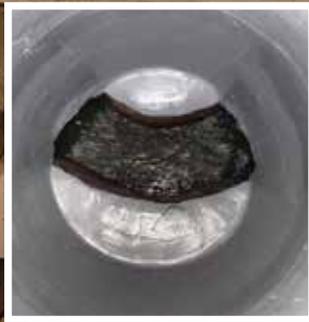




MID ATLANTIC JOURNAL OF TRENCHLESS TECHNOLOGY 2019

OFFICIAL PUBLICATION OF THE MID ATLANTIC SOCIETY FOR TRENCHLESS TECHNOLOGY

MASTT: A NON-PROFIT ORGANIZATION



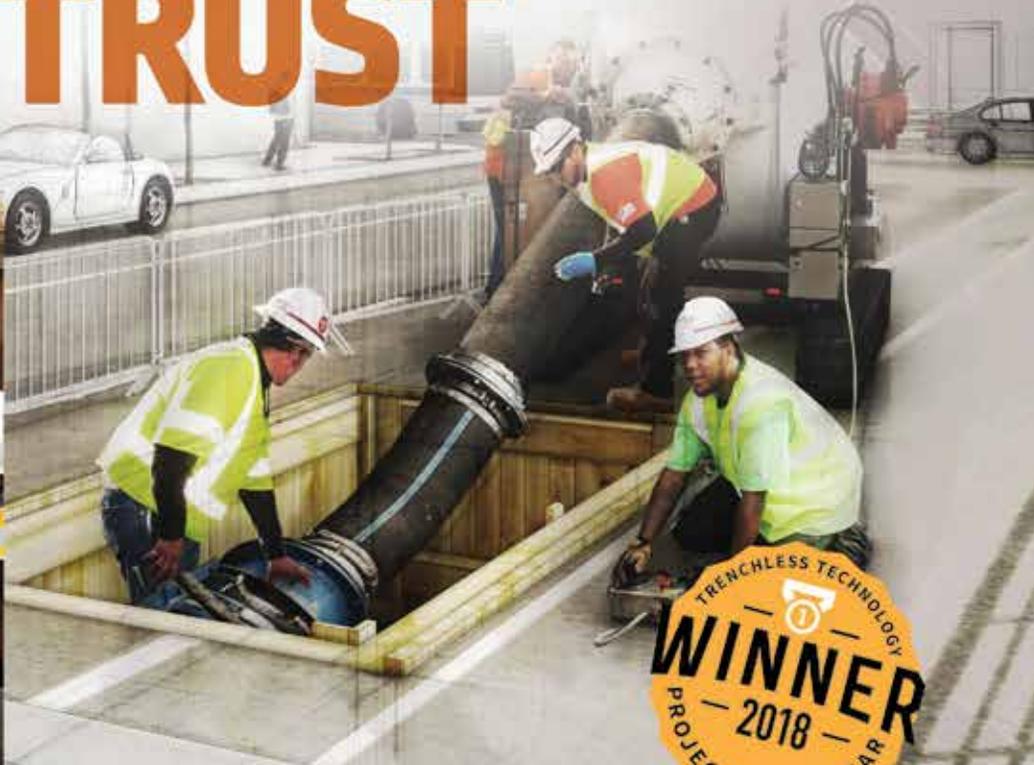
Pipeline Inspection Technology
Miles of HDPE Pipe
Manhole Lining Logistics
MASTT Trenchless Technology Seminars

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A truly non-destructive method for assessing wall thickness of cast iron and steel pipe, Broadband Electromagnetic Probe (BEM) is a technology which can accurately pinpoint pipe thinning, corrosion and cracking. BEM is a valuable tool when considering CIPL because it captures detailed real time data on ferrous pipe conditions.



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18 Miles of HDPE Pipe

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MASTT Trenchless Technology seminars are premier educational outreach events with informed industry speakers on present-day underground infrastructure topics. In the past 12 months, the MASTT Chapter hosted 3 highly successful Trenchless Technology seminars in Pittsburgh PA, Virginia Beach VA, and Essington PA.



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MESSAGE FROM THE MASTT CHAIR

Richard Thomasson, P.E., MASTT Chair

We are very pleased to produce our fifth publication of the Mid Atlantic Society for Trenchless Technology (MASTT) Journal. The MASTT was founded in 2004 as a Chapter of the North American Society for Trenchless Technology (NASTT) and serves the geographical region of Virginia, West Virginia, District of Columbia, Maryland, Delaware, Pennsylvania, and New Jersey. The region has a huge population and many large municipalities and also, a large industrial base. The infrastructure is very large for water, sewer, stormwater, gas and electric, which in many cases is older and deteriorating. There is an overwhelming need for replacement and rehabilitation of the infrastructure which drives the interest in Trenchless Technology.

There are also a lot of major academic institutions in the Mid Atlantic region which are heavily involved in research on Trenchless Technology. Being close to the nation's Capital, creates a high visibility on infrastructure funding and interest in new technologies which can make tight budgets be used more effectively. There are also major industry leading technology and service companies within the MASTT region. Also, there are major trade associations such as NASSCO, ASCE, NSF, NIST, PPI and others, who are essential in the infrastructure industry. Each has done a tremendous amount of work in asset management being used to manage the replacement and rehabilitation of all infrastructure in the region. Because of the above factors, MASTT is a valuable grassroots resource for education,

training, specifications, governance, funding and promotion of the trenchless industry.

Both private and public infrastructure owners across the region have used the new service products and innovation for trenchless work. Educating and introducing new trenchless technologies and services, MASTT has conducted 30 seminars throughout the Mid Atlantic region. These seminars have been very informative and have introduced Trenchless Technology to many people who were not aware of the information over the last 15 years. We are trying to incorporate some of the NASTT short courses into our seminar schedule.

We have an overwhelming opportunity and responsibility to bring the deteriorating infrastructure to an acceptable level of service for the huge populous that we serve. The infrastructure assets we are focusing on are generally out of sight and out of mind until a catastrophic failure occurs. A focus on asset management has started to address these assets in a structured and effective way. The major factors in asset management, such as condition assessment, risk management, safety, economic planning, and social factors flow seamlessly into trenchless technology as a major tool for accomplishing the desired outcomes. Environmental, social and economic factors are all addressed and greatly enhanced through the application of trenchless technology. Focus on performance, sustainability, and resiliency of the infrastructure systems

“WE LOOK FORWARD TO YOUR COLLABORATION & PARTICIPATION”

to provide a level of service necessary to maintain a healthy nation are primary drivers in our vision for MASTT.

MASTT can be an integral part of the education of providers and users of the infrastructure which is critical to continued viability in the region. We need your participation and collaboration to be able to provide the resources to accomplish this vision. Join in active membership in MASTT and be a part of this critical work to enhance the infrastructure in our region.

Thank you,

Richard Thomasson
Chair, MASTT



MASTT SITE



GREETINGS FROM THE MASTT EXECUTIVE DIRECTOR

Leonard Ingram, Sr., PWAM Executive Director, MASTT

THANKS FOR YOUR SUPPORT!

These four words may not be parked in your brain as they have in mine, but this is what keeps our Trenchless Technology Industry going and growing strong. This is particularly true with NASTT and its Chapters as per our non-profit charter purpose: “to promote trenchless technology through education and development for the public benefit”. Without your support of the seminars, trade shows, training courses, journals, publications and many other trenchless technology items, NASTT and its Chapters would not be as strong as they are today. THANK YOU!

I want to also give a special thanks to Mike Wilmets, NASTT Executive Director, for the support he has given the Chapters through the excellent Staff he has developed at NASTT. Mike’s support to the Chapters and to the No-Dig Show has been exceptional. He has done a great job as NASTT Executive Director. I wish him the very best with his well-deserved retirement and with his future success with the Wounded Warrior venture. THANK YOU MIKE!

As we continue on with our “Trenchless Technology, SSES and Buried Asset Management” seminars please find listed below the 2019 Proposed Seminar and Journal Publication Schedule for the Mid Atlantic, Midwest and Southeast Societies for Trenchless Technology. As Executive Director for each Society,

I would very much appreciate your support by participating with these seminars and journals as an exhibitor, food sponsor, presenter, advertiser or article contributor. Please contact me at leonard@engconco.com to participate with the seminars and Andrew Pattison at marcomap@shaw.ca to participate with the journals.

MASTT had a “Trenchless Technology, SSES and Buried Asset Management” seminar in Pittsburgh on July 24, 2018 at the Hyatt Place – Pittsburgh – North Shore. The Guest Presenter was Mr. Shawn McWilliams, Civil Engineer, Regional Conveyance, Allegheny County Sanitary Authority (ALCOSAN), Pittsburgh PA with the presentation “ALCOSAN’s Trenchless Technology In Pittsburgh”. ASCE Pittsburgh Section was the seminar co-sponsor.

In May 2018, MASTT published the MASTT Journal of Trenchless Technology 2018. It contained many interesting trenchless technology articles from the Mid Atlantic region and a lot of trenchless technology information and advertisement support.

MASTT had a “Trenchless Technology, SSES and Buried Asset Management” seminar in Virginia Beach VA on December 12, 2018 at the Wyndham Virginia Beach Oceanfront Hotel. The Guest Presenter was Mr. Phil Hubbard, Special Assistant,

“THANKS FOR THE SUPPORT”

Compliance, Hampton Roads Sanitation District (HRSD), Virginia Beach VA with the presentation “HRSD’s Trenchless Technology Program”. ASCE Norfolk Branch was the seminar co-sponsor.

MASTT had a successful “Trenchless Technology, SSES and Buried Asset Management” seminar on April 3, 2019 at the Clarion Hotel and Convention Center, Philadelphia PA (Essington). The Guest Presenter was Mr. Jeffrey Twardzik, Engineering Supervisor, Philadelphia Water Department with the presentation “Philadelphia’s Trenchless Program”. ASCE Philadelphia Section was the seminar co-sponsor. The networking and learning was terrific.

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



MASTT SEMINAR





MESSAGE FROM NASTT CHAIR

Craig Vandaele, NASTT Chair

Hello Mid Atlantic Chapter Members! As the year develops we're looking forward to the continued growth of the trenchless industry and our Society. In March we wrapped up another impressive conference as the NASTT 2019 No-Dig Show in Chicago, Illinois was very successful on all accounts. The exhibit hall featured over 200 exhibitors, which is the most we've hosted yet! We also welcomed over 2,200 attendees from all over the world, who came to experience the world class technical sessions and networking events that our Show is known for.

NASTT exists because of the dedication and support of our volunteers and our 11 regional chapters. Our No-Dig Show Program Committee members volunteer their time and industry knowledge to peer-review the abstracts which then become presentations and technical papers. These committee members ensure that the technical presentations are up to the standards we are known for. This year we had 160 presentations over the course of three days on all aspects of trenchless technology. We also featured three industry forums hosted by trenchless experts in their fields and encouraged input from the audience members. These topics included: Direct Pipe, Advanced Pressure Pipeline Condition Assessment and Innovative Products. Thank you to Mid Atlantic Chapter members that

THANK YOU AGAIN FOR YOUR SUPPORT OF OUR SOCIETY AND THE TRENCHLESS TECHNOLOGY INDUSTRY.

served on the 2019 Program Committee: Logan Harper, Tayo Olatunji, Peter Oram, George Ragula, Jean Rivard, Dennis Walsh and Daniel Yandle. I'd also like to extend a special thank you to the Program Committee Members that also served as Track Leaders and had the added responsibility of managing and assisting the paper authors in their specific track: Tayo Olatunji, Peter Oram, George Ragula and Dennis Walsh.

Plans are now underway for the 2020 conference in Denver, Colorado. If you would like to join the Program Committee to help us develop the technical sessions and special events for next year's Show, meet us in Denver this summer! Please contact us at info@nastt.org for more information.

I'm also excited for the upcoming No-Dig North conference! The Canadian Chapters are hosting the first annual No-Dig North in Calgary in October. The show will consist of two days of technical paper presentations and industry exhibits in the trenchless technology field. Pre-event Good Practices Courses will also

be held. The event will be held at the Telus Convention Centre in Calgary. Visit nodignorth.ca for all the details.

The North American Society for Trenchless Technology is a society for trenchless professionals. Our goal is to provide innovative and beneficial initiatives to our members. 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 active with the trenchless community and to have your voice heard.

Our continued growth relies on the grassroots involvement of our regional chapter advocates. Thank you again for your support and dedication to NASTT and the trenchless technology industry.

Craig Vandaele

NASTT Chair





MEMBERSHIP IN NASTT

Carolyn Hook, NASTT Membership
Outreach & Database Manager

MEMBERS TALK NASTT MEMBERSHIP

As the Membership Outreach and Database Manager at the North American Society for Trenchless Technology (NASTT), it's my job to be able to speak about the value of NASTT membership and all it offers beyond professional credibility and information. NASTT is a community of peers where members are connected to go-to people in the trenchless industry – innovators, experts and a network of students and future trenchless professionals.

At every stage of their career, NASTT members have access to a comprehensive set of tools ensuring success.

- **Engage in learning.** NASTT member-only pricing for top-notch training courses, conferences and webinars.
- **Expand your knowledge set.** Largest online trenchless library of technical papers.
- **Increase your visibility.** Opportunities to speak at conferences, write for publications, volunteer to serve and give back.
- **Propel your career.** Career resources, including NASTT's Job Board.
- **Empower your position.** NASTT's *No-Dig Show* - North America's premier Trenchless Technology Conference and Trade Show.
- **Connect locally.** Regional educational and networking events.
- **Find answers at your fingertips.** Subscriptions to *NASTT's Trenchless Today*, *NASTT's Regional Chapter magazines*, *ISTT's Trenchless International* and *Trenchless Technology*.

NASTT is the largest community of trenchless professionals in USA and Canada committed to promoting better and more responsible ways to manage

underground infrastructure and advance trenchless technology for the benefit of the public and the natural environment.

That's what I would say. But what about NASTT members, do they agree? It's also my job to know what NASTT members think about membership. So, I asked a few to share their insights. Here's what I found out.

NASTT Transforms Careers

"Having come from an entirely different industry focusing on natural gas, the common link of construction bonds the two industries closely together. Membership has made me a well-known nationally recognized expert in the use of trenchless and its applications in two industries. When I do not know the answer, I can call on an established network of key contacts and access a library of technical papers. Membership allows me to maintain a current and state-of-the-art awareness of trenchless methods and potential improvement areas that I address through my R&D activities." – *George Ragula, Distribution Technology Manager, PSE&G*

NASTT Provides Leverage for Corporations, Municipalities, Educational Institutions and More

"NASTT is far and away the leading educator and networking pool in the trenchless industry. If your company plays a part in the trenchless industry, you will benefit from NASTT membership much more than you realize." – *Joe Lane, Vice President, International Operations, Infrastructure, Aegion Corporation*

"We advertise that our staff are members of NASTT for RFPs and on

YOU BELONG IN NASTT!

Trenchless resumes." – *David Crowder, C.E.T., C.D., Senior Associate, Trenchless Practice Leader, R.V. Anderson Associates Limited*

"I get to network and share ideas with other like-minded professionals. I've learned about new technologies that make us work more efficiently." – *Tayo Olatunji, PE, PMP, CCM, Supervisor Construction Projects, DC Water*

"The bottom line is that active membership benefits me professionally and, in turn, my company can provide unique and cost-effective solutions to challenging projects." – *George Ragula*

Regional Chapters Bring NASTT to Your Backyard

"The quality and dedication of local volunteers makes working in the industry much easier, more fun and extremely fulfilling." – *Joe Lane*

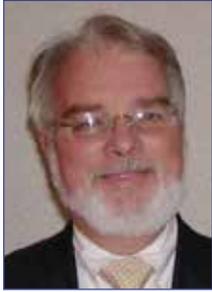
"Regional chapters make it easy to meet locally with engineering consultants and municipal staff who share the same passion for trenchless technology, learn new ideas and discuss other trenchless topics."

– *David Crowder*

"Seeing the impact that trenchless technology has on our communities and the country makes chapter participation worthwhile." – *Alan Goodman, Strategic Accounts Sales Manager, HammerHead Trenchless Equipment*

What about you? How has NASTT membership made a difference in your career? Email me at chook@nastt.org and let me know. You Belong in NASTT!

2019-2020 MASTT BOARD OF DIRECTORS



Richard Thomasson – Chair

Richard O. Thomasson has over 49 years of experience working in the water and wastewater field. He has been closely involved with Trenchless Technology for nearly his entire career. While at the Washington Suburban Sanitary Commission he directed many uses of new trenchless technologies, retiring

after 31 years as the Director of Construction. He has worked with Parsons Brinckerhoff for 8 years, and Arcadis for the past 11 years, continuing his involvement in numerous trenchless projects.

Richard has a B.Sc. in Civil Engineering from Virginia Tech, a M.Sc. in Civil Engineering and a MPP in Public Affairs from the University of Maryland. He is a licensed P.E. in Virginia, Maryland and Georgia. As a Founding Director and the very first Chair of the North American Society for Trenchless Technology (NASTT), Richard believes fully operational water and wastewater systems are crucial assets for a healthy growing nation. In 2016 Richard was inducted into the NASTT Hall of Fame.



Dennis Walsh – Secretary

Dennis M. Walsh, P.E. is a Senior Project Manager – Horizontal Directional Drilling for Public Service Electric & Gas in New Jersey. Dennis is a 1972 graduate of the University of Dayton, Ohio with a B.S. in Civil Engineering and a 2002 graduate of the Polytechnic University of New York with a M.S. in Technology. He

retired from KeySpan Energy Company in 2005 after a 28 year career in the gas utility field with a background in engineering, operations, construction, Quality Assurance and HVAC. He led KeySpan's efforts to expand the use of trenchless technology in the early 1990's to decrease its main and service installation costs. Prior to joining PSE&G, he was a consulting engineer for various consultants in the natural gas industry.

Dennis is a member of the Society of Gas Operators, and a Board Member of the North American Society for Trenchless Technology. He is also on the NASTT No-Dig Show Committee. Throughout his career, he has designed numerous HDD installations for various utilities. When he is not involved in trenchless projects, Dennis enjoys traveling and playing golf.



John Hrabosky – Vice Chair

John Hrabosky is the Technical Support Manager for HammerHead Trenchless in the Rehabilitation & Replacement (R&R) division. Drawing on his nearly 30 years of experience in the trenchless industry, John provides project and equipment consultation, training and support to

customers worldwide.

He specializes in pipe ramming, pipe bursting, point repair and CIPP lining solutions. John holds a degree in management and marketing from Duquesne University in Pittsburgh, PA.



Mike Hoffmaster – Treasurer

Mike Hoffmaster is the Marketing Manager for both Pleasants Construction and Reline UV America. He is responsible for educating municipalities and engineering firms on the benefits of a variety of trenchless rehabilitation products.

Mike has a Bachelor of Science degree from Shepherd University and has over 32 years of experience in the construction industry. Prior to his employment with Pleasants Construction and Reline UV America, he spent 25 years, working in a variety of roles, for a major precast concrete company. Mike has played a vital role in obtaining product approvals and specification writing for products he has been associated with. He is an active member of Chesapeake Water Environmental Association (CWEA), Maryland Rural Water Association (MRWA), Virginia Rural Water Association (VRWA), Pennsylvania Rural Water Association (PRWA) and Water Environment Federation (WEF). Mike enjoys photography, traveling and volunteering with the Special Olympics, which is something he has been involved with for over 30 years.

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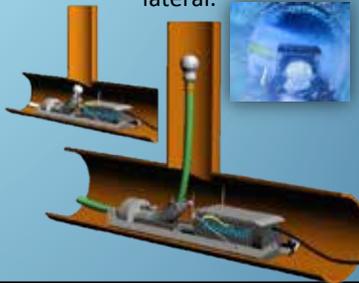
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2019 SEMINAR & JOURNAL SCHEDULE

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 MSTT - MIDWEST SOCIETY FOR TRENCHLESS TECHNOLOGY
 SESTT - SOUTHEAST SOCIETY FOR TRENCHLESS TECHNOLOGY

SOCIETY	PROPOSED DATE	LOCATION	STATUS
MASTT SEMINAR	APRIL 3, 2019	MT. LAUREL MD (PHILADELPHIA)	CONDUCTED
SESTT SEMINAR	MAY 22, 2019	CHARLESTON SC	CONDUCTED
MASTT JOURNAL	JUNE 25, 2019	PUBLISH DATE	PUBLISHED
MSTT SEMINAR	JUNE 26,-27 2019	INDIANAPOLIS IN	CONDUCTED
MASTT SEMINAR	AUGUST 14, 2019	ARLINGTON VA	PROPOSED
MSTT JOURNAL	SEPTEMBER 25, 2019	PUBLISH DATE	PROPOSED
SESTT SEMINAR	OCTOBER 8, 2019	CHARLOTTE NC	PROPOSED
SESTT JOURNAL	NOVEMBER 15, 2019	PUBLISH DATE	PROPOSED
MSTT SEMINAR	DECEMBER 4, 2019	COUNCIL BLUFFS IA (OMAHA)	PROPOSED



For registration and updated information on the 2019 "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

2019 UPCOMING TRENCHLESS EVENTS

June 26-27, 2019
MSTT Trenchless Technology, SSES & Buried Asset Management Seminar
Indianapolis, Indiana
(Date may change)
Information:
Leonard Ingram, mstt@engconco.com

August 14, 2019
MASTT Trenchless Technology, SSES & Buried Asset Management Seminar
Arlington, Virginia
(Date may change)
Information:
Leonard Ingram, mastt@engconco.com

October 8, 2019
SESTT Trenchless Technology, SSES & Buried Asset Management Seminar
Charlotte, North Carolina
(Date may change)
Information:
Leonard Ingram, sestt@engconco.com

October 23 - 24, 2019
RM-NASTT 9th Annual Regional Conference: Trenchless Elevated!
Location TBD
Denver, Colorado
Information: www.nastt.org/events

October 28 - 30, 2019
NO-DIG NORTH
Telus Convention Centre
Calgary, Alberta
Information: www.nodignorth.ca

November 11 - 12, 2019
2019 NASTT Northeast Trenchless Conference
Embassy Suites by Hilton Syracuse
Destiny USA
Syracuse, New York
Information:
www.nastt-ne.org/seminar-2019.html

November 20 - 21, 2019
15th Annual Western Regional No-Dig Show
Location TBD
Honolulu, Hawaii
Information: www.westt.org

December 4, 2019
MSTT Trenchless Technology, SSES & Buried Asset Management Seminar
Council Bluffs, Iowa
(Date may change)
Information:
Leonard Ingram, mstt@engconco.com

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

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PIPELINE WALL CONDITION INSPECTION USING BROADBAND ELECTROMAGNETIC PROBE (BEM)

By: Jean Rivard, Progressive Pipeline Management

The ability to identify and measure the integrity of ferrous pipe walls, particularly cast iron pipe, provides critical data needed to determine the strength and expected life of an underground facility. Broadband Electromagnetic Probe (BEM) pipe inspection technology provides the ability to make an informed decision on the most appropriate manner to replace gas facility and accurately rank pipe replacement in a gas utility's Distribution Integrity Management Program (DIMP) program.

Current and conventional approaches to DIMP programs vary by utility and how risk management is defined. Often, they include gathering information about the history of a pipe, including the miles and material categorized into sizes and pressure ranges. The definition of the "history of failure" includes the number of breaks, leaks, cracks in a certain distance. The goal is to target

pipes that are going to leak and cause problems first. Cast iron pipes with known history of breaks and elevated operating pressures may automatically be targeted for replacement. Some utilities make replacement decisions based solely on pressure and location, for example in densely populated areas a blanket decision is made to replace pipes. These conventional methods of decision making are based on theoretical risk management, without a fact-based assessment of ferrous wall conditions.

PIPELINE RISK MANAGEMENT

Gas utilities from the mid-Atlantic to the northeast region represent over 22,200 miles of cast iron facilities ranging in size from eight-inch to greater than thirty-inch diameter according to



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the 2017 PHMSA Annual Gas Distribution report. While PHMSA and State commissions are urging and/or requiring utilities to replace cast iron pipe, PHMSA also recognizes the need for technology that can identify the conditions and anomalies in pipes. In September 2018, PHMSA R&D held a working session in Baltimore which focused on pipeline integrity inspection technology with special attention to cast iron pipes, which are being targeted for replacement. The following excerpt is from PHMSA's 2018 workshop:

“Expanding In-Line Inspection Capabilities & Application – This group will discuss development of technology that can internally inspect natural gas and hazardous liquid pipelines. It will cover both piggable and hard to inspect pipeline systems where robotic solutions are necessary. A primary focus of this group is to envision technology solutions that advance the state of the art beyond current abilities and push for technology to detect anomalies having complex features.”

The need to utilize technology to identify the integrity of cast iron pipeline health is not only recognized by industry operators but also by the governing bodies of the natural gas industry. BEM technology specifically developed for cast iron pipe integrity assessment can determine wall thinning, graphitization and cracks, both by external or internal means. With the data provided by BEM tools, replacement methods can be evaluated with empirical data and facts to help determine the most cost effective and environmentally efficient solution.⁽¹⁾

Often, the first decision of pipeline replacement is to utilize direct bury methods. This requires a full trench excavation and the abandonment of the old pipe. It is costly, especially when using

steel for larger diameter pipes. Other costs include back filling, paving (temporary and final restorations), equipment and labor. Some streets are so congested there's no place to put another piece of pipe, and conditions such as bridges, railways and historical protected areas make excavation difficult or impossible. BEM can help determine whether the effort and costs of direct bury are absolutely necessary.

An alternative method is to insert a new pipe into an old pipe. For example, a 10-inch pipe being retired can be inserted with a 6-inch pipe inside the 10-inch pipe. A downside to this approach is potentially reduced capacity flowing through the system.

Another option to replacing pipeline is Cured-In-Place-Lining. CIPL is proven to extend the life of pipelines by 100+ years. Lining can cost about one third the cost of direct bury replacement. Benefits to lining also include the ability to maintain flow volumes through systems. The use of CIPL also allows for capitalization of asset replacement costs. BEM is a valuable tool when considering CIPL as it captures actual data on pipe conditions providing decision makers real time data as opposed to the current practice of speculation and educated guesses.

WHAT IS BEM?

BEM is a patented, main ferrous assessment tool that's been in operation in Australia for over 20 years. It was developed by Rock Solid Pty. Ltd. The Australian company has extensive experience with non-destructive assessment of cast iron and other ferrous piping. It is a true NDT method for investigating ferrous pipelines



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of all types and all diameters. All ferrous pipeline materials can be investigated – steel, cast iron and ductile iron. Pipes of any size from 110mm (4 inches) diameter upward can be investigated. The tool has applications for external and internal surveys, described in more detail below. It is also possible to evaluate other ferrous structures such as tanks or sections of pipes through coatings. BEM is available through Progressive Pipeline Management and will be a valuable addition to a utility’s DIMP program.

BEM empowers operators to make better decisions both to prioritize pipes that need replacement and make informed decisions. An informed decision maker can determine replacement priorities and options that enhance safety, reduce installation costs, decrease unnecessary exposure and damage to underground utility infrastructure, reduce impact on surface strata, reduce inconvenience to the community, while reducing the carbon footprint.

One prominent northeast utility dug up a series of cast iron pipes that had perfectly good wall conditions. If BEM technology had been utilized, the operator could have made a more informed decision on replacement strategy and prioritization. Considering other replacement alternatives would have cost significantly less when compared to the investment of direct bury, while conserving rate payer funds and company resources.

HOW BEM TECHNOLOGY WORKS

The technology works by inducing eddy currents to flow in close proximity to the transmitter. In a ferrous pipe these eddy

currents migrate with time allowing a complete profile of the ferrous pipe to be obtained. BEM recorded data can reveal the location of perturbations in the thickness of the ferrous pipe and with appropriate configuration, indications of fracturing can also be detected. BEM data is recorded at distinct frequency increments with the duration and number of increments being dependent upon the material conditions as well as the nature of the target. These parameters can easily be set with the aid of a pre-survey calibration of the ferrous material or less accurately with the aid of ‘as built’ documentation.^[2]

APPLICATIONS: BEM IN THE FIELD

Because of the way in which BEM operates, sensor shapes and sizes for emitting and collecting suitable data are highly flexible. The BEM tool allows for a number of assessments including:

(1) External or surface application devices where manned access is possible and (2) In-line or remote application where an internal delivery vehicle such as a ‘pig’ is used to transport the device. Both inspection techniques produce the same data.

1) External Ferrous Wall Condition Assessment Tool. Flexible Array Scanning Tool (FAST) is ideal for external pipe wall condition assessments carried out on all types of ferrous pipelines to explore the integrity on pipe diameters from 2 inches upwards. The pipe wall is scanned externally and pipe wall integrity is determined without interrupting the pipe flow or disrupting gas service. Manned access is needed to position the sensors and antennae which surround the



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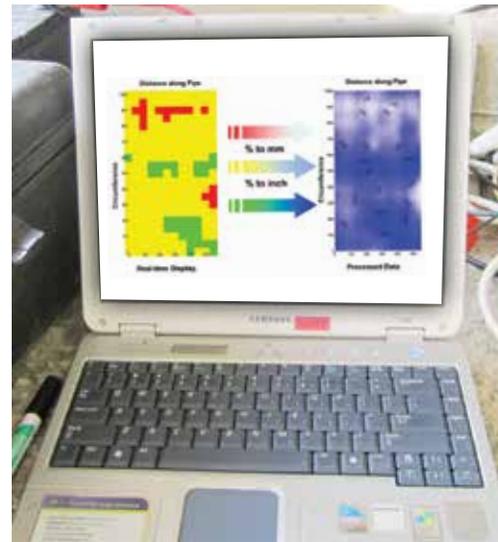
pipe. 100 percent pipe coverage can be obtained without diameter or shape restrictions. Individual readings are taken along the surface of a pipe. The coating (bitumen, polyethylene, or even concrete) does not need to be removed. The wall can be scanned with the aid of a temporary marked grid around the outside of the pipe allowing for accurate positioning of each reading taken.



The Flexible Array Scanning Tool (FAST) strips adjust to the pipe circumference and form a “blanket.” Inside each strip are sensors, antennae and cables that connect to the core processor

Strips that adjust to the pipe circumference form a “blanket.” Inside each strip are a series of sensors, antennae and cables that connect to the core processor. The blanket holds the array and wraps around the pipe. Once set, the program is initiated using

a magnetic field and each antenna sends out a pulse received back at the processor. Data goes back to the core processor on the computer. Initial results are seen on screen.



Initial results can be seen live via a laptop. The real-time wall thickness display uses color to denote wall thickness ranges and areas of concern.

The FAST tool is good for taking measurements on a specific area that has suspect compromised wall conditions. The corrosion group at a major northeast utility is investing in the BEM FAST tool for random excavations. It will be used to survey sections



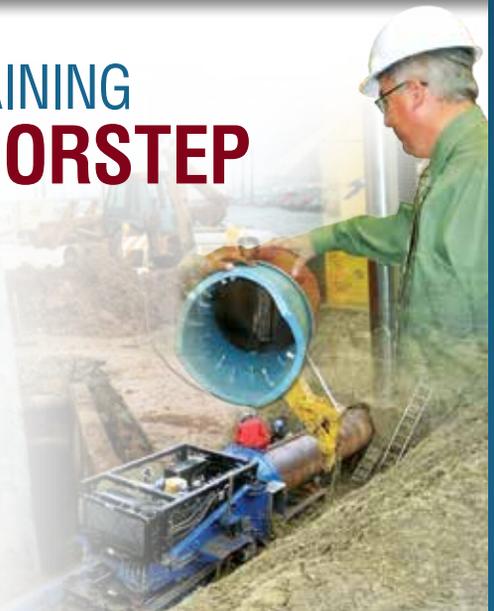
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of pipe that have been exposed during the course of normally scheduled and unscheduled activities to gather data about the characteristics of their system.

(2) In-Line Internal Ferrous Wall Condition Assessment

Internal pipe wall condition assessments can be carried out on pipe diameters of pipe 4 inches upwards. Once the pipeline is taken out of service, a pig is moved down the pipe and placed in a position/location. During in-pipe data acquisition, the NDT probes are either winched or rodded through the pipe. In large diameters, personnel can assist the mechanical movement of the pigs on the inside of the pipe.

The Pig moves through the pipes via tether or rod and takes three readings per section. It can handle up to 90 degree bends.

Continuous data can be recorded along extensive lengths of pipeline. Due to the large volumes of data recorded as part of any scan, distances surveyed along smaller diameter pipes are typically 1,500 - 2,000 feet per day, while in large diameters lower footages per day are scanned. Data acquired is generally represented graphically or as color contour plots.

REAL TIME WALL THICKNESS RESULTS

Whether using the FAST tool or the PIG the results are the same for each of the two applications. The results come in two forms. Data gathered in the field is converted to a topographic map, using proprietary software. Onsite, live data looks at ranges.



The PIG (Pipe Inspection Gauge) moves through the pipes via tether or rod and takes three readings per section. It can handle up to 90 degree bends with a single point of entry

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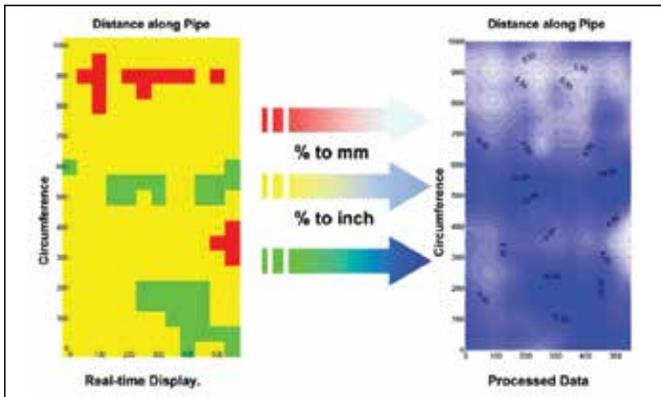


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...CONVENTIONAL METHODS OF DECISION MAKING ARE BASED ON THEORETICAL RISK MANAGEMENT, WITHOUT A FACT-BASED ASSESSMENT OF FERROUS WALL CONDITIONS.

For deeper analysis, the scans get uploaded to Rock Solid Group for a detailed interpretation of the data. Post survey data processing allows a presentation of results in an easy to understand and accurate color contour heatmap.

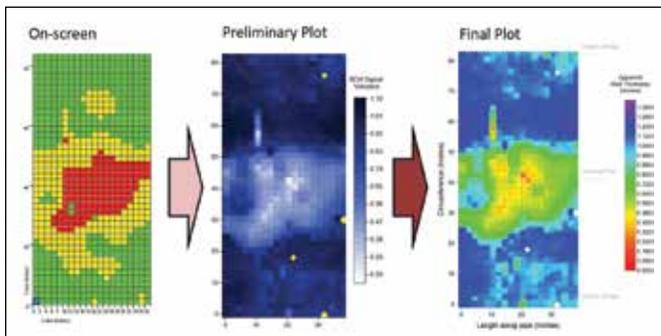


Data is processed in a number of ways with initial readings and in depth data analysis. In the heat map, green areas have 90% wall thickness in tact, and red shows areas of concern

Colors are used to differentiate between differing thicknesses, so that a visual assessment can be made. The plot contours are a representation of the variation of the ferrous thickness or condition across the contoured area. The blue and light green colors indicate a good piece of pipe at that scan point.

DATA POINTS AND ANALYSIS

The figure below shows a sample of a pipe section plot. The pipe is horizontal, with the 180° position running through the horizontal centerline, and the 0° at top and 360° position at the bottom.



Post survey data processing allows an easily understood and accurate presentation of results

PPM is working with a number of gas utilities who are committed to reducing their carbon footprint and conserve rate payer funds. BEM pipe inspection technology provides the ability to make more informed decisions on the most appropriate manner to replace gas facilities and accurately rank pipe replacement in a DIMP program.

“We are pleased to have partnered with Rock Solid on this important and vital technology. A key reason why PPM has invested in BEM is it will help our customers with critical and strategic decision making regarding their pipeline replacement programs. The ability to investigate wall thickness and condition of the pipeline before committing capital or maintenance dollars pairs very well with our Starline cured- in-place lining technology for complete pipeline renewal.”

- David Wickersham, CEO, Progressive Pipeline Management. †

REFERENCES:

- November, 2018: Cast Iron (CI) Pipe Replacement and Priority Assessment (Revised) (BEM) Broadband Electro-Magnetic Testing, Jean Rivard, Vice President, Progressive Pipeline Management
- Investigating Pipeline Integrity Using Broadband Electromagnetic Technology, Glyn Hazelden; Jason Consultants, Inc., George Ragula; PSE&G; Paul Beckendorf; GTI, Martin Roubal; Rock Solid Pty, Ltd.

ABOUT THE AUTHOR:



Jean Rivard works with Natural Gas Distribution companies to develop pipeline lining solutions. His extensive experience includes working with maintenance and construction of city gate stations, district regulator, maintenance, and leak repair activities. Jean’s career has spanned construction and maintenance management, safety and technical training, construction, main installation and retirements using tapping and stopping equipment, pressure regulation, leak repair and system maintenance.

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MILES OF HDPE PIPE BRING POTABLE WATER TO PENNSYLVANIA AMISH AREA

By: Tony Radoszewski, Plastics Pipe Institute (PPI)



HDD was used to install new potable water pipeline for Intercourse, PA. Nearly 10 miles of HDPE pipe installed

The necessity of a new potable water pipeline was critical for the residents of Intercourse, Pennsylvania because local supply wells were found to have high concentrations of trichloroethylene (TCE), a widely used industrial solvent known to be a human carcinogen. The \$20 million-plus project involved the wells, water tower,

a treatment plant and nearly 10 miles of high-density polyethylene (HDPE) pipe to deliver the fresh water to some 450 homes and businesses. The goal for the new pipeline system was to have it be entirely leak-free. Early on, the decision was made that the distribution piping would be all HDPE with the idea of putting it in using horizontal directional drilling.

The design by Groundwater & Environmental Services, Inc. (GES) (Easton, PA) used 52,000 feet of the HDPE pipe manufactured by WL Plastics (Ft. Worth, TX), plus more than 200 valves and 69 fire hydrants, supplied by the local branches of Core & Main LP (St. Louis, MO). GES was also responsible for the design and overseeing construction of the

“THE LONGEST HDD PULL WAS ABOUT AN 800 FOOT DRILL SHOT FOR THE 12-INCH DIAMETER HDPE PIPE. WE HAD TO GO THROUGH A BUSINESS PARKING LOT AND THEY DIDN’T WANT ANY DISRUPTION TO THEIR BUSINESS.”

– JOHN YODER, WEXCON, INC.

900,000 gallon-per-day water treatment plant and the 500,000-gallon capacity water tower.

According to a recent Utah State University report, HDPE pipe is the most accepted pipe for trenchless installation.

“HDPE pipe is the number one material for trenchless construction,” stated Camille George Rubeiz, P.E., F. ASCE, Senior Director of Engineering, Municipal and Industrial Division for the Plastics Pipe Institute, Inc. (PPI). “Its high flexibility, tight bending radius, high impact resistance, high ductility and longest fatigue life makes HDPE the preferred material for the major trenchless installation methods such as sliplining, horizontal directional drilling (HDD), Swagelining™ and pipe bursting. Long continuous segments of HDPE pipe are fused together per ASTM standards (F2620, F3190) and installed with HDD as detailed in ASTM standard F1962, PPI Boreaid software and in the PPI PE Handbook.”

PPI is the major North American trade association representing all segments of the plastic pipe industry.

To meet the design requirements for horizontal directional drilling and the operating pressure of 60 psi to 80 psi and 150 psi test pressure with a 2,000 gpm fire flow and 125 gpm average flow, the design required PE4710 DR11 IPS per ANSI/AWWA C906.

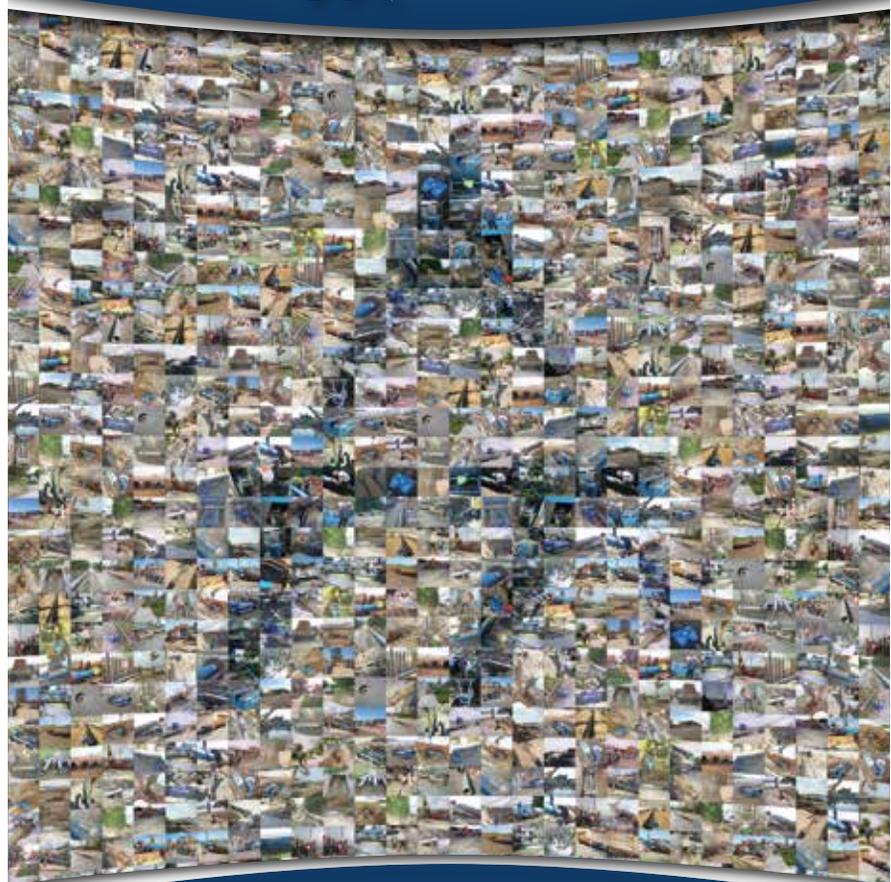
The shut off valves were Series 66 Gate Valves with HDPE fusible ends, installed every 500 feet of the pipe run. Fire hydrants were also heat fused into the system using an AVK base with polyethylene connectors. Heat fusing the sections of HDPE pipe, the valves and hydrants provided a monolithic and leak-free system.

“We had multiple crews with three or four guys in a crew,” explained John Yoder vice president of contractor

Wexcon, Inc. (Mohrsville, PA), “and we had four crews doing the directional drilling. We had a pullback crew, another

connecting drill shots together, another building intersection connections, and another doing water services and

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– CAMILLE RUBEIZ, P.E., F. ASCE, PLASTICS PIPE INSTITUTE, INC. (PPI)



Shut-off valves and fire hydrants were heat fused into the HDPE pipeline to further ensure a leak-free, closed loop system



Sections of HDPE pipe were heat fused together to construct a monolithic pipeline nearly 10 miles long. Distributor Core & Main provided a 2-day training session for the crew

hydrants. Standard HDD equipment was used. Maybe 10 percent of the area had hard rock, which is typical for southeastern Pennsylvania. In those spots we had to dig a trench. The longest HDD pull

was about an 800 foot drill shot for the 12-inch diameter HDPE pipe. We had to go through a business parking lot and they didn't want any disruption to their business.”

The project, including the water treatment plant and water tower, is scheduled for completion in 2020. †

ABOUT PPI:



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.

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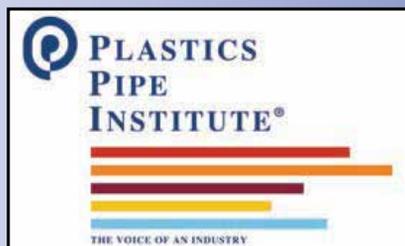
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PE4710 Pipe: The Best Solution for Water Systems

MANHOLE LINING LOGISTICS

By: Jerry Trevino, Protective Liner Systems, Inc.

The successful lining of new and existing manhole structures requires basic understanding of the structure's condition, material composition, its level of corrosive environmental exposure, and its physical location. The successful lining is not only dependent on the skill set and experience of the lining technician, but primarily the liner's formulation, performance history of protective lining products, and the products' ability to function in a myriad of different environmental conditions and locations. In most cases it requires several products to successfully line the manholes versus one universal product. I will describe the key design criteria required to formulate such protective lining products for both maximum protection and long term endurance.

Manholes provide the main human and equipment access to maintain the sanitary sewer pipelines flowing properly. Sewer pipelines are installed in all types of soils, landscapes and terrains, inclusive of swamps, near or in watersheds, sandy soils, and in areas which experience extreme wet and dry cycles. Water tables levels fluctuate, daily and seasonal temperatures cycle from warm and freezing temperatures. In some cases the sewer systems are exposed to shock, vibrations and seismic movements. The interior surface is exposed to not only the exterior changes but also to chemical attack and microbial corrosive environments of the influent. Manholes are typically composed of vulnerable masonry, brick and mortar, blocks and stones, and precast concrete. Other materials may also be present in the manholes such as polymers, steel, and rubber. Most masonry materials are very susceptible to most chemical attacks.

MANHOLE CONDITIONS

Throughout the year, manholes move due to shifting soils in wet/dry cycles, and are also subject to corrosive hydrogen sulfide gas and other chemical exposure. The walls are porous and subject to permeation and migration of sulfates, chlorides and other chemicals from the exterior. Manholes corrode, allowing massive amounts of groundwater infiltration and endangering the sewer system. Manhole protective linings extend the life of new and existing manholes and underground structures.

MANHOLE LINING PROCESS

The lining of existing and new structures involves the surface cleaning and surface preparation of interior surfaces to accept cementitious re-surfaces and polymeric coatings.

Cleaning involves the removal of all debris, weak concrete scum and mineral deposits via high pressure water blasting and/or abrasive blasting. Manhole defects and cracks are exposed. One can then locate infiltration sources, and measure the extent of missing and compromised materials. Should the manhole have significant original material loss, we should then resurface to bring the design thickness and weight. In some cases 2 to 4 inches of cement may be missing.

Infiltration must be completely stopped, defects corrected with chemical resistant cementitious mortar, then completely coated or lined. The successful stoppage of infiltration is mostly due to applicator skill and experience, and to a lesser degree, product effectiveness. We have found that very fast acting powders and cements are very effective for small leaks. Chemical grouts work for large infiltration flows.

CEMENTITIOUS COATINGS AND LININGS

Pozzolanic cements are much more chemical resistant than regular Portland cements. Calcium aluminate cements are also used in manhole applications, however, calcium aluminates are more unstable and undergo conversion process, resulting in much lower compressive strength over time and increasing porosity and permeability. In contrast, Pozzolanic cements such as those containing Microsilicas will gain higher compressive strengths over time and become less porous and permeable.

The key characteristics of a well formulated Microsilica cement is the ability to be hand troweled or spray applied by rotor stator type mixers. Well formulated Microsilica cements will not shrink or crack, and can be top coated with epoxy coatings shortly after application. Microsilica cements will continue to hydrate, and gain strength over a long period of time. The moisture source is the porous manhole wall. Another characteristic of Microsilica cement is that it can be applied at 0.5 inches to 2 inches thick on vertical wall surfaces without sagging or falling.

POLYMERS

There are thousands of different epoxies and polymers in the coating industry. Each manufacturer has proprietary formulations. Out of thousands of polymers, only a small percentage of coatings will perform well for manhole rehabilitation. To install an epoxy liner inside an underground structure requires skill and extensive experience. The polymer must be able to:

- be applied by hand trowel or spray
- bond and cure in wet manholes
- cure underwater

MAINTENANCE AND UPGRADING AND LINING OF OUR SEWER INFRASTRUCTURE IS REQUIRED TO MAINTAIN A HEALTHY SOCIETY



Manhole protective linings extend the life of new and existing manholes and underground structures

- be applied at 60 to 100 mils thick per coat
- be 100 percent solids with no odors or toxic fumes
- not sensitize applicators and endanger their health
- be applied at a wide range of ambient temperatures and humidity
- be user friendly as to be mixed in proper mix ratios to its curing agents
- resist and be impermeable to chemical and microbial growth
- withstand varying hydrostatic pressures
- perform in new and old structures.

Epoxy and polymer coatings and liners that require very dry surfaces and environments are not suitable for the lining of underground structures.

MANHOLES FLOAT

In sandy soils, in swampy areas, and by creeks and lakes, manholes are exposed to dynamic movement. Therefore, if a very rigid coating or liner is applied, it may be too brittle and eventually fail. Polymers that are too flexible are typically not strong enough to resist hydrostatic pressure. Brick manholes have a lot more

moving parts. Resin and sand aggregate manholes are typically 25 percent lighter and present an even more buoyant structure.

Newer era manhole manufacturing have higher quality controls than in the past. When manholes and pipelines are lined, they become more buoyant. When they are more hermetically sealed they tend to float and move more. The mortar resurface and epoxy lining are then more greatly exposed to additional stresses at the precast joints and within brick mortar joints. In these cases a cured-in-place composite fiberglass or other fiber mat protective liner should be used in order to unitize the entire manhole monolithically together. A thin film of epoxy of 100 to 200 mils may not be strong enough to keep the joints from separating.

INFILTRATION

Infiltration depletes and contaminates the clean ground water. Infiltration was not a critical concern 40 to 100 years ago when our national sewer collection system infrastructure was being built,

Water Infiltration is now a major concern. Manhole liners should stop all infiltration coming in to the manhole. When sewer pipes are internally lined, the same lining criteria is not used. CIPP pipe liners are not designed to stop water infiltration. Huge quantity of ground water infiltrates into the pipes and flows through the annulus space between the CIPP liner and the host pipes, and finally empty into the manholes. A manhole typically has 80 to 150 square feet of surface area. The pipeline between manholes has 700 to 3000 square feet. Water infiltration through pipelines must then be stopped via pipe end seals or more often must be stopped at the manhole invert area.

Often the infiltration flow is larger than the effluent flow, especially in outfalls adjacent to creeks and in wet outfalls. Manhole lining contractor are often asked to correct these infiltration flows not stopped by the CIPP liners. The manhole liner must be able to stop high pressure infiltration flows in a 8 to 12 square foot surface area that was generated over several thousand square feet of pipe. This is a very difficult task.



Manholes provide the main human and equipment access to maintain sanitary sewer pipelines

in-place fiber reinforced liners are more sustainable.

In general, manholes are a critical component of our waste water collection system. They must be maintained and properly lined to protect them from further deterioration and possible collapse. Manholes are made up of masonry materials which are always wet, in a dynamic state, exposed to varying temperatures, and exposed to chemicals and sulfur reducing bacteria. Maintenance and upgrading and lining of our sewer infrastructure is required to maintain a healthy society. †

THE FUTURE

As we continue to rehabilitate more manholes, pipelines and other sewerage structures, and as we simultaneously reduce the volume of water used in homes such as in higher efficient toilets, and as we reduce ground water infiltration, we have less water flow to convey waste solids to treatment plants. We create more

blocked sewers and the sewer effluent becomes more septic and corrosive and thus creates more havoc for the entire sewer collection system. We should properly line all sewer structures today to protect the sewer collection system in the future. Manholes that are only lined with a cementitious material and thin film polymers will not be protecting the manholes in the future. Epoxy and cured-

ABOUT THE AUTHOR:



Jerry Trevino is President of Protective Liner Systems, Inc., specializing in infrastructure rehabilitation since 1984. As longtime

Chairman of the NASTT Southeast Chapter, Jerry strongly believes that Trenchless Technologies offer numerous methods to maintain and upgrade aging infrastructure.



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The background of the advertisement is a large, circular tunnel with a corrugated metal interior. Three workers wearing hard hats are silhouetted against the bright light at the end of the tunnel. On the right side of the image, there are several inset images of different pipe sections: a long section of grey corrugated pipe, a black pipe section with a flange, a white pipe section, a white pipe section with a flange, and a dark blue pipe section with a flange.

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“ALCOSAN: Trenchless Technology in Pittsburgh”

Mr. Shawn McWilliams,
Civil Engineer, Regional Conveyance
Allegheny County Sanitary Authority (ALCOSAN)

PRESENTATIONS

Welcome Address and “Liquid Assets” Overview Video,

Leonard Ingram, PWAM, MASTT Executive Director

Overview of Trenchless Technology & MASTT Education Efforts,

Dr. Tom Iseley, P.E., Louisiana Tech University

Internal Joint Seals - Where, When, How,

Jeremy Keininger, Miller Pipeline Corporation

New Standards for Testing & Certifying CIPP as Watertight,

Chuck Hansen, Electro Scan Inc.

Underground Gyroscopic Mapping Tool,

Mac McGarry, CUES

How DC Water Is Using GeoSpray Geopolymer To Rehabilitate Large Diameter Pipes & Manholes,

Scott Naiva, P.E., Milliken Infrastructure Solutions, LLC

Sealing the Collection System With A Focus On Main-To-Lateral Rehabilitation,

Chris Hulse, LMK Technologies LLC

Guided Boring Using Pilot Tubes - Methodology and Case Studies,

Steve Matheny, P.E., Logan Clay Products

Asset Management and the Use of Autonomous Pipeline Inspection,

John DePasquale, RedZone Robotics, Inc.

Relining Water Mains with Flexible High Pressure Pipes,

John Moody, Raedlinger Primus Line, Inc.

Fold and Form PVC Liners for Culvert Rehabilitation,

Michael W. Johnson, IPEX USA LLC

BAMI-I & Certification of Training in Asset Management (CTAM) Program,

Dr. Tom Iseley, P.E.,
Buried Asset Management Institute - International

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Trenchless Technology, SSES and Buried Asset Management Seminars hosted by MASTT in locations across the Mid Atlantic region have a solid reputation as premier educational events. MASTT was proud to host 3 events over the past 12 months, in Pittsburgh, Virginia Beach and Philadelphia. Each seminar had knowledgeable industry presenters on a wide range of trenchless technology topics, including a guest presentation from a key local public works official.

As part of the MASTT mandate to “promote Trenchless Technology through education for the public benefit”, the



Mr. Shawn McWilliams, Civil Engineer, Regional Conveyance Allegheny County Sanitary Authority (ALCOSAN) gives presentation on his organization's trenchless technology program



MASTT Trenchless Technology seminars are great networking and educational opportunities

VIRGINIA BEACH SEMINAR DECEMBER 12, 2018:

GUEST PRESENTATION

"HRSD's Trenchless Technology Program"
Mr. Phil Hubbard, Special Assistant, Compliance
Hampton Roads Sanitation District (HRSD)

PRESENTATIONS

Welcome Address and "Liquid Assets" Overview Video,
Leonard Ingram, PWAM, MASTT Executive Director

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Fold and Form PVC Liners for Culvert Rehabilitation,
Michael W. Johnson, IPEX USA LLC

Multi Sensor Inspection, Ed Diggs, Pipeline Inspection Partners Corp., PPIC
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Visi-Sewer Making Sewer Studies Smarter,
Dave McArthur, Visu-Sewer

Preliminary Design and Installation of HDPE per AWWA C901, C906 and M55,
Camille G. Rubeiz, Plastics Pipe Institute (PPI)

UV GRP Advantages,
Mike Hoffmaster, Pleasants Construction

New Standards for Testing & Certifying CIPP as Watertight,
Mike Grabowski, Electro Scan Inc.

Guided Boring Using Pilot Tube,
Steve Matheny, P.E., Logan Clay Products



Mr. Phil Hubbard, Special Assistant, Compliance, Hampton Roads Sanitation District provides overview of HRSD trenchless technology projects

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 Mid Atlantic states.

MASTT **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.



PHILADELPHIA (ESSINGTON)

SEMINAR

APRIL 3, 2019:

GUEST PRESENTATION

"Philadelphia's Trenchless Program"

Mr Jeff Twardzik, Engineering Supervisor,
Philadelphia Water Department

PRESENTATIONS

Welcome Address and "Liquid Assets" Overview Video,

Leonard Ingram, PWAM, MASTT Executive Director

BAMI-I & Certification of Training in Asset Management (CTAM) Program,

Leonard Ingram, PWAM, BAMI-I Treasurer

Trenchless Technology Center, Louisiana Tech University,

Leonard Ingram, PWAM

Pipe Bursting,

Kevin Nagle, TT Technologies, Inc.

Fold and Form PVC Liners for Culvert Rehabilitation,

Robin Hershman, IPEX USA LLC

Sealing The Collection System With A Focus On Main-To-Lateral Rehabilitation,

Joshua Gass, LMK Technologies LLC

How DC Water Is Using GeoSpray Geopolymer To Rehabilitate Large Diameter Pipes & Manholes,

Scott Naiva, P.E., Milliken Infrastructure Solutions, LLC

Pilot Tube Method and Why Clay,

Steve Matheny, P.E., Logan Clay Products

MSI Methods,

Ed Diggs, Pipeline Inspection Partners Corp., PPIC
(Purveyor of Cues High Technologies)

The Use of Advanced Instrumentation in Bypass Pumping Operations,

Patrick Witts, Rain For Rent

Trenchless Spot Repairs,

Gregg Conklin, Hammerhead Trenchless

Internal Joint Seals

Jeremy Keininger, Miller Pipeline Corporation

Mainline Chemical Grouting,

Chris M. Hamilton, Avanti International

The World's Largest CIPL Gas Rehabilitation of 36" Cast Iron Main,

Phillip D Hoffer, Progressive Pipeline Management

Infrastructure Linings of Waste Water, Potable Water & Storm Water Structures,

Rusty Hesselschwardt, Advanced Rehabilitation Technology

***"EVERYONE IS FOCUSED ON NETWORKING AND
LEARNING IN A SMALL CLASSROOM SETTING.
BEING TOGETHER IN THE SAME ROOM FOR A
FULL DAY PROMOTES INFORMAL NETWORKING"***

LEONARD INGRAM, PWAM, MASTT EXECUTIVE DIRECTOR



Attendees are up close with vendors during informal breaks



Trenchless technology activity in Philadelphia is outlined by Mr Jeff Twardzik, Engineering Supervisor, Philadelphia Water Department

Jointly sponsored with the local ASCE section and/or branch, registration fees for the MASTT seminars include program materials, all day refreshments, breakfast pastries, lunches, networking, and a PDH Certificate. Special thanks go out to 2018 - 2019 seminar food sponsors:

BAMI-I, *Electro Scan Inc., LMK Technologies LLC, Logan Clay Products, Miller Pipeline Corp, Pipeline Inspection Partners Corp, Plastics Pipe Institute (PPI), RedZone Robotics, Inc., TT Technologies, Inc.*

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

"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 MASTT seminars have really helped grow the business of trenchless technology across the Mid Atlantic over the years. They promote greater understanding and acceptance of different trenchless applications, and underline the critical importance of systematic buried asset management" ✚



For information dates and locations of the 2019 MASTT Trenchless Technology, SSES and Buried Asset Management seminars planned for the Mid Atlantic, visit:

www.mastt.org

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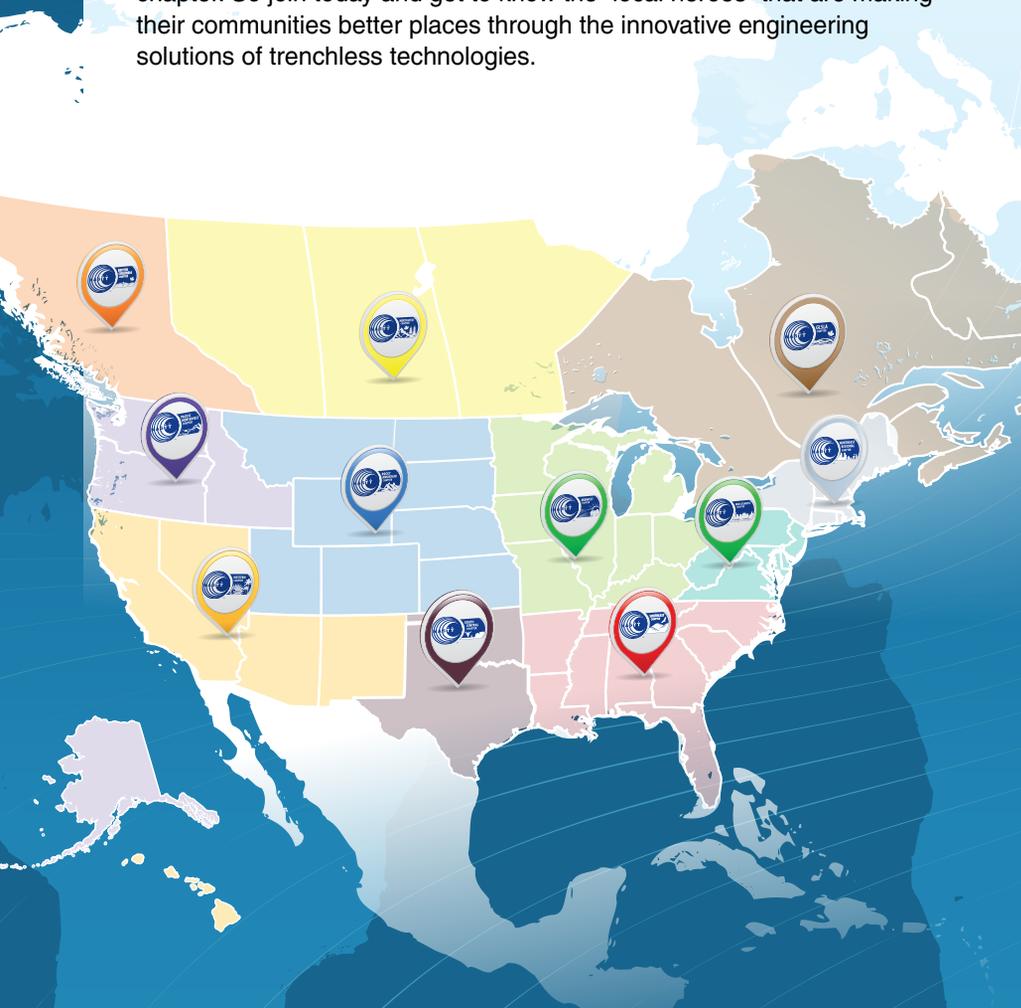
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NASTT REGIONAL CHAPTERS **REGIONAL ISSUES,** **INTERNATIONAL SUPPORT**

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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