MONDAY, MARCH 26 - AM SESSIONS

**Track 1: Condition Assessment**

**9:50 AM** MM-T1-01  **Wastewater**

**Masters of the Interceptors: Leveraging Trenchless Technology and Corrosion Modeling for Sever 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 60 miles of sewer interceptor. The project included use of an advanced hydrogen-sulfide corrosion modeling 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; Jordan 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 repurposed to service as an efficient force main for a major wastewater treatment plant.

**10:20 AM** MM-T1-03  **Wastewater**

**40-Year-Old RCP: What to Do?**

Swirvine Nyiredha, 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, CH2D; Greg Watanabe, CH2D

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 manhole entry.

**11:10 AM** MM-T1-05  **Wastewater**

**No Dig Pipe Rehabilitation Saves Cost and Keeps Airport in Operation**

Xiangguan Li, Kennedy/Jenks Consultants; Tom Kapushiniski, 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.

**Track 2: HDD**

**Monday Morning**

**9:30 AM** MM-T2-01  **Wastewater**

**Telegraph Franklin Sewer Replacement Project Using HDD Technology**

Abdulnasser Almadhoun, 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-in. 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-in. HDPE pipe was installed using HDD technology combined with jack-and-bore techniques to replace the collapsed sewer.

**9:30 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; Kimberly Staehli, Staehli Trenchless Consultants; Kevin Dour; Tetra Tech

King County is constructing a conveyance upgrade from Mercer Island to Bellevue including a 36-in. HDD. Geotechnical conditions include large gravel, however, permitting was more challenging due to the HDD proximity to the Interstate-90 bridge. Specially 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; 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-in. 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 1730s.
HDD Used to Install New Force Main under Lake Meade

Tim Marsh, Hampton Roads Sanitation District; Brandon Beaumon, Michael Baker International; Rachel Maupin, Underground Solutions, Inc.

Hampton Roads Sanitation District undertook a two-phase, 26,000-ft. force main replacement project to revitalize an undersized sewer system in Suffolk, Virginia. A 3,200-ft. 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 Sewer System

Reza Emtiazizooni, Dewberry Consultants LLC; Robert Siter, SAK Construction LLC; Mathew Rhoads, SAK Construction LLC; Wazir Qadri, City of Baltimore

A consent decree project for City of Baltimore that included approximately 60,000 LF of CIPP rehabilitation of 8 to 52-in. 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, Massachusetts

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 A CIPP First Approach Changes Community From Reactive Scramblers to Proactive Believers

Justin deMello, Woodard & Curran

This presentation will illustrate how the poorest community in the state of Massachusetts doubled down and took a proactive CIPP First approach to sewer rehabilitation that proved to be four times more cost-effective than its historical approach of doing nothing and waiting for the next open-cut emergency.

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, CD&M 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 parking lot critical for commuters heading into the City of Boston.

Monday Morning

Track 4: Pipe Bursting

Session Leader: Babs Marquis

9:30 AM MM-T4-01 Wastewater Record Upsizing Using Static Pipe Bursting Technology (from 15 in to 34 in.)

Velimir Stetin, City of Maple Ridge

This paper describes a successful, record upsizing (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. Catherines, Canada

Dave Holcomb, TT Technologies, Inc.; Steve Kottenberg, AVERTEX Utility Solutions Inc.

This paper will focus on how the owner, engineer and contractor overcame the challenges of pipe bursting a 230-ft. section of 18-in. PVC gravity feed sanitary sewer pipe 32-ft. deep, located between two houses, with the pipe collapsed down to 4-in. 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 LV CIPP and Close Tolerance Horizontal Directional Drilling (CTHDD) were used to repair an aging and undersized sewer in Greenville, South Carolina. Originally designed as pipe bursting, it was necessary to incorporate the LV 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, Inc.; Douglas Vander, City of Redding, California; Cori Vander; City of Redding, California

The City of Redding in Northern California has teamed with AM Trenchless to help design and permitted 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.

11:10 AM MM-T4-05 Wastewater Solon, Ohio: Protecting Natural Resources via Pipe Bursting

Jared Abeli, Solon, Ohio; Aaron Smith, H.R. Gray (Haskell)

The Miles Rd Sanitary Sewer Replacement Project is part of the Solon, Ohio Citywide 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

9:30 AM MM-T5-01 Wastewater

Implementing Major CSO Solutions via Deep Rock Tunneling - Ohio River Tunnel (ORT)

Jonathan Stefflik, 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 Loeche, Louisville and Jefferson County Metropolitan Sewer District; Adam Westermann, Black & Veatch

Louisville Metropolitan Sewer District (MSD) is in the process of completing an $850 million, 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. (2,550-mm) Diameter Storm Culverts

Jack Grazioso; City of Vaughan; Paolo Masaro, City of Vaughan

The City of Vaughan carried out the new installation of twin 100-in. (2,550-mm) 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 ft. 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 ft. deep, were set in urban environments, requiring utility support and resident coordination.

10:45 AM MM-T5-04 Wastewater

Seven Years, Five Projects and More Than 40 Km 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 40 km in length, in Indiana and Kentucky. Parameters include tunnels, underground bifurcations, and drop shafts.

Monday Morning

9:30 AM MM-T6-01 Water

Bellvue Transmission Line Tunnels - Challenging Construction in Dipping Bedrock

Robin Domfest, Lithos Engineering; Nade Soule, Lithos Engineering; Dylan Fevez, Lithos Engineering

The two tunnels are 567 and 1,814 ft. long and were constructed utilizing tunnel boring machines. The Overland Tunnel was constructed with an 88-in. gripper style TBM, while the East/West Tunnel was constructed with an 86-in. 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-in. 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; Jeff Rumer, Underground Infrastructure Technologies, Anna Crockford, CH2M

Several unexpected geotechnical conditions were encountered during the construction of the Ridgegate Line for the Parker Water 7 Sanitation District. This paper discusses the design process, conditions encountered, and how the team of owner, designer, and contactor partnered to develop resolutions to address the changes.

10:45 AM MM-T6-04 Water

Halton Zone 4 Feeder Main - Tunneling A Confined Aquifer Beneath Major Railways and Highways

Clan McDermott, Associated Engineering; Chris Ewen, Halton Region; Gary Lukez, Dibco Underground Ltd.

The Halton Zone 4 Feedermain Project involves the installation of 13 km of trunk watermain, 4,080 m within tunnels ranging from 1,800 mm to 3,500 mm in diameter. This presentation discusses the challenges with planning and designing a 3,500 mm diameter tunnel crossing Union Gas transmission lines, Highway 401, CP Rail Tracks, and 16-mile Creek.
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<tr>
<th>Time</th>
<th>Paper ID</th>
<th>Industry Segment</th>
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<tbody>
<tr>
<td>11:30 AM</td>
<td>MM-T6-05</td>
<td>Water</td>
<td>Trenchless Water Main Installation Under Tight Timelines and Spatial Constraints</td>
<td>Chad Schwartzentruber, Stantec; Joe Linsenan, Stantec; Ajayn Khedir, Stantec; Lauren Young, Stantec</td>
<td>This paper demonstrates a case study of an effective methodology for designing and installing a trenchless large diameter water main under tight timelines and tight spatial site constraints.</td>
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**MONDAY, MARCH 26 - PM SESSIONS**

### 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 Seaver CCTV and Renewal Assessment

**Lauren Young, Stantec Consulting; John Zhu, Region of York; Joe Linsenan, Stantec Consulting; Erez Allouche, Stantec Consulting; Joe Herman, Stantec Consulting**

In 2015 the region of York initiated its 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  
Rehabilitation of Harbour Island Force Main Tampa Uses Tysol Carbon Fiber to Rehabilitate Pressure Pipeline

**Andrew Costa, Insituform Technologies, LLC; Amber Wagner, Fyfe Co.**

Fibrwrap Construction used its FRP system to rehabilitate almost 400 ft. of 48- and 54-in. 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.

**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 a 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

**Moderator:** Jennifer Glynn; Woodard and Curran

**Forum Participants:** Piero Salvo, GAME Trenchless Consultants, Mike Davison, Sansen, Paul Pasko, SESi; Tanner Randall, City of Loveland, Colorado Water & Power; Shaun McHugh, FER-PAK Construction

This forum discussion will focus on water main CIPP.

**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.
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<th>Time</th>
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<tr>
<td>Monday Afternoon</td>
<td>Track 4: Pipe Ramming</td>
<td>Water</td>
<td>Twin 120-in. Pipe Rams in Northern California</td>
<td>Kathryn Wallin, Bennett Trenchless Engineers, LLP; David Bennett, Bennett Trenchless Engineers, LLP; Ken Sorensen, Kleinfelder</td>
<td>Case study describing twin 120-in. pipe rams, each approximately 170 ft. long, under US 101 in Willits, California. Challenges included very large diameter pipe, long drive lengths, highly restricted work areas, and a short construction window.</td>
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<td>3:45 PM</td>
<td>MA-T4-01</td>
<td>Water/Wastewater</td>
<td>Pipe Ramming – Understanding the Forces that Drive the Industry</td>
<td>Kimberly Staheli, Staheli Trenchless Consultants, Armin Steudelin, Associate Professor of Civil Engineering, Oregon State University; Paul Richart, Aldenwoood Water and Wastewater District, Bert Minor, RMĐT</td>
<td>Pipe ramming is advancing while engineers strive to develop models of ramming behavior. Three ramming projects (diameters from 36-84 in.) 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.</td>
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<td>3:45 PM</td>
<td>MA-T4-02</td>
<td>Wastewater</td>
<td>Pipe Ramming Methods Used to Swallow 250 ft of 48-in. Casing</td>
<td>Brian Harris, Drill Tech Drilling &amp; Shoring, Inc.; Alan Goodman, Hammer-Head Trenchless, Raguparan (Ragg) Thangavelautham, California Department of Transportation (Caltrans); Cameron Zoucha, Ditch Witch Southern California</td>
<td>This case study features the use of a 34-in. pipe ramming tool to replace 250 ft of 48-in. CMP with 72-in. 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.</td>
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<td>4:35 PM</td>
<td>MA-T4-03</td>
<td>Wastewater</td>
<td>From Pipe Ram to Microtunnel - How Owner and Contractor Worked Together</td>
<td>Erik Waligorski, Carollo Engineers; Ron Speer, Soos Creek Water &amp; Sewer District; Ken Van Den Bergh, Soos Creek Water and Sewer District; Greg Hill, Stantec Consulting Engineers Inc.</td>
<td>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.</td>
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<td>4:35 PM</td>
<td>MA-T4-04</td>
<td>Wastewater</td>
<td>Urban Microtunneling Par Excellence: Five Multiple Curved Microtunnels Below Road and Railways in Switzerland</td>
<td>Cyril Althuser, Jackcontrol AG; Marc Reinhard, Go Bau AG</td>
<td>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.</td>
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<td>4:35 PM</td>
<td>MA-T4-05</td>
<td>Wastewater</td>
<td>Design of the City of St. Albert’s North Interceptor Sanitary Trunk</td>
<td>Kate Polkowsky, City of St. Albert; Jason Lueke, Associated Engineering; Cian McDermott, Associated Engineering; Paul Dedeluk, Associated Engineering</td>
<td>This paper will discuss the design of the North Interceptor Sanitary Trunk consisting of 3,000 m of 1,500-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.</td>
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<td>4:35 PM</td>
<td>MA-T4-06</td>
<td>Wastewater</td>
<td>Six Microtunnel Drives Successfully Completed in Difficult Ground on the Broad Creek Augmentation Project</td>
<td>David Watson, Mott MacDonald</td>
<td>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.</td>
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<td>5:00 PM</td>
<td>MA-T4-07</td>
<td>Wastewater</td>
<td>Superior Avenue Force Main Curved Microtunnel Collaboration to Mitigate Project Risk</td>
<td>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</td>
<td>In order to eliminate potential damage to a historic building and two large diameter water transmission lines, worked with the Contractor and Design Engineer to increase a 48-in. microtunnel to 60-in. to mitigate glacial soils/obstruction risks and curved the alignment to avoid settlement damage.</td>
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### TUESDAY, MARCH 27 - AM SESSIONS

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<tr>
<td>8:00 AM</td>
<td>TMI-T1-01</td>
<td>Wastewater</td>
<td>Manhole Rehab and I&amp;I: Sliplining</td>
<td>Julie McMullin, Brown and Caldwell; Jeff Nettlesheim</td>
<td>Investigations including flow monitoring, storm ditch flooding with dyed-water, and lateral television 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 (99%) in the laterals.</td>
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<td>8:25 AM</td>
<td>TMI-T1-02</td>
<td>Wastewater</td>
<td>The Logic and Economics of Lateral Grouting: Decision Support Matrix Compares Trenchless Rehabilitation Technologies</td>
<td>Don Rigby, Avanti International; Marc Anctil; Logiball; Jeff Maier; C&amp;L Water Solutions</td>
<td>The EPA makes a clear and compelling statement. Nationwide, nearly 50 percent of flow to the WWTPs is clean groundwater from I&amp;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.</td>
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<td>8:50 AM</td>
<td>TMI-T1-03</td>
<td>Wastewater</td>
<td>I&amp;I Abatement Using the Trenchless Toolbox for Project Success</td>
<td>Brendan O'Sullivan, Murray Roth; Sue Nelson; City of St. Helen; Sharon Darroux, City of St. Helen</td>
<td>The City of St. Helens, Oregon recently completed a multi-year I&amp;I Abatement Program to reduce sanitary sewer overflows and reducing treatment plant costs. With a holistic approach to reduce I&amp;I, the program rehabilitated 12 miles of sanitary sewer and installed 2 miles of storm sewer using open-cut and trenchless installation techniques.</td>
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<td>9:15 AM</td>
<td>TMI-T1-04</td>
<td>Wastewater</td>
<td>Improving Acid Resistance of Shotcrete for Sewer Tunnel Rehabilitation in Edmonton</td>
<td>Leping Wu, University of Alberta; W. Victor Liu; University of Alberta; Chaoshi Hu; The City of Edmonton</td>
<td>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.</td>
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<td>9:40 AM</td>
<td>TMI-T1-05</td>
<td>Wastewater</td>
<td>CIPP Rehab for the Hospedia Trunk Sanitary Sewer</td>
<td>Bradley Marin, CHD Ltd.</td>
<td>The paper will discuss the process by which CHD Ltd evaluated, designed and worked with the City and contractor to rehabilitate approximately 5,600 ft (1,400 m) of 27-24 (675-600 mm) diameter vitrified clay pipe and 18 manholes varying in depth of up to 15 ft.</td>
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### Track 2: HDD

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<tr>
<td>8:00 AM</td>
<td>TMI-T2-01</td>
<td>Water</td>
<td>Post-disaster Trenchless Installation of Water Pipelines in Napa, California</td>
<td>Michael Hether; City of Napa; Jon Marshall; Carollo Engineers</td>
<td>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.</td>
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<tr>
<td>8:25 AM</td>
<td>TMI-T2-02</td>
<td>Water</td>
<td>HDD Enables Florida Utility to Serve Popular Tourist Location Without Interruption</td>
<td>Clifford Wilson; Dewberry Engineers; Dina Bautista; Dewberry Engineering; Benjamin Bilitch; Bay County Utility; Sara Maloney; Underground Solutions, Inc</td>
<td>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 polyvinyl chloride pipe.</td>
</tr>
</tbody>
</table>
The San Joaquin River HDD crossing is 2,820 ft of 42-in. welded-steel recycled-water pipeline installed at depths greater than 90 ft within dense micaceous sands derived from the granitic Sierra Nevada. The crossing is the capstone of a drought-inspired regional program to increase irrigation water supply in central California.

Tuesday Morning

8:00 AM TM1-T3-01 Water San Joaquin River HDD Crossing, Modesto, California
Oru R. Nelson, McMillen Jacobs Associates; Rachel Martin, McMillen Jacobs Associates; Ryan Sellman, Carollo Engineers; Janet Atkinson, MWH/Stantec; William Wang, City of Modesto
The San Joaquin River HDD crossing is 2,820 ft of 42-in. welded-steel recycled-water pipeline installed at depths greater than 90 ft within dense micaceous sands derived from the granitic Sierra Nevada. The crossing is the capstone of a drought-inspired regional program to increase irrigation water supply in central California.

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.

9:15 AM TM1-T2-04 Water Appication of HDD for Subsea Installation of Micro-porous Intake Pipeline 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 Love, CDM Smith; Clay Tappan, CDM Smith; Ryan Hagaman, 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 4: Auger Boring

8:00 AM TM1-T4-01 Wastewater 72-in/66-in. 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-ft. and the second of a 72-in sewer to 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.
Wastewater Groundwater Impacts on Water/Wastewater Navigating a Difficult Time Paper ID Industry Segment Paper Title Author(s) Description

8:25 AM TM1-T6-02 Wastewater Groundwater Impacts on Sewer Relocation Using Trenchless Technologies near and under I-405 in Renton, Washington Erik Waligorski, Carollo Engineers; Dave Christensen, City of Renton, Washington; Mike Benoit, City of Renton, Washington 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 Sam Wilson, 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-in. 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.

8:25 AM TM1-T5-02 Wastewater Analysis of Trenchless and Conventional Technologies Utilized for Installation of 5,550 lf of Relief Sewer John Ososke, CH2M; Eric Muir, CH2M; 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 TM1-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 TM1-T5-04 Water Analysis of Jacking Loads for Microtunneling Projects in Western Canada – A Case Study Andreas Fleischmann, REAULINGER This paper will discuss a case study of trenchless pipeline rehabilitation of a 155 year old, 4,000-ft long, 20-in. diameter raw water transmission main with a Kevlar reinforced composite lining system.

9:40 AM TM1-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 Rehabilitation Session Leader: Jason Schiro

8:00 AM TM1-T6-01 Water So You’re Thinking About Using CIPP. Determining if CIPP is Right for Your Potable Water System and Developing a Pilot Project Sandie Dudley, HydroScience Engineers Inc.; Cindy Preuss, HydroScience Engineers Inc. This paper discusses typical owner concerns, evaluation criteria and decision making processes associated with the potential use of CIPP rehabilitation for potable water applications, as well as provides bidding and specification strategies that have been successfully employed on pilot projects. Specific examples and case studies are included.

8:25 AM TM1-T6-02 Water The City of Miami Beach Utilizes CIPP to Structurally Renew 20-in. Water Main Crossing David P. Kozman, P.E., HammerHead 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 crossing for the City of Miami Beach, Florida in July 2016.

8:50 AM TM1-T6-03 Water Highlighting Innovation and Sustainability by Renewing AC Pipelines with Cured-In-Place Pipe Tara Sweet, East Bay Municipal Utility District; David Katzev, 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.
## Summary

**Paper 2018 Water 20-In. Raw Water Rehabilitation: Is Renewing the Infrastructure of 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 summarized the process taken by LVVWD for the rehab of two water pipelines (8- and 16-in.) critical to the operation of its system.**

**Paper 25-29 PALM SPRINGS, CALIFORNIA**

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<tr>
<th>Time</th>
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<th>Industry Segment</th>
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<tr>
<td>9:15 AM</td>
<td>TM1-T6-04</td>
<td>Water</td>
<td>20-In. Raw Water Transmission Main Rehabilitation</td>
<td>Andreas Fleischmann, RAEDLINGER</td>
<td>This paper will discuss a case study of trenchless pipeline rehabilitation of a 155 year old, 4000-H ft-long, 20-in diameter raw water transmission main with a Kevlar reinforced composite lining system.</td>
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<tr>
<td>9:40 AM</td>
<td>TM1-T6-05</td>
<td>Water</td>
<td>Learning about UV CIPP vs. Steam and Water Cure CIPP in Portland, Oregon</td>
<td>Mark Hutchinson, City of Portland</td>
<td>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.</td>
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### Tuesday Morning

#### Track 1: Emerging Technologies

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<tr>
<th>Time</th>
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<tbody>
<tr>
<td>10:20 AM</td>
<td>TM2-T1-01</td>
<td>Water</td>
<td>Competitive Tendering of Alternative Sewer Rehabilitation Technologies for Large Diameter and Non-Circular Applications</td>
<td>Adam Braun, AECOM Canada Ltd.; Chris Macey, AECOM Canada Ltd.; Stacy Cournoyer, AECOM Canada Ltd.</td>
<td>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) slippiping, centrifugally cast concrete pipe (CCCP), spiral wound PVC strip lining, and bonded FRP liners.</td>
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<tr>
<td>10:45 AM</td>
<td>TM2-T1-02</td>
<td>Water</td>
<td>Evaluating Arrow Bore™: a Case Study of a Patented Technology from the Engineers Perspective.</td>
<td>Michelle Macaulay, Jacobs Engineering; David Landling, Jacobs Engineering</td>
<td>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 AmovBore™ process in lieu of HDD. This paper discusses AmovBore technology, outlines our concerns and discusses how construction progressed.</td>
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<tr>
<td>11:10 AM</td>
<td>TM2-T1-03</td>
<td>Water</td>
<td>How Rehab. Pipe Rehab. Is Renewing the Infrastructure of Las Vegas</td>
<td>Ryan Bonner, Las Vegas Valley Water District; Mike Ambroziak, CPM, LLC</td>
<td>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 summarized the process taken by LVVWD for the rehab of two water pipelines (8- and 16-in.) critical to the operation of its system.</td>
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<tr>
<td>11:35 AM</td>
<td>TM2-T1-04</td>
<td>Other</td>
<td>Lengthy Crossings Shortened by Direct Pipe Technology</td>
<td>Matt Smith, Michels Corporation; Tucker Toelke, Michels Corporation</td>
<td>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.</td>
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#### Track 2: HDD

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<tr>
<td>10:20 AM</td>
<td>TM2-T2-01</td>
<td>Other</td>
<td>Clogging Potential Assessment of Kaolinite and Performance Evaluation of an Additive</td>
<td>Chao Kang, University of Alberta; Yichen Wu, University of Alberta; Alireza Bayat, University of Alberta</td>
<td>This paper reviews a clogging potential assessment of kaolinite and performance evaluation of an additive.</td>
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<tr>
<td>10:45 AM</td>
<td>TM2-T2-02</td>
<td>Other</td>
<td>HDD Damages to Other Utilities Problems and Solutions</td>
<td>James Anspach, Cardno, Inc.</td>
<td>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.</td>
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<td>11:10 AM</td>
<td>TM2-T2-03</td>
<td>Other</td>
<td>Study of the Cleaning Capacity of Drilling Fluid in Horizontal Directional Drilling</td>
<td>Sai Deng, University of Alberta; Nero Cao, University of Alberta; Alireza Bayat, University of Alberta; Manley Osbak, The Crossing Company Inc.; Kristin Barr, Evolution Energy Services</td>
<td>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.</td>
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<td>11:35 AM</td>
<td>TM2-T2-04</td>
<td>Other</td>
<td>Strategies for Combating Rock</td>
<td>Tod Michael, Vermeer Corporation; Curt Dubbins, Mincon, Inc.</td>
<td>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.</td>
</tr>
</tbody>
</table>
Tuesday Morning Track 3: Geotechnical Issues
10:20 AM TM2-T3-01&02 Owner Differing Site Conditions Claims Forum
Moderator: Don Del Nero, Stantec
Forum Participants: Paul Cuellar, Orange County Sanitation District; Mark Hutchinson, Staheli Trenchless Consultants; Ovnen Randall, City of Fort Collins
This forum discussion will focus on claims.

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.
This presentation uses two case studies to demonstrate the controlling 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 resources and references will also be discussed.

11:35 AM TM2-T3-04 Water/Wastewater Frisco Extends Reuse System along Busy Commercial Corridor Using 2,500-ft Horizontal Directional Drill
Clayton Barnard, Freese and Nichols, Inc.; Art Hattie, City of Frisco; Marvin Lee, Underground Solutions, Inc.
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 ft. of 12-in. reuse pipeline was installed, including 2,500 ft. of HDD installations under busy traffic.

Tuesday Morning Track 4: Pipe Jacking
10:20 AM TM2-T4-01 Water/Wastewater Using Open Face Shields and Pipe Jacking to Handle Ground with Cobbles and Boulders
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 Microtunneling technology to make long-distance drives of more than 1,000 m possible, also for diameters smaller than 30 in.

10:45 AM TM2-T4-02 Other New Jet Pump Technology for Long-distance Pipe Jacking and HDD Crossings in Highly Permeable Soil
Glen Boyce, McMillen Jacobs Associates; Rick Smith, McMillen Jacobs Associates; Mark Havelock, McMillen Jacobs Associates; John Waggeron, McMillen Jacobs Associates
This paper describes recently completed projects where an open face shield was successfully used to mine through ground containing cobbles and boulders.

11:10 AM TM2-T4-03 Water/Wastewater Successful Open Shield Pipe Jacking through Reservoir Embankment
Marshall McLeod, East Bay Municipal Utility District; Evan Wheeler, Pipe Jacking Trenchless, Inc.
Two nominal 44-in. casing pipelines (total length 600 ft.) 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 Water/Wastewater Redwood City, California: Completes Soft Bay Mud Trenchless Crossing of US Highway 101
James Boyland, Kennedy/Denko Consultants; Brad Moore, Staheli 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 RCCF sewer pipe in soft bay mud.

Tuesday Morning Track 5: Project Planning & Delivery
10:20 AM TM2-T5-01 Other An Overview of Safety Considerations for Large Diameter Direct Pipe® Installation
Alan Snider, Laney Directional Drilling; Maureen Carlin, Laney Directional Drilling; Brian Carpenter, Laney Directional Drilling
The purpose of this paper is to present advantages and challenges associated with safety for large diameter Direct Pipe® Installation. Most importantly, this presentation provides an understanding of customer operations and the site specific rescue methods to ensure a safe and effective rescue within a confined space (CS).

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 Trisac, Mott MacDonald; Donald Chang, City of Burlingame; Catherine Okamura, Mott MacDonald
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.

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.; Dhruba 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
10:20 AM TM2-T6-01 Wastewater Rehabilitating a Critical Large Diameter Sewer Under a Levee and a Historic Park
Mathew Roder, Creeley and Hansen; Aaron Hughes, Washington Suburban Sanitary Commission; Glen Diaz, Washington Suburban Sanitary Commission
At 102 in., 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.
### Tuesday Afternoon  
**Track 1: Condition Assessment**

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<th>Time</th>
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<tr>
<td>3:30 PM</td>
<td>TA-T1-01</td>
<td>Water</td>
<td>How to Use Multiple Condition Assessment Tools to Make Water Main Rehabilitation Decisions</td>
<td>Paul Pasko, SEH, Inc; Greg Kottisik, City of Fridley, Minnesota</td>
<td>The City of Fridley, Minnesota, needed to determine exactly where and how its water main 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.</td>
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<td>3:55 PM</td>
<td>TA-T1-02</td>
<td>Water</td>
<td>Higher Education - University of Ottawa Investigates to Identify Underground Infrastructure Academic Grade</td>
<td>Piero Salvo, GAME Trenchless Consultants; Michael Sparling, University of Ottawa</td>
<td>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.</td>
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<td>4:20 PM</td>
<td>TA-T1-03</td>
<td>Water</td>
<td>Del-Co Raw Water Pump Station River Tap</td>
<td>Jim Mantes, Michels Corporation</td>
<td>The Del-Co Raw Water Pump Station project was constructed north west of Columbus, Ohio. The project included a microtunneled 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.</td>
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<td>4:45 PM</td>
<td>TA-T1-04</td>
<td>Water</td>
<td>Tiered Approach for the Condition Assessment of 50-Year-Old Steel Waterline with History of Breaks</td>
<td>Steve Simon, City of Aurora, Craig Vanhorn, CH2M; Liv Haugen, CH2M; Annalee Collins, CH2M</td>
<td>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.</td>
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<td>5:10 PM</td>
<td>TA-T1-05</td>
<td>Water</td>
<td>Recent Advances on Condition Assessment Technologies for Metallic Water Transmission Mains</td>
<td>Ahmad Habibian, CDM Smith</td>
<td>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.</td>
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### Tuesday Afternoon  
**Track 2: HDD**

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<tr>
<td>3:30 PM</td>
<td>TA-T2-01</td>
<td>Water/ Wastewater</td>
<td>Billings Heights Uses HDD/ Jack-and-Bore to Install New 24-in. and 12-in. Lines</td>
<td>Bill Enright, Interstate Engineering Duke Nielson, County Water District of Billings Heights; Peyton Brookshire, County Water District of Billings Heights; Marvin Lee, Underground Solutions, Inc.</td>
<td>With the need for additional storage and rapid growth through the last decade in Billings, 12- and 24-in. 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.</td>
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Tuesday Afternoon
Track 3: CIPP

3:30 PM TA-T3-01 Water/Wastewater
Curing Method - Heat or UV? Potential Effect on CIPP Resin Properties

3:55 PM TA-T3-02 Water/Wastewater
Emergency Pipeline Rehabilitation Ensures Raw Water Supply to Dornmar Paper Mill
Robert Cullwell, Carollo Engineers. Mike Fleury, Carollo Engineers. Jonathan Herboldt, Carollo Engineers.

4:20 PM TA-T3-03 Water/Wastewater
Making the CIPP Process Easier and More Reliable
Benjamin Hazen, Interplastic Corporation.

4:45 PM TA-T3-04 Water/Wastewater
Best Value Engineered Design for a Sealed CIPP Collection System

5:10 PM TA-T3-05 Water/Wastewater
Engineering the Empire Lateral Lining and Covers: Technical Discussion, Test Data
Ian Lancaster, Aegion Corporation. Rick Baxter, Insituform Technologies, LLC.

Session Leader: Bill Moore

Session: 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.

Tuesday Afternoon
Track 4: Water Main Rehab

3:30 PM TA-T4-01 Water
Manned Internal Repair of a 385 ft 30-in. Pipeline using Carbon Fiber

3:55 PM TA-T4-02 Water
Replacement of 700 Lead Water Service Pipes in the City of Montréal

Session Leader: Kalyan Piratla

Session: Middlesex Water Company encountered a challenging pipeline leak involving a 30-in. 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.
### Time | Paper ID | Industry Segment | Paper Title | Author(s) | Description
---|---|---|---|---|---
4:20 PM | TA-T4-03 | Water | South Ogden Country Club Drive Pipe Burst Project | Benjamin Quick, Finnview Water Systems, June Baterina, Underground Solutions, Inc. Patrick Laidlaw, Underground Solutions, Inc. Dexter Fisher, J-U-B Engineers | 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-in. Water Transmission Line Rehabilitation Project | Sean Boris, United Pipeline Systems | Assessment of a 20-in. 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 | Los Angeles Department of Water and Power Structural Water Main Lining Aqua-Pipe Great Impression | Alvin Bautista, LADWP; Jeff Coffman, Sanwan 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 & Auger Bore

**Session Leader:** Jonathan Kunay

#### Time | Paper ID | Industry Segment | Paper Title | Author(s) | Description
---|---|---|---|---|---
3:30 PM | TA-T5-01 | Water/Wastewater | Revised Method for Estimating Microtunneling 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 Domest, Lithos Engineering; John Beckos, BT Construction; Lance Heyer, Lithos Engineering | Seventy feet of 14-ft. 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 GBP 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 Staheli, Staheli Trenchless Consultants; Kimberlie Staheli, Staheli 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 CBIs 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 CBI was effectively used to avoid construction claims.

4:45 PM | TA-T5-04 | Wastewater | Pilot Tube and Front Steer Guided Boring Through 7,900 ft of Clay Soils | David Mathy, DCM Consulting Inc.; Nancy Molina, Central Contra Costa Sanitary District; Darmasion Zepeda, Aregon, Central Contra Costa Sanitary District | This project case history presents significant and valuable lessons learned from design and construction of over 7,900 ft of trenchless new pipeline installation of 18- to 24-in. 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 | 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 Giline, Stantec Consulting; Joel Savatzky, Stantec Consulting | The North Red Deer Regional Wastewater Services Commission and Stantec Consulting undertook the construction of a 29 km 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 6: Slippinling

**Session Leader:** Dave Crowder

#### Time | Paper ID | Industry Segment | Paper Title | Author(s) | Description
---|---|---|---|---|---
3:30 PM | TA-T6-01 | Water/Wastewater | The Rehabilitation of the Hamilton Mountain Trunk sewer | David Crowder, R.V. Anderson Associates Limited; Erika Wait, 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.
Emergency Sewer Force Main Rehabilitation in Valley Forge National Historic Park

Tredyffrin Township faced three catastrophic failures of a 30-in. 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-ft. force main located at Valley Forge National Historic Park.

Denver Gets 500-Year Service Life by Sliplining Sewers with Fiberglass Pipe

Busy downtown Denver sewers were sliplined with 3,100 LF of 48, 54 and 66 Hobas Centifugally Cast FRPMP 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.

ORFEUS – Real-Time Obstacle Detection for HDD

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 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.

Disposal Problems in Drilling Fluid and Cuttings

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.

Roadmap to Manage Differing Site Conditions for Reline Applications

This paper will review current methods contained within various specifications that are available to help determine design loads for relines 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 relines.

What to Do When Your As-Built Are Not As-Found!

This paper describes the design and construction of a complex trenchless crossing of a major California highway for a 36-in. 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.

Important Factors when Determining Design Loads for Reline Applications

This paper will review current methods contained within various specifications that are available to help determine design loads for relines 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 relines.

Wednesday Morning Tracks: Project Planning & Delivery

Wednesday Morning Tracks: Close Fit Sliplining Technologies Forum

This forum discussion will focus on close fit & sliplining technologies.

Wednesday Morning Tracks: Gas

Wednesday Morning Tracks: Water/Wastewater

Wednesday Morning Tracks: Gas

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Thursday Morning

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 force main 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
A Deep Learning Framework for Automated Defect Detection Using Sewer CCTV Videos
In this report two different micro tunneling projects in Alberta, Canada, are used as examples to illustrate the importance of considering the minimum required pipe stiffness. In this report two different micro tunneling projects in Alberta, Canada, are used as examples to illustrate the importance of considering the minimum required pipe stiffness. 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 to illustrate the importance of considering the minimum required pipe stiffness. 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.

8:50 AM WM-T3-03 Wastewater
Compiling the various inspection results, obtaining items for the combined sewers within City of Hartford. This paper discusses the steps taken to develop implementable near-term and long-term action items for the combined sewers within City of Hartford. Compiling the various inspection results, obtaining items for the combined sewers within City of Hartford. This paper discusses the steps taken to develop implementable near-term and long-term action items for the combined sewers within City of Hartford. Compiling the various inspection results, obtaining items for the combined sewers within City of Hartford. This paper discusses the steps taken to develop implementable near-term and long-term action items for the combined sewers within City of Hartford. Compiling the various inspection results, obtaining items for the combined sewers within City of Hartford. 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<th>Author(s)</th>
<th>Description</th>
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<tr>
<td>9:15 AM</td>
<td>WM-T6-04</td>
<td>Water/Wastewater</td>
<td>&quot;Vacuum-assisted&quot; Fusion Welded Saddle Process for Service Connections after Pipe Bursting Installation</td>
<td>Collins Orton. Faction Fusion</td>
<td>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.</td>
</tr>
<tr>
<td>9:40 AM</td>
<td>WM-T4-05</td>
<td>Other</td>
<td>Trenchless Breakthrough Technologies: How They Changed the Industry &amp; Continue to Influence the Future</td>
<td>Steven Kramer. CDWI North America, Inc.; Tom Ilsley. Louisiana Tech University / Trenchless Technology Center</td>
<td>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.</td>
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**Wednesday Morning**

**Track 5: New Installations**

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<th>Time</th>
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<th>Paper Title</th>
<th>Author(s)</th>
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<tr>
<td>8:00 AM</td>
<td>WM-T5-01</td>
<td>Water</td>
<td>Rehabilitating CMP in Traffic</td>
<td>Andrea Long, City of Aurora; Ethan Ford. CH2M</td>
<td>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.</td>
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<tr>
<td>8:25 AM</td>
<td>WM-T5-02</td>
<td>Wastewater</td>
<td>Pipe Reaming Risks and Rewards</td>
<td>Vern Phillips. Harris &amp; Associates; Thomas Sharp. City of Watonville; Kurt Marie. Harris &amp; Associates</td>
<td>This paper will describe the evaluation and use of pipe reaming as a preferred alternative to rehabilitaoting 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.</td>
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<tr>
<td>8:50 AM</td>
<td>WM-T5-03</td>
<td>Wastewater</td>
<td>Tunneling Challenges on the East 140th Consolidation and Relief Sewer (EHOCR)</td>
<td>Thomas Hessler. DLZ Ohio, Inc.; Thomas Shively. Northeast Ohio Regional Sewer District; Robert Auber. Northeast Ohio Regional Sewer District; Alison Scheible. Northeast Ohio Regional Sewer District; Keith Casper. COWI</td>
<td>The East 140th Street Consolidation and Relief Sewer is a Consent Decree project for the Northeast Ohio Regional Sewer District (NEORS) project involves over 11,000 feet of 60 to 84-inch diameter two-pass tunnel and 285 ft of 84-inch hand mined tunnel.</td>
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<td>9:15 AM</td>
<td>WM-T5-04</td>
<td>Wastewater</td>
<td>The First Major Pilot Tube Project in the Detroit, Michigan Metropolitan Area: A Case Study</td>
<td>Steve Matheny. P.E., Logan Clay Products, Inc.; Lyle Winn Anderson. Eckstein &amp; Westrick, Inc.</td>
<td>PTM using a guided boring method which originated in Europe nearly 2 decades ago as a method of installing 4 and 6-inch house connections using trenchless technologies. Today, this technology has grown to installations with sizes up to 48-inch outside diameter and drive lengths in the 500-ft range.</td>
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<td>9:40 AM</td>
<td>WM-T5-05</td>
<td>Water/Wastewater</td>
<td>Evaluation of Interlocking Joint Technology Used on Auger Boring Pipe Casings</td>
<td>Urs Campos. Louisiana Tech University; David Hall. Louisiana Tech University; Shaurav Alam. Louisiana Tech University; John Matthews. Louisiana Tech University; Chris Morgan. Louisiana Tech University</td>
<td>This evaluation included testing of four 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.</td>
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**Wednesday Morning**

**Track 6: Water Main Rehab**

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<tr>
<td>8:00 AM</td>
<td>WM-T6-01</td>
<td>Water</td>
<td>Strategic Slipline Rehabilitation of New York City's Trunk Water Main System</td>
<td>Mario Valenti. New York City Department of Design and Construction; Thomas Leung. New York City Department of Design and Construction</td>
<td>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.</td>
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<td>8:25 AM</td>
<td>WM-T6-02</td>
<td>Water</td>
<td>Static Pipebursting for Clean Water Rehabilitation - A European Perspective</td>
<td>Matthew Izzard. Tracto Technik UK</td>
<td>This presentation focuses on smaller diameter static pipe bursting used on clean water rehabilitation and gives examples of challenging projects undertaken in Europe.</td>
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<td>8:50 AM</td>
<td>WM-T6-03</td>
<td>Water</td>
<td>The City of Boynton Beach, Florida, Pilot Project for Encapsulation of Asbestos Cement Pipe Fragments</td>
<td>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.</td>
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<tr>
<td>9:15 AM</td>
<td>WM-T6-05</td>
<td>Water</td>
<td>Willamette Water Supply Program Successfully Completes Initial Trenchless Crossing</td>
<td>Brad Moore. Staheli Trenchless Consultants; Michael Humm. Kennedy/Denkis Consultants</td>
<td>The concept planned for the trenchless crossing included a 400-ft. 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 ft. so that auger boring could be feasible.</td>
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