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Mike Willmets
NASTT EXECUTIVE DIRECTOR

NASTT'S 2017 NO-DIG SHOW & ISTT'S 35TH INTERNATIONAL NO-DIG

Celebrates Trenchless Around the World

So far, 2017 has been a fantastic and busy year here at NASTT. We're riding high on the success of NASTT's 2017 No-Dig Show and ISTT's 35th International No-Dig held in Washington, D.C., and we are proud of the fact that our show offers such top-notch training, education and networking opportunities. NASTT's No-Dig Show is truly the premier trenchless conference in the world. We were thrilled to co-host this year's show with ISTT to welcome global trenchless delegates from 32 different countries.

NASTT's Gala Awards Dinner is an event that is close to my heart. This year we put out the call for a Tuxedo Challenge and many of you responded by donning your best formal wear! This is such a great event to honor so many trenchless icons and up-leveling the status of the event makes perfect sense. Along with our Chair, Frank Firsching and Benjamin Media CEO, Bernie Krzys, I had the honor of inducting the newest members to NASTT's Hall of Fame. The 2017 inductees were the late Joseph L. Abbott Jr. of Godwin Pumps, Dr. Tom Iseley of the Trenchless Technology Center and the late Rod Sutliff of R.S. Technical Services.

All three of these gentlemen exhibit the traits that we look for in Hall of Fame inductees and it was our privilege to honor them during our annual Gala Awards Dinner. In recognition of decades of outstanding service to both ISTT and NASTT, John Hemphill was also honored as a new member of the Hall of Fame. John was NASTT's first official employee and much of the success NASTT enjoys today is founded upon John's efforts. Please visit our website at *nastt.org/no-dig-show/hall-of-fame* to learn more about these fine gentlemen.

Along with honoring colleagues that have spent their careers dedicated to the trenchless industry, we also had the privilege to recognize some future leaders with the Ralston Award for Young Trenchless Achievement. The recipients of the awards this year were Amana Arayan, Marketing Manager at LMK Technologies and Christopher Larson, Chief Operations Officer at C&L Water Solutions. Congratulations to these exceptional young professionals!

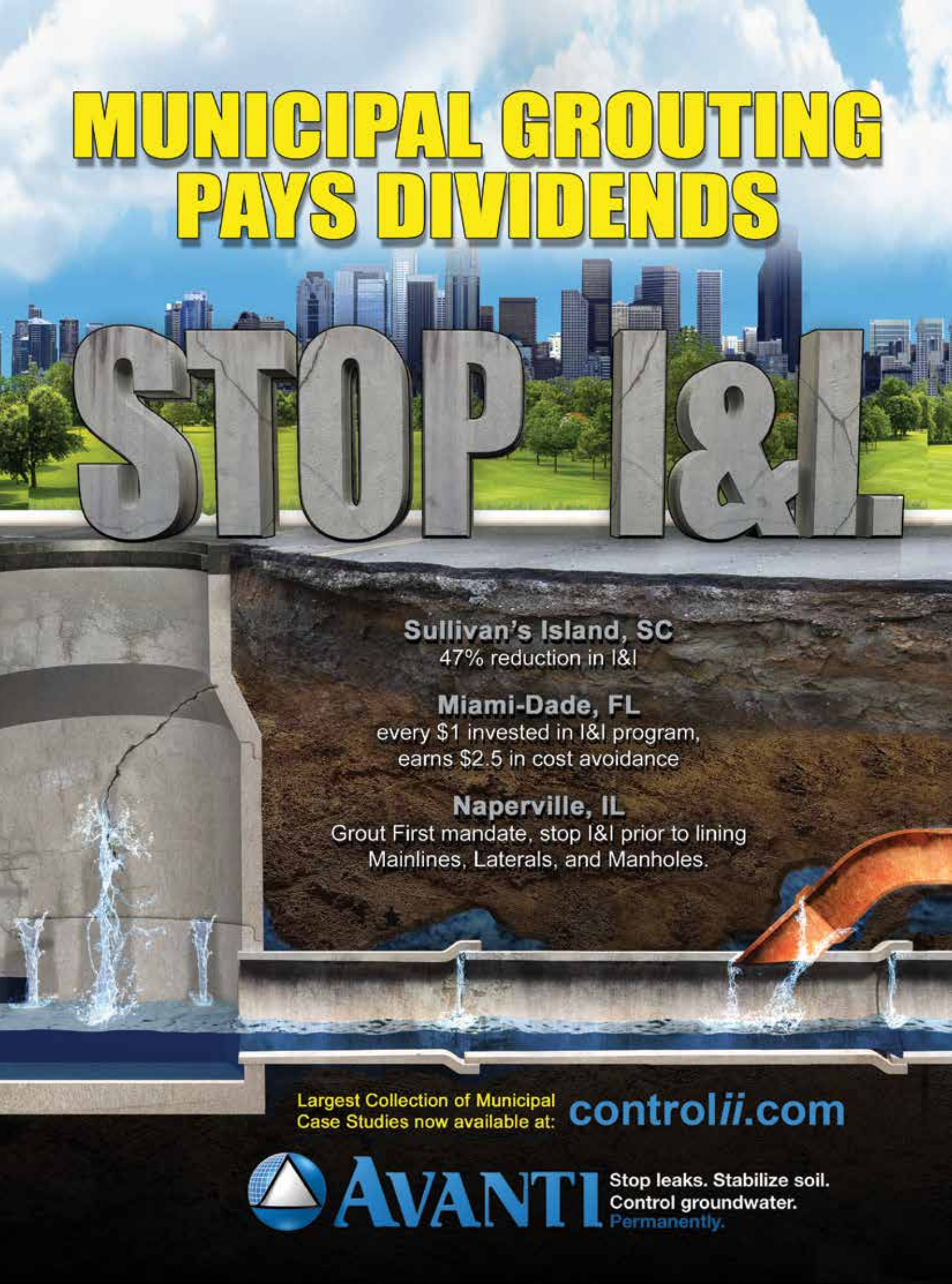
Each year NASTT recognizes companies with state-of-the-art products in either new installation or rehabilitation with the Abbott Innovative Product Awards. These awards are named in honor of the late Joseph L. Abbott, Jr. who was an active member of the society since its inception in 1990, a respected champion of innovation and one of the 2017 Hall of Fame inductees.

We received many qualified nominations and the volunteer Awards Committee members had the nearly impossible task of reviewing all the submissions and interviewing company representatives. This year, in a break from tradition, we recognized three companies! The 2017 Abbott Innovative Product Awards winners were: Deep Trekker for its DT340 Crawler, Ditch Witch for its JT40 and HEBNA Corp. for its iMFL. Congratulations to the winners and thank you for advancing the trenchless industry!

My sincerest thank you goes to all the dedicated volunteers that made our show such a success. NASTT's 2017 No-Dig Show Program Chair, Jennifer Glynn of RMC Water & Environment (a Woodard & Curran Company) and Vice Chair, Don Del Nero of Stantec, put in many hours of volunteer time to make the conference the valuable and sought after event that it is. Jen and Don worked closely with our Program Committee that is comprised of more than 100 volunteer members to peer review every technical paper in the schedule. Several of our Program Committee members also served as Session Leaders who dedicated additional hours working with the paper authors. I want to recognize the dozens of event sponsors and loyal exhibitors that make all this possible. We sincerely thank you for your continued support of our industry, the Society and NASTT's No-Dig Show.

Michael J. Willmets

Michael J. Willmets
NASTT Executive Director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Frank Firsching
NASTT CHAIR

NASTT's 2017 No-Dig Show Exceeds Expectations

NASTT's 2017 No-Dig Show and ISTT's 35th International No-Dig held this past April in Washington, D.C. was another exceptional conference to add to the trenchless history books! With more than 2,300 attendees and a sold-out exhibit hall, it was a busy and productive week with great things on tap for everyone.

Trenchless professionals from all over the world attended the conference for training, networking and fun. We were pleased to partner with ISTT to co-host the event and welcome delegates from literally the four corners of the world! We started with the Kickoff Breakfast on Monday morning where we recognized many of our dedicated members and volunteers. This list included the Board of Directors, our 2017 No-Dig Show Program Committee and Session Leaders, event sponsors and our 2017 Program Chair, Jennifer Glynn of RMC Water & Environment, a Woodard & Curran Company, and Vice Chair, Don Del Nero of Stantec.

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

We also recognized some of our promising student members who are the future of trenchless. One of NASTT's number one goals is to support these future leaders through our student programs including the Argent Memorial Scholarship. Each year, NASTT awards scholarships to exceptional students who have demonstrated success both inside and outside of the classroom. Over the past eight years, 34 student scholarships have been awarded, totalling more than $170,000. This year, we recognized five top-level students in our organization: Randall Castor of Oklahoma State University, Amr Fenais of Arizona State University, Johnathan Grill of Montana Tech, Moath Mohammed of Louisiana Tech University and Ali Rostami of the University of Alberta.

The technical sessions are a major component of the conference. The 160 technical papers in the program were all peer-reviewed by our Program Committee that is made up of over 100 industry volunteers. These papers covered dozens of topics over the course of six tracks and three days. Also, this year, Program Chair Jen Glynn continued the tradition of hosting roundtable discussions, with three popular topics over the course of three days. These discussions were led by a panel of industry and topic experts and each one was moderated by either Jen or Vice Chair Don Del Nero.

Monday night we celebrated during an event that never fails to get everyone in party mode: The 16th annual Education Fund Auction. This year's theme was "Heroes of the Underground" where attendees came dressed as heroes and villains! We enjoyed cocktails and each other's company while raising money for a great cause! We owe so much gratitude to everyone involved in the auction planning. Thank you to our Auction Committee members, Committee Chair, Tim Petrie of Insituform/AEGION, and Vice Chair, Gregg Leslie of Xylem Dewatering for all your hard work behind the scenes. Thank you to Bernie Krzys of Benjamin Media for acting as our MC for the night and volunteer auctioneer, Butch Graham for donating your time and exceptional talents for the evening. Of course, we also owe a huge thank you to all the bidders and participants who helped us raise more than $110,000 that night! Since 2002, we've raised more than $1 MILLION and have used those funds in support of our educational initiatives and programs. Thank you to everyone involved for making this event a huge success.

During Tuesday night's Gala Awards Dinner, I had the privilege of recognizing and honoring my friend and colleague, Jim Rankin of Vermeer, with NASTT's Chair Award for Outstanding Service. Jim has been a dedicated volunteer and tireless supporter of the trenchless industry for many years. He served on NASTT's Board of Directors for six years, the Program Committee for countless years and is one of our students and young professionals biggest champions. Jim embodies the spirit of a mentor and volunteer and the trenchless community is lucky to have him as our advocate. Thank you, Big Jim, for all your years of dedication!

NASTT's 2017 No-Dig Show was a wonderful success and we are already in the planning stages for next year in Palm Springs, California. We hope to see you March 25-29, 2018 to learn about trenchless innovations and network while having fun and celebrating our industry.

Frank Firsching

Frank Firsching
NASTT Chair

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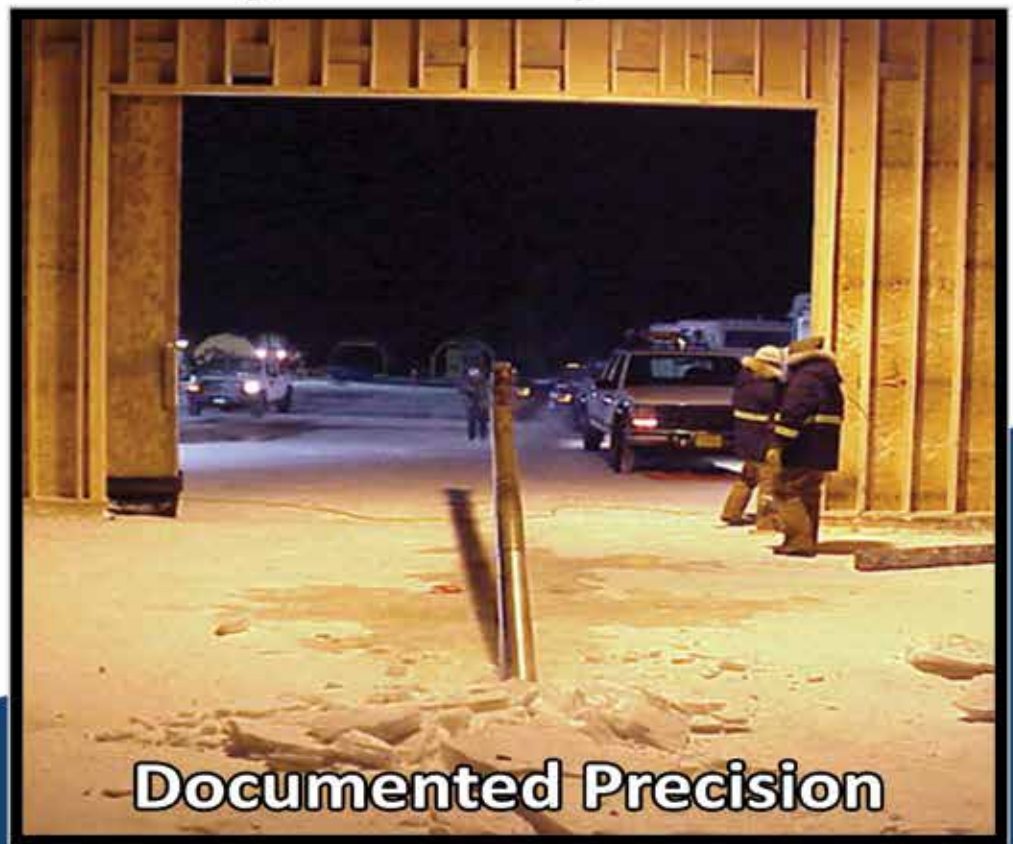

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Michelle Hill
NASTT PROGRAM DIRECTOR

Trenchless Mutual Funds:

HOW NASTT AND MUNICIPALITIES ARE POOLING FUNDING TO INVEST IN THE FUTURE

When building a financial portfolio, the key to success is defining your investing goals and objectives. Many investors who are focused on diversity are attracted to mutual funds since they offer a wide variety of investments.

Just like a mutual fund where a group of investors effectively pool their money, NASTT and North American municipalities combined financial resources to exceed educational goals at NASTT's 2017 No-Dig Show.

For those of you who attended the conference in April, I'm sure you will agree it was an educational experience like no other. In just four days, attendees had the opportunity to experience introduction to trenchless technology courses, 160 different technical presentations and in-depth good practice trainings. This diverse curriculum is the largest of its kind in the trenchless industry.

So how did NASTT and municipalities take a mutual fund approach to education at this year's conference?

First of all, NASTT set a goal and offered their No-Dig Show Municipal & Public Utility Scholarship. The objective of this scholarship is to provide education and training for employees of North American municipalities, government agencies and utility owners who have limited or no training funds due to economic challenges. This scholarship was established in 2013 and includes full access to all exhibits and technical paper sessions. Along with complimentary registrations, selected applicants were also eligible to receive overnight accommodations. NASTT awarded 151 municipal scholarships covering 107 different organizations, which is the largest municipal and public utility scholarship investment the organization has made since the inception of the program.

Once municipalities were awarded the scholarship, they investigated other opportunities that were available at the conference to further their educational investment. Many of the organizations decided to participate in the pre and post courses which were not part of the scholarship package. This is where the mutual investments really paid off. By pooling NASTT's Municipal & Public Utility Scholarship budget covering conference fees and municipality training budgets covering Good Practice Course fees the end result was an even higher return on the educational investment.

I'm a firm believer that education is the first step in advancing this industry. I encourage all municipalities and public utility organizations to look into attending NASTT's 2018 No-Dig Show in Palm Springs, California and apply for the scholarship. Applications are now available online at nastt.org.

I look forward to helping you all with your education portfolio.

Michelle Hill

Michelle Hill
NASTT Program Director

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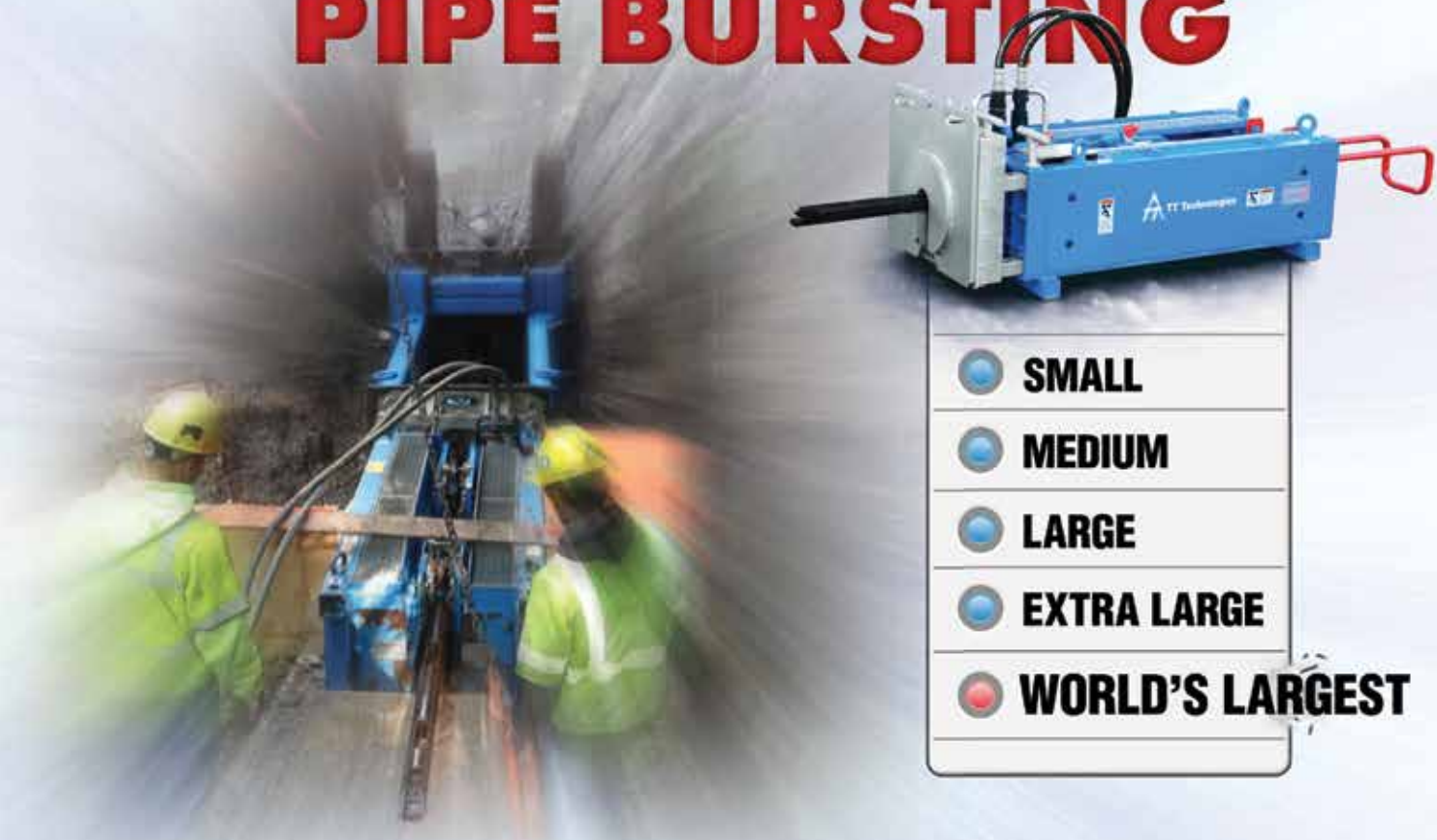

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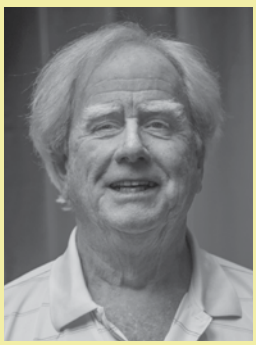
NASTT Q&A

A CONVERSATION WITH BILL GRAY



Bill Gray

NASTT caught up with retired industry veteran Bill Gray at the 2017 No-Dig Show in Washington, D.C. We chatted with the NASTT Original Director and Past Chair about the growth of the trenchless industry, today's challenges and NASTT's leadership role

Going back to early in your career, tell us about how you first got involved in the industry and with NASTT.

I worked for a long time in Toronto doing sewer and water main design along with civil engineering work for tunnels, intakes and outfalls. By the mid- to late-1980s, because I was a member of the Institution of Civil Engineers in Britain, I knew of the formation of the International Society for Trenchless Technology (ISTT) and had joined around that time. Meanwhile, I had also known Richard Thomasson since the 1970s through the Water Environment Federation (WEF) Collection Systems committee and we were good friends. Richard was one of the founding members of NASTT. In 1989, my company was starting to get more into trenchless work and, along with the Ontario Sewer and Watermain Contractors Association, we worked to organize and sponsor a seminar along with some representatives from Yorkshire Water in the U.K. and some folks from Germany. We held the two-day seminar in London and Mississauga, Ontario, and I think it drew close to 500 people. So that was the point in my career when I got involved in education initiatives, and that led me into NASTT where Richard was the chair at the time. I joined and eventually became chair in 1996.

What interested you most about working in this business?

I was always working in tunnels, microtunnels, directional drilling and also rehabilitation and pipeline renewal. The company I worked for did a lot of sewage plant and water treatment plant design. When you're building a water treatment plant, you have to get raw water. That requires pipes to bring water from the source to the plant where it's treated, and then more pipes to distribute it through water mains. Then, you use sewer pipes to bring it back to the treatment plants and then discharge it back through an outfall. There's a lot that goes into water and sewer infrastructure, so it's been interesting to see all the technology that has progressed to help the renewal of every area. There are situations where trenchless is more structurally-sound and less disruptive. It's been exciting to see how all of it works.

In your mind, what is the most significant evolution that has taken place in the trenchless industry?

It's the technology itself. A tunneling contractor I used to work with once told me, "With today's technology, if money was available, we could do the last 20 years of tunneling in two years." With HDD, we're drilling longer and more accurately. We can tunnel around curves. Who could have thought of that 15 years ago? Our geotechnical capacity for ground analysis has also made projects like that more efficient.

I can't say enough about the technology, the skill of the contractors, the knowledge of the design engineers and the willingness of the municipalities to step forth and accept trenchless. Twenty-plus years ago, they wouldn't touch it. It was untried. With today's technologies, today's materials and skills, it's wonderful to see.

On the other side of that, what do you see as some of the current challenges?

The big challenge hasn't gone away — our infrastructure is getting older. You turn on the tap and water comes out, and you flush and it goes away. Where does it go and where does it come from? This is an advanced country because we have sewage and water treatment and supply systems.

You go to a third world country, and they may not have toilets or access to clean water. So it's imperative that we maintain ours. As infrastructure grows older, trenchless technology is here to help rescue these systems. A friend of mine said to me one time, instead of calling it pipeline rehabilitation "Let's call it pipeline renewal." And that's what we can do — renew these pipelines and maintain the hole in the ground instead of digging a new one. That's why pipe bursting is such a great technology because it's a wonderful way to do that.

Why do you think NASTT has endured as a leader in promoting the use of trenchless technology and education?

With ISTT, we're united around the world and we can transfer information and knowledge and know-how. With NASTT, there's a similar network [in North America]. And that's very important. NASTT itself was a struggle at first because people weren't sure if [trenchless]

worked. Owners didn't always understand it. Part of the reason was that the technology had been around for 30 years. It wasn't new. We just didn't call it "trenchless technology." We had to translate the language and transform the discussion, develop technical manuals, run courses and educate.

In the late 1990s, we sort of struggled because money was tight, but we recovered. Eventually we got John Hemphill as executive director. What a blessing that man was. With leadership like his, we really got NASTT on the right track. There's also people like Maynard Akkerman who have spent so much money on the [Educational Fund] auction. We've come a long way and we're still expanding and more people are using trenchless. It's still so exciting to be a part of. This year's No-Dig Show is probably the biggest I've ever seen.

In terms of continuing the growth, what do you think is needed in our industry going forward?

It's imperative not to lose direction.

"I CAN'T SAY ENOUGH ABOUT THE TECHNOLOGY, THE SKILL OF THE CONTRACTORS, THE KNOWLEDGE OF THE DESIGN ENGINEERS AND THE WILLINGNESS OF THE MUNICIPALITIES TO STEP FORTH AND ACCEPT TRENCHLESS…IT'S WONDERFUL TO SEE."

I was talking with some of the guys on the Program Committee this week about how the technical program is so critical. If you get to present your paper, that means you are absolutely worthy of presenting your case study or technology. We must continue selling trenchless technology. When we first started, suppliers were tentative because they wanted their system to be the one used or presented. It was very competitive, and that's natural. Today I think we work together a lot better and we must maintain that. There's room for everyone. It's a team game.

We have trillions of dollars' worth of [infrastructure needs]. There's more than enough work to go around. For the trenchless industry, the imperative thing is to keep focused, not lose what we've done and keep pressing ahead and getting students involved. Students can come out of university to be trenchless experts just the same as a doctor or a lawyer. We want them to be passionate about not just being engineers, but trenchless engineers.

In the Trenches

BY ANDREW FARR

Michelle Beason, P.E.

It's important not to forget that reducing the impact to the environment is one of the important benefits that trenchless technology methods offer, and one the industry rightfully promotes. Michelle Beason was inspired at a young age to get into environmental work, and it's what ultimately led her to the trenchless field.

"When I was in high school, my principal recommended me for an opening as a Student Aide for the U.S. EPA. There was an EPA office in my hometown, so starting at 16, I began working there. All of the field managers were civil engineers and they dedicated their careers to cleaning up hazardous waste spills, water pollution and sewer overflows," Beason says, noting the many CSO issues in the Detroit area where she grew up. "I really learned a lot from them, and they were mentors for me. I saw how important this work was, and that led me to study Environmental Engineering at Purdue University, and then to my first job in the water/wastewater business."

As she began her career, Beason continued working for EPA in various capacities through college before going to work on the consulting engineering side. She then worked in California for the East Bay Municipal Utility District, in the San Francisco Bay area for 12 years. There, she gained more experience in rehabilitation, seismic improvement, wet weather and I/I projects. After that, Beason started her own construction company, specializing in building construction and underground work including sewer lateral replacement. Her specific introduction to trenchless technology was seven years ago when she got more involved in pipe inspection and trenchless rehabilitation work.

"I'm now very involved with different aspects of trenchless sewer maintenance and repair," she says. "The experience I've gained throughout my career has made me a good resource as I've had different viewpoints: as a consulting engi-

Michelle Beason
NATIONAL PLANT SERVICES, INC., A CARYLON CO.

neer, on the owner side for a utility, as a contractor who's trenched to install pipe systems, and now with a maintenance and rehab contractor that helps many cities. And if I don't know something, I soon learn the ins and out of it and I can share it with my clients and colleagues."

Today, Beason is regional manager for National Plant Services, Inc., a subsidiary of the Carylon Corp., covering the western United States, where she focuses on rehabilitation work ranging from injection grouting for I/I control, CIPP lateral lining, point repairs and manhole rehabilitation, structural pipe coatings, as well as multi-sensor and CCTV inspection, and sewer cleaning work.

"The Carylon Corp. was founded in Chicago in 1949 and is the oldest environmental services company of its kind. We are continuously expanding into more trenchless services," she says. "Being in California, there is little groundwater, especially with the drought the last several years. Now with the return of wet weather, people can see the infiltration coming in. And if there is infiltration, there is also exfiltration occurring that is contaminating our soils, which is of concern to the EPA." To that point, she is focused on educating people in different regions on their options for addressing I/I with trenchless methods like injection grouting, CIPP lateral lining and point repairs, as opposed to replacement. "Private sewer laterals are a big contributor to both environmental pollution, and increased treatment plant costs," she says. "New lateral lining technologies make it economically and practically feasible to stop these issues, as well as to reduce maintenance costs."

Beason also enjoys volunteering her time and experience to help educate the industry. With NASTT, she was recently elected to the Board of Directors for the Western Regional Chapter (WESTT) and she also serves on NASTT's Auction Committee. She is also Vice Chair of the NASSCO Infrastructure Assessment Committee.

"NASTT has made a tremendous effort to encourage education, set up programs and come up with new ideas to grow the industry," she says. "I know I've learned a lot in the past seven years coming to these tradeshows where you meet the different vendors and you work on projects with people who you haven't before. NASTT is facilitating this exchange of information and growth, and putting together the venues so we can share this information and come up with new ideas.

"National Plant Services and the 17 other Carylon companies are focused on that, too," she adds. "We're always looking down the road at new technologies, how we can better serve our customers and improve our services."

As a trenchless expert who has racked up a wealth of experience working in many different segments of the water/wastewater business, Beason says that helping her clients is still her favorite part about working in this industry.

"I love being a resource for them," she says, "and I love learning from their experiences as well. I feel like I'm helping both the environment and humans. People call me and ask for my advice. They're looking for solutions, and in turn, those solutions will help all the people who live in those service areas. I think that's the best part of my job; being that resource and helping everyone down the chain to the end-user."

Carrie Murray
STANTEC

Jim Williams
MEARS GROUP

Carrie Murray, M.Eng., P.Eng.

Growing up in the Prairie province of Saskatchewan, Carrie Murray says the origin of her interest in engineering and construction comes from being raised on a farm. "Always having to fix things on the farm and coming up with creative solutions with limited materials planted the idea that I could have a career as a problem solver," she says.

Today, Murray is a senior geotechnical consultant with Stantec and works on projects primarily across western Canada in the transportation, water and oil and gas sectors. She has held positions as a geotechnical engineer, team lead, project manager and field engineer. Murray was first introduced to trenchless technology early in her career when clients in the oil and gas market were seeking trenchless methods for major river crossings.

"Early in my career, I worked in the field completing drilling site investigations for trenchless crossings. It was intriguing that a pipeline could be installed by drilling horizontally across major rivers. So that's how I was introduced to trenchless, doing geotechnical field work," she says. "From there, I got more and more involved with design and assessment."

Working as a consultant and briefly as a contractor, Murray has worked on trenchless projects since 1999, ranging from road and rail HDD crossings to major river crossings that are 2,000-plus meters. She says that from her perspective, the trenchless industry is seeing owners taking more of a risk management approach to design and construction, which she says is a good thing as the trenchless industry continues to experience tremendous growth in both capability and complexity.

"As projects increase in diameter and length while intersecting complex ground conditions, they need to be treated more like tunneling projects," she says. "Developing risk management frameworks with the owner has been a migration in the industry that I've been involved with. This is a more holistic approach, working together with the owner, the designer and the contractor to give the best project outcome. I think the industry is still getting on board with that approach."

Murray first got involved with NASTT when she was a chapter leader for the NASTT student chapter of the University of Alberta. From there, her volunteer work with the Society has evolved and she has been a part of educational initiatives in western Canada with the Northwest Chapter of NASTT. She also serves on the review committee for the HDD Good Practices Guidelines and has written and presented several papers at NASTT's No-Dig Show since 2012.

"I think educating owners and project managers about the technology is important because they are required to manage these trenchless projects as part of their linear infrastructure," she says. "When you have a major trenchless crossing in your linear infrastructure, it's an important piece of the equation and depending upon the complexity, may need to be managed as a separate project. So, the more [owners] understand about what can impact their budgets and schedules, the better equipped they can be to accommodate an appropriate investigation and design to construct a successful crossing on time and on budget."

While Murray says planning for risk is an important area of large HDD projects, she also adds that budgeting and knowing the true cost of trenchless projects could benefit from more education.

"I've come across situations many times where owners have not properly allocated funds for the HDD expense which creates a challenging working environment for everyone involved," she says. "But when it can be recognized early on that trenchless crossings will be a high-risk component of your linear infrastructure, then the team can properly manage and mitigate the risks. This is where NASTT does a great service nationally and within local chapters; by promoting trenchless dialogue with all interested stakeholders to broaden the understanding of the nuances created by trenchless projects."

Jim Williams, P.E.

Jim Williams is no stranger to complex HDD projects, and along with the rest of his team at Mears Group, he's been involved in several award winning trenchless projects in recent years.

Williams first got his start in the construction industry working as a consultant with various civil engineering firms in Florida, where he worked on projects ranging from pipeline construction to pump stations and treatment plants. By the late 1990s, he was introduced to HDD. Although admittedly not an immediate expert, Williams says that because the demand for the use of directional drilling was expanding, expertise in the industry – including his own – evolved as the scope and magnitude of projects became more difficult.

By 2006, he started his own firm, working with HDD contractors on engineering consulting for design-build, as well as other construction projects. Williams then joined Mears Group in 2010 and today is the company's engineering manager for horizontal directional drilling services. In his time with Mears, Williams has been involved in some very notable projects, including the recent 2015 *Trenchless Technology* Project of the Year honorable mention – the South Magnolia CSO Control Project Gravity Sewer Pipeline. This project, outside of Seattle, was designed to cap-

ture excess flows during storm events and transfer them to a 1.5-million-gallon retention tank. Mears served as the drilling subcontractor.

Then in 2016, Mears was the HDD contractor on the Indian River HDD Crossing project. This impressive HDD project involved the installation of two parallel 32-in., 7,020-ft bores 60 ft below a river bottom in an environmentally-sensitive area in order to ultimately install underground electric lines. The project received *Trenchless Technology's* 2016 Project of the Year Award for New Installation.

"We're always working on something new and challenging," Williams says of Mears' projects. "There's never a dull moment."

Williams notes the growth in all segments of trenchless technology including HDD has been significant over the course of his career, despite still being a niche market.

"Overall, HDD is still a specialty construction method, but it has grown in a huge way," he says. "And with this growth, a lot of the service providers for things like steering systems, tooling and drill pipe, are reaching a much bigger market. I think that's giving a lot of contractors more resources. It has raised the level of expertise and the types of projects that can be completed.

"Some of the big projects I worked on early in my career were maybe 4,000 ft and that was seen as a really long crossing and a huge accomplishment, and still is. But now we're seeing 7,000-, 8,000-, 10,000-ft crossings. Obviously, the technology and the expertise is growing all the time. In 15-20 years, you've basically doubled the length and magnitude of some of these projects."

Williams first attended NASTT's No-Dig Show in the early 2000s and has since been consistently involved in writing and collaborating on papers for the technical paper program.

"We like telling people about the types of projects we're doing and helping the industry realize that some of the things that not too long ago were thought of as impossible, are actually doable with the right approach to the project," he says. "I think education, which NASTT really focuses on, is key to further development. You see a wide variety of understanding of construction methods and the design approach that people are taking. Some are very good, but some are unnecessarily challenging."

Williams says one thing he thinks could be a positive development down the road in HDD design would be creating more unified design standards that could be adopted by engineering firms.

"Not that it would be required necessarily," he says. "But if engineers designed a project in accordance with a specific industry design standard, then the owner, contractor and everyone involved would know it's been designed at a level that's appropriate for that project's conditions.

"I know it's a pretty challenging thing to do to get everyone on the same wavelength, but I think it's a worthy goal at some point."

ANDREW FARR IS THE ASSOCIATE EDITOR OF *NASTT'S TRENCHLESS TODAY.*

No-Dig Goes Global in Washington, D.C.

With Help from the International Trenchless Community, NASTT's No-Dig Show Continued Its Record-Breaking Run in 2017

By Andrew Farr

NASTT's No-Dig Show can be described as a measuring stick for the trenchless industry — examining its success each year is telling of the growth of this niche market in underground construction.

But that's not to say that tradeshow attendance is necessarily indicative of an entire industry. Rather, NASTT's No-Dig Show can be used to gauge the level of interest in trenchless across all industry segments — owners and municipal engineers, consultants, contractors and manufacturers. With education, training and networking highlighting the conference, NASTT's No-Dig Show is the place where experience gained on the jobsite is shared for others to learn. The show is also a celebration of the advancements that have taken place to push the industry to new heights. And the numbers reveal consistency in that growth.

This year, the No-Dig Show was co-hosted by the International Society for Trenchless Technology (ISTT). Billed as NASTT's 2017 No-Dig Show & ISTT's 35th International No-Dig, the conference brought nearly 2,300 attendees to Washington, D.C., at the Gaylord National Resort and Convention Center, April 9-13. The conference again broke a record for number of exhibitors with 195 companies displaying their technology — the most ever for a No-Dig Show.

Day 1

NASTT's No-Dig Show is the premier trenchless event of the year, providing a unique blend of business, education and networking while bringing together the industry's past, present and future to celebrate the industry's success.

This year's show started off on Sunday, April 9 with pre-conference courses. The official Day 1 start on the morning of April 10 got underway with the annual Kick-Off Breakfast. NASTT recognized its Board of Directors for 2017 including new Board members Alan Goodman of HammerHead Trenchless Equipment, Michelle Macauley of Jacobs Engineering and John Matthews of the Trenchless Technology Center.

The Kick-Off Breakfast also recognized NASTT's 2016 Outstanding Paper Awards. The 2016 Outstanding Paper for Rehabilitation was awarded to Matthew Olson and Cody Nelson for the paper "Into the Void: Case Study of an Emergency Pipe Burst Beneath the West Seattle Bridge" (see p. 42). The Outstanding Paper Award for New Installation was presented to Rory Ball, Rich Leon, Martin Dix and Mark Briggs for the paper, "What Happens When a Microtunnel Passes through Mixed Face Ground with Hazardous Gas and Encounters Unexpected Reinforced Concrete, Timber Piles and a 10-in. High-Pressure Gas Main."

In addition to honoring industry leaders of the present, NASTT also recognizes the young, upcoming talent in the trenchless field. This year's Argent Memorial Student Scholarships went to: Randall Castor, Oklahoma State University; Amir Fenais, Arizona State University; Johnathan Grill, Montana Tech; Moath Mohammed, Louisiana Tech University; and Ali Rostami, University of Alberta.

The winners of the 2016 *Trenchless Technology* Projects of the Year were also recognized. Jason Edberg with NTH accepted the Project of the Year award for Rehabilitation for the Oakland Macomb Interceptor Drain. The Project of the Year for New Installation was presented to Ron Halderman of Mears Group for the contractor's work on the Indian River HDD Crossing project.

The 2017 *Trenchless Technology* Person of the Year was formally presented to Vermeer Corp.'s Jim Rankin — an industry professional who has helped shape and expand the horizontal directional drilling industry over the past 40 years. Rankin delivered an emotional speech to the crowd at the Kick-Off Breakfast, as he was honored as a true industry icon.

On the evening of April 10, the 16th annual Educational Fund Auction and Reception was held — a popular networking event complete with a costume theme after a busy day of technical sessions and walking the exhibit hall. With the theme of "Heroes of the Underground," the 2017 Educational Fund Auction attracted an array of superheroes and villains — all coming together to raise money for a great cause. The auction raised more than $110,000, bringing the 16-year total to more than $1 million! The raised funds go toward financial support for NASTT's 18 student chapters and educational initiatives. Great villains like The Riddler and The Joker were in the auction house, as well as superheroes such as He-Man, Wonder Woman and Batman. Special sewer and water heroes also made appearances such as Super Mario (he is a plumber, you know!) and Captain Hydrant.

Butch Graham, recently retired from Ritchie Bros. Auctioneers

served as the official auctioneer for this popular No-Dig event, and a silent auction was also held. During the auctions, a wide range of items were donated and bid on from jewelry and electronics to sporting event tickets and trenchless tools and equipment. Once again, the popular Morty the Sewer Rat was up for bid. The popular Sewer Rat was not in attendance due to some travel issues but the bidding for his annual, year-long service was fierce (Read more about "Morty" on p. 32). The winning bidders were Iowa Trenchless and Michael Byrne Mfg.

Day 2

On Tuesday, April 11, the show continued with technical sessions and exhibit hall time. NASTT's No-Dig Show is the place to unveil the latest in trenchless technologies and this year was no exception. There were many new products — rehabilitation and new installation — on the exhibit hall floor in 2017, highlighting the fact that the trenchless industry continues to evolve, as well as face new challenges.

NASTT's highly acclaimed Technical Program is also one of the biggest draws to the No-Dig Show. In 2017, more than 160 peer-reviewed papers were presented through six tracks. The papers represented a broad range of industry topics, covering the full scope of trenchless concepts, methods, challenges and solutions. Sessions this year included roundtables featuring various trenchless topics, including pressure pipe inspection and rehabilitation, CIPP and improving design documents — views from contractors.

Undoubtedly the highlight of Day 2 — and arguably of the entire show — is the induction of NASTT's new Hall of Fame class at the Gala Awards Dinner. This year, NASTT inducted its sixth Hall of Fame Class: the late Joe Abbott Jr. of Godwin Pumps, Dr. Tom Iseley, who established the industry, academic and government cooperative research center known as the Trenchless Technology Center, and the late Rod Sutliff, founder of R.S. Technical Services and a pioneer in the CCTV industry. A special induction was also given to John Hemphill, whose leadership with both NASTT and ISTT over the years has helped bring trenchless education and advocacy to new heights. Rankin also received NASTT's Chair Award for Outstanding Lifetime Service. Also receiving recognition at the Gala Dinner were recipients of the Ralston Award for Young Trenchless Achievement: Amana Arayan of LMK Technologies, and Christopher Larson of C&L Water Solutions.

Each year, NASTT recognizes these technological advancements through the Abbott Innovative Product Awards. Annually, two companies with state-of-the-art products are chosen as recipients of the award, and in 2017, a third shared this honor. This year, the Abbott Innovative Products Awards were presented to Ditch Witch for its JT40 directional drill on the new installation side. Receiving the award on the rehabilitation side were HEBNA Corp. for its iMFL, a series of advanced magnetic flux leakage tools that can inspect ferrous pipes through non-ferrous liner; and Deep Trekker, for its DT340 Pipe Crawler, the world's only remotely-operated, battery powered crawler system. All three companies were recognized at Tuesday's Gala Awards Dinner (for more on this year's Innovative Product Awards, flip to p. 30).

Day 3

On Wednesday, April 12, Day 3 commenced with more technical sessions and exhibit hall time in the morning. As in recent years, the technical program on Day 3 also includes a Gas Industry Track, highlighting new concepts, trenchless methods and challenges facing gas construction.

For the second year, one of the big hits at the conference was the interaction on the No-Dig Show mobile app, which allowed attendees to stay connected with other users while sharing and commenting on photo posts.

NASTT's No-Dig Show drew a record 195 exhibiting companies to the 2017 conference in Washington, D.C. The exhibit hall is THE place for trenchless companies to unveil their latest in new installation and rehabilitation equipment and technology.

The show concluded on Wednesday with NASTT's Closing Luncheon, which honors both the next generation of trenchless professionals with student awards and looks to next year as the industry gears up for another great No-Dig Show. NASTT also recognized its Student Presentation Awards and the winners of the Student Poster Competition Awards.

In NASTT's Tropical Vacation Raffle, also announced at the Closing Luncheon and donated by Vermeer, the winner was James Kohne of Woodard & Curran.

Palm Springs 2018

The Closing Luncheon also gives attendees a preview of what's in store when the trenchless community gathers in 2018 in Palm Springs, California, for the next NASTT No-Dig Show. The 2018 conference will be headed up by Program Committee Chair Don Del Nero and Vice Chair Cindy Preuss and will take place March 25-29, 2018 at the Palm Springs Convention Center.

Flip through the following pages and check out all the great photos from the pre- and post-conference courses, as well as all the events and activities from Days 1-3 at NASTT's 2017 No-Dig Show. Flip to page 28 for more on next year's show.

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

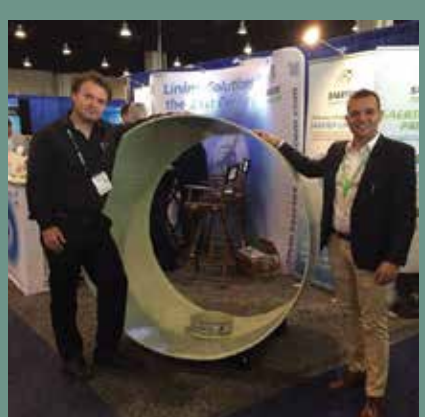
Pre- and Post-Conference Courses & Events

NASTT's 2017 No-Dig Show featured panel discussions on Sunday, April 9, specifically geared toward student chapter members attending the conference.

NASTT's Northeast Regional Chapter Board of Directors and members snap a photo after their annual meeting at the No-Dig Show.

The technical program featured pre- and post-conference educational sessions on Sunday, April 9 and Thursday, April 13.

Awesome Photos Shared on the No-Dig App!



Students attending NASTT's 2017 No-Dig Show gathered for a group photo.

NASTT hosts a student chapter orientation on Sunday, April 9, for students to learn more about opportunities within NASTT.

No-Dig attendees at NASTT's Municipal & Public Utility Scholarship reception. This program provides education and training for employees of North American municipalities, government agencies and utilities who may have limited funds to attend NASTT's national No-Dig Show.

NASTT invites students from each of its 19 student chapters to attend the No-Dig Show each year. For many, it is their first introduction to the fantastic networking that NASTT and the tight-knit trenchless industry have to offer.

Day 1

NASTT's Board of Directors gather on stage at the Opening Kick-Off Breakfast. Much of the planning and preparation for NASTT's No-Dig Show can be traced back to the hard work of the Society's Board.

***Trenchless Technology* editors Jim Rush and Sharon Bueno present the 2016 *Trenchless Technology* Project of the Year for Rehabilitation to NTH Consultants' Jason Edberg.**

(L-R): NASTT Chair Frank Firsching, 2017 Program Chair Jennifer Glynn, ISTT Chair Enrico Boi and 2017 Program Vice Chair Don Del Nero handle the ribbon cutting duties, officially opening the exhibit hall for NASTT's 2017 No-Dig Show.

Attendees pack the technical program sessions on Day 1.

The Kick-Off Breakfast is the first of many great networking events throughout the week at NASTT's No-Dig Show.

2017 *Trenchless Technology* Person of the Year, Jim Rankin, and his wife, Jeanette.

The Kick-Off Breakfast entertainment from Industrial Rhythm got the crowd going in preparation for a busy Day 1.

Platinum sponsor TT Technologies poses for a photo at their booth.

Batman AKA Auction Chair Tim Peterie and Vice Chair Gregg Leslie kick off the 2017 Educational Fund Auction & Reception.

Bo Botteicher and Ian Lancaster of platinum sponsor Aegion Corp. grab a quick photo at their booth.

The Educational Fund Auction & Reception attracted an array of superheroes and villains for its "Heroes of the Underground" costume theme.

Perma-Liner Industries was once again a platinum sponsor of NASTT's 2017 No-Dig Show.

NASTT's Educational Fund Auction & Reception gives attendees the chance to unwind at the end of Day 1 while benefitting important education initiatives.

Taking the services of "Morty the Sewer Rat" for the next year are Michael Byrne Mfg. and Iowa Trenchless.

Day 2

Deep Trekker won the Abbott Innovative Product Award for its DT340 Pipe Crawler, the world's only remotely-operated, battery-powered crawler system.

The excellent networking opportunities around the exhibit hall is one of the hallmarks of NASTT's No-Dig Show.

Ditch Witch received the Abbott Innovative Product Award for its JT40 directional drill in the New Installation category.

HEBNA Corp. won the Abbott Innovative Product Award for its iMFL series of advanced magnetic flux leakage tools that can inspect ferrous pipes through non-ferrous liner.

The Godwin Pumps crew at NASTT's No-Dig Show Gala Awards Dinner, who came to see their longtime colleague, the late Joe Abbott get inducted into NASTT's Hall of Fame.

John Hemphill was honored with a surprise induction into NASTT's Hall of Fame at the Gala Awards Dinner.

The induction of NASTT's new Hall of Fame class is arguably the highlight of the No-Dig Show.

Chris Larson of C&L Water Solutions accepts the Ralston Award for Young Trenchless Achievement.

Dr. Tom Iseley, founder of the Trenchless Technology Center, was inducted into NASTT's Hall of Fame.

Amana Arayan of LMK Technologies also received the Ralston Award for Young Trenchless Achievement.

Jim Rankin (left) receives NASTT's Chair Award for Outstanding Lifetime Service from current NASTT Chair Frank Firsching.

Once the Gala Awards Dinner ended, it was time for the dancing to begin!

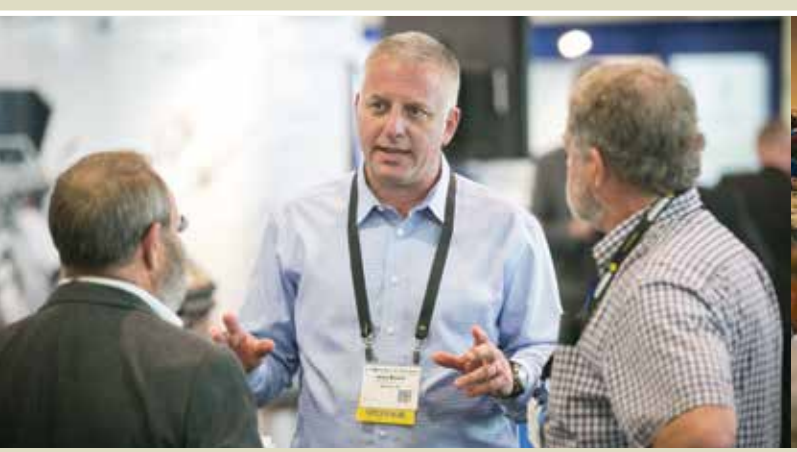
Day 3

Titilope-Oluwa Adebola of Queens University presents her poster during NASTT's Student Chapter Research Poster Competition.

The next generation of trenchless! Students take a break from the Research Poster Competition to take a group photo in the exhibit hall.

Did we mention that a record 195 exhibiting companies displayed the latest and greatest in trenchless equipment, technology and services at this year's No-Dig Show?

Dr. Sam Ariaratnam of Arizona State University chats with some No-Dig attendees in the exhibit hall.



More exhibit hall networking!

NASTT's Closing Luncheon offers attendees a chance to say goodbye to their colleagues and get a sneak peek of next year's No-Dig Show.

Chao Kang of the University of Alberta won third place in NASTT's annual NASTT's Student Chapter Research Poster Competition.

Yuchen Lui of Queens University won first place in NASTT's Student Chapter Research Poster Competition.

Jennifer Glynn receives the 2017 Program Chair Award from 2016 Program Chair Jeff Maier.

Dr. Glenn Boyce of McMillen Jacobs Associates gives a talk during a technical session on Day 3.

Attendees listen intently as the technical sessions continue on Day 3.

George Ragula of Public Service Electric & Gas and past chair of NASTT gives a talk during 'Gas Industry Day' on Day 3 of NASTT's 2017 No-Dig Show.

Back to Cali

A Look Ahead to NASTT's 2018 No-Dig Show in Palm Springs, California

In 2018, NASTT's No-Dig Show will head back to the West Coast for the first time since Sacramento played host in 2013. The 2018 show will be held March 25-29 at the Palm Springs Convention Center in Palm Springs, California.

Over the past three years, NASTT's No-Dig Show has been growing consistently, setting an all-time mark for total attendance in 2015 and breaking records for number of exhibitors in 2016 and again this year with nearly 200 technology manufacturers and service providers.

Aging water and sewer systems continues to be the biggest challenge facing the underground infrastructure market today. With major pipeline challenges, such as contaminated drinking water and lead service lines coming to national attention, the decision to replace old, ineffective pipe systems is critical. Furthermore, replacement is costly and may not always be the best option. Trenchless technology offers both innovative rehabilitation and replacement options for communities looking for cost-effective, non-disruptive and environmentally-sound infrastructure solutions.

For more than 25 years, the goal of NASTT's No-Dig Show has been to increase awareness and acceptance of this technology. The benefits it provides can be substantial for municipalities. As NASTT's 2018 No-Dig Show heads west – a region known for a different set of water infrastructure challenges – NASTT looks forward to continuing its momentum in advocating trenchless technology all across North America.

Call for Abstracts Still Open!

NASTT's 2018 No-Dig Show will once again offer six tracks and more than 160 peer-reviewed, non-commercial presentations. The Call for Abstracts for the 2018 conference is out. 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 by June 30, 2017. NASTT's all-volunteer Program Committee will meet later this summer to review the abstracts and select the papers that will be presented at the 2018 No-Dig Show. For more information on how to submit an abstract, please visit *nodigshow.com*.

At this year's No-Dig Show Closing Luncheon, 2017 Program Committee Chair Jennifer Glynn helps Vice Chair and 2018 Chair Don Del Nero preview the show in Palm Springs. Don's ready for California!

Don with NASTT's 2018 No-Dig Show Program Vice Chair Cindy Preuss.

CALL FOR ABSTRACTS

NASTT'S 2018
No-Dig Show
MARCH 25-29
PALM SPRINGS, CALIFORNIA

The North American Society for Trenchless Technology (NASTT) is now accepting abstracts for its 2018 No-Dig Show in Palm Springs, California at the Palm Springs Convention Center on March 25-29, 2018. 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, 2017: 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

SUBMISSIONS DEADLINE: JUNE 30, 2017

QUESTIONS? PLEASE CONTACT:

Michelle Hill
NASTT Program Director
E: mhill@nastt.org
P: 888-993-9935

The 2018 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.

FOR MORE INFORMATION VISIT NODIGSHOW.COM

NASTT'S

EYE ON THE INDUSTRY

OUR MEMBERS IN ACTION

Source One launches new pipe reinstatement, drain cleaning equipment

Source One Environmental (S1E) has announced their partnership with Finnish manufacturers, Renssi and Seweri, launching new reinstatement and drain cleaning tools and equipment. The tools include both high performing and cost-effective carbide and stainless steel offerings to reinstate, cut, and clean pipelines and drainage systems.

Under the same ownership, Renssi and Seweri manufacture a similar range of tools. Renssi manufactures carbide equipment which include: chain knockers, reinstatement cutters, over-shot cutters, collapsed line drills, cables and brushes. The Seweri tools are made of stainless steel and include chain knockers, circular chain knockers and cables. Along with traditional markets, the Seweri products are used in restaurant, oil and gas industries.

"We are looking forward to the new partnership with Renssi and Seweri and the ability to continue providing invaluable solutions to the infrastructure market," said Ron Smith, President of Source One Environmental.

The new tools are operated by drill or machines, such as the MiniForce, MiniForce+ and MaxForce. With the ability to open and clean pipe branches quickly, the reinstatement cutters are ideal for installers who are preparing lines for repair as well as correcting faulty trenchless installations.

Created with customers in mind, the equipment is manufactured to be long-lasting, durable and withstand extreme conditions. The tools are designed to match common pipe sizes and are compatible with other manufacturer's machines in the industry.

The equipment is currently available for purchase on *s1eonline.com*, as well as through the S1E sales team and factory representatives. For more information, S1E can be reached at (877) 450-3701.

Scott Eicher joins Sprayroq

Sprayroq, Inc. has announced the addition of Scott Eicher to its corporate team.

Eicher joins the Sprayroq organization as director of contractor development, responsible for managing the Sprayroq Certified Partner team. His mission includes achieving our goal of building the most effective team of highly trained, certified applicators of our diverse solutions for infrastructure rehabilitation and protection in North America.

Prior to joining Sprayroq, Eicher was president of Foam Fusion, a company he started to apply foam and coatings for the residential and commercial market. He sold his firm to join our team, and we're proud to have such a seasoned professional with a broad background helping to develop our SCP team.

Eicher's industry experience began when, at age 16, he became a technician for a local contractor, spraying foam and coatings and maintaining application equipment. As he continued to learn the industry, he was given the opportunity to become Assistant Technical Manager at Dow Chemical in 1998. In 2002, he started Chemical Fusion, spraying polyurea linings and coatings in industrial and commercial applications. Two years later, he started Foam Fusion. In 2016, he became the Southeast Technical Sales Manager for Rhino Linings.

Eicher's experience and knowledge brings a potent understanding that will help him spot the best talent to develop Sprayroq's SCP team at its highest level and ensure continued, effective installations for its contractors and customers.

HEBNA, Deep Trekker, Ditch Witch win Abbott Innovative Product Awards

This year at NASTT's 2017 No-Dig Show in Washington, D.C., three companies were awarded the Abbott Innovative Product Award. On the rehabilitation side, HEBNA Corp. won for its iMFL series of advanced magnetic flux leakage tools and Deep Trekker, for its remotely-operated DT340 Pipe Crawler. Ditch Witch won in the new installation category for its JT40 directional drill.

NASTT annually recognizes two companies with state-of-the-art products in either a new installation or rehabilitation for their achievements in advancing the trenchless industry. In October 2010, NASTT re-named these prestigious awards in honor of the late Joseph L. Abbott, Jr. Joe was an active member of the Society. For the first time this year, three companies received this prestigious honor.

HEBNA's series of iMFL pipeline inspection tools – magnetic flux leakage tools with the unique capability to inspect steel (or any ferrous host pipe) through an internal lining.

Deep Trekker's DT-340 is the world's only truly portable, battery-operated crawler system. The system deploys in less than five minutes.

HEBNA was awarded the Abbott Innovative Product Award in the rehabilitation category for its series of iMFL pipeline inspection tools – magnetic flux leakage tools with the unique capability to inspect steel (or any ferrous host pipe) through an internal lining. Magnetic Flux Leakage (MFL) tools used for the inspection of steel pipes have been in use for decades and are a highly accurate method to detect metal loss due to corrosion or pipeline damage.

"We were very excited to be selected for this award from the wide range of new and impressive technologies," said David Simpson, COO of HEBNA Corp. "There are thousands of miles of lined steel pipelines around the world which were unable to be MFL inspected until now. Additionally, there are pipeline owners, notably many in the regulated pipeline industry, who had been hesitant to use liners to protect and rehabilitate their pipelines because of the lack of adequate inspection technology. iMFL opens up the advantages of pipeline liners in PHMSA regulated pipelines and many others."

Deep Trekker's DT-340, whcih also won in the rehabilitation category, is the world's only truly portable, battery-operated crawler system. Everything needed for trenchless inspection comes in two carrying cases, with no need for dedicated trucks or complicated systems. The system deploys in less than five minutes. Deep Trekker introduced its enhanced product line of trenchless technologies at NASTT's No-Dig Show. This event provided the ideal platform to display the DT-340 Pipe Crawler and its robust features to industry professionals.

"We were absolutely thrilled to be chosen for this award from the wide range of new technologies," said Sam Macdonald, president of Deep Trekker Inc. "We aim to make the most robust, yet easy to use and deploy systems for infrastructure inspection, and the DT-340 Pipe Crawler was developed keeping these principles in mind."

Ditch Witch received Abbott Innovative Product Award for its JT40 directional drill. The JT40 offers boosted power – 20 more horsepower than some competitive models in its class to maximize drilling performance, according to Ditch Witch. The drill includes an operator interface and station for a more transparent view into machine operations, improved operator comfort and enhanced operational control.

For more information on NASTT's Abbott Innovative Product Awards, visit *nastt.org*.

Mortimer the Sewer Rat (2007 – 2016)

Mortimer the Sewer Rat, the coveted prize of NASTT's No-Dig Show Educational Fund Auction and famed symbol of trenchless education, has been retired. He was nine.

To NASTT members and trenchless professionals, Mortimer has become the headlining act of the No-Dig Show auction each year, with trenchless companies bidding on the stuffed rat as the final auction prize of the night. The demand for Mortimer has resulted in thousands of dollars donated to NASTT's Educational Fund, with the money benefitting the Society's 18 student chapters and numerous education initiatives. Over the years, Mortimer has also traveled the trenchless construction world, making regular appearances on projects with construction crews.

Mortimer first entered the spotlight in 2007. During the Western Society for Trenchless Technology's No-Dig Annual Conference, Dr. Sam Ariaratnam, WESTT chair at the time, organized a Jeopardy game for exhibitors during the conference reception in which exhibitors created questions and the participant with the most points won a prize. Jan Gould of the City of Reno, purchased the rat at a Halloween store, created his safety vest and presented him to the Jeopardy game winner Glenn Boyce of McMillen Jacobs Associates. According to records, by 2009, after Akkerman, Inc. won the sewer rat at the auction, Ariaratnam suggested Akkerman give it a name, and "Mortimer" was chosen. Since then, Mortimer has been a staple of the NASTT auction and the trenchless community.

In 2016, Mortimer was split between Midwest Mole and Iowa Trenchless. Unfortunately, after a nine-year run and a bit too much jobsite wear and tear, Mortimer succumbed to injuries and was forced into retirement. Not to worry…

Meet Morty!

Although Mortimer was still hanging around the men and women at Midwest Mole for much of 2016, he had sustained some damage from years on the job. "Morty Jr.," was introduced and named by Iowa Trenchless in late 2016 as the new sewer rat.

Over the winter, Morty had the opportunity to visit and learn from Iowa Trenchless crews on two tunnel projects and a pilot-tube auger boring project at various stops along the Missouri River. Morty has also been outfitted with some new digs, including new pants, a vest and hardhat, as well as a souvenir Iowa Trenchless T-shirt.

In October 2016, Morty was able to get in on a 440-ft tunnel installing steel casing pipe on a project in Council Bluffs, as part of a 48-in. sanitary sewer line relocation near the Interstate 29 and highway 92 interchange. This was Morty's first experience on a jobsite, and he had fun seeing the inner workings of a tunnel-

Over the winter, Morty had the opportunity to visit and learn from Iowa Trenchless crews on two tunnel projects and a pilot-tube auger boring project.

ing operation. He enjoyed hanging out with the crew while they slammed 59.5-in. steel casing in the ground behind an open-face TBM. He was pretty amazed as the crew was able to average 60-ft of pipe installed per day and keep the tunnel on precise line and grade the entire way.

Morty has been thoroughly impressed by the capabilities of trenchless technology and work of the Iowa Trenchless crew, being able to go the distance and hit the mark each time. He's looking forward to seeing more work throughout the 2017 construction season, as he will be dividing his time between Iowa Trenchless and Michael Byrne Mfg. for the coming year.

Keep an eye out in *NASTT's Trenchless Today* for more on Morty's travels. Morty will be up for auction at NASTT's 2018 No-Dig Show in Palm Springs, California, March 25-29. The Educational Fund Auction is scheduled for the evening of March 26. For more info, visit *nastt.org/auction.*

NASTT Chapter News

BRITISH COLUMBIA

In 2017, the British Columbia Chapter (NASTT-BC) is delighted to once again be hosting the Trenchless Technology Roadshow! This roadshow is a result of a joint effort between the Centre for Advancement of Trenchless Technologies (CATT), Benjamin Media, Inc. and NASTT-BC.

This year's roadshow will be held at the Sheraton Vancouver Airport Hotel in Richmond, British Columbia, and will consist of one day of courses followed by two days of technical presentations. We will cover a range of topics including condition assessment, pres-

sure and gravity pipe renovation, SUE, HDD, tunnelling and case studies. The exhibit hall will be filled with the latest and greatest from the trenchless technology world, offering great networking opportunities with industry peers. You can find more info at *roadshow2017.cattevents.ca.*

In addition to the Trenchless Technology Roadshow, NASTT-BC will also be hosting a one-day seminar on Assessment and Trenchless Rehabilitation of Culverts. This workshop will cover culvert management principles and will be held on June 14 in Victoria and on June 15 in Parksville.

GREAT LAKES, ST. LAWRENCE & ATLANTIC

The Great Lakes, St. Lawrence & Atlantic Chapter (GLSLA) held its second CIPP Good Practices course this year in Halifax, May 10, in partnership with NASTT and ACWWA. The course was well attended with more than 20 participates. The chapter would like to thank ACWWA for their partnership in presenting this course and we look forward to continuing to promote the trenchless industry in Atlantic Canada with ACWWA. Stay up to date on training opportunities and other events at *glsla.ca.*

The GLSLA Chapter will be holding its Board of Directors elections coming up very soon, so please take the time to vote when you receive your ballot. For more information on GLSLA, our events, our training sessions or to contact us if you wish to publish an article in our magazine, please visit our website at *glsla.ca.*

MID ATLANTIC

The Mid Atlantic Chapter (MASTT) held a "Trenchless Technology, SSES and Buried Asset Management" seminar in Newark N.J. on Sept. 14, 2016, at the Wyndham Garden Newark Airport Hotel. Dino Y. P. Ng, P.E., associate commissioner of the New York City Department of Design and Construction was the guest presenter with the presentation "Trenchless Technology Applications In New York City." ASCE North New Jersey Branch was co-sponsor of the seminar. MASTT is planning the "Trenchless Technology, SSES and Buried Asset Management" seminar for Philadelphia, Pa. (Mt. Laurel N.J.) on Nov. 1-2, 2017. MASTT also published its third annual *Mid Atlantic Journal of Trenchless Technology* in April.

MIDWEST

The Midwest Chapter (MSTT) conducted a "Trenchless Technology, SSES and Buried Asset Management" seminar in St. Louis, Mo., Dec. 14-15, 2016 at the Hilton St. Louis Union Station Hotel Downtown. The guest presenter was Allen Muehlher, P.E., program manager of the Metropolitan St. Louis Sewer District's Construction Division with the presentation "Trenchless Technology – A Critical Component of the MSD Capital Construction Program." ASCE St. Louis Section was the co-sponsor for the seminar. The seminar was a great success with excellent networking and learning.

MSTT is planning a one-day "Trenchless Technology, SSES and Buried Asset Management" seminar for Milwaukee, Wis., on July 26 or 27, 2017 and for Cincinnati, Ohio, on Dec. 13 and/or 14, 2017. MSTT plans to publish its *Midwest Journal of Trenchless Technology* in mid-September 2017.

NORTHEAST

The Northeast Chapter (NASTT-NE) has completed its first year with multiple successes including publishing two journals, starting a student chapter at UMass Lowell and hosting a well-attended conference. Plans are now underway to have a fall conference in mid-November 2017 in Cooperstown, N.Y. at the Baseball Hall of Fame. We have also initiated an effort to grow membership within the region and are adjusting our Board of Directors to encompass a better cross section owners, contractors, suppliers and engineers, as well as reaching more geographical area within the region. Finally, we are considering starting another student chapter. For more information, visit *nastt-ne.org.*

NORTHWEST

Registration for the 2017 Northwest Trenchless Conference will open in July 2017 and the location is currently being determined. For information on the applying for the 2017 Municipal and Utility Scholarship Program, please visit *nastt-nw.com.* The program is intended to subsidize attendance of municipal and utility employees at the 2017 Northwest Trenchless Conference. If you are a trenchless professional in the Canadian provinces of Alberta and British Columbia, Canada or Wash-

ington state and are interested in applying for this scholarship, please visit *nastt-nw.com*.

Congratulations to the TransCanada Corp., CCI Inc., and Michels Canada on being awarded the 2016 Northwest Trenchless Project of the Year for the Northern Courier Pipeline project. For more information on the Northwest Trenchless Project of the Year, visit *nastt-nw.com*.

PACIFIC NORTHWEST

The Pacific Northwest Chapter is off to another strong start in 2017. The chapter held its biennial Trenchless Symposium in January in SeaTac, Wash. to great fanfare and attendance. The chapter also held Board elections during the symposium and welcomed several newcomers to its Board of Directors. This year, the chapter is focused on increasing educational opportunities/events, growing its membership numbers and continuing to promote the utilization of trenchless technologies. As future educational opportunities are scheduled, the chapter website will be updated with details. The next PNW Symposium will be held in Portland, Ore., in early 2019. Exact dates and location to be determined.

ROCKY MOUNTAIN

At the Rocky Mountain Chapter, planning is under way for educational jobsite visits, young professionals and outreach committee events, sporting clays tournaments and our annual conference this fall in Colorado. Look for these events and more in the near future and visit *rmnastt.org* for more information. As always, the chapter is looking for new volunteers and members and would love to see YOU get involved!

SOUTH CENTRAL

The South Central Chapter is planning its second annual Trenchless Technology and Pipe Conference (TTP 2017) in

conjunction with the University of Texas Arlington's Center for Underground Infrastructure Research and Education (CUIRE), which will take place June 20. The event will offer a full day of interesting presentations from industry professionals and exhibitors from across the trenchless industry. The chapter is also pleased to announce that it will be awarding multiple student scholarships as part of the event this year. For more: *uta.edu/engineering/conferences/ttp*.

SOUTHEAST

SESTT conducted a "Trenchless Technology, SSES and Buried Asset Management" seminar in Raleigh N.C. at the Holiday Inn Raleigh Downtown Capital on March 29-30, 2017. Arron B. Brower, P.E., assistant public utilities director for the Public Utilities Department for the City of Raleigh was the guest presenter with his presentation "Trenchless Technology in Raleigh." ASCE North Carolina Eastern Branch was co-sponsor for the seminar.

SESTT is planning a "Trenchless Technology, SSES and Buried Asset Management" seminar for New Orleans, La., Sept. 13-14, 2017. Please plan to support and attend the seminars to enjoy the networking and learning. SESTT also plans to publish its *Southeast Journal of Trenchless Technology 2017* in mid-November.

WESTERN

WESTT continues an active schedule. In conjunction with the NASTT's No-Dig Show in April, the WESTT Board met and elected four new members to the Board of Directors: Tim Taylor, Jacquie Jaques, Michelle Beason and Gayleen Darting. Thank you to our outgoing members for their many years of exceptional volunteer service: Matt Wallin, Mo Ehsani, Collins Orton and Noel Guercio. An annual general membership meeting followed the April Board meeting. Our annual chapter magazine will be published and distributed in late summer 2017. In the fall, WESTT will be hosting a mini No-Dig Conference at the Embassy Suites in Walnut Creek, California from Oct. 15-17, 2017.

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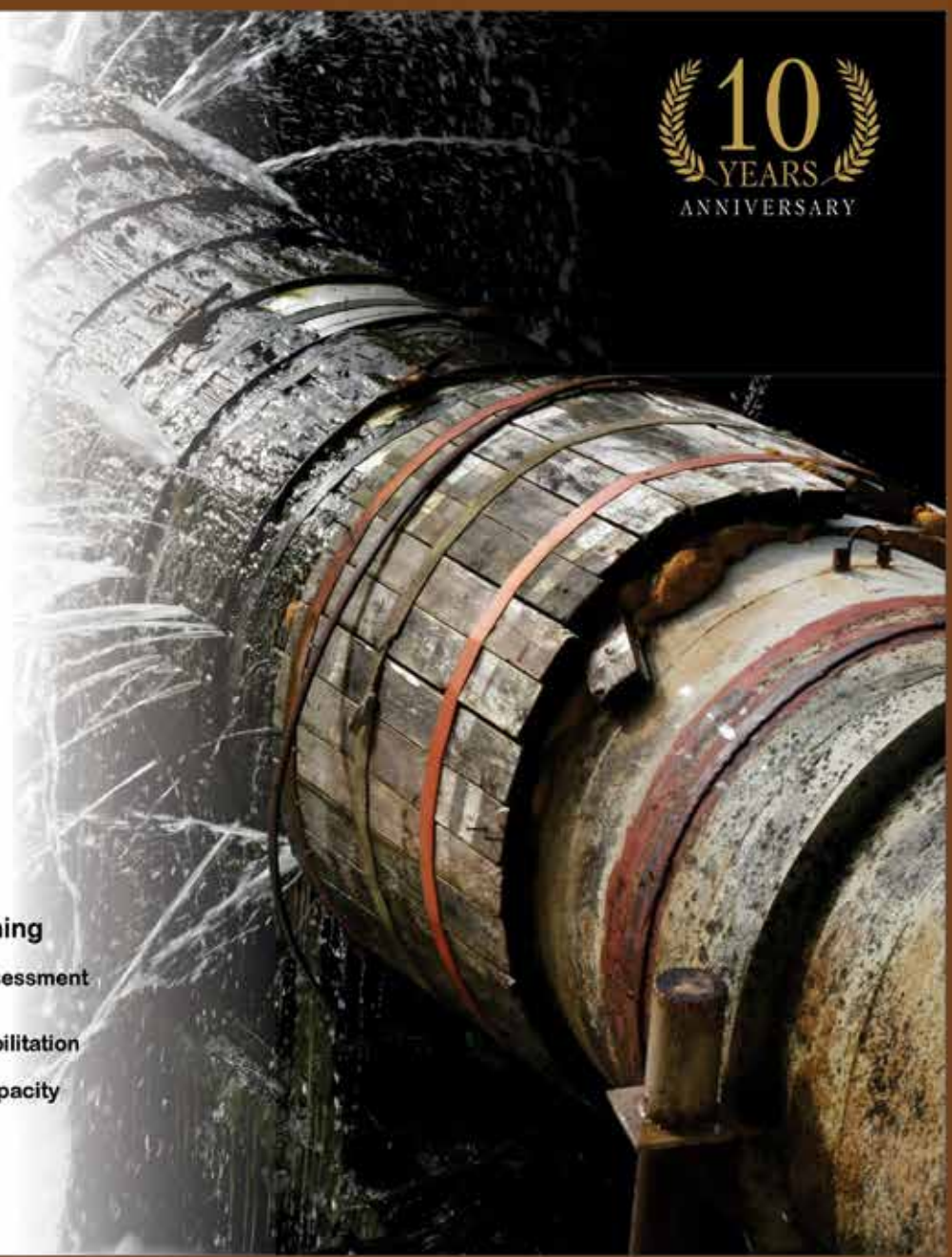

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NASTT CHAPTERS

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

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

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ELECTED OFFICERS
Chair - Kieran Field
Treasurer - Preston Creelman

GREAT LAKES, ST. LAWRENCE & ATLANTIC

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

CHAPTER CONTACT
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ELECTED OFFICERS
Chair - Kevin Bainbridge
Vice Chair - Anna Polito
Secretary - Gerald Bauer
Treasurer - Derek Potvin

MID ATLANTIC

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

CHAPTER CONTACT
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ELECTED OFFICERS
Chair - Richard Thomasson
Vice Chair - Michael Delzingaro
Secretary - Dennis Walsh
Treasurer - Tom Wyatt

MIDWEST

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

CHAPTER CONTACT
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ELECTED OFFICERS
President - Jeff Boschert
Vice President - Chris Schuler
Secretary - John Milligan
Treasurer - Ryan Poertner

NORTHEAST

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

CHAPTER CONTACT
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ELECTED OFFICERS
Chair – Dennis Doherty
Vice Chair – Ian Mead
Secretary – Walter Fromm
Treasurer – Babs Marquis

NORTHWEST

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
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ELECTED OFFICERS
Chair - Craig Vandaelle
Vice Chair - Greg Tippett
Treasurer - Keith Moggach

PACIFIC NORTHWEST

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

CHAPTER CONTACT
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ELECTED OFFICERS
Chair - Brendan O'Sullivan
Immediate Past Chair - Chris Sivesind
Secretary - Carl Pitzer
Treasurer - Dylan Davidson

ROCKY MOUNTAIN

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

CHAPTER CONTACT
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ELECTED OFFICERS
Chair - Joe Lane
Vice Chair - Chris Larson
Secretary - Benny Siljenberg
Treasurer - Stephanie Nix-Wille
Past Chair - Bo Botteicher

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
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Website coming soon!

ELECTED OFFICERS
Chair – Larry Johnson
Vice Chair – Alan Goodman
Secretary – Luis Cuellar
Treasurer – Josh Kercho, P.E.

SOUTHEAST

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

CHAPTER CONTACT
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ELECTED OFFICERS
Chair - Jerry Trevino
Vice Chair - Ed Paradis
Secretary - J. Chris Ford
Treasurer - Kelly Derr

WESTERN

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

CHAPTER CONTACT
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ELECTED OFFICERS
Chair - Cindy Preuss
Vice Chair - Brian Avon
Secretary - Jennifer Glynn
Treasurer - Norman Joyal

THANK YOU FROM NASTT

This year's auction raised over **$110,000 in funds!** That brings our grand total since **2002 to well over ONE MILLION DOLLARS!** These funds will be directed toward educational and outreach activities offered by NASTT 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. *This fund would not be possible without the generous donations made by the following organizations:*

In conjunction with NASTT's No-Dig Show

Thank you!

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Trenchless Technology
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TT Technologies Inc.
Water Finance & Management
Western Chapter of NASTT
Xylem Dewatering Solutions

A special thank you to Mr. Butch Graham for donating his time and talents to conduct our auction.

nastt.org
North American Society for Trenchless Technology
14500 Lorain Avenue #110063 • Cleveland, Ohio 44111
Phone: 888-993-9935

NASTT STUDENT CHAPTERS

NASTT Student chapters are involved in a number of activities throughout the academic year including field trips, seminars and fundraisers. Members of student chapters also attend and participate in NASTT's No-Dig Show where they present trenchless research posters, participate in competitions and provide event support monitoring the technical paper sessions. There are many benefits for students who belong to a NASTT student chapter – scholarships, networking opportunities, education and career opportunities to name a few. To learn more about NASTT's 18 student chapters, visit *nastt.org/about/student-chapters.*

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TECH PAPER

Into the Void:
Case Study of an Emergency Pipe Burst under the West Seattle Bridge

MATTHEW OLSON
Staheli Trenchless Consultants, Lynnwood, Wash.

CODY NELSON
Seattle Public Utilities, Seattle, Wash.

This paper highlights the various stages of the SW Orleans Street Pipe Replacement Project, from feasibility analysis through construction. The purpose of the Project was to replace an 8-inch vitrified clay pipe (VCP) combined sewer that had collapsed, creating a void approximately 6 feet in diameter directly below the east bound ramp to the West Seattle Bridge (WSB). Due to the presence of the void and the subsequent risk of settlement to the eastbound ramp pavement deck, timely and efficient replacement of the 8-inch pipe and grouting of the void was crucial, resulting in the project being classified as an emergency replacement project. Besides risk to public safety, the collapsed pipe and resulting void threatened to further isolate the quiet neighborhood peninsula. To stress the importance of the emergency replacement, the WSB is the primary corridor for transit to and from West Seattle and downtown, with alternative access provided by a detour that could foreseeably add 30 minutes to the West Seattle/Downtown Seattle commute. Figure 1 identifies West Seattle, the WSB, and the approximate location of the collapsed 8-in. combined sewer.

Figure 1 – Vicinity Map (Left), Project Location (Right)

Seattle Public Utilities (SPU) had performed closed-circuit television (CCTV) inspection of the existing sewer, indicating an 8-ft long section of the pipe had collapsed, 25 ft below the eastbound lane of the ramp. As a result of the collapse, combined sewer and storm flows had backed up at least 60 ft from the collapse, surcharging the nearby catch basin on the west side of the WSB ramp. In response to the surcharging, SPU crews had setup a bypass pump in the catch basin west of the collapse to reroute flows to a downstream location. At the time Staheli Trenchless Consultants (STC) was brought on board, settlement monitoring of the pavement deck indicated that settlement had not yet occurred. STC was hired to advise SPU regarding the feasibility of open-trench installation versus trenchless construction for purposes of replacing the existing pipeline and to backfill the void. Should further settlement monitoring have indicated signs of pavement settlement, remedial grouting of the void would have been scheduled immediately, influencing the applicable trenchless methods for replacing the existing pipe. As such, the feasibility analysis and resulting design and construction were under significant pressure to complete the project.

SITE CONDITIONS

As with many Seattle neighborhood sewer replacement projects, the site constraints were substantial. Access to the site was restricted at the east and west ends of the alignment. The east side of the alignment could only be accessed from SW Orleans Street, a 50-ft wide residential street, which in turn was only accessible through 30th Avenue SW, a 15-ft wide alley. There was some room for staging along SW Orleans Street, upon placement of temporary no parking signs, and underneath the WSB adjacent to the abutment, but both locations did not allow for much room to turn around, nor did they provide for a flat staging area; the slope on SW Orleans Street is approximately 22 percent. Neighbors were inconvenienced by the no-parking restriction directly outside their homes.

The west side of the alignment fortunately, was undeveloped. However, three large trees needed to be felled and the site cleared of brush for access. However, a disadvantage at the west side is that the work area could only be accessed as one was traveling west on the WSB, and by pulling over at the 150-foot long pull off on the west side of the ramp. From there, equipment and personnel had to traverse the side of the ramp approximately 200 ft to reach the upstream end of the existing 8-in. pipe. If one wanted to go from the east end of the alignment to the west, one would have to travel east on the WSB before making a U-turn and head west on the WSB. To accommodate the work, the outside lane of the WSB was closed overnight several times in order to offload equipment and materials to the west side of the project area. Operations such as this, required efficient and well thought out construction staging and work strategies.

At the time of the feasibility study, the subsurface conditions were described in a draft geotechnical report prepared by SPU prior to the declaration of an emergency condition. The geotechnical study involved reviewing readily available geotechnical and geological information, conducting a geotechnical exploration program consisting of two hollow stem auger borings (B-101 & B-102), and performing laboratory testing and engineering analyses. It was found that geologic formations in the project area include alluvium, Lawton Clay, and Olympia beds. Based on borings B-101 and B-102, the existing 8-inch VCP was likely to be within Mass Wastage deposits, which generally consists of loose to

medium dense poorly-graded sand and silty-sands (SP-SM to SM) with varying amounts of gravel, soft to very stiff silt (ML), and stiff clay (CL). The standard penetration test N-values for the Mass Wastage deposits ranged from 2 to 30, with an average of 14. Lawton Clay was encountered beneath the Mass Wastage deposits in boring B-101 and generally consisted of hard silt (ML). N-values for the Lawton Clay ranged from 58 to 71, with an average of 65.

While drilling B-101 near the upstream portion of the alignment, groundwater was encountered 7.5 ft below ground surface (bgs) at an elevation of 138.5 ft. Groundwater was found 10 ft bgs, elevation 86 ft, while drilling B-102. A standpipe piezometer was installed in B-102 to measure fluctuations in the groundwater level. One groundwater reading had been obtained at the time of the draft geotechnical report, indicating groundwater at elevation 88.75 ft, or 7.25 ft bgs. This groundwater reading was taken February 10, 2015, when groundwater levels are anticipated to be at a high. The existing 8-in. VCP in the vicinity of borings B-101 and B-102 was at elevations 130 and 90 ft, respectively, leading the design team to believe the upstream end of the alignment could be 10 ft below the groundwater table elevation, but the downstream end of the alignment would be above the groundwater.

TRENCHLESS VS. OPEN TRENCH FEASIBILITY & RISK ASSESSMENT

SPU desired for STC to evaluate the feasibility and risk of an open trench alternative (Option One) that SPU developed to re-route the 8-in. VCP on the northwest side of the WSB ramp in comparison to using trenchless construction methods (Option Two) to replace the existing 8-in. VCP along the existing alignment. Notable features of the two options are described as follows:

Option One – Open Trench Re-routing

Option One included installation of a new 8-in. pipeline and abandonment of the existing 8-in. VCP combined sewer. The new open trench pipeline would have intercepted flows from the existing system at a new MH installed on the west side of the WSB and would have discharged flows into the existing combined sewer at a new MH on SW Manning Street, to the north.

The new pipeline would have traversed Seattle Department of Transportation (SDOT) right of way (ROW) between the connection points at depths below grade ranging from 7 to 19 ft. SDOT required the pipeline to be located 10 ft laterally from the WSB deck and foundation system. Private structures encroaching on SDOT ROW, left approximately 6 ft of working space along a portion of the proposed alignment, dubbed the "pinch point." As such, Option One would have necessitated removal of a privately-owned storage shed and fence, an option that was to be avoided if possible.

Although open trenching is commonly thought to have low construction risks, when compared to trenchless technology for this project, certain site characteristics posed the following risks to the open cut installation:

- Encountering groundwater that is difficult to control and requires use of deep wells or well points;
- Installing the pipeline at a grade exceeding that which a contractor can efficiently lay pipe;
- Installing the pipeline at a depth that may require engineered shoring;
- Encountering infrastructure of poor condition at the upstream or downstream connections; and
- Increased ancillary expenses (private structure removal and replacement and associated potential legal costs).

To quantify these risks, a risk assessment matrix was developed in which risks were assigned a probability of occurrence and an impact or consequence should that risk come to fruition. Probabilities were ranked on a 0 to 10 scale, indicating a probability range from 0 to 100 percent. Impact was quantified on a 1 to 5 scale to represent mitigation costs ranging from less than $10,000 to greater than $200,000. The risk factor for each risk was found by multiplying the probability of occurrence by its impact, and the cumulative risk score was found by finding the sum of the individual risk factors.

Option Two – Trenchless Rehabilitation/Replacement using Existing Alignment

The trenchless replacement Option Two, included feasibility analysis of both pipe ram engulfment and pipe bursting. Pipe ram engulfment involves ramming an oversized casing around the existing pipe from a launch pit to a receiving pit. Once the oversized pipe is rammed over the existing pipe, the engulfed soil and existing pipe is removed from within the oversized casing and a new pipe can be constructed in the clean casing. Alternatively, pipe bursting is a technique where a bursting head is pulled through an existing pipe, fracturing or splitting the pipe as it proceeds, while concurrently pulling in a new pipe. Unique to this project, a rope had been threaded through the existing pipe before it collapsed and could possibly be used to facilitate initiation of the pipe bursting methodology.

To provide room for pit excavation and shoring, as well as support for trenchless activities, SW Orleans St on the west side of the alignment would have to be temporarily closed to residential parking, inconveniencing the adjacent homeowners. The temporary closure could have been intermittent or may have needed to last for the duration of trenchless construction, depending on the technology. If the existing line were to have been replaced via pipe bursting, the pit would have been actively used for the duration of the burst, installation of the new MH, and connection to the downstream system. Access to this pit would not have been required for the duration of pipe ram engulfment; however, as the majority of the trenchless construction work would have proceed from the up-station pit.

To differentiate the risks between pipe ram engulfment and pipe bursting, Option Two was subdivided into Option 2A – Pipe Ram Engulfment and Option 2B – Pipe Bursting.

Groundwater/dewatering risks were limited to the pit excavations on the upstream and downstream ends of the alignment and were discussed in the previous section. The estimated probability and impact of dewatering risks was higher for the pipe ram engulfment method than for pipe bursting due to the larger size of the up-station pit used with pipe ram engulfment. The risk of encountering infrastructure in poor condition was slightly higher than that of the open trench method due to additional infrastructure of unknown condition in SW Orleans St.

Getting stuck, as a result of hitting an obstruction or a combination of prohibitively high frictional and end bearing forces, presented one of the greatest risks to the trenchless installations. This was primarily due to the relatively high impact that would result should the risk occur; however, the probability of getting stuck was low. The probability was low since the subsurface conditions as described in the Draft Geotechnical Report indicated favorable soil conditions along the pipe alignment. Cobbles, boulders, or other obstacles were not anticipated based on the soils report. With an installation length of approximately 210 ft, frictional and end bearing soil resistance were also not anticipated to be problematic.

Some remedial measures that could be considered should the installation get stuck, include digging up the bursting head or reinforced lead casing edge as well as ramming an oversized casing around the stuck casing or pipe. For pipe ram engulfment, additional remedial measures such as prematurely cleaning out the casing and/or telescoping a smaller casing within the larger stuck casing could considered.

The collapsed portion of the 8-in. VCP could have interfered with forward progress of a trenchless installation; however, due

to the brittle nature of VCP this risk was considered small, especially if minimum equipment and tooling requirements were followed. Presence of the collapse and the likely decreased soil strength above the collapse increased the likelihood of the trenchless installation deviating from design line and grade above that of a traditional installation. The trenchless installation could trend upwards from the design grade in the location of the void due to the soil on the bottom of the pipe being denser and the path of least resistance being into the void space. Grade deviations could possibly have been sensed by an increase in installation forces. Use of pipe ramming to engulf the existing 8-in. VCP would allow cleaning of the casing to check grade at regular intervals, but there would be few available options to identify grade deviations if pipe bursting was chosen. Although grade deviations along the alignment may cause increased frictional forces, the increased forces were not expected to be of any considerable amount and were not anticipated to be of a magnitude that would increase the risk of getting stuck. Since the existing 8-in. VCP was at a grade of 20 percent, should grade deviations occur, they should not cause reverse grade and would not be detrimental to achieving project goals.

Risk of surface heave was small for this project and was not anticipated to occur due to the depth of the pipe. The risk of settlement propagating to the surface was higher than that of surface heave, particularly in the location of the existing void. Vibrations from trenchless installations may result in a redistribution of the soil adjacent to the void into the void space, if not already occurred. This redistribution of soil was not anticipated to cause settlement of the WSB ramp pavement; however, at the time of the feasibility analysis design, it was recommended to perform continuous settlement monitoring of WSB ramp pavement over the void location as the trenchless installation proceeded past the void.

COMPARATIVE ASSESSMENT OF OPTION ONE AND OPTION TWO

Both Options were considered feasible options for replacing the existing 8-in. VCP with a new 8-in. pipeline, although Option One presented a greater risk exposure to the project. The main advantage to utilizing Option Two to replace the existing 8-in. VCP was the ability to complete the required work through the "pinch point" without necessitating removal of the private structures encroaching on SDOT ROW. Additionally, Option Two would prevent the contractor from having to dewater, shore, lay pipe and complete other open trenching tasks at the pinch point. Upon review of the cumulative risk scores, SPU chose Option Two for design and construction and STC recommended pipe bursting to complete the installation.

DESIGN-BUILD 8-IN. VCP REPLACEMENT VIA PIPE BURSTING

Since this project was classified as an emergency, SPU was able to exempt this public works project from competitive bidding process, as well as waive contracting requirements as they deemed appropriate and directly contract with a firm to address the emergency (State law, RCW 39.04.020 and 39.04.280.2(b)). Trenchless Construction Services (Trenchless Construction), out of Arlington, Wash., was selected due to their qualifications, price and availability. Upon discussion of the project characteristics, risks, and goals between SPU, STC, and Trenchless Construction, it was determined that a non-traditional form of pipe bursting should be used to replace the 8-in. VCP. Trenchless Construction desired to use an HDD drill rig to push drill pipe through the existing pipe and to back-ream the existing pipe as they pull in the replacement pipe. Although this process does burst the existing pipe, and is in essence a form of pipe bursting, the process proposed by Trenchless Construction is commonly referred to as inne-reaming.

Since the STC did not want to limit the contractor's means and methods, performance-based specifications were produced to detail the work required to replace the existing 8-in. VCP and to grout the existing void above the pipe alignment. The performance-based pipe bursting specification required submittal of the construction machinery, means, and methods planned to be used by Trenchless Construction. The specifications required the reamer, or bursting head, to be of a diameter greater than that of the product pipe and for drilling fluid to be used to lubricate the product pipe during pullback and to flush soil cuttings from the hole. Additionally, they provided requirements for the bypass pumping of upstream flows to the downstream MH for the duration of the construction.

Figure 2 – Vermeer D36x50 Setup (Left); Drill Pipe Entering Existing 8-inch VCP in Trench Box (Right)

Trenchless construction began on Aug. 24, 2015 (site preparation had been completed by the subcontractor the prior week, and included excavation of both the jacking and receiving pits). Trenchless Construction used a Vermeer D36x50 drill rig with a Vermeer LP 855 SDT Vac-Tron drilling fluid tank/pump. By 2 p.m., Trenchless Construction was ready to begin inserting drill rods into the existing pipe at the necessary line and grade (21 percent slope, 8.5-degree entry angle). The drill rig was set back from the exposed 8-in. VCP approximately 40 ft, or the length of 4 drill pipe in order to achieve the entry angle. The existing rope through the pipeline was determined to be more of a potential detriment than useful, and it was cut and removed. When the drill bit on the lead drill pipe entered the trench box with the exposed 8-in. VCP, the pitch was a positive 6 degrees. Figure 5 illustrates the drill pipe entering the existing pipe. By 4 p.m., nine drill pipe had been advanced, extending roughly 50 ft through the existing 8-in. VCP. Since the extent of the collapsed pipe and subsequent surcharging upstream was unknown, it was desirable to refrain from puncturing the blockage so late in the day, and work for the day was wrapped up by 4:30pm.Drilling resumed the following day around 8:40 a.m., after clearing a path in

the brush for walkover locate. By 9 a.m., 13 additional drill pipe had been advanced totaling a cumulative 22 drill pipe and 180 ft of advancement west of the existing pipe/drill pipe insertion point. At this point, the lead drill pipe had advanced through the blockage in the existing line, allowing for surcharged combined sewerage to pass through, extending to the downstream system. The surge flow was too great for the downstream system to handle, surcharging a shallow maintenance holes and requiring vactor-truck removal of the sewerage.

The remainder of the drill pipe were advanced by 2 p.m., marking the beginning of the pullback operation. SPU desired for Trenchless Construction to replace the existing 8-in. VCP with 8-inch restrained joint ductile iron pipe (DIP). This pipe had a bell of 13-in. outside diameter, and as such, Trenchless Construction brought a 14-in. diameter 54-in. long reamer to use as the bursting head. The reamer was fabricated for the job and was unique in that it allowed for the swivel and pull-head to be inside the reamer. This provided protection for the swivel and prevented any burst VCP pipe pieces or soil from contacting the swivel and preventing isolation of the 8-in. DIP product pipe from the rotating drill pipe. Between 2:30 and 4 p.m., Trenchless worked on connecting the reamer to the drill pipe and getting their drilling fluid lubrication process dialed in.

Pullback of the 8-in. DIP began at 4 p.m. To minimize the entrance pit excavation and pipe layout, the 8-in. DIP was pulled in one pipe section at a time, requiring a temporary pause of the pullback operation to connect subsequent 8-in. DIP sections. A few times during pullback of DIP number 2, the DIP began to rotate, indicating that the swivel was not operating properly. When this happened crew at the entrance pit radioed the drill rig operator and directed him to reverse the rotation direction. This "freed" the DIP. It was thought that the swivel had bound up and that by reversing the rotation direction the swivel was unwound and any blockage or interference was remedied. By 4:30, the second DIP was pulled in and the swivel was operating as it was intended.

During the pullback operation, Trenchless Construction had plugged the downstream sewer to prevent drilling fluid from entering the downstream sewer system. As such, drilling fluid would collect in the trench used to expose the existing 8-in. VCP at the downstream end. Trenchless Construction used Vac-trucks to remove drilling fluid from this trench as necessary during pullback. By 7:30, two Vac-trucks had been filled with drilling fluid and the collar between the reamer and lead drill pipe was visible in the downstream trench, resulting in the reamer being just shy of the trench. It was determined that pullback would be ceased for the remainder of the day and the reamer and attached 8-in. DIP product would be excavated and exposed the following day. By 8 p.m., the crews had cleaned up the site and left for the day.

All in all, it took just over two hours to advance the drill pipe and five hours to pull in the 8-in. DIP product. Exposing the reamer and downstream DIP proceeded without complications the following day. A new MH was placed at the southern end of the replaced pipe alignment and SPU had a working system a few days later. The emergency pipe burst replacement was successful.

DESIGN-BUILD: GROUTING THE VOID

The approximate location of the void was estimated using CCTV of the 8-in. VCP to determine where the collapse was and by confirmation through the use of ground penetrating radar (GPR). CCTV indicated the collapse was roughly 8 ft long below the eastern eastbound lane for the WSB ramp. GPR was able to depict the void in three dimensions. Figure 6 shows the approximately 6-ft x 5-ft x 5-ft void as determined by GPR.

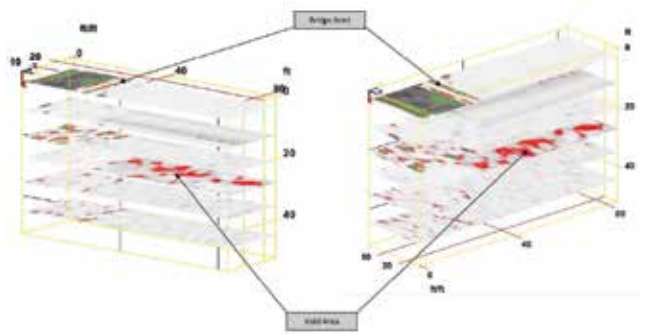

Figure 3 – Three-Dimensional Mapping of Void Using Ground Penetrating Radar.

Ongoing settlement monitoring indicated zero movement of the pavement deck. As such, grouting was postponed until after the trenchless pipe replacement had been completed. The entire grouting operation, from excavating a hole in the existing pavement to paving the hole after grouting, was required to be performed during nighttime to prevent impacting large traffic flows. Additionally, the work footprint was restricted to one inside traffic lane in either direction.

On Sept. 9, Trenchless attempted to grout the existing void by excavating a small 4-ft x 4-ft hole above the suspected void location. The construction crew attempted to excavate down to the void with a Vactor-truck, but encountered a concrete obstacle 6 feet below the pavement. The construction crew was not prepared to complete the excavation in any other manner, and the grouting operation was ceased. A temporary patch was placed on the backfilled excavation while the team regrouped to discuss penetrating the obstruction. The obstruction was most likely construction debris within the fill dating to the initial WSB construction.

A second, and more robust grouting attempt was made on Oct. 23. The contractor was prepared to use a combination of excavating and vactoring to get past the concrete obstruction. Details of the second grouting plan are as follows:

- Work restricted to between 7 p.m. Friday and 7 p.m. Sunday
- Dual lane closure, inside lanes only
- 5-ft by 9-ft saw cut into concrete panel
- Excavate down (10-ft max), shore with trench boxes
- Vacuum excavate toward void location identified by GPR to locate void
- Backfill void and excavation with CDF
- Type 2 mineral aggregate road base (thickness > 6 in.)
- Planned for concrete road deck to be poured 5 p.m. Saturday
- Traffic reinstated when concrete strength > 3,000 psi

The revised grouting plan went extremely well. Since the access hole through the pavement was larger than the first grouting attempt the construction crew was able to expose the edge of the concrete obstruction when it was encountered. Vactor excavating was successful from around the edge of the obstruction, and angled down towards the void location. Further excavation exposed the void approximately 1.5 hours after excavation below the road deck began. It took roughly 2 to 3 cubic yards to fill the void, approximately half the size estimated by GPR. The remainder of the grouting, backfilling, and paving operation proceeded without complications, leading to a successful void grouting operation.

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CALENDAR

JUNE

7
NASTT's Trenchless Trends in the Gas Industry Webinar

20
Trenchless Technology and Pipe Conference for Water, Sewer, Oil, and Gas Applications
Hosted by NASTT's South Central Chapter
Arlington, Texas

JULY

26–27
Trenchless Technology Seminar
Hosted by NASTT's Midwest Chapter
Milwaukee, Wisconsin

AUGUST

24
NASTT's Municipal Contracts Webinar

27–30
APWA's PWX 2017
Orlando, Florida

SEPTEMBER

13–14
2017 League of California Cities Annual Conference & Expo
Sacramento, California

13–14
Trenchless Technology Seminar
Hosted by NASTT's Southeast Chapter
New Orleans, Louisiana

OCTOBER

16
13th Annual Western Regional No-Dig Show
Hosted by NASTT's WESTT Chapter
Walnut Creek, California

NOVEMBER

1–2
Trenchless Technology Seminar
Hosted by NASTT's Mid Atlantic Chapter
Mount Laurel, Pennsylvania

7
NASTT's Sealing a Collection System Webinar

8–9
Trenchless Elevated 2017
Hosted by NASTT's Rocky Mountain Chapter
Denver, Colorado

8
2017 Northwest Trenchless Conference
Hosted by NASTT's Northwest Chapter
Calgary, Alberta

9
NASTT's HDD Good Practices Course
Hosted by NASTT's Northwest Chapter
Calgary, Alberta

15–16
2017 Northeast Chapter Municipal Outreach Forum
Hosted by NASTT's Northeast Chapter
Cooperstown, New York

For more info, visit *nastt.org/training/events*.

FUTURE NASTT'S NO-DIG SHOW LOCATIONS

NASTT's 2018 No-Dig Show
March 25-29
Palm Springs Convention Center
Palm Springs, California

NASTT's 2019 No-Dig Show
March 17-21
Donald E. Stephens Convention Center
Chicago, Illinois

NASTT's 2020 No-Dig Show
April 5-9
Colorado Convention Center
Denver, Colorado

AD INDEX

Congratulations

2017 NASTT's Ralston Award for Young Trenchless Achievement

Amana Arayan

Marketing Manager, LMK Technologies

A graduate of DePaul University's College of Commerce in Chicago, IL, Amana Arayan is currently the Marketing Manager at LMK Technologies. She is instrumental in preparing educational presentations and seminars on the benefits of trenchless cured-in-place pipe (CIPP) rehabilitation solutions and best practices as well as developing new product promotional campaigns and advertisements. Recent advertisements developed by Amana have received the Water Environment Federation's Citation of Excellence in Advertising for both Best Presentation of Information (2016) and Best Design (2014). In addition, Amana has co-authored and presented several technical papers at NASTT's No-Dig Conferences in 2015 and 2016. Prior to joining LMK Technologies in 2011, she was the Education Specialist at the Trade Show Exhibitors Association. She is also an active member of the NASTT Young Professionals Committee, No-Dig Show Program Committee and the NASSCO Rehab Zone Committee.

Christopher Larson

Chief Operations Officer, C & L Water Solutions

Christopher has been working as a Project Manager for C&L Water Solutions and recently promoted to Chief Operations Officer. Business development expertise is one of Christopher's strongest attributes. Since his graduation from the University of Denver in 2007, Christopher began launching the UV cured in place pipe movement in the predominately-felt driven CIPP pipelining marketplace. With determination, he enabled C&L to become one of the largest UV cured in place pipeline contractors in the United States as of 2013. While this is one of his most valued accomplishments, he has many other areas of proficiency. Some of these areas include expertise in manhole rehabilitation, lateral rehabilitation, pipe bursting, slip lining, pipe fusion, cut and cover utility installations. Christopher currently serves as the Vice Chairman on the Board of Directors of the North American Society for Trenchless Technology – Rocky Mountain Chapter (RMNASTT).

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