BERMINGHAM

FOUNDATION SOLUTIONS SINCE 1897

IN THIS ISSUE — January 2017

RC DRILLING THROUGH IRON ORE

VIRGINIA, MINNESOTA

In 2015, Louis Fritz of Bermingham was contacted by VEIT & Company, Inc. to assist with a test pile program for the re-routing of Minnesota's Highway 53. The existing road was located over a valuable iron ore deposit that was scheduled to be mined. The re-location consisted of constructing a new bridge over the existing Rouchleau mine pit and the project required a unique foundation system of down-the-hole-hammer piles.

This project was a challenge as the rock drilling was up to 200 feet deep and the bedrock is considered to be particularly abrasive and among the hardest on earth. Bermingham and VEIT's system included Bermingham's BL-37 flying lead and BHD-40 Drill.

Six months later, the piling contract was awarded to VEIT's Foundation Division. The permanent piles were 30 inches in diameter and were drilled up to 176 feet into rock. Adding to the challenge of such deep drilling in the iron ore, the work needed to be done over the harsh northern Minnesota winter and there were significant liquidated damages if the construction schedule was not met.

Bermingham and VEIT's engineers worked together to optimize the drilling setup. Bermingham proposed 186 foot long L-27 Vertical Travel Lead System (VTL) on a 275 ton crane, fortutiously Bermingham had a rental crane available in Alberta. The VTL system proved its worth by maintaining the strict location and vertical tolerances required for the project.

A casing advancement system equipped with a down-the-hole-hammer was utilized on Bermingham's BHD-80 Reverse Circulation Drill, and Bermingham's new 20-in RC Drill String. Bermingham also designed new Quick Disconnects with high tensile load capacity to carry the long and heavy drilling system.

VEIT got up to speed quickly and the drilling went very well – at one location the first 80 feet of piling was drilled in under 2 hours! The drilling was slower at depth as rock hardness increased, but production rates in general were better than expected.

"Louis Fritz and the Bermingham Team proved to be an invaluable partner in engineering the equipment and drill string to aid Veit in the successful completion of this difficult drilling project. We look forward to working with them again in the near future."

- Eric Pederson
VEIT

I am proud to be leading Bermingham as we celebrate our 120th anniversary. Bermingham is Canada's oldest foundation contractor and is recognized around the world as a supplier of superior quality, innovative custom machinery and equipment for the foundation industry. Bermingham's Construction group is recognized for safety, collaboration with clients to optimize foundation design, the ability to do the difficult projects, quality and efficiency.

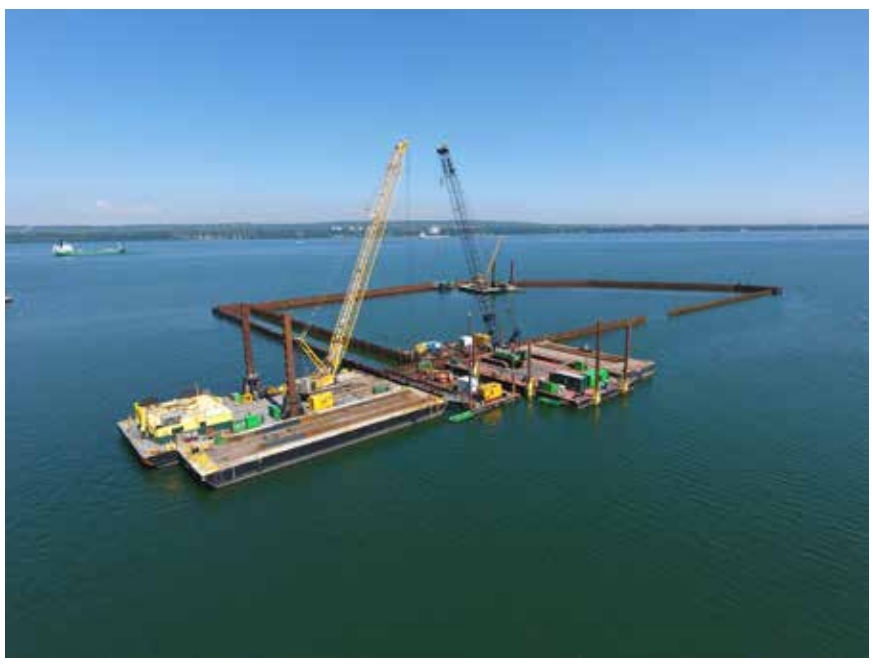
Our commitment to Customer Service, Innovation, Responsiveness and Capability drives everything we do. The combination of project delivery excellence with our engineering and manufacturing capability, makes Bermingham one of the most trusted providers of foundation solutions in North America and beyond.

As we enter our 121st year, we are staying abreast of the new technology, equipment and science to continue to evolve to meet our client's current and future needs. We believe our partnership with Soletanche Bachy makes us the strongest deep foundation solution provider in Canada. When you have a challenging project, gives us a call; we'd love to help.

Robert Marzetti, P. Eng - President & CEO

407 EXPANSION
OSHAWA, ONTARIO

Bermingham is proud to be part of the **$1.2 billion** 32km expansion of the 407 series highway megaproject. The expansion of this highway will help connect the western and eastern greater Toronto area and ease congestion for daily commuters. Crews mobilized to site in late 2016 and once the project is complete we will have installed a total of 44km of piles and installed foundations for a total of 35 structures. At the peak of production, Bermingham had multiple crews working at 5 structures simultaneously utilizing cranes equipped with Berminghammer Vertical Travel Leads and hammers.



RANDLE REEF
HAMILTON, ONTARIO

Identified as the most contaminated zone of the great lakes, Randle Reef in Hamilton harbor is undergoing a monumental rehabilitation project. Over 700,000 cubic meters of sediment contaminated with polycyclic aromatic hydrocarbons (PAH) sit at the bottom of the area. Bermingham became involved in this **$140 million** dollar project when plans to create a containment facility for the PAH's were considered. Bermingham is driving 2300 sheets (9,000 tons) with a custom template around the most contaminated area as part of a solution that creates an impermeable containment facility meant to permanently encapsulate the carcinogenic material.

REGINA BYPASS
REGINA, SASKATCHEWAN

Touted as the City of Regina's largest ever construction project with a cost of **$1.88 billion,** the Regina bypass is a 40 km section of four lane highway that will divert traffic around the city's core. The project started in 2015 and anticipated completion will be in 2019. Bermingham is providing piled foundations for the 14 bridges along the route. Bermingham is utilizing an L-23 Vertical Travel lead paired with B-5505 diesel impact hammer to drive 115-ft long piles (HP 14x117 and 14x89). Three of the bridges are utilizing 30-in pile piles 3/4-in thick. For these piles Bermingham is utilizing a B-64 hammer.

EGLINTON CROSSTOWN
TORONTO, ONTARIO

The Eglinton Crosstown LRT project is an **$8.4 billion** dollar investment from the Government of Ontario to expand transit in Toronto. It is the largest transit expansion project in Toronto's history. When completed the line will be 19 km long of which 10 km will be underground. In 2012, Bermingham installed a launch shaft for the tunnel boring machine to start the boring process. Bermingham is presently installing shoring at the last station on the line so that a tunnel to the new station can be created. Later in 2017, Bermingham will also assist bringing the tunneled portion back to grade at the east and west portals.

MICHELS PIPELINE

ONTARIO

The **$650 million** Enbridge GTA Project will upgrade the existing distribution system that delivers natural gas to Brampton, Mississauga, Vaughan, Richmond Hill, Markham, and Toronto. Bermingham was awarded the contract with Michels Canada to carry out the design and installation of 24 custom shoring solutions across the 60 km long natural gas pipeline project. Each shoring structure was designed to facilitate underground boring operations needed to safely install the natural gas pipeline underneath all roadways, utilities and environmentally sensitive areas. Approximately 10,000m of sheet pile and combi-wall pipe was installed and removed over the course of this rapid 8 month long project.

"I would like to thank the shoring crews, design personnel, and managment team at Bermingham for their efforts in contributing to the overall success of the GTA Pipeline Project. I look forward to the next opportunity to continue this successful working relationship" - Bill Gavinchuk, P.Eng - Michels Canada Co.

TOP DOWN BRIDGE BUILDING

CARTAGENA, COLOMBIA

In 2015, Bermingham was contacted by DEAL (of Italy) to assist with the piling portion of a new Beam Launcher project in Cartegena, Colombia.

DEAL parent company Rizzani de Eccher was to build a 5 km bridge with bents spaced at 37 meter increments. This bridge was the final section of the highway connecting Barranquilla to Cartagena to be upgraded.

The selected piles for the bents were to be 1 meter diameter precast concrete with segments up to 42 meters in length with an approximate mass of 1 ton per linear meter. A total of over 800 piles were to be driven in the construction of the bridge.

DEAL, a worldwide leader in beam launching girder systems, already partnered with Bermingham to supply two similar systems for the construction of a bridge in Washington, North Carolina in 2007. Bermingham was to add all the necessary foundation abilities to these Launching Girders turning them into groundbreaking Top Down Construction Equipment.

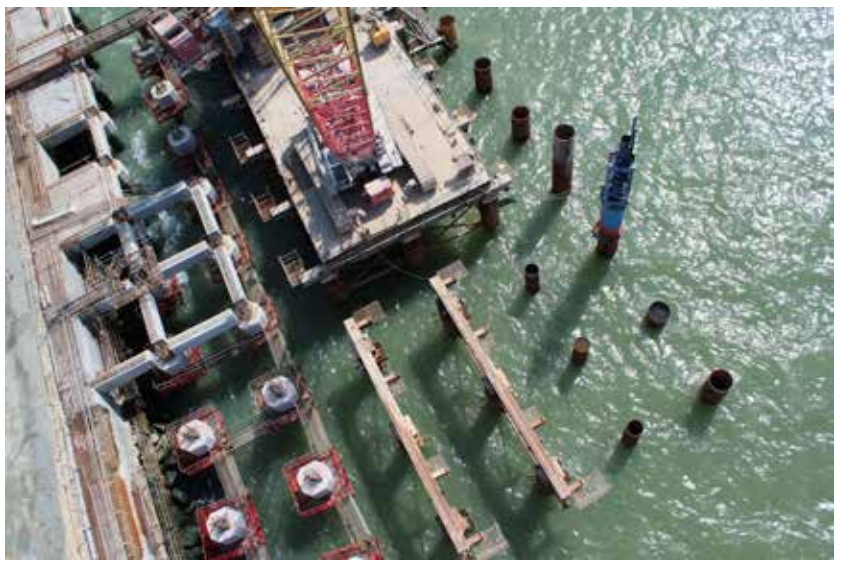
After the successful completion of the Washington Bypass project, DEAL proposed the use of the same technology for the Cartagena Bridge Project. The wetlands and shallow water in the area prevent conventional floating equipment and cranes. The top down methodology addresses the challenges of this unique environment.

The launcher cantilevers forward to allow the installation of the piles and the subsequent formation of the next pier without ever having to touch down on the ground.

Within the launcher there is a tilting lead that is loaded with a pile horizontally and then is rotated to a vertical position and driven into place at the bents. Bermingham designed a custom 48 inch box lead for this project based on the selected pile design. Two launching systems were to be utilized starting from either end of the bridge. One launcher system would start first and the second would follow half a year later. Despite the staggered start of the launchers, Bermingham was still required to deliver both systems at the same time. Bermingham supplied two lead systems and refurbished the B-6505HD diesel impact hammers from the Washington project in order to meet the tight delivery timeframe. At the time of publication, the lead system has installed 12 bents and the second launcher was put into service in early 2017.

The estimated completion date is 2019 . Bermingham would like to thank DEAL for the opportunity to work together again and look forward to new and exciting projects in the future.

PORT OF LA ROCHELLE EXPANSION
LA ROCHELLE, FRANCE



In 2013, Bermingham was contacted by Pierre-Tristan Duhammel of ROC DRILL for the purpose of supplying to the Association (Groupement) EMCC/ETPO the required equipment for drilling 914 mm (36″) and 1321 mm (52″) piles 28 meters (92′) long in the Port of La Rochelle, France. This was the second phase of an expansion program in the port for the purpose of expanding the loading terminal's capabilities. For the first construction phase, a case advancing system, also supplied by Bermingham, was tested and proved effective and thus was specified for the second phase of the project. However, the diameter of the piles increased, providing a unique challenge: large piles of 1321 mm diameter had previously never been attempted with case advancing methodology. Accepting the challenge, Bermingham worked with ROC DRILL to provide a 120-ft L-23 Vertical Travel Lead System that would drill the piles utilizing a BHD-80 (80,000 ft-lbs) Drill to drive a 30-inch down-the-hole-hammer.

Improving on an existing crossover design, Bermingham also developed, specific for the project, a new 360 degree crossover for reverse circulation drilling. The purpose of the crossover is to collect the cuttings from the drilling, re-direct them back into the drill string where they flow out to the top of the drill string and are diverted for spoils control and collection. The advantage of the 360 degree crossover was that it provided a substantially faster 'spoils evacuation time' than traditional crossovers and thus better collection of the substantial amount of cuttings resulting in faster drilling rates.

Bermingham's VTL and BHD-80 Reverse Circulation System requires several hydraulically powered winches and cylinders. ROC DRILL had a basic power pack typically used for a vibratory hammer so Bermingham supplied a Stand Alone Valve (SAV). The SAV acts as a quick and easy hydraulic control solution that does not require customization of a power pack unit; one simply attaches the SAV to the power pack. The SAV has its own pendant controller that is mounted in the cab of the crane so that the crane operator can control the drilling.

Bermingham's specialized service technician Ryan Chevalier went to La Rochelle to support the project with the rig-up and maintenance of the equipment. At the conclusion of the project ROC DRILL was very pleased with the record breaking achievement. Bermingham would like to thank ROC DRILL for their order and look forward to a continued business relationship.