FOUNDATION INVESTIGATION REPORT
OVERHEAD AND CANTILEVERED SIGN SUPPORTS
HIGHWAY 400
MAJOR MACKENZIE DRIVE TO NORTH OF KING ROAD
TORONTO, ONTARIO
G.W.P. 2539-04-00

GEOCRES No. 30M13-194

Submitted

To

SNC-Lavalin Inc.

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PART 1 FACTUAL INFORMATION

1.0 INTRODUCTION

This report presents the factual data obtained from a foundation investigation carried out by Thurber Engineering Ltd. (Thurber) for the detailed design of Overhead and Cantilevered Sign (OH&CS) supports at locations from Major Mackenzie Drive 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 explore the subsurface conditions at the proposed locations of the overhead and cantilevered sign supports and, based on this data, to provide borehole locations plans, records of boreholes, laboratory test results and a written description of the subsurface conditions.

2.0 SITE DESCRIPTION

The overhead and cantilevered signs are to be located along the alignment of the proposed Highway 400 widening, between the interchange at Major Mackenzie Drive and about 1 km north of 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

The field investigation for this project was carried out between January 24 and February 3, 2011, and on May 3, 2011. Twenty one (21) boreholes (11-01 to 11-19, 11-21 and 11-22) were advanced at the locations of proposed overhead signs during the first period, while Borehole 11-20 was advanced in May. All of the boreholes were located in the Highway 400 median or on the shoulder of either the northbound or southbound lanes. The locations of the boreholes were determined based on drawings provided by SNC Lavalin. The approximate locations of the boreholes covered in this report are shown on the Borehole Locations Plans (8 sheets) immediately following the text and tables.

The boreholes were advanced using solid stem augers to depths of 9.8 m to 11.3 m. 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 were observed in the open boreholes throughout the drilling operations. No standpipe piezometer was installed for this investigation since existing groundwater data along the subject highway alignment was considered sufficient to provide information for sign support design. Moreover, the boreholes were located adjacent to travelled lanes on the highway

rendering it very disruptive to the traffic during the reading and decommissioning of piezometers should they be installed. The borehole completion details are summarized below in Table 3.1.

Table 3.1 – Borehole Completion Details

Borehole Number	Completion Details
11-01	Bentonite holeplug to 9.4 m, cuttings from 9.4 m to 0.6 m, concrete from 0.6 m to 0.1 m, then asphalt from 0.1 m to surface.
11-02	Bentonite holeplug to 9.1 m, cuttings from 9.1 m to 1.8 m, bentonite holeplug from 1.8 m to 0.4 m, concrete from 0.4 m to 0.1 m, then asphalt from 0.1 m to surface.
11-03	Bentonite holeplug to 9.8 m, cuttings from 9.8 m to 0.9 m, concrete from 0.9 m to 0.1 m, then asphalt from 0.1 m to surface.
11-04	Bentonite holeplug to 9.7 m, cuttings from 9.7 m to 0.6 m, concrete from 0.6 m to 0.1 m, then asphalt from 0.1 m to surface.
11-05	Bentonite holeplug to 8.8 m, cuttings from 8.8 m to 0.6 m, concrete from 0.6 m to 0.2 m, then asphalt from 0.2 m to surface.
11-06	Bentonite holeplug to 9.4 m, cuttings from 9.4 m to 0.9 m, bentonite holeplug from 0.9 m to 0.6 m, concrete from 0.6 m to 0.1 m, then asphalt from 0.1 m to surface.
11-07	Bentonite holeplug to 9.1 m, cuttings from 9.1 m to 0.8 m, bentonite holeplug from 0.8 m to 0.4 m, concrete from 0.4 m to 0.1 m, then asphalt from 0.1 m to surface.
11-08	Bentonite holeplug to 9.6 m, cuttings from 9.6 m to 0.7 m, bentonite holeplug from 0.7 m to 0.4 m, concrete from 0.4 m to 0.1 m, then asphalt from 0.1 m to surface.
11-09	Bentonite holeplug to 9.7 m, cuttings from 9.7 m to 0.9 m, bentonite holeplug from 0.9 m to 0.4 m, concrete from 0.4 m to 0.1 m, then asphalt from 0.1 m to surface.
11-10	Bentonite holeplug to 9.7 m, cuttings from 9.7 m to 0.9 m, bentonite holeplug from 0.9 m to 0.4 m, concrete from 0.4 m to 0.1 m, then asphalt from 0.1 m to surface.
11-11	Bentonite holeplug to 10.0 m, cuttings from 10.0 m to 0.9 m, bentonite holeplug from 0.9 m to 0.4 m, concrete from 0.4 m to 0.1 m, then asphalt from 0.1 m to surface.
11-12	Bentonite holeplug to 10.0 m, cuttings from 10.0 m to 0.9 m, bentonite holeplug from 0.9 m to 0.4 m, concrete from 0.4 m to 0.1 m, then asphalt from 0.1 m to surface.
11-13	Bentonite holeplug to 9.4 m, cuttings from 9.4 m to 0.9 m, bentonite holeplug from 0.9 m to 0.4 m, concrete from 0.4 m to 0.1 m, then asphalt from 0.1 m to surface.
11-14	Bentonite holeplug to 9.9 m, cuttings from 9.9 m to 0.4 m, bentonite holeplug from 0.4 m to 0.1 m, then asphalt from 0.1 m to surface.

Borehole Number	Completion Details
11-15	Bentonite holeplug to 9.7 m, cuttings from 9.7 m to 0.8 m, bentonite holeplug from 0.8 m to 0.4 m, concrete from 0.4 m to 0.1 m, then asphalt from 0.1 m to surface.
11-16	Bentonite holeplug to 10.0 m, cuttings from 10.0 m to 0.9 m, bentonite holeplug from 0.9 m to 0.4 m, concrete from 0.4 m to 0.1 m, then asphalt from 0.1 m to surface.
11-17	Bentonite holeplug to 9.7 m, cuttings from 9.7 m to 0.9 m, bentonite holeplug from 0.9 m to 0.4 m, concrete from 0.4 m to 0.1 m, then asphalt from 0.1 m to surface.
11-18	Bentonite holeplug to 9.7 m, cuttings from 9.7 m to 0.3 m, bentonite holeplug from 0.3 m to 0.1 m, then asphalt from 0.1 m to surface.
11-19	Bentonite holeplug to 9.7 m, cuttings from 9.7 m to 0.9 m, bentonite holeplug from 0.9 m to 0.4 m, concrete from 0.4 m to 0.1 m, then asphalt from 0.1 m to surface.
11-20	Bentonite holeplug to 1.0 m, concrete from 1.0 m to 0.1 m, then asphalt from 0.1 m to surface.
11-21	Bentonite holeplug to 10.0 m, cuttings from 10.0 m to 0.7 m, bentonite holeplug from 0.7 m to 0.4 m, concrete from 0.4 m to 0.1 m, then asphalt from 0.1 m to surface.
11-22	Bentonite holeplug to 9.7 m, cuttings from 9.7 m to 0.7 m, bentonite holeplug from 0.7 m to 0.4 m, concrete from 0.4 m to 0.1 m, then asphalt from 0.1 m 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 supervisor processed the recovered soil samples for transport to Thurber's laboratory for further examination and testing. Results of field sampling and testing are presented in the Record of Borehole sheets included in Appendix A.

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 also conducted on selected samples. The results of these laboratory tests are summarized on the Record of Borehole sheets included in Appendix A and are illustrated on the figures included in Appendix B.

4.0 SUBSURFACE CONDITIONS

4.1 General

This section presents a generalized summary of the subsurface conditions encountered in Boreholes 11-01 to 11-22. The detailed subsurface soil and groundwater conditions encountered in these boreholes are presented on the Record of Borehole sheets included in Appendix A. The factual data presented in the records of boreholes governs any interpretation of the site conditions. It must be recognized that the subsurface conditions vary between and beyond the borehole locations.

In general, the subsurface conditions encountered in the boreholes consist of pavement structure, and in some locations embankment fill, overlying native clayey silt to silty clay till. At some locations, the clayey silt to silty clay till is underlain by deposits of silt and sand till, sand and/or silt. Approximately half of the boreholes were dry upon completion of drilling.

4.2 Pavement Structure

Pavement structure consisting of asphalt overlying granular fill materials (sand fill) was encountered in all of the boreholes. The thickness of the asphalt ranged between 150 mm and 280 mm, and was typically greater than 230 mm. The granular fill consists of sand with trace to some gravel, and trace to some silt and clay, and was found to range between 0.6 m and 1.7 m in thickness. These soils are in a compact to very dense state as indicated by SPT 'N' values ranging from 11 to 75 blows per 0.3 m penetration. The base of the granular fill varies from Elevation 226.2 m to 308.6 m.

Selected samples of the sand fill were submitted for laboratory gradation testing, the results of which are summarized below. The grain size distribution curves for these samples are included in Figure B1 of Appendix B. The results of these tests are also summarized on the Record of Borehole sheets included in Appendix A. The measured moisture contents of the granular fill ranged from 0.5% to 19%.

Soil Particles	Percentage (%)
Gravel	0 to 10
Sand	81 to 88
Silt and Clay	9 to 16

4.3 Embankment Fill

Below the pavement structure, embankment fill was encountered in Boreholes 11-02, 11-04, 11-05, 11-08, 11-10, 11-11, 11-14 to 11-17, 11-19, 11-20, 11-21, and 11-22. The embankment fill consists of clayey silt to silty clay with sand and trace gravel and is brown to grey in colour. The thickness of the fill ranged from 0.4 m to 9.1 m and the base of the fill was found to vary between Elevations 227.4 m and 307.2 m.

SPT 'N' recorded in the embankment fill materials varied from 4 to 77 blows per 0.3 m penetration, indicating a firm to hard consistency. However, in most boreholes the embankment fill was found to have a firm to very stiff consistency. The measured moisture contents of the embankment fill material ranged from 9% to 28%, typically between 10% and 20%.

Selected samples of the embankment fill were submitted for gradation analysis and Atterberg Limits testing, the results of which are summarized below. Figure B2 of Appendix B presents the grain size distribution curves for these samples and Figure B13 illustrates the Atterberg Limits classification.

Soil Particles	Percentage (%)
Gravel	0 to 1
Sand	20 to 38
Silt	44 to 62
Clay	18 to 26

Index Property	Percentage (%)
Liquid Limit	21 to 28
Plastic Limit	13 to 15
Plasticity Index	8 to 14

The results of the Atterberg Limits tests show that the clayey silt to silty clay embankment fill is low plastic, with a group symbol of CL.

4.4 Clayey Silt to Silty Clay Till

A till deposit consisting of clayey silt to silty clay with sand and trace gravel was encountered in all but Borehole 11-19 either directly below the pavement structure or below the embankment fill described above. This deposit was typically brown changing to grey with increased depth. Where fully penetrated in Boreholes 11-03, 11-06, 11-07, 11-08, 11-21 and 11-22, the thickness of the clayey silt to silty clay till ranged from 4.8 m to 8.0 m. A maximum thickness of 10.1 m was encountered in one of the remaining boreholes (11-09) where this till deposit was not fully penetrated. Where fully penetrated, the base of the till was found to vary between Elevations 230.2 and 298.4 m.

SPT 'N' values measured in this till deposit ranged from 8 to 84 blows for 0.3 m penetration indicating a stiff to hard consistency. In many locations, the SPT 'N' values increase with depth. Occasional high 'N' values of greater than 50 blows for less than 0.3 m penetration are indicative of the presence of cobbles and/or boulders within the till deposit. Measured moisture contents of the clayey silt/silty clay till samples generally ranged from 10% to 20% with occasional lower and higher values.

Selected samples of the clayey silt to silty clay till were submitted for gradation analysis and Atterberg Limits testing. The results of these tests are summarized in the tables below as well as on the Record of Borehole sheets included in Appendix A. Figures B3 to B8 present the grain size distribution curves for these samples and Figures B14 to B19 illustrate the results of the Atterberg Limits tests.

Soil Particles	Percentage (%)
Gravel	0 to 4
Sand	4 to 39
Silt	35 to 56
Clay	13 to 60

Index Property	Percentage (%)
Liquid Limit	18 to 44
Plastic Limit	12 to 20
Plasticity Index	6 to 24

The results of the Atterberg Limits tests indicate that the clayey silt to silty clay till is generally low plastic, with a group symbol of CL. At a few selected locations, the silty clay till is medium plastic, with a group symbol of CI.

Glacial tills inherently contain cobbles and boulders, and were inferred by the refusal 'N' values recorded in the boreholes.

4.5 Sandy Silt to Silt and Sand Till

Deposits of sandy silt to silt and sand till were encountered below the clayey silt to silty clay till in Boreholes 11-03, 11-06, and 11-07 at depths of 6.1 m to 9.6 m. The thickness of the sandy silt to silt and sand till encountered in these boreholes ranged from 1.2 m to 5.0 m, though these deposits were not fully penetrated in any of these boreholes.

SPT 'N' values recorded in the sandy silt to silt and sand till deposits ranged from 75 blows for 0.3 m penetration to greater than 50 blows for less than 0.3 m penetration. These 'N' values indicate a very dense condition throughout, and possible presence of cobbles and boulders in the deposit. Measured moisture contents of the sandy silt to silt and sand till samples ranged from 4 % to 15%.

Selected samples from these deposits underwent laboratory gradation testing. Figure B9 in Appendix B shows the grain size distribution curves for these samples and the results are also summarized on the Record of Borehole sheets in Appendix A. The results of the gradation testing are summarized below.

Soil Particles	Percentage (%)
Gravel	0 to 3
Sand	13 to 63
Silt	35 to 82
Clay	2 to 10

4.6 Sandy Silt

A 3.2 m thick layer of sandy silt was encountered at a depth of 2.9 m, or Elevation 237.7m, in Borehole 11-04 below the clayey silt fill. Silt to sandy silt was also encountered at a depth of 8.7 m or Elevation 296.9 m in Borehole 11-22, below a thin layer of silty sand. Borehole 11-22 was terminated within this layer.

At Borehole 11-04, the SPT 'N' values ranged from 30 to 55 blows for 0.3 m penetration, indicating a dense condition. At BH11-22, SPT 'N' values recorded in the silt and sandy silt ranged from 18 to 28 blows for 0.3 m penetration, indicating a compact condition. Measured moisture contents of samples of the silt to sandy silt ranged from 10% to 20%.

Selected samples of the silt to sandy silt were subjected to gradation analysis, the results of which are summarized below. These results are also summarized on the Record of Borehole sheets in Appendix A. The grain size distribution curves for these samples are presented on Figures B10 and B11 of Appendix B.

Soil Particles	Percentage (%)
Gravel	0
Sand	4 to 20
Silt	66 to 85
Clay	11 to 14

4.7 Sand

Sand deposits containing some silt and clay were encountered at depths ranging from 6.1 to 10.3 m, or Elevations 234.5 to 298.4 m, in Boreholes 11-04, 11-08, 11-19, 11-21 and 11-22. At Boreholes 11-08 and 11-19, the sand was not fully penetrated. Where fully penetrated, the sand

deposits were found to range in thickness from 1.0 m to 3.8 m. A thin layer of sand, 0.2 m thick, was encountered in Borehole 11-03 within the silt and sand till deposit and in Borehole 11-18, a thin layer of sand (0.5 m thick) was encountered within the silty clay till.

SPT 'N' values recorded in the sand deposits ranged from 17 to 80 blows for 0.3 m penetration, indicating a compact to very dense condition. Measured moisture contents of samples of the sand typically ranged from 10 to 20%, with some lower values.

Selected sand samples were subjected to gradation testing, the results of which are summarized below. These results are also summarized on the Record of Borehole sheets included in Appendix A and the grain size distribution curves are presented on Figure B12 of Appendix B.

Soil Particles	Percentage (%)
Gravel	0
Sand	70 to 89
Silt	14 to 26
Clay	2 to 4
Silt and Clay	11 to 16

4.8 Groundwater Conditions

Groundwater conditions were observed during drilling and water levels were measured in the open borehole upon completion of drilling. Several of the boreholes were dry upon completion. The water levels measured in the open boreholes are summarized below.

Table 4.1 Water Level Measurements in Open Boreholes

Borehole Number	Date	Depth (m)	Elevation (m)
11-01	January 24, 2011	5.4	222.3
11-02	January 24, 2011	DRY	
11-03	January 25, 2011	DRY	
11-04	January 25, 2011	6.7	233.9
11-05	January 25, 2011	DRY	
11-06	January 25, 2011	DRY	
11-07	January 26, 2011	DRY	
11-08	January 26, 2011	6.7	240.5
11-09	January 26, 2011	DRY	
11-10	January 27, 2011	DRY	
11-11	January 27, 2011	DRY	
11-12	January 27, 2011	7.9	247.3
11-13	January 28, 2011	8.5	249.1
11-14	January 31, 2011	8.8	262.8
11-15	January 28, 2011	3.6	270.6
11-16	January 28, 2011	3.6	270.9
11-17	January 31, 2011	5.1	275.3
11-18	January 31, 2011	4.5	272.6
11-19	February 3, 2011	DRY	
11-20	May 3, 2011	DRY	
11-21	February 1, 2011	7.0	299.1
11-22	February 1, 2011	4.2	301.4

Based on the observations in the open boreholes, the water level varies between 3.6 and 8.8 m depth below ground surface. 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 marked the borehole locations in the field and obtained utility clearances prior to drilling. J.D. Barnes Limited surveyed the as-drilled locations, and provided northing and easting coordinates and ground surface elevations.

DBW Drilling Ltd of Ajax, Ontario supplied the drill rig and conducted the drilling, sampling and in-situ testing operations. 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 Ms. Eckie Siu of Thurber. Laboratory testing was carried out by Thurber in its MTO-approved Oakville laboratory.

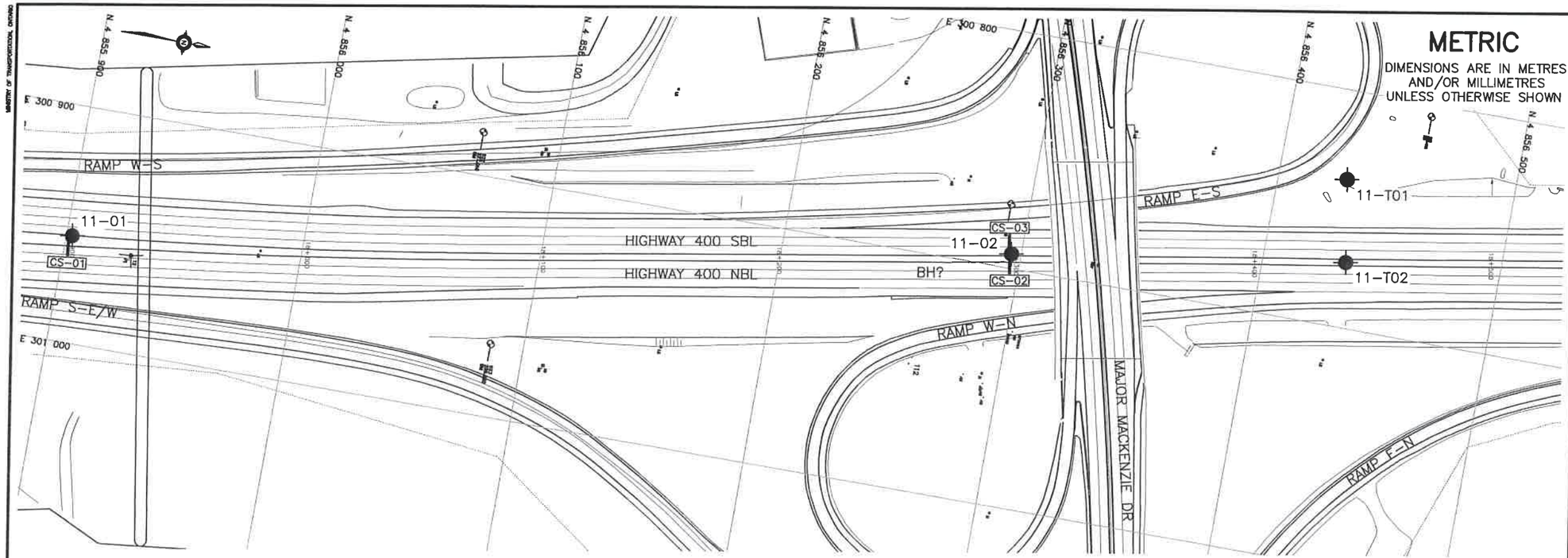
Mr. Mark Farrant, P.Eng provided overall direction of the field operations and Mrs. Lindsey Blaine, E.I.T prepared this report. Dr. P.K. Chatterji, P.Eng., a Designated Principal Contact for MTO Foundations projects, reviewed the report.

L. Blaine Dec. 19/11

Lindsey Blaine, E.I.T
Project Manager

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

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



PLAN

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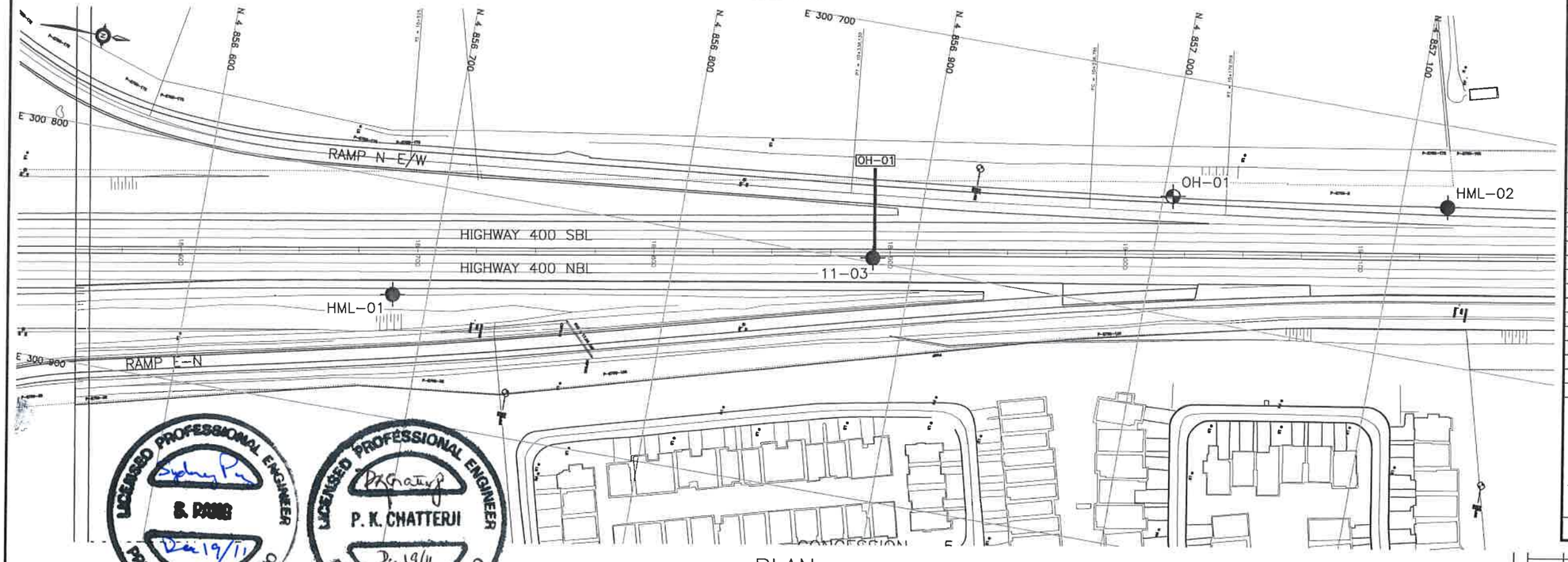

PLAN

40 0 40 80m

SCALE 1:2000

METRIC

DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN

HIGHWAY 400
CONT No
GWP No 2539-04-00

HWY 400 WIDENING
OVERHEAD & CANTILEVERED
SIGN SUPPORTS
BOREHOLE LOCATIONS PLAN

SHEET

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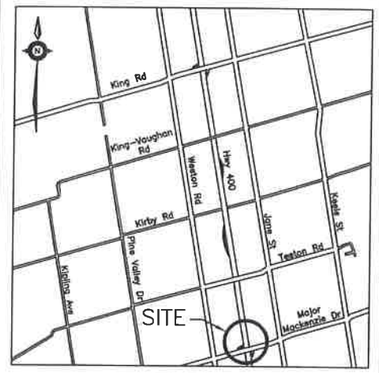

KEYPLAN

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
11-01	227.7	4 855 902.6	300 955.0
11-02	229.7	4 856 296.0	300 893.8
11-03	236.3	4 856 883.1	300 798.1
HML-01	233.9	4 856 685.5	300 848.3
HML-02	239.0	4 857 119.6	300 734.1
OH-01	236.3	4 857 004.0	300 750.4

-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. 30M13-194

LICENSED PROFESSIONAL ENGINEER
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Dec 19/11
PROVINCE OF ONTARIO

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P. K. CHATTERJI
Dec 19/11
PROVINCE OF ONTARIO

REVISIONS		
DATE	BY	DESCRIPTION

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

FILENAME: H:\Drafting\19\22\06 Hwy400\ed9288-BoreholePlan.dwg
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METRIC

DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN

HIGHWAY 400
CONT No
GWP No 2539-04-00

HWY 400 WIDENING
OVERHEAD & CANTILEVERED SIGN SUPPORTS
BOREHOLE LOCATIONS PLAN

SHEET

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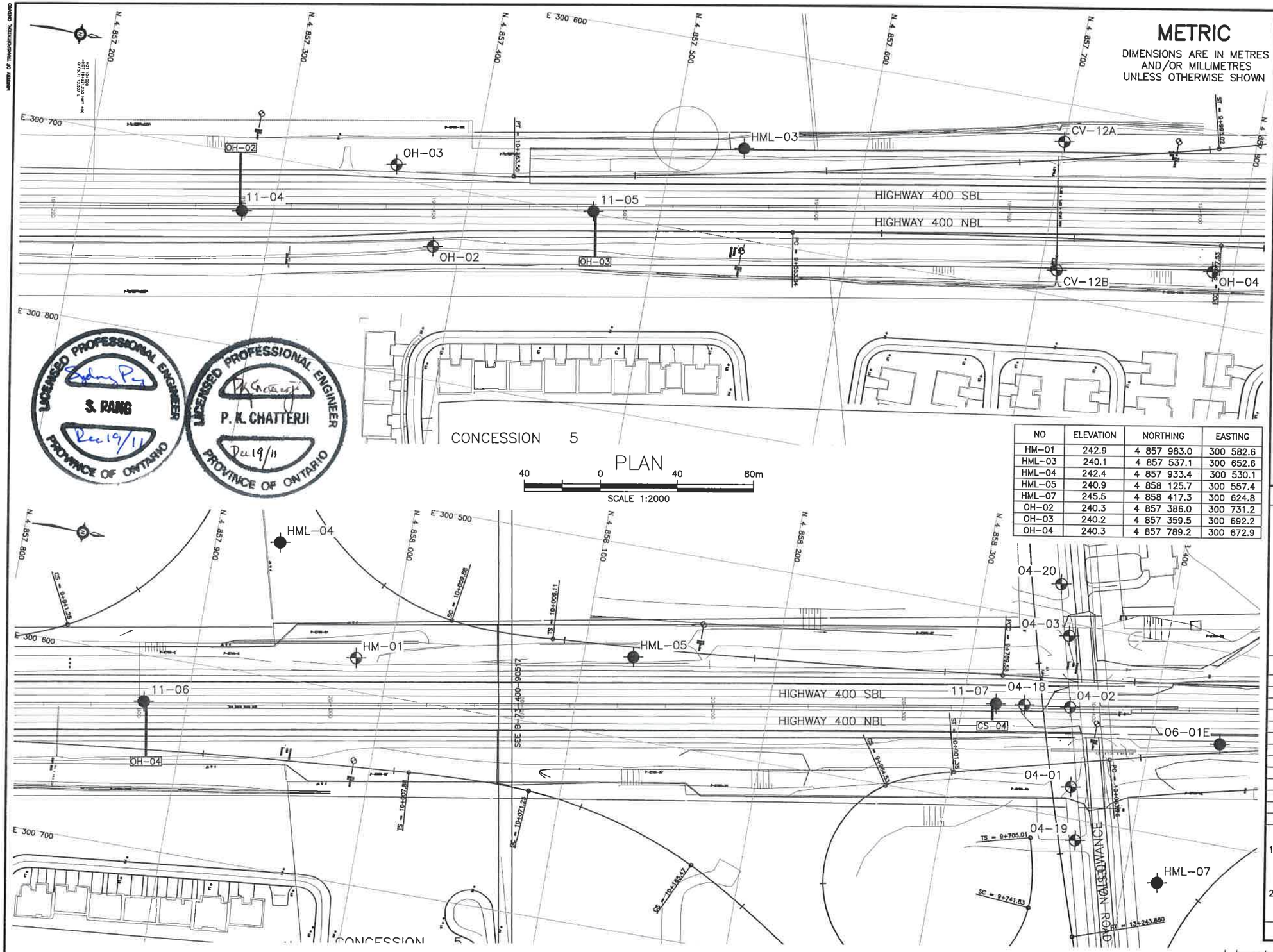
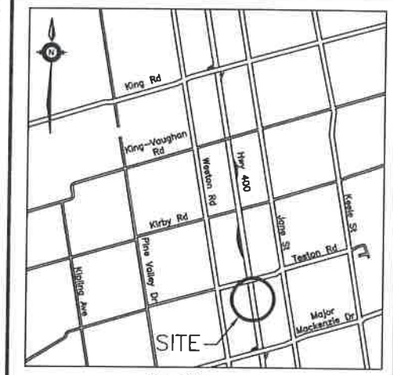


NO	ELEVATION	NORTHING	EASTING
HM-01	242.9	4 857 983.0	300 582.6
HML-03	240.1	4 857 537.1	300 652.6
HML-04	242.4	4 857 933.4	300 530.1
HML-05	240.9	4 858 125.7	300 557.4
HML-07	245.5	4 858 417.3	300 624.8
OH-02	240.3	4 857 386.0	300 731.2
OH-03	240.2	4 857 359.5	300 692.2
OH-04	240.3	4 857 789.2	300 672.9



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
04-01	245.0	4 858 363.9	300 583.6
04-02	239.0	4 858 356.0	300 542.9
04-03	244.2	4 858 348.8	300 506.4
04-18	239.5	4 858 332.0	300 546.0
04-19	245.4	4 858 371.2	300 610.7
04-20	243.5	4 858 339.9	300 480.6
06-01E	238.1	4 858 436.6	300 547.8
11-04	240.6	4 857 283.8	300 729.9
11-05	241.4	4 857 465.5	300 698.7
11-06	243.8	4 857 877.7	300 623.8
11-07	239.6	4 858 317.2	300 548.1
CV-12A	239.3	4 857 699.9	300 619.9
CV-12B	240.0	4 857 708.5	300 686.8

-NOTES-

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REVISIONS		
DATE	BY	DESCRIPTION

DESIGN	SKP	CHK	PKC	CODE		LOAD	
DRAWN	MFA	CHK	PKC	SITE		STRUCT	DWG 2

DATE DEC. 2011

LICENSED PROFESSIONAL ENGINEER S. RANG Dec 19/11 PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER P. K. CHATTERJI Dec 19/11 PROVINCE OF ONTARIO

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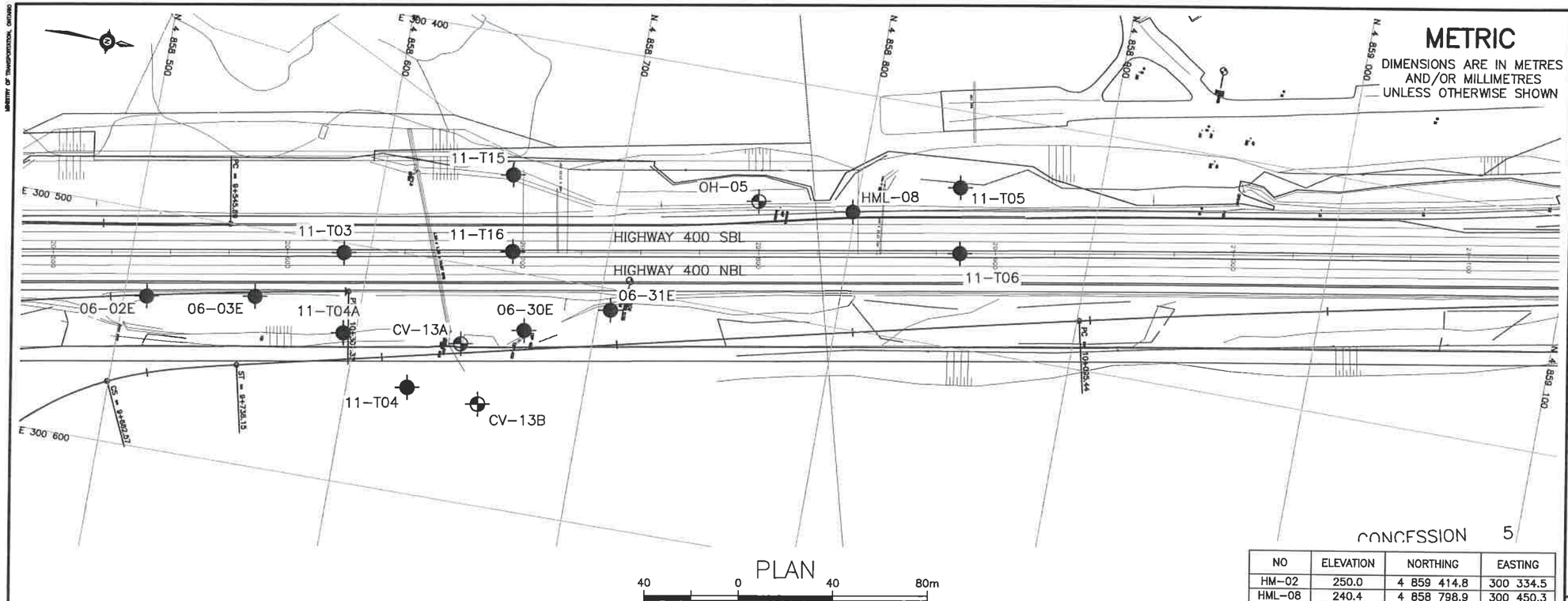

METRIC

DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN

NO	ELEVATION	NORTHING	EASTING
HM–02	250.0	4 859 414.8	300 334.5
HML–08	240.4	4 858 798.9	300 450.3
HML–09	246.3	4 859 107.8	300 393.7
OH–05	239.9	4 858 758.9	300 452.7

HIGHWAY 400
CONT No
GWP No 2539–04–00

HWY 400 WIDENING
OVERHEAD & CANTILEVERED SIGN SUPPORTS
BOREHOLE LOCATIONS PLAN

SHEET

SNC·LAVALIN

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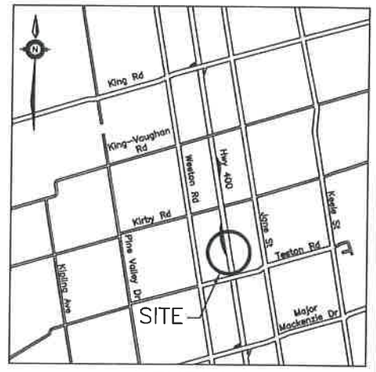

KEYPLAN

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
06–02E	236.9	4 858 509.7	300 536.5
06–03E	236.7	4 858 555.2	300 528.8
06–04W	246.1	4 859 096.3	300 383.5
06–05W	240.9	4 859 131.2	300 359.1
06–06W	249.5	4 859 182.8	300 352.5
06–30E	233.0	4 858 670.5	300 523.6
06–31E	238.2	4 858 705.1	300 508.9
11–08	247.2	4 859 141.5	300 412.5
11–09	249.4	4 859 400.1	300 368.3
11–10	251.0	4 859 723.2	300 313.0
C14	–	4 859 205.9	300 438.2
CV–13A	229.0	4 858 645.1	300 533.6
CV–13B	229.7	4 858 656.8	300 557.6

-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. 30M13-194

LICENSED PROFESSIONAL ENGINEER S. RAMB PROVINCE OF ONTARIO Dec 19/11

LICENSED PROFESSIONAL ENGINEER P. K. CHATTERJI PROVINCE OF ONTARIO Dec 19/11

REVISIONS		
DATE	BY	DESCRIPTION

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

DATE DEC. 2011
DWG 3

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PLOTDATE: 12/19/2011 1:46 PM

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
OVERHEAD & CANTILEVERED SIGN SUPPORTS
BOREHOLE LOCATIONS PLAN

SHEET

SNC·LAVALIN

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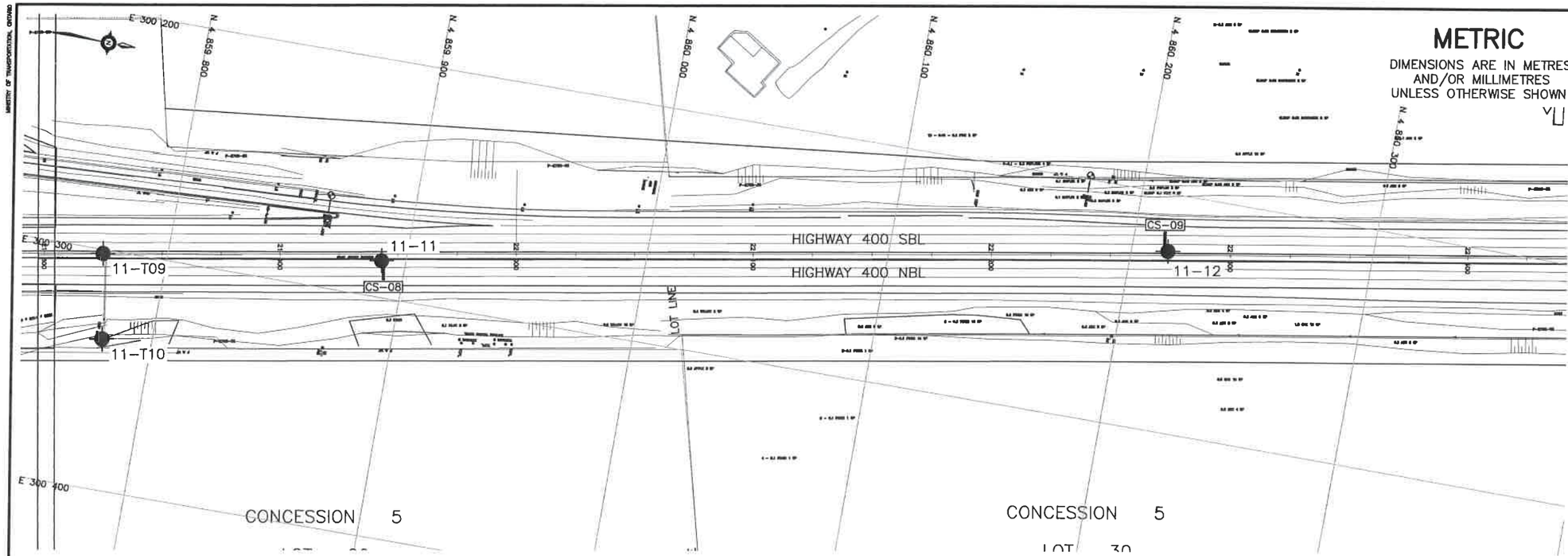
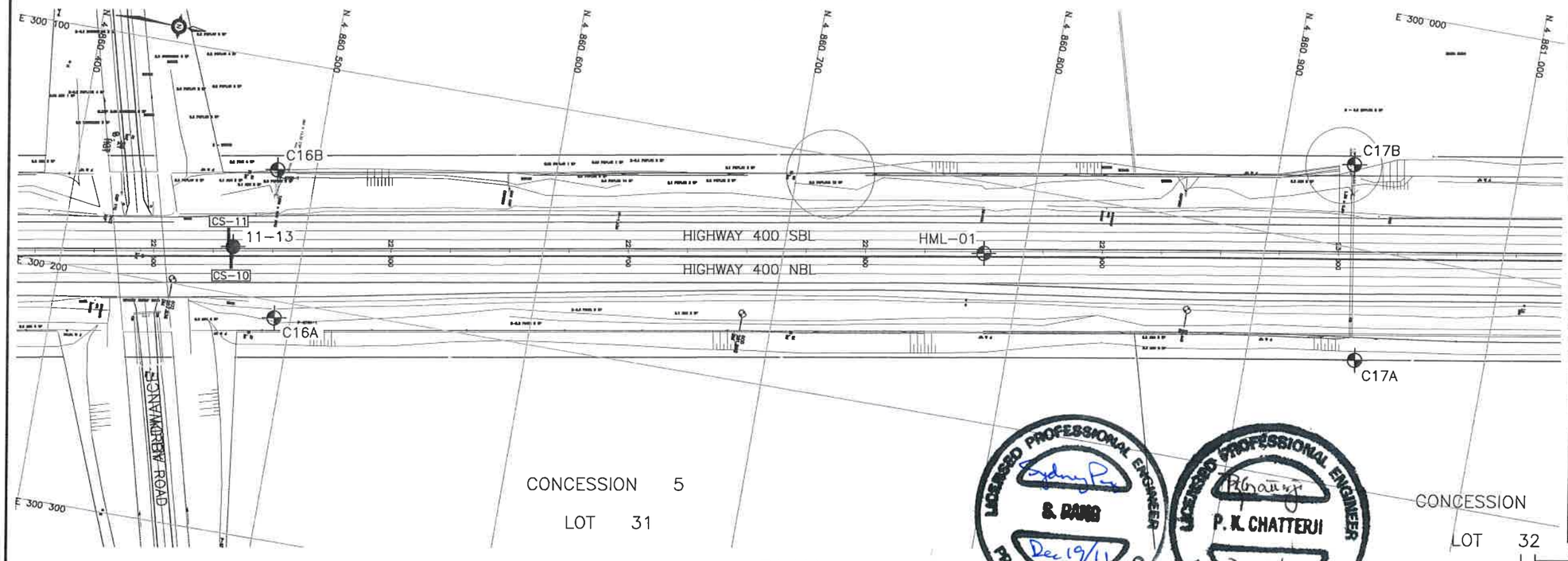


PLAN

40 0 40 80m

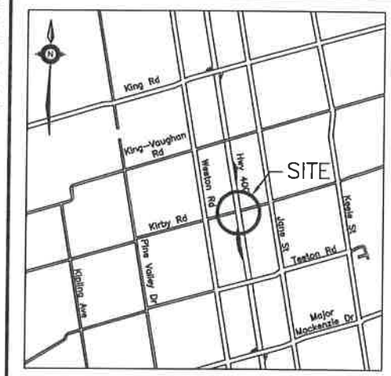
SCALE 1:2000



PLAN

40 0 40 80m

SCALE 1:2000



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
11-11	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
C17A	–	4 860 945.9	300 146.3
C17B	–	4 860 931.1	300 065.6
HML-01	–	4 860 783.4	300 129.6

-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. 30M13-194

LICENSED PROFESSIONAL ENGINEER
S. PANG
Dec 19/11
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
P. K. CHATTERJI
Dec 19/11
PROVINCE OF ONTARIO

REVISIONS		
DATE	BY	DESCRIPTION

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

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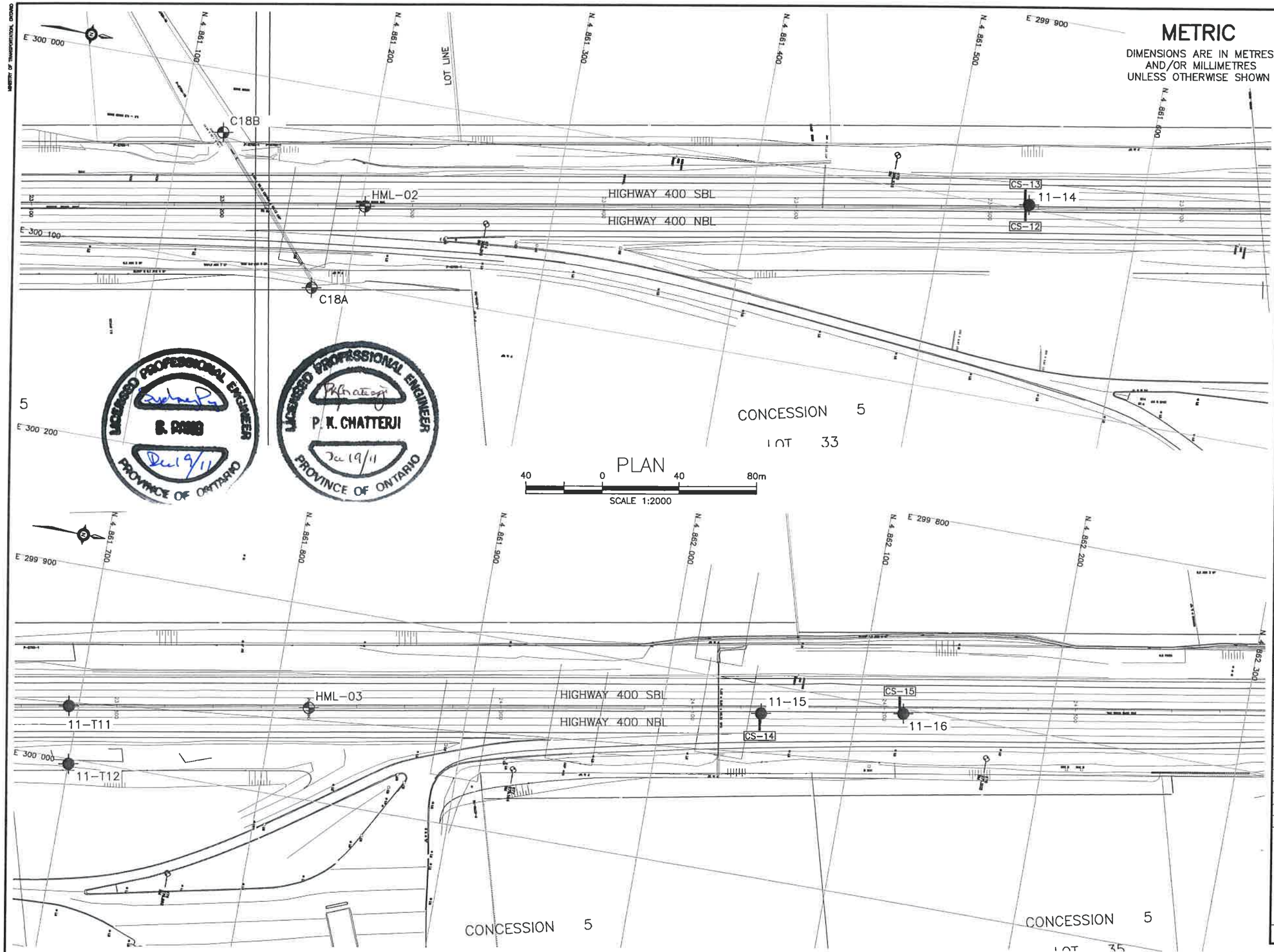

LICENSED PROFESSIONAL ENGINEER
B. PANG
Dec 19/11
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
P. K. CHATTERJI
Dec 19/11
PROVINCE OF ONTARIO

METRIC

DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN

HIGHWAY 400
CONT No
GWP No 2539-04-00

HWY 400 WIDENING
OVERHEAD & CANTILEVERED
SIGN SUPPORTS
BOREHOLE LOCATIONS PLAN

SHEET

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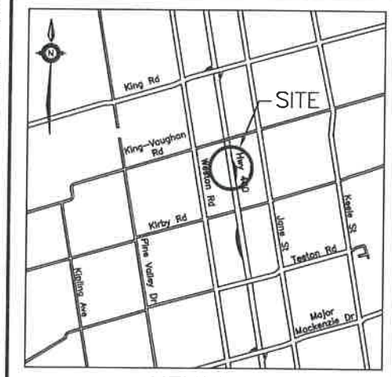

KEYPLAN

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
11-14	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
C18A	--	4 861 182.3	300 104.4
C18B	--	4 861 122.0	300 032.7
HML-02	--	4 861 202.4	300 058.0
HML-03	--	4 861 818.4	299 952.6

-NOTES-

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2) This drawing is for subsurface information only. Surface details and features are for conceptual illustration.

GEOCRES NO. 30M13-194

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

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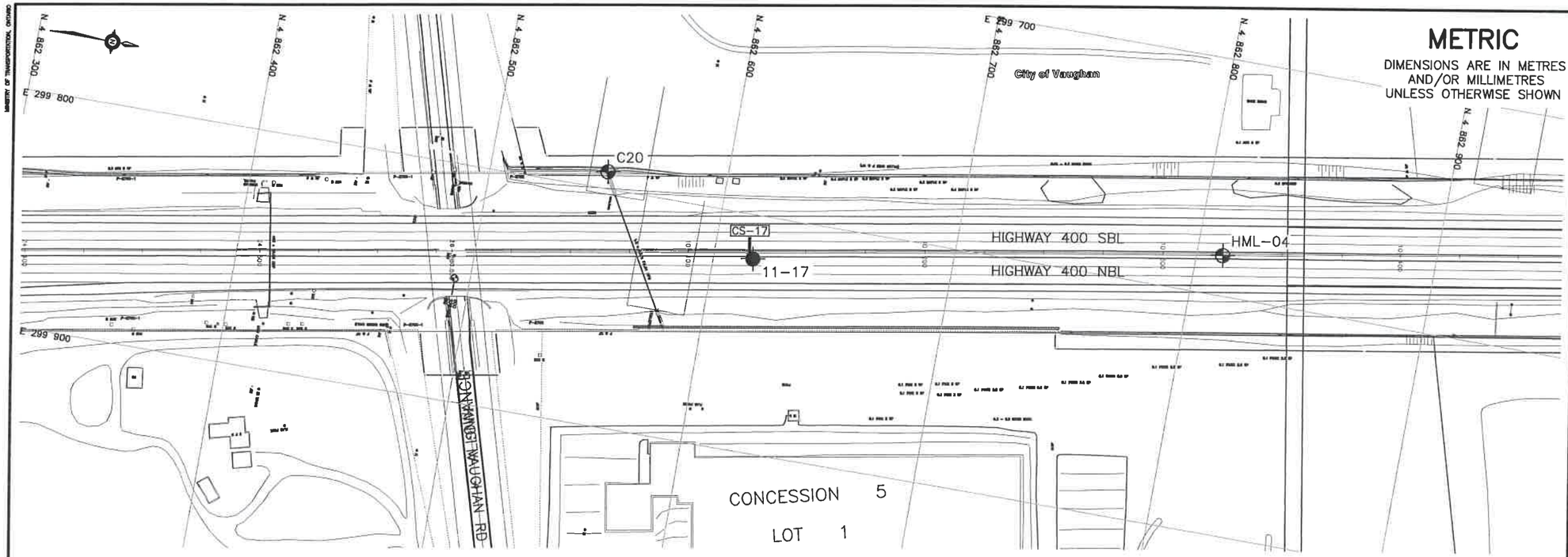
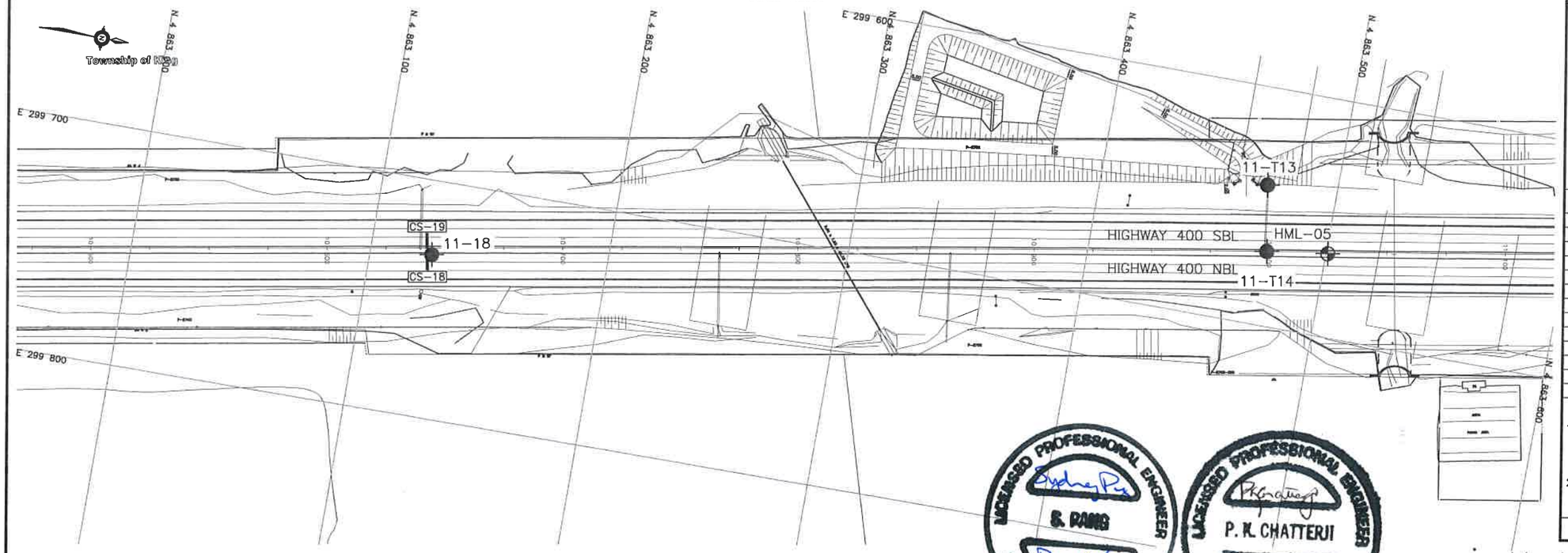
MINISTRY OF TRANSPORTATION ONTARIO



PLAN

40 0 40 80m

SCALE 1:2000



PLAN

40 0 40 80m

SCALE 1:2000

METRIC

DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN

HIGHWAY 400
CONT No
GWP No 2539-04-00

HWY 400 WIDENING
OVERHEAD & CANTILEVERED
SIGN SUPPORTS
BOREHOLE LOCATIONS PLAN

SHEET

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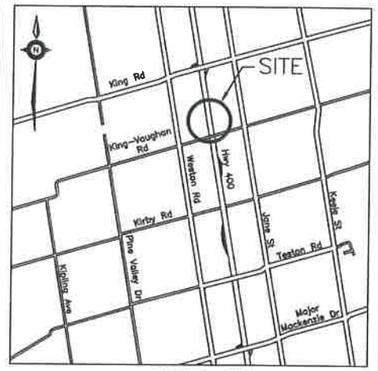

KEYPLAN

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
HML-04	–	4 862 810.8	299 782.9
HML-05	–	4 863 500.8	299 664.9

-NOTES-

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GEOCRES NO. 30M13-194

REVISIONS			
DATE	BY	DESCRIPTION	
DESIGN SKP	CHK PKC	CODE	LOAD
DRAWN MFA	CHK PKC	SITE	STRUCT
		DATE DEC. 2011	DWG 6

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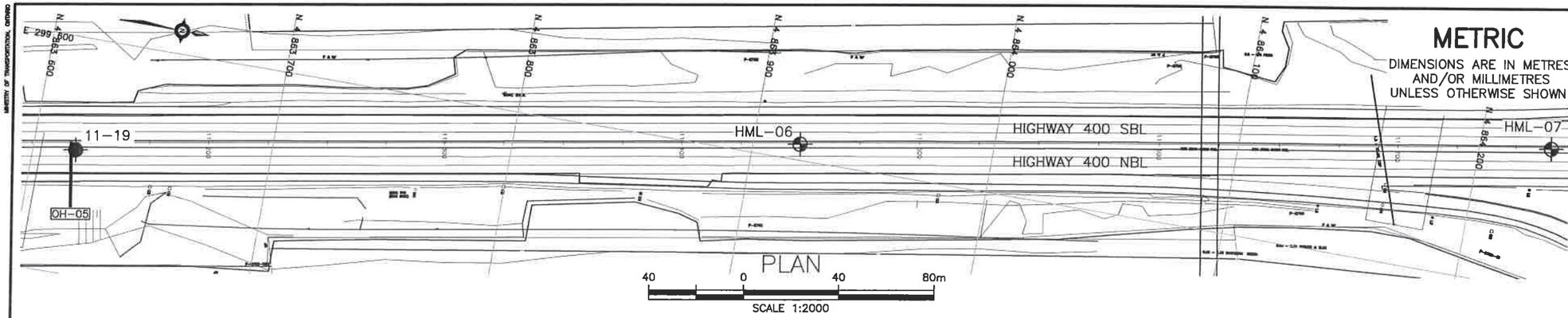
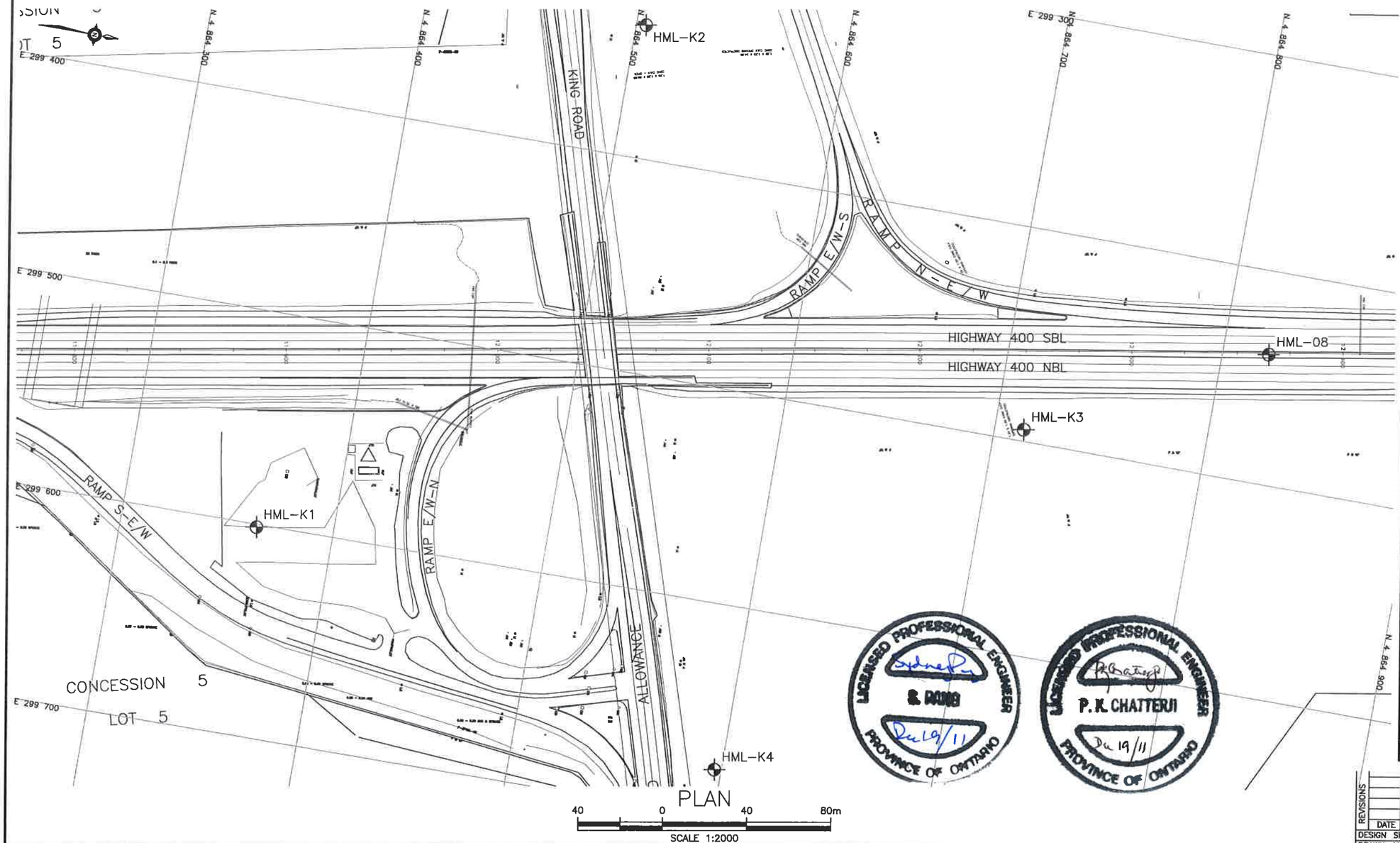


PLAN

40 0 40 80m

SCALE 1:2000



PLAN

40 0 40 80m

SCALE 1:2000

METRIC

DIMENSIONS ARE IN METRES AND/OR MILLIMETRES UNLESS OTHERWISE SHOWN

HIGHWAY 400
CONT No
GWP No 2539-04-00

HWY 400 WIDENING
OVERHEAD & CANTILEVERED
SIGN SUPPORTS
BOREHOLE LOCATIONS PLAN

SHEET

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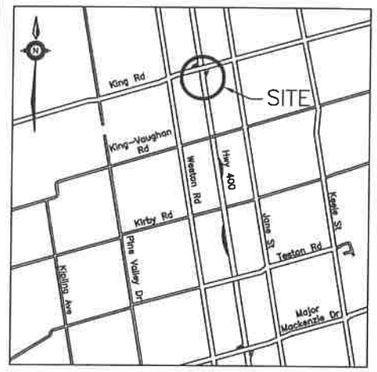

KEYPLAN

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
HML-06	–	4 863 919.7	299 593.2
HML-07	–	4 864 230.3	299 540.3
HML-08	–	4 864 821.7	299 439.1
HML-K1	–	4 864 363.7	299 601.3
HML-K2	–	4 864 504.6	299 337.6
HML-K3	–	4 864 713.6	299 494.5
HML-K4	–	4 864 596.8	299 677.5

-NOTES-

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GEOCRES NO. 30M13-194

LICENSED PROFESSIONAL ENGINEER
S. RUNJI
PROVINCE OF ONTARIO
Dec 19/11

LICENSED PROFESSIONAL ENGINEER
P.K. CHATTERJI
PROVINCE OF ONTARIO
Dec 19/11

REVISIONS		
DATE	BY	DESCRIPTION

DESIGN	SKP	CHK	PKC	CODE	LOAD	DATE	DEC. 2011
DRAWN	MFA	CHK	PKC	SITE	STRUCT	DWG	7

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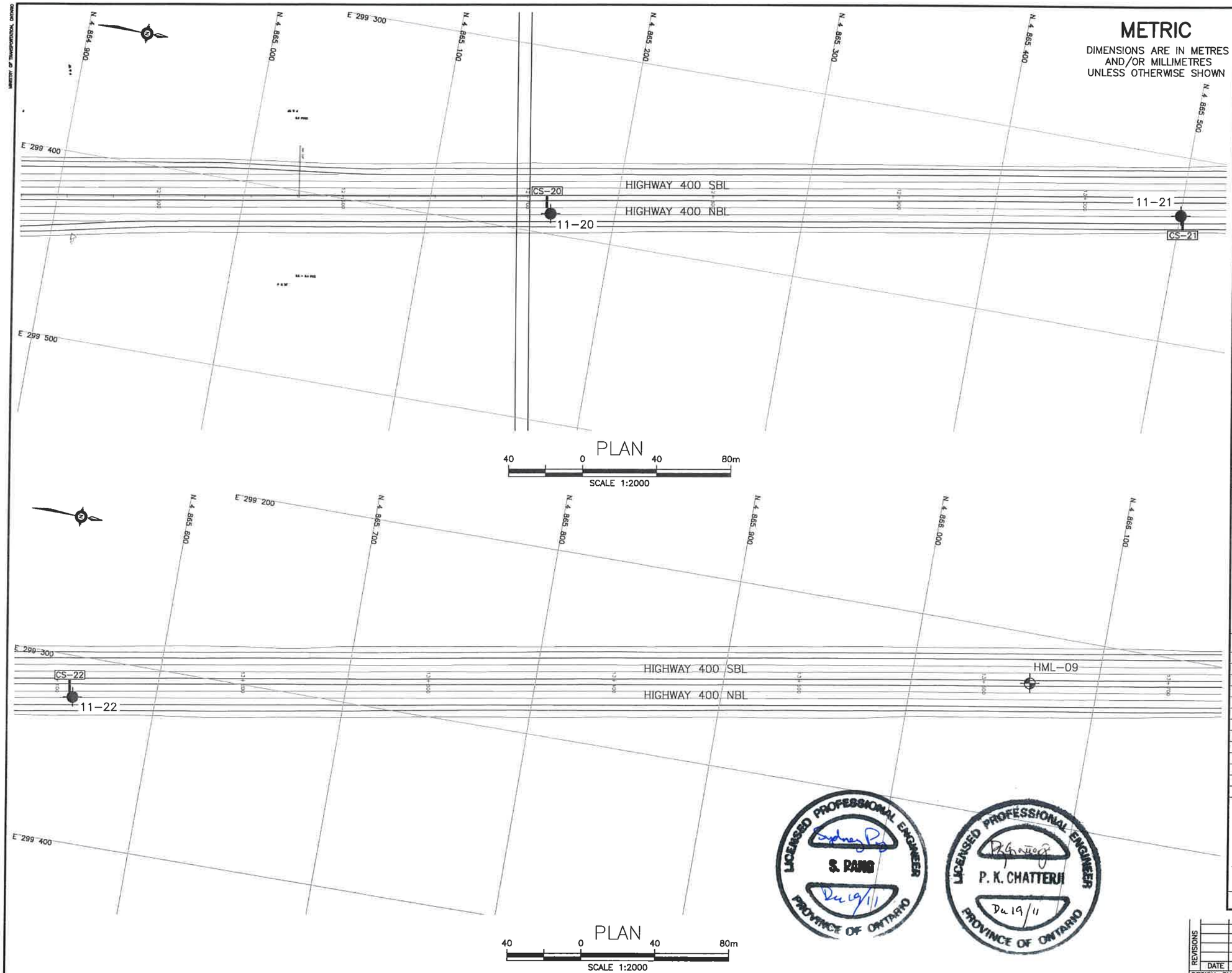
PLOTDATE: 12/19/2011 1:47 PM

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
OVERHEAD & CANTILEVERED SIGN SUPPORTS
BOREHOLE LOCATIONS PLAN

SHEET

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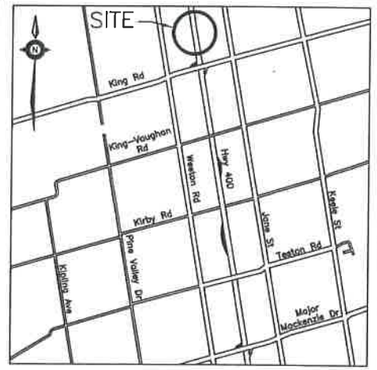

KEYPLAN

	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
11-20	309.3	4 865 165.7	299 389.0
11-21	306.1	4 865 500.3	299 331.6
11-22	305.6	4 865 555.8	299 322.0
HML-09	–	4 866 063.6	299 226.6

-NOTES-

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GEOCRES NO. 30M13-194

LICENSED PROFESSIONAL ENGINEER
S. PAINE
Dec 19/11
PROVINCE OF ONTARIO

LICENSED PROFESSIONAL ENGINEER
P. K. CHATTERJI
Dec 19/11
PROVINCE OF ONTARIO

REVISIONS		
DATE	BY	DESCRIPTION

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

DATE DEC. 2011
DWG B

FILENAME: H:\Drafting\19\92\68 Hwy400\Jan9258-BoreholePlan.dwg
PLOTDATE: 12/19/2011 1:47 PM

Appendix A

Record of Boreholes

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-01 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 855 902.6 E 300 955.0 ORIGINATED BY ES
HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2011.01.24 - 2011.01.24 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 γ kN/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
227.7											
0.0	**ASPHALT:** (150mm)										
0.2	**SAND**, trace to some gravel, trace silt Dense Brown Moist (FILL)		1	GS					○		
			1	SS	33		227		○		10 81 9 (SI+CL)
226.2											
1.5	Clayey **SILT**, with sand, trace gravel Stiff to Very Stiff Brown Moist (TILL)		2	SS	14		226		○		
			3	SS	8		225		○		
			4	SS	15		224		⊢		0 39 48 13
223.6											
4.1	Becomes hard		5	SS	38	▽	223		○		
	Becomes grey		6	SS	34		222		○		
			7	SS	36		221		○		
			8	SS	33		220		○		1 25 53 21
							219				
							218				

Continued Next Page

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

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

ONTMT4S 9268.GPJ 10/31/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-01 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 855 902.6 E 300 955.0 ORIGINATED BY ES
HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2011.01.24 - 2011.01.24 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/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						GR SA SI CL
	Continued From Previous Page										
216.4	Clayey **SILT**, with sand, trace gravel Stiff to Hard Grey Moist (TILL)		9	SS	29		217		○		
11.3	END OF BOREHOLE AT 11.3m. BOREHOLE OPEN TO 9.7m AND WATER LEVEL AT 5.4m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 9.4m, CUTTINGS TO 0.6m, CONCRETE TO 0.1m, THEN ASPHALT TO SURFACE.										

+ ³, × ³: Numbers refer to Sensitivity

20
15 ⊕ 5
10
(%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 10/31/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-02 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 856 296.0 E 300 893.8 ORIGINATED BY ES
HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2011.01.24 - 2011.01.24 CHECKED BY MEF

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
229.7									
0.0	**ASPHALT:** (240mm)								
0.2	**SAND,** some gravel Brown Moist		1	GS					
229.0	(FILL)						229		
0.7	**SAND,** some silt, trace gravel Compact Brown Moist (FILL)		1	SS	15				0 84 16 (SI+CL)
227.8			2	SS	12		228		
1.9	Clayey **SILT,** some sand, trace gravel Stiff								
227.4	Grey (FILL)								
2.3	Clayey **SILT,** with sand, trace gravel Very Stiff Brown		3	SS	21		227		
226.7	(TILL)								
3.0	Becomes hard		4	SS	42		226		0 34 48 18
	Becomes grey		5	SS	45		225		
			6	SS	70		224		
							223		
			7	SS	43		222		0 24 54 22
			8	SS	38		221		
							220		

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

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

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

ONTMT4S 9268.GPJ 10/31/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-02 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 856 296.0 E 300 893.8 ORIGINATED BY ES
HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2011.01.24 - 2011.01.24 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										
218.4	Clayey **SILT**, with sand, trace gravel Hard Grey (TILL)		9	SS	45		219		o		
11.3	END OF BOREHOLE AT 11.3m. BOREHOLE OPEN TO 10.6m AND DRY UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 9.1m, CUTTINGS TO 1.8m, 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

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Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-03 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 856 883.1 E 300 798.1 ORIGINATED BY ES
HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2011.01.25 - 2011.01.25 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
236.3											
0.0	**ASPHALT:** (200mm)										
0.2	**SAND**, some gravel Brown Moist (FILL)		1	GS			236				
235.6											
0.7	**SAND**, fine grained, trace gravel Dense Brown Moist (FILL)		1	SS	35						
235.0							235				
1.3	Clayey **SILT**, with sand, trace gravel Stiff to Very Stiff Brown Moist (TILL)		2	SS	9						
			3	SS	10		234				2 33 47 18
			4	SS	21		233				
232.2											
4.1	Hard		5	SS	50/.150		232				
230.8											
5.5							231				
230.2											
6.1	**SILT** and **SAND**, some clay, trace gravel Very Dense Brown Moist (TILL)		6	SS	85		230				3 43 44 10
228.6											
228.5 7.7	**SAND**, some silt and clay		7	SS	81/0.280		229				0 85 15 (SI+CL)
7.9							228				
			8	SS	50/.150		227				

Continued Next Page

+ 3 , × 3 : Numbers refer to Sensitivity

20 15 5 10 (%) STRAIN AT FAILURE

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RECORD OF BOREHOLE No 11-03 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 856 883.1 E 300 798.1 ORIGINATED BY ES
HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2011.01.25 - 2011.01.25 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										
225.2	**SILT** and **SAND**, trace clay, trace gravel Very Dense Brown Moist (TILL)		9	SS	75		226		o		0 63 35 2
11.1	END OF BOREHOLE AT 11.1m. BOREHOLE OPEN AND DRY UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 9.8m, CUTTINGS TO 0.9m, CONCRETE TO 0.1m, THEN ASPHALT TO SURFACE.										

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

15 20 10 5 (%) STRAIN AT FAILURE

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Ontario

RECORD OF BOREHOLE No 11-04 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 857 283.8 E 300 730.0 ORIGINATED BY ES
HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2011.01.25 - 2011.01.25 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
240.6											
0.0 / 240.3	**ASPHALT:** (250mm)										
0.3 / 240.0	**SAND**, some gravel Brown Moist (FILL)		1	GS							
0.6 / 239.4	**SAND**, fine grained, trace gravel Compact Brown Moist (FILL)		1	SS	11		240				
1.2 / 237.7	Clayey **SILT**, some sand, trace gravel Firm to Stiff Brown Moist (FILL)		2	SS	9		239				
			3	SS	7		238				
2.9 / 234.5	Sandy **SILT**, some clay, trace gravel Dense to Very Dense Brown Moist		4	SS	30		237				0 20 66 14
			5	SS	55		236				
6.1 / 230.7	**SAND**, fine grained, some silt, trace clay Dense to Very Dense Brown Moist to Wet		6	SS	50	▽	235				
			7	SS	32		234				0 84 14 2
			8	SS	57		233				
							232				
							231				

Continued Next Page

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

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

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RECORD OF BOREHOLE No 11-04 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 857 283.8 E 300 730.0 ORIGINATED BY ES
HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2011.01.25 - 2011.01.25 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										
9.9	Silty **CLAY**, with sand, trace gravel Hard Grey Moist (TILL)						230				
229.3			9	SS	72				⊢●⊣		0 21 48 31
11.3	END OF BOREHOLE AT 11.3m. BOREHOLE OPEN AND WATER LEVEL AT 6.7m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 9.7m, CUTTINGS TO 0.6m, CONCRETE TO 0.1m, THEN ASPHALT TO SURFACE.										

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

20
15 5
10
(%) STRAIN AT FAILURE

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Ontario

RECORD OF BOREHOLE No 11-05 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 857 465.5 E 300 698.7 ORIGINATED BY ES
HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2011.01.25 - 2011.01.25 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
241.4										
0.0 / 241.2	**ASPHALT:** (250mm)									
0.3 / 240.9	**SAND**, some gravel Brown Moist		1	GS			241			
0.6	(FILL)									
	SAND, fine grained, trace gravel Dense Brown Moist		1	SS	31					
239.9	(FILL)						240			
1.5	Clayey **SILT**, some sand, trace gravel Very Stiff Brown		2	SS	18					
239.2	(FILL)									
2.3	Silty **CLAY**, with sand, trace gravel Very Stiff to Hard Brown Moist (TILL)		3	SS	26		239			
			4	SS	22		238			0 25 49 26
	Becomes grey									
			5	SS	29		237			
							236			
			6	SS	40		235			
							234			
			7	SS	45					0 24 56 20
							233			
	Occasional cobbles		8	SS	47		232			

Continued Next Page

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

(%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 10/31/11

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THURBER

RECORD OF BOREHOLE No 11-05 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 857 465.5 E 300 698.7 ORIGINATED BY ES

HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN

DATUM Geodetic DATE 2011.01.25 - 2011.01.25 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										
230.2	Silty **CLAY**, with sand, trace gravel Hard Grey Moist (TILL)		9	SS	39		231		○		
11.3	END OF BOREHOLE AT 11.3m. BOREHOLE OPEN AND DRY UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 8.8m, CUTTINGS TO 0.6m, CONCRETE TO 0.2m, THEN ASPHALT TO SURFACE.										

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

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

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Ontario

RECORD OF BOREHOLE No 11-06 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 857 877.7 E 300 623.8 ORIGINATED BY ES
HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2011.01.25 - 2011.01.25 CHECKED BY SKP

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 (20 40 60 80 100) o UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE	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
243.8											
0.0 / 243.5	**ASPHALT:** (280mm)										
0.3 / 243.2	**SAND**, some gravel Brown Moist (FILL)		1	GS							
0.6	**SAND**, fine grained, trace gravel Dense Brown Moist (FILL)		1	SS	32		243				
242.2 / 1.6	Silty **CLAY**, with sand, trace gravel Stiff Brown (TILL)		2	SS	11		242				
			3	SS	9		241				
			4	SS	9						0 33 45 22
	Becomes hard						240				
			5	SS	40		239				
							238				
	Occasional cobbles		6	SS	84						
							237				
			7	SS	42		236				0 20 46 34
							235				
			8	SS	50/.100						
234.2 / 9.6	Sandy **SILT**, trace gravel Very Dense						234				

Continued Next Page

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

(%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 10/31/11

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RECORD OF BOREHOLE No 11-06 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 857 877.7 E 300 623.8 ORIGINATED BY ES
HWY 400 BOREHOLE TYPE Solid Stem Augers COMPILED BY AN
DATUM Geodetic DATE 2011.01.25 - 2011.01.25 CHECKED BY SKP

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 (%) GR SA SI CL
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						
	Continued From Previous Page										
233.0	Sandy **SILT**, trace gravel Brown Moist (TILL)		9	SS	50/				o		
10.8	END OF BOREHOLE AT 10.8m. BOREHOLE OPEN AND DRY UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 9.4m, CUTTINGS TO 0.9m, BENTONITE HOLEPLUG TO 0.6m, CONCRETE TO 0.1m, THEN ASPHALT TO SURFACE.				,150		233				

+ ³, × ³: Numbers refer to Sensitivity

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

ONTMT4S 9268.GPJ 10/31/11

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RECORD OF BOREHOLE No 11-07 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 858 317.2 E 300 548.2 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	NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT (20 40 60 80 100) / SHEAR STRENGTH kPa (20 40 60 80 100): ○ UNCONFINED, ● QUICK TRIAXIAL, + FIELD VANE, × LAB VANE	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
239.6											
0.0 / 239.3	**ASPHALT:** (280mm)										
0.3 / 239.0	**SAND**, some gravel Brown Moist		1	GS			239				
0.6	(FILL)										
	SAND, trace gravel Compact Brown Moist (FILL)		1	SS	25						
238.2 / 1.3							238				
	Silty **CLAY**, with sand, trace gravel Very Stiff Grey		2	SS	28						
237.4 / 2.2	(TILL)										
	Becomes hard		3	SS	37		237				3 25 50 22
			4	SS	30						
							236				
			5	SS	33		235				3 25 47 25
							234				
			6	SS	50/.125						
232.4							233				
7.2	Sandy **SILT**, trace clay, occasional oxide staining Very Dense Brown Moist (TILL)		7	SS	50/.100		232				0 13 82 5
							231				
			8	SS	52/0.150						
							230				

Continued Next Page

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

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

ONTMT4S 9268.GPJ 10/31/11

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RECORD OF BOREHOLE No 11-07 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 858 317.2 E 300 548.2 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: ○ 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													
228.6	Sandy **SILT**, trace clay Very Dense Moist (TILL)		9	SS	50/.150		229		○		0	30	66	4
11.0	END OF BOREHOLE AT 11.0m. BOREHOLE OPEN AND DRY UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 9.1m, CUTTINGS TO 0.8m, 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 10/31/11

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RECORD OF BOREHOLE No 11-08 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 859 141.5 E 300 412.5 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	NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
247.2									
0.0 / 246.9	**ASPHALT:** (280mm)								
0.3 / 246.5	**SAND**, some gravel Brown Moist (FILL)		1	GS			247		
0.6 / 245.9	**SAND**, fine grained Compact Brown Moist (FILL)		1	SS	18		246		
1.2	Clayey **SILT**, some sand, trace gravel Firm to Stiff Brown Moist (FILL) Dark grey from 2.3m to 3.4m		2	SS	10		245		
			3	SS	9				
			4	SS	5		244		
242.6							243		
4.6	Silty **CLAY**, with sand, trace gravel Hard Brown Moist (TILL)		5	SS	32				0 22 50 28
			6	SS	35	▽	242		
240.0							241		
7.2	**SILT** and **SAND**, trace clay Compact Grey Moist						240		0 37 58 5
239.3									
7.8			7	SS	10		239		
			8	SS	33		238		1 31 44 24

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 10/31/11

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RECORD OF BOREHOLE No 11-08 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 859 141.5 E 300 412.5 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: ○ 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										
236.9							237				
10.2	**SAND**, some silt Very Dense Grey Moist										
			9	SS	80				○		
236.0											
11.1	END OF BOREHOLE AT 11.1m. BOREHOLE OPEN AND WATER LEVEL AT 6.7m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 9.6m, 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 10/31/11

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RECORD OF BOREHOLE No 11-09 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 859 400.1 E 300 368.3 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	NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	UNIT WEIGHT γ kN/m³	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		
0.6 / 248.2	**SAND**, fine grained Compact Brown Moist (FILL)		1	SS	11		248		
1.2	Silty **CLAY**, with sand, trace gravel Very Stiff to Hard Brown Moist (TILL)		2	SS	28		247		0 23 55 22
			3	SS	19		246		
			4	SS	28		245		
243.3			5	SS	34		244		
6.1 / 242.8	**SILT** and **SAND**, trace gravel Very Dense Grey		6	SS	50/.150		243		
6.6	Moist Becomes grey		7	SS	32		242		
							241		
			8	SS	60		240		0 25 47 28

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 10/31/11

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RECORD OF BOREHOLE No 11-09 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 859 400.1 E 300 368.3 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

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

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Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-10 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 859 723.2 E 300 313.0 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
251.0									
0.0 / 250.7	**ASPHALT:** (250mm)						251		
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		
							247		
			5	SS	17		246		1 23 52 24
							245		
			6	SS	12				
							244		
			7	SS	12		243		
	Becomes grey		8	SS	28		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

Continued Next Page

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

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

ONTMT4S 9268.GPJ 10/31/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-10 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 859 723.2 E 300 313.0 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 ● 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
240.9	Continued From Previous Page										
10.1	Clayey **SILT**, with sand, trace gravel Hard Grey (TILL)						241				
			9	SS	41		240		○		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 10/31/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-11 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 859 889.9 E 300 284.5 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 / SHEAR STRENGTH kPa (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				
							243				
			8	SS	19						1 32 47 20

Continued Next Page

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

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

ONTMT4S 9268.GPJ 10/31/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-11 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 859 889.9 E 300 284.5 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										
	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

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

ONTMT4S 9268.GPJ 10/31/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-12 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 860 215.2 E 300 224.2 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, ● 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
255.2										
0.0 / 254.9	**ASPHALT:** (280mm)									
0.3 / 254.5	**SAND**, some gravel Brown Moist (FILL)		1	GS			255			
0.7 / 253.9	**SAND**, fine grained, trace gravel Compact Brown Moist (FILL)		1	SS	21		254			
1.3	Silty **CLAY**, with sand, trace gravel Stiff to Hard Brown (TILL)		2	SS	10		253			
			3	SS	14					
			4	SS	18		252			1 24 51 24
	Becomes grey		5	SS	17		251			
			6	SS	27		250			
			7	SS	34	▽	249			
							248			
			8	SS	67		247			
	Hard						246			0 16 56 28

Continued Next Page

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

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

ONTMT4S 9268.GPJ 10/31/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-12 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 860 215.2 E 300 224.2 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										
	Silty **CLAY**, with sand, trace gravel Very Stiff Grey (TILL)						245				
243.9			9	SS	26				o		
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}, × ^{3}: Numbers refer to Sensitivity

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

ONTMT4S 9268.GPJ 10/31/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-13 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 860 470.9 E 300 180.5 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	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
257.6											
0.0 / 257.3	**ASPHALT:** (250mm)										
0.3 / 256.9	**SAND**, some gravel Brown Moist (FILL)		1	GS			257				
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		256				
	Occasional sand seams, occasional oxide staining		3	SS	36		255				
			4	SS	31						0 19 55 26
							254				
	Becomes grey		5	SS	22		253				
							252				
			6	SS	22						
							251				
			7	SS	38		250				
						▽	249				
			8	SS	22						0 9 35 56
							248				

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

20
15 5
10 (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 10/31/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-13 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 860 470.9 E 300 180.5 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: 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										
	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				o o		
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

20
15 5
10
(%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 10/31/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-14 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 861 542.3 E 299 997.5 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	SAMPLES NUMBER	TYPE	"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
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		○		
							263		○⊢		1 14 45 40
							262				

Continued Next Page

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

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

ONTMT4S 9268.GPJ 10/31/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-14 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 861 542.3 E 299 997.5 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.										

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

15 20 10 5 (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 10/31/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-15 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 862 050.9 E 299 915.2 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	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
274.2											
0.0 / 274.0	**ASPHALT:** (250mm)						274				
0.3 / 273.6	**SAND**, some gravel Brown Moist (FILL)		1	GS					o		
0.6 / 272.9	**SAND**, some silt, trace gravel Compact Brown Moist (FILL)		1	SS	18		273		o		2 84 14 (SI+CL)
1.3	Clayey **SILT**, some sand, trace gravel Stiff to Firm Brown Moist (FILL)		2	SS	11				o		
	Becomes grey		3	SS	5		272		o		
			4	SS	4	▽	271		o		
270.2											
4.0	Silty **CLAY**, some sand, trace gravel Hard to Very Stiff Brown Moist (TILL)		5	SS	33		270		o		
	Occasional sand seams Becomes grey		6	SS	53		269		o		4 15 45 36
			7	SS	25		268		o		
			8	SS	18		267		o		
							266				
							265		o		

Continued Next Page

+ ³, × ³: Numbers refer to Sensitivity

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

ONTMT4S 9268.GPJ 10/31/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-15 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 862 050.9 E 299 915.2 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 (%) GR SA SI CL
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						
	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}, × ^{3}: Numbers refer to Sensitivity

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

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Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-16 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 862 124.3 E 299 902.5 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	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
274.5											
0.0 / 274.2	**ASPHALT:** (280mm)										
0.3 / 273.9	**SAND**, some gravel Brown Moist (FILL)		1	GS							
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						
			3	SS	14						0 22 52 26
	Occasional roots and rootlets		4	SS	7	▽					
270.3											
4.3	Clayey **SILT**, with sand, trace gravel, occasional clay seams Stiff to Hard Brown Moist (TILL)		5	SS	14						
	Occasional oxide staining		6	SS	39						
	Becomes grey		7	SS	47						
265.4											
9.1	Silty **CLAY**, trace sand, trace gravel Very Stiff Grey Moist (TILL)		8	SS	18						0 4 36 60

Continued Next Page

+ 3 . × 3 Numbers refer to Sensitivity

(%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 10/31/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-16 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 862 124.3 E 299 902.5 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 (%) GR SA SI CL
ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						
	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}, × ^{3}: Numbers refer to Sensitivity

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

ONTMT4S 9268.GPJ 10/31/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-17 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 862 616.7 E 299 818.6 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 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
280.4											
0.0 / 280.2	**ASPHALT:** (250mm)										
0.3 / 279.8	**SAND**, some gravel Brown Moist (FILL)		1	GS			280				
0.7 / 279.1	**SAND**, trace gravel Compact Brown Moist (FILL)		1	SS	24		279				
1.3	Clayey **SILT**, some sand, trace gravel Stiff to Firm Brown Moist (FILL)		2	SS	14		278				
			3	SS	8						
			4	SS	7		277				
276.0											
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				
							272				
							271				0 27 50 23

Continued Next Page

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

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

ONTMT4S 9268.GPJ 10/31/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-17 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 862 616.7 E 299 818.6 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.										

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

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

ONTMT4S 9268.GPJ 10/31/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-18 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 863 126.1 E 299 731.1 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 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 47 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 52 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

20 15 5 10 (%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 10/31/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-18 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 863 126.1 E 299 731.1 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										
266.2	Silty **CLAY**, with sand, trace gravel Hard Grey Moist (TILL)		9	SS	55/ .150		267		o		
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 9268.GPJ 10/31/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-19 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 863 618.0 E 299 647.5 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	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa (o 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
267.6								20 40 60 80 100	20 40 60		
0.0	**ASPHALT:** (200mm)										
0.2	**SAND**, some gravel Brown Damp		1	GS							
266.9	(FILL)						267				
0.6	**SAND**, trace gravel Dense Brown Damp		1	SS	47						
266.4	(FILL)						266				
1.2	Clayey **SILT**, some sand to sandy, trace gravel Hard to Stiff Brown (FILL)		2	SS	49						
			3	SS	13		265				
			4	SS	31						0 20 62 18
							264				
			5	SS	33		263				
							262				
			6	SS	16						
							261				
			7	SS	26		260				0 38 44 18
							259				
			8	SS	35		258				

Continued Next Page

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

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

ONTMT4S 9268.GPJ 10/31/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-19 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 863 618.0 E 299 647.5 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 ○ 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
257.3	Continued From Previous Page										
10.3	**SAND**, trace silt, trace gravel Dense Brown Moist		9	SS	35		257		○		0 89 11 (SI+CL)
256.3											
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 10/31/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-20 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 865 160.6 E 299 383.2 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/m^3	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
309.4											
0.0	**ASPHALT:** (150mm)										
0.2	**SAND**, some gravel Compact (FILL)		1	SS	22		309				
308.6											
0.8	Clayey **SILT**, trace sand, trace gravel Stiff Grey Moist (FILL)		2	SS	11		308				
			3	SS	12						
307.2											
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 49 35
			6	SS	27		305				
			7	SS	36		304				
301.8							303				
7.6	Sandy **SILT**, trace clay Dense Brown Moist		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

(%) STRAIN AT FAILURE

ONTMT4S 9268.GPJ 10/31/11

Ministry of Transportation
Ontario

THURBER

RECORD OF BOREHOLE No 11-20 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 865 160.6 E 299 383.2 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 ○ 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 9.8m. 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 10/31/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-21 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 865 500.3 E 299 331.6 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 / SHEAR STRENGTH kPa (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
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				
	Becomes grey		6	SS	12	▽	301				
298.4							300				
7.7	**SAND**, fine to coarse grained, some sill, trace to some gravel Dense Brown Moist		7	SS	33		299				0 84 16 (SI+CL)
			8	SS	32		298				
							297				

Continued Next Page

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

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

ONTMT4S 9268.GPJ 10/31/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-21 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 865 500.3 E 299 331.6 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	Silty **CLAY**, some sand, trace gravel		9	SS	48				⊢o		0 12 58 30
294.9	Hard Grey (TILL)						295				
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}, × ^{3}: Numbers refer to Sensitivity

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

ONTMT4S 9268.GPJ 10/31/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-22 1 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 865 555.8 E 299 322.0 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	NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
305.6									
0.0	**ASPHALT:** (230mm)								
0.2	**SAND**, some gravel Brown Moist (FILL)		1	GS					
304.8							305		
0.8	**SAND**, some silt, trace gravel Dense Brown Moist (FILL)		1	SS	30				
304.4									
1.2	Clayey **SILT**, some sand, trace gravel Very Stiff Brown to Dark Grey (FILL)		2	SS	21		304		
303.2									
2.4	Silty **CLAY**, with sand, trace gravel Very Stiff Brown Moist (TILL)		3	SS	16		303		
			4	SS	20		302		
						▽			
			5	SS	16		301		0 26 45 28
	Becomes grey		6	SS	24		300		
297.9							299		
7.7	Silty **SAND**, trace clay Compact Brown Moist		7	SS	17		298		0 70 26 4
296.9									
8.7	**SILT**, some clay, trace sand Compact Grey Moist		8	SS	18		297		0 4 85 11
295.7							296		

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 10/31/11

Ministry of Transportation
Ontario

RECORD OF BOREHOLE No 11-22 2 OF 2 METRIC

W.P. 2539-04-00 LOCATION N 4 865 555.8 E 299 322.0 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: ○ 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										
9.9	Sandy **SILT**, trace gravel Compact Grey Moist										
							295				
294.3			9	SS	28				o		
11.3	END OF BOREHOLE AT 11.3m. BOREHOLE OPEN AND WATER LEVEL AT 4.2m UPON COMPLETION. BOREHOLE BACKFILLED WITH BENTONITE HOLEPLUG TO 9.7m, 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 10/31/11

Appendix B

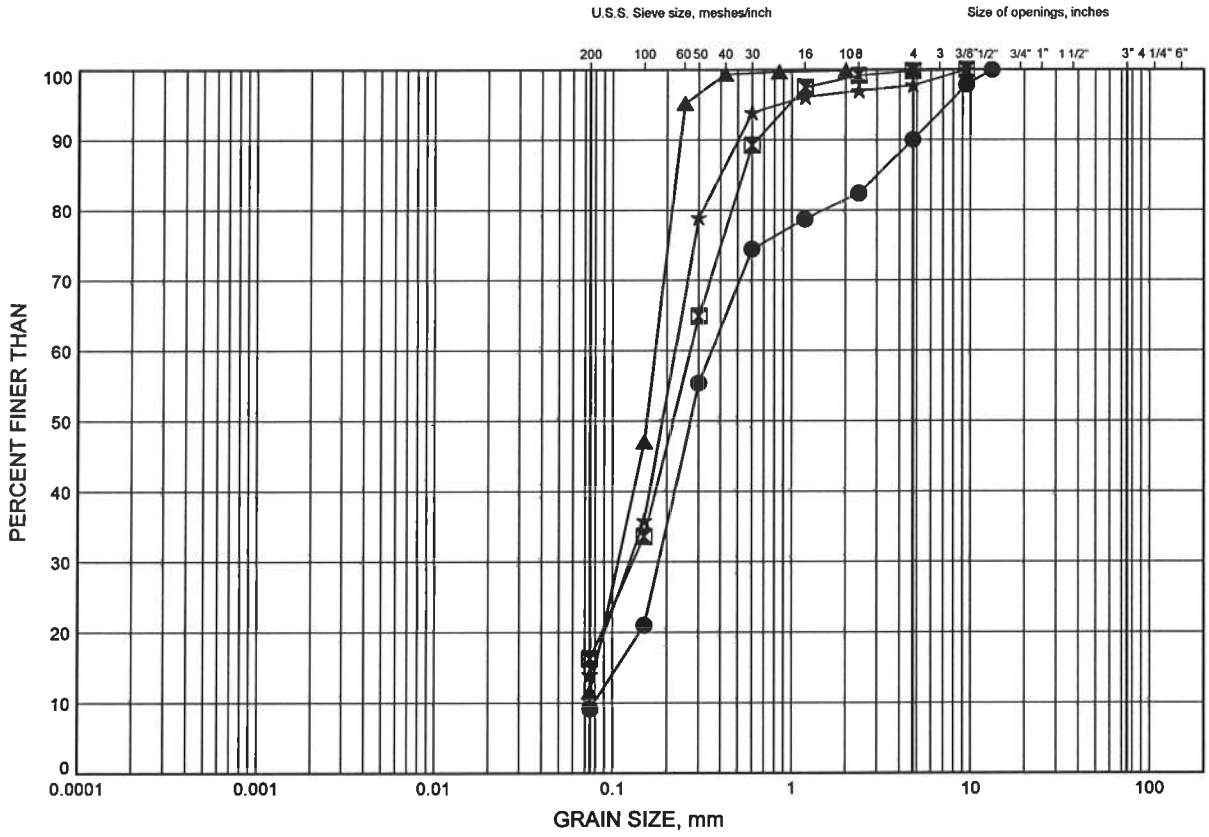
Geotechnical Laboratory Test Results

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)
●	11-01	1.07	226.64
⊠	11-02	1.07	228.62
▲	11-13	0.99	256.56
★	11-15	1.07	273.14

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

THURBER

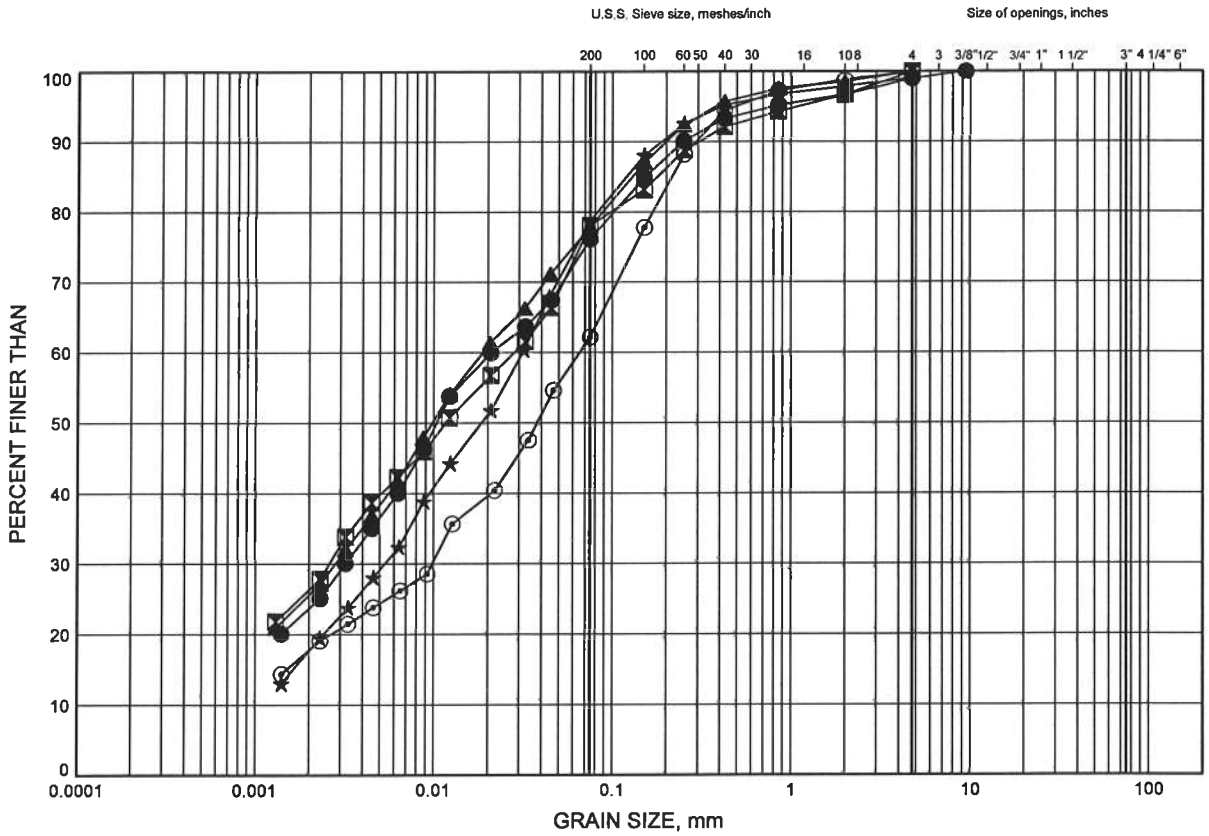
GRAIN SIZE DISTRIBUTION - THURBER 9268.GPJ 9/27/11

Widening of Hwy 400, Major Mackenzie to King Road

GRAIN SIZE DISTRIBUTION

FIGURE B2

CLAYEY SILT TO SILTY CLAY FILL



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	11-10	4.88	246.11
⊠	11-11	3.35	248.65
▲	11-16	2.59	271.94
★	11-19	3.35	264.20
⊙	11-19	7.92	259.63

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

THURBER

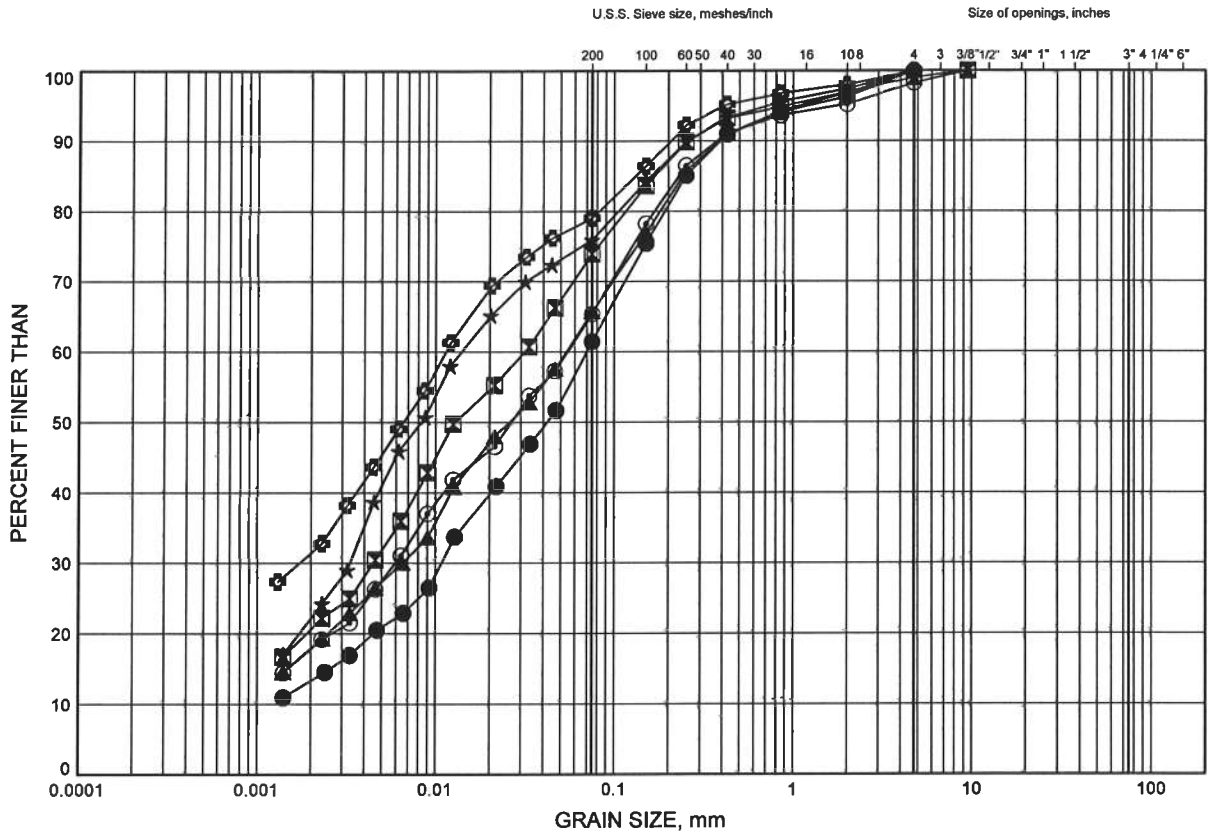
GRAIN SIZE DISTRIBUTION - THURBER 9268.GPJ 9/27/11

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)
●	11-01	3.35	224.36
⊠	11-01	9.45	218.26
▲	11-02	3.35	226.34
★	11-02	7.92	221.77
⊙	11-03	2.59	233.74
✿	11-04	10.97	229.62

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

THURBER

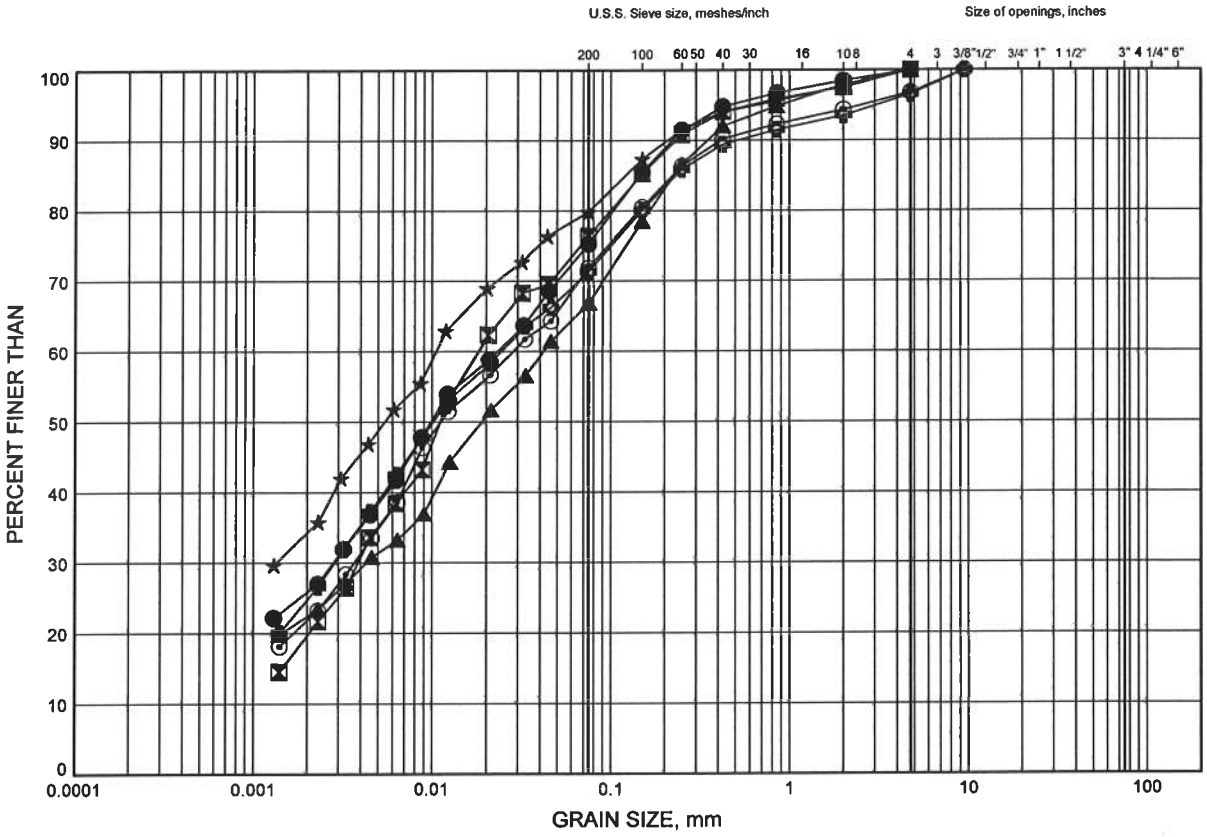
GRAIN SIZE DISTRIBUTION - THURBER 9268.GPJ 9/27/11

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)
●	11-05	3.35	238.09
⊠	11-05	7.92	233.52
▲	11-06	3.35	240.44
★	11-06	7.92	235.87
⊙	11-07	2.59	236.97
✿	11-07	4.88	234.68

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

THURBER

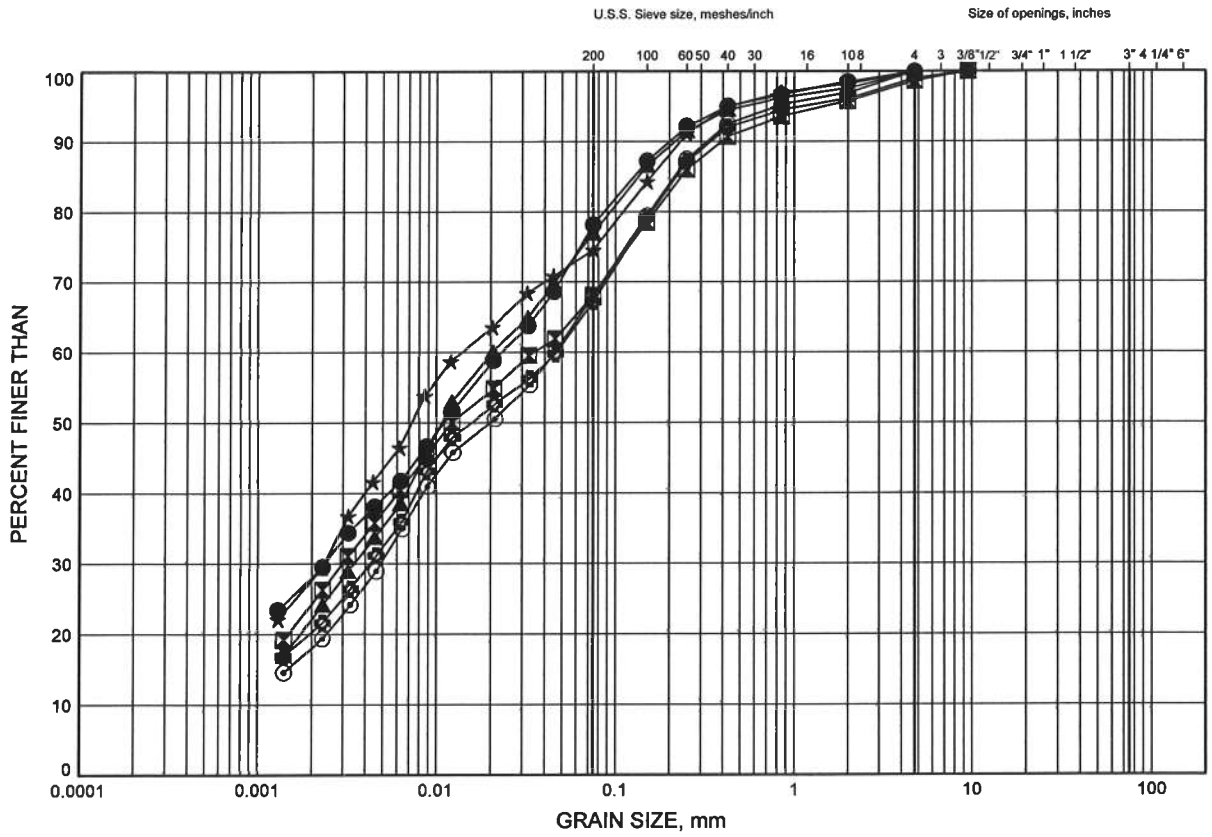
GRAIN SIZE DISTRIBUTION - THURBER 9268.GPJ 9/27/11

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)
●	11-08	4.88	242.27
⊠	11-08	9.45	237.70
▲	11-09	2.59	246.76
★	11-09	9.45	239.90
⊙	11-10	10.97	240.02
✿	11-11	9.45	242.55

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

THURBER

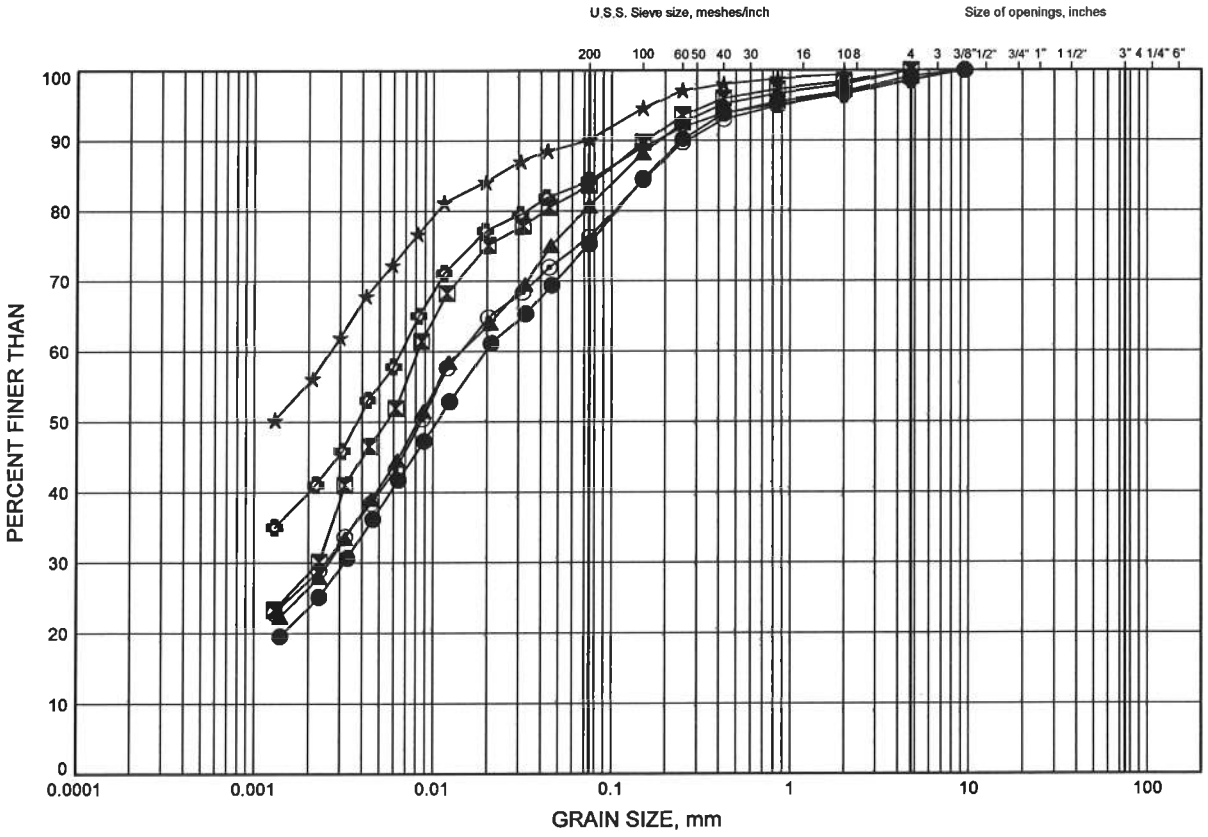
GRAIN SIZE DISTRIBUTION - THURBER 9268.GPJ 9/27/11

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)
●	11-12	3.35	251.86
⊠	11-12	9.45	245.76
▲	11-13	3.35	254.20
★	11-13	9.45	248.10
⊙	11-14	3.35	268.22
✿	11-14	9.45	262.12

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Prepared By MFA
Checked By SKP

THURBER

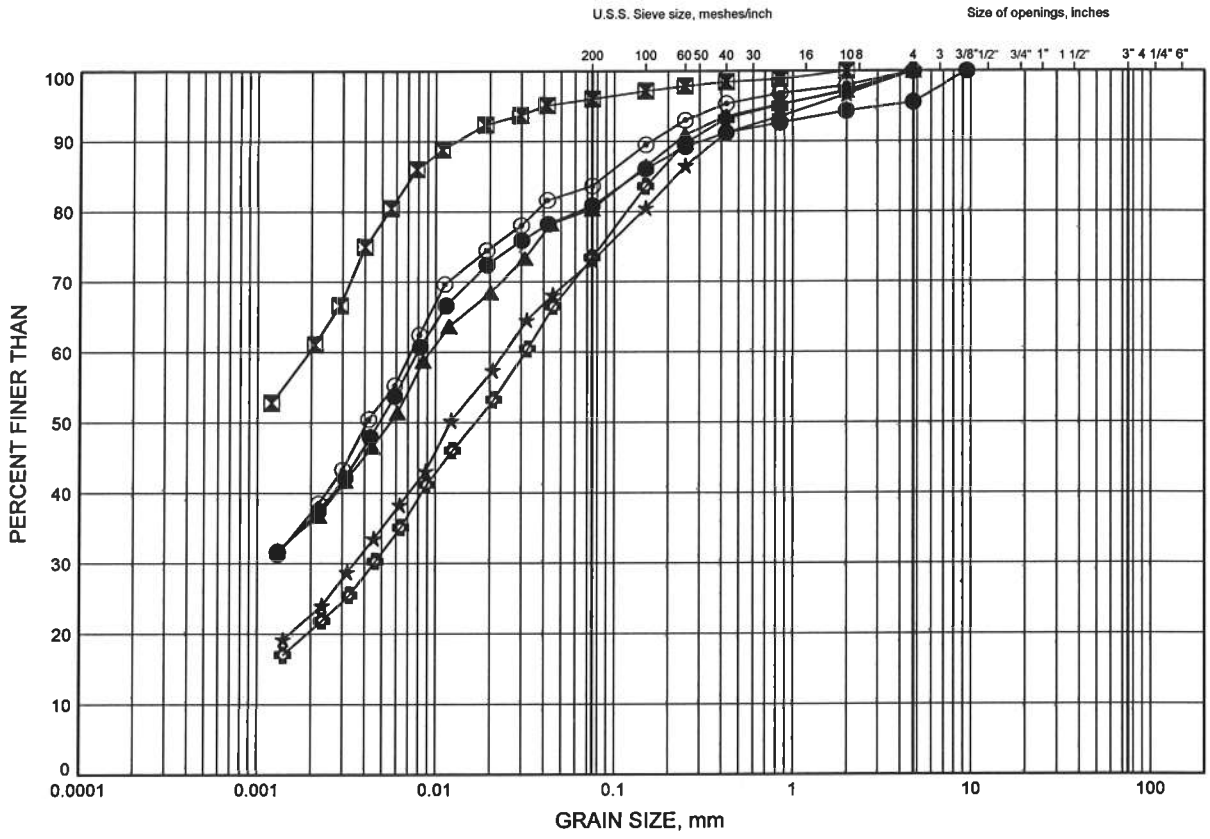
GRAIN SIZE DISTRIBUTION - THURBER 9268.GPJ 9/27/11

Widening of Hwy 400, Major Mackenzie to King Road

GRAIN SIZE DISTRIBUTION

FIGURE B7

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)
●	11-15	6.40	267.81
⊠	11-16	9.45	265.08
▲	11-17	4.88	275.54
★	11-17	9.45	270.97
⊙	11-18	2.59	274.55
✿	11-18	9.45	267.69

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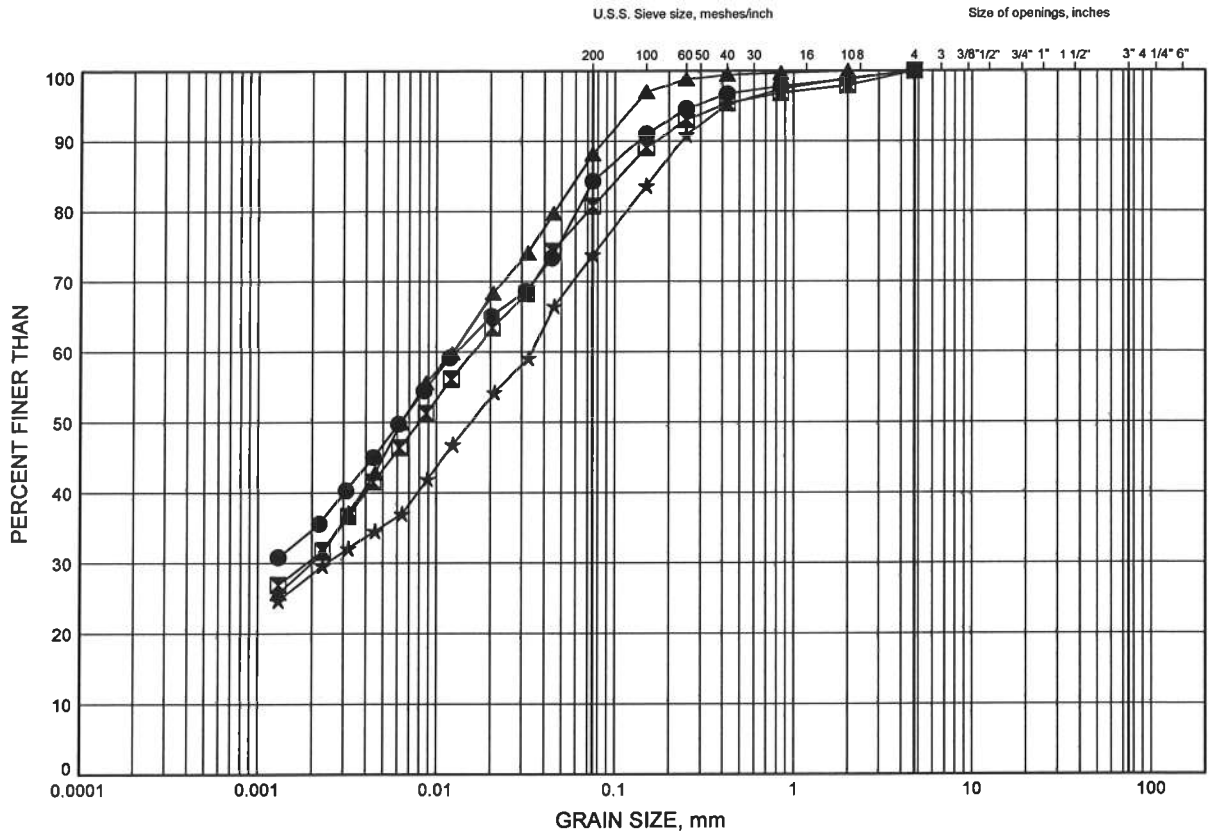
GRAIN SIZE DISTRIBUTION - THURBER 9268.GPJ 9/27/11

Widening of Hwy 400, Major Mackenzie to King Road

GRAIN SIZE DISTRIBUTION

FIGURE B8

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
⊠	11-21	2.59	303.55
▲	11-21	10.97	295.17
★	11-22	4.88	300.72

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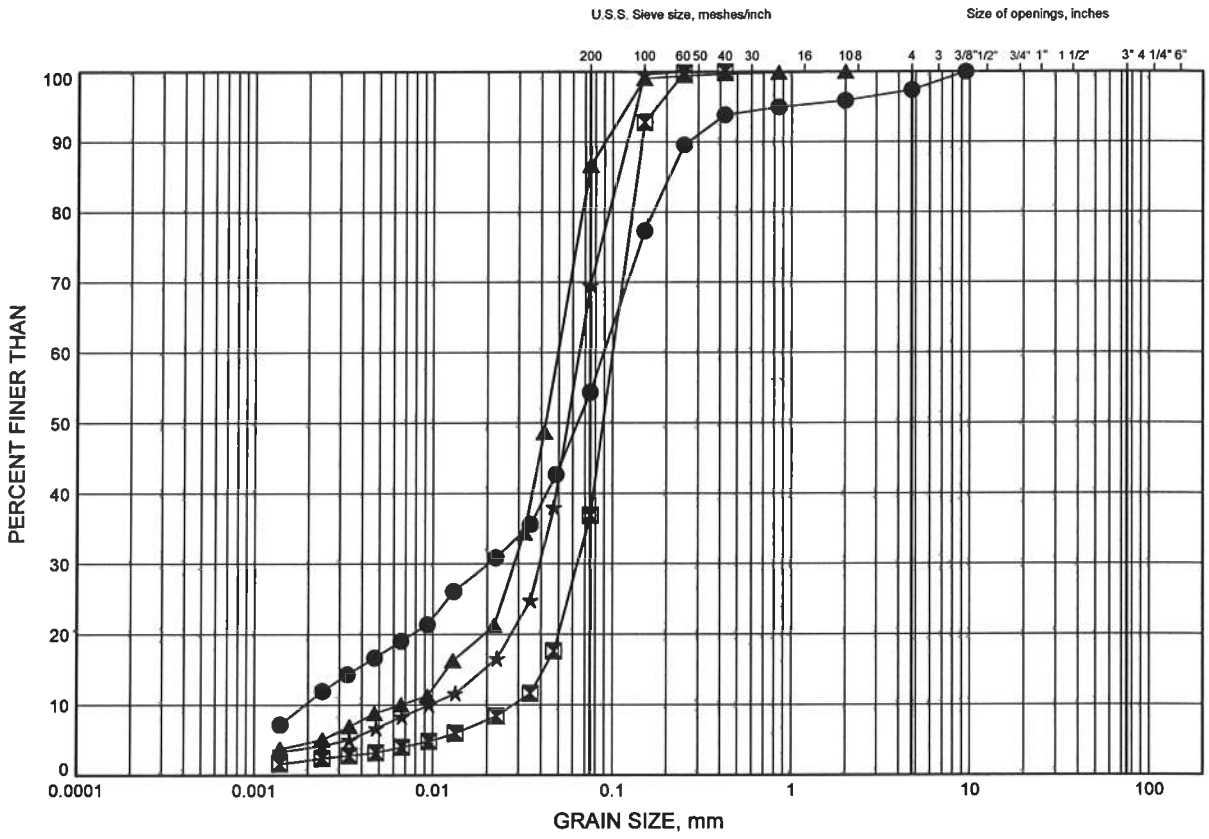
Widening of Hwy 400, Major Mackenzie to King Road

GRAIN SIZE DISTRIBUTION

FIGURE B9

SAND & SILT TO SANDY SILT TILL



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	11-03	6.32	230.01
⊠	11-03	10.90	225.43
▲	11-07	7.74	231.82
★	11-07	10.82	228.74

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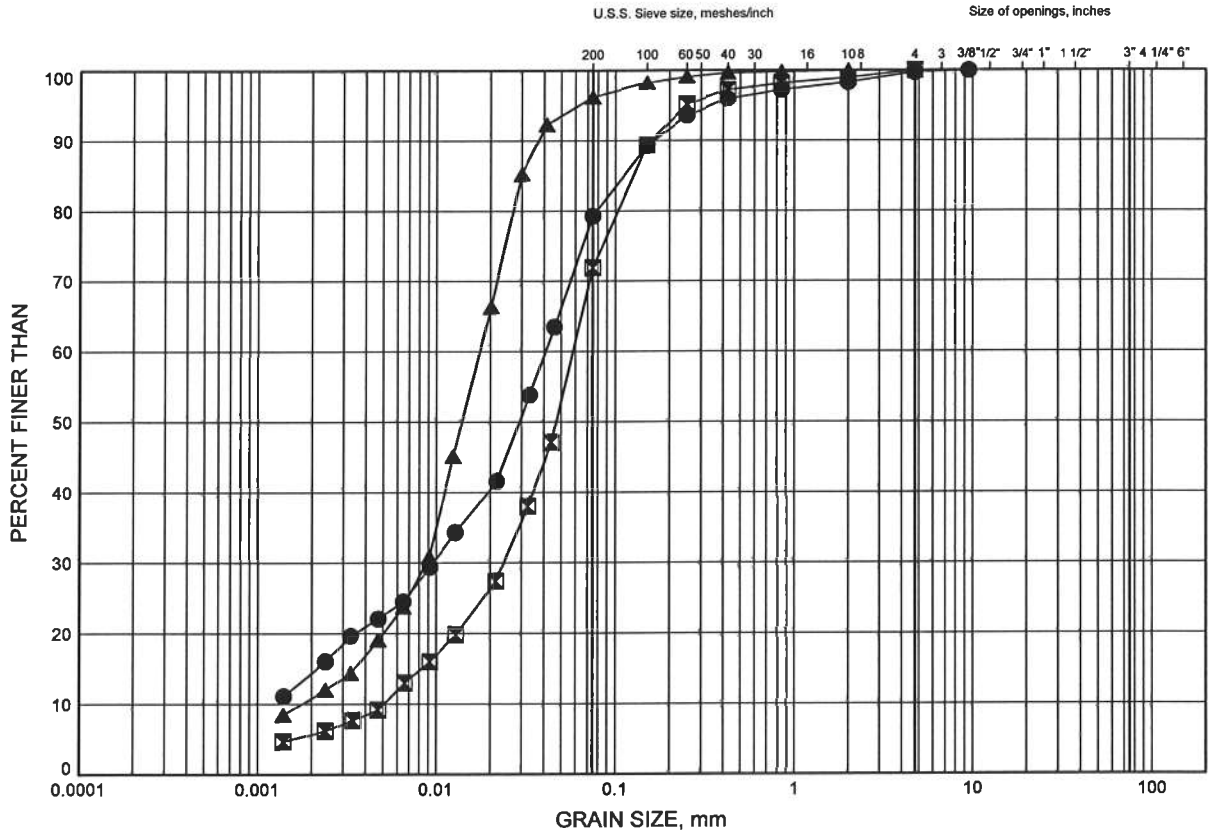
Widening of Hwy 400, Major Mackenzie to King Road

GRAIN SIZE DISTRIBUTION

FIGURE B10

SANDY SILT TO SILT



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	11-04	3.35	237.24
⊠	11-20	7.92	301.46
▲	11-22	9.45	296.15

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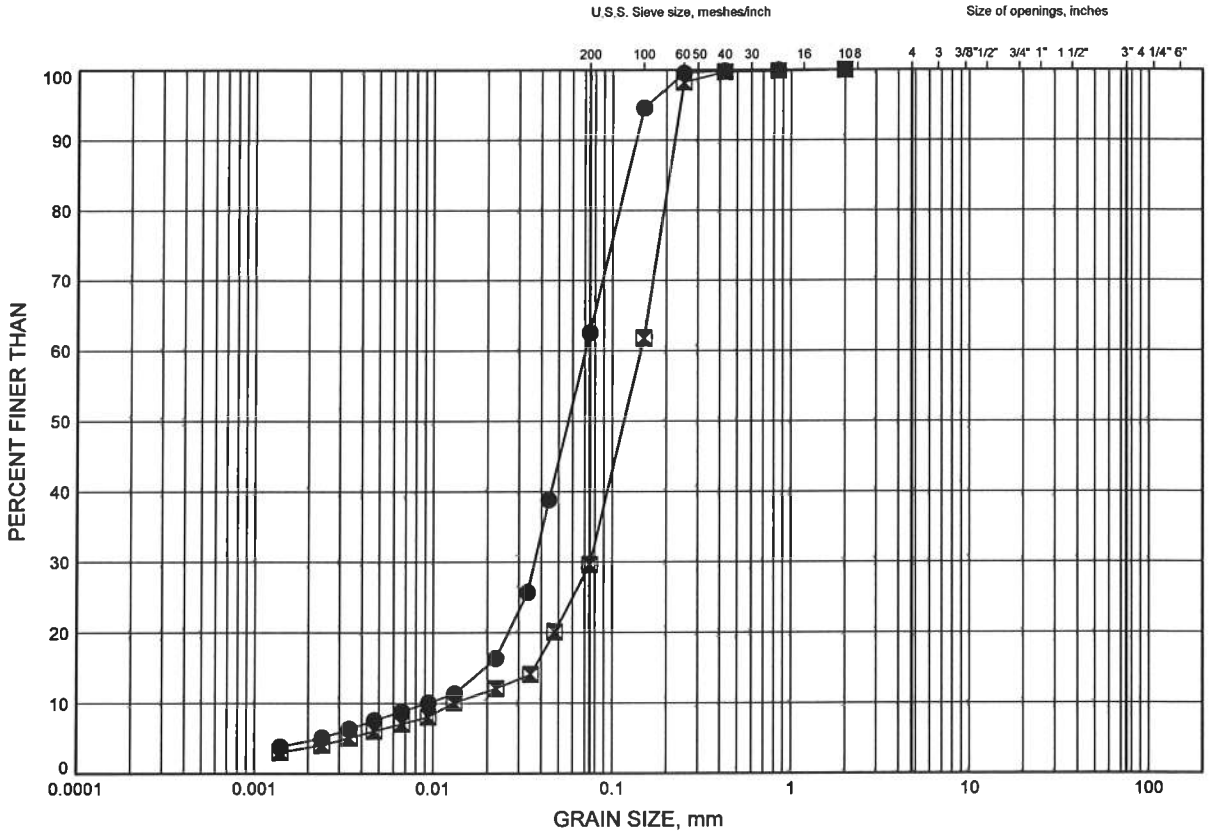
Widening of Hwy 400, Major Mackenzie to King Road

GRAIN SIZE DISTRIBUTION

FIGURE B11

SILT & SAND TO SILTY SAND



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	11-08	7.73	239.42
⊠	11-22	7.92	297.68

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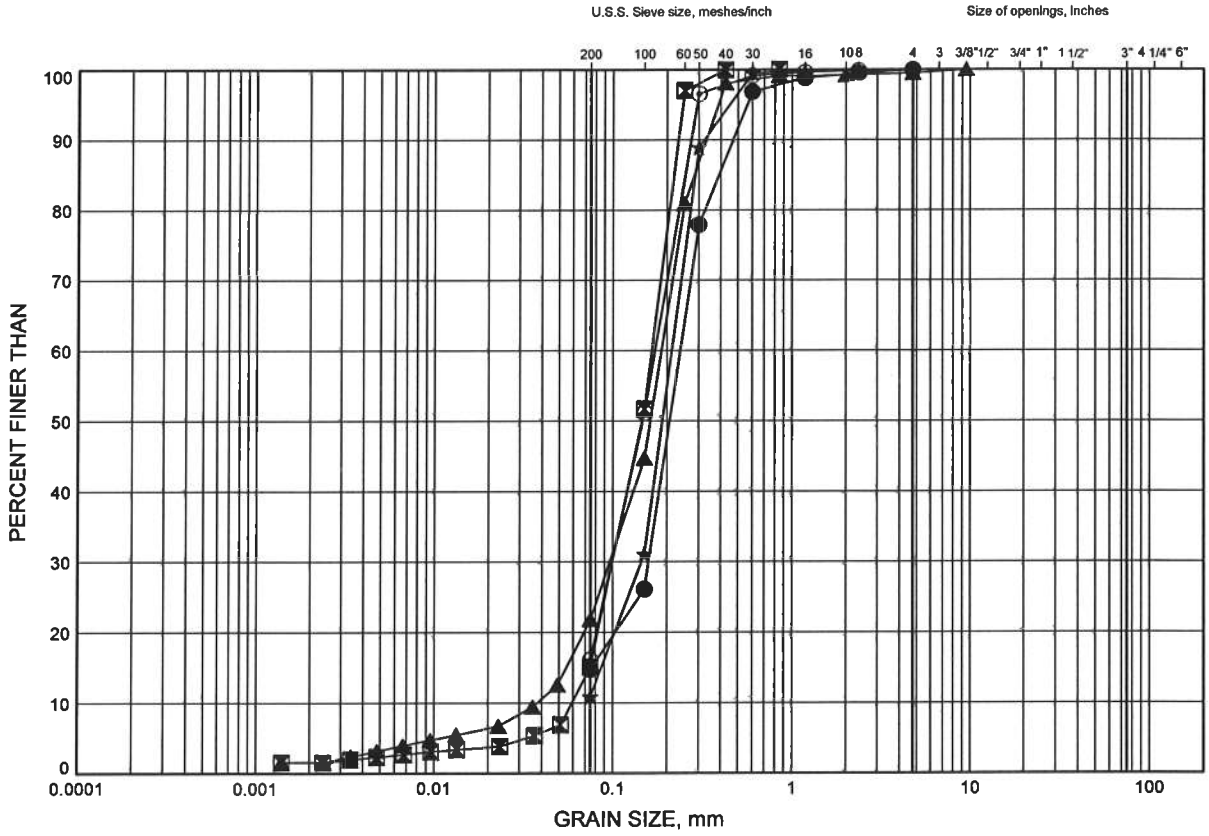
Widening of Hwy 400, Major Mackenzie to King Road

GRAIN SIZE DISTRIBUTION

FIGURE B12

SAND



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

LEGEND

SYMBOL	BOREHOLE	DEPTH (m)	ELEV. (m)
●	11-03	7.74	228.59
⊠	11-04	7.92	232.67
▲	11-18	6.34	270.80
★	11-19	10.97	256.58
⊙	11-21	7.92	298.22

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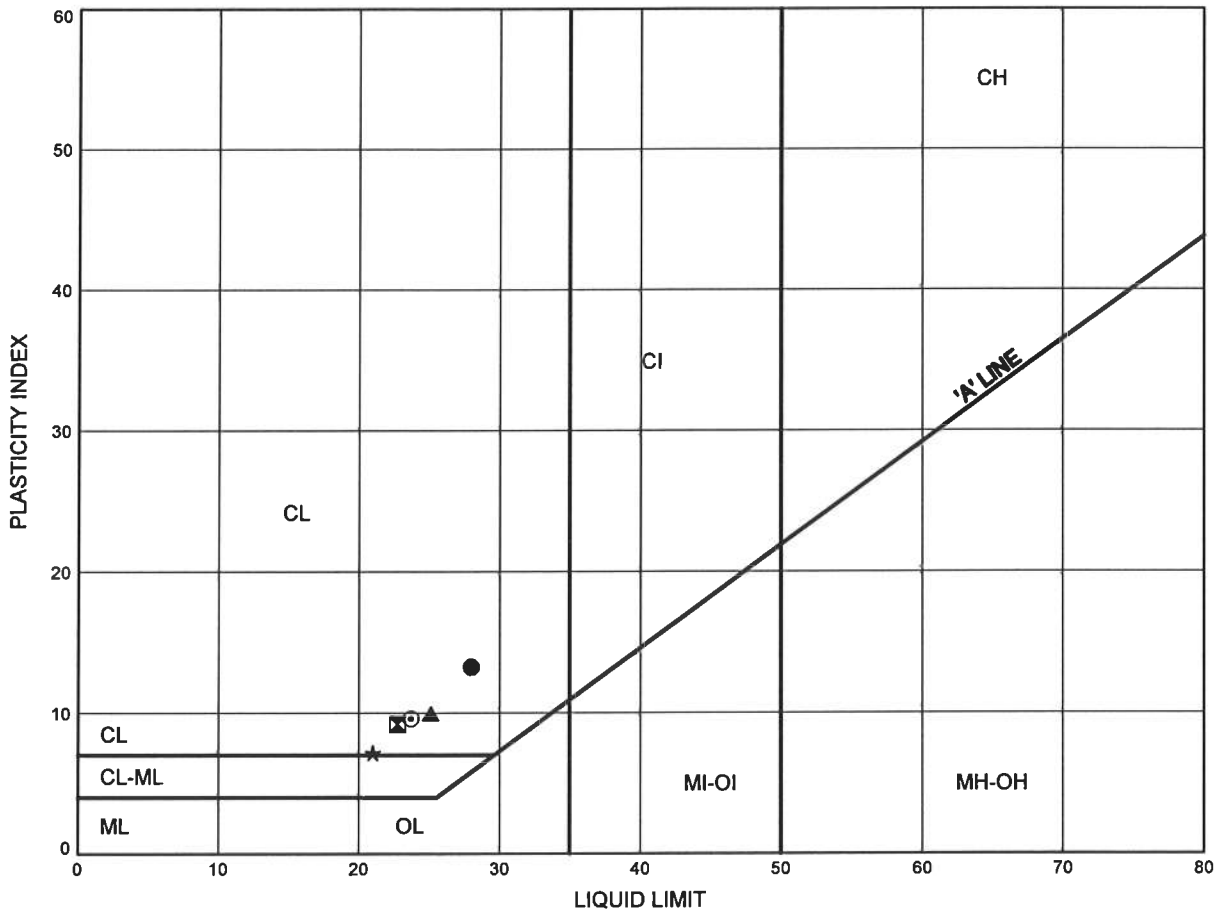
GRAIN SIZE DISTRIBUTION - THURBER 9268.GPJ 9/27/11

Widening of Hwy 400, Major Mackenzie to King Road

ATTERBERG LIMITS TEST RESULTS

FIGURE B13

CLAYEY SILT TO SILTY CLAY FILL



SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	11-10	4.88	246.11
⊠	11-11	3.35	248.65
▲	11-16	2.59	271.94
★	11-19	3.35	264.20
⊙	11-19	7.92	259.63

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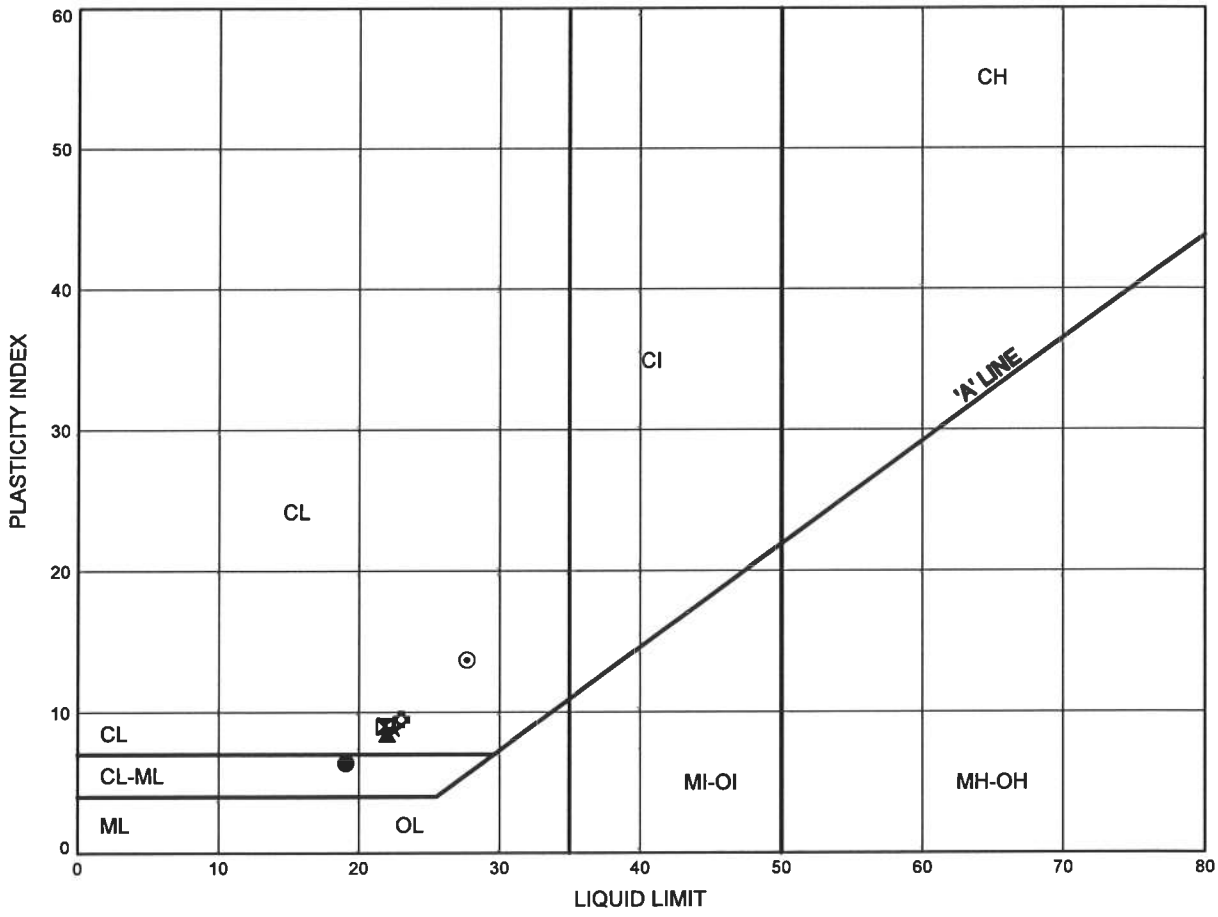
Widening of Hwy 400, Major Mackenzie to King Road

ATTERBERG LIMITS TEST RESULTS

FIGURE B14

CLAYEY SILT TO SILTY CLAY TILL



SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	11-01	3.35	224.36
⊠	11-02	3.35	226.34
▲	11-02	7.92	221.77
★	11-03	2.59	233.74
⊙	11-04	10.97	229.62
✿	11-05	3.35	238.09

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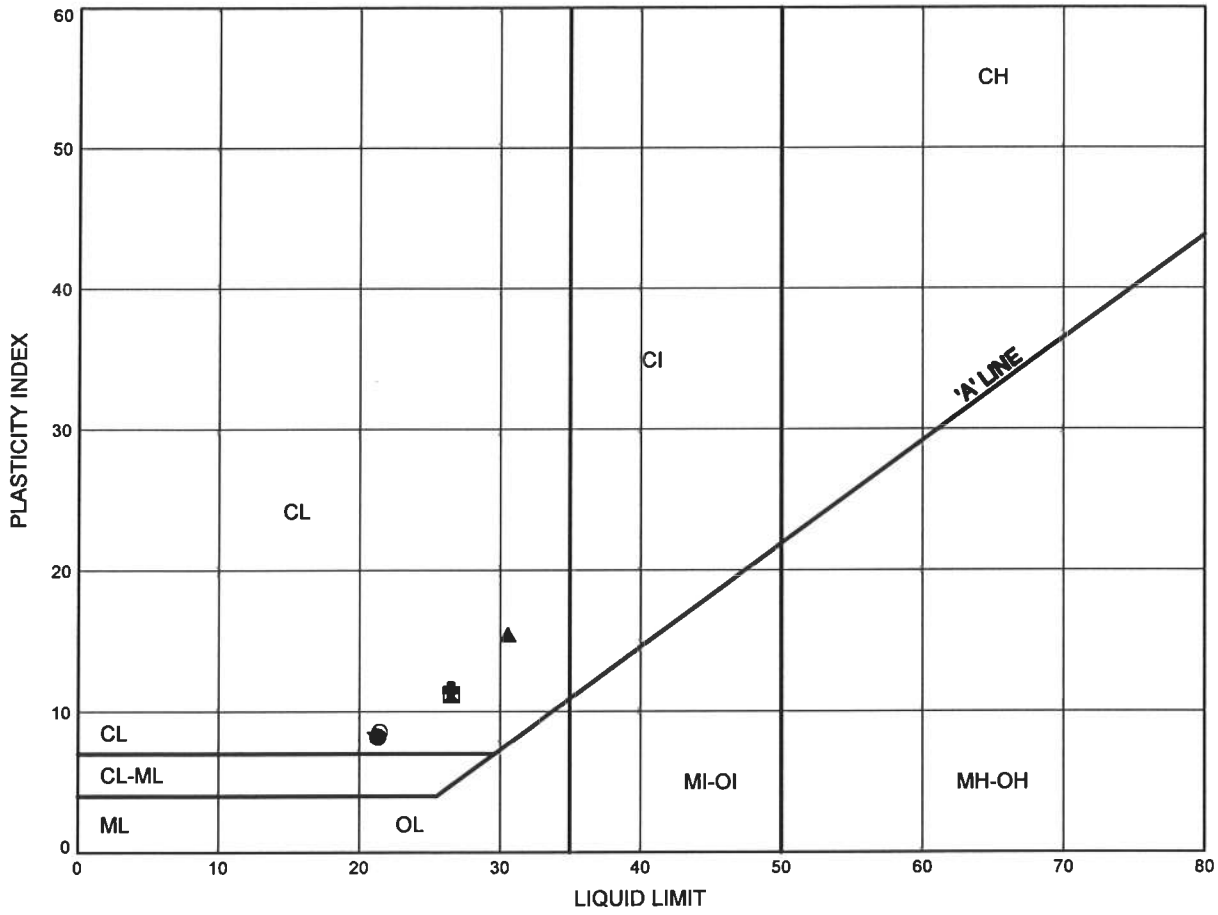
Widening of Hwy 400, Major Mackenzie to King Road

ATTERBERG LIMITS TEST RESULTS

FIGURE B15

CLAYEY SILT TO SILTY CLAY TILL



SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	11-05	7.92	233.52
⊠	11-06	3.35	240.44
▲	11-06	7.92	235.87
★	11-07	2.59	236.97
⊙	11-07	4.88	234.68
✿	11-08	4.88	242.27

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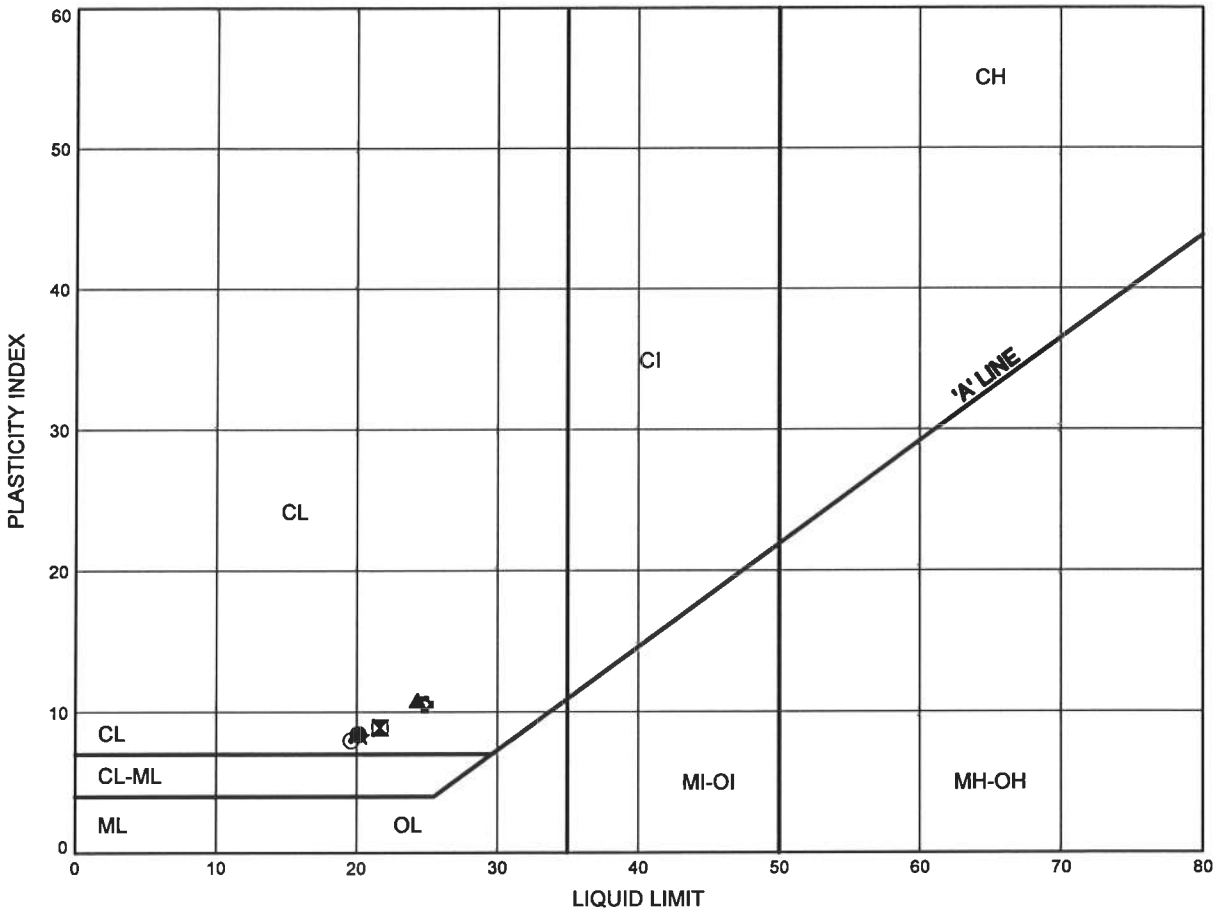
Widening of Hwy 400, Major Mackenzie to King Road

ATTERBERG LIMITS TEST RESULTS

FIGURE B16

CLAYEY SILT TO SILTY CLAY TILL



SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	11-08	9.45	237.70
⊠	11-09	2.59	246.76
▲	11-09	9.45	239.90
★	11-10	10.97	240.02
⊙	11-11	9.45	242.55
✿	11-12	3.35	251.86

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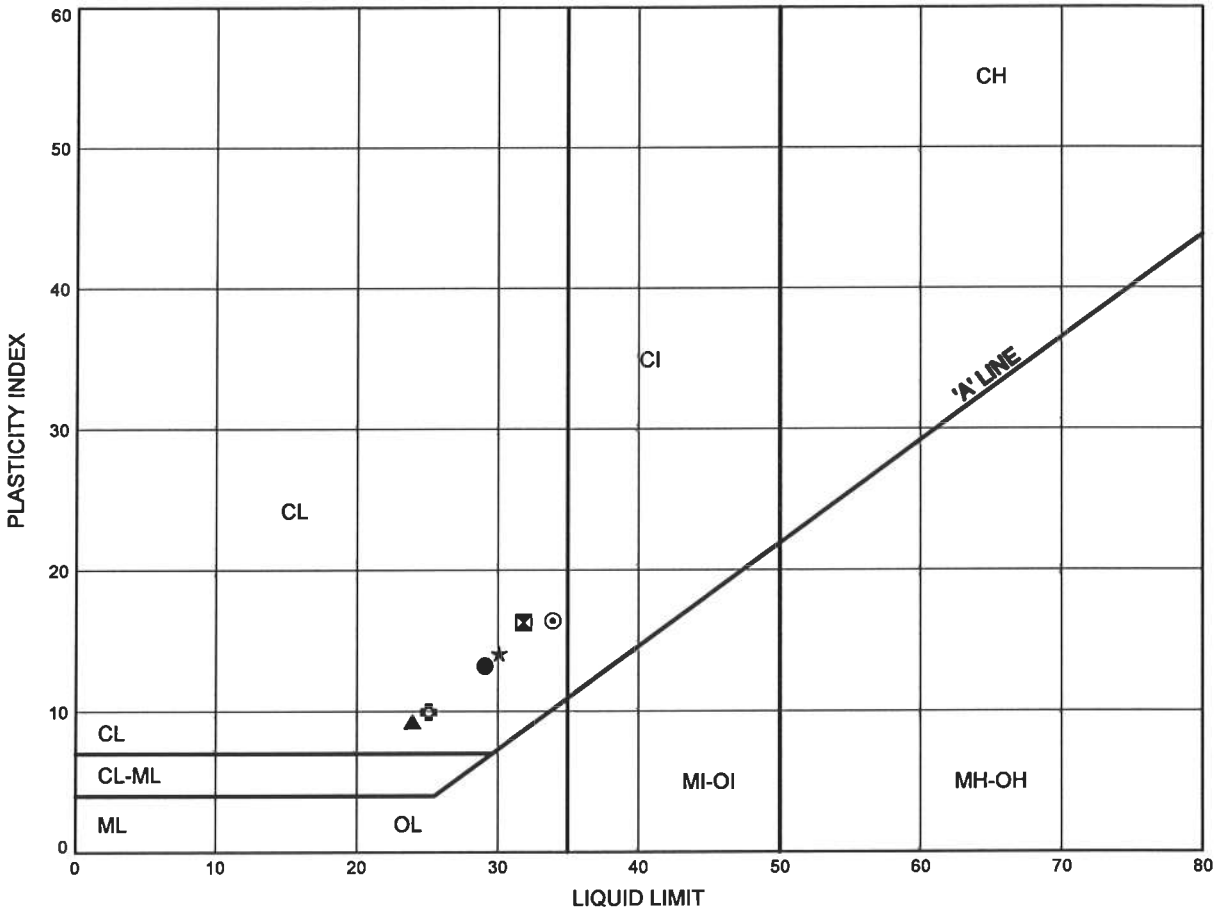
Widening of Hwy 400, Major Mackenzie to King Road

ATTERBERG LIMITS TEST RESULTS

FIGURE B17

CLAYEY SILT TO SILTY CLAY TILL



SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	11-13	3.35	254.20
⊠	11-13	9.45	248.10
▲	11-14	3.35	268.22
★	11-14	9.45	262.12
⊙	11-15	6.40	267.81
✿	11-16	2.59	271.94

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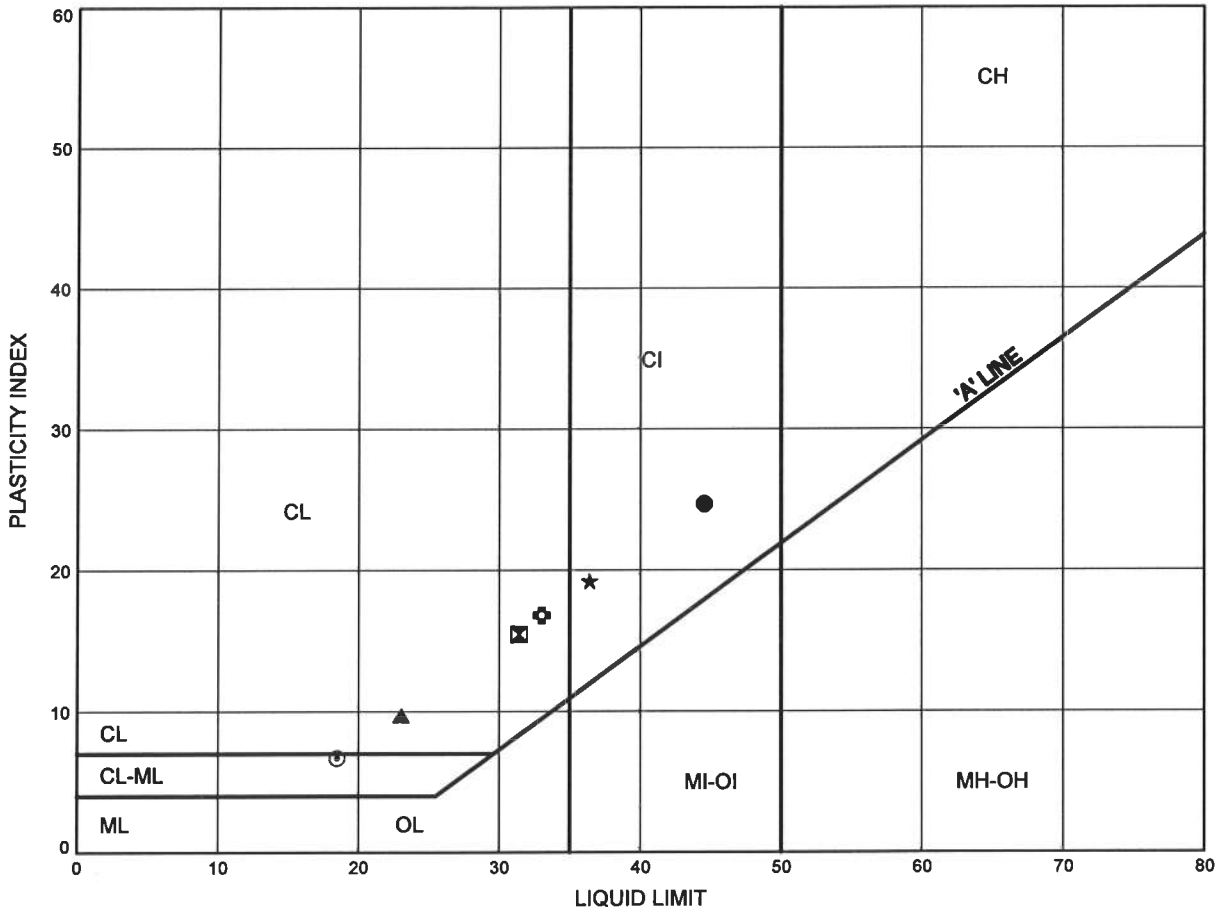
THURBALT 9268.GPJ 9/27/11

Widening of Hwy 400, Major Mackenzie to King Road

ATTERBERG LIMITS TEST RESULTS

FIGURE B18

CLAYEY SILT TO SILTY CLAY TILL



SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	11-16	9.45	265.08
⊠	11-17	4.88	275.54
▲	11-17	9.45	270.97
★	11-18	2.59	274.55
⊙	11-18	9.45	267.69
✿	11-20	3.35	306.03

Date September 2011

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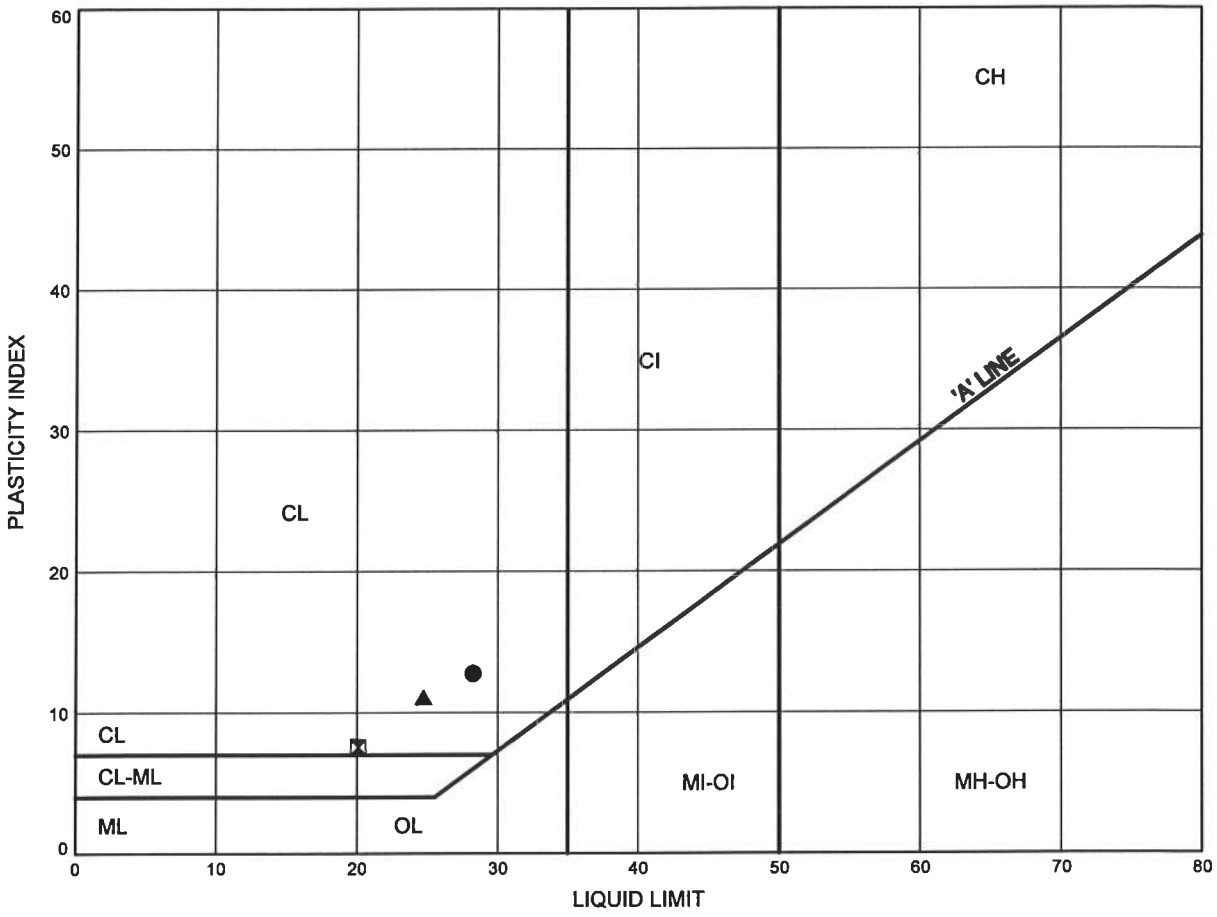
THURBALT 9268.GPJ 9/27/11

Widening of Hwy 400, Major Mackenzie to King Road

ATTERBERG LIMITS TEST RESULTS

FIGURE B19

CLAYEY SILT TO SILTY CLAY TILL



SYMBOL	BH	DEPTH (m)	ELEV. (m)
●	11-21	2.59	303.55
⊠	11-21	10.97	295.17
▲	11-22	4.88	300.72

Date September 2011

Project 2539-04-00

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