



Sustainable Municipal Pipelines

Centre for Advancement of Trenchless Technologies

Sustainable Buried Infrastructure for Livable Communities

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Sustainable Municipal Pipelines

Fall 2017

Message from the Board of Directors

With summer winding down and everyone scrambling to complete their construction projects before winter sets in, it's hard to be thinking about what's next. Where did the summer go? Well if your project will involve trenchless technology, CATT has you covered. Whether you're an employee of an engineering firm, municipality or contractor, CATT can help.

Never has trenchless technology been as viable a solution for rehabilitation/replacement projects as it is today. Whether it's a Public Works manager who's just heard of pipe bursting for the first time or a Consulting Engineer who's looking for advice on contract specifications, CATT is Canada's "go to" source for trenchless information. At CATT, we endeavor to educate everyone and anyone who has an interest in becoming more knowledgeable about trenchless technology.

With more than 15 technical courses offered annually, CATT is the local industry leader for education and research in trenchless technology. We continue to offer our base 101 courses for people new to the technology, while continuing to develop new cutting edge courses about the latest trenchless technologies, construction techniques and methods for industry professionals. A few of our upcoming courses this fall include 'Assessment and Rehabilitation of Trunk Sewers and Transmission Mains', 'Geotechnical Considerations for Underground Pipelines Projects' and 'Providing Good Quality Trenchless Rehabilitation Contract Specifications.' Please check out the website (<http://cattevents.ca/upcoming-workshops/>) for a full list of upcoming courses.

I'm also very excited about our trenchless roadshow to be held in Richmond, B.C., from September 25 to 27, 2017. This is our second roadshow in the west and, with over 250 industry members expected to attend (including a sold out exhibit hall), this will continue the tradition of the fabulous roadshows we've had in the past, here in Ontario. And don't worry; we'll be back in Ontario in 2018 for another great show, this time in London, Ontario!

Jason Johnson, Vice-Chair

2016 Award of Excellence

CATT is pleased to announce the winners of the 2016 Award of Excellence

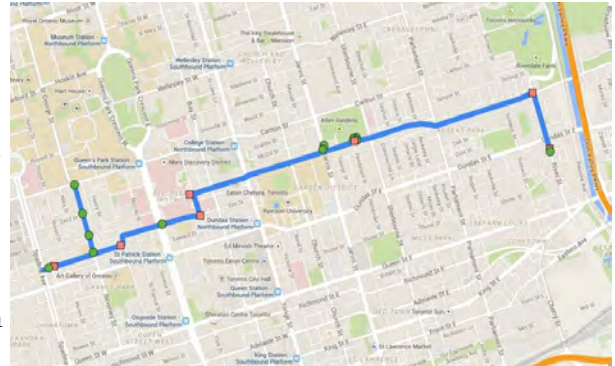
Chris Macey has been named the winner in the individual category for his expertise and contributions to the trenchless renovation/rehabilitation and asset management fields. Chris is the Americas Technical Practice Leader for AECOM for condition assessment and rehabilitation of pipelines. With over 35 years of experience, Chris has considerable expertise in material failure assessment for both gravity and pressure pipelines. He has extensive knowledge of pipeline materials, pipe/soil interaction, pipeline deterioration processes, material limit states, and state of the art condition assessment and rehabilitation technologies. Chris graduated from University of Manitoba in 1977 and has been working as consultant since 1978. Mr. Macey is also a member of following AWWA Committees: Structural Classes of Pipeline Repair Subcommittee; M77 Manual - Condition Assessment of Water Mains; and M28 Manual of Water main Rehabilitation. *(cont'd on page 4)*



Gerrard Street Transmission Watermain Completed

Prapan Dave and Oscar Orellana , City of Toronto

The Gerrard Street project is one of the largest water transmission main replacement projects in the City of Toronto's history. The transmission main is 3.9 km long and stretches from Spadina Avenue at D'Arcy in the west, along D'Arcy, McCaul, Elm, and Elizabeth Streets, to Gerrard Street, and then east on Gerrard to River Street and south to Mark Street. The project achieved substantial completion in Nov-2015 and all construction work is now completed. The new main is 1.65 metres (5.4 feet) in diameter and replaces a 0.9 metre diameter 100 year old cast iron main. The new main improves water supply, redundancy and flexibility for the City and York Region through enhanced ability to supply water from two Water Treatment Plants (WTP), the Centre Island WTP and the R. C. Harris WTP. The construction started January 2012 and will ended on December 2015. The project value was \$84 million and the Contractor: was C&M McNally. Engineering Consultant: exp Services Inc. was engaged by the City of Toronto in 2008 to complete the design and issue a tender to construct the transmission main.



Benefits of this project:

By increasing the capacity and enhancing the reliability of the water supply for a major portion of the City of Toronto and York Region, the long term servicing needs of both partners were met. Costs were shared by both partners as each benefitted from this project. The failure of the old cast iron Gerrard Street main would have jeopardized water transmission and supply in the City of Toronto and York Region. The new main has more than double the capacity of the original main and has improved the overall water network hydraulics.

“The project team completed the work within the City approved budget, and on schedule. Consideration of the environment, residents, businesses and services was a priority during design and construction with impacts to these being minimal.”

Construction Method, Project Challenges and Successes:

The watermain was constructed by tunneling. Traffic and utility congestion in the downtown core lead the consultant to reassess and reduce the number of construction shafts from the proposed 20 at the environmental assessment stage, to 6. This change helped in mitigating traffic issues, reduce cost of the shafts, and expedite construction. By constructing the new watermain in a tunnel, traffic restrictions were drastically reduced. No major roads were affected, and one lane of traffic in each direction was maintained through the shaft work zones. Access and water supply to all six nearby hospitals on University Avenue was maintained throughout the construction. The transmission main was constructed from spiral weld steel pipe with a cement mortar lining that was applied on site. Historically, steel mains have provide 80-100 years of life, or more, in Toronto and have an excellent record.

The main crossed below the Yonge-Spadina subway line at two locations at a depth of 20-25 m, and in shale rock.

Numerous connections were made to the local distribution system which required isolation and enormous coordination to ensure the water supply was not disrupted for residents and businesses, including the 6 hospitals, and other critical facilities on University Avenue.

The shaft location at Allan Gardens was of archeological significance. Visual art work the size of two football fields was created by First Nation's Communities on the construction shaft hoardings and represented their life and culture in Toronto. The title of this work was "All My Relations".

The project team completed the work within the City approved budget, and on schedule. Consideration of the environment, residents, businesses and services was a priority during design and construction with impacts to these being minimal. It was this proactive approach, instead of reactive, with few and minimal issues, that assisted with the successful completion of the project. All stakeholders were kept well informed on a monthly basis.



Project Milestone: Zone 4 Feeder mains and Reservoir, Milton, ON

Cian McDermott, Associated Engineering

Halton Region retained Associated Engineering (AE) in 2014, to design 12km of 900mm and 1200mm diameter feeder mains (water mains) and a 30ML reservoir in the Towns of Milton and Halton Hills, Ontario, Canada. The project, known as the Zone 4 Feeder main and Reservoir project, was derived from the Sustainable Halton Water and Wastewater Master Plan (2011) to supply water to Zone 4 in Milton and ultimately Georgetown (Halton Hills).

AE completed the design of the feeder mains and reservoir in November 2015 and the project was awarded to General Contractor Kenaidan Contracting Ltd. in January 2016. The feeder main portion of the project is currently being constructed utilizing both open cut and trenchless methods. The alignment includes the trenchless crossing of six (6) sensitive creeks within conservation lands, Union Gas transmission lines, 8 lanes of Highway 401 at the interchange with Trafalgar Road, Canadian Pacific Rail (CPR) tracks and a number of busy arterial and collector roads.



“The feeder main portion of the project is currently being constructed utilizing both open cut and trenchless methods.”

The 12km of feeder main includes the installation of 3000m of 1200mm diameter feeder main from the project's south tie-in location at Trafalgar Road and Britannia Road to the intersection of Trafalgar Road and Derry Road to the north. At the intersection of Trafalgar Road and Derry Road, the single 1200mm diameter feeder main transitions into twin 900mm diameter feeder mains to the north and a single 900mm diameter feeder main to the west through a large interconnection control chamber. The twin section of feeder mains traverses 6000m north from this location to the Zone 4 Reservoir through some extremely challenging ground conditions; while, the single 900mm branch traverses 3000m to the west where it connects into an existing branch along 5th Line.

A comprehensive geotechnical and hydrogeological investigation was undertaken by the design team to determine the varying ground conditions throughout the project alignment and to assist with determining the appropriate tunneling methodologies for each tunnel section.

As previously noted, the twin section of feedermain presented many design challenges but none more so than the 2000m section of trenchless installation required to cross the CPR tracks, Highway 401, entrances to Toronto's Premium Outlet Mall, Steele Avenue and a conservation water crossing. This section passes through mixed face conditions of glacial tills containing cobbles and boulders, sand seams, and a confined aquifer with artesian pressure 1.5m above existing ground level at the intermediate shaft locations. This 2000m section has two intermediate shafts located on the south and north sides of the highway to facilitate interconnection valves chambers. The alignment contains three 600m radius bends and one 210m radius bend in order to remain within the confines of the Region's right-of-way and avoid various structures along the route. Based on the geotechnical and hydrogeological investigations, AE specified that the tunnel section be completed utilizing closed face tunnel methodology. Kenaidan's tunneling sub-contractor, Dibco Underground, proposed to utilize a 3500mm Lovat Earth Pressure Balance Tunnel Boring Machine (TBM) with concrete segmental liners for this work.

The TBM was launched on February 6th 2017 from a 14m deep secant pile shaft located 30m south of the CPR right-of-way. The TBM is currently making its way to the first intermediate shaft located 950m north of the launch shaft and immediately south of Highway 401. This portion of the tunnel drive contains a 600m radius S bend through a confined aquifer with 8.0m of head pressure acting on the tunnel face. Commercial and residential buildings in the area rely on the aquifer for their water source, which adds an additional complexity to the tunnel drive and intermediate shaft construction. The launch of the TBM was a key project milestone as it represents the commencement of the critical path activity for Halton Region. The TBM is anticipated to be extracted from the retrieval shaft north of Steels Avenue in September of 2018, which will enable the Contractor to install the final section of twin 900m feeder mains and therefore complete the linear portion of the works.

The project benefits from a strong team including: Owner - Halton Region, Design Consultant - Associated Engineering, General Contractor - Kenaidan Contracting, Tunneller-Dibco Underground, Geotechnical - Thurber Engineering and Hydrogeology - Palmer Environmental.

Project of the Year: Boyne Trunk Sanitary Sewer, Region of Halton

2016 Award of Excellence (cont'd from page 1)

Dillon Consulting completed a Class EA, detailed design and construction for a large diameter (1500mm to 2400 mm) gravity sewer from Milton to the Mid-Halton Wastewater Treatment Plant in Oakville. The overall cost of the sewer project is in the order of \$90 million, with a substantial completion date in 2016.



The alignment passed beneath a number of environmentally significant areas, including the Glenorchy Conservation Area, and beneath Highway 407 ETR and with the significant depth of portions of the sewer (>30m), trenchless construction methods were selected and designed to install this trunk sanitary sewer with a major portion of the project in a tunnel using an advanced tunnel boring machine (TBM)



The design techniques used reduced the potential for infiltration and ex-filtration and a microbial inhibitor was also specified within the concrete

of the pipe and maintenance holes to reduce the potential for hydrogen sulphide corrosion and a detailed Environmental Management Plan was also completed for the project to protect the environment during construction.

Welcome New Members:

Corporate Gold: Atlas Dewatering

Corporate Silver: Michels Canada, Andrews Engineer, CIMA+

Richmond, BC, Trenchless Technology Road Show 2017 Was a Huge Success

Much like the 2015 event, this Road Show was also very successful with sold out exhibit hall, and a record breaking number of attendees who filled the technical sessions. The show was preceded by three technical workshops on HDD, SUE, and Trenchless Technologies 101.

Keep an eye out for details on the upcoming event in 2019 on the west coast

TRENCHLESS TECHNOLOGY ROADSHOW 2017

Richmond, BC | September 25-27, 2017



Helping Municipalities Save Millions of Dollars on Infrastructure Renewal

Upcoming Events

Asset Management of Buried Infrastructure Nov. 20-24, 2017

The Centre for Advancement of Trenchless Technologies is pleased to partner with the Ontario Good Roads Association to offer the hands-on asset management of buried infrastructure course. The course will present the fundamentals of asset management with particular emphasis on urban water distribution and wastewater collection pipelines. The course will provide an in-depth knowledge and practical examples of the essential processes and techniques to establish an effective asset management program for water and wastewater utilities. The course will also highlight the new developments and future trends in the asset management field. For registration, please visit the OGRA course website <https://www.ogra.org/courses-and-events/courses/event-details.html/Ogra/event-info/details/id/28227>

Workshops

- October 17:** Geotechnical Considerations for Underground Pipelines Projects
- November 7:** Navigating and using Current Utility Standards in the Trenchless World
- November 28:** Providing High Quality Contract Specifications
- January 17:** Integrating TT into Open-cut Projects
- February 10:** Design and Construction of Microtunneling Projects
- March 7:** Return on Investments for Condition Assessment Programs

The Trenchless Technology Road Show is Coming to London

Don't miss this chance to attend one of the best Trenchless Technology Road Shows in London, Ontario. For more information visit <http://catttrenchlessroadshow.ca/>

Trenchless Technology Road Show 2018

London, ON | May 15th - May 17th





Gold Members



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Grouting Made Easy

CUES Canada

CUES offers a full line of portable and truck-mounted grout rehabilitation systems. Truck-mounted grout rehabilitation systems are available for mainline joint sealing/lateral sealing and can be equipped with the latest CCTV equipment for television inspection. Applications include joint testing and sealing of mainline and lateral joints, manholes, junction boxes, large diameter pipes, or any other low pressure waterproofing application. All systems can be configured to run Urethane, Acrylimide and Acrylate grouts.

With the new CUES Easy Grout graphical user interface (GUI), you can operate the grout system from wherever you like because the grout panel is now a computer interface! The computerized grout control system is designed to consolidate all the valves, electrical controls, etc., into an instrumentation cabinet that can be mounted in any location. The Easy Grout system and user interface includes help files and tool tip descriptions to assist new users and refresh users who have been away from operating for some time. Automated entry logic provides recommended settings for the grouting process automatically based on the basic inputs of pipe size, depth etc. Because the grout panel is now a computer user interface, it is no longer physically tied to the grout process equipment and can be located virtually anywhere a computer connection, wired or wireless, can be made.



CUES also offers the most advanced line of joint sealing packers for large sized sewers - the CUES compact/collapsible packer. These packers can be quickly disassembled to provide easy insertion into the manhole. Save time, labor and money over conventional style packers. CUES compact/collapsible packers are rugged, but lightweight for easy handling. The packers compact design, along with the collapsible feature, means any of the CUES large pipe sized packers can be inserted through a minimum 21" standard manufactured manhole without having to remove the ring or cone. The savings in time, labor and money are significant over conventional style packers. Contact salesinfo@cuesinc.com

News Release: Successful crossing under Hwy 400 in Barrie



On September 11th 2017, CRS Tunneling completed a 61m long micro-tunnel crossing under highway # 400 in Barrie. CRS was the tunnel sub-contractor and Dufferin Construction was the General Contractor on the project. CRS installed an 1800mm RCP microtunnel pipe, manufactured by Forterra, using an Akkerman machine, under the highway to act as a

new culvert for the Ministry of Transportation Contract **MTO 2016-2016-Hwy 400 & Tiffin Street Overpass**. CRS is currently setting up for its second tunnel, parallel to the first crossing. Once the second tunnel is complete, CRS will install a 2.1m HDPE liner in the steel casing, grout it in place, and that will act as the final culvert liner.