

Voices of the Industry

Leaders of the underground industry speak out about challenges and expectations for the coming year

What are today's biggest challenges for the underground sector?



Lori Simpson, Principal/Vice President, Langan Treadwell Rollo

Lori Simpson:

As the geotechnical engineer of record for developments around the world, we are seeing excavations going deeper and extending farther below the groundwater table than what

has been typical. With demand for city lifestyles increasing, these projects in dense urban areas involve significant technical challenges, such as adjacencies to subway tunnels, building foundations and highway structures. As projects become more sophisticated and complex, we are dealing with more diverse construction techniques, including new applications of existing technologies being used onsite. We also must be adept at developing suitable quality control/quality assurance programs.

This is an exciting time to be a geotechnical engineer, especially at Langan, where we integrate subsurface capabilities with our site/civil and environmental engineering practice groups.



Dan A. Brown, President/Senior Principal Engineer, Dan Brown and Associates

Dan Brown: The biggest challenges are the complexity of projects and the increasing demands on engineers and constructors to address a wide range of issues, such as nearby structures, environmental

constraints, schedule demands and maintenance of traffic. A failure to effectively handle an important issue can jeopardize the schedule and the entire project. Another major challenge is the effective allocation of risks associated with these issues and the inherent uncertainty associated with the underground.



Peter Faust, Vice President, Business Development, Malcolm Drilling

Peter Faust:

Every major project nowadays requires innovative thinking to satisfy tight budgetary and high environmental requirements. Modern public financing and operating

structures like public-private partnerships (PPPs) will get more and more attention, and will ultimately require foundation contractors to become more innovative and flexible. Project size and complexity will increase, and demand for integrated solutions rather than conventional bid-as-designed will increase. Companies without engineering capability will find it harder and harder to compete. Owners will look more and more to 'solution providers' instead of reducing the size of projects into smaller, manageable sizes and then dealing with multiple subcontractors.

What new technologies and management systems will be coming on board in 2016?

Peter Faust: Newer, more powerful equipment and better tools are pushing the boundaries to unheard dimensions. Vibration concerns and reduced noise installation techniques are becoming the standard for construction in urban

areas. Augercast piles are replacing more and more driven piles, while cased shafts are the preferred option when it comes to increased quality requirements of large foundation elements. Slurry and cut-off walls will reach unseen depth due to the availability of modern hydromills or cutters. Deep soil mixing techniques have advanced to the point where they can change an entire marketplace to allow for safe and affordable underground space construction. Today's modern equipment can monitor all installation parameters automatically and therefore increase the level of reliability of deep foundations to a degree never seen before.



Marco Chiarabelli, North America Area Manager, Soilmec S.p.A., a division of the Trevi Group

Marco Chiarabelli:

Trevi Group is very focused on research and development of new technologies. Soilmec's plans include new high-end drilled shaft and diaphragm wall equipment models

and a redesigned range of micropile equipment.

Dan Brown: As technologies evolve, we have a challenge for engineers to understand and employ these capabilities. Outdated specifications or code provisions and public agency acceptance of new technologies are impediments. I believe that fast-evolving construction technologies for underground work are often most effectively employed via innovative contracting methods, such as design-build, rather than with conventional design-bid-build arrangements. Some other innovative approaches include

the use of pre-bid alternate technical concepts, such as was done by the Missouri Dept. of Transportation for the Stan Musial Veterans Memorial Bridge over the Mississippi River in St. Louis.

Where do you see the biggest market for underground projects in 2016?

Marco Chiarabelli: Activities in the United States should increase, especially in California, Texas, Hawaii and coastal regions. Internationally, there will likely be several key markets: development of metro, light train lines and ports, not limited to socio-economically developed countries; challenging projects in the Middle East, including Saudi Arabia, United Arab Emirates, Kuwait and Qatar; and in Europe, the United Kingdom has the highest expectation in terms of investments.

“Every major project nowadays requires innovative thinking to satisfy tight budgetary and high environmental requirements.”

—Peter Faust

Peter Faust: The biggest markets in North America will be generated by the public transportation and private building sectors. The large flood defense projects around New Orleans and several huge dam remediation projects have nearly come to an end. Focus has shifted quickly to infrastructure projects, such as mass transportation (high-speed rail) and combined sewer overflow (CSO) control projects. Deep foundation work for a new sprawl of high-rise building construction along the East and West coasts will also have another strong year. Domestic investors are keen to invest their money after several years of holding back, and foreign investors are looking to North America since their traditional markets collapsed after overheating. ■

Setting a Horizontal Directional Drilling Record

Michels Canada successfully navigated significant challenges

to complete the longest horizontal directional drill (HDD) installation of a 42-in. pipeline in North America. The 7,200-ft crossing passed under the Athabasca River and a nearby highway in a remote area 40 miles north of Fort McMurray, Alberta, Canada.

Michels used a 1.2-million-lb drill rig on each side of the river to complete pilot hole intersect and reaming processes. The complex alignment required the precise navigation of four vertical curves and a depth of 230 ft to meet the design requirements and facilitate the ability to thermally grout a 24-in. pipeline inside the 42-in. string.

The entire project took less than four months, with pullback taking only 36 hours. Michels accomplished



Michels completed a 7,200-ft HDD under the Athabasca River in Alberta, Canada.

most of the pullback with one of its drill rigs, occasionally using a 750-ton Herrenknecht Pipe Thruster for assistance. The pipe thruster was a necessary contingency on the crossing because the pipe was laid out in one massive string that spanned more than 1½ miles and included a sharp bend. In addition to performing the HDD work, Michels Canada handled all welding and pipe support, using 10 cranes, five side booms and three excavators to wrangle the pipe into position for pullback. ■

PHOTO: COURTESY OF MICHELS CANADA

Sarah Mildred Long Bridge Project

The New Hampshire and Maine Depts. of Transportation are working together to replace the aging Sarah Mildred Long Bridge, which carries vehicle and rail traffic between Portsmouth, N.H., and Kittery, Maine, across the Piscataqua River. Case Foundation was contracted to construct drilled shafts to provide the deep foundations for the replacement bridge.

Working from trestles and barges, Case is installing 29 drilled shafts for approach piers and lift tower piers. Large 10-ft-dia permanent casing is being advanced through water and overburden material and seated

into rock from 54 ft to 104 ft deep. Rock sockets are drilled 21 ft to 35 ft deep with reverse circulation drill methods.

Case Foundation's portion of work is expected to be completed in late April, with the new bridge scheduled to be open for traffic in September 2017. ■



Case Foundation constructed drilled shafts for the bridge replacement between New Hampshire and Maine across the Piscataqua River.

PHOTO: COURTESY OF CASE FOUNDATION