

MONDAY, MARCH 26 - AM SESSIONS

Time	Paper ID	Industry Segment	Paper Title	Author(s)	Description
Monday Morning		Track 1: Condition Assessment			Session Leader: Edward Alan Ambler
9:30 AM	MM-T1-01	Wastewater	Masters of the Interceptors: Leveraging Trenchless Technology and Corrosion Modeling for Sewer Asset Management	Daniel Buonadonna, CH2M; Elaine Huber, City of Vancouver; Kenny Moffat, CH2M	This paper includes a case study on the condition assessment and risk analysis for 40-miles of sewer interceptor. The project included use of an advanced hydrogen-sulfide corrosion modelling to predict remaining useful life and calculate where corrosion protection or trenchless rehabilitation was more cost-effective to extend the asset's service life.
9:55 AM	MM-T1-02	Wastewater	Assessment of the 99 Year Old Sunrise Highway Aqueduct in Nassau County, New York	Christopher Macey, AECOM; Jordon Thompson, AECOM; Brian Gee, AECOM	The project involved the assessment of a 99 year old, 72-in. diameter steel water main that has been out of service for over 50 years to ascertain whether it could be rehabilitated by relining technologies and re-purposed to serve as an effluent force main for a major wastewater treatment plant.
10:20 AM	MM-T1-03	Wastewater	40 year old RCP: What to Do?	Swirvine Nyirenda, City of Aurora; Andrea Long, City of Aurora; Steve Simons, City of Aurora	This paper will discuss a series of projects the City of Aurora has undertaken to formulate an asset management strategy for rehabilitation of large diameter Reinforced Concrete Pipe (RCP) interceptors.
10:45 AM	MM-T1-04	Wastewater	Nothing Rosy about a Failed Sewer: Rehabilitation of the Rose Canyon Trunk Sewer	Casey Raines, GHD; Greg Watanabe, GHD	The Rose Canyon Trunk Sewer, a 54-in. and 60-in. plastic-lined reinforced concrete pipe, required rehabilitation due to failed weld strips at the pipe joints. Considering the potential environmental, encroachment and traffic impacts, internal mechanical pipe seals and new plastic liner strips were selected to repair the pipe via manned entry.
11:10 AM	MM-T1-05	Wastewater	No Dig Pipe Rehabilitation Saves Cost and Keeps Airport in Operation	Xiangquan Li, Kennedy/Jenks Consultants; Tom Kapushinski, City of Palo Alto	This paper discusses an innovative method to inspect and locate an existing large diameter pipe used to convey effluent from a wastewater treatment plant while maintaining the pipe in service. The paper subsequently discussed the considerations to select pipe rehabilitation method based on the pipe condition assessment data.
Monday Morning		Track 2: HDD			Session Leader: Maureen Carlin
9:30 AM	MM-T2-01	Wastewater	Telegraph Franklin Sewer Replacement Project Using HDD Technology	Abdulnasser Almhadoun, NTH Consultants, Ltd.; Hosam Yaldo, NTH Consultants, Ltd.; Joel Brown, Oakland County Water Resources Commissioner; Daniel Dilegge, DVM utilities	Project involves replacement of a 48-inch diameter collapsed sewer under a busy state highway, revealed during investigation of a sinkhole. Several rehabilitation alternatives were considered. Based on site conditions, a new 24-inch HDPE pipe was installed using HDD technology combined with jack and bore techniques to replace the collapsed sewer.
9:55 AM	MM-T2-02	Wastewater	King County Embarks on Large Conveyance System Upgrade that Includes Challenging HDD	Sibel Yildiz, Wastewater Treatment Division, King County Department of Natural Resources and Parks; Kimberlie, Stahel, Stahel Trenchless Consultants; Kevin, Dour, Tetra Tech	King County is constructing a conveyance upgrade from Mercer Island to Bellevue, including a 36-inch HDD. Geotechnical conditions include large gravel; however, permitting was more challenging due to the HDD proximity to the Interstate-90 bridge. Specialty analysis to determine impacts on I-90 bridge piles and permitting challenges will be presented.
10:20 AM	MM-T2-03	Wastewater	City Solves a Failing Sewer Problem with HDD and Drill Drop Methods	Rory Ball, Mott MacDonald; Chris Petta, Mott MacDonald; Don Ramm, City of Independence, Ohio; Clark Merdes, City of Independence, Ohio	A recently completed gravity sewer involved an uphill HDD-crossing through an S-curve to reroute a sewer in jeopardy of failure. At the downstream end, the project installed a drill drop tapping into an existing interceptor sewer. This paper provides insight into how the design and construction challenges were overcome.
10:45 AM	MM-T2-04	Wastewater	The Art of the Deal: Negotiating a High-Risk, Contractor-Proposed HDD on the Fly!	William Gibson, AECOM; Tim Marsh, HRSD; Geoffrey Burdick, Aegion; Daniel Rickmond, Tidewater Utility Construction, Inc.	This paper will detail cost/risk negotiations and lessons learned from a contractor-proposed alternative to the engineer's open-cut design, to install 1000-LF of 30-inch pipe via HDD, in a downtown environment. Critical considerations included HDD construction next to high-rise buildings and a colonial-era, historical church dating back to the 1730's.
11:10 AM	MM-T2-05	Wastewater	HDD Used to Install New Force Main under Lake Meade	Tim Marsh, Hampton Roads Sanitation District; Brandon Beamon, Michael Baker International; Rachel Maupin, Underground Solutions, Inc.	Hampton Roads Sanitation District undertook a two-phase, 26,000-foot force main replacement project to revitalize an undersized sewer system in Suffolk, Virginia. A 3200-foot horizontal directional drill was designed to cross Lake Meade. Complications during installation required the driller's ingenuity to recover the installation.
Monday Morning		Track 3: CIPP			Session Leader: Kaleel Rahaim
9:30 AM	MM-T3-01	Wastewater	Improvements to City of Baltimore High Level Sewershed (West Baltimore Region)	Reza Emtiazoori, Dewberry Consultants LLC; Robert Stier, SAK Construction LLC; Mathew Rhoads, SAK Construction LLC; Wazir Qadri, City of Baltimore	A consent decree project for City of Baltimore which included approximately 60,000 LF of CIPP rehabilitation of 8-52 inch pipes, manholes and laterals rehabilitation, point repairs. Among one of the few City projects that its design and construction was completed in time and within budget.
9:55 AM	MM-T3-02	Wastewater	Sectional CIPP of Sanitary Force Main Preserves Historic Hull Waterfront	Charles Tripp, Kleinfelder; John, Struzziery, Director of Wastewater Operations/Assistant Director of Public Works, Town of Hull, MA	This paper/presentation will describe the planning, logistics and construction involved to improve the reliability of the subject sewer infrastructure. The technique and lessons learned from this project will be applicable to other communities knowing that force main renewal is one of the growing areas of interest in our industry.
8:50 AM	MM-T3-03	Wastewater	16th Avenue Sanitary Trunk Sewer Rehabilitation - Use of Sprayed Geopolymer in a Challenging Environment	Paul Headland, Aldea Services LLC; Grant, Robinson, Regional Municipality of York; Darrel Johnston, Michels Pipe Services; Joe Royer, Milliken Infrastructure Solutions, LLC	Rehabilitation of the 16th Avenue Sanitary Trunk Sewer Rehabilitation located at depths of 50m below ground surface, and 45m below the groundwater table. Use of crystalline grout to seal water leaks and sprayed geopolymer to rehabilitate tunnel due to lining deterioration and structural defects.
10:55 AM	MM-T3-04	Wastewater	Tying Up Loose Ends: Rehabilitating the Downstream End of an Egg-Shaped Brick Interceptor Near Boston	Nicholas Rystrom, City of Revere; Jonathan, Kunay, CDM Smith	This paper will detail the challenges faced during the rehabilitation of an egg-shaped brick interceptor including access issues, bypass pumping discharge coordination at the downstream manhole located in a tidally influenced waterbody, and traffic management within a state-owned parkway critical for commuters heading into the City of Boston.
11:10 AM	MM-T3-05	Wastewater	Is it Round, Square or Oval: Repair of a Culvert with Multiple Cross Sections	Mo Ehsani, PipeMedic by QuakeWrap; Alex Christensen, Salt Lake City Corporation; Marvin Murphy, FRP Construction, LLC	This paper describes a uncommon case where a culvert consisting of three different cross sections was repaired with field applied FRP products.
Monday Morning		Track 4: Pipe Bursting			Session Leader: Babs Marquis
9:30 AM	MM-T4-01	Wastewater	Record up-sizing Using Static Pipe Bursting technology (from 15 inches to 34 inches)	Veilimir Stetin, City of Maple Ridge	This paper describes a successful, record up-sizing (15 to 34) of an undersized gravity sanitary sewer in the City of Maple Ridge, British Columbia, Canada using Static Pipe Bursting technology
9:55 AM	MM-T4-02	Wastewater	Pipe Bursting Challenges in the City of St. Catharines Canada	Dave Holcomb, TT Technologies, Inc.	This paper will focus on how the owner, engineer and contractor overcame the challenges of pipe bursting a 230' section of 18 PVC gravity feed sanitary sewer pipe, 32' deep, located between two houses, with the pipe collapsed down to 4" with very high flow, utilizing multiple trenchless technologies.
10:20 AM	MM-T4-03	Wastewater	Combined Trenchless Technologies Prove Successful	Michael Woodcock, Portland Utilities Construction Co., LLC; Keith Dunn, Dunn & Associates Engineering, Inc.	The combined trenchless technologies of Pipe Bursting, UV CIPP and Close Tolerance Horizontal Directional Drilling (CTHDD) were used to repair an aging and undersized sewer in Greenville, SC. Originally designed as pipe bursting, it was necessary to incorporate the UV CIPP and CTHDD trenchless technologies to successfully complete the project.
10:20 AM	MM-T4-04	Wastewater	The City of Redding, California Implements Pipe Bursting for Existing Asbestos Cement Gravity Sewer Pipe	Edward Alan Ambler, AM Trenchless; Josh Vandiver, City of Redding, California; Corri, Vandiver, City of Redding, California	The City of Redding in Northern California has teamed with AM Trenchless to help design and permit an asbestos cement gravity sewer pipe bursting project. City staff were committed to pipe bursting and worked to overcome the misconceptions of bursting asbestos cement pipe and obtain the required permits.

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11:10 AM	MM-T4-05	Wastewater	Solon, Ohio- Protecting Natural Resources Via Pipe Bursting	Jared Abell, Solon, OH; Aaron Smith, H.R. Gray (Haskell)	The Miles Rd Sanitary Sewer Replacement Project is part of the Solon, OH City-Wide Sanitary Sewer Improvement Program. In order to protect a cluster of nearby ponds and avoid the advanced shoring and dewatering costs associated with open-cut trench excavation, the city engineer opted to utilize the pipe bursting method.
Monday Morning			Track 5: Large Diameter Tunneling	Session Leader: Anil Dean	
9:30 AM	MM-T5-01	Wastewater	Implementing Major CSO Solutions via Deep Rock Tunneling - Ohio River Tunnel (ORT)	Jonathan Steffik, Black & Veatch; Mark Bradford, Black & Veatch; Greg Powell, Louisville and Jefferson County Metropolitan Sewer District; Jacob Mathis, Louisville and Jefferson County Metropolitan Sewer District; John Loechle, Louisville and Jefferson County Metropolitan Sewer District; Adam Westermann, Black & Veatch	Louisville Metropolitan Sewer District (MSD) is in the process of completing an \$850 M, 20-year Integrated Overflow Abatement Plan (IOAP) by 2020 to reduce combined sewer overflows (CSOs). Originally scoped as three separate CSO basin projects, the Ohio River Tunnel (ORT) was developed in response to challenges encountered throughout design.
9:55 AM	MM-T5-02	Wastewater	Microtunneling of Twin 100-in. (2,250-mm) Diameter Storm Culverts	Jack Graziosi, City of Vaughan	The City of Vaughan carried out the new installation of twin 100in (2550mm) dia. storm culverts in order to accommodate the construction of a new hospital. Microtunneling was selected as the preferred method of installation given the various co-ordination issues associated with the project and other jurisdictional authorities.
10:20 AM	MM-T5-03	Wastewater	Urban Hard Rock Tunneling & Blasting in Baltimore City	Todd Brown, Bradshaw Construction Corporation; Jordan Bradshaw, Bradshaw Construction Corporation	Bradshaw Construction completed 2,500' of tunnel for a 36 sanitary sewer under Baltimore through geology consisting of very hard rock with decomposed veins using a 72 Double Shielded TBM. Access shafts, up to 57' deep, were set in urban environments, requiring utility support and resident coordination.
10:45 AM	MM-T5-04	Wastewater	Seven Years, Five Projects, and Over Forty Kilometers of Hard Rock Tunnel Design Improvements	Alston Noronha, Black & Veatch; Mark Bradford, Black & Veatch	This paper discusses design enhancements for five hard rock tunnel projects, over forty kilometers in length, in Indiana and Kentucky. Parameters include tunnels, underground bifurcations, and drop shafts.
11:10 AM	MM-T5-05	Wastewater	Overcoming Challenging Conditions with Engineering and Construction Flexibility	Brendan Hedel, CH2M Hill Engineers, Inc.; Josh Livemore, BT Construction, Inc.; Jon Wicke, Metro Wastewater Reclamation District; Liv Haugen, CH2M Hill Engineers, Inc.	Approximately 2 miles of large diameter sewer interceptor was designed and constructed with open-cut and trenchless technologies in challenging conditions included open-cut river crossing, trenchless irrigation ditch crossing, deep excavations, and groundwater.
Monday Morning			Track 6: Large Diameter Water	Session Leader: Peter Oram	
9:30 AM	MM-T6-01	Water	Bellvue Transmission Line Tunnels - Challenging Construction in Dipping Bedrock	Robin Dornfest, Lithos Engineering, Nate Soule, Lithos Engineering, Dylan Favaz, Lithos Engineering	The two tunnels which are 567- and 1,814 feet-long and were constructed utilizing tunnel boring machines. The Overland Tunnel was constructed with an 88-inch gripper style TBM, while the East/West Tunnel was constructed with an 86-inch TBM with ribs and lagging.
9:55 AM	MM-T6-02	Water	San Francisco Public Utilities Commission Completes Hand Mined Tunnel for Seismic Resiliency Project	James Bowland, Kennedy/Jenks Consultants	140 LF of 72-inch diameter liner plate tunnel was installed using hand mining down a 28-degree slope. The tunnel was constructed using bolted liner plate. An auger bored pipe in the center of the tunnel was used for soil removal along the alignment of the tunnel to the receiving shaft.
10:20 AM	MM-T6-03	Water	Partnering Solutions When Below Ground is not as Expected	Liv Haugen, CH2M Hill Engineers, Inc.; Rebecca Tejada, Parker Water & Sanitation District; Kevin Strott, Reynolds Construction, LLC	Several unexpected geotechnical conditions were encountered during the construction of the Ridgeway Line for the Parker Water 7 Sanitation District. This paper discusses the design process, conditions encountered, and how the team of owner, designer, and contractor partnered to develop resolutions to address the changes.
10:45 AM	MM-T6-04	Water	Halton Zone 4 Feedermain - Tunneling A Confined Aquifer Beneath Major Railways and Highways	Cian McDermott, Associated Engineering; Chris Ewen, Halton Region; Gary Lukez Dibco, Underground Ltd.	The Halton Zone 4 Feedermain Project involves the installation of 13km of trunk watermain, 4080m within tunnels ranging from 1800mm to 3500mm in diameter. This presentation discusses the challenges with planning and designing a 3500mm diameter tunnel crossing Union Gas transmission lines, Highway 401, CP Rail Tracks, and 16-mile Creek.
11:10 AM	MM-T6-05	Water	Trenchless Watermain Installation Under Tight Timelines and Spatial Constraints	Chad Schwartzentruber, Stantec; Joe Linseman, Stantec; Ayman Khedr, Stantec; Lauren Young, Stantec	This paper demonstrates a case study of an effective methodology for designing and installing a trenchless large diameter watermain under tight timelines and tight spatial site constraints.

MONDAY, MARCH 26 - PM SESSIONS

Time	Paper ID	Industry Segment	Paper Title	Author(s)	Description
Monday Afternoon			Track 1: Asset Management	Session Leader: Adam McKnight	
3:45 PM	MA-T1-01	Wastewater	Executing a Trenchless Rehabilitation Program through a Risk Based Asset Management Program	Ryan Eisele, HDR; Jeff Stacy Johnson, County Wastewater	JCW's condition assessment and renewal programs are executed through the Collection System Asset Management Program. A rehab decision and prioritization model was developed through the program. This presentation will describe how JCW uses the decision model to assess risk and plan, execute, and manage the utility's trenchless renewal program.
4:10 PM	MA-T1-02	Wastewater	Region of York Storm Sewer CCTV and Renewal Assessment	Lauren Young, Stantec Consulting; John Zhu, Region of York; Joe Linseman, Stantec Consulting; Erez Allouche, Stantec Consulting; Joe Herman, Stantec Consulting	In 2015, the Region of York initiated their first Storm Sewer CCTV program to assess the condition of the identified critical storm sewers and determine the need for rehabilitation and develop a prioritized storm sewer rehabilitation program.
4:35 PM	MA-T1-03	Wastewater	Overcoming the Challenges of Gravity Pipeline Inspections with New Technologies and Data Management	John Schroeder, CDM Smith; Nicholas Domenick, City of Columbus Sewers and Drainage	There are many advanced and simple technologies /techniques to consider before selecting and performing gravity sewer inspections. This paper will provide a vast understanding of selecting the right tool for a wide variety of challenging pipeline inspection needs.
5:00 PM	MA-T1-04	Wastewater	Improving an Island: Tampa Uses Tyfo® to Rehabilitate Pressure Pipeline	Andrew Costa, Insituform Technologies, LLC; Amber Wagner, Fyfe Co.	Fibwrap Construction used its FRP system to rehabilitate almost 400 feet of 48- and 54-inch pipeline on an island in Tampa's downtown area. This paper will discuss project specifications as well how diameter loss was kept to a minimum while providing a structural solution.
Monday Afternoon			Track 2: HDD	Session Leader: Rachel Maupin	
3:45 PM	MA-T2-01	Other	Practical Criteria for Borehole Instability in Sand during Horizontal Directional Drilling	Haitao Lan, Queen's University; Ian Moore, Queen's University	The paper addresses the calculations of maximum allowable mud pressure in sand during Horizontal Directional Drilling. The tests conducted in GeoEngineering Center at Queen's University are summarized and the calculation is improved from Queen's Equation which accounts for anisotropic condition.
4:10 PM	MA-T2-02	Other	FRAC-LESS: A New Generation of HDD Drilling Tools	Martin Cherrington, HDD/HDB Consultant	Features and exemplary description of small diameter HDD in-hole drilling tools, that will directionally drill and remove bore-hole cuttings, without risk of drill-mud frac-outs.
4:35 PM	MA-T2-03	Other	Comparison of Different Inadvertent Return Prediction Methods and an Approach to Integrate Them	David Landing, Jacobs Engineering; Michelle Macauley, Jacobs Engineering	This paper compares different Inadvertent Return (IR) prediction methodologies and proposes an adaptation to the Delft equation to address multiple soil layers in proximity to the HDD bore. Additionally, we will propose a holistic approach that combines various soil-specific IR calculations into one methodology.

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5:00 PM	MA-T2-04	Other	A Bore-head Radar for Safe Horizontal Directional Drilling (HDD) Operations	Enrico Boi, IDS GeoRadar North America; Guido Manacorda, IDS GeoRadar Srl	During an European cooperative research, a bore-head ground penetrating radar system has been developed; it will offer the operator information directly from the drill, in real time, allowing objects to be avoided, thus improving the safety of the operation.
Monday Afternoon			Track 3: CIPP	Session Leader: Jennifer Glynn & Shaurav Alam	
3:45 PM	MA-T3-01&02		Water Main CIPP Forum		
4:35 PM	MA-T3-03	Wastewater	Philadelphia Finds A New Solution to Rehab Sewers Efficiently through a Service Contract	Jeff Twardzik, Philadelphia Water Department; Paul Mourt, Mott MacDonald	The Philadelphia Water Department has embarked on an indefinite quantity contract for CIPP sewer rehabilitation in order to increase the annual rehabilitation footage performed. This paper will review the procedures developed to improve the efficiency of indefinite quantity contracts to the benefit of both the City and the construction contractor.
5:00 PM	MA-T3-04	Wastewater	Leveraging infrastructure investment with trenchless technologies: The City of Calgary's Sanitary Lateral Lining Journey	Sclater Paterson, City of Calgary; Kevin Bainbridge, Robinson Consultants Inc.	The City of Calgary created a Sanitary Lateral Lining Program using CIPP and this paper will discuss the research, development, implementation and lessons learned. Discussions will focus on creating the program, development of QA/QC protocol, site inspection, customer notifications and lessons learned.
Monday Afternoon			Track 4: Pipe Ramming	Session Leader: Michelle Macauley	
3:45 PM	MA-T4-01	Water	Twin 120-inch Pipe Rams in Northern California	Kathryn Wallin, Bennett Trenchless Engineers, LLP; David Bennett, Bennett Trenchless Engineers, LLP; Ken Sorensen, Kleinfelder	Case study describing twin 120-inch pipe rams, each approximately 170 feet long, under US 101 in Willits, CA. Challenges included very large diameter pipe, long drive lengths, highly restricted work areas, and a short construction window.
4:10 PM	MA-T4-02	Water/Wastewater	Pipe Ramming - Understanding the Forces that Drive the Industry	Kimberlie Staheli, Staheli Trenchless Consultants; Armin Steudlein, Associate Professor of Civil Engineering, Oregon State University; Paul Richart, Alderwood Water and Wastewater District; Bert Minor, RMDT	Pipe ramming is advancing while engineers strive to develop models of ramming behavior. Three ramming projects (diameters from 36-84 inches) were instrumented with strain gages and accelerometers to compare design models to field behavior. Results, including hammer efficiency, casing resistance, advance rates, etc. are compared to predictions of ramming behavior.
4:35 PM	MA-T4-03	Wastewater	Pipe Ramming Methods Used To Swallow 250 Feet Of 48-inch Casing	Brian Harris, Drill Tech Drilling & Shoring, Inc.; Alan Goodman, Hammer-Head Trenchless; Raguparan (Ragu) Thangavelutham, California Department of Transportation (Caltrans); Cameron Zoucha, Ditch Witch Southern California	This case study features the use of a 34-inch pipe ramming tool to replace 250 feet of 48-inch CMP with 72-inch-diameter steel wall casing beneath an interstate highway. The project represents the pipe swallowing technique's effectiveness in a notably long and difficult application. Complications included misaligned and corroded joints.
5:00 PM	MA-T4-04	Wastewater	From Pipe Ram to Microtunnel - How Owner and Contractor Worked Together	Erik Waligorski, Carollo Engineers; Ron Speer, Soos Creek Water & Sewer District; Ken Van Den Bergh, Soos Creek Water and Sewer District; Greg Hill, Stantec Consulting Engineers Inc.	This paper looks at the construction of eight trenchless gravity sewer installations that started being constructed using pipe ramming technology and was completed using microtunneling. The paper reviews the reasons behind the initial design of pipe ramming, why the construction method was changed and how the change was contracted.
Monday Afternoon			Track 5: Microtunneling	Session Leader: Jack Burnam	
3:45 PM	MA-T5-01	Wastewater	Urban Microtunneling Par Excellence: 5 Multiple Curved Microtunnels Below Road and Railways in Switzerland	Cyrril Althuser, Jackcontrol AG	People often think of microtunneling with the predicate short and straight. The paper focuses on the immense flexibility gained in design and by allowing the highly engineered technology of microtunneling to actually do what it can do, going further and going curved.
4:10 PM	MA-T5-02	Wastewater	Design of the City of St. Albert's North Interceptor Sanitary Trunk	Kate Polkovsky, City of St. Albert; Jason Lueke, Associated Engineering; Cian McDermott, Associated Engineering; Paul Dedeluk, Associated Engineering	This paper will discuss the design of the North Interceptor Sanitary Trunk consisting of 3000m of 1500-mm diameter sewer by microtunneling, horizontal directional drilling and open trench methods; outlining key design features and mitigation strategies to deliver the largest capital project in the history of the City of St. Albert.
4:35 PM	MA-T5-03	Wastewater	Six Microtunnel Drives Successfully Completed in Difficult Ground on the Broad Creek Augmentation Project	David Watson, Mott MacDonald	Washington Suburban Sanitary Commission's Broad Creek Augmentation Project consists of 4.8 miles of sewer conveyance pipeline with pump station and wastewater treatment plant upgrades. Microtunneling and jack and bore methods were employed to cross various obstacles including highways, National Park Service environmentally sensitive areas (ESAs), streams, wetlands, and hills.
5:00 PM	MA-T5-04	Wastewater	Superior Avenue Force Main Curved Microtunnel: Collaboration to Mitigate Project Risk	James Jones, P.E., Northeast Ohio Regional Sewer District; Justin Kolster, Super Excavators, Inc.; Richard Keith, Northeast Ohio Regional Sewer District; Brandon Meyer, Independence Excavating, Inc.; Vito Cimino, P.E., Stantec; Barry Doyle, P.E., Stantec	In order to eliminate potential damage to a historic building and two (2) large diameter water transmission lines, worked with the Contractor and Design Engineer to increase a 48-inch microtunnel to 60-inch to mitigate glacial soils/obstruction risks and curved the alignment to avoid settlement damage.
Monday Afternoon			Track 6: Sliplining	Session Leader: George Ragula	
3:45 PM	MA-T6-01	Wastewater	Little Cuyahoga Interceptor Hard Pipe Segmental Slip Line Replacement	James Shelton, ARCADIS; Dave Frank, ARCADIS; Chris Ryman, ARCADIS	Case study of an expedited design and construction of an 87-in. and 75-in. diameter brick interceptor using hard pipe segmental slipline. Project paralleled the Little Cuyahoga River with several tributary crossings. Paper focuses on construction phase aspects of the project.
4:10 PM	MA-T6-02	Wastewater	XXXL Slipline Rehabilitates 60 Year Old 144 RCP Pipe in LA County	Bijan Khamanian, Hobas Pipe USA; Abdou Seydi, Spiniello Companies; Anthony Howard, P.E., Los Angeles County Sanitation Districts	This is the largest pipeline rehab undertaken in Southern California and from the tunnel/pipe size, flows, and curved alignments, provided a great learning experience for the designer, contractor and manufacturer of the liner that would be beneficial for future projects.
4:35 PM	MA-T6-03	Wastewater	60-inch Sanitary Sewer Interceptor Rehabilitation under Submerged Groundwater Conditions - Lessons Learned	David Laughlin, Albuquerque Bernalillo County Water Utility Authority; Melanie Sikes, Carollo Engineers; Michael Rocco, AUL, Inc.	The construction techniques used to slip-line the pipe and rehabilitate manholes in submerged conditions, including the challenges with grouting the annular space, the methods used to maintain the access pits during slip-lining, the sealant techniques used for the manhole inserts, and the odor control equipment that was installed.
5:00 PM	MA-T6-04	Wastewater	Urban Tunneling in the City of Ottawa - A Case Study	Philipp Reeve, J.L. Richards & Associates Limited; Jonathan Knoyle, City of Ottawa	Replacement of a composite culvert section under an arterial roadway designated as a scenic entry route into Canada's capital city, outfalling to a World Heritage waterway, included a new tunnel driven using a Tunnel Digging Machine (TDM) and sliplining of the existing structure to achieve the hydraulic requirements.

TUESDAY, MARCH 27 - AM SESSIONS

Time	Paper ID	Industry Segment	Paper Title	Author(s)	Description
Tuesday Morning			Track 1: Manhole Rehab and I&I	Session Leader: George Kurz	
8:00 AM	TMI-TI-01	Wastewater	Menomonee Falls and the Case of the Leaky Laterals: A Case Study in PPII Reduction	Julie McMullin, Brown and Caldwell; Jeff Nettesheim, Village of Menomonee Falls; Andrew Lukas, Brown and Caldwell	Investigations including flow monitoring, storm ditch flooding with dyed-water, and lateral televising identified leaky laterals and a recurring defect in many of the laterals in a Menomonee Falls neighborhood. Consequently, 47 laterals were lined with cured-in-place pipe to reduce the private property infiltration and inflow (PPII) in the laterals.

Time	Paper ID	Industry Segment	Paper Title	Author(s)	Description
8:25 AM	TM1-T1-02	Wastewater	The Logic and Economics of Lateral Grouting—Decision Support Matrix Compares Trenchless Rehabilitation Technologies	Don Rigby, Avanti International; Marc Ancill, Logiball; Jeff Maier, C&L Water Solutions	The EPA makes a clear and compelling statement. Nationwide, nearly 50% of flow to the WWTPs is clean ground water from I&I sources. Small municipal utilities and large sewer districts attack this problem with different methodologies, however the ROI for taking ownership of the problem is immediate and sustainable.
8:50 AM	TM1-T1-03	Wastewater	I&I Abatement: Using the Trenchless Toolbox for Project Success	Brendan O'Sullivan, Murraysmith	The City of St. Helens, Oregon recently completed a multiyear I&I Abatement Program to reduce sanitary sewer overflows and reducing treatment plant costs. With a holistic approach to reduce I&I, the program rehabilitated 12-miles of sanitary sewer and installed 2-miles of storm sewer using open cut and trenchless installation techniques.
9:15 AM	TM1-T1-04	Wastewater	Improve Acid Resistance of Shotcrete for Sewer Tunnel Rehabilitation in Edmonton	Linping Wu, University of Alberta; W. Victor Liu, University of Alberta; Chaoshu Hu, The City of Edmonton	This paper is an update on the research progress of the acid resistant shotcrete project under NSERC Engage Grant in collaboration with the City of Edmonton. This project aims to investigate the use of pozzolans for improving the acid resistance of shotcrete for the sewer system.
9:40 AM	TM1-T1-05	Wastewater	CIPP Rehab for the Hespeler Trunk Sanitary Sewer	Bradley Marin, GHD Ltd.	The paper will discuss the process by which GHD Ltd. evaluated, designed and worked with the City and contractor to rehabilitate approximately 5600ft (1.400m) of 27- 24(675-600mm) diameter vitrified clay pipe and eighteen manholes varying in depth of up to 15ft.
Tuesday Morning			Track 2: HDD	Session Leader: Jim Murphy	
8:00 AM	TM1-T2-01	Water	Post-Disaster Trenchless Installation Of Water Pipelines In Napa, California	Michael Hether, City of Napa; Jon Marshall, Carollo Engineers	On August 24, 2014 the South Napa Earthquake caused extensive damage to Napa's water distribution system. Four leaking pipelines beneath Highway 29 were abandoned and replaced with directionally drilled pipelines. This paper describes the geotechnical findings, design development, and administrative challenges to implementing a FEMA funded project.
8:25 AM	TM1-T2-02	Water	HDD Enables Florida Utility to Serve Popular Tourist Location Without Interruption	Clifford Wilson, Dewberry Engineers; Dina Bautista, Dewberry Engineering; Benjamin Blitch, Bay County Utility; Sara Maloney, Underground Solutions	After the failure of a crucial potable water transmission main to the city of Panama City Beach two months before peak water demand, Bay County Utility Services of Florida utilized subaqueous horizontal directional drilling to replace the failed line and a similarly aged one with new fusible polyvinylchloride pipe.
8:50 AM	TM1-T2-03	Water	San Joaquin River HDD Crossing, Modesto, California	Dru R. Nielson, McMillen Jacobs Associates; Rachel Martin, McMillen Jacobs Associates; Ryan Sellman, Carollo Engineers; Janet Atkinson, MWH/Stantec; Ted Foltz, Michels Directional Crossings	The San Joaquin River HDD crossing will be 2,800 feet of 42-inch welded-steel recycled water pipeline installed at depths greater than 50 feet and within micaceous sands derived from the granitic Sierra Nevada. The pipeline is part of a regional program to increase water supply in central California.
9:15 AM	TM1-T2-04	Water	Application of HDD for Subsea Installation of Microporous Pipe for Intake for Ocean Desalination	Anthony Jones, Intake Works LLC	Horizontal Directional Drilling (HDD) from shore out under the seafloor is proposed for under the sea intake for salt water desalination in California. Boring is anticipated in October at Camp Pendleton and a 12- month water quality sampling program follows. California policy suggests a preference for subsea intakes for desalting.
9:40 AM	TM1-T2-05	Water	Separating Fire Flow from the Potable System and Adding Recirculation Pipes At Naval Air Station	Karen Lowe, CDM Smith; Clay Tappan, CDM Smith	The Naval Air Station Joint Reserve Base, New Orleans (NAS JRB NOLA) experiences water quality issues due to periods of low demand and oversized distribution pipelines. This paper presents a case study for pipeline design and HDD construction of multiple services (fire protection, potable and recirculation) within crowded utility corridors.
Tuesday Morning			Track 3: CIPP	Session Leader: Annalee Collins	
8:00 AM	TM1-T3-01	Wastewater	Utilizing UV Cure for CIPP Lining of a Small City Sewer System	Dave Hutton, SEH, Inc	This paper will present the results of the City of Medicine Lakes evaluation and selection of utilizing UV curing methods for their CIPP sanitary sewer rehabilitation project, and becoming the first City in Minnesota to use this method.
8:25 AM	TM1-T3-02	+ Other	A 10-in., 186-mi inversion lining undersea and a follow-up study after 30+ years	Aya Nakagawa, Ashimori Industry CO, LTD; Takashi Ashimori, Ashimori Industry Co., Ltd.	A challenging project of approximately 186-mi lining project installed more than 30 years ago will be given. A follow-up study to assess the integrity of the installed liner will be also shown.
8:50 AM	TM1-T3-03	+ Other	Turners Falls Main Drain and Siphon Rehabilitation	Ryan Graham, CDM Smith; Tom Bergeron, Town of Montague; Jonathan Kunay, CDM Smith	This paper will detail the challenges faced during the rehabilitation design of a heavily deteriorated 32-inch by 48-inch double brick wall drain line constructed in the late 1800's, as well as a double barrel concrete siphon, which were built beneath a canal located in the town of Turners Falls, Massachusetts.
9:15 AM	TM1-T3-04	Water/Wastewater	Upgrading Akron's Sewers - CIPP Lining Up to 72-inch Diameter	Aaron J. (A.J.), Smith, P.E., CCM; H.R. Gray - A Haskell Company	Akron, Ohio like other municipalities, has infrastructure approaching its useful life. To minimize the cost, time, and public disturbance of open-cut reconstruction, Akron is using trenchless CIPP Lining to upgrade many sewers within the city. The Tallmadge-Firestone Sewer Lining Project is an outstanding example, lining sewers up to 72-inch diameter.
9:40 AM	TM1-T3-05	Wastewater	A Cured In Place Pipe Rehabilitation Project Turned Bypass Pumping Project	Reace Fisher, Carollo Engineers, Inc.	The Dublin San Ramon Services District's Dublin Trunk Rehabilitation Project was implemented to rehabilitate approximately 8,000 linear feet of deteriorating 33, 36, 39, and 42-inch reinforced concrete trunk sewer that conveys approximately 50 percent of the District's wastewater flows, which involved creative bypass pumping techniques for successful project implementation.
Tuesday Morning			Track 4: Auger Boring	Session Leader: Mark Wade	
8:00 AM	TM1-T4-01	Wastewater	72/66 Jack and Bore Challenges encountered under CA 91-freeway and Carbon Creek Flood Channel	Raul Cuellar, Orange County Sanitation District; Brad Moore, Orange County Sanitation District; John Waggoner, McMillen Jacobs Associates	This paper discusses the major challenges encountered during construction of two jack and bore operations under California 91-freeway and Carbon Creek Flood Channel. The first jack and bore consisted of installation of a 66-inch casing for approx. 46-feet and the second of a 72-inch casing for approx. 600-feet.
8:25 AM	TM1-T4-02	Wastewater	Nevada County Sanitation District - Penn Valley Dual Force Main Project	Brad Torres, Nevada County Sanitation District No.1; Cindy Preuss, HydroScience Engineers, Inc.	This paper reviews the background, design, and construction of a new dual sewer force main to convey sewage from a new lift station in Penn Valley to the Lake Wildwood Wastewater Treatment Plant. Horizontal directional drilling, boring and jacking, pipeline suspension, and traditional open-cut trenching techniques were utilized for construction.
8:50 AM	TM1-T4-03	Wastewater	Groundwater Impacts on Sewer Relocation Using Trenchless Technologies Near and Under I-405 in Renton, Washington	Erik Waligorski, Carollo Engineer; Dave Christensen, City of Renton, WA; Mike Benoit, City of Renton, WA	This paper looks at the alternative construction methods used to relocate existing sewer lines to make way for a new freeway interchange in Renton, Washington and how the trenchless construction was impacted by localized groundwater conditions.
9:15 AM	TM1-T4-04	Wastewater	Navigating a Difficult Crossing in New York Using a Remotely Operated Boring Machine Setup	Joe Lechner, The Robbins Company; Mark Case, Case Boring Corporation	A unique, remotely operated auger boring solution was utilized at New York's North Aurora Pump Station Elimination Project on a particularly difficult crossing. The technology allowed for remote steering on line and grade at rates of 25 to 30 ft per day in shale rock.
9:40 AM	TM1-T4-05	+ Other	Guided Slip Bore, Settlement and Sinkhole Development on a 5 m High Railway Embankment	Mustafa Yulek, CCI Inc.	The paper will analyze the root causes of settlement and sinkhole development experienced on a 5 m high railway embankment, resulting from a guided slip bore installation of a 42 inch casing pipe. Geotechnical conditions will be summarized and lessons learned for future projects will be presented.
Tuesday Morning			Track 5: Microtunneling	Session Leader: Brenden Tippets	
8:00 AM	TM1-T5-01	Water/Wastewater	Trenchless Crossings Play Critical Role in Large Infrastructure Design Project	Darren Baune, Carollo Engineers; Matthew Wallin, Bennett Trenchless Engineers	The City of Modesto initiated the River Trunk Realignment Project to relocate and replace the River Trunk Pipeline(s) to increase resiliency of critical infrastructure. The Project is the largest infrastructure project in the City's history.

Time	Paper ID	Industry Segment	Paper Title	Author(s)	Description
8:25 AM	TMI-T5-02	Wastewater	Analysis of Trenchless and Conventional Technologies Utilized for Installation of 5.55OLF of Relief Sewer	John Ososkie, CH2M Hill, Eric Muir, CH2M Hill, Jason Waterbury, Metropolitan District Commission	The Metropolitan District Commission and CH2M have prepared this paper to discuss the tunneling and open cut excavation design alternatives evaluation and philosophy for rating construction options, factors that affect selection of trenchless technologies, risks and contingencies related to trenchless installation and minimization of risks by proper contract document preparation.
8:50 AM	TMI-T5-03	Water/Wastewater	Microtunneling with Water Only Can Cause Over Excavation	Glenn Boyce, McMillen Jacobs Associates, Norm Joyal, McMillen Jacobs Associates	Slurry microtunneling counterbalances earth and groundwater pressures by using a bentonite drilling fluid. This drilling fluid stabilizes the ground. When no bentonite is used, over-excavation and settlement can occur. This paper discusses using bentonite and how the new Microtunneling Standard should be modified to provide further clarification on the matter.
9:15 AM	TMI-T5-04	Water/Wastewater	Analysis of Jacking Loads for Microtunneling Projects in Western Canada - A Case Study	Erez Allouche, Stantec	Estimate of the maximum jacking load anticipated to develop during a given microtunneling drive impact several design and construction aspects of such a project. The accuracy and generality of commonly used predictive models are evaluated by comparing their predictions with jacking load measured on eighteen recently completed microtunneling drives.
9:40 AM	TMI-T5-05	Water/Wastewater	Assessing Abrasivity and Wear Risks for Microtunneling in Ground with Cobbles and Boulders	Steven Hunt, CH2M	An assessment of tunnel zone ground abrasivity to estimate wear of cutters, cutterhead, rock crusher and mucking system is a very important component of risk management for microtunneling in ground with gravel, cobbles and boulders. Abrasion and wear including breakage of cutters and rock crusher components is due to the combined effects of soil matrix abrasivity and the effects of cobbles and boulders. This paper explains how to determine soil matrix abrasivity and combine it with cobble and boulder characterization data from subsurface investigation to estimate total ground abrasivity to help select the right microtunneling equipment and payment methods.
Tuesday Morning		Track 6: Water Main Rehab- CIPP			Session Leader: Jason Schiro
8:00 AM	TMI-T6-01	Water	San Jose Water Company - Orion CIPP Project	Thanh Nguyen, San Jose Water Company, Sandie Dudley, HydroScience Engineers, John-Carlo Cuevara, San Jose Water Company	This paper reviews CIPP rehabilitation of an existing 12-inch water main. San Jose Water Company included the option for utilizing this technology with an aging pipeline located beneath railroad tracks and within limited easements as part of their Orion Project to assess the merits of CIPP for future rehabilitation opportunities.
8:25 AM	TMI-T6-02	Water	The City of Miami Beach Utilizes CIPP to Structurally Renew 20 Water Main Crossings	David P. Kozman, P.E., Hammer-Head Trenchless, Fred Tingberg, Jr., Lanzo Companies, Bruce Mowry, Ph.D., P.E., City of Miami Beach	This paper describes the Class IV, fully structural cured-in-place pipe (CIPP) lining of 20 cast iron potable water main crossings for the City of Miami Beach, FL in July 2016.
8:50 AM	TMI-T6-03	Water	Highlighting Innovation and Sustainability by Renewing AC Pipelines with Cured-In-Place Pipe	Tara Sweet, East Bay Municipal Utility District, David Katzew, East Bay Municipal Utility District, Tim Harris, East Bay Municipal Utility District	In 2016-17 East Bay Municipal Utility District (EBMUD) completed a 2.5-mile pilot program to evaluate the structural rehabilitation of asbestos cement pipelines with cured in place structural liner. This paper reviews the methods, results, challenges, and recommendations of the pilot.
9:15 AM	TMI-T6-04	Water/Wastewater	Comparison of resin systems for CIPP in pressure pipe applications	Gerhard Bohme, ANDARA llc	A comparison of resin systems for the CIPP rehabilitation of pressure pipes. Epoxy and vinyl ester systems including a new non-styrene containing option will be compared for mechanical properties, processing characteristics and finished liner performance
9:40 AM	TMI-T6-05	Water	Learning about UV CIPP versus steam and water cure CIPP in Portland Oregon	Mark Hutchinson, City of Portland	This paper will explain how the steps the City of Portland went through to gain experience with UV CIPP on three projects, and what we learned about how UV CIPP compared with steam and water cure CIPP.
Tuesday Morning		Track 1: Emerging Technologies			Session Leader: Will Craven
10:20 AM	TM2-T1-01	Wastewater	Competitive Tendering of Alternative Sewer Rehabilitation Technologies for Large Diameter and Non-Circular Applications	Adam Braun, AECOM Canada Ltd., Chris Macey, AECOM Canada Ltd., Stacy Courmoyer, AECOM Canada Ltd.	This paper discusses efforts undertaken by AECOM to tender alternative large diameter and non-circular sewer rehabilitation technologies in a competitive manner, including Cured In Place Pipe (CIPP), Glass Reinforced Polymer (GRP) sliplining, Centrifugally Cast Concrete Pipe (CCCP), spiral wound PVC strip lining, and bonded FRP liners
10:45 AM	TM2-T1-02	Water/Wastewater	Evaluating Arrow Bore™ - a case study of a patented technology from the Engineers perspective.	Michelle Macauley, Jacobs Engineering, David Landing, Jacobs Engineering	As part of a large diameter water main rehabilitation project, three parallel bypass pipelines were installed under roadways in West Palm Beach, Florida. Post-award, the Contractor proposed the patented ArrowBore™ process in lieu of HDD. This paper discusses ArrowBore technology, outlines our concerns and discusses how construction progressed.
11:10 AM	TM2-T1-03	Water	How Rehab...Pipe Rehab...is Renewing the Infrastructure of Las Vegas	Ryan Benner, Las Vegas Valley Water District, Mike Ambroziak, CPM, LLC	Las Vegas Valley Water District (LVVWD) has been proactively managing its infrastructure utilizing innovative technologies to minimize social, economic, and environmental impacts. This presentation will summarize the process taken by LVVWD for the rehab of two water pipelines (8 and 16 inch) critical to the operation of their system.
11:35 AM	TM2-T1-04	Other	Lengthy Crossings Shortened by Direct Pipe Technology	Matt Smith, Michels Corporation, Tucker Toelke, Michels Corporation	Horizontal Directional Drilling (HDD) often requires deep installations to facilitate construction in subsurface conditions that can withstand anticipated annular pressures. The Direct Pipe® installation method is capable of operating within various types of geotechnical formations at much shallower depths with little risk of an inadvertent fluid release.
Tuesday Morning		Track 2: HDD			Session Leader: Diana Worthen
10:20 AM	TM2-T2-01	Other	Initial Experimental Investigation Into Clogging Potential During Tunnelling/Drilling	Chao Kang, University of Alberta, Yichen Wu, University of Alberta, Alireza Bayat, University of Alberta	Development of a new apparatus to assess the clogging potential and the evaluation of the new apparatus through comparing the results with that from conventional assessment methods.
10:45 AM	TM2-T2-02	Other	HDD Damages to Other Utilities: Problems and Solutions	James Anspach, Cardno, Inc.	HDD methods are a cost effective way of emplacing new facilities. However, when proper site engineering is not performed, or performed inadequately, terrible things can and do happen. This paper will review recent cases, causes, and issues surrounding cases that went to litigation from the perspective of the expert.
11:10 AM	TM2-T2-03	Other	Study of the Cleaning Capacity of Drilling Fluid in Horizontal Direction Drilling	Sai Deng, University of Alberta, Nero Gao, University of Alberta, Alireza Bayat, University of Alberta, Manley Osbak, The Crossing Company Inc., Kristin Barr, Evolution Energy Services	Hole cleaning is always one of the major concerns in HDD project. The conventional rheological model cannot meet the needs in HDD. Based on Herschel-Bulkley (H-B) model, an experimental procedure, together with a calculation method are recommended to evaluate the cleaning capacity of drilling fluid.
11:35 AM	TM2-T2-04	Other	Strategies for Combating Rock	Tod Michael, Vermeer Corporation, Curt Dubbins, Mincon, Inc.	This presentation will supply you with guidelines for selecting the best available horizontal directional drilling technology and tools for the rock conditions you may face as a utility installation contractor, project planner or civil engineer.
Tuesday Morning		Track 3: Geotechnical Issues			Session Leader: Robin Dornfest & Don Del Nero
10:20 AM	TM2-T3-01&02		Claims Forum		
11:10 AM	TM2-T3-03	Water/Wastewater	Understanding Geologic History When Selecting Trenchless Installation Methods	Bradford Miller, Haley & Aldrich, Inc., Dennis Doherty, Haley & Aldrich, Inc. Bedford, NH	This presentation uses two case studies to demonstrate the controlling effects geology has on trenchless crossings, and emphasizes that understanding the geologic history of an area is imperative for the trenchless design engineer. Brief guidance on locating geologic references and resources will also be discussed.

Time	Paper ID	Industry Segment	Paper Title	Author(s)	Description
11:35 AM	TM2-T3-04	Water/Wastewater	Frisco Extends Reuse System along Busy Commercial Corridor using 2,500-foot Horizontal Directional Drill	Clayton Barnard, Freese and Nichols, Inc.; Art Hartle, City of Frisco; Marvin Lee, Underground Solutions	The rapid population growth, recent drought conditions, and limited overall water resource options triggered the City to extend its existing reuse system to use treated wastewater for irrigation. 10,000 feet of 12-inch reuse pipeline was installed, including 2,500 feet of HDD installations under busy traffic.
Tuesday Morning			Track 4: Pipe Jacking	Session Leader: Mohammad Najafi	
10:20 AM	TM2-T4-01	Water/Wastewater	Using Open Face Shields and Pipe Jacking to Handle Ground with Cobbles and Boulders	Glenn Boyce, McMillen Jacobs Associates; Rick Smith, McMillen Jacobs Associates; Mark Havekost, McMillen Jacobs Associates; John Waggoner, McMillen Jacobs Associates	Open face shields and pipe jacking can be an effective method especially when cobbles, boulders, and buried objects may be in the pipe horizon. This paper describes recently completed projects where an open face shield was successfully used to mine through ground containing cobbles and boulders.
10:45 AM	TM2-T4-02	Other	New Jet Pump Technology for long-distance pipe jacking and HDD crossings in highly permeable soil	Dr. Gerhard Lang, Herrenknecht AG	Originally developed and successfully tested for HDD crossings in highly permeable soil, the innovative Jet Pump system has now been implemented into Slurry Microtunnelling technology to make long-distance drives of more than 1,000m possible, also for diameters smaller than 30.
11:10 AM	TM2-T4-03	Water/Wastewater	Successful Open Shield Pipe Jacking through Reservoir Embankment	Marshall McLeod, East Bay Municipal Utility District (EBMUD); Evan Wheeler, Pipe Jacking Trenchless, Inc.	Two nominal 48-inch casing pipelines (total length 600 feet) have been successfully installed by open shield pipe jacking through a former open-cut reservoir embankment, which consisted of mainly weathered rock for the tunnel horizon. HDPE carrier pipes have been installed for storm water and reservoir overflow service.
11:35 AM	TM2-T4-04	Wastewater	Redwood City, CA completes soft Bay Mud trenchless crossing of US Highway 101	James Bowland, Kennedy/Jenks Consultants; Brad Moore, Stahlie Trenchless	The Redwood City Walnut Street Interceptor Project increases capacity of the Redwood City's trunk sewer to move raw wastewater under US Highway 101 to the Redwood City Pump Station. This project used open shield pipe jacking to directly install 360 LF of RCP sewer pipe in soft bay mud.
Tuesday Morning			Track 5: Project Planning & Delivery	Session Leader: Matt Wallin	
10:20 AM	TM2-T5-01	Other Gas	TBA	Robert Hotz, Laney Directional Drilling; Alan Snider, Laney Directional Drilling; Maureen Carlin, Laney Directional Drilling; Brian Carpenter, Laney Directional Drilling	Deciding which trenchless construction method is most appropriate can be a difficult decision for project owners and trenchless engineers. This paper examines the selection criteria for both Direct Pipe® Method and Horizontal Directional Drilling (HDD) and discusses how to achieve the greatest overall value for trenchless crossing projects.
10:45 AM	TM2-T5-02	Water/Wastewater	Difficult Situations Require Ext-REAM Measures: How Pipe Reaming Was Selected to Rehabilitate Easement Sewer Mains	Jonathan Tristao, Mott MacDonald; Donald Chang, City of Burlingame	This paper describes the design process and reasoning that lead to the specification of pipe reaming and open cut as rehabilitation methods for sewer mains in difficult to access, overgrown easements in the city of Burlingame, California.
11:10 AM	TM2-T5-03	Wastewater	Eliminating Sewer Infiltration within the Region of Halton	Patrick Moskwa, Robinson Consultants; Jasna Filipovic, Region of Halton; Kevin Bainbridge, Robinson Consultants	The Silver Creek Sanitary Trunk Sewer was constructed in 1968. Located in the Silver Creek Valley, the sanitary trunk sewer conveys the majority of the sanitary sewage flow from Georgetown to the Georgetown wastewater treatment plant. The sewer has exhibited large amounts of infiltration which require rehabilitation.
11:35 AM	TM2-T5-04	Water/Wastewater	Bringing the 120-year-old Historic Sault Ste. Marie Canal Powerhouse into the future.	Gerald Bauer, Stantec Consulting Ltd; Dhruva Subedi, Parks Canada; Pierre Wilder, Stantec Consulting Ltd.	The Sault Ste. Marie Canal - a Canadian National Historic Site commemorates an outstanding example of Canadian engineering achievement. This paper focuses on the condition assessment of the steel penstock and discharge pipes. The challenges, approach, condition assessment technologies, and findings will be described in this paper.
Tuesday Morning			Track 6: Wastewater Rehab	Session Leader: Brenda Kingsmill	
10:20 AM	TM2-T6-01	Wastewater	Rehabilitating a Critical Large Diameter Sewer Under a Levee and a Historic Park	Mathew Roder, Greeley and Hansen; Aaron Hughes, Washington Suburban Sanitary Commission; Glen Diaz, Washington Suburban Sanitary Commission	At 102 inches, the Anacostia Trunk Sewer is the largest, most critical pipe in WSSC's collection system. The trenchless rehabilitation of this pipe was supported by a bypass system that maximized the use of existing facilities and by separating the work into multiple contracts to maximize bidder interest.
10:45 AM	TM2-T6-02	Wastewater	Holistic Trenchless Rehabilitation for Wastewater Collection Systems	Jeff Maier, C&L Water Solutions, Inc.	Holistic rehabilitation, defined as the strategic utilization of multiple, complementary types of trenchless technologies applied in combination to achieve highly effective, best value solutions for sewer system infiltration and corrosion rehabilitation projects is introduced. Advantages and technical considerations of using this approach, including project case study examples, will be discussed.
11:10 AM	TM2-T6-03	Wastewater	Guaranteed Outcome Delivery for Sewer Rehabilitation - The HRSD Collaborative Design/Build Sewer Rehabilitation Pilot	James Shelton, Arcadis; Emily Sadowsky, Arcadis	A case study in the implementation of a \$12M Guaranteed Outcome Design-Build sewer rehabilitation where payment basis included a time and materials cost-only reimbursable amount to an agreed upset and a lump sum success fee amount only paid upon achieving 100% of the project flow reduction goal.
11:35 AM	TM2-T6-04	Wastewater	Regional Wastewater System to Providing Environmental Stewardship While Allowing Development of Fast Growing Communities	Matt Goudy, North Red Deer Regional Wastewater Services Commission; Cody Gillirie, Stantec Consulting; Joel Sawatzky, Stantec Consulting	The North Red Deer Regional Wastewater Services Commission and Stantec Consulting undertook the construction of a 29km wastewater transmission system to serve the needs of the rapidly growing member communities. The construction required an expedited schedule and had many challenging trenchless crossings across highways, railways, and a river, among others.
Tuesday Afternoon			Track 1: Condition Assessment	Session Leader: Marc Lehmann	
3:30 PM	TA-T1-01	Water	How to Use Multiple Condition Assessment tools to make watermain rehabilitation decisions.	Paul Pasko, SEH, Inc; Greg Kottsik, City of Fridley, Minnesota	The City of Fridley, Minnesota needed to determine exactly where and how their watermain crossed I-694 prior to issuing bid documents for a CIPP watermain lining project in order to accurately convey to prospective bidders. Using both a push camera and ROV they were successful in achieving their goals.
3:55 PM	TA-T1-02	Water	Higher Education - University of Ottawa Investigates to Identify Underground Infrastructure Academic Grade	Piero Salvo, GAME Trenchless Consultants; Michael Sparling, University of Ottawa	The University of Ottawa decided to investigate all campus underground infrastructure, both water and sewer with the intention of prioritizing future maintenance and capital investments. The water main inspection was to be done without any interruptions. This paper will present challenges and findings of these live inspections
4:20 PM	TA-T1-03	Water	Del-Co Raw Water Pump Station River Tap	Jim Mantes, Michels Corporation	The Del-Co Raw Water Pump Station project was constructed north west of Columbus, OH. The project included a microtunnelled water intake structure. The microtunnel drive was launched from an excavation on the bank of the Sioto River and terminated in the river bottom with a wet retrieval.
4:45 PM	TA-T1-04	Water	Tiered Approach for the Condition Assessment of 50-year old Steel Waterline with History of Breaks	Steve Simon, City of Aurora; Craig Vanhorn, CH2M; Liv Haugen, CH2M; Annalee Collins, CH2M	A tiered approach is used to evaluate pipe condition and estimate remaining useful life to select condition assessment methods, technologies, and rehabilitation strategies. By applying cost effective strategies, this approach minimizes risk and maximizes the value of information, allowing the City to make informed decisions regarding improvement of aging infrastructure.
5:10 PM	TA-T1-05	Water	Recent Advances on Condition Assessment Technologies for Metallic Water Transmission Mains	Ahmad Habibian, CDM Smith	The objective of this presentation is to offer a realistic account of the capabilities and limitation of condition assessment and inspection technologies for metallic water transmission mains. Case histories will be included in the presentation to illustrate the practical applications of such tools and the importance of planning and coordination.

Time	Paper ID	Industry Segment	Paper Title	Author(s)	Description
Tuesday Afternoon			Track 2: HDD		Session Leader: Jon Robison
3:30 PM	TA-T2-01	Water/Wastewater	Billings Heights Uses HDD and Jack-and-Bore to Install New 24-inch and 12-inch Lines	Bill Enright, Interstate Engineering; Duke Nieskens, County Water District of Billings Heights; Peyton Brookshire, County Water District of Billings Heights; Marvin Lee, Underground Solutions	With the need for additional storage and rapid growth through the last decade in Billings, 12 and 24-inch transmission lines were installed to convey water from Ox Bow Reservoir and eliminate the need of three existing booster pump stations. HDD and Jack-and-Bore methods were required to cross multiple sensitive surfaces.
3:55 PM	TA-T2-02	Gas	Gravels in HDD: Impact, Mitigation and Lessons Learned	Carrie Murray, Stantec Consulting Ltd.; Erez Allouche, Stantec Consulting Ltd.	Gravels in horizontal directional drilling (HDD) projects continue to be a challenge across North America. Their negative impacts are many and varied, which contribute to cost overruns, schedule delays and in the worst cases, an incomplete installation. Through case histories, this paper provides significant lessons learned and mitigation strategies.
4:20 PM	TA-T2-03	Gas	Formational Fluid Loss and Inadvertent Returns Risk in Sedimentary Rock HDD Construction	Jonathan Robison, GeoEngineers, Inc.; Mark Miller, GeoEngineers, Inc.	This paper will discuss formational fluid loss and inadvertent surface fluid returns risk for HDDs constructed in sedimentary bedrock.
4:45 PM	TA-T2-04	Gas	Abandoned Coal Mines Make for Challenging HDD Design and Installation	Jason Lueke, Associated Engineering; Amber McQuarrie, ATCO Pipelines; Patrick Bain, ATCO Pipelines; Renato Clementino, Thurber Engineering; Niels Rasmussen, Thurber Engineering; Tamer Elshimi, Thurber Engineering	This paper discusses the geotechnical design and construction methodologies utilized to successfully complete a 700 m long HDD crossing of the Whitemud Creek through abandoned coal mine workings in the City of Edmonton, as part ATCO Pipelines Southwest Edmonton Connector (SWEC) program.
5:10 PM	TA-T2-05	Wastewater	Construction Induced Vibration Case Histories for HDD and Direct Pipe Installations	Anil Dean, Stantec; Jon Pearson, Stantec	DirectPipe® and HDD installations are used for increasingly challenging utility crossings near sensitive structures and utilities. Associated vibration and ground movement is a common stakeholder concern when construction occurs near homes, businesses, and utilities. This paper details two case histories to help inform the development of vibration specifications.
Tuesday Afternoon			Track 3: CIPP		Session Leader: Bill Moore
3:30 PM	TA-T3-01	Water/Wastewater	Curing Method - Heat or UV? Potential effect on CIPP resin properties	Shaurav Alam, Trenchless Technology Center, Louisiana Tech University; John Matthews, Trenchless Technology Center, Louisiana Tech University; William Johnston, Louisiana Tech University; Sven Eklund, Louisiana Tech University	This paper focuses on ASTM standard Tests and Raman Spectroscopy Study on Heat and UV Cured CIPP Resin Samples. Study includes ASTM D638, D790, and D2240 tests performed on coupon samples. Raman spectroscopy studied using an HR3000. Study showed minor deviation. Further work recommended for conclusive results.
3:55 PM	TA-T3-02	Water/Wastewater	Emergency Pipeline Rehabilitation Ensures Raw Water Supply to Domtar Paper Mill	Robert Culwell, Carollo Engineers; Mike Fleury, Carollo Engineers; Jonathan Herrboldt, Carollo Engineers, Inc.	The Southwest Arkansas Water District contracted Carollo Engineers for site evaluation, development of project alternatives, and design/build services for emergency installation of cured-in-place pipes to repair twin inverted siphons while maintaining continuous raw water flow of up to 70 million gallons per day to the Domtar Paper Mill.
4:20 PM	TA-T3-03	Water/Wastewater	Making The CIPP Process Easier And More Reliable	Benjamin Hazen, Interplastic Corporation	A significant need for the CIPP process was to develop resin systems that are available in all geographic locations, markedly easier and safer to use without sacrificing any of the performance attributes of traditional systems. This paper describes such systems
4:45 PM	TA-T3-04	Water/Wastewater	Best Value Engineered Design for a Sealed CIPP Collection System	Bevin Beaudet, Bevin A. Beaudet, P.E., LLC; Norman 'Ed' Kampbell, Rehabilitation Solutions LLC; Tim Back, Back Municipal Consulting; Gerhard 'Gerry' Muenchmeyer, Muenchmeyer Associates, LLC	Successful trenchless rehabilitation projects require watertightness, whole system rehabilitation and sustainability which should result in a system as good as new. This paper is focused on trenchless sewer lateral lining and covers: technical discussion, test data and case studies comparing ASTM-2561-compliant hydrophilic gasket seals with adhesive-based seals.
5:10 PM	TA-T3-05	Water/Wastewater	Engineering the Empire	Ian Lancaster, Aegion Corporation; Rick Baxter, Insituform Technologies, LLC	After a brine spill, cured-in-place pressure pipe was used to rehabilitate a 24-inch PVC line carrying salty wastewater. This paper will discuss the reinforced glass tube product, design criteria and installation.
Tuesday Afternoon			Track 4: Water Main Rehab		Session Leader: Kalyan Piratla
3:30 PM	TA-T4-01	Water	Tight Fit - Manned Internal Repair of a 385 LF 30-inch Pipeline	Jan Chwiedosiuk, Middlesex Water Company; David Tanzi, CDM Smith; Anna Pridmore, Structural Technologies	Middlesex Water Company encountered a challenging pipeline leak involving a 30-inch diameter PCCP main under a major roadway. Carbon fiber-reinforced polymer was installed to provide a fully structural repair, and the project included several unique safety and logistical issues which had to be properly managed to successfully implement the repair.
3:55 PM	TA-T4-02	Water	Replacement of 700 Lead Water Service Pipes in the City of Montréal	Manli Joelle Chen, Ville de Montréal; Abdelwahid Bekkouche, City of Montreal	A contract to replace 700 lead water service pipes in the City of Montréal was awarded in 2016. This paper is a case study that includes a description of the work methodology, a cost analysis, the challenges and limitations encountered under the contract.
4:20 PM	TA-T4-03	Water	South Ogden Country Club Drive Pipeburst Project	Greg Seegmiller, JUB Engineers Inc.; Benjamin Quick, Pineview Water Systems; June Bateria, Underground Solutions, Inc.	Ogden is one of Utah's oldest cities whose infrastructure dates back to the early 1900s. Its water system is reaching the end of its life expectancy and solution was needed to rehabilitate and replace its overpopulated city's waterlines with minimal disturbance to residents.
4:45 PM	TA-T4-04	Water	Laramie 20-inch Water Transmission Line Rehabilitation Project	Sean, Boris, United Pipeline Systems	Assessment of a 20-inch water transmission line resulted in the need for rehabilitation. This paper will detail how the contractor installed roughly 18 miles of HDPE liner in just 17 weeks, exceeding the expectations of the City of Laramie, the Wyoming DOT and the general public.
5:10 PM	TA-T4-05	Water	LADWP Abstract	Alvin Bautista, LADWP; Jeff Coffman, Sanexen Water	Los Angeles Department of Water and Power completed a pilot project to evaluate a fully structural, Class IV, CIPP liner to rehabilitate a residential cast iron water main. Following the completion of the pilot project, LADWP proceeded to extract 6 samples of lined pipes and did a comprehensive evaluation.
Tuesday Afternoon			Track 5: Pipe Jacking & Pilot Tube		Session Leader: Johnathan Kunay
3:30 PM	TA-T5-01	Water/Wastewater	Revised Method for Estimating Microtunnelling Jacking Forces	Alex Burnett, Hatch	In this paper, data from recent Ontario microtunnel installations is compiled and categorized by soil type to observe trends in field-recorded jacking forces. The results are discussed and a revision to available methods for estimating jacking forces and microtunnel drive lengths is proposed.
3:55 PM	TA-T5-02	Other	Fossil Creek Pedestrian Tunnel, A Unique Project Design and Delivery Method	Robin Dornfest, Lithos Engineering; John Beckos, BT Construction; Lance Heyer, Lithos Engineering	Seventy feet of 14-foot diameter steel pipe was jacked through the railroad embankment and was kept on line-and-grade and supported by steel guide rails filled with concrete, installed with a GBM system. The project was designed and constructed using a delivery method unique to the City of Fort Collins.
4:20 PM	TA-T5-03	Water/Wastewater	Successful Risk Management on Challenging Trenchless Project Involving Multiple Boulders	Joel Stahehl, Stahehl Trenchless Consultants; Kimberlie Stahehl, Stahehl Trenchless Consultants; Mark Hutchinson, City of Portland, Bureau of Environmental Services	Geotechnical Baseline Reports are used to manage trenchless risk with mixed results. Construction managers often execute GBRs without knowledge of intended implementation, resulting in confusion and claims. This paper presents a pipe-jacking case history where several obstructions were encountered and how the GBR was effectively used to avoid construction claims.

Time	Paper ID	Industry Segment	Paper Title	Author(s)	Description
4:45 PM	TA-T5-04	Water/Wastewater	Pilot Tube and Front Steer Guided Boring Through 7,900 Feet of Clay Soils	David Mathy, DCM Consulting, Inc.; Nancy Molina, Central Contra Costa Sanitary District; Damasio Zepeda, Aragon Central Contra Costa Sanitary District	This project case history presents significant and valuable lessons learned from design and construction of over 7,900 feet of trenchless new pipeline installation of 18 to 24 inch gravity trunk sewers including a unique comparison of pipeline installation by Pilot Tube Guided Boring and Front Steer Guided Boring.
5:10 PM	TA-T5-05	+ Other	The Application of Three Tunneling Methods in a 500-m Storm Tunnel	Chaoshi Hu, Integrated Infrastructure Services, City of Edmonton; Siri Fernando, SMA Consulting Ltd.; Minnan Liu, City of Edmonton; Sam Samarakoon, City of Edmonton	The Mill Woods Double Barrel Replacement project involves the construction of a 16 meter to 37 meter deep, 2340 mm to 3500mm in diameter, and 3.3 km long storm trunk sewer in City of Edmonton (City). This paper will describe the geotechnical and schedule challenges, additional geotechnical investigations, the procedure for selecting tunneling methodologies and redesigns implemented for the remaining section of tunnel.
Tuesday Afternoon			Track 6: Sliplining	Session Leader: Dave Crowder	
3:30 PM	TA-T6-01	Water/Wastewater	The Rehabilitation of the Hamilton Mountain Trunk Sewer	David Crowder, R.V. Anderson Associates Limited; Erika Waite, City of Hamilton; Tyler Lahti, R.V. Anderson Associates Limited	This paper will focus on the past sewer investigations, the ongoing rock movement monitoring program, and the large diameter slip line trenchless repair to the Hamilton Mountain Trunk Sewer
3:55 PM	TA-T6-02	Water/Wastewater	Emergency Sewer Force Main Rehabilitation in Valley Forge National Historic Park	Sean Boris, United Pipeline Systems	Tredyffrin Township faced three catastrophic failures of a 30-inch prestressed concrete cylinder pipe between 2012 and 2014. This paper will give an overview of the emergency repair project using an HDPE lining solution on the 18,000-foot force main located at Valley Forge National Historic Park.
4:20 PM	TA-T6-03	Water/Wastewater	Denver Gets 500-year Service Life by Sliplining Sewers with Fiberglass Pipe	Bijan Khamanian, Hobas Pipe USA; Michael Rocco, AUI Inc.	Busy downtown Denver sewers were sliplined with 3,100 Lf of 48, 54 and 66 Hobas Centrifugally Cast FRPM pipes as part of PAR-1250 project. Both CIPP and SLIPLINE methods were used in this project at a very tight quarters. Paper will discuss the design and installation of this system.
4:45 PM	TA-T6-04	Water	Virgin Valley HDD Cased Crossing	Gary Ashby, Forsgren Associates Inc; June Bateria, Underground Solutions, Inc.	The Virgin Valley Water District (VWD) required a replacement water supply line to transport potable water from water supply diversion points south of the Virgin River to storage facilities and users north of the river. Installation would necessitate crossing the Virgin River east of the Riverside Road Bridge.
5:10 PM	TA-T6-05	Water/Wastewater	Important Factors when Determining Design Loads for Reline Applications	Mitch Hardert, CBC Engineers and Associates, Ltd.; Hugh Mickel, Contech Engineered Solutions	This paper will review current methods contained within various specifications that are available to help determine design loads for reline applications. It will also discuss applicability of these sources of information. Finally, it will present a number of considerations that can be important factors in determining design loads for reline.

WEDNESDAY, MARCH 28 - AM SESSIONS

Time	Paper ID	Industry Segment	Paper Title	Author(s)	Description
Wednesday Morning			Track 1: Gas	Session Leader: Dennis Walsh	
8:00 AM	WM-T1-01	Gas	High Pressure (HP) Natural Gas Main CIPL Renewal Project Through a Golf Course	George Ragula, Public Service Electric & Gas Co.	This project involves CIPL renewal of approximately 3,500 ft of 12-in. diameter HP cast iron gas main located in a golf course scheduled to hold the PGA Championship in September 2016 as part of a planned replacement program. Outdated maps and records created planning challenges.
8:25 AM	WM-T1-02	Gas	Solidification Solves Drilling Fluid and Cuttings Disposal Problems in Toronto Canada	James Murphy, Universal Pegasus International; Tyler Horton, Enbridge; Andrew McNabb, MetaFLO Technologies; Nick Gannon, Allstream Waste Solutions	Dealing with large volumes of wet cuttings and drilling fluids from trenchless installations is a major problem particularly in urban areas. Solidification of the wet cuttings and fluid is a solution that has been successfully employed recently on large HDD installations in Toronto.
8:50 AM	WM-T1-03	Gas	What to Do When Your As-Builts are Not As-Found!	Mary Neher, Bennett Trenchless Engineers; Joshua Hampton, Pacific Gas and Electric; Sean Dearborn, Pacific Gas and Electric; Brian Avon, Colder Associates, Inc.	This paper describes the design and construction of a complex trenchless crossing of a major California highway for a 36-inch natural gas transmission pipeline in the congested cities of Newark and Fremont, CA. The microtunnel required a dig-up due to an unknown obstacle but was ultimately successful.
9:15 AM	WM-T1-04	Gas	ORFEUS - Real-Time Obstacle Detection for HDD	Dennis Jarnecke, GTI; Aaron Rezendez, PG&E	ORFEUS is a project which is developing safe, cost effective and fast radar-assisted Horizontal Directional Drilling (HDD) equipment. Operating within the drilling head of HDD systems, the ORFEUS HDD radar provides the operator with real-time obstacle detection needed to increase the safety of HDD operations.
9:40 AM	WM-T1-05	Gas	Refinements in pipe bursting Tooling make it a preferred technique for gas line replacement	Dustin Hagg, Columbia Gas of Pennsylvania & Maryland; Alan Goodman, HammerHead Trenchless; John Hrabosky, HammerHead Trenchless	Originally created for the natural gas industry more than 30 years ago, the pipe bursting technique has proven to be an effective, economical trenchless pipe replacement method for quickly upsizing or replacing plastic, cast iron, ductile iron and even steel gas line mains and services.
Wednesday Morning			Track 2: Project Planning & Delivery	Session Leader: Cindy Preuss & Firat Sever	
8:00 AM	WM-T2-01&02		Close Fit & Sliplining Technologies Forum		
8:50 AM	WM-T2-03	+ Other	A Discussion of Design-Build Framework for High Profile HDD Crossing Projects	Kerby Primm, Laney Directional Drilling; Maureen Carlin, Laney Directional Drilling	This paper will discuss how the Design-Build Project Delivery Method has gained popularity in recent years with both private owners as well as public agencies and discusses three current high profile trenchless crossing projects that are in various stages of the design-build process.
9:15 AM	WM-T2-04	+ Other	It Is Not as Simple as Just a Line On A Piece of Paper	Dennis Doherty, Haley & Aldrich	Too many engineers think it is as simple as drawing a line on a piece of paper when they are designing new trenchless installations, and put it on the contractor to install, even if they are impossible. This leads to added risk to owner and third party.
9:40 AM	WM-T2-05	Water/Wastewater	Archimedes' Principle - An Uncommon Carrier Pipe Installation Method	Eddie Lyons, P.E., Mladen Buntich Construction Co., Inc.	Our project plans called for carrier pipe to be installed into a casing using a series of wheels, however this design proved ineffective as the weight of the pipe caused a misalignment of the wheels. As a solution, we devised a system to float the carrier pipe into the casing.
Wednesday Morning			Track 3: Condition Assessment	Session Leader: Dan Buonadonna	
8:00 AM	WM-T3-01	Water/Wastewater	Inspect this force main if you can... It's located beneath a drinking water reservoir.	Ari Elden, Brown and Caldwell; Ernesto Fernandez, City of San Diego, Public Utilities Department; Gary Skipper, Brown and Caldwell; Don Gordon, Brown and Caldwell; Chris Garrett, Pipeline Inspection and Condition Analysis Corp. (PICA)	Failure of the City of San Diego's forcemain beneath Lake Hodges is not an option -- yet the condition of the 40-year-old pipeline was unknown. The City did not believe it could be inspected. Brown and Caldwell deployed a cutting-edge in-line-inspection technology to determine if repair or replacement was required.
8:25 AM	WM-T3-02	+ Other	Preliminary Study on Application of Pipe-Jacking Techniques to Infrastructure Construction in Frozen Ground	Kai Wen, Kyushu University; Hideki Shimada, Kyushu University; Takashi Sasaoka, Kyushu University; Akihiro Hamanaka, Kyushu University; Sugeng Wahyudi, Kyushu University	Past decades, pipe-jacking technology has been properly adopted and well-understood. Meanwhile, the frozen ground engineering has developed rapidly under the pressure of necessity. However, till now, there is hardly any pipe-jacking practice in frozen ground. Therefore, the application of pipe-jacking technique in frozen ground will be prospective in the future.

Time	Paper ID	Industry Segment	Paper Title	Author(s)	Description
8:50 AM	WM-T3-03	Wastewater	City of Raleigh Neuse 72-inch Parallel Interceptor Condition Assessment and Rehabilitation	Matthew Brent Johnson, CDM Smith	Manned-entry inspection of 72-inch RCP gravity sewer pipes to perform condition assessment and rehabilitation design.
9:15 AM	WM-T3-04	Wastewater	Implementing action items from MSI of Large Diameter Sewer in the City of Hartford	Jason Waterbury, The Metropolitan District; Vinta Varghese, CH2M; Eric Muir, CH2M	This paper discusses the steps taken to develop implementable near-term and long-term action items for the combined sewers within the City of Hartford. Compiling the various inspection results, obtaining a cleaning contractor and developing a systematic schedule as well as the cleaning and repairing of the sewer mains will be featured.
9:40 AM	WM-T3-05	Wastewater	Trunkline Sewer Failure- Lessons Learned	Jeremy Charlesworth, City of Lethbridge; Adam Campbell, City of Lethbridge	The paper will examine where the City of Lethbridge could have improved with asset management and inspections of a sanitary trunkline that failed due to corrosion. It will also examine the numerous advantages a trenchless rehabilitation could have provided had we caught the corrosion earlier than we did.
Wednesday Morning			Track 4: Microtunneling & Pipe Jacking		Session Leader: Paul Headland
8:00 AM	WM-T4-01	+ Other	Engineered Drilling Fluid for the Layman	Craig Camp, Mott MacDoald	This paper will describe how slurry works in microtunneling to reduce the possibility of settlement.
8:25 AM	WM-T4-02	+ Other	Analysis and Design of Pipes Installed via Direct Pipe® Technology	Montazar Rabie, Hatch; Kuo Ping (Sonny) Chang, Hatch; Marc Gelinas, Hatch; Adam Neale, Hatch	This paper proposes a method for analysis and design of pipes installed via Direct Pipe Technology. For verification, the method's estimated thrusting forces are compared against measured ones on several Direct Pipe projects. The results demonstrate the ability of the new method to reliably estimate the thrusting force.
8:50 AM	WM-T4-03	Wastewater	Fiberglass Jacking Pipe Design, Native Soil Analysis, Stiffness Selection and Case Studies	Casey Wood, Thompson Pipe Group; Christopher Lamont, Associated Engineering	The determination of appropriate soil modulus values is key to long-term fiberglass jacking pipe design for its direct correlation to the minimum required pipe stiffness. In this report two different micro tunneling projects in Alberta, Canada are used as examples for comprehensive pipe design, applicable design standards, and lessons learned.
9:15 AM	WM-T4-04	Water/Wastewater	Vacuum Assisted Fusion Welded Saddle Process for Service Connections after Pipe Bursting Installation	Collins Orton, Facion Fusion	A Pipe Bursting job is not complete until the side connections are renewed. The Vacuum Assisted Fusion Welding process provides a high strength, repeatable, verifiable and cost effective installation for specialized Wye or Tee saddles after pipe bursting installation of new HDPE pipe.
9:40 AM	WM-T4-05	+ Other	Trenchless Breakthrough Technologies: How they changed the industry & continue to influence the future	Steven Kramer, COWI North America, Inc.; Tom Iseley, Louisiana Tech University / Trenchless Technology Center	Description of the key breakthroughs in all types of trenchless methods and who were the people and businesses that made these contributions. The impact of each achievement will be presented and the roles that the innovators played.
Wednesday Morning			Track 5: New Installations		Session Leader: Robert Martin
8:00 AM	WM-T5-01	Water	Rehabilitating CMP in Traffic	Andrea Long, City of Aurora; Ethan Ford, CH2M Hill	This paper discusses the City of Aurora's alternative approach to addressing a failing CMP storm sewer. The pipe crosses under an arterial street and requires frequent maintenance from Aurora Operations. An alternative design and bidding approach for the trenchless portion allowed for the market to dictate the trenchless technology.
8:25 AM	WM-T5-02	Wastewater	Pipe Reaming Risks and Rewards	Vern Phillips, Harris & Associates; Thomas Sharp, City of Watsonville	This paper will describe the evaluation and use of pipe reaming as a preferred alternative to rehabilitating deficient sewer pipelines. Two case studies of recent successful large diameter trunk sewer rehabilitation projects for the cities of Watsonville and Concord, California will be presented and lessons learned from their construction.
8:50 AM	WM-T5-03	+ Other	Pilot Tube Innovation in Dubai	Rabie Ruzek, Trenchless Technology Middle East and Africa; Jason Holden, Akkerman	Pilot tube innovation contributed to the success of a high profile project in Dubai, UAE where a contractor utilized their fleet of three guided boring systems to accurately and efficiently install 296 pilot tube alignments, mostly in densely compacted sandstone in six months.
9:15 AM	WM-T5-04	Wastewater	The First Major Pilot Tube Project In The Detroit, MI Metropolitan Area: A Case Study	Steve Matherly, P.E., Logan Clay Products, Inc.; Lyle Winn Anderson, Eckstein & Westrick, Inc.	PTM of the guided boring method originated in Europe nearly 2 decades ago as a method of installing 4 & 6-in house connections using trenchless technologies. Today, this technology has grown to installations with sizes up to 48-in outside diameter and drive lengths in the 400-ft range.
9:40 AM	WM-T5-05	Water/Wastewater	Evaluation of Interlocking Joint Technology Used on Auger Boring Pipe Casings	Urso Campos, Louisiana Tech University; David Hall, Louisiana Tech University; Shaurav Alam, Louisiana Tech University; John Matthews, Louisiana Tech University; Chris Morgan, Louisiana Tech University	This evaluation included testing of four (4) sets of 36-inch diameter steel pipe with interlocking joints used for auger boring to determine the necessary force to engage and disengage. Ongoing research is being conducted that could lead to an optimized pipe joint connection for auger boring steel casings.
Wednesday Morning			Track 6: Water Main Rehab		Session Leader: Ashley Rammeloo
8:00 AM	WM-T6-01	Water	Strategic Slip Line Rehabilitation of New York City's Trunk Water Main System	Mario Valenti, New York City Department of Design and Construction; Thomas Leung, New York City Department of Design and Construction	The slipline rehabilitation of 8,500-linear foot stretch of decommissioned 60-inch diameter trunk main spanning seventeen city blocks to mitigate disruption to a highly dense, commercial and residential hub, centrally located in Astoria, Queens.
8:25 AM	WM-T6-02	Water	Pipebursting for Clean Water Rehabilitation - A European Perspective	Matthew Izzard, Tracto Technik UK	This presentation focusses on smaller diameter static pipe bursting used on clean water rehabilitation and gives examples of challenging projects undertaken in Europe.
8:50 AM	WM-T6-03	Water	The City of Boynton Beach, Florida Pilot Project for Encapsulation of Asbestos Cement Pipe Fragments	Edward Alan, Ambler, AM Trenchless; Todd Grafenauer, Murphy Pipeline Contractors	The City of Boynton Beach, Florida hired Murphy Pipeline Contractors, Inc. to perform an asbestos cement pipe bursting project that included a demonstration of encapsulation of the remaining pipe fragments. AM Trenchless worked with Boynton Beach and Murphy Pipeline to document the efficiency of encapsulation of the pipe fragments.
9:15 AM	WM-T6-05	Water	Willamette Water Supply Program Successfully Completes Initial Trenchless Crossing	Brad Moore, Staheli Trenchless Consultants; Michael Humm, Kennedy/Jenks Consultants	The concept planned for the trenchless crossing included a 400-foot long pipe jacking segment estimated at more than \$1 million. To reduce project costs and risks, alignment options were further considered to reduce the trenchless crossing length to under 300 feet so that auger boring could be feasible.
9:40 AM	WM-T6-05	Water	Expanding the Toolbox: Arlington utilizes in-house crews to replace high maintenance, asbestos cement mains	Jessie Allen, Arlington Water Utilities; John Rafferty, TRIC Tools, Inc.	Arlington Water Utilities teamed with TRIC Tools, Inc. to replace approximately 850 feet of existing 6-inch AC water main with 8-inch HDPE by pipe bursting methods. The use of in-house labor and trenchless construction methods results in significant cost savings, reduced customer impact, and increased productivity rates.