FOUNDATION INVESTIGATION REPORT
HIGH MAST LIGHTING POLES
HIGHWAY 400 WIDENING
TESTON ROAD TO NORTH OF KING ROAD
VAUGHAN, ONTARIO
G.W.P. 2539-04-00

GEOCRES No. 30M13-193

Submitted

To

SNC Lavalin Inc.

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File: 19-92-68

TABLE OF CONTENTS

SECTION **PAGE**

FOUNDATION INVESTIGATION REPORT
HIGH MAST LIGHTING POLES
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PART 1 FACTUAL INFORMATION

1.0 INTRODUCTION

This report presents the factual data from a foundation investigation carried out by Thurber Engineering Ltd. (Thurber) for the detailed design of High Mast Lighting (HML) poles at locations between the service station to the north of Teston Road to north of King Road along Highway 400 in the Regional Municipality of York, Ontario. Thurber has been retained by SNC-Lavalin Inc. (SLI) to carry out this investigation under the Ministry of Transportation Ontario (MTO) Agreement No. 2005-E-0037.

The purpose of this investigation was to determine the subsurface conditions in areas where HML poles are proposed and, based on this data, to provide borehole location drawings, records of boreholes, laboratory test results and a written description of the subsurface conditions.

It is understood that as of June 24, 2011, 70 high mast lighting (HML) pole locations have been proposed for the Highway 400 widening project from Major Mackenize Drive to north of King Road. Twenty-three of the HML pole locations have previously been investigated and the results reported in Thurber's report entitled "Foundation Investigation and Design Report, High Mast Lighting Poles, Highway 400, Major Mackenzie Drive to North of Teston Road, Toronto, Ontario", G.W.P. 2539-04-00 Report to SNC-Lavalin, File No. 19-92-68, April 1, 2010. The remaining HML pole locations are addressed in this report. The locations of these HML poles were established based on information dated June 24, 2011 provided by MTO and are listed in Table 1 at the end of the text.

In addition to the boreholes drilled specifically for the HML poles, reference has been made to information on subsurface conditions contained in another foundation report to be issued for the overhead and cantilevered sign support design.

2.0 SITE DESCRIPTION

The HML poles are to be located along the alignment of the proposed Highway 400 widening, from the service station just north of Teston Road to north of King Road. This is part of a project of broader scope involving the widening of Highway 400 from Major MacKenzie Drive to King Road.

The project area is located within the physiographic region known as the South Slope of the Oak Ridges Moraine, which is comprised predominantly of the Halton drift (till). The Halton till is an interbedded complex of clayey silt to silt till and sand. This till comprises a slightly hummocky till plain, into which the surface watercourses have eroded 10 to 15 m deep gullies. Relatively recent fluvial sediments have been deposited in the gullies. The Halton drift overlies bedrock at depths in the order of 100 m in the vicinity of the project area.

Drainage in the vicinity of the project area is largely controlled by the Humber River and its tributaries. Localized drainage is facilitated by the creeks flowing within the gullies.

The land use adjacent to this section of Highway 400 is largely rural and agricultural, although there is increasing residential and commercial development in recent years.

3.0 INVESTIGATION PROCEDURES

3.1 Field Investigation

A borehole investigation program for the HML poles was carried out between April 18 and May 5, 2011. This investigation consisted of a total of 14 boreholes, 13 of which were advanced at selected locations within the Highway 400 right-of-way in the vicinities where new HML poles are to be constructed, and 1 of which was advanced at the approximate location of one of the

proposed overhead sign supports. Ten of the boreholes (HML11-01 to HML11-09 and BH11-20) were located along the centre median of the highway and four of the boreholes (HMLK-1 to HMLK-4) were located at the Highway 400-King Road Interchange. These boreholes were terminated at between 9.4 m and 9.8 m depths.

Previously drilled, relevant boreholes located within the subject section of Highway 400 are also referenced in this report and are included in Appendix C. The approximate locations of all relevant boreholes are shown on the Borehole Locations Plans immediately following the text and tables.

In each borehole, soil samples were obtained at selected intervals with a 50 mm outside diameter split spoon sampler driven in conjunction with the Standard Penetration Test (SPT). Groundwater conditions in the open boreholes were observed upon completion of the drilling operations. Standpipe piezometers were installed in boreholes located off of the highway to facilitate longer term monitoring of the groundwater levels. The borehole completion details are summarized in Table 3.1 below.

Table 3.1 – Borehole Completion Details

Borehole Number	Piezometer Tip Depth / Elevation (m)	Completion Details
HML11-01	None Installed	Bentonite holeplug to 6.7 m, cuttings to 0.2 m, concrete to 0.1 m, then asphalt to surface.
HML11-02	None Installed	Bentonite holeplug to 7.3 m, cuttings to 0.2 m, concrete to 0.1 m, then asphalt to surface.
HML11-03	None Installed	Bentonite holeplug to 7.6 m, cuttings to 0.3 m, concrete to 0.1 m, then asphalt to surface.
HML11-04	None Installed	Bentonite holeplug to 0.4 m, concrete to 0.2 m, then asphalt to surface.
HML11-05	None Installed	Bentonite holeplug to 0.5 m, concrete to 0.1 m, then asphalt to surface.
HML11-06	None Installed	Bentonite holeplug to 1.2 m, concrete to 0.1 m, then asphalt to surface.
HML11-07	None Installed	Bentonite holeplug to 1.3 m, concrete to 0.1 m, then asphalt to surface.
HML11-08	None Installed	Bentonite holeplug to 1.2 m, concrete to 0.1 m, then asphalt to surface.

HML11-09	None Installed	Bentonite holeplug and cuttings to 0.4 m, concrete to 0.1 m, then asphalt to surface.
HMLK-1	9.1 / 278.4	Filter sand from 9.1 m to 7.3 m, bentonite holeplug from 7.3 m to 0.9 m, then cuttings to surface.
HMLK-2	9.2 / 283.8	Filter sand from 9.2 m to 7.2 m, bentonite holeplug from 7.2 m to 0.6 m, then cuttings to surface.
HMLK-3	9.1 / 289.4	Filter sand from 9.1 m to 6.4 m, bentonite holeplug to surface.
HMLK-4	9.6 / 283.1	Filter sand from 9.6 m to 7.3 m, bentonite holeplug to surface.
BH11-20	None Installed	Bentonite holeplug to 1.0 m, concrete to 0.1 m, then asphalt to surface.

The drilling investigation was supervised on a full-time basis by a member of Thurber's technical staff who located the boreholes in the field, cleared borehole locations of underground utilities, directed the drilling, sampling and in-situ testing operations, and logged the boreholes. The soil samples were identified in the field, placed in appropriately labeled containers and transported back to Thurber's laboratory for further examination and testing.

3.2 Laboratory Testing

Geotechnical laboratory testing consisted of natural moisture content determination and visual identification of all soil samples in accordance with the current MTO standards. Grain size distribution analysis and Atterberg Limits tests were conducted on selected samples. Laboratory test results are summarized on the Record of Borehole sheets included in Appendix A and are presented on the figures in Appendix B.

4.0 SUBSURFACE STRATIGRAPHY

4.1 General

This section presents a generalized summary of the subsurface conditions encountered in Boreholes HML11-01 to HML11-09, HMLK-1 to HMLK-4, and BH11-20. The detailed subsurface soil and groundwater conditions encountered in these boreholes are presented in the Records of Borehole sheets included in Appendix A. Selected boreholes from Reference 1 are included in Appendix C. The actual borehole data closest to any one HML pole location governs

any interpretation of the site conditions at that specific pole location. It should be recognized that the subsurface conditions may vary between and beyond the borehole locations.

In general, the subsurface conditions encountered in the boreholes located on the highway consist of pavement structure overlying either embankment fill or native clayey silt to silty clay till. Deposits of sandy silt were encountered within the clayey silt to silty clay till in some boreholes. In the boreholes drilled off of the highway, a thin layer of topsoil or sand fill was encountered at surface overlying clayey silt fill, which was underlain by clayey silt to silty clay till in most boreholes. A sand deposit was encountered in two of the four boreholes located at the Highway 400-King Road Interchange and sandy silt till was also encountered in the other 2 boreholes at this location.

4.2 Topsoil

Topsoil was encountered surficially in Boreholes HMLK-3 and HMLK-4 which were advanced at the Highway 400-King Road Interchange. The topsoil was 100 mm thick in both boreholes.

4.3 Sand Fill

A thin layer of sand fill was encountered surficially at the location of Borehole HMLK-1. The sand fill is brown and contains some gravel. The thickness of the sand fill at this location is 200 mm.

4.4 Pavement Structure

Pavement structure consisting of asphalt overlying granular fill was encountered in all of the boreholes located along the centre median of Highway 400 (Boreholes HML11-01 to HML11-09, and BH11-20). The thickness of the asphalt ranges between 150 mm and 300 mm. The granular fill typically consists of brown sand containing trace to some gravel and trace silt and clay. The thickness of the granular fill ranges from 0.6 m to 1.8 m. The base of the granular fill varies from Elevation 259.0 m to 308.6 m.

SPT N-values recorded in the granular fill ranged from 9 blows to 59 blows for 0.3 m penetration, indicating a loose to very dense condition. Typically SPT N-values ranged from 10 to 27 blows for 0.3 m penetration, indicating a compact condition.

The measured moisture contents of samples of the granular fill ranged from 4% to 18%.

Selected samples of the granular fill underwent grain size analysis testing, the results of which are summarized below. These results are also presented on the Record of Borehole sheets included in Appendix A. Figure B1, Appendix B illustrates the grain size distribution curves of these selected samples of the sand fill.

Soil Particles	Percentage (%)
Gravel	1 to 18
Sand	67 to 96
Silt and Clay	3 to 26

4.5 Embankment Fill

Below the pavement structure, embankment fill was encountered in Boreholes HML11-01, 02, 04, 05, 07, 09 and Borehole 11-20. The embankment fill is typically brown and consists of clayey silt with sand and trace gravel. The thickness of the embankment fill ranged from 0.3 m to 3.0 m. The base of the embankment fill varies from Elevation 257.9 m to 307.2 m.

SPT N-values recorded in the clayey silt embankment fill typically ranged from 10 blows to 17 blows for 0.3 m penetration, indicating a stiff to very stiff consistency. A higher SPT N-value of 42 blows was recorded in Borehole HML11-01 and a lower SPT N-value of 6 blows was recorded in HML11-09.

The measured moisture contents of samples of the clayey silt embankment fill generally ranged from 10% to 25%.

Selected samples of the clayey silt embankment fill underwent grain size analysis and Atterberg Limits testing, where appropriate. The results of these tests are presented on the Record of Borehole sheets included in Appendix A and are summarized below. Figure B2 of Appendix B shows the grain size distribution curves for these samples of the clayey silt fill. Figure B10 illustrates the results of the Atterberg Limits tests for these samples.

Soil Particles	Percentage %
Gravel	0 to 1
Sand	24 to 29
Silt	47 to 51
Clay	20 to 25

Index Property	Percentage %
Liquid Limit	25 to 32
Plastic Limit	13 to 15
Plasticity Index	12 to 17

The results of the Atterberg Limits tests indicate that they clayey silt embankment fill is of low plasticity with a group symbol of CL.

4.6 Clayey Silt Fill

At the King Road Interchange, clayey silt fill was encountered below the sand fill in Borehole HMLK-1, at surface in Borehole HMLK-2, and below the topsoil in Boreholes HMLK-3 and 4. The clayey silt fill at these locations is similar to the embankment fill material and is also brown and contains sand and trace to some gravel. The thickness of the clayey silt fill at these locations ranged from 1.5 m to 2.1 m. The base of the clayey silt fill at the King Road Interchange varies from Elevation 285.8 m to 296.7 m.

SPT N-values recorded in the clayey silt fill typically ranged from 10 blows to 29 blows for 0.3 m penetration, indicating a stiff to very stiff consistency. Higher SPT N-values of 52 blows and 67 blows for 0.3 m penetration were also recorded in this fill, indicating a very hard consistency at some locations and depths.

The measured moisture contents of samples of the clayey silt fill at the King Road Interchange generally ranged from 12% to 22%.

Selected samples of the clayey silt fill underwent grain size analysis and Atterberg Limits testing, where appropriate. The results of these tests are presented on the Record of Borehole sheets included in Appendix A and are summarized below. Figure B2 of Appendix B shows the grain size distribution curves for these samples of the clayey silt fill. Figure B10 illustrates the results of the Atterberg Limits tests for these samples.

Soil Particles	Percentage (%)
Gravel	2 to 10
Sand	24
Silt	49 to 56
Clay	17 to 19

Index Property	Percentage %
Liquid Limit	28
Plastic Limit	15
Plasticity Index	13

The results of the Atterberg Limits tests indicate that they clayey silt fill is of low plasticity with a group symbol of CL.

4.7 Clayey Silt to Silty Clay Till

A deposit of native clayey silt to silty clay till was encountered either directly below the pavement structure or below the pavement structure and embankment fill in Boreholes HML11-01 to HML11-09 and BH11-20. In Boreholes HMLK-2 to HMLK-4 the clayey silt to silty clay till was encountered below the clayey silt fill and in Borehole HMLK-1 the clayey silt to silty clay was encountered below a sand deposit.

The clayey silt to silty clay till contains some sand to sandy and trace gravel and is typically brown changing to grey with increased depth. In all boreholes, except Borehole HMLK-2, this deposit was not fully penetrated. In some boreholes (HML11-08, HML11-09, BH11-20, HMLK-3, and HMLK-4) a non-cohesive sandy silt interbed was encountered within this cohesive deposit. The thickness and the elevation of the bottom of the clayey silt to silty clay deposit for each borehole is summarized in Table 4.1.

Table 4.1 – Clayey Silt to Silty Clay Till Thickness and Base Elevations

Borehole	Thickness (m)	Base Elevation (m)	Interbed Encountered
HML11-01	at least 7.3	250.6	-
HML11-02	at least 6.6	254.9	-
HML11-03	at least 8.6	263.7	-
HML11-04	at least 8.3	272.4	-
HML11-05	at least 5.7	257.0	-
HML11-06	at least 7.8	266.2	-
HML11-07	at least 8.3	275.8	-
HML11-08	at least 8.8	294.0	3.1 m Sandy SILT
HML11-09	at least 7.5	296.7	1.6 m Sandy SILT
HMLK-1	at least 0.2	278.0	-
HMLK-2	7.3	283.5	-
HMLK-3	at least 7.9	288.8	4.9 m Sandy SILT TILL
HMLK-4	at least 7.4	283.1	3.5 m Sandy SILT TILL
BH11-20	at least 7.6	299.6	1.5 m Sandy SILT

SPT N-values recorded in the clayey silt to silty clay till ranged from 8 blows for 0.3 m penetration to 100 blows for less than 0.3 m penetration, indicating a stiff to very hard consistency. Typically, SPT N-values were greater than 25 blows for 0.3 m penetration.

Measured moisture contents of the clayey silt to silty clay till samples generally ranged between 10% and 28%. Moisture content values less than 10% were measured in 3 samples of the clayey silt to silty clay till.

Some of the clayey silt to silty clay till samples were selected for laboratory grain size analysis and Atterberg Limits testing, the results of which are summarized below. These results are also presented on the Record of Borehole sheets included in Appendix A. Figures B3 to B6 of Appendix B illustrate the grain size distribution curves for these samples and Figures B11 to B13 illustrate the results of the Atterberg Limits tests.

Soil Particles	Percentage (%)
Gravel	0 to 1
Sand	2 to 30
Silt	46 to 73
Clay	13 to 38

Index Property	Percentage %
Liquid Limit	21 to 40
Plastic Limit	12 to 26
Plasticity Index	8 to 21

The above results show that the clayey silt to silty clay till ranges from low to medium plasticity with a group symbol of CL to CI.

4.5 Sandy Silt Till

A layer of sandy silt till was encountered within the clayey silt to silty clay till deposit in Boreholes HMLK-3 and HMLK-4. The sandy silt till is brown to grey in colour and contains trace to some clay and trace gravel. The thickness of the sandy silt till ranges from 3.5 m to 4.9 m. The base of the sandy silt till layer was found to vary between Elevation 283.9 m and 289.0 m.

SPT N-values recorded in the sandy silt till layer ranged from 18 blows to 38 blows for 0.3 m penetration, indicating a compact to dense condition.

The measured moisture contents of samples of the sandy silt till generally ranged from 14% to 18%.

Selected samples of the sandy silt till underwent laboratory grain size analysis testing, the results of which are summarized below. These results are also presented on the Record of Borehole sheets included in Appendix A. Figure B8 of Appendix B presents the grain size distribution curves for these samples.

Soil Particles	Percentage (%)
Gravel	0 to 1
Sand	16 to 30
Silt	66 to 72
Clay	3 to 11

4.6 Sandy Silt

A layer of sandy silt was encountered within the clayey silt to silty clay till deposit in Boreholes HML11-08, HML11-09, and BH11-20. The sandy silt is brown to grey in colour and contains trace clay. The thickness of the sandy silt ranges from 1.5 m to 3.1 m. The base of the sandy silt layer was found to vary between Elevation 297.5 m and 300.8 m.

SPT N-values recorded in the sandy silt layer ranged from 18 blows to 37 blows for 0.3 m penetration, indicating a compact to dense condition.

The measured moisture contents of samples of the sandy silt till generally ranged from 14% to 18%.

Some samples of the sandy silt were selected for laboratory grain size analysis testing, the results of which are summarized below. These results are also presented on the Record of Borehole

sheets included in Appendix A. Figure B7 of Appendix B presents the grain size distribution curves for these samples.

Soil Particles	Percentage (%)
Gravel	0
Sand	21 to 28
Silt	66 to 76
Clay	3 to 9

4.7 Sand

Sand was encountered below the clayey silt fill in Borehole HMLK-1 and below the silty clay till encountered in Borehole HMLK-2. In Borehole HMLK-1 the sand was 7.5 m thick and was underlain by clayey silt till. In Borehole HMLK-2 the sand was encountered near the base of the borehole and therefore the borehole penetrated only 0.2 m of this deposit. The sand is brown and fine grained and contains trace gravel and trace silt and clay. The base of the sand layer was found to vary between Elevation 278.2 m and 283.4 m.

SPT N-values recorded in the sand ranged from 28 blows to 69 blows for 0.3 m penetration, indicating a compact to very dense condition. In general, the SPT N-value in the sand increases with depth.

The measured moisture contents of samples of the sand generally ranged from 2% to 5%.

Selected samples of the sand underwent laboratory grain size analysis testing, the results of which are summarized below. These results are also presented on the Record of Borehole sheets included in Appendix A. Figure B9 of Appendix B presents the grain size distribution curves for these samples.

Soil Particles	Percentage (%)
Gravel	0 to 1
Sand	90 to 92
Silt and Clay	7 to 10

4.7 Groundwater Conditions

Groundwater conditions were observed during and upon completion of drilling. Some boreholes were dry upon completion. Standpipe piezometers were installed in the boreholes located off of the highway at the King Road Interchange. The water levels measured in the open boreholes upon completion of drilling and in the piezometers are presented in Table 4.2.

Table 4.2 Water Level Measurements

Borehole	Date	Depth (m)	Elevation (m)	Comments
HML11-01	April 20, 2011	8.5	251.7	Open Borehole
HML11-02	April 21, 2011	1.8	262.8	Open Borehole
HML11-03	April 21, 2011	Dry		Open Borehole
HML11-04	April 29, 2011	Dry		Open Borehole
HML11-05	April 29, 2011	Dry		Open Borehole
HML11-09	April 29, 2011	1.4	305.0	Open Borehole
HMLK-1	April 19, 2011	Dry		Open Borehole
	June 27, 2011	9.1	278.4	Piezometer
HMLK-2	April 19, 2011	5.0	288.0	Open Borehole
	June 27, 2011	6.5	286.5	Piezometer
HMLK-3	June 27, 2011	2.7	295.8	Piezometer
HMLK-4	April 18, 2011	1.4	291.3	Open Borehole
	June 27, 2011	0.6	292.1	Piezometer

Previous borehole results and observations as discussed above indicate that the groundwater level varies from 2 m to 9 m depth at the borehole locations. It should be noted that these are very short term observations and groundwater levels are subject to seasonal fluctuations and severe climatic events.

5.0 MISCELLANEOUS

Thurber staked and/or marked the borehole locations in the field and obtained utility clearances prior to drilling. The as-drilled borehole locations (northing, easting, elevation) were surveyed by Thurber using a Trimble Pathfinder ProXRT differential GPS.

DBW Drilling Ltd. of Ajax, Ontario supplied the drill rig and conducted the drilling, sampling and in-situ testing operations. Kodiak Drilling of Oakville, Ontario supplied a limited-access rig for drilling, sampling, and in-situ testing of Borehole HMLK-3. Traffic control during the field work was provided by Barricade Traffic Services Inc. where required.

The drilling and sampling operations in the field were supervised on a full time basis by a member of Thurber's technical field staff. Laboratory testing was carried out by Thurber in its MTO-approved Oakville laboratory.

Mr. Mark Farrant, P.Eng provided overall direction of the field operations and Ms. Lindsey Blaine, E.I.T prepared this report. Dr. P.K. Chatterji, P.Eng., a Designated Principal Contact for MTO Foundations projects, reviewed the report.

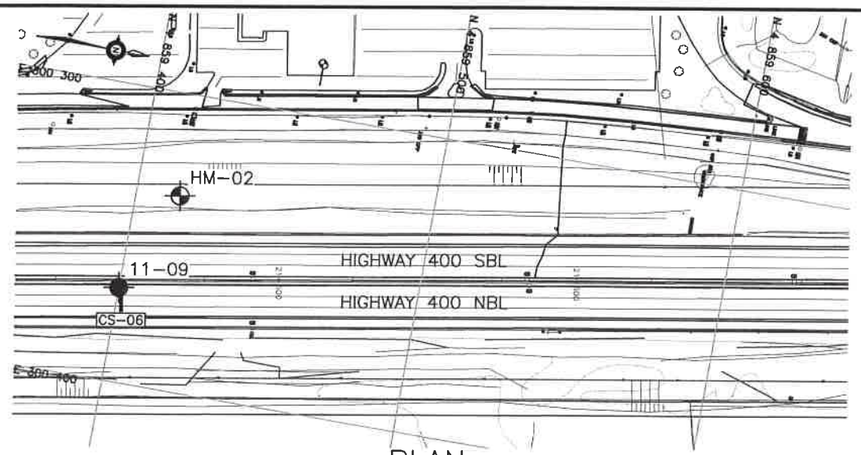
L. Blaine
Dec. 17/11

Lindsey Blaine, E.I.T.
Project Manager

Sydney Pang, P.Eng.
Associate, Senior Project Engineer

P.K. Chatterji, P.Eng.
Review Principal, Designated MTO Contact

MINISTRY OF TRANSPORTATION, ONTARIO



PLAN

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METRIC

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LICENSED PROFESSIONAL ENGINEER — S. DOBS — Dec 17/11 — PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER — P. K. CHATTERJI — Dec 17/11 — PROVINCE OF ONTARIO

HIGHWAY 400
CONT No
GWP No 2539-04-00

HWY 400 WIDENING
HIGH MAST LIGHTING POLES
TESTON RD TO NORTH OF KING RD
BOREHOLE LOCATIONS PLAN

SHEET

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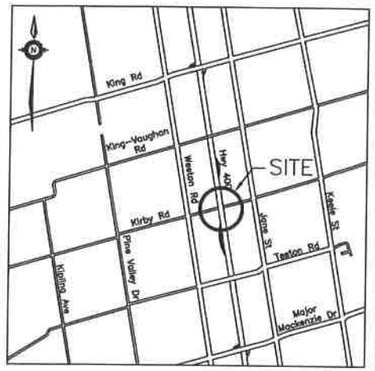

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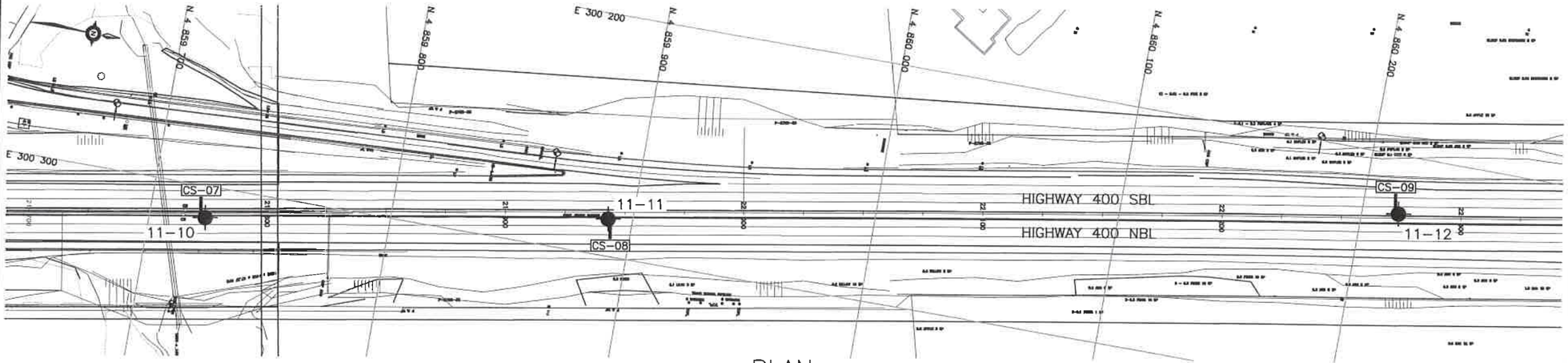

PLAN

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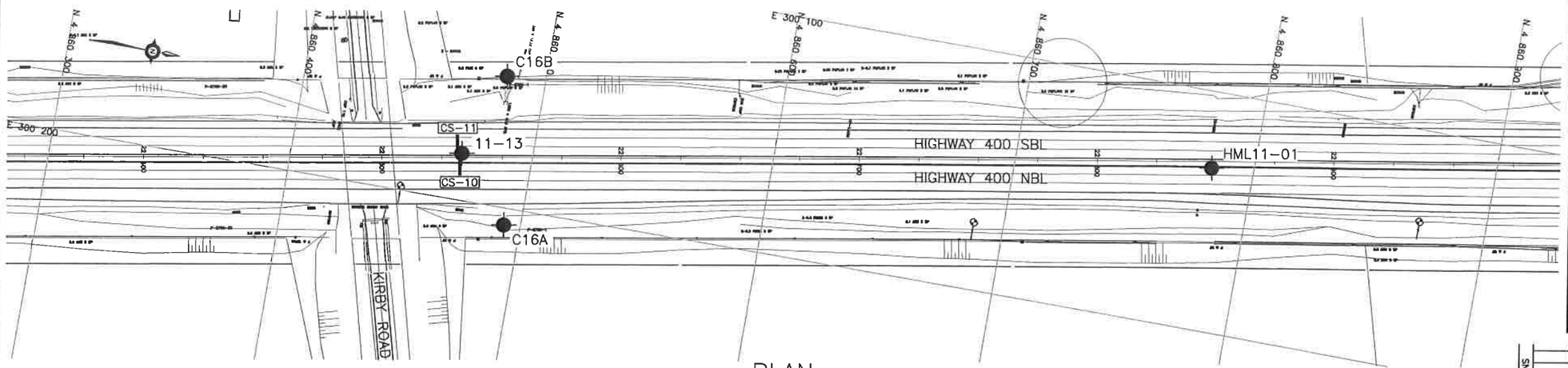

PLAN

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SCALE 1:2000

LEGEND

●	Borehole
⊕	Borehole and Cone
N	Blows /0.3m (Std Pen Test, 475J/blow)
CONE	Blows /0.3m (60° Cone, 475J/blow)
PH	Pressure, Hydraulic
▽	Water Level
▽	Head Artesian Water
	Piezometer
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal

NO	ELEVATION	NORTHING	EASTING
11-09	249.4	4 859 400.1	300 368.3
11-10	251.0	4 859 723.2	300 313.0
11-11	252.0	4 859 889.9	300 284.5
11-12	255.2	4 860 215.2	300 224.2
11-13	257.6	4 860 470.9	300 180.5
C16A	–	4 860 493.2	300 207.0
C16B	–	4 860 483.9	300 145.6
HM-02	250.0	4 859 414.8	300 334.5
HML11-01	260.2	4 860 782.2	300 131.8

-NOTES-

1) The boundaries between soil strata have been established only at Borehole locations. Between Boreholes the boundaries are assumed from geological evidence.
2) This drawing is for subsurface information only. Surface details and features are for conceptual illustration.

GEOCRES NO. 30M13-193

REVISIONS			
DATE	BY	DESCRIPTION	
DESIGN SKP	CHK PKC	CODE	LOAD
DRAWN MFA	CHK PKC	SITE	STRUCT
			DATE DEC. 2011
			DWG 1

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MINISTRY OF TRANSPORTATION, ONTARIO

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C17B | C18B | HML11-02 | HIGHWAY 400 SBL | HIGHWAY 400 NBL | 11-14 | CS-13 | CS-12

E 300 100 | E 300 200

C17A | C18A

CONCESSION 5

LOT 32

CONCESSION 5

LOT 33

PLAN

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SCALE 1:2000

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HML11-03 | HIGHWAY 400 SBL | HIGHWAY 400 NBL | 11-15 | CS-14 | CS-15 | 11-16

E 300 000 | E 300 100 | E 300 200

CONCESSION 5

CONCE

PLAN

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METRIC

DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN

HIGHWAY 400
CONT No
GWP No 2539-04-00

SHEET

HWY 400 WIDENING
HIGH MAST LIGHTING POLES
TESTON RD TO NORTH OF KING RD
BOREHOLE LOCATIONS PLAN

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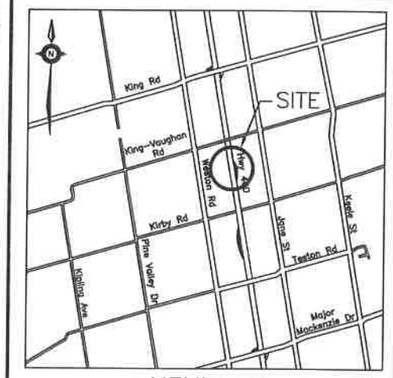

KEYPLAN

LEGEND

⊕	Borehole
⊕	Borehole and Cone
N	Blows /0.3m (Std Pen Test, 475J/blow)
CONE	Blows /0.3m (60° Cone, 475J/blow)
PH	Pressure, Hydraulic
▽	Water Level
▼	Head Artesian Water
	Piezometer
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal

NO	ELEVATION	NORTHING	EASTING
11-14	271.6	4 861 542.3	299 997.5
11-15	274.2	4 862 050.9	299 915.2
11-16	274.5	4 862 124.3	299 902.5
C17A	–	4 860 945.9	300 146.3
C17B	–	4 860 931.1	300 065.6
C18A	–	4 861 182.3	300 104.4
C18B	–	4 861 122.0	300 032.7
HML11-02	264.6	4 861 202.3	300 060.0
HML11-03	273.5	4 861 817.2	299 952.6

-NOTES-

1) The boundaries between soil strata have been established only at Borehole locations. Between Boreholes the boundaries are assumed from geological evidence.
2) This drawing is for subsurface information only. Surface details and features are for conceptual illustration.

GEOCRES NO. 30M13-193

LICENSED PROFESSIONAL ENGINEER
S. PAINE
Dec 17/11
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
P. K. CHATTERJI
Dec 17/11
PROVINCE OF ONTARIO

REVISIONS		
DATE	BY	DESCRIPTION

DESIGN	SKP	CHK	PKC	CODE		LOAD	DATE DEC. 2011
DRAWN	MFA	CHK	PKC	SITE		STRUCT	DWG 2

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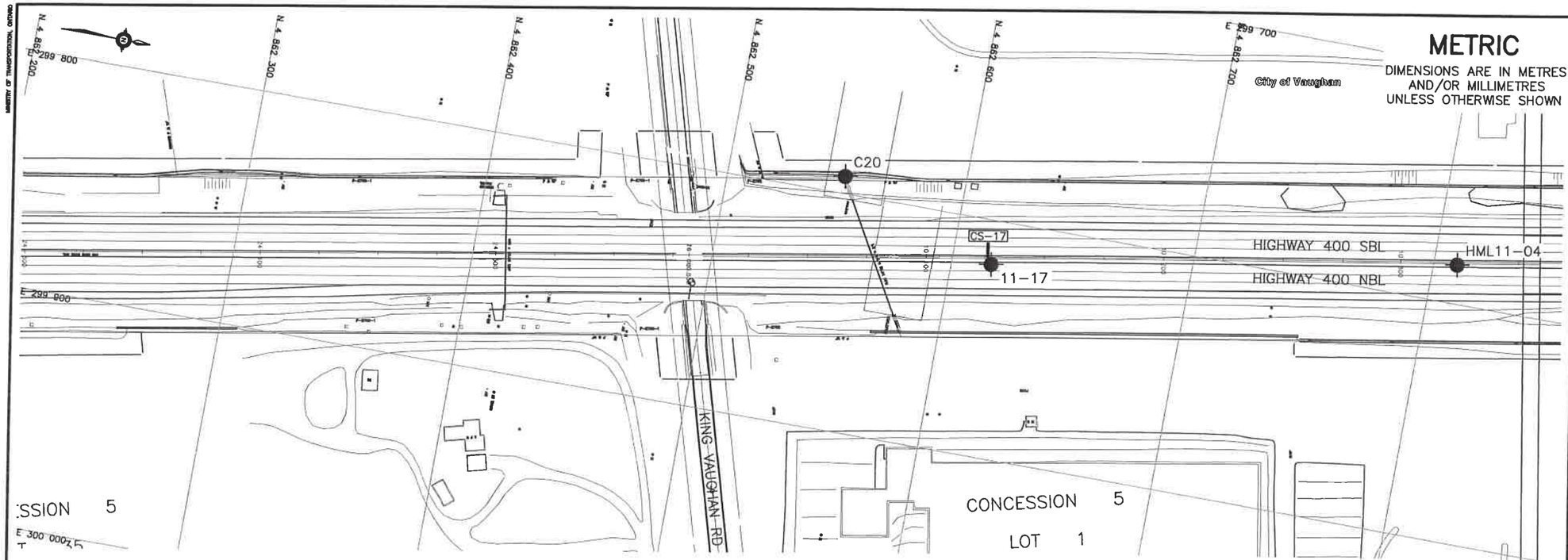
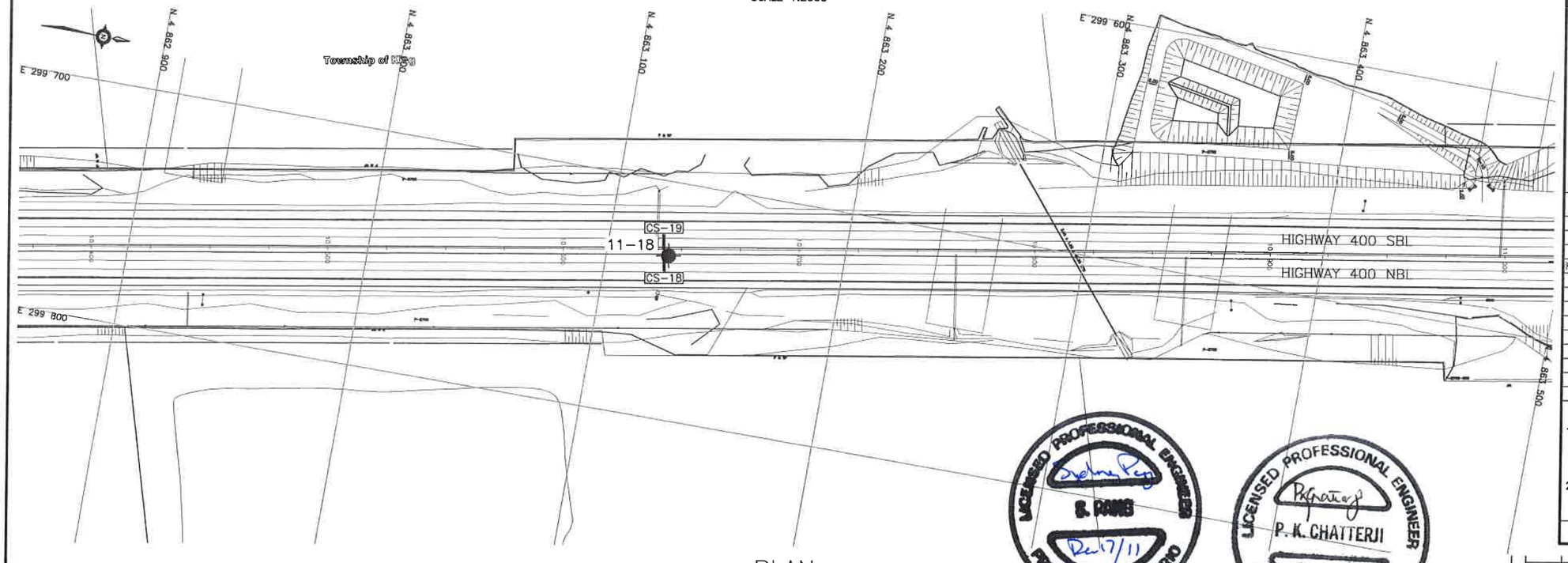


PLAN

40 0 40 80m

SCALE 1:2000



PLAN

40 0 40 80m

SCALE 1:2000

HIGHWAY 400
CONT No
GWP No 2539-04-00

HWY 400 WIDENING
HIGH MAST LIGHTING POLES
TESTON RD TO NORTH OF KING RD
BOREHOLE LOCATIONS PLAN

SHEET

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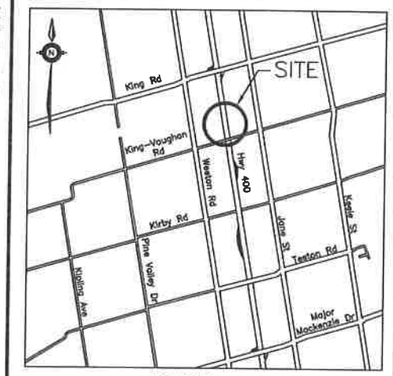

KEYPLAN

LEGEND

⊕	Borehole
⊕	Borehole and Cone
N	Blows /0.3m (Std Pen Test, 475J/blow)
CONE	Blows /0.3m (60° Cone, 475J/blow)
PH	Pressure, Hydraulic
▽	Water Level
▽	Head Artesian Water
	Piezometer
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal

NO	ELEVATION	NORTHING	EASTING
11-17	280.4	4 862 616.7	299 818.6
11-18	277.1	4 863 126.1	299 731.1
C20	–	4 862 549.3	299 792.8
HML11-04	282.1	4 862 810.0	299 783.6

-NOTES-

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GEOCRES NO. 30M13-193

LICENSED PROFESSIONAL ENGINEER
S. DANG
Dec 17/11
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LICENSED PROFESSIONAL ENGINEER
P.K. CHATTERJI
Dec 17/11
PROVINCE OF ONTARIO

REVISIONS		
DATE	BY	DESCRIPTION

DESIGN	SKP	CHK	PKC	CODE	LOAD
DRAWN	MFA	CHK	PKC	SITE	STRUCT

DATE DEC. 2011
DWG 3

PLOTDATE: 12/19/2011 2:20 PM
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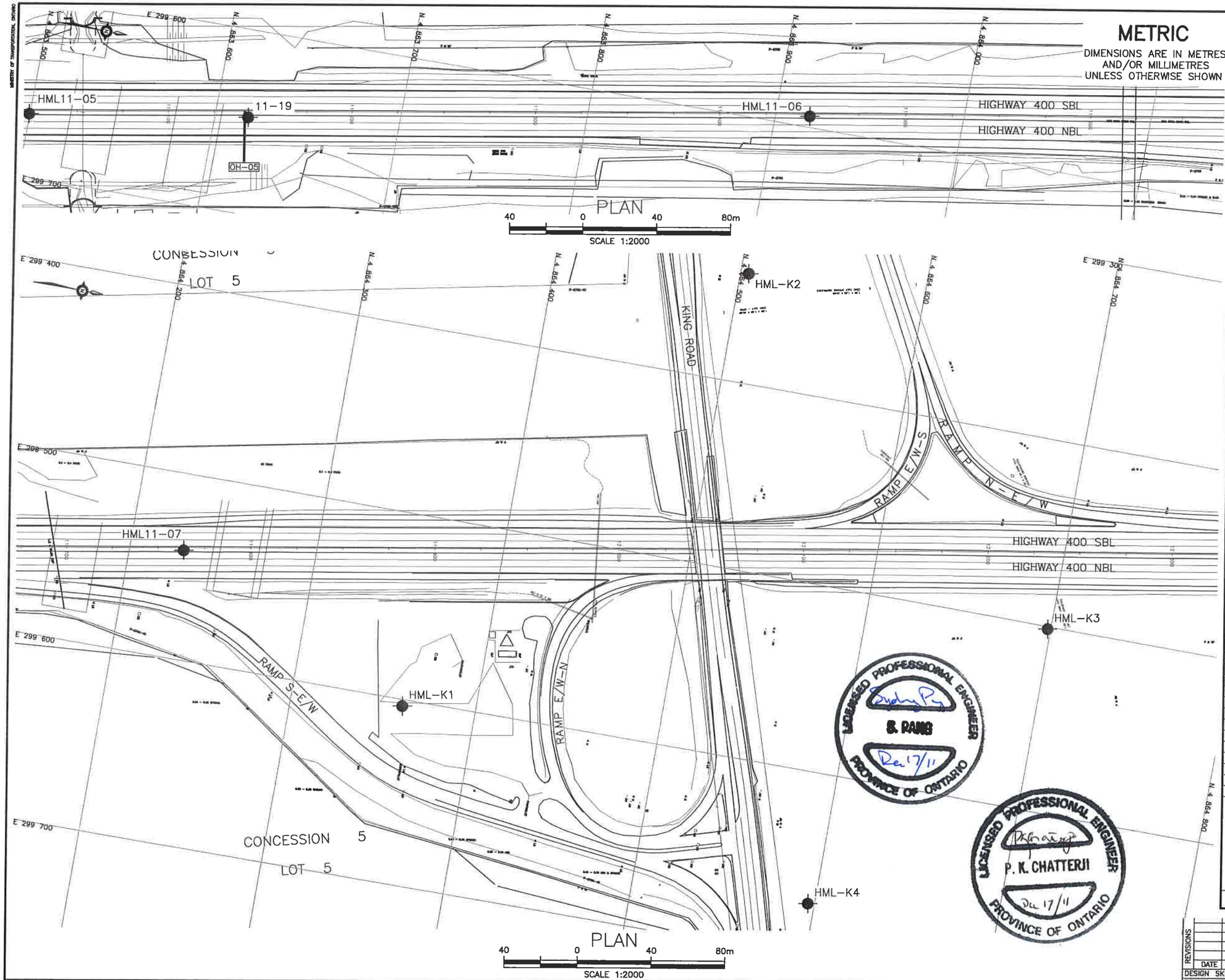
MINISTRY OF TRANSPORTATION, ONTARIO

METRIC

DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN



HIGHWAY 400
CONT No
GWP No 2539-04-00

HWY 400 WIDENING
HIGH MAST LIGHTING POLES
TESTON RD TO NORTH OF KING RD
BOREHOLE LOCATIONS PLAN

SHEET

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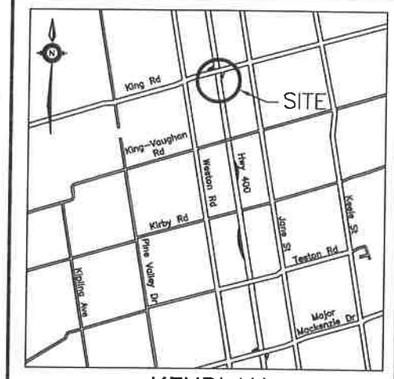

KEYPLAN

LEGEND

●	Borehole
⊕	Borehole and Cone
N	Blows /0.3m (Std Pen Test, 475J/blow)
CONE	Blows /0.3m (60° Cone, 475J/blow)
PH	Pressure, Hydraulic
▽	Water Level
▽	Head Artesian Water
	Piezometer
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal

NO	ELEVATION	NORTHING	EASTING
11-19	267.6	4 863 618.0	299 647.5
HML11-05	266.8	4 863 499.7	299 666.0
HML11-06	276.0	4 863 918.5	299 593.9
HML11-07	285.6	4 864 229.1	299 541.1
HML-K1	287.5	4 864 360.6	299 603.5
HML-K2	293.0	4 864 504.4	299 341.2
HML-K3	298.5	4 864 698.4	299 501.2
HML-K4	292.7	4 864 596.4	299 670.7

-NOTES-

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GEOCRES NO. 30M13-193

LICENSED PROFESSIONAL ENGINEER
S. PAINE
Dec 17/11
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
P. K. CHATTERJI
Dec 17/11
PROVINCE OF ONTARIO

REVISIONS			
DATE	BY	DESCRIPTION	
DESIGN SKP	CHK PKC	CODE	LOAD
DRAWN MFA	CHK PKC	SITE	STRUCT
			DATE DEC. 2011
			DWG 4

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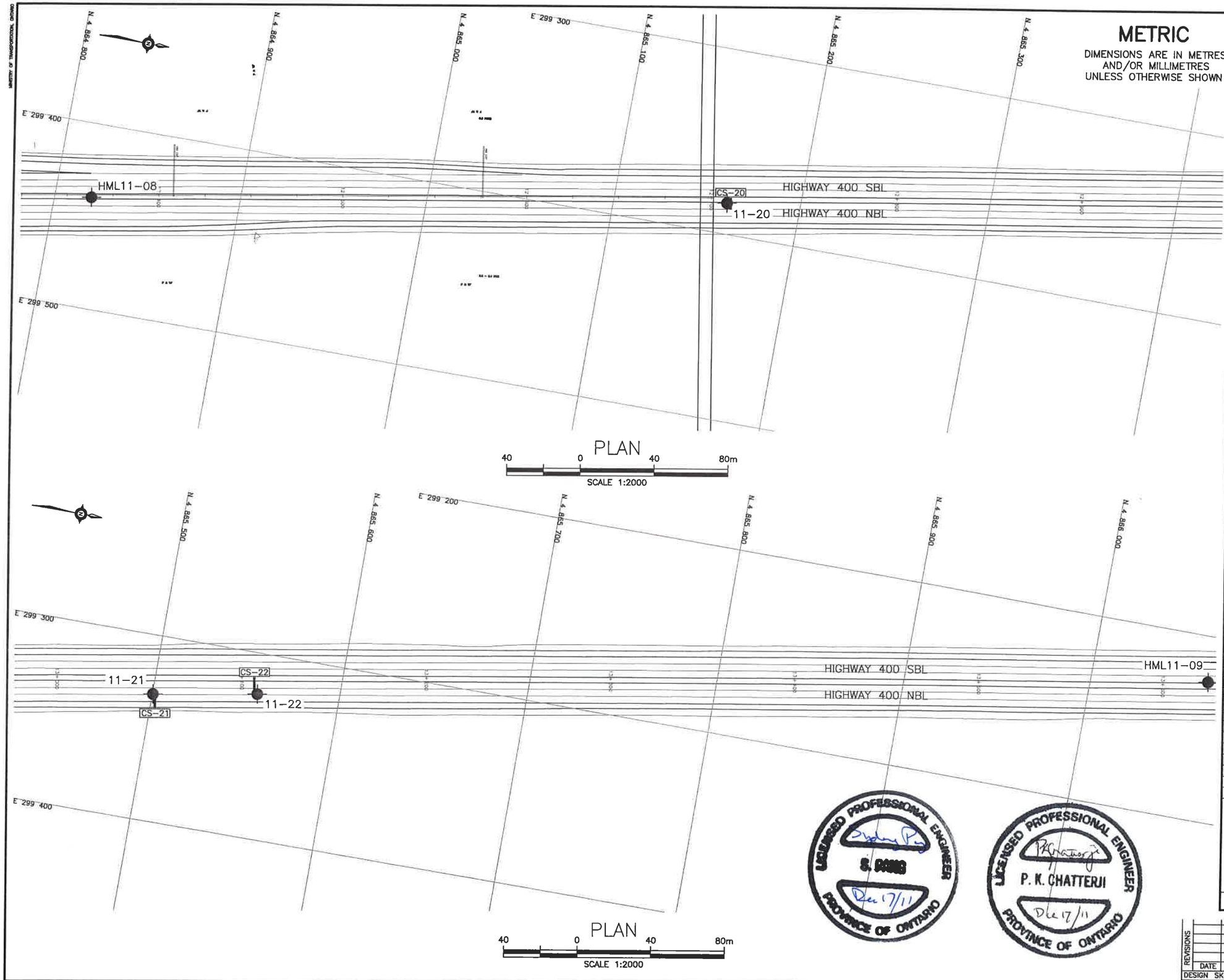

METRIC

DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN

HIGHWAY 400
CONT No
GWP No 2539-04-00

SHEET

HWY 400 WIDENING
HIGH MAST LIGHTING POLES
TESTON RD TO NORTH OF KING RD
BOREHOLE LOCATIONS PLAN

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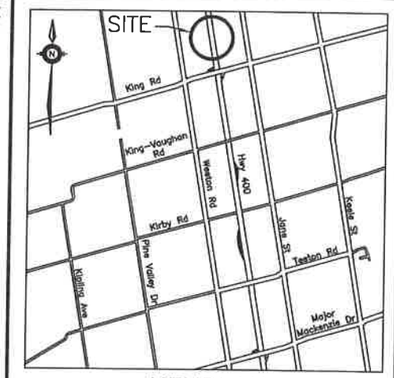

KEYPLAN

LEGEND

⊕	Borehole
⊕	Borehole and Cone
N	Blows /0.3m (Std Pen Test, 475J/blow)
CONE	Blows /0.3m (60° Cone, 475J/blow)
PH	Pressure, Hydraulic
⧖	Water Level
⧗	Head Artesian Water
	Piezometer
90%	Rock Quality Designation (RQD)
A/R	Auger Refusal

NO	ELEVATION	NORTHING	EASTING
11-20	309.4	4 865 160.6	299 383.2
11-21	306.1	4 865 500.3	299 331.6
11-22	305.6	4 865 555.8	299 322.0
HML11-08	303.6	4 864 820.0	299 439.9
HML11-09	306.4	4 866 062.9	299 224.6

-NOTES-

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GEOCRES NO. 30M13-193

LICENSED PROFESSIONAL ENGINEER — S. DOBS — Dec 17/11 — PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER — P. K. CHATTERJI — Dec 17/11 — PROVINCE OF ONTARIO

REVISIONS		
DATE	BY	DESCRIPTION

DESIGN	SKP	CHK	PKC	CODE		LOAD	DATE DEC. 2011
DRAWN	MFA	CHK	PKC	SITE		STRUCT	DWG 5

FILENAME: H:\Drafting\19\92\88 Hwy400\Ind9288-BoreholePlan(HML).dwg
PLOTDATE: 12/19/2011 2:23 PM

Appendix A

Record of Boreholes

(Present Investigation)

19-92-68

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No HML11-01 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 860 782.21 E 300 131.82 ORIGINATED BY ES
HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2011.04.20 - 2011.04.20 CHECKED BY MEF

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
260.2							
0.0	**ASPHALT:** (175mm)						
0.2	**SAND**, some gravel Compact Brown Moist (FILL)		1	GS			
259.0			1	SS	25		
1.2	Clayey **SILT**, with sand, trace gravel Very Stiff to Hard Brown (FILL)		2	SS	42		0 24 51 25
257.9							
2.3	Clayey **SILT**, with sand, trace gravel Hard Brown (TILL)		3	SS	57		
			4	SS	77		1 30 52 17
	Becomes grey						
			5	SS	57		
			6	SS	67		
			7	SS	71	▽	1 23 52 24
			8	SS	75		
250.6							
9.6	END OF BOREHOLE AT 9.6m. BOREHOLE OPEN AND WATER						

ELEVATION SCALE: 260, 259, 258, 257, 256, 255, 254, 253, 252, 251

DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100

SHEAR STRENGTH kPa
o UNCONFINED + FIELD VANE
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P NATURAL MOISTURE CONTENT w LIQUID LIMIT w_L
WATER CONTENT (%) 20 40 60

UNIT WEIGHT γ kN/m^3

Continued Next Page

+ ^{3}, × ^{3}: Numbers refer to Sensitivity

20 / 15 / 10 / 5 (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No HML11-01 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 860 782.21 E 300 131.82 ORIGINATED BY ES

HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN

DATUM Geodetic DATE 2011.04.20 - 2011.04.20 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa: O UNCONFINED + FIELD VANE; ● QUICK TRIAXIAL × LAB VANE; 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L; WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
	Continued From Previous Page										
	LEVEL AT 8.5m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 6.7m, CUTTINGS TO 0.20m, CONCRETE TO 0.10m THEN ASPHALT TO SURFACE.										

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

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No HML11-02 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 861 202.26 E 300 060.01 ORIGINATED BY ES
HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2011.04.21 - 2011.04.21 CHECKED BY MEF

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
264.6									
0.0	**ASPHALT:** (160mm)								
0.2	**SAND**, trace gravel, trace silt Dense Brown Damp (FILL)		1	GS					1 96 3 (SI+CL)
263.4			1	SS	39		264		
1.2	Clayey **SILT**, with sand, trace gravel Very Stiff to Stiff Grey (FILL)		2	SS	16	▽	263		0 29 46 24
261.4			3	SS	14		262		
3.2	Silty **CLAY**, trace sand, trace gravel Very Stiff Grey (TILL)		4	SS	26		261		
260.5									
4.1	Brown		5	SS	72		260		
259.1									
5.6			6	SS	51		259		0 2 60 38
							258		
			7	SS	30		257		
							256		
254.9			8	SS	25		255		
9.8	END OF BOREHOLE AT 9.8m.								

DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100
SHEAR STRENGTH kPa 20 40 60 80 100
○ UNCONFINED + FIELD VANE
● QUICK TRIAXIAL × LAB VANE
PLASTIC LIMIT w_P NATURAL MOISTURE CONTENT w LIQUID LIMIT w_L
WATER CONTENT (%) 20 40 60

Continued Next Page

+ ³, × ³: Numbers refer to Sensitivity

20 15 5 10 (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No HML11-02 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 861 202.26 E 300 060.01 ORIGINATED BY ES

HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN

DATUM Geodetic DATE 2011.04.21 - 2011.04.21 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa: O UNCONFINED, + FIELD VANE, ● QUICK TRIAXIAL, × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L / WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						
	Continued From Previous Page										
	BOREHOLE OPEN AND WATER LEVEL AT 1.8m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 7.3m, CUTTINGS TO 0.2m, CONCRETE TO 0.10m THEN ASPHALT TO SURFACE.										

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

$\oplus^{20}_{15\ 10\ 5}$ (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No HML11-03 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 861 817.24 E 299 952.62 ORIGINATED BY ES
HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2011.04.21 - 2011.04.21 CHECKED BY MEF

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa: ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
273.5											
0.0	**ASPHALT:** (200mm)										
0.2	**SAND**, fine grained, some silt, trace gravel Compact Brown Moist (FILL)		1	GS			273		○		
272.3			1	SS	22				○		6 82 12 (SI+CL)
1.2	Clayey **SILT**, some sand, trace gravel Hard Brown (TILL)		2	SS	42		272		○		
			3	SS	55		271		○		1 19 60 20
			4	SS	46		270		○		
	Becomes grey		5	SS	41		269		○		
268.0											
5.5	Silty **CLAY**, some sand Hard Grey (TILL)		6	SS	50		268		○⊢⊣		0 13 54 33
			7	SS	51		267		○		
			8	SS	38		266		○		
263.7							265				
9.8	END OF BOREHOEL AT 9.8m.						264				

Continued Next Page

+ ³, × ³: Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No HML11-03 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 861 817.24 E 299 952.62 ORIGINATED BY ES

HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN

DATUM Geodetic DATE 2011.04.21 - 2011.04.21 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
	Continued From Previous Page										
	BOREHOLE OPEN AND DRY UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 7.6m, CUTTINGS TO 0.3m, CONCRETE TO 0.1m, THEN ASPHALT TO SURFACE.										

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

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No HML11-04 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 862 809.96 E 299 783.58 ORIGINATED BY ES
HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2011.04.29 - 2011.04.29 CHECKED BY MEF

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa: o UNCONFINED, + FIELD VANE, ● QUICK TRIAXIAL, × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
282.1							282				
0.0 / 281.9	**ASPHALT:** (275mm)										
0.3	**SAND**, some silt, trace gravel Compact to Loose Brown Moist (FILL)		1	SS	27				o		
280.9			2	SS	9		281		o		8 81 11 (SI+CL)
1.2 / 280.7	Clayey **SILT**, trace gravel Stiff								o		
1.5	Brown Moist (FILL)		3	SS	14				o		
	Silty **CLAY**, with sand, trace gravel Stiff to Very Stiff Brown Moist (TILL)		4	SS	10		280		o		
			5	SS	11		279		o		
	Becomes grey										
			6	SS	11		278		⊢●⊣		1 26 50 24
							277				
			7	SS	21		276		o		
							275				
			8	SS	21				⊢o⊣		1 28 47 25
							274				
							273				
272.4			9	SS	24				o		
9.8	END OF BOREHOLE AT 9.8m.										

Continued Next Page

+ ^{3}, × ^{3}: Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No HML11-04 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 862 809.96 E 299 783.58 ORIGINATED BY ES

HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN

DATUM Geodetic DATE 2011.04.29 - 2011.04.29 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa: O UNCONFINED + FIELD VANE; ● QUICK TRIAXIAL × LAB VANE; 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L; WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
	Continued From Previous Page										
	BOREHOLE OPEN AND DRY UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 0.4m, CONCRETE TO 0.2m THEN ASPHALT TO SURFACE.										

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

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No HML11-05 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 863 499.72 E 299 666.03 ORIGINATED BY SLL
HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2011.04.29 - 2011.04.29 CHECKED BY MEF

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
266.8											
0.0 / 266.5	**ASPHALT:** (260mm)										
0.3 / 265.7	Silty **SAND**, some gravel Dense Brown Moist (FILL)		1	SS	34		266		○		
			2	SS	14				○ ○		7 67 26 (SI+CL)
1.1 / 262.7	Clayey **SILT**, with sand, trace gravel Stiff to Very Stiff Brown Moist (FILL)		3	SS	14		265		○		
			4	SS	17		264		○		
			5	SS	10				⊢		1 28 52 20
4.1 / 257.0	Clayey **SILT**, some sand, trace gravel Very Stiff to Stiff Brown Moist (TILL)		6	SS	16		263 262		○		
			7	SS	15		261		○		
			8	SS	22		260 259		○		
			9	SS	55		258		○		0 19 68 13
9.8	END OF BOREHOLE AT 9.8m.										

Continued Next Page

+³, ×³: Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No HML11-05 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 863 499.72 E 299 666.03 ORIGINATED BY SLL

HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN

DATUM Geodetic DATE 2011.04.29 - 2011.04.29 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa	PLASTIC LIMIT / NATURAL MOISTURE CONTENT / LIQUID LIMIT / WATER CONTENT (%)	UNIT WEIGHT	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100; ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE; 20 40 60 80 100	w_P w w_L; 20 40 60	γ kN/m³	GR SA SI CL
	Continued From Previous Page										
	BOREHOLE OPEN AND DRY UPON COMPLETION OF DRILLING. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 0.5m, CONCRETE TO 0.1m THEN ASPHALT TO SURFACE.										

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

20 / 15 5 / 10 (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No HML11-06 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 863 918.52 E 299 593.91 ORIGINATED BY MAT
HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2011.05.04 - 2011.05.04 CHECKED BY MEF

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa: o UNCONFINED, + FIELD VANE, ● QUICK TRIAXIAL, × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
276.0											
0.0	**ASPHALT:** (150mm)						276				
0.2	**SAND**, some gravel, trace silt and clay Very Dense to Compact Brown Damp to Moist (FILL)		1	SS	59				o		
			2	SS	19		275		o		18 72 10 (SI+CL)
274.0			3	SS	10				o		
2.0	Clayey **SILT**, with sand, trace gravel Very Stiff to Hard Brown Moist (TILL)						274				
			4	SS	41				o		
			5	SS	28		273		o		
							272				
	Becomes grey		6	SS	42				o⊢		1 22 60 17
							271				
			7	SS	32		270		o		
							269				
			8	SS	32		268		o		
							267				
			9	SS	26				o		
266.2											
9.8	END OF BOREHOLE AT 9.8m.										

Continued Next Page

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

20 / 15 5 / 10 (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No HML11-06 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 863 918.52 E 299 593.91 ORIGINATED BY MAT
HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2011.05.04 - 2011.05.04 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa: O UNCONFINED, + FIELD VANE, ● QUICK TRIAXIAL, × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L / WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
	Continued From Previous Page										
	BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 1.2m, CONCRETE MIX TO 0.1m, THEN ASPHALT TO SURFACE.										

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

20
15 ⊕ 5
10
(%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No HML11-07 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 864 229.12 E 299 541.14 ORIGINATED BY MAT
HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2011.05.04 - 2011.05.04 CHECKED BY MEF

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa: ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
285.6											
0.0	**ASPHALT:** (150mm)										
0.2	**SAND**, some gravel Compact Brown Damp		1	SS	25		285	○	○		
284.8	(FILL)										
0.8	Clayey **SILT**, some sand, trace gravel Stiff Brown Damp		2	SS	15			○	○		
284.1	(FILL)						284				
1.5	Silty **CLAY**, some sand Firm to Stiff Brown Moist (TILL)		3	SS	8			⊖	○		0 16 52 33
			4	SS	9		283		○		
			5	SS	9				○		
281.5							282				
4.1	Becomes Very Stiff to Hard		6	SS	34				○		
							281				
	Becomes grey		7	SS	23				○		
							280				
			8	SS	27				⊖		0 20 58 22
							279				
			9	SS	22				○		
275.8							278				
9.8	END OF BOREHOLE AT 9.8m.						277				
							276				

Continued Next Page

+³, ×³: Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No HML11-07 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 864 229.12 E 299 541.14 ORIGINATED BY MAT

HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN

DATUM Geodetic DATE 2011.05.04 - 2011.05.04 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa: O UNCONFINED + FIELD VANE; ● QUICK TRIAXIAL × LAB VANE; 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L; WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
	Continued From Previous Page										
	BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 1.3m, CONCRETE MIX TO 0.1m, THEN ASPHALT TO SURFACE.										

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

$\frac{20}{15 \oplus 5}$ (%) STRAIN AT FAILURE
10

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No HML11-08 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 864 820.03 E 299 439.93 ORIGINATED BY MAT
HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2011.05.03 - 2011.05.03 CHECKED BY MEF

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa (○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
303.6								20 40 60 80 100	20 40 60		
0.0	**ASPHALT:** (150mm)										
0.2	**SAND**, some gravel Compact Brown Damp		1	SS	27		303		○		
302.8	(FILL)										
0.8	Silty **CLAY**, some sand, trace gravel Stiff to Very Stiff Grey Moist (TILL)		2	SS	19				○		
			3	SS	12		302		⊢○⊣		1 12 51 36
			4	SS	25		301		○		
300.5											
3.0	Sandy **SILT**, trace clay Compact to Dense Brown Moist to Wet		5	SS	18		300		○		
			6	SS	32		299		○		0 21 76 3
297.5							298				
6.1	Silty **CLAY**, trace sand, trace gravel Hard Grey Moist (TILL)		7	SS	41		297		○		
			8	SS	32		296		○		
			9	SS	100/0.275		295		○		
294.0											
9.6	END OF BOREHOLE AT 9.6m. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 1.2m.										

Continued Next Page

+ ³, × ³: Numbers refer to Sensitivity

20 / 15 5 / 10 (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No HML11-08 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 864 820.03 E 299 439.93 ORIGINATED BY MAT
HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2011.05.03 - 2011.05.03 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa O UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P NATURAL MOISTURE CONTENT w LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						
	Continued From Previous Page										
	CONCRETE MIX TO 0.1m, THEN ASPHALT TO SURFACE.										

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

$\frac{20}{15}\diamond\frac{5}{10}$ (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No HML11-09 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 866 062.86 E 299 224.63 ORIGINATED BY SLL
HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2011.04.29 - 2011.04.29 CHECKED BY MEF

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	UNIT WEIGHT kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
306.4									
0.0	**ASPHALT:** (300mm)								
0.2	**SAND**, trace gravel, trace silt Compact Brown Moist to Wet (FILL)		1	SS	25		306		
305.3			2	SS	11				
1.2	Clayey **SILT**, with sand, some roots and rootlets, topsoil stained Firm Dark Brown Moist (FILL)		3	SS	6	▽	305		0 27 48 25
304.2									
2.3	Silty **CLAY**, with sand, trace gravel Stiff Brown Moist to Wet (TILL)		4	SS	14		304		
302.5			5	SS	8		303		
4.0	Sandy **SILT**, trace gravel, trace clay Dense Brown to Grey Moist		6	SS	32		302		0 21 70 9
300.8							301		
5.6	Silty **CLAY**, with sand Stiff to Hard Grey Moist (TILL)		7	SS	14		300		
			8	SS	45		299		0 22 48 30
							298		
296.7			9	SS	52		297		
9.8	END OF BOREHOLE AT 9.8m.								

DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100
SHEAR STRENGTH kPa
○ UNCONFINED + FIELD VANE
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P NATURAL MOISTURE CONTENT w LIQUID LIMIT w_L
WATER CONTENT (%)
20 40 60

Continued Next Page

+ ³, × ³: Numbers refer to Sensitivity

20 15 10 5 (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No HML11-09 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 866 062.86 E 299 224.63 ORIGINATED BY SLL

HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN

DATUM Geodetic DATE 2011.04.29 - 2011.04.29 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa: O UNCONFINED + FIELD VANE; ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L / WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
	Continued From Previous Page										
	BOREHOLE OPEN TO 1.4m AND WATER LEVEL AT 1.4m UPON COMPLETION. BOREHOLE BACKFILLED WITH CUTTINS AND BENTONITE HOLEPLUG TO 0.4m, CONCRETE MIX TO 0.1m, THEN ASPHALT TO SURFACE.										

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

$\overset{20}{15\oplus 5}$ $\underset{10}{}$ (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No HMLK-1 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 864 360.61 E 299 603.50 ORIGINATED BY ES
HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2011.04.19 - 2011.04.19 CHECKED BY MEF

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
287.5 / 0.0	**SAND**, some gravel Brown Damp (FILL)		1	SS	17			
0.2	Clayey **SILT**, with sand, trace gravel Very Stiff Dark Brown to Brown (FILL)		2	SS	67			2 24 56 19
285.8 / 1.7	**SAND**, fine grained, trace silt and clay, trace gravel Compact to Very Dense Brown Damp		3	SS	33			1 93 7 (SI+CL)
			4	SS	28			
			5	SS	29			
			6	SS	52			
			7	SS	54			0 90 10 (SI+CL)
			8	SS	69			
278.2 / 9.2	Clayey **SILT**, some sand, trace gravel, occasional clay seams Hard Brown (TILL)		9	SS	72/ 0.150			1 17 64 19
278.0 / 9.4								

DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100

SHEAR STRENGTH kPa
○ UNCONFINED + FIELD VANE
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P NATURAL MOISTURE CONTENT w LIQUID LIMIT w_L
WATER CONTENT (%) 20 40 60

ELEVATION SCALE: 287, 286, 285, 284, 283, 282, 281, 280, 279

Continued Next Page

+ ³, × ³: Numbers refer to Sensitivity

20 / 15 5 / 10 (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No HMLK-1 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 864 360.61 E 299 603.50 ORIGINATED BY ES

HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN

DATUM Geodetic DATE 2011.04.19 - 2011.04.19 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa: O UNCONFINED, + FIELD VANE, ● QUICK TRIAXIAL, × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
	Continued From Previous Page										
	END OF BOREHOLE AT 9.4m. BOREHOLE OPEN AND DRY UPON COMPLETION. Piezometer installation consists of 25mm diameter Schedule 40 PVC pipe with a 1.52m slotted screen. WATER LEVEL READINGS: DATE DEPTH (m) ELEV. (m) Jun. 26, 11 9.1 278.4						▼				

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

20 / 15 5 / 10 (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No HMLK-2 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 864 504.40 E 299 341.16 ORIGINATED BY ES
HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2011.04.19 - 2011.04.19 CHECKED BY MEF

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa: ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L / WATER CONTENT (%) 20 40 60	UNIT WEIGHT kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
293.0											
0.0	Clayey **SILT**, with sand, some gravel Stiff to Hard Brown (FILL)		1	SS	13		293	○	○		
			2	SS	52		292	○	○		10 24 49 17
290.8			3	SS	29		291	○	○		
2.1	Silty **CLAY**, some sand, trace gravel Very Stiff to Hard Brown Damp (TILL)		4	SS	24			○	○		0 12 52 37
			5	SS	32		290	○	○		
			6	SS	29		289	○	○		
	Becomes grey		7	SS	72		288	○	○		
			8	SS	60		287	○	○		1 16 52 31
283.5			9	SS	58		286	○	○		
283.4 9.4	**SAND**, fine grained Very Dense Brown						285				
9.6							284				

Continued Next Page

+ ³, × ³: Numbers refer to Sensitivity

20 / 15 5 / 10 (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No HMLK-2 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 864 504.40 E 299 341.16 ORIGINATED BY ES

HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN

DATUM Geodetic DATE 2011.04.19 - 2011.04.19 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa	PLASTIC LIMIT / NATURAL MOISTURE CONTENT / LIQUID LIMIT / WATER CONTENT (%)	UNIT WEIGHT	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100	20 40 60	kN/m³	GR SA SI CL
	Continued From Previous Page										
	Moist										
	END OF BOREHOLE AT 9.6m. BOREHOLE OPEN AND WATER LEVEL AT 5.0m UPON COMPLETION OF DRILLING. Piezometer installation consists of 25mm diameter Schedule 40 PVC pipe with a 1.52m slotted screen.										
	WATER LEVEL READINGS: DATE DEPTH (m) ELEV. (m) Jun. 26, 11 6.5 286.5										

DYNAMIC CONE PENETRATION RESISTANCE PLOT
SHEAR STRENGTH kPa
○ UNCONFINED + FIELD VANE
● QUICK TRIAXIAL × LAB VANE

PLASTIC LIMIT w_P NATURAL MOISTURE CONTENT w LIQUID LIMIT w_L
WATER CONTENT (%)

UNIT WEIGHT γ kN/m³

REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

+³, ×³: Numbers refer to Sensitivity

20
15 ⊕ 5 (%) STRAIN AT FAILURE
10

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No HMLK-3 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 864 698.41 E 299 501.25 ORIGINATED BY LRB
HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2011.05.05 - 2011.05.05 CHECKED BY MEF

ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	UNIT WEIGHT kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
298.5								
0.0	**TOPSOIL**, with sand: (100mm)							
0.1	Clayey **SILT**, some sand, trace gravel, some rootlets Stiff Brown to Dark Grey (FILL)	1	SS	11		298		
		2	SS	10				
296.7		3	SS	14		297		
1.8	Silty **CLAY**, some sand, trace gravel Very Stiff Brown (TILL)	4	SS	25		296		0 17 53 30
		5	SS	15	▼	295		
293.9								
4.6	Sandy **SILT**, trace clay, trace gravel Compact Brown Moist to Wet (TILL) Becomes grey	6	SS	23		294		1 16 72 11
		7	SS	18		293		
		8	SS	25		292		
		9	SS	70		291		
289.0						290		
9.5	Silty **CLAY**, some sand, trace gravel Hard Grey					289		0 16 60 24
288.8								
9.7								

DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100
SHEAR STRENGTH kPa
○ UNCONFINED + FIELD VANE
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P NATURAL MOISTURE CONTENT w LIQUID LIMIT w_L
WATER CONTENT (%)
20 40 60

Continued Next Page

+³, ×³: Numbers refer to Sensitivity

20
15 ⊕ 5 (%) STRAIN AT FAILURE
10

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No HMLK-3 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 864 698.41 E 299 501.25 ORIGINATED BY LRB

HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN

DATUM Geodetic DATE 2011.05.05 - 2011.05.05 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa: O UNCONFINED + FIELD VANE; ● QUICK TRIAXIAL × LAB VANE; 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L; WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
	Continued From Previous Page										
	Moist (TILL)										
	END OF BOREHOLE AT 9.7m. Well installation consists of 50mm diameter Schedule 40 PVC pipe with a 1.52m slotted screen. WATER LEVEL READINGS: DATE DEPTH (m) ELEV. (m) Jun. 26, 11 2.7 295.8										

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

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No HMLK-4 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 864 596.44 E 299 670.66 ORIGINATED BY ES
HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2011.04.18 - 2011.04.18 CHECKED BY MEF

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	UNIT WEIGHT kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
292.7									
0.0 / 0.1	**TOPSOIL**								
	Clayey **SILT**, some sand, trace organics Stiff to Very Stiff Brown and Grey Damp (FILL)		1	SS	11				
			2	SS	23		292		
			3	SS	23		291		
290.5									
2.2	Clayey **SILT**, some sand, trace gravel Hard Brown Damp to Moist (TILL)		4	SS	37		290		0 11 73 16
			5	SS	45		289		
			6	SS	52		288		1 18 67 14
287.4									
5.3	Sandy **SILT**, trace to some clay, trace gravel Very Dense to Dense Grey Moist to Wet (TILL)		7	SS	38		287		
			8	SS	38		286		0 30 66 3
							285		
283.9							284		
8.8	Clayey **SILT**, with sand, trace gravel Hard Grey Moist (TILL)		9	SS	65				0 24 54 21
283.1									
9.6	END OF BOREHOLE AT 9.6m. BOREHOLE OPEN AND WATER								

DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100
SHEAR STRENGTH kPa 20 40 60 80 100
○ UNCONFINED + FIELD VANE
● QUICK TRIAXIAL × LAB VANE

PLASTIC LIMIT w_P NATURAL MOISTURE CONTENT w LIQUID LIMIT w_L
WATER CONTENT (%) 20 40 60

Continued Next Page

+³, ×³: Numbers refer to Sensitivity

20 / 15 / 10 / 5 (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No HMLK-4 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 864 596.44 E 299 670.66 ORIGINATED BY ES

HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN

DATUM Geodetic DATE 2011.04.18 - 2011.04.18 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa	PLASTIC LIMIT / NATURAL MOISTURE CONTENT / LIQUID LIMIT / WATER CONTENT (%)	UNIT WEIGHT	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100; O UNCONFINED + FIELD VANE; ● QUICK TRIAXIAL × LAB VANE; 20 40 60 80 100	w_P w w_L; 20 40 60	γ kN/m^3	GR SA SI CL
	Continued From Previous Page										
	LEVEL AT 1.4m UPON COMPLETION. Well installation consists of 25mm diameter Schedule 40 PVC pipe with a 1.52m slotted screen. WATER LEVEL READINGS: DATE DEPTH (m) ELEV. (m) Jun. 26, 11 0.6 292.1										

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

(%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-20 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 865 160.65 E 299 383.24 ORIGINATED BY MAT
HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2011.05.03 - 2011.05.03 CHECKED BY MEF

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
309.4											
0.0	**ASPHALT:** (150mm)										
0.2 / 308.6	**SAND**, some gravel Compact (FILL)		1	SS	22		309		○		
0.8 / 307.2	Clayey **SILT**, trace sand, trace gravel Stiff Grey Moist (FILL)		2	SS	11		308		○		
			3	SS	12				○		
2.2	Silty **CLAY**, some sand, trace gravel Very Stiff to Hard Brown Moist (TILL)		4	SS	16		307		○		
			5	SS	22		306		○		0 16 50 35
			6	SS	27		305		○		
301.8							304				
7.6	Sandy **SILT**, trace clay Dense Brown Moist		7	SS	36		303		○		
			8	SS	37		302		○		0 28 66 6
300.2							301				
9.1	Silty **CLAY**, some sand Hard Grey Moist (TILL)		9	SS	38		300		○		
299.6 / 9.8											

Continued Next Page

+ ^{3}, × ^{3}: Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-20 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 865 160.65 E 299 383.24 ORIGINATED BY MAT

HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN

DATUM Geodetic DATE 2011.05.03 - 2011.05.03 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa: O UNCONFINED, + FIELD VANE, ● QUICK TRIAXIAL, × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L / WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
	Continued From Previous Page										
	END OF BOREHOLE AT 9.8m. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 1.0m, CONCRETE MIX TO 0.1m, THEN ASPHALT TO SURFACE.										

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

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11

Appendix B

Geotechnical Laboratory Test Results

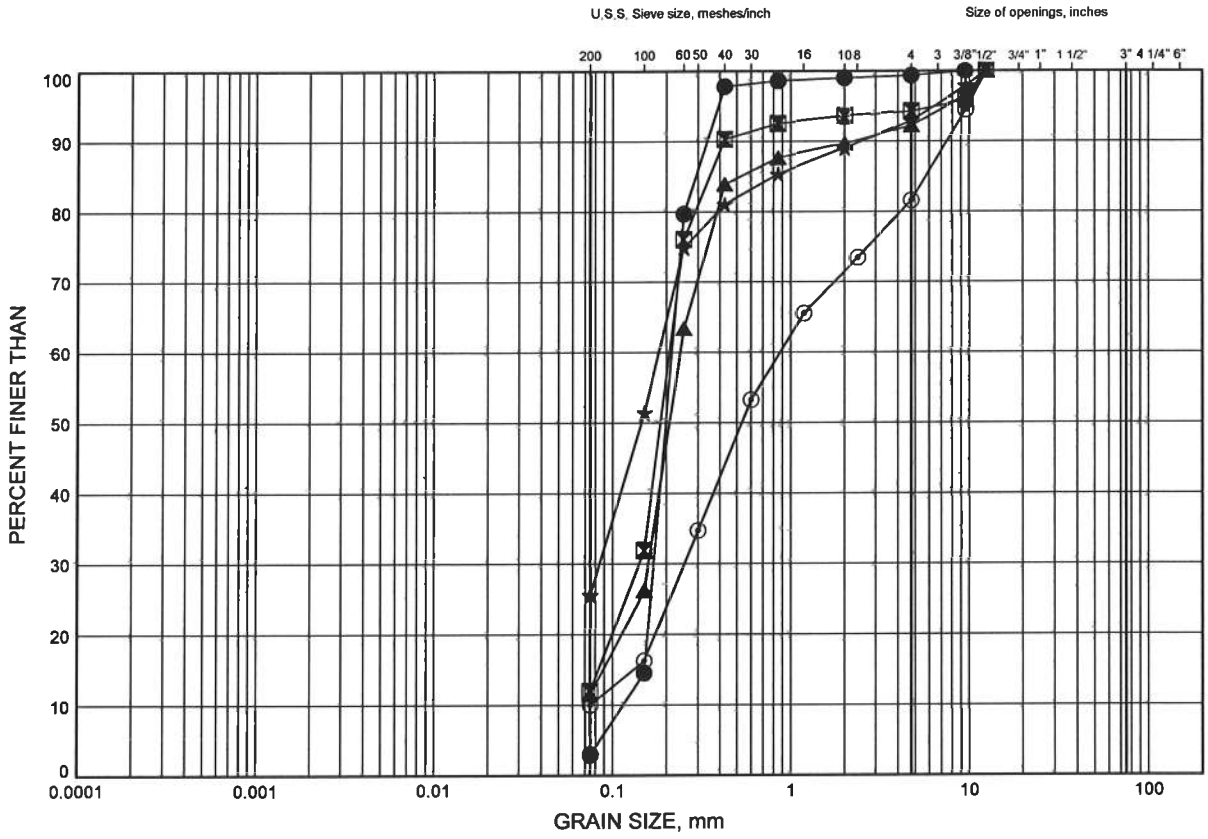
(Present Investigation)

Widening of Hwy 400, Major Mackenzie to King Road

GRAIN SIZE DISTRIBUTION

FIGURE B1

Sand FILL



SILT and CLAY	FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE SIZE
FINE GRAINED	SAND			GRAVEL		

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	HML11-02	0.38	264.25
⊠	HML11-03	1.07	272.43
▲	HML11-04	0.99	281.15
★	HML11-05	0.91	265.87
⊙	HML11-06	1.07	274.90

W.P.# 2539-04-00
Prepared By MFA
Checked By SKP

THURBER

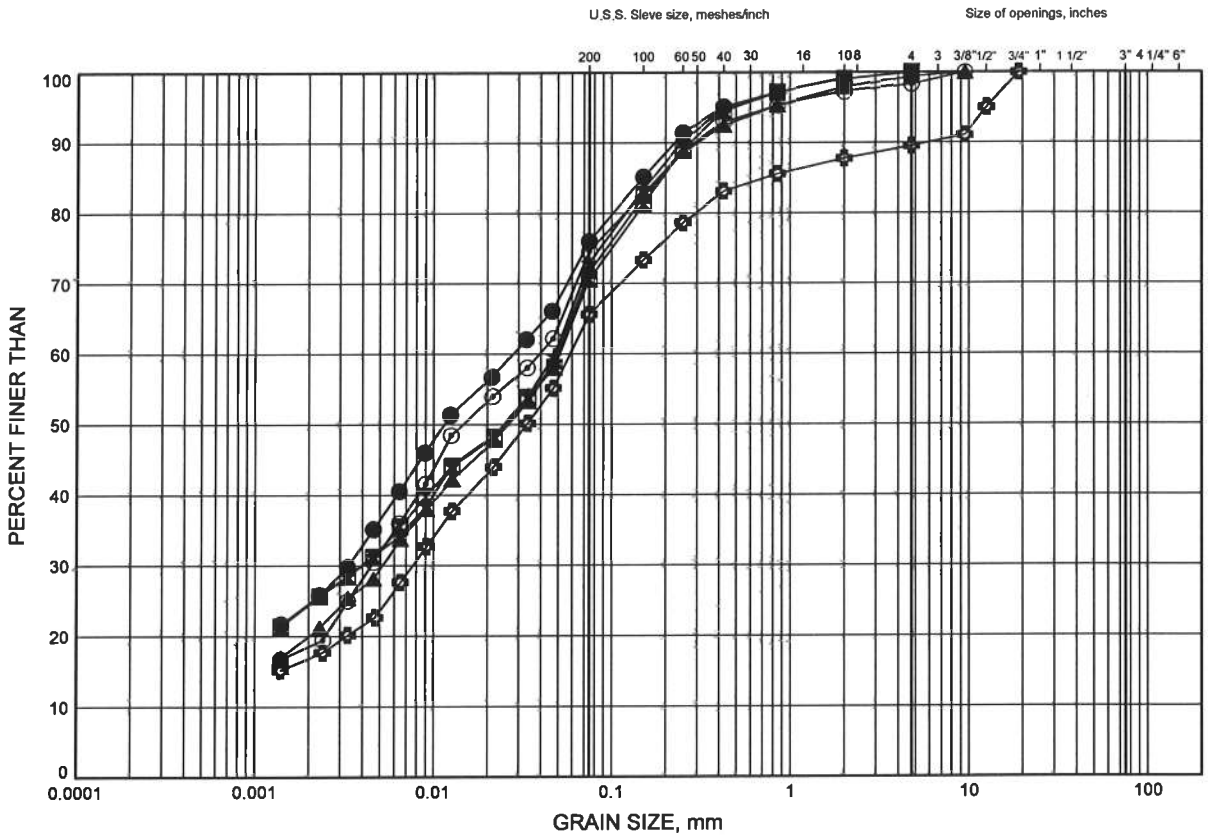
GRAIN SIZE DISTRIBUTION - THURBER 9268.GPJ 8/15/11

Widening of Hwy 400, Major Mackenzie to King Road

GRAIN SIZE DISTRIBUTION

FIGURE B2

Clayey Silt FILL



SILT and CLAY	FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE SIZE
FINE GRAINED	SAND			GRAVEL		

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	HML11-01	1.83	258.38
⊠	HML11-02	1.83	262.80
▲	HML11-05	3.35	263.43
★	HML11-09	1.83	304.60
⊙	HMLK-1	0.99	286.47
✿	HMLK-2	1.07	291.90

W.P.# 2539-04-00
Prepared By MFA
Checked By SKP

THURBER

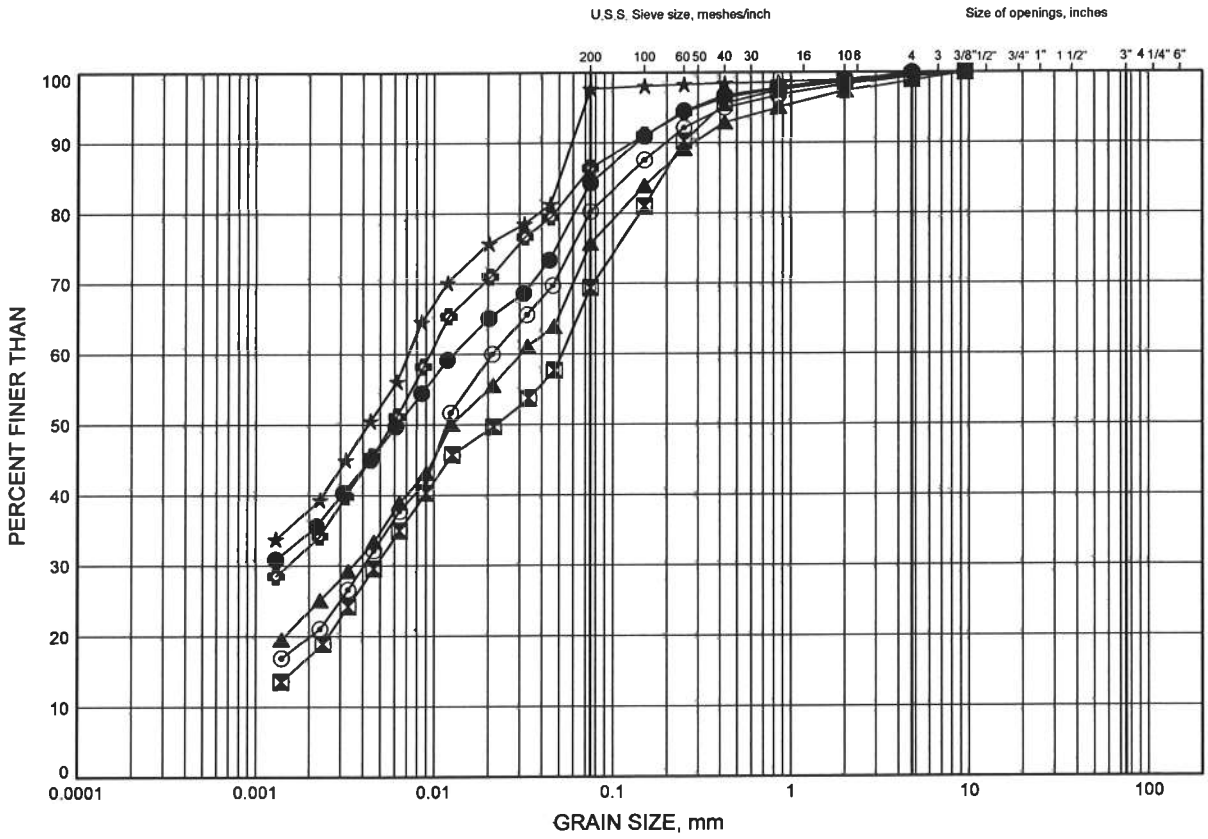
GRAIN SIZE DISTRIBUTION - THURBER 9268.GPJ 8/15/11

Widening of Hwy 400, Major Mackenzie to King Road

GRAIN SIZE DISTRIBUTION

FIGURE B3

Clayey Silt to Silty Clay TILL



SILT and CLAY	FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE SIZE
FINE GRAINED	SAND			GRAVEL		

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	11-20	3.35	306.03
⊠	HML11-01	3.28	256.93
▲	HML11-01	7.85	252.36
★	HML11-02	6.40	258.23
⊙	HML11-03	2.59	270.91
✿	HML11-03	6.40	267.10

W.P.# 2539-04-00
Prepared By MFA
Checked By SKP

THURBER

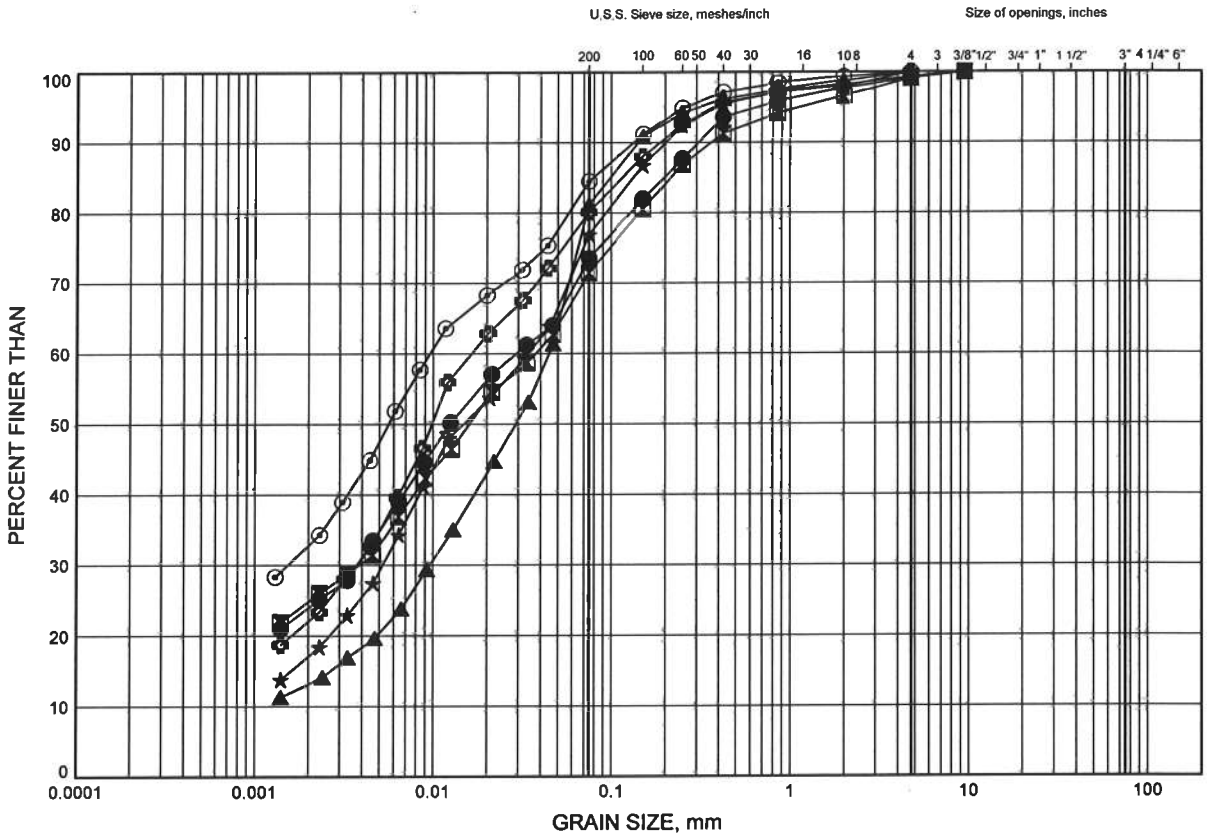
GRAIN SIZE DISTRIBUTION - THURBER 9268.GPJ 8/15/11

Widening of Hwy 400, Major Mackenzie to King Road

GRAIN SIZE DISTRIBUTION

FIGURE B4

Clayey Silt to Silty Clay TILL



SILT and CLAY	FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE SIZE
FINE GRAINED	SAND			GRAVEL		

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	HML11-04	4.88	277.27
⊠	HML11-04	7.92	274.22
▲	HML11-05	9.45	257.34
★	HML11-06	4.88	271.09
⊙	HML11-07	1.83	283.76
✿	HML11-07	7.92	277.67

W.P.# 2539-04-00
Prepared By MFA
Checked By SKP

THURBER

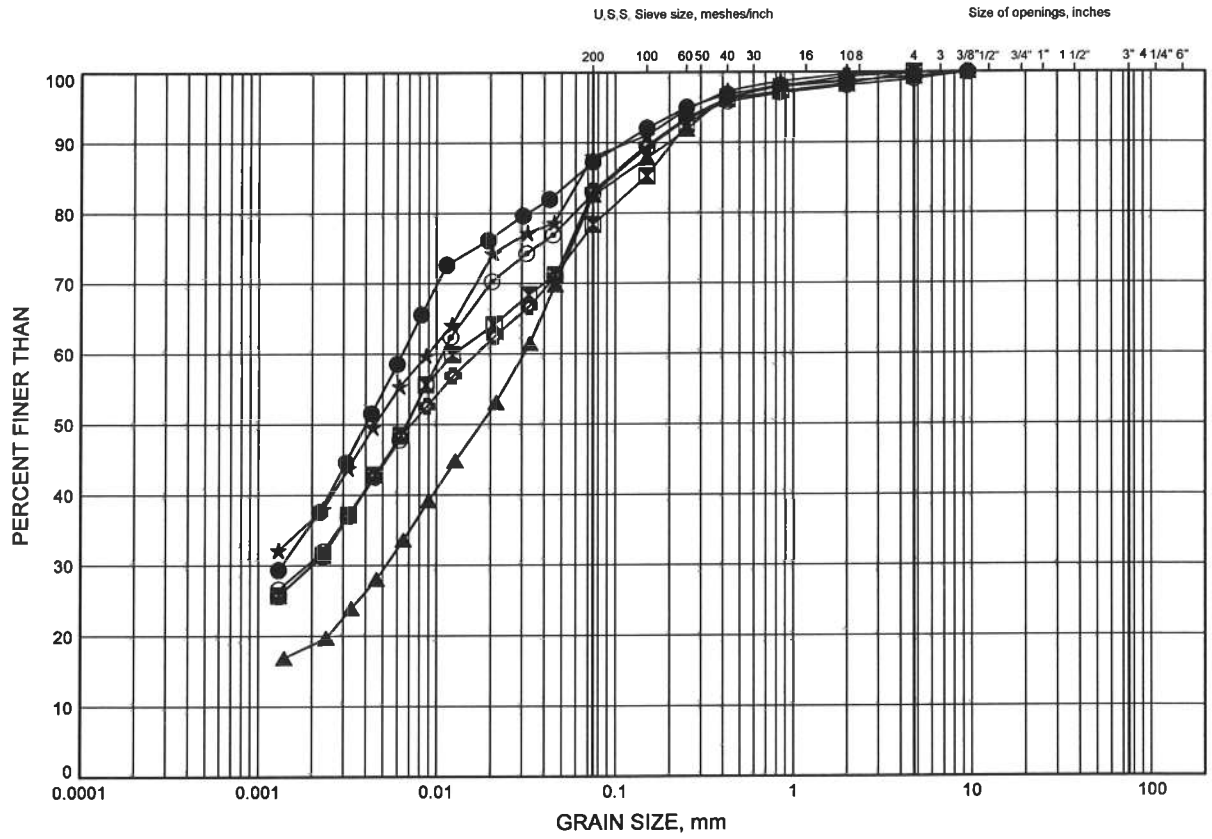
GRAIN SIZE DISTRIBUTION - THURBER 9268.GPJ 8/15/11

Widening of Hwy 400, Major Mackenzie to King Road

GRAIN SIZE DISTRIBUTION

FIGURE B5

Clayey Silt to Silty Clay TILL



SILT and CLAY	FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE SIZE
FINE GRAINED	SAND			GRAVEL		

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	HML11-08	1.83	301.76
⊠	HML11-09	7.92	298.50
▲	HMLK-1	9.30	278.16
★	HMLK-2	2.59	290.37
⊙	HMLK-2	7.85	285.12
✿	HMLK-3	2.59	295.87

W.P.# 2539-04-00
Prepared By MFA
Checked By SKP

THURBER

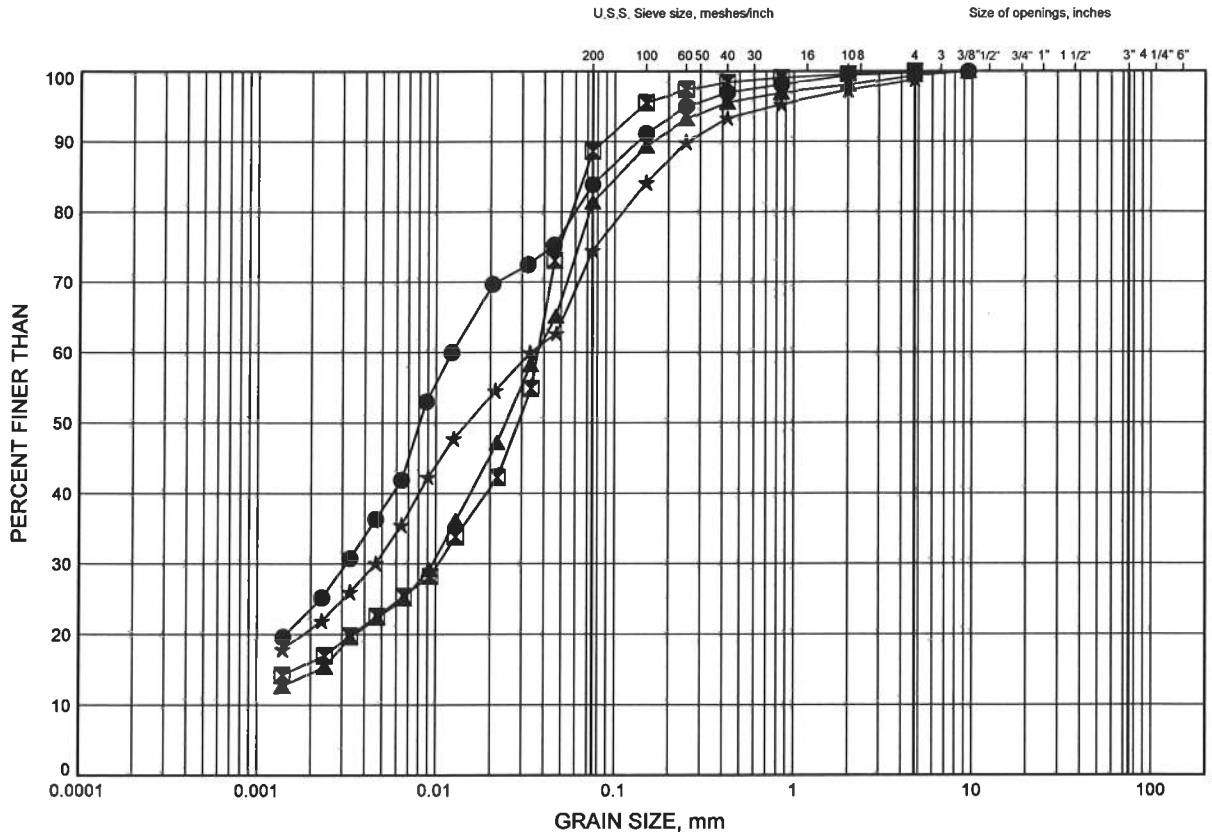
GRAIN SIZE DISTRIBUTION - THURBER 9268.GPJ 8/15/11

Widening of Hwy 400, Major Mackenzie to King Road

GRAIN SIZE DISTRIBUTION

FIGURE B6

Clayey Silt to Silty Clay TILL



SILT and CLAY	FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE SIZE
FINE GRAINED	SAND			GRAVEL		

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	HMLK-3	9.60	288.86
⊠	HMLK-4	2.59	290.13
▲	HMLK-4	4.80	287.92
★	HMLK-4	9.37	283.35

W.P.# 2539-04-00
Prepared By MFA
Checked By SKP

THURBER

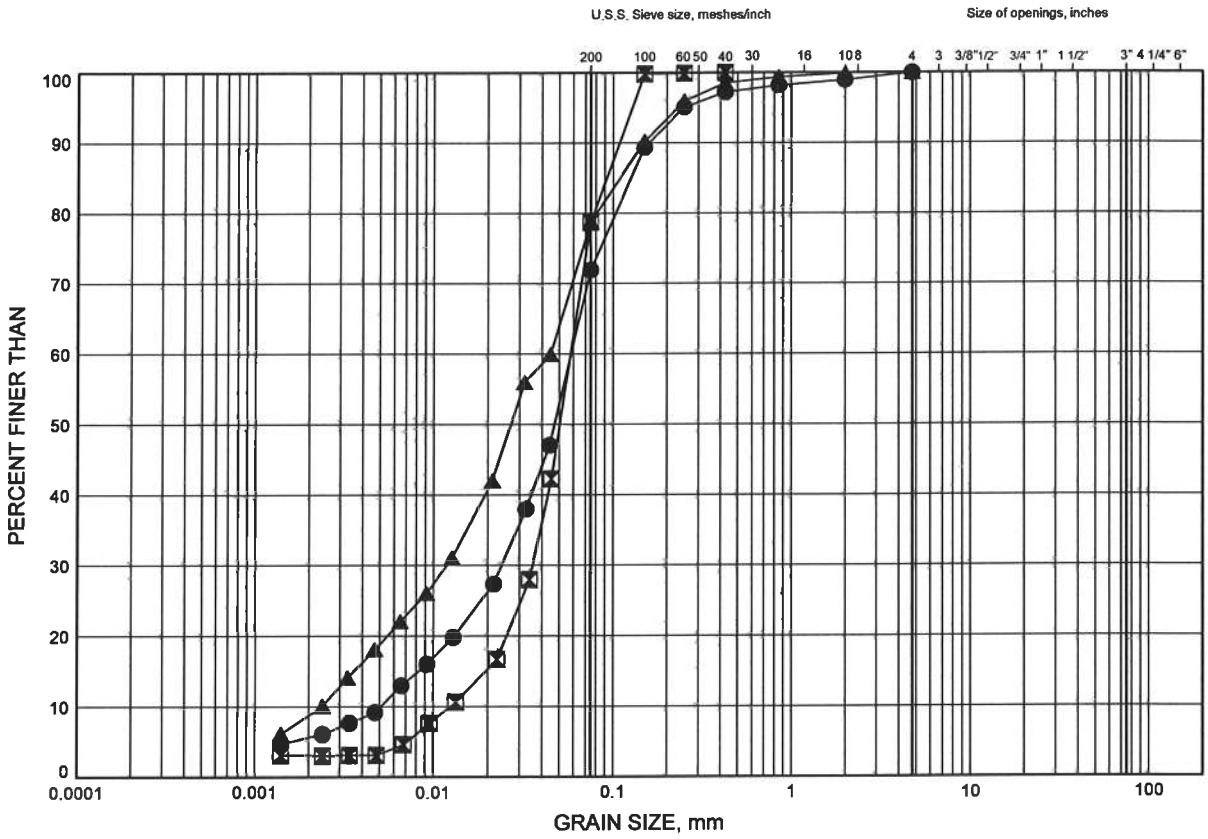
GRAIN SIZE DISTRIBUTION - THURBER 9268.GPJ 8/15/11

Widening of Hwy 400, Major Mackenzie to King Road

GRAIN SIZE DISTRIBUTION

FIGURE B7

Sandy Silt



SILT and CLAY	FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE SIZE
FINE GRAINED	SAND			GRAVEL		

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	11-20	7.92	301.46
⊠	HML11-08	4.88	298.71
▲	HML11-09	4.88	301.55

W.P.# 2539-04-00
Prepared By MFA
Checked By SKP

THURBER

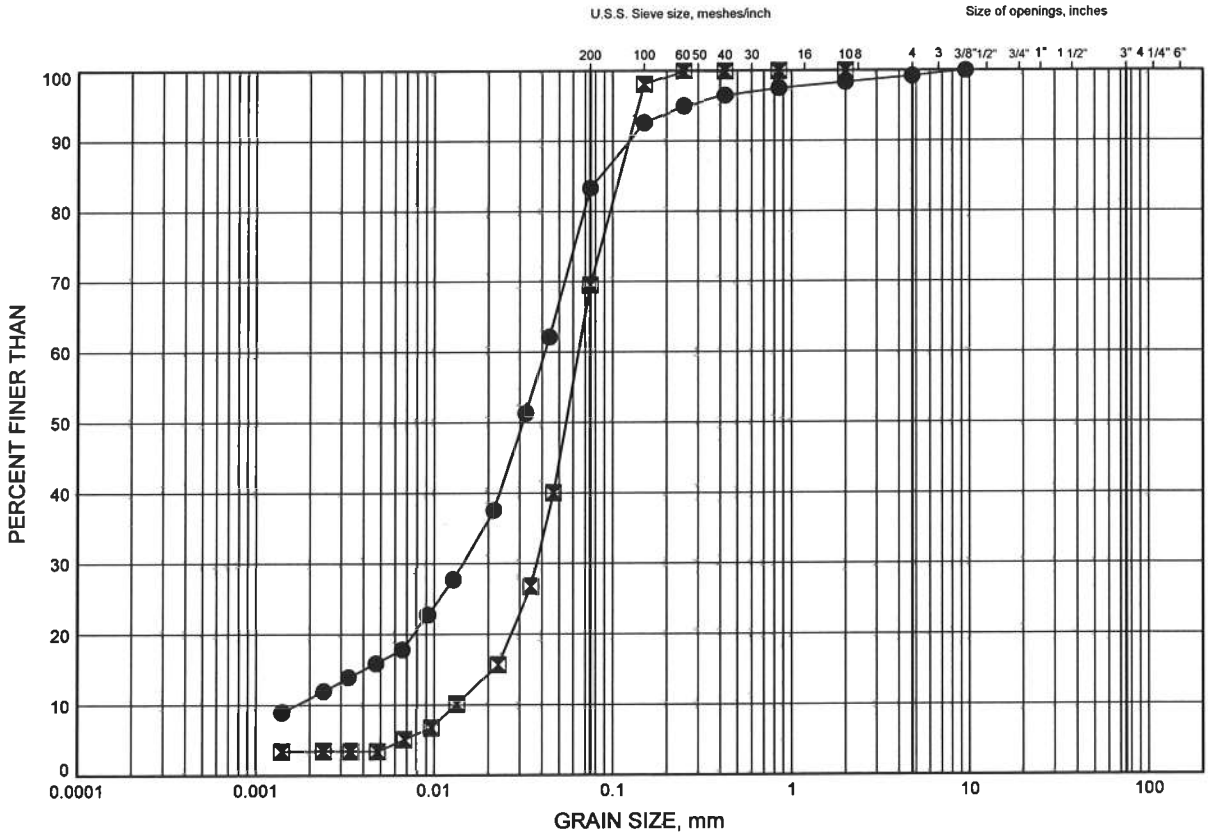
GRAIN SIZE DISTRIBUTION - THURBER 9268.GPJ 8/15/11

Widening of Hwy 400, Major Mackenzie to King Road

GRAIN SIZE DISTRIBUTION

FIGURE B8

Sandy Silt TILL



SILT and CLAY	FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE SIZE
FINE GRAINED	SAND			GRAVEL		

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	HMLK-3	4.88	293.59
⊠	HMLK-4	7.92	284.80

W.P.# 2539-04-00
Prepared By MFA
Checked By SKP

THURBER

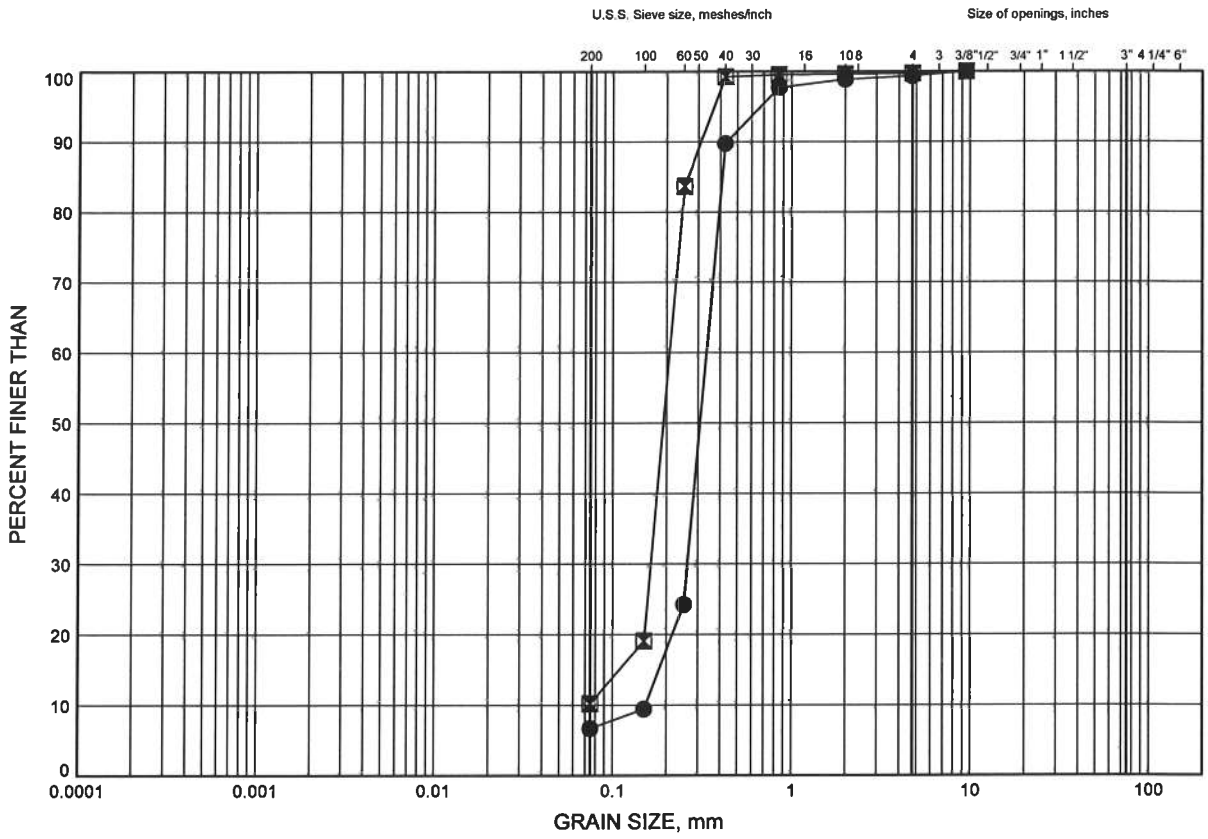
GRAIN SIZE DISTRIBUTION - THURBER 9268.GPJ 8/15/11

Widening of Hwy 400, Major Mackenzie to King Road

GRAIN SIZE DISTRIBUTION

FIGURE B9

Sand



SILT and CLAY	FINE	MEDIUM	COARSE	FINE	COARSE	COBBLE SIZE
FINE GRAINED	SAND			GRAVEL		

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	HMLK-1	1.83	285.63
⊠	HMLK-1	6.40	281.06

W.P.# 2539-04-00
Prepared By MFA
Checked By SKP

THURBER

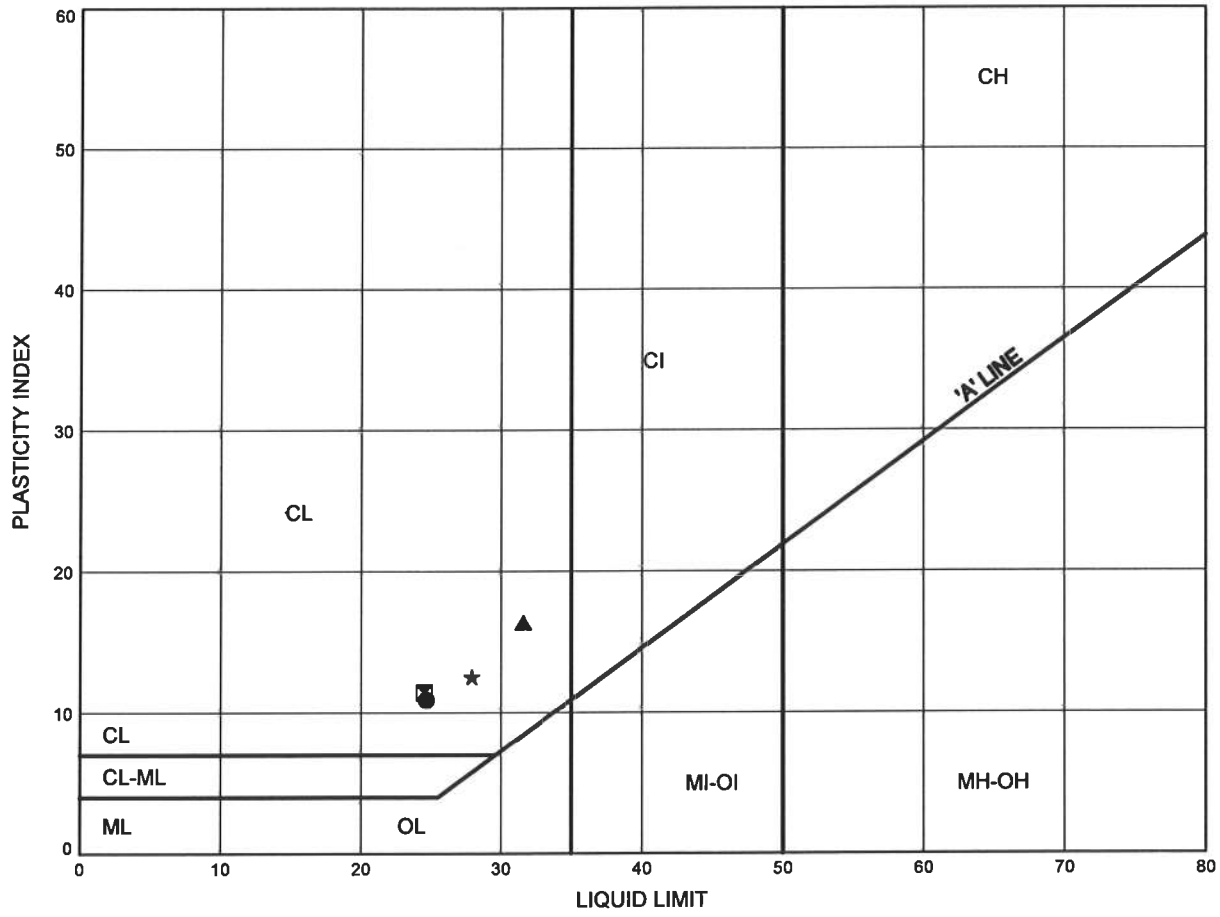
GRAIN SIZE DISTRIBUTION - THURBER 9268.GPJ 8/15/11

Widening of Hwy 400, Major Mackenzie to King Road

ATTERBERG LIMITS TEST RESULTS

FIGURE B10

Clayey Silt FILL



SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	HML11-01	1.83	258.38
⊠	HML11-05	3.35	263.43
▲	HML11-09	1.83	304.60
★	HMLK-1	0.99	286.47

Date August 2011

Project 2539-04-00

THURBER

Prep'd MFA

Chkd. SKP

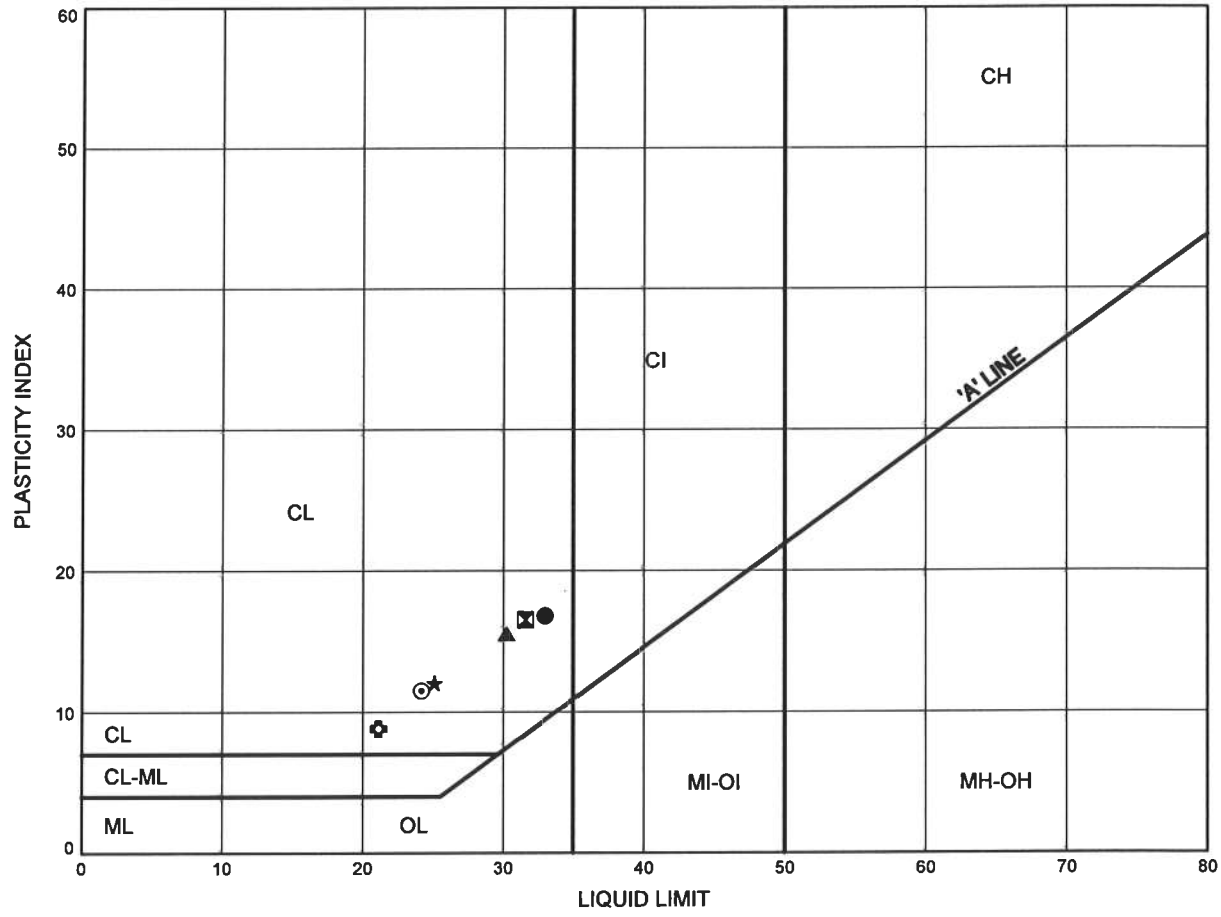
THURBALT 9268.GPJ 8/15/11

Widening of Hwy 400, Major Mackenzie to King Road

ATTERBERG LIMITS TEST RESULTS

FIGURE B11

Clayey Silt to Silty Clay TILL



SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	11-20	3.35	306.03
⊠	HML11-02	6.40	258.23
▲	HML11-03	6.40	267.10
★	HML11-04	4.88	277.27
⊙	HML11-04	7.92	274.22
✿	HML11-06	4.88	271.09

Date August 2011

Project 2539-04-00

THURBER

Prep'd MFA

Chkd. SKP

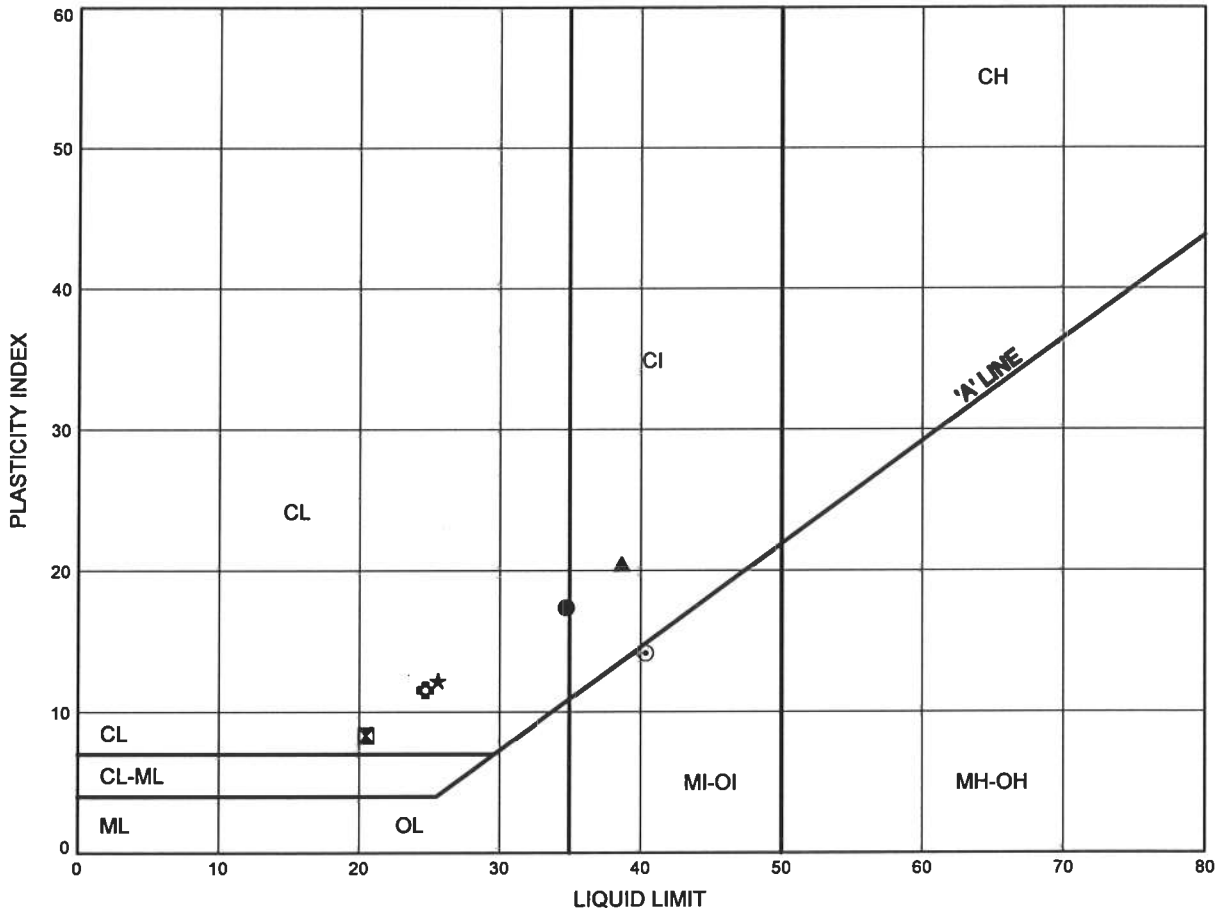
THURBALT 9268.GPJ 8/15/11

Widening of Hwy 400, Major Mackenzie to King Road

ATTERBERG LIMITS TEST RESULTS

FIGURE B12

Clayey Silt to Silty Clay TILL



SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	HML11-07	1.83	283.76
⊠	HML11-07	7.92	277.67
▲	HML11-08	1.83	301.76
★	HML11-09	7.92	298.50
⊙	HMLK-2	2.59	290.37
✿	HMLK-2	7.85	285.12

Date August 2011

Project 2539-04-00

THURBER

Prep'd MFA

Chkd. SKP

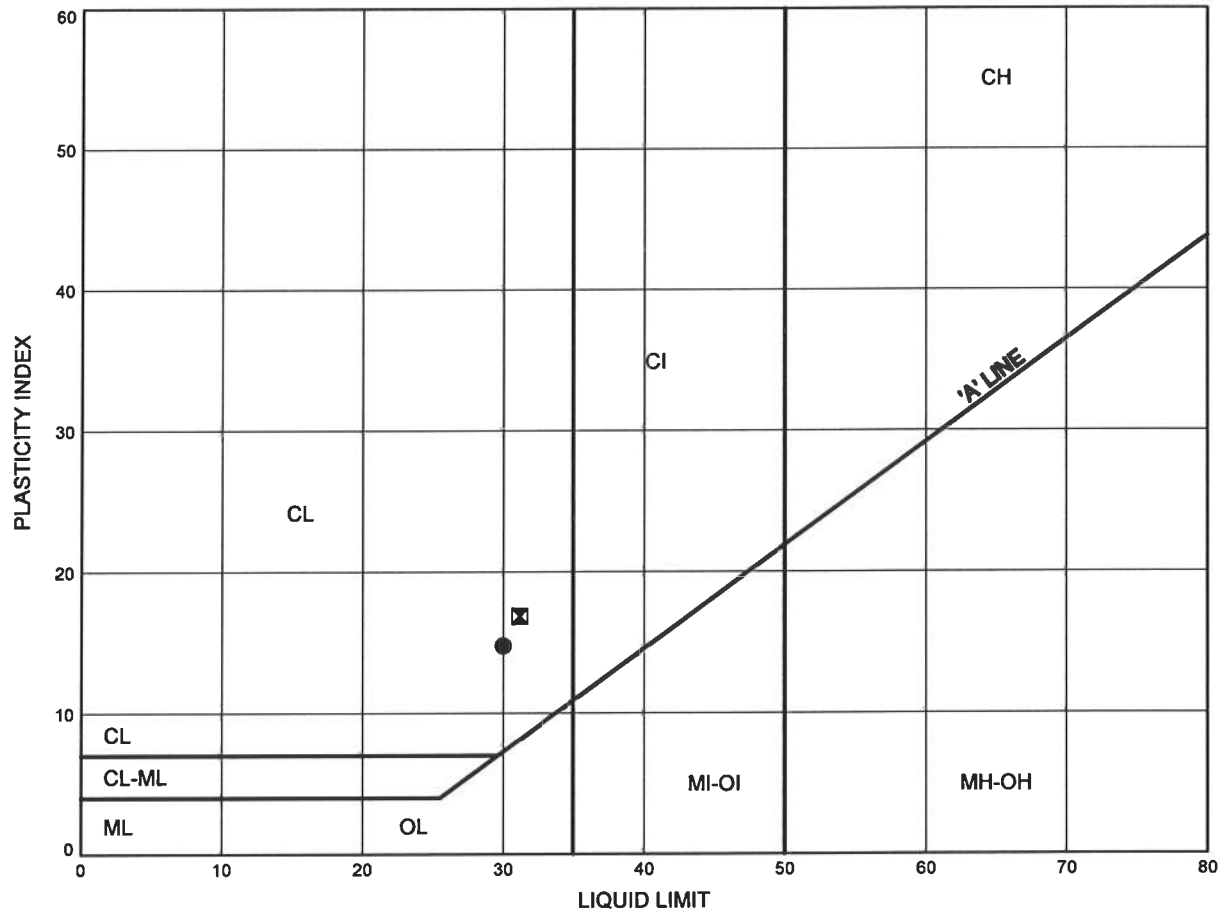
THURBALT 9268.GPJ 8/15/11

Widening of Hwy 400, Major Mackenzie to King Road

ATTERBERG LIMITS TEST RESULTS

FIGURE B13

Clayey Silt to Silty Clay TILL



SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	HMLK-3	2.59	295.87
⊠	HMLK-4	2.59	290.13

Date August 2011

Project 2539-04-00

THURBER

Prep'd MFA

Chkd. SKP

THURBALT 9268.GPJ 8/15/11

Appendix C

Record of Boreholes

(Previous Investigations)

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No HM-2 1 OF 2 METRIC

G.W.P. _____ LOCATION Hwy 400 / Teston Road, N 4 859 416, E 300 343 ORIGINATED BY TK

HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY SL/SS

DATUM Geodetic DATE 2004.07.19 - 2004.07.19 CHECKED BY SMS

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (O UNCONFINED, + FIELD VANE, ● QUICK TRIAXIAL, × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
250.0											
0.0 / 249.8	Silty SAND, trace gravel, trace clay, occasional organic pockets Compact Brown		1	SS	17				o		
0.2	Clayey, Sandy SILT, trace gravel, occasional iron oxide staining Hard Brown (TILL) (CL-ML)		2	SS	51		249 248		o		0 23 55 22
	becoming Grey		3	SS	72/ 254		247 246		o		
244.5			4	SS	52		245		o		
5.5	SAND, some to trace silt, trace gravel Very Dense Grey Wet (SP)		5	SS	50/ .152		244 243		o		
242.4											
7.6	Sandy SILT, some clay to clayey, trace gravel, occasional cobbles Very Dense Grey (TILL)(ML-NONPLASTIC)		6	SS	54		242		o⊢		1 27 52 20
			7	SS	76		241 240		o		

Continued Next Page

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

(%) STRAIN AT FAILURE

ONTMT4S 5166A.GPJ 3/20/08

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No HM-2 2 OF 2 METRIC

G.W.P. _____ LOCATION Hwy 400 / Teston Road, N 4 859 416, E 300 343 ORIGINATED BY TK

HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY SL/SS

DATUM Geodetic DATE 2004.07.19 - 2004.07.19 CHECKED BY SMS

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa: O UNCONFINED, + FIELD VANE, ● QUICK TRIAXIAL, × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
250.0											
239.3											
10.7 / 238.9	**SAND**, trace silt Very Dense Grey Wet (SP)		8	SS	92		239		o		
11.1	END OF BOREHOLE AT 11.1 m. Piezometer installation consists of 19 mm diameter Schedule 40 PVC pipe with a 1.52 m slotted screen. WATER LEVEL READINGS: DATE DEPTH(m) ELEV.(m) 2004.08.05 10.7 239.3										

+ ³ , × ³ : Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTMT4S 5166A.GPJ 2/14/08

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-09 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 859 400.07 E 300 368.34 ORIGINATED BY ES
HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2011.01.26 - 2011.01.26 CHECKED BY MEF

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (O UNCONFINED, + FIELD VANE, ● QUICK TRIAXIAL, × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
249.4											
0.0 / 249.1	**ASPHALT:** (250mm)										
0.3 / 248.8	**SAND**, some gravel Brown Moist (FILL)		1	GS			249		o		
0.6 / 248.2	**SAND**, fine grained Compact Brown Moist (FILL)		1	SS	11				o o		
1.2	Silty **CLAY**, with sand, trace gravel Very Stiff to Hard Brown Moist (TILL)		2	SS	28		248		o		
			3	SS	19		247		o		0 23 55 22
			4	SS	28		246		o		
			5	SS	34		245		o		
243.3							244				
6.1 / 242.8	**SILT** and **SAND**, trace gravel Very Dense Grey		6	SS	50/.150		243		o		
6.6	Moist Becomes grey										
			7	SS	32		242		o		
							241				
			8	SS	60		240		o		0 25 47 28

Continued Next Page

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

20 / 15 5 / 10 (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 4/29/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-09 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 859 400.07 E 300 368.34 ORIGINATED BY ES

HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN

DATUM Geodetic DATE 2011.01.26 - 2011.01.26 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa: O UNCONFINED, + FIELD VANE, ● QUICK TRIAXIAL, × LAB VANE, 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
	Continued From Previous Page										
							239				
238.1			9	SS	58				o		
11.3	END OF BOREHOLE AT 11.3m. BOREHOLE OPEN AND DRY UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 9.7m, CUTTINGS TO 0.9m, BENTONITE HOLEPLUG TO 0.4m, CONCRETE TO 0.1m, THEN ASPHALT TO SURFACE.										

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

$\frac{20}{15 \diamond 5}$ (%) STRAIN AT FAILURE
10

ONTMT4S 9268.GPJ 4/27/11

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 11-10 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 859 723.19 E 300 313.04 ORIGINATED BY ES

HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN

DATUM Geodetic DATE 2011.01.27 - 2011.01.27 CHECKED BY MEF

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE
251.0							251
0.0 / 250.7	**ASPHALT:** (250mm)						
0.3 / 250.3	**SAND**, some gravel Brown Moist (FILL)		1	GS			
0.7 / 249.7	**SAND**, fine grained Compact Brown Moist (FILL)		1	SS	17		250
1.3	Silty **CLAY**, with sand, trace gravel Firm to Very Stiff Brown (FILL)		2	SS	7		249
			3	SS	11		
			4	SS	9		248
			5	SS	17		247
			6	SS	12		246
			7	SS	12		245
	Becomes grey		8	SS	28		244
							243
							242

DYNAMIC CONE PENETRATION RESISTANCE PLOT
20 40 60 80 100

SHEAR STRENGTH kPa
○ UNCONFINED + FIELD VANE
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)
20 40 60

UNIT WEIGHT γ kN/m^3

REMARKS & GRAIN SIZE DISTRIBUTION (%)

NUMBER	GR	SA	SI	CL
5	1	23	52	24

Continued Next Page

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

20 / 15 5 / 10 (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-10 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 859 723.19 E 300 313.04 ORIGINATED BY ES

HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN

DATUM Geodetic DATE 2011.01.27 - 2011.01.27 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa: O UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
	Continued From Previous Page										
240.9											
10.1	Clayey **SILT**, with sand, trace gravel Hard Grey (TILL)						241				
			9	SS	41		240		o		0 32 50 18
239.7											
11.3	END OF BOREHOLE AT 11.3m. BOREHOLE OPEN AND DRY UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 9.7m, CUTTINGS TO 0.9m, BENTONITE HOLEPLUG TO 0.4m, CONCRETE TO 0.1m, THEN ASPHALT TO SURFACE.										

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

20 / 15 5 / 10 (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-11 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 859 889.89 E 300 284.52 ORIGINATED BY ES
HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2011.01.27 - 2011.01.27 CHECKED BY MEF

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
252.0							252				
0.0 / 251.7	**ASPHALT:** (250mm)										
0.3 / 251.3	**SAND**, some gravel Brown Moist (FILL)		1	GS							
0.7 / 250.4	**SAND**, fine grained, trace gravel Dense Brown Moist (FILL)		1	SS	33		251				
1.6	Silty **CLAY**, trace gravel Very Stiff to Hard Brown Moist (FILL)		2	SS	16		250				
			3	SS	29						
			4	SS	32		249				0 22 52 26
							248				
			5	SS	77						
							247				
	Become grey		6	SS	33		246				
							245				
243.9			7	SS	30						
8.1	Clayey **SILT**, with sand, trace gravel Very Stiff Grey Moist (TILL)						244				
			8	SS	19		243				1 32 47 20

Continued Next Page

+^{3}, ×^{3}: Numbers refer to Sensitivity

15 20 10 5 (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-11 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 859 889.89 E 300 284.52 ORIGINATED BY ES

HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN

DATUM Geodetic DATE 2011.01.27 - 2011.01.27 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa: ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L / WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
	Continued From Previous Page										
	Clayey **SILT**, with sand, trace gravel Hard Grey Moist (TILL)						242				
240.7			9	SS	61		241		o		
11.3	END OF BOREHOLE AT 11.3m. BOREHOLE OPEN AND DRY UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 10.0m, CUTTINGS TO 0.9m, BENTONITE HOLEPLUG TO 0.4m, CONCRETE TO 0.1m, THEN ASPHALT TO SURFACE.										

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

15 20 10 5 (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-12 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 860 215.15 E 300 224.23 ORIGINATED BY ES
HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2011.01.27 - 2011.01.27 CHECKED BY MEF

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
255.2									
0.0 / 254.9	**ASPHALT:** (280mm)								
0.3 / 254.5	**SAND**, some gravel Brown Moist (FILL)		1	GS					
0.7 / 253.9	**SAND**, fine grained, trace gravel Compact Brown Moist (FILL)		1	SS	21				
1.3	Silty **CLAY**, with sand, trace gravel Stiff to Hard Brown (TILL)		2	SS	10				
			3	SS	14				
			4	SS	18				1 24 52 24
	Becomes grey		5	SS	17				
			6	SS	27				
			7	SS	34	▽			
	Hard		8	SS	67				0 16 55 28

DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100

SHEAR STRENGTH kPa
○ UNCONFINED + FIELD VANE
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P NATURAL MOISTURE CONTENT w LIQUID LIMIT w_L
WATER CONTENT (%) 20 40 60

Continued Next Page

+³, ×³: Numbers refer to Sensitivity

(%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-12 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 860 215.15 E 300 224.23 ORIGINATED BY ES

HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN

DATUM Geodetic DATE 2011.01.27 - 2011.01.27 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa: ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L / WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
	Continued From Previous Page										
	Silty **CLAY**, with sand, trace gravel Very Stiff Grey (TILL)						245				
243.9			9	SS	26				○		
11.3	END OF BOREHOLE AT 11.3m. BOREHOLE OPEN AND WATER LEVEL AT 7.9m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 10.0m, CUTTINGS TO 0.9m, BENTONITE HOLEPLUG TO 0.4m, CONCRETE TO 0.1m, THEN ASPHALT TO SURFACE.						244				

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

$\oplus^{20}_{15\ 10\ 5}$ (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-13 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 860 470.92 E 300 180.48 ORIGINATED BY ES
HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2011.01.28 - 2011.01.28 CHECKED BY MEF

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
257.6									
0.0 / 257.3	**ASPHALT:** (250mm)								
0.3 / 256.9	**SAND**, some gravel Brown Moist (FILL)		1	GS					
0.6 / 256.3	**SAND**, some silt, trace gravel Compact Brown (FILL)		1	SS	18				0 88 12 (SI+CL)
1.3	Silty **CLAY**, trace to some sand, trace gravel Very Stiff to Hard Brown Moist (TILL)		2	SS	20		257		
	Occasional sand seams, occasional oxide staining		3	SS	36		256		
			4	SS	31		255		0 19 54 26
	Becomes grey		5	SS	22		254		
			6	SS	22		253		
			7	SS	38	▽	252		
			8	SS	22		251		
							250		
							249		
							248		0 9 35 56

DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100
SHEAR STRENGTH kPa 20 40 60 80 100
○ UNCONFINED + FIELD VANE
● QUICK TRIAXIAL × LAB VANE

PLASTIC LIMIT w_P NATURAL MOISTURE CONTENT w LIQUID LIMIT w_L
WATER CONTENT (%) 20 40 60

Continued Next Page

+³, ×³: Numbers refer to Sensitivity

20 15 5 10 (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-13 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 860 470.92 E 300 180.48 ORIGINATED BY ES

HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN

DATUM Geodetic DATE 2011.01.28 - 2011.01.28 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa ○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE 20 40 60 80 100	WATER CONTENT (%) 20 40 60		GR SA SI CL
	Continued From Previous Page										
	Silty **CLAY**, trace to some sand, trace gravel Hard Grey Moist (TILL)						247				
246.3	200mm sandy silt layer at 10.6m		9	SS	35				○ ○		
11.3	END OF BOREHOLE AT 11.3m. BOREHOLE OPEN AND WATER LEVEL AT 8.5m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 9.4m, CUTTINGS TO 0.9m, BENTONITE HOLEPLUG TO 0.4m, CONCRETE TO 0.1m, THEN ASPHALT TO SURFACE.										

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

$\oplus^{20}_{10}$ (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-14 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 861 542.28 E 299 997.49 ORIGINATED BY ES
HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2011.01.31 - 2011.03.31 CHECKED BY MEF

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE) (20 40 60 80 100)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) (20 40 60)	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
271.6											
0.0 / 271.3	**ASPHALT:** (280mm)										
0.3 / 270.9	**SAND**, some gravel Dark Brown Moist (FILL)		1	GS					○		
0.6	**SAND**, trace gravel Compact Brown Moist (FILL)		1	SS	24		271		○		
270.0 / 1.6	Clayey **SILT**, some sand, trace gravel Stiff Brown to Dark Brown (FILL)		2	SS	9		270		○		
269.1 / 2.5	Silty **CLAY**, with sand, trace gravel Stiff to Hard Brown Moist (TILL)		3	SS	13		269		○		
			4	SS	19		268		⊕		1 23 49 27
			5	SS	27		267		○		
	Becomes grey		6	SS	34		266		○		
			7	SS	26	▽	265		○		
			8	SS	36		264		○⊢		1 14 44 40
							263				
							262				

Continued Next Page

+ ^{3}, × ^{3}: Numbers refer to Sensitivity

15-20-10-5 (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-14 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 861 542.28 E 299 997.49 ORIGINATED BY ES

HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN

DATUM Geodetic DATE 2011.01.31 - 2011.03.31 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa: O UNCONFINED, + FIELD VANE, ● QUICK TRIAXIAL, × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L / WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
	Continued From Previous Page										
260.3	Silty **CLAY**, with sand, trace gravel Hard Grey Moist (TILL)		9	SS	49		261		o		
11.3	END OF BOREHOLE AT 11.3m. BOREHOLE OPEN AND WATER LEVEL AT 8.8m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 9.9m, CUTTINGS TO 0.4m, BENTONITE HOLEPLUG TO 0.1m, THEN ASPHALT TO SURFACE.										

+ ^{3}, × ^{3}: Numbers refer to Sensitivity

15 20 10 5 (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-15 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 862 050.93 E 299 915.20 ORIGINATED BY ES
HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2011.01.28 - 2011.01.28 CHECKED BY MEF

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
274.2									
0.0 / 274.0	**ASPHALT:** (250mm)								
0.3 / 273.6	**SAND**, some gravel Brown Moist (FILL)		1	GS			274		
0.6 / 272.9	**SAND**, some silt, trace gravel Compact Brown Moist (FILL)		1	SS	18		273		2 84 14 (SI+CL)
1.3 / 270.2	Clayey **SILT**, some sand, trace gravel Stiff to Firm Brown Moist (FILL) Becomes grey		2	SS	11		272		
			3	SS	5				
			4	SS	4	▽	271		
4.0	Silty **CLAY**, some sand, trace gravel Hard to Very Stiff Brown Moist (TILL)		5	SS	33		270		
	Occasional sand seams Becomes grey		6	SS	53		269		4 15 44 36
			7	SS	25		268		
			8	SS	18		267		
							266		
							265		

DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100
SHEAR STRENGTH kPa
○ UNCONFINED + FIELD VANE
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P NATURAL MOISTURE CONTENT w LIQUID LIMIT w_L
WATER CONTENT (%) 20 40 60

Continued Next Page

+³, ×³: Numbers refer to Sensitivity

15 20 10 5 (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-15 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 862 050.93 E 299 915.20 ORIGINATED BY ES

HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN

DATUM Geodetic DATE 2011.01.28 - 2011.01.28 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa: ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
	Continued From Previous Page										
	Silty **CLAY**, some sand, trace gravel Very Stiff Grey Moist (TILL)						264				
262.9			9	SS	26				○		
11.3	END OF BOREHOLE AT 11.3m. BOREHOLE OPEN AND WATER LEVEL AT 3.6m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 9.7m, CUTTINGS TO 0.8m, BENTONITE HOLEPLUG TO 0.4m, CONCRETE TO 0.1m, THEN ASPHALT TO SURFACE.						263				

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

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-16 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 862 124.26 E 299 902.47 ORIGINATED BY ES
HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2011.01.28 - 2011.01.28 CHECKED BY MEF

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (○ UNCONFINED ● QUICK TRIAXIAL + FIELD VANE × LAB VANE)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%)	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
274.5											
0.0 / 274.2	**ASPHALT:** (280mm)										
0.3 / 273.9	**SAND**, some gravel Brown Moist (FILL)		1	GS			274				
0.7 / 273.3	**SAND**, trace gravel Compact Brown Moist (FILL)		1	SS	26						
1.2	Silty **CLAY**, with sand, trace gravel Very Stiff to Firm Brown (FILL) Becomes grey		2	SS	16		273				
			3	SS	14		272				0 22 52 26
	Occasional roots and rootlets		4	SS	7	▽	271				
270.3											
4.3	Clayey **SILT**, with sand, trace gravel, occasional clay seams Stiff to Hard Brown Moist (TILL)		5	SS	14		270				
	Occasional oxide staining		6	SS	39		269				
	Becomes grey		7	SS	47		268				
265.4							267				
9.1	Silty **CLAY**, trace sand, trace gravel Very Stiff Grey Moist (TILL)		8	SS	18		266				0 4 36 60
							265				

Continued Next Page

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

(%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-16 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 862 124.26 E 299 902.47 ORIGINATED BY ES

HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN

DATUM Geodetic DATE 2011.01.28 - 2011.01.28 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa: ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L / WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
	Continued From Previous Page										
	Silty **CLAY**, trace sand, trace gravel Very Stiff Grey Moist (TILL)						264				
263.3			9	SS	21				○		
11.3	END OF BOREHOLE AT 11.3m. BOREHOLE OPEN AND WATER LEVEL AT 3.6m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 10.0m, CUTTINGS TO 0.9m, BENTONITE HOLEPLUG TO 0.4m, CONCRETE TO 0.1m, THEN ASPHALT TO SURFACE.										

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

$15 \oplus^{20}_{10} 5$ (%) STRAIN AT FAILURE

ONTMT4S 9266.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-17 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 862 616.74 E 299 818.61 ORIGINATED BY ES

HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN

DATUM Geodetic DATE 2011.01.31 - 2011.01.31 CHECKED BY MEF

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa (○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE)	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L / WATER CONTENT (%)	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
280.4											
0.0 / 280.2	**ASPHALT:** (250mm)										
0.3 / 279.8	**SAND**, some gravel Brown Moist (FILL)		1	GS							
0.7 / 279.1	**SAND**, trace gravel Compact Brown Moist (FILL)		1	SS	24		280				
1.3 / 276.0	Clayey **SILT**, some sand, trace gravel Stiff to Firm Brown Moist (FILL)		2	SS	14		279				
			3	SS	8		278				
			4	SS	7		277				
4.4	Silty **CLAY**, with sand, trace gravel Very Stiff to Hard Brown Moist (TILL)		5	SS	30	▽	276				0 20 44 36
			6	SS	27		275				
	Becomes grey		7	SS	25		274				
			8	SS	24		273				0 27 50 23
							272				
							271				

Continued Next Page

+ ^{3}, × ^{3}: Numbers refer to Sensitivity

15 (20, 10, 5) (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-17 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 862 616.74 E 299 818.61 ORIGINATED BY ES

HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN

DATUM Geodetic DATE 2011.01.31 - 2011.01.31 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa: O UNCONFINED, + FIELD VANE, ● QUICK TRIAXIAL, × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L / WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
	Continued From Previous Page										
269.1	Silty **CLAY**, with sand, trace gravel Hard Grey Moist (TILL)		9	SS	39		270		o		
11.3	END OF BOREHOLE AT 11.3m. BOREHOLE OPEN AND WATER LEVEL AT 5.1m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 9.7m, CUTTINGS TO 0.9m, BENTONITE HOLEPLUG TO 0.4m, CONCRETE TO 0.1m, THEN ASPHALT TO SURFACE.										

+ ^{3}, × ^{3}: Numbers refer to Sensitivity

20 / 15 ⊕ 5 / 10 (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-18 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 863 126.14 E 299 731.09 ORIGINATED BY ES
HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2011.01.31 - 2011.01.31 CHECKED BY MEF

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
277.1									
0.0 / 276.9	**ASPHALT:** (250mm)								
0.3 / 276.5	**SAND**, some gravel Brown Moist (FILL)		1	GS					
0.6 / 275.8	**SAND**, trace gravel Dense Brown Moist (FILL)		1	SS	38				
1.3	Silty **CLAY**, some sand, trace gravel Stiff to Very Stiff Brown Moist (TILL)		2	SS	19				
			3	SS	11				0 16 46 37
	Occasional oxide staining		4	SS	26				
			5	SS	19	▽			
271.0									
6.1 / 270.6	**SAND**, fine grained, some silt, trace clay, occasional oxide staining Compact Brown Moist		6	SS	21				0 78 20 2
6.6			7	SS	23				
			8	SS	43				0 27 53 21

DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100

SHEAR STRENGTH kPa
○ UNCONFINED + FIELD VANE
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L
WATER CONTENT (%) 20 40 60

ELEVATION SCALE 277 276 275 274 273 272 271 270 269 268

Continued Next Page

+ ³, × ³: Numbers refer to Sensitivity

15 20 10 5 (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-18 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 863 126.14 E 299 731.09 ORIGINATED BY ES

HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN

DATUM Geodetic DATE 2011.01.31 - 2011.01.31 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa: O UNCONFINED, + FIELD VANE, ● QUICK TRIAXIAL, × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P — NATURAL MOISTURE CONTENT w — LIQUID LIMIT w_L / WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						
	Continued From Previous Page										
266.2	Silty **CLAY**, with sand, trace gravel Hard Grey Moist (TILL)		9	SS	55/.150		267				
11.0	END OF BOREHOLE AT 11.0m. BOREHOLE OPEN AND WATER LEVEL AT 4.5m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 9.7m, CUTTINGS TO 0.3m, HOLEPLUG TO 0.1m, THEN ASPHALT TO SURFACE.										

+ ^{3}, × ^{3}: Numbers refer to Sensitivity

20
15 5
10
(%) STRAIN AT FAILURE

ONTMT4S 9266.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-19 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 863 618.00 E 299 647.47 ORIGINATED BY ES
HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2011.02.03 - 2011.02.03 CHECKED BY MEF

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
267.6									
0.0	**ASPHALT:** (200mm)								
0.2 / 266.9	**SAND**, some gravel Brown Damp (FILL)		1	GS			267		
0.6 / 266.4	**SAND**, trace gravel Dense Brown Damp (FILL)		1	SS	47				
1.2	Clayey **SILT**, some sand to sandy, trace gravel Hard to Stiff Brown (FILL)		2	SS	49		266		
			3	SS	13		265		
			4	SS	31		264		0 20 61 18
			5	SS	33		263		
			6	SS	16		262		
			7	SS	26		261		
			8	SS	35		260		0 38 44 18
							259		
							258		

DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100
SHEAR STRENGTH kPa
○ UNCONFINED + FIELD VANE
● QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT w_P NATURAL MOISTURE CONTENT w LIQUID LIMIT w_L
WATER CONTENT (%) 20 40 60

Continued Next Page

+ ^{3}, × ^{3}: Numbers refer to Sensitivity

20 / 15 5 / 10 (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-19 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 863 618.00 E 299 647.47 ORIGINATED BY ES

HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN

DATUM Geodetic DATE 2011.02.03 - 2011.02.03 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa: O UNCONFINED, + FIELD VANE, ● QUICK TRIAXIAL, × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
	Continued From Previous Page										
257.3											
10.3	**SAND**, trace silt, trace gravel Dense Brown Moist						257				
256.3			9	SS	35				o		0 89 11 (SI+CL)
11.3	END OF BOREHOLE AT 11.3m. BOREHOLE OPEN AND DRY UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 9.7m, CUTTINGS TO 0.9m, BENTONITE HOLEPLUG TO 0.4m, CONCRETE TO 0.1m, THEN ASPHALT TO SURFACE.										

+ ^{3}, × ^{3}: Numbers refer to Sensitivity

15 20 10 5 (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-21 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 865 500.32 E 299 331.61 ORIGINATED BY ES
HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2011.02.01 - 2011.02.01 CHECKED BY MEF

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 / SHEAR STRENGTH kPa: ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P / NATURAL MOISTURE CONTENT w / LIQUID LIMIT w_L — WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
306.1											
0.0	**ASPHALT:** (200mm)						306				
0.2	**SAND**, some gravel Very Dense Brown Moist (FILL)		1	GS							
304.8			1	SS	75		305				
1.3	Clayey **SILT**, some sand, trace gravel Stiff Brown to Dark Grey (FILL)		2	SS	9		304				
303.9											
2.3	Silty **CLAY**, some sand, trace gravel Stiff to Very Stiff Brown Moist (TILL)		3	SS	18						0 19 50 31
			4	SS	18		303				
			5	SS	23		302				
			6	SS	12		301				
	Becomes grey					▽	300				
298.4							299				
7.7	**SAND**, fine to coarse grained, some silt, trace to some gravel Dense Brown Moist		7	SS	33		298				0 84 16 (SI+CL)
			8	SS	32		297				

Continued Next Page

+ ³, × ³: Numbers refer to Sensitivity

15 (20, 10, 5) (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-21 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 865 500.32 E 299 331.61 ORIGINATED BY ES

HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN

DATUM Geodetic DATE 2011.02.01 - 2011.02.01 CHECKED BY MEF

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100; SHEAR STRENGTH kPa: O UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE 20 40 60 80 100	PLASTIC LIMIT w_P NATURAL MOISTURE CONTENT w LIQUID LIMIT w_L WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
	Continued From Previous Page						296				
295.2											
10.9 / 294.9	Silty **CLAY**, some sand, trace gravel Hard Grey (TILL)		9	SS	48		295				0 12 58 30
11.3	END OF BOREHOLE AT 11.3m. BOREHOLE OPEN AND WATER LEVEL AT 7.0m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 10.0m, CUTTINGS TO 0.7m, BENTONITE HOLEPLUG TO 0.4m, CONCRETE TO 0.1m, THEN ASPHALT TO SURFACE.										

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

20 / 15 5 / 10 (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 8/15/11