GEOCRES No: 30M12-261

Golder Associates Ltd.

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Golder Associates

REPORT

FOUNDATION INVESTIGATION AND DESIGN REPORT PROPOSED NOISE BARRIER WALL BETWEEN SOUTH SHERIDAN WAY AND INDIAN GROVE, MISSISSAUGA, ONTARIO W.P. 134-99-00 MINISTRY OF TRANSPORTATION, ONTARIO

Submitted to:
Cole, Sherman & Associates Ltd.
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L3T 7N5

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TABLE OF CONTENTS

SECTION **PAGE**

PART A

FOUNDATION INVESTIGATION AND DESIGN REPORT
PROPOSED NOISE BARRIER WALL
BETWEEN SOUTH SHERIDAN WAY AND INDIAN GROVE, MISSISSAUGA, ONTARIO
W.P. 134-99-00
MINISTRY OF TRANSPORTATION, ONTARIO

TABLE OF CONTENTS

SECTION **PAGE**

1.0 INTRODUCTION

Golder Associates Ltd. has been retained by Cole, Sherman & Associates Ltd. (Cole, Sherman) on behalf of the Ministry of Transportation, Ontario (MTO) to provide foundation investigation and design services for the proposed noise barrier wall extension between South Sheridan Way and Indian Grove in Mississauga, Ontario.

This report addresses the proposed noise barrier wall extension to be constructed along the hydro right of way between South Sheridan Way and Indian Grove in Mississauga, Ontario. A subsurface investigation has been carried out, in which three boreholes were advanced and in-situ and laboratory testing were conducted, to determine the subsurface conditions along the proposed noise barrier wall extension.

The terms of reference for the scope of work are outlined in Golder Associates' Proposal No. P21-1343 dated August 16, 2002. The proposed alignment for the noise wall extension was provided to us by Cole, Sherman in digital format in September 2002.

The subsurface data obtained from the current investigation was complemented with subsurface information from the following report prepared by Golder Associates Ltd. carried out for the previously proposed noise barrier wall alignments:

> *"Foundation Investigation and Design For Proposed Noise Barriers, Queen Elizabeth Way (QEW) Site 24-B and West of Mississauga Road, South Side of South Sheridan Way, Region of Peel, Mississauga, Ontario", Report No. 981-8004B, June 1999.*

2.0 SITE DESCRIPTION

The proposed noise barrier wall extension will be located along the hydro right of way from South Sheridan Way to just east of Indian Grove in Mississauga, Ontario. The ground surface within the hydro right of way is generally flat. Vegetation coverage along the proposed noise barrier wall extension consists of grass, shrubs, and occasional small trees.

3.0 INVESTIGATION PROCEDURES

A subsurface investigation was carried out at this site on October 3, 2002, at which time three boreholes were drilled at approximately 45 m horizontal spacing along the proposed noise barrier wall extension. Boreholes 1 to 3 were drilled, along the edge of the hydro right of way and extended to approximately 5.5 m to 6.2 m depth (between Elevations 98.5 m and 92.2 m).

The investigation was carried out using a truck mounted drill rig supplied and operated by Geo-Environmental Drilling Inc. of Milton, Ontario. The boreholes were advanced using 114 mm diameter solid stem augers. Samples of the overburden were obtained at 0.75 m to 1.5 m intervals of depth using 50 mm outside diameter split-spoon samplers, in accordance with the Standard Penetration Test (SPT) procedure. The water levels in the open boreholes were observed throughout the drilling operations, and piezometers were installed in two selected boreholes to permit monitoring of the groundwater level at these locations.

The fieldwork was supervised on a full-time basis by a member of Golder Associates' staff who located the boreholes in the field, directed the drilling, sampling and in-situ testing operations, and logged the boreholes. The samples were identified in the field, placed in labelled containers and transported to Golder Associates' laboratory in Mississauga for further examination and testing. Index and classification tests consisting of grain size analyses, Atterberg limits tests and water content determinations were carried out on selected soil samples.

The ground surface elevations, and northing and easting coordinates for the borehole locations were provided by Cole, Sherman.

4.0 GENERAL SITE GEOLOGY AND STRATIGRAPHY

4.1 Regional Geological Conditions

The site is located within the physiographic region known as the Peel Plain. Surficial soils in this region are predominantly clayey soils covering the central portions of York, Peel and Halton regions ("The Physiography of Southern Ontario", 3rd Edition, Chapman and Putnam, 1984). The surface topography slopes gradually and fairly uniformly towards Lake Ontario. The native soils at the site area are silty clay glacial till, which are underlain by bedrock comprised of shale and limestone interbeds of the Georgian Bay (Meaford-Dundas) Formation. Bedrock at this site is at shallow depth, with typical depths ranging from 2 m to 3 m below existing ground surface.

4.2 Site Stratigraphy

The detailed subsurface soil and groundwater conditions encountered in the boreholes are given on the Record of Borehole sheets following the text of this report. The Record of Borehole sheets, for the previously drilled boreholes are included in Appendix A. The stratigraphic boundaries shown on the borehole records are inferred from non-continuous sampling and, therefore, represent transitions between soil types rather than exact planes of geological change. Subsoil conditions will vary between and beyond the borehole locations.

The boreholes encountered topsoil and silty clay fill overlying silty clay glacial till in turn underlain by shale bedrock. A more detailed description of the subsurface conditions encountered in Boreholes 1 to 3 is provided in the following sections. The locations and elevations of the boreholes are shown on the attached Drawing 1.

4.2.1 Topsoil and Fill Material

About 100 mm of topsoil was encountered at the ground surface in all the boreholes put down at the site for the present investigation.

Below the topsoil is a 0.7 m to 1.1 m thick layer of silty clay fill with base of the deposit between about Elevation 97.2 m and 97.6 m. Standard Penetration Testing carried out within the fill gave 'N' values ranging from 5 to 17 blows for 0.3 m of penetration, indicating a firm to stiff consistency. Measured water contents of selected samples of silty clay fill ranged from 10 percent to 23 percent. Atterberg Limits testing carried out on one representative sample gave a liquid limit of 40 percent and plasticity index of 20 percent indicating the fill is clay of intermediate plasticity.

4.2.2 Silty Clay Glacial Till

A glacial till deposit consisting of silty clay with some sand and gravel was encountered below the fill. The thickness of the silty clay till ranges from 1.1 m to 1.5 m at the borehole locations. The base of the deposit was encountered at between Elevation 96.1 m and 96.2 m. Standard Penetration Testing carried out within the silty clay till gave 'N' values ranging from 30 blows to greater than 75 blows for 0.3 m of penetration, indicating a hard consistency. Measured water contents of selected samples of silty clay till ranged from 11 percent to 13 percent. The results of a grain size distribution analysis carried out on a representative sample are shown on Figure 2. Atterberg Limits testing on one sample of the till gave liquid limit of 35 percent and plasticity index of 15 percent indicating a clay which is borderline on low to intermediate plasticity.

4.2.3 Bedrock

Shale bedrock of the Georgian Bay formation was encountered below the glacial till at all borehole locations. Grinding of the augers within the shale during drilling was noted and refusal to further auger penetration was met in one of the boreholes. The grinding and auger refusal is indicative of hard limestone layers which will pose difficulties during augering of large diameter caissons. The bedrock surface elevation is relatively consistent at the boreholes along the proposed noise barrier wall extension and is at about Elevation 96.1 m.

4.2.4 Groundwater Conditions

The open boreholes were dry upon completion of drilling. A standpipe piezometer was installed in each of Boreholes 1 and 3 to permit monitoring of the groundwater conditions at these locations. The water levels were measured in Borehole 1 and 3 on October 10, 2002, and were found to be at depths of 2.75 m (Elevation 95.7 m) and 3.20 m (Elevation 94.9 m) respectively.

It should be noted that groundwater levels are expected to fluctuate seasonally and are expected to rise during wet periods of the year.

GOLDER ASSOCIATES LTD.

Christopher Ng, B.A.Sc.

Anne S. Poschmann, P.Eng.
Principal

Fintan J. Heffernan, P.Eng.,
Designated MTO Contact

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PART B

FOUNDATION INVESTIGATION AND DESIGN REPORT
PROPOSED NOISE BARRIER WALL
BETWEEN SOUTH SHERIDAN WAY AND INDIAN GROVE,
MISSISSAUGA, ONTARIO
W.P. 134-99-00
MINISTRY OF TRANSPORTATION, ONTARIO

October, 2002

021-1150

Golder Associates

5.0 ENGINEERING RECOMMENDATIONS

5.1 General

This section of the report provides parameters and recommendations regarding the geotechnical aspects of design of the proposed noise barrier wall extension, located along the hydro right of way between South Sheridan Way and Indian Grove. The design parameters and recommendations have been developed based on interpretation of the factual data obtained during subsurface investigations at the site. It should be noted that the interpretation and recommendations are intended for use only by the design engineer. Where comments are made on construction, they are provided only in order to highlight those aspects that could affect the design of the project. Those requiring information on aspects of construction should make their own interpretation of the factual information provided as it may affect equipment selection, proposed construction method and scheduling.

5.2 Noise Barrier Wall Foundations

It is assumed that the noise barrier wall extension will be supported using augered caissons between about 0.6 m to 0.9 m in diameter.

Design parameters for the soils encountered in the boreholes advanced along the wall alignment are given in the following Table 1, where:

- c_u is the undrained shear strength (kPa) = 0.5 times the unconfined compressive strength (q_u)
- Φ' is the effective angle of friction (°)
- γ is the bulk unit weight (kN/m^3)

It should be noted that the stratigraphy presented in the table has been simplified for the purposes of the noise barrier wall foundation design.

Reference Boreholes	*Stratum*	*Depth or Elevation Interval*	*Design Parameters*			
			c_u	Φ'	γ	*Water Level*
1 to 3	Fill	Ground surface to Elevation 97.2 m	-	28	19	Elevation 96 m
	Silty Clay Till	Elevation 97.2 m to Elevation 96.1 m	100	32	20	
	Shale Bedrock	Below Elevation 96.1 m	-	40	23	

Where both the undrained shear strength, c_u, and the effective friction angle, Φ', have been given for a specific stratum, the caisson design should be checked for both the drained and the

undrained condition, and the larger of the two calculated caisson depths shall govern. The effective unit weight, γ', should be used below the groundwater table, where:

$$\gamma' = \gamma - 10 \text{ kN/m}^3$$

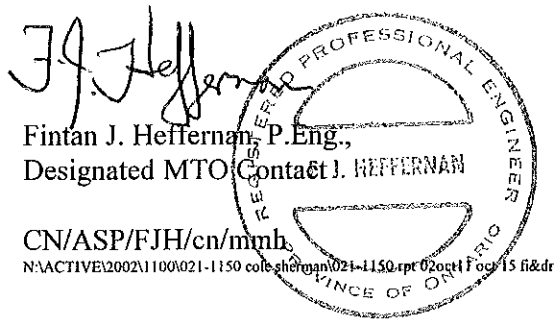
For foundation design, full passive resistance will be mobilized only where the width of soil in front or behind the caissons is equal to or greater than eight caisson diameters. If there is lesser width of soil for development of passive resistance (i.e. if there is sloping ground in front of the noise wall), the magnitude of the passive resistance may be determined by interpolating between zero passive resistance at ground surface and full passive resistance at the depth where the berm slope face is greater than eight caisson diameters away from the face of the caisson. In addition, the passive resistance in front of the caisson within the upper 1.2 m below ground surface should be neglected to account for frost action.

The Contractor's proposed excavation techniques should be able to accommodate removal or breaking up of boulders and / or other obstructions which are expected in both the fill and native soils. In addition, the hard limestone layers within the shale will require special procedures to break up and remove during augering of large diameter caissons.

GOLDER ASSOCIATES LTD.

Christopher Ng, B.A.Sc.

Anne S. Poschmann, P.Eng.
Principal



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Designated MTO Contact

CN/ASP/FJH/cn/mmh
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LIST OF ABBREVIATIONS

The abbreviations commonly employed on Records of Boreholes, on figures and in the text of the report are as follows:

I. SAMPLE TYPE

AS	Auger sample
BS	Block sample
CS	Chunk sample
SS	Split-spoon
DS	Denison type sample
FS	Foil sample
RC	Rock core
SC	Soil core
ST	Slotted tube
TO	Thin-walled, open
TP	Thin-walled, piston
WS	Wash sample

II. PENETRATION RESISTANCE

Standard Penetration Resistance (SPT), N:

The number of blows by a 63.5 kg. (140 lb.) hammer dropped 760 mm (30 in.) required to drive a 50 mm (2 in.) drive open sampler for a distance of 300 mm (12 in.)

Dynamic Cone Penetration Resistance; N_d:

The number of blows by a 63.5 kg (140 lb.) hammer dropped 760 mm (30 in.) to drive uncased a 50 mm (2 in.) diameter, 60° cone attached to "A" size drill rods for a distance of 300 mm (12 in.).

PH: Sampler advanced by hydraulic pressure
PM: Sampler advanced by manual pressure
WH: Sampler advanced by static weight of hammer
WR: Sampler advanced by weight of sampler and rod

Piezo-Cone Penetration Test (CPT)

A electronic cone penetrometer with a 60° conical tip and a project end area of 10 cm^2 pushed through ground at a penetration rate of 2 cm/s. Measurements of tip resistance (Q_t), porewater pressure (PWP) and friction along a sleeve are recorded electronically at 25 mm penetration intervals.

III. SOIL DESCRIPTION

(a) Cohesionless Soils

Density Index (Relative Density)	N Blows/300 mm or Blows/ft.
Very loose	0 to 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very dense	over 50

(b) Cohesive Soils

Consistency	c_u, s_u kPa	c_u, s_u psf
Very soft	0 to 12	0 to 250
Soft	12 to 25	250 to 500
Firm	25 to 50	500 to 1,000
Stiff	50 to 100	1,000 to 2,000
Very stiff	100 to 200	2,000 to 4,000
Hard	over 200	over 4,000

IV. SOIL TESTS

w	water content
w_p	plastic limit
w_l	liquid limit
C	consolidation (oedometer) test
CHEM	chemical analysis (refer to text)
CID	consolidated isotropically drained triaxial test[1]
CIU	consolidated isotropically undrained triaxial test with porewater pressure measurement[1]
D_R	relative density (specific gravity, G_s)
DS	direct shear test
M	sieve analysis for particle size
MH	combined sieve and hydrometer (H) analysis
MPC	Modified Proctor compaction test
SPC	Standard Proctor compaction test
OC	organic content test
SO_4	concentration of water-soluble sulphates
UC	unconfined compression test
UU	unconsolidated undrained triaxial test
V	field vane (LV-laboratory vane test)
γ	unit weight

Note: 1 Tests which are anisotropically consolidated prior to shear are shown as CAD, CAU.

LIST OF SYMBOLS

Unless otherwise stated, the symbols employed in the report are as follows:

I. GENERAL

π = 3.1416
ln x, natural logarithm of x
$\log_{10}$ x or log x, logarithm of x to base 10
g acceleration due to gravity
t time
F factor of safety
V volume
W weight

II. STRESS AND STRAIN

γ shear strain
Δ change in, e.g. in stress: $\Delta \sigma$
ε linear strain
ε_v volumetric strain
η coefficient of viscosity
ν Poisson's ratio
σ total stress
σ' effective stress ($\sigma' = \sigma - u$)
σ'_{vo} initial effective overburden stress
$\sigma_1, \sigma_2, \sigma_3$ principal stresses (major, intermediate, minor)
σ_{oct} mean stress or octahedral stress $= (\sigma_1 + \sigma_2 + \sigma_3)/3$
τ shear stress
u porewater pressure
E modulus of deformation
G shear modulus of deformation
K bulk modulus of compressibility

III. SOIL PROPERTIES

(a) Index Properties

$\rho(\gamma)$ bulk density (bulk unit weight*)
$\rho_d(\gamma_d)$ dry density (dry unit weight)
$\rho_w(\gamma_w)$ density (unit weight) of water
$\rho_s(\gamma_s)$ density (unit weight) of solid particles
γ' unit weight of submerged soil ($\gamma' = \gamma - \gamma_w$)
D_R relative density (specific gravity)of solid particles ($D_R = \rho_s / \rho_w$) (formerly G_s)
e void ratio
n porosity
S degree of saturation

* Density symbol is ρ. Unit weight symbol is γ where $\gamma = \rho g$ (i.e. mass density x acceleration due to gravity)

(a) Index Properties (con't.)

w water content
w_l liquid limit
w_p plastic limit
I_P plasticity Index = $(w_l - w_p)$
w_S shrinkage limit
I_L liquidity index = $(w - w_p) / I_p$
I_C consistency index = $(w_l - w) / I_p$
e_{max} void ratio in loosest state
e_{min} void ratio in densest state
I_D density index = $(e_{max} - e) / (e_{max} - e_{min})$ (formerly relative density)

(c) Hydraulic Properties

h hydraulic head or potential
q rate of flow
v velocity of flow
i hydraulic gradient
k hydraulic conductivity (coefficient of permeability)
j seepage force per unit volume

(d) Consolidation (one-dimensional)

C_c compression index (normally consolidated range)
C_r recompression index (overconsolidated range)
C_S swelling index
C_α coefficient of secondary consolidation
m_v coefficient of volume change
c_v coefficient of consolidation
T_v time factor (vertical direction)
U degree of consolidation
σ'_p pre-consolidation pressure
OCR Overconsolidation ratio $= \sigma'_p / \sigma'_{vo}$

(e) Shear Strength

τ_p, τ_r peak and residual shear strength
ϕ' effective angle of internal friction
δ angle of interface friction
μ coefficient of friction = tan δ
c' effective cohesion
c_u, s_u undrained shear strength ($\phi = 0$ analysis)
p mean total stress $(\sigma_1 + \sigma_3)/2$
p' mean effective stress $(\sigma'_1 + \sigma'_3)/2$
q $(\sigma_1 - \sigma_3)/2$ or $(\sigma'_1 - \sigma'_3)/2$
q_u compressive strength $(\sigma_1 - \sigma_3)$
S_t sensitivity

Notes: 1. $\tau = c' + \sigma' \tan \phi'$
2. Shear strength = (Compressive strength)/2

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RECORD OF BOREHOLE No 1

1 OF 1 **METRIC**

PROJECT 021-1150
W.P. 134-99-00
LOCATION N 4823294.8; E 295490.4
ORIGINATED BY PKS
DIST 6 HWY QEW
BOREHOLE TYPE 114mm Diameter Solid Stem Auger
COMPILED BY CN
DATUM Geodetic
DATE October 3, 2002
CHECKED BY ASP

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (o UNCONFINED, + FIELD VANE, ● QUICK TRIAXIAL, × REMOULDED) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (10 20 30)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES						
98.4	GROUND SURFACE										
98.3 / 0.1	Topsoil										
	Silty Clay, some sand and gravel (Fill) Firm to stiff Grey/brown Moist		1	SS	5		98		o		
97.6 / 0.8	Trace rootlets in upper 0.61m.		2	SS	30				o		
	Silty Clay, some sand, trace gravel (Glacial Till) Hard Grey/brown Moist		3	SS	75/.15		97		o		
96.1 / 2.3	Shale with inferred limestone interbeds (Bedrock) Weathered Grey		4	SS	100/.08		96				
			5	SS	100/.13		95				
			6	SS	100/.08		94				
92.9 / 5.5	END HOLE Refusal to auger penetration. Refusal to split spoon sampler advance and spoon bouncing.						93				

Notes:

1. Open borehole dry upon completion of drilling.

2. Water level measured in piezometer at 2.75m depth (Elev.95.7m) on Oct.10/02.

$+^3, \times^3$: Numbers refer to Sensitivity

$o^{3\%}$ STRAIN AT FAILURE

Golder Associates

RECORD OF BOREHOLE No 2

1 OF 1

METRIC

PROJECT 021-1150
W.P. 134-99-00
DIST 6 HWY QEW
DATUM Geodetic
LOCATION N 4823331.9; E 295505.8
BOREHOLE TYPE 114mm Diameter Solid Stem Auger
DATE October 3, 2002
ORIGINATED BY PKS
COMPILED BY CN
CHECKED BY ASP

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa: ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × REMOULDED (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (10 20 30)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
98.5	GROUND SURFACE										
0.0	Topsoil										
0.1	Silty Clay, some sand, trace gravel and rootlets (Fill) Stiff Grey/brown Moist		1	SS	13		98		○		
97.2			2	SS	17				○		40
1.2	Silty Clay, some sand, trace gravel (Glacial Till) Hard Grey/brown Moist		3	SS	75/.15		97		○		
96.2			4	SS	75/.15		96				
2.3	Shale with inferred limestone interbeds (Bedrock) Weathered Grey		5	SS	75/.05		95				
			6	SS	75/.08		94				
92.3			7	SS	75/.08		93				
6.2	END HOLE										

Notes:

1. Open borehole dry upon completion of drilling.

$+^{3}, \times^{3}$: Numbers refer to Sensitivity

$\circ^{3\%}$ STRAIN AT FAILURE

Golder Associates

RECORD OF BOREHOLE No 3

1 OF 1

METRIC

PROJECT 021-1150

W.P. 134-99-00 LOCATION N 4823363.5; E 295522.3 ORIGINATED BY PKS

DIST 6 HWY QEW BOREHOLE TYPE 114mm Diameter Solid Stem Auger COMPILED BY CN

DATUM Geodetic DATE October 3, 2002 CHECKED BY ASP

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × REMOULDED) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (10 20 30)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
98.4	GROUND SURFACE										
0.0	Topsoil										
0.1	Silty Clay, some sand and gravel (Fill) Stiff Grey/brown Moist		1	SS	11		98		○		
97.5											
0.9	Silty Clay, some sand, trace gravel (Glacial Till) Hard Grey/brown Moist		2	SS	63				○		
			3	SS	50/.05		97		○		10 12 55 23
96.1											
2.3	Shale with inferred limestone interbeds (Bedrock) Weathered Grey		4	SS	50/.08		96				
			5	SS	50/.05		95				
			6	SS	75/.08		94				
							93				
92.2			7	SS	75/.08						
6.2	END HOLE										

Notes:

1. Open borehole dry upon completion of drilling.

2. Water level measured in piezometer at 3.20m depth (Elev.94.9m) on Oct.10/02.

$+^3, \times^3$: Numbers refer to Sensitivity

$\circ^{3\%}$ STRAIN AT FAILURE

DIST. 6 HWY. QEW CONT No. WP No. 134-99-00	N
SOUTH SHERIDAN NOISE BARRIER WALL EXTENSION BOREHOLE LOCATION PLAN	SHEET
Golder Associates	Golder Associates Ltd. MISSISSAUGA, ONTARIO, CANADA

METRIC
DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN

QEW WESTBOUND

QEW EASTBOUND

SOUTH SHERIDAN WAY

INDIAN GROVE

LOCATION OF PREVIOUSLY PROPOSED NOISE BARRIER WALL

PROPOSED NOISE BARRIER WALL

EXISTING TRANSNORTHERN PIPELINES

HYDRO CORRIDOR

BH1 BH2 BH3 BH18 BH19

EXISTING BERM

TIM HORTON PARKING LOT

DITCH

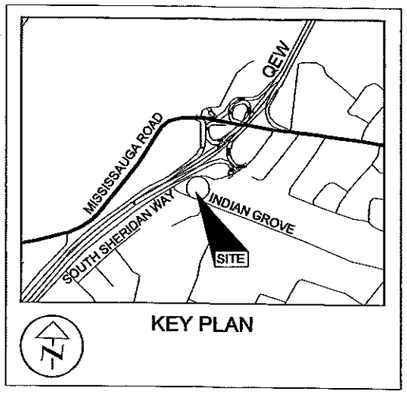
EXISTING FENCE LINE

WOOD FENCE

POST & CABLE FENCE

HYDRO STATION

DRIVEWAY



KEY PLAN

LEGEND

- Borehole – Current Golder Associates Ltd. Investigation
- Borehole – Previous Golder Associates Ltd. Investigation (Report No. 981–8004B, dated June 1999)

No.	ELEVATION	LOCATION	
		NORTHING	EASTING
BH 1	98.4	4823294.8	295490.4
BH 2	98.5	4823331.9	295505.8
BH 3	98.4	4823363.5	295522.3

REFERENCE

BASE PLAN PROVIDED IN DIGITAL FORMAT BY COLE SHERMAN, DRAWING NAME: PLAN-NOISE.DWG, DATED SEPT.16/02.

20 0 20 40
SCALE 1:1000 METRES

NO.	DATE	BY	REVISION

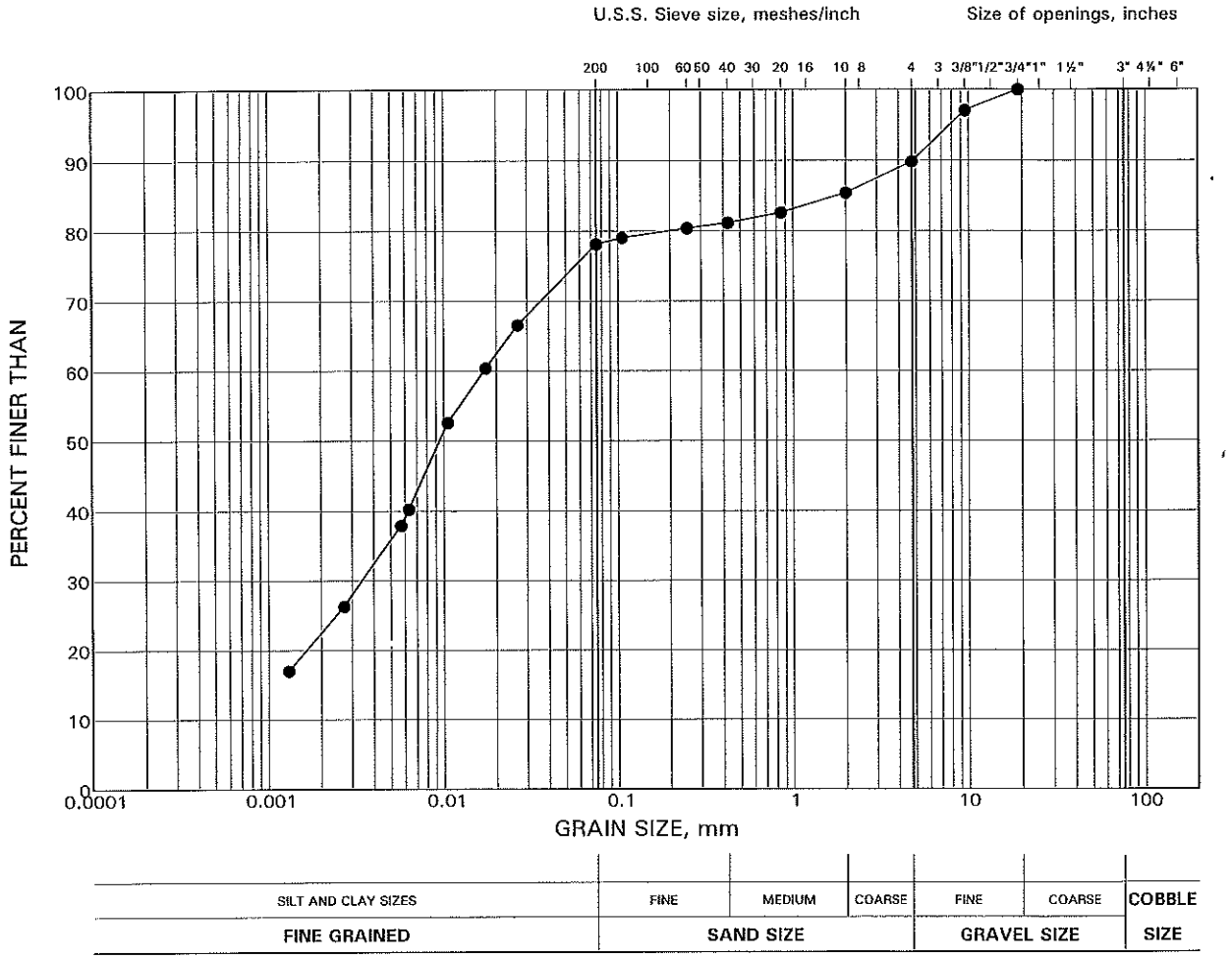
Geocres No.

HWY. QEW	PROJECT NO. 021-1150		DIST. 6
SUBM'D. CN	CHKD. CN	DATE: OCTOBER 2002	SITE:
DRAWN: PS	CHKD. ASP	APP'D.	DWG. 1

PLOT DATE: October 11, 2002
FILENAME: T:\Projects\2002\021-1150\GCS2DFS\021150D1_misc.dwg

GRAIN SIZE DISTRIBUTION
Silty Clay (Glacial Till)

FIGURE 1



LEGEND

SYMBOL	BOREHOLE	SAMPLE	ELEVATION (m)
●	3	3	96.5

Project 021-1150

Golder Associates

APPENDIX A

EXISTING RELEVANT RECORD OF BOREHOLE 18 AND 19 FOR SOUTH SHERIDAN WAY

FROM

GOLDER ASSOCIATES LTD. REPORT TITLED "FOUNDATION INVESTIGATION AND DESIGN FOR PROPOSED NOISE BARRIERS QUEEN ELIZABETH WAY (QEW) SITE 24-B AND WEST OF MISSISSAUGA ROAD, SOUTH SIDE OF SOUTH SHERIDAN WAY, REGION OF PEEL, MISSISSAUGA, ONTARIO", REPORT NO. 981-8004B, DATED JUNE 1999

W.P. 339-98-01

DIST. CENT. HWY. QEW

LOCATION: N: 4823378.08; E: 295565.84

RECORD OF BOREHOLE BH18

BORING DATE: MAY 18, 1999

SHEET 1 OF 1

DATUM: LOCAL

PROJECT: 981-8004B

N8004018.BHS

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m; SHEAR STRENGTH Cu, kPa (nat V +, rem V ⊕, Q ●, U ○)	HYDRAULIC CONDUCTIVITY, k, cm/s; WATER CONTENT, PERCENT (Wp, W, Wl; 10 20 30 40)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0		GROUND SURFACE		99.11 / 0.00							
	D-50 POWER AUGER BORING; 108mm O.D. SOLID STEM AUGERING	Sand, some gravel, trace silt Dense to compact Brown Moist (FILL)			1	50 DO	36				BENTONITE SEAL
1					2	50 DO	13				
				97.89 / 1.22							
		Silty Clay, trace sand and gravel Hard Brown/grey mottled Moist (Glacial TILL)			3	50 DO	50/ .15		O		
2				97.05 / 2.06							
		Silty Clay, trace sand and gravel, occasional shale fragments Hard Brown Moist (Residual Soil)			4	50 DO	60/ .15				SAND
3					5	50 DO	65/ .15		O		
				95.61 / 3.50							
					6	50 DO	64/ .05				
4		Shale with inferred limestone interbeds Weathered Grey (Bedrock)									
				94.49 / 4.62	7	50 DO	70/ .05				
		END OF BOREHOLE REFUSAL TO SPLIT SPOON SAMPLER ADVANCE									Open borehole dry upon completion of drilling Piezometer dry on May 21, 1999.
5											

DATA INPUT: MMZ MAY 25, 1999

SOILM6

DEPTH SCALE

1 to 25

Golder Associates

LOGGED: DKB

CHECKED: SP

W.P. 339-98-01

DIST. CENT. HWY. QEW

LOCATION: N. 4823377.90; E:295515.48

RECORD OF BOREHOLE BH19

BORING DATE: MAY 19, 1999

SHEET 1 OF 1

DATUM: LOCAL

PROJECT: 981-8004B

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.3m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	HYDRAULIC CONDUCTIVITY, k, cm/s	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0	D-50 POWER AUGER BORING; 108mm O.D. SOLID STEM AUGERING	GROUND SURFACE		99.07 / 0.00				SHEAR STRENGTH Cu, kPa; nat V - +, Q - ●; rem V - ⊕, U - ○	WATER CONTENT, PERCENT; Wp, W, Wl; 10 20 30 40		
		Sand, some gravel, trace silt Dense to compact Brown Moist (FILL)			1	50 DO	30				
1					2	50 DO	28				
				97.62 / 1.45							
2		Silty Clay, trace sand and gravel Hard Brown/grey mottled Moist (Glacial TILL)			3	50 DO	46				
				96.86 / 2.21							
		Silty Clay, trace sand and gravel, occasional shale fragments Hard Brown Moist (Residual Soil)			4	50 DO	50/ .15				
3				96.02 / 3.05	5	50 DO	60/ .08				
		Shale with inferred limestone interbeds Weathered Grey (Bedrock)									
				95.21 / 3.86	6	50 DO	70/ .05				
4		END OF BOREHOLE REFUSAL TO SPLIT SPOON SAMPLER ADVANCE									Open borehole dry upon completion of drilling
5											

DEPTH SCALE

1 to 25

Golder Associates

LOGGED: DKB

CHECKED: SP

N8004019.BHS

DATA INPUT: MMZ MAY 25, 1999

SOILM6