



Sustainable Municipal Pipelines

Centre for Advancement of Trenchless Technologies

Building Sustainable Buried Infrastructure for the Future

In this issue:

Message from the Board of Directors	1
2013 Canadian Municipal Buried Infrastructure Survey	2
Project Highlight: Reversing Falls Bridge Watermain Rehabilitation	3
2013 Canadian Municipal Buried Infrastructure Survey (cont'd)	5
Featured Product: PDM-300 Mobile Waste Drill Mud Treatment System	6
CATT Research News	6

Information contained in the newsletter is compiled from sources provided to CATT. All article providers are required to ensure that the articles are accurate and copyright permission, if necessary, is obtained. CATT is not responsible for article accuracy, copyrights or other editorial matters. Articles in this newsletter are provided for information only and provide no legal or professional advice.

Issue 6

April 2014

Message from the Board of Directors

From May 27 to 29, 2014 CATT and Benjamin media will host the largest Roadshow ever at the Niagara Falls Scotia Bank Convention Centre.

Since 2001, CATT has organized and produced six successful Trenchless Roadshows that have provided trenchless education to engineers, owners and contractors and introduced new innovative technologies.

With over 60 exhibitors to date, we are sold out! Our technical program will be larger than our previous show in 2012, with over 70 speakers from Canada, USA, and Australia. We will have 10 technical sessions, including microtunnelling, gravity pipe renovation, pipeline inspection, and condition assessment to name a few. We guarantee that there will be something for everyone involved in the buried pipeline and water industry.

We are also pleased to announce two pre-event courses—*Trenchless 101* and *Advances in Water and Wastewater Infrastructure Asset Management*. These pre-event courses are for newcomers to the industry and for those interested in current and emerging trends in the buried infrastructure asset management.

Dr. Penny Burns will present at the pre-event Asset Management workshop and will be the keynote speaker at the Trenchless Technology Roadshow. For the last 30 years Penny, an economist, has worked with engineers to develop and advance the field of asset management. She is credited with the first published use of the term in its physical asset sense, the first to use life cycle modelling to project asset renewal, the first to develop full replacement value costing for utilities, and many of her original terms, phrases and definitions are still in common use around the world. She has also been a Parliamentary Researcher with eight Parliamentary reports on Asset Renewal to her credit. She is the editor of 'Strategic Asset Management', which this year celebrated 20 years of publication.

The Trenchless Roadshow is an educational and industry meeting forum. It is also a place where engineers, municipal owners, and contractors can stay in touch with new technologies and meet with trenchless experts to learn how to solve buried pipelines' infrastructure renewal and construction challenges using cost effective and environmentally friendly technologies. It is also a great place to learn how to reduce infrastructure deficits using state-of-the-art tools.

As trenchless solutions continue to be a large part of our future in building and renewing our cities, share your own knowledge or come and experience the 2014 Trenchless Roadshow for yourself! See you in Niagara Falls from May 27-29, 2014.

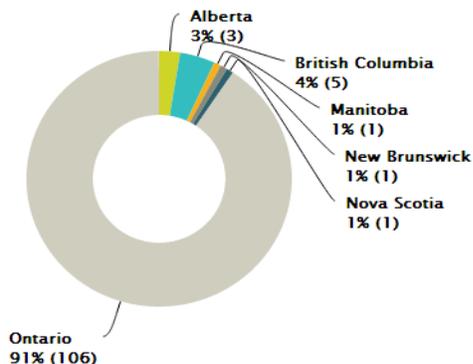
Dave Crowder, Conferences, Chair

Dr. Robert McKim (1955-2014): It is with a sad heart to announce that on Friday March 21, 2014, Dr. Robert McKim passed away in Ruston Louisiana. Dr. McKim was the founding Executive Director CATT. In 1999 he left CATT to continue the development of the trenchless industry in the USA by joining the Trenchless Technology Centre (TTC) in Ruston, Louisiana. Rob's warm and friendly smile will be missed. The CATT family wishes Rob's family our heartfelt condolences.

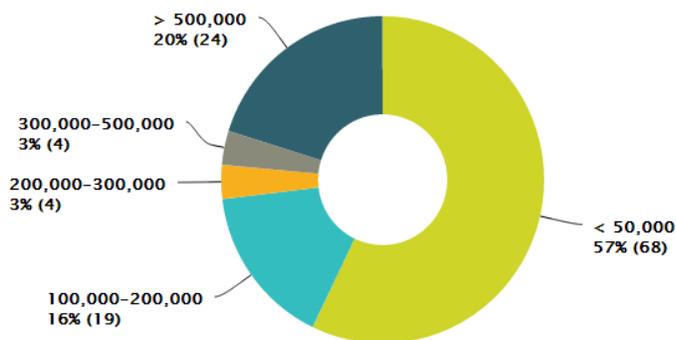
2013 Canadian Municipal Buried Infrastructure Survey

Rizwan Younis, Mark Knight, and Hongyuan Zhou

CATT conducted the first Canadian Annual Municipal Infrastructure Survey from February through May 2013. The survey collected information from Canadian municipalities on construction, renewal, and financing of water, wastewater and storm water pipelines. In total, 117 municipalities from Alberta, British Columbia, Manitoba, New Brunswick, Nova Scotia, and Ontario participated in the survey.



Survey participants: Close to 90% of respondents were from Ontario.



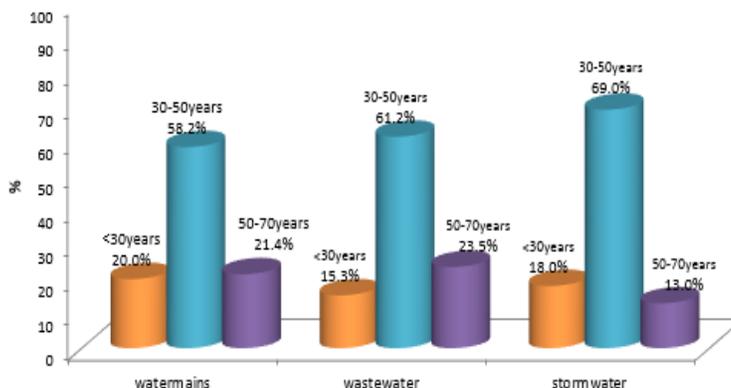
Survey participants: About 20% of the respondents were from municipalities with population >500,000 and 57% with population <50,000.

Critical Issues

Watermains: Close to 70% of the respondents reported reducing leakage and breaks, and improving water quality as critical or very critical issues.

Wastewater Pipelines: Over 75% of the respondents categorized inflow/infiltration as the critical or very critical issue. About 40% reported surcharging, pipe collapses and flow capacity issues as critical or very critical.

Storm Water Pipelines: About 50% of the respondents reported flow capacity, surcharging, pipe collapses, and inflow/infiltration as the critical or very critical issues.



Aging infrastructure: Based on age profile, about 20% of pipelines (belonging to >50 year cohort) need intervention such as inspection or renewal. The cities need to make adequate plans for the 30-50 year cohort that makes up about 60% of the pipelines.

Addressing Critical Issues

Rate Increase: About 70% of the respondents consider that rate increase is important or very important.

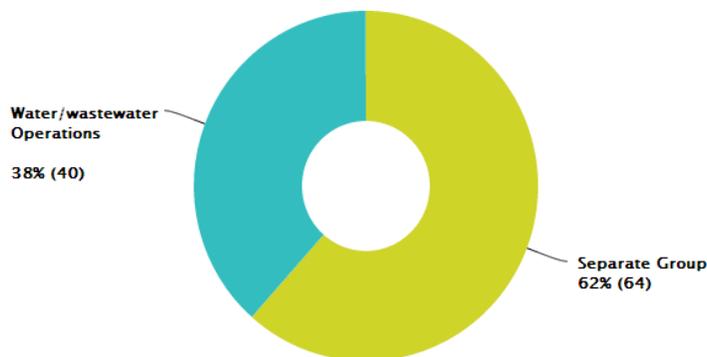
Government Grants: An overwhelming 80% of the respondents consider access to government grants as critical or very critical.

Long-term Financing: About 50% of the respondents find long-term financing to be useful or very useful.

Education: About 52% of the participants consider public education to be important or very important.

Public-Private Partnerships: About 21% of the respondents think public-private partnerships to be useful or very useful.

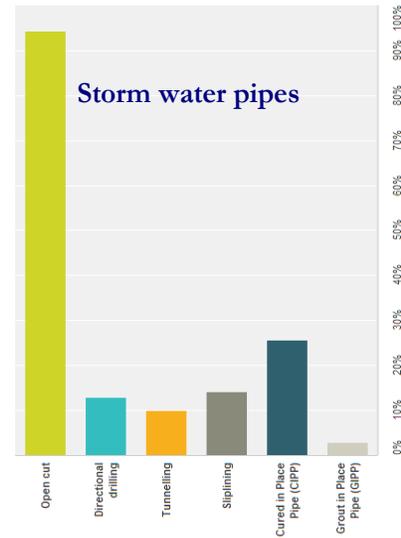
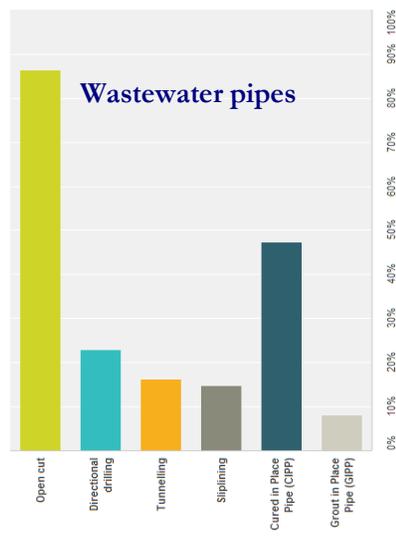
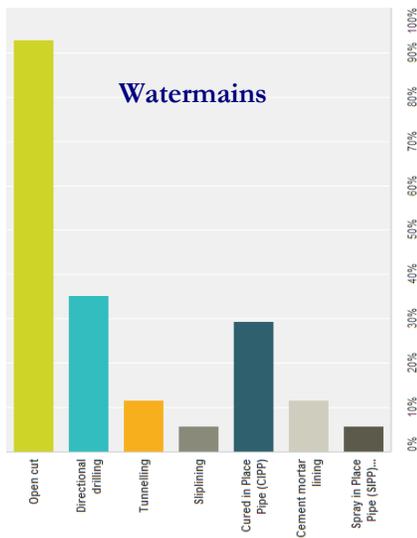
Government Regulations: About 60% of the participants consider regulatory requirements to be useful or very useful.



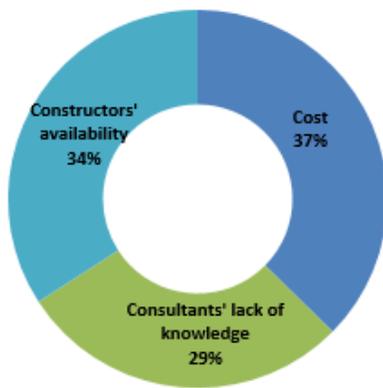
Asset management: Close to 40% municipalities do not have a separate asset management group.

(continued on page 5)

2013 Canadian Municipal Buried Infrastructure Survey (cont'd. from page 4)



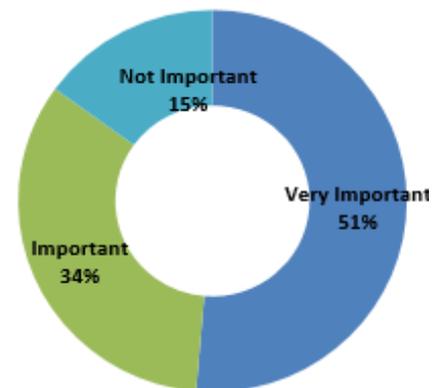
Pipe renovation/construction methods: Trenchless industry has a huge potential and room to grow.



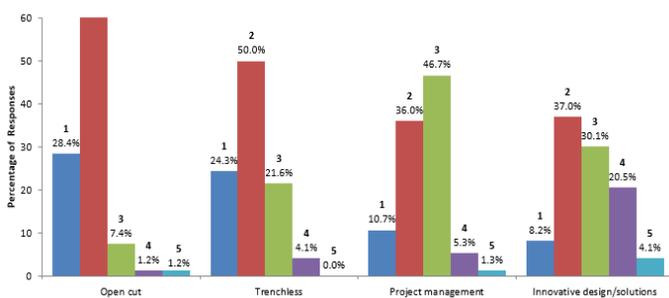
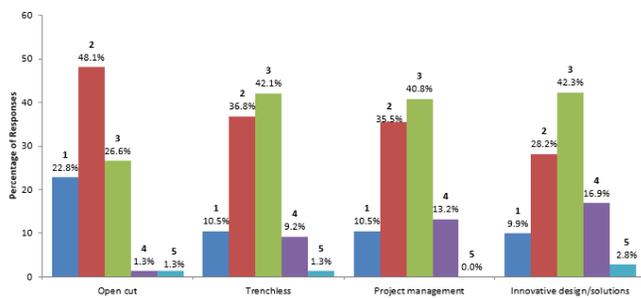
Barriers to the use of trenchless methods

Benefits of Trenchless Technologies

- Cost Effectiveness:** About 71% of the respondents reported trenchless construction to be cost effective or very cost effective
- Deep Pipelines:** 67% of the respondents found trenchless construction to be useful or very useful for deep pipelines
- Urban Congestion:** About 67% of the respondents categorized trenchless methods to be useful or very useful in congested urban settings.
- Environment:** 73% of the respondents consider trenchless construction to be useful or very useful in environmentally sensitive areas.



Staff education and training



Satisfaction with consulting engineers' performance

Satisfaction with contractors' performance

Welcome New Members:

Platinum Member: Interplastic

Silver Members: GM Blue Plan Engineering, Vacuum Trucks of Canada, Jack Control AG, CRS Tunneling Inc.,

Municipal Level 2: Town of Innisfil, Utilities Kingston

Project Highlight: Reversing Falls Bridge Water Main Rehabilitation

Brian Moreau, CBCL Limited

“The project had added complexity, compared to traditional trenchless projects, due to the large non-standard pipe size and the watermain being suspended from a bridge that passes high over the World famous Reversing Falls”

The Reversing Falls Bridge traverses the Saint John River in New Brunswick and is one of only two bridges connecting the east and west sides of the City of Saint John. The Saint John Water Utility operates a 484mm diameter welded steel watermain suspended beneath the bridge which provides potable water from the east side to some consumers on the west. Due to aging and deterioration processes that resulted in corrosion and leaks, this critical transmission pipe was planned to be replaced with a new pipeline hung off the bridge. After extensive research, it was decided to rehabilitate the existing water transmission main by means of a fully structural cured-in-place pipe (CIPP) liner.

In late 2010, the transmission watermain beneath the bridge was taken out of service due to a leak at the bridge abutment on the west side of the Saint John River. Although the bridge is situated in the centre of the City, the New Brunswick Department of Transportation and Infrastructure (NBDTI) owns and maintains the bridge structure. NBDTI required the leak be fixed prior to putting the watermain back in service. CBCL Limited was retained to evaluate alternatives to repair or replace the leaking transmission pipe for which the exact location of the leak could not be determined. The leak was however known to be within an accessible piping that penetrated through the bridge abutment.



A variety of options were considered for the repair of the watermain such as: spray-on liners, slip-lining, spot repairs (e.g. internal repair sleeves), and CIPP liners. The project had added complexity, compared to traditional trenchless projects, due to the large non-standard pipe size and the watermain being suspended from a bridge

that passes high over the World famous Reversing Falls. A major constraint for the project was to ensure that the repaired pipe did not impose any additional weight to the bridge structure. CBCL Limited determined that the construction of a new pipeline (including the temporary works required during construction) would require extensive structural upgrades to the bridge members that would cost between \$500,000 to \$800,000.

Some of the key considerations for the project are summarized as follows:

- Weight neutral solution required by NBDTI.
- Non-standard size of steel host pipe (484mm O.D.) with circumferential and longitudinal welds and the potential to be out-of-round.
- Bituminous lining present inside host pipe.

- Expansion and contraction of the host pipe, fittings and bridge structure.
- Lateral bridge movements.
- Requirement to work around pipeline, multiple bends and reducers cast into concrete abutments that can not be accessed or modified.
- Hydraulic analysis required a minimal diameter reduction.
- Length between access pits of 220m (to span the entire bridge).
- Carrying out design and procurement around the schedule for the Harbour Bridge upgrades as NBDTI would not allow both bridges to be under construction simultaneously.



Upon consideration of the alternatives, the use of a fully structural CIPP liner was considered the most viable solution given the project constraints. Galbraith Construction Ltd. was awarded the tendered contract with AQUAREHAB as their lining sub-contractor. The following provides a summary of the project design and construction:

- Weight neutral solution achieved by removing the bituminous liner and replacing with a CIPP liner.
- CIPP liner able to navigate through 4 to 11.25 degree bends cast in the bridge abutments.
- Installation of pre-liner to prevent the CIPP liner from bonding to the steel host pipe. This allowed the liner to move independently from the host pipe reducing expansion and contraction issues.
- Water inverted CIPP liner over the entire 220m span.
- Construction completed in four weeks as opposed to the 10 to 12 months projected for conventional pipeline replacement.
- Construction cost savings of 26% compared to conventional pipe replacement.
- Project risks greatly reduced by not having to work beneath the bridge, significantly shorter construction schedule, minimal works in the roadway, and lower overall construction costs.
- Significantly reduced social and environmental costs with the shorter construction duration, and lower greenhouse emissions with one-way traffic maintained and the pipe returned to service sooner.

“Upon consideration of the alternatives, the use of a fully structural CIPP liner was considered the most viable solution given the project constraints”

Several key factors led to the justification of this project, many of which are cost related. With the City of Saint John currently in need of major upgrades to their water system, economical solutions to enhance and prolong the life of their infrastructure are needed. Rehabilitation of the existing steel watermain by means of a CIPP liner has proven to be an effective pipe renovation solution that results in significant cost, social and environmental savings when compared to conventional pipe replacement. The result is a big win for everyone - the City, the public, water users connected to the transmission main, and water rate payers.

Brian Moreau
Email: brianm@cbcl.ca



Centre of Advancement of
Trenchless Technologies
University of Waterloo
200 University Ave. W
Waterloo ON N2L 3G1

Phone: 519-888-4770

Fax: 519-746-6556

E-mail: catt@uwaterloo.ca

Platinum Members



Gold Members



Feature Product - PDM-300 Mobile Waste Drill Mud Treatment System

MetaFLO Technologies of Toronto, ON has developed the PDM-300 for the on-site treatment of water based liquid drilling waste.

Conventional liquid waste disposal techniques add amendments like sawdust to meet solids criteria for transportation to landfill – expanding volume by 200% or more. The PDM-300 turns liquid waste to a solid in real time, reducing cost, improving safety, and significantly reducing the environmental impact. MetaFLO's proprietary, engineered reagent formulation, combined with high shear mixing technology, adds only a 1-3% dosage, which saves time and money through reduced transportation and landfill tipping fees.



The PDM-300 model is available in gas, electric, diesel or hydraulic power sources. Its compact design allows it to be moved to the job site in a pickup truck, small trailer, or flatbed truck. Once on site, the user has eliminated the need for costly transportation to and from a transfer station. MetaFLO's R-T-S™ reagents are applied through the PDM's patented high shear mixing process to solidify the liquid waste, chemically fixate heavy metal bearing wastes, and stabilize hydrocarbons and other organic and inorganic material. Additionally, R-T-S™ environmentally friendly reagents tie up water, which given drying time, can evaporate away from the resulting matrix (providing up to a 50% volume reduction).

R-T-S™ reagent is limited to water based streams with low hydrocarbon, salt and corrosivity. The PDA-300 treats on average 20m³ /hour of flow-able liquid wastes (heavier non-flow-able are best treated by MetaFLO's alternative formulation mechanically). It is best used in conjunction with a shaker bed to remove larger solids from the waste.

It is designed to operate in harsh climates and conditions. Since being introduced in 2007, the PDM has produced a successful result in locations as diverse as Northern Alberta and Australia.

For more information about this process, O&M, costing or any other information, please contact Michael MacDonald at 647-991-3771 or michael@metaflo.ca.

CATT Research News

The CATT is pleased to announce that our research team has been successful in securing a Water Research Foundation Grant. The research team, led by Dr Mark Knight, in the Department of Civil and Environmental Engineering at the University of Waterloo and Dr Rizwan Younis, Research Associate with the Centre for Advancement of Trenchless Technologies (CATT) also located at the University of Waterloo, will be working with a group of international experts to develop the first standardized method to evaluate and classify the condition state of North America's water mains. The goal of this project is to develop an industry accepted standard that will allow all cities in North America to speak the same talk and to determine what pipes need to be fixed now or in the near future. It will also lay the foundation for North America's water utilities to determine the real cost of the water infrastructure backlog and deficit which is known to be increasing annually. This work will be complete in collaboration with Dr. John Matthews, Principal Research Scientist at Battelle, Baton Rouge Louisiana, and Dr. Yehuda Kleiner, Principal, Yeda Consultants Ltd. For further details on the project please visit the CATT website at www.catt.ca or contact Dr. Rizwan Younis at CATT.