Trow

Geotechnical Investigation
Directional Drilling Crossing Highway 401
Hurontario Street and Highway 401
Mississauga, Ontario

Plantec Project #08-376, Network J15685

Prepared for:

Plantec Inc. Consulting Engineers
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Attention: Ms. Joelle Chan

Trow Associates Inc.

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brge00360897a
March 30, 2009

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1. Introduction

Trow Associates Inc. (Trow) was retained by Plantec Inc. Consulting Engineers to conduct a geotechnical investigation for the proposed Highway 401 Bell crossing in the City of Mississauga, Ontario.

It is understood that the proposed Bell crossing, located to the east of Hurontario Street, will be installed by trenchless techniques under Hurontario Street, the access ramps and Highway 401. As specified in the terms of reference, the area of investigation is limited to two (2) boreholes located to the north and south limits of the existing Highway 401.

Based on preliminary project information, the proposed Bell crossing will consist of 16 - 100 mm diameter ducts. The invert for the proposed crossing will be at least 5 m below the existing road grade of Highway 401. The invert for the proposed crossing will be at least 5 m below the existing road grade of Highway 401. The length of the crossing under the highway will be approximately 80 m.

The purpose of this geotechnical investigation was to determine the subsurface soil and groundwater conditions at the site by drilling two (2) boreholes (Boreholes. 1 and 2) along the proposed crossing alignment on either side of the Highway 401 to a depth of about 10 m below the existing grade, and based on this information, to provide an engineering report with geotechnical recommendations pertaining to the proposed construction.

The comments and recommendations given in this report are based on the assumption that the above-described design concept will proceed into construction. If changes are made either in the design phase or during construction, this office must be retained to review these modifications. The result of this review may be a modification of our recommendations or it may require additional field or laboratory work to check whether the changes are acceptable from a geotechnical viewpoint.

2. Site Description

The proposed Bell crossing will be located underneath Highway 401 at about 20 m east of Hurontario Street in the City of Mississauga, Ontario.

The areas of the investigation are within the Ministry of Transportation Right of Way. The boreholes were drilled within the grassy areas between the access ramps from north bound Hurontario Street to east and west bound Highway 401. .

3. Methodology

The fieldwork for the investigation was carried out on March 18, 2009. At that time, two (2) sampled boreholes were put down at the approximate locations as shown on the attached Borehole Location Plan (Drawing No. 1).

The drilling was carried out using a drill rig adapted for soil sampling purposes owned and operated by a specialist drilling contractor (DBW Drilling Limited). In each borehole, samples were recovered with conventional split spoon equipment using the standard penetration test method. Water level observations were carried out in the open boreholes during the course of the fieldwork and in piezometer installed in each borehole.

The fieldwork was supervised by Trow geotechnical personnel who monitored the drilling operations and logged the borings. All split spoon samples were transported to our laboratory for detailed examination.

The borehole locations and elevations were established in the field by Trow personnel. The ground surface elevations at the boreholes were referenced to a local benchmark. This local benchmark is the finished floor elevation of 150 Courtneypark Drive West which has a City of Mississauga elevation of 199.65 m (Geodetic elevation 199.53 m).

4. Subsurface Conditions

4.1 Soil

The detailed soil profiles encountered in each borehole are indicated on the attached borehole logs.

It should be noted that the soil boundaries indicated on the borehole logs are inferred from non-continuous sampling and observations during drilling. These boundaries are intended to reflect approximate transition zones for the purpose of geotechnical design and should not be interpreted as exact planes of geological change. The "Notes on Sample Description" preceding the borehole logs form an integral part of and should be read in conjunction with this report.

The following is a brief description of the soil conditions encountered during the investigation.

Topsoil

Topsoil with thickness of about 175 and 150 mm was encountered surficially at all Boreholes 1 and 2, respectively.

It should be noted that topsoil quantities should not be established from the information provided at the borehole locations only. If required, a more detailed analysis (involving shallow test pits) should be carried out to accurately quantify the amount of topsoil to be removed for construction purposes.

Silt Till

The surficial topsoil was underlain by a silt till deposit at both borehole locations. This deposit is brown to grey in colour, contains some gravel and occasional wet sand seams and pockets. Rootlets and organic inclusions were noted in the upper level of the silt till. The N-values recorded in the silt till deposit indicates it exists in a compact to very dense state. The silt till deposit extends to depths of about 8 to 8.3 m below existing grade.

Grain size analysis and Atterberg limits were carried out in the laboratory on selected samples and the test results are summarized in Tables 1 and 2 below. The grain size analysis results are presented in Appendix A.

Table 1: Summary of Grain Size Analysis

Borehole No.	Sample	Gravel	Sand	Silt	Clay
Borehole 1	SS5	11.6	32.6	41.8	14.0
Borehole 2	SS7	14.1	35.7	43.7	6.5

Table 2: Summary of Atterberg Limits

Borehole No.	Sample	Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index
Borehole 1	SS7	24	14	10
Borehole 2	SS4	22	13	9

Based on the Atterberg limits, the soil samples tested are classified as low plasticity clays using the Unified Soil Classification System (USCS).

Shale Bedrock

Shale bedrock of Georgian Bay Formation was encountered underlying the silt till deposit at both borehole locations. The elevation for the bedrock encountered at each borehole is presented in the individual borehole logs. The shale consists of moderately soft bedded grey shale with frequent limestone interbeds and is generally weathered at the upper level and becoming sound with depth. Both Boreholes 1 and 2 were terminated in the shale bedrock at about 10 m below existing grades.

Typically for the Georgian Bay shale, the limestone layer within the shale comprises about 15 to 20 percent of the rock unit. The hard layers are usually less than about 100 to 150 mm thick but some layers are much thicker. The thicker layers have been observed to be as much as 750 to 900 mm at other sites. The layers are actually lenses and they can vary significantly in thickness over short distances. Stress relief features such as folds and faults are common in the Georgian Bay Formation. In these features the rock is heavily fractured and sheared, and contains layers of shale rubble and clay. Due to the fracturing, these features may also be groundwater conduits, which could result in excessive water flow into excavations. Weathering is much deeper than the surrounding rock in these features. The stress relief features are usually in the order of 4 to 6 m wide, but the depth can vary from 4 to 5 m to in excess of 10 m.

4.2 Groundwater Conditions

Groundwater conditions were assessed in the open boreholes during the course of the fieldwork and in the piezometers installed in each borehole. The water level observations in Boreholes 1 and 2 are presented in Table 3 below:

Table 3: Water Level Observations

Borehole No.	Groundwater Level (m/Elevation)			
	Upon Completion	After 2 days	After 4 days	After 6 days
Borehole 1	4.0 / 188.7	3.9 / 188.8	4.3 / 188.4	3.1 / 189.6
Borehole 2	5.0 / 187.8	0.9 / 191.9	0.9 / 191.9	0.9 / 191.9

In the long term, seasonal fluctuations of the groundwater level at the site should be anticipated.

5. Discussions and Recommendations

5.1 Engineering Evaluation of Subsurface Conditions

In summary, the stratigraphy at the site comprises compact to very dense silt till overlying shale bedrock. The surface of the bedrock is located at about 8 to 8.3 m below ground surface. The subsurface conditions are generally favorable for the proposed construction.

The overburden soils contain a sufficiently high percentage of soil fines, which gives the soils an apparent cohesion. The upper level of the silt till can be classified as Type 2 soil and the lower level can be classified as Type 1 soil as defined in the Occupational Health and Safety Act (OHSA). Excavations in the overburden materials should remain temporarily stable when they are cut to the OHSA requirements. The seepage rate in the silt till is expected to be low due to the low hydraulic conductivity of the soil and stability should not be affected. Water seepage from the more pervious seams in the silt till should be anticipated. These seepages, however, should be readily handled by pumping from local sumps placed within the excavation.

Based on preliminary project information, the Bell crossing under the highway will be constructed in the very dense silt till, which is generally of good quality and should provide excellent support for the Bell conduit. The stability of the proposed Bell crossing in the silt till should be satisfactory. Further discussion of tunneling conditions is presented in the following section of this report.

5.2 Comments on Trenchless Installation Techniques

The proposed Bell crossing will consist of 16 - 100 mm diameter ducts with a length of about 80 m under Highway 401. The ducts will be grouped into two (2) - 400 mm diameter conduits with a spacing of about 2 m between the conduits. The invert for the proposed crossing will be at least 5 m below the existing road grade of Highway 401. At that depth, the tunnel invert is expected to be in the very dense silt till.

Constructing the tunnel in the very dense silt till using horizontal directional drilling (HDD) is considered feasible. The diameter of the tunnel constructed by HDD for each proposed conduit is expected to be ~800 mm. Primary support is not required, as a drilling fluid is used for temporary support and transportation of the cuttings. The risk of loss of drilling fluid is minimal since the tunnel is at least 5 m below ground and located within a cohesive soil in a very dense condition. High density polyethylene pipes can be utilized at this site.

The tunnel could also be installed by jacking and boring, using a steel pipe for primary support, and a rotary cutting head with disc cutters for excavation. The steel liner should follow closely behind the drill head. After installing the conduit, the annular space between the conduit and the liner should be grouted.

Significant ground settlement is not expected since the bored hole will be in very dense silt till. Boulder and cobbles type obstructions in the till deposit should be anticipated.

5.3 Shaft Excavations

The proposed alignment of the directional drilling under the access ramps and Highway 401 will be located at about 20 m east of Hurontario Street. An entry and exit shaft is proposed for the directional drilling work. The depth of the shafts is expected to be between 3 to 6 m below existing grades. Based on the soil conditions revealed from the two boreholes, the shaft excavation will generally be carried out in the dense to very dense silt till. It should be noted that the subsurface conditions can be significantly different from those indicated in the boreholes if there are existing service trenches immediately adjacent to the excavations. If such is the case, more fill material should be anticipated during excavations.

Open cut excavation can be considered if space constraint is not an issue at the shaft locations. The side slopes should be cut as per the OSHA regulations. Where fill is encountered and there are seepages, the slope would have to be flattened.

If shoring is considered, the overburden soil can be supported by steel sheet piles. The sheet piles should be designed for the lateral earth pressure given in section 5.5 of this report.

The overburden materials may be excavated with large conventional equipment such as a mechanical backhoe. It should be noted that glacial till is a non-sorted deposit and therefore may contain boulders. Provisions must be made in the excavation contract for the removal of possible boulders.

The seepage rate in the silt till is expected to be low due to the low hydraulic conductivity of the soil. Water seepage from the more pervious seams in the silt till should be anticipated and it should be feasible to handle the seepage by gravity drainage and pumping from filtered sumps placed within the excavation.

5.4 Backfilling Operations

Backfill for all excavations should be compactable fill, i.e. inorganic soil with its moisture content close to its optimum moisture content determined in a standard Proctor test. Most of the excavated soils, apart from topsoil, should be suitable for reuse as backfills. The native silt till will likely be excavated in large blocks, which must be broken into smaller pieces before re-using, and some moisture adjustment would be required. Imported granular or other non-cohesive soils should be considered for backfilling confined areas.

Any organic, excessively wet, or otherwise deleterious material should not be used for backfilling purposes. Any shortfall of suitable on-site excavated material can be made up with imported and approved materials.

In areas where long term settlements are to be avoided, the backfills should be placed in lifts not exceeding 200 mm and compacted to minimum 98% standard Proctor maximum dry density. The use of unshrinkable fill for backfilling can also be considered.

All backfill and compaction operations should be monitored by qualified geotechnical personnel to approve material, to evaluate placement operations, and to verify that the specified degree of compaction is being achieved throughout the fill.

All annular space around the directional drilled holes should be grouted.

5.5 Lateral Earth Pressure

Flexible shoring for the temporary support of trenches and shafts should be designed for the lateral earth pressures given in Section 26.10.3 of the Canadian Foundation Engineering Manual (4^{th} Edition).

A triangular earth pressure distribution can be considered for the shaft walls. Water pressure and surcharge loads should be taken into consideration as appropriate.

The lateral earth pressure acting on the relatively rigid concrete walls of permanent maintenance holes and shafts may be calculated from the following equation:

$$p = K(\gamma h + q)$$

where p = lateral earth pressure in kPa acting at depth h;

K = earth pressure coefficient a value of 0.45 is recommended

γ = unit weight of retained soil, a value of 22 kN/m^3 is recommended

h = depth to point of interest in m; and

q = equivalent value of any surcharge on the ground surface in kPa.

The above expression assumes that there will be no hydrostatic pressure behind the sheetings.

5.6 Ground Movement Monitoring

It is recommended that ground movement monitoring should be carried out for the highway during construction. Based on the monitoring results, the method and equipment of construction may have to be modified where necessary. The ground movement monitoring program should be carried out in accordance with the MTO requirements and the most recent guideline for tunneling.

6. General Comments

The comments given in this report are intended only for the guidance of design engineers. The number of boreholes required to determine the localized underground conditions between boreholes affecting construction costs, techniques, sequencing, equipment, scheduling, etc., would be much greater than has been carried out for design purposes. Contractors bidding on or undertaking the works should, in this light, decide on their own investigations, as well as their own interpretations of the factual borehole results, so that they may draw their own conclusions as to how the subsurface conditions may affect them.

The information contained in this report in no way reflects on the environmental aspects of the soils, which has not been addressed in this report, since this is beyond our terms of reference. Should specific information be required, additional drilling and/or testing may be required.

More specific information, with respect to the conditions between samples, or the lateral and vertical extent of materials, may become apparent during excavation operations. Consequently, during the future development of the property, conditions not observed during this investigation may become apparent; should this occur, Trow Associates Inc. should be contacted to assess the situation, and additional testing and reporting may be required. Trow has qualified personnel to provide assistance in regards to future geotechnical and environmental issues related to this property.

Trow Associates Inc. should be retained for a general review of the final design and specifications to verify that this report has been properly interpreted and implemented. If not accorded the privilege of making this review, Trow Associates Inc. will assume no responsibility for interpretation of the recommendations in the report.

We trust that this report has provided sufficient information for the preliminary design of the pavement. Should you have any questions regarding this report, please do not hesitate to contact the undersigned.

Trow Associates Inc.

LICENSED PROFESSIONAL ENGINEER
K. W. Y. LEUNG
April 2, 2004
PROVINCE OF ONTARIO

Kevin W. Y. Leung, M. Sc., P. Eng.
Senior Engineer, Geotechnical Division

Stephen S. M. Cheng, P. Eng.
Associate

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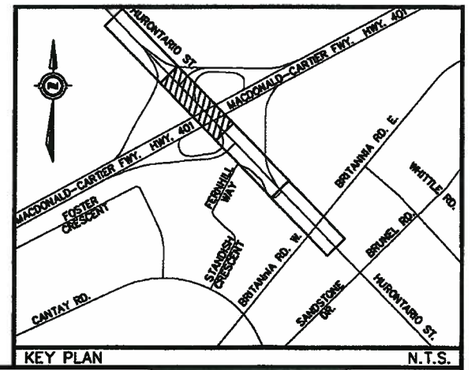
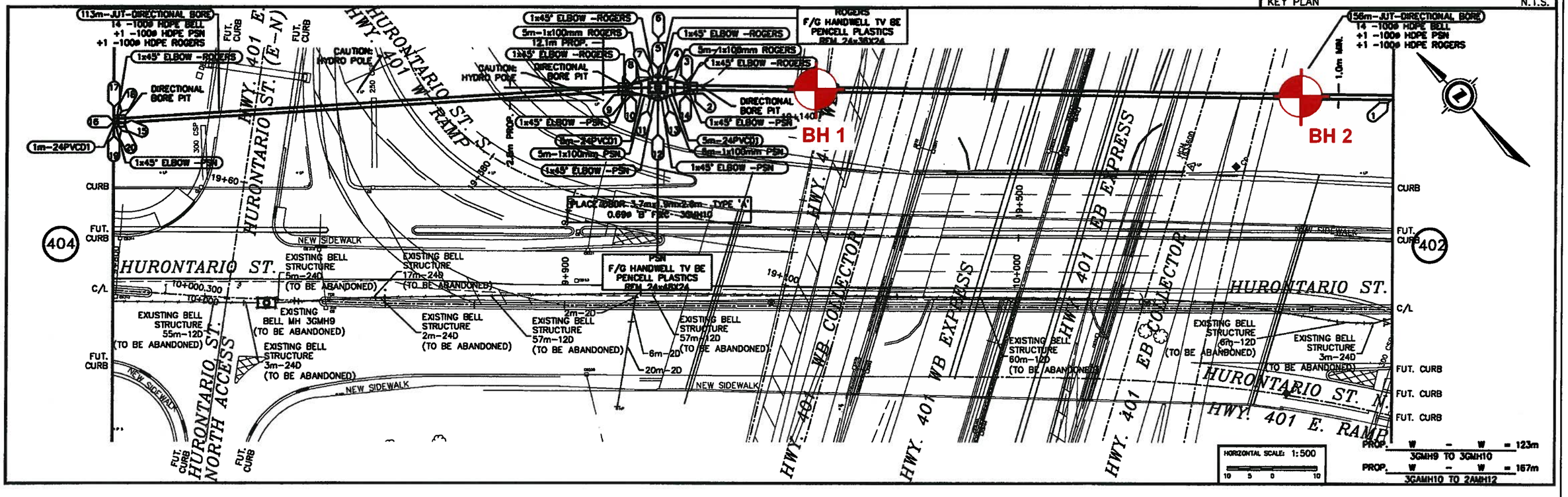
Drawings





TROW ASSOCIATES INC.
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Geotechnical Investigation
Borehole Location Plan
Highway 401 and Hurontario Street
Mississauga, Ontario

Project No.: brge00360897a	Scale:	As Shown	Drawn by: N. V.
Drawing No.: 1	Date:	March 2009	Checked by: K. L.

Notes On Sample Descriptions

Drawing 1A

1. All sample descriptions included in this report follow the Canadian Foundations Engineering Manual soil classification system. This system follows the standard proposed by the International Society for Soil Mechanics and Foundation Engineering. Laboratory grain size analyses provided by Trow Associates Inc. also follow the same system. Different classification systems may be used by others; one such system is the Unified Soil Classification. Please note that, with the exception of those samples where a grain size analysis has been made, all samples are classified visually. Visual classification is not sufficiently accurate to provide exact grain sizing or precise differentiation between size classification systems.

ISSMFE SOIL CLASSIFICATION

CLAY	SILT			SAND			GRAVEL			COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE		

0.002 0.006 0.02 0.06 0.2 0.6 2.0 6.0 20 60 200

EQUIVALENT GRAIN DIAMETER IN MILLIMETRES

CLAY (PLASTIC) TO	FINE	MEDIUM	CRS.	FINE	COARSE
SILT (NONPLASTIC)	SAND			GRAVEL	

UNIFIED SOIL CLASSIFICATION

2. Fill: Where fill is designated on the borehole log it is defined as indicated by the sample recovered during the boring process. The reader is cautioned that fills are heterogeneous in nature and variable in density or degree of compaction. The borehole description may therefore not be applicable as a general description of site fill materials. All fills should be expected to contain obstruction such as wood, large concrete pieces or subsurface basements, floors, tanks, etc.; none of these may have been encountered in the boreholes. Since boreholes cannot accurately define the contents of the fill, test pits are recommended to provide supplementary information. Despite the use of test pits, the heterogeneous nature of fill will leave some ambiguity as to the exact composition of the fill. Most fills contain pockets, seams, or layers of organically contaminated soil. This organic material can result in the generation of methane gas and/or significant ongoing and future settlements. Fill at this site may have been monitored for the presence of methane gas and, if so, the results are given on the borehole logs. The monitoring process does not indicate the volume of gas that can be potentially generated nor does it pinpoint the source of the gas. These readings are to advise of the presence of gas only, and a detailed study is recommended for sites where any explosive gas/methane is detected. Some fill material may be contaminated by toxic/hazardous waste that renders it unacceptable for deposition in any but designated land fill sites; unless specifically stated the fill on this site has not been tested for contaminants that may be considered toxic or hazardous. This testing and a potential hazard study can be undertaken if requested. In most residential/commercial areas undergoing reconstruction, buried oil tanks are common and are generally not detected in a conventional geotechnical site investigation.

3. Till: The term till on the borehole logs indicates that the material originates from a geological process associated with glaciation. Because of this geological process the till must be considered heterogeneous in composition and as such may contain pockets and/or seams of material such as sand, gravel, silt or clay. Till often contains cobbles (60 to 200 mm) or boulders (over 200 mm). Contractors may therefore encounter cobbles and boulders during excavation, even if they are not indicated by the borings. It should be appreciated that normal sampling equipment cannot differentiate the size or type of any obstruction. Because of the horizontal and vertical variability of till, the sample description may be applicable to a very limited zone; caution is therefore essential when dealing with sensitive excavations or dewatering programs in till materials.

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Trow Brampton, Ontario L6T 4V1

RECORD OF BOREHOLE No 1

SHEET 1 OF 1 **METRIC**

PROJECT NO. brge00360897a | LOCATION N4831660 E606149 | ORIGINATED BY NV
DIST Central | HWY Highway 401 | BOREHOLE TYPE Solid Stem Augers | COMPILED BY KL
DATUM Geodetic | DATE 3/18/2009 - 3/18/2009 | CHECKED BY KL

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE
192.7 / 0.0	~175 mm **TOPSOIL** over **SILT TILL** - clayey, some gravel, occasional wet sand seams and pockets, rootlets and organic inclusion in upper level, brown to ~4 m depth, grey below, moist, compact to very dense		1	SS	9		192
			2	SS	25		
			3	SS	37		191
			4	SS	62		190
	- becoming more sandy below ~3 m depth		5	SS	60		
			6	SS	60		189
	- colour changing to red						188
	- spoon wet		7	SS	80		187
184.4			8	SS	60		186
8.3	**SHALE BEDROCK** - highly weathered, grey		9	SS	60		185
182.8			10	SS	60		184
10.0	**End of Borehole**						183

SPT TEST (N-Value) ●
DYNAMIC CONE PENETRATION 20 40 60 80 100
SHEAR STRENGTH kPa
○ UNCONFINED + FIELD VANE
⊗ QUICK TRIAXIAL × LAB VANE
20 40 60 80 100

PLASTIC LIMIT PL | NATURAL WATER CONTENT w | LIQUID LIMIT LL
WATER CONTENT (%)
10 20 30

UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR	SA	SI	CL
20.9				
20.4				
21.8				
21.9				
21.2	12	33	42	14
22.0				
22.7				

9 | 25 | 37 | 62 | 60/150 mm | 60/150 mm | 80/275 mm | 60/125 mm | 60/50 mm | 60/50 mm

$+^{3}, \times^{3}$: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

ON_MOT 360897A_BH_LOG.GPJ ON_MOT.GDT 09/03/31

Trow Associates Inc.
1595 Clark Boulevard Ltd.
Trow Brampton, Ontario L6T 4V1

RECORD OF BOREHOLE No 2

SHEET 1 OF 1 **METRIC**

PROJECT NO. brge00360897a | LOCATION N4831597 E606213 | ORIGINATED BY NV

DIST Central | HWY Highway 401 | BOREHOLE TYPE Solid Stem Augers | COMPILED BY KL

DATUM Geodetic | DATE 3/18/2009 - 3/18/2009 | CHECKED BY KL

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES: NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	ELEVATION SCALE	SPT TEST (N-Value) / DYNAMIC CONE PENETRATION (20 40 60 80 100)	SHEAR STRENGTH kPa: ○ UNCONFINED + FIELD VANE ⊗ QUICK TRIAXIAL × LAB VANE (20 40 60 80 100)	PLASTIC LIMIT PL / NATURAL WATER CONTENT w / LIQUID LIMIT LL; WATER CONTENT (%) (10 20 30)	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%): GR SA SI CL
192.8												
0.0	~150 mm **TOPSOIL** over **SILT TILL** - clayey, some gravel, occasional wet sand seams and pockets, rootlets and organic inclusion in upper level, brown to ~4 m depth, grey below, moist, compact to very dense		1	SS	14		192	14			17.9	
			2	SS	24			24			20.2	
			3	SS	44		191	44			21.7	
			4	SS	55			55			21.0	
	- becoming more sandy below ~3 m depth		5	SS	55		190	55			22.1	
			6	SS	60		189	60/125 mm			22.6	
	- colour changing to red and grey						188					
	- spoon wet		7	SS	60		187	60/75 mm				14 36 44 7
							186					
			8	SS	60		185	60/100 mm				
184.8												
8.0	**SHALE BEDROCK** - highly weathered, red to grey		9	SS	60		184	60/50 mm				
182.9												
10.0	**End of Borehole**		10	SS	60		183	60/50 mm				

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

ON_MOT 360897A BH_LOG.GPJ ON_MOT.GDT 09/03/31

Appendix A

Trow

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Grain Size Analysis & Hydrometer Test Report

ST08

Sample Test No.: 128742-2 **Report No.:** 2 **Date Reported:** 25-Mar-09

Project No.: brge00360897a
Project Name: Bell Crossing, Hwy 401 & Hurontario Street, Mississauga, Ontario

Grain Size Proportion (%)

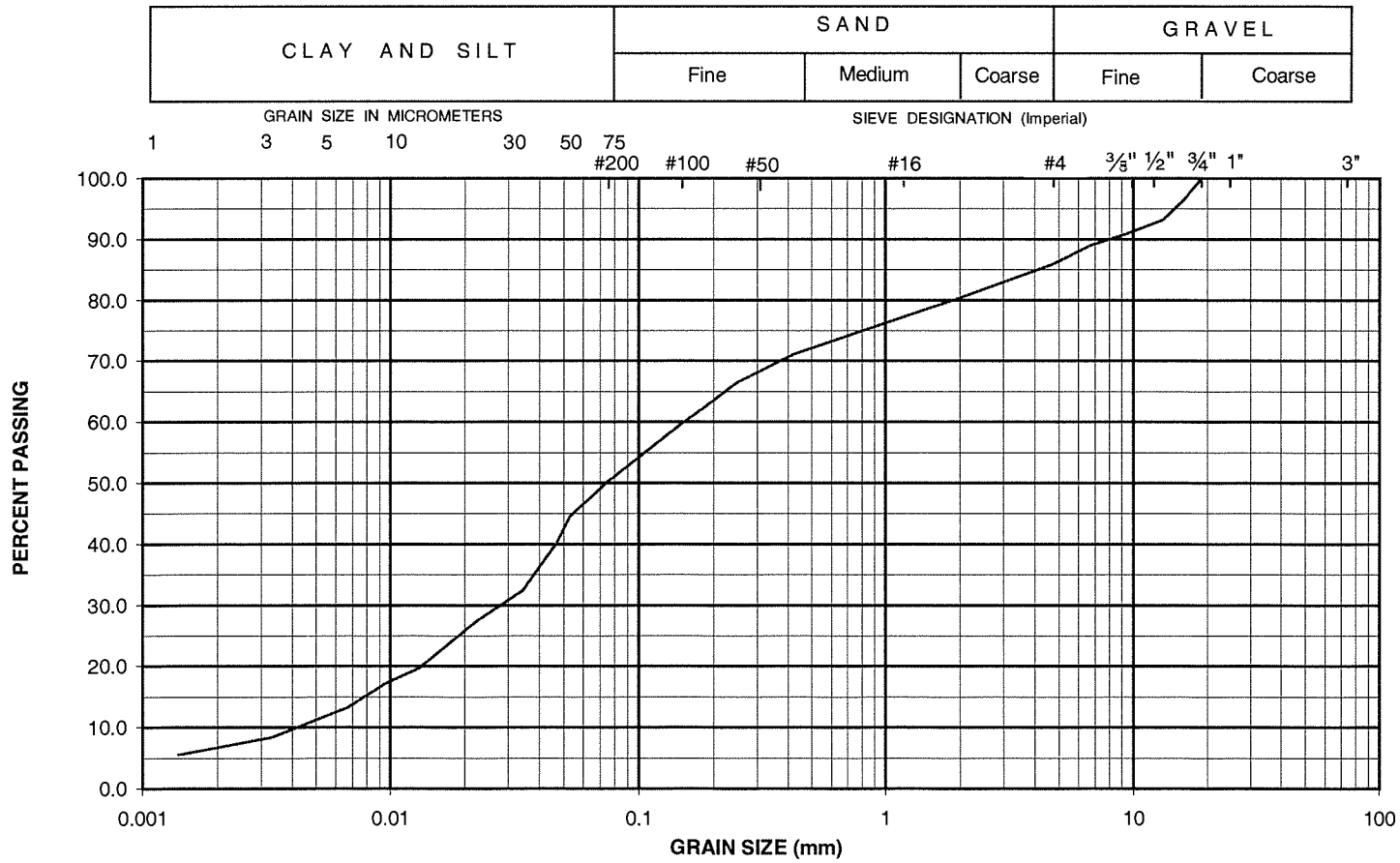
Gravel (> 4.75mm):	**14.1**
Sand (> 75µm, < 4.75mm):	**35.7**
Silt (> 2µm), < 75µm):	**43.7**
Clay (< 2µm):	**6.5**

Sample Information

Location: BH 2
Sample Method: SS
Sample No.: 7
Depth: 6.0 - 6.4m
Sample Description: Silt & Sand;some Gravel;trace Clay;Brown
Sampled By: Nebojsa Vaskovic
Sampling Date: 03/18/2009
Date Received: 03/18/2009
Client Sample ID:
Comments:

Grain Size (mm)	% Passing	Grain Size (mm)	% Passing
26.5	100.0	**0.0342**	32.4
22.4	100.0	**0.0221**	27.3
19	100.0	**0.0131**	19.7
16	96.5	**0.0094**	17.1
13.2	93.2	**0.0067**	13.3
9.5	91.0	**0.0033**	8.4
6.7	88.9	**0.0014**	5.6
4.75	85.9		
2	80.4		
0.85	75.3		
0.425	71.2		
0.25	66.5		
0.18	62.1		
0.15	59.8		
0.075	50.2		
0.053	44.5		
0.0468	40.1		

UNIFIED SOIL CLASSIFICATION SYSTEM



Project Manager: Kevin Leung **Approved By:** *Original Signed By*
Willie Rodych, Lab Supervisor
Date Approved: 25-Mar-09

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Grain Size Analysis & Hydrometer Test Report

ST08

Sample Test No.: 128749-3 **Report No.:** 1 **Date Reported:** 25-Mar-09

Project No.: brge00360897a
Project Name: Bell Crossing, Hwy 401 & Hurontario Street, Mississauga, Ontario

Grain Size Proportion (%)

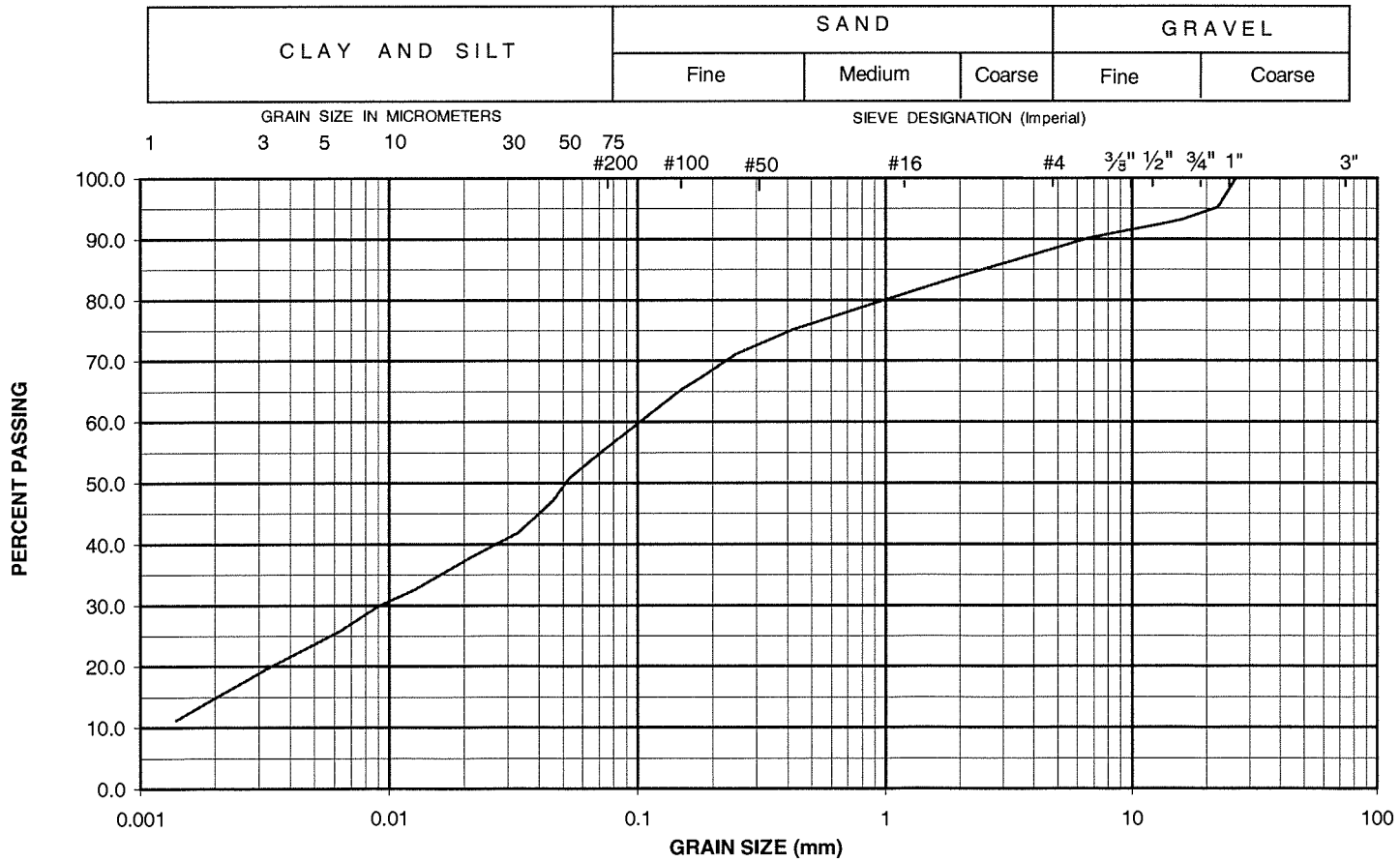
Gravel (> 4.75mm):	**11.6**
Sand (> 75µm, < 4.75mm):	**32.6**
Silt (> 2µm), < 75µm):	**41.8**
Clay (< 2µm):	**14.0**

Sample Information

Location: BH 1
Sample Method: SS
Sample No.: 5
Depth: 3.0 - 3.4m
Sample Description: Sandy Silt; some Clay and Gravel; Brown
Sampled By: Nebojsa Vaskovic
Sampling Date: 03/18/2009
Date Received: 03/18/2009
Client Sample ID:
Comments:

Grain Size (mm)	% Passing	Grain Size (mm)	% Passing
26.5	100.0	**0.0213**	37.9
22.4	95.2	**0.0125**	32.5
16	93.2	**0.0090**	29.9
13.2	92.5	**0.0064**	25.9
9.5	91.4	**0.0032**	19.5
6.7	90.2	**0.0014**	11.2
4.75	88.4		
2	83.9		
0.85	79.1		
0.425	75.2		
0.25	71.2		
0.18	67.3		
0.15	65.3		
0.075	55.8		
0.053	50.8		
0.0457	47.2		
0.0331	41.9		

UNIFIED SOIL CLASSIFICATION SYSTEM



Project Manager: Kevin Leung **Approved By:** *Original Signed By* **Date Approved:** 25-Mar-09

Willie Rodych, Lab Supervisor