



GEO-FOUNDATIONS Contractors Inc.

YDSS Interceptor Jet Grouting



Date: 2007

Technology: Jet Grouting

The York District Sanitary Sewer Interceptor in Richmond Hill, Ontario, is a tunnel, at some places 28 metres below surface, constructed by McNally Construction Inc. The tunnel was excavated using a tunnel boring machine and has six deep shafts over its 4.3 km length. Soils surrounding two of the six shafts were treated by Geo-Foundations with double fluid jet grouting.

As dewatering is not allowed in the environmentally significant Oak Ridges Moraine deposits at this site, the purpose of the jet grouting was to strengthen and render less permeable any water-bearing soils local to three junctions of tunnel and shaft where, without ground stabilization, there was a significant risk of ground loss into the shaft upon breakthrough of the tunnel boring machine. Starting 9 metres below surface, blocks of soil, each 9.3 x 10.4 metres in plan by another 9.0 metres in depth were treated by jet grouting at each of three tunnel-to-shaft junctions. Shaft #3 had two treated blocks of soil with 354 jet grout columns and Shaft #2 had one treated block of soil with 191 jet grout columns.

The double fluid system of jet grouting was selected as the best system for meeting the needs and challenges of this project considering factors such as depth, soil type and degree and type of ground improvement required. This system employs compressed air and cement grout as the two injection fluids. Both fluids are pumped, isolated from one another, down specialized drill rods to the tip of the drill string where the cement grout exits a nozzle under very high pressure and the compressed air exits in a perimeter around the grout stream forming a 'jacket' around the grout. The air jacket improves the grout's efficiency at cutting and eroding the soil, creating a larger diameter column and also improving the efficiency of spoils flush away from the jet-grouted column and up to surface.



Daily delivery of dry cement to site by bulk tanker

A Casegrande C8 drill rig capable of a 25-metre single-stroke hole depth was used to drill the holes. Each jet grouted column's entire construction progress was monitored, displayed, controlled and recorded using a Jean Lutz

LT3 automatic parameter recorder. Quality assurance coring was conducted using HQ3 coring method to confirm as-built jet grouted column diameter, to capture in situ soil samples for visual inspection and laboratory testing and, most importantly, to test residual in situ permeability of the jet grouted soil mass.



Jet grouting at Shaft #2, looking east along 16th Avenue



Exhumed jet grouted test column showing 2 metre diameter