2024

TRENCHLESS SANS TRANCHÉE Journal

THE OFFICIAL PUBLICATION OF THE NORTH AMERICAN SOCIETY FOR TRENCHLESS TECHNOLOGY
Great Lakes, St. Lawrence & Atlantic Chapter | Chapitre des Grands-Lacs, du Saint-Laurent et de l'Atlantique

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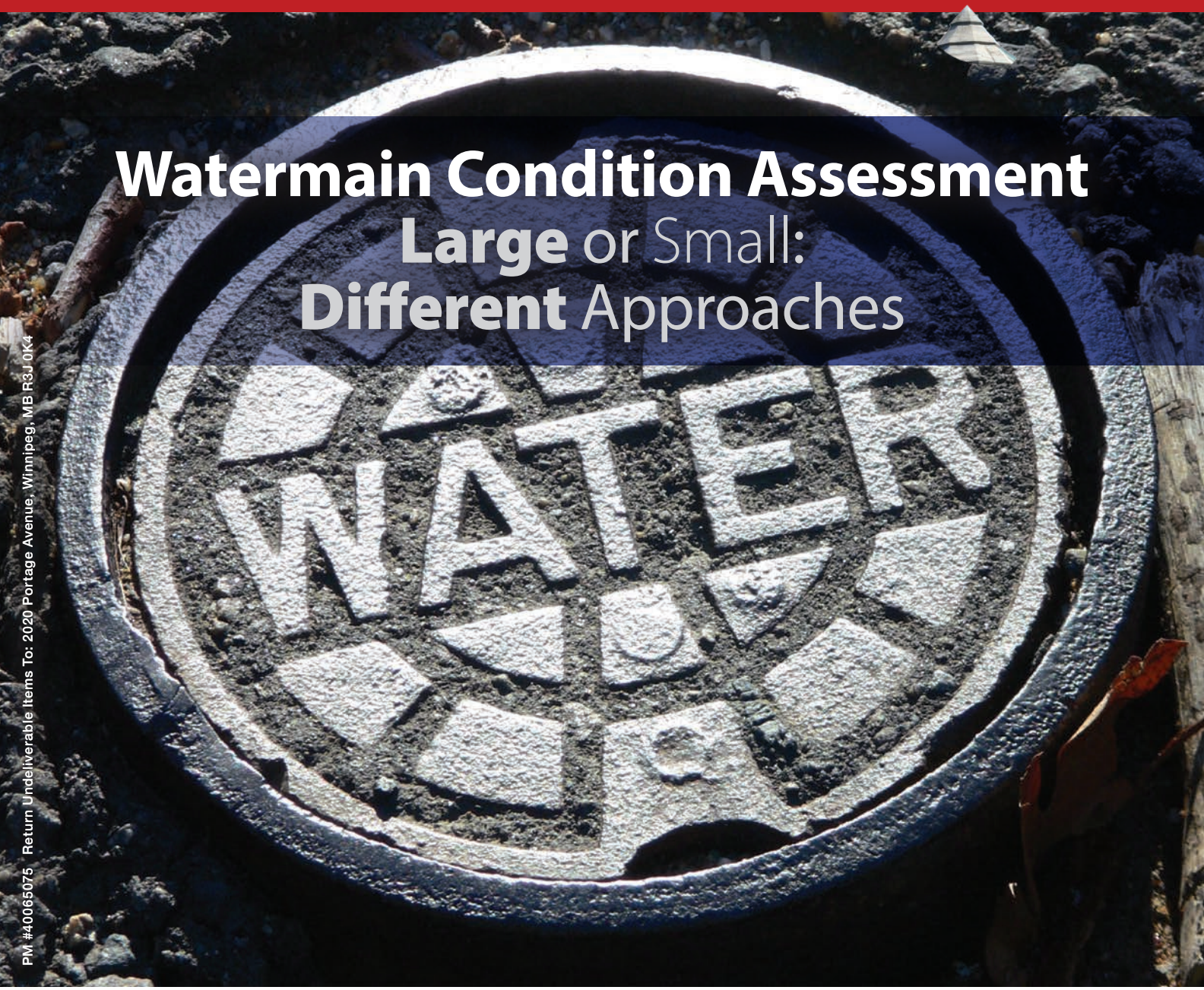

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- NASTT's Good Practices Courses & Publications Featuring Newly Revised HDD and CIPP Materials

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TRENCHLESS SANS TRANCHÉE
Journal
2024

11


18

CONTENTS | CONTENU :

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Marya Jetten, *GLSLA Chapter Chair*

A Year of Progress and Looking Ahead

As we reflect on a successful 2024, it is with great pride that I share the achievements and exciting developments within the North American Society for Trenchless Technology's Great Lakes, St. Lawrence & Atlantic Chapter (GLSLA). This year has been a testament to the dedication and hard work of our members, committees, and volunteers, all of whom have contributed to advancing trenchless technology education, fostering professional connections, and encouraging the next generation of industry leaders.

The year kicked off with continued efforts to engage students and promote careers in trenchless technology. Our Student Chapter members benefited from hands-on experience through a site visit with the Region of Peel visiting a variety of sites and in Kingston, ON, where they learned about CIPP best practices and had the opportunity to observe a live demonstration of CIPP installation. These initiatives, coordinated by jointly by our Student Engagement Committee and our Events and Training Committee, underscores our commitment to bridging the gap between classroom learning and real-world applications.

In June, our Seminar Committee hosted a successful full-day seminar focused on Inspection and Condition Assessment for Gravity and Pressure Pipelines, with participation from both professional members and students from Queen's and Concordia University. This event was a highlight of our educational outreach efforts, and we are grateful for the enthusiastic engagement from attendees.

Our Chapter's growth is also reflected in our expanded online presence. This year, we launched our official LinkedIn page to better connect with members and keep them informed about upcoming events, volunteer opportunities, and industry news. If you haven't already, I encourage you to follow us on LinkedIn to stay up-to-date with everything happening in the GLSLA community.

October's No Dig North event in Niagara, ON, was a momentous occasion for our chapter. Not only was it a successful tradeshow, but it also served as the platform for welcoming new board members: Alexandra Grant, Brad Marin, Hiva Mahdavi, and John Bowles, joining Marya Jetten (Chair), Patrick Moskwa (Vice Chair & Treasurer), Mike Near (Secretary), Nicholas Gan, Harry Krinas and Tony Araujo. We are excited about the expertise and vision they bring to the Board as we continue to grow and shape the future of trenchless technology. At the same time, we bid farewell and extend our heartfelt thanks to outgoing board members Kevin Bainbridge, Ashley Rammeloo, Brian Moreau, and Bill Garibaldi, and of course, David Crowder, who moves from Chair to Past Chair, all of whose contributions over the years have been invaluable.

As we look ahead to 2025, we remain committed to our core mission of promoting trenchless technology and continuing to offer educational opportunities, professional development, and community engagement. We encourage all members to get involved in our committees and to stay engaged as we push forward into another successful year.

On behalf of the GLSLA Board, thank you for your continued support. We look forward to seeing what we can achieve together in the coming year.

RETURN TO CONTENTS PAGE

Marya Jetten, *président de la section GLSLA*

Une année de progrès et un regard vers l'avenir

En cette fin d'année 2024, je suis très fière de vous faire part des réalisations et des progrès stimulants du chapitre des Grands Lacs, du Saint-Laurent et de l'Atlantique (GLSLA) de la North American Society for Trenchless Technology. La dernière année témoigne du dévouement et du travail acharné de nos membres, comités et bénévoles qui contribuent à l'avancement des connaissances sur les technologies sans tranchée, à la promotion des liens professionnels et au soutien de la prochaine génération de chefs de file dans notre domaine.

L'année a commencé en force avec nos efforts de mobilisation étudiante et de promotion des carrières en technologies sans tranchée. Notamment, les membres de notre section étudiante ont bénéficié d'une expérience pratique comprenant la visite de divers sites dans la région de Peel et à Kingston (Ontario), où ils ont pris connaissance de pratiques exemplaires en matière de chemisage et ont observé une installation de chemisage en temps réel. Ces initiatives, coordonnées conjointement par notre comité de mobilisation étudiante et notre comité des événements et de la formation, témoignent de notre engagement à combler l'écart entre l'apprentissage en classe et les applications concrètes.

En juin, notre comité des séminaires a organisé un séminaire d'une journée sur l'inspection et l'évaluation de l'état des canalisations à circulation naturelle et de refoulement. Cet événement a été l'un des faits saillants de nos efforts de sensibilisation auprès des établissements d'enseignement, et nous sommes ravis de l'enthousiasme des membres professionnels et des étudiants des universités Queen's et Concordia qui y ont participé.

La croissance de notre chapitre se reflète également dans notre présence virtuelle. En effet, nous avons lancé cette année notre page LinkedIn officielle afin d'améliorer nos communications avec les membres, qui seront désormais informés des futurs événements, des occasions de bénévolat et des nouvelles de l'industrie. Si vous ne l'avez pas déjà fait, nous vous encourageons fortement à vous abonner à notre page LinkedIn pour rester à l'affut des dernières nouvelles de notre communauté GLSLA.

L'événement No Dig North, qui s'est tenu à Niagara (Ontario) en octobre dernier, a été mémorable pour notre chapitre. En plus d'être couronné de succès, le salon a servi de plateforme pour accueillir les nouveaux membres de notre conseil d'administration : Alexandra Grant, Brad Marin, Hiva Mahdavi et John Bowles qui se sont joints à Marya Jetten (présidente), Patrick Moskwa (vice-président et trésorier), Mike Near (secrétaire), Nicholas Gan, Harry Krinas et Tony Araujo. Nous sommes ravis de l'expertise et de la vision qu'ils apportent au conseil d'administration alors que nous continuons à croître et à façonner l'avenir des technologies sans tranchée. Parallèlement, lors de cet événement, nous avons également dit au revoir aux membres sortants du conseil d'administration, Kevin Bainbridge, Ashley Rammeloo, Brian Moreau, Bill Garibaldi et, bien sûr, David Crowder, qui passe de président à président sortant, et les avons tous remerciés pour leurs contributions inestimables au cours des dernières années.

À l'aube de 2025, nous restons fidèles à notre mission principale, soit la promotion des technologies sans tranchée et la poursuite de nos activités de formation, de développement professionnel et d'engagement communautaire. Nous encourageons tous les membres à s'impliquer dans nos comités et à participer à nos activités en vue d'une année à venir exceptionnelle.

Le conseil d'administration du chapitre des GLSLA vous remercie de votre appui continu. Nous avons hâte de découvrir ce que nous réaliserons ensemble en 2025.

Matthew Wallin, PE, *NASTT Chair*

New Training Resources Available

I'd like to offer a big thank you to everyone who participated in this year's 2024 No-Dig North conference held in your region in Niagara Falls this past October! Your engagement and contributions made it a resounding success! The presentations were insightful, and the networking opportunities were invaluable. We are currently in the thick of 2025 planning for both the No-Dig Show being held March 30 – April 4 in Denver, CO and the 2025 No-Dig North being held Ocobert 27–29 in Vancouver, BC! If you have any feedback or suggestions for future events, please do not hesitate to reach out to us at *info@nastt.org*.

Recently, the fifth edition of the *Horizontal Directional Drilling (HDD) Good Practices Guidelines* book was released. And by popular demand, the book is now available in a digital format you can access online from any device, as well as a print-on-demand version! The fifth edition includes updated content reflecting the latest advancements and techniques in HDD. Alongside the book, we have also updated our HDD training course to align with the new edition. These courses are designed to provide both new and experienced professionals with the knowledge and skills needed to excel in their roles. Please check our website for more details on how to purchase the book and enroll in the courses.

Thank you for your continued support and dedication to your Chapter. Together, we are driving the future of trenchless technology forward. If you have any questions or need further information on any of the topics mentioned, please do not hesitate to contact me.

> "Thank you for your continued support and dedication to your Chapter. Together, we are driving the future of trenchless technology forward."

RETURN TO CONTENTS PAGE

Matthew Wallin, PE, *président, NASTT*

De nouvelles ressources de formation

Je tiens à remercier toutes les personnes qui ont participé à l'édition 2024 du congrès No-Dig North, qui s'est tenue en octobre dernier dans votre région, à Niagara Falls! Grâce à votre engagement et à vos contributions, ce congrès a connu un succès retentissant! En effet, les présentations étaient très intéressantes et les possibilités de réseautage, inestimables. Nous planifions actuellement l'édition 2025 du No-Dig Show, qui se tiendra du 30 mars au 4 avril à Denver (Colorado), et l'édition 2025 de No-Dig North, qui aura lieu du 27 au 29 octobre à Vancouver (Colombie-Britannique).

Si vous avez des commentaires ou suggestions au sujet des prochains événements, n'hésitez pas à nous contacter à l'adresse suivante *: info@nastt.org*.

La cinquième édition du livre *Horizontal Directional Drilling (HDD) Good Practices Guidelines* a été publiée récemment. À la demande générale, le livre est désormais offert dans un format numérique accessible en ligne à partir de n'importe quel appareil, ainsi qu'en version imprimée, sur demande. Le contenu de cette cinquième édition reflète les dernières avancées et techniques en forage directionnel horizontal. Nous avons également mis à jour notre formation sur le sujet afin qu'elle corresponde à cette nouvelle édition. Cette formation offre aux professionnels novices et chevronnés les connaissances et compétences nécessaires pour exceller dans leur rôle. Veuillez consulter notre site Web pour plus de renseignements sur l'achat du livre et l'inscription à la formation.

Nous sommes très reconnaissants de votre soutien indéfectible et de votre dévouement envers votre chapitre. Ensemble, nous sommes les garants de l'avenir de la technologie sans tranchée. Si vous avez des questions ou souhaitez obtenir des renseignements supplémentaires sur l'un des sujets mentionnés, n'hésitez pas à me contacter.

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GLSLA Member Appreciation Event

November 29, 2023

It was gratifying to see over 40 members travelling from as far as Kingston to attend the Members Appreciation Luncheon. Jacobs was gracious enough to provide their conference room where members and invited guests listened to a presentation by Dr. Blair Feltmate of the Intact Centre on Climate Adaptation. The Centre is based at the University of Waterloo. Dr. Blair's presentation detailed how Canada is preparing for flooding, wildfires and extreme heat as a result of climate change and evolving extreme weather.

Dave Crowder, Chair of the GLSLA Chapter, presented outgoing director Bill Garibaldi with a certificate of appreciation and a gift for his many years of service to the Chapter.

Attendees to the Member Appreciation Event

Dr. Blair Feltmate

Queens Students CIPP Seminar and Site Visit

Utilities Kingston graciously hosted a seminar and CIPP installation site visit on September 30, 2024. Queens Civil Engineering students and Utilities Kingston staff attended the half-day event. Laura Segura Serrano of Utilities Kingston described the sewer and watermain rehabilitation programs underway at the utility. Rob Cichocki of AECOM and Tony Araujo of Paragon Systems presented on Modeling CIPP Liner Buckling within Corrugated Steel Pipe Under Hydrostatic Pressure and CIPP Testing Requirements respectively.

The presentations were followed up by a site visit to a gravity sewer CIPP installation presentation led by Sinan Omari of Insituform Technologies.

Dr. Neil Hoult, one of the advisors for the Queen's Students, described the session as an excellent and really interesting event. The students especially enjoyed the learning experience and physically witnessing the construction process. By the end of the demonstration, student questions were leading various discussions on the CIPP process.

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Meet Our Incoming GLSLA Chapter Board of Directors

The GLSLA Chapter Annual Meeting was held in Niagara Falls in conjunction with the No-Dig North Conference. The well attended event (even for a 7:30am start) heard reports from the directors, describing the many successful events and initiatives executed by the GLSLA Chapter over the past year.

The election for the Board took place and the following members will form the 2024/24 GLSLA Chapter Board of Directors.

Before wrapping up the Annual Meeting, Kevin Bainbridge, Outgoing Past Chair, paid tribute to Outgoing Chair David Crowder. David has served in many positions on the GLSLA Chapter Board, and has been responsible for many of the great initiatives undertaken by the Chapter. Thanks Dave, from a very grateful Chapter membership.

Welcome!

GLSLA CHAPTER

Bienvenu!

Chair – **Marya Jetten**, AECOM
Vice Chair and Treasurer – **Patrick Moskwa**, Robinson Consultants
Secretary – **Mike Near**, Liquiforce
Magazine Committee – **Tony Araujo**, Testrium (Paragon Systems)
Student Engagement – **Nicholas Gan**, Region of Peel
Past Chair – **David Crowder**, R.V. Anderson Associates
Director – **Brad Marin**, GHD
Director – **John Bowles**, Inversa/Eastern Trenchless
Director – **Alexandra Grant**, City of Ottawa
Director – **Harry Krinas**, City of Hamilton
Director – **Hiva Mahdavi**, Stantec

NASTT's Good Practices Courses & Publications Featuring Newly Revised HDD and CIPP Materials

NASTT offers multiple in-depth, high-quality training courses each year in-person in cities throughout North America as well as a virtual webinar format covering targeted trenchless topics, such as CIPP, Horizontal Directional Drilling (HDD), pipe bursting, laterals, and new installation methods. They strive to produce high quality course content that is peer reviewed for non-commercialized, consensus-based information.

NASTT's mission is to be the premier resource for knowledge and education in trenchless technology. As such, the Training and Publication Committee is tasked with the mission, "to promote education on current, up to date trenchless methods both virtually and in-person." Funds raised through these courses provide the financial resources to further develop and update the training courses which NASTT provides.

Recently the fifth edition of *NASTT's Horizontal Directional Drilling (HDD) Good Practices Guidelines* book was released. By popular demand, the book is now available in a digital format you can access online from any device, as well as a print-on-demand version! The fifth edition includes updated content reflecting the latest advancements and techniques in HDD. Alongside the book, NASTT has also updated the HDD training course to align with the new edition. The all-new HDD Good Practices Course is eight hours of technical education. Here are some of the exciting updates you can expect from this revised course: expanded geotechnical investigation recommendations; revised recommendations for bend radius considerations; discussion of new US Army corps requirements for HDD crossings under levees; significant changes to recommendations for guidance, surveying, and tracking of HDD pilot holes; and significant changes to construction considerations, including noise abatement, intersect method, drilling in rock, pipe fabrication and support, and inspection of HDD projects.

An additional advanced HDD short course has also been developed to address further topics. NASTT's HDD: Calculations & Advanced Design Good Practices Course is based on advanced modules from the guidelines. The four-hour 'Focus on HDD Design' course is geared toward industry professionals that have an understanding of the basics of HDD construction. This session focuses on advanced design considerations that are specific to HDD projects. The presentation includes a detailed look at geotechnical conditions and potential risks related to ground conditions, as well as a discussion of contract document considerations. The course also includes an in-depth discussion of the various calculations that are needed to assess and mitigate risks when designing HDD crossing geometries, including: hydrofracture risk analysis, pull back and pipe stress calculations for various pipe materials, and settlement risk evaluations. These calculations are often required to secure permits from departments of transportation, railroad owners, environmental agencies, and flood control agencies, among other stakeholders.

NASTT's CIPP Good Practices Guidelines book and course training materials began their development in 2004 and were originally part of a training program developed by the Centre for the Advancement of Trenchless Technologies (CATT), located at the University of Waterloo. Installation methodologies, tube and resin systems, engineering methodologies, and technologies have advanced over the past several years, and significant updates were made so that the book and course materials were current and relevant. The first edition of the book was published in 2015 and is still available for purchase on the NASTT website with the second edition coming in 2025.

The all-new NASTT CIPP Good Practices Course provides a comprehensive overview of gravity sewer CIPP rehabilitation from planning, through design, project implementation, and verification. It also provides an overview of CIPP in pressure applications and in sewer lateral programs. Major updates in design include both the most current ASTM F1216- Appendix X1 releases, ASCE MOP 145 and an overview of the soon to be released AWWA Design Appendices for Pressure Pipe Design of CIPP. Other enhancements include environmental and safety aspects of CIPP, include the latest research on VOC management.

Additional updates on the horizon include an all-new Laterals Good Practices Course that will premier during the NASTT 2025 No-Dig Show in Denver in April 2025. The suite of NASTT training courses, both the four-hour 'Intro to New Installation' and 'Intro to Rehabilitation Courses' as well as the eight-hour courses will be available in-person in Denver and virtually throughout the year. For the latest schedule visit *nastt.org/training/upcoming-events* to view the training and events calendar. For questions on NASTT publications or training program, contact NASTT Education Manager, Kari Webb at *kwebb@nastt.org*.

"The Training and Publication Committee is tasked with the mission, "to promote education on current, up to date trenchless methods both virtually and in-person." Funds raised through these courses provide the financial resources to further develop and update the training courses which NASTT provides."

RETURN TO CONTENTS PAGE

NASTT-GLSLA Trenchless Insights Seminar – INSPECTION OF MUNICIPAL PIPELINES

By Robert Cichocki, PhD, Municipal Engineering Specialist, Water, Toronto/Ottawa, Ontario for AECOM

All structures deteriorate over time, and unfortunately, some asset owners have more experience with this than others. However, with challenges, time, and engineering also comes innovation. The 2024 NASTT-GLSLA Trenchless Insights Seminar, held on June 19, 2024, brought professionals from across the trenchless technology sector together for a deep dive into the latest industry advancements in the field of Inspection of municipal pipelines. Held at the Mississauga Grand Banquet & Event Centre, this year's event was split up into two sessions covering relevant topics for wastewater/stormwater in the morning, and potable water in the afternoon. The event featured a diverse mix of consultants, owners, contractors, and suppliers as presenters and audience members came together to discuss and learn about current & evolving practices, emerging technologies, and project case studies.

In the morning, presentation topics included:

- **Challenges and Innovations in CCTV Inspection of Trunk Sewers**, by John Medeiros from Capital Infrastructure
- **Innovations in Confined-Space Inspection Technologies for Sewer, Manhole & Culverts – A Remotely Operated Approach**, by Joel Batters from Lone Drone Solutions
- **Sewer Inspection Program Management: Strategies for Reliable Data Collection**, by Jax Vollmer from GEI Consultants
- **McMaster University Infrastructure Management Plan,** by Patrick Moskwa & Noah Resendes from Robinson Consultants
- **Leveraging Artificial Intelligence & Machine Learning for Aging Infrastructure**, by James Tustin from Jacobs

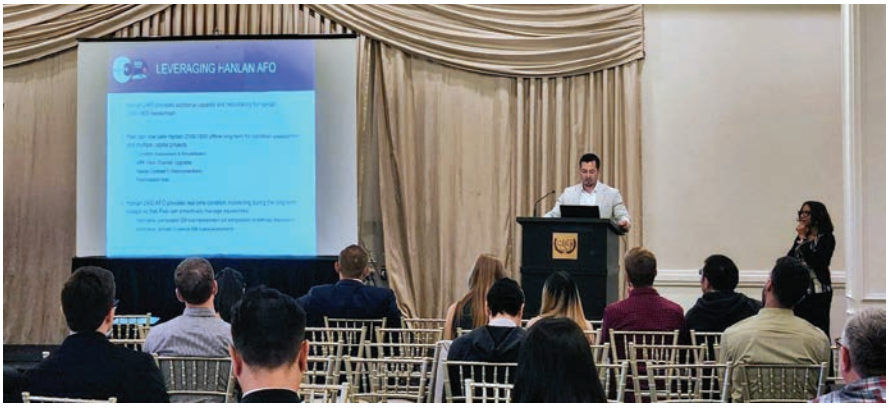
Showcasing Innovation

From the morning sessions, Joel Batters and Lone Drone Solutions demonstrated how advanced instrumentation, robotics, and drones can minimize risk while also optimize time and budget. Wastewater/stormwater assets such as sewers are naturally a confined space hazard, water hazard, and toxic waste hazard. And, once you couple those hazards with deteriorating infrastructure, there are real health and safety risks at play when entering a sewer to do any inspection or other work. Therefore, using robotics in inspection is naturally the preferred alternative to humans as the loss of an instrument can be a managed risk while the loss of life or injury is unacceptable. Joel's team at Lone Drone Solutions discussed what could be the next innovation in condition assessment of sewer assets. Conventional CCTV inspection utilize remotely operated vehicle (ROV) equipped with wheels, a camera, and a light, however Lone Drone Solutions hosts an array of aerial, terrestrial, and marine remotely operated devices that operate high-lumen lighting, high-resolution cameras, and LiDAR scanning that can generate 3D models with photogrammetry. Further, Joel's team could also improve the rate at which inspection and condition assessment can be undertaken. Having a unique set of robots propelled by other movements like walking or flight compared to the traditional wheel type will allow for asset owners to inspect hard -to-reach places where debris may obstruct the line of travel. Could this be the end of our incomplete CCTV inspections due to blockage from debris?

In the afternoon, presentation topics included:

- **Buried Pipelines: Navigating the Complex Web of Inspection Technologies for Optimal Decision Making**, by Chris Macdonald from CPM Pipelines
- **Acoustic Fiber Optic for Long-Term Condition Monitoring of Transmission Mains**, by Nicholas Gan & Heather Jefferson from the Region of Peel

> "The 2024 NASTT-GLSLA Trenchless Insights Seminar demonstrated the latest advancements in the inspection of municipal pipeline infrastructure, and highlighted how engineering is addressing the challenges posed by aging infrastructure to ensure the reliability and safety of essential water and wastewater systems."



- **Big Pipes, Big Data: Advances in Metallic Pipeline Condition Assessment**, by Eric Toffin & Angie Wu from Xylem
- **Leveraging Acoustics to Detect Leaks & Confirm Lead Services**, by Andrew Bisso & Marwan Daar from Mueller
- **Increasing the Technical Envelope of Desktop Assessments for Water Distribution Networks with AI and Other Advanced Analytical Techniques**, by Chris Macey from AECOM

Innovation in Action

During the afternoon session, Nicholas Gan and Heather Jefferson from the Region of Peel demonstrated how the Region of Peel is applying state-of-the-art acoustic fibre optic sensing technology to monitor the health of critical water transmission main infrastructure. The application of fiber optic sensing utilizes the science of lasers, glass fibres, and interferometry to make highly sensitive measurements down to the micro-strain level. In short, to leverage this technology for inspection and asset management, fiber optic cables are strung through the transmission main, connected to a data acquisition unit, and together the system 'listens' for when and where wire breaks occur. With this system, the Region of Peel is proactively continuously monitoring their critical water assets to strategically plan repairs and replacements without acting too early or, even worse, too late.

Are We Too Late?

Just before the seminar, a disaster was in the news, affecting a major Canadian city when a critical transmission main burst in Calgary, leading to a city-wide disruption. The water main break resulted in a massive leak, water shortages, low water pressure, and boil water advisories for citizens. Initially, mobilizing a repair could have taken an indeterminate amount of time, as materials for a two-metre diameter pipe repair don't simply come off the shelf at the hardware store. Thankfully, spare parts were sent from San Diego for an emergency repair to be mobilized, and water service was restored about a month later. Although the water main was only in year 49 of 100 of its design life, this event underscores the importance of innovation in infrastructure health monitoring to help prevent such occurrences in the future.

In Conclusion

The 2024 NASTT-GLSLA Trenchless Insights Seminar demonstrated the latest advancements in the inspection of municipal pipeline infrastructure, and highlighted how engineering is addressing the challenges posed by aging infrastructure to ensure the reliability and safety of essential water and wastewater systems. The recent incident in Calgary served as a stark reminder of the consequences of infrastructure failures and the urgent need for continuous monitoring and proactive maintenance. By leveraging these emerging technologies, municipalities can better manage their assets, prevent catastrophic failures, and ensure a sustainable future for their communities.

RETURN TO CONTENTS PAGE

OCTOBER 28-30 | NIAGARA FALLS, ON

NO-DIG NORTH 2024

RECAP AND GALLERY

Submitted by Chad Morrison

The 2024 No-Dig North Conference, held from October 28-30 at the Niagara Falls Convention Centre, brought together professionals from the trenchless technology sector for an outstanding showcase of innovation, learning, and networking. With two full days of presentations across four session tracks, as well as specialized Good Practice Courses, attendees were immersed in technical insights and cutting-edge developments.

The conference kicked off with an Opening Day Reception in the exhibit hall, which featured over 140 exhibitors showcasing the latest advancements in trenchless technology. Social highlights included a memorable reception at the historic Niagara Falls Power Station, where attendees enjoyed exclusive tours and a scenic evening in one of Canada's most iconic locations.

A major highlight was the Project of the Year awards. PULLMAN Canada received the 2024 Project of the Year for their emergency rehabilitation of the Kenilworth Trunk Watermain in Hamilton, Ontario. This complex project extended the service life of a critical water supply line serving Hamilton's 550,000 residents. Similarly, the New Installation Project of the Year was awarded to the 99 Avenue Sanitary Trunk Bypass in Edmonton, Alberta. Led by Associated Engineering, EPCOR, Shanghai Construction Group (Canada), and Stantec, this project utilized advanced micro-tunneling to rehabilitate a 1.1-kilometre sewer, setting a new standard for urban infrastructure resilience.

Special thanks go to the three Canadian chapters of the North American Society for Trenchless Technology (NASTT) for coming together to create such a successful event. The industry now looks forward to No-Dig North 2025, which will take place in Vancouver from October 27–30. Mark your calendars!

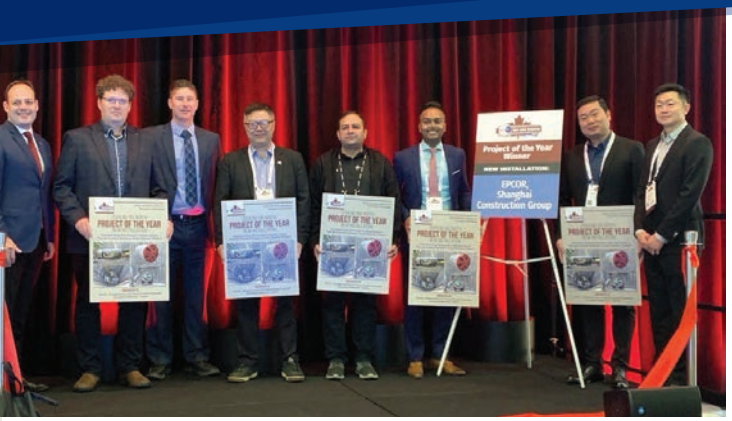
APRIL 14-18 | PROVIDENCE, RI

NO-DIG SHOW 2024

NASTT's No-Dig Show was held in Providence, Rhode Island, April 14–18, 2024. The conference had over 200 exhibitors showcasing their companies, and a wide range of technical sessions featuring paper presentations and panels for different industry tracks. Attendance for the conference was the highest since pre-COVID, with over 1,700 registered attendees. Mark your calendars for next year, March 30 – April 3, 2025 in Denver, CO. Visit *nastt.org/no-dig-show* to register today.

RETURN TO CONTENTS PAGE

Shaping Our Shared Future



Congratulations to the team of EPCOR, Shanghai Construction Group (Canada), Associated Engineering, and Stantec, who worked on the 99 Avenue Sanitary Trunk Bypass project in Edmonton. The team was honoured with the New Installation Project of the Year Award at the No-Dig North conference. The project involved the construction of a 1.6 km bypass sewer using advanced microtunneling technology, allowing for the safe rehabilitation of the aging trunk sewer.

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Channeline NIEA Detroit Multi-Segmental

By Andy Sherwin, Technical Sales Director for Channeline

Founded in 1984, Channeline began manufacturing Structural Fiberglass non-circular sewer liners. The focus was on manufacturing the egg-shaped sewers of the UK and Europe. They were extremely successful in this market, and as the brand grew both locally and internationally, it became apparent that in order to maintain this momentum, their technology needs to be specified for larger sewers and culverts.

From the successful development of large-diameter custom fabricated pipe liners, Channeline discovered a new dilemma: how do you ship these pipe liners when they do not fit into a standard shipping container?

"The Solution we found [was a] Tapered Tongue-and-Groove Jointing system. This system offered a way to break the geometrically complex pipe liners down into multiple component segments, while still maintaining structural integrity and load capacity when finally installed" – Tim Webb, Senior Vice President, Channeline International.

Channeline patented this proprietary jointing system back in the 1990s and found that they were not only able to ship for increasingly larger projects, but they could also reduce the overall shipping cost of the lining system by reducing the number of containers required. In many cases, with very large structures, it is desirable for the pipe panels to be manufactured into two or more sections specifically because of the ease of shipping and drop in price. These panels are then bonded onsite using a proprietary structural adhesive above ground. Once the segments are assembled, the Channeline GRP Structural Lining System provides the same structural performance of a Channeline manufactured single piece pipe with a stand-alone service life of 100 years.

Things have come a long way since the 90s, and the Tapered Tongue and Groove Jointing system has additional benefits, not only in reducing shipping costs, but for rehabilitation projects that have difficult access such as lining through manhole, or maintenance chambers, where the same structural liner can be installed using fully trenchless methods.

Oakland-Macomb County, Detroit Case Study

A new milestone, and our most recent triumph, was the inclusion of the Multi- Segmental Liner in a pilot project for the North Interceptor, East Arm (NI-EA) PCI-4, Oakland-Macomb County in Detroit, for a 17.5-foot (5.3 metre) diameter tunnel with a 16-foot (4.9 metre) ID liner.

The NI-EA was constructed in six contract sections over a period from 1969 until 1978. The NI-EA conveys sanitary and combined sewer flows from the Oakland and Macomb County communities serviced by the Oakland Macomb Interceptor Drain Drainage District (OMIDDD) north of the City of Detroit, the interceptor has an approximate total length of 79,380 feet (24,195 metres).

In April 2015, NTH engineering was engaged by DWSD to perform a confined space entry 150 inspection of the portion of the NI-EA. The distress noted during the inspection of the sewer included; loss of concrete liner thicknesses up to 6 inches (15.24 cms) in depth at locations along the crown of the sewer, exposed circumferential and horizontal reinforcing steel, along with scaling and cracks.

Based on the observed deterioration of the interceptor, recommendations were given to repair the first 1,500 feet (457.2 metres) of the NI-EA extending downstream from the Northeast Sewerage Pumping Station (NESPS) Gate House.

In 2017/2018, the first 110 feet (333.5 metre) section, which showed significant distress, was repaired using a 3" spray-in-place pipe liner (SIPP).

In 2019, an NTH Engineering led team was engaged by OMIDDD to perform another confined space entry inspection of the portion of the NI-EA sections to provide an updated condition assessment of the existing interceptor. Using the NASSCO Pipeline Assessment Certification Program (PACP) inspection reports and photographs, NTH compared the 2019 observed conditions with historical inspection data presented in the January 8, 2016, NTH report. The overall condition of PCI-4 sewer reaches was considered fair to poor.

Case Study

In June 2020, the Pilot Project was put out to bid for 1,560 LF of the PCI-4 Interceptor and Channeline was specified as a mandatory rehabilitation method. Low-bid contractor Marra Services of Cleveland Ohio chose Channeline to supply 1,280 LF of multi-segmental fiberglass liner with the proprietary Tapered Tongue-and-Groove Jointing system.

This also included a 6-degree curve section in the centre of the section. The liner is a 4-piece multi-segmental lining with a 16-foot (4.9-metre) internal diameter, having been designed using AWWA M45 Direct Bury calculations, the liner has a 3.54-inch (9-cm) wall thickness. "As far as we are aware, this the largest Fiberglass sewer liner ever built to date. This was a huge challenge for Channeline, but I was confident in my team and the Channeline Product to get this done and exceed expectations," said Tim Webb, Senior Vice President at Channeline International.

As each assembled section weighs more than 6 tons (5,443.1 kgs), Marra Services were flown over to Dubai to visit the factory and work with the manufacturing team to fine tune the assembly and installation process, and spent the week getting to know the Channeline Team. Following the award and Technical Submittal stages, production of the liner started in May of 2021, and container deliveries started to arrive at site in August of 2021. The liner segments were shipped standing upright on pallets and Channeline were able to fit 4.5 total liners per container.

During the initial inspection and cleaning works, it was noted that the previously installed SIPP liner was showing signs of severe deterioration, due to the high levels of hydrogen sulfide and very low pH levels. A decision was made to add this section to the contract and reline the 110 feet (33.5 metres) with Channeline Structural GRP.

The segmental liners were assembled on-site using a temporary paved level staging area installed by Marra Services and specially rigged for safe handlining into the access shaft, the entire construction footprint was less than 150 feet (45.7 metres). One of the main challenges from a construction standpoint was how to move and install the liner, which had to travel the 1,500 feet (457.2 metres) into the tunnel. Marra Services employed the services of Kelley Engineering to custom design and build a self-driven robotic pipe carrier that transported each segment and is designed to position and home the gasketed joint for a fully sealed Lining system. The contractors were able to install an average of four segments per day and are grouting the annulus every 100 feet as an additional safety measure.

Nick Marra, President and CEO of Marra Services, states "we like using Channeline due to the versatility and custom design of the product. This made a very challenging project much easier, as Marra were able to work closely with the Channeline design team to tweak the GRP Lining System for ease of handling and installation. In particular, the curve and tapered transition piece had everyone scratching heads, but with close teamwork, we were able to come up with a robust solution that worked really well."

As the project drew to a close, it is easy to conclude that Channeline was the right solution to offer a 100-year additional service lift to the large, deep asset. All in all, even with weather, flow challenges, and the addition of the extra 110 feet of liner, the job has come in on time and within budget with minimal disruption to residents and businesses.

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HDPE Pipe Lining Options for Water Transmission Renewal

By Todd Grafenauer, Educational Director for Murphy Pipelines

Transmission mains form the backbone of our communities. They are the arteries that transport water from the treatment facility to areas within a city, town, or region. These large-diameter pipes are essential for supplying water to the network of small diameter distribution water mains and service pipe. As one of the major drivers of underground infrastructure improvement across Canada is the need for safe and clean drinking water, these transmission mains are undergoing replacement at an accelerated rate.

Two different HDPE pipe lining methods are being utilized that offer similar value: slip lining & CompressionFit.

One of the oldest and simplest trenchless technologies known today is that of slip lining. The method installs a new HDPE pipe inside the existing failing pipeline. The new pipe is typically installed either by pushing or pulling the new pipe into the host pipe with installation distances of a few hundred feet, up to one mile at a time.

The slip lining technology is advantageous for replacement as the method is cost effective requiring only a few access pits. This reduces restoration efforts including environmental impact. The method also follows the existing utility path which can be critical, as many cities do not have an available easement to relocate the new pipeline, especially for large diameter transmission mains located in congested utility corridors. Following the existing utility path also affords the city to reduce upfront design time and cost.

While cities may ultimately select the slip lining method due to the many advantages the method offers, another consideration is constructability. Installing or replacing water and sewer infrastructure in mature urbanized areas presents its own set of challenges for any construction method, including slip lining. An important part of the evaluation of selecting the best construction method for a given project is not only in finding value, but one that can be constructed within the constraints of mature residential neighborhoods and business districts.

Crews butt-fuse HDPE pipe on a multi-year slip lining project in Saint John, New Brunswick. The city replaced 10 km of 100-year-old cast iron water transmission main by slip lining with new HDPE pipe.

The trend of cities preferring trenchless methods in mature urban areas continue due to the reduction in social impact. These include limiting road and intersection closures, reducing the impact to businesses, homeowners and pedestrians, and preference for expeditated construction schedules to return the area back to normal. With the reduction in social impact that trenchless methods afford, cities still need to understand the constructability of the methods during the planning and design phase of the project.

Slip Lining Constructability

Slip lining has generally utilized two methods for installing the new pipe within the failing host pipe: 1) pre-assembling the new pipe before installation and 2) using the cartridge method (installing one section of new pipe at a time). Continuous or pre-assembling the new pipe before installation, such as using the butt fusion method with HDPE pipe, has oftentimes been the preferred method of installation by the contractor. By pre-assembling the new pipe to correspond to the pull-in distance, the contractor can focus on the proper procedures for butt fusion in advance of the pull. It also allows the contractor to focus solely on installation on the day of the pull, which helps to expedite pulling in the pipe.

However, many cities have limited laydown areas in which it is not feasible to pre-assemble more than 500 to 1,000 feet (152 to 304 metres) of pipe in one continuous length. Many cities cannot block major intersections or approaches to businesses. In these situations, there are alternatives that can be utilized to ensure the constructability of continuous slip lining. These include pre-assembling the new pipe in an area that has room to assemble the pipe in the predetermined installation distance of 2,000 feet (610 metres) or more. In this case, the new pipe would be moved the morning of the installation to the slip lining location. This would limit the pipe blocking any intersections or business approaches to only a few hours as the new pipe is pulled into place. It must be noted that the new pipe material selected for installation plays a critical factor if this is an option. One reason why HDPE pipe has become a preferred option for slip lining is the pipe material has the characteristics required to move the pipe from the pre-assemble area to the slip lining location. These characteristics include the material properties of being lightweight, extremely flexible, with a scratch resistance property.

Another option is the fuse-pull-fuse-pull method. This option includes pre-assembling the new pipe at the slip lining installation location, only to assemble lengths of new pipe that fit within the existing landscape that minimize impact to the area. An example of this would be if the slip lining installation distance is 3,000 feet (914 metres), but a major intersection is located 1,000 feet away and cannot be shut down, then to pre-assemble three sections of new pipe at 1,000 feet each. With this option, slip lining activity would first install the first 1,000 foot section, then operations would pause to connect the next 1,000 foot section, continue slip lining until the last 1,000 foot section is connected, and then finish the pull.

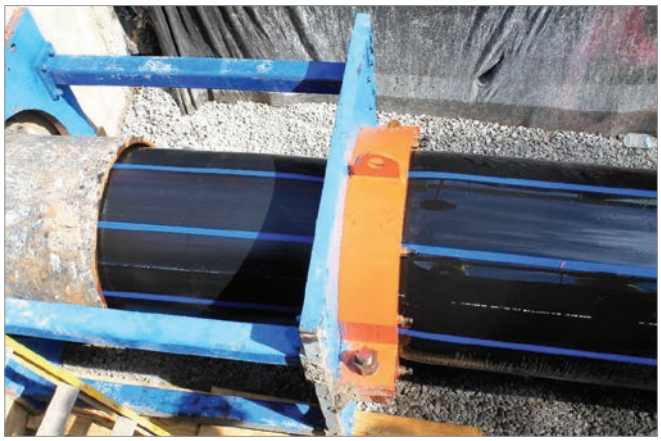
The second option for slip lining the new pipe includes the cartridge method or segmental installation. With this method, each section of new pipe is assembled in the insertion pit. Once the connection is made, the new pipe section is either pushed or pulled in. Many cartridge slip lining installations will utilize the pushing method and can be assisted with equipment such as a jacking machine.

With the cartridge method, after the first section of pipe is installed, the pull is then stopped, and another section is lowered into the insertion pit. The next joint is then connected and slip lining operations resume. This method continues until then entire section for replacement is completed.

While slip lining can offer a city an abundance of value, one potential downside includes a reduced cross-sectional area due to installing a smaller sized pipe, thus reducing flow rates and capacity. Hydraulic calculations need to be considered. For water and sewer transmission projects that need to maximize the Internal Diameter, CompressionFit HDPE pipe lining may add more value.

How does CompressionFit work?

Governed by ASTM F3508, the CompressionFit HDPE pipe lining technology specifies an HDPE pipe with an outside diameter larger in size than the inside of the host pipe to be replaced. After the HDPE is butt fused to correspond to the pull distance, the pipe is pulled through a reduction die immediately before entering the host pipe. This reduces the HDPE pipe temporarily below the ID of the host pipe allowing it to be inserted.



Crews install HDPE pipe with the CompressionFit process to replace a failing water transmission main. The value over slip lining is after the HDPE pipe is pulled in and tension is released, the pipe naturally reverts to form a tight fit within the host pipe. This method maximizes the final internal diameter which allows for greater flow and capacity.

While the towing load keeps the HDPE under tension during the pull, the pipe remains in its reduced size. The HDPE remains fully elastic throughout the reduction and installation process. After installation, the pulling load is removed. The HDPE pipe expands until it is halted by the inside diameter of the host pipe. The effectively natural 'tight' or 'compression fit' exchanges an existing failing pipeline with a composite pipe in its place.

The CompressionFit process shares in the same attributes of slip lining in that it follows the existing utility path, can make long installation distances requiring only a few access pits, expedites the project schedule, reduces social impact and can utilize the fuse-pull-fuse-pull installation process.

Class 5 and Class 6 Designations per ASTM F3508 within the CompressionFit Standard

Class 5 designation provides a dual wall composite pipe in place. When it is deemed that there is value remaining with the host pipe, the combination of the new HDPE plus the value of the host pipe provides a new design life. Class 6 designation provides an unequaled independent liner. The failing host can continue to deteriorate and disappear as the liner stands alone. The method uses the same HDPE pipe and wall thickness installed by other methods such as open cut, directional drilling or pipe bursting. "The infrastructure value that the method provides to these high-volume flow application assets is significant. These include providing well over a 100-year new design life, corrosion resistance for life, ductility of withstanding water hammer/pressure surges, smooth interior wall (C-factor of 150) increasing operating efficiencies and lowering operating costs and its resistance to extreme weather (freeze/thaw and dry/wet cycles)." comments Richard Crow, Director of Engineering & Special Project with Murphy Pipelines.

With the trend of cities preferring trenchless methods in mature urban areas continuing to grow due to the need to reduce traffic and pedestrian disruption, resident and commercial inconvenience – both slip lining and CompressionFit continue to advance in the large diameter water transmission main replacement market.

Watermain Condition Assessment – **Large** or Small: **Different** Approaches

By Piero Salvo and David Gosselin, of GAME Consultants

LARGE DIAMETER

Since its inception in 2013, GAME Trenchless Consultants has conducted a multitude of watermain condition assessments for both small diameter (300 mm and less) and large diameter (greater than 300 mm). The majority of the projects have been in Canada, with a few projects in the United States.

There are a multitude of techniques and approaches that can be taken to evaluate an existing water network and depending on the level of detail required by each municipality, the cost variations can be very large.

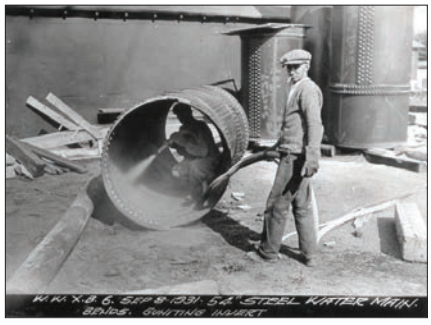
Some tools require no interruption in the water service and can be used as a preliminary approach. Some of these technologies are of an acoustic nature and others may combine an acoustic evaluation, combined with a visual option. The acoustic tools can be used on both small and large diameter watermain systems. The acoustic and visual tools are typically inserted into the pipe through an existing fire hydrant or tap on an existing pipe. This approach will be expanded on in the paper.

Some tools that do not require interruption for larger diameter watermain systems can provide very detailed information, such as wire breaks in prestressed concrete cylindrical pressure (PCCP) pipes. For these scenarios, an intervention on the watermain is usually required to insert and capture the tool and can increase the price of the inspections.

Some municipalities have adopted a condition assessment program for large diameters that allows them to conduct leak detection, visual inspection and pipe wall thickness measurements. One such project was done from 2017 to 2022, and the objective was to cover approximately 16 km of Riveted Steel Watermains. The riveted steel watermain pipe consists of a cement mortar lined, riveted steel cylinder core which is fully encased in concrete.

The watermains varied in diameter from 600 mm to 1,200 mm. For this project, prior to field investigations, the City asked for five specific Technical Memos (TM): TM1 was for historical data on Original Pipe Wall Thickness, TM2 was to identify Riveted Steel Failure Mode and Mechanism, TM3 was to identify Riveted Steel Deterioration Rate, TM4 was for Riveted Steel Failure Thickness and TM5 was to provide a Riveted Steel Break/ Leak Prediction based on collected data.

Typical Detail of Metro Spec Concrete Casing and Lining



Typical Riveted Steel Manufacturing

In 2023 the City of Toronto continued the same approach as the Riveted Steel Project and awarded an eight kilometer Large Diameter Condition Assessment project for three different types of watermain: Metromain (1,200 mm and 2,100 mm), Prestressed Concrete Cylindrical Pressure (PCCP) pipe (900 mm) and Cast Iron (600 mm, 900 mm) that extend into 2028. The main difference between the 2017 and 2023 Condition Assessment projects is that a Leak Detection Component was added.

Typical Metro Main Pipe

Here are a few pictures of the watermain designated tool for the CCTV inspection that has been used on this project. It is a is a custom built Remotely Operated Vehicle (ROV) VT150 MkII from Inuktun. Designed strictly for potable water use, the vehicle is equipped with 1.2 km of fiberoptic tether, Full HD Pan/ Tilt/Zoom camera, auto-adjustable height and expandable auxiliary components. Prior to each inspection, the vehicle and its components get full decontamination using a 1,000-ppm chlorine solution. The cable is then fed through a series of chlorine applicators which clean the cable throughout the inspection. To date, GAME has conducted over 15 km (9.4 miles) of inspection using this equipment.

15x20 Oval Lid used as entry point

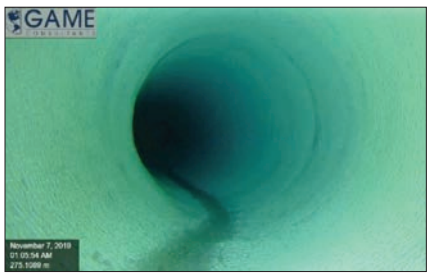
For one of the inspections, a total of 576.1metres was inspected. This was done after getting a successful isolation, the oval access lid was removed, water levels were controlled, and the tool

VT150 MkII

Insertion through manway

inserted into the watermain. The entire inspection was completed within 3.5 hours and by 16h00, the main was already in the process of being recommissioned by the City. The maximum crawl speed is 9 m/min. On average, the length of inspections using this equipment is 500 to 600 metres per installation.

Overall, the results from the first inspection were very promising with regards to the overall condition of the watermain. No major defects were identified, and everything was in accordance with the original as-built plans.



Inspection screenshot 11 1/4-degree bend

Operator's View (front and back camera)

Several areas of interest were located, and these were integrated to our original GIS plans to facilitate the selection of more invasive external testing locations.

SMALL DIAMETER

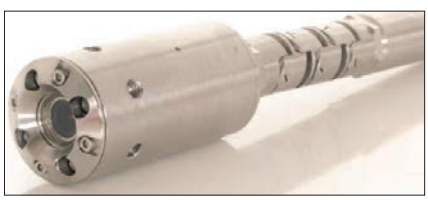
The next section will discuss small watermain condition assessment using a tool that combines leak detection and CCTV inspection while maintaining the watermain in service.

The Investigator+™ is a condition assessment technology for potable water distribution mains designed for diameters from 75 mm to 300 mm. The technology operates in pressurized watermains and efficiently provides visual and leak detection assessments through a single, advanced tethered sensor.

This technology can be launched through fire hydrants, pressure fittings, removed air release valves, gate valves and flow meters while the main remains in service. The technology is capable of travelling in either direction from the insertion point – with or against the flow of water.

The tool has a small footprint which minimizes the impact of inspection on traffic and residents. The system is operated by manually guiding the sensor head within the watermain. The sealing mechanism also has a built-in disinfection functionality which ensures the protection of potable water supplies.

Inspection Footprint



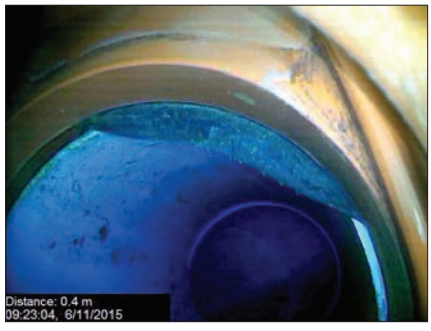
Camera head

To date, approximately 48.5 km of watermains varying from 100 mm to 300 mm have been inspected. That represents approximately 850 insertions.

This technology can be used to specifically search for a leak on an existing watermain or in some instances, the municipalities want to get a snapshot of the condition of their existing network without having to interrupt the water service.

Access for small diameter leak detection is done through existing fire hydrants, direct taps onto the watermain or through test caps. Although there are numerous different types of fire hydrants throughout North America, there are three different operating styles: Compression, Gate or Wet Barrel. Similarities between the styles allow for the system to be modified whenever a new hydrant model is encountered. Once inside the pipe, the Investigator+™ tool gets pushed through the main as far as the conditions will allow and provides visual and acoustic footage.

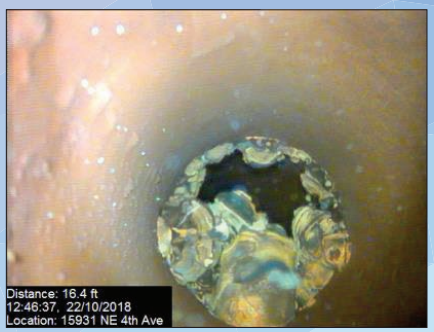
Since this tool is capable of operating in watermains that are in service or out of service, it is important to note that leak detection can only be performed while the main is under pressure. Leak detection using an internal acoustic tool is not as simple as having a computer algorithm identify noise within the environment since the moving tool also produces noise during the inspection. Operators are trained in the art of leak identification since differences in material, operating pressure, magnitude, diameter, etc. will directly affect how a leak sounds. Contrary to what many people believe, a leak rarely produces any visual identifiers. Occasionally, an operator may get a break and hear a leak at an exposed or pinched gasket.



Leak at Pinched Gasket

When it comes to the leaks themselves, similarities can be observed between situations on site. For new pipe installation, a pressure test which fails to hold at 125 psi but stabilizes at 70 psi is most likely a gasket either rolled or damaged but that has not completely failed; a test which slowly drops from the testing pressure could be slightly opened joint which was overworked

RETURN TO CONTENTS PAGE



Images from a live inspection

during installation; if pressure can't reach testing pressure, a service connection may be opened or a gasket may have completely failed. When working on an aged network, an operator must listen for particular sounds while inspecting a section of the main. Distinctive differences in sound between different pipe materials make it easier to confirm a leak versus background noise. Metallic pipes have the largest audible zone for a leak. Depending on the pressure, a leak may be heard within 1 to 1.2 metres before and after the actual source of the leak (in these situations, the leak is identified as being the location where the sound is at its peak). Leaks on plastic pipes on the other hand can only be heard within one foot of the source therefore an operator must take extra care during the inspection to make sure it is not missed.

Although the results from the inspections may not seem exciting or significant, these are the types of results everyone was hoping to encounter. No major findings mean excellent things for the projected life of the pipe. The experience acquired during the procedures followed for the inspections will also be retained for future inspections of this type. The fact that each isolation could be verified and executed without any glitches, that the network could sustain continuous isolations of major transmission lines for 48 hours through monitoring, that ports and existing infrastructure are operable and in good condition are independent elements, which until this series of inspections, were only confirmed visually when entering select chambers.

These two technologies have been used in Canada since 2013 and have proven to provide very reliable and pertinent information to the municipalities. To recap, approximately 15 km of large diameter watermains have been inspected using the ROV and approximately 48.5 km of small diameter watermains have been inspected using the small diameter Investigator+ too.

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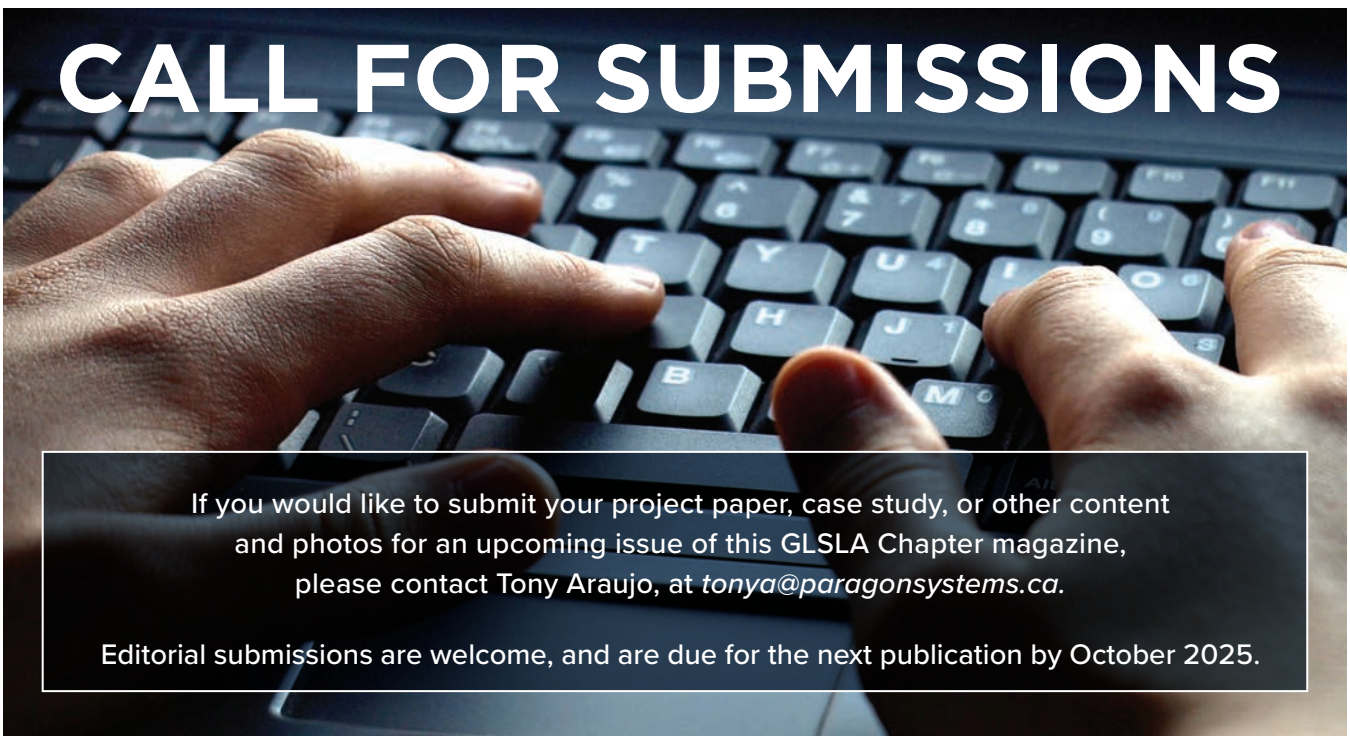

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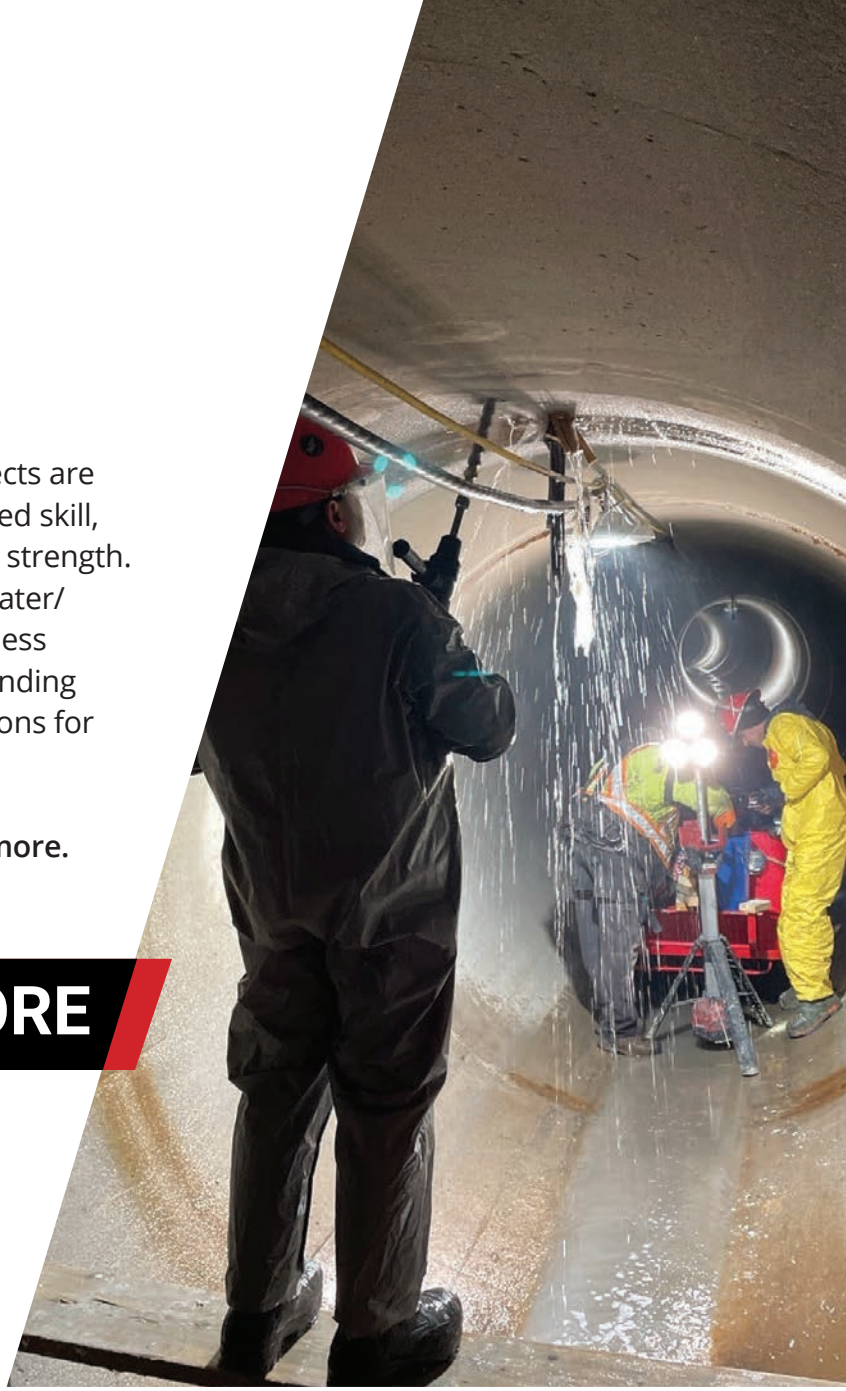

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