

## TTC - ST PATRICK STATION EASIER ACCESS – PERMEATION GROUT

PROPERTY: TORONTO TRANSIT COMMISSION  
 CONTRACTOR: APLUS GENERAL CONTRACTOR  
 SCOPE OF WORK: PERMEATION GROUT

### INTRODUCTION

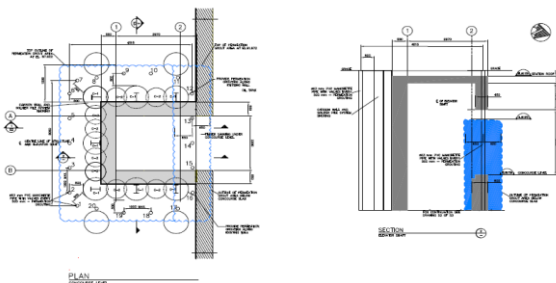
This Job Report is about the ground improvement with permeation grouting to improve the soil's frictional angle and cohesion to allow the excavation and connection of existing structural elements with the new ones, and to avoid the presence of water during the excavation of a new Easier Access to the TTC St Patrick Station in Downtown Toronto.

The permeation grouting was installed in a grid of sleeve PVC pipes every 1.00 meter with an offset from the caissons of 1.00 m



### SCOPE OF WORK

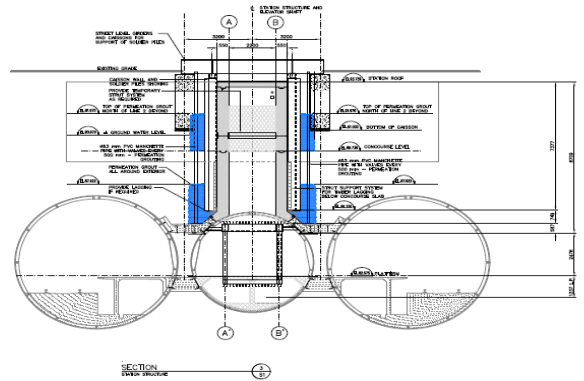
Further the execution of the Secant pile wall SITE Canada proceeded with the execution of the Permeation Grouting.



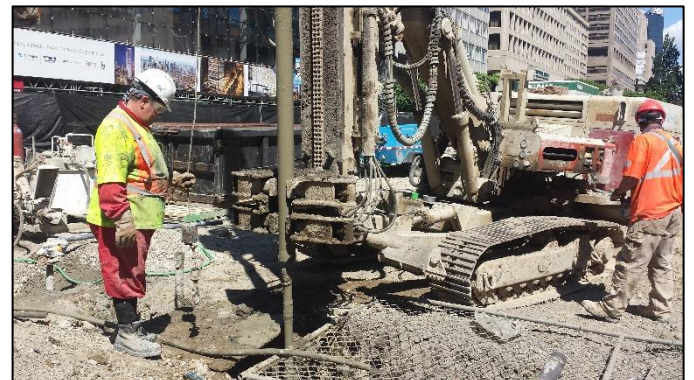
This process has filled materials, the native silty clay with trace of sand and gravel, filling the voids where the water flow can have a preferential way before the ground improvement.

The grouting procedure, consisted on grouting through the sleeve non return valves using a mix of Sodium Silicate and water mixtures and a chemical reactive in

With a rate of 48 % Sodium, 48% Water and 4% of chemical reactive, controlling the flow rate, volume, injection, and rejection pressure, without reach pressures over 2 psi per foot of overburden.



The Drilling for the sleeve installation has been made with temporary casing removed only after the PVC sleeve installation sealing the annular space around the PVC sleeve with a plastic mix cement-bentonite.



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The grouting mix has been tested taking five samples from different rate mixes of sodium silicate and water to choose the mix with the setup time compatible with the grouting operations, what means the time available for each grout operation without the risk to harden inside the grout circuit, hoses, or packers, but reaching the minimum setup time to close the water flow after the grouting operation.



The mix chosen has a setup of 45 minutes after mix.



The grouting operation were made in ascending sequence valve by valve and sleeve by sleeve until close the perimeter around the secant caisson wall, after reach the refusal criteria for the permeation grouting operation.



The grouting operation was monitored by an Automatic parameters register from Jean LUTZ VOPI2, controlling the flow rate, the pressure and the intake of Sodium Silicate mix in each valve.



After the treatment, the shaft has been excavated without any water leak during the whole excavation.

**QUANTITIES**

PVC Sleeves Installed	20 units
Drilling	160 m
Valves Injected	176 units
Sodium Silicate Mix	4,600 liters