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**FOUNDATION INVESTIGATION
AND DESIGN REPORT
PROPOSED HIGH MAST LIGHT POLES
QEW WIDENING
FROM THIRD LINE TO 1 KM EAST OF TRAFALGAR ROAD
OAKVILLE, ONTARIO
G.W.P 189-00-01**

Submitted to:

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

GEOCRE NO. 30M5-259

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011-1128-3 HML



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PART A

**FOUNDATION INVESTIGATION REPORT
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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 detail design of the proposed high mast light poles along the Queen Elizabeth Way (QEW) between Third Line and 1 km east of Trafalgar Road in Oakville, Ontario. This work forms part of the overall project which includes widening of the QEW, twinning of the Sixteen Mile Creek bridge structure, replacement of the Fourth Line bridge, construction of new retaining walls and culvert extensions.

This report addresses the foundation investigation and design of proposed high mast light (HML) poles along the QEW from about 1 km west of Third Line to 1 km east of Trafalgar Road. Foundation investigations were carried out by Golder in 2001/2002 and 2006/2007 as part of the overall scope of work for the widening of the QEW. For this report, the information from the current investigation has been supplemented with information from the following previous geotechnical investigations:

- *Foundation Investigation Report for W.P. 125-66-02 & 03, Site 10-275, QEW District 4, Dorval Drive Underpass, 0.4 mile West of Kerr St. Interchange*, dated 1975. Geocres No. 30M5-101.
- *Foundation Investigation Report for Trafalgar Road Interchange, QEW, District 4, Hamilton, W.P. 1-79-07*, by Associated Technical Services Limited (ATSL), dated February 1979. Geocres No. 30M5-1120.

Permission was obtained from the Regional Municipality of Halton to use the geotechnical data from the following report:

- *Geotechnical Investigation, Proposed Watermain Replacement, Oakville, Ontario*, by Golder Associates Ltd., Report No. 991-1174, dated November 1999.
- *Geotechnical Investigation, North Service Road Watermain Relocation Project (Phase 3), Sixth Line to East of Trafalgar Road, Oakville, Ontario*, by Golder Associates Ltd., Report No. 04-1111-012B-1, dated December 2005.

The terms of reference for the scope of work are outlined in Golder's proposal P01-1104, dated March 2000, that forms part of the Consultant's Agreement (Number 2005-A-000219) for this project. A digital file of the General Arrangement plan showing the proposed high mast light poles was provided to Golder by URS in December 2006.

2.0 SITE DESCRIPTION

The project study area extends along the QEW from Third Line to just east of Trafalgar Road in the Town of Oakville. The proposed high mast light poles will be located along the centre median of the QEW as well as in the northeast and southwest quadrants of both Dorval Drive and Trafalgar Road interchanges.

The existing QEW grade in this area varies from about Elevation 106 m to Elevation 115 m, generally rising westward. The roadway was constructed generally at the level of the adjacent ground with very little cut in some areas, however some sections of the roadway consist of fill embankments, such as adjacent to Dorval Drive.

3.0 INVESTIGATION PROCEDURES

3.1 Current Borehole Investigation

The field work for the subsurface investigation in the areas of the proposed high mast light poles was carried out in two phases: between December 6, 2001 and January 4, 2002; and between December 12 and December 22, 2006, during which time numerous boreholes were advanced as part of the subsurface investigations for the widening of the QEW, bridge replacements (Sixteen Mile Creek WBL and Fourth Line), new retaining walls, culvert extensions and high mast light poles. Thirty of these boreholes have been incorporated into this report for the proposed high mast light poles. Drawings 1 and 2 show the locations of these boreholes as well as the locations of selected boreholes advanced as part of previous investigation in this area considered applicable to some of the proposed high mast light pole locations.

The borehole investigations were carried out using a truck-mounted CME 75 drill rig supplied and operated by Geo-Environmental Drilling Ltd. of Milton, Ontario. The boreholes were advanced through the overburden using 100 mm outside diameter (O.D.) continuous flight solid stem augers. Soil samples were obtained at depth intervals of 0.76 m and 1.5 m, using 50 mm outer diameter split-spoon samplers (advanced with an automatic hammer) in accordance with the Standard Penetration Test (SPT) procedures.

The boreholes were advanced to depths ranging from 2.5 m to 9.2 m below the existing ground surface and were terminated within the shale bedrock. Groundwater conditions in the open boreholes were observed during the drilling operations and on completion of drilling. All of the boreholes were backfilled to the ground surface with bentonite pellets in accordance with the requirements of Ontario Regulation 903. The water level information upon completion of drilling is presented on the Record of Borehole sheets that follow the text of this report.

The field work was supervised throughout by a member of Golder's technical staff, who located the boreholes, arranged for the clearance of underground service locations, observed the drilling, sampling and in situ testing operations, logged the boreholes, and examined and cared for the soil samples. The samples were identified in the field, placed in appropriate containers, labelled and transported to Golder's Mississauga geotechnical laboratory where the samples underwent further visual examination and laboratory classification testing on selected soils which includes water contents, Atterberg Limits and grain size distributions. All of the laboratory tests were carried out to MTO and/or ASTM Standards as appropriate.

The as-drilled borehole locations and elevations were measured by Golder relative to survey stakes established by Callon Dietz Inc. The borehole positions are in terms of MTM NAD 83

northing and easting coordinates; this information together with the ground surface elevations (referenced to geodetic datum) are presented on the Record of Borehole sheets that follow the text of this report and on Drawings 1 and 2.

3.2 Previous Borehole Investigation

In addition to the foundation investigation carried out by Golder as part of the current assignment, use has been made of seven boreholes from previous investigations in this area referenced in Section 1.0 and as noted below. The location of the various boreholes from the previous investigation have been converted to MTM NAD83 coordinates, as presented on Drawings 1 and 2.

- Boreholes 5, 6 and 8: *1975 Foundation Investigation Report*. Geocres No. 30M5-101.
- Borehole 38: *1979 Foundation Investigation Report*, by Associated Technical Services Limited (ATSL). Geocres No. 30M5-1120.
- Borehole BH1: *1999 Geotechnical Investigation Report*, by Golder Associates Ltd. Report No. 991-1174.
- Boreholes BH05-6 and BH05-9: *2005 Geotechnical Investigation Report*, by Golder Associates Ltd. Report No. 04-1111-012B-1.

The Record of Borehole sheets for the above referenced boreholes are presented in Appendices A to D.

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 in the area between Hamilton and Toronto¹. The surface topography slopes down gradually and fairly uniformly towards Lake Ontario. The overburden in the general area of the site consists of a shallow cover of clayey silt till and residual soil which is underlain by bedrock comprised of red shale of the Queenston Formation.

4.2 Subsurface Conditions

The detailed subsurface soil, bedrock and groundwater conditions as encountered in the boreholes advanced during the current investigations, together with the results of the laboratory tests carried out on selected soil samples, are given on the attached Record of Borehole sheets and on Figures 1 to 3 following the text of this report. 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 (SPTs). 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.

In general, the subsoils at the site consist of a layer of asphalt/road base fill or topsoil, underlain by fill materials of varying composition. The fill was underlain by clayey silt till, clayey silt residual soil, silty sand and gravel till and shale bedrock of the Queenston Formation. Details of the subsurface conditions are given below.

4.2.1 Asphalt / Topsoil

The boreholes put down through the existing roadway (Boreholes H2, H7 and most of the Boreholes W19 to W40) penetrated between 0.1 m and 0.3 m of asphalt pavement. Most of the other boreholes encountered a 0.2 m thick layer of silty sand topsoil (Boreholes H3, H4 and H6) or a 0.1 m to 0.5 m thick layer of clayey topsoil (Boreholes H9, H11, S13 and S14) at the ground surface. Fill of varying composition was encountered at the remaining borehole locations, either at the ground surface or immediately below the asphalt or topsoil layer (see Section 4.2.2)

¹ Chapman, L.J. and Putnam, D.F., 1984. The Physiography of Southern Ontario, 3rd Edition (Ontario Geological Survey, Special Volume 2). Ontario Ministry of Natural Resources.

4.2.2 Fill

A 0.2 m to 5.3 m thick layer of fill of varying composition was encountered either immediately below the topsoil/asphalt, where present, or at ground surface in all of the boreholes except Boreholes H9, H10 and S14. The base of the fill extends to between about Elevation 97.3 m and Elevation 113.6 m.

The measured Standard Penetration Test (SPT) 'N' values within the fill layers ranged between 5 blows per 0.3 m of penetration to 50 blows per 0.08 m of penetration, with the higher values in the sand and gravel fill. The SPT 'N' values indicate a loose to very dense relative density in the cohesionless fill and a firm to very stiff consistency in the cohesive fill.

The measured water contents of selected samples of sand and gravel fill ranged between 1 percent to 7 percent and water contents of selected samples of the clayey silt/silty clay fill ranged between 6 percent and 21 percent. Atterberg limits test carried out on one sample of the clayey silt fill yielded a plastic limit of 20 percent and a liquid limit of 31 percent, corresponding to a plasticity index of 11 percent. This result, which is plotted on Figure 1, classify this fill as a clayey silt of low plasticity.

4.2.3 Clayey Silt Till

A till deposit ranging in thickness between about 0.5 m and 3.2 m was encountered underlying the silty sand, sand and gravel, and clayey silt fill in Boreholes H4, W1, W5, W23, W24, W39, W40, S13 and CU1. The till deposit consists of clayey silt with sand and trace gravel. The surface of the clayey silt till was encountered between Elevation 104.0 m and Elevation 113.5 m.

Measured SPT 'N' values within the clayey silt till ranged from 9 blows to 30 blows per 0.3 m of penetration with one value as high as 75 blows for 0.25 m of penetration, indicating a stiff to hard consistency.

The measured water content of selected samples of the fill ranged between about 4 percent and 22 percent. The results of the Atterberg limits testing on one sample of the till, presented on Figure 2, yielded a plastic limit of 21 percent and a liquid limit of 32 percent, corresponding to a plasticity index of 11 percent, classifying the till as a clayey silt of low plasticity.

In Borehole W37, a 0.7 m thick layer of silty clay was penetrated between the fill and the underlying residual soil. Laboratory testing on one sample of silty clay yielded a water content of about 17 percent; a plastic limit of 24 percent and a liquid limit of 47 percent, corresponding to a

plasticity index of 23 percent. The Atterberg limits test results, presented on Figure 2, classify this material as a clayey silt/silty clay of medium plasticity.

4.2.4 Silty Sand and Gravel Till

A deposit of silty sand and gravel till containing trace gravel and occasional cobbles between 1.2 m and 4.7 m thick was encountered beneath the fill and clayey silt till deposit in Boreholes W31 and W33. The top of the silty sand and gravel till deposit was encountered between Elevation 110.1 m and 113.6 m.

Measured SPT 'N' values within the silty sand and gravel till ranged between 18 blows to 90 blows per 0.3 m of penetration with one blow count as high as 50 blows per 0.15 m of penetration, indicating a compact to very dense relative density.

The measured water contents of selected samples of the silty sand and gravel deposit about 4 percent.

4.2.5 Clayey Silt (Residual Soil)

A deposit of clayey silt residual soil containing trace to some sand, trace gravel and trace shale fragments was encountered beneath the fill and till, where present, overlying bedrock in Boreholes H1 to H4, H7, and H9 to H11. In Boreholes W9, W18, W22, W34, W35 and W37 the residual soil did not appear to retain any of the underlying highly weathered shale structure and was described as a clayey silt. The top of the clayey silt residual soil deposit was encountered between Elevation 97.3 m and Elevation 110.3 m, and the deposit was found to be between 0.3 m and 3.2 m thick. In Borehole S14, a 1.8 m thick layer of silty sand with a trace of clay and gravel was encountered directly overlying the bedrock.

Measured SPT 'N' values within the clayey silt residual soil deposit typically ranged between 6 blows and 60 blows per 0.3 m of penetration but with blow counts as high as 70 blows per 0.25 m of penetration, indicating a firm to hard consistency.

The measured water contents of selected samples of the clayey silt residual soil ranged between 9 percent and 17 percent. The grain size distribution analysis on one sample of the clayey silt residual soil is shown on Figure 3.

4.2.6 Bedrock

Shale bedrock was encountered in all boreholes underlying either the fill, clayey silt till, clayey silt residual soil or the silty sand and gravel till deposit where present between Elevation 97.0 m and 112.2 m. The boreholes were advanced into the shale bedrock for depths ranging between 0.6 m and 6.4 m by augering and split spoon sampling. Grey limestone/siltstone interbeds were noted (based on auger resistance) in the majority of the boreholes.

Based on strength testing completed on the rock core samples from boreholes put down for other aspects of the project, the shale bedrock is very weak to medium-strong below the upper completely to highly weathered portion. SPT 'N' values within the shale ranged from 46 blows per 0.3 m of penetration to 50 blows per 0.01 m of penetration.

Laboratory testing of selected samples of the weathered upper portion of the shale yielded water contents ranging between 4 percent and 14 percent. Laboratory tests on one sample of the shale bedrock yielded a plastic limit of 24 percent and liquid limit of 36 percent, corresponding to a plasticity index of 12 percent, classifying the weathered shale as a clayey silt of medium plasticity.

4.2.7 Groundwater Conditions

The water levels in the boreholes advanced by Golder in 2001/2002 and in 2006 were noted during and after drilling operations in the boreholes; typically the open boreholes were dry upon completion of drilling. Piezometers were installed in four of the boreholes that are included in this report, sealed within the shale bedrock or clayey silt residual soil. Details of the piezometer installations are shown on the Record of Borehole sheets following the text of this report.

The water level conditions in the boreholes advanced as part of previous investigations are presented on the borehole records in Appendices A to D.

Typically, the water level measured in the piezometers varied from about 1.9 m to 7.0 m below ground surface at the site, except for BH1 which was dry on the date of measurement. The recorded water levels in the piezometers are summarised below.

<i>Borehole Number</i>	<i>Ground Surface Elevation</i>	<i>Depth to Water Level</i>	<i>Water Level Elevation</i>	<i>Date of Measurement</i>
W9	107.3 m	2.1 m	105.2 m	February 13, 2007
W35	106.0 m	1.9 m	104.1 m	February 13, 2007
F10	110.5 m	2.1 m	108.4 m	June 10, 2002



<i>Borehole Number</i>	<i>Ground Surface Elevation</i>	<i>Depth to Water Level</i>	<i>Water Level Elevation</i>	<i>Date of Measurement</i>
CU1	115.0 m	3.6 m	102.6 m	February 13, 2007
BH1	107.0 m	Dry	Dry	October 27, 1999
BH05-6	107.8 m	4.9 m	102.6 m	June 12, 2005
BH05-9	109.4 m	7.0 m	103.5 m	June 12, 2005

It should be noted that groundwater levels in the area are subject to seasonal fluctuations and precipitation events and may also be affected by housing development and buried services in the vicinity of the interchange.

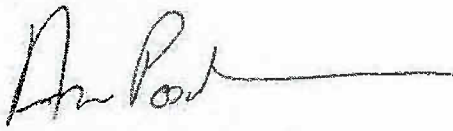
5.0 CLOSURE

The field technician supervising the drilling program in 2001/2002 and 2006 were Messrs. Gerard DeFreitas and Chris Radway, CET, respectively. This report was prepared by Ms. Nikol Kochmanová, EIT, and Mr. Christopher Ng, P.Eng., an intermediate geotechnical engineer and the technical aspects were reviewed by Ms. Anne Poschmann, P.Eng., Principal. Mr. Jorge Costa, P.Eng., a Designated MTO Contact for Golder, conducted a quality control review of the report.

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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

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

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.)

(b) Cohesive Soils

Consistency

	c_u, s_u	kPa	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

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 cm² 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.

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 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 $= \sigma'_p / \sigma'_{vo}$

(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 $= \tan \delta$
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 $= (\text{compressive strength})/2$
 - * density symbol is ρ . Unit weight symbol is γ where $\gamma = \rho g$ (i.e. mass density x acceleration due to gravity)

PROJECT <u>011-1128</u>		RECORD OF BOREHOLE No H1		1 OF 1 METRIC	
G.W.P. <u>189-00-01</u>		LOCATION <u>N 4813365.0 ; E 289777.0</u>		ORIGINATED BY <u>ANB</u>	
DIST <u>4</u> HWY <u>QEW</u>		BOREHOLE TYPE <u>CME 75, 100mm O.D. Solid Stem Auger</u>		COMPILED BY <u>SEP</u>	
DATUM <u>Geodetic</u>		DATE <u>December 12, 2001</u>		CHECKED BY <u>ASP</u>	

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC NATURAL LIQUID LIMIT MOISTURE LIMIT CONTENT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa		WATER CONTENT (%)				
								○ UNCONFINED ● QUICK TRIAXIAL	+ FIELD VANE × REMOULDED	W _p	W	W _L		
106.2 0.0	GROUND SURFACE Silty sand with gravel, trace clay (FILL) Brown to red-brown Moist													
105.4 0.8	CLAYEY SILT, trace sand and gravel, trace shale fragments (Residual Soil) Very stiff Red-brown Moist		1	SS	24									
104.9 1.4	SHALE BEDROCK (Queenston Formation) Red-brown and grey Grey, siltstone/limestone layers present at depths of 3.8 m and 4.6 m. Grinding of augers periodically between depths of 3.9 m and 4.4 m.		2	SS	50/15									
			3	SS	50/06									
			4	SS	50/08									
			5	SS	50/02									
101.6 4.6	END OF BOREHOLE Notes: 1. Open borehole dry upon completion of drilling.		6	SS	50/02									

MIS-MTO 001 011-1128.GPJ GAL-MISS.GDT 21/9/09

PROJECT 011-1128			RECORD OF BOREHOLE No H2			1 OF 1 METRIC											
G.W.P. 189-00-01			LOCATION N 4813186.0 ; E 289644.0			ORIGINATED BY ANB											
DIST 4 HWY QEW			BOREHOLE TYPE CME 75, 100mm O.D. Solid Stem Auger			COMPILED BY SEP											
DATUM Geodetic			DATE December 12, 2001			CHECKED BY ASP											
SOIL PROFILE			SAMPLES			DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT			REMARKS & GRAIN SIZE DISTRIBUTION (%)		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × REMOULDED			WATER CONTENT (%) W _p — W — W _L			γ			
106.5	GROUND SURFACE							20 40 60 80 100									
0.0	ASPHALT																
0.3	Crushed gravel (FILL) Brown Moist																
105.1	CLAYEY SILT, some sand, trace gravel (Residual Soil) Hard		1	SS	60		106										
1.4	Red-brown and grey Moist		2	SS	50/08		105										
	SHALE BEDROCK (Queenston Formation) Red-brown and grey		3	SS	50/08		104										
	Grinding of augers at depths of 2.0 m, 3.7 m and 3.8 m.		4	SS	50/08		103										
			5	SS	50/08		102										
101.9	END OF BOREHOLE		6	SS	50/02												
4.6	Notes: 1. Open borehole dry upon completion of drilling.																

PROJECT 011-1128			RECORD OF BOREHOLE No H3			1 OF 1 METRIC												
G.W.P. 189-00-01		LOCATION N 4812891.0 ; E 289410.0		ORIGINATED BY ANB														
DIST 4 HWY QEW		BOREHOLE TYPE CME 75, 100mm O.D. Solid Stem Auger		COMPILED BY SEP														
DATUM Geodetic		DATE December 12, 2001		CHECKED BY ASP														
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa								WATER CONTENT (%)		
								20 40 60 80 100	20 40 60 80 100	20 40 60 80 100						10 20 30	10 20 30	10 20 30
107.3	GROUND SURFACE																	
0.0	TOPSOIL, silty sand Brown Moist																	
106.7	Crushed gravel (FILL) Brown Moist																	
0.6	CLAYEY SILT, trace sand and shale and limestone/siltstone fragments (Residual Soil) Firm to very stiff Red-brown Moist		1	SS	12													
			2	SS	6													
			3	SS	21													
			4	SS	16													
103.5																		
3.8	SHALE BEDROCK (Queenston Formation) With interbedded grey siltstone/limestone, wet to dry Red-brown Grinding of augers from depths of 3.8 m to 4.1 m and 4.3 m to 4.6 m.		5	SS	50/02													
			6	SS	50/02													
			7	SS	50/02													
			8	SS	50/02													
99.7			9	SS	50/02													
7.6	END OF BOREHOLE Notes: 1. Water level in open borehole at a depth of 7.2m (Elev.100.1m) upon completion of drilling.																	

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PROJECT 011-1128			RECORD OF BOREHOLE No H4			1 OF 1 METRIC												
G.W.P. 189-00-01			LOCATION N 4812694.0 ; E 289256.0			ORIGINATED BY ANB												
DIST 4 HWY QEW			BOREHOLE TYPE CME 75, 100mm O.D. Solid Stem Auger			COMPILED BY SEP												
DATUM Geodetic			DATE December 12, 2001			CHECKED BY ASP												
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa								WATER CONTENT (%)		
								20 40 60 80 100	20 40 60 80 100	20 40 60 80 100						10 20 30	10 20 30	10 20 30
107.4	GROUND SURFACE																	
0.0	TOPSOIL, silty sand																	
0.2	Brown Moist																	
	Silty sand, trace to some gravel, trace clay (FILL)																	
106.2	Loose Brown Moist		1	SS	7													
1.2	CLAYEY SILT, with sand, trace gravel (TILL) Stiff to hard Grey Moist		2	SS	11													
			3	SS	33													
104.5	CLAYEY SILT, trace sand and gravel (Residual Soil) Hard Red-brown Moist		4	SS	49													
2.9																		
103.4	SHALE BEDROCK (Queenston Formation) with grey, limestone/siltstone interbeds Red-brown		5	SS	50/10													
4.0	Grinding of augers at a depth of 5.3 m.		6	SS	50/10													
			7	SS														
			8	SS	50/02													
99.8			9	SS	50/02													
7.6	END OF BOREHOLE																	
Notes: 1. Borehole caved at a depth of 1.5 m upon completion of drilling. 2. Water level in open borehole measured at a depth of 1.2 m (Elev. 106.2 m) upon completion of drilling. 3. Spoon bouncing at a depth of 6.1 m (no sample).																		

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PROJECT		RECORD OF BOREHOLE				No H5		1 OF 1		METRIC						
G.W.P. 189-00-01		LOCATION		N 4812159.0 ; E 288886.0		ORIGINATED BY		PKS								
DIST 4 HWY QEW		BOREHOLE TYPE		CME 75, 100mm O.D. Solid Stem Auger		COMPILED BY		SEP								
DATUM Geodetic		DATE		January 4, 2002		CHECKED BY		ASP								
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa								
111.9 0.0	GROUND SURFACE Crushed sand and gravel (FILL)															
111.3 0.6	Clayey silt, some sand and gravel, trace shale fragments (FILL) Firm to stiff Red-brown to brown Moist		1	SS	9											
109.6 2.3	SHALE BEDROCK (Queenston Formation) with grey limestone/siltstone interbeds Red-brown		2	SS	9											
			3	SS	50/08											
			4	SS	75/15											
			5	SS	75/13											
105.8 6.1	END OF BOREHOLE Notes: 1. Water level at a depth of 6.0 m (Elev. 105.9 m) upon completion of drilling.		6	SS	50/05											

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PROJECT <u>011-1128</u>		RECORD OF BOREHOLE No H6		1 OF 1 METRIC	
G.W.P. <u>189-00-01</u>		LOCATION <u>N 4811546.0 ; E 288291.0</u>		ORIGINATED BY <u>ANB</u>	
DIST <u>4</u> HWY <u>QEW</u>		BOREHOLE TYPE <u>CME 75, 100mm O.D. Solid Stem Auger</u>		COMPILED BY <u>SEP</u>	
DATUM <u>Geodetic</u>		DATE <u>December 14, 2001</u>		CHECKED BY <u>ASP</u>	

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa								
								○ UNCONFINED	+ FIELD VANE	● QUICK TRIAXIAL	× REMOULDED					
115.4	GROUND SURFACE															
0.0	TOPSOIL, silty sand															
0.2	Brown Moist		1	AS												
	Sand and gravel to gravelly sand, trace silt and clay (FILL)		2	SS	50/08											
114.0	Dense Brown Moist															
1.4	Clayey silt with sand, trace gravel (FILL)		3	SS	10											
113.3	Firm Brown to red-brown															
2.1	Moist															
	Silty sand, trace gravel and shale fragments (FILL)		4	SS	23											
	Compact Dark brown Moist		5	SS	12											
111.3																
4.1	SHALE BEDROCK (Queenston Formation)		6	SS	50/08											
	Red-brown		7	SS	50/02											
			8	SS	50/02											
107.8			9	SS	50/02											
7.6	END OF BOREHOLE															
	Notes: 1. Open borehole dry upon completion of drilling.															

PROJECT 011-1128			RECORD OF BOREHOLE No H7			1 OF 1 METRIC									
G.W.P. 189-00-01			LOCATION N 4811344.0 ; E 288142.0			ORIGINATED BY ANB									
DIST 4 HWY QEW			BOREHOLE TYPE CME 75, 100mm O.D. Solid Stem Auger			COMPILED BY SEP									
DATUM Geodetic			DATE December 14, 2001			CHECKED BY ASP									
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa							
112.2 0.0	GROUND SURFACE ASPHALT		1	AS											
	Crushed gravel (FILL) Brown														
111.4 0.8	Silty sand, trace gravel (FILL) Brown Moist		2	SS	11										
	Clayey silt, trace to some sand, trace gravel (FILL) Stiff to very stiff Brown to red-brown Moist		3	SS	16										
110.1 2.1	CLAYEY SILT, trace sand to some shale fragments (Residual Soil) Firm to stiff Red-brown Moist		4	SS	6										
			5	SS	10										
108.2 4.0	SHALE BEDROCK (Queenston Formation) with occasional grey limestone/siltstone fragments Red-brown and grey		6	SS	50/05										
			7	SS	50/02										
			8	SS	50/02										
104.6 7.6	END OF BOREHOLE		9	SS	50/02										
Notes: 1. Borehole caved at a depth of 3.6 m upon completion of drilling. 2. Water level in open borehole at a depth of 3.3 m (Elev.108.9 m) upon completion of drilling.															

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PROJECT <u>011-1128</u>		RECORD OF BOREHOLE No H8		1 OF 1 METRIC	
G.W.P. <u>189-00-01</u>		LOCATION <u>N 4810808.0 ; E 287692.0</u>		ORIGINATED BY <u>ANB</u>	
DIST <u>4</u> HWY <u>QEW</u>		BOREHOLE TYPE <u>CME 75, 100mm O.D. Solid Stem Auger</u>		COMPILED BY <u>SEP</u>	
DATUM <u>Geodetic</u>		DATE <u>December 14, 2001</u>		CHECKED BY <u>ASP</u>	


SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa		WATER CONTENT (%)				
								20 40 60 80 100	W _p	W	W _L			
							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × REMOULDED							
111.2	GROUND SURFACE													
0.0	Crushed gravel (FILL) Brown						111							
110.4														
0.8	Clayey silt, trace sand and gravel (FILL) Very stiff		1	SS	16		110			○				
109.8	Brown to red-brown Moist		2	SS	50/13									
1.4	SHALE BEDROCK (Queenston Formation) with grey limestone/siltstone interbeds Red-brown		3	SS	50/02		109							
			4	SS	50/05		108							
			5	SS	50/10		107							
106.5			6	SS	50/10									
4.7	END OF BOREHOLE													
	Notes: 1. Open borehole dry upon completion of drilling.													

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PROJECT <u>011-1128</u>		RECORD OF BOREHOLE No H9		1 OF 1 METRIC	
G.W.P. <u>189-00-01</u>		LOCATION <u>N 4810305.0 ; E 287280.0</u>		ORIGINATED BY <u>PKS</u>	
DIST <u>4</u> HWY <u>QEW</u>		BOREHOLE TYPE <u>CME 75, 100mm O.D. Solid Stem Auger</u>		COMPILED BY <u>SEP</u>	
DATUM <u>Geodetic</u>		DATE <u>January 4, 2002</u>		CHECKED BY <u>ASP</u>	

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × REMOULDED		WATER CONTENT (%) W _p — W — W _L				
108.5	GROUND SURFACE													
0.1	TOPSOIL													
107.6	CLAYEY SILT, trace sand and gravel (Residual Soil) Stiff													
0.9	Red-brown Moist		1	SS	100									
	SHALE BEDROCK (Queenston Formation) with occasional grey shale beds Red		2	SS	75/15									
			3	SS	50/05									
103.9			4	SS	50/05									
4.6	END OF BOREHOLE													
	Note: 1. Open borehole dry upon completion of drilling.													

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PROJECT 011-1128			RECORD OF BOREHOLE No H10			1 OF 1 METRIC												
G.W.P. 189-00-01			LOCATION N 4810033.0 ; E 287060.0			ORIGINATED BY ANB												
DIST 4 HWY QEW			BOREHOLE TYPE CME 75, 100mm O.D. Solid Stem Auger			COMPILED BY SEP												
DATUM Geodetic			DATE December 14, 2001			CHECKED BY ASP												
SOIL PROFILE			SAMPLES			DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT			REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × REMOULDED			WATER CONTENT (%) W _p — W — W _L			γ				
110.3 0.0	GROUND SURFACE CLAYEY SILT, trace sand (Residual Soil) Very stiff Red-brown Moist		1	SS	23		110											
108.9 1.4	SHALE BEDROCK (Queenston Formation) Red-brown		2	SS	50/10		109											
			3	SS	50/15		108											
			4	SS	50/08		107											
			5	SS	50/02		106											
			6	SS	50/01		105											
104.2 6.1	END OF BOREHOLE Notes: 1. Open borehole dry upon completion of drilling.		7	SS	50/02													




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PROJECT <u>011-1128</u>		RECORD OF BOREHOLE No H11		1 OF 1 METRIC	
G.W.P. <u>189-00-01</u>		LOCATION <u>N 4812425.1 ; E 289050.6</u>		ORIGINATED BY <u>ANB</u>	
DIST <u>4</u> HWY <u>QEW</u>		BOREHOLE TYPE <u>CME 75, 100mm O.D. Solid Stem Auger</u>		COMPILED BY <u>SEP</u>	
DATUM <u>Geodetic</u>		DATE <u>December 17, 2001</u>		CHECKED BY <u>ASP</u>	

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa					WATER CONTENT (%)				GR	SA	SI	CL
								20	40	60	80	100	W _p	W	W _L					
100.8	GROUND SURFACE																			
0.0	TOPSOIL																			
0.2	Clayey silt, some sand, trace gravel, shale pieces, trace organics, rootlets (FILL) Firm Red Moist		1	SS	6															
			2	SS	7															
			3	SS	8															
			4	SS	5															
97.3																				
97.0	CLAYEY SILT, trace sand and gravel (Residual Soil) Very stiff Red		5	SS	46															
3.8	SHALE BEDROCK (Queenston Formation) Red-brown		6	SS	107/20															
95.9	END OF BOREHOLE Auger Refusal																			
4.9	Notes: 1. Open borehole dry upon completion of drilling.																			

PROJECT 011-1128			RECORD OF BOREHOLE No W1			1 OF 1 METRIC											
G.W.P. 189-00-01			LOCATION N 4813284.1 ; E 289704.1			ORIGINATED BY CR											
DIST 4 HWY QEW			BOREHOLE TYPE CME 75, 100mm O.D. Solid Stem Auger			COMPILED BY NK											
DATUM Geodetic			DATE December 14, 2006			CHECKED BY CN											
SOIL PROFILE			SAMPLES			DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT			REMARKS & GRAIN SIZE DISTRIBUTION (%)		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × REMOULDED			WATER CONTENT (%) W _p — W — W _L			γ kN/m ³	GR SA SI CL		
							20 40 60 80 100				10 20 30						
106.3	GROUND SURFACE																
0.0	ASPHALT																
0.2	Sand and gravel, trace silt (FILL) Compact		1	SS	19		106										
105.6	Reddish brown																
0.7	Moist CLAYEY SILT, some to trace sand, trace gravel, containing sand seams (TILL) Very stiff to hard Reddish brown to grey, mottled Moist		2	SS	22		105										
			3	SS	33												
103.9	Grinding of augers noted at a depth of 2.29 m		4	SS	50/0.08		104										
2.4	SHALE BEDROCK Reddish to grey																
			5	SS	50/0.13		103										
							102										
101.7	END OF BOREHOLE		6	SS	50/0.08												
4.6	Notes: 1. Open borehole dry upon completion of drilling.																

PROJECT <u>011-1128</u>		RECORD OF BOREHOLE No W5		1 OF 1 METRIC	
G.W.P. <u>189-00-01</u>		LOCATION <u>N 4813038.0 ; E 289523.3</u>		ORIGINATED BY <u>CR</u>	
DIST <u>4</u> HWY <u>QEW</u>		BOREHOLE TYPE <u>CME 75, 100mm O.D. Solid Stem Auger</u>		COMPILED BY <u>NK</u>	
DATUM <u>Geodetic</u>		DATE <u>December 12, 2006</u>		CHECKED BY <u>CN</u>	

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa										WATER CONTENT (%)		
								○ UNCONFINED	+ FIELD VANE	● QUICK TRIAXIAL	× REMOULDED									
107.5	GROUND SURFACE																			
0.0	Silty sand and gravel (FILL) Loose to compact Brown Moist		1	SS	5															
106.4			2	SS	10															
106.1	Sandy silt, trace gravel, contains topsoil (FILL) Compact																			
1.4	Brown to dark brown Moist to wet		3	SS	50															
105.6	CLAYEY SILT, trace sand, trace gravel (TILL) Hard																			
1.9	Reddish brown to grey, mottled Moist to wet		4	SS	55/0.13															
105.0	SHALE BEDROCK Reddish brown																			
2.5	Grinding of augers noted at depths 1.98 to 2.08 m END OF BOREHOLE																			
	Notes: 1. Water level in open borehole at a depth of 1.8 m (perched) during drilling. 2. Water level in open borehole at a depth of 1.8 m (Elev. 105.7 m) upon completion of drilling.																			

PROJECT 011-1128			RECORD OF BOREHOLE No W9			1 OF 1 METRIC													
G.W.P. 189-00-01			LOCATION N 4812803.2; E 289325.0			ORIGINATED BY CR													
DIST 4 HWY QEW			BOREHOLE TYPE CME 75, 100mm O.D. Solid Stem Auger			COMPILED BY NK													
DATUM Geodetic			DATE December 12, 2006			CHECKED BY CN													
SOIL PROFILE			SAMPLES			DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT			REMARKS & GRAIN SIZE DISTRIBUTION (%)				
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × REMOULDED			WATER CONTENT (%) W _p — W — W _L			γ					
107.3 0.0	GROUND SURFACE TOPSOIL		1	SS	8		107												
106.8 0.6	Sandy silt, trace gravel, trace organics (FILL) Loose Brown Moist Clayey silt, trace to some sand, some gravel, contains topsoil (FILL) Firm Brown Moist to wet		2	SS	7		106												
105.1 2.2	CLAYEY SILT, some sand, some gravel, contains cobbles (TILL) Hard Reddish brown Wet		3	SS	50/0.13		105												
104.1 3.2	SHALE BEDROCK Reddish brown		4	SS	46		104												
102.5 4.8	Grinding of augers noted at depths 4.57 m to 4.65 m Auger refusal at a depth of 4.78 m END OF BOREHOLE		5	SS	55/0.08		103												
	Notes: 1. Water level in open borehole at a depth of 1.5 m during drilling. 2. Water level in open borehole at a depth of 2.1 m (Elev. 105.2 m) upon completion of drilling. 3. Water level in piezometer at a depth of 2.1 m (Elev. 105.2 m) on February 13, 2007.		6	SS	50/0.08														

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PROJECT <u>011-1128</u>		RECORD OF BOREHOLE No W18				1 OF 1 METRIC	
G.W.P. <u>189-00-01</u>		LOCATION <u>N 4810943.8 ; E 287813.3</u>				ORIGINATED BY <u>CR</u>	
DIST <u>4</u> HWY <u>QEW</u>		BOREHOLE TYPE <u>CME 75, 100mm O.D. Solid Stem Auger</u>				COMPILED BY <u>NK</u>	
DATUM <u>Geodetic</u>		DATE <u>December 17, 2006</u>				CHECKED BY <u>CN</u>	

SOIL PROFILE			SAMPLES		GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE "N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × REMOULDED		WATER CONTENT (%) W _p W W _L				
110.4	GROUND SURFACE												
0.0	ASPHALT												
0.2	Sand and gravel (FILL)		1	SS	35								
0.6	Compact Brown Moist												
109.8	Clayey silt, trace to some sand, trace gravel, contains topsoil (FILL)		2	SS	12								
109.0	Very stiff to stiff												
1.4	Reddish brown, grey, mottled Moist		3	SS	71/0.29								
108.3	CLAYEY SILT, trace to some sand, trace gravel (Residual Soil)												
2.1	Hard Reddish brown Moist		4	SS	50/0.13								
	SHALE BEDROCK												
	Reddish brown		5	SS	50/0.08								
105.7	END OF BOREHOLE		6	SS	50/0.08								
4.7	Notes: 1. Water level in open borehole at a depth of 2.7 m during drilling. 2. Water level in open borehole at a depth of 2.7 m (Elev. 107.7 m) upon completion of drilling.												

PROJECT <u>011-1128</u>		RECORD OF BOREHOLE No W19		1 OF 1 METRIC	
G.W.P. <u>189-00-01</u>		LOCATION <u>N 4810904.9 ; E 287778.8</u>		ORIGINATED BY <u>CR</u>	
DIST <u>4</u> HWY <u>QEW</u>		BOREHOLE TYPE <u>CME 75, 100mm O.D. Solid Stem Auger</u>		COMPILED BY <u>NK</u>	
DATUM <u>Geodetic</u>		DATE <u>December 17, 2006</u>		CHECKED BY <u>CN</u>	

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC NATURAL LIQUID LIMIT MOISTURE LIMIT CONTENT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa		WATER CONTENT (%)				
								20 40 60 80 100	W _p	W	W _L			
							○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x REMOULDED							
110.5	GROUND SURFACE													
0.0	ASPHALT		1	SS	18									
0.2	Sand and gravel (FILL) Compact to loose Brown													
109.7	Moist													
0.8	Clayey silt to silty clay, contains topsoil (FILL) Firm to stiff Reddish brown, grey, mottled Moist		2	SS	7									
			3	SS	12									
108.2														
2.3	SHALE BEDROCK, contains limestone inclusions Reddish brown to grey		4	SS	50/0.08									
			5	SS	50/0.15									
105.8	Grinding of augers noted at a depth of 4.27 m													
4.7	END OF BOREHOLE		6	SS	50/0.08									
	Notes: 1. Open borehole dry upon completion of drilling.													

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PROJECT <u>011-1128</u>			RECORD OF BOREHOLE No W22			1 OF 1 METRIC		
G.W.P. <u>189-00-01</u>			LOCATION <u>N 4810674.5 ; E 287584.4</u>			ORIGINATED BY <u>CR</u>		
DIST <u>4</u> HWY <u>QEW</u>			BOREHOLE TYPE <u>CME 75, 100mm O.D. Solid Stem Auger</u>			COMPILED BY <u>NK</u>		
DATUM <u>Geodetic</u>			DATE <u>December 17, 2006</u>			CHECKED BY <u>CN</u>		

SOIL PROFILE			SAMPLES		GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	"N" VALUES			SHEAR STRENGTH kPa						
						○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × REMOULDED							
109.7	GROUND SURFACE												
0.0	ASPHALT												
	Sand and gravel (FILL)		1	SS 14									
108.9	Compact Brown Moist												
0.8	Clayey silt, some sand, some gravel (FILL)		2	SS 14									
	Stiff Reddish brown, mottled Moist												
	CLAYEY SILT, some sand, trace gravel (TILL)		3	SS 44									
107.4	Stiff to hard Reddish brown to grey, mottled Moist		4	SS 50/0.13									
2.3	Grinding of augers noted at a depth of 2.29 m		5	SS 50/0.10									
	SHALE BEDROCK contains limestone inclusions Reddish brown to grey Moist		6	SS 50/0.07									
	Grinding of augers noted at a depth of 3.81 m												
105.0			7	SS 50/0.07									
4.7	END OF BOREHOLE												
Notes: 1. Water level in open borehole at a depth of 0.5 m (perched) during drilling. 2. Water level in open borehole at a depth of 0.5 m (Elev. 109.2 m) upon completion of drilling.													

PROJECT <u>011-1128</u>		RECORD OF BOREHOLE No W23				1 OF 1 METRIC	
G.W.P. <u>189-00-01</u>		LOCATION <u>N 4811095.8 ; E 288003.9</u>				ORIGINATED BY <u>CR</u>	
DIST <u>4</u> HWY <u>QEW</u>		BOREHOLE TYPE <u>CME 75, 100mm O.D. Solid Stem Auger</u>				COMPILED BY <u>NK</u>	
DATUM <u>Geodetic</u>		DATE <u>December 20, 2006</u>				CHECKED BY <u>CN</u>	

SOIL PROFILE			SAMPLES		GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE "N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × REMOULDED						
109.4	GROUND SURFACE												
0.0	ASPHALT												
0.1	Sand and gravel (FILL)		1	SS 25									
0.6	Compact Grey-brown Moist												
0.8			2	SS 75/0.25									
1.1	CLAYEY SILT, some sand, trace gravel (TILL) Hard Reddish brown Moist												
	SHALE BEDROCK Reddish brown		3	SS 78/0.28									
			4	SS 50/0.13									
	Grinding of augers noted at a depth of 3.05 m		5	SS 50/0.13									
	Grinding of augers noted at a depth of 3.96 m												
104.7			6	SS 50/0.10									
4.7	END OF BOREHOLE												
Notes: 1. Open borehole dry upon completion of drilling.													

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PROJECT <u>011-1128</u>		RECORD OF BOREHOLE No W24				1 OF 1 METRIC	
G.W.P. <u>189-00-01</u>		LOCATION <u>N 4811151.2; E 288049.9</u>		ORIGINATED BY <u>CR</u>			
DIST <u>4</u> HWY <u>QEW</u>		BOREHOLE TYPE <u>CME 75, 100mm O.D. Solid Stem Auger</u>		COMPILED BY <u>NK</u>			
DATUM <u>Geodetic</u>		DATE <u>December 20, 2006</u>		CHECKED BY <u>CN</u>			

SOIL PROFILE			SAMPLES		GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE "N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × REMOULDED						
110.4	GROUND SURFACE												
0.0	ASPHALT												
109.9	Sand and gravel (FILL) Compact Brown		1	SS 24									
0.5	Moist CLAYEY SILT, some sand, trace gravel (TILL) Very stiff		2	SS 24									
108.9	Reddish brown Moist		3	SS 50/0.13									
1.5	SHALE BEDROCK, contains limestone inclusions Reddish brown to grey		4	SS 50/0.13									
	Grinding of augers noted at depths of 3.20 m to 3.25 m and 3.51		5	SS 50/0.13									
	Grinding of augers noted at a depth of 3.96 m												
105.8	END OF BOREHOLE		6	SS 50/0.08									
4.7	Notes: 1. Open borehole dry upon completion of drilling.												

PROJECT 011-1128			RECORD OF BOREHOLE No W31			1 OF 1 METRIC			
G.W.P. 189-00-01			LOCATION N 4811557.1 ; E 288388.5			ORIGINATED BY CR			
DIST 4 HWY QEW			BOREHOLE TYPE CME 75, 100mm O.D. Solid Stem Auger			COMPILED BY NK			
DATUM Geodetic			DATE December 21, 2006			CHECKED BY CN			
SOIL PROFILE			SAMPLES			DYNAMIC CONE PENETRATION RESISTANCE PLOT			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	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/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
113.1	GROUND SURFACE						113		
0.0	ASPHALT								
0.2	Sand and gravel, some silt, occasional cobbles (FILL)		1	SS	55				
112.3	Very dense								
0.8	Brown Moist		2	SS	18		112		
	CLAYEY SILT, some sand, some gravel, occasional cobbles (TILL)								
	Very stiff to hard		3	SS	22		111		
	Brown to reddish brown Moist								
	Cobbles encountered at depths of 1.98 m to 2.44 m, 2.29 m to 2.89 m, 3.05 m to 3.1 m		4	SS	50/0.15				
110.1							110		
3.1	Silty SAND AND GRAVEL, trace clay, occasional cobbles (TILL)		5	SS	90				
	Very dense								
	Brown Moist								
108.8	Cobbles encountered at depths of 3.1 m to 3.5 m						109		
4.3	SHALE BEDROCK		6	SS	50/0.05		108		
	Reddish brown								
	Grinding of augers noted at depths of 4.57 m to 4.78 m								
106.9							107		
6.2	END OF BOREHOLE		7	SS	50/0.05				
Notes: 1. Water level in open borehole at a depth of 4.3 m during drilling. 2. Water level in open borehole at a depth of 4.9 m (Elev. 108.2 m) upon completion of drilling.									

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PROJECT		011-1128		RECORD OF BOREHOLE No W33				1 OF 1		METRIC						
G.W.P.		189-00-01		LOCATION		N 4811645.1 ; E 288469.2		ORIGINATED BY		CR						
DIST		4 HWY QEW		BOREHOLE TYPE		CME 75, 100mm O.D. Solid Stem Auger		COMPILED BY		NK						
DATUM		Geodetic		DATE		December 22, 2006		CHECKED BY		CN						
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa								
114.4	GROUND SURFACE															
0.0	ASPHALT															
0.2	Sand and gravel, trace clay, contains clayey silt pockets, contains cobbles (FILL)		1	SS	20											
113.6	Compact Brown to reddish brown Moist		2	SS	50/0.15											
0.8	Silty SAND AND GRAVEL, trace clay, occasional cobbles (TILL) Compact to very dense Brown Moist		3	SS	60											
	Encountered cobbles at depths of 1.07 m to 1.37 m, 1.52 m to 2.13 m, 1.98 m to 2.29 m and 2.29 m to 2.82 m		4	SS	71											
	Grinding of augers noted at depths of 3.65 m to 3.96 m		5	SS	90											
	Grinding of augers noted at depths of 4.27 m to 4.42 m		6	SS	17											
108.9	SHALE BEDROCK Gray to reddish brown Moist															
5.5	Grinding of augers noted at a depth of 5.64 m		7	SS	50/0.13											
106.7	END OF BOREHOLE		8	SS	50/0.08											
7.7	Notes: 1. Open borehole dry upon completion of drilling.															

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PROJECT <u>011-1128</u>			RECORD OF BOREHOLE No W34			1 OF 1 METRIC		
G.W.P. <u>189-00-01</u>			LOCATION <u>N 4813711.4 ; E 290128.5</u>			ORIGINATED BY <u>CR</u>		
DIST <u>4</u> HWY <u>QEW</u>			BOREHOLE TYPE <u>CME 75, 100mm O.D. Solid Stem Auger</u>			COMPILED BY <u>NK</u>		
DATUM <u>Geodetic</u>			DATE <u>December 15, 2006</u>			CHECKED BY <u>CN</u>		

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa								
						○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × REMOULDED				WATER CONTENT (%)						
						20	40	60	80	100	10	20	30			
107.0	GROUND SURFACE															
0.0	ASPHALT															
0.2	Sand and gravel, trace silt (FILL)		1	SS	16						○					
0.6	Compact Brown Moist															
0.8	CLAYEY SILT, some sand, trace gravel (TILL)		2	SS	18											
1.5	Very stiff Reddish brown to grey, mottled Moist		3	SS	39							○			4 5 63 28	
1.5	CLAYEY SILT, some sand (Residual Soil)															
2.1	Hard Reddish brown Moist		4	SS	50/0.13											
	SHALE BEDROCK contains limestone inclusions Reddish brown to grey		5	SS	50/0.07											
	Grinding of augers noted at depths of 2.13 m to 2.29 m, 2.29 m to 2.57 m, 2.89 m to 3.05 m, 3.20 m to 3.25 m, 3.96 m, 4.11 m, 4.47 m		6	SS	50/0.13						○					
102.3	END OF BOREHOLE		7	SS	50/0.15											
4.7	Notes: 1. Water level in open borehole at a depth of 3.1 m during drilling. 2. Water level in open borehole at a depth of 4.4 m (Elev. 102.6 m) upon completion of drilling.															

PROJECT <u>011-1128</u>		RECORD OF BOREHOLE No W35		1 OF 1 METRIC	
G.W.P. <u>189-00-01</u>		LOCATION <u>N 4813772.1 ; E 290171.4</u>		ORIGINATED BY <u>CR</u>	
DIST <u>4</u> HWY <u>QEW</u>		BOREHOLE TYPE <u>CME 75, 100mm O.D. Solid Stem Auger</u>		COMPILED BY <u>NK</u>	
DATUM <u>Geodetic</u>		DATE <u>December 15, 2006</u>		CHECKED BY <u>CN</u>	







SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa							WATER CONTENT (%)		
								20	40	60	80	100			W _p	W	W _L
106.0	GROUND SURFACE																
0.0	Sand and gravel, some silt (FILL) Compact Brown Moist		1	SS	16												
105.3																	
0.7	CLAYEY SILT, trace sand, trace gravel (Residual Soil) Very stiff to hard Reddish brown to grey Moist		2	SS	24												
			3	SS	58												
103.8																	
2.2	SHALE BEDROCK contains limestone inclusions Reddish brown to grey		4	SS	50/0.13												
	Grinding of augers noted at depths of 2.20 m to 2.90m, 3.35 m to 3.51 m, 3.66 m to 3.76 m, 4.27 m to 4.37 m, 4.57 m to 4.57 m		5	SS	50/0.13												
101.4																	
4.6	END OF BOREHOLE		6	SS	50/0.09												
	Notes: 1. Water level in open borehole at a depth of 1.5 m during drilling. 2. Water level in open borehole at a depth of 1.5 m (Elev. 104.5 m) upon completion of drilling. 3. Water level in piezometer at a depth of 1.9 m (Elev. 104.1 m) on February 13, 2007.																

PROJECT <u>011-1128</u>			RECORD OF BOREHOLE No W37				1 OF 1 METRIC	
G.W.P. <u>189-00-01</u>			LOCATION <u>N 4813890.6 ; E 290260.4</u>				ORIGINATED BY <u>CR</u>	
DIST <u>4</u> HWY <u>QEW</u>			BOREHOLE TYPE <u>CME 75, 100mm O.D. Solid Stem Auger</u>				COMPILED BY <u>NK</u>	
DATUM <u>Geodetic</u>			DATE <u>December 15, 2006</u>				CHECKED BY <u>CN</u>	

SOIL PROFILE			SAMPLES		GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE "N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × REMOULDED		WATER CONTENT (%) W _p W W _L					
106.2 0.0	GROUND SURFACE Sand and gravel, some silt (FILL) Compact Brown Moist		1	SS 21	▽	106								
105.5 0.7	SILTY CLAY, some sand Stiff Reddish brown to grey, mottled Moist		2	SS 12		105								
104.8 1.4	CLAYEY SILT, some sand, trace gravel (Residual Soil) Hard Reddish brown to grey, mottled Moist		3	SS 40		104								
104.1 2.1	SHAPE BEDROCK contains limestone inclusions Grey to reddish brown		4	SS 50/0.1		103								
101.5 4.7	Grinding of augers noted at depths of 2.13 m to 2.18 m Grinding of augers noted at depths of 2.59 m to 2.64 m, 2.79 m to 2.89 m, and 3.66 m to 3.71 m Grinding of augers noted at depths of 4.27 m to 4.37 m		5	SS 50/0.07		102								
Notes: 1. Water level in open borehole at a depth of 2.6 m during drilling. 2. Water level in open borehole at a depth of 2.4 m (Elev. 103.8 m) upon completion of drilling.														

+³, ×³: Numbers refer to Sensitivity ○^{3%} STRAIN AT FAILURE

PROJECT <u>011-1128</u>		RECORD OF BOREHOLE No W40		1 OF 1 METRIC	
G.W.P. <u>189-00-01</u>		LOCATION <u>N 4814057.8 ; E 290391.4</u>		ORIGINATED BY <u>CR</u>	
DIST <u>4</u> HWY <u>QEW</u>		BOREHOLE TYPE <u>CME 75, 100mm O.D. Solid Stem Auger</u>		COMPILED BY <u>NK</u>	
DATUM <u>Geodetic</u>		DATE <u>December 20, 2006</u>		CHECKED BY <u>CN</u>	

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT NATURAL MOISTURE LIQUID CONTENT LIMIT			UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa		WATER CONTENT (%)				
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × REMOULDED	20 40 60 80 100	W _p W W _L				
106.5 0.0	GROUND SURFACE ASPHALT		1	SS	19									
106.0 0.6	Sand and gravel (FILL) Compact Brown Moist		2	SS	14									
105.1 1.4	Clayey silt to silty clay, some sand, contains sand pockets (FILL) Stiff Reddish brown to grey Moist		3	SS	60									
104.3 2.2	CLAYEY SILT, trace sand, trace gravel (TILL) Hard Moist		4	SS	50/0.15									
	SHALE BEDROCK, contains limestone inclusions Grey		5	SS	50/0.08									
102.7 3.8	Grinding of augers noted at depths of 2.74 m to 2.89 m, 2.95 m to 2.99 m, 3.2 m to 3.30 m, 3.40 m to 3.50 m and 3.61 m to 3.81 m END OF BOREHOLE		6	SS	50/0.04									
Notes: 1. Open borehole dry upon completion of drilling.														

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PROJECT 011-1128				RECORD OF BOREHOLE No F10				1 OF 1 METRIC								
G.W.P. 189-00-01		LOCATION N 4811035.0 ; E 287871.0		ORIGINATED BY PKS												
DIST 4 HWY QEW		BOREHOLE TYPE CME 75, 100mm O.D. Solid Stem Auger		COMPILED BY SEP												
DATUM Geodetic		DATE December 6, 2001		CHECKED BY ASP												
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC NATURAL LIQUID LIMIT MOISTURE LIMIT CONTENT			UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa				WATER CONTENT (%)				
110.5	GROUND SURFACE															
0.0	Clayey TOPSOIL															
0.2	Clayey Silt, some sand, trace gravel, occasional shale fragments (FILL)															
109.6	Firm Red-brown Moist															
0.9	Weathered, red-brown SHALE BEDROCK (Queenston Formation) with occasional grey limestone/siltstone layers		1	SS	53											
			2	SS	109											
	Becoming wet below 2.3 m depth.		3	SS	100/15											
107.4			4	SS	100/08											
3.1	END OF BOREHOLE															
Notes: 1. Borehole caved at a depth of 2.4 m, base of hole wet upon completion of drilling. 2. Water level in piezometer at a depth of 2.3 m (Elev. 108.2 m) on January 8, 2002 and at a depth of 2.1 m (Elev. 108.4 m) on June 10, 2002.																

PROJECT <u>011-1128</u>		RECORD OF BOREHOLE No S13		1 OF 1 METRIC	
G.W.P. <u>189-00-01</u>		LOCATION <u>N 4812570.0 ; E 289140.0</u>		ORIGINATED BY <u>PKS</u>	
DIST <u>4</u> HWY <u>QEW</u>		BOREHOLE TYPE <u>CME 75, 100mm O.D. Solid Stem Auger</u>		COMPILED BY <u>SEP</u>	
DATUM <u>Geodetic</u>		DATE <u>January 3, 2002</u>		CHECKED BY <u>ASP</u>	



SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × REMOULDED									
108.6	GROUND SURFACE						20	40	60	80	100						
0.0	TOPSOIL, clayey silt																
0.2	Clayey silt, some sand, trace gravel and shale fragments (FILL) Very soft to very stiff Red-brown Moist		1	SS	2												
			2	SS	17												
106.3																	
2.3	CLAYEY SILT, trace to some sand, trace gravel (TILL) Hard Red to grey Moist		3	SS	35												
			4	SS	22												
			5	SS	24												
			6	SS	43												
103.1																	
5.5	Completely weathered, red-brown and grey SHALE BEDROCK (Queenston Formation)		7	SS	95												
100.8			8	SS	100/15												
7.8	END OF BOREHOLE																
	Notes: 1. Open borehole dry upon completion of drilling.																

MIS-MTO 001 011-1128.GPJ GAL-MISS.GDT 21/9/09

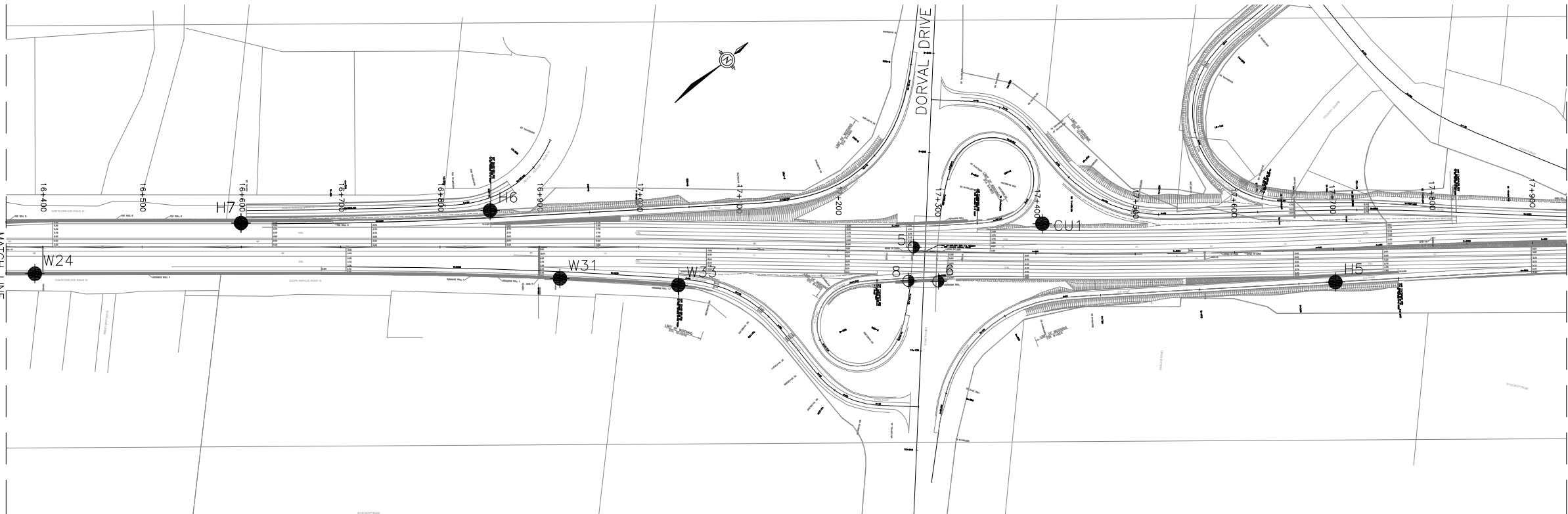
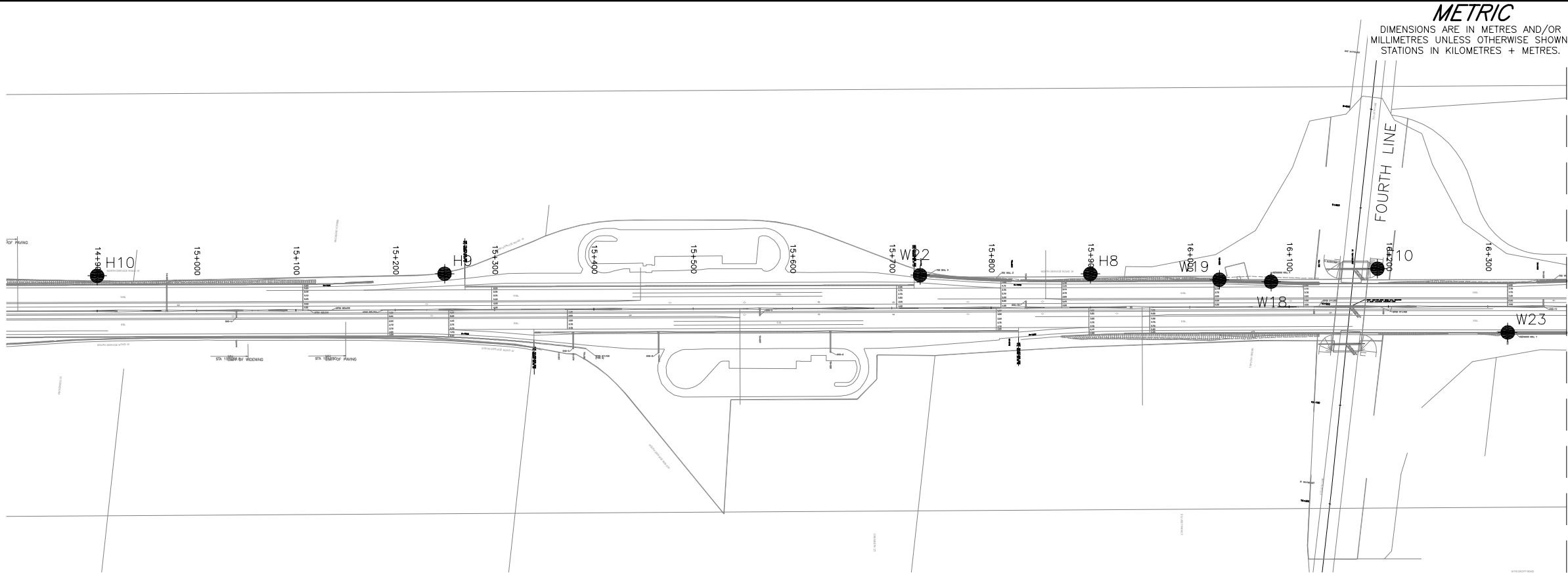
PROJECT <u>011-1128</u>		RECORD OF BOREHOLE No S14		1 OF 1 METRIC	
G.W.P. <u>189-00-01</u>		LOCATION <u>N 4812382.0 ; E 288994.0</u>		ORIGINATED BY <u>PKS</u>	
DIST <u>4</u> HWY <u>QEW</u>		BOREHOLE TYPE <u>CME 75, 100mm O.D. Solid Stem Auger</u>		COMPILED BY <u>SEP</u>	
DATUM <u>Geodetic</u>		DATE <u>December 6, 2001</u>		CHECKED BY <u>ASP</u>	

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE CONTENT			LIQUID LIMIT	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa					WATER CONTENT (%)					GR	SA	SI	CL
													20	40	60						
110.0	GROUND SURFACE																				
0.0	TOPSOIL																				
109.5																					
0.5	SILTY SAND, trace clay, trace gravel Loose to compact Red-brown Moist		1	SS	9																
			2	SS	17								○								
107.7																					
2.3	Weathered, red brown and grey SHALE BEDROCK (Queenston Formation)		3	SS	14								○								
			4	SS	122																
			5	SS	100/13																
105.3			6	SS	100/13																
4.7	END OF BOREHOLE																				
	Notes: 1. Open borehole dry upon completion of drilling.																				

MIS-MTO 001 011-1128.GPJ GAL-MISS.GDT 21/9/09

PROJECT 011-1128			RECORD OF BOREHOLE No CU1			1 OF 1 METRIC							
G.W.P. 189-00-01		LOCATION N 4811968.0 ; E 288653.5		ORIGINATED BY CR									
DIST 4 HWY QEW		BOREHOLE TYPE CME 75, 100mm O.D. Solid Stem Auger		COMPILED BY NK									
DATUM Geodetic		DATE December 20, 2006		CHECKED BY CN									
SOIL PROFILE			SAMPLES		GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES	SHEAR STRENGTH kPa					
115.0 0.0	GROUND SURFACE Sandy silt, some clay, trace gravel, containing topsoil (FILL) Compact Brown Moist		1	SS	11								
114.2 0.8	Silty sand and gravel, trace topsoil, asphalt fragments (FILL) Loose Brown to reddish brown Moist		2	SS	7								
113.5 1.5	CLAYEY SILT, some sand, some gravel, occasional shale fragments (TILL) Stiff Reddish brown Moist		3	SS	9								
112.2 2.8	SHALE BEDROCK Redish brown to grey		4	SS	10								
			5	SS	50/0.08								
			6	SS	50/0.08								
			7	SS	50/0.08								
			8	SS	50/0.10								
			9	SS	50/0.03								
105.8 9.2	END OF BOREHOLE		10	SS	50/0.03								
Notes: 1. Water level in open borehole at a depth of 1.8 m (Elev. 113.2 m) upon completion of drilling. 2. Water level in piezometer at a depth of 3.6 m (Elev. 111.4 m) on February 13, 2007.													

MIS-MTO 001 011-1128.GPJ GAL-MISS.GDT 21/9/09



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

CONT No.
WP No. 189-00-01

HIGH MAST LIGHT POLES
QEW WIDENING FROM THIRD LINE TO
1 KM EAST OF TRAFALGAR ROAD, OAKVILLE
BOREHOLE LOCATIONS



SHEET



Golder Associates Ltd.
MISSISSAUGA, ONTARIO, CANADA



LEGEND

- Borehole – Current Investigation
- Borehole – Previous Investigation by Others

No.	ELEVATION	CO-ORDINATES	
		NORTHING	EASTING
W18	110.4	4810943.8	287813.3
W19	110.5	4810904.9	287778.8
W22	109.7	4810674.5	287584.4
W23	109.4	4811095.8	288003.9
W24	110.4	4811151.2	288049.9
W31	113.1	4811557.1	288388.5
W33	114.4	4811645.1	288469.2
CU1	115.0	4811968.0	288653.5
F10	110.5	4811035.0	287871.0
H5	111.9	4812159.0	288886.0
H6	115.4	4811546.0	288291.0
H7	112.2	4811344.0	288142.0
H8	111.2	4810808.0	287692.0
H9	108.5	4810305.0	287280.0
H10	110.3	4810033.0	287060.0
5	114.8	4811852.7	288589.8
6	114.5	4811850.1	288632.2
8	114.6	4811827.2	288612.8

REFERENCE

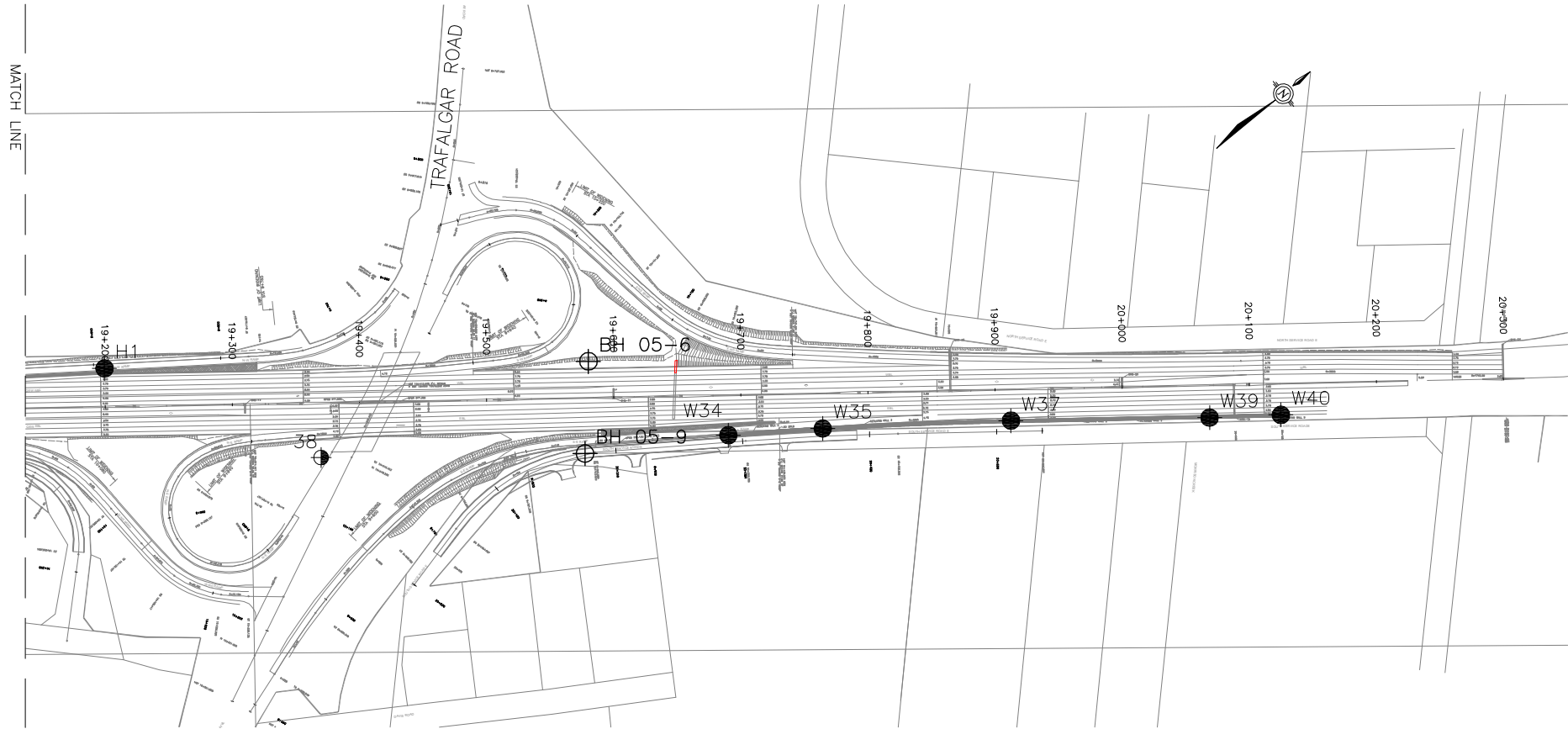
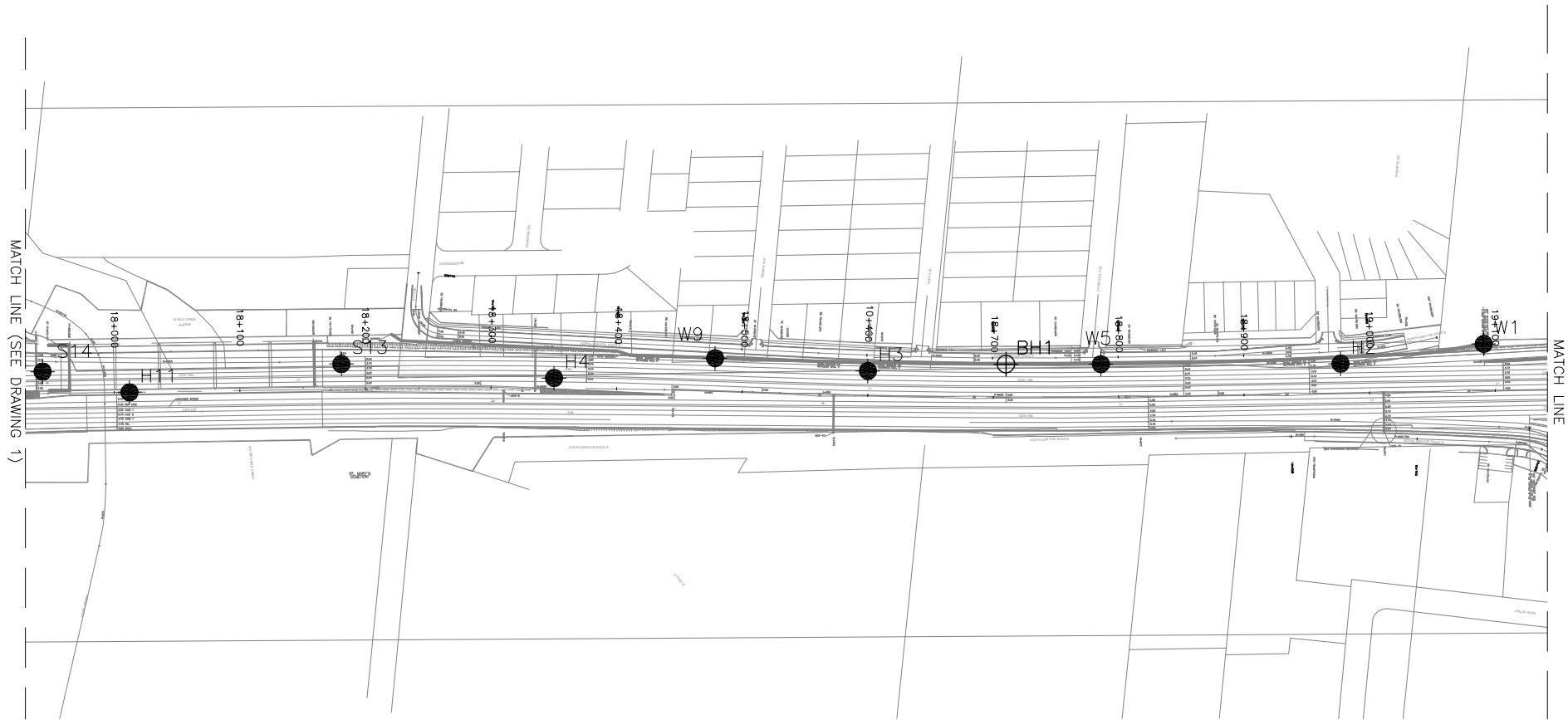
Base plans provided in digital format by URS, drawing file no.
QEW-EL-LS-MTO-60% and QEW Plan, received on December 20, 2006.

NOTES

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

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.

NO.	DATE	BY	REVISION
Geocres No. 30M5-259			
HWY. QEW	PROJECT NO. 011-1128		DIST.
SUBM'D. NK	CHKD. CN	DATE: May 2007	SITE:
DRAWN: MSM	CHKD. ASP	APPD. JMAC	DWG. 1



PLAN
SCALE
50 0 50 100 m

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

CONT No.
WP No. 189-00-01

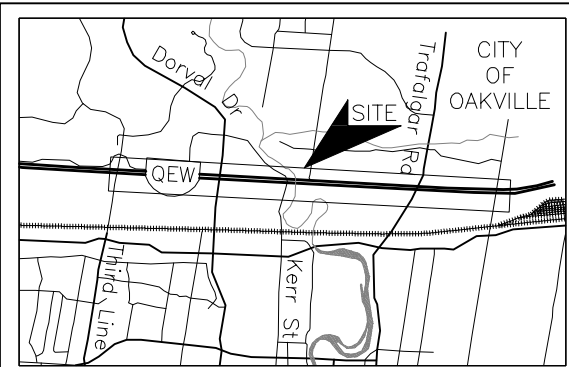
HIGH MAST LIGHT POLES
QEW WIDENING FROM THIRD LINE TO
1 KM EAST OF TRAFALGAR ROAD, OAKVILLE
BOREHOLE LOCATIONS



SHEET



Golder Associates Ltd.
MISSISSAUGA, ONTARIO, CANADA



KEY PLAN

SCALE
0 800 m

LEGEND

- Borehole - Current Investigation
- Borehole - Previous Golder Investigation
- Borehole - Previous Investigation by Others

No.	ELEVATION	CO-ORDINATES	
		NORTHING	EASTING
W1	106.3	4813284.1	289704.1
W5	107.5	4813038.0	289523.3
W9	107.3	4812803.2	289325.0
W34	107.0	4813711.4	290128.5
W35	106.0	4813772.1	290171.4
W37	106.2	4813890.6	290260.4
W39	106.2	4814013.0	290357.6
W40	106.5	4814057.8	290391.4
H1	106.2	4813365.0	289777.0
H2	106.5	4813186.0	289644.0
H3	107.3	4812891.0	289410.0
H4	107.4	4812694.0	289256.0
H11	100.8	4812425.1	289050.6
S13	108.6	4812570.0	289140.0
S14	110.0	4812382.0	288994.0
BH 05-6	107.8	4813663.0	290013.8
BH 05-9	109.4	4813615.0	290068.2
38	106.5	4813452.4	289939.2
BH1	107.0	4812979.5	289475.4

NOTES

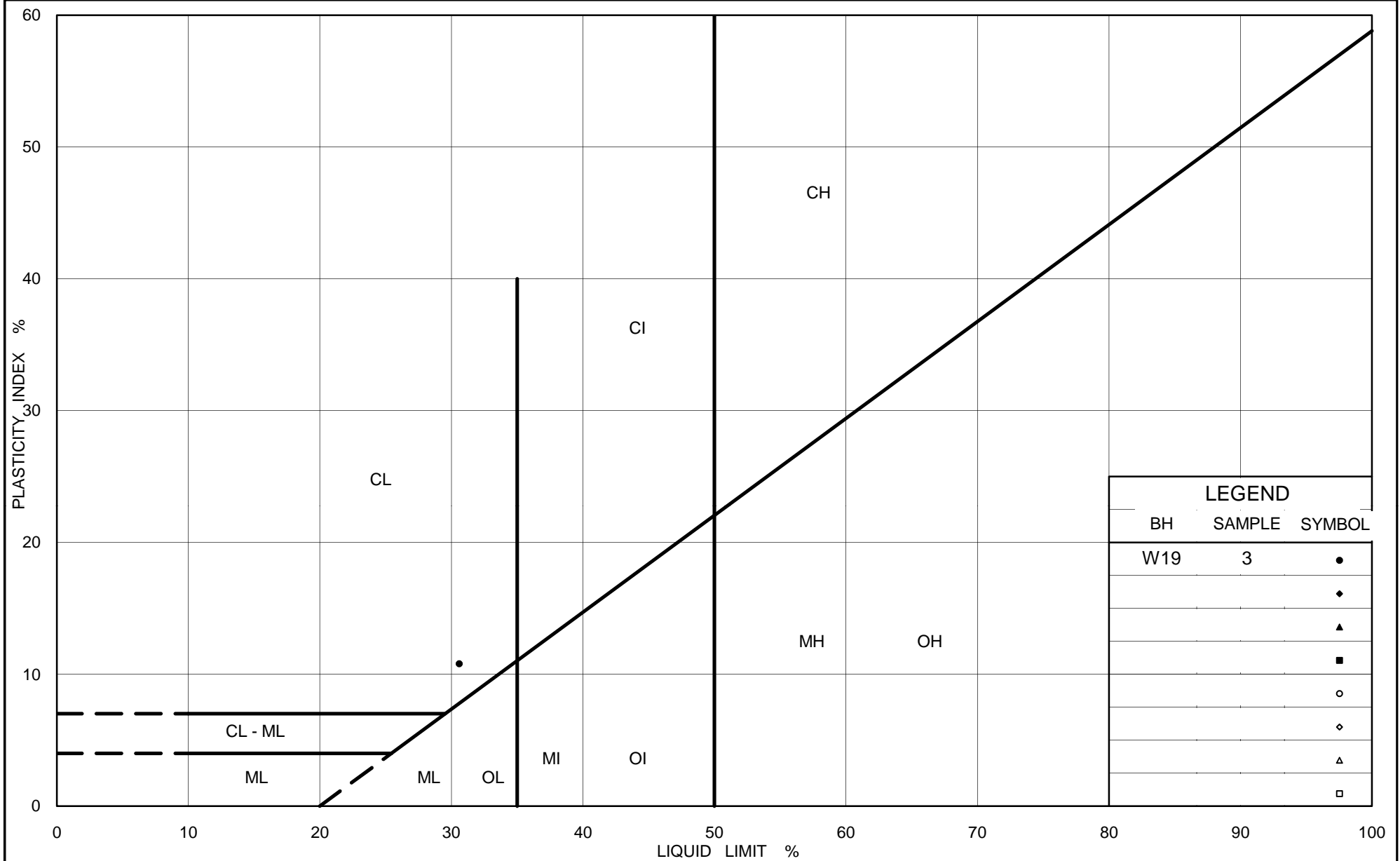
This drawing is for subsurface information only. The proposed structure details/works are shown for illustration purposes only and may not be consistent with the final design configuration as shown elsewhere in the Contracts Documents.

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REFERENCE

Base plans provided in digital format by URS, drawing file no. QEW-EL-LS-MTO-60% and QEW Plan, received on December 20, 2006.

NO.	DATE	BY	REVISION
Geocres No. 30M5-259			
HWY. QEW	PROJECT NO. 011-1128		DIST.
SUBM'D. NK	CHKD. CN	DATE: May 2007	SITE:
DRAWN: MSM	CHKD. ASP	APPD. JMAC	DWG. 2



Ministry of Transportation

Ontario

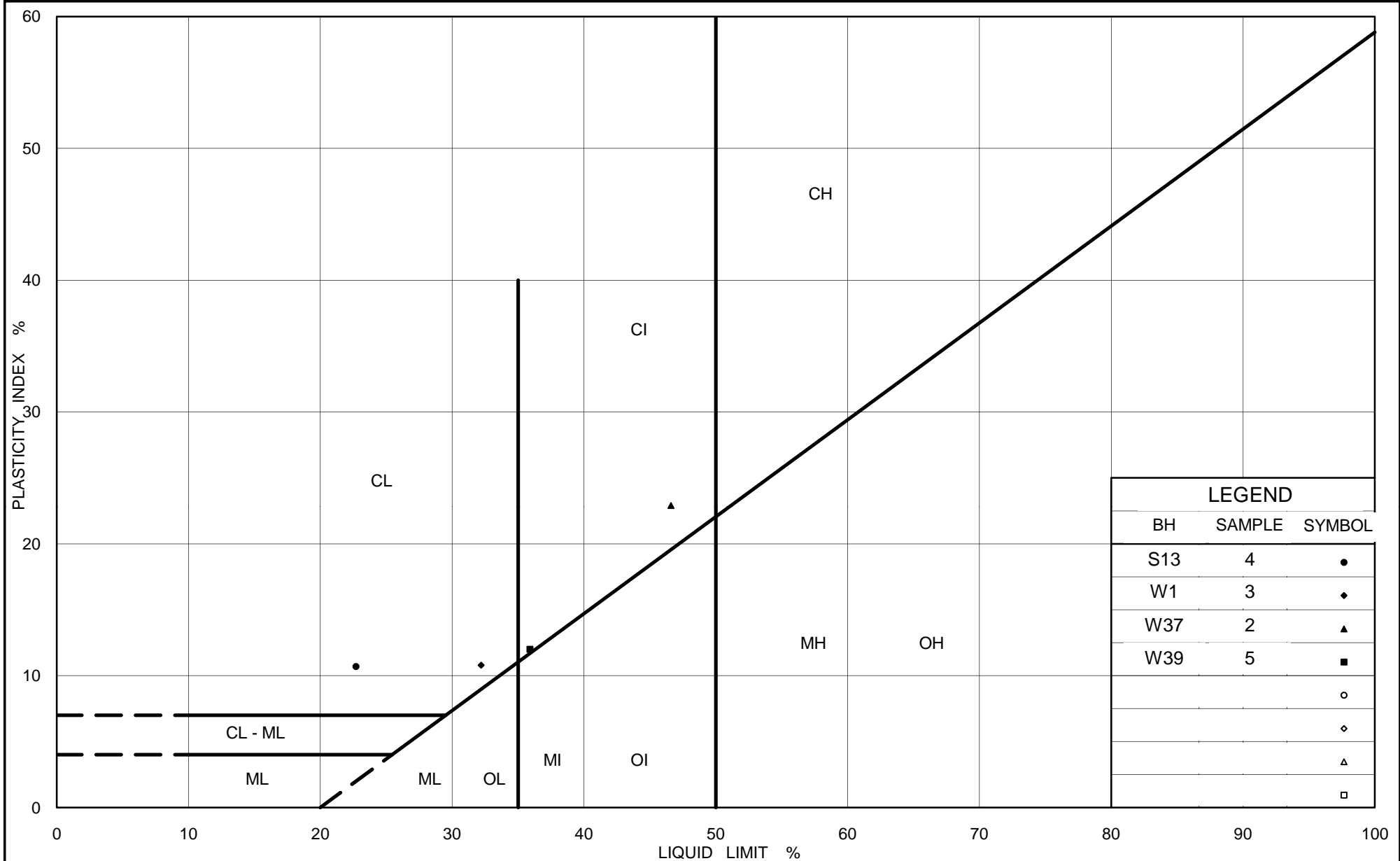
PLASTICITY CHART

Clayey Silt Fill

Figure 1

Project No. 011-1128

February, 2007



Ministry of Transportation

Ontario

PLASTICITY CHART Clayey Silt Till, Silty Clay and Weathered Shale

Figure 2

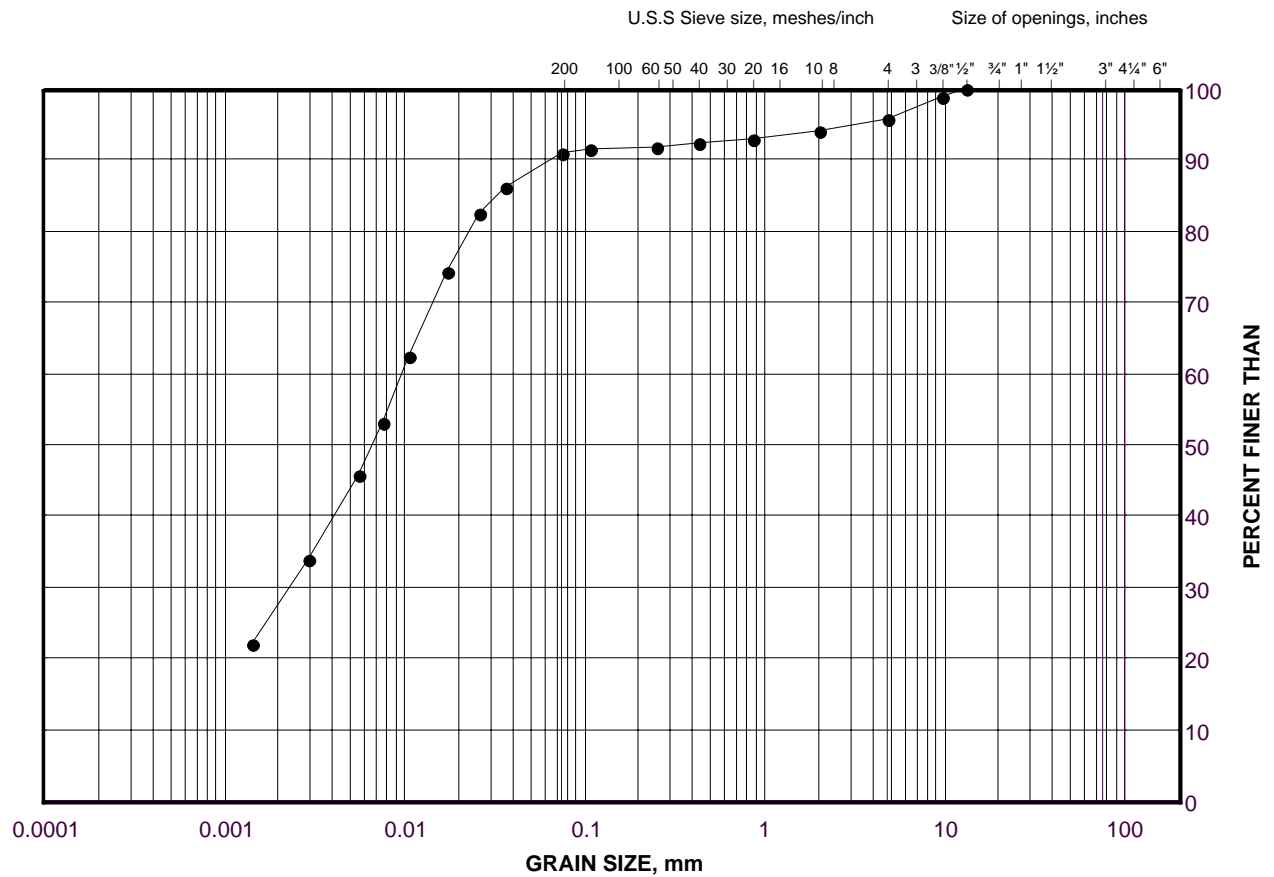
Project No. 011-1128

February, 2007

GRAIN SIZE DISTRIBUTION

Clayey Silt Residual Soil

FIGURE 3



September 2009

011-1128-3 HML

APPENDIX A

**RECORDS OF BOREHOLES 5, 6 AND 8, 1975 INVESTIGATION BY MTO
GEOCRES NO. 30M5-101**

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS-ONTARIO
ENGINEERING SERVICES BRANCH-GEOTECHNICAL OFFICE-SOIL MECHANICS SECTION
RECORD OF BOREHOLE NO 5

WP 125-66-02 LOCATION Co-ords. 786,188 N; 946,765 E. ORIGINATED BY PJS
DIST 4 HWY QEW BORING DATE December 18, 1975 COMPILED BY PJS
DATUM Geodetic BOREHOLE TYPE Hollow Stem Auger CHECKED BY

SOIL PROFILE			SAMPLES			GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT					LIQUID LIMIT w_L PLASTIC LIMIT w_p WATER CONTENT w			UNIT WEIGHT γ	REMARKS
ELEV DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	IN' VALUES		20	40	60	80	100	w_p	w	w_L		
376.8	Ground Level															
0.0	Gravel & sand, some silt, trace of clay, numerous boulders (Glacial Till)		1	SS	10											
	Compact to Very Dense		2	SS	257	370										
			3	SS	82											
363.7	(Red) Shale		4	SS	100	8"										
13.1	End of Borehole															
						360										

20
15-5 % STRAIN AT FAILURE
10

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS-ONTARIO
ENGINEERING SERVICES BRANCH-GEOTECHNICAL OFFICE-SOIL MECHANICS SECTION

RECORD OF BOREHOLE NO 6

WP 125-66-02 LOCATION Co-ords .786,180 N; 946,897 E. ORIGINATED BY PJS
DIST 4 HWY QEW BORING DATE December 22, 1975 COMPILED BY PJS
DATUM Geodetic BOREHOLE TYPE Hollow Stem Auger CHECKED BY

SOIL PROFILE			SAMPLES			GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT					LIQUID LIMIT w_L PLASTIC LIMIT w_p WATER CONTENT w			UNIT WEIGHT γ	REMARKS
ELEV DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	'N' VALUES		20	40	60	80	100	w_p	w	w_L		
375.5	Ground Level															
0.0	Gravel & sand, some silt, trace of clay numerous boulders (Glacial Till)		1	SS	95	370										
			2	SS												
	Compact to Very Dense		3	SS	10											
362.8	(Red) Shale		4	SS	50/3											
12.7	End of Borehole					360										

20
15 ϕ 5 % STRAIN AT FAILURE
10

MINISTRY OF TRANSPORTATION AND COMMUNICATIONS-ONTARIO
ENGINEERING SERVICES BRANCH-GEOTECHNICAL OFFICE-SOIL MECHANICS SECTION

RECORD OF BOREHOLE NO 8

WP 125-66-02 LOCATION Co-ords. 786,108 N; 946,836 E. ORIGINATED BY EJS
DIST 4 HWY QEW BORING DATE December 21, 1975 COMPILED BY EJS
DATUM Geodetic BOREHOLE TYPE Hollow Stem Auger & BXL Core CHECKED BY

SOIL PROFILE			SAMPLES			GROUND WATER ELEV	DYNAMIC CONE PENETRATION RESISTANCE PLOT					LIQUID LIMIT w_L PLASTIC LIMIT w_p WATER CONTENT w			UNIT WEIGHT γ	REMARKS
ELEV DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	'N' VALUES		20	40	60	80	100	w_p	w	w_L		
376.0	Ground Level															
0.0	Gravel & sand, some silt, trace of clay, numerous boulders (Glacial Till) Very Dense		1	SS	53	370										
			2	SS	25	"										
364.0			3	SS	79											
12.0	(Red) Shale, severely to moderately weathered		4	BXL	90%	360										
359.6																
16.4	End of Borehole															

20
15 ϕ 5 % STRAIN AT FAILURE
10

September 2009

011-1128-3 HML

APPENDIX B

RECORD OF BOREHOLE 38, 1979 INVESTIGATION BY ATSL

RECORD OF BOREHOLE No 38

W P 1-79-01 LOCATION Co-ords 15,791.439 N; 951,192 E. ORIGINATED BY T L
 DIST Hamilton HWY Q.E.W. BOREHOLE TYPE Solid Stem Auger COMPILED BY T L
 DATUM Geodetic DATE January 23, 1979 CHECKED BY _____

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT γ					PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	'N' VALUES			20	40	60	80	100					
349.3	Ground Level																
0.0	Topsoil.		1	AS													
0.4	Asphalt.																
0.6	Wet gravelly sand. Brown		2	AS			348										
346.8																	
2.5	Silty clay. Red		3	SS	8		346										
344.8			4	SS	28/12 40/6												
4.5	Severely Weathered shale with horizontal clay seams.		5	SS	40		344										
	Red and Green		6	SS	61		342										
340.8			7	SS	41/61 100/2		340										
8.5	Apparent Shale Bedrock																
8.7	End of Borehole																

September 2009

011-1128-3 HML

APPENDIX C

RECORD OF BOREHOLE BH1, 1999 INVESTIGATION BY GOLDER ASSOCIATES

PROJECT: 991-1174

RECORD OF BOREHOLE: BH1

SHEET 1 OF 1

LOCATION: Refer to Figure 2

BORING DATE: 6/10/99

DATUM:

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		net V. + Q - ● rem V. @ U - ○		10 ⁻² 10 ⁻⁴ 10 ⁻⁶ 10 ⁻⁸					
												Wp ——— W ——— Wi					
							20	40	60	80		10	20	30	40		
0	D-50 TRUCK MOUNT 114mm SOLID STEM AUGER	Ground Surface		0.00													
		ASPHALT		0.11	1	SO	28										CONCRETE
		Compact, moist, brown sand and gravel, trace silt. (Granular FILL)		0.81	2	SO	16										BENTONITE SEAL
		Compact, moist, brown silty sand, trace to some gravel, occ. organics. (FILL)		1.43	3	SO	34										
1																	
2		Hard, moist, reddish brown SILTY CLAY, trace to some sand, trace gravel, occ. shale fragments. (TILL)			4	SO	108										
3				2.86	5	SO	100/										SAND
		Weathered, red SHALE, occ. weathered siltstone/ limestone interlayers. (BEDROCK)															
4				3.71	6	SO	100/										
		END OF BOREHOLE															
5																	
6																	
7																	
8																	
9																	
10																	

Note: 1. Open borehole dry upon completion of drilling.
2. Piezometer dry on October 27/99.

Note: 1. Open
borehole dry
upon completion
of drilling.

2. Piezometer
dry on October
27/99.

DEPTH SCALE

1 : 50



LOGGED: DKB

CHECKED: ASP

BOREHOLE 991-1174 GPJ GLDR. CAN.GDT 29/10/99 PS

September 2009

011-1128-3 HML

APPENDIX D

RECORDS OF BOREHOLES BH05-6 AND BH05-9, 2005 INVESTIGATION BY GOLDER ASSOCIATES

PROJECT: 04-1111-012B

RECORD OF BOREHOLE: BH 05-6

SHEET 1 OF 1






LOCATION: N 4813046.6 ;E 606563.8

BORING DATE: January 18, 2005

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT					
								Cu, kPa		nat V. + Q - rem V. U -		Wp — W —					
		GROUND SURFACE		107.75				20	40	60	80	10 ⁻⁶	10 ⁻⁵	10 ⁻⁴	10 ⁻³		
0	Power Auger 108 mm O.D. Solid Stem Augers	Firm, moist, red CLAYEY SILT, trace gravel/shale fragments (TILL)		0.00	1	50 DO	6										
1		Highly to completely weathered, red SHALE (Bedrock), contains grey limestone/siltstone interbeds		106.99 0.76	2	50 DO	75										
					3	50 DO	58/.15										
2					4	50 DO	100/.15										
3		Weathered to completely weathered, very weak to weak, grey SHALE (Bedrock), contains interbeds of fresh to slightly weathered grey siltstone/limestone		105.01 2.74													
		Bedrock cored from 2.74 m to 7.21 m															
4		For bedrock coring details refer to Record of Drillhole 05-6															
5																	
6																	
7																	
		END OF BOREHOLE		100.54 7.21													
8		Notes: 1. Open borehole dry upon completion of drilling operations. 2. Water level in piezometer at 4.85 m depth (Elevation 102.9 m) on January 28, 2005. 3. Water level in piezometer at 5.14 m depth (Elevation 102.61 m) on June 12, 2005.															
9																	
10																	

DEPTH SCALE

1 : 50



LOGGED: PKS

CHECKED: SLP

MISS BHS 041111012BAAGDR.GPJ GLDR CAN.GDT 21/12/05 DD

PROJECT: 04-1111-012B

RECORD OF BOREHOLE: BH 05-9

SHEET 1 OF 2

LOCATION: N 4812999.5 ; E 606619.1

BORING DATE: January 17, 2005

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION										
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.3m	SHEAR STRENGTH				WATER CONTENT PERCENT													
								20		40		60				80		10 ⁻⁶		10 ⁻⁵		10 ⁻⁴		10 ⁻³	
								Cu, kPa		nat V. + rem V. ⊕		Q - U -				⊙		⊙		⊙		⊙			
								20	40	60	80					10	20	30	40						
0		GROUND SURFACE		109.40																					
		TOPSOIL		0.07	1	50 DO	11																		
		Stiff to very stiff, moist, brown to grey clayey silt, some sand, trace gravel, tile pieces, slag, roots, pockets of topsoil and sand (FILL)																							
1					2	50 DO	22																		
					3	50 DO	27																		
2					4	50 DO	20																		
		Sample 4 - Faint hydrocarbon odour																							
3				106.35	5	50 DO	26																		
		Compact, moist, brown silt and sand, trace gravel, trace clay (FILL)		3.05																					
		Hydrocarbon odour noted																							
4				105.44	6	50 DO	85																		
		Hard, red CLAYEY SILT, some sand, trace gravel (TILL/RESIDUAL SOIL)		3.96																					
		Hydrocarbon odour noted																							
5				104.22	7	50 DO	89																		
				5.18																					
		Weathered to completely weathered, very weak to weak, grey SHALE (Bedrock), contains slightly weathered to fresh limestone/siltstone interbeds.			8	50 DO	90/.15																		
6																									
		Bedrock cored from 5.49 m to 9.45 m																							
		For bedrock coring details refer to Record of Drillhole 05-9																							
7																									
8																									
9																									
				99.95																					
				9.45																					
		Notes:																							
		1. Open borehole dry upon completion of drilling operations.																							
10		CONTINUED NEXT PAGE																							

MISS BHS 041111012BAAGDR.GPJ GLDR CAN.GDT 21/12/05 DD

DEPTH SCALE

1:50



LOGGED: PKS

CHECKED: SLP