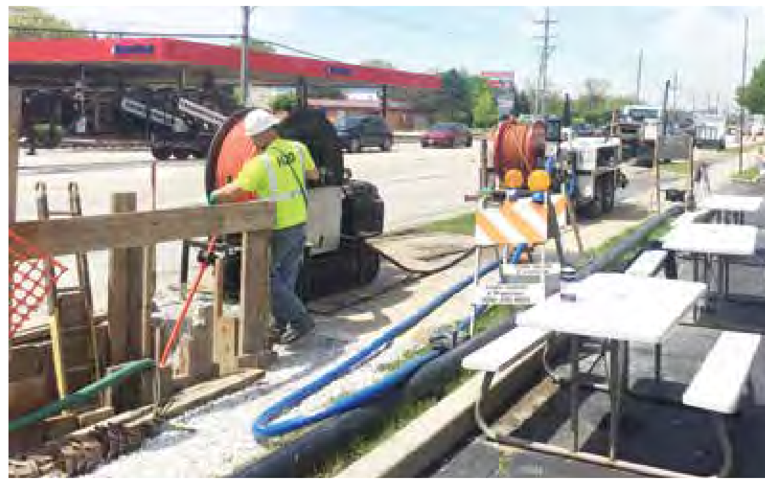


Brian Brown *is a Project Engineer for Midwest Mole. He is involved with estimating, project engineering and project management, and has had particular involvement with several tunneling projects since joining the company. Prior to Midwest Mole, Brian's career included 10 years of management and three years of executive leadership in the financial services industry.*

VILLAGE OF LOMBARD AVOIDS DISRUPTION WITH INNOVATIVE WATERMAIN LINING PROJECT

By: Carl Goldsmith and Avis Meade, Village of Lombard

Access pits situated to minimize disruption to traffic



Adjacent commercial properties required a steady flow of traffic and uninterrupted supply of water

One thing that remains true across all watermain replacement projects, difficult locations often lead to innovative solutions. This would hold true when the Village of Lombard, Illinois looked to reline a failing watermain situated in the Roosevelt Road right-of-way, one of the busiest and most traveled roadways in the state.

Through several years of planning, the Village, along with its consultant, elected to pursue Cured-In-Place-Pipe (CIPP) Lining to replace the aging watermain in order to minimize the impact on traffic and surrounding businesses.

Background

The Village of Lombard sits about 20 miles west of the City of Chicago and is one of Chicagoland's largest suburbs with a population of approximately 43,815 according to Census.gov. Using water purchased from the City of Chicago, the Village Water Department is responsible for the distribution of potable water across 180 miles of watermain.

One of the largest roadways within the Village is IL-38, also known as Roosevelt Road. This four-lane road runs through the central portion of the suburb and is under the jurisdiction of the Illinois Department of Transportation (IDOT). Several different watermains run underneath the corridor of Roosevelt Road ranging in size from eight to twelve inches.

These watermains were installed an average of 40-years ago and have suffered from pre-mature failure. The Village has experienced almost 50 watermain breaks along this stretch of roadway, with 29 of the breaks occurring after 1996.

Knowing the importance of this roadway and its impact on movement through Lombard, the Village prioritized the rehabilitation of the watermain. As part of the design efforts, the Village hired Caltech Engineering to review several replacement and rehabilitation options.

Challenges

The location of this watermain meant that a typical watermain replacement would be difficult.

The roadway is a major artery for the Village as well as for several other Western Suburbs of the City of Chicago. Therefore, the flow of traffic would be a major difficulty throughout construction. This section of roadway is also home to many commercial properties. Strip malls, car dealerships and restaurants all require a steady flow of traffic and an uninterrupted supply of water.

The watermain was also in proximity to several utilities, including a storm sewer main. As State regulations mandate that a watermain must not lie within ten feet of an existing sewer, it meant that the watermain could not be relocated within the same trench, without upgrading the sewer to watermain quality pipe, which was cost prohibitive.

Due to these challenges, a typical open-cut replacement was ruled out. The watermain could not be replaced in the same trench and relocating it within the Roosevelt Road right-of-way was not feasible due to existing utilities.

The technology that was deemed most suitable was structural watermain lining via Cured-In-Place Pipe lining (CIPP).

The Solution

Used across North America to rehabilitate watermains, CIPP works by inserting a woven liner injected with epoxy resin into the existing watermain. This liner has the equivalent structure of a brand new watermain, giving it new life.

CIPP had previously been used in Illinois for several years but had not yet been used for lining a watermain, due to conflict with Illinois Environmental Protection Agency (IEPA) regulations. For this project to proceed a further approval would be required.

In June 2014 an amendment was made to the IEPA regulations which stated, "The existence of a violation of the Act or a regulation will not prevent the issuance of a construction permit if: The Agency determines the permit application is for construction or installation of equipment necessary to produce water that is assuredly safe, as required by 35 Ill. Adm. Code 601.101."

Formal approval was granted to the Village by the IEPA in May 2015 allowing for the Village to proceed with creating the tender. The tender was released in January 2016 and the contract was awarded to FER-PAL Construction LLC on May 19. Headquartered out of Elgin, Illinois, FER-PAL specializes in the installation of the Aqua-Pipe CIPP product. With over a million miles installed across North America, Aqua-Pipe is the most commonly used CIPP liner for watermains.

As the scope of the project was quite large and the Village lacked sufficient cash reserves to construct the project, the Village had looked for alternative ways to fund the project. The most suitable option was the Drinking Water State Revolving Fund (DWSRF) loan program.

Created in 1996, this program is a federal-state partnership used to provide funding to help ensure safe drinking water across the USA. In December 2015, the Village was notified that their request had been approved and that the project would be fully funded by the DWSRF loan program. The loan program allowed the Village to borrow funds at an interest rate of 1.86% over 20 years. This interest rate was roughly half of what the Village could have secured by issuing debt.

Planning for a Successful Project

With a total length of 16,000 feet it was determined that the project would be best constructed over the course of two years in two different phases. The first phase was from Finley Road to Fairfield Avenue to be completed in 2016. The second phase was from Fairfield Avenue to Wisconsin Avenue with completion in 2017.

> **"Providing clear and ongoing communication was key to this project. The Village utilized all of its resources to bring information to residents, business owners, commuters, and visitors. We shared frequent updates and photos from our contractors in press releases, newsletters, open house meetings, and photos of the construction process on social media, and answered people's questions."**
>
> - Avis Meade, Communications Coordinator, Village of Lombard

The first step was the creation of a dedicated website to help answer and disseminate information to the public. The website (www.38water.org) allowed residents and motorists to access information on the project without having to click through a variety of links on the Village's main website. This website contained project boundaries, appropriate contacts, information on the contractor and links to the contractor's website (www.ferpalinfrastructure.com) which contained videos describing the technology.

In addition to the dedicated website, use of social media also played a large role in the dissemination of information to residents. This, along with the Village's Notify Me® system, allowed for two-way communication with anyone affected by the project.

More than one million miles of Aqua-Pipe CIPP liner have been installed in watermains across North America

Lastly, a public information meeting was organized to help present the project to the residents of the Village. The Village, the Engineering Firm and Contractor had representatives present to answer any questions. A video of this meeting was posted to the website and YouTube for anyone who could not attend.

As the project moved into the construction phase continuous open communication with the Contractor was necessary for the Village to properly inform its residents.

"The use of CIPP for the rehabilitation of the Roosevelt Road watermain was the most cost-effective method to address the conditions. The use of the lining process allowed us to minimize the disruption to the corridor and provide a long term solution to the deficiencies that we have encountered with the existing main. In addition to the newly lined main, the project also included the installation of all new fire hydrants and valves, which will assist the Village in managing its utility system."

- Carl Goldsmith, Director of Public Works, Village of Lombard

Construction

The CIPP process utilizes multiple stages to complete the watermain lining process.

First, a temporary water system was installed to provide customers access to water when the watermain is shutdown. After this, the access pits were excavated and shoring boxes installed into each pit. Road plates allowed traffic to pass over these access pits when construction was not taking place.

Once the access pits were installed the watermain was cleaned and a video of the cleaned watermain was recorded. Next, the inside of the watermain was scanned to size the Aqua-Pipe CIPP liner. Once the size was determined, the liner was pulled into place, then cured and hardened by using hot water. Once cured, the watermain was tested and videoed to ensure a quality product was installed.

The next stage was to reinstate each service connected to the watermain. For services 2 inches or less, this was done by robotically controlled drills that drill through the liner and reconnect the service connections to the watermain. Larger services required a pit to reinstate the services to the lined watermain. Finally, the watermain was chlorinated, tested, new fittings (hydrants, valves, tees) were installed, and the affected areas were restored.

The first phase of the project began in June 2016 with construction wrapping up in the late fall. The second phase of work began in March of 2017 with the last of the restorations for phase two completed by Labor Day.

Results

By thinking outside of the box, the Village found a solution that was not initially thought to be feasible. The impact of this project has the potential to set an example for other utility owners constrained by the same set of IEPA regulations.

This was evident during several live demonstrations that were held throughout the project duration. Dozens of interested parties attended these demonstrations to see how the Village of Lombard was tackling the challenge of having a watermain requiring rehabilitation situated in a less than ideal location.

By using an innovative approach, utilizing modern communication resources, and by creating a strong team to complete the project, the Village of Lombard found the right solution for an aging watermain located in a precarious position.

ABOUT THE AUTHORS:

Carl Goldsmith *has been the Director of Public Works for the Village of Lombard, IL since October 2008. Mr. Goldsmith has over twenty years of experiencing local government and has been involved in many facets of municipal government management. He earned a Bachelor of Arts Degree (Political Science) from the University of Kansas and a Master of Public Administration Degree from Northern Illinois University in DeKalb, Illinois. He is a member of the American Public Works Association, the International City/County Managers Association and the Illinois City/County Managers Association.*

Avis Meade *has been the Village of Lombard's Communications Coordinator since 2015. Ms. Meade graduated from University of Illinois with a degree in Communications in 2012, and has held communications positions with Lake County Government and the Lake County Convention and Visitor's Bureau.*

BAMI-I CONDUCTS 4-DAY CTAM CLASSROOM PROGRAM IN COLUMBUS, OH

By: The Trenchless Technology Center (TTC)

On May 16 – 19, 2017, TTC in partnership with BAMI-I, conducted a 4 day "Asset Management Training for Water Infrastructure", Certification of Training in Asset Management (CTAM) session in Columbus, OH. The program was conducted in response to a request received by the TTC from Ms. Deb Martin, WSOS Community Action Development Director.

Headquartered in Fremont, Ohio WSOS Community Action serves as the regional management entity in Ohio and Michigan for the Great Lakes Rural Community Assistance Program (RCAP), which assists small rural communities in developing and maintaining infrastructure for drinking water, wastewater treatment, and other community services, thereby improving rural quality of life. Formed in 1980, the Great Lakes RCAP encompasses Illinois, Indiana, Kentucky, Michigan, Ohio, West Virginia, and Wisconsin.

This four day session held at The Westin Columbus was the second time all four CTAM courses were taught in a classroom format – the first was in Raleigh NC in 2015. As before, each day of the program was devoted to one level of training (i.e., level 100, 200, 300, and 400) and included quizzes for each chapter.

The program was attended by 35 professionals from around the US who are focused on utility management. Instructors for the course included: Dr. Tom Iseley (TTC Director of International Operations), Kurt Wright (President, SDG Engineering), Ronald Thompson (STRADA Engineering), George Kurz (Consulting Engineer), and Joe Crea (RFC). The course was also supported by Saleh Behbahani, Shijun Lu, and Huayuan Zhong, graduate students at Louisiana Tech University.

After completion of these 4 courses (CTAM 100-400), participants received designation as an Associate Water Asset Manager (AWAM) plus 30 hours of PDH credits. Attendees also received a complimentary one year BAMI-I membership.

Buried Asset Management Institute-International (BAMI-I)

The Buried Asset Management Institute - International (BAMI-I) is a non-profit corporation whose main purpose is to educate and assist those who have an interest in applying best buried asset management practices to extend the life and efficiency of their assets. Although BAMI-I has been mainly focused on water and wastewater systems, the principles of asset management apply to all different types of buried assets including for instance gas distribution pipes, electric cables.

Good buried asset management practices will:

- Maximize life-cycle value of assets
- Sustain economic development
- Protect public health
- Improve the environment
- Enhance the quality of life

The purpose of BAMI-I is to provide a center of excellence for owners of underground water infrastructure to join with industry and researchers, using sound science, to evaluate and/or develop buried asset management protocols for application worldwide.

Certification in Training of Asset Management (CTAM)

CTAM is an exclusive four part series in Asset Management coursework and certification. The CTAM program was developed by BAMI-I in conjunction with the TTC (Trenchless Technology Center) at Louisiana Tech and IUPUI (Indiana University-Purdue University at Indianapolis), in partnership with UIM: Water Utility Infrastructure Management, and is hosted by the Trenchless Technology Center at Louisiana Tech.

BAMI-I launched the first CTAM course (CTAM 100) in 2010. The CTAM

100 course provides a comprehensive introduction to Asset Management principles and concepts with special emphasis on their application to "buried assets" associated with water and sewer systems. The initial success of the CTAM 100 course created awareness of the need to broaden its scope and provide more detailed training in an expanded sphere of utility system concerns. This led to the release in 2013 of the CTAM 200 course level, which focused on the specifics of how to develop an Asset Management Plan. In July and August 2015, BAMI-I released the CTAM 300 and CTAM 400 course levels respectively. CTAM 300 & 400 focus on the ongoing management of the Asset Management Plan, as well as the financial aspects of funding Asset Management Plans.

CTAM is offered as 4 online courses and per request in classroom format. More than 800 individuals from 14 countries have enrolled in the CTAM program. There are three levels of certification available – Certificates of Completion, the Associate Water Asset Manager (AWAM) and Professional Water Asset Manager (PWAM) designations. To date 100 AWAM and 12 PWAM certifications have been awarded.

For more information, and application requirements, please visit http://bami-i.com or contact Dr. Tom Iseley: dtiseley@latech.edu.

The principles of asset management apply to all different types of buried assets including water and wastewater systems, gas distribution pipes, electric cables.

The program was attended by 35 professionals focused on utility management

Dr. Tom Iseley (TTC Director of International Operations) introduces the CTAM 300 course

ABOUT THE TRENCHLESS TECHNOLOGY CENTER (TTC):

The Trenchless Technology Center (TTC) is an industry/university/government research center at Louisiana Tech University. It has world-class research and testing facilities at the National Trenchless Technology Research Facility (NTTRF) in South Campus at Louisiana Tech. The TTC was established by Dr. Tom Iseley in 1989. It was created to promote research, development and technology transfer in the trenchless technology industry. For over 28 years TTC has served as a global leader for the development of technologies influencing almost every aspect of trenchless construction methods.

ACE PIPE CLEANING, INC. UTILIZES PRIMUS LINE® TO REHABILITATE WATER MAIN INSTEAD OF EXCAVATION

By: Ryan Poertner, Ace Pipe Cleaning, Inc.

Ace Pipe Cleaning, Inc., (Headquartered in Kansas City, MO with offices in St. Louis, Nashville, Fort Worth, and San Antonio) currently holds a sewer rehabilitation contract with the City of Columbia, MO. As a part of this contract, Ace and its subcontractors are responsible for rehabilitating the sewer mains, sewer laterals, and manholes within the City of Columbia. The vast majority of this work is done utilizing trenchless technologies that do not require disturbance of the ground. At one of the progress meetings, City of Columbia Sanitary Sewer Engineer, Nate Runyan, indicated that Dave Mathon, Water Engineering Supervisor, had a water distribution line, approximately 300 feet in length, which needed rehabilitation in lieu of excavation because of the other utilities in the surrounding area, along with a retaining wall very close by.

Existing utilities and retaining wall nearby

Mathon inquired if Ace had any products or processes that would allow for the in-place rehabilitation of this water main. Since Ace was already a licensed Primus Line® (NSF/ANSI 61 certified) installer, their low pressure water main product fit perfectly into this application, which is a flexible relining solution for the trenchless rehabilitation of pressure pipes. It is not bonded to the host pipe and is self-supporting. As John Moody with Primus Line® said, "This is the ideal solution for pressure pipe rehabilitation because of the reduced risk during installation with a smaller environmental foot print… Primus Line® rehabilitation also extends the life of the pipe while simultaneously increasing operating pressure capabilities."

After the access pits were excavated, Ace ran a camera through the line to determine the extent of scale buildup in the pipe, and what tools would be required to clean the line out. There were soft deposits, as well as hard deposits at some of the joints, that needed to be cleaned out prior to installation.

Soft and hard deposits were jetted and grinded out

For this project the cleaning was accomplished using a high pressure jetter with a rotating nozzle to blast and scour the pipe. This removed 98 percent of the debris, however some of the hardened deposits, as well as a few of the welded joints, needed some grinding work to finish the preparation.

Pile of debris removed from inside host pipe

A remote cutter was used to grind down the remaining imperfections and create a smooth bore pipe.

Post cleaning, ready for liner insertion

When the cleaning was completed the crew set to work installing the liner. The liner installation was a fairly simple process that involved using a winch to pull the liner through the existing host pipe from one pit to the other. The size of the winch necessary to ensure a successful installation depends upon the number of bends in the host pipe and the length of the liner to be installed. The liner is delivered folded and taped into a C-shape, which reduces the surface area and pulling forces required for installation.

Rollers were secured to the host pipe at both ends of the pit to ensure the liner was not damaged when it was being pulled into place. Once the liner extended into both pits, the liner and end fittings were prepped. The rollers were then removed from the host pipe and double-sided ANSI flanged end fittings put into place. These specially designed fittings connected to the existing host pipe, and allowed for a spool piece to be dropped into the pit in order to tie the system back together.

Upon completion of the liner installation, the rehabilitated liner was pressure tested at 1.5 times operating pressure, or approximately 100 psi for this installation. A chlorination and bacteria test was performed on the newly rehabilitated liner and it was put back into service. Dave Mathon said, "The Primus liner was the perfect solution for us. It greatly minimized our excavation through a highly congested area. This section of water main was cleaned, lined, tested and back in service in about a week."

As this was part of a much bigger project, once restoration has been completed, Ace will utilize their live water main investigation tools to perform a live video inspection through a fire hydrant while the system is active and under pressure. Ace has the ability to provide full turnkey services for live main inspection and cleaning of water mains and force mains.

If you have any projects where live investigation or Primus Line® sounds like an ideal solution, please reach out to Ryan Poertner (rpoertner@acepipe.com).

ABOUT THE AUTHOR

Ryan Poertner *is General Manager of Ace Pipe Cleaning, Inc. (a member of the Carylon Corporation) a Midwest contractor specializing in Lateral Connection Repair, CIPP Point Repairs, Structural Rehabilitation, Laser/Sonar/HDCCTV Profiling, Sewer Cleaning, among other things. Ryan serves as Treasurer for the MSTT Board of Directors.*

STATIC BURSTING MASTER CLASS:

GM Contracting Achieves High Production on Trunk Watermain Burst Project

An 8-inch HDPE above ground bypass had to be added to the job during start up

By: TT Technologies Inc.

Sometimes trenchless applications not only make the most sense in areas that are highly traveled and congested, sometimes they are also the perfect choice for difficult to access areas. That was the case for a recent water transmission replacement project for the city of Montevideo, MN. Utility contractor GM Contracting, Lake Crystal, MN, was brought in to battle a deteriorating 12-inch cast iron trunk main in a small, hard to reach, overgrown easement.

Located on the western edge of Minnesota, the city of Montevideo is home to just over 5,300 residents. The area is also home to the confluence of the Chippewa and Minnesota rivers, creating a scenic landscape that offers a variety of recreational opportunities for visitors and residents alike.

According to the city's website, drinking water is supplied through a series of wells located throughout the surrounding area. In addition, water is pumped to an elevated storage tank with a 500,000-gallon capacity to enable the city to meet the usage needs of its residents. With one of the well's transmission lines in need of replacement, the city looked for an economical option to replace the main in an extremely difficult area.

GM Contracting Vice President Mike Urban said, "That was really the most challenging aspect of the whole project, maintaining access. The pipe was located in a river bottom area. And there really wasn't any true public access. Basically all the city had was a fairly small easement. We actually needed to make some arrangements with private landowners to gain access to the area."

For the project, GM contracting crews utilized a Grundoburst 1250G static pipe bursting system from trenchless equipment manufacturer TT Technologies, Aurora, IL.

Contractor Background: Midwestern Roots

GM Contracting provides construction services for cities, municipalities and counties in Minnesota, Iowa, Wisconsin, North and South Dakota and other areas throughout the upper Midwest. As a certified Disadvantaged Business Enterprise (DBE) and Targeted Group Business (TGB), the contractor provides a full range of underground utility

Crews averaged nearly 1,000 feet per pipe bursting run. Pipe bursting was completed in about seven runs

"According to Schwager, other pipe materials are being installed now through static bursting including ductile iron, fusible PVC, restrained joint PVC, sectional VCP and steel."

construction services, combined with years of experience.

In addition to traditional construction methods, GM Contracting is a full service trenchless contractor. Through a variety of trenchless construction methods GM Contracting is able to install or replace service lines and mains with limited surface disruption, leaving roadways, landscaping, driveways and sidewalks undisturbed or with minimal restoration in most situations.

In addition to directional drilling, pipe ramming and horizontal boring, the contractor is well versed in static and pneumatic pipe bursting. Urban estimates the company performs about 10,000 feet of pipe bursting work annually. The project in Montevideo would put that pipe bursting experience to the test, if the crews could actually reach the pipeline.

Bladed rollers, bursting head, expander, and new HDPE is connected to the bursting rods at the launch pit. Patented Quicklock bursting rods are linked, not screwed together like traditional drill stems or other static systems. This speeds up the installation significantly

Access Issues

The line in question carries raw water from one of the city's wells to the water treatment facility in town. The city needed to replace one of the existing transmission mains that connected one of the wells with the water tower located on the other side of town. The existing 12-inch cast iron water main was badly deteriorated and very difficult to access.

TT Technologies pipe bursting specialist Mike Schwager said, "This was a completely undeveloped right of way through an overgrown, wooded area. An open cut project would not have even been feasible in the area. While this wasn't necessarily a high-valued wildlife area, the access was just poor and a trenchless application was really the best option here."

The difficult access area also made time of the essence. The objective of the GM Contracting crews was to approach the situation as a high production pipe project. The goal from the beginning was to burst 1,000-foot sections at a time.

Static Pipe Bursting Process

The static bursting process used in the Montevideo project is basically a three-step process. After establishing launch/insertion and exit/machine pits, bursting rods are inserted through the existing line from the exit pit to the launch pit. At the launch pit, the bladed rollers, bursting head, expander, and new HDPE is connected to the bursting rods.

Finally, the entire configuration is pulled back through an existing line by a hydraulically powered bursting unit. As the bladed rollers are pulled through, they split the host pipe. An expander attached to the rollers forces the fragmented pipe into the surrounding soil while simultaneously pulling in the new pipe.

Unique to this system, patented Quicklock bursting rods are linked not screwed together like traditional drill stems or other static systems. This system speeds up the installation significantly. The rods can be quickly removed one at a time at the retrieval pit during the bursting operation. While HDPE is commonly used, new techniques and technologies are allowing contractors a choice when it comes to product pipe.

According to Schwager other pipe materials are being installed now through static bursting including ductile iron, fusible PVC, restrained joint PVC, sectional VCP and steel. He said, "Several techniques have been developed by TT Technologies, pipe manufacturers and partner contractors to allow the use of a variety of product pipe options with the static pipe bursting process. Beside its inherent trenchless aspect, this is one of the main reasons that the popularity of the method has really taken off. It really provides a level of choice and versatility previously not available with the bursting process."

High Production Bursting

The project in Montevideo was ultimately a model of high production bursting in difficult jobsite conditions. The total job included bursting, replacing and upsizing approximately 6,700 feet of 12-inch cast iron trunk main with 16-inch DIPS High Density Polyethylene Pipe (HDPE).

The project started in the beginning of May. Before the bursting could begin, crews needed to run an 8-inch bypass in order to continue to feed water to the city. Schwager said, "There was an existing 10-inch CIP raw water line near the trunk main, about a foot deeper than the 12-inch line. The original plan was to use it as the feed during construction, but it was not flowing with enough capacity, so an 8-inch HDPE above ground bypass had to be added to the job during start up."

GM Contracting crews devised a plan to maximize bursting operations, dividing the runs into 900- to 1000-foot sections. In several areas crews were able to use the equipment pit to burst and replace pipe in both directions. Schwager explained, "In certain circumstances the bursting unit can be positioned in the middle of two runs. This way, crews can complete a bursting run in one direction, reposition the machine 180 degrees and then burst in the other direction. This results in fewer pits and a more efficient approach to the overall layout of the project."

Urban said, "We were able to achieve very high rates of bursting production on the Montevideo project. Our crews averaged almost 1,000 feet per pipe bursting run. The entire project was completed in about two months and the actual pipe bursting was completed in about seven runs. After bacteria testing and chlorination, we were able to put the new line in service."

Schwager said, "This project was a good example of what can be achieved in terms of production rates through static pipe bursting. GM Contracting was very effective in a difficult area. It was an impressive project."

ABOUT TT TECHNOLOGIES:

TT Technologies

*For more than 45 years, **TT Technologies** has been the worldwide leader in trenchless technology. TT Technologies' complete line of trenchless equipment includes piercing tools, guided boring tools, pneumatic, static and lateral pipe bursting systems, pipe ramming tools, bentonite mixing systems, constant-tension winches, directional drills and mini-directional drill rigs. Each year, more trenchless sewer, water, gas and electric rehabilitation and replacement projects are successfully completed with trenchless equipment from TT Technologies than any other. TT Technologies is the leader in trenchless!*

MILLER PIPELINE

AN MVERGE COMPANY

MILLER PIPELINE UTILIZES INTERNAL JOINT SEALS TO SOLVE A VARIETY OF CUSTOMER PROBLEMS

Close up of WEKO-SEAL® product
(PHOTO BY RYAN COOPER, MILLER PIPELINE)

Internal Joint Seals are a leading trenchless system for internally and economically renewing leaking joints in water, wastewater, storm water, natural gas and industrial piping 18 inches up through 216 inches and larger.

Miller Pipeline utilizes WEKO-SEAL® which is made exclusively by Miller Pipeline. WEKO-SEAL® is one brand of internal joint seal that features a flexible rubber leak clamp that ensures a non-corrodible, bottle-tight seal around the full inside circumference of the pipe joint area. The unique design incorporates a series of proprietary lip seals that create a leak proof fit on either side of the joint. Installed internally with up to 2,000 feet between access points, WEKO-SEAL® technology can be utilized in square, rectangular, round and elliptical pipe, including transitions, fittings, and even vertical offsets or specialty configurations.

Example of installation of WEKO-SEAL®

Internal joint seals can be 216" or larger.
(PHOTO BY RYAN COOPER, MILLER PIPELINE)

Examples of an abnormal shaped pipe being sealed

Monitoring while divers install an internal joint seal to stop a leaking pipe
(PHOTO BY RYAN COOPER, MILLER PIPELINE)

WEKO-SEAL® is appropriate for installation in natural gas and industrial piping, potable water distribution lines, sanitary sewers, and storm sewers. It is permanent and handles operating pressures in excess of 300 psi and 100 feet of external head pressure, with proper design. In nuclear and fossil fuel power plant applications, the WEKO-SEAL® is routinely used for sealing leaks in both fresh and seawater cooling and circulation lines. In all cases our customers are left with bottle-tight joints that will provide years of worry-free maintenance. Internal joint seals are widely used in new installations where the pipe has been improperly installed. Internal joint seals are also an effective solution for concrete pipes that are in good structural shape and that only have joint issues.

Miller Pipeline has trained and experienced personnel who handle installation. The material specifications for the WEKO-SEAL® fall into four main application categories: water, wastewater, natural gas and seawater/brackish water. Each application has materials specifically engineered to provide years of worry-free maintenance through the proper rubber seal and stainless steel retaining band selections.

Permanent

Each WEKO-SEAL® features a non-corrodible, bottle-tight seal with minimal reduction of the pipeline's interior diameter and can handle operating pressures in excess of 300 psi and 100 feet of external head pressure, with proper design.

Flexible

With its proven patented technology with a positive mechanical locking wedge design, the internal joint seal accommodates normal pipe movement from ground shifting, thermal expansion or contraction, and vibration. A test valve comes standard on every seal and features durable cross-sectional seal thickness.

There are design and installation options for standard round pipes as well as lines with unusual shapes including oval, square, or those having compound angles

Trenchless Installation

Internal joint seal WEKO-SEAL® is installed with minimum surface disturbance and allows for access openings in excess of 2,000 feet apart. Entrance through manholes, vaults, fittings or cut-outs permits fast installation, which lends itself to immediate or emergency situations.

Cost-Effective

The use of maintenance free internal joint seals offers savings of up to 60 percent over other repair methods and can be used in a wide range of applications: water, wastewater, storm water, natural gas pipelines and more. WEKO-SEAL® is appropriate for uses in steel, cast iron, ductile iron, reinforced concrete, PVC, and more. Internal joint seals are appropriate for all types of environments, including underwater, and can be installed vertically.

Miller Pipeline's staff can quickly aid in specifying the proper materials for your applications, and even provide custom designs for one-of-a kind situations. No matter the unique problem, Miller Pipeline will have a solution. For more information, visit www.weko-seal.com.

ABOUT MILLER PIPELINE:

Miller Pipeline offers a full range of rehabilitation methods for wastewater pipeline systems, covering practically all methods of trenchless technologies, from pipe bursting and internal joint seals to trenchless options such as expanded-in-place PVC liner and cured-in-place pipe. A leader in building and maintaining America's infrastructure for over sixty years, Miller Pipeline is one of the nation's premier natural gas distribution, transmission pipeline and utility contractors.

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NORTH AMERICAN SOCIETY *FOR*
TRENCHLESS TECHNOLOGY

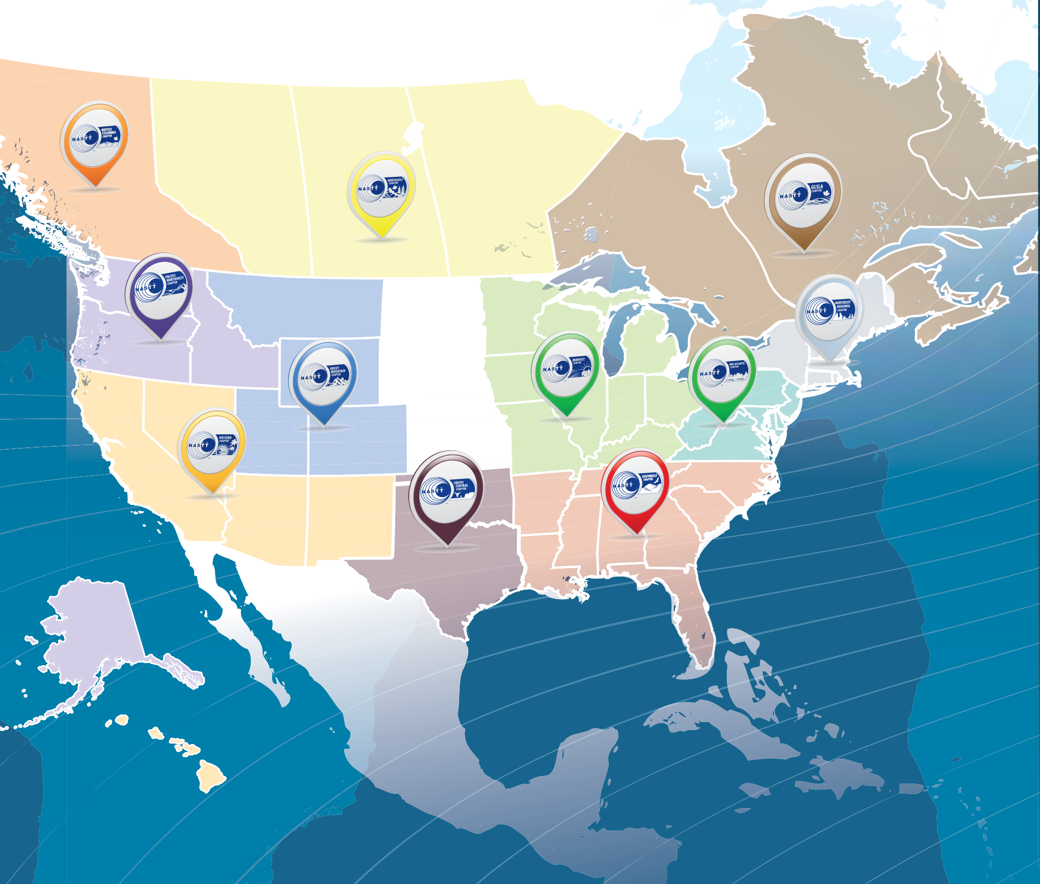
NASTT REGIONAL CHAPTERS

REGIONAL ISSUES, INTERNATIONAL SUPPORT

Contact your regional chapter today.

The grassroots of NASTT is a network of eleven regional chapters throughout the United States and Canada. Regional chapters network at the local level, share infrastructure challenges and develop new ideas. Regional chapters hold various events throughout the year, and like NASTT, are dedicated to the advancement of trenchless technologies for the benefit of the public and the environment.

With your NASTT membership you are automatically enrolled not only in the national and international organization, but also in your regional chapter. So join today and get to know the “local heroes” that are making their communities better places through the innovative engineering solutions of trenchless technologies.



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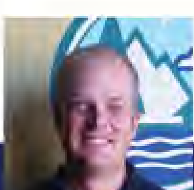

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