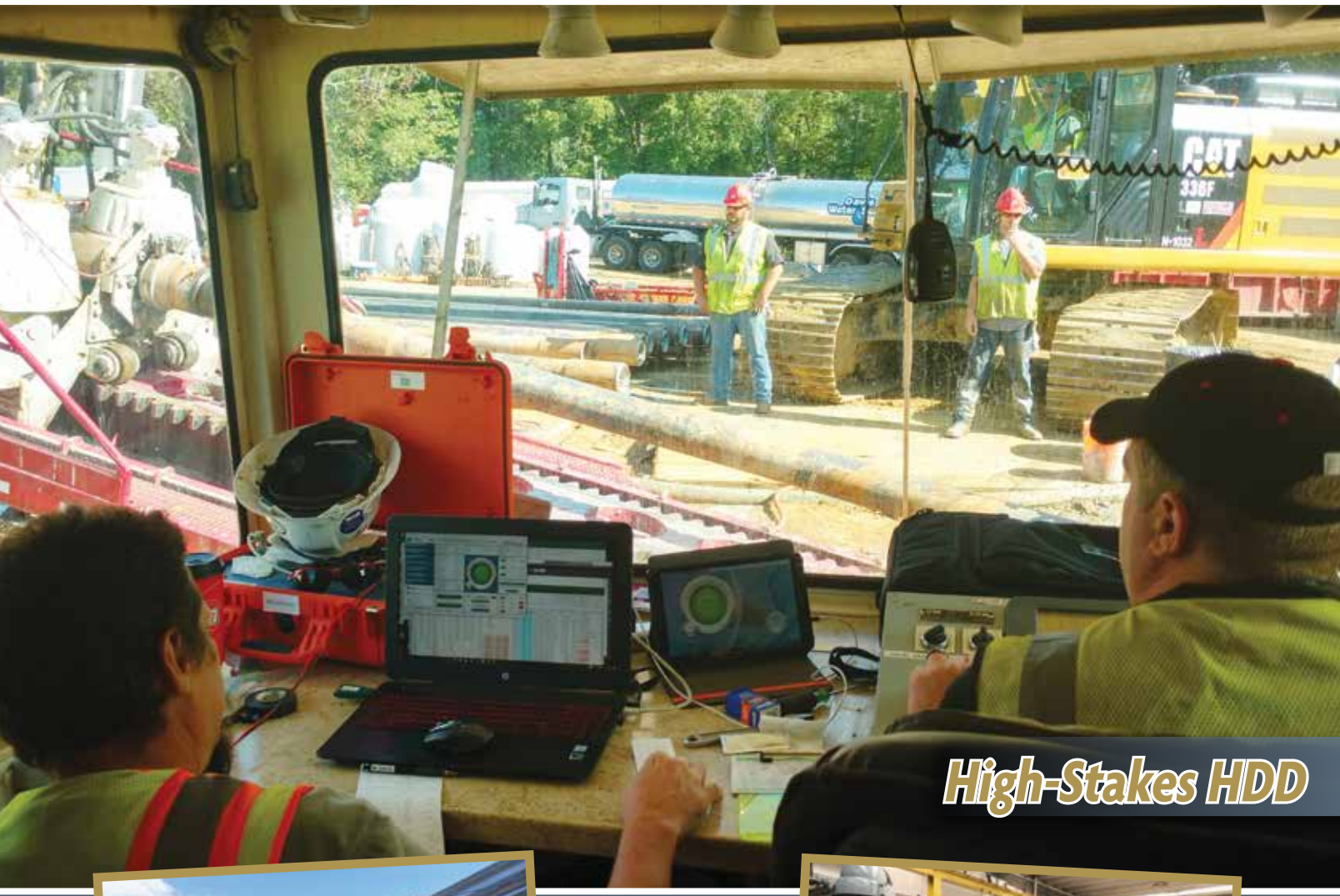
NASTT NORTHEAST REGIONAL CHAPTER

NORTHEAST JOURNAL
OF TRENCHLESS TECHNOLOGY PRACTICES



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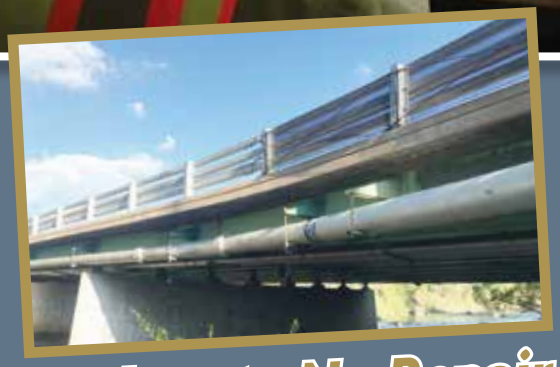

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MESSAGE FROM NASTT-NE CHAIR

Babs Marquis, CCM, NASTT-NE Chair

Welcome to OUR Fall/2020 edition of the NASTT Northeast Regional Chapter's *Northeast Journal of Trenchless Technology Practices*. In our Spring edition, we acknowledged the onset of the Global COVID-19 Pandemic, public health threat and the resulting cancellations of large event gatherings in order to stem the spread of the virus. Our premier 30-year celebration at 2020 No-Dig in Denver, CO had to be cancelled as the nation went into a lock-down in concert with the rest of the word.

As the Pandemic lingered through Spring, Summer and into the Fall, its impact in terms of lives lost and global economy grinding to a halt has presented a global challenge as well as opportunity to collaborate in pursuit of a vaccine. As we emerge from the lockdowns, large crowd events are highly discouraged while promoting elevated hygiene, social distancing and wearing facial masks as a practical approach to controlling the spread of the virus. The most notable resulting outcome from the Pandemic is how we have altered how we work and conduct business. Working from home, collaborating and conducting meetings on virtual platforms has proven to be effective and likely to continue for the forceable future.

Although we were initially disappointed to have cancelled our 5th annual Trenchless Technology Conference scheduled to be held at the elegant Portland Sheraton at Sable Oaks in Portland Maine, I am pleased to report that we are continuing our goal to expand awareness of trenchless technology throughout our region with increased representation in Maine. For that reason, the BoD agreed to retain planning arrangements and event deposit with Portland Sheraton towards holding our 2022 annual conference in Portland, Maine.

In lieu of the cancelled 2020 Annual Conference, the Chapter sponsored a free webinar on Thursday November 12th to keep the regional members engaged. In addition, the Chapter rolled out its annual scholarship program awarding four scholarships to deserving student members of the UMass Lowell Student Chapter of the NASTT-NE Region. It is our plan to expand and extend the scholarship program to the new incoming student chapter from Quinnipiac University School of Engineering in Connecticut in 2021.

We are continuing to work with our UMass Lowell student chapter to schedule virtual guest lectures for this academic year and postponing project site visits for the immediate future until when it is safe to do so. We solicit input from our regional trenchless practitioners to get involved in continuing with this endeavor as we see it as a forward looking investment in the future of our industry.

Conducting the business of this chapter (especially hosting our annual conferences, publication of this journal as well sponsorship for our student chapter scholarship) would not be possible without the generous support of our sponsors and vendors. We extend our sincere gratitude for your continued support, participation and investment to sustain the chapter. I hope the time you spend reviewing the articles and information in this edition of the Journal will encourage you to get involved in the chapter, perhaps with an article for the next journal or a presentation at the 2021 Conference scheduled to be held at the historic West Point Military Academy in New York. The Northeast Chapter is a strong voice for trenchless in the region, and we need your support to ensure that the Chapter succeeds and continue to grow in its mission and membership.

"PLEASE JOIN US"

The Board of Directors continues to explore ways to maintain the connection with past presidents and founding members of the Northeast Trenchless Association. Thank you to all of our chapter members for participating, reading and sharing the journal, and joining us at our annual conferences. Thanks also to our current Executive Committee, and Board of Directors for your time and dedication to the chapter during this difficult period.

Please join us! Stay healthy, stay safe as we work towards a brighter future for the NASTT and regional chapters.

Babs Marquis

Babs Marquis, CCM
Chair, NASTT-NE

MESSAGE FROM NASTT CHAIR

Craig Vandaelle, NASTT Chair

Hello Northeast Chapter Members. For everyone, 2020 has been quite a whirlwind year! Like the rest of the world, the staff and volunteers here at NASTT have been pivoting and evolving on a near daily basis to changes in how we do business due to the COVID-19 situation.

As this unprecedented year continues to unfold, NASTT is working diligently to continue to provide the training and education you need to do business and stay up to date with innovations in our industry. We are excited to have rolled out virtual events and training opportunities as we fulfill our mission to be the premier trenchless educational society in North America.

In August we launched our NASTT Good Practices Courses as virtual events. These courses are a rescheduling of the 2020 No-Dig Show Good Practices Courses and our entire suite of courses will be available as live training events. Our four-hour courses will take place in one day and our eight-hour courses will be split into two-day sections to allow for schedule flexibility for our attendees. All NASTT Good Practices Courses include Continuing Education Units, a training manual and the accompanying NASTT Good Practices Guidelines book if applicable. Visit nastt.org/training/events for the full schedule and registration details.

We are also looking forward to holding the Northeast Regional Chapter Trenchless Webinar on November 12. This free training opportunity is focused on the topic of *Trenchless Challenges: Applications and Advancements in Renewing the Future in the Northeast*. Industry experts will be presenting, and a live Q & A session will be available to attendees. We hope you will join us! Visit nastt.org/events for registration.

WITH THE TRENCHLESS MARKET GROWING SO FAST NOW IS THE TIME TO GET INVOLVED.

Our goal is to represent our industry and provide valuable initiatives. To do that, we need the involvement and feedback from our members. We are always seeking volunteers for our various committees and programs. If you are interested in more information, please visit our website at nastt.org/membership/volunteer. There you can view the committees and learn more about the ways to stay involved with the trenchless community and to have your voice heard. Please consider becoming a volunteer – we would love to tap into your expertise.

We are looking forward to coming together in Orlando next March for the NASTT 2021 No-Dig Show. It will be particularly exciting to come together again as a group and celebrate the trenchless industry in North America as we learn and network together. Things may look a bit different at the 2021 show but the top-notch technical training and networking you expect from our conference will not change! We understand how important the in-person conversations are for sharing ideas, networking and growing our industry. With that in mind, we plan to deliver a worthwhile event in a safe manner while still bringing you the value you expect from the NASTT No-Dig Show.

We look forward to growing and learning from these recent challenges and coming back stronger than ever. Thank you for all your support and dedication to NASTT and the trenchless technology industry. We are only as strong as our Regional Chapters. We are always looking for volunteers and new committee members not only locally but nationally. Don't be afraid to get involved! With the trenchless market growing so fast now is the time to join us!

Thank you for being a part of our organization and for dedicating your careers to the trenchless industry.

Craig Vandaelle

Craig Vandaelle,
NASTT Chair

TALK TRENCHLESS

Carolyn Hook, NASTT Membership Outreach & Database Manager

Whether you're on the job site, at the water cooler or at a conference, you'll want to connect with trenchless professionals. The North American Society for Trenchless Technology can help you make those connections every day with Talk Trenchless.

Talk Trenchless is an exclusive, secure, members-only networking tool designed to connect you with verified NASTT members – your peers and trenchless technology experts throughout North America. Participants can download and share ideas, articles, reports and more in the NASTT Members community.

Establish your professional identity.

Create your profile with your photo and areas of expertise, along with your education and position history. Talk Trenchless is a showcase of NASTT's most valuable assets – its members!

Discuss industry-related hot topics with your peers.

Don't wait for the next meeting. Talk about what's happening today and exchange ideas in a professional NASTT setting.

Increase your network.

Build your own contact list or search for colleagues by name, location, company or region in the NASTT online member directory. Meet others in your area online then connect in person at a regional chapter.

Find answers you need.

Looking for a standard practice or for someone to share their experience with a tool or technique? Post your need and access the ideas and stories of more than 2000 NASTT members.

Pay it forward.

Lend your expertise and give back to the profession when you share your knowledge, innovations, resources and experiences with others.

Access the right tools.

Members can post research, projects, solutions, calculators and videos that will be available at your fingertips in the community library.

IT'S TIME TO TALK TRENCHLESS

TALK-TRENCHLESS.NASTT.ORG

How to Get Started

Log in with your nastt.org credentials at talk-trenchless.nastt.org. If you've never accessed the site, you'll be asked to agree to the Community Rules which remind everyone to:

- Stay on topic.
- Don't post commercial messages.
- Be honest, be yourself.
- Submit only your own, original content.
- Keep it clean, keep it friendly.

Next, click your Profile on the top right and add your information. To access the NASTT Members Community, click Communities, My Communities. You'll see the most recent conversations and posts. Join in or start a new one. Send your questions to **membership@nastt.org.**

NASTT NORTHEAST REGIONAL CHAPTER ™

NASTT-NE BOARD 2020 – 2021

BABS MARQUIS – CHAIR

Babs Marquis is presently the Trenchless Practice lead for the East Coast and Construction Manager with the Burlington, Mass., office of McMillen Jacobs Associates. He previously worked for Jacobs Engineering Group for 10 years and Stone & Webster for 11 years. During his extensive career in the trenchless industry, Babs has been involved in major tunneling and trenchless projects in the Northeast for clients such as the Massachusetts Water Resources Authority, Boston Water & Sewer Commission, the Metropolitan District Commission (Hartford, CT), Narragansett Bay Commission (Providence, RI), NYC Dept. of Design & Construction, NYC Dept. of Environmental Protection and is now embarking on a recently awarded New York State Department of Environmental Conservation/Nassau County Design-build Conveyance Project in Long Island, NY.

For the past 22 years, he has focused on underground construction management for tunnels and conveyance including water and wastewater pipeline design and construction projects, with emphasis on trenchless construction methods. He has worked on various pipeline projects utilizing microtunneling, pipe jacking, horizontal auger bore, pipe bursting and other pipeline renewal methods. From 2009-2011 Babs was resident engineer on the pivotal Microtunneling, & Pipe Bursting components of the East Boston Branch Sewer Relief Project. His commitment to the trenchless practice includes co-author for revision and update of the ASCE Manual of Practice (MOP 106) for Horizontal Auger Boring Projects and is the chair leading the effort for review and update of ASCE MOP 112 for Pipe Bursting Projects. Babs was instrumental in the development of the Auger Boring School at the Louisiana Technical University where he continues support the training program agenda.

Babs views the NASTT-NE Regional Chapter as an important vehicle to promoting greater awareness and understanding of trenchless applications at the local level. He sees the level of interest and confidence in trenchless technology growing among owner groups based on the successful completion of many high profile projects across the Northeast. Drawn to the varied unique and innovative aspects of trenchless technology, Babs believes access to ongoing education is key to even greater owner acceptance and NASTT-NE Chapter is a key component towards achieving this acceptance by making information available at the grassroots level as well as attracting student chapters from the region and a robust local participation in the Chapter activities throughout the region.

ERIC SCHULER – VICE CHAIR

Eric Schuler is the City Engineer for an upstate-New York community that is rich in history. As a Department Head, he oversees all of Public Works, Sanitary Sewer, Storm Sewer, Water Distribution, Water Treatment, Wastewater Treatment, Facilities, and Traffic departments. Mr. Schuler has over 10 years of experience as in both the private and public sectors. He earned his Bachelor of Science in Civil Engineering degree from Clarkson University in Potsdam, NY and has primarily been involved in wastewater, drinking water, civil-site, and stormwater sectors. Eric is a licensed Professional Engineer in New York whose design, project management, and construction-related experiences have helped successfully execute many "trenchless"-focused projects.

Early in his engineering career he gained exposure to various trenchless technologies through utility evaluations and development of utility project design alternatives. He immediately started to envision great opportunities for communities plagued by utility deficiencies and construction constraints to utilize CIPP, HDD, among other trenchless technologies; and for them to be able to benefit from both social and economic perspectives. Eric has also stressed the importance for municipalities to incorporate asset management into utility system evaluations and system rehabilitation designs in order to aid development of capital projects and to determine the most suitable trenchless applications for implementation.

In addition to NASTT-NE, Eric is also a Board Member for the Central New York Branch of the American Public Works Association (APWA), a Director of the Central New York Water Works Conference (CNYWCC), and is active with the New York State American Water Works Association (NYAWWA). Eric continues to push for growth of trenchless technologies in upstate-New York and has trained utility owners on the use of hydraulic modeling methods for proper development of utility rehabilitation project design. He is an advocate for educating (designers & installers) of trenchless applications through proper training and increased accessibility of industry standards/guidelines to ensure successful project design and execution. The successful use and increased awareness of modern-day trenchless technologies that incorporate innovative equipment and materials are what Eric believes will continue to shape and drive the direction of the utility industry for the coming decades.

EXECUTIVE COMMITTEE

PAUL SAVARD – TREASURER

With almost 30 years of career experience in engineering and construction management, Paul is a successful project manager with a proven track record building and leading multifunctional trenchless technology teams. He has worked in both the public sector for a regional water and wastewater provider that serves over 2.5M customers and for private consulting firms on planning, designing, and constructing water and wastewater transmission and conveyance systems. Since the 1990s, he has developed a strong focus on design and construction using trenchless construction methods including microtunneling, pipe jacking, horizontal directional drilling, pipe ramming, auger boring, sliplining, cured-in-place pipe lining, epoxy coatings, carbon fiber reinforced plastic linings, pipe bursting, and manhole rehabilitation. His trenchless projects ranged in construction costs from $1 million up to $90 million.

Paul likes to partner with his clients locally, nationally, and across North America to deliver value for their most complex and critical infrastructure obstacles. Paul recognizes that trenchless technology provides new answers to old questions that provides a better way to update and expand the needed critical infrastructure to move water, sewer, power and communications. Trenchless technology brings the commitment to innovation that provides the greatest value to solving our client's needs.

As NASTT-NE Treasurer, Paul brings a focused energy to grow the trenchless market in the Northeast. He will work hard to expand the Northeast chapter in a financially viable and sustainable way through outreach to our members and their communities. He believes strongly in the NASTT mission to advance trenchless technology and promote its benefits for the public and the natural environment.

JONATHAN KUNAY – SECRETARY

Jonathan Kunay, P.E., PMP is a Principal Engineer and the global Conveyance Market Discipline Leader for CDM Smith in Boston, MA. He has 18 years of experience working as a design engineer and project manager on a variety of trenchless projects including infrastructure assessment with traditional and state-of-the-art investigative techniques, rehabilitation using CIPP, HDD and pipe bursting, facilities planning and master planning, leak detection of water distribution systems, enterprise asset management and risk/criticality studies.

While trenchless technologies have been his primary focus over the past 15 years, he also has worked on civil site design for commercial developments and municipalities, navigated Consent Order driven long-term programs, designed new pumping stations and developed alternatives for sewer separation projects. While Jonathan is based in New England, his diverse project experience has brought him many places to experience unique perspectives in the trenchless marketplace. He has worked on trenchless projects all over the United States including California, Texas, Illinois, Tennessee, Louisiana, South Carolina, Florida and Georgia. He has also implemented trenchless projects and programs internationally in the Middle East, China, South America, the Pacific Islands and Europe.

Jonathan was the project manager and design engineer responsible for helping to bring service lateral lining into the New England market in 2008 as part of a comprehensive sewer system rehabilitation program. This comprehensive model has now been adopted across the country as a proven methodology by which infiltration and inflow can be removed in large quantities from the sewer collection system. This comprehensive approach has been presented at conferences to showcase the validity of utilizing a holistic trenchless methodology when large percentages of I/I by volume must be eliminated.

Jonathan has a Bachelor of Civil Engineering and a Minor in Environmental Engineering from the University of Cincinnati, is certified in NASSCO's Pipeline Assessment and Certification Program (PACP), Manhole Assessment and Certification Program (MACP), and Lateral Assessment and Certification Program (LACP), and is the Co-Chair of the Pipeline Rehabilitation Committee in the National Association of Sewer Service Companies (NASSCO).

EXECUTIVE COMMITTEE - CONT'D

IAN MEAD – PAST CHAIR

Ian Mead, P.E., BCEE is a Senior Project Manager with Tighe & Bond in Worcester MA, and has over 20 years of experience working as design engineer, project manager and construction coordinator. His varied experience includes work on drinking water, wastewater, pipeline, site and civil, energy and other municipal infrastructure projects. His more recent focus is on development and delivery of projects for municipal clients across New England.

Born and raised in the construction industry, Ian has spent his entire lifetime on and around heavy equipment on various construction sites. While working for a private engineering company doing survey and site design work, Ian studied civil engineering at the University of Massachusetts Amherst. His first job after graduation was doing site inspection work on pipeline projects throughout MA and RI. He was quickly introduced to trenchless technology as many municipal clients were then expanding sanitary sewer collection systems, and some of this work involved trenchless applications such as HDD, bursting, and CIPP. More recently his experience has also included comprehensive pressure pipe condition assessment and rehabilitation, and the incorporation of this information into enterprise asset management programs.

Ian thinks that increasing owner acceptance, and convincing local decision makers that trenchless methods should be part of any utility's asset management plan, are important keys to future growth of the industry. Education and information provided to municipalities and utilities will help spread the word that trenchless is a viable and proven option. Ian feels there is a great opportunity to generate more interest in trenchless technology with mid to smaller sized utilities across the Northeast. Another major goal he has is building general awareness of the NASTT-NE Chapter, and coordinating its resources and activities, such as website, publications and conferences, with the parent NASTT organization and other regional chapters across North America.

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IN MEMORIAM

JEAN RIVARD, 1961 – 2020

The NASTT-NE Chapter and Board of Directors are saddened at the passing Saturday July 11, 2020 of our fellow Board Member, colleague and friend, Jean Rivard, at the age of 58. Born in Edmonston, New Brunswick, Jean grew up in East Hartford and Enfield, proudly serving in the US Navy from 1980-1981, before being honorably discharged.

Jean had a long and successful career in the natural gas distribution industry where he became familiar with trenchless applications used in the repair and replacement of gas distribution pipelines. Jean was employed with Connecticut Natural Gas from 1985-2017 as a Manager of Construction and Distribution and then worked for Progressive Pipeline Management as the Vice President of the Northeast Region. His strong background and knowledge in gas infrastructure construction were assets to his colleagues and to the NASTT Northeast Regional Chapter.

Jean had a warm friendly smile, and calm engaging disposition. He enjoyed discussing the most recent innovations in trenchless technology applications for the gas sector, and he will be deeply and truly missed by all of us who knew and worked with him. The NASTT-NE Chapter extends condolences to his family, colleagues and friends.

KATELYN BIEDRON, 1983 – 2020

The NASTT-NE Chapter members and Board of Directors mourn the passing of a well-known colleague and friend Katelyn "Kate" Biedron at the age of 36. Growing up on a dairy farm near Dracut MA, Kate attended Dracut High School, received her Bachelor's Degree in Civil Engineering from UMass Amherst, then her Masters of Science degree from UMass Lowell.

For the past 15 years Kate worked at CDM Smith as a Civil Engineer, and loved her job. Her dedication, work ethic and positive energy led to her promotion as a Project Manager and most recently to a Regional Team Leader for the Manchester, NH, Boston, MA, and East Hartford CT offices. In addition, Kate was the Vice Chair of the Lowell Conservation Commission and a member of the executive committee of New England Water Environment Association. Always smiling and cheering others on, Kate loved to travel, hike, ski, and bike in her free time. She will be dearly and forever missed by all those who knew her, a bright shining star. The NASTT-NE Board and members extend their condolences to Kate's family, colleagues and many friends.

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STUDENT SCHOLARSHIPS AWARDED

NASTT-NE CHAPTER AWARDS FOUR 2020/2021 STUDENT SCHOLARSHIPS

The NASTT Northeast Regional Chapter is pleased to award scholarships to four deserving students for the Spring term of the 2020/2021 academic year. Each scholarship ($ 1,500 US) is awarded to eligible students who are in good academic standing and actively involved with the NASTT-NE Student Chapter at UMass Lowell. The Scholarships are competitive and the awards can be used by students towards tuition, academic fees, books, electronic media, or computer hardware required to successfully complete their school work.

"In reading the students' applications, I am both in awe and extremely proud of these students. My vision when I was asked to help start a student chapter at UMass Lowell was to expose the students to the world of trenchless and inspire them to want to engage in trenchless as a career path or at least be aware of the family of technologies known as trenchless. One student made the observation that "The industry is still ahead of its time, and continued innovation may keep it that way for the foreseeable future." Another student noted "The trenchless industry has shown me a career path pertinent to my degree that is both fascinating and important. There is truly something for every interest in the trenchless industry; the wide range of application and procedures ties together an extensive web of experts, each of whom hold an essential role." These students are the future of a growing industry."

– Dennis Doherty, Kleinfelder Inc., Founding NASTT-NE Chapter Chair

Congratulations to these four future Trenchless Leaders!

Liam Henderson

Joseph Pietropaolo

Violet Smith

Connor Sullivan

NANSEMOND RIVER CROSSING: HIGH-STAKES HORIZONTAL DRILLING

Demonstrating Effective HDD Team Building Using the EpCM Model

By: James C. Ulrich, CHMM, LSRP, Kaitlin J. Wong, Kenneth G. Sorensen, PE, GE, Romeo R. Shiplee, PE, Kleinfelder, Inc.

Figure 1. Directional Drill Rig Shack, Nansemond River

The Nansemond River in Suffolk, Virginia is a picturesque, navigable waterway with peaceful river views of undisturbed nature and wildlife. The river is bordered by scenic parks, farmland, schools, and quiet neighborhoods where the residents enjoy life near the river. With scenes this quaint, it is easy to overlook the 14-inch diameter petroleum pipeline crossing beneath the river that provides a lifeline to transportation refueling in the Norfolk, Virginia area. When the existing pipeline was nearing the end of its life cycle, Kleinfelder, a national Engineering, Geotechnical, and Environmental Consulting firm was engaged by their client to develop a plan to replace the existing pipeline. A primary objective of the replacement plan was to minimize disruption to the community while protecting the environment, local habitat, and navigable waterway.

Little room for error existed here, considering the project parameters, sensitive locations, and proximity to the community. To accomplish the long list of project objectives including safety, scope, schedule, and budget, Kleinfelder proposed the Engineering, Procurement, and Construction Management (EpCM) model to deliver this project for their client. The EpCM model streamlines the engineering design, procurement process, and construction management with one lead engineering firm, while allowing the client the benefits of directly retaining the drilling contractor for efficiency. The process began with the selection of a highly-motivated Project Management team lead by James Ulrich and Katie Wong of Kleinfelder who established the primary

Figure 2: Nansemond River Right-Of-Way, Looking Towards Willis

THE USE OF THE EPCM MODEL ADDED CONSISTENCY, EFFECTIVE COMMUNICATION, AND VALUE TO THE PROJECT.

project schedule and engaged their Trenchless Technology Engineers early in the project.

Ken Sorensen and Romeo Shiplee, the lead Trenchless Technology Engineers for Kleinfelder were tasked with designing the +/-9,126-foot horizontal directional drill (HDD) beneath the river, while site feasibility evaluation, public outreach, permitting, and the procurement process were initiated by the project team. Due to the width of the river and the length of the crossing, two drill rigs would be used, one on each side of the river to complete the intersect of the pilot hole prior to reaming and pullback. This design required construction areas on each side of the river to stage the drill rigs, supporting equipment, and facilitate stringing and fabrication of the steel pipe prior to pullback. It also required a horizontal curve near Wills Island to stay within the proposed construction right-of-way. Project constraints dictated having the HDD exit and pipeline laydown area on the northwest end of the crossing, in a farm field. A residential development adjoined by a local Middle School with an athletic field would serve as a drill site and laydown yard at the southeast end of the crossing. Understandably, the stakeholders at this location were concerned with a multitude of issues including disruption to the school and children, excessive noise to the homeowners, and traffic flow for the duration of the project.

To minimize disruption to the school and residences, multiple options were considered. The design team scheduled the majority of the work, including the larger drill rig, to be located on the opposite side of the river secluded in a farm field. The pipe string was laid out behind the farm field along a lightly traveled local road. As the local road intersected a State Route that would present challenges to close, parallel pipe strings were laid, then joined by a mid-weld during pull back to minimize traffic disruption and ease permitting. Construction activities were strategically planned in a sequence that would have the least impact on the school by having the majority of the construction activities take place during the students' summer break. Sound walls and noise monitoring were used where operations occurred in close proximity to the residential properties, and vibration-monitoring systems were temporarily installed to ensure that construction activities would not impact the local residents. Pre- and post-construction photography of the nearby residences was conducted to ensure that all parties were properly protected from damage liability.

Because the Nansemond River is a navigable waterway, recreational boaters and fishermen alike expressed a concern of being able to access the river during

Figure 3: Replacement 14-Inch Pipeline Alignment
(Image Copyright 2020 Google)

Figure 4: Parallel Pipe Strings Maintaining Access to Roadway

Figure 5: Main HDD Rig and Yard on the Farm Field (West) Side of the River

construction. The project team addressed this concern early by precluding the use of conventional tracking techniques such as above ground wireline guidance and specified that the drilling contractor must use gyroscopic steering to keep the navigable waterway free of surface obstructions. The gyro tool has the distinct advantage of not needing a ground-surface coil wire, so this allowed the waterways to remain navigable and unrestricted during construction. The project team recognized these crucial elements in the pre-planning phase and identified the necessity for truly open and transparent communication with the key stakeholders potentially impacted by the project. These initial conversations, as well as follow-up communications around the mitigation plans, provided transparency and helped instill public confidence that the project would be safe and protective of the environment.

Engineering worked closely with the project team to properly evaluate details during the design phase, and to anticipate, and prepare, prevention strategies for possible problems that could occur. Environmental parties and regulators were concerned with the potential for an inadvertent release of drill fluids into the river, its biological habitat, and the surrounding wetlands. If released, the slurry can sometimes increase normal instream turbidity, and could potentially harm aquatic life by smothering spawning aquatic beds and reducing the community diversity and health of the waterway. As the safety and integrity of the river was of utmost importance to the project team, multiple engineering safeguards were implemented.

Once a preliminary geometric profile had been developed, Kleinfelder performed multiple geotechnical borings offset of the alignment to depths greater than the anticipated bottom tangent elevation. These bores were conducted using both truck mounted mud rotary drill rigs on land and barge mounted drilling rigs in the river. Boring samples were obtained every five feet utilizing a combination of split spoon and Shelby Tube samplers. The project team chose mud rotary techniques for their exploratory borings to obtain high quality soil samples and help evaluate the potential for drilling fluid losses into the subsurface formations. Exploratory samples were delivered to the laboratory for soil index and strength testing to aid in the hydrofracture analysis, which was conducted in accordance with the NASTT's HDD Good Practices Guidelines, 3rd edition. With a clear objective of protecting the environment and waterway, Kleinfelder prepared a comprehensive inadvertent return potential analysis and mitigation plan using the data generated from the hydrofracture analysis. The plan included setting the minimum depth of the bore at about 83 feet, continuously monitoring drilling fluid pressure and pump rates, and specifying the use of secondary containment casing at specific locations of the bore path most susceptible to hydrofracture, which typically occurs in the upper formation.

Based on site constraints and engineering design, and to reduce the overall bore depth as much as possible, the intersect drilling method was selected for this project since the HDD pilot hole drilling fluid pressures can be reduced to as much as half. The intersect method uses two drilling rigs for advancement of the pilot hole from either side. The main HDD rig on the entry side is used for drilling, reaming and pipe pullback. A second HDD rig on the exit side is used for pilot hole drilling and assisting with the reaming operation. Once the main drill string enters the intersect zone, the drill string is retracted and the secondary rig advances its pilot hole to the intersect point as directed by honing radar, connecting the pilot holes. Then, the secondary drill rig trips out its drill string and the main rig advances its pilot

Figure 6: Pull Back from the West (Farm Field) Side of the Nansemond River

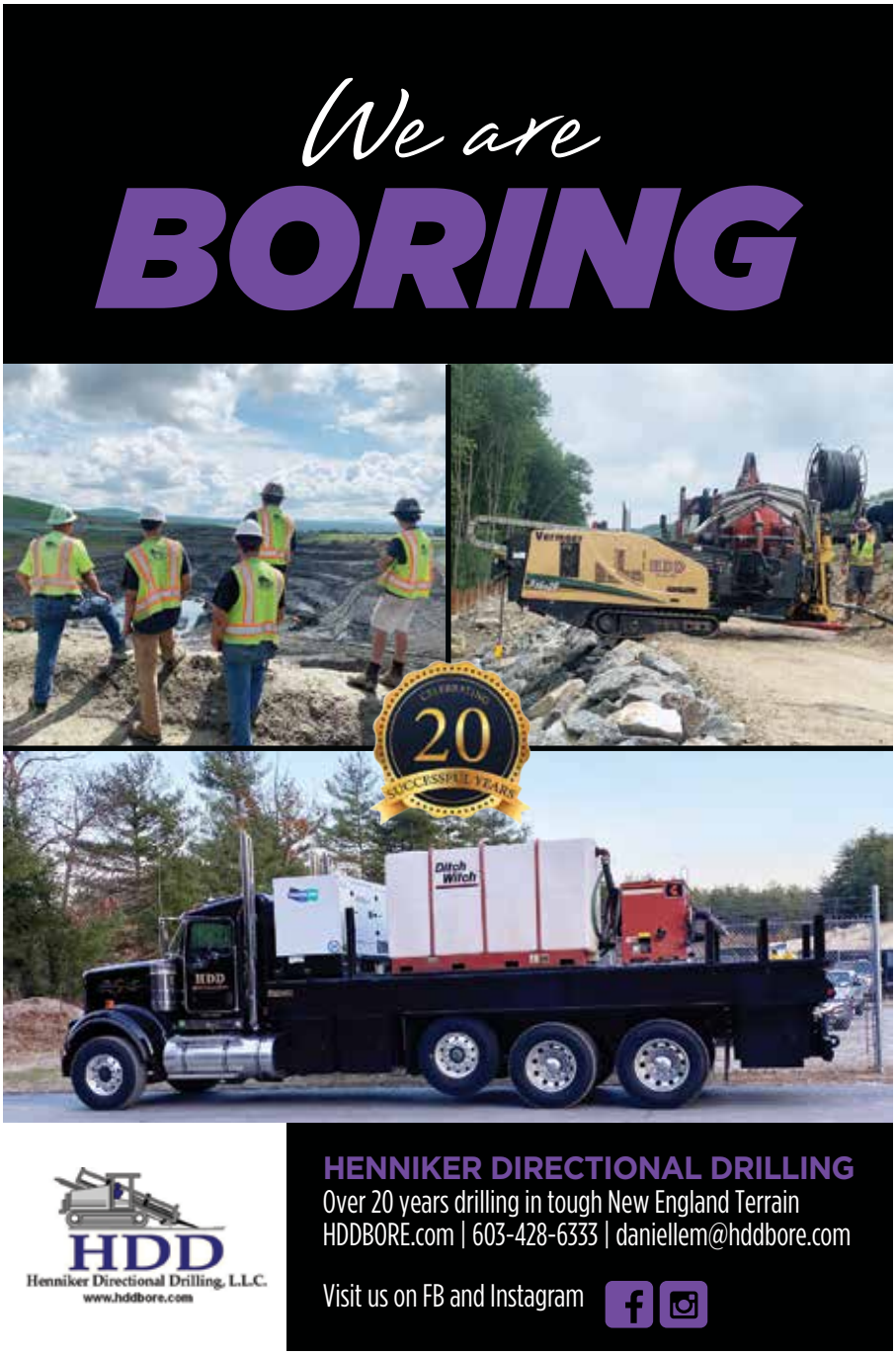
hole assembly to the exit point. After the intersect is complete, the secondary rig continues with reaming assist operations but is removed just prior to the hole swabbing and pipe pullback To use the intersect pilot hole drilling method, the most optimal intersect location was established at a straight section along the bottom tangent of the bore path. Wills Island provided such a location, just west of the 10-degree (PI) turn in the easement where a straight run was used for the intersect. The location was selected based on having about 200 feet of straight drilling prior from each direction to approaching the intersect point. In order to navigate the horizontal and vertical radii within this long length ROW and guide the bits toward a precise intersect location both drill rigs' guidance systems needs to be proven very accurate and must be steered with great caution by the HDD surveyors to achieve the ultimate goal of an intersect.

When the design and planning phases of the project were completed, the project team moved into procurement with the issuance of bid specifications, a bid meeting and site walk, then careful review of contractor submittals during the review process. Based on their technical approach and bid submittals, Michels Corporation was selected to join the project team by the client and contracted to conduct the construction phase of the project. This entailed mobilization, development of the laydown yards and drill sites, and most importantly safely drilling an intercept pilot bore from both sides of the Nansemond River and conducting the pull back and tie-ins. To accomplish this, an Atlas-840 (840,000# drill thrust pull power capacity) dual engine drill rig was located on the west (farm field) side of the river with an Atlas-840 single engine drill rig on the east (residential and school) side of the river. Mud recycling systems were also set up on both sides of the crossing and consisted of a series of screened shakers, desilters and desanders mounted over large metal containers to collect heavy solid cuttings making for an efficient mud-recycling operation. The lead drill rig drilled over ½ of the 9,126-foot distance using a 12-3/4-inch tri-cone rotary bit before communicating with, and then intersecting the secondary rig drill bit. Once the intersecting pilot bore was complete, the driller enlarged the hole in a single ream pass using a 22-inch barrel reamer. After the final swab pass confirmed a smoothly drilled hole, clean of heavy solid cuttings, the construction team successfully completed pullback of the 14-inch steel petroleum product line only needing 9 hours and up to 100,000 lbs. of pull force, before completing the subsequent hydrostatic testing, tie-in to the existing line, and restoration of service.

The use of the EpCM model during the Nansemond River Crossing aided in adding consistency, effective communication, and value to the project by developing a team approach from project inception through construction demobilization. The EpCM approach used for Nansemond River Crossing was a result of a dedicated project team that successfully conducted a thorough pre-planning process, exceptional engineering design, solid communication and developed a team relationship between Kleinfelder, their client, and Michels Corporation. In the end, the total labor hours required to successfully and safely complete this project on schedule and on budget was extensive. Eight firms and more than 150 people contributed to the project's success during the 18-plus month engagement, which will always be remembered by everyone on the team as a career milestone project!

ABOUT THE AUTHORS:

James Ulrich *is a Senior Program Manager and Qualified Project Manager for Kleinfelder driving client engagement and development of the Northeast Energy Market, delivering projects to new and existing energy clients. With more than 25 years of environmental compliance and remediation experience, James is an Honorably Discharged Veteran of the United States Army Infantry (11B-Light), and is currently a NJDEP Licensed Site Remediation Professional, Certified Hazardous Materials Manager, and a NJDEP Licensed Wastewater Treatment Plant Operator (N2).*



Kaitlin Wong *is a Senior Project Manager for Kleinfelder with 11 years of experience in environmental and engineering consulting. Kaitlin is skilled in the management and successful delivery of complex projects involving multiple disciplines, offices, and stakeholders. She is a results-oriented Project Manager who enjoys working alongside Professional Engineers and Licensed Site Remediation Professionals to produce high quality engineering or environmental deliverables.*

Ken Sorensen *is a California licensed civil and geotechnical engineer with over 34 years of experience in consulting geotechnical engineering. As a Senior Principal Geotechnical Engineer with Kleinfelder Ken is engaged mainly in utility and roadway infrastructure work including electrical transmission lines and substations, oil and gas pipelines, sewer, water and reclaimed water pipelines and tunnels, landslide mitigation, highway bridges, retaining walls and rock sheds. As a specialist in trenchless technologies, he has led the Kleinfelder Trenchless Technology practice for the last 15 years.*

Romeo Shiplee *is a Principal Trenchless Technology Engineer with Kleinfelder and has more than 15 years of geotechnical engineering and materials testing experience. Romeo has performed geotechnical design reports, feasibility evaluations, and alternatives analyses for open cut and trenchless pipeline installation, as well as replacement methods such as pipe bursting, pipe reaming, and pipe eating. He brings a unique combination of design and construction oversight experience with HDD. Romeo provides effective solutions to a variety of challenges encountered during construction.*

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PE4710 Pipe: The Best Solution for Water Systems

BRIDGES TO NO REPAIR

By: Mario Carbone, Progressive Pipeline Management

Since 2002, Progressive Pipeline Management (PPM) has been renewing natural gas pipelines in challenging situations including highways, bridges, railroad lines and environmentally sensitive areas. We use the Starline® Cured-in-place-lining, which is a proven, cost effective trenchless technology that extends the life of a pipeline by 100 years.

In 30 years, I haven't met a utility that didn't have pipelines along bridges in their inventory. As bridges age, so do the pipelines. Like us, they are getting older. Over forty percent of the bridges in the US are over fifty years old. In the Northeast, gas pipelines and bridges are typically 75 - 100 years old.

As they age, pipelines are vulnerable to corrosion. Leaks come from corrosion, which is accelerated in pipelines along bridges. Repair of a gas pipeline alongside a bridge or overpass is nothing like a repair in a typical roadway where a pipeline is buried. Let's say a leak is identified in the abutment wall. Go-to methods are to put a sleeve on or to remove the pipe from the abutment wall and replace the piece of pipe. Here's the dilemma. The owner of the bridge will never allow that. If you can't disturb the pipe on the bridge, or cut and cap the main, there are no viable alternatives.

Leaking pipelines on bridges cannot be repaired using conventional methods of replacing the pipe. There is another way that has been around for 30 years. Cured-in-place-lining is a proven and cost effective way to repair pipelines without disturbing the bridge.

WHY ARE PIPELINES ON BRIDGE CROSSINGS SO DIFFICULT TO REPAIR?

Pipelines run under or alongside and traverse the bridge's abutment walls. The position of some of these gas pipelines places them in a problematic location as they are mostly hung under or alongside the bridge structure, limiting access to the pipeline. In some cases, and the most convenient, the pipeline is resting on top of the structure completely exposed except for where it re-enters the road or offsets into the abutment walls. Most of these bridge or overpass crossings place the pipeline through the concrete abutment wall of the structure, either with a protective sleeve, or in some cases without a sleeve.

Bridges are highly susceptible to the elements. Wind, salt and extreme temperatures accelerate corrosion, which is the reoccurring issue, especially where the hangers supporting the pipeline make contact with the gas-carrying pipe. The greatest corrosion concerns are within the abutment wall itself, where the concrete accelerates the localized corrosion. The pipeline is weakened at that juncture and in most cases a gas leak is present. Excessive corrosion of the pipeline where the pipe enters the abutment wall of the bridge cannot be repaired without removing the pipe.

Figure A. Bridge with pipeline hanging under bridge

Figure B. Bridge with pipeline alongside

Figure C. Pipeline under bridge going towards abutment

BRIDGES TO NO REPAIR

Let's say a manager in charge of a bridge sends the leak truck out to investigate, and decides that a section needs to be replaced. Here's where the nightmare begins. Pipelines at bridge crossings require multiple levels of approvals, and layers of restrictions, from

"CIPL IS THE RIGHT CHOICE AS AN ALTERNATIVE TO CONVENTIONAL MAIN REPLACEMENT GIVEN THE LOWER COSTS AND 100-YEAR SERVICE LIFE. BRIDGES, ROADWAYS WITH HIGH RESTORATION COSTS, HISTORICAL AREAS, AND RAILROAD CROSSINGS ALL MAKE CIPL THE LOGICAL CHOICE."

- CASEY GIAMBRONE, VICE PRESIDENT, PROGRESSIVE PIPELINE MANAGEMENT

the owner and regulators. Bridges are owned by municipalities or railroads, so the utility is limited to what is permitted by these owners. Traditional replacement presents utilities with multiple engineering hurdles to overcome.

When a bridge or crossing is functioning, the owners are not open to a utility coming in and messing with the pipeline. When a bridge is in need of repairs, there is no way the owner will let anyone near it. Existing pipelines are grandfathered into the bridge, but any replacement pipe or hanger is not. The structure of the bridge may or may not support a new pipe and the owner won't take a chance with it.

In addition to owner permissions, there are regulator and Department of Transportation (DOT) approvals and inspections. Engineering designs have to be submitted and approved to the bridge owner, DOT and city/county regulators before any traditional replacement can be completed. Hangers that support the pipeline need to be replaced with new hangers of approved designs, per owner's SOP. Re-engineering pipe supports and hangers, or attempting to remove the old corroded pipe from the abutment wall, are cost prohibitive methods, and in most cases simply not allowed. Even a simple change in hangers can sometimes make the project a no-go.

Removing the pipe that is nestled in an abutment wall is an extremely costly and difficult process that affects the structure of the bridge. The local municipalities or owners of the bridge will not allow the replacement of the pipeline, especially where it enters and exits the abutment wall of the bridge structure. A bridge owner will never permit a utility or contractor to drill through the foundation of the abutment wall to put a pipe in. If they were to gain permission, the equipment, insurance and safety protocols required would be cost prohibitive.

The red tape and headaches that come with trying to use conventional replacement lead to months and months of dead ends. All the while the leak is still there and getting worse. This is what is meant by "Bridges to No Repair."

HOW BIG IS THE BRIDGE PROBLEM?

There are more than 614,387 suspension bridges in the U.S. Forty percent are 50 years or older. Pennsylvania has the third-largest number of bridges in the nation with 25,000 state-owned bridges, some dating back to 1929. On top of that are the millions of overpasses that cross creeks, highways or railroad tracks. These are still bridges although not as iconic as the Brooklyn Bridge. The majority have utilities, since pipelines have to go under or over the pass.

CURED IN PLACE LINING A SOLUTION FOR BRIDGE CROSSINGS

There is a simple solution to the headaches that come with "Bridges to no Repair". Reconditioning the pipeline using Cured-in-Place Lining (CIPL) reinforces the pipeline within the abutment wall without disturbing the pipeline or the structure of the bridge. The first step is to review the drawings of where the pipe connects to the road. The process is done using two excavation points at the beginning and ending points where the liner is inserted. These excavation pits are done outside or beyond the limits of the bridge. We cut and cap the main and line it from these two points.

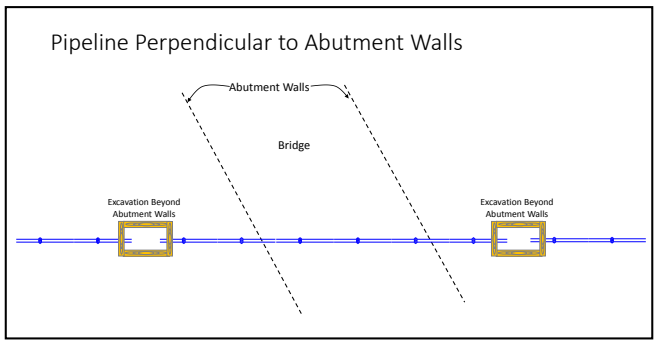


Figure D. CIPL process takes place outside the limits of the bridge

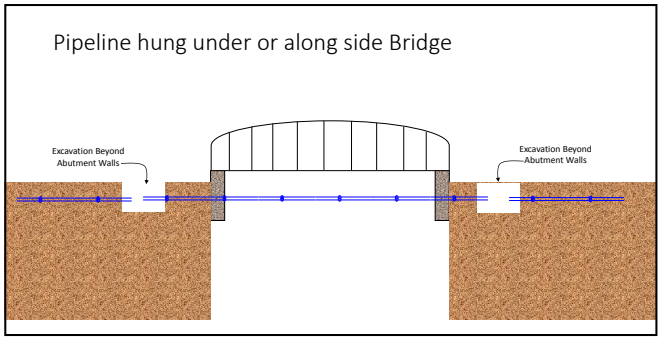


Figure E. Same process if the pipeline hangs under or alongside the bridge

Figure F. SRS liner prep

Figure G. PPM crew installing SRS sleeve and PVC pipe between abutment wall and gas main

Figure H. Interior of pipeline with SRS installed at the bridge abutment

Leaving the pipeline in place and repairing it using CIPL falls within "grandfathering" guidelines, thus avoiding the need for total replacement. CIPL is far less expensive than replacement, and in most cases is the only viable option.

CARBON FIBER STRUCTURAL REINFORCEMENT SLEEVES (SRS) IDEAL FOR ABUTMENTS

PPM developed an innovative solution that prevents the need for the removal or excavation of a pipeline. Installing a structural reinforcement sleeve (SRS) has been a choice of gas utilities throughout the industry for this purpose. The carbon fiber SRS reinforces the corroded pipe with a carbon fiber sleeve without the need to remove the pipe. The SRS has been tested at pressures to 250 PSI and approved by the Gas Technology Institute for its strength, durability and compatibility with PPM's Starline CIPL product. This innovative approach is accomplished by installing a Carbon Fiber sleeve into the gas carrying pipeline directly at the bridge abutment wall. PPM's SRS sleeves are made of a high strength carbon fiber laminate with a glass outer skin, and are installed robotically into the pipeline. The laminate composite material and glass outer coating prevent corrosion.

The carbon fiber material bonds to the interior of the pipeline, and improves the pipe's integrity at the position of the installation. While each project is unique, carbon fiber SRS can save utilities as much as $500,000 per project by preventing future corrosion and eliminating the need for costly additional excavations and pipe work.

During a 12-inch rehabilitation project in East Orange NJ, the pipeline went directly through the bridge's concrete abutment wall. As shown in Figure G, the crew installed the SRS in the abutment wall, with temporary PVC piping between the 12-inch gas main and abutment wall. After lining, the PVC pipe was removed and the utility re-installed the expansion joint at that point.

Figure H shows the SRS sleeve and PVC pipe successfully installed between the abutment wall and wrought iron main. The liner has already been installed in main. As noted, this section was cut out and the utility re-installed an expansion joint at that point.

CURED-IN-PLACE-LINING PROCESS

Whether on a bridge or under a highway, the CIPL lining process follows the same steps, with the entire process taking just a couple of days. After the sending and receiving pits are excavated, the first step requires a pre-clean CCTV inspection. Robotic cameras confirm the pipeline geometries, check for anomalies and protrusions, and assess the overall internal condition of the host pipe. The next step involves a thorough internal surface preparation using robotic sandblasting and subsequent recovery of the leftover sand and debris.

Adhesive is mixed and prepared and added to the liner. The liner is loaded into the Starline drum, and then inverted and inserted into the pipe. The Starline® liners are a seamless / joint-less circular woven fabric-hose made of polyester yarns and a plastic coating (PU/PE) which is bonded as inner liner into the

Figure I. PPM team members load the liner into the Starline pressure drum prior to inversion in the excavation pit

Figure J. PPM Cured-in-place-liner inversion in process

host pipe using a solvent-free two-component adhesive custom fit to each project. After the liner cures, it is cut out on both ends flush with the end of the pipe.

The CCTV camera is inserted again to ensure it looks good. The final step is a pressure test and the gas is turned back on.

During the entire process, the host pipe remains in the bridge, with no interference at all with the bridge structure. All the action happens at the excavation points. The owner will not have issues with a process that happens outside his domain. The complete reconditioning of the entire segment, plus the SRS reinforcement of the pipeline at the abutment wall, is typically completed within a few days. Curing times vary depending on the ambient temperatures. Reconditioning a pipeline will add an additional 100 years of reliable life to the old existing pipeline including the reinforcement of the pipeline at the abutment walls.

The entire lining process does not disturb the pipeline, will not affect the supporting hangers, or disturb the pipeline within the abutment wall. Cured-in-place-lining plus the Carbon Fiber SRS is a perfect marriage and ideal solution to expensive, and often impossible, repairs within bridge pipelines.

"CIPL is the right choice as an alternative to conventional main replacement given the lower costs and 100-year service life. Bridges, roadways with high restoration costs, historical areas, and railroad crossings all make CIPL the logical choice." Casey Giambrone, Vice President, Progressive PIpeline Management.

BACKED BY $15M INDEPENDENT TESTING

Extensive R & D and independent testing on rehabilitated pipe with the Starline technology has confirmed a service life of 100-plus years. The natural gas industry has invested over $15 million in testing of the liner and its capabilities at such esteemed institutions as Cornell University, Battelle Labs, ASTM, NYSEARCH and PHMSA. PPM now has liners capable of installation at a maximum allowable operating pressure of 99 PSI, 180 PSI, 250 PSI and soon, 450 PSI.

PPM holds the exclusive license for North America for the Starline® liner. PPM has decades of specialized expertise associated with gas pipeline related issues, including lining and trenchless technology. This depth of understanding and engineering of the entire project is applied from inception to completion. The PPM team and crews have collaborated with industry experts at leading utilities and institutions. Together, they have developed and tested innovative technology that will extend the life of gas infrastructure for generations to come. Through advanced robotics and offering Broadband Electromagnetic Inspection technology, PPM is taking pipeline integrity management into the 21st century.

"The beauty of CIPL is that it not only addresses the leaks that our customers have identified, but eliminates the ones that have not been identified. The most dangerous leaks in the industry are the ones you don't know about."

-Casey Giambrone, Vice President, Progressive PIpeline Management.

ABOUT THE AUTHOR:

***Mario Carbone's** ingenuity and perseverance define his leadership. His 46 years in the gas pipeline industry include 32 years in design, maintenance and construction with Brooklyn Union Gas/KeySpan Energy and ten years as the senior manager for gas research and development with KeySpan Energy. Mario's decades of experience enable PPM to design, develop and test new technologies and robotics on demand while complying with required industry standards. As a respected authority on innovative trenchless techniques, he has frequently been a speaker at industry events.*

CONDITION ASSESSMENT IN THE CITY OF CHAMPIONS: BROCKTON'S TWIN 24-INCH CI TRANSMISSION MAINS

By: Ian W. Mead, PE, BCEE, Tighe & Bond,
Lawrence Rowley, City of Brockton, Massachusetts

INTRODUCTION

The City of Brockton is located in Plymouth County, 25 miles South of Boston (see Figure 1). The population has hovered slightly above 95,000 for each of the past five years. The City benefits from a large raw water supply approximately ten miles to the southeast, where a system of ponds and diversions feeds the Silver Lake water treatment plant (WTP). Built in the 1960s, the conventional 24 MGD surface water treatment plant was originally designed to accommodate anticipated growth projections at that time, which were double the actual current population. Given the relatively flat population growth in the City, loss of water-intensive manufacturing industries in the City, plus the incorporation of water conservation measures and more efficient fixtures, demand has actually decreased to a rolling average of about 10MGD. Ironically, in the 1980s drought conditions led to state regulators requiring the City to identify and develop a supplemental source of drinking water. Over the ensuing years a desalination plant was developed on the Taunton River and activated in 2008 with the City as the sole customer, but it was only capable of providing 10-20 percent of the daily demands at significantly higher unit cost than the existing surface water treatment plant. The City provides wholesale service to several nearby communities. The distribution system consists of over 300 miles of piping up to 36 inches in diameter, two pressure zone booster stations, and four storage tanks.

Figure 1. City of Brockton Locus Map

Potable water is pumped from the WTP through two parallel 24-inch cast iron transmission mains constructed in 1905 and 1932. From the WTP, the route encompasses cross country easements near cranberry bogs, wooded areas and homes, as well as active paved streets through several towns (Figure 2). The system was constructed with seven crossover locations with connections between the two mains isolated by 8-inch or 12-inch gate valves. Both of these pipelines were cleaned and cement mortar lined in 1968 after construction of the WTP was completed.

Figure 2. Transmission Main Route

The Brown's Crossing pump station is located about 7.5 miles from the plant. Originally the station was constructed to boost pressures, mitigate surge, and allow for additional chemical addition in the context of the larger population projections. Although much of the internal station piping remains in place (Figure 3), the pumps have been removed as the WTP can meet the hydraulic needs of the distribution system and fill all four storage tanks within and north of the City. For most of the 20th century the system operated reliably in a "set it and forget it" mode, with limited maintenance and only reactive repairs. Over the past fifteen years, the City's Department of Public Works (DPW) implemented several programs to assess and improve the transmission mains, including easement clearing, valve location and operation, and targeted valve improvements and replacements. However, it was determined during the most recent programs that the City's ability to isolate individual segments of the transmission mains was quite limited, and as a result many of the proposed improvements were deferred.



Figures 3a, 3b, 3c. Brown's Crossing Pump Station Piping Configuration

2015 PIPE RUPTURE

On a late May morning in 2015, the City received a call that there was a water main break adjacent to a home on Central Street in East Bridgewater, MA. Upon investigation, the City determined that the southern transmission main had ruptured near the residential garage, within the City's easement across the property. City staff mobilized to several valve locations in an effort to isolate the area of the break. Due to loss of pressure the WTP pumps automatically shut down. The City implemented a boil water order while the situation was evaluated, ramped up production at the desalination plant to augment available storage in the distribution system, and provided bottled water to residents during the repair. Ultimately the City shut down both transmission mains at the Browns Crossing pump station and the WTP, and was also able to close a nearby isolation valve on the north transmission main to prevent it from draining through a crossover to the south main and the break.

City staff excavated and dewatered the break and replaced the broken cast iron pipe with new ductile iron. Unfortunately, the City did not have the exact repair couplings needed to connect to the existing cast iron, as the outside diameter of the existing cast iron is variable along its length. Luckily, a large regional water supplier (the MWRA) had excess repair materials on hand and provided both materials and staff support to the City in the repair efforts. The repair was effectively completed, and the transmission mains were flushed, tested, and restored to service within two days of the break. It was assumed at the time that prior construction of a residential garage addition may have adversely impacted the existing pipe backfill, ultimately contributing to the failure.

CONDITION ASSESSMENT PROGRAM PLANNING

Following the emergency response and subsequent reporting to the state regulators, the City committed to developing and implementing a condition assessment and improvement program for the transmission main system between the WTP and Brown's Crossing pump station. The program was funded through the low interest state revolving fund (SRF) loan program administered by the Massachusetts Department of Environmental Protection (MADEP). The pipeline improvement project was designed to replace all crossover pipe and valve configurations, and also provided new mainline valves at key locations along both transmission mains.

Completed in conjunction with the pipeline improvement program, the condition assessment project included the following tasks:

Data Review and Program Development

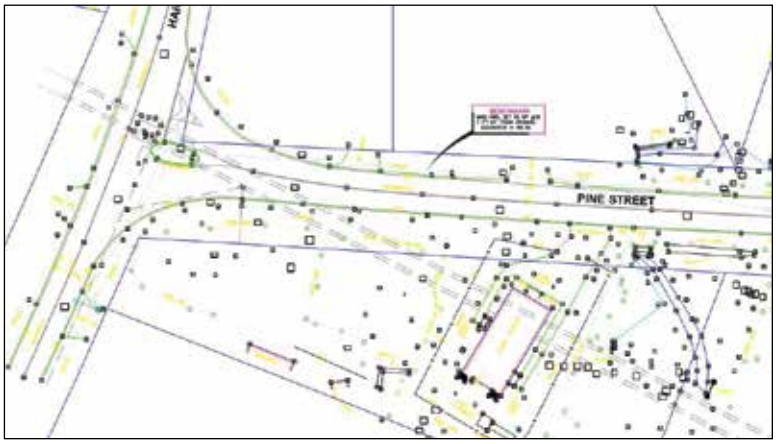
The team collected and reviewed all available data associated with the transmission mains, including incident reports, follow up documentation submitted to DEP regarding the 2015 rupture, recent crossover inspection and improvements field notes, survey data, and prior testing results for existing valves. Under this review, the team assessed the current status of the transmission mains, developed a field testing program to determine what additional improvements were needed, and reviewed the overall assessment program.

Site Visits and System Testing

The team visited the site to view recently completed work. The City had installed new insertion valves on all crossovers



Figures 4a, 4b, 4c. Isolation and Exposure of the Break



Figures 5a and 5b. Aerial View and Ground Survey Results at Browns Crossing Pump Station

to facilitate the pipeline improvement program, ensuring that one of the transmission mains could always be maintained in service while new control valves were installed on the other main. System modifications necessary to accommodate the in-line leak detection, such as test pits, potholes, and pump station modifications, were also defined.

Site Survey and Easement Research

The project included ground survey of six existing crossover locations plus the site of the Brown's Crossing pump station to document existing transmission main, valve, and hydrant locations, pipe materials, and diameters, as well as other utilities and roadway or cross-country alignment. Initially the team anticipated tapping the transmission mains outside the pump station to accommodate inspection, but the survey picked up wetlands and space constraints that prevented this approach. The survey reflected an average length of about 100-feet along the transmission main alignment at each location, to capture existing conditions at each crossover location. This survey was utilized to plan subsequent phases, including leak detection and pipe testing, and was also incorporated into the separate design for valve replacements under the pipeline improvement project.

In addition to the site survey, comprehensive research of all existing easements along the pipeline route was also completed, to compile a full record of all public and private property impacts and better document the transmission main locations.

In Line Leak Detection

The services of a specialty pipeline condition assessment subcontractor were included to provide in-line leak detection on both transmission mains, for the entire length between the Silver Lake WTP and Brown's Crossing pump station (39,000-feet for each transmission main). The SmartBall® system by Pure Technologies is a free-swimming acoustic sensor array packed into a rigid ball the size of a tennis ball, which is protected by a larger foam ball. The sensors listen for and track active leaks and gas pockets, and also record progress and location. This assembly is inserted into the inspected pipe via 6-inch or larger openings and carried along by the flow (at least 1-3 feet per second). In order to facilitate this work, modifications to the existing piping were required in the pump station to accommodate isolation of each transmission main and extraction of the leak detection tool. Existing defunct isolation and surge control valves were removed and replaced with new 18" pipe, 18x6 tees, and one new control valve on each transmission main (Figure 6). This configuration allowed for isolation of the pipeline segment directly within the

Figures 6a and 6b. Brown's Crossing Piping (Before) and Modifications (After)

Figures 7a and 7b. Potholes in Street and Cross Country with Tracking Device during Inspection

pump station, and simplified retrieval of the inspection tool.

The City also provided 12-inch potholes, access ports to the top of each transmission main approximately every 3,000 feet along each main, for the subcontractor to attach location devices to assist in the tracking of the leak detection tool during the inspection. PVC pipe was installed vertically over the transmission mains to provide access for these tracking instruments (Figure 7). The team leapfrogged these locations during inspection to track progress of the tool.

The SmartBall was inserted at the WTP via the temporary removal of the bolted 18-inch top flange cover of an existing weighted check valve. No flow interruption or impact to plant operations was required since multiple finish water pumps provide operational redundancy. Once the SmartBall was installed and the cover replaced, the pump was started, and the tool entered the pipeline. The City (through its WTP contract operator) was able to provide sufficient flow within each force main to attain at least 1 foot per second (fps) to convey the tool through each pipe individually. The total inspection time was between seven and eight hours for each transmission main. Upon completion of the inspection, a summary field report from the subcontractor was provided.

CI Pipe Testing

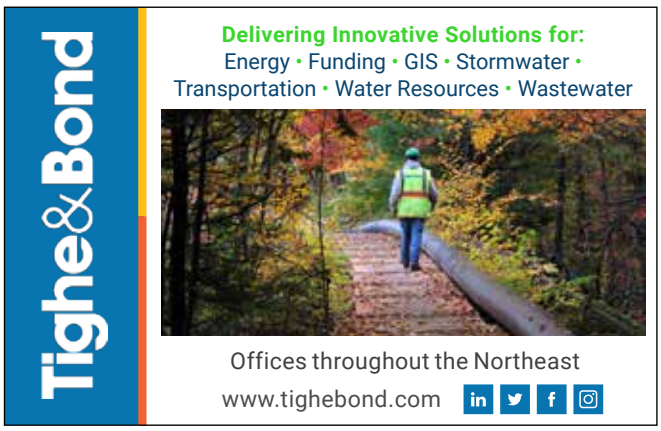
During completion of the concurrent pipeline improvements project, the team coordinated the collection of thirteen samples of the 24-inch transmission main pipe by a laboratory analysis subcontractor, to accommodate testing and analysis to document structural conditions of the pipe. Each sample of pipe was up to two feet long, and generally fully intact as found "in-situ" at the location of construction. The contractor on the construction phase work was required to cut and set aside one pipe sample for each transmission main at each of the six crossover locations. The laboratory collected the samples from the contractor on site as they became available, and performed the following tests on the sample set:

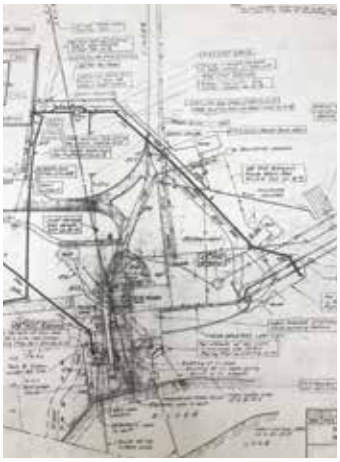
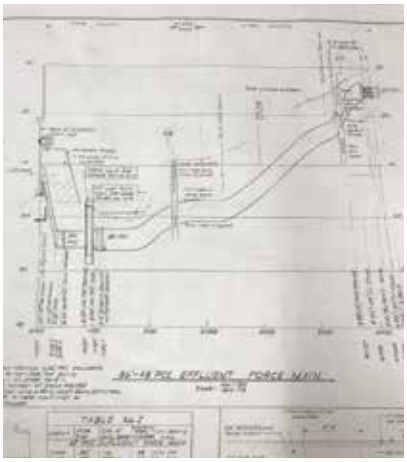
- Visual and photographic documentation of existing conditions
- Radiography to identify quality of casting and presence of graphitic corrosion
- Talbot strip tests, ring crush and tensile tests to AWWA specifications
- Optical microscopy to evaluate microstructure and level of metallurgical degradation
- Hardness testing to evaluate metallurgical conditions of pipe

A summary testing report was provided upon completion of all analysis, indicating test results and conditions of the pipe at each sample location.

Reporting

The team prepared a report summarizing all work completed under the prior tasks. Results of the site inspection and survey, leak detection program, and laboratory analysis were included. Conclusions regarding the existing condition of the transmission main piping system were documented. The report includes recommendations on maintaining the transmission main system, emergency response planning, additional improvements, and future testing recommendations.



Figures 8a, 8b, and 8c. WTP Insertion Location and Yard Piping Schematics

RESULTS

The easement research resulted in a large printed and electronic volume of all impacted properties along the project route, including ownership, dimensions, and site plans from the Registry of Deeds. The individual easements were classified by Town and assigned a unique number for tracking purposes. It has been almost twenty years since the City cleared vegetative growth from the existing cross-country easements, and this research will prove useful for the next project that implements this maintenance work. It should also help to minimize issues such as improper construction of new residential structures within the easement, which could damage the pipe directly or impact the soil around them, potentially contributing to future failures such as the one experienced in 2015.

The leak detection work was completed – after several years of discussion, planning, field work, and system modifications – over two days in October 2019. Following a slow start on the first day after insertion at the WTP, it was determined that the 48-inch PCCP at the plant slowed the velocity enough to impact the smart ball's progression. Therefore one of the new crossover valves was opened downstream of the WTP to induce higher velocities, which moved the tool into the target transmission main. The crossover valve was then closed to ensure the tool stayed in the intended transmission main for inspection. On the second day the inspection was started with this crossover valve opened to again induce sufficient velocity on the second transmission main.

The new piping within the Brown's Crossing pump station performed as intended, simplifying isolation and retrieval of the SmartBall tool upon completion of the inspections. Based on the age and prior break history of this pipe system, it was anticipated that some active leaks would be found during the inspection, such as joint leaks or otherwise. The inspection detected no active leaks or air pockets in either of the transmission mains.

The results of the metallurgical investigations and laboratory analysis generally reinforced the team's assumptions that these



Figures 9a, 9b, and 9c. Installed Retrieval System, Removed Net, and SmartBall After Inspection

pipes are performing consistent with expectations given their material and age. The cast iron pipe presents with a thick cross section, and evidence of the prior (1960s) cement mortar lining remains. The rate of leakage and breakage has been low but also inconsistent, and in the context of their current age the remaining useful life is unclear. Analysis indicated no catastrophic issues, however the pipe may be particularly susceptible to brittle failure. One issue in support of this contention is phosphorus content in the pipe. The 1962 AWWA (e.g., C106) Standards allow up to 0.9 percent phosphorus content and only one pipe segment failed to meet that AWWA standard. All pipe segments contained at least 0.524 percent phosphorus, and available documentation indicates that concentrations of phosphorus above 0.3 percent in cast iron pipe will form steadite, a brittle material that has been shown through research to weaken the pipe. Steadite was found in the pipe segments' microscopic analysis. The presence of this compound, plus the graphitic corrosion identified both on the inside and outside of the pipe may explain the pipes' diminished mechanical properties and contributed to prior failures (notwithstanding the likely impact of the nearby residential garage construction on the 2015 failure). Pipes with steadite and graphitic corrosion often visually appear to be fine, other than general surface corrosion. The issue is that these materials can develop across the pipe thickness, substantially weakening the pipe, and sufficient buildup of these materials can lead to catastrophic failure in grey cast iron pipes carrying water at relatively high pressures. The valve improvements completed by the City will help ensure that any such impacts can be quickly isolated for repair while maintaining service to the City.

SUMMARY AND CONCLUSIONS

Like many older cities in the region, the City of Brockton manages many different assets with limited funding. The transmission main system has operated reliably for over 100 years with minimal maintenance and improvement work. Subsequent to the 2015 rupture, the Massachusetts Department of Environmental Protection required follow up activities by the City to assess the cause of the break and potential for future issues. The City embarked on a two-phase program to both improve the operability and control of the system, as well as perform a comprehensive assessment of the conditions of the pipeline. New valves and piping have been installed throughout the system. Investigations and laboratory analysis have indicated no active leaks, and an aging pipe system that may be subject to brittle breaks in the future. The City has also installed a hydro-pneumatic surge control system at the WTP to add protection to the transmission main system. As a result of this program, the City is confident in its ability to rapidly isolate and address any future issues, while maintaining continuous water service to the citizens of Brockton.

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Ian Mead, P.E., BCEE *is a Senior Project Manager with Tighe & Bond in Worcester MA, and has over 20 years of experience working as design engineer, project manager and construction coordinator. His varied experience includes work on drinking water, wastewater, pipeline, site and civil, energy and other municipal infrastructure projects. Ian is immediate Past-Chair of the NASTT-NE Chapter.*

Lawrence Rowley *has worked for the City of Brockton Department of Public Works for decades, in the highway department, as Superintendent of Utilities, and for the past several years as Commissioner of Public Works, responsible for water, wastewater, stormwater, roads, bridges, culverts, streetlights and more.*

INTERSTATE CULVERT REHABILITATION DURING EARLY COVID-19 SHUTDOWN

Interstate 89 and Skunk Hill Road over Unnamed Brook, Georgia VT

By: Steve Wolf, P.E., Contech Engineered Solutions LLC
Matt Wheeler, SD Ireland
Nick Wark, P.E., Vermont Agency of Transportation (VTrans)
Jim Cota, VTrans Maintenance Operations Bureau

ABSTRACT

Culvert rehabilitation remains a growing industry in an aging infrastructure. Vermont Agency of Transportation (VTrans) has, for a couple of decades, taken the lead on identifying, inspecting and addressing culverts for potential rehabilitation that are near the end of their useful life. Over the years, VTrans has used various methods including open cut and replacement, reinforced concrete inverts, and segmental slip-lining. A majority of the rehabilitated culverts under Vermont's Interstate and state road system are now relined with a new smaller pipe having the same roughness coefficient as many culverts built in the 1950s and 1960s. Fortunately, these culverts are oversized because they were built using older hydraulic analysis tools. Open-cut and replacement is expensive, especially under deep fills, and VTrans has only completed those where the hydraulic capacity cannot be accommodated. In many cases that approach can be 3-5 times more costly when factoring in staged construction and maintenance of traffic.

SOUTHBOUND EXIT 18 RAMP

On November 1, 2019 the District Transportation Maintenance Supervisor reported a significant sink hole on the Exit 18 southbound off-ramp in Georgia, Vermont. Upon inspection with the District technical team using a video camera lowered into the new void, it was determined the sink hole was at least 10 feet deep and branched under the travel way into at least two other underground sink holes. The Ramp was closed immediately for the safety of the traveling public.

Just three days later, SD Ireland Corp, a General Contractor that specializes in excavation work and concrete work, received a call from the VTrans District 8 Office in St. Albans. They reported that the sinkhole on the southbound exit ramp of I-89 was over an existing 11-foot diameter vertical ellipse galvanized steel structural plate pipe with almost 20 feet of cover. The consensus is this occurred as a result of a significant rain event on October 31, 2019. VTrans determined they would have SD Ireland immediately mobilize, shut down the ramp, place detour signage and investigate the massive sink hole. Per VTrans Operations: *"Once the detour is in place and pipe investigation work is done, we will determine the best course of action, i.e. trench excavation, common*

Figure 1. Sink hole on the Exit 18 southbound off ramp in Georgia, Vermont (Contech Engineered Solutions LLC, New London, NH)

excavation, flowable fill for voids around pipe, possible grout (rapid repair) in the pipe." Contech Engineered Solutions LLC (Contech) received a call from SD Ireland on the same day to take a field trip to Georgia and inspect the existing structure with them.

The hydraulics section of VTrans quickly determined this culvert had been on their "HOT 200" list and was last inspected in November of 2017. This lists all large culvert structures (over 6 feet in diameter) with the most urgent need of evaluation and inspection for rehabilitation. The bank full width upstream was 17 -23 feet, and considered a moderate restriction, not ideal for a pipe but water only flowing 7 feet deep during a 100-year storm event. A liner pipe approximately 24 inches smaller would increase the water surface elevation only 6-12 inches at the inlet and the upstream wetlands could easily accommodate that increase. However, due to the massive sinkhole, the uncertainties of filling all the voids of the ramp embankment, and the ability to keep the ramp closed for a month or two, it was determined that a full replacement could occur at this site if work proceeded in an accelerated timeline.

Contech developed a 20-foot 5-inch span x 17-foot 9-inch rise aluminum structural plate vehicular underpass shape and was able to commit to a two-week lead time on material. Due to the large covers that existed under the embankment the larger than normal rise was suggested by Contech in order to reduce the height of cover over the crown of the structure. SD Ireland, in addition to being the largest site and concrete contractor in Vermont, is also one of the premier pre-casters in the northeastern United States and was able in a three-four week timeframe to fabricate a 20 x 8 x 120-foot reinforced concrete box (RCB) with a much thicker top slab for the larger than normal earth cover with precast headwalls and wingwalls. It was installed by Christmas week in 2019 and the ramp was re-opened. Late fall and winter are not ideal times to build culverts in northern Vermont due to freezing temperatures, high precipitation and base flows. Maintenance of water was a challenge on this full replacement job but this also provided VTrans and SD Ireland with great site-specific base flow information for what was to come next.

Figure 2. Aerial of the Original Culvert Running under I-89 (noted with the green and red lines) (SD Ireland Corporation, South Burlington, VT)

VTRANS HAS INSTALLED ABOUT 25 LARGE-DIAMETER, SEGMENTAL CSP SLIP-LINERS UNDER THEIR INTERSTATE SYSTEM WITH EXCELLENT RESULTS.

MAINLINE INTERSTATE I-89 CULVERT

During their November site visit, VTrans, Contech and SD Ireland also inspected a culvert just downstream for the replacement culvert that was the same size 11-foot diameter vertical ellipse (139 x 126 inches), however this was a 580 LF long crossing under both the southbound and northbound traffic lanes of I-89, also crossing under a local road on the downstream end. This fairly long culvert, with an average of 17 feet of earth cover, typical in Vermont, was at a 45-degree skew to the highway. The hot dipped galvanized steel plate culvert was installed in 1967 so had met the initial design life expectations for a highway bridge structure of around 50 years. It was determined that this would be a prime candidate for a segmental liner pipe.

Apparently, the large rain event in October caused damage to the existing corrugated metal plate structure. The high water washed material away and settlement caused by the piping material was observed in the median. During monitoring a second area of settlement was observed closer to the shoulder. The travel lane above the northbound barrel was subsequently closed.

Figure 3. Original Galvanized Steel Plate Culvert, installed in 1967 (VTrans – Bridge Maintenance, Berlin, VT)

On February 2, 2020, VTrans personnel reached out again to Contech and SD Ireland as the VT State Police reported a sinkhole appearing under the right shoulder of the northbound lanes of I-89 near the downstream end of the 580 LF culvert. The shoulder and northbound right lane were immediately closed by VTrans and SD Ireland personnel. By February 14 it was determined that this would be lined with 620 LF of 108-inch diameter round 10-gage polymer-coated corrugated steel pipe, and SD Ireland immediately began the work.

VTrans ordered the pipe from the Contech State culvert contract. Sloping 12-inch to 6-inch fish baffles were fabricated in the liner pipe at 8-foot centers to facilitate Aquatic Organism Passage (AOP). Several rock weirs were also proposed in the downstream outfall channel to create back water up into the outlet end for AOP. A new hydraulically improved inlet cast-in-place concrete headwall made to lower the entrance loss coefficient was proposed for the upstream end, and a toe/cradle wall was proposed for the downstream end.

Figure 4. Outlet End of Polymer-Coated CSP Liner Pipe (VTrans – Hydrology and Hydraulics, Montpelier, VT)

It was determined that three 30-inch solid wall polyethylene directional bores at 550 LF were necessary to pass under I-89 in order to handle the stream relocation base flow bypassed through a 24-inch diesel pump. At this juncture, all travel from China had already been shut down as COVID -19 was spreading around the world and had started appearing in the United States. By early March, all construction work was halted in Vermont due to COVID-19 and the state was on lockdown except for essential services and emergency projects, which this project qualified under.

Once the directional drills were complete and the base flow bypassed, SD Ireland installed a shallow concrete mud mat in the bottom to fill some of the obvious voids under the culvert of the vertical ellipse, and to use as a flat working platform. This was not a typical approach, however due to cold weather and groundwater infiltration the mud mat was required, and once complete made installing the liner much easier.

The first piece of liner pipe was delivered on March 16, just as the COVID-19 shutdowns were commencing. March is not an ideal time in Vermont for work within a waterway with a 5.8 square-mile drainage area, as the snowpack was melting and the spring rains were present. Normally throughout the northeastern US, large liners are installed in the low flow season of June 15 - October 1, but there was no other choice for this critical Interstate repair. Given the critical nature of this project, it was imperative for the infrastructure that installation proceed immediately. All involved were deemed essential workers and able to continue with the installation to avoid further degradation to the roadway above. A new improved inlet headwall was installed with a lower entrance loss coefficient than the existing culvert, which had only an inlet toe wall to help mitigate for the 33 percent reduction in flow area.

Figure 5. Inlet End of the New Polymer-Coated CSP Liner Pipe with Improved Headwall Design (VTrans – Structures Design, Montpelier, VT)

Figure 6. Invert of New Polymer-Coated CSP Liner. Notice the water depth and low velocity provided by the baffles. This will improve the AOP in the area (VTrans - District 8, St. Albans, VT)

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ABOUT CONTECH:

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Cost Summary

The estimated cost was $11 M to open cut and replace this structure with a 20-foot span RCB at 600 feet long, using the same size box structure as installed under the upstream ramp. VTrans also investigated replacement with 3 new integral abutment bridges. These options would have required similar water diversion strategies, but would have been more complicated by the staged construction and maintenance of traffic.

The $4.66 M actual total price of the 108-inch diameter CSP segmental slip-liner was broken down as shown below:

Northbound Lane Closure / Sinkhole Monitoring / Filling	**$90,000**
Crossover Construction	**$600,000**
Mobilization	**$240,000**
Access Roads, Staging & Removal	**$216,000**
Temporary Relocation of Stream	**$882,000**
Fill Concrete Voids in Bottom of Pipe/Mud Mat	**$25,000**
Pipe Lining (Polymer-Coated, 10 GA CSP w/ grout)	**$1,400,000**
Concrete Inlet Headwall & Outlet Cradle Wall	**$156,000**
Lining of Downstream Channel w/Rock	**$91,000**
Removal and Replacement of DI in Median	**$15,000**
Compaction Grouting from Surface	**$585,000**
Mill, Shim and Pave NB & SB Lanes	**$72,000**
Crossover Removal	**$267,000**
Mill, Shim and Pave Skunk Hill Road	**$25,000**

Along with the substantial savings from the $11 M open cut estimate, it is notable that of the $4.66 M total cost, $885 k (19 percent) was the water diversion/directional drill work that is not typically performed to such an extent when liners are installed during the dry season. Another $979 k (21%) covered the installation and removal of contingent traffic crossovers. These are not typically required with a planned liner project. Finally, compaction grouting from the surface to fill voids under the Interstate was $585 k (12.5 percent). As a result, over 50 percent of the total project cost were contingencies in addition to what is typically required with a large segmental slip-liner project.

In the past 12 years, VTrans has installed about 25 large-diameter, segmental CSP slip-liners under their interstate system with excellent results.


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UMass Lowell NASTT Student Chapter Update

Recent achievements of NASTT Student Chapter members:

Joseph Pietropaolo, Vice-President of NASTT Student Chapter (completed his Independent Study on Trenchless Technologies)

Raj Gondle, Faculty Advisor to the NASTT Student Chapter (received the UMass Lowell Department of Civil and Environmental Engineering 2020 Teaching Excellence Award)

Liam Henderson, President of NASTT Student Chapter (John Ting Endowed Scholarship Award; Speaking on trenchless technology at various college events)

Steven Fallon, Past President of NASTT Student Chapter (Dean's Medal for Student Service)

Susom Dutta, Graduate Student Coordinator (Dean's Gold Medal for Highest Achievement; CEE Outstanding Doctoral Student Award)

Congratulations! We appreciate your hard work and dedication to Trenchless Technology in the Northeast!

STAYING ON TOP OF UNDERGROUND INFRASTRUCTURE

UMass Lowell NASTT Student Chapter Report

By: Liam Henderson and Dr. Raj Kumar Gondle (Faculty Advisor)

The 2019 Northeast Regional Conference in Syracuse, NY was the 5th NASTT conference I had attended since joining the UMass Lowell student chapter in 2017. As the presenters started breaking down their booths and the final lectures were rounding to their conclusions, I took a moment to reflect on how different my entire perspective was since walking in to my first conference in Cooperstown, NY. In only two years I had gone from never hearing about "*Trenchless Technologies*", to being able to hold relevant conversations with industry professionals about a multitude of various trenchless methods. Without the NASTT, this huge part of my life would never have been, and I don't know what I would be doing otherwise. The Trenchless Industry has given me a pathway that interests me and helps me to focus my studies on a particular end goal, which in turn, helps to motivate my academic performance. This experience is not unique to me, and over the years I've witnessed several other qualities that separate this industry from the rest.

Members of the industry are often eager to reach out and help answer any questions you may have. For students, this is very important in bridging the connection between book-learned theory and real-world results. At every conference new equipment, materials, and processes are introduced. Information is exchanged first hand from experienced individuals who can explain in unparalleled detail. Having one-on-one conversations also provide an aspect of professional development; for students who attend multiple conferences, there are plenty of opportunities to network and build personal connections with industry leaders.

LOOKING FOR ALTERNATIVE SOLUTIONS HAS ALWAYS BEEN AT THE CORE OF THIS INDUSTRY

When the COVID-19 pandemic hit, I was sad to hear that the NO-DIG 2020 show scheduled to be in Denver, CO had been canceled. I was worried that just as my senior year rolled around, all of the relationships and connections I had built up over the past few years would be swept out from under me. Luckily this was far from the case. Board members of the NASTT made communication a top priority and constantly sent out updates of the current events. Virtual presentations immediately replaced scheduled physical presentations, and in what felt like the blink of an eye I was listening in to the monthly northeast conference call setting up the webinar that would take the place of the 2020 northeast regional NASTT conference. Joining in to the call, I was greeted by several members like an old friend, immediately reinforcing my sense of welcome and belonging. I was able to participate in the meeting and had a chance to share some of my own experiences of coping with the changes brought about by the pandemic.

The decision to move all classes online was done during our spring break, leaving very little time to prepare for the switch to online classes. The first scrambled transition to a virtual semester carried a learning curve for everyone involved, and took quite a bit of getting used to. Had it not been for the relationships I had established through the NASTT with members of the campus community, I would have been so lost throughout the whole experience. Being able to communicate with other members of the NASTT student chapter helped to mitigate the overwhelming sense of detachment from the learning atmosphere. It also eased communication between myself and several faculty members, allowing us to strategically approach the new and unfamiliar challenges.

After a summer's worth of preparation, a virtual fall semester has gone a lot smoother but still has some bumps here

and there. Finding ways to keep our chapter active has been the main topic of our Zoom meetings. The remaining active members have been taking turns presenting virtually in freshman classes to try and engage new members. We are also in the process of drawing up plans for a display model that will offer an educational and interactive demonstration showing the general principles behind several trenchless methods. The idea is to create a variety of scaled representations for both trenchless installation and rehabilitation processes. The scale would be similar to that of a model train set and would allow interested minds of all ages to interact and observe common applications of trenchless technology. Other activities that can be kept socially distant such as field site visits are also options under consideration for club activities that can be made available to students during the pandemic. The two main goals I have as president for the club are keeping current students engaged and working out ways to engage future students.

As with all things, we are learning and adapting every day. There is a lot of uncertainty to face with the pandemic, it's difficult to gauge how soon or even if we will be able to resume our regular interactions. Until then we keep working with what is available and make the most of it. Looking for alternative solutions has always been at the core of this industry, and in a way this new challenge is no different than any other. The Pandemic has affected several aspects of our lives and has changed so much in a short amount of time. We take the changes as they come, and continue working towards improving methods of safe communication and involvement, while also improving methods and practices of trenchless technologies.

ABOUT THE AUTHORS:

Liam Hendrik Henderson *is a Senior Civil Engineering Student at the University of Massachusetts Lowell, focusing on Geotechnical Engineering Practices and Methods. He is the current President of the NASTT Student Chapter and has been attending both regional and national conferences since 2017.*

Dr. Raj K. Gondle *is an Assistant Teaching Professor in the Department of Civil and Environmental Engineering at the University of Massachusetts Lowell (UMass Lowell). He serves as a faculty advisor for North American Society for Trenchless Technology (NASTT) Student Chapter. He was recently presented with the UMass Lowell "2020 Teaching Excellence Award in Civil and Environmental Engineering".*

COVID-19 RESPONSE ROUNDTABLE:

Dealing with the Pandemic. Rising to the Occasion

By: NASTT-NE Chapter Members

The emergence of the COVID-19 pandemic from late March onwards prompted lockdowns and constraints on regular business and personal activities, fundamentally changing normal life. In general, these myriad restrictions were complex in practice, difficult to follow, changing often and varying across jurisdictions. People everywhere have responded to these profound changes with numerous inventive adaptations, innovations and use of virtual technology platforms.

Six NASTT-NE Chapter members share their reflections, on their own evolving "Approach" in response to the pandemic, on what has worked well within their own companies and organizations as everyone faces the ongoing challenges caused by spread of the coronavirus.

Helpful interesting details shared from two municipal members, two engineering firm members, and two contractor members. From keeping vital core municipal services operating, to developing site safety procedures factsheets & checklists, to hosting flu clinics at company offices, to sanitizing hundreds of offices, hospitals, transportation facilities, trains, buses and other critical infrastructure from Boston to DC, NASTT-NE Members have been at the forefront dealing with Covid-19 pandemic, rising to the occasion to meet these challenges head on!

CITY OF ONEIDA – ERIC SCHULER

COVID-19 sure has been a learning experience. It was amazing how quickly we had to adapt (within a period of days) mid-March to completely change how we approached operations. Core municipal functions have always included a risk of logistical and operational headaches. COVID-19 forced us to re-write the day-to-day ops rules pretty quick. As one of 4 Department Heads in the City appointed to a task force for mitigating impacts of COVID-19 on key City functions, it was sure a learning and growth experience I will never forget.

Following is a discussion of our key pandemic management items:

- Changes to Services
  - There were none! We provide core functions to the municipality and surrounding service area. Water still had to get to be treated and conveyed to houses, sanitary sewer influent flows still had to get treated. Streets still had to be snowplowed. Green waste still needed to be picked-up. We still had to find a way provide the same services that were a necessity pre-pandemic.
- Staff Hours
  - The State required us to go to "Essential Workers only" pretty early on. But then it went a step further requiring municipalities to reduce staff by 50%. Water and Wastewater Operators were split in half and went to alternating 7-day shifts in order to minimize exposure and overlap. Same thing with DPW staff. Office staff went to less than 50% capacity in buildings after capabilities for remote working were rolled-out.
- How did we ensure worker safety?
  - Daily health screenings from the beginning. Screenings were conducted before employees were allowed to start their shift. Disinfection of common areas (break rooms, bathrooms, door knobs, etc) was conducted 2-3x per shift with required sign-off by delegated cleaning personnel. Staff were assigned a specific truck for the week in order to minimize exposure with sharing vehicles. Vehicles were disinfected daily. Existing break rooms were reconfigured and make-shift break rooms were created in order to facilitate social distancing. Luckily we have a factory in the community that produces cleaning products for hospitals, etc…so obtaining cleaning products was never an issue for us. PPE was secured through our Fire Department and provided to all workers in all departments.
- Productivity
  - Productivity on the Water and Wastewater side did not miss a beat. DPW functions took a hit, as the alternating "half-capacity" crews hindered ability to prep for roadwork, storm sewer cleaning/replacements, etc. Office staff was arguably more productive during times they were working remotely.
- Morale
  - Employee morale never was much of an issue through the worst of the lockdowns. We were not a hot-spot within the state and the risk for exposure was pretty low. Nonetheless, our staff followed all necessary protocol to mitigate potential exposure and spread of the virus. Employees held each other accountable for cleaning/disinfecting and adhering to mitigation measures. We did end up with one positive case within my department, but that individual did not get exposed to other employees and we avoided an outbreak that could have really affected the workforce.

"It was sure a learning and growth experience I will never forget!"

TOWN OF WAREHAM – GUY CAMPINHA

WAREHAM
Massachusetts

The Covid-19 Pandemic.

For the Town of Wareham the Covid-19 virus did not stop the flow of sewer and the flow needed to continue being treated and the functions and task had to continue, all be it with greater caution.

We did not change staffing as we dealt with the unknown viability of the virus in the wastewater stream.

The Town stepped up the safety measures and PPE needed to deal with the new unknown virus. Cleaning common areas was stepped up and the common areas were disinfected at the end of each day by spraying disinfectants help keep the working areas and staff safe.

Only one person to a vehicle, and masks and/or shields were to be worn when task required you to be within 6 feet. Any areas where wastewater could or was splashed was washed down with bleach immediately. When the Town shut down town offices the wastewater division continued to address ongoing projects and meet regularly with consultants respecting the Covid-19 protocol for the town and the state.

One thing that I think needs to be noted is the commitment of the wastewater workers/operators who continue to do their job, as essential workers, assuring the continued wastewater flow and the operation of the hospitals and safety buildings that are essential in addressing the Covid-19 pandemic.

The uniqueness of what the operators do daily and the safety precautions in place helped us to deal with the changing waste steam with Covid-19.

The town started testing their sewer influent for Covid in March and stopped in June. The testing program was very helpful in identifying the presence of Covid-19 in the influent. Zoom meetings each Friday with Bio-Bot and MIT staff helped calm the fears of many staff as they explained the lack of viability of the virus in the wastewater stream at that time. I believe the testing continues in many States in the US and the risk of the virus in wastewater will be significant concern moving forwards to each and every operator in the wastewater industry.

"The risk of the virus in wastewater will be significant concern moving forwards to each and every operator"

"One thing I think needs to be noted is the commitment of the wastewater workers/operators who continue to do their job, as essential workers."

KLEINFELDER – DENNIS DOHERTY/CHARLIE TRIPP

Kleinfelder is providing services to assist companies in taking proactive steps to face the ongoing Covid-19 challenge.

Site Observation and Documentation COVID-19 Safety Protocols
Kleinfelder's core value of Safety is ingrained within the behavior of all employees which results in health and safety performance excellence and, ultimately, better project outcomes. Kleinfelder applies our robust and varied safety program on every project to provide clients with site safety observation and documentation services for a wide range of infrastructure projects.

IN-DEPTH UNDERSTANDING OF COVID-19 SAFETY PROTOCOLS
Kleinfelder has expanded its practice to include site safety observation and documentation for COVID-19 safety protocols. Staff trained in performing these responsibilities have up-to-date knowledge and experience in observation and documentation of CDC and OSHA COVID-19 guidelines, as well a comprehensive understanding of local, state, and client protocols for each project.

HEALTH AND SAFETY PLANNING AND COLLABORATION
As leaders in site safety observation and documentation, Kleinfelder's main goal is helping identify unsafe site behaviors and bring them to the client's attention immediately. We take a collaborative approach in working with contractors, suppliers, and other site personnel, along with the project owner. Tied to having a clear mission, we leverage a systematically planned approach to conducting observation and documentation that is defined with the client prior to project onset.

COVID-19 Site Safety Observation and Documentation Tasks can include:
- Single point of access screening
- On-site Personnel Screening Assistance
- Daily Observation Report
- Observation of:
  - Social Distancing Practices
  - Job Sanitation and Hygiene
  - Face Covering Usage

Personnel Screening Assistance

Social Distancing Documentation

"Core value of Safety is ingrained within the behavior of all employees."

TIGHE AND BOND – IAN MEAD

Tighe & Bond approach to COVID19 response:

- Firm developed preliminary response based on Governor Baker's executive orders and subsequent guidance
- Staff were allowed to reduce work hours to full time 35 or 30 if helpful
- Firm provided work authorization letters for staff who needed to travel to work sites as restrictions were discussed early on
- All staff were allowed to take computer station equipment home for remote work
- Early on, staff were experimenting with all the different web meeting tools, as were clients
- In person meetings, business development, conferences stopped early on. Contact was limited to phone and video conferencing.
- Lots of remote check ins with various teams, office groups, etc. to check in, maintain culture, and make sure folks were doing okay
- IT department extended licenses, remote VPN access, additional hardware and support to help remote staff get set up, standardized to MS Teams for video conference
- Most construction projects continued, and additional equipment – masks, sanitizer, etc. was made available to all field staff and those visiting sites
- A self-certification form was created on our internal server accessible by cell phone, that staff complete whenever visiting an office or client/job site
- Self-quarantine procedures established for those who could not self-certify or were positive, travelled outside the region, had symptoms, etc.
- Return to office guidelines were developed over the summer in conjunction with state guidance on reopening offices and businesses. Early on a 2-day maximum staggered return to work schedule was been developed to limit capacity in offices to 25% on any given day. Subsequent phases have increased the max capacity to 50%, though many folks have continued to work remotely as the limits have not been exceeded
- Additional sanitizing stations, policies on not standing desks adjacent to others, flow path/direction arrows for walking around the office, limited in person meetings and restrictions on common/kitchen areas.
- Staff empowered to leave client/job sites/offices if unsafe practices witnessed, and advised to inform project managers or corporate H&S staff for support
- Senior leadership and the CEO have been communicating frequently with all staff, including a Friday afternoon communication summarizing all events, progress, notable news, etc. for the week.
- Everyone pulled together, worked hard to continue delivering quality service to our clients, and notwithstanding all the challenges, as a result 2020 will end on a positive note from a financial/firm performance perspective.

> **"Everyone pulled together, and as a result 2020 will end on a positive note from a financial/firm performance perspective."**

ENGINEERS CONSTRUCTION INC. – TOM LOYER

ECI
ENGINEERS CONSTRUCTION INC.

From the beginning our company has taken a very serious approach to the pandemic and continually work to make everyone as safe as possible. For the first few weeks (7 days a week) our management team held a zoom meeting every day to monitor the situation and develop our protocols.

As you know the world has worrisome people, skeptics and those in between. We have always put a lot of effort into our company safety culture which has made this situation a little easier to deal with, but at the end of the day we have our worrisome people, skeptics and those in between!

With so many job sites throughout a large geographical area it is near impossible to measure the true effectiveness of our COVID efforts but I am optimistic in that we are in the 90 % plus effective rate. There is always room for improvement.

Some of the efforts made include:

- ECI offices and shops closed to visitors and all unnecessary personnel.
- All main doors are secured and signage for contacts regarding deliveries are posted.
- Telework to the greatest extent possible.
- If it is necessary to work in office it will be done following best practices for isolation and disinfection.
- Coordination with shop personnel and tool crib should be done remotely to the greatest extent possible.
- Crews will coordinate remotely and avoid coming into the office whenever possible.
- Meetings will be done electronically. If face to face is necessary it will be done following best practices and outdoors if possible.
- Monitoring red zone numbers for our out of town crews, and when necessary have them travel to a lower count County for overnight stays.
- Provide all employees with annual flu shot at no charge. Clinic is held at our office every year and this year a $25 gift certificate incentive was provided.
- Communicate our expectations to our clients to assure the entire job site (when multiple contractors are involved) is a safe job site and that all parties on site are committed in making the same strong efforts.

"The world has worrisome people, skeptics, and those in between."

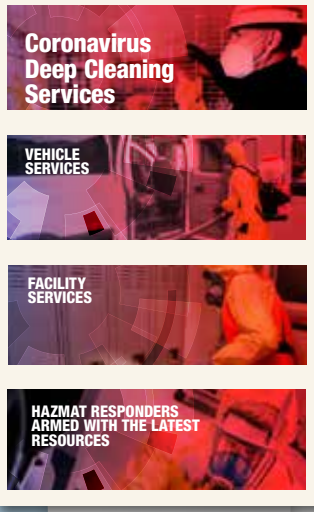
"Following best practices for isolation and disinfection. Meetings are done electronically."

PROGRESSIVE PIPELINE MANAGEMENT – DAVE WICKERSHAM

PPM SITE SERVICES
BIOHAZARD STRIKE TEAM
www.ppmsiteservice.com

FIRST CALL PPE
Where Safety Comes First.

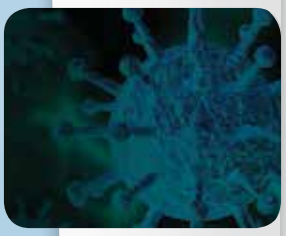
Dave Wickersham, Owner and President, formed **PPM Site Services** in August 2002, at the same time as **Progressive Pipeline Management**. **First Call PPE** was founded this May 2020 to respond to needs arising from the Covid-19 Pandemic. Dave is a Graduate of U.S. Merchant Marine Academy at Kings Point and Veteran of Gulf War One Operation Desert Storm.



PPM Site Services

PPM Site Services now has over 28-years' Experience in Environmental and Hazardous Material Response, Management and Operations. It has a staff of over 300 FIRST RESPONDERS - all OSHA Hazardous Materials Trained, Drug Tested & Medically Screened. The PPM industry leading staff Health & Safety program has resulted in ZERO positive Covid-19 in over 32 weeks of intensive Coronavirus clean-up operations.

- COVID-19 Response Contractor for Con Edison of NYC for ALL facilities from Westchester to Long Island
- COVID-19 Decon Work at the US Capitol, US Senate & House Office Buildings, Library of Congress and Other DC Federal Buildings
- PRIME COVID-19 Decon Contractor for NYC MTA Cleaning Subway Stations, Platforms and Rail Cars
- DECON Work at Multiple State and Local Police Departments, Port of Baltimore and other State Buildings
- DECON work at Holiday Inn, Whole Foods, CVS, Walmart and Food Processing Plants and Banks
- DECON Work on Rail Cars, Subways (DC Metro, SEPTA, NJ Transit & NYC MTA) , Fleet Vehicles, Busses, Large Trucks, Car Dealers & BOATS!
- Arsenal of Latest ULV Foggers & Misters with EPA, CDC, NYDEC and FDA approved disinfectants
- Full line of UV, Ozone and Hydroxyl Generating Air Cleaners from portable units to HVAC system modules
- PPM "Send-It Back Sunday" Program with over $300,000 of donated Services and PPE to Police, Fire, EMT, Hospitals, Schools & Churches
- Pro-Bono with Curtis Sliwa & The Guardian Angels in NYC Penn Station: https://youtu.be/cVBVgNx-FAM,



First Call PPE

Formed **First Call PPE** in May 2020 to meet heavy demand for COVID-19 PPE with a major focus on USA-Made PPE for First Responders:

- Full Inventory of Needed PPE Including Sanitizer, Wipes, Gloves, Touchless Thermometers and Chem Suits
- Authorized Re-Seller of Kimberly Clark KIMTECH NIOSH N-95 Respirator Masks
- Rapid Antigen, Antibody & PCR Swab Test Kits & Full Return to Work Testing Programs with our partner HC CLIA Laboratory
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"Industry leading staff Health & Safety program has resulted in ZERO positive Covid-19 in over 32 weeks."

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Eris Underground LLC

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NASTT-NE NORTHEAST TRENCHLESS WEBINAR A SUCCESS!

"Trenchless Challenges: Applications and Advancements in Renewing the Future in the Northeast"

12:00 – 1:30pm November 12, 2020

NASTT-NE members, municipal attendees, students, and other trenchless professionals joined the first-ever Northeast Regional Chapter Webinar ***"Trenchless Challenges: Applications and Advancements in Renewing the Future in the Northeast"***, capably moderated by Jonathan Kunay, NASTT-NE Board Secretary. The webinar was held in lieu of the 2020 NASTT-NE Northeast Trenchless Technology Conference in Portland ME, which was postponed due to the pandemic.

Hosted in a compact accessible "lunch and learn" format, the webinar was fast paced, well-run and informative. After brief welcoming remarks from NASTT-NE Board Chair Babs Marquis, and an overview of the proceedings from NASTT-NE Board Secretary, Jonathan Kunay, there were two excellent trenchless technology presentations:

"BREAKING THE TYPICAL I/I TREND: Using Creative Techniques to Locate Extraneous Flow in Small Systems"

PRESENTER:
David Burnett PE,
CDM Smith

"TRENCHLESS CONSTRUCTION HURDLES IN AN URBAN ENVIRONMENT – The East Boston Branch Sewer Project Construction"

PRESENTER:
Babs Marquis CCM,
McMillen Jacobs
Associates

A highlight of the event was the announcement by NASTT-NE Board Vice Chair Eric Schuler, and Founding Chair Dennis Doherty of the 2020 NASTT-NE Student Scholarship Awards to four deserving members of the UMass Lowell NASTT Student Chapter: Connor Sullivan, Joseph Pietropaolo, Liam Henderson, and Violet Smith. Dennis Doherty remarked he was absolutely "blown away" by the quality of the student's submissions. Cultivating tomorrow's trenchless leadership, the ultimate goal of the NASTT-NE Chapter is to have a student chapter located in every state in the region.

Vice Chair Eric Schuler concluded the webinar proceedings with closing remarks and a preview of the upcoming NASTT-NE Trenchless Technology Conference November 8-9, 2021 in West Point, New York.

The NASTT-NE Chapter Board of Directors thanks everyone for their participation in a successful first-ever webinar! Special appreciation to the presenters and moderator, along with attendees for their participation. Also a special note of thanks to Jessie Clevenger, NASTT Regional Chapter Relations Manager, for her work in setting up the webinar and handling the logistics.

Hope to see everyone next year in person in beautiful West Point New York for the much awaited Fifth Annual Northeast Trenchless Technology Conference at the gorgeous Thayer Hotel.

For further details and updates please visit:

www.nastt-ne.org

NASTT NORTHEAST REGIONAL CHAPTER

NASTT-NE Vision for 2021 - We are moving on and aiming high!!

JOIN US NEXT YEAR!
Hosting at the Beautiful West Point Military Academy, New York

for the 2021

Northeast Regional Chapter Trenchless Conference

November 8 - 9, 2021

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Save the Date!

Visit www.nastt-ne.org for updates on the conference & program

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