SOUTHEAST JOURNAL OF

TRENCHLESS TECHNOLOGY 2018

OFFICIAL PUBLICATION OF THE SOUTHEAST SOCIETY FOR TRENCHLESS TECHNOLOGY

Rogerson Drive Force Main Rehabilitation

Florida East Coast Railway Culvert Reline

Trenchless Technology Education & Networking!

MARCH 18, 2019 | 5:30-7:30PM | CHICAGO, ILLINOIS

In conjunction with NASTT's No-Dig Show

2019 NASTT SPEAKEASY

EDUCATIONAL FUND AUCTION

NASTT'S 18TH ANNUAL EDUCATIONAL FUND SPEAKEASY AUCTION & RECEPTION

Join us in a Chicago Speakeasy! The Annual Educational Fund Auction helps raise money for very worthy causes. Since 2002, **NASTT has raised nearly $1.1 Million** and used those funds in support of our many educational initiatives. Due to your generosity, NASTT is able to provide targeted trenchless training courses to the industry, publish trenchless resources manuals and sponsor university students' attendance at NASTT's No-Dig Shows, as well as award scholarships.

EXCITING AUCTION ITEMS

Come to the auction and bid on great items like trips, tickets, electronics, industry items and more!

HAWAIIAN VACATION RAFFLE

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Auction Reception sponsored by

INTERPLASTIC CORPORATION · Ditch Witch ditchwitch.com · BENNETT trenchless engineers

FOR MORE INFORMATION VISIT
NASTT.ORG/NO-DIG-SHOW/AUCTION

2019 NASTT's NO-DIG SHOW

March 17-21, 2019 | Chicago, Illinois

Attend NASTT's 2019 No-Dig Show for the networking events.

Strengthen relationships with existing customers, form new ones, and make invaluable connections in the ever-growing trenchless industry.

Networking events include: Kick-Off Breakfast, 18th Annual Educational Fund Auction and Reception, the Gala Awards Dinner and Reception and the Closing Luncheon.

Coffee Breaks and the Exhibit Hall showcasing more than 190 exhibitors are great networking opportunities too!

Plus

- Explore more than 190 trenchless exhibits!
- Attend NASTT's world-class educational program!
- Get involved in the ever-growing trenchless market!

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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SESTT CHAIRMAN MESSAGE 2018

Moving Trenchless Technology Forwards

Jerry Trevino, SESTT Chairman

Welcome to our fifth annual edition of the *Southeast Journal of Trenchless Technology*. This new magazine is a fresh opportunity to reflect on the progress that has been made in the Trenchless Technology industry over the last 17 years, since the Southeast Society for Trenchless Technology (SESTT) was founded as a NASTT Chapter in 2000.

SESTT was formed shortly after a very motivating and convincing meeting headed by Dr. Tom Iseley and Leonard Ingram in Atlanta, Georgia, in 1999. A handful of people from the corporate and municipal sectors were also present. I remember very keenly Dr. Iseley presenting the case that there was a need to create a Southeast Chapter of NASTT to share information and promote trenchless technology at the local level.

Per the Charter & Bylaws, the primary objective of SESTT is to "promote Trenchless Technologies" by conducting training and education through seminars, short courses and field demonstrations. Since 2000, we have held numerous seminars in locations throughout the Southeast. Leonard Ingram, the Executive Director of SESTT, has been the muscle pushing through many obstacles to schedule, organize, and conduct these seminars.

The seminars continue to be an important forum to educate decision makers on the Trenchless Technologies available to rehabilitate and to increase the capacity of our infrastructure. The broad spectrum of challenges presented by the aging infrastructure and by urban population growth has spurred innovations in technologies, materials engineering, installation equipment development and better asset condition data from which municipality managers can make more informed decisions. Organizations such as SESTT, NASTT and the other regional chapters are important education and training providers helping select the best methods and processes to meet these challenges.

The seminars continue to be an important forum to educate decision makers on the Trenchless Technologies available to rehabilitate and to increase the capacity of our infrastructure.

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 all look forward to 2019 and encourage everyone to attend the upcoming NASTT No-Dig Show March 17 - 21 at the Donald E. Stephens Convention Center in Rosemont, Illinois. In addition, 2019 will again have a full slate of planned single day Trenchless Technology seminars by SESTT, MSTT, and MASTT. A full schedule of the upcoming 2019 seminars will be posted to www.sestt.org very soon. Best wishes to all for a productive year!

Sincerely,

Jerry Trevino
SESTT Chairman

SESTT SITE

GREETINGS FROM THE SESTT EXECUTIVE DIRECTOR

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

Welcome to the 5th annual publication of the *Southeast Journal of Trenchless Technology 2018*. This magazine highlights some of the many trenchless projects performed around the Southeast region. It shows the successes and continued rapid growth in demand for trenchless projects and presents some of the new ideas, products and innovations coming from SESTT members. Please help me thank the journal advertisers, the SESTT Board of Directors and their companies for their support throughout the year and for their effort in making this Journal a reality. The SESTT Board of Directors is listed on page 11. The list of journal advertisers is on page 31.

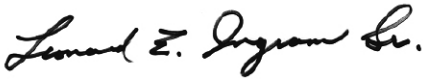
Since its foundation as a NASTT Chapter in 2000, the SESTT purpose has been to "promote education and development of Trenchless Technology for public benefit". I became Executive Director of SESTT in 2001 and, since then, SESTT has presented a total of 49 seminars in 27 cities throughout the Chapter's ten state area. Through this active education outreach, SESTT has engaged over 2,000 classroom attendees. Public officials, engineers, utility company personnel, designers, manufacturers and contractors involved in underground construction have all benefitted from past SESTT Trenchless Technology, SSES and Buried Asset Management seminars.

"Thanks for the support!"

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

Our new single day format makes it easier for a greater number of people to be able to take time away from their busy schedules to attend these valuable learning and networking sessions, while reducing travel and accommodation expenses. To avoid schedule conflicts, the MASTT, MSTT and SESTT Proposed 2019 Seminar and Journal Schedule can be seen on page 12. Please place these dates on your calendar and plan to support them. Watch for further details on the SESTT website, www.sestt.org.

Thanks for the support!



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

NASTT SOUTHEAST CHAPTER TM

MESSAGE FROM NAST

Frank Firsching, NASTT Chair

Hello Southeast Chapter Members! We're looking forward to the continued growth of the trenchless industry and our Society. Earlier this year we hosted NASTT's 2018 No-Dig Show in Palm Springs, California. The conference was very successful on all accounts. The exhibit hall featured close to 190 exhibitors and we welcomed over 2,000 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's 17th Annual Educational Fund Auction was, once again, the trenchless social event of the year and we raised nearly $100,000 for our educational programs! Thank you all for your generous support.

NASTT exists because of the dedication and support of our volunteers and our 11 regional chapters. Plans are now underway for the 2019 conference. Please plan to join us at the Donald E. Stephens Convention Center in Rosemont, Illinois. Our No-Dig Show Program Committee members volunteered their time and industry knowledge to peer-review the 2019 abstracts. These committee members ensure that the technical presentations are up to the standards we are known for. There are many Southeast Chapter Members on our Program Committee!

> ***Please plan to join us at the Donald E. Stephens Convention Center in Rosemont, Illinois, March 17 - 21.***

Thank you to the members who have volunteered for this important task this year: Shaurav Alam, Alan Ambler, Amin Azimi, Sam Brancheau, Joanne Carroll, Andrew Costa, Will Craven, Don Del Nero, George Kurz, Bill Moore and Kalyan Piratla. The Southeast Chapter is also home to many of our Track Leaders. Track Leaders are Program Committee members that have the added responsibility of managing a track of the technical program and working with the authors and presenters to facilitate excellent presentations. I would like to extent a special thank you to the Southeast Chapter Members that will also serve as Track Leaders in 2019: Alan Ambler, Amin Azimi, Sam Brancheau, Joanne Carroll, Andrew Costa, Will Craven, George Kurz, Bill Moore and Kalyan Piratla.

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.

Frank Firsching

Frank Firsching
NASTT Chair

MEMBERSHIP IN NASTT

All in the Family: NASTT is pleased to present new opportunities to join the NASTT Family!

Attention Students! *Available now:* Student Non-Affiliated Membership

NASTT proudly engages 19 official Student Chapters, and now we are branching out to all students throughout North America! The NASTT Student Non-Affiliated Membership ($50 USD per year) is available to any student actively enrolled full-time in a North American university that doesn't currently have an official Student Chapter on campus.

Overseas Opportunities! *Available now:* International Individual Membership

The NASTT International Individual Membership ($250 USD per year) is available to any individual residing outside of North America.

Stay Engaged! *Available now:* Retiree Membership

The NASTT Retiree Membership ($40 USD per year) is open to NASTT members after they retire from the industry.

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

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

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

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

Are you interested in getting to know the next generation of trenchless champions? NASTT also offers membership to students! We are proud of our 19 NASTT Student Chapters and these student members are given the opportunity to attend the No-Dig show and learn about the trenchless world while networking with potential employers. Student chapters fulfill critical roles as not only volunteers at NASTT's No-Dig Show, but are the next generation of trenchless professionals.

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

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

SOUTHEAST SOCIETY FOR TRENCHLESS TECHNOLOGY
BOARD OF DIRECTORS 2018-2019

Jerry Trevino - *Chairman*

Jerry Trevino is President of Protective Liner Systems, Inc., and principal owner of other construction and consulting companies. 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 strongly believes that trenchless technologies offer numerous methods to maintain and upgrade aging infrastructure.

Ed Paradis - *Vice Chairman*

Ed Paradis is Sales and Market Development Manager, Injection Systems - North America, Underground Construction for 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 attended Boston University while serving in the U.S. Army. He 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.

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 29 years of experience, Chris serves as a leading trenchless technologies resource for public utilities in the Carolinas. Over the last 13 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.

Brent Johnson - *Treasurer*

Brent Johnson has over 28 years of experience in the planning, design and construction of water and wastewater facilities. Since 2000, he has focused on the use of trenchless technologies for pipeline construction and rehabilitation. He is a member of NASSCO's CIPP, Lateral, Manhole, and Pipe Rehabilitation committees. For the last ten years he has focused on the inspection and condition assessment of water and wastewater pressure mains and is a past chair of the NASSCO Pressure Pipe Committee and a member of the AWWA Water Main Condition Assessment Committee. He is in the CDM Smith Raleigh, North Carolina, office and is the firm's national technical leader for pipeline condition assessment and rehabilitation.

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

www.sestt.org

2019 SEMINAR & JOURNAL SCHEDULE

MASTT - MID ATLANTIC SOCIETY FOR TRENCHLESS TECHNOLOGY
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)	PROPOSED
SESTT SEMINAR	MAY 22, 2019	CHARLESTON SC	PROPOSED
MASTT JOURNAL	MAY 30, 2019	PUBLISH DATE	PROPOSED
MSTT SEMINAR	JUNE 26, 2019	INDIANAPOLIS IN	PROPOSED
MASTT SEMINAR	AUGUST 21, 2019	ARLINGTON VA	PROPOSED
MSTT JOURNAL	SEPTEMBER 25, 2019	PUBLISHED	PROPOSED
SESTT SEMINAR	SEPTEMBER 25, 2019	CHARLOTTE NC	PROPOSED
SESTT JOURNAL	NOVEMBER 15, 2019	PUBLISH DATE	PROPOSED
MSTT SEMINAR	DECEMBER 4, 2019	COUNCIL BLUFFS IA (OMAHA)	PROPOSED

To Present, Exhibit and/or Food Sponsorships please contact Leonard Ingram, PWAM, Executive Director at 888-817-3788 or leonard@engconco.com

For Journal articles & advertisements contact Andrew Pattison, A2B Publishing, at 204-275-6946 or marcomap@shaw.ca

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 NASTT TRENCHLESS EVENTS

February 5, 2019
NASTT CIPL Good Practices Course (in partnership with NEGDC)
8:00 AM - 5:00 PM
PSE&G Training and Development Center
Edison, New Jersey
Information:
www.nastt.org/training/events

March 17, 2019
NASTT Introduction to Trenchless Technology – Rehabilitation
8:00 AM - 12:00 PM
Donald E. Stephens Convention Center
Rosemont, Illinois
Information:
www.nastt.org/training/events

March 17, 2019
NASTT Introduction to Trenchless Technology – New Installations
8:00 AM - 12:00 PM
Donald E. Stephens Convention Center
Rosemont, Illinois
Information:
www.nastt.org/training/events

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

March 20 – 21, 2019
NASTT Pipe Bursting Good Practices Course
March 20 2:30 PM - 5:30 PM
March 21 8:00 AM - 12:00 PM
Donald E. Stephens Convention Center
Rosemont, Illinois
Information:
www.nastt.org/training/events

March 20 – 21, 2019
NASTT New Installation Methods Good Practices Course
March 20 2:30 PM - 5:30 PM
March 21 8:00 AM - 1:00 PM
Donald E. Stephens Convention Center
Rosemont, Illinois
Information:
www.nastt.org/training/events

March 20 – 21, 2019
NASTT CIPP Good Practices Course
March 20 2:30 PM - 5:30 PM
March 21 8:00 AM - 1:00 PM
Donald E. Stephens Convention Center
Rosemont, Illinois
Information:
www.nastt.org/training/events

March 20 – 21, 2019
NASTT Laterals Good Practices Course
March 20 2:30 PM - 5:30 PM
March 21 8:00 AM - 12:00 PM
Donald E. Stephens Convention Center
Rosemont, Illinois
Information:
www.nastt.org/training/events

March 20 – 21, 2019
NASTT HDD Good Practices Course
March 20 2:30 PM - 5:30 PM
March 21 8:00 AM – 2:30 PM
Donald E. Stephens Convention Center
Rosemont, Illinois
Information:
www.nastt.org/training/events

March 20, 2019
NASTT Gas Good Practices Course
2:30 PM - 5:30 PM
Donald E. Stephens Convention Center
Rosemont, Illinois
Information:
www.nastt.org/training/events

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

ROGERSON DRIVE FORCE MAIN REHABILITATION

Lessons Learned Concerning CIPP Lining of High Spots in Force Mains

By: Brent Johnson, CDM Smith

The Orange Water and Sewer Authority (OWASA) is a public, non-profit agency that provides water, sewer, and reclaimed water services to the Carrboro-Chapel Hill community including the University of North Carolina at Chapel Hill in southern Orange County, NC. OWASA conveys approximately 60 percent of its sewer service flow through the highly critical Rogerson Drive sewer force main (RDFM). This single 24-inch and 30-inch ductile iron force main spans 2.2 miles from the Rogerson Drive pump station to the Mason Farm Wastewater Treatment Plant (WWTP), traversing through neighborhoods, mid-rise mixed-use developments, and a golf course.

The RDFM runs from the Rogerson Drive pump station then under a 6-lane highway and transitions from 30-inch to 24-inch for several hundred feet, and then back to 30-inch. At the intersection where the 24-inch force main transitions back into a 30-inch DIP force main, it also connects to the original 16-inch ductile iron (DIP) and asbestos cement (AC) force main that served an earlier station that is still present but typically is out of service. The 30-inch and 16-inch force mains run in parallel over the remaining distance to the WWTP until they recombine into the final 42-inch incoming sewer.

In September 2016, there was a break in the 30-inch section at a high point of the force main downstream of the intersection of the 24 and 16x30 inch split, which created a large sink hole that required an emergency point repair. During the repair, the 30-inch portion was temporarily bypassed by placing all flow from the 24-inch section into the 16-inch main which could adequately carry all the dry weather flows. While bypassed, this 30-inch force main section was inspected using a closed-circuit television (CCTV) camera and it was discovered that much of the DIP in this gravity flow section had significant corrosion, with high potential for further failures.

Area of Force Main Break in Secondary Street

"A CIPP liner was selected as the rehabilitation method based on lower cost, faster schedule, and less disruption to the public..."

OWASA quickly determined that the temporary repair was inadequate for this section of pipe and began developing long term rehabilitation plans for the pipe. Subsequently, CDM Smith was contracted to perform condition assessment and rehabilitation design on the high point of the RDFM. A cured-in-place pipe (CIPP) liner was selected as the rehabilitation method based on lower cost, faster schedule, and less disruption to the public; however there were portions of the force main that required open-cut replacement. Coordination was required with various departments within OWASA, and multiple stakeholders, including the Town of Chapel Hill and the NCDOT, and was a critical aspect of this project. Also coordination was required with a private development project involving the concurrent active construction of a multi-story building along Prestwick Road.

The 16-inch force main that carried bypass flow to facilitate the emergency repair and CCTV inspection of the 30-inch force main was once again utilized to allow insertion of tee and plug valves at the most downstream portion of the 30-inch force main where it departs from the roadway and heads off into the greenway. This infrastructure allowed for connection of the above ground bypass as well as connections for future infrastructure such as a parallel main. At the upstream end of the 24-inch force main along highway 54 a mechanical line stop was utilized to divert flow into the above ground temporary HDPE 24-inch bypass that was connected to the new 30-inch plug valve and tee at the downstream end. This removed flow from the section of 24-inch force main running from the highway to the 30-inch section that runs along the much smaller and lower traffic neighborhood street and also eliminated the need for reliance on the limited capacity of the 16-inch main.

OWASA chose to bid an alternate arrangement for installation of another permanent tee and valve on the 24-inch section. Once flow was removed from the 24-inch section new 24-inch tee and plug valves were installed and connected to the above ground bypass so that the 24-inch mechanical line stop could be removed and returned in order to limit rental costs. Based on bid prices, the anticipated time required for the temporary bypass and

24-inch Tee and Plug Valves Installed Downstream of Line Stop

the monthly rental fee for the 24-inch mechanical line stop, the savings from releasing the line stop after installation of the permanent tee paid for the costs of the tee!

Since the force main changes diameter in this area, it was necessary to install two sections of CIPP liner along the high point of the force main; one liner in the 300-foot section of now isolated 24-inch DIP force main and a second 400-foot section of 30-inch DIP force main running along the neighborhood street. There were several issues that led to a recommendation to open cut the portion of the force main sandwiched between the two CIPP sections. The first issue was the need for access pits for both the 24-inch liner extraction and insertion of the 30-inch liner. Second, there was a need to relocate an existing bypass and associated valves that connected the 24-inch and 30-inch sections of force main. Lastly, there was a desire to relocate an existing ARV and associated manhole out of the roadway and closer to the highpoint of the force main. Because these issues made it necessary to remove so much of the pipe in this high point area a decision was made to replace the remaining DIP with new pipe. PVC pipe was chosen as the material for all open cut replacement efforts because of the highly corrosive nature of the area.

The project also included a unique design feature – a large road ramp to maintain access to a parking deck for a multi-story hotel. The 24-inch HDPE bypass was laid across the hotel parking lot and teed into a header that broke the wastewater flow down into six 12-inch bypass pipes which passed under the road ramp and entered a second header pipe which transferred the flow back into the 24-inch HDPE bypass pipe. The road ramp consisted of three steel I-beams and welded road plates in the center with concrete end ramps that were poured on a layer of heavy mill plastic and plywood for easy removal and cleanup. The edges of the concrete ramp were feathered in with asphalt to make a smooth transition for vehicles. The sides of the ramp were lined with water filled Jersey Barriers for safety. The alternative would have required the contractor to excavate near many buried utilities owned by OWASA and others to maintain access to the parking deck. Additionally, stamped concrete, walkways and roadway repair costs were avoided. Contractors bid the ramp versus the buried bypass and the ramp was the lowest cost and least disruptive option.

The 24-inch section of CIPP lining was installed without any issues. The 30-inch liner had multiple issues that required multiple liners. It was decided by the contractor to install the 30-inch liner

Concrete Road Ramp with six 12-inch HDPE Bypass Lines

> *"There were several project lessons concerning CIPP lining of the high spots in force mains that are not experiencing full pipe flow."*

via air inversion and steam cure due to the 20-foot elevation difference between the insertion and extraction pits which created concerns over the bag rupturing at the lower end due to the hydraulic head pressure. However, it was later found that water was likely infiltrating into the 30-inch section of force main and accumulating in the belly of the piping.

The first 30-inch CIPP liner section was air inverted and steam cured. This was ineffective at pushing out the water that had collected in the low point because either a) if the infiltration was occurring at the low point then the hydraulic pressure of the infiltrating water was greater than the pressure of the air and steam on the pipe or b) the water had infiltrated during the inversion process and could not escape through any point in the belly of the pipe where it accumulated and was locked in by the curing pipe. This created a waterbed type condition where the trapped water resulted in a heat sink preventing proper curing and creating a notable obstruction in the pipe. The liner had a 20-foot long area filled with water located in the pipe invert that was 6-inches wide and 3-inches tall. Manned entry allowed for the liner to be sliced open and the trapped water extracted in preparation for rehabilitation efforts.

A second 30-inch short liner was installed from the downstream end to shore up this uncured section. When a pressure test was performed on the entire 400-foot pipe section, a hole was discovered in the upstream section of the original liner on the inside edge of an 11-degree pipe bend. It was suspected that the hole was a result of friction from the guide rope that was used to invert the liner. This prompted the installation of a second (third liner overall) partial liner on the upstream portion that would meet up with the partial liner correcting the uncured original liner section at the downstream end. The two partial

Trapped Water from Potential Infiltration in CIPP Liner

Holes in Second Partial Liner

liners would be joined and sealed by an intermediate end seal. Upon CCTV inspection of the second partial liner it was discovered to have multiple factory defects that had the appearance of cigarette burns spaced out evenly along the pipe length. The presence of these holes once again prevented a successful pressure test which prompted yet another CIPP liner to be installed for the full 30-inch pipe length.

Calculations were performed to ensure that the reduced internal diameter of the 3-layer composite liner would not adversely affect the hydraulic capacity of the force main piping nor affect the efficiency of the pump station pumps. The intermediate end seal was removed, and the third liner installed this time utilizing water inversion/curing. Due to the concerns over hydraulic head pressure a cage was built at the downstream extraction pit that would support the liner and prevent bursting from over pressurization. The liner was inserted utilizing the slug method where water was only introduced into the down tube when the inversion process had stalled, and more hydraulic head was needed to resume inversion of the liner. This method allowed for better control of the inversion rate as well as reducing the possibility of rope burn on the liner at the inside face of the two 11-degree bends along the 30-inch section. The third liner successfully passed the pressure test.

There were several project lessons concerning CIPP lining of the high spots in force mains that are not experiencing

Pedestrian Ramp and Temporary Odor Control

full pipe flow. The first is the need for a preliner. The preliner shields the liner resin from becoming diluted by either active infiltration in the corroded host pipe or by the melting of any existing protective liners on the host pipe. The high temperature of the curing process exceeds the melting point of existing liners causing them to liquefy and run to the invert of the pipe where they can mix with the liner resin causing improper curing. A second is the need to utilize water inversion/ curing when infiltration is suspected and paying special attention to the potential of water accumulating at low spots in the pipe during inversion. Air inversion and steam cure does not effectively remove standing water in low points of the force main nor does it prevent subsequent water from entering during the depressurized state that occurs when switching from air to steam.

Other project constraints addressed by the CDM Smith design team included the need to maintain greenway and school pedestrian traffic. The nearby elementary school was located on the dead end of Prestwick Road and even though the project required a portion of Prestwick Road to be closed to vehicular traffic it had to remain open to pedestrian traffic including those utilizing the nearby greenway. That issue was addressed using a prefabricated aluminum pedestrian ramp. Since this is the high point of the force main and required an air release valve, the design team also had to employ the use of temporary odor control devices due to both pedestrian traffic and the nearby mixed use residential and commercial complex. Most notable were the traffic snarls created by busy deliveries for the commercial construction as well as the lining work, closed roadways for the lining construction, and school pick up and drop off times. The RDFM rehabilitation was completed in Fall of 2017.

ABOUT THE AUTHOR:

Brent Johnson *is focused on the condition assessment and rehabilitation of water and wastewater pressure mains and is current Chair of the NASSCO Pressure Pipe Committee. He is the CDM Smith National technical leader for pipeline condition assessment and rehabilitation in the Southeast Region. Brent serves as the SESTT Treasurer. His full bio is on pg.10.*

FLORIDA EAST COAST RAILWAY CULVERT RELINE

By: Robert Morris, Contech Engineered Solutions

- Owner: Florida East Coast Railway (FEC)
- Engineer: Florida East Coast Railway (FEC)
- Contractor: MG Underground LLC
- Technical Description: DuroMaxx SRPE Liner Pipe, 30-psi WC joints, 42-inch, 220 LF
- Installation: September, 2018

Welded Coupler (WC) joints were included in the design to provide a 30 psi, watertight joint

Founded in 1885 by Henry Flagler, the Florida East Coast Railway (FEC) is a Class II regional railroad that owns a 351-mile mainline track in Florida from Jacksonville down to Miami. The FEC Railway is the exclusive rail provider for Port of Miami, Port Everglades and Port of Palm Beach.

The FEC connects to the national railway system in Jacksonville, allowing it to provide rail service in and out of Georgia, Tennessee, South Carolina, and North Carolina, into and out of Florida's east coast. Based in Jacksonville, FEC provides end-to-end intermodal and carload solutions to customers who demand cost-effective and premium quality transportation solutions. Every day, the railroad is moving commodities such as aggregate, automobiles, bulk liquids, building materials, orange juice, electronics and other items.

Given the high demand placed upon the FEC track, it is very important that the line remains fully functioning 24-hours a day, seven days a week. In order to maintain the track, FEC engineers will routinely inspect crossings and culverts to ensure the line remains structurally intact. A 48-inch diameter, reinforced concrete pipe (RCP) drainage culvert was found to be structurally deficient with cracking and spalling occurring throughout the run, combined with joint failures that were very concerning. This particular portion of the line also runs across the entire rail yard in Jacksonville, and nearly 25 tracks cross over this deteriorated culvert.

FEC called on MG Underground LLC, a leader in installation and rehabilitation of buried infrastructure, to assess the condition and identify the best solutions for consideration.

Completing an infrastructure assessment and enacting a preventive maintenance plan to ensure that production is not hindered with aging or failing infrastructure is imperative. Deteriorated culverts not only pose potential production losses but can also be a health and environmental hazard if not identified and repaired or replaced in time.

To avoid any down time to the line above the culvert, which was

A push-pull method was incorporated to expedite the installation process

The DuroMaxx SRPE Liner Pipe offered a fully structural reline solution

an imperative aspect to the project, both the FEC and MG Underground determined that a relining solution was the best route to go. After some review of available solutions, MG Underground recommended sliplining with DuroMaxx® SRPE liner pipe with welded coupler (WC) joints, a steel reinforced polyethylene pipe manufactured by Contech Engineered Solutions LLC. Offering the strength of steel and the durability of pressure rated polyethylene resin (PE), DuroMaxx is a smooth inner wall pipe with a Manning's "n" value of 0.012 that provides superior durability with enhanced hydraulic capacity. Manufactured at their nearby plant in Montgomery, Alabama, the DuroMaxx liner pipe was shipped directly to the construction site.

For the installation process, MG Underground diverted the waterflow from the inside of the host pipe to expedite the sliplining process as well as the grout curing process. Using a hammer head and wedge system to pull the liner pipe in to the inlet of the culvert, MG lined the deteriorating host pipe with 42-inch diameter DuroMaxx SRPE and then incorporated a backhoe on the outlet end of the pipe to pull the pipe into place throughout the 220 LF length of the original drainage culvert. Utilizing the push-pull method, they were able to lay and joint five sections per day. Once the liner pipe was in place, a lightweight, cellular grout was pumped through in a single-stage lift approach. This is done most efficiently by constructing a bulkhead at each end of the reline and allowing the new pipe to float to the crown of the existing pipe while grout is pumped into the annular space. The grout was pumped in a controlled manner to ensure balanced filling on all sides and cured. This allowed MG to employ only a small crew for the installation process, providing added savings and improving the efficiency of the installation and time needed to complete the project. The entire installation including the reline, welding, grouting and setting was completed in roughly four weeks.

> ***"Nearly 25 tracks cross over the deteriorated culvert... a relining solution was the best route to go..."***

The owner of MG Underground LLC, George Coleman, commented, "DuroMaxx makes it easy to install, especially with its easy-to-use pressure rated 30 psi joints."

The end result, to what could have been a time-consuming and costly replacement, was a reline solution utilizing a steel, reinforced polyethylene liner pipe that provided both the strength and durability necessary to offer a permanent, structural solution that would extend the service life of the existing host pipe for over 100-years.

ABOUT THE AUTHOR:

***Robert Morris** is currently a Regional Engineer for Contech Engineered Solutions LLC. Robert has worked with Contech for 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.*

ATLANTA SEMINAR MAY 9, 2018:

GUEST PRESENTATION

"Lessons Learned and Future Efforts"
Mr. Maurice L. Horsey, IV
Chief EPA Municipal & Industrial Enforcement,
US EPA, Region 4

PRESENTATIONS

Welcome Address to the Trenchless Technology Seminar ,
Leonard Ingram, PWAM, SESTT Executive Director

Trenchless Technology Center,
Dr Tom Iseley, P.E., Louisiana Tech University

BAMI-I & Certification of Training in Asset Management (CTAM) Program,
Dr. Tom Iseley, P.E., BAMI-I

Internal Joint Seals - Where, When, How,
Jeremy Keininger, Miller Pipeline Corporation

Site Dewatering & Water Management,
Chad Freund, Xylem, Inc.

Cured-In-Place Pipe - Is It Safe?
Kaleel Rahaim, IP-Corporation

HDPE Design and Installation per AWWA C901, C906 And M55,
Camille Rubeiz, Plastic Pipe Institute

Infrastructure Repairs Using Chemical Grout,
Ed Paradis, BASF - Master Builders Solutions

Pilot Tube Guided Boring,
Troy Stokes, Akkerman

Relining 650 LF 20-inch Steel Pipe along Bridge in Less Than 3 Days,
John Moody, Primus Line, Inc.

Multi Sensor Inspection,
Ed Diggs, Pipeline Inspection Partners Corp

Rehabilitation of Underground Structures,
Jerry Trevino, Protective Liner Systems

IPEX PVC Fold & Form,
Michael W. Johnson, P.E., IPEX USA LLC

New Standards for Testing & Certifying CIPP as Watertight,
Chuck Hansen, Electro Scan Inc.

UV GRP Lining,
Grant Whittle, Reline America

TRENCHLESS TECHNOLOGY EDUCATION & NETWORKING!

SESTT Seminars Promote Trenchless Technology across the Southeast

SESTT Trenchless Technology seminars are great networking and educational opportunities

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

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

SESTT **Trenchless Technology, SSES and Buried Asset Management Seminars** are

> ***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"***
>
> LEONARD INGRAM, PWAM, SESTT EXECUTIVE DIRECTOR

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

Jointly sponsored with the local ASCE section and/or branch, registration fees for the SESTT seminars include program materials, all day refreshments, breakfast pastries, lunches, networking, and a PDH Certificate. Special thanks go out to 2018 food sponsors *Akkerman, Electro Scan, Interplastic Corporation, Miller Pipeline, Pipeline Inspection Partners Corp*, and *Raedlinger Primus Line*.

SESTT Executive Director Leonard Ingram believes the seminar programs are essential in fulfilling the SESTT 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 SESTT seminars have really helped grow the business of trenchless technology across the Southeast over the years. They promote greater understanding and acceptance of different trenchless applications, and underline the critical importance of systematic buried asset management."

Great opportunity to resource knowledgeable trenchless vendors

For information dates and locations of the proposed 2019 SESTT Trenchless Technology, SSES and Buried Asset Management seminars planned for the Southeast, visit:

www.sestt.org

TAMPA SEMINAR OCTOBER 16, 2018:

GUEST PRESENTATION

"Trenchless Technology in Tampa"
Ms. Cassidy Barrett, Project Engineer,
Wastewater Department/AWTP
City of Tampa FL

PRESENTATIONS

Welcome Address
Leonard Ingram, PWAM, SESTT Executive Director

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

New Standards for Testing & Certifying CIPP as Watertight,
Chuck Hansen, Electro Scan Inc.

Pilot Tube Guided Boring,
Troy Stokes, Akkerman

Conquering Microbial Induced Corrosion,
Scott Kelly, AP/M Permaform

Rehabilitation of Underground Structures,
Jerry Trevino, Protective Liner Systems

Multi Sensor Inspection,
Ed Diggs, Pipeline Inspection Partners Corp

Relining Water Mains with Flexible High Pressure Pipes,
John Moody, Raedlinger Primus Line, Inc.

Sanitary Sewer Lateral Lining: An Update,
Gordon Marshall, BLD Services, LLC

Fold and Form, PVC Liners,
Michael Johnson, IPEX Municipal Systems

Reinforced CIPP for Pressure Pipe Rehabilitation,
Andrew Costa, Aegion/Insituform

NASTT SOUTHEAST CHAPTER

SEWER MANHOLE LINING LOGICS

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, Pozzzolanic 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

> ***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

- bond and cure in wet manholes
- cure underwater
- 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

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

surface area that was generated over several thousand square feet of pipe. This is a very difficult task.

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-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.

ABOUT THE AUTHOR:

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 pg10.*

BASF CASE STUDY:

How to Stop ~125 GPM Gushing Water

By: Grout Tech Foundation & Structural Repair

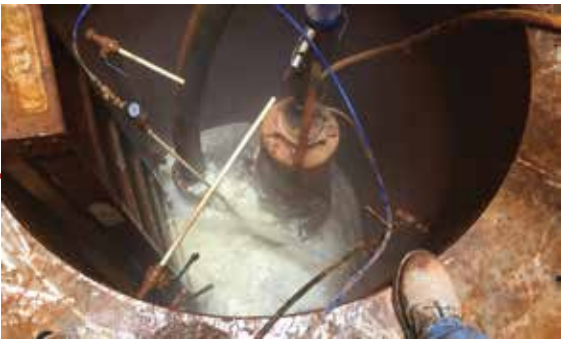
A precast sump pit of 5 feet diameter by 6 feet height, located at the base of an approximate seven story high Oxygen Pit (OP) water holding tower (the cleaned and oxygenated water would be discharged into the adjacent river), began leaking ground water into the pit. This pit was located approximately 30 feet below the ground water table. As time went on the leak went from a nuisance to an approximate 125 GPM of gushing water. The leak was so severe it was estimated it took only a few hours for the water to rise to the same height as the exterior water table. The water, entering into the bottom of the sump pit, was also causing the sandy soils from under and around the OP to enter into, and fill, the sump pit. This created grave concern of the possibility of the OP tilting, and possibly even falling into the adjacent river. The soils were continually being replaced by the plant. Further, at least two large industrial sized sump pumps had been ruined due to the sandy soil running through and stripping the pumps.

Initial discussions with the customer indicated they wanted to have Portland based grout injected in an effort to plug the hole. Nichols/GROUT TECH personnel explained this product/method would likely not be successful due to the amount of flowing water, which was only approximately 50 GPM at that time — we could inject a low slump mix, but it most likely would wash out prior to it ever setting enough to stop the water. At this time it was estimated the hole at the base of the concrete pit was only a couple of inches in diameter.

On our second visit to the site it was estimated the flow had increased to about 75 GPM (which meant the hole in the base of the concrete sump pit was also expanding). The owners had decided to try stopping the water infiltration by inserting a steel "sleeve" into the pit. This sleeve was smaller than the original sump pit by approximately 1.5 feet diameter and 1 foot depth. The new plan was to have GROUT TECH inject a bagged, specialty cement grout into the annulus space between the pit and steel sleeve, through 12 valves they had installed into the steel pit walls (three each (low middle and high) at 12, 3, 6, and 9 o'clock;). Again, we explained this would likely not be successful due to the amount of water gushing inward. Keep in mind they wanted all of the water infiltration stopped. Therefore, a cement based grout would likely allow for water infiltration over a short period of time since the injected product would not bond with both the existing concrete and new steel. GROUT TECH suggested utilizing a urethane based foam grout.

Consulting with Ed Paradis (BASF) and Tim Fitzgerald (Coastal Construction

"Upon completion not a single drop of water was exiting any of the valves – not one drop!"



Products), GROUT TECH settled on using BASF's MasterRoc® MP 355 1K for the project. Our reasoning was this product had a proven track record of stopping gushing water. In addition, the product is a one component grout (plus accelerator), making it easier to maneuver around within the limited space at the base of the seven story "silo" containing various obstacles (stairwell, large diameter pipe, etc.), not to mention having to crane all the materials and equipment down into the pit through a narrow skylight. On the day of the injection, the estimated water flow was around 125 GPM. A single valve had been placed in the center of the bottom of the steel insert. It was through this single 2-inch valve that we would insert a 1-inch tremmie tube to pump the MP 355 1K through, utilizing the valves located on the side of the pit as exit/relief valves. When we inserted the tube, it went approximately 4 feet below the base of the pit… without resistance, and the water pressure was high enough to spew out our injection port! Now we knew there was at least a 4-foot deep void, but how wide was it? The base of the OP was 40 feet in diameter. Obviously the void couldn't be that large as the structure was still standing.

Initially, GROUT TECH had estimated it would take approximately 50 gallons of the BASF product to stop the leak. In the end it took about 4 hours of continuous pumping, and 90 gallons of product! Since no one knew the size of the hole at the bottom of the sump pit to begin with, but we knew our void was at least 4 feet in depth, this meant the diameter of the void was quite a bit larger than the client had initially thought, as was the opening at the base of the pit, allowing the water to infiltrate.

Upon completion not a single drop of water was exiting any of the valves — not one drop!

ABOUT NICHOLS/GROUT TECH:

Nichols/Grout Tech *is the industry leading foundation repair water management, and specialty grouting company in Birmingham, AL and throughout the Southeastern US.*

BAMI-I UPDATE

Third 4-day CTAM workshop held in Lewisville TX November 2018

By: The Trenchless Technology Center (TTC)

The Buried Asset Management Institute (BAMI) was established in the Department of Watershed Management (DWM) for the City of Atlanta in 2003 as a result of the leadership and inspiration of Mayor Shirley Franklin and DWM Commissioner Jack Ravan. In 2004, BAMI transitioned to BAMI-International (BAMI-I). BAMI-I is a non-profit corporation whose main purpose is to educate and assist those who have an interest in applying best buried asset management practices to extend the life and efficiency of their assets.

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

In 2006, BAMI-I was selected for U.S. EPA Cooperative Agreement (CP 83 282901-1), which was completed in 2008. As a result of it, BAMI-I launched the Certificate of Training in Asset Management courses (CTAM 100-400). This program consists of 4 online courses plus a 2-level certification program (Associate Water Asset Manager (AWAM) & Professional Water Asset Manager (PWAM)). So far, individuals from 16 countries have enrolled in the CTAM program.

In August 2015, BAMI-I was requested by the Division of Water Infrastructure (DWI) of North Carolina Department of Environment and Natural Resources (NC - DENR) to conduct a 4-day course to teach CTAM 100-400 in Raleigh, NC.

Also, BAMI-I was requested to conduct a 4-day CTAM course by Rural Community Assistance Partnership (RCAP) in Columbus, OH in May 2017.

BAMI-I teamed up with the Underground Construction Technology Association North Texas Chapter (UCTA-NT) to hold the third 4-day CTAM workshop on Nov 5-8, 2018. The workshop was a four-day offering of an exclusive four part series in Asset Management coursework, CTAM, for Water Infrastructure and certification. The workshop covered one course level per day. The attendees consisted of approximately 50% municipal representatives and 50% consultants. It was a great success.

The BAMI-I Board meeting will be held in conjunction with UCT Conference on January 28, 2019 in Fort Worth, TX. For more information please visit www.bami-i.com and contact Dr. Tom Iseley, dtiseley@latech.edu.

The Trenchless Technology Center (TTC): *is an industry/university/government research center at Louisiana Tech University. It has world-class research and testing facilities at the National Trenchless Technology Research Facility (NTTRF) in South Campus at Louisiana Tech. The TTC was established by Dr. Tom Iseley in 1989. It was created to promote research, development and technology transfer in the trenchless technology industry. For nearly 30 years TTC has served as a global leader for the development of technologies influencing almost every aspect of trenchless construction methods. development of technologies influencing almost every aspect of trenchless construction methods. From BAMI-I membership & CTAM information visit: www.bami-i.com*

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