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SESTT CHAIRMAN MESSAGE 2021

Moving Trenchless Technology Forwards While Facing Challenges

Jerry Trevino, SESTT Chairman

Right off the BAT! The year started with a pandemic in the early months of 2020, causing the global economy to decline. Despite this challenge, all citizens still expect governments to supply them with clean water, adequate collection of sewerage, and ample supplies of all utilities without interruptions of service to homes, businesses, schools and churches. This current pandemic and its effects on our economy has created major obstacles, challenges, and also opportunities, with respect to maintaining our infrastructure. In addition, the threat of cyber-attacks puts up roadblocks to the efficient delivery of public utility services.

These challenging times should also strengthen us and prepare us to proactively plan to survive future calamities. We all look forward to meeting in Orlando at the NASTT No-Dig Show March 28-31 to learn about new and existing innovations in trenchless technologies and underground construction services. We will also have the opportunity to visit over 100 exhibits set up for us by the vendors of these new forward looking technologies.

> ***These challenging times should also strengthen us and prepare us to proactively plan to survive future calamities.***

Moving forwards, the trenchless technology industry must continue highlighting the need to not only to maintain our infrastructure but also to upgrade it to the next level for future generations in order to maintain a healthy nation. One of government's foremost obligations is to provide its citizenry with clean and safe drinking water and an efficiently functioning infrastructure. It will challenge us all to the core to create the necessary new materials, processes, and technologies to achieve this.

We thank everyone involved in the Southeast Society for Trenchless Technology (SESTT), participants in our regional Trenchless Technology seminars, and the advertisers and editorial contributors in this magazine for their ongoing support in promoting Trenchless Technologies. As we continue assessing and upgrading infrastructure to promote healthier lives, and improved social and environmental conditions, your efforts and dedication are vitally important!

Sincerely,

Jerry Trevino
SESTT Chairman

SESTT SITE

GREETINGS FROM THE EXECUTIVE DIRECTOR

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

I am the Executive Director for the Mid Atlantic (MASTT), Midwest (MSTT) and Southeast (SESTT) Society for Trenchless Technology. Needless to say, Coronavirus 19 shut down the seminar programs for all three NASTT Chapters last year. No municipal guest presenter or municipal attendees… no seminar! I was able to get the MSTT Kansas City seminar conducted on March 11, 2020 as everything was shutting down. My wife and I experienced Coronavirus 19 traveling problems while returning home from the Kansas City seminar. Scary and not good!

All MSTT, MASTT and SESTT "Trenchless Technology, SSES and Buried Asset Management" 2020 seminars scheduled after Kansas City, were postponed. MASTT, MSTT and SESTT are tentatively planning to conduct all the 2020 postponed seminars in 2021, Coronavirus 19 allowing. The proposed 2021 Seminar and Journal Schedule is shown below.

"Thanks for your support!"

MSTT conducted the FREE LIVE two hour "MSTT Trenchless Technology 2020 Fall Webinar" through NASTT on Thursday, December 17, 2020 from 11:00 am to 1:00 pm EST. The webinar was a huge success with 148 attending and earning them 2 PDHs and a certificate. The presentations can be viewed at www.mstt.org.

Thanks for your support!

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

PLEASE REVIEW THE MASTT, MSTT AND SESTT 2021 PROPOSED SEMINAR AND JOURNAL PUBLICATION SCHEDULE:

SOCIETY	LOCATION/PUBLISH	PROPOSED DATE	STATUS
MASTT SEMINAR	BALTIMORE MD	MAY 19, 2021 - WED	PROPOSED
MASTT JOURNAL	PUBLISH DATE (DEADLINE 04/30/21)	MAY 20, 2021 - THUR	PROPOSED
SESTT SEMINAR	SAVANNAH GA	JUL 21, 2021 - WED	PROPOSED
MSTT SEMINAR	MILWAUKEE WI	AUG 18, 2021 - WED	PROPOSED
MASTT SEMINAR	ATLANTIC CITY NJ	SEP 15, 2021 - WED	PROPOSED
MSTT JOURNAL	PUBLISH DATE (DEADLINE 09/10/21)	OCT 1, 2021 - FRI	PROPOSED
MSTT SEMINAR	CINCINNATI OH	OCT 27, 2021 - WED	PROPOSED
SESTT JOURNAL	PUBLISH DATE (DEADLINE 11/12/21)	DEC 3, 2021 - FRI	PROPOSED
SESTT SEMINAR	MIAMI FL	DEC 8, 2021 - WED	PROPOSED

Please contact Leonard Ingram, PWAM, Executive Director at leonard@engconco.com or call (334) 872-1012 to present, exhibit, food sponsor or attend at these seminars.

Please contact Andrew Pattison, A to B Publishing, Inc. at marcomap@shaw.ca or call (204) 275-6946 to advertise in the journal or discuss an article for the journal.

OUR 119 "TRENCHLESS TECHNOLOGY, SSES AND BURIED ASSET MANAGEMENT" SEMINARS SINCE 2001, HAVE OFFERED A LOT OF INFORMATION, A LOT OF NETWORKING AND A LOT OF LEARNING.

MESSAGE FROM NASTT CHAIR

Alan Goodman, NASTT Chair

This year I begin my term as Chair of NASTT's Board of Directors, and I am looking forward to seeing the continued progress and expansion of NASTT, the Southeast Chapter and the trenchless industry. 2020 was a year that truly was unprecedented! We've seen challenges with communication and physical meetings due to the global pandemic, however the perseverance of our membership, sponsors, and trenchless community have enabled this society to rise above the circumstances and set our future for success. Due to unparalleled creativity and sheer effort, we will continue to experience growth and recovery as we work toward our common goals in 2021.

We are in the final days of planning the NASTT 2021 No-Dig Show being held in the heart of the Southeast Chapter in Orlando at the end of the month. There are currently more than 110 registered exhibitors that will be on site and ready to display their innovative trenchless products and services. Joining us in person may look a bit different as we work to ensure your health and safety, while still bringing you the value you expect from the No-Dig Show. We will ensure the proper health protocols are in place to provide a safe environment. Having attended two conferences over the last 30 days I am assured that the best efforts are being made to protect attendees at No-Dig 2021. We are also offering an On-Demand option for attendees that are unable to be onsite in Orlando. Visit the conference website at www.nodigshow.com and explore the pages in this magazine for more information on all the ways you can virtually participate in the 2021 No-Dig Show.

> ***We focus on bringing trenchless technology to every corner of North America!***

NASTT exists because of our dedicated volunteers. I'd like to thank our 2021 No-Dig Show Program Chair Dr. John Matthews of the Trenchless Technology Center at Louisiana Tech University for volunteering his time and expertise to help us make this show an exceptional event. Dr. Matthews is a vital volunteer and member of the Southeast Chapter of NASTT. He not only serves as Program Chair, but he serves on the NASTT Board of Directors and on several committees. His volunteer spirit and technical expertise are invaluable to our success here at NASTT!

With training and education at the forefront of our mission as a Society, we look forward to offering many creative options for trenchless training and education throughout the year including our Virtual Good Practices Courses and our virtual or in-person Regional Chapter meetings, conferences and webinars. Stay tuned as we roll out a wide range of opportunities to meet your professional needs.

Our Society is only as strong as our members and volunteers. I have gotten to see first-hand the time and sacrifice that each of you have made. Since our committees align with the strategic plan, I challenge our membership to participate in the NASTT committees. Education and the college curriculum will continue to evolve as we focus on bringing trenchless technology to every corner of North America. I thank you for your dedication and your commitment during what can only be described as one of the most challenging and unusual years of our lifetime!

Alan Goodman

NASTT Chair

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Jerry Trevino - *Chairman*

Jerry Trevino is President of Mechanical Jobbers Marketing, Inc. and Protective Liner Systems, Inc. Jerry is an engineering graduate from the University of Texas in Austin. Before specializing in infrastructure rehabilitation, he worked as a project engineer and in research and product development for Procter and Gamble and Mobil Oil. He now specializes in the development, manufacturing and installation of all types of polymeric and cementitious coatings, liners and FRP composites used to rehabilitate infrastructure for municipalities and the industrial sector. He has expanded his business to include assessment of pipes and manholes to help his municipal and industrial clients to be able to pinpoint and get ahead of deterioration. He strongly believes that trenchless technologies offer numerous methods to maintain and upgrade aging infrastructure.

Chris Ford - *Secretary*

Chris Ford is Principal and Vice President of Operations at Highfill Infrastructure Engineering, PC, a Carolinas engineering consulting firm specializing in community and municipal water and wastewater infrastructure engineering. With over 30 years of experience, Chris serves as a leading trenchless technologies resource for public utilities in the Carolinas. Over the last 16 years he has focused on the use of trenchless technologies for condition assessment, evaluation, renewal, and replacement of both pressure and gravity pipelines. His experience includes large diameter ductile iron pipe splitting, pipeline renewal with high pressure liners, various methods of gravity sewer rehab, and new installations via horizontal directional drilling. A graduate of NCSU with a BS in Civil Engineering-Construction, Chris regularly presents at conferences including NC AWWA-WEA, NASTT No-Dig, and UCT.

Ed Paradis - *Vice Chairman*

Ed Paradis is Market Development Manager, Injection Systems specialist - North America, Underground Construction for Master Builders Solutions – BASF . Ed has served the industry in various positions over 20 years and is highly regarded as a leading resource on chemical grouts. His dedication to the specialty field of chemical grouts has been proven by his involvement in some of the country's highest profile projects, such as the Port of Miami Tunnel.
Ed served in the U.S. Army for 8 years and has been involved in the construction and rehabilitation industry since 1989, and further contributes to and advances industry growth through active membership in various associations such as Nevada Mining Assc, NASTT, SESTT, UCT, ICRI, and DFI (Deep Foundation Institute). His 20 plus years in the chemical grout market both as a contractor, salesman and manager has provided countless useful knowledge for the industry.

Ed Diggs - *Treasurer*

Ed Diggs has been involved with CCTV inspection equipment for nearly 30 years, working with municipalities, contractors and engineers, insuring their specific needs. He began his career in the sewer business as a senior manager with R.S. Technical Services and for the past twenty years has been employed by SPX Cues, Inc. in various positions. Currently Ed's role is with SPX Cues' sister company PIPC (Pipeline Inspection Partners Corp.), a purveyor of Cues High Technology products, where he develops business for 2D and 3D multi-sensor platforms and reports. Ed is a member of NASTT, SESTT, WEF, FWEA, WEAT, APWA, and AWWA.

SOUTHEAST SOCIETY FOR TRENCHLESS TECHNOLOGY
BOARD OF DIRECTORS 2021

For more information, and to join the Southeast Society of Trenchless Technology, please visit

www.sestt.org

2021 SEMINAR & JOURNAL SCHEDULE

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

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For registration and updated information on the 2021 "Trenchless Technology, SSES and Buried Asset Management" Seminars and Trenchless Journals, please visit:

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

RALSTON YOUNG TRENCHLESS ACHIEVEMENT AWARD

Kalyan Piratla, Ph.D.

The Ralston Young Trenchless Achievement Award applauds savvy NASTT members under 36 who have demonstrated excellence early in their career by making valuable contributions to the trenchless technology industry, achieving noteworthy professional success, and actively participating in NASTT or its regional or student chapters. With their talent and ability, these impressive people are the future of trenchless.

The 2020 award recipient is Dr. Kalyan Piratla, the Liles Associate Professor of Civil Engineering at Clemson University. As a NASTT volunteer Kalyan served as a moderator, track leader and program committee member for several NASTT No-Dig conferences and other technical conferences. As the Advisor for the NASTT Student Chapter at Clemson University, he focuses its 85 members on education and outreach activities associated with trenchless construction methods.

Congratulations and thank you, Kalyan!

OUT OF SIGHT, OUT OF MIND, OR IS IT?

Force Main Assessment Case Study: South Seminole and North Orange Wastewater Transmission Authority (SSNOCWTA), north of Orlando, Florida

By: Jerry Trevino, Mechanical Jobbers Marketing, Inc.
Ed Gil de Rubio, SSNOCWTA
Weston Haggen P.E. Reiss Engineering Inc., a CHA Company
Emily Staubus Williamson, E.I., Reiss Engineering Inc., a CHA Company

GENERAL OVERVIEW

Flourishing population centers require an abundant source of clean fresh water to sustain any healthy, thriving urbanization. Equally as important is a safe and efficient wastewater sanitary collection transmission and treatment system.

The South Seminole and North Orange County Wastewater Transmission Authority (SSNOCWTA), located just north of the City of Orlando, Florida, is charged with the mandate to responsively and proactively assess, prioritize, construct and maintain its water and wastewater infrastructure.

Since 1838, this geographical area in Central Florida, just north of Orlando, has experienced a steady growth in population. A sky view or 4000-foot perspective shows this area is nestled among numerous scenic lakes and streams and has abundant clean water sources, all of these characteristics are requirements for a high quality of life. The warm climate as well as the recreational opportunities available to citizens and vacationers helps to create growth and with that trend underground utilities have to be proportionally upsized, upgraded and maintained.

SSNOCWTA recognizes that the "out of sight, out of mind" mindset is 180 degrees in direct contrast to what it takes to maintain critical underground infrastructure. It requires the allocation of financial resources and contracting with professional

Area has abundant clean water sources, nestled among numerous scenic lakes and streams

> ***All man-made structures including raw water mains and wastewater collection and transmission piping are subject to entropy.***

engineering firms, such as Reiss Engineering Inc., a CHA Company, as well as other contracting firms, like Mechanical Jobbers, to assess underground infrastructure through the use of state-of-the-art Trenchless Technologies. These assessments not only evaluate current conditions but also are used to foresee the future needs for repairs and upgrades as the population growth requires.

ALL MAN-MADE STRUCTURES REQUIRE CONSTANT EVALUATION AND MAINTENANCE TO CONTINUE TO EXIST

All man-made structures including raw water mains and wastewater collection and transmission piping are subject to an increase of entropy to a zero-energy degree level into a state of full decay. That is why it is imperative to disrupt and interfere with the natural direction of this decay trend, through critical assessments, repair and upgrades. In addition, since funding is finite, responsible public authorities contract with experienced professionals to research and recommend the use of the latest most effective technologies. In essence they are changing the course of nature.

CASE STUDY: SPECIFIC TO EXTRACTION WITH SPECIALTY COLLECTION DEVICE

This case study involves SSNOCWTA contracting Reiss Engineering Inc., a CHA Company, PICA, INGU, Mechanical Jobbers Marketing as well as other professional entities. There was a considerable amount of preplanning, several Zoom meetings and many decisions behind the scenes by the time Mechanical Jobbers Marketing was requested by Kris Embry of PICA to help with the collection and extraction of the Recon+ ball.

This multi jurisdiction, wastewater collection system consisted of 32 lift stations feeding wastewater through a complicated transmission pressure pipeline to a transitional manhole. The manhole was located in a small median island and consisted of a standard size manhole frame with a standard size manhole chimney leading to a 10-foot diameter bottom section. Two 36-inch diameter pipes transitioned into a 42-inch diameter exit invert pipe. Our role was to custom design an extraction device, place it inside a 10-foot manhole section and catch the Recon+ ball. The collection and extraction device went from conception to fabrication to application in a short period of time.

The design criteria included the following:

1. A device with sufficient structural strength to withstand the effluent pressure of a 42-inch diameter full flow pipe, without restricting the flow to create surcharging.
2. A device allowing for sewerage effluent with solids to flow while capturing a 2.2-inch free swimming inspection device.
3. A device that is capable of being lowered through a standard size manhole frame with a 19-inch opening, then deployed to a 10-foot diameter manhole bottom section.
4. The installation required technicians to perform a confined space entry.
5. The device had to be deployed in a matter of minutes and had to be adjusted to conform to the invert, bench and existing exit pipe so as to NOT allow the inspection device to pass through.
6. The device had to be removed in a short period of time from the manhole once it had caught the inspection device without losing the Recon+ ball.

There were several big challenges involved in this particular project. Mechanical Jobbers Marketing has lined thousands of manholes and underground structures over the last 30 years. The confined space entry and dealing with the sewerage on these jobs was not as big a challenge as that of capturing a relatively small ball in a river of sewer effluent.

Another big issue was the physical location of the extraction manhole on a small median between two 3 lane roads on each counter flow of traffic in addition to turning lanes. The whole project had to be completed without affecting this traffic flow.

The extraction device was constructed based on piping drawings that were many years old and without any current as built manhole drawings. We took enough caging material and fabrication tools to modify the extraction device as needed.

Ultimately, we were successful in capturing and recovering one of two sensor loaded Recon+ balls that were launched. After the ball was collected it was sent for data analysis and interpretation. Following is the Report from SSNOCWTA and Reiss Engineering Inc., a CHA Company, based on the data that was collected.

> ***SSNOCWTA chose the most comprehensive and cost effective tool available to assess this critical Force Main.***

"GOOD DECISIONS START WITH GOOD INFORMATION"

INTRODUCTION AND BACKGROUND

The South Seminole and North Orange County Wastewater Transmission Authority (SSNOCWTA) is an organization tasked with funding, planning, operating, and maintaining a regional wastewater transmission system serving five (5) major municipalities including Seminole County, City of Casselberry, City of Winter Park, City of Maitland, and City of Winter Springs. The SSNOCWTA transmission system includes lift stations, transmission force mains, and metering stations to transmit the collected wastewater to the City of Orlando Iron Bridge Regional Water Reclamation Facility (WRF).

The most recent SSNOCWTA 2019 Capital Improvement Plan (CIP) identified a 30-inch ductile iron force main located on Howell Branch (Figure 1) for future replacement. The replacement recommendation was made based on a variety of factors including the pipe material, age, and past associated history with the force main. The force main also had a previous failure which required an emergency repair. Ultrasonic Thickness Testing (UTT) previously completed on the Howell Branch force main also identified areas with reduced wall thickness, which indicates the occurrence of corrosion of the pipe wall that ultimately may lead to deterioration of the pipe's structural characteristics. The force main is a critical main in the SSNOCWTA transmission system, which transmits a significant portion of the overall system flow.

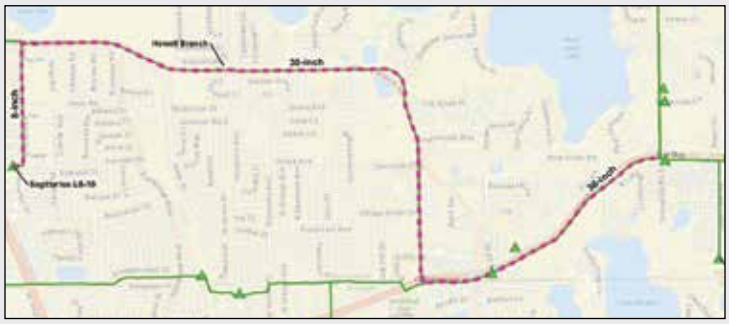


Figure 1. Total length of pipe inspected was 4.33 miles

Force main failures are often associated with the accumulation of sewer gases, commonly known as gas pockets or air pockets, which typically includes a high concentration of hydrogen sulfide (H_2S) that may result in the formation of sulfuric acid (H_2SO_4) within the pipe, leading to corrosion and eventual breakdown of the pipes structural characteristics. Additionally, the gas pockets can reduce the hydraulic capacity of the pipeline and diminish the effective capacity of the pump stations delivering flow through the force main. Air release valves (ARVs) are typically installed in below grade vaults or above grade enclosures and connect to the force main pipe via a tap or tee on the force main to prevent the formation of gas pockets by expelling the built-up gas. SSNOCWTA has a significant ARV maintenance program to ensure the proper operation of the ARVs to limit the occurrence of gas pockets.

SSNOCWTA and their Authority Engineer, Reiss Engineering Inc., a CHA Company, (Reiss) were interested in evaluating the Howell Branch force main based on its known history for areas with corrosion based on UTT results and risk assessment. The PICA RECON+ tool by INGU was selected to evaluate the Howell Branch force main due to its capability to identify gas pockets, leaks, and defects, as further described below.

PICA RECON+

PICA's Recon+ In-Line screening technology (powered by INGU) is making an impact in the water and wastewater marketplace. With a lower cost than similar technologies, the Recon+ small diameter sphere travels freely, within product flow, through most pipelines. It is an excellent solution to acoustically screen pipelines for leaks/gas pockets as well as geometry and mapping (X, Y and Z). Consecutive runs through a pipeline deliver additional layers of information that can enhance inspection quality, reliability and delivers easy to interpret data for identifying potential pipeline risk, helping asset managers to effectively manage these assets.

PICA's Recon+ Inline tools utilize the INGU innovative Pipers® technology and are shaped in the form of small, billiard ball sized spherical sensors (Figure 2). The size of these sensors allows them to easily be deployed into any pipe and passed through the usual product stream with less risk of any delays due to debris or the device itself getting stuck. Recon+ inline tools are effective and low-cost compared to traditional inspection methods.

Figure 2. INGU Recon+ is 2.2 inches Diameter

Ideal applications include:

- 3-inch to 78-inch water or wastewater mains
- Long pipeline lengths, (24 hrs. run time)
- 0.5 - 6.5 feet/sec inspection velocities
- Any pipe material (CI, DI, CS, AC, RCP, PCCP, PVC)
- Difficult to inspect (non-piggable) pipelines
- Lines that cannot be taken out of service
- Deeply trenched pipelines
- New pipeline baselining

METHODOLOGY AND TESTING

The total length of pipe proposed for the inspection was 4.33 miles, beginning at Sagittarius lift station and traveling through an 8-inch main which manifolds into the subject 30-inch Howell Branch section. After traveling the subject Howell Branch section, the main manifolds into a 36-inch main and travels east along Aloma Avenue where it can transition to a 42-inch gravity main manhole to be extracted. Under normal conditions, the wastewater transitions to gravity in a significantly larger 72-inch gravity main which presented a greater risk of potentially losing the device after it traveled through the force main. To decrease the risk associated with collection in a larger gravity main, the project was carefully coordinated with another SSNOCWTA CIP project, the Aloma Dean Force Main reconnection. Part of the construction work required the transition to the typically unused 42-inch gravity main which allowed for the collection of the RECON+ device in a gravity manhole to the 42-inch gravity main.

Utilizing RECON+ required the coordination of multiple different entities including the City of Casselberry, Reiss, PICA, INGU, and Mechanical Jobbers. PICA and INGU required additional information for pressure and flow in order to properly review the results. Based on the known flow and pressure information, it was anticipated that the time to complete the inspection would be four hours. The proposed location of launch was the Sagittarius lift station which collects wastewater from customers of the City of Casselberry. The City of Casselberry assisted the inspection efforts by providing field staff to operate pumps at Sagittarius LS, dissemble the check valve for RECON+ insertion, etc. The City of Casselberry staff additionally provided maintenance of traffic (MOT) arrow boards for SSNOCWTA to utilize nearby the extraction site to notify nearby motorists of the work occurring.

At the extraction manhole, Mechanical Jobbers installed a specialty collection cage with staff trained for OSHA confined space who were in the manhole to ensure that the devices when discharged from the force main could be collected properly. The extraction manhole was in a traffic median on State Road Aloma Avenue which required minimal traffic drums and arrow boards to notify motorists of the work.

Prior to testing, Reiss provided PICA and INGU with all known information for the subject force main including profile, elevation, pressure, and flow information. The elevation, pressure, and flow information allowed for PICA and INGU to plan for the RECON+ survey. Additionally, on the day of testing, flow information during the time of testing was logged and provided to PICA to be used for the purpose of data post processing. Pressure information was recorded along the Howell Branch force main during testing via two pressure gauges connected to ARVs.

On the day of testing, a proving sphere was inserted at the Sagittarius lift station for the purpose of decreasing risk of inserting the actual RECON+ device into the system to ensure capture. However, the proving sphere was not captured. The PICA and INGU team chose to insert and deploy the RECON+ device after waiting four hours for the proving sphere to be collected. A second device was inserted approximately 15-minutes after the first RECON+ insertion. The purpose of the second device was to provide more exact data on the size of any gas pockets identified.

The first RECON+ device was extracted at the manhole four (4) hours after the insertion. The second RECON+ device was not collected. PICA and INGU staff searched the collected debris from the headworks at the City of Orlando Iron Bridge WRF the following day to locate the lost RECON+ device but were unsuccessful in locating the device. However, since one device was collected, the results of the survey were still available.

RESULTS

The results of the RECON+ survey identified that the main is generally overall in good condition. The pressure and deposit survey did not identify any significant deposit build ups. The pressure survey did identify some discrepancies in elevation as shown in Figure 3.

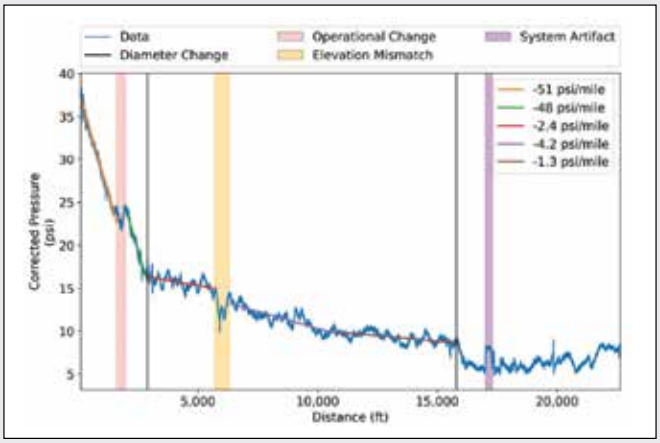


Figure 3. Recon+ Pressure Survey Results

The acoustic sensor did not detect any leaks but did identify fourteen (14) air pockets. Leaks and air pockets can be distinguished due to the spectral signatures in the data post processing, where leaks are a point source with a single intense peak that fades quickly on each side of the spectral analysis whereas the air pocket is more significantly spread out in the spectral analysis. The fourteen (14) air pockets identified are shown in Figure 4, highlighted in yellow.

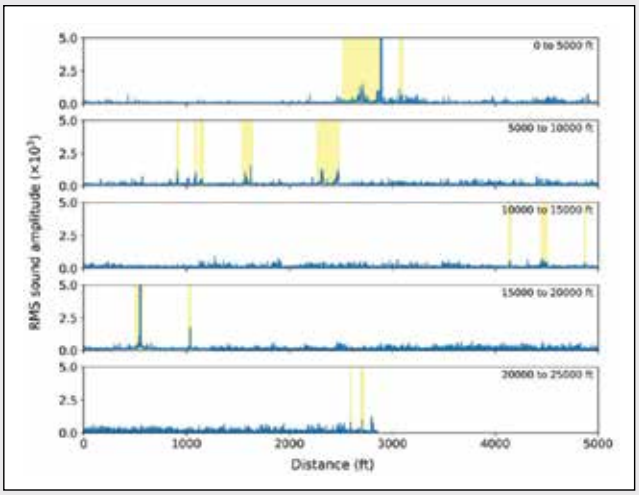


Figure 4. Recon+ Acoustic Sensor Results

The RECON+ magnetic analysis shown in Figure 5 measures residual magnetization using a 3D digital magnetic sensor to determine metal features by determining magnetic flux based on metal volume and the distance between the sensor and metal. Since the RECON+ tool is generally considered a screening tool only, it is only capable of distinguishing magnetic differences larger than 25 percent relative volumetric wall loss. The magnetic analysis of the subject force main overall found that the magnetic flux showed relatively low spread over the entire length of the pipeline which indicates that the pipe overall is in relatively good condition. However, the magnetic flux did identify thirty-six (36) segments that have increased outliers or less homogenous magnetic flux compared to the rest of the pipeline. These are indicators that these segments are in relatively slightly worse condition. Seven (7) segments show changes in magnetic flux structures but are likely to be spool pieces of pipe. Additionally, diameter and material changes and metallic fittings were also identified as part of the magnetic flux analysis which is shown in the output results below along with the identified 36 slightly worse areas.

The locations of the air pockets and slightly worse areas detailed above are plotted in the Figure 6 map with the air pockets in red, and slightly worse areas in black. The slightly worse areas are distributed throughout the entire length of the Howell Branch force main. The air pockets are generally in the first third and last third of the 30-inch pipe near the manifolding pipe locations, or within proximity to existing ARVs. When comparing the locations of the air pockets and slightly worse areas, six (6) of the air pockets overlap with the slightly worse areas. When the locations of the air pockets and slightly worse areas are compared to the previously completed UTT testing locations, the air pockets and defects generally only somewhat overlap with the previous UTT locations. One specific area which shows overlap in the air pockets and slightly worse areas is the section of 30-inch force main prior to the 36-inch main along Old Howell Branch Road which has multiple slightly worse areas and air pockets in an area which has previous UTT results that indicated areas of the pipe which have reduced wall thickness.

CONCLUSIONS AND RECOMMENDATIONS

The PICA RECON+ survey provided a complete screen of the subject 4.33-mile Howell Branch pressurized force main. The survey indicated that while the main is in generally good condition, it identified areas of concern which require further and more detailed attention, identifying fourteen (14) air pockets and thirty-six (36) defects which were relatively slightly worse compared to the overall survey. SSNOCWTA plans to further evaluate these subject areas using more detailed condition assessment technologies such as the PICA Bracelet or UTT to quantitatively define the extent (wall loss) of the RECON+ identified areas of concern. This will allow for SSNOCWTA to define and prioritize the most critical locations to plan repairs and/or replacements before failures and/or emergency responses are necessary.

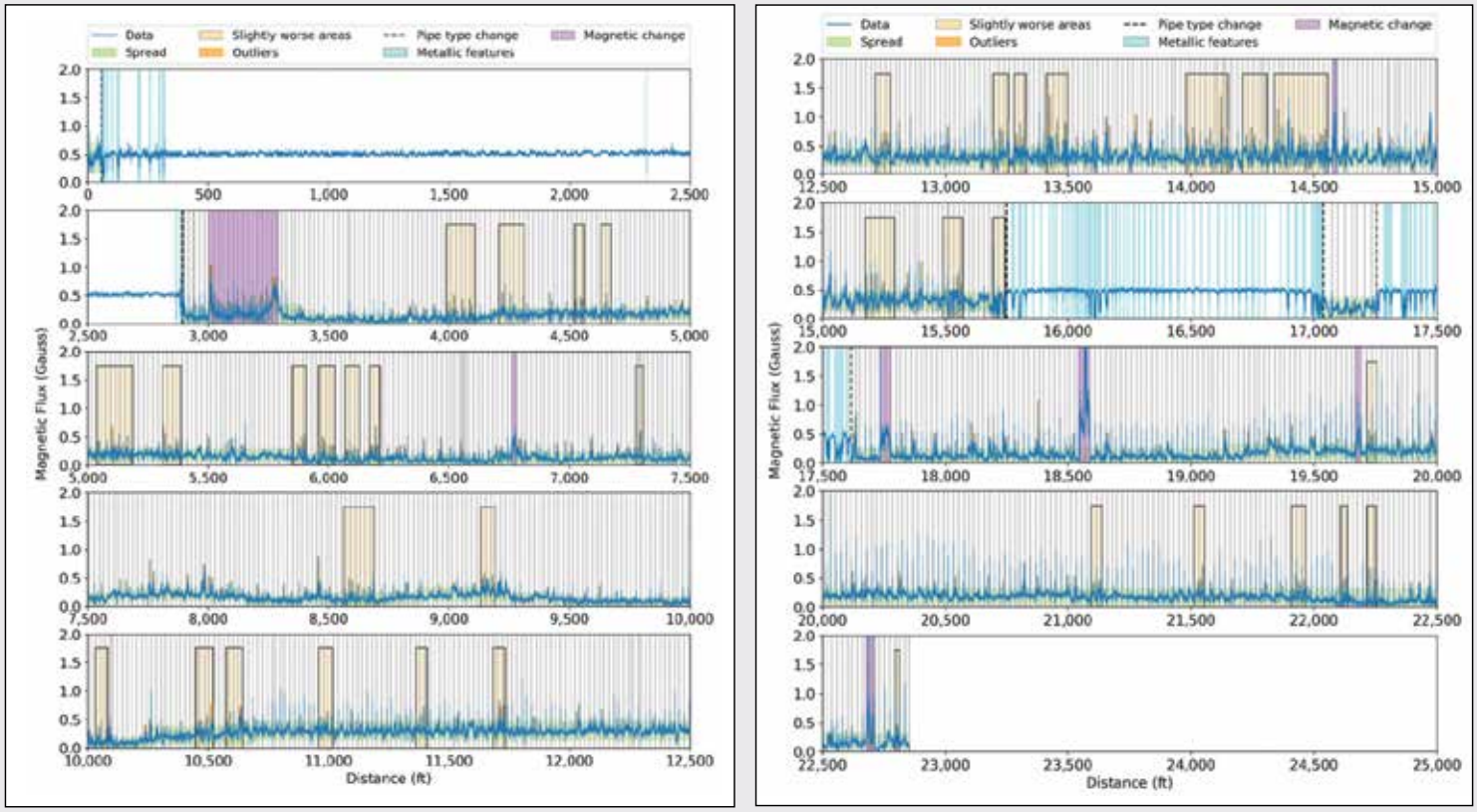


Figure 5. Recon+ Magnetic Analysis Results

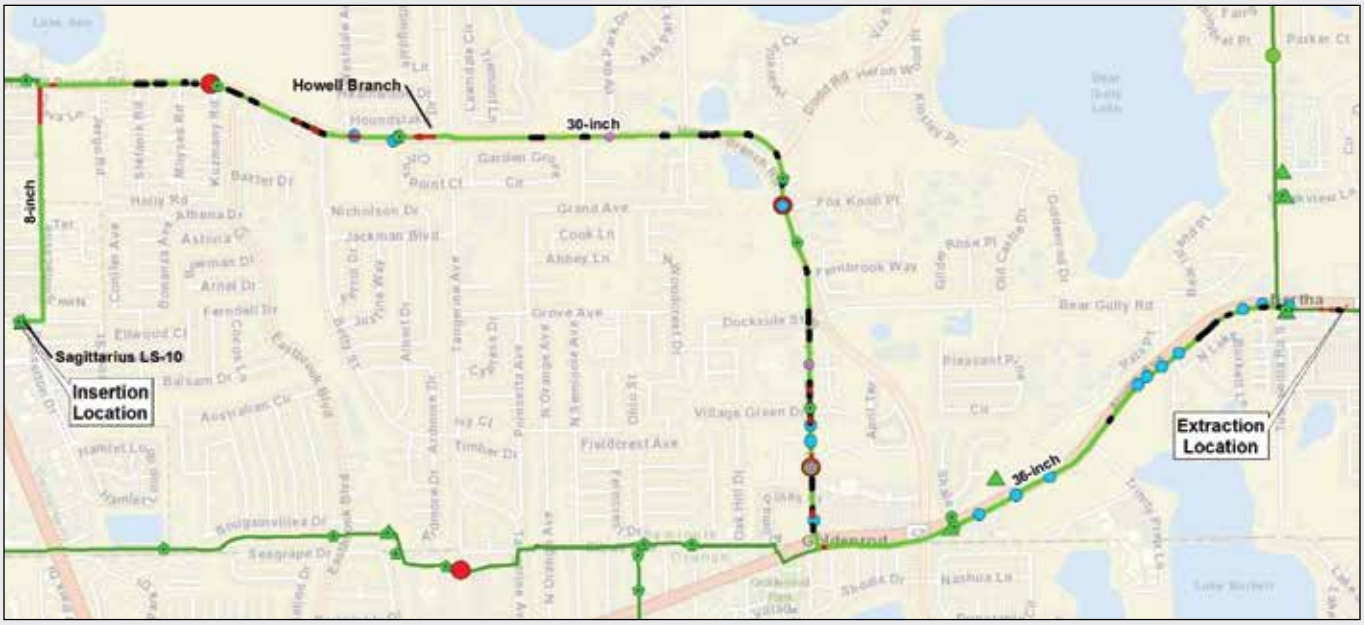


Figure 6. Air pockets shown in red, and slightly worse areas in black

ABOUT THE AUTHORS:

***Jerry Trevino** is President of Protective Liner Systems, Inc., specializing in infrastructure rehabilitation since 1984. As longtime SESTT Chairman, Jerry strongly believes that Trenchless Technologies offer numerous methods to maintain and upgrade aging infrastructure. His full bio is on pg. 8.*

***Emily Staubus Williamson E.I.** is a Project Engineer with Reiss Engineering Inc., a CHA Company, providing support to various projects in water distribution, wastewater collection and transmission, wastewater pump station design, wastewater process improvement, unidirectional flushing, water quality, stormwater collection and pumping, and more, for municipal and private customers across the state of Florida.*

***Weston Haggen P.E.** has over a decade of experience in water, wastewater, and reclaimed water, involved in a variety of municipal and government projects in water and wastewater treatment on behalf of Reiss Engineering Inc., a CHA Company. Projects include water quality hydraulic modeling, master planning, pipeline design, lift station design, potable water quality improvement, unidirectional flushing, inflow and infiltration (I/I) studies, construction administration, preliminary design of wastewater and water plants, regulatory permitting, water treatment pilot studies, feasibility studies, report writing, and data management, including geographic information systems (GIS).*

MIAMI-DADE COUNTY EMERGENCY RELINE

Liner Pipe Installed Completely Submerged

By: Robert Morris, Contech Engineered Solutions

Miami-Dade County Department of Transportation and Public Works (MDC) was notified of a partial culvert collapse and needed to act quickly to avoid any further damage to the culvert as well as the roadway above. The original culvert that failed was installed many years ago, while there was an extension that was added when the road was widened a few years ago which remained intact.

As soon as the County discovered the failure, they closed half of the roadway, detoured traffic, and began looking at viable solutions. Fortunately, only the original portion of the culvert would need to be cut in and replaced while the rest could be relined with a new liner pipe. The County worked with local contractors, David Mancini & Sons, Inc. (DMSI), to devise a way to address the emergency situation that would be both structurally efficient and cost-effective. The goal was to identify a solution quickly that would allow them to replace the partial portion while relining the remaining section as they could not afford to shut down the roadway above. Speed was of the essence.

Ultimately, Miami-Dade County and DMSI utilized a HEL-COR® ALT2 solution manufactured by Contech Engineered Solutions to reline the existing culvert. The 137.5 LF of 120-inch HEL-COR pipe was manufactured with skid rails at the nearby Lantana, Florida manufacturing

The 120-inch HEL-COR® ALT2 Liner Pipe was delivered directly to the site

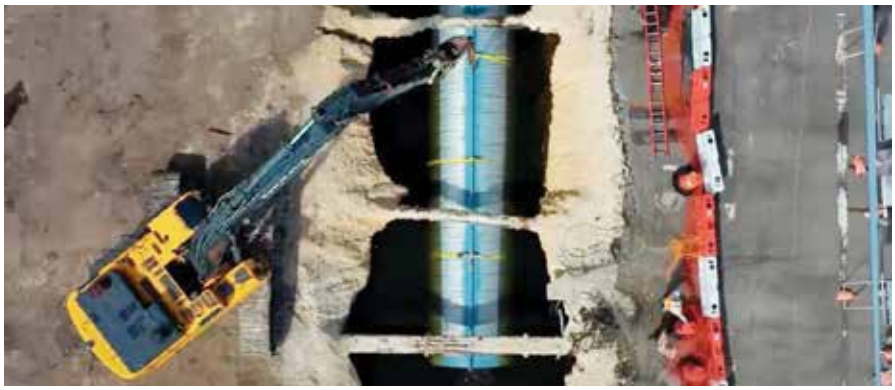
The liner pipe was installed under live flow using a unique anti-buoyancy method

> ***Speed was of the essence.***

facility and shipped directly to the site. DMSI came up with a very interesting method to pull this off with as little disruption as possible which was to install the liner pipe in a completely submerged condition. DMSI completed the emergency culvert reline for Miami Dade County Transportation and Public Works Department by assembling the pipe on a nearby staging site. At which point, they installed the liner pipe under live flow using a unique anti-buoyancy method to lower the pipe into the water and align with the host pipe prior to relining and grouting in place.

David Mancini, Jr. of DMSI commented, "A special thanks to the Contech team for taking my calls at odd hours of the night to discuss and design our in-the-wet reline concept. It was a lot of fun working with Contech to turn these conceptual ideas into reality! The materials and pieces of the puzzle were prefabricated and shipped to the site exactly as we envisioned."

The County was extremely pleased with the quick installation to repair the existing culvert with a fully structural pipe that would adhere to the service life desired while avoiding major roadway closures at the same time.



The HEL-COR liner pipe was installed with skid rails to ease installation

ABOUT THE AUTHOR:

***Robert Morris** is currently a Regional Engineer for Contech Engineered Solutions LLC. Robert has worked with Contech for over 20 years since graduating from Georgia Tech with a degree in Civil Engineering. Robert is a past recipient of ASCE's Younger Civil Engineer of the Year Award for the GA Section and also received the President's Award for outstanding service to the section.*

END TERMINATION OF CIPP LINED PRESSURIZED PIPELINES

By: Steve Soldati, P.E., Aegion Corporation

The traditional method of addressing pressurized pipelines has been to dig and replace. This is a conservative method to either restore structural integrity, improve water quality, protect pipes from further corrosion, or to reduce maintenance costs. The dig and replace method will provide a full replacement of the existing piping system including connections, fittings, and valves to provide a complete piping system. Although this has been the traditional method of addressing aging infrastructure, there have been techniques developed over the years that create more cost-effective solutions to achieving the same goal. The continued development built on top of existing pipelines, additional other utility infrastructure put in the ground, and easement and access agreements that have changed have been the driver to allow for trenchless rehabilitation technologies to show their true colors. Additionally, the lesser amount of disruption to the community resulting from using a trenchless technology has proven to be a common priority with various groups.

But what does it mean to rehabilitate an existing pipe? How do you define the scope of work? What is the project goal of rehabilitation? What are the appropriate standards for this scope of work?

The American Water Works Association (AWWA) Manual M28 provides a thorough review of the various classifications of rehabilitation to determine the level of rehabilitation needed for an existing pipeline. From a non-structural Class I to a fully-structural Class IV solution that will remove the need to rely on the existing pipe for continued strength and operation. It's important to determine the appropriate classification because it identifies the required level of effort needed to return the existing pipe to its intended design and purpose. The design and purpose is not only to provide a structurally sound carrier for the movement of the intended fluid but is also designed to carry the intended amount of fluid to its end user. It's these details and project goals that set the foundation for developing the right details into the project.

Class IV is much more than just looking at the fully structural cross-sectional area of a rehabilitated pipeline to accommodate the internal pressures and external loading. AWWA M28 Appendix A under the Class IV section refers to a Class IV classification as "fully structural" or "structurally independent". When a new pipeline is structurally independent, there is no need to rely on the host pipe for continued life. If the intent of being structurally independent is to remove the host pipe from continued life then this would theoretically extend to the full operational purpose of the pipeline. The purpose of the pipeline is to be a structurally-sound carrier of the host fluid but also to carry all of the intended fluid, preferably without leakage.

The focus of municipalities and water agencies is to increase reliability of their buried infrastructure to reduce the risk of failure, leaking, and maintenance costs. The risk of these factors are borne from the aged materials and condition of the existing infrastructure that was put in the ground several decades ago, and sometimes as early as the late 1800s. Providing a new design life to the pipe itself is the first priority, but that priority should also include the complete piping system.

Of course, buried infrastructure come in all different sizes and operational purpose. Properly terminating the lining system is adaptable to various operating pressures and host pipe materials. Whether it is a low pressure, large diameter force main or a higher pressure, small diameter water main, the concept will remain the same – removing the reliance on the host pipe for the new life span.

Figure 1 shows examples of pipe conditions that could be found in current operation. Without the proper end connection detailing, there is the risk of continued leaking or structural instability if the reconnection is tied back to the existing pipe.

Figure 1. Examples of Deteriorated Pipelines

Without proper end connection detailing, there is risk of continued leaking or structural instability...

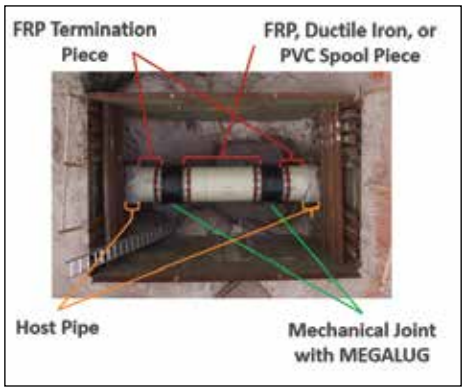


Figure 2. Complete Reconnection of a 48-inch PCCP Force Main in South Florida

Figure 2 is a clear example of the end termination, with full reconnection. The existing host pipe is exposed on either end of the excavation pit and the short spool piece is placed adjacent to the end of the host pipe prior to the lining installation. This short spool piece is lined at the same time as the existing pipe. Once the lining is fully cured, the mechanical joints, end seals, and closure spool piece are then connected. The key here is that the reconnection is installed all to new materials, not to the host pipe.

Figure 3. End termination of a 24-inch Force Main in South Carolina

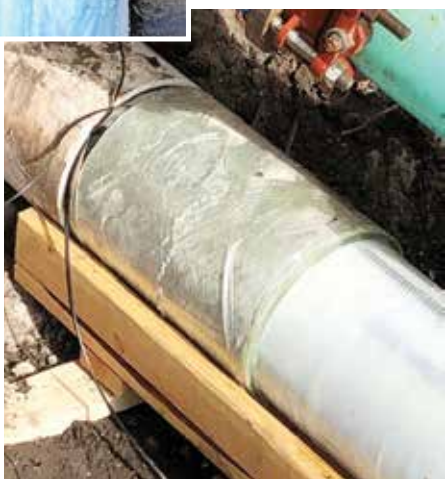


Figure 4. End termination of a 10-inch Force Main in Central Florida

Figures 3 and 4 show end termination detailing. These projects were located in Florida and South Carolina and show the adaptability of the end termination to a variety of different applications.

The goal of each of these projects was to provide a complete, full system, meeting the Class IV intent of the AWWA Manual M28. This approach resulted in providing the owner the assurance that the rehabilitated pipe length had the structural stability and watertightness for the new service life.

ABOUT THE AUTHOR:

Steve Soldati P.E. *is the Regional Sales Manager of Pressure Pipe covering the Eastern United States. He is a registered Professional Engineer in Florida and California and has over 10 years of industry experience working in construction, sales, program management, and asset management.*

BIG TIME BURSTING IN GEORGIA!

H&H Site Specialty Dominates Ductile Iron & Keeps Traffic Moving

By: TT Technologies

At the very core of trenchless technology is the idea that subsurface pipes and utilities can be replaced, rehabilitated or installed without having to dig…much, and sometimes not at all. Sometimes that means trenchless technology lives in the spotlight and carries all the weight of success or failure on a job. This is never truer than in a situation where no "digging" can occur and project success is thoroughly planted on the shoulders of skilled contractors and their assessment of what can be accomplished.

Bursting ductile iron pipe has become more prevalent with static pipe bursting systems. Special bladed rollers are needed to properly split the difficult pipe material

Randy Higginbotham owner of H&H Site Specialty LLC, of Atlanta, GA was recently in the role of that contractor for a significant pipe bursting project that took place under I-675 in Clayton County Georgia. Higginbotham has been involved in some of the largest, most impressive and publicized pipe bursting programs and projects ever attempted, from Houston, TX to Jacksonville, FLA to Atlanta, GA. And after decades in the industry, he started H&H Site Specialty two years ago with his son Josh. With a reputation for quality and ability, H&H Site Specialty was the ideal choice to facilitate the I-675 pipe burst.

Higginbotham said, "The project came to us through RDJE, Inc, out of Newman, GA, one of the best contractors I know. A large portion of the project was being completed by an open cut contractor. When they came to this section under the interstate, they called RDJE because they do pipe bursting. It was really one of the most challenging projects we've seen in quite some time. They reviewed it and called me in to review it as well to see if we would be able to take it on. We don't run away from stuff. Joe Webb called me and said, 'Randy, can you do it?'"

Webb, Vice President of Utility Rehab at RDJE, said, "We were contracted to do the burst, but ended up not having the capacity to complete it within the given timeframe. Now it was a difficult project. We trust Randy and his company as if we were doing the job ourselves. It's kind of like bragging about your own company. That's how much respect we have for Randy and H&H. If someone is willing to take the risk and it's a project that can be done, RDJE or H&H will make it happen. So Randy was the choice to handle this one."

What H&H Site Specialty was gearing up to handle was a 400-foot, 8-inch ductile iron to 12-inch ductile iron pipe burst under Interstate I-675. For the project H&H used a 1250G Grundoburst static pipe bursting system from trenchless equipment manufacturer TT Technologies, Aurora, Ill.

According to TT Technologies pipe bursting specialist Eddie Ward, static bursting was the right choice for the difficult ductile iron host pipe. He said, "Static pipe bursting is really becoming a 'go to' method when it comes to replacing pipe. Pneumatic bursting is still a work horse, but static is very versatile and the fact that you can install different pipe materials such as fusible PVC, ductile iron, HDPE, clay, etc., makes it very attractive.

> ***It was really one of the most challenging projects we've seen in quite some time.***
>
> – Randy Higginbotham, Owner, H&H Site Specialty LLC

Static pipe bursting systems are able install a wide range of product pipe. For the burst under I-675, H&H Site Specialty burst the existing 8-inch ductile iron and replaced it with 12-inch ductile iron

"Plus, the fact that it can burst ductile iron and other difficult host pipes contributes to the fact that people want to use it on their projects. It helps in the design process, as well as the bidding process."

PROJECT BACKGROUND

The project owner was the Clayton County Water Authority (CCWA), GA. According to its website, the CCWA provides a range of services including water, sewer, and storm waters to over 250,000 residents throughout Clayton County and its six cities including approximately 82,000 accounts. The CCWA also operates three water production facilities that together can treat up to 42 million gallons-per-day.

Higginbotham said, "They're [CCWA] good people to work for. They're all about getting the project done and working with the contractor. I have to give them a hand."

With existing capacity issues and a major development coming to the area, the current 8-inch ductile iron trunk main needed to be upsized. But any project under an interstate where no digging is allowed poses some fairly significant challenges and risks.

Webb said, "We made it clear to the county prior that there was a chance that this project might not work because we could not see what type of material was surrounding that pipe. We expressed that concern so that everyone was on the same page. Ultimately the county did commit to tunneling in the event that the bursting project didn't go as planned."

While the fill material around the outside of the pipe was not known, ductile iron pipe, is an inherently difficult material to split or burst. However, it has become more common over the last 15 years. It takes the right type of equipment and equipment configuration. Ward said, "When it comes to tackling ductile

> ***Static pipe bursting is really becoming a 'go to' method when it comes to replacing pipe.***
>
> – Eddie Ward, TT Technologies Pipe Bursting Specialist

H&H Site Specialty utilized a Grundoburst 1250G static bursting unit from TT Technologies. The challenging burst took place under a 4-lane interstate where no digging was allowed

The existing trunk main was being upsized for capacity reasons. Bursting took approximately 1 hour and 30 minutes to complete

iron, specially designed bladed rollers are important. The bladed rollers are pulled through the host pipe by a hydraulically powered bursting unit. As they are pulled through, they split the ductile pipe. An expander attached to the rollers forces the fragmented pipe into the surrounding soil while simultaneously pulling in the new pipe.

"The bursting rods are also critical to the success of any static pipe bursting project. Ward said, "Some stems get screwed together like drill stems would, Quicklock style rods link together forming a secure connection, while eliminating serious rod torque. It also helps when it comes time to install or breakdown the project. These rods can be quickly removed at the exit pit, while the bursting run is being completed. That's a big time saver. Plus, you don't have that potentially dangerous high torsion situation."

BURSTING UNDER THE INTERSTATE

The new 12-inch diameter TR Flex restrained joint ductile iron pipe segments were 20 feet long. That type of segmented pipe can be installed through static bursting. Ward explained, "Installing segmented pipe has been a major advantage of static pipe bursting. Segmented pipe like ductile iron is fed into the bursting system one joint at a time, in what's referred to as a cartridge loading process.

"Whether it's restrained joint or non-restrained joint, each one requires a little different tooling when used in a static pipe bursting application. For example, a sectional pipe with restrained joints needs a specific type of bursting head. That head connects to the product pipe and then to specially designed tooling. As the pipe string is pulled in, when its time, a section is dropped in place, the tooling is moved and reconnected, and the process continues."

On the job, the bypass was set up by the general contractor

before H&H Site Specialty arrived on site. It traveled through a system creek and under the interstate. In all, it took several weeks to set up. After the bypass was in place, H&H crews began bringing equipment to the site.

Higginbotham said, "Once the equipment was brought on site, we actually set everything up the same day we did the bursting. It doesn't take our crew long to get set up and start pushing rods. That's the good thing about that particular equipment, it's easy to set up and take apart. I think we started on the 5th and on the 6th we pulled that pipe in."

H&H had an 8-man crew complement on the project. The ground conditions were rocky, but a lot of that was shot rock or rip-rap. The existing line was approximately 20 feet deep, however, the launch and exit pits were only 10 feet deep, as the interstate was elevated and gave the crew good access on either side. As such, only 8-foot tall trench boxes were required, at a length of 24 feet each to accommodate the long segments of new ductile iron pipe. The existing trunk main was 8-inch ductile iron and was upsized to 12-inch ductile iron. But for the complete upsize, the OD of the expander on the bursting head was 19 inches.

Higginbotham said, "It took us an hour and thirty minutes. Once it was hooked up, it pulled right to us. Man that pulled easy, with hydraulic pressure readings between 60 and 80 bar. At the end of the burst we ran into a section of extremely thick ductile iron that began to pull loose from the soil. At the point we were just about finished and extracted that last piece of old pipe. We were really pleased with the results."

FINAL THOUGHTS

The project marks another impressive burst for Higginbotham and H&H Site Specialty. Higginbotham had nothing but praise for his crew. He said, "My son's been with me 23 years through a bunch of different contractors on our way up. We've got over a million feet behind us. And now we've finally gone out on our own. But I'd put him and his group up against any contractor in the country. He really knows how to get things moving and get the job done. Those guys know every step, and that makes a good pipe bursting operation. We always try to make sure wherever we work, that we're always invited to come back."

ABOUT TT TECHNOLOGIES:

TT TECHNOLOGIES

*For more than 45 years, **TT Technologies** has been the worldwide leader in trenchless technology. 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!*

AN OVERVIEW OF HDPE ELECTROFUSION PIPE JOINTS: PIPE SURFACE PREPARATION

By: Camille Rubeiz, P.E., F. ASCE, Plastics Pipe Institute, Inc. (PPI)

High-density polyethylene (HDPE) pipe has been used for municipal and industrial water applications for almost 50 years. HDPE's heat-fused joints create a leak-free, self-restraint, monolithic pipe structure. The fused joint will also eliminate infiltration into the pipe and exfiltration into the environment. HDPE pipe has other benefits including chemical, abrasion, fatigue, seismic and corrosion resistance, and is designed for water and wastewater applications meeting the latest AWWA C906 and ASTM F714 standards.

Heat fusion can be used to join sections of HDPE pipe, including high-performing PE4710 pipe, while electrofusion is used to add couplings, tapping tees, branch saddles and other fittings. Proven to be an extremely reliable joining system, an electrofusion joint is heated internally, either by a conductor at the interface of the joint or by a conductive polymer. Heat is created as an electric current is applied to the conductive material in the fitting.

> ***"Pipe preparation is among the most important aspects of making a sound electrofusion joint"***

All heat fusion joining methods require that there is no water flowing or standing in the pipe that can reach the fusion surfaces. De-watering of the site may be

TIP: *Some practical temporary methods for stemming water flow and avoid the need to disinfect the line, are the use of organic absorbent materials, such as bread, which can later be flushed from the system at downstream hydrants.*

Typical Electrofusion Joint

Electrofusion has proven to be an extremely reliable joining system

TIP: *Tip: Dry ice placed in the pipe upstream of the fusion location will temporarily freeze small amounts of flowing water until the fusion process can be completed. In smaller diameter pipes inflated latex balloons also provide good temporary stoppage of trickling water. The balloon will burst during pressure testing and can be flushed from the system at a downstream outlet.*

required to prevent ground water from reaching the fusion and contaminating the surfaces to be joined.

In repair or cut-in situations, flowing water in the pipe may be present due to leakage of valves. Flowing water in contact with the fusion surfaces during the assembly or fusion cycle must be avoided as it can cause voids as the moisture turns into expanding steam during the fusion process. PE squeeze-off tools can be used to control the flow of water in cases where a valve is not present or will not shut off completely - refer to ASTM F1041.

Electrofusion fittings can be installed in ambient temperatures as recommended by the manufacturer. A typical qualified temperature range for installation is 14°F minimum to 113°F maximum. Some manufacturers have lower and/or higher temperature limits and will state their qualified range in the technical specifications. Contact the fitting manufacturer to verify.

Improper pipe preparation is overwhelmingly the leading cause of unsuccessful electrofusion joint attempts because the installer may not completely understand the goal of pipe scraping, which is to remove a thin layer of the outer pipe surface to expose clean virgin material beneath.

Pipe surfaces exhibit surface oxidation from the extrusion process, transportation, and outdoor exposure. Surface oxidation is a normal chemical reaction that results in a physical change to the molecular structure of the polymer chains on the pipe surface. Oxidation acts as a physical barrier and therefore those surfaces cannot be heat fused. Simply roughing the pipe surface is not sufficient. In order to achieve fusion, this layer must be removed. Even new pipe must be properly scraped before a fusion will be successful.

The outer oxidation layer on a pipe surface is very thin. It does not increase in depth of more than a few thousandths of an inch even over long periods of exposure, so regardless of the amount of time the pipe has been stored before scraping, the scraping depth requirement is the same. An adequate minimum amount of material that must be removed is just seven one-thousandths of an inch (.007 inches) -- approximately the same thickness as two sheets of ordinary paper.

Sandpaper, emory cloth, or other abrasives should ***never*** be used to prepare a pipe surface for electrofusion. Abrasives don't adequately remove material, and can redistribute contaminates on the surfaces, and the grit left behind forms another barrier that will also prevent proper fusion.

The only tools used for surface preparation are those that are specifically designed for electrofusion scraping and peeling, which can peel the pipe surface to a controlled depth. Tools with serrated blades are also available. These tools physically scrape the pipe surface by pulling the serrated blade across the pipe in a perpendicular position. Serrated blades sometimes mask the pipe surface by leaving behind score marks that make it difficult to visually tell if all of the original surface material has been removed.

Types of scrapers that are ***not*** recommended are "hand scrapers" such as wood rasps and metal files. Using these will result in inconsistent surface preparation and difficulty in mastering skills required for uniform surface preparation.

No matter what type of tool is used, it is strongly recommended that witness marks be made on the pipe surface prior to scraping with a permanent marker, such as a Sharpie® marker or another brand that dries fast and contains no

TIP: *A visual indicator can be very helpful to ensure that the entire surface has been scraped, and that an adequate amount has been removed. Marking the pipe surface with a permanent marker is a simple and effective way.*

oils. (Some markers that dry slowly or contain oils that can spread onto the fusion surface and should not be used.) Any marking that remains after scraping is evidence that areas were missed or that more scraping is required.

Avoid all possible recontamination of the prepared surface. This includes handling or even touching the scraped pipe surface or the inside of the coupling as body oils and other contaminates can affect fusion joint performance. If the surfaces become contaminated, clean thoroughly with a clean, lint-free towel and a minimum 96 percent concentration of isopropyl alcohol and allow to dry before assembling. Do not use alcohol with any additives other than water.

Gouges that are deeper than the scrape depth may also require extra attention when scraping the pipe to ensure that any debris or contaminates embedded in the gouges are removed; use of a hand tool to scrape the gouge may be necessary. If the gouge exceeds 10 percent of the pipe wall thickness, that pipe section should be cut out and replaced to maintain the maximum pressure rating of the pipe.

Two guides detailing the steps for electrofusing joints and couplings for HDPE pipelines are available for free. Published by the Municipal Advisory Board - MAB - , the two documents are: *MAB Generic Electrofusion Procedure for Field Joining of 12 Inch and Small Polyethylene (PE) Pipe (MAB-01-2017)* and *MAB Generic Electrofusion Procedure for Field Joining of 14 inch to 30 Inch Polyethylene (PE) Pipe (MAB-02-2017)*. MAB serves as an independent, non-commercial adviser to the Municipal & Industrial Division of the Plastics Pipe Institute, Inc. (PPI). The mission of the MAB is to improve the design, installation, and operation of municipal HDPE water piping systems through the creation of partnerships among utilities, researchers, designers, contractors, and the HDPE industry.

The direct link to download MAB-01-2017 is: https://plasticpipe.org/pdf/mab-generic-ef-110515.pdf while the link for MAB-02-2017 is: https://plasticpipe.org/pdf/mab-02-generic-electrofusion.pdf

ABOUT THE AUTHOR:

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

Here's Why PE 4710 Pipe is the Best Solution for Water Systems

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7. Popular for open cut & trenchless applications
8. Superior resistance to water hammer, fatigue, earthquakes, ground movements and freeze-thaw cycles
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PE4710 Pipe: The Best Solution for Water Systems

CITY OF RALEIGH RAW WATER MAIN INSPECTION

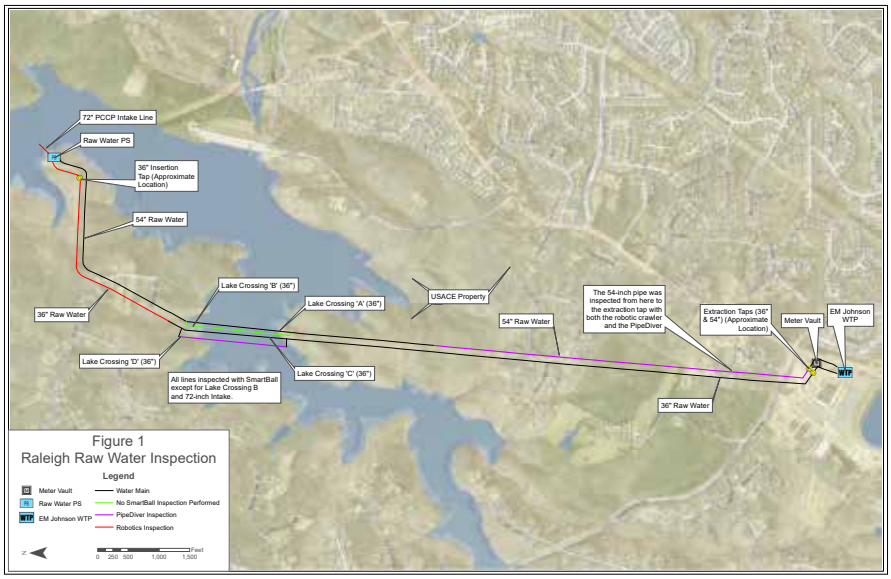
By: M. Brent Johnson P.E., CDM Smith

ABSTRACT

Raleigh Water, NC relies on its critical raw water transmission mains from the raw water pump station (PS) at Falls Lake to the EM Johnson Water Treatment Plant (WTP) which supplies water to most of North Raleigh. The raw water transmission main is made up of approximately 3 miles of parallel 54-inch and 36-inch prestressed concrete cylinder pipe (PCCP), including a manifold and four-barrel, 36-inch PCCP crossing under Falls Lake. There was a failure in one of the 36-inch lake crossings, and portions of the transmission main are made up of 1980s era Interpace PCCP with class IV reinforcing wire, which has had known issues with premature failure.

Due to the criticality of this asset, Raleigh Water elected to perform inspection and condition assessment of the 36-inch and 54-inch raw water transmission mains and the 72-inch PCCP pump station intake pipe to determine the overall condition of the system. The inspection was performed using the electromagnetic tools, PipeDiver and PureRobotics, by PURE Technologies (Pure). Both tools required access to the interior of the pipeline at multiple locations for insertion and removal.

Extensive planning and preparation work were necessary to properly coordinate the inspection while maintaining sufficient water supply to the plant and minimizing risk to the system. A civil contractor was employed to perform exploratory investigations, perform pipe tapping, provide safe inspection access, and to provide overall inspection support. The use of divers was also required to perform portions of the PureRobotics inspections to assist with placement and retrieval of the tool. The inline inspection was completed in February 2020.



Raw Water Main Schematic

This article addresses the extensive planning and coordination required for this type of pressure pipe inspection, risk management, the need for real-time flexibility during inspection, and how the data is evaluated and analyzed to provide the owner with the information required to make sound decisions.

This article will be of interest to water utilities that desire to plan and implement an asset management program that includes evaluation of PCCP pressure mains; understand the logistical considerations and limitations of inline inspection technologies; pre-planning, coordination and preparation work required to implement the inspection; and interpretation of inspection data.

INTRODUCTION

The EM Johnson Water Treatment Plant (WTP) provides the City of Raleigh with the majority of North Raleigh's water demands and is located near Falls Lake in North Raleigh. Raleigh Water hired CDM Smith to perform condition assessment of the parallel raw water mains that run from Falls Lake through the Army Corp of Engineers land and several neighborhoods to the WTP site. The original 36-inch Prestressed Concrete Cylinder Pipe (PCCP) was installed in the 1960s and the newer 54-inch PCCP main was installed in the early 1980s. The two mains run parallel from the raw water pump station (PS) and are manifolded together at the shore of Falls Lake where 4 parallel 36-inch PCCP pipes take a subaqueous crossing to a manifold structure on the opposite shore of the lake. From there, the 36-inch and 54-inch mains run parallel once again all the way to the WTP.

Raleigh Water has future capacity concerns with the existing system because the 54-inch is required to stay in operation during peak demands with no redundancy

36-inch PCCP Inspection with Robotics

built into the system. A second 54-inch raw water main is in the planning stage, and condition assessment efforts will identify any defects on the existing pipelines.

PROJECT PREPARATION

The first step in the planning process was to perform a valve assessment of all butterfly valves in the raw water main system. Several of these valves were found to be inoperable, many due to a broken pin in the actuator gears causing it to malfunction, all of which were repaired. The remaining valves were either repaired or replaced.

The second step was the installation of SmartBall Sensing devices every 2500 feet along the raw water mains. These devices help to both track the tools during inspection as well as increase stationing accuracy when reporting defect information.

In preparation for the inspection effort, three taps were made on the raw water mains to facilitate installation and removal of the inspection tools.


SmartBall Insertion in 12-inch Surge Valve

Tool Insertion locations (near PS)

Initially the plan was to tap the 36-inch DIP in the PS parking lot just outside of the valve vault however there were several short pipe joints near the vault that didn't provide the length needed to make the tap. The DIP just downstream of these short pipe sections of pipe appeared to be pit cast with a thicker pipe wall which would not fit the available tapping sleeve. Subsequently an 18-inch tap was made on the 36-inch PCCP in the access drive outside of the raw water Pump Station fence near the first Air Release Valve (ARV). Upon completion of the inspection, the 18-inch tapping sleeve and valve were buried. A manhole was not installed due to concerns over stress being put on the PCCP given the minimal cover.

The DIP portion of the 54-inch main near the PS valve vault could not be tapped due to a restraining rod system on the piping and a unique pipe section with a built-in bend just outside of the valve vault. A decision was made by the City not to tap the 54-inch PCCP raw water main in a different location due to concerns about maintaining water supply if the pipeline was damaged during the tapping effort and required a shutdown in order to repair. Instead a plan was developed for insertion of the inspection tools at the existing 12-inch surge valve on the pump discharge header inside the pump dry well.

Tool Extraction Locations (at Plant)

Taps were made on both the 36-inch DIP and 54-inch DIP raw water mains just upstream of the venturi meter vaults on the plant site. Upon completion of the inspection, manholes were installed over the tapping sleeve and valves at the two extraction locations.

Other Inspection Preparations

In addition to Raleigh Water performing valve exercising, testing, and repair efforts in preparation for the free-swimming tool inspections, they also identified the need to drop the reservoir levels to 17 feet to allow freeboard to ensure that once the tools were inserted that the pumps could be run for the entirety of the inspection effort.

INSPECTION APPROACH

From January 27 through February 5, 2020 the CDM Smith project team performed a condition assessment inspection of the raw water transmission main from Falls Lake Raw Water Pump Station (PS) to the E.M. Johnson Water Treatment Plant (WTP) for Raleigh Water.


Robotic Crawler Insertion in 36-inch PCCP

Diver Assistance with Robotics Inspection of 72-inch Intake

SmartBall Inspection

The inspection effort began with the SmartBall (SB) inspection of the 36-inch main from the insertion tap near the PS all the way to the extraction tap at the WTP site. The second leg inspected with SB was the Lake D crossing. Access for the Lake D crossing was gained by excavating down on a cross at the end of the common manifold on both sides of the lake. A blind flange was removed from the PS side of the lake to insert the SB and a blind flange was removed from the cross on the WTP side of the lake to install a net to capture the SB. The blind flanges had to be reinstalled and the line repressurized to propel the tool across the lake and then the Lake D crossing was isolated once again and the blind flange on the plant side removed to retrieve the SB.

The third SB inspection run was on the 54-inch main. Insertion was accomplished via a 12-inch pressure relief valve on the 54-inch header coming out of the pump dry pit. A net was installed at the plant site extraction tap to capture and remove the SB.

Robotic Inspection

A Robotic Crawler was used to inspect the 36-inch PCCP main from the extraction tap back upstream 300 feet to the PS and then from the extraction tap downstream 3000 feet to the lake crossing manifold. The Robotic Crawler also provided CCTV which was useful to help ascertain pipe condition and valve positioning.

The second Robotic inspection was on the 72-inch PCCP intake pipe that is used to draw water out of Falls Lake. The entry point was 25 feet deep in the PS wetwell and required the help of human divers for insertion into the 72-inch pipe due to a lip on the pipe invert where it enters the wetwell. The robot was able to travel 530 feet out into the pipeline before encountering an obstruction that was presumed to be a grate from the intake structure that had fallen into the pipe invert.

The last Robotic inspection was on the 54-inch main from the extraction tap at the plant upstream 1700 feet to a butterfly valve. No inspection of the 54-inch main downstream of the extraction tap was performed as that section consists of DIP.

PipeDiver Inspection

The free-swimming PD was utilized to inspect the same Lake D crossing that was previously inspected with the SB tool. There was no net installed to capture the PD at the plant side manifold but the valves were throttled nearly shut to prevent the tool from leaving the manifold and the speed of the tool was controlled by throttling valves to slowly bring it to a stop in the manifold. The PD inspected 1400 feet of the 36-inch PCCP Lake D crossing and was safely retrieved from the manifold.

The last inspection performed was on the 54-inch main from a 24-inch manway access 2000 feet downstream of the plant side lake crossing all the way to the extraction tap at the plant. There was concern about the ability of the PD to navigate the series of butterfly valves along the PCCP mains as they were vertical in their orientation and Pure did not have sufficient previous inspection attempts to guarantee success. The PD travelled 6500 feet navigating several vertical butterfly valves with no issues.

INSPECTION RESULTS

Acoustic leak and gas pocket detection utilizing the free-swimming SB inspection tool revealed no leaks or air pockets. Internal electromagnetic inspection, using Pure Technology's (Pure) free swimming PipeDiver (PD) tool and PureRobotics inspection tool, also revealed no defects requiring immediate attention. A small number of broken prestressing wires were identified in two pipe segments of the 54-inch main (5 broken wires each) and in one pipe segment on the 36-inch lake crossing D. Based on the analysis, the pipes inspected are categorized as being in a 'low level of distress'.

Extraction of PipeDiver Following Inspection of Lake Crossing D

Inspection data revealed that 14 of the 104 pipe sections in lake crossing D had a thicker steel cylinder than the other sections. This cylinder thickness difference made it difficult to quantify the number of wire breaks on those sections. A pipe strength analysis was performed based on the known pipe parameters and assumptions. Since the span of wire breaks is 1.5 feet, the number of wire breaks could range from 1 to 19 breaks (worst case). The yield limit for this pipe is 39 wire breaks. Based on the analysis, the pipes inspected are categorized as being low to moderate level of distress.

POST INSPECTION REVIEW

After completion of the inspection a meeting was held with Raleigh Water, CDM Smith, Pure Technologies and Pipeline Utilities to discuss the inspection achievements and issues to better prepare

Insertion of PipeDiver in 24-inch Manway

for future inspections. Below is a list of the key items discussed.

Positive Project Outcomes

It was agreed that the project team did a great job being flexible with the inspection plan as it morphed several times during the project effort. The team had to adapt to changing conditions and as we learned new information about the system and inspection limitations.

Pure was pleased to have the opportunity to utilize their tool on vertically oriented butterfly valves to increase their knowledge base on how the tool performs.

CDM Smith provided daily onsite coordination and email updates that proved helpful in maintaining plant operations. Several meetings were held with key plant staff during the project effort to get buy in on changing inspection plans.

Preparation and conducting the inspection helped to identify valves that were not working properly as well as piping configurations that can be utilized to isolate sections of the mains in the event of future repair needs.

Next Steps

It should be noted that inline electromagnetic inspection of the most critical section of pipe based on diameter and pressure was not performed due to City's concerns with providing insertion access and with the vertical orientation of the butterfly valves. The 54-inch section from the PS to the PS side lake header only received an acoustic inspection with the SB that tests for leaks and air pockets. Plans are currently being made to inspect this section of 54-inch by tapping and inserting the Robotic Crawler. PD inspections performed during the first phase have indicated that the valve orientation does not prohibit a successful inline inspection.

ABOUT THE AUTHOR:

Brent Johnson, P.E. *is focused on the condition assessment and rehabilitation of water and wastewater pipelines and is a member of the NASSCO Pressure Pipe Committee and the AWWA Water Main Condition Assessment and Rehabilitation Committees. He is the CDM Smith National Discipline leader for pipeline condition assessment and rehabilitation.*

-PRESS RELEASE-

BAMI-I
Buried Asset Management Institute - International

Purdue University's CEM EPCom Partners with BAMI-I, WTC-Indy & IIS to develop a 1-day track in Dubai on developing underground space and asset management.

International Conference on Building Materials and Construction Technologies (BMCT) will be held on April 06-08, 2021 in Dubai. The theme of the conference is "Explore the latest innovations in Building Materials and Civil Engineering". BMCT Dubai 2021 primary objective is to exchange ideas and experiences directly with the speakers and also provide various networking opportunities. The Civil Engineering conference is going to provide a great opportunity for the people who are interested to be as an entrepreneur in the field of construction. BMCT Dubai 2021 will create a premier interdisciplinary platform for all Civil Engineering professionals and students to give presentations and discuss the most recent innovations, trends, and concerns, as well as practical challenges, encountered and solutions adopted in the field of Civil Engineering.

World Trade Center Indianapolis (WTC-Indy), Construction Engineering and Management Purdue, Buried Asset Management Institute – International (BAMI-I), and International Infrastructure Solutions (IIS) will be coordinating a 1-day track on the Development of Underground Space & Asset Management in conjunction with the BMCT Conference in Dubai.

For more information please contact Dr. Tom Iseley
diseley@purdue.edu | (404) 386-5667

-PRESS RELEASE-

Respond to Industry Demands by Providing 3 Utility Investigation School (UIS) Programs in 2021 at:

8th UIS: Date: May 24-28, 2021 Location: Louisiana Tech University
9th UIS: Date: August 9-13, 2021 Location: Lawrence Technological University
10th UIS: Date: September 13-17, 2021 Location: Purdue University

Course Director
Tom Iseley, Ph.D., P.E., Dist. M. ASCE, PWAM
Professor of Engineering Practice
Beavers Heavy Construction Distinguished Fellow
Construction Engineering and Management
Purdue University
Chair, BAMI-I Board of Director
Professor Emeritus, Louisiana Tech University

Course Developer & Primary Instructor
Jim Anspach, PG(r), Dist. M. ASCE
ASCE/UESI President 2018
Member-EJCDC, TRB Utility Committee
Chair ASCE -38
J.H. Anspach Consulting

Background:

Existing utilities are at varied depths, in varied soils, made of different materials, are varied sizes and have varied access. The importance of accurately locating and depicting existing underground utilities comes more obvious each day to ensure successful construction projects. It has been reported that at least 70% of projects experience delays and budget overruns due to utility conflicts. The 2019 Common Ground Alliance (CGA) Technical Report cited an upward trend in total damage from 509,000 in 2018 to 532,000 in 2019, representing a 4.5 percent increase. Inaccurate utility information means increased risk of utility hits. It is important that underground infrastructure industry realize that the continued increase in the number of subsurface utility hits is unacceptable. Late utility relocation raises public safety risks due to longer-lasting work zones and exposure to worker strikes and striking a utility line occurs every minute somewhere in the USA. We must have an industry paradigm shift to reverse this trend. The industry is experiencing too much property damage and loss of lives. The sponsoring organizations have responded to this crisis by offering the three 5-day UIS.

Objectives:

These UIS programs are intended to address the two critical performance goals of ASCE 38:

- How can a project be designed so as to have minimal utility issues during project development, and
- How can the professionals protect themselves against utility-related claims.

Deliverables:

Each UIS will provide attendees the knowledge and tools to provide competent utility investigations in accordance with accepted national standards. The course covers geophysics, utility systems construction and configuration, ASCE 38 risk-based presentations and professional liability issues. In addition to the classroom lectures, practical session will be held where participants will offer hands-on experience with the Ground Penetrating Radar (GPR), Pipe Cable Locator (PCL), and etc.

This 5-day school has been designed for:

- Engineers and surveyors and project managers providing deliverables that include results and depictions of utility investigations.
- Consulting engineers, Employees of utility companies, state DOTs and local highway agencies, regulatory agencies, local governments, etc.

Jim Anspach, Founding Governor of ASCE's Utility Engineering and Surveying Institute, and Chair of ASCE-38, has a special role in the development of this school. Jim is a special advisor and instrumental in developing the curriculum and identifying the best instructors. "ASCE has recognized that Utility Engineering is a missing task discipline from our educational curriculum. One important aspect of that discipline, Utility Risk Management for Projects, is embodied in part through the use and proper application of the ASCE 38 Standard. Yet all too often, there is no avenue to learn the principles that govern the use of this standard," says he. "I am delighted that TTC and ASCE initiated this series of educational opportunities for those professionals and others under their direct responsible charge. It has been exciting to see how BAMI-I and Purdue have joined in to expand these efforts."

At the end of this short course, students will receive 4 CEUs /40 PDHs and a Certificate of Completion.

For more information, please contact Dr. Tom Iseley: diseley@purdue.edu

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NO-DIG SHOW 2022

Call for Abstracts

Submission Deadline: June 30, 2021



The North American Society for Trenchless Technology (NASTT) is now accepting abstracts for its 2022 No-Dig Show in Minneapolis, MN at the Minneapolis Convention Center on April 10-14, 2022. Prospective authors are invited to submit a 250-word abstract outlining the scope of their paper and the principal points of benefit to the trenchless industry. The abstracts must be submitted electronically at NASTT's website by June 30, 2021: nastt.org/no-dig-show.

Abstracts from the following subject areas are of interest to the No-Dig Show Program Committee:

Potable Water and Pressure Systems

- Pipeline Inspection, Locating, and Condition Assessment
- Pipe Rehabilitation
- Pipe Bursting
- Emerging Technologies
- Case Studies

Wastewater, Storm water and Non-pressure Systems

- Advanced Pipeline Condition Assessment
- I&I and Leak Detection
- Pipeline and Laterals Rehabilitation
- Pipeline Inspection, Locating, and Condition Assessment
- Cured-in-Place Pipe Lining
- Sliplining
- Pipe Bursting
- Spray Applied Linings
- Grouting
- Manhole Rehabilitation
- Case Studies

Energy Pipeline Systems

- Pipeline Inspection, Locating, and Condition Assessment
- Aging System Rehabilitation
- New Trenchless Installation
- Standards and Regulations

Trenchless Research and Development

- University and Industry Initiatives
- Education and Training

Industry Issues

- Subsurface Utility Engineering
- Submittal Requirements and Quality Assurance/Quality Control
- Project Budgeting and Prioritization
- Funding for "Green" Technologies
- Selection Criteria for Contractors
- Social Costs and Impacts
- Carbon Footprint Reduction
- Sustainable Construction Practices
- Industry Trends, Issues and Concerns
- Differing Site Condition Claims

New Installations – Tunneling, Boring and Pipe Ramming

- New Concepts or Trenchless Equipment, Materials and Methods
- New Applications for Boring Techniques (Auger Boring and Pipe Ramming)
- Pilot Tube Boring (Tunneling)
- Case Studies

Horizontal Directional Drilling (HDD)

- New Concepts and Applications for Horizontal Directional Drilling Equipment, Materials and Methods
- Case Studies

Microtunneling

- New Concepts and Applications for Microtunneling Equipment, Materials and Methods
- Case Studies

Questions?

Please contact:

Michelle Hill
NASTT Program Director
E: mhill@nastt.org
P: 888-993-9935

For more information visit

nodigshow.com

The No-Dig Show is owned by the North American Society for Trenchless Technology (NASTT), a not-for-profit educational and technical society established in 1990 to promote trenchless technology for the public benefit. For more information about NASTT, visit our website at nastt.org.

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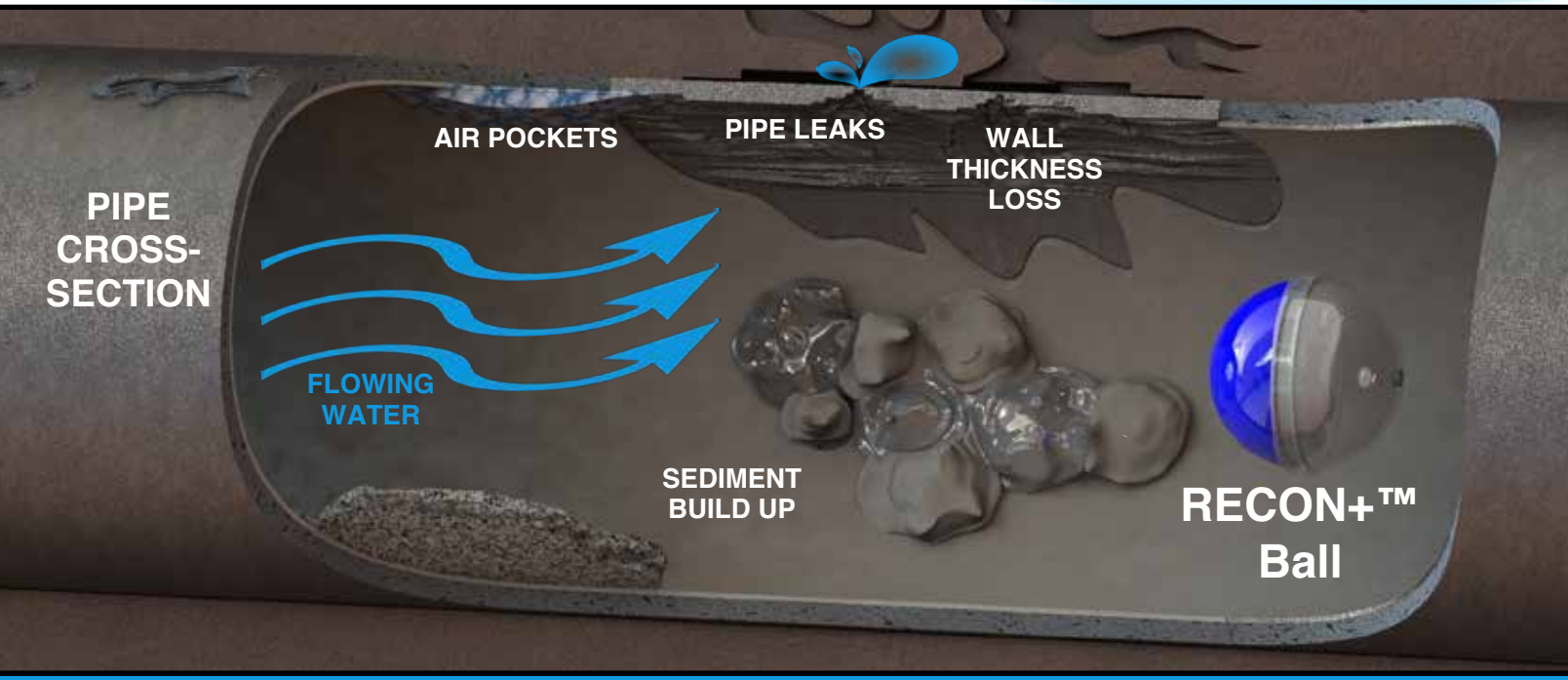

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