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# TRENCHLESS NORTH AMERICA

The Official Magazine of the North American Society for Trenchless Technology

## NASTT 2025 NO-DIG SHOW RECAP

*Mile High Success!*

**Denver CO March 30 – April 3, 2025**

SUMMER 2025
Volume 15 • Issue 3

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# TRENCHLESS NORTH AMERICA

The Official Magazine of the North American Society for Trenchless Technology

SUMMER 2025 – VOLUME 15, ISSUE No. 3

## 16 NASTT 2025 NO-DIG SHOW REACHES NEW HEIGHTS IN DENVER!

Fresh mountain air and spring excitement were at the forefront as the world's largest trenchless technology conference and trade show rolled into the Mile-High City, returning to Denver for the frst time in ten years. Held March 30 - April 3 at the iconic Colorado Convention Center, the NASTT 2025 No-Dig Show showcased numerous environmentally friendly trenchless solutions and cost-saving opportunities that municipalities and utilities can implement to help their communities.

MARCH 30-APRIL 3 | DENVER, CO
NO-DIG SHOW 2025

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# WELCOME TO THE SUMMER 2025 EDITION OF NASTT'S TRENCHLESS NORTH AMERICA

Dear NASTT Members and Trenchless Advocates:

As the trenchless community continues to thrive, 2025 has already proven to be a landmark year for our industry. This past March, we welcomed thousands of professionals to Denver, Colorado for the NASTT 2025 No-Dig Show — and what an extraordinary week it was! From a record-breaking turnout to an expansive exhibit hall and over 160 peer-reviewed technical papers, Denver showcased the strength, diversity, and growth of our trenchless family. The energy was palpable, and it was inspiring to witness first-hand the continued collaboration, learning, and passion that drive this industry forward.

One of the standout themes from Denver was innovation — not just in technology, but also in how we collaborate, train, and grow our workforce. From smart inspection tools and AI-driven planning systems to advanced materials for rehabilitation, the No-Dig Show once again affirmed that trenchless technology remains at the forefront of sustainable infrastructure solutions. I extend heartfelt thanks to our volunteers, authors, exhibitors, sponsors, and attendees who made Denver such a success.

*"Innovation remains the lifeblood of trenchless technology."*

Looking ahead, momentum is building rapidly for the No-Dig North 2025 conference, set for October 20-22 in Vancouver, British Columbia. With the Pacific Northwest as our backdrop, the event will bring together the Canadian and international trenchless communities for three days of knowledge sharing, networking, and technical excellence. Vancouver is also hosting the ISTT's International No-Dig, adding a unique global perspective. This rare joint event promises to be a truly world-class experience, showcasing the latest innovations from around the world and providing a platform for global collaboration.

*"Trenchless technology remains at the forefront of sustainable infrastructure solutions."*

As we prepare for these upcoming events, it's clear that innovation remains the lifeblood of trenchless technology. Whether it's digital modeling, robotics, or sustainability-driven design, our industry continues to challenge the status quo. NASTT is proud to support this progress through our training programs, regional chapters, and student initiatives, ensuring that we build not just better infrastructure — but also a stronger, smarter workforce for tomorrow.

*"Thank you for being part of this journey."*

Thank you for being part of this journey. I look forward to seeing many of you in Vancouver as we continue to build the future.

Enjoy your read!

Matthew

**Matthew Izzard, Executive Director**
**North American Society for Trenchless Technology (NASTT)**
**mizzard@nastt.org**


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# HEARTFELT THANKS TO EVERYONE!

Dear Members and Friends of NASTT!

As Chair of the Board of Directors, it's my pleasure to extend heartfelt thanks to everyone who joined us in Denver this past spring for the 2025 No-Dig Show. What an incredible experience it was to bring together trenchless professionals from across North America and beyond for several days of learning, networking, collaboration and innovation.

The energy throughout the show was nothing short of inspiring. The record-breaking event, which provided robust educational sessions, along with a buzzing exhibit hall featuring the latest technologies, reminded us why this event is considered the must-attend conference for our industry. From networking receptions and student research competitions to hands-on demonstrations and thought-provoking panels, the 2025 No-Dig Show was a powerful reminder of how much progress and passion exists within the trenchless community.

One of the highlights of the event was the presentation of the **Abbott Innovative Product & Services Awards**. These awards recognize excellence and breakthrough innovation in our field, and this year's recipients truly exemplified forward-thinking solutions that are shaping the future of underground infrastructure. Congratulations to the winners and nominees alike, you are setting new standards and challenging us all to think differently, design smarter, and dig less. Be sure to see the full article in this issue with all the details on the winners and nominees. (See pgs 26-31)

*"I look forward to seeing many of you in Vancouver this fall - more than just a conference, it's a milestone moment!"*

As we reflect on the success of Denver, we're already looking ahead with excitement to what's next: the **2025 No-Dig North & ISTT International No-Dig**, taking place October 27–29 at the stunning Vancouver Convention Centre in British Columbia. For the first time ever, NASTT and the International Society for Trenchless Technology (ISTT) will co-host this landmark event, bringing global attention and expertise to North America in a way we've never seen before.

This is more than just a conference, it's a milestone moment. Combining the spirit of No-Dig North with the global prestige of the ISTT International No-Dig, Vancouver promises an unparalleled opportunity for education, international networking, and cross-border innovation. With world-class programming, technical paper presentations, and a dynamic exhibit hall, this event will offer value to engineers, contractors, utilities, municipalities, academics, and manufacturers alike.

Whether you're a longtime member or new to trenchless technology, I encourage you to be part of this gathering. Let's carry the momentum from Denver into Vancouver and continue advancing the smart, sustainable solutions our communities need now more than ever.

Thank you once again for your commitment to NASTT and for helping shape the future of trenchless technology. I look forward to seeing many of you in Vancouver this fall!

*Greg Tippett*

**Greg Tippett P. Eng., Board Chair**
**North American Society for Trenchless Technology (NASTT)**

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# Q&A with Stephanie Nix-Thomas

*After winning the Honorable Mention for Trenchless Project of the Year at the 2008 NASTT No-Dig Show in Dallas, Stephanie Nix-Thomas discovered the value of the NASTT mission in helping her company stay at the forefront of trenchless technology applications. Involved since the inception of the NASTT Rocky Mountain Chapter, Stephanie led the organization's first regional chapter conference in Utah, and served in varying roles including Chapter Treasurer, Vice-Chair and Chair. She is currently serving a six-year term on the NASTT National Board of Directors. Stephanie has also volunteered on the Auction Committee for No-Dig, and remains active on the Regional Chapter, as well as other committees as needed. She was elected as a board member of the Utah AGC in 2023 - 2024. Stephanie offers a valuable well informed perspective on the current and future state of the trenchless technology industry.*

### *What first inspired you to become interested in the construction & engineering field, particularly underground construction?*

I grew up in a construction family. My parents started an underground construction company, Claude H. Nix Construction Co., in 1974. Like most high school graduates, I didn't really know what I wanted to be, but my math skills were decent, and my dad challenged me to study engineering. I graduated with a civil and environmental engineering degree and a minor in business administration from Utah State University in 1984. Spending the next 7 years as an engineering consultant, I often had the opportunity to ask my dad for practical solutions to some of the design problems I was working on in my professional career. He always had practical and constructable ideas that improved the design I was working on. In 2000, when I decided to join the family business with my brother Jon, I found that I really enjoyed and preferred building things over designing them.

### *Outline your experience of first being introduced to trenchless technology methods and applications.*

In 2003, there was a decent size job out for bid in Logan Utah. Jon (my brother and business partner) had researched guided boring machines and felt like it would be a good fit for constructing that project. The first time it bid, we didn't get the job. The contractor that did had issues in a very deep, wet part of the project and ultimately, terminated the contract. The remainder of the project went out for bid again, and this time we won it. We purchased an Akkerman Guided Bore Machine 240 A (we have machine #12) and

> *"There are so many smart, interesting, and dedicated professionals in this field."*

completed the first pilot tube job in Utah. Since that time, Jon and I have made it a goal to stay in the forefront with trenchless technology as much as possible. We purchased a GeoNex Hzr-610 this year.

### *How did you first get involved with NASTT? What are some of the goals and initiatives you would like to see NASTT pursue?*

I first became involved in 2009. We were nominated and won honorable mention for Trenchless Project of the Year for our work on the light rail system from Ogden to Salt Lake City. We attended the conference in Dallas to receive the award. I was very impressed by the conference and the mission of NASTT. In 2015 we were asked by the Rocky Mountain chapter leadership to help get things started on the western side of the Rockies. I have been very involved ever since.

I believe that if NASTT could foster a connection between industry and education that encouraged more research and development, it would encourage students and young professionals to expand the benefits of what we do. This, I believe would encourage governments to become more educated and to utilize trenchless methods even more. I have personally experienced a great increase (perhaps 200 percent)


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*"I was very impressed by the conference and the mission of NASTT."*

*"The end result is excellence for our clients - and it's fun."*

in trenchless projects in our market area. Some of that is due to population growth, but some is due to the improvement and development of trenchless technologies. I would also like to see the natural resource conservation aspect of trenchless technology become more of a priority.

***What are your thoughts on the current state of the trenchless industry? What areas do you see evolving in STEM education and post-secondary academics?***

I think that the current state of the trenchless industry is very positive and there is much room to expand. As a member of the education committee for the national board, I think that figuring out how to get some money to higher education for research will enhance both STEM and post secondary opportunities. I think that the few post-secondary institutions that are currently promoting trenchless technologies have done a fine job to date, but if we can expand that to more schools – it would be better. I think that encouraging trenchless as a design norm will be better for infrastructure and natural resource consumption/conservation.

***Is the trenchless industry generally doing a good job of attracting young professionals? What do you think can be done to better engage students and young professionals in the trenchless industry?***

You know, I do think we are doing a good job of attracting young professionals. What I've experienced here in the Rocky Mountain Chapter is that smart young professionals are taking the reins of leadership. Their ideas and actions are fueling progress for the industry and that is awesome.

I mentioned earlier that infusing some research money at post-secondary institutions would do much to update curriculum and better engage students.

The Rocky Mountain Chapter did a presentation for a graduate class at my alma matter in 2024. One of the things we discovered was that trenchless technologies were not a part of the current curriculum. Just looking at the potential environmental and social benefits should warrant an update to civil engineering curriculum. Some examples include less fuel consumed, fewer hillsides disappearing due to construction material mining, or system maintenance efficiency such as fewer manholes and better pipeline installation are clear benefits that upcoming engineers should be aware of as they learn how to design community infrastructure.

***Biggest challenges facing the trenchless industry today? Has acceptance and understanding of trenchless technology improved?***

I do believe that acceptance and understanding of trenchless technology has improved. The challenges that I see are consistent understanding of the terms and methods and the need for a complete long-term cost-benefit analysis, not just the immediate.

Examples for the terms and methods would be the use of "jack and bore" in a bid package when the engineer does not envision the use of an auger bore machine. Or confusion regarding directional drill slurry and bentonite lubrication for a pipe ram.

As for cost-benefit analysis, when project budgets are assembled for communities, I don't think life cycle things like fuel usage, green house gas emissions, or mined granular material are considered. In areas like Salt Lake City, maybe they should be. Air quality is a very real health concern, fuel is a non-renewable resource, and the mountain side can never be restored. As we plan and build our communities, we should consider all the factors that result from and for the improvements that we are putting in place. Trenchless technologies allow us to do a better job – not just for right now, but also for the future – for our kids.

***What do you personally enjoy most about working in the trenchless technology field?***

By far it is the people I work with and get to interact with. There are so many smart, interesting, and dedicated professionals in this field. I think we are all driven by the fact that not every problem has been solved, we can innovate, and the end result is excellence for our clients. And it's fun.

# Vitrified Clay Pipe (VCP) as a Carrier Pipe Within a Steel Casing

By: Jeff Boschert, P.E., BC.PLW, F.ASCE,
National Clay Pipe Institute (NCPI)

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After more than 30-years of direct jacking Vitrified Clay Pipe (VCP) via Microtunneling and Pilot Tube Methods in the U.S., installation options continue to evolve. In a lesser-known method, VCP has also been installed within a steel casing as a carrier pipe for gravity sanitary sewer. This experience establishes that Bell & Spigot VCP and jacking pipe can both be used within a permanent steel casing.

The Pilot Tube Method of Guided Boring (PTM) with VCP has long been a popular option for many challenging conditions. The reliable rifle-barrel straight installations ensure precise line and grade pipelines suitable for gravity sanitary sewers which do not require casing pipe to be left in the ground.

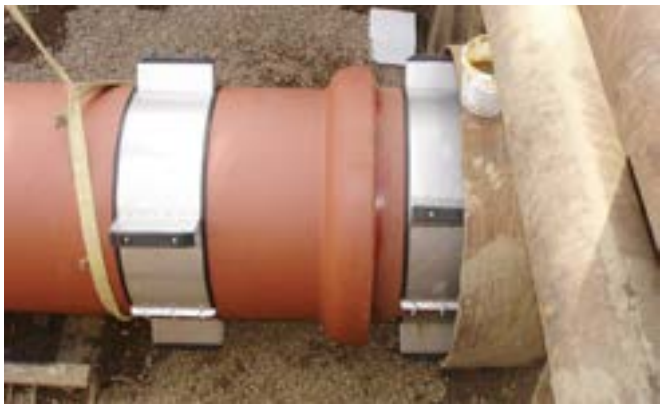
Installing the steel casing is the first step. This is commonly accomplished using Horizonal Auger Boring (HAB) Methods with or without the guidance of a pilot tube.

## Using Bell and Spigot Vitrified Clay as the Carrier

Bell and Spigot pipe is a common pipe material used for conventional open trench construction. However, it can be jacked within a steel casing. When this pipe product is used, casing spacers or wooden skids are attached to the pipe barrels to elevate the pipe bells during installation. Bell and Spigot pipe is not specifically designed to be direct jacked and thus, it is typically used for runs within a casing at drive lengths of approximately 200 LF or less. Longer runs with Bell and Spigot pipe have been accomplished using lubricants at the friction points of the casing spacers.

Bell and Spigot pipe needs to have a wood cushion between the section being jacked and the steel push plate on the jacking frame. When pushing on the bell end, the force must be applied to the pipe barrel inside the bell and not to the pipe bell itself. This can be accomplished using wood cribbing, plywood, or a combination thereof.

Unlike Jacking Pipe, the pipe ends are not machined on a lathe to a precise tolerance for squareness, nor are wood rings



*Stainless-Steel Casing Spacers with polyethylene runners designed for a 30-inch Bell and Spigot VCP Pipe*

(cushions) used between each assembled Bell and Spigot joint. Casing spacers, attached to the pipe barrel, need to be placed at intervals sufficient to support the weight of each pipe section (usually 2 spacers per pipe). Casing spacers also need to resist abrasion and sliding wear during installation without failure within the tunnel.

If skids are used in place of casing spacers, commonly two wood skids placed at the 5 and 7 o'clock positions per section of pipe are held in place with steel banding. Lubrication within the installed casing can be used to reduce the friction (and thus jacking forces) on longer push lengths.

*2M section length of 18-inch Vitrified Clay Jacking pipe with redwood skids being lowered in a jacking shaft*

*"The Pilot Tube Method of Guided Boring (PTM) with VCP has long been a popular option."*

## Using Vitrified Clay Jacking Pipe as the Carrier

Specialized VCP Jacking Pipe (manufactured in 8- to 24-inch diameters) is commonly direct jacked to advance a temporary casing, a Microtunnel Boring Machine, a powered cutterhead, or a reaming head but it can also be direct jacked within a previously installed casing. Using jacking pipe instead of a pipe designed for use in an open trench allows the casing diameter to be reduced. VCP Jacking pipe with a flush bell design (smooth profile joint) and machined ends for transferring axial loads during installation was introduced to the US in 1992.

## Final Installation: Bell & Spigot or Jacking Pipe

A horizontal auger-bore jacking frame should be used to install the carrier pipe (Bell and Spigot or Jacking pipe) after the steel casing is in place. The jacking frame applies a uniform circumferential force to the end of the carrier pipe.

When the annular space between the casing and carrier line is filled; fill materials may include 3/8-inch pea gravel, sand or one of the many mix varieties of flowable, cellular fill, or grout. Bulkheads at the ends of the casing or casing end seal closures may be used to prevent water and/or soil from entering annular space if it is not filled.

Longer drive lengths are practical when using VCP jacking pipe as it is designed and manufactured to be loaded axially. An independent lab for the City of Los Angeles recently completed compression tests on NO-DIG VCP Jacking Pipe. The minimum compression strength of the five pipe sampled and tested was over 30,000 psi. This is well-above the minimum requirement of ASTM C1208 (*Standard Specification for Vitrified Clay Pipe and Joint for Use in Microtunneling, Sliplining, Pipe Bursting and Tunnels*) of 7,000 psi.

## Current Installation: Ontario CA Sports Empire Complex Infrastructure

In a project relying on the compression strength of NO-DIG pipe in Ontario, CA, Golden State Boring is currently installing 5,500 LF of 18- and 21-inch VCP jacking pipe as the gravity sewer carrier pipe within a 36-inch casing. Redwood skids are strapped to the pipe and used for invert adjustments for the installed carrier pipe. The average drive length on the Ontario Sports Empire Complex project is over 700 LF. The choice of the longer drive lengths was made due to the depth of the installation at 40 – 45 feet. For this project, where the native soils are soft sandy clays (SC), trenchless installation was more cost effective than a traditional open trench construction. To date, approximately 70 percent of the drives have been completed. Projected completion for this installation is October 2025.

## Sustainability of Vitrified Clay Pipe

The options available to owners, engineers and contractors are driving some to look at clay pipe with a fresh perspective. The long-term value of any installation is built on sustainability. The longevity of the material, unmatched corrosion resistance,

*24-inch Vitrified Clay Carrier pipe within a Casing: Concrete Bulkhead/ Grout Filled Annulus*

*18-inch NO-DIG Pipe installed within a 36-inch steel casing in Ontario, CA*

and the ability to use aggressive cleaning methods are unique to VCP. For municipalities accepting sustainability as part of their mission, the natural raw materials and manufacturing processes used to make clay pipe are also far preferable to the alternative plastic products.

*Drive lengths of over 700 feet were completed out of 14x48 FT jacking shafts averaging over 40-feet deep*

As in any ceramic material, the physical properties of the clay pipe will remain unchanged over time and are not susceptible to degradation. Because the raw materials used in the manufacture of clay pipe are just clay, shale and water, the environmental impacts are minimal. The limited environmental impact of raw material extraction and the long life of clay combine to make it far more sustainable than any other pipe product.

*Jeff Boschert,*
***P.E., BC.PLW, F.ASCE,***
*PRESIDENT,*
*National Clay Pipe Institute (NCPI)*

# UNDERGROUND INFRASTRUCTURE SUSTAINABILITY:

## No-Dig North, Vancouver Convention Centre
## October 27 – 29, 2025

### *Explore the Future of Trenchless Innovation at the NASTT 2025 No-Dig North & ISTT International No-Dig*

***Join industry leaders from across North America and around the world at the 2025 No-Dig North & ISTT International No-Dig conference, happening October 27-29 at the Vancouver Convention Centre. No-Dig North is an annual event that brings together professionals in engineering, construction, manufacturing, and municipal planning to exchange ideas and discover cutting-edge trenchless technologies that support sustainable, cost-effective infrastructure development. With this year's partnership with ISTT, the conference brings a global vision of trenchless technology into focus.***

**No-Dig North is the largest trenchless technology conference in Canada where municipalities, contractors, consulting engineers, public utilities, industrial facilities, and damage prevention professionals attend to learn new techniques that will save money and improve infrastructure. This show offers topic tracks over the course of two days with peer-reviewed, non-commercial presentations, including case studies detailing environmentally friendly trenchless solutions and cost-saving opportunities. Additionally, an exhibition hall and networking events are offered throughout the week for opportunities to exchange ideas with colleagues. NASTT's suite of Good Practices Courses is offered on the first day of the conference as well.**

*Networking and access to industry expertise is a central feature of the annual No-Dig North show*

*The exhibit hall features the latest innovations in trenchless technology from around the globe*

**For information and registration link please visit:**

**https://nastt.org/no-dig-north/**


# Meet Us in Vancouver

## October 27-29 | Vancouver Convention Centre

No-Dig North is the premier annual conference focused on trenchless technology in Canada. Attendees include engineers, contractors, manufacturers, and municipal representatives who seek to learn about and discuss sustainable, cost-effective solutions for infrastructure needs. The 2025 No-Dig North and ISTT International No-Dig conference is coming to Vancouver, BC at the Vancouver Convention Centre, October 27-29, 2025.

**Learn more at**

**nastt.org/no-dig-north**

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No-Dig North 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.

MARCH 30-APRIL 3 | DENVER, CO
NO-DIG SHOW 2025

NEW HEIGHTS. UNDER GROUND.

# NASTT 2025 No-Dig Show Reaches New Heights in Denver!

## Mile-High Conference Another Successful Trenchless Showcase!

Fresh mountain air and spring excitement were at the forefront as the world's largest trenchless technology conference and trade show rolled into the Mile-High City, returning to Denver for the first time in ten years. Held March 30 - April 3 at the iconic Colorado Convention Center, the NASTT 2025 No-Dig Show showcased numerous environmentally friendly trenchless solutions and cost-saving opportunities that municipalities and utilities can implement to help their communities.

Over 2000 attendees, including NASTT Student Chapter members and Municipal Scholarship recipients, enjoyed a busy fast-paced week of fun, networking events and a wealth of information about the latest in innovative trenchless products and services. It was a unique opportunity to connect with the Contractors, Manufacturers, Engineers, Educators, and Utility Owners who work daily in North America's the trenchless industry. The NASTT 2025 No-Dig Show's motto, "New Heights, Underground," saluted Denver's "Mile High" status and the continued rapid growth of the underground construction industry. It displayed the resilience, resourcefulness and innovative foundations of the trenchless industry, and the people who pursue it with a passion.

With seven tracks of peer-reviewed, presentations, over 200 informative trade exhibits and multiple networking opportunities, the NASTT 2025 No-Dig Show once again reinforced its stature as one of the most notable high-profile underground construction conferences in North America.

The NASTT 2025 No-Dig Show in Denver demonstrated beyond question that trenchless technology offers both innovative rehabilitation and technically advanced replacement options for communities and utilities looking for cost effective, non-disruptive and greener infrastructure solutions.

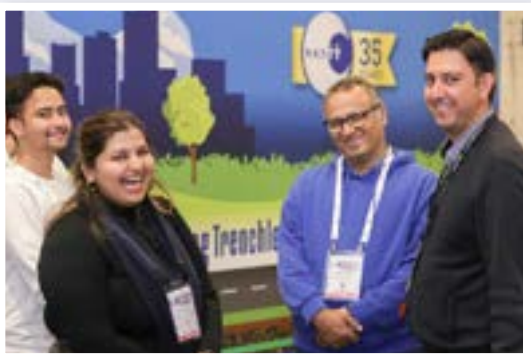
As preparations begin for the NASTT 2026 No-Dig Show next year in Palm Springs CA, March 29 – April 2, the trenchless technology industry remains at the forefront as a key environmental steward offering an impressive toolbox of methods and ideas which help preserve our natural resources, reducing both GHG emissions and community impacts from construction. Exemplifying the theme of ***"New Heights Under Ground",*** NASTT looks forward to continuing to expand its role as the premier resource for knowledge, networking, education, and training in trenchless technology all across North America.

*"I am always amazed at the positive energy that No-Dig Show builds in creating real opportunities for everyone."*

*– Matthew Izzard, NASTT Executive Director*

# Mile High Mixer – Networking with Municipal Attendees & Students

*There was no better way to celebrate the start of the 2025 No-Dig Show in Denver than joining together for welcome drinks and appetizers at the Mile High Mixer! Attendees started the conference off with excitement as they looked forward to the days ahead greeting friends and welcoming new faces. This event welcomed the recipients of the NASTT Municipal & Public Utility Scholarship, Student Chapter Members and all attendees in Denver.*





## Opening Breakfast & NASTT Awards

*Full Conference attendees were invited to the Opening Breakfast to visit with colleagues and learn all that was in store for the week! During this plated breakfast awards were presented, and volunteers were recognized for their trenchless achievements.*

*Tiffanie Mendez, Sunbelt Rentals Inc., honored for six years of distinguished service on the NASTT Board of Directors*

*"Trenchless Technology" magazine 2025 Person of the Year Chris Macey, P.Eng AECOM (left), receives award plaque from Dan Sisko Benjamin Media (right)*

*Kim Hanson P.E., Project Manager and Tunnel Design Engineer, Hazen and Sawyer (right) receives the 2025 NASTT Volunteer Award from Matthew Izzard, NASTT Executive Director (left)*

*Trenchless Technology Magazine 2024 Project of the Year – New Installations awarded (from left to right) Sharon Bueno Benjamin Media, Rob Brown Universal Pegasus International, Jim Murphy Universal Pegasus International, Trevor Miles Universal Pegasus International, Dan Sisko Benjamin Media*

*Trenchless Technology Magazine 2024 Project of the Year – Rehabilitation awarded (from left to right) Sharon Bueno Benjamin Media, Chris Macey P.Eng. AECOM, Nick Rosengarten Azuria Water Solutions, Andrew Costa Azuria Water Solutions, Jeffrey Bowra Capital Region Water*

*Tiffanie Mendez, Sunbelt Rentals, NASTT Board of Directors Officer-at-Large (left) presents the 2025 NASTT Michael E. Argent Memorial Scholarships to six worthy recipients (from left to right) Ehsan Rajaie, University of Texas at Arlington, Sonja Kozak, CalPoly Pomona, Jimmy Hanashian, Arizona State University, Chetan Chalumuri, Arizona State University, Parisa Beigvand, University of Texas at Arlington, Fadilat Amisu, UMass Lowell*

*NASTT Ralston Young Trenchless Achievement Award recipients Phil Perron The Crossing Group (left) and Kyle Friedman P.E. Brierley Associates (right) are congratulated by Kalyan Piratla Clemson University (center)*


*BGC Engineering Inc.*

*Northwest Pipe Company*

*R&R McClure*

*Azuria Water Solutions*

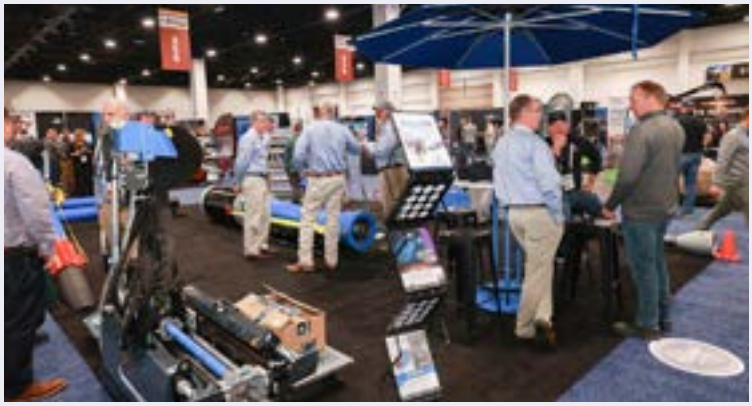
*Cindy Preuss, PE, Chair, Abbot Innovative Product & Services Award Committee, presents the award to the four 2025 winners*

## Ribbon Cutting & Exhibit Hall

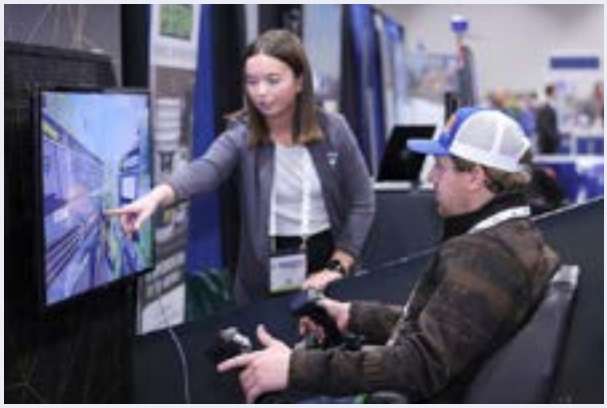

*The annual ceremonial ribbon cutting opened the exhibit hall and welcomed sponsors, exhibitors, attendees and guests to the NASTT No-Dig Show! (left to right): NASTT Executive Director, Matthew Izzard (NASTT); No-Dig Show Technical Program Chair, Maureen Carlin (Garver); No-Dig Show Planning Chair, Chris Knott (BTrenchless); NASTT Board Chair, Greg Tippett P. Eng. (Stantec Consulting Ltd); and No-Dig Show Technical Program Vice-Chair, Andrew (Drew) Sparks (Integrated Trenchless Engineering)*


*Delegates stream into the Exhibit Hall to discover the latest innovations in the trenchless industry*

*NASTT student members present their research during the Trenchless Research Competition held in the exhibit hall*



*Networking and education are always top of mind during the NASTT No-Dig Show. The exhibit hall is buzzing with the latest innovations in the trenchless industry with product and equipment demonstrations and lively technical discussions. Exhibitors offer raffles, food and beverages give-aways and more in their booths for attendees to explore and enjoy.*



## Technical Sessions & Forums

MARCH 30-APRIL 3 | DENVER, CO
NO-DIG SHOW 2025

*A core feature of the NASTT No-Dig Show is the unparalleled technical schedule which now features seven tracks over the course of three days. Sessions on all aspects of trenchless technology were presented and also included panel forums with industry experts offering topic discussions where audience Q&A and participation is encouraged! Registrants are able to earn Continuing Education Units to support their professional development with their attendance to the technical sessions.*

## Meet Greet Drink & Eat/Silent Auction


*All attendees were invited to celebrate the end of the first full day of the conference with a networking cocktail hour that helped raise money for the NASTT Educational Fund through a silent auction*

## Casino Royale & NASTT Hall of Fame

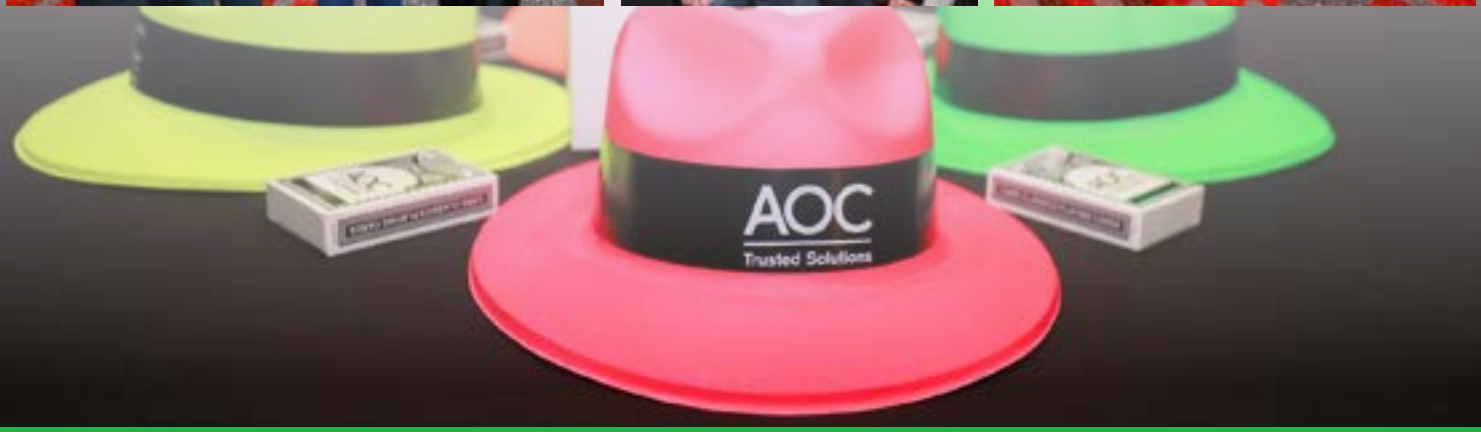

*Long time NASTT member, former NASTT Board Chair, ISTT Board Member, trenchless innovator and recognized expert on geotechnical engineering and trenchless methods, Kimberlie Staheli, PE, President of Staheli Trenchless, was inducted into the 2025 NASTT Hall of Fame. Shown here receiving her award from NASTT Executive Director Matthew Izzard*

*Former NASTT Chair Craig Vandaelle congratulates the 2025 NASTT Hall of Fame recipient Kimberlie Staheli, PE*

*For the third year in a row, the NASTT Casino Royale Award Celebration and Casino Games was a smashing success – hard working NASTT staff members (left to right) Michelle Hill, Jessie Clevenger, & Kari Webb*

*No-Dig Show Planning Committee Chair Chris Knott, BT Construction, (right) receives the NASTT 2025 Chair Award for Distinguished Service from NASTT Board Chair, Greg Tippett P. Eng.,Stantec Consulting Ltd (left)*

*Folks rolled the dice at the beloved networking event, Casino Royale! This festive celebratory event honored the NASTT 2025 Hall of Fame class and the Chair Award recipient. After the awards ceremony, attendees were provided with play money to try their luck at the many gaming tables*




**Exemplary efforts ★ Unparalleled dedication ★ Stellar achievements**

*NASTT Celebrate Trenchless awards recognize innovators, champions, volunteers, emerging leaders and the employers who support them in their exceptional contributions to driving industry progress. NASTT applauds their ongoing initiatives to promote the best practices, cost savings, sustainability, efficiency and versality of trenchless technology.*

- **Abbott Innovative Products & Services – APPLY NOW!**
- **Chair Award for Distinguished Service** – *selected by NASTT Chair*
- **NASTT Hall of Fame – NOMINATE OR APPLY NOW!**
- **NASTT No-Dig North Project of the Year – APPLY NOW!**
- **Outstanding Trenchless Paper** – *selected after the NASTT No-Dig Show*
- **Ralston Young Trenchless Achievement – NOMINATE OR APPLY NOW!**
- **Trenchless Rising Star – NOMINATE OR APPLY NOW!**
- **Volunteer Award** – *selected by NASTT staff*

**Nominate or apply now at nastt.org/awards. Questions? Contact Carolyn Hook at chook@nastt.org.**

*"We agreed to look beyond new creations by broadening the scope of the award to include redesign and repurposing."*

*– Cindy Preuss, PE, Chair, Abbot Innovative Product & Services Award Committee*

**The Abbott Innovative Product Award**, awarded annually by the North American Society for Trenchless Technology (NASTT), celebrates state-of-the-art products or services making a significant impact in advancing the trenchless industry. The award is named for the late Joseph L. Abbott, Jr., an active NASTT member since its founding in 1990 and a champion of innovation. Submissions are judged in four categories:

- INNOVATION (concept, method, development)
- VALUE (need, advantages, cost)
- COMPETITIVE POSITION (pricing, quality, market share)
- IMPACT (sustainability, social/environmental responsibility and potential)

The Abbot Innovative Product & Services Award committee, chaired by Cindy Preuss, PE, Water Conveyance Discipline Leader - Water Services Group at CDM Smith, prepared for the 2025 program by examining innovation in the industry, past submissions, and the challenges innovative technologies solve. "We agreed to look beyond new creations by broadening the scope of the award to include redesign and repurposing," Preuss explained. "We believed this would bring more innovations and the teams producing them to the forefront of the trenchless community. And we were right!"

As a result, there were 11 submissions exemplifying products from companies doing great work in the industry. While in year's past, the award has typically recognized products for their work in new installations or rehabilitation, the committee decided to identify new ways to recognize stellar products.

The 2025 Abbott Innovative Product & Services Award winners were announced at the NASTT 2025 No-Dig Show in Denver, Colorado in April. Congratulations to the winners.

# NASTT Selects 2025 Innovative Product Award Winners

**NASTT Abbott Award - Big Data Innovation**

**BEST BIG DATA INNOVATION: DRILL ANALYTICS**

## BGC Engineering Inc. | bgcengineering.ca

### Submitted by Jeremy Groves, Senior Geotechnical Engineer

Drill Analytics is an advanced software solution that enables data-driven decision making in Horizontal Directional Drilling (HDD). Designed with seamless integration into HDD projects, Drill Analytics leverages real-time drilling data to generate in-depth analytics and insights into the drilling operation as it is underway. It produces an intuitive overview of HDD drilling metrics and operations, facilitating the ability to track progress and to efficiently identify and manage potential risks and challenges at every phase of drilling.

**NASTT Abbott Award - New Installations Innovation**

**BEST OVERALL NEW INSTALLATIONS INNOVATION: PERMALOK® HDD JOINT**

## Northwest Pipe Company | nwpipe.com

### Submitted by Bryan Swanson, Sales Manager – Trenchless

The Permalok® HDD Joint is a direct push steel casing system specially designed to optimize Horizontal Directional Drilling (HDD) operations. Typically, an HDD set-up requires a substantial footprint, including a rig/operating area, reception area, and a stretch of open land for laying out and welding the pipe string. With Permalok's weld-free HDD system, the casing pipe is cartridge-fed from the launch rig side and advanced similar to drill stem. The press-fit joint design eliminates pipe string out and welding on the exit side, reducing the project footprint, enhancing installation speed and efficiency, and lowering construction costs.

## NASTT Abbott Award - New Trenchless Breakthrough

**NEW BREAKTHROUGH IN TRANSFORMING TRENCHES TO TRENCHLESS: TRENCHLESS GROUNDING SYSTEM**

### R&R McClure | rrmcclure.com.au
### Submitted by Tim McClure, Director

The Trenchless Grounding System uses directional drilling (HDD) to install the earth system and can be connected to many different high voltage (HV) and low voltage (LV) assets including, Power Poles, Transformers, Substations, Single wire earth return systems (SWER) and Communication Towers. It can also be used on renewable energy sites such as Solar, Hydro Electric, Wind and Geothermal energy. By directing and steering underground, the electrode and conductor can be installed substantially within the geological layer providing the most favorable ground resistivity. This method also allows an earth resistivity test of the drill string to periodically or continuously measure and record the total electrical resistance while drilling, allowing the target resistance to be achieved in real time. After reaching the target resistance the conductor can be installed into and connected to the electrical network. As the system does not require a bore exit hole, completion of construction is only required at the point of electrical connection.

## NASTT Abbott Award - Best Overall Innovation

**BEST OVERALL INNOVATION: CLOSE TOLERANCE PIPE SLURRIFICATION (CTPS)**

### Azuria Water Solutions | azuria.com
### Submitted by Michael Woodcock, General Manager

The Close Tolerance Pipe Slurrification (CTPS) process is an innovative trenchless technology designed to safely and efficiently replace Asbestos Cement (AC) pipes. Unlike traditional open cut methods, which require extensive digging and can cause significant disruption, CTPS uses a rotating cutting head to grind the existing pipe and surrounding soil into a slurry. This slurry is then removed, allowing a new pipe, usually HDPE or Fusible PVC, to be installed in the same location and alignment.

***Watch your email for an upcoming webinar exploring the winning products! https://nastt.org/training/upcoming-events/***

## INNOVATIVE COMPETITORS

***NASTT also recognizes the companies and innovative products of all the award competitors:***

### Brawo Systems | brawosystems-usa.com
**Submitted by Andrew Marshall, Sales Manager USA**

*BRAWO® Pico is the first stand-alone system specifically designed for use in very small wastewater pipes. These are usually found inside buildings (in-house) or under a slab. The innovative light curing for small nominal diameters (2-4 inches) is unique.*

### DrilRite Chemical LLC | drilrite.com
**Submitted by Anthony Burasco, Director of Marketing**

*SureFlow is an all-in-one, dry drilling fluid additive designed to simplify mixing, improve drilling efficiency, and enhance borehole stability in horizontal directional drilling (HDD). By combining pH stabilization, fluid loss control, hole cleaning, and downhole pressure management into a single, pre-measured formulation, SureFlow eliminates the need for multiple additives, reducing material costs, mixing errors, and operational complexity.*

### GeoTree Solutions (Henkel Corporation) | geotreesolutions.com
**Submitted by Joe Royer, Director of Innovation & Technology**

*GeoSpray EX Geopolymer Mortar is an innovative extension to the standard GeoSpray product line that provides significant new features. EX stands for Extended Working Time, the main updated feature. This new product extends the pumping distance of the mortar from a previous maximum of ~1000 ft to over 3500 feet. While this attribute is not always critical, for large and unique projects with difficult access and long distances between access points, this innovation makes spray applied lining technology possible where it could not be done before. The extended working time of 90 minutes and changes to the flow characteristics allows for the extended pumping and delivery distance.*

### PLG Technologies | plgtech.us
**Submitted by Aaron Orndorff, Co-Founder**

*The Casing Compass is designed to assist contractors and engineers accomplish safer, more accurate, and more productive casing installations. It adapts to any size casing on any machine. Although developed with the traditional auger boring industry in mind, this device has found favor in the hammer boring / pipe ramming, conductor barrel installation, tunneling, and GBM / Pilot tube methods of casing installation as well. Since its launch, the instant, accurate data provided by the casing compass has proven to reduce confined space casing entries into the casing by contractors, minimize the amount of time spent pulling augers, and reduce instances of broken tooling, saving the contractor thousands of dollars per occurrence.*

## Thompson Pipe Group | thompsonpipegroup.com
### Submitted by Carl Pitzer, Director – Trenchless Markets

*Flow-Crete™ is a first-in-class single pass composite pipe designed to meet the strict requirements of jacking and microtunneling installations for both pressure water and sewer applications. It combines the compressive strength of reinforced concrete with the corrosion resistance and pressure capabilities of TPG FRP.*

*This composite pipe incorporates an outer load-bearing wall of reinforced concrete and an inner TPG fiberglass reinforced liner pipe that is fully structural. The wall thickness of the RCP is designed to accommodate the jacking loads and distances under consideration and the dimensions of the equipment used in the jacking process. The TPG FRP liner is built to withstand the required internal pressure and the corrosive environment of sanitary sewers and similar environments. Flow-Crete™ is supplied with grout ports. To distribute jacking forces, the pipe is compatible with standard wooden packers and hydraulic compression rings, when required.*

## Vermeer Corporation | vermeer.com
### Submitted by John Cope, Applications Engineer

*The Vermeer R125 Reclaimer is a compact, high-performance mud recycling system designed to help horizontal directional drilling (HDD) contractors reduce water usage, minimize disposal costs and improve jobsite efficiency. With operational costs rising due to fluid and waste disposal expenses, as well as environmental restrictions on freshwater access, the R125 provides an effective solution for managing drilling fluids while maintaining productivity.*

*Operating at 480V and 60 Hz, the skid-mounted R125 offers a 125 gpm (500 L/min) recycling capacity at 20 percent solids loading. Its robust design includes a double screen deck and six 4-inch hydrocyclones, helping to ensure premium cleaning performance. The unit features a 15-hp pump for optimal circulation and an air-clamping system for quick screen changes. Automated fluid level switches help prevent overflow and reduce manual monitoring, allowing crews to focus on drilling instead of fluid management.*

## Xylem | xylem.com
### Submitted by Eric Toffin, Global Product Manager

*With PipeDiver Ultra XL, utilities can identify and manage localized threats with planned and targeted repairs. This tool is built to inspect metallic pipelines 54 inches in diameter and above. PipeDiver Ultra XL minimizes inspection time, operational costs, and service impacts. It is an inline, free-swimming tool that travels with the flow of water, inspecting the pipeline while it's in service. The tool's flexible design enables it to navigate bends, tees, and inline butterfly valves. PipeDiver Ultra XL can inspect an average of 10 miles of pipe per day, making it 10 times more efficient than other inspection options.*


***Product overview presentations from all of the competing companies are available in the NASTT Trenchless Knowledge Hub:***
***www.knowledgehub.nastt.org***

***APPLY NOW for the 2026 NASTT Abbott Award for Innovation***

***Visit www.nastt.org/awards***
***Contact membership@nastt.org for more information or to join NASTT.***

# NASTT 2025 No-Dig Show Scholarships Provided to Municipal & Public Utilities

*Municipal and public utility scholarships covered registration and accommodations costs for over 150 delegates attending the 2025 No-Dig Show, March 30 - April 3 in Denver, Colorado!*

In 2013, NASTT established the No-Dig Show Municipal & Public Utility Scholarship Award Program to provide education and training for employees of North American municipalities, government agencies and utility owners who have limited or no training funds due to economic challenges. At least 100 applicants are awarded the scholarship annually, with a total of over 2,000 scholarships since the inception of the program.

### *Who Do You Want to Meet at No-Dig 2026?*

Doing business with municipal agencies and public utilities is crucial to the trenchless industry. NASTT's Municipal & Public Utility Scholarship brings hundreds of decision-maker agency representatives in-person to the No-Dig Show. Nearly 2,000 delegates have been onsite looking for solutions to their infrastructure challenges that you can provide.

*Join us at the Palm Springs Convention Center, March 29 - April 2, 2026. Apply or refer a colleague to the Scholarship by November 1, 2025. Visit https://nastt.org/no-dig-show/municipal-scholarships/*

*"The show provided many opportunities to network with contractors, consultants, and decision makers within municipalities and utilities across the United States and Canada."*

*– Joseph Barnes, Johnson County Wastewater*

*"I found the sessions interesting and gained a lot of useful information to bring back to my community. I had such a narrow view of Trenchless Technology before the show, and now see it in a clearer fashion and in a larger light. The exhibits were interesting and I found many products or ideas that directly related to what I deal with on a day to day basis."*

*– Matt Overeem, Village of Wilmette*

# The Following Agencies Were Offered a Scholarship to Attend the 2025 No-Dig Show:

Albuquerque Bernalillo County Water Utility Authority
ARROW Utilities
(formerly Alberta Capital Region Wastewater Commission)
Aurora Water
Aurora Water Project Delivery Services
Baltimore County Maryland Government,
Department of Public Works & Transportation
Bureau of Reclamation, Department of the Interior
Capital Region Water
Castle Pines Metropolitan District
Castle Rock Water
Central Arizona Project
Central Arkansas Water
Central Contra Costa Sanitary District
Citizens Energy Group
City and County of Denver
City and County of Honolulu, Department of Environmental Services,
Collection System Maintenance Division
City and County of San Francisco
City of Arvada
City of Atlanta
City of Aurora - Colorado
City of Bismarck
City of Burlington
City of Burnaby
City of Calgary
City of Dallas
City of Dallas, Dallas Water Utilities
City of Dubuque
City of Durham
City of East Providence, RI
City of Everett
City of Fort Collins
City of Fort Lauderdale
City of Fort Smith
City of Greeley
City of Haltom City
City of Hamilton
City of Hillsboro
City of Hot Springs
City of Indianapolis
City of Joliet
City of Lancaster
City of London
City of Los Angeles
City of Los Angeles, Bureau of Engineering
City of Moscow
City of Moscow Water Reclamation Facility
City of New Bedford
City of Niagara Falls
City of Omaha
City of Ottawa
City of Pawtucket
City of Peterborough
City of Philadelphia - Philadelphia Water Department
City of Prince Albert
City of Regina
City of Renton
City of Richland
City of Richmond
City of Rochester Hills
City of Roseville
City of San Jose
City of San Luis Obispo
City of Sandy
City of Seattle (Seattle Public Utilities)
City of Stratford
City of Thornton
City of Torrington
City of Tukwila
City of Vancouver
City of Vancouver WA Public Works
City of Vaughan
City of West Fargo
City of Westminster
City of Winnipeg
City of Winston-Salem
City of Winston-Salem/Forsyth County Utilities
City of Yakima
Clackamas Water Environment Services
Colorado Springs Utilities
Con Edison of New York
Contra Costa Water District


Corporation of the City of Welland
DeKalb County Department of Watershed Management
Delaware County
Delaware County Regional Sewer District
Denver Water
District of Columbia Water and Sewer Authority
East Bay Municipal Utility District
EPCOR Utilities Inc.
Fairfax County Water Authority (dba Fairfax Water)
Fort Collins-Loveland Water District
Fort Wayne City Utilities
Great Lakes Water Authority
Jefferson County Commission
Lac La Biche County
Little Rock Water Reclamation Authority
Long Beach Utilities Department
Metro Vancouver
Metro Water Recovery
Metropolitan Utilities District Omaha
Metropolitan Water District of Southern California
Miami Dade Department of Transportation and Public Works
Milwaukee Metropolitan Sewerage District
Mohawk Valley Water Authority
Montgomery County Government
National Grid USA
New Castle County
Norwich Public Utilities
Oakland County Water Resources Commissioner's Office
Onondaga County Dept. Water Environment Protection
Orange County Sanitation District
Pacific Gas & Electric
Peel Region
Philadelphia Water Department
Public Service Electric & Gas
Regional Municipality of Peel
Renewable Water Resources
Rock Creek Public Sewer District
Rural Municipality of East St. Paul
Salt Lake City Department of Public Utilites
San Antonio River Authority
Sanitation District #1: Bethel, OH
Santa Clarita Valley Water Agency
South Essex Sewerage District
Sussex County Council
Tarrant County
Town of Andover
Town of Cary
Town of Devon
Town of Flower Mound
Town of Plymouth
Town of Stony Plain
Town of Sylvan Lake
Trinity River Authority of Texas
U.S. NAVY
United States Bureau of Reclamation
Upper Montgomery Joint Authority
US-EPA
Vallecitos Water District
Village of Wilmette Public Works
Water Environment Services - Clackamas County
WSSC WATER
Xcel Energy

# NASTT Municipal & Public Utility Scholarship

## APPLICATION DEADLINE: NOVEMBER 1


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 (one-day conference registrations are also available). Hotel accommodations for three nights at the host hotel are provided for selected applicants. Recipients have full access to all exhibits and technical paper sessions.

**Join us in Palm Springs! Applications should be submitted by November 1, 2025 at nastt.org/no-dig-show**

NORTH AMERICAN SOCIETY FOR TRENCHLESS TECHNOLOGY

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.

# HDPE PE4710 PIPE

## *The Best Choice for Water Systems*

| | TOP 10 Features & Benefits | HDPE | D. Iron | Sample References |
|---|---|---|---|---|
| 1 | **Applications:** Potable Water (Lead Free), Raw Water, Reclaimed Water, and Wastewater | ✓ | ✓ | AWWA C901, C906, C151, and NSF 61 + Health Effects of HDPE Pipes and Fittings for Potable Water Applications, NSF 2014 |
| 2 | **Open Cut Construction:** Design and install per AWWA Standards and Manuals | ✓ | ✓ | AWWA M55, M41 + MAB-3, MAB-6 |
| 3 | **Trenchless Construction:** Material of choice for HDD, Creek Crossings, Pipe Bursting, Sliplining, and Compression Fit | ✓ | ✗ | ASTM F585, F1962, F3508 + MAB-5, MAB-7, MAB-11 |
| 4 | **Fully Restrained Joint-Free System:** Minimize need for fittings to facilitate horizontal and vertical deflections | ✓ | ✗ | AWWA M55, M41 |
| 5 | **Longevity & Corrosion:** Pipes, Fittings, and Joints have the least potential for corrosion or tuberculation | ✓ | ✗ | Durability and Reliability of Large Diameter HDPE Pipe for Water Main Applications, EPA/NRF/NEIEF 2015 + The Critical Need for Corrosion Management in the Water Treatment Sector, NACE 2019 + PPIPPACE.com + Long-Term Aging of Polyethylene Pipes, UKWIR 2020 |
| 6 | **Flow Capacity:** New pipes have similar flow capacity per AWWA Standards and Manuals | ✓ | ✓ | AWWA M55, C906, M41 + PPIPACE.com |
| 7 | **Water & Energy Conservation:** Fused joints have zero allowable water leakage, zero infiltration, and lowest carbon footprint | ✓ | ✗ | AWWA M55, M41 + ASTM F2620, F3190, F3565 + MAB-1, MAB-2, MAB-8 + TEMPA Polyethylene Plastic Pipe Systems vs Ductile Iron Environmental Impact Comparison, TEMPA EPD Calculator |
| 8 | **Cost Effective:** Has the lowest initial cost, lowest life cycle cost, and lowest restoration cost for trenchless installations | ✓ | ✗ | Life Cycle Analysis of Water Networks, CSIRO 2008 + Annual Drinking Water Quality Report for 2014, Kittery Water District, 5/15/2015 |
| 9 | **Resilient:** Ability to resist ground movements due to droughts, freeze/thaw, earthquakes, hurricanes, with ability for flow control/squeeze off | ✓ | ✗ | Recent Earthquakes: Implications for U.S. Water Utilities, WRF 2012 + Polyethylene Pipeline Performance Against Earthquake, Kubota 2018 + MAB-9 |
| 10 | **Permeation/BTEX:** Pipes and elastomeric joints need to be properly engineered for contamined conditions | ✗ | ✗ | AWWA C901/C906 and C111/C151, Sec. 4 |

Additional information including MAB-3 Model Spec Guide can be found at www.plasticpipe.org/mabpubs

MUNICIPAL ADVISORY BOARD

Underground Magnetics
simple. powerful. affordable.

# Congested Intersection HDD Crossing: Navigating Extreme Interference in Mexico

*One of Monterry's Most Complex Trenchless Installations*

In February 2025, Grupo Zanjador Mexicano (GZM) faced one of its most challenging horizontal directional drilling (HDD) projects to date. A project that had been attempted twice by other contractors. The HDD bore called for installing an 8-inch HDPE conduit to encase three fiber optic conduits under one of Monterrey, Mexico's busiest intersections. The intersection included 12 vehicle lanes and four traffic lights, passing underneath a six-lane highway underpass. Designing a boring profile to navigate the underground utilities and stacked freeway structural complexities required meticulous planning, but as the crew discovered, the biggest challenge was the active and passive interference from power lines and the bridge's steel pilings.

*Active interference* refers to the electromagnetic disturbances or "noise" emitted from energized power lines and other magnetic interference, which can distort the signal between the drill head and the receiver, making it difficult to maintain an accurate bore path. *Passive interference*, on the other hand, refers to anything near the bore path that blocks or distorts the locator from receiving an accurate signal. One of the most common is the rebar found in reinforced concrete. On this bore, there were also metallic structures such as bridge pilings, steel reinforcements, and underground pipelines. The crew quickly discovered that both types of interference would require a locating system that could address the active and passive interference.

The crossing extended 777 feet, from entry to exit, reaching a minimum depth of 46 feet. The primary topographic concern was the intersection's six-lane underpass, supported by 100-foot-deep, five-foot-diameter pilings spaced 17 feet apart. Complicating matters further, the site contained two active 36-inch gas pipelines, a 36-inch water line, multiple storm drains, and a fire protection pipeline. GZM had limited documentation on the precise location of each piling, which increased the risk. Given these constraints, the success of this crossing depended on accurate navigation through an exceptionally dense and uncertain environment.

On day one, GZM set up one of their DWJT30 HDD rigs on the north side of the intersection. The JT30 is designed for tougher drilling applications, with a maximum thrust and pullback force of 30,000 lbs. Depending on the drilling operations, the rig supports either a single rod system or a dual "rod-within-a-rod" configuration. For this bore, the single-rod setup offered drill bit change-out, which also proved to be a wise decision.

Anticipating unknown perimeters, GZM elected to approach the bore with an ultra-cautious slow-speed strategy, utilizing their Underground Magnetics Mag X Pro locating system paired with the UMag Echo 50XF, a standard-size transmitter with multiple power levels and 16 frequencies for filtering capability. This system, which covers 90 percent of all jobs, also features real-time data logging and extended depth capabilities, making it highly suitable for deep and congested urban HDD crossings.

At 180 feet, the pilot bore encountered one of the bridge's pilings, forcing the crew to pull out and recalculate a new trajectory to bypass the obstruction. The rig was then re-positioned six feet from the original entry point. Despite passive interference from the steel foundation, adjustments in tracking frequency on the UMag locator allowed the bore to proceed with minimal incidents.

After crossing the first 36-inch gas pipeline, the team began encountering more severe interference, making standard locating frequencies ineffective. Initial attempts in K32 and K62

frequencies mode failed. These frequency adjustments are a crucial troubleshooting step. K32 frequency is effective in moderate interference zones and K62 offers higher resistance to extreme electromagnetic "noise." When these frequencies fail, it indicates an exceptionally challenging interference environment that requires alternative solutions.

The locating team decided to move to the lower part of the bridge to get better signal strength. Moving to the lower level worked perfectly, however, when it was necessary to returned to locating from the upper level during the final accent, signal was unreliable. The locator tried switching frequencies, but at that depth and with the amount of interference, the receiver could not find stable enough readings to accurately stay on the drilling axis and surface. The team elected to fly the project lead to Guadalajara, approximately 700 km (435 miles) from the bore site in Monterrey, to pick up an Echo 75XF 19-inch transmitter.

Echo 75XF 19-inch transmitter features advanced signal reliability and tracking accuracy, particularly in high-interference conditions. Its extended depth capabilities also allows varying power levels, reaching depths of up to 278 feet in high power mode. It also has a wider frequency range, from 0.325 kHz to 41 kHz, enabled adaptation to different interference conditions.

The Mag X Pro locator / Echo 75XF transmitter change-out proved to be the right choice. Signal stability improved dramatically, allowing the bore to proceed past the second piling line and another 36-inch pipeline. The locator made numerous frequency mode shifts, but the borepath maintained alignment despite constant electromagnetic disruptions.

The soil composition presented additional difficulties, primarily due to cobble layers. During the pilot hole, the loose formations make it very difficult to maintain the planned alignment, requiring multiple adjustments. At one point, progress became so unstable that the crew had to pull out once again and switch to the original 5-inch bit and 15-inch 50XF transmitter. Re-entry with the blade bit stabilized control allowing the crew to continue drilling accurately through the rest of the bore. Locating was also ideal, especially during the gradual +6 percent accent to the preferred exit point on the South side of the interchange.

Once the pilot bore was completed, the crew step-reamed the hole with fluted reamers; first pulling back an 8-inch hole-opener and then a 12-inch. During the 8-inch ream the operator was intentional about monitoring any resistance. While most sections experienced stable rotation and fluid pressure, there were moments of resistance. Returns were satisfactory so the 8-inch pipe was attached on the 12-inch backreamer. Care was taken to keep the hole lubricated, allowing the reamer to pack the wall of the hole.

When the product entered the service pit the crew was relieved. After 12 grueling days of drilling, reaming, and pullback operations, the duck run was successfully installed. Underground Magnetics' locating system ability to adapt to varying interference conditions overcoming structural and electromagnetic challenges, coupled with the GZM crew's attention to downhole behavior and resourcefulness, "saved the day". It was one of Monterrey's most complex trenchless installations.

# Efficient Under Difficult Conditions: Primus Line® Rehab for Inverted Siphon Rehabilitation

***Flexible, fabric-reinforced liners are the ideal solution for the challenging rehabilitation of pressurised pipes under waterways or traffic routes: they combine stability and flexibility, require only short rehabilitation times and protect the environment and surroundings.***

They run under roads, railway tracks, rivers or lakes: pressure pipes that transport various liquids under these 'obstacles'. These pressure pipes, known as inverted siphons, are often characterised by long lengths and a U-shape with curved fittings built into their course. In addition, they are only accessible to a limited extent, for example from the banks of a body of water or next to the track bed. Many trenchless rehabilitation methods reach their limits here. New construction is time-consuming and cost-intensive and is often associated with geotechnical and hydrogeological problems as well as construction risks.

Primus Line® Rehab, the technology for trenchless rehabilitation of pressurised pipelines, is both strong and flexible. Why is that? These properties result from the multi-layer liner structure in combination with the specially developed connectors.

The liner consists of three layers. The inner layer is tailored to the medium to be transported: it is made of either polyethylene (PE) or thermoplastic polyurethane (TPU) with high chemical, abrasion and corrosion resistance. The middle layer is a seamlessly woven Kevlar® fabric. It fully absorbs the operating pressure and is up to ten times stronger than steel of the same weight. This layer in particular provides the necessary stability, but also the required flexibility when travelling through bends. The outer layer of Primus Line® Rehab made of polyethylene (PE) protects the fabric from abrasion during insertion and operation.

Whether under rivers, lakes, railway tracks or motorways: Inverted siphon rehabilitation with Primus Line® Rehab requires minimal space, which significantly reduces construction activity and therefore the impact on the surrounding area. The liner is pulled in using a cable winch at a speed of up to ten metres per minute. For transport, the flexible pipe is folded into a U-shape and wound onto special reels. Depending on the diameter, a single reel can hold up to 4,000 metres of pipe, which can be efficiently loaded onto a single truck. This minimises both the logistics costs and the environmental impact associated with transport.

*Existing manholes can be used as access points for trenchless rehabilitation*

A leaking DN 250 steel drinking water inverted siphon crossing under a river in Winnipeg, Canada, was in urgent need of action due to the constant loss of water. The original plan to rehabilitate the pipe using the CIPP method had to be abandoned due to a large number of bends in the pipe. In addition, the pipeline was constantly filling with water due to leaks in the outer area, which jeopardised the curing process in the CIPP method.

*The liner folded into U-shape and coiled on reels saves transport costs thanks to its small footprint*

This is why the responsible engineering office and the City of Winnipeg opted for the Primus Line® system, which is also certified to Canadian drinking water standards. Thanks to its flexibility, it could be laid through the three 45-degree, 22.5-degree and 11.5-degree bends in the 172 metre long rehabilitation section.

After the liner had been moulded into its round shape using compressed air, the installation team fitted the connectors at both ends. The installation was completed within a day and the pipeline went back into operation after successful pressure testing and disinfection to ensure drinking water safety.

Vermeer

# New Vermeer BorePlan Enhances HDD Planning, Execution and Documentation

Vermeer BorePlan is a new mobile application for horizontal directional drilling (HDD) contractors. This app streamlines the planning process, improves execution accuracy and simplifies project documentation. BorePlan is free on Apple iOS and Android devices, with a premium version offering advanced capabilities for complex projects.

Vermeer BorePlan helps HDD contractors tackle their daily challenges by offering practical solutions for issues like utility avoidance and complex bore path management. This mobile application puts powerful tools directly at operators' fingertips, enhancing onsite decision-making and efficiency.

Brad Ausman, lead product manager for Vermeer Intelligent Worksite Products, highlights the app's significance: "BorePlan is designed to make HDD operations smoother and more efficient. It's like having an expert assistant in your pocket, helping you navigate the complexities of each project."

The app addresses several key industry needs, helping improve both project execution and productivity:

- Simplified planning: Digital tools create accurate bore plans, reducing time spent on manual calculations.
- Risk awareness: Utility mapping features record potential underground infrastructure, enhancing awareness and aiding HDD operators in making informed decisions during operations.
- Operator efficiency: Rod-by-rod plans enable operators to make quick adjustments during drilling, allowing crews to adapt to unexpected challenges.
- Streamlined documentation: Reporting features help contractors meet industry documentation requirements efficiently.

The Vermeer BorePlan interface is designed with user-friendliness, catering to experienced operators and industry newcomers. Seasoned professionals can leverage features that streamline their workflow, while newcomers can use it as an effective learning tool. The app guides users step-by-step through the planning process and emphasizes key factors for successful bore execution.

The BorePlan free version includes several essential features for HDD operations:

- Straight-line bore planning
- Basic utility mapping
- Onsite accessible rod-by-rod plans
- Integration with high-accuracy GPS tools
- Aerial imagery provided by ESRI

These features enable contractors to visualize their projects within the surrounding environment, leading to more informed decision-making during operations.

For contractors requiring enhanced capabilities, BorePlan Premium offers an upgraded experience. This version builds upon the free app with advanced features:

- Compound curve planning for complex bore paths
- Advanced calculators for setbacks and bore exit
- Comprehensive reporting packages
- CAD and engineering plan exports
- Multi-project management capabilities

"In today's regulatory landscape, comprehensive documentation is often essential," said Ausman. "BorePlan's advanced reporting tools streamline this process, reducing

administrative time and helping contractors meet increasingly stringent industry requirements more efficiently."

As the HDD industry evolves, emphasizing detailed documentation and precise planning, BorePlan is well-positioned to help contractors meet these changing demands. The app's development reflects an ongoing commitment to providing innovative solutions that address the HDD industry's evolving needs, helping contractors maintain a competitive edge in the market.

To try Vermeer BorePlan for free, download the app from the Apple App Store or Google Play Store. For contractors needing advanced features, BorePlan Premium is available for an annual fee of $1,299. It can be purchased directly through the Vermeer website.

For assistance with Vermeer BorePlan, contact a local Vermeer dealer.

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*~ Eric Schuler, PE, Onondaga County Department Water Environment Protection*

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*~ Joe Lane, Azuria Water Solutions*

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*~ Marya Jetten, AECOM*

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*~ Cindy Preuss, PE, CDM Smith*

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"I would not be doing what I love to do without the presence and impact of NASTT. I wanted the industry to know about a record HDD project and NASTT gave me the access and opportunity to tell to the industry."

*~ Jim Murphy, UniversalPegasus International*

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# INNOVATIONS AND LESSONS LEARNED FROM A WORLD RECORD LENGTH, LARGE DIAMETER SUBAQUEOUS HDD CROSSING PROJECT IN SOUTHEASTERN VIRGINIA


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## 1. ABSTRACT


A new world record for 42-inch HDPE IPS DR11 subaqueous pipe installation approximately 5,700 linear feet was recently achieved in the James River in Southeastern Virginia. The crossing was part of the James River Crossing (JRX) project to install over four miles of force main across the river including the trenchless component beneath the Newport News Ship Channel, a heavily trafficked commercial and naval vessel maritime channel. Due to the challenging onsite conditions and workspace constraints, the Project Team focused on risk mitigation and utilized numerous innovations in the HDD design and pipe installation to ensure success. Geotechnical data indicated the river is underlain by geologically recent, weak sediments characterized by low strengths and unit weights. Therefore, the HDD was designed with the drill path over 100 feet below the river mudline with extended steel surface casings, and the pilot hole geometry designed using the intersect method to minimize annular pressures and reduce the risk of inadvertent returns (IR's). Field operations also contributed to the project's success.


**This paper was selected as Outstanding Paper – New Installations, from all the presentations at the 2025 NASTT No-Dig Show in Denver CO. NASTT No-Dig Papers are available for download, free to members, at www.nastt.org**

Despite occasionally adverse weather conditions, these included 24-hour marine operations, careful monitoring and maintenance of low borehole mud weights, staging the entire pre-fused pipe string floating within the river to reduce stoppages, optimizing pipe buoyancy, and employing a plastic pipe pusher built in Germany to reduce tensile loads during pipe pullback. This paper discusses conditions onsite, how the design was modified for those conditions, and innovations that allowed the pipe to be successfully installed with no health, safety, or environmental incidents.

## 2.0 INTRODUCTION

The James River Crossing (JRX) project is part of Hampton Roads Sanitation Districts' (HRSD) capital improvement program called SWIFT (Sustainable Water Initiative for Tomorrow), and will convey wastewater from Newport News to Suffolk, over 4.5 miles across the historic James River. This area of southeastern Virginia is among the oldest maritime areas of the New World, berths the largest concentration of military vessels in the world, and is the entrance to the sixth busiest port in the United States.

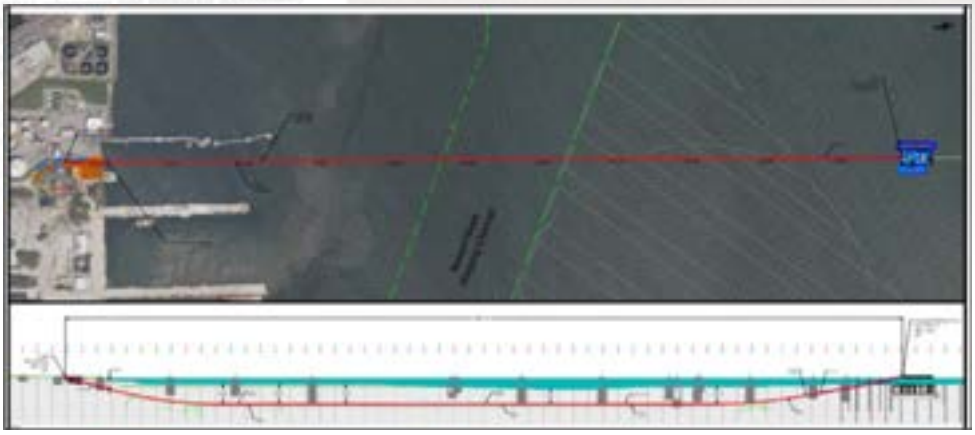

*Figure 1. Site Area, HDD Crossing in RED, Marine Entry Platform center right, Land Entry center left*

SWIFT is an innovative water treatment and conveyance program in southeastern Virginia designed to further protect the region's environment, enhance the sustainability of the region's long-term groundwater supply and help address environmental pressures such as Chesapeake Bay restoration, sea level rise and saltwater intrusion. SWIFT takes highly treated water that would otherwise be discharged into rivers and puts it through additional advanced water treatment to meet drinking water quality standards. SWIFT water is then added to the Potomac Aquifer through deep injection wells, which is the primary source of groundwater throughout eastern Virginia.

The project is being executed using a design-build (D/B) delivery method that was awarded in April 2022 to the Garney/Dewberry design-build team. JRX includes designing, permitting, and installing a raw wastewater force main across the James River from Newport News to Suffolk, Virginia. Brierley Associates (Horizontal Directional Drilling (HDD) design and geotechnical lead), Huxted Trenchless (HDD Contractor), Michael Baker International (Permitting), and Seaward Marine (Marine Contractor) were the key subcontractors for the D/B Team.

The most challenging and complex component of the JRX project was completed successfully in early May 2024 – the installation of a world record length subaqueous HDD crossing beneath the Newport News Shipping Channel. The record setting HDD crossing was completed by the D/B Team using several innovative approaches both during design and construction to mitigate impacts to adjacent maritime activities. Figure 1 shows the HDD alignment, some of the marine infrastructure, and the zones of exclusion within the James River.

## 3.0 SITE CONDITIONS / GEOTECHNICAL STUDIES

The James River, near its confluence with the Chesapeake Bay, is underlain by a thick sequence of geologically recent sediments. Since the end of the last Glacial Maximum about 12,000 years ago, global sea levels have risen approximately 400 feet. This progressive sea level rise caused the lower reaches of the historical Susquehanna, James, York, and Rappahannock Rivers to become submerged to form the modern-day Chesapeake Bay. Large quantities of Quaternary-aged loose saturated soils were deposited overtop of the older Yorktown Formation at the mouths of these rivers, and today this part of the James River is underlain by very soft clayey sediments up to over 70 feet in thickness, to approximate Elevation (El.) – 100 feet as shown on Figure 2.

For the HDD crossing, an extensive overwater geotechnical drilling, sampling, and laboratory testing program was performed. The Owner's Engineer conducted an overwater geotechnical program prior to contract award in late 2021 that consisted of 5 Cone Penetrometer Tests (CPTs), 2 seismic CPTs, and thirty-five sample borings. Explorations were conducted from a spud barge that was towed

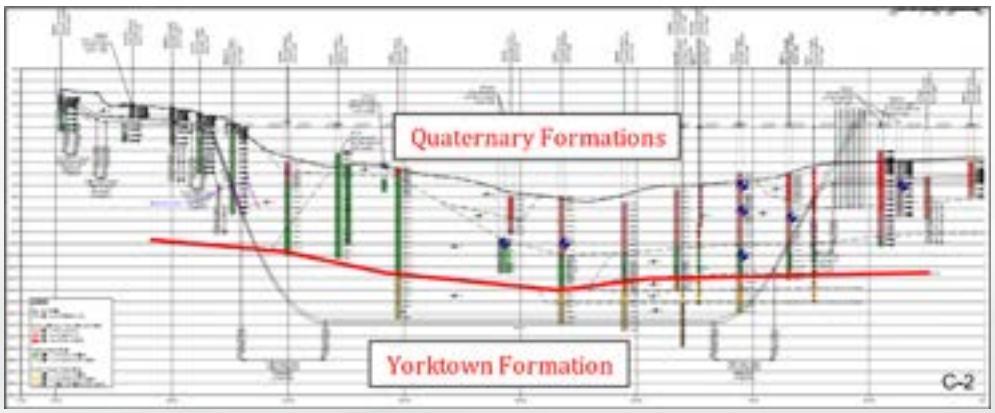


*Figure 2. Site Area, HDD Crossing at Exaggerated Scale in Black, showing subsurface soil units*

between locations by a tug. A laboratory test program of recovered samples was performed and the results reported in a Geotechnical Data Report (GET Solutions, 2022).

Once the D/B Team was under contract they performed four additional sample borings from a spud barge in the vicinity of the marine platform on the south side of the HDD crossing; this additional data was issued as a supplemental Geotechnical Data Report (GET Solutions, 2023).

Laboratory testing on recovered soil samples was focused on providing engineering parameters for HDD design. Moisture contents, grain size curves, liquid/plastic limit tests, unit weights, corrosivity tests, and organic content tests provided index testing criteria to classify soil types. In addition, a limited amount of soil strength information in very soft cohesive soils was performed, including one-dimensional consolidation, consolidated-drained triaxial, laboratory vane shear, and direct shear tests.

In general, the overwater borings encountered a thick surficial soil unit consisting of very soft cohesive soils, with Standard Penetration Test (SPT) N-values based on blow counts typically being Weight of Rod (WOR) or Weight of Hammer (WOH). On the north side of the HDD crossing near the landfall at Sewell's Point in Newport News, the soils were geologically older and denser, but on the south side of the HDD crossing these WOR/WOH clays extended to as deep as El – 100 feet. Underlying these soils were marginally denser/stronger soils of the Yorktown Formation that extended down to the maximum depth of the borings, approximately El -190 feet.

These extremely soft soils represented a very challenging subsurface condition since they provided minimal strength for steering the HDD during the drilling of the pilot hole and minimal unit weights to reduce the risk of frac-outs during advancement of the HDD.

## 4.0 HDD ENGINEERING AND LAYOUT

The Owner specified using high-density polyethylene (HDPE) pipe for the force main system. The pipe for the HDD segment was designed by Dewberry as 42-inch IPS DR11 HDPE. This pipe has an allowable tensile stress of 1,274 psi and an allowable pull load of 583,464 pounds for a 24-hour duration at 73 F degrees. The original HDD alignment prepared by the Owner's Engineer was designed using twin marine platforms for a shorter water-to-water HDD crossing beneath the shipping channel. Upon project award starting in mid-2022, the D/B Team began assessing potential value engineering options to provide cost savings and to reduce the risk of the proposed pipeline alignment. The HDD design team prepared a 60 percent level design for the HDD crossing including lengthening the drill by moving the transition point to the northern shore. The engineering work performed for the HDD required extensive use of the available geotechnical information, and combined elements of drill path design, pipe materials, and careful consideration of the construction requirements for equipment layout and pipe fusion options.

The engineering calculations for the HDD crossings were based on the methodology of ASTM International F1962 (2022). Additionally, a modified fluid drag calculation method (ASCE MOP 108) was used to better account for this component of the pull-back forces. The calculations were based on a fully ballasted pipe with seawater to reduce pull loads and to counter the external pressure on the pipe. Calculations for unconstrained buckling and pipe deflection were also performed.

One of the primary design criteria was to use the available geotechnical data to minimize the risk of an IR of drilling fluid using all reasonable design and construction methods. The bottom tangent of the drill path was located within medium dense silty sands of the Yorktown Formation at El. -160 feet and later revised to El -170 to -175 feet which provided sufficient depth of cover and soil strength to minimize the IR risk. The weaker, shallow soils were managed near the entry and exit locations by utilizing large-diameter conductor casings.

The inclination angle on the northern shore was designed at 15 degrees from horizontal, and the angle on the southern marine platform side was at 12 degrees from horizontal. Additional measures to minimize IR risk included driving steel casing through tens of feet of low strength/weight soils, specifying the intersect drilling method for the pilot hole of the HDD crossing, careful maintenance of mud weights between 9-10.5 lbs./gallon, and requiring real-time downhole pressure monitoring. Figure 3 shows the annular pressure graph, indicating the importance of drilling the pilot hole using the intersect method to avoid an IR.

As shown in Figure 5, the layout of the HDD was constrained on the northern shore by a highly congested industrial area with a large tank farm to the east and several ship repair and reprovisioning docks to the west of the exit pit. Ultimately, the onshore workspace area was laid out as an irregular polygon with the drill rig and mud pit in a narrow corridor that opened at the shoreline to a larger rectangular area housing the separation plant, mud mixing plant, and drilling supplies. Within the river, the location for the 90-foot x 200-foot marine platform / entry pit was selected to cross the shipping channel at a perpendicular angle, and to avoid adjacent anchorage areas in the vicinity of the shipping channel. The final layout for the HDD was approximately 5685 linear feet.

## 5.0 PRE-INSTALLATION CONSTRUCTION ACTIVITIES

Prior to commencing construction activities, the D/B Team focused on obtaining the required permits to perform the field works. Permit applications were prepared and submitted to the US Army Corps of Engineers, the Virginia Marine Resources Commission, Virginia Department of Environmental Quality, the local city municipalities in Newport News and Suffolk, and US Fish and Wildlife Service, among others. The time for approval ranged from less than three months to over a year. Once all permits were received, construction started immediately on building the marine platform.

The D/B Team designed and constructed the 90-foot x 200-foot marine platform at the exit side of the HDD crossing with the deck approximately 12 feet above the high-water mark of the river. Guide piles (termed "goal posts") were installed north of the platform to help guide the 600-foot long, 66-inch-diameter steel casing during driving to maintain the casing alignment and grade (Figure 4). Garney drove 600 feet of 66-inch casing using a customized TT Technologies Grundoram pneumatic pipe ramming hammer. Huxted Trenchless then set up an HDR 500 drill rig on the marine platform.

After contract award, Garney ordered a custom pipe pusher and hydraulic power pack from Prime Drilling GmbH in Wenden, Germany designed for compatibility with HDPE pipe. The Prime Pipe Pusher PPP 380 was designed for a maximum of about 400 tons of thrust, and could accommodate pipe diameters from approximately 20 inches to 48 inches. The feed length of the pipe pusher with attachments was a maximum of 34 feet, allowing it to travel a full length of drill pipe matching the pulling rig on shore.

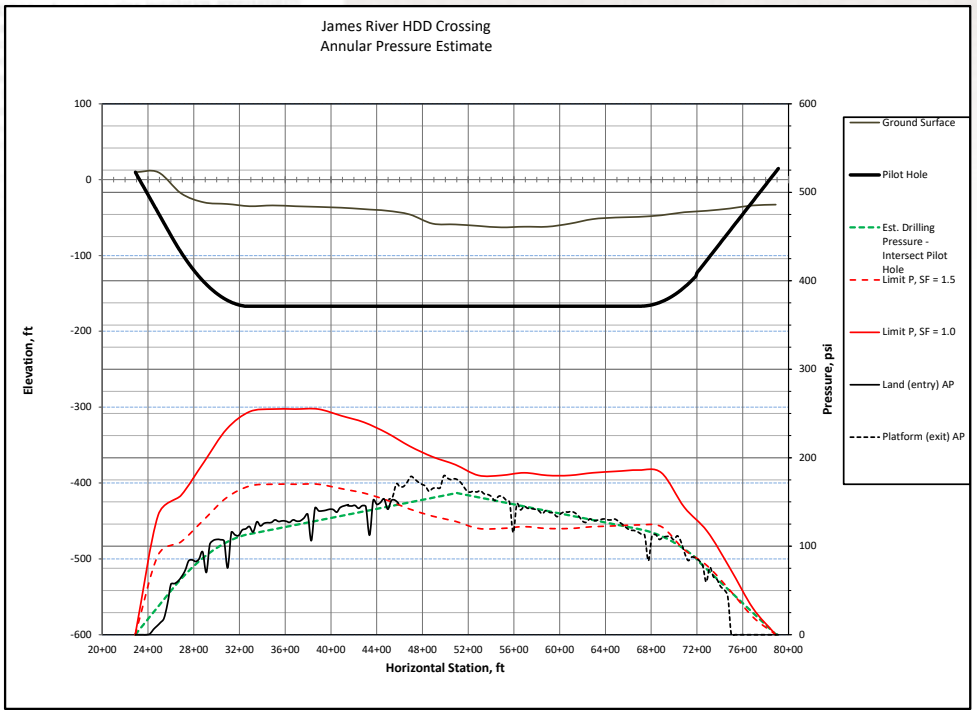


*Figure 3: Annular pressure graph showing importance of drilling the pilot hole using the intersect method*

*Figure 4: Aerial view of marine platform and ancillary barges and crane. View to southeast. Steel conductor pipe is visible at bottom left of image trending northward from the platform*

*Figure 6a*

*Figure 6b*

*Figure 6: Aerial view of pipe-fusing barge (Figure 6A) and the fused pipe deployed out into the James River (Figure 6B)*

Onshore at the northern end of the crossing, Garney drove approximately 300 feet of 66-inch steel casing with a customized Grundoram pneumatic hammer to reduce the risk of IR along the shoreline. The casing was left in place to help protect the product pipe with future bulkhead work. A 16-inch steel casing was centered within the 66-inch casing on both ends. Huxted Trenchless then set up an American Auger 240 drill rig in front of the landside entry pit for the pilot hole, switching it out prior to reaming with a HDR 1.200 drilling rig for the remainder of the project. (Figure 5).

*Figure 5: Aerial view of onshore entry pit and ancillary equipment and crane. View to southeast. Steel conductor casing is visible within entry pit trending southward towards shoreline*

While the HDD bore was being completed, a separate barge was staged offshore on the river's southern shore to fuse the 53-foot sections of pipe into a full 5,760-foot HDPE pipe string (Figure 6A). Approximately 115 pipe fusions, each requiring up to 2.5 hours including time for de-beading and quality checks, were performed during these operations over a period of three months. Almost 50 steel mooring piles were driven parallel to the south shore about 3 miles south of the marine platform to tie off and secure the over one-mile length of floating pre-fused pipe until the time of pipe pullback (Figure 6B).

## 6.0 HDD DRILLING AND PIPE PULLBACK

The complexity, long length, and subaqueous nature of the subaqueous HDD crossing called for an array of installation methods and drill string tracking solutions. Due to the length of the drill and anticipated very soft subsurface material, the intersect method was chosen using Brownline USA for steering the pilot hole. The intersect method allowed reduced downhole pressures, shorter distances for the cuttings to travel and aided in steering the drill string up into the previously installed 66-inch casing. During the pilot hole stage, each rig was monitored in real-time via readings of the inclination and azimuth of the Bottom Hole Assembly (BHA). Brownline's Steering experts were onsite for the duration of the pilot hole and worked off the same data to achieve a smooth transition. To facilitate the intersection of the drill bits advancing from each rig, the Drillguide GST was combined with a radar tool included in the downhole tooling. The steering engineers activated the radar tool when the bits were in proximity, automatically triggering communication between the two probes. The intersect was completed on the first attempt, and as the drilling rig on land backed up through the hole, the waterside drill advanced all the way to the north shore.

DrilRite Chem, LLC was chosen to supply and monitor the drilling fluid program for this project specifically using NSF 60 certified products. The mud density, funnel viscosity, sand content and yield point were monitored on a full-time basis throughout the pilot hole by their mud engineers to maintain the drill fluid properties for the formation while staying within the required design densities. Huxted Trenchless used a carefully calibrated mud program with a customized separation system including a separate centrifuge to continuously remove the sand and fines content from the drilling fluid. At the south side platform, drill cuttings were moved into a large hopper barge placed next to the drilling platform and on land a large pit was used for spoils collection.

With the pilot hole complete, the reaming process started. The plan was to use a 4-stage reaming process for enlarging the hole to 54 inches, large enough to install the 42-inch HDPE pipe. Huxted Trenchless chose to ream the first pass using an 18-inch fly cutter to

allow greater mud flow in the hole and enhance fluid recirculation. With the 18-inch pass complete, a small swab was run through the hole to make sure cuttings were removed, and the hole was in good condition.

The reaming process continued with using progressively larger 30-inch, 42-inch and 54-inch passes. During each pass the reaming was paused every 800 to 1000 feet with full pumping to confirm the driller cuttings were being removed and the hole was well conditioned. After each ream pass through the hole, a separate swab run was used to maintain the borehole stability and remove all soil cuttings. A final swab run was made through the reamed hole to ensure hole integrity and keep the drilling fluid free of cuttings and well-conditioned prior to pullback.

After the final swab run, drilling activities were paused. At this time, the drilling rig and ancillary equipment were removed from the platform and placed onto barges for transport back to shore. The previously mentioned pipe pusher was installed on the platform in line with the 66-inch casing and prepped to accept the product pipe for pullback.

The pipe pullback commenced in the early morning of May 1, 2024. Shortly after sunrise, tugboats and barges retrieved the fused pipe from its moored location near the south shore and towed it approximately 3 miles northward to the marine platform. Heavy cranes then picked up the pipe supported by a series of pipe cradles and adjustable rollers and pulled it towards the casing entrance (Figure 7). Once the pipe was threaded through the pipe pusher (Figure 8), the custom-made pullhead was attached, and pullback operations commenced at approximately 10 pm on May 1. During the pipe pullbacks, onsite Virginia Marine Police vessels provided notice to other maritime vessels to avoid the area.

During pipe pullback operations, the pipe was ballasted to maintain neutral buoyancy and to reduce pull loads during the pipe pull-back operations. River water was used to ballast the pipe, and a series of load cells at the base of the pipe pusher monitored pipe weight to ensure that the ballasted water inside the pipe was maintained at the approximate level with the river to ensure proper buoyancy control was maintained.

*Figure 7: HDPE Pipe suspended above the marine barge during pipe pullback operations*

*Figure 8: Pipe pusher installed on marine barge prior to pipe pull-back operations*

*Figure 9: Pipe successfully pulled through bore back to entry pit after pipe pullback*

Pipe pullback continued without significant delays until the pipe emerged at the entry pit 22 hours later, at approximately 8 pm on May 2 (Figure 9). The pipe installation started briskly with the pipe moving without any delay using only 100,000 pounds of force being supplied by the 1.2-million-pound drill rig onshore. The displaced fluid initially flowed to the platform and transferred to an adjacent hopper barge for proper disposal. As the pull progressed, after roughly a third of the total distance of the pull, the displaced mud flow started to come to the land side of the project and was collected in the large receiving pit and multiple frac-tanks.

As the pulling force climbed to 300,000 pounds, the pipe pusher was engaged to start assisting with the pipe installation.

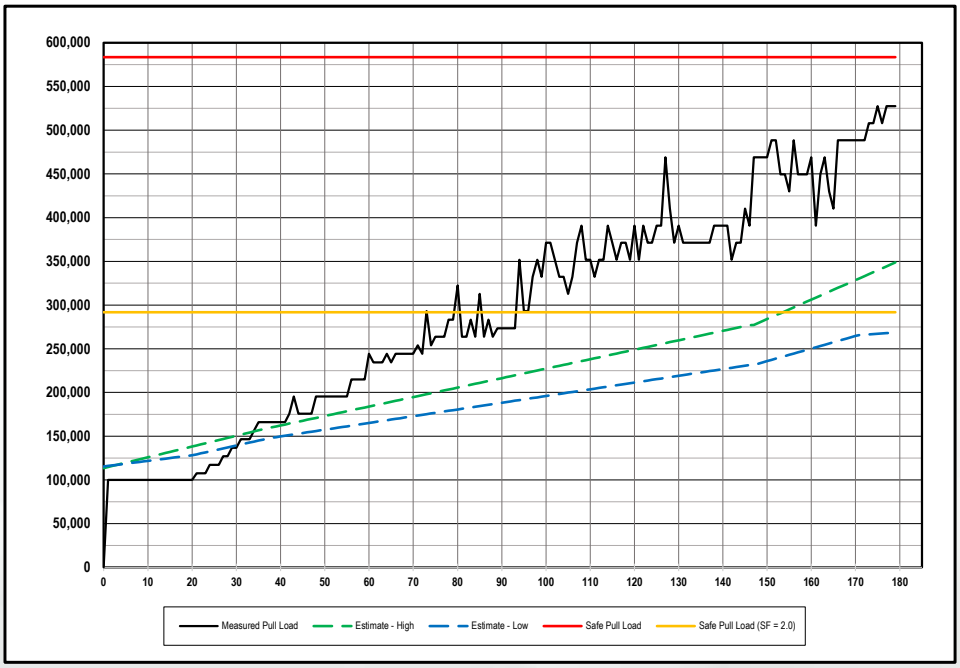


*Figure 10: HDPE Pipe Pullback tensile loads comparing estimated and actual recorded values*

**Table 1. Summary of Durations of Key Activities during HDD construction and installation**

| Activity | Dates | Cumulative Duration |
|---|---|---|
| Installation of Casings | February 5 to 14, 2024 | 10 days |
| 12.25-in Pilot Hole Drilling | February 15 to 19, 2024 | 4 days |
| Intersect of Drills | February 19, 2024 | 1 day |
| 18-in Ream Pass | February 21-24, 2024 | 4 days |
| 30-in Ream Pass | February 26-March 4, 2024 | 8 days |
| 42-in Ream Pass | March 14-22, 2024 | 9 days |
| 54-in. Ream Pass | April 8-15, 2024 | 8 days |
| 51-in Swab Pass | April 29-30, 2024 | 2 days |
| Pipe Pullback | May 1-2, 2024 | 2 days |
| **TOTAL** | | **48 DAYS** |

The pipe pusher started by adding 50,000 lbs of compressional force to aid the drill rig, advancing the HDPE pipe. As the pipe kept getting closer to the northern shore and pull forces increased, the pipe pusher thrust was progressively increased, eventually reaching 200,000 pounds of force. The final pull load recorded was just over 525,000 lbs, roughly 50,000 pounds under the Allowable Pull Load. Figure 10 shows the trend of tensile strength load increasing roughly uniformly over the duration of the pipe pullback operations.

## 7.0 HDD AS-BUILT METRICS

Table 1 presents a summary of the durations for the construction and installation of the product pipe. The schedule below does not take into account down time due to weather delays, non-working periods, or time spent on other construction activities related to the project.

Table 2 presents a listing of the HDD's key drilling metrics. It is important to note that although the measured pull loads exceeded the estimated pull loads, the measured loads were below the Allowable Pull Loads as calculated from the HDPE pipe properties.

## 8.0 INNOVATIONS AND CHALLENGES OVERCOME

Innovations utilized by the JRX D/B Team during both design and construction led to the successful completion of this

Table 2. Summary of Calculated Maximum Pull Loads & Peak Tensile Stress for the crossing

| Location | Joint No. | Length Installed | | Estimated Pull Load | | Measured Pull Load | | | Peak Tensile Stress | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | feet | meters | lbs. | metric ton | lbs. | metric ton | % of Allowable | psi | kPa |
| Entry | 1 | 0 | 0.00 | 113,500 | 51.48 | 50,000 | 22.68 | 9% | 109 | 753 |
| PC (End of Casing) | 19 | 603.38 | 184.03 | 137,000 | 62.14 | 100,000 | 45.36 | 17% | 218 | 1,506 |
| PT | 37 | 1,175.01 | 358.38 | 159,200 | 72.21 | 166,100 | 75.34 | 28% | 363 | 2,501 |
| | 48 | 1,524.34 | 464.92 | 171,000 | 77.56 | 195,400 | 88.63 | 33% | 427 | 2,942 |
| | 63 | 2,000.69 | 610.21 | 187,200 | 84.91 | 234,500 | 106.37 | 40% | 512 | 3,530 |
| | 79 | 2,508.80 | 765.18 | 204,500 | 92.76 | 283,300 | 128.50 | 49% | 619 | 4,265 |
| Start Pipe Pusher | 95 | 3,016.92 | 920.16 | 221,800 | 100.61 | 293,100 | 132.95 | 50% | 640 | 4,413 |
| | 111 | 3,525.03 | 1,075.13 | 239,100 | 108.45 | 332,200 | 150.68 | 57% | 725 | 5,001 |
| | 126 | 4,001.38 | 1,220.42 | 255,400 | 115.85 | 390,800 | 177.26 | 67% | 853 | 5,884 |
| PC | 147 | 4,668.28 | 1,423.83 | 277,200 | 125.74 | 469,000 | 212.73 | 80% | 1,024 | 7,061 |
| In Casing | 168 | 5,335.18 | 1,627.23 | 324,100 | 147.01 | 488,500 | 221.58 | 84% | 1,067 | 7,355 |
| Exit | 179 | 5,684.50 | 1,733.77 | 352,600 | 159.94 | 527,600 | 239.32 | 90% | 1,152 | 7,943 |

world record 42-inch HDPE IPS DR 11 pipe crossing. The greatest challenges to overcome for the HDD project were the presence of tens of feet of very weak sediments that impacted annular pressure mitigation and impacted HDD drill path steering, and the potential risk of pipe deformation during pipe pullback due to excessive tensile loading.

Innovations included converting the HDD geometry to extend from the southern platform to the northern shoreline rather than a marine-to-marine HDD drill. The weak soils required the design of the HDD drill path to an unusually deep bottom tangent and the use of extended steel casings to reduce annular pressures in the shallowest portions of the HDD. Steering Tools were used to maintain the drill string as close to the design drill path as possible, and constant monitoring of mud weights ensured that the borehole fluids properly circulated soil cuttings back to the surface without over-pressurizing the borehole and risking an IR. The latter challenge was overcome by continuous ballasting of the pipe with

river water during pullback to maintain proper pipe buoyancy.

Pre-fusing all the HDPE pipe in advance and staging it floating within the river to minimize fusing stoppages during pullback, and the use of the pipe pusher to reduce tensile loads on the pipe during pullback were two important innovations used to mitigate risk. Another risk mitigation performed was to cut off the north shore casing below the ground surface rather than fully extract it. The remaining casing will provide protection for the force main pipe should the coastline bulkhead ever be modified and deepened.

Lessons learned include that good planning pays dividends. The project was successfully completed due to the D/B Team's extensive upfront planning and design efforts. Detailed geotechnical characterizations and river mapping ensured the surface and subsurface conditions were properly modelled and taken into consideration for design. Method of construction studies, routing studies, and connection studies over the course of two years prior to final design as well as the geotechnical and river mapping performed contributed to the success of the project. The Owner's openness to modifications of the design achieved significant saving to the project budget.

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## Upcoming Conferences, Courses & Events

**September 18-19**
HDD Good Practices
Virtual

**September 18**
Mid-Atlantic Chapter Trenchless Technology Conference
Deptford, New Jersey, USA

**September 18**
Midwest Chapter Trenchless Technology Conference
Milwaukee, Wisconsin, USA

**September 24**
GLSLA Trenchless Insights: New Installations
Mississauga, Ontario, Canada

**October 14-16**
19th Annual Western No-Dig Conference
Scottsdale, Arizona, USA

**October 15**
Southeast 2025 Trenchless Conference
Jacksonville, Florida, USA

**October 27 - 29**
NASTT 2025 No-Dig North & ISTT International No-Dig
Vancouver, British Columbia, Canada

**October 27**
Introduction to New Installations
Vancouver, British Columbia, Canada

**October 27**
Introduction to Rehabilitation
Vancouver, British Columbia, Canada

**October 27**
CIPP Good Practices Course
Vancouver, British Columbia, Canada

**October 27**
HDD Good Practices Course
Vancouver, British Columbia, Canada

**October 27**
Direct Steerable Pipe Thrusting Good Practices Course
Vancouver, British Columbia, Canada

**November 4**
9th Annual South Central Trenchless Technology Conference
Arlington, Texas, USA

**November 6**
Advanced HDD Good Practices
Virtual

**November 10-11**
9th Annual Northeast Regional Chapter Conference
Nashua, New Hampshire, USA

**November 12 - 13**
Direct Steerable Pipe Thrusting Good Practices
Virtual

**December 10 - 11**
Pipe Bursting Good Practices
Virtual

**February 5, 2026**
RMNASTT Trenchless Elevated 2026
Sandy, Utah, USA

**March 29 - April 2, 2026**
NASTT 2026 No-Dig Show
Palm Springs, California, USA

**November 2 - 4, 2026**
NASTT 2026 No-Dig North
Calgary, Alberta, Canada


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