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Winter 2020

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EXPERTISE

All

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Growth & Change for NASTT



Welcome New Executive Director Matthew Izzard!



It's a year of change here at NASTT. We are excited to celebrate our 30th anniversary this year! In 1989, NASTT was formed and the growth and change we've seen over the last three decades is nothing short of thrilling. I joined NASTT in 1998 as the municipal representative for the Region of Ottawa-Carleton in Ottawa, Canada. I then became the chair of the Great Lakes, St. Lawrence & Atlantic (GLSLA) Chapter in 2004 and was elected to the NASTT Board of Directors in 2005. I have retired once before...after 35 years in infrastructure management, I retired from the City of Ottawa in 2008 and started the next day as NASTT's executive director! It's been quite a ride, and so, after more than 10 years serving as the executive director of NASTT, I am retiring. But that doesn't mean I'm leaving NASTT. I'm excited for the chance to go back to my volunteer roots and to help with my regional chapter efforts.

During my time as the executive director I have seen tremendous growth in our organization and exciting advancements in the trenchless industry. Our staff has grown from two to six full-time employees who all work tirelessly to promote the good news story that is trenchless! We have published many Good Practices Guidelines, updated several more of our books and have even translated to Spanish and French.

Our membership has continued to grow and flourish, and last year we rolled out three new levels of membership to match the direction of our industry. Now, along with Corporate, Government and Individual membership tiers, we offer a Student Non-Affiliated membership (discounted rates to university students outside of our Student Chapters), Retiree membership for those legends of the industry who wish to stay involved and an International Individual membership for our colleagues living outside of North America. We saw the need to make our membership offerings more inclusive and we're excited to welcome our newest members.

There are so many accomplishments I'd like to recognize our members and dedicated volunteers for, but I would be remiss

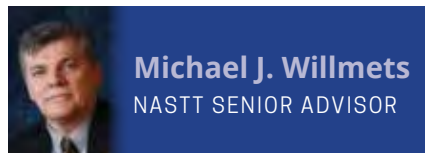
if I didn't highlight something so near and dear to my heart – the No-Dig North conference. 2019 saw a dream of mine and so many others in Canada come to fruition with the huge success of the inaugural No-Dig North. The three Canadian Chapters joined forces and put on what ended up being a runaway hit. The support for this conference blew us away with nearly double the attendees anticipated. Plans are in the works for the 2020 No-Dig North and I hope you'll consider joining us in British Columbia in October.

As I make plans to pass the leadership torch at NASTT, I'm excited to introduce you to the new executive director, Matthew Izzard. Matthew comes to us from the trenchless industry and is the past chair of our sister organization, the United Kingdom Society for Trenchless Technology (UKSTT). I will continue to advise and assist Matthew with the transition until May of this year. I know along with Matthew's leadership and the strength of the NASTT staff and Board of Directors, this transition will be smooth. Welcome Matthew!

Throughout the year we will be celebrating our 30th anniversary with a look back at our early years, steady growth and exciting changes. Please join us in Denver for the NASTT 2020 No-Dig Show where we expect our largest conference attendance yet. I'd love for you to join me in a celebratory toast to the good news story of trenchless technology and NASTT.

Our Society is only as strong as our members and volunteers. With that in mind, we are in great shape! It is with bittersweet sentiment that I bid you all adieu as your executive director, but I'm excited for the next chapter for not only myself but this Society that has been my home and a point of great pride for the last decade.

Cheers!



Matthew has been involved in the no-dig industry since the late 1980s, holding senior positions in sales and business development with equipment manufacturers. He has written and presented more than 40 papers around the world and has been involved in the publication of accredited trenchless training courses and international standards. As Past Chairman of the United Kingdom Society of Trenchless Technology (UKSTT) and his role as the Vice Chairman of the International Society of Trenchless Technology (ISTT), he brings a wealth of experience and knowledge.

"NASTT is the largest and most recognized organization promoting trenchless technology in the world. It is an honor to follow on from Mike Willmets as executive director and recognize the growth and status the Society has achieved under his guidance," he says. "It is inspiring to have the opportunity to continue to develop this legacy with such a dynamic board, council and staff that have so many exciting ideas for the future. We look forward to engaging with both existing and future members of our family to support and create new opportunities."

Based out of Seattle, Matthew has been a member of NASTT since 2017, including his work with the Pipe Bursting Center of Excellence. He is also active in the Pacific Northwest Regional Chapter. Outside of work, Matthew enjoys spending time with his family, running, hiking, supporting Tottenham Hotspur soccer team and trying to explain the laws of cricket.



THANK YOU, MIKE

The NASTT Staff would like to thank you, Mike, for all your years of leadership, advice, dedication and especially your humor!
No one tells a Dad Joke like you!

We wish you all the best in your retirement: relaxation, travel, time with family and friends and a new chapter of volunteerism with NASTT.

We will miss you!

Much love from
Michelle, Jenna, Renee, Carolyn and Jessie



EDUCATION UPDATE



From left: Ophir Wainer, NASTT-BC chair; Greg Tippet, NASTT-NW chair; Craig Vandaele, NASTT chair; Jari Kaukonen, ISTT chair; and Kevin Bainbridge, GLSLA chair.

Runnin' Down a Dream

No-Dig North Goes from Concept to Reality

Back in June 2013, Mike Willmets called me up with a crazy idea. He said, and I quote, "We should do two No-Dig Shows." If I'm remembering correctly my response was something along the lines of, "Over my dead body!"

I had barely recovered from the show in Sacramento a few months prior, and I was knee-deep in recruiting abstracts for the 2014 show. How in the world could we do this twice a year? There was no way we could pull it off.

Fast forward to June 2018, and this crazy idea of Mike's started to become a reality. A lot of things had changed in those five years. We had grown our little staff of two to five. We were working closer with our Regional Chapters and providing marketing support. We continued to grow our volunteer community. Maybe, just maybe, this crazy idea of Mike's could be a reality.

We discussed the idea of joining forces

with our Canadian chapters: Northwest, British Columbia and Great Lakes, St. Lawrence & Atlantic. All of them had had experience hosting training events, and some had experience with doing conferences. The groups were keen on teaming up to put on one larger annual event.

Now for the next order of business — finding a leader. This was going to be no small task, and we needed a volunteer who had great insight as well as the ability to coordinate the efforts of many different teams. We were fortunate that Greg Tippet with Stantec was up for the challenge. I honestly don't think No-Dig North would have been a reality if it weren't for Greg's leadership and dedication.

As the team developed, they enlisted the help of Benjamin Media for various event details. NASTT staff was able to manage four pre-courses and handle marketing support. The chapter volunteers focused on the educational program. It

was all hands on deck, and everyone was making this dream of Mike's a reality.

Flash forward to October, and it's show time! I was so proud to see the No-Dig North team come together and put on an amazing conference. I believe the initial goal was to have around 350 attendees, and we closed out the show with 573. Clearly the industry was craving a No-Dig North.

As you can imagine, planning is already underway for the 2020 show. Please mark your calendar for October 19-21 in Vancouver. The team is always looking for additional volunteer help, so if you would like to be a part of this new educational initiative, please contact me at mhill@nastt.org.



Michelle Hill
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Q&A:

Mike Willmets Leaves His Mark on Advocacy in the Trenchless Industry



Mike Willmets knows all about leadership, coordinating a team and getting the job done. He served four years in the Canadian Army before starting a 35-year career in

infrastructure management. He retired from the City of Ottawa in 2008 and soon took the job of NASTT executive director. Although Willmets had previously served as an NASTT representative for the Region of Ottawa-Carleton, as chair of the GLSLA Chapter and later as a member of the NASTT Board of Directors, it would be a new challenge to coordinate all of the Society's activities across North America.

Now after 12 years as executive director, Willmets is retiring again. As he heads into the next phase, he leaves behind a body of work at NASTT that has seen the organization launch new educational initiatives for both career engineers and young professionals, spread the trenchless word across the continent and take the NASTT No-Dig Show to new heights as a respected, multi-faceted tradeshow experience.

NASTT's Trenchless Today (NTT) caught up with Willmets in January to reflect on his tenure as executive director, the Society's growth under his leadership and how the trenchless industry has evolved over the past decade.

NTT: How do you characterize the growth of NASTT during the time you have served as executive director? What is different about the organization?

MW: Over the last several decades, there has been increasing financial pressure on municipalities and utilities. More taxation is never the popular option, so owners have wisely turned to alternative methods such as trenchless technologies. NASTT is uniquely positioned to provide the non-commercial education required to understand those options and how to source the best trenchless solutions. It's a double political win, too, as trenchless is not only generally cheaper, it's more environmentally responsible.

NASTT has demonstrated steady membership growth, and that growth meant that we could expand our outreach and services. We offer far more training and publications now with more to come. Also, we have grown our Regional Chapters to now be coast-to-coast both in the United States and Canada.

NTT: When you first took the job of executive director, what were some things you were looking to accomplish?

MW: My wish list actually never stopped growing as there was just so much to explore and do. Outreach was very important, and NASTT needed to raise its industry profile. That led to our magazine, *NASTT's Trenchless Today*, and then our complimentary webinar program. We also needed to ensure that more people were interested in trenchless as a career. That meant funding more Student Chapters and creating the Student Chapter Scholarships. Ultimately, the No-Dig Show needed to grow and improve the educational offerings every year. The focus of course was on non-commercial content and professionalism.

NTT: I know one thing you're particularly proud of is the creation of NASTT's Hall of Fame, which was your idea. How did that come about, and has it lived up to your expectations?

MW: The trenchless industry has had so many amazing and inspiring pioneers. Meeting and working with many of these individuals has been an incredible honor, and my idea for an NASTT Hall of Fame just evolved out of pure respect. I presented the concept to the board for approval in 2011 not only as acknowledgment of outstanding trenchless ac-

accomplishments but also as a form of motivation for the entire membership. I believe it has truly been embraced by our industry as the pinnacle of achievement and it is now the centerpiece of our No-Dig Show Gala Dinner.

NTT: What are your thoughts on the current state of the industry? What trends are you seeing and what areas do you see evolving?

MW: The trenchless industry is amazingly strong and certainly proven to be a viable alternative. As a former municipal water works person, it's been remarkable to witness the evolution of pipe rehabilitation methods. That applies to the new diagnostic tools, as well. Owners are much better equipped now to focus their financial resources on the most at-risk segments of the distribution and collection systems. As for new installations, new distance records are being set all the time. Every year we see new trenchless products being launched and showcased at the No-Dig Show. Many of them involve revolutionary robotics and I believe that is an area where we will witness some tremendous advancement.

NTT: Obviously one of NASTT's biggest initiatives has been to broaden its educational reach and offer more opportunities and easier access to training. What do you think still needs to be done in terms of education/training?

MW: Wow! That's a never-ending task. Trenchless is a rapidly evolving industry and NASTT needs to keep current to remain relevant to the needs of the membership. In recent years, NASTT has doubled its suite of Good Practices Guidelines courses and authored companion books for most of those courses. We have a very active committee that reviews existing offerings and recommends funding for new programs. Translation is part of the outreach too, as we offer some of our books in French, Spanish and Portuguese. NASTT is firmly committed to growing those educational programs not only in North America but abroad, as well.

NTT: Let's talk about No-Dig North. I'm sure it's been exciting to bring the No-Dig experience to Canada. What are

your thoughts on how the inaugural conference went last fall?

MW: We had a sense that the show would do well but actually, the results were far above everyone's expectations. My hat goes off to Greg Tippet and the entire planning committee who really showed what volunteers can accomplish. The feedback from attendees and exhibitors was incredibly positive. NASTT is very grateful for Jari Kaukonen, ISTT chair, for coming all the way from Finland to attend and support this new event. Now we'll take that momentum to Vancouver and hit another home run. I'm just one of many people who wanted a quality annual show in Canada and what a thrill to get off to such a fabulous start.

NTT: What have you enjoyed most about working in the trenchless technology field?

MW: It's exciting, even healthy, to challenge yourself and do something in engineering that's new and innovative. My favorite projects were always the trenchless-based ones and I was very fortunate to work for an engineering director who had faith in my "let's try something new" approach. A successful trenchless job is a good news story with cost savings and a green profile! It also opens doors to more trenchless projects as politicians and communities can plainly see the benefits. That's where NASTT helped me in my municipal career as I became increasingly aware of how to plan a successful trenchless project. I can honestly say that knowledge I acquired from NASTT saved my water utility millions of dollars.

NTT: What are your plans following your official departure from NASTT?

MW: I do plan on staying involved by returning to my volunteer member roots. There are too many good people and longtime friends at NASTT to walk away. Thankfully, there will be more time for family and recreation. Camping and canoeing have always been something of a passion for me. My wife and I have a great love of travel, so watch for us at the airports! I proudly belong to several military associations and hope to increase my contribution to those much-needed efforts. After 12 years as executive director and a member since 1998, I'll always look back at NASTT with a sense of accomplishment and I'm very grateful to all the people who were part of that collective effort.



In the TRENCHES

By Andrew Farr



Britt Babcock

AVANTI INTERNATIONAL

growing up, Britt Babcock always took a keen interest in learning about how things tick. As a kid he would build and repair everything from stereos to bicycles, go-carts and car engines. So, it was no surprise when his curiosities led him into the civil engineering program at Colorado State University.

After graduating with a Bachelor of Science, Babcock began his career working as a project engineer in the geotechnical engineering field. He would perform geological evaluations and site investigations for every type of construction – single family homes, multi-story hospitals, commercial buildings and large-scale infrastructure projects.

After working on a wide variety of projects as an engineer, mostly in new construction, Babcock slowly ventured into trenchless technologies, working on projects involving directional boring and CIPP applications on a limited scope. He says his true deep dive into trenchless came in 2011 when he joined the team at Avanti International.

“It was with Avanti that I was able to expand my prior engineering knowledge and experience all the different aspects of the trenchless technology industry,” he says.

Today Babcock has more than 25 years of experience in engineering, construction, sales and management. He took over as president of Avanti in 2018 after serving as vice president of sales for the Houston area-based injection grout company. Avanti grouts are used globally in municipal, industrial, commercial and geotechnical applications to stop water infiltration, stabilize soils, encapsulate hazardous waste and control groundwater.

“I continue to see growth every year,” Babcock says of the trenchless market today. “More and more, municipalities are expanding their knowledge on trenchless technology and its benefits, and often use a proactive versus a reactive approach to rehabilitation. There is also a trend of industry innovators starting to retire which means educating the future workforce is important now more than ever.”

Babcock says the biggest challenge facing the underground construction market is the widely referenced “out of sight, out of mind” nature of

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IN THE TRENCHES

the infrastructure. He says the next phase of growth will depend on how the industry can bring issues to the surface and convince decision makers that water and sewer work should be a top funding priority. He also says further education and advocacy about trenchless solutions can be a driving force – a change he thinks is possible and already starting to occur.

“Often, we see taxpayer money being allotted to other issues and not on water and wastewater rehabilitation. However, with new studies and research on products and applications, the industry is continuing to evolve for the better. Stakeholders are more willing to be open-minded about new technologies and their benefits – both from a cost and safety perspective,” he says.

But Babcock also acknowledges that the mindset toward trenchless technologies and the owner acceptance that has evolved did not happen by accident, noting NASTT as leading the way in training and promoting the benefits of a trenchless approach.

“The industry does a great job in the way of education and training,” he says. “NASTT and the NASTT No-Dig Show have a great agenda of technical sessions and workshops available through the year – including the introduction of NAS-

TT’s Municipal Grouting Good Practices Course. For the past 40 years, Avanti has believed education is the way forward – and we continue to do so.”

In addition, Avanti hosts its own slate of educational events throughout the year, including hands-on grout schools, certification courses, lunch and learns, and technical presentations. “Continuing to educate the industry on best practices is important for ensuring the correct products and applications are utilized every time,” Babcock adds.

According to Babcock, one of the unique aspects about the trenchless industry that consistently piques his interest is the fact that every project is unique with its own situation, conditions and application.

“It is the diversity of project applications that makes being in the trenchless technology field fun and exciting. Every day is a new adventure,” he says, adding that the environmental benefits trenchless provides is one of its most important aspects.

“By engaging trenchless technologies to rehabilitate and repair our aging infrastructure and extend its functional life, trenchless technologies reduce impacts to the environment – we help keep nature natural.”

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Robin Dornfest

LITHOS ENGINEERING

For Lithos Engineering president Robin Dornfest, a career in underground construction wasn't initially what he had in mind.

Unlike many who find their way into the industry, Dornfest says he actually wasn't interested in construction or engineering when he finished graduate school. Rather, he had his sights set on a job working with the U.S. Geological Survey or in academia. But after being offered a job by a small engineering company doing mostly inspection work on residential and commercial jobs, he says had a change of heart.

"I quickly learned that the design and construction industry was both interesting and challenging," he says. "I simply fell into an industry that ended up being my career."

Fast forward a short time later and Dornfest was quickly becoming immersed in construction. He recalls his first experience with a tunneling project – a short microtunnel under a roadway that involved deep shafts and heavy dewatering. He admits he had no clue what went into tunneling design and construction, but soon figured out that a good understanding of subsurface conditions, geology and risk management was the key.

"It was a combination of being able to apply my understanding of subsurface conditions and ground behavior to a project that utilized really cool tools to complete the project," he says. "I was hooked."

Dornfest has now been involved in the underground industry for more than 20 years and has held a number of executive roles with engineering firms focused on tunneling. As president of Lithos Engineering, based in the Denver metro area, he specializes in engineering geology and geotechnical engineering as it relates to water and wastewater, oil and gas, transportation, aggregate producers, mining, and water supply and irrigation. The firm handles projects ranging from geotechnical investigations, pipeline alignments and crossings and geologic hazard evaluation to mitigation design, small dam design, earth retention systems and groundwater control.

Dornfest says he believes the biggest challenge facing the tunnel and trenchless industry today is complacency.

"With an increase in tunnel and trenchless construction around the nation, the risks associated with the work are often being ignored and the trend toward bigger projects with shorter design phases is creating problems," he explains.

"This is not only happening on the design side, but on the construction side, too. With more and more tunnel and trenchless projects around the nation, I am seeing a focus shift toward schedule and cost over experience and risk assessment and mitigation, creating an environment of increased claims and litigation."

Despite those challenges, Dornfest says the state of the industry is extremely strong and advancing at an increased rate. On the advocacy and education end, he was first introduced to NASTT when one of his mentors who brought him along to the No-Dig Show. He says he was surprised and impressed by not only the projects that were presented, but by the quality of the people

In the
TRENCHES



who make up NASTT.

“I have belonged to many professional organizations over my career, but the enthusiasm and passion of the tunnel and trenchless engineers and contractors that I have met through NASTT is unsurpassed,” he says.

In terms of industry development, Dornfest says he sees one particular area that’s lacking, which is the fact that training courses and other educational initiatives, despite their importance, are no substitute for hands-on experience in the field.

“Training is only the start to developing expertise but on its own does not make one an expert. I have seen numerous instances where the lack of actual construction experience has resulted in designs that don’t work and often result in rescue projects and claims. I can’t emphasize enough, how impor-

tant it is for people to spend time in the field, understand how systems work, and learn about sensitivities of different tunnel and trenchless means and methods to the given ground conditions and behavior.”

Dornfest says the combination of project challenges and the advancement of the technologies and equipment that have expanded the capabilities make him want to come to work every day.

“The things I most enjoy are the people, the challenging projects, and the cool toys – I mean equipment! – we get to work with every day,” he says.

“I am so lucky to have stumbled my way into such a niche field filled with amazing clients, engineers, geologists and contractors who are not only passionate about what they do, but love the challenges associated with underground work.”

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Brenden Tippets

NADA PACIFIC CORP.



“Construction is my passion,” says Brenden Tippets. Like so many in the industry and especially those on the contracting side, Tippets takes great pride in his upbringing around construction and says he was inspired from an early age to get into the business. His father worked as a surveyor and Tippets says he has fond memories of helping his dad lay out construction points in residential developments.

“I can remember coming home late at night from football and basketball practice after school, and he would take me out to the construction sites with flashlights, rod and tape to survey ahead of the crews for the next morning,” he says. “I always loved playing in the dirt, and knowing that we were working on something important.”

A bit later in life while in college, Tippets even worked full time for engineering firms while going to school. During the weekend, he’d help his father with building a house for his parents. “Working in construction has been the only thing I have ever known or thought about,” he says.

Tippets’ first trenchless project eventually came in 2003 while working on an 84-in. diameter conventional Akkerman TBM. The project was for the Stapleton airport redevelopment storm outfall under Interstate I-270 in Denver. During excavation of the shafts it became apparent that a conventional TBM would not be suitable in running sands. Tippets worked with Mortenson Construction and the City and County of Denver for several months proposing the alternate method of microtunneling. He then worked with Herrenknecht and Hobas Pipe, to deliver the project successfully.

“I was so appreciative to work with so many great people at Mortenson, the City of Denver, Herrenknecht and Hobas on the project,” he says, calling it a groundbreaking project in the Denver metro area that helped propel the market into microtunneling.

Today Tippets is a veteran of the business and has held a number of positions with leading contractors doing trenchless work and specifically, microtunneling. He recently joined microtunneling contractor Nada Pacific as vice president of operations.

Tippets says he views construction overall and the trenchless market as being strong with a substantial amount of work going on.

“I am seeing larger design-build and CMAR projects coming across North America and the P3 industry has also begun to emerge with smaller wastewater and sanitation districts,” he says. “This can provide an upgrade to their aging facilities with investment over a long period of time.”

But Tippets also echoes much of the widely known challenges hitting contractors, with workforce development being front and center.

“The skilled labor shortage in the field is a large challenge,” he says. “Finding the crews has been and is still a major concern.” He also points to the current standard for reinforced concrete jacking pipe, saying that it needs updating with industry buy-in from contractors, engineers and suppliers.

Tippets has also been involved in supporting the industry through his work with NASTT. He first began speaking at regional conferences for the Rocky Mountain Chapter of NASTT, and later got involved with the Program Committee for the NASTT No-Dig Show. He has served as both a track leader at No-Dig, as well as on the Program Committee, reviewing abstracts and working with the authors to help polish their paper and presentations.

“I believe continual education is very important and will always be needed,” he says. “However, training in the skilled labor force is still lacking any accredited training institute, and the industry could benefit from that.”

Tippets says the challenges of trenchless construction are limitless, but he wouldn’t have it any other way, saying the most complex projects are the most fulfilling. He adds that its especially satisfying in trenchless where everyone involved in the industry can come together to solve problems when needed.

“Being part of projects that build the infrastructure that is the backbone to society is incredible and very humbling,” he says. “There are so many people, even competitors, willing to help and solve problems when they come up. I am so grateful and honored to join Nada Pacific. This new opportunity will bring many new challenges, but working with such an amazing and talented group will be such a blessing in my career and I look forward to working with everyone.”

Andrew Farr is the managing editor of NASTT’s Trenchless Today.


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THE NASTT NO-DIG SHOW RETURNS TO DENVER



The Trenchless Industry's Premiere Conference Looks to Replicate 2015 Success in the Mile High City

By Andrew Farr

The NASTT 2020 No-Dig Show will return to Denver this April and will look to repeat the outstanding success of the conference in 2015 when the show broke its all-time record for attendance with 2,361 attendees.

This year's show will be held April 5-9 at the Colorado Convention Center (look for the giant blue bear!). As NASTT celebrates its 30th anniversary in 2020, the No-Dig Show will bring back all the events and activities that make it the most comprehensive tradeshow for trenchless construction.

If you work in the underground construction industry in any capacity, the NASTT No-Dig Show is a must-attend event. The conference prides itself on attendee experience, presenting not only a first-class technical program but a variety of networking events, awards presentations and many other fun activities fit for both trenchless industry veterans and newcomers.

"We are very excited about the return of the NASTT No-Dig Show to the Colorado Convention Center in beautiful downtown Denver, the site of the record-setting 2015 show," says Joe Lane, vice president of international operations for Aegion's Infrastructure Solutions

Platform and the NASTT 2020 No-Dig Show program chair. "This year is well on its way to beating all previous attendance records as well as offering the largest exhibition space ever. We hope you will join us to experience the myriad of educational events at the greatest show in the trenchless industry!"

The NASTT No-Dig Show engages all industry segments – municipalities, engineers, contractors, manufacturers and service providers – and showcases the latest advancements across the trenchless technology marketplace. One of the unique aspects of the conference is the ease of access to trenchless industry pioneers, who are always on hand. Attendees have the opportunity to get in front of these experts throughout the week at technical presentations and during networking time to learn directly from the industry thought leaders.

The conference's technical program features more than 160 peer-reviewed, high-quality technical papers, as well as opportunities for continuing education units (CEUs). The topics focus on both trenchless new installation and rehabilitation. The exhibit hall is also a can't-miss aspect of the show. Since 2015, the number of exhibiting companies has

consistently increased, culminating in more than 200 last year. Conference organizers are expecting to again surpass the 200-exhibitor mark this year. If you're looking for a particular company that provides trenchless equipment, products or services, you will likely find it at the No-Dig Show.

Attendees can begin planning their 2020 No-Dig Show experience, learn about the networking events, view speaker information and connect with other attendees by using the official 2020 event app. To download the app, download "CrowdCompass AttendeeHub" from your app store. Then, search "NASTT" to join.

For NASTT and the trenchless industry, it will be a fitting return to the Mile High City, as Denver is widely recognized as a major engineering hub in the United States and home to many consulting firms, contractors and service providers in the trenchless space. The show's location at the Colorado Convention Center in the heart of downtown Denver also offers many options for outside meetings and down time, located just minutes from numerous local restaurants, bars, hotels and the 16th Street Mall.



TOP-NOTCH TECHNICAL PROGRAM

Pre-conference courses will kick things off on Sunday, April 5: the NASTT Trenchless Technology Short Course – Rehabilitation (8 a.m. – 12 p.m.); the NASTT Trenchless Technology Short Course – New Installation (8 a.m. – 12 p.m.); and the NASTT Municipal Sewer Grouting Good Practices Course (8 a.m. – 12 p.m.).

The NASTT No-Dig Show's top-notch technical program is organized by NASTT's all-volunteer Program Committee, which works throughout the year to bring attendees the best presentations in the industry.

The 160 peer-reviewed papers to be presented put the spotlight on a wide range of trenchless topics, including horizontal directional drilling (HDD), cured-in-place pipe rehabilitation (CIPP), microtunneling, inspection, asset management, pipe jacking and ramming, water and sewer rehabilitation, inspection, project planning and risk management. Papers are presented in a six-track schedule and grouped mostly by subject matter so attendees can choose from six presentations at any given time. These presentations highlight innovative projects and lessons learned from case studies, present thought leadership discussions, as well as unique and challenging applications of trenchless technologies and methods.

A popular recent addition to the technical program is the No-Dig Show forums – 50-minute panel discussions that encourage audience participation. This year, the show will include three such forums. On Monday, April 6, a Service and Lateral Rehabilitation Forum will be held from 3:45 – 4:35 p.m., moderated by John Matthews, director of the Trenchless Technology Center at Louisiana Tech and this year's program vice chair. On Tuesday, April 7, the forums will continue with a CIPP Forum from 8 – 8:50 a.m., moderated by Cindy Preuss of HydroScience Engineers. A third Innovative Products Forum will be presented later in the morning on Tuesday from 10:20 a.m. – 12 p.m. The Innovative Products forum will be moderated by new NASTT Executive Director Matthew Izzard and will showcase the products and technologies that are this year's finalists for the Abbott Innovative Product Awards for Rehabilitation and New Installation.

As has been the case on Day 3 for the past several years at the NASTT No-Dig Show, Wednesday, April 8, will serve as a Gas Industry Day and will feature a slate of presentations devoted to trenchless construction in the gas industry. Wednesday afternoon will also include a slate of post-conference courses including: the NASTT Sewer Laterals Good Practices Course (2:30 – 6 p.m.); the NASTT Cured-in-Place Pipe Good Practices Course (2:30 – 6 p.m.); the NASTT Gas Good Practices Course (2:30 – 6 p.m.); the NASTT Horizontal Directional Drilling Good Practices Course (2:30 – 6 p.m.); the NASTT New Installation Methods Good Practices Course (2:30 – 6 p.m.); and the NASTT Pipe Bursting Good Practices Course (2:30 – 5 p.m.).

Thursday, April 9, will feature more post-conference courses including the NASTT Horizontal Directional Drilling Good Practices Course (7:30 a.m. – 12 p.m.); the NASTT Cured-in-Place Pipe Good Practices Course (8 a.m. – 12 p.m.); the NASTT New Installation Methods Good Practices Course (8 a.m. – 12 p.m.); and the NASTT Pipe Bursting Good Practices Course (8:30 a.m. – 12 p.m.).

EVENTS



KICK-OFF BREAKFAST & ENTERTAINMENT

Monday, April 6

7:30 AM – 9:15 AM

EXHIBIT HALL HOURS

Monday, April 6

11:45 AM – 3:45 PM

Tuesday, April 7

12:00 PM – 3:30 PM

Wednesday, April 8

10:00 AM – 12:30 PM



NASTT'S 19TH ANNUAL EDUCATIONAL FUND AUCTION & RECEPTION

Monday, April 6

5:30 PM – 7:00 PM



GALA AWARDS DINNER

Tuesday, April 7

Reception: 6:00 PM – 7:00 PM

Dinner: 7:00 PM – 10:00 PM (ticketed event)

CLOSING LUNCHEON

Wednesday, April 8

12:30 PM – 2:00 PM

POPULAR NETWORKING EVENTS ARE BACK

As is typical with most conferences, main events for the NASTT No-Dig Show begin on Monday, but the official first day is Sunday, April 5, which will include Regional Chapter meetings, a Student Orientation Meeting and Dinner, as well as a Young Trenchless Professionals Networking Reception. Please reference nodigshow.com or your official Conference Preview for a full schedule of events.

On the morning of Monday, April 6, the conference will get under way with its annual Kick-Off Breakfast from 7:30 to 9:15 a.m. During the breakfast, NASTT will introduce its incoming board members for 2020 (turn to page 26 for more!) and preview the week's activities for attendees. NASTT will also present its 2019 Outstanding Papers in Rehabilitation and New Installation Awards and its first-ever NASTT Volunteer of the Year Award.

Also being recognized are the *Trenchless Technology's* 2020 Person of the Year and the recipients of its 27th annual Projects of the Year for Rehabilitation and New Installation.

The breakfast will conclude with a talk

from the keynote speaker, Staff Sergeant Keni Thomas, a U.S. Army Ranger veteran who was deployed in the Battle of Mogadishu in Somalia in 1993. The conflict was chronicled in the popular book and movie "Black Hawk Down."

On Monday night, NASTT's 19th Annual Educational Fund Auction & Reception will be held from 5:30 to 7:30 p.m. The auction benefits NASTT's educational initiatives and is known for its themed fun. This year, NASTT is featuring a Wild West Saloon theme, so come wearing your cowboy boots and your best western attire for the auction's annual costume contest! Prizes will be awarded. The auction will also feature a Hawaii vacation raffle and 50/50 raffles. Since starting the auction 2002, NASTT has raised more than \$1.2 million to provide targeted trenchless training courses to the industry, publish trenchless resources manuals and sponsor university students' attendance at NASTT's No-Dig Shows, as well as award scholarships.

On Tuesday April 7, NASTT will host its annual Gala Awards Dinner featuring the induction of NASTT's 2020 Hall of Fame Class: the late James "Jim" S. Barbera, founder of Barbco; Tom Marti, vice president of engi-

TRENCHLESS FORUMS

SERVICE AND LATERAL REHABILITATION FORUM
Monday, April 6
3:45 PM – 4:35 PM

CIPP FORUM
Tuesday, April 7
8:00 AM – 8:50 AM

INNOVATIVE PRODUCTS FORUM
Tuesday, April 7
10:20 AM

neering and technology for Underground Solutions, Inc., part of Aegion Corp.; and Lynn Osborn, retired, formerly of Insituform Technologies. This will be the ninth class of inductees to join NASTT's Hall of Fame honoring trenchless industry trailblazers. The Gala Awards Dinner also features the presentation of NASTT's Abbott Innovative Product Awards, NASTT's Chair Award for Distinguished Service and the Ralston Award for Young Trenchless Achievement.

On April 8, the No-Dig Show will continue its Wednesday tradition and host Gas Industry Day. This special program will feature a technical paper track specifically for those involved in the oil and gas pipeline industry. Attendees not looking to attend No-Dig in its entirety can register exclusively for Gas Industry Day, which includes admittance to track sessions, an exhibit hall pass, access to Wednesday's Closing Luncheon and the NASTT Gas Good Practices Post-Conference Course on Wednesday. Attendees can earn CEUs/PDHs for the Track Sessions and the Gas Good Practices Course.

The NASTT No-Dig Show Closing Luncheon at 12:30 p.m. on Wednesday will be the final event for NASTT's 2020 No-Dig Show. The luncheon provides a recap of NASTT's initiatives going forward as No-Dig's next program chair, John Matthews of the Trenchless Technology Center, will preview NASTT's 2021 No-Dig Show in Orlando, Florida. For more info, visit nodigshow.com, email conferences@benjaminmedia.com or call 330-467-7588.

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

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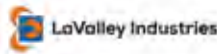
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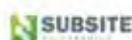
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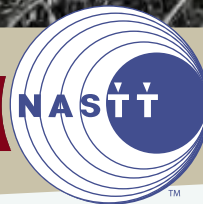


Call for Abstracts

Submission Deadline: June 30, 2020

March 28 -
April 1
2021

Orange County
Convention Center
Orlando, FL



MARCH 28-APRIL 1 | ORLANDO, FL

NO-DIG SHOW

2021

The North American Society for Trenchless Technology (NASTT) is now accepting abstracts for its 2021 No-Dig Show in Orlando, Florida at the Orange County Convention Center on March 28-April 1, 2021. 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, 2020: nastt.org/no-dig-show.

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
- Differing Site Condition Claims

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

Questions?

Please contact:

Michelle Hill

NASTT Program Director

E: mhill@nastt.org

P: 888-993-9935

For more
information visit
nodigshow.com



The No-Dig Show is owned by the North American

Society for Trenchless Technology (NASTT), a not-for-profit educational and technical society established in 1990 to promote trenchless technology for the public benefit. For more information about NASTT, visit our website at nastt.org.



A Legacy of Trenchless Leadership

NASTT to Honor 2020 Hall of Fame Class in Denver

NASTT is pleased to announce the inductees of the Society's ninth Hall of Fame class. This year, three new inductees are joining this celebrated group of trenchless technology innovators and pioneers: the late James "Jim" S. Barbera, founder of Barbco; Tom Marti, vice president of engineering and technology for Underground Solutions, Inc., part of Aegion Corp.; and Lynn Osborn, retired, formerly of Insituform Technologies.

NASTT and the trenchless community will recognize and reflect on the careers of the 2020 Hall of Fame class as the inductees will be honored on the evening of April 7 at the Gala Awards Dinner at the NASTT 2020 No-Dig Show in Denver. The new inductees will join a distinguished group of trenchless icons who have helped transform the underground construction industry.

Jim Barbera, founder of Barbco, dedicated much of his career to the advancement of trenchless technology manufacturing, and much of his family, who are heavily involved in Barbco today, carry on his legacy. Tom Marti is a true industry pioneer thanks to his patents on Fusible PVC and his development of guidelines for its use in trenchless installations. Lynn Osborn has been a leader and advocate in trenchless, still active in the industry today despite his retirement from Insituform in 2014. He was named *Trenchless Technology's* Person of the Year in 2016.

"The NASTT Hall of Fame inductees for 2020, like all our past inductees, continue to exemplify extraordinary leadership and innovation," says outgoing NASTT Executive Director Mike Willmets, who was instrumental in establishing the Hall of Fame. "The Hall of Fame has truly been embraced by our industry as the pinnacle of achievement."

NASTT Hall of Fame Inductees (2012 - 2019)

2012

Frank Canon
Bernie Krzys
Gary Vermeer (1918-2009)

2013

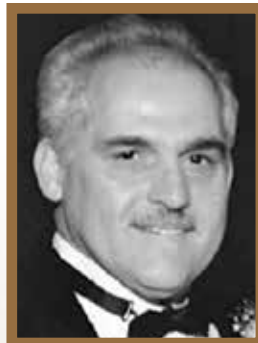
Dr. David Bennett
Ed Malzahn (1921-2015)
Eric Wood (1935-1994)

2014

Bob Affholder
Joe Loiacono
Dr. Ray Sterling

2015

David Magill, Jr. (1943-2014)
Ron Halderman
Kaleel Rahaim



James "Jim" S. Barbera (1940-2019)

Founder,
Barbco Inc.

James "Jim" S. Barbera founded Barbco, a family-run manufacturing company, in 1989. Jim served in the U.S. Army and worked for the police department in Canton, Ohio, before going into construction and the pool solar heating business.

Jim then started working at American Augers for his brother, Leo, in 1979. During his 10 years there, Jim oversaw the sales department and had oversight of several initiatives including the reconditioning of a 19-ft Robbins tunnel boring machine and being an active organizer in the auger boring schools that were held in Arizona. After Leo sold American Augers in 1989, Jim continued in the industry and started Barbco. As Jim saw opportunities in the trenchless industry, Barbco grew and expanded its manufacturing capabilities and product line to equipment like directional drills and pilot tube machines that would go on to have a tremendous impact on the industry.

Jim and his brother, Leo, were well known within the trenchless industry. Both were recently honored by the Trenchless Technology Center at Louisiana Tech University with Lifetime Achievement Awards for their contributions to the industry. A new training and educational building, the Barbera Education, Research & Training facility, is currently being built on campus. Jim is survived by Frances, his loving wife of 56 years, their children James, Christina, Anthony and David, 12 grandchildren and one great-granddaughter.



Tom Marti

Vice President,
Engineering & Technology, Underground
Solutions, Inc., Part of Aegion Corp

Tom is vice president of engineering and technology for Underground Solutions, Inc., part of Aegion Corp. in Chesterfield, Missouri. He has been working for Underground Solutions since August 2002, more than 17 years.

2016

Martin Cherrington
Ken Foster
Richard Thomasson

2017

John Hemphill
David T. (Tom) Iseley
Roderick W. (Rod) Sutliff
(1934-2014)

2018

Chris Brahler
Ian Doherty
George Ragula

2019

Maynard Akkerman
Chris Macey
Robert Westphal



Tom is a patent holder for the fusion and formulation patents for Fusible PVC. He also led the development of the installation guidelines for the use of Fusible PVC for trenchless installation including HDD, and also pipe bursting and sliplining. Fusible PVC was developed at Underground Solutions in 2003 and went commercial with the first fused PVC horizontal directional drill installation in 2004. Since then Fusible PVC has grown into a mainstay trenchless pressure pipe material used in municipal water systems, wastewater systems and for the undergrounding of high voltage electrical power cables in PVC conduit and casings.

Tom has authored multiple peer reviewed papers regarding Fusible PVC and its use in trenchless installations. He has been a member of NASTT since 2010 and also supports the industry through other associations. Tom participates with the American Water Works Association, having served on its C900, C605, and M23 subcommittees, as well as ASTM International's F17 plastic pipe subcommittees dealing with PVC and trenchless installations.

Tom earned a bachelor's in civil engineering from Lehigh University and resides in Marshall Township, Pennsylvania, with his son, Mike, and daughter, Laura.



Lynn Osborn

Retired,
Insituform Technologies

Lynn Osborn spent his entire professional career working in the water and wastewater industries, with 35 of those years in the trenchless technology industry. He joined what is now known as Aegion (Insituform Technologies) in 1984 and spent 31 years planning,

designing and constructing sewers, water lines and water and wastewater treatment plants as a trailblazer in the industry. After spending more recent years concentrating on engineering and R&D, Lynn retired in 2014.

He took on a part-time role as the technical director of the

National Association of Sewer Service Companies (NASSCO), an organization where he volunteered over the years. His NASSCO career included reviewing and writing for publications, presenting papers, organizing technical sessions and workshops, teaching training courses and rewriting the Inspector Training and Certification Program CIPP Manual. Lynn recently stepped down as technical director and became president of the American Society of Civil Engineers' Utility Engineering & Surveying Institute. Lynn enjoys spending time with his wife of 52 years, Ivy, as well as his daughters' families, Julee and husband Dennis and Valerie and husband Ryan. He also enjoys being grandpa to two granddaughters and two grandsons, ranging in age from seventh grade to mid-20s.

NASTT's Hall of Fame was created by the NASTT Board of Directors to celebrate the Society's most outstanding and accomplished members who have made a lasting impact on the trenchless industry. Inductees may be elected from any NASTT membership category. The NASTT Board of Directors met last year and voted these trenchless icons as members of the 2020 class. Jim Barbera, Tom Marti and Lynn Osborn are the ninth Hall of Fame class to be commemorated. Congratulations to the new inductees!

To learn more about NASTT's Hall of Fame and its inductees, visit nastt.org. The NASTT 2020 No-Dig Show will be held April 5-9 at the Colorado Convention Center in Denver. For details, visit nodigshow.com.



SETTING *the* TONE

**Experience and Wide-Ranging
Expertise Define NASTT's 2020
Board of Directors**

As a premier organization for underground construction professionals, NASTT prides itself on being the go-to resource for all things trenchless technology. The Society engages its members in a number of ways, presenting educational resources, activities, national and regional conferences, networking events and much more. These initiatives help to inform trenchless professionals about the innovative work going on across the industry. Most of them can be traced back to one group of individuals who set the tone for the organization – the NASTT Board of Directors.

The Board of Directors is composed of the ultimate trenchless industry volunteers, devoting their own time to help coordinate all activities and events on behalf of the membership. The Board is made up of 20 officers and directors from across North America who are elected by the Society's members each fall.

Ending their tenure on the Board in 2019 were Joe Lane of Aegion, Jeff Maier of Garver and Dennis Walsh of PSE&G. NASTT would like to thank Joe, Jeff and Dennis for their outstanding contributions and looks forward to continuing to work with them in other facets of the Society.

With these great volunteers leaving, NASTT is very excited to welcome to the Board: Richard (Bo) Botteicher, P.E., vice president, Aegion Corp., Dan Buonadonna, P.E., global technology leader at Jacobs, and Chris Knott, lead trenchless estimator, BTrenchless. Welcome to the Board, gentlemen. Meet NASTT's Board of Directors for 2020!

Officers



CHAIR & INTERNATIONAL REPRESENTATIVE

Craig Vandaele

General Manager of Alternative Delivery and Business Development, Michels Corp.

Craig Vandaele is the general manager of alternative delivery and business development for Michels Tunneling, a division of Michels Corp. Craig has more than 20 years of experience in the North American tunneling and trenchless technology industries. His vast experience includes design, inspection, construction and construction management of trenchless projects throughout North America.

Craig has a deep understanding of the complexities of trenchless projects. In his 11 years at Michels, he has served as the project manager on many significant tunneling, HDD and cured-in-place pipe (CIPP) rehabilitation projects. Among them are the McOrmond Drive Sanitary and Storm Sewer Trunks in Saskatoon, Saskatchewan, Canada; Big Lake Offsite Gravity Portion (W14) in Edmonton, Alberta, Canada; Vancouver City Central Transmission Project, Vancouver, British Columbia, Canada; and Upper Northwest Interceptor Sections 3 & 4 in Sacramento, California. He has worked on projects that include conventional tunneling, microtunneling, EPBTBM, pipe jacking, pipe bursting, CIPP and shaft construction of various types and sizes.

Craig is proud to be a leader and an advocate of the trenchless technology industry. He is active in many other industry organizations, including NASTT's Northwest Chapter (past chair) and the Tunnel Association of Canada (TAC). Craig has also co-authored papers for several NASTT No-Dig Shows.



VICE CHAIR

Alan Goodman

Strategic Account Sales Manager, HammerHead Trenchless

Alan Goodman has more than 18 years of experience in the underground construction industry. Alan began his career in the auger boring industry as a sales representative and is currently employed with HammerHead Trenchless as Strategic Account Sales Manager in the United States and Canada. After learning Japanese in high school, Alan studied abroad in Japan and served as an Ambassador for the Rotary International exchange program. Alan completed his education with a B.A. in International Business from the Stephen F. Austin State University in East Texas and had the opportunity to manage the Asia/ Australia business and utilize his Japanese.

During his tenure at HammerHead Trenchless, he has worked closely with municipalities, engineering firms and contractors around the world providing customer training, technical support, pre-project planning, project specifications, and installations for pipe ramming, pipe bursting and slitting, cured-in-place pipe (CIPP) and other trenchless projects.

Alan currently serves as Vice Chair on NASTT's National Board and sits on the Program Committee. He also serves on the board of NASTT's South Central chapter, which includes Oklahoma and Texas.

Alan is also an active member of the following industry associations: Distribution Contractors Association (DCA), American Gas Association (AGA), Pipe Line Contractors Association (PLCA), Pipe Line Contractors Association of Canada (PLCAC) and the National Utility Contractor's Association (NUCA).





SECRETARY

**Greg Tippett,
P.Eng.**

**Regional Delivery Lead,
Western Canada Water Group,
Stantec Consulting Ltd.**

Greg Tippett is the regional delivery lead for the Western Canada Water Group at Stantec Consulting Ltd. He is currently responsible for the group's project delivery and quality control. Greg graduated from Lakehead University in 2003 and has been working as a consulting engineer in Alberta's Capital Region since. Throughout his career, Greg has specialized in the design, assessment and construction of municipal underground infrastructure. Greg has successfully designed and implemented a number of projects within the Capital Region that included the use of several trenchless technologies. His past trenchless experience includes case bore, pipe jacking, horizontal directional drilling, microtunneling and conventional tunneling.

Greg has been an active member of the Northwest Chapter of NASTT (NASTT-NW) since 2009. In 2010, Greg joined the NASTT-NW Conference planning committee and has never looked back. Since then he has served in many different capacities on these committees, including conference chair for the 2016 and 2018 conferences. In 2019, Greg was very proud to chair the first-ever national show for NASTT in Canada, No-Dig North.



TREASURER

**Michael
Davison, P.Eng.**

**General Manager,
Sanexen Water Inc.**

Michael Davison, P.Eng. is currently general manager of Sanexen Water Inc., where he is responsible for daily operations of all aspects related to the business unit including strategies, overall delivery and quality of the unit's offerings.

Since 2002, he has been involved in the design and manufacturing of the product Aqua-Pipe, the creation and maintenance of installation operation procedures, training of operators and licensees, the development of QA/QC procedures, the planning and management of projects and improvements through research and development.

A graduate of McGill University in Civil Engineering, Mike is an active member of the NASTT No-Dig Show Program Committee. He is also involved in ASTM International standard committees and American Water Works Association (AWWA) standards and M28 CIPP subcommittees. Mike is a member of the American Society of Civil Engineers (ASCE), and also works locally to improve the trenchless industry with the Bureau de Normalisation du Québec (BNQ).



OFFICER-AT-LARGE

**Matthew
Wallin, P.E.**

**Partner & Senior Project
Manager, Bennett
Trenchless Engineers**

Matthew Wallin is a principal partner and senior project manager with Bennett Trenchless Engineers (BTE), located in Folsom, California. BTE's engineering practice is focused entirely on trenchless technology design, construction management, and claims assistance with clients and projects located throughout California, as well as Texas, Florida, Nebraska, Iowa and Canada.

Matthew holds both bachelor's and master's degrees in civil engineering from Case Western Reserve University in Cleveland, Ohio. He began his career working for URS in Oakland, California in 2001 in their geotechnical group. Since that time, Matthew has focused his practice on geotechnical engineering and the design and construction management of new pipeline projects using horizontal directional drilling, microtunneling, open-shield pipejacking, pipe ramming and auger boring.

Matthew has been a member of NASTT since 2002 and has participated in the organization in many capacities. He has been an active member in the Western Chapter (WESTT) since 2003 and previously served as a member of the Board of Directors and as the Chapter Treasurer from 2008 to 2016. He joined the No-Dig Show Program Committee in 2010 and has acted as a session leader since that time. Matthew is also an instructor for NASTT's HDD Good Practices Course as well as the Introduction to New Trenchless Methods Course, each of which are taught annually at the No-Dig Show and at other off-site venues throughout the year.



IMMEDIATE PAST CHAIR

**Frank Firsching,
B.Sc., MBA**

Water Industry Consultant

Frank Firsching is an independent business consultant serving the water industry. Prior to this role he served for three years as president of Aegion's Infrastructure Solutions Platform, which is comprised of the global business units of Insituform Technologies, Fyfe Company, Fibrwrap Construction Services, MTC and Underground Solutions. Previous positions include executive vice president, general manager and vice president of sales during his 10 years with Underground Solutions. Before joining Underground Solutions, Frank worked for USFilter Corporation as president of its \$1 billion Water and Wastewater Systems Group with responsibility for USFilter's global process equipment and technology divisions. Frank

also held the positions of executive vice president of the Process Water Group, west regional manager and general manager during his 13 years at USFilter. Prior to joining USFilter he worked at Deloitte & Touch Management Consulting and at GE Corp. He received an MBA at the Wharton School of Business and a B.S. in Mechanical Engineering from the University of Virginia, where he serves on the Board of Trustees for the Engineering School.

municipal utility while developing the capital improvement program and executing projects. Alan has designed more than 370,000 lf of pipeline projects and is a national leader in trenchless technologies, such as pipe bursting.

Alan joined NASTT in 2013 and serves as a Track Leader on the No-Dig Show Program Committee. Alan is the Chair of NASTT's Pipe Bursting Center of Excellence and a co-author of the forthcoming Pipe Bursting Good Practices Guidelines, 3rd Edition. Alan also volunteers as an instructor for NASTT's Good Practices Training Courses. Alan has a BS in Civil Engineering, a MS in Environmental Engineering, holds two patents, and is the owner of AM Trenchless LLC. In his spare time, Alan loves to play guitar, cook for his wife and coach baseball for his three boys.

Directors



Alan Ambler, P.E.
Owner, AM Trenchless

Edward "Alan" Ambler has 18 years of experience working on engineering projects including the World Islands in Dubai and cruise ship berth construction in Alaska. While an employee at the City of Casselberry, Florida, Alan managed the day-to-day operations of a



Lisa Arroyo, P.E. TM
President, Arroyo Trenchless

Lisa Arroyo is the founder and president of Arroyo Trenchless Inc. Prior to starting Arroyo Trenchless, Lisa was the wastewater system manager for the City of Santa Barbara, California.

During her 17-year tenure with the City of Santa Barbara, Lisa held progressively increasing roles of responsibility.



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ity in the areas of engineering design, project development and program management. She oversaw the operation and maintenance of the city's wastewater treatment plant, collection system and laboratory. She managed a multi-million-dollar capital improvement program and a \$20 million operating budget.

Over the past several years, Lisa has used her knowledge and experience to focus on capital improvement projects that leverage trenchless technology to economically renew aging wastewater collection systems. She has experience with both CIPP and directional drilling methodologies. Lisa has long been a champion of trenchless technology, as it is proven to be both an effective and economical solution for improving wastewater collections systems.

Lisa holds Bachelor of Science degrees in both mathematics and civil engineering, and she is a licensed professional civil engineer in California. Lisa was elected to the Board of Directors for the Western Chapter of NASTT in 2016, where she served as secretary. Currently, she serves as WESTT's vice chair and was the conference chair for WESTT's 2018 Trenchless Conference in Arizona. She is also a member of NASTT's Program Committee.

Welcome to the Board!



Richard (Bo) Botteicher, P.E.

**Vice President, Aegion Corp. –
Underground Solutions Inc./
Fyfe Co. LLC/Fibrwrap
Construction Services Inc.**

Bo Botteicher currently serves as vice president for the infrastructure product-focused businesses for Aegion Corp. including Underground Solutions, Inc., Fyfe Co., LLC and Fibrwrap Construction Services Inc. Prior to this role, he worked for 12 years with Underground Solutions Inc., including positions of general manager, vice president of sales and senior product engineer. Bo started his career and worked for seven years in Denver, Colorado, as a water and wastewater industry consulting engineer and is a licensed professional engineer in Colorado. Bo has specialized in horizontal directional drilling, pipe bursting and sliplining trenchless installation methodologies over the course of his career.

Bo has been involved with the North American Society for Trenchless Technologies (NASTT) since 2008. He is a past chair and board member of the Rocky Mountain Chapter of NASTT. He has also participated on the program committee and was the 2015 program committee chair of the NASTT No-Dig Show. Bo is a member of the American Society of Civil Engineers (ASCE) and the American Water Works Association (AWWA) organizations.

Welcome to the Board!



Dan Buonadonna, P.E.

**Global Technology Leader,
Jacobs Condition Assessment
and Rehabilitation Services
(CARS) Practice**

Dan Buonadonna is the global technology leader for Jacobs' Condition Assessment and Rehabilitation Services (CARS) practice. He has more than 17 years of pipeline analysis, design and rehabilitation experience for more than 1,400 miles of buried water, sewer and industrial infrastructure.

As a consulting engineer his focus has evolved to trenchless condition assessments, trenchless rehabilitation technologies, and buried infrastructure asset management. He has authored more than 20 technical publications on pipeline asset management and holds a seat as an Industrial Advisory Board Member for the Trenchless Technology Center at Louisiana Tech University. Dan holds a bachelor's in civil engineering from the University of Notre Dame and a master's in environmental engineering from the University of California, Berkeley. He is a regular presenter at the NASTT No-Dig Show and is also a member of the Society's Pacific Northwest Chapter. He's also served on the No-Dig Show Program Committee and has participated in NASTT training and webinars.



Maureen Carlin, Ph.D.

**Strategic Marketing Manager,
Laney Directional Drilling**

Maureen has more than 14 years of experience in construction engineering and project management for both vertical commercial construction and trenchless pipeline construction. Maureen's areas of expertise are in advanced project planning and market analysis for Horizontal Directional Drilling and Direct Pipe® engineering and construction projects both domestically and internationally. This includes knowledge of established markets such as oil, gas, water and power in addition to emerging markets such as desalinization, offshore cabling and wind farming and military applications.

Maureen received B.S. degrees in Civil Engineering and Architectural Engineering from the Missouri University of Science and Technology. While working on large-scale and complicated projects in Las Vegas, Nevada, she received a M.B.A from the University of Nevada-Las Vegas. Maureen went on to receive a Ph.D. in Civil Engineering with an

Emphasis in Construction Engineering and Management. Maureen spent extended time in mainland China developing her dissertation studying horizontal directional drilling methods in China compared to North America.

Welcome to the Board!



Chris Knott

Lead Trenchless Estimator, BTrenchless

With more than 26 years in civil utilities construction, Chris Knott began his career as a laborer and quickly progressed to an operator for an auger bore crew. He then advanced to supervisor, overseeing auger bore crews, pipe ramming crews and the directional drilling operations. Chris enjoyed working with a variety of trenchless methods and ultimately took on project management and estimating.

Chris began working at BT Construction Inc. in 2005 in the role of both trenchless estimator and project manager. He has been integral to the formation of the company's trenchless division, BTrenchless, and is currently the lead trenchless estimator, reviewing all work involving bores and tunnels. Ad-

ditionally, his expertise is utilized to market BTrenchless, Inc. as the region's premier tunneling contractor, showcasing the company's ability to perform pipe ramming, auger boring, pilot tube, TBM, microtunnels, hand tunneling and sliplining as the director of business development.

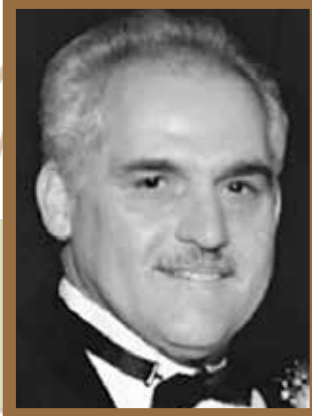
Chris has a passion for sharing the capabilities and opportunities of trenchless construction, helping to inspire young engineers by presenting the applications of trenchless construction at annual presentations, hosted by The Colorado School of Mines (Microtunneling Short Course) and the University of Colorado-Boulder.

Involved with the Rocky Mountain Chapter of NASTT since its inception, Chris serves on its board as an officer, helping with its annual conference and clay shoot. Recently, he has also contributed to the program and auction committees for the NASTT's national No-Dig Show.



Gerard P. Lundquist, P.E.

Director, Gas Construction, National Grid



James "Jim" S. Barbera
(1940-2019)
Founder,
Barbco Inc.



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Gerry Lundquist is a director with National Grid, USA. National Grid is an international electric and natural gas transmission and distribution company. He is the director of gas construction for New York State and has more than 30 years of experience in all phases of construction, design, engineering and project management. His responsibilities include the execution of the capital work plan while also ensuring the safety, security and reliability of the natural gas distribution system. Prior assignments have included project manager for the JFK Airport Cogeneration Facility and the Stony Brook Cogeneration Facility. He integrates innovative technologies to reduce costs and increase operational efficiencies.

Gerry has a Bachelor's in Civil Engineering from The Cooper Union, a Master of Business Administration from Adelphi University, and a Master's of Science in Economics and Finance from NYU. He is a New York State Registered Professional Engineer.

He has served on the North American Society for Trenchless Technology Board of Directors and Program Committee for the annual No-Dig Show since 2015.

His affiliations also include serving on the on the Board of Directors for the (NEGDC) Northeast Gas Distribution Council, consisting of natural gas utilities throughout the northeast, an active member of the (NSPE) National Society of Professional Engineers, and (ASCE) American Society of Professional Engineers. He is a member of the (APWA) American Public Works Association and serves on the (UPROW) Utility and Public Right of Way Technical Committee for the past four years and chairs the Construction Practices Subcommittee.



**Michelle L.
Macauley, P.E.,
LEG**

**Owner, Macauley
Trenchless, PLLC**

Michelle is a geotechnical engineer and the founder and owner of Macauley Trenchless, PLLC. Prior to starting Macauley Trenchless, Michelle was the national trenchless practice lead for Jacobs Engineering and oversaw multiple trenchless projects across the company. She earned her B.S. in Geological Sciences from the University of Washington and her M.S. in Geological Engineering from the University of Alaska, Fairbanks. She is a licensed professional engineer in Washington, Oregon, Alaska, California and Texas, and a licensed engineering geologist in Washington.

Michelle has more than 22 years of experience in geotechnical engineering, with a particular emphasis on trenchless feasibility, design and constructability. Prior to joining Jacobs, Michelle was a senior geotechnical engineer specializing in trenchless design and construction with GeoEngineers and Staheli Trenchless Consultants. She has been involved in proj-

ects using horizontal directional drilling, microtunneling, pipe bursting, auger boring, pipe ramming, conventional tunneling, and pilot-tube guided auger boring—just to name a few.

Michelle has been involved with NASTT since 2006. During that time, she has been involved with the Pacific Northwest Chapter both as a chapter president and an organizer of the chapter's inaugural trenchless technology symposium. She has been a contributor to the PNW Chapter Trenchless Review (bi-yearly publication) and is a regular speaker, attendee and program committee member for the No-Dig Show. She has also presented at the Washington State chapter of the American Public Works Association conference on trenchless technology. Michelle is a member of the ASCE Trenchless Installation of Pipelines group and is helping update the Manuals of Practice for Pipe Ramming (MOP 115) and Pipe Bursting (MOP 112). Additionally, she is a member of the committee to write the new manual of practice for Direct Pipe.

As the founder of Macauley Trenchless, Michelle works with trenchless professionals across the nation and is always excited to expand her trenchless expertise to other regions. She enjoys bringing that experience and passion to bear on the national level as part of the NASTT Board of Directors.



**Babs Marquis,
CCM**

**Trenchless Practice Lead -
East Coast, McMillen Jacobs
Associates**

Babs Marquis has more than 26 years of experience in underground project design and construction. He is McMillen Jacobs Associates' trenchless practice lead for the east coast, and is located in the company's Burlington, Massachusetts office. Previously, Babs worked for Jacobs Engineering Group for 10 years and Stone & Webster Engineering Corp. for 11 years as a construction manager. During his extensive career in the trenchless industry, Babs has been involved in major tunneling and trenchless projects in the northeast for several clients such as the Massachusetts Water Resources Authority, Boston Water & Sewer Commission, and others.

For the past 17 years, Babs has focused on underground construction management for tunnels and conveyance, including water and wastewater pipeline design and construction projects, with an emphasis on trenchless construction methods. He was involved with the planning and design of the East Boston Branch Sewer Relief Project as part of the Boston Harbor cleanup, ordered under a Massachusetts Water Resources Authority (MWRA) consent decree. From 2009 to 2011 he was resident engineer on the project's pivotal microtunneling and pipe bursting components. In 2011, East Boston Branch Sewer Relief was named *Trenchless Technology Project of the Year* for New Installation. Babs has authored and coauthored several papers for the NASTT No-Dig Show, American Society of Civil Engineers (ASCE) Pipelines Conference, and Rapid Excavation & Tunneling Conference (RETC);

and is a member of NASTT, ASCE, Underground Construction Technology (UCT), and the Construction Management Association of America (CMAA).

Babs is an active member on the board of directors for the NASTT Northeast Regional Chapter and serves as its vice chair. He played an active role in the launch of the chapter and its successful inaugural conference and journal for trenchless practices for the Northeast Region.



John Matthews, Ph.D.
Director of the Trenchless Technology Center & Associate Professor, Louisiana Tech University

Dr. John Matthews has more than 15 years of experience in the rehabilitation and inspection of infrastructure systems. He is the director of the Trenchless Technology Center (TTC) and an associate professor of civil engineering and construction engineering technology at Louisiana

Tech University. Prior to rejoining the TTC, he served as the pipe renewal service line manager at Pure Technologies providing clients with guidance on the selection and use of trenchless rehabilitation technologies. Prior to joining Pure, he served as Battelle's water infrastructure management lead, where he led multiple water and sewer infrastructure research studies. Prior to joining Battelle, he led multiple projects at the TTC relating to the development of automated decision support systems for technology selection. He has also been involved in numerous projects relating to condition assessment technology selection and field evaluation of trenchless rehabilitation technologies.

He has given more than 130 conference presentations and authored more than 180 publications in the area of trenchless technology for which he has received two International Society for Trenchless Technology (ISTT) No-Dig Awards (2005, 2012) and a North American Society for Trenchless Technology (NASTT) Outstanding Paper Award (2015). He has been an active member of NASTT since 2003, serving on the No-Dig Show Program Committee and various other committees. He also serves as a NASTT Course Instructor for both the Laterals Good Practices and Intro to Trenchless Technology - Rehabilitation Good Practices Courses.

In 2013, he was awarded NASTT's Ralston Award for

We're invested in our people.

Jeff Maier is passionate about improving the communities in which Garver serves, and that's why he's so dedicated to improving the valuable mission of NASTT. Congratulations, Jeff, on being named Volunteer of the Year!



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CONGRATULATIONS

Thank you Mike Willmets for over 11 years of exemplary leadership as NASTT's Executive Director. Enjoy your retirement!

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Young Trenchless Achievement. He is also an active member of the American Society of Civil Engineers (ASCE) and American Water Works Association (AWWA) and he currently serves on the Editorial Advisory Board for *Trenchless Technology* magazine. He also serves as an associate editor for the ASCE Journal of Pipeline Systems Engineering and Practice.



Rick Melvin
National Product Specialist,
TT Technologies Inc.

Rick Melvin is a national product specialist for TT Technologies Inc. He has been involved in a variety of underground construction applications for more than 20 years. This includes sales and servicing of pipe ramming, horizontal directional boring machines and pipe bursting systems. Rick has also been heavily involved in pursuing overall growth of the trenchless technology market. He has assisted in educating engineers and contractors on the extensive benefits of various available trenchless technologies and trenchless equipment techniques.



Tiffanie Mendez

Director of Sales, Western States, Sunbelt Rentals

A 23-year liquids solutions and management professional, Tiffanie began her career in the early 1990s in Yuma, Arizona, focusing on specialty equipment rental systems and design/build liquids handling systems. Her early focus was groundwater dewatering, pump and treat systems, sewer bypass systems and construction stormwater runoff management. After relocating to Northern California in 2005, the design/build systems focus grew to include temporary plants for environmental remediation, low and medium voltage electrical power systems and compressed air systems.

Tiffanie is now the director of sales for Sunbelt Rentals, Western States. She holds a BSBA from Northern Arizona University and an MBA, General Management, from California State University, East Bay. Tiffanie has been a part of NASTT's No-Dig Show Program Committee since 2016 and believes the future of the industry lies in preparing the new leaders of the trenchless industry now. As such, she is particularly passionate about the student programs and student chapters associated with NASTT.



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Charles Pullan, P.Eng.

Senior Project Engineer, City of Calgary's Water Resources Department

Charles Pullan is a senior project engineer with the City of Calgary's Water Resources Department in Calgary, Alberta. Charles holds a Bachelor of Science in Civil Engineering from the University of Calgary. In his current role, Charles focuses on linear capital construction of water, sanitary and drainage systems. He has been involved with various trenchless technologies including electromagnetic inspection of PCCP water mains, HDD projects and microtunneling installations.

Charles has been heavily involved in the Northwest Chapter of NASTT since 2014 and has been part of the organizing committee for the 2015 and 2017 Northwest Trenchless Conferences. Charles has also co-authored papers for the NASTT No-Dig Show and various Northwest Trenchless conferences.



Chris Sivesind

Territory Sales Manager, Akkerman

Chris Sivesind is a territory sales manager with pipe jacking and tunneling equipment manufacturer Akkerman.

He is responsible for sales in the western-most portions of the United States, as well as Western Canada, Europe and Southeast Asia. Chris' career in the pipe jacking and tunneling industry has been multi-faceted. Early on, he was regional manager for his family's pipe jacking and auger boring construction business. Following this, he worked as west coast sales representative and specialty shoring installation consultant for a trench safety rental group. Prior to Akkerman, Chris worked for another pipe jacking equipment manufacturer. Chris is an active participant in industry associations NASTT, ISTT and CSITT, has authored and presented several papers at their conferences and served as chair and secretary for the Pacific Northwest Chapter of NASTT. He received his formal education from Washington State University with a Bachelor's in Business Administration. Go Cougs!



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Plastics Pipe Institute names new executive director



The Plastics Pipe Institute, Inc. (PPI) has named David M. Fink as its new president and executive director effective at the end of January 2020. Fink, a veteran of the plastics pipe industry, previously served as the chairman of the PPI Board of Directors from 2017 to 2019, and has held a number of other leadership positions within the organization.

PPI is the major North American trade association representing all segments of the plastic pipe industry. Fink will succeed longtime executive director Tony Radoszewski who left the association in September to become president and CEO of the Plastics Industry Association.

“David brings a wealth of knowledge and experience to PPI,” stated Peter Zut of KraussMaffei, chair of the PPI Board

of Directors and chair of the executive search committee. “With his more than 25 years of experience in the plastics industry, including 13 years at a major plastic pipe manufacturer, David has key insights into all segments of the markets served by PPI, and for many years has been instrumental in developing and executing the PPI Strategic Plan.”

Fink most recently served as the Senior Vice President at PPI member company, WL Plastics, and previously at Dow Chemical in the company's polyolefin resin business with the majority of the years being part of growing its plastics pipe resin business. While at WL Plastics, he oversaw significant growth of the company's sales in the polyethylene pipe market segments including gas gathering and distribution, municipal water distribution, industrial and mining applications, telecommunication conduit, and geothermal. He has participated in a number of related standard setting organizations and related associa-

tions, including the Alliance for PE Pipe, ASTM International, American Petroleum Institute (API), American Gas Association (AGA), American Society of Mechanical Engineers (ASME), American Water Works Association (AWWA), NSF International, and the Canadian Standards Association (CSA). Fink currently chairs the PPI Statistics Committee and co-chairs the newly established PPI Safety Committee.

“I am excited to take on my new responsibilities as president of PPI,” Fink remarked. “I look forward to working with PPI's exceptional staff and serving PPI's membership to continue developing the association as The Voice of an Industry. Through research, education, and advocacy, we will work together to further advance the acceptance and use of plastic piping systems throughout North America and around the world.”

For additional information, please visit the Plastics Pipe Institute's website at plasticpipe.org.

Barbco's inaugural St. Baldrick's head shaving fundraiser a huge success

Barbco Inc., a capital equipment manufacturer in the horizontal boring, trenchless excavating and underground manufacturing industries, decided to celebrate 30 years of being a family owned business by giving back to children in need of hope and support. The St. Baldrick's Foundation was selected as a partner in this noble endeavor by the team at Barbco, Inc.

The St. Baldrick's Foundation is a not-for-profit organization with the aim of raising funds to help find cures for children with cancer. The name of the foundation is not associated with a recognized Saint of the Catholic Church; but, is founded on word play and appropriation of the title of sainthood. Volunteers sponsored by family, friends, and employers shave their heads or “chop” their ponytails in solidarity with

children who typically lose their hair during cancer treatment in order to raise funds.

The event, entitled Bald Is Beautiful at Barbco, Inc., was held on Oct. 16 in the Barbco Employee Lunch Room which was converted into a Barber Shop for the event. More than 30 shavees and about 100 guests/employees aka non shavees enjoyed the festivities which, in addition to the head shaving, included free coffee and donuts, 50/50 drawings, and special raffles. Moreover, special event t-shirts were available for free to the brave shavees and for sale to the general public.

The community came out strongly to support this first time ever event at Barbco, Inc. In addition to a dozen, passionate volunteers, 15 corporate partners joined in to help, including: SACS Consulting and In-



vestigative Services, JB Jewelers, Kraft Fluid Systems, Alro Steel, NAPA Auto Parts, TRS Trenchless Rental Solutions, National Steel Tube, U.S. Shoring & Equipment, Peace Love & Little Donuts of Canal Fulton, Atwood Industries, Midwest Mole, and C. Massouh Printing Services. At the time of the event, Barbco said it is nearly halfway to its goal of raising \$10,000 for this cause.

BTrenchless Brings Complete Arsenal of Utility Services

BT Construction was born of humble beginnings in 1980. Equipped with a small excavator and a few great employees, Bob Bergstrom and John Turner set out to establish a utility construction company that would set a new standard in the Denver market. Now celebrating 40 years in business, BT Construction has become a leader in underground utility and infrastructure construction across the western United States.

BT Construction is a common name amidst the community of contractors. BTrenchless, a division of BT, performs trenchless construction and enjoys a resume comprised of some difficult and high-profile projects across several states. The capabilities of BTrenchless range from small diameter auger bores to 10-ft diameter microtunnels. The arsenal of equipment includes tunnel boring machines, pneumatic hammers, guided boring machines, custom hand tunnel shields and an array of other equipment. Supported by the open cut capabilities of parent company BT Construction, BTrenchless is able to provide complete utility services for owners and municipalities.

In the past few years, BTrenchless has completed several interesting projects in multiple states. In the City of Denver, a high profile 210-ft long, 10-ft diameter storm sewer was installed under the Union Pacific Rail Yard as part of the 33rd Street Outfall Project. In the mountains outside of Fort Collins, a 730-ft long, 96-in. diameter, curved TBM restored the Michigan Ditch after a landslide cut off a major source of water. In Salt Lake City, BTrenchless has completed microtunnel drives of 500-ft and 700-ft lengths, ranging from 51 to 72-in. diameter as well as guided pipe ramming installations over 200-ft in length. In Fort Collins, a 14 ft pedestrian and equestrian tunnel was in-

stalled under the BNSF Railroad embankment. Most recently, a pair of microtunnels were installed out of the same launch pit in a turn lane of a major intersection in the City of Aurora as part of a major stormwater outfall project.

The rapid development of communities in the west has brought with it the need for more complicated projects, requiring faster life cycles than a traditional design-bid-build format. To fast track these projects, the use of alternative contracting methods including CMGC and CMaR delivery has become more prevalent in the utility construction world. BTrenchless has completed a number of tunnel projects with these delivery methods over the past decade and will continue to do so in the future. Early involvement in the design of these projects allows BTrenchless to provide valuable constructability reviews to the designers, help the team pick the best trenchless method for the project, and provide the best valued product for our clients. Such projects are a success for all involved.

Trenchless construction is a fascinating business. Soil conditions, obstructions, and the unknown offer each and every project its own set of challenges to overcome. BTrenchless has a long history of success in overcoming those challenges and solving the problems inherent with underground construction. Combining a history of experience with new technologies, BTrenchless is always looking at ways to complete projects in a better, safer, and more economical manner. With every passing year, utility corridors are getting more crowded, social and environmental costs are increasing, and the need for creative trenchless solutions are ever increasing. BTrenchless is looking forward to what tomorrow holds.



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USL Group acquires Logiball Inc.



USL Group – parent company of Prime Resins – announced its acquisition of Logiball Inc. in November. Logiball is a leading manufacturer of trenchless pipe rehabilitation equipment headquartered in Quebec, Canada.

Founded in the early 1980s, Logiball holds a leading position in the manufacturing and supply of inflatable pipe plugs and test-and-seal injection packers for the maintenance and trenchless rehabilitation of collection systems and gravity pipes compromised by groundwater intrusion – a sizable segment of the general infrastructure sector known as the inflow and infiltration (I&I) market.

Logiball's main product range is test-and-seal injection packers, which are used to confine and apply grouts for the repair of points of water ingress and egress from pipes, such as leaking joints or cracks. Logiball is the primary producer of these specialized products, which has allowed the company to forge a strong position in the niche of the I&I market.

"This acquisition provides channel synergies for both Logiball and our Prime Resins business, which makes chemical grouts. It will enable both companies to expand their reach in the growing I&I market space by leveraging their joint reputations and product offerings" said John Taylor, director at USL Group. "Prime Resins has actively pursued growth in this market space, and the clear synergies with Logiball will lead to product improvement and expansion of use that will benefit the trenchless rehabilitation industry as a whole." Terms of the transaction were not disclosed.

Founded in 1981 – and acquired by RPM Inc. in 2009 – the USL Group of companies are market leaders in specialized civil engineering and construction solutions.

Mary Andringa inducted to AEM Hall of Fame

The Association of Equipment Manufacturers (AEM) has elected Mary Andringa, chair of the board at Vermeer Corp., to its Hall of Fame. She was honored Nov. 20 at during the AEM Annual Conference in Florida.

"We are very pleased to announce and congratulate Mary Andringa as the latest inductee into the AEM Hall of Fame," said Dennis Slater, AEM president. "She joins an elite group of respected industry leaders whose work and accomplishments inspire the next generation to continue our industry's legacy of progress enhancing productivity, sustainability, and economic and social prosperity."

The AEM Hall of Fame recognizes individuals whose innovations, ideas and leadership have advanced the off-road equipment manufacturing industry and contributed to its success in the past and into tomorrow.

Mary Andringa's commitment and leadership positioned Vermeer Corp. as a strong voice in the industry – for lean manufacturing, for the education of our future workforce, for the legislation of policies having a positive impact on manufacturing, for family-owned and -operated companies and for taking care of the people of Vermeer.



Andringa is now chair of the board at Vermeer after filling roles as CEO, co-CEO, president and COO. Her level of passion and commitment have made her a voice of change and innovation not only at Vermeer, but in the industry and community.

Andringa joins her father, Gary Vermeer, founder, chairman emeritus Vermeer Manufacturing who was inducted into the AEM Hall of Fame in 1996 and her brother Robert "Bob" Vermeer, chair emeritus Vermeer Corp., who was inducted in 2016.

Nominations for the AEM Hall of Fame are open year-round. An independent panel of industry experts evaluates potential inductees, and honorees are publicly announced and celebrated during special ceremonies at AEM's annual conference.

More than 60 industry leaders have been inducted into the AEM Hall of Fame since its inception in 1993. Learn more and read their stories at aem.org/HallofFame.

Trenchless Pipe Repairs now part of Vortex Companies



The Vortex Companies (Vortex), one of the nation's fastest-growing trenchless infrastructure solutions providers, has acquired the assets of Trenchless Pipe Repairs LLC (TPR), a leading trenchless sewer and drain service company based in Sumner, Washington, according to Vortex CEO Mike Vellano.

Known for its reputation for being an environmentally friendly service company, TPR specializes in robotic cutting, cleaning and reinstatement services, cured-in-place lining (CIPP) and trenchless infrastructure management. "We've always had an excellent relationship with TPR's owner, Nick Patrick, his reputation and the company's attention to service and quality is unmatched in the region," added Vellano.

TPR was founded in 2011, however, Patrick brings nearly 25 years of trench-

less service experience to Vortex family. "We are extremely excited to be a part of Vortex. Our approach to business is similar and our service offerings complement Vortex's line of trenchless products and industry solutions," said Patrick, who is TPR's founder and president. "Being a part of Vortex will give us added resources and technology to offer more solutions to our northwest customers."

As part of the Vortex Companies, Patrick's role will evolve into a national and global product manager, in which he will focus on promoting Vortex robotic systems and lining materials. "Nick's experience and knowledge of our Schwalm robotic system and our trenchless solutions is tremendous asset to us," added Vellano. "He will help continue to expand our business and add customers across multiple product lines and geographies."



NASTT

Chapter News



British Columbia

The British Columbia Chapter (NASTT BC) was proud to co-host No-Dig North, Oct. 28-30, along with the GLSLA and Northwest Chapters of NASTT. This conference is the first trenchless conference produced by NASTT to exclusively cover the trenchless construction market in Canada. No-Dig North was held at the TELUS Convention Centre in Calgary, Alberta and brought nearly 600 attendees to the first-ever conference. The show also featured more than 75 exhibiting companies from across the industry. NASTT BC looks forward to hosting the 2020 No-Dig North Show to be held Oct. 19-21 at the Vancouver Convention Centre in Vancouver, British Columbia. You can view information on the conference on the website, nodignorth.ca.



Great Lakes, St. Lawrence & Atlantic

In October of last year, the GLSLA Chapter co-hosted the first-ever No-Dig North Show in Calgary. The inaugural No-Dig North was held in conjunction with the British Columbia and Northwest Chapters of NASTT and drew nearly 600 attendees. The GLSLA Chapter is looking forward to continuing to be involved in the spearheading of this event for 2020 and beyond. For now, you can view chapter information and other upcoming events and activities such as our training schedule at glsla.ca.



Mid Atlantic

In 2020, the Mid Atlantic Chapter (MASTT) is planning seminars for Baltimore, Maryland, on May 6, and in Atlantic City, New Jersey on Sept. 16. Please plan to support these seminars as an attendee, presenter, exhibitor and/or food sponsor. There will be a lot of networking and learning at these seminars. Please go to mastt.org to learn more about MASTT and the MASTT seminar program. Or, contact Leonard Ingram, PWAM, MASTT executive director, at leonard@engconco.com or call (334)-327-7007.

MASTT is planning to publish its annual journal, *Mid Atlantic Journal of Trenchless Technology 2020* in May. The journal will have numerous excellent Mid Atlantic project articles and messages. Past journal issues can be seen at mastt.org. Each

publication is distributed to more than 4,000 water and sewer decision makers in the MASTT area. Thanks for your support!



Midwest

The Midwest Chapter (MSTT) conducted a very successful Trenchless Technology, SSES and Buried Asset Management seminar in Omaha, Nebraska, Dec. 3, 2019, at the Hilton Omaha Downtown. The guest presenter was Adam Wilmes, P.E., collection system design manager, Public Works, Design Division, City of Omaha, who presented on trenchless technology in the City of Omaha. ASCE and APWA were the co-sponsors for the seminar where there was ample networking and learning opportunities.

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In 2020, MSTT is planning seminars for Kansas City, Missouri, March 11 and another in Cincinnati, Ohio, on Oct. 21. Please plan to support these seminars as an attendee, presenter, exhibitor and/or food sponsor. There will be many networking and learning opportunities at both of these seminars. Please visit mstt.org to learn more about MSTT and the MSTT seminar program or contact Leonard Ingram, PWAM, MSTT executive director at leonard@engconco.com or (334)-327-7007.

MSTT is planning to publish its annual journal, *Midwest Journal of Trenchless Technology 2020*, in September, which will include numerous excellent articles covering trenchless technology in the Midwest. Past journal issues can be seen at mstt.org. Each publication is distributed to more than 4,000 water and sewer decision makers in the MSTT area. Thanks for your support!



Northeast

The Northeast Chapter reports another successful annual conference held Nov. 11-12, 2019, in Syracuse, N.Y. The annual event was kicked off with an evening networking welcome reception on Monday, Nov. 11 at the Dinosaur Bar-B-Que restaurant which was followed with a full day of technical presentations and outdoor technology demonstrations on Nov. 12. The Fall edition of the *Northeast Journal of Trenchless Technology Practices* was released at the conference.

The chapter also concluded its election announcing the results and regime change at the annual event and the new Board of Directors taking over leadership and vision for the chapter for 2020-21. The Northeast student chapter at UMass is pressing forward with the establishment of the Center

for Excellence in Trenchless Technologies & Underground Engineering (CETTUE). The Center is seeking industry partnership as it moves into the next phase preparing for the National Science Foundation (NSF) workshop. We are looking forward to the NASTT 2020 No-Dig Show in Denver, Colorado, and we are working on our Spring edition of the *Northeast Journal of Trenchless Technology Practices* which will be released at the No-Dig Show. Please see our website, nastt-ne.org, for more information.



Northwest

Continuing again this year, NASTT's Northwest Chapter will be presenting its Technical Lunch Program. This program provides a venue for our members to learn from each other's accomplishments and from suppliers and manufacturers about new innovative products. The next Technical Lunch in Edmonton is scheduled for March 28. For registration or further information, please refer to the chapter's events webpage, nastt-nw.com.

The chapter is also proud to be jointly presenting the second annual No-Dig North in partnership with the Canadian Chapters of NASTT. The Conference will take place in Vancouver, British Columbia, on Oct. 19-21, 2020, at the Vancouver Convention Centre. The call for abstracts is officially open with a deadline to submit of March 20. Pre-event Good Practices Courses will also be available on Monday, Oct. 19. The exhibit hall will be open all day Oct. 20-21. More information on sponsorship, booths, delegate registration and municipal scholarships will be coming soon and posted on the conference's website, nodignorth.ca. For more information, please email gtippett@nastt-nw.com.



Pacific Northwest

Greetings from the Pacific Northwest! Our yearly magazine, the *Pacific Northwest Trenchless Review*, was recently mailed. This year, we had a large number of contributors and excellent articles

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showcasing trenchless technology in the Pacific Northwest. If you would like a copy please reach out to Carl Pitzer at cpitzer@thompsonpipegroup.com or come to our chapter meeting at the NASTT 2020 No-Dig Show in Denver on Sunday, April 5, from 4-5 p.m. in Room 707.

There will also be students from Oregon State University attending the No-Dig Show in Denver this year. The PNW Chapter is also pleased to announce the recent addition of Oregon State University as a new student chapter of NASTT and the first in the Pacific Northwest region. Please extend a warm welcome to any OSU Students you see at No-Dig this year.



Rocky Mountain

This year, Colorado is blessed to have the

NASTT 2020 No-Dig Show return to Denver. As such, the Rocky Mountain Chapter will not be having our regional show this year. We are excited to announce that we have been active in our outreach to Kansas and Nebraska and look forward to bringing on some new city involvement to the chapter. Stand by on this exciting news!

We continue to plan our clay shoots in both Colorado and Utah, along with other field trips. We also look forward to adding a potential Top Golf outing in May! Our Young Professionals group has been afforded their new budget for this year and they are active in setting up new social events. Our last social event was packed and a huge success. Our new website is up and active, and is certainly more user-friendly.

Lastly, we held our board elections this past fall and we would like to welcome and re-welcome Joshua Shackelford with Tetra Tech, Todd Kilduff with Kilduff Underground, and returning to our board, Lisa Ferreira with the City and County of Denver.



South Central

The South Central Chapter is continuing to grow, and pushing

for new avenues to get the word out about trenchless technology. As part of this effort,

the chapter will be holding its fifth annual chapter conference in the Houston, Texas, metro area for the first time ever. The conference will be held at the Sugar Land Marriott Town Square on Oct. 5-6, 2020. We are very much looking forward to the interesting and exciting exhibitors and presentations on the newest industry developments and compelling case studies and technologies that will be showcased. Conference information and registration can be found at nastt-sc.ticketleap.com/nastt-sc, and if you are interested in exhibiting or presenting, please reach out to Jim Williams at jwilliams@brierleyassociates.com or Justin Taylor at justin.taylor@ccian-dassociates.com.

In the lead up to the conference, the chapter will also be releasing the third annual *Texas and Oklahoma Trenchless Journal* earlier in 2020, highlighting some of the interesting recent projects and technological developments within the trenchless industry.



Southeast

The Southeast Chapter (SESTT) conducted a successful Trenchless

Technology, SSES and Buried Asset Management seminar in Charlotte, North Carolina, on Oct. 8, 2019, at the Hilton Charlotte Center City. The guest presenter was Michelle Montgomery, construction supervisor, Storm Water Service, City of Charlotte, who presented on trenchless solutions to storm-water problems in Charlotte. The seminar co-sponsor was APWA and there were ample learning and networking opportunities throughout the event.

In 2020, SESTT is planning seminars for Savannah, Georgia on Aug. 5 and in Miami, Florida on Dec. 9. Please plan to a support these seminars as an attendee, presenter, exhibitor and/or food sponsor. There will be many networking and learning opportunities at these seminars. Please visit sestt.org to learn more about SESTT and the SESTT seminar program or contact Leonard Ingram, PWAM, MSTT executive director, at leonard@engconco.com or (334)-327-7007.

SESTT is planning to publish its annual journal, *Southeast Journal of Trenchless Technology 2020* in November, which will feature numerous excellent articles on trenchless technology in the Southeast. Past issues of the journal can be found at sestt.org. Each journal is distributed to more than 4,000 water and sewer decision makers in the MSTT area. Thanks for your support!



Past and newly elected WESTT board members (L-R): Jacquie Jaques, Tim Taylor, Kate Wallin, Brian Avon, Michelle Beason and Cindy Preuss.



Western

The Western Chapter (WESTT) had a very successful Western Regional

No-Dig Conference and Exhibition last November in Honolulu, Hawaii. More than 200 engineers, contractors and vendors attended the first day of technical paper presentations and hosted 47 attendees at the two Trenchless 101 courses on the second day. The WESTT board is already planning its 2020 event in Southern/Central California.

WESTT is happy to welcome the following newly elected board members: Michelle Beason (returning board member) of National Plant Services, Jacquie Jaques (returning member) of Sekisui SPR Americas, Rachel Martin of McMillen Jacobs Associates, Sasha Mestetsky of Central Contra Costa Sanitation District and Greg Watanabe of GHD. Thank you to Gayleen Darting of Sacramento Regional County Sanitation District, Norm Joyal of McMillen Jacobs Associates and Cindy Preuss of HydroScience Engineers for your years of service as board members. You will be missed!

All Western Chapter members are welcome to attend the WESTT Chapter meeting to be held at the NASTT 2020 No-Dig Show in Denver on Sunday, April 5. Please see the onsite brochure at the conference for location information.

Being a Good Neighbor: Trenchless Technology Eases Construction Impacts

By Kurt Staller, Adam McKnight & Blake Alldredge



Upper Trinity Regional Water District (Upper Trinity) is a wholesale water and wastewater provider located in Lewisville, Texas. Established in 1989 by the Texas State Legislature, Upper Trinity currently serves more than 280,000 people in 25 communities in Denton and Collin counties, north of the City of Dallas. Its service area continues to rapidly grow, with an estimated 10,000 to 20,000 new residents every year. Upper Trinity's primary mandate is to develop and implement regional plans for water and wastewater services to ensure each community's (or customer's) water and wastewater needs are met to support their growing communities. Upper Trinity currently has more than 100 miles of treated water pipeline and 30 miles of wastewater lines serving these communities.

Upper Trinity's water treatment facilities, along with its water pipelines and pump stations, have the capacity to deliver up to 90 million gallons per day (MGD), or almost 33 billion gallons per year. Upper Trinity's system is critical to the communities that we serve and cannot be taken out or service for extended periods of time; therefore, limiting service disruptions and maintaining a reliable water supply is of the utmost importance.

In order to limit water supply disruptions, Upper Trinity has successfully used trenchless techniques on numerous treated water and wastewater pipeline

construction projects. Recently, a 60-in. treated water pipeline was installed along a major roadway in the Town of Flower Mound, Texas. By using trenchless techniques, Upper Trinity was able to expedite the permitting process and fast track construction of this critical pipeline through highly populated areas. Tunneling was used to install 84-in. steel casings under roadways and critical utilities. The casing installation was completed independent of the pipeline installation allowing the pipeline contractor to quickly and efficiently install the water pipeline through the casing with minimal disruptions. By going trenchless Upper Trinity reduced the impact to businesses by eliminating the need to cut off their access and remove/replace pavement, thereby limiting disruptions. Another benefit was just how much safer the project was for the general public (drivers and pedestrians), Upper Trinity staff and construction crews that were working along the shoulder of the busy road.

Building upon past success, Upper Trinity plans to continue using trenchless techniques in future projects. Currently, Upper Trinity is installing a 72-in. water transmission pipeline next to an existing 48-in. pipeline from the Thomas E. Taylor Water Treatment Plant in Lewisville, Texas, to a major transfer Pump Station in Flower Mound, Texas – more than 3.5 miles of new pipeline. Trenchless techniques will be used at 10 critical rail, utility

(water, sewer, storm, gas, fiber, and telecom), and roadway crossings, including Interstate Highway 35-East that connects the City of Dallas to the City of Denton. Using trenchless techniques will greatly reduce impacts for the public and will save time and money. When Upper Trinity completes this project, more than 2,600 ft of large diameter steel casing or liner plate will have been installed through hand mining and/or tunnel boring machines.

Upper Trinity is also planning the design and construction of a new major water supply reservoir in northeast Texas, approximately 80 miles away from the Upper Trinity's regional water system. In addition to the reservoir, Upper Trinity will construct a 32-mile raw water pipeline to bring water from the reservoir to Upper Trinity's Customers. Upper Trinity anticipates utilizing trenchless construction techniques at more than 50 different locations along the raw water pipeline route that will help limit construction impacts to environmentally sensitive areas, minimize public disruptions and reduce the risk of damaging critical infrastructure.

Upper Trinity Regional Water District strives to be up-to-date on the latest trenchless installation techniques and recognizes the importance of utilizing technology to better serve our customers. Upper Trinity's staff are active members in several associations, including the North American Society for Trenchless Technology and the local South Central Chapter, and have served on the Program Committee and other various capacities in recent years. Upper Trinity's involvement in the educational opportunities provided by these organizations has played a key role in the successful implementation of trenchless technology in its capital improvement program.

Kurt Staller, P.E., is the assistant director of engineering, Adam McKnight, P.E., is a senior professional engineer, and Blake Alldredge is the water education coordinator, all with the Upper Trinity Regional Water District in Lewisville, Texas.



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NASTT 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
Website: nastt-bc.org

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

Chapter Contact
Charlotte Wong
charlottenapwong@gmail.com

Elected Officers
Chair - Ophir Wainer
Treasurer - Preston Creelman



Great Lakes, St. Lawrence & Atlantic
Website: glsla.ca

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
Kevin Bainbridge
Phone: (905) 304-0080
kbainbridge@rcii.com

Elected Officers
Chair - Kevin Bainbridge
Vice Chair - Anna Polito
Secretary - Gerald Bauer
Treasurer - Derek Potvin



Mid Atlantic
Website: mastt.org

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
Leonard Ingram
Phone: (888) 817-3788
leonard@engconco.com

Elected Officers
Chair - Richard Thomasson
Vice Chair - Michael Delzingaro
Secretary - Dennis Walsh



Midwest
Website: mstt.org

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
Jeff Boschert
Phone: (314) 229-3789
jeffboschert@ncpi.org

Elected Officers
President - Jeff Boschert
Vice President - Chris Schuler
Secretary - John Milligan
Treasurer - Ryan Poertner



Northeast
Website: nastt-ne.org

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
Babs Marquis
Phone: (781) 852-0462
marquis@mcmjac.com

Elected Officers
Chair - Babs Marquis
Vice Chair - Eric Schuler
Secretary - Jonathan Kunay
Treasurer - Marshall Gaston



Northwest
Website: nastt-nw.com

The Northwest Chapter was established in 1995 by members in the provinces of Alberta and British Columbia, Canada, and in Washington state. In 2005, the members in BC established the NASTT-BC Chapter. In 2009, members in Washington state established the Pacific Northwest Chapter and the Northwest Chapter adjusted the geographic area to include members in the provinces of Manitoba and Saskatchewan.

Chapter Contact
Ben Campbell
ben@neptunecoring.com

Elected Officers
Chair - Ben Campbell
Secretary - Jeff Galloway
Treasurer - Keith Moggach



Pacific Northwest
Website: pnwnastt.org

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

Chapter Contact
Carl Pitzer
Phone: (971) 227-3920
cpitzer@thompsonpipegroup.com

Elected Officers
Chair - Carl Pitzer
Vice Chair - AJ Thorne
Secretary - Glen Wheeler
Treasurer - Heidi Howard



Rocky Mountain
Website: rmnastt.org

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

Chapter Contact
Chris Larson
Phone: (303) 791-2521
clarson@clwsi.com

Elected Officers
Chair - Chris Larson
Vice Chair - Benny Siljeborg
Secretary - Swirvine Nyirenda
Treasurer - Stephanie Nix



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

Justin Taylor
 Phone: (281) 686-1430
 justin.taylor@cciadassociates.com

Elected Officers

Chair - Jim Williams
Vice Chair - Jonghoon "John" Kim
Secretary - Luis Cuellar
Treasurer - Josh Kercho



Southeast

Website: sestt.org

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

Leonard Ingram
 Phone: (888) 817-3788
 leonard@engconco.com

Elected Officers

Chair - Jerry Trevino
Vice Chair - Ed Paradis
Secretary - J. Chris Ford
Treasurer - Brent Johnson



Western

Website: westt.org

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

Chapter Contact

Brian Avon
 Phone: (925) 932-1710
 bavon@carollo.com

Elected Officers

Chair - Brian Avon
Vice Chair - Lisa Arroyo
Secretary - Jennifer Glynn
Treasurer - Tim Taylor



Introducing NASTT's Regional Chapter Relations Manager, Jessie Clevenger! Jessie is here to provide enhanced services and support to our Regional and Student Chapters. Are you looking to get more involved with your Regional Chapter? Look for Jessie at an upcoming Regional event or reach out to her via email with any questions at jclevenger@nastt.org.



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NASTT STUDENT CHAPTERS

Members of NASTT's Student Chapters 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 an NASTT Student Chapter – scholarships, networking opportunities, education and career opportunities to name a few. To learn more about NASTT's 17 Student Chapters, visit nastt.org/student-chapters.



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Tempe, Arizona

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Trenchless Technology Center**

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University of Massachusetts at Lowell

Lowell, Massachusetts

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Bowling Green State University

Bowling Green, Ohio

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Montana Tech

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Oregon State University

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New Brunswick, New Jersey

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This paper is the winner of NASTT's Outstanding Paper Award in New Installation for 2019 and will have an encore presentation at the NASTT 2020 No-Dig Show on April 8 in Denver.

ASSESSMENT OF SOIL AND BEDROCK ABRASIVITY FOR HORIZONTAL DIRECTIONAL DRILLING PROJECTS — A QUALITATIVE APPROACH

NICK H. STRATER, P.G.

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BRIAN C. DORWART, P.G., P.E.

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ABSTRACT

A common risk to Horizontal Directional Drilling projects is excessive tool and equipment wear associated with abrasive soil and bedrock conditions. Abrasive conditions can significantly reduce drilling and reaming production rates and increase project costs associated with tool and equipment rehabilitation and replacement. This paper provides a summary of indicators that may be used to assess both soil and bedrock abrasivity during project planning and design. We have developed scales to qualify soil and bedrock abrasivity, which may be used to anticipate tool and equipment wear and assist with tool selection.

INTRODUCTION

Subsurface investigation and characterization are fundamental components of the design for any trenchless installations, including Horizontal Directional Drilling (HDD) projects. The results are used by the engineer in the development of the drill geometry and evaluation of frac-out risk, and by the contractor for estimating the project cost and schedule, and selection of drilling tools. In the case of soil, the subsurface investigations and subsequent laboratory testing typically focus on density, strength and gradation. For bedrock, the subsurface investigations and lab testing usually focus on determination of lithology, fracture patterns, weathering, hardness, and compressive strength.

In most cases, abrasivity is not a primary

consideration during the subsurface characterization, particularly for HDD installations in soil. Unlike microtunneling, where access to the cutterhead may be difficult, repair and replacement of HDD drilling tools may be relatively straightforward. However, the designer must recognize that retrieval, repair and replacement of drill tools due to abrasion can result in significant cost and schedule impacts. In a study of risk events associated with HDD, Osbak et al (2012) identified the occurrence of downhole tooling failure, catastrophic or through rapid degradation (beyond normal wear), as one of the greatest potential contributors to schedule overrun. Increased focus on the potential for abrasion-related tool damage is thus warranted during the subsurface characterization.



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ABRASIVITY

In the context of this paper the term “abrasivity” refers to a material’s potential to cause tool or equipment wear, and “abrasion” refers to loss of material from a surface by hard particles or protuberances on a counter surface (after Hutchings, 1992).

The degree of abrasivity is a function of the ratio of the hardness between the two interacting bodies, in this case between the drill tools and soil or bedrock. Hardness is typically expressed in terms of Mohs relative hardness, whereby a material can scratch and is considered abrasive to a material having a lower Mohs hardness value. Some Mohs hardness values for common minerals are included in Table 1, along with typical values for drill tool components. By this measure, minerals with Mohs hardness values greater than 5.5 may be considered abrasive to steel. Abrasion and wear rate increase significantly when the mineral hardness exceeds about 20% of the drill tool component hardness (Plinninger, 2017).

In addition to Mohs Hardness, the potential for abrasivity depends on the toughness of the individual minerals comprising the soil or bedrock. Toughness is a qualitative value that represents a mineral’s resistance to fracture when exposed to a high strain rate impact stress. Abrasive minerals will exhibit a high Mohs hardness in addition to toughness. Quartz has a relatively high hardness (Mohs hardness of 7) and “good” toughness. While most feldspars (orthoclase, plagioclase) exhibit moderate hardness (Mohs

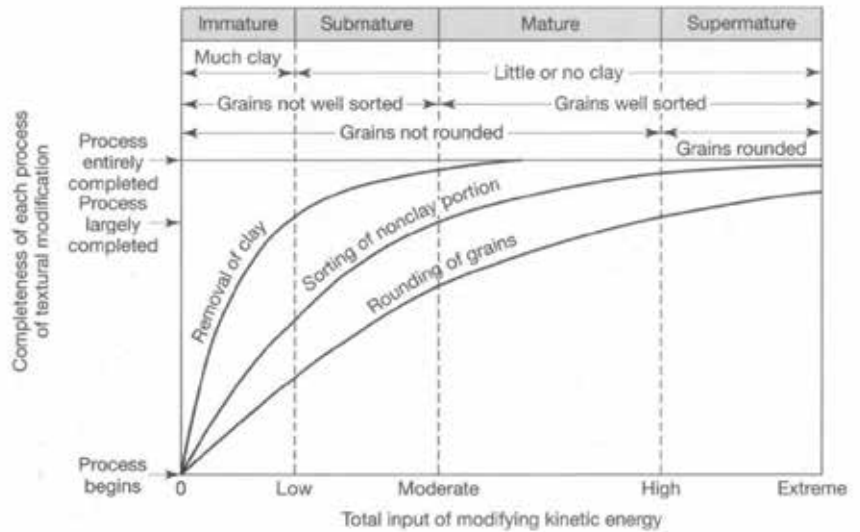


FIGURE 1 – Stages of Textural Maturity, after Folk, 1951.

hardness of 6 – 6.5), they often demonstrate “poor” toughness, and are susceptible to fracture. This may be due to pervasive cleavage, and microscopic sericitic or zoisitic alteration along the cleavage planes. Common rock forming minerals which exhibit moderate to high hardness and “good” toughness include quartz, garnet and amphiboles.

As with most trenchless and drilling methods, the HDD process uses a drill bit tool (bit or reamer) to dislodge or break down material within the bore horizon. Rotation and movement of the drill tool against the face and side-wall of the bore may result in primary abrasion of the portion of the drill tool intended to be in direct contact with the ground, and which may be replaced, i.e., drag bits, buttons. Secondary abrasion refers to the process whereby the steel housing or body of the drill

tool is degraded. This terminology was originally developed for tunnel boring machines (Jakobsen et al, 2013).

In the case of HDD, a bentonite based drilling fluid transports the soil and bedrock particles to the ground surface. During transportation, these particles impact the drilling equipment, and tertiary abrasion may occur. This is a common source of wear associated with the drill fluid pumping and cleaning system, such as pump impellor blades. The drill fluid recycling system needs to remove these particles to prevent subsequent damage to downhole equipment such mud motor components, jet assemblies, and steering probes.

SOIL

In general, the abrasivity of soil deposits is a function of mineral composition, in conjunction with particle gradation, and particle roundness. In this regard, the abrasivity of siliclastic soils will be a function of the compositional and textural maturity.

The mineralogic composition of most siliclastic soil deposits is a function of the source material, degree of transport and reworking (from the source), and weathering, both chemical and physical. Compositionally mature sediment contains large amounts of minerals which are stable at the earth’s surface (resistant to weathering), a principal example being quartz. In this regard there is a general correlation between increasing compositional maturity and sediment abrasivity.

The concept of textural maturity of sediment was introduced by Folk (1951), who suggested this was based on the amount of clay-size particles in the sample, the sorting (gradation, poorly sorted = well graded) and rounding of the framework grains. Folk established four grades of textural maturity: immature, submature, mature and super-

| Mohs Hardness | Mineral | Drill Tool Component |
|---------------|--------------------------------|---|
| 10 | Diamond | Tungsten carbide; 8.5-9 Hardened Steel; 7-8 Tungsten; 7.5 |
| 9 | Corundum | |
| 8 | Topaz | |
| 7 | Quartz, Garnet | |
| 6.5 | Plagioclase Feldspar | |
| 6 | Orthoclase Feldspar, Magnetite | Steel; 4 - 5.5, Cobalt; 5 |
| 5.5 | Amphibole (Hornblende) | |
| 5 | Apatite | |
| 4 | Flourite, Dolomite | |
| 3 | Calcite | |
| 2 | Gypsum | |
| 1 | Talc | |

TABLE 1 – Mohs Relative Hardness Values for Common Minerals and Drill Tool Components.

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FIGURE 2—Sediment roundness scale of Powers, 1951.

mature (Figure 1). In general, the evolution of immature to supermature sediment may be completed through transport and reworking, and increasing input of kinetic energy (Boggs, 1992).

Sediment roundness can be measured using visual estimation charts. For this purpose, the roundness scale of Powers (1953) is most common (Figure 2 below), which is based on sphericity and angularity. Individual particle abrasive potential increases with decreasing particle roundness (Käsling and Thuro, 2010). As individual grains become more angular, it also results in increased “grain locking”, which further increases abrasive potential (Hashemnejad et al, 2012).

The abrasivity of sediment is thus greatest within the texturally “mature” stage of Figure 1. As the sediment evolves to “supermature” the abrasivity may actually decrease due to increased rounding and sphericity.

It should be noted that the primary and secondary abrasivity of soil will increase with increasing in-situ density (or strength) and degree of cementation, if present. Increasing density and interstitial cement will reduce the tool penetration rate, and increase time of exposure during the drilling process, affecting the primary abrasivity. If cementation of the soil is present, the mineralogy of the cement is also important. Common cementing agents include calcium and magnesium carbonate (calcite, dolomite), salt (halite, sylvite) and quartz. Carbonate and salt cement are not considered abrasive, but quartz cement will add to the primary, secondary and tertiary abrasivity of a soil.

With regard to grain size, sand and gravel-sized materials tend to be more abrasive than fine grained materials, if all other variables (composition, texture, density) are equal. In particular, clay sized materials, even with high hardness, generally present a low risk of abrasivity (J. Rostami et al. 2012). Mirmehrabi et al (2016) determined that the addition of fines to otherwise abrasive soils decreased their abrasivity.

Experiments done by Hashemnejad et al,

2012 suggest that in terms of relative magnitude, variability in mineral composition has the greatest impact on soil abrasive potential, followed by grain size, then roundness. Note that increasing moisture content of soils will generally result in decreasing abrasivity, as this reduces the frictional contact between the soil clasts and the drill tools. Hashemnejad et al., 2012 suggest that moisture also creates adhesion between fine grained soils and/or crushed clasts and undamaged, otherwise abrasive clasts.

BEDROCK

Similar to soil, the abrasivity of bedrock is primarily a function of mineral hardness and durability, in conjunction with mineral size and shape, and material strength. Whether igneous, metamorphic or sedimentary, all bedrock lithologies can be characterized in terms of primary, secondary and tertiary minerals. The overall abrasivity of the rock mass increases significantly when the proportion of hard minerals (Table 1) increases, relative to the hardness of the drill tool(s). Given its frequency in many rocks, free quartz is often identified as a primary concern in the evaluation of abrasivity. Quartz may be present in monocrystalline form (free quartz), polycrystalline form (chert, quartzite), and as secondary cementing agents and intrusive veins. Note that there are other minerals with similar hardness, which may occur in significant proportion in rock types containing small amounts of quartz. An example includes amphibolite, a common metamorphic lithology containing large amounts of amphibole (e.g., hornblende, actinolite), which is relatively hard and tough.

Similar to the relationship between soil density and primary abrasivity, the primary abrasivity of bedrock will tend to increase with increasing compressive strength, as this will reduce the tool penetration rate, and increase time of exposure during the drilling process.

The size and shape of the mineral clasts/grains as well as the nature of the interclast/

grain contacts will also impact bedrock abrasivity. Bedrock which exhibits sutured or recrystallized interclast/grain contacts, or strong secondary cement (e.g., quartz cement) will have a tendency to exhibit higher primary abrasivity than bedrock without. Likewise, bedrock with rounded or euhedral clast/grain distribution will exhibit less abrasivity than bedrock with mineral clasts/grains which are angular or anhedral.

It is worth noting that the durability, and effective grain size of the particles being removed at the face of the bore will also be impacted by the presence of micro-cracking of bedrock clasts/grains, which may be associated with the stress history (thermal and tectonic) of the rock mass.

TESTING METHODS

Two relatively new laboratory test methods for measurement of soil abrasivity for tunneling projects include the Soil Abrasion Test (SAT™), and the Penn State Soil Abrasion Index (PSAI). Currently, neither test method is well established. More common is evaluation of soil abrasivity through examination of mineralogical composition by petrographic examination of samples, following impregnation with a bonding agent. Although less common (and more expensive) X-ray diffraction or scanning electron microprobing may also be used. The textural characteristics of soil can be determined using hand samples and microscopic analysis.

Numerous tests have been developed for abrasivity testing of bedrock, though the Cerchar Abrasivity test is the most common, and most readily available. Despite this, Cerchar Abrasivity has not been widely used in the HDD industry (PRCI, 2008). Supplementing the test results with petrographic analysis of sample thin sections provides a summary of mineralogical composition and textural characteristics.

Similar to soil, petrographic analysis of thin sections can be used to determine the mineralogical composition of bedrock. The analysis should focus not just on total quartz content, but total content of hard, tough minerals, as well as the size and shape of these minerals. The presence of microscopic weakness such as microcracking and weathering should also be noted, as these features will reduce mineral toughness.

ABRASION ASSESSMENT

Soil

In the absence of a readily accepted procedure for soil abrasivity testing, the authors



FIGURE 4 — Examples of tool abrasion resulting from tool gauging.

present a means of qualifying primary soil abrasivity for the purpose of site characterization and risk assessment. This is shown in Table 2, which utilizes parameters which appear fundamental to tool abrasion during the HDD process, and which may be readily available from test boring logs, visual sample (macroscopic or microscopic) characterization, or published geologic literature. For the purpose of this exercise, we have applied a Moh's Hardness of 5.5 in Table 2, as this is generally upper limit of the hardness for untreated drill steel.

Bedrock

Current methods of evaluating bedrock abrasivity consider single parameters, such as quartz content or Cerchar Abrasivity test values. However, these singular methods neglect other considerations specific to the lithology and the reaction to drilling. For instance, a shale may have a total quartz content of 40 percent, but the size of the quartz particles may not present a significant risk of abrasion.

Available abrasion scales do not consider the impact of weathering on the abrasivity of the rock mass. Microscopic weathering in the form of alteration or microcracking can greatly reduce the abrasivity. Further, when selecting samples for testing, there is often a tendency to test unweathered rock samples. Table 3 presents a method of qualifying rock mass abrasivity. Similar to Table 2, this is intended to aid in general site characterization



FIGURE 3 — Before and after photographs depicting abrasion of drill tools in dense glacial sand and gravel.

and risk assessment. The equivalent Cerchar Abrasivity Index test values are included for comparison.

TOOL ABRASION EXAMPLES

Examples of primary abrasion of various drill tools used in abrasive soil deposits (dense glacial sand and gravel) are included in Figure 3.

Tool abrasion may be exacerbated if the borehole is not gauged carefully. This requires carefully inserting new or replacement drill tools into a borehole of slightly different or gradually decreasing diameter. If abrasion has reduced the diameter of the drill tools, the diameter of the borehole will gradually decrease with distance. If the driller doesn't slowly advance the tool to accommodate the diameter difference, tool wear or damage may occur. This is often evident around the circumference of the bit. Examples of abrasion caused by gauging problems are shown in Figure 4.

It should be noted that there are sources of tool damage that may not be exclusively the result of abrasivity. An example is failure of the tool resulting from dramatically different torque values, which may occur while drilling through materials of highly variable density or strength. An example is shown in Figure 5, which is a roller cone reamer which has lost the outermost two rows of buttons through shattering after being advanced through gneissic bedrock with highly variable weathering (highly weathered to fresh), and lithologies of dramatically different compressive strength (schist and quartzite).

ADDITIONAL CONSIDERATIONS

There may be HDD design elements that can be modified to reduce adverse impacts, if abrasive soil or bedrock conditions are anticipated. This may include avoiding compound curves and tight bore path curve radii, which can increase the rate of tool wear. The designer should consider whether abrasive units can be avoided altogether.

The designer, and the site inspection personnel also need to recognize that the rate of tool advance must be carefully balanced with the drill fluid pumping rate. Balanced



FIGURE 5 — Roller cone with shattered buttons. Note minimal abrasion in remaining button.

drill fluid flow ensures that abrasive materials are efficiently removed from the face, and transported away from the drill tool. Requesting that the contractor reduce or minimize pumping rate to reduce annular pressures (and fracout risk) is common. However, this may result in additional tool wear, requiring more frequent trips to replace or condition tools, and more time downhole, which may ultimately increase fracout risk.

The contractor should consult the equipment manufacturer to determine the appropriate tools for the given subsurface conditions. The tool manufacturer should be able to provide recommendations with regard to appropriate rotation rate, weight on tool, appropriate reamer steps, and pump rate to help reduce tool wear potential.

CONCLUSIONS

Excessive tool wear from abrasive soil and bedrock materials is a leading cause of cost and schedule overruns associated with HDD projects. Understanding the factors that cause abrasion and identifying their presence through a geotechnical investigation are necessary to avoid unforeseen costs and schedule delays. In the absence of laboratory test data, evaluation of parameters including mineral composition, textural maturity, size and shape of mineral clasts/grains, weathering and density/strength may be useful in evaluating the abrasive potential of geologic materials.

Qualitative abrasivity assessment methods are provided for soil and bedrock. The authors emphasize that additional work is needed to "fine-tune" these methods, to improve their accuracy and applicability for HDD projects. Further, the user is cautioned that additional site-specific considerations may be warranted in the abrasivity evaluation.

This paper was edited for style and space for publication in *NASTT's Trenchless Today*. To view Paper TM2-T2-02 in its entirety, please visit nastt.org/technicalpapers.

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