Western Regional Trenchless Review

2024

The 18th Annual Western Regional No-Dig Conference, Exhibition, and Training Course

October 15 - 16, 2024 • Pomona, California

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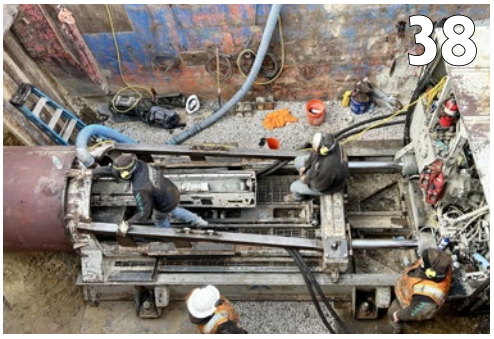

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MESSAGE FROM THE WESTT CHAIR

Michelle Beason, PE, Chair, WESTT

This past year, the WESTT Chapter Board of Directors (BOD) has been striving to increase the education opportunities available for trenchless technologies; both to industry professionals, and through outreach efforts to student organizations.

We are very excited about our conference, exhibition, and course on October 15 and 16, 2024, at the Kellogg Center within the Campus of Cal Poly Pomona (California Polytechnic State University, Pomona Campus)! WESTT will be presenting NASTT's two 4-hour courses: Introduction to New Installations and Introduction to Rehabilitation. We are proud of the technical expertise of the WESTT Board as three of the four course instructors are WESTT Board members! This conference is a great opportunity for networking and education and the venue is central to our membership in Southern California.

One key initiative that the board has prioritized is increasing coordination with the student chapters in our region at Arizona State University and at Cal Poly Pomona. We have designated student ambassadors who help the board understand the ongoing activities, structure, and overall goals of the student chapters. We are actively coordinating with Cal Poly Pomona to provide field site visits to active trenchless construction sites to provide real-world experience of a career in the trenchless field. This interaction is the primary reason why we chose to have our conference on the Cal Poly campus! We are also looking to provide brown-bag presentations to the students to highlight the variety of projects and careers that fall under the umbrella of trenchless construction.

The board is also reaching out to additional universities within our region to see where WESTT could provide valuable knowledge that is often not provided in a collegiate setting and to get more young engineers excited about trenchless! We are always looking to widen our reach, so if you have contacts with Civil Engineering, Geotechnical Engineering, and/or Construction Management programs at universities in the Western region, we would love to have an introduction!

WESTT is currently accepting nominations for new board members until November 17, so please watch for an email with details, or visit our website for election information. If you wish to get more involved in the organization, I encourage you to run. The current board is filled with passionate individuals who work to advance the practice of Trenchless Technology through education, training, and research. Interested parties should contact our Election Chair, Cindy Preuss, at **PreussCL@CDMSmith.com**.

I would like to thank the WESTT Board of Directors, committee chairs, and other member volunteers for their continued involvement. We have accomplished so much over the past few years, and I look forward to continuing to pursue our ambitious plans for the future of the chapter: to grow our trenchless industry! It has been an honor to work with so many dedicated individuals who share the goal of advancing the practice of trenchless technology through education, training, and research for public benefit.

"Thank you for your continued support of WESTT."

To stay connected and hear about upcoming events, visit our website (**www.westt.org**) or find us on LinkedIn (WESTT NASTT). If you want to get involved in WESTT activities, I encourage you to please reach out to me or any of our Board members.

Thank you for your continued support of WESTT.

Michelle Beason

Michelle Beason, PE, Chair, WESTT
National Plant Services, Inc.,
a Carylon Company

MARCH 30-APRIL 3 | DENVER, CO

NO-DIG SHOW 2025

THE NASTT 2025 NO-DIG SHOW MUNICIPAL & PUBLIC UTILITY

Scholarship Program

The NASTT No-Dig Show Municipal & Public Utility Scholarship Award has been established to **provide education and training** for North American municipalities, government agencies and utility owners who have limited or no travel funds due to restricted budgets.

Selected applicants will be awarded **complimentary full conference registration** to the NASTT 2025 No-Dig Show in Denver, CO, March 30 - April 3, 2025. One day conference registrations will also be available. Registration includes **full access to all exhibits and technical paper sessions**... all you have to do is get yourself to the conference! Selected applicants will also be eligible to receive **overnight accommodations**. Selection based on responses to the application as well as need.

APPLY TODAY! Application deadline is November 1, 2024.




NETWORKING EVENTS | EXHIBIT HALL | TECHNICAL SESSIONS

Visit **nastt.org** to learn more

The No-Dig Show is owned by the North American Society for Trenchless Technology (NASTT), a not-for-profit educational and technical society established in 1990 to promote trenchless technology for the public benefit. For more information about NASTT, visit our website at nastt.org.

MESSAGE FROM NASTT CHAIR

Matthew Wallin, PE, NASTT Chair

Hello Fellow WESTT Regional Chapter Members!

As we roll into the Fall, I want to share some key updates and upcoming opportunities that are of importance to your chapter and our organization and industry.

I hope you are joining us for the 18th Annual Western Regional No-Dig Conference, Exhibition and Good Practices Courses being held on October 15-16 at CalPoly in Pomona, CA. This is an exciting event dedicated to advancing the field of trenchless technology in the region.

This year's conference promises to be an exceptional gathering of industry experts, innovators, and professionals, offering a unique opportunity to explore the latest trends, technologies, and best practices in the trenchless sector. Attendees will benefit from insightful presentations and valuable networking sessions. Don't miss this chance to connect with peers, gain fresh perspectives, and contribute to the future of the industry. For more information on the conference, visit our Chapter's website: **https://westt.org/education-and-events/upcoming-events/**

I'd like to offer a big thank you to everyone who participated in this year's 2024 No-Dig Show held in Providence, RI. Your engagement and contributions made it a resounding success! The presentations were insightful, and the networking opportunities were invaluable. We are currently in the thick of 2025 planning and we hope you will mark your calendars for March 30-April 4 in Denver, CO! If you have any feedback or suggestions for future events, please do not hesitate to reach out to us at **info@nastt.org**.

We are now accepting applications for our municipal scholarship program for the 2025 conference. The NASTT No-Dig Show Municipal & Public Utility Scholarship awards employees of North American municipalities, government agencies and utility owners who have limited or no training funds with a Full Conference and Exhibition registration to the NASTT No-Dig Show. Hotel accommodations are provided for selected applicants. Recipients have full access to all exhibits and technical paper sessions. The application deadline is November 1, so please spread the word to any eligible candidates who may benefit from this opportunity. Detailed information about the scholarship program and the application process can be found on our website at **https://nastt.org/no-dig-show/municipal-scholarships/**.

> *"Together, we are driving the future of trenchless technology forward!"*

We are excited that the fifth edition of the Horizontal Directional Drilling (HDD) Good Practices Guidelines book has been released. And by popular demand, the book is now available in a digital format you can access online from any device, as well as a print-on-demand version coming soon! The fifth edition includes updated content reflecting the latest advancements and techniques in HDD. Alongside the book, we have also updated our HDD training course to align with the new edition. These courses are designed to provide both new and experienced professionals with the knowledge and skills needed to excel in their roles. Please check our website for more details on how to purchase the book and enroll in the courses.

We are also excited for the upcoming No-Dig North conference, scheduled to take place from October 28-30 in Niagara Falls, ON, Canada. This event is a premier opportunity for professionals in our field to learn about the latest innovations and best practices in trenchless technology in Canada. We encourage all members to attend and take advantage of the technical sessions, exhibits, and networking opportunities. Early bird registration is now open, so be sure to register soon to secure your spot. Visit nodignorth.ca for all the details.

Thank you for your continued support and dedication to our Chapter. Together, we are driving the future of trenchless technology forward. If you have any questions or need further information on any of the topics mentioned, please do not hesitate to contact me.

Matthew Wallin

Matthew Wallin, PE
NASTT Board Chair

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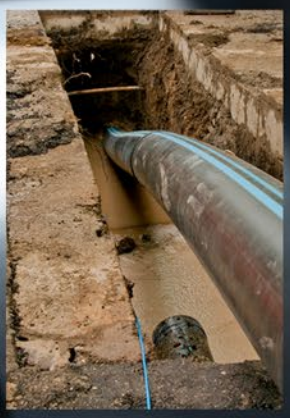
HDPE Pipe - Your Best Solution



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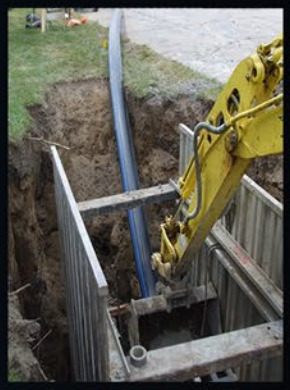

For more details, visit www.plasticpipe.org/MABpubs

HDPE MUNICIPAL ADVISORY BOARD

Find out more:

A not-for-profit association, the Plastics Pipe Institute, Inc. has the technical information, data, field reports plus professional engineers to help in the design and selection of the proper components for your system.

WESTERN REGIONAL CHAPTER

ELECTED OFFICERS:

MICHELLE BEASON, PE – CHAIR
National Plant Services Inc.

mbeason@nationalplant.com

Michelle received a BS in Civil Engineering from Purdue University, and is a registered California PE with over 30 years of water and wastewater experience. She has worked as a Project Engineer for Black &Veatch, as an Asset Management Engineer with the East Bay Municipal Utility District, she owned her own Engineering & Construction firm for 5 years, and for the last 12 years has specialized in CCTV and multi-sensor inspections and trenchless rehabilitation of sewer, storm, and water assets. She is currently the Regional Manager for National Plant Services, Inc., covering the 12 Western States, including Hawaii and Alaska. Michelle is also active in many industry organizations. In addition to serving as a Board Member of WESTT, she is a Board Member of NASSCO, and led the working group in charge of NASSCO's new PACP/MACP/LACP Version 8.

MIKE JAEGER – VICE CHAIR
Tanner Pacific, Inc.

mjaeger@tannerpacific.com

Mike is a Principal Co-Founder of Tanner Pacific, Inc., specializing in Construction Management of Water Resource Projects. Mike is the Chief Marketing Officer responsible for all Marketing and Business Development for the Company. He has over 38 years of experience in public infrastructure project/construction management, as well as, over 15 years of Partnering Facilitation. Having spent his early professional years working for the Cities of Fremont and Palo Alto and at the Union Sanitary District, Mike worked on many different types of projects including, roadway improvements, building renovations, landfill closures and large wastewater treatment plant expansions, just to name a few. Mike has managed many large diameter pipeline projects, totaling more than 40 miles of installed pipe. Ranging in size from 30 to 60 inches in diameter, these projects included many miles of open cut, microtunnel, HDD and pipe bursting to traverse under highways, active school sites, active rail lines and sensitive environmental habitats. Mike is a native Californian growing up in San Jose and Campbell and later becoming a graduate of San Jose State University with a BS in Civil Engineering.

DAVID HAUG – SECRETARY
Black & Veatch

haugd@bv.com

David is a Senior Project Manager with Black & Veatch and has 30 years of experience in the water and wastewater market as a project engineer, construction manager and project manager. His experience ranges from developing plans and specifications for conveyance and distribution systems to preparing environmental documentation and feasibility reports for large capital improvement projects. David worked on projects ranging from rehabilitation of pipes, two-pass tunnel installations, microtunneling, to large diameter tunneling. He also has experience as both a consultant and an owner having worked for a large municipality in Los Angeles County for 19 years.

RACHEL MARTIN - TREASURER
Delve Underground

martin@
delveunderground.com

Rachel Martin has over 20 years of experience in design and construction management on civil projects focused in the fields of water, wastewater, and hydropower. Her experience includes trenchless and tunnel design, development of contract drawings and specifications, construction management, design and constructability reviews, project controls, quality management, and cost estimating. Rachel has developed designs for microtunneling, pipe jacking, HDD, and sliplining projects throughout the US, Canada, and New Zealand.

BOARD OF DIRECTORS & OFFICERS 2024-2025

ELECTED OFFICERS:

KATE WALLIN – PAST CHAIR
Bennett Trenchless Engineers

kate.wallin@bennetttrenchless.com

Kate has been involved with trenchless design since 2005 and has provided design and construction management services on trenchless new installation projects using horizontal directional drilling, microtunneling, pipe ramming, guided boring, and earth pressure balance pipe jacking. She is a contributing author on the 2024 revision of the Horizontal Directional Drilling Good Practices Guidelines. Kate volunteers on the NASTT Student Scholarship Award/Education Committee, the Regional Chapter Committee, the No-Dig Show Technical Program Committee, and serves as a No-Dig session leader. Kate was honored to receive the NASTT Volunteer of the Year award in 2023.

DIRECTORS AT-LARGE:

JEN GLYNN
Woodard & Curran Inc.

jglynn@woodardcurran.com

Jennifer Glynn is a Senior Technical Practice Lead and Senior Principal for Woodard & Curran out of their Sacramento, California office. Jen has over 27 years of experience in Project Management and Infrastructure Design, with an expertise in Condition Assessment and Trenchless Rehabilitation.
Jen has been authoring papers and presenting at conferences both domestically and internationally for the past 25 years. She was a founding member of WESTT and past Executive Board Member for NASTT and is currently an NASTT training course instructor for two classes: Introduction to Trenchless Rehabilitation and Pipe Bursting Good Practices. She is also a member of the AWWA Water Main Rehabilitation and Water Main CIPP Standards Committees.

DIRECTORS AT-LARGE:

JACQUIE JAQUES
Sekisui SPR Americas

jacquie.jaques@sekisui-spr.com

Jacquie Jaques is the Regional Manager for Sekisui SPR Americas for the Western US. Jacquie has over 25 years of industry experience working with manufacturers and contractors specializing in pipeline condition assessment and trenchless rehabilitation solutions. She started her career working for a technical services company specializing pipeline cleaning and CCTV condition assessment. During that time, she worked with municipalities, FEMA and OES on post-earthquake pipeline condition assessment inspection that enabled agencies to obtain federal funding for projects. With a high demand for cost effective solutions to repair our infrastructure, she became involved with cutting edge trenchless technologies that could meet stringent industry design and performance standards.
Jacquie has been actively involved in numerous industry committees over her career. Early on, she was a member and recording secretary for the "Green Book Pipeline Rehabilitation Task Force" which evaluated new trenchless technologies that were germane to public works construction. This task group wrote the first Part 5 of the "Green Book" "Pipeline System Rehabilitation". Jacquie is still active on the committee today and works with the subcommittee to ensure that the specifications are current and still relevant to public works construction. As a WESTT Board Member, she is the Education Liaison for the university members and conducts the outreach on behalf of the committee. Jacquie has also authored several industry papers and presented at national and regional conferences including NASTT, WESTT, Pipe Users Group and HWEA. She has also authored or contributed to several magazine articles including NASSCO and Trenchless Technology.

BOARD OF DIRECTORS & OFFICERS 2024-2025

DIRECTORS AT-LARGE:

SASHA MESTETSKY
Central Contra Costa Sanitary District
smestets@centralsan.org

Sasha Mestetsky is a Senior Engineer in the Capital Projects Division at Central Contra Costa Sanitary District (Central San) located in Martinez, California. He manages Central San's Collection System Program with an annual fiscal budget of approximately $40 million. Sasha is responsible for the design and construction management of all sewer system replacement and renovation capital improvement projects. Most of these projects utilize various trenchless technologies.

Sasha has over 25 years of experience in design and construction of collection systems projects. He holds a Bachelor of Science degree in Civil Engineering from California State University, Sacramento and is a California-licensed Civil and Mechanical Engineer.

Sasha serves as the At-Large Representative of WESTT Chapter Board of Directors. He is a long time member of Water Environment Federation (WEF), North American Society for Trenchless Technology (NASTT), and Northern California Pipe Users Group (PUG). Sasha is passionate about everything trenchless, enjoys sharing his experiences, and actively promotes trenchless technology education.

DEVIN NAKAYAMA
Carollo Engineers
dnakayama@carollo.com

Devin has over 23 years of geotechnical engineering experience in Hawaii, and has served as a geotechnical and trenchless engineer on projects requiring microtunneling, horizontal directional drilling, and guided bore methods, as well as shallow and deep foundations, rockfall mitigation, deep shaft excavations, and soil stabilization. He is a professional civil engineer licensed in Hawaii and California, and obtained his Bachelor and Master's Degree in Civil Engineering from the University of Hawaii at Manoa. Currently a Principal Infrastructure Engineer at Carollo Engineers, he has published and presented two papers on trenchless pipe installation at the North American Society of Trenchless Technology No-Dig conferences.

BOARD OF DIRECTORS & OFFICERS 2024-2025

DIRECTORS AT-LARGE:

CINDY PREUSS – CDM Smith HydroScience Engineers

preusscl@cdmsmith.com

Cindy is a registered professional engineer in California and brings 25 years of experience in planning, designing and managing large-scale public water and wastewater projects throughout the West. As Water Conveyance Discipline Leader at CDM Smith, Cindy serves as an internal resource to project teams across the country, providing her insight and knowledge in water and wastewater pipeline rehabilitation and construction. Her expertise with trenchless technology project planning, evaluation, design and inspection has been of particular benefit to those with whom she works, and is a facet of our industry about which she is especially passionate.

Over her career, Cindy has served on the Board of Directors of both NASTT and WESTT, as well as the Northern California Pipe Users Group (Nor Cal PUG). Cindy currently serves on the WESTT Board, the AWWA Condition Assessment Committee, the NASSCO Pressure Pipe Committee, and several national No-Dig conference committees. She also an instructor for NASTT's Trenchless 101 Good Practices Courses.

GREG WATANABE GHD

greg.watanabe@ghd.com

Mr. Watanabe is a Civil Engineer registered in California, Hawaii, Idaho, Oregon, and Guam and has more than 23 years of engineering and construction experience largely focused on trenchless technologies for both rehabilitation and new installations of underground utilities. During this time, he has planned, assessed, and designed over 100 miles of pipelines up to 96 inches for public utility systems. His project experience includes the design and construction via horizontal auger boring, burst and insert, sliplining, HDD, point repairs, Thermal CIPP, Thermal PCIPP, and microtunneling.

He is currently the Collaborative Delivery Leader for GHD's US West Water Market Sector covering Alaska, Arizona, California, Guam, Hawaii, Idaho, Nevada, Oregon, Saipan, and Utah. In this role he oversees the pursuit and delivery of all water/wastewater design-build projects in the region. He is also GHD's managing Principal for GHD's NASTT No-Dig participation across North America.

COMMITTEE CHAIRS:

Budget Committee:
Rachel Martin

Conference Committee:
Michelle Beason

Nominations and Elections Committee:
Cindy Preuss

Social Media Committee:
Greg Watanabe

Student Chapter Liaison:
Jacquie Jaques

WESTT Magazine Committee:
Devin Nakayama

Joint WESTT/HWEA 2023 Conference a Hawaiian Success!

2023 WESTT 17th Annual Western Regional No-Dig Conference Wrap-up

Over 200 attendees enjoyed the joint conference held at the beautiful Koolau Ballrooms and Conference Center in Kaneohe HI

> *"The joint conference reinforced the benefit of WESTT's partnership with local organizations."*

On November 7 – 8, 2023, we were fortunate to hold our 17th annual Western Regional No-Dig Conference jointly with the 11th Biennial HWEA Collection Systems Conference. HWEA (Hawaii Water Environment Association) is a non-profit organization based in Honolulu, Hawaii, and is part of the national and international organization Water Environment Federation (WEF). HWEA has about 450 members in a broad range of professions dedicated to promoting sustainable water management practices and protecting Hawaii's unique natural environment.

Conference included presentations on a wide range of trenchless technology topics

NASTT Good Practices Course for New Installations and Rehabilitation Methods at the Japanese Cultural Center in Honolulu HI had over 70 participants attending the eight-hour session

NASTT promotional booth at the joint WESTT-HWEA conference

Exhibition hall - networking and close personal access to industry expertise is an integral feature of the annual Western No-Dig Conference

Pre-conference activities consisted of the NASTT Good Practices Course for New Installations and Rehabilitation Methods, held on November 7, 2023 at the Japanese Cultural Center in Honolulu, Hawaii. Over 70 participants from local engineering firms and government agencies attended the 8-hour course to learn more about the benefits of incorporating trenchless technologies into their infrastructure projects.

The joint conference was held at Koolau Ballrooms and Conference Center in Kaneohe on November 8, 2023, and offered dual track sessions. WESTT's track included presentations on horizontal directional drilling, microtunneling, rehabilitation, CCTV, artificial intelligence, pipeline assessment, and trenchless inspection. HWEA's track included a wide variety of topics related to wastewater collection systems and buried infrastructure with an emphasis on current collection system technologies, assessment, rehabilitation, and operations. Networking breaks between session blocks gave exhibitors the opportunity to share their information on products and services.

Post-conference activities were hosted by HWEA and led by the local municipal agencies. The half-day session included updates on their agencies, challenges they face, lessons learned, a Q&A panel discussion, and field demonstrations of their latest inspection and maintenance equipment. With over 200 attendees over 2.5 days, the joint conference reinforced the benefit of WESTT's partnership with local organizations in promoting the use of trenchless construction practices and technologies across a larger audience and wide range of disciplines.

WESTT Chapter Board Members at the post-conference dinner (From l – r): Devin Nakayama, Jennifer Glynn, Rachel Martin, Michelle Beason, Cindy Preuss, Kate Wallin, Greg Watanabe

Lush Hawaiian scenery and stunning Pacific skies were backdrops to the joint WESTT-HWEA Conference

The 18th Annual Western Regional No-Dig Conference, Exhibition, and Good Practices Courses

Cal Poly Pomona Kellogg Center - Pomona, California

Tuesday, October 15 - Wednesday, October 16

All of the benefits of a national conference in a smaller forum with a personalized touch! This year's conference will be held on the campus of Cal Poly Pomona in beautiful Southern California. This is a great opportunity to mingle with students and other professionals in the region while learning about the latest in trenchless technologies from experts in the field.

Registration for the conference includes an informative one-day technical program with a product exhibition area. On the second day, for an additional fee, attendees may also elect to enroll in two optional NASTT Introduction to Trenchless Technology Courses: 1. New Installations, and 2. Rehabilitation

Earn valuable Continuing Education Units (CEU's)!

Conference Information

WESTT

WESTT (www.westt.org) is the Western regional chapter of the North American Society for Trenchless Technology (NASTT) (www.nastt.org), promoting education and development of Trenchless Technology for public benefit. WESTT is a non-profit organization established in 2004 and includes Arizona, California, Hawaii, Nevada, and New Mexico.

WESTT Conference Format – Tuesday, October 15

The first day of the conference will feature an informative technical program with eight presentations focused on various aspects of trenchless construction. Welcome addresses and Keynote Address in the morning after sponsored breakfast with Innovative Products Forum just before sponsored luncheon. Attendees will also have several opportunities to interact with exhibitors during sponsored meals, breaks, and a happy hour reception.

NASTT Good Practices Courses – Wednesday, October 16

These introductory courses are ideally suited for both newcomers to the industry and anyone who is interested in seeking a refresher course on trenchless technology methods. The New Installation course covers new construction techniques such as microtunneling, HDD, pipe jacking, auger boring and pipe ramming. The Rehabilitation session provides an overview of the methods available to public works and sewer agencies to rehabilitate water, sewer, and gas systems without the need for excavation.

Attendees

The conference and course are both useful to public officials, engineers, utility company personnel, designers, and contractors who are involved with constructing, rehabilitating, and managing underground utilities.

Attendee Registration

Register at: Event Registration (nastt.org)

NASTT and HWEA members receive a discount for both the conference and course fees. Government Employees are eligible for discounted registration rates for both the conference and Good Practices course.

WESTT 2024 CONFERENCE AGENDA

Tuesday, October 15
Kellogg Convention Center, Pomona CA

7:30	Sponsored Breakfast and Registration
8:30	*Welcome Address and Exhibitor/Sponsor Introductions* Mike Jaeger, Tanner Pacific (2024 WESTT Conference Chair)
8:55	*NASTT Welcome* Jenna Hale, NASTT
9:10	*Keynote Address:" A Century of Service… Reflecting on Our Past but Focused on the Future"* Sam Espinoza, Head of Engineering, Los Angeles County San. Dist.
9:35	*Inspection of a 50-Year Old Outfall Force Main to San Pablo Bay* Michelle Beason, National Plant Services; James Kohne, Woodard & Curran
10:00	Refreshments and Exhibitor Hour
10:45	*Trenchless Replacement of Aging Force Main in the Russian River Gorge* Su Soe, Delve Underground
11:10	*Innovative Products in Trenchless Rehabilitation & New Installation Forum* Forum Moderator: Cindy Preuss, CDM Smith Forum Participants: Brawo (Magnavity SX), Sunbelt Rentals (Pump Sentri), Boyd-Tech (B-Tech Connections), Ditch Witch (AT120 All Terrain HDD), and Digital Control Inc. (TeraTrak R1)
12:00	Luncheon and Exhibitor Hour
1:30	*First Aqueduct Water Tunnels Rehabilitation for Domestic Water with Geopolymer for San Diego County Water Authority (SDCWA) Presenter* Joe Royer, Henkel Corporation; Nick Frank, Michels
1:55	*Advancements in Trenchless Technology: San Diego First Aqueduct Treated Water Tunnels Rehabilitation Project* Presenter Craig Vandaelle, Michels
2:20	*Laguna County Sanitary District Asbestos Abatement UV CIPP Rehabilitation Through Protected Environments in Santa Maria, CA* Dave Badgley, Badgley & Associates
2:55	Refreshments and Exhibitor Hour
3:40	*Trenchless Replacement of Aging Sewer Trunk Main in Sonoma, CA* Sarah Mills, Delve Underground
4:05	*16-inch HDD Gas Pipeline Crossing of the Sacramento River in Rio Vista, California* Mary Neher, Bennett Trenchless Engineers
4:30	*HDD Construction of a Large Diameter Pipeline Under the Oakland Inner Harbor and Through Soft Clays* Justin Lianides, Mott MacDonald
5:00	Cocktail Reception (Until 7:00)

NASTT Good Practices Courses

Wednesday, October 16
Kellogg Convention Center, Pomona CA

NASTT's GOOD PRACTICES
INTRO TO NEW INSTALLATIONS
EST. 2002

The four-hour NASTT Introduction to New Installation Methods Good Practices Course is ideally suited for both newcomers to the industry and for anyone who is interested in seeking a refresher course on the trenchless technology methods that are used to install new utility pipelines. This course provides an overview of various trenchless construction methods and discusses the broad applications and limitations of each method. For each method, the presentation includes a discussion of achievable drive lengths, suitable pipe diameters, anticipated accuracy, required work areas, and appropriate ground conditions. The new construction techniques discussed include HDD, piercing, pipe ramming, auger boring, guided methods, pipe jacking, and microtunneling. For additional training, NASTT also provides a detailed eight-hour course on New Installation Methods Good Practices as well as an in-depth eight-hour HDD Good Practices course.

NASTT's GOOD PRACTICES
INTRO TO REHAB
EST. 2002

The four-hour NASTT Introduction to Trenchless Rehabilitation Good Practices Course is geared to consultants, municipalities, and contractors and gives a high-level overview of numerous trenchless methods commonly used in North America to rehabilitate existing pipe and conduit. This half day course covers Rehabilitation Project Planning (including pipe and manhole inspection technologies), Watermain Rehabilitation, and Sewer Rehabilitation and offers a brief introduction of technologies such as sliplining, panel lining, spiral wound lining, spray on lining, pipe bursting, cure-in-place lining, lateral lining, and manhole rehabilitation. This course is ideally suited for both newcomers to the industry and anyone who is interested in a refresher course and offers an excellent basis for basic understanding of different trenchless rehabilitation methods currently out in the marketplace. It can be augmented with other more in-depth eight-hour good practices courses offered by NASTT.

MEMBERSHIP

Meet Your Career Goals

Stay ahead of the curve.

- NASTT Good Practices Courses
- *Trenchless North America* & E-news
- Regional chapter magazines
- NASTT technical papers

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KEYNOTE SPEAKER: Sam Espinoza

Los Angeles County Sanitiation Districts (LACSD)

LOS ANGELES COUNTY SANITATION DISTRICTS
Converting Waste Into Resources

Department Head of the LACSD Engineering Department, Sam Espinoza shares his thoughts on the history and mission of the organization and its relationship with the trenchless technology industry. Sam is delivering the Keynote Address at the 18th Annual Western Regional No-Dig Conference October 15 in Pomona CA

The Los Angeles County Sanitation Districts (LACSD) is a public agency focused on protecting public health and the environment through innovative and cost-effective wastewater and solid waste management practices and, in doing so, converting waste into resources like recycled water, energy, and recycled materials. The agency consists of 24 independent special districts serving approximately 5.5 million people in Los Angeles County. The service areas cover approximately 825 square miles and encompass 78 cities and unincorporated areas in the county.

Sam Espinoza is currently the head of the Engineering Department at LACSD. With over 30 years in the wastewater industry, his professional background includes experience in construction management and contract administration, pipeline design, management of the operation and maintenance programs for the collection system, management of the agency's regulatory compliance, laboratory, research and safety programs, and management of the design and construction of numerous wastewater and solid waste facility projects. Prior to his employment with LACSD, Sam worked in the private sector for MWH's Applied Research Department where his duties included the development and execution of various research studies for the water and wastewater industry, including the design and construction of pilot-scale treatment facilities for various clients throughout the country.

Sam earned both his BS and MS degrees in civil engineering from the University of California at Berkeley. His professional affiliations include WEF, CWEA, CMAA, and ASCE.

LACSD consists of 24 independent special districts. What advantages and challenges does this present to your department?

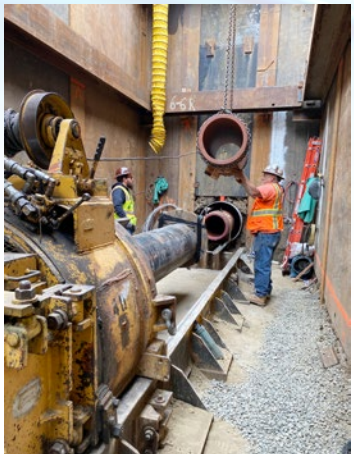
For LACSD, the advantage of having independent special districts working cooperatively with a centralized management team is that it maximizes efficiency and reduces overall costs. Cost efficiency is achieved through reduced administrative costs associated with sharing resources such as office space, facilities, equipment, and most importantly the staff. Sharing staff with specialized skills in engineering, operations, planning and finance, IT, human resources, and legal matters, not only leads to cost savings for all districts but also ensures consistency in terms overall quality of work. Economies of scale are also realized through combined purchasing power, which allows for bulk discounts and better negotiation terms with contractors and suppliers.

For the Engineering Department, the advantage of serving these 24 independent special districts is that there is never a shortage of important and interesting projects. With 1,400 miles of sewers, 49 pump stations, 11 wastewater treatment plants, 2 landfills and 3 materials recovery/transfer facilities, the number and diversity of projects keep staff engaged and proficient in the production of high-quality engineering solutions. Our biggest challenge associated with serving multiple special districts is balancing the competing needs of each district. Since our agency performs most of its engineering using in-house staff, proper resource allocation becomes critical to ensure we are working on the highest priority projects and managing our risk without overextending ourselves and potentially causing employee burnout.

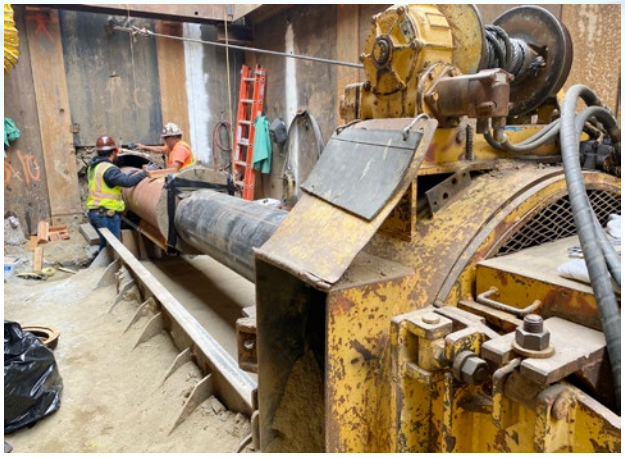
> *"Trenchless technology benefits our agency and ratepayers in several ways."*

What else makes your department and its mission unique compared to those of other regions?

Although we are very similar to other wastewater agencies in terms of our primary mission, what makes our agency and department unique is that we design most of our projects with internal staff and generally do not need to rely on engineering consulting firms to complete our work. In our department we have experienced and specialized staff in all the design disciplines (civil, mechanical, structural, architectural, and electrical). With numerous wastewater and solid waste facilities to operate and maintain, LACSD has the volume of work to efficiently sustain a full-time engineering design and construction management staff. This in-house engineering approach has been utilized over many years and is responsible for the original design and expansions of our wastewater treatment plants and collection system. Utilizing a permanent, in-house engineering design and construction management staff rather than contracting out the work has several advantages for LACSD including standardization of design procedures and contract documents, a reduction in design costs



Pipe Jacking - Readying segment of VCP for placement on jacking machine rails



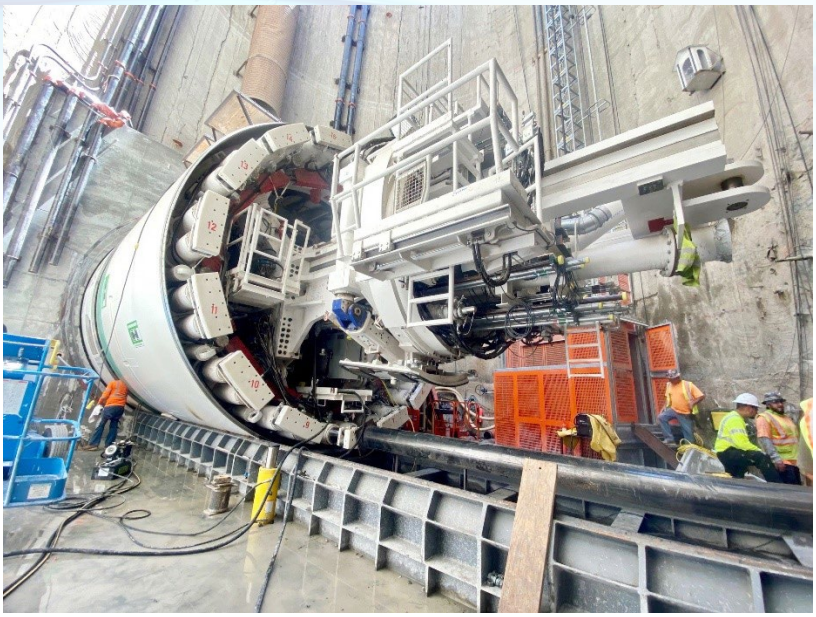
Jacking machine with VCP conduit loaded onto rails

View of jacking machine from atop shoring pit

and errors, continual improvement of the design and construction processes over time, and institutional knowledge that goes back decades. Our engineering department staff is very knowledgeable regarding the needs of our operational departments and coordinate closely with them to incorporate their requirements into our contract documents and to quickly resolve issues during construction in the field. In the last few years, LACSD has begun to utilize an on-call engineering services program to augment LACSD staff during peak demands. This relatively new approach for LACSD has been beneficial both in terms of reducing the backlog of work and establishing a healthy knowledge exchange between our staff and the engineering consulting firms we work with.

What is the most underappreciated impact of LACSD that the public may not be aware of?

The public may not be aware that last year LACSD celebrated 100 years of service to the people of Los Angeles County. LACSD was created in 1923 with a mission to construct, operate, and maintain facilities that collect and treat domestic and industrial wastewater. Over the past century, LACSD has evolved into an



There is never a shortage of important and interesting projects!

> *We actively support staff attendance to trade organization events such as NASTT.*

agency that protects public health and the environment through innovative and cost-effective wastewater and solid waste management. In 2023, LACSD and its partners turned wastewater and trash into 54 billion gallons of recycled water, 57 megawatts of electricity, 154,000 tons of recycled material and 130,000 tons of compost. Over the last 60 years, LACSD has been the nation's largest producer of recycled water.

What was your first experience with trenchless technologies, and what lessons would you share to others who are starting on their first trenchless project?

My first experience with trenchless technologies was in the mid-1990s working for LACSD on a project to construct about a mile of 60-inch diameter sewer pipe inside a rib and lag tunnel underneath a busy street in the City of Industry. The soil conditions were such that the contractor was able to use an open-faced tunnel boring machine and for the most part the project went smoothly up until we hit a pocket of water and running sand that created a large void underneath an active railroad track. Given the safety concerns, we had to quickly mobilize more staff and equipment to stabilize the tracks and resume our tunneling operation. The lesson I would share with others starting their first trenchless project is to be sure that you ask lots of questions and learn from the experiences of highly qualified, individuals who have been doing this type of work for many years.

How has trenchless technologies benefited LACSD and their end users?

Trenchless technology benefits our agency and our ratepayers in several ways that come to mind. The first is that trenchless technology significantly minimizes the disruption caused by construction activities in a densely populated area such as Los Angeles County. With the strategic placement of collection system entry points for rehabilitation, we can further limit the disturbances to the local community while addressing the essential need of infrastructure repair. Another benefit of trenchless technology is an overall reduction in the time and cost needed to complete a sewer rehabilitation project. Rehabilitating existing

LACSD streamlined its sewer rehabilitation design process and sped up completion

> *Organizations such as NASTT are critical to our staff's continued growth.*

sewer lines using cured-in-place pipe (CIPP) liner systems enables our agency to repair critical assets without the added concern of utility conflicts or lengthy design and construction durations.

What trenchless projects are upcoming at LACSD?

For this current fiscal year, LACSD plans to award 25 trenchless (sewer rehabilitation) projects with an anticipated total construction cost of approximately $105M. This includes 16 smaller diameter sewer (less than 27-inch diameter) CIPP projects with a construction cost of $47M and 5 medium diameter sewer (27-inch to 48-inch diameter) CIPP projects with a construction cost of $28M. The 4 remaining projects will utilize sliplining sewers with fiberglass pipe and have a total estimated construction cost of $30M.

How would you describe the role that professional and trade organizations such as NASTT provide to LACSD?

The importance of attending professional and trade conferences was instilled in me early in my career when I worked in the private

CIPP enables the LACSD to repair critical assets without utility conflicts or lengthy project duration

> *Over the last 60 years, LACSD has been the nation's largest producer of recycled water.*

sector. The value of networking, staying informed with the latest trends, recruiting top talent, and showcasing the company's expertise to gain visibility within the industry was among the many benefits of participating in these types of events. At LACSD, we actively support staff attendance to trade organization events such as NASTT conferences as it provides our staff the opportunity to connect with industry peers, gain valuable insights into new products, services, innovations, technologies, and best practices. Organizations such as NASTT are critical to our staff's continued growth and help to ensure our agency stays current with our industry. I can say from direct experience that listening to the success stories of others can inspire and motivate staff to implement new strategies and formulate new ideas for their own work.

What collection system challenges do you foresee for LACSD, and how will LACSD adapt?

In December 2021, a large sanitary sewer overflow occurred from an LACSD sewer as the result of a 48-inch diameter pipe that collapsed during a heavy rainstorm. The sewer pipe that collapsed was an unlined concrete pipe that had corroded and was surcharged during the storm. Although LACSD was in the process of constructing a replacement sewer for the line that collapsed, it was not completed in time to avoid the spill. LACSD has approximately 650 miles of unlined concrete pipe throughout its collection system which is subject to corrosion and should be protected. To avoid a repeat of the spill event, LACSD has streamlined its sewer rehabilitation design process and sped up the completion of its high priority sewer projects. In the last decade, on average LACSD awarded approximately $18M of sewer construction and repair projects per year. With a streamlined design approach, increases in staffing and the use of on-call engineering consultants, LACSD was able to award $100M and $125M in sewer repair projects in the last two fiscal years, respectively. Even at this increased rate, it is anticipated that it will take more than 20 years to protect all the remaining unlined concrete pipe in LACSD's collection system.

What project, program or initiative that involves your department are you most looking forward to?

Currently our department is working on a comprehensive and strategic technology and workforce development plan to document and guide our efforts as we continue to evolve and strive to be leaders in the use of technology by a public agency. Over the last several years, our department has been adopting and integrating various digital solutions into our design and construction management practices to enhance service quality and boost our workforce capabilities. This initiative aligns with LACSD's commitment to leadership through innovation. Although not every digital solution has been a success, we are now in a position to share our experiences with other public agencies who are looking to advance their capabilities.

What has been your most memorable experience at LACSD?

Some of my most memorable experiences at LACSD all seemed to have occurred during my tenure as the collection systems manager for the agency. One such experience started with a late-night phone call from my superintendent letting me know that the police had just reported that two juveniles have escaped a detention center by entering our sewer line through a manhole on their property. By the time we got on site, one of the juveniles was being lifted out of the sewer through a manhole located just outside the detention center walls. At that time there was no sign of the second escapee. With the police looking over our shoulders, our crew set up CCTV near the detention center and started going downstream. In the meantime, the superintendent and I drove a couple of miles away to a location just upstream of where the sewer siphoned underneath the 105 Freeway. To

Historic LACSD Construction Projects

1953 - 12-Foot tunnel preparing for next segment by removing tracks

1953 – 12-Foot Tunnel Arch Support Construction

1955 – 12-Foot Tunnel Mucking Machine

our surprise, the manhole cover was off its frame, and there were sludge footprints on the sidewalk leading to the brush alongside the freeway. We informed the police and all we could think about was how this kid must have seen the "Shawshank Redemption" one too many times. The police eventually caught up with him at his grandmother's house just a few miles away.

Cal Poly Pomona NASTT Student Chapter Report:

CALIFORNIA STATE POLYTECHNIC UNIVERSITY, POMONA

Pioneering Trenchless Technology for Students on the West Coast

By: Sonja Kozak (Student Chapter President) and Dr. Jinsung Cho (Faculty Advisor)

As the construction industry rapidly develops and our planet faces new challenges, students are eager to be at the forefront of these changes. College curriculums in civil engineering and construction typically focus on buildings and other surface-level structures. However, the NASTT Student Chapter at California State Polytechnic University, Pomona (Cal Poly Pomona) is educating students about the importance of engineering below the surface. The trenchless industry advocates for improved and more sustainable methods of managing our underground infrastructure. Without the need for extensive excavation, trenchless technology minimizes environmental impacts and reduces disruption to communities. Sustainability is increasingly crucial in engineering so that we can ensure our planet can meet the needs of both current and future generations. Cal Poly Pomona, the first public university in California to complete the Sustainability Tracking Assessment and Rating System (STARS) report, truly values sustainability and the NASTT Student Chapter further exemplifies its significance in engineering and construction practices.

The CPP – NASTT student chapter was established by Dr. Jinsung Cho in 2013, who started his teaching at Cal Poly Pomona. Cal Poly Pomona is the only university with a NASTT Student Chapter in the state of California. It is also one of two universities to have a student chapter in the entire western region of the United States. Although the chapter is small, the current members have been recruited for their exceptionally hard work and efforts. Student chapter faculty advisor and Professor, Dr. Cho, was also once a student part of his university's NASTT student chapter. His passion for construction engineering and trenchless technology continues to grow as he is continuously seeking educational opportunities for his students. The CE 4161 (Underground Construction and Trenchless Technology) course has been offered to both undergraduate and graduate civil and construction engineering students at Cal Poly Pomona. The CPP - NASTT student chapter introduces students to the world of trenchless technology by providing "Lunch-N-Learns", field trips, networking opportunities, and research projects (Figure 1).

The chapter has been participating in the "No-Dig Show" since 2014 and attended the "No-Dig Show" in Providence, Rhode

> *"Cal Poly Pomona is the only NASTT Student Chapter in the state of California."*

Figure 1. CPP-NASTT Chapter and WESTT Board Members at the 2024 No-Dig Show

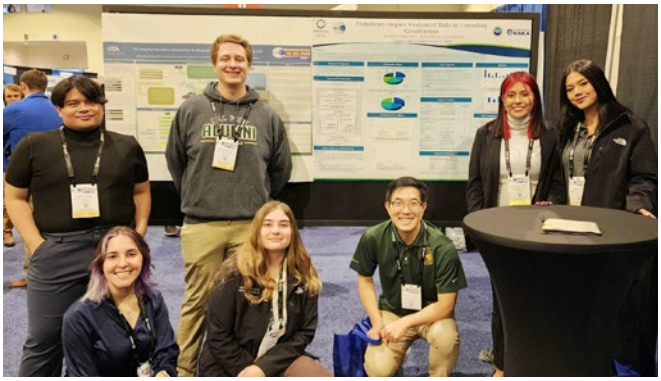


Figure 2. Chapter members and their student research competition poster

> *Trenchless technology minimizes environmental impacts and reduces disruption to communities.*

Figure 3. Students attending a "Lunch-N-Learn"

Island earlier this year. This opportunity was a once-in-a-lifetime experience and a few members even participated in the student research poster competition (Figure 2).

The track sessions and exhibit halls were unlike anything the students receive on campus. "Lunch-N-Learns", available to all students of Cal Poly Pomona's Civil Engineering department, are information sessions hosted by clubs and other chapters featuring guest speakers and industry professionals (Figure 3).

Lunch is provided, making these events extra enticing for college students! CPP's NASTT Student Chapter is always seeking new guest speakers from the trenchless and underground infrastructure industry. They believe that "Lunch-N-Learns" are an excellent way for students to gain more knowledge about the trenchless industry and utility construction field. Students oftentimes find themselves attending for a free lunch but walking away with a newfound

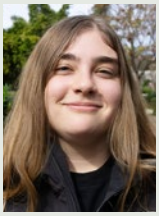
> *Lunch is provided, making these events extra enticing for college students!*

Figure 4. Chapter board members and faculty on a site visit to the Thompson Pipe Facility

interest and possible job opportunities. The chapter has also offered field trips to expose students to the world of underground construction and trenchless technology (Figure 4). Field trips will always be on the agenda for CPP-NASTT to promote the significance of the utility construction field to the 1,600 civil and construction students at Cal Poly Pomona.

The trenchless industry lacks exposure on college campuses, making CPP's NASTT Student Chapter especially dedicated to increasing awareness and promoting its significance in engineering. Cal Poly Pomona and the NASTT Student Chapter are looking forward to hosting the 18th Annual WESTT Western No-Dig Conference. By hosting events such as these and providing students with experiences outside of the classroom, Cal Poly Pomona's NASTT Student Chapter encourages students on the West Coast to learn more about the world of trenchless technology.

ABOUT THE AUTHORS:



Sonja Kozak *is a student in the Civil Engineering department at Cal Poly Pomona. She currently serves as the President for the NASTT Student Chapter (2024-2025) at Cal Poly Pomona.*

Dr. Jinsung Cho *is a professor in the Civil Engineering department at Cal Poly Pomona. He has served as the faculty advisor for the NASTT Student Chapter at Cal Poly Pomona for 11 years.*

Arizona State University NASTT Student Chapter Report:

A Highly Competitive Market

ARIZONA STATE UNIVERSITY

By: Samuel T. Ariaratnam, Ph.D., P.E., P.Eng., BC.PLW, F.ISTT, EASA, F.CAE, NAC, Dist.M.ASCE

Today, the Engineering and Construction job market is highly competitive. All sectors of the industry are competing for the best and brightest students from academic institutions throughout the country. Our students at Arizona State University are typically faced with deciding between three to five different job offers even before they graduate. The challenge is to expose these students to the trenchless industry to foster interest in pursuing such jobs.

The ASU-NASTT Student Chapter was started in 2001 after I moved to ASU from the University of Alberta. Since then, we have taken students to the No-Dig Show annually where they have had the opportunity to interact with trenchless professionals, learn about the latest technologies, and listen to engaging technical presentations. Over the years, our students have participated in various NASTT No-Dig Student competitions including the CCTV competition, research poster competition (Figure 1), chapter activity PPT competition, and recorded video competition. This is great exposure and provides friendly competition among the various universities. Every student that has attended a No-Dig Conference has left amazed at the generosity and friendliness of the trenchless industry. Our industry truly cares about educating

Figure 1. Student research poster competition – Hala Sanboskani, ASU

> *"Every student that has attended a No-Dig Conference has left amazed at the generosity and friendliness."*

students, who are the future generation of the trenchless profession. The No-Dig Show has had a major impact on the Student Chapter members, as many have gone on to careers in the industry. Our members are pursuing undergraduate and graduate degrees in Civil Engineering, Construction Engineering and Construction Management. All of these degrees are typically aligned with our industry!

The ASU-NASTT Student Chapter members try to bring awareness to their club by setting up information booths for other ASU students to learn more about their activities. Outreach efforts are vital in attracting new blood each year in a landscape where there are many competing club options available.

All of the Student Chapter members have taken a Senior/Graduate-Level "Trenchless Construction Methods" class taught by me each Fall semester. The class gives an introductory overview of the various trenchless methods and also explores the importance of geotechnical considerations and utility damage prevention. Our students are also exposed to NASTT industry members who volunteer their precious time to lecture. Some of the individuals that have come to Tempe, Arizona over the past 23 years include: Jeff Boschert, Maureen Carlin, Arvid Veidmark III, Frank Canon, Piero Salvo, Joe Loiacono, Collins Orton, Wing Chan, Siggi Finnsson, Richard Barge, Tom Furie, Carl Neagoy, Corey Street, Casey Smith, David Gill, Michael Rocco, Myron Shenkiryk, Bethany McDonald, Jeremy Haskins, Scott Arnold, Ben Nelson and Ray Post. You probably recognize many of these names, as they are all stalwarts

Figure 2. HDD Site Visit


Figure 3. CIPP Site Visit


Figure 4. Pipe Bursting with Mike Rocco, AUI

in the industry. In addition to the obvious benefits of hearing "real-world" stories from these exceptional individuals, another major benefit of these interactions is that it provides our students with instant contacts within the industry upon graduation. How valuable is that?

Our Student Chapter members also visit local trenchless jobsites every year to gain a real-life perspective. Over the years, they have gone to horizontal directional drilling (Figure 2), CIPP lining (Figure 3), auger boring, condition assessment and pipe bursting (Figure 4)

> *Our industry truly cares about educating students, who are the future generations.*

Figure 5. ASU Group picture (No-Dig 2010 Chicago)

projects. Classroom lectures are no substitute for physically being on site and observing trenchless projects in the field. I truly believe that these experiences spark student interest in pursuing careers in the industry.

Some of our Student Chapter members have gone on to internships with trenchless design firms, contractors, and suppliers. It is rewarding for me to see our ASU students take an interest in an industry that is so important to me. Former ASU-NASTT Student Chapter members are currently working across Canada and the U.S. as well as internationally. An interesting fact looking at the group photo from the 2010 No-Dig Show in Chicago is that five of these former students are now university professors lecturing and conducting their own research in trenchless technology (Figure 5). This is something that I am extremely proud of as they are educating the next generation.

ABOUT THE AUTHOR:

Dr. Samuel T. Ariaratnam *is a Professor and Sunstate Chair in the School of Sustainable Engineering and the Built Environment at Arizona State University. He serves as the faculty advisor for the ASU-NASTT Student Chapter. He is a former Chairman of the International Society for Trenchless Technology and was the 2012 Trenchless Technology Person of the Year.*

Presentation to UC Berkeley Students:

WESTT Chapter Student Engagement & Outreach

By: Kate Wallin, Past Chair, WESTT Chapter

The geotechnical department at the University of California at Berkeley invited the Western Chapter of NASTT (WESTT) to present at their GeoSystems Seminar series on March 13, 2024. The seminars are held weekly during the school term and are open to the public. The seminar series focuses on geotechnical challenges in civil engineering projects with an emphasis on lessons learned. Brian Avon with Carollo Engineers introduced NASTT and the WESTT Chapter to the attendees who were predominantly post-graduate geotechnical engineering students. Matthew Wallin with Bennett Trenchless Engineers then presented design and construction aspects on a case study of a pilot tube guided pipe ram project in Salt Lake City, UT. The seminar was well-received by both faculty and students. WESTT looks forward to future opportunities to present at the seminar and provide education on trenchless construction methods to upcoming engineers.

Matthew Wallin, NASTT Chair, Bennett Trenchless Engineers presents case study of a pilot tube guided pipe ram project to University of California at Berkeley geotechnical students

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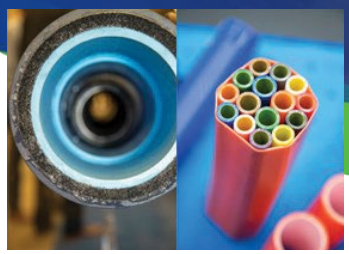

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16-inch HDD Gas Pipeline Crossing of the Sacramento River in Rio Vista, California

By: Mary Neher, PE, Bennett Trenchless Engineers
Danny Lee, PE, Pacific Gas and Electric Company
Gareth Owens, PE, PMP, Longitude 123

1.0 INTRODUCTION

The R-1402 Line 130 Replacement Project began in response to an inspection recommendation issued by The National Transportation Safety Board (NTSB). The recommendation was that the existing 10-inch diameter high pressure natural gas transmission pipeline crossing of the Sacramento River near Rio Vista, California be assessed by December 22, 2022. The age of the pipe, segments with shallow depth of burial, and the configuration of the pipeline made in-line inspection very challenging. Therefore, Pacific Gas & Electric (PG&E) determined that the pipeline should be replaced prior to NTSB's recommended assessment date.

To avoid the more environmentally impactful alternative of underwater open cut trenching in the Sacramento River, horizontal directional drilling (HDD) was selected to install approximately 3,700 feet of new pipeline. The HDD installation method eliminated potential temporary construction impacts associated with the open cut trenching installation, such as turbidity and disturbance to sensitive shoreline biological resources, as well as eliminated the risk of the new pipeline crossing becoming exposed by future changes to the river bottom elevation. The 16-inch diameter was selected to match the diameter and facilitate the tie-in of the new pipeline to the existing 16-inch diameter pipeline on the east side.

Figure 1. Aerial view of the project location

2.0 SITE AND GEOTECHNICAL CONDITIONS

The project site was in a rural area south of Rio Vista, California. An aerial view of the project location is shown in Figure 1. The primary source of geotechnical data for the HDD crossing of the Sacramento River levees was a 2020 Geotechnical Investigation Report prepared by Kleinfelder. Figure 2 shows the geotechnical conditions interpreted from the Kleinfelder borings.

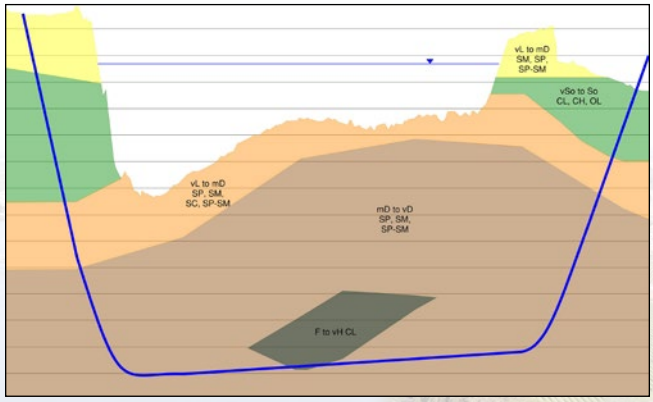


Figure 2. Geotechnical conditions interpreted from Kleinfelder borings

3.0 PERMITTING CHALLENGES

The permitting process for this project took approximately two years to complete. (It should be noted that, due to recent regulatory changes, project planners should anticipate a minimum three-year timeline for a similar project today.) Since the project was in California, the California Environmental Quality Act (CEQA) process had to be completed before many other agencies would issue their permit, which extended the permitting timeline. The California State Lands Commission served as CEQA Lead Agency for this project. Permits were also required from ten additional federal, state, and local agencies.

3.1 Construction Schedule And Seasonal Constraints

Potential impacts to giant garter snakes restricted work in the fall, and there were schedule restrictions with the flood season and levees which restricted work in the winter and early spring. Therefore, although it is the season when bird nesting activity peaks, the project was scheduled to begin in the late spring. Regardless of when construction began, there was substantial risk that the construction schedule would be delayed and compressed. However, since work could proceed if no nests were present, late spring and nesting season was deemed the lowest risk timeframe.

Figure 3. Aerial view of the Sacramento River and Rio Vista Bridge near the project site

Figure 4. Aerial view of the western HDD work area looking across the Sacramento Riverproject site

4.0 DESIGN AND DESIGN CONSIDERATIONS

Of the potential trenchless methods, HDD was deemed the only one that was both technically and economically feasible for installing the relatively small diameter pipeline (16-inch) the required distance (approximately 3,700 feet). The length of conductor casing necessary to minimize risk of hydrofracture was significant and drove the length of the vertical tangents.

4.1 Conductor Casings

To minimize the risk of hydrofracture in and create a stable bore through the very soft to soft clays and clays with organic materials that were encountered at and near the ground surface it was deemed necessary to install approximately 260 feet of steel conductor casing on both sides of the Sacramento River crossing.

The length of the required conductor casings, particularly given the need to remove the casing on the western side of the crossing (to minimize the potential for accelerated corrosion of the steel product pipe), was identified by the design team as likely to be challenging. Therefore, the design required that the contractor install the full 260-foot lengths by telescoping a minimum of two casing sections.

The design team recommended removing the western conductor casing after completion of pullback with the addition of a testing step that would be performed shortly before pullback. However, after discussions with Brotherton, the HDD contractor performing the work, it was decided to remove the conductor casings on the western side of the crossing completely after pullback primarily to avoid a delay between the final swab and start of pullback.

Figure 5. Installing the telescoped conductor casing at the eastern entry point

Mitigating the risk of corrosion to the steel product pipe due to the conductor casing that could not be removed on the eastern side of the crossing (due to the USACE levee and anticipated ground conditions) presented an even larger challenge for the project team. Several alternatives were considered but the final selected approach was to install casing spacers on the last section of the product pipe as it was pulled into the bore and to grout the annular space afterwards. In addition to installing the casing spacers to ensure there was no contact between product pipe and the conductor casing, an anode bed consisting of four 50-pound magnesium sacrificial anodes was installed to provide added corrosion protection.

4.2 Hydrofracture Risk Evaluation

Given the length of the crossing and the anticipated soil conditions, it was quickly determined that the risk of hydrofracture would be unacceptably high during pilot hole drilling, assuming a typical single HDD rig installation procedure. Therefore, the crossing was designed as an intersect drill. The geotechnical layer profile used, and the results of the analysis are shown in Figure 6. Figure 6 has two P_{min} lines intersecting at the middle of the bore, showing the minimum required pressures to return drilling fluid to each rig during the intersect drilling.

The results showed that the risk of hydrofracture was expected to be low for most of the bore except for approximately 100 and 150 feet near the entry points where the ground conditions were anticipated to be very soft to soft clay. The previously mentioned conductor casings, the extents of which are shown in Figure 6 by the green shaded areas, were specified to mitigate the risk of hydrofracture in these areas.

Although the calculated risk of hydrofracture was low, the actual risk of hydrofracture during construction is dependent on contractor means and methods and actual ground conditions along and above the bore. To minimize the potential of an inadvertent drilling fluid release occurring, the contract documents included a requirement for the annular pressure to be monitored and continuously recorded during drilling of the pilot hole. If, despite all the mitigation measures an inadvertent drilling fluid release did occur during construction, the risk of adverse consequences was mitigated by the required response laid out in the detailed Surface Spill and Inadvertent Drilling Fluid Return Contingency Plan.

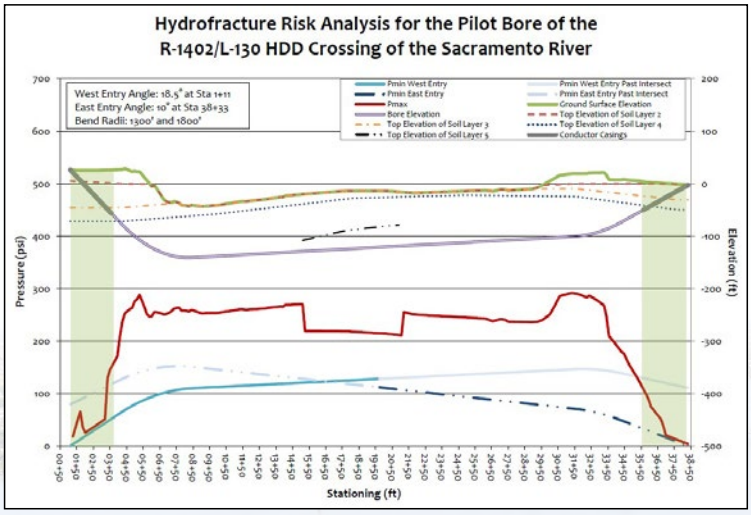


Figure 6. Evaluation of hydrofracture risks – comparison of maximum allowable and minimum required drilling fluid pressures for the pilot bore using the intersect method

> *"The solution was to begin steering the tight required horizontal curve immediately after exiting the casing."*

4.3 HDD Settlement And Seismic Induced Liquefaction/ Settlement Evaluations

The potential for the HDD installation of the new 16-inch pipeline to cause settlement damage to the levee or State Route 160 was also a significant concern to regulatory agencies. The profile of the HDD was designed so that the minimum clearance beneath the levee toe was approximately 98 feet and the minimum clearance below the levee crest/highway was approximately 110 feet.

There was a second settlement risk that affected the design of the project. Namely, the potential for ground displacements that could affect the pipeline by earthquake-inducted liquefaction or long-term subsidence of the organic soil deposits on Brannan Island. D.G. Honegger Consulting performed evaluations using finite element analysis (FEA) techniques to determine the pipeline response. The results of the FEA analysis led to the design being modified to include a length of trench-installed pipeline between the HDD catch point and the existing pipeline tie-in location. This additional section increased the flexibility of the pipeline to accommodate ground displacements while keeping pipeline stresses within acceptable limits.

4.4 River Elevation Above Eastern Work Area

The work area on the east side of the river was significantly lower than the mean high water (MHW) elevation in the Sacramento River and the project team identified concerns about the potential for groundwater seepage both during and after construction of the HDD crossing. To address the potential for seepage during HDD construction, Brotherton chose to construct an approximately 14-foot-high temporary platform to raise the HDD rig above the MHW elevation. The entry point was effectively also raised to this elevation by extending the conductor casing an additional approximately 100 feet. This allowed the static weight of the drilling fluid within the casing to resist seepage pressures during drilling.

After drilling was complete, the design included a requirement to full grout the annular space between the conductor casings and the product pipe to mitigate the risk of long-term seepage along the annulus of the bore.

Figure 7. Brotherton's secondary HDD rig on top of the temporary work platform that was used to raise the eastern entry above the Sacramento River's mean high water elevation

5.0 CONSTRUCTION

Construction began at the end of March 2023 and the early stages of the work proceeded mostly as planned. The HDD portion of the work began in late April of 2023. Some challenges were encountered during installation of the conductor casings, which are discussed in more detail in Section 5.1 below. The pilot bore intersect was completed on May 6, reaming was completed on May 19, and the swab pass was completed on May 22. Pullback began on May 25 and was completed a few hours after midnight on May 26.

Although the original plan was for grouting of the annular space at the ends of the bore to be completed in a single operation, several attempts were required to completely cut off groundwater inflows on the eastern side of the crossing. Initial grouting was performed on May 26 and final grouting was completed June 22. These activities are discussed further in Section 6.3 further below. Removal of the western conductor casing was completed June 2, between the initial and final grouting operations.

5.1 Conductor Casing Installation And Removal

Although the high rainfall in March resulted in some minor obstacles during the early stages of the construction, the first major challenges occurred during conductor casing installation in late April. All of the casings were rammed into place using pneumatic hammers. This is a typical method to install HDD conductor casings, but it does have the drawback of having no steering or guidance capabilities.

Installation of the 30-inch diameter casing on the west side of the river proceeded until refusal was reached with 227 feet out of the planned 260 feet in place. After cleaning out the casing it was discovered that the end of the casing was 5.5 feet north (left) of the design alignment and 5.3 feet deeper in elevation than anticipated.

If the deviation to the north had occurred at almost any other location on the project or had the end of the casing gone south (right) instead, steering adjustments to return to the design geometry would have been a challenge, but a straightforward one to address. However, the northern edge of the project right of way (ROW) reduced to only 5 feet from the design alignment near the end of the casing due to challenges with a nearby landowner. Ideally, no project easement would ever be so close to the centerline of an HDD alignment and tolerances would be set so that drill path geometry can be adjusted to conditions encountered in the field without overstressing the pipe. Narrow spots in the easement and/or the selection of tight tolerances should be carefully considered and avoided if possible. In this case, unfortunately, the narrow spot was unavoidable. Given the easement constraint, it would not have been possible for Brotherton to steer a tight horizontal curve allowing the HDD alignment to stay within the easement while also beginning the vertical curve called for in the design profile without exceeding the minimum allowable bend radius for the steel product pipe. The solution was to begin steering the tight required horizontal curve immediately after exiting the casing to stay within the ROW and then to begin the vertical curve. This resulted in an as-drilled bore approximately 2 feet south of the easement boundary and approximately 30 feet deeper than the design profile on the western side of the crossing (see Figure 8). Fortunately, some of the geotechnical borings extended to the new, greater depth so the project team was comfortable that the risk of going deeper was minimal.

5.2 Pullback And Inadvertent Drilling Fluid Release

Pullback began on May 25 and initially went smoothly. There was not quite enough pipe layout space to fabricate the entire 3,700-foot pipe string so an initial short section was pulled before

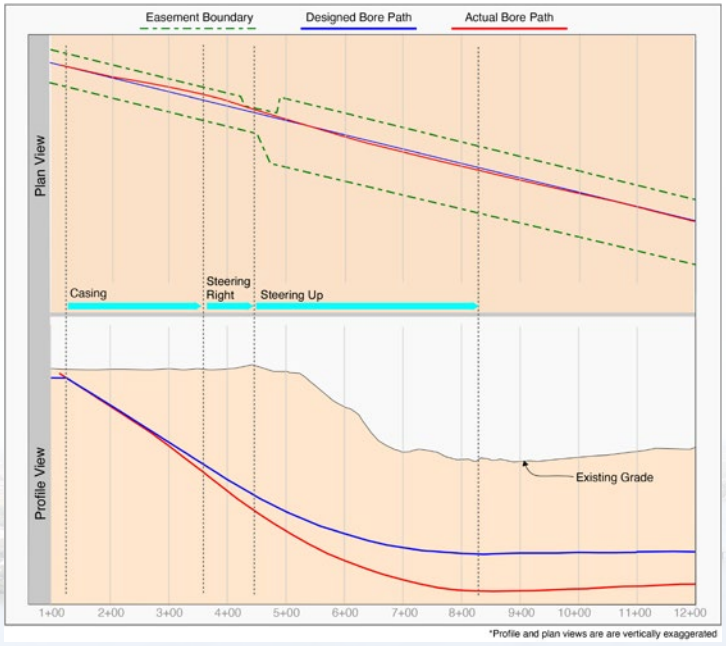


Figure 8. Plan and profile showing the designed bore path, the as-drilled bore path, and the easement boundaries on the western side of the crossing

> *The process of completing a trenchless crossing of a major waterway in California is long and challenging.*

pullback paused for an intermediate weld. After welding, coating, and inspection the pullback operation continued to proceed without issue for several more hours until an inadvertent drilling fluid release was discovered near the end of the 150-foot-long conductor casing that remained in place on the east side of the crossing (the 260-foot-long telescoped section was removed prior to pullback). Pullback paused while the drilling fluid was contained and cleaned up, and regulatory agencies were notified in accordance with the Inadvertent Drilling Fluid Return Contingency Plan. Fortunately, no inadvertent releases occurred in new locations and pullback was completed successfully in the early hours of the morning on May 26.

Figure 9. Drilling fluid from the hydrofracture near the end of the eastern conductor casing that occurred during pullback

Although HDD designers typically focus on the pilot bore as the phase of drilling with the highest risk of hydrofracture, it can occur at any time during HDD operations. The end of the remaining 150 feet of casing was in significantly weaker soils with less ground cover than where the end of the 260-foot casing had been. The most likely explanation of the inadvertent drilling fluid release that occurred is that this weaker formation became over-pressurized during pullback operations, whether due to a localized soil collapse or some other factor, resulting in a hydrofracture. Fortunately, the Inadvertent Drilling Fluid Return Contingency Plan had received buy-in from regulatory agencies and included a clear containment/cleanup procedure and notification list. This made for a smooth and fast

Figure 10. 16-inch gas pipeline supported by cranes during pullback

Figure 11. 16-inch gas pipeline nearing the end of pullback. Casing spacers were installed on the final 150 feet of the pipe after it came through the last roller cradle to centralize the product pipe inside the steel casing

response to the unexpected condition, which meant that pullback successfully completed with the minimum possible interruption.

5.3 Annular Space Grouting

The design always included a requirement to grout the casing on the eastern side of the crossing to mitigate the risk of a future preferential seepage path along the annulus of the HDD bore. After pullback it was also deemed critical that the grouting operation seal the hydrofracture that occurred very near the end of the conductor casing. The original grouting plan for the 150 feet of casing that remained in place after pullback was to tap a hole at the end of the casing and fill it using a 2-inch steel tremie line that had been welded on the exterior of the casing prior to installation. However, during pullback this tremie line was tested and found to

be clogged so a secondary plan was developed. The second plan called for strapping multiple HDPE tremie lines of varying lengths along the length of the 16-inch product pipe and pulling them into the annular space with the casing spacers during pullback. Four tremie lines of various lengths were successfully installed during pullback.

Due to the hydrofracture at the end of the casing, the project team wanted to move the initial grouting activities to sooner in the schedule than had been originally planned for. Unfortunately, because of the short notice, local suppliers were not able to provide enough grout to fully fill the annular space the day that pullback was completed (May 26). Given the concerns over the hydrofracture and potential seepage, it was decided that proceeding with partially grouting the annular space was the lowest risk alternative. During the initial grouting operation, the tremie line that was installed approximately 25 feet outside of the casing was found to be clogged and unusable but the next, located 50 feet from the downhole end of the casing, was usable and allowed for placement of 17.5 cubic yards of grout. After this initial grout placement, no changes were observed at the hydrofracture location and no apparent groundwater was found seeping through the annular space.

Figure 12. Casing spacers and PVC pipe for grouting the annular space being pulled into the eastern conductor casing

After the extension of the conductor casing was cut off and a second round of grouting operations to fill the remaining length of casing was complete, groundwater was found to be leaking at approximately 1 gallon per minute through the annular space. With clear evidence that the second grouting operation did not successfully cut off the groundwater flow, an additional grouting plan was developed by Foundation Soil Stabilization Inc. This grouting plan used two mixes that worked together to seal the annular space. The first was a highly flowable mix to fill as much of the seepage path as possible and the second was a Portland cement sodium silicate mix with a fast set time to avoid groundwater washing either mix out. The third grouting operation successfully cut off the flow of groundwater.

With the benefit of hindsight, the apparent lack of groundwater movement after the initial grouting operation was because the 36-inch conductor casing that extended to the top of the working platform (above the water elevation in the river) was left in place until the day that the second grouting operation occurred. This meant that any groundwater movement that happened during/shortly after the initial grouting was not observable since the driving head was only enough to cause the groundwater elevation to stabilize inside the casing, not for it to flow out of the top of the casing where it could be seen. After stabilization, it is unlikely that much additional groundwater flow occurred. However, the paths for the water to move through the initial grout were there, as evidenced by the flow that was observed after the casing extension was cut off near the ground surface during the second grouting operation.

An important lesson learned with regards to the grouting operation was that any time there is a possibility of water flowing through the annular space, grouting will be challenging and significant effort may be required to cut off groundwater flow. A grouting specialist should be involved in the process whether that involvement occurs during design, during the planning and submittal phase of construction, or both. It will also benefit the project if the contractor provides a detailed grouting plan and the owner's team reviews it carefully prior to the start of grouting operations.

> *"Inadvertent Drilling Fluid Return Contingency Plan included a clear containment/cleanup procedure which made for a smooth and fast response to the unexpected condition."*

Figure 13. The primary HDD rig that was located in the western work area

> *Managing groundwater was a particular challenge for this project because the water elevation in the Sacramento River was located above the eastern HDD entry point.*

6.0 FINAL THOUGHTS

The process of completing a trenchless crossing of a major waterway in California, particularly when a levee and highway are also involved, is long and challenging. Owners seeking to complete such a project should be aware of the timeline and effort required to design, permit, and construct it.

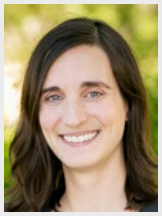
Thorough design evaluations were required to analyze the risks associated with the HDD installation. The results were used to make key design decisions such as the specified length of conductor casings, requirement to perform an HDD intersect, and what type of monitoring was required during construction.

One outcome of the required length of the conductor casings was that significant deviation of the end of one of the casings occurred during installation. It is common for the end of a conductor casing, particularly a long conductor casing, to drop as it is installed. The deviation of the western casing on this project, however, was greater than anticipated and resulted in the bore geometry having to be adjusted deeper to avoid an unacceptably tight compound bend radius. When right of ways/easements are being acquired and tolerances are being selected, it is important to keep in mind that the HDD drill paths may need to be adjusted for a variety of reasons.

Managing groundwater was a particular challenge for this project because the water elevation in the Sacramento River was located above the eastern HDD entry point. The platform that Brotherton Pipelines chose to construct to raise the elevation of the HDD rig above the maximum anticipated flood elevation in the river and the conductor casing that also extended above this elevation resulted in minimal impact on the HDD drilling operations due to water flow. However, the groundwater flow had a significant impact on the grouting of the annular space that was required to mitigate the risk of long-term seepage along the HDD bore. In the end, multiple grouting operations and grouting experts were required to successfully complete grouting on the eastern side of the crossing where groundwater flow was occurring. Grouting on the western side of the crossing was completed successfully with no significant challenges because it was higher in elevation than the river and groundwater flow was not a factor.

The authors would like to thank ARB Underground, Brotherton Pipelines, and Foundation Soil Stabilization Inc. for their efforts to make this project a success. Teamwork and perseverance among the Owner, Engineer, and Contractor were essential to the successful completion of this highly challenging HDD project.

ABOUT THE AUTHORS:



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Gareth Owens, PE*, is an engineer and project manager at Longitude 123, specializing in navigating California's complex permitting processes for projects in environmentally sensitive coastal and riverine locations. Gareth is licensed in California as a Mechanical Engineer, with experience designing multidisciplinary projects which include both mechanical and civil engineering elements.*

Tunnel Boring & Slip-Lining Go Hand In Hand Next To The Rio Grande River!

42-inch CMP Replacement Under Highway

By: Michael Rocco, AUI Inc.

In October 2023 the MRGCD (Middle Rio Grande Conservancy District) experienced a major collapse of an existing 42-inch corrugated metal pipe paralleling the Rio Grande river. The MRGCD offers irrigation river flood control and responsible water conservation services to irrigators and farmers in the middle agricultural region of the state of New Mexico. The 42-inch CMP pipe was originally installed in 1978 to carry irrigation water downstream south of Isleta Pueblo. The location of the collapse was approximately 20 feet deep from street surface (Highway 147) and the water started backing up and it filled the earthen channel upstream for miles. The exact location of the collapse was located at the main entrance to the Isleta Pueblo reservation named Highway 147, so closing this road would not be acceptable.

The first order of business was to bypass the channel and pump the irrigation water into the Rio Grande river. The estimated volume of irrigation water was approximately 22 million gallons per day. AUI, Inc., out of Albuquerque,NM was called out to evaluate and come up with a trenchless solution, as open cut was not an option. Two trenchless methods were considered, the first was slip lining the existing culvert with a slightly smaller pipe and grouting the annular space. The second method was pipe bursting the existing 42-inch CMP pipe and replacing it with a 42-inch high density polyethylene

Drilling deep wells for dewatering

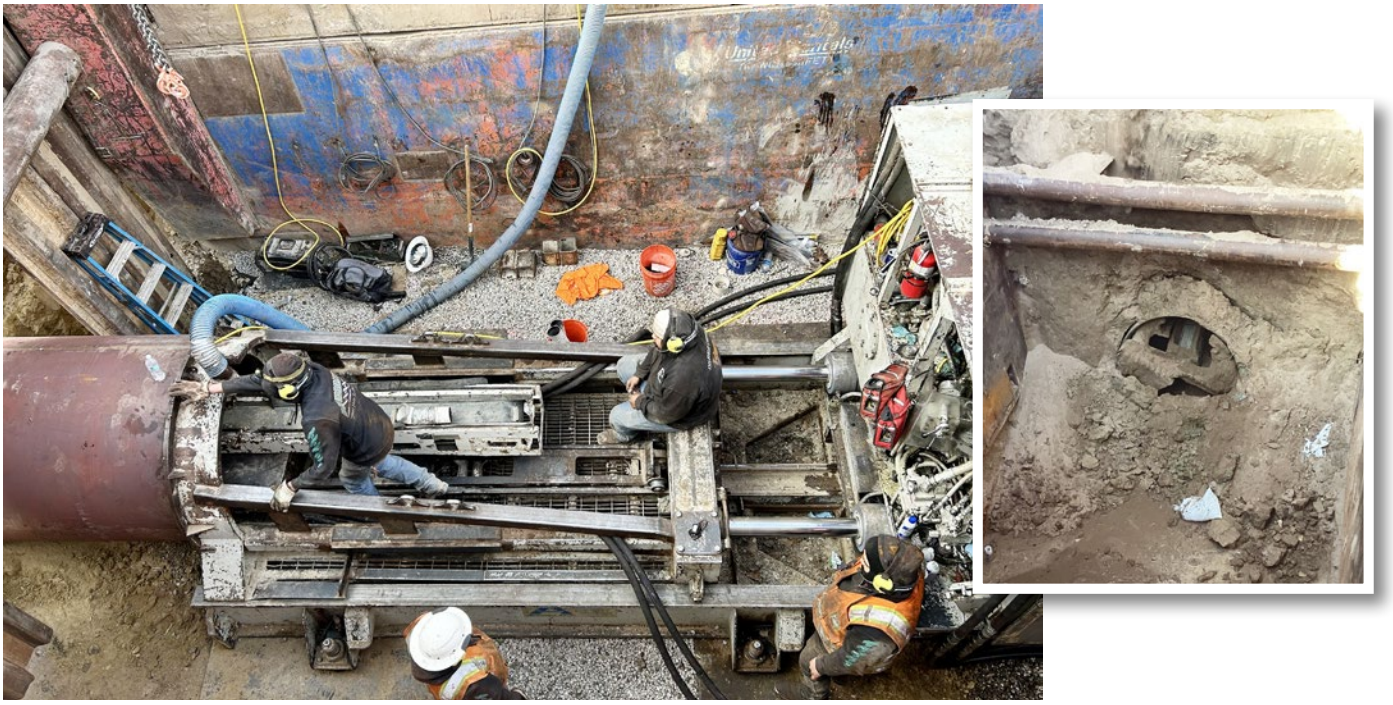
Dewatering groundwater into the Rio Grande

> *The 50-inch tunnel boring and 42-inch ultra flow slip lining went hand in hand.*

pipe period. However, after realizing that the existing 42-inch CMP had been collapsed 50 percent and the pipeline was a siphon under the road, both options were not feasible. After further analysis it was decided that the best construction option was to utilize a tunnel boring machine and install a 50-inch steel casing and slip line the 50-inch steel casing with a new 42-inch ultra flow pipeline. The 42-Ultra pipe is manufactured by Contech Engineered Solutions located in Albuquerque, NM.

It was well known in the area next to the Rio Grande River that ground water table was going to be an major issue and that it would be at approximately 10 feet below ground level and dewatering would be required for the installation of the tunnel boring machine and exit pits. Mercino Construction company was selected to install deep wells to facilitate the dewatering and dry out the pits. A total of 7 deep wells were drilled on the north side of the collapse and 7 deep wells we're drilled on the south side of the collapse. The discharge lines were located towards the Rio Grande river so as not to disturb any of the pueblos cultural activities. There was one location where steps led to the Rio Grande River during tribal ceremonies for the Isleta Pueblo reservation and we made sure not to track any equipment or materials in this area. One of the challenges on this project was to always be aware of cultural activities on tribal land. All members invested in this project met with the tribe to discuss construction activities and how they affect the daily routine for the tribe. During the project there were several occasions where we were asked not to perform any work due to a death of a tribal member or another cultural activity. The only major challenge was fueling the dewatering equipment during off hours to facilitate the tribal request and not let the pumps run out of fuel.

Once the dewatering was in place, we could now excavate and shore the tunnel boring machine pit which was approximately 50 feet long by 20 feet wide. AUI utilized 2 trench boxes so that we and our subcontractors could work safely during the boring operation. It did not go as planned when the boring started, the machine traversed approximately 5 feet and it hit a steel pipe which was excavated and discovered to be an existing 36-inch corrugated metal pipeline that nobody knew was there, and it was in our way of the bore. The MRGCD found old as- builts of a culvert that was abandoned in 1958. Because of this obstruction this now changed the construction location and sequence of the bore underneath highway 147. The new pit tunnel boring machine pit was to be excavated approximately 20 feet to the east of its original location. The



50-Inch Tunnel Bore was on line and grade

MRGCD wanted to make sure that we would hit no other obstructions that they knew about. So the whole operation had to restart with a brand new tunnel boring machine pit and new exit location and the elevation of the 50-inch steel casing was still to be maintained at approximately 20 feet deep.

Once the new location was established and our subcontractor DH Underground installed the tunnel boring machine they successfully bored the steel casing 220 feet to the north under highway 147. The operation was a success and the tunnel bore was online and grade. The tunnel boring operation construction was 10 working days but, we could not work on weekends and overtime due to tribal constraints. The welding of the 50-inch

42-Inch Ultra Flow pipe manufactured by Contech ES in Albuquerque NM

Sliplining 42-inch Ultra Flow Pipe inside 50-Inch Steel Casing

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Concrete head walls and rip rap allowed for smooth transitions from earthen channel into new pipe

casing was performed by DH underground and took approximately two to three hours per joint to complete.

Now that the 50-inch casing was installed and on grade the next sequence of construction was to install the 42-inch ultra flow galvanized aluminum pipe. The 42-inch ultra flow had to be installed using casing spacers at approximately 10 foot spacing for the alignment of the pipe. The ultra flow pipe came with a bitumious coating inside and out to protect the pipe from any groundwater and corrosive material. The ultra flow pipe came in 18 foot joints and the spacers were installed during the Slip-Line operation. AUI utilized a 120,000lbs excavator to perform the Slip-Line operation and was able to install the pipeline in two days. The Slip-Line operation was performed so fast due to the fact that there was nothing inside the 50-inch steel casing and after the pipe was installed, end seals were attached to the 50 inch steel casing and 42-inch ultra flow pipe. AUI also installed approximately 50 feet of 42-inch ultra flow open cut with traditional trench backfill and compaction operations on the North End and the South end. The pipeline was designed as a siphon and 45degree bends were installed on both ends to bring the pipe up to the existing inlet and outlet of the earthen channel.

AUI also utilized a subcontractor to install cellular grout to the pipeline that had been collapsed under highway 147. Condeck corporation out of Albuquerque, NM utilizes Elastizell cellular grout to fill voids and abandon pipelines. The existing pipeline installed with 1978 was filled with cellular grout on the North and South ends. The final sequence of construction was to build two concrete head walls on the North and South end of the channel. The South concrete headwall also had rip rap installed at the toe of the channel 16 inches thick. The concrete head walls and rip rap were designed by MRGCD and allowed for smooth transitions from the earthen channel into the new 42-inch ultra flow pipeline.

In summary the 50-inch tunnel boring and 42-inch ultra flow slip lining went hand in hand. The MRGCD now has a pipeline within a pipeline that will provide irrigation water for over 50 years and beyond. If the MRGCD ever want to switch out the pipe inside the 50-steel casing it can be easily done by pulling out the old pipe and installing a new pipe, however this will probably not be done in our lifetime.

> *"One of the challenges on this project was to always be aware of cultural activities on tribal land."*

SPECIAL THANKS TO ALL WHO MADE THIS TRENCHLESS PROJECT A SUCCESS:

AUI Project Manager	**Wayne McCarthy**
AUI Project Superintendent	**Archie Lucero III**
AUI Project Superintendent	**Chris Benavidez**
Dewatering – Mercino Dewatering	**David Giles**
Tunnel Boring – DH Underground	**John Theiler**
Grouting – Condeck Corporation	**Ernie Casias**
Ultra Flow Pipe – Contech ES	**Joe Menicucci**

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Michael Rocco *has been employed with AUI, Inc., for over 33 years and works in the estimating, project management and marketing departments. His experience includes rehabilitation of water, storm sewer and sanitary sewer pipelines by Slip-lining, Pipe Bursting and Spiral Pipe Rehabilitation trenchless methods. Mike has well over 35 years' experience with various trenchless applications, and was a long-serving Director on the WESTT Chapter Board.*

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Optimal Application of Pipe Bursting and Trenchless Methods:

9,000-foot Water and Sewer Pipeline Replacement Project City of Eureka, CA

By: George Mallakis, TT Technologies, Inc. & Michael Garrett, Underground Solutions

INTRODUCTION

The City of Eureka, CA is bordered on one side by beautiful and functional Humboldt Bay, and on the other by mountains lush with giant redwoods and a population of about 28,000 residents. The City Bid a pipeline replacement project in November 2020 to replace approximately 5,000 lf of water mains and approximately 3,600 lf of sewer mains using open cut. Mercer Fraser Co., a local pipeline contractor was the low bidder at a little over $3M. Mercer Fraser offered to use Pipe Bursting technology to replace the mains instead of open cut to minimize disruption, increase productivity, and minimize carbon emissions as an added "Green Benefit." They replaced 5,000 lf of existing 8-inch cast iron (CI) and asbestos cement (AC) water mains with 8-inch fusible PVC (FPVC) and 3,600 lf of existing 8-inch vitrified clay pipe (VCP) sewer mains with 8-inch High Density Polyethylene (HDPE). In addition to using pipe bursting to replace the sewer and water main lines, they used pipe bursting to replace the home and business sewer laterals and used split & pull trenchless techniques to replace water services in place and horizontal boring tools to install new water services.

DESIGN AND BIDDING

The project scope included (1) removing 5,085 lf of existing 8-inch CI and AC water main pipelines and installing new 8-inch ductile iron pipe (DI), (2) replacing 34 water service laterals and meters, (3), removing the existing 3,600 feet of 8-inch VCP sewer mains and installing new 8-inch polyvinyl chloride pipe (PVC), (4) and replacing 41 sewer laterals.

> *"Carbon emission reduction of 80 percent over traditional open cut replacement is achievable."*

Three contractors submitted bids for the project; Mercer Fraser was the low bidder at $3,025,882. Contractor #2 submitted a bid of $3,825,213, while contractor #3's bid was $3,889,783. Mercer Fraser was $799,331 lower than the next low bidder. Approximately 25 percent less.

This lower bid to build the job was based on Mercer Fraser's experience with pipe bursting. They knew they could save costs using pipe bursting instead of removing and replacing the mains with traditional open cut trenching. Pipe bursting would allow them to excavate, export, import, and resurface about 80 percent less materials than open cut. With less equipment to excavate trench and to run back and forth to export and import materials, carbon emission reduction by about 80 percent over traditional open cut replacement is achievable. Finally, the city saves 25 percent or $800,000 on this project with the use or pipe bursting.

CONSTRUCTION

Mercer Fraser used Fusible PVC (FPVC) to replace the existing water mains. FPVC provided a fused restrained joint pipe to be pulled in using pipe bursting. The FPVC also allowed for a smaller outside diameter due to its characteristics in handling pressure pipe conditions keeping the degree of upsize smaller while pipe bursting. In addition to the advantage of smaller upsize, most potable water agencies are familiar with PVC and have standard fittings readily available.

For the gravity sanitary sewer mains, they used high density polyethylene (HDPE). The flow in the sewer mains was driven by gravity and not pressure pipes; therefore, they were much deeper than the water mains. The increased wall thickness (and therefore outside diameter to maintain design inside diameter) wasn't an issue. In addition, due to the much deeper depths of cover, the flexibility of the HDPE abled shorter length for the pipe launching pits. This was a great application of using two different new pipe materials for specific pipe-bursting applications.

Mercer Fraser used TT Technologies, Inc Grudoburst Static Pipe Bursting equipment

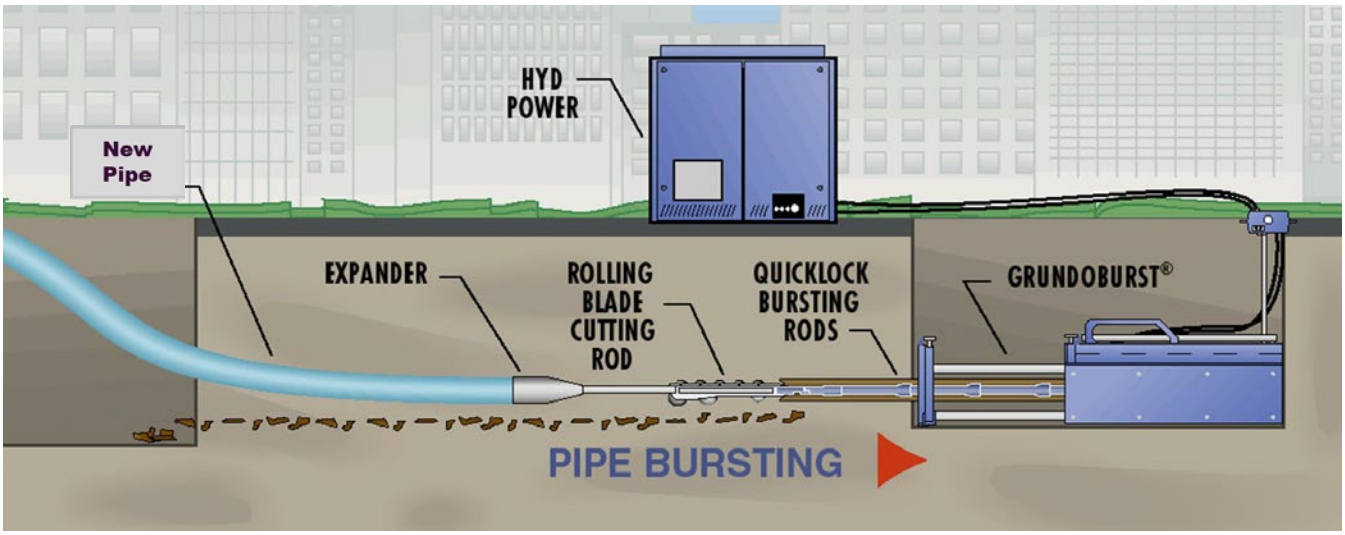

Figure 1. Static Pipe Bursting Set Up

for this project; they used this equipment on past projects. They were experienced and productive with the use of this equipment. Another advantage of the static system is its ability to burst almost all existing pipe materials while pulling in all new types of new pipe materials. This system is compact, productive, and quiet. Extremely versatile. (See Figure 1 for Static Pipe Bursting Set Up)

The contractor started this project with the water main portion of work. They began by installing the above ground temporary bypass system. They used 1" and 2" HDPE pipe system that was laid in the curb and gutters to supply each home or business with a temporary connection. When crossing the street or driveways, they cut narrow trenches to set bypass below grade and covered with temporary asphalt. At driveways they simply, created a ramp over the bypass pipe with temporary asphalt to allow cars to drive over. The bypass was fed from fire hydrants or taps on the mains that were live behind sections being shut down. The connections from the main bypass to the services related to a variety of PVC, brass fittings and hoses. The bypass was chlorinated and bacterial tested before putting into service. Installing the bypass and connecting the services was simple and productive. (See Figures 2 and 3 for water bypass)


Figure 2. Temporary bypass being supplied from fire hydrant


Figure 3. 2-inch HDPE temporary water bypass

Figure 4. 800G Grundoburst Static Pipe Bursting System

Figure 5. Pipe Bursting Existing 8-inch pipe w/new FPVC

While the bypass system was being installed and services were being changed over to the bypass, another crew was excavating access at gate valves, fire hydrant tees, and service lateral connections. At the same time, a fusion tech was fusing together lengths of FPVC for each section of pipe bursting. Once all water services were switched from the mains to bypass, access, and appurtenance excavations complete, water mains shut down and drained, pipe bursting operations began. The crews were very methodical and productive. Productions averaged at least one run of 350 feet/day, and some days two runs totaling 600 feet. (See Figures 3, 4 and 5)

After each pipe burst, they installed new pipe sections and appurtenances, backfilled, and compacted each excavation finishing with asphalt. This was accomplished each day for each run. Very efficient operations by crew. (See Figures 6 and 7)

Figure 6. 8-inch FPVC being pulled in keeping one-way traffic flowing with minimal impact

Figure 7. Mechanical coupling and fire hydrant tee with gate valve installed

Figure 8. ackfill and Pave access pits each day after pipe bursting

Figure 9. Temporary sewer bypass from manhole to downstream manhole

Figure 10. Temporary bypass into manhole

Figure 11. 800G Grundoburst Static Pipe Bursting system and crew for sewer

Figure 12. Launch Pit – 8-inch HDPE Sewer Pipe Bursting

Figure 13. HDPE to PVC sewer main reconnect

HDPE to PVC reconnect into Manhole with grout closure

Water service laterals were replaced using trenchless horizontal boring tools or split and pull methods to minimize disruption and reduce costs.

The sewer operations were very similar except that they used new 8" HDPE for the mainline pipe bursting replacement. The crews pipe burst runs averaging 300 feet between manholes each day. Temporary bypass was set up before each run. (See Figures 8 through 13)

CONCLUSION

This water and sewer pipeline replacement project is a model example of how pipe bursting along with appropriate fused PVC and HDPE can be used to replace mainlines saving time and money. Productions averaged 300 feet per day including reconnections and backfill. Cost savings of 25 percent and lower carbon footprint about 80 percent less than open cut.

The City of Eureka was so pleased with the cost savings and lower disruption from replacing their sewer and water mains using pipe bursting, they have a second project that will begin construction in August 2024. This new project will include pipe bursting about 4,300 lf of existing 8-inch cast iron water mains installing new 8-inch FPVC.

REFERENCES

City of Eureka, CA Public Works Contract Documents for Henderson Improvements 2021, Bid No. 2021-7, Bid Opening November 19, 2020

City of Eureka, CA Engineering Department, Henderson ST Improvements, Fairfiled Street to F Street, Bid No. 2021-7, Plan Drawings

City of Eureka, CA Henderson Improvements 2021, Bid No. 2021-07, Bid Opening Date: November 19, 2020, Tabulated Bid Results Summary

ABOUT THE AUTHORS:

George Mallakis *is Regional Manager for TT Technologies, Inc. He has over 35 years of varied pipeline and trenchless technology experience in both design and construction as a municipal engineer, contractor, and manufacturer. George has a Bachelor of Science in Civil Engineering and a Master of Business Administration.*

Mike Garrett *is a Regional Construction Manager for Underground Solutions, an Azuria Water Solutions Company. Mike has worked for Underground Solutions for 17 years and has been involved in the pipeline industry for 34 years. He covers the Western region of the United States including Hawaii and Guam.*

East Bay Municipal Utility District's I&I Source Identification and Quantification Tool

By: Jonathan Kunay, P.E., CDM Smith
Chris Dinsmore, P.E., East Bay Municipal District

East Bay Municipal Utility District (EBMUD) and its seven satellite agencies have undertaken a bold and forward-thinking approach to implementing inflow and infiltration (I/I) reduction efforts. Since entering a Wet Weather Consent Decree in 2014, in addition to traditional rehabilitation of public and private infrastructure, EBMUD has sought to identify specific locations of entry for public and private sources of I/I, which are then removed by the asset's owner. The overarching goal of this approach is to reduce excessive I/I in the regional wastewater collection system which will reduce the frequency of sanitary sewer overflows and the size of discharge volumes from EBMUD's three peak excess flow treatment facilities. A key element of this focused effort is to quantify discrete I&I sources (IIS), thereby allowing for the determination of appropriating rankings as to the criticality of correction. As such, EBMUD sought to develop methods to determine the direct and indirect discrete IIS entering the collection system, as well as the contributions from confirmed IIS, and then develop reproducible and reliable procedures and tools to validate these quantification methods.

EBMUD's current approach to quantification of IIS was initially described in their Regional Technical Support Program (RTSP) Plan and updated annually in submittal of progress reports to the United States Environmental Protectional Agency (USEPA). This program includes several field investigation and quantification methods that are further outlined in the EBMUD's document entitled *Evolution of RTSP Investigations*. Additionally, in their FY2020 report to the USEPA regarding progress towards achieving the goals and objectives of the Consent Decree, EBMUD identified the field investigation methods currently utilized, those that had been trialed and were not currently utilized, and those that may be trialed in the future. To support EBMUD's compliance efforts, CDM Smith was retained to implement a Consent Decree Source Identification Support (CDSIS) project. This project was broken into four sequential tasks – Step 1: Literature Review and Expert Interviews; Step 2: Data Analysis; Step 3- Development of a Quantification Tool (qTool); and Step 4: Development of Validation Procedures for recommended IIS quantification methods.

LITERATURE REVIEW AND EXPERT INTERVIEWS

To initiate the project, a robust search and review of all available literature and District-provided field investigation information was performed. The objective of the literature review was to identify industry standards, best practices, and limitations that will be used to set up a foundation for developing the qTool. Additionally, interviews with industry experts were conducted to gain a comprehensive view into what other agencies and engineering consultants have experienced when faced with similar situations. Both the literature review and the interviews with industry experts were conducted in the fall of 2020.

Based on the literature search and review, current industry standards and methods for quantifying I&I were determined to not be ideal approaches in terms of robustness, accuracy, and applicability to EBMUD's goals, as shown in the table below. These scores in the table are ranked on a scale of 1 to 4, with 4 being most ideal. Most of the reviewed literature related to I&I quantification does not estimate flow rates for specific defects, but rather estimates flows for specific basins or areas of pipeline. These basin-level quantification methods, however, can be utilized in the proposed qTool to balance flows for specific defects.

During interviews with industry experts, several challenges related to quantifying I&I for specific defects were stated by the participants. Some of the challenges included operator subjectivity, lack of quality and consistent condition assessment data, varying groundwater levels/ soil moisture indexes, and variance of climatological conditions. Several interviewees also noted that the condition assessment data used is limited to the state of the pipe at the time of defect identification. Some best practices identified from the

Field Methods	Applicability	Robustness	Accuracy	TOTAL	Use by EBMUD?
Flow/Rainfall monitoring					
Pre-/Post-rehab flow monitoring	3	1	1	5	Y
Short-/Long-term flow monitoring	2	2	2	6	Y
Smoke/dye testing	2	1	1	4	Y
CCTV inspection	3	3	2	8	Y
Deep learning automated detection of defects	3	2	2	7	Pilot
Distributed temperature sensing	2	1	1	4	Pilot
Quantification Methods	**Applicability**	**Robustness**	**Accuracy**	**TOTAL**	**Use by EBMUD?**
Analytical Quantification					
Orifice equation	2	1	1	4	Y
Alternative rational method	2	1	1	4	Y
Darcy's Law	1	1	1	3	N
Industry experience/expertise	2	1	1	4	N
Predictive Modeling					
PCSWMM	2	2	2	6	N
InfoWorks ICM	2	2	2	6	N
I&I Envelope Method	1	1	1	3	N

Figure 1. Summary of Field Investigation and Quantification Methods

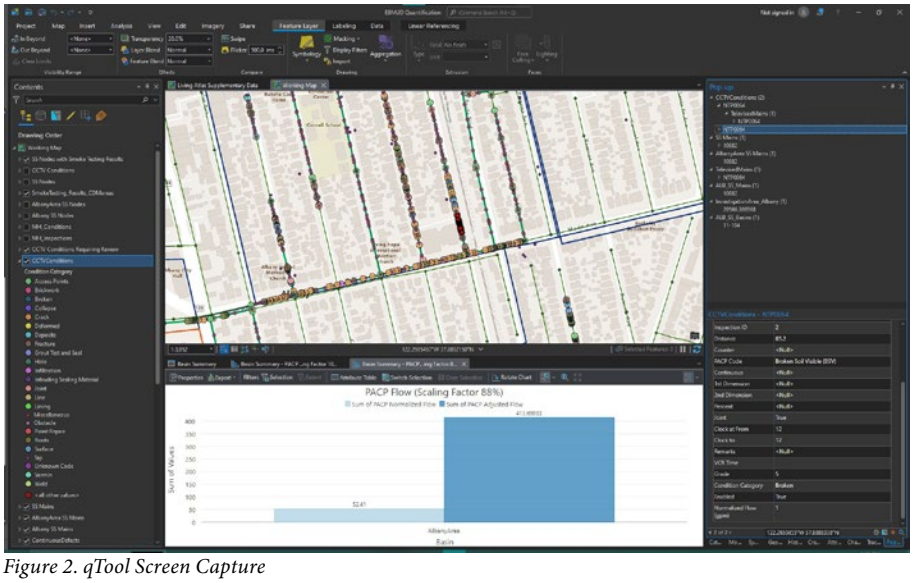

Figure 2. qTool Screen Capture

literature review and interviews include the following:

- Disaggregating flow data to attribute to various defect types and sources within the observed sewershed
- Using different equations and methods for quantifying flows based on defect type
- Using available software for calibration efforts
- Setting flow limits for specific defects to prevent overcalculation

The parameters, data, and methodologies were integrated into the qTool to the extent possible to help calculate a factor for the propensity for IIS flows to enter the system on a per defect basis. For example, some of the equations identified in the literature review will be used to mathematically derive I&I flow rates expected for each type of defect. In addition, basin-level I&I quantification and flow metering data will also be used to balance flows for each identified defect. Most importantly, flows will first be disaggregated to differentiate infiltration from inflow. This important first step allowed for the isolation of various defect types and sources.

DATA ANALYSIS

Step 2 was a thorough review of the collection system data. The data review was conducted throughout the first half of 2021 and involved collecting, cataloging and reviewing the following datasets for five training areas within the regional wastewater collection system. The qTool relies on standardized geospatial and tabular data to quantify IIS; datasets that do not match the standardized criteria were either altered or removed from consideration. However, known defects discovered during investigations that result in non-standardized datasets were still taken into account by the qTool when creating training data by manually adding I&I for known defects. The qTool makes use of the pipes (mains) and maintenance holes (MHs and nodes) from the Satellite Asset Data geodatabase and included a unique asset identifier (e.g. Asset_ID) to link asset to inspection data. A sample screen capture of the qTool is provided below.

In addition to the asset data, the qTool relies on datasets from the Esri Living Atlas for conflating the environmental factors with the assets and defects. Datasets provided by the living atlas are maintained by Esri and available to those using ArcGIS Pro. Leveraging these datasets reduces the data required to be maintained by EBMUD in order to use the qTool. Other data used included USA Soils Map data to input for annual rainfall, groundwater depth, slope gradient, and hydraulic conductivity as

well as USA Population Density data to estimate the population contributing to base flow within the input basin.

Inspection data such as information from a smoke testing geodatabase, pipeline inspection data and MH inspection data from corresponding databases were also incorporated. In this way, pipeline and MH defects, ground cover, and drainage areas are revealed and used within the qTool. Reference data, such as basin flow volume, clock position of identified defect, and flow from defect, were also used by the qTool. This allows the qTool to factor in normalized flow values for different defect types and for mean runoff coefficients for different ground cover types.

DEVELOPMENT OF QUANTIFICATION TOOL

Step 3 was to develop a quantification methodology. The quantification methodology development involved grouping the data by the type of contribution and assigned base flow quantification and then scaling the flows to the specific storm event referenced for compliance with the Wet Weather Consent Decree. To scale to the compliance storm event, the USEPA software Sanitary Sewer Overflow Assessment Program (SSOAP) was used to identify RTK values and a Storm Water Management Model (SWMM) was used to simulate peak storm flow and total volume. To estimate the additional flow volume of IIS flow, quantifying defects in the sewer network, such as breaks in the pipe, was done.

The quantification method makes use of quantification variables to calculate scale factors for the investigation area used to adjust the sum of the defect flow values based on variables such as the location of the defect within the basin, clock position of the defect on the pipe, depth to groundwater and other applicable variables that could impact the I/I potential. Inflow is quantified using the rational method to calculate flow based on the ground cover and drainage area noted during smoke testing. The scale factors are calculated by using a regression tree to compare the similarity of quantification variables of the investigation area against those in the training dataset. Base flow is quantified by using the area of the basin or investigation area and the population density from the census data.

QUANTIFICATION PROCESS

Prior to using the closed-circuit television (CCTV) inspection records in Pipeline Assessment Certification Program (PACP) and Manhole Assessment Certification Program (MACP) formats, the PACP exchange database needed to be processed using Esri's CCTV Manager. CCTV Manager converts the Microsoft Access database with all inspections and conditions into an Esri file geodatabase and maps the inspections to the appropriate asset (pipe) and locates the conditions (defects) along the asset as a point feature class. The final step in the quantification modelling process uses the training dataset previously defined to summarize flow in the basin or investigation area, summarize flow at node and main assets, and to summarize flow for defects and outputs the results to a file geodatabase within the geographic information system (GIS).

The generalized process for the model during quantification was as follows:

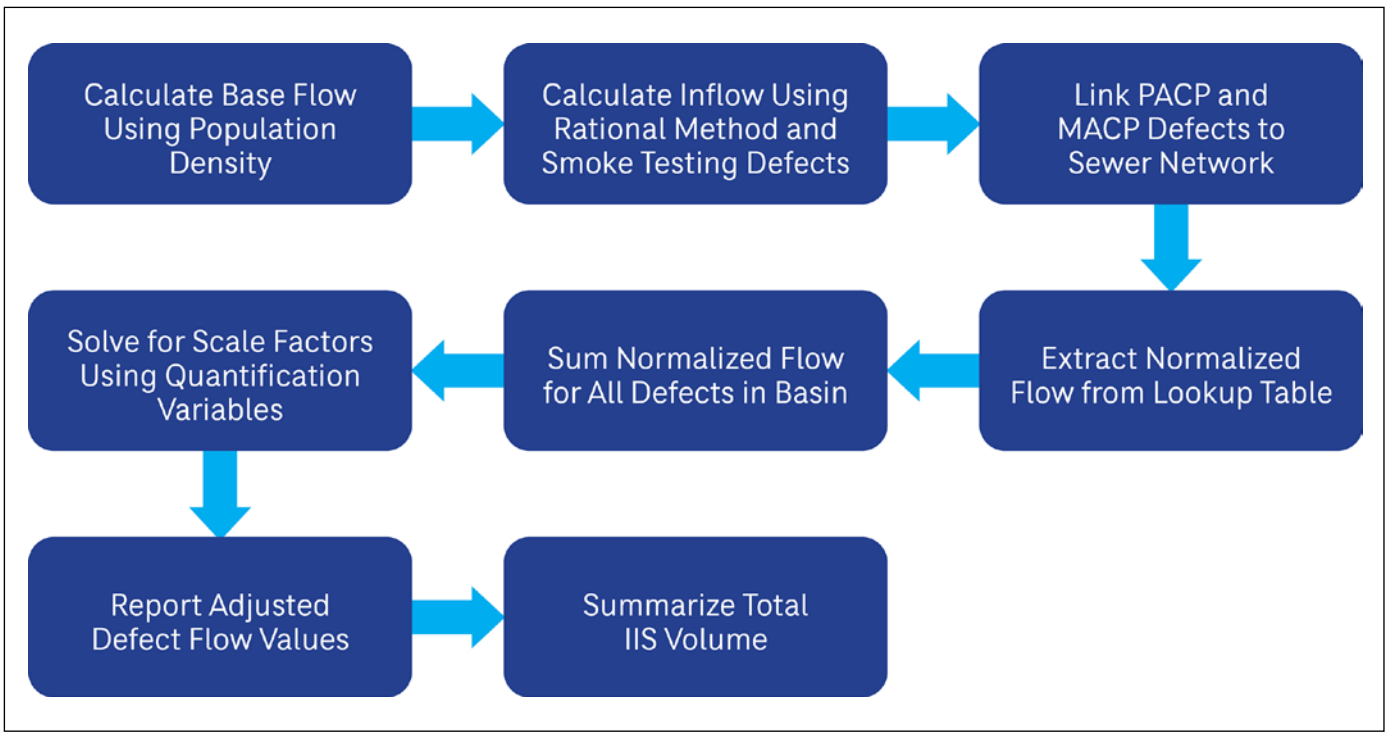

Figure 3. Generalized Model Quantification Process

VALIDATION

The final step was to perform a validation of the qTool. This step included development of the validation procedures for the recommended IIS quantification methods. The aim of the validation was to be able demonstrate reproducibility and technical defensibility for any of the EBMUD's regional wastewater collection system quantified IIS. Validation was be performed by EBMUD staff (with assistance by CDM Smith) using existing flow metering data and field investigation data in a different sewershed. The flow measurements recorded at these locations were correlated to the quantification of the sum of the defects in the project area using linear regression. This process identified which defects warrant a quantification assignment and which defects do not correlate to an increase in I&I. Additionally, the qTool allows for EBMUD staff to use variable timeframes for which a defect may contribute I&I, based on its potential exposure to available stormwater and groundwater sources. As such, EBMUD is able to review locations and depths of sewer infrastructure to assess the scale of likely f IIS, which would then allow for EBMUD to develop appropriate thresholds for performing field validation exercise.

SUMMARY

EBMUD is currently finalizing development of the qTool. Once the qTool is fully operational, EBMUD will integrate its use with other existing tools to assist with meeting regulatory requirements. The qTool will be able to quantify specific defects identified in the regional wastewater collection system and then determine the potential amount of IIS that are present, and could be removed, in a particular sewershed. The reporting will include collecting condition assessment and flow data. The qTool will be fully transparent with formulas and parameters used to quantify IIS flows for each defect presented as part of the output file for confirmation and calibration purposes. Next steps include further internal validation and testing by EBMUD of the qTool.

ABOUT THE AUTHORS:

Jonathan Kunay, PE *is the global Conveyance Market Discipline Leader for CDM Smith. He has 21 years of experience working on a variety of collection systems projects including infrastructure assessment with traditional and state-of-the-art investigative techniques, rehabilitation using CIPP, HDD and pipe bursting, facilities planning and master planning, enterprise asset management and risk/criticality studies. Jonathan is Chair of the NASTT-NE Regional Chapter.*

Christopher Dinsmore, PE *has been leading EBMUD's Inflow and Infiltration Control Program for 10 years, following a stint as a hydrologic and hydraulic modeling expert. He has a BSCE from the University of Texas at Austin and a MSCE from the University of California-Berkeley.*

Compression Fit HDPE Pipe – Another Proven Pipeline Replacement Method

ASTM Standard Codifies Method for Gravity and Pressure Pipe for Both Water and Force Main Projects

By: Steve Cooper, SCA Communications

It wasn't a typical, normal sliplining job to replace a failing force main line in Sioux Falls SD. The original ductile iron pipe had deformed and had severe ovality. Hydrogen sulfide gas from the sewage flow made sulfuric acid, which collected at the top of the metal pipe and destroyed it. It was thought that pulling through a new pipe wouldn't be possible as it would hang up on the deformed inner wall of the old pipe. Reducing the diameter was not possible -- the diameter of the new pipe needed to be as close to the old one to maintain the rate of flow. The solution provided by Murphy Pipeline Contractors (Jacksonville, FL) was to use high-density polyethylene (HDPE) pipe and compress it to fit, knowing that the thermoplastic pipe would naturally reform itself.

"This is one of the inherent attributes of HDPE pipe," stated Camille George Rubeiz, P.E., F. ASCE, co-chair, HDPE Municipal Advisory Board, and senior director of engineering for the Plastics Pipe Institute's (PPI) Municipal & Industrial Division. "As well as being corrosion proof, it is flexible and ductile to go through a special die on the job site that makes it possible to be pulled inside a host pipe even when the pipe is not round. In this case, the ovality would have no affect during installation and the HDPE pipe would form a tight compression fit within the old ductile iron pipe." PPI is the major North American association representing the plastic pipe industry.

More than 8,700 feet of 36-inch ductile iron sewer force main was replaced with HDPE PE 4710, DR 21 pipe using Murphy's CompressionFit™ method, patent pending. The new pipe has a 100-psi operating and a 200-psi surge pressure rating, and is rated as a Class 6 solution in accordance with ASTM F3508. The sewer force main traversed under three city parks, along Covell Lake, through major commercial districts and under state highway SD 115. It was made and provided by WL Plastics (Fort Worth, TX), a member company of PPI.

> *"The thicker HDPE pipe provides structural integrity. In this case, the ovality would have no affect during installation and the HDPE pipe would form a tight compression fit within the old ductile iron pipe."*
>
> *- Harvey Svetlik, P.E., HDPE Pipe Industry Consultant*

Opened in 1985, the Sioux Falls system treats some 18 million gallons of wastewater daily. There are 900 miles of pipe in the system that conveys the wastewater to the city's treatment plant. There is a $215 million expansion plan underway that will increase the facility's capacity by 50 percent when completed in 2025.

"One of the questions we were asked was 'Can a 36-inch ductile iron sewer force main with severe ovality be replaced with HDPE pipe using CompressionFit?'", said HDPE pipe industry expert and consultant Harvey Svetlik, P.E. "The answer was an unequivocal 'yes'. Matter of fact, some other recent projects saw 54-inch diameter pipe with a three-inch wall thickness installed using the CompressionFit method. One of the principal things that this technology does is that it preserves the flow rate of the existing host pipeline and seals over holes and leaks, so you have a dual-wall composite pipeline. And the thicker HDPE pipe provides structural integrity."

Svetlik has more than 40 years of experience in the plastic pipe industry, specializing in polyethylene pipes and fittings. He is the inventor of the MJ Adapter, also known as the Harvey Adapter. An active member of PPI for 30 years, he is the author of numerous PPI technical notes, developer of ASTM/AWWA standards, and an inventor who holds 16 patents.

The new 36-inch HDPE pipe replaces the corroded ductile iron pipe in the Sioux Falls, SD sewer system (Photo credit: Murphy Pipeline)

One of the most recent ASTM standards authored by Svetlik is ASTM F3508 for the installation of compressed fit shape memory polymer pipe. "ASTM F3508 codifies the specification of the material to use and deals with the shape memory characteristics of the material such as high-density polyethylene.

"With the CompressionFit technology, instead of elongating a rubber band and letting it recover as is done with Swagelining, they basically do a lot more of radial compression. Instead of stretching it and thinning the wall, they downsize it and radially thicken the wall, such that when it goes into place it enlarges in diameter, and the radial wall thickness stands as it expands out, like rolling out pie dough."

The developer of CompressionFit is Murphy Pipeline Contractors (Jacksonville, FL). "Most cities cannot afford to relocate and replace a 16-inch diameter or larger pipeline within their vast utility network," said Todd Grafenauer, education director for Murphy. "The result of the CompressionFit HDPE pipe lining technology is that a new HDPE pipe will be 'compressive fit' inside the existing host pipe. This lining offers remarkable value over other construction methods such as an increased flow rate over sliplining, we do an average pull distance of 2,000 feet with more than a 90 percent reduction in excavation and there's no new easement documentation needed. Plus, we simply follow the existing pipe path using GIS maps." Murphy is a member company of the association's Municipal Advisory Board (MAB).

Governed by ASTM F3508, the CompressionFit HDPE pipe lining technology

> *In this case, the ovality would have no affect during installation and the HDPE pipe would form a tight compression fit within the old ductile iron pipe.*
>
> *- Camille George Rubeiz, P.E., F. ASCE, Co-chair, HDPE Municipal Advisory Board Sr. Dir. Engineering, PPI Municipal & Industrial Division*

Replacing the Sioux Falls corroded ductile iron pipe that had been eaten away by sulfuric acid caused by sewage, the HDPE pipe is inserted into the destroyed pipe using the CompressionFit method from Murphy Pipeline (Photo credit: Murphy Pipeline)

specifies an HDPE pipe with an outside diameter larger in size than the inside of the host pipe to be renewed. After the HDPE is butt fused to correspond to the pull distance, the pipe is pulled through a reduction die immediately before entering the host pipe. This reduces the HDPE pipe temporarily below the inside diameter of the host pipe allowing it to be inserted.

While the towing load keeps the HDPE under tension during the pull, the pipe remains in its reduced size. The HDPE remains fully elastic throughout the reduction and installation process. After installation, the pulling load is removed. The HDPE pipe expands until it is halted by the inside diameter of the host pipe. The effectively natural 'tight' or 'compression fit' is accepted as exchanging an existing failing pipeline with a composite pipe in its place.

"One of the things about the ASTM F3508," Svetlik explained, "is that it can be utilized not only for municipalities for gravity flow, but even more ideally for pressure pipes for water pipeline replacement, or force main replacement."

Additional information can be found at www.plasticpipe.org/mabpubs

ABOUT PPI:

The Plastics Pipe Institute, Inc. (PPI) *is the major North American trade association representing the plastic pipe industry and is dedicated to promoting plastic as the materials of choice for pipe and conduit applications. PPI is the premier technical, engineering and industry knowledge resource publishing data for use in the development and design of plastic pipe and conduit systems. Additionally, PPI collaborates with industry organizations that set standards for manufacturing practices and installation methods.*

NORTH AMERICAN SOCIETY *FOR* TRENCHLESS TECHNOLOGY

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Seattle Public Utilities Pump Station 043 Emergency Force Main Repair, Hiram M. Chittenden Locks (the Ballard Locks) in Seattle, WA.

Pipeline construction is booming and the need for installation beneath USACE structures using trenchless technologies is increasing. Horizontal directional drilling, microtunneling, pipe ramming and pipe bursting offer positive solutions to installing pipelines with minimal disruption.

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King County Selects SEKISUI Spiral Wound Liners for Challenging Sewer Rehabilitation Project

By: Jacquie Jaques, SEKISUI SPR Americas

The Lake Hills Interceptor is a critical pipeline that efficiently collects and transports wastewater from numerous homes and businesses in Bellevue to the South Treatment Plant in Renton, WA. After more than fifty years in service, the Lake Hills Interceptor started to show signs of corrosion. With concerns about protecting the community and environment from potential failures, overflows, or service disruptions, King County evaluated several rehabilitation solutions for this project. First and foremost, the selected lining solution had to be structural and provide sufficient hydraulic capacity post rehabilitation. Additionally, due to the project location, the technology had to have a small construction footprint to minimize traffic disruption to commercial and residences.

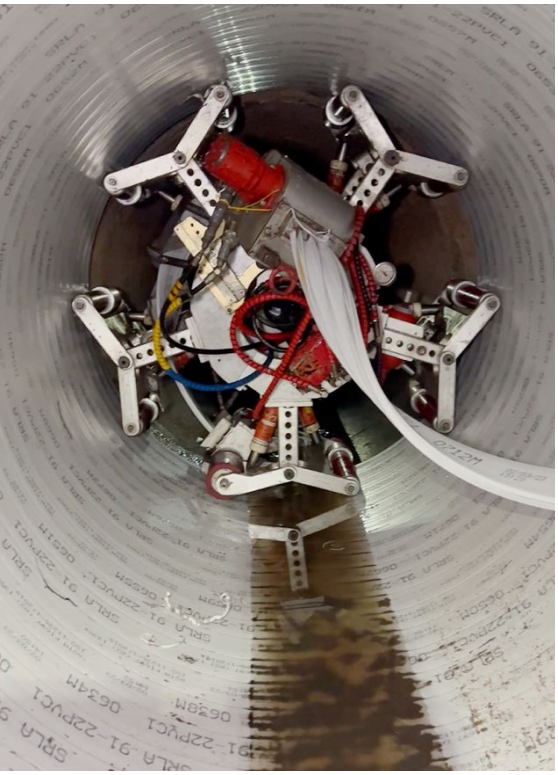
During the design phase, SEKISUI worked with King County and their consultant Brown and Caldwell and evaluated project plans, condition assessment reports as well as flow data. Based on comparative analysis done by the agency's engineering team, King County selected SEKISUI's SPR SPR™TF/RO PVC (Polyvinyl Chloride) Spiral Wound lining system for the project.

PROJECT SCOPE:

The Lake Hills project involved the rehabilitation of over 7,200 feet of 48- and 54-inch RCP. SPR™TF/RO liner that was specified for the project is a tight fit lining system designed for 40- to 60-inch

PVC liner is fed from above ground spool

> *Trenchless pipe rehabilitation method for mid-range diameter sewers, storm drains and culverts.*



Spiral winding machine "lays" PVC liner directly against host pipe wall

gravity pipelines that does not require annular space grouting. With several standard PVC profiles, complete with optional steel-reinforced ribs, SPR™TF/RO successfully satisfied both the hydraulic and structural prerequisites for the project.

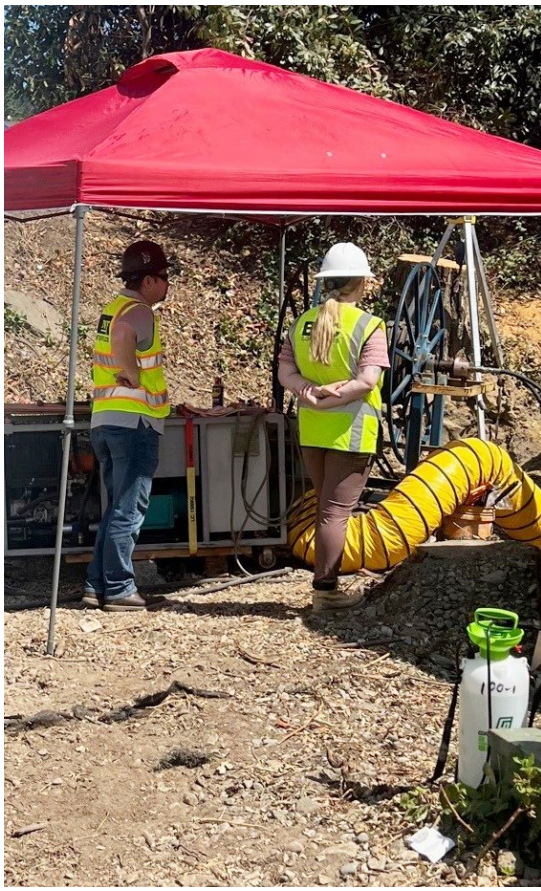
The project was competitively bid, and James W. Fowler was the low responsive bidder. After completing a successful project in the City of Portland using Spiral Wound liners, James W. Fowler opted to train additional crews for their Washington office for this and future projects. The Lake Hills project was completed in two phases. Phase One started in June 2023 which involved 3838 feet of 54-inch RCP. Once this segment was completed, Phase 2 involving 3400 LF rehabilitation of 48-inch RCP started in September 2023 and was completed in October 2023.

The decision to opt for rehabilitation instead of replacement was carefully considered, considering the significantly lower cost and minimal construction footprint compared to new construction or pipe replacement. By selecting SPR™TF/RO, King County was able to meet the structural and hydraulic capacity requirements plus extend the useful service life of the interceptor for another 50 years.

SPR™TF/RO METHOD/ TIGHT FIT PVC LINING:

SPR™TF/RO is a Spiral Wound pipe rehabilitation method for mid-range diameter sewers, storm drains and culverts. This trenchless lining system 'lays' PVC liner directly against the host pipe wall, requiring no annular space grouting. The SPR™TF/RO method features 2 different winding machines depending on the project: a lightweight, compact machine or one featuring rotating hydraulic arms. Both machines traverse the pipeline while constructing a tight-fit liner.

The trenchless pipe lining process begins by feeding PVC profile from an above ground spool directly into the host pipe. SPR™TF/RO traverses the length of a deteriorated pipeline while pulling profile to construct the PVC liner. Wraps of PVC are locked together as the winding machine continues down the pipeline. The machine 'lays' profile directly against the pipe wall, resulting in no space between liner and pipe. Since the profile is installed directly against the pipe wall, no annular space grouting is required. The fully structural pipe rehabilitation process is complete once the liner reaches the termination access chamber, and the ends are sealed.



Trenchless pipe rehabilitation method has minimal construction footprint

As Spiral Wound liners are mechanically installed, there is no styrene or chemicals involved in the installation process. By selecting SEKISUI's PVC Spiral Wound liners for this project, King County demonstrated its unwavering commitment to delivering efficient and sustainable solutions for the community's wastewater management needs.

ABOUT THE AUTHOR:

SEKISUI SPR
Leading-Edge Trenchless Solutions

SEKISUI SPR Americas, LLC *provides Spiral Wound liners for trenchless pipeline rehabilitation. Spiral wound involves constructing PVC liners inside existing pipelines utilizing machinery. SEKISUI SPR is based out of Atlanta, GA with representatives on the East and West Coast U.S.*

PRESS RELEASE

Trenchless Technology in Action: The Seattle West Armory Way High-Pressure Potable Water Rehabilitation Project

In the fast-evolving world of infrastructure maintenance, trenchless technology has emerged as a game-changer, allowing municipalities to address aging and compromised pipelines without the disruption of traditional open-trench methods. A recent project in Seattle, WA, exemplifies how the Primus Line® Rehab system, a flexible fiber-reinforced pipe solution, rehabilitated a crucial section of the city's potable water pipeline, demonstrating the efficiency of this innovative technology.

The Challenge

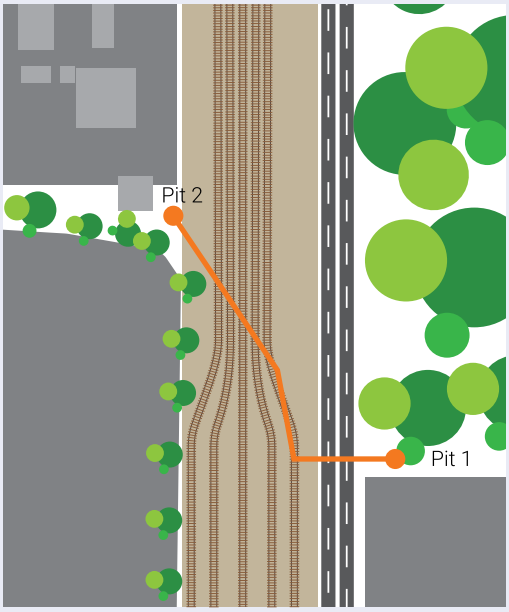
The City of Seattle faced a significant challenge: a 1,785-foot section of its potable water transmission pipeline under and across a heavily used railroad had become compromised due to age and mechanical faults. The pipeline of both 20-inch and 16-inch diameter concrete mortar pipes had leaks at the joints, leading to soil erosion and water loss. Additionally, the pipeline featured several bends, including a 45-degree bend and multiple 22-degree bends, further complicating the rehabilitation efforts.

Given the urban location of the pipeline, with access points near an electric vehicle charging station and within a residential area, the solution needed to be minimally invasive. Furthermore, the pipeline's operation at 250 PSI, with a hydrostatic test requirement of 300 PSI, demanded a system that could handle high pressure while navigating the pipeline's bends and transitions.

The Primus Line® Solution

Primus Line® Rehab was selected for this project due to its unique capabilities – flexibility, durability, and ability to navigate bends and transitions – which perfectly matched the requirements of the Seattle pipeline. The Primus Liner DN 300, ANSI/NSF 61 approved for potable water, was installed with high-pressure connectors with ANSI flanges 300 lbs.

Before installation, the pipeline underwent thorough cleaning and CCTV inspection to remove debris and remnants. Hydrojet cleaning was employed to eliminate any remaining debris, and to ensure a clear inner diameter for the liner. Installation of the 1,785-foot liner took only 50 minutes. Once in place, the liner was inflated with water, reverting to its original round shape.



The schematic illustration shows the congested area with the pipeline route: it crosses a busy street and railroad tracks, and required just two small excavation pits – a classic case for Primus Line® Rehab

> *The installation took only two days.*

The Outcome

After liner installation, high-pressure connectors assembled on both ends of the pipeline reintegrated the rehabilitated section with the water main. The entire installation was completed in just two days with minimal disruption to the surroundings. After successful pressure tests and disinfection, the rehabilitated pipeline was handed back to the City of Seattle.

The use of Primus Line® Rehab not only restored the pipeline's integrity but also extended its useful life by at least 50 years. This project highlights the significant benefits of the Primus Line® system, particularly in urban environments where traditional methods would be prohibitively disruptive and time-consuming.

> *This project highlights the significant benefits of the Primus Line® system.*

Minimal space required: The reel with the coiled folded liner could be placed next to the electric vehicle charging station

After connector assembly and pressure test, the rehabilitated pipeline could be reintegrated into the existing network. The installation had only taken two days

Conclusion

The Seattle West Armory Way project underscores the transformative potential of trenchless technology, particularly with advanced solutions like Primus Line®. As municipalities face aging infrastructure, such innovative methods offer efficient, durable, and minimally invasive rehabilitation, ensuring the continued reliability of critical public services.

The successful rehabilitation of Seattle's potable water pipeline with Primus Line® serves as a model for future projects, demonstrating that with the right technology, a professional installation partner like Advantage Reline, and Primus Line on-site technicians even the most challenging infrastructure issues can be addressed swiftly and effectively.

Weathering the Storm with Technology: The Catalyst for Sustainable Pipeline Infrastructure

By: Chris McDowell, CPM Pipelines

The pipeline industry faces a tempest of challenges, from aging infrastructure to environmental concerns and limited budgets. Yet, in the midst of this storm, there is a powerful tool that can help us navigate towards a more sustainable future: technology.

Water and wastewater infrastructure is not immune to complex challenges that require adept navigation. In fact, one might argue that the buried infrastructure that brings life-giving water and takes away waste is collapsing beneath our very feet. Yet innovations exist that can markedly increase the design life of these assets without adversely impacting the environment and, in many cases, are more economical than the less environmentally friendly "incumbents".

Consider some of the environmental factors that go into a pipe replacement project. Excavators, pumps, utility vehicles, graders, concrete trucks, delivery trucks – all burning fuel every day for the entirety of the project. The reward? A new pipeline with an 80-year design life? The dig and replace model is not only harmful to the environment but also economically unfeasible due to the lack of funding to replace the infrastructure that requires attention.



Understanding the condition of a water main or force main prior to replacement is one way to minimize the environmental footprint and economic impact of a project slated for replacement. Non-destructive, in-line inspection technologies with ultrasound sensors have advanced to provide insights into the condition of pressurized assets that allow owners to understand where a particular asset is structurally sound and where replacement or rehabilitation is necessary.

This empowers owners and their consultants to proactively plan and budget for capital improvement to known areas of a pipeline that are in jeopardy. This proactive management approach decreases project scopes, budgets, and environmental impacts.

Many owners face three common challenges:

1. The water mains and force mains in most dire need of inspection were not designed to be cleaned, much less inspected.

This design flaw (though the designers should not be faulted) results in the necessity for civil expenditures that often exceed the cost of the actual inspection. This fact alone precludes many agencies from performing inspections. We can learn from this though. New pipelines can be designed with pigging stations and isolation valves that allow for basic maintenance such as cleaning. The added benefit of designing to allow for cleaning is that a broad spectrum of in-line inspection technologies are available for owners previously limited to only low-resolution inspections. Moreover, while we cannot predict what inspection technologies will look like in 50 years, we do know that pigging will always be the most effective means of cleaning pressurized water and sewer pipelines. Advances in artificial intelligence (AI) should also be considered in the design of new pipelines. Correct placement of flow monitors and pressure sensors are just two design considerations that AI could use to predict leaks in real-time.

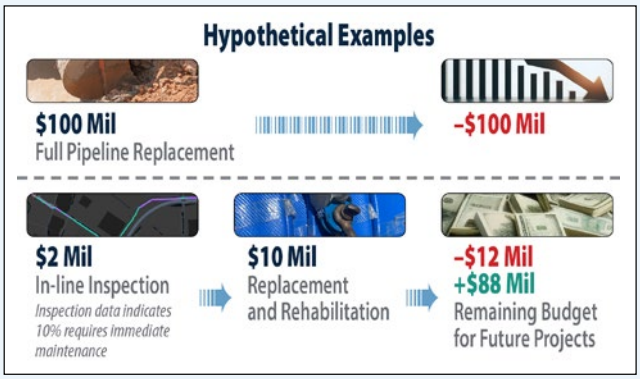
2. Many owners do not budget for condition assessment of these critical depreciable assets.

Again, this is not an indictment on any owner or agency but rather an observation of the way "things have always been." There is a sea of change in this arena as many utilities are coming to terms with the need for buried asset management.

This change does not happen without transparent communication with the constituents these assets serve. Do we love to see green spaces, sustainable development, and resilient city structures? Absolutely. Would our opinion of priorities change if clean water weren't available to drink and we were left to our own devices to deal with waste? Absolutely!

By openly communicating with the public about the impending infrastructure crisis, we can raise awareness and generate support for increased funding. This funding can be directed towards advanced inspection technologies that provide crucial information about the remaining lifespan of pipelines, enabling proactive maintenance, rehabilitation, or replacement strategies.

Framing it in terms of replacement cost is often helpful. Hypothetically, if it costs $100,000,000 to replace a pipeline, there is value in spending 2 percent of this cost on an inspection that, on average, suggests that 3 - 7 percent of the pipeline needs replacement or rehabilitation. Therefore, $2 million is spent on an inspection, $10 million (rounding the 7 percent up to 10 percent to be ultraconservative) is spent on replacement and rehabilitation, thus netting the owner $88,000,000. The remaining budget can be utilized for future projects while reducing the environmental impact. Of course, this is an example and there are always outliers to disprove a point, but in general, the case can be made for condition assessment.



There is a reason the Environmental Protection Agency (EPA) issued the Guide for Evaluating Capacity, Management, Operation, and Maintenance (CMOM) Programs for Sanitary Sewer Collection Systems. CMOM programs have been embraced and are the cornerstone of sewer collection system maintenance for many owners and agencies across the U.S.

Why would we not do the same with force mains? Is collecting samples to obtain chlorine residuals and disinfection byproducts enough maintenance for our drinking water systems? Rhetorical questions, but the point remains that we must collaborate on new ways to look at water and wastewater pipelines if we are to say we have a goal of sustainability and resiliency.

Emergency funds are readily available when systems are run to failure. Can a portion of this funding be allocated to asset maintenance and emergency prevention? This is a question outside of this author's purview, but it stands to reason that emergency prevention, through the implementation of a strategic asset management plan, is exponentially less expensive than emergency repairs. We don't just replace cars when the air conditioning goes out, we inspect the problem to determine if the cost of the AC replacement is less than the replacement cost of the vehicle and make a sound decision accordingly. Why wouldn't we treat millions of dollars of pipelines like we treat other, less expensive assets like, for instance, a city truck?

3.Risk averseness.

New technologies that have been proven abroad are plentiful in the United States market. Agencies and owners are understandably unwilling to "be the first" to try a new technology in whichever region that influences them. The question must be asked though, are the bedding and pipeline materials so different on other continents that no valence can be given to the inspections on those continents? This logic certainly doesn't apply to most of our personal lives; if a new technology exists that will make our lives easier, we'll adopt it immediately. Pull out your cell phone and check where it was manufactured. Walk around your house. Look at your car. Take note of where items were manufactured and think about the logic of only purchasing items that are produced in your region. There is a bit of absurdity here, but it makes a point: if we don't support the technology providers that are coming up with new and improved ways of pressure pipe inspection and condition assessment, they will simply go out of business. What next? Will we be left with what we have now which is, in part, responsible for where we are now?

Condition assessment is a critical path to sustainability and resiliency, but other pathways exist. New technologies for the trenchless rehabilitation of pressurized pipelines are abundant. These technologies can substantially reduce the environmental and economical footprint of a project. Technologies such as Fold and Form Replacement Pipe (FFRP) can be installed in distances as long as several thousand feet. A 20,000 linear foot pipeline could be rehabilitated with potentially less than 5 or 6 access points in a fraction of the time of open-cut replacement. The project footprint is much smaller, requiring a minimal number of vehicles and diesel hungry pieces of equipment for less time while a design life of up to 50 years can be obtained.

This is only accounting for one product or category of products, but the reduction in environmental impact cannot be understated. Fewer material deliveries, fewer excavations, less concrete restoration (if in the street), minimal traffic disruptions due to smaller traffic control zones for a shorter amount of time. The amount of fuel savings alone substantially reduces greenhouse gas emissions. This is sustainability and resiliency in buried asset management in action. And this is just one technology.

One pragmatic challenge these types of solutions present is in relation to the traditional owner/consultant relationship. Consultants design projects and new construction requires the greatest amount of design effort, and in turn hours. There will always be projects that require the expertise and ingenuity of design consultants. The question to ask is what is the motivation to develop projects that require much less design effort? If a business is based on performing designs for valued and trusted clients, it would do just that. This has been the hallmark of the design business and without motivation from the owners, this structure won't change.

Bonuses for cost savings and environmental consideration could be introduced to induce consultants to consider alternatives to new design. Another consideration would be to award new design projects to those consultant firms that bring new technologies and innovations that result in environmental and cost savings on other projects. This topic expands far beyond the scope of this article, but the intent is to get wheels turning. After all, if we keep doing what we've always done, we'll keep getting what we've always gotten.

This article started with language I think we can all relate to in some form or fashion. The world presents many challenges that we simply cannot navigate. Hope is found in the challenges we can address and the introduction of innovative new technologies that stand to change the world we live in. Nothing happens overnight. Everything falls somewhere in a continuum. Figuring out where we lie in the continuum and taking positive action forward is progress towards resiliency in buried asset management and better infrastructure for our children.

ABOUT THE AUTHOR:

***Chris McDowell** is a seasoned professional with sixteen years of diverse experience in the water industry, culminating in his current role as Vice President at CPM Pipelines. In his current capacity, he oversees departmental management, devises marketing and sales strategies, and ensures financial accountability. Chris's multifaceted background uniquely positions him to drive success and innovation at CPM Pipelines.*

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