Sustainable Municipal Pipelines

Centre for Advancement of Trenchless Technologies

Building Sustainable Buried Infrastructure for the Future

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Message from CATT's Board of Directors

CATT continues to evolve and change to meet industry and members needs. In 2011, CATT's Board of Directors established the Public Relation Committee to increase awareness of CATT activities and the ever changing buried infrastructure industry. In its early years, CATT primarily focused on trenchless pipe construction and renovation technologies. Over the years this has changed to include buried infrastructure condition assessment, asset management, and more recently, buried infrastructure financial sustainability. The launch of the newsletter *Sustainable Municipal Pipelines* is an initiative of the new Public Relations Committee that will highlight CATT recent and upcoming activities, CATT research projects, showcase local projects and products along with other industry activities. The newsletter is planned to be published two times a year. The committee welcomes new committee members, articles, information, and ideas to ensure the newsletter is relevant, informative and constructive. CATT is also excited about the upcoming *Underground Infrastructure Research and Trenchless Road Show* that will be held at the new Scotiabank Convention Center in Niagara Falls, Ontario on June 5 to 6, *2012*. This event is shaping up to be our best yet and will have industry experts from around the globe. To find more about the program, exhibiting, and sponsorship opportunities please visit the CATT website. We hope you enjoy the newsletter. Please contact CATT if you wish to submit an article, or have any ideas or questions or want to be a volunteer on any of the CATT's committees.

News Release— New Trenchless Carbon Tool to be Released

PW Trenchless, located in Surrey BC, is funding the development of a carbon protocol that will allow cities in British Columbia to create a carbon credit to offset their "day to day " operations. This credit will come from the use of any form of trenchless technology used in capital work projects. Initial research completed by CATT showed that the use trenchless pipeline construction methods can reduce greenhouse gas emission by 80 to 100 percent when compared with traditional open cut. The new protocols are expected to be ready for public use in the Fall of 2012.

For more information please contact:

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Project Highlight - *HDD Watermain in City of Waterloo*

Brad Marin & Aaron Bruce, Conestoga-Rovers & Associates

Hydro-vac working at a frac-out.

The City of Waterloo, Ontario is currently experiencing intensification along its core. As such, the existing infrastructure is being evaluated and upgraded to meet the ever-increasing need. One of the projects included in these upgrades was the rehabilitation of an existing 200mm diameter watermain located on the South side of Columbia Street East (between Weber Street North and Marsland Drive). The City chose this location for several reasons:

-new zoning for 25-storey office buildings
-high frequency of breaks reported along the existing watermain
-compatibility with existing/future infrastructure
-ease of tapping new services
-lessen the impact on traffic; and,
-maintain the use of the existing main without installing temporary above ground service.

"Using horizontal directional drilling in order to reduce capital costs and time"

The project scope included upgrading the existing cast iron 200mm diameter watermain to a PVC 300mm diameter main and installing a new 200mm diameter commercial water service to the North side of the road. It was recommended to the City that the project be designed and carried out using horizontal directional drilling (HDD) to reduce : 1) capital costs, 2) time required to complete the works, and 3) impact on traffic.

The successful contractor was A. van Egmond Construction Ltd . At the outset of the project, the contractor mobilized to site with a portable drilling rig, supporting grout truck and PVC fusing apparatus. The project commenced in March with the setup of a temporary shelter in the project staging area that allowed increased environmental control during the pipe fusing process. The contractor's plan was to complete the watermain installation in three pulls. The first two consisted of 12 sections of 300mm diameter DR18 PVC pipe being fused together for a total pipe length of 146.4m. A third pull was implemented for the trenchless 200mm diameter water service installation (crossing Columbia Street).

HDD Pipe pullback in process.

While the technicians worked to fuse the sections of the new main, the contractor began the first bore that would eventually house the watermain. The drilling process used bentonite drilling fluid to support the integrity of the drilled bore and to carry native clayey soils from the bore. The bentonite drilling fluid presented the largest obstacle for the contractor to overcome as drilling fluids inadvertently worked their way through non-native granular material and seeped out where new asphalt and existing roadway and/or curb met. This occurred at previous watermain repair locations and the construction of newly installed asphalt on the adjacent property.

To mitigate the occurrence of inadvertent drill fluid release, the contractor utilized a hydro-vac sub-contractor to create pressure relief pits along the bore path. This was done to prevent drill fluid pressure build out along the bore path.

Directional drilling each bore was completed in three passes. The first pass was a 100mm diameter pilot bore. The drilling-head was tracked along the surface by the contractor at 10m intervals using a hand-held locator which detected an electromagnetic signal sent out by the drill head. This allowed the contractor to ensure that the minimum cover between the watermain and the existing surface was maintained. Once the pilot bore was complete, the contractor proceeded with a back-ream pass to increased the diameter of the bore to 250mm. The final pass consisted of attaching a steel pulling-head to a 1.5m section of fusible PVC which was fused to one end of the watermain section to be pulled. The pulling-head was secured to a 450mm diameter reaming head. The reamer was used to enlarge the bore to allow the new PVC watermain to be installed with minimal resistance. The contractor pulled the new service into-place, then connected the next section of pipe in the sending pit. The new road crossing consisted of pulling back four sections of 200mm diameter DR18 PVC Cobra-Lock that were spline locked and not fused. Once all the HDD works were completed, the contractor proceeded to connect all three HDD installed pipe sections using cast-iron fittings and DR18 PVC pipe (non-fusible), which were restrained using mechanical joint restraints.

"The frac-out worked its way through the non-native granular material"

Following the commissioning of the newly installed watermain and all its components, the connections to the existing infrastructure were complete. The existing watermain was kept on-line throughout the work to avoid having to utilize temporary water services, and once taken off-line, the watermain was sealed and abandoned in-place.

Overall, the project was a success for the City of Waterloo. The new watermain was installed at a reduced cost over conventional open-cut methodology. The City has since proceeded with two more rehabilitation projects. Both sections of watermain will be rehabilitated using trenchless methods (a combination of HDD and cured-in-place-pipe); and the City of Waterloo is looking to the future with plans for new trenchless rehabilitation projects as well.

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Education Program for Civil Infrastructure Professionals (www.epcip.ca)

A university-level diploma program for municipal buried infrastructure professionals jointly offered by University of Waterloo Centre for Extended Learning and CATT.

Core Courses

- Trenchless Rehabilitation
- Trenchless Construction
- Pipe Materials and Engineering Properties
- Data Management (GIS, Databases) and Analysis

Elective Courses

- Asset management and Life Cycle Costing
- Asset's Inventory and condition Assessment
- Design Methods
- Contract Administration and Construction Supervision

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Feature Product - *PureRobotics*

Lauren Rutherford, Pure Technologies Ltd.

Pure Technologies ("Pure") was contracted by the City of Calgary to conduct a non-destructive evaluation of PCCP portions of the McKenzie Feedermain using the newest of its PureRobotics electromagnetic inspection tools, the G2 unit.

The McKenzie Feedermain, which runs through several housing communities and a provincial park, is comprised of 36-inch diameter lined cylinder pipes. The inspected sections cover a cumulative distance of 3 km, spanning a total of 438 pipes. Analysis of the data obtained during the inspection determined that 1 pipe in the feedermain was identified to have magnetic anomalies consistent with pipes that have wire break damage. In addition, 8 pipes were identified as having anamalous signals, most likely due to non-uniform construction of the steel cylinder.

Pipeline failures in Calgary have been predominantly related to sulphides in the soil, which is the main criteria used for prioritizing which pipelines require electromagnetic inspection. Despite alum deposits at the bottom of the Feedermain pipe making the surface slippery, the G2 unit was still able to effectively inspect the line.

Pure's electromagnetic inspections ascertain a magnetic signature for each pipe section to identify anomalies that are produced by zones of wire break damage. Various characteristics associated with an anomaly (length, magnitude, phase shift, etc.) are evaluated to provide an estimate of the number of broken wire wraps. This inspection method is able to quantify the amount of wire break damage and is the best method of determining the baseline condition of a pipeline.

The City of Calgary has an aggressive plan to continue to use the G2 unit in the coming year with two more feedermain inspections currently scheduled for the fall shutdown season in October.

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

CATT Annual General Meeting/ Seminar - Oct. 26, 2011 - keynote speaker Dr. Yehuda Kleiner, Institute for Research in Construction (IRC)/ National Research Council of Canada (NRC), on "***Better Management of Buried Infrastructure***"

Financially Sustainable Management Strategies for Urban Water and Wastewater Networks - Nov. 15, 2011, featuring Dr. Dragan Savic, on a methodology to improve overall performance assessment.

HDD - Design of Steel and Plastic Pipelines - Nov. 17, 2011

Underground Infrastructure Research and Trenchless Road Show, June 5-6, 2012