

# REPORT

Foundation Investigation and  
Design Report  
Poor Performing Area  
Highway 401  
Township of Blanford-Blenheim,  
Ontario  
District – London

G.W.P. 71-00-00

STANTEC CONSULTING LTD.

PROJECT NO. 1009213.02  
GEOCRES NO. 40P2-66



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# FOUNDATION INVESTIGATION REPORT

**Poor Performing Area  
Highway 401  
Township of Blanford-Blenheim, Ontario  
G.W.P. 71-00-00  
District – London**

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## 1.0 INTRODUCTION

Jacques Whitford Limited (Jacques Whitford) was retained by Stantec Consulting Ltd. (Stantec), to complete a Foundation Investigation and Design Report for a 1.2 km section of Highway 401 in the Township of Blanford-Blenheim, near Woodstock, Ontario.

The work was carried out under Agreement No. 3005-E-0031. Authorization to proceed with the investigation was provided by Mr. David Emery, P.Eng., of Stantec Consulting Ltd, the prime consultant on this design assignment.

This foundation investigation report has been prepared specifically and solely for the project described herein. It contains the factual results of the foundation investigation and the laboratory testing.

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## 2.0 SITE DESCRIPTION

The area under investigation is a section of Highway 401 located approximately 9 km east of Interchange No. 238 (Oxford Road 2) in Woodstock, Ontario. The site is approximately 1.2 km in length and located between Station (Sta.) 14+500 and Sta. 15+700, in the Township of Blanford-Blenheim, Ontario.

In this area, Highway 401 is built on embankments of approximately 2 m in height, to a rural highway section with wide gravel shoulders and a wide grass covered centre median. The highway is generally at a higher elevation than the surrounding lands. Drainage for Highway 401 is provided by ditches located along the sides of the highway and in the centre median, which are sloped to drain towards a series of culverts. The culverts generally drain water to the local creeks and rivers, located on the south side of the highway.

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## 3.0 PHYSIOGRAPHY

Based on the physiography of Southern Ontario by Chapman and Putnam (1984), this section of Highway 401 is situated between two physiographic regions known as the Oxford Till Plain and the Waterloo Hills. The Oxford Till Plain is characterized as pale brown calcareous loam. The Waterloo Hills are characterized by sandy hills and ridges of sandy till, with outwash sands occupying the



hollows. In addition, a number of kettle lakes and swampy areas are typically encountered in this region.

Physiographic Map No. 2715 titled "Physiography of Southern Ontario", dated 1984, indicates that the site is situated on a drumlinized till plain and a spillway.

Based on Map No. 2544, titled "Bedrock Geology of Ontario, Southern Sheet", dated 1991 and published by the Ontario Ministry of Northern Development and Mines, the bedrock at the site is noted as sedimentary rock comprised of limestone, dolostone, shale, sandstone, gypsum and salt.

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## 4.0 BACKGROUND

### 2003 Investigation

Jacques Whitford previously completed a pavement investigation for a section of Highway 401 from 1 km east of Oxford Road 2 to 1 km West of Drumbo Road. The work was carried out under WP 71-00-00. The field work for this investigation was carried out in 2003. A factual investigation report titled "Final Geotechnical Investigation Report, Highway No. 401, 1 km East of Oxford Road 2 to 1 km West of Drumbo Road, Township of Blanford to Township of Blanford-Blenheim, Ontario" dated May 19, 2006 was subsequently issued.

A portion of this section, between Sta. 14+500 and Sta. 15+700, is considered to be performing poorly. The pavement condition encountered in the area considered to be performing poorly generally consisted of approximately 300 mm to 1170 mm of asphalt underlain by granular material. Locally, the asphalt was thickest between Sta. 15+100 and Sta. 15+200 and ranged from approximately 760 mm to 1170 mm.

Several shallow boreholes advanced along the centre median and on the shoulder of the existing highway platform in this section of the highway generally encountered topsoil or granular fill at the ground surface underlain by 1 m to 2 m of sand fill with varying amounts of gravel. Native sand with varying amounts of gravel and silt was generally encountered below the sand fill. The sand stratum contained trace to some organic matter and occasionally seams of peat. Peat deposits or seams of peat in a sand deposit were generally encountered between Sta. 15+100 and Sta. 15+200. The peat deposits were underlain by sand and clayey silt.

The pertinent Borehole Logs and Laboratory Test Data sheets, Core Analysis tables and representative photographs of the asphalt cores from the 2003 investigation have been provided for reference in Appendix D.

### 2004 Investigation

In addition to the pavement investigation noted above, a foundation investigation was also carried out by Jacques Whitford under WP 71-00-00. With specific reference to the Poor Performing Area (Sta. 14+500 to Sta. 15+700.), six boreholes were advanced in 2004, in the right shoulder of the existing road platform to depths in the range of approximately 5 m to 12.6 m below existing grade. The factual results of the investigation were provided in a report titled "Draft Pavement Investigation Report, Poor Performing Area, Highway 401, The Township of Blanford-Blenheim, Ontario", dated February 15, 2005.



The subsurface soil conditions encountered were similar to those encountered previously, consisting of sand fill overlying native sand or silty sand. Deposits of peat were encountered in the boreholes advanced at Sta. 15+125 and Sta. 15+145. The peat deposits were underlain by sand, with varying amounts of gravel, silt and clay.

### Current Study

MTO subsequently requested that an additional investigation be carried out along this section of the highway. This report provides the results of the additional investigation and incorporates the factual results from the previous investigations into one consolidated report.

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## 5.0 INVESTIGATION PROCEDURES

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### 5.1 Field Program

The investigation dates for the fieldwork along with the number of boreholes and borehole numbering system for this and the previous investigations are provided in the following table:

Investigation	Number of Boreholes	Borehole Numbers
September 20 and 30, 2003 October 20, 21, 28 and 29, 2003 December 16, 2003	26	PPA-03-01 to PPA-03-26
October 18 to 22, 2004	6	PPA-04-1 to PPA-04-6
April 10 to 20, 2006	24 – Boreholes 24 – Dynamic Cones	PPA-06-1 to PPA-06-48

The boreholes for these investigations were advanced using both truck and track mounted drill rigs equipped with continuous flight, hollow or solid stem augers. The boreholes were advanced to depths in the range of approximately 4.3 m to 13.7 m below existing grade or to elevations in the range of approximately 283.6 m to 293.9 m.

Prior to commencing the field investigations, the borehole locations were established in the field by Jacques Whitford personnel. The borehole locations were cleared of underground utilities by the various utility companies.

Soil samples were recovered from the boreholes at regular intervals using a 50 mm Outside Diameter split-tube sampler by conducting Standard Penetration Tests (SPTs) in general accordance with the procedures outlined in ASTM specification D1586-99.

Where soft cohesive soils were encountered, in situ shear vane testing was carried out using a vane meeting the MTO N-Vane design requirements and following the procedures outlined in ASTM D2573-94.

Dynamic cones were driven in accordance with the method outlined in the Canadian Foundation Engineering Manual, 1992 edition.



Jacques Whitford field personnel recorded the conditions encountered in all boreholes at the time of the investigations. Soils were described in accordance with the MTO Soils Classification System for foundation reports.

The groundwater levels, where encountered and where practical, were measured in the boreholes during and upon completion of the drilling. Standpipes were installed in Boreholes PPA-06-045, PPA-06-046, PPA-06-047 and PPA-06-048. All other boreholes without standpipes were backfilled in accordance with the Ontario Ministry of the Environment Regulation 903, using cement/bentonite slurry.

All soil samples recovered from the boreholes were placed in moisture-proof bags and transported to our laboratory for detailed classification and testing as required.

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## 5.2 Survey

The borehole locations were established by Jacques Whitford personnel and referenced to the chainage for Highway 401, as noted on the Record of Borehole sheets. Offsets were referenced looking towards increasing chainage either left or right of the centreline of the highway right-of-way. The borehole locations are provided on Drawing Nos. 1 to 4 in Appendix A and on the Record of Borehole sheets in Appendix B.

The ground surface elevation at the borehole locations were interpolated from a topographic plan provided to Jacques Whitford by Stantec. It is presumed that the topographic plan provided is referenced to geodetic benchmarks.

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## 5.3 Laboratory Testing

All soil samples transported to the laboratory were subjected to detailed visual examination and classification. Approximately 25% of the soil samples were tested for grain size distribution analyses, Atterberg limits or moisture content determination.

The laboratory results are provided on the Record of Borehole sheets in Appendix B. The results of the grain size analyses and Atterberg limits tests are plotted on Figure Nos. 1 through 14 in Appendix C.

Unless requested in advance, all samples will be stored in our laboratory for a period of 12 months, after issuance of this report.

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# 6.0 RESULTS OF THE INVESTIGATION

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## 6.1 Subsurface Conditions

The subsurface conditions encountered in the boreholes are summarized on the Record of Borehole sheets provided in Appendix B. An explanation of the terms used on the Record of Borehole sheets is also provided in Appendix B.

A Borehole Location Plan is provided on Drawing Nos. 1 and 2 in Appendix A. Strata Plots of the soils encountered in the boreholes are provided on Drawing Nos. 3 and 4 in Appendix A.

A summary of the soil and groundwater conditions encountered in the boreholes is provided below.



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## 6.2 Soil

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### 6.2.1 Topsoil

Topsoil was encountered at the ground surface in 16 of the boreholes. The topsoil ranged in thickness from approximately 50 mm to 230 mm, with a mean of about 100 mm.

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### 6.2.2 Sand Fill and Sand and Gravel Fill

Sand fill and sand and gravel fill was encountered at the ground surface in 39 of the boreholes that were advanced on the shoulder of the highway and underlying the topsoil in 16 of the boreholes. The thickness of the sand fill and sand and gravel fill was variable ranging from approximately 0.4 m to 3.4 m.

The sand fill and sand and gravel fill was moist to wet.

Based on the N-values obtained from the Standard Penetration Tests (SPTs), the compactness of the sand fill and sand and gravel fill was determined to be variable ranging from very loose to very dense, but was typically compact.

Laboratory testing performed on selected samples consisted of moisture content and grain size distribution tests. The test results are as follows:

- Moisture Content:
  - 4% to 18%
- Grain Size Distribution:
  - 0% to 35% gravel;
  - 58% to 94% sand; and,
  - 6% to 21% fines (silt and clay).

The results of the moisture content and grain size distribution tests are provided on the Record of Borehole sheets in Appendix B. The results of the grain size distribution tests on the sand fill and sand and gravel fill are also provided on Figure 1 and 2 in Appendix C.

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### 6.2.3 Silty Sand Fill

Silty sand fill was encountered at the ground surface in Borehole PPA-06-045 and in Borehole PPA-04-005 at a depth of approximately 2.1 m below existing grade, an elevation of about 295.9 m. The thickness of the silty sand fill was approximately 0.3 m and 0.8 m respectfully.

Based on the N-values obtained from the SPTs, the compactness of the silty sand fill was determined to be loose to compact.

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### 6.2.4 Native Sand

Native sand was generally encountered underlying the sand fill and sand and gravel fill in 51 of the 56 boreholes. The native sand was encountered at depths in the range of approximately 0.4 m to 6.1 m below existing grade, elevations in the range of about 291.0 m to 297.8 m. The thickness of the naive sand was variable ranging from approximately 0.4 m to 8.4 m. A total of 22 boreholes were terminated

in the native sand at depths in the range of approximately 4.3 m to 11.1 m below existing grade, elevations of about 285.7 m to 297.8 m.

The sand contained varying amounts of gravel (with to some, generally increasing content with depth), trace silt and was moist to saturated.

Based on the N-values obtained from the SPTs, the compactness of the sand was determined to be variable ranging from very loose to very dense, but was typically loose to compact.

Laboratory testing performed on selected samples consisted of moisture content and grain size distribution tests. The test results are as follows:

- Moisture Content:
  - 8% to 34%, more typically 11% to 18%.
- Grain Size Distribution:
  - 0% to 38% gravel;
  - 45% to 94% sand; and,
  - 3% to 17% fines (silt and clay).

The results of the moisture content and grain size distribution tests are provided on the Record of Borehole sheets in Appendix B. The results of the grain size distribution tests on the native sand are provided on Figure Nos. 3 to 7 in Appendix C.

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#### 6.2.5 Peat

Localized deposits of peat were encountered at the ground surface in Borehole PPA-06-047 (Sta. 14+800, extending to approximately 2.9 m below existing grade, or to an elevation of about 293.5 m), and underlying the sand fill in PPA-06-048 (Sta. 15+.250, approximately 0.5m thick, extending to a depth of approximately 1.4 m below existing grade, or to an elevation of about 295.3 m). A larger deposit of peat was encountered between Sta. 15+125 and Sta. 15+175, underlying a layer of native sand in Boreholes PPA-04-001, PPA-04-003, PPA-06-008 and PPA-06-010. The peat was encountered at depths of approximately 0.9 m to 4.3 m below existing grade or between elevations of 295.8 m to 293.0 m. The thickness of the peat was variable, ranging from approximately 1.8 m to 5.7 m.

Based on the N-Values obtained from the SPTs, the consistency of the peat was determined to be very soft to firm.

Laboratory testing performed on selected samples consisted of moisture content tests and a grain size distribution test. The test results are as follows:

- Moisture Content:
  - 111% to 536%

The results of the moisture content tests are provided on the Record of Borehole sheets in Appendix B.

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#### 6.2.6 Clayey Silt

Clayey silt was generally encountered underlying the native sands and peat in 20 boreholes at depths in the range of approximately 0.7 m to 9.1 m below existing grade, elevations in the range of about

296.7 m to 290.7 m. A total of 14 boreholes were terminated in the clayey silt stratum at depths of approximately 4.7 m to 11.1 m below existing grade, elevations of about 287.0 m to 293.2 m.

Based on the N-Values obtained from the SPTs, the consistency of the clayey silt was determined to be very soft to hard, but typically firm to stiff.

Laboratory testing performed on selected samples consisted of moisture content, grain size distribution and Atterberg Limits tests. The test results are as follows:

- Moisture Content:
  - 10% to 23%
- Grain Size Distribution:
  - 1% to 14% gravel;
  - 9% to 40% sand;
  - 25% to 59% silt; and,
  - 15% to 36% clay.
- Atterberg Limits:
  - Liquid Limits: 14% to 24%
  - Plastic Limits: 10% to 14%
  - Plasticity Indices: 4% to 10%

The results of the moisture content, grain size distribution and Atterberg limits tests are provided on the Record of Borehole sheets in Appendix B.

The results of the grain size distribution tests are plotted on Figure 8 and 9 in Appendix C. The results of the Atterberg limits tests are provided on Figure 10 and 11 in Appendix C.

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#### 6.2.7 Silt (ML)

Silt was encountered in eight boreholes at depths in the range of approximately 2.7 m to 12.3 m below existing grade, elevation in the range of about, 284.1 m to 295.0 m. Seven of the eight boreholes were terminated in the silt stratum at depths in the range of approximately 5 m to 12.6 m below existing grade, elevation in the range of about 283.8 m to 292.4 m. The silt was approximately 1.9 m thick in the borehole that did not terminate in the silt.

Based on the N-Values obtained from the SPTs, the compactness of the silt was determined to be variable, ranging from very loose to dense, but was typically loose to compact.

Laboratory testing performed on selected samples consisted of moisture content and a grain size distribution test. The test results are as follows:

- Moisture Contents:
  - 11% to 22%
- Grain Size Distribution:
  - 0% gravel;
  - 7% sand;
  - 85% silt; and
  - 8% clay sized particles.

Atterberg Limits testing was attempted on three selected samples. The results indicated the material was non-plastic.

The results of the moisture content and grain size distribution tests are provided on the Record of Borehole sheets in Appendix B.

The results of the grain size distribution test are provided on Figure 12 in Appendix C.

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#### 6.2.8 Sandy Silt / Silty Sand

Sandy silt/silty sand was encountered in 17 boreholes at depth in the range of approximately 0.8 m to 10.1 m below existing grade, elevations in the range of about 288.1 m to 296.2 m. The thickness of the sandy silt/silty sand ranged from approximately 0.6 m to 4 m. A total of 12 boreholes were terminated in the sandy silt/silty sand stratum at depths in the range of approximately 8.1 m to 12.6 m below existing grade, elevations in the range of about 285.5 m to 291.9 m.

Based on the N-Values obtained from the SPTs, the compactness of the sandy silt/silty sand was variable ranging from very loose to very dense, but was typically loose to compact.

Laboratory testing performed on selected samples consisted of moisture content and grain size distribution tests. The test results are as follows:

- Moisture Content:
  - 9% to 24%, more typically in the range of about 15% to 25%
- Grain Size Distribution:
  - 0% to 11% gravel;
  - 12% to 40% sand;
  - 45% to 71% silt; and
  - 3% to 15 % clay sized particles.

The results of the moisture content and grain size distribution tests are provided on the Record of Borehole sheets in Appendix B. The results of the grain size distribution tests are provided on Figures 13 and 14 in Appendix C.

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#### 6.3 Borehole Cave-in and Groundwater

Borehole cave-in was measured in some boreholes on completion of the drilling at depths between approximately 2.4 m to 9.1 m below existing grade or elevations of about 288.9 m and 295.8 m.

Groundwater was measured on completion of drilling in both open and caved boreholes at depths of approximately 1.7 m to 6.4 m below grade or elevations of about 291.1 m to 296.3 m.

Groundwater was measured November 2, 2006, in the four standpipes installed at the site at the depths and elevations are noted in the following table:

<b>Borehole</b>	<b>Depth Below Existing Grade (m)</b>	<b>Elevation (m)</b>
PPA-06-45	1.6	295.9
PPA-06-46	2.7	294.1
PPA-06-47	0.5	295.9
PPA-06-48	0.7	295.9

Fluctuation in the groundwater levels due to seasonal changes or in response to particular precipitation events should be anticipated.

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## 7.0 CLOSURE

A soil investigation is a limited sampling of a site. The information is gathered at specific borehole locations and can only be extrapolated to an undefined limited area around the borehole locations. The extent of the limited area depends on the variability of the soil and ground water conditions as influenced by geological processes, as well as the history of the site reflecting natural conditions, construction activities and site use. Should any conditions at the site be encountered which differ from those at the borehole locations, we request that we be notified immediately in order to assess the additional information.

We trust the above information meets with your present requirements. Should you have any questions or require further information, please do not hesitate to contact us at your convenience.

Regards,

**JACQUES WHITFORD LIMITED**

*Original Signed By:*

Geoffrey Creer, P.Eng.  
Geotechnical Engineer

*Original Signed By:*

Raymond Haché, M.Sc., P. Eng.  
Principal and Senior Service Director  
MTO Principal Foundations Engineer



# FOUNDATION DESIGN REPORT

## Poor Performing Area Highway 401 Township of Blanford-Blenheim, Ontario G.W.P. 71-00-00 District – London

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### 8.0 DISCUSSION

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#### 8.1 General

The area under investigation is a section of Highway 401 located approximately 9 km east of Interchange No. 238 (Oxford Road 2) in Woodstock, Ontario. The site is approximately 1.2 km in length and located between Stations (Sta.) 14+500 and Sta. 15+700, in the Township of Blanford-Blenheim, Ontario.

In this area, Highway 401 is built on embankments of approximately 2 m in height, to a rural highway section with wide gravel shoulders and a wide grass covered centre median. The highway is generally at a higher elevation than the surrounding lands. Drainage for Highway 401 is provided by ditches located along the sides of the highway and in the centre median, which are sloped to drain towards a series of culverts. The culverts generally drain water to the local creeks and rivers, located south of the highway.

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#### 8.2 Proposed Development

The Ministry of Transportation (MTO) is planning to widen a section of Highway 401 just east of Woodstock Ontario. The planned widening will extend from approximately 1 km east of Interchange No. 238 (Highway 401 and Oxford Road 2), in the Township of Blanford, to approximately 4.1 km east of the Drumbo Road underpass in the Township of Blanford-Blenheim. The widening consists of adding a single lane to both the east and west bound lanes of the highway. It is understood that the additional lanes will be constructed in the existing centre median of the highway.

The widening work is to include the following:

- Removal of any existing structures in the centre median;
- Stripping the existing organic ground surface cover;
- Placement of engineering fill;
- Installation of underground storm sewers and culverts;
- Construction of a new concrete barrier wall in the centre median; and

- Placement of the proposed pavement structure that, based on correspondence from Stantec and MTO, will consist of the following design:
  - Reconstruction of the existing lanes:
    - Excavate 500 mm
    - 300 mm Hot Mix
    - 200 mm of new Granular A over remaining granular material.
  - Proposed widening pavement structure:
    - 300 mm Hot Mix
    - 200 mm Granular A
    - 550 mm Granular B

It is understood that the existing grades and elevation of the highway platform will not be increased through the poor performing area.

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### 8.3 Subsurface Conditions

The subsurface conditions encountered in the area identified a poor performing area between Sta.14+500 and Sta. 15+700, generally consisted of the following:

- Topsoil, or generally loose to compact sand or sand and gravel fill at the ground surface;
- Native sand generally loose to compact;
- Clayey silt generally firm to stiff;
- Localized deposits of silt, sandy silt and silty sand; and
- Deposits of peat were encountered in the area, but were concentrated between Sta. 15+050 and Sta. 15+250. The thickness of the peat was variable ranging from about 0.5 m to 5.7 m.

Groundwater was encountered in the boreholes on completion of drilling at depths between approximately 1.7 m to 6.4 m below existing grade or between elevations of about 291.1 m to 296.3 m. Groundwater was measured in the standpipes installed in Boreholes PPA-06-045 to PPA-06-048 at depths of approximately 0.5 m to 2.7 m below existing grade or between elevations of about 294.1 m to 295.9 m.

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### 8.4 Geotechnical Assessment

Peat deposits were generally encountered locally between Sta. 14+800 and Sta. 15+300 with thicker peat deposits between Sta. 15+050 and Sta. 15+250. These stations generally correspond to the locations where thicker asphalt (ranging from approximately 760 mm to 1170 mm) was encountered during the previous field investigations.

It is anticipated that the placement of the embankment fill for the existing highway initiated consolidation and compression of the underlying peat resulting in settlement of the highway surface. Over time,

additional asphalt was added to “smooth out” the ride in this area. This additional asphalt increased the load on the underlying peat inducing additional consolidation and compression and resulting in additional settlement of the road surface.

Based on published correlations from the Muskeg Engineering Handbook, the following design parameters have been selected for the peat deposits for the purpose of evaluating the settlement characteristics:

Typical Moisture Content	Unit Weights	Compression Indices	Void Ratio
400%	11	4	8
300%	12	3	6
200%	14	2	4

Consolidation of the widened portion will be similar to that which has occurred beneath the existing roadway platform. The base of the fill material overlying the peat is approximately 1.5 m to 2.0 m below the adjacent top of peat. Therefore, it is assumed that the combined primary and secondary compression of the peat, from initial fill placement has exceeded 1.5 m.

For discussion purposes, the magnitude of calculated peat compression for various moisture contents and thicknesses are presented below for the case of placing a total of 4 m of structural fill on top of the unconsolidated peat surface. The basic assumption is that the bottom of the fill will ultimately settle to 2 m below the top of peat present within the median.

Uncompressed Peat Thickness (m)	Peat Moisture Content		
	200%	300%	400%
4	1.3 m	1.5 m	1.6 m
6	1.7 m	2.0 m	2.3 m
8	2.1 m	2.5 m	2.9 m

- Notes:
- 1 The above calculations do not include effects of secondary compression
  - 2 The above magnitudes are approximate. However it is noted that the existing bottom of fill present at the site, the peat beneath Highway 401 has compressed to a similar magnitude. As well, the post construction settlement of Highway 401 is estimated to be over 1.0 m at some locations, based on the thickness of the asphalt material recovered as part of the pavement investigation.

Calculations, based on empirical correlations, indicate that the estimated time for approximately 90% of the settlement to occur is variable, and ranges from approximately 4 to 5 months upwards to about 12 to 15 months or more, depending on the thickness and composition of the peat. Placing a surcharge load will decrease the time required to achieve 90% consolidation of the underlying peat.

The above calculated peat compression values are based on loading the peat for the first time. However, site observations indicate that the median has already been filled to approximately elevation 296.3 m. Using the above parameters it is projected that future settlements associated with raising the grade to approximately elevation 297.8 m will be in the order of approximately 500 mm to 800 mm.

It is anticipated that consolidation and compression of the peat under the existing roadway will continue although it is anticipated that much of the primary settlement has already taken place. The placement of fill material for the planned widening of the highway embankments will cause additional consolidation of

the underlying peat as a portion of this area to date has only been lightly loaded. Calculations indicate that the placement of conventional fill and borrow material for the widening area would result in primary settlements in the range of about 500 mm to 800 mm in addition to the longer term secondary settlements. The variable thickness of the peat soils will also contribute to differential settlement of the driving surface between the existing and widened portion of the highway and along the length of the lane.

Calculations, based on empirical data, indicate that secondary settlements of the peat could be in the range of about 400 mm to 600 mm over a life of approximately 20 years. Placing a surcharge load of approximately 1.5 m prior to constructing the planned highway could reduce the secondary settlement to approximately <50 mm to 100 mm over the same time period.

The following table provides a comparison of the design alternatives, estimated settlements, and advantages, disadvantages and risks associated with each design alternative considered for the widened section of Highway 401:

Design Alternative	Estimated Settlements	Advantages	Disadvantages	Risk / Consequences
Conventional Granular Fill	500 mm to 800 mm	Easiest to construct	Continued settlements of the underlying peat, requiring regular maintenance.	Continued settlements of the peat material. Regular maintenance will still be required.
Polystyrene Fill	50 mm to 80 mm	Very light weight fill (2kN/m <sup>3</sup> )	Will impact traffic during construction. Will require temporary diversions Potential concern for roadway icing. Possible buoyancy issues with high groundwater levels especially in early spring.	Possible concern with roadway icing. Possible buoyancy issues given the high groundwater levels encountered.
Lightweight Slag Fill	400 mm to 600 mm	Light weight fill (approx. 13 kN/m <sup>3</sup> )	Potential Environmental concerns with high water levels.	Potential Environmental Concerns with high water
Preload /Surcharge	Normal fill 500 mm to 800 mm. 1.5 m Surcharge may induce 0.8 m to 1.4 m of settlement	Less impact to traffic. Proven technique at other sites.	Additional time added to construction schedule work carried out in two stages. Secondary settlement will continue to occur over time. Will require a carefully planned monitoring program.	Time required to achieve desired settlements may be longer than anticipated. This could result in contract delays.
Preload/ Surcharge and Geogrid	Normal fill 500 mm to 800 mm 1.5 m Surcharge may induce 0.8 m to 1.4 m of settlement.	Reduces risks associated with differential settlements.	Geogrid should be added after the preload/surcharge program is complete. This will increase excavation costs for double handling material to place the geogrid layers.	Duration of settlements longer than anticipated could result in delay to contract.
Subexcavate	Settlement of the embankment fill only	Eliminates the peat from below the embankments and any potential settlement from peat.	Will require shoring, groundwater control and detours. Significant traffic impacts during construction.	Construction may require the closure of the highway.
Reinforce the peat with stone columns	Anticipated to be minimal	Reduced settlement as the road would be supported on stone columns.	Peat soil extends beyond the limit of the equipment Preliminary estimates indicate	Many stone columns to be constructed. Requires 60 %to 70% of the



Design Alternative	Estimated Settlements	Advantages	Disadvantages	Risk / Consequences
			that stone columns would cover approximately 60% to 70% of the areas. Cost would be high given the anticipated coverage.	area to be covered with columns. Likely not cost effective given the coverage. Would still require geogrid to be placed over the stone columns before placing the pavement structure.

Based on our review of the options and through discussions with representatives of both Stantec and MTO, the preferred option is to consolidate the peat by pre-loading the area prior to construction. Therefore, it is recommended that preload/surcharge loading program be carried out for the planned widening. It is also recommended that consideration be given to placing a layer of geogrid reinforcement between the engineered fill sub-grade and the sub-base granulars, to help minimize any future differential settlements.

---

## 9.0 RECOMMENDATIONS

---

### 9.1 Existing Road Structure

Thick asphalt, between 0.75 m and 1.1 m thick, was encountered on the existing highway between Sta. 15+100 and 15+200. The thick asphalt is a result of past settlement and will contribute to current and future settlements. It is recommended that all the asphalt in this area be removed, and replaced with the pavement structure recommended for the planned widening section.

The exposed subgrade of the embankment should be proof rolled, inspected and certified in accordance with SP902S01, prior to the placement of any fill materials. In low areas, where significant amounts of asphalt are removed, it is recommended that Granular B should be used if additional material is required to achieve subgrade elevation.

It is recommended that a layer of geogrid reinforcement be placed on the subgrade, prior to placing the granular subbase. The placement of this layer will help minimize future differential settlements.

---

### 9.2 Proposed Road Structure - Embankment Design and Construction

Prior to placing any fill, all topsoil, loose, wet, organic and other deleterious materials should be removed from the area of the proposed widening. It is noted that the removal of all organic materials may not be practical where thick deposits of peat were encountered. Where the peat extends to depths of 6 m or less below existing grade, it is suggested that it be removed as per OPSD 203.010 and OPSS 209. Where the peat is deeper than 6 m below existing grade (Between Sta. 15+100 and 15+200), the peat should remain in place and the platform fill should be constructed above the existing median fill after removal of all topsoil and other deleterious material as noted herein, the deeper peat left in place should be surcharged to induce most of the settlements prior to paving.

The exposed subgrade of the embankment should be proof rolled, inspected and certified in accordance with SP902S01, prior to the placement of any fill materials.

A settlement monitoring program must be established and should include the installation of a number of settlement monitoring plates. These plates should be surveyed on a regular basis prior to and during the placement of any fill material, and for the entire surcharge loading period.

The widened area should be constructed of OPSS Select Subgrade Material or earth fill in accordance with OPSS 206 and 501.

To help to reduce the potential differential settlement of the paved surface as a result of consolidation and compression of the peat soils between Sta. 15+100 and Sta. 15+200, placing a surcharge of approximately 1.5 m is recommended. The limits of the surcharge should extend from Sta. 15+075 to 15+225. Calculated settlements with the placement of the additional surcharge load are in the range of approximately 0.8 m to 1.4 m. The surcharge load should be placed a minimum of 10 months prior to the construction of the planned highway widening.

To minimize differential settlements of the pavement surface, it is recommended that a biaxial geogrid be placed beneath the pavement structure. It is recommended that the geogrid be placed between the subgrade surface and the granular subbase.

The geogrid reinforcement should be placed after the preloading program has been carried out. Therefore, it will be necessary to remove most of the material for the proposed widening in order to place the geogrid. It is recommended that excavations created through the removal process and placement of the grid be open for a maximum of 10 to 12 days; this recommendation is to minimize rebound due to temporary unloading.

Consideration should also be given to placing a layer of geogrid reinforcement beneath the storm sewers in this area in order to minimize potential differential settlements of the pipes. The geogrid should be placed below the pipe bedding material and for the full width of the trench.

All geogrid placed at the site should consist of a biaxial geogrid (Terrafix BX-1200 or equivalent). Compaction of the soil placed on the geogrid with larger static rollers is likely to provide optimum results.

It is noted that this approach of surcharging the proposed widening will induce some settlement below the existing road platform during construction. To minimize the impact on the existing road platform, it is recommended that the surcharge load be applied in 2 layers; the first layer should be constructed to 0.75 m above final grade and the second layer to 1.5 m above final grade. There should be a minimum of 5 calendar days between the placement of the first and second layer. Periodic re-levelling of the surcharge fill should be anticipated due to the settlements associated with peat consolidation. It is also recommended that the movement of the existing road platforms be monitored during the surcharge loading program by establishing several settlement monitoring points on the existing road platform. These points should be surveyed both prior to and during the placement of the fill and for the duration of the surcharge loading program. This option will need to be discussed with the local district staff and planning and design to ensure that appropriate re-levelling works can be carried out as required.

The stability of the underlying peat with the surcharge load applied was carried out using Geostudios Geoslope, a commercially available slope stability program. A factor of safety of 2.6 was calculated, indicating that the placement of the surcharge should not affect the stability of the peat. Results of the stability analysis are provided in Appendix E.

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## 10.0 CONSTRUCTION RECOMMENDATIONS

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### 10.1 Excavations

Excavations for the removal of topsoil, any deleterious material, the removal of the surcharge load and the installation of underground services should be carried out in accordance with OPSS-206. Side slopes for excavations should conform to the requirements of the Occupational Health and Safety Act and Regulations for Construction Projects current at the time of construction.

In accordance with the present act, the existing fill and native soils are considered Type 3 soils. Temporary excavations should be made with side slopes no steeper than 1:1 (horizontal:vertical) from the base of the excavation.

The construction should be subject to time constraints such that temporary excavations are open for no longer than 10 calendar days. Flatter side slopes will be required for excavations in sand and peat deposits below the water line. Dewatering is expected to be difficult in the area, given the high water levels and the presence of water bearing sands.

Excavation side slopes should be protected from erosion and should be inspected regularly for signs of instability. Slopes should be flattened as required to maintain safe working conditions.

Where space is restricted such that the side slopes cannot be safely cut back in accordance with the OHS A regulation, cave-in is encountered or when excavations are in close proximity to existing infrastructure and embankments, temporary shoring must be provided. Temporary shoring must be provided in accordance with the regulations and may be designed using the parameters provided in Section 10.4 titled "Shoring".

---

### 10.2 Staging

Through discussions with representatives of Stantec and the MTO, it is understood that this area will likely be used as a staging area to stock pile construction materials during the construction of other areas of the planned widening. This will provide an opportunity to pre-load the area. It is understood that there could be up to 12 to 14 months available for a pre-loading program. It is noted that the pre-loading program should be carried out for a minimum of 10 months prior to construction of the planned road platform.

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### 10.3 Groundwater Control

Groundwater was measured in several open and cased boreholes on completion of drilling at depths in the range of approximately 1.7 m to 6.4 m below existing grade, elevations in the range of about 291.1 m to 296.3 m.

Groundwater was also measured in the standpipes installed in 4 boreholes at depths in the range of approximately 0.5 m to 2.7 m below existing grade, elevations in the range of about 294.1 m to 295.9 m.

Given the soil conditions, seepage above the elevations noted is anticipated and should be readily handled by conventional sumps and pumping techniques.

Excavations below the elevations noted above may be difficult given the presence of wet sands layers and seams. Consideration could be given to using some form of dewatering such as single or multiple well points, in addition to conventional sumps and pumping techniques. As discussed in Section 10.4, excavations to remove organic material and for the installation of underground services are anticipated to require shoring such as sheet piles. Dewatering within the sheet piled enclosures would be suitable for this site.

An appropriate NSSP should be included in the contract alerting the contractor to the dewatering issue.

Dewatering systems used on the site are the responsibility of the contractor and should be designed by a dewatering specialist retained by the contractor.

## 10.4 Shoring

Shoring may be required where excavations to remove organic material or for the installation of underground services are carried out in-close proximity to the traveled lanes of the highway. The following table may be used to design temporary shoring where the backslope is horizontal.

Parameters	OPSS Granular A	OPSS Granular B, Type II	Native Sand	Peat
Unit Weight (kN/m <sup>3</sup> )	22.0	21.0	18	11 to 14 Based on natural water content (See Section 8.4)
Angle of Internal Friction, $\phi$	35°	35°	30°	25°
Coeff. of Active Earth Pressure, $K_a$	0.27	0.27	0.33	0.41
Coeff. of Passive Earth Pressure, $K_p$	3.69	3.69	3.0	2.46
Coeff. of Earth Pressure at Rest, $K_0$	0.43	0.43	0.5	0.58

Shoring should meet the requirements of Performance Level 2 as per SP105S19 and should consider backfill and traffic loading.

Shoring could consist of driven sheet piles sealed to reduce the volume of ground water infiltration. Soldier piles and wood lagging could be considered for use at this site, however, the high ground water levels will require the use of a drainage system behind the wall.

The design of shoring systems for use at the site must be carried out by a shoring specialist retained by the contractor.

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## 11.0 CLOSURE

This report has been prepared for the sole benefit of Stantec Consulting Ltd., the Ministry of Transportation of Ontario and their agents, and may not be used by any third party without the express written consent of Jacques Whitford Limited, Stantec Consulting Ltd. and the Ministry of Transportation of Ontario. Any use that a third party makes of this report is the responsibility of the third party.

The information presented in this report is in accordance with our present understanding of the project.

A soils investigation is a limited sampling of a site. The conclusions given herein are based on information gathered at specific borehole locations and can only be extrapolated to an undefined limited area around the locations. The extent of the limited area depends on the variability of the soil and ground water conditions as influenced by geological processes, as well as the history of the site reflecting natural conditions, construction activities, and site use.

Should any conditions at the site be encountered which differ from those at the borehole locations, we request that we be notified immediately in order to assess the additional information.

We trust the above information meets with your present requirements. Should you have any questions or require further information, please do not hesitate to contact us at your convenience.

Regards,

**JACQUES WHITFORD LIMITED**

*Original Signed By:*

Geoffrey Creer, P.Eng.  
Geotechnical Engineer

*Original Signed By:*

Raymond Haché, M.Sc., P. Eng.  
Principal and Senior Service Director  
MTO Principal Foundations Engineer



# Appendix A

## Drawings



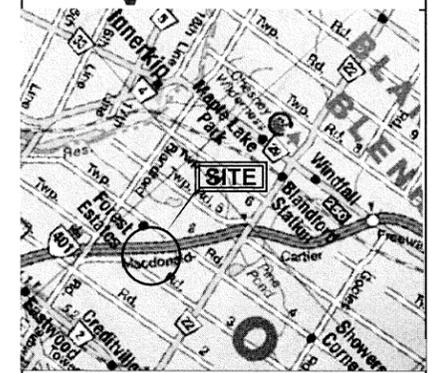
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WP No 71-00-00



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AND/OR MILLIMETRES  
UNLESS OTHERWISE SHOWN

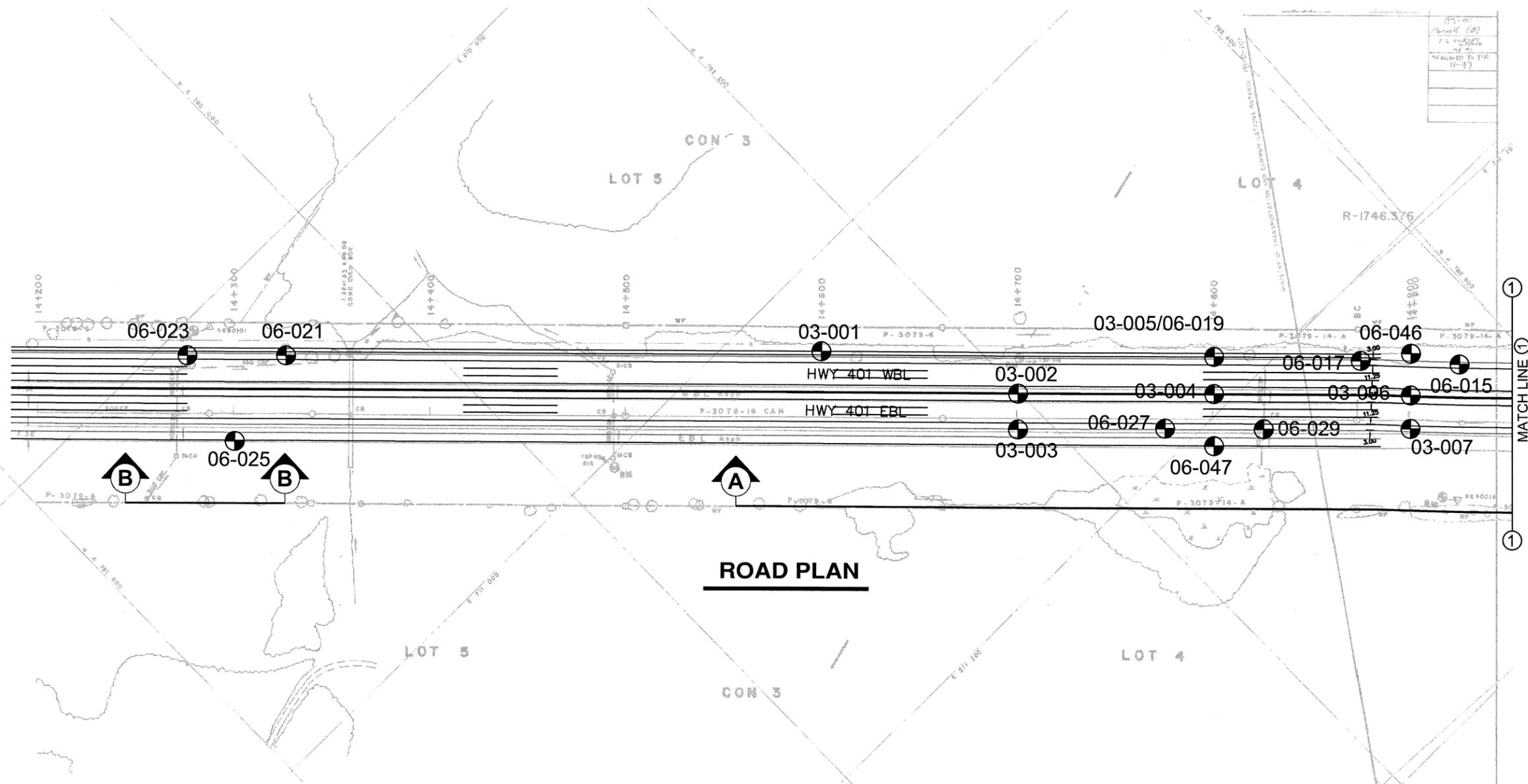
POOR PERFORMING AREA  
HIGHWAY 401  
STATION 14+200 TO 14+950  
TOWNSHIP OF BLANFORD



KEY PLAN

TO LONDON ←

→ TO TORONTO



ROAD PLAN

MATCH LINE ①

LEGEND

BOREHOLE			
No	ELEVATION (m)	STATION	OFFSET
03-001	297.4	14+600	20.8m LT
03-002	297.3	14+700	CL
03-003	297.9	14+700	18.0m RT
03-004	296.9	14+800	CL
03-005	297.5	14+800	19.0m LT
03-006	296.8	14+900	CL
03-007	297.9	14+900	17.0m RT
06-015	297.2	14+925	16.5m LT
06-017	297.5	14+875	17.5m LT
06-019	297.7	14+800	17.0m LT
06-021	297.0	14+325	17.0m LT
06-023	297.1	14+275	17.0m LT
06-025	297.1	14+300	22.0m RT
06-027	297.8	14+775	17.5m RT
06-029	297.8	14+825	17.2m RT
06-046	296.8	14+900	21.0m LT
06-047	296.4	14+800	26.0m RT

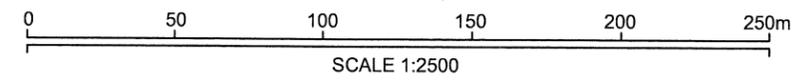
NOTE

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

NOTE: 1) The complete foundation investigation and design report for this project and other related documents may be examined at the Engineering Materials Office, Downsview, information contained in this report and related documents is specifically excluded in accordance with the conditions.

2) Base plan provided by Stantec Consulting Ltd.

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



SCALE 1:2500

DATE	BY	DESCRIPTION

GEOCREs No 40P2-66

HWY No	SUBM'D	CHECKED	DATE	SITE	DIST
401	OC		2008-02-13		LONDON
	PC				



CONSTRUCTION NORTH

METRIC  
DIMENSIONS ARE IN METRES  
AND/OR MILLIMETRES  
UNLESS OTHERWISE SHOWN



TRUE NORTH

CONT No -  
WP No 71-00-00

POOR PERFORMING AREA  
HIGHWAY 401  
STATION 14+950 TO 15+700  
TOWNSHIP OF BLANFORD

SHEET

TO LONDON

TO TORONTO



KEY PLAN

LEGEND

BOREHOLE			
No	ELEVATION (m)	STATION	OFFSET
03-008	296.5	15+000	CL
03-009	297.6	15+000	7m LT
03-010	297.1	15+000	18.4m LT
03-011	296.6	15+100	CL
03-012	298.0	15+100	17.5m RT
03-013	297.1	15+200	CL
03-014	298.2	15+200	6.1m LT
03-015	297.7	15+200	17.5m LT
03-016	297.4	15+300	CL
03-017	298.1	15+300	17.3m RT
03-018	297.7	15+400	CL
03-019	298.3	15+400	6.2m LT
03-020	298.1	15+400	17.6m LT
03-021	297.8	15+500	CL
03-022	298.4	15+500	16.8m RT
03-023	297.7	15+600	CL
03-024	298.4	15+600	17.3m LT
03-025	297.5	15+700	CL
03-026	298.2	15+700	17.6m RT
04-001	296.8	15+125	25.0m RT
04-002	296.5	15+142	25.0m LT
04-003	296.4	15+145	26.0m RT
04-004	297.6	15+000	7.5m RT
04-005	298.0	15+100	7.5m RT
04-006	298.2	15+300	7.5m RT
06-002	297.8	15+350	20.0m LT
06-004	297.8	15+300	19.0m LT
06-006	297.5	15+250	20.0m LT
06-008	297.6	15+175	20.0m LT
06-010	297.2	15+125	21.0m LT
06-013	297.3	15+050	18.0m LT
06-033	297.8	15+025	18.0m RT
06-035	298.1	15+075	17.5m RT
06-038	298.2	15+175	19.0m RT
06-040	298.2	15+225	18.0m RT
06-042	298.1	15+275	18.0m RT
06-043	298.1	15+325	18.0m RT
06-045	297.5	15+300	12.2m LT
06-048	296.7	15+250	30.0m RT

NOTE

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

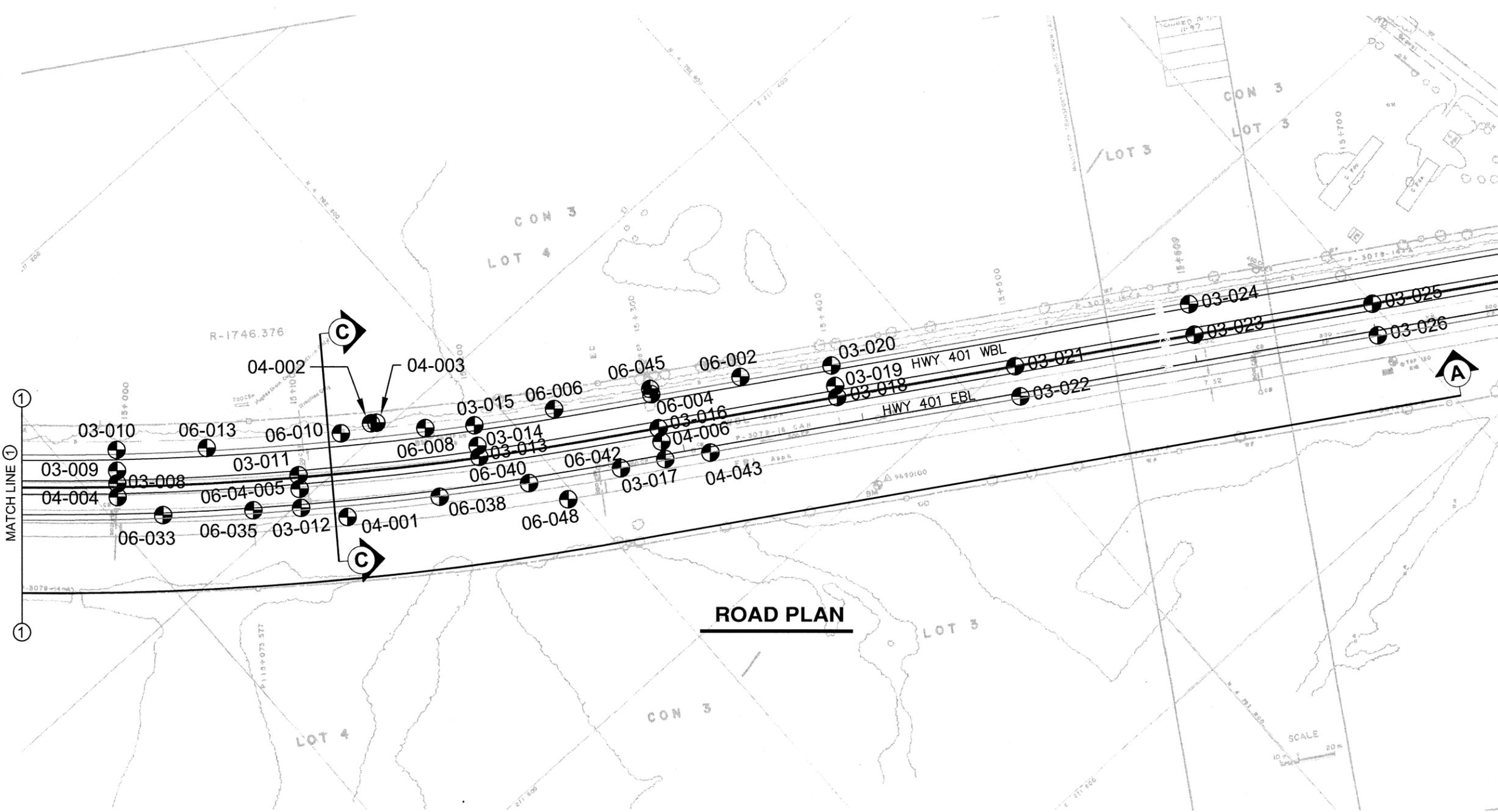
NOTE: 1) The complete foundation investigation and design report for this project and other related documents may be examined at the Engineering Materials Office, Downsview. Information contained in this report and related documents is specifically excluded in accordance with the conditions.

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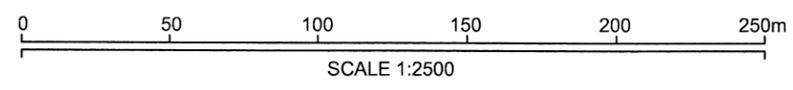
DATE	BY	DESCRIPTION

GEOCREs No 40P2-66

HWY No	GC	CHECKED	DATE	BY	DIST
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DRAWN	PC	CHECKED			DWG100921301GEO-A02



ROAD PLAN





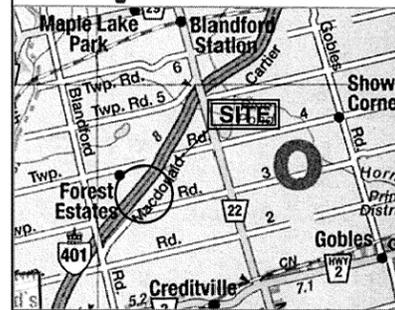
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WP No 71-00-00

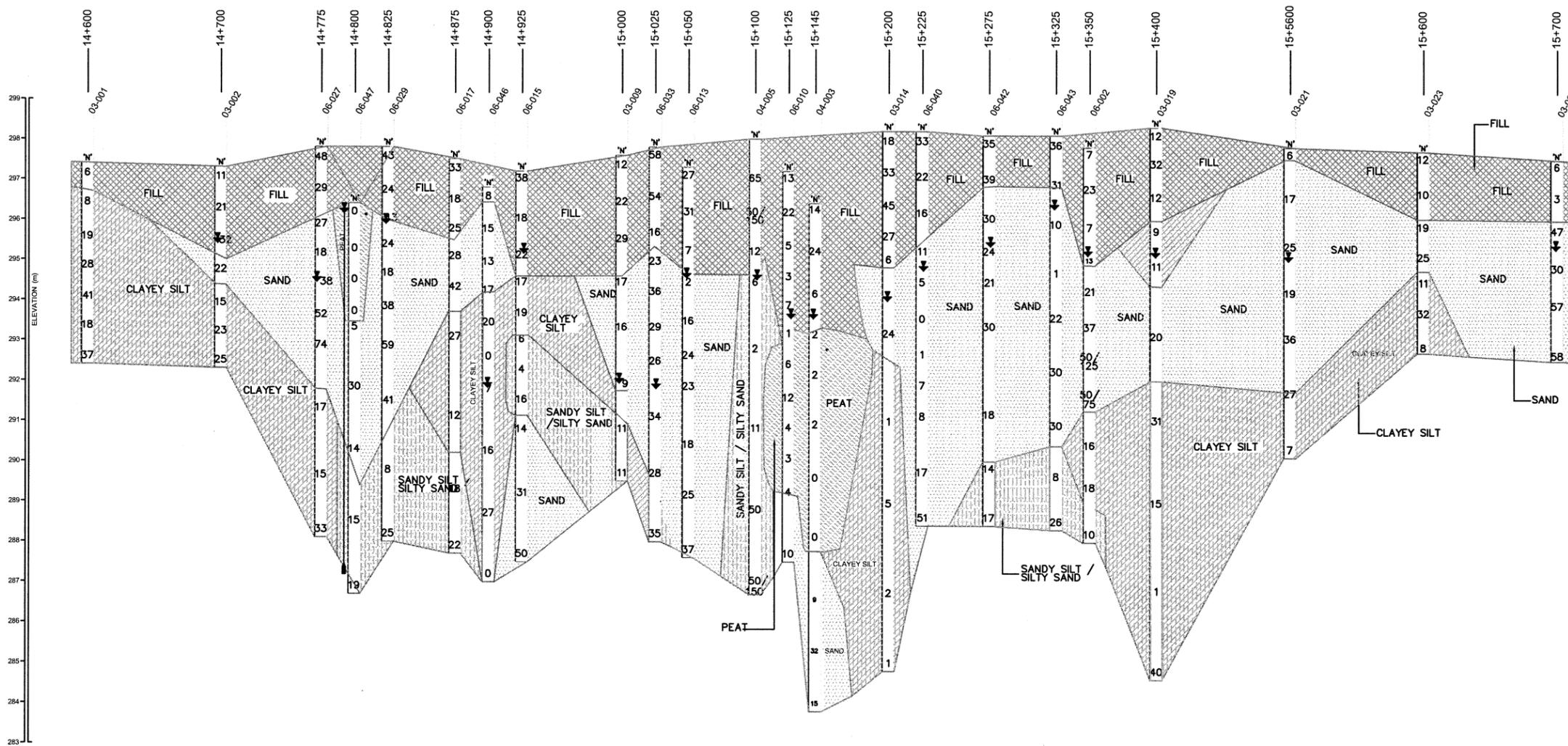


SHEET

POOR PERFORMING AREA  
HIGHWAY 401  
STATION 14+700 TO 15+700  
TOWNSHIP OF BLANFORD



KEY PLAN KEY PLAN



A-A CROSS-SECTION

HORI. SCALE : 1:2000  
VERT. SCALE : AS SHOWN

LEGEND

- N Blows/0.3m (Std Pen Test, 475 J/blow)
- W.L. at time of investigation
- W.L. in Piezometer
- Piezometer
- Borehole Number

No	ELEVATION (m)	STATION	OFFSET
03-001	297.4	14+600	20.8m LT
03-002	297.3	14+700	CL
03-009	297.6	15+000	7.0m LT
03-014	298.2	15+200	6.1m RT
03-019	298.3	15+400	6.2m LT
03-021	297.8	15+500	CL
03-023	297.7	15+600	CL
03-025	297.5	15+700	CL
04-003	296.4	15+145	26.0m RT
04-005	298.0	15+100	7.5m RT
06-002	297.8	15+350	20.0m LT
06-010	297.2	15+125	21.0m RT
06-013	297.3	15+050	18.0m LT
06-015	297.2	14+925	16.5m LT
06-017	297.5	14+875	17.5m LT
06-027	297.8	14+775	17.5m RT
06-029	297.8	14+825	17.2m RT
06-033	297.8	15+025	18.0m RT
06-040	298.2	15+225	18.0 m RT
06-042	298.1	15+275	18.0m RT
06-043	298.1	15+325	18.0m RT
06-046	296.4	14+900	21.0m LT
06-047	296.4	14+800	26.0m RT

NOTE

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

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2) Base plan provided by Stantec Consulting Ltd.

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

DATE	BY	DESCRIPTION

GEOCREs No 40P2-66

HWY No 401	SUBMITT GC	CHECKED	DATE 2008-02-13	SITE	DIST LONDON
DRAWN PC	PC	CHECKED	PC	DWG 100921.301GEO-A03	

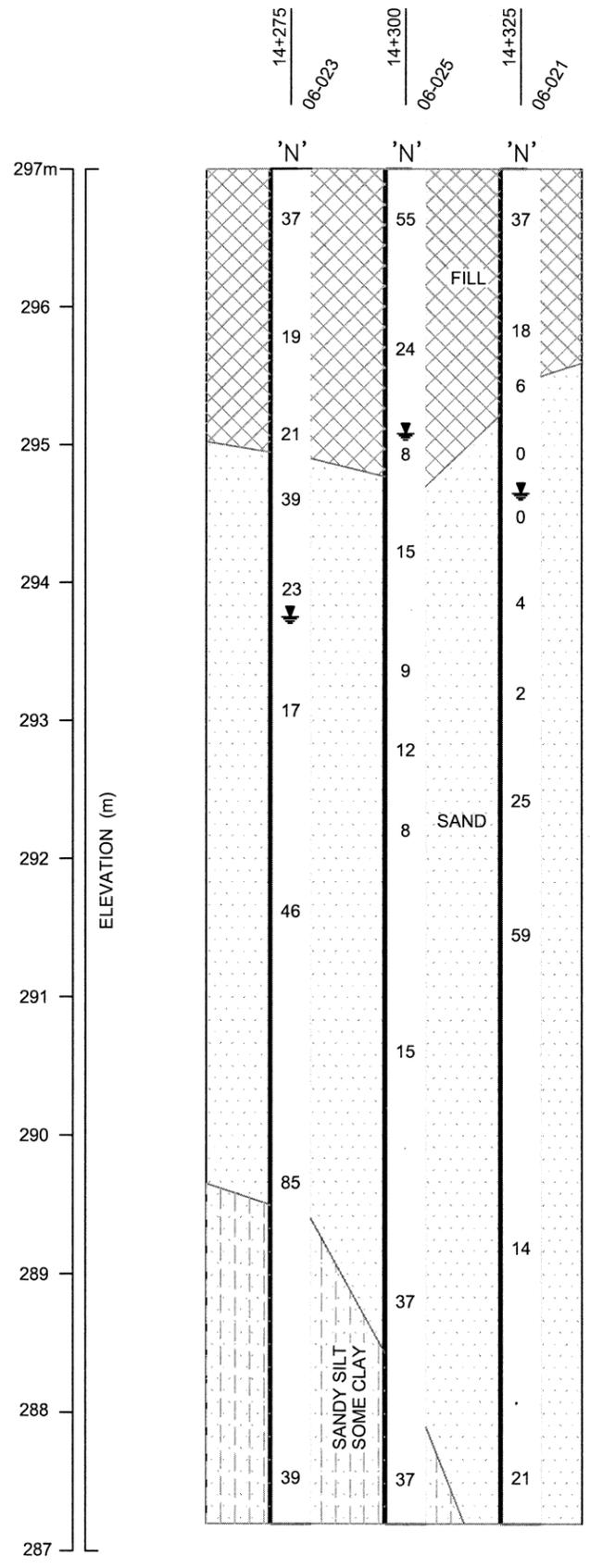
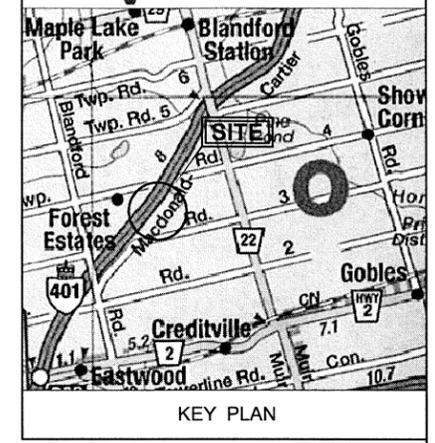


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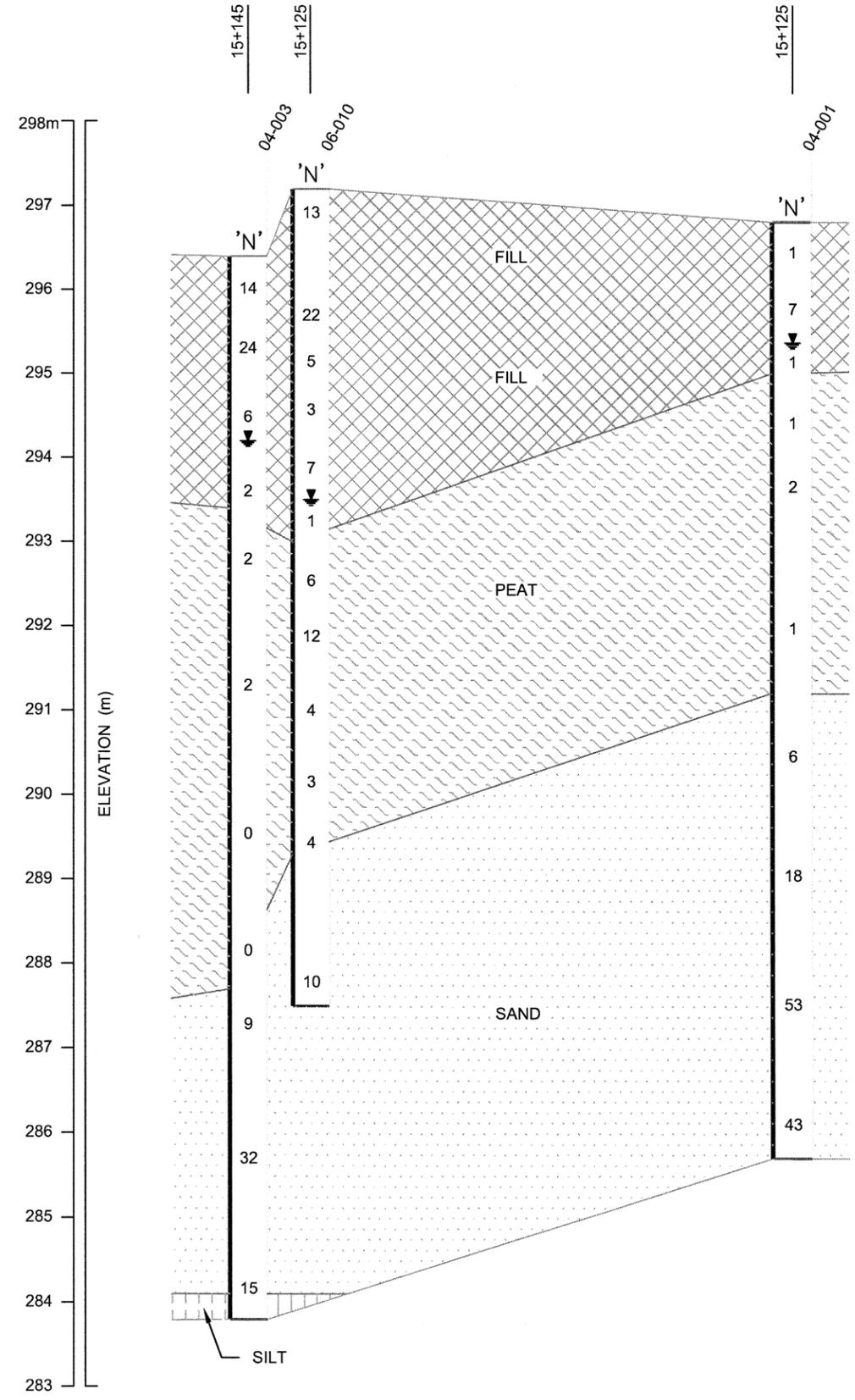
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WP No 71-00-00

POOR PERFORMING AREA  
HIGHWAY 401  
SECTION B-B AND C-C  
TOWNSHIP OF BLANFORD

SHEET



**B-B CROSS-SECTION**  
HORIZONTAL SCALE 1:3000  
VERTICAL SCALE : AS SHOWN



**C-C CROSS-SECTION**  
HORIZONTAL SCALE 1:500  
VERTICAL SCALE : AS SHOWN

**LEGEND**

N Blows/0.3m (Std Pen Test, 475 J/blow)  
 W.L. at time of investigation 04 03

No	ELEVATION (m)	STATION	OFFSET
06-021	297.0	14+325	17m LT
06-023	297.1	14+275	17m LT
06-025	297.1	14+300	22m RT
04-001	296.8	15+125	25m RT
04-003	296.4	15+145	26m RT
06-010	297.2	15+125	21m LT

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

DATE	BY	DESCRIPTION

GEOCREs No 40P2-66

HWY No 401	CHECKED	DATE 2008-02-13	SITE
SUBM'D GC	CHECKED	APPROVED	DIST LONDON
DRAWN PC	CHECKED		DWG100921301GEO-A04

# Appendix B

Terms and Symbols Used on the Record of Borehole Sheet  
Record of Borehole Sheets

## SYMBOLS AND TERMS USED ON BOREHOLE AND TEST PIT RECORDS

### SOIL DESCRIPTION

Terminology describing common soil genesis:

<i>Topsoil</i>	-	mixture of soil and humus capable of supporting good vegetative growth
<i>Peat</i>	-	fibrous fragments of visible and invisible decayed organic matter
<i>Till</i>	-	unstratified and unsorted glacial deposit which may include particle sizes from clay to boulders
<i>Fill</i>	-	materials not identified as deposited by natural geological processes

Terminology describing soil structure:

<i>Desiccated</i>	-	having visible signs of weathering by oxidization of clay minerals, shrinkage cracks, etc.
<i>Fissured</i>	-	material breaks along plane of fracture
<i>Varved</i>	-	composed of regular alternating layers of silt and clay
<i>Stratified</i>	-	alternating layers or beds greater than 6mm (1/4") thick
<i>Laminated</i>	-	alternating layers or beds less than 6mm (1/4") thick
<i>Blocky</i>	-	material can be broken into small and hard angular lumps
<i>Lensed</i>	-	irregular shaped pockets of soil with differing textures
<i>Seam</i>	-	a thin, confined layer of soil having different particle size, texture, or color from materials above and below
<i>Well Graded</i>	-	having wide range in grain sizes and substantial amounts of all intermediate particles sizes
<i>Uniformly Graded</i>	-	predominantly one grain size

Soil descriptions and classification are based on the Unified Soil Classification System (USCS) (ASTM D-2488), which classifies soils on the basis of engineering properties. The system divides soils into three major categories: (1) coarse grained, (2) fine-grained, and (3) highly organic. The soil is then subdivided based on either gradation or plasticity characteristics. This system provides a group symbol (e.g. SM) and group name (e.g. silty sand) for identification. The classification excludes particles larger than 76 mm.

Terminology describing materials outside the USCS, (e.g. particles larger than 76 mm, visible organic matter, construction debris) is based upon the proportion of these materials present and as described below in accordance with the standard of the Ministry of Transportation of Ontario:

<i>Trace or occasional</i>	Less than 10%
<i>Some</i>	10-20%
<i>With</i>	20-30%

The standard terminology to describe cohesionless soils includes the compactness as determined by the Standard Penetration Test 'N'-value\*.

Compactness	'N'-value
Very loose	<4
Loose	4-10
Compact	10-30
Dense	30-50
Very dense	>50

## SYMBOLS AND TERMS USED ON BOREHOLE AND TEST PIT RECORDS

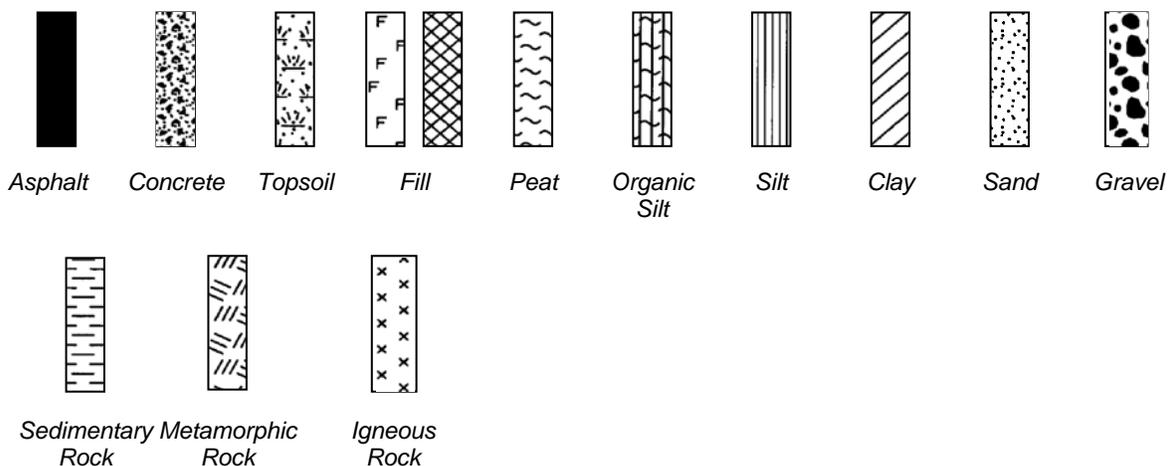
The standard terminology to describe cohesive soils includes consistency, which is based on undrained shear strength as measured by insitu vane tests, penetrometer tests, unconfined compression tests or similar field and laboratory analysis. Standard Penetration Test 'N'-values\* can also be used to provide an approximate indication of the consistency and shear strength of fine grained, cohesive soils.

Consistency	Undrained Shear Strength (kPa)	'N'-Value
Very Soft	<12.5	<2
Soft	12.5-25	2-4
Firm	25-50	4-8
Stiff	50-100	8-15
Very Stiff	100-200	15-30
Hard	>200	>30

**Note: \*\*N'-VALUE-** The Standard Penetration Test records the number of blows of a 140 pound (64kg) hammer falling 30 inches (760mm), required to drive a 2 inch (50.8mm) O.D. split spoon sampler 1 foot (305mm). For split spoon samples where full penetration is not achieved, the number of blows is reported over the sampler penetration in millimeters (e.g. 50/75).

### STRATA PLOT

Strata plots symbolize the soil or bedrock description. They are combinations of the following basic symbols:



### WATER LEVEL MEASUREMENT



Open Borehole or Test Pit



Monitoring Well, Piezometer or Standpipe

### SAMPLE TYPE

SS	Split spoon sample (obtained from the Standard Penetration Test)	BS	Bulk sample
TW	Thin Wall Sample or Shelby Tube	WS	Wash sample
PS	Piston sample	HQ, NQ, BQ, etc.	Rock core samples obtained with the use of standard size diamond drilling bits.
GS	Grab sample		
AS	Auger sample		
VT	Vane Test		

**RECORD OF BOREHOLE No BH-PPA-03-001 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 14+600 o/s 20.8 m Lt., Twp of Blandford-Blenheim ORIGINATED BY NK  
 DIST London HWY 401 BOREHOLE TYPE Hollow Stem Auger, Split Spoons COMPILED BY MW  
 DATUM Geodetic DATE 9.30.03 - 9.30.03 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT $\gamma$	REMARKS & GRAIN SIZE DISTRIBUTION (%)							
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	20	40	60	80	100	W <sub>p</sub>	W			W <sub>L</sub>	10	20	30	GR	SA	SI
297.4	Grass																						
0.0	SAND and GRAVEL (SP-SM) (FILL), some silt, some organics, moist		1	SS	6																		
296.7	Loose Brown		2	SS	8																		
0.7	Clayey SILT (CL-ML), some sand, some gravel, trace organics, moist		3	SS	19																		
	Stiff to very stiff		4	SS	28																		
	Brown		5	SS	41																		
	- trace gravel		6	SS	18																		
	- hard		7	SS	37																		
292.4	END OF BOREHOLE at approximately 5.0 m																						
5.0	Borehole Dry Upon Completion of Drilling																						

ONTARIO.MOT\_1009213.01\_PPA.GPJ\_ONTARIO.MOT.GDT\_2/22/08

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

**RECORD OF BOREHOLE No BH-PPA-03-002 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 14+700 o/s C.L., Twp of Blandford-Blenheim ORIGINATED BY NK  
 DIST London HWY 401 BOREHOLE TYPE Solid Stem Auger, Split Spoons COMPILED BY MW  
 DATUM Geodetic DATE 10.28.03 - 10.28.03 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	20	40	60	80						100	SHEAR STRENGTH kPa	
											○ UNCONFINED	× FIELD VANE							
											● QUICK TRIAXIAL	× LAB VANE							
											WATER CONTENT (%)								
											20	40	60	80	100	10	20	30	
297.3	Grass																		
297.0	150 mm TOPSOIL		1	SS	11														
0.2	SAND (SP-SM) (FILL), trace silt, trace gravel, trace organics, moist Compact Brown		2	SS	21														
295.8	- with organics																		
1.5	SAND (SM to SP-SM), with gravel, trace silt, wet Dense Grey		3	SS	32														
295.0																			
2.3	SILT (ML), some sand, some gravel, trace clay, wet Very stiff Grey		4	SS	22														
	- 0.6 m sand seam, some clay, trace silt, trace gravel		5	SS	15														
			6	SS	23														
			7	SS	25														
292.3	END OF BOREHOLE at approximately 5.0 m																		

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT 2/22/08

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

**RECORD OF BOREHOLE No BH-PPA-03-003 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 14+700 o/s 18.0 m Rt., Twp of Blandford-Blenheim ORIGINATED BY NK  
 DIST London HWY 401 BOREHOLE TYPE Solid Stem Auger, Split Spoons COMPILED BY MW  
 DATUM Geodetic DATE 10.20.03 - 10.20.03 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES	SHEAR STRENGTH kPa									WATER CONTENT (%)
						20	40	60	80	100							
297.9	Gravel shoulder		1	SS	38												
0.0	SAND and GRAVEL (SP-SM) (FILL), some silt, damp Compact to very dense Brown		2	SS	50												
	- moist		3	SS	35												
	- trace gravel		4	SS	58												
294.9			5	SS	38												
3.0	Clayey SILT (CL-ML), some sand, some gravel, moist Very stiff to hard Brown		6	SS	16												
			7	SS	50/ 0 mm												
293.2	- inferred boulder																
4.7	END OF BOREHOLE at approximately 4.7 m																

ONTARIO.MOT\_1009213.01\_PPA.GPJ\_ONTARIO.MOT.GDT\_2/22/08

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

**RECORD OF BOREHOLE No BH-PPA-03-004 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 14+800 o/s C.L., Twp of Blandford-Blenheim ORIGINATED BY NK  
 DIST London HWY 401 BOREHOLE TYPE Solid Stem Auger, Split Spoons COMPILED BY MW  
 DATUM Geodetic DATE 10.28.03 - 10.28.03 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	20	40	60	80					
296.9	Grass															
296.8	150 mm TOPSOIL		1	SS	10											
0.2	SAND (SP-SM) (FILL), trace silt, trace gravel, trace organics, moist Compact to dense Brown															
296.2	Silty SAND (SP), trace gravel, moist Loose to dense Brown to grey		2	SS	46											
0.8																
			3	SS	36											
			4	SS	7											
294.0	SAND (SM to SP-SM), trace silt, wet Very loose to dense Grey - trace organics at upper 1.5 m  - trace gravel		5	SS	1											
2.9																
			6	SS	46											
			7	SS	24											
291.9	END OF BOREHOLE at approximately 5.0 m															
5.0																

ONTARIO.MOT\_1009213.01\_PPA.GPJ\_ONTARIO.MOT.GDT\_2/22/08

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

**RECORD OF BOREHOLE No BH-PPA-03-005 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 14+800 o/s 19.0 m Lt., Twp of Blandford-Blenheim ORIGINATED BY NK  
 DIST London HWY 401 BOREHOLE TYPE Hollow Stem Auger, Split Spoons COMPILED BY MW  
 DATUM Geodetic DATE 9.30.03 - 9.30.03 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES	SHEAR STRENGTH kPa								
						20	40	60	80	100						
297.5	Gravel Shoulder															
0.0	SAND and GRAVEL (SP-SM) (FILL), some silt, some organics, moist Compact Brown - trace organics		1	SS	14											
			2	SS	11											
295.8																
1.7	SAND (SM to SP-SM), trace gravel, moist Loose to compact Brown  - wet		3	SS	9											
			4	SS	6											
			5	SS	23											
			6	SS	46											
			7	SS	54											
292.3																
5.2	Silty SAND (SP), trace gravel, wet Compact to dense Brown															
291.1			8	SS	24											
290.6	Clayey SILT (CL-ML), some sand, trace gravel, moist Brown END OF BOREHOLE at approximately 6.6 m															
6.6																

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT 2/22/08

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

**RECORD OF BOREHOLE No BH-PPA-03-006 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 14+900 o/s C.L., Twp of Blandford-Blenheim ORIGINATED BY NK  
 DIST London HWY 401 BOREHOLE TYPE Solid Stem Auger, Split Spoons COMPILED BY MW  
 DATUM Geodetic DATE 10.28.03 - 10.28.03 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	20	40	60	80						100	SHEAR STRENGTH kPa	
											○ UNCONFINED	× FIELD VANE							
											● QUICK TRIAXIAL	× LAB VANE							
											WATER CONTENT (%)								
											20	40	60	80	100	10	20	30	
296.8	Grass																		
296.0	150 mm TOPSOIL		1	SS	10														
0.2	SAND (SP-SM) (FILL), trace gravel, trace organics, moist Compact Brown		2	SS	20														
295.3	SAND (SM to SP-SM), trace gravel, trace silt, wet Compact Grey		3	SS	27														
1.5			4	SS	14														
294.1	SILT (ML), some sand, some gravel, moist Compact Brown		5	SS	15														
2.7			6	SS	14														
292.2	SAND (SM to SP-SM), trace gravel, wet Compact Brown		7	SS	12														
4.6																			
291.8																			
5.0	END OF BOREHOLE at approximately 5.0 m																		

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT 2/22/08

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

**RECORD OF BOREHOLE No BH-PPA-03-007 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 14+900 o/s 17.0 m Rt., Twp of Blandford-Blenheim ORIGINATED BY NK  
 DIST London HWY 401 BOREHOLE TYPE Solid Stem Auger, Split Spoons COMPILED BY MW  
 DATUM Geodetic DATE 10.20.03 - 10.20.03 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	20	40	60	80	100	W <sub>p</sub>	W		
297.9	Gravel shoulder															
0.0	SAND and GRAVEL (SP-SM) (FILL), some silt, moist Dense Brown		1	SS	50											
296.8			2	SS	40											
1.1	SAND (SM to SP-SM), trace gravel, trace silt, moist Compact to dense Brown		3	SS	12											
	- wet		4	SS	31											
			5	SS	22											
294.1			6	SS	20											
3.8	Clayey SILT (CL-ML), some sand, trace gravel, moist Very stiff Brown		7	SS	18											
292.9																
5.0	END OF BOREHOLE at approximately 5.0 m  Borehole caved to a depth of 1.7 m (Elev. of 296.2 m) on completion of drilling															

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT 2/22/08

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

**RECORD OF BOREHOLE No BH-PPA-03-008 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+000 o/s C.L., Twp of Blandford-Blenheim ORIGINATED BY NK  
 DIST London HWY 401 BOREHOLE TYPE Solid Stem Auger, Split Spoons COMPILED BY MW  
 DATUM Geodetic DATE 10.28.03 - 10.28.03 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)					
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	SHEAR STRENGTH kPa									WATER CONTENT (%)				
							20	40	60	80	100		10	20	30		GR	SA	SI	CL	
296.5	Grass																				
296.0	150 mm TOPSOIL		1	SS	13																
0.2	SAND (SP-SM) (FILL), trace gravel, trace organics, moist Compact Brown																				
295.6	SAND (SM to SP-SM), trace silt, wet Loose to compact Grey - trace organics in upper 300 mm		2	SS	26																
0.9																					
			3	SS	4																
			4	SS	11																
			5	SS	4																
	- compact		6	SS	21																
	- some gravel		7	SS	23																
291.5	END OF BOREHOLE at approximately 5.0 m																				
5.0																					

ONTARIO.MOT\_1009213.01\_PPA.GPJ\_ONTARIO.MOT.GDT\_2/22/08

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

**RECORD OF BOREHOLE No BH-PPA-03-009 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+000 o/s 7.0 m Lt., Twp of Blandford-Blenheim ORIGINATED BY MW  
 DIST London HWY 401 BOREHOLE TYPE Hollow Stem Auger, Split Spoons COMPILED BY MW  
 DATUM Geodetic DATE 12.16.03 - 12.16.03 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)								
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	SHEAR STRENGTH kPa									WATER CONTENT (%)							
						20	40	60	80	100	20	40	60	80	100	10	20	30		GR	SA	SI	CL	
297.6	Gravel shoulder																							
0.0	SAND (SP-SM) (FILL), with gravel, trace silt, trace organics, moist Compact Brown - trace silt, trace gravel		1	SS	12																			
			2	SS	22																			
	- layered topsoil		3	SS	29																			
295.3																								
2.3	SAND (SM to SP-SM), trace silt, wet Loose to compact Brown - trace wood chips in upper 450 mm		4	SS	17																			
			5	SS	16																			
	- with silt, some gravel, saturated		6	SS	9																			
292.1																								
5.5	Clayey SILT (CL-ML), with sand, wet Stiff Brown		7	SS	11																			
290.6																								
7.0	Silty SAND (SP-SM), trace clay, saturated Compact Brown		8	SS	11																			
289.5																								
8.1	END OF BOREHOLE at approximately 8.1 m																							

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT 2/22/08

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

**RECORD OF BOREHOLE No BH-PPA-03-010 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+000 o/s 18.4 m Lt., Twp of Blandford-Blenheim ORIGINATED BY NK  
 DIST London HWY 401 BOREHOLE TYPE Hollow Stem Auger, Split Spoons COMPILED BY MW  
 DATUM Geodetic DATE 9.30.03 - 9.30.03 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC NATURAL LIQUID LIMIT			UNIT WEIGHT $\gamma$	REMARKS & GRAIN SIZE DISTRIBUTION (%)		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES	20	40	60	80	100	W <sub>p</sub>	W			W <sub>L</sub>	GR
297.1	Gravel shoulder																	
0.0	SAND and GRAVEL (SP-SM) (FILL), some silt, moist Compact Brown		1	SS	20													
296.2	Silty SAND (SP), trace gravel, moist Very loose to loose Brown		2	SS	14													
0.9			3	SS	8													
	- trace organics, trace wood chips, wet Grey		4	SS	3													
294.0	Sandy SILT (ML), some gravel, moist Loose to compact Brown		5	SS	6													
3.0			6	SS	22													
			7	SS	20													
291.0			8	SS	19													
6.1	SAND (SM to SP-SM), some gravel, trace silt, wet Compact Brown																	
290.5	END OF BOREHOLE at approximately 6.6 m																	
6.6	Borehole caved to a depth of approximately 3.0 m (Elev. of 294.1 m) below existing grade on completion of drilling																	

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT 2/22/08

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

**RECORD OF BOREHOLE No BH-PPA-03-011 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+100 o/s C.L., Twp of Blandford-Blenheim ORIGINATED BY NK  
 DIST London HWY 401 BOREHOLE TYPE Solid Stem Auger, Split Spoons COMPILED BY MW  
 DATUM Geodetic DATE 10.28.03 - 10.28.03 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)										
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	20						40	60	80	100	20	40	60	80	100	10
296.6	Grass																						
296.6	150 mm TOPSOIL		1	SS	16																		
0.2	SAND (SP-SM) (FILL), trace gravel, trace organics, moist Compact to dense Brown		2	SS	33																		
295.9	SAND (SM to SP-SM), trace gravel, wet Very loose to loose Brown		3	SS	10																		
294.4	- trace organics, grey		4	SS	4																		
			5	SS	5																		
			6	SS	3																		
			7	SS	4																		
291.5	Dynamic Cone Penetration Test start at 5.2 m																						
289.0	END OF BOREHOLE at approximately 7.6 m																						

ONTARIO.MOT\_1009213.01\_PPA.GPJ\_ONTARIO.MOT.GDT\_2/22/08

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

**RECORD OF BOREHOLE No BH-PPA-03-012 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+100 o/s 17.5 m Rt., Twp of Blandford-Blenheim ORIGINATED BY NK  
 DIST London HWY 401 BOREHOLE TYPE Solid Stem Auger, Split Spoons COMPILED BY MW  
 DATUM Geodetic DATE 10.20.03 - 10.20.03 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES	20	40	60	80					
											○ UNCONFINED	× FIELD VANE				
											● QUICK TRIAXIAL	× LAB VANE	WATER CONTENT (%)			
													10	20	30	
298.0	Gravel shoulder															
0.0	SAND and GRAVEL (SP-SM) (FILL), some silt, damp Compact Brown		1	SS	29											
			2	SS	24											
	- trace cobbles, wet		3	SS	19											
295.9																
2.1	Sandy SILT (ML), trace gravel, wet Very loose to loose Brown		4	SS	10											Orgs.: 0.6%
			5	SS	7											Orgs.: 0.7%
	- 450 mm with peat		6	SS	3											Orgs.: 2.3%
			7	SS	1											Orgs.: 0.4%
			8	SS	1											Orgs.: 2.4%
291.9																
6.1	Dynamic Cone Penetration Test start at 6.1 m															
290.4																
7.6	END OF BOREHOLE at approximately 7.6 m															

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT 2/22/08

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

**RECORD OF BOREHOLE No BH-PPA-03-013 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+200 o/s C.L., Twp of Blandford-Blenheim ORIGINATED BY NK  
 DIST London HWY 401 BOREHOLE TYPE Solid Stem Auger, Split Spoons COMPILED BY MW  
 DATUM Geodetic DATE 10.28.03 - 10.28.03 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)										
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	20						40	60	80	100	20	40	60	80	100	10
297.1	Grass																						
296.9	230 mm TOPSOIL		1	SS	11																		
0.2	SAND (SP-SM) (FILL), trace gravel, trace organics, moist																						
296.3	Compact Brown		2	SS	23																		
0.8	SAND (SM to SP-SM), trace gravel, moist																						
	Compact Grey		3	SS	12																		
			4	SS	11																		
294.0	- 300 mm with peat, saturated - dark grey		5	SS	15																		
3.1			6	SS	18																		
			7	SS	15																		
292.0	Dynamic Cone Penetration Test start at 5.0 m																						
5.0																							
286.4	END OF BOREHOLE at approximately 10.7 m																						
10.7																							

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT 2/22/08

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

**RECORD OF BOREHOLE No BH-PPA-03-014 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+200 o/s 6.1 m Lt., Twp of Blandford-Blenheim ORIGINATED BY MW  
 DIST London HWY 401 BOREHOLE TYPE Hollow Stem Auger, Split Spoons COMPILED BY MW  
 DATUM Geodetic DATE 12.16.03 - 12.16.03 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)		
ELEV. DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	20	40	60	80						100	SHEAR STRENGTH kPa
											○ UNCONFINED	× FIELD VANE	● QUICK TRIAXIAL	× LAB VANE	WATER CONTENT (%)			
298.2	Gravel shoulder																	
0.0	SAND (SP-SM) (FILL), with gravel, dry Compact to dense Brown - some silt		1	SS	18													
			2	SS	33													
	- trace silt, trace gravel, trace shale fragments		3	SS	45													
			4	SS	27													
294.9	- 150 mm peat seam		5	SS	6													
3.4	SAND (SM to SP-SM), trace silt, saturated Loose Brown																	
293.6	- grey, compact		6	SS	24													
292.1	Clayey SILT (CL-ML), trace sand, saturated Very soft to firm Grey		7	SS	1													
			8	TW														
			9	SS	5													
			10	SS	2													
287.5	SILT (ML), trace sand, trace clay, saturated Very soft Grey		11	SS	1													
10.7																		
286.9	Dynamic Cone Penetration Test start at 11.3 m																	
11.3																		
284.8	END OF BOREHOLE at approximately 13.4 m																	
13.4																		

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT\_2/22/08

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

**RECORD OF BOREHOLE No BH-PPA-03-015 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+200 o/s 17.5 m Lt., Twp of Blandford-Blenheim ORIGINATED BY MW  
 DIST London HWY 401 BOREHOLE TYPE Solid Stem Auger, Split Spoons COMPILED BY MW  
 DATUM Geodetic DATE 10.21.03 - 10.21.03 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC NATURAL LIQUID LIMIT MOISTURE LIMIT CONTENT			UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	SHEAR STRENGTH kPa					WATER CONTENT (%)			
						20	40	60	80	100	W <sub>p</sub>	W	W <sub>L</sub>			
297.7	Gravel shoulder															
298.4	50 mm TOPSOIL SAND (SP-SM) (FILL), with gravel, some silt and clay, damp Dense to very dense Brown - 50 mm topsoil		1	SS	32										23 56 (21)	
			2	SS	72											
296.2																
1.5	SAND (SM to SP-SM), trace silt, wet Compact to dense Grey 150 mm peat seam  - some rock fragements		3	SS	34											
			4	SS	11											
			5	SS	31											
293.9																
3.8	Clayey SILT (CL-ML), trace sand, saturated Stiff to very stiff Grey - with sand		6	SS	8											
			7	SS	26											
292.7	END OF BOREHOLE at approximately 5.0 m															
5.0																

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT 2/22/08

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

**RECORD OF BOREHOLE No BH-PPA-03-016 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+300 o/s C.L., Twp of Blandford-Blenheim ORIGINATED BY NK  
 DIST London HWY 401 BOREHOLE TYPE Solid Stem Auger, Split Spoons COMPILED BY MW  
 DATUM Geodetic DATE 10.28.03 - 10.28.03 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)					
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	SHEAR STRENGTH kPa									WATER CONTENT (%)				
						20	40	60	80	100	20	40	60	80	100	10	20	30		GR SA SI CL	
297.4	Grass																				
297.0	150 mm TOPSOIL		1	SS	10																
0.2	SAND (SP-SM) (FILL), trace gravel, trace silt, trace organics, moist Compact Brown																				
296.7	SAND (SM to SP-SM), with gravel, some clay, moist Compact Brown		2	SS	17																
0.8	- wet		3	SS	10																
			4	SS	10																
			5	SS	28																
			6	SS	20																
292.6	SILT (ML), some sand, trace gravel, moist Compact Dark brown		7	SS	10																
292.8	END OF BOREHOLE at approximately 5.0 m																				
5.0																					

ONTARIO.MOT\_1009213.01\_PPA.GPJ\_ONTARIO.MOT.GDT\_2/22/08

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



**RECORD OF BOREHOLE No BH-PPA-03-018 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+400 o/s C.L., Twp of Blandford-Blenheim ORIGINATED BY NK  
 DIST London HWY 401 BOREHOLE TYPE Solid Stem Auger, Split Spoons COMPILED BY MW  
 DATUM Geodetic DATE 10.28.03 - 10.28.03 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	SHEAR STRENGTH kPa								
297.7	Grass															
297.8	225 mm TOPSOIL		1	SS	7											
0.2	SAND and GRAVEL (SP-SM) (FILL), trace silt, trace organics, moist															
296.9	Loose Brown		2	SS	15											
0.8	SAND (SM to SP-SM), trace silt, trace gravel, moist Loose to compact Brown		3	SS	9											
			4	SS	8											
			5	SS	4											
294.1	- grey, trace clay		6	SS	20											
3.7			7	SS	24											
	- some gravel															
292.7	Dynamic Cone Penetration Test start at 5.0 m															
5.0																
292.1																
290.1	END OF BOREHOLE at approximately 7.6 m															
7.6																

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT 2/22/08

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

**RECORD OF BOREHOLE No BH-PPA-03-019 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+400 o/s 6.2 m Lt., Twp of Blandford-Blenheim ORIGINATED BY MW  
 DIST London HWY 401 BOREHOLE TYPE Hollow Stem Auger, Split Spoons COMPILED BY MW  
 DATUM Geodetic DATE 12.16.03 - 12.16.03 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	SHEAR STRENGTH kPa					
298.3	Gravel shoulder						20 40 60 80 100						GR SA SI CL
298.4	50 mm TOPSOIL SAND (SP-SM) (FILL), trace silt, moist Compact to dense Brown		1	SS	12								
			2	SS	32								
			3	SS	12								
296.0													
2.3	Sandy SILT (ML), trace clay, trace organics, saturated Stiff Dark brown		4	SS	9								
			5	SS	11								
294.5													
3.8	SAND (SM to SP-SM), trace gravel, saturatd Compact Brown		6	SS	20								
	- with gravel, some silt, moist		7	SS	31								
290.7													
7.6	Clayey SILT (CL-ML), trace gravel, moist Very stiff Grey		8	SS	15								
289.2													
9.1	- grey, with sand, saturated		9	SS	1								
287.2													
11.1	Dynamic Cone Penetration Test start at 11.1 m		10	SS	40								
284.6													
13.7	END OF BOREHOLE at approximately 13.7 m												

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT 2/22/08

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

**RECORD OF BOREHOLE No BH-PPA-03-020 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+400 o/s 17.6 m Lt., Twp of Blandford-Blenheim ORIGINATED BY MW  
 DIST London HWY 401 BOREHOLE TYPE Solid Stem Auger, Split Spoons COMPILED BY MW  
 DATUM Geodetic DATE 10.21.03 - 10.21.03 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
ELEV. DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES	20	40	60	80						100
											○ UNCONFINED	× FIELD VANE	WATER CONTENT (%)				GR SA SI CL
298.1	Gravel shoulder																
0.0	SAND and GRAVEL (SP-SM) (FILL), some silt, damp		1	SS	38												
297.5																	
0.6	SAND (SM to SP-SM), trace gravel, trace silt, damp Compact to dense Brown		2	SS	35												
			3	SS	19												
			4	SS	26												
295.1																	
3.0	- grey		5	SS	22												
293.9	- trace gravel, saturated		6	SS	44												
4.3	END OF BOREHOLE at approximately 4.3 m																

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT 2/22/08

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

**RECORD OF BOREHOLE No BH-PPA-03-021 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+500 o/s C.L., Twp of Blandford-Blenheim ORIGINATED BY NK  
 DIST London HWY 401 BOREHOLE TYPE Solid Stem Auger, Split Spoons COMPILED BY MW  
 DATUM Geodetic DATE 10.28.03 - 10.28.03 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)										
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	20						40	60	80	100	20	40	60	80	100	10
297.8	Grass																						
297.6	150 mm TOPSOIL		1	SS	6																		
0.2	SAND (SP-SM) (FILL), trace gravel, trace silt, trace organics, moist Loose to compact Brown																						
297.0	SAND (SM to SP-SM), trace gravel, moist Compact to dense Brown		2	SS	17																		
0.8			3	SS	25																		
	- wet		4	SS	19																		
	- some gravel, trace silt, wet		5	SS	36																		
293.6	Clayey SILT (CL-ML), trace sand, trace gravel, wet Firm to stiff Brown		6	SS	27																		
292.7	Dynamic Cone Penetration Test start at 5.0 m		7	SS	7																		
5.0																							
292																							
291																							
290.1	END OF BOREHOLE at approximately 7.6 m																						
7.6																							

ONTARIO.MOT\_1009213.01\_PPA.GPJ\_ONTARIO.MOT.GDT\_2/22/08

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

**RECORD OF BOREHOLE No BH-PPA-03-022 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+500 o/s 16.8 m Rt., Twp of Blandford-Blenheim ORIGINATED BY NK  
 DIST London HWY 401 BOREHOLE TYPE Solid Stem Auger, Split Spoons COMPILED BY MW  
 DATUM Geodetic DATE 10.20.03 - 10.20.03 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)				
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	20	40	60	80						100	SHEAR STRENGTH kPa		
											○ UNCONFINED	× FIELD VANE								
											● QUICK TRIAXIAL	× LAB VANE								
											WATER CONTENT (%)									
											20	40	60	80	100	10	20	30		
298.4	Gravel shoulder																			
0.0	SAND and GRAVEL (SP-SM) (FILL), trace silt, moist		1	SS	54															
297.8	Brown																			
0.6	SAND (SM to SP-SM), trace silt, trace gravel, moist		2	SS	36															
	Compact to dense																			
	Brown																			
	- grey seam		3	SS	13															
	- some gravel, some clay		4	SS	30															
		5	SS	30																
	- with gravel, some clay, trace sand, wet	6	SS	28																
	- 300 mm silty clay seam																			
	- some gravel, wet	7	SS	26																
293.4	END OF BOREHOLE at approximately 5.0 m																			
5.0																				

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT 2/22/08

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

**RECORD OF BOREHOLE No BH-PPA-03-023 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+600 o/s C.L., Twp of Blandford-Blenheim ORIGINATED BY NK  
 DIST London HWY 401 BOREHOLE TYPE Solid Stem Auger, Split Spoons COMPILED BY MW  
 DATUM Geodetic DATE 10.28.03 - 10.28.03 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	SHEAR STRENGTH kPa								
							20	40	60	80	100					
297.7	Grass															
297.6	150 mm TOPSOIL		1	SS	12											
0.2	SAND (SP-SM) (FILL), trace silt, trace gravel, wet Compact Brown		2	SS	10											
296.2	SAND (SM to SP-SM), moist Compact Grey		3	SS	19											
1.5	- wet		4	SS	25											
294.7	Clayey SILT (CL-ML), trace sand, trace gravel, moist Stiff to hard Brown		5	SS	11											
3.0	- 300 mm sand seam		6	SS	32											
292.7	END OF BOREHOLE at approximately 5.0 m  Borehole Dry Upon Completion of Drilling		7	SS	8											

ONTARIO.MOT\_1009213.01\_PPA.GPJ\_ONTARIO.MOT.GDT\_2/22/08

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

**RECORD OF BOREHOLE No BH-PPA-03-024 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+600 o/s 17.3 m Lt., Twp of Blandford-Blenheim ORIGINATED BY MW  
 DIST London HWY 401 BOREHOLE TYPE Solid Stem Auger, Split Spoons COMPILED BY MW  
 DATUM Geodetic DATE 10.21.03 - 10.21.03 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	SHEAR STRENGTH kPa									
298.4	Gravel shoulder		1	SS	48	▽	20	40	60	80	100					1 82 (17)	
0.0	SAND (SP-SM) (FILL), some silt and clay, trace gravel, damp Compact to very dense Brown		2	SS	63		298						○				23 65 (12)
	- with gravel		3	SS	14		297						○				
			4	SS	23		296						○				
295.3	- with silt, saturated SAND (SM to SP-SM), some silt, trace gravel, damp Compact to dense Brown		5	SS	26		295							○			
3.1			6	SS	12		294						●	○		10 30 34 26	
294.3	Clayey SILT (CL-ML), with sand, trace gravel, moist Stiff to hard Brown		7	SS	41		294							○			
4.1																	
293.2	END OF BOREHOLE at approximately 5.2 m																
5.2																	

ONTARIO.MOT\_1009213.01\_PPA.GPJ\_ONTARIO.MOT.GDT\_2/22/08

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

**RECORD OF BOREHOLE No BH-PPA-03-025 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+700 o/s C.L., Twp of Blandford-Blenheim ORIGINATED BY MW  
 DIST London HWY 401 BOREHOLE TYPE Solid Stem Auger, Split Spoons COMPILED BY MW  
 DATUM Geodetic DATE 10.29.03 - 10.29.03 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	SHEAR STRENGTH kPa									
297.5	Grass																
298.4	100 mm TOPSOIL	[Cross-hatched pattern]	1	SS	6	[Water table symbol]											
0.1	SAND (SP-SM) (FILL), trace to some gravel, damp Very loose to loose Brown		2	SS	3												
296.0	SAND (SM to SP-SM), trace gravel, trace silt, damp Dense to very dense Brown	[Dotted pattern]	3	SS	47												
1.5	- saturated		4	SS	30												
	- trace gravel		5	SS	57												
			6	SS	58												
292.5	- with gravel and silt																
5.0	END OF BOREHOLE at approximately 5.0 m																

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT 2/22/08

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

**RECORD OF BOREHOLE No BH-PPA-03-026 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+700 o/s 17.6 m Rt., Twp of Blandford-Blenheim ORIGINATED BY NK  
 DIST London HWY 401 BOREHOLE TYPE Solid Stem Auger, Split Spoons COMPILED BY MW  
 DATUM Geodetic DATE 10.20.03 - 10.20.03 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT $\gamma$	REMARKS & GRAIN SIZE DISTRIBUTION (%)		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES	20	40	60	80	100	W <sub>p</sub>	W			W <sub>L</sub>	GR
298.2	Gravel shoulder																	
0.0	SAND and GRAVEL (SP-SM) (FILL), trace silt, moist Dense Brown		1	SS	36													
297.6																		
0.6	SAND (SM to SP-SM), trace gravel, wet Compact to dense Grey		2	SS	35													
	- loose		3	SS	9													
	- wet		4	SS	19													
			5	SS	20													
	- some gravel		6	SS	24													
293.7																		
4.6	- grey, with gravel, some silt		7	SS	56													
293.2																		
5.0	END OF BOREHOLE at approximately 5.0 m  Borehole caved to depth of approximately 2.4 m (Elev. of 295.8 m) below existing grade on completion of drilling																	

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT 2/22/08

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

**RECORD OF BOREHOLE No BH-PPA-04-001 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+125 o/s 25.0 m Rt., Twp of Blandford-Blenheim ORIGINATED BY HM  
 DIST London HWY 401 BOREHOLE TYPE Hollow Stem Auger, Split Spoons COMPILED BY MW  
 DATUM Geodetic DATE 4.21.04 - 4.21.04 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)					
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			T <sub>N</sub> VALUES	SHEAR STRENGTH kPa									WATER CONTENT (%)				
						20	40	60	80	100	20	40	60	80	100	10	20	30		GR SA SI CL	
296.8	Grass																				
0.0	SAND and GRAVEL (SP-SM) (FILL), trace rootlets and organics in upper zone Very loose to loose Dark brown		1	SS	1																
295.9	Wet		2	SS	7																
0.9	SAND (SM to SP-SM) (FILL), trace organics, peat layered, wet Very loose to loose Dark brown		3	SS	1																
295.0	PEAT, wet Very loose Black		4	SS	1																
1.8			5	SS	2																
			6	SS	1																
291.2	SAND (SM to SP-SM), trace gravel, trace silt and clay, wet Loose to compact Grey		7	SS	6																
5.6			8	SS	18																
	- boulders, rock fragments		9	SS	53																
	- possible cobbles and boulders		10	SS	43																
285.7	END OF BOREHOLE at approximately 11.1 m																				
11.1																					

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT 2/22/08

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

**RECORD OF BOREHOLE No BH-PPA-04-002 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+142 o/s 25.0 m Lt., Twp of Blandford-Blenheim ORIGINATED BY HM  
 DIST London HWY 401 BOREHOLE TYPE Hollow Stem Auger, Split Spoons COMPILED BY MW  
 DATUM Geodetic DATE 4.21.04 - 4.21.04 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC NATURAL LIQUID LIMIT MOISTURE LIMIT CONTENT			UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	SHEAR STRENGTH kPa					W <sub>p</sub>	W			W <sub>L</sub>	
							20	40	60	80	100							
							○ UNCONFINED    × FIELD VANE					● QUICK TRIAXIAL    × LAB VANE						
							20 40 60 80 100					10 20 30						
296.5	Grass																	
0.0	SAND and GRAVEL (SP-SM) (FILL), trace silt, moist to wet Loose to compact Brown		1	SS	7													
	- cobbles and boulders		2	SS	24													35 60 (5)
295.0																		
1.5	SAND (SM to SP-SM), trace gravel, wet Very loose Brown		3	SS	4													
294.2																		
2.3	- grey		4	SS	2													
	- peat, dark brown to black, wet		5	SS	2													
291.5																		
5.0	END OF BOREHOLE at approximately 5.0 m		6	SS	1													

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT 2/22/08

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





**RECORD OF BOREHOLE No BH-PPA-04-005 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+100 o/s 7.5 m Rt., Twp of Blandford-Blenheim ORIGINATED BY AH  
 DIST London HWY 401 BOREHOLE TYPE Solid Stem Auger, Split Spoons COMPILED BY MW  
 DATUM Geodetic DATE 10.19.04 - 10.19.04 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)								
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	20	40	60	80						100	20	40	60	80	100	10	20
298.0	Gravel shoulder																							
0.0	SAND and GRAVEL (SP-SM) (FILL), brown, very dense, damp		1	AS																				
			2	SS	65																			
296.6																								
1.4	SAND (SP-SM) (FILL), trace gravel, brown, very dense, damp		3	SS	50/150 mm																			
295.9																								
2.1	SILTY SAND (SP-SM) (FILL), trace gravel, brown, compact, moist		4	SS	12																			
295.1																								
2.9	SANDY SILT (ML), dark brown, loose to very dense, wet		5	SS	6																			
			6	SS	2																			
			7	SS	11																			
			8	SS	50																			
288.9																								
9.1	- strong organic odor, wet		9	SS	50/150 mm																			
			10	AS																				
287.3																								
10.7	SILTY SAND, trace gravel, brown, wet		11	AS																				
286.7																								
11.3	END OF BOREHOLE AT 11.3 m  Borehole caved to a depth of about 9.1 m below existing grade on completion of drilling  Groundwater encountered during drilling at a depth of 3.1 m (Elev. 294.9 m) below existing grade																							

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT\_2/22/08

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

**RECORD OF BOREHOLE No BH-PPA-04-006 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+300 o/s 7.5 m Rt., Twp of Blandford-Blenheim ORIGINATED BY AH  
 DIST London HWY 401 BOREHOLE TYPE Solid Stem Auger, Split Spoons COMPILED BY MW  
 DATUM Geodetic DATE 10.19.04 - 10.19.04 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
ELEV. DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			T <sub>N</sub> VALUES	20	40	60	80						100
											○ UNCONFINED	× FIELD VANE	● QUICK TRIAXIAL	× LAB VANE	WATER CONTENT (%)		
															10	20	30
298.2	Gravel shoulder																
0.0	SAND and GRAVEL (SP-SM) (FILL), trace silt and organics, brown Dense to very dense Damp to moist		1	AS													
			2	SS	66												
296.8	- dense to very dense																
1.4	SAND (SP-SM) (FILL), trace gravel, trace silt, trace clay, brown Dense to compact Damp		3	SS	32												
			4	SS	20												
295.3																	
2.9	SAND (SM to SP-SM), trace to some gravel, trace silt, brown Compact Moist		5	SS	18												
	- trace gravel, moist																
			6	SS	12												
	- with gravel, some silt																
			7	SS	18												
291.1																	
7.0	Clayey SILT (CL-ML), with sand, trace gravel, wet Soft to very stiff Brown		8	SS	4												
			9	SS	27												
288.1																	
10.1	Sandy SILT (ML), some gravel, trace clay Dense to compact Grey Moist		10	SS	38												
			11	SS	16												
285.5																	
12.6	END OF BOREHOLE at approximately 12.6 m																

ONTARIO.MOT\_1009213.01\_PPA.GPJ\_ONTARIO.MOT.GDT\_2/22/08

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





**RECORD OF BOREHOLE No BH-PPA-06-006 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+250 o/s 20.0 m Lt., Twp of Blandford-Blenheim ORIGINATED BY JP  
 DIST London HWY 401 BOREHOLE TYPE Hollow Stem Auger, Split Spoon COMPILED BY MW  
 DATUM Geodetic DATE 4.11.06 - 4.11.06 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)							
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	SHEAR STRENGTH kPa									WATER CONTENT (%)						
						20	40	60	80	100	20	40	60	80	100	10	20	30	GR	SA	SI	CL	
297.5	Gravel shoulder		1	SS	4	▽																	
0.0	SAND (SP-SM) (FILL), some silt, trace gravel, moist Loose to compact Brown - trace organics in upper 0.9 m - trace silt, wet		2	SS	16		297																
	- saturated		3	SS	3		296																
			4	SS	4		295																
294.5			5	SS	20		294																
3.0	Sandy SILT (ML), trace gravel, trace clay, wet Compact Brown		6	SS	23		293																
293.7	- grey, saturated		7	SS	27		292																
3.8			8	SS	39		291																
	- 430 mm sand and gravel seam, saturated - some clay, trace sand		9	SS	4		290																
	- some sand, trace clay, saturated Loose		10	SS	11		289																
287.8	- some gravel Compact				288																		
9.8	END OF BOREHOLE at approximately 9.8 m  Groundwater measured at a depth of 4.0 m (Elev. 293.5 m) on completion of drilling  Cave of borehole measured at 4.0 m on completion of drilling																						

ONTARIO.MOT\_1009213.01\_PPA.GPJ\_ONTARIO.MOT.GDT\_2/22/08

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



**RECORD OF BOREHOLE No BH-PPA-06-010 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+125 o/s 21.0 m Lt., Twp of Blandford-Blenheim ORIGINATED BY JP  
 DIST London HWY 401 BOREHOLE TYPE Hollow Stem Auger, Split Spoon COMPILED BY MW  
 DATUM Geodetic DATE 4.13.06 - 4.13.06 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV. DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	20	40	60	80					
297.2	Gravel shoulder															
0.0	SAND (SP-SM) (FILL), some gravel, moist Compact Brown		1	SS	13											
			2	SS	22											
295.7																
1.5	SAND (SM to SP-SM) (FILL), with gravel, some organics, wet Loose Brown		3	SS	5											
	- saturated		4	SS	3											
	- trace organics		5	SS	7											
	- very loose		6a	SS	1											
293.0			6b	SS												
4.3	PEAT, some sand, saturated Loose to very loose Black		7	SS	6											
	- seam of peat with wood chips		8	SS	12											
			9	SS	4											
			10	SS	3											
			11a	SS	4											
289.3			11b	SS												
7.9	SAND (SM to SP-SM), with silt, saturated Loose to compact Grey															
	- trace silt		12	SS	10											
287.5																
9.8	END OF BOREHOLE at approximately 9.8 m  Groundwater measured at a depth of 3.7 m (Elev. 293.5 m) on completion of drilling															

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT 2/22/08

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

**RECORD OF BOREHOLE No BH-PPA-06-013 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+050 o/s 18.0 m Lt., Twp of Blandford-Blenheim ORIGINATED BY JP  
 DIST London HWY 401 BOREHOLE TYPE Hollow Stem Auger, Split Spoon COMPILED BY MW  
 DATUM Geodetic DATE 4.10.06 - 4.10.06 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)									
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	SHEAR STRENGTH kPa									WATER CONTENT (%)								
						20	40	60	80	100	20	40	60	80	100	10	20	30		GR	SA	SI	CL		
297.3	Gravel shoulder		1	SS	27	▽																			
0.0	SAND (SP-SM) (FILL), trace gravel, trace silt, trace organics, moist Compact to loose Brown		2	SS	31																				
	- loose, wet		3	SS	7																				
295.1																									
2.3	SAND (SM to SP-SM), trace silt, saturated Loose to dense Grey		4	SS	2																				
	- compact		5	SS	16																				
			6	SS	24																				
			7	SS	23																				
	- with gravel, wet		8	SS	18																				
	- some silt Compact to dense	9	SS	25																					
287.6			10	SS	37																				
9.8	END OF BOREHOLE at approximately 9.8 m  Groundwater measured at a depth of 2.4 m (Elev. 294.9 m) on completion of drilling  Cave of borehole measured at 2.6 m on completion of drilling																								

ONTARIO.MOT\_1009213.01\_PPA.GPJ\_ONTARIO.MOT.GDT\_2/22/08

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

**RECORD OF BOREHOLE No BH-PPA-06-015 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 14+925 o/s 16.5 m Lt., Twp of Blandford-Blenheim ORIGINATED BY RM  
 DIST London HWY 401 BOREHOLE TYPE Hollow Stem Auger, Split Spoons COMPILED BY MW  
 DATUM Geodetic DATE 4.10.06 - 4.10.06 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)								
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES	SHEAR STRENGTH kPa									WATER CONTENT (%)							
						20	40	60	80	100	20	40	60	80	100	10	20	30	GR	SA	SI	CL		
297.2	Gravel shoulder																							
0.0	SAND (SP-SM) (FILL), trace silt, moist Dense to compact Brown		1	SS	38																		0 91 (9)	
	- trace gravel		2	SS	18																			
			3	SS	22																			
294.8																								
2.4	Clayey SILT (CL-ML), with sand, trace gravel, moist Very stiff to firm Brown		4	SS	17																		6 31 48 15	
			5	SS	19																			
293.1																								
4.1	Sandy SILT (ML), trace gravel, trace clay, wet Loose to compact Grey		6	SS	6																			
			7	SS	4																			
			8	SS	16																			2 37 50 11
291.1																								
6.1	SAND (SM to SP-SM), trace silt, wet Compact to dense Grey		9	SS	14																			
	- some silt		10	SS	31																			
			11	SS	50																			
287.5																								
9.8	END OF BOREHOLE at approximately 9.8 m  Groundwater measured at a depth of 1.8 m (Elev. 295.4 m) on completion of drilling																							

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT 2/22/08

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



**RECORD OF BOREHOLE No BH-PPA-06-019 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 14+800 o/s 17.0 m Lt., Twp of Blandford-Blenheim ORIGINATED BY RM  
 DIST London HWY 401 BOREHOLE TYPE Hollow Stem Auger, Split Spoons COMPILED BY MW  
 DATUM Geodetic DATE 4.11.06 - 4.11.06 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC NATURAL LIQUID LIMIT MOISTURE LIMIT CONTENT			UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	20	40	60	80	100	W <sub>p</sub>	W		
297.7	Gravel shoulder															
0.0	SAND (SP-SM) (FILL), trace to some gravel, moist Dense to compact Brown		1	SS	43											
			2	SS	23											
296.2																
1.5	SAND (SM to SP-SM), trace silt and clay, damp Compact to very dense Grey		3	SS	19											
	- saturated		4	SS	10											
	- seams of peat with vegetation		5	SS	16											
			6	SS	39											
			7	SS	66											
292.2																
5.5	Clayey SILT (CL-ML), trace sand, some gravel, moist Hard to very stiff Grey		8	SS	31											
			9	SS	19											
	- some sand, trace gravel Very stiff		10	SS	13											
288.0																
9.8	END OF BOREHOLE at approximately 9.8 m  Groundwater measured at a depth of 3.0 m (Elev. 294.7 m) on completion of drilling															

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT 2/22/08

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

**RECORD OF BOREHOLE No BH-PPA-06-021 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 14+325 o/s 17.0 m Lt., Twp of Blandford-Blenheim ORIGINATED BY RM  
 DIST London HWY 401 BOREHOLE TYPE Hollow Stem Auger, Split Spoons COMPILED BY MW  
 DATUM Geodetic DATE 4.13.06 - 4.13.06 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)							
ELEV. DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES	SHEAR STRENGTH kPa									WATER CONTENT (%)						
						20	40	60	80	100	20	40	60	80	100	10	20	30	GR	SA	SI	CL	
297.0	Gravel shoulder																						
0.0	SAND (SP-SM) (FILL), some gravel, some silt, moist Dense to compact Brown		1	SS	50											○							28 58 (14)
	- trace gravel		2	SS	18											○							
295.5																							
1.5	SAND (SM to SP-SM), trace silt, wet Very loose to very dense Brown		3	SS	6												○						
			4	SS	0												○						0 90 (10)
	- saturated		5	SS	0												○						
			6	SS	4												○						
			7	SS	2												○						0 91 (9)
	- occasional peat pockets Compact		8	SS	25												○						
	- wet Very dense		9	SS	59												○						
			10	SS	14												○						
	- some silt Compact																						
	- with silt, saturated		11	SS	21												○						
287.2																							
9.8	END OF BOREHOLE at approximately 9.8 m Groundwater measured at a depth of 3.0 m on completion of drilling																						

ONTARIO.MOT\_1009213.01\_PPA.GPJ\_ONTARIO.MOT.GDT\_2/22/08

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

**RECORD OF BOREHOLE No BH-PPA-06-023 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 14+275 o/s 17.0 m Lt., Twp of Blandford-Blenheim ORIGINATED BY RM  
 DIST London HWY 401 BOREHOLE TYPE Hollow Stem Auger, Split Spoons COMPILED BY MW  
 DATUM Geodetic DATE 4.13.06 - 4.13.06 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)									
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	20	40	60	80						100	20	40	60	80	100	10	20	30
297.1	Gravel shoulder																								
0.0	SAND (SP-SM) (FILL), some gravel, trace silt, moist Dense to compact Brown	[Cross-hatched pattern]	1	SS	37																				
	- trace gravel		2	SS	19																				
	- some silt		3	SS	21																				
295.0																									
2.1	SAND (SP-SM), with gravel, trace silt and clay, moist Compact to dense Brown	[Dotted pattern]	4	SS	39																			26 68 (6)	
	- trace gravel		5	SS	23																				
293.3																									
3.8	- with silt Grey	[Dotted pattern]	6	SS	17																				
	- some silt, trace gravel, saturated		7	SS	46																				
289.5																									
7.6	Sandy SILT (ML), some clay, saturated Very dense to dense Grey	[Dotted pattern]	8	SS	85																			0 38 47 15	
			9	SS	39																				
287.3																									
9.8	END OF BOREHOLE at approximately 9.8 m  Groundwater measured at a depth of 3.7 m (Elev. ????? m) on completion of drilling																								

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT 2/22/08

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

**RECORD OF BOREHOLE No BH-PPA-06-025 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 14+300 o/s 22.0 m Rt., Twp of Blandford-Blenheim ORIGINATED BY RM  
 DIST London HWY 401 BOREHOLE TYPE Hollow Stem Auger, Split Spoons COMPILED BY MW  
 DATUM Geodetic DATE 4.17.06 - 4.17.06 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES	20	40	60	80						100	SHEAR STRENGTH kPa	
											○ UNCONFINED	× FIELD VANE							
											● QUICK TRIAXIAL	× LAB VANE							
											WATER CONTENT (%)								
											20	40	60	80	100	10	20	30	
297.1	Gravel shoulder																		
0.0	SAND (SP-SM) (FILL), some gravel, trace silt, moist Very dense to loose Brown		1	SS	55														
	- compact		2	SS	24														
			3	SS	8														
294.8																			
2.3	SAND (SM to SP-SM), some silt, trace gravel, moist Loose to compact Brown		4	SS	15														
	- seams of peat with rootlets		5	SS	9														
293.3																			
3.8	- grey, saturated		6	SS	12														
	- some silt		7	SS	8														
	- trace silt		8	SS	15														
	- dense		9	SS	37														
288.0																			
9.1	Clayey Silt (CL-ML), with sand, trace gravel, saturated Hard Grey		10	SS	37														
287.3																			
9.8	END OF BOREHOLE at approximately 9.8 m  Groundwater measured at a depth of 1.8 m (Elev. ????? m) on completion of drilling																		

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT 2/22/08

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

**RECORD OF BOREHOLE No BH-PPA-06-027 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 14+775 o/s 17.5 m Rt., Twp of Blandford-Blenheim ORIGINATED BY RM  
 DIST London HWY 401 BOREHOLE TYPE Hollow Stem Auger, Split Spoons COMPILED BY MW  
 DATUM Geodetic DATE 4.17.06 - 4.17.06 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	20	40	60	80						100	SHEAR STRENGTH kPa	
											○ UNCONFINED	× FIELD VANE							
											● QUICK TRIAXIAL	× LAB VANE	WATER CONTENT (%)						
											20	40	60	80	100	10	20	30	
297.8	Gravel shoulder																		
0.0	SAND (SP-SM) (FILL), some gravel, trace silt, moist Dense to compact Brown		1	SS	48														
	- trace gravel		2	SS	29														
296.3																			
1.5	SAND (SM to SP-SM), trace silt and clay, moist Compact to very dense Grey		3	SS	27														
	- some silt, wet Dense to very dense		4	SS	18														
	- saturated		5	SS	38														
	- trace silt		6	SS	52														
			7	SS	74														
291.7																			
6.1	CLAYEY SILT (CL-ML), some sand, trace gravel, saturated Very Stiff to hard Brown		8	SS	17														
	- trace sand, wet		9	SS	15														
	- with sand		10	SS	33														
288.1																			
9.8	END OF BOREHOLE at approximately 9.8 m  Groundwater measured at a depth of 3.2 m (Elev. 294.6 m) on completion of drilling																		

ONTARIO.MOT\_1009213.01\_PPA.GPJ\_ONTARIO.MOT.GDT\_2/22/08

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

**RECORD OF BOREHOLE No BH-PPA-06-029 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 14+825 o/s 17.2 m Rt., Twp of Blandford-Blenheim ORIGINATED BY RM  
 DIST London HWY 401 BOREHOLE TYPE Hollow Stem Auger, Split Spoons COMPILED BY MW  
 DATUM Geodetic DATE 4.18.06 - 4.18.06 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)												
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES	20	40	60	80						100	20	40	60	80	100	10	20	30	GR	SA	SI
297.8	Gravel shoulder		1	SS	43	▽																						
0.0	SAND (SP-SM) (FILL), some gravel, trace silt, moist Dense to compact Brown		297	2	SS		24																					
	- trace gravel		296	3	SS		13																					
295.8	- wet SAND (SM to SP-SM), trace silt and clay, wet Compact to very dense Brown		4	SS	24		295																0	94	(6)			
2.0	- trace wood chips and rootlets		294	5	SS		18																					
	- trace gravel Dense to very dense		293	6	SS		38																	3	94	(3)		
			292	7	SS		59																					
			291	8	SS		41																					
			290	9	SS		8																		3	35	52	11
			289	10	SS		25																					
288.0	- trace clay																											
9.8	END OF BOREHOLE at approximately 9.8 m  Groundwater measured at a depth of 1.8 m (Elev. 296.0 m) on completion of drilling																											

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT 2/22/08

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

**RECORD OF BOREHOLE No BH-PPA-06-033 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+025 o/s 18.0 m Rt., Twp of Blandford-Blenheim ORIGINATED BY RM  
 DIST London HWY 401 BOREHOLE TYPE Hollow Stem Auger, Split Spoons COMPILED BY MW  
 DATUM Geodetic DATE 4.19.06 - 4.19.06 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	20	40	60	80						100	SHEAR STRENGTH kPa	
											○ UNCONFINED	× FIELD VANE							
											● QUICK TRIAXIAL	× LAB VANE							
											WATER CONTENT (%)								
											20	40	60	80	100	10	20	30	
297.8	Gravel shoulder																		
0.0	SAND (SP-SM) (FILL), with gravel, trace silt, moist Very dense to compact Brown		1	SS	58														
	- some gravel		2	SS	54														
			3	SS	16														
295.6	- trace gravel, trace organics, saturated																		
2.1	SAND (SM to SP-SM), trace gravel, trace silt and clay, trace organics, wet Compact to dense Brown		4	SS	23														
	- some silt, saturated		5	SS	36														
			6	SS	29														
			7	SS	26														
	- wet		8	SS	34														
290.1	- grey		9	SS	28														
7.6																			
288.6																			
9.1	Sandy SILT (ML), some clay, trace gravel, saturated Dense Grey		10	SS	35														
288.0																			
9.8	END OF BOREHOLE at approximately 9.8 m  Groundwater measured at a depth of 5.5 m (Elev. 292.3 m) on completion of drilling																		

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT 2/22/08

**RECORD OF BOREHOLE No BH-PPA-06-035 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+075 o/s 17.5 m Rt., Twp of Blandford-Blenheim ORIGINATED BY RM  
 DIST London HWY 401 BOREHOLE TYPE Hollow Stem Auger, Split Spoons COMPILED BY MW  
 DATUM Geodetic DATE 4.19.06 - 4.19.06 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)								
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES	SHEAR STRENGTH kPa									WATER CONTENT (%)							
						20	40	60	80	100	20	40	60	80	100	10	20	30	GR	SA	SI	CL		
298.1	Gravel shoulder		1	SS	61																			
0.0	SAND (SP-SM) (FILL), some gravel, trace silt, moist Very dense to compact Brown			2	SS	58																		
	- trace gravel			3	SS	30																		
296.0																								
2.1	SAND (SM to SP-SM), trace silt and clay, saturated Loose to dense Brown			4	SS	10																		
				5	SS	9																		
	- some silt			6	SS	7																		
292.0																								
6.1	- trace silt compact grey			8	SS	29																		
				9	SS	42																		
	- trace gravel dense			10	SS	32																		
288.4																								
9.8	END OF BOREHOLE at approximately 9.8 m  Groundwater measured at a depth of 3.0 m (Elev. 295.1 m) on completion of drilling																							

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT 2/22/08

**RECORD OF BOREHOLE No BH-PPA-06-038 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+175 o/s 19.0 m Rt., Twp of Blandford-Blenheim ORIGINATED BY MW  
 DIST London HWY 401 BOREHOLE TYPE Hollow Stem Auger, Split Spoons COMPILED BY MW  
 DATUM Geodetic DATE 4.17.06 - 4.17.06 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)								
ELEV. DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	20	40	60	80						100	20	40	60	80	100	10	20
298.2	Gravel shoulder																							
0.0	SAND (SP-SM) (FILL), with gravel, some silt, trace organics, damp Dense to very dense Brown -trace cobble, moist		1	SS	41																			24 61 (16)
			2	SS	50/150 mm																			
296.5																								
1.7	SAND (SM to SP-SM), trace organics, wet Dense to compact Brown - occasional peat layers  -with gravel, trace cobble, some silt, wet  - gravelly sand seam		3	SS	39																			38 45 (17)
			4	SS	24																			
			5	SS	23																			
			6	SS	15																			
292.4																								
5.8	Clayey SILT (CL-ML), with sand, trace gravel, wet Stiff Grey  - soft  - very stiff		7	SS	9																			5 30 51 15
			8	SS	3																			
			9	SS	16																			
			10	SS	16																			
288.5	END OF BOREHOLE at approximately 9.8 m  Groundwater measured at a depth of 2.1 m (Elev. 296.1 m) on completion of drilling																							

ONTARIO.MOT\_1009213.01\_PPA.GPJ\_ONTARIO.MOT.GDT\_2/22/08

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

**RECORD OF BOREHOLE No BH-PPA-06-040 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+225 o/s 18.0 m Rt., Twp of Blandford-Blenheim ORIGINATED BY MW  
 DIST London HWY 401 BOREHOLE TYPE Hollow Stem Auger, Split Spoons COMPILED BY MW  
 DATUM Geodetic DATE 4.18.06 - 4.18.06 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)									
ELEV. DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	20	40	60	80						100	20	40	60	80	100	10	20	30
298.2	Gravel shoulder		1	SS	33	▽																			
0.0	SAND (SP-SM) (FILL), with gravel, trace silt, trace organics, damp Dense to compact Brown - trace gravel, trace cobbles, moist		2	SS	22																				
	- wet		3	SS	16																				
295.7			4	SS	11																				
2.4	SAND (SM to SP-SM), trace gravel, trace organics, wet, Loose to compact Brown		5	SS	5																				
295.1	- trace silt and clay, saturated Grey		6	SS	0																				
3.0	- very loose		7	SS	1																				
	- some silt, loose		8	SS	7																				
	- trace silt and clay		9	SS	8																				
	- compact		10	SS	17																				
288.4	END OF BOREHOLE at approximately 9.8 m Groundwater measured at a depth of 2.9 m (Elev. 295.3 m) on completion of drilling		11	SS	51																				

ONTARIO.MOT\_1009213.01\_PPA.GPJ\_ONTARIO.MOT.GDT\_2/22/08

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

**RECORD OF BOREHOLE No BH-PPA-06-042 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+275 o/s 18.0 m Rt., Twp of Blandford-Blenheim ORIGINATED BY MW  
 DIST London HWY 401 BOREHOLE TYPE Hollow Stem Auger, Split Spoons COMPILED BY MW  
 DATUM Geodetic DATE 4.18.06 - 4.18.06 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES	20	40	60	80						100	SHEAR STRENGTH kPa	
											○ UNCONFINED	× FIELD VANE							
											● QUICK TRIAXIAL	× LAB VANE							
											WATER CONTENT (%)								
											20	40	60	80	100	10	20	30	
298.1	Gravel shoulder																		
0.0	SAND and GRAVEL (SP-SM) (FILL) moist Dense Brown - trace organics		1	SS	35														
297.0			2	SS	39														
1.1	SAND (SM to SP-SM), some silt and clay, moist Compact to dense Brown - wet		3	SS	30														
	- trace to some gravel, saturated		4	SS	24														
			5	SS	21														
293.2			6	SS	30														
4.9	- with gravel, wet Grey		7	SS	18														
290.5			8	SS	14														
7.6	Sandy SILT (ML), some clay, trace gravel, saturated Compact Grey		9	SS	17														
288.4																			
9.8	END OF BOREHOLE at approximately 9.8 m  Groundwater measured at a depth of 2.4 m (Elev. 295.7 m) on completion of drilling																		

ONTARIO.MOT\_1009213.01\_PPA.GPJ\_ONTARIO.MOT.GDT\_2/22/08

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





**RECORD OF BOREHOLE No BH-PPA-06-046 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 14+900 o/s 21.0 m Lt., Twp of Blandford-Blenheim ORIGINATED BY RM  
 DIST London HWY 401 BOREHOLE TYPE Hollow Stem Auger, Split Spoons COMPILED BY MW  
 DATUM Geodetic DATE 4.20.06 - 4.20.06 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)												
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			T <sub>N</sub> VALUES	20						40	60	80	100	20	40	60	80	100	10	20	30
296.8	Grass																								
0.0	SAND (SP-SM) (FILL), trace gravel, with organics, moist Loose Brown	[Strat Plot]	1	SS	8																				
296.4				2	SS	15																			
0.4				3	SS	13																			
	SAND (SM to SP-SM), trace gravel, trace silt, wet Compact Brown - trace organics in upper 1.2 m																								
294.2	Clayey SILT (CL-ML), with sand, trace gravel, moist Very stiff to very soft Brown	[Strat Plot]	4	SS	17																				
2.6				5	SS	20																			
	- saturated Very soft		6	SS	0																				
	- firm		7	SS	7																				
	- trace sand Very stiff		8	SS	16																				
	- some gravel, moist		9	SS	27																				
	- saturated Very soft		10	SS	0																				
287.0	END OF BOREHOLE at approximately 9.8 m  Standpipe installed to a depth of approximately 5.5 m (Elev. 291.3 m) below existing grade  Groundwater measured in standpipe on Nov 6, 2006 at a depth of approximately 2.7 m (Elev. 294.1 m) below existing grade																								

ONTARIO.MOT\_1009213.01\_PPA.GPJ\_ONTARIO.MOT.GDT\_2/22/08

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

**RECORD OF BOREHOLE No BH-PPA-06-047 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 14+800 o/s 26.0 m Rt., Twp of Blandford-Blenheim ORIGINATED BY MW  
 DIST London HWY 401 BOREHOLE TYPE Hollow Stem Auger, Split Spoons COMPILED BY MW  
 DATUM Geodetic DATE 4.17.06 - 4.17.06 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			T <sub>N</sub> VALUES	SHEAR STRENGTH kPa								
						20	40	60	80	100						
296.4	Grass															
0.0	PEAT, saturated Very loose Black - trace rootlet at upper 0.6 m	~	1	SS	0									151.7		
		~	2	SS	0									335.8		
	- trace wood chips	~	3	SS	0									173.5		
		~	4	SS	0											
293.5																
2.9	SAND (SM to SP-SM), trace silt and clay, wet Loose to compact Grey	•••	5	SS	5										0 93 (7)	
	- trace clay Compact	•••	6	SS	30											
	- cobbles and/ or boulder	•••	7	SS	14											
289.4																
7.0	SILT (ML), trace clay, trace sand, wet Compact Grey		8	SS	15											
	- 200 mm sand seam, saturated		9	SS	19										0 6 86 8	
286.7																
9.8	END OF BOREHOLE at approximately 9.8 m  Standpipe installed to a depth of approximately 5.2 m (Elev. 291.2 m) below existing grade  Groundwater measured in standpipe on Nov 6, 2006 at a depth of approximately 0.5 m (Elev. 295.9 m)															

ONTARIO.MOT\_1009213.01\_PPA.GPJ\_ONTARIO.MOT.GDT\_2/22/08

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

**RECORD OF BOREHOLE No BH-PPA-06-048 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+250 o/s 30.0 m Rt., Twp of Blandford-Blenheim ORIGINATED BY MW  
 DIST London HWY 401 BOREHOLE TYPE Hollow Stem Auger, Split Spoons COMPILED BY MW  
 DATUM Geodetic DATE 4.18.06 - 4.18.06 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)										
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			T <sub>N</sub> VALUES	20	40	60	80						100	20	40	60	80	100	10	20	30	GR
296.7	Grass																									
296.0	25 mm TOPSOIL Black		1	SS	2																					
295.8	SAND (SP-SM) (FILL), some organics, wet Very loose Dark brown		2	SS	2																					
0.9	PEAT, trace wood fragements, saturated Very loose to compact Black																									
295.3	SAND (SM to SP-SM), trace silt, trace clay, trace to some organics, saturated Very loose Dark grey		3	SS	1																					
1.4			4	SS	0																		0	89	8	3
	- loose		5	SS	8																					
	- trace rootlets		6	SS	5																					
292.0	- with gravel, some silt Compact Grey		7	SS	20																			27	60	(13)
			8	SS	24																					
289.1	SILT (ML), some sand, trace clay, trace gravel, saturated Compact to loose Grey		9	SS	11																					
			10	SS	4																					
287.0	END OF BOREHOLE at approximately 9.8 m  Standpipe installed to a depth of approximately 5.3 m (Elev. 292.0 m) below existing grade  Groundwater measured in standpipe on Nov 6, 2006 at a depth of approximately 0.7 m (Elev. 296.0 m) below existing grade																									

ONTARIO.MOT\_1009213.01\_PPA.GPJ\_ONTARIO.MOT.GDT\_2/22/08

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

**RECORD OF BOREHOLE No DCPT-PPA-06-001 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+375 o/s 19.0 m Lt., Twp of Blandford-Blenheim ORIGINATED BY JP  
 DIST London HWY 401 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY MW  
 DATUM Geodetic DATE 4.10.06 - 4.10.06 CHECKED BY GC

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	PLASTIC LIMIT W <sub>p</sub> NATURAL MOISTURE CONTENT W LIQUID LIMIT W <sub>L</sub> WATER CONTENT (%)	UNIT WEIGHT γ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV. DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE						
298.0 0.0	Plot inferred from BH-PPA-06-002 Inferred SAND (FILL)									
295.2 2.7	Inferred SAND									
293.1 4.9	END OF DCPT at approximately 4.9 m									

ONTARIO.MOT\_1009213.01\_PPA.GPJ\_ONTARIO.MOT.GDT\_2/22/08

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

**RECORD OF BOREHOLE No DCPT-PPA-06-003 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+325 o/s 18.0 m Lt., Twp of Blandford-Blenheim ORIGINATED BY JP  
 DIST London HWY 401 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY MW  
 DATUM Geodetic DATE 4.10.06 - 4.10.06 CHECKED BY GC

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	PLASTIC LIMIT W <sub>p</sub> NATURAL MOISTURE CONTENT W LIQUID LIMIT W <sub>L</sub> WATER CONTENT (%)	UNIT WEIGHT γ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE						
297.9 0.0	Plot inferred from BH-PPA-06-004 Inferred SAND (FILL)									
295.6 2.3	Inferred SAND									
293.2 4.7	Inferred SILT (TILL)									
292.1 5.8	END OF DCPT at approximately 5.8 m									

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT 2/22/08

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

**RECORD OF BOREHOLE No DCPT-PPA-06-005 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+275 o/s 20.0 m Lt., Twp of Blandford-Blenheim ORIGINATED BY JP  
 DIST London HWY 401 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY MW  
 DATUM Geodetic DATE 4.11.06 - 4.11.06 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV. DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE								
297.6 0.0	Plot inferred from BH-PPA-06-006 Inferred SAND (FILL)											
294.6 3.0	Inferred SAND (TILL)											
291.1 6.6	Inferred Clayey SILT											
290.5 7.2	Inferred Sandy SILT											
288.9 8.7	Inferred Sand SILT (TILL)											
283.3 14.3	END OF DCPT at approximately 14.3 m											

ONTARIO MOT\_1009213.01\_PPA.GPJ ONTARIO MOT.GDT 2/22/08

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

**RECORD OF BOREHOLE No DCPT-PPA-06-007 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+225 o/s 20.0 m Lt., Twp of Blandford-Blenheim ORIGINATED BY JP  
 DIST London HWY 401 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY MW  
 DATUM Geodetic DATE 4.11.06 - 4.11.06 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)										
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	20						40	60	80	100	20	40	60	80	100	10
297.5 0.0	Plot inferred from BH-PPA-06-006 Inferred SAND (FILL)																						
294.4 3.0	Inferred SAND																						
293.6 3.8	- grey																						
290.9 6.6	Inferred Clayey SILT																						
290.3 7.2	Inferred Sandy SILT																						
288.8 8.7	Inferred Sand SILT (TILL)																						
285.0 12.5																							

ONTARIO.MOT\_1009213.01\_PPA\_GPJ\_ONTARIO.MOT.GDT\_2/22/08

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

**RECORD OF BOREHOLE No DCPT-PPA-06-009 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+150 o/s 20.0 m Lt., Twp of Blandford-Blenheim ORIGINATED BY JP  
 DIST London HWY 401 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY MW  
 DATUM Geodetic DATE 4.13.06 - 4.13.06 CHECKED BY GC

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	PLASTIC LIMIT W <sub>p</sub> NATURAL MOISTURE CONTENT w LIQUID LIMIT W <sub>L</sub> WATER CONTENT (%)	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE						
297.4 0.0	Plot inferred from BH-PPA-06-010 Inferred SAND (FILL)									
295.9 1.5	Inferred SAND (FILL)									
293.2 4.3	Inferred PEAT									
289.5 7.9	Inferred SAND									
285.8 11.6	END OF DCPT at approximately 11.6 m									

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT 2/22/08

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

**RECORD OF BOREHOLE No DCPT-PPA-06-011 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+100 o/s 19.0 m Lt., Twp of Blandford-Blenheim ORIGINATED BY JP  
 DIST London HWY 401 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY MW  
 DATUM Geodetic DATE 4.13.06 - 4.13.06 CHECKED BY GC

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	PLASTIC LIMIT W <sub>p</sub> NATURAL MOISTURE CONTENT W LIQUID LIMIT W <sub>L</sub> WATER CONTENT (%)	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV. DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE						
297.4 0.0	Plot inferred from BH-PPA-06-010 Inferred SAND (FILL)									
293.1 4.3	Inferred PEAT									
289.5 7.9	Inferred SAND									
288.0 9.4	END OF DCPT at approximately 9.4 m									

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT 2/22/08

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

**RECORD OF BOREHOLE No DCPT-PPA-06-012 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+075 o/s 19.0 m Lt., Twp of Blandford-Blenheim ORIGINATED BY JP  
 DIST London HWY 401 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY MW  
 DATUM Geodetic DATE 4.13.06 - 4.13.06 CHECKED BY GC

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	PLASTIC LIMIT W <sub>p</sub> NATURAL MOISTURE CONTENT W LIQUID LIMIT W <sub>L</sub> WATER CONTENT (%)	UNIT WEIGHT γ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV. DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE						
297.4 0.0	Plot inferred from BH-PPA-06-013 Inferred SAND (FILL)									
295.1 2.3	Inferred SAND									
289.7 7.6	Inferred Silty SAND									
283.6 13.7	END OF DCPT at approximately 13.7 m									

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT 2/22/08

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

**RECORD OF BOREHOLE No DCPT-PPA-06-014 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+025 o/s 17.0 m Lt., Twp of Blandford-Blenheim ORIGINATED BY RM  
 DIST London HWY 401 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY MW  
 DATUM Geodetic DATE 4.10.06 - 4.10.06 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100	PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE								
297.2 0.0	Plot inferred from BH-PPA-06-013 Inferred SAND (FILL)	[Cross-hatched pattern]										
294.9 2.3	Inferred SAND	[Dotted pattern]										
289.6 7.6	Inferred Silty SAND	[Horizontal line pattern]										
286.9 10.4	END OF DCPT at approximately 10.4 m											

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT 2/22/08

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

**RECORD OF BOREHOLE No DCPT-PPA-06-016 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 14+900 o/s 16.5 m Lt., Twp of Blandford-Blenheim ORIGINATED BY RM  
 DIST London HWY 401 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY MW  
 DATUM Geodetic DATE 4.11.06 - 4.11.06 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE								
297.3 0.0	Plot inferred from BH-PPA-06-017 Inferred SAND (FILL)											
295.0 2.3	Inferred SAND											
293.2 4.1	Inferred Clayey SILT (TILL)											
290.0 7.3	Inferred Silty SAND											
289.1 8.2	END OF DCPT at approximately 8.2 m											

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT 2/22/08

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

**RECORD OF BOREHOLE No DCPT-PPA-06-018 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 14+825 o/s 17.2 m Lt., Twp of Blandford-Blenheim ORIGINATED BY RM  
 DIST London HWY 401 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY MW  
 DATUM Geodetic DATE 4.11.06 - 4.11.06 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)										
ELEV. DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	20						40	60	80	100	20	40	60	80	100	10
297.6	Plot inferred from BH-PPA-06-019																						
0.0	Inferred SAND (FILL)																						
296.1	Inferred SAND																						
292.2	Inferred Clayey SILT (TILL)																						
290.0	Inferred SILT																						
287.9	END OF DCPT at approximately 9.8 m																						

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT 2/22/08

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

**RECORD OF BOREHOLE No DCPT-PPA-06-020 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 14+775 o/s 18.0 m Lt., Twp of Blandford-Blenheim ORIGINATED BY RM  
 DIST London HWY 401 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY MW  
 DATUM Geodetic DATE 4.13.06 - 4.13.06 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)										
ELEV. DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	20						40	60	80	100	20	40	60	80	100	10
297.7 0.0	Plot inferred from BH-PPA-06-019 Inferred SAND (FILL)																						
296.2 1.5	Inferred SAND																						
292.2 5.5	Inferred Clayey SILT (TILL)																						
290.1 7.6	Inferred SILT																						
288.6 9.1	END OF DCPT at approximately 9.1 m																						

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT 2/22/08

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

**RECORD OF BOREHOLE No DCPT-PPA-06-022 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 14+300 o/s 18.0 m Lt., Twp of Blandford-Blenheim ORIGINATED BY RM  
 DIST London HWY 401 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY MW  
 DATUM Geodetic DATE 4.13.06 - 4.13.06 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT $\gamma$	REMARKS & GRAIN SIZE DISTRIBUTION (%)					
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	20						40	60	80	100	10
0.0	Plot inferred from BH-PPA-06-023 Inferred SADN (FILL)																	
-2.1	Inferred SAND																	
-3.8	Inferred Sandy SILT																	
-4.9	Inferred SAND																	
-9.4	END OF DCPT at approximately 9.4 m																	

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT 2/22/08

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

**RECORD OF BOREHOLE No DCPT-PPA-06-024 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn" 14+275 o/s 18.0 m Rt., Twp of Blandford-Blenheim ORIGINATED BY RM  
 DIST London HWY 401 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY MW  
 DATUM Geodetic DATE 4.17.06 - 4.17.06 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100	PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE								
0.0	Plot inferred from BH-PPA-06-025 Inferred SAND (FILL)											
-2.3 2.3	Inferred SAND											
-7.9 7.9	END OF DCPT at approximately 7.9 m											

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT 2/22/08

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

**RECORD OF BOREHOLE No DCPT-PPA-06-026 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 14+325 o/s 17.0 m Rt., Twp of Blandford-Blenheim ORIGINATED BY RM  
 DIST London HWY 401 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY MW  
 DATUM Geodetic DATE 4.17.06 - 4.17.06 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100	PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE								
0.0	Plot inferred from BH-PPA-06-025 Inferred SAND (FILL)											
-2.3 2.3	Inferred SAND											
-3.8 3.8	- grey											
-9.1 9.1	END OF DCPT at approximately 9.1 m											

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT 2/22/08

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

**RECORD OF BOREHOLE No DCPT-PPA-06-028 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 14+800 o/s 17.6 m Rt., Twp of Blandford-Blenheim ORIGINATED BY RM  
 DIST London HWY 401 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY MW  
 DATUM Geodetic DATE 4.17.06 - 4.17.06 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE								
297.7 0.0	Plot inferred from BH-PPA-06-027 Inferred SAND (FILL)	[Cross-hatched pattern]										
296.2 1.5	Inferred SAND	[Dotted pattern]										
291.6 6.1	Inferred Clayey SILT	[Diagonal lines]										
290.4 7.3	END of DCPT at approximately 7.3 m	[Vertical lines]										

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

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT 2/22/08

**RECORD OF BOREHOLE No DCPT-PPA-06-030 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 14+875 o/s 17.2 m Rt., Twp of Blandford-Blenheim ORIGINATED BY RM  
 DIST London HWY 401 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY MW  
 DATUM Geodetic DATE 4.18.06 - 4.18.06 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL			
ELEV. DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	20						40	60	80
297.9 0.0	Plot inferred from BH-PPA-03-007 Inferred SAND (FILL)															
296.3 1.5	Inferred SAND															
294.1 3.8	Inferred SILT															
292.8 5.0	END OF DCPT at approximately 6.1 m															

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

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT 2/22/08

**RECORD OF BOREHOLE No DCPT-PPA-06-031 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 14+925 o/s 17.2 m Rt., Twp of Blandford-Blenheim ORIGINATED BY RM  
 DIST London HWY 401 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY MW  
 DATUM Geodetic DATE 4.18.06 - 4.18.06 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV. DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE								
297.9 0.0	Plot inferred from BH-PPA-03-007 Inferred SAND (FILL)											
296.3 1.5	Inferred SAND											
294.1 3.8	Inferred SILT											
291.8 6.1	Unknown soil											
285.4 12.5	END OF DCPT at approximately 12.5 m											

ONTARIO.MOT\_1009213.01\_PPA\_GPJ\_ONTARIO.MOT.GDT\_2/22/08

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

**RECORD OF BOREHOLE No DCPT-PPA-06-032 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+000 o/s 18.0 m Rt., Twp of Blandford-Blenheim ORIGINATED BY RM  
 DIST London HWY 401 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY MW  
 DATUM Geodetic DATE 4.18.06 - 4.18.06 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE								
297.7 0.0	Plot inferred from BH-PPA-06-033 Inferred SAND (FILL)											
292.1 5.6	Inferred SAND											
288.6 9.1	Inferred CLAYEY SILT											
286.5 11.3	END of DCPT at approximately 11.3 m											

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT 2/22/08

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

**RECORD OF BOREHOLE No DCPT-PPA-06-034 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+050 o/s 17.5 m Rt., Twp of Blandford-Blenheim ORIGINATED BY RM  
 DIST London HWY 401 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY MW  
 DATUM Geodetic DATE 4.19.06 - 4.19.06 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)							
ELEV. DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	20						40	60	80	100	20	40	60
297.9 0.0	Plot inferred from BH-PPA-06-035 Inferred SAND (FILL)																			
295.8 2.1	Inferred SAND																			
283.6 14.3	END of DCPT at approximately 14.3 m																			

ONTARIO MOT\_1009213.01\_PPA.GPJ ONTARIO MOT.GDT 2/22/08

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

**RECORD OF BOREHOLE No DCPT-PPA-06-036 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+125 o/s 17.5 m Rt., Twp of Blandford-Blenheim ORIGINATED BY MW  
 DIST London HWY 401 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY MW  
 DATUM Geodetic DATE 4.17.06 - 4.17.06 CHECKED BY GC

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	PLASTIC LIMIT W <sub>p</sub> NATURAL MOISTURE CONTENT w LIQUID LIMIT W <sub>L</sub> WATER CONTENT (%)	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE						
298.2 0.0	Plot inferred from BH-PPA-03-014 Inferred SAND (FILL)	[Cross-hatched pattern]								
295.9 2.3	Inferred SAND	[Dotted pattern]								
293.2 5.0	Unknown Soil									
287.5 10.7	END of DCPT at approximately 10.7 m									

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT\_2/22/08

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

**RECORD OF BOREHOLE No DCPT-PPA-06-037 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+150 o/s 18.0 m Rt., Twp of Blandford-Blenheim ORIGINATED BY MW  
 DIST London HWY 401 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY MW  
 DATUM Geodetic DATE 4.17.06 - 4.17.06 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100	PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE								
298.3 0.0	Plot inferred from BH-PPA-06-038 Inferred SAND (FILL)	[Cross-hatched pattern]										
296.0 2.3	Inferred SAND	[Dotted pattern]										
293.2 5.0	Unknown Soil											
288.4 9.9	END of DCPT at approximately 9.9 m											

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT 2/22/08

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

**RECORD OF BOREHOLE No DCPT-PPA-06-039 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+200 o/s 18.0 m Rt., Twp of Blandford-Blenheim ORIGINATED BY MW  
 DIST London HWY 401 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY MW  
 DATUM Geodetic DATE 4.17.06 - 4.17.06 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	20					
298.2 0.0	Plot inferred from BH-PPA-06-038 Inferred SAND (FILL)												
296.5 1.7	Inferred SAND												
292.4 5.8	Inferred Clayey SILT (TILL)												
290.9 7.3	Inferred Sandy SILT (TILL)												
289.4 8.8	END OF DCPT at approximately 8.8 m												

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT 2/22/08

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

**RECORD OF BOREHOLE No DCPT-PPA-06-041 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+250 o/s 18.0 m Rt., Twp of Blandford-Blenheim ORIGINATED BY MW  
 DIST London HWY 401 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY MW  
 DATUM Geodetic DATE 4.17.06 - 4.17.06 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)										
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			'N' VALUES	20						40	60	80	100	20	40	60	80	100	10
298.2 0.0	Plot inferred from BH-PPA-06-042 Inferred SAND and GRAVEL (FILL)																						
297.1 1.1	Inferred SAND																						
293.3 4.9	Inferred SAND and GRAVEL																						
290.5 7.6	Inferred Sandy SILT																						
289.0 9.1	Inferred SILT																						
286.0 12.2	END OF DCPT at approximately 12.2 m																						

ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT 2/22/08

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

**RECORD OF BOREHOLE No DCPT-PPA-06-044 1 OF 1 METRIC**

W.P. 71-00-00 LOCATION Stn: 15+350 o/s 18.0 m Rt., Twp of Blandford-Blenheim ORIGINATED BY MW  
 DIST London HWY 401 BOREHOLE TYPE Dynamic Cone Penetration Test COMPILED BY MW  
 DATUM Geodetic DATE 4.18.06 - 4.18.06 CHECKED BY GC

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE								
298.1 0.0	Plot inferred from BH-PPA-06-043 Inferred SAND (FILL)	[Cross-hatched pattern]										
296.6 1.5	Inferred SAND	[Dotted pattern]										
295.0 3.0	- grey	[Dotted pattern]										
290.5 7.6	Inferred Sandy SILT	[Vertical line pattern]										
287.7 10.4	END OF DCPT at approximately 10.4 m											

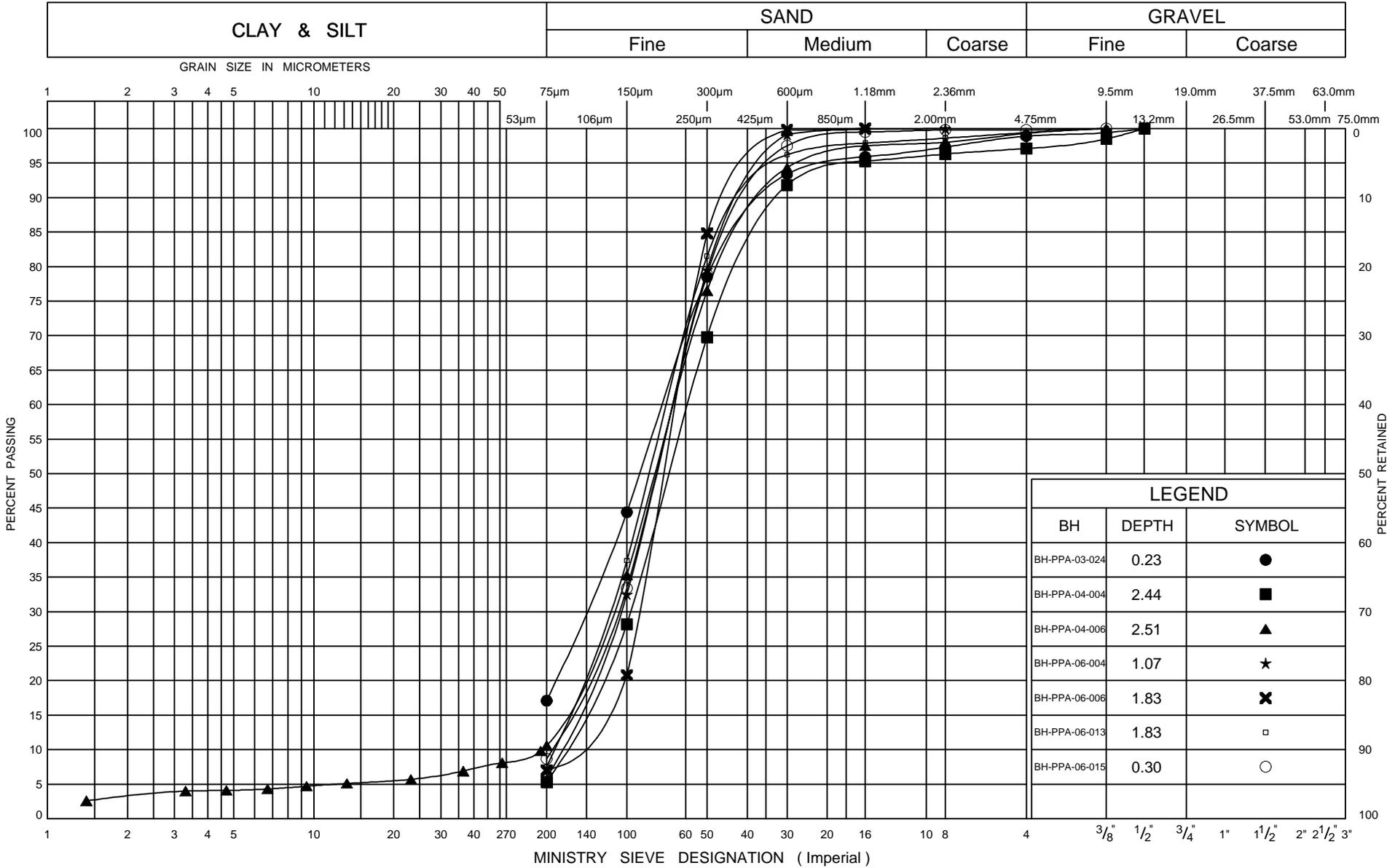
ONTARIO.MOT\_1009213.01\_PPA.GPJ ONTARIO.MOT.GDT 2/22/08

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

# Appendix C

## Geotechnical Laboratory Test Results

### UNIFIED SOIL CLASSIFICATION SYSTEM



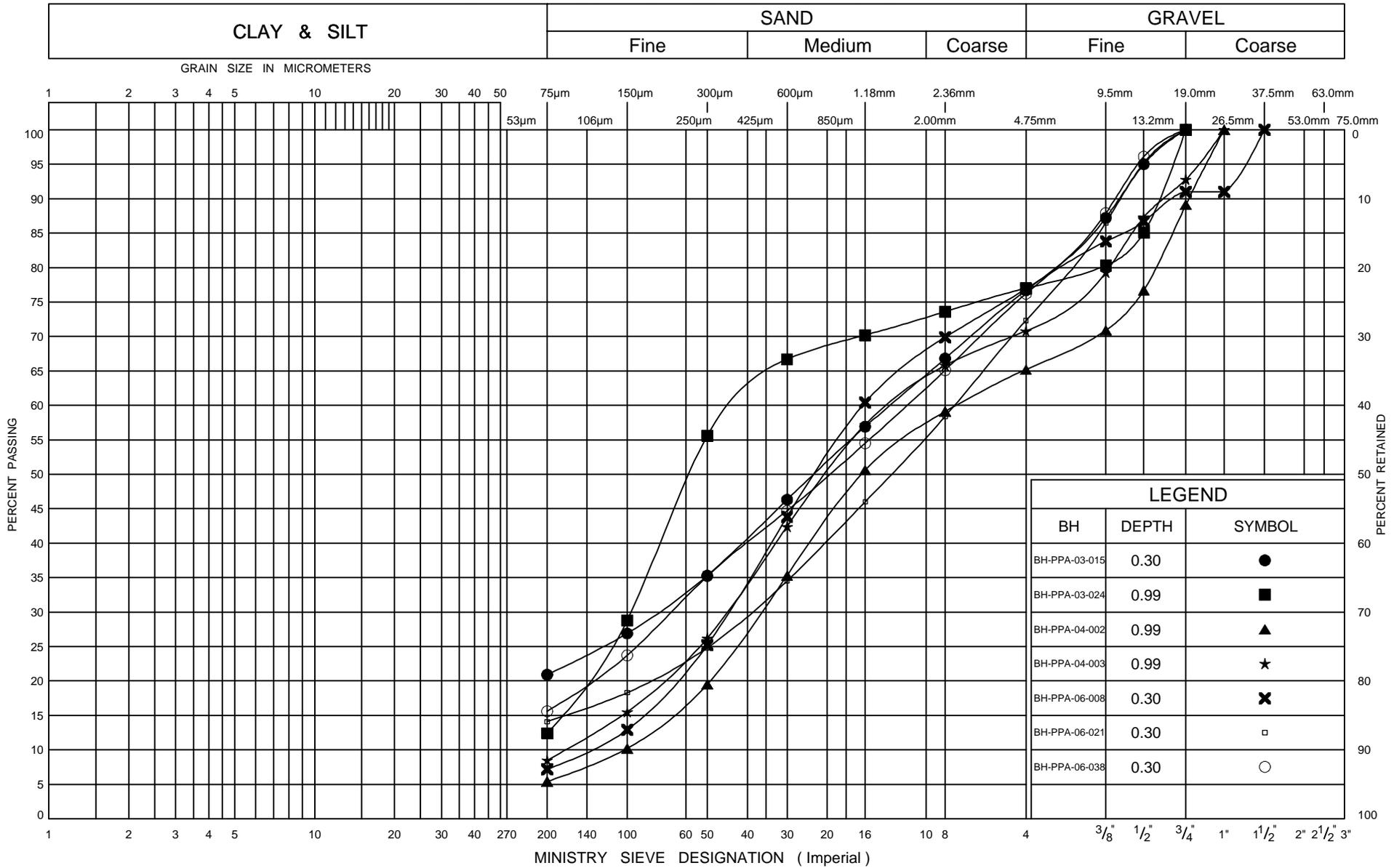
ONTARIO MOT GRAIN SIZE 1009213.01\_PPA.GPJ\_ONTARIO MOT.GDT 2/22/08



**GRAIN SIZE DISTRIBUTION**  
Sand Fill (SP-SM)

FIG No 1  
W P 71-00-00  
Poor Performing Area

### UNIFIED SOIL CLASSIFICATION SYSTEM



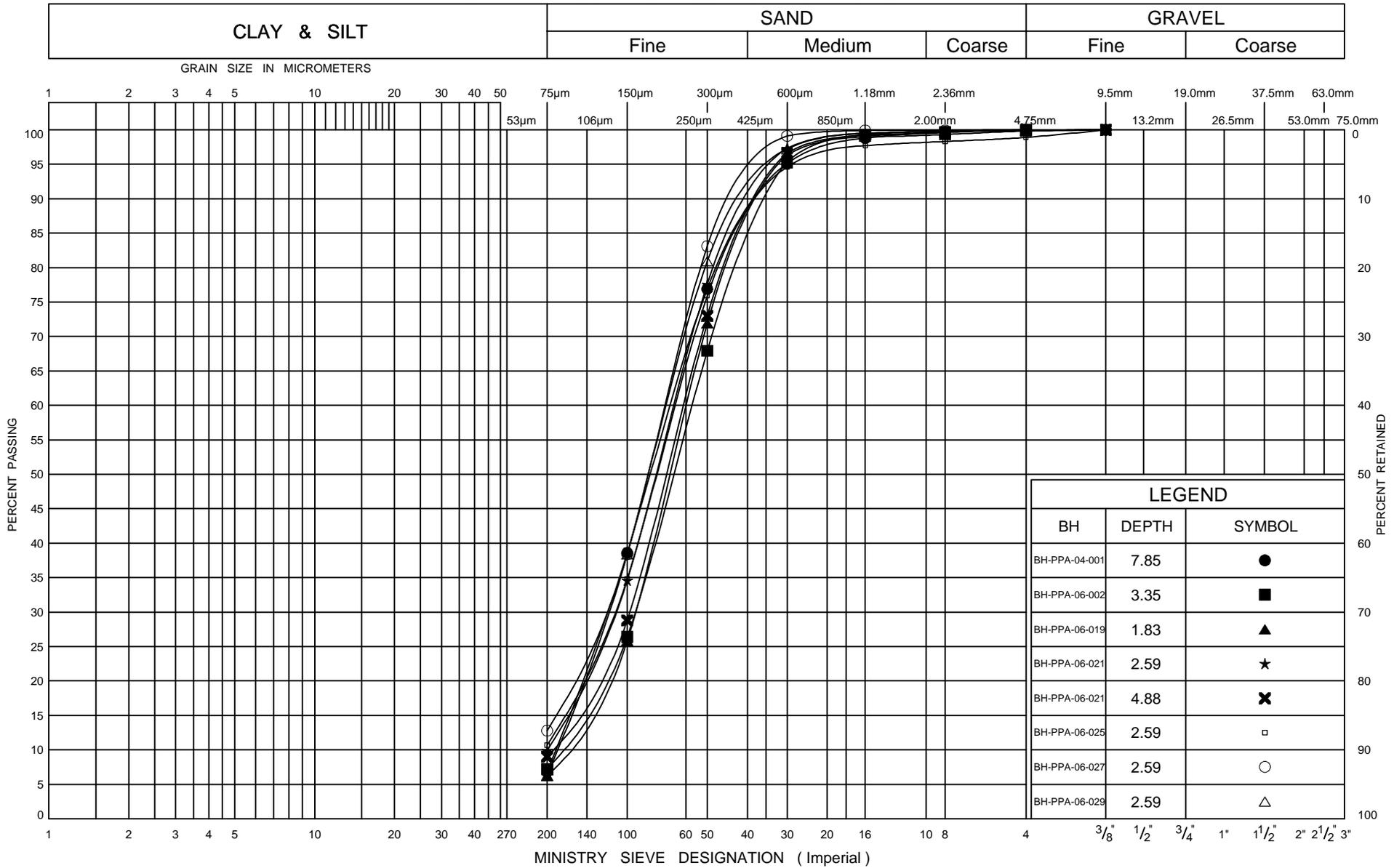
ONTARIO MOT GRAIN SIZE 1009213.01\_PPA.GPJ\_ONTARIO MOT.GDT 2/22/08



**GRAIN SIZE DISTRIBUTION**  
Sand and Gravel Fill (SP-SM)

FIG No 2  
W P 71-00-00  
Poor Performing Area

### UNIFIED SOIL CLASSIFICATION SYSTEM



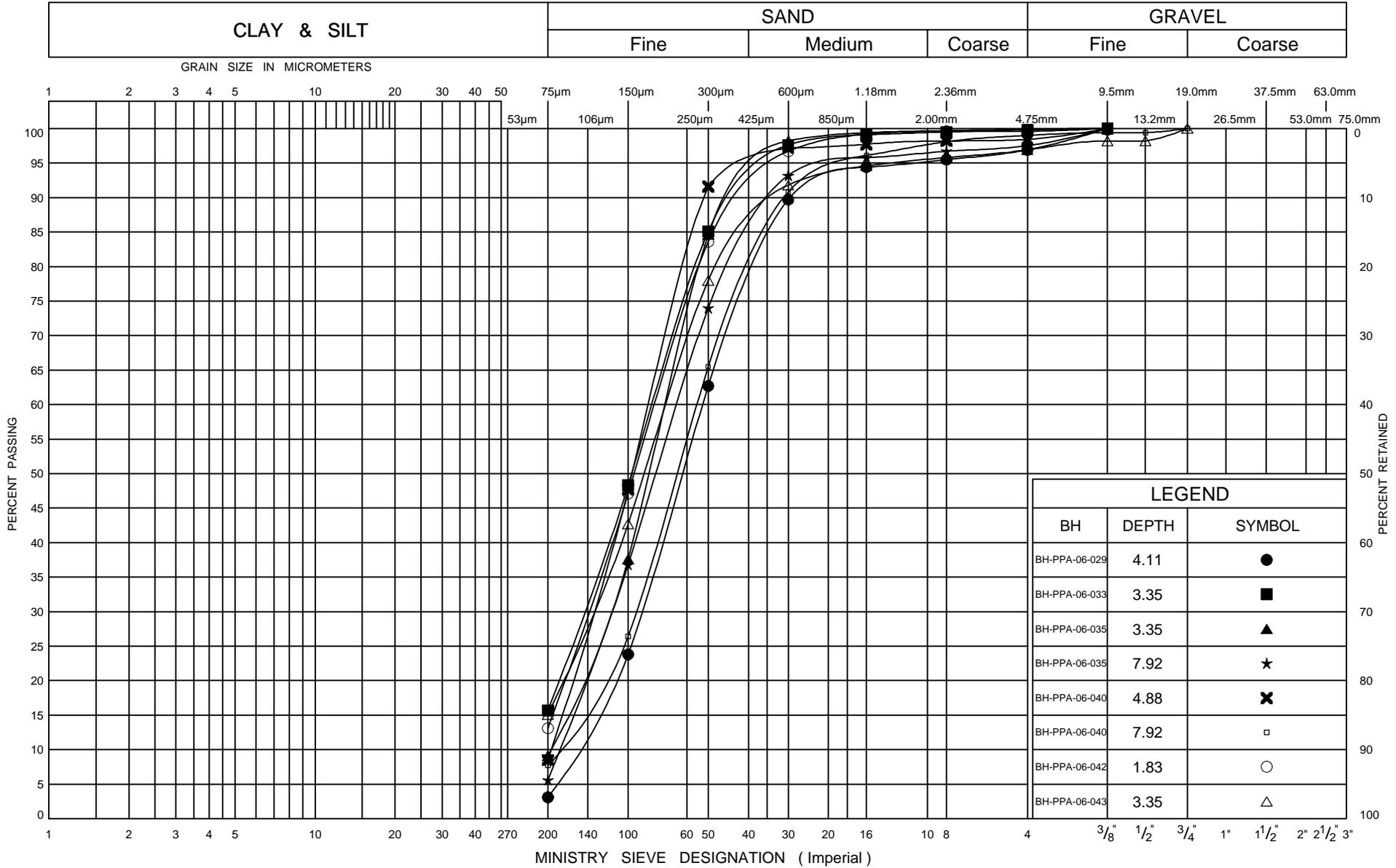
ONTARIO MOT GRAIN SIZE 1009213.01\_PPA\_GPJ\_ONTARIO MOT\_GDT 2/22/08



**GRAIN SIZE DISTRIBUTION**  
Sand (SM to SP-SM)

FIG No 3  
W P 71-00-00  
Poor Performing Area

### UNIFIED SOIL CLASSIFICATION SYSTEM



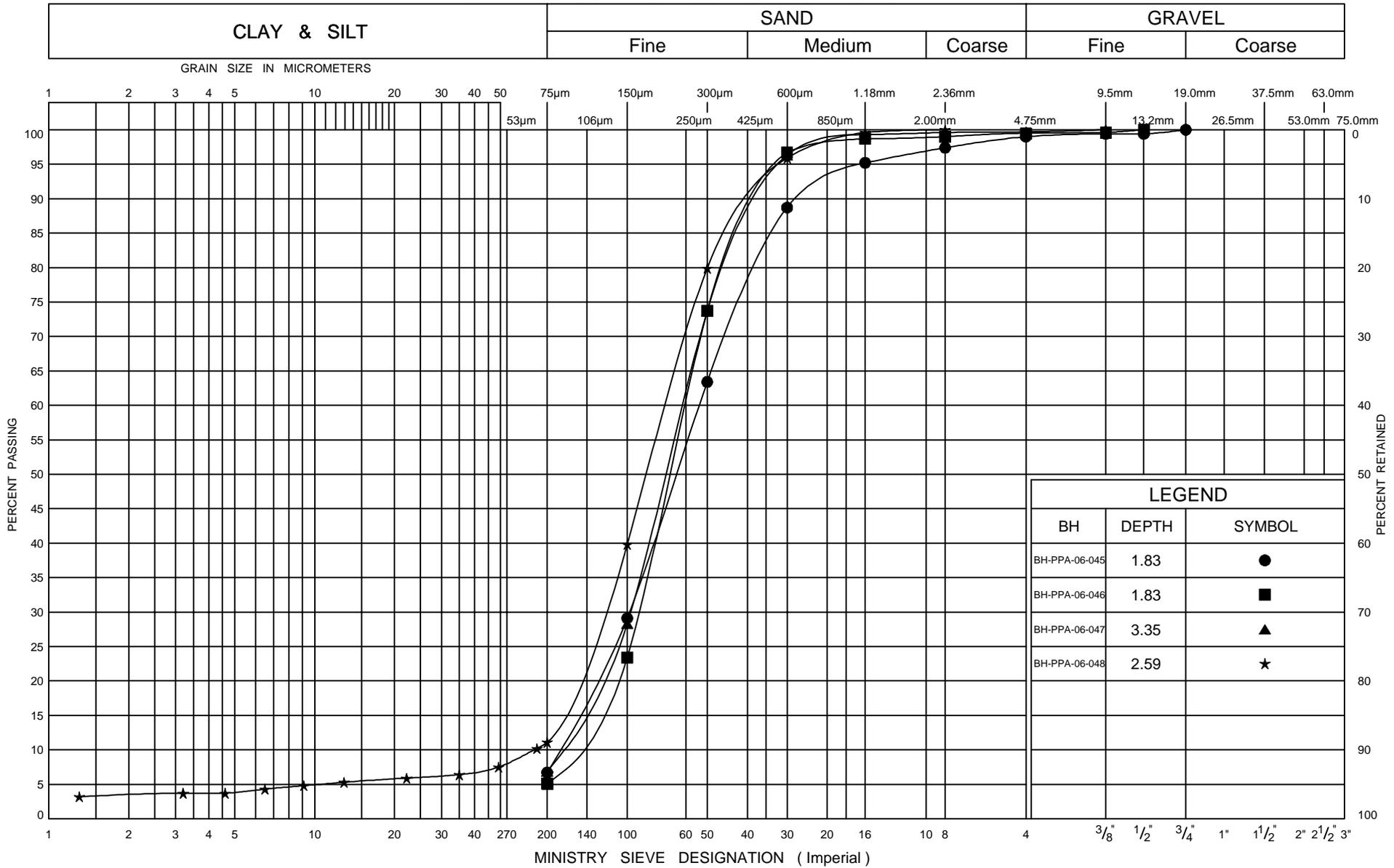
ONTARIO MOT GRAIN SIZE 1009213.01\_PPA.GPJ\_ONTARIO MOT.GDT 2/25/08



**GRAIN SIZE DISTRIBUTION**  
Sand (SM to SP-SM)

FIG No 4  
W P 71-00-00  
Poor Performing Area

### UNIFIED SOIL CLASSIFICATION SYSTEM



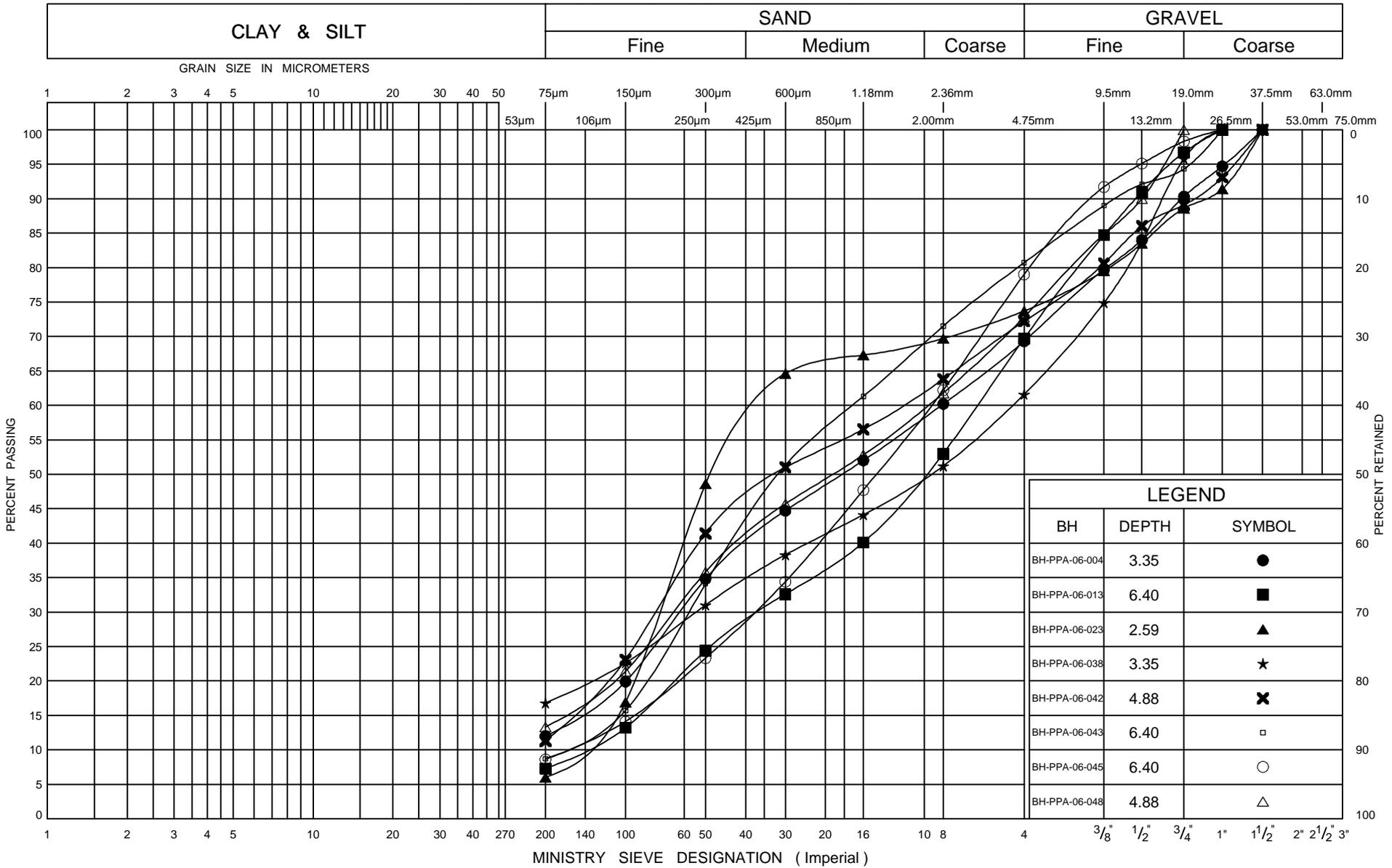
ONTARIO MOT GRAIN SIZE 1009213.01\_PPA\_GPJ\_ONTARIO MOT\_GDT 2/25/08



**GRAIN SIZE DISTRIBUTION**  
Sand (SM to SP-SM)

FIG No 5  
W P 71-00-00  
Poor Performing Area

### UNIFIED SOIL CLASSIFICATION SYSTEM



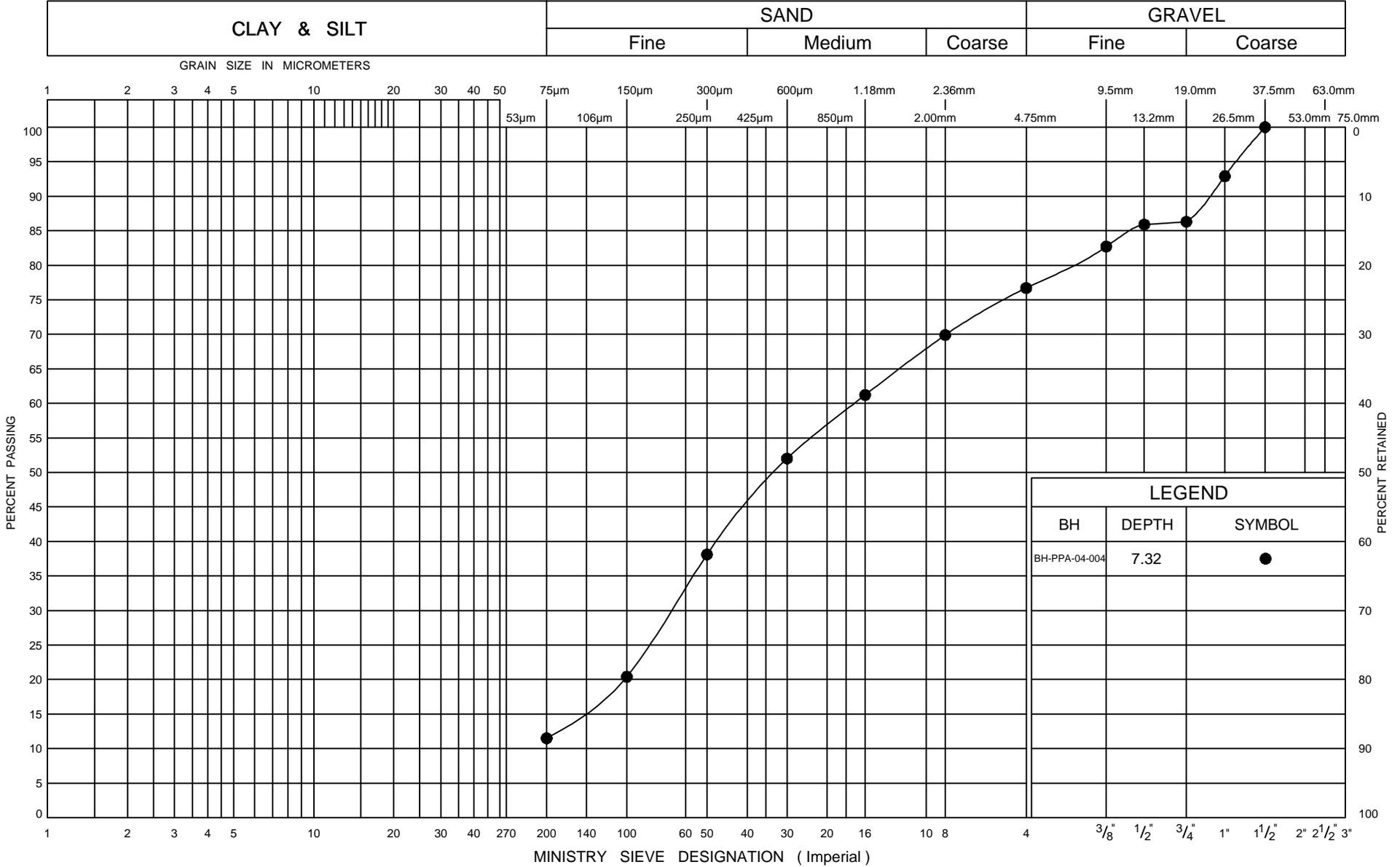
ONTARIO MOT GRAIN SIZE 1009213.01\_PPA\_GPJ\_ONTARIO MOT.GDT 2/25/08



**GRAIN SIZE DISTRIBUTION**  
Sand with Gravel (SP-SM)

FIG No 6  
W P 71-00-00  
Poor Performing Area

UNIFIED SOIL CLASSIFICATION SYSTEM



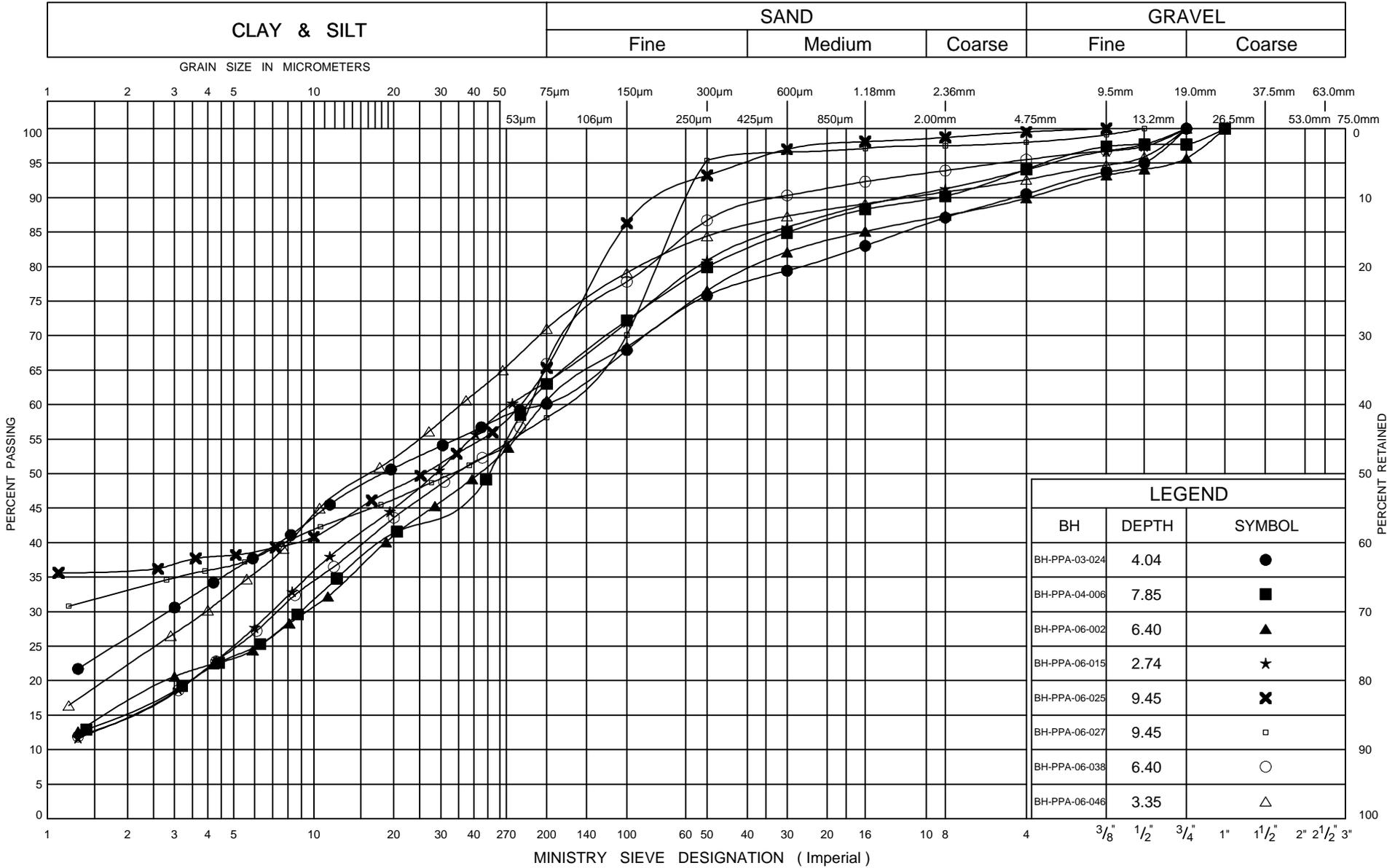
ONTARIO MOT GRAIN SIZE 1009213.01\_PPA.GPJ\_ONTARIO MOT.GDT 2/25/08



GRAIN SIZE DISTRIBUTION  
Sand with Gravel (SP-SM)

FIG No 7  
W P 71-00-00  
Poor Performing Area

### UNIFIED SOIL CLASSIFICATION SYSTEM



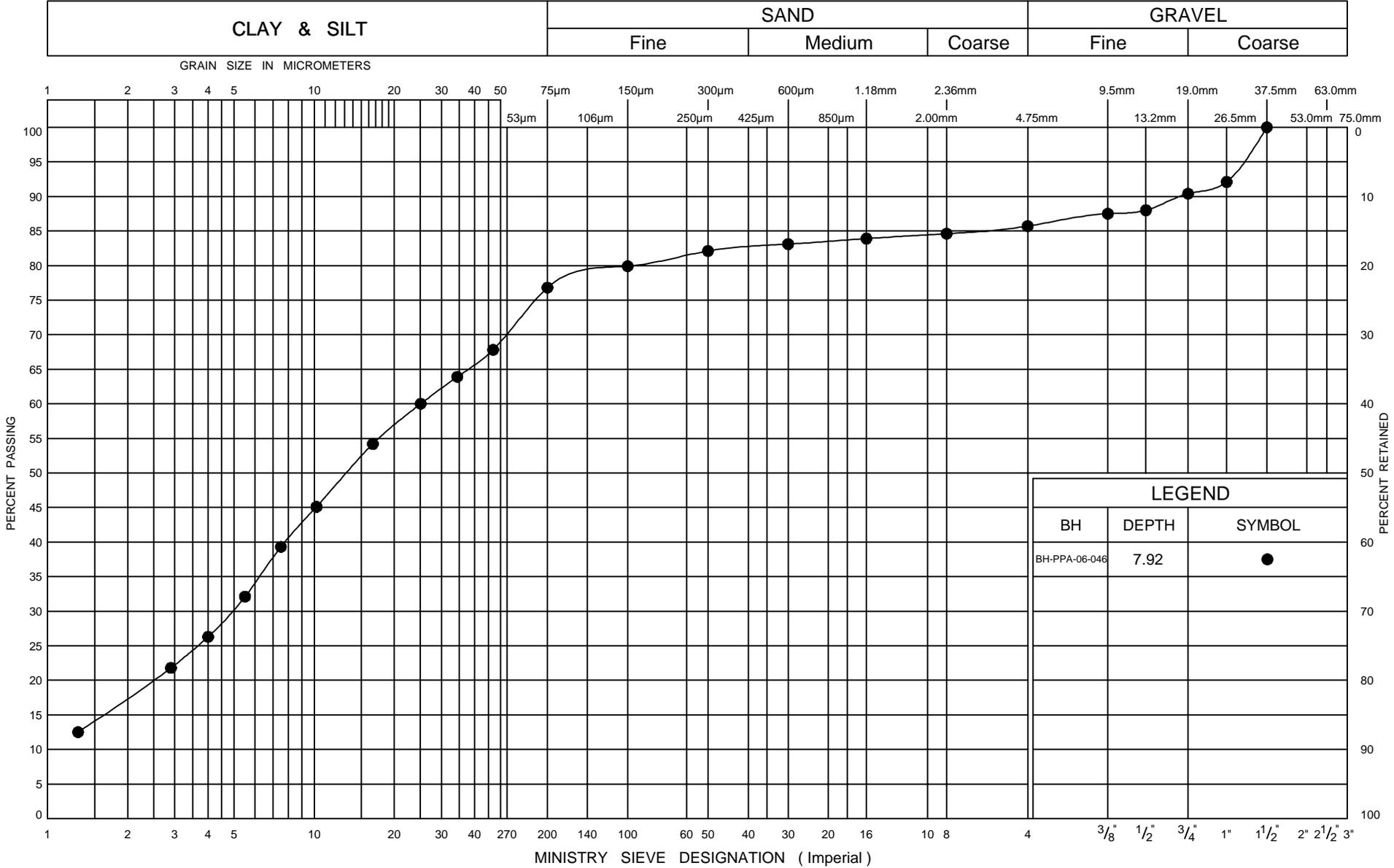
ONTARIO MOT GRAIN SIZE 1009213.01\_PPA.GPJ\_ONTARIO MOT.GDT 2/25/08



**GRAIN SIZE DISTRIBUTION**  
Clayey Silt (CL-ML)

FIG No 8  
W P 71-00-00  
Poor Performing Area

### UNIFIED SOIL CLASSIFICATION SYSTEM



LEGEND		
BH	DEPTH	SYMBOL
BH-PPA-06-046	7.92	●

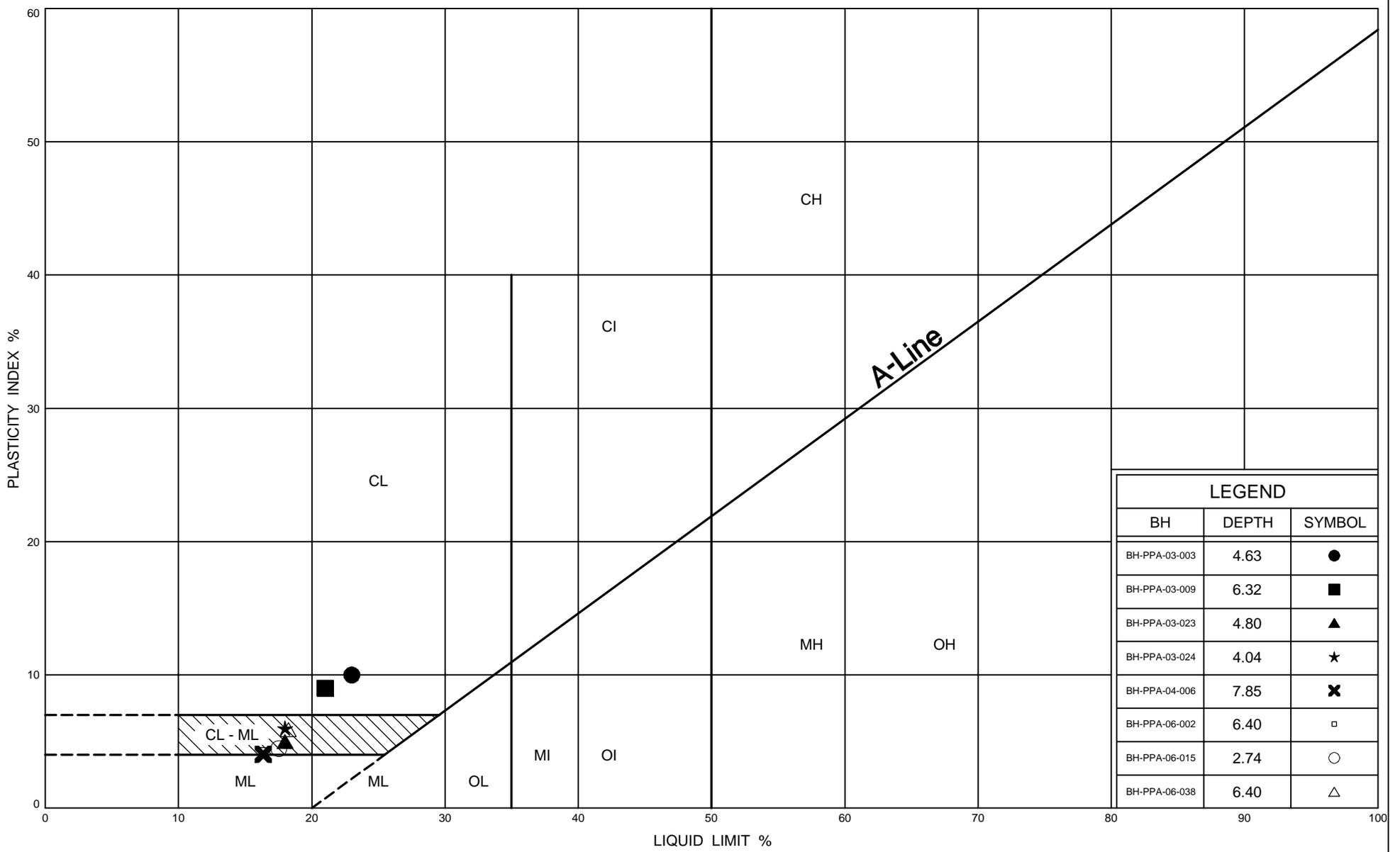
ONTARIO MOT GRAIN SIZE 1009213.01\_PPA.GPJ\_ONTARIO MOT.GDT 2/25/08



## GRAIN SIZE DISTRIBUTION

### Clayey Silt (CL-ML)

FIG No 9  
 W P 71-00-00  
 Poor Performing Area



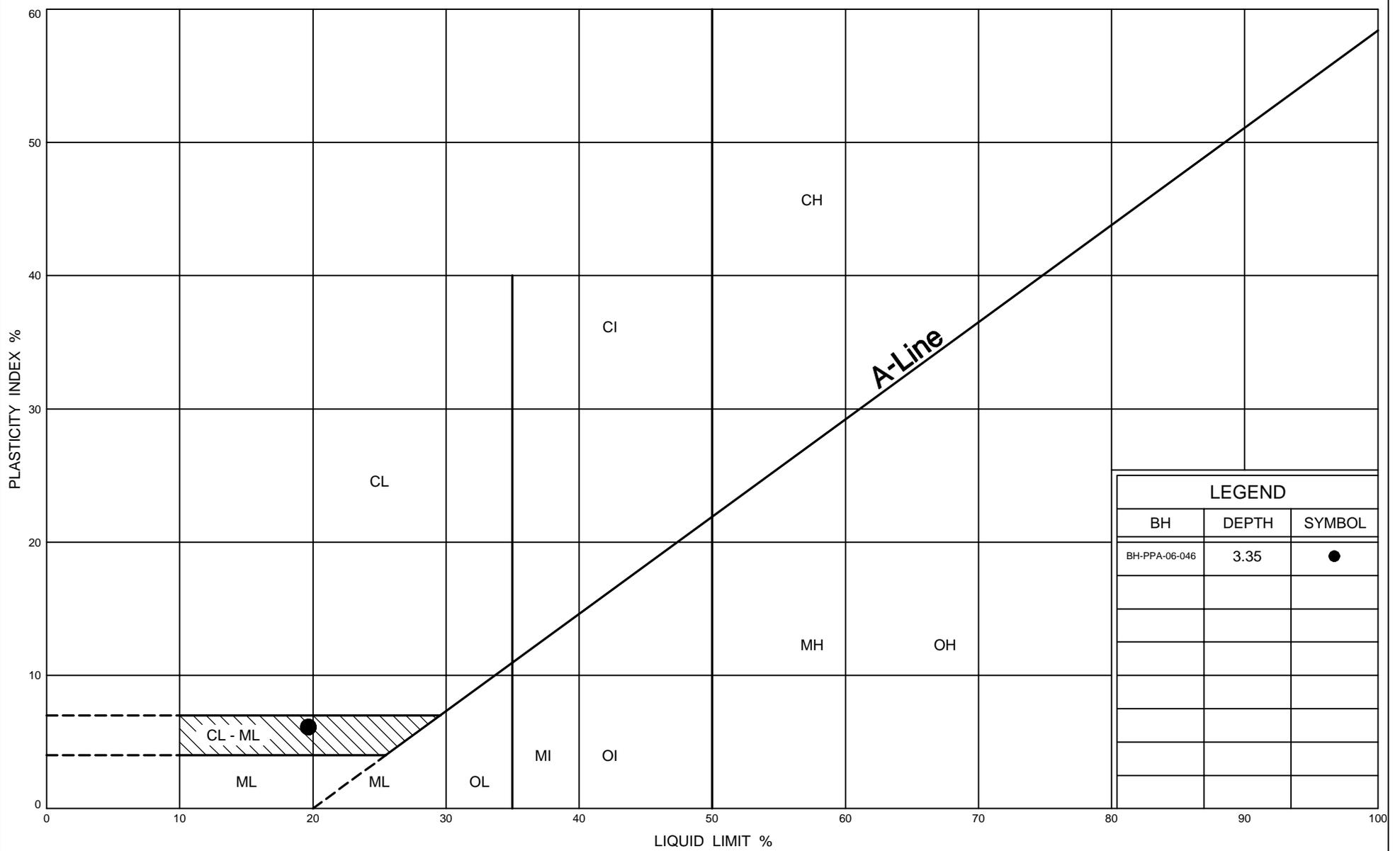
LEGEND		
BH	DEPTH	SYMBOL
BH-PPA-03-003	4.63	●
BH-PPA-03-009	6.32	■
BH-PPA-03-023	4.80	▲
BH-PPA-03-024	4.04	★
BH-PPA-04-006	7.85	✕
BH-PPA-06-002	6.40	□
BH-PPA-06-015	2.74	○
BH-PPA-06-038	6.40	△

ONTARIO MOT PLASTICITY CHART 1009213.01\_PPA.GPJ\_ONTARIO MOT.GDT 2/25/08



**PLASTICITY CHART**  
Clayey Silt (CL-ML)

FIG No 10  
W P 71-00-00  
Poor Performing Area



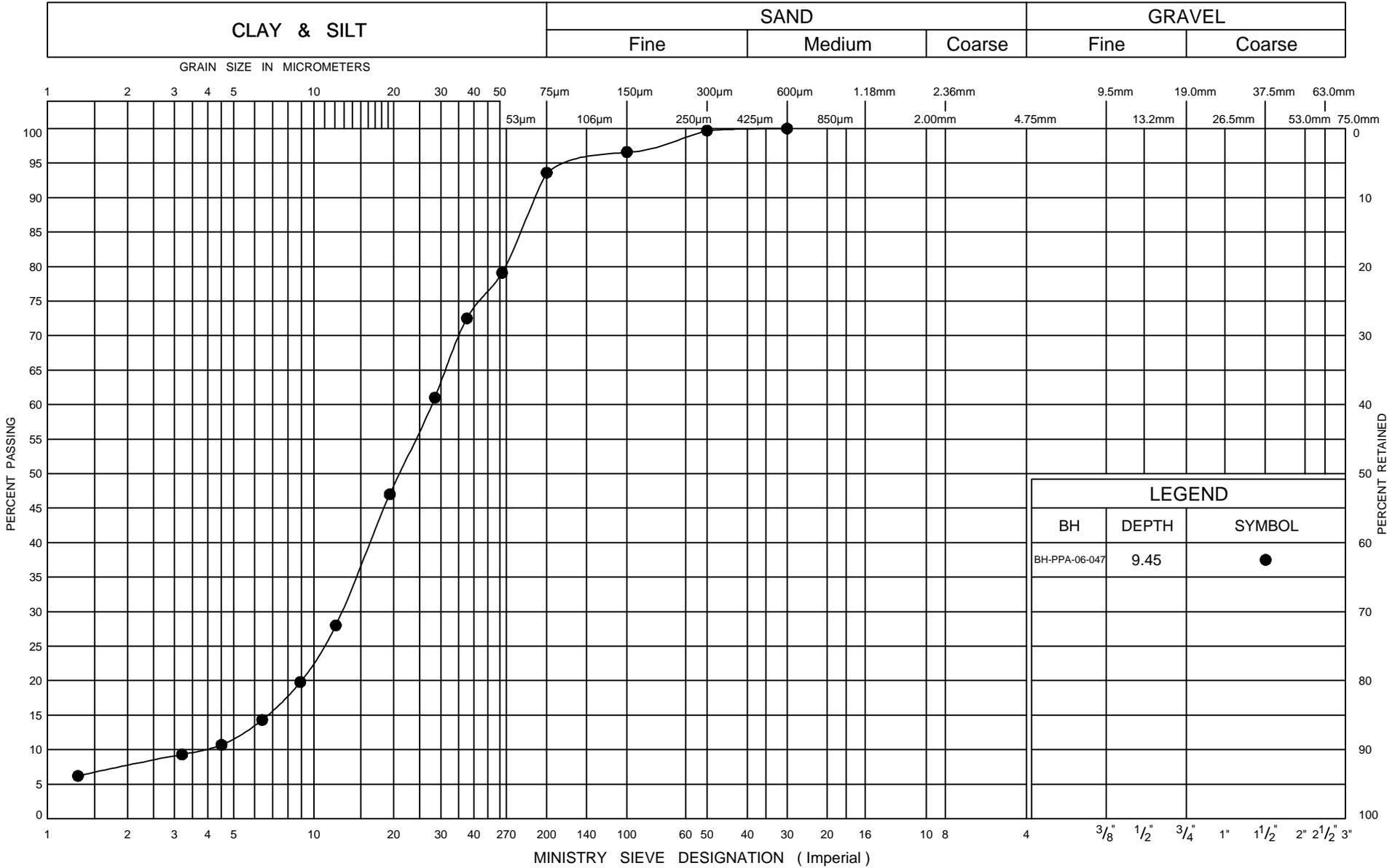
ONTARIO MOT PLASTICITY CHART 1009213.01\_PPA.GPJ\_ONTARIO MOT.GDT 2/25/08



**PLASTICITY CHART**  
Clayey Silt (CL-ML)

FIG No 11  
W P 71-00-00  
Poor Performing Area

### UNIFIED SOIL CLASSIFICATION SYSTEM



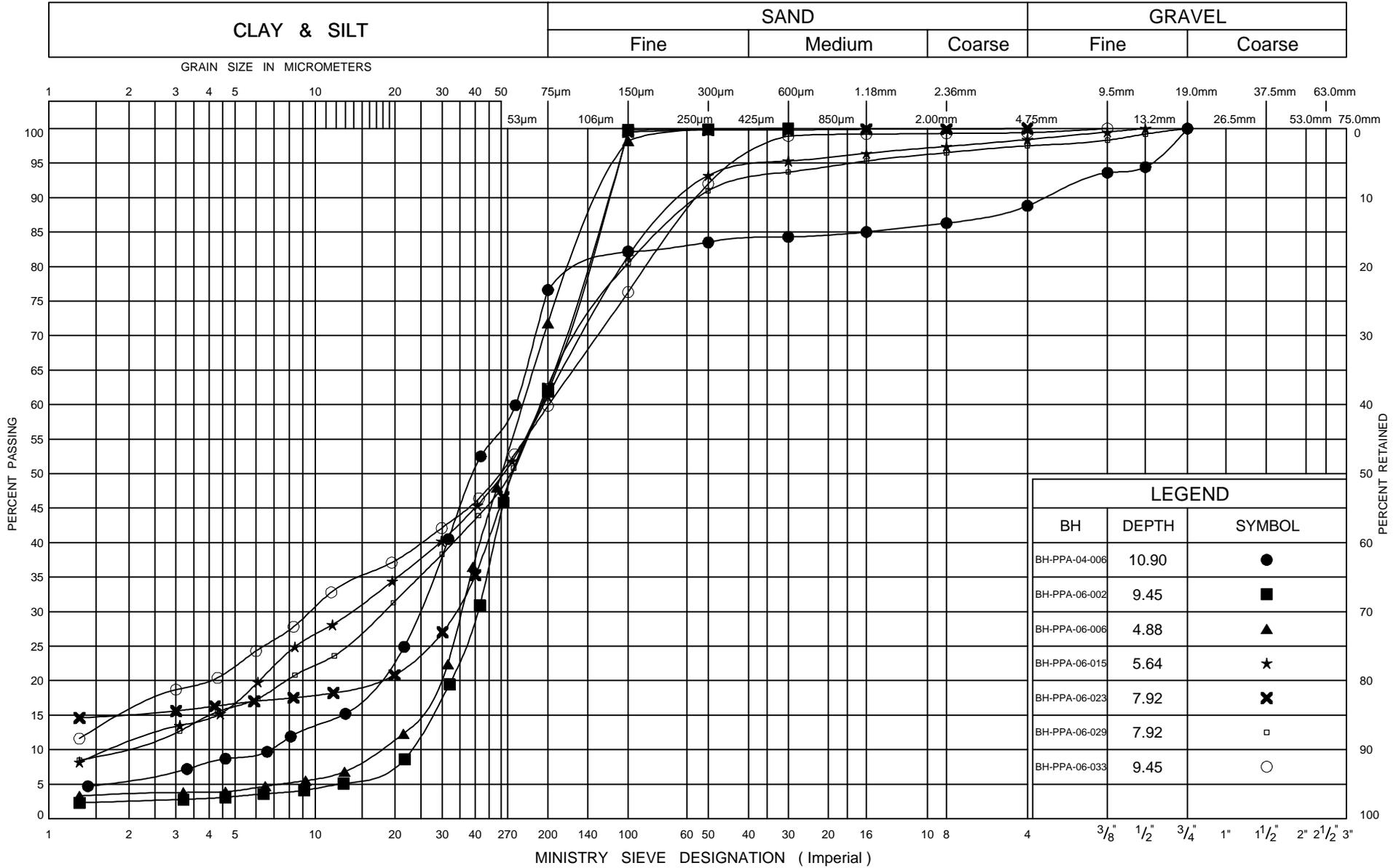
ONTARIO MOT GRAIN SIZE 1009213.01\_PPA.GPJ\_ONTARIO MOT.GDT 2/25/08



**GRAIN SIZE DISTRIBUTION**  
Silt (ML)

FIG No 12  
W P 71-00-00  
Poor Performing Area

### UNIFIED SOIL CLASSIFICATION SYSTEM



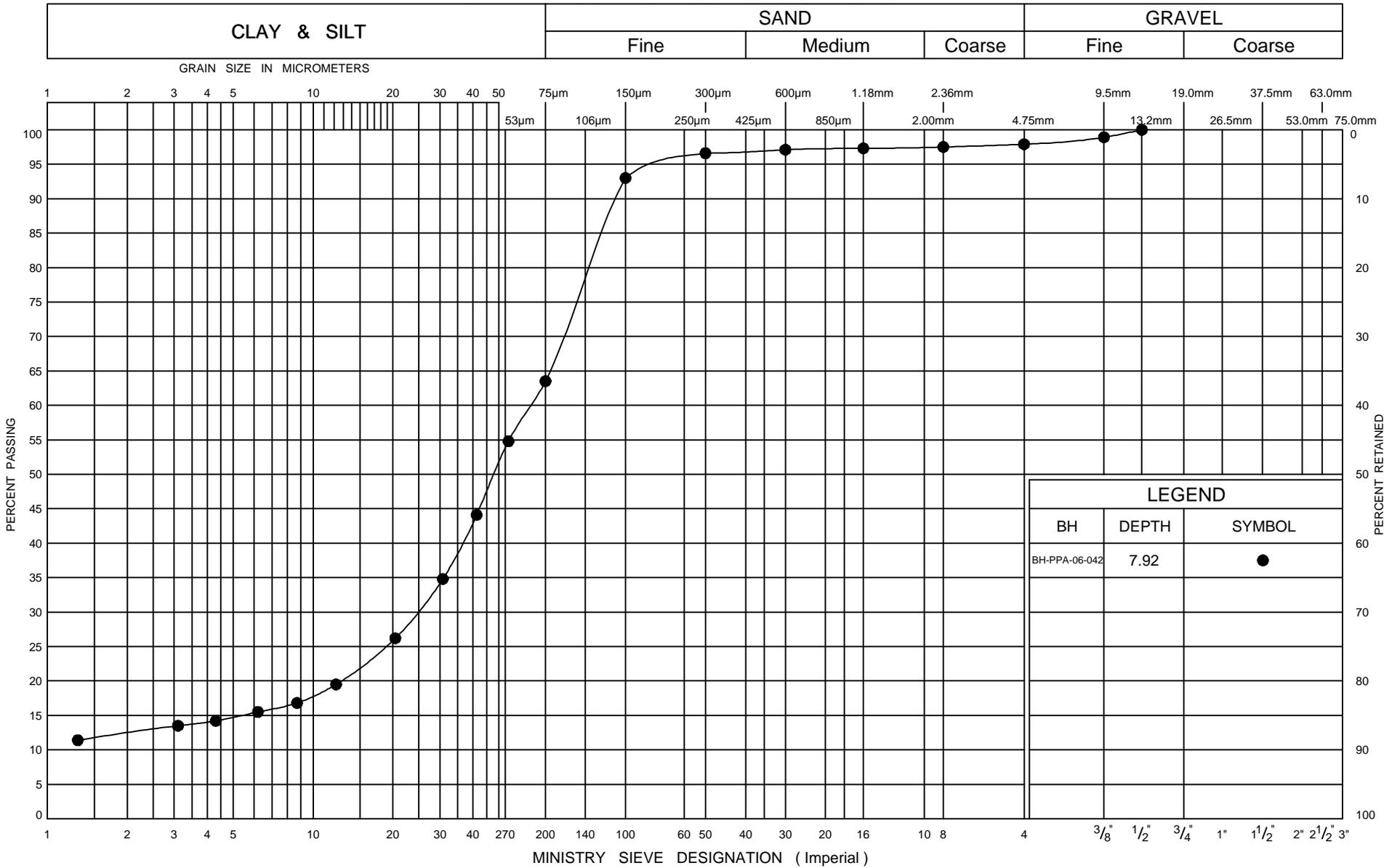
ONTARIO MOT GRAIN SIZE 1009213.01\_PPA.GPJ\_ONTARIO MOT.GDT 2/25/08



**GRAIN SIZE DISTRIBUTION**  
Silty Sand (SM)

FIG No 13  
W P 71-00-00  
Poor Performing Area

### UNIFIED SOIL CLASSIFICATION SYSTEM



ONTARIO MOT GRAIN SIZE 1009213.01\_PPA.GPJ\_ONTARIO MOT.GDT 2/25/08



**GRAIN SIZE DISTRIBUTION**  
Sandy Silt (ML)

FIG No 14  
W P 71-00-00  
Poor Performing Area

# APPENDIX D

2003 Pavement Investigation Factual Data from the Poor Performing Area  
Including:

Borehole Log and Laboratory Test Data Sheets

Core Analysis Tables, and

Representative Asphalt Core Photographs



## BOREHOLE LOG AND LABORATORY TEST DATA

Highway 401

Group WP 71-00-00 (Component II)

**14+600 O/S 20.8 m Lt (WB, Rt Shldr)**  
 0 - 700 Br Sa and Gr Fill, Some Si  
 & Tps, Loose, Moist  
 700 - 5.2 Br Cl Si, Some Sa & Gr, Stiff  
 to Very Stiff, Moist

**14+625 O/S 5.3 m Lt (WB, Lt Shldr)**  
 0 - 680 Br Sa and Gr, Tr Org  
 680 - 1.5 Br Si Sa, Moist

**14+700 C/L**  
 0 - 150 Blk Tps  
 150 - 1.5 Br Sa, Tr Gr, Si & Roots,  
 Dense, Moist  
 1.5 - 2.3 Gry Sa and Gr, Tr Si, Dense,  
 Moist,  
 N=32  
 2.3 - 2.6 Dk Gry Si, Some Sa & Gr,  
 Compact, Moist  
 2.6 - 3.3 Gry Sa, Tr Si & Cl, Comp,  
 Wet,  
 N=22  
 3.3 - 5.0 Dk Gry Si, Some Sa & Gr,  
 Compact, Moist,  
 N=15 to 25  
 Fr Wet @ 1.8

**14+700 O/S 18.0 m Rt (EB, Rt Shldr)**  
 0 - 3.0 Br Sa and Gr Fill, Some Si,  
 Dense to Very Dense,  
 Moist, Wet @ 2.5  
 N=35 to 50  
 w =4% to 14%  
 3.0 - 4.7 Br Cl Si\* Some Sa & Gr, Occ  
 Bldr, V. Stiff to Hard, Moist  
 N=16 to >100  
 w =11% to 13%

\* Cl Si

w<sub>p</sub> = 13  
 w<sub>L</sub> = 23  
 I<sub>p</sub> = 10  
 w = 12%

HSFH

**14+750 O/S 16.9 m Lt (WB, Rt Shldr)**  
 0 - 1.4 Br Sa, Some Gr, Tr Si,  
 Moist  
 1.4 - 1.5 Br Si Sa, Moist

**14+750 O/S 6.0 m Rt (EB, Lt, EP)**  
 0 - 600 Br Sa Some Cr Gr  
 600 - 1.5 Br Si Sa, Moist

**14+750 O/S 18.8 m Rt (EB, Rt Shldr)**  
 0 - 150 Br Sa Some Gr  
 150 - 600 Br Si Sa, Tr Gr, Occ Cob,  
 Moist  
 600 - 1.5 Br Si Sa, Moist

**14+800 C/L**  
 0 - 150 Blk Tps  
 150 - 760 Br Sa, Tr Gr, Si & Roots,  
 Compact, Moist  
 760 - 2.9 Br-Gry Si Sa Till, Tr Gr,  
 Dense, Moist,  
 N=7 to 36  
 2.9 - 3.1 Gry Sa Tr Tps Tr to Some  
 Org, Very loose, Moist,  
 N=1  
 3.1 - 5.0 Gry Sa, Tr Gr, Dense, Wet,  
 N=46, 24

**14+800 O/S 19 m Lt (WB, Rt Shldr)**  
 0 - 1.7 Br Sa and Gr Fill, Some Si  
 & Tps, Compact, Moist  
 1.7 - 5.2 Br Sa, Tr Gr, Loose, Moist,  
 N=6, 9  
 5.2 - 6.5 Br Si Sa, Tr Gr, Comp, Wet,  
 N=22 to 54  
 6.5 - 6.6 Br Cl Si, some Sa, Tr Gr, V.  
 Stiff, Moist,  
 N=24

**14+875 O/S 6.6 m Lt (WB, Lt EP)**  
 0 - 300 Br Sa and Cr Gr, Wet  
 300 - 800 Br Sa, Some Gr, Tr Si, Moist  
 800 - 1.5 Br Si Sa, Moist

**14+900 C/L**  
 0 - 150 Blk Tps  
 150 - 1.5 Br Sa, Tr Gr, Si & Roots,  
 Comp, Moist  
 1.5 - 2.7 Gry Sa Tr Gr, Comp, Wet  
 2.7 - 4.6 Br Si, Some Sa & Gr, Comp,  
 Moist  
 4.6 - 5.0 Br Sa, Tr Gr, Comp, Wet

**14+900 O/S 17 m Rt (EB, Rt Shldr)**  
 0 - 1.1 Br Sa and Gr Fill, Some Si,  
 Dense, Moist  
 1.1 - 3.8 Br Sa, Tr Gr, Comp, Moist  
 Wet@ 2.5  
 3.8 - 5.0 Br Cl Si, Some Sa, Tr Gr, V.  
 Stiff, Moist  
 BH Cave @ 1.7

## BOREHOLE LOG AND LABORATORY TEST DATA

Highway 401  
Group WP 71-00-00 (Component II)

<b>15+000</b>	<b>C/L</b>	
0	- 150	Blk Tps
150	- 900	Br Sa, Tr Gr & Roots, Moist
900	- 4.6	Gry Sa, Tr Tps, V. loose to Comp, Wet, N=4 to 21
4.6	- 5.0	Br Sa, Some Gr, Loose to Comp, Wet, N=23 Fr Wat @ 2.7m

<b>15+000</b>	<b>O/S 15.7 m Lt (WB, Rt EP)</b>	
0	- 1.1	Br Sa, Some Cr Gr
1.1	- 1.5	Br Si Sa, Moist

<b>15+000</b>	<b>O/S 18.4 m Lt (WB, Rt Shldr Rndg)</b>	
0	- 900	Br Sa and Gr Fill, Some Si, Comp, Moist
900	- 3.0	Br Si Sa, Tr Gr, V. Loose to Loose, Moist, Tr Org and Wet @ 2.7, N=3 to 8
3.0	6.1	Br Sa Si, some Gr, Comp, Moist N=20, 22
6.1	6.4	Br Sa, Some Gr, Comp, Wet N=19 BH Cave @ 3.0

<b>15+000</b>	<b>O/S 5.3 m Rt (EB, Lt Shldr)</b>	
0	- 100	Br Sa, Some Cr Gr
100	- 690	Br Sa, Tr Gr & Si, Moist
690	- 1.5	Br Si Sa, Moist

<b>15+000</b>	<b>O/S 15.9 m Rt (EB, Rt EP)</b>	
0	- 650	Br Sa, Some Cr Gr
650	- 1.5	Br Si Sa, Tr Gr, Moist

<b>15+100</b>	<b>C/L</b>	
0	- 150	Blk Tps
150	- 760	Br Sa, Tr Gr & Roots, Moist
760	- 2.3	Br Sa, Tr Gr, Comp, Wet, N=10, 33
2.3	- 5.2	Gry Sa, Some Org, Loose, Wet, N=3 to 5
5.2	- 7.6	DCPT N=0, 3, 3, 19, 36, 47, 52, 63, 71

<b>15+100</b>	<b>O/S 17.5 m Rt (EB, Rt Shldr)</b>	
0	- 2.1	Br Sa and Gr Fill, Some Si, Comp, Moist w =4% to 14% N=10 to 33
2.1	- 6.1	Br Sa Si, W/ Pockets of Org, Tr Gr, V. Loose to Loose, Wet, Org=0.4% to 2.4% w =16% to 25% N=3 to 8
6.1	- 7.6	DCPT N=4, 3, 7, 40, 40

<b>15+125</b>	<b>O/S 5.5 m Lt (WB, Lt Shldr)</b>	
0	- 1.5	Br Sa, Some Gr, Moist

<b>15+200</b>	<b>C/L</b>	
0	- 230	Blk Tps
230	- 760	Br Sa, Tr Gr & Roots, Moist
760	- 2.9	Gry Sa, Tr Gr, Comp, Wet, N=11 to 23
2.9	- 3.1	Gry Sa, W/ Peat
3.1	- 5.2	Dk Gry Sa, Tr Gr & Org, Comp, Wet, N=15 to 18
5.2	- 10.7	DCPT N=12, 28, 37, 64, 62, 53, 38, 36, 52, 59, 44, 59, 53, 72, 66, 39, 38, 33

<b>15+200</b>	<b>O/S 17.5 m Lt (WB Rt EP)</b>	
0	- 50	Blk Tps
50	- 1.5	Br Sa* Fill, W/ Gr Some Si, V. Dense, Moist
1.5	- 2.3	Br Sa, Tr Si, Dense, Moist N=34
2.3	- 2.4	Blk Peat, Wet
2.4	- 3.7	Gry Sa, Occ Cob, Comp, Wet, N=11, 31
3.7	- 5.0	Gry Cl Si, Firm, Sat N=8, 26

* Sa % Passing	
100%	19 mm
95%	13.2 mm
77%	4.75 mm
65%	2.00 mm
40%	425 µm
21%	75 µm
w = 6%	

Not Acceptable Gran B  
LSFH

<b>15+250</b>	<b>O/S 19.1 m Lt (WB, Rt Shldr Rndg)</b>	
0	- 200	Br Sa, Some Cr Gr
200	- 1.5	Br Si Sa, Moist

## BOREHOLE LOG AND LABORATORY TEST DATA

Highway 401

Group WP 71-00-00 (Component II)

<p><b>15+250 O/S 5.8 m Rt (EB, Lt EP)</b></p> <p>0 - 760 Br Sa, Some Gr, Tr Cob</p> <p>760 - 1.5 Br Si Sa, Moist</p> <p><b>15+250 O/S 18 m Rt (EB, Rt EP)</b></p> <p>0 - 600 Br Sa, Some Cr Gr</p> <p>600 - 1.1 Br Si Sa, Tr Gr</p> <p>1.1 - 1.5 Br Si Sa, Moist</p> <p><b>15+300 C/L</b></p> <p>0 - 150 Blk Tps</p> <p>150 - 760 Br Sa, Tr Gr, Si &amp; Org</p> <p>760 - 3.8 Br Sa, Tr Gr, Comp, Moist, Wet@2.7, N=10 to 28</p> <p>3.8 - 4.8 Br Sa, W/ Gr Some Cl, Comp, Moist, N=20</p> <p>4.8 - 5.0 Dk Br Si, Some Sa, Tr Gr, Comp, Moist, N=10</p> <p style="padding-left: 20px;">Cave @ 2.7 m</p> <p><b>15+300 O/S 17.3 m Rt (EB, Rt Shldr)</b></p> <p>0 - 600 Br Sa and Gr, Tr Si, Moist</p> <p>600 - 4.6 Br Sa, Tr Gr, Comp, Moist, Wet @ 2.7, N=14 to 45</p> <p>2.9 - 6.1 Gry Sa, Tr Si, Comp, Wet</p> <p>6.1 - 6.6 Gry Cl Si, Some Sa, Tr Gr, V. Stiff, Wet</p> <p><b>15+375 O/S 5.8 m Lt (WB, Lt Shldr)</b></p> <p>0 - 200 Br Sa, Some Gr, Tr Org</p> <p>200 - 400 Br Sa, Tr Gr, Moist</p> <p>400 - 1.5 Br Si Sa, Moist</p> <p><b>15+400 C/L</b></p> <p>0 - 760 Br Sa and Gr Fill, Tr Org</p> <p>760 - 3.6 Br Sa Tr Si, Loose to Comp, Moist, N=8 to 15</p> <p>3.6 - 5.2 Gry Sa Till, Tr Gr, Loose to Comp, Sat, N=4 to 24</p> <p>5.2 - 7.6 DCPT N=28, 39, 39, 50, 61, 63, 102, 84</p> <p style="padding-left: 20px;">Cave @ 3.4</p>	<p><b>15+400 O/S 17.6 m Lt (WB, Rt EP)</b></p> <p>0 - 600 Br Sa and Gr, some Si, Tr Org</p> <p>600 - 4.3 Br Sa, Tr Si &amp; Gr, Dense, Moist, Sat @ 3.0, N=19 to 44</p> <p style="padding-left: 20px;">Cave and Fr Wat @ 2.9 m</p> <p><b>15+500 C/L</b></p> <p>0 - 150 Blk Tps</p> <p>150 - 760 Br Sa, Tr Gr, Si &amp; Org</p> <p>760 - 3.1 Br Sa, Tr Gr, Comp, Moist to Wet</p> <p>3.1 - 4.1 Br Sa, Some Gr, Tr Si &amp; Cl, Comp, Wet</p> <p>4.1 - 5.2 Br Si, Tr Sa &amp; Gr, Firm to V. Stiff, Moist, W/ Wet Sa Seams, N=27, 7</p> <p>5.2 - 7.6 DCPT N=8, 12, 16, 34, 44, 100, 117, 103</p> <p style="padding-left: 20px;">Cave @ 2.7 m</p> <p><b>15+500 O/S 17.2 m Lt (WB, Rt Shldr)</b></p> <p>0 - 770 Br Sa, Tr to Some Gr, Tr Si</p> <p>770 - 1.5 Br Si Sa, Moist</p> <p><b>15+500 O/S 5.3 m Rt (EB, Lt Shldr)</b></p> <p>0 - 250 Br Sa, Some Cr Gr</p> <p>250 - 600 Br Sa, Tr Gr &amp; Si, Moist</p> <p>600 - 1.5 Br Si Sa, Moist</p> <p><b>15+500 O/S 16.8 m Rt (EB, Rt Shldr)</b></p> <p>0 - 600 Br Sa, and Gr, Tr Si, Moist</p> <p>600 - 3.8 Br Sa, Tr Gr, Comp, Moist</p> <p>3.8 - 5.0 Gr Sa, Tr Si, Comp, Wet</p> <p style="padding-left: 20px;">Some Gr @ 4.9 m</p> <p style="padding-left: 20px;">Cave @ 3.0</p> <p><b>15+500 O/S 19 m Rt (EB, Rt Shldr Rndg)</b></p> <p>0 - 150 Br Sa, Tr Cr Gr</p> <p>150 - 1.5 Br Si Sa, Moist</p>
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## BOREHOLE LOG AND LABORATORY TEST DATA

Highway 401  
Group WP 71-00-00 (Component II)

15+600	C/L	
0 - 150		Blk Tps
150 - 3.1		Br Sa, Tr Gr & Si, Comp, Moist, w=10% to 15% N=10 to 25
3.1 - 3.8		Br Cl Si, Tr Sa & Gr, V. Stiff, Moist, w=17% N=17
3.8 - 4.1		Br Sa, Tr Gr & Si, Dense, Moist, w=14% N=32
4.1 - 5.0		Br Cl Si* Some Sa & Gr, Firm, Moist, w=16%, N=8 Cave @ 3.0 m

\* Cl Si

w <sub>P</sub>	=	13
w <sub>L</sub>	=	18
I <sub>P</sub>	=	5
w	=	16%
HSFH		

15+600	O/S 17.3 m Lt (WB, Rt EP)	
0 - 3.1		Br Sa* Fill, Some Gr & Si, Dense, Damp w=4% to 9%
3.1 - 4.1		Br Sa** some Si, Tr Gr, Comp to Dense, Sat. w=17%
4.1 - 5.2		Br Cl Si*** W/ Sa, Tr Gr, Comp to Dense, Sat w=13% to 15% Fr Wat @ 2.7

\* Sa % Passing

100 %	19 mm
77 %	4.75 mm
72 %	2 mm
63 %	425 µm
12 %	75 µm
w =	11 %

Not Acceptable Gran A  
LSFH

** Sa % Passing	
100%	19 mm
99 %	4.75 mm
97 %	2.00 mm
88 %	425 µm
17 %	75 µm
w =	9 %

Not Acceptable Gran B  
LSFH

*** Cl Si % Passing	
100%	19 mm
90 %	4.75 mm
86 %	2.00 mm
77 %	425 µm
60 %	75 µm
34 %	5 µm
26 %	2 µm
w =	13%

HSFH

\*\*\* Clayey Silt

w <sub>P</sub>	=	12
w <sub>L</sub>	=	18
I <sub>P</sub>	=	7
w	=	13%

HSFH

15+625	O/S 6.5 m Lt (WB, Lt EP)	
0 - 150		Br Sa, Some Cr Gr
150 - 800		Br Sa, Tr Gr & Cob
800 - 1.5		Br Si Sa, Moist

15+700	C/L	
0 - 100		Blk Tps
100 - 4.6		Br Sa, Tr Gr & Si, Loose (100-1.2) to Dense, Moist, Sat @ 2.4
4.6 - 5.0		Br Si and Sa, Some Gr, Dense, Sat

15+700	O/S 17.6 m Lt (WB, Rt Shldr)	
0 - 600		Br Sa and Gr, Tr Si, Moist
600 - 4.6		Br Sa, Tr Gr, Comp, Moist, Wet @ 2.4
4.6 - 5.0		Gry Sa, Some Si, Comp, Wet Cave @ 2.4

15+750	O/S 5.8 m Rt (EB, Lt Shldr)	
0 - 100		Br Sa Some Cr Gr
100 - 700		Br Sa Tr Gr Tr Si, Moist
700 - 1.5		Br Sa Tr Si, Moist

**TABLE 1  
CORE ANALYSIS**

**HIGHWAY 401  
COUNTY OF OXFORD**

**LOCATION:** Highway 401, From 1 km east of Oxford Road 2 (Formerly Highway 2) easterly to 1km west of Drumbo Road (Component II)

**DATE OF SURVEY:** September through November, 2003

Core No.	Station	Offset Distance (m)	Asphalt Depth (mm)	Lifts Thickness (mm)	Asphalt Type	Underlying Base Type	Remarks
128	14+758 PL	7.5	320	40 45 40 60 30 50 45	DFC HDB HL-4 HL-3 HL-1 HL-8 HL-8	Gr	Crack, Slight in upper 100 mm moderate in lower lifts.  Full depth repair
71	14+800 DL	12.5	310	60 50 20 30 50 100	DFC HDB HL-2 HL-4 modified HL-1 HL-4	Gr	Very soft mix.
67	14+893 PL	9.5	330	50 50 60 50 25 95	DFC HDB HL-1 HL-4 HL-1 HL-8	Gr	Crack slight with moderate stripping in lower lifts
90	14+939 DL	13.5	420	45 60 75 100 140	DFC HDB HL-1 HL-4 Concrete	Gr	Crack, Slight to Moderate
129	15+150 PL	8.0	870	40 55 55 20 50 40 55 25 90 70 40 50 65 45 170	DFC HDB HL-1 HL-2 HL-3 HL-1 HL-4 HL-2 HL-3 HL-3 HL-1 HL-1 HL-8 HL-8 Concrete	Gr	
72	15+200 DL	13.0	760	45 50 40 35 50 75 30 75 70 115 45 120	DFC HDB HL-1 HL-3 HL-3 HL-1 HL-1 HL-8 HL-2 HL-2 HL-1 HL-8	Gr	

**TABLE 1  
CORE ANALYSIS**

**HIGHWAY 401  
COUNTY OF OXFORD**

**LOCATION:** Highway 401, From 1 km east of Oxford Road 2 (Formerly Highway 2) easterly to 1km west of Drumbo Road (Component II)

**DATE OF SURVEY:** September through November, 2003

Core No.	Station	Offset Distance (m)	Asphalt Depth (mm)	Lifts Thickness (mm)	Asphalt Type	Underlying Base Type	Remarks
130	15+550 PL	9.0	460	40 55 35 35 25 85 185	DFC HDB HL-1 HL-2 HL-1 HL-8 Concrete	Gr	
73	15+600 DL	14.0	300	45 115 40 10	DFC HDB HL-1 HL-8	Gr	
75	15+600 DL	14.0	300	50 40 50 45 155	DFC HDB HL-1 HL-2 HL-8	Gr	
91	15+750 DL	12.5	405	40 60 40 35 100 130	DFC HDB HL-1 HL-1 HL-8 Concrete	Gr	
92	15+750 SHLDR	15.0	140	50 90	DFC HDB	Gr	
169	16+000 PL	8.0	345	45 55 35 30 30 45 45 60	DFC HDB DFC HL-1 DFC HL-4 HL-4 Concrete	Gr	Crack, Slight Full depth repair  Repair 375 mm asphalt thickness
74	16+006 DL	12.0	330	50 50 55 30 145	DFC HDB HL-1 HL-1 HL-8	Gr	Crack, slight to 180 mm depth terminating at debonded lift
93	16+159 DL	13.0	370	50 70 50 40 160	DFC HDB HL-1 HL-1 Concrete	Gr	Crack, slight, moderate below a depth of 100 mm, Severe stripping in lower lifts.  HL-8 in Repair
167	16+400 PL	8.5	405	40 45 45 40 30 90 115	DFC HDB DFC HL-1 DFC HL-4 Concrete	Gr	Concrete Cracked

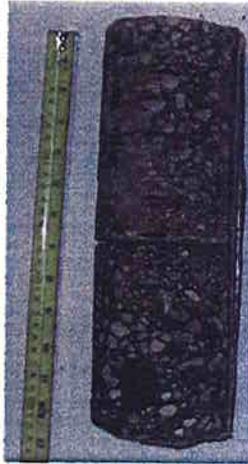
**Core Photos**  
Highway 401 East Bound, Township of Blandford



14+400 EB DL  
Core No. 69



14+550 EB DL  
Core No. 89



14+600 EB PL  
Core No. 66



14+758 EB PL  
Core No. 128



14+800 EB DL  
Core No. 71



14+893 EB PL  
Core No. 67



14+893 EB DL  
Core No. 90



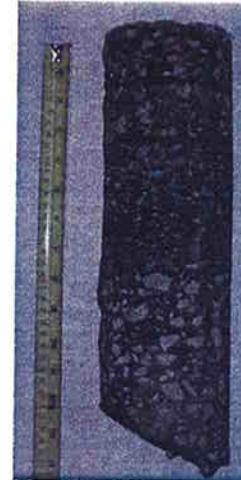
15+150 EB PL  
Core No. 129



15+200 EB DL  
Core No. 72



15+550 EB PL  
Core No. 130



15+600 EB DL  
Core No. 75



15+750 EB DL  
Core No. 91

# APPENDIX E

Stability Analysis

Highway 401 - Poor Performing Area  
GWP 71-00-00  
JW Project No. 1009213.02  
February 15, 2008

