Sustainable Municipal Pipelines

Centre for Advancement of Trenchless Technologies

Sustainable Buried Infrastructure for Livable Communities

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Message from the Board of Directors

Let's make the difference! Since the 1990s, there has been a steady increase in the use of trenchless technologies for buried pipelines' condition assessment, rehabilitation, replacement, and subsurface utility engineering. However, despite demonstrated environmental benefits and reduced costs, uptake of trenchless construction is slow compared to the traditional open-cut methods. The slow acceptance can be attributed to the lack of formal education and training programs that prepare students or industry professionals in the application of trenchless techniques. It is no surprise that senior level engineering staff and decision makers in many jurisdictions have little knowledge and experience in trenchless construction methods. Therefore, it is important to engage in a concerted outreach effort to educate buried infrastructure practitioners, regulatory agencies and government about the benefits of these alternative construction techniques.

Since its start in 1994, the Centre for Advancement of Trenchless Technologies (CATT) has benefited hundreds of civil infrastructure professionals through its education and training programs. CATT with Benjamin Media Inc., organizes the largest Canadian *Trenchless Technology* Road Show that provides a great opportunity to learn about new developments in the trenchless industry. CATT continues to work with the industry stakeholders to develop specifications for new products and techniques, and improve existing specifications. CATT also supports and trains the next generation of trenchless experts that include undergraduate students through the uWaterloo co-op programs and grad students.

Trenchless equipment manufacturers and contractors continue to develop new technologies and materials that reduce costs and increase productivity. It is important to note that CATT does not endorse or promote a particular product or technology, but collaborates with a number of organizations including municipalities, water utilities, contractors, consultants, manufacturers, suppliers and federal and provincial agencies to carry out trenchless research and development programs and to bring new technologies to the marketplace. CATT will continue to play the pivotal role to further advance and grow the trenchless industry with the great help of its volunteers and financial support and participation of its member organizations. We encourage you to participate in CATT's programs and services to advance the trenchless industry.

Rizwan Younis , Research Associate

2015 Award of Excellence: CATT is pleased to announce the winners of the winners of the 2015 Award of Excellence.

Ian Doherty was named the winner in the Individual Category for his decades of contributions to the trenchless industry.

The winner in the Project Category was the **Region of Peel - Twinning of Etobicoke Creek Trunk Sanitary Sewer Under Runway 23 At Lester B. Pearson International Airport**. This project was a complex and challenging microtunneling project beneath Canada's busiest airport.

Project Highlight: City of Houston 30-inch Water Transmission Main Replaced by Compressed Fit HDPE Lining

Todd Grafenauer , Murphy Pipelines

City of Houston was faced with the need to renew a critical 30-inch well collection line. The steel cylinder reinforced concrete (SCRC) and prestressed concrete cylinder pipe (PCCP) water main required replacement of approximately 7,600 feet.

During the design phase and selection process various construction methods such as open cut, slip lining, CIPP and a compressive tight fitting HDPE pipe (Swagelining) were considered.

The design criteria required a fully structural Class IV solution capable of 60 psi operating pressure. Overall, the hydraulic cross section needed to be maintained as large as possible requiring an I.D. of liner 28-inch or greater within the 30-inch I.D. host pipe. The optimized thickness of the liner required was 1-inch or less including maintaining various other required parameters such as vacuum pressures, live loads and ground water.

Open cut was eliminated early in the design phase due to the limited 60 foot ROW, congested utility corridor and mature landscaping of the residential neighborhood. Slip lining was also eliminated early in the design phase due to the required flow of the system in which slip lining would have reduced the final internal diameter below the 28-inches required. During the bid process, CIPP and the compressive tight fitting HDPE lining process were allowed.

Among many factors, the compressive tight fitting HDPE process was selected because it is trenchless and less disruptive to the residents, required less time for installation, offered a long design life with the new HDPE and was less expensive. Also, the implementation schedule could be accomplished in low water demand season.

"...the compressive tight fitting HDPE process was selected because it is trenchless and less disruptive to the residents, required less time for installation, offered a long design life with the new HDPE and was less expensive."

SWAGELINING OVERVIEW

The Swagelining technology was developed over 30 years ago by British Gas in conjunction with United Utilities. With an extensive list of successfully completed projects across the globe, the technology has been proven in many extreme projects spanning three decades onshore and subsea. Projects have been completed for water, sewer force main, mining, hydrocarbons, chemicals, bulk products and gas distribution.

Swagelining process as HDPE is pulled through the reduction die

The Swagelining technology specifies a PE4710 High Density Polyethylene (HDPE) pipe with an outside diameter larger in size than the inside of the host pipe to be renewed. After the HDPE is butt fused to correspond to the pull distance, the pipe is pulled through a single reduction die immediately before entering the host pipe. This reduces the HDPE pipe temporarily below the I.D. of the host pipe allowing it to be inserted. 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.

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As the liner pipe is not permanently deformed by Swagelining™, the release of the towing load after insertion is the catalyst for the liner to revert back towards its original size. As its original size is larger than that of the host pipe, the HDPE pipe expands until it is halted by the inside diameter of the host pipe. Swagelining process as HDPE is pulled through the reduction die. The effectively natural compressive tight fit produced by Swagelining provides value for clients looking to maximize the final I.D. of their pipeline.

"As its original size is larger than that of the host pipe, the HDPE pipe expands until it is halted by the inside diameter of the host pipe."

CONSTRUCTION PHASE

Scenic Ridge Drive is an urban residential area. The project limits encompassed a very tight area with a 60 foot ROW. The 30-inch water transmission main was located along the edge of the pavement among a congested utility corridor.

The rehabilitation of the 7,600 linear feet of the 30-inch diameter waterline included the replacement of three 30-inch diameter butterfly valves with 48-inch operator manholes, three 16-inch butterfly valves, one 24-inch butterfly valve, the replacement of five air relief valves and various cross connections. The placement of valves, blow-offs and tees were relocated based on the constructability of the project.

Residential area with limited ROW and mature landscaping. 30-inch HDPE pipe enters insertion

To minimize the impact of the project to the surrounding community, Murphy Pipelines designed the project layout in which installations ranged from 600 feet to 1,700 feet in length. The long pull lengths were beneficial as they allowed for long fused sections of HDPE to be installed eliminating future leak potential and aided in the reduction of excavations by 89% of what open trench would have required.

CONCLUSION

The 30-inch water transmission main project represents the first Swagelining project completed by the City of Houston, that has a long history of utilizing trenchless technologies. Success of the technology is critical as Houston and other communities look for methods to renew their medium to large diameter water transmission and sewer force main pipeline networks. Swagelining offers a solution for pressure pipe renewal that is unique in today's trenchless pressure pipe market.

Contact: toddg@murphypipelines.com

CATT's Annual Municipal Buried Infrastructure Survey - Fiscal Year 2016/17

CATT's 2016/17 municipal buried infrastructure survey will commence in the first week of November 2016. The objective of the anonymous survey will be to provide a broad-based summary of market conditions in Canada's water and wastewater sector. Your response will help to assess the market activity in water and wastewater buried infrastructure field. The information will be useful for a variety of stakeholders – city engineers/managers, contractors, consultants, manufacturers and political decision makers – for market analysis and assessment.

The collected data will be used in aggregate and no individual responses will be disclosed. You may also choose to fill out your information to enter into prize drawings. For previous survey reports, please visit http://cattevents.ca/surveys/.

Standards and Specifications for Municipal Infrastructure: A Chronology

By Roger Crawford, P. Eng., Environmental Specialist

In 1977, a Committee chaired by the late John Wikes, P. Eng., Executive Director, Ministry of Transportation demonstrated the need to establish Provincial Standards for the design and construction of municipal infrastructure, because of the very substantial provincial subsidies at the time paid by the MTO for construction and maintenance of the infrastructure.

It is important to note here that following the 1977 meeting of the John Wilke's Municipal Projects Liaison Committee, the decision was taken that "STANDARDIZATION" must include municipal participation. Until then, standards had been produced almost entirely by provincial agencies: the Department of Highway of Ontario (DHO), Ontario Resources Commission (OWRC), Ministry of Transportation and Ministry of Environment (MOE).

In 1978 a joint Committee of 5 was formed. I was appointed by the late Ken Sharpe, P. Eng., then Deputy Minister of the Environment, to be MOE representative. The late Hardy Martens, P. Eng., was MTO representative; Peter Marko, P. Eng., from the municipality of Hamilton Wentworth was chosen Chair; Greg Flint, P. Eng, from the City of Toronto; and one other.

The newly drafted Ontario Provincial Standards were accepted and adopted by MTO and MOE in 1982, and distributed for municipal acceptance. Jim Snow, then Minister of Transportation requested that the standards simply be send to the municipalities. Andy Brandt, then Minister of the Environment insisted that all 440 letters to the municipalities be personalized to the mayors. And he then signed them!

In 1985 MOE established and funded ($10 million) a program for rehabilitation of aging municipal sanitary sewer and watermain systems. This attracted a bunch of non-open-cut technologies for which there were few (if any) standards or specifications. Many were used under less than ideal conditions. Bad results! In an attempt to address the issues, OPS Sanitary Sewer and Watermain Committees drafted standards and specifications in 1990. When circulated for review and comment. there was considerable dispute, criticism and rejection.
In 2000, a recommendation was made to CATT Board that CATT (only) produce STANDARDS and SPECIFICATIONS for Trenchless Technologies, to be incorporated in OPS.

Upcoming Events - *Visit www.catt.ca for more details*

October 27: ***Sewer and Watermain Condition Inspection Tools, Techniques***
November 2: ***Rehab Methods for Manhole Chambers***
November 21-25: ***Asset Management of Buried Infrastructure***
Visit www.ogra.org
January 24: ***How to Manage Asbestos Cement Pipelines***
February 9: ***Common Sense Project Management for Trenchless Projects***

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