

Memorandum

Date: Friday, January 22, 2021
 Project: Ontario Line TA
 To: Liana Bresler, SvN
 From: Walter Burke and Anish Deshpande, Mott MacDonald
 Subject: Summary Hydrological Scope Discussion for Queen-Spadina TOC-North Site & South Site

Purpose

The purpose of this memorandum is to present Mott MacDonald’s recommended preliminary geotechnical and hydrological investigation scope (i.e., wells, borings and testing) to be performed at the Queen-Spadina TOC to provide initial information to prospective TOC developers (DevCo). This memorandum supersedes our earlier memo dated December 31, 2020 based on ongoing discussions and recent information provided to Mott MacDonald by SvN on January 19, 2021. It is our intent that the data derived from this recommended preliminary investigation will be reviewed in conjunction with data presented in an earlier geotechnical data report prepared by another consultant and a design memorandum prepared by Thurber Engineering Ltd. (Thurber). This preliminary investigation is limited in extent and scope and is not intended to represent all the geotechnical and hydrological studies required for the project. At present Metrolinx is performing preliminary investigations to support the request for proposals (RFPs) for the stations and tunnel and the preliminary investigations will be followed by final investigations to be performed by the ProjectCo. Preliminary investigations are within the vicinity of the TOC footprint; however, it does not appear that any of the preliminary Metrolinx investigations are located within the footprint of the Queen-Spadina Station TOC. We assume that the recommended preliminary investigation for the TOC development will be followed by a detailed final investigation to be performed by the DevCo.

The DevCo will be responsible to interpret the data presented and, perform the detailed geotechnical and hydrological investigations, testing, analysis and reporting necessary to develop final designs and comply with applicable codes and requirements, including but not limited to the City of Toronto Application Support Material: Terms of Reference (TOR). The DevCo is responsible for all applicable regulatory submissions, including but not limited to the City of Toronto Hydrological Review Form, August 2018 (Hydrological Form).

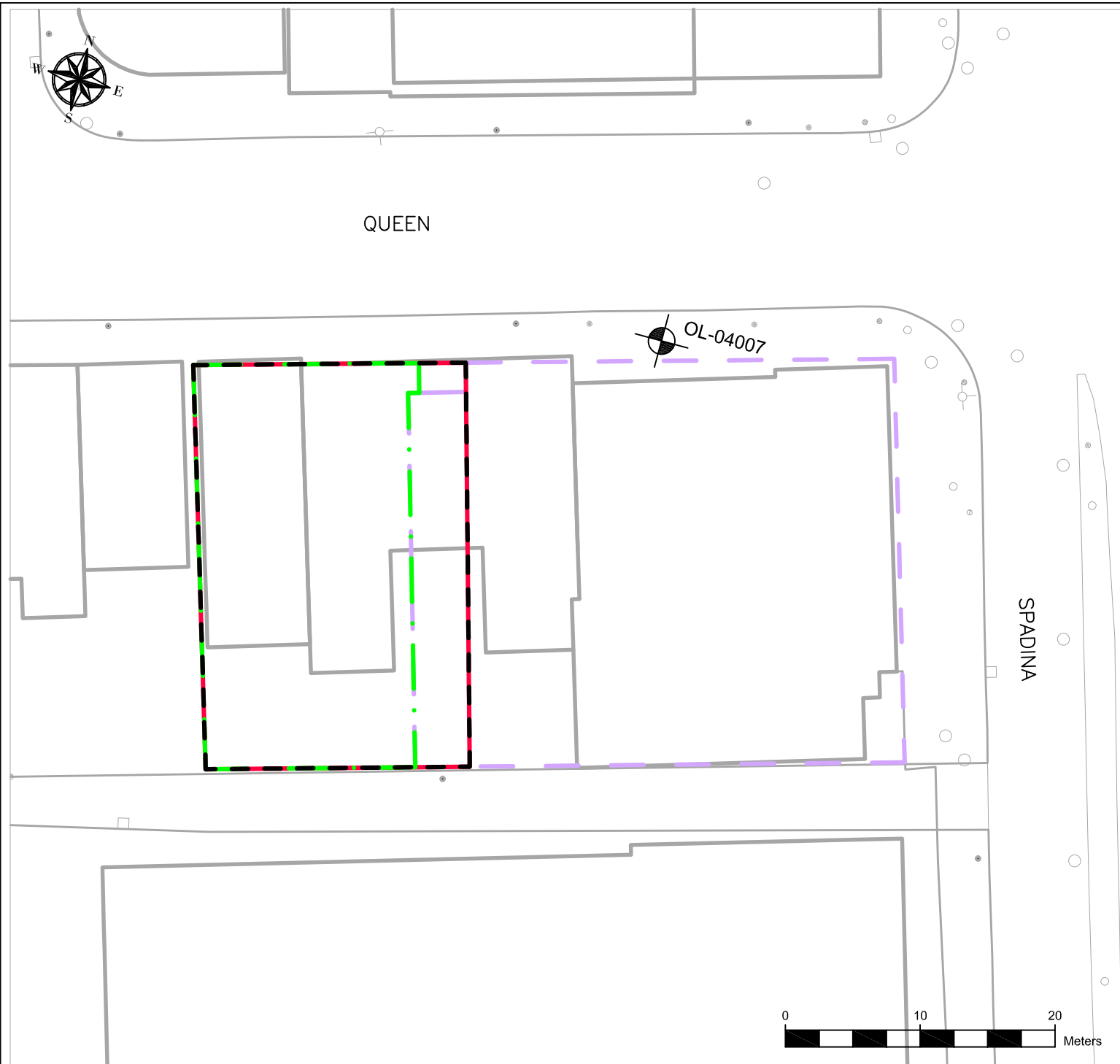
Scope

TOC Development ⁽¹⁾	
Name	Queen-Spadina
<u>South Site</u>	
Approximate development footprint in square meters (sqm)	597
Number of basements	1
Size of basement (sqm)	473
Development footprint without basements (sqm)	124
Maximum depth of basement, meters (m)	8.0
Maximum depth of preliminary drilled pier foundation ⁽²⁾ (m)	20

North Site	
Approximate development footprint in square meters (sqm)	350
Number of basements	1
Size of basement (sqm)	350
Development footprint without basements (sqm)	0
Maximum depth of basement, meters (m)	8.0
Maximum depth of preliminary drilled pier foundation ⁽²⁾ (m)	20
Current Investigation Status	
South Site	
Minimum number of wells in basements required per TOR ^{(3), (4), (5)}	3
Estimated number of borings required in non-basement areas ⁽⁶⁾	1
Estimated total number of borings required for this development	4
Current number of borings/wells in immediate vicinity of TOC development:	1
Current number of borings/wells located within TOC footprint	0
Depth(s) of borings/wells within TOC footprint (m)	Not Applicable
North Site	
Minimum number of wells in basements required per TOR ^{(3), (4), (5)}	3
Estimated number of borings required in non-basement areas ⁽⁶⁾	0
Estimated total number of borings required for this development	3
Current number of borings/wells in immediate vicinity of TOC development:	2
Current number of borings/wells located within TOC footprint	0
Depth(s) of borings/wells within TOC footprint (m)	Not Applicable
Thickness of soil overburden (m)	12.8 to 14.8
Depth of groundwater in soil (m)	5.3
Depth of groundwater in rock (m)	19.5 to 31.1
Recommended Preliminary Investigation ^{(7) (8)}	
South Site	
Total no. of preliminary borings to be converted to wells in TOC basements	1
Depth of borings/wells in TOC basement (m)	30
Number of downhole hydrological tests	1
Number of preliminary borings in non-basement TOC footprint	1
Depth of borings in remaining TOC footprint (m)	30
Total number of recommended preliminary borings/wells	2
North Site	
Total no. of preliminary borings to be converted to wells in TOC basements	1
Depth of borings/wells in TOC basement (m)	30
Number of downhole hydrological tests	1
Number of preliminary borings in non-basement TOC footprint	0
Depth of borings in remaining TOC footprint (m)	30
Total number of recommended borings/wells	1
Recommended testing for North Site and South Site:	
<ul style="list-style-type: none"> rock unconfined compression tests ⁽⁹⁾ 	6 (2 each boring)
<ul style="list-style-type: none"> groundwater analytical test suites in compliance with the testing protocols presented in the TOR. 	2
<ul style="list-style-type: none"> Analytical soil testing, as applicable ⁽¹⁰⁾ 	Assume by Stantec

Notes:

- (1) Refer to attached drawings, QS1 and QS2, based on SvN drawings provided.
- (2) Depths are estimated as preliminary foundation design is not currently completed.
- (3) The TOR requires a minimum of 5 wells for a 30m x 30m basement. This results in a base exploration coverage of 180 square meters per well. The TOR states: "...additional groundwater wells shall be installed, and the qualified professional will use professional judgement to determine the number of additional wells required."
- (4) Mott MacDonald has assumed a coverage of 500 square meters per additional well for basements that exceed 500 sqm in size. The combined basements (North Site and South Site) have a footprint of 763 sqm; however, the recommended number of wells considers that the basements for the Queen-Spadina TOC are separated.
- (5) Mott MacDonald assumes that borings to be performed for explorations to support the design of the station will be advanced to depths adequate for design of the TOC portion that overlays the station footprint, as applicable.
- (6) Based on an assumed boring distribution within the non-basement footprint to be confirmed by the geotechnical P. Eng. of record.
- (7) Advance and sample investigations through soil overburden in accordance with ASTM D1586. Advance investigations through rock in accordance with ASTM D2113.
- (8) Coordinate performance of recommended preliminary investigations with demolition, site remediation and access agreement constraints.
- (9) Perform tests in accordance with ASTM D7012.
- (10) Testing to be performed by Stantec as an extension of the OLTA Environmental Investigations.



LEGEND	
	STATION FOOTPRINT
	TOC FOOTPRINT AT GROUND LEVEL
	TOC MAXIMUM BUILT OVER FOOTPRINT
	TOC BASEMENT FOOTPRINT
	HISTORIC BORING LOCATION

AREA	m ²
TOC AERIAL FOOTPRINT	597
TOC ROOFPRIENT UNDERLAIN BY STATION FOOTPRINT	116
TOTAL AREA OF TOC BASEMENT	473
TOC ROOFPRIENT NOT UNDERLAIN BY TOC BASEMENT OR STATION FOOTPRINT	8
TOC FOOTPRINT AT GROUND LEVEL	597

Reference Files:
 P:\Geotechnical References\Projects\Ontario Line Technical Advisory Services\Queen-Spadina Station\03_Spadina.zip\03_Spadina\20201117-TD003-DT-SPADINA_AT_GRADE.pdf, P:\Geotechnical References\Projects\Ontario Line Technical Advisory Services\Queen-Spadina Station\03_Spadina.zip\03_Spadina\20201117-TD003-DT-SPADINA_BELOW_GRADE.pdf, P:\Geotechnical References\Projects\Ontario Line Technical Advisory Services\Queen-Spadina Station\03_Spadina.zip\03_Spadina\10206938-TD003-DT-SPADINA - SITE E and F_BELOW_GRADE.dwg, P:\Geotechnical References\Projects\Ontario Line Technical Advisory Services\Queen-Spadina Station\03_Spadina.zip\03_Spadina\10206938-TD003-DT-SPADINA - SITE E and F_AT_GRADE.dwg, P:\Geotechnical References\Projects\Ontario Line Technical Advisory Services\Ontario Line\Station Dwgs & Calcs from SvN\10206938-CI0000-00-BP001 Ontario Line Existing Conditions Plan.dwg

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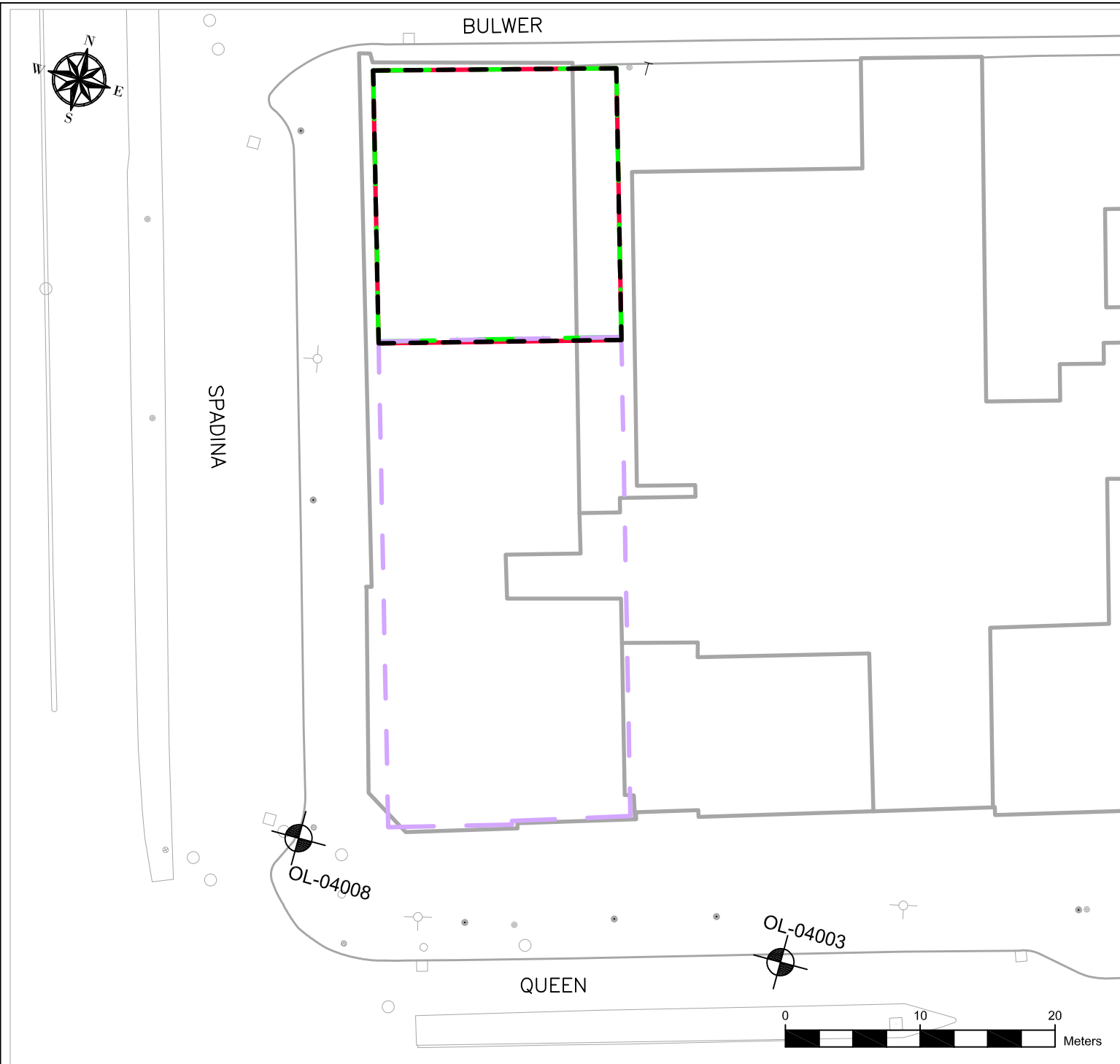


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Rev	Date	Drawn	Description	Ch'k'd	App'd	Title	Drawn	AJ	
						ONTARIO LINE - QUEEN SPADINA TOC SOUTH SITE	Checked	AD	
					Approved		WB		
							Scale at ANSI B 1:10		
							Security	Status	Rev
							STD	PRE	1



LEGEND	
	STATION FOOTPRINT
	TOC FOOTPRINT AT GROUND LEVEL
	TOC MAXIMUM BUILT OVER FOOTPRINT
	TOC BASEMENT FOOTPRINT
	HISTORIC BORING LOCATION

AREA	m ²
TOC AERIAL FOOTPRINT	353
STATION FOOTPRINT OUTSIDE OF TOC AERIAL FOOTPRINT	621
TOTAL AREA OF TOC BASEMENT	350
TOC FOOTPRINT AT GROUND LEVEL	353

Reference Files:
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Client

ONETEAM
ONTARIO LINE TECHNICAL ADVISOR

Rev	Date	Drawn	Description	Ch'k'd	App'd

Title ONTARIO LINE - QUEEN SPADINA TOC NORTH SITE	Drawn	AJ	
	Checked	AD	
	Approved	WB	
Drawing Number QS2	Scale at ANSI B 1:10		
	Security STD	Status PRE	Rev 1