



# NASTT's *Trenchless Today*

Educate - Train - Research - Publish



SUMMER 2016 | VOLUME 6 | ISSUE NO. 2

## Trenchless in Texas ●●●●●●●●●●

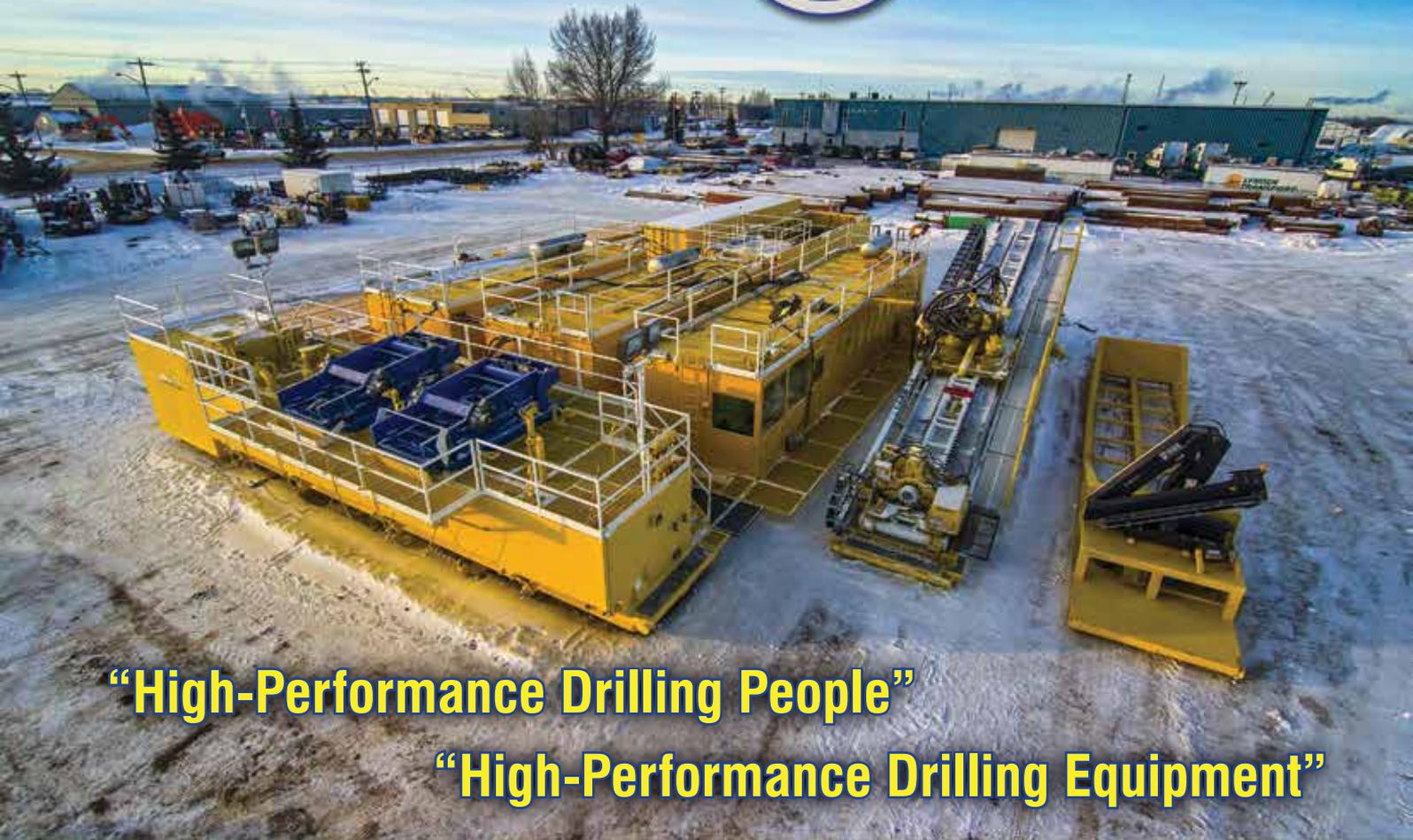
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## FEATURES

## 10 Q&amp;A

*Compiled by NTT staff*

NTT sits down with Matt Timberlake, president of Ted Berry Co., to talk about how his family's business came into the trenchless industry, the growth of trenchless acceptance in the Northeast and how trenchless evolved from being his job to his passion.

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*By Andrew Farr*

For this month's In the Trenches, NTT profiles Northeast Regional Chapter Board Members Dennis Doherty, Walter Fromm, Babs Marquis and Ian Mead. These individuals exemplify NASTT members who make the commitment to volunteer their time to help the Society expand its educational footprint. This year, with the launch of the NASTT's newest chapter, the Board is planning several initiatives to revamp trenchless education in the Northeast.

## 16 NASTT's 2016 No-Dig Show Review

*By Andrew Farr*

We take a look back at NASTT's 2016 No-Dig Show in March. This year's show drew a record number of exhibitors to Grapevine, Texas, as NASTT's flagship event of the year continues to hit new heights. Relive all the highlights of this year's show while taking a look at all the things that make NASTT's No-Dig Show the best trenchless technology conference in the world.



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## NASTT's No-Dig Show Honors Dedicated Industry Supporters



**Mike Willmets**  
NASTT Executive  
Director

This year is already proving to be another stellar year here at NASTT. We're riding high on the success of NASTT's 2016 No-Dig Show in Dallas, Texas, and we are proud that our show offers such incredible training, learning and networking opportunities. The NASTT No-Dig Show is truly the premier trenchless conference in the world.

The social jewel in the crown of our show, and an event that is very special to me, is our Gala Awards Dinner. Along with our Chair, Dr. Kimberlie Staheli and Vice Chair, Frank Firsching, I had the honor of inducting the newest members into NASTT's Hall of Fame – Martin Cherrington, Ken Foster and Richard Thomasson.

Martin Cherrington conceived the use of horizontal directional drilling as a practical alternative to conventional trenching methods in the 1960s. HDD, as it would become known, would ultimately revolutionize the way the construction industry would come to install underground piping on a worldwide basis. Martin's stature in the trenchless industry is iconic, and as such, he is rightfully known as the "Father of HDD."

Ken Foster has been a leading presence in the trenchless industry in Canada, the western United States and the United Kingdom for several decades. He has been a major contributor to the field of asset management, providing expertise to countless municipal rehabilitation programs, as well as being on the cutting edge of product and procedural development. Always the ambassador, Ken has tirelessly promoted trenchless technologies, particularly at the municipal level. Many of our communities owe much to Ken!

Richard Thomasson is the original Chair of NASTT and is one of the five individuals

who founded our Society in 1990. Richard's commitment and loyalty to NASTT over the decades is considerable and honorable. He is a long-term member of NASTT's No-Dig Show Program Committee and has contributed to the technical paper program numerous times. A former municipal employee turned consultant, Richard is very well known throughout our industry with more than 30 years of experience with trenchless projects. We all owe Richard an enormous debt of gratitude.

All of these gentlemen exhibit the traits that we look for in NASTT Hall of Fame inductees and it was our privilege to honor them during our annual Gala Awards Dinner.

Along with honoring professionals who have spent their careers dedicated to the industry, we also had the privilege to recognize some future leaders with the Ralston Award for Young Trenchless Achievement. The recipients of the awards this year were Rory Ball and Mary Neher.

Rory is a graduate of the University of Illinois and a senior project manager for Mott MacDonald in Cleveland, Ohio. He has more than a decade of experience in the tunneling industry on a variety of large to small diameter tunnels in four countries and more than a dozen states.

Mary Neher is a senior project engineer with Bennett Trenchless Engineers in Folsom, California. She earned her bachelor's degree in mechanical engineering from the University of California, Berkeley and her master's degree in geotechnical engineering from the University of California, Davis. She has designed numerous trenchless pipeline projects and has provided onsite inspection for HDD, pipe ramming and mi-

cro tunneling jobs.

Each year, NASTT recognizes two companies with state-of-the-art products in either new installation or rehabilitation for their achievements in advancing the trenchless industry with the Abbott Innovative Product Awards.

We once again received many high-quality applications and our Awards Committee had the very difficult task of reviewing all the submissions and interviewing company representatives. This year's Abbott Innovative Product Award winners were Akkerman, for its AZ100 Total Guidance System, and HammerHead Trenchless Equipment, for its Same Path gas pipe slitting system. Congratulations to the winners!

In closing, I would like to sincerely thank all of the many dedicated volunteers who made our show such a wonderful success. NASTT's 2016 No-Dig Show Program Chair Jeff Maier of C&L Water Solutions and Vice Chair Jennifer Glynn of RMC Water & Environment put in so many hours of volunteer time to make the conference the valuable event that it is. Jeff and Jen worked closely with our Program Committee that is comprised of more than 100 volunteer members to peer review every technical paper in the schedule. Several of our Program Committee members also served as Session Leaders, who dedicated additional hours working with the paper authors. I also want to recognize and thank the dozens of event sponsors that make all of this possible.

We sincerely thank you for your continued support of our industry, the Society and NASTT's No-Dig Show.

**Michael J. Willmets**  
NASTT Executive Director



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## Everything Is Bigger in Texas – NASTT's 2016 No-Dig Show Was No Exception



**Dr. Kimberlie Staheli, P.E.**  
NASTT Chair

**N**ASTT's 2016 No-Dig Show, held this past March in Dallas, Texas, was one of our best shows yet! With more than 2,000 attendees and a sold-out exhibit hall, it was a busy and successful week with something to offer everyone.

Trenchless professionals from all over the world attended the conference for training, networking and fun. We started off with the Kickoff Breakfast on Monday morning where we were able to recognize many of our dedicated members and volunteers. This list included the Board of Directors, our 2016 No-Dig Show Program Committee and Session Leaders, event sponsors and our 2016 Program Chair, Jeff Maier of C&L Water Solutions and Vice Chair, Jennifer Glynn of RMC Water & Environment.

We were proud to host more than 100 Municipal and Public Utility Scholarship winners for the fourth year in a row. NASTT's Municipal & Public Utility Scholarship Program was developed in 2013 to encourage attendance of municipal and utility employees who might not otherwise be able to travel to our event due to limited funding. It is important that our cities, counties and public utilities stay current with trenchless innovations and it is NASTT's goal to help them do so.

We also recognized some of our fantastic student chapter members who are the future of the trenchless industry. One of our main goals is to support these trenchless leaders of tomorrow through

our many programs, including the Argent Memorial Scholarship. Each year NASTT awards scholarships to exceptional students who have demonstrated success both inside and outside of the classroom. This year we recognized five bright stars in our organization: Urso Campos of Louisiana Tech, Marco Regoli of Vanderbilt University, Sam Schlinger of Arizona State University, Kate Wiczoerck of Clemson University and Hamed Zamenian of Purdue.

The technical sessions are a major highlight of the conference each year. The 160 technical papers in the program were all peer-reviewed by our Program Committee that is comprised of more than 100 trenchless industry volunteers. These papers covered dozens of topics over the course of six tracks and three days. This year, Program Chair Jeff Maier introduced six roundtable discussions, one in each track. These discussions were led by a panel of industry and topic experts and each one was moderated by either Jeff or Vice Chair Jennifer Glynn. All the roundtables were lively and included audience participation. They were a great addition to this year's program.

Monday night we celebrated during an event that never fails to get everyone in party mode: The 15th Annual Education Fund Auction. This year's theme was the Rockin' Auction, in which attendees came dressed as their favorite rock stars! We enjoyed cocktails and each other's company while raising

money for a great cause! Thanks to our Auction Committee members and Chair, Joe Lane of HEBNA Corporation, along with all the bidders and participants, we raised nearly \$90,000 that night and since 2002, we've raised \$940,000 and used those funds in support of our educational initiatives and programs.

During Tuesday night's Gala Awards Dinner, I had the privilege of recognizing and honoring my friend and colleague, Derek Potvin of Robinson Consultants, with NASTT's Chair Award for Outstanding Service. Derek has been a dedicated volunteer and tireless supporter of the trenchless industry for many years. He served as NASTT's Chair, is active in the GLSLA Regional Chapter and is also one of NASTT's Good Practices Course instructors. But this only touches on his involvement in the industry. Derek embodies the spirit of a mentor and volunteer and the trenchless community is lucky to have him as our advocate.

NASTT's 2016 No-Dig Show was a wonderful success and we are already in the planning stages for next year in Washington, D.C. We hope to see you April 9-13 at the Gaylord National Convention Center for NASTT's 2017 No-Dig Show, where we will learn about trenchless innovations and network while having fun and celebrating our industry.

**Dr. Kimberlie Staheli, P.E.**  
NASTT Chair & International Representative

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# The Ultimate Q&A

## Roundtable Success During NASTT's 2016 No-Dig Show



**Michelle Hill**  
NASTT Program  
Director

If you were able to join us for NASTT's 2016 No-Dig Show, I hope you had the opportunity to sit in on one or more of our six different roundtables. Designing this type of schedule was the brainchild of NASTT's No-Dig Show Program Chair Jeff Maier, as he was dedicated to creating a unique experience for this year's conference.

Roundtables and panel discussions aren't necessarily a new concept, but what made this year's program unique is that there was a roundtable created for each track topic. There was a great balance of education on both new installations and rehabilitation in an informal question and answer atmosphere. Attendees were able to dive right in and share their challenges with the best in the business. Better yet, members of the audience were encouraged to share their experiences and participate as well.



Attendees participate in the microtunneling roundtable on Monday, March 21. The roundtable included (l-r) Craig Vandaele of Michels Corp., Don Del Nero of Stantec, Brendan Tippets of BT Construction and Glenn Boyce, McMillen Jacobs Associates, with NASTT's 2016 No-Dig Show Program Chair Jeff Maier moderating.

It took more than 30 volunteers to make this program possible, along with our Program Chair Jeff Maier and our Vice Chair Jennifer Glynn, who both served as moderators. I want to take this opportunity to thank these amazing professionals, along with their organizations, for their time and dedication.

If you weren't able to join us for this roundtable program at NASTT's 2016 No-Dig Show, keep an eye out for some of these topics to make an encore performance during our webinar series this year. Start coming up with some questions today!

**Michelle Hill**  
NASTT Program Director

### Microtunneling

Don Del Nero, Stantec  
Dr. Glenn Boyce, McMillen Jacobs Associates  
Brendan Tippets, Independent Consultant  
Craig Vandaele, Michels Corp.

### HDD

Dr. Kimberlie Staheli, Staheli Trenchless Consultants  
Mary Neher, Bennett Trenchless Consultants  
Brian Dorwart, Brierley Associates  
Dr. Sam Ariaratnam, Arizona State University  
Jeremy King, HDD Company

### Watermain Rehabilitation

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Ben Cote, Sanexen Environmental Services Inc.  
George Malakis, TT Technologies  
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## NASTT's Trenchless Today chats with



### Matt Timberlake, president, Ted Berry Co., about his introduction to the industry, how he became passionate about trenchless and, of course, #drainspotting

#### Can you give us a little background on Ted Berry Co. and how it came into the trenchless market?

My grandfather, Ted, started the company in 1972 and they were an agricultural equipment dealer in Maine. It's funny how stuff happens. In the early 1980s, John Bean came out with a trailer-mounted sewer cleaning machine and accidentally shipped it to Ted Berry Co. So they shipped us the wrong machine. One night, not long after that, my grandfather got a call from a guy who ran a local paper mill that had a plugged pipe. My grandfather said, "Well that's funny, we have this sewer cleaning machine. It's not even ours, but what if we came up and tried it out?" Needless to say, my grandfather and father went up there to this paper mill and unplugged this sewer with this sewer flushing machine. Thus, our sewer cleaning company started. So it kind of happened by accident. From there, we expanded our sales and service line and started selling a lot of municipal equipment in addition to the agricultural equipment.

#### What was the next step?

When my father began to run the day-to-day operations of the company in the mid-late 1980s, he had a vision to start getting into more industrial services. We have a lot of paper mills and power facilities around us. My father saw these vacuum trucks and really thought there was a place for the company in the industrial cleaning market. So they bought an industrial vacuum truck in 1989 and also some hydro blast equipment. Really from the late 80s to early 90s, we built a strong industrial service base.

#### So when did you come into all this?

I came along in the early 90s. I was working for the company in high school, and when I was about 18 years old, I was positive I did not want to continue working for the company like my father. Honestly, I didn't see it as something I wanted to do the rest of my life. It was a job to me. At the time, we had about 12 employees and served a small geographical area. My father wasn't afraid to take a risk but we really had no big plans to grow.

By the time I was about 21, I started getting *Cleaner Magazine* and started reading about all these robotic camera inspection units. I really thought that was something that could help our business grow. My father said, "You're crazy, those things are too expensive, too high tech. They don't fit here." But I ended up convincing him to let me go out to the Pumper show. I talked to a lot of people and learned a lot about different units and the capabilities and picked one. But my father supported it and we started doing camera inspection.

At that point, I really became interested in what I was doing. Today, we've grown our pipe inspection business and I have six main line CCTV units and 14 people who work just in CCTV. So it's very rewarding for me to have had this idea, and now I've got crews working all over New England. That was the turning point, and that's really when my passion for what I do started.

#### And you do a lot more than pipe inspection now.

Well, fast-forward about 6-8 years. There was

a local sewer district that we had been working with, inspecting pipe. We started finding pipes that were all cracked. I called the superintendent and asked him what he did with all the inspection videos after we would leave and he said they called a company in Massachusetts that come and line the pipe. That's when I wanted to learn more about trenchless repair. Overnight, trenchless technology became my thing and I wanted to learn everything I could, go everywhere I could and meet every person I could. I ended up buying a little lateral pipe bursting unit, then we bought a lateral lining until. So over the next 15 years from then, I just wanted to know everything there was. So I took this idea and turned into what is now a major component of our company. In fact, I think Ted Berry is mostly known for its trenchless work and how we've helped grow the acceptance of pipe bursting in the Northeast.

**At No-Dig, we talked about Flint and what its impact on the industry will ultimately be. Is that changing the industry at all and what do you see as the biggest challenges?**

Not too long ago, someone asked me who my biggest competitor is. If I was Coca-Cola, I'd say Pepsi. But for our industry, our biggest competitor is still the "this is the way we've always done it" mentality. Our biggest competitor isn't necessarily the company in the next town that does the same type of work as we do. It's education at the municipal and consultant level. There are areas of the country where trenchless is the rule and they do trenchless first. I think 99 percent of the country is the opposite of that. That holds us back. I think the biggest challenge for us as an industry still is to educate people as to what trenchless is.

As far as trends, main line sewer rehab and renewal is still the focus and probably will be for a long time. However, main line to lateral connections are really becoming a focal dis-

cussion point. I think there are a lot of newer versions of technology that are helping in this area like UV CIPP. The water rehab market in trenchless has also really grown in trenchless over the last 10 years. When we started pipe bursting, I thought we would burst sewer pipes. Now, the technology is just as applicable to water systems. In the last 3-4 years, we've done about a 50/50 split on pipe bursting for water and sewer. The last trend is storm drains. When we added UV CIPP to what we do, one of the determining factors was the ability go in and do storm drains, open-ended culverts in sensitive areas without the need to deal with steam or hot water. We think we're really going to grow storm drain rehab and I think you see that evolving in other areas of the country as well.

**A lot of people in the industry would probably agree that your activity on social media – the Tweets, the photos with #drainspotting hashtags, etc. – is pretty recognizable. A lot of contractors are old school and don't get into that. When did that all start?**

Honestly, I don't know. It's not like I went to some seminar and was taught how to do it. But we work in a lot of communities and there are people who don't know the difference between sewers and drains. They don't know the value of buried infrastructure, and as contractors, people have no idea what we do. I just got to a point one day where I thought, if I'm not talking about what we do, and I'm not drawing attention to our industry, who is? But it's been fun. People send me stuff from all over the world. Somebody sent me manhole pictures from Dublin the other day. Someone sent me something from Munich earlier in the week. It's just a way to continue to draw attention to what we do. And inside our company, I feel there is a fine line between hard work and having fun. If I'm having fun and enjoying what I do, other

people tend to do the same.

Our work is hard. Its long hours, it's dirty, it's cold, it stinks. It's all of those things. And if you can take a crew and an iPhone, and snap a couple pictures of them and snap a selfie with a guy who just climbed out of a hole and get him to smile for half a second, what the hell is wrong with that? And that's how I've approached it. I don't have a strategic marketing plan and we don't have a marketing person in the company. It's just stuff I enjoy doing.

**Let's talk about the new Northeast Chapter. What kinds of things are you looking to do in terms of regional activities?**

The old NTA (Northeast Trenchless Association from which the Northeast Chapter originated) was in about its twelfth or thirteenth year, and like a lot of associations you get a small group that does all the work. So transitioning to an NAS-

TT Chapter has been fantastic. It has been so much fun to see the drive and passion in everyone's participation. Our chair, Dennis Doherty, has put together a strong vision for educating the people we need to target, such as partnering with universities to talk about implementing trenchless programs for students. At NTA, one of the biggest feathers in our cap was our municipal outreach programs. So I think one of the key targets of the Northeast Chapter will be education. We've got people with a ton of experience. The value of the regional-type chapter is really huge, and people in the Northeast want to hear from people in the Northeast.

Alignment with the national association will also be important. NASTT has really put a lot of effort into aligning themselves with their regional chapters in recent years. The fact that all the chapters are going in the same direction, I think that's going to pay off huge.



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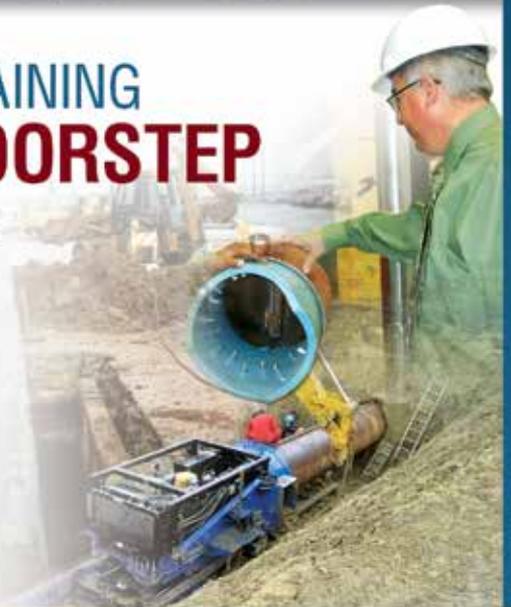
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# In the Trenches

## Northeast Chapter Edition

By Andrew Farr

It's no secret NASTT is big on education. It's the association's first and foremost priority. But as much as we talk about spreading the trenchless word, hindrances unfortunately exist when it comes to education at the national level. Enter NASTT's Regional Chapters. In this issue, we're taking a look at NASTT's recently-formed Northeast Chapter and the trenchless professionals who will work to expand trenchless education across New England through exciting chapter initiatives.

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*Same Path™ gas-line slitting technology wins NASTT's 2016 Abbott Innovative Product Award*



## Dennis Doherty

National Practice Leader, Trenchless Technologies, Haley & Aldrich

The trenchless industry has many people who are considered experts in the field. This one is known as the @TrenchlessGuru on Twitter and Dennis Doherty, national practice leader for trenchless technologies at Haley & Aldrich, is just that.

Doherty has more than 25 years of experience in the trenchless technology industry. After earning his degree in civil engineering from the University of Massachusetts Lowell, Doherty actually spent the early years of his career working on the structural side.

In 1989, he joined Bryant Associates where he began working on sewer rehab projects, which led to his introduction to trenchless work. One such project took place in the early 1990s in downtown Boston, where the Boston Water & Sewer Commission (BWSC) was examining ways to repair an aging sewer main. Doherty produced a manual for BWSC detailing various trenchless methods that could be applicable to the project. BWSC liked the study so much that they hired Doherty and Bryant Associates to do the project design.

The project – the New St. James Avenue Interceptor Project – involved roughly 15,000 lf of sewer rehab and replacement including microtunneling, pipe bursting, CIPP and gunite. In 1996, it became the first and only project to win *Trenchless Technology's* Project of the Year in both the new installation and rehabilitation categories.

“That’s when I really started learning a lot about trenchless and all the different methods,” Doherty says. That was his first Project of the Year.

Over the next 15 years, Doherty would go on to be involved in an additional three Project of the Year wins, performing design, conceptual work and constructability reviews on a variety of innovative trenchless projects.

After leaving Bryant Associates, he continued work around the greater Boston area, moving to Metcalf & Eddy (now an AECOM company) in 1996 and later for Jacobs Engineering in 2000, where he spent 10 years. Throughout this time, Doherty worked on several combined sewer overflow (CSO) projects including the East Boston Branch Sewer Project, another large-

scale project incorporating a variety of applications including pipe busting, microtunneling and CIPP.

In 2010, Doherty joined Haley & Aldrich where he now heads up its trenchless technology practice. These days, his work is heavily focused on private sector energy projects, specifically in electrical power installations using microtunneling and HDD.

Throughout his career, Doherty has developed a unique understanding of the full scope of trenchless techniques and is particularly interested in risk management as it relates to trenchless design. He says a focus of his at Haley & Aldrich is applying a total trenchless approach, helping clients from feasibility through construction.

“You can’t design things on a shoestring budget,” he says. “There are so many things to look at, there are so many things to consider. One of the things I enforce with all the people that work for me is that you’re designing to manage risk.”

Total trenchless solutions will also be something Doherty will look to address in his new role as chair of the Northeast Chapter of NASTT. The Chapter has been revamped from the formerly independent Northeast Trenchless Association, initially formed in the mid-2000s, which Doherty co-founded. He says regional education in the New England area will be the first priority for the Chapter. He also says drawing more young engineering professionals into the trenchless industry will be a must, along with using social media like Facebook, Twitter and LinkedIn to help spread the word about Chapter activities and initiatives.

“I’ve seen a lot of stuff in the industry come and go,” he says. “It’s important that people understand what products do, how they work and if they’re practical. I’m not going to recommend [methods] to clients that haven’t been tried and true. I need to be convinced that it’s going to work before I recommend it to a client. That’s part of the reason I’m always very involved.”



Doherty is also involved because of the challenges, and he says it's his favorite part about working in the trenchless industry.

"In the underground world, there are many shades of gray," he says. "In a geotechnical boring, that dirt over there is differ-

ent from dirt over here. It's looking at 'How is a microtunneling machine going to behave in this ground?' or, 'How is HDD going to work in this ground?' You have to understand all that. It's always challenging. It's fascinating work.

"I drive my wife nuts with this stuff," he jokes. "I love it."

## Walter Fromm

Director, Gas Construction New England, National Grid

As the trenchless industry has continued to expand into new markets over the years, the gas industry has had a noticeably increasing presence as more gas utility professionals are becoming interested in growing the application of trenchless technology in the gas industry.

Walter Fromm, director of gas construction in New England for National Grid, is new to the North American Society for Trenchless Technology, but his involvement in trenchless has been consistent throughout his career.

Fromm will be working with Dennis Doherty and the other trenchless professionals highlighted in this section to help grow trenchless education initiatives in the Northeast. Fromm has worked for National Grid since 1999 in various roles in gas engineering, project management and regulatory work. He has a degree in civil engineering and actually got his start doing water and sewer work early in his career. In his current role, he oversees all of the gas contractors working on upgrading the utility's system.

Recently he was invited to an NASTT meeting by Gerard Lundquist, director of gas construction in New York for National Grid, and George Ragula, both of whom he's known through the gas market. Fromm said he was convinced to get involved in NASTT this year to gain more exposure to the growth of trenchless methods that could help National Grid expand its trenchless toolbox in New England.

"We've always had some projects that involve trenchless, whether it's lining, using robotics to rehabilitate pipelines or using direction drilling," he says. "I would say there's much more interest in trenchless technology and we're investing a lot more money in upgrading our infrastructure. We have such an aged infrastructure in the Northeast. With the help

of our regulators, we're investing more and more in replacing that infrastructure. We're always looking for ways to upgrade infrastructure most economically with the least impact to the communities we serve.

"If we go into a neighborhood or street and replace aging infrastructure at low cost with minimal impact to the community, that's the best place we want to be. We see trenchless as another tool to invest in the most economical way, while also limiting disruption to the community. Trenchless definitely affords us the ability to do that."

Fromm agrees that the key to growth in the trenchless market will continue to be educating everybody from engineering firms, municipalities and the general public as to what trenchless technologies offer. But despite being part of NASTT for only a matter of months, he says another aspect of the industry impresses him.

"I really like the passion from the people I've interacted with so far," he says. "People in my field who work in trenchless are very passionate about this industry and the potential for it going forward, which is exciting. Being in the construction industry, you're always looking for ways to do things cheaper, more efficiently, with the least impact to communities. Looking down the road in the gas industry, we're investing so much money in upgrading infrastructure. So it's really important for us to be looking at trenchless methods because we owe it to our customers."



## Babs Marquis

Associate, McMillen Jacobs Associates

If trenchless technology has one consistent trait, it's that it is unique in the realm of construction. It's a specialty method that's cost-effective, environmentally sound and non-disruptive. Babs Marquis comes from a construction family. His father was a contractor in Nigeria who worked on building police barracks and post offices. He says he was drawn to trenchless technology specifically because it's unique.

"[My father] was one of the few contractors in Nigeria that was smart enough to specialize in something unique," says Marquis. "So when I finished school, I was also looking to do something that was unique."

Today, Marquis is a construction manager with McMillen Jacobs Associates working out of its Burlington, Mass., office. He graduated from the Wentworth Institute of Technology in Boston and previously worked for Jacobs Engineering Group for 10 years and Stone & Webster Engineering for 11 years. During his time in the trenchless industry, Marquis has been involved in major tunneling and trenchless projects in North-eastern United States.

For the past 15 years, he has focused on underground construction management for tunnels and conveyance including water and wastewater pipeline design and construction projects with an emphasis on trenchless methods. He has worked on various pipeline projects utilizing microtunneling, pipe jacking, horizontal auger bore, pipe bursting and pipelines renewal. Marquis says his favorite kinds of projects to work on are microtunneling. He has authored several papers for NASTT's No-Dig Show and ASCE Pipelines and is a member of NASTT, ASCE, UCT and CMAA.

Marquis says that in the Northeast, owner acceptance has evolved based on the number of successful trenchless projects that have been completed.

"I think the level of interest and the level of confidence based on the successes that have come from the projects that have been done, has brought a lot of awareness to a lot of the clients like the Massachusetts Water Resources Authority, Boston Water & Sewer Commission and the Metropolitan District Commission (Hartford)," he says. "But trenchless technology works best if you apply the right technology to the right problem."

Marquis says one of the biggest benefits of NASTT is education, but it's the access to that education that he believes should be a priority going forward. In the Northeast, he sees the new regional chapter – for which he will serve as treasurer – as being a primary component to that goal.

"We have a lot of municipalities in the Northeast. For those of us who are consultants, we see the value in attending conference such as the No-Dig Show. So our employer sets up funds for that because we bring value back to the company. But for public agencies, it's very hard for them to get funding to go to national conferences. By having the regional chapter, it brings that big picture to a local level."



## Ian Mead

Associate & Client Service Leader, CDM Smith

Ian Mead was born and raised in the construction industry. His grandfather had a tree service company and his father had a landscaping and site excavation company in Massachusetts.

"I grew up on a bulldozer," he says. "From about the age of two on, I've got pictures of me on heavy equipment. Growing up, when I wasn't at school, I was working with my father and grandfather."

Mead went on to study civil engineering and graduate from the University of Massachusetts Amherst while also working for a private engineering company doing survey and design work. Just before graduating, he received a job

offer from CDM Smith (then Camp Dresser & McKee), and started working for its construction services division doing site inspection work.

Around that time, Mead had his introduction to trenchless technology as a lot CDM's municipal clients were expanding their sanitary sewer collection systems, some of which involved trenchless work such as horizontal direction drilling (HDD) and CIPP.

After a few years in the field, Mead transitioned into the office doing more design work for trenchless projects. Today, he has 19 years of experience as a design engineer, project manager and construction coordinator and is currently an associate and client service leader with CDM Smith where he continues work on drinking water, wastewater, pipeline, site and civil, energy and other municipal infrastructure projects. His recent work focuses more on business development with long-term clients of CDM Smith.

Mead says the biggest trend in the trenchless industry right now is probably owner acceptance of the technology, but specifically convincing municipalities that trenchless methods should be part of a utility's asset management plan.

"Some communities have fear of trying something new," he says. "The interesting thing is that none of these technologies are really new. They've been around for a long time. So there have been some interesting challenges in terms of getting people to buy in and convince them that trenchless is a viable and proven alternative and should be part of the toolbox."

Mead, who will serve as vice chair of the Northeast Chapter of NASTT, says that education on the municipal side will be a big part of the chapter's initiatives going forward, with an emphasis on smaller utilities.

"I think the biggest thing for us is just getting the word out and making sure utilities know there are resources available to them," he says. "I think there's an opportunity to get more utilities involved. I think more utilities at the medium and smaller level are realizing that trenchless technology is a really strong option for them with limited funds to make some improvements to their system. But some are not quite sure where to go for help."

Mead also says a big goal is building interest in the chapter and streamlining its resources such as its website and conferences with the national association and other regional chapters.

"I think the industry has a lot of great people," he says. "When you go to No-Dig, there's great participation from the consultants, the contractors

and many at the larger utilities. I'm hopeful that at the local level, we'll be able to get more interest from the mid and smaller utilities to expand the acceptance of these technologies and the association overall."

**Andrew Farr is the associate editor of *NASTT's Trenchless Today*.**

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# NASTT's No-Dig Show

## Keeps Trending Upward in 2016

By Andrew Farr

Every spring, the North American Society for Trenchless Technology (NASTT) hosts its flagship event of the year – NASTT's Annual No-Dig Show. For many who work in the trenchless industry, the event takes on an identity beyond a typical tradeshow. In addition to being a conference dedicated to the education and promotion of trenchless technology, it's just as much a celebration of the industry and the people who push it forward.

The 2016 show continued that trend.

After setting the standard high in 2015, NASTT's No-Dig Show looked to continue

the momentum as North America's largest event dedicated exclusively to the education and advancement of trenchless technology, came to Grapevine, Texas, March 20-23, 2016.

The 2016 No-Dig Show managed to eclipse 2,000 attendees and attracted a record number of exhibitors with 185, reinforcing the considerable growth of the conference in recent years. The 2016 event marked the first return to the Gaylord Texan Resort and Convention Center in Grapevine since 2008.

"There are a lot of moving parts and behind-the-scenes details that go into the planning to ensure that the conference program is of the highest quality," says Jeff Maier, NASTT's 2016 No-Dig Show Program Chair. "The Program Chair position has certainly been a very interesting and rewarding experience for me.

"I am very proud of the momentum that NASTT and the No-Dig Show has generated over the past several years, and to play an instrumental role in the success of the 2016 conference."

### Awards

NASTT's No-Dig Show is the premier trenchless event on the calendar, providing a perfect blend of business, education and networking while bringing together the industry's past, present and future, honoring the indelible work that trenchless professionals have created.

The festivities began on Monday, March 21 with the annual Kick-Off Breakfast. NASTT recognized its Board of Directors for 2016 including new Board members Craig Vandaele of Michels Corp. and Michels Canada Co., and Matthew Wallin of Bennett Trenchless Engineers. Ending their tenure on the Board in 2015 were Jennifer Glynn of RMC Water & Environment and Cindy Preuss of HydroScience Engineers who were also recognized.

The Kick-Off Breakfast also recognized NASTT's 2015 Outstanding Papers. The

2015 Outstanding Paper for Rehabilitation was presented to Dr. John Matthews, Lawrence Pultz II and Edward Alan Ambler for the paper, "The Path Forward for Pipe Bursting Asbestos Cement Pipe." The Outstanding Paper for New Installation was presented to Matthew P. Olson and Christopher Price for the paper, "Pipe Ramming through Challenging Subsurface Conditions in the Pacific Northwest."

The 2016 *Trenchless Technology* Person of the Year was formally presented to Lynn Osborn — an industry professional who has helped to shape and expand the trenchless industry over the last 30 years. All of the winners of the 2015 *Trenchless Technology* Projects of the Year were also recognized.

On Tuesday, March 22, NASTT inducted its fifth Hall of Fame Class: HDD pioneer Martin Cherrington, engineer and NASTT found-

ing member and chair Richard Thomasson and Insituform Technologies Ltd.'s Ken Foster. Past NASTT Chair Derek Potvin of Robinson Consultants, received the NASTT Chair Award for Outstanding Lifetime Service and Mary Neher, Bennett Trenchless Engineers, and Rory Ball, Mott McDonald, received the Ralston Award for Young Trenchless Achievement.

NASTT's No-Dig Show is the place to unveil the latest in trenchless technologies and this year was no exception. There were many new products — rehabilitation and new installation — on the exhibit hall floor in 2016, highlighting the fact that the trenchless industry continues to grow to new heights. Each year, NASTT recognizes these technological advancements through the Joseph L. Abbott Jr. Innovative Product Awards. Annually, two companies with state-of-the-art products are

chosen as recipients of this honor. This year, the Innovative Products Awards were presented to HammerHead Trenchless Equipment for its Gas Pipe Slitting System and to Akkerman Inc. for its AZ100 Guidance System.

NASTT's Awards program also recognizes the future of the industry – engineering students looking to get into the trenchless technology field. The Argent Memorial Student Scholarships were awarded to Urso Campos of Louisiana Tech University, Marco Regoli of Vanderbilt University, Samuel Schlinger of Arizona State University, Kate Wieczorek of Clemson University and Hamed Zamenian of Purdue University.



### Technical Program, Exhibits & Networking

NASTT's highly acclaimed Technical Program is one of the biggest draws to the No-Dig Show. In 2016, more than 160 peer-reviewed papers were presented through six tracks. The papers represented a broad range of industry topics, covering the full scope of trenchless concepts, methods, challenges and solutions.

The sessions this year also included six Roundtables that featured different trenchless topics (Manhole Rehab, Microtunneling, HDD, Water Main Rehab, Stormwater/Condition Assessment and Alternative Project Delivery), as well as a dedicated Gas Industry Track.

Another attraction of the No-Dig Show is the exhibit hall, in which attendees can see first-hand the latest products that are keeping the trenchless industry moving forward in its quest to address the utility construction and repair industry.

One of the big hits at the conference this year was the brand new mobile app for NASTT's 2016 No-Dig Show. Through the app, attendees could stay connected throughout the show while sharing and commenting on photo posts.

### Educational Fund Auction and Reception

On the evening of March 21, the 15th annual Educational Fund Auction and Reception was held – a popular networking event for attendees after a full and busy day of technical sessions and walking the exhibit hall.

NASTT would like to thank Auction Committee Chair, Joe Lane, and the rest of the auction committee for their hard work, time and dedication to creating such a great event!

Lady Gaga was in the house, as was Ozzy Osbourne, KISS and Slash and Axl Rose from Guns n' Roses and many other rockers for the "Rockin' Auction" theme. This year's event raised nearly \$90,000. The raised funds are used to provide targeted trenchless training courses to the industry, publish trenchless resource manuals and sponsor university students' attendance at NASTT's No-Dig Shows, as well as award scholarships. Since 2002, the auction has raised more than \$930,000 for those efforts. Curt Albin with Ritchie Bros. Auctioneers served as the official auctioneers for the popular No-Dig event; a silent auction was also held. During the auctions, a wide range of items were donated and bid on from jewelry and electronics to sporting event tickets and trenchless tools and equipment.

Once again, the popular Mortimer the Sewer Rat was up for bid. The winning bidder for Mortimer was Midwest Mole and he'll spend the next year traveling with the contractors, checking out the trenchless jobsites. The rock 'n roll theme proved to be a fun choice as attendees' inner rock stars emerged with the theme. Tying for first place for the women was: Cindy Preuss, Jennifer Glynn, Wendy Del Nero and Jeanette Rankin as KISS, with Vicki Miner and Nicole Lane as The Runaways. On the men's side, the winner was George Ragula as Stevie Wonder. In NASTT's Tropical Vacation Raffle (announced at the Closing Luncheon and donated by Vermeer), the winner was Mike Hawkins of Georg Fischer Central Plastics LLC.

This year the auction committee introduced the Qtogo mobile bidding service, where attendees were able to view and bid on the silent auction items right from their mobile devices and receive real-time updates all day long. This new addition to the auction brought another level of fun and friendly competition to the bidding process. Flip through the following pages and check out all the great photos from the Auction and the rest of NASTT's 2016 No-Dig Show.

### Next Stop, D.C.

The annual Closing Luncheon, held March 23, gave everyone a chance to say good-bye and the opportunity for NASTT to get a jump on pumping up the industry for the 2017 show in Washington, D.C. 2017 No-Dig Show Program Committee chair Jennifer Glynn filled everyone in on what they can anticipate in our nation's capital, April 9-13 at the Gaylord National Convention Center.

"There have been two challenges – keeping up with the tireless NASTT and BMI staff who have been working non-stop since the last day of the 2015 show to make the 2016 show a success [and] letting the Program Chair make all the decisions!" says Jennifer Glynn, 2016 Program Vice Chair and 2017 Chair, reflecting on Dallas show. "I can't wait to jump in and get my hands dirty for the 2017 show."

In 2017, the NASTT No-Dig Show will be held at the Gaylord National Hotel & Convention Center in Washington, D.C., April 9-13. Deadline to submit an abstract for the technical program is June 30, 2016. Flip to page 28 for more on next year's show.

Andrew Farr is associate editor of *NASTT's Trenchless Today*.



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1. A record 185 exhibitors filled the exhibit hall at the Gaylord Texan.
2. (L-R): NASTT Vice Chair Frank Firsching, 2016 Program Chair Jeff Maier and NASTT Chair Dr. Kimberlie Staheli cut the ribbon to open the exhibit hall.
3. Networking in the exhibit hall is one of the best attributes of NASTT's No-Dig Show.



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## Around the exhibit hall



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**4.** Perma-Liner Industries again served as a Platinum Sponsor of NASTT's 2016 No-Dig Show.

**5.** Representatives from Platinum Sponsor TT Technologies chat with No-Dig Show attendees in their booth.

**6.** The exhibit hall is the ideal place for attendees and exhibiting companies to discuss new trenchless methods and technology.

**7.** The guys at Underground Solutions, a platinum sponsor, pose for a photo with a piece of their 36-in. Fusible PVC Pipe.

**8.** Rick Gage of LMK Technologies hosts a live demo in the exhibit hall.

**9.** Akkerman won NASTT's Abbott Innovative Product Award for its AZ100 Guidance System.

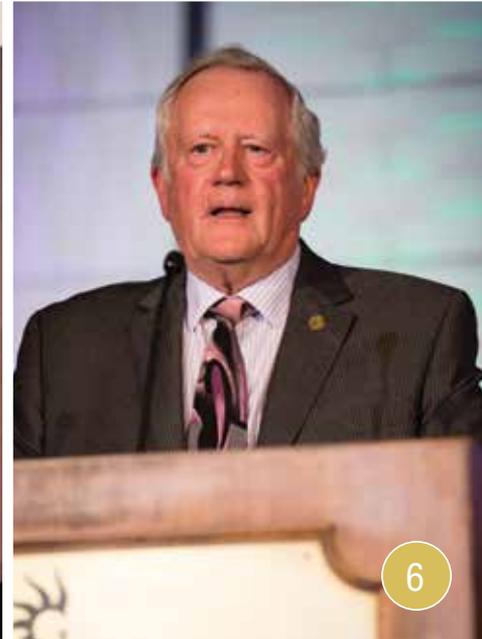
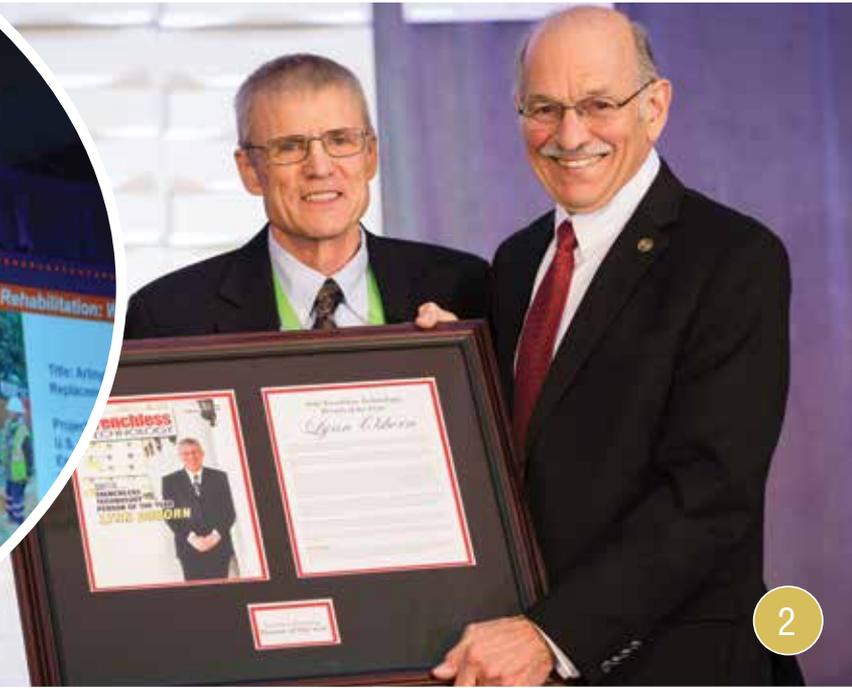
**10.** Hammerhead took home the other Innovative Product Award for its Gas Pipe Slitting System.



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# And the winner is....



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1. Tom Hayes accepts the *Trenchless Technology* Project of the Year Award for Rehabilitation on behalf of Murphy Pipeline.
2. Lynn Osborn (left) is *Trenchless Technology*'s 2016 Person of the Year. Here, he poses for a photo with *Trenchless Technology* Publisher Bernie Krzys.
3. NASTT Chair Dr. Kimberlie Staheli pins Martin Cherrington's Hall of Fame pin to his jacket.
4. The audience participates in a game show, the entertainment at this year's Gala Awards Dinner.
5. (L-R): NASTT Executive Director Mike Willmets, 2016 Hall of Fame inductee Richard Thomasson and NASTT Vice Chair Frank Firsching.
6. 2016 Hall of Fame Inductee Ken Foster gives his acceptance speech at the Gala Awards Dinner.

7. NASTT's fifth Hall of Fame Class (L-R): HDD pioneer Martin Cherrington, Insituform's Ken Foster and engineer and NASTT founding member and chair Richard Thomasson.
8. (L-R): *Trenchless Technology* Editor Jim Rush and Managing Editor Sharon Bueno present the *Trenchless Technology* Project of the Year Award for New Installation to Michels Corp.'s Greg Goral and Tim McGuire.
9. Mary Neher (middle left) of Bennett Trenchless Engineers and Rory Ball (middle right) of Mott McDonald received the Ralston Award for Young Trenchless Achievement.
10. Derek Potvin, NASTT immediate past chair, receives the NASTT's Chair Award for Lifetime Service at the Gala Awards Dinner.



1. Chris Macey of AECOM presents to attendees at NASTT's 2016 No-Dig Show.
2. NASTT Board Member Dennis Walsh (left) and Bo Botteicher (right) present the Outstanding Paper in New Installation Award to Matthew Olson of Staheli Trenchless Consultants. Christopher Price of Staheli Trenchless Consultants was co-author on the paper.
3. NASTT Hall of Famer Dr. Ray Sterling talks to attendees during a technical session.
4. The educational tracks at NASTT's No-Dig Show are one of the biggest draws to the conference each year.
5. NASTT's Student Scholarship winners came on stage for a photo at the Closing Luncheon on March 23.



## In the classroom

- 6. (L-R): Craig Vandaele, Michels Corp., Don Del Nero, Stantec, Brendan Tippets, BTrenchless, and Dr. Glenn Boyce, McMillen Jacobs Associates, participate in the Micro-tunneling Roundtable, moderated by NASTT's 2016 No-Dig Show Program Chair, Jeff Maier, of C&L Water Solutions (far right).
- 7. Dennis Walsh (left) and Bo Botteicher (right) present the Outstanding Paper in Rehabilitation to John Matthews of Pure Technologies, Law-

rence Pultz of CPH, Inc. and Alan Ambler of the City of Casselberry, Fla. Ryan Stowe was also co-author on the paper.

- 8. NASTT's 2016 No-Dig Show Program Vice Chair Jennifer Glynn moderates the Stormwater Condition Assessment and Rehabilitation Roundtable.
- 9. NASTT's No-Dig Show technical program is second to none in the world of trenchless.





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1. At NASTT's Educational Fund Auction, attendees bid on a wide range of items including electronics, sporting event tickets and trenchless tools and equipment.
2. 2016 Auction Chair Joe Lane poses with auction items.
3. Looks like Ozzy Osbourne, AKA Jeff Maier, is threatening to bite off Mortimer's head! For the record, Mortimer is fake.
4. NASTT sponsors students from numerous universities so they can attend the No-Dig Show and learn more about trenchless technology.
5. In addition to the live auction, a silent auction was also held which included a wide range of items up for bid.
6. Slash, AKA NASTT marketing manager Jenna Hale, shows off a Fender Strat up for auction! Where's the Les Paul?
7. Charlotte Storms (middle) of Rain for Rent presents awards to the 2016 Charles P. Lake Rain for Rent Scholarship winners.
8. Each year, NASTT Student Members are given the opportunity to present a poster on their trenchless research projects to a panel of industry experts.
9. The 2016 Educational Fund Auction and Reception featured Ozzy, Lita Ford, Joan Jett and KISS!
10. (L-R): Maureen Cassin and Stephen Welling present Amazing Trenchless Race awards to Leo Schlinger and Samuel Schlinger from Arizona State University.
11. NASTT's Membership Coordinator, Molly Margosian, and Board Member, Jim Rankin, present the awards for the Student Chapter Presentations: first place Louisiana Tech, second place University of Alberta and third place University of Texas at Arlington.
12. Maureen Cassin and Stephen Welling present Amazing Trenchless Race awards to Charles Calhoun (middle left) and Ethan Nugent (far right).



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Going  
once...



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## Looking Ahead

### NASTT's 2017 No-Dig Show Returns to Washington, D.C.

In 2017, NASTT's No-Dig Show will return to the nation's capital for the first time since 2011. The conference will be held at the Gaylord National Hotel and Convention Center, April 9-13, 2017.

NASTT's No-Dig Show has been gaining momentum in recent years with a record number of attendees in 2015 followed by record exhibitors in 2016. Infrastructure renewal and replacement issues have also been thrust into the national spotlight following the water crisis in Flint, Michigan. Repairing and replacing aging infrastructure using cost-effective, non-disruptive methods is no longer just an option – it's a necessity. For more than 25 years, the goal of NASTT's No-Dig Show has been to spread the word about trenchless technology and to educate municipalities on its benefits in an effort to grow owner acceptance. With momentum clearly building, NASTT's 2017 No-Dig Show will be a must-attend event.

NASTT's 2017 No-Dig Show will once again offer six tracks and more than 160 peer-reviewed, non-commercial presentations,

including case studies detailing environmentally friendly trenchless solutions and cost-saving opportunities for municipalities and utilities.

There is still time to submit an abstract for the 2017 show. The abstracts must be submitted electronically by June 30, 2016. Prospective authors are invited to submit a 250-word summary outlining the scope of their paper and the principal points of benefit to the trenchless industry.

NASTT's volunteer Program Committee has grown to more than 100 members! These industry experts will be meeting in Washington, D.C. in August and reviewing every abstract that is submitted. Authors will be contacted in late September regarding the status of their acceptance in NASTT's 2017 No-Dig Show Technical Program. For more information, visit [nodigshow.com](http://nodigshow.com). For more info on NASTT and ways you can get involved, visit [nastt.org](http://nastt.org).



**NASTT's 2016 No-Dig Show Program Chair Jeff Maier hands the reins over to Vice Chair Jennifer Glynn at the closing luncheon in 2016. Glynn will serve as NASTT's 2017 No-Dig Show Program Chair in Washington, D.C.**



**Throwback! NASTT's No-Dig Show returns to the nation's capital in 2017. George Washington made an appearance at the ribbon cutting back in 2011!**

# Call for Abstracts



**Submission Deadline: June 30, 2016**

The North American Society for Trenchless Technology (NASTT) is now accepting abstracts for its 2017 No-Dig Show in Washington D.C. at the Gaylord National on April 9-12, 2017. Prospective authors are invited to submit a 250-word abstract outlining the scope of their paper and the principal points of benefit to the trenchless industry. The abstracts must be submitted electronically at NASTT's website by **June 30, 2016: [nastt.org/abstractsubmission](http://nastt.org/abstractsubmission)**.

**Abstracts from the following subject areas are of interest to the No-Dig Show Program Committee:**

#### Potable Water and Pressure Systems

- Pipeline Inspection, Locating, and Condition Assessment
- Pipe Rehabilitation
- Pipe Bursting
- Emerging Technologies
- Case Studies

#### Wastewater, Storm water, and Non-pressure Systems

- Advanced Pipeline Condition Assessment
- I&I and Leak Detection
- Pipeline and Laterals Rehabilitation
- Pipeline Inspection, Locating, and Condition Assessment
- Cured-in-Place Pipe Lining
- Sliplining
- Pipe Bursting
- Spray Applied Linings
- Grouting
- Manhole Rehabilitation
- Case Studies

#### Energy Pipeline Systems

- Pipeline Inspection, Locating, and Condition Assessment
- Aging System Rehabilitation
- New Trenchless Installation
- Standards and Regulations

#### Trenchless Research and Development

- University and Industry Initiatives
- Education and Training

#### Industry Issues

- Subsurface Utility Engineering
- Submittal Requirements and Quality Assurance/Quality Control
- Project Budgeting and Prioritization
- Funding for "Green" Technologies
- Selection Criteria for Contractors
- Social Costs and Impacts
- Carbon Footprint Reduction
- Sustainable Construction Practices
- Industry Trends, Issues and Concerns

#### New Installations - Tunneling, Boring and Pipe Ramming

- New Concepts or Trenchless Equipment, Materials and Methods
- New Applications for Boring Techniques (Auger Boring and Pipe Ramming)
- Pilot Tube Boring (Tunneling)
- Case Studies

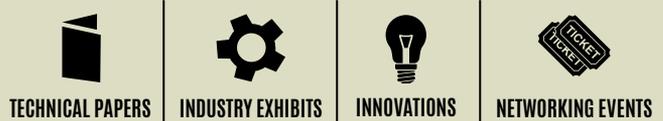
#### Horizontal Directional Drilling (HDD)

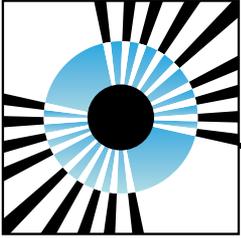
- New Concepts and Applications for Horizontal Directional Drilling Equipment, Materials and Methods
- Case Studies

#### Microtunneling

- New Concepts and Applications for Microtunneling Equipment, Materials and Methods
- Case Studies

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# NASTT'S EYE ON THE INDUSTRY

## OUR MEMBERS IN ACTION

### Underground Solutions

Upper Narrows Pipeline Replacement Project  
Victorville, California



Underground Solutions supplied fusible PVC pipe for the recently completed Upper Narrows Pipeline Replacement project. In the winter of 2010 the Victor Valley Wastewater Reclamation Authority (VWVRA) in Victorville, Calif., sustained damage to several of its sewer interceptors. High flows in the Mojave River caused a blockage which resulted in an overflow event for the system. As part of reestablishing the gravity interceptor system, the new Upper Narrows Pipeline Replacement project was designed.

The project was designed to relocate the main interceptor from the Mojave River to a new line through Old Town Victorville. Tetra Tech's Irvine, Calif., office was hired to develop plans for the wastewater main replacement. Tetra Tech's design was complicated by the presence of various hydrocarbons found in soils around the Narrows project area. Limiting the public's short term and long term exposure to these hydrocarbons became a priority in the design. It was this site condition which dictated that a significant portion of the project would be installed using trenchless methods.

To minimize the impacts of existing hydrocarbons in and around the project area, Tetra Tech incorporated horizontal directional drilling (HDD), microtunneling, and bore-and-jack installation methods to limit the amount of open trench construction. VWVRA was amenable to different pipe materials but were insistent that the final pipe system be a fused system without gaskets.

Both fusible polyvinylchloride pipe and HDPE pipe were approved for the dual-pull 1,750-lb horizontal directional drill segment. To offer equivalent degrees of soil load bearing capability and hydraulic capacity, both

16-in. DR18 FPVC pipe and 20-in. DR9 HDPE pipe were specified in the design documents. Contractors were required to designate which pipe material they would install at the time of bid submittal. The project was completed with two parallel drills of 16-in. FPVC pipe in 24-in. bores.

### The Robbins Company

Chennai Metro  
Chennai, India



In January 2016, a Robbins mixed ground EPB broke through at Chennai Metro, finishing up a challenging second drive that saw the full gamut of difficult conditions. The 1,027 m long second drive for the machine was part of Lot UAA-01 on Line 1 of the city's metro, consisting of two parallel 1.0 km (0.6 mi) tunnels running from the Washermanpet area towards Chennai International Airport.

"We are really proud of our executing team, who have maintained a high standard of quality. We didn't record any water leakage or settlement at the surface, and we have demonstrated a high standard of safety in the tunnel during construction," said Gopal Dey, Sr. Manager for contractor Afcons Infrastructure Ltd.

The 6.65 m (21.8 ft) diameter Robbins EPB was designed to excavate granite, sand, silt and clay with boulders up to 300 mm (12 in.) in diameter. The specialized design utilized a combination of 17-in. diameter disc cutters as well as soft ground tools. Small grippers located around the circumference of the machine's shield allowed for cutterhead stabilization in

harder ground, while additionally reacting the forces needed to pull the cutterhead back from the face in difficult conditions.

The TBM was launched on its initial drive in January 2012 from a 28 m (92 ft) deep starting pit. The TBM was first launched on the second tunnel in February 2015.

The completed sections of tunnel will now be commissioned as part of Line 1, a 32.1 km (19.9 mi) long route in total with 14.3 km (8.9 mi) underground and a total of 17 stations. The southeastern Indian city of Chennai is a rapidly growing technological and industrial center with a population of more than 8.2 million people and a high need for alternate means of transportation.

### Raedlinger Primus Line

Arizona Grand Resort AC Pipe Rehab  
Phoenix, Arizona

Raedlinger's Primus Line system was recently used to complete the rehabilitation of 440 lf of 12 in. asbestos cement pipe (ACP) on a project at the Arizona Grand Resort. Project challenges included heavy traffic and a utility corridor, pipe depth of up to 35 ft due to a pedestrian tunnel above the pipe and multiple bends up to 45 degrees. Open-cut remove and replace was impossible. Jack-and-bore was priced out and it was determined that the Primus Line system would reduce the budget by 60 percent.

The Primus Line process begins with shutdown, cleaning and CCTV inspection of the host pipe. Once the pipeline is properly prepared, the liner is folded and inserted into the host pipe. After connection fittings are attached at each end, the liner is then reverted using compressed air. The liner is reconnected to the existing pipeline utilizing specialty flanged or welded fitting. This liner can withstand pressures ranging from 145 psi up to 900 psi.

The process is applicable to both potable and non-potable systems. The installation for the Arizona Grand Resort project was completed by J. Wise Construction using a JOC contract.

## DCI; Vermeer

HDD Locating  
San Antonio, Texas



Proper location is one of the keys to a successful horizontal directional drilling (HDD) operation. Some would say locating brings the direction to directional drilling.

Knowing the accurate location of the drill tool once it's below ground is pivotal to completing the job on target and on budget. Unfortunately, one thing often gets in the way of this accuracy and that is interference, both passive and active. In addition, some jobsites are more prone to interference as was the case late last year when TH Construction tackled a series of bores for Cargill Food Distribution in San Antonio, Texas. The month-long job brought heating under Cargill's deep freeze cold storage building used to house meat for the state's meat packing industry. This project had the HDD crew putting the new Falcon F5 locating system from Digital Control Inc. (DCI) through its paces.

Cargill expanded the facility, which required an update to the underground heating system. That is where TH Construction, its Vermeer D36x50 and the DCI Falcon F5 with Aurora display came into play.

In addition to varying soil conditions, crews also had to contend with boring under a private rail spur and a ditch before getting under the building to deliver the electric heating system. Underfloor heat is critical to the operation of cold storage warehouses because the manufactured subzero temperatures inside are not contained by the concrete slab floor and go beneath the surface.

The Falcon F5, as well as the Falcon F2, measured interference over a wide frequency spectrum – 4.5 to 45 kHz – and from there, the system gives the operator several optimal frequencies where interference is the lowest.

On this job, that capability translated to crews shaving about one to two hours off of their day – approximately 60 hours total – compared to similar jobs, in like conditions, using the older systems.

In all, the TH Construction crews completed 44 bores at an average of five per day, pulling in 1.25-in. pipe, totaling 300 ft in mixed soil conditions. In addition to locating concerns, the crews also contended with a ditch and private rail spur outside of the building and the rig was setback 60 to 90 ft from the building to achieve the proper depth for the heating system, which is about 3 ft under the cold storage floor.

## Echologics

New Jersey Condition Assessment  
Millburn, New Jersey

New Jersey American Water serves almost 3 million people through 8,600 miles of water and sewer mains ranging in size from 2- to 72-in. in diameter. More than half



of the New Jersey American Water distribution system consists of pre-1960s pipelines that require ongoing pipeline rehabilitation of approximately 100,000 ft of pipe every year. New Jersey American Water invited Echologics, a Mueller Water Products subsidiary specializing in water infrastructure technologies, to participate in a 2014 trial deployment of its pipe assessment technology.

The test: deploy ePulse acoustic-based pipeline condition assessment tools to assess and determine the structural integrity and wall thickness of several miles of problematic cast-iron mains, then analyze the data using Echologics EchoLife software to accurately determine the remaining service life (RSL) of the pipe segments.

The pre-1960 cast iron mains involved in the trial of Echologics ePulse were a water distribution system maintenance challenge. Located in the Millburn-Maplewood area of New Jersey, these mains suffered from frequent leaks and pipe breaks, along with heavy mineral-deposit tuberculation on the internal pipe wall surfaces, a condition that causes significantly decreased water volume and high levels of water discoloration, especially during higher-flow conditions.

The utility's pilot of the new cleaning and lining approach using ePulse technology was performed in two phases, with the level of pipe rehabilitation required based on the RSL data.

The rehabilitation methods involved employing cement mortar lining for pipe segments with service life greater than 30 years, and a polyuria-based structural liner for segments with service life less than 30 years.

The ePulse trial results caused New Jersey American Water to review and revise its long-standing rehabilitation strategy.

## McLaughlin

Rush Creek Interceptor Project  
Hamburg, New York



A McLaughlin On Target steering system was used during auger boring on the Rush Creek Interceptor Project. The massive wastewater pipeline project in Hamburg, N.Y., is expected to last into early 2017. Rush Creek is a project for the Erie County Department of Environment and Planning. The project is designed to abandon an existing wastewater treatment plant. Right now, the plant cannot handle the water capacities it is taking in. The project will also eliminate overflows into Rush Creek.

Spanning more than 8,600 lf, the contractor, Kandey Co., will install a combination of 1,700 ft of gravity and force main sewer line that will be placed within a 48-in. steel casing. Using the McLaughlin On Target system, crews have the ability to steer the drill head. The On Target steering head allows contractors to not only control horizontal on-grade (up and down) changes but also allows for lateral (left to right) direction changes. The new system provides contractors with more control of the auger boring steering head, leading to more accuracy for difficult on-grade bores.

The cutting path — grade and lateral movement — of the steering head is controlled by hydraulic actuated flaps that open and close to keep the head on the intended path. A control station features a hydraulic power pack to control the movement of the steering head, and a built-in water level helps monitor grade throughout the bore. Two halogen lights in the control station indicate lateral (left and right) steering head movements.



# NASTT CHAPTER NEWS

## British Columbia



It's already shaping up to be a good year for trenchless technologies in British Columbia in 2016. Our chapter is continuing its efforts to advance the science and practice of trenchless technology.

We're looking forward to hosting Dr. Alan Atalah of Bowling Green State University and Dr. David Bennett of Bennett Trenchless Engineers as instructors for our upcoming Pipe Bursting Courses. One course will be held in Vernon on June 14 and another course will be held in Victoria on June 16. The courses will cover topics such as types, methods and applications of pipe bursting and take attendees through the planning and preliminary design stage all the way through to construction. For more information please visit [nastt-bc.org](http://nastt-bc.org).

Also, stay tuned for details on the 2017 *Trenchless Technology* Roadshow, which we will once again be hosting with the help of CATT and Benjamin Media.

## Great Lakes, St. Lawrence & Atlantic



The Great Lakes, St. Lawrence & Atlantic (GLSLA) Board of Directors and member volunteers are continuing to work to provide value to our members through training, publications and our website.

In coordination with NASTT, GLSLA hosted a very successful two-day trenchless conference and training session, Oct. 15-16, 2015 at the Hilton Niagara Falls. The conference featured a day of trenchless presentations in four tracks including, Watermain Rehabilitation, Sewer

Rehabilitation, Condition Assessment and New Installation. The first day also included an exhibit hall and networking opportunities. The second day featured NASTT's CIPP Good Practices Course and Lateral Good Practices Course. The event was very well attended with more than 75 attendees and 20 course participants. GLSLA would like to thank the volunteer course trainers and presenters, along with NASTT staff for making the event a great success.

GLSLA's annual magazine is scheduled for release in September 2016. Advertising space is available, so please visit our website for information if you are interested in placing a company advertisement in our magazine. We are also looking for interesting project articles, so if you have been involved in a trenchless project, please consider writing an article about your project so others can benefit from your experience.

GLSLA will once again be promoting trenchless technology at the ACWWA to be held Sept. 18-21, 2016 in Moncton, New Brunswick. The conference will provide an opportunity to learn about and discuss the water and wastewater industry issues with peers in both a technical and social atmosphere.

GLSLA is planning a few upcoming events, including NASTT training courses to be held in the Greater Golden Horse Shoe area, and a trenchless conference in Atlantic Canada. The GLSLA website will be updated with details as these events are finalized. Please visit [glsla.ca](http://glsla.ca).

## Mid Atlantic



The Mid Atlantic Chapter (MASTT) held a very successful Trenchless Tech-

nology, SSES and Buried Asset Management seminar April 6-7, 2016, at the Radisson Baltimore Hotel at Cross Keys, Baltimore, Md. Art Shapiro, P.E., PMP, chief engineer and Wazir Qadir, chief, Urgent Response Project Delivery Section, for the Baltimore Department of Engineering & Construction were the guest presenters, who presented on "Trenchless Technology In Baltimore." The ASCE Maryland Section was co-sponsor of the seminar, which included excellent networking and learning opportunities.

MASTT is planning a Trenchless Technology, SSES and Buried Asset Management seminar for Newark, N.J., Sept. 14-15, 2016. Please plan to support and attend the seminar to enjoy the networking and learning.

MASTT had its annual 2016 Membership and Board of Directors meeting at the NASTT's 2016 No-Dig Show in Grapevine, Texas. MASTT elected its 2016 Board of Directors and Officers at the meeting.

In May, MASTT planned to publish the second annual issue of its *Mid Atlantic Journal of Trenchless Technology 2016*. The publication will be distributed to more than 4,000 water and sewer decision makers in the MASTT Chapter area.

Please visit [mastt.org](http://mastt.org) for more information on chapter events.

## Midwest



The Midwest Chapter (MSTT) is planning a Trenchless Technology, SSES and Buried Asset Management seminar in Detroit, July 20-21, 2016 and in St. Louis, Dec. 7-8, 2016. Please plan to support and attend the seminars to enjoy the networking and learning. MSTT also plans to pub-

lish its *Midwest Journal of Trenchless Technology 2016* in early September.

MSTT had its annual 2016 Membership and Board of Directors meeting at the NASTT's 2016 No-Dig Show in March in Grapevine, Texas. MSTT elected its 2016 Board of Directors and Officers at the meeting.

Please visit [mstt.org](http://mstt.org) to for more information on chapter events.

## Northeast



The newest regional chapter of NASTT has gotten off to a great start. We will be publishing our annual magazine, *Journal of Trenchless Practices*, just before World Trenchless Day in September. We are also revising the former Northeast Trenchless Association website to reflect the new regional chapter with dynamic

improvements to Facebook, LinkedIn and Twitter. We have a great committee working on our first annual regional conference, aiming for early fall. Finally, we are also moving towards collaboration with the Department of Civil Engineering at the University of Massachusetts-Lowell. The intent of the collaboration is to establish a research center relative to trenchless methods, establish a student chapter and host – at the least – an annual regional conference. We are hoping to develop students' knowledgeable in trenchless methods to expand the engineering workforce in the region.

We recently held our annual Board of Directors meeting at NASTT's 2016 No-Dig Show in Dallas and currently hold monthly conference calls to move the new Northeast Chapter to be seen as the leader in trenchless education. We note the light house in our logo is to be a guide to all in understanding trenchless methods.

## Northwest



This year, the 2016 NW-NASTT Trenchless Conference will be held in Edmonton, Alberta, Canada, Nov. 9-10, and planning is underway. Technical lunches in both Edmonton and Calgary will continue as well. Please check our website at [nastt-nw.com](http://nastt-nw.com) for further information on these events.

## Pacific Northwest



The Pacific NW Chapter held its general meeting during NASTT's 2016 No-Dig Show in Grapevine, Texas, in March. We have decided to hold our 2017 bi-annual symposium in January 2017; dates and location will be announced soon. We also decided to spread our wings

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and hold the 2019 Symposium in Portland, Ore. We will also be having a symposium committee meeting in June.

## Rocky Mountain



The Rocky Mountain Chapter hosted its second Utah Training Day in January in Sandy, Utah. The training day included a full slate of paper presentations by regional trenchless experts discussing trenchless techniques and unique case studies from across the region, as well as a full complement of exhibitors.

Looking forward, the Rocky Mountain Chapter will hold its annual regional conference in the Salt Lake City area this year, Oct. 5-6, which will include a full day of regional paper presentations, exhibitors and networking opportunities. The second day will be devoted to an NASTT Short Course. Additionally, the Chapter will be hosting a number of networking events, including young professionals events, project site visits and a clay shoot in October in Colorado.

For more information about upcoming Rocky Mountain Chapter events and how to get involved, please visit [rmnastt.org](http://rmnastt.org), or contact Bo Botteicher, at [bbotteicher@undergroundssolutions.com](mailto:bbotteicher@undergroundssolutions.com).



**The UT Training Day featured presentations on trenchless subject matter within the region.**

## Southeast



The Southeast Chapter (SESTT) is planning a Trenchless Technology, SSES and Buried Asset Management seminar in Miami, Fla., Oct. 12-13, 2016. Please plan to support and attend the seminars to enjoy the networking and learning.

SESTT had its annual 2016 Membership and Board of Directors meeting at NASTT's 2016 No-Dig Show in March in Grapevine, Texas, where the chapter elected its 2016 Board of Direc-

tors and Officers.

SESTT plans to publish the second annual issue of its *Southeast Journal of Trenchless Technology 2016* in early November.

Please visit [sestt.org](http://sestt.org) for more information on chapter events.

## South Central



At NASTT's 2016 No-Dig Show in Grapevine, Texas, the South Central Chapter had its first meeting, which was well-attended with more than 20 people. From that meeting, the Chapter was able to fill all its Board positions. The South Central Chapter is happy to announce its first event, being held at the University of Texas at Arlington (UTA), on Tuesday, Aug. 23 from 9 a.m. to 4 p.m. Lunch will be sponsored for the registered attendees and will be followed by several presentations on trenchless technology. CEUs will be available for all of those in attendance. The Chapter looks forward to helping students, municipalities and consulting engineers learn about the trenchless market and what NASTT has to offer both locally and nationally.

## Western



The Western Chapter had a fantastic turnout for both its Board and general meetings at NASTT's 2016 No-Dig Show in March. As such, committee members were selected for ongoing chapter and outreach efforts, and a program chair was selected to host this year's 12th annual mini No-Dig conference to be held in Las Vegas, Nev., Oct. 17-18, 2016. The conference will be a two-day event, with the first day to include technical presentations and papers selected from this year's national No-Dig Show held in Grapevine, Texas, and the second day to include one of NASTT's Good Practices Courses. We welcome all regional members to attend our conference, and ask that regional members be on the lookout for registration information to be sent out this summer.

The Chapter's WESTT magazine is currently under development, with the Call for Papers deadline due at the end of June. Advertisements deadline closes the beginning of August. We will also be showcasing some of our WESTT volunteers this year, and expect excellent editorial and advertising content that is sure to foster enjoyable and educational reading.

Lastly, Craig Camp, WESTT's immediate past chair, was presented with a mini-Craig bobblehead as a token of appreciation from his fellow directors. As WESTT chair, Craig's contribution to streamlining our annual conference venue solicitation and selection process, among other routine practices and protocol, helped our chapter tremendously. We are fortunate to have his continued participation in the role of immediate past chair as the new WESTT officers step into position, and extend our gratitude for his years of volunteer service.

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**N**ASTT has a network of 11 regional chapters throughout the United States and Canada. With a single NASTT membership, you're automatically enrolled in the national organization, the international organization (ISTT) and also in your regional chapter. Regional chapters offer valuable educational and networking opportunities in your local area. Share your ideas, network with colleagues and find solutions to your everyday challenges.



### British Columbia

The British Columbia (NASTT-BC) Chapter was established in 2005 by members in the province of British Columbia, Canada.

Chapter Contact	Elected Officers
Kieran Field, Chair Phone: (604) 990-4800 E-mail: <a href="mailto:kieran.field@opusdaytonknight.com">kieran.field@opusdaytonknight.com</a> Website: <a href="http://nastt-bc.org">nastt-bc.org</a>	Chair - Kieran Field Treasurer - Preston Creelman



### Great Lakes, St. Lawrence & Atlantic

The Great Lakes, St. Lawrence & Atlantic (GLSLA) Chapter was established in 1995 and represents the Eastern Canadian perspective of the trenchless technology marketplace. GLSLA members are from Ontario, Quebec and the four Atlantic provinces.

Chapter Contact	Elected Officers
Kevin Bainbridge, Chair Phone: (905) 304-0080 E-mail: <a href="mailto:kbainbridge@rcii.com">kbainbridge@rcii.com</a> Website: <a href="http://glsla.ca">glsla.ca</a>	Chair - Kevin Bainbridge Vice Chair - Anna Polito Secretary - Gerald Bauer Treasurer - Derek Potvin



### Mid Atlantic

The Mid Atlantic (MASTT) Chapter was established in 2004 by members from the states of Delaware, Maryland, New Jersey, Pennsylvania, Virginia, West Virginia and the District of Columbia.

Chapter Contact	Elected Officers
Richard Thomasson, Chair Phone: (703) 842-5621 E-mail: <a href="mailto:rthomasson@pirnie.com">rthomasson@pirnie.com</a> Website: <a href="http://mastt.org">mastt.org</a>	Chair - Richard Thomasson Vice Chair - Michael Delzingaro Secretary - Dennis Walsh Treasurer - Tom Wyatt



### Midwest

The Midwest (MSTT) Chapter was established in 1998 to promote trenchless technology education and development for public benefit in Illinois, Indiana, Iowa, Kentucky, Michigan, Minnesota, Missouri, Ohio and Wisconsin.

Chapter Contact	Elected Officers
Jeff Boschert, Chair Phone: (314) 229-3789 E-mail: <a href="mailto:jeffboschert@yahoo.com">jeffboschert@yahoo.com</a> Website: <a href="http://mstt.org">mstt.org</a>	President - Jeff Boschert Vice President - Chris Schuler Secretary - John Milligan Treasurer - Gary Smolinski



### Northeast

The Northeast Chapter was established in 2015 by members in the states of Connecticut, Maine, Massachusetts, New Hampshire, New York, Rhode Island and Vermont.

Chapter Contact	Elected Officers
Dennis Doherty, Chair Phone: (603) 320-6331 E-mail: <a href="mailto:ddoherty@haleyaldrich.com">ddoherty@haleyaldrich.com</a> Website coming soon!	Chair - Dennis Doherty Vice Chair - Ian Mead Secretary - Walter Fromm Treasurer - Babs Marquis



### Northwest

The Northwest Chapter was established in 1988 by members in the Canadian provinces of Alberta and British Columbia, Canada, and in Washington state. In 2009, the Chapter adjusted the geographic area to include the members in the provinces of Manitoba and Saskatchewan, Canada.

Chapter Contact	Elected Officers
Alan Miller, Chair E-mail: <a href="mailto:amiller@nastt-nw.com">amiller@nastt-nw.com</a> Website: <a href="http://nastt-nw.com">nastt-nw.com</a>	Chair - Alan Miller Secretary - Ben Campbell Treasurer - Keith Moggach



### Pacific Northwest

The Pacific Northwest Chapter was established in 2009 by members in the states of Alaska, Idaho, Oregon and Washington.

Chapter Contact	Elected Officers
Chris Sivesind, Chair Phone: (507) 567-2261 x155 E-mail: <a href="mailto:csivesind@akkerman.com">csivesind@akkerman.com</a> Website: <a href="http://pnwnastt.org">pnwnastt.org</a>	Chair - Chris Sivesind Vice Chair - Brendan O'Sullivan Secretary - Brandon Simonds Treasurer - Matt Pease



### Rocky Mountain

The Rocky Mountain Chapter was established in 2009 by members in the states of Colorado, Utah and Wyoming.

Chapter Contact	Elected Officers
Bo Botteicher, Chair Phone: (303) 521-2618 E-mail: <a href="mailto:bbotteicher@undergroundolutions.com">bbotteicher@undergroundolutions.com</a> Website: <a href="http://rmnastt.org">rmnastt.org</a>	Chair - Bo Botteicher Vice Chair - Ken Matthews Secretary - Chris Larson Treasurer - Joe Lane



### South Central

The South Central Chapter was established in 2015 to serve the members of NASTT from Texas and the south central area of the United States.

Chapter Contact	Elected Officers
Larry Johnson, Chair Phone: (800) 856-7473 E-mail: <a href="mailto:ljohnson@hobaspipe.com">ljohnson@hobaspipe.com</a> Website coming soon!	Chair - Larry Johnson Vice Chair - Alan Goodman Secretary - Luis Cuellar Treasurer - Josh Kercho, P.E.



### Southeast

The Southeast (SESTT) Chapter was established in 2001 to serve the members of NASTT from Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee and Puerto Rico.

Chapter Contact	Elected Officers
Jerry Trevino, Chair Phone: (877) 462-6465 E-mail: <a href="mailto:jerry@mechanicaljobbers.com">jerry@mechanicaljobbers.com</a> Website: <a href="http://sestt.org">sestt.org</a>	Chair - Jerry Trevino Vice Chair - Ed Paradis Secretary - J. Chris Ford Treasurer - Kelly Derr



### Western

The Western (WESTT) Chapter was established in 2003 by members from the states of Arizona, California, New Mexico, Nevada and Hawaii.

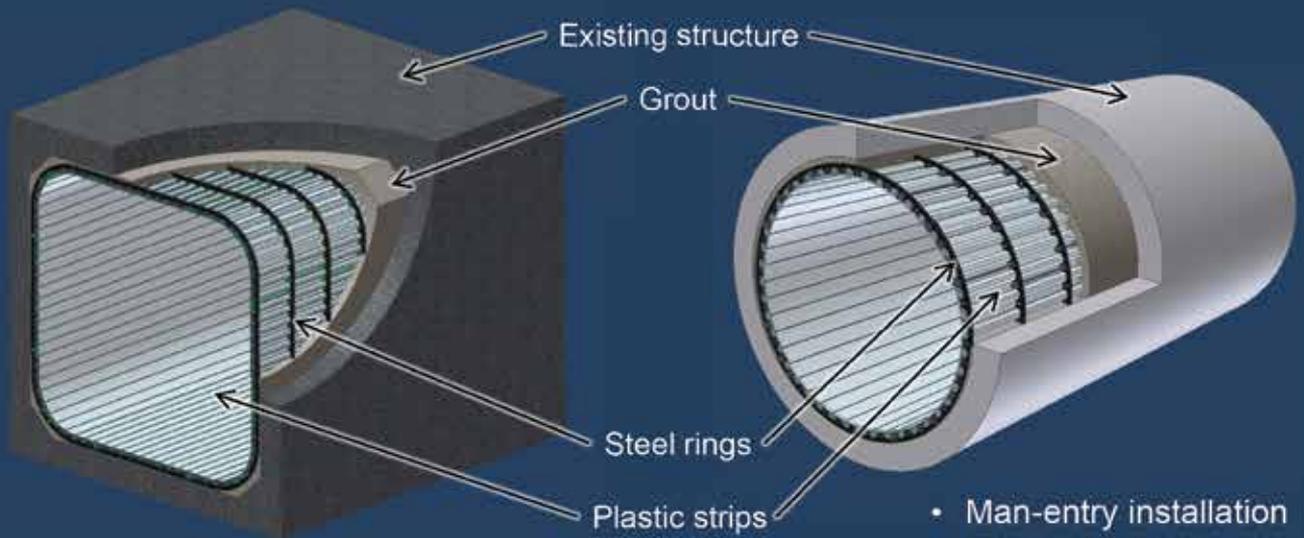
Chapter Contact	Elected Officers
Cindy Preuss Phone: (925) 332-5221 Email: <a href="mailto:cpreuss@hydroscience.com">cpreuss@hydroscience.com</a> Website: <a href="http://westt.org">westt.org</a>	Chair - Cindy Preuss Vice Chair - Brian Avon Secretary - Lisa Arroyo Treasurer - Matt Wallin



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**N**ASTT Student chapters are involved in a number of activities throughout the academic year including field trips, seminars and fundraisers. Members of student chapters also attend and participate in NASTT's No-Dig Show where they present trenchless research posters, participate in competitions and provide event support monitoring the technical paper sessions. There are many benefits for students who belong to a NASTT student chapter – scholarships, networking opportunities, education and career opportunities to name a few. To learn more about NASTT's student chapters, visit [www.nastt.org/student\\_chapters](http://www.nastt.org/student_chapters).



### Arizona State University

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### Bowling Green State University

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### California State Polytechnic University, Pomona

Pomona, California  
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### Clemson University

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### Concordia University

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### Indiana University - Purdue University Indianapolis

Indianapolis, Indiana  
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 E-mail: [dankoo@iupui.edu](mailto:dankoo@iupui.edu)



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# Pipe Ramming through Challenging Subsurface Conditions in the Pacific Northwest

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## SCAPPOOSE INTRODUCTION

The Scappoose project was located in the vicinity of JP West Road in Scappoose, Ore. An aging bridge spanning the South Fork of Scappoose Creek needed to be replaced and the pre-existing sanitary sewer system, two pipelines 6 and 8 in. in diameter, fixed to the bridge underside needed to be replaced as a result. The goal of the project was to install a new sanitary sewer approximately 15 ft south of the new bridge for 150 lf. Recommendation and selection of the preferred trenchless methods was based on the 30 percent design-level plans produced by Kennedy Jenks and the geotechnical report for the new bridge (Pfeiffer, 2012).

Two exploratory borings were drilled along JP West Road for purposes of designing and constructing the new bridge spanning the South Fork of Scappoose Creek. Beneath the creek, the bore logs indicated loose to medium dense silty sand with scattered organics, wood debris, and gravel with some silt and a trace of sand, underlain by medium dense to dense sandy gravel with scattered cobbles. Groundwater was believed to reflect the water level in the South Fork of Scappoose Creek.

## SCAPPOOSE DESIGN

The design team believed pipe ramming would be feasible in the anticipated soil conditions and provided the greatest chance of successful sewer installation without significant settlement below Scappoose Creek. The anticipated settlement was thought to be small due to excavation not taking place during the casing installation. If groundwater and loose or running soils were encountered along the alignment, the soil within the casing would provide resistance at the face and

generally counterbalance effective lateral earth pressures, holding up surrounding soils and preventing settlement.

The presence of wood debris in the geotechnical borings suggested that wood might be encountered as the casing was rammed along the alignment. It was uncertain as to the size and distribution of wood that might be encountered, and as such it was recommended that the casing be sized to a minimum 36-in. diameter to allow for manned entry of the casing if needed. A 36-in. casing would have also been sufficient to engulf the scattered cobbles along the alignment, as pipe ramming can generally accept objects up to 80 percent of the casing inside diameter without issue. It was recommended to maintain a depth of cover equivalent to two casing diameters, or 6 ft in this case, to disperse any near-pipe settlement that would occur so that it would be negligible by the time it propagated to the ground surface. At this depth, groundwater head at the casing crown was anticipated to be 8 feet. Due to the presence of water, the Contractor was required to maintain an adequate soil plug within the casing while the face was passing under the creek.

## SCAPPOOSE CONSTRUCTION

The project was awarded to K/E Excavating with Gonzales Boring and Tunneling as the trenchless subcontractor. Pipe ramming began on Thursday, March 28, 2014. Staheli Trenchless Consultants (STC) was scoped to perform construction inspection for a total of two days on the project and was present on the first day of trenchless activities that included launch of the first 10-ft casing. An STC inspector was on-site on the second day of trenchless activity, which began with setting up the second 10-ft casing in the launch shaft. Upon discussion with Gonzales' foreman, STC learned that the first casing was installed using an auger boring machine (ABM) without spoil removal with the augers. Thus, the spoils were still inside the first casing. Little progress was made the first day due to the significant rainfall throughout the day and the abundance of surface water making its way into the launch shaft (Figure 1).



Figure 1 – (Left) Flooding within the launch shaft; (Right) Channel of surface water flowing into the launch shaft

STC was asked to come back to the site on Wednesday, April 2. By that time 42 ft of casing had been installed. The contractor was required to keep soil within the casing during the ramming operations to provide resistance to flowing or running sand and to hold back hydrostatic pressures. In contradiction to this specified requirement, 35 ft of soil had been augered from within the casing leaving a 7-ft soil plug at the face. The fifth 10-ft casing was welded in place and ramming commenced without complications at an average advancement rate of 2 ft per minute.

The sixth casing was welded to the fifth, two hours after the fifth casing was rammed. The sixth casing was rammed 1 to 2 ft before the casing began to rebound; forward progress was immediately stopped as the air compressor recharged

between blows. Gonzales allowed the hammer to strike the collets for a few minutes before closing the valve to the compressor and stopping the ramming process to evaluate the situation. The crew members informed the inspector that they believe they had hit an obstruction and proceeded to remove their equipment from the shaft and secure the site for the day.

Normally, if an obstruction is encountered with pipe ramming the hammer is disconnected, the casing is cleaned of spoils, and the obstruction is removed from the face manually. Unfortunately, the lead edge of the casing was located directly underneath the South Fork of Scappoose Creek, which was flowing strongly following the significant rainfall over the previous week. The design team was concerned that if Gonzales were to clean out the casing the soils at the face would flow uncontrolled into the casing given the 8 ft of groundwater head.

The crew returned on Thursday and began inserting auger flights into the casing. When they were asked for their construction plan they said they would insert augers all the way up to the face and attempt to auger out the spoils as they jacked the casing forwards with the ABM. They were hoping that whatever was stopping them at the face would be excavated by the cutterhead, allowing for forward progress of the casing. The design team was not alone with their wor-

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ries regarding the groundwater head at the face; before auger boring began Gonzales used chain rigging on the ABM so that they would be prepared to lift the ABM out of the shaft should it flood upon cleaning out the casing (Figure 2).



Figure 2 – Crane ready to pick ABM in the event of significant water flow through casing.

The ABM was able to advance the casing and excavate the spoils without uncontrolled flow of groundwater. There was some water coming from the spoil chute along with the excavated cobbles, however, it was of a manageable flow rate. It took a total of three minutes to advance the remainder of casing six. It became obvious that there was no obstruction at the face. The reason for the inability to advance the casing via pipe ramming when auger boring was successful was still unclear. There were no signs of wood within the spoils, just gravel and small cobbles with silt and sand.

Casings six through eight were installed with the ABM without issue. Halfway through the installation of casing nine the augers bound up, got stuck, and caused the machine to roll approximately 90 degrees. No one was hurt, although, the tracks and ABM had to be realigned and the augers needed to be freed before further progress could be made. Upon moving the ABM back and forth and attempting to rotate the augers intermittently, they were able to free the bound augers and progress could resume once more. Cobbles and gravel were coming out of the chute throughout the auguring process. The casing was advanced another 2 ft before the crew turned off the ABM and exited the shaft.

The foreman informed the inspector that they had a problem with the augers and they suspected they had broken an auger flight. They proceeded to pull the augers from the installed pipe. At 33 ft, the auger flight connection was broken, leaving approximately 50 ft of flights in the casing. The crew spent the next two days attempting to rid the casing of the flights, but they were unsuccessful in removing them in their entirety. It was decided that the remainder of casing nine would be installed via pipe ramming due to their inability to remove the augers.

Casings nine through 13 were installed via pipe ramming without noteworthy issues, completing the drive. The casing came into the reception shaft 1.5 ft lower than design;

although, since the carrier pipes were to operate under pressure the misalignment was not problematic. Upon demobilizing the pipe ramming equipment, the crew began to work on removing the remaining augers and spoil from the casing.

## SCAPPOOSE LESSONS LEARNED

The combined auger boring/pipe ramming project in Scappoose provided many valuable lessons. The first was centered on hitting refusal during the ramming of casing number six. Originally, it was thought that an obstruction was blocking casing six from advancing; however, wood was not observed in any of the spoils, a boulder did not prevent forward progress when the crew used the auger boring machine to jack the casing, and the hammer and casing combination should have allowed progress through the cobbles that were observed in the spoils. The design team questioned why auger boring was capable of advancing the casing past this location when pipe ramming was not. Analysis of the geotechnical report provided some explanation for this phenomenon.

Geotechnical boring #2 was located in close proximity to the launch shaft and indicated silty sand (SM) with scattered organics that were wet, loose, sand of fine to medium grain size, and organics consisting of wood debris. SPT blow counts ranged from 4 to 10 blows per foot. Boring #1 was located near the reception shaft and consisted of gravel (GP), with some silt and a trace of sand with the following characteristics: wet, medium dense to dense, fine to coarse sand, and fine to coarse sub-rounded to rounded gravel. It was expected that the soil adjacent to the casing alignment near the reception shaft would have SPT blow counts ranging from 19 to 50 per 2 in. of penetration. It is likely that the 50/2 in. value was attained as the sampler was hitting a cobble.

It was apparent that the soil transitioned from a looser material with limited gravel, to a dense to very dense poorly graded gravel. Furthermore, the soil at the casing spring-line was saturated and likely 9 to 10 ft below the water level in the South Fork Scappoose Creek. Upon evaluating the likely soil conditions along the alignment and anticipating the transition from the less dense silty sand to the more dense poorly graded gravel, it became apparent that with only 52 ft of casing advanced, there was not sufficient pipe-soil interface friction within the loose soil zone to resist the rebound generated at the face as the casing attempted to enter the dense soil zone.

When the hammer was hitting the casing with no advance, the inspector could see soil ooze out from around the bore along the casing outer surface. The loose saturated conditions, combined with the energy shockwaves traveling from the hammer to the casing to the soil, and the high soil resistance at the cutting shoe on the casing face, were the perfect ingredients for causing the casing to rebound forwards and backwards, essentially oscillating, without permanent advancement. When the crew decided to use auger boring in lieu of hammering, the constantly applied force from the

ABM jacks combined with the augers ability to excavate from within the casing allowed for permanent advancement of the casing. Auger boring would not have been successful in other situations that would prevent advancement with pipe ramming, such as an obstruction.

**CAMAS INTRODUCTION**

The STEP Sewer/Garfield Waterline Relocation Project in Camas, Wash., was spurred by the Burlington Northern and Santa Fe (BNSF) Railway Company. The City of Camas had a waterline within BNSF’s right of way (ROW) and when BNSF decided to move their tracks, Camas was forced to relocate their main. The water main relocation consisted of abandoning the existing line and installing a new 16-in. ductile iron water main for 66 lf across BNSF property from SE Garfield Street to Camas’ existing 16-in. water main in SE 6th Avenue. In addition to the water main installation, a 24-in. sanitary sewer force main was to be installed across BNSF property from the intersection of SE 6th Avenue and SE Polk Street for 94 lf to the other side of BNSF’s ROW to be available for use upon further sanitary system upgrades. The crossings were approximately one third of a mile apart, on each side of the Washougal River.

Otak, Inc. was solicited as the prime design firm, who sought out Apex Companies, LLC to perform the geotechni-

cal investigation. One of the most challenging aspects of the project was the subsurface conditions. Research into the geological characteristics of the area revealed that flood deposits with boulders, cobbles, gravels, and sands were to be expected. Boulders in excess of 10 ft in diameter had been found within the flood deposits. The geotechnical investigation program consisted of four borings, one at each of the proposed bore pit locations, drilled using mud rotary techniques.

Geotechnical borings B1 and B2 were taken along the sanitary sewer alignment at the southern and northern ends, respectively. Generally, both borings indicated medium stiff clayey silt, loose to medium dense sandy silt, and loose to medium dense sand underlain by very dense gravel, cobbles, and boulders in a sandy/silty clay matrix. Standard penetration test blow counts within the underlying dense layer were primarily above 50 blows per 12 in. of penetration. The overlying soil layer had blow counts in the range of 4 to 10 blows per foot, with a blow count of 18 observed near the soil transition. Borings B3 and B4 were taken along the southern and northern water main alignment termini, respectively. These borings indicated a similar trend as the sanitary sewer borings, showing a softer soil layer underlain by a layer of sandy clay/clayey sand matrix with gravel and cobbles. Boulders were not encountered in the sandy clay/clayey sand matrix during boring B3, but were found in boring B4. Apex noted

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that groundwater conditions could not be accurately determined at the time of drilling due to the mud rotary drilling technique used to complete the borings; however, boring B3 was allowed to remain open for several hours at which time groundwater was measured at approximately 18 ft below ground surface, or at an approximate elevation 32 ft.

STC was hired at the 60 percent design level to evaluate feasible trenchless construction methods and develop trenchless related contract documents. To gain a stronger understanding of the frequency and size of the boulders and to gain first-hand knowledge of the soils and their behavior, STC met the Camas Public Works crew on site to observe the excavation of two test pits dug on each end of the sanitary sewer alignment. The southern test pit, located approximately 65 ft south of the railroad, indicated a distinct transition between the overlying medium stiff silt layer and the underlying sandy clay matrix with gravel, cobbles, and boulders. The largest boulders encountered were located near the transition between the two soil types. The first large boulder was unearthed 6 ft below ground surface, translating to an elevation of approximately 43 ft which coincides with the contact transition shown in boring B1. At a depth of 7 ft the soil transitioned from a brown sandy silt to a gray sand with numerous cobbles. Three boulders ranging in size from 2 to 3 ft were discovered by the time the test pit was 8 ft deep. Boulders/cobbles near 1 ft in size were slightly more abundant.

Cobbles and boulders were not encountered in the test pit at the northern terminus of the alignment. Absence of boulders within this test pit is likely attributable to the ground surface being 7 to 8 ft higher in elevation than at the southern end and the maximum achievable excavation depth for the backhoe being 10 ft deep. Based on excavation of the test pits and correlation to the boring logs, it was anticipated that cobbles and boulders would be encountered at elevations less than 42 and 35 ft at the southern and northern ends of the sanitary alignment, respectively. Groundwater was not encountered in either of the two test pits, and the sides of the excavations were stable at a near vertical side slope for the duration of the exploration.

## SUMMARY

A combination of auger boring and pipe ramming were necessary to install casing beneath the South Fork of Scappoose Creek. When the pipe was rammed to refusal, auger boring was used to provide a constant load on the casing, preventing rebound as the casing face advanced from the loose soils into the denser soil strata. Fortunately, the contractor was able to operate the auger bore with the augers retracted, creating a soil plug at the face that provided stability during casing advancement. The soil plug prevented uncontrolled flow of soil and groundwater into the shaft. Later, as the soil transitioned to include an abundance of gravel and cobbles, which bound up the augers, pipe ramming took over as being the most suitable method and was used to complete the drive.

The abundance of cobbles and boulders within the Camas

alignments combined with the necessity to prevent ground surface heave and settlement near the BNSF railroad tracks led the Design Team to specify pipe ramming as the preferred trenchless construction method. Pipe ramming is generally more suitable for preventing heave and settlement of the ground surface and is often used for casing installations beneath railroad tracks. Auger boring has a lesser ability to install casing through boulder-rich ground than pipe ramming, due to the presence of the auger string within the casing that is not able to convey boulders larger than approximately 30 percent of the casing inside diameter. Despite these conventions, the contractor felt more confident using the auger boring method with regards to surface heave.

The contractor did not attempt to get paid for the time required to remove the augers upon encountering an obstruction, which was precluded from Force Account pay in the specification. Attributable to the measurement and payment language in the contract and the Contractor, Owner, and Design Team's willingness to collaborate effectively, the project was completed successfully with fair compensation for the work performed to remove obstructions from the face.

Both the City of Scappoose 130 lf, 36-in. diameter casing installation and Camas' 66 lf and 94 lf, 48-in. diameter casing installations were performed successfully using a combination of pipe ramming and auger boring trenchless construction methods. It was found that depending on the soil conditions encountered during construction, one method that may have been preferred due to rule of thumb conventions, such as using pipe ramming in lieu of auger boring when there is significant groundwater head, may indeed be less preferable if the contractor has more experience and is more comfortable with the method that is less preferred from a purely technical standpoint. Adjustments to the construction method mid-way throughout a project may be warranted, and project teams should work collaboratively to ensure a smooth transition if necessary. The auger boring and pipe ramming technologies allow a relatively effortless exchange between the two methods, which is an inherent benefit of these closely related methods.

## ACKNOWLEDGEMENTS

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**This paper was edited for style and space for publication in *NASTT's Trenchless Today* and omits portions of the paper detailing design and construction of the STEP Sewer/Garfield Waterline Relocation project in Camas, Wash. To read the full version of paper TA-T4-03, visit [nastt.org/technicalpapers](http://nastt.org/technicalpapers).**



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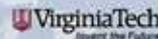
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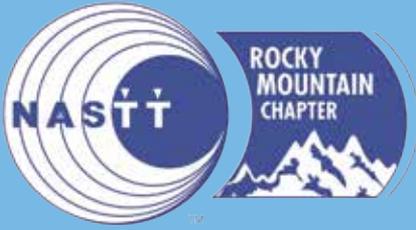
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