

**Golder Associates Ltd.**

2390 Argentia Road  
Mississauga, Ontario, Canada L5N 5Z7  
Telephone: (905) 567-4444  
Fax: (905) 567-6561



**FOUNDATION INVESTIGATION REPORT  
NOISE BARRIER WALLS  
QEW WIDENING FROM HIGHWAY 406  
TO GARDEN CITY SKYWAY  
ST. CATHARINES, ONTARIO  
G.W.P. 607-00-00**

Submitted to:

Morrison Hershfield Limited  
235 Yorkland Boulevard, Suite 600  
Toronto, Ontario  
M2J 1T1

GEOCRES No.

**DISTRIBUTION:**

- 1 Copy - Ministry of Transportation Ontario, Downsview, Ontario
- 1 Copy - Morrison Hershfield, Toronto, Ontario

January 2007



04-1111-002-9



**TABLE OF CONTENTS**

<b><u>SECTION</u></b>	<b><u>PAGE</u></b>
1.0 INTRODUCTION .....	1
2.0 SITE DESCRIPTION .....	2
3.0 INVESTIGATION PROCEDURES .....	3
4.0 GENERAL SITE GEOLOGY AND STRATIGRAPHY .....	4
4.1 Regional Geological Conditions .....	4
4.2 Site Stratigraphy .....	4
4.2.1 Topsoil .....	5
4.2.2 Asphalt and Fill Materials .....	5
4.2.3 Surficial Silty Sand to Sandy Silt .....	6
4.2.4 Surficial Clayey Silt to Silty Clay .....	6
4.2.5 Clayey Silt to Silty Clay Till .....	7
4.3 Groundwater Conditions .....	8
5.0 CLOSURE .....	9

In Order  
Following  
Page 9

Lists of Abbreviations and Symbols

Records of Boreholes 401 to 406, 501 to 507, W-1 to W-8, W-9A, W-10 to W-32, W-37, and W-41 to W-82

Drawings 1 to 4

Figures 1A to 6H

**LIST OF DRAWINGS**

Drawing 1	Noise Barrier Wall 1 – Borehole Locations
Drawing 2	Noise Barrier Walls 2 and 3 – Borehole Locations
Drawing 3	Noise Barrier Walls 4, 5, 6 and 7 – Borehole Locations
Drawing 4	Noise Barrier Walls 8, 9, 10 and 11 – Borehole Locations

**LIST OF FIGURES**

Figure 1A/1B	Grain Size Distribution Test Results – Fill
Figure 2	Plasticity Chart – Fill
Figure 3	Grain Size Distribution Test Results – Surficial Silty Sand to Sandy Silt
Figure 4	Grain Size Distribution Test Results – Surficial Clayey Silt
Figures 5A-5D	Grain Size Distribution Test Results – Clayey Silt to Silty Clay Till
Figures 6A-6H	Plasticity Chart – Clayey Silt to Silty Clay Till

## 1.0 INTRODUCTION

Golder Associates Ltd. (Golder) has been retained by Morrison Hershfield Limited (MH) on behalf of the Ministry of Transportation, Ontario (MTO) to provide foundation engineering services associated with the widening of the Queen Elizabeth Way (QEW) between Highway 406 and the Garden City Skyway in the City of St. Catharines, in the Region of Niagara. Foundation engineering services are required for the widening or replacement of five structures (Third Street overpass, Martindale Road underpass, Lake Street underpass, Geneva Street overpass, and Welland Avenue overpass), new retaining walls and noise barrier walls, culvert extensions and high mast light poles.

This report addresses the foundation investigation carried out for the proposed noise barrier walls between Station 10+415, approximately 400 m west of Ontario Street, and Station 14+825, approximately 400 m east of Welland Avenue.

The terms of reference and scope of work for the foundation engineering services are outlined in MTO's Request for Proposal for Agreement No. 2005-A-000564, issued in July 2002, and in Section 6.8 of MH's *Technical Proposal* for G.W.P. 607-00-00.

## **2.0 SITE DESCRIPTION**

The proposed noise barrier walls extend along the north and south sides of the QEW from Station 10+415, approximately 400 m west of Ontario Street, to Station 14+825, approximately 400 m east of Welland Avenue, in St. Catharines, Ontario.

Throughout the study area, the QEW runs roughly parallel to and north of (below) the Niagara escarpment, and sub-parallel to and south of Lake Ontario; the highway is located closer to the lake near the western portion of the study area, and trends away from the lake toward the eastern portion of the study area.

The terrain along the QEW is generally flat-lying to gently sloping, with a regional slope downward to the north toward Lake Ontario. East of Martindale Pond, the QEW climbs gradually toward the east, from about Elevation 92 m to 93 m near Ontario Street to about Elevation 101 m to 101.5 m near Welland Avenue. Fill embankments are present above the natural ground surface along the QEW and the local roads throughout the study area.



### **3.0 INVESTIGATION PROCEDURES**

The field work for the widening of the QEW from Highway 406 to the Garden City Skyway was carried out by Golder from October to December 2004 and May to August 2005, during which time boreholes were advanced as part of the subsurface investigations for the widening or replacement of five structures, new retaining walls and noise barrier walls, culvert extensions, and high mast light poles. Of these boreholes, eighty-eight have been used in this report for the proposed noise barrier walls. Drawings 1 to 4 show the locations of these boreholes.

The field investigation was carried out using truck- and track-mounted drill rigs supplied and operated by Walker Drilling Ltd. of Utopia, Ontario. The boreholes were advanced to depths ranging from 5.2 m to 36.7 m below the existing ground surface, using 108 mm diameter solid stem augers. Soil samples were obtained at intervals of 0.75 m to 1.5 m in depth within the upper 20 m of the boreholes, and at 3 m spacing below this depth. The samples were obtained using a 50 mm outer diameter split-spoon sampler driven by an automatic hammer, in accordance with Standard Penetration Test (SPT) procedure. In situ vane testing (using an MTO “N” vane) was carried out at selected depths through softer cohesive strata, where encountered.

The groundwater conditions in the open boreholes were observed throughout the drilling operations and standpipe piezometers were installed in selected boreholes to permit monitoring of the groundwater level at these locations. The piezometers consist of 50 mm outside diameter rigid PVC tubing with a 1.5 m long slotted screen sealed within a filter sand pack at a selected depth within the boreholes (typically within the clayey silt to silty clay till deposit). The screen and filter sand pack have been backfilled to ground surface using bentonite pellets. Boreholes that did not have piezometers installed were backfilled to ground surface upon completion of the drilling operations, using bentonite pellets.

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

The as-drilled borehole locations were measured in the field by Golder relative to site features and the alignment of the walls staked by MH, and the ground surface elevations at the borehole locations were determined from the digital terrain model (DTM) for this project. The borehole locations (NAD83 northing and easting coordinates) and ground surface elevations (referenced to geodetic datum) are presented on the Record of Borehole sheets and on Drawings 1 to 4.

## **4.0 GENERAL SITE GEOLOGY AND STRATIGRAPHY**

### **4.1 Regional Geological Conditions**

The area of the QEW from Highway 406 to the Garden City Skyway lies within the Iroquois Plain physiographic region, as delineated in *The Physiography of Southern Ontario*<sup>1</sup> and *Urban Geology of Canadian Cities*<sup>2</sup>.

The Iroquois Plain extends around the western shore of Lake Ontario; on the south side of the lake, in the St. Catharines area, the Plain is located between the present Lake Ontario shorebluffs and the foot of the Niagara Escarpment. The Plain is comprised of the flat to undulating lake bed and beaches of the former glacial Lake Iroquois, which occupied this area during the last glacial recession.

The surficial soils in the Iroquois Plain are typically comprised of glaciolacustrine clays and silts. However, in the St. Catharines area, surficial deposits of beach sand and gravel are also present. The surficial sands, silts and clays are underlain by an extensive till deposit; portions of the till are considered to be “water-lain” (that is, formed by sediment rain-out either from a floating ice margin or from iceberg dumping), resulting in a predominantly massive, matrix-supported structure, as well as relatively thin sand to silt stringers or interlayers. This extensive till deposit may be underlain by or interlayered with a lower glaciolacustrine clay deposit, although this glaciolacustrine layer is absent in some portions of the Iroquois Plain in the St. Catharines area. Finally, the till and/or glaciolacustrine layer may be underlain by a lower till unit, that typically has increasing gravel content with proximity to the underlying bedrock (Menzies and Taylor, 1998).

The overburden soils are underlain by red shale bedrock of the Queenston Formation. This shale formation contains siltstone interlayers as well as “occasional patches of gypsum” (Menzies and Taylor, 1998).

### **4.2 Site Stratigraphy**

The detailed subsurface soil and groundwater conditions as encountered in the boreholes advanced during this investigation, together with the results of the laboratory tests carried out on selected soil samples, are given on the attached Record of Borehole sheets and Figures 1A to 6H

---

<sup>1</sup> Chapman, L.J. and D.F. Putnam. *The Physiography of Southern Ontario*, Ontario Geological Survey Special Volume 2, Third Edition, 1984. Accompanied by Map P.2715, Scale 1:600,000.

<sup>2</sup> J. Menzies and E.M. Taylor. “Urban Geology of St. Catharines-Niagara Falls, Region Niagara”. In *Urban Geology of Canadian Cities*, Geological Association of Canada Special Paper 42, Ed. P.F. Karrow and O.L. White, 1998.

following the text of this report. The stratigraphic boundaries shown on the borehole records are inferred from non-continuous sampling, observations of drilling progress and the results of Standard Penetration Tests. These boundaries, therefore, represent transitions between soil types rather than exact planes of geological change. Subsoil conditions will vary between and beyond the borehole locations.

In general, the surficial soils at the site consist of fill materials associated with embankments for the QEW and local roads, overlying a thick deposit of clayey silt to silty clay till of firm to hard consistency. Relatively thin surficial deposits of silty sand to sandy silt and clayey silt to silty clay were encountered in some of the boreholes, overlying the till deposit. In the deeper boreholes the clayey silt to silty clay till was often underlain by dense to very dense silty sand to sandy silt till, sand or silt. The boreholes were typically terminated within the clayey silt to silty clay till at depths ranging from about 5.2 m to 36.7 m below the ground surface.

A more detailed description of the subsurface conditions encountered in the boreholes is provided in the following sections. The deeper soil deposits (for example, lower granular deposits or residual soils below about 20 m depth), as encountered in the 400-series and 500-series boreholes advanced at the Geneva Street and Welland Avenue overpass sites, respectively, are not addressed in this report as they are located below the depth of interest for noise barrier wall foundations.

#### **4.2.1 Topsoil**

About 70 mm to 150 mm of topsoil was encountered at ground surface in eleven of the boreholes that were advanced within landscaped areas, outside of the paved roadways or shoulders.

#### **4.2.2 Asphalt and Fill Materials**

In forty-four of the boreholes advanced through the QEW or local roadway pavements, a layer of asphalt about 100 mm to 200 mm in thickness was encountered at ground surface. In Boreholes W-57, W-69 and W-72 the asphalt layer was underlain by a layer of concrete about 100 mm to 250 mm thick. Fill material is present below the pavements, and fill materials were typically encountered in the remaining boreholes at ground surface. The fill extends to depths ranging from about 0.5 m to 9.1 m below the ground surface, as encountered in the boreholes.

The existing fill materials vary in composition from sand to sand and gravel or crushed limestone, clayey silt to silty clay, and foundry sand. The results of grain size distribution testing carried out on fourteen selected samples of the fill are shown on Figure 1A and 1B. A 150 mm to 200 mm thick layer of concrete was encountered in Boreholes W-37, W-42, W-54 and W-80 within or at the base of the fill material.

Atterberg limits testing was conducted on six selected samples of the cohesive fill, and measured plastic limits of 13 to 17 per cent, liquid limits of 18 to 35 per cent, and plasticity indices of 5 to 18 per cent; these results, which are plotted on a plasticity chart on Figure 2, indicate that the cohesive fill is typically a clayey silt of low plasticity.

The measured SPT “N” values within the cohesionless fill ranged from about 4 to 70 blows per 0.3 m of penetration, indicating that the fill has a variable, loose to very dense relative density. The layers of foundry sand that were encountered within the QEW embankment fill in some boreholes yielded SPT “N” values ranging from 10 to 107 blows per 0.3 m of penetration, indicating that this portion of the fill has a compact to very dense, and generally very dense, relative density. The measured SPT “N” values within the cohesive fill ranged from 4 to 40 blows per 0.3 m of penetration, indicating that the clayey silt fill has a variable, firm to hard consistency.

#### **4.2.3 Surficial Silty Sand to Sandy Silt**

Surficial deposits of cohesionless soil were encountered in some of the boreholes (Boreholes 403, 406, W-15, W-16, W-17, W-20, W-32, W-44, W-45, W-48, W-50, W-53, W-54, W-56, W-58, W-59, W-60 and W-67), generally below the topsoil or fill and on top of the clayey silt to silty clay till deposit. Where encountered, the surficial cohesionless deposits varied from about 0.2 m to 2.3 m in thickness.

The surficial cohesionless soils vary in composition from silty sand to sandy silt containing trace to some gravel; silty clay seams were observed within the deposit at some locations. The results of grain size distribution tests conducted on five samples of the surficial silty sand to sandy silt are shown on Figure 3; on this Figure, the result for Borehole W-48, Sample 2 demonstrates the presence of silty clay seams within the deposit. In addition, organic matter, rootlets and wood fragments were observed in recovered samples of the surficial silty sand to sandy silt.

The measured SPT “N” values ranged from 4 to 29 blows per 0.3 m of penetration, indicating that the surficial silty sand to sandy silt has a loose to very dense state of packing.

#### **4.2.4 Surficial Clayey Silt to Silty Clay**

Surficial layers of cohesive soil were encountered in some of the boreholes (Boreholes 405, W-18, W-42, W-72 and W-79) below the topsoil or fill, and on top of the clayey silt to silty clay till deposit. Where encountered as part of this investigation, the surficial cohesive soils varied from about 0.7 m to 1.5 m in thickness.

The surficial cohesive soils vary in composition from clayey silt to silty clay containing trace to some sand, trace gravel, and trace quantities of organic material. The result of a grain size distribution test conducted on one selected sample of the surficial clayey silt to silty clay is shown on Figure 3.

The SPT “N” values measured within the surficial clayey silt to silty clay ranged from 5 to 18 blows per 0.3 m of penetration, indicating that this material has a firm to very stiff consistency.

#### **4.2.5 Clayey Silt to Silty Clay Till**

An extensive till deposit was encountered beneath the topsoil, fill and surficial soil deposits, where present, in all of the boreholes. The surface of this deposit was encountered at a depth of between 0.1 m and 9.4 m below the ground surface at the borehole locations, ranging between Elevations 89.2 m and 103.2 m (generally rising toward the east). All of the W-series boreholes were terminated within the till deposit; where fully penetrated in some of the deeper boreholes advanced for the Geneva Street and Welland Avenue structures, the till deposit is greater than 20 m in thickness.

The till consists of brown to grey clayey silt to silty clay, containing trace to some sand and gravel/shale fragments. Seams of silt and sandy silt were noted within some of the recovered till samples. Interlayers of moist to wet silty sand to sand and silt were encountered within the clayey silt to silty clay till deposit in Boreholes W-26, W-42 and W-45; these interlayers vary from 0.2 m to greater than 0.9 m in thickness. The results of grain size distribution testing completed on forty selected samples of the clayey silt to silty clay till are shown on Figures 5A to 5D. Although boulders and cobbles were not encountered within the deposit in the boreholes advanced as part of this investigation, the deposit is glacially-derived and may contain cobbles and boulders.

Atterberg limits testing was completed on 147 samples of the till deposit, and measured plastic limits of 13 to 25 per cent, liquid limits of 21 to 51 per cent, and plasticity indices of 9 to 30 per cent. These results, which are plotted on plasticity charts on Figures 6A through 6H, confirm that the till varies from a clayey silt of low plasticity to a silty clay of intermediate plasticity.

The SPT “N” values measured within the clayey silt to silty clay till deposit generally ranged from 6 to 60 blows per 0.3 m of penetration. In situ vane testing was carried out within the firm to stiff zones of the till deposit, where encountered, and measured undrained shear strengths ranging from about 45 kPa to greater than 100 kPa; the detailed results of the field vane testing are presented on the borehole records. The results of the SPT “N” values and in situ vane testing indicate that the till deposit has a firm to hard, but typically stiff to hard, consistency.

### 4.3 Groundwater Conditions

The water levels in the boreholes advanced by Golder in 2004 and 2005 were noted during and after the drilling operations; typically, the open boreholes were dry upon completion of drilling. Piezometers were installed in nine of the boreholes that are included with this report, generally sealed within the clayey silt to silty clay till deposit. Details of the piezometer installations are shown in the borehole records following the text of this report.

Typically, the water level measured in the piezometers installed as part of the subsurface investigation for the noise barrier walls and for other elements of this project varies from about 1.5 m to 4 m below the natural ground surface at the site. The recorded water levels in the piezometers are summarized below:

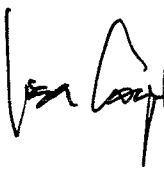
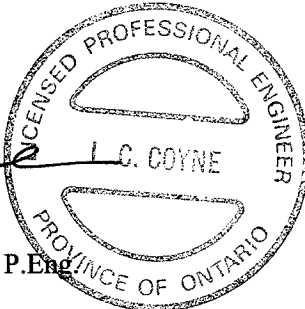
<i>Borehole Number</i>	<i>Ground Surface Elevation (m)</i>	<i>Water Level Depth (m)</i>	<i>Water Level Elevation (m)</i>	<i>Date</i>
405	100.0	2.8	97.2	Aug 8, 2005
		0.6	99.4	Dec 6, 2005
503	101.4	11.6	89.8	May 13, 2005
		13.7	87.7	Dec 20, 2005
507	101.5	1.6	99.9	May 13, 2005
		6.0	95.5	Dec 20, 2005
W-9A	93.8	2.8	91.0	Aug 8, 2005
		1.7	92.1	Dec 6, 2005
W-25	94.5	3.8	90.7	Aug 8, 2005
		2.5	92.0	Dec 6, 2005
W-59	102.0	8.7	93.3	Aug 8, 2005
		3.7	98.3	Dec 6, 2005
W-61	101.8	7.3	94.5	Aug 8, 2005
		2.5	99.3	Dec 6, 2005
W-65	101.2	4.2	97.0	Aug 8, 2005
		1.2	100.0	Dec 6, 2005
W-77	101.4	3.2	98.2	Aug 8, 2005
		1.1	100.3	Dec 6, 2005

The groundwater levels will subject to seasonal fluctuations, and will be higher during wetter periods of the year. In addition, the surficial silty sand to sandy silt soils, where present, should be expected to be water-bearing, with water “perched” on top of the underlying, less permeable clayey silt to silty clay till deposit. Water may also be present at the base of cohesionless fill soils, again “perched” on top of the clayey silt to silty clay till deposit.

## 5.0 CLOSURE

This Foundation Investigation Report was prepared by Ms. Sarah Grady and reviewed by Ms. Lisa Coyne, P.Eng., an Associate and geotechnical engineer with Golder. Mr. Jorge Costa, P.Eng., a Principal and Designated MTO Contact for Golder, carried out an independent review of the report.

### GOLDER ASSOCIATES LTD.

  
  
Lisa C. Coyne, P.Eng.  
Associate

  
  
Jorge M.A. Costa, P.Eng.  
Principal, Designated MTO Contact

SJG/LCC/JMAC/sjg

N:\ACTIVE\2004\1111\04-1111-002 MH QEW WIDENING ST. CATHARINES\6 - REPORTS\CONTRACT FI REPORTS\04-1111-002 FIR09 07JAN NOISE WALLS.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

### 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 cm<sup>2</sup> 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 <sup>1</sup>
CIU	consolidated isotropically undrained triaxial test with porewater pressure measurement <sup>1</sup>
$D_R$	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 <sub>4</sub>	concentration of water-soluble sulphates
UC	unconfined compression test
UU	unconsolidated undrained triaxial test
V	field vane (LV-laboratory vane test)
$\gamma$	unit weight

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

S:\FINALDATA\ABBREV\2000\LOFA-D00.DOC



## LIST OF SYMBOLS

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

### I. General

$\pi$	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

$\gamma$	shear strain
$\Delta$	change in, e.g. in stress: $\Delta \sigma$
$\epsilon$	linear strain
$\epsilon_v$	volumetric strain
$\eta$	coefficient of viscosity
$\nu$	poisson's ratio
$\sigma$	total stress
$\sigma'$	effective stress ( $\sigma' = \sigma - u$ )
$\sigma'_{vo}$	initial effective overburden stress
$\sigma_1, \sigma_2, \sigma_3$	principal stress (major, intermediate, minor)
$\sigma_{oct}$	mean stress or octahedral stress $= (\sigma_1 + \sigma_2 + \sigma_3)/3$
$\tau$	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
$\gamma'$	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
$\sigma'_p$	pre-consolidation pressure
OCR	over-consolidation ratio $= \sigma'_p / \sigma'_{vo}$


#### (d) Shear Strength

$\tau_p, \tau_r$	peak and residual shear strength
$\phi'$	effective angle of internal friction
$\delta$	angle of interface friction
$\mu$	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 = (compressive strength)/2  
 \* density symbol is  $\rho$ . Unit weight symbol is  $\gamma$  where  $\gamma = \rho g$  (i.e. mass density x acceleration due to gravity)

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○<sup>3%</sup> STRAIN AT FAILURE

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○<sup>3</sup>% STRAIN AT FAILURE

PROJECT <u>04-1111-002</u>		<b>RECORD OF BOREHOLE No 401</b>				3 OF 3 <b>METRIC</b>											
W.P. <u>607-00-00</u>		LOCATION <u>N 4781742.3 ; E 325860.8</u>				ORIGINATED BY <u>PKS</u>											
DIST <u>Central</u> HWY <u>QEW</u>		BOREHOLE TYPE <u>108 mm Diameter Solid Stem Augers</u>				COMPILED BY <u>HJ</u>											
DATUM <u>Geodetic</u>		DATE <u>June 29, 2005</u>				CHECKED BY <u>LCC</u>											
SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT  γ  kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)  GR SA SI CL	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES	SHEAR STRENGTH kPa									WATER CONTENT (%)
	--- CONTINUED FROM PREVIOUS PAGE ---																
	CLAYEY SILT, some sand, trace gravel and shale pieces (TILL/RESIDUAL SOIL) Hard Red Moist		20	SS	153		75										11 21 55 13
								74									
			21	SS	100/0.13			73									
72.0 33.7	END OF BOREHOLE		22	SS	100/0.15												
	Note:  1.) Borehole dry upon completion of drilling operations.																

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE

PROJECT 04-1111-002			RECORD OF BOREHOLE No 402			1 OF 3 METRIC		
W.P. 607-00-00			LOCATION N 4781732.1 ; E 325899.5			ORIGINATED BY PKS		
DIST Central HWY QEW			BOREHOLE TYPE 108 mm Diameter Solid Stem Augers			COMPILED BY HJ		
DATUM Geodetic			DATE June 27, 2005			CHECKED BY LCC		
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 NATURAL MOISTURE CONTENT LIQUID LIMIT W <sub>p</sub> W W <sub>L</sub> WATER CONTENT (%)		
						UNIT WEIGHT γ kN/m <sup>3</sup>		
						REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL		
106.0	GROUND SURFACE							
0.0	ASPHALT							
0.2	Sand and gravel (FILL) Compact to very dense Red Moist		1	SS	53		105	
			2	SS	24		104	
			3	SS	13		103	
103.0								
3.1	Silty sand to sand, some silt, trace to some gravel (FILL) Loose to compact Red Moist		4	SS	7		103	
			5	SS	12		102	
			6	SS	4		101	
							100	
99.6			7	SS	30		99	
6.4	Sand and gravel (FILL) Compact to very dense Grey/brown Moist							
	Wet below 7.6 m depth		8	SS	50		98	
							97	
96.9								
9.1	CLAYEY SILT, some sand, trace gravel and shale pieces (TILL) Stiff to very stiff Grey Moist/wet		9	SS	16		96	
			10	SS	15		95	
							94	
			11	SS	15		93	
							92	
			12	SS	13			

Continued Next Page

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

PROJECT <u>04-1111-002</u>		<b>RECORD OF BOREHOLE No 402</b>		2 OF 3 <b>METRIC</b>	
W.P. <u>607-00-00</u>		LOCATION <u>N 4781732.1 ; E 325899.5</u>		ORIGINATED BY <u>PKS</u>	
DIST <u>Central</u> HWY <u>QEW</u>		BOREHOLE TYPE <u>108 mm Diameter Solid Stem Augers</u>		COMPILED BY <u>HJ</u>	
DATUM <u>Geodetic</u>		DATE <u>June 27, 2005</u>		CHECKED BY <u>LCC</u>	

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa						
	--- CONTINUED FROM PREVIOUS PAGE ---													
88.2	CLAYEY SILT, some sand, trace gravel and shale pieces (TILL) Stiff to very stiff Grey Moist/wet		13	SS	11		90							
17.8	SILTY CLAY, some sand, trace gravel and shale fragments (TILL) Firm to Stiff Grey Wet		14	SS	10		89							
			15	SS	8		88							
			16	SS	8		86							
			17	SS	9		85							
			18	SS	10		83							
	Containing sand seams below 24.4 m depth		19	SS	11		81							
79.8	CLAYEY SILT, some sand, trace gravel, shale and limestone pieces (TILL) Hard Grey to red Wet		20	SS	43		79							
26.2			21	SS	93		77							
77.7	CLAYEY SILT, some sand, trace gravel, shale and limestone pieces (TILL/RESIDUAL SOIL) Hard Red Wet													

Continued Next Page

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE

PROJECT <u>04-1111-002</u>		<b>RECORD OF BOREHOLE No 402</b>				3 OF 3 <b>METRIC</b>											
W.P. <u>607-00-00</u>		LOCATION <u>N 4781732.1 ; E 325899.5</u>				ORIGINATED BY <u>PKS</u>											
DIST <u>Central</u> HWY <u>QEW</u>		BOREHOLE TYPE <u>108 mm Diameter Solid Stem Augers</u>				COMPILED BY <u>HJ</u>											
DATUM <u>Geodetic</u>		DATE <u>June 27, 2005</u>				CHECKED BY <u>LCC</u>											
SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES	SHEAR STRENGTH kPa									WATER CONTENT (%)
	--- CONTINUED FROM PREVIOUS PAGE ---																
	CLAYEY SILT, some sand, trace gravel, shale and limestone pieces (TILL/RESIDUAL SOIL) Hard Red Wet	[Hatched Box]	22	SS	103												
							75										
			23	SS	110/30		74										
							73										
72.2 33.8	END OF BOREHOLE		24	SS	116												
	Note:  1. Water level measured in open borehole at 32.6 m depth (Elev. 73.4 m) upon completion of drilling operations.																

+<sup>3</sup>, X<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE

PROJECT		04-1111-002		RECORD OF BOREHOLE No 403		1 OF 3 METRIC						
W.P.		607-00-00		LOCATION		N 4781714.1 ; E 325863.9						
DIST		Central HWY QEW		BOREHOLE TYPE		108 mm Diameter Solid Stem Augers						
DATUM		Geodetic		DATE		June 19, 2005						
				ORIGINATED BY		PKS						
				COMPILED BY		HJ						
				CHECKED BY		LCC						
SOIL PROFILE		SAMPLES		GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER			TYPE	"N" VALUES					
105.8	GROUND SURFACE											
0.0	ASPHALT											
0.2	Sand and gravel (FILL) Loose to dense Reddish brown to red Moist		1	SS	38							
			2	SS	25							
			3	SS	8							
			4	SS	8							
102.0	Foundry sand (FILL) Compact to very dense Black Moist		5	SS	10							
3.8			6	SS	25							
			7	SS	82							
99.3	Sandy SILT Very dense Brown Moist											
6.6												
98.2	CLAYEY SILT to SILTY CLAY, trace sand, trace gravel (TILL) Stiff to very stiff Grey-brown Moist		8	SS	24							
7.6												
			9	SS	28							
	Becoming grey below 10.7 m depth		10	SS	14							
			11	SS	12							
			12	SS	14							
90.8												


Continued Next Page

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE



Continued Next Page

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○<sup>3</sup>% STRAIN AT FAILURE

PROJECT <u>04-1111-002</u>		<b>RECORD OF BOREHOLE No 403</b>				3 OF 3 <b>METRIC</b>								
W.P. <u>607-00-00</u>		LOCATION <u>N 4781714.1 ; E 325863.9</u>				ORIGINATED BY <u>PKS</u>								
DIST <u>Central</u> HWY <u>QEW</u>		BOREHOLE TYPE <u>108 mm Diameter Solid Stem Augers</u>				COMPILED BY <u>HJ</u>								
DATUM <u>Geodetic</u>		DATE <u>June 19, 2005</u>				CHECKED BY <u>LCC</u>								
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa						
	--- CONTINUED FROM PREVIOUS PAGE ---							20 40 60 80 100						
72.3	CLAYEY SILT, trace sand, trace gravel (TILL) Hard Grey Moist Containing shale pieces and red in color below 30.5 m depth		21	SS	57									
33.5	CLAYEY SILT, some sand, containing shale pieces (TILL/RESIDUAL SOIL) Hard Red Moist		22	SS	100/20									
70.8	Red SHALE (BEDROCK)													
35.1														
69.2	END OF BOREHOLE		23	SS	100/07									
36.7	Note:  1.) Borehole dry upon completion of drilling operations.													

MIS-MTO 001 041111002AAMTO.GPJ GAL-MISS.GDT 23/1/07

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE

PROJECT 04-1111-002			RECORD OF BOREHOLE No 404			1 OF 3 METRIC		
W.P. 607-00-00			LOCATION N 4781705.4 ; E 325898.0			ORIGINATED BY PKS		
DIST Central HWY QEW			BOREHOLE TYPE 108 mm Diameter Solid Stem Augers			COMPILED BY HJ		
DATUM Geodetic			DATE June 22, 2005			CHECKED BY LCC		
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 <sub>p</sub> NATURAL MOISTURE CONTENT W LIQUID LIMIT W <sub>L</sub> WATER CONTENT (%)
106.1	GROUND SURFACE							
0.0	ASPHALT						106	
0.2	Sand and gravel (FILL) Compact Red Moist		1	SS	24		105	
104.6								
1.5	Silty sand to sand, some silt, trace gravel (FILL) Compact to dense Reddish brown Moist		2	SS	25		104	
			3	SS	27		103	
			4	SS	24		102	
			5	SS	21		101	
			6	SS	22		100	
99.7			7	SS	40		99	
6.4	Foundry sand (FILL) Dense Black Moist						98	
98.5							97	
7.6	CLAYEY SILT, trace sand, trace gravel (TILL) Very stiff to hard Brown Moist		8	SS	41		96	
	Grey below 9.0 m depth		9	SS	28		95	
	Wet below 10.7 m depth		10	SS	18		94	
94.5							93	
11.6	CLAYEY SILT, trace sand and gravel (TILL) Stiff to very stiff Grey Wet		11	SS	13		92	
			12	SS	13			

Continued Next Page



+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

PROJECT <u>04-1111-002</u>		<b>RECORD OF BOREHOLE No 404</b>		2 OF 3 <b>METRIC</b>	
W.P. <u>607-00-00</u>		LOCATION <u>N 4781705.4 ; E 325898.0</u>		ORIGINATED BY <u>PKS</u>	
DIST <u>Central</u> HWY <u>QEW</u>		BOREHOLE TYPE <u>108 mm Diameter Solid Stem Augers</u>		COMPILED BY <u>HJ</u>	
DATUM <u>Geodetic</u>		DATE <u>June 22, 2005</u>		CHECKED BY <u>LCC</u>	

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	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							
--- CONTINUED FROM PREVIOUS PAGE ---								● QUICK TRIAXIAL    × REMOULDED							
84.2	CLAYEY SILT, trace sand and gravel (TILL) Stiff to very stiff Grey Wet		13	SS	14		91								
							90								
			14	SS	15		89								
							88								
			15	SS	14		87								
							86								
			16	SS	14		85								
							84								
22.0	SILTY CLAY, trace sand, trace gravel (TILL) Stiff Grey Wet		18	SS	9		83								
81.7	CLAYEY SILT, some sand, trace gravel (TILL) Very stiff to hard Grey Moist		19	SS	17		82								
						81									
24.4							80								
						79									
						78									
			21	SS	17		77								

Continued Next Page

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE

PROJECT <u>04-1111-002</u>		<b>RECORD OF BOREHOLE No 404</b>				3 OF 3 <b>METRIC</b>									
W.P. <u>607-00-00</u>		LOCATION <u>N 4781705.4 ;E 325898.0</u>				ORIGINATED BY <u>PKS</u>									
DIST <u>Central</u> HWY <u>QEW</u>		BOREHOLE TYPE <u>108 mm Diameter Solid Stem Augers</u>				COMPILED BY <u>HJ</u>									
DATUM <u>Geodetic</u>		DATE <u>June 22, 2005</u>				CHECKED BY <u>LCC</u>									
SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES	SHEAR STRENGTH kPa							
	--- CONTINUED FROM PREVIOUS PAGE ---														
75.6	SAND and SILT, trace to some gravel and shale fragments, trace clay (TILL/RESIDUAL SOIL) Very dense Grey to red Moist to wet					76									5 36 53 6
30.5						75									
			22	SS	100/10	74									
						73									
72.5	CLAYEY SILT, some sand trace gravel and shale pieces (TILL/RESIDUAL SOIL) Hard Red Wet					72									
33.6						71									
70.9	END OF BOREHOLE		23	SS	100/13										
35.2	Note:  1.) Open borehole wet below 10.7m depth upon completion of drilling operations.														

+<sup>3</sup>, X<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE

PROJECT 04-1111-002			RECORD OF BOREHOLE No 405			1 OF 1 METRIC		
W.P. 607-00-00			LOCATION N 4781733.9; E 325941.6			ORIGINATED BY PKS		
DIST Central HWY QEW			BOREHOLE TYPE 108 mm Diameter Solid Stem Augers			COMPILED BY HJ		
DATUM Geodetic			DATE July 28, 2005			CHECKED BY LCC		
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
100.0	GROUND SURFACE							PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT W <sub>p</sub> W W <sub>L</sub> WATER CONTENT (%)
0.0	TOPSOIL		1	SS	6			
99.2	CLAYEY SILT, some sand, trace to some gravel, trace organics		2	SS	32			
0.8	Firm Dark brown Moist		3	SS	32			
	CLAYEY SILT to SILTY CLAY, some sand, trace gravel (TILL)		4	SS	15			
	Stiff to hard Brown Moist		5	SS	27			
	Wet below 2.1 m depth		6	SS	16			
	Becoming grey below 4.5 m depth		7	SS	9			
			8	SS	17			
			9	SS	15			
			10	SS	16			
90.1	END OF BOREHOLE							
9.9	Note: 1. Water level measured in open borehole at 8.2 m depth upon completion of drilling operations. 2. Water level measured in piezometer at 2.8 m depth (Elevation 97.2 m) on August 8, 2005. 3. Water level measured in piezometer at 0.6 m depth (Elevation 99.4 m) on December 6, 2005.							

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

PROJECT		04-1111-002		<b>RECORD OF BOREHOLE No 406</b>		1 OF 1 <b>METRIC</b>								
W.P.		607-00-00		LOCATION		N 4781719.6 ; E 325844.8								
DIST		Central HWY QEW		BOREHOLE TYPE		108 mm Diameter Solid Stem Augers								
DATUM		Geodetic		DATE		June 17, 2005								
				ORIGINATED BY		PKS								
				COMPILED BY		HJ								
				CHECKED BY		LCC								
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa						
105.6	GROUND SURFACE							20 40 60 80 100						
0.0	ASPHALT							20 40 60 80 100						
0.2	Sand and gravel (FILL) Very dense Red Moist							20 40 60 80 100						
104.5			1	SS	107									
1.1	Foundry sand (FILL) Very dense Black Moist													
			2	SS	77									
			3	SS	60									
			4	SS	53									
			5	SS	78									
			6	SS	74									
99.2														
6.4	Sand and gravel (FILL) Very dense Grey Moist		7	SS	55									
98.0														
7.6	Sandy SILT Compact Brown Wet		8	SS	16									0 19 72 9
96.2														
95.9	CLAYEY SILT, some sand, trace gravel (TILL) Very stiff Grey Wet		9	SS	26									
9.8	END OF BOREHOLE													
	Note: 1. Bottom of borehole wet upon completion of drilling operations.													

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE

MIS-MTO 001 041111002AAMTO.GPJ GAL-MISS.GDT 23/1/07

PROJECT		04-1111-002		RECORD OF BOREHOLE No 501		1 OF 1 METRIC											
W.P.		607-00-00		LOCATION		N 4781339.1 ; E 327298.4											
DIST		Central HWY QEW		BOREHOLE TYPE		108 mm Diameter Solid Stem Augers											
DATUM		Geodetic		DATE		December 13, 2004											
				ORIGINATED BY		PKS											
				COMPILED BY		SLP											
				CHECKED BY		LCC											
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					WATER CONTENT (%)			γ kN/m³	GR SA SI CL
								20 40 60 80 100	20 40 60 80 100	W <sub>p</sub>	W	W <sub>L</sub>	10 20 30				
101.2	GROUND SURFACE																
0.0	TOPSOIL																
	SILTY CLAY, trace to some sand, trace gravel (TILL) Stiff to very stiff Brown Moist		1	SS	9		101										
			2	SS	17		100										
			3	SS	22		99										
			4	SS	21		98										
			5	SS	23		97										
			6	SS	13		96										
96.8	SILTY CLAY, trace to some sand, trace gravel (TILL) Firm to stiff Grey Moist to wet		7	SS	7		95										
4.4			8	SS	8												
94.5	END OF BOREHOLE																
6.7	Note: 1. Borehole dry upon completion of drilling operations.																




+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE



PROJECT 04-1111-002			RECORD OF BOREHOLE No 502			1 OF 3 METRIC		
W.P. 607-00-00			LOCATION N 4781342.0 ; E 327287.0			ORIGINATED BY PKS		
DIST Central HWY QEW			BOREHOLE TYPE 108 mm Diameter Solid Stem Augers			COMPILED BY SLP		
DATUM Geodetic			DATE December 13, 2004			CHECKED BY LCC		
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 <sub>p</sub> NATURAL MOISTURE CONTENT W LIQUID LIMIT W <sub>L</sub> WATER CONTENT (%)
101.2	GROUND SURFACE							
0.0	TOPSOIL		1	SS	7		101	
100.4	Sand and gravel, trace rootlets (FILL) Loose Red Moist		2	SS	9		100	
0.8	SILTY CLAY, trace to some sand, trace gravel (TILL) Stiff to very stiff Brown Moist to wet		3	SS	22		99	
			4	SS	23		98	47
			5	SS	17		97	
			6	SS	14		96	
			7	SS	13		95	
95.5	SILTY CLAY, trace to some sand, trace gravel (TILL) Stiff Grey to reddish grey Wet		8	SS	11		94	
5.7			9	SS	9		93	
			10	SS	8		92	
			11	SS	8		91	
89.5	SILTY CLAY, trace to some sand, trace gravel (TILL) Firm to stiff Grey to reddish grey Wet		12	SS	5		90	
11.7			13	SS	7		89	43
							88	
							87	

Continued Next Page

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

PROJECT		04-1111-002		<b>RECORD OF BOREHOLE No 502</b>		2 OF 3 <b>METRIC</b>									
W.P.		607-00-00		LOCATION		N 4781342.0 ; E 327287.0									
DIST		Central HWY QEW		BOREHOLE TYPE		108 mm Diameter Solid Stem Augers									
DATUM		Geodetic		DATE		December 13, 2004									
				ORIGINATED BY		PKS									
				COMPILED BY		SLP									
				CHECKED BY		LCC									
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES										
--- CONTINUED FROM PREVIOUS PAGE ---															
82.0	SILTY CLAY, trace to some sand, trace gravel (TILL) Firm to stiff Grey to reddish grey Wet		14	SS	10	▽	86							8 8 48 36	
								85							
			15	SS	8		84								
			16	SS	7		83								
19.2	CLAYEY SILT, some sand, trace gravel (TILL) Stiff to very stiff Grey/red Moist to wet						82								
			17	SS	12		81								
			18	SS	15		80								
			19	SS	24		79								
76.8	SILTY SAND, trace gravel, trace shale fragments Dense to very dense Grey/red Wet						78								
24.4			20	SS	38		77								
			21	SS	109	76									
			22	SS	107	75									
						74									
						73									
72.1			23	SS	100/13										
29.1															

Continued Next Page

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE







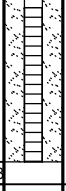
PROJECT <u>04-1111-002</u>		<b>RECORD OF BOREHOLE No 502</b>				3 OF 3 <b>METRIC</b>										
W.P. <u>607-00-00</u>		LOCATION <u>N 4781342.0 ; E 327287.0</u>				ORIGINATED BY <u>PKS</u>										
DIST <u>Central</u> HWY <u>QEW</u>		BOREHOLE TYPE <u>108 mm Diameter Solid Stem Augers</u>				COMPILED BY <u>SLP</u>										
DATUM <u>Geodetic</u>		DATE <u>December 13, 2004</u>				CHECKED BY <u>LCC</u>										
SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES	SHEAR STRENGTH kPa								
	--- CONTINUED FROM PREVIOUS PAGE ---															
	END OF BOREHOLE  Note:  1. Water level at 24.4 m depth upon (Elev. 76.8 m) completion of drilling operations.															

+ 3, X 3: Numbers refer to Sensitivity      O 3% STRAIN AT FAILURE

PROJECT 04-1111-002			RECORD OF BOREHOLE No 503			1 OF 3 METRIC		
W.P. 607-00-00			LOCATION N 4781350.0 ; E 327255.0			ORIGINATED BY PKS		
DIST Central HWY QEWE			BOREHOLE TYPE 108 mm Diameter Solid Stem Augers			COMPILED BY SLP		
DATUM Geodetic			DATE December 16, 2004			CHECKED BY LCC		
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
101.4	GROUND SURFACE							PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT W <sub>p</sub> W W <sub>L</sub> WATER CONTENT (%) 10 20 30
100.9	TOPSOIL Clayey silt, some sand and gravel (FILL) Very stiff Brown/red Moist		1	SS	15		101	
100.6			2	SS	8		100	
100.0	Sand, some gravel (FILL) Loose Red Wet		3	SS	16		99	
99.4	SILTY CLAY, trace to some sand, trace gravel (TILL) Stiff to very stiff Brown to brown/grey Wet		4	SS	24		98	
			5	SS	16		97	
			6	SS	15		96	
			7	SS	12		95	
96.0	SILTY CLAY, trace to some sand, trace gravel (TILL) Stiff Grey Wet		8	SS	7		94	
5.4			9	SS	7		93	
			10	TO	PH		92	
			11	SS	7		91	
89.5	SILTY CLAY, trace to some sand, trace gravel (TILL) Firm to stiff Grey Wet		12	SS	7		90	
11.9			13	SS	9		89	
							88	
							87	

Continued Next Page

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

PROJECT 04-1111-002			RECORD OF BOREHOLE No 503			2 OF 3 METRIC				
W.P. 607-00-00			LOCATION N 4781350.0 ; E 327255.0			ORIGINATED BY PKS				
DIST Central HWY QEW			BOREHOLE TYPE 108 mm Diameter Solid Stem Augers			COMPILED BY SLP				
DATUM Geodetic			DATE December 16, 2004			CHECKED BY LCC				
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 <sub>p</sub> NATURAL MOISTURE CONTENT W LIQUID LIMIT W <sub>L</sub> WATER CONTENT (%) 10 20 30 UNIT WEIGHT γ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
--- CONTINUED FROM PREVIOUS PAGE ---										
83.5	SILTY CLAY, trace to some sand, trace gravel (TILL) Firm to stiff Grey Wet		14	SS	7		86	1.5 + 1.2 + 1.3 +		
17.9	CLAYEY SILT, some sand, trace gravel (TILL) Very stiff Grey Wet		15	TO	PH		85			
			16	SS	15		84	1.7 +		
77.0	Contains shale fragments below 22.0 m depth		17	SS	15		83			
24.4			GRAVELLY SAND to SAND, some gravel, some silt, trace clay, containing shale fragments Dense to very dense Grey Wet	18	SS		22	82		
				19	SS		29	81		
				20	SS		33	80		
74.0	SANDY SILT, containing clayey silt seams Very dense Grey Wet		21	SS	110		79			
27.4				22	SS		100/23	78		
72.2							77			
29.2							76			
							75			
							74			
							73			

Continued Next Page

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

PROJECT <u>04-1111-002</u>		<b>RECORD OF BOREHOLE No 503</b>				3 OF 3 <b>METRIC</b>										
W.P. <u>607-00-00</u>		LOCATION <u>N 4781350.0 ; E 327255.0</u>				ORIGINATED BY <u>PKS</u>										
DIST <u>Central</u> HWY <u>QEW</u>		BOREHOLE TYPE <u>108 mm Diameter Solid Stem Augers</u>				COMPILED BY <u>SLP</u>										
DATUM <u>Geodetic</u>		DATE <u>December 16, 2004</u>				CHECKED BY <u>LCC</u>										
SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT  $\gamma$  kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)  GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES	SHEAR STRENGTH kPa								
	--- CONTINUED FROM PREVIOUS PAGE ---															
	END OF BOREHOLE  Note:  1. Water level at 24.4 m depth upon completion of drilling operations.  2. Water level in piezometer at 13.7 m depth (Elevation 87.7 m) on December 20, 2004.  3. Water level in piezometer at 11.6 m depth (Elevation 90.2 m ) on May 13, 2005 and on December 6, 2005.															

+<sup>3</sup>, X<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE

PROJECT 04-1111-002			RECORD OF BOREHOLE No 504			1 OF 3 METRIC		
W.P. 607-00-00			LOCATION N 4781321.0; E 327215.0			ORIGINATED BY PKS		
DIST Central HWY QEW			BOREHOLE TYPE 108 mm Diameter Solid Stem Augers			COMPILED BY SLP		
DATUM Geodetic			DATE December 20, 2004			CHECKED BY LCC		
SOIL PROFILE			SAMPLES			DYNAMIC CONE PENETRATION RESISTANCE PLOT		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × REMOULDED 20 40 60 80 100 PLASTIC LIMIT W <sub>p</sub> NATURAL MOISTURE CONTENT W LIQUID LIMIT W <sub>L</sub> WATER CONTENT (%) 10 20 30
101.5	GROUND SURFACE							
0.0	Asphalt							
0.2	Sand and gravel (FILL) Compact Brown/red Moist		1	SS	28		101	
100.3			2	SS	13		100	
1.2	SILTY CLAY, trace to some sand, trace gravel (TILL) Stiff to very stiff Brown Moist		3	SS	17		99	
			4	SS	19		98	
			5	SS	16		97	
			6	SS	14		96	
			7	SS	13		95	
96.0							94	
5.5	SILTY CLAY, trace to some sand, trace gravel (TILL) Stiff Grey Wet		8	SS	8		93	
							92	
			9	SS	7		91	
							90	
			10	SS	9		89	
							88	
			11	SS	8		87	
89.5								
12.0	SILTY CLAY, trace to some sand, trace gravel (TILL) Firm to stiff Grey Wet		12	SS	7			
			13	SS	6			

Continued Next Page

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○<sup>3</sup>% STRAIN AT FAILURE



PROJECT <u>04-1111-002</u>		<b>RECORD OF BOREHOLE No 504</b>				3 OF 3 <b>METRIC</b>										
W.P. <u>607-00-00</u>		LOCATION <u>N 4781321.0;E 327215.0</u>				ORIGINATED BY <u>PKS</u>										
DIST <u>Central</u> HWY <u>QEW</u>		BOREHOLE TYPE <u>108 mm Diameter Solid Stem Augers</u>				COMPILED BY <u>SLP</u>										
DATUM <u>Geodetic</u>		DATE <u>December 20, 2004</u>				CHECKED BY <u>LCC</u>										
SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES	SHEAR STRENGTH kPa								
	--- CONTINUED FROM PREVIOUS PAGE ---															
71.0						71										
30.5	SILT, trace to some sand, trace		23	SS	106											3 7 82 8
70.6	clay, trace gravel															
30.9	Very dense Grey Wet END OF BOREHOLE															
	Note:  1. Water level in open borehole at 25.9 m depth (Elev. 75.6 m) upon completion of drilling operations.															

+<sup>3</sup>, X<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE

PROJECT 04-1111-002			RECORD OF BOREHOLE No 505			1 OF 3 METRIC			
W.P. 607-00-00			LOCATION N 4781313.0; E 327227.0			ORIGINATED BY PKS			
DIST Central HWY QEW			BOREHOLE TYPE 108 mm Diameter Solid Stem Augers			COMPILED BY SLP			
DATUM Geodetic			DATE December 15, 2004			CHECKED BY LCC			
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 <sub>p</sub> NATURAL MOISTURE CONTENT W LIQUID LIMIT W <sub>L</sub> WATER CONTENT (%) 10 20 30 UNIT WEIGHT γ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
101.4	GROUND SURFACE								
0.0	Asphalt								
0.2	Sand and gravel (FILL) Compact Red Wet		1	SS	14		101		
			2	SS	20				
99.9							100		
1.5	SILTY CLAY, trace to some sand, trace gravel (TILL) Stiff to very stiff Brown/grey Wet		3	SS	25				
			4	SS	24		99		
			5	SS	15		98		
			6	SS	34		97		
			7	SS	21				
			8	SS	13		95		
94.5							94		
6.9	SILTY CLAY, trace to some sand, trace gravel (TILL) Stiff Grey Wet		9	TO	PH				
			10	SS	9		92		
			11	SS	9		90		
	Containing trace shale fragments below 12.5 m depth		12	SS	18		89		
88.0							88		
13.4	SILTY CLAY, trace to some sand, trace gravel (TILL) Firm to stiff Grey Wet		13	SS	8		87		

Continued Next Page

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○<sup>3%</sup> STRAIN AT FAILURE

PROJECT <u>04-1111-002</u>		<b>RECORD OF BOREHOLE No 505</b>				3 OF 3 <b>METRIC</b>										
W.P. <u>607-00-00</u>		LOCATION <u>N 4781313.0 ; E 327227.0</u>				ORIGINATED BY <u>PKS</u>										
DIST <u>Central</u> HWY <u>QEW</u>		BOREHOLE TYPE <u>108 mm Diameter Solid Stem Augers</u>				COMPILED BY <u>SLP</u>										
DATUM <u>Geodetic</u>		DATE <u>December 15, 2004</u>				CHECKED BY <u>LCC</u>										
SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION  --- CONTINUED FROM PREVIOUS PAGE ---	STRAT PLOT	NUMBER	TYPE			"N" VALUES	SHEAR STRENGTH kPa								
70.7			23	SS	100/23		71									
30.7	END OF BOREHOLE  Note:  1. Water level in open borehole at 24.4 m depth (Elev. 77.0 m) upon completion of drilling operations.															

+<sup>3</sup>, X<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE

PROJECT 04-1111-002			RECORD OF BOREHOLE No 506			1 OF 1 METRIC		
W.P. 607-00-00			LOCATION N 4781316.5; E 327181.5			ORIGINATED BY PKS		
DIST Central HWY QEW			BOREHOLE TYPE 108 mm Diameter Solid Stem Augers			COMPILED BY SLP		
DATUM Geodetic			DATE December 21, 2004			CHECKED BY LCC		
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 NATURAL MOISTURE CONTENT LIQUID LIMIT W <sub>p</sub> W W <sub>L</sub> WATER CONTENT (%)
101.4	GROUND SURFACE							
0.0	Asphalt							
0.2	Sand and gravel (FILL) Compact Brown/red Moist		1	SS	24		101	
			2	SS	13		100	
99.9								
1.5	SILTY CLAY, trace to some sand, trace gravel (TILL) Stiff to very stiff Brown to brown/grey Moist		3	SS	18		99	
			4	SS	21		98	
			5	SS	14		97	
			6	SS	14		96	
			7	SS	14		95	
94.7			8	SS	16			
6.7	END OF BOREHOLE							
	Note: 1. Borehole dry upon completion of drilling operations.							

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

PROJECT 04-1111-002		<b>RECORD OF BOREHOLE No 507</b>				1 OF 1 <b>METRIC</b>						
W.P. 607-00-00		LOCATION N 4781306.1 ; E 327232.2				ORIGINATED BY PKS						
DIST Central HWY QEW		BOREHOLE TYPE 108 mm Diameter Solid Stem Augers				COMPILED BY SLP						
DATUM Geodetic		DATE December 14, 2004				CHECKED BY LCC						
SOIL PROFILE			SAMPLES			DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT		UNIT WEIGHT $\gamma$	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	20 40 60 80 100	W <sub>p</sub> W W <sub>L</sub>			
101.5	GROUND SURFACE											
0.0	Sandy silt, trace gravel (FILL) Compact Red Moist		1	SS	15		101					
100.4			2	SS	11		100					
1.1	SILTY CLAY, trace to some sand, trace gravel and shale fragments (TILL) Stiff to hard Brown/grey Moist		3	SS	28		99					
			4	SS	31		98					
			5	SS	36		97					
			6	SS	18		96					
			7	SS	16		95					
96.0												
5.5	SILTY CLAY, trace to some sand, trace gravel (TILL) Stiff Grey Wet		8	SS	10							
94.7												
6.7	END OF BOREHOLE											
Notes: 1. Borehole dry upon completion of drilling operations. 2. Water level in piezometer at 6.0 m depth (Elevation 95.5 m ) on December 20, 2004. 3. Water level in piezometer at 1.6 m depth (Elevation 99.9 m) on May 13, 2005. 4. Water level in piezometer at 1.9 m depth (Elevation 99.6 m) on December 6, 2005.												

PROJECT <u>04-1111-002</u>		<b>RECORD OF BOREHOLE No W-1</b>		1 OF 1 <b>METRIC</b>																					
W.P. <u>607-00-00</u>		LOCATION <u>N 4782339.3 ; E 323568.7</u>		ORIGINATED BY <u>PKS</u>																					
DIST <u>Central</u> HWY <u>QEW</u>		BOREHOLE TYPE <u>108 mm Diameter Solid Stem Augers</u>		COMPILED BY <u>SG</u>																					
DATUM <u>Geodetic</u>		DATE <u>June 2, 2005</u>		CHECKED BY <u>LCC</u>																					
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS			ELEVATION SCALE			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																				
92.0	GROUND SURFACE																								
89.7	TOPSOIL CLAYEY SILT, some sand, trace gravel (TILL) Very stiff to hard Brown Moist		1	SS	16																				
			2	SS	26																				
			3	SS	34																				
			4	SS	40																				
			5	SS	57																				
			6	SS	21																				
			7	SS	21																				
86.8	END OF BOREHOLE																								
5.2	Note: 1. Borehole dry upon completion of drilling operations.																								

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE

PROJECT		04-1111-002		RECORD OF BOREHOLE No W-2		1 OF 1 METRIC											
W.P.		607-00-00		LOCATION		N 4782259.3 ; E 323584.2											
DIST		Central HWY QEW		BOREHOLE TYPE		108 mm Diameter Solid Stem Augers											
DATUM		Geodetic		DATE		June 2, 2005											
ORIGINATED BY		PKS		COMPILED BY		SG											
CHECKED BY		LCC															
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					WATER CONTENT (%)			γ kN/m³	GR SA SI CL
								20 40 60 80 100	20 40 60 80 100	W <sub>p</sub>	W	W <sub>L</sub>	10 20 30				
93.0	GROUND SURFACE																
8.9	TOPSOIL Clayey silt, some sand, trace gravel (FILL) Stiff Brown Moist		1	SS	14												
			2	SS	12		92										
			3	SS	13		91										
			4	SS	13		90										
90.0																	
3.1	CLAYEY SILT, some sand, trace gravel (TILL) Very stiff to hard Brown Moist		5	SS	35		89										
			6	SS	31												
	Grey below 4.6 m depth		7	SS	15		88										
87.8																	
5.2	END OF BOREHOLE																
	Note: 1. Borehole dry upon completion of drilling operations.																

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE




PROJECT		04-1111-002		RECORD OF BOREHOLE No W-3		1 OF 1 METRIC								
W.P.		607-00-00		LOCATION		N 4782223.7 ; E 323544.6								
DIST		Central HWY QEW		BOREHOLE TYPE		108 mm Diameter Solid Stem Augers								
DATUM		Geodetic		DATE		July 15, 2005								
				ORIGINATED BY		PKS								
				COMPILED BY		SG								
				CHECKED BY		LCC								
SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES	SHEAR STRENGTH kPa						WATER CONTENT (%)
92.5	GROUND SURFACE						20	40	60	80	100			
0.0	ASPHALT													
0.2	Sand and gravel (FILL)													
91.7	Compact Brown Moist													
0.8	CLAYEY SILT, some sand, trace gravel (TILL)		1	SS	28									
	Very stiff to hard													
	Brown Moist		2	SS	29									
			3	SS	41									
			4	SS	60									
			5	SS	22									
			6	SS	33									
			7	SS	29									
			8	SS	32									
			9	SS	32									
82.8	END OF BOREHOLE													
9.8	Note: 1. Borehole dry upon completion of drilling operations.													

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE

PROJECT		04-1111-002		RECORD OF BOREHOLE No W-4		1 OF 1 METRIC											
W.P.		607-00-00		LOCATION		N 4782197.9 ; E 323466.4											
DIST		Central HWY QEY		BOREHOLE TYPE		108 mm Diameter Solid Stem Augers											
DATUM		Geodetic		DATE		June 3, 2005											
ORIGINATED BY		PKS		COMPILED BY		SG											
CHECKED BY		LCC															
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	20 40 60 80 100	20 40 60 80 100	W <sub>p</sub>	W	W <sub>L</sub>	γ	GR	SA	SI	CL
92.8	GROUND SURFACE																
8.9	TOPSOIL Clayey silt, some sand, trace gravel (FILL) Stiff Brown Moist		1	SS	14		92										
			2	SS	10		91										
			3	SS	12		90										
90.5	CLAYEY SILT, trace to some sand, trace gravel (TILL) Stiff to very stiff Brown becoming grey below 3.1 m depth Moist		4	SS	26		89										
2.3			5	SS	11		88										
			6	SS	14												
			7	SS	14												
87.6	END OF BOREHOLE																
5.2	Note: 1. Borehole dry upon completion of drilling operations.																

PROJECT		04-1111-002		RECORD OF BOREHOLE No W-5		1 OF 1 METRIC												
W.P.		607-00-00		LOCATION		N 4782180.3 ; E 323406.6												
DIST		Central HWY QEW		BOREHOLE TYPE		108 mm Diameter Solid Stem Augers												
DATUM		Geodetic		DATE		June 3, 2005												
				ORIGINATED BY		PKS												
				COMPILED BY		SG												
				CHECKED BY		LCC												
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					WATER CONTENT (%)			γ	GR SA SI CL
								20 40 60 80 100	20 40 60 80 100	W <sub>p</sub>	W	W <sub>L</sub>	10 20 30					
93.0	0.0	GROUND SURFACE																
		TOPSOIL																
		Clayey silt, some sand, trace gravel (FILL)		1	SS	34												
		Firm to hard																
		Brown/grey		2	SS	15		92										
		Moist																
				3	SS	9		91										
				4	SS	8		90										
				5	SS	6												
89.2	3.8	CLAYEY SILT, some sand, trace gravel (TILL)		6	SS	8		89										
		Stiff to very stiff																
		Grey		7	SS	23		88										
		Moist																
87.8	5.2	END OF BOREHOLE																
		Note:																
		1. Borehole dry upon completion of drilling operations.																

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE



PROJECT <u>04-1111-002</u>		<b>RECORD OF BOREHOLE No W-6</b>		1 OF 1 <b>METRIC</b>										
W.P. <u>607-00-00</u>		LOCATION <u>N 4782261.6; E 323741.1</u>		ORIGINATED BY <u>PKS</u>										
DIST <u>Central</u> HWY <u>QEW</u>		BOREHOLE TYPE <u>108 mm Diameter Solid Stem Augers</u>		COMPILED BY <u>SG</u>										
DATUM <u>Geodetic</u>		DATE <u>June 7, 2005</u>		CHECKED BY <u>LCC</u>										
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa						
93.0	GROUND SURFACE													
0.0	Clayey silt, some sand, trace gravel (FILL) Hard Brown Moist		1	SS	40									0 11 53 36
92.2	SILTY CLAY, some sand, trace gravel (TILL) Very stiff Brown Moist		2	SS	16									
0.8														
91.5	CLAYEY SILT, some sand, trace gravel (TILL) Very stiff to hard Brown Moist		3	SS	23									
1.5														
			4	SS	36									
			5	SS	47									
		6	SS	38										
	Grey below 4.6 m depth		7	SS	20									
87.8	END OF BOREHOLE													
5.2	Note: 1. Borehole dry upon completion of drilling operations.													

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE

PROJECT <u>04-1111-002</u>		<b>RECORD OF BOREHOLE No W-7</b>		1 OF 1 <b>METRIC</b>													
W.P. <u>607-00-00</u>		LOCATION <u>N 4782257.6 ; E 323817.5</u>		ORIGINATED BY <u>PKS</u>													
DIST <u>Central</u> HWY <u>QEW</u>		BOREHOLE TYPE <u>108 mm Diameter Solid Stem Augers</u>		COMPILED BY <u>SG</u>													
DATUM <u>Geodetic</u>		DATE <u>June 7, 2005</u>		CHECKED BY <u>LCC</u>													
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV. DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
93.5	GROUND SURFACE							20	40	60	80	100					
0.0	Clayey silt, some sand, trace gravel (FILL) Firm Brown Moist		1	SS	7												
			2	SS	8												
			3	SS	7												
91.2	CLAYEY SILT, some sand, trace gravel Firm Grey Moist		4	SS	6												
2.3			5	SS	5												
89.7	CLAYEY SILT, some sand, trace gravel (TILL) Very stiff Grey Moist		6	SS	15												
3.8			7	SS	26												
88.3	END OF BOREHOLE																
5.2	Note: 1. Water level in open borehole measured at 3.96 m depth (Elev. 89.5 m) upon completion of drilling operations.																

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE



MIS-MTO 001 041111002AAMTO.GPJ GAL-MISS.GDT 23/1/07

PROJECT <u>04-1111-002</u>		<b>RECORD OF BOREHOLE No W-8</b>				1 OF 1 <b>METRIC</b>											
W.P. <u>607-00-00</u>		LOCATION <u>N 4782251.8 ; E 323893.2</u>				ORIGINATED BY <u>PKS</u>											
DIST <u>Central</u> HWY <u>QEW</u>		BOREHOLE TYPE <u>108 mm Diameter Solid Stem Augers</u>				COMPILED BY <u>SG</u>											
DATUM <u>Geodetic</u>		DATE <u>June 7, 2005</u>				CHECKED BY <u>LCC</u>											
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
93.7	GROUND SURFACE							20	40	60	80	100					
0.0	Clayey silt, some sand, containing organics (FILL) Firm Brown/grey Moist		1	SS	7												
			2	SS	7												
			3	SS	7												
			4	SS	5												
90.7																	
3.1	CLAYEY SILT, some sand, trace gravel (TILL) Stiff to very stiff Brown to grey Moist		5	SS	9												
			6	SS	15												
			7	SS	21												
88.5																	
5.2	END OF BOREHOLE																
	Note: 1. Borehole dry upon completion of drilling operations.																

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE

PROJECT 04-1111-002			RECORD OF BOREHOLE No W-9A			1 OF 1 METRIC		
W.P. 607-00-00			LOCATION N 4782238.4 ; E 323969.3			ORIGINATED BY PKS		
DIST Central HWY QEW			BOREHOLE TYPE 108 mm Diameter Solid Stem Augers			COMPILED BY SG		
DATUM Geodetic			DATE July 25, 2005			CHECKED BY LCC		
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
93.8	GROUND SURFACE							PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT W <sub>p</sub> W W <sub>L</sub> WATER CONTENT (%)
0.0	Clayey silt, some sand, trace gravel, containing roots/topsoil (FILL) Firm Brown Moist		1	SS	7			
93.0			2	SS	19			
0.8	CLAYEY SILT, some sand, trace gravel (TILL) Very stiff to hard Brown Moist		3	SS	32			
			4	SS	29			
			5	SS	30			
			6	SS	21			
			7	SS	24			
87.7								
6.1	CLAYEY SILT, some sand, trace gravel (TILL) Hard Brown Moist		8	SS	58			
			9	SS	56			
84.7								
9.1	SILTY CLAY, some sand, trace gravel (TILL) Grey Very stiff Moist		10	SS	16			
84.1								
9.8	END OF BOREHOLE							
Note: 1. Borehole dry upon completion of drilling operations. 2. Water level in piezometer measured at 2.8 m depth (Elev. 91.0 m) on Aug. 8, 2005 and at 1.7 m depth (Elev. 92.1 m) on Dec. 6, 2005.								

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE



PROJECT <u>04-1111-002</u>		<b>RECORD OF BOREHOLE No W-10</b>		1 OF 1 <b>METRIC</b>													
W.P. <u>607-00-00</u>		LOCATION <u>N 4782215.4 ;E 324046.9</u>		ORIGINATED BY <u>PKS</u>													
DIST <u>Central</u> HWY <u>QEW</u>		BOREHOLE TYPE <u>108 mm Diameter Solid Stem Augers</u>		COMPILED BY <u>SG</u>													
DATUM <u>Geodetic</u>		DATE <u>June 7, 2005</u>		CHECKED BY <u>LCC</u>													
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
94.0	GROUND SURFACE																
0.0	Clayey silt, some sand, trace gravel, containing organics (FILL) Stiff Brown Moist		1	SS	8												
			2	SS	12												
92.5																	
1.5	CLAYEY SILT, some sand, trace gravel (TILL) Very stiff Brown Moist		3	SS	23												
			4	SS	22												
			5	SS	26												
			6	SS	23												
			7	SS	15												
88.8	Grey below 4.4 m depth																
5.2	END OF BOREHOLE																
	Note: 1. Borehole dry upon completion of drilling operations.																

+<sup>3</sup>, X<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE

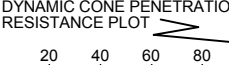






PROJECT <u>04-1111-002</u>		<b>RECORD OF BOREHOLE No W-11</b>		1 OF 1 <b>METRIC</b>										
W.P. <u>607-00-00</u>		LOCATION <u>N 4782197.0; E 324119.3</u>		ORIGINATED BY <u>PKS</u>										
DIST <u>Central</u> HWY <u>QEW</u>		BOREHOLE TYPE <u>108 mm Diameter Solid Stem Augers</u>		COMPILED BY <u>SG</u>										
DATUM <u>Geodetic</u>		DATE <u>June 10, 2005</u>		CHECKED BY <u>LCC</u>										
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa						
94.4	GROUND SURFACE													
0.0	Crushed limestone (FILL) Compact Brown Moist		1	SS	16									
93.6														
0.9	Clayey silt with sand, trace gravel (FILL) Firm Brown Moist		2	SS	5									
92.9														
1.5	Silty sand, trace gravel (FILL) Loose Brown Moist		3	SS	15									
	CLAYEY SILT, some sand, trace gravel (TILL) Stiff to hard Brown Moist		4	SS	32									
			5	SS	34									
	Grey below 3.8 m depth		6	SS	18									
			7	SS	14									
89.2	END OF BOREHOLE													
5.2	Note: 1. Borehole dry upon completion of drilling operations.													

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE

PROJECT <u>04-1111-002</u>		<b>RECORD OF BOREHOLE No W-12</b>		1 OF 1 <b>METRIC</b>													
W.P. <u>607-00-00</u>		LOCATION <u>N 4782177.9; E 324191.8</u>		ORIGINATED BY <u>PKS</u>													
DIST <u>Central</u> HWY <u>QEW</u>		BOREHOLE TYPE <u>108 mm Diameter Solid Stem Augers</u>		COMPILED BY <u>SG</u>													
DATUM <u>Geodetic</u>		DATE <u>June 7, 2005</u>		CHECKED BY <u>LCC</u>													
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
94.6	GROUND SURFACE																
0.0	Sand and gravel (FILL) Compact Brown/red Moist		1	SS	15												
			2	SS	12												
93.1																	
1.5	CLAYEY SILT, some sand, trace gravel (TILL) Very stiff to hard Brown Moist		3	SS	16												
			4	SS	35												
			5	SS	27												
			6	SS	22												
			7	SS	17												
89.4	Grey below 4.6 m depth																
5.2	END OF BOREHOLE																
	Note: 1. Borehole dry upon completion of drilling operations.																

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE

PROJECT <u>04-1111-002</u>			<b>RECORD OF BOREHOLE No W-13</b>			1 OF 1 <b>METRIC</b>					
W.P. <u>607-00-00</u>			LOCATION <u>N 4782158.9 ; E 324264.7</u>			ORIGINATED BY <u>PKS</u>					
DIST <u>Central</u> HWY <u>QEW</u>			BOREHOLE TYPE <u>108 mm Diameter Solid Stem Augers</u>			COMPILED BY <u>SG</u>					
DATUM <u>Geodetic</u>			DATE <u>June 6, 2005</u>			CHECKED BY <u>LCC</u>					
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT  SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × REMOULDED	PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT W <sub>p</sub> — W — W <sub>L</sub> WATER CONTENT (%)	UNIT WEIGHT γ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						
94.9	GROUND SURFACE										
0.0	Sand and gravel (FILL) Compact Brown Moist		1	SS	16						
94.1											
0.8	Silty sand (FILL) Compact Brown/black Moist		2	SS	11		94				
93.4											
1.5	CLAYEY SILT, some sand, trace gravel (TILL) Stiff to very stiff Brown Moist		3	SS	14		93		20	30	
			4	SS	26		92				
			5	SS	22		91		20		
			6	SS	18		90				
	Grey below 4.4 m depth		7	SS	21				20	30	
89.7											
5.2	END OF BOREHOLE										
	Note: 1. Borehole dry upon completion of drilling operations.										

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE

MIS-MTO 001 041111002AAMTO.GPJ GAL-MISS.GDT 23/1/07

PROJECT		04-1111-002		RECORD OF BOREHOLE No W-14		1 OF 1 METRIC												
W.P.		607-00-00		LOCATION		N 4782139.3 ; E 324337.0												
DIST		Central HWY QEW		BOREHOLE TYPE		108 mm Diameter Solid Stem Augers												
DATUM		Geodetic		DATE		June 6, 2005												
				ORIGINATED BY		PKS												
				COMPILED BY		SG												
				CHECKED BY		LCC												
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					WATER CONTENT (%)			γ	GR SA SI CL
								20 40 60 80 100	20 40 60 80 100	W <sub>p</sub>	W	W <sub>L</sub>	10 20 30					
95.0	0.0	GROUND SURFACE																
		Sand and gravel (FILL) Compact Brown Moist		1	SS	25												
	94.2																	
	0.8	Clayey silt, some sand, trace gravel (FILL) Firm Brown/grey Moist		2	SS	7		94										
	93.5																	
	1.5	CLAYEY SILT, trace to some sand, trace gravel (TILL) Stiff to very stiff Brown Moist		3	SS	18		93										
				4	SS	24		92										
				5	SS	23		91										
				6	SS	19		90										
		Grey below 4.6 m depth																
				7	SS	14												
	89.8																	
	5.2	END OF BOREHOLE																
		Note: 1. Borehole dry upon completion of drilling operations.																

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE

PROJECT		04-1111-002		RECORD OF BOREHOLE No W-15		1 OF 1 METRIC											
W.P.		607-00-00		LOCATION		N 4782120.3 ; E 324409.7											
DIST		Central HWY QE		BOREHOLE TYPE		108 mm Diameter Solid Stem Augers											
DATUM		Geodetic		DATE		June 6, 2005											
ORIGINATED BY		PKS		COMPILED BY		SG											
CHECKED BY		LCC															
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	20 40 60 80 100	20 40 60 80 100	W <sub>p</sub>	W	W <sub>L</sub>	γ	GR	SA	SI	CL
95.2	GROUND SURFACE																
0.0	Clayey silt, some sand, trace gravel (FILL) Stiff Grey Moist		1	SS	13		95										
94.4							94										
0.8	Silty SAND, trace gravel, containing organics Loose Brown/black Moist/wet		2	SS	4												
			3	SS	7		93										
92.9							92										
2.3	CLAYEY SILT, some sand, trace gravel (TILL) Very stiff Grey Wet		4	SS	16		91										
			5	SS	18												
			6	SS	15												
			7	SS	15												
90.0																	
5.2	END OF BOREHOLE																
	Note: 1. Water level in open borehole measured at 2.7 m depth (Elev. 92.5 m) upon completion of drilling operations.																

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE

PROJECT 04-1111-002			RECORD OF BOREHOLE No W-16			1 OF 1 METRIC		
W.P. 607-00-00			LOCATION N 4782104.3; E 324514.8			ORIGINATED BY PKS		
DIST Central HWY QEW			BOREHOLE TYPE 108 mm Diameter Solid Stem Augers			COMPILED BY SG		
DATUM Geodetic			DATE July 20, 2005			CHECKED BY LCC		
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
95.2	GROUND SURFACE							PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT W <sub>p</sub> W W <sub>L</sub> WATER CONTENT (%)
0.0	ASPHALT						95	
0.1	Sand and gravel (FILL)							
94.4	Brown Moist							
0.8	Silty sand, trace gravel (FILL)		1	SS	21		94	
	Compact Red Moist							
93.4			2	SS	13		93	
1.8	Silty SAND, trace gravel							
	Compact Brown Moist		3	SS	19			
92.2							92	
3.1	CLAYEY SILT, some sand, trace gravel (TILL)		4	SS	12			
	Stiff Brown becoming grey below 3.8 m depth Moist		5	SS	14		91	
			6	SS	8		90	
			7	SS	13		89	
							88	
			8	SS	12		87	
							86	
85.5			9	SS	13			
9.8	END OF BOREHOLE							
	Note: 1. Borehole dry upon completion of drilling operations.							

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

MIS-MTO 001 041111002AAMTO.GPJ GAL-MISS.GDT 23/1/07

PROJECT 04-1111-002			RECORD OF BOREHOLE No W-17			1 OF 1 METRIC		
W.P. 607-00-00			LOCATION N 4782094.1 ; E 324557.6			ORIGINATED BY PKS		
DIST Central HWY QEW			BOREHOLE TYPE 108 mm Diameter Solid Stem Augers			COMPILED BY SG		
DATUM Geodetic			DATE July 20, 2005			CHECKED BY LCC		
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 <sub>p</sub> NATURAL MOISTURE CONTENT W LIQUID LIMIT W <sub>L</sub> WATER CONTENT (%)
95.4	GROUND SURFACE							
0.0	ASPHALT							
0.2	Sand and gravel (FILL)							
94.6	Compact Brown Moist							
0.8	Silty sand, trace gravel (FILL)		1	SS	19			
	Loose to compact Red Moist							
93.7								
1.7	Silty SAND, trace gravel		2	SS	9			
	Loose Brown Moist							
93.1								
2.3	CLAYEY SILT, some sand, trace gravel (TILL)		3	SS	26			
	Very stiff Brown Moist							
			4	SS	24			
	Grey below 4.3 m depth		5	SS	26			
			6	SS	15			
90.2								
5.2	END OF BOREHOLE							
	Note: 1. Borehole dry upon completion of drilling operations.							

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

PROJECT 04-1111-002			RECORD OF BOREHOLE No W-18			1 OF 1 METRIC		
W.P. 607-00-00			LOCATION N 4782076.6 ; E 324630.6			ORIGINATED BY PKS		
DIST Central HWY QEW			BOREHOLE TYPE 108 mm Diameter Solid Stem Augers			COMPILED BY SG		
DATUM Geodetic			DATE July 20, 2005			CHECKED BY LCC		
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 <sub>p</sub> NATURAL MOISTURE CONTENT W LIQUID LIMIT W <sub>L</sub> WATER CONTENT (%) 10 20 30
95.5	GROUND SURFACE							
0.0	ASPHALT							
0.2	Sand and gravel (FILL)							
94.7	Brown Moist							
0.9	Silty sand, trace gravel (FILL)		1	SS	10			
	Compact Red Moist							
93.5	CLAYEY SILT, some sand, trace gravel		2	SS	16			
2.0	Stiff to very stiff Brown Moist							
	CLAYEY SILT, some sand, trace gravel (TILL)		3	SS	22			
	Stiff to very stiff Brown becoming grey below 2.7 m depth Moist							
			4	SS	12			
			5	SS	13			
			6	SS	13			
90.3	END OF BOREHOLE							
5.2	Note: 1. Borehole dry upon completion of drilling operations.							

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

MIS-MTO 001 041111002AAMTO.GPJ GAL-MISS.GDT 23/1/07



PROJECT 04-1111-002			RECORD OF BOREHOLE No W-19			1 OF 1 METRIC		
W.P. 607-00-00			LOCATION N 4782058.2; E 324703.3			ORIGINATED BY PKS		
DIST Central HWY QEY			BOREHOLE TYPE 108 mm Diameter Solid Stem Augers			COMPILED BY SG		
DATUM Geodetic			DATE July 20, 2005			CHECKED BY LCC		
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 <sub>p</sub> NATURAL MOISTURE CONTENT W LIQUID LIMIT W <sub>L</sub> WATER CONTENT (%)
95.6	GROUND SURFACE							
0.0	ASPHALT							
0.2	Sand and gravel (FILL) Brown Moist							
94.8								
0.8	Silty sand, trace gravel (FILL) Compact Red Moist		1	SS	16			
94.4								
1.2	Clayey silt, some sand, trace gravel (FILL) Stiff to very stiff Brown Moist		2	SS	10			
93.6								
2.0	CLAYEY SILT, some sand, trace gravel (TILL) Stiff to hard Brown becoming grey below 3.1 m depth Moist		3	SS	32			
			4	SS	13			
			5	SS	14			
			6	SS	14			
90.4								
5.2	END OF BOREHOLE							
	Note: 1. Borehole dry upon completion of drilling operations.							

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

MIS-MTO 001 041111002AAMTO.GPJ GAL-MISS.GDT 23/1/07

PROJECT 04-1111-002			RECORD OF BOREHOLE No W-20			1 OF 1 METRIC		
W.P. 607-00-00			LOCATION N 4782041.2; E 324776.9			ORIGINATED BY PKS		
DIST Central HWY QEW			BOREHOLE TYPE 108 mm Diameter Solid Stem Augers			COMPILED BY SG		
DATUM Geodetic			DATE July 20, 2005			CHECKED BY LCC		
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 <sub>p</sub> NATURAL MOISTURE CONTENT W LIQUID LIMIT W <sub>L</sub> WATER CONTENT (%)
95.8	GROUND SURFACE							
0.0	ASPHALT							
0.2	Silty sand, some gravel (FILL) Compact Brown/red Moist		1	SS	20		95	
94.6								
1.2	Silty SAND, trace gravel Loose to compact Brown Moist		2	SS	9		94	
94.0								
1.8	CLAYEY SILT, some sand, trace gravel, containing shale pieces (TILL) Stiff to hard Brown becoming grey below 3.1 m depth Moist		3	SS	34		93	
			4	SS	29		92	
			5	SS	25		91	
	Red-brown and gravelly from 4.6 to 5.2 m depth		6	SS	24		90	
			7	SS	16		89	
			8	SS	15		88	
			9	SS	17		87	
86.1								
9.8	END OF BOREHOLE							
	Note: 1. Borehole dry upon completion of drilling operations.							

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE



MIS-MTO 001 041111002AAMTO.GPJ GAL-MISS.GDT 23/1/07

PROJECT		04-1111-002		RECORD OF BOREHOLE No W-21		1 OF 1 METRIC							
W.P.		607-00-00		LOCATION		N 4782145.2; E 324183.3							
DIST		Central HWY QEW		BOREHOLE TYPE		108 mm Diameter Solid Stem Augers							
DATUM		Geodetic		DATE		June 8, 2005							
ORIGINATED BY		PKS		COMPILED BY		SG							
CHECKED BY		LCC											
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		WATER CONTENT (%)		γ	GR SA SI CL
								20 40 60 80 100	20 40 60 80 100	10 20 30			
94.6	GROUND SURFACE												
8.9	TOPSOIL Clayey silt, some sand, trace gravel (FILL) Stiff to very stiff Brown Moist		1	SS	17		94						
			2	SS	12								
93.1							93						
1.5	CLAYEY SILT, some sand, trace gravel (TILL) Stiff to very stiff Brown Moist		3	SS	8								
			4	SS	23		92						
			5	SS	22		91						
	Grey below 3.8 m depth		6	SS	12		90						
			7	SS	13								
89.4													
5.2	END OF BOREHOLE												
	Note: 1. Borehole dry upon completion of drilling operations.												

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE


PROJECT		04-1111-002		RECORD OF BOREHOLE No W-22		1 OF 1 METRIC						
W.P.		607-00-00		LOCATION		N 4782133.8 ; E 324232.0						
DIST		Central HWY QEW		BOREHOLE TYPE		108 mm Diameter Solid Stem Augers						
DATUM		Geodetic		DATE		June 8, 2005						
				ORIGINATED BY		PKS						
				COMPILED BY		SG						
				CHECKED BY		LCC						
SOIL PROFILE		SAMPLES		GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER			TYPE	"N" VALUES					
94.9	GROUND SURFACE											
0.0	Clayey silt, some sand, trace gravel, containing organics (FILL) Firm to very stiff Brown Moist		1	SS	22							
			2	SS	10							
			3	SS	7							
92.6												
2.3	CLAYEY SILT, some sand, trace gravel (TILL) Firm to stiff Brown becoming grey below 3.1 m depth Moist		4	SS	5							
			5	SS	9							
			6	SS	6							
	Wet below 4.3 m depth		7	SS	7							
			8	SS	14							
88.2												
6.7	END OF BOREHOLE											
	Note:  1. Water level in open borehole measured at 5.5 m depth (Elev. 89.4 m) upon completion of drilling operations.											

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE

PROJECT <u>04-1111-002</u>		<b>RECORD OF BOREHOLE No W-23</b>		1 OF 1 <b>METRIC</b>													
W.P. <u>607-00-00</u>		LOCATION <u>N 4782118.1 ; E 324305.4</u>		ORIGINATED BY <u>PKS</u>													
DIST <u>Central</u> HWY <u>QEW</u>		BOREHOLE TYPE <u>108 mm Diameter Solid Stem Augers</u>		COMPILED BY <u>SG</u>													
DATUM <u>Geodetic</u>		DATE <u>June 8, 2005</u>		CHECKED BY <u>LCC</u>													
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					WATER CONTENT (%)			γ	GR SA SI CL
							20 40 60 80 100	20 40 60 80 100	W <sub>p</sub>	W	W <sub>L</sub>	10 20 30					
95.0	GROUND SURFACE																
0.0	Silty sand and gravel, containing asphalt pieces and organics (FILL) Loose to compact Brown/black Moist		1	SS	24												
			2	SS	12												
			3	SS	5												
92.7																	
2.3	CLAYEY SILT, trace to some sand, trace gravel (TILL) Stiff to very stiff Brown Moist		4	SS	11												
			5	SS	11												
			6	SS	15												
	Wet below 3.8 m depth																
	Grey below 4.6 m depth																
89.8			7	SS	22												
5.2	END OF BOREHOLE																
	Note: 1. Water level in open borehole measured at 4.0 m depth (Elev. 91.0 m) upon completion of drilling operations.																

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE

MIS-MTO 001 041111002AAMTO.GPJ GAL-MISS.GDT 23/1/07

PROJECT <u>04-1111-002</u>		<b>RECORD OF BOREHOLE No W-24</b>				1 OF 1 <b>METRIC</b>											
W.P. <u>607-00-00</u>		LOCATION <u>N 4782099.5 ; E 324377.9</u>				ORIGINATED BY <u>PKS</u>											
DIST <u>Central</u> HWY <u>QEW</u>		BOREHOLE TYPE <u>108 mm Diameter Solid Stem Augers</u>				COMPILED BY <u>SG</u>											
DATUM <u>Geodetic</u>		DATE <u>June 8, 2005</u>				CHECKED BY <u>LCC</u>											
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									WATER CONTENT (%)
95.2	GROUND SURFACE							20	40	60	80	100					
0.0	Silty sand and gravel (FILL) Compact Brown Moist		1	SS	21												
94.4																	
0.8	Clayey silt, some sand, trace gravel (FILL) Stiff Brown Moist		2	SS	12												
93.7																	
1.5	CLAYEY SILT, some sand, trace gravel (TILL) Stiff to very stiff Brown Moist		3	SS	15												
			4	SS	21												
			5	SS	17												
	Grey below 3.1 m depth	6	SS	12													
		7	SS	16													
90.0	END OF BOREHOLE																
5.2	Note: 1. Borehole dry upon completion of drilling operations.																

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE

PROJECT <u>04-1111-002</u>		<b>RECORD OF BOREHOLE No W-25</b>		1 OF 1 <b>METRIC</b>																											
W.P. <u>607-00-00</u>		LOCATION <u>N 4782073.8 ; E 324448.9</u>		ORIGINATED BY <u>PKS</u>																											
DIST <u>Central</u> HWY <u>QEW</u>		BOREHOLE TYPE <u>108 mm Diameter Solid Stem Augers</u>		COMPILED BY <u>SG</u>																											
DATUM <u>Geodetic</u>		DATE <u>June 9, 2005</u>		CHECKED BY <u>LCC</u>																											
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS			ELEVATION SCALE			DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			SHEAR STRENGTH kPa			WATER CONTENT (%)			UNIT WEIGHT			REMARKS & GRAIN SIZE DISTRIBUTION (%)				
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES																										
94.5	GROUND SURFACE																														
0.0	Clayey silt to silty sand, trace gravel (FILL) Firm to stiff/Loose to compact Brown/red Moist		1	SS	11																										
			2	SS	9																										
			3	SS	7																										
92.2																															
2.3	CLAYEY SILT, some sand, trace gravel (TILL) Stiff Grey Moist		4	SS	9																										
			5	SS	12																										
			6	SS	12																										
			7	SS	15																										
89.3																															
5.2	END OF BOREHOLE																														
	Notes:  1. Borehole dry upon completion of drilling operations.  2. Water level measured at 3.8 m depth (Elev. 90.7 m) on Aug. 8, 2005.  3. Water level measured at 2.5 m depth (elev. 92.0 m) on Dec. 6, 2005.																														

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE

MIS-MTO 001 041111002AAMTO.GPJ GAL-MISS.GDT 23/1/07




PROJECT		04-1111-002		RECORD OF BOREHOLE No W-26		1 OF 1 METRIC								
W.P.		607-00-00		LOCATION		N 4782054.7 ; E 324521.2								
DIST		Central HWY QEW		BOREHOLE TYPE		108 mm Diameter Solid Stem Augers								
DATUM		Geodetic		DATE		June 8, 2005								
ORIGINATED BY		PKS		COMPILED BY		SG								
CHECKED BY		LCC												
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa						
94.4	GROUND SURFACE							20 40 60 80 100	20 40 60 80 100	10 20 30				
0.0	Clayey silt, some sand, trace gravel (FILL) Stiff Brown Moist		1	SS	10									
93.6														
0.8	CLAYEY SILT, some sand, trace gravel (TILL) Stiff to very stiff Brown Moist		2	SS	12									
			3	SS	16									
	Grey below 2.3 m depth		4	SS	12									
			5	SS	14									
90.1			6	SS	19									
4.3	SAND and SILT, trace clay, trace gravel Compact Red Moist													
89.2			7	SS	15									
5.2	END OF BOREHOLE													
	Note: 1. Borehole dry upon completion of drilling operations.													

+<sup>3</sup>, X<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE





PROJECT		04-1111-002		RECORD OF BOREHOLE No W-27		1 OF 1 METRIC											
W.P.		607-00-00		LOCATION		N 4782025.0 ; E 324637.0											
DIST		Central HWY QEW		BOREHOLE TYPE		108 mm Diameter Solid Stem Augers											
DATUM		Geodetic		DATE		June 9, 2005											
				ORIGINATED BY		PKS											
				COMPILED BY		SG											
				CHECKED BY		LCC											
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					WATER CONTENT (%)			γ	GR SA SI CL
								20 40 60 80 100	20 40 60 80 100	W <sub>p</sub>	W	W <sub>L</sub>	10 20 30				
94.0	GROUND SURFACE																
0.0	Silty sand, trace gravel, containing organics (FILL) Loose to compact Brown Moist		1	SS	10												
			2	SS	8		93										
92.5																	
1.5	CLAYEY SILT, some sand, trace gravel (TILL) Very stiff Brown to grey Moist		3	SS	16		92										
			4	SS	16												
			5	SS	17		91										
			6	SS	19		90										
			7	SS	17												
88.8	Containing shale fragments below 5.0 m depth						89										
5.2	END OF BOREHOLE																
	Note: 1. Open borehole wet at 5.2 m depth upon completion of drilling operations.																

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE

PROJECT <u>04-1111-002</u>		<b>RECORD OF BOREHOLE No W-28</b>				1 OF 1 <b>METRIC</b>												
W.P. <u>607-00-00</u>		LOCATION <u>N 4782021.2 ; E 324667.6</u>				ORIGINATED BY <u>PKS</u>												
DIST <u>Central</u> HWY <u>QEW</u>		BOREHOLE TYPE <u>108 mm Diameter Solid Stem Augers</u>				COMPILED BY <u>SG</u>												
DATUM <u>Geodetic</u>		DATE <u>June 9, 2005</u>				CHECKED BY <u>LCC</u>												
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa										
95.0	GROUND SURFACE							20	40	60	80	100						
0.0	Clayey silt, some sand, trace gravel (FILL) Firm to stiff Brown Moist		1	SS	9													
			2	SS	5		94											
			3	SS	4		93											
92.7	CLAYEY SILT, some sand, trace gravel (TILL) Stiff to very stiff Grey Wet		4	SS	15		92											
2.3			5	SS	13													
			6	SS	13		91											
			7	SS	12		90											
89.8	END OF BOREHOLE																	
5.2	Note: 1. Water level in open borehole measured at 4.3 m (Elev. 90.7 m) upon completion of drilling operations.																	

+<sup>3</sup>, X<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE

PROJECT <u>04-1111-002</u>		<b>RECORD OF BOREHOLE No W-29</b>		1 OF 1 <b>METRIC</b>										
W.P. <u>607-00-00</u>		LOCATION <u>N 4782002.6;E 324740.3</u>		ORIGINATED BY <u>PKS</u>										
DIST <u>Central</u> HWY <u>QEW</u>		BOREHOLE TYPE <u>108 mm Diameter Solid Stem Augers</u>		COMPILED BY <u>SG</u>										
DATUM <u>Geodetic</u>		DATE <u>June 9, 2005</u>		CHECKED BY <u>LCC</u>										
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC NATURAL LIQUID LIMIT MOISTURE LIMIT CONTENT			UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa		WATER CONTENT (%)				
95.8	GROUND SURFACE													
0.0	Clayey silt, some sand, trace gravel, containing organics (FILL) Firm Brown Moist		1	SS	9									
95.0	Silty sand (FILL) Loose Red Wet		2	SS	4									
94.3	CLAYEY SILT, some sand, trace gravel (TILL) Very stiff Brown becoming grey below 2.1 m depth Moist		3	SS	19									
1.5			4	SS	17									
			5	SS	17									
			6	SS	19									
			7	SS	17									
90.6	END OF BOREHOLE													
5.2	Note: 1. Borehole dry upon completion of drilling operations.													


+<sup>3</sup>, X<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE

PROJECT		04-1111-002		RECORD OF BOREHOLE No W-30		1 OF 1 METRIC												
W.P.		607-00-00		LOCATION		N 4781983.9; E 324812.7												
DIST		Central HWY QEW		BOREHOLE TYPE		108 mm Diameter Solid Stem Augers												
DATUM		Geodetic		DATE		June 9, 2005												
				ORIGINATED BY		PKS												
				COMPILED BY		SG												
				CHECKED BY		LCC												
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					WATER CONTENT (%)			γ	GR SA SI CL
								20 40 60 80 100	20 40 60 80 100	W <sub>p</sub>	W	W <sub>L</sub>	10 20 30	kN/m <sup>3</sup>				
96.0		GROUND SURFACE																
95.2	0.8	TOPSOIL Clayey silt, some sand, containing topsoil (FILL) Firm Brown Moist		1	SS	7												
94.5	0.8	Silty sand, trace gravel (FILL) Loose Red Moist/wet		2	SS	7		95										
94.5	1.5	CLAYEY SILT, trace to some sand, trace gravel (TILL) Stiff to very stiff Brown becoming grey below 2.3 m depth Moist		3	SS	28		94									0 5 73 22	
				4	SS	13		93										
				5	SS	12		92										
				6	SS	15		91										
90.8	5.2	END OF BOREHOLE		7	SS	14												
		Note: 1. Borehole dry upon completion of drilling operations.																

+ 3, X 3: Numbers refer to Sensitivity      O 3% STRAIN AT FAILURE

PROJECT 04-1111-002			RECORD OF BOREHOLE No W-31			1 OF 1 METRIC		
W.P. 607-00-00			LOCATION N 4781955.5 ; E 324882.7			ORIGINATED BY PKS		
DIST Central HWY QEW			BOREHOLE TYPE 108 mm Diameter Solid Stem Augers			COMPILED BY SG		
DATUM Geodetic			DATE June 10, 2005			CHECKED BY LCC		
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 NATURAL MOISTURE CONTENT LIQUID LIMIT W <sub>p</sub> W W <sub>L</sub> WATER CONTENT (%)
95.9	GROUND SURFACE							
0.0	Sand and gravel (FILL)							
0.2	Compact Brown		1	SS	13			
95.3	Clayey silt, some sand, trace gravel (FILL)							
0.6	Stiff Brown Moist		2	SS	9			
94.4	Silty sand (FILL)							
1.5	Loose Brown Moist		3	SS	17			
	CLAYEY SILT, some sand, trace gravel (TILL)							
	Stiff to very stiff Grey Moist		4	SS	24			
			5	SS	16			
			6	SS	15			
			7	SS	13			
90.7	END OF BOREHOLE							
5.2	Note: 1. Borehole dry upon completion of drilling operations.							

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

PROJECT <u>04-1111-002</u>		<b>RECORD OF BOREHOLE No W-32</b>				1 OF 1 <b>METRIC</b>								
W.P. <u>607-00-00</u>		LOCATION <u>N 4781934.9; E 324954.7</u>				ORIGINATED BY <u>PKS</u>								
DIST <u>Central</u> HWY <u>QEW</u>		BOREHOLE TYPE <u>108 mm Diameter Solid Stem Augers</u>				COMPILED BY <u>SG</u>								
DATUM <u>Geodetic</u>		DATE <u>June 10, 2005</u>				CHECKED BY <u>LCC</u>								
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa						
96.4	GROUND SURFACE							20 40 60 80 100	20 40 60 80 100	10 20 30				
0.0	Silty SAND, trace gravel Compact Brown Moist		1	SS	12									0 12 51 37
			2	SS	15									
94.9	CLAYEY SILT, some sand, trace gravel (TILL) Very stiff Grey Moist	3	SS	21										
1.5		4	SS	27										
		5	SS	22										
		6	SS	22										
		7	SS	17										
91.2	END OF BOREHOLE													
5.2	Note: 1. Borehole dry upon completion of drilling operations.													

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE

PROJECT		04-1111-002		<b>RECORD OF BOREHOLE No W-37</b>		1 OF 1 <b>METRIC</b>								
W.P.		607-00-00		LOCATION		N 4781736.7 ; E 325782.0								
DIST		Central HWY QEW		BOREHOLE TYPE		108 mm Diameter Solid Stem Augers								
DATUM		Geodetic		DATE		June 16, 2005								
				ORIGINATED BY		PKS								
				COMPILED BY		SG								
				CHECKED BY		LCC								
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa						
104.7	GROUND SURFACE													
0.0	ASPHALT													
0.2	Sand and gravel (FILL)													
104.1	Compact Brown Moist													
0.6	Foundry sand (FILL) Very dense Black Moist		1	SS	90									
			2	SS	46									
			3	SS	78									
			4	SS	70									
			5	SS	53									
			6	SS	66									
98.8	Concrete													
6.1	Silty sand (FILL) Loose Black Moist		7	SS	9									
97.1	CLAYEY SILT, some sand, trace gravel (TILL) Stiff to hard Brown Moist		8	SS	32									
7.6														
	Grey below 9.1 m depth		9	SS	11									
95.0	END OF BOREHOLE													
9.8	Note: 1. Borehole dry upon completion of drilling operations.													

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE

MIS-MTO 001 041111002AAMTO.GPJ GAL-MISS.GDT 23/1/07

PROJECT 04-1111-002			RECORD OF BOREHOLE No W-41			1 OF 1 METRIC											
W.P. 607-00-00			LOCATION N 4781754.1 ; E 325812.2			ORIGINATED BY PKS											
DIST Central HWY QEW			BOREHOLE TYPE Power Auger, 108 mm Solid Stem Augers			COMPILED BY SG											
DATUM Geodetic			DATE July 8, 2005			CHECKED BY LCC											
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					W <sub>p</sub> W W <sub>L</sub> WATER CONTENT (%)			γ	GR SA SI CL
105.0	GROUND SURFACE							20 40 60 80 100									
0.0	ASPHALT																
0.2	Sand and gravel (FILL)																
104.2	Compact Brown Moist																
0.8	Foundry sand (FILL)		1	SS	80		104										
	Very dense Black Moist		2	SS	69		103										
			3	SS	78		102										
			4	SS	76		101										
			5	SS	75		100										
			6	SS	90		99										
98.9	Silty SAND, some gravel, trace clay		7	SS	21		98										
6.1	Compact Brown Moist						97										
97.4	SILTY CLAY, some sand, trace gravel (TILL)		8	SS	32		96										
7.6	Very stiff to hard Brown Moist																
			9	SS	23												
95.3	END OF BOREHOLE																
9.8	Note: 1. Borehole dry upon completion of drilling operations.																

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

MIS-MTO 001 041111002AAMTO.GPJ GAL-MISS.GDT 23/1/07



PROJECT		04-1111-002		RECORD OF BOREHOLE No W-42		1 OF 1 METRIC											
W.P.		607-00-00		LOCATION		N 4781686.7 ; E 325975.7											
DIST		Central HWY QEW		BOREHOLE TYPE		108 mm Diameter Solid Stem Augers											
DATUM		Geodetic		DATE		June 17, 2005											
				ORIGINATED BY		PKS											
				COMPILED BY		SG											
				CHECKED BY		LCC											
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	20 40 60 80 100	20 40 60 80 100	W <sub>p</sub>	W	W <sub>L</sub>	γ	GR	SA	SI	CL
106.1	GROUND SURFACE																
0.0	ASPHALT						106										
0.2	Silty sand, trace gravel, trace slag pieces (FILL) Compact to dense Red Moist		1	SS	46		105										
			2	SS	17		104										
			3	SS	18		103										
			4	SS	14		102										
			5	SS	27		101										
			6	SS	18		100										
100.2	Concrete						99										
6.1	CLAYEY SILT, some sand, containing organics Firm Grey/black Moist/wet		7	SS	6		98										
98.5	CLAYEY SILT, some sand, trace gravel (TILL) Hard Brown Moist		8	SS	35		97										
9.1	Silty SAND Dense Grey Wet		9	SS	46												
96.4	END OF BOREHOLE																
9.8	Note:  1. Borehole dry upon completion of drilling operations.																

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE

PROJECT		04-1111-002		RECORD OF BOREHOLE No W-43		1 OF 1 METRIC											
W.P.		607-00-00		LOCATION		N 4781657.9 ; E 326045.0											
DIST		Central HWY QEW		BOREHOLE TYPE		108 mm Diameter Solid Stem Augers											
DATUM		Geodetic		DATE		July 12, 2005											
				ORIGINATED BY		PKS											
				COMPILED BY		SG											
				CHECKED BY		LCC											
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			W <sub>p</sub> W W <sub>L</sub> WATER CONTENT (%)			γ	GR SA SI CL		
100.4	GROUND SURFACE							20 40 60 80 100									
0.0	ASPHALT						100										
	Sand and gravel (FILL)																
	Compact																
	Brown																
	Moist																
99.3	CLAYEY SILT to SILTY CLAY, trace to some sand, trace gravel (TILL)		1	SS	17		99										
1.1	Stiff to very stiff		2	SS	19		98										
	Brown		3	SS	14		97										
	Moist		4	SS	12		96										
			5	SS	13		95										
			6	SS	9		94										
			7	SS	12												
93.7	END OF BOREHOLE																
6.7	Note: 1. Borehole dry upon completion of drilling operations.																

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

PROJECT 04-1111-002			RECORD OF BOREHOLE No W-44			1 OF 1 METRIC		
W.P. 607-00-00			LOCATION N 4781638.0; E 326117.2			ORIGINATED BY PKS		
DIST Central HWY QEW			BOREHOLE TYPE 108 mm Diameter Solid Stem Augers			COMPILED BY SG		
DATUM Geodetic			DATE July 13, 2005			CHECKED BY LCC		
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
100.8	GROUND SURFACE							PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT W <sub>p</sub> W W <sub>L</sub> WATER CONTENT (%)
0.0	ASPHALT							
0.1	Sand and gravel (FILL)							
100.0	Compact Brown Moist							
0.8	Silty SAND, trace gravel		1	SS	7		100	
99.3	Loose Brown/black Moist							
1.5	SILTY CLAY, trace sand and gravel (TILL)		2	SS	23		99	40
	Stiff to very stiff							
	Brown becoming grey below 2.3 m depth		3	SS	14		98	
	Moist							
			4	SS	8		97	
			5	SS	8		96	
			6	SS	12		95	
94.1	END OF BOREHOLE							
6.7	Note: 1. Borehole dry upon completion of drilling operations.							

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

MIS-MTO 001 041111002AAMTO.GPJ GAL-MISS.GDT 23/1/07

PROJECT 04-1111-002			RECORD OF BOREHOLE No W-45			1 OF 2 METRIC											
W.P. 607-00-00			LOCATION N 4781618.7 ; E 326189.8			ORIGINATED BY PKS											
DIST Central HWY QEW			BOREHOLE TYPE 108 mm Diameter Solid Stem Augers			COMPILED BY SG											
DATUM Geodetic			DATE July 13, 2005			CHECKED BY LCC											
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 <sub>p</sub> W W <sub>L</sub>			γ	GR SA SI CL		
101.2	GROUND SURFACE							20 40 60 80 100									
0.0	ASPHALT						101										
0.1	Sand and gravel (FILL) Compact Brown Moist		1	SS	17		100										
99.7																	
1.7	Silty SAND, trace gravel Compact Brown Moist		2	SS	11		99										
	CLAYEY SILT, some sand, trace gravel (TILL) Stiff Grey Moist		3	SS	7		98										
			4	SS	6		97										
			5	SS	7		96										
			6	SS	7		95										
94.3							94										
6.9	SILTY CLAY to CLAYEY SILT, trace to some sand, trace gravel (TILL) Stiff to very stiff Grey Moist		7	SS	11		93										
			8	SS	15		92										
			9	SS	11		91										
			10	SS	12		90										
			11	SS	16		89										
87.0							88										
14.3	Silty SAND, some gravel, trace clay Compact Red						87										

Continued Next Page

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○<sup>3%</sup> STRAIN AT FAILURE

MIS-MTO 001 041111002AAMTO.GPJ GAL-MISS.GDT 23/1/07

PROJECT 04-1111-002			RECORD OF BOREHOLE No W-46			1 OF 1 METRIC		
W.P. 607-00-00			LOCATION N 4781591.3 ; E 326265.5			ORIGINATED BY PKS		
DIST Central HWY QEW			BOREHOLE TYPE 108 mm Diameter Solid Stem Augers			COMPILED BY SG		
DATUM Geodetic			DATE July 14, 2005			CHECKED BY LCC		
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
101.6	GROUND SURFACE							PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT W <sub>p</sub> W W <sub>L</sub> WATER CONTENT (%)
100.8	ASPHALT Silty SAND, trace gravel (FILL) Compact Brown Moist						101	
100.8	SILTY CLAY, trace sand, trace gravel (TILL) Stiff Grey Moist		1	SS	17		100	
			2	SS	10		99	
			3	SS	9		98	
			4	SS	6		97	
			5	SS	7		96	
96.0	END OF BOREHOLE							
5.6	Note: 1. Borehole dry upon completion of drilling operations.							

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

PROJECT		04-1111-002		RECORD OF BOREHOLE No W-47		1 OF 1 METRIC							
W.P.		607-00-00		LOCATION		N 4781567.9;E 326331.2							
DIST		Central HWY QEW		BOREHOLE TYPE		108 mm Diameter Solid Stem Augers							
DATUM		Geodetic		DATE		June 7, 2005							
				ORIGINATED BY		PKS							
				COMPILED BY		SG							
				CHECKED BY		LCC							
SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES	SHEAR STRENGTH kPa					
101.7	GROUND SURFACE												
0.0	ASPHALT												
0.2	Silty sand, trace to some gravel (FILL) Compact Brown Moist		1	SS	21								5 62 27 6
100.2													
1.5	SILTY CLAY, trace sand, trace gravel (TILL) Stiff Grey Moist		2	SS	8								
			3	SS	9								
			4	SS	6								
			5	SS	6								
96.1													
5.6	END OF BOREHOLE												
	Note: 1. Borehole dry upon completion of drilling operations.												

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE

MIS-MTO 001 041111002AAMTO.GPJ GAL-MISS.GDT 23/1/07

PROJECT 04-1111-002			RECORD OF BOREHOLE No W-48			1 OF 1 METRIC		
W.P. 607-00-00			LOCATION N 4781553.7 ; E 326405.3			ORIGINATED BY PKS		
DIST Central HWY QEW			BOREHOLE TYPE 108 mm Diameter Solid Stem Augers			COMPILED BY SG		
DATUM Geodetic			DATE August 4, 2005			CHECKED BY LCC		
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
101.9	GROUND SURFACE							PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT W <sub>p</sub> W W <sub>L</sub> WATER CONTENT (%)
0.0	ASPHALT							
0.2	Sand and gravel (FILL) Brown Moist							
101.1								
0.8	Silty sand, trace gravel (FILL) Compact Brown Moist		1	SS	25		101	
100.4								
1.5	Silty SAND, trace gravel, containing silty clay seams Loose to compact Brown Wet		2	SS	22		100	
			3	SS	9			
99.0								
2.9	SILTY CLAY, some sand, trace gravel (TILL) Stiff Grey Wet		4	SS	10		99	
			5	SS	9		98	
			6	SS	7		97	
96.3								
5.6	END OF BOREHOLE							
	Note:  1. Water level in open borehole measured at 4.9 m depth (Elev. 97.0 m) upon completion of drilling operations.							

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

MIS-MTO 001 041111002AAMTO.GPJ GAL-MISS.GDT 23/1/07



PROJECT 04-1111-002			RECORD OF BOREHOLE No W-49			1 OF 1 METRIC		
W.P. 607-00-00			LOCATION N 4781531.9; E 326476.9			ORIGINATED BY PKS		
DIST Central HWY QEW			BOREHOLE TYPE 108 mm Diameter Solid Stem Augers			COMPILED BY SG		
DATUM Geodetic			DATE August 4, 2005			CHECKED BY LCC		
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 <sub>p</sub> NATURAL MOISTURE CONTENT W LIQUID LIMIT W <sub>L</sub> WATER CONTENT (%)
102.5	GROUND SURFACE							
0.0	ASPHALT							
0.2	Sand and gravel (FILL) Brown Moist						102	
101.7	Silty sand, trace gravel (FILL) Compact Brown Moist		1	SS	18		101	
101.0	CLAYEY SILT to SILTY CLAY, trace to some sand, trace gravel (TILL) Stiff Grey Moist		2	SS	10		100	
			3	SS	10		99	
			4	SS	12		98	
			5	SS	7			
			6	SS	7			
96.9	END OF BOREHOLE						97	
5.6	Note: 1. Borehole dry upon completion of drilling operations.							

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

MIS-MTO 001 041111002AAMTO.GPJ GAL-MISS.GDT 23/1/07

PROJECT 04-1111-002			RECORD OF BOREHOLE No W-50			1 OF 1 METRIC											
W.P. 607-00-00			LOCATION N 4781494.5 ; E 326553.4			ORIGINATED BY PKS											
DIST Central HWY QEWS			BOREHOLE TYPE 108 mm Diameter Solid Stem Augers			COMPILED BY SG											
DATUM Geodetic			DATE August 4, 2005			CHECKED BY LCC											
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					WATER CONTENT (%)			γ kN/m <sup>3</sup>	GR SA SI CL
							20 40 60 80 100	20 40 60 80 100	W <sub>p</sub>	W	W <sub>L</sub>	10 20 30					
105.8	GROUND SURFACE																
0.0	ASPHALT																
0.2	Sand and gravel (FILL)																
105.0	Brown Moist																
0.8	Silty SAND, trace gravel		1	SS	19		105										
	Compact																
	Brown Moist		2	SS	20		104										
103.2			3	SS	15		103										
2.6	CLAYEY SILT to SILTY CLAY, some sand, trace gravel (TILL)																
	Stiff to very stiff		4	SS	11		102										
	Brown becoming grey below 3.1 m depth		5	SS	11												
	Wet		6	SS	9		101										
100.2																	
5.6	END OF BOREHOLE																
	Note:																
	1. Bottom of borehole wet upon completion of drilling operations.																

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE

PROJECT		04-1111-002		RECORD OF BOREHOLE No W-51		1 OF 1 METRIC							
W.P.		607-00-00		LOCATION		N 4781716.5 ; E 325957.4							
DIST		Central HWY QEW		BOREHOLE TYPE		108 mm Diameter Solid Stem Augers							
DATUM		Geodetic		DATE		July 8, 2005							
				ORIGINATED BY		PKS							
				COMPILED BY		SG							
				CHECKED BY		LCC							
SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES	SHEAR STRENGTH kPa					
106.1	GROUND SURFACE						20 40 60 80 100	20 40 60 80 100	10 20 30				
0.0	Sand and gravel (FILL) Compact Grey Moist												
105.2	Silty sand, trace gravel, trace clay (FILL) Compact to dense Reddish brown Moist		1	SS	47								
0.9			2	SS	47								
			3	SS	26								
			4	SS	17								
			5	SS	21								
			6	SS	18								
99.7			7	SS	66								
99.4	Sand and gravel, containing foundry sand, brick and asphalt fragments (FILL) Very dense Grey/black Moist												
6.7	CLAYEY SILT, some sand, trace gravel (TILL) Hard Brown Moist to wet		8	SS	47								
			9	SS	30								
96.4	END OF BOREHOLE												
9.8	Note: 1. Water level in open borehole measured at 9.5 m (Elev. 96.6 m) upon completion of drilling operations.												

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE

PROJECT 04-1111-002			RECORD OF BOREHOLE No W-52			1 OF 1 METRIC		
W.P. 607-00-00			LOCATION N 4781709.9;E 326033.1			ORIGINATED BY PKS		
DIST Central HWY QEW			BOREHOLE TYPE 108 mm Diameter Solid Stem Augers			COMPILED BY SG		
DATUM Geodetic			DATE July 12, 2005			CHECKED BY LCC		
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
100.0	GROUND SURFACE							PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT W <sub>p</sub> W W <sub>L</sub> WATER CONTENT (%)
0.0	ASPHALT							
0.1	Sand and gravel (FILL) Compact Brown Moist							
99.1								
0.9	SILTY CLAY, some sand, trace gravel (TILL) Stiff to very stiff Brown Moist		1	SS	15		99	
			2	SS	18		98	
			3	SS	20		97	
			4	SS	15		96	
96.2								
3.8	CLAYEY SILT, some sand, trace gravel (TILL) Stiff Grey Moist		5	SS	10		95	
			6	SS	9		94	
			7	SS	11			
93.3								
6.7	END OF BOREHOLE							
	Note: 1. Borehole dry upon completion of drilling operations.							

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

MIS-MTO 001 041111002AAMTO.GPJ GAL-MISS.GDT 23/1/07

PROJECT 04-1111-002			RECORD OF BOREHOLE No W-53			1 OF 1 METRIC		
W.P. 607-00-00			LOCATION N 4781691.2; E 326105.8			ORIGINATED BY PKS		
DIST Central HWY QEW			BOREHOLE TYPE 108 mm Diameter Solid Stem Augers			COMPILED BY SG		
DATUM Geodetic			DATE July 11, 2005			CHECKED BY LCC		
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 <sub>p</sub> NATURAL MOISTURE CONTENT W LIQUID LIMIT W <sub>L</sub> WATER CONTENT (%)
100.5	GROUND SURFACE							
0.0	ASPHALT							
0.2	Sand and gravel (FILL)							
99.7	Compact Brown Moist							
0.8	Silty SAND, trace gravel, containing roots		1	SS	11			
99.0	Compact Brown Moist							
1.5	SILTY CLAY, some sand, trace to some gravel (TILL)		2	SS	19			
	Stiff to very stiff Brown Moist							
			3	SS	13			44
97.5								
3.0	SILTY CLAY to CLAYEY SILT, trace sand, trace gravel (TILL)		4	SS	10			
	Stiff Grey Moist							
			5	SS	11			
			6	SS	8			
			7	SS	7			
			8	SS	7			
			9	SS	14			
90.8								
9.8	END OF BOREHOLE							
	Note: 1. Borehole dry upon completion of drilling operations.							

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

PROJECT 04-1111-002		RECORD OF BOREHOLE No W-54				1 OF 1 METRIC								
W.P. 607-00-00		LOCATION N 4781660.5 ; E 326175.3				ORIGINATED BY PKS								
DIST Central HWY QEW		BOREHOLE TYPE 108 mm Diameter Solid Stem Augers				COMPILED BY SG								
DATUM Geodetic		DATE July 7, 2005				CHECKED BY LCC								
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa						
103.0	GROUND SURFACE													
0.0	ASPHALT													
0.2	Silty sand, trace to some gravel, trace clay (FILL) Compact to very dense Reddish brown Moist		1	SS	66									
			2	SS	28									
			3	SS	19									
			4	SS	45									
99.0	CONCRETE		5	SS	100/15									
4.1	SAND and SILT, trace gravel, trace clay Compact Brown Wet		6	SS	14									
96.9	CLAYEY SILT, some sand, trace gravel (TILL) Stiff to very stiff Grey Moist		7	SS	18									
6.1														
			8	SS	14									
93.3	END OF BOREHOLE		9	SS	14									
9.8	Note: 1. Borehole dry upon completion of drilling operations.													

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE

PROJECT 04-1111-002			RECORD OF BOREHOLE No W-55			1 OF 1 METRIC		
W.P. 607-00-00			LOCATION N 4781653.3 ; E 326250.8			ORIGINATED BY PKS		
DIST Central HWY QEW			BOREHOLE TYPE 108 mm Diameter Solid Stem Augers			COMPILED BY SG		
DATUM Geodetic			DATE July 11, 2005			CHECKED BY LCC		
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 <sub>p</sub> NATURAL MOISTURE CONTENT W LIQUID LIMIT W <sub>L</sub> WATER CONTENT (%)
101.2	GROUND SURFACE							
0.0	ASPHALT							
0.2	Silty sand, trace gravel (FILL) Compact Brown Moist		1	SS	10			
99.7								
1.5	SILTY CLAY, some sand, trace gravel (TILL) Stiff to very stiff Brown Moist		2	SS	14			
			3	SS	19			
			4	SS	10			
97.4								
3.8	CLAYEY SILT, trace sand, trace gravel (TILL) Stiff Grey Moist		5	SS	8			
			6	SS	9			
96.0								
5.2	END OF BOREHOLE							
	Note: 1. Borehole dry upon completion of drilling operations.							

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

MIS-MTO 001 041111002AAMTO.GPJ GAL-MISS.GDT 23/1/07

PROJECT 04-1111-002			RECORD OF BOREHOLE No W-56			1 OF 1 METRIC											
W.P. 607-00-00			LOCATION N 4781629.6 ; E 326322.0			ORIGINATED BY PKS											
DIST Central HWY QEW			BOREHOLE TYPE 108 mm Diameter Solid Stem Augers			COMPILED BY SG											
DATUM Geodetic			DATE June 7, 2005			CHECKED BY LCC											
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					WATER CONTENT (%)			γ kN/m³	GR SA SI CL
							20 40 60 80 100	20 40 60 80 100	W <sub>p</sub>	W	W <sub>L</sub>						
101.6	GROUND SURFACE																
0.0	ASPHALT																
0.2	Sand and gravel (FILL)																
100.8	Compact Red Moist																
0.8	Silty SAND, trace gravel		1	SS	25												
100.1	Compact Brown Moist																
1.5	CLAYEY SILT, trace to some sand, trace gravel (TILL)		2	SS	18												
	Stiff to very stiff Grey Moist		3	SS	13												
			4	SS	10												
			5	SS	8												
	Silty sand layer from 4.6 m to 5.3 m depth		6	SS	9												
			7	SS	16												
94.9	END OF BOREHOLE																
6.7	Note: 1. Borehole dry upon completion of drilling operations.																

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE



PROJECT 04-1111-002			RECORD OF BOREHOLE No W-57			1 OF 1 METRIC		
W.P. 607-00-00			LOCATION N 4781614.2 ; E 326395.4			ORIGINATED BY PKS		
DIST Central HWY QEW			BOREHOLE TYPE 108 mm Diameter Solid Stem Augers			COMPILED BY SG		
DATUM Geodetic			DATE June 7, 2005			CHECKED BY LCC		
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
101.7	GROUND SURFACE							PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT W <sub>p</sub> W W <sub>L</sub> WATER CONTENT (%)
0.0	ASPHALT							
0.2	CONCRETE							
	Silty sand, trace clay (FILL)							
	Compact							
	Brown							
	Moist		1	SS	15		101	
			2	SS	7		100	
99.7								
2.0	CLAYEY SILT to SILTY CLAY, some sand, trace gravel (TILL)							
	Stiff		3	SS	12		99	○
	Grey		4	SS	9		98	
	Moist		5	SS	9		97	○
			6	SS	8		96	
			7	SS	11		95	○
95.0								
6.7	END OF BOREHOLE							
	Note: 1. Borehole dry upon completion of drilling operations.							

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

PROJECT 04-1111-002			RECORD OF BOREHOLE No W-58			1 OF 1 METRIC		
W.P. 607-00-00			LOCATION N 4781596.4 ;E 326468.6			ORIGINATED BY PKS		
DIST Central HWY QEW			BOREHOLE TYPE 108 mm Diameter Solid Stem Augers			COMPILED BY SG		
DATUM Geodetic			DATE July 11, 2005			CHECKED BY LCC		
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
101.5	GROUND SURFACE							PLASTIC LIMIT W <sub>p</sub> NATURAL MOISTURE CONTENT W           LIQUID LIMIT W <sub>L</sub>
0.0	ASPHALT							WATER CONTENT (%) 10 20 30
0.1	Sand and gravel (FILL) Compact Brown Moist						101	
100.7	Silty SAND, trace gravel Compact Brown Moist/wet		1	SS	29		100	
100.0	SILTY CLAY, trace to some sand, trace gravel (TILL) Stiff Grey Moist		2	SS	7		99	
1.5			3	SS	9		98	
			4	SS	8		97	
			5	SS	8			
96.3	END OF BOREHOLE							
5.2	Note: 1. Borehole dry upon completion of drilling operations.							

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

MIS-MTO 001 041111002AAMTO.GPJ GAL-MISS.GDT 23/1/07

PROJECT 04-1111-002			RECORD OF BOREHOLE No W-59			1 OF 1 METRIC													
W.P. 607-00-00			LOCATION N 4781601.9; E 326530.7			ORIGINATED BY PKS													
DIST Central HWY QEW			BOREHOLE TYPE 108 mm Diameter Solid Stem Augers			COMPILED BY SG													
DATUM Geodetic			DATE July 27, 2005			CHECKED BY LCC													
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			WATER CONTENT (%)			γ			GR SA SI CL		
102.0	GROUND SURFACE							20 40 60 80 100	20 40 60 80 100	10 20 30									
0.0	TOPSOIL																		
0.2	Silty SAND, trace gravel Compact Brown Moist		1	SS	18														
			2	SS	16														
100.0			3	SS	15														
2.0	CLAYEY SILT to SILTY CLAY, trace to some sand, trace gravel (TILL) Stiff Grey Moist		4	SS	11														
			5	SS	11														
			6	SS	8														
			7	SS	7														
			8	SS	13														
			9	SS	11														
			10	SS	7														
91.8																			
10.2	END OF BOREHOLE																		
	Note: 1. Borehole dry upon completion of drilling operations. 2. Water level in piezometer measured at 8.7 m depth (Elev. 93.3m) on Aug. 8, 2005 and at 3.7 m depth (Elev. 98.3 m) on December 6, 2005.																		

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE

PROJECT 04-1111-002			RECORD OF BOREHOLE No W-60			1 OF 1 METRIC											
W.P. 607-00-00			LOCATION N 4781508.5 ; E 326755.5			ORIGINATED BY PKS											
DIST Central HWY QEW			BOREHOLE TYPE 108 mm Diameter Solid Stem Augers			COMPILED BY SG											
DATUM Geodetic			DATE July 18, 2005			CHECKED BY LCC											
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					WATER CONTENT (%)			γ	GR SA SI CL
							20 40 60 80 100	20 40 60 80 100	W <sub>p</sub>	W	W <sub>L</sub>	10 20 30	41				
101.5	GROUND SURFACE																
0.0	Silty sand, trace gravel, containing organics and asphalt pieces (FILL) Compact Brown Moist		1	SS	16		101										
100.7	SILTY CLAY, trace to some sand, trace to some gravel (TILL) Stiff to hard Brown Moist		2	SS	11		100										
0.8			3	SS	8												
			4	SS	12		99										
			5	SS	24		98										
			6	SS	35												
			7	SS	13		97										
96.3	END OF BOREHOLE																
5.2	Note: 1. Borehole dry upon completion of drilling operations.																

+ 3, X 3: Numbers refer to Sensitivity      O 3% STRAIN AT FAILURE

PROJECT 04-1111-002			RECORD OF BOREHOLE No W-61			1 OF 1 METRIC											
W.P. 607-00-00			LOCATION N 4781490.7 ; E 326829.5			ORIGINATED BY PKS											
DIST Central HWY QEW			BOREHOLE TYPE 108 mm Diameter Solid Stem Augers			COMPILED BY SG											
DATUM Geodetic			DATE July 18, 2005			CHECKED BY LCC											
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 <sub>p</sub> W W <sub>L</sub>			γ	GR SA SI CL		
101.8	GROUND SURFACE							20 40 60 80 100									
0.0	Sand and gravel (FILL)		1	SS	9		101										
0.2	Compact Brown Moist		2	SS	17												
	SILTY CLAY, trace to some sand, trace gravel (TILL)		3	SS	31		100										
	Stiff to hard Brown Moist		4	SS	12		99										
	Grey below 3.0 m depth		5	SS	8		98										
			6	SS	8		97										
			7	SS	9		96										
			8	SS	12		95										
			9	SS	14		94										
			10	SS	15		93										
92.1	END OF BOREHOLE																
9.8	Note: 1. Borehole dry upon completion of drilling operations. 2. Water level in piezometer at 7.3 m depth (Elev. 94.5 m) on Aug. 8, 2005 and at 2.5 m depth (Elev. 99.3 m) on Dec. 6, 2005.																

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

PROJECT <u>04-1111-002</u>		<b>RECORD OF BOREHOLE No W-62</b>		1 OF 1 <b>METRIC</b>													
W.P. <u>607-00-00</u>		LOCATION <u>N 4781471.5; E 326901.9</u>		ORIGINATED BY <u>PKS</u>													
DIST <u>Central</u> HWY <u>QEW</u>		BOREHOLE TYPE <u>108 mm Diameter Solid Stem Augers</u>		COMPILED BY <u>SG</u>													
DATUM <u>Geodetic</u>		DATE <u>July 18, 2005</u>		CHECKED BY <u>LCC</u>													
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
101.6	GROUND SURFACE							20	40	60	80	100					
0.0	Clayey silt, some sand, trace gravel, containing organics (FILL) Stiff to very stiff Brown Moist		1	SS	15												
			2	SS	9												
100.1																	
1.5	SILTY CLAY, some sand, trace gravel (TILL) Stiff to very stiff Brown Moist		3	SS	20												
			4	SS	22												
			5	SS	16												
			6	SS	15												
			7	SS	12												
96.4	END OF BOREHOLE																
5.2	Note:  1. Borehole dry upon completion of drilling operations.																

+<sup>3</sup>, X<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE

PROJECT <u>04-1111-002</u>		<b>RECORD OF BOREHOLE No W-63</b>				1 OF 1 <b>METRIC</b>										
W.P. <u>607-00-00</u>		LOCATION <u>N 4781447.8 ; E 326973.2</u>				ORIGINATED BY <u>PKS</u>										
DIST <u>Central</u> HWY <u>QEW</u>		BOREHOLE TYPE <u>108 mm Diameter Solid Stem Augers</u>				COMPILED BY <u>SG</u>										
DATUM <u>Geodetic</u>		DATE <u>July 19, 2005</u>				CHECKED BY <u>LCC</u>										
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa								
101.5	GROUND SURFACE							20	40	60	80	100				
0.0	Silty sand, trace gravel (FILL) Loose Red Moist		1	SS	9											
100.7																
0.8	SILTY CLAY, some sand, trace gravel (TILL) Stiff to very stiff Brown Moist		2	SS	15											
			3	SS	15											
			4	SS	17											
			5	SS	14											
			6	SS	12											
			7	SS	14											
96.3																
5.2	END OF BOREHOLE															
	Note:  1. Borehole dry upon completion of drilling operations.															

+<sup>3</sup>, X<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE

PROJECT		04-1111-002		RECORD OF BOREHOLE No W-64		1 OF 1 METRIC															
W.P.		607-00-00		LOCATION		N 4781425.2 ; E 327045.0															
DIST		Central HWY QEW		BOREHOLE TYPE		108 mm Diameter Solid Stem Augers															
DATUM		Geodetic		DATE		July 19, 2005															
ORIGINATED BY		PKS		COMPILED BY		SG															
CHECKED BY		LCC																			
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 20 40 60 80 100 ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × REMOULDED					W <sub>p</sub> W W <sub>L</sub> 10 20 30			γ kN/m <sup>3</sup>			GR SA SI CL		
101.4	GROUND SURFACE																				
0.0	Clayey silt, some sand and gravel (FILL) Very stiff Brown Moist		1	SS	17		101														
100.6																					
0.8	Silty sand and gravel, trace clay (FILL) Compact Brown Moist		2	SS	13		100														
99.9																					
1.5	SILTY CLAY, trace to some sand, trace gravel (TILL) Stiff to very stiff Brown Moist		3	SS	18																
			4	SS	16		99														
			5	SS	14		98														
			6	SS	14		97														
			7	SS	12		96														
			8	SS	11		95														
94.7	END OF BOREHOLE																				
6.7	Note: 1. Borehole dry upon completion of drilling operations.																				

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE



+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○<sup>3%</sup> STRAIN AT FAILURE

MIS-MTO 001 041111002AAMTO.GPJ GAL-MISS.GDT 23/1/07

PROJECT 04-1111-002				RECORD OF BOREHOLE No W-66				1 OF 1 METRIC						
W.P. 607-00-00				LOCATION N 4781363.3 ; E 327182.7				ORIGINATED BY PKS						
DIST Central HWY QEW				BOREHOLE TYPE 108 mm Diameter Solid Stem Augers				COMPILED BY SG						
DATUM Geodetic				DATE July 25, 2005				CHECKED BY LCC						
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa						
107.5	GROUND SURFACE													
0.0	ASPHALT													
0.2	Sand and gravel (FILL)													
106.7	Brown Moist													
0.8	Clayey silt, some sand, trace gravel (FILL)		1	SS	7									
	Firm to very stiff													
	Brown Moist		2	SS	16									
			3	SS	7									
			4	SS	11									
			5	SS	11									
			6	SS	15									
101.4	Gravelly sand, some silt (FILL)		7	SS	28									
6.1	Compact Brown Moist to wet													
99.9	SILTY CLAY, some sand, trace gravel (TILL)		8	SS	60									
7.6	Very stiff to hard Brown Moist													
			9	SS	22									
97.8	END OF BOREHOLE													
9.8	Note: 1. Borehole dry upon completion of drilling operations.													

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE

PROJECT		04-1111-002		RECORD OF BOREHOLE No W-67		1 OF 1 METRIC											
W.P.		607-00-00		LOCATION		N 4781456.2 ; E 326601.3											
DIST		Central HWY QEW		BOREHOLE TYPE		108 mm Diameter Solid Stem Augers											
DATUM		Geodetic		DATE		July 22, 2005											
				ORIGINATED BY		PKS											
				COMPILED BY		SG											
				CHECKED BY		LCC											
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					WATER CONTENT (%)			γ kN/m³	GR SA SI CL
								20 40 60 80 100	20 40 60 80 100	W <sub>p</sub>	W	W <sub>L</sub>	10 20 30				
104.5	GROUND SURFACE																
0.0	Silty sand, some gravel (FILL) Compact Brown Moist		1	SS	14		104										
103.7																	
0.8	Silty SAND, trace gravel, containing wood pieces/rootlets Loose to compact Brown Moist		2	SS	12		103										
			3	SS	9												
			4	SS	15		102										
101.4																	
3.1	SILTY CLAY, some sand, trace gravel (TILL) Stiff Grey Moist		5	SS	15		101										
			6	SS	8		100										
			7	SS	7												
98.9							99										
5.6	END OF BOREHOLE																
	Note:  1. Borehole dry upon completion of drilling operations.																

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE

PROJECT 04-1111-002			RECORD OF BOREHOLE No W-68			1 OF 1 METRIC		
W.P. 607-00-00			LOCATION N 4781460.0 ; E 326660.9			ORIGINATED BY PKS		
DIST Central HWY QEW			BOREHOLE TYPE 108 mm Diameter Solid Stem Augers			COMPILED BY SG		
DATUM Geodetic			DATE July 25, 2005			CHECKED BY LCC		
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
103.5	GROUND SURFACE							PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT W <sub>p</sub> W W <sub>L</sub> WATER CONTENT (%)
0.0	Silty sand, trace gravel (FILL) Loose to compact Brown Moist		1	SS	9		103	
			2	SS	23			
102.0							102	
1.5	SILTY CLAY, some sand, trace gravel (TILL) Stiff Brown/grey Moist		3	SS	13			45
			4	SS	14		101	
	Becoming grey below 3.1 m depth		5	SS	8		100	
			6	SS	8			
			7	SS	7		99	41
97.9							98	1.5
5.6	END OF BOREHOLE							
	Note: 1. Borehole dry upon completion of drilling operations.							

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

MIS-MTO 001 041111002AAMTO.GPJ GAL-MISS.GDT 23/1/07

PROJECT <u>04-1111-002</u>			<b>RECORD OF BOREHOLE No W-69</b>			1 OF 1 <b>METRIC</b>											
W.P. <u>607-00-00</u>			LOCATION <u>N 4781343.3 ; E 327097.9</u>			ORIGINATED BY <u>PKS</u>											
DIST <u>Central</u> HWY <u>QEW</u>			BOREHOLE TYPE <u>108 mm Diameter Solid Stem Augers</u>			COMPILED BY <u>SG</u>											
DATUM <u>Geodetic</u>			DATE <u>July 21, 2005</u>			CHECKED BY <u>LCC</u>											
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
101.5	GROUND SURFACE							20	40	60	80	100					
0.0	ASPHALT																
0.2	CONCRETE																
	Silty sand, trace gravel (FILL)																
	Compact																
	Red																
	Moist		1	SS	18												
100.1																	
1.4	SILTY CLAY, trace to some sand, trace gravel (TILL)																
	Stiff to very stiff																
	Brown																
	Moist		2	SS	20												
			3	SS	22												
			4	SS	18												
			5	SS	15												
			6	SS	14												
96.3																	
5.2	END OF BOREHOLE																
	Note:																
	1. Borehole dry upon completion of drilling operations.																

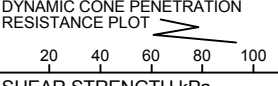
+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE

PROJECT 04-1111-002			RECORD OF BOREHOLE No W-70			1 OF 1 METRIC											
W.P. 607-00-00			LOCATION N 4781323.1 ; E 327306.1			ORIGINATED BY PKS											
DIST Central HWY QEW			BOREHOLE TYPE 108 mm Diameter Solid Stem Augers			COMPILED BY SG											
DATUM Geodetic			DATE July 24, 2005			CHECKED BY LCC											
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					WATER CONTENT (%)			γ	GR SA SI CL
							20 40 60 80 100	20 40 60 80 100	W <sub>p</sub>	W	W <sub>L</sub>	10 20 30	kN/m <sup>3</sup>				
107.6	GROUND SURFACE																
0.0	ASPHALT																
0.2	Sand and gravel to gravel, some sand, trace silt (FILL) Loose Brown/grey Moist		1	SS	7		107										
			2	SS	8		106										84 13 (3)
105.0	Clayey silt to silty clay, some sand, trace to some gravel (FILL) Stiff Brown Moist		3	SS	6		105										
2.6			4	SS	13		104										
			5	SS	12		103										
			6	SS	10		102										
101.5	Silty sand and gravel (FILL) Very dense Brown/red Moist		7	SS	70		101										
6.1							100										
100.0	SILTY CLAY, some sand, trace gravel (TILL) Very stiff to hard Brown Moist		8	SS	32		99										
7.6							98										
97.9			9	SS	28												
9.8	END OF BOREHOLE																
	Note: 1. Borehole dry upon completion of drilling operations.																

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE

PROJECT 04-1111-002			RECORD OF BOREHOLE No W-71			1 OF 1 METRIC		
W.P. 607-00-00			LOCATION N 4781309.5 ; E 327348.7			ORIGINATED BY PKS		
DIST Central HWY QEW			BOREHOLE TYPE 108 mm Diameter Solid Stem Augers			COMPILED BY SG		
DATUM Geodetic			DATE July 24, 2005			CHECKED BY LCC		
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 <sub>p</sub> NATURAL MOISTURE CONTENT W LIQUID LIMIT W <sub>L</sub> WATER CONTENT (%) 10 20 30
107.2	GROUND SURFACE							
0.0	ASPHALT							
0.2	Sand and gravel (FILL)							
106.4	Compact Brown Moist							
0.8	Clayey silt, some sand, trace to some gravel (FILL)		1	SS	8			
	Firm to very stiff Brown Moist		2	SS	5			
			3	SS	6			
			4	SS	6			
			5	SS	14			
			6	SS	22			
101.7	Sand and gravel (FILL)							
5.6	Grey Moist SILTY CLAY, some sand, trace gravel (TILL)		7	SS	15			
	Very stiff to hard Brown Moist		8	SS	27			
			9	SS	31			
97.5	END OF BOREHOLE							
9.8	Note: 1. Borehole dry upon completion of drilling operations.							

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

PROJECT <u>04-1111-002</u>			<b>RECORD OF BOREHOLE No W-72</b>			1 OF 1 <b>METRIC</b>					
W.P. <u>607-00-00</u>			LOCATION <u>N 4781300.4 ; E 327426.3</u>			ORIGINATED BY <u>PKS</u>					
DIST <u>Central</u> HWY <u>QEW</u>			BOREHOLE TYPE <u>108 mm Diameter Solid Stem Augers</u>			COMPILED BY <u>SG</u>					
DATUM <u>Geodetic</u>			DATE <u>July 21, 2005</u>			CHECKED BY <u>LCC</u>					
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT  SHEAR STRENGTH kPa ○ UNCONFINED    + FIELD VANE ● QUICK TRIAXIAL    × REMOULDED	PLASTIC LIMIT W <sub>p</sub> NATURAL MOISTURE CONTENT W    LIQUID LIMIT W <sub>L</sub> WATER CONTENT (%)	UNIT WEIGHT γ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						
101.3	GROUND SURFACE										
0.0	ASPHALT										
	CONCRETE										
100.5	Sand and gravel (FILL)										
0.8	Compact Brown Moist		1	SS	4						
99.8	SILTY CLAY, some sand, trace gravel, containing organics										
1.5	Firm Grey to grey-black Moist		2	SS	14						
	SILTY CLAY, some sand, trace gravel (TILL)										
	Stiff to very stiff Brown Moist		3	SS	14						
			4	SS	17						
			5	SS	15						
			6	SS	13						
96.1	END OF BOREHOLE										
5.2	Note: 1. Borehole dry upon completion of drilling operations.										

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity    ○ 3% STRAIN AT FAILURE



PROJECT 04-1111-002			RECORD OF BOREHOLE No W-73			1 OF 1 METRIC		
W.P. 607-00-00			LOCATION N 4781263.8 ; E 327492.2			ORIGINATED BY PKS		
DIST Central HWY QEW			BOREHOLE TYPE 108 mm Diameter Solid Stem Augers			COMPILED BY SG		
DATUM Geodetic			DATE July 24, 2005			CHECKED BY LCC		
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
104.0	GROUND SURFACE							PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT W <sub>p</sub> W W <sub>L</sub> WATER CONTENT (%)
0.0	ASPHALT							
0.2	Sand and gravel (FILL) Compact Brown Moist							
103.2	Clayey silt, some sand, trace to some gravel (FILL) Stiff to hard Brown/red Moist		1	SS	11		103	
0.8			2	SS	15		102	
			3	SS	24		101	○
			4	SS	32		100	
			5	SS	11			
99.4	CLAYEY SILT to SILTY CLAY, some sand, trace gravel (TILL) Very stiff Brown Moist		6	SS	18		99	○
4.6			7	SS	20		98	
			8	SS	27		96	○ 40
			9	SS	29		95	
94.3	END OF BOREHOLE							
9.8	Note: 1. Borehole dry upon completion of drilling operations.							

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

PROJECT 04-1111-002				RECORD OF BOREHOLE No W-74				1 OF 1 METRIC									
W.P. 607-00-00				LOCATION N 4781255.6 ; E 327567.5				ORIGINATED BY PKS									
DIST Central HWY QEW				BOREHOLE TYPE 108 mm Diameter Solid Stem Augers				COMPILED BY SG									
DATUM Geodetic				DATE July 21, 2005				CHECKED BY LCC									
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
101.0	GROUND SURFACE																
0.0	Sand and gravel (FILL) Compact Brown Moist																
100.4																	
0.6	SILTY CLAY, some sand, trace gravel (TILL) Stiff to very stiff Brown Moist		1	SS	9												
			2	SS	11												
			3	SS	19												
			4	SS	13												
			5	SS	15												
			6	SS	14												
95.8	END OF BOREHOLE																
5.2	Note: 1. Borehole dry upon completion of drilling operations.																

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE

PROJECT <u>04-1111-002</u>				<b>RECORD OF BOREHOLE No W-75</b>				1 OF 1 <b>METRIC</b>									
W.P. <u>607-00-00</u>				LOCATION <u>N 4781231.4 ; E 327639.7</u>				ORIGINATED BY <u>PKS</u>									
DIST <u>Central</u> HWY <u>QEW</u>				BOREHOLE TYPE <u>108 mm Diameter Solid Stem Augers</u>				COMPILED BY <u>SG</u>									
DATUM <u>Geodetic</u>				DATE <u>July 21, 2005</u>				CHECKED BY <u>LCC</u>									
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
100.9	GROUND SURFACE																
0.0	Sand and gravel (FILL) Compact Brown Moist																
100.3																	
0.6	SILTY CLAY, some sand, trace gravel (TILL) Stiff to very stiff Brown Moist		1	SS	15												
			2	SS	16												
			3	SS	15												
			4	SS	14												
			5	SS	13												
			6	SS	12												
95.7																	
5.2	END OF BOREHOLE																
	Note:  1. Borehole dry upon completion of drilling operations.																

+<sup>3</sup>, X<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE

PROJECT 04-1111-002			RECORD OF BOREHOLE No W-76			1 OF 1 METRIC		
W.P. 607-00-00			LOCATION N 4781307.0 ; E 327269.3			ORIGINATED BY PKS		
DIST Central HWY QEW			BOREHOLE TYPE 108 mm Diameter Solid Stem Augers			COMPILED BY SG		
DATUM Geodetic			DATE July 27, 2005			CHECKED BY LCC		
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 <sub>p</sub> NATURAL MOISTURE CONTENT W LIQUID LIMIT W <sub>L</sub> WATER CONTENT (%)
107.8	GROUND SURFACE							
0.0	ASPHALT							
0.2	Sand and gravel (FILL)							
107.2	Brown Moist							
0.6	Clayey silt, trace to some sand, trace gravel (FILL) Stiff to very stiff Reddish brown to brown Moist		1	SS	13		107	
			2	SS	11		106	
			3	SS	14		105	
			4	SS	13		104	
			5	SS	20		103	
			6	SS	18		102	
101.7	Sand and gravel (FILL) Compact Brown/grey Moist/wet		7	SS	22		101	
101.1	SILTY CLAY, some sand, trace gravel (TILL) Very stiff to hard Brown/grey Moist		8	SS	41		100	
6.7							99	
			9	SS	21		98	
98.0	END OF BOREHOLE							
9.8	Note: 1. Borehole dry upon completion of drilling operations.							

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

PROJECT 04-1111-002			RECORD OF BOREHOLE No W-77			1 OF 1 METRIC		
W.P. 607-00-00			LOCATION N 4781265.1 ; E 327334.9			ORIGINATED BY PKS		
DIST Central HWY QEW			BOREHOLE TYPE 108 mm Diameter Solid Stem Augers			COMPILED BY SG		
DATUM Geodetic			DATE July 21, 2005			CHECKED BY LCC		
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 <sub>p</sub> NATURAL MOISTURE CONTENT W LIQUID LIMIT W <sub>L</sub> WATER CONTENT (%)
101.4	GROUND SURFACE							
0.0	ASPHALT							
0.2	Sand and gravel (FILL)							
100.8	Compact Brown Moist							
0.6	SILTY CLAY, some sand, trace gravel (TILL) Firm to very stiff Brown Moist		1	SS	6		101	
			2	SS	15		100	
			3	SS	20		99	
			4	SS	14		98	
			5	SS	13		97	
			6	SS	11			
96.2	END OF BOREHOLE							
5.2	Notes: 1. Borehole dry upon completion of drilling operations. 2. Water level measured in piezometer at 3.2 m depth (Elev. 98.2 m) on August 8, 2005. 3. Water level measured in piezometer at 1.1 m depth (Elev. 100.3 m) on December 6, 2005.							

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

PROJECT		04-1111-002		RECORD OF BOREHOLE No W-78		1 OF 1 METRIC										
W.P.		607-00-00		LOCATION		N 4781260.2; E 327412.0										
DIST		Central HWY QEW		BOREHOLE TYPE		108 mm Diameter Solid Stem Augers										
DATUM		Geodetic		DATE		July 27, 2005										
				ORIGINATED BY		PKS										
				COMPILED BY		SG										
				CHECKED BY		LCC										
SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE		"N" VALUES	SHEAR STRENGTH kPa									
105.7	GROUND SURFACE															
0.0	ASPHALT															
0.2	Sand and gravel (FILL)															
105.1	Brown Moist															
0.6	Clayey silt, some sand, trace gravel (FILL) Stiff to very stiff Reddish brown to brown Moist		1	SS	12											
	Contains layers of dense, black foundry sand		2	SS	12											
			3	SS	11											
			4	SS	42											
			5	SS	48											
101.1	Sand and gravel (FILL) Very dense Grey/red Moist/wet		6	SS	53											
99.6	SILTY CLAY, some sand, trace gravel (TILL) Very stiff to hard Brown Moist		7	SS	60											
6.1			8	SS	29											
			9	SS	26											
95.9	END OF BOREHOLE															
9.8	Note: 1. Water level in open borehole measured at 9.1 m depth (Elev. 96.6 m) upon completion of drilling operations.															

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○ 3% STRAIN AT FAILURE

PROJECT 04-1111-002			RECORD OF BOREHOLE No W-79			1 OF 1 METRIC		
W.P. 607-00-00			LOCATION N 4781236.5 ; E 327483.2			ORIGINATED BY PKS		
DIST Central HWY QEW			BOREHOLE TYPE 108 mm Diameter Solid Stem Augers			COMPILED BY SG		
DATUM Geodetic			DATE July 27, 2005			CHECKED BY LCC		
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
104.0	GROUND SURFACE							PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT W <sub>p</sub> W W <sub>L</sub> WATER CONTENT (%)
0.0	ASPHALT							
0.2	Sand and gravel (FILL)							
103.2	Brown Moist							
0.8	Clayey silt, some sand, trace gravel (FILL)		1	SS	15		103	
	Very stiff to hard							
	Brown Moist							
	Very dense, black foundry sand from 1.8 m to 2.1 m depth		2	SS	76		102	
101.7								
2.3	Silty sand and gravel (FILL)		3	SS	42		101	
101.3	Compact Brown/grey Moist							
2.7	CLAYEY SILT, some sand, trace gravel, containing organics		4	SS	18		101	
	Very stiff							
	Black/grey Moist							
100.2	SILTY CLAY, trace to some sand, trace gravel (TILL)		5	SS	50		100	
3.8	Very stiff to hard							
	Brown Moist							
			6	SS	31		99	
			7	SS	22		98	
97.3								
6.7	END OF BOREHOLE							
	Note:							
	1. Water level in open borehole measured at 6.1 m depth (Elev. 97.9 m) upon completion of drilling operations.							

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

PROJECT 04-1111-002			RECORD OF BOREHOLE No W-80			1 OF 1 METRIC		
W.P. 607-00-00			LOCATION N 4781213.0; E 327554.3			ORIGINATED BY PKS		
DIST Central HWY QEW			BOREHOLE TYPE 108 mm Diameter Solid Stem Augers			COMPILED BY SG		
DATUM Geodetic			DATE July 27, 2005			CHECKED BY LCC		
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
102.0	GROUND SURFACE							PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT W <sub>p</sub> W W <sub>L</sub> WATER CONTENT (%)
0.0	ASPHALT							
0.1	Sand and gravel (FILL)							
101.2	Brown Moist							
100.9	Sandy silt, trace gravel and clay (FILL)		1	SS	18		101	
1.2	Compact Red Moist							
	Concrete		2	SS	22		100	
	SILTY CLAY, some sand, trace gravel (TILL)							
	Very stiff to hard		3	SS	25		99	
	Brown Moist		4	SS	46		98	44
			5	SS	34			
			6	SS	32		97	
96.8	END OF BOREHOLE							
5.2	Note: 1. Water level in open borehole measured at 1.2 m depth (Elev. 100.8 m) upon completion of drilling operations.							

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE



PROJECT 04-1111-002			RECORD OF BOREHOLE No W-81			1 OF 1 METRIC		
W.P. 607-00-00			LOCATION N 4781189.7 ; E 327625.8			ORIGINATED BY PKS		
DIST Central HWY QEW			BOREHOLE TYPE 108 mm Diameter Solid Stem Augers			COMPILED BY SG		
DATUM Geodetic			DATE July 27, 2005			CHECKED BY LCC		
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 NATURAL MOISTURE CONTENT LIQUID LIMIT W <sub>p</sub> W W <sub>L</sub> WATER CONTENT (%)
101.7	GROUND SURFACE							
0.0	ASPHALT							
0.1	Sand and gravel (FILL)							
100.9	Brown/grey Moist							
0.8	Clayey silt, some sand, trace gravel (FILL)		1	SS	12		101	
100.2	Stiff Brown Moist							
1.5	SILTY CLAY, some sand, trace gravel (TILL)		2	SS	23		100	
	Very stiff to hard Brown Moist							
			3	SS	34		99	
			4	SS	32		98	
			5	SS	22		97	
			6	SS	22			
96.5	END OF BOREHOLE							
5.2	Note: 1. Water level in open borehole measured at 3.4 m depth (Elev. 98.3 m) upon completion of drilling operations.							

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

PROJECT 04-1111-002			RECORD OF BOREHOLE No W-82			1 OF 1 METRIC		
W.P. 607-00-00			LOCATION N 4781460.7 ; E 326741.7			ORIGINATED BY PKS		
DIST Central HWY QEW			BOREHOLE TYPE 108 mm Diameter Solid Stem Augers			COMPILED BY SG		
DATUM Geodetic			DATE August 2, 2005			CHECKED BY LCC		
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
102.0	GROUND SURFACE							PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT W <sub>p</sub> W W <sub>L</sub> WATER CONTENT (%)
0.0	ASPHALT							
0.1	Sand and gravel, trace silt (FILL) Compact Brown Moist		1	SS	19		101	
100.5								
1.5	SILTY CLAY, trace to some sand, trace gravel (TILL) Stiff to very stiff Brown becoming grey below 2.3 m depth Moist		2	SS	24		100	47
			3	SS	11		99	
			4	SS	17		98	41
			5	SS	8			
			6	SS	11		97	
96.8	END OF BOREHOLE							
5.2	Note: 1. Borehole dry upon completion of drilling operations.							

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

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

CONT No.  
WP No.607-00-00

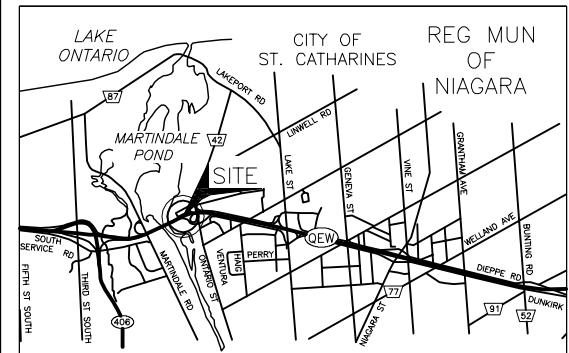


NOISE BARRIER WALL 1  
BOREHOLE LOCATIONS

SHEET



**Golder Associates Ltd.**  
MISSISSAUGA, ONTARIO, CANADA



KEY PLAN

SCALE  
1 0 1 km

LEGEND

Borehole-Current Investigation

No.	ELEVATION	CO-ORDINATES	
		NORTHING	EASTING
W-1	92.0	4782339.3	323568.7
W-2	93.0	4782259.3	323584.2
W-3	92.5	4782223.7	323544.6
W-4	92.8	4782197.9	323466.4
W-5	93.0	4782180.3	323406.6

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.

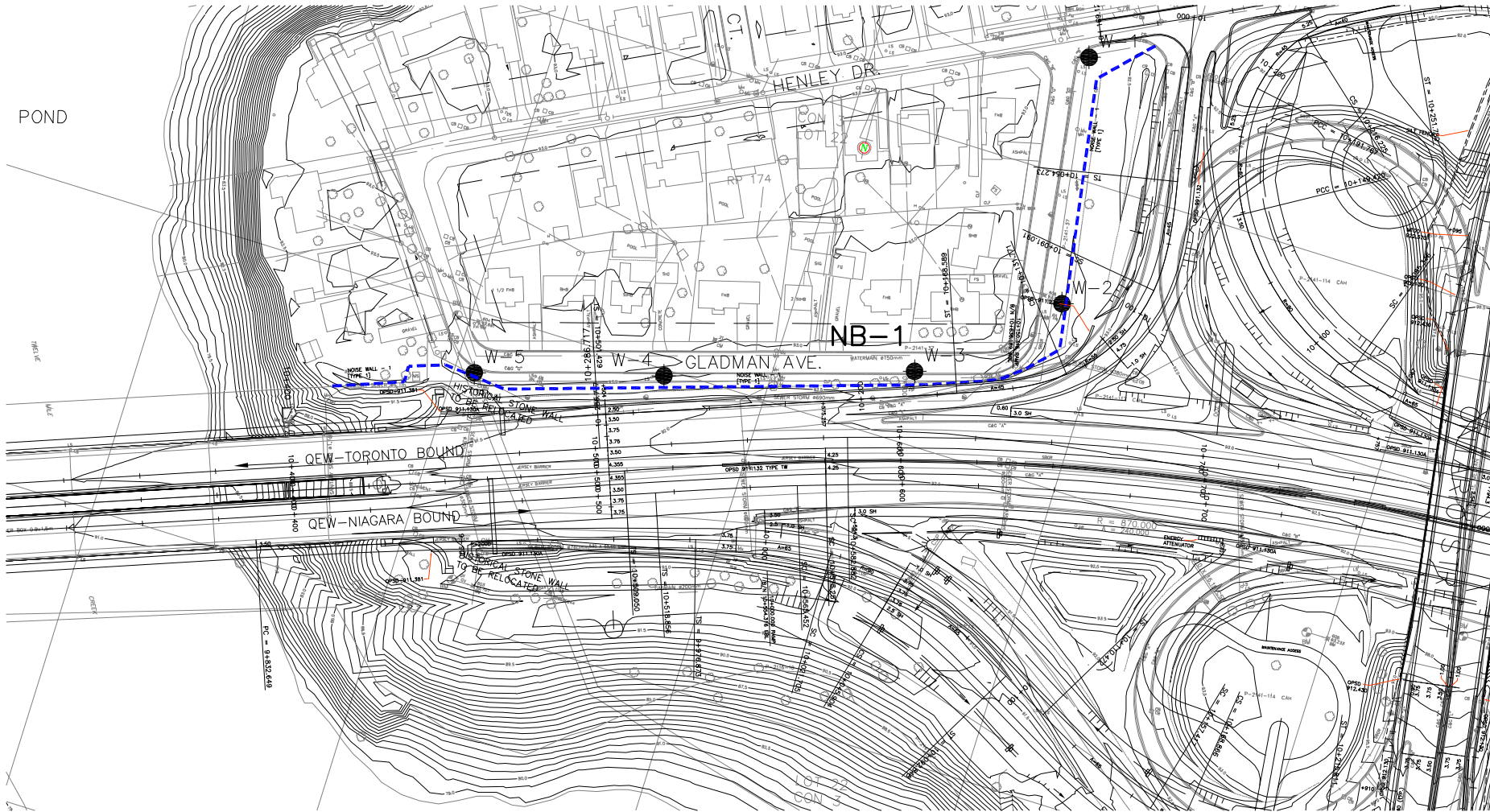
The boundaries between soil strata have been established only at borehole locations. Between Boreholes the boundaries are assumed from geological evidence.

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.

REFERENCE

Base plans provided in digital format by Morrison Hershfield Limited, drawing file nos. x4026design.dwg and x4026baseplan.dwg, received March 21, 2005.

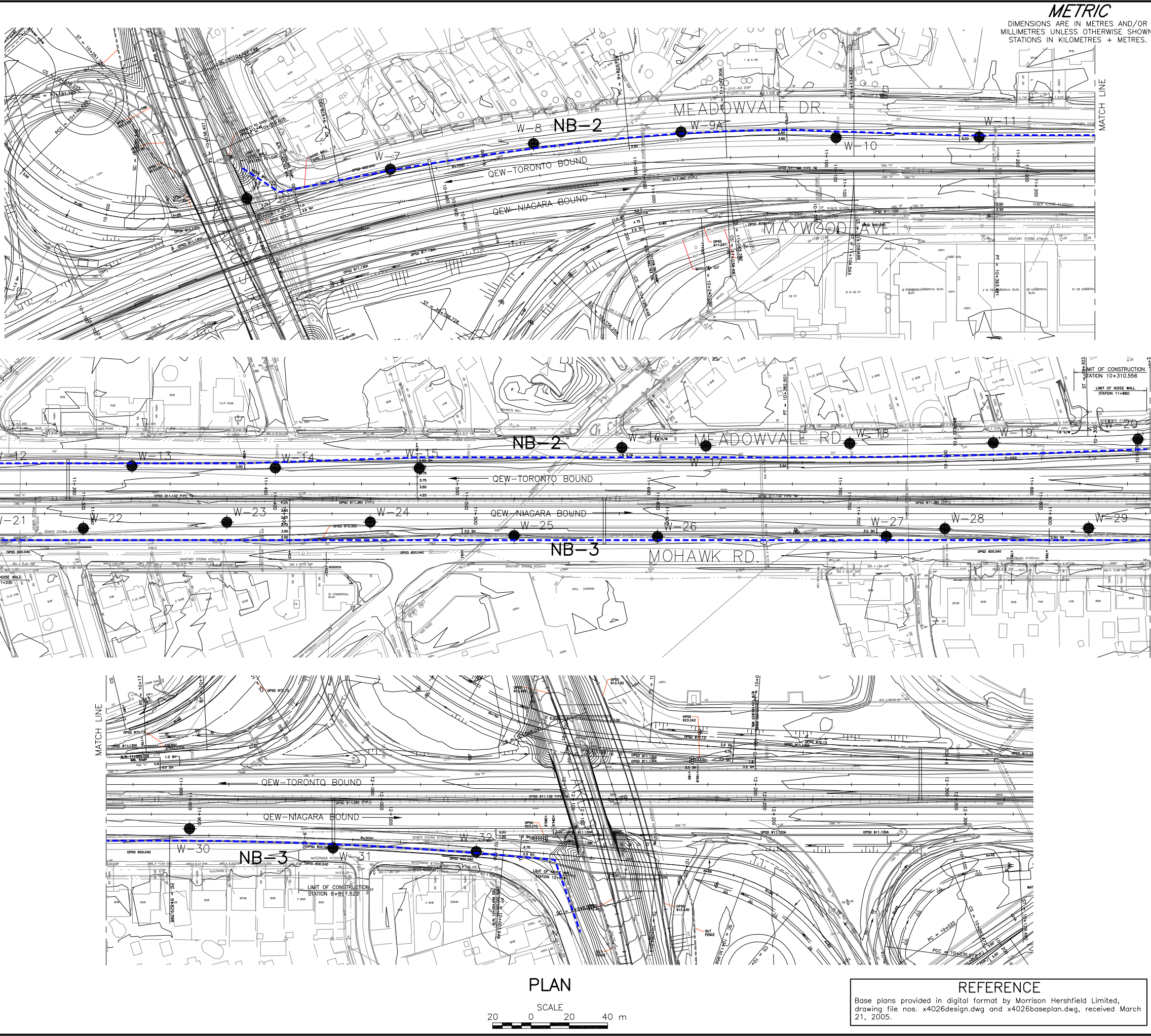
NO.	DATE	BY	REVISION
Geocres No.			
HWY. QEW	PROJECT NO. 04-1111-002		DIST.
SUBM'D. KG	CHKD. KG	DATE: DEC 2006	SITE:
DRAWN: MSM	CHKD. JMAC	APPD. LCC	DWG. 1



PLAN

SCALE  
20 0 20 40 m



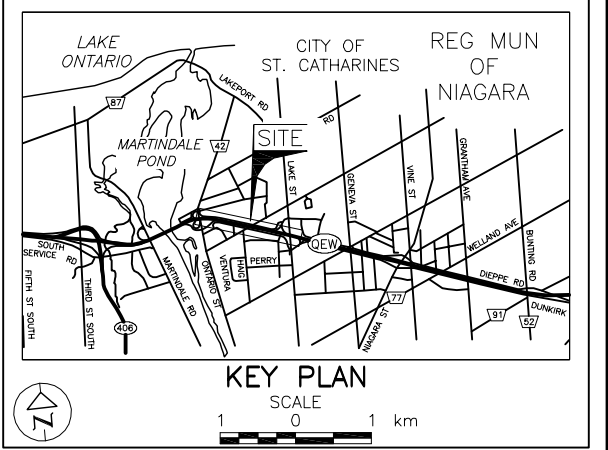


**METRIC**  
DIMENSIONS ARE IN METRES AND/OR  
MILLIMETRES UNLESS OTHERWISE SHOWN.  
STATIONS IN KILOMETRES + METRES.

CONT No.  
WP No.607-00-00

NOISE BARRIER WALLS 2 AND 3  
BOREHOLE LOCATIONS

**Golder Associates Ltd.**  
MISSISSAUGA, ONTARIO, CANADA



LEGEND

Borehole-Current Investigation

No.	ELEVATION	CO-ORDINATES	
		NORTHING	EASTING
W-6	93.0	4782261.6	323741.1
W-7	93.5	4782257.6	323817.5
W-8	93.7	4782251.8	323893.2
W-9A	93.8	4782238.4	323969.3
W-10	94.0	4782215.4	324046.9
W-11	94.4	4782197.0	324119.3
W-12	94.6	4782177.9	324191.8
W-13	94.9	4782158.9	324264.7
W-14	95.0	4782139.3	324337.0
W-15	95.2	4782120.3	324409.7
W-16	95.2	4782104.3	324514.8
W-17	95.4	4782094.1	324557.6
W-18	95.5	4782076.6	324630.6
W-19	95.6	4782058.2	324703.3
W-20	95.8	4782041.2	324776.9
W-21	94.6	4782145.2	324183.3
W-22	94.9	4782133.8	324232.0
W-23	95.0	4782118.1	324305.4
W-24	95.2	4782099.5	324377.9
W-25	94.5	4782073.8	324448.9
W-26	94.4	4782054.7	324521.2
W-27	94.0	4782025.0	324637.0
W-28	95.0	4782021.2	324667.6
W-29	95.8	4782002.6	324740.3
W-30	96.0	4781983.9	324812.7
W-31	95.9	4781955.5	324882.7
W-32	96.4	4781934.9	324954.7

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.

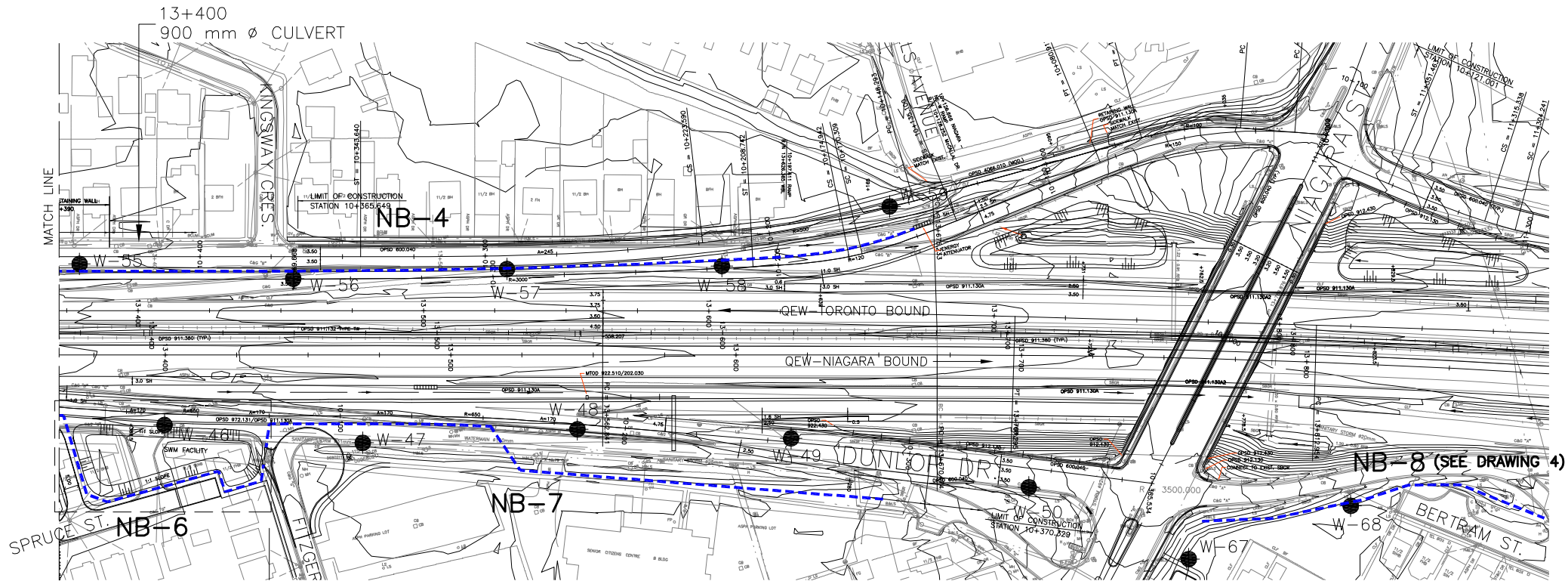
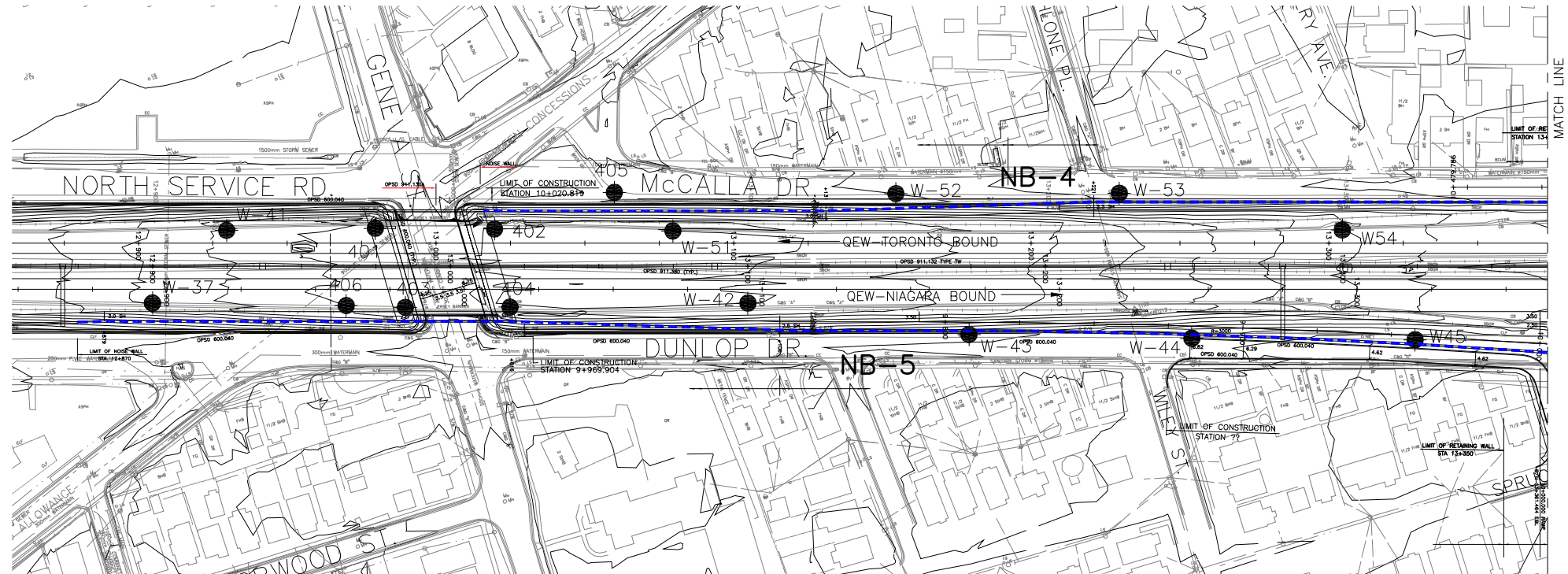
The complete foundation investigation and design report for this project and other related documents may be examined at the Materials Engineering and Research Office, Downsview. Information contained in this report and related documents is specifically excluded in accordance with Section GC 2.01 of OPS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

REFERENCE

Base plans provided in digital format by Morrison Hershfield Limited, drawing file nos. x4026design.dwg and x4026baseplan.dwg, received March 21, 2005.

NO.	DATE	BY	REVISION
Geocres No.			
HWY. QEW		PROJECT NO. 04-1111-002	
SUBM'D. KG	CHKD. KG	DATE: DEC 2006	SITE:
DRAWN: MSM	CHKD. JMAG	APPD. LCC	DWG. 2





#### 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.

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

CONT No.  
WP No.607-00-00

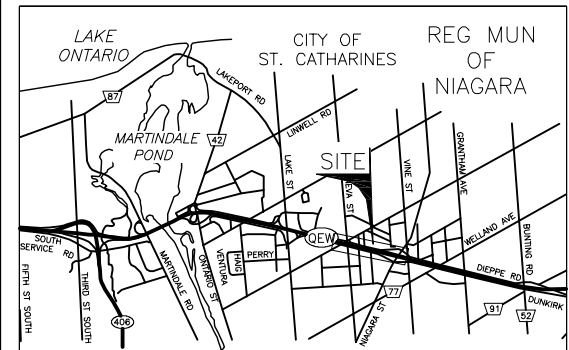
NOISE BARRIER WALLS  
4, 5, 6 AND 7  
BOREHOLE LOCATIONS



SHEET



**Golder Associates Ltd.**  
MISSISSAUGA, ONTARIO, CANADA



KEY PLAN

SCALE  
1 0 1 km

#### LEGEND

Borehole-Current Investigation

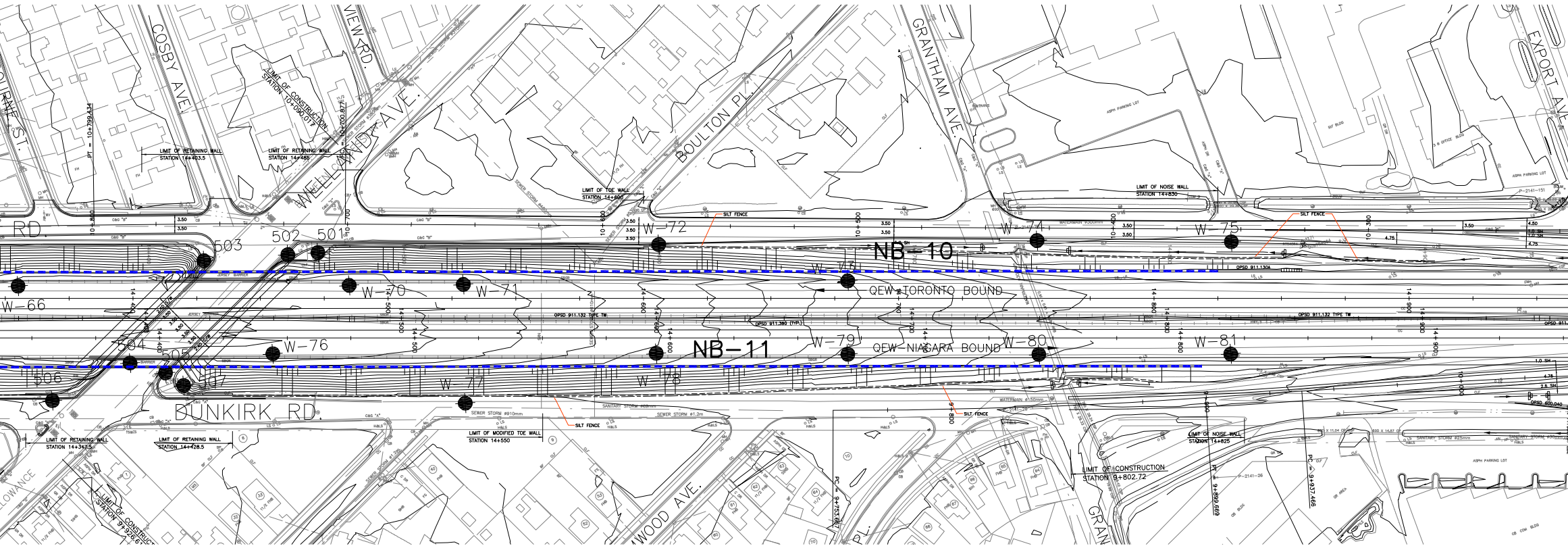
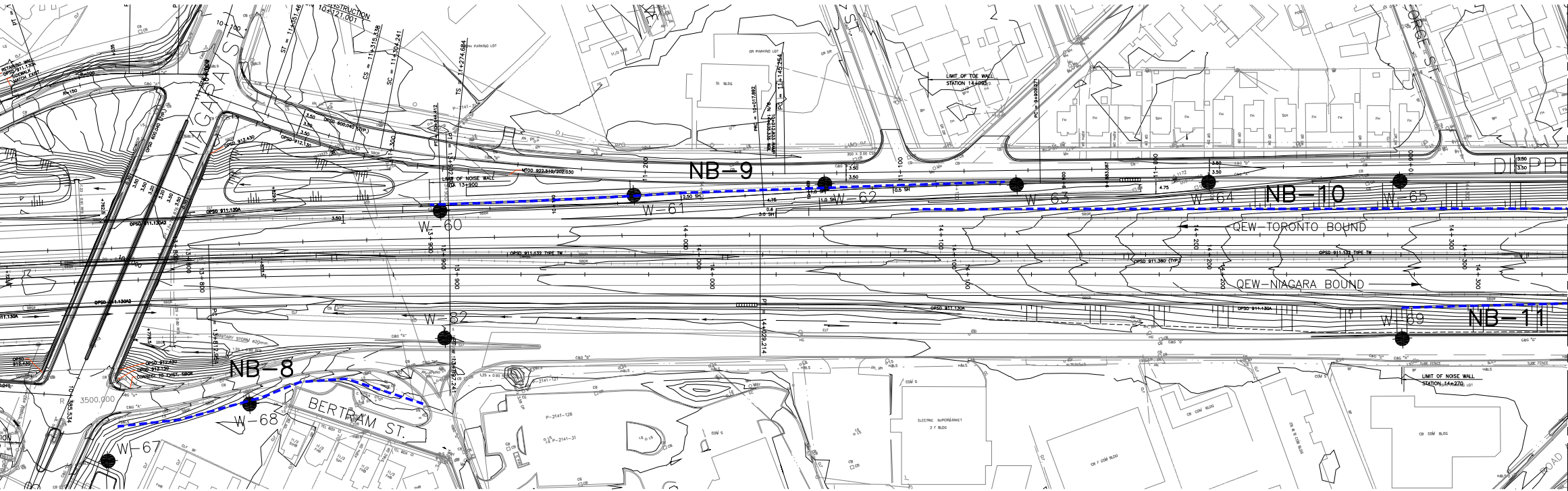
No.	ELEVATION	CO-ORDINATES	
		NORTHING	EASTING
W-37	104.7	4781736.7	325782.0
W-41	105.0	4781754.1	325812.2
W-42	106.1	4781686.7	325975.7
W-43	100.4	4781657.9	326045.0
W-44	100.8	4781638.0	326117.2
W-45	101.2	4781618.7	326189.8
W-46	101.6	4781591.3	326265.5
W-47	101.7	4781567.9	326331.2
W-48	101.9	4781553.7	326405.3
W-49	102.5	4781531.9	326476.9
W-50	105.8	4781494.5	326553.4
W-51	106.1	4781716.5	325957.4
W-52	100.0	4781709.9	326033.1
W-53	100.5	4781691.2	326105.8
W-54	103.0	4781660.5	326175.3
W-55	101.2	4781653.3	326250.8
W-56	101.6	4781629.6	326322.0
W-57	101.7	4781614.2	326395.4
W-58	101.5	4781596.4	326468.6
W-59	102.0	4781601.9	326530.7
W-67	104.5	4781456.2	326601.3
W-68	103.5	4781460.0	326660.9
401	105.7	4781742.3	325860.8
402	106.0	4781732.1	325899.5
403	105.8	4781714.1	325863.9
404	106.1	4781705.4	325898.0
405	100.0	4781733.9	325941.6
406	105.6	4781719.6	325844.8

#### REFERENCE

Base plans provided in digital format by Morrison Hershfield Limited, drawing file nos. x4026design.dwg and x4026baseplan.dwg, received March 21, 2005.

NO.	DATE	BY	REVISION
Geocres No.			
HWY: QEW	PROJECT NO. 04-1111-002		DIST.
SUBM'D. KG	CHKD. KG	DATE: DEC 2006	SITE:
DRAWN: MSM	CHKD. JMAC	APPD. LCC	DWG. 3





PLAN



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.

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

CONT No.  
WP No.607-00-00

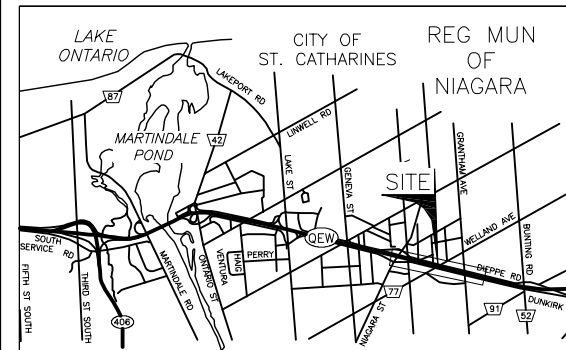
NOISE BARRIER WALLS  
8, 9, 10 AND 11  
BOREHOLE LOCATIONS



SHEET



**Golder Associates Ltd.**  
MISSISSAUGA, ONTARIO, CANADA



KEY PLAN

SCALE  
1 0 1 km

LEGEND

● Borehole-Current Investigation

No.	ELEVATION	CO-ORDINATES	
		NORTHING	EASTING
W-60	101.5	4781508.5	326755.5
W-61	101.8	4781490.7	326829.5
W-62	101.6	4781471.5	326901.9
W-63	101.5	4781447.8	326973.2
W-64	101.4	4781425.2	327045.0
W-65	101.2	4781402.1	327116.4
W-66	107.5	4781363.3	327182.7
W-67	104.5	4781456.2	326601.3
W-68	103.5	4781460.0	326660.9
W-69	101.5	4781343.3	327097.9
W-70	107.6	4781323.1	327306.1
W-71	107.2	4781309.5	327348.7
W-72	101.3	4781300.4	327426.3
W-73	104.0	4781263.8	327492.2
W-74	101.0	4781255.6	327567.5
W-75	100.9	4781231.4	327639.7
W-76	107.8	4781307.0	327269.3
W-77	101.4	4781265.1	327334.9
W-78	105.7	4781260.2	327412.0
W-79	104.0	4781236.5	327483.2
W-80	102.0	4781213.0	327554.3
W-81	101.7	4781189.7	327625.8
W-82	102.0	4781460.7	326741.7
501	101.2	4781339.1	327298.4
502	101.2	4781342.0	327287.0
503	101.4	4781350.0	327255.0
504	101.5	4781321.0	327215.0
505	101.4	4781313.0	327227.0
506	101.4	4781316.5	327181.5
507	101.5	4781306.1	327232.2

REFERENCE

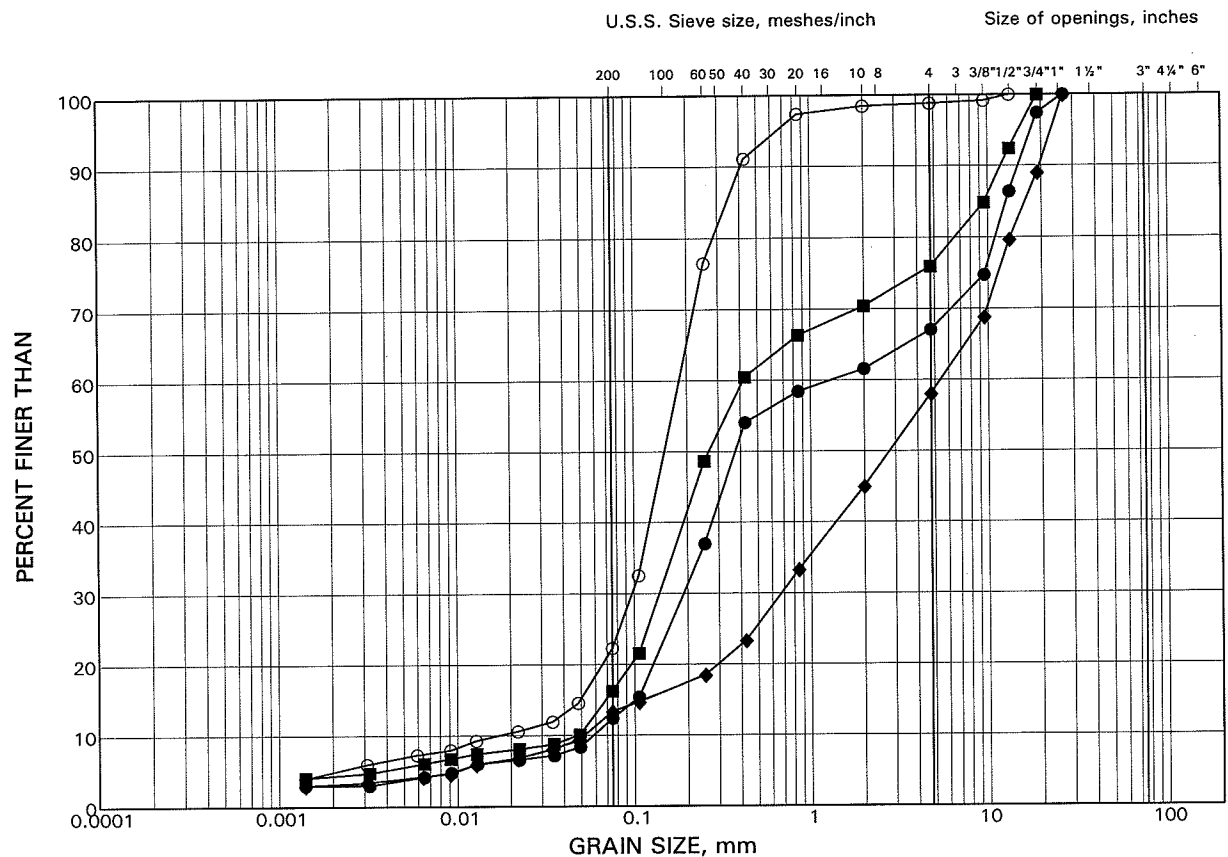
Base plans provided in digital format by Morrison Hershfield Limited, drawing file nos. x4026design.dwg and x4026baseplan.dwg, received March 21, 2005.

NO.	DATE	BY	REVISION
Geocres No.			
HWY. QEW	PROJECT NO. 04-1111-002		DIST.
SUBM'D. KG	CHKD. KG	DATE: DEC 2006	SITE:
DRAWN: MSM	CHKD. JMAC	APPD. LCC	DWG. 4

# GRAIN SIZE DISTRIBUTION TEST RESULTS

Fill

FIGURE 1A



SILT AND CLAY SIZES	FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE
FINE GRAINED	SAND SIZE			GRAVEL SIZE		SIZE

## LEGEND

SYMBOL	BOREHOLE	SAMPLE	ELEVATION (m)
●	401	7	99.3
■	402	4	102.7
◆	403	4	102.4
○	404	4	102.8

Date January, 2007  
Project 04-1111-002-9

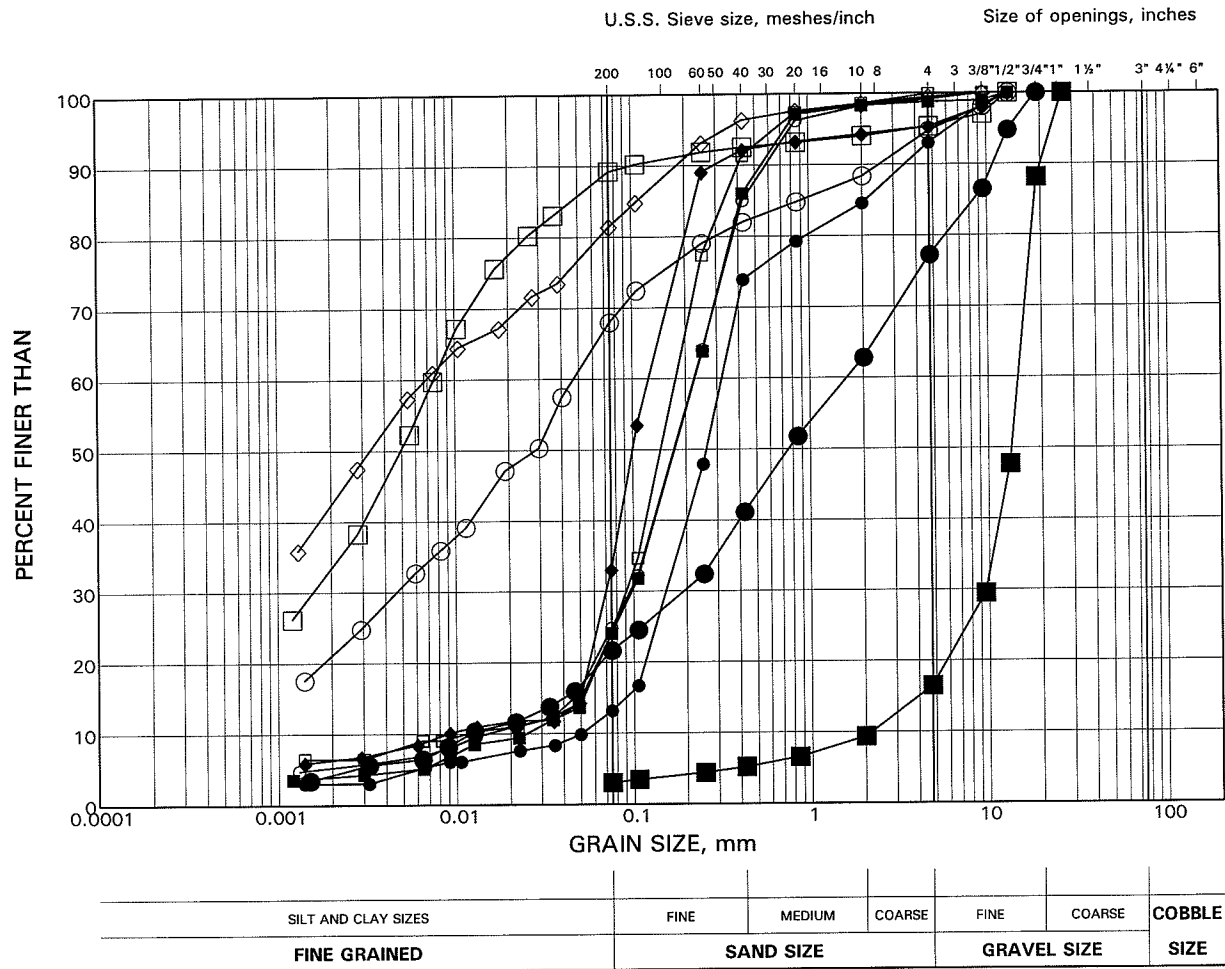
**Golder Associates**

Prepared by LG  
Checked by *ll*

# GRAIN SIZE DISTRIBUTION TEST RESULTS

Fill

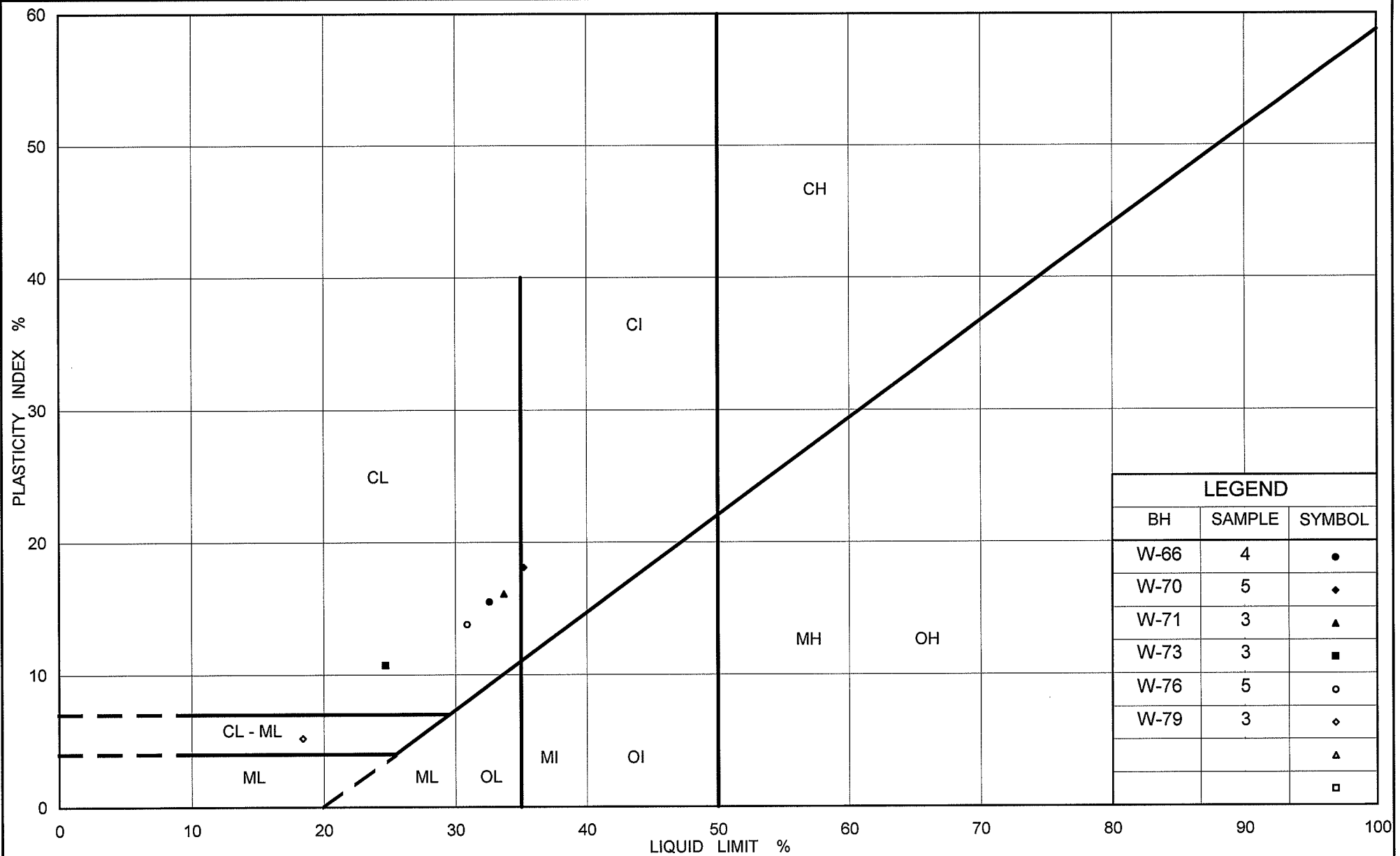
FIGURE 1B



## LEGEND

SYMBOL	BOREHOLE	SAMPLE	ELEVATION (m)
●	W-41	4	101.6
■	W-42	3	103.5
◆	W-47	1	100.6
○	W-51	4	102.7
□	W-54	3	100.4
◇	W-62	2	100.5
●	W-66	7	101.1
■	W-70	2	105.8
○	W-73	3	101.4
□	W-76	5	103.7





Ministry of Transportation

Ontario

# PLASTICITY CHART Fill

FIG No. 2

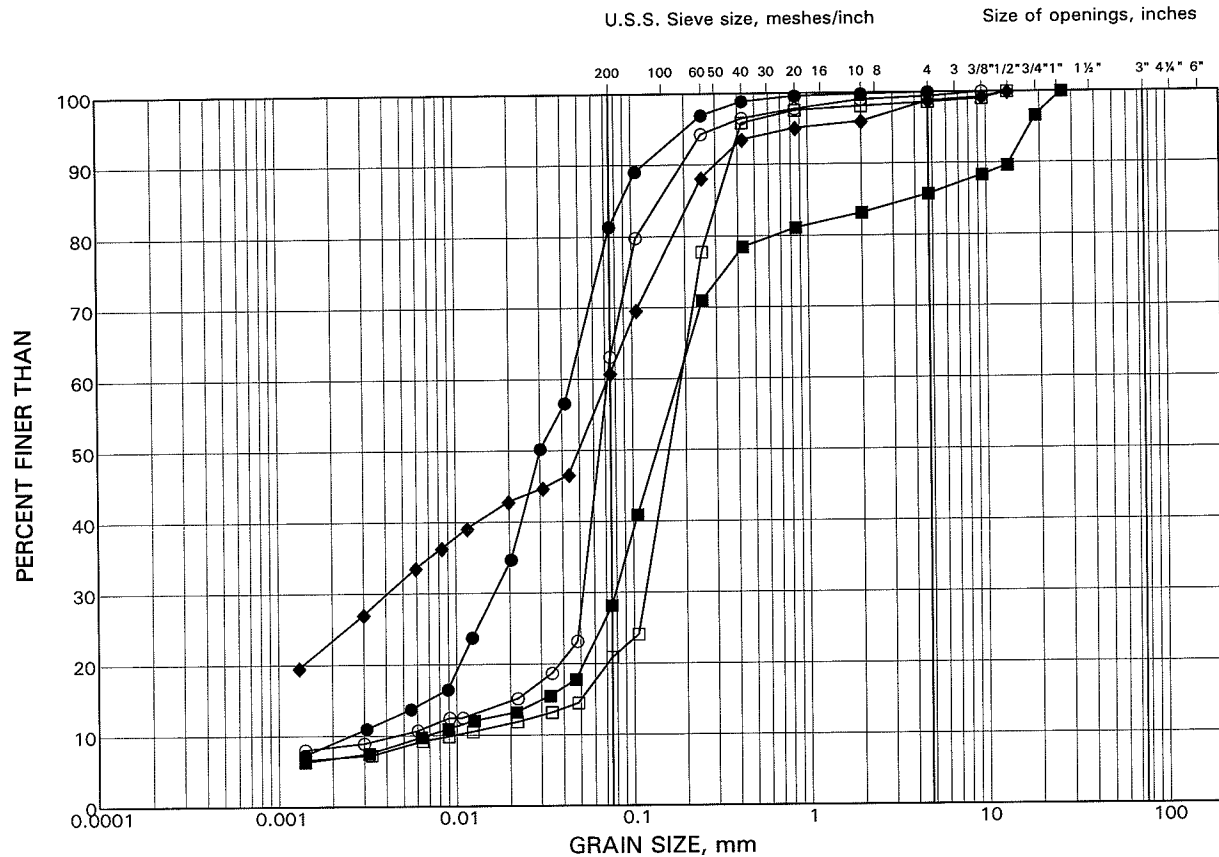
Project No. 04-1111-002-9

Checked by *ul*

# GRAIN SIZE DISTRIBUTION TEST RESULTS

Surficial Silty Sand to Sandy Silt

FIGURE 3



SILT AND CLAY SIZES	FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE
FINE GRAINED	SAND SIZE			GRAVEL SIZE		SIZE

## LEGEND

SYMBOL	BOREHOLE	SAMPLE	ELEVATION (m)
●	406	8	97.7
■	W-41	7	98.6
◆	W-48	2	100.1
○	W-54	6	98.1
□	W-67	3	102.7

Date January, 2007  
Project 04-1111-002-9

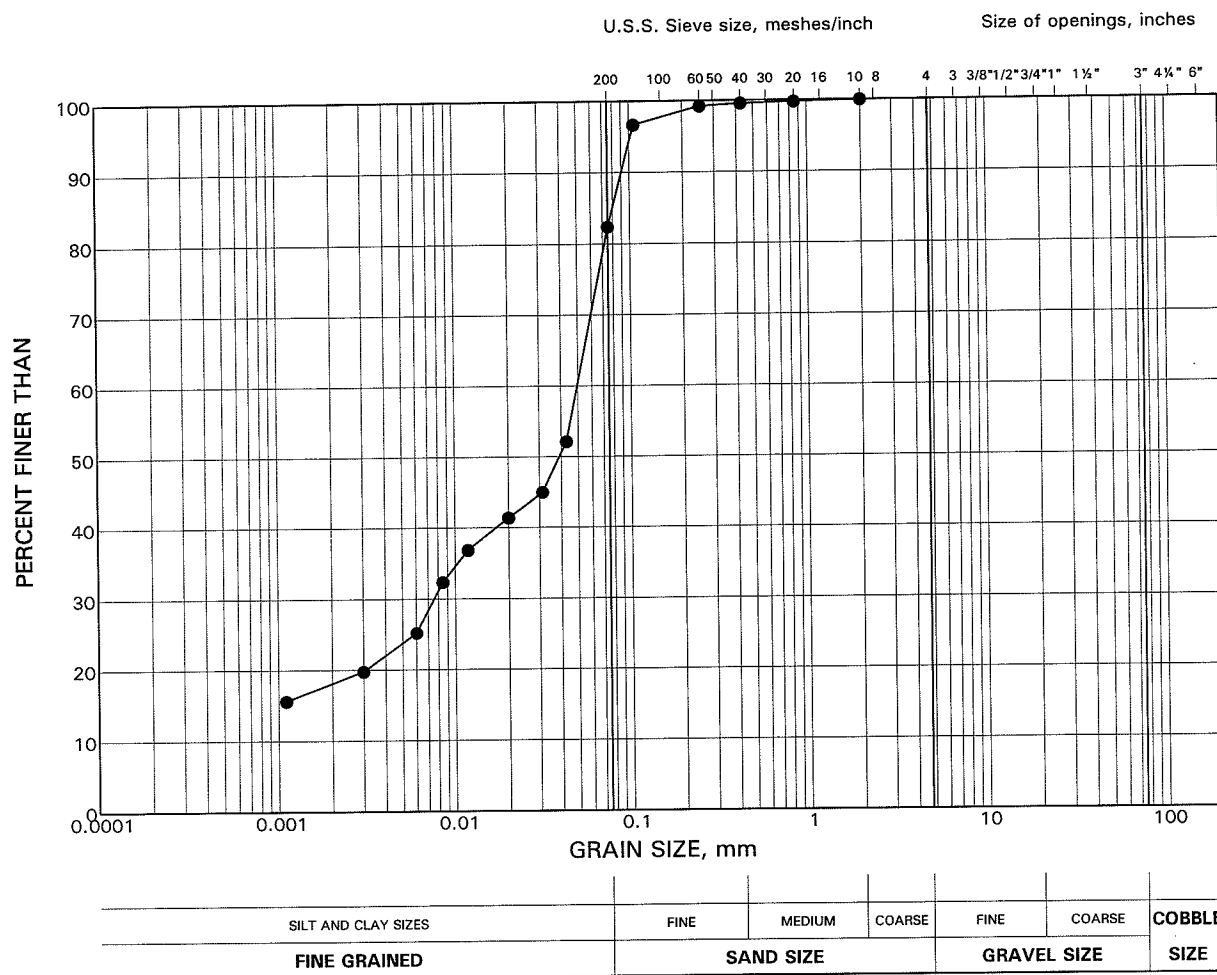
**Golder Associates**

Prepared by LG  
Checked by *lll*

# GRAIN SIZE DISTRIBUTION TEST RESULT

## Surficial Clayey Silt

FIGURE 4



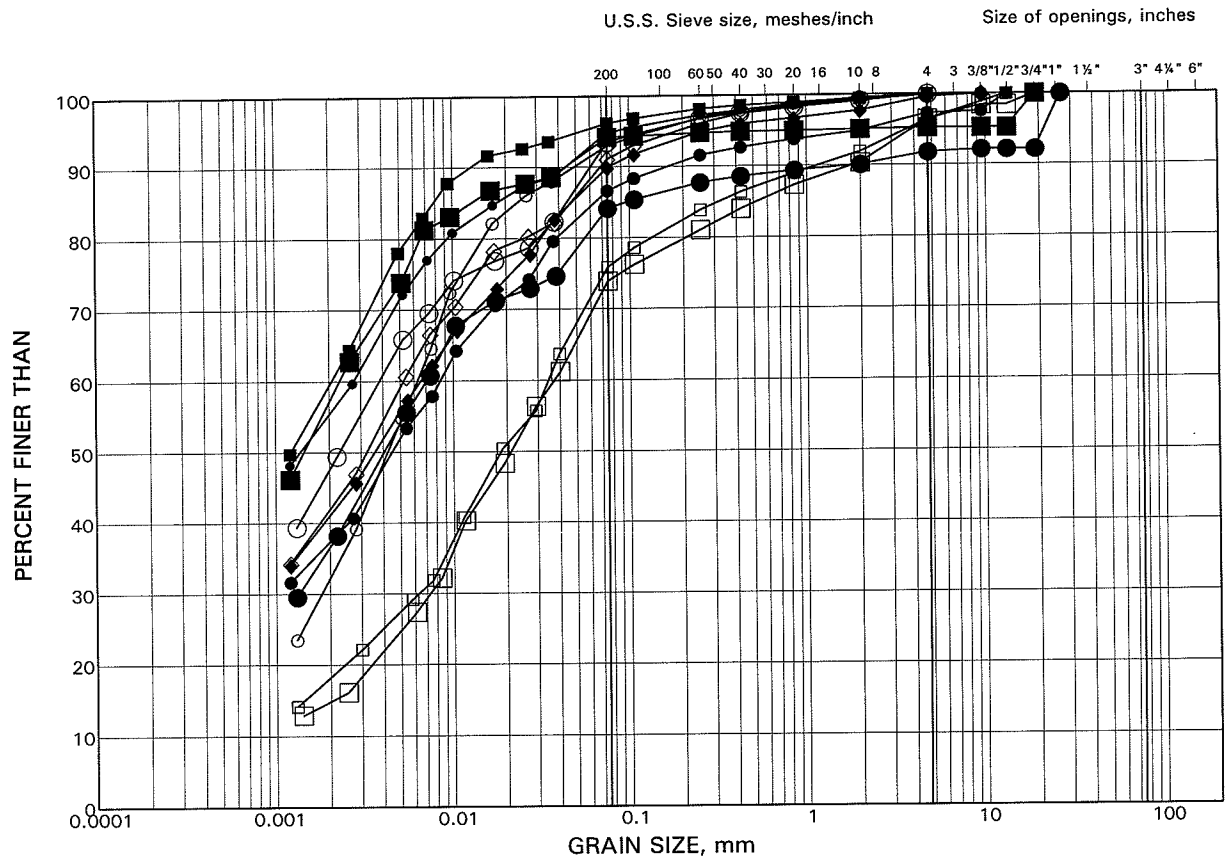
### LEGEND

SYMBOL	BOREHOLE	SAMPLE	ELEVATION (m)
•	W-18	1	94.4

# GRAIN SIZE DISTRIBUTION TEST RESULTS

Clayey Silt to Silty Clay Till

FIGURE 5A



SILT AND CLAY SIZES	FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE
FINE GRAINED	SAND SIZE			GRAVEL SIZE		SIZE

## LEGEND

SYMBOL	BOREHOLE	SAMPLE	ELEVATION (m)
●	401	11	93.2
■	402	16	85.9
◆	403	9	96.3
○	403	19	81.1
□	404	20	79.9
◇	405	7	95.1
●	502	15	84.1
■	503	13	87.4
○	504	10	92.1
□	505	19	79.2
•	507	6	97.4

Date January, 2007  
Project 04-1111-002-9

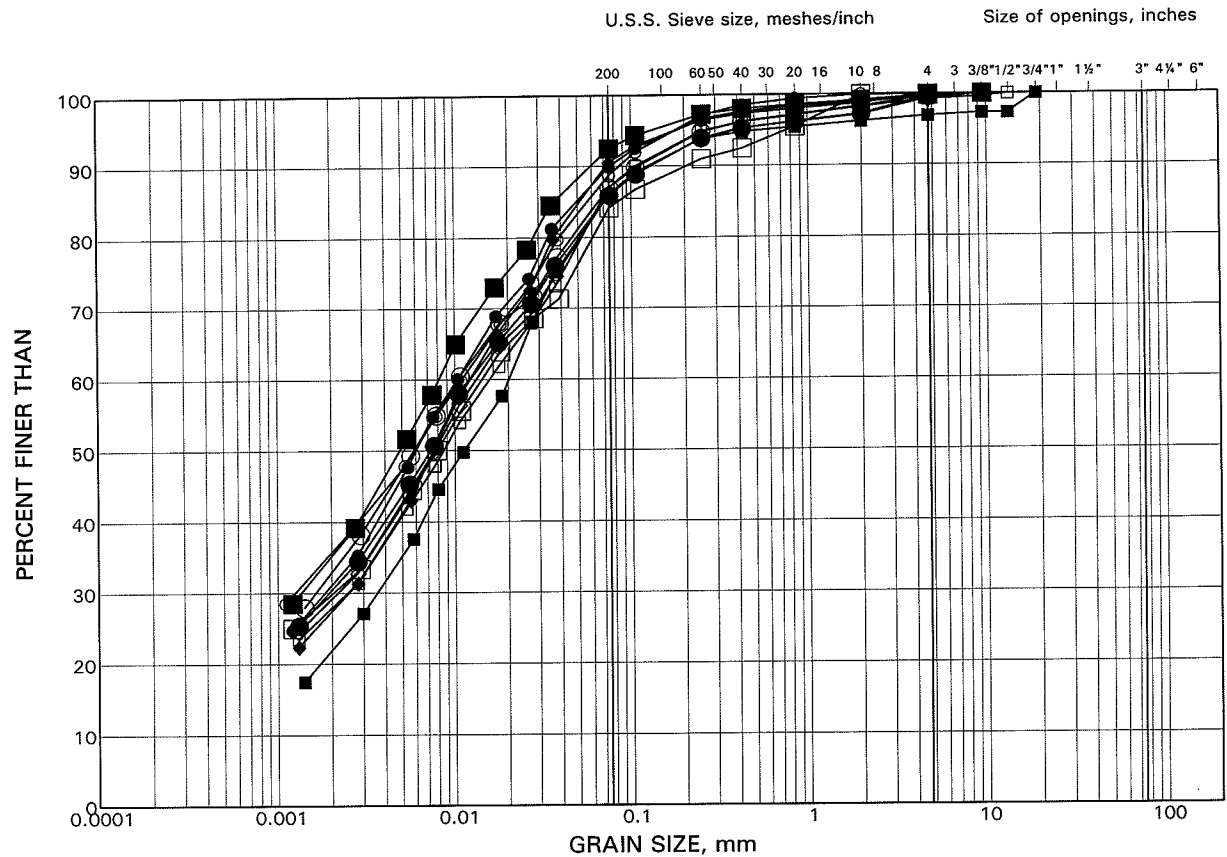
**Golder Associates**

Prepared by LG  
Checked by *[Signature]*

# GRAIN SIZE DISTRIBUTION TEST RESULTS

Clayey Silt to Silty Clay Till

FIGURE 5B



SILT AND CLAY SIZES	FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE
FINE GRAINED	SAND SIZE			GRAVEL SIZE		SIZE

## LEGEND

SYMBOL	BOREHOLE	SAMPLE	ELEVATION (m)
●	W-1	6	87.9
■	W-3	3	89.9
◆	W-4	4	90.2
○	W-6	2	91.9
□	W-8	5	90.3
◇	W-10	4	91.4
●	W-12	6	90.5
■	W-14	4	92.4
○	W-17	4	92.1
□	W-19	3	93.0

Date January, 2007  
Project 04-1111-002-9

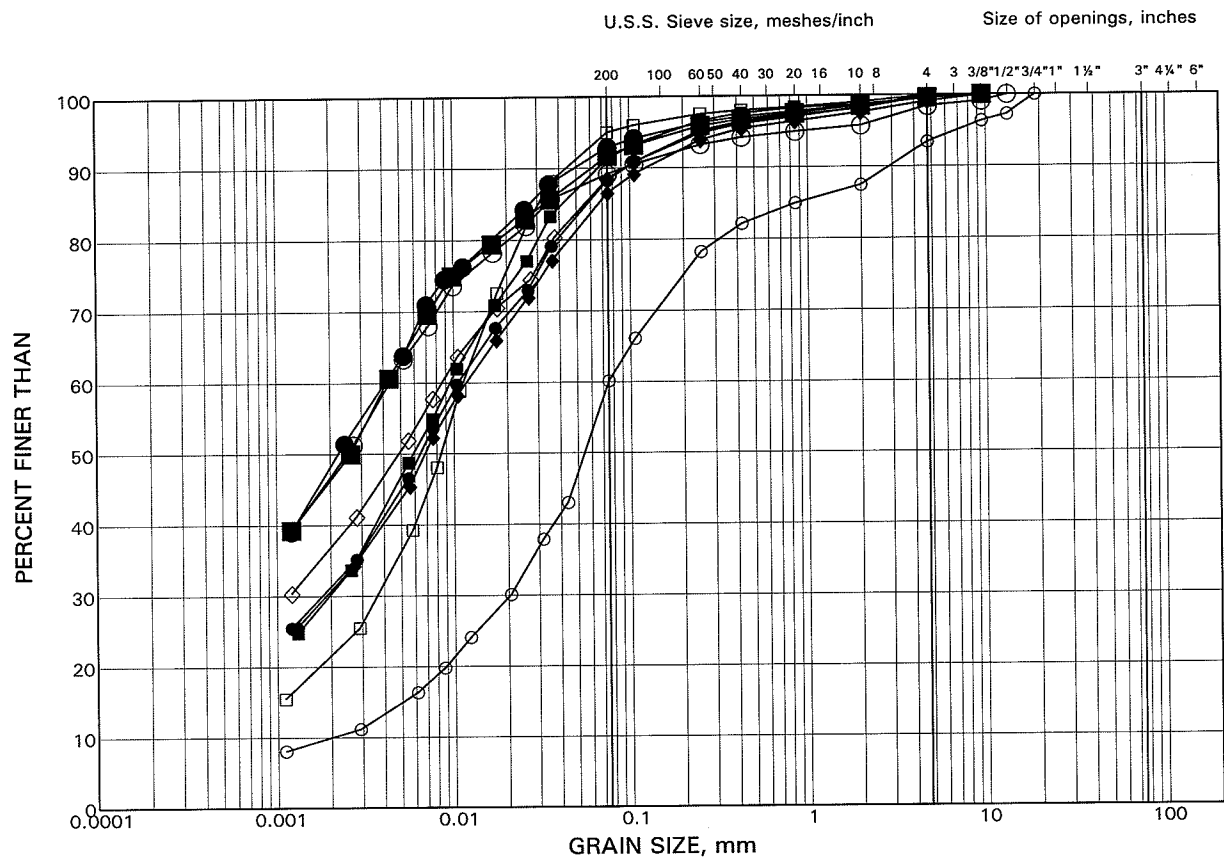
**Golder Associates**

Prepared by LG  
Checked by *ll*

# GRAIN SIZE DISTRIBUTION TEST RESULTS

Clayey Silt to Silty Clay Till

FIGURE 5C



SILT AND CLAY SIZES		FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE
FINE GRAINED		SAND SIZE			GRAVEL SIZE		SIZE

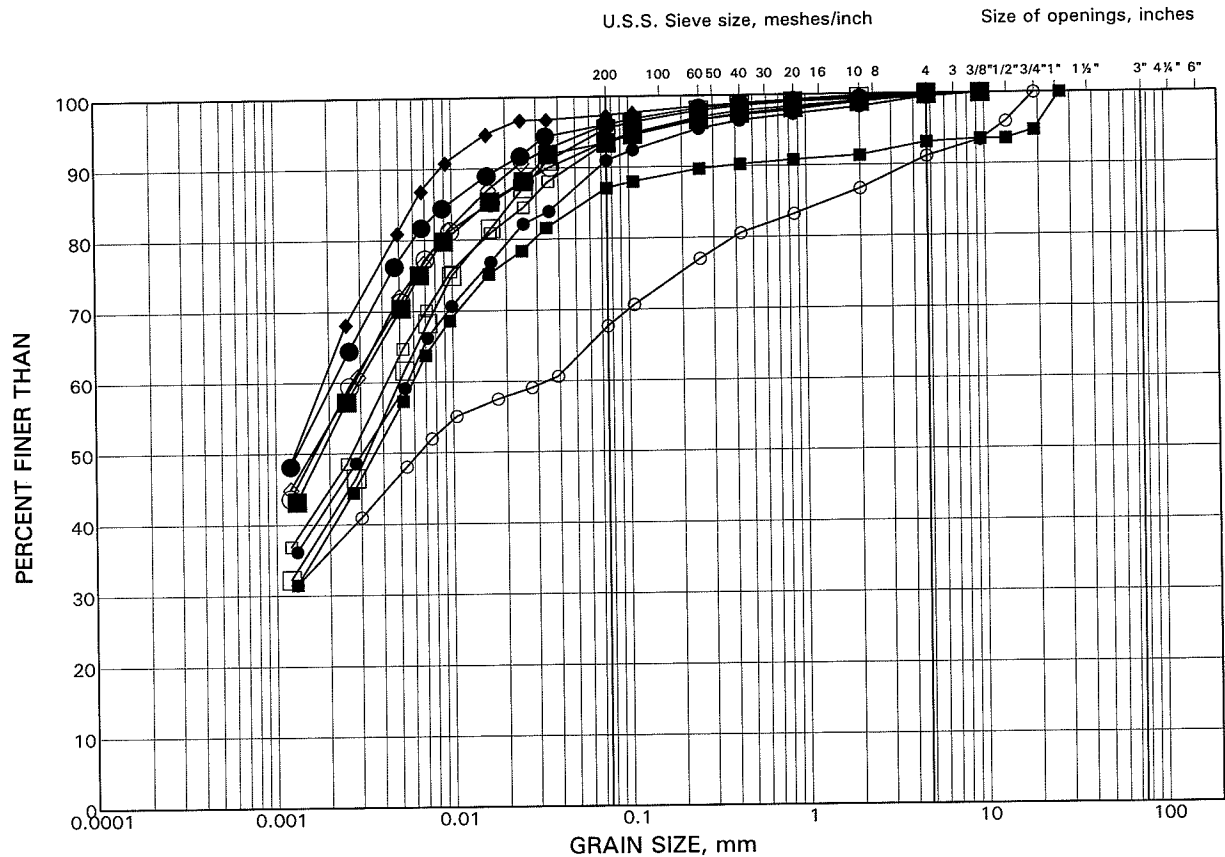
## LEGEND

SYMBOL	BOREHOLE	SAMPLE	ELEVATION (m)
●	W-21	5	91.2
■	W-23	4	92.4
◆	W-25	6	90.4
○	W-26	6	90.3
□	W-30	3	94.2
◇	W-32	3	94.6
●	W-44	2	99.0
■	W-45	7	93.3
○	W-49	6	97.6

# GRAIN SIZE DISTRIBUTION TEST RESULTS

Clayey Silt to Silty Clay Till

FIGURE 5D



SILT AND CLAY SIZES	FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE
FINE GRAINED	SAND SIZE			GRAVEL SIZE		SIZE

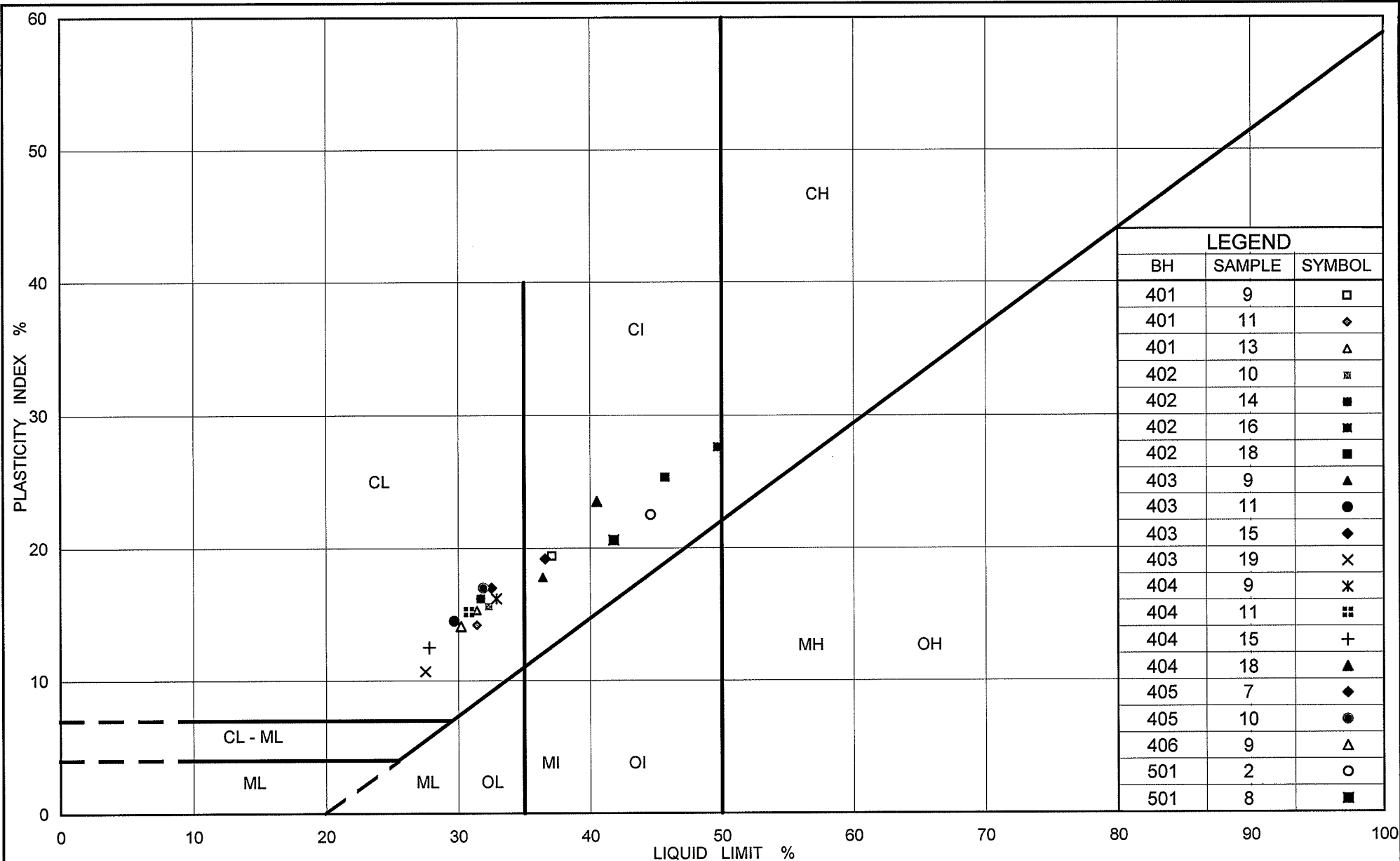
## LEGEND

SYMBOL	BOREHOLE	SAMPLE	ELEVATION (m)
●	W-53	8	92.6
■	W-56	4	98.3
◆	W-59	10	92.6
○	W-60	5	98.2
□	W-61	8	95.4
◇	W-64	8	95.0
●	W-69	5	97.4
■	W-75	5	96.8
○	W-79	7	97.6
□	W-82	4	98.7

Date January, 2007  
Project 04-1111-002-9

**Golder Associates**

Prepared by LG  
Checked by *ll*



Ministry of Transportation

Ontario

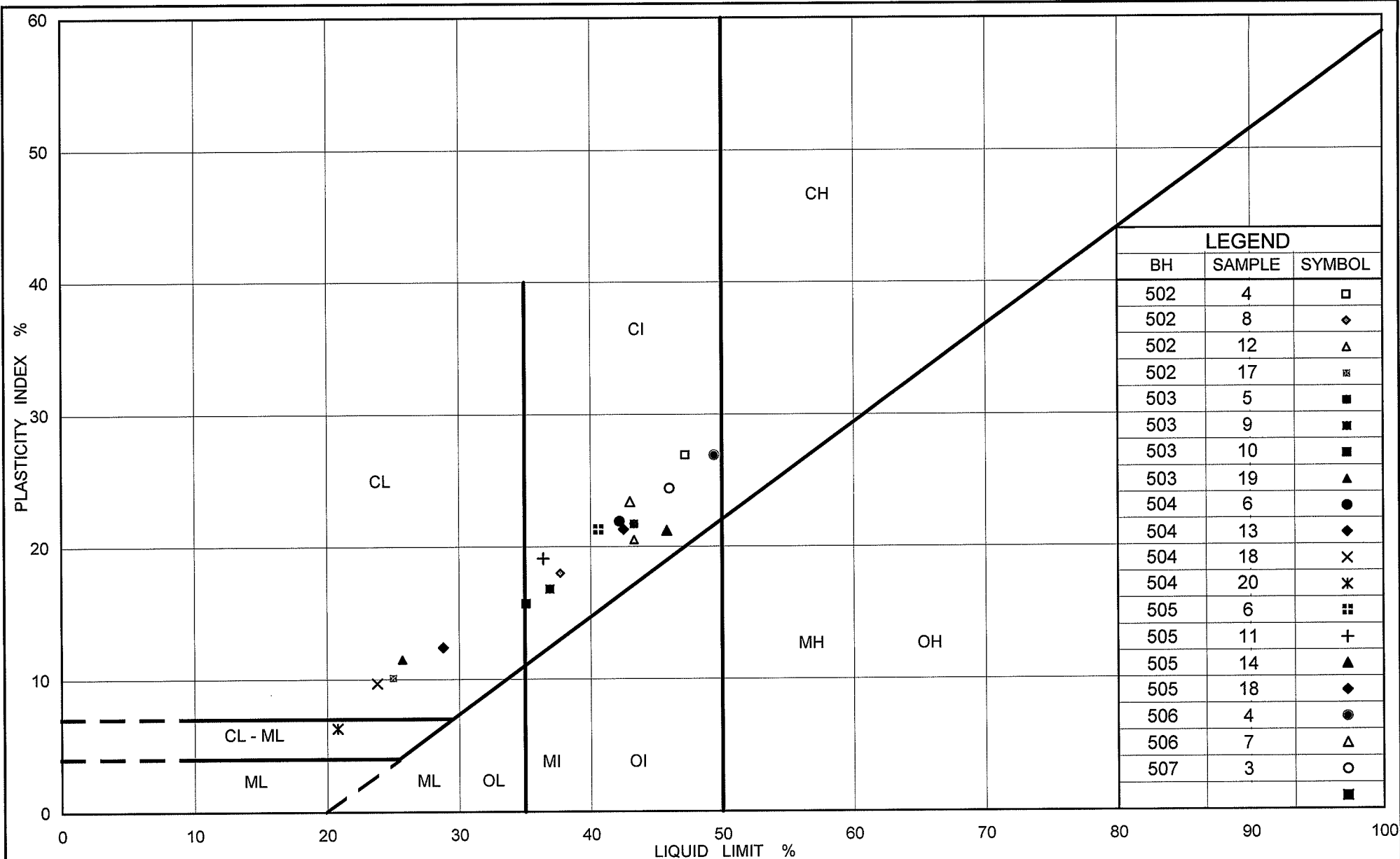
# PLASTICITY CHART Clayey Silt to Silty Clay Till

FIG No. 6A

Project No. 04-1111-002-9

Checked By: *u*





Ministry of Transportation

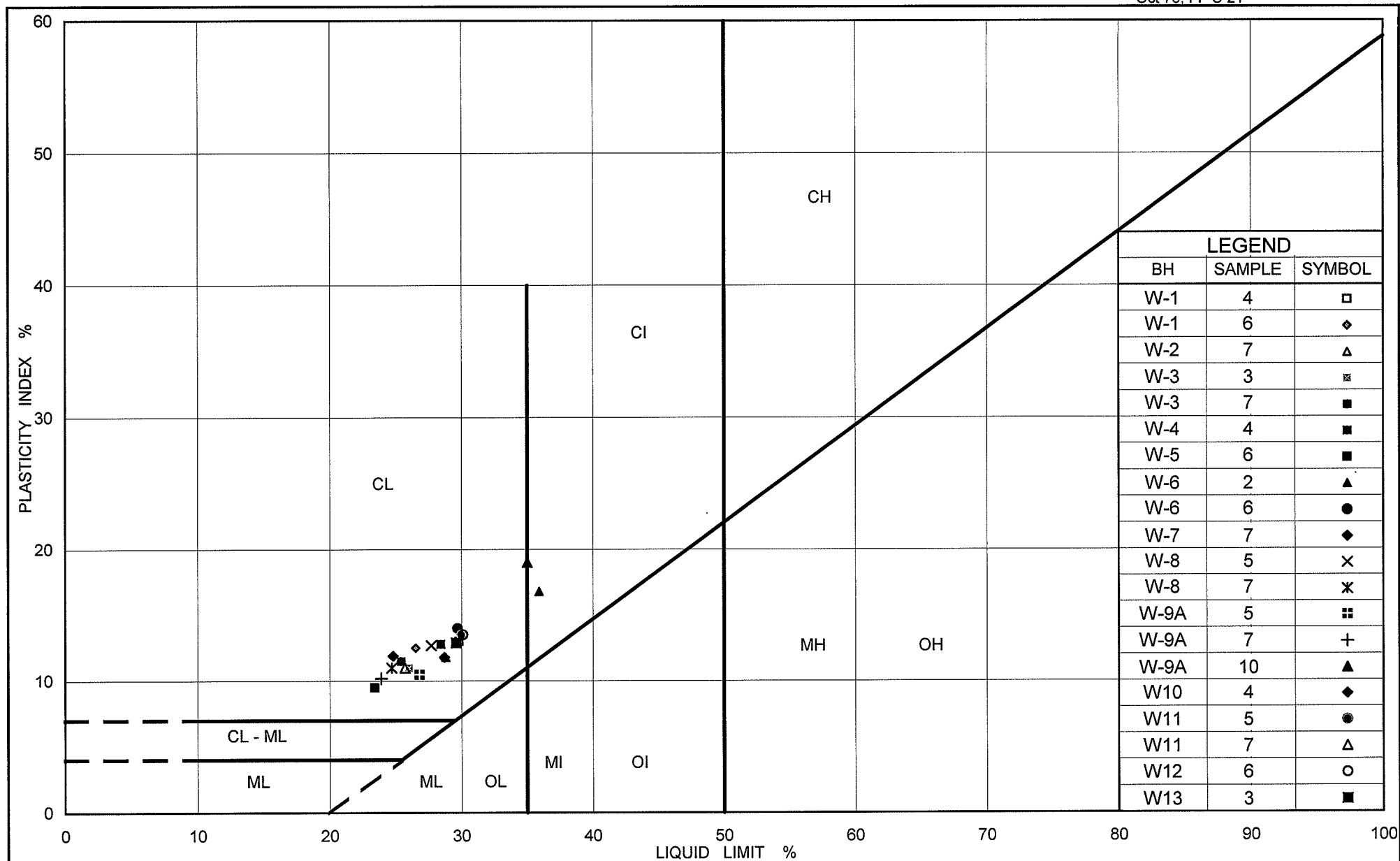
Ontario

# PLASTICITY CHART Clayey Silt to Silty Clay Till

FIG No. 6B

Project No. 04-1111-002-9

Checked By: *ul*



Ministry of Transportation

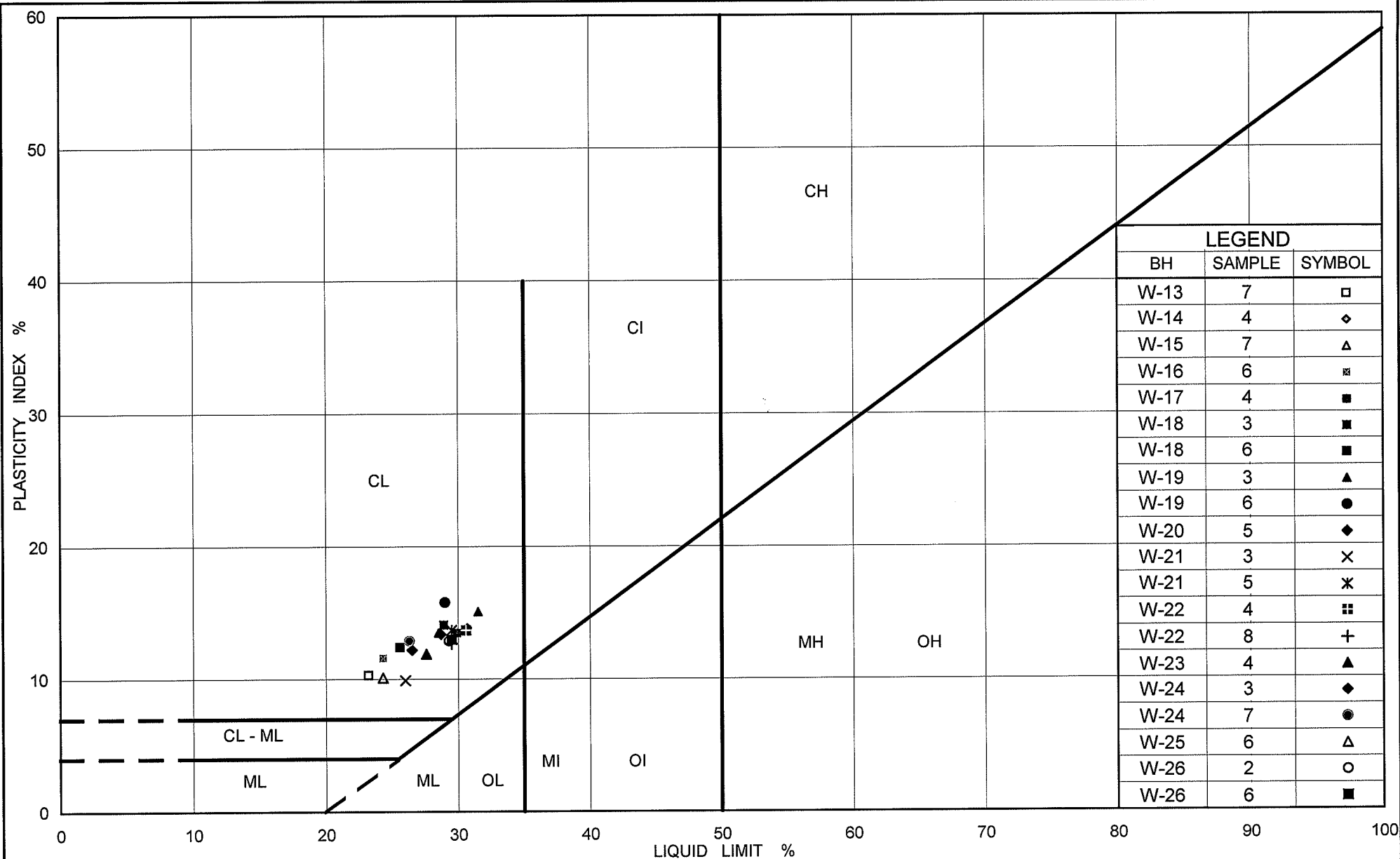
Ontario

# PLASTICITY CHART Clayey Silt to Silty Clay Till

FIG No. 6C

Project No. 04-1111-002-9

Checked By: *ll*



Ministry of Transportation

Ontario

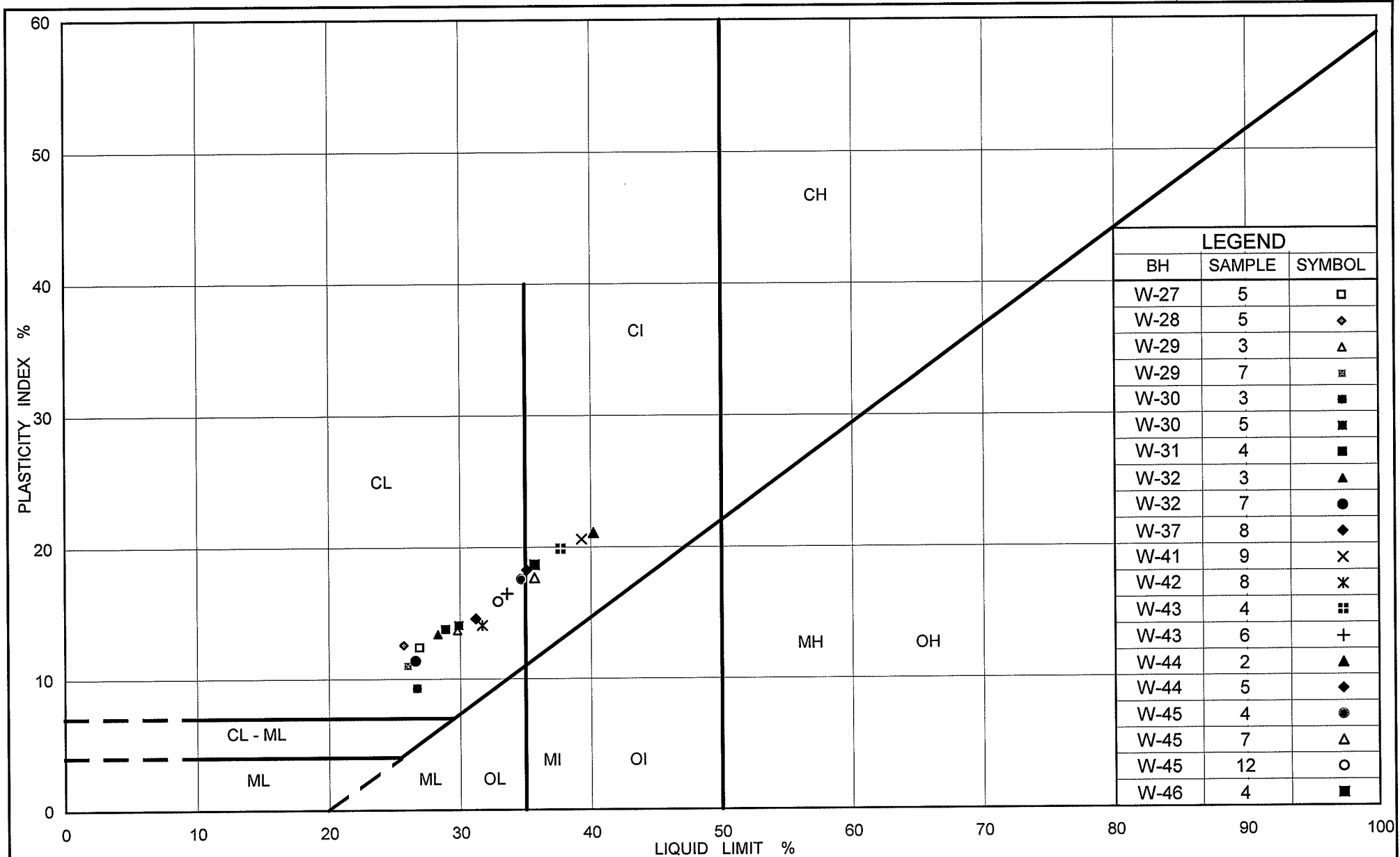
## PLASTICITY CHART

### Clayey Silt to Silty Clay Till

FIG No. 6D

Project No. 04-1111-002-9

Checked By: *u*



Ministry of Transportation

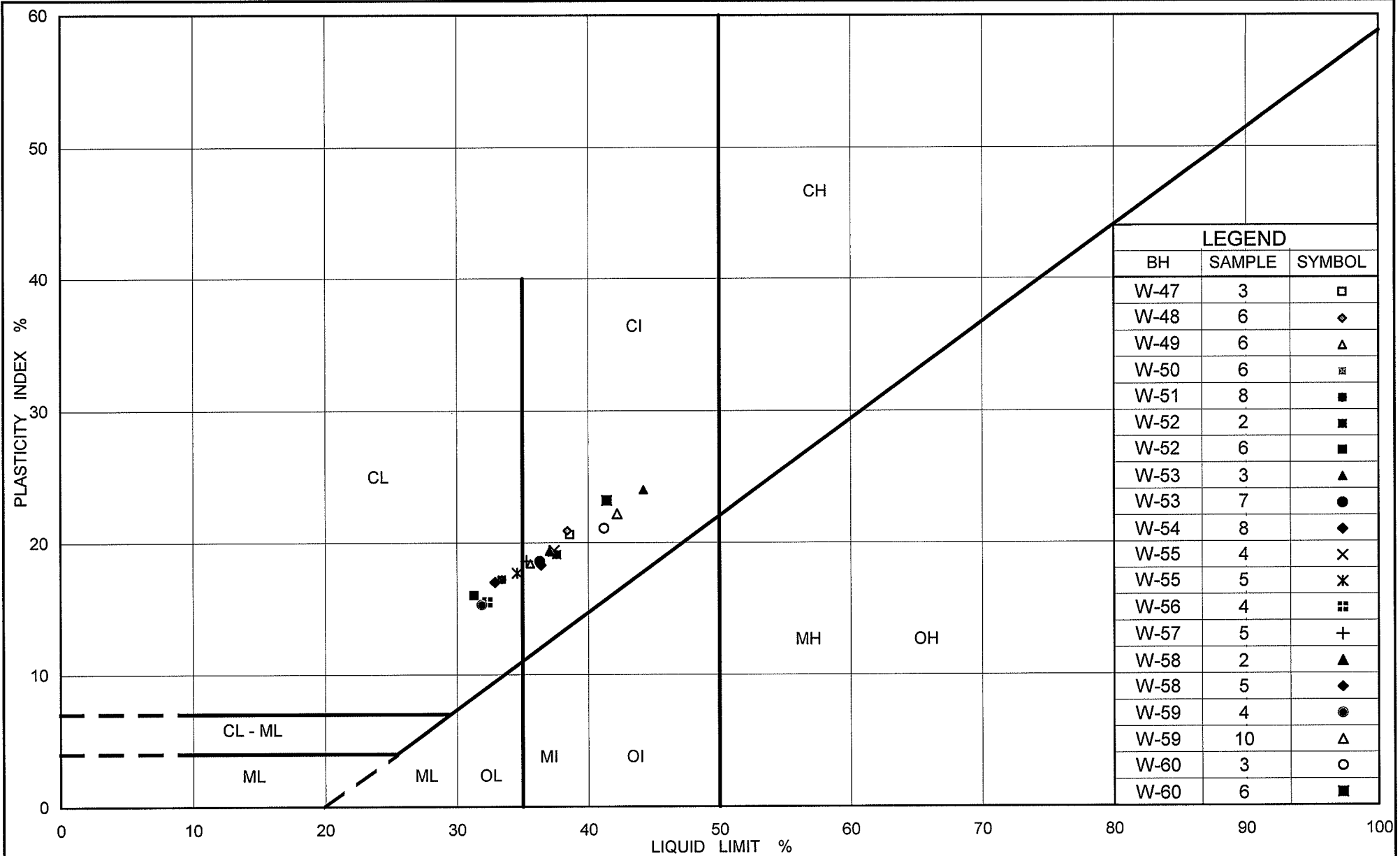
Ontario

# PLASTICITY CHART Clayey Silt to Silty Clay Till

FIG No. 6E

Project No. 04-1111-002-9

Checked By: *u*



Ministry of Transportation

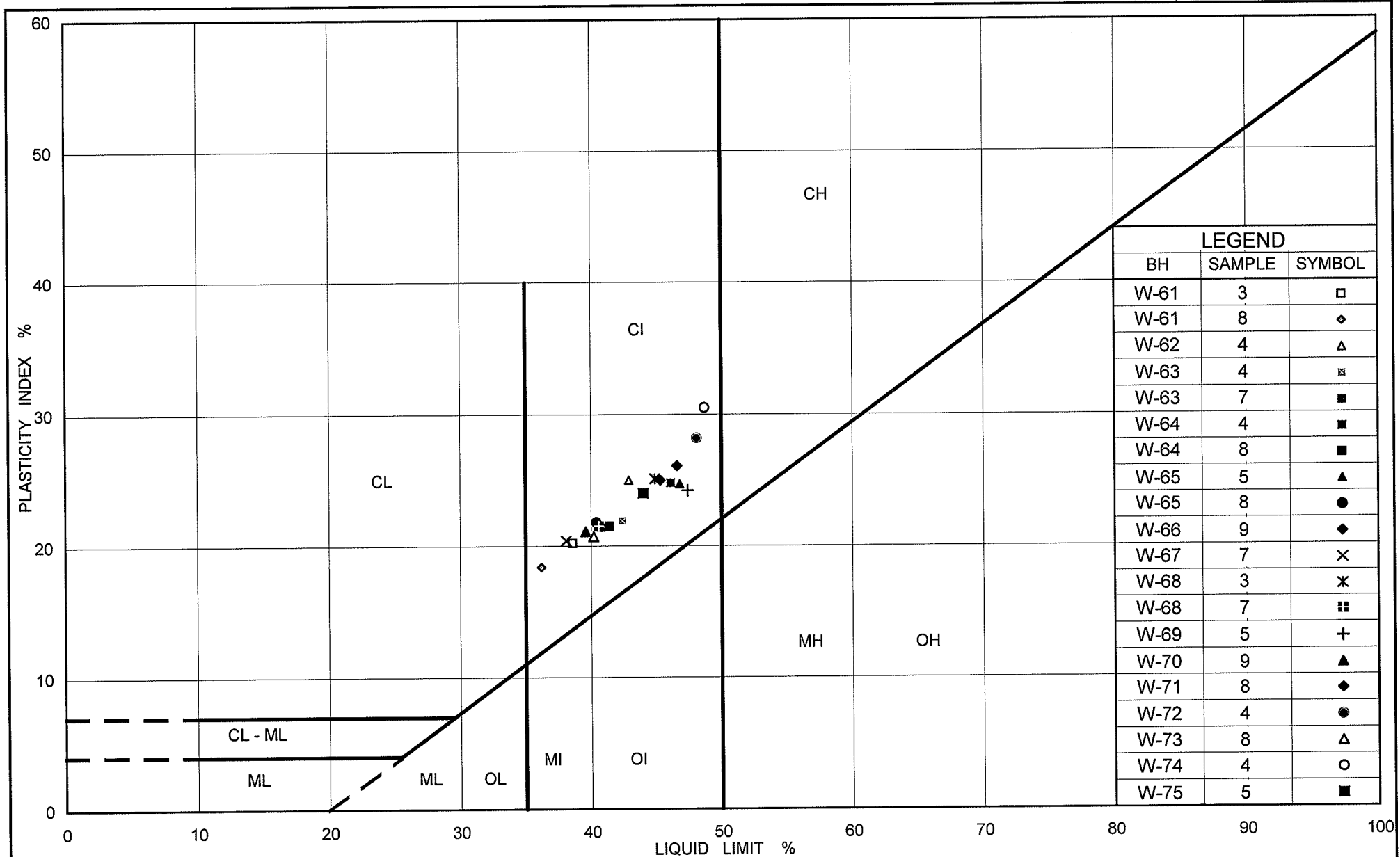
Ontario

# PLASTICITY CHART Clayey Silt to Silty Clay Till

FIG No. 6F

Project No. 04-1111-002-9

Checked By: *ll*



Ministry of Transportation

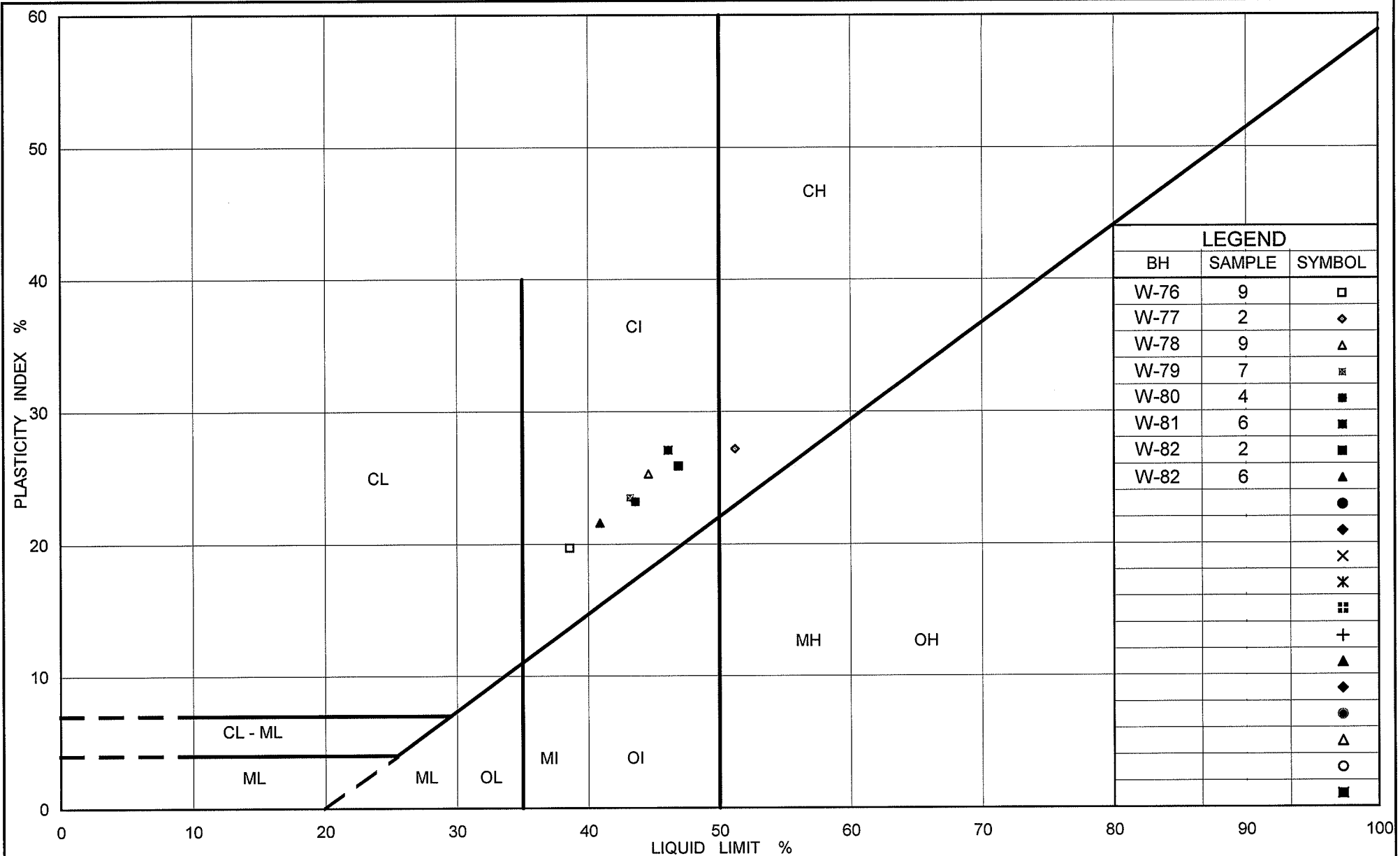
Ontario

# PLASTICITY CHART Clayey Silt to Silty Clay Till

FIG No. 6G

Project No. 04-1111-002-9

Checked By: *W*



Ministry of Transportation

Ontario

# PLASTICITY CHART Clayey Silt to Silty Clay Till

FIG No. 6H

Project No. 04-1111-002-9

Checked By: *lll*