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THE LARGEST DEEP WATER DOCK IN NORTH AMERICA

PORT OF SEPT-ILES, QUEBEC

In the spring of 2012, Birmingham was contacted by one of Quebec's largest general contractors, Pomerleau Inc, to partner with them on the construction of the largest deep water port of its kind in North America. Pomerleau brought Birmingham's marine rock socketing expertise and ability to quickly design and build custom equipment in on a joint venture basis.

This multi-users dock was constructed in the Gulf of St Lawrence in the town of Sept-Iles, Quebec. This dock has the ability to

service two Chinamax ships simultaneously. These ships hold 7 times the volume of a traditional large ocean freighter. The project was awarded in the fall of 2012 and had an almost immediate start-up. The piles supporting the massive dock were up to six feet in diameter, 195 feet long, and weighed 65 tons. These huge piles were installed and driven to bedrock in **one piece** and were both vertical and battered.

The rock borings indicated soft rock of 85 MPa. As Birmingham did not have large diameter underreaming

bits, they ordered them from a UK supplier. Unfortunately, the bits did not perform as the actual rock strength was **185 MPa** - near the upper limit of rotary drilling. Birmingham in house engineering and fabrication came to the rescue - quickly designing and building new bits that could take the downforce (crowd) required to cut this very hard rock.

The drilling was done with our BHD-80 Reverse Circulation Drilling system on a flying lead capable of applying the high crowd loading required.

The work was executed through two challenging winter seasons under significant tidal conditions. Birmingham built bubble systems and utilized underwater sound monitoring to enable construction during the regulated whale mating season.

Birmingham's rapid response to the changed rock conditions and engineered workaround of the 'whale window' enabled the rock socketed piling to be finished just on time.



It is my pleasure to announce that I am passing the torch to the next generation at Birmingham Foundation Solutions. The company has grown significantly since I took over from my father 20 years ago, with a five-fold increase in revenues. Together with support of Soletanche Freyssinet, the company is in a great position to continue our expansion in the world equipment market and to continue constructing the foundations of Canada's Infrastructure. During the past 20 years I have worked to increase

the financial strength of our company, modernize our fleet of equipment and recruit a new generation of dedicated professionals who can lead the company forward into the future. I would like to thank **everyone** who has helped me to build and strengthen our company. Most importantly - our clients and industry partners who have put their trust and confidence in our company. Peter Smith will lead a new management team bolstered by the additions of the newly promoted Greg Stokkermans, Andrew Weltz and Todd Barlow.

I have every confidence in their ability and determination to continue to lead the company towards new challenges and adventures in the realm of heavy construction. I hope that you will join me in giving your support and trust to this experienced team who are the future of the company. I have accepted a new position managing International Business Development with our parent company, Soletanche Bachy and will remain the Chairman of the Board at Birmingham.

BERMINGHAM GOES DOWN UNDER - WHEATSTONE LNG Australia

Wheatstone LNG is a \$29 Billion liquefied natural gas plant under construction in Western Australia. The LNG liquefaction and export plant will have an annual capacity of 15 million tonnes of LNG. Bechtel Oil & Gas Chemicals Inc. is undertaking the design of the onshore gas plant, and awarded the design and construction of the LNG storage and condensate tanks to EVT, a joint venture between Entrepouse Contracting, VINCI Construction Grand Projects, and Thiess.

EVT contracted the deep foundation works for the two LNG storage tanks to Menard Bachy Pty. Ltd., while MBPL sought out Birmingham's expertise in pile driving equipment and construction. Birmingham provided three systems of 33m long L23 VTL with B64 Diesel hammers mounted on three different cranes. Along with renting the three pile driving systems, Birmingham provided key personnel to help start the job, train MBPL employees, and service the systems.

One challenge MBPL and Birmingham overcame was to install 1m diameter sleeves around the 610mm diameter driven pile. A chaser was developed that sat between the sleeve and the pile, and was driven with the B64. This voided the area between the pile and the sleeve, and left the sleeve in the ground. A second challenge was to develop a system that could chase 5m piles 11m below ground and extract the chaser. Birmingham developed the idea to use a ring-vibrator, mounted to the leads just below the hammer, hanging

from a Birmingham custom head sheave. It allowed the B64 to drive the chaser to depth, while the ring-vibrator would readily extract it.

"Menard Bachy Australia has been looking to the Birmingham capabilities in order to provide suitable and reliable equipment for the driving of its piles and inclusions. Three B64 hammers have been mounted on special leads fitted on three 100 to 150 tons cranes. In order to train the local staff, Birmingham have supplied some

experienced staff, including site and QA engineer, piling supervisors and specialized fitter. Due to the high level of urgency required of the client, these qualified personnel has been seconded to Menard Bachy for the whole duration of the project. Their skills and knowledge have allowed the project to run efficiently and to provide proper support."

-Vincent Douet,
Technical Manager - Geotechnical,
Menard.



BERMINGHAM GETS SECOND PHASE - 78 YEARS LATER

Port of Oshawa, Ontario



The Port of Oshawa is Durham Region's gateway to world markets through the St. Lawrence Seaway. This national deep-sea port has handled over 500 vessels and shipped more than 3 million tonnes of cargo over the past decade. On average, the port handles \$23 million worth of cargo annually, from salt and steel products to asphalt and grain. In May of 2014, Oshawa Port Authority awarded the contract to Bermingham for the Major Consolidation Project at the Port of Oshawa. This challenging project involved relocating the heavy industrial uses of the west wharf to the east wharf and would require a significant upgrade to the east dock face. This was not the first time Bermingham has worked at the Port of Oshawa. In 1937, Bermingham installed the existing wall which had been in place for 78 years. This time, the project had two main items; the removal of the existing wall which consisted of a 60 m long sheet pile wall and 160 m long armour stone wall, and

then the installation of 226 m of Combi-Wall. The new wall is a combination of 98 pipe piles, alternating with 78 sheet piles. The resulting dock face held back 8 to 10 meters of soil, and supports the docking of ocean freighters. High strength tiebacks were installed to hold back the top of the wall. Finally, the piles and tiebacks are cast within a concrete cap, and receive a series of bollards, fenders, ladders and backing curbs along its length. The installation of the combi-wall required strict and accurate placement to avoid compounding error building over its length. Bermingham developed a template that enabled accurate placement of the pipe piles and minimized the compounding error. This turnkey project for Bermingham showcases our wealth of expertise. BFS undertook the excavation of giant armour stones (some the size of compact cars), and the backfill of granular material. Vibratory hammers were used to drive large diameter pipe piles, small and slender H-piles,



Bermingham Construction 1937

and sheets of varying sizes. Conventional crane mount drilling and high-end, lead-mount reverse circulation drilling was done to remove the soil and rock respectively. Complex welded elements, difficult field alignment, and rough, wet working conditions display the versatility of our welding team. Despite the early onset of winter, large diameter tiebacks were accurately drilled off a barge buffeted by winds and waves in order to maintain the owners schedule. The Port of Oshawa is pleased to

have a new docking facility that is longer and capable of taking larger vessels that was completed on time and on budget.

"Bermingham completed the project on time and at all times were professional and innovative, even suggesting a money saving alternative to the original design. The Oshawa Port Authority does not hesitate to recommend Bermingham in their future endeavors".

- Ms. Donna Taylor
President & CEO, Harbourmaster

BERMINGHAM TAMES THE TRENT SEVERN

Bolsover Dam, Ontario

In 2013, Bermingham began a challenging construction project at Lock 37 on the Trent-Severn Waterway. The Bolsover Dam, built in 1903 is one of the deepest fully manual lock structures on the Waterway and is also a Canadian National Historical Site.

Bermingham was contracted to design-build, and subsequently remove a cofferdam, allowing for dewatering and demolishing the existing structure, and to allow for the construction of a new dam. The project presented Bermingham with many challenges including working over water through one of the coldest winters on record, working in an environmentally

sensitive area and a requirement that the ancient locks remain operational throughout the duration of the project.

The first challenge of the project was to come up with a method of diverting up to 50 cubic meters per second of water that pass over the dam every day. The concept drawings denoted a six foot square concrete culvert, however calculations showed that this was grossly inadequate. Bermingham was retained to build a 40 foot wide diversion channel the length of three football fields with drop structures that provided a controlled diversion around the dam and locks.

To facilitate the replacement of the existing dam structure a number of distinct shoring systems were used. Upstream, a bin-wall cellular structure system was installed with the downstream portion consisting of a combi-wall (the combination of sheet piles interlocking with pipe piles). This bin-wall retained a head of 55 feet (17 meters).

Immediately adjacent to the existing and operating 112 year old lock, Bermingham was challenged to install a secant pile cutoff wall to create a watertight seal and provide stability for the existing deteriorated lock structure.

Due to the concern of the turbidity of the water downstream of

construction, Bermingham installed a temporary sheet pile wall, surrounded by gravel. In addition two layers of silt curtains were installed immediately downstream. This combination proved very effective as was evidenced by the pure blue colour of the water downstream of the curtain.

In total Bermingham installed 2 million pounds of steel sheet and combi-wall in order to tame and control the Trent Severn during the rebuilding process of the Bolsover Dam. The reconstructed dam is expected to be completed in 2016.



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