



SOUTHEAST JOURNAL OF TRENCHLESS TECHNOLOGY 2021-2022

OFFICIAL PUBLICATION OF THE SOUTHEAST SOCIETY FOR TRENCHLESS TECHNOLOGY



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Orlando Sanitary Sewer Upgrade
Miami-Dade Emergency Reline

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- Sanitary Sewers
- Culverts & Structures
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The City of Orlando initiated a \$1.8 million wastewater project to increase capacity for an undersized sanitary sewer. With a large number of existing utility lines in the area, including a pressurized gas main that ran parallel to the new sanitary sewer location, the City needed to find a safe but effective installation solution. Details on the solution found including details on the patented close tolerance horizontal directional drilling (CTHDD) process.



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SESTT CHAIRMAN MESSAGE 2021 - 2022

Moving Trenchless Technology Forwards While Facing Challenges

Jerry Trevino, SESTT Chairman

The Corona virus and its mutant descendants are still with us and are still creating global havoc. In addition to increasing labor shortages as compared to previous years, we also have severe raw materials and finished product supply shortages. Along with higher costs for fuel, food and practically everything, the cost of doing business has proportionally increased for municipalities, businesses, and individuals. Despite all this, citizens still expect governments to supply them with clean water, adequate collection and processing of sewerage, and maintain and upgrade all other essential utilities and public services. Population shifts have also created some infrastructure capacity issues. With all that said, Trenchless Technologies providers play a vital role in helping municipalities manage through these uncharted waters. We look forward to the end of this pandemic, hoping this latest virus variant provides the long awaited herd immunity scenario.

These challenging times should also strengthen us and prepare us to protectively plan to survive future calamities. We look forward to meeting in Minneapolis at the NASTT No-Dig

These challenging times should also strengthen us and prepare us to protectively plan to survive future calamities.

Show on April 10 - 14 to learn about new and existing innovations in Trenchless Technologies and underground construction services. We will also have the opportunity to visit booths and exhibits with forward looking technologies and innovations.

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

the necessary new materials, processes, and technologies to achieve this.

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

Sincerely,

Jerry Trevino
SESTT Chairman



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GREETINGS FROM THE EXECUTIVE DIRECTOR

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

Seminars in 2021 were looking better! Even with some Covid-19 in the areas, the Southeast Society for Trenchless Technology had a better year for seminars in 2021 than 2020 and was able to conduct two “Trenchless Technology, SSES and Buried Asset Management” seminars.

On July 21, 2021 SESTT had a successful “Trenchless Technology, SSES and Buried Asset Management” seminar in Savannah GA. The Guest Presenter was Mr. Jim Laplander, Director of Planning and Engineering, City of Savannah Water and Sewer, Savannah, GA with the presentation “Trenchless Technology in Savannah and the Need for Waterline Rehab”. There was a lot of networking and learning.

Thank you Mr. Jim Laplander!

Then on December 8, 2021, SESTT had a very successful “Trenchless Technology, SSES and Buried Asset Management” seminar in Miami FL. The Guest Presenter

was Ms. Marisela Aranguiz, Capital Improvements Program Deputy Director, Miami-Dade Water and Sewer Department, Miami FL with the presentation “Trenchless Technology at Miami-Dade Water and Sewer”. ASCE Miami-Dade Branch was co-sponsor for the seminar and really promoted the seminar.

Thank you Ms. Marisela Aranguiz and ASCE Miami-Dade Branch!

The MASTT, MSTT & SESTT 2022 Proposed Seminar, Webinar and Journal Publication Schedule has been published and is available on the SESTT website. Plans are a to have a SESTT seminar in Nashville TN on Wednesday, March 23, 2022 and one in Baton Rouge LA on Wednesday, December 7, 2022, Covid-19 allowing. These areas are

trenchless hot spots that we have not visited in the past few years. The schedule below is updated regularly and will include date changes, planned webinars and annual Society journal information. Your support and participation with MASTT, MSTT and SESTT Seminars, Webinars and Journals are very much appreciated to make **YOU** and **US** successful. Please review the Schedule below and try to support each event as much as possible.

Thanks for your support!

Leonard E. Ingram, Sr., PWAM
Executive Director, MASTT, MSTT & SESTT

PLEASE REVIEW THE MASTT, MSTT AND SESTT 2022 PROPOSED SEMINAR AND JOURNAL PUBLICATION SCHEDULE:

SOCIETY	LOCATION/PUBLISH	PROPOSED DATE	STATUS
SESTT SEMINAR	NASHVILLE TN	MAR 23, 2022 - WED	PROPOSED
MSTT SEMINAR	CINCINNATI OH	MAY 11, 2022 - WED	PROPOSED
MASTT SEMINAR	BALTIMORE MD	JUL 20, 2022 - WED	PROPOSED
MASTT JOURNAL	PUBLISH DATE (DEADLINE (05/27/22))	JUNE 15, 2022	PROPOSED
MASTT SEMINAR	ATLANTIC CITY NJ	SEP 14, 2022 - WED	PROPOSED
MSTT JOURNAL	PUBLISH DATE (DEADLINE (09/09/22))	SEP 30, 2022	PROPOSED
MSTT SEMINAR	ST. LOUIS MO	OCT 26, 2022 - WED	PROPOSED
SESTT SEMINAR	BATON ROUGE LA	DEC 7, 2022 - WED	PROPOSED
SESTT JOURNAL	PUBLISH DATE (DEADLINE (11/19/22))	DEC 9, 2022	PROPOSED

To Exhibit, Food Sponsor, or Present at the 2022 Seminars:

Contact Leonard Ingram, PWAM
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To Get Your Advertising Message to Trenchless Professionals into the Upcoming 2022 Journal:

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MESSAGE FROM NASTT CHAIR

Alan Goodman, NASTT Chair

Our Chapter Members and Volunteers are Crucial to our Society

Hello Southeast Chapter Members. The trenchless industry grows stronger every year. Even in the pandemic our membership and regional chapters are moving forward to educate the public. It's amazing when you look back at what we accomplished in 2021. We had an in-person and virtual No-Dig Conference in Orlando last March, leading the industry in safely meeting face to face once again. Many of our Regional Chapters held their fall conferences and networking events all over North America. And this past November we successfully held No-Dig North in Vancouver, BC!

NASTT's mission and vision are "to continuously improve infrastructure

***"We are a
resilient
industry!"***

management through trenchless technology" and "to be the premier resource for knowledge, education, and training in trenchless technology." With education as our goal and striving to provide valuable, accessible learning tools to our community, one of the

things of which we are most proud at NASTT is that even during uncertainty we have been able to grow. Recently, we welcomed our latest Regional Chapter to the NASTT family and completed our representation of the entirety of North America. NASTT is so excited to announce that we now have our first chapter in Mexico!

Looking ahead, we are currently planning the NASTT 2022 No-Dig Show to be held in Minneapolis, Minnesota, April 10-14. We are anticipating over 2,000 attendees and over 200 exhibitors. There are many new features we plan to roll out including enhanced educational forums, more networking opportunities and expanded exhibit hall time. Our industry is constantly growing in innovative ways and the No-Dig Show is a representative of our industry. We are excited to bring new value and educational experiences to you in April. Visit www.nodigshow.com for all the latest details and to register or exhibit today.

For more information on our organization, committees, and member benefits, visit our website at www.nastt.org and please feel free to contact us at info@nastt.org.

We look forward to seeing you at a regional or national conference or training event soon!

Alan Goodman

NASTT Chair

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Jerry Trevino - Chairman

Jerry Trevino is President of Mechanical Jobbers Marketing, Inc. and Protective Liner Systems, Inc. He is also the principal owner of other consulting and real estate 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 has expanded his business to include assessment of pipes and manholes to help his municipal and industrial clients to be able to pinpoint and get ahead of deterioration. He strongly believes that trenchless technologies offer numerous methods to maintain and upgrade aging infrastructure.



Jimmy Stewart - Vice Chairman

Jimmy Stewart has over 25 years' experience working in over 20 consent order driven cities, where he has been involved in full-service environmental assessments, technical water/wastewater evaluations and rehabilitation processes for waste and storm water systems.

Through his company Advanced Water/Wastewater Infrastructure Solutions (AWWIS) Jimmy currently provides condition assessments, rehab recommendations, asset management programs and digital solutions for utilities and engineers primarily across the United States. Jimmy is a past NASSCO Board Member, and the current WEF Collection System Committee Chair. He is also recipient of WEF and WEF Member associations Golden Manhole and 5s Society awards. He is currently Vice Chair of the Southeast Society of Trenchless Technology (SESTT).



Chris Ford - Secretary

Chris Ford is Principal and Vice President of Operations at Highfill Infrastructure Engineering, PC, a Carolinas engineering consulting firm specializing in community and municipal water and wastewater infrastructure engineering. With over 30 years of experience, Chris serves as a leading trenchless technologies

resource for public utilities in the Carolinas. Over the last 15 years he has focused on the use of trenchless technologies for condition assessment, evaluation, renewal, and replacement of both pressure and gravity pipelines. His experience includes large diameter ductile iron pipe splitting, pipeline renewal with high pressure liners, various methods of gravity sewer rehab, and new installations via horizontal directional drilling. A graduate of NCSU with a BS in Civil Engineering-Construction, Chris regularly presents at conferences including NC AWWA-WEA, NASTT No-Dig, and UCT.



Ed Diggs - Treasurer

Ed Diggs has been involved with CCTV inspection equipment for nearly 30 years, working with municipalities, contractors and engineers, insuring their specific needs. He began his career in the sewer business as a senior manager with R.S. Technical Services and for the past twenty years has been

employed by SPX Cues, Inc. in various positions. Currently Ed's role is with SPX Cues' sister company PIPC (Pipeline Inspection Partners Corp.), a purveyor of Cues High Technology products, where he develops business for 2D and 3D multi-sensor platforms and reports. Ed is a member of NASTT, SESTT, WEF, FWEA, WEAT, APWA, and AWWA.

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2022 SEMINAR & JOURNAL SCHEDULE

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

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

Please contact Andrew Pattison, A To B Publishing, Inc., at marcomap@shaw.ca

Or call (204) 275-6946 to advertise in the journal or discuss an article for the journal.

Our 119 "Trenchless Technology, SSES and Buried Asset Management" seminars since 2001 have offered a lot of information, a lot of networking and a lot of learning. The journal and webinar are a great source for advertising, learning and teaching.



For registration and updated information on the 2022 "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

PROMOTING TRENCHLESS TECHNOLOGY IN THE SOUTHEAST!

SESTT Seminars Get Back on Track with Savannah & Miami Successes

The Trenchless Technology seminars hosted by SESTT in locations across the Southeast have been a mainstay of trenchless technology outreach and education efforts across the region for nearly two decades.

Renewing optimism that the SESTT will be able to fully resume these very effective in-person **Trenchless Technology, SSES and Buried Asset Management Seminars** for 2022, the Society held a very successful one-day seminar Wednesday December 8 at the Marriott Miami Airport Hotel.

Held in conjunction with the ASCE Miami-Dade Branch, the SESTT Miami Trenchless Technology seminar featured a presentation from Ms. Marisela Aranguiz,

Capital Improvements Program Deputy Director at the Miami-Dade Water and Sewer Department, on "Trenchless Technology at Miami-Dade Water and Sewer". There were fourteen other presentations by industry professionals on a wide range of trenchless technology topics, along with exhibits from 15 industry suppliers.

Since 2003, SESTT has been hosting **Trenchless Technology, SSES and Buried Asset Management Seminars** in various cities across the Chapter's ten state area. These seminars have engaged over 2000 underground infrastructure professionals over this period, facilitating meaningful direct networking between industry and owner groups.

On July 21 SESTT hosted a successful one-day seminar at the DeSoto Hotel Downtown in Savannah GA. Jim Laplander, Director of Planning and Engineering for the City of Savannah Sewer & Water gave a presentation on Trenchless Technology in Savannah and the need for Waterline Rehab. Jarred Jones from the North Charleston Sewer District drove all the way down to Savannah to deliver a talk on Trenchless Technology in his city.

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,



Ms. Marisela Aranguiz, Capital Improvements Program Deputy Director at the Miami-Dade Water and Sewer Department, delivered an excellent presentation on the Trenchless Technology programs in her city

“SESTT Seminars facilitate meaningful direct networking between industry and owner groups.”



Ms. Marisela Aranguiz, Capital Improvements, Program Deputy Director; Miami-Dade Water and Sewer Department and co-presenters at the Miami-Dade seminar



Dr. Tom Iseley, BAMI-I Chairman, delivers a presentation at the Savannah GA seminar on the Certification of Training in Asset Management (CTAM) program

designers, and contractors involved with the construction, rehabilitation,

and management of underground infrastructure assets, in the Southeastern US. They are great venues for educating decision-makers on the many social and economic benefits of using trenchless technology in their infrastructure renewal and new construction programs.

As the success of the both Savannah and Miami seminars demonstrates, there is good reason to think, as 2022 gets underway, that SESTT will again be able to conduct a full slate of seminars across the Southeast this year!

Special thanks to our loyal SESTT seminar exhibitors, sponsors, presenters and attendees! **THANKS FOR YOUR ONGOING SUPPORT!!!**



SESTT Trenchless Technology seminars are excellent networking and educational opportunities

For information dates and locations of future SESTT Trenchless Technology, SSes and Buried Asset Management seminars and virtual webinars planned for the Midwest, visit:

www.sestt.org

MIAMI-DADE SEMINAR DECEMBER 8, 2021: SESTT - ASCE MIAMI-DADE

GUEST PRESENTATION

“Trenchless Technology at Miami-Dade Water and Sewer”

Ms. Marisela Aranguiz, Capital Improvements Program Deputy Director
Miami-Dade Water and Sewer Department, Miami FL

PRESENTATIONS

Welcome to Trenchless Technology Seminar,

Leonard Ingram, PWAM, SESTT Executive Director

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

Leonard Ingram, PWAM, BAMI-I Treasurer

Sewer and Water Construction - Trenchless Technologies,

Ted Dimitroff, Trenchless Consulting, LLC

Subaqueous Microtunnel Crossing of Ybor Channel, Tampa FL,

Robert Gilbert, Vadnais Trenchless Services, Inc.

Geopolymer for Large Diameter Pipe Rehab,

Richard Goodrum, GEOTREE Solutions

Biogenic Corrosion and Cementitious Materials,

Joe Talley, IMERYS

Pressure Pipe Condition Assessment and How to Collect The Right Data,

Jimmy Stewart, Mechanical Jobbers Marketing

Multi Sensor Inspection,

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

Pilot Tube Method (PTM) Of Guided Boring For New Pipeline Installations,

Steve Matheny, P.E., Logan Clay Products

Using Cellular Grouts to Reduce Grouting Risk,

Kirk Roberts, GJGeo

Structural & Semi-Structural Lining Solutions for Pressurized Pipelines,

Andrew Costa, Aegion Corp

Carbon Fiber Pipe Strengthening For Wastewater Pipelines,

Mike Larson, Structural Technologies

Overview of PVC Piping Systems,

Paul Blastic, Florida Pipeline Sales

Internal Joint Seals - Where, When, and How,

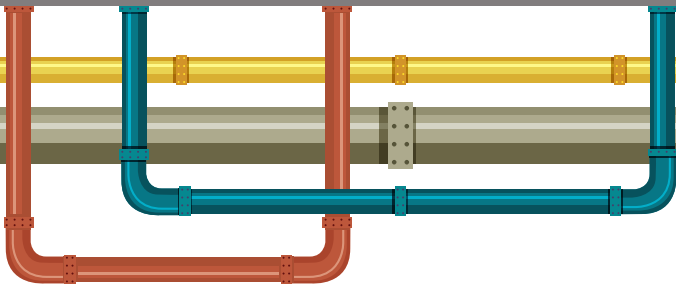
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Municipal Case Study

By: Alex DeMonia, NAPCO Pipe & Fittings

PROJECT TYPE:

Sanitary Sewer

OWNER:

City of Orlando

CONTRACTOR:

Killebrew, Inc.

ENGINEERING:

City of Orlando EOR,
Charlie Conklin, P.E.

APPLICATION:

Close Tolerance Horizontal
Directional Drilling (CTHDD)

PRODUCT USED:

16" DR 26 Certa-Lok®
RJ Yelomine®

SUB-CONTRACTOR:

Trenchless Consulting, LLC

With the large number of existing utility lines in the area, including a pressurized gas main that ran parallel to the new sanitary sewer location, the city's engineer was posed with a challenge to find a safe but effective installation solution.

CHALLENGE

The City of Orlando initiated a \$1.8 million wastewater project to increase capacity for an undersized sanitary sewer. The upgrade was needed to support the new growth and development in the immediate area around American Way, an already high-density business area that includes a popular restaurant, many hotels and a multi-story office building.

APPLICATION

The plan for the American Way sanitary sewer project allowed the contractor to use pipe bursting or ArrowBore close tolerance horizontal directional drilling (CTHDD). An existing high-pressure steel gas line was identified 5 feet away from the proposed sewer pipe alignment which led the contractor to move away

from static pipe bursting and choose ArrowBore, a patented close tolerance horizontal directional drilling (CTHDD) process. This provided a safe method

of construction with the existing utility constraints and a more precise way to consistently ensure the pipe was on-grade. In addition, ArrowBore offered a



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Charlie Conklin, P.E.,
Project Manager/
Design Engineer,
City of Orlando



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construction method to ensure minimal impact to traffic on the nearby seven-lane road. The replacement sanitary sewer line totaled 260 feet of 16-inch DR 26 Certa-Lok® Yelomine® PVC pipe with restrained joint (RJ) coupled sections.

SOLUTION

To start the ArrowBore CTHDD process, vertical site relief holes were auger drilled, then 18 in. diameter pipe was inserted vertically at 20-foot intervals.

The vertical relief holes are critical to the process and are used to sight the drill stem for on-grade measurements as well as reduce drilling fluid pressure build-up when inserting the pipe at such a close tolerance to the surrounding soil. Engineers were able to verify proper grade during installation with the stem depth verified at each relief hole location using a laser sight and measuring rod in the hole. If the drilling head is off grade, it can be adjusted and realigned with a rod hooked to the pilot drill stem. The continual



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measurement ensures the accuracy of the gravity sewer grade. While the pipe is being pulled into place, the drilling fluid slurry is relieved through the vertical relief holes allowing the contractor to have control of the drilling slurry flow and fluid pressure. This prevents collapse of the bore hole, as well as surface and utility damage. By reducing the drilling fluid volume, the amount of soil removed is only the amount needed to displace the pipe being installed. The excess slurry is then removed using a vacuum truck.

The close tolerance pilot hole was drilled and the location of the drill stem approved before beginning installation of the pipe. The recommended carrier pipe, 16-inch DR26 Certa-Lok® Yelomine® RJ PVC pipe, in 20-foot lengths, from NAPCO Pipe & Fittings, was installed segmentally in the launch pit as the ArrowBore process progressed and run at a 0.60 percent grade at an average depth of 13 feet below ground. The outer diameter of the coupling was 17.40 inches and the reamer hole was 17.75 inches. The close tolerance back reamer is only 0.25 to 0.50 inches larger than the greatest outer diameter of the pipe being installed, which prevents pipe flotation and soil settlement; standard HDD would have used at least a 26-inch bore hole. Once the length of pipe, with the coupling attached, was dropped into the pit, it was placed in a PVC channel. This channel helped ensure the pipe stayed clean for



connection to the pipe being pulled and was also used as a guide to assist with pipe alignment. The Certa-Lok cartridge-style assembly measurably reduces the staging area so there is no need to string out lengths of pipe and, as a result, eliminates the need for several hundred feet of working space.

"I have been a proponent of using the ArrowBore technology provided by Trenchless Flowline for many years, and as a result that also means that I'm a proponent of using Certa-Lok PVC pipe," said Charlie Conklin, P.E., project manager/design engineer for the City of Orlando. "For those not familiar with the ArrowBore process, its technical description is Close Tolerance Horizontal Directional Drilling, which is a controlled grade HDD that can be used for gravity or force main sewer construction. We at the City of Orlando have a strong affinity for PVC pipe, so Certa-Lok pipe is our first choice whenever we need restrained joint pipe, such as required for Close Tolerance HDD."

The top few feet of soil was loose sand, the remaining 13 feet was packed clay and very saturated. In the water table with clay and sand mixture, dewatering was

necessary only around the manholes, not for the boring process.

The Certa-Lok restrained joints can be assembled in less than one minute per joint. Since this project was such close tolerance, the sub-contractor felt that cutting the spline would reduce drag. In most cases, the spline does not need to be cut. 🛠️

ABOUT THE AUTHOR:



Alex DeMonia is a specification sales engineer for NAPCO Pipe & Fittings based out of Florida with 2 years of consulting design experience in water and wastewater projects.



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MIAMI-DADE COUNTY EMERGENCY RELINE

Liner Pipe Installed Completely Submerged

By: Robert Morris, Contech Engineered Solutions

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

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

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



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



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

“Speed was of the essence.”

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

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

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

ABOUT THE AUTHOR:



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



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

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THE “SOONER” THE BETTER

Oklahoma City Pressure Pipe Inspection and Condition Assessment: Witcher Force Main Case Study



By: Jerry Trevino, Mechanical Jobbers Marketing, Inc.

The day after Independence Day, I found myself surrounded and outnumbered at the Atlanta Airport gate by a sea of Oklahoma University (OU) fans while they were waiting for a plane to return them to Oklahoma City. Toddlers to older generations alike, they wore all kinds of red logo OU clothing, back packs, cell phone protectors, face masks and other contraptions and gadgets bearing the red OU logo. I believe I was probably the only one out of several hundred people at the gate with a University of Texas Longhorn emblem on my back pack. I knew for sure I was heading to my alma mater's college football rivalry territory, Oklahoma City - OU Country!

As being the third person to board the plane, I was sure some were questioning my reasoning and logic for going to Sooner Boomer land with a Burnt Orange Longhorn back pack. As soon as I sat on the plane, my thoughts immediately changed to focus on the task at hand. To review the proposed project plan, maps, drawings and known data of the pressure pipes and to rethink all the possible risks involved in the upcoming project the following day. I tried to imagine all the ways possible to prevent and reduce the risks of failure. While I was flying, the crew was taking the long drive from Atlanta to OKC with vital equipment needed to launch/insert, and then capture and retrieve, precious little ball shaped “Pipers” tools needed to perform an air-pocket and leak pressure pipe condition assessment project.

Oklahoma City Water Utility Trust (OCWUT) issued a purchase order to

I believe I was probably the only one out of several hundred people at the gate with a University of Texas Longhorn emblem!

Mechanical Jobbers Marketing a few weeks earlier to perform the insertion and capturing these relatively very small balls when compared to the very large diameter force main sewer transmission lines with a transport capacity of up to 75 million gallons of sewage per day.

OKLAHOMA CITY

Oklahoma City, Oklahoma the Capitol of the State has a population of over 638,000 people, covers an area of 620 square miles. It is the 8th largest land base city in the United States.

GENERAL

Infrastructure becomes more critical and more essential when it personally affects you as when it suddenly fails. We really do not pay too much attention to all the roads, bridges as we are driving on them or pay attention to water and sewer lines and other utilities until they are suddenly and without warning shut down. The Texas 2021 freeze in February is a painful reminder of the criticality

of infrastructure. Unfortunately, people died in that event. It also affected its surrounding states and Mexico. Therefore, it is essential that municipalities start inspecting and assessing the condition of infrastructure “the sooner the better.” The assessments will provide important data to help prioritize maintenance work and design the required upgrades on a planned basis versus an unplanned shutdown. This will save taxpayers funds and, in some cases, save lives.

SITE VISIT

A couple of months before, we had done a site visit to evaluate the insertion/launch site at the Witcher plant, and to evaluate and select the possible extraction manholes and underground chambers that were located a few miles away from the plant. We met with the OKC manager of the Line Maintenance Department, and during lunch when we were inquiring about other potential and future work in OKC, it was made very clear to us with a statement that is etched in my brain to the effect that “there would be no other potential future

work if we were not successful in catching these balls.” So, in my mind we had to develop a mindset of “Failure Is Not an Option”. Although this was not the Apollo 13 mission, which also involved launching and retrieval, it was just as important to me, my field crew, and to the many other personnel and stakeholders involved.

There was a recent history of a similarly funded project where others had very recently failed to catch any of the similar free flowing balls. Therefore, no data was collected, nor any deliverable data was issued to OCWUT after a great expense. So, I had a lot of mental pressure to succeed.

Joe Wells of PICA had previous contact with OKC regarding this project and helped with its conception and coordination. The date and project schedule were established before anyone knew OKC was to experience a 12- to 14-inch rain event just the week before the extraction project. Hurricane Elsa was also moving through Cuba towards Florida and Georgia creating some concern back home. While one carefully creates plans on how to execute a project, these sometimes change due to further evaluation and because of other circumstances, such as weather.

Therefore, we had to quickly make several last-minute changes to the plan. The change in plans involved a change in scope of work. We had previously reached out to CPM, another PICA contractor, for support in this project, in which they had agreed to do, however, the combination of the downpour of rain, and because the change in scope of work, we decided to perform the work ourselves. I had originally planned one permit required for confined space entry and changed that to two entries on two different structures at the same time to reduce the risk of losing the “Pipers”, due to higher flows. Also, due to the rain event we could not park large heavy equipment immediately adjacent to the extraction sites as we had planned, such as a vac truck and other support equipment.

There were two possible extraction structures we selected. One was a huge underground piano shaped chamber 30 feet by 20 feet with 8-foot-high ceilings buried 5 to 8 feet underground. This chamber had a flat bottom without any

flow channels. It had two force mains feeding it, a 42-inch and a 36-inch with a 72-inch exit pipe. The other was a 16-foot-deep manhole with a 72-inch entry and exit sized pipe. We did not know before the project started the extent of the solids built up in the large chamber. As in most projects, there are many unknowns, and one has to attempt to reduce the unknowns and to reduce the potentials for failure. We were prepared to do some shoveling if we had to since the vac truck would not have access.

CASE STUDY

The OKCWUT took a proactive approach to managing a critical buried asset by requesting a contractor to provide data on the live force mains. The Witcher Force Main is the largest sewer force main in Oklahoma City sewer collection system. It consists of two twin lines; one is 36 inches in diameter and the second one is 42-inch diameter ductile iron pipe. The two twin parallel lines are each over 8000 feet long. The pump station has the capability of pumping 75 MGD.

Based on the location there is a concern with respect to corrosive soils, age, and wear and tear on the twin lines. OCWUT recognized the need to know and understand the internal and external condition in effort to prolong the life of this asset.

Based on its importance, previous repairs, and a need-to-know mindset, OCWUT made the decision to assess the condition of these twin lines using the “Ingu Piper” tools provided by PICA to identify any leaks, gas pockets, and debris build up. After identifying areas of concern, the PICA Bracelet Probe, which utilizes a high-resolution pulse eddy current technology for measuring loss in wall thickness, will likely be used in validation of this condition. The Remaining Useful life (RUL) of the pipe will be calculated based on the operating conditions, surge pressures and other factors. All verified areas of concern will then be scheduled for repairs or replacements of these sections of the sewer lines. This will result in savings to OCWUT and the citizens of Oklahoma City by preventing future pipe breaks and failures.



Figure 1. The Ingu “Piper”

TEAM WORK TO REACH A COMMON GOAL

To execute this project successfully, it took the planning and collaboration of numerous stakeholders working together to achieve a common goal. The Witcher pump station is operated by the management company Inframark on behalf of OCWUT. Inframark met the City’s criteria and expectations, improved performance efficiency including strict adherence to compliance regulations, protection, and preservation of the facility. It helps maximizing operational efficiencies and minimizing energy consumption including odor management, improved public and employee health and safety guidelines along with improved biosolids disposal processes. Inframark managed the sewer pumps flow rates, pressures, volumes, and flow velocity as recommended by Ingu engineers and scientists within the parameters of the Piper ball operational conditions to acquire



Figure 2. The “Bracelet Probe”

data. OCWUT Line Maintenance and their manager were present to provide assistance as needed. The City's crews are well trained and provided unprecedented level of expertise and provided a "can do" attitude towards this project and were present and available from start to

finish. Mechanical Jobbers Marketing / PICA provided the tools, technology, technicians, the operational plan, and the custom-designed extraction mechanism to successfully execute a safe insertion and extraction process.

All was executed by establishing proper

communications of the plan via various Zoom phone calls, on site meetings, and constant communications throughout the project. The successful completion of this project demonstrates that regardless of your sport team affiliations we all can work together to reach common goals.



Figure 3. Identifies the inspection area of the twin force mains. The area located in the Green had been previously rehabilitated. The acoustic anomalies are identified with pins on each line



Figure 4. Zoom of the pipeline section of the 36-inch and 42-inch force mains with the acoustic anomalies. Based on the locations and confirmation of the air-pockets OKCWUT will perform external validations utilizing the PICA Bracelet Probe (Figure 2) to identify the wall loss in these areas and determine the RUL (Remaining Useful Life) of this critical asset

“It is essential that municipalities start inspecting and assessing the condition of infrastructure ‘the sooner the better.’”

PRE-PROJECT PLANNING & EXECUTION

OCWUT Line Maintenance provided 4-inch valves on each of the twin lines to facilitate the insertion process. We first selected to insert the “Pipers” balls in the larger 42-inch diameter force main. OCWUT assisted first by dewatering the rainwater flooded insertion pit OCWUT personnel assisted MJM and Joe Wells of PICA with the insertions. 3 different “PIPERs” balls

were inserted in each of the two twin lines. Each was inserted at 20-minute intervals. Inframark controlled the pumps to achieve 12,000 GPM to provide optimal velocity for the “Pipers.” Mechanical Jobbers Marketing crews cleaned and prepared the extraction structures and installed the extraction device to facilitate catching the “Pipers. The balls arrived at the expected times on the 42-inch forced main.

We all took a lunch break and called in a local food truck to bring in Mexican cuisine before starting to work on the second force main line. The second pipe insertion took place. Once again, all crews and interested stakeholders worked together to successfully insert and retrieve

all of the inserted “Pipers.” All six “Pipers” were recovered after a very long and hot day.

NEXT STEPS

Oklahoma City Water Utilities Trust received the deliverables in approximately 3 weeks from the completion of the field work. This information provided data for OKC managers and engineers needed to mitigate catastrophic pipe bursts and unexpected service interruptions to tens of thousands of taxpayers. As per Dave Russell’s (PICA CEO) quote “Good Decisions Start with Good Information.” The data provided and interpreted by Ingu will indicate potential pipe sections which may require additional pipe wall thickness validations. PICA has additional high-resolution tools to assess suspect pipe sections that will be used for additional validation. The Bracelet Probe.

THE DELIVERABLES

The deliverables identified several areas of concern. These areas of concern were gas pockets located in (2) 90-degree angles and were in both the 36-inch and 42-inch force main near each other. These multiple gas

pockets are areas of potential corrosion/deterioration.

MOVING FORWARD “SOONER” RATHER THAN LATER

Based on the teamwork of all stakeholders, the success of the project and the pro-active approach of OKCWUT, there will be validations, prioritizations and future inspections to help OKCWUT identify and manage these critical assets and minimize any Environmental, Social, or Regulatory impacts. ✚

ABOUT THE AUTHOR:



Jerry Trevino is President of Protective Liner Systems, Inc. and sister company Mechanical Jobbers Marketing Inc., specializing in infrastructure

rehabilitation since 1984. As longtime Chair of the NASTT Southeast Chapter, Jerry strongly believes that trenchless and condition assessment technologies offer numerous methods to maintain and upgrade aging infrastructure.

SUMMARY:

Survey date: July 6, 2021
Report date: August 11, 2021
Line(s) surveyed: 36” Witcher Force Main (35.577854°, -97.426656° to 35.569281°, -97.404524°)
42” Witcher Force Main (35.577854°, -97.426656° to 35.569281°, -97.404524°)
Service: Leak detection and air pocket survey

36-Inch Witcher Force Main Results

- Leak Detection Survey: No leaks were detected within the sensitivity of the Pipers®.
- Air Pocket Survey: Two acoustic anomalies were detected that may be caused by the presence of stationary air pockets.

42-Inch Witcher Force Main Results

- Leak Detection Survey: No leaks were detected within the sensitivity of the Pipers®.
- Air Pocket Survey: Three acoustic anomalies were detected that may be caused by the presence of stationary air pockets.

SLIP-LINING SOLUTION IN TENNESSEE

By: Alex Sherrod, Precision Pipe & Products, Inc.

InfraSteel, a permanent culvert rehabilitation system, was identified by the Tennessee Department of Transportation to slip-line a deteriorating corrugated metal pipe (CMP) culvert under State Highway 242 in Lawrence County, TN.

State Highway 242 is the main paved state access through the south-central county, and Region 2 Maintenance Engineers determined that slip-lining was the best option for repairing the failing structure. The alternative of cutting and replacing the roadway would have resulted in a significant detour of local residents as well as emergency vehicles in the area. The InfraSteel team first met with the TDOT Region 2, Maintenance Engineers in the summer of 2019 to discuss InfraSteel's capabilities and benefits as a smooth wall, carbon steel, culvert slip-liner. Following this initial meeting the two organizations conducted a thorough site inspection to assess current conditions and feasibility of a slip-line rehabilitation in September 2019.

Initial inspection of the structure revealed that severe deterioration of the invert had occurred due to abrasive and corrosive factors in the environment, and the length of time that the culvert had been in service, which was estimated to be 50+ years.

With the InfraSteel liner identified as the preferred rehabilitation option, the team set to work confirming the interior dimensions of the culvert, and the design of the InfraSteel liner. Detailed measurements and survey were taken to ensure the liner would match the exact shape of the existing structure, and maximize the area of flow.

This major sizing consideration took into account the hydraulic capacity of the liner. With a manning's coefficient of .012, InfraSteel provided a greater flow rate than the existing CMP culvert. Inlet & Outlet control features were also available but not required on this project.

Upon confirmation that the designed liner would meet all site and project requirements, InfraSteel fabricated a metal template and shipped to the project site in February 2020. This template was assembled by TDOT Maintenance Crews and walked through the structure ensuring a proper fit, and verifying no complications would arise once the lining commenced.

The InfraSteel liner was then entered into production and shipped to TDOT's Lawrenceville Maintenance yard in March 2020.

With the liner shipped in 8 pieces, each measuring 8-10 feet in length, TDOT decided to weld two sections together in order to save on the number of field welds required at the project



CMP Culvert located under SR-242. The structure was located under approximately 7ft of cover from the roadway and measured, 92" Span x 61.5" Rise x 64' Length

site. During this time TDOT prepared the site for rehabilitation by cutting and removing the deteriorated invert, and pouring a concrete pad with inserted channel iron in order to facilitate an easy slip-line insertion.

Once the concrete slab had cured, the InfraSteel liner sections were transported to the site in August 2020.

An excavator was brought on site to move and position each liner section into place. TDOT utilized maintenance and welding crews to join the liner sections together with full penetration welds, ensuring no possibility of joint failure. The liner was then pushed into the existing structure.

Cross bracing is tack-welded into inside the liner place ensuring each section keeps its shape during transportation. This cross bracing also serves as a "crosshair" when aligning the sections into place. These were left in place until the grouting of the annular space was completed. (These cross-braces can be removed if manipulation of the ends is required to ensure alignment of full penetration welds.)

“ States and counties with active culvert inspection programs are less likely to experience a catastrophic failure or roadway collapse. ”

Once the liner was pushed into place, TDOT proceeded to utilize pressurized grout to fill the annular space between the InfraSteel liner and existing structure. Once the grout set, the bracing bars were removed creating a smooth flow surface and open barrel. The end result was a new structure that will continue to serve the Volunteer State for another 70+ years.

More than just a component of the highway infrastructure, culverts or groups of culverts, serve an important purpose to carry drainage water from one side of a roadway to another; in addition, they also serve a bridge function to transport the traveling public across waterways. They can be found with round, boxed, elliptical, or arched construction. The overall condition of the approximate 4 million miles of culverts across the country varies, but many have been in service for 30-70 years and are reaching the end of their designed service life.



Pictures capture the deteriorated invert of the existing CMP culvert



Liner sections on standby at the project site





TDOT Maintenance crews cut and removed the deteriorated invert, and prepped the existing culvert for slip-line rehabilitation by pouring a concrete slab and laying channel iron for the InfraSteel liner to slide over



The liner section contained inverted bevels on the invert, allowing for welding to occur inside the liner. Welding of the top of the liner was accessible from the outside



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Liner sections being maneuvered into place, prior to slip-line insertion



A look inside the InfraSteel liner, prior to bracing removal

This need has led to the growing market of trenchless rehabilitation. It is now possible to fully rehabilitate or repair a structure with no impact to the roadway or traveling public.

According to a recent article by Trenchless Technology, "State and local governments have become more aware of and are

utilizing trenchless rehab methods for repairing their aging and deteriorated culvert and drainage systems...currently, the rehabilitation of storm water pipelines and culverts is estimated to be 15 to 20 percent of the overall trenchless rehabilitation marketplace."

States and counties with active culvert inspection programs are less likely to experience a catastrophic failure or roadway collapse.

It is as equally important for all infrastructure professionals and traveling public to be aware, and on the lookout, for the common signs of an impending culvert failure. Many potential failures can be identified from the roadway surface by paying attention to the tell-tale signs of pavement cracking, eroding embankments, and dips or drops in the road and guardrails where there are creeks or streams. †

ABOUT THE AUTHOR:



Alex Sherrod is a graduate of Auburn University and an energetic and driven professional. He served in the United States Marine Corps as an Infantry Officer, and now in his role at Precision Pipe & Products, he focuses on identifying infrastructure rehabilitation solutions and growing client relationships. Precision Pipe & Products focuses on delivering cost effective and environmentally friendly structural solutions for failing culvert and small span bridge structures.



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BAMI-I First Journal publishing	The BAMI-I Journal will be positioned as a platform for information sharing and exchange of ideas among water and wastewater utilities, government departments, service providers, constructors, material and equipment suppliers, and academic institutions to promote the development of water infrastructure asset management
BAMI-I Annual Board of Directors Meeting	This annual meeting will be co-located with ASCE's Pipeline Conference. In addition to the regular meetings, some reform measures for the development of BAMI-I will be proposed, such as re-confirming BOD members, Partnership Program with Purdue University, formulating BAMI-short-term and long-term plans, etc. It is hoped that all BODs will participate as much as possible
ASCE UESI / BAMI-I Utility investigation School (UIS) in 2022	12th UIS 5 days
	13th UIS 5 days
	14th UIS 5 days
	15th UIS 5 days
BAMI-I Certification of Training & Asset management (CTAM) 4 days workshop	BAMI-I will be teaming up with Purdue University CEM to host a four-day Certification of Training in Asset Management (CTAM) workshop
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2022 EVENTS SCHEDULE

Date	Time (Local time)	Location	Contact Information
March 31, 2022			Wei Liao liao186@purdue.edu, (318) 497-8288 or Leonard Ingram, leonard@engconco.com, (334) 872-1012
July 31, 2022	2:00 pm – 5:00 pm	IUPUI-Indianapolis, IN	
March 14-18, 2022	8:00 am – 5:00 pm Daily	University of Texas at Arlington, TX	Saleh Behbahani, sbehbaha@purdue.edu or Leonard Ingram, leonard@engconco.com, (334) 872-1012
June 6-10, 2022	8:00 am – 5:00 pm Daily	Michigan State University, MS	
September 2022	8:00 am – 5:00 pm Daily	Purdue University, West Lafayette, IN	
December 2022	8:00 am – 5:00 pm Daily	Colorado School of Mines, Golden, CO	
September 2022	8:00 am – 5:00 pm Daily	Purdue University, West Lafayette, IN	Wei Liao liao186@purdue.edu, (318) 497-8288 or Tom Iseley, diseley@purdue.edu, (404) 386-5667
September 2022	2:00 pm – 4:00 pm	Hybrid Meeting (Virtual & In-Person) West Lafayette, IN	



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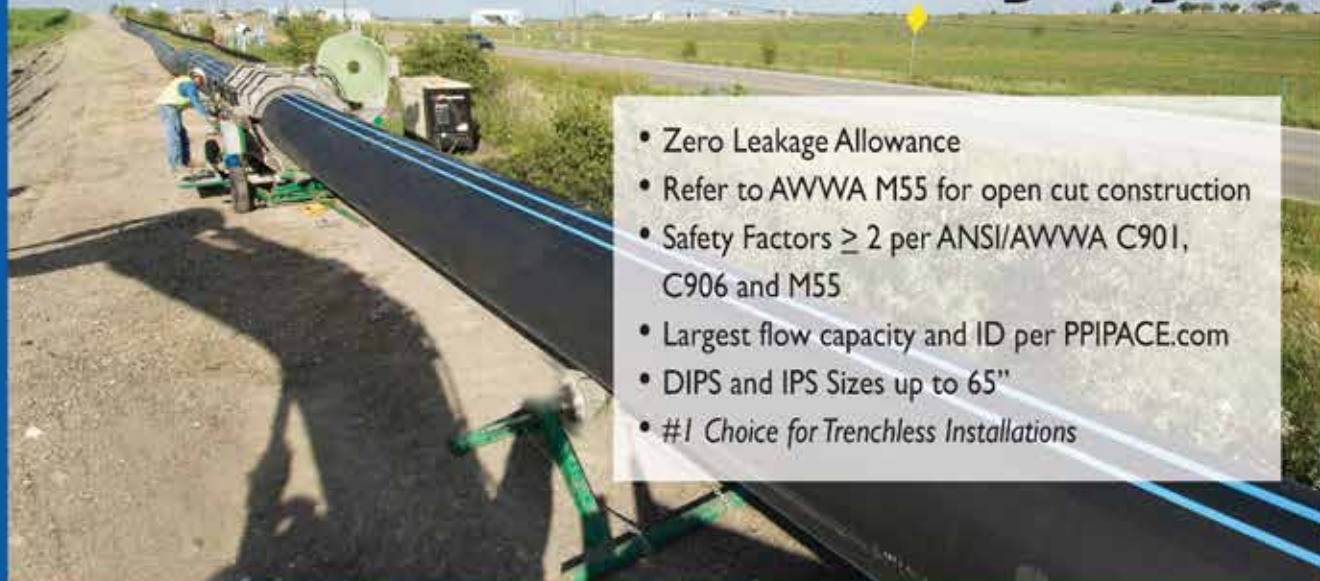
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Before



After



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