

The Official Magazine of the North American Society for Trenchless Technology



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WELCOME to NASTT's 2019 No-

Summer 2019

Volume 9 | Issue No. 2

Events



SWEET HOME CHICAGO

The NASTT 2019 No-Dig Show Continues Exhibitor Surge in Return to the Midwest

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SUMMER 2019



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By NTT Staff

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12 In the Trenches

By Andrew Farr

For this month's *In the Trenches*, *NTT* profiles Amana Arayan of LMK Technologies, John Milligan of Vermeer and Mike Woodcock of Portland Utilities Construction Co. Going beyond their typical day jobs, learn how these individuals make the commitment to volunteer their time to *NASTT* to help advance both the Society and the trenchless marketplace.



18 NASTT's 2019 No-Dig Show Recap

By Andrew Farr

Take a look back at the *NASTT* 2019 No-Dig Show in March. This year's show drew more than 2,200 attendees to Chicago, Illinois – a return to the Midwest following a successful trip out to Southern California in 2018. No-Dig again broke a record for number of exhibiting companies. Relive all the highlights of this year's show while taking a look ahead to next year's return to Denver.

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Canadian Subscriptions: Canada Post Agreement Number 40830553. Send change of address information and blocks of undeliverable copies to: KML Logistics Group Inc., 118 Herald Ave., Oakville, ON L6K 1S2 Canada

EXECUTIVE DIRECTOR MESSAGE

2019 THE NASTT NO-DIG SHOW

The NASTT 2019 No-Dig Show Expands in the Midwest

The summer season is a busy time here at NASTT as we wrap up the 2019 No-Dig Show and start focusing on preparing for the 2020 show. As I'm sure you know, the NASTT 2019 No-Dig Show was held in Chicago this past March and I am beyond proud of the quality of the training and education that we offered during the conference. It was great to be back in the Chicago area as the Midwest continues to be a growth center for trenchless technology. Now we're excited to start planning for our much-anticipated return to Denver, Colorado, for the NASTT 2020 No-Dig Show next April.

The NASTT Gala Awards Dinner is an event that I look forward to each year. It is an honor to be part of the induction ceremony for the newest members of the NASTT Hall of Fame. The 2019 inductees were Maynard Akkerman of Akkerman Inc., Chris Macey of AECOM and Robert Westphal of Michels Corp. All three of these gentlemen personify the traits and qualities we honor with our industry's highest award. Please visit our website at nastt.org/hall-of-fame to learn more about these trenchless champions, as well as all the past Hall of Fame inductees.

Along with recognizing the long ca-

reers of trenchless icons, we also have the privilege of rewarding future leaders with the Ralston Award for Young Trenchless Achievement. The recipient of the award this year was Brendan O'Sullivan, P.E. of Murraysmith. Congratulations to this extraordinary young professional!

Each year NASTT shines a spotlight on companies with state-of-the-art trenchless products in either new installations and rehabilitation with the Ab-

bott Award for Innovative Products & Services. 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.

This year we received 13 qualified nominations and the volunteer Awards Committee members took on the challenging and exciting task of reviewing all the submissions and interviewing company representatives. The 2019 Abbott Innovative Product Awards winners were: Geonex Oy for its DTH-Hammer Drilling System and Kobus Services Ltd. for its Pipe Puller KPP400 Series. Congratulations to these industry leaders and thank you for your innovations!

NASTT owes so much to all the dedicated volunteers that make our show such a success each and every year. NASTT's 2019 No-Dig Show Program Chair, Cindy Preuss of HydroScience Engineers and Vice Chair, Joe Lane of Aegion, dedicated hours of their personal time to make the conference the prestigious event that it is. Cindy and Joe worked closely with our Program Committee that is comprised of more than 100 volunteer members to peer review every technical paper in the schedule. Many of our Program Committee members also served as Track Leaders who dedicated additional hours working with the paper authors. I also want to personally recognize the 84 No-Dig Show sponsors and the more than 200 loyal exhibiting companies and organizations that make all this possible. We sincerely thank you for your continued support of our industry, our not-for-profit volunteer Society and our annual NASTT No-Dig Show.

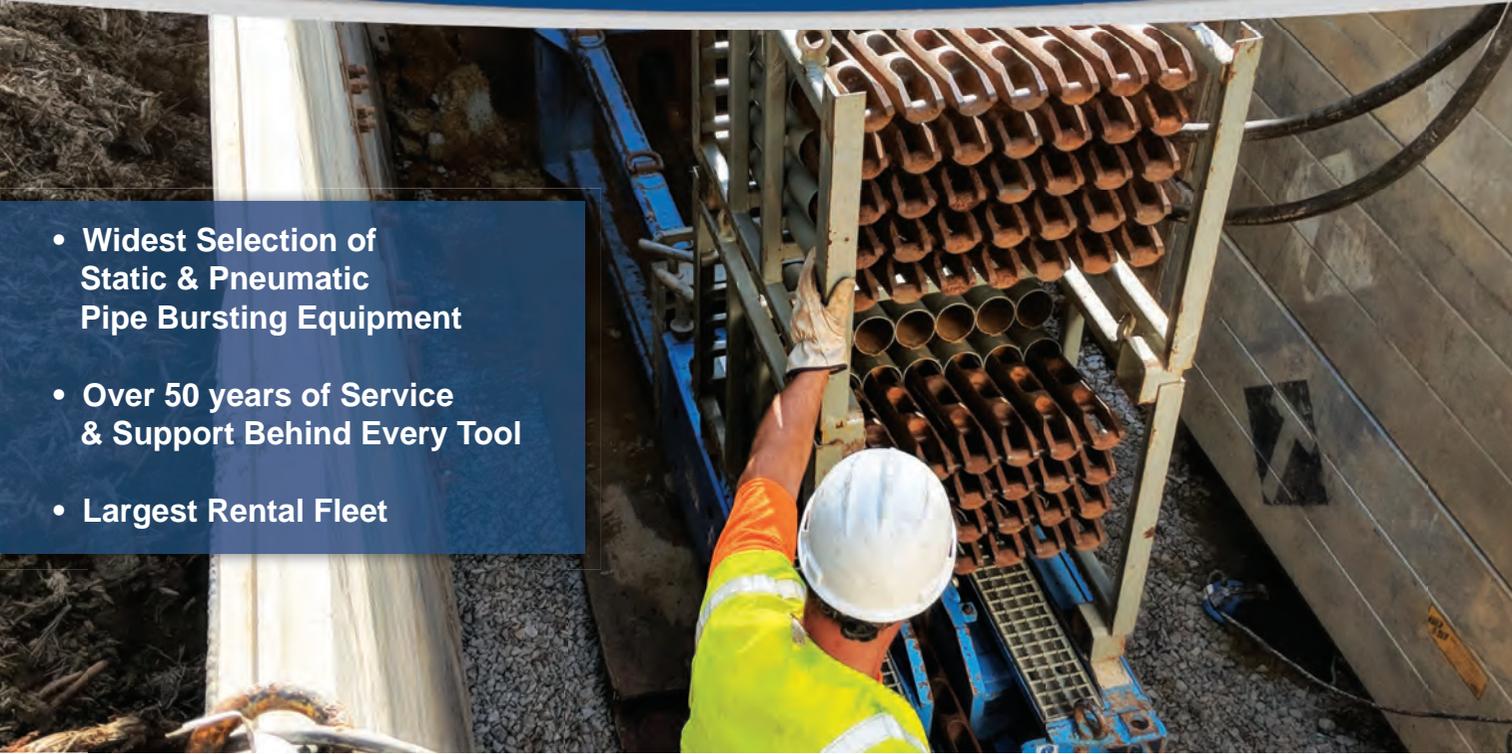


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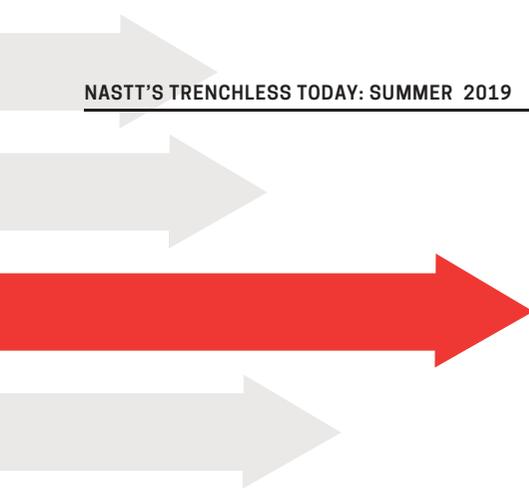


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Trenchless Industry Moving in the Right Direction

Following The NASTT No-Dig Show

The NASTT 2019 No-Dig Show held in Chicago in March was an extremely successful event and I hope you had a chance to attend. Take a look throughout this issue for a recap and overview of the 2019 show and make sure to mark your calendars so you can join us in Denver in April 2020 for another outstanding event.

With more than 2,200 attendees and a record number of exhibitors at this year's conference, it was a busy and fun week for all, including the 110 university students from our Student Chapters and more than 100 Municipal Scholarship recipients from all across North America. Thank you again to our Program Committee members and the NASTT 2019 No-Dig Show Chair, Cindy Preuss of HydroScience Engineers and Vice Chair, Joe Lane of Aegion for all your time and effort. Our volunteers are the backbone of this Society and we are grateful and appreciative of everyone's contributions to making NASTT what it is today.

On Monday evening we had the opportunity to socialize and network with our peers during the 18th annual Education Fund Auction. This event is always a hit and we have a great time while we raise money for our educational initiatives. The ballroom was transformed into a 1920s Chicago Speak-

easy where gangsters and flappers mingled and bid on exciting auction items. This year we held silent auctions throughout the evening where bidders could take advantage of multiple opportunities to win the items they were eying all day. This new format allowed for even more networking and was quite a hit. Thank you to our Auction Committee members, Committee Chair, Dennis Walsh of PSE&G and our auction emcee for the evening, Jeff Maier of Garver for making the event such a great time for all. I'd also like to say thank you to George Ragula for selling the majority of the 1,000 vacation raffle tickets. And thank you to Vermeer for sponsoring the vacation raffle. This raffle helps us raise up to \$25,000 each year. To all the bidders, donors and sponsors who helped us raise more than \$80,000 in one night: Thank you! Since 2002, we've raised more than \$1.1 million. These are the funds we use to sponsor our university students, fund our Municipal Scholarship Program, publish industry training guidelines and more. We couldn't do any of this without our generous supporters.

During the NASTT No-Dig Show Gala Awards Dinner, I had the privilege of recognizing and honoring my friend and colleague, Frank Firsching, with the NASTT Chair Award for Outstanding Service. Frank has been a standout leader and supporter

of the trenchless industry and of NASTT. He has served on the Board of Directors for several years, as the Chair for the past two years and is currently serving as the Immediate Past Chair. Thank you, Frank, for all your years of service and leadership within our organization.

The NASTT 2019 No-Dig Show was a wonderful success and we are already in the planning stages for next year in Denver. Denver is a great central location and an engineering hub where historically we have seen record attendance. We are excited to head back and break records once again.

We are also excited that the Canadian Regional Chapters have joined forces to present the first No-Dig North, coming to Calgary this October. The show will consist of two days of technical paper presentations and industry exhibits, along with awards presentations, pre-conference training courses and plenty of networking opportunities. Join us at the Telus Convention Centre in Calgary, Alberta, Oct. 28-30.

It is an exciting time in the trenchless industry and we are happy to help lead the way in training, education and research. If you'd like to put your expertise to good use as a volunteer, please reach out to us at info@nastt.org. It is our dedicated volunteers who continue to help grow our organization.



Craig Vandaele
NASTT CHAIR

The background of the advertisement is a high-contrast, black and white photograph showing the silhouettes of three workers wearing hard hats and safety gear. They are positioned inside a large, circular tunnel with a corrugated metal interior. The light source is from the right, creating a bright glow and casting long shadows. To the right of the main text, there are several smaller images of different pipe relining products: a long section of white corrugated pipe, a section of black corrugated pipe, a section of white smooth pipe, and a section of white smooth pipe with a dark interior.

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EDUCATION UPDATE

It Takes a Village:

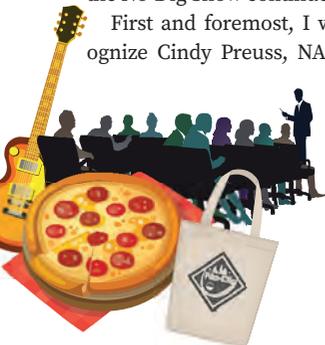


The NASTT No-Dig Show Has Another Successful Year Thanks to Volunteers

We've all heard the saying "it takes a village," but I never fully appreciated this fact until I became a mom. First with my pugs and then with my son, I realized quickly how important it is to have a team of people helping you along the way.

I have to believe that most successful endeavors rely on a village, and that is definitely the case with the NASTT No-Dig Show. Most people don't realize that NASTT is run by a staff of five people. And back when I started in 2012, we only had two staff members. Even with such a small staff, the No-Dig Show continues to grow.

First and foremost, I would like to recognize Cindy Preuss, NASTT 2019 No-Dig Show Chair and Joe Lane, NASTT 2019 No-Dig Show Vice Chair for the countless volunteer hours they contributed to making the show a success. Did you enjoy all of the food in the exhibit hall this year? That was one of Cindy's goals. Did you attend the Advanced Pressure Pipeline Condition Assessment Forum? That was Joe's brainchild. Did you sit in on a technical session, enjoy the entertainment, wear your pin proudly or reuse your attendee bag? These were all decisions made by the Program Committee led by Cindy and Joe.



Speaking of that Program Committee, the group was 93 volunteers strong. These folks scored more than 200 abstracts and made sure the technical content at this year's show was top notch.

They weighed in on marketing endeavors and special events. They volunteered at the Newbie Lounge that served as a place to welcome newcomers to our show. Above all, they helped us spread the trenchless word.

A select group of Program Committee members, 41 professionals to be exact, raised their hand again to serve as Track Leaders. They each managed a track to ensure high quality and noncommercial content would be delivered at the conference. They serve as mentors to the presenters and continue to ensure that our technical paper library is of the highest quality.



Another group of volunteers you'll see running around the conference center are our student members. NASTT supports these young minds by covering the cost of hotel rooms and registration fees, and in exchange the student volunteers help with our auction, session scanning, registration

and selling publications in our bookstore. We had over 100 volunteers this year who helped staff keep the conference running smoothly.



It's important for us to recognize members and companies for their successes in our industry, therefore we have a variety of awards that are presented at No-Dig.

Many of the awards given onsite are committee decided, including the Hall of Fame, The Abbott Award for Innovative Products & Services: Rehabilitation & New Installation, NASTT's Ralston Young Trenchless Achievement Award, NASTT's No-Dig Show Municipal & Public Utility Scholarship Award, NASTT's Outstanding Paper Awards – Rehabilitation & New Installation and student scholarships. Thank you to all of the volunteers who served on these committees to recognize our trenchless leaders.

We have more than 20 committees here at NASTT, and I'd love for you to be on one (or more!) of them. As you can see, you can make a big impact by joining the NASTT volunteer village. Check out all of our opportunities at nastt.org/membership/volunteer.



Michell Hill
NASTT PROGRAM
DIRECTOR

2019 NASTT SPEAKEASY

EDUCATIONAL
FUND AUCTION



In conjunction with
NASTT's No-Dig Show

THANK YOU FROM NASTT

This year's auction raised over **\$80,000!** Since 2002 we have raised well over **\$1.1 million!** These funds will be directed toward educational and outreach activities offered by NASTT to provide targeted trenchless training courses to the industry, publish trenchless resource manuals and sponsor university students' attendance at the NASTT No-Dig Show, as well as award scholarships. This fund would not be possible without the generous donations made by the following organizations:

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Q&A with

Dr. Dan Koo, IUPUI

What first piqued your interest in working in the construction/engineering field, particularly underground construction?

My dad founded a construction company in the early 1980s and had been a heavy civil contractor for more than 30 years. I was exposed to many exciting construction operations and activities including various underground projects. Construction was the most exciting thing as a profession. Upon graduation from high school in 1992, I decided to study civil engineering and earned my Ph.D. at Arizona State University (ASU). I had several internships during college and worked as an assistant project engineer when I completed my junior year in 1994, working on a sewer project in my hometown. The sewer project was my first full-time experience and I worked almost 12 hours per day to complete the project. I made many silly mistakes and couldn't even complete the first survey assignment. But I finally completed it about six months later and couldn't express what I had accomplished. Construction is great, and I am still proud of serving the industry.

Tell us about your first introduction to trenchless technology methods and applications.

When Dr. Sam [Ariaratnam] joined ASU in 2001, he became my advisor. Dr. Sam offered two trenchless courses at the graduate level – horizontal directional drilling trenchless construction methods. It was the first time I had heard about “trenchless” and I completely fell in love with these new technologies for underground infrastructure systems. That was my first introduction and I continued studying until I completed my master's and Ph.D. After ASU, I worked for Project Engineering Consultants in Phoenix before starting at IUPUI teaching trenchless.

This month, *NASTT's Trenchless Today* talked with Dr. Dan Koo, Associate Professor of Construction Engineering Management Technology at Indiana University-Purdue University Indianapolis (IUPUI), to discuss the current academic climate for underground construction and the biggest needs for education.



What are your thoughts on the current state of the trenchless industry? What areas do you see evolving in academics?

From the local to the global market, trenchless technology has proven its benefits. The family of trenchless technology solutions are both environmentally and socially friendly construction methods. Many of the technologies are even more cost-effective than conventional open-cut construction. It is a continuously growing industry and always expanding its boundaries. Nowadays, academics are no longer conservative and old fashioned. The academics continuously seek cutting-edge construction technologies such as trenchless. The federal and state grants for research in this field are not increasing, however. But, there is still a great opportunity for the continued development of new materials, methods and applications related to trenchless technologies.

How did you first get involved with NASTT? Briefly summarize some of your goals or initiatives for the organization.

I joined the ASU-NASTT student chapter in 2002. It was one of only a few student chapters at the time. The first No-Dig Show I attended was the 2003 International No-Dig held in Las Vegas. The atmosphere had energy and innovation emitting from each technical session and through the exhibition hall. Many of those people are now retired and the industry is filled with new blood. Since I've been involved with NASTT, I have served as the president of the IUPUI Student Chapter, presenting my research papers, engaging in activities like poster competitions, sewer inspection and other industry engagements. Since joining IUPUI as a faculty member, I have served as a reviewer on the Program Committee for the NASTT No-Dig Show. My goals and initiatives for the organization are to continue serving in volunteer roles and promoting the organization and its mission to the global trenchless industry, especially in Asian markets.

What is the biggest challenge facing the trenchless industry today? Has acceptance of the technology improved?

The biggest challenge is, in fact, the very slow acceptance of new technologies. Although the overall market size of trenchless technology has significantly improved over all geographical regions, many challenges still hinder industry sustainability. For example, the conventional bid system is inadequate to reflect the innovation and benefits of technology implementation. All stakeholders in the industry including engineers, suppliers, educators and contractors keep our unified voice to promote, contribute and serve to create better underground infrastructure systems.

On that note, what do you think can be done to better engage students and young professionals in the trenchless industry?

For most institutes in the United States, the mission is two-fold. One is education, and the other is research. Undergraduate and graduate student engagement in the development of innovative technology in their learning process ensures achieving both missions in education and research. The industry should allow students and young professionals engaging in the R&D (Research and Development) work. R&D collaboration will be the most mutually beneficial approach and inspiring young professionals to enter the trenchless industry.

Do you see any particular needs with regard to education? Is the industry doing a good job of attracting young professionals?

Yes, the educational and academic institutions need industry support, including the development of course materials, reshaping instructors and professors, and greater financial assistance to help bring new courses into the traditional curriculum. Young generations are particularly attracted by innovation, but the institutions need industry support to embrace its initiatives. The more young professionals we can attract to the innovation, the more prepared and engaged they will be to enter the trenchless industry.

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

I enjoy being close to great people who continuously innovate the world. The nature of the industry is an excellent example of diversified background and interdisciplinary engineering. I am sure that the trenchless industry keeps growing and needs talented and dedicated people. I want to be one of them.



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NORTH AMERICAN SOCIETY FOR TRENCHLESS TECHNOLOGY

NASTT's Pipe Bursting Webinar

Wednesday, September 18, 2019 at 2:00 PM EST

This webinar will host a discussion on pipe bursting with the intent to educate owners and their agents of the benefits of this proven, alternative trenchless technology.

Industry experts from the NASTT membership will be presenting this complimentary webinar:

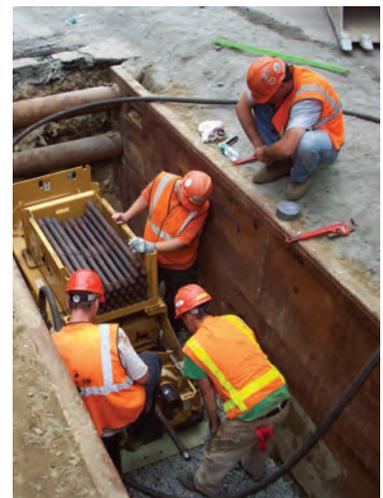
- Alan Ambler, PE, LEED AP, AM Trenchless (Moderator)
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Designed to share the many benefits of trenchless technology, NASTT's complimentary webinar series welcomes industry newcomers and seasoned veterans alike. The program is modeled to bring you professional instruction from leading experts in the field of trenchless technology. The content of all NASTT training is peer-reviewed, consensus-based information and free of commercialism.

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In the TRENCHES

By Andrew Farr



Amana Arayan

LMK TECHNOLOGIES

**“IT’S AN INDUSTRY THAT
MAKES A MONUMENTAL
DIFFERENCE WHEN
IT COMES TO
INFRASTRUCTURE, THE
ENVIRONMENT AND
PUBLIC HEALTH. WE ARE
AN INVISIBLE GIANT!”**

For manufacturers and technology providers in the niche trenchless industry, properly communicating the value of trenchless solutions and touting your products through targeted marketing is key – it’s also Amana Arayan’s forte.

As marketing manager at LMK Technologies (LMK), Arayan has spent the past eight years in the industry implementing marketing campaigns and developing new ways to connect product with customer for the Ottawa, Illinois-based lateral rehabilitation company. She brings a singular skillset to her position, separate from the engineering perspective of her colleagues, that has allowed LMK to grow its brand recognition in the marketplace. She’s also taken the opportunity to go beyond her job at LMK and become fully engrained in the industry through her volunteer work with organizations like NASTT and NASSCO.

“Our industry has a huge impact on the daily lives of so many people, most without realizing it,” she says. “Although this is a dynamic and competitive field, everyone is working toward the common goal of minimizing the global footprint of this industry while discovering the next big idea in innovation.”

Arayan got her start in the industry upon joining LMK in 2011. Since her dad is a chemical engineer and her brother is a doctor, she says she’s always had a keen interest in taking a science-adjacent career path that would make a societal impact. “I know a lot of people outside the industry probably don’t know or don’t think too much about trenchless technology,” she says. But it’s an industry that makes a monumental difference when it comes to infrastructure, the environment and public health. We are an invisible giant!”

Although her work in the construction business was a new and tough challenge, Arayan says it was made simpler by the fact that LMK was founded and led by trenchless industry pioneer Larry Kiest Jr., who she considers a mentor.

“It was such an honor to be able to learn from him,” she says about Kiest, who is now out of the business but holds more than 100 patents for his innovations at LMK. “Seeing Larry’s involvement in the industry firsthand gave me a greater appreciation and understanding for trenchless technology as a whole. Larry emphasized that quality of our work had to be foremost in our minds and that we do not cut corners. His dedication to everything he was involved in, no matter the significance, never faltered.” Arayan also credits Rick Gage of LMK’s parent company, Waterline Renewal Technolo-

gies, for helping her learn the ropes at LMK and advising her on the company's technologies and the business of the trenchless market.

At LMK, Arayan is instrumental in preparing educational presentations and seminars on the benefits of CIPP rehabilitation and best practices, as well as developing new product promotional campaigns and advertisements. She also spends a meaningful portion of her work planning and implementing LMK's digital marketing strategy while strengthening its social media presence. Recent advertisements developed by Arayan have received the Water Environment Federation's Citation of Excellence in Advertising for both Best Presentation of Information (2016) and Best Design (2014). She has also co-authored and presented several technical papers at NASTT's No-Dig Shows.

Arayan serves as chair of NASTT's Young Professionals Committee, which works to connect aspiring young professionals with opportunities in the trenchless industry. Alongside her committee colleagues and NASTT, Arayan has led many of these efforts in recent years including organizing committee activities, exhibit hall tours and networking events for students at the NASTT No-Dig Show.

In 2018, Arayan was featured on the cover of *Trenchless Technology* magazine, which hosted a roundtable discussion on young professionals in the industry. She was also a recipient of NASTT's Ralston Award for Young Trenchless Achievement at the NASTT 2017 No-Dig

Show in Washington, D.C.

As significant as her mentors and colleagues, Arayan credits her family for her success early in her career. "Sometimes I don't think – actually I know – my parents do not understand the particulars of the trenchless industry," she jokes. "But having their support is imperative and they were elated and extremely proud when I won the award. Growing up, they sacrificed their entire lives to give my brothers and I opportunities here," she says of her parents who immigrated to the United States from Pakistan when they were just 19.

For Arayan, the trenchless industry has afforded her the opportunity to grow her career and develop a working knowledge of and passion for a fascinating field while developing relationships both professionally and personally.

"Every day is different in the trenchless industry," she says. "For a young professional, having the opportunity to be in the same room with people like the Larry Kiests of the industry is very inspiring. It's not often you have the opportunity to work alongside such pioneers, and the fact that industry leaders are still so passionate is a reminder of how far the industry has already come.

"I look forward to the future of the trenchless technology industry," she says. "In particular, I'm excited about helping usher in the next generation of talent and providing them with the extraordinary toolkit my mentors have imparted me."



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John Milligan

VERMEER

**“THE FOCUS THAT
NASTT HAS PLACED
ON EDUCATION IS
UNPARALLELED IN
THE INDUSTRY.”**

John Milligan didn't initially envision himself ending up in the construction industry. But growing up in São Paulo, Brazil, he had a first-hand account of how construction – and open cut methods, in particular – could disrupt life in a big city.

“I can't say I was endeared to the construction field,” he says. “It wasn't until I was exposed to the equipment that is designed to improve our everyday lives with minimum disruption that I became interested in this career.”

Milligan would join Vermeer in 1992 but not before he had the opportunity to witness an HDD project up close, which he says piqued his fascination about the technology.

“It feels like a lifetime ago, but I visited a jobsite in Iowa where one of the first Navigators was working,” he says. “It was all very new to me, but anyone who can recall a similar moment can attest to the fact that watching a horizontal directional drill for the first time is intriguing, to say the least. There was almost something mysterious about HDD in the early 1990s but the potential applications seemed endless.”

Milligan has remained with Vermeer ever since and has now become heavily involved in the trenchless industry through his work with the company, as well as through NASTT. At Vermeer, Milligan has been involved in product development for the trenchless market, noting a big focus for the company in recent years has been the integration of technology to increase productivity and profit for the customer. He also notes data as a key area of development.

“Data is becoming a critical aspect of the project planning and delivery,” he says. “Owners are demanding more information be delivered when the project is complete and we're focusing on making sure that process is as seamless as possible for the contractors.”

Milligan says the evolution of the acceptance of trenchless technology is evidence that the market continues to grow, noting that technology that was once an alternative only used in situations when open cut was impossible is increasingly becoming the preferred option.

In the TRENCHES



"Of course, that doesn't come without challenges," he says. "Whether not enough focus was placed on this aspect in recent years, or whether the industry growth has simply outpaced the manpower development, what I continue to hear and observe is the growing need for qualified operators, especially on the HDD side. It's not unusual to hear of a company whose growth is limited based on the lack of staff."

In response, Milligan notes that equipment manufacturers like Vermeer are now taking on some of the responsibility for developing the training opportunities to supplement what other organizations are already providing.

Milligan's volunteer efforts in industry development through NASTT hit a new high when Vermeer launched its vacuum microtunneling technology for laser-guided on-grade pipe installation in 2009. Since then, he's also served on NASTT's No-Dig Show Program Committee and participat-

ed in NASTT's Midwest Chapter activities, serving as secretary and on the chapter's board of directors for several years.

"It's been amazing to see how many people volunteer their time to make the NASTT and the No-Dig show a success," he says. "The focus that NASTT has placed on education is unparalleled in the industry and continues to improve year after year."

As for working for Vermeer, Milligan says it's great to be involved with a company that's dedicated to trenchless technology. Unlike many of the other industries Vermeer serves, trenchless, he says, continues to evolve which presents challenges in every aspect of equipment design, manufacturing, commercialization, sales and even the parts and service support that is involved in a machine's lifecycle.

"What trenchless was five years ago is not what it is today," he says. "I expect we'll be saying the same thing five years from now."

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Mike Woodcock

PORTLAND UTILITIES CONSTRUCTION CO.

**“I ENJOY
EVERYTHING ABOUT
THIS FIELD – OUR
EMPLOYEES, OUR
CUSTOMERS, THE
TECHNOLOGIES
AND INDUSTRY
LEADERS.”**

Mike Woodcock was born into the construction field and he wouldn't have it any other way.

“I enjoy everything about this field – our employees, our customers, the technologies and industry leaders,” he says.

Woodcock's father, Ernie Woodcock, worked most of his adult life as a water and sewer utility contractor, installing projects as a laborer, foreman, superintendent and eventually a general superintendent. Mike Woodcock grew up working summers and winter breaks as a laborer starting in high school. A few years later as he was about to finish college, the elder Woodcock decided to start his own construction company doing the same kind of work. In 1991, Portland Utilities Construction Co. (Pucc) was born in Portland, Tenn., and is now a respected contractor in the Southeast that specializes in trenchless construction.

Mike Woodcock started out with the company working on and off during school breaks. After earning his MBA, he decided to make it full time. That was 1995, and today Woodcock is still at the company and loving every minute of it.

His first introduction to trenchless methods was in 1996 when a municipality in Tennessee for which Pucc had been performing water and sewer projects embarked on a gravity sewer replacement project. The documents called for a lump sum bid for open cutting the entire project – mainline and services. The streets were 12-in. thick concrete and the document mentioned pipe bursting the services as an option for the contractor.

“We had never really heard of the technology and bid the project by open cut,” he remembers. “After we were awarded the project, we looked into the possibility of bursting the services.”

Upon starting the project, Pucc brought in TT Technologies to do a demonstration for its crews. The demonstration was witnessed by representatives from the city and some other contractors that TT Technologies and the city had invited.

“Like all demonstrations, it was an incredible flop,” he says. “The other contractors called it a ‘bust’ and left. We, however, stuck with it until we got it right.”

From that point forward, Woodcock says he became enthralled with doing something that nobody else in the area was doing. Since that time, Pucc has pipe burst almost 2.5 million lf of pipe using the method. In addition, the company has also rehabilitated more than 280,000 lf of sewer pipe using UV-cured CIPP lining. All

In the TRENCHES

told, PUCG has completed more than \$300 million in trenchless work over the past 28 years.

"We went from [trenchless rehab] being a tiny part of our business to pretty much all we do now," says Woodcock, who now serves as vice president. Ernie Woodcock also remains in the business as company president.

Woodcock says the trenchless industry has been in a growth period for quite some time, citing the ability of all industry segments to recognize challenges and meet them head-on with innovation.

"As an industry, we continue to identify weaknesses in our technologies and overcome them," he says. "There also seems to be some momentum in creating awareness that will bring additional opportunities. For example, state and federal regulators now recognize more of the finer points our industry tries to address. The EPA is beginning to have more recognition that asbestos issues aren't just about buildings."

Woodcock's career and keen interest in trenchless technology has also opened the door for him to get more involved in industry education and best practices. He's regularly attended

the NASTT No-Dig Show, and in 2018, was named vice chair of the NASTT Pipe Bursting Center for Excellence. He also co-authored the 3rd edition of the NASTT Pipe Bursting Guidelines with Alan Ambler and Matt Timberlake, which was launched at the NASTT 2019 No-Dig Show in Chicago.

So, how does Woodcock feel about the industry he's come to love?

"As an industry, we tend to do a lot of talking about the 'what,' 'when,' 'where,' and 'how' of our trenchless rehab technologies," he says. "I think we need to focus more of our marketing and education efforts on the 'why' of sewer and water rehab. Environmental issues are front and center on the political stage, but we as an industry have not connected what we do to that band wagon. Saving our streams, rivers, and lakes is 'why' our industry is so important.

"It's just an exciting time to be in this field."

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

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2019



THE NASTT
**NO-DIG
SHOW**

March 17-21, 2019 | Chicago, Illinois



The Greatest Trenchless Show on Earth

The NASTT 2019 No-Dig Show Continues Exhibitor Surge in Return to Chicago

By Andrew Farr

In March, more than 2,200 attendees got the full trenchless treatment at the largest event on the calendar for the North American trenchless technology industry.

Held March 17-21 at the Donald E. Stephens Convention Center in Rosemont, Illinois, the NASTT No-Dig Show is the flagship event of the year for the North American Society for Trenchless Technology. If you've never attended, the show is known for its unique program structure that incorporates networking and educational events with the renowned technical program. The show is as much about celebrating the success of the niche trenchless industry and the people who push it forward as it is about showcasing technology and projects.

The NASTT No-Dig Show is also known for its engagement of all industry segments – owners and municipal engineers, consultants, contractors, manufacturers and service providers. The show's annual attendance and overall reach is also telling of the development and trends happening across the trenchless construction market. This year, the conference again broke a record for number of exhibitors with more than 200 companies displaying their technology – the most ever for a No-Dig Show. Let's take a look back at each day of this year's memorable show in Chicago.

Day I

The NASTT No-Dig Show provides a seamless blend of business, education and networking while bringing together the industry's past, present and future, honoring the incredible work of trenchless professionals. Though the show officially opened on Sunday, March 17 with pre-conference educational sessions and networking events, the first official event was the annual Kickoff Breakfast on the morning of Monday, March 18. The breakfast was opened by NASTT Chair, Craig Vandaele, and 2019 Program Committee Chair, Cindy Preuss, who previewed the week ahead. Motivational speaker Jody Urquhart was the featured entertainment.

NASTT recognized its Board of Directors for 2019 including new board members: Alan Ambler of AM Trenchless; Tiffanie Mendez, Sunbelt Rentals; Chris Sivesind, Akkerman; and Greg Tippett, Stantec. Next, NASTT's 2018 Outstanding Papers of the Year Awards in Rehabilitation and New Installation were announced. In the rehabilitation category, the winning paper was "Assessment of the 110-Year Old Sunrise Highway Aqueduct in Nassau County, New York," written by Chris Macey, AECOM; Brian Gee, AECOM; Jordan Thompson, AECOM; Joe Davenport, Nassau County Department of Public Works; Damon Urso, Nassau County Department of Public Works. In the New Installation category, the winning paper was "Assessing Abrasivity and Wear Risks for Microtunneling in Ground with Cobbles and Boulders," written by Steven Hunt of Jacobs.

Trenchless Technology editors Jim Rush and Sharon M. Bueno presented the winners of the 2018 *Trenchless Technology* Projects of the Year for New Installation to the Valley Crossing Project Gulf of Mexico Direct Pipe Shore Approach project team. The 2018 Project of the Year Award for Rehabilitation was presented to the project team for the World Record 36-in. CIPL Gas Main Rehabilitation Project.

Trenchless Technology publisher Bernie Krzys and associate publisher Kelly Dadich formally presented the 2019 *Trenchless Technology* Person of the Year award to Mike Burkhard — an industry professional who has dedicated his 40-plus year career to the trenchless rehabilitation industry, serving as NASSCO executive director, as well as helping to introduce UV CIPP technology to North America.

The No-Dig Show got into full swing following the Kickoff Breakfast, starting with the opening of the exhibit hall that featured more than 200 companies displaying the latest equipment and technologies for new installation and rehabilitation in the trenchless industry.

The well-attended technical sessions also got underway, featuring more than 160 peer-reviewed technical papers. This year, NASTT also hosted special forums covering a range of trenchless topics. First up Monday was a forum on Direct Pipe. On Tuesday, the forums covered Advanced Pressure Pipeline Condi-

Day 2

tion Assessment and Innovative Products. The latter highlighted all of the products in the running for NASTT's Abbott Award for Innovative Products & Services: Rehabilitation & New Installation.

Day 1 events concluded with NASTT's 18th annual Educational Fund Auction and Reception, a highly popular and themed fundraising event benefiting NASTT's educational initiatives. The auction was hosted by Auction Committee Chair Dennis Walsh of PSE&G and committee member Jeff Maier of Garver, who served as auction emcee for the night. This year, the theme of the auction was the "Roaring 1920s/Speakeasy style." Attendees were encouraged to dress in 1920s gangster or flapper attire. Winners of the costume competition were Cat Rutherford and Jeb Kraft, both of Louisiana Tech University.

This year's auction was a silent auction with bidding taking place throughout the day. The only live bidding was the last item on the docket – the services of Morty the Sewer Rat. With a \$5,000 bid, Morty was split between BTrenchless and Akkerman at the auction this year. Since 2002, the NASTT Educational Fund has raised more than \$1 million total.

Day 2 continued with relevant subjects being covered in the classroom and important discussions and networking taking place on the exhibit floor.

Each year, NASTT recognizes technological advancements through the Abbott Jr. Innovative Product Awards. Annually, two companies with state-of-the-art products are chosen as recipients of this honor. The Innovative Product Awards were handed out for the top technology in the industry on March 19 and recognized at the annual Gala Dinner.

The Kobus Pipe Puller from Kobus Services Ltd. received the Innovative Product Award for Rehabilitation. The Kobus Pipe Puller KPP400 Series is an innovative trenchless technology for the replacement of water and gas service pipes. The device is a self-contained hydraulic winch that mounts on the arm of a typical compact excavator found on most construction sites. The hydraulic motors are driven from the auxiliary hydraulics motors of the excavator and are capable of delivering 60,000 lbs of pulling force.

The Geonex Oy DTH-hammer drilling system received the Innovative Product Award for New Installation. Geonex's system works with steel casing or without casing in solid rock and performs best in hard rock and mixed soil conditions, where rock quality creates significant

costs with tricone bits or in mixed soil conditions that cannot be supported with drilling fluids. Method is direct pipe installation method and operates with an air percussion hammer.

The highlight of Day 2 is undeniably the induction of NASTT's new Hall of Fame Class at the Gala Awards Dinner. This year, NASTT inducted its ninth Hall of Fame class.

Maynard C. Akkerman, president, CEO and owner of Akkerman Inc.; Chris Macey, P.Eng., Americas Technical Practice Leader-Condition Assessment and Rehabilitation of Linear Infrastructure at AECOM; and Robert "Bob" Westphal, senior advisor of operations at Michels Corp.

The NASTT Board of Directors created the Hall of Fame in 2010 to ensure that the society's most outstanding and praiseworthy members received due recognition. The intent of the NASTT Hall of Fame is to preserve the outstanding accomplishments of exceptional individuals and to honor their contributions to the advancement of both the trenchless industry and the society.

Also receiving recognition at the Gala Dinner was Brendan O'Sullivan, P.E., of Murray-Smith, who was the recipient of the Ralston Award for Young Trenchless Achievement and Frank Firsching, B.Sc., MBA, water industry consultant, who received NASTT's Chair Award for Lifetime Service.

Day 3

On Wednesday, March 20, Day 3 commenced with more technical sessions and exhibit hall time in the morning. As in recent years, the technical program on day three also included a Gas Industry Track, highlighting new concepts, trenchless methods and challenges facing gas construction.

NASTT also coordinated a tour at the Gas Technology Institute (GTI) in nearby Des Plaines, Illinois. The GTI tour included live demonstrations of several trenchless technologies including: plastic pipe slitting, keyhole technologies, vacuum excavation and pipe locating.

The conference concluded with its

annual Closing Luncheon, which gives attendees a preview of the 2020 No-Dig Show, which is returning to Denver. The show will take place April 5-9 at the Colorado Convention Center. At the Closing Luncheon, Program Committee chair Cindy Preuss handed the reins over to Joe Lane, who is the 2020 Program Committee chair.

For the fourth year, a hit 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 (turn to the next page to check out some of the photos shared on

the No-Dig app this year).

In NASTT's Tropical Vacation Raffle (announced at the Closing Luncheon and donated by Vermeer), the winner was Dave Wickersham of Progressive Pipeline Management for the second consecutive year!

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 Monday through Wednesday at the NASTT 2019 No-Dig Show. Flip to page 28 for more on next year's show.

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

THE NASTT 2019 NO-DIG SHOW RECAP

THE NASTT 2019 NO-DIG SHOW Getting Started



↑ Past NASTT chairs, including current chair Craig Vandaele (front, right), gather on Sunday, March 17 for a group photo.



↑ Volunteers from NASTT's Northeast Chapter convene following a pre-conference meeting on Sunday, March 17, to discuss upcoming chapter activities.



↑ Volunteers from NASTT's Great Lakes, Lawrence & Atlantic Chapter also met on Sunday, March 17.



↑ Attendees gather in a meeting room for the Introduction to Trenchless Technology - New Installations course on Sunday, March 17.



↑ Also included on the pre-conference lineup Sunday was a Young Professionals Social sponsored by Laney, where young professionals in the trenchless industry got acquainted before the show.



↑ Irish...ish? Club Professionals Social beer for

More photos shared on the No-Dig app!





First-time attendees get to know each other in the Newbie Lounge outside the exhibit hall.



Dr. Sam Ariaratnam of Arizona State University shows off his NASTT New Installations Good Practices Course manual.



The Young Professionals Day was complete with green Patrick's Day!



Amana Arayan, Chair of NASTT's Young Professionals Committee (middle), with Brandon Hale of Kennedy/Jenks Consultants Inc. (left) and Jeff Maier of Garver (right).

Students



Engineering students looking to break into the trenchless market had the opportunity to attend the No-Dig Show to get a glimpse of the industry up close.



NASTT's Student Chapter advisors grab a photo before the Student Orientation on Sunday, March 17.



Student Orientation



THE NASTT 2019 NO-DIG SHOW RECAP

THE NASTT 2019 NO-DIG SHOW
Day I

Kick-Off Breakfast & Entertainment



↑ NASTT's Board of Directors gather on stage before the Kick-Off Breakfast on Monday, March 18 at the 2019 No-Dig Show.



↑ NASTT Chair Craig Vandaele awards Frank Firsching, immediate past chair, with NASTT's Leadership Award.



↑ The other Leadership Award went to Larry Kiest, founder of LMK Technologies and a No-Dig Show Regional Ambassador this year.



↑ Chris Macey and Jordan Thompson of AECOM (middle and right) were awarded NASTT's 2018 Outstanding Paper of the Year Award in Rehabilitation.



↑ The *Trenchless Technology Project* of the Year Award for New Installation was presented to the project team for the Valley Crossing Project Gulf of Mexico Using Direct Pipe Method Shore Approach.



↑ *Trenchless Technology's Project* of the Year Award in Rehabilitation was formally presented to the CIPL Gas Main Rehabilitation Project.

NASTT'S 18th Annual Educational Fund Auction



↑ The auction was hosted by NASTT Auction Committee member Jeff Maier of Garver (left), who served as auction emcee for the night.



↑ Auction Committee Chair Dennis Walsh of PSE&G (right) served as auction and costume contest co-host for the night while Program Committee member Jennifer Glynn brought the flapper style!



↑ The Speakeasy theme of NASTT's 18th annual Educational Fund Auction and Reception brought out the 1920s Chicago gangster attire, as well.



↑ Costume Contest winners! Louisiana Tech's Cat Rutherford and Jeb Kraft.



↑ Don Del Nero, NASTT's 2018 Program Chair (right) awards the 2018 Outstanding Paper of the Year Award in New Installation to Steve Hunt (left) of Jacobs.



↑ *Trenchless Technology* Publisher Bernie Krzys (left) and Associate Publisher Kelly Dadich (right) present the 2019 *Trenchless Technology* Person of the Year Award to Mike Burkhard of Reline America.



↑ NASTT Vice Chair Alan Goodman (left) awards the Michael E. Argent Memorial Scholarship Awards (l-r): Ashkan Faghii, University of Alberta; Jebadiah Kraft, Louisiana Tech; John Kraft, Louisiana Tech; Sarah Sargent, Oklahoma State University; and Andrew Hayes, Clemson University.



Morty the Sewer Rat (l-r) BTrenchless' Chris Matt, Harper Daniel and Marilee Bergstrom.



↑ The LaValley Industries team grabs a group photo at the auction.

Exhibit Hall Opening



↑ NASTT's 2019 Program Chair Cindy Preuss cuts ribbon to officially open the exhibit hall along with Vice Chair Joe Lane (middle) and NASTT Chair Craig Vandaele (right).



↑ A few members of TT Technologies, a platinum sponsor again this year, enjoying the exhibit hall action (l-r): Scott Kneip, Mike Schultz and Mark Dorn.



↑ Platinum sponsor Perma-Liner's crew at the booth (l-r): Jack Manuel, Kevan Taylor, Patrick Olive, Joel Siperek and Rob Larsen Jr.



↑ The team at platinum sponsor Aegion gather for a photo in the booth.

THE NASTT 2019 NO-DIG SHOW RECAP

THE NASTT 2019 NO-DIG SHOW
Day 2

Exhibit Hall



↑ Xylem's Greta Vladeanu working the Pure Technologies booth. Vladeanu is a former graduate research and teaching assistant at the Trenchless Technology Center at Louisiana Tech.

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

↑ The Geonex Oy DTH-hammer received the Abbott Innovative New Installation award.

Classroom



↑ Anthony Vitale of the Northeast Ohio Regional Sewer District presents during a technical session.



↑ This year's attendees were treated to a six-track technical program featuring more than 160 peer-reviewed papers, as well as special forums covering a range of trenchless topics.

↑ Maureen Carlin of Laney Directional Drilling Co. - winner of the 2018 Trenchless Technology Project of the Year Award for New Installation - gives a talk on HDD to a packed room.



drilling system
product Award for



↑ The Kobus Pipe Puller KPP400 Series from Kobus Services Ltd. received the Abbott Innovative Product Award for Rehabilitation.



↑ The NASTT No-Dig Show is renowned for its top notch, non-commercial technical program that also encourages interactive discussion in the classroom.



↑ The Advanced Pressure Pipeline Condition Assessment Forum was held on the morning of Tuesday, March 19.

Gala Awards Dinner



↑ This year, NASTT inducted its ninth Hall of Fame class: Maynard C. Akkerman of Akkerman Inc. (right), Chris Macey of AECOM (left) and Robert "Bob" Westphal of Michels Corp. (middle).



↑ Brendan O'Sullivan of Murraysmith (left) accepts NASTT's Ralston Award for Young Trenchless Achievement from NASTT Vice Chair Alan Goodman.



↑ Frank Firsching, water industry consultant and immediate past chair of NASTT (left) receives the Chair Award for Lifetime Service from current NASTT chair Craig Vandaele.



↑ New NASTT Board Member Alan Ambler of AM Trenchless (who moonlights as a guitarist in a rock band) sat in with the Gala Dinner entertainment for a tune.

THE NASTT 2019 NO-DIG SHOW
Day 3

THE NASTT 2019 NO-DIG SHOW RECAP

Exhibit Hall



↑ The last full day of action at the No-Dig Show didn't slow down the interaction in the exhibit hall.



↑ No-Dig Show attendees have the opportunity to network with expert technology, equipment and service providers from across the trenchless industry.



↑ This year's show featured a record 200-plus exhibiting companies!



↑ s

Closing Luncheon



↑ Chris Larson of C&L Water Solutions (far right) presents NASTT's Student Chapter Video Presentation Awards (l-r): First place: Sheng Huang and Chao Kang of the University of Alberta and third place Tanner Fialkowski and Robert Russell of Oklahoma State. Second place (not pictured) went to Cal Poly Pomona.



↑ NASTT's Kaleel Rahaim (left) and Ian Mead (right) award the Student Research Poster Competition finalists (middle l-r): First place Jeffrey Feghaly, Arizona State; second place Ashkan Faghieh, University of Alberta; and third place Anderson de Oliveira, Queen's University.



↑ Cindy Preuss, Program Chair, takes the stage with Don... served as Program... NASTT 2018 N...

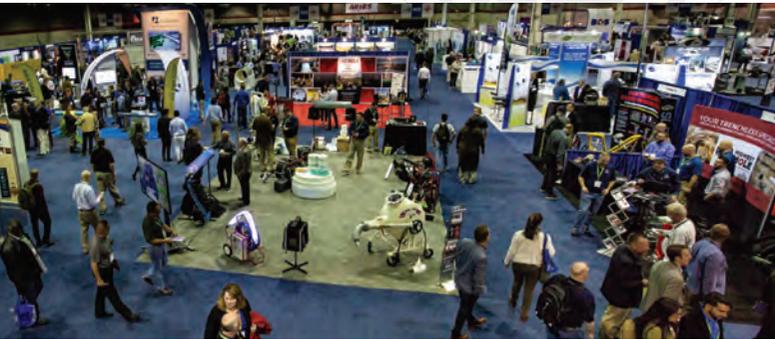
Student Poster Competition



↑ Students participating in NASTT's Student Research Poster Competition take a break from presenting their research to pose for a group photo in the exhibit hall.



↑ Louisiana Tech student Victor Bivens presents to NASTT judges during the Student Research Poster Competition.



Exhibiting companies specialize in technologies for a range of trenchless solutions – from HDD, microtunneling and auger boring to pipe bursting, CIPP and manhole rehabilitation.

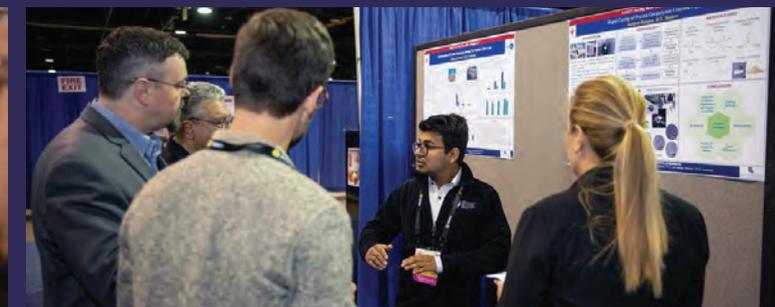


This year's... photo on... Nero, who... Chair for the... Dig Show.

↑ A "shotski" to officially kick off the conference planning for next year's show in Denver!

Gas Industry Day

Keeping with the format of recent years, Day 3 at the No-Dig Show featured Gas Industry Day, showcasing technical presentations and events dedicated to trenchless construction in the gas utility industry. NASTT also organized a tour at the Gas Technology Institute (GTI) in nearby Des Plaines, Illinois. The GTI tour included live demonstrations of several trenchless technologies including plastic pipe slitting, keyhole technologies, vacuum excavation and pipe locating.



↑ Ashlesh Banjara of Louisiana Tech University presents during the Student Research Poster Competition.



MILE HIGH TRENCHLESS 2.0



April 5-9 | Denver, Colorado
Colorado Convention Center



Looking Ahead to the NASTT 2020 No-Dig Show in Denver

NASTT and the trenchless industry will be looking to break records again when the NASTT 2020 No-Dig Show returns to Denver, Colorado next year, April 5-9, at the Colorado Convention Center.

In recent years, the NASTT No-Dig Show has been growing consistently, setting an all-time mark for total attendance in 2015 when the show last came to Denver. Since then, the show has regularly topped its previous year totals for number of exhibitors, with more than 200 in 2019.

Challenges remain rife in the underground construction market and the ability to connect technology manufacturers and service providers with municipalities in need of innovative solutions is critical. Aging water and sewer systems continues to be the biggest challenge facing the underground infrastructure market. 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 the NASTT No-Dig Show has been to increase awareness and acceptance of this technology. The benefits it provides can be substantial for municipalities. As the 2020 No-Dig Show gets ready to head back to Denver, NASTT looks forward to continuing its momentum in advocating trenchless technology all across North America.

ARE YOU A TRENCHLESS EXPERT?

If you're an industry expert, we invite you to join the NASTT 2020 No-Dig Show as a track leader is a great way to network with industry professionals and to be part of the trenchless industry's most notable association. The deadline to become a track leader is July 31, 2019. To join or for more information, please email Michelle Hill at mhill@nastt.org.



Joe Lane of Aegion (right) will serve as the NASTT 2020 No-Dig Show Program Chair, while John Matthews (left) of the Trenchless Technology Center will step into the role of Vice Chair.

The NASTT 2020 No-Dig Show will once again offer six tracks and more than 160 peer-reviewed, non-commercial presentations. This year's Program Committee Chair, Cindy Preuss of HydroScience Engineers, is handing over the reins to Joe Lane of Aegion, who will serve as the 2020 Program Committee Chair. John Matthews, Director of the Trenchless Technology Center and Associate Professor at Louisiana Tech University, will take on the duties of Vice Chair.

For more information on the NASTT 2020 No-Dig Show in Denver, please visit nodigshow.com.

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“In the work I do for the City of Seattle we are faced with many system challenges. These challenges can be difficult to navigate and figure out how best to manage them trenchlessly. The No-Dig Show gave me the opportunity to talk with multiple contractors and businesses to pick their brains on how their product or process can help Seattle manage some of the toughest sites.”

Maria Stevens

Senior Civil Engineering
Specialist - City of
Seattle, Seattle
Public Utilities



Attend the NASTT 2020 No-Dig Show for trenchless solutions to YOUR aging infrastructure.



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NODIGSHOW.COM



The Toro Company acquires The Charles Machine Works Inc.



The Toro Company announced Feb. 15 that it has entered into a definitive agreement to acquire privately-held The Charles Machine Works Inc., an Oklahoma corporation and the parent company of Ditch Witch and several other leading brands in the underground construction market, for \$700 million in cash subject to certain adjustments set forth in the definitive agreement.

The transaction is subject to regulatory approvals and other customary closing conditions and is currently anticipated to close before the end of Toro's fiscal 2019 third quarter. More detailed information regarding the transaction is included in an investor presentation available at thetorocompany.com.

Headquartered in Perry, Oklahoma, Charles Machine Works designs, manufactures and sells a range of products to cover the full life-cycle of underground pipe and cable, including horizontal directional drills, walk and ride trenchers, utility loaders, vacuum excavators, asset locators, pipe rehabilitation solutions and after-market tools.

The company, known as "The Underground Authority" for their deep understanding of the structures and systems in those markets, and the most important needs of underground construction professionals, generated calendar year 2018 revenues of approximately \$725 million.

"The addition of Charles Machine Works will further strengthen our portfolio of market-leading brands supported by talented employees, a commitment to innovation, a best-in-class dealer network and long-standing customer relationships," said Richard M. Olson, Toro's chairman and CEO.

On the trenchless side of the construction business Charles Machine Works brands include America Augers, Ditch Witch, DW/TXS, HammerHead Trenchless, MTI Equipment Radius and Subsite Electronics. Charles Machine Works also owns trencher manufacturer Trenchor.

Robbins crossover TBM completes Turkey's longest water tunnel

Excaavation of Turkey's longest water tunnel came to an end on Dec. 18, 2018. To get there, a 5.56 m (18.2 ft) diameter Robbins Crossover (XRE) TBM and the contractor JV of Kolin/Limak had to overcome dozens of major fault zones and water pressures up to 26 bar. The completed national priority water line is set to go into operation in March 2019.

The 31.6 km (19.6 mi) long Gereede Water Transmission Tunnel is an urgently needed project due to severe and chronic droughts in the capital city Ankara. Its final leg, a 9.0 km (5.6 mi) section of extremely difficult ground including sandstone agglomerate, limestone and tuff, was just one section in the middle of a tunnel widely considered to be the most challenging ever



Numa announces new CFO Mark Stickney



Numa, a leading drilling technology provider, has announced the appointment of Mark Stickney to the position of chief financial officer. Stickney will succeed Joe Tokarz, who served as CFO for more than 30 years and retired in April 2019.

Stickney is a finance leader with a proven track record of driving performance and process improvements in highly diversified manufacturing businesses. He brings over 25 years of top-level financial experience and leadership to the organization. This is Stickney's second stint with Numa as he was previously a Senior Cost Accountant for the company in the late 1990's.

"We are very pleased to welcome back Mark as our new CFO," said Numa President, Ralph Leonard. "Mark's past experience with Numa and his deep expertise in operational finance makes him uniquely qualified for this role. We look forward to him joining our leadership team and helping us execute on our growth plans while maximizing profitability."

Prior to joining Numa, Stickney served in various finance and accounting management roles for Saint-Gobain Ceramics & Plastics, Inc., a multinational corporation that produces a variety of construction and high-performance materials.

EYE ON THE INDUSTRY

driven by TBMs in Turkey. "I've had the chance to study and visit the majority of mechanized tunneling projects in Turkey since the 1980s. The Gerece project is one of the most challenging projects among them," said Dr. Nuh Bilgin, Professor of Mine and Tunnel Mechanization at Istanbul Technical University and Chairman of the Turkish Tunneling Society.

The Robbins XRE TBM was called in to complete the tunnel, which was at a standstill after using three Double Shield TBMs from another manufacturer. Those machines encountered incredibly difficult geology including massive inrushes of mud and water.

The Crossover machine was assembled in spring 2016 after crews excavated a bypass tunnel to one side of one of the stuck Double Shield TBMs. An underground assembly chamber allowed the machine to be built in the tunnel using Onsite First Time Assembly (OFTA).

The tunnel will convey water from the Gerece River to Çamlidere Dam, which provides potable water for the Ankara city water system.

Akkerman gets new ISO standard for quality management

Akkerman Inc., a trenchless underground construction systems manufacturer, recently attained the International Organization for Standardization (ISO) ISO 9001:2015 for its quality management system at its sole manufacturing facility in Brownsdale, Minnesota.

Following an independent audit conducted by SAI Global, the certificate was issued in January 2019. The scope of the certification applies to the design, manufacture, sales and services of on line and on grade tunneling and pipe jacking products for the underground sewer, water, gas and electrical utilities industries.

Akkerman embarked on the implementation of its quality management system in 2015 with consulting assistance from Enterprise Minnesota who was integral to the system's execution.

Justin Akkerman, Akkerman operations manager, said, "Minnesota Occupational

Safety and Health recognized us through the Minnesota Safety and Health Achievement Recognition Program for our safety program in 2010. Having our management system certified to ISO 9001:2015 was a natural progression to strengthen the business. Not only does our comprehensive quality management system benefit our employees through procedure efficiencies and repeatability, but our customers can also feel confident in knowing that the equipment that we manufacture is subject to the highest standards and continuous improvement at every step in the manufacturing process."

Established in 1973, Akkerman develops, manufactures and supports advanced guided boring, microtunneling, pipe jacking, sliplining and tunneling underground construction solutions that accurately install a variety of pipe in an extensive range of ground conditions and project challenges. For more, visit akkerman.com.

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Olson joins Lithos Engineering



Lithos Engineering has announced that Matthew Olson recently joined its team as project manager. Olson is a professional engineer licensed in Washington and soon to be in Colorado. He brings an additional seven years of experience to the Lithos team.

With a BS from University of Minnesota in Civil Engineering and a MS from Arizona State University in Geotechnical Engineering, Olson has spent the bulk of his career working as an engineer specializing tunnel and trenchless design. In addition to his design experience, Olson worked as a contractor for a midwestern trenchless company building numerous guided trenchless installations. He also worked as a hydrologist for the Dam Safety Unit of the Minnesota Department of Natural Resources.

In joining Lithos, Olson brings significant trenchless expertise in micro-tunneling, auger boring, HDD, pipe jacking, pipe ramming, pipe bursting, pipe reaming, and UV and steam cured CIPP. He has also served as chair of the North American Society for Trenchless Technology (NASTT) Young Professionals Committee and has twice been awarded NASTT's Outstanding Paper Award.

Olson is based in Lithos' Lakewood, Colo., office. Welcome to the Lithos family, Matt!

Vermeer introduces new MX300 mixing system



The right-sized mixing system is key for drilling operations. With a redesigned, slim rectangular profile tank, the new Vermeer MX300 mixing system helps horizontal directional drilling (HDD) contractors optimize productivity and offers customizable mounting configuration options.

Equipped with a 23 hp (17.2 kW) Kohler ECH 7300 EFI gas engine that outputs 350 gpm (1,324.9 Lpm) of flow, the MX300 mixing system power unit can be paired with up to two tanks at once to help decrease time spent mixing and refilling drilling fluid tanks. The unit's narrow rectangular tank design also helps maximize fluid volume, and a small footprint can help with convenient transporting and storage.

"The Vermeer MX300 mixing system is an upgrade to the MX240 model," explained Tod Michael, product manager of trenchless products at Vermeer. "With the ability to use one pump with one or two tanks, the MX300 is scalable to a contractor's jobsite needs from small bores to large-diameter and longer-distance HDD applications in varying soil types."

The new Vermeer mixing system can be paired with a 750-gallon (2,839.1 L) or 1,000-gallon (3,785.4 L) tank and works with a variety of horizontal directional drills. It features a wide-mouth hopper and suction hose for the convenient pouring of drilling additives. The tapered bottom of the rectangular tank design helps prevent additives from settling, building up and assists with efficient drainage. At a width of just 40 in. (101.6 cm), the MX300 can be mounted to transport two tanks inside a standard-sized enclosed truck.

The MX300 comes with a 16-gallon (60.6 L) fuel tank and is convenient to service with access to the roll jets through the top of the tank and two drainage points that are operated by two accessible valves.

For more on the Vermeer MX300 mixing system, visit vermeer.com or contact your local Vermeer dealer.

Shelter Island, N.Y. depends on Fusible PVC conduit

When Hurricane Sandy hit the New York coastline in 2012, Shelter Island had three circuits providing power - one of which was known to be inadequate but provided some back up capability at peak power use. Sandy destroyed one of the two remaining circuits and left the island with no adequate back up circuit. Long Island Power Authority acted quickly to resolve the issue and obtained the funding and permissions to replace the line under the Peconic River and Pipers Cove using horizontal directional drilling (HDD) methods. The HDD process would be used to install three conduits under the water, each of 3,300 ft long, from Southold to Shelter Island. However, this initial installation was a failure and the project had to be shut down.

PSEG Long Island then brought in one of the premier drilling contractors in the nation, Carson Corporation, to help them complete the project. Carson part-

nered with Underground Solutions to tackle this challenging project using Fusible PVC pipe.

At the recommendation of Carson Corporation, three separate bores were performed instead of a single bundled installation. A single 8-in. diameter Fusible PVC conduit was installed in each bore, approximately 3,300 ft in length. The bores were drilled from Greenport to Shelter Island, up to 120 ft below water body. Of the three conduits installed, only one currently carries an active circuit, while the other two will provide options for future reliability and capacity expansion projects.

The second attempt at the project was delivered on time and on budget. Thanks to the experience and diligence of Carson Corporation and the use of Fusible PVC conduit, Shelter Island has the energy capacity and system resiliency needed for the future.

Akkerman: Driven for Customer Success

Since 1973, Akkerman has developed, manufactured and supported powerful and versatile guided boring, microtunneling, pipe jacking, sliplining, tunneling and earth pressure balance underground construction solutions that accurately install a variety of pipe in an extensive range of ground conditions and project challenges.

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Symmetry with contractors has been the backbone of our business and a point of distinction above our competition. Before Akkerman the equipment manufacturer there was D.H. Akkerman Construction Company. To satisfy their need to accurately install pipe under crossings, the manufacturing branch of Akkerman was founded forty-six years ago.

Our manufacturing business operates

with the highest level of integrity and Akkerman employees have a personal investment in our customers' success. Our highly skilled sales team has a clear understanding of industry demands. Our in-house engineering department applies the most current standards and continually reviews, reassesses and enhances our equipment offerings.

We are committed to making every effort to position our equipment on your next project. Akkerman systems are available for purchase, lease-to-purchase, or rent from our rental fleet.

Our Equipment Systems

Since inception, Akkerman has grown with the evolution of industry demands. We offer underground construction solutions to address each project's ground conditions, pipe specifications and complexities. When we present equipment solutions, we include everything you need along with versatility packages to keep your equipment relevant

to industry requisites project after project.

Service & Support

We champion our equipment with a team of experienced field technicians, an extensive parts department, and manufacturing services all dedicated to superior reliability and responsive service. Akkerman field technicians represent a powerhouse of hands-on equipment experience to train your crew on the project site. Our field technicians regularly update their safety training credentials and demonstrate the highest levels of safety protocols on your project.

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Contact us to partner on your next project at 800.533.0386 and learn more at akkerman.com.



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McElroy celebrates 50 years of fusion

McElroy, a 65-year-old company with small beginnings as a contract job shop, announces its 50th year as a leading manufacturer of thermoplastic pipe fusion machines used worldwide.

"If you look at the industries that have already embraced this technology, they believe in it," said Chip McElroy, president of McElroy. "Those people are already believers and are challenging us to make our equipment more efficient, even easier to operate and to create the tools that let pipeline owners know joints were done per specification."

McElroy found its niche in the thermoplastics world in 1969 when Phillips DriscoPipe asked the company founder Art McElroy to design a 2-in. prototype machine for their high-density polyethylene (PE) pipe product. This led to the 4-in. Hand Pump and more sizes developed rapidly after that along with stationary and wheeled models and eventually tracked vehicles.

Art McElroy accurately predicted a sustainable future in fusion and adopted a philosophy to stay ahead of the game by investing in engineering and product development. Its equipment was relied on heavily in the construction of natural gas distribution systems and today thermoplastics are gaining ground in nearly every industry, as heat-fused, leak-free joints are accepted as a reliable piping solution.

McElroy sold direct initially. Its sales team gave demos, trained customers, rented machines, sold parts, made repairs and logged a lot of miles. In 1981, Art McElroy created McElroy University, a formal training facility to ensure that operators and inspectors develop best fusion practices. The company also moved towards a distribution network in 1984 to sell equipment on a broader scale.

In the 90s, McElroy was encouraged by the mining industry to create a self-propelled fusion machine. The prototype was a self-contained, track-mounted 500 mm fusion machine. Today that line of equipment is known in the industry as the TracStar, and has be-



Chip McElroy drives the first TracStar machine on a jobsite in 1997.

come the flagship of McElroy's machine lines.

Sparked by the increasing use of pipe up to 2,000 mm, McElroy set out on a completely new design to meet the challenge. The Talon 2000 is a self-propelled machine with a jaw design that self-loads pipe from the ground, positions it to be fused and moves from joint to joint down the pipeline. The new method for handling pipe known as pipelining provides a safer, more efficient way to fuse large pipe.

McElroy took its products inside the building in 2014 with equipment to fuse polypropylene pipe for plumbing and mechanical systems. By 2018, the company offered socket tools as small as 16 mm and butt fusion machines up to 630 mm for polypropylene pipe. With record-breaking sales in 2018, McElroy said it believes its polypropylene tools are a key part of the future.

Granite Construction acquires Lametti & Sons CIPP assets, equipment

Granite Construction Inc. has further strengthened its position in the water and wastewater market by acquiring certain assets and equipment related to the Lametti & Sons Inc. CIPP business.

Lametti & Sons, a Minnesota-based company with expertise in cured-in-place pipe (CIPP) rehabilitation and trenchless renewal is one of the original certified installers of the Inliner CIPP product.

"We are excited about the opportunities that this acquisition provides as we continue to build our capabilities and position ourselves as a national leader in the water and wastewater markets," said Granite president and CCEO James H. Roberts. "This is another step in the execution of our strategic plan which includes strong organic growth through our core business lines, acquisitions in the water

and wastewater markets, and additional growth and geographical diversification in our vertically integrated business."

"We are thrilled to formally welcome Lametti's CIPP operations into the Granite Inliner family," said vice president of Granite Inliner, Denise McClanahan. "Lametti has been an integral part of our Inliner CIPP network for 23 years and I am confident that this transition will be seamless for our customers and employees."

This acquisition will become the Minnesota Area office of the Granite Inliner Division, a wholly-owned subsidiary of Granite Construction Inc., which includes operations based in Orleans, Indiana as well as 17 offices and more than 800 employees in the U.S. and Canada.



NASTT Chapter News



British Columbia

The British Columbia Chapter (NASTT BC) recently entered into an agreement with the GLSLA and Northwest Chapters to host the first annual No-Dig North, a new conference geared specifically toward the trenchless market in Canada. No-Dig North will be held Oct. 29-30, 2019 in Calgary, Alberta. Visit nodignorth.ca for more information. The chapter is also continuing its efforts to introduce trenchless technologies into educational institutes across the province.



Great Lakes, St. Lawrence & Atlantic

This year, the Great Lakes, St. Lawrence & Atlantic (GLSLA) Chapter will co-host No-Dig North with the British Columbia and Northwest Chapters in Calgary, Alberta, on Oct. 29-30. Visit nodignorth.ca for more info. For more information on GLSLA, events and chapter training sessions, please visit glsla.ca.



Mid Atlantic

The Mid Atlantic Chapter (MASTT) conducted a Trenchless Technology, SSES and Buried Asset Management seminar in Philadelphia on April 3 at the Clarion Hotel and Convention Center. The guest presenter, Jeffery Twardzik, engineering supervisor with the Philadelphia Water Department, presented on Philadelphia's Trenchless Program. ASCE Philadelphia Section was the seminar co-sponsor.

MASTT also has plans to conduct a Trenchless Technology, SSES and Buried

Asset Management seminar in Arlington, Va., on Aug. 24, 2019. Please place this date on your calendar and plan to participate. Please visit mastt.org to learn more about MASTT and the MASTT seminar program or contact Leonard Ingram, MASTT executive director, at leonard@engconco.com or call (334)-327-7007.

MASTT published its annual *Mid Atlantic Journal of Trenchless Technology* in May of 2018 and plans to publish the 2019 issue in mid-June. Please contact Andrew Pattison, A To B Publishing, at (204)-275-6946 to participate.



Midwest

In 2019, the Midwest Chapter (MSTT) is planning to conduct a Trenchless Technology, SSES and Buried Asset Management Seminar in Indianapolis, June 26-27 and another event in Council Bluffs, Iowa, on Dec. 4. Please place these dates on your calendar and plan to participate. Visit mstt.org to learn more about MSTT and the seminar program or contact Leonard Ingram, MSTT executive director, at leonard@engconco.com or call (334)-327-7007.

MSTT last published its annual *Midwest Journal of Trenchless Technology* in September of 2018. It and past issues can be seen at mstt.org. The chapter plans to publish a 2019 edition in late September. Please contact Andrew Pattison, A To B Publishing, at (204)-275-6946 to participate.



Northeast

The Northeast Chapter is actively planning its annual conference in

Syracuse, New York, scheduled for Nov. 11-12, 2019. A welcome reception will be held at Dinosaur Bar-B-Que on the evening of Monday, Nov. 11, with a full day of technical presentations and outdoor technology demonstrations on Nov. 12. The spring edition of the *Northeast Journal of Trenchless Technology Practices* was released at the NASTT 2019 No-Dig Show in March, and the chapter is looking forward to its fall 2019 edition soon.

The Northeast Chapter also sponsored the development and publication of the inaugural *Trenchless for Gas Infrastructure Journal*, to further spread the word on the capabilities of trenchless technologies in gas construction.

The Northeast Chapter will hold elections this summer for several Board of Director positions, with results to be announced at the annual conference. The chapter continues to work with its student chapter at UMass Lowell to identify volunteers to provide technical presentations and sponsor field trips to engage the next generation of trenchless experts. Leadership at the university is actively pursuing for the establishment of a Center of Excellence focused on advances in trenchless technologies. Please visit the Northeast Chapter website, nastt-ne.org, for more information and please join us!



Northwest

The Northwest Chapter is proud to be jointly presenting No-Dig North in partnership with the Canadian Chapters of NASTT. The conference will take place in Calgary, Alberta, Oct. 28-30, 2019, at the TELUS Conference Centre. The Canadian Chapters of NASTT are accepting applications for 2019 Project of the Year awards, which will be presented at No-Dig North. There will be awards for

the Canadian Project of the Year, as well as the British Columbia Chapter, GLSLA Chapter and Northwest Chapter. Projects submitted for consideration must be located within Canada, utilize at least one form of trenchless technology and be in some form of activity between November 2018 and November 2019. The deadline to submit is June 30, 2019. For more information on sponsorships, tradeshow booths, delegate registration and Project of the Year awards, please visit nodignorth.ca.

The chapter is also accepting applications for the NASTT-NW Municipal and Utility Scholarship for No-Dig North. The scholarship is open to employees of municipalities, government agencies and utility owners who have limited or no training funds due to economic challenges. To apply for the scholarship, please visit nastt-nw.com. The deadline to apply is June 28, 2019.

The Northwest Chapter also recently closed out another great Technical Lunch Program in both Edmonton and Calgary. The chapter will be planning the 2019-2020 Program over the summer and would like to extend an invitation to members to submit topics for this program. If you have a specific topic or project that you would like to see us spotlight, please reach out and let us know. For more information, email gtippett@nastt-nw.com.



Pacific Northwest

Greetings from the Pacific Northwest

Chapter! The chapter had a strong presence at the NASTT 2019 No-Dig Show in Chicago. Much of the board and many active members were present. Glen Wheeler with James W. Fowler Co. was voted in as the new Secretary during the chapter meeting.

The chapter is currently testing its new website and hopes to report it up and running by the next update! Until then, add us on LinkedIn to follow the latest PNW-NASTT Trenchless News: [linkedin.com/company/pnwnastt](https://www.linkedin.com/company/pnwnastt).

The *Pacific Northwest Trenchless Review*, our yearly chapter publication, will be published and mailed towards the end of the year. Look for a call for abstracts in June. We will also be putting out a survey to see what education our members

need. In the meantime, please reach out to Carl Pitzer at cpitzer@thompsonpipe-group.com or AJ Thorne andrew.thorne@greshamoregon.gov if you have an immediate need for a best practices course or have an abstract you would like to submit for the *PNW Trenchless Review*.



Rocky Mountain

The Rocky Mountain Chapter is well on its

way to having a successful 2019. We are pushing forward with our conference on Oct. 23-24, which will be held in Sandy, Utah, this year at the Mountain Expo Center. We already have signups and sponsors rolling in and will have a great lineup of abstract/papers. We will be continuing with our annual clay shoot in the fall and will have multiple field trips lined up. In particular, we will be pushing for field trip participation in Kansas and Nebraska. Our outreach team is looking for strong participation from these chapter member areas in 2019 and 2020. Overall, we are very excited for the future over here in the Rocky Mountain Chapter!



South Central

The South Central chapter recently held its fourth annual regional conference in May, in conjunction with the University of Texas at Arlington's Center for Underground Infrastructure Research and Education (CUIRE). Some of Texas and Oklahoma's best presentations were put on with both contractors and manufacturers exhibiting. The chapter also gave out three \$2,500 scholarships to two UTA students and one Oklahoma State student. We were also able to give away more than \$8,000 in books to the attendees at our fourth annual event. Many of the attendees and exhibitors have already signed up for next year, as the board finalizes the 2020 annual NASTT South Central Chapter Conference.

The chapter also recently released the second annual publication of the *Texas and Oklahoma Trenchless Report*, the only regional publication dedicated exclusively to trenchless technology in the South Central United States, which serves to educate local governments, utilities

and other end-user groups on the benefits and practice of utilizing trenchless technology. For information regarding this publication, please contact Justin Taylor at justin.taylor@cciandassociates.com or call 832-210-1032.



Southeast

The Southeast Chapter (SESTT) hosted a very successful

Trenchless Technology, SSES and Buried Asset Management Seminar in Charleston, S.C. (North Charleston), on May 22 at the Marriott North Charleston Hotel. The guest presenter was Chris Troutman, assistant director of engineering and construction with the Charleston Water System in Charleston, S.C., who presented on Charleston's trenchless program. The seminar co-sponsors were ASCE South Carolina Section-Southeast Branch and SC APWA Lowcountry Branch.

SESTT is planning a Trenchless Technology, SSES and Buried Asset Management seminar in Charlotte, N.C. on Sept. 25, 2019. Please place these dates on your calendar and plan to participate. Visit sestt.org to learn more about SESTT and the SESTT seminar program or contact Leonard Ingram, SESTT executive director, at leonard@engconco.com or call (334)-327-7007.

SESTT plans to publish its 2019 *Southeast Journal of Trenchless Technology* in mid-November.



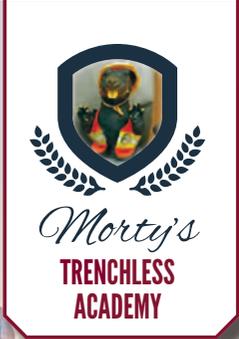
Western

The Western Chapter (WESTT) is planning its Fall 2019 Western

Regional No-Dig Conference and Exhibition on Oahu, Hawaii. The conference will be held in conjunction with the Hawaii Water Environment Association (HWEA) on Wednesday, Nov. 20 at the Koolau Conference Center with short courses offered on Thursday, Nov. 21 in Waikiki. The conference will include presentations on trenchless construction and rehabilitation projects, as well as collection systems and infrastructure assessment. The agenda and registration information will be available on the chapter website at westt.org later this summer.

Microtunneling a Win in Calgary with Triple Bottom Line Analysis

By Charles Pullan



Calgary, Alberta, is a city of 1.3 million people on the eastern slopes of the Rocky Mountains where the foothills meet the prairies. The City of Calgary manages water, wastewater and stormwater utilities within the city, totaling more than 4,500 km of pipe per utility to service its customers. Calgary is a uni-city, a single city that does not border other cities, and is not constrained by geography; it is surrounded by agricultural land that typically does not inhibit urban sprawl. This unique situation has contributed to growth with only moderate densification, thereby allowing new water feeder mains and sewer trunks to service new communities. Until the early 2000s, Calgary's few microtunneling projects occurred in areas where open cut methods were impractical, such as for river and railway crossings.

With a population increase of more than 300,000 people, the past 12 years were a different story for Calgary. Despite an economic downturn in the energy sector, a prime driver in Calgary's economy, the city's downtown core and surrounding areas densified. Additionally, developers expanded from simpler projects near the city core into more challenging areas for their land development. Such extensive growth required numerous large infrastructure projects for water and sewer servicing in the new communities and increased capacity in the densified areas.

In 2005, Calgary adopted a Triple Bottom Line Policy which considers economic, social and environmental factors in all decision-making processes. This approach ensures that the right projects are being pursued and the right construction methods are being used. In brief, this framework rolls up all fac-

tors into a single "cost" for the project or construction method. While there can be challenges in assigning a cost for social or environmental factors, once complete, genuine comparisons of projects and methods are possible.

When looking at Triple Bottom Line (TBL) analysis for projects required for Calgary's recent growth, microtunneling was advantageous in numerous locations. As in the past, TBL has confirmed the use of microtunneling for river and rail crossings. However, microtunneling has also been endorsed for major and moderate roadway crossings to limit traffic disruption. It has been used in established areas, reducing the need for numerous road detours and disruptions to residents and businesses. On one occasion, microtunneling was used for a deep sewer in a greenfield site, which minimized the extent of surface disturbance. Consequently, this method enabled more productive land use because it allowed the building of houses in an area that would be trench backfill if open-cut methods were employed. TBL analysis clearly identifies the value that citizens receive from the use of microtunneling.

Microtunneling is inherently risky, and when problems arise they tend to be costly, cause long delays, and damage organizational reputations. As such, Calgary has embraced educating its project managers to understand their knowledge base and source credible expertise when warranted. Calgary has sent numerous project managers to the NASTT No-Dig Shows and regional conferences, the Microtunneling Short Course in Boulder, Colorado, and to NASTT's Introduction to Trenchless Technology New Installation Methods short course. Such efforts toward enhanced

education allow the City of Calgary, with assistance from its knowledgeable consulting engineers, to make informed decisions and input proper information into the TBL analysis.

Calgary currently has two large microtunneling projects underway. Northridge Feedermain is a 1350mm feedermain supporting population growth in north Calgary. A 310 m section is being installed by microtunnel to limit disruption to a residential street and a 130 m section is being installed by microtunnel under a highway. Inglewood Sanitary Trunk is 3.5 km of 2,400 mm sanitary trunk being installed by microtunnel through a built-up industrial area to increase capacity, supporting growth and densification in Calgary. These projects are large-scale for Calgary and have high visibility; the use of microtunneling limits disruption to citizens and provides greater value as the TBL analysis noted.

Budget cycles in Calgary operate on four-year budget cycles, with the current 2019-22 budget underway. There are new projects within this budget that will likely be delivered by microtunneling once TBL analyses are concluded and designs are furthered. Education and experience from past and current projects help expand knowledge to deliver projects more effectively, resulting in fewer social and environmental costs while still meeting budget goals and expectations of Calgarians.



Charles Pullan, P.Eng., is senior project engineer, infrastructure delivery, water resources, for the City of Calgary.

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
Website: nastt-bc.org

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

Chapter Contact
Charlotte Wong
charlottenapwong@gmail.com

Elected Officers
Chair - Ophir Wainer
Treasurer - Preston Creelman



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

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

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

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



Mid Atlantic
Website: mastt.org

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

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

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



Midwest
Website: mstt.org

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

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

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



Northeast
Website: nastt-ne.org

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

Chapter Contact
Ian Mead
Phone: (508) 754-2201
imead@tighebond.com

Elected Officers
Chair - Ian Mead
Vice Chair - Babs Marquis
Secretary - Eric Schuler
Treasurer - Marshall Gaston



Northwest
Website: nastt-nw.com

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

Chapter Contact
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Elected Officers
Chair - Greg Tippett
Vice Chair - Ben Campbell
Secretary - Jeff Galloway
Treasurer - Keith Moggach



Pacific Northwest
Website: pnwnastt.org

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

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



Rocky Mountain
Website: rmnastt.org

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

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

NASTT CHAPTERS



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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Elected Officers

Chair - Alan Goodman
Vice Chair - Jonghoon "John" Kim
Treasurer - Josh Kercho



Western

Website: westt.org

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

Chapter Contact

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WESTTchapter.org@gmail.com

Elected Officers

Chair - Brian Avon
Vice Chair - Lisa Arroyo
Secretary - Kathryn Wallin
Treasurer - Norman Joyal



Southeast

Website: sestt.org

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

Chapter Contact

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Elected Officers

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Vice Chair - Ed Paradis
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Remco Kleinlugtenbelt, No-Dig North 2019 Program Chair
Email: rkleinlugtenbelt@thurber.ca

EXHIBITOR OR SPONSORSHIP QUESTIONS? PLEASE CONTACT:

Brittany Cline, Events Manager
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NASTT STUDENT CHAPTERS

Members of NASTT's Student Chapters attend and participate in NASTT's No-Dig Show where they present trenchless research posters, participate in competitions and provide event support monitoring the technical paper sessions. There are many benefits for students who belong to an NASTT Student Chapter – scholarships, networking opportunities, education and career opportunities to name a few. To learn more about NASTT's 19 Student Chapters, visit nastt.org/student-chapters.



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Toronto Water's Annual

Sewer Rehabilitation Program

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Toronto Water (TW) manages an inventory of more than 10,500 km (6,500 miles) of sewers that directly service a population of 2.81 million. The age of the oldest of the inventory is older than Canada itself (well over 150 years old). The greater metropolitan area is over 6 million and is the largest in Canada. The City also sees huge influxes of workers and tourists daily. 43.7 million people visited Toronto in 2017 making it a very high profile, congested, complex environment to carry out traditional rehabilitation works. The annual sewer rehabilitation program has embraced the use of trenchless technologies for many years.

TW's annual program is among the largest and most mature programs in North America with a focus on sustainability and minimizing the impact of delivering the program on the public by minimizing environmental and construction footprint. The 2018 Program design phase included over 2,570 repairs, involving 103 km (63 miles) of programed specialized maintenance and repair (>80 percent CIPP).

This paper provides an overview of the current program in Toronto and its evolution into a program that exemplifies the intelligent use of both technology and trenchless construction. From construction packages delivered in virtual workspaces that allow contractors an unparalleled visualization of the work area to an extraordinary coordination effort with competing programs which is balanced with a comprehensive QA program to assure that the design life objectives are achieved; the Toronto annual rehabilitation program is an excellent example of how large, complex rehabilitation programs can be delivered successfully.

Introduction

The City of Toronto is the largest City in Canada with a direct service area of 2.81 million (Figure 1). The Greater Toronto Area (GTA) topped 6 million in population in 2018 and with about 44 million people visiting the City annually it is a very complex environment to maintain buried sewer assets (or assets of any kind for the matter). The sewer inventory includes over 10,500 km (6,500 miles) of pipe from 100 mm to 5,500 mm (4 in. to 18 ft) in diameter that is largely trying to make its way back to Lake Ontario through the original core of the City. The

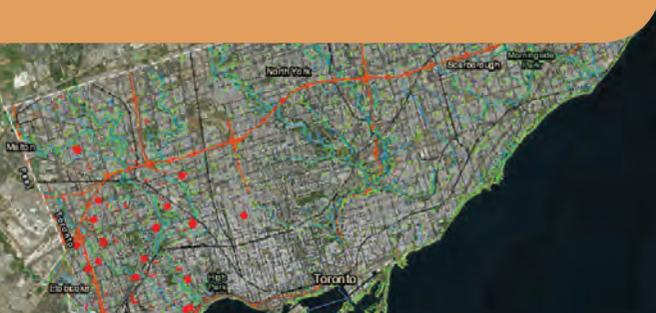


Figure 1: City of Toronto

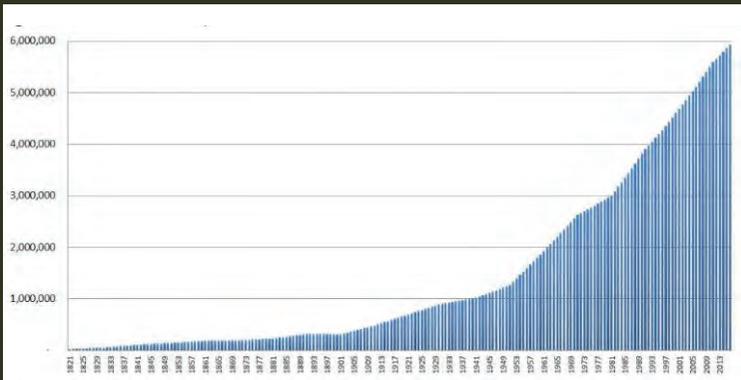


Figure 2: Growth of the Greater Toronto Area

GTA's core infrastructure is among the oldest in North America and in conjunction with rapid annual growth in the metropolitan area outside of Toronto dating back to the early 1950s (see Figure 2); it creates a compelling environment to drive intelligent use of trenchless technologies.

The seeds of the current annual Sewer Rehabilitation Program in Toronto date back to late 1990s when the modern CCTV program began and TW's first Asset Management plans were conceived to ensure sustainability for their sewer and water infrastructure. In 2008, the replacement value of its sanitary, storm and combined sewer systems was estimated to be \$13.3 billion. The 2008 Report on Toronto Water's Infrastructure Renewal Backlog depicted an inventory that experienced extreme post-second World War growth (see Figure 3) and sewer and water backlog in excess of \$1.3 billion, requiring a greatly increased emphasis on its renewal programs (Figure 4).

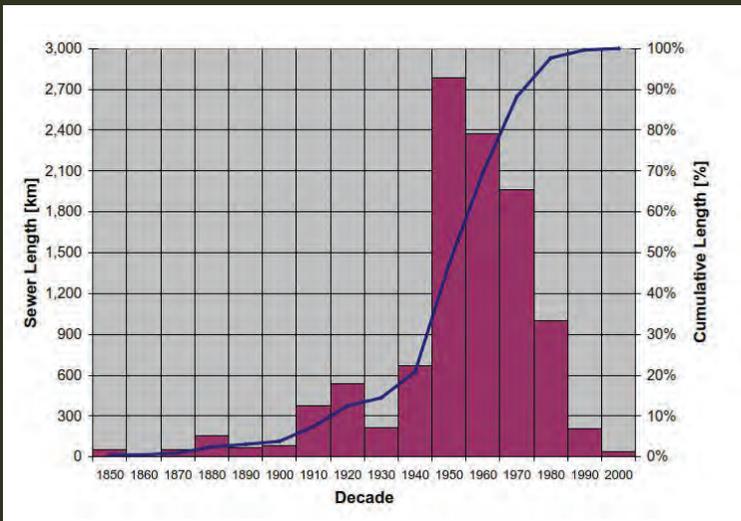


Figure 3: Length by Decade and Cumulative Growth (Toronto Water's Infrastructure Renewal Backlog - 2008)

Toronto: A Pioneer in Large Program Sewer Renovation by CIPP

Toronto has long been a pioneer in attacking its infrastructure deficit with intelligent use of trenchless technologies. The City commenced trial use of cured-in-place pipe (CIPP) in 1988 and by the early 2000's had established a large annual renewal program with ever increasing portions of the program delivered by CIPP renovation methods. While other trenchless techniques have been piloted and are occasionally still used in the annual program, the backbone has consistently been CIPP which accounts for delivery of more than 80 percent of the current program. The rationale for CIPP use is based on capital and life cycle costing as well as consideration of the indirect costs in terms of minimizing the impact of program implementation on the public.

The NASTT CIPP Good Practice Guidelines (2006) identify that the requirements for a successful CIPP Project is built on the following four (4) tenets:

1. Selection of right materials and process
2. Design by an experienced engineer
3. Clear and detailed well written tender and contract specifications
4. Comprehensive field quality assurance & control programs

These tenets were developed in Toronto's CIPP early program and are a foundation for successful delivery to this day. There were plenty of other innovative milestones in the early 2000s including:

- The first studies on public and worker exposure to styrene in CIPP works and the develop of design and construction procedures to minimize styrene odour levels (2000);
- Requiring creep testing to facilitate design for all CIPP resin composites (2002);
- Independent creep testing on CIPP composites standardized at 25 percent of yield strength (2005);
- Requirement for sealed site-specific designs for each installation;
- Development of detailed quality assurance requirements for the program; and
- Verification testing for each installation to confirm that de-

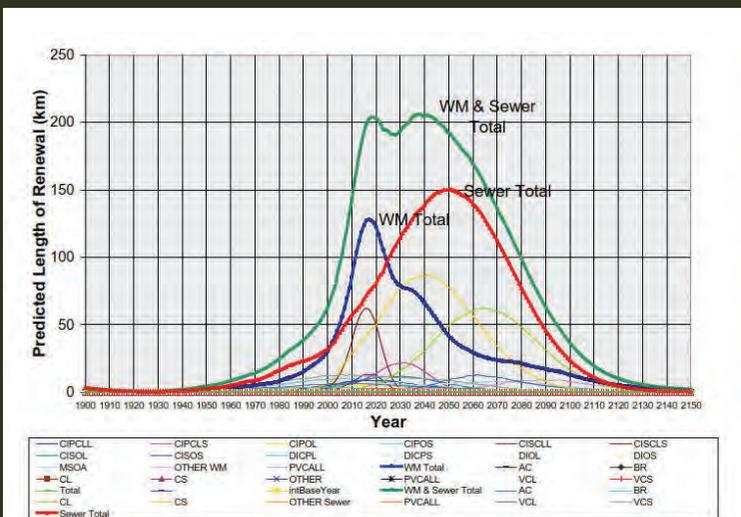


Figure 4: Predicted Length of Renewal Required - (Toronto Water's Infrastructure Renewal Backlog - 2008)

TRENCHLESS TECHNICAL PAPERS

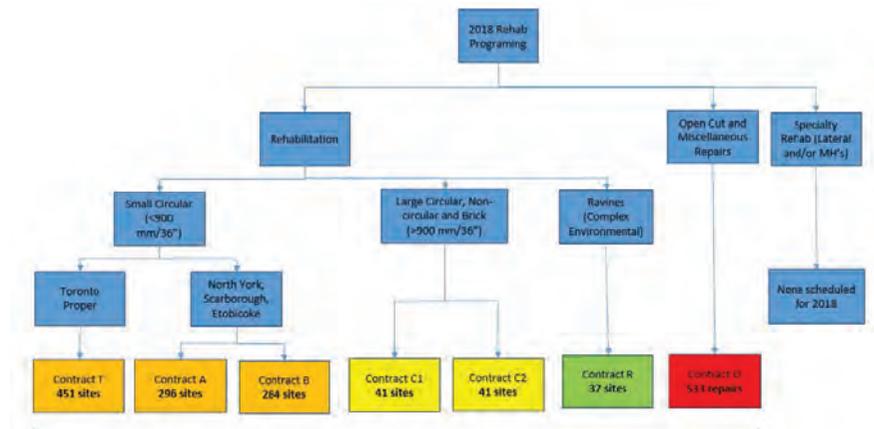


Figure 5: 2018 Program Structure

sign intent is achieved on a site-by-site basis and the use of design reconciliations for acceptance to address the natural variation in individual properties.

2018 Program Structure

The 2018 Program included design for more than 2,570 unique repairs, involving 103 km (63 miles) of programed specialized maintenance and repair at an estimated cost of \$56.6 million. The Contract Structure is depicted in Figure 5 and included the following rationale to partition the work into logical work packages and into three (3) distinct work streams, as follows:

Rehabilitation

- Predominately full MH-to-MH relining works ~ accounts for 88 percent of the 2018 program;
- Generally, includes all assigned rehab within a designated lining area which may include site prep and some external point repairs to facilitate lining;
- Can also include trenchless point repairs in the same geographic area associated with MH-to-MH linings.

Open Cut and Miscellaneous Repairs and Maintenance

- Predominately open cut and specialty maintenance repairs ~ about 12% of the 2018 program;
- Includes an array of trenchless point repairs that don't align well with rehab geographic locations

Specialty Rehab – Lateral and MH Rehab

- No dedicated program in 2018

While the Open Cut/Miscellaneous Repair and Specialty Programs are relatively self-explanatory; the rehabilitation work streams are

diverse and are sub-divided into three distinct sub-groups based on the unique Contractor skill set necessary to successfully complete the works. These include:

1. Small circular lining

- By definition, circular lining projects <900 mm (36 in.)
- Lining is exclusively CIPP
- Spatially grouped into:
 - One package covering downtown Toronto
 - Two packages in geographic clusters covering the slightly less congested communities of North York, Scarborough, Etobicoke

2. Large and complex lining

- Circular liners 900 mm and larger, all non-circular liners, and all brick host pipes.
- Lining is predominately CIPP but includes provision for use of segmental GRP, glass and carbon reinforced tubes and design considered other alternative lining solutions

3. Ravines – Complex Environmental Settings

- This includes all lining repairs found in the City's ravine by-law or in lands regulated under the Toronto and Region Conservation Area (TRCA)
- These areas often require large site development costs with considerable environmental considerations
- CIPP lining in these areas requires more stringent environmental controls relative to residual styrene levels control. This can include on-site treatment where water cures are used; 100% condensate capture and offsite disposal where air-inversion-steam cures (AISC) are used; use of UV curing methods and monitoring; and/or

the use of styrene free resins.

Compartmentalizing the rehabilitation packages in this manner allowed the development of unique teams with the appropriate skills for the design, approval and ultimately for construction of an otherwise very diverse array of rehabilitation works.

Moving forward, the City's needs in each area can be communicated to industry clearly such that their understanding of the unique skill sets required for the rehabilitation program on an annual basis, can be developed commensurately with program needs.

Design Development, Delivery and Innovation

Design development and delivery is driven by the City's unique program approach of single consultant, multiple contracts, single point of inspection and contract administration, the use of a field ambassador implementations and town halls to engage the multiple stakeholders involved. The program itself requires consideration innovation to deliver.

The mere size of the program required the development of a considerably different mindset and process to design than that utilized in conventional design processes. For example, developing unique drawings for 2,570 repairs in a diverse array of locations would have been extremely time consuming and very difficult to compile in a manner that tied together the spatial relationship between various repairs. In a conventional tender it would have required the preparation of over 1200 drawings.

To address the challenges of pulling together such a large program in a replicable, streamlined manner that enhanced as opposed to compromised the Bidder's view of design objectives, the design evolution and packaging included a number of unique steps:

1. Raw PACP Data Screening – all sites

The design process commenced with a large post-processing exercise of all PACP data for the project. As many of the CCTV inspections were dated, post-processing needed to include CCTV data interpretation of both PACP and WRc inspection protocol. The primary output of this screening was as follows:

- The codes were searched for key defects that impacted lining constructability so that the sites could be highlighted for detailed review by designer and contractor in the bid phase. These included defects such as increased ovality, offset fractures, loss

TRENCHLESS TECHNICAL PAPERS

of stability of the host pipe, etc.

- Preliminary quantify take-offs were obtained for all preparatory work for each MH-to-MH run
- Preliminary lining quantities were taken off Sites with unusual design requirements such as increased depth, increased ovality and/or the requirement for MH construction or modifications to facilitate liner installations were highlighted so that site-specific quantities could be developed.

2. Partitioning into packages

After preliminary screening of the raw PACP defects, the data was then partitioned into the package structure noted in Section 4.

3. Development of a Geospatial Database for Design, Bidding and Construction

The design process was converted to a spatial database driven process. A Web-based geospatial database was developed for the entire work scope. The geodatabase was partitioned into the unique work packages for both finalization of design development and for bidding. All relevant design data could be compartmentalized in this manner.

By incorporating licensed features such as Google Street View, robust data search capability and printing; Bidders had enhanced access to each Contract during the Bidding phase and a very useful tool to supplement site planning and execution during the construction phase (see Figure 6).

Further, Construction Progress Dashboards are under development to communicate Construction Progress to all parties in near real time.

4. Package Specific Tender Specifications

Using the above global templates to compile all works, the site-specific design requirements could be articulated within the geodatabase and then packaged into unique site-specific tender documents highlighting specific and non-standard aspects in each contract.

Annual Coordination of Works with Other Activities in Toronto

How does one coordinate works in a City where nearly 44 million people come to visit annually? Never mind a City with both mature infrastructure and continued pressure for expansion precipitates billions of dollars construction. The answer is simply that it is an incredibly complex job. In Toronto it is made

possible by an office known as the Major Capital Infrastructure Coordination (MCIC) Office.

Simply speaking, planned work at its earliest stage is scheduled on an on-going basis through MCIC in a continuous process and scheduling, coordinating and responding to schedule variations for planned use of the right-of-way. Scheduling is a major aspect of contract delivery for every package in the annual capital and through MCIC's master list of reporting both planned and emergency activities, works are able to be communicated to Contractor for scheduling purposes at the Bid Phase and through Construction through integration of the MCIC activity database to the project's central geodatabase. It doesn't make it easy to plan (it is a daunting annual and continuous task), but it makes it possible and manageable as a program.

Quality Assurance for CIPP

With a rehabilitation program driven by as much CIPP lining as Toronto's program, a robust Quality assurance program is essential to verification that design objectives are truly met in the construction phase. Toronto's CIPP has long embraced a comprehensive quality assurance approach which has included:

- Design for each and every site. While many standardized design sections are used, the process includes verification that site specific designs are appropriate on a site-by site basis.
- The extensive use of CCTV inspection during the Q process to: Confirm pipe preparatory works (V1); confirm that the pipe is ready for relining and that the site-specific design is still adequate (V2); and confirm that the installed liner visually met visual classification standards of design intent (V3)
- Site-by-site sampling to confirm that the mechanical properties meet design objectives
- Design reconciliations in instances where one or more parameters are at variance with design values to confirm that the overall product still fully meets overall design objectives for site specific conditions
- Routine review of all testing on a global basis to assess trends, etc. that overall quality is maintained by all contractors involved in the CIPP program.

Conclusions and Closure

Designing, tendering and implementing



Figure 6: Snapshot of Geospatial Workspace

underground rehabilitation works in a City with pipes as old as 150 years and more, a population of 2.81 million, having about 44 million people visiting the City annually and virtually thousands of other competing events and infrastructure projects on an annual basis is a very challenging task.

Toronto Water has demonstrated that just because large, complex programs are challenging to deliver; doesn't mean that they can't be delivered in a sustainable manner and in a manner that fully meets long term design life objectives; without compromise.

The 2018 program in Toronto continues a long tradition of intelligent use of both technology and trenchless construction. From design development that is driven from advanced processing of raw condition assessment data to jump start and focus the design process; to construction packages delivered in active geodatabases that allow contractors an unparalleled visualization of the work area and all parties a near real-time view of progress; many innovative processes have been developed. These processes go well beyond traditional rehabilitation design to cope with the immense size of the program without losing the unique site-by-site vision that is often required for individual complex rehabilitation projects.

Further, the city's commitment to a comprehensive quality assurance program to assure that the design life objectives are achieved, literally on a site-by-site basis; is an excellent example of how large, complex rehabilitation programs can be delivered successfully for long periods of time without any compromise of core program objectives.

This paper was edited for style and space for publication in NASTT's Trenchless Today. To view Paper MM-T5-03 in its entirety, please visit nastt.org/technicalpapers.

Calendar

August

24
Trenchless Technology Seminar
 Hosted by NASTT's Mid-Atlantic Chapter
 Arlington, Virginia

September

8-11
APWA's PWX 2019
 Seattle, Washington

18
NASTT Pipe Bursting Webinar

25
Trenchless Technology Seminar
 Hosted by NASTT's Southeast Chapter
 Charlotte, North Carolina

October

9
NASTT's Introduction to Trenchless Technology – Rehabilitation Good Practices Course
 Hosted by NASTT's GLSLA Chapter
 Halifax, Nova Scotia

23
Trenchless Elevated 2019
 Hosted by NASTT's Rocky Mountain Chapter
 Sandy, Utah

24
NASTT's Introduction to Trenchless Technology – Rehabilitation Good Practices Course
 Hosted by NASTT's Rocky Mountain Chapter
 Sandy, Utah

24
NASTT's Grouting Good Practices Course
 Hosted by NASTT's Rocky Mountain Chapter
 Sandy, Utah

28
NASTT's Introduction to Trenchless Technology – Rehabilitation Good Practices Course
 Hosted by NASTT's Northwest, British Columbia and GLSLA Chapters
 Calgary, Alberta

28
NASTT's HDD Good Practices Course
 Hosted by NASTT's Northwest, British Columbia and GLSLA Chapters
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NASTT's Gas Distribution Good Practices Course
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NASTT's New Installation Good Practices Course
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11-12
2019 NASTT Northeast Trenchless Conference
 Hosted by NASTT's Northeast Chapter
 Syracuse, New York

20-21
15th Annual Western Regional No-Dig Show
 Hosted by NASTT's Western Chapter
 Honolulu, Hawaii

December

4
Trenchless Technology Seminar
 Hosted by NASTT's Midwest Chapter
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The NASTT 2023 No-Dig Show
April 30-May 4
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 Portland, Oregon

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