



Geo-Connect

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FEATURE STORY

Port of Halifax – Pier 9B Reinforcement



Working from a jack-up barge in Halifax Harbour, and subject to the caprice of rising tides and more than one hurricane, a crew from Geo-Foundations spent the summer and fall of 2010 installing 84 large and long tieback anchors as part of the Port's Pier 9B Reinforcement project. Tieback design featured a 3" x 150 ksi DCP tendon, grouted in 2 stages within a permanent 9-5/8" steel casing (70 to 120 feet deep) and a 10-3/8" diameter x 20 ft deep rock socket.

Numerous challenges were encountered during drilling, including steel obstructions, entombed timber cribbing and concrete seawalls, silty overburden soils and extremely hard bedrock encountered at varying depth across the work site. To add to these challenges, each hole's collar was below the high water mark, requiring the drill rig to be positioned atop a jack-up barge fully 40 ft away from the hole collar, further necessitating the use of a W310x60 steel beam to span the gap over water between drill rig and hole collar.

Proof tensioning to 2030 kN took place at 5 tiebacks, and all 84 tiebacks were tensioned to a permanent pre-stress of 1525 kN. With collar elevation below high water level, scheduling of pre-tensioning and secondary grouting had to be constantly reconciled against nature's clock of tide movements. 🟡

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Project Update

In Northern Ontario's picturesque Ouimet Canyon, work is underway on the 43-turbine Greenwich Lake Wind project. >

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By the Numbers

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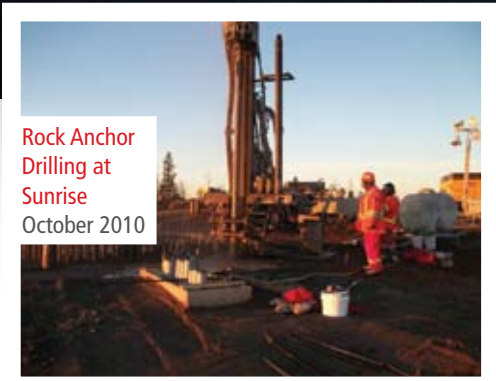
Geo-Foundations in Japan

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Project Update – Greenwich Lake Wind



Cast-in-place Turbine Base with Sleeved Rock Anchor Conduits, Awaiting Commencement of Drilling



Rock Anchor Drilling at Sunrise
October 2010



Drilling of Test Program Rock Anchors
May 2010

In Northern Ontario's picturesque Ouimet Canyon, work is underway on the 43-turbine Greenwich Lake Wind project.

Working for the project developer, Geo-Foundations' crews are busy this fall drilling, installing, grouting and post-tensioning 688 multi-strand rock anchors to act as the key components of the turbine foundations.

A rock anchor test program was completed in May 2010 by Geo-Foundations, wherein 3 representatively constructed rock anchors were each performance tested to 3740 kN (or 841,000 lbs).

Rock anchor installation is being completed after turbine base construction. Each rock anchor features a tendon of 18 strands encased in Class 1 corrosion protection.

The bottom of the 5 metre deep rock anchor bond zone is located 13 metres below the top of the turbine base. Every rock anchor is being locked in place with an externally threaded anchor head to enable future confirmation testing and re-tensioning.

Bedrock at this eerily beautiful and barren site consists of extremely hard (unconfined compressive strengths range from 125 to 300 MPa), coarse grained pegmatite (granite). Rock anchor components are supplied by Con-Tech Systems. 🚧

BY THE NUMB3RS

"Micropiles"

Micropiles have the unique ability of being constructible within remarkably tight quarters. The most extreme example in terms of work completed by Geo-Foundations is at the Bay Dundas Development in 2004.

Inside a **6 ft x 8 ft** mechanical closet full of operational steam and water services, Geo-Foundations constructed a 3-micropile arrangement capable of resisting service loading of **10,000 kN** in place of the specified (but otherwise inconstructable) caisson. This work required a drill mast so light in weight that it had to be bolted to the concrete floor in order to operate! 🇯🇵



Geo-Foundations in Japan

A **contingent** from Geo-Foundations traveled to Japan this past May to join contractors and engineers from Asia and South America in attending an equipment show and demonstration staged and sponsored by Japanese manufacturer YBM.

The demonstration included jet grouting and soil mixing drill rigs, compact cranes, compaction grout pumps, jet grout pumps and specialty drilling & grouting tooling.

Geo-Foundations' primary interests on this trip were YBM's YMA series of high volume automated grout batching plants and SI series of restricted access jet

grout pumps and drill rigs, all capable of being skid mounted and fully operational with just 30 kW of source power.

As a bonus to the equipment expo, our contingent enjoyed YBM-hosted tours of the Ancient city of Dazaifu and the Kyushu National museum, as well as an unguided, week long trip through the cities of Hiroshima, Miyajima, Himeji, Kyoto, Nara and Tokyo. 🇯🇵





GEO-FOUNDATIONS
Contractors Inc.

www.geo-foundations.com