Golder Associates Ltd.

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FINAL REPORT ON

DETAIL DESIGN
FOUNDATION INVESTIGATION AND DESIGN
NOISE BARRIER
G.W.P. 190-00-01
MINISTRY OF TRANSPORTATION, ONTARIO
OAKVILLE, ONTARIO

Submitted to:

URS Canada Inc.
75 Commerce Valley Drive East
Markham, Ontario
L3T 7N9

GEOCRES NO. 30M5-261

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September 2009 011-1128-NB

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PART A

FOUNDATION INVESTIGATION REPORT
NOISE BARRIER
G.W.P. 190-00-01
MINISTRY OF TRANSPORTATION, ONTARIO
OAKVILLE, ONTARIO

1.0 INTRODUCTION

Golder Associates Ltd. (Golder) has been retained by URS Canada Inc. (URS) on behalf of the Ministry of Transportation, Ontario (MTO) to carry out a foundation investigation for the proposed noise barrier as part of the detailed design for the new bridge structure over Sixteen Mile Creek in Oakville, Ontario.

The terms of reference for the scope of work are outlined in Golder's addendum proposal letter dated October 29 2004 and forms part of the Consultant's Agreement (Number P.O.2005-A-000219) for this project. The work was carried out in accordance with the Quality Control Plan for this project dated March 2000. This report addresses the noise barrier located at the northeast side of the new structure over Sixteen Mile Creek.

2.0 SITE DESCRIPTION

The site is located on the Queen Elizabeth Way (QEW) on the east side of the Sixteen Mile Creek Valley between Trafalgar Road and Dorval Drive in Oakville, Ontario. The proposed noise barrier will be located at the northeast corner of the proposed bridge which will form the new west bound lanes (WBL) of the QEW in this area. The wall is immediately adjacent to and runs perpendicular to Sixth Line, which runs in the north south direction.

The noise barrier is located on the tableland of the Sixteen Mile Creek Valley and the topography of the site is relatively flat grassland with landscaping on adjacent residential properties.

3.0 INVESTIGATION PROCEDURES

3.1 Foundation Investigation

The field work at the noise barrier site was carried out on January 28, 2005 at which time three (3) boreholes, numbered N-1 N-2 and N-3 were advanced. The locations of these boreholes are shown on Drawing 1.

The current field investigation was carried out using a truck-mounted D 90 drill rig supplied and operated by DBW Drilling of Toronto, Ontario. The boreholes were advanced using 108 mm outside diameter (O.D.) solid stem augers. Soil samples were obtained at intervals ranging from 0.75 m to 1.5 m in depth, using a 50 mm outer diameter (O.D.) split-spoon sampler in accordance with Standard Penetration Test (SPT) procedures.

The boreholes were advanced to depths ranging from 6.3 m to 6.4 m below the existing ground surface. The groundwater conditions in the open boreholes were observed during the drilling operations and are described on the Record of Borehole sheets that follow the text of this report. Upon completion of drilling the holes were backfilled with bentonite pellets.

The field work was supervised throughout by members of our engineering and technical staff, who located the boreholes, arranged for the clearance of underground service locations, supervised the drilling, sampling and in-situ testing operations, logged the boreholes, and examined and cared for the soil and rock samples. The samples were identified in the field, placed in appropriate containers, labelled and transported to our Mississauga geotechnical laboratory where the samples underwent further detailed visual examination and laboratory testing. All of the laboratory tests were carried out to MTO and/or ASTM Standards as appropriate. Classification testing (water content, Atterberg Limits and grain size distribution) was carried out on selected samples.

The boreholes were laid out in the field by Golder Associates based on the property lines staked by URS. The locations of the as-drilled boreholes were measured in the field relative to the staked locations and the northings and eastings coordinates and elevations determined using the digital terrain mapping (DTM) were provided by URS. The borehole locations, including NAD 83 MTM northing and easting coordinates and ground surface elevations referenced to geodetic datum are shown on Drawing 1.

4.0 SITE GEOLOGY AND SUBSURFACE CONDITIONS

4.1 Regional Geology

The site is located in the physiographic region known as the Iroquois Plain. The Iroquois Plain is generally composed of shallow deposits of sand and till covering portions between Hamilton and Toronto (Chapman and Putnam, "The Physiography of Southern Ontario", 3rd Edition, 1984). The surface topography of the tableland slopes gradually and fairly uniformly towards Lake Ontario. The overburden at the site consists of a shallow cover of residual soil which is underlain by bedrock comprised of red shale of the Queenston Formation. The adjacent Sixteen Mile Creek valley has been cut through surficial deposits of glacial till as well as the Queenston shale, which is exposed on the valley walls. At the base of the valley, shallow floodplain/alluvial deposits of silty sand and clayey silt are present overlying grey shale of the Georgian Bay Formation. The Georgian Bay shale is exposed as a rock face at the base of the east slope.

4.2 Subsoil Conditions

The detailed subsurface soil and groundwater conditions encountered at each of the boreholes advanced during this investigation are provided on the Record of Borehole Sheets following the text report. Included on each of the Record of Borehole Sheets are the results of the laboratory tests carried out on selected soil samples. The stratigraphic boundaries shown on the Record of Borehole sheets are inferred from non-continuous sampling, observations of drilling progress and the results of Standard Penetration Tests (SPT). These boundaries, therefore, represent transitions between soil types rather than exact planes of geological change. Further, subsurface conditions will vary between and beyond the borehole locations. The location of the boreholes are shown on Drawing 1.

The subsoil conditions at the noise barrier site consist of a thin layer of topsoil overlying a sand deposit which in turn is underlain by a deposit of clayey silt till containing shale fragments. Bedrock of the Queenston formation was encountered below the clayey silt till deposit in each of the boreholes. A more detailed description of the subsurface conditions encountered along the length of the noise barrier is presented in the following sections.

4.2.1 Topsoil

A thin layer of topsoil ranging between 0.1 m and 0.2 m in thickness was encountered at the existing ground surface in all boreholes. The existing ground surface ranged between Elevation 109.5 m to 109.6 m.

4.2.2 Sand

A sand deposit was encountered below the topsoil in all three boreholes. The reddish-brown sand deposit contained trace to some silt, trace gravel and was encountered between Elevations 109.3 m and 109.5 m. The deposit ranges between 2.2 m and 2.4 m in thickness at the borehole locations.

The measured Standard Penetration Testing (SPT) 'N' values within the sand ranges between 8 and 100 blows per 0.3 m of penetration indicating a loose to very dense relative density. The lower 'N' values (i.e. less than 20 blows) were encountered closer to the ground surface. One grain size distribution on the sand deposit is shown on Figure 1 and indicate the sample to be predominately a fine sand.

The natural water content measured on samples of the sand deposit ranges between 7 and 22 percent.

4.2.3 Clayey Silt (Till)

A deposit of clayey silt till containing sand and trace to some gravel was encountered below the sand deposit in all boreholes. The clayey silt till was typically red in colour becoming grey with depth. Occasional shale fragments were present in the samples obtained from Boreholes N-2 and N-3. The deposits surface was encountered between Elevations 106.9 m and 107.3 m and ranged between 2.9 m and 3.2 m in thickness at the borehole locations.

It should be noted that cobbles and boulders are inherent within glacially derived materials. Evidence of cobbles was noted in Borehole N-1 by a SPT 'N' value of greater than 100 blows per 0.3 m of penetration.

Measured Standard Penetration Testing (SPT) 'N' values within the clayey silt till deposit ranged between 25 and greater than 100 blows per 0.3 m of penetration, typically the values ranged between 25 and 65 blows per 0.3 m of penetration indicating that the deposit has a very stiff to hard consistency. Two grain size distributions were performed on samples of the clayey silt till deposit and the results are shown on Figure 2.

Atterberg testing was performed on two samples within the clayey silt till deposit. The liquid limits from the two samples are 22 and 24 percent and the plastic limits from the two samples are 13 and 14 percent. The plasticity index corresponding to the measured limits are 9 and 10 respectively. The results of the two Atterberg tests on the clayey silt till are plotted on Figure 3 and indicate that the till is a clayey silt of low plasticity.

The natural water content measured on samples of the clayey silt till deposit ranges between 7 and 13 percent.

4.2.4 Bedrock

The bedrock surface was encountered between Elevations 104.0 m and 104.1 m at each of the borehole locations. The boreholes were terminated after penetrating between 0.8 m and 0.9 m into the bedrock by split spoon sampling. The samples recovered consisted of red, completely weathered, shale bedrock of the Queenston Formation. Pockets of grey limestone/siltstone were observed in the samples from Borehole N-1.

The measured Standard Penetration Testing (SPT) 'N' values from samples taken within the bedrock ranges between 60 and greater than 100 blows per 0.3 m of penetration.

One natural water content measured on the bedrock indicated a water content of about 8 percent.

4.3 Groundwater Conditions

The water levels were noted during and after the drilling operations in the boreholes and are shown on the Record of Borehole Sheets. The water level in the open boreholes upon completion of drilling was encountered at about Elevation 103.7 m in Boreholes N-1 and N-2. This water level corresponds to about the surface of the bedrock. In Borehole N-3 which is near the crest of the valley, the open borehole was dry upon completion of drilling.

It should be noted that groundwater levels in the area are subject to seasonal fluctuations and will be higher during periods of heavy precipitation.

GOLDER ASSOCIATES LTD.

Sarah E. M. Coyne, P.Eng.,
Geotechnical Engineer

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

BML/SEP/FJH/bml
N:\Active\2001\1100\011-1128\Reporting\Noise Barrier\Final\011-1128 RPT 09Sept Final Report Noise Barrier.doc

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
in 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
v	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 stress (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

(a) Index Properties (continued)

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)

(b) 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

(c) Consolidation (one-dimensional)

C_c	compression index (normally consolidated range)
C_r	recompression index (over-consolidated range)
C_s	swelling index
C_a	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	over-consolidation ratio = σ'_p/σ'_{vo}

(d) 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

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

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Golder Associates

RECORD OF BOREHOLE No N-1

1 OF 1

METRIC

PROJECT 011-1128 | W.P. 190-00-01 | LOCATION N 4812623.5 ;E 289131.7 | ORIGINATED BY PKS

DIST 4 | HWY QEW | BOREHOLE TYPE Power Auger D-90, 108mm O.D. Solid Stem Auger | COMPILED BY BML

DATUM Geodetic | DATE January 28, 2005 | CHECKED BY SEP

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
109.6	GROUND SURFACE										
0.0	Topsoil										
0.2	Sand, trace to some silt, trace gravel Loose to compact Dark brown/red Moist to wet		1	SS	11		109		○		
			2	SS	9				○		
			3	SS	21		108				
107.0			4	SS	61		107		○		
2.6	Clayey Silt with sand, trace to some gravel (Till) Very stiff to hard Reddish brown becoming grey with depth Wet		5	SS	100/.15						
			6	SS	25		106		○		
			7	SS	27		105				
104.1											
5.5	Highly to completely weathered, reddish brown SHALE BEDROCK (Queenston Formation) with pockets of limestone/siltstone					▽	104				
103.2			8	SS	60				○		
6.4	END OF BOREHOLE										

Notes:

1. Water level in open borehole at 5.8m depth (Elev. 103.8 m) upon completion of drilling.

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

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

Golder Associates

RECORD OF BOREHOLE No N-2

1 OF 1

METRIC

PROJECT 011-1128 | W.P. 190-00-01 | LOCATION N 4812600.6 ;E 289112.2 | ORIGINATED BY PKS

DIST 4 | HWY QEW | BOREHOLE TYPE Power Auger D-90, 108mm O.D. Solid Stem Auger | COMPILED BY BML

DATUM Geodetic | DATE January 28, 2005 | CHECKED BY SEP

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 + 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
109.5	GROUND SURFACE										
0.0	Topsoil										
0.2	Sand, trace to some silt, trace gravel Loose to dense Dark brown Moist		1	SS	8		109		○		
			2	SS	14						
			3	SS	75		108		○		6 83 11 0
			4	SS	100						
106.9							107				
2.6	Clayey Silt with sand, trace to some gravel, shale fragments (Till) Very stiff to hard Reddish brown becoming grey with depth Wet		5	SS	29		106		⊢●		
			6	SS	31		105				
			7	SS	52				○		
104.0							104				
5.5	Highly to completely weathered, reddish brown SHALE BEDROCK (Queenston Formation)					▽					
103.1			8	SS	100						
6.4	END OF BOREHOLE										

Notes:

1. Water level in open borehole at 5.8m depth (Elev. 103.7 m) upon completion of drilling.

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

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

MISS_MTO 011-1128.GPJ ON_MOT.GDT 6/4/05

Golder Associates

RECORD OF BOREHOLE No N-3

1 OF 1

METRIC

PROJECT 011-1128 | W.P. 190-00-01 | LOCATION N 4812572.6 ;E 289091.3 | ORIGINATED BY PKS

DIST 4 | HWY QEW | BOREHOLE TYPE Power Auger D-90, 108mm O.D. Solid Stem Auger | COMPILED BY BML

DATUM Geodetic | DATE January 28, 2005 | CHECKED BY SEP

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
109.6	GROUND SURFACE										
0.0	Topsoil										
0.1	Sand, trace to some silt, trace gravel Loose to compact Red Moist		1	SS	11		109		○		
	Mottled brown/red between 0.1m - 0.8m depth		2	SS	9						
			3	SS	51		108		○		
107.3											
2.3	Clayey Silt with Sand, trace to some gravel, with shale fragments (Till) Hard Redddish brown, becoming grey below 3.7m depth Wet		4	SS	54		107		○		18 47 35 13
			5	SS	65				○		
			6	SS	56		106				
			7	SS	57		105		○ ⊢		6 50 44 16
104.1											
5.5	Highly to completely weathered, reddish brown SHALE BEDROCK (Queenston Formation)						104				
103.3			8	SS	60/.05						
6.3	END OF BOREHOLE Notes: 1. Open borehole dry upon completion of drilling.										

$+^3, \times^3$: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

MISS_MTO 011-1128.GPJ ON_MOT.GDT 6/4/05

MINISTRY OF TRANSPORTATION, ONTARIO

METRIC
DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN.
STATIONS IN KILOMETRES + METRES.

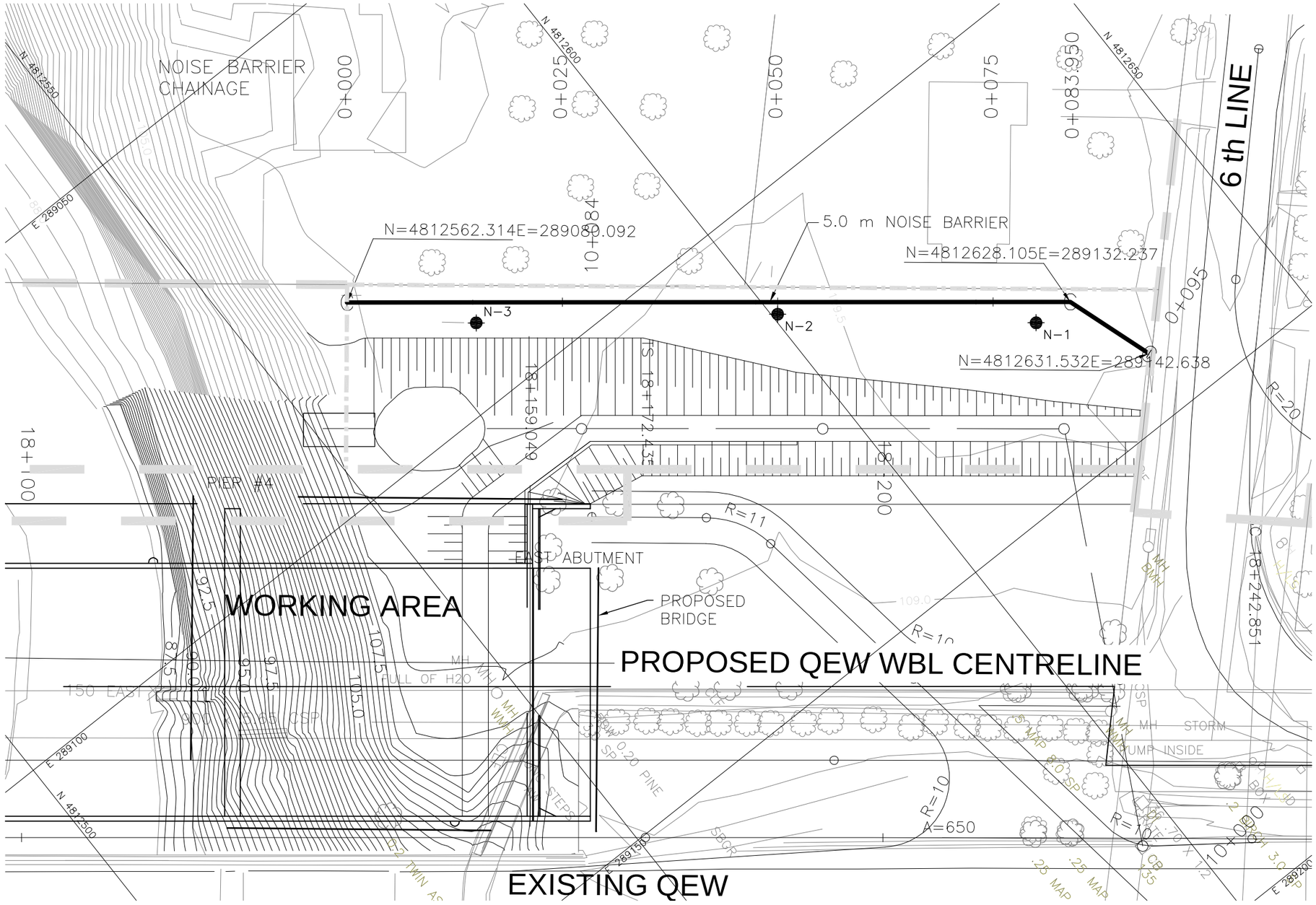
CONT No.
WP No. 190-00-01

SHEET

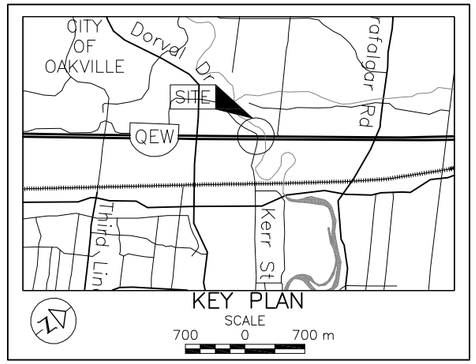
NOISE BARRIER BOREHOLE LOCATION PLAN

Golder Associates

Golder Associates Ltd.
MISSISSAUGA, ONTARIO, CANADA



PLAN
SCALE
5 0 5 10 m



LEGEND

Borehole – Current Investigation

No.	ELEVATION	CO-ORDINATES	
		NORTHING	EASTING
N-1	109.6	4812623.5	289131.7
N-2	109.5	4812600.6	289112.2
N-3	109.6	4812572.6	289091.3

NOTES

The complete foundation investigation and design report for this project and other related documents may be examined at the Materials Engineering and Research Office, Downsview. Information contained in this report and related documents is specifically excluded in accordance with Section GC 2.01 of OPS General Conditions.

This drawing is for subsurface information only. The proposed works are shown for illustration purposes only and may not be consistent with the final design configuration as shown elsewhere in the Contract Documents.

REFERENCE

Base plan provided in digital format by URS, drawing file no. nc_17900_16MileCreek.dwg date modified September 13, 2004, received March 07, 2005.

NO.	DATE	BY	REVISION

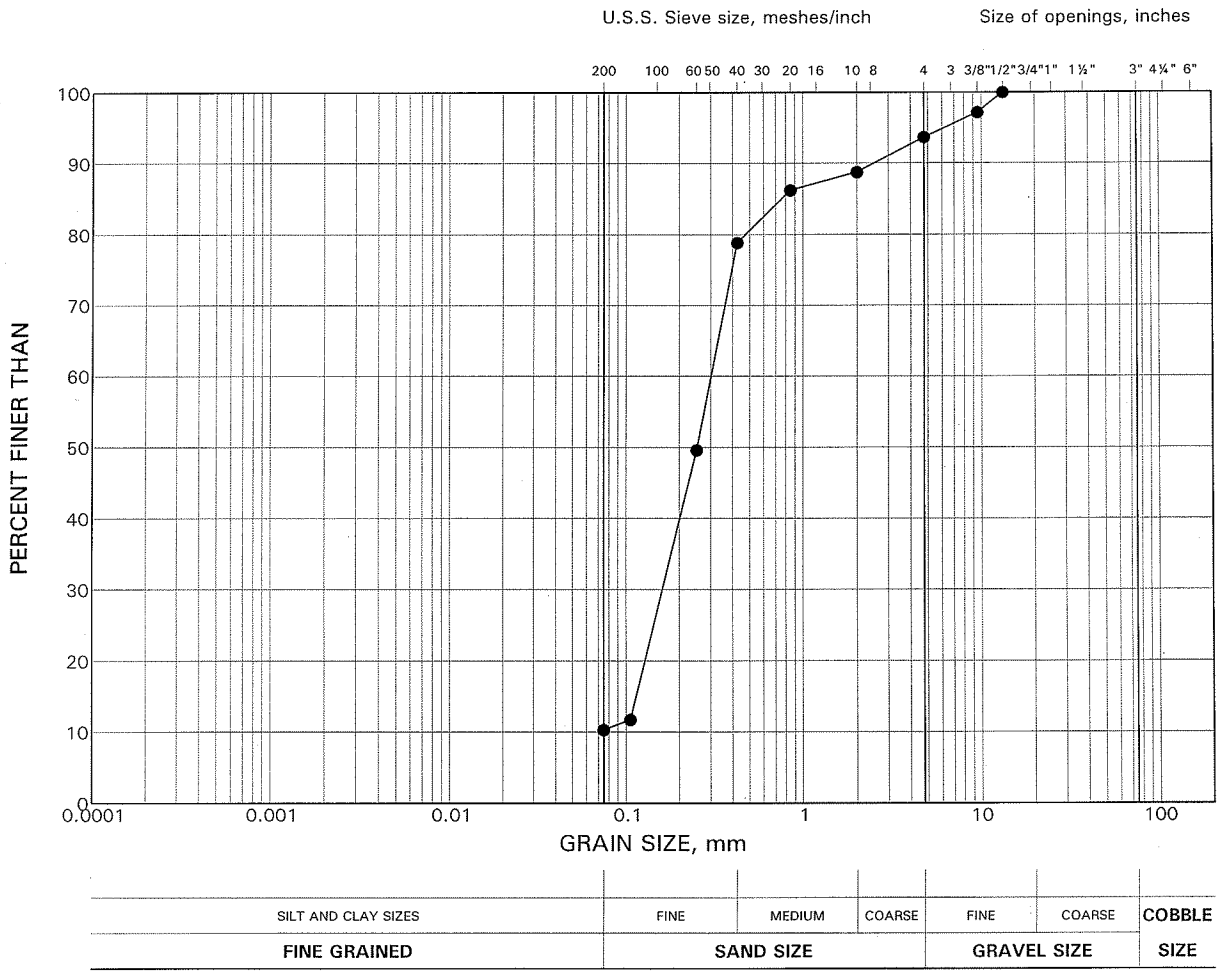
Geocres No. 30M5-261

HWY. QEW	PROJECT NO. 011-1128		DIST. 4
SUBM'D.	CHKD. BL	DATE: MAR. 2005	SITE:
DRAWN: JFC	CHKD. SEP	APPD.	DWG. 1

PLOT DATE: September 14, 2009
FILENAME: T:\Projects\2009\011-1128\-BB- (NOISE WALL)\011128BB001.dwg

GRAIN SIZE DISTRIBUTION
Sand

FIGURE 1



LEGEND

SYMBOL	BOREHOLE	SAMPLE	ELEVATION (m)
●	N-2	3	107.8

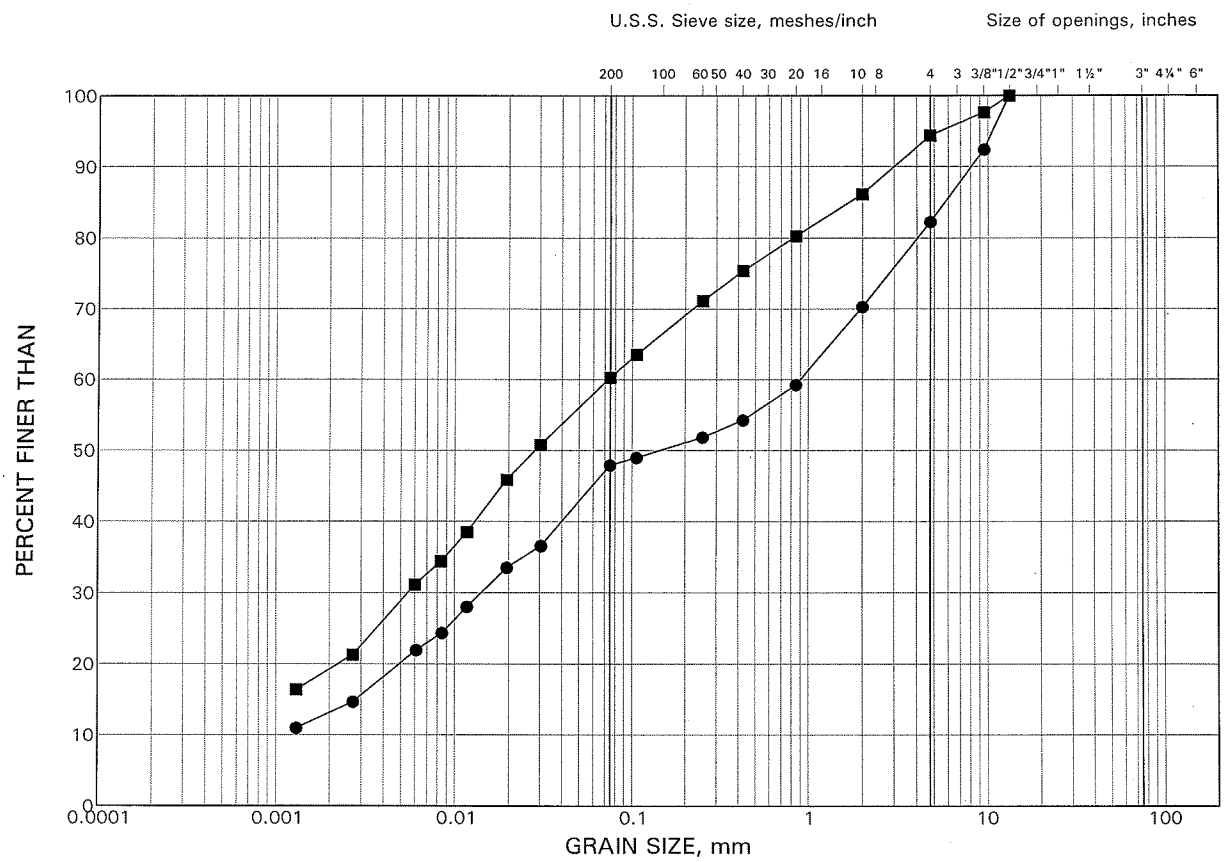
Date March 2005
Project 011-1128

Golder Associates

Prepared by LG
Checked by _____

GRAIN SIZE DISTRIBUTION
Clayey Silt (Till)

FIGURE 2



LEGEND

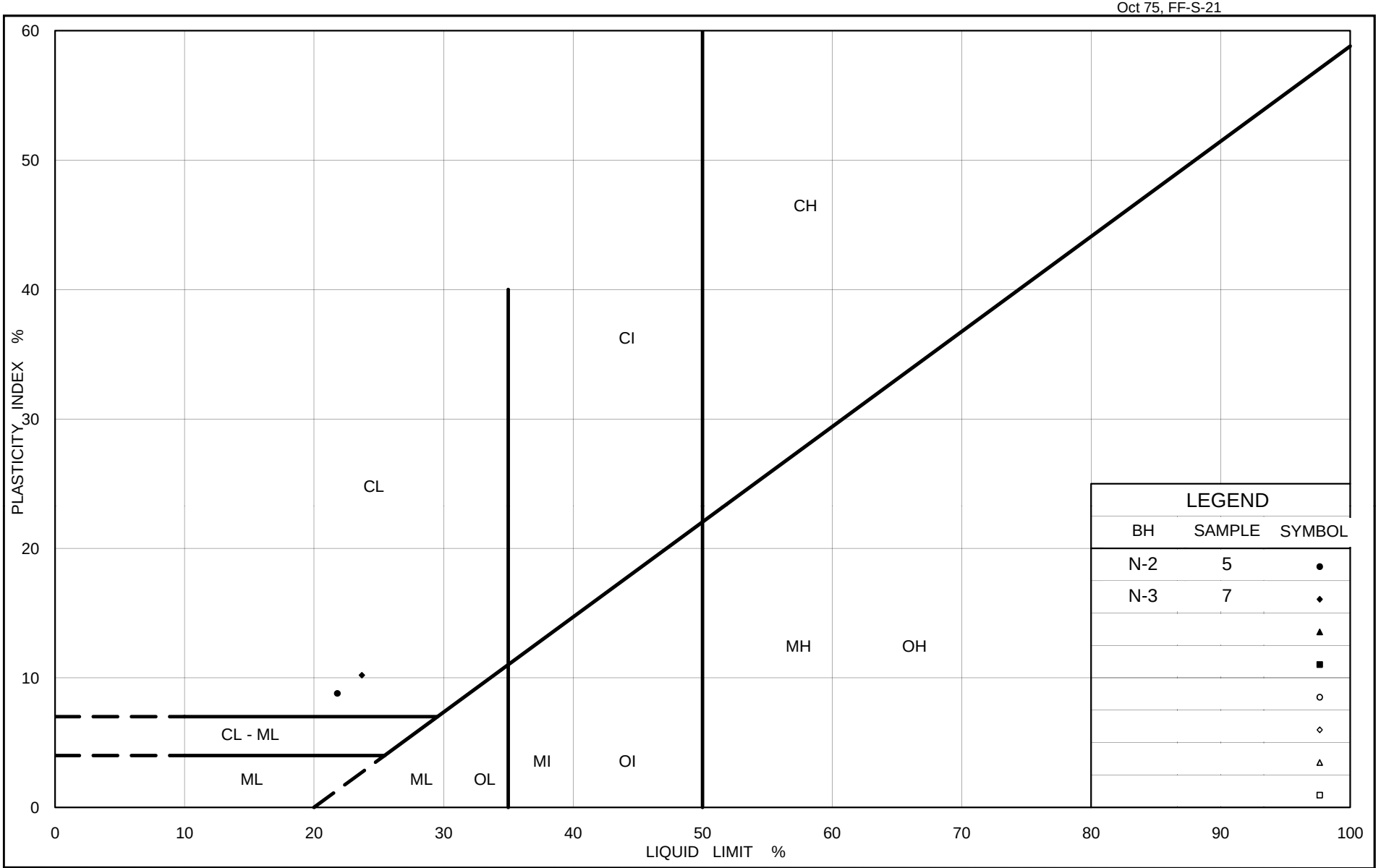
SYMBOL	BOREHOLE	SAMPLE	ELEVATION (m)
●	N-3	4	107.0
■	N-3	7	104.7

Date March 2005
Project 011-1128

Golder Associates

Prepared by LG
Checked by _____

Oct 75, FF-S-21



Ministry of Transportation

Ontario

PLASTICITY CHART
Clayey Silt (Till)

FIG No. 3

Project No. 011-1128

Date: March, 2005