

DRAFT FOUNDATION INVESTIGATION REPORT

PROPOSED MISSISSAUGA TRANSITWAY-HIGHWAY
407 WESTBOUND CONNECTION
MISSISSAUGA, ONTARIO

GEOCRES NO.
G.W.P. NO.

**WSP Project No.: 161-06464-00
August 15, 2016**

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PROPOSED MISSISSAUGA TRANSITWAY-
HIGHWAY 407 WESTBOUND CONNECTION
MISSISSAUGA, ONTARIO

Prepared For:

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DRAFT
FOUNDATION INVESTIGATION REPORT
PROPOSED MISSISSAUGA TRANSITWAY-HIGHWAY 407 WESTBOUND CONNECTION
HIGHWAY 407 and Highway 403, MISSISSAUGA, ONTARIO,

1 INTRODUCTION

WSP Canada Inc. (WSP), was retained by MMM Group to carry out pavement and foundation investigations for factual reporting for the proposed Mississauga Transitway – Highway 407 Westbound Connection. This investigation was carried out as per the Terms of Reference (TOR) dated April 8, 2016 and the subsequent three addenda.

Foundation investigations have been carried out to facilitate the design and construction of the proposed Transitway Connection. This connection proceeds from west of the Mississauga BRT Station at Winston Churchill Boulevard in the east to Highway 407 in the west, for about 1.5 km of Transitway. This will include the construction of a new bridge (ramp) adjacent to and west of the existing Hwy 403/Ridgeway Drive Underpass Structure and a Retaining Wall System using back-to-back RSS walls required for the new ramp.

This report documents the foundation investigations (factual) carried out for the proposed works whilst a separate report documents the pavement investigations.

2 GEOLOGICAL SETTING AND SITE DESCRIPTION

2.1 GEOLOGICAL SETTING

According to Surficial Geology of the Greater Toronto Area, Southern Ontario (MNDM 3062, Scale 1:200 000), the project site lies within the Glacial Till Deposits, which has been characterized mainly as clayey silt to silt till (Halton Till). The bedrock underlying the site comprises Queenston Formation (Shale, Limestone, Dolostone and Siltstone) from the Upper Ordovician based on the Bedrock Geology of Ontario; Southern Sheet (MNDM 2544, Scale 1:1 000 000).

2.2 PREVIOUS GROUND INVESTIGATIONS

We have been able to locate one prior Foundation Investigation and Design Report in close proximity to the subject site in the MTO GEOCRES library listings in addition to the another foundation investigation and design report that was made available as part of the contract documentation.

The above reports' details are given below which provide subsurface information on the site and/or the surrounding area:

- Foundation Investigation and Design Report (Mississauga City's **Procurement No. FA.49.33-05**) – titled "Foundation Investigation and Design Report –Municipal Class Environmental Assessment Study, Ridgeway Drive/Highway 403 Grade Separation, Mississauga, Ontario", prepared for Philips Engineering Limited by Golder Associates Inc. (Golder), dated July 2007 (File No. 06-1111-021). As part of this investigation, sixteen boreholes were undertaken at the proposed site. This report indicated that the site

consists of mainly topsoil/fill material, clayey silt to sandy silt till deposits, which are underlain by bedrock within the depths investigated. The groundwater levels were reported to vary from about 0.1 m to 1.8 m below existing ground surface at the site. This report was made available as part of the contract documentation.

- Foundation Investigation and Design Report (**Geocres No. 30M12-281**) – titled “Foundation Investigation and Design Sanitary Sewer Crossing, Beneath Highway 403 and 407 Ramp and Stormwater Pond, Mississauga, Ontario” prepared by Golder Associates Inc. (Golder), dated August 2008, located in the vicinity of this site. This report indicated that the site consists of mainly fill materials underlain by deposits of clayey silt till and silty sand till, which are underlain by bedrock within the depths investigated. The groundwater levels were observed to vary from about 2.1 to 6.8 m below existing ground surface at the site.

2.3 SITE DESCRIPTION

The key plan of site location is shown on **Drawings 1, 2 and 3**. The landscape in the site area is generally flat-lying with the exception of drainage ditches than run along the north and south sides of Highway 403. Grassy nature of the surrounding landscape is observed in Photographs 1 to 8 (all photographs are in **Appendix C**) which give a general impression of the landscape.

3 FIELD AND LABORATORY INVESTIGATIONS

3.1 FIELD INVESTIGATIONS

The fieldwork undertaken by WSP during June 2016 consisted of carrying out twenty two boreholes (BH16-1 to BH16-16 and BH16-45 to BH16-50) to investigate foundation conditions. **Table 3-1**, presents the borehole details of the WSP investigation program. The borehole locations are shown on **Drawings 1, 2 and 3** following the text of the report.

Table 3-1 Borehole Details*

BH No	*Co-ordinates (m)	Ground Elevation (m)	Drilled Depth (m)	Remarks
BH16-1	E 287040 N 4821621	180.0	13.9	Bridge Structure

BH16-2	E 287023.5 N 4821602	179.1	10.8	Bridge Structure
BH16-3	E 287029.5 N 4821597	179.4	10.8	Bridge Structure
BH16-4	E 287004.5 N 4821579.5	179.1	10.8	Bridge Structure
BH16-5	E 287010.5 N 4821574	179.2	12.35	Bridge Structure
BH16-6	E 286996 N 4821561	178.8	6.25	Bridge Structure
BH16-7	E 286978.5 N 4821542.5	178.2	10.8	RSS Wall
BH16-8	E 286985 N 4821538	178.7	10.8	RSS Wall
BH16-9	E 286950 N 4821501.5	178.6	7.8	RSS Wall

BH16-10	E 286954 N 4821498.5	179.2	7.7	RSS Wall
BH16-11	E 286921 N 4821461.5	180.0	4.7	RSS Wall
BH16-12	E 286935.5 N 4821451	180.1	5.2	RSS Wall
BH16-13	E 286895.5 N 4821416.5	179.3	3.7	RSS Wall
BH16-14	E 286903.5 N 4821411	179.7	3.7	RSS Wall
BH16-15	E 286876 N 4821384	179.6	3.7	RSS Wall
BH16-16	E 286882.5 N 4821380	179.7	3.7	RSS Wall
BH16-45	E 287011.5 N 4821725	178.0	7.9	High Embankment (East)

BH16-46	E 287005.5 N 4821740	176.7	7.8	High Embankment (East)
BH16-47	E 287038.5 N 4821718	177.7	7.9	High Embankment (East)
BH16-48	E 287018.5 N 4821754.5	176.4	7.8	High Embankment (East)
BH16-49	E 287032.5 N 4821746.5	176.0	6.2	High Embankment (East)
BH16-50	E 287049.5 N 4821732	177.0	8.1	High Embankment (East)

Notes*:

1. Co-ordinates: based on MTM NAD 83 Zone 10 coordinates
2. Name of Drilling Company: Drill Tech Drilling Limited, Newmarket, Ontario
3. Type of Drilling rig Used: Marl M5T track mounted (similar to CME 55 rig)
4. Drilling Supervision by: WSP staff from Toronto office
5. Borehole Survey: by the J.D. Barnes Limited, Markham, Ontario
6. Reporting accuracies are to the nearest 0.1 m and 0.5 m for vertical and horizontal measurements respectively as per MTO requirements

Solid stem augers were used to advance the boreholes. The soil stratigraphy was recorded by observing the quality and changes of augered materials that were withdrawn from the boreholes, and by sampling the soils at regular intervals of depth using a 50mm O.D. split spoon sampler, in accordance with the Standard Penetration Test (ASTM D 1586) method. This sampling method recovers samples from the soil strata, and the number of

blows required to drive the sampler 300 mm depth into the undisturbed soil (SPT 'N'-values) gives an indication of the compactness condition or consistency of the sampled soil material. The SPT 'N' values are indicated on the Record of Borehole Sheets (Refer to **Appendix A**).

The WSP borehole drilling was carried out under full-time supervision of WSP engineering staff who directed the drilling and sampling operation, logged borehole data in accordance with MTO Soils Classification System and took custody of soil samples retrieved for subsequent laboratory testing and identification. Soil samples were visually classified in the field and later re-evaluated by an engineer. The recovered soil samples were placed in labelled moisture-proof bags, and returned to WSP's Galaxy laboratory for further assessment.

Groundwater conditions in the boreholes were observed during and on completion of drilling in the open boreholes. A 50 mm monitoring well was installed in boreholes BH16-5 and BH16-50 upon their completion to enable long term groundwater monitoring without interference from surface water. The rest of the boreholes were grouted using a cement/bentonite mixture as per MTO procedures. As part of the construction, the piezometers need to be decommissioned in accordance with Ontario Regulation 903 (amended by Ontario Regulation 372/07).

3.2 LABORATORY INVESTIGATIONS

Visual examination and classification were undertaken on the soil samples returned to the WSP laboratory. A laboratory testing program consisting of natural water content tests, grain size analyses, including hydrometer testing and Atterberg limits, was performed on selected samples. The results of the laboratory tests are summarized on the appropriate Record of Borehole Sheets in **Appendix A**, and the details presented in **Appendix B**.

4 SUBSURFACE CONDITIONS

4.1 GENERAL

The subsurface conditions encountered at the site are described in the following sections. For purposes of soil description, the MTO soil classification manual was generally followed.

The subsoil conditions are discussed under the following three headings in Section 4.2.

- Bridge Structure
- Retaining Wall
- High Embankment

Drawings 1, 2 and 3 show the borehole location plans with subsurface profiles projected along the Bridge, Retaining Wall and High Embankment alignment respectively. The inferred stratigraphic profiles at these locations are based on the borehole data. The soil descriptions are based on visual and tactile observations, and complemented by the results of field and laboratory soil test results. An overview of subsurface conditions is described below. All depths quoted are below existing ground surface. It is to be noted that based on the borehole

data, the elevations (El.) reported for strata boundaries are from the shallowest occurrence to the deepest occurrence.

It should be noted that the subsurface conditions and the topsoil thicknesses encountered might vary in between and beyond the borehole locations. The strata boundaries shown on the subsurface profiles must not be interpreted as exact planes of geological change but rather as inferred transitions from one soil type to another.

The factual data presented on the Record of Borehole Sheets would govern any interpretation of the site conditions. However, it should be noted that the strata boundaries marked on the Record of Borehole Sheets are inferred from drilling observations, data from field tests carried out at intermittent depths and visual and tactile observations and laboratory test results on non-continuous samples.

Groundwater conditions for the investigated site are discussed in a common section following the High Embankment fills, in Section 4.3.

4.2 SUBSOIL CONDITIONS

4.2.1 BRIDGE

Boreholes BH 16-1 to BH 16.6 (6 boreholes) were carried out for the proposed bridge structure (ramp). Borehole BH 16-6 addresses the bridge approach subsoil conditions (**Drawing 1**).

4.2.1.1 OVERVIEW

As an overview, the encountered subsurface conditions at the site consisted of a pavement granular material overlying cohesionless / cohesive fill material generally underlain by deposit of clayey silt till. The deeper boreholes terminated in a deposit of sandy silt to silty sand till.

The following paragraphs are intended to give more detailed descriptions of the data documented on the Record of Borehole Sheets (**Appendix A**).

4.2.1.2 TOPSOIL

Topsoil (70 mm thick) was contacted at ground surface in BH 16-6. This thickness should not be relied upon for any quantity estimation.

Based on our experience, the thickness of topsoil/organics could frequently vary in between and beyond borehole locations, especially in depressed areas and near watercourses.

4.2.1.3 FILL MATERIALS

4.2.1.3.1 GRANULAR FILL

The grain size distributions of four (4) samples from the granular fill were determined in the laboratory and gave the grain size distribution shown in **Table 4-1**.

Table 4-1 Grain Size Distribution Summary – Pavement Fill

Samples Tested	Size Fraction	% Passing by Weight	Remarks
BH 16-1/SS1	Gravel	35 - 42%	Shown as Figure B-1, Appendix B; Summarized on the relevant Record of Borehole Sheets
BH 16-2/SS1T	Sand	44 - 54%	
BH 16-4/SS1	Fines	12 – 18%	
BH 16-5/SS1			

The grading results shown above indicate this granular fill material can be classified as cohesionless (SM/SP).

The grain size distribution results indicate excessive fines with respect OPSS granular materials, i.e. granular A and granular B (Fig. B1).

The moisture content based on nine (9) samples recovered from this material ranged from 4% to 12% indicative of a moist to wet condition.

SPT testing carried out in the boreholes, gave SPT 'N' values ranging from 7 blows/300 mm to 23 blows/225 mm (based on 6 SPT results) which indicate generally a loose to compact relative density.

4.2.1.3.2 COHESIVE FILL (SILTY CLAY TO CLAYEY SILT)

A silty clay to clayey silt fill was in all the bridge structure boreholes underlying the granular fill. The fill contained trace to some sand and trace gravel and rootlets.

The thicknesses of this layer ranged between 1.0 m and 3.6 m and the elevation of the base of the unit were between El. 178.0 m (BH16-5) and El. 175.5 m (BH 16-2) respectively.

The grain size distributions of two (2) samples from the embankment fill were determined in the laboratory and gave the grain size distribution shown in **Table 4-2**.

Table 4-2 Grain Size Distribution Summary – Cohesive Fill

Samples Tested	Size Fraction	% Passing by Weight	Remarks
BH 16-4/SS2	Gravel	6 - 9%	Shown as Figure B-2, Appendix B; Summarized on the relevant Record of Borehole Sheets
BH 16-5/SS2B	Sand	21 - 23%	
	Silty	46 – 47%	
	Clay	24%	

The grading results shown above indicate this embankment fill material can be classified as cohesive (CL/ML).

The moisture content based on sixteen (16) samples recovered from this material ranged from 5% to 33% indicative of a moist to wet condition.

SPT testing carried out in the boreholes, gave SPT 'N' values ranging from 5 blows/300 mm to 48 blows/300 mm (based on 16 SPT results) which indicate generally a firm to hard consistency.

4.2.1.3.3 COHESIONLESS FILL (SAND AND GRAVEL)

A sand and gravel fill was contacted in borehole BH 16-2 underlying the granular fill. The fill contained trace silt.

The thickness of this layer was 0.7 m and the elevation of the base of the unit was El. 177.8 m.

The moisture content based on one (1) sample recovered from this material was 8% indicative of a moist condition.

SPT testing carried out in the borehole, gave a SPT 'N' value of 5 blows/300 mm (based on 1 SPT result) which indicates a loose relative density.

4.2.1.4 CLAYEY SILT TO SILTY CLAY (TILL)

A grey clayey silt to silty clay native deposit was contacted in all the bridge structure boreholes. It contained trace gravel. The upper levels of the deposit in BH 16-1 was sandy in nature. An interlayer of silty clay was contacted in BH 16-1 at a depth of 9.1 m.

The thickness of this deposit varied from 0.8 m from 6.4 m and the elevation of the base of the unit varied from El. 176.6 m (BH 16-6) to El. 169.2 m (BH 16-1).

The grain size distributions of four (4) samples from the deposit was determined in the laboratory and gave the grain size distribution shown in **Table 4-3**.

Table 4-3 Grain Size Distribution Summary – Clayey Silt to Silty Clay Till

Samples Tested	Size Fraction	% Passing by Weight	Remarks
BH 16-01/SS7	Gravel	3 - 8%	Shown in Figure B-3, Appendix B Summarized on the relevant Record of Borehole Sheets
BH 16-02/SS6	Sand	25 - 34%	
BH 16-05/SS3	Silt	40 - 47%	
BH 16-06/SS3	Clay	18 - 25%	

An Atterberg Limits test was performed on three (3) samples from this deposit. These tests indicate the following index values as shown in **Table 4-4**.

Table 4-4 Atterberg Limits Summary – Clayey Silt to Silty Clay Till

Samples Tested	Liquid Limit (w_L) %	Plastic Limit (w_P) %	Plasticity Index (I_P) %	Remarks
BH 16-01/SS7	22	14.6	7.4	Shown as Figure B-3a, Appendix B Summarized on the relevant Record of Borehole Sheets
BH 16-01/SS11	31.2	17.6	13.6	
(silty clay interlayer)	30.7	16.8	13.9	
BH 16-02/SS6	25.4	15.8	9.6	
BH 16-06/SS3				

The above values are characteristic of a cohesive soil of low plasticity (CL).

The moisture content based on eleven (11) samples recovered from the layer ranged from 8% to 15% indicative of a moist to wet condition.

SPT testing carried out in the boreholes gave SPT 'N' values ranging from 16 blows/300 mm to 91 blows/300 mm (based on 11 SPT results) which indicate a compact to very dense relative density.

A silty clay interlayer was contacted at a depth of 9.1 m in BH 16-1 SS11. It had a moisture content of 16% with a grain size distribution: Gravel 1%, Sand 2%, silt 65% and clay 32% with a liquid limit of 31.2% and plastic limit of 17.6% and a plasticity index of 13.6%. It can be describes as a cohesive soil of low plasticity (CL).

SPT testing carried out in this interlayer gave SPT 'N' value of 87 blows/300 mm (based on 1 SPT result) which indicates hard consistency and this is reflected in the natural moisture content being less than the plastic limit.

4.2.1.5 SAND AND SILT TO SILT

A sand and silt to silt deposit was contacted in boreholes BH 16-2 and BH 16-3 only. It contained some sand and traces of clay and gravel. Occasional rock fragments were observed within this till deposit. All the bridge structure boreholes were terminated in this deposit.

The thickness of this deposit 2.7 m and the elevation of the base of the unit varied from El. 172.5 m (BH 16-3) to El. 172.0 m (BH 16-2).

The grain size distributions of one (1) sample from this embankment fill was determined in the laboratory and gave the grain size distribution shown in **Table 4-5**.

Table 4-5 Grain Size Distribution Summary – Sand and Silt to Silt with Sand

Samples Tested	Size Fraction	% Passing by Weight	Remarks
BH 16-02/SS8	Gravel	0	Shown in Figure B-4, Appendix B
	Sand	14%	Summarized on the relevant Record of Borehole Sheet
	Fines (Silt and clay)	86%	

The grading result shown above indicates this material can be classified generally as cohesionless (ML).

The moisture content based on six (6) samples recovered from the layer ranged from 12% to 17% indicative of a moist to wet condition.

SPT testing carried out in the boreholes gave SPT 'N' values ranging from 37 blows/300 mm to 73 blows/300 mm (based on 6 SPT results) which indicate a dense to very dense relative density.

4.2.1.6 SANDY SILT TO SILTY SAND (TILL)

A sandy silt to silty sand till deposit was contacted in all the bridge structure boreholes. The deposit contained traces of gravel and clay.

The thickness of this deposit varied between 3.1 m and 9.3 m and the elevation of the base of the unit varied between El. 172.5 m (BH 16-6) and El. 166.1 m (BH 16-1).

The grain size distributions of three (3) sample from the deposit were determined in the laboratory and gave the grain size distribution shown in **Table 4-6**.

Table 4-6 Grain Size Distribution Summary – Sandy Silt to Silty Sand Till

Samples Tested	Size Fraction	% Passing by Weight	Remarks
BH 16-04/SS9	Gravel	0 - 5%	Shown in Figure B-5, Appendix B
BH 16-05/SS11	Sand	14 - 28%	Summarized on the relevant Record of Borehole Sheets
BH 16-06/SS5	Silt	60 - 71%	
	Clay	9 -10%	

The grading results shown above indicate the deposit to be generally cohesionless (ML).

The moisture content based on twenty-five (25) samples recovered from this layer ranged from 6% to 19% indicative of a moist to wet condition.

SPT testing carried out in the boreholes, gave SPT 'N' values ranging from 17 blows/300 mm to greater than 100 blows/300 mm (based on 24 SPT results) which indicate a compact to very dense relative density.

4.2.2 RETAINING WALL

Boreholes BH16-7 to BH16-16 (10 boreholes) were carried out for the proposed Retained Soil System (RSS) Wall. **Drawing 2** shows the geotechnical profile at the RSS wall location.

4.2.2.1 OVERVIEW

As an overview, the encountered subsurface conditions at the RSS wall site consisted of a topsoil/pavement granular material overlying cohesionless / cohesive fill material generally underlain by a deposit of clayey silt till. The deeper boreholes terminated in a deposit of sandy silt to silt till underlying the cohesive till at these deeper borehole locations.

The following paragraphs are intended to give more detailed descriptions of the data documented on the Record of Borehole Sheets (**Appendix A**).

4.2.2.2 TOPSOIL

A topsoil thickness of 50 mm to 170 mm was contacted at ground surface in the boreholes BH16-7, BH16-8, BH16-10, BH16-11, BH16-13 and BH16-15. These thicknesses should not be relied upon for any quantity estimation.

Based on our experience, the thickness of topsoil/organics could frequently vary in between and beyond borehole locations, especially in depressed areas and near watercourses.

4.2.2.3 FILL MATERIALS

4.2.2.3.1 GRANULAR FILL

A granular fill material with thickness varying from 30 mm to 740 mm was encountered in the boreholes BH16-12, BH16-14 and BH16-16. A 170 mm thick asphalt material was encountered only in borehole BH16-12.

The grain size distributions of one (1) sample from granular fill material was determined in the laboratory and gave the grain size distribution shown in **Table 4-7**.

Table 4-7 Grain Size Distribution Summary – Granular Fill

Samples Tested	Size Fraction	% Passing by Weight	Remarks
BH16-14/SS1	Gravel	43%	Shown as Figure B-6, Appendix B; Summarized on the relevant Record of Borehole Sheet.
	Sand	35%	
	Fines	22%	

The gradation envelopes for OPSS Granular 'A and B' Type materials are drawn on Fig. B-6. Figure B-6 shows that when compared to gradation limits outlined in OPSS1010, the encountered granular fill material from the borehole does not meet the requirements for either Granular 'A or B' Type materials due to excessive fines. The moisture content based on two (2) samples recovered from this material were 10% and 13% indicative of a moist condition.

SPT testing carried out in the boreholes, gave SPT 'N' value of 3 blows/300 mm and 17 blows/300 mm which indicate generally a very loose to compact relative density.

4.2.2.3.2 COHESIVE FILL (SILTY CLAY TO CLAYEY SILT)

A silty clay to clayey silt fill was contacted in the boreholes BH16-7, BH16-8, BH16-13, BH16-14, BH16-15 and BH16-16 underlying the granular fill/topsoil. The fill contained trace to some sand and trace gravel and rootlets.

The thickness of this material ranged between 0.2 m and 1.4 m and the elevation of the base of the unit ranged between El. 179.3 m (BH16-15) and El. 177.6 m (BH 16-7) respectively.

The moisture content based on seven (7) samples recovered from this material ranged from 8% to 18% indicative of a moist condition.

SPT testing carried out in the boreholes, gave SPT 'N' values ranging from 5 blows/300 mm to 47 blows/300 mm (based on 7 SPT results) which indicate a firm to hard consistency but typically a firm to very stiff condition.

4.2.2.3.3 COHESIONLESS FILL (SANDY SILT)

A sandy silt fill was contacted in boreholes BH16-9, BH16-10 and BH16-11 underlying the topsoil/ground surface. The fill contained trace to some clay and trace gravel and rootlets.

The thickness of this material ranged between 0.7 m and 1.0 m and the elevation of the base of the unit varied between El. 179.2 m (BH16-11) and El. 177.8 m (BH 16-9) respectively.

The moisture content based on four (4) samples recovered from this material ranged from 8% to 11% indicative of a moist condition.

SPT testing carried out in the boreholes, gave SPT 'N' values ranging from 8 blows/300 mm to 18 blows/300 mm (based on 4 SPT results) which indicate generally a loose to compact relative density.

4.2.2.4 CLAYEY SILT TILL

A brown to grey clayey silt till native deposit was contacted in all the RSS wall boreholes. It contained trace to some sand/sandy and trace gravel. An occasional oxidized traces were observed within the deposit. Boreholes BH16-13, BH16-14, BH16-15 and BH16-16 were terminated within this deposit.

The thickness of this deposit varied from 0.9 m to 3.4 m and the elevation of the base of the unit varied from El. 176.7 m (BH 16-7) to El. 175.6 m (BH 16-13).

The grain size distributions of six (6) samples from the deposit were determined in the laboratory and gave the grain size distribution shown in **Table 4-8**.

Table 4-8 Grain Size Distribution Summary – Clayey Silt Till

Samples Tested	Size Fraction	% Passing by Weight	Remarks
BH 16-9/SS3	Gravel	4 - 9%	Shown in Figure B-7, Appendix B Summarized on the relevant Record of Borehole Sheets
BH 16-10/SS3	Sand	26 - 31%	
BH 16-11/SS5	Silt	41 - 46%	
BH 16-13/SS4	Clay	19 - 25%	
BH 16-15/SS5			
BH 16-16/SS5			

Atterberg Limits tests were performed on the same samples from this deposit. These tests indicate the following index values as shown in **Table 4-9**.

Table 4-9 Atterberg Limits Summary – Clayey Silt Till

Samples Tested	Liquid Limit (w _L) %	Plastic Limit (w _P) %	Plasticity Index (I _P) %	Remarks
BH 16-9/SS3	26.1	15.0	11.1	Shown as Figure B-7b, Appendix B; Summarized on the relevant Record of Borehole Sheets
BH 16-10/SS3	26.3	15.0	11.3	
BH 16-11/SS5	22.6	13.8	8.8	
BH 16-13/SS4		15.4	10.3	
BH 16-15/SS5	25.7	12.6	7.2	
BH 16-16/SS5	19.8	15.0	11.2	
	26.2			

The above values are characteristic of a cohesive soil of low plasticity (CL).

The moisture content based on thirty (30) samples recovered from the layer ranged from 6% to 27% indicative of a moist to wet condition.

SPT testing carried out in the boreholes gave SPT 'N' values ranging from 12 blows/300 mm to greater than 100 blows/300 mm (based on 28 SPT results) which indicate a stiff to hard consistency.

4.2.2.5 SANDY SILT TO SILT TILL

A sandy silt to silt till deposit was contacted in the boreholes BH16-7, BH16-8, BH16-9, BH16-10, BH16-11 and BH16-12. The deposit contained trace to some clay and trace gravel. Rock fragments were generally identified within this deposit.

The thickness of this deposit varied between 0.9 m and 9.3 m and the elevation of the base of the unit varied between El. 175.3 m (BH 16-11) and El. 167.9 m (BH 16-8). These boreholes were terminated within this till deposit.

The grain size distributions of four (4) samples from the deposit were determined in the laboratory and gave the grain size distribution shown in **Table 4-10**.

Table 4-10 Grain Size Distribution Summary – Sandy Silt to Silt Till

Samples Tested	Size Fraction	% Passing by Weight	Remarks
BH 16-12/SS7	Gravel	1 - 3%	Shown in Figure B-8, Appendix B Summarized on the relevant Record of Borehole Sheets
BH 16-08/SS5	Sand	7 - 29%	
BH 16-08/SS10	Silt	59 - 84%	
BH 16-09/SS8	Clay	7 - 9%	

The grading result shown above indicate the deposit to be generally cohesionless (ML).

The moisture content based on thirty-seven (37) samples recovered from this layer ranged from 6% to 17% indicative of a moist condition.

SPT testing carried out in the boreholes, gave SPT 'N' values ranging from 38 blows/300 mm to greater than 100 blows/300 mm (based on 36 SPT results) which indicate a dense to very dense relative density.

4.2.3 HIGH EMBANKMENT

Boreholes BH 16-46 to BH 16.-50 (5 boreholes) were carried out to investigate the subsurface conditions for the proposed high embankment fill (**Drawing 3**).

4.2.3.1 OVERVIEW

As an overview, the encountered subsurface conditions at the site consisted of topsoil underlain by fill essentially of a cohesive nature. These layers were underlain by a clay silt till overlying sandy silt till where all the boreholes were terminated.

The following paragraphs are intended to give more detailed descriptions of the data documented on the Record of Borehole Sheets (**Appendix A**).

4.2.3.2 TOPSOIL

Topsoil (140mm to 230 mm thick) was contacted at ground surface in all embankment boreholes. These thicknesses should not be relied upon for any quantity estimation.

The moisture content based on six (6) samples recovered from this material ranged from 16% to 36% indicative of a moist condition.

SPT testing carried out in the boreholes, gave SPT 'N' values ranging from 4 blows/300 mm to 9 blows/300 mm (based on 6 SPT results) which indicate generally a loose relative density.

Based on our experience, the thickness of topsoil/organics could frequently vary in between and beyond borehole locations, especially in depressed areas and near watercourses.

4.2.3.3 COHESIVE FILL

A cohesive fill consisting of clayey silt to silty clay was encountered in all the embankment boreholes. The fill was trace to sandy and contained traces of gravel, topsoil and rootlets.

The thicknesses of this layer ranged between 0.6 m and 2.1 m and the elevation of the base of the unit ranged from El. 175.7 m (BH 16-45) to El. 173.0 m (BH 16-47) respectively.

The moisture content based on ten (10) samples recovered from this material ranged from 11% to 23% indicative of a moist condition.

SPT testing carried out in the boreholes, gave SPT 'N' values ranging from 7 blows/300 mm to 50 blows/300 mm (based on 10 SPT results) which indicate generally a firm to hard but typically firm very stiff consistency.

4.2.3.4 CLAYEY SILT TILL

A clayey silt native deposit was contacted in all the embankment boreholes. It was sandy and showed traces of gravel.

The grain size distributions of four (4) samples from the deposit were determined in the laboratory and gave the grain size distribution shown in **Table 4-11**.

Table 4-11 Grain Size Distribution Summary – Clayey Silt Till

Samples Tested	Size Fraction	% Passing by Weight	Remarks
BH C16-46/SS4	Gravel	4 - 15%	Shown in Figure B-9, Appendix B Summarized on the relevant Record of Borehole Sheets
BH C16-47/SS9	Sand	22 - 30%	
BH C16-49/SS4		42 - 48%	
BH C16-50/SS4	Clay	13 - 22%	

Atterberg Limits tests were performed from the same spoon samples from this deposit. These tests indicate the following index values as shown in **Table 4-12**.

Table 4-12 Atterberg Limits Summary – Clayey Silt Till

Samples Tested	Liquid Limit (w _L) %	Plastic Limit (w _P) %	Plasticity Index (I _P) %	Remarks
BH C16-46/SS4	25.8	16.4	9.4	Shown as Figure B-9a, Appendix B; Summarized on the relevant Record of Borehole Sheets
BH C16-47/SS9	17.7	13.0	4.7	
BH C16-49/SS4	25.1	15.5	9.6	
BH C16-50/SS4	23.2	14.7	8.5	

The above values are characteristic of a cohesive soil of low plasticity (CL).

The moisture content based on twenty (20) samples recovered from the layer ranged from 9% to 14% indicative of a moist condition.

SPT testing carried out in the boreholes gave SPT 'N' values ranging from 18 blows/300 mm to >100 blows/300 mm (based on 20 SPT results) which indicate a very stiff to hard relative density.

4.2.3.5 SANDY SILT TO SILTY SAND TILL

A sandy silt to silty sand till was contacted below the cohesive till layer in all the embankment boreholes and these boreholes were terminated in this deposit. It contained trace to some clay and trace gravel.

The contacted thickness of this deposit ranged from 1.0 m to 4.8 m. The elevation of the base of the unit ranged from El.170.0 m (BH 16-45) to El. 168.7 m (BH 16-48) respectively.

The grain size distributions of two (2) samples from this deposit were determined in the laboratory and gave the grain size distribution shown in **Table 4-13**.

Table 4-13 Grain Size Distribution Summary – Sand and Silt to Silt with Sand

Samples Tested	Size Fraction	% Passing by Weight	Remarks
BH C16-48/SS6 BH C16-50/SS10	Gravel	6 – 8%	Shown in Figure B-10, Appendix B
	Sand	36%	Summarized on the relevant Record of Borehole Sheets
	Silt	42 - 50%	
	Clay	9 - 15%	

The grading results shown above indicate this material can be classified generally as cohesionless (ML).

The moisture content based on twenty-four (24) samples recovered from the layer ranged from 5% to 11% indicative of a moist to wet condition.

SPT testing carried out in the boreholes gave SPT 'N' values ranging from 41 blows/300 mm to greater than 100 blows/300 mm (based on 24 SPT results) which indicate a dense to very dense relative density.

4.3 GROUNDWATER OBSERVATIONS

Groundwater levels were encountered in all boreholes and were noted upon completion of drilling except in two embankment boreholes, BH16-45 and BH 16-48. All water level observations are shown on the individual Record of Borehole Sheets in **Appendix A**.

Groundwater levels measured on completion are not considered to have stabilized and may not necessarily represent the long-term groundwater level at the site. **Table 4-14** summarizes the groundwater observations.

Table 4-14 Summary of Groundwater Observations

BH No	Ground Surface Elevation (m)	Water Level Measurements		Remarks
		Depth of water (m)	Elevation (m)	
BH 16-1	180.0	7.6*	172.4	Upon completion on 10 June 2016 caved-in at 7.9m
BH 16-2	179.1	4.0*	175.1	Upon completion on 9 June 2016 caved-in at 4.9m
BH16-3	179.4	4.3*	175.1	Upon completion on 9 June 2016 caved-in at 5.0 m
BH16-4	179.1	-	-	Caved-in and wet bottom at 4.0 m Upon completion on 10 June 2016
BH16-5	179.2	4.6* 1.3 1.7	174.6 (9 June 2016) 177.8 (15 June 2016) 177.5 (18 July 2016)	caved-in at 5.0 m

BH No	Ground Surface Elevation (m)	Water Level Measurements		Remarks
		Depth of water (m)	Elevation (m)	
BH16-6	178.8	4.1*	174.7	Upon completion on 14 June 2016 caved-in at 5.6 m
BH16-7	178.2	-	-	Caved-in and wet bottom at 4.0 m upon completion on 10 June 2016
BH16-8	178.7	Dry	-	Upon completion on 14 June 2016 caved-in at 3.4m
BH16-9	178.6	5.2*	173.37	Upon completion on 14 June 2016 caved-in at 7.2m
BH16-10	179.2	-	-	Caved-in and wet bottom at 2.9 m upon completion

BH No	Ground Surface Elevation (m)	Water Level Measurements		Remarks
		Depth of water (m)	Elevation (m)	
				on 10 June 2016
BH16-11	180.0	Dry	-	Upon completion on 14 June 2016 caved-in at 4.3m
BH16-12	180.1	Dry	-	Upon completion on 8 June 2016 caved-in at 4.1m
BH16-13	179.29	Dry	-	Upon completion on 17 June 2016 caved-in at 2.6m
BH16-14	179.65	Dry	-	Upon completion on 17 June 2016 caved-in at 2.6m

BH No	Ground Surface Elevation (m)	Water Level Measurements		Remarks
		Depth of water (m)	Elevation (m)	
BH16-15	179.63	Dry	-	Upon completion: 17 June 2014 caved-in at 2.4m
BH16-16	179.7	Dry	-	Upon completion on 8 June 2016 Borehole open on completion
BH16-45	178.0	Dry	-	Upon completion on 2 June 2016
BH16-46	176.7	5.5*	171.2	Upon completion on 2 June 2016 Borehole open on completion
BH16-47	177.7	4.0*	173.7	Upon completion on 2 June 2016 caved-in at

BH No	Ground Surface Elevation (m)	Water Level Measurements		Remarks
		Depth of water (m)	Elevation (m)	
				6.1m
BH16-48	176.4	Dry	-	Upon completion on 1 June 2016
BH16-49	176.0	Dry	-	Upon completion on 1 June 2016
BH16-50	177.0	6.1* 2.2 2.3	170.9 (1 June 2016) 174.7 (15 June 2016) 174.7 (18 July 2016)	

Note: * Unstabilized water levels

It should be pointed out that the groundwater levels would be subject to seasonal fluctuations in response to major weather events.

CLOSURE

The “Limitations of Report” as presented in **Appendix D** are an integral part of this report.

SIGNATURES

We trust that the information contained in this foundation investigation report is satisfactory. Should you have any questions, please do not hesitate to contact this office.

WSP Canada Inc.

Mani Patchayappan M.Eng., P.Eng
Intermediate Geotechnical Engineer

Vasanth Wijeyakulasuriya, M.Eng., P.Eng
Senior Technical Director, Geotechnical
MTO Designated Contact



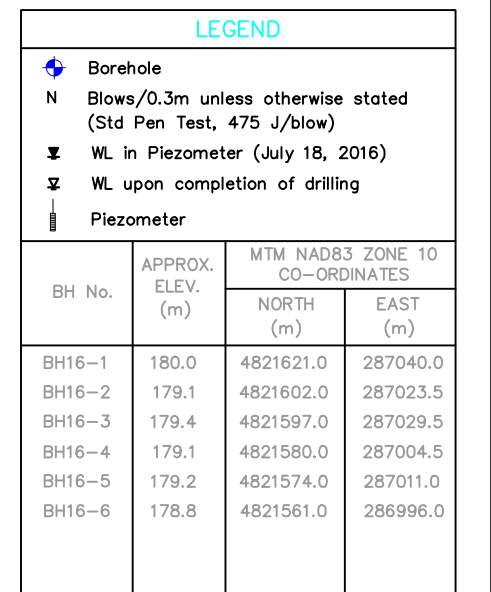
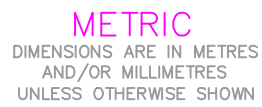
REFERENCES

Canadian Highway Bridge Design Code (CHBDC) and Commentary on CAN/CSA S6-14. 2014. CSA Special Publication, S6-14. Canadian Standards Association.

Canadian Geotechnical Society, 2006. Canadian Foundation Engineering Manual, 4th Edition. The Canadian Geotechnical Society c/o BiTech Publisher Ltd, British Columbia.

M.T.O Soil Classification Manual, Ministry of Transportation, Ontario.

Drawings Nos 1 to 3



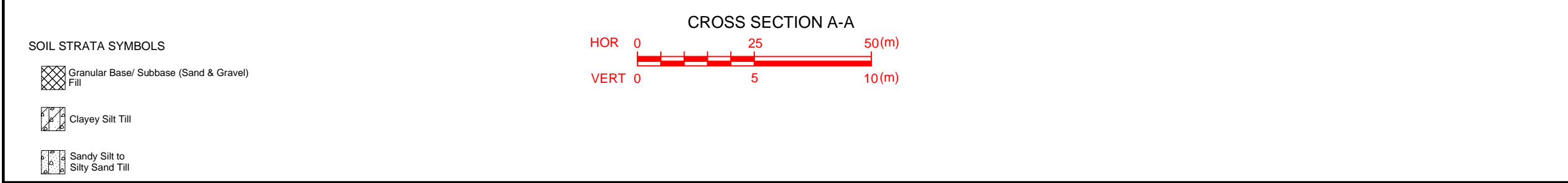
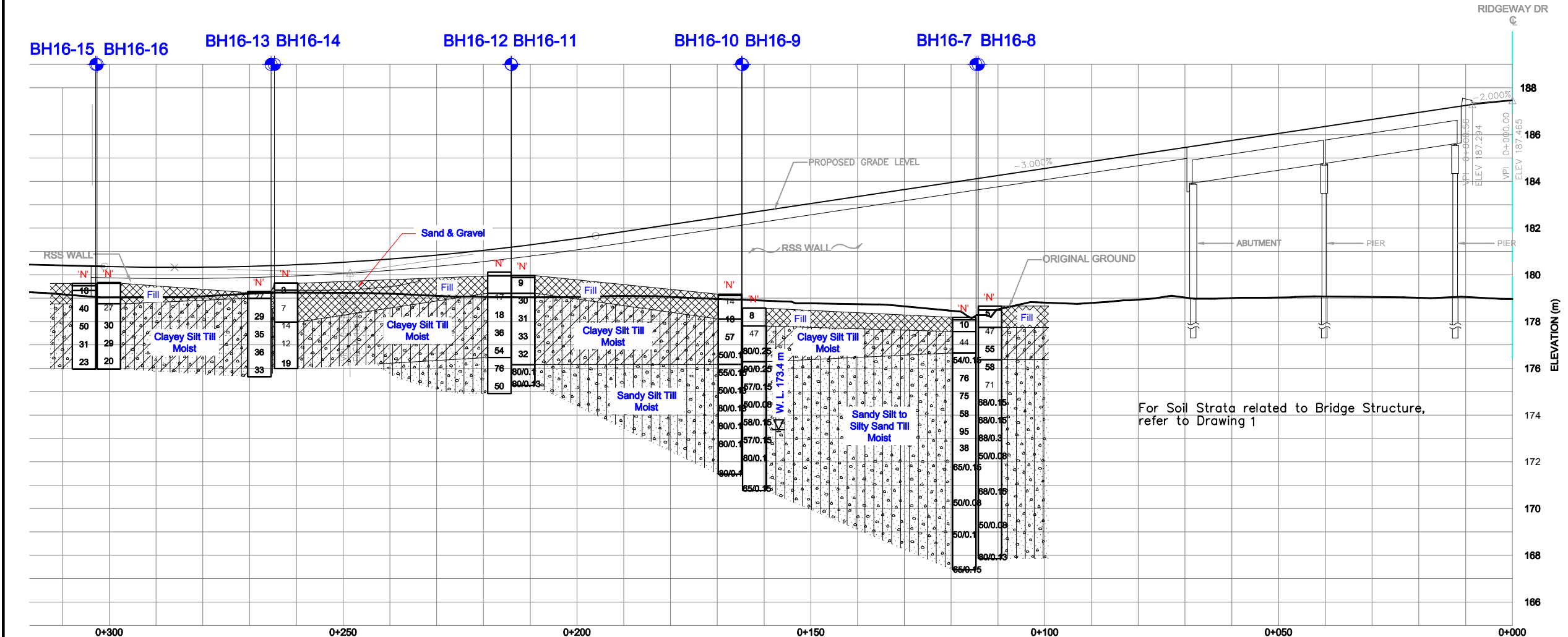
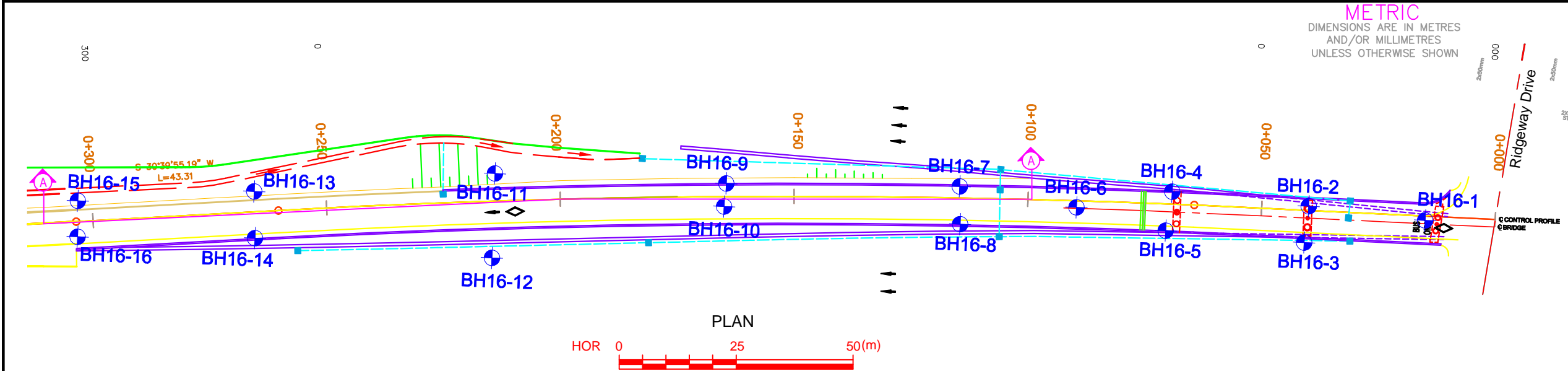
— NOTES —

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

Borehole Location plan and profile are based on drawing "S01—Ridgeway Drive to Hwy 403—407_TransitwayConnection_Bridge_GA_Preliminary" received on July 14, 2016.

For Detailed Subsurface Conditions Refer to Record of Borehole Sheets

REVISIONS				
	July 25/16	ZMO	Submission for MTO review	
	DATE	BY	DESCRIPTION	
GEOCRES No :				
HWY No				DIST
SUBM'D		CHECKED MP	DATE July 25/16	SITE
DRAWN ZMO		CHECKED MP	APPROVED VW	DWG 1



51 Constellation Court
Toronto, Ontario
M9W 1K4

KEY PLAN
NOT TO SCALE

LEGEND

- Borehole
- N Blows/0.3m unless otherwise stated (Std Pen Test, 475 J/blow)
- WL upon completion of drilling

BH No.	APPROX. ELEV. (m)	MTM NAD83 ZONE 10 CO-ORDINATES	
		NORTH (m)	EAST (m)
BH16-7	178.2	4821542.5	286978.5
BH16-8	178.7	4821538.0	286985.0
BH16-9	178.6	4821501.5	286950.0
BH16-10	179.2	4821498.5	286954.0
BH16-11	180.0	4821461.5	286921.0
BH16-12	180.1	4821451.0	286935.5
BH16-13	179.3	4821416.5	286895.5
BH16-14	179.7	4821411.0	286904.0
BH16-15	179.6	4821384.0	286876.0
BH16-16	179.7	4821380.0	286882.5

NOTES

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

Borehole Location plan and profile are based on drawing "1515015a1.dwg" received on July 15, 2016.

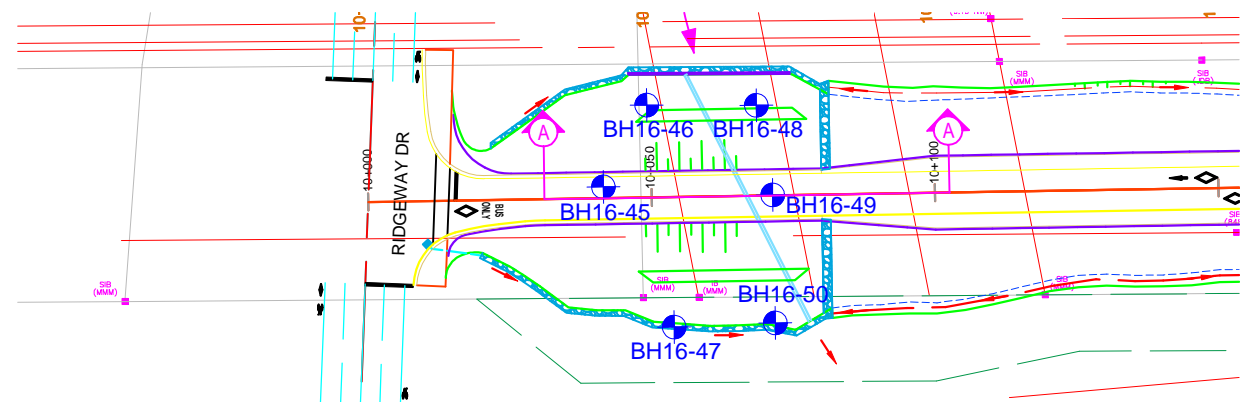
For Detailed Subsurface Conditions Refer to Record of Borehole Sheets

REVISIONS

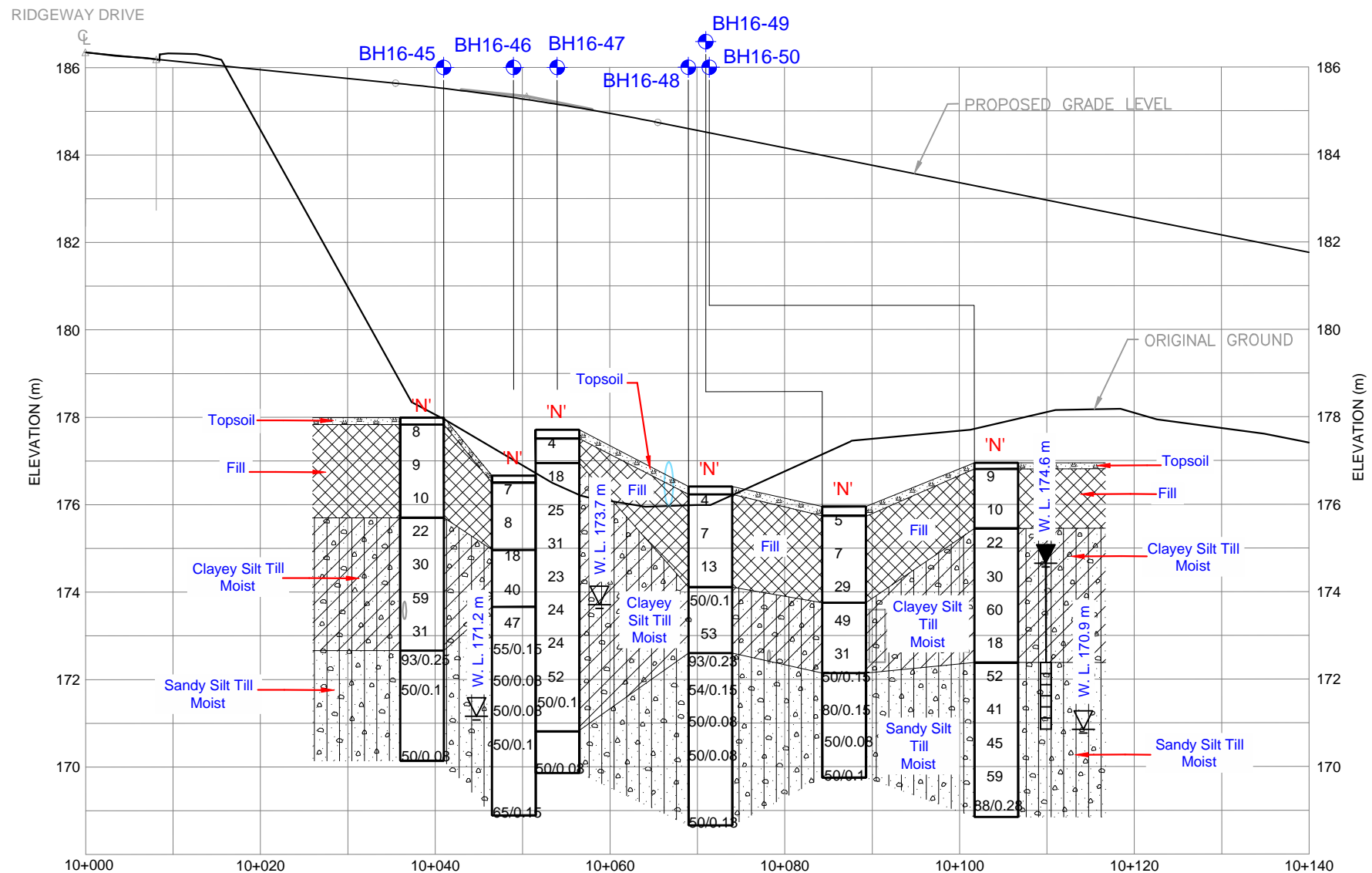
DATE	BY	DESCRIPTION
July 28/16	ZMO	Submission for MTO review

GEOCRESS No :

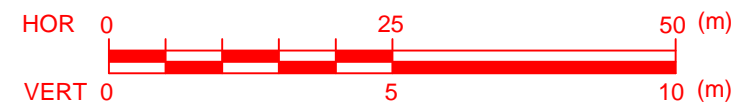
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	ZMO		July 28/16					2



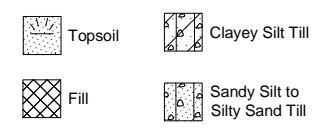
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CROSS SECTION A-A



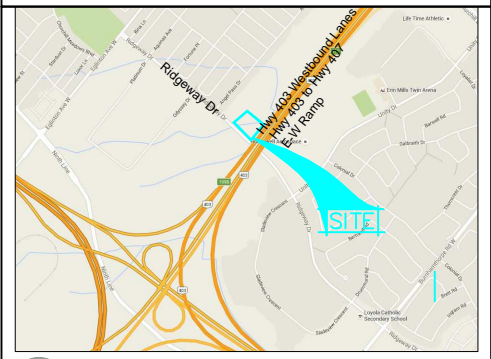
SOIL STRATA SYMBOLS



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

Mississauga Transitway –
Highway 407
Westbound Connection
Proposed High Embankment
BOREHOLE LOCATIONS & SOIL STRATA

WSP 51 Constellation Court
Toronto, Ontario
M9W 1K4



KEY PLAN
NOT TO SCALE

LEGEND

- Borehole
- N Blows/0.3m unless otherwise stated (Std Pen Test, 475 J/blow)
- W.L. in Piezometer (July 18, 2016)
- W.L. upon completion of drilling
- Piezometer

BH No.	APPROX. ELEV. (m)	MTM NAD83 ZONE 10 CO-ORDINATES	
		NORTH (m)	EAST (m)
BH16-45	178.0	4821725.0	287011.5
BH16-46	176.7	4821740.0	287006.0
BH16-47	177.7	4821718.0	287038.5
BH16-48	176.4	4821754.5	287018.5
BH16-49	176.0	4821747.0	287032.5
BH16-50	177.0	4821732.0	287050.0

NOTES

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

Borehole Location plan and profile are based on drawing "1515015a1.dwg" received on July 15, 2016.

For Detailed Subsurface Conditions Refer to Record of Borehole Sheets

REVISIONS		GEOCRES No :	
DATE	BY	DESCRIPTION	
July 25/16	ZMO	Submission for MTO review	
HWY No		DIST	
SUBM'D	CHECKED MP	DATE July 25/16	SITE
DRAWN ZMO	CHECKED MP	APPROVED VW	DWG 3

Appendix A: Record of Borehole Sheets

A.1 Bridge (Section 4.2.1) Borelogs

RECORD OF BOREHOLE No BH16-1





METRIC 1 OF 2

W.P.	<u>Mississauga Transitway</u>	LOCATION	<u>Sta. 0+015, E 287040, N 4821621</u>	ORIGINATED BY	<u>FJ</u>
DIST	<u>HWY 407 ETR and 403</u>	BOREHOLE TYPE	<u>Solid Stem Auger</u>	COMPILED BY	<u>MP</u>
DATUM	<u>Geodetic</u>	DATE	<u>Jun/10/2016 to Jun/10/2016</u>	CHECKED BY	<u>VW</u>

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GROUNDWATER ELEVATIONS

	1st	2nd	3rd	4th
Measurement				

+³, ×³: Numbers refer to Sensitivity ○ **8**=3% Strain at Failure

161-06464-00

RECORD OF BOREHOLE No BH16-1

METRIC 2 OF 2

W.P. Mississauga Transitway LOCATION Sta. 0+015, E 287040, N 4821621 ORIGINATED BY FJ
 DIST HWY 407 ETR and 403 BOREHOLE TYPE Solid Stem Auger COMPILED BY MP
 DATUM Geodetic DATE Jun/10/2016 to Jun/10/2016 CHECKED BY VW

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa										
						○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE					WATER CONTENT (%)							
						20 40 60 80 100					10 20 30							
	Continued																	
	SILTY CLAY TILL: trace sand, trace gravel, grey, moist, hard, (continued)																	
	reddish brown																	
169.2			12	SS	60/ 150mm													
10.8	SANDY SILT TILL: trace clay, contain rock fragments, reddish brown, moist, very dense.																	
	reddish brown																	
			13	SS	75/ 150mm													
166.1			14	SS	80/ 125mm													
13.9	END OF THE BOREHOLE Notes: 1) Borehole caved-in at 7.9m and water level was at 7.6m upon completion of drilling.																	

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

+ 3, × 3: Numbers refer to Sensitivity ○ 3% Strain at Failure

161-06464-00

RECORD OF BOREHOLE No BH16-2

METRIC 1 OF 2

W.P. Mississauga Transitway LOCATION Sta. 0+040, E 287023.5, N 4821602 ORIGINATED BY FJ
DIST HWY 407 ETR and 403 BOREHOLE TYPE Solid Stem Auger COMPILED BY MP
DATUM Geodetic DATE Jun/09/2016 to Jun/09/2016 CHECKED BY VW

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				POCKET PEN. (C _u) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS & GRAIN SIZE DISTRIBUTION (%)					
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa							PLASTIC LIMIT W _P	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L		
								○ UNCONFINED	+ FIELD VANE	● QUICK TRIAXIAL	× LAB VANE								
179.1	Ground Surface		1T	SS															
0.0	GRANULAR FILL: 710mm, sand and gravel, some silt, brown, moist, compact clayey with trace black soil below 0.08m		1B	SS	13														
178.4	FILL: sand and gravel, trace silt, brown, moist, loose.		2	SS	5														
177.8	FILL: silty clay to clayey silt, trace sand, trace gravel, occasional rootlets, brown to grey, moist, firm to stiff.		3	SS	5														
177.8			4	SS	7														
177.8			5	SS	8														
175.5	SILTY CLAY TILL: sandy, trace gravel, occasional oxidized, grey, moist, hard.		6	SS	44														
174.7	SAND AND SILT TO SILT: some sand, grey, moist, dense to very dense.		7	SS	37														
174.7			8	SS	50/ 100mm														
174.7			9	SS	73														
172.0	SANDY SILT TILL TO SILTY SAND TILL: trace clay, trace gravel, grey to reddish brown, moist, very dense.		10	SS	50/ 75mm														
172.0			11	SS	50/ 50mm														
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GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

+ 3, X 3: Numbers refer to Sensitivity

○ 3% Strain at Failure

161-06464-00

ON-MTO-2016-WITH WSP 10000161-06464-00 LOG.GPJ ONI.MOT.GDT 8/16/16

RECORD OF BOREHOLE No BH16-2

METRIC 2 OF 2

W.P. Mississauga Transitway LOCATION Sta. 0+040, E 287023.5, N 4821602 ORIGINATED BY FJ
 DIST HWY 407 ETR and 403 BOREHOLE TYPE Solid Stem Auger COMPILED BY MP
 DATUM Geodetic DATE Jun/09/2016 to Jun/09/2016 CHECKED BY VW

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa										
						20 40 60 80 100 ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE												
	Continued																	
	SANDY SILT TILL TO SILTY SAND TILL: trace clay, trace gravel, grey to reddish brown, moist, very dense. (continued)						169											
168.3	contain rock fragments from 10.6m																	
10.8	END OF THE BOREHOLE Notes: 1) Borehole caved-in at 4.9m and water level was at 4.0m upon completion of drilling.		12	SS	75/ 150mm													

ON-MTO-2016-WITH WSP 10000161-06464-00 LOG.GPJ ON_MOT.GDT 8/16/16

161-06464-00

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

+ 3, × 3: Numbers refer to Sensitivity ○ 6=3% Strain at Failure

RECORD OF BOREHOLE No BH16-3

METRIC 1 OF 2

W.P. Mississauga Transitway LOCATION Sta. 0+040, E 287029.5, N 4821597 ORIGINATED BY FJ
 DIST HWY 407 ETR and 403 BOREHOLE TYPE Solid Stem Auger COMPILED BY MP
 DATUM Geodetic DATE Jun/09/2016 to Jun/09/2016 CHECKED BY VW

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20 40 60 80 100	20 40 60 80 100	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L		
179.4	Ground Surface													
0.0	GRANULAR FILL: 700mm, sand and gravel, brown to light grey, moist, compact.		1T	SS	23		179							
178.7			1B	SS										
0.7	FILL: silty clay to clayey silt, trace to some sand, trace gravel, occasional rootlets, brown to grey, moist, stiff to hard.		2	SS	48		178							
1														
2			3	SS	15									
3														
4			4	SS	12		177							
5														
6			5	SS	15		176							
175.8														
3.7	CLAYEY SILT TILL: sandy, trace gravel, occasional oxidized, grey, moist, compact.		6	SS	27		175							
175.0														
4.4	SAND AND SILT TO SILT: with some sand, trace clay, trace gravel, grey, moist, very dense.		7	SS	66		174							
5														
6			8	SS	50/ 100mm									
7														
8			9	SS	70		173							
9														
10														
11														
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+ 3, X 3: Numbers refer to Sensitivity ○ 6=3% Strain at Failure

161-06464-00

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

ON-MTO-2016-WITH WSP 10000161-06464-00 LOG.GPJ ONI MOT.GDT 8/16/16

Continued Next Page

RECORD OF BOREHOLE No BH16-3

METRIC 2 OF 2

W.P. Mississauga Transitway LOCATION Sta. 0+040, E 287029.5, N 4821597 ORIGINATED BY FJ
 DIST HWY 407 ETR and 403 BOREHOLE TYPE Solid Stem Auger COMPILED BY MP
 DATUM Geodetic DATE Jun/09/2016 to Jun/09/2016 CHECKED BY VW

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa										
						20 40 60 80 100 ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE					20 40 60 80 100 WATER CONTENT (%)							
	Continued																	
	SANDY SILT TILL TO SILTY SAND TILL: trace clay, trace gravel, contain rock fragments, grey to reddish brown, moist, very dense. (continued)																	
168.6			12	SS	85/													
10.8	END OF THE BOREHOLE Notes: 1) Borehole caved-in at 5.0m and water level was at 4.3m upon completion of drilling.				150mm													

ON-MTO-2016-WITH WSP 10000161-06464-00 LOG.GPJ ON_MOT.GDT 8/16/16

161-06464-00

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

+ 3, × 3: Numbers refer to
Sensitivity

○ 3% Strain at Failure

RECORD OF BOREHOLE No BH16-4

METRIC 1 OF 2

W.P.	<u>Mississauga Transitway</u>	LOCATION	<u>Sta. 0+070, E 287004.5, N 4821580</u>	ORIGINATED BY	<u>FJ</u>
DIST	<u>HWY 407 ETR and 403</u>	BOREHOLE TYPE	<u>Solid Stem Auger</u>	COMPILED BY	<u>MP</u>
DATUM	<u>Geodetic</u>	DATE	<u>Jun/10/2016 to Jun/10/2016</u>	CHECKED BY	<u>VW</u>

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+ 3, × 3: Numbers refer to Sensitivity

○ **$\epsilon = 3\%$** Strain at Failure

161-06464-00



GROUNDWATER ELEVATIONS

	1st	2nd	3rd	4th
Measurement				

RECORD OF BOREHOLE No BH16-4

METRIC 2 OF 2





W.P. Mississauga Transitway LOCATION Sta. 0+070, E 287004.5, N 4821580 ORIGINATED BY FJ
 DIST HWY 407 ETR and 403 BOREHOLE TYPE Solid Stem Auger COMPILED BY MP
 DATUM Geodetic DATE Jun/10/2016 to Jun/10/2016 CHECKED BY VW

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	POCKET PEN. (C _u) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES									
	Continued SAND AND SILT TO SILT WITH SAND TILL : grey, moist, very dense. (continued)						169							
168.3			12	SS	78/									
10.8	END OF THE BOREHOLE Notes: 1) Caved-in at 4.0 m 2) Wet bottom was observed at caved-in depth				150mm									

ON-MTO-2016-WITH WSP 10000161-06464-00 LOG.GPJ ON_MOT.GDT 8/16/16

161-06464-00

GROUNDWATER ELEVATIONS

Measurement    

+ ³, × ³: Numbers refer to Sensitivity

○ ³=3% Strain at Failure

RECORD OF BOREHOLE No BH16-5

METRIC 1 OF 2

W.P. Mississauga Transitway LOCATION Sta. 0+070, E 287011, N 4821574 ORIGINATED BY FJ
 DIST HWY 407 ETR and 403 BOREHOLE TYPE Solid Stem Auger COMPILED BY MP
 DATUM Geodetic DATE Jun/09/2016 to Jun/09/2016 CHECKED BY VW

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			POCKET PEN (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa						
								○ UNCONFINED	+ FIELD VANE	● QUICK TRIAXIAL				× LAB VANE
179.2	Ground Surface		1	SS	7								GR SA SI CL	
0.0	GRANULAR FILL: 910mm sand and gravel, trace topsoil, moist, loose.												42 44 (14)	
178.3			2T	SS										
0.9	FILL: silty clay, trace sand, trace gravel, occasional oxidized, brown, moist, firm.		2B	SS	7								9 21 46 24	
1.2	SILTY CLAY TO CLAYEY SILT TILL: sandy, trace gravel, occasional oxidized, grey, moist, firm to very stiff.													
			3	SS	16								4 30 47 19	
			4	SS	22									
176.1														
3.1	SANDY SILT TILL TO SILTY SAND/SILT WITH SAND TILL : trace clay, trace gravel, grey, moist, compact to very dense		5	SS	27									
			6	SS	33									
	wet from 4.6m		7	SS	30									
	dilate from 5.3m to 7.0m		8	SS	25									
			9	SS	25									
	trace reddish brown pockets below 7.6m		10T	SS	17									
			10B											
	contain occasional rock fragments below 9.1m		11	SS	106/ 150mm								NP 5 14 71 10	

Continued Next Page

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

+ 3, X 3: Numbers refer to Sensitivity

○ 6=3% Strain at Failure

161-06464-00

ON-MTO-2016-WITH WSP 10000161-06464-00 LOG.GPJ ONI.MOT.GDT 8/16/16

RECORD OF BOREHOLE No BH16-5





METRIC 2 OF 2

W.P. Mississauga Transitway LOCATION Sta. 0+070, E 287011, N 4821574 ORIGINATED BY FJ
 DIST HWY 407 ETR and 403 BOREHOLE TYPE Solid Stem Auger COMPILED BY MP
 DATUM Geodetic DATE Jun/09/2016 to Jun/09/2016 CHECKED BY VW

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40	60	80	100						
	Continued																	
	SANDY SILT TILL TO SILTY SAND/SILT WITH SAND TILL : trace clay, trace gravel, grey, moist, compact to very dense (continued)		12	SS	100/ 150mm													
11																		
12																		
166.8	trace rock fragments below 12.2m		13	SS	85/ 150mm													
12.4	END OF THE BOREHOLE																	
	Notes: 1) Borehole caved-in at 5.0m and water level was at 4.6m upon completion of drilling. 2) 50 mm monitoring well installed upon completion of drilling. 3) Water Level Readings: Date Depth (m) Elevation (m) June 15, 2016 1.32 177.8 July 18, 2016 1.70 177.5																	

ON-MTO-2016-WITH WSP 10000161-06464-00 LOG.GPJ ON_MOT.GDT 8/16/16

GROUNDWATER ELEVATIONS

Measurement    

+ 3, X 3: Numbers refer to Sensitivity ○ 3% Strain at Failure

161-06464-00

RECORD OF BOREHOLE No BH16-6

METRIC 1 OF 1

W.P. Mississauga Transitway LOCATION Sta. 0+090, E 286996, N 4821561 ORIGINATED BY FJ
 DIST HWY 407 ETR and 403 BOREHOLE TYPE Solid Stem Auger COMPILED BY MP
 DATUM Geodetic DATE Jun/14/2016 to Jun/14/2016 CHECKED BY VW

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT W _P	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	POCKET PEN. (C _u) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									WATER CONTENT (%)
								○ UNCONFINED	+ FIELD VANE	● QUICK TRIAXIAL							
178.8	Ground Surface							20 40 60 80 100								GR SA SI CL	
178.8	TOPSOIL: 70mm.							20 40 60 80 100									
178.8	FILL: clayey silt, trace sand to sandy, trace rootlets, trace gravel, brown, moist, stiff.		1	SS	13												
177.7	CLAYEY SILT TILL: sandy, trace gravel, occasional oxidized, brown, moist, stiff to hard.		2	SS	14												
177.7	occasional reddish brown seams below 1.5m		3	SS	43											8 32 40 20	
176.6	SANDY SILT TILL: trace clay, trace gravel, grey, moist, very dense.		4	SS	107/ 250mm											NP	
176.6			5	SS	50/ 150mm											2 28 60 10	
175			6	SS	55/ 150mm												
174			7	SS	60/ 150mm												
173			8	SS	75/ 150mm												
172.5	END OF THE BOREHOLE		9	SS	56/ 150mm												
6.3	Notes: 1) Borehole caved-in at 5.6m and water level was at 4.1m upon completion of drilling.																

A.2 Retaining Wall (Section 4.2.2) Borelogs

RECORD OF BOREHOLE No BH16-7

METRIC 1 OF 2

W.P. Mississauga Transitway LOCATION Sta. 0+115, E 286978.5, N 4821542.5 ORIGINATED BY FJ
 DIST HWY 407 ETR and 403 BOREHOLE TYPE Solid Stem Auger COMPILED BY MP
 DATUM Geodetic DATE Jun/10/2016 to Jun/10/2016 CHECKED BY VW

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40	60	80	100			
178.2	Ground Surface														
178.0	TOPSOIL: 110mm														
0.1	FILL: clayey silt to silty clay, trace sand to sandy, trace gravel, trace topsoil, trace rootlets, occasional oxidized, brown, moist, loose		1	SS	10		178								
177.6	CLAYEY SILT TILL: sandy, trace gravel, occasional oxidized, brown, moist, hard.		2	SS	44		177								
176.7	SANDY SILT TO SILTY SAND TILL: trace gravel, trace clay, occasional oxidized, grey, moist to wet, dense to very dense.		3	SS	54/ 150mm		176								
1.5	occasional reddish brown seams below 3.0m		4	SS	76		175								
			5	SS	75		174								
			6	SS	58		173								
			7	SS	95		172								
			8T	SS	38		171								
			8B	SS			170								
			9	SS	65/ 150mm		169								
			10	SS	50/ 75mm										
			11	SS	50/ 100mm										

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GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

+ 3, × 3: Numbers refer to Sensitivity

○ 3% Strain at Failure



161-06464-00

ON-MTO-2016-WITH WSP 10000161-06464-00 LOG.GPJ ONI MOT.GDT 8/16/16

RECORD OF BOREHOLE No BH16-7

METRIC 2 OF 2





W.P. Mississauga Transitway LOCATION Sta. 0+115, E 286978.5, N 4821542.5 ORIGINATED BY FJ
 DIST HWY 407 ETR and 403 BOREHOLE TYPE Solid Stem Auger COMPILED BY MP
 DATUM Geodetic DATE Jun/10/2016 to Jun/10/2016 CHECKED BY VW

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	POCKET PEN. (C _u) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES									
	Continued													
	SANDY SILT TO SILTY SAND TILL: trace gravel, trace clay, occasional oxidized, grey, moist to wet, dense to very dense. <i>(continued)</i>						168							
167.4			12	SS	65/ 150mm									
10.8	END OF THE BOREHOLE Notes: 1) Caved-in at 4.3 m depth 2) Wet bottom was observed at caved-in depth.													

ON-MTO-2016-WITH WSP 10000161-06464-00 LOG.GPJ ON_MOT.GDT 8/16/16

161-06464-00

GROUNDWATER ELEVATIONS

Measurement    

+ ³, × ³: Numbers refer to Sensitivity

○ ⁶=3% Strain at Failure

RECORD OF BOREHOLE No BH16-8

METRIC 1 OF 2

W.P.	<u>Mississauga Transitway</u>	LOCATION	<u>Sta. 0+115, E 286985, N 4821538</u>	ORIGINATED BY	<u>FJ</u>
DIST	<u>HWY 407 ETR and 403</u>	BOREHOLE TYPE	<u>Solid Stem Auger</u>	COMPILED BY	<u>MP</u>
DATUM	<u>Geodetic</u>	DATE	<u>Jun/14/2016 to Jun/14/2016</u>	CHECKED BY	<u>VW</u>

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GROUNDWATER ELEVATIONS

	1st	2nd	3rd	4th
Measurement				

+³, ×³: Numbers refer to Sensitivity ○ **8**=3% Strain at Failure

161-06464-00

RECORD OF BOREHOLE No BH16-8

METRIC 2 OF 2

W.P. Mississauga Transitway LOCATION Sta. 0+115, E 286985, N 4821538 ORIGINATED BY FJ
 DIST HWY 407 ETR and 403 BOREHOLE TYPE Solid Stem Auger COMPILED BY MP
 DATUM Geodetic DATE Jun/14/2016 to Jun/14/2016 CHECKED BY VW

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	POCKET PEN. (C _u) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa										
						○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE					WATER CONTENT (%)							
						20 40 60 80 100					10 20 30							
	Continued																	
	SANDY SILT TILL: trace gravel, trace clay, grey, moist, very dense. (continued)																	
167.9			12	SS	80/													
10.8	END OF THE BOREHOLE Notes: 1) Borehole caved-in at 3.4m and dry upon completion of drilling.				25mm													

ON-MTO-2016-WITH WSP 10000161-06464-00 LOG.GPJ ON_MOT.GDT 8/16/16

161-06464-00

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

+ 3, × 3: Numbers refer to
Sensitivity

○ 3% Strain at Failure

RECORD OF BOREHOLE No BH16-9

METRIC 1 OF 1

W.P. Mississauga Transitway LOCATION Sta. 0+165, E 286950, N 4821501.5 ORIGINATED BY FJ
 DIST HWY 407 ETR and 403 BOREHOLE TYPE Solid Stem Auger COMPILED BY MP
 DATUM Geodetic DATE Jun/14/2016 to Jun/14/2016 CHECKED BY VW

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40	60	80	100			
178.6	Ground Surface														
0.0	FILL: sandy silt, trace gravel, trace clay, trace rootlets, brown, moist, loose.		1	SS	8		178								
177.8	CLAYEY SILT TILL: sandy, trace gravel, occasional oxidized, brown, moist, hard,		2	SS	47		177								
0.8			3	SS	80/ 250mm		176								4 29 42 25
176.3	SANDY SILT TILL: trace gravel, trace clay, grey, moist, very dense.		4	SS	90/ 250mm		175								
2.3			5	SS	57/ 150mm		174								
			6	SS	50/ 75mm		173								1 18 72 9
			7	SS	58/ 150mm		172								
			8	SS	57/ 150mm		171								
			9	SS	80/ 100mm										
			10	SS	65/ 150mm										
170.8	trace reddish brown rock fragments														
7.8	END OF THE BOREHOLE Notes: 1) Borehole caved-in at 7.2m and water level was at 5.2m upon completion of drilling.														

+ 3, × 3: Numbers refer to Sensitivity ○ 3% Strain at Failure

161-06464-00

GROUNDWATER ELEVATIONS
 Measurement 1st 2nd 3rd 4th

ON-MTO-2016-WITH WSP 10000161-06464-00 LOG.GPJ ONI MOT.GDT 8/16/16

RECORD OF BOREHOLE No BH16-10

METRIC 1 OF 1

W.P. Mississauga Transitway LOCATION Sta. 0+165, E 286954, N 4821498.5 ORIGINATED BY FJ
 DIST HWY 407 ETR and 403 BOREHOLE TYPE Solid Stem Auger COMPILED BY MP
 DATUM Geodetic DATE Jun/14/2016 to Jun/14/2016 CHECKED BY VW

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40	60	80	100			
179.2	Ground Surface														
178.9	TOPSOIL: 55mm FILL: sandy silt, clayey, trace gravel, trace rootlets, brown, moist, compact.		1	SS	14		179								
178.1	CLAYEY SILT TILL: sandy, trace gravel, occasional oxidized, brown to grey, moist, very stiff to hard.		2	SS	18		178								
177.2			3	SS	57		177								7 26 44 23
176.2	SANDY SILT TILL: trace to some clay, trace gravel, grey, moist, very dense.		4	SS	50/ 100mm		176								
			5	SS	55/ 150mm		175								
			6	SS	50/ 125mm		174								
			7	SS	80/ 125mm		173								
			8	SS	80/ 100mm		172								
			9	SS	80/ 100mm										
171.5	containing rock fragments		10	SS	80/ 100mm										
171.5	END OF THE BOREHOLE Notes: 1) Borehole caved-in at 2.9 m. 2) Wet bottom was observed at caved-in depth.														

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

+ 3, X 3: Numbers refer to Sensitivity ○ 3% Strain at Failure

161-06464-00

ON-MTO-2016-WITH WSP 10000161-06464-00 LOG.GPJ ONL MOT.GDT 8/16/16

RECORD OF BOREHOLE No BH16-11

METRIC 1 OF 1

W.P. Mississauga Transitway LOCATION Sta. 0+215, E 286921, N 4821461.5 ORIGINATED BY FJ
 DIST HWY 407 ETR and 403 BOREHOLE TYPE Solid Stem Auger COMPILED BY MP
 DATUM Geodetic DATE Jun/14/2016 to Jun/14/2016 CHECKED BY VW

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40	60	80	100			
180.0	Ground Surface														
179.0	TOPSOIL: 90mm														
0.1	FILL: sandy silt, trace gravel, trace rootlets, brown, moist, loose.		1	SS	9										
179.2	CLAYEY SILT TILL: trace sand to sandy, trace gravel, occasional oxidized, brown to grey, moist, hard.		2	SS	30		179								
0.8															
1			3	SS	31		178								
2			4	SS	33										
3			5	SS	32		177								
176.2	SANDY SILT TILL: trace gravel, occasional reddish brown fragments, grey, moist, very dense.		6	SS	80/ 100mm		176								
3.8															
175.3	END OF THE BOREHOLE		7	SS	80/ 25mm										
4.7	Notes: 1) Borehole caved-in at 4.3m and dry upon completion of drilling.														

RECORD OF BOREHOLE No BH16-12

METRIC 1 OF 1

W.P. Mississauga Transitway LOCATION Sta. 0+215, E 286935.5, N 4821451 ORIGINATED BY FJ
 DIST HWY 407 ETR and 403 BOREHOLE TYPE Solid Stem Auger COMPILED BY MP
 DATUM Geodetic DATE Jun/08/2016 to Jun/08/2016 CHECKED BY VW

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			POCKET PEN (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS & GRAIN SIZE DISTRIBUTION (%)						
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa											
								UNCONFINED + FIELD VANE											
								QUICK TRIAXIAL X LAB VANE											
180.1	Ground Surface					20	40	60	80	100	W _P	W	W _L	γ	GR	SA	SI	CL	
180.0	ASPHALT: 170 mm																		
0.2	GRANULAR FILL: sand and gravel, brown, moist.		1	AS															
179.2																			
1	0.9 CLAYEY SILT TILL: trace to sandy, trace gravel, occasional oxidized, brown, moist, very stiff to hard.		2	SS	17														
2			3	SS	18														
	trace reddish brown seams below 2.3m																		
			4	SS	36														
	grey																		
			5	SS	54														
176.5																			
3.7	SANDY SILT TILL: trace gravel, trace clay, grey, moist, very dense.		6	SS	76														
4																			
5			7	SS	50														
174.9																			
5.2	END OF BOREHOLE																		
	Notes: 1) Borehole caved-in at 4.1m and dry upon completion of drilling.																		

2 27 64 7

161-06464-00

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

+ 3, X 3: Numbers refer to Sensitivity

○ 3% Strain at Failure

RECORD OF BOREHOLE No BH16-13

METRIC 1 OF 1

W.P. Mississauga Transitway LOCATION Sta. 0+265, E 286895.5, N 4821416.5 ORIGINATED BY FJ
 DIST HWY 407 ETR and 403 BOREHOLE TYPE Solid Stem Auger COMPILED BY MP
 DATUM Geodetic DATE Jun/17/2016 to Jun/17/2016 CHECKED BY VW

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40	60	80	100			
179.3	Ground Surface														
179.2	TOPSOIL: 50 mm														
179.0	FILL: clayey silt, sandy, trace gravel, trace rootlets, brown, moist, very stiff.		1T	SS	27		179								
0.3	CLAYEY SILT TILL: sandy, trace gravel, brown to grayish brown, moist, very stiff to hard.		1B	SS											
	occasional oxidized below 0.9m														
1			2	SS	29		178								
2			3	SS	35		177								
3			4	SS	36		176								
5			5	SS	33										
175.6	END OF BOREHOLE														
3.7	Notes: 1) Borehole caved-in at 2.6m and dry upon completion of drilling.														

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

+ 3, X 3: Numbers refer to Sensitivity

○ 3% Strain at Failure

161-06464-00

ON-MTO-2016-WITH WSP 10000161-06464-00 LOG.GPJ ON_MOT.GDT 8/16/16





RECORD OF BOREHOLE No BH16-14

METRIC 1 OF 1

W.P. Mississauga Transitway LOCATION Sta. 0+265, E 286904, N 4821411 ORIGINATED BY FJ
 DIST HWY 407 ETR and 403 BOREHOLE TYPE Solid Stem Auger COMPILED BY MP
 DATUM Geodetic DATE Jun/17/2016 to Jun/17/2016 CHECKED BY VW

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40	60	80	100			
179.7	Ground Surface														
0.0	GRANULAR FILL: 310mm sand and gravel														
179.3															
0.3	FILL: silty clay, trace sand to sandy, trace gravel, brown, moist, soft to firm.		1	SS	3		179								43 35 (22)
			2	SS	7										
178.0							178								
1.7	CLAYEY SILT TILL: trace sand to sandy, trace gravel, brown to grey, moist, stiff to very stiff.		3	SS	14										
			4	SS	12		177								
			5T	SS											
	grey below 3.4m		5B	SS	19		176								
176.0	END OF BOREHOLE Notes: 1) Borehole caved-in at 2.6m and dry upon completion of drilling.														
3.7															

GROUNDWATER ELEVATIONS

Measurement    

+ ³, × ³: Numbers refer to Sensitivity ○ ³=3% Strain at Failure

161-06464-00

ON-MTO-2016-WITH WSP 10000161-06464-00 LOG.GPJ ON_MOT.GDT 8/16/16

RECORD OF BOREHOLE No BH16-15

METRIC 1 OF 1

W.P. Mississauga Transitway LOCATION Sta. 0+305, E 286876, N 4821384 ORIGINATED BY FJ
 DIST HWY 407 ETR and 403 BOREHOLE TYPE Solid Stem Auger COMPILED BY MP
 DATUM Geodetic DATE Jun/17/2016 to Jun/17/2016 CHECKED BY VW

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	POCKET PEN (C _u) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa										WATER CONTENT (%)		
								○ UNCONFINED	+ FIELD VANE	● QUICK TRIAXIAL	× LAB VANE							W _p	W	W _L
179.6	Ground Surface																			
179.6	TOPSOIL: 100 mm																			
179.3	FILL: clayey silt, sandy, trace gravel, trace rootlets, brown, moist, very stiff.		1	SS	18															
0.3	CLAYEY SILT TILL: sandy, trace gravel, occasional oxidized, brown to grey, moist, very stiff to hard.																			
			2	SS	40															
			3	SS	50															
			4	SS	31															
	grey below 2.6m																			
	trace rock fragments below 3.0m		5	SS	23															
175.9	END OF BOREHOLE																			
3.7	Notes: 1) Borehole caved-in at 2.4m and dry upon completion of drilling.																			

RECORD OF BOREHOLE No BH16-16

METRIC 1 OF 1

W.P. Mississauga Transitway LOCATION Sta. 0+305, E 286882.5, N 4821380 ORIGINATED BY FJ
 DIST HWY 407 ETR and 403 BOREHOLE TYPE Solid Stem Auger COMPILED BY MP
 DATUM Geodetic DATE Jun/08/2016 to Jun/08/2016 CHECKED BY VW

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _P	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	POCKET PEN. (C _u) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa							
								○ UNCONFINED	+ FIELD VANE	● QUICK TRIAXIAL	× LAB VANE				
179.7	Ground Surface														GR SA SI CL
178.8	GRANULAR FILL: 30 mm FILL: clayey silt, sandy, trace gravel, brown, moist, very stiff.		1	AS											
178.8	CLAYEY SILT TILL: trace to sandy, trace gravel, occasional oxidized, brown to grayish brown, moist, very stiff.		2	SS	27										
178.8															
178.8			3	SS	30										
178.8															
178.8			4	SS	29										
178.8			5	SS	20										6 31 44 19
176.0	END OF BOREHOLE														
3.7	Notes: 1) Borehole was open and dry upon completion.														

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

+ 3, X 3: Numbers refer to Sensitivity ○ 3% Strain at Failure





161-06464-00

A.3 High Embankment (Section 4.2.3) Borelogs

RECORD OF BOREHOLE No BH16-45

METRIC 1 OF 1

W.P. Mississauga Transitway LOCATION Sta. 10+040, E 287011.5, N 4821725 ORIGINATED BY FJ
 DIST HWY 407 ETR and 403 BOREHOLE TYPE Solid Stem Auger COMPILED BY MP
 DATUM Geodetic DATE Jun/02/2016 to Jun/02/2016 CHECKED BY VW

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT				POCKET PEN. (C _u) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa							
								20 40 60 80 100							
								20 40 60 80 100							
178.0	Ground Surface														
179.8	TOPSOIL: 160mm														
0.2	FILL: clayey silt, sandy, trace gravel, trace topsoil /rootlets, brown to dark brown, moist, stiff.		1	SS	8										
			2	SS	9										
			3	SS	10										
175.7	CLAYEY SILT TILL: sandy, trace gravel, occasional oxidized, brown, moist, very stiff to hard,		4	SS	22										
2.3															
			5	SS	30										
			6	SS	59										
	grey below 4.6m		7	SS	31										
172.7	SANDY SILT TILL: trace to some clay, trace gravel, grey, moist, very dense.		8	SS	93/ 250mm										
5.3															
			9	SS	50/ 100mm										

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

+ 3, X 3: Numbers refer to Sensitivity ○ 3% Strain at Failure

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ON-MTO-2016-WITH WSP 10000161-06464-00 LOG.GPJ ONI MOT.GDT 8/16/16

RECORD OF BOREHOLE No BH16-46

METRIC 1 OF 1

W.P. Mississauga Transitway LOCATION Sta. 10+050, E 287006, N 4821740 ORIGINATED BY FJ
 DIST HWY 407 ETR and 403 BOREHOLE TYPE Solid Stem Auger COMPILED BY MP
 DATUM Geodetic DATE Jun/01/2016 to Jun/02/2016 CHECKED BY VW

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	POCKET PEN. (C _u) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									WATER CONTENT (%)		
								○ UNCONFINED	+ FIELD VANE	● QUICK TRIAXIAL							× LAB VANE		
176.7	Ground Surface															GR SA SI CL			
178.9	TOPSOIL: 160mm																		
0.2	FILL: silty clay, some sand to sandy, trace gravel, trace topsoil /rootlets, brown to dark brown, moist, firm.		1	SS	7														
			2	SS	8														
175.0	CLAYEY SILT TILL: some sand to sandy, trace gravel, occasional oxidized, brown to grey, moist, very stiff to hard.		3	SS	18														
1.7																			
			4	SS	40														
173.7	SANDY SILT TILL: trace to some clay, trace gravel, grey, moist, dense to dense to very dense.		5	SS	47														
3.0																			
			6	SS	55/ 150mm														
			7	SS	50/ 75mm														
	trace clay below 5.3m		8	SS	50/ 75mm														
			9	SS	50/ 100mm														

+ 3, X 3: Numbers refer to Sensitivity ○ 3% Strain at Failure

161-06464-00

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

ON-MTO-2016-WITH WSP 10000161-06464-00 LOG.GPJ ON MDT.GDT 8/16/16

RECORD OF BOREHOLE No BH16-47

METRIC 1 OF 1

W.P. Mississauga Transitway LOCATION Sta. 10+050, E 287038.5, N 4821718 ORIGINATED BY FJ
 DIST HWY 407 ETR and 403 BOREHOLE TYPE Solid Stem Auger COMPILED BY MP
 DATUM Geodetic DATE Jun/02/2016 to Jun/02/2016 CHECKED BY VW

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT W _P	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	POCKET PEN (C _u) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									WATER CONTENT (%)
								○ UNCONFINED	+ FIELD VANE	×							
								● QUICK TRIAXIAL	×	LAB VANE							
177.7	Ground Surface															GR SA SI CL	
0.0 177.5	TOPSOIL: 200mm																
0.2	FILL: clayey silt, sandy, trace gravel, trace topsoil /rootlets, brown, moist, firm.		1	SS	4												
177.0							177										
0.8	CLAYEY SILT TILL: some sand to sandy, trace gravel, occasional oxidized, brown, moist, very stiff to hard.		2	SS	18												
1																	
			3	SS	25		176										
2																	
	sandy		4	SS	31		175										
3																	
			5	SS	23												
4	grey below 3.8m		6	SS	24		174										
			7	SS	24		173										
5																	
	Silty sand with some gravel		8	SS	52		172										
6																	
			9	SS	50/ 100mm											15 30 42 13	
170.8							171										
6.9	SANDY SILT TILL: trace clay, trace gravel, grey, moist, very dense.																
169.9																	
7.9	END OF THE BOREHOLE		10	SS	50/ 75mm		170										
	Notes: 1) Borehole was open to 6.1m and water level was at depth of 4.0m upon completion.																

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

+ 3, X 3: Numbers refer to Sensitivity ○ 3% Strain at Failure

161-06464-00

ON-MTO-2016-WITH WSP 10000161-06464-00 LOG.GPJ ON MOT.GDT 8/16/16

RECORD OF BOREHOLE No BH16-48

METRIC 1 OF 1

W.P. Mississauga Transitway LOCATION Sta. 10+070, E 287018.5, N 4821754.5 ORIGINATED BY FJ
 DIST HWY 407 ETR and 403 BOREHOLE TYPE Solid Stem Auger COMPILED BY MP
 DATUM Geodetic DATE Jun/01/2016 to Jun/01/2016 CHECKED BY VW

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	POCKET PEN (C _u) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS & GRAIN SIZE DISTRIBUTION (%)					
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									WATER CONTENT (%)				
								○ UNCONFINED + FIELD VANE									W _p W W _L				
								● QUICK TRIAXIAL × LAB VANE													
176.4	Ground Surface						20	40	60	80	100										
0.0	TOPSOIL: 180 mm						20	40	60	80	100										
176.2	FILL: clayey silt, trace sand, trace gravel, brown, moist, firm to stiff		1	SS	4																
0.2																					
1			2	SS	7																
2			3	SS	13																
174.1	CLAYEY SILT TILL: sandy, trace gravel, brown, moist, hard.		4	SS	50/ 100mm																
2.3			5	SS	53																
172.6	SANDY SILT TO SILTY SAND TILL: trace to some clay, trace gravel, grey, moist, very dense.		6	SS	93/ 225mm																
3.8			7	SS	54/ 150mm																
4			8	SS	50/ 75mm																
5			9	SS	50/ 75mm																
6																					
7																					
168.6	END OF BOREHOLE		10	SS	50/ 125mm																
7.8	Notes: 1) Borehole was dry upon completion of drilling.																				

wet spoon
8 35 42 15

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

+ 3, × 3: Numbers refer to Sensitivity ○ 3% Strain at Failure

161-06464-00

ON-MTO-2016-WITH WSP 10000161-06464-00 LOG.GPJ ONI.MOT.GDT 8/16/16

RECORD OF BOREHOLE No BH16-49

METRIC 1 OF 1

W.P. Mississauga Transitway LOCATION Sta. 10+070, E 287032.5, N 4821747 ORIGINATED BY FJ
 DIST HWY 407 ETR and 403 BOREHOLE TYPE Solid Stem Auger COMPILED BY MP
 DATUM Geodetic DATE Jun/01/2016 to Jun/01/2016 CHECKED BY VW

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT W _P	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	POCKET PEN. (C _u) (kPa)	NATURAL UNIT WT (kN/m ³)	REMARKS & GRAIN SIZE DISTRIBUTION (%)		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									WATER CONTENT (%)	
								○ UNCONFINED	+ FIELD VANE	● QUICK TRIAXIAL								× LAB VANE
176.0	Ground Surface					20	40	60	80	100						GR SA SI CL		
0.0 175.7	TOPSOIL: 210 mm																	
0.2	FILL: silty clay, trace sand, trace gravel, trace rootlets, grayish brown, moist, firm to very stiff.		1	SS	5													
			2	SS	7													
			3	SS	29													
173.8																		
2.2	CLAYEY SILT TILL: sandy, trace gravel, brownish grey to grayish brown, moist, hard.		4	SS	49													
			5	SS	31													
172.1																		
3.8	SANDY SILT TILL: trace gravel, trace clay, contains rock fragment, grey, moist, very dense.		6	SS	50/ 150mm													
			7	SS	80/ 150mm													
			7A	AS														
			8	SS	50/ 75mm													
			8A	AS														
169.8			9	SS	50/ 100mm													
6.2	END OF BOREHOLE Notes: 1) Borehole was open and dry upon completion of drilling.															auger refusal		

GROUNDWATER ELEVATIONS

Measurement 1st 2nd 3rd 4th

+ 3, X 3: Numbers refer to Sensitivity ○ 3% Strain at Failure

161-06464-00

ON-MTO-2016-WITH WSP 10000161-06464-00 LOG.GPJ ON_MOT.GDT 8/16/16

RECORD OF BOREHOLE No BH16-50

METRIC 1 OF 1

W.P. Mississauga Transitway LOCATION Sta. 10+070, E 287050, N 4821732 ORIGINATED BY FJ
 DIST HWY 407 ETR and 403 BOREHOLE TYPE Solid Stem Auger COMPILED BY MP
 DATUM Geodetic DATE Jun/01/2016 to Jun/01/2016 CHECKED BY VW

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		POCKET PEN. (Cu) (kPa)	NATURAL UNIT WT (kN/m³)	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa				
177.0	Ground Surface							20 40 60 80 100	W _P	W	W _L	
176.8	TOPSOIL: 140 mm							20 40 60 80 100	WATER CONTENT (%)			
0.1	FILL: clayey silt, sandy, trace gravel, trace topsoil/rootlets, brown, moist, stiff.		1	SS	9		Cement					
1			2	SS	10		176					
175.5												
1.5	CLAYEY SILT TILL: sandy, trace gravel, occasional oxidized, brown, moist, very stiff to hard.		3	SS	22		175					
2							Bentonite W. L. 174.8 m Jun 15, 2016 ⁿ Jul 18, 2016					
3			4	SS	30		174					4 28 48 20
	greyish brown below 3.1m											
4			5	SS	60		173					
	grey below 3.81m		6	SS	18							
172.4							Sand					
4.6	SANDY SILT TILL: trace gravel, trace to some clay, trace cobbles, grey, moist, dense to very dense.		7	SS	52		172					
5												
6			8	SS	41		171					
							Screen W. L. 170.9 m Jun 01, 2016					
7			9	SS	45		170					6 35 50 9
			10	SS	59							
8												
	moist to wet below 7.6m		11	SS	88/ 275mm		Caved					
168.9							169					
8.1	END OF BOREHOLE											
Notes: 1) Water level was at 6.1m upon completion of drilling. 2) 50 mm monitoring well installed upon completion of drilling. Date Depth (m) Elevation (m) June 15, 2016 2.2 174.7 July 18, 2016 2.3 174.7												

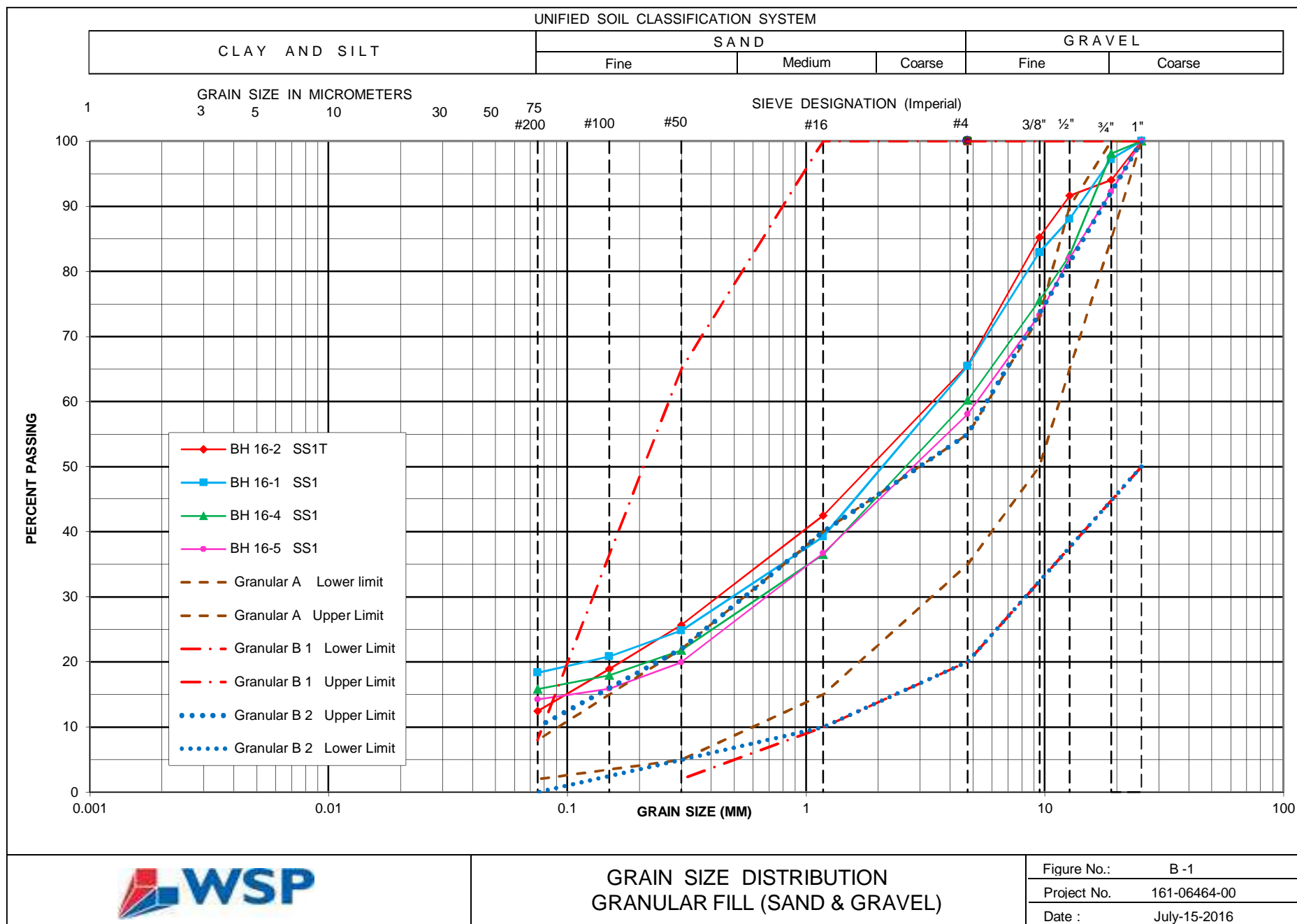
GROUNDWATER ELEVATIONS
 Measurement 1st 2nd 3rd 4th

+ 3, X 3: Numbers refer to Sensitivity ○ 6=3% Strain at Failure

161-06464-00

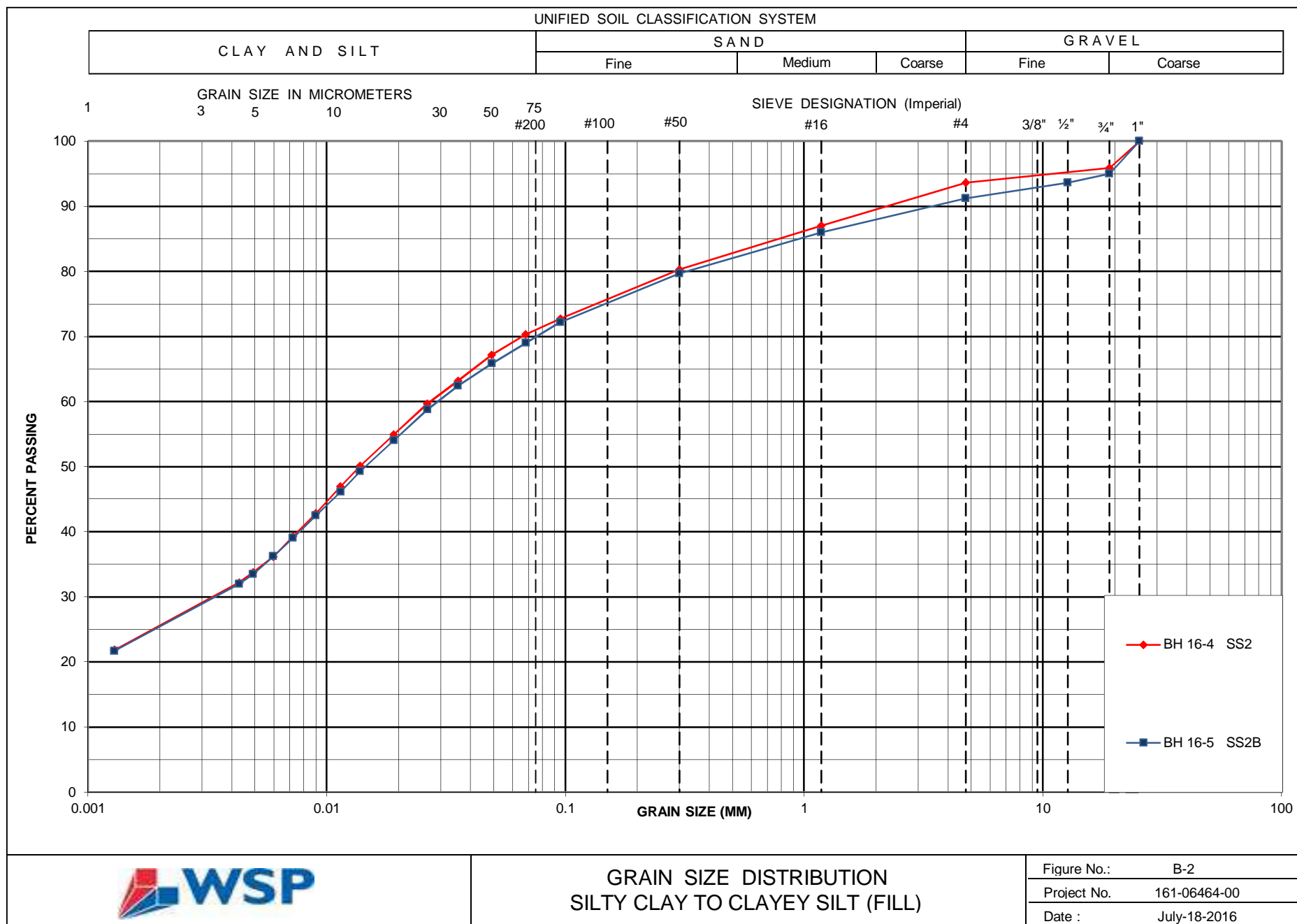
ON-MTO-2016-WITH WSP 10000161-06464-00 LOG.GPJ ON MDT.GDT 8/16/16

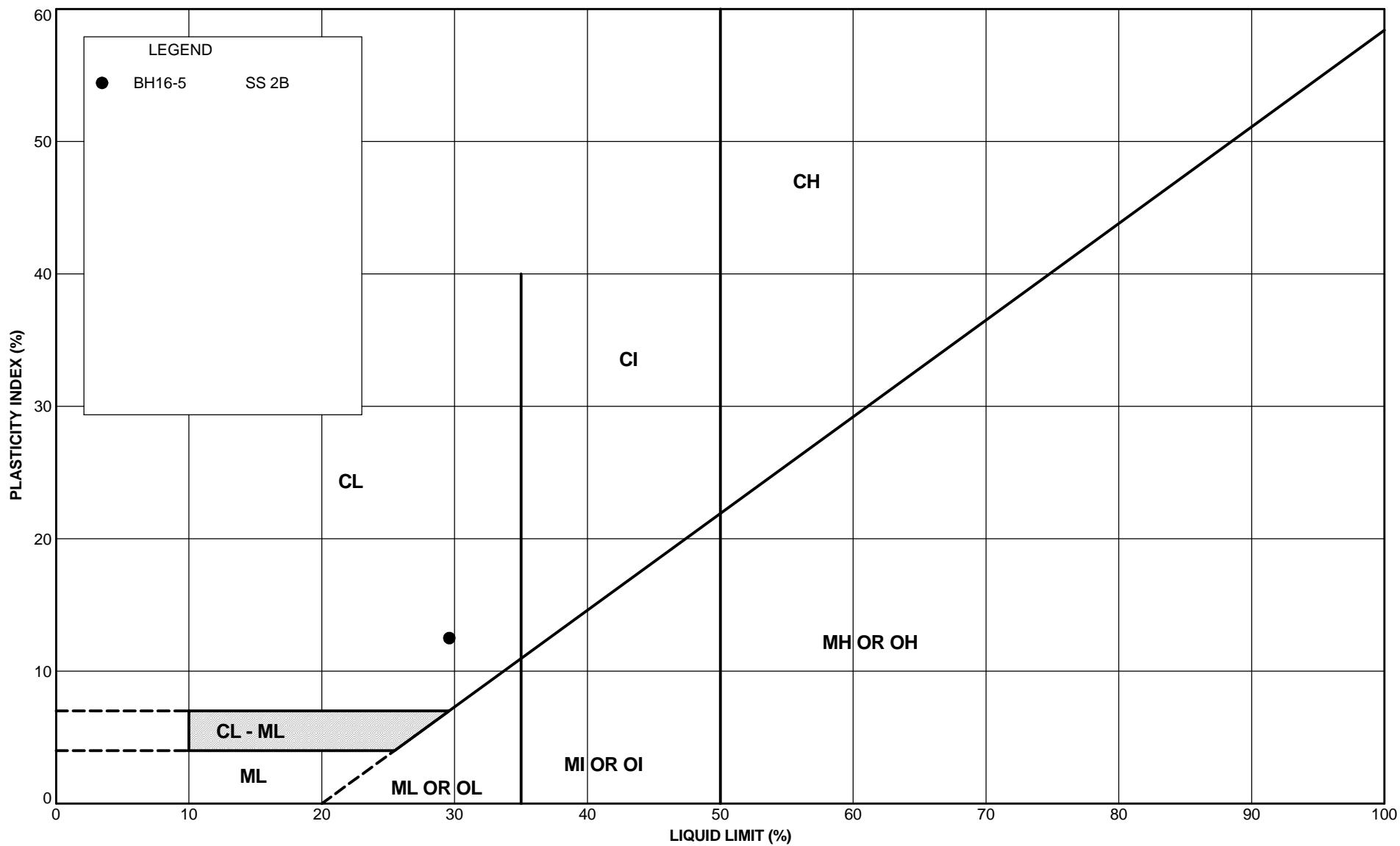
Appendix B: Laboratory Test Results



GRAIN SIZE DISTRIBUTION
GRANULAR FILL (SAND & GRAVEL)

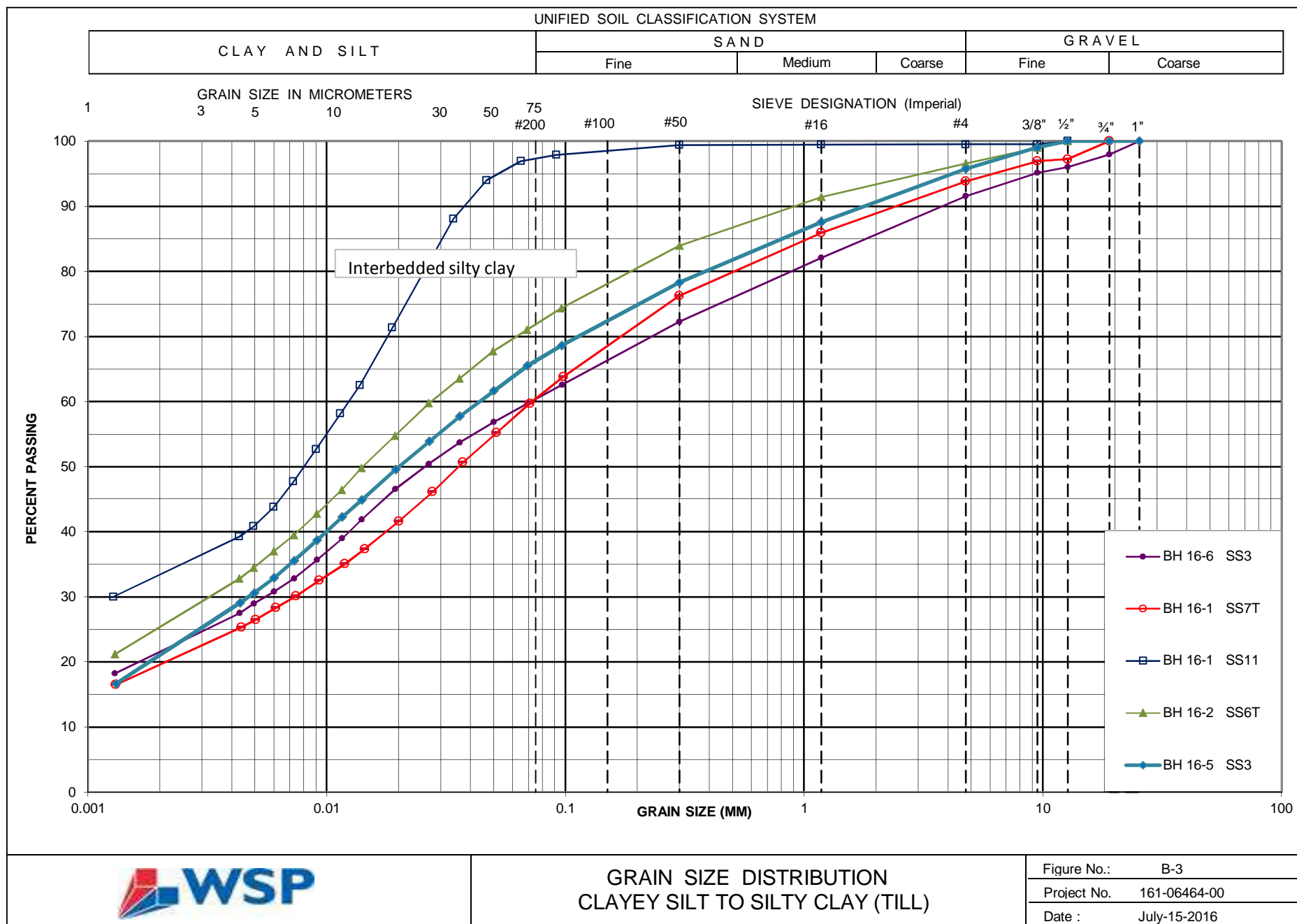
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Project No.	161-06464-00
Date :	July-15-2016

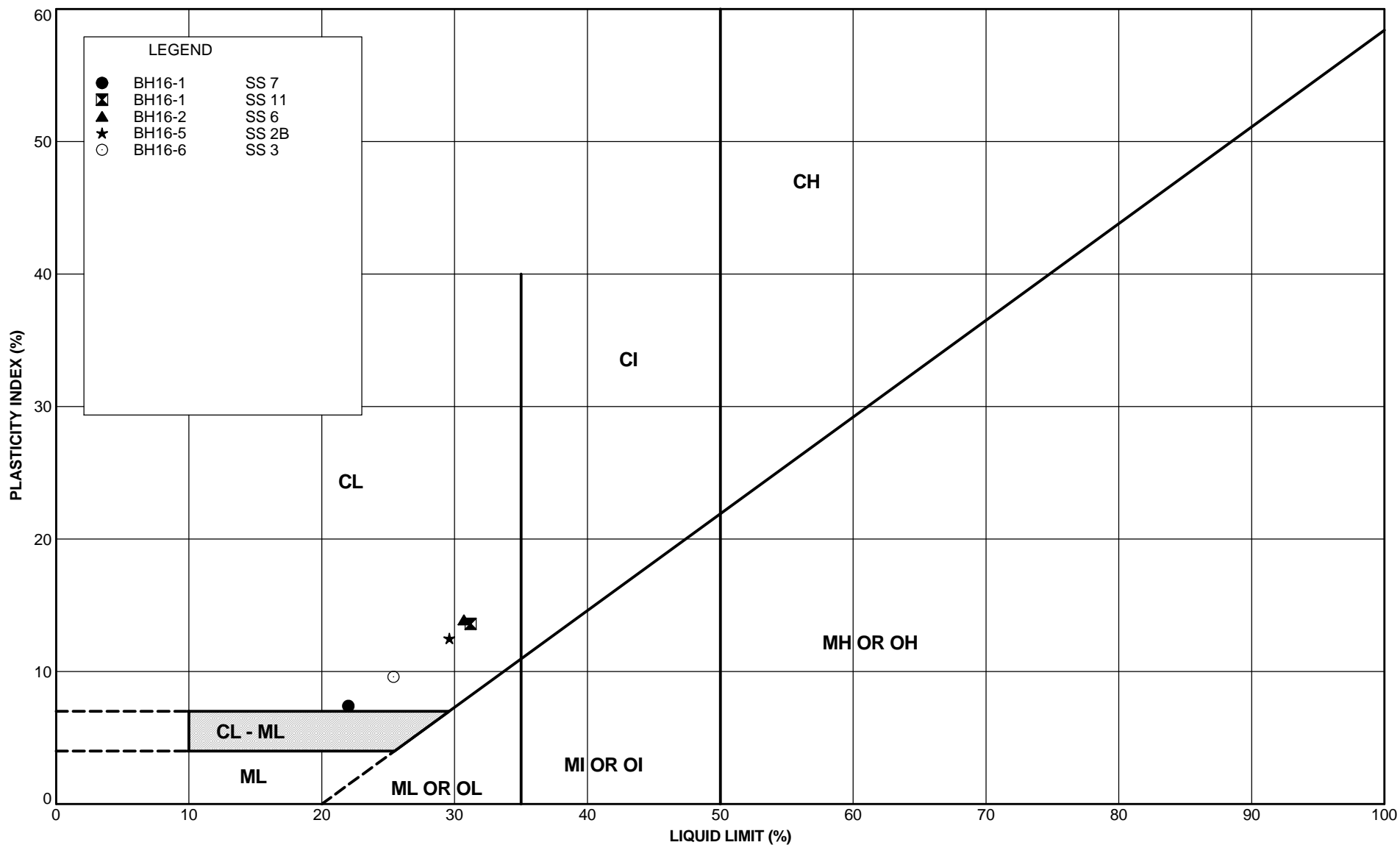




PLASTICITY CHART
SILTY CLAY TO CLAYEY SILT (FILL)

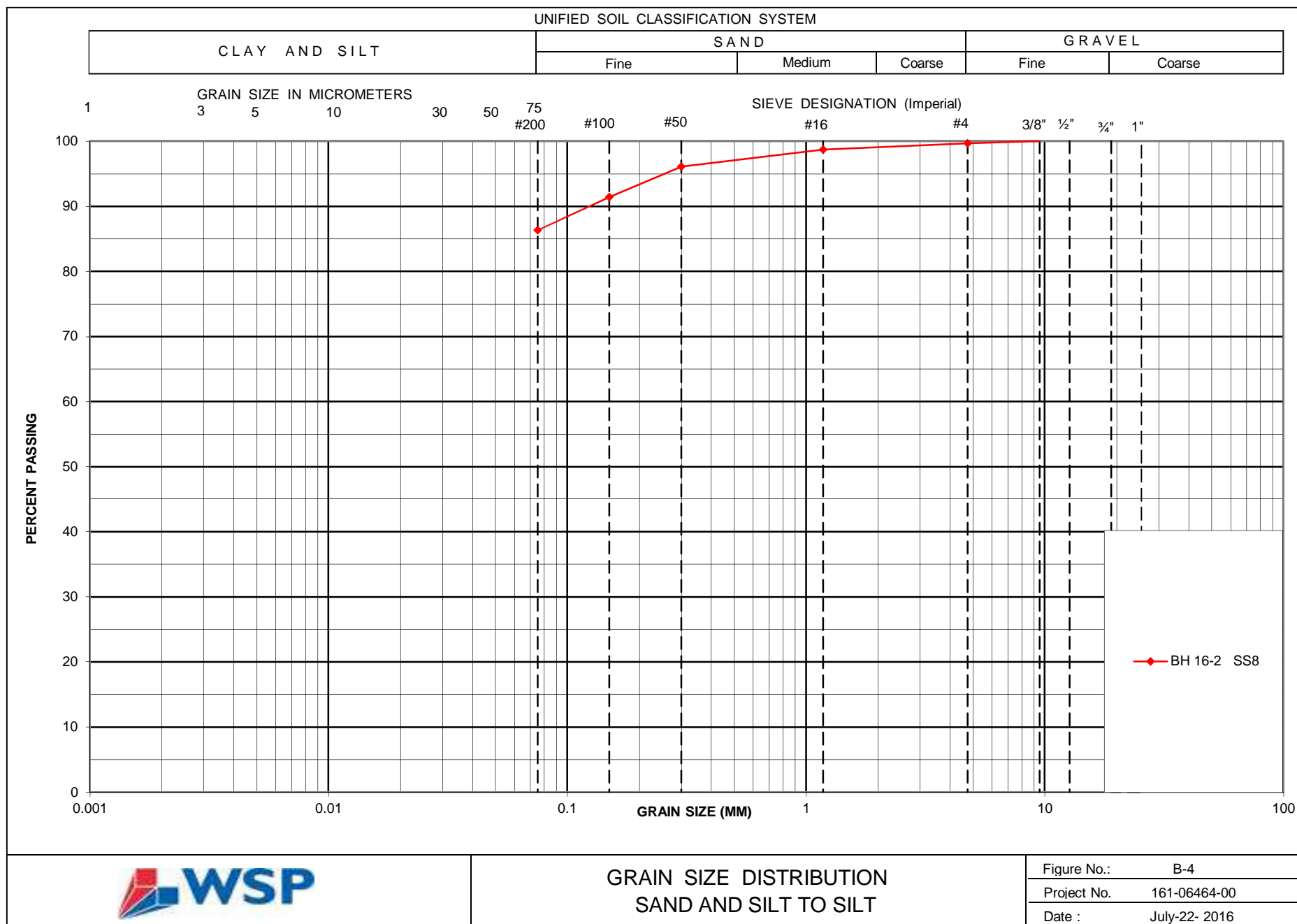
FIGURE NO.	B-2a
JOB NO.	161-06464-00
DATE	July 27, 2016

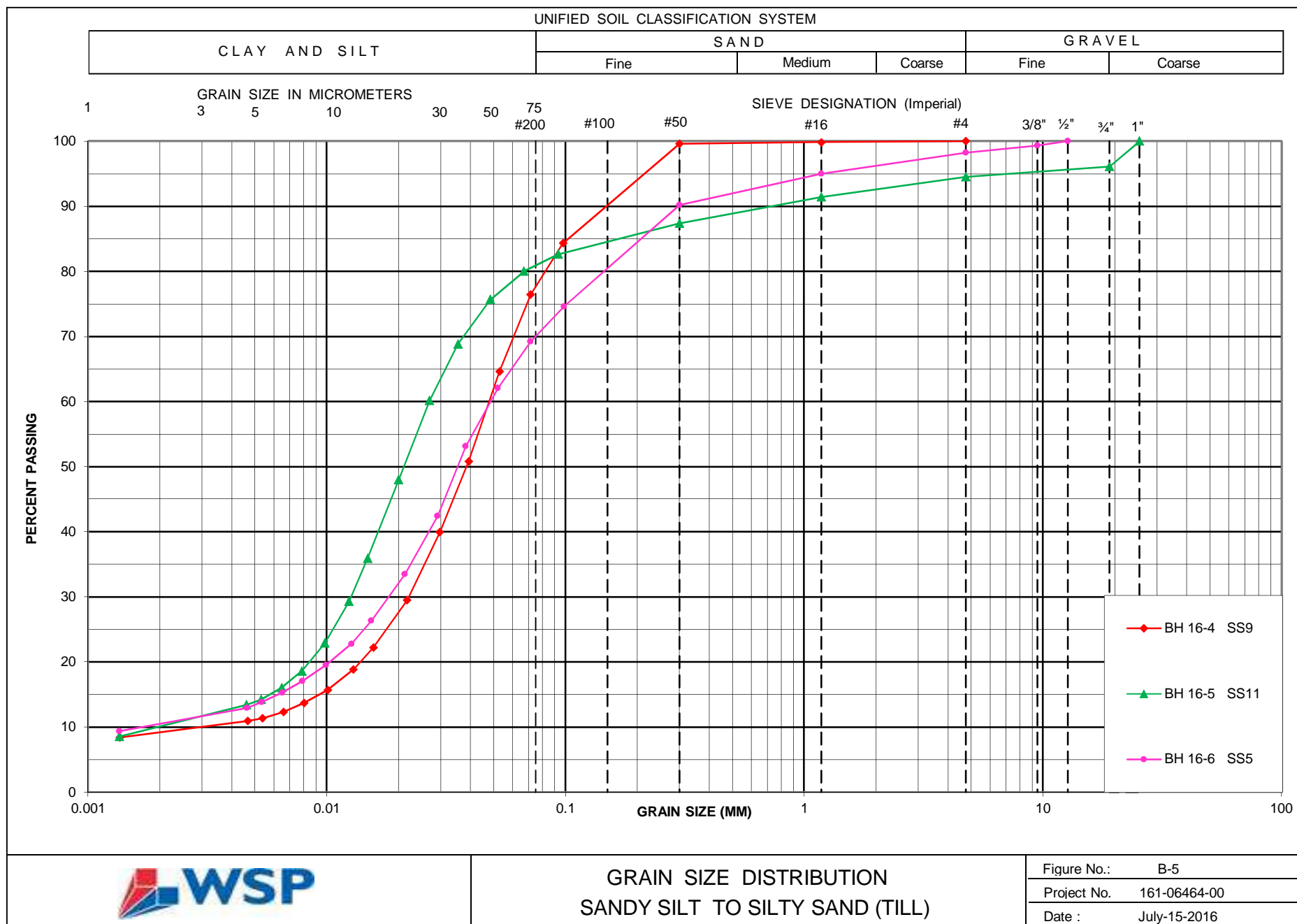


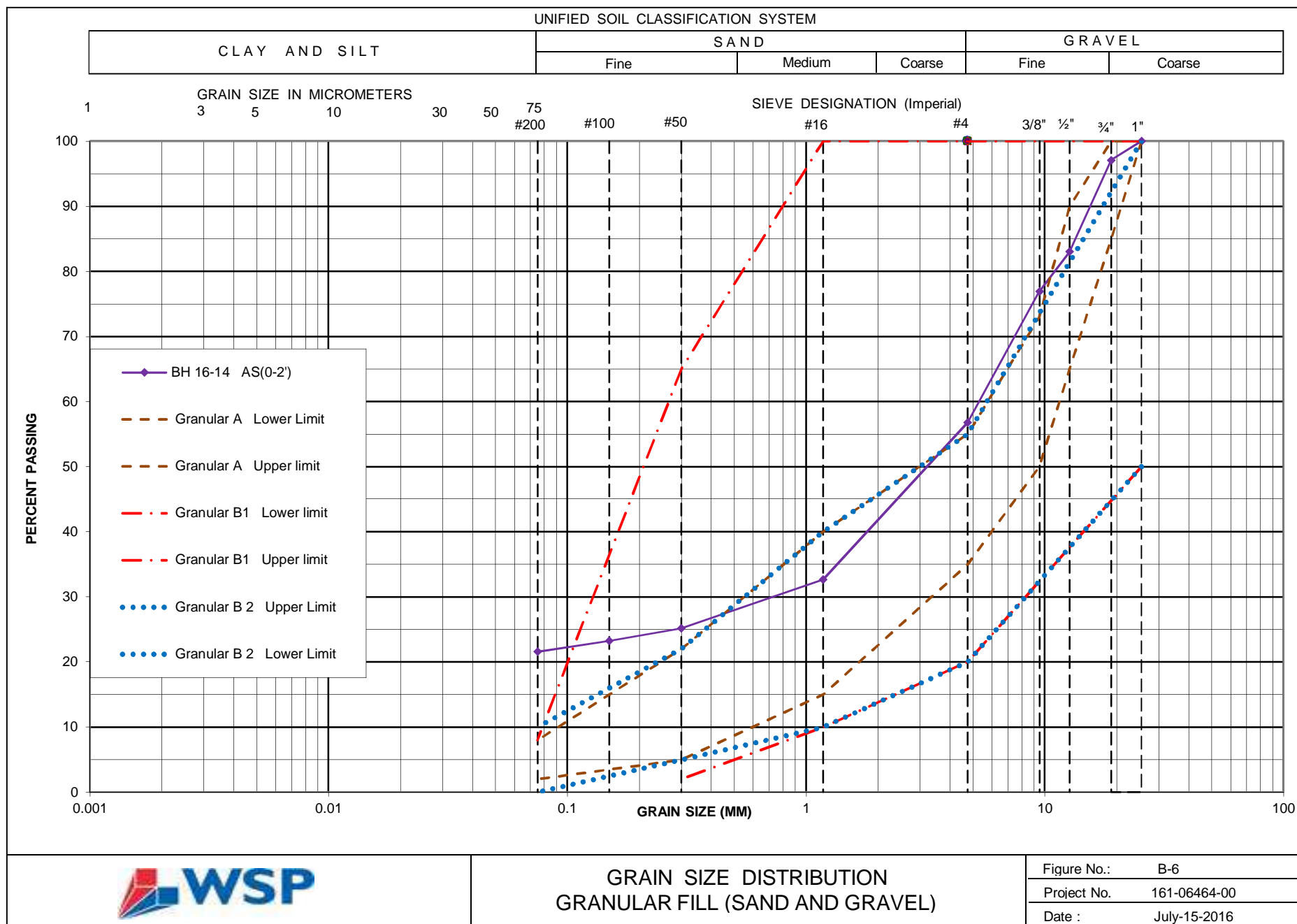


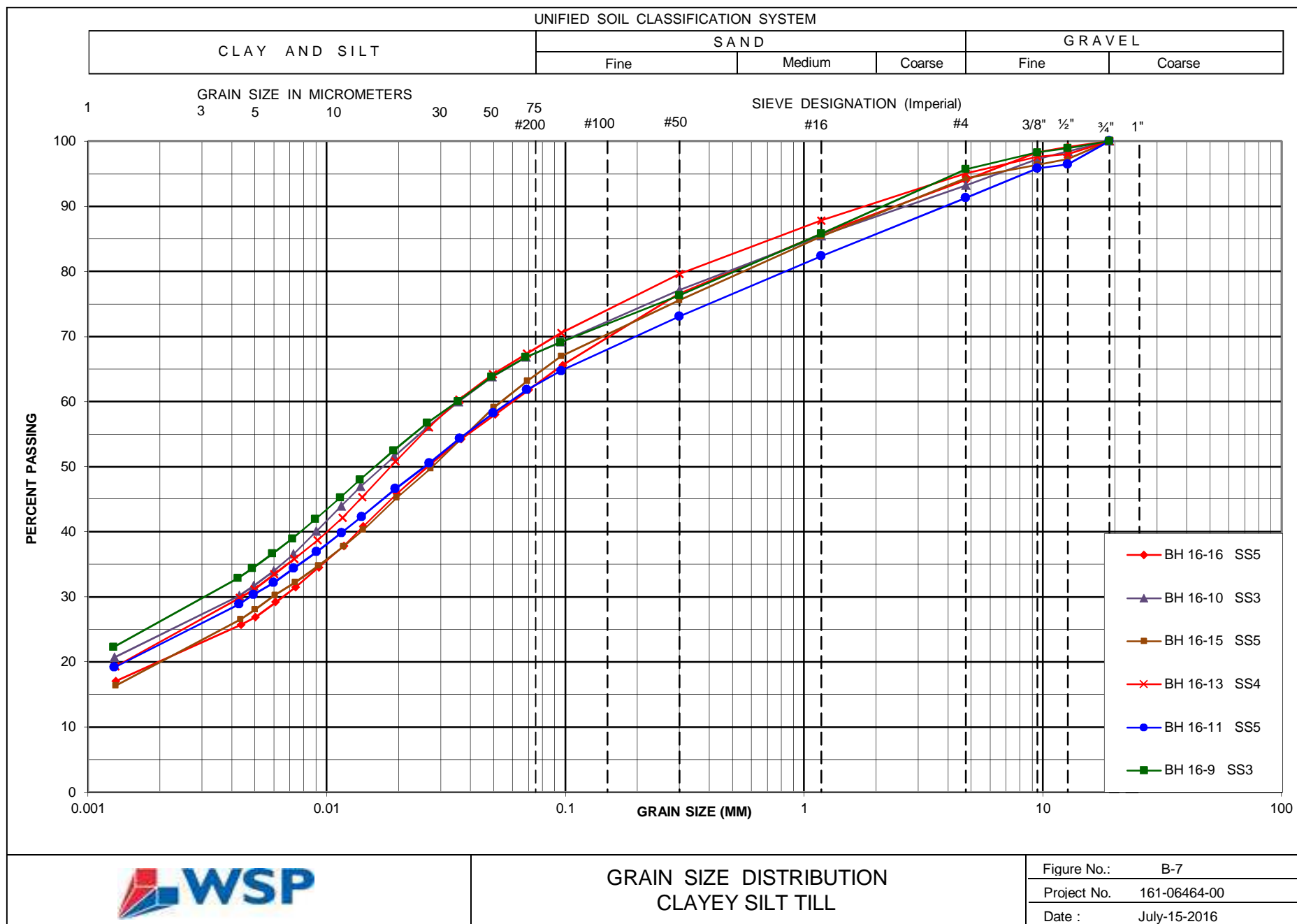
PLASTICITY CHART
CLAYEY SILT TO SILTY CLAY (TILL)

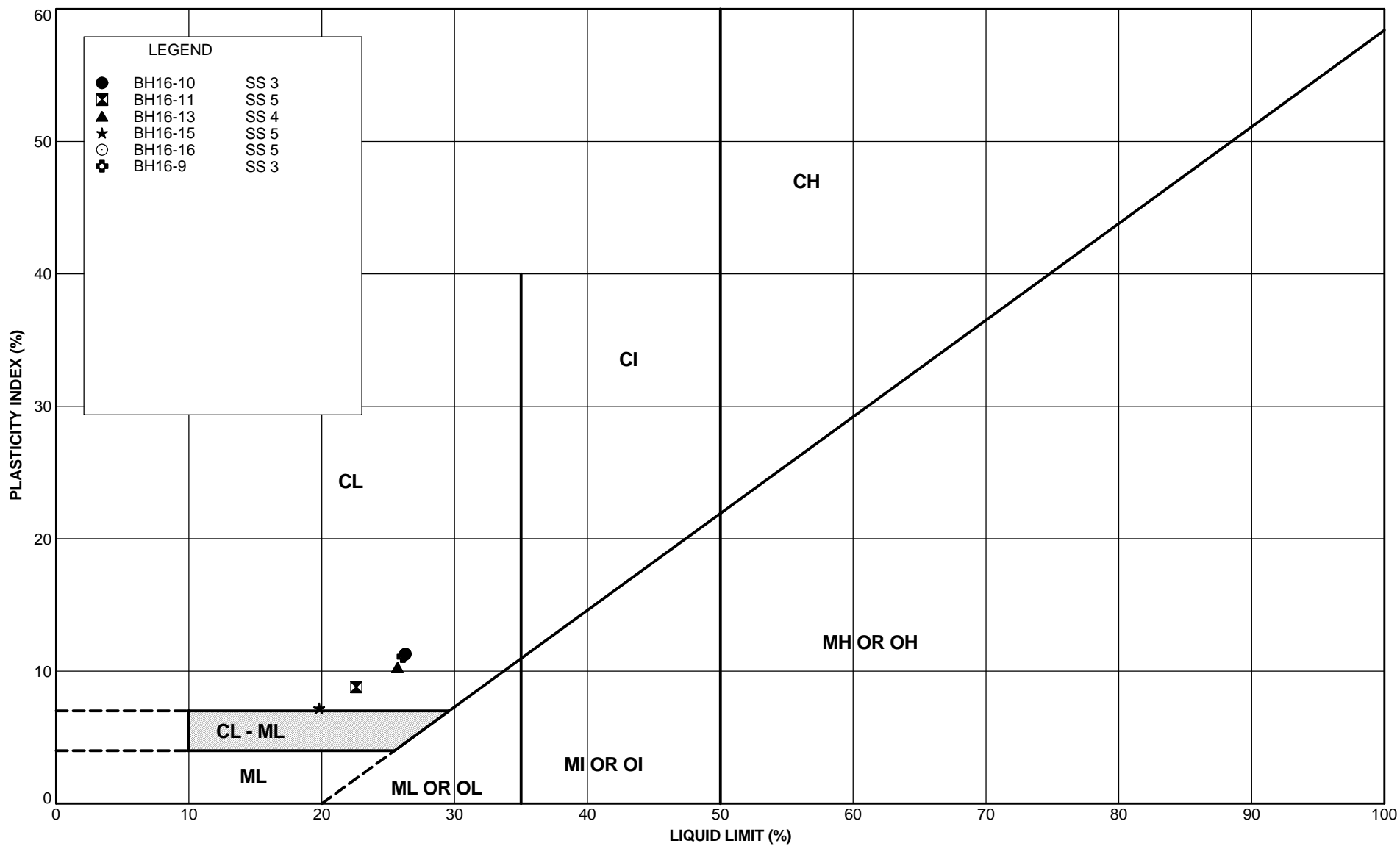
FIGURE NO.	B-3a
JOB NO.	161-06464-00
DATE	July 27, 2016





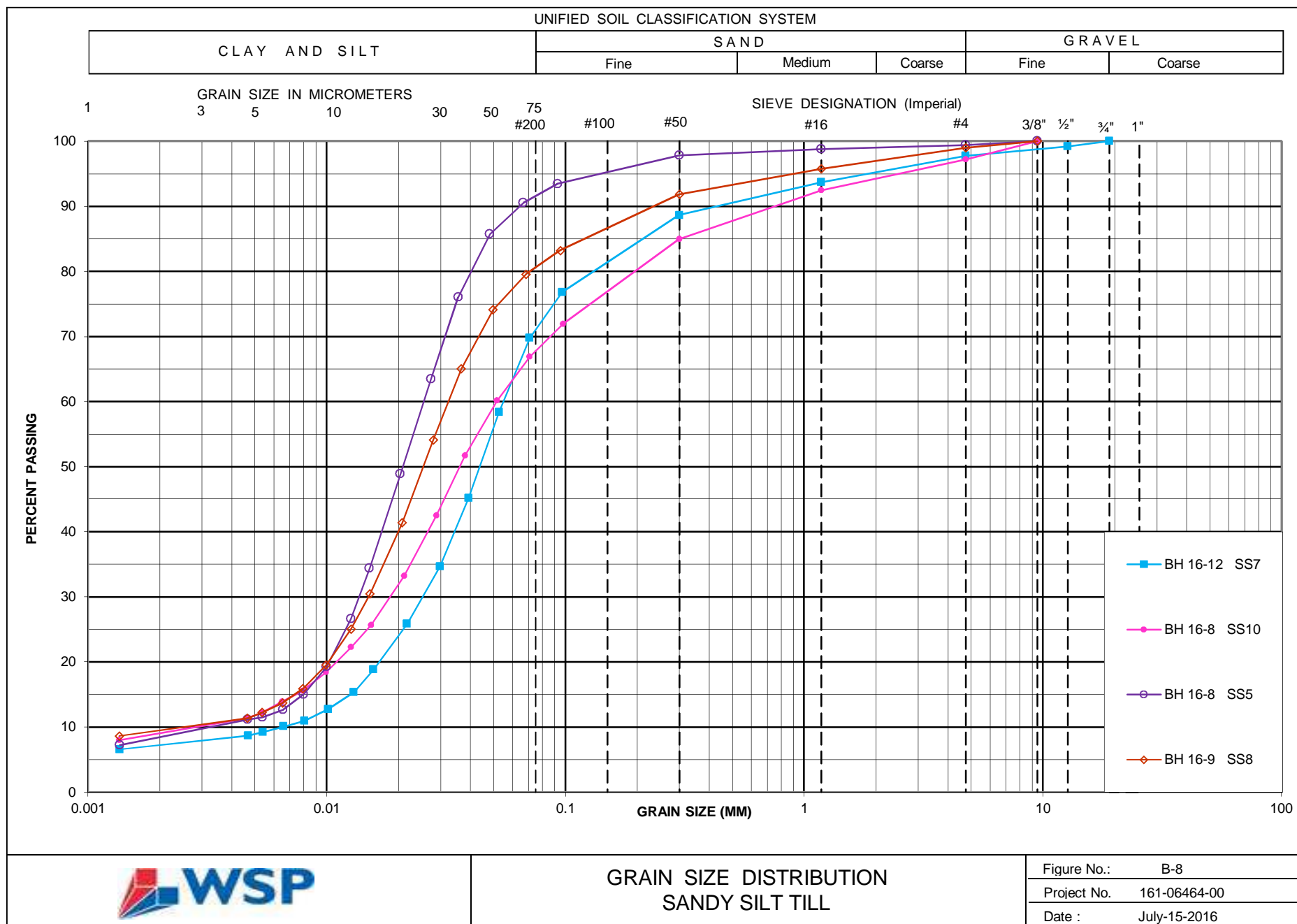


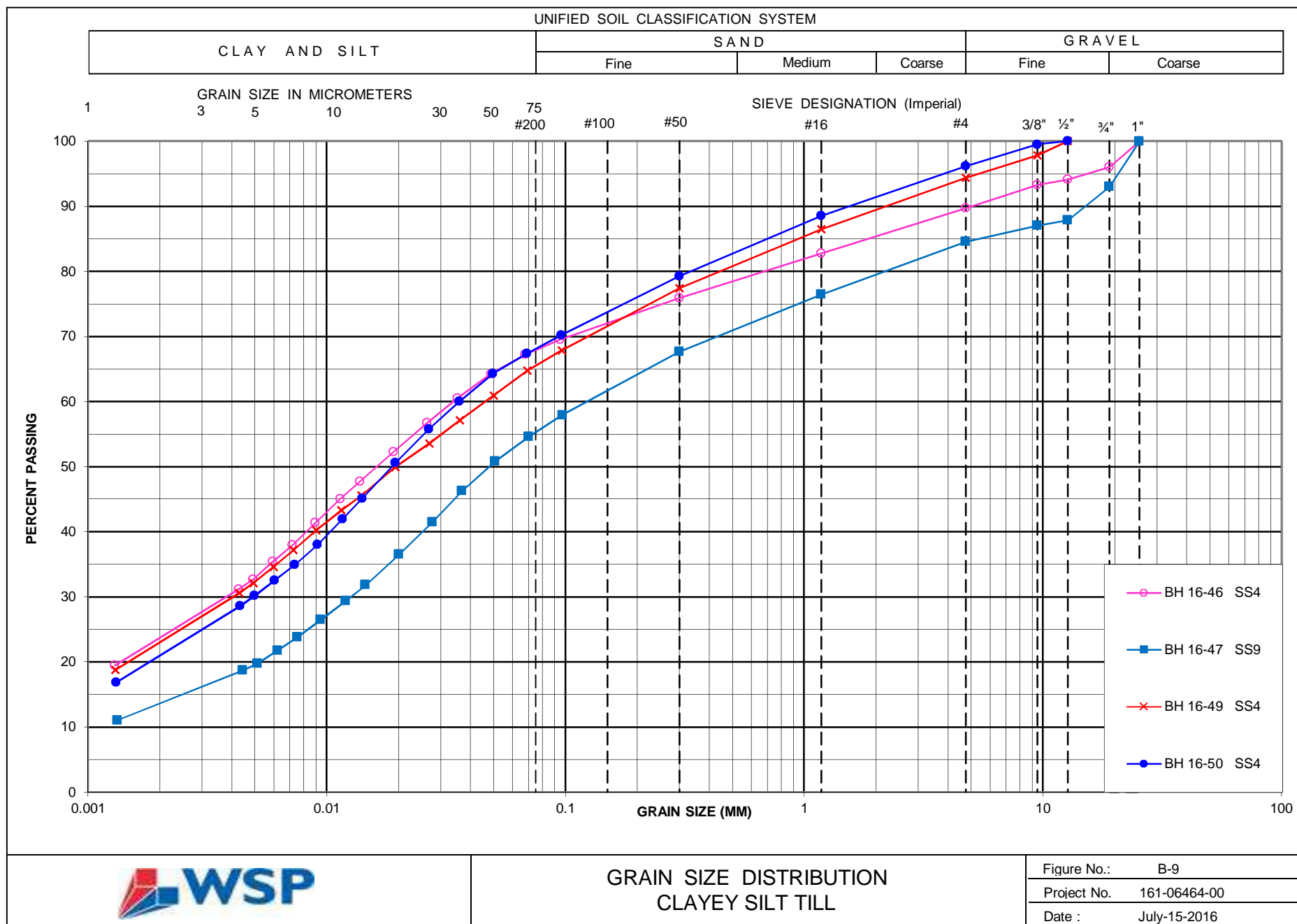


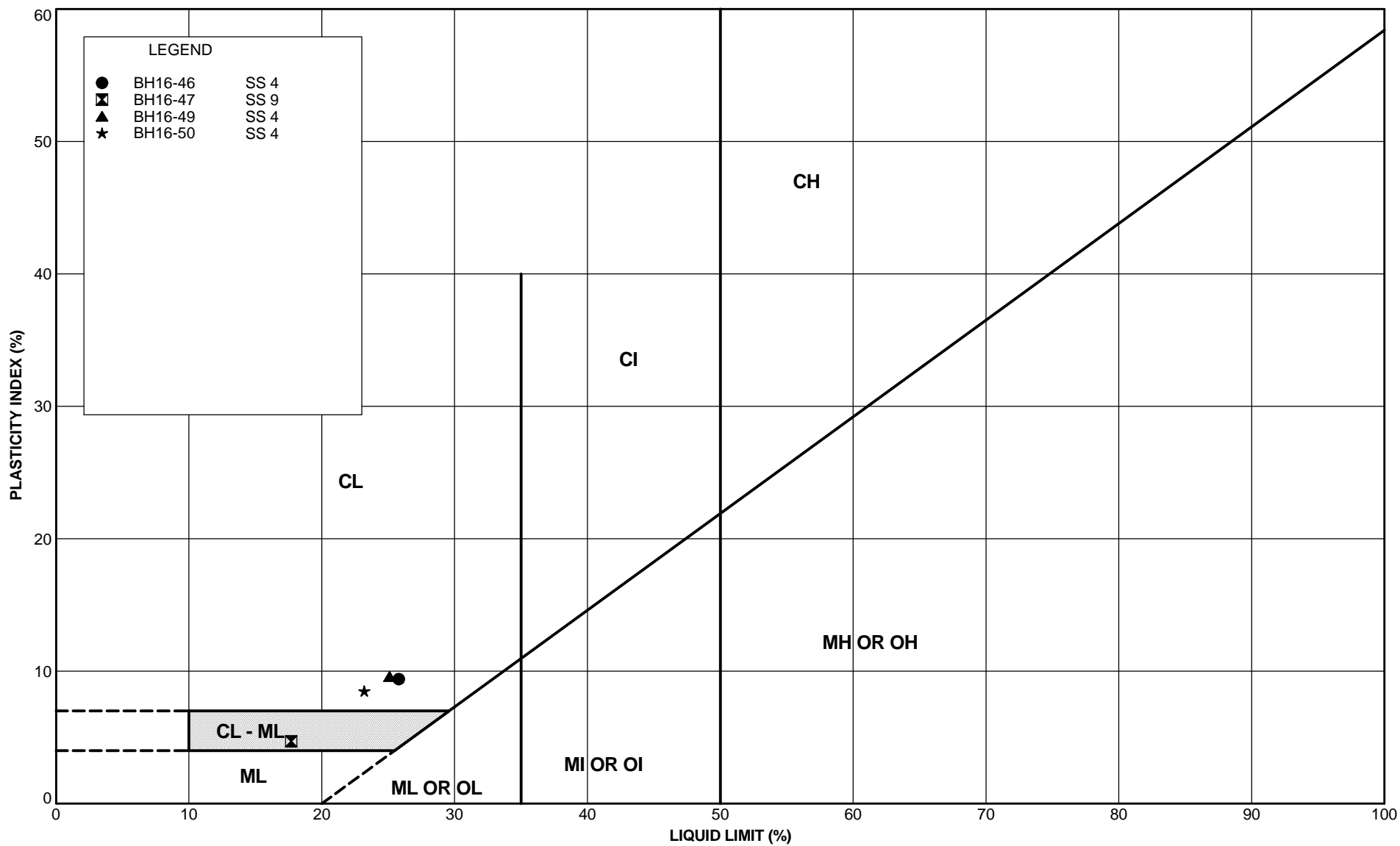


PLASTICITY CHART
CLAYEY SILT TILL

FIGURE NO.	B-7a
JOB NO.	161-06464-00
DATE	July 27, 2016

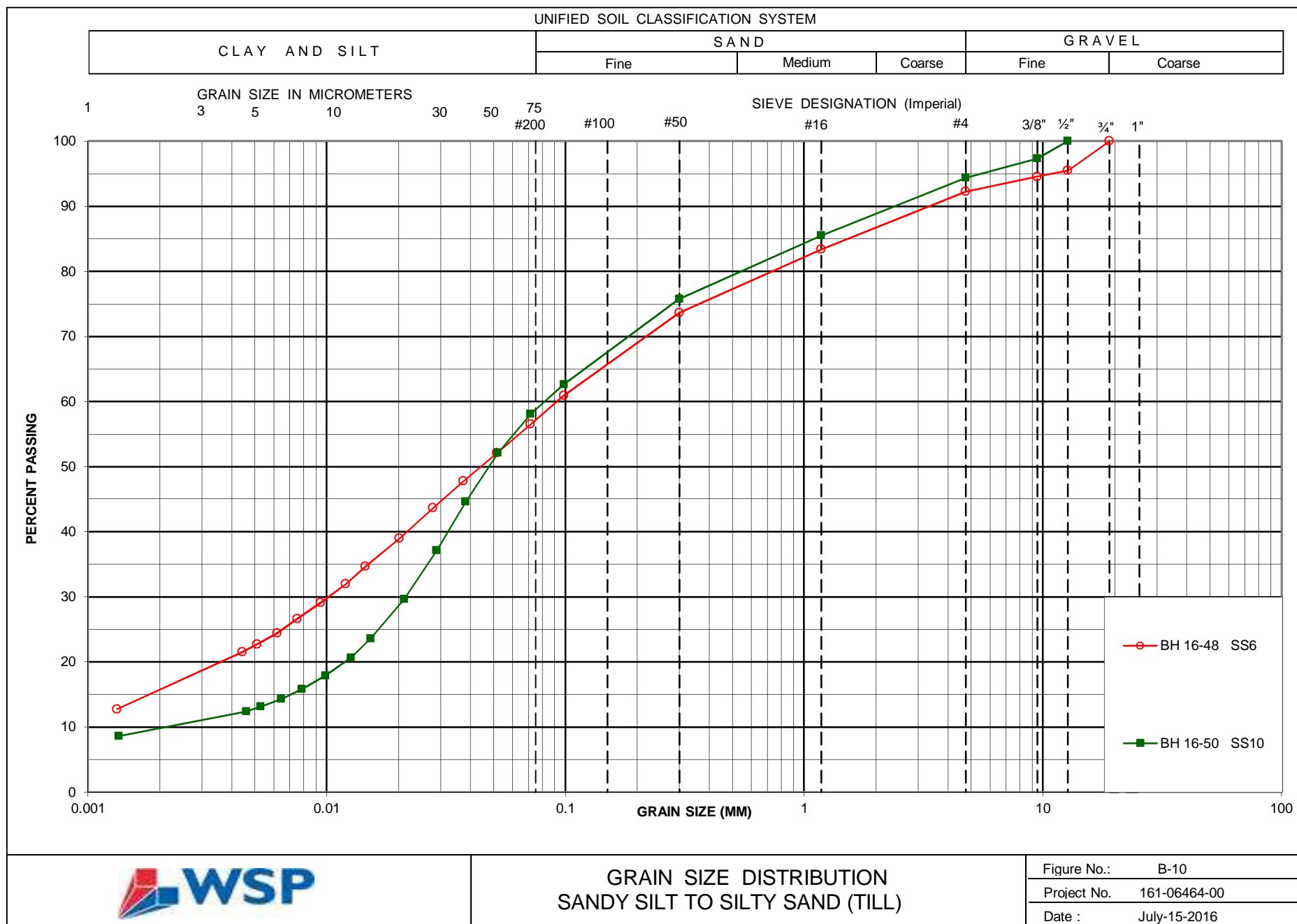






PLASTICITY CHART
CLAYEY SILT TILL

FIGURE NO.	B-9a
JOB NO.	161-06464-00
DATE	July 27, 2016



GRAIN SIZE DISTRIBUTION
SANDY SILT TO SILTY SAND (TILL)

Appendix C: Site Photographs



Photo 1: Facing East , East of Ridgeway Drive near Station 10+000



Photo 2: Facing East , near BH16-45 (Sta. 10+040)

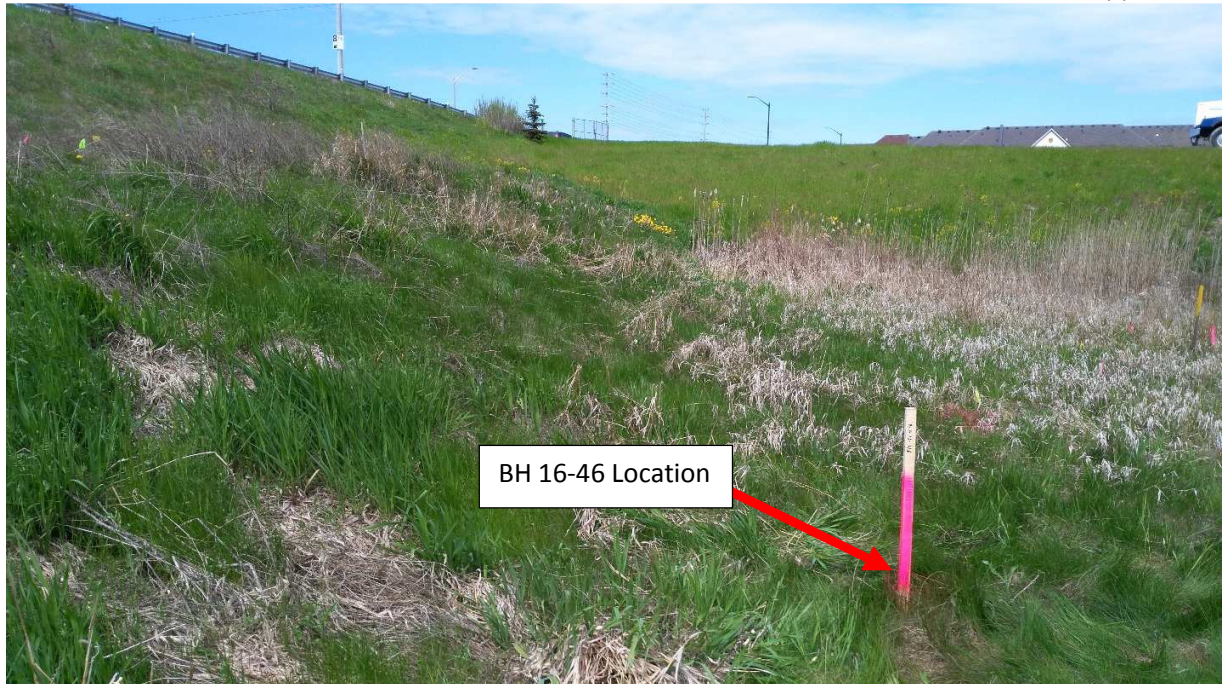


Photo 3: Facing North West , near BH16-46 (Sta. 10+050)

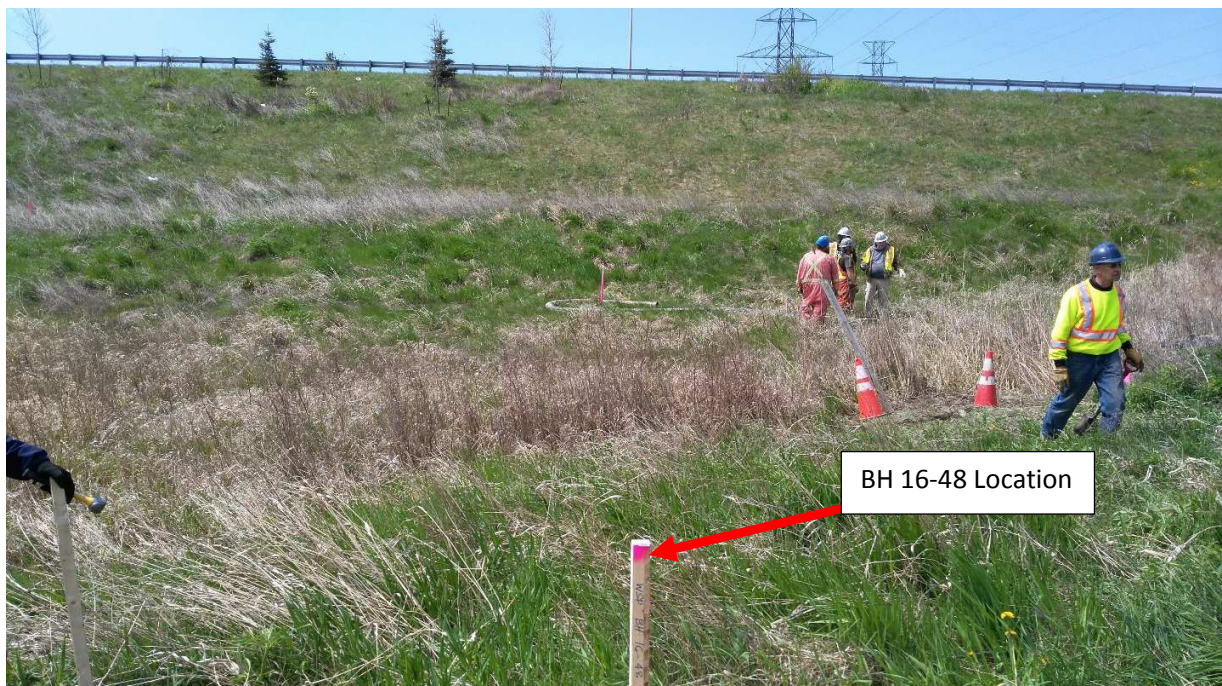


Photo 4: Facing West, near BH16-48 (Appr. Sta. 10+070)



Photo 5: Facing South East, near BH16-50 (Sta. 10+070)



Photo 6: Facing West , near approximate. Sta. 10+105)



Photo 7: Facing West , West of Ridgeway Drive near Station 0+000



Photo 8: Facing East , near BH16-1 (Sta. 0+015)

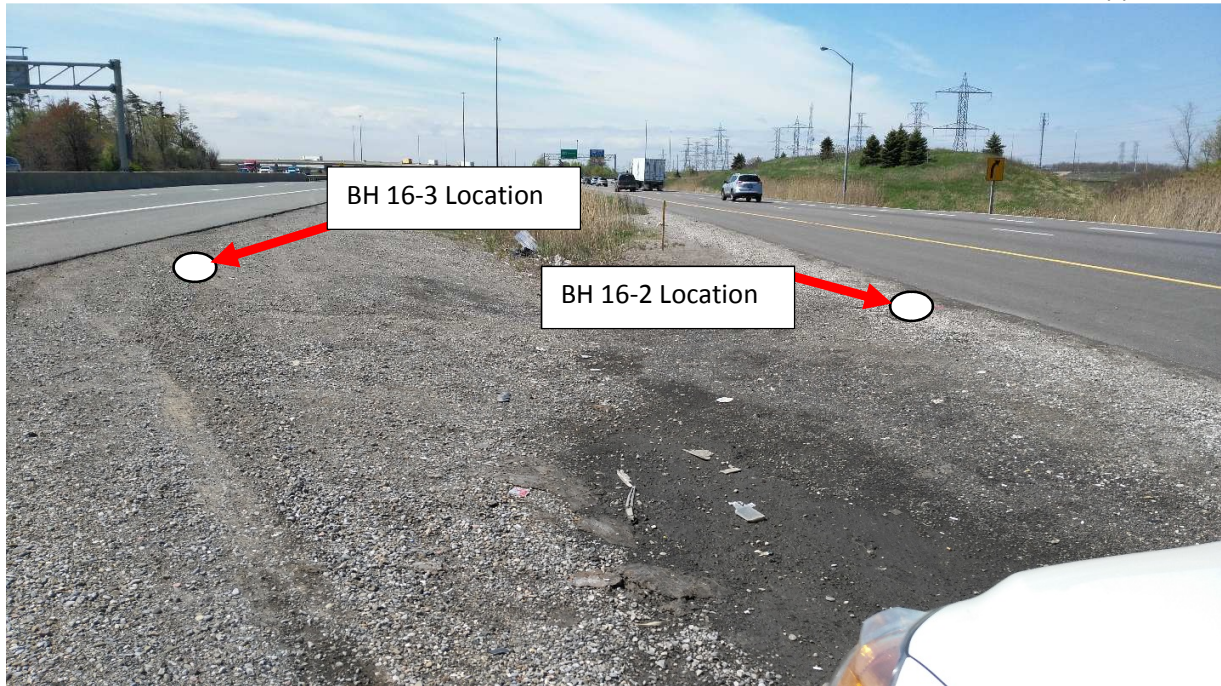


Photo 9: Facing West , near BH16-2 and BH16-3 (Sta. 0+040)



Photo 10: Facing West, near BH16-5 (Sta. 0+070)



Photo 11: Facing East , near BH16-6 (Appr. Sta. 0+090)



Photo 12: Facing West, near BH16-9 (Appr. Sta. 0+165)



Photo 13: Facing East, near BH16-9 (Appr. Sta. 0+165)



Photo 14: Facing West, near BH16-16 (Appr. Sta. 0+305)

Appendix D: Limitations

LIMITATIONS OF FACTUAL REPORTS FOR DESIGN-BUILD PROJECTS

This report is intended solely for the Client named. The material in it reflects our best judgment in light of the information available to WSP Canada Inc. at the time of preparation.

The information contained herein in no way reflects on the environment aspects of the project, unless otherwise stated. Subsurface and groundwater conditions between and beyond the test holes may differ from those encountered at the test hole locations, and conditions may become apparent during construction, which could not be detected or anticipated at the time of the site investigation. The benchmark and elevations used in this report are primarily to establish relative elevation differences between the test hole locations and should not be used for other purposes, such as grading, excavating, planning, development, etc.

The comments made in this report on potential construction problems and possible methods are intended only for the guidance of the designer. The number of test holes may not be sufficient to determine all the factors that may affect construction methods and costs. For example, the thickness of surficial topsoil or fill layers may vary markedly and unpredictably. The contractors bidding on this project or undertaking the construction should, therefore, make their own interpretation of the factual information presented and draw their own conclusions as to how the subsurface conditions may affect their work. This work has been undertaken in accordance with normally accepted geotechnical engineering practices.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. WSP Canada Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

