

# UMBRELLA OF MICROPILES SEM TUNNEL

TORONTO – YORK SPADINA Subway expansion

MAIN CLIENT:  
MAIN CONTRACTOR:

TORONTO TRANSIT COMMISSION (TTC)  
FFC CANADA – OHL CANADA

## INTRODUCTION

SEM Tunnel is part of one of the sections of the future subway expansion to the North of Toronto city. The project includes drilling this tunnel under Keele Street, in a stretch with a predominance of false tunnels between piling walls, to avoid interference with the route of a pipeline that runs perpendicular to it above the tunnel key, and to minimize the effect in the traffic.

## WORKS DESCRIPTION

SITECANADA works were focused on drilling a double umbrella of micropiles, also called barrel vault pipe, at both elevations, South and North, to create the mouth of the tunnel for the subsequent excavation of it.

The machine to use was the PG-115 Casagrande, completely suitable for this type of work, given its versatility to reach heights of 6.5 meters, hydraulic double mast 18 meters, saving layout tasks, gaining accuracy against deviations and increasing production due to automatic changes to the drill rods.

The terrain belongs to the so-called Glacial Till, overconsolidated clays, it was decided to put self-drilling reinforcement with rubber sleeves, and threaded joints 101.6/7.1 diameter. Micropiles length was 15 and 20 meters, the diameter of the bore 130 mm.

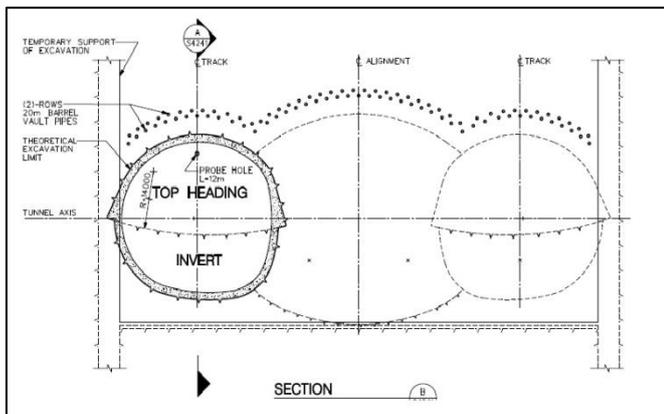
For the primary injection was used w/c relation = 0.5. Pressures of 5 bar and approximately 480 Kg admission on each drilled micropile.

The rhythm of production was high. Getting to complete 90 meter of micropile drilled per day, using water and compressed air therein.

Once the barrel vault pipe was finished SITECANADA was commissioned to drill horizontal boreholes between 25 and 30 meters long beside the key of the tunnel in order to anticipate the possible terrain that could be found during the excavation.



PG-115 in drilling position



## RESULTS

The results were within expectations and coupled with the general schedule planning for the site.

## MEASUREMENTS

2700	Meters of micropile drilled with steel pipe 101.6/5.6 with sleeves valves
580 Tn	Tn. Portland cement injected
930	Meters of borehole 86 mm with annular space sealing