Project No. 3760-13-G-TRI-C

Log of Borehole 5

Dwg No. 6

Sheet No. 1 of 1

Project: Geotechnical Investigation

Location: 1100 Eglinton Avenue East, Toronto, Ontario

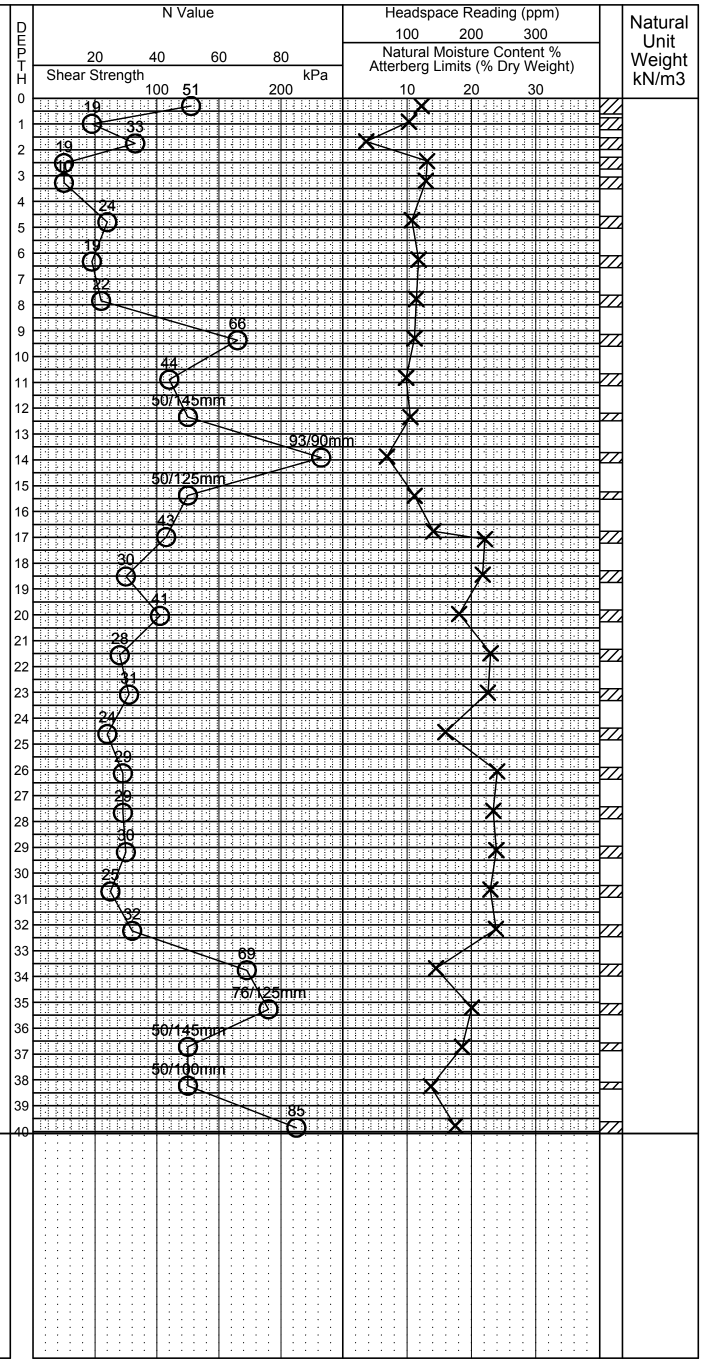
Date Drilled: 4/4/14

Drill Type: Truck Mounted

Datum: Geodetic

Auger Sample	⊠
SPT (N) Value	○ ⊘
Dynamic Cone Test	——
Shelby Tube	■
Field Vane Test	✚ S
Headspace Reading (ppm)	•
Natural Moisture	×
Plastic and Liquid Limit	├──┤
Unconfined Compression % Strain at Failure	⊗
Penetrometer	▲

Soil Description	ELEV. m
Ground Surface	126.84
TOPSOIL	126.53
FILL - dark brown to grey sandy silt - minor rootlets - trace of gravel, brick pieces - moist	125.93 124.71
SANDY SILT TILL - compact to dense, brown - some same and gravel at 1.5 m - moist	118.31
CLAYEY SILT TILL - stiff to very stiff, grey - trace of gravel - some sandy silt - moist	115.26
SANDY SILT TILL - very dense to dense, grey - some gravel - trace of clayey silt - moist	109.16
SAND - very dense to dense - medium grained - trace of gravel - a layer of sand and gravel at 16.5m - layers of sandy silt below 16.6m - moist	
CLAYEY SILT - hard to very stiff, grey - some sandy silt - seems of fine sand - layers of sandy silt at 28.5m - moist to very moist	94.23
SAND - very dense, grey - fine to medium grained - layer of sandy silt at 34.5m - silty - trace of gravel - moist to damp	86.76
END OF BOREHOLE **NOTE:** upon completion of drilling: - no free water	



LGBE3 3760-13-G-TRI-C.GPJ 11/18/14

NOTE: THE BOREHOLE DATA NEEDS INTERPRETATION ASSISTANCE BY TORONTO INSPECTION LTD. BEFORE USE BY OTHERS

Toronto Inspection Ltd.

Time	Water Level (m)	Depth to Cave (m)

Project No. 3760-13-G-TRI-C

Log of Borehole 6

Dwg No. 7

Project: Geotechnical Investigation

Sheet No. 1 of 1

Location: 1100 Eglinton Avenue East, Toronto, Ontario

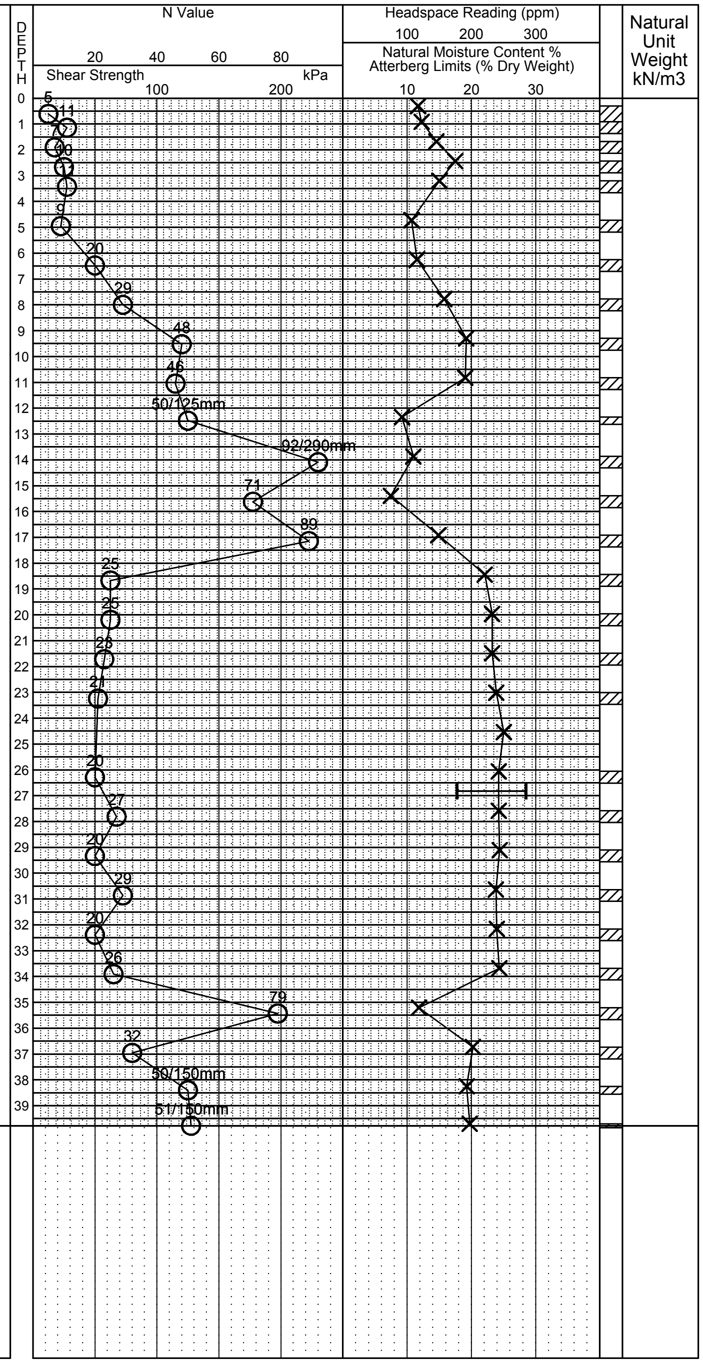
Date Drilled: 4/11/14

Drill Type: Truck Mounted

Datum: Geodetic

Auger Sample	⊠	Headspace Reading (ppm)	●
SPT (N) Value	○ ▨	Natural Moisture	×
Dynamic Cone Test	―	Plastic and Liquid Limit	├─┤
Shelby Tube	■	Unconfined Compression % Strain at Failure	⊗
Field Vane Test	✚ S	Penetrometer	▲

Soil Description	ELEV. m
Ground Surface	129.30
ASPHALT PAVEMENT - 75mm asphalt over granular bases	129.22 128.99
FILL - brown sandy silt - some sand, trace of gravel - trace of clayey silt - moist to damp	125.34
SANDY SILT TILL - loose to compact, grey - some gravel - trace of clayey silt - moist	122.29
CLAYEY SILT - very stiff to hard, grey - trace of sandy silt - moist	117.72
SAND - very dense, brown - trace of gravel at 16.5mm - moist to very moist	111.62
CLAYEY SILT - very stiff, grey - some sandy silt - seams of find sand - moist	94.86
SAND - very dense, grey - fine to medium grained, trace silt - damp to moist	93.33 91.81
CLAYEY SILT - hard, grey - seems of fine sand, trace sandy silt - moist	89.52
SAND - very dense, grey - fine to medium grained - wet	
END OF BOREHOLE **NOTE:** upon completion of drilling: - no free water	

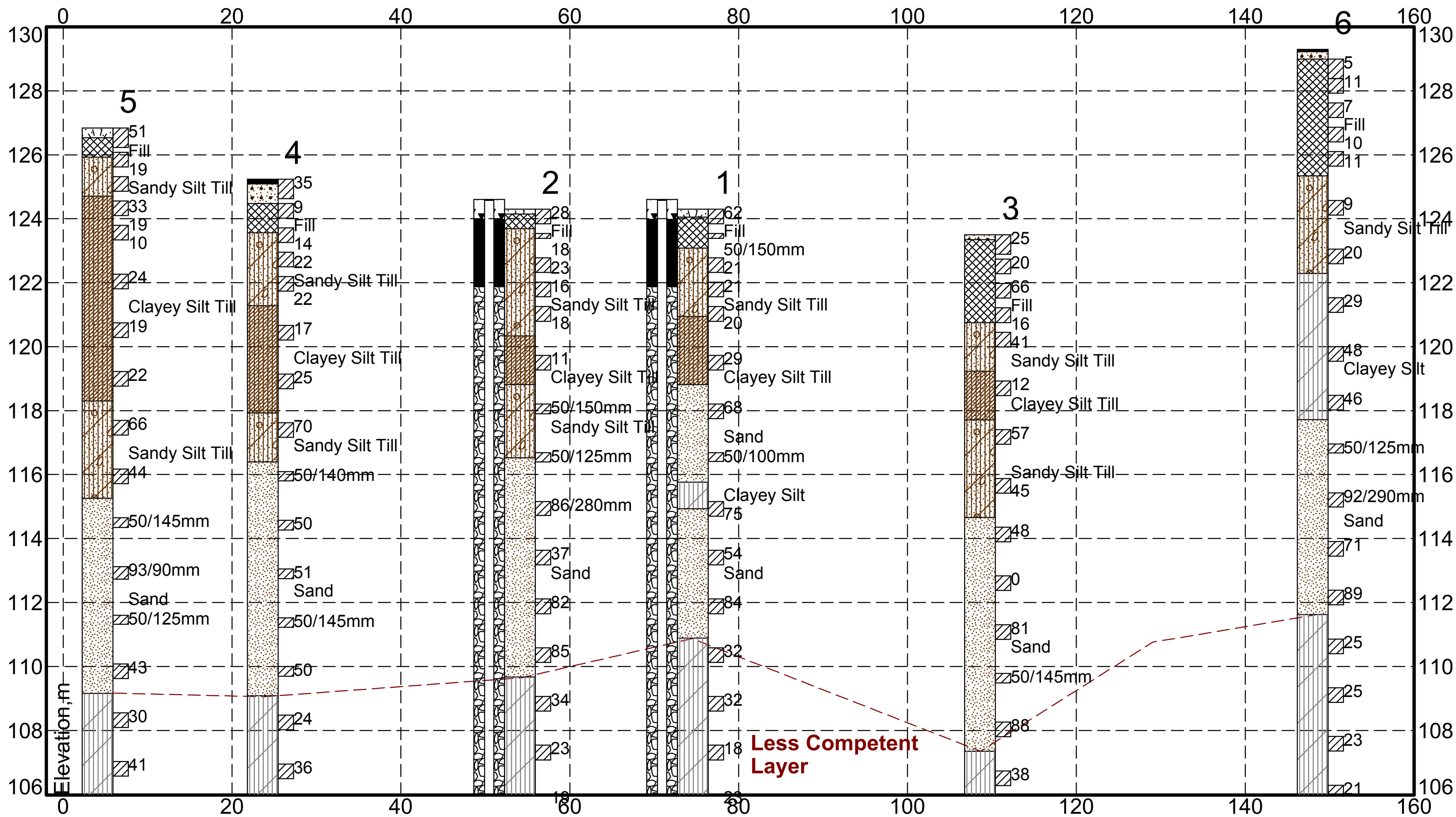


LGBE3 3760-13-G-TRI-C.GPJ 11/18/14

NOTE: THE BOREHOLE DATA NEEDS INTERPRETATION ASSISTANCE BY TORONTO INSPECTION LTD. BEFORE USE BY OTHERS

Toronto Inspection Ltd.

Time	Water Level (m)	Depth to Cave (m)



Borehole No	Elev.	Depth
1	124.3	30.9
2	124.3	40.1
3	123.5	39.9
4	125.2	39.9
5	126.8	40.1
6	129.3	39.8

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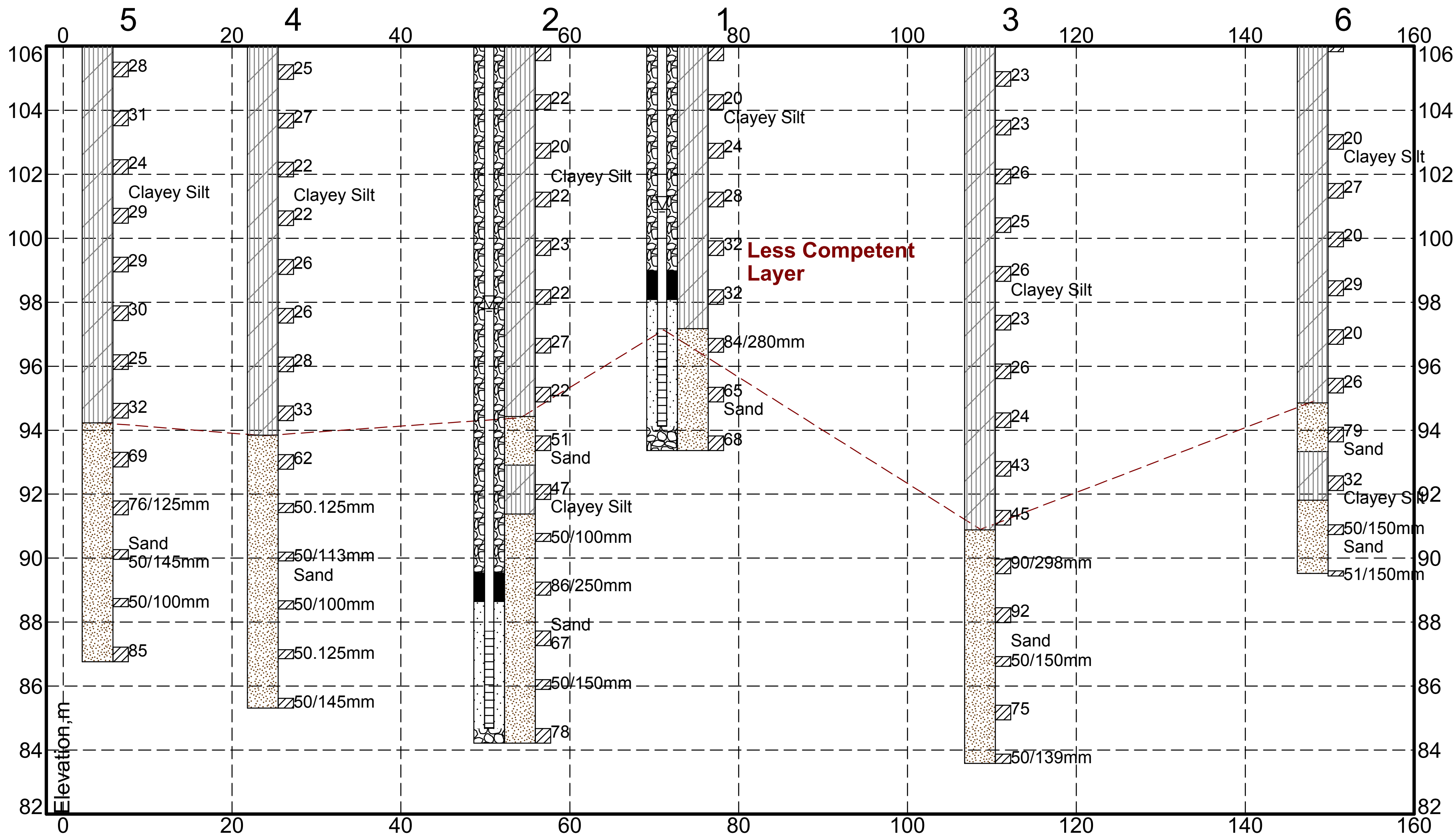
SUBSURFACE STRATIGRAPHY

Section of BH-1 to BH-6

Geotechnical Investigation

1100 Eglinton Avenue East, Toronto, Ontario

PROJECT #	DATE	DRAWING
3760-13-G-TRI-C	Nov 14	8-1



Borehole No	Elev.	Depth
1	124.3	30.9
2	124.3	40.1
3	123.5	39.9
4	125.2	39.9
5	126.8	40.1
6	129.3	39.8

Toronto Inspection Ltd.

SUBSURFACE STRATIGRAPHY

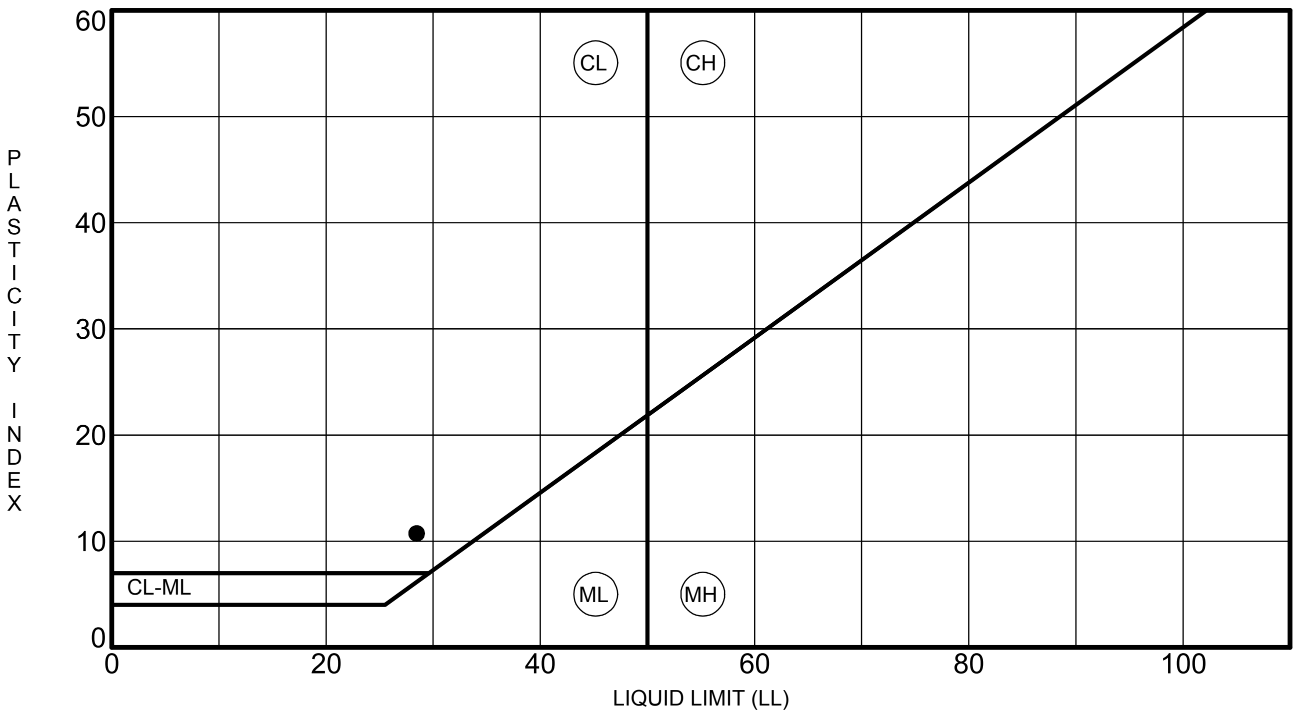
Section of BH-1 to BH-6

Geotechnical Investigation

1100 Eglinton Avenue East, Toronto, Ontario

PROJECT #	DATE	DRAWING
3760-13-G-TRI-C	Nov 14	8-2

Figures
Atterberg Limits' Results
Grain Size Analyis



	Specimen Identification		LL	PL	PI	Fines	Classification
●	**6**	**88.0**	**28**	**18**	**10**		

PROJECT	**Geotechnical Investigation - 1100 Eglinton Avenue East, Toronto, Ontario**	JOB NO.	**3760-13-G-TRI-C**
		DATE	**4/18/14**

ATTERBERG LIMITS' RESULTS

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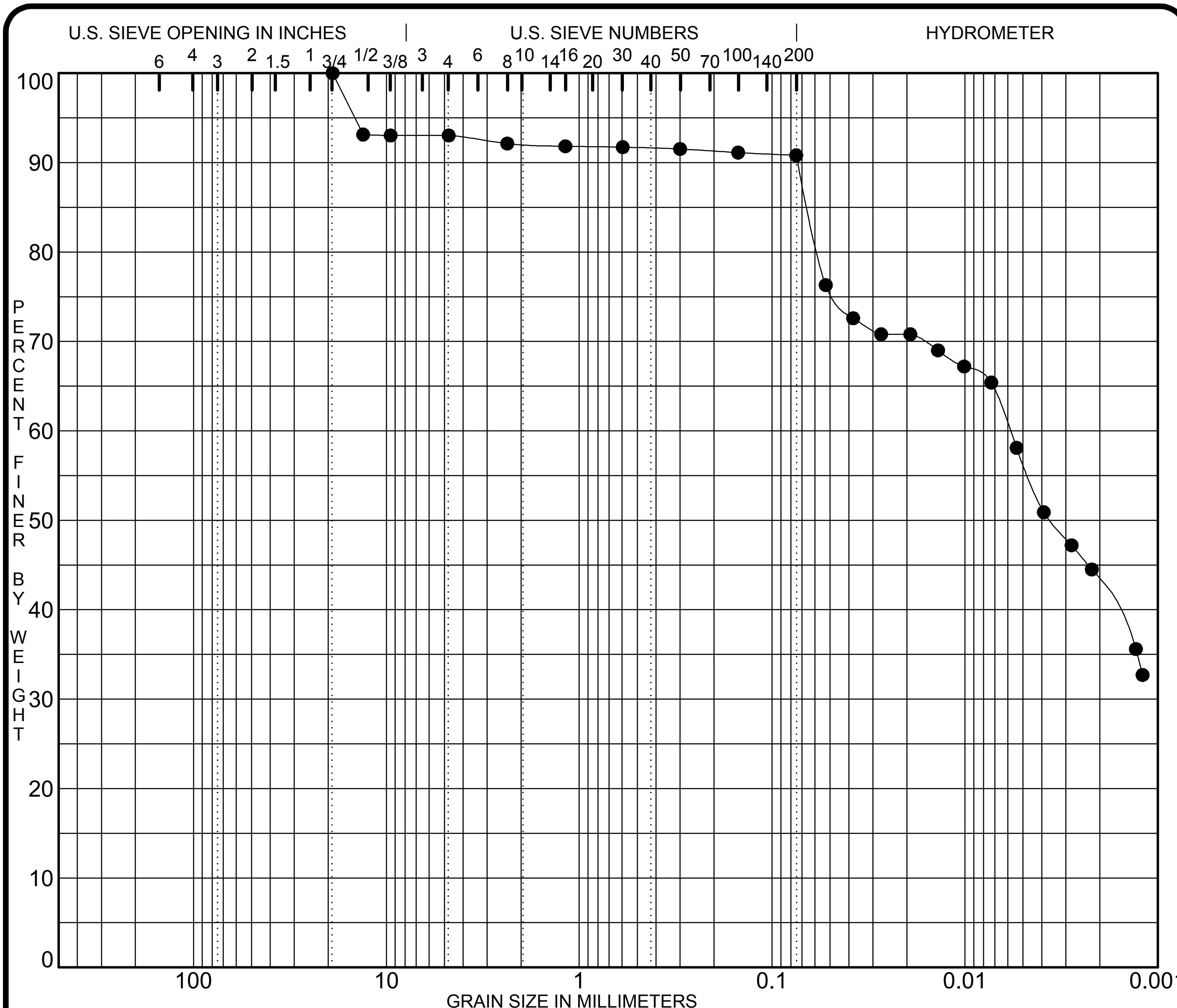
Figure No. 1



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

	Specimen Identification		Classification	MC%	LL	PL	PI	Cc	Cu
●	**6**	**26.8**							

	Specimen Identification		D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	**6**	**26.8**	**19.00**	**0.01**	**0.001**		**7.0**	**2.2**	**34.4**	**56.4**

PROJECT **Geotechnical Investigation - 1100 Eglinton Avenue East, Toronto, Ontario**

JOB NO. **3760-13-G-TRI-C**
DATE **4/25/14**

GRADATION CURVES

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Figure No. 2

Appendix A
Temporary Shoring

SHORING DESIGN

All specifications for the design of the shoring system are in accordance with Chapter 26 of the 4th Edition of the Canadian Foundation Engineering Manual.

Due to close proximity of adjacent structure and the depth of the excavation, a caisson wall, embedded into the strata below the bottom of the excavation, may have to be used to prevent any movement in the adjacent properties. Shoring, consisting of soldier piles and lagging, can be used on the other sides where slight movement in the ground surface can be tolerated.

1. Earth pressure

For multiple level support systems, the recommended earth pressure distributions are shown on Drawing A1.

The lateral earth pressure expressions, recommended in the drawings, assume that there will be no build up of hydrostatic pressure behind the shoring.

2. Pile Penetration

The soldier piles should be installed in pre-augured holes which should be filled to excavation level with 20 MPa (3000 psi) concrete and above that with 1-1/2 bag mix.

The depth of pile penetration in the very dense sand deposit, should be calculated from the following expression:

$$R = 1.5\ D\ K_p\ L^2 \gamma$$

where

R	= Ultimate Load to be restrained	kN
D	= Diameter of concrete filled hole	m
Kp	= Passive resistance in the till deposits	5.0
L	= Embedment Depth of the pile	m
γ	= Unit weight of the soil	21 kN/m^3

The depth of pile penetration in the low to medium plasticity very stiff clayey silt deposit, should be calculated from the following expression:

$$R = 9\, Cu\, D\, (L - 1.5\, D)$$

where	R	= Ultimate Load to be restrained	kN
	D	= Diameter of concrete filled hole	m
	Cu	= Undrained shear strength of the soil	75 kPa
	L	= Embedment Depth of the pile	m

The shoring system should be designed for a factor of safety of F = 2. The overall factor of safety of the anchored block of soil must be considered.

3. Lagging Boards

The following thicknesses of lagging boards have been recommended in the Canadian Foundation Engineering Manual:

Thickness of lagging	**Maximum Spacing of Soldier Piles**
50 mm (2 in)	2.0 m (6.5 ft)
75 mm (3 in)	2.5 m (8.0 ft)
100 mm (4 in)	3.0 m (10 ft)

Local experience has indicated that the lagging thickness of 75 mm has been adequate for soldier pile spacing of 3 m for soil conditions similar to those encountered at the subject site. However, it is important to consider all local conditions, such as the duration of excavation, the weather likely to be encountered, seasonal variations in the ground water and ice lensing causing frost heave in determining the lagging thickness.

If wet conditions are encountered the space between boards should be packed with geotextile filter fabric or straw to prevent loss of ground.

All spaces behind the lagging must be filled with free draining granular fill.

4. Tie Backs

The minimum spacing and the depths of the soil anchors should be as recommended in the Canadian Foundation Engineering Manual.

The tie back anchor lengths, in the sandy silt till or very dense sand, can be estimated using a value of 75 kPa (~ 1500 psf). The tie back anchor lengths, in the low to medium plasticity clayey silt till / clayey silt, can be estimated using an adhesion values of 20 kPa (~ 400 psf).

At least four full scale load tests should be carried out on the tieback anchors in each of the above subsoils. These tests should be taken to 200% of the design load or until there is a significant increase in the pullout rate. In the latter case, the design load must be limited to 50% of the load at which the pullout increases. Based on the results of the pullout test, it may be necessary to modify the anchor design and place limits on the capacity.

In addition, each anchor must be proof loaded. This is done by loading the anchor to 133% of the design load, and the anchor must be capable of sustaining this load for a minimum of 10 minutes without creep. The load may then be relaxed to 100% of design and locked in. The higher the lock in loads, the less will be the outward movement after excavation.

The proposed design of the tie-back system and method of installation must be discussed with this office prior to the finalization. Systems involving high grout pressures should be avoided if working near other basements or buried services.

5.0 Rakers

An alternative to tie backs is to use rakers. Rakers founded in the clayey silt / sand deposits should be designed for allowable bearing pressures of 100 kPa, for rakers inclined at an angle of 45 degrees.

The raker footings should be located outside the zone of influence of the buried portion of the soldier piles and at a distance of not less than 1.5 L from the piles, where L = the embedment of the pile. No excavation should be made within two footing width of the raker footings on the side opposite the rakers.

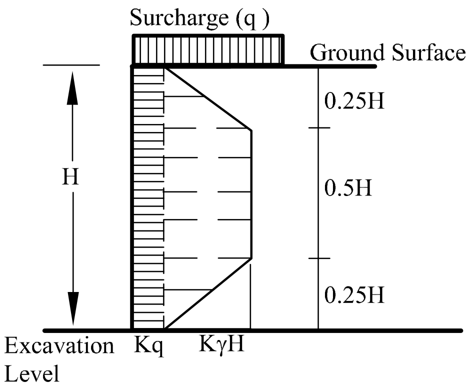
6.0 General Shoring Notes

It is recommended that close monitoring of vertical and lateral movement of the shoring system should be carried out at the site. If movements at the top of the piles are more than 12 mm (0.5 in), extra bracing maybe required. In this regard, monitoring by inclinometers and by survey on targets should be instituted to ensure that the contractor maintains movements within design limit.

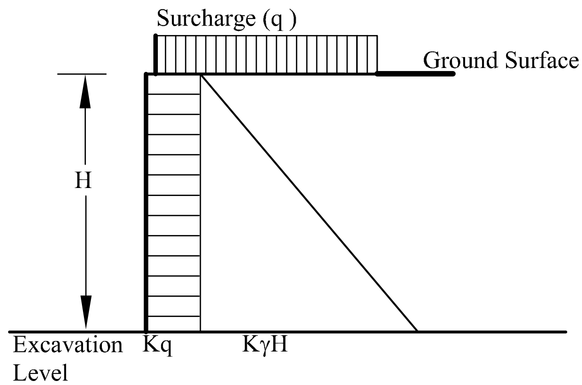
TEMPORARY SHORING

Lateral Pressure

I. Multiple Level Support



II. Single Level Support



Lateral Pressure $P = K(\gamma H + q)$

where	H = Height of Shoring	m
	γ = Unit Weight of Retained Soil	21.0 kN/ m^3
	q = Surcharge	kPa
	K = Earth Pressure Coefficient	

If moderate ground and shoring movements are permissible then:
K = Ka = Active Earth Pressure Coeffiecient = 0.25

If there are building foundations within a distance of 0.5 H behind the shoring then:
K = Ko = Earth Pressure at rest = 0.4

If there are building foundations within a distance of between 0.5 H and H behind the shoring then:
K = 0.5 (Ka + Ko) = 0.33

Note:
The lateral pressure equation assumes effective drainage from behind the temporary shoring

NOT TO SCALE

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110 Konrad Cresent, Unit 16, Markham, Ontario L3R 9X2
Tel: 905-940 8509 Fax: 905-940 8192

TITLE: Temporary Shoring Design

LOCATION: 1100 Eglinton Avenue East, Toronto, Ontario

PROJECT NO.: 3760-13-G-TRI-C

DATE: November, 2014

DRAWING NO.: A1