

PRELIMINARY FOUNDATION INVESTIGATION AND  
DESIGN REPORT – STRUCTURAL AREAS  
FOUNDATION INVESTIGATION – 2  
HIGHWAY 69 ROUTE SELECTION STUDY  
3.5 km NORTH OF HIGHWAY 559 TO 3.8 km NORTH OF HIGHWAY 522  
G.W.P. 5377-02-00, HIGHWAY 69  
MTO GEOCRETS No. 41H - 57

Submitted to:

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## **1.0 INTRODUCTION**

AMEC Earth & Environmental, a division of AMEC Americas Limited (AMEC), Consulting Geotechnical, Construction Quality Control and Environmental Engineers, was retained by the Ministry of Transportation (Northeastern Region) to conduct a foundation investigation for Highway 69 Route Selection Study, from 3.5 km North of Highway 559 to 3.8 km North of Highway 522 (68.0 km) in Ontario.

A preliminary foundation investigation and design study had been carried out by Trow Associates Inc. (TROW, ref. brge00140201a dated 12 September 2005), on behalf of the Ministry of Transportation (MTO), for some of the structures and swamp crossings for the proposed four-laning of Highway 69. Additional soil information was required to determine the preferred route of the new four-lane highway. Forty-five (45) locations for additional investigation in structural areas were specified by MTO in the Terms of Reference as outlined in the Request for Quotation (Agreement Number: 5005-E-0033 dated 15 December 2005). Authorization to proceed with this investigation was signed by the Regional / Branch Director of MTO dated 19 December 2005. The work was carried out by AMEC according to the MTO Terms of Reference and AMEC's Proposal dated 28 November 2005.

This report (Foundation Investigation – 2) should be considered as “supplementary” to TROW's report (ref. brge00140201a dated 12 September 2005). As such, any information already provided in TROW's report that may be needed will only be referred and / or briefly discussed in this supplementary report.

The investigation was carried out by means of a limited number of boreholes, in-situ tests and laboratory tests on selected samples. Based on AMEC's interpretation of the data obtained, preliminary recommendations for structural areas are provided. The results of the investigation and preliminary foundation design for swamp areas are provided in a separate report (AMEC Report No. TT53126 – Swamp Areas dated 27 July 2006).



## **2.0 SITE DESCRIPTION**

The site for the foundation investigation extends along the existing Highway 69 (north of Parry Sound) - from 3.5 km north of Highway 559 (Township of Carling) to 3.8 km north of Highway 522 (Grundy Lake Provincial Park), with a total length of approximately 68 km. The general site location is shown on Figure No. 1 in Appendix B. Some sections of the proposed Highway 69 would pass through the First Nations' lands which belong to the Shawanaga First Nation, the Magnetewan First Nation and the Henvey Inlet First Nation. A few private lands would also be passed by the new highway.

The existing Highway 69 within the site for the foundation investigation is generally a two-lane undivided highway. The planned new four-lane Highway 69 within the site predominantly follows the alignment of the existing Highway 69. A significant change of the highway alignment under consideration is in the section of the existing highway located within Henvey Township (close to the northern study limit at Grundy Lake Provincial Park). The new highway alignment in that section could be in the order of 1 km from the existing highway alignment. Three possible alignments in this section are presently under consideration by the Ministry of Transportation. Four possible interchange locations are also under consideration. An overall outline of the planned alignment of the new Highway 69 is shown on Figure No. 2.

The topography of the site for the foundation investigation is generally undulating and covered by wooded areas and water bodies (lakes, rivers, and swamps). Rock outcrops and excavated rock slopes are visible in a number of sections along the existing highway. At the time of the foundation investigation, the majority of the site was covered by snow. Access to some of the borehole locations had to be prepared by an excavator for the drilling rig, while at some borehole locations, snowmobiles were used for transporting drilling equipment and personnel.

### **3.0 QUATERNARY AND BEDROCK GEOLOGY**

The physiography and geology of the site have been described in TROW's report (ref. brge00140201a dated 12 September 2005) and therefore will not be repeated in this report. Brief descriptions of the quaternary geology and bedrock geology are provided below for information.

#### **3.1 Quaternary Geology**

According to the Quaternary Geology of Ontario – Southern Sheet, the areas along Highway 69 are covered with a variety of deposits, the majority of which are as follows:

Glaciofluvial outwash deposits – gravel and sand; includes proglacial river and deltaic deposits.

Glaciolacustrine deposits – silt and clay, minor sand, basin and quiet water deposits.

Organic deposits – peat, muck and marl.

#### **3.2 Bedrock Geology**

According to the Bedrock Geology of Ontario – Southern Sheet, the bedrock along Highway 69 consists of the following rock types:

- Gneisses of metasedimentary origin;
- Migmatitic rocks and gneisses;
- Felsic igneous rocks (tonalite, granodiorite, monzonite, granite, syenite, derived gneisses);
- Tectonite unit (tectonites, various gneisses).

## **4.0 INVESTIGATION PROCEDURES**

### **4.1 Field Investigation**

In accordance with the Terms of Reference for this investigation, forty-five (45) locations in structural areas were to be investigated as listed in Table 1 of Appendix A. However, five (5) of the forty-five locations were placed in the Henvey Inlet First Nation's lands and permission to enter the lands was not granted for investigation. Thus, forty (40) of the forty-five (45) locations were investigated.

The fieldwork was performed from 16 January 2006 to 8 March 2006, starting with staking out the borehole locations, followed by preparing access for a drilling rig and drilling the boreholes using a track-mounted drilling rig or a portable drilling equipment. The borehole locations were surveyed and staked out in the field by an Ontario Land Surveyor firm (L.U. Maughan Co. Ltd.) according to the coordinates provided in the Terms of Reference (as listed in Table 1 of Appendix A), which were based on the MTM Zone 10 NAD 83 coordinate system.

A few boreholes specified in the Terms of Reference were slightly relocated with the approval of MTO (ref. e-mail from MTO to AMEC dated 23 January 2006) since they were located within the existing Highway 69 road surface where the soil conditions were known to be competent. Due to the possible variation in soil and groundwater conditions immediately around the specified borehole locations, additional test holes were normally put down in the vicinity of the specified borehole locations.

Rolling terrains and heavily-wooded areas were encountered in some of the borehole locations. An excavator was therefore used to prepare access for a drilling rig at those locations. As rock outcrops were visible at or near some borehole locations, the excavator was used to excavate test pits in the vicinity of those areas to determine and / or confirm the presence of bedrock. A track-mounted drilling rig (CME 55) was used to drill the boreholes where accessible and the ground could support the drilling rig. For drilling the boreholes that were located on ice-covered areas (particularly major swamps), portable drilling equipment was used. The portable drilling equipment and crew typically reached the boreholes by snowmobiles and / or on foot. The boreholes were drilled / investigated to depths ranging from about 0.1 m to 44.1 m below the existing ground surface.

The borehole locations established in the field by the survey crew are presented on Drawing Sheet Nos. 1 to 17 in Appendix B. The coordinates and the geodetic ground surface elevations at the specified borehole locations were surveyed by the surveyor and confirmed by a hand-held GPS unit prior to drilling. Existing geodetic benchmarks located within or close to the site were used for reference in surveying the borehole locations and elevations. The coordinates of the boreholes / test holes which were in addition to the boreholes specified by the Terms of Reference were surveyed by the hand-held GPS unit.

The majority of the boreholes were advanced using solid-stem continuous-flight augers with a track-mounted power-auger drilling rig, where accessible. Other boreholes were advanced by portable drilling equipment using wash-boring through a 100 mm diameter casing. The borehole investigation was under the full-time supervision of experienced geotechnical personnel from AMEC.

The boreholes were advanced at least to the anticipated depths shown in the Terms of Reference unless auger refusal was reached first. If the anticipated borehole depth was exceeded, further investigation was carried out by either Standard Penetration Testing (SPT) or Dynamic Cone Penetration Testing (DCPT). Where shallow possible bedrock was encountered, additional one location or more, in the vicinity of the specified borehole location, was investigated by DCPT or test pits in order to confirm the presence of bedrock.

Soil samples were normally taken at 1.5 m intervals to a depth of 15 m and subsequently at 3 m intervals beyond 15 m during the performance of Standard Penetration Test (SPT) in accordance with ASTM D1586. This consisted of freely dropping a 63.5 kg (140 lbs.) hammer for a vertical distance of 0.76 m (30 inches) to drive a 51 mm (2 inches) diameter O.D. split-barrel (split spoon) sampler into the ground. The number of blows of the hammer required to drive the sampler into the relatively undisturbed ground by a vertical distance of 0.30 m (12 inches) was recorded as SPT 'N' value of the soil which indicated the consistency of cohesive soils or the relative density of non-cohesive soils. The 63.5 kg (140 lbs.) hammer was used in both the track-mounted drilling rig and the portable drilling equipment using wash-boring. The majority of the boreholes were terminated due to auger refusal on possible bedrock, or SPT 'N' value in excess of 100 blows per 0.30 m.

The dynamic cone penetration test (DCPT) was carried out by advancing a steel cone into the ground with a 63.5 kg (140 lbs.) hammer. The number of blows per 0.3 m required to advance the cone was recorded and presented in the Record of Boreholes (Appendix C).

The test holes carried out at each location specified by the Terms of Reference are summarized in Table 2 (Appendix A).

Where soft clayey soils were encountered, MTO Field Vane Test was carried intermittently in the boreholes drilled by the track-mounted drilling rig. A smaller field vane was used in the boreholes advanced by the portable drilling equipment using the wash boring technique.

Soil samples were normally collected for each soil layer exposed in the test holes for laboratory inspection and testing.

Upon completion of drilling, the test holes were backfilled with bentonite in accordance with the general requirements of Ministry of the Environment Regulation 903 as indicated in the Record of Boreholes.

The soil samples were transported to AMEC's Advanced Soil Laboratory in Scarborough (Toronto) for further examination and laboratory soil testing. The program of laboratory testing included, where applicable, grain size analysis, Liquid and Plastic Limits, and in-situ water content determination.

The results of the in-situ and laboratory tests are presented in the corresponding Record of Boreholes (Appendix C) and Laboratory Test Results - Appendix D.

#### **4.2 Laboratory Tests**

Representative soil samples were subject to laboratory testing in AMEC's Advanced Soil Laboratory in Scarborough (Toronto) for soil classification. The following tests were conducted:

- Natural water content determination (65);
- Grain size distribution analysis (50); and
- Liquid and Plastic Limits (25).

The results of the laboratory tests are included in the Record of Boreholes in Appendix C. The grain size distribution curves and Liquid / Plastic Limits are shown in Figure Nos. 1 to 13 in Appendix D.

## 5.0 SUB-SURFACE CONDITIONS

The sub-surface soil conditions encountered at the specified borehole locations are summarized in Table 2 (Appendix A). The presence of bedrock was generally confirmed by test pit excavation and / or possible bedrock was confirmed by refusal to split-spoon / dynamic cone penetration at test locations adjacent to or near the specified borehole location. The following nomenclatures are used to identify the borehole / test hole and the associated test methods used:

- ST-X denotes Borehole No. X for a structural area as specified by the Terms of Reference (Table 1 in Appendix A).
- SW-X denotes Borehole No. X for a swamp area as specified by the Terms of Reference.
- ST-FN-X denotes Borehole No. X for a structural area as specified by the Terms of Reference that is located in the First Nation's land.
- ST-X (A) denotes Borehole No. X (A) for a structural area that was drilled in addition to the borehole (ST-X) specified by the Terms of Reference.
- ST-X (TP) denotes a test pit for a structural area that was in addition to the specified borehole (ST-X).
- ST-X (DCPT) denotes a dynamic cone penetration test for a structural area that was in addition to the specified borehole (ST-X).

The stratigraphic units and groundwater conditions for each borehole location are discussed in the following sections. Where necessary, the subsoil information encountered in the test holes that were carried out in addition to the specified borehole locations is also discussed. Detailed information is provided in the Record of Boreholes (Appendix C).

The groundwater level in each open test hole was observed during drilling and measured upon completion of drilling. The measured groundwater levels are shown in the Records of Boreholes (Appendix C). It should be noted that the groundwater at the site would fluctuate seasonally and can be expected to be somewhat higher during the spring months and in response to major weather events.

The following summary is to assist the designers of the project with an understanding of the anticipated soil conditions across the site. However, it should be noted that the soil and groundwater conditions may vary between the test hole locations.

### 5.1 New Shebeshekong Road Interchange (Drawing Sheet 1)

The new Shebeshekong Road Interchange to be located in the Township of Shawanaga and Shawanaga First Nation was investigated at the following two (2) locations in the structural area. All test holes for this site are listed in Table 2.

- ST-FN-1      Station 15+202      Offset 40R
- ST-FN-2      Station 15+202      Offset 40L

### Topsoil

Topsoil was encountered at the ground surface at both locations. The thickness of the topsoil was approximately 0.18 m at ST-FN-1 and 0.1 m at ST-FN-2.

### Sand and Gravel

The topsoil at ST-FN-1 was underlain by sand and gravel, approximately 0.2 m thick. The SPT 'N' value of the sand and gravel is more than 100 blows per 0.3 m (i.e., very dense relative density).

### Bedrock

The presence of bedrock in the vicinity of both locations was confirmed by test pits to be at the following depths:

ST-FN-1:	0.3 m to 0.6 m	(Elevation 213.5 m to 215.5 m)
ST-FN-2:	0.1 m to 0.5 m	(Elevation 214.9 m to 217.1 m)

### Groundwater

Groundwater was not noticed at the locations investigated.

## 5.2 Service Road / Existing Highway 69 South of Pointe au Baril (Drawing Sheet 2)

Two boreholes were located on the service road, across the existing Highway 69, in the Township of The Archipelago, as follows:

- ST-3:      Station 10+990      Offset 40R
- ST-4:      Station 11+040      Offset 40L

All test holes for this site are listed in Table 2.

### Topsoil

Topsoil, about 0.075 m thick, was encountered at both borehole locations.

## Sand / Silty Sand

A thick layer of sand was encountered in both boreholes and extended to a depth of about 12.4 m (Elevation 201.3 m) in ST-3 and 10.5 m (Elevation 199.4 m) in ST-4. A pocket / seam of silty sand was found in ST-4 from a depth of about 4.0 m to 5.5 m. The SPT 'N' values of the sand / silty sand vary significantly from 3 blows per 0.3 m to 48 blows per 0.3 m, indicating a very loose to dense relative density.

The results of laboratory tests conducted on five samples are as follows:

Natural moisture content (%):	15 to 23		
Grain size (5 samples):	Gravel (%):	0	
	Sand (%):	58 to 93	
	Silt (%):	20 and 40	(2 samples)
	Clay (%):	2 and 3	(2 samples)
	Silt and Clay (%):	7 to 30	(3 samples)

The grain size distribution curves are presented in Figure No. 10 in Appendix D.

## Possible Bedrock

Refusal to augering and dynamic cone penetration on possible bedrock was encountered at the following depths:

ST-3:	12.4 m	(Elevation 201.3 m)
ST-3 (DCPT):	12.0 m	(Elevation 201.0 m)
ST-4:	10.5 m	(Elevation 199.4 m)
ST-4 (DCPT):	8.2 m	(Elevation 201.8 m)

## Groundwater

Groundwater level was measured to be at a depth of 1.0 m (Elevation 212.7 m) in ST-3 and 1.0 m (Elevation 208.9 m) in ST-4, upon completion of drilling.

## 5.3 Pointe au Baril Interchange – Highway 529 (Drawing Sheet 3)

Two boreholes were drilled at the proposed Pointe au Baril (Highway 529) Interchange in the Township of The Archipelago, as follows:

- ST-5: Station 15+980 Offset 40L
- ST-6: Station 15+980 Offset 40R



All test holes for this site are listed in Table 2.

### **Topsoil**

The ST-5 location was covered by topsoil, about 0.07 m in thickness.

### **Asphaltic Pavement**

The ST-6 location was drilled through the existing pavement consisting of 50 mm thick asphaltic concrete overlying sand and gravel fill, approximately 0.3 m in thickness.

### **Sand**

At ST-6, the existing asphaltic pavement was underlain by a sand deposit that extended to a depth of about 12.8 m (Elevation 187.7 m). The sand deposit was interbedded by silty clay. The SPT 'N' values of the sand deposit are 4 and 9 blows per 0.3 m (loose relative density) in the upper 4 m, and 18 and 45 blows per 0.3 m from a depth of about 10 m to 12.8 m below the existing ground surface.

The results of laboratory tests conducted on two samples are as follows:

Natural moisture content (%):	15 and 21	
Grain size (2 samples):	Gravel (%):	0 and 17
	Sand (%):	62 and 85
	Silt and clay (%):	15 and 21

The grain size distribution curves are shown in Figure No. 10 in Appendix D.

### **Silty Clay**

At ST-6, a silty clay deposit was interbedded in the sand deposit from a depth of about 4 m (Elevation 196.5 m) to 10.0 m (Elevation 190.5 m). The SPT 'N' values of the silty clay range from 2 to 9 blows per 0.3 m, indicating a very soft to stiff consistency. Two field vane tests performed in this deposit resulted in undrained strengths of 35 kPa (sensitivity of 1.7) and 110 kPa (sensitivity of 2.5).

The results of laboratory tests conducted on one sample are as follows:

Natural moisture content (%):	65
Liquid / Plastic Limits:	48 / 17

Grain size (one sample):	Gravel (%):	1
	Sand (%):	4
	Silt (%):	40
	Clay (%):	55

The grain size distribution curve is shown in Figure No. 12 and the liquid limit is plotted on the plasticity chart (Figure No. 4 in Appendix D).

### **Bedrock / Possible Bedrock**

In the vicinity of ST-5, the presence of bedrock was confirmed to be from the ground surface to a depth of about 0.9 m (Elevation 205.5 m to 208.0 m)

At ST-6, possible bedrock as indicated by refusal to split-spoon penetration and dynamic cone penetration was encountered at a depth of about 12.8 m (Elevation 187.7 m).

### **Groundwater**

Groundwater was not noticeable at both locations.

## **5.4 Point au Baril - Highway 529 Extension (Drawing Sheet 4)**

Two locations were investigated for the Pointe au Baril – Highway 529 Extension in the Township of The Archipelago, as follows:

- ST-7: Station 21+444 Offset 18.75L
- ST-8: Station 21+455 Offset 18.75R

All test holes for this site are listed in Table 2.

### **Asphaltic Pavement**

ST-7 was drilled on the existing pavement which consisted of 60 mm thick asphaltic concrete overlying sand and gravel fill that extended to a depth of about 1.1 m (Elevation 190.0 m).

### **Topsoil**

At ST-8, the ground surface was covered with topsoil of which the thickness was approximately 0.25 m.

### **Silty Sand**

At ST-8, the topsoil was underlain by silty sand that extended to a depth of about 0.5 m (Elevation 199.9 m). The silty sand is brown and contains some gravel.

### **Bedrock / Possible Bedrock**

At ST-7, possible bedrock was encountered at a depth of about 0.8 m to 1.1 m (Elevation 190.0 m to 190.3 m).

In the vicinity of ST-8, bedrock was confirmed at a depth ranging from about 0.2 m to 0.5 m (Elevation 199.8 m to 207.7 m).

### **Groundwater**

Groundwater was not encountered at both locations.

## **5.5 Pointe au Baril – Service Road North of Moose Lake (Drawing Sheet 5)**

Two boreholes were drilled on Moose Lake Road at Highway 69 in the Township of The Archipelago, as follows:

- ST-9:                Station 22+086                Offset 32R
- ST-10:             Station 22+086                Offset 32L

All test holes for this site are listed in Table 2.

### **Asphaltic Concrete**

ST-9 was drilled on the existing pavement which consisted of 100 mm thick asphaltic concrete overlying 0.2 m thick sand fill.

### **Peat**

At ST-10, the ground surface was covered with a peat deposit that extended to a depth of about 0.8 m (Elevation 205.2 m). The dark brown peat contained sand and rootlets, and was fibrous and wet. The measured natural moisture content of the peat was 41 %.

### **Sand**

At ST-9, the asphaltic concrete and sand fill was underlain by sand that extended to a depth of about 1.2 m (Elevation 205.7 m).

The results of laboratory tests conducted on one sample are as follows:

Natural moisture content (%):	2
Grain size (one sample):	Gravel (%): 19
	Sand (%): 61
	Silt (%): 19
	Clay (%): 1

The grain size distribution curve is presented in Figure No. 10 in Appendix D.

### **Possible Bedrock**

At ST-9, possible bedrock was encountered at a depth of about 1.2 m (Elevation 205.7 m). Bedrock was visible at ST-9A located about 20 m west of ST-9 (Elevation 208.9 m).

At ST-10 and ST-10A (located about 5 m south of ST-10), possible bedrock was found at a depth of 0.8 m (Elevation 205.2 m) and 0.2 m (Elevation 204.8 m), respectively.

### **Groundwater**

No groundwater was noticeable at both locations.

## **5.6 Harris Lake Road Interchange (Drawing Sheet 6)**

The following two locations were investigated at Harris Lake Road Interchange in Wallbridge Township.

- ST-11: Station 11+456 Offset 40L
- ST-12: Station 11+456 Offset 40R

All test holes for this site are listed in Table 2.

### **Topsoil**

Both locations were covered with topsoil of which the thickness was about 0.15 m at ST-11 and 0.05 m at ST-12.

### **Bedrock**

Bedrock was confirmed in the vicinity of both locations at a depth of about 0.15 m and 0.9 m (Elevation 195.1 m in ST-11 (TP) and Elevation 196.2 m in ST-11), and about 0.05 m and 1.0 m

.../...

(Elevation 198.0 m in ST-12 (TP) and Elevation 199.3 m in ST-12). In ST-11 (TP), sand and gravel was encountered between the topsoil and the bedrock, i.e., between a depth of 0.3 m (Elevation 195.7 m) and 0.9 m (Elevation 195.1 m). In ST-12 (TP), rock fragments were found between the topsoil and the bedrock, i.e., between a depth of 0.4 m (Elevation 198.6 m) and 1.0 m (Elevation 198.0 m).

## **Groundwater**

Groundwater was not noticed at both locations.

## **5.7 Magnetawan River NB Lanes (Drawing Sheet 7)**

Two locations were investigated at the existing Highway 69 crossing Magnetawan River, as follows:

- |             |                |               |
|-------------|----------------|---------------|
| • ST-FN-13: | Station 21+663 | Offset 18.75R |
| • ST-14:    | Station 21+730 | Offset 18.75R |

All test holes for this site are listed in Table 2.

## **Topsoil**

Topsoil was encountered at both locations. The thickness of the topsoil was approximately 0.18 m at ST-FN-13 and 0.10 m at ST-14.

## **Clayey Silt**

At ST-FN-13, the topsoil was underlain by clayey silt that extended to a depth of about 0.5 m (Elevation 178.3 m). The clayey silt contains some sand, gravel and rootlets. A single SPT 'N' value of the clayey silt is 12 blows per 0.3 m (stiff consistency). The natural moisture content measured in one sample of the clayey silt is 52 %.

## **Bedrock**

The presence of bedrock was confirmed in the vicinity of both locations investigated. The depths to bedrock in the vicinity of ST-FN-13 range from the ground surface to 0.6 m (Elevation 176.5 m to 181.9 m). In the vicinity of ST-14, the depths of bedrock vary from 0.1 m to 0.4 m (Elevation 181.2 m to 184.8 m).

## **Groundwater**

Groundwater was not noticeable at both locations investigated.

## 5.8 Existing Highway 69 South of Highway 526 (Drawing Sheet 8)

The following two locations were investigated at the existing Highway 69, south of Highway 526, for the I1-K2a / PIC# 3 alignment.

- ST-15: Station 11+200 Offset 18.75L
- ST-16: Station 11+295 Offset 18.75R

All test holes for this site are listed in Table 2.

### Topsoil

The ground surface at ST-16 was covered by topsoil with a thickness of about 0.2 m.

### Silty Clay / Clayey Silt

At ST-15, silty clay / clayey silt was encountered from the ground surface down to a depth of about 1.2 m (Elevation 185.7 m). One SPT 'N' value (5 blows per 0.3 m) was measured in the silty clay / clayey silt near the ground surface, indicating a firm consistency.

The results of laboratory tests conducted on one sample are as follows:

Natural moisture content (%):	33
Liquid / Plastic Limits:	32 / 18
Grain size (one sample):	Gravel (%): 0
	Sand (%): 4
	Silt (%): 79
	Clay (%): 27

The grain size distribution curve is shown in Figure No. 12 and the liquid limit is plotted on the plasticity chart (Figure No. 1 in Appendix D).

### Rock Fragments

The topsoil in ST-16 was underlain by rock fragments down to a depth of about 0.7 m (Elevation 189.5 m). The rock fragments contain some sand, silt and gravel.

### Bedrock / Possible Bedrock

At ST-15 and ST-15A, bedrock was possibly present at a depth of about 1.2 m (Elevation 185.7 m) and 1.8 m (Elevation 184.7 m), respectively.

At ST-16 and its vicinity (ST-16 (TP1) to ST-16 (TP3)), bedrock was confirmed at a depth ranging from about 0.1 m to 0.8 m (Elevation 188.9 m to 190.8 m).

## Groundwater

Groundwater was not noticed at both locations and their vicinity.

## 5.9 Highway 526 Interchange / CPR / Still River (Drawing Sheet 8)

Three locations were investigated at the Highway 526 Interchange / CPR / Still River for the I1-K2a / PIC# 3 alignment, as follows:

- ST-17          Station 11+655          Offset 18.75R
- ST-18          Station 11+727          Offset 18.75L
- ST-19          Station 11+767          Offset 18.75R

All test holes for this site are listed in Table 2.

## Topsoil

The location of ST-19 was covered with topsoil, the thickness of which was approximately 0.36 m.

## Gravelly Sand

At ST-18, gravelly sand was encountered from the ground surface to a depth of about 1.2 m (Elevation 177.8 m). One SPT 'N' value (33 blows per 0.3 m) was measured in the gravelly sand, indicating a dense relative density.

The results of laboratory tests carried out on one sample are as follows:

Natural moisture content (%):	8
Grain size (1 sample):	Gravel (%): 32
	Sand (%): 55
	Silt (%): 12
	Clay (%): 1

The grain size distribution curve is presented in Figure No. 11 in Appendix D.

## Silt and Sand

At ST-19, the topsoil was underlain by silt and sand that extended to a depth of 1.7 m (Elevation 180.9 m). The SPT 'N' values of the silt and sand range from 3 to 6 blows per 0.3 m, indicating a very loose to loose relative density.

The results of laboratory tests carried out on one sample are as follows:

Natural moisture content (%):	17
Grain size (1 sample):	Gravel (%): 0
	Sand (%): 41
	Silt (%): 57
	Clay (%): 2

The grain size distribution curve is shown in Figure No. 11 in Appendix D.

## Bedrock

The presence of bedrock / possible bedrock was confirmed / identified by refusal to borehole advance and / or test pit excavation. The depths to bedrock / possible bedrock are as follows:

ST-17 (2 locations):	at surface and 0.7 m	(Elevation 177.3 m and 181.1 m)
ST-18 (2 locations):	1.1 m and 1.2 m	(Elevation 177.8 m and 177.9 m)
ST-19 (4 locations):	0.1 m to 1.7 m	(Elevation 178.7 m to 183.8 m)

## Groundwater

At ST-17, groundwater was not noticed although at ST-17 (TP), ice and water up to a depth of about 0.7 m was encountered over bedrock.

Groundwater was encountered in ST-18 at a depth of about 0.8 m (Elevation 178.2 m).

Groundwater was not encountered in ST-19 and the test pits excavated nearby.

## 5.10 Britt K2 Interchange (Drawing Sheet 9)

Two locations were investigated at the K2-revised alignment in the Henvey Township, as follows:

- ST-20: Station 10+930 Offset 40R
- ST-21: Station 10+930 Offset 40L



All test holes for this site are listed in Table 2.

### **Topsoil**

The ground surface at both ST-20 and ST-21 locations was covered by topsoil with a thickness of about 0.1 m and 0.6 m, respectively.

### **Bedrock**

The presence of bedrock in the vicinity of ST-20 and ST-21 was confirmed by test pit excavation. The depths to bedrock are as follows:

ST-20:	0.1 m to 0.2 m	(Elevation 195.3 m to 197.6 m)
ST-21:	surface to 0.7 m	(Elevation 196.4 m to 198.9 m)

### **Groundwater**

Groundwater was not encountered at ST-20 and ST-21 and their vicinity investigated.

## **5.11 K2a – Still River (Drawing Sheet 10)**

The following two borehole locations were investigated near Still River, for the K2a-revised alignment.

- ST-22: Station 11+874 Offset 18.75L
- ST-23: Station 11+925 Offset 18.75R

### **Topsoil**

The ground surface at ST-22 and ST-23 was covered by topsoil with a thickness of about 0.36 m and 0.46 m, respectively.

In ST-22, the topsoil was underlain by a thin pocket of sandy silt that extended to a depth of about 0.6 m (Elevation 180.5 m). The sandy silt contains trace clay and organic matters.

### **Silty Clay / Clayey Silt**

In ST-22, the topsoil and sandy silt were underlain by silty clay / clayey silt that extended to a depth of about 3.4 m (Elevation 177.8 m). The SPT 'N' values of the silty clay / clayey silt are 9 and 14 blows per 0.3 m, indicating a stiff consistency.

The results of laboratory tests conducted on one sample are as follows:

Natural moisture content (%): 35

Liquid / Plastic Limits: 34 / 15

Grain size (1 sample):

Gravel (%):	0
Sand (%):	7
Silt (%):	60
Clay (%):	33

The grain size distribution curve is shown in Figure No. 12 and the liquid limit is plotted on the plasticity chart (Figure No. 1 in Appendix D).

### **Sand / Sandy Silt / Silty Sand**

The silty clay / clayey silt in ST-22 was underlain by sand overlying sandy silt / silty sand deposits to a depth of about 9.1 m (Elevation 172.0 m). The topsoil in ST-23 was underlain by silty sand that extended to a depth of about 5.5 m (Elevation 172.0 m). The SPT 'N' values of the sand / sandy silt / silty sand deposits range widely from 1 to 47 blows per 0.3 m, indicating a very loose to dense relative density.

The results of laboratory tests conducted on one sample of sandy silt / silty sand are as follows:

Natural moisture content (%): 19

Grain size (1 sample):

Gravel (%):	0
Sand (%):	34
Silt and clay (%):	66

The grain size distribution curve is shown in Figure No. 8 in Appendix D.

### **Silt**

In ST-23, the silty sand was underlain by silt that extended to a depth of 11.7 m (Elevation 165.7 m). The SPT 'N' values of the silt vary from 1 to 4 blows per 0.3 m, indicating a very soft consistency / very loose relative density. The field vane shear strengths range from 15 kPa to 25 kPa with a sensitivity of 1.0 to 1.5.

The results of laboratory tests carried out on two samples are as follows:

Natural moisture content (%): 25 (non-plastic, SS 5) and 41 (plastic, SS 7)

Liquid / Plastic Limits: 27 / 17 (Sample SS 7)

Grain size (2 samples):	Non-plastic (SS 5)	Plastic (SS 7)
Gravel (%):	0	0
Sand (%):	16	0
Silt (%):	78	75
Clay (%):	6	25

The grain size distribution curves are shown in Figure No. 8 and the liquid limit is plotted on the plasticity chart (Figure No. 1 in Appendix D).

### Clay and Silt

The sand / sandy silt / silty sand deposits in ST-22 and the silt in ST-23 were underlain by a thick layer of clay and silt that possibly extended to a depth of about 30 m to 35 m (Elevation 146.0 m to 147.0 m). The SPT 'N' values of the clay and silt vary from 3 to 20 blows per 0.3 m (very soft to very stiff consistency) above a depth of about 25 m to 28 m. The clay and silt deposits possibly extend to a depth of about 30 m to 35 m as indicated by dynamic cone penetration. The consistency of the possible clay and silt deposits below a depth of about 25 m to 28 m should be very stiff to hard as indicated by cone resistances of more than 40 blows per 0.3 m. Cone resistances of 100 blows per 0.3 m or higher are achieved at a depth of about 34.7 m (Elevation 146.3 m) in ST-22 and 30 m (Elevation 147.5 m) in ST-23. The field vane shear strengths range from 24 kPa to 98 kPa with a sensitivity of 1.4 to 2.2.

The results of laboratory tests conducted on four (4) samples are as follows:

Natural moisture content (%):	47 to 53
Liquid / Plastic Limits:	49 to 54 / 18 to 19
Grain size (4 samples):	Gravel (%): 0
	Sand (%): 1 to 3
	Silt (%): 40 to 44
	Clay (%): 55 to 58

The grain size distribution curves are shown in Figure No. 12 and the liquid limits are plotted on the plasticity chart (Figure Nos. 4 and 6 in Appendix D).

### Groundwater

Due to the use of wash boring, the groundwater levels observed during drilling are not representative. However, based on the soil conditions encountered, groundwater levels should be within 1 m to 2 m below the existing ground surface.

## 5.12 I1-K2a - Existing Highway 69 (Drawing Sheet 11)

Two locations were investigated near the existing Highway 69 in the Henvey Township for the I1-K2a alignment, as follows:

- ST-24: Station 14+200 Offset 18.75R
- ST-25: Station 14+350 Offset 18.75L

All test holes at this site are listed in Table 2.

### Topsoil

The ground surface at ST-24 was covered by topsoil with a thickness of about 0.05 m.

### Asphaltic Pavement

ST-25 was drilled through the existing pavement which was found to consist of 130 mm thick asphaltic concrete overlying sand and gravel fill to a depth of about 0.5 m (Elevation 190.5 m).

### Bedrock / Possible Bedrock

The presence of bedrock or possible bedrock in the vicinity of the locations investigated was identified by refusal to borehole advance and / or test pit excavation. The depths to bedrock or possible bedrock are as follows:

ST-24:	0.1 m to 0.4 m	(Elevation 192.8 m to 194.5 m)
ST-25:	0.5 m and 0.8 m	(Elevation 190.0 m and 190.5 m)

### Groundwater

Groundwater was not encountered in the two locations investigated.

## 5.13 I1-K2a - CPR (Drawing Sheet 11)

The following two locations were investigated for the I1-K2a crossing CPR in the Henvey Township.

- ST-26: Station 14+800 Offset 18.75R
- ST-27: Station 14+925 Offset 18.75L

All test holes for this site are listed in Table 2.

## **Ice**

The ground surface at ST-27 was covered by 0.3 m thick ice.

## **Sand / Silty Sand / Sandy Silt**

The ground surface at ST-26 was covered with sand down to a depth of about 1.1 m (Elevation 181.7 m). In ST-27, silty sand was found underneath the ice and extended to a depth of about 1.5 m (Elevation 179.1 m). In ST-26, a sandy silt pocket was found from a depth of about 5.9 m to 7.0 m (Elevation 176.9 m to 175.8 m). The SPT 'N' values of the sand and sandy silt deposits found in ST-26 are 6 (loose) and 0 (very loose) blows per 0.3 m, respectively.

The results of laboratory tests carried out on two samples are as follows:

Natural moisture content (%):	17 and 25
Liquid / Plastic Limits:	14 / 13 (one sample in ST-26)
Grain size (two samples):	Gravel (%): 0
	Sand (%): 28 and 79
	Silt (%): 17 and 65
	Clay (%): 4 and 7

The grain size distribution curves are presented in Figure Nos. 8 and 11 and the liquid limit is plotted on the plasticity chart (Figure No. 3 in Appendix D).

## **Silty Clay / Silt and Clay**

In ST-26, the sand was underlain by silty clay / silt and clay deposits that extended to a depth of about 5.9 m (Elevation 176.9 m). In ST-27, the silty sand was underlain by silty clay / silt and clay deposits down to a depth of about 10.2 m (Elevation 170.4 m). The SPT 'N' values of the silty clay / silt and clay deposits vary from 1 to 5 blows per 0.3 m, indicating a very soft to firm consistency. The measured field vane shear strengths range from 28 kPa to 56 kPa with a sensitivity range of 2.3 to 4.0.

The following laboratory results are obtained from testing three (3) samples.

Natural moisture content (%):	37 to 78
Liquid / Plastic Limits:	36 to 43 / 16 to 19

Grain size (3 samples):	Gravel (%):	0
	Sand (%):	2 to 4
	Silt (%):	46 to 56
	Clay (%):	40 to 52

The grain size distribution curves are shown in Figure Nos. 12 and 13 and the liquid limits are plotted on the plasticity chart (Figure No. 4 in Appendix D).

### Silt

The silty clay / silt and clay deposits in both ST-26 and ST-27 were underlain by silt that extended to at least a depth of about 12.7 m (Elevation 170.1 m) in ST-26 and 11.1 m (Elevation 169.4 m) in ST-27. The SPT 'N' values of the silt deposits range from 2 to 4 blows per 0.3 m (very soft to soft) in ST-26 and the only one SPT 'N' value measured in the silt in ST-27 is 14 blows per 0.3 m (compact relative density). The field vane shear strengths of the silt deposits measured in ST-26 vary from 28 kPa to 77 kPa with a sensitivity range of 2.0 to 2.5.

In ST-26, the silty / clayey deposits likely extend below a depth of about 12.7 m (Elevation 170.1 m) as indicated by the resistances to dynamic cone penetration which gradually increase with depth from 2 blows per 0.3 m at a depth of about 13.0 m to 50 blows per 0.3 m at a depth of about 29.2 m. A cone resistance of more than 100 blows per 0.3 m is encountered at a depth of about 29.4 m (Elevation 153.4 m). A cone resistance of more than 100 blows per 0.3 m is also encountered in ST-26 (DCPT) located about 6 m east of ST-26, at and below a depth of about 26.6 m (Elevation 156.2 m).

In ST-27, the silty / clayey deposits likely extend below a depth of about 11.1 m (Elevation 169.4 m) as indicated by the resistances to dynamic cone penetration which are close to 0 blows per 0.3 m until a depth of about 13.3 m (Elevation 167.3 m) where a cone resistance of more than 100 blows per 0.3 m is encountered. In ST-27 (DCPT) located about 5 m south and 2 m east of ST-27, the cone resistances increase gradually with depth until a resistance of more than 100 blows per 0.3 m is measured at a depth of about 10.6 m (Elevation 170.3 m).

The results of laboratory tests conducted are as follows:

Natural moisture content (%):	20 to 29
Liquid / Plastic Limits:	18 to 26 / 13 to 16
Grain size (five samples):	Gravel (%): 0
	Sand (%): 2 to 16
	Silt (%): 72 to 90
	Clay (%): 3 to 22

The grain size distribution curves are presented in Figure No. 8 and the liquid limits are plotted on the plasticity chart (Figure Nos. 1, 2 and 3 in Appendix D).

## Groundwater

Groundwater was encountered at a depth of 0.6 m (Elevation 182.2 m) in ST-26 and 3.7 m (Elevation 176.9 m) in ST-27.

### 5.14 PIC# 3 Beckanon Interchange (Drawing Sheet 12)

Two locations, ST-FN-28 (Station 18+521, Offset 40R) and ST-FN-29 (Station 18+521, Offset 40L), were planned to be investigated at the proposed PIC# 3 Beckanon Interchange. However, the two locations are located on the Henvey Inlet First Nation's lands and permission to enter the lands for drilling has not been granted. MTO has therefore cancelled the investigation at the two locations.

### 5.15 I1-K2a Beckanon Interchange (Drawing Sheet 13)

Two locations were investigated at the proposed I1-K2a Beckanon Interchange located in the Henvey Township, as follows:

- ST-30: Station 19+700 Offset 40R
- ST-31: Station 19+700 Offset 40L

All test holes for this site are listed in Table 2.

## Topsoil

The ground surface at ST-30 and ST-31 was covered by topsoil with a thickness of about 0.1 m.

## Rock Fragments

The topsoil was underlain by rock fragments that extended to a depth of about 0.8 m (Elevation 200.7 m) in ST-30 and 0.5 m (Elevation 198.8 m) in ST-31. The rock fragments were mixed with some silt, sand and rootlets.

## Bedrock

The presence of bedrock in the vicinity of the boreholes was confirmed by test pit excavation. The depths to bedrock are as follows:

ST-30:	0.6 m to 1.0 m	(Elevation 199.2 m to 201.3 m)
ST-31:	surface to 0.5 m	(Elevation 198.4 m to 201.8 m)

## Groundwater

Groundwater was not encountered at the two locations investigated. However, groundwater at ST-30 (TP2) located in the vicinity of ST-30 was at 0.8 m (Elevation 199.40 m).

### 5.16 PIC#3 Straight Lake (Drawing Sheet 14)

Two locations, ST-FN-32 (Station 20+975, Offset 18.75L) and ST-FN-33 (Station 21+300, Offset 18.75R), were planned to be investigated at the proposed PIC# 3 Straight Lake. However, the two locations are located on the Henvey Inlet First Nation's lands and permission to enter the lands for drilling has not been granted. MTO has therefore cancelled the investigation at the two locations.

### 5.17 I1-K2a CPR (Drawing Sheet 15)

The following two locations were investigated at the proposed I1-K2a CPR in Mowat Township.

- ST-34: Station 11+350 Offset 18.75L
- ST-35: Station 11+425 Offset 18.75R

All test holes for this site are listed in Table 2.

## Topsoil

The ground surface at ST-34 and ST-35 was covered by topsoil with a thickness of about 0.05 m and 0.26 m, respectively.

## Bedrock

The presence of bedrock in the vicinity of ST-34 and ST-35 was identified by test pit excavation. The depths to bedrock are as follows:

ST-34:	surface to 0.4 m	(Elevation 196.6 m to 202.9 m)
ST-35:	0.2 m to 1.5 m	(Elevation 189.5 m to 199.4 m)

## Groundwater

Groundwater was not encountered in the vicinity of ST-34 and ST-35.



## 5.18 I1-K2a Straight Lake (Drawing Sheet 15)

The following three locations were investigated at the proposed I1-K2a Straight Lake:

- ST-36            Station 11+590            Offset 18.75L
- ST-37            Station 11+720            Offset 18.75R
- ST-FN-38       Station 11+815            Offset 18.75L

All test holes for this site are listed in Table 2.

ST-FN-38 is located on the Henvey Inlet First Nation's land and permission to enter the location for drilling is not granted. MTO therefore cancelled the location for investigation.

### Ice and Water

At ST-37, the ground surface was covered with ice and water to a depth of about 3.1 m (Elevation 175.5 m).

### Topsoil

At ST-36, the ground surface was covered by topsoil with a thickness of about 0.2 m.

### Silty Clay / Silt and Clay / Clayey Silt

At ST-37, thick deposits of silty clay / silt and clay / clayey silt were found underneath the ice and water and extended to a depth of about 24.6 m (Elevation 153.9 m). The SPT 'N' values of the silty clay / silt and clay / clayey silt deposits vary from 0 to 8 blows per 0.3 m (very soft to firm consistency), except for a SPT 'N' value of more than 100 blows per 0.3 m measured at a depth of 12.4 m (Elevation 166.2 m) that is likely caused by cobbles. The field vane shear strengths range from 15 kPa to 77 kPa with a sensitivity range of 1.6 to 2.5.

The results of laboratory tests conducted on three (3) samples are as follows:

Natural moisture content (%):	44 to 51
Liquid / Plastic Limits:	35 to 55 / 16 to 19
Grain size (two samples):	Gravel (%): 0
	Sand (%): 0 to 6
	Silt (%): 36 to 58
	Clay (%): 36 to 64

The grain size distribution curves are presented in Figure No. 13 and the liquid limits are plotted

on the plasticity chart (Figure Nos. 1, 4 and 6 in Appendix D).

### **Silt / Sandy Silt / Silt and Sand**

The silty clay / silt and clay / clayey silt deposits in ST-37 were underlain by silt / sandy silt / silt and sand deposits that extended to a depth of at least 37 m (Elevation 141.5 m). The SPT 'N' values of the silt / sandy silt / silt and sand deposits range from 45 to 64 blows per 0.3 m (dense to very dense relative density), except for a SPT 'N' value of 12 blows per 0.3 m (compact relative density) measured at a depth of about 27.6 m (Elevation 150.8 m).

The results of laboratory tests conducted on two samples are as follows:

Natural moisture content (%):	18 and 25
Liquid / Plastic Limits:	21 / 14 (one sample)
Grain size (2 samples):	Gravel (%): 0
	Sand (%): 4 and 47
	Silt (%): 49 and 89
	Clay (%): 4 and 7

The grain size distribution curves are shown in Figure Nos. 8 and 9 and the liquid limit is plotted on the plasticity chart (Figure No. 2 in Appendix D).

### **Bedrock**

The presence of bedrock in the vicinity of ST-36 was identified by test pit excavation. The depths to bedrock range from the ground surface to 0.6 m (Elevation 177.4 m to 185.6 m).

### **Groundwater**

Groundwater was not noticed at the location of ST-36, while the ground surface at ST-37 (Elevation 178.5 m) was covered with ice and water.

## **5.19 Key River (Drawing Sheet 16)**

The following three locations were investigated at Key River in the Mowat Township:

- ST-39      Station 10+030      Offset 18.75L
- ST-40      Station 10+120      Offset 18.75L
- ST-41      Station 10+151      Offset 18.75R

All test holes for this site are listed in Table 2.

## Ice and Water

At ST-40, the ground surface was covered with ice and water to a depth of about 4.4 m (Elevation 171.5 m).

At ST-40(A) located about 28 m south of ST-40, the ground surface was covered with ice and water to a depth of about 8.8 m (Elevation 167.1 m).

## Topsoil

At ST-39 and ST-41, the ground surface was covered by topsoil with a thickness of about 0.1 m.

## Silt

At ST-40, silt was encountered at the bottom of the ice and water and extended to a depth of about 5.0 m (Elevation 170.9 m). One SPT 'N' value (0 blow per 0.3 m – very soft consistency) was measured in the silt.

The results of laboratory tests conducted on one sample of the silt are as follows:

Natural moisture content (%):	85
Liquid / Plastic Limits:	40 / 26
Grain size (1 sample):	Gravel (%): 0
	Sand (%): 1
	Silt (%): 84
	Clay (%): 15

The grain size distribution curve is presented in Figure No. 9 and the liquid limit is plotted on the plasticity chart (Figure No. 5 in Appendix D).

## Clayey Silt / Silty Clay

At ST-40(A), clayey silt / silty clay deposits were found underlying the ice and water to a depth of at least 14.3 m (Elevation 161.6 m) as identified by split-spoon sampling. The clayey silt / silty clay deposits are likely to extend to a depth of about 24.2 m (Elevation 151.7 m) as indicated by dynamic cone penetration testing. The two measured SPT 'N' values of the clayey silt / silty clay are both 0 blow per 0.3 m, indicating a very soft consistency. The resistances to dynamic cone penetration gradually increase with depth until reaching refusal (more than 100 blows per 0.3 m) at a depth of about 24.2 m (Elevation 151.7 m). Two measured field vane shear strengths are 21 kPa and 28 kPa with a sensitivity of 3 and 2, respectively.

The results of laboratory tests conducted on one sample are as follows:

Natural moisture content (%):	124
Liquid / Plastic Limits:	59 / 42
Grain size (1 sample):	Gravel (%): 0
	Sand (%): 2
	Silt (%): 68
	Clay (%): 30

The grain size distribution curve is presented in Figure No. 13 and the liquid limit is plotted on the plasticity chart (Figure No. 7 in Appendix D).

### **Bedrock / Possible Bedrock**

The presence of bedrock in the vicinity of ST-39 and ST-41 was identified by test pit excavation while the presence of possible bedrock in ST-40 and ST-40(A) was indicated by refusal to Standard Penetration Test and Dynamic Cone Penetration Test. The depths to bedrock / possible bedrock are as follows:

ST-39:	surface to 0.1 m	(Elevation 178.4 m to 198.9 m)
ST-40:	5.0 m and 24.2 m	(Elevation 151.7 m and 170.9 m)
ST-41:	surface to 0.5 m	(Elevation 180.9 m to 197.6 m)

### **Groundwater**

Groundwater was not noticed in the vicinity of ST-39 and ST-41, while the ground surface at ST-40 (Elevation 175.9 m) was covered with ice and water.

### **5.20 CNR (Drawing Sheet 17)**

The following two boreholes were drilled at the CNR in the Mowat Township.

- ST-42: Station 12+081 Offset 18.75L
- ST-43: Station 12+108 Offset 18.75R

All test holes for this site are listed in Table 2.

### **Ice**

At ST-42, the ground surface was covered with ice, approximately 0.2 m thick.

.../...

## Topsoil

At ST-43, the ground surface was covered by topsoil with a thickness of about 0.13 m.

## Peat

At ST-42, a thick peat deposit was encountered underneath the ice cover and extended to a depth of about 4.3 m (Elevation 176.0 m). The peat is dark brown / black, fibrous and wet. Two SPT 'N' values measured in the peat deposit are both 0 blow per 0.3 m, indicating a very soft consistency. Two field vane shear strengths are both 11 kPa with a sensitivity of 2. Two measured natural moisture contents are 90 % and 112 %.

## Silt / Clayey Silt / Silty Clay / Silt and Clay

At ST-42, thick deposits of silt / clayey silt / silty clay / silt and clay were found underneath the peat and extended to a depth of about 26.1 m (Elevation 154.1 m). A pocket or seam of sand was encountered within the silty / clayey deposits from a depth of about 7.3 m (Elevation 172.9 m) to 10.1 m (Elevation 170.2 m). The SPT 'N' values of the silty / clayey deposits vary predominantly from 0 to 3 blows per 0.3 m (very soft consistency), except below a depth of about 21.5 m (Elevation 158.7 m) where two SPT 'N' values measured are 17 and 9 blows per 0.3 m (very stiff and stiff consistency, respectively). The field vane shear strengths range from 27 kPa to 55 kPa with a sensitivity range of 1.7 to 2.3.

The results of laboratory tests conducted on five (5) samples are as follows:

Natural moisture content (%):	24 to 134
Liquid / Plastic Limits:	31 to 63 / 15 to 44
Grain size (two samples):	Gravel (%): 0
	Sand (%): 0 to 23
	Silt (%): 60 to 82
	Clay (%): 5 to 40

The grain size distribution curves are presented in Figure Nos. 9 and 13 and the liquid limits are plotted on the plasticity charts (Figure Nos. 1, 4 and 7 in Appendix D).

At ST-43, thick deposits of clayey silt / silt were encountered underlying the topsoil and extended to a depth of about 33.0 m (Elevation 147.4 m). A pocket / seam of sand was encountered within the clayey silt / silt deposits from a depth of about 8.6 m (Elevation 171.8 m) to 10.1 m (Elevation 170.3 m). The SPT 'N' values of the clayey silt / silt range from 0 to 27 blows per 0.3 m (very soft to very stiff consistency) with SPT 'N' values equal to or higher

than 13 blows per 0.3 m (stiff consistency) found below a depth of about 24.5 m (Elevation 155.7 m). The field vane shear strengths vary from 21 kPa to 48 kPa with a sensitivity range of 1 to 4.

The results of laboratory tests conducted on five (5) samples are as follows:

Natural moisture content (%):	18 to 42
Liquid / Plastic Limits:	16 to 24 / 14 to 16 (2 samples – non plastic)
Grain size:	Gravel (%): 0
	Sand (%): 1 to 21
	Silt (%): 69 to 90
	Clay (%): 0 to 26

The grain size distribution curves are shown in Figure Nos. 9 and 11 and the liquid limits are plotted on the plasticity chart (Figure Nos. 1 and 3 in Appendix D).

### **Sand and Silt**

At ST-42, a pocket / seam of sand was encountered underlying the silt and overlying the clayey silt / silty clay deposits, from a depth of about 7.3 m (Elevation 172.9 m) to 10.1 m (Elevation 170.2 m). Two SPT 'N' values of the sand deposit are both 1 blow per 0.3 m, indicating a very loose relative density.

The results of laboratory tests conducted on one sample of sand are as follows:

Natural moisture content (%):	21
Grain size (1 sample):	Gravel (%): 0
	Sand (%): 76
	Silt (%): 22
	Clay (%): 2

The grain size distribution curve is shown in Figure No. 11 in Appendix D.

At ST-43, a pocket / seam of sand was encountered within the clayey silt / silt deposits from a depth of about 8.6 m (Elevation 171.8 m) to 10.1 m (Elevation 170.3 m). The only one SPT 'N' value measured in the sand is 0 blow per 0.3 m, indicating a very loose relative density.

At ST-43, sand and silt deposits were found underlying the silt deposit from a depth of about 33.0 m (Elevation 147.4 m) to at least a depth of 40.1 m (Elevation 140.3 m). The SPT 'N' values of the sand and silt increase with depth from 17 to 33 blows per 0.3 m (compact to dense

relative density). Resistances to dynamic cone penetration below a depth of about 40.1 m (Elevation 140.3 m) increase with depth, possibly through granular deposits, until refusal (100 blows per 0.3 m) at a depth of about 44.1 m (Elevation 136.3 m).

### **Sand and Gravel**

At ST-42, sand and gravel deposits were found underlying the silt from a depth of about 26.1 m (Elevation 154.1 m) to 29.0 m (Elevation 151.3 m). SPT 'N' values of the sand and gravel are more than 100 blows per 0.3 m.

### **Possible Bedrock**

Bedrock is possibly present at the ST-42 location at a depth of about 29.0 m (Elevation 151.3 m) as indicated by auger refusal.

At ST-43, bedrock could possibly be slightly below a depth of about 44.1 m (Elevation 136.3 m) as indicated by refusal to dynamic cone penetration.

### **Groundwater**

The groundwater at ST-42 was at the ground surface (Elevation 180.2 m), while the groundwater level at ST-43 was at a depth of 1.2 m (Elevation 179.2 m).

## **5.21 Highway 522 Interchange (Drawing Sheet 17)**

Two locations were investigated at the Highway 522 Interchange in the Mowat Township, as follows:

- ST-44: Station 12+526 Offset 18.75R
- ST-45: Station 12+597 Offset 18.75L

All test holes for this site are listed in Table 2.

### **Topsoil**

Both locations, ST-44 and ST-45, were covered with topsoil, approximately 0.15 m and 0.25 m in thickness, respectively.

### **Silty Clay**

The topsoil at both locations was underlain by silty clay that extended to a depth of about 0.6 m (Elevation 184.4 m) in ST-44 and 1.1 m (Elevation 184.3 m) in ST-45. The SPT 'N' values of the silty clay are 8 blows per 0.3 m (firm consistency) in ST-44 and 5 blows per 0.3 m (firm

consistency) in ST-45. The measured natural moisture contents of the silty clay are 41 % in ST-44 and 26 % in ST-45.

### **Sand / Silty Sand**

The silty clay in ST-44 was underlain by sand that extended to a depth of about 3.4 m (Elevation 181.7 m), while the silty clay in ST-45 was underlain by silty sand that extended to a depth of about 1.9 m (Elevation 183.5 m). The SPT 'N' values of the sand in ST-44 are 7 blows per 0.3 m (loose relative density) at a depth of about 1.7 m and increase to more than 100 blows per 0.3 m at a depth of about 3.1 m. The only one SPT 'N' value of the silty sand in ST-45 is more than 100 blows per 0.3 m, indicating a very dense relative density.

The results of laboratory tests carried out on two samples are as follows:

Natural moisture content (%):	11 and 22		
Grain size (2 samples):	Gravel (%):	0 and 6	
	Sand (%):	59 and 97	
	Silt (%):	31	(one sample)
	Clay (%):	4	(one sample)
	Silt and clay (%):	3	(one sample)

The grain size distribution curves are shown in Figure No. 11 in Appendix D.

### **Bedrock / Possible Bedrock**

The presence of bedrock / possible bedrock was confirmed / identified by refusal to borehole advance and / or test pit excavation. The depths to bedrock / possible bedrock are as follows:

ST-44 (2 locations):	2.7 m and 3.4 m	(Elevation 181.7 m and 181.8 m)
ST-45 (3 locations):	1.7 m to 2.4 m	(Elevation 181.9 m to 183.5 m)

### **Groundwater**

At ST-44, groundwater was measured to be at a depth of about 1.2 m (Elevation 183.8 m), while the groundwater at ST-45 was also at a depth of about 1.2 m (Elevation 184.2 m).



## 6.0 DISCUSSIONS AND RECOMMENDATIONS

The current foundation investigation discussed in this report is the second foundation investigation for the Highway 69 Route Selection Study. The first investigation was carried out by Trow Associates Inc. (ref. TROW Report - brge00140201a dated 12 September 2005 – Preliminary Foundation Investigation and Design Report for Selected Structures). The borehole locations investigated in the current investigation program were specified by MTO's Terms of Reference as listed in Table 1 (Appendix A). The discussions and recommendations provided herein are therefore site specific that are applicable only to the locations investigated. Furthermore at the time of report preparation, the details of the new highway design were available to AMEC only at some of the borehole locations investigated. For the borehole locations where the details of the new highway design were not available to AMEC, the recommendations provided in this report are preliminary and general in nature. This report is supplementary to TROW's referenced report, and as such, it should be read in conjunction with TROW's report.

For structural areas, it is considered that highway bridge abutments / piers and approach embankments will be constructed at the locations investigated. Topographic maps of the water bodies (swamps / lakes / rivers) at the locations investigated for this report were not available to AMEC for information at the time of report preparation. Some cross-sections of structures planned for the new Highway 69 at the locations investigated for this report were provided by MTO, as mentioned in the subsequent relevant sections of this report. The discussions and recommendations provided in this report are therefore concentrated on bridge foundations (shallow and /or deep foundations). The deep foundation considered is the driven steel H piles typically used for highway projects.

In general, approach embankments in the water bodies, if existed at the structural areas, should be designed following to the requirements shown in Ontario Provincial Standard Drawing (OPSD – 203.010) – Embankments Over Swamp – New Construction. Accordingly, a 2H:1V earth embankment or a 1.25H:1V rock embankment can be constructed over a swamp after excavating incompetent soil in the swamp and backfilling with competent soil up to a depth of about twice the height of the embankment.

Shallow bedrock has been found in some locations investigated. New highway bridge foundations can be constructed over the bedrock with or without an approach embankment, depending on the location of the foundation and the final design grade. In a few borehole locations, deep deposits of incompetent soils (e.g., very soft to soft silty clay, loose sand, etc.) have been found. Such incompetent soil deposits are not suitable for supporting highway bridge foundations and / or approach embankments. Highway bridge abutments / piers may have to be constructed without any embankment around the abutments / piers in order to prevent slope instability and / or reducing the potential of negative skin friction (down-drag). Additional bridge spans may be required in some locations.

## 6.1 Preliminary Foundation Design

The following discussions and recommendations are provided for each location specified in the Terms of Reference (Table 1 in Appendix A). Only the profile grades of the new Highway 69 and the layout of the structures at the locations investigated that were known at the time of preparing this report are described herein. Furthermore, rock coring had not been requested by MTO during the current foundation investigation program. The rock qualities below the bedrock / possible bedrock surface encountered in this investigation are therefore not available for information.

The general design and construction requirements for foundations are provided in Section 6.2 – Shallow Foundations and Section 6.3 – Deep Foundations. Approach embankments are generally addressed in Section 6.4. The foundation type and the constructability of approach embankments at each location investigated are summarized in Table 4 in Appendix A.

### 6.1.1 New Shebeshekong Road Interchange (Drawing Sheet 1)

According to the drawing for the proposed Shebeshekong Road Interchange prepared by McCormick Rankin Corporation (MRC), dated Jan/06, a two-span bridge will be constructed along Shebeshekong Road over Highway 69. Each span will be about 38 m long and will be constructed by concrete girders. The centre of the bridge pavement surface will be at Elevation of about 220 m while the pavement surface of Highway 69 underneath the bridge will be at Elevation of about 212.5 m. The original ground surface along the Highway 69 alignment will be cut by about 2 m to 4 m. The approach bridge embankment, up to a maximum height of about 8 m, will be constructed partially by cutting and partially by placing fill soils.

The new interchange structures can be founded on shallow foundations (spread / strip foundations) supported by bedrock at the following depths:

East Abutment (ST-FN-1):	0.3 m to 0.6 m	(Elevation 213.5 m to 215.5 m)
West Abutment (ST-FN-2):	0.1 m to 0.5 m	(Elevation 214.9 m to 217.1 m)

The bedrock appears to slightly dip down from west to east. It should be possible to found the central pier foundation on bedrock at Elevation of about 211 m as shown on the referenced drawing by MRC. The presence of bedrock at the location of the central pier should however be confirmed by test holes prior to construction.

General design and construction requirements for spread / strip foundations are provided in Section 6.2.

Removal of topsoil and incompetent overburden will be required to expose the bedrock. Bedrock excavation will be required for constructing both new Highway 69 and bridge abutments / pier foundations. Impact hammers and / or blasting will likely be required to

.../...

excavate the bedrock. Rock coring should be carried out to assess the bedrock conditions prior to construction.

Approach embankments founded on bedrock and constructed with engineered fill at 2H:1V slopes or rock fill at 1.25H:1V slopes should be stable. General design and construction requirements for approach embankments are provided in Section 6.4.

During construction, dewatering (if required) may be carried out by gravity drainage and / or a system of sumps and pumps.

### **6.1.2 Service Road / Existing 69 South of Pointe au Baril (Drawing Sheet 2)**

The details of the proposed structures at this location were not available for information at the time of preparing this report.

Deep foundations will be required to support the bridge structure at this location. Steel H-piles should be driven to or below the following approximate depths:

East Abutment (ST-3):	12.0 m and 12.4 m	(Elevation 201.0 m and 201.3 m)
West Abutment (ST-4):	8.2 m and 10.5 m	(Elevation 199.4 m and 201.8 m)

General design and construction requirements for deep foundations are discussed in Section 6.3. The presence of bedrock should be confirmed and the rock quality should be assessed by rock coring prior to construction.

The compact to dense sand deposits covering the two locations should be capable of supporting approach embankments not higher than 6 m. Slope stability analysis should be carried out to assess the global stability of approach embankments. The sand deposits, if exposed permanently, should be protected against erosion by proper surface protection (e.g., vegetation, geotextile with rip-rap, etc.). The design and construction of the approach embankments should follow the general requirements discussed in Section 6.4.

The groundwater level is at a depth of about 1 m below the existing grade (Elevation 212.7 m at East Abutment (ST-3) and Elevation 208.9 m at West Abutment (ST-4)). Excavation into the sand deposits below the groundwater may require a significant effort in dewatering (e.g., a series of sumps and pumps, a well-point system, etc.).

### **6.1.3 Pointe au Baril Interchange – Highway 529 (Drawing Sheet 3)**

According to the drawing for the proposed Highway 529 Interchange prepared by McCormick Rankin Corporation (dated Jan/06), a two-span bridge structure will be constructed along Highway 529 over Highway 69. The bridge with span lengths of about 40 m and 40.5 m will be

constructed using concrete girders. The new lanes for Highway 69 underneath the bridge will be constructed by cutting into the existing ground. The pavement surface of the bridge will be at Elevation of about 207 m while the pavement surface of Highway 69 will be at Elevation of about 200 m. Based on the original ground elevation shown on the referenced drawing, the maximum height of the approach embankment will be approximately 8 m, particularly above the original ground surface at the location of West Abutment.

Shallow foundations supported on bedrock can be used at the location of East Abutment (ST-5) while deep foundations should be used at the location of West Abutment (ST-6). The approximate depths to the founding levels are as follows:

East Abutment (ST-5: shallow foundation): 0.9 m (Elevation 205.5 m to 208.0 m)

West Abutment (ST-6: deep foundation): 12.8 m (Elevation 187.7 m)

Central Pier – Possibly deep foundation (no borehole requested)

General design and construction requirements are provided in Section 6.2 for shallow foundation and Section 6.3 for deep foundation.

In the area of West Abutment (ST-6), the soil profile consisted of loose sand overlying very soft to stiff silty clay that extended to a depth of about 10 m (Elevation 190.5 m). It is unlikely that such subgrade conditions are capable of supporting an 8 m high approach embankment without failure and / or significant settlement. A bridge structure should be used instead of an approach embankment.

In the vicinity of East Abutment (ST-5), an approach embankment can be supported by the bedrock after removing the topsoil and overburden soils. Approach embankments founded on bedrock and constructed with engineered fill at 2H:1V slopes or rock fill at 1.25H:1V slopes should be stable. General design and construction requirements for approach embankments are provided in Section 6.4.

Impact hammers and / or blasting will likely be required to excavate the bedrock. Rock coring should be carried out to assess the bedrock conditions prior to construction.

Dewatering in the bedrock at East Abutment (ST-5), if required, may be carried out by gravity drainage and / or a system of sumps and pumps. In the area of West Abutment (ST-6), perched groundwater may be present in the sand overlying silty clay. Dewatering in this area, if required, may require a series of sumps and pumps.

#### **6.1.4 Point au Baril - Highway 529 Extension (Drawing Sheet 4)**

The structure shown in the drawing prepared by McCormick Rankin Corporation (dated Jan 2006) for this location is proposed to be a 15 m wide concrete-frame structure built over Highway 529. Two separate structures are proposed, one for the Highway 69 south-bound

lanes and the other for the Highway 69 north-bound lanes. The Highway 69 lanes will be constructed by fill embankments with a maximum height of about 11 m.

Shallow foundations founded on bedrock can be used to support the bridge structures at both locations investigated. The approximate founding depths on bedrock are as follows:

South Abutment (ST-7):	0.8 m to 1.1 m	(Elevation 190.0 m to 190.3 m)
North Abutment (ST-8):	0.2 m to 0.5 m	(Elevation 199.8 m to 207.7 m)

General design and construction requirements for shallow foundations are provided in Section 6.2.

Approach embankments can be founded on the bedrock after removing the topsoil, fill soils and overburden soils. Approach embankments founded on bedrock and constructed with engineered fill at 2H:1V slopes or rock fill at 1.25H:1V slopes should be stable. General design and construction requirements for approach embankments are provided in Section 6.4.

#### **6.1.5 Pointe au Baril – Service Road North of Moose Lake (Drawing Sheet 5)**

Based on the drawing prepared by McCormick Rankin Corporation (dated Nov./05) for this location, two 13 m wide concrete-frame bridge structures will be constructed over Moose Lake Road, one for the Highway 69 south-bound lanes and the other for the Highway 69 north-bound lanes. Both Highway 69 lanes will be constructed by fill embankments with a maximum height of about 6 m.

Shallow foundations founded on bedrock can be used to support highway bridges at both locations investigated at the following approximate depths:

NBL Abutments (ST-9):	1.2 m	(Elevation 205.7 m)
SBL Abutments (ST-10):	0.2 m to 0.8 m	(Elevation 204.8 m to 205.2 m)

General design and construction requirements for shallow foundations are provided in Section 6.2. Impact hammers and / or blasting may be required for excavating the bedrock.

Approach embankments founded on bedrock should be stable. All existing asphaltic pavement structure, peat and overburden soils should be removed in order to support the approach embankments on bedrock. Approach embankments founded on bedrock and constructed with engineered fill at 2H:1V slopes or rock fill at 1.25H:1V slopes should be stable. General design and construction requirements for approach embankments are provided in Section 6.4.

### **6.1.6 Harris Lake Road Interchange (Drawing Sheet 6)**

According to the drawing prepared by McCormick Rankin Corporation (dated Jan./06), a two-span concrete bridge structure will be constructed along Harris Lake Road over Highway 69. Concrete box-girders will be used for the two spans, one 39 m in length and the other 46 m in length. The pavement surface of the bridge will be at about Elevation 203 m while the pavement surface of Highway 69 will be at about Elevation 195 m. Highway 69 at this location will be constructed mainly by cutting into the existing ground. The maximum height of the fill embankment for the bridge approach will be about 7 m.

Shallow foundations founded on bedrock can be used to support the bridge structures at both locations investigated. The approximate founding depths are as follows:

West Abutment (ST-11):	0.15 m to 0.9 m	(Elevation 195.1 m to 196.2 m)
East Abutment (ST-12):	0.05 m to 1.0 m	(Elevation 198.0 m to 199.3 m)
Central Pier – Possibly on bedrock (no borehole requested)		

General design and construction requirements for shallow foundations are provided in Section 6.2. Impact hammers and / or blasting will likely be needed for excavating the bedrock. Rock conditions and qualities should be investigated by rock-coring prior to construction.

Approach embankments can be founded on bedrock after removing the topsoil. Approach embankments founded on bedrock and constructed with engineered fill at 2H:1V slopes or rock fill at 1.25H:1V slopes should be stable. General design and construction requirements for approach embankments are provided in Section 6.4.

### **6.1.7 Magnetawan River NB Lanes (Drawing Sheet 7)**

The details of the proposed structures at this location were not available for information at the time of preparing this report.

Shallow foundations can be founded on bedrock to support the bridge structures. The approximate founding depths are as follows:

South Abutment (ST-FN-13):	ground surface to 0.6 m	(Elevation 176.5 m to 181.9 m)
North Abutment (ST-14):	0.1 m to 0.4 m	(Elevation 181.2 m to 184.8 m)

General design and construction requirements for shallow foundations are provided in Section 6.2. Impact hammers and / or blasting will likely be required to excavate bedrock.

Approach embankments can be founded on bedrock after removing the topsoil and overburden soils. Approach embankments founded on bedrock and constructed with engineered fill at



2H:1V slopes or rock fill at 1.25H:1V slopes should be stable. General design and construction requirements for approach embankments are provided in Section 6.4.

#### **6.1.8 Existing Highway 69 South of Highway 526 (Drawing Sheet 8)**

The details of the proposed structures at this location were not available for information at the time of preparing this report.

Shallow foundations can be founded on bedrock to support the structures at the following approximate founding depths:

East Abutment (ST-15):	1.2 m to 1.8 m	(Elevation 185.7 m to 185.1 m)
West Abutment (ST-16):	0.1 m to 0.8 m	(Elevation 188.9 m to 190.8 m)

Approach embankments can be founded on bedrock after removing the overburden soils. Impact hammers and / or blasting will likely be required for excavating the bedrock.

General design and construction requirements are provided in Section 6.2 for shallow foundations and Section 6.4 for approach embankments.

#### **6.1.9 Highway 526 Interchange / CPR / Still River (Drawing Sheet 8)**

The details of the proposed bridge at this location were not available for information at the time of preparing this report.

The highway bridge structures can be supported by shallow foundations on bedrock at the following approximate founding depths:

East Abutment (ST-17):	at surface to 0.7 m	(Elevation 177.3 m to 181.1 m)
West Abutment (ST-18):	1.1 m and 1.2 m	(Elevation 177.8 m to 177.9 m)
West Abutment (ST-19):	0.1 m to 1.7 m	(Elevation 178.7 m to 183.8 m)

Approach embankments can be founded on bedrock after removing the topsoil and overburden soils. Impact hammers and / or blasting will likely be needed for rock excavation.

General design and construction requirements are provided in Section 6.2 for shallow foundations and Section 6.4 for approach embankments.

#### **6.1.10 Britt K2 Interchange (Drawing Sheet 9)**

The details of the proposed bridge structure at this location were not available for information at the time of preparing this report.

Shallow foundations founded on bedrock can be used to support the highway bridge structures. The approximate founding depths are as follows:

East Abutment (ST-20):	0.1 m to 0.2 m	(Elevation 195.3 m to 197.6 m)
West Abutment (ST-21):	surface to 0.7 m	(Elevation 196.4 m to 198.9 m)

Approach embankments can be founded on bedrock after removing the topsoil. Impact hammers and / or blasting will likely be required for rock excavation.

General design and construction requirements are provided in Section 6.2 for shallow foundations and Section 6.4 for approach embankments.

#### **6.1.11 K2a – Still River (Drawing Sheet 10)**

The details of the proposed bridge structure at this location were not available for information at the time of preparing this report.

Deep foundations will be required to support the bridge structures at K2a – Still River. The founding depths should be at or below the following depths:

East Abutment (ST-22):	35.3 m or slightly deeper	(Elevation 145.8 m or lower)
West Abutment (ST-23):	30.5 m or slightly deeper	(Elevation 147.0 m or lower)

Deep foundations will have to be designed for downdrag if approach embankments are located at or close to the deep foundations. General design and construction requirements for deep foundations are provided in Section 6.3.

At the location of East Abutment (ST-22), approach embankment heights should be limited, probably lower than 6 m, in order to prevent slope instability and / or significant long-term settlement. Detailed analyses of slope stability and settlement for approach embankments should be carried out during the detailed design. General design and construction requirements for approach embankments are provided in Section 6.4.

At the location of West Abutment (ST-23), approach embankments can not be supported by the very loose / very soft soil strata without significant settlement. Approach embankments may not be stable, particularly along the river banks. Additional spans of bridge structures should be used in the vicinity of river banks.



Groundwater level should be close to the existing ground surface due to the location of the site in the flood plain of Still River. Dewatering will likely be required, particularly when excavating into sandy stratum. A series of sumps and pumps and / or well points may be required.

#### **6.1.12 I1-K2a - Existing Highway 69 (Drawing Sheet 11)**

The details of the proposed bridge structure at this location were not available for information at the time of preparing this report.

Shallow foundations founded on bedrock can be used to support the highway bridge structures. The approximate founding depths are as follows:

South Abutment (ST-24):	0.1 m to 0.4 m	(Elevation 192.8 m to 194.5 m)
North Abutment (ST-25):	0.5 m and 0.8 m	(Elevation 190.0 m and 190.5 m)

Approach embankments can be founded on bedrock after removing topsoil, fill soils and overburden soils. Impact hammers and / or blasting will likely be required for rock excavation.

General design and construction requirements for are provided in Section 6.2 for shallow foundations and Section 6.4 for approach embankments

#### **6.1.13 I1-K2a - CPR (Drawing Sheet 11)**

The details of the proposed bridge structure at this location were not available for information at the time of preparing this report.

Deep foundations will be required to support structures. The approximate founding depths are as follows:

South Abutment (ST-26):	29.4 m or slightly deeper	(Elevation 153.4 m or lower)
North Abutment (ST-27):	13.3 m or slightly deeper	(Elevation 167.3 m or lower)

Deep foundations will have to be designed for down-drag if approach embankments are located at or near the foundations. General design and construction requirements for deep foundations are provided in Section 6.3.

At both locations of South Abutment (ST-26) and North Abutment (ST-27), the very soft silty / clayey soils can not support approach embankments. Additional spans of bridge structures should be considered.

The high groundwater level and the very soft silty / clayey soils will require gentle slope for open cut and dewatering using a system of sumps and pumps may be required.

#### **6.1.14 PIC# 3 Beckanon Interchange (Drawing Sheet 12)**

The two borehole locations, ST-FN-28 and ST-FN-29, can not be accessed since permission to enter the site from the Henvey Inlet First Nation has not been granted.

#### **6.1.15 I1-K2a Beckanon Interchange (Drawing Sheet 13)**

The details of the proposed bridge structure at this location were not available for information at the time of preparing this report.

Shallow foundations can be founded on bedrock to support highway bridge structures. The approximate founding depths are as follows:

East Abutment (ST-30):	0.6 m to 1.0 m	(Elevation 199.2 m to 201.3 m)
West Abutment (ST-31):	surface to 0.5 m	(Elevation 198.4 m to 201.8 m)

Approach embankments can be founded on bedrock after removing the topsoil and overburden soils. Impact hammers and / or blasting will likely be required for rock excavation.

General design and construction requirements are provided in Section 6.2 for shallow foundations and Section 6.4 for approach embankments.

#### **6.1.16 PIC#3 Straight Lake (Drawing Sheet 14)**

Two borehole locations, ST-FN-32 and ST-FN-33, can not be accessed since the permission to enter the site for drilling has not been granted by the Henvey Inlet First Nation.

#### **6.1.17 I1-K2a CPR (Drawing Sheet 15)**

The details of the proposed bridge structure were not available for information at the time of preparing this report.

Shallow foundations can be founded on bedrock to support the highway bridge structures. The approximate founding depths are as follows:

South Abutment (ST-34):	surface to 0.4 m	(Elevation 196.6 m to 202.9 m)
North Abutment (ST-35):	0.3 m to 1.5 m	(Elevation 189.5 m to 199.4 m)

Approach embankments can be founded on bedrock after removing the topsoil. Impact hammers and / or blasting will likely be required for rock excavation.

General design and construction requirements are provided in Section 6.2 for shallow foundations and Section 6.4 for approach embankments.

#### **6.1.18 I1-K2a Straight Lake (Drawing Sheet 15)**

The details of the proposed bridge structure were not available for information at the time of preparing this report.

The location of ST-FN-38 can not be investigated since permission to enter the site for drilling is not granted by the Henvey Inlet First Nation.

At the South Abutment (ST-36), shallow foundations founded on bedrock can be used to support the highway structures. The approximate founding depth is as follows;

South Abutment (ST-36): ground surface to 0.6 m (Elevation 177.4 m to 185.6 m)

At the location of the Central Pier (ST-37) which is located approximately at the centre of Straight Lake, deep foundations will be required to support the highway bridge structures. The founding depth should be slightly below the following depth:

Central Pier (ST-37): slightly below 37.0 m (slightly below Elevation 141.5 m)

Approach embankments at the location of South Abutment (ST-36) can be founded on bedrock after removing the topsoil.

General design and construction requirements are provided in Section 6.2 for shallow foundations, Section 6.3 for deep foundations and Section 6.4 for approach embankments.

Cofferdams may be required to construct the foundations and / or the construction of approach embankments.

#### **6.1.19 Key River (Drawing Sheet 16)**

The details of the proposed bridge structure were not available for information at the time of preparing this report.

Shallow / deep foundations can be founded on bedrock to support the highway bridge structures. The approximate founding depths are as follows:

North Abutment of SBL (ST-39): surface to 0.1 m (Elevation 178.4 m to 196.9 m)

South Abutment of SBL (ST-40): 5.0 m (shallow) and 24.2 m (deep) (Elevation 151.7 m and 170.9 m)

North Abutment of NBL (ST-41): surface to 0.5 m (Elevation 180.9 m to 197.6 m)

Approach embankments can be founded on bedrock after removing the topsoil and overburden soils.

General design and construction requirements are provided in Section 6.2 for shallow foundations, Section 6.3 for deep foundations and Section 6.4 for approach embankments.

Cofferdams may be required to construct the shallow foundations and / or the construction of approach embankments.

#### **6.1.20 CNR (Drawing Sheet 17)**

The details of the proposed bridge structure at this location were not available for information at the time of preparing this report.

Deep foundations will be required to support the highway bridge structures over the CNR. The approximate founding depths are as follows:

South Abutment (ST-42):	slightly below 29.0 m (slightly below Elevation 151.3 m)
North Abutment (ST-43):	slightly below 44.1 m (slightly below Elevation 136.3 m)

Approach embankments should not be constructed at the two locations due to very soft silty / clayey deposits present at both locations. Additional spans of bridge structures should be considered.

General design and construction requirements are provided in Section 6.3 for deep foundations.

#### **6.1.21 Highway 522 Interchange (Drawing Sheet 17)**

The details of the proposed bridge structure were not available for information at the time of preparing this report.

Shallow foundations founded on bedrock can be used to support the highway bridge structures. The approximate founding depths are as follows:

South Abutment (ST-44: 2 locations):	2.7 m and 3.4 m (Elevation 181.7 m and 181.8 m)
North Abutment (ST-45: 3 locations):	1.7 m to 2.4 m (Elevation 181.9 m to 183.5 m)

Approach embankments can be founded on bedrock after removing the topsoil and overburden soils.

General design and construction requirements are provided in Section 6.2 for shallow foundations and Section 6.4 for approach embankments.

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## **6.2 Shallow Foundations**

For the locations where bedrock is located at or close to the existing ground surface as listed in Table 2 in Appendix A, shallow foundations (i.e., spread / strip footings) can be founded on solid bedrock to support highway bridge structures. The conditions of the existing bedrock have not been investigated by rock coring in this investigation since rock coring had not been requested by MTO.

Footings founded on solid bedrock can be designed with a Factored Geotechnical Axial Resistance (Compression) at Ultimate Limit States (ULS) ranging from 2,000 kPa to 5,000 kPa, depending on the bedrock conditions, with an applied resistance factor of 0.5. The Geotechnical Reaction at Serviceability Limit States (SLS) for solid bedrock should not be applicable.

The minimum footing sizes, footing thickness, excavations and other footing requirements should be designed in accordance to the latest edition of the Canadian Highway Bridge Design Code (CAN/CSA-S6-00).

The design frost penetration for the general area is 1.6 m. Therefore, a permanent soil cover of 1.6 m or its thermal equivalent is required for frost protection of foundations. However, if the footings are placed over solid bedrock at a depth less than 1.6 m, placement of the thermal insulation is not necessary under the conditions that the footings will not be subject to any frost heave / thaw (e.g., no presence of water at the interface of footings and bedrock, no bedrock that will be affected by ice formation, etc.).

## **6.3 Deep Foundations**

Deep foundations, typically driven steel H-piles, should be used to support the highway bridge structures. The piles should be driven into the competent soil / rock stratum. In order to adequately penetrate the competent soil stratum that may contain cobbles/boulders and / or weathered rock, a heavy section such as HP 310 x 110 equipped with reinforced driving shoes as per Ministry of Transportation of Ontario's Standard requirements would be suitable for use.

Due to the presence of weak soils in some locations, using an approach earth embankment could result in down-drag on the piles. The pile capacity to be used in the design should therefore take into account the negative skin friction due to the down-drag on the piles.

Based on the results of the boreholes drilled in the vicinity of the highway bridge structures, Table 4 in Appendix A summarizes the approximate pile tip elevations that may be used for preliminary design purposes.

The approximate pile tip levels are based on the assumption that the piles would penetrate a minimum of 1.0 m into the competent soil / bedrock stratum. The elevations shown in Table 4 in

Appendix A are approximate from the results of a limited number of boreholes drilled and should not be used for accurate determination of pile tip elevations.

For HP 310 x 110 steel H-piles driven to practical refusal within competent soil / bedrock stratum, the following axial resistances may be used for preliminary design:

- Factored Geotechnical Axial Resistance (Compression) at Ultimate Limit States = 1,600 kN in competent soil and 2,000 kN in competent weathered bedrock, with an applied resistance factor of 0.5.
- Geotechnical Reaction at Serviceability Limit States = 1,000 kN in competent soil and 1,200 kN in competent weathered bedrock.

The above values are selected in view of the fact that some premature pile refusals may be encountered at elevations higher than those shown in Table 4 in Appendix A. The axial resistances of the driven, HP 310 x 110, steel H-piles shown above will have to be reduced in the location where some negative skin frictions may develop due to additional fill loads (e.g., from approach embankments).

Cobbles and/or boulders may be encountered within the native soils. Hard pile driving conditions should therefore be anticipated. The piles should be equipped with reinforced driving shoes as per Ministry of Transportation of Ontario's Standard requirements in order to adequately penetrate the native soils and weathered bedrock.

It is possible that, due to the variations in the soil / bedrock stratum, some piles may penetrate a few metres below the approximate tip elevations shown in Table 4 in Appendix A. This aspect should be taken into consideration during design and construction.

The Geotechnical Reaction at Serviceability Limit States is dependent on the settlement of the pile group and, therefore, is governed by the size of the pile group. The pile group configuration is not available at the time of preparing this report. Provided that the piles are designed and installed as recommended in this report, the Serviceability Limit States value provided should correspond to no more than 25 mm of settlement of the pile group. Once the information on the pile group configuration is known, the estimated settlement should be confirmed, if necessary.

At the locations investigated, laterally-applied loads on driven piles should not be considered, from the geotechnical consideration, due to the poor soil conditions in the upper soil strata located close to the existing ground surface. Battered piles should be used to resist lateral loading.

## 6.4 Approach Embankment

Approach embankments can be founded on bedrock identified at some locations as listed in Table 3 in Appendix A. The approach embankments should be constructed with compacted engineered fill with 2H:1V side slopes or rock fill with 1.25H:1V side slopes.

For approach embankments founded on soil subgrade, the stability and settlement of the embankment should be analysed during the detailed design. For soft soil subgrade found at some locations investigated, approach embankments should not be constructed as mentioned in Table 3 in Appendix A.

All organic matters, peat and other unsuitable soils should be removed, as per Ministry of Transportation of Ontario's current practice, with an envelope given by a gradient not steeper than 1H:1V away from the toe of the proposed embankment. For above water construction, the exposed subgrade should be inspected, approved and properly compacted from the surface, to a minimum of 95 % Standard Proctor Maximum Dry Density (SPMDD), under the supervision of qualified geotechnical personnel. Any soft spots identified during stripping and/or recompacting should be sub-excavated and replaced with compacted engineered fill. Care should be exercised to minimize disturbance to the subgrade during preparation and the construction of embankment. For under water construction, all organic matters / peat and /or soft / loose soils should be removed and backfilled with rock / granular soils until the backfill level is above the water level. Otherwise, dewatering is required for placing an engineered fill.

For an engineered fill, the fill materials used for construction of the conventional earth fill embankment, or for the purposes of backfilling, should consist of approved, clean earth fill (e.g. Select Subgrade Materials – Ontario Provincial Standards Specifications Number: 1010). The fill may be imported for this purpose or the excavated soils may be reused provided that they do not contain organic matters and can be compacted to the specifications. The fill materials should be placed in accordance with Ontario Provincial Standards Specifications Number: 501. Each lift should not exceed 300 mm before compaction and each lift should be uniformly compacted to at least 95 % of the Standard Proctor Maximum Dry Density (SPMDD) of the materials. The degree of compaction within the top 0.6 m of the fill (i.e., the subgrade immediately beneath the granular sub-base) should be increased to 98 % SPMDD. The selection, placement and compaction of the fill should be carried out under a geotechnical control program.

For the fill embankment at this site, using properly compacted and acceptable inorganic fill material, the side slopes should not be steeper than 2H:1V for earth fill embankment and 1.25H:1V for rock fill embankment. Proper erosion control measures should be implemented both during construction and on a permanent basis. This can be achieved by immediate seeding or sodding (Ontario Provincial Standards Specification Number: 572) or equivalent.

The slope in front of swamps will have to be protected against erosion due to possible current and ice movement.



## **7.0 SUGGESTED FURTHER INVESTIGATION**

Based on the field observation of the existing ground conditions along the proposed alignments of the new Highway 69, a number of locations should be further investigated for the route selection study or detailed design as suggested in Table 5 (Appendix A). It should be noted that only the locations that may be swamps near the locations investigated in this study are mentioned. The actual swamps are difficult to identify in some areas during winter as they are covered with ice and / or snow. The suggested locations for further investigation are therefore limited to the areas that appear to be swamps during this investigation and no previous investigation has been carried out by Trow Associates Inc. (ref. brge00140201a dated 12 September 2005).

## 8.0 CLOSURE

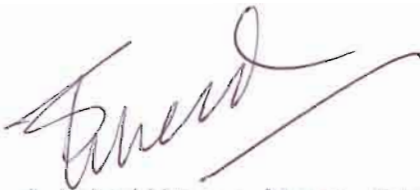
The sub-soil information and recommendations contained in this report should be used solely for the purpose of preliminary foundation assessment of this site.

AMEC should be retained to review the recommendations provided in this report, once the details of the development are finalized and prior to the final design stage of the project.

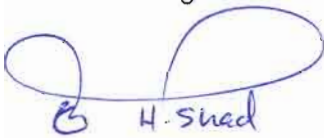
The attached Report Limitations is an integral part of this report.

Sincerely,

AMEC Earth & Environmental  
A division of AMEC Americas Limited



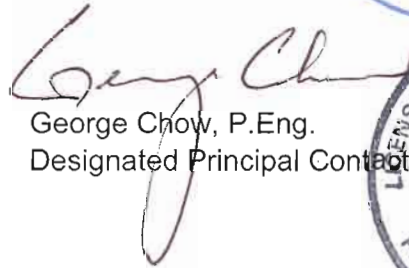
S. Irshad Hassan, M.Eng., P.Eng.  
Geotechnical Engineer



Houshang Shad, Ph.D., P.Eng.  
Technical Manager and Project Reviewer



Prapote Boonsinsuk, Ph.D., P.Eng.  
Project Manager



George Chow, P.Eng.  
Designated Principal Contact



**AMEC Earth & Environmental, a division of AMEC Americas Limited**

**REPORT LIMITATIONS**

The conclusions and recommendations given in this report are based on information determined at the testhole locations. The information contained herein in no way reflects on the environmental aspects of the project, unless otherwise stated. Subsurface and groundwater conditions between and beyond the testholes may differ from those encountered at the testhole locations, and conditions may become apparent during construction, which could not be detected or anticipated at the time of the site investigation. It is recommended practice that the Geotechnical Engineer be retained during the construction to confirm that the subsurface conditions across the site do not deviate materially from those encountered in the testholes.

The design recommendations given in this report are applicable only to the project described in the text, and then only if constructed substantially in accordance with the details stated in this report. Since all details of the design may not be known, we recommend that we be retained during the final design stage to verify that the design is consistent with our recommendations, and that assumptions made in our analysis are valid.

The comments made in this report relating to potential construction problems and possible methods of construction are intended only for the guidance of the designer. The number of testholes 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. No other warranty is expressed or implied.

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. AMEC Earth & Environmental accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

## **APPENDIX A**

### **TABLES**

**TABLE 1**  
**BOREHOLE LOCATIONS AS PROVIDED IN THE TERMS OF REFERENCE BY MTO (STRUCTURE AREAS)**



BOREHOLE NUMBER	Structure Site	Estimated Depth (m)	Township	STATION	OFFSET	Northing	Easting
<b>ST-FN -1</b>	New Shebeshekong Rd interchange (First Nation)	10	SHAWANAGA	15+202	40R	5044051	245214
<b>ST-FN -2</b>	New Shebeshekong Rd interchange (First Nation)	10	SHAWANAGA	15+202	40L	5043990	245163
ST - 3	Service Road/Existing 69 South of Pointe au Baril	5	THE ARCHIPELAGO	10+990	40R	5046453	242742
ST - 4	Service Road/Existing 69 South of Pointe au Baril	5	THE ARCHIPELAGO	11+040	40L	5046413	242663
ST - 5	Pointe au Baril Interchange (Hwy 529)	5	THE ARCHIPELAGO	15+980	40L	5048993	238255
ST - 6	Pointe au Baril Interchange (Hwy 529)	5	THE ARCHIPELAGO	15+980	40R	5048925	238215
ST - 7	Pointe au Baril Hwy 529 Extension	5	THE ARCHIPELAGO	21+444	18.75L	5050449	237048
ST - 8	Pointe au Baril Hwy 529 Extension	5	THE ARCHIPELAGO	21+455	18.75R	5050464	237084
ST - 9	Pointe au Baril Service Road North of Moose Lake	5	THE ARCHIPELAGO	22+086	32R	5054227	235359
ST - 10	Pointe au Baril Service Road North of Moose Lake	5	THE ARCHIPELAGO	22+086	32L	5054199	235300
ST - 11	Harris Lake Road Interchange	5	WALLBRIDGE	11+456	40L	5061468	230858
ST - 12	Harris Lake Road Interchange	5	WALLBRIDGE	11+456	40R	5061498	230933
<b>ST - FN - 13</b>	Magnetawan River NB Lanes (First Nation)	5	WALLBRIDGE	21+663	18.75R	5071008	227318
ST-14	Magnetawan River NB Lanes	5	WALLBRIDGE	21+730	18.75R	5071072	227304
ST- 15	Existing Hwy 69 South of Hwy 526	5	I1-K2a, PIC# 3	11+200	18.75L	5073313	224503
ST - 16	Existing Hwy 69 South of Hwy 526	5	I1-K2a, PIC# 3	11+295	18.75R	5073381	224430
ST - 17	Hwy 526 Interchange/CPR/Still River	10	I1-K2a, PIC# 3	11+655	18.75R	5073550	224109
ST - 18	Hwy 526 Interchange/CPR/Still River	15	I1-K2a, PIC# 3	11+727	18.75L	5073563	224026
ST - 19	Hwy 526 Interchange/CPR/Still River	10	I1-K2a, PIC# 3	11+767	18.75R	5073612	224023
ST - 20	Britt K2 Interchange	5	K2 - Revised	10+930	40R	5073962	225478
ST - 21	Britt K2 Interchange	5	K2 - Revised	10+930	40L	5073936	225403
ST - 22	K2a - Still River	15	K2 - Revised	11+874	18.75L	5074832	225102
ST - 23	K2a - Still River	10	K2 - Revised	11+925	18.75R	5074865	225048
ST - 24	I1-K2a Existing Hwy 69	10	I1-K2a	14+200	18.75R	5075821	223499
ST - 25	I1-K2a Existing Hwy 69	10	I1-K2a	14+350	18.75L	5075954	223483
ST - 26	I1-K2a CPR	10	I1-K2a	14+800	18.75R	5076403	223594
ST - 27	I1-K2a CPR	10	I1-K2a	14+925	18.75L	5076547	223580
<b>ST-FN-28</b>	PIC#3 Beckanon Interchange (First Nation)	5	PIC#3	18+521	40R	5079959	222071
<b>ST-FN-29</b>	PIC#3 Beckanon Interchange (First Nation)	5	PIC#3	18+521	40L	5079966	221991
ST - 30	I1-K2a Beckanon Interchange	5	I1-K2a	19+700	40R	5081053	223088
ST - 31	I1-K2a Beckanon Interchange	5	I1-K2a	19+700	40L	5081081	223013

**TABLE 1 (Continued)**  
**BOREHOLE LOCATIONS AS PROVIDED IN THE TERMS OF REFERENCE BY MTO (STRUCTURE AREAS)**



BOREHOLE NUMBER	Structure Site	Estimated Depth (m)	Township	STATION	OFFSET	Northing	Easting
<b>ST -FN-32</b>	PIC#3 Straight Lake (First Nation)	15	PIC#3	20+975	18.75L	5082403	222295
<b>ST-FN-33</b>	PIC#3 Straight Lake (First Nation)	15	PIC#3	21+300	18.75R	5082710	222408
ST - 34	I1-K2a CPR	5	I1-K2a	11+350	18.75L	5082667	223121
ST - 35	I1-K2a CPR	5	I1-K2a	11+425	18.75R	5082755	223127
ST - 36	I1-K2a Straight Lake	10	I1-K2a	11+590	18.75L	5082893	223033
ST - 37	I1-K2a Straight Lake	20	I1-K2a	11+720	18.75R	5083027	223022
<b>ST-FN-38</b>	I1-K2a Straight Lake (First Nation)	15	I1-K2a	11+815	18.75L	5083101	222953
ST-39	Key River	10	MOWAT	10+030	18.75L	5084234	222514
ST - 40	Key River	15	MOWAT	10+120	18.75L	5084205	222522
ST - 41	Key River	10	MOWAT	10+151	18.75R	5084245	222550
ST - 42	CNR	40	MOWAT	12+081	18.75L	5086057	221873
ST - 43	CNR	40	MOWAT	12+108	18.75R	5086089	221905
ST - 44	Hwy 522 Interchange	10	MOWAT	12+526	18.75R	5086489	221791
ST - 45	Hwy 522 Interchange	10	MOWAT	12+597	18.75L	5086553	221735

**TABLE 2**  
**LIST OF TEST HOLES INVESTIGATED FOR STRUCTURAL AREAS**

<b>Township</b>	<b>Test Hole Designations</b>	<b>Structure Site</b>	<b>Station (km)</b>	<b>Offset (m)</b>	<b>Approximate Peat / Topsoil Thickness (m)</b>	<b>Approximate Depth to Bottom Soft / Loose* deposit (m)</b>	<b>Approximate Depth to Possible Bedrock (m)</b>	<b>Drawing Sheet No.</b>
Shawanaga First Nation	ST-FN-1, ST-FN-1(A), ST-FN-1 (TP1), ST-FN-1 (TP2), ST-FN-1 (TP3)	New Shebeshekong Rd interchange (First Nation)	15+202	40R	0.2 – 0.6	0.2 – 0.6	0.3 – 0.6	1
Shawanaga First Nation	ST-FN-2, ST-FN-2 (A), ST-FN-2 (B), ST-FN-2 (TP1), ST-FN-2 (TP2)	New Shebeshekong Rd interchange (First Nation)	15+202	40L	0.1 – 0.5	0.2 – 0.5	0.1 – 0.5	1
The Archipelago	ST-3, ST-3 (DCPT)	Service Road/Existing 69 South of Pointe au Baril	10+990	40R	0.1	1.0	12.0 -12.4	2

**TABLE 2 (Continued)**  
**LIST OF TEST HOLES INVESTIGATED FOR STRUCTURAL AREAS**

<b>Township</b>	<b>Test Hole Designations</b>	<b>Structure Site</b>	<b>Station (km)</b>	<b>Offset (m)</b>	<b>Approximate Peat / Topsoil Thickness (m)</b>	<b>Approximate Depth to Bottom Soft / Loose* deposit (m)</b>	<b>Approximate Depth to Possible Bedrock (m)</b>	<b>Drawing Sheet No.</b>
The Archipelago	ST-4, ST-4 (DCPT)	Service Road/Existing 69 South of Pointe au Baril	11+040	40L	0.1	1.0	8.2 – 10.5	2
The Archipelago	ST-5, ST-5 (TP1), ST-5 (TP2), ST-5 (TP3)	Pointe au Baril Interchange (Hwy 529)	15+980	40L	0 – 0.5	0 – 0.5	0 – 0.9	3
The Archipelago	ST-6	Pointe au Baril Interchange (Hwy 529)	15+980	40R	Not encountered	10.0	12.8	3
The Archipelago	ST-7, ST-7 (A)	Pointe au Baril Hwy 529 Extension	21+444	18.75L	Not encountered	Not encountered	0.8 – 1.1	4
The Archipelago	ST-8, ST-8 (TP1), ST-8 (TP2)	Pointe au Baril Hwy 529 Extension	21+455	18.75R	0.2 – 0.3	0.2 – 0.3	0.2 – 0.5	4



**TABLE 2 (Continued)**  
**LIST OF TEST HOLES INVESTIGATED FOR STRUCTURAL AREAS**

<b>Township</b>	<b>Test Hole Designations</b>	<b>Structure Site</b>	<b>Station (km)</b>	<b>Offset (m)</b>	<b>Approximate Peat / Topsoil Thickness (m)</b>	<b>Approximate Depth to Bottom Soft / Loose* deposit (m)</b>	<b>Approximate Depth to Possible Bedrock (m)</b>	<b>Drawing Sheet No.</b>
The Archipelago	ST-9 ST-9 (A)	Pointe au Baril Service Road North of Moose Lake	22+086	32R	Not encountered	Not encountered	0 – 1.2	5
The Archipelago	ST-10, ST-10 (A)	Pointe au Baril Service Road North of Moose Lake	22+086	32L	0.2 – 0.8	0.2 – 0.8	0.2 – 0.8	5
Wallbridge	ST-11, ST-11 (TP)	Harris Lake Road Interchange	11+456	40L	0.2 – 0.3	0.2 – 0.3	0.2 – 0.9	6
Wallbridge	ST-12, ST-12 (TP)	Harris Lake Road Interchange	11+456	40R	0.1 – 0.4	0.1 – 0.4	0.1 – 1.0	6
Wallbridge First Nation	ST-FN-13, ST-FN-13 (A), ST-FN-13 (TP1), ST-FN-13 (TP2), ST-FN-13 (TP3)	Magnetawan River NB Lanes (First Nation)	21+663	18.75R	0 – 0.2	0 – 0.2	0 – 0.6	7

**TABLE 2 (Continued)**  
**LIST OF TEST HOLES INVESTIGATED FOR STRUCTURAL AREAS**

<b>Township</b>	<b>Test Hole Designations</b>	<b>Structure Site</b>	<b>Station (km)</b>	<b>Offset (m)</b>	<b>Approximate Peat / Topsoil Thickness (m)</b>	<b>Approximate Depth to Bottom Soft / Loose* deposit (m)</b>	<b>Approximate Depth to Possible Bedrock (m)</b>	<b>Drawing Sheet No.</b>
Wallbridge	ST-14, ST-14 (TP1), ST-14 (TP2)	Magnetawan River NB Lanes	21+730	18.75R	0.1 – 0.4	0.1 – 0.4	0.1 – 0.4	7
I1-K2a PIC #3	ST-15, ST-15 (A)	Existing Hwy 69 South of Hwy 526	11+200	18.75L	Not encountered	1.2	1.2 – 1.8	8
I1-K2a PIC #3	ST-16, ST-16 (TP1), ST-16 (TP2), ST-16 (TP3)	Existing Hwy 69 South of Hwy 526	11+295	18.75R	0.1 – 0.5	0.1 – 0.5	0.1 – 0.8	8
I1-K2a PIC #3	ST-17, ST-17 (TP)	Hwy 526 Interchange/CPR/Still River	11+655	18.75R	Not encountered	Not encountered	0 – 0.7	8
I1-K2a PIC #3	ST-18, ST-18 (A)	Hwy 526 Interchange/CPR/Still River	11+727	18.75L	Not encountered	Not encountered	1.1 – 1.2	8

**TABLE 2 (Continued)**  
**LIST OF TEST HOLES INVESTIGATED FOR STRUCTURAL AREAS**

<b>Township</b>	<b>Test Hole Designations</b>	<b>Structure Site</b>	<b>Station (km)</b>	<b>Offset (m)</b>	<b>Approximate Peat / Topsoil Thickness (m)</b>	<b>Approximate Depth to Bottom Soft / Loose* deposit (m)</b>	<b>Approximate Depth to Possible Bedrock (m)</b>	<b>Drawing Sheet No.</b>
I1-K2a PIC #3	ST-19, ST-19 (TP1), ST-19 (TP2), ST-19 (TP3)	Hwy 526 Interchange/CPR/Still River	11+767	18.75R	0.1 – 0.4	0.1 – 1.7	0.1 – 1.7	8
K2 Revised	ST-20, ST-20 (TP1), ST-20 (TP2), ST-20 (TP3), ST-20 (TP4)	Britt K2 Interchange	10+930	40R	0.1 – 0.2	0.1 – 0.2	0.1 – 0.2	9
K2 Revised	ST-21, ST-21 (TP1), ST-21 (TP2), ST-21 (TP3), ST-21 (TP4), ST-21 (TP5)	Britt K2 Interchange	10+930	40L	0 – 0.7	0 – 0.7	0 – 0.7	9

**TABLE 2 (Continued)**  
**LIST OF TEST HOLES INVESTIGATED FOR STRUCTURAL AREAS**

<b>Township</b>	<b>Test Hole Designations</b>	<b>Structure Site</b>	<b>Station (km)</b>	<b>Offset (m)</b>	<b>Approximate Peat / Topsoil Thickness (m)</b>	<b>Approximate Depth to Bottom Soft / Loose* deposit (m)</b>	<b>Approximate Depth to Possible Bedrock (m)</b>	<b>Drawing Sheet No.</b>
K2 Revised	ST-22	K2a - Still River	11+874	18.75L	0.4	2.5	35.3	10
K2 Revised	ST-23	K2a - Still River	11+925	18.75R	0.5	21	30.5	10
I1-K2a	ST-24, ST-24 (TP1), ST-24 (TP2)	I1-K2a Existing Hwy 69	14+200	18.75R	0.1 – 0.4	0.1 – 0.4	0.1 – 0.4	11
I1-K2a	ST-25, ST-25 (A)	I1-K2a Existing Hwy 69	14+350	18.75L	Not encountered	Not encountered	0.5 – 0.8	11
I1-K2a	ST-26, ST-26 (DCPT)	I1-K2a CPR	14+800	18.75R	Not encountered	16.5 – 17.0	27.9 – 29.4	11
I1-K2a	ST-27, ST-27 (DCPT)	I1-K2a CPR	14+925	18.75L	Not encountered	10.0	10.6 – 13.3	11
PIC#3 First Nation	ST-FN-28	PIC#3 Beckanon Interchange (First Nation)	18+521	40R	CANCELLED			12

**TABLE 2 (Continued)**  
**LIST OF TEST HOLES INVESTIGATED FOR STRUCTURAL AREAS**

<b>Township</b>	<b>Test Hole Designations</b>	<b>Structure Site</b>	<b>Station (km)</b>	<b>Offset (m)</b>	<b>Approximate Peat / Topsoil Thickness (m)</b>	<b>Approximate Depth to Bottom Soft / Loose* deposit (m)</b>	<b>Approximate Depth to Possible Bedrock (m)</b>	<b>Drawing Sheet No.</b>
PIC#3 First Nation	ST-FN-29	PIC#3 Beckanon Interchange (First Nation)	18+521	40L	CANCELLED			12
I1-K2a	ST-30, ST-30 (TP1), ST-30 (TP2), ST-30 (TP3)	I1-K2a Beckanon Interchange	19+700	40R	0.1 – 0.4	0.1 – 0.4	0.6 – 1.0	13
I1-K2a	ST-31, ST-31 (TP1), ST-31 (TP2), ST-31 (TP3), ST-31 (TP4)	I1-K2a Beckanon Interchange	19+700	40L	0 – 0.2	0 – 0.2	0 – 0.5	13
PIC#3 First Nation	ST-FN-32	PIC#3 Straight Lake (First Nation)	20+975	18.75L	CANCELLED			14

**TABLE 2 (Continued)**  
**LIST OF TEST HOLES INVESTIGATED FOR STRUCTURAL AREAS**

<b>Township</b>	<b>Test Hole Designations</b>	<b>Structure Site</b>	<b>Station (km)</b>	<b>Offset (m)</b>	<b>Approximate Peat / Topsoil Thickness (m)</b>	<b>Approximate Depth to Bottom Soft / Loose* deposit (m)</b>	<b>Approximate Depth to Possible Bedrock (m)</b>	<b>Drawing Sheet No.</b>
PIC#3 First Nation	ST-FN-33	PIC#3 Straight Lake (First Nation)	21+300	18.75R	CANCELLED			14
I1-K2a	ST-34, ST-34 (TP1), ST-34 (TP2), ST-34 (TP3), ST-34 (TP4)	I1-K2a CPR	11+350	18.75L	0 – 0.4	0 – 0.4	0 – 0.4	15
I1-K2a	ST-35, ST-35 (TP1), ST-35 (TP2), ST-35 (TP3), ST-35 (TP4)	I1-K2a CPR	11+425	18.75R	0.2 – 0.4	0.2 – 0.4	0.2 – 1.5	15

**TABLE 2 (Continued)**  
**LIST OF TEST HOLES INVESTIGATED FOR STRUCTURAL AREAS**

<b>Township</b>	<b>Test Hole Designations</b>	<b>Structure Site</b>	<b>Station (km)</b>	<b>Offset (m)</b>	<b>Approximate Peat / Topsoil Thickness (m)</b>	<b>Approximate Depth to Bottom Soft / Loose* deposit (m)</b>	<b>Approximate Depth to Possible Bedrock (m)</b>	<b>Drawing Sheet No.</b>
I1-K2a	ST-36, ST-36 (TP1), ST-36 (TP2), ST-36 (TP3), ST-36 (TP4)	I1-K2a Straight Lake	11+590	18.75L	0 – 0.6	0 – 0.6	0 – 0.6	15
I1-K2a	ST-37	I1-K2a Straight Lake	11+720	18.75R	Not encountered	25	Not encountered	15
I1-K2a First Nation	ST-FN-38	I1-K2a Straight Lake (First Nation)	11+815	18.75L	CANCELLED			15
MOWAT	ST-39, ST-39 (TP1), ST-39 (TP2), ST-39 (TP3), ST-39 (TP4), ST-39 (TP5)	Key River	10+030	18.75L	0 – 0.1	0 – 0.1	0 – 0.1	16

**TABLE 2 (Continued)**  
**LIST OF TEST HOLES INVESTIGATED FOR STRUCTURAL AREAS**

<b>Township</b>	<b>Test Hole Designations</b>	<b>Structure Site</b>	<b>Station (km)</b>	<b>Offset (m)</b>	<b>Approximate Peat / Topsoil Thickness (m)</b>	<b>Approximate Depth to Bottom Soft / Loose* deposit (m)</b>	<b>Approximate Depth to Possible Bedrock (m)</b>	<b>Drawing Sheet No.</b>
MOWAT	ST-40, ST-40 (A)	Key River	10+120	18.75L	Not encountered	5 – 18	5 – 24.2	16
MOWAT	ST-41, ST-41 (TP1), ST-41 (TP2), ST-41 (TP3), ST-41 (TP4), ST-41 (TP5), ST-41 (TP6), ST-41 (TP7)	Key River	10+151	18.75R	0 – 0.5	0 – 0.5	0 – 0.5	16
MOWAT	ST-42	CNR	12+081	18.75L	4.3	20 – 25	29	17
MOWAT	ST-43, ST-43 (TP)	CNR	12+108	18.75R	0.1 – 0.8	24	44.1	17



**TABLE 2 (Continued)**  
**LIST OF TEST HOLES INVESTIGATED FOR STRUCTURAL AREAS**

Township	Test Hole Designations	Structure Site	Station (km)	Offset (m)	Approximate Peat / Topsoil Thickness (m)	Approximate Depth to Bottom Soft / Loose* deposit (m)	Approximate Depth to Possible Bedrock (m)	Drawing Sheet No.
MOWAT	ST-44, ST-44 (A)	Hwy 522 Interchange	12+526	18.75R	0.2	2.5	2.7 – 3.4	17
MOWAT	ST-45, ST-45 (A), ST-45 (TP)	Hwy 522 Interchange	12+597	18.75L	0.3	1.0	1.7 – 2.4	17

\* - “soft / loose” means “incompetent to support embankment”

Notes:

- ST-X denotes Borehole No. X for a structure area as specified by the Terms of Reference (Table 1 in Appendix A).
- ST-FN-X denotes Borehole No. X for a structure area as specified by the Terms of Reference that is located in the First Nation’s land.
- ST-X (A) denotes Borehole No. X (A) for a structure area that was drilled in addition to the borehole (ST-X) specified by the Terms of Reference.
- ST-X (TP) denotes a test pit for a structure area that was in addition to the specified borehole (ST-X).
- ST-X (DCPT) denotes a dynamic cone penetration test for a structure area that was in addition to the specified borehole (ST-X).

**TABLE 3**  
**PRELIMINARY FOUNDATION TYPE FOR STRUCTURAL AREAS**

Test Hole Designations	Structure Site	Station (km)	Offset (m)	Foundation Type (Shallow / Deep)	Approximate Founding Depth below Existing Ground (m)	Approach Embankment
ST-FN-1, ST-FN-1(A), ST-FN-1 (TP1), ST-FN-1 (TP2), ST-FN-1 (TP3)	New Shebeshekong Rd interchange (First Nation)	15+202	40R	Shallow	0.3 – 0.6	Approach embankment can be supported on bedrock / possible bedrock at 0.3 – 0.6 m depth
ST-FN-2, ST-FN-2 (A), ST-FN-2 (B), ST-FN-2 (TP1), ST-FN-2 (TP2)	New Shebeshekong Rd interchange (First Nation)	15+202	40L	Shallow	0.1 – 0.5	Approach embankment can be supported on bedrock / possible bedrock at 0.1 – 0.5 m depth
ST-3, ST-3 (DCPT)	Service Road/Existing 69 South of Pointe au Baril	10+990	40R	Deep	12.0 – 12.4	Approach embankment, probably less than 6 m high can be supported on compact to dense sand at 1.5 m depth

**TABLE 3 (Continued)**  
**PRELIMINARY FOUNDATION TYPE FOR STRUCTURAL AREAS**

Test Hole Designations	Structure Site	Station (km)	Offset (m)	Foundation Type (Shallow / Deep)	Approximate Founding Depth below Existing Ground (m)	Approach Embankment
ST-4, ST-4 (DCPT)	Service Road/Existing 69 South of Pointe au Baril	11+040	40L	Deep	8.2 – 10.5	Approach embankment, probably less than 6 m high can be supported on compact to dense sand at 1.5 – 2.0 m depth
ST-5, ST-5 (TP1), ST-5 (TP2), ST-5 (TP3)	Pointe au Baril Interchange (Hwy 529)	15+980	40L	Shallow	0.9	Approach embankment can be supported on bedrock / possible bedrock at 0.9 m depth
ST-6	Pointe au Baril Interchange (Hwy 529)	15+980	40R	Deep	12.8	Additional span of bridge structure should be considered instead of an approach embankment
ST-7, ST-7 (A)	Pointe au Baril Hwy 529 Extension	21+444	18.75L	Shallow	0.8 – 1.1	Approach embankment can be supported on bedrock / possible bedrock at 0.8 – 1.1 m depth

**TABLE 3 (Continued)**  
**PRELIMINARY FOUNDATION TYPE FOR STRUCTURAL AREAS**

Test Hole Designations	Structure Site	Station (km)	Offset (m)	Foundation Type (Shallow / Deep)	Approximate Founding Depth below Existing Ground (m)	Approach Embankment
ST-8, ST-8 (TP1), ST-8 (TP2)	Pointe au Baril Hwy 529 Extension	21+455	18.75R	Shallow	0.2 – 0.5	Approach embankment can be supported on bedrock / possible bedrock at 0.2 – 0.5 m depth
ST-9 ST-9 (A)	Pointe au Baril Service Road North of Moose Lake	22+086	32R	Shallow	1.2	Approach embankment can be supported on bedrock / possible bedrock at 1.2 m depth
ST-10, ST-10 (A)	Pointe au Baril Service Road North of Moose Lake	22+086	32L	Shallow	0.2 – 0.8	Approach embankment can be supported on bedrock / possible bedrock at 0.2 – 0.8 m depth
ST-11, ST-11 (TP)	Harris Lake Road Interchange	11+456	40L	Shallow	0.15 – 0.9	Approach embankment can be supported on bedrock / possible bedrock at 0.15 – 0.9 m depth
ST-12, ST-12 (TP)	Harris Lake Road Interchange	11+456	40R	Shallow	0.05 – 1.0	Approach embankment can be supported on bedrock / possible bedrock at 0.05 – 1.0 m depth

**TABLE 3 (Continued)**  
**PRELIMINARY FOUNDATION TYPE FOR STRUCTURAL AREAS**

<b>Test Hole Designations</b>	<b>Structure Site</b>	<b>Station (km)</b>	<b>Offset (m)</b>	<b>Foundation Type (Shallow / Deep)</b>	<b>Approximate Founding Depth below Existing Ground (m)</b>	<b>Approach Embankment</b>
ST-FN-13, ST-FN-13 (A), ST-FN-13 (TP1), ST-FN-13 (TP2), ST-FN-13 (TP3)	Magnetawan River NB Lanes (First Nation)	21+663	18.75R	Shallow	Ground surface to 0.6	Approach embankment can be supported on bedrock / possible bedrock at ground surface to 0.6 m depth
ST-14, ST-14 (TP1), ST-14 (TP2)	Magnetawan River NB Lanes	21+730	18.75R	Shallow	0.1 – 0.4	Approach embankment can be supported on bedrock / possible bedrock at 0.1 – 0.4 m depth
ST-15, ST-15 (A)	Existing Hwy 69 South of Hwy 526	11+200	18.75L	Shallow	1.2 – 1.8	Approach embankment can be supported on bedrock / possible bedrock at 1.2 – 1.8 m depth

**TABLE 3 (Continued)**  
**PRELIMINARY FOUNDATION TYPE FOR STRUCTURAL AREAS**

Test Hole Designations	Structure Site	Station (km)	Offset (m)	Foundation Type (Shallow / Deep)	Approximate Founding Depth below Existing Ground (m)	Approach Embankment
ST-16, ST-16 (TP1), ST-16 (TP2), ST-16 (TP3)	Existing Hwy 69 South of Hwy 526	11+295	18.75R	Shallow	0.1 – 0.8	Approach embankment can be supported on bedrock / possible bedrock at 0.1 – 0.8 m depth
ST-17, ST-17 (TP)	Hwy 526 Interchange/CPR/Still River	11+655	18.75R	Shallow	Ground surface to 0.7	Approach embankment can be supported on bedrock / possible bedrock at ground surface to 0.7 m depth
ST-18, ST-18 (A)	Hwy 526 Interchange/CPR/Still River	11+727	18.75L	Shallow	1.1 – 1.2	Approach embankment can be supported on bedrock / possible bedrock at 1.1 – 1.2 m depth
ST-19, ST-19 (TP1), ST-19 (TP2), ST-19 (TP3)	Hwy 526 Interchange/CPR/Still River	11+767	18.75R	Shallow	0.1 – 1.7	Approach embankment can be supported on bedrock / possible bedrock at 0.1 – 1.7 m depth

**TABLE 3 (Continued)**  
**PRELIMINARY FOUNDATION TYPE FOR STRUCTURAL AREAS**

Test Hole Designations	Structure Site	Station (km)	Offset (m)	Foundation Type (Shallow / Deep)	Approximate Founding Depth below Existing Ground (m)	Approach Embankment
ST-20, ST-20 (TP1), ST-20 (TP2), ST-20 (TP3), ST-20 (TP4)	Britt K2 Interchange	10+930	40R	Shallow	0.1 – 0.2	Approach embankment can be supported on bedrock / possible bedrock at 0.1 – 0.2 m depth
ST-21, ST-21 (TP1), ST-21 (TP2), ST-21 (TP3), ST-21 (TP4), ST-21 (TP5)	Britt K2 Interchange	10+930	40L	Shallow	Ground surface to 0.7	Approach embankment can be supported on bedrock / possible bedrock at ground surface to 0.7 m depth
ST-22	K2a - Still River	11+874	18.75L	Deep	35.3 m or slightly deeper	Approach embankment height should be limited, probably less than 6 m

**TABLE 3 (Continued)**  
**PRELIMINARY FOUNDATION TYPE FOR STRUCTURAL AREAS**

Test Hole Designations	Structure Site	Station (km)	Offset (m)	Foundation Type (Shallow / Deep)	Approximate Founding Depth below Existing Ground (m)	Approach Embankment
ST-23	K2a - Still River	11+925	18.75R	Deep	30.5 m or slightly deeper	Additional span of bridge structure should be considered instead of approach embankment
ST-24, ST-24 (TP1), ST-24 (TP2)	I1-K2a Existing Hwy 69	14+200	18.75R	Shallow	0.1 – 0.4	Approach embankment can be supported on bedrock / possible bedrock at 0.1 – 0.4 m depth
ST-25, ST-25 (A)	I1-K2a Existing Hwy 69	14+350	18.75L	Shallow	0.5 – 0.8	Approach embankment can be supported on bedrock / possible bedrock at 0.5 – 0.8 m depth
ST-26, ST-26 (DCPT)	I1-K2a CPR	14+800	18.75R	Deep	29.4 m or slightly deeper	Additional span of bridge structure should be considered instead of approach embankment



**TABLE 3 (Continued)**  
**PRELIMINARY FOUNDATION TYPE FOR STRUCTURAL AREAS**

Test Hole Designations	Structure Site	Station (km)	Offset (m)	Foundation Type (Shallow / Deep)	Approximate Founding Depth below Existing Ground (m)	Approach Embankment
ST-27, ST-27 (DCPT)	I1-K2a CPR	14+925	18.75L	Deep	13.3 m or slightly deeper	Additional span of bridge structure should be considered instead of approach embankment
ST-FN-28	PIC#3 Beckanon Interchange (First Nation)	18+521	40R	CANCELLED		
ST-FN-29	PIC#3 Beckanon Interchange (First Nation)	18+521	40L	CANCELLED		
ST-30, ST-30 (TP1), ST-30 (TP2), ST-30 (TP3)	I1-K2a Beckanon Interchange	19+700	40R	Shallow	0.6 – 1.0	Approach embankment can be supported on bedrock / possible bedrock at 0.6– 1.0 m depth

**TABLE 3 (Continued)**  
**PRELIMINARY FOUNDATION TYPE FOR STRUCTURAL AREAS**

Test Hole Designations	Structure Site	Station (km)	Offset (m)	Foundation Type (Shallow / Deep)	Approximate Founding Depth below Existing Ground (m)	Approach Embankment
ST-31, ST-31 (TP1), ST-31 (TP2), ST-31 (TP3), ST-31 (TP4)	I1-K2a Beckanon Interchange	19+700	40L	Shallow	Ground surface to 0.5	Approach embankment can be supported on bedrock / possible bedrock at ground surface to 0.5 m depth
ST-FN-32	PIC#3 Straight Lake (First Nation)	20+975	18.75L	CANCELLED		
ST-FN-33	PIC#3 Straight Lake (First Nation)	21+300	18.75R	CANCELLED		
ST-34, ST-34 (TP1), ST-34 (TP2), ST-34 (TP3), ST-34 (TP4)	I1-K2a CPR	11+350	18.75L	Shallow	Ground surface to 0.4	Approach embankment can be supported on bedrock / possible bedrock at ground surface to 0.4 m depth

**TABLE 3 (Continued)**  
**PRELIMINARY FOUNDATION TYPE FOR STRUCTURAL AREAS**

<b>Test Hole Designations</b>	<b>Structure Site</b>	<b>Station (km)</b>	<b>Offset (m)</b>	<b>Foundation Type (Shallow / Deep)</b>	<b>Approximate Founding Depth below Existing Ground (m)</b>	<b>Approach Embankment</b>
ST-35, ST-35 (TP1), ST-35 (TP2), ST-35 (TP3), ST-35 (TP4)	I1-K2a CPR	11+425	18.75R	Shallow	0.3 – 1.5	Approach embankment can be supported on bedrock / possible bedrock at 0.3 – 1.5 m depth
ST-36, ST-36 (TP1), ST-36 (TP2), ST-36 (TP3), ST-36 (TP4)	I1-K2a Straight Lake	11+590	18.75L	Shallow	Ground surface to 0.6	Approach embankment can be supported on bedrock / possible bedrock at ground surface to 0.6 m depth
ST-37	I1-K2a Straight Lake	11+720	18.75R	Deep	37 m or slightly deeper	Centre of Straight Lake – no approach embankment required

**TABLE 3 (Continued)**  
**PRELIMINARY FOUNDATION TYPE FOR STRUCTURAL AREAS**

Test Hole Designations	Structure Site	Station (km)	Offset (m)	Foundation Type (Shallow / Deep)	Approximate Founding Depth below Existing Ground (m)	Approach Embankment
ST-FN-38	I1-K2a Straight Lake (First Nation)	11+815	18.75L	CANCELLED		
ST-39, ST-39 (TP1), ST-39 (TP2), ST-39 (TP3), ST-39 (TP4), ST-39 (TP5)	Key River (First Nation)	10+030	18.75L	Shallow	Ground surface to 0.1	Approach embankment can be supported on bedrock / possible bedrock at ground surface to 0.1 m depth
ST-40, ST-40 (A)	Key River	10+120	18.75L	Shallow / Deep	5.0 at ST-40 / 24.2 at ST-40 (A)	Approach embankment supported on bedrock / possible bedrock at 5.0 m depth at ST-40 / Additional span of bridge should be considered at ST-40 (A) instead of approach embankment

**TABLE 3 (Continued)**  
**PRELIMINARY FOUNDATION TYPE FOR STRUCTURAL AREAS**

Test Hole Designations	Structure Site	Station (km)	Offset (m)	Foundation Type (Shallow / Deep)	Approximate Founding Depth below Existing Ground (m)	Approach Embankment
ST-41, ST-41 (TP1), ST-41 (TP2), ST-41 (TP3), ST-41 (TP4), ST-41 (TP5), ST-41 (TP6), ST-41 (TP7)	Key River	10+151	18.75R	Shallow	Ground surface to 0.5	Approach embankment can be supported on bedrock / possible bedrock at ground surface to 0.5 m depth
ST-42	CNR	12+081	18.75L	Deep	29	Additional span of bridge structure should be considered instead of approach embankment
ST-43, ST-43 (TP)	CNR	12+108	18.75R	Deep	44.1	Additional span of bridge structure should be considered instead of approach embankment

**TABLE 3 (Continued)**  
**PRELIMINARY FOUNDATION TYPE FOR STRUCTURAL AREAS**

Test Hole Designations	Structure Site	Station (km)	Offset (m)	Foundation Type (Shallow / Deep)	Approximate Founding Depth below Existing Ground (m)	Approach Embankment
ST-44, ST-44 (A)	Hwy 522 Interchange	12+526	18.75R	Shallow	2.7 – 3.4	Approach embankment can be supported on bedrock / possible bedrock at 2.7 – 3.4 m depth
ST-45, ST-45 (A), ST-45 (TP)	Hwy 522 Interchange	12+597	18.75L	Shallow	1.7 – 2.4	Approach embankment can be supported on bedrock / possible bedrock at 1.7 – 2.4 m depth

Notes:

- ST-X denotes Borehole No. X for a structure area as specified by the Terms of Reference (Table 1 in Appendix A).
- ST-FN-X denotes Borehole No. X for a structure area as specified by the Terms of Reference that is located in the First Nation's land.
- ST-X (A) denotes Borehole No. X (A) for a structure area that was drilled in addition to the borehole (ST-X) specified by the Terms of Reference.
- ST-X (TP) denotes a test pit for a structure area that was in addition to the specified borehole (ST-X).
- ST-X (DCPT) denotes a dynamic cone penetration test for a structure area that was in addition to the specified borehole (ST-X).

**TABLE 4**  
**APPROXIMATE PILE TIP LEVELS**

Support Location	Reference Borehole	Approximate Pile Tip Level (m)		Founding Stratum*
		Elevation (m)	Depth Below Existing Grade (m)	
East Abutment	ST-3	200.0 to 200.3	13.0 to 13.4	Possible Bedrock
West Abutment	ST-4	198.4 to 200.8	9.2 to 11.5	Possible Bedrock
South Abutment	ST-6	186.7	13.8	Possible Bedrock
South Abutment	ST-22	144.8	36.3	Possible Bedrock
North Abutment	ST-23	146.0	31.5	Possible Bedrock
South Abutment	ST-26	152.4	30.4	Possible Bedrock
North Abutment	ST-27	166.3	14.3	Possible Bedrock
Intermediate Abutment	ST-37	138.5 to 141.5	37.0 to 40.0	Possible Bedrock
West Abutment	ST-42	150.3	30.0	Possible Bedrock
East Abutment	ST-43	135.3	45.1	Possible Bedrock

\* The rock conditions should be investigated by rock coring.

**TABLE 5**  
**SUGGESTED LOCATIONS FOR FURTHER INVESTIGATIONS IN STRUCTURAL AREAS**

Township	Location	Proposed Borehole No.	Station <sup>1</sup>	Offset <sup>1</sup>	Coordinates <sup>1</sup>		Estimated Depth of Boreholes (m) <sup>2</sup>
					Northing	Easting	
Henvey (K2)	West of Old Still River Road	ST-A	13+835	0	5076437	224015	10
Mowat	South of Straight Lake	ST-B	10+219	1 (L)	5081812	223267	10
Henvey Inlet First Nation	Centre of Straight Lake	ST-FN-C	21+140	0	5082557	222352	40
Henvey Inlet First Nation	South Bank of Key River	ST-FN-D	12+629	0	5084099	222587	20

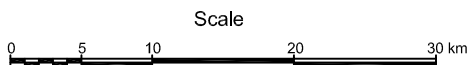
<sup>1</sup> Station, Offset and Coordinates are approximate and are taken from the digital drawing of the proposed route provided by MTO

<sup>2</sup> Depths of the proposed boreholes are approximate



## **APPENDIX B**

### **FIGURES AND DRAWINGS**



**AMEC Earth & Environmental**  
**a Division of AMEC Americas Limited**  
104 Crockford Blvd, Scarborough, Ontario, M1R 3C3



CLIENT LOGO



CLIENT

**MINISTRY OF  
TRANSPORTATION ONTARIO**  
**MTO GEOCREs No. 41H-57**

TITLE

**SITE MAP**

DWN BY:

KW

DATUM:

NAD83

DATE:

March 2006

PROJECT

**FOUNDATION INVESTIGATION FOR HIGHWAY 69 ROUTE  
SELECTION STUDY**

Parry Sound, Ontario

CHK'D BY:

PB

REV. NO.:

A

PROJECT NO:

TT53126

PROJECTION:

MTM Zone 10

SCALE:

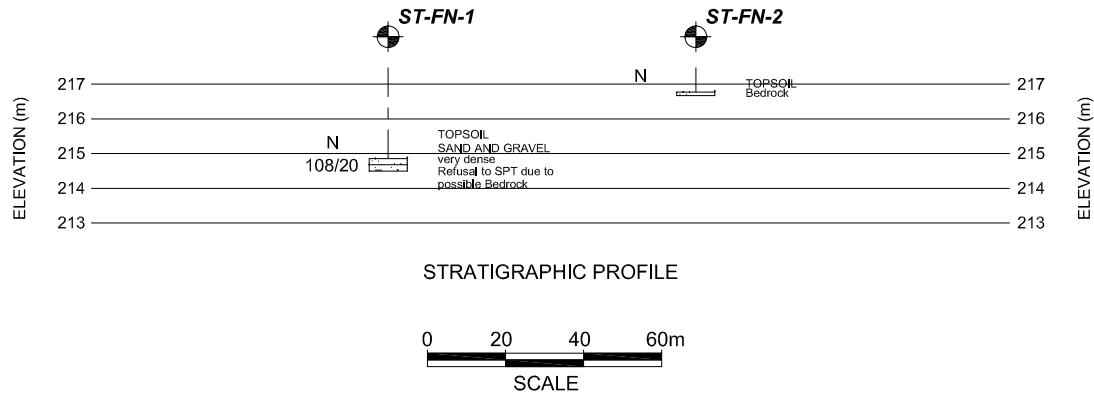
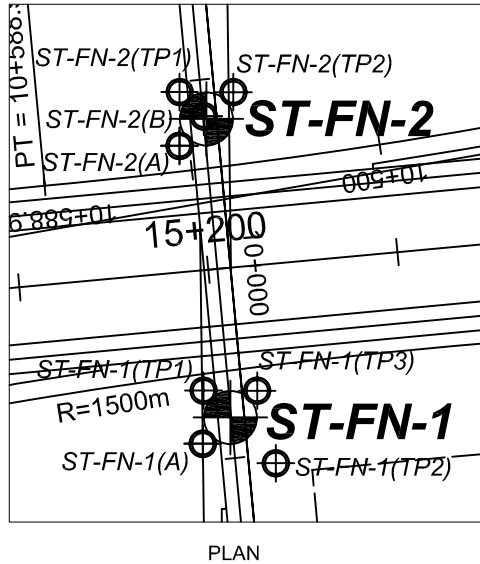
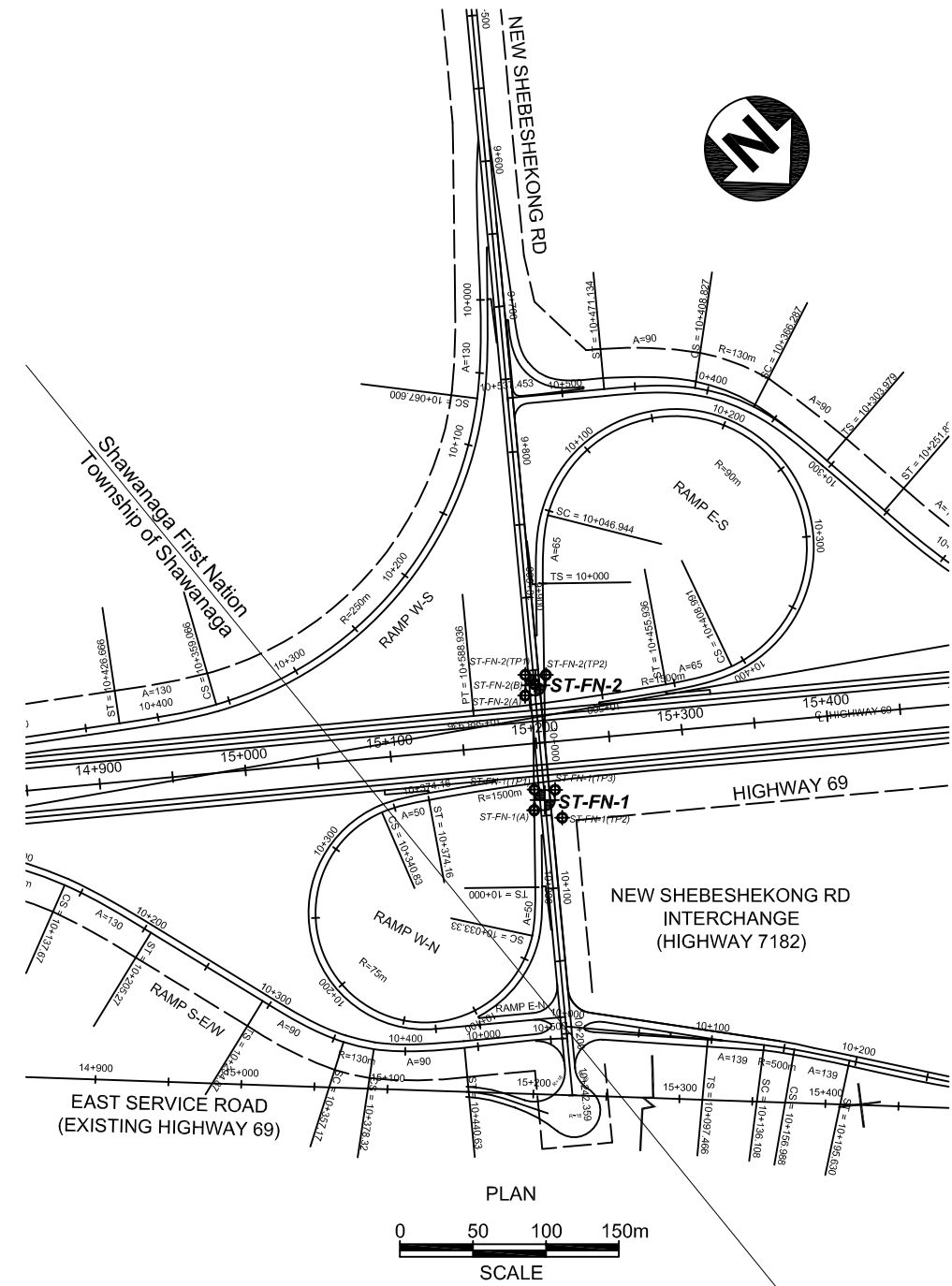
AS SHOWN

FIGURE No.


**1**

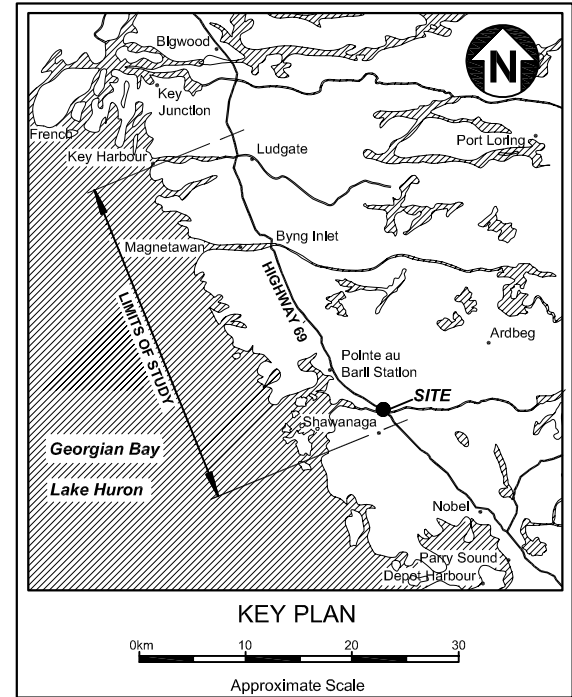






**METRIC**  
DIMENSIONS ARE IN METRES  
AND/OR MILLIMETRES  
UNLESS OTHERWISE SHOWN

MTO GEOCRES No. 41H-57	
AGREEMENT No.	
5005-E-0033	
G.W.P. No.	
5377-02-00	
FOUNDATION INVESTIGATION FOR HIGHWAY 69 ROUTE SELECTION STUDY	
STA 14+850 TO STA 15+490	
	
AMEC Earth & Environmental, a Division of AMEC Americas Limited	



LEGEND			
	BOREHOLE IN STRUCTURAL AREA		
	BOREHOLE IN SWAMP AREA		
	(TP) - TEST PIT		
	(A) - ADDITIONAL BOREHOLE		
BOREHOLE	MTM COORDINATES		ELEVATION (m)
	NORTHING	EASTING	
<b>ST-FN-1</b>	<b>5044051</b>	<b>245214</b>	<b>214.86</b>
ST-FN-1(A)	5044051	245224	215.60
ST-FN-1(TP1)	5044051	245204	214.00
ST-FN-1(TP2)	5044068	245214	216.00
ST-FN-1(TP3)	5044041	245214	214.00
<b>ST-FN-2</b>	<b>5043990</b>	<b>245163</b>	<b>216.77</b>
ST-FN-2(A)	5043990	245173	217.50
ST-FN-2(B)	5043999	245163	217.10
ST-FN-2(TP1)	5043980	245163	216.00
ST-FN-2(TP2)	5043990	245153	215.30

**NOTES**  
For boreholes located in swamp areas, please refer to AMEC's report. Ref.: TT53126-Swamps.

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

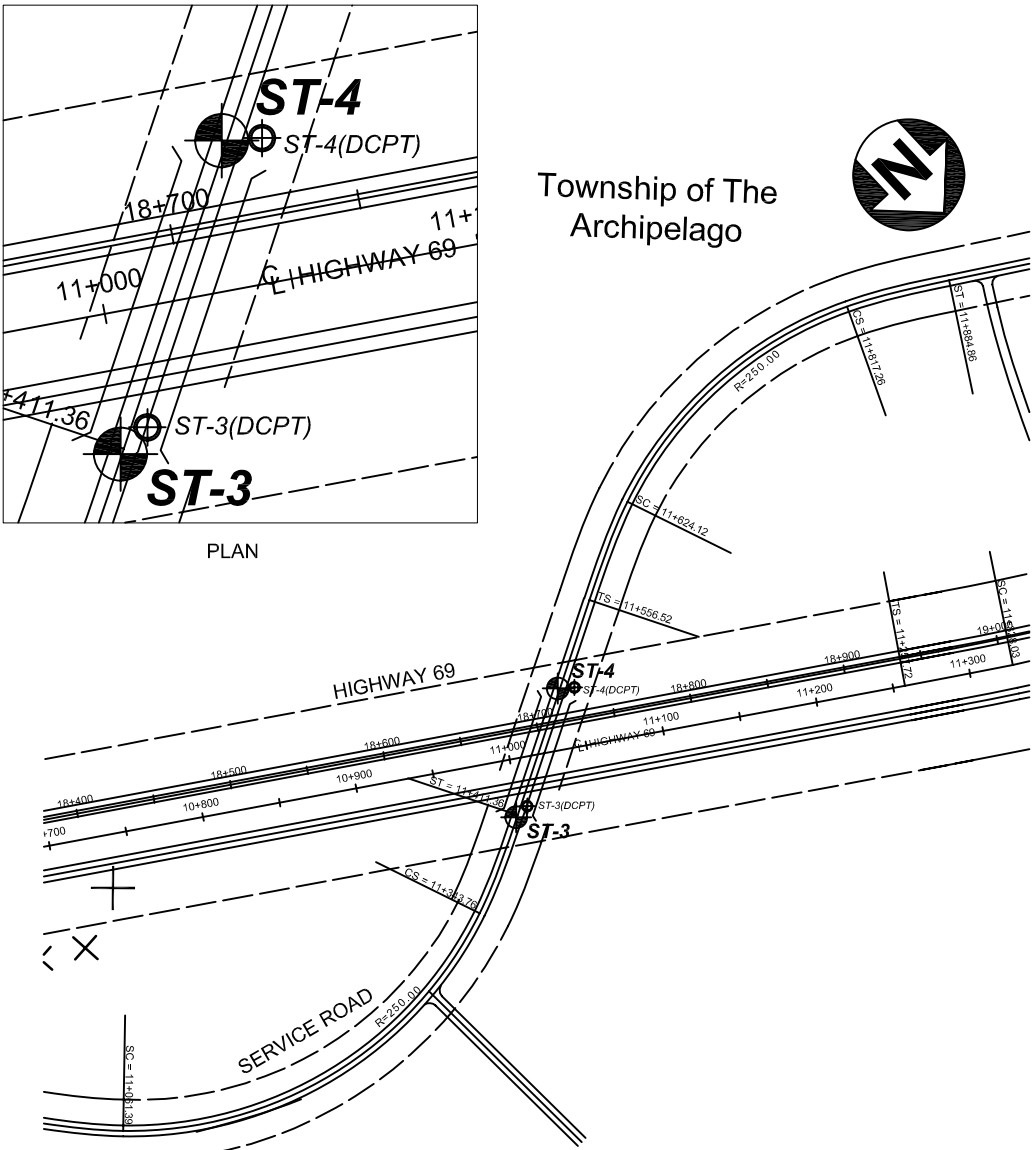
MTO GEORES No. 41H-57
AGREEMENT No.
5005-E-0033
G.W.P. No.
5377-02-00
FOUNDATION INVESTIGATION FOR HIGHWAY 69 ROUTE SELECTION STUDY
STA 10+680 TO STA 11+340



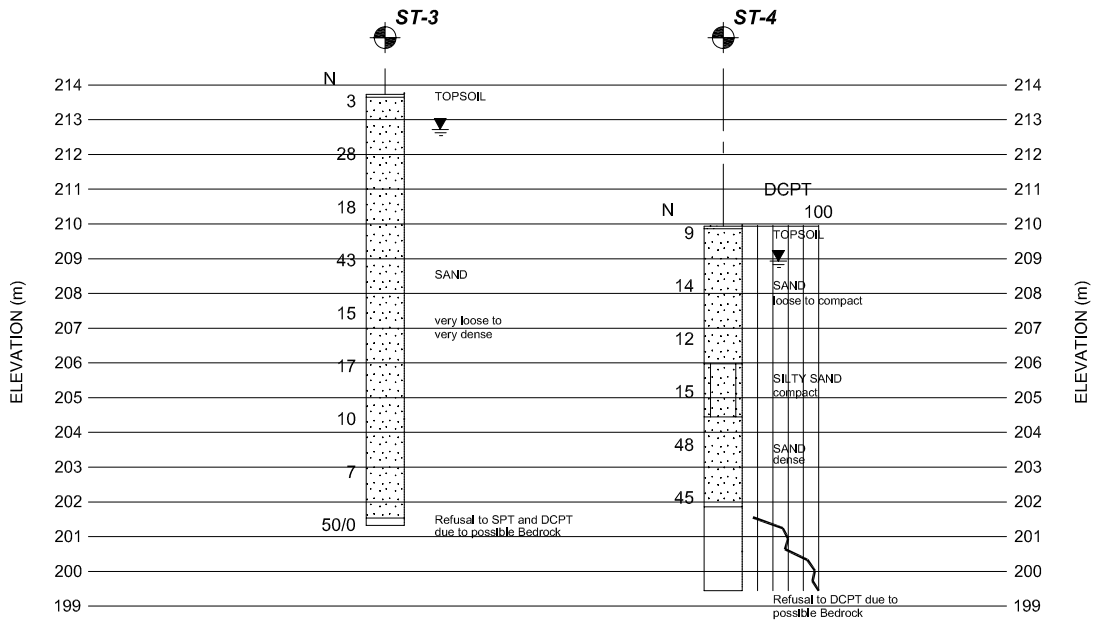
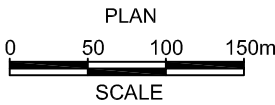
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**2**

**amec**

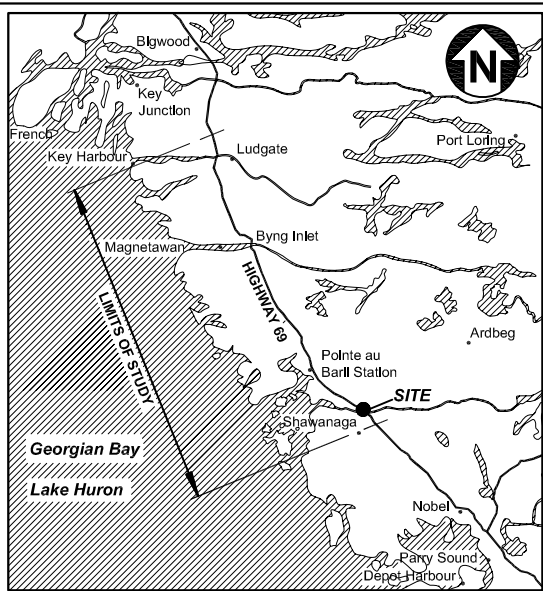
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PLAN



STRATIGRAPHIC PROFILE



KEY PLAN



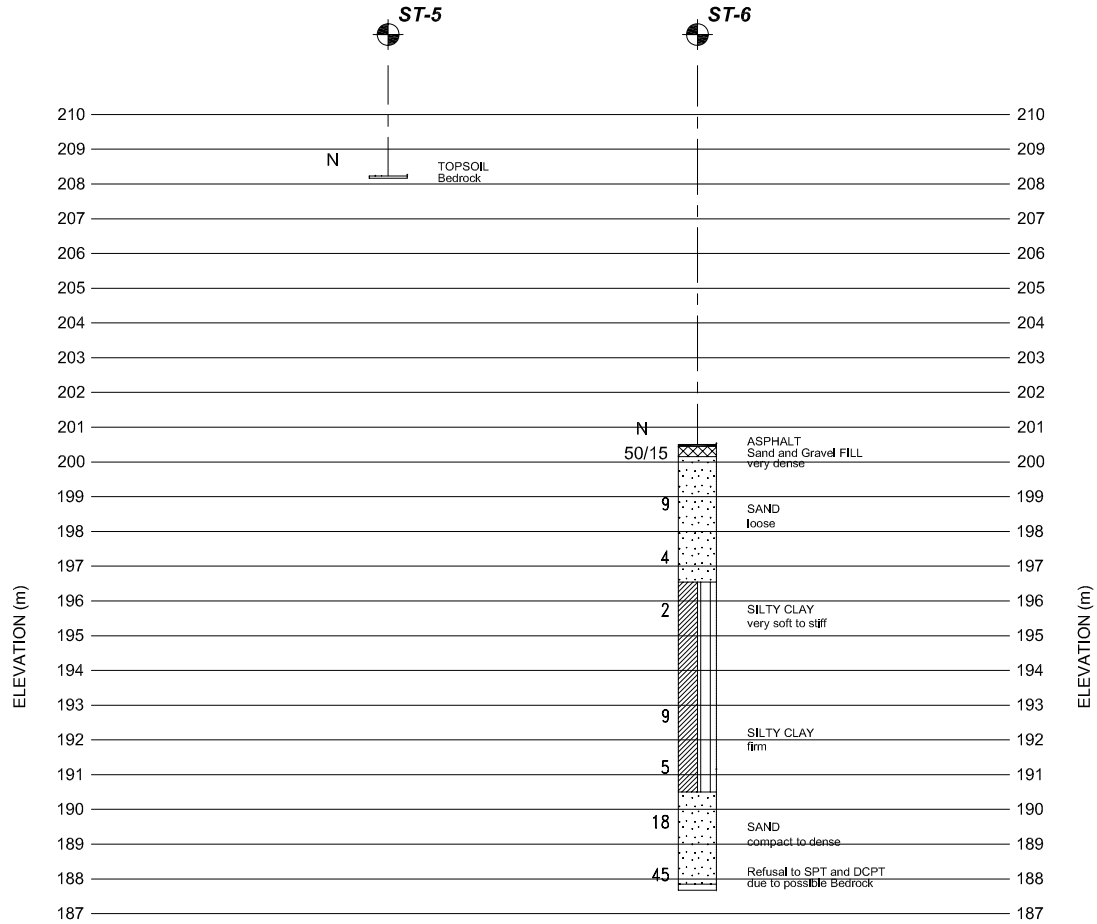
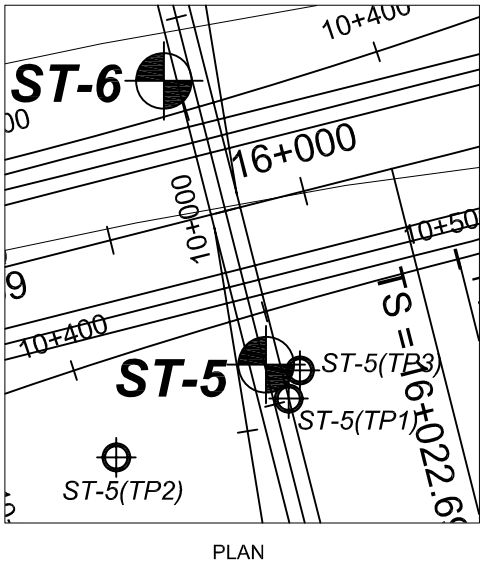
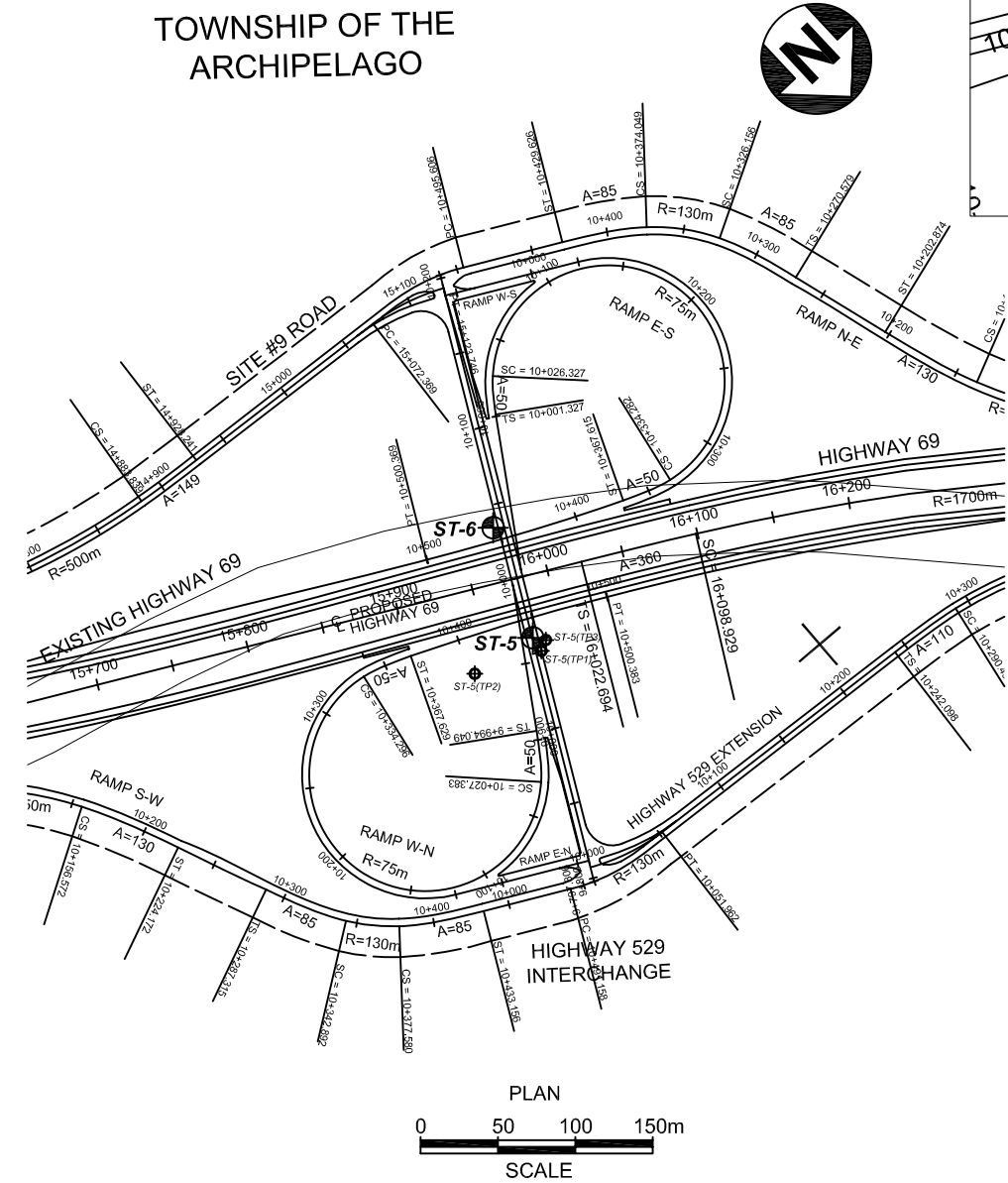
Approximate Scale

LEGEND

- BOREHOLE IN STRUCTURAL AREA
- BOREHOLE IN SWAMP AREA
- (DCPT) - DYNAMIC CONE PENETRATION TEST

BOREHOLE	MTM COORDINATES		ELEVATION (m)
	NORTHING	EASTING	
ST-3	5046453	242742	213.73
ST-3(DCPT)	5046453	242732	213.00
ST-4	5046413	242663	209.94
ST-4(DCPT)	5046420	242655	209.98

**NOTES**  
For boreholes located in swamp areas, please  
refer to AMEC's report. Ref.: TT53126-Swamps.

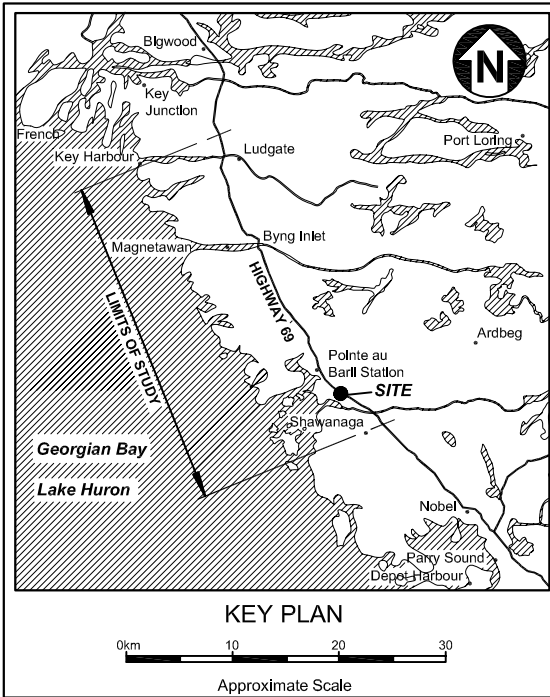


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G.W.P. No.
5377-02-00
FOUNDATION INVESTIGATION FOR HIGHWAY 69 ROUTE SELECTION STUDY
STA 15+650 TO STA 16+300
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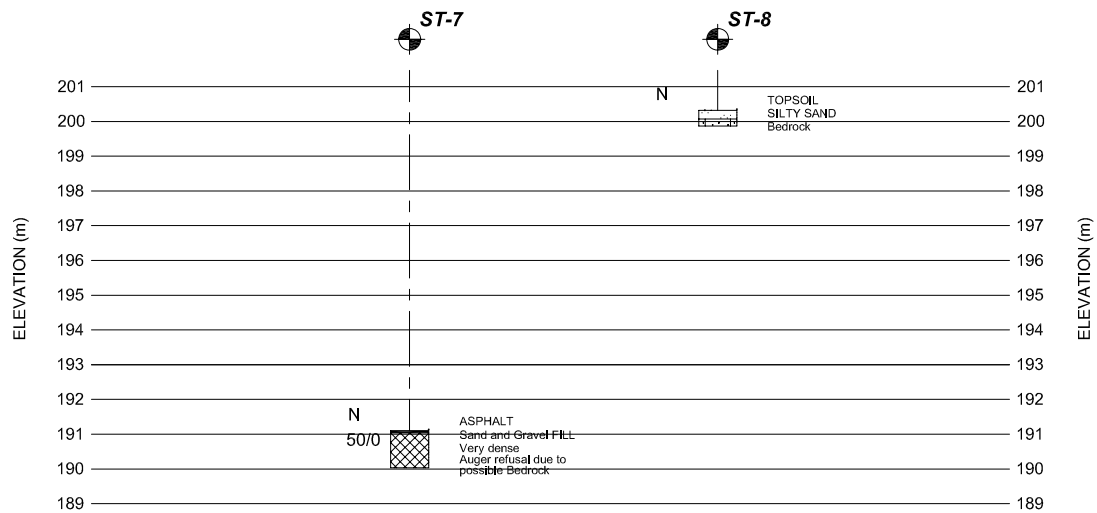
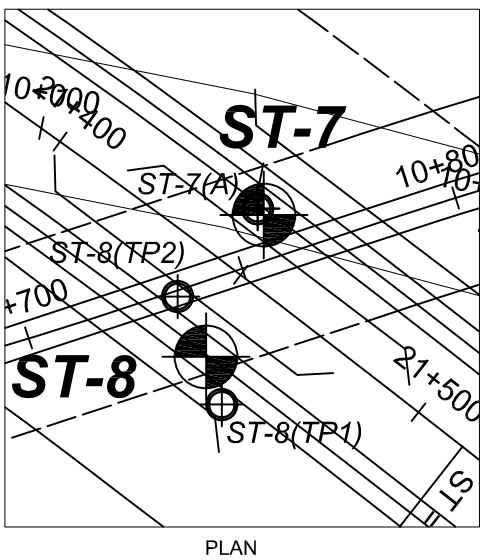
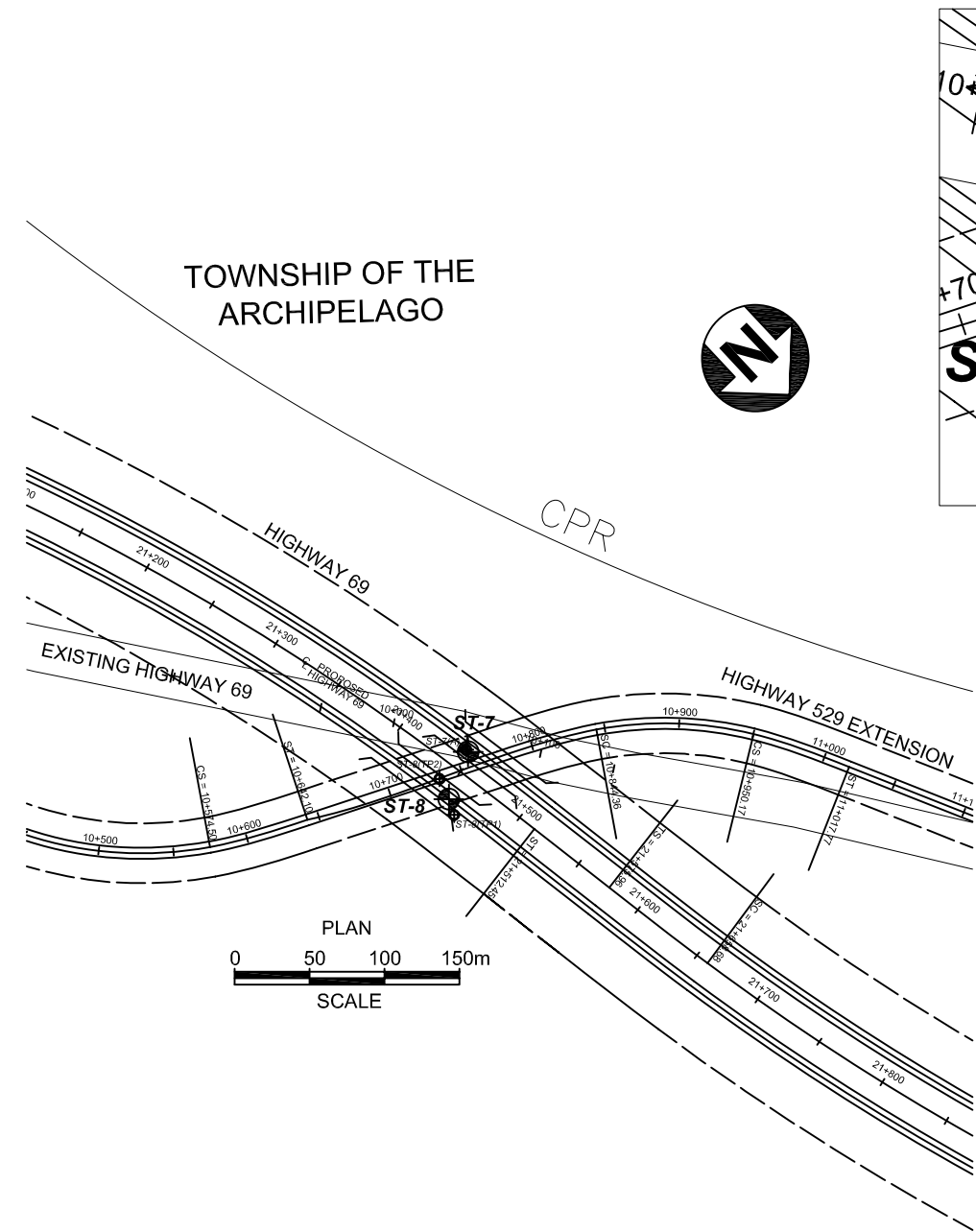


**SHEET**  
**3**



LEGEND			
	BOREHOLE IN STRUCTURAL AREA		
	BOREHOLE IN SWAMP AREA		
	(TP) - TEST PIT		
BOREHOLE	MTM COORDINATES		ELEVATION (m)
	NORTHING	EASTING	
ST-5	5048993	238255	208.21
ST-5(TP1)	5049003	238257	206.32
ST-5(TP2)	5048983	238298	208.00
ST-5(TP3)	5049003	238252	207.90
ST-6	5048925	238223	200.50

**NOTES**  
For boreholes located in swamp areas, please  
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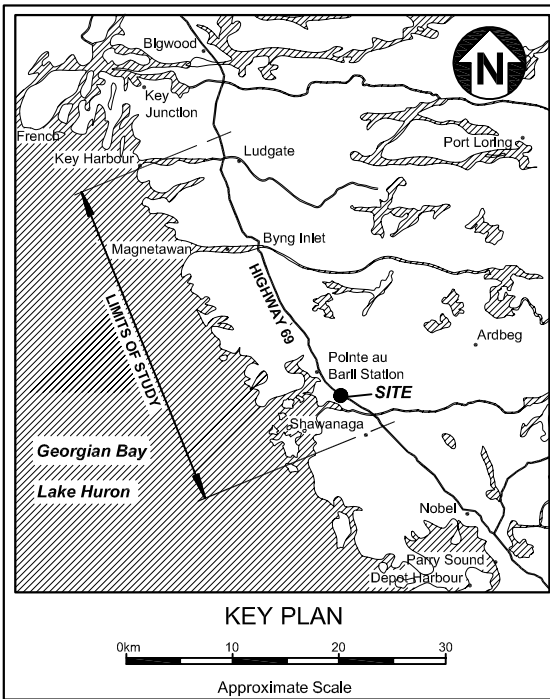
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STA 21+100 TO STA 21+875



**SHEET**  
**4**

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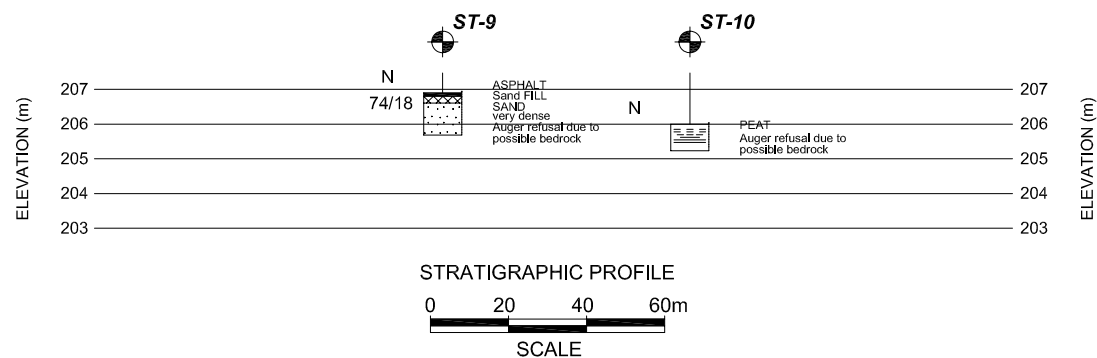
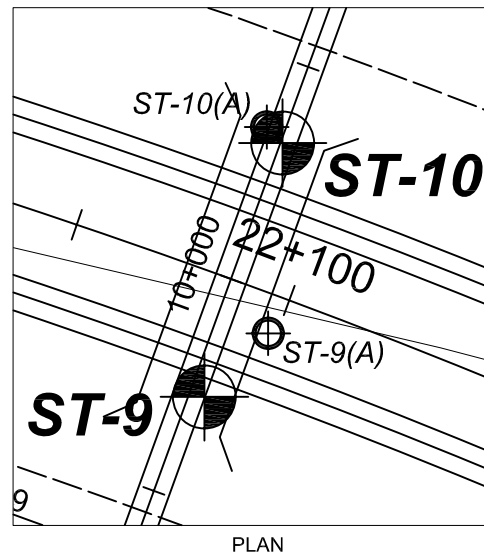
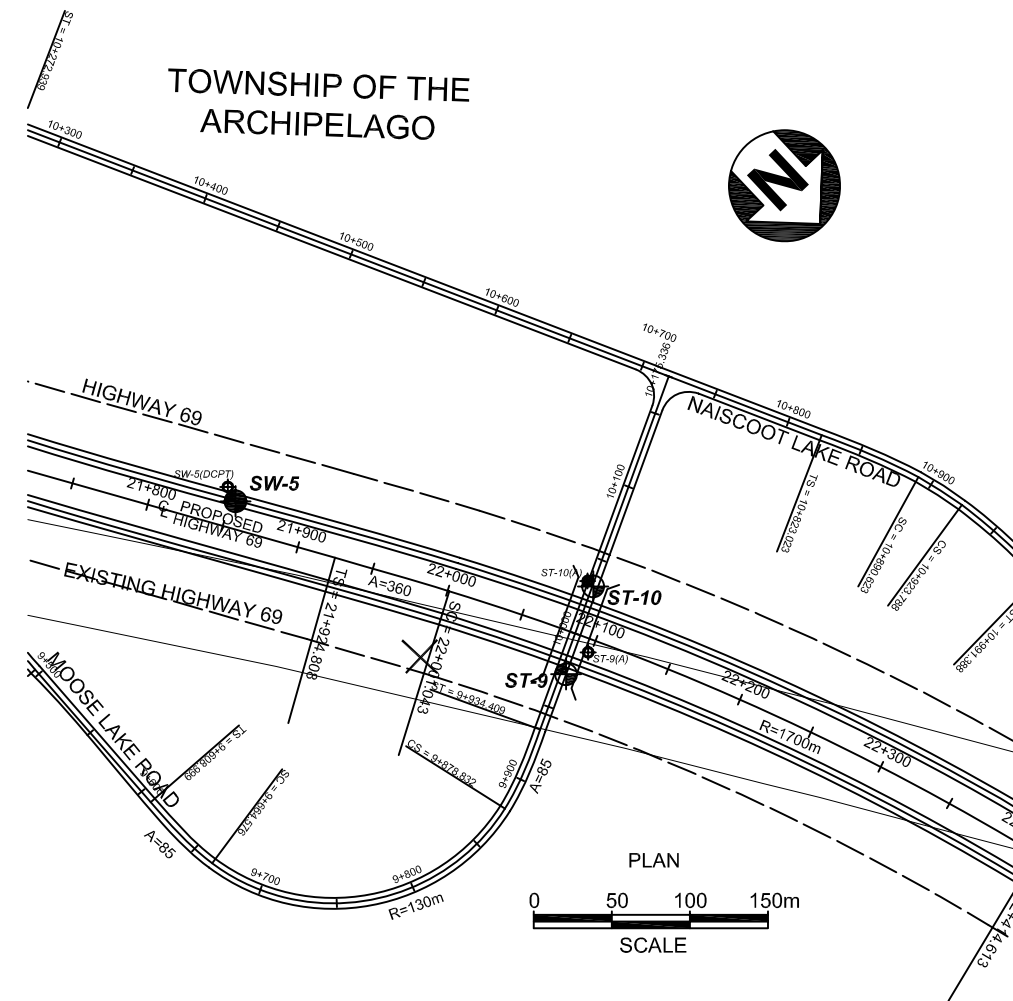


**LEGEND**



- BOREHOLE IN STRUCTURAL AREA
- BOREHOLE IN SWAMP AREA
- (TP) - TEST PIT
- (A) - ADDITIONAL BOREHOLE

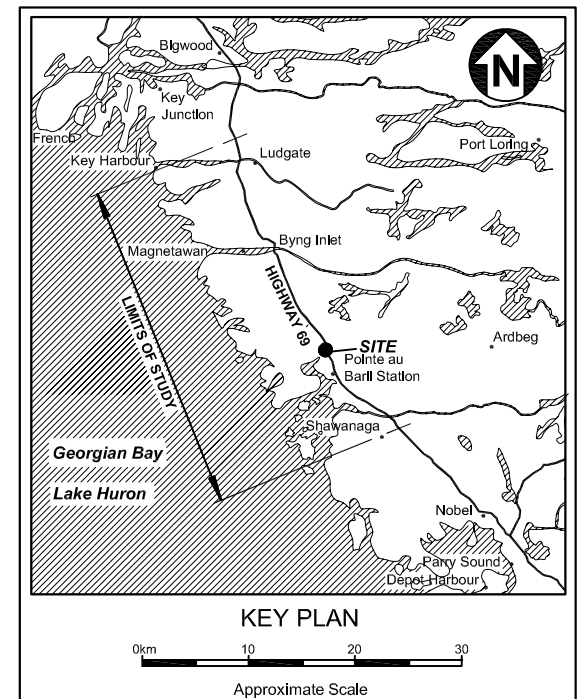
BOREHOLE	MTM COORDINATES		ELEVATION (m)
	NORTHING	EASTING	
ST-7	5050451	237053	191.10
ST-7(A)	5050449	237053	191.10
ST-8	5050464	237084	200.32
ST-8(TP1)	5050474	237089	200.00
ST-8(TP2)	5050450	237079	208.00




**NOTES**  
For boreholes located in swamp areas, please  
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**METRIC**  
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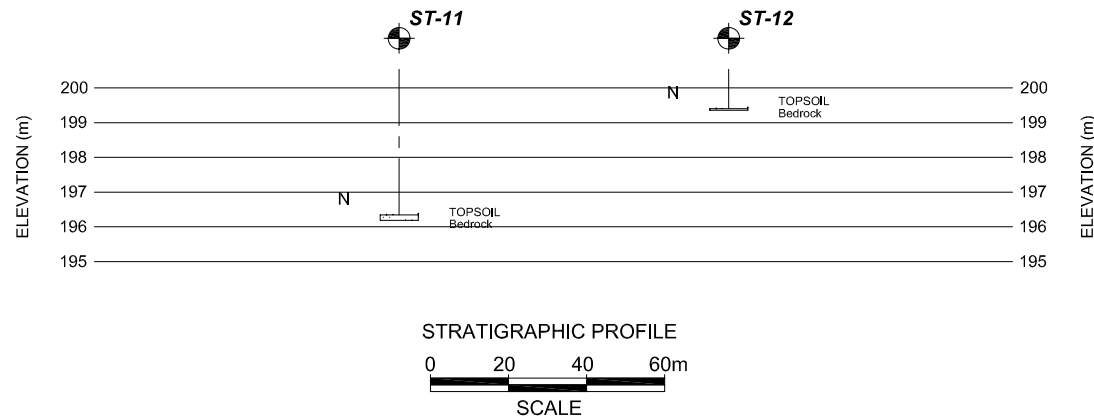
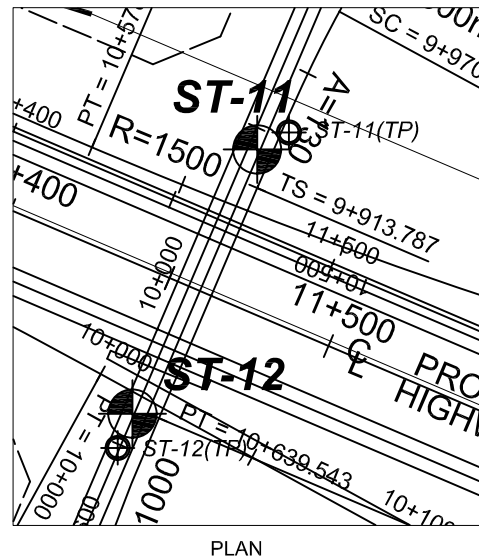
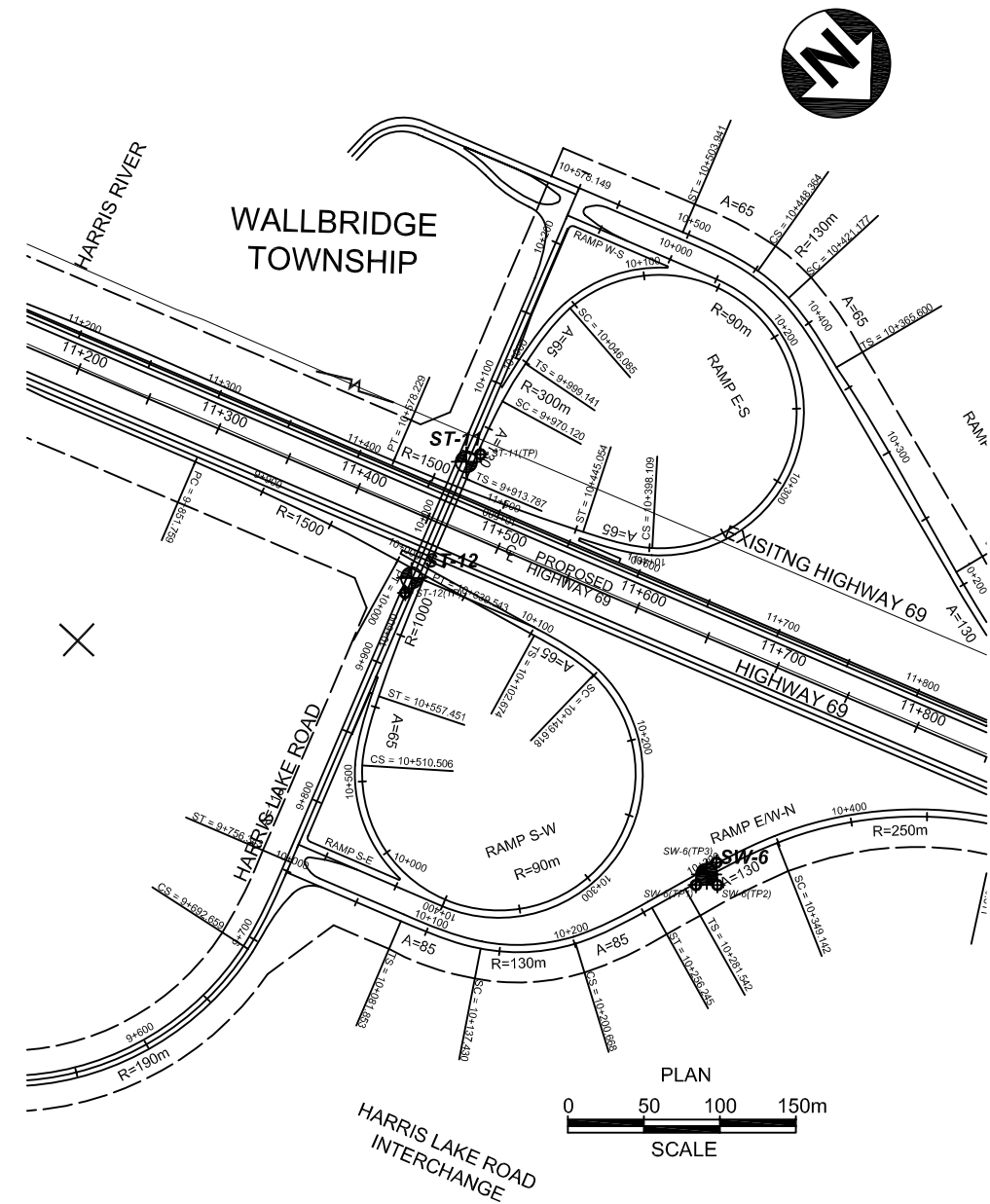
MTO GEOCRES No. 41H-57		
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G.W.P. No.		
5377-02-00		<b>SHEET</b> <b>5</b>
FOUNDATION INVESTIGATION FOR HIGHWAY 69 ROUTE SELECTION STUDY		
STA 21+720 TO STA 22+400		
		
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LEGEND			
	BOREHOLE IN STRUCTURAL AREA		
	BOREHOLE IN SWAMP AREA		
	(A) - ADDITIONAL BOREHOLE		
BOREHOLE	MTM COORDINATES		ELEVATION (m)
	NORTHING	EASTING	
ST-9	5054227	235354	206.90
ST-9(A)	5054227	235334	208.90
ST-10	5054199	235300	205.99
ST-10(A)	5054194	235301	205.00

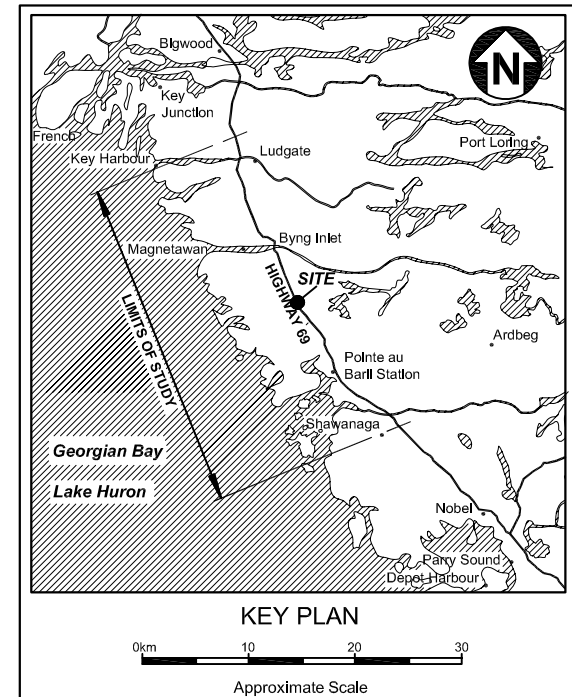
**NOTES**  
For boreholes located in swamp areas, please  
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STA 11+160 TO STA 11+850	
	
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LEGEND			
	BOREHOLE IN STRUCTURAL AREA		
	BOREHOLE IN SWAMP AREA		
	(TP) - TEST PIT		
BOREHOLE	MTM COORDINATES		ELEVATION (m)
	NORTHING	EASTING	
ST-11	5061468	230858	196.34
ST-11(TP)	5061471	230848	196.02
ST-12	5061498	230933	199.41
ST-12(TP)	5061502	230943	198.97

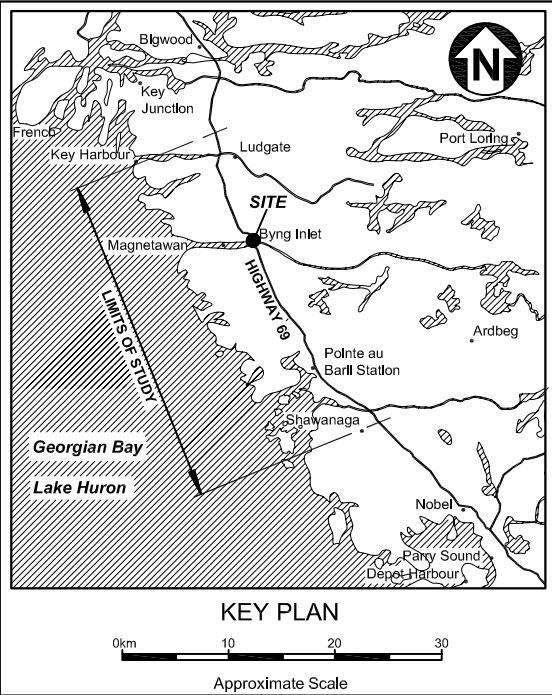
**NOTES**  
For boreholes located in swamp areas, please  
refer to AMEC's report. Ref.: TT53126-Swamps.

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HIGHWAY 69 ROUTE SELECTION STUDY  
STA 21+395 TO STA 22+130

**SHEET**  
**7**

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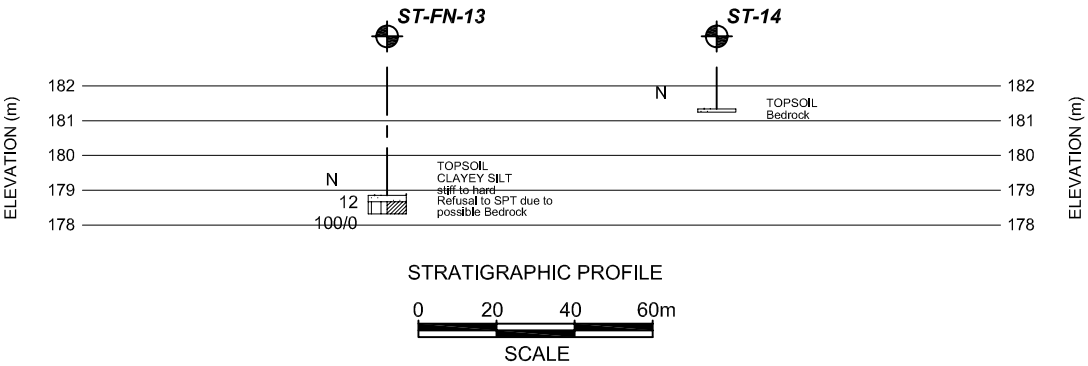
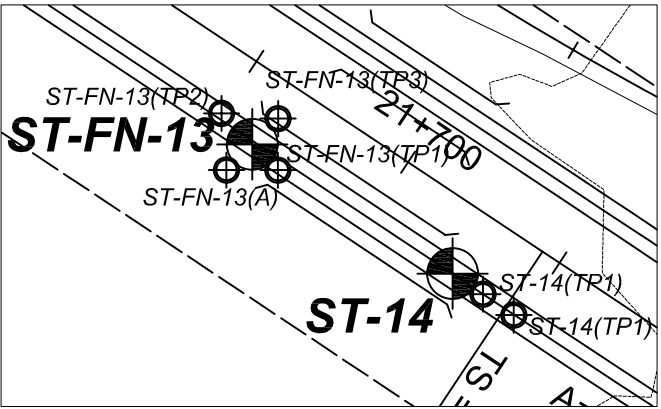
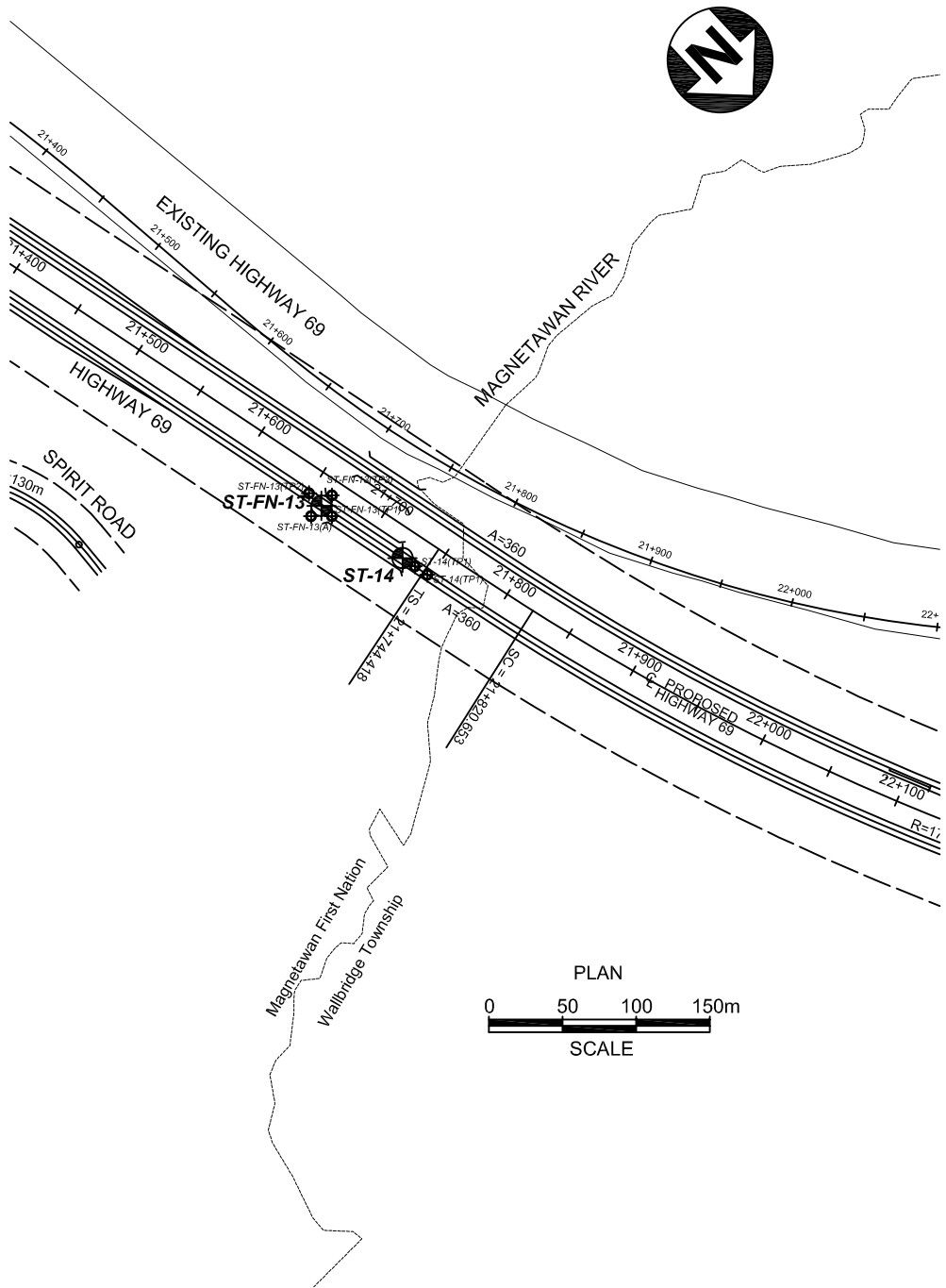
**LEGEND**

- BOREHOLE IN STRUCTURAL AREA
- BOREHOLE IN SWAMP AREA
- (TP) - TEST PIT
- (A) - ADDITIONAL BOREHOLE

BOREHOLE	MTM COORDINATES		ELEVATION (m)
	NORTHING	EASTING	
<b>ST-FN-13</b>	<b>5071008</b>	<b>227318</b>	<b>178.85</b>
ST-FN-13(A)	5071008	227328	178.00
ST-FN-13(TP1)	5071018	227318	176.50
ST-FN-13(TP2)	5070996	227318	181.90
ST-FN-13(TP3)	5071008	227308	179.35
<b>ST-14</b>	<b>5071072</b>	<b>227304</b>	<b>181.34</b>
ST-14(TP1)	5071082	227302	183.20
ST-14(TP2)	5071092	227300	185.10

**NOTES**

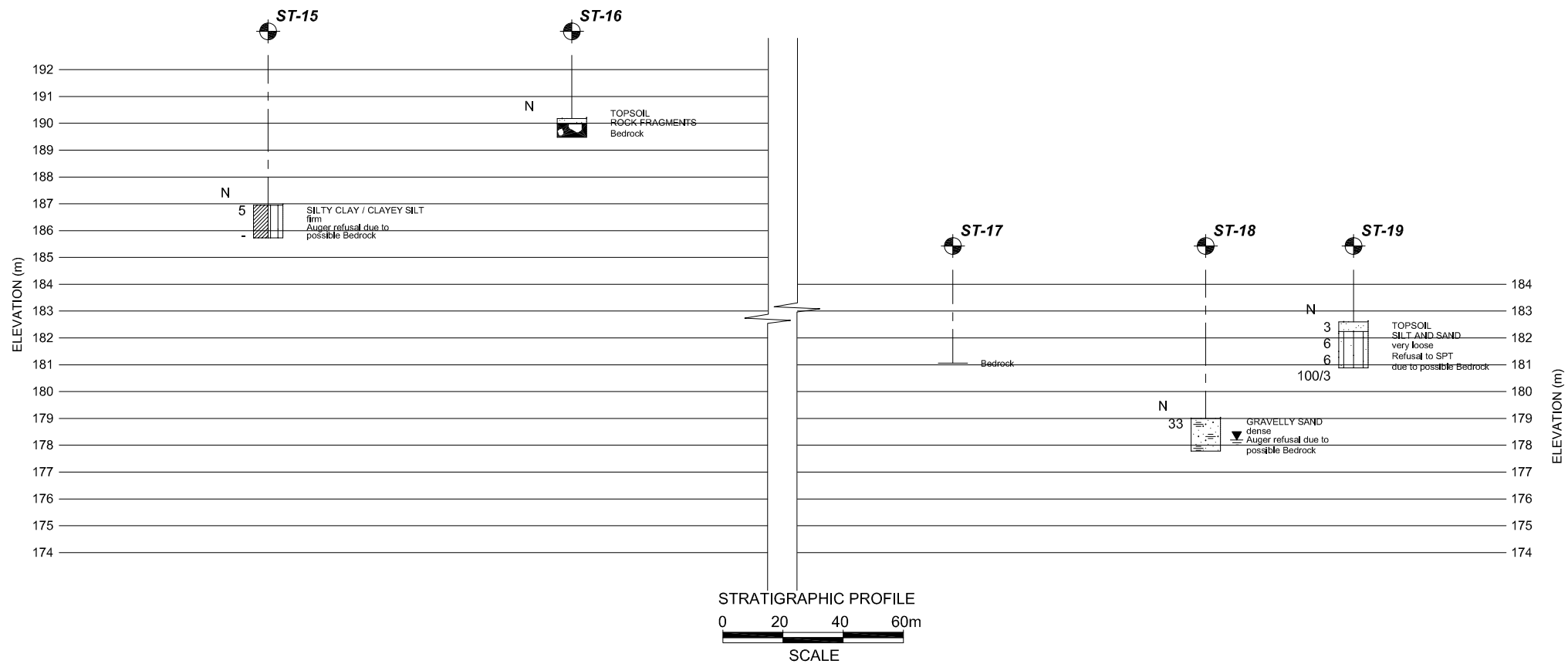
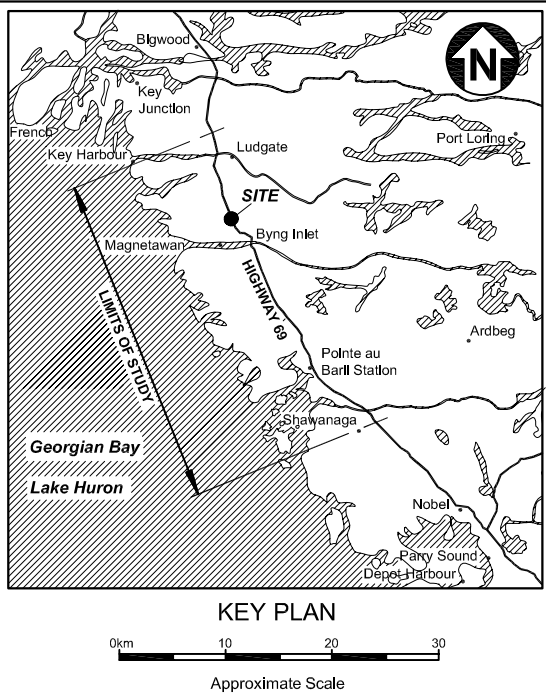
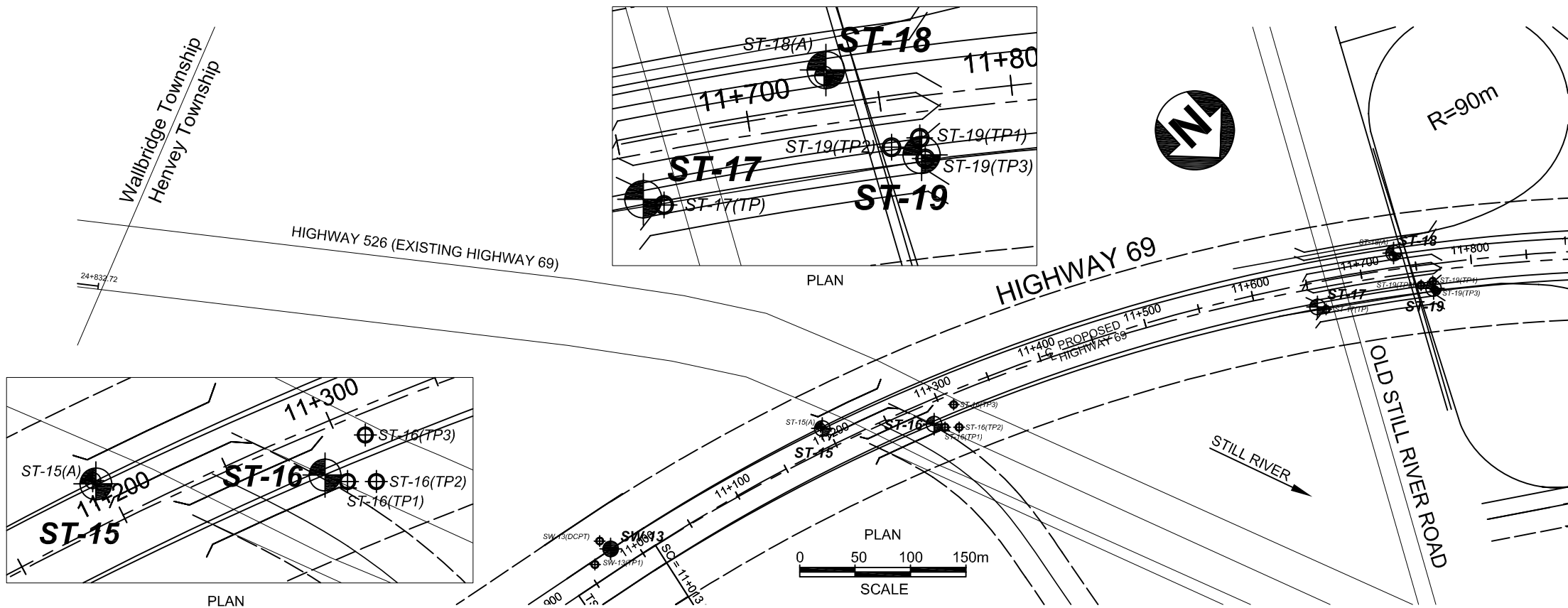
For boreholes located in swamp areas, please refer to AMEC's report. Ref.: TT53126-Swamps.



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STA 10+020 TO STA 11+880
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**SHEET**  
**8**

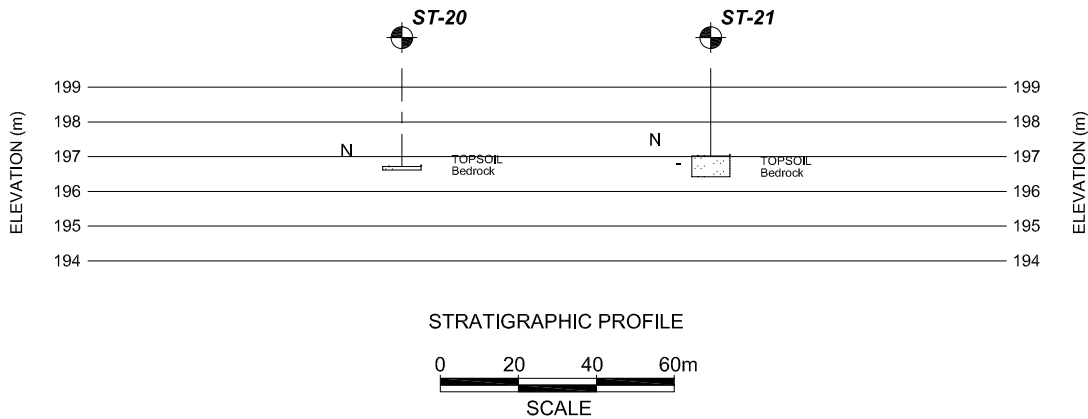
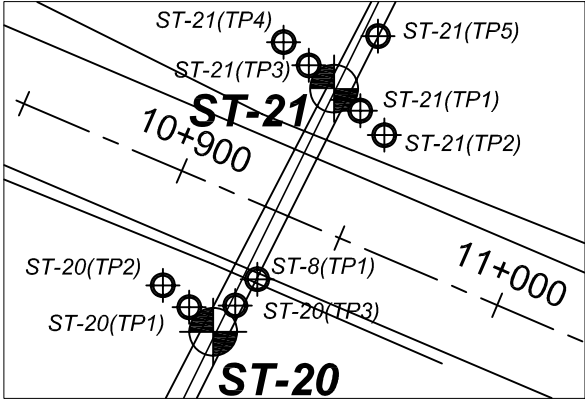
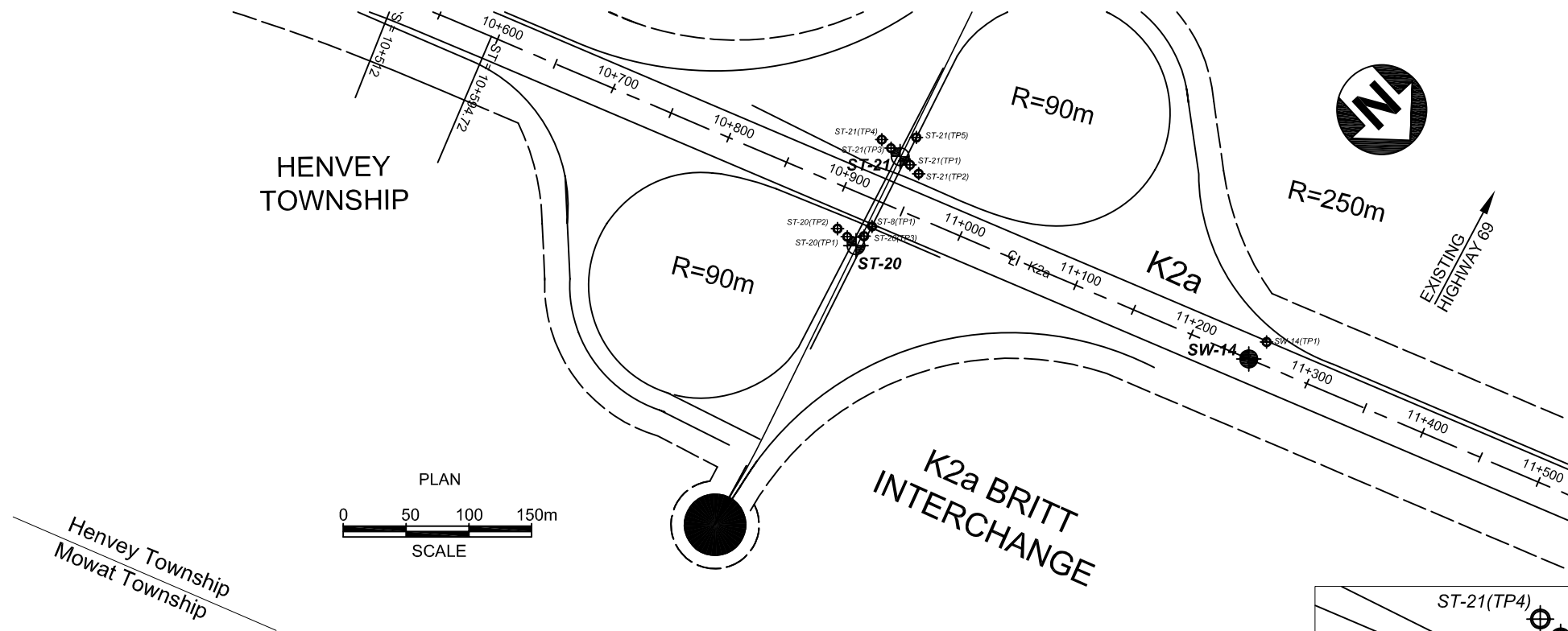


**LEGEND**

- BOREHOLE IN STRUCTURAL AREA
- BOREHOLE IN SWAMP AREA
- (TP) - TEST PIT
- (A) - ADDITIONAL BOREHOLE

BOREHOLE	MTM COORDINATES		ELEVATION (m)
	NORTHING	EASTING	
<b>ST-15</b>	<b>5073313</b>	<b>224503</b>	<b>186.95</b>
ST-15(A)	5073311	224503	186.50
<b>ST-16</b>	<b>5073381</b>	<b>224430</b>	<b>190.18</b>
ST-16(TP1)	5073390	224425	189.33
ST-16(TP2)	5073399	224416	190.90
ST-16(TP3)	5073381	224405	190.92
<b>ST-17</b>	<b>5073550</b>	<b>224109</b>	<b>181.09</b>
ST-17(TP)	5073557	224105	177.98
<b>ST-18</b>	<b>5073564</b>	<b>224026</b>	<b>179.00</b>
ST-18(A)	5073565	224024	179.00
<b>ST-19</b>	<b>5073612</b>	<b>224023</b>	<b>182.60</b>
ST-19(TP1)	5073612	224025	183.00
ST-19(TP2)	5073607	224019	183.85
ST-19(TP3)	5073602	224029	179.20

**NOTES**  
For boreholes located in swamp areas, please refer to AMEC's report. Ref.: TT53126-Swamps.

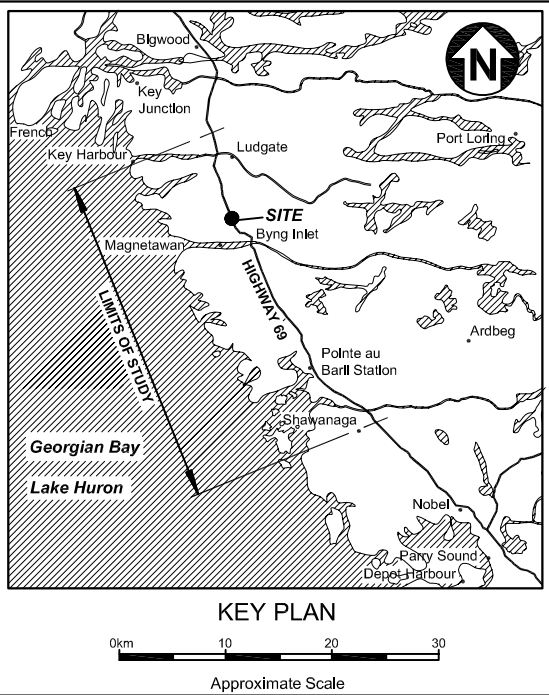


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STA 10+540 TO STA 11+530
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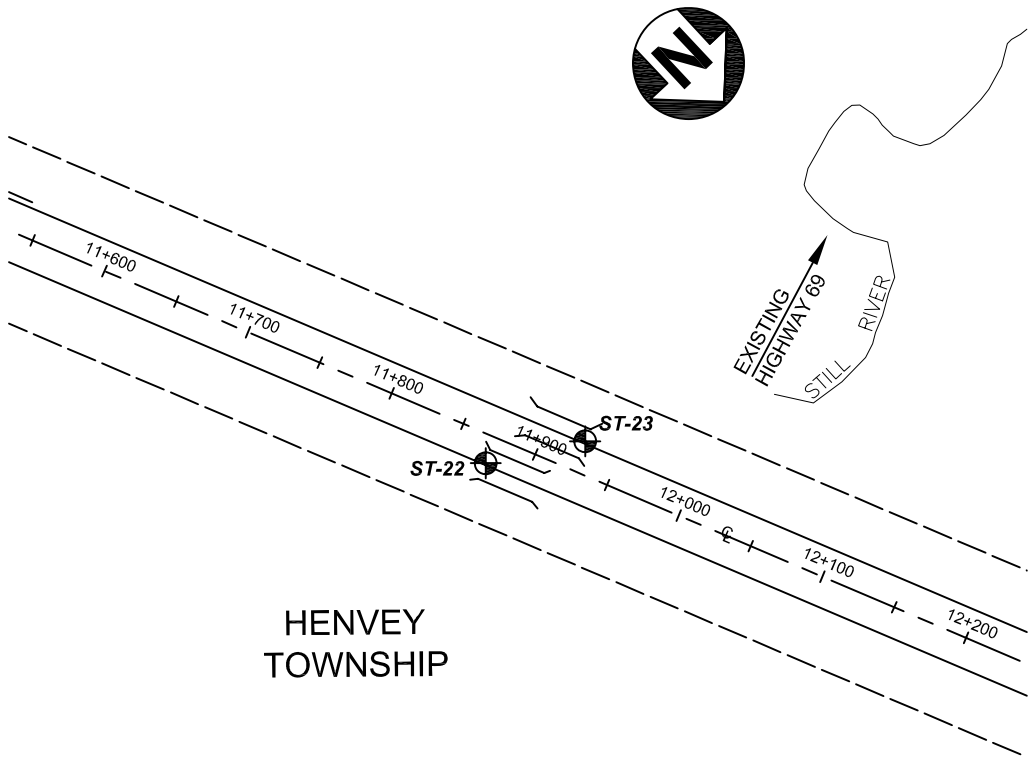


**SHEET**  
**9**

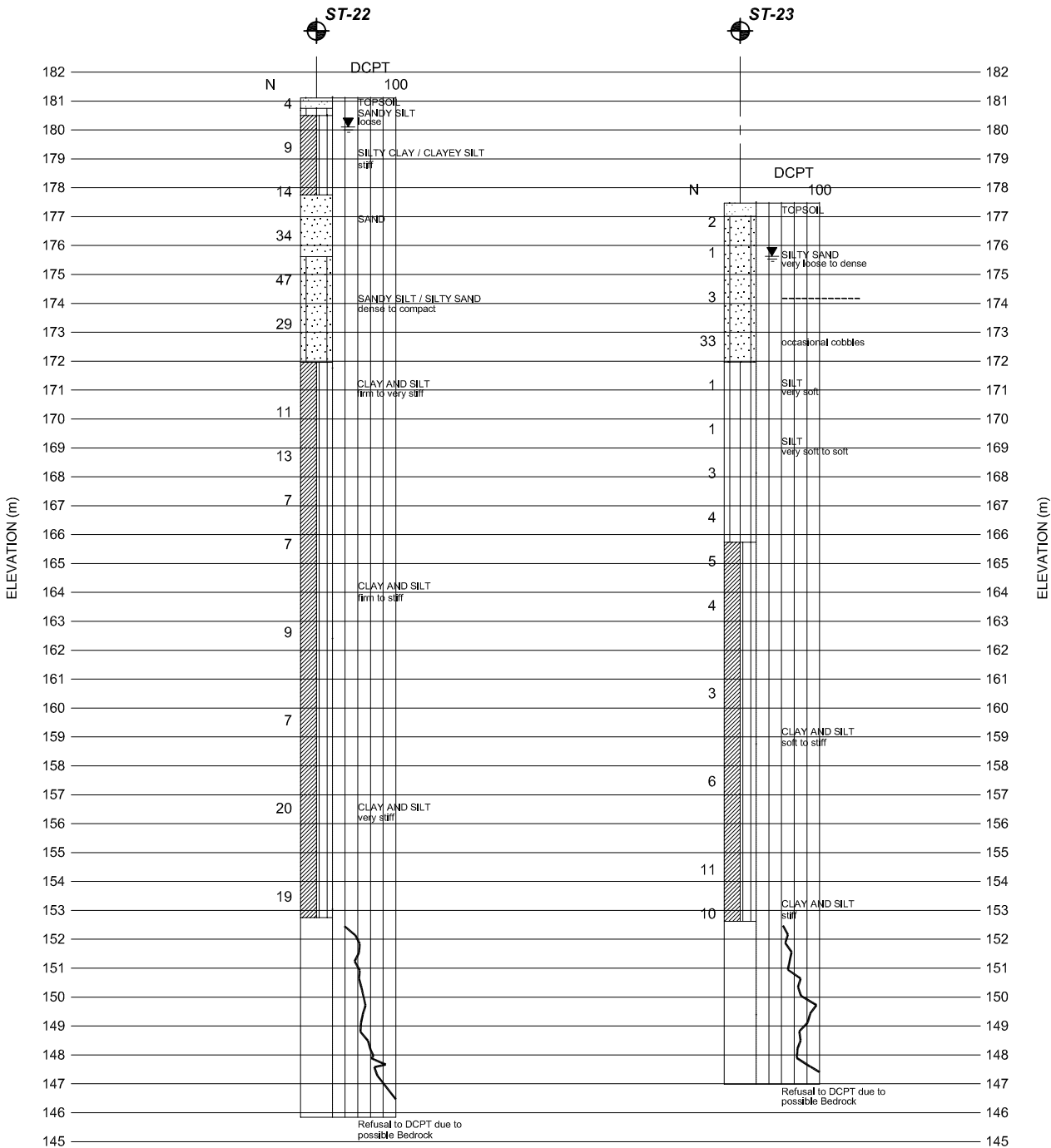
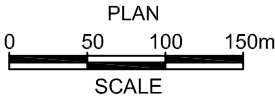


LEGEND			
	BOREHOLE IN STRUCTURAL AREA		
	BOREHOLE IN SWAMP AREA		
	(TP) - TEST PIT		
BOREHOLE	MTM COORDINATES		ELEVATION (m)
	NORTHING	EASTING	
<b>ST-20</b>	<b>5073962</b>	<b>225478</b>	<b>196.72</b>
ST-20(TP1)	5073952	225477	196.11
ST-20(TP2)	5073942	225478	197.80
ST-20(TP3)	5073962	225468	195.40
ST-20(TP4)	5073960	225458	195.75
<b>ST-21</b>	<b>5073936</b>	<b>225403</b>	<b>197.02</b>
ST-21(TP1)	5073946	225403	197.80
ST-21(TP2)	5073956	225404	198.90
ST-21(TP3)	5073926	225403	197.02
ST-21(TP4)	5073916	225403	198.17
ST-21(TP5)	5073936	225383	197.20

**NOTES**  
For boreholes located in swamp areas, please refer to AMEC's report. Ref.: TT53126-Swamps.



HENVEY  
TOWNSHIP



STRATIGRAPHIC PROFILE



**METRIC**

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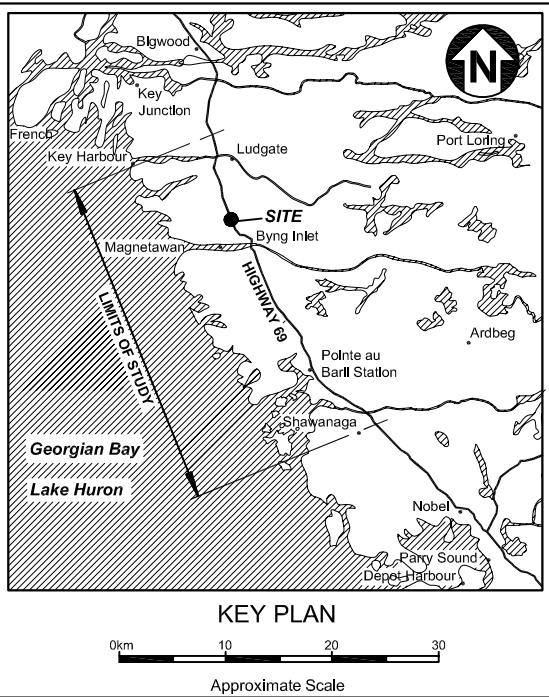
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HIGHWAY 69 ROUTE SELECTION STUDY

STA 11+530 TO STA 12+830

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**SHEET  
10**



LEGEND

- BOREHOLE IN STRUCTURAL AREA
- BOREHOLE IN SWAMP AREA

BOREHOLE	MTM COORDINATES		ELEVATION (m)
	NORTHING	EASTING	
ST-22	5074832	225102	181.10
ST-23	5074865	225048	177.50

**NOTES**

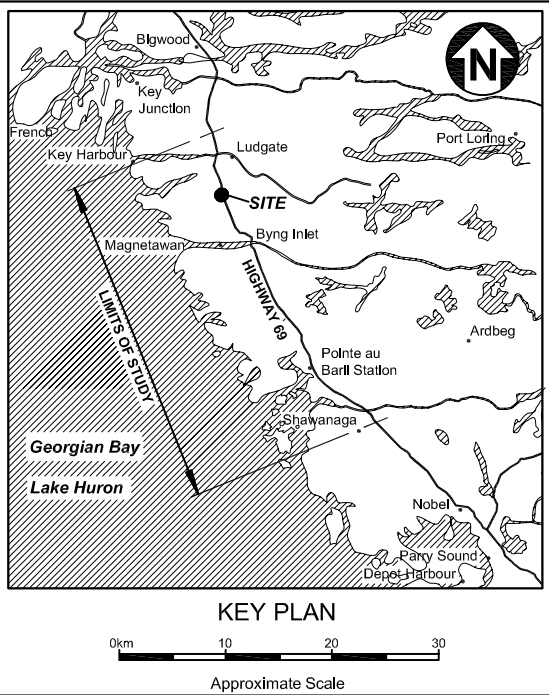
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**5377-02-00**  
FOUNDATION INVESTIGATION FOR  
HIGHWAY 69 ROUTE SELECTION STUDY  
STA 14+130 TO STA 15+010

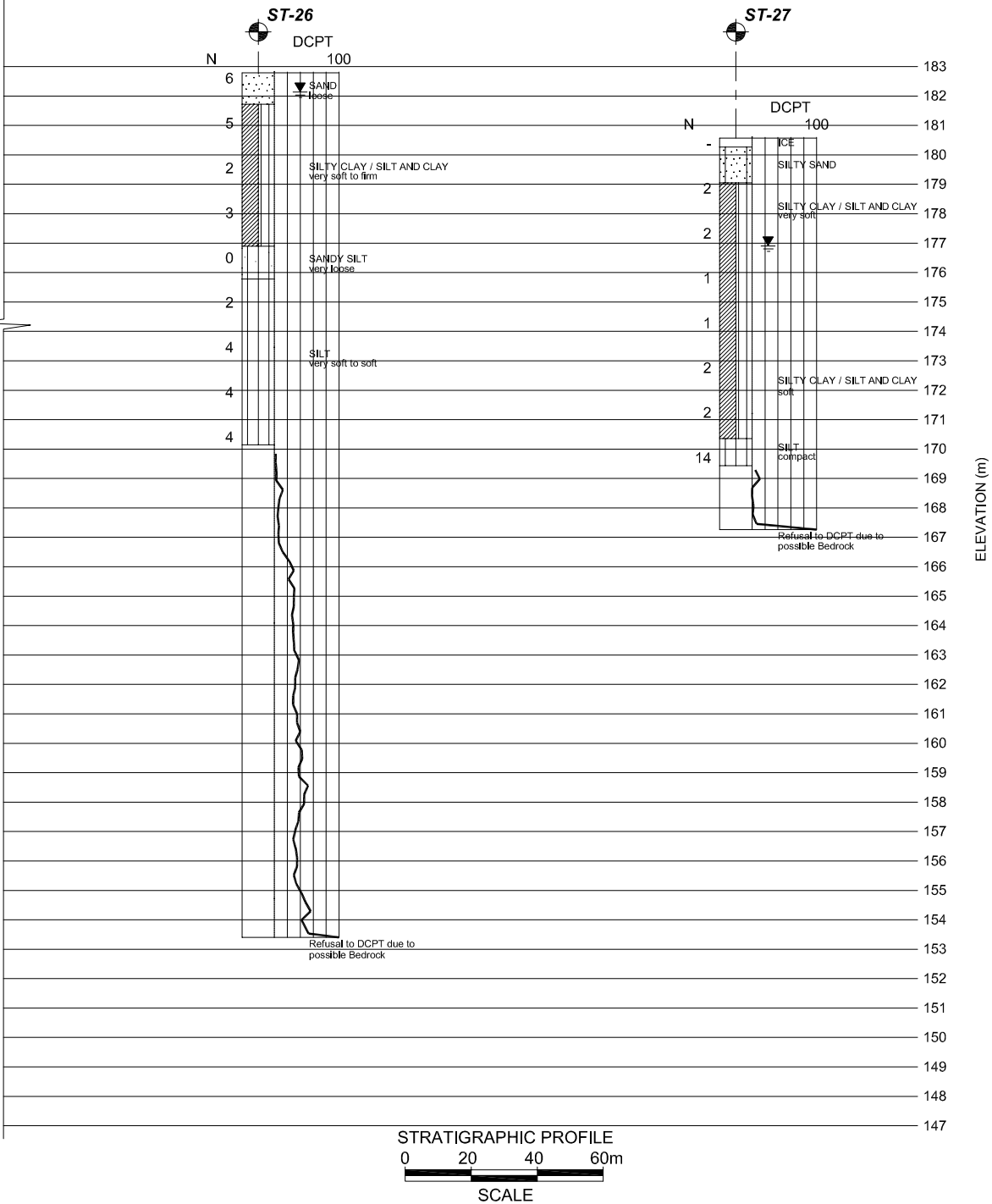
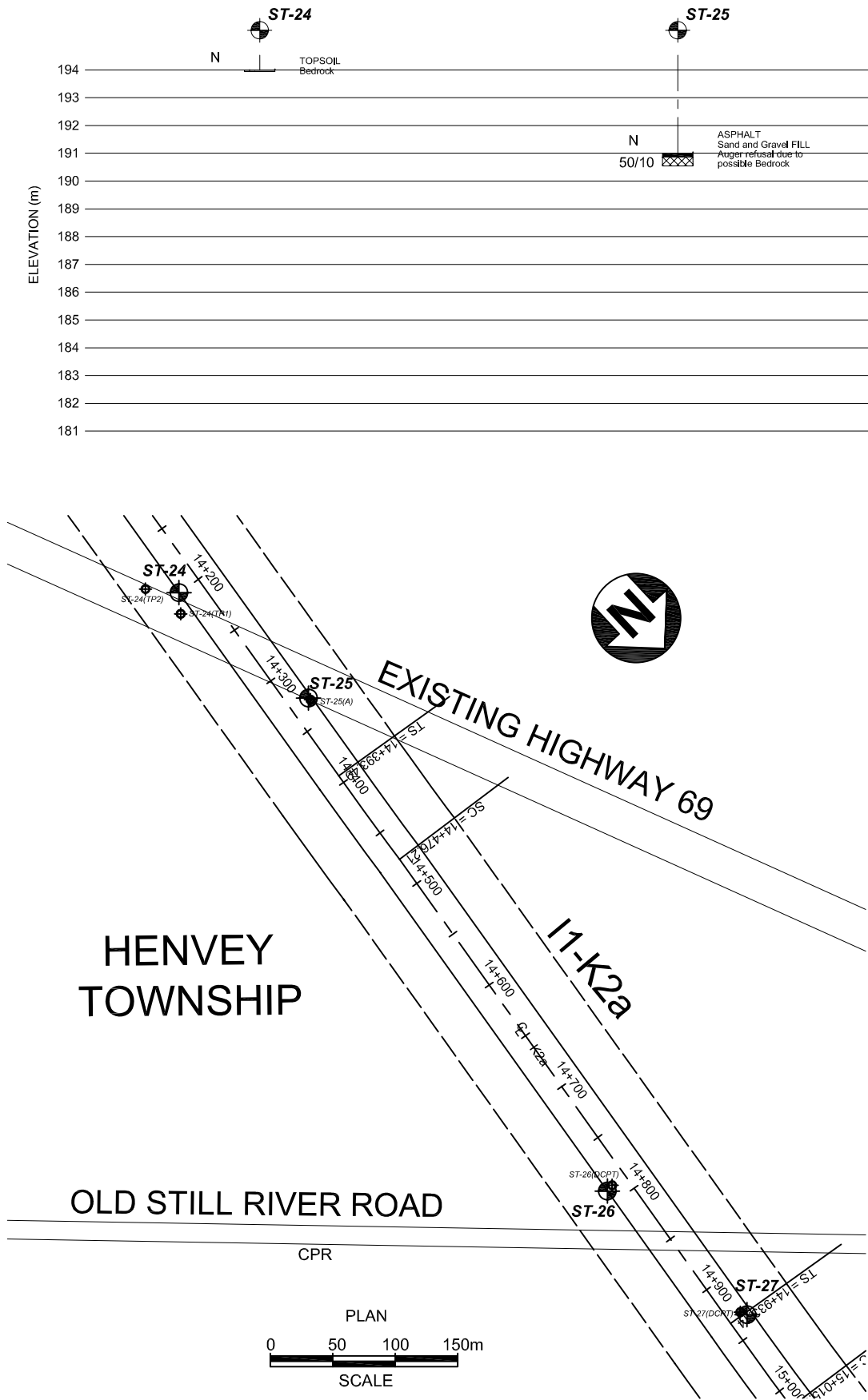
**SHEET**  
**11**

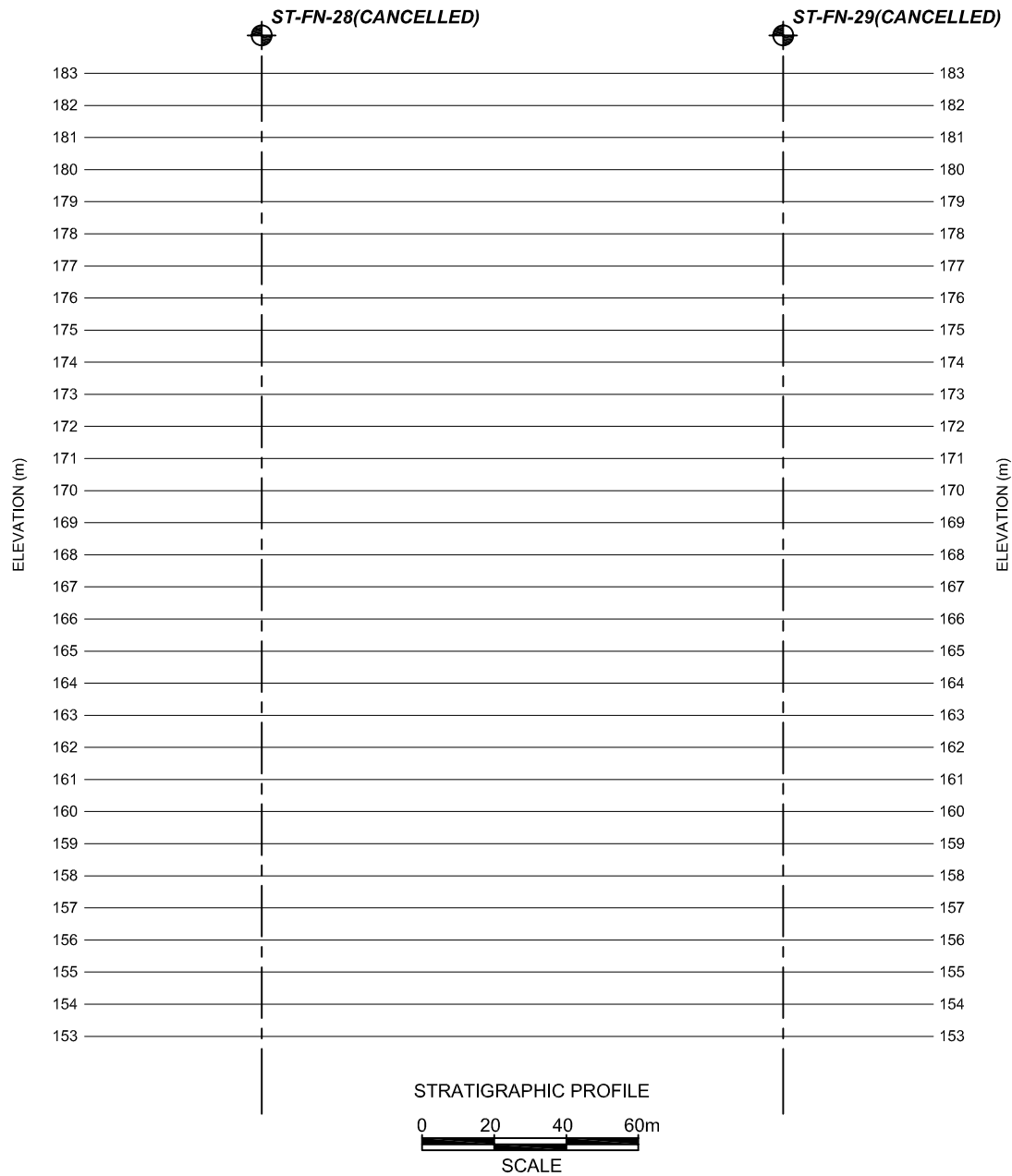
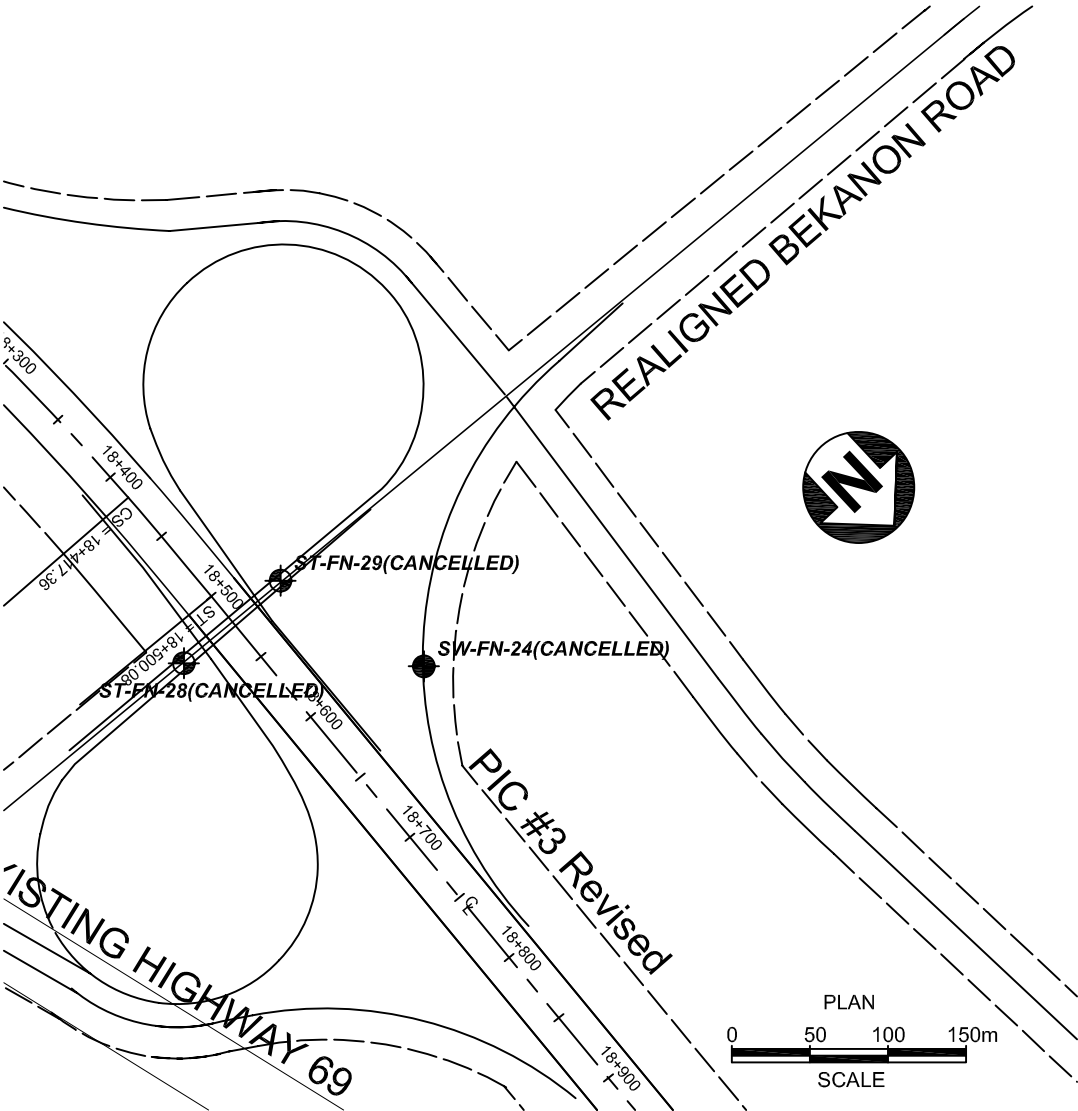
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LEGEND			
	BOREHOLE IN STRUCTURAL AREA		
	BOREHOLE IN SWAMP AREA		
	(TP) - TEST PIT		
	(A) - ADDITIONAL BOREHOLE		
	(DCPT) - DYNAMIC CONE PENETRATION TEST		
BOREHOLE	MTM COORDINATES		ELEVATION (m)
	NORTHING	EASTING	
ST-24	5075821	223499	193.99
ST-24(TP1)	5075834	223510	193.19
ST-24(TP2)	5075800	223516	194.55
ST-25	5075954	223485	191.00
ST-25(A)	5075956	223485	190.80
ST-26	5076403	223600	182.79
ST-26(DCPT)	5076403	223602	182.79
ST-27	5076552	223585	180.57
ST-27(DCPT)	5076547	223587	180.90

**NOTES**  
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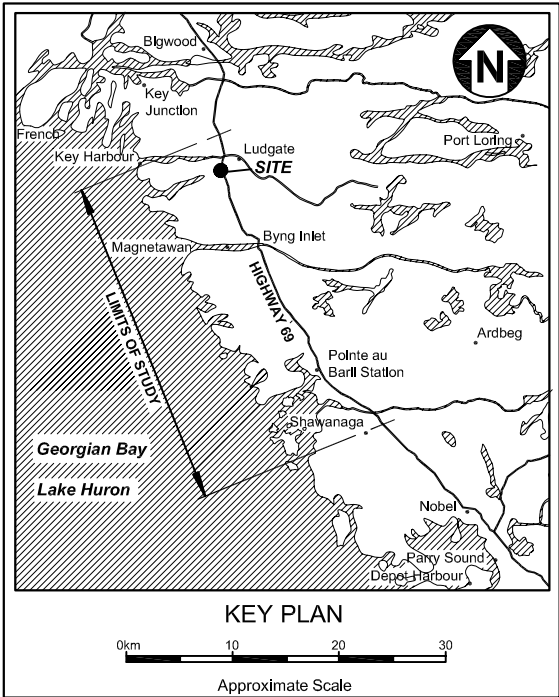
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FOUNDATION INVESTIGATION FOR HIGHWAY 69 ROUTE SELECTION STUDY
STA 18+300 TO STA 18+940



**SHEET**  
**12**



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LEGEND			
BOREHOLE IN STRUCTURAL AREA			
BOREHOLE IN SWAMP AREA			
BOREHOLE	MTM COORDINATES		ELEVATION (m)
	NORTHING	EASTING	
ST-FN-28(CANCELLED)	5079959	222071	-
ST-FN-29(CANCELLED)	5079966	221991	-

**NOTES**  
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HIGHWAY 69 ROUTE SELECTION STUDY

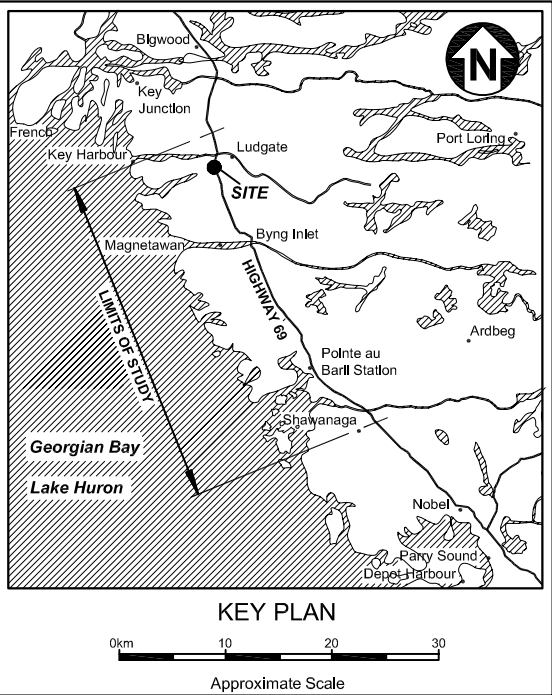
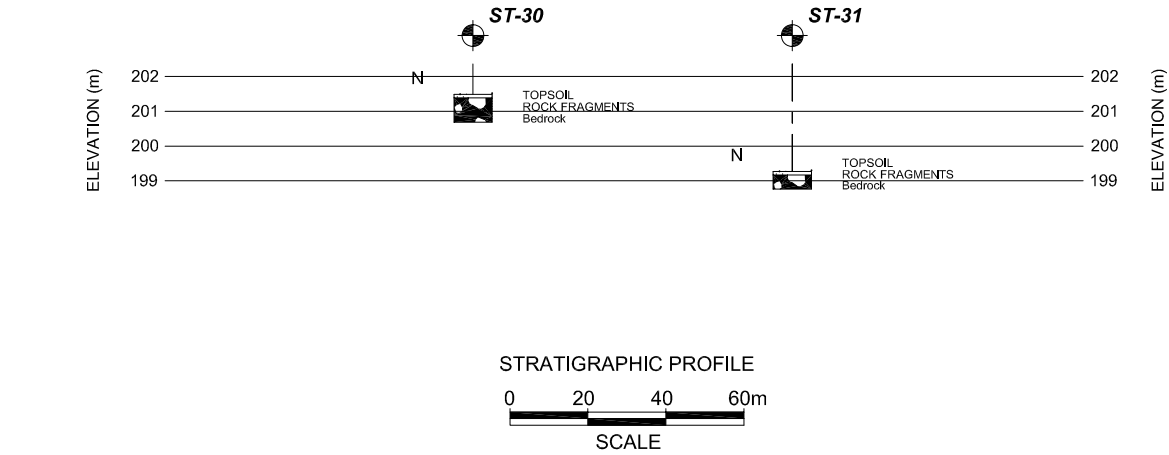
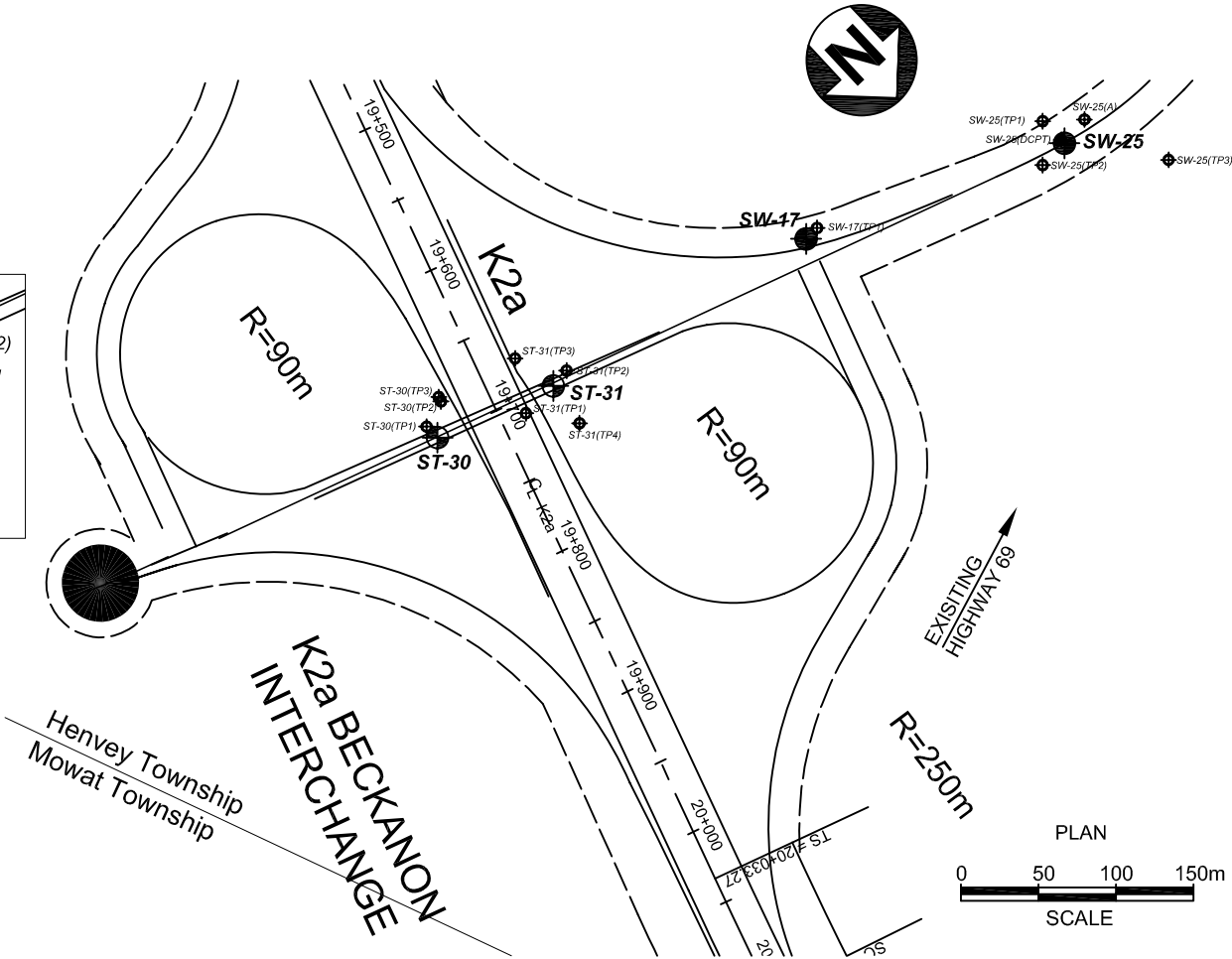
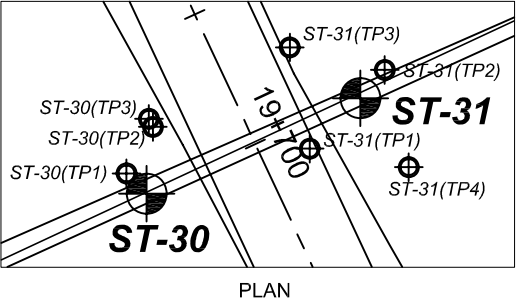
STA 19+460 TO STA 20+190

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SHEET  
13



LEGEND			
	BOREHOLE IN STRUCTURAL AREA		
	BOREHOLE IN SWAMP AREA		
BOREHOLE	MTM COORDINATES		ELEVATION (m)
	NORTHING	EASTING	
ST-30	5081053	223088	201.49
ST-30(TP1)	5081043	223088	202.00
ST-30(TP2)	5081038	223070	200.20
ST-30(TP3)	5081035	223069	200.40
ST-31	5081081	223013	199.27
ST-31(TP1)	5081081	223038	201.80
ST-31(TP2)	5081080	223000	199.00
ST-31(TP3)	5081051	223018	200.90
ST-31(TP4)	5081100	223018	198.40

NOTES  
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METRIC

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FOUNDATION INVESTIGATION FOR HIGHWAY 69 ROUTE SELECTION STUDY
STA 20+750 TO STA 21+415

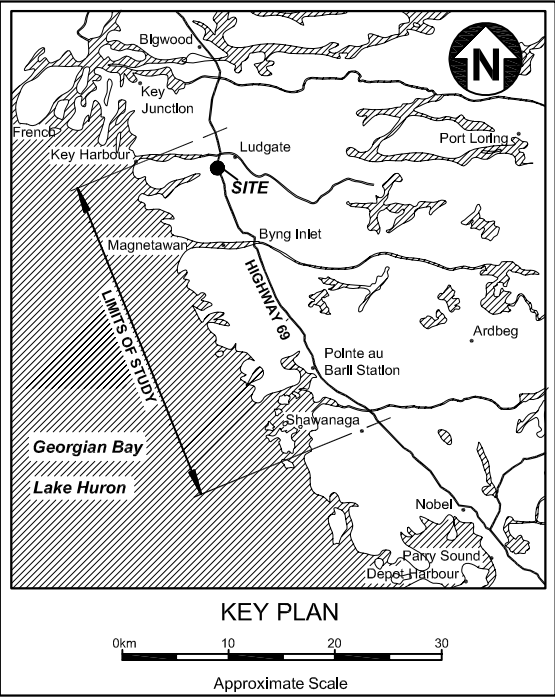
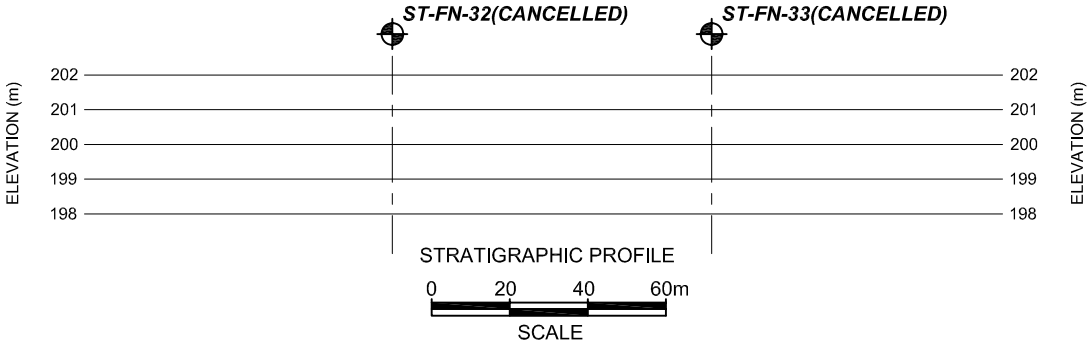
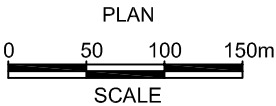
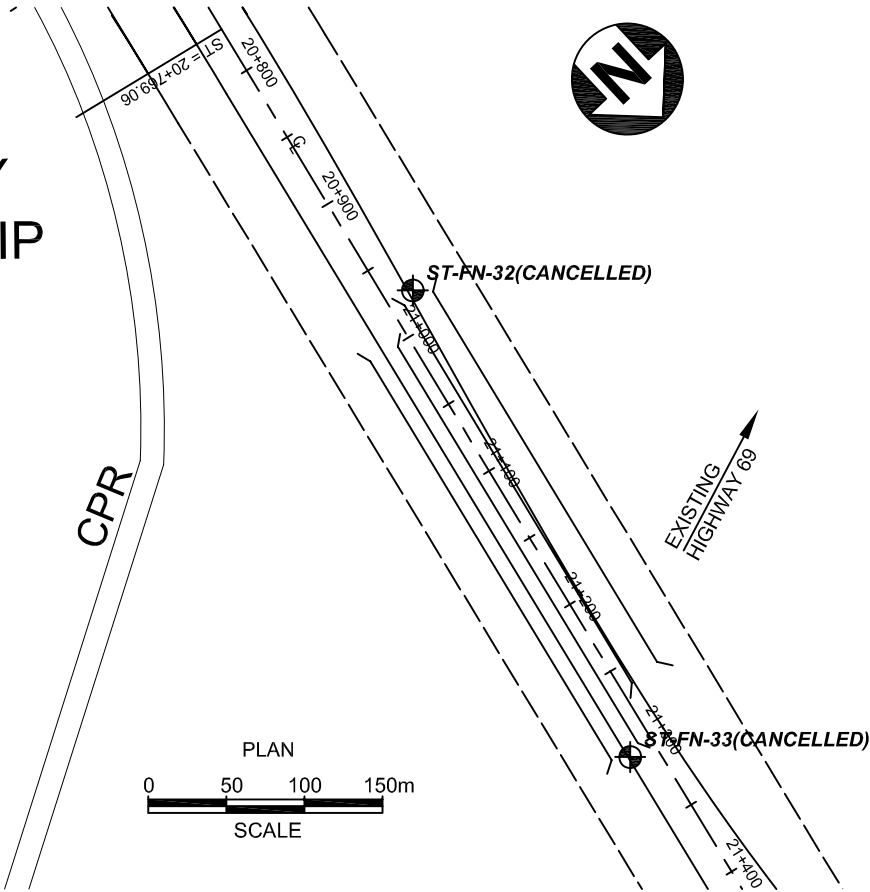


SHEET  
14



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HENVEY  
TOWNSHIP



LEGEND

- BOREHOLE IN STRUCTURAL AREA
- BOREHOLE IN SWAMP AREA

BOREHOLE	MTM COORDINATES		ELEVATION (m)
	NORTHING	EASTING	
ST-FN-32(CANCELLED)	5082403	222295	-
ST-FN-33(CANCELLED)	5082710	222408	-

NOTES  
For boreholes located in swamp areas, please refer to AMEC's report. Ref.: TT53126-Swamps.

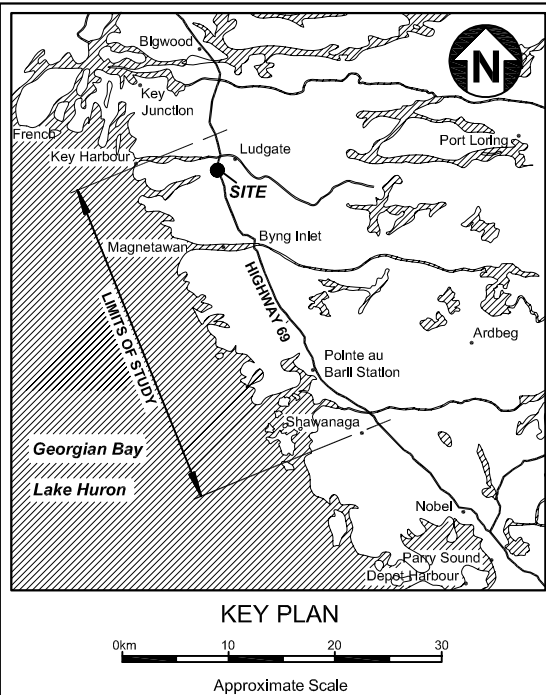
**METRIC**  
DIMENSIONS ARE IN METRES  
AND/OR MILLIMETRES  
UNLESS OTHERWISE SHOWN

MTO GEOCRES No. 41H-57  
AGREEMENT No.  
**5005-E-0033**  
G.W.P. No.  
**5377-02-00**  
FOUNDATION INVESTIGATION FOR  
HIGHWAY 69 ROUTE SELECTION STUDY  
STA 10+700 TO STA 11+670



**SHEET  
15**

**amec**  
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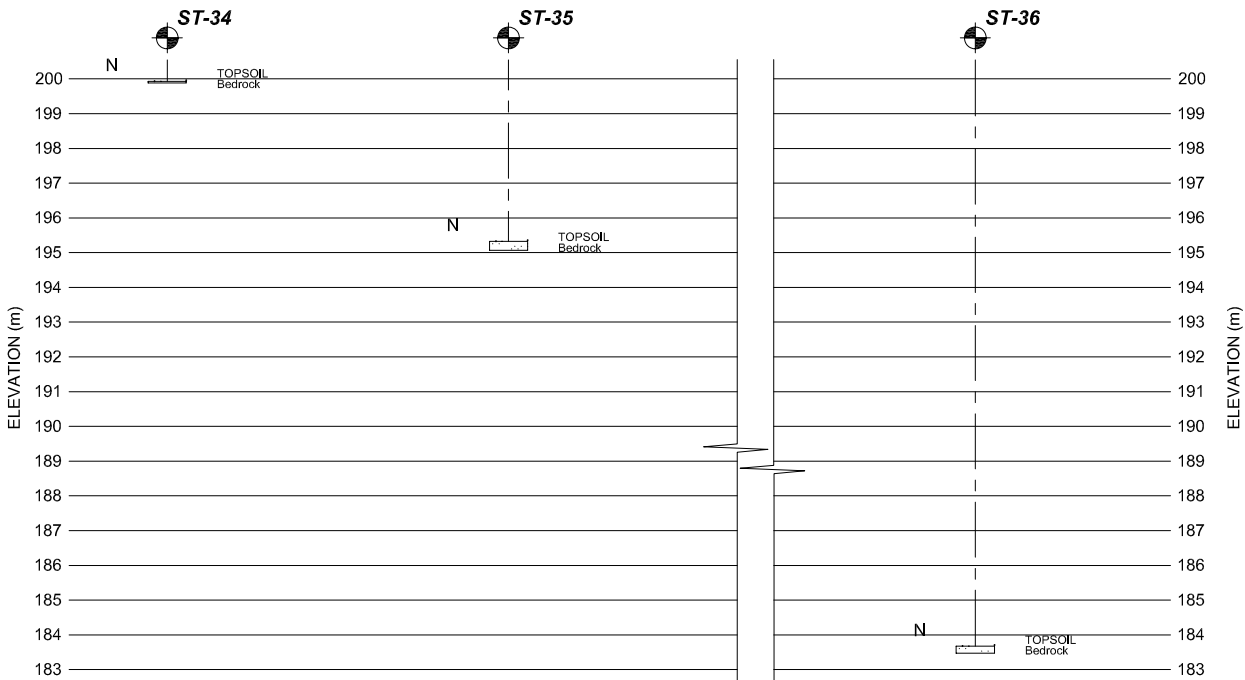


**LEGEND**

- BOREHOLE IN STRUCTURAL AREA
- BOREHOLE IN SWAMP AREA
- (TP) - TEST PIT

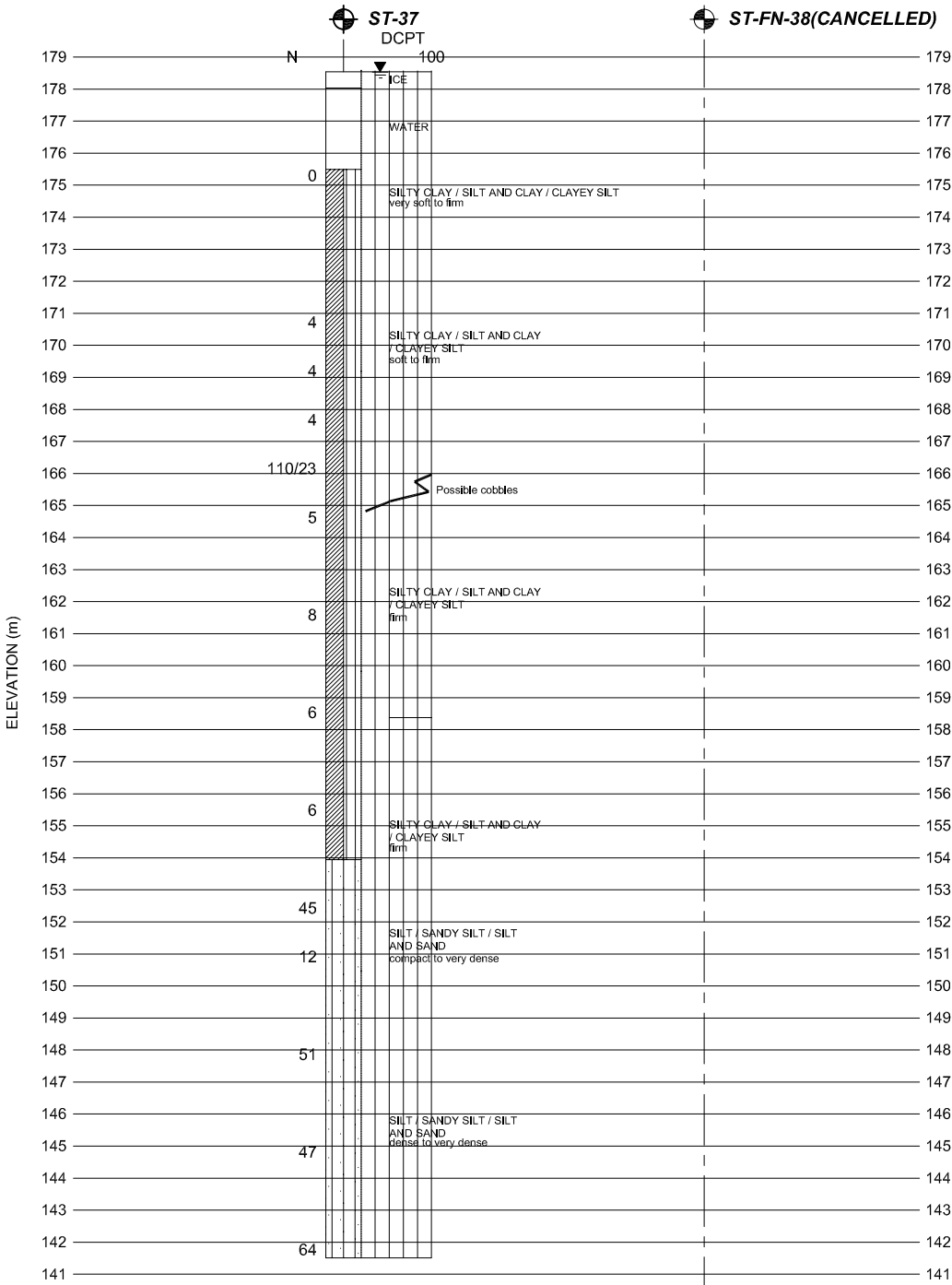
BOREHOLE	MTM COORDINATES		ELEVATION (m)
	NORTHING	EASTING	
<b>ST-34</b>	<b>5082667</b>	<b>223121</b>	<b>199.93</b>
ST-34(TP1)	5082687	223121	197.43
ST-34(TP2)	5082667	223100	197.00
ST-34(TP3)	5082647	223121	198.00
ST-34(TP4)	5082667	223141	202.90
<b>ST-35</b>	<b>5082755</b>	<b>223127</b>	<b>195.33</b>
ST-35(TP1)	5082755	223102	196.80
ST-35(TP2)	5082755	223152	194.00
ST-35(TP3)	5082780	223127	199.80
ST-35(TP4)	5082734	223127	191.00
<b>ST-36</b>	<b>5082893</b>	<b>223033</b>	<b>183.67</b>
ST-36(TP1)	5082915	223033	178.00
ST-36(TP2)	5082868	223033	182.00
ST-36(TP3)	5082893	223058	180.00
ST-36(TP4)	5082893	223008	185.62
<b>ST-37</b>	<b>5083027</b>	<b>223022</b>	<b>178.54</b>
<b>ST-FN-38(CANCELLED)</b>	<b>5083101</b>	<b>222953</b>	<b>-</b>

**NOTES**  
For boreholes located in swamp areas, please  
refer to AMEC's report. Ref.: TT53126-Swamps.



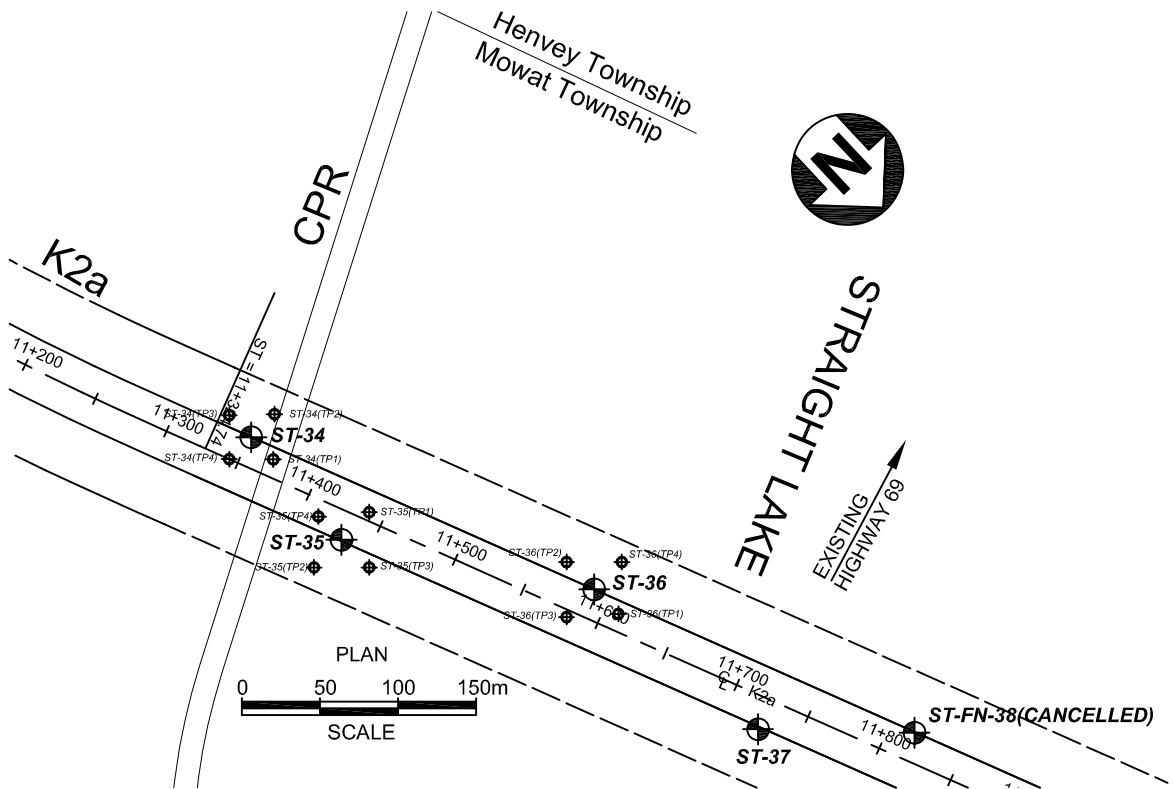
STRATIGRAPHIC PROFILE

0 20 40 60m  
SCALE



STRATIGRAPHIC PROFILE

0 20 40 60m  
SCALE



PLAN

0 50 100 150m  
SCALE

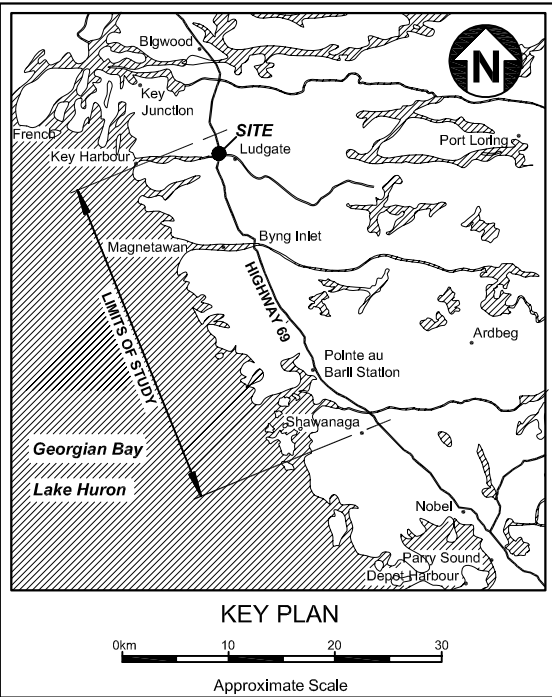
**METRIC**  
DIMENSIONS ARE IN METRES  
AND/OR MILLIMETRES  
UNLESS OTHERWISE SHOWN

MTO GEOCRES No. 41H-57
AGREEMENT No.
5005-E-0033
G.W.P. No.
5377-02-00
FOUNDATION INVESTIGATION FOR HIGHWAY 69 ROUTE SELECTION STUDY
STA 22+400 TO STA 10+420



**SHEET**  
**16**

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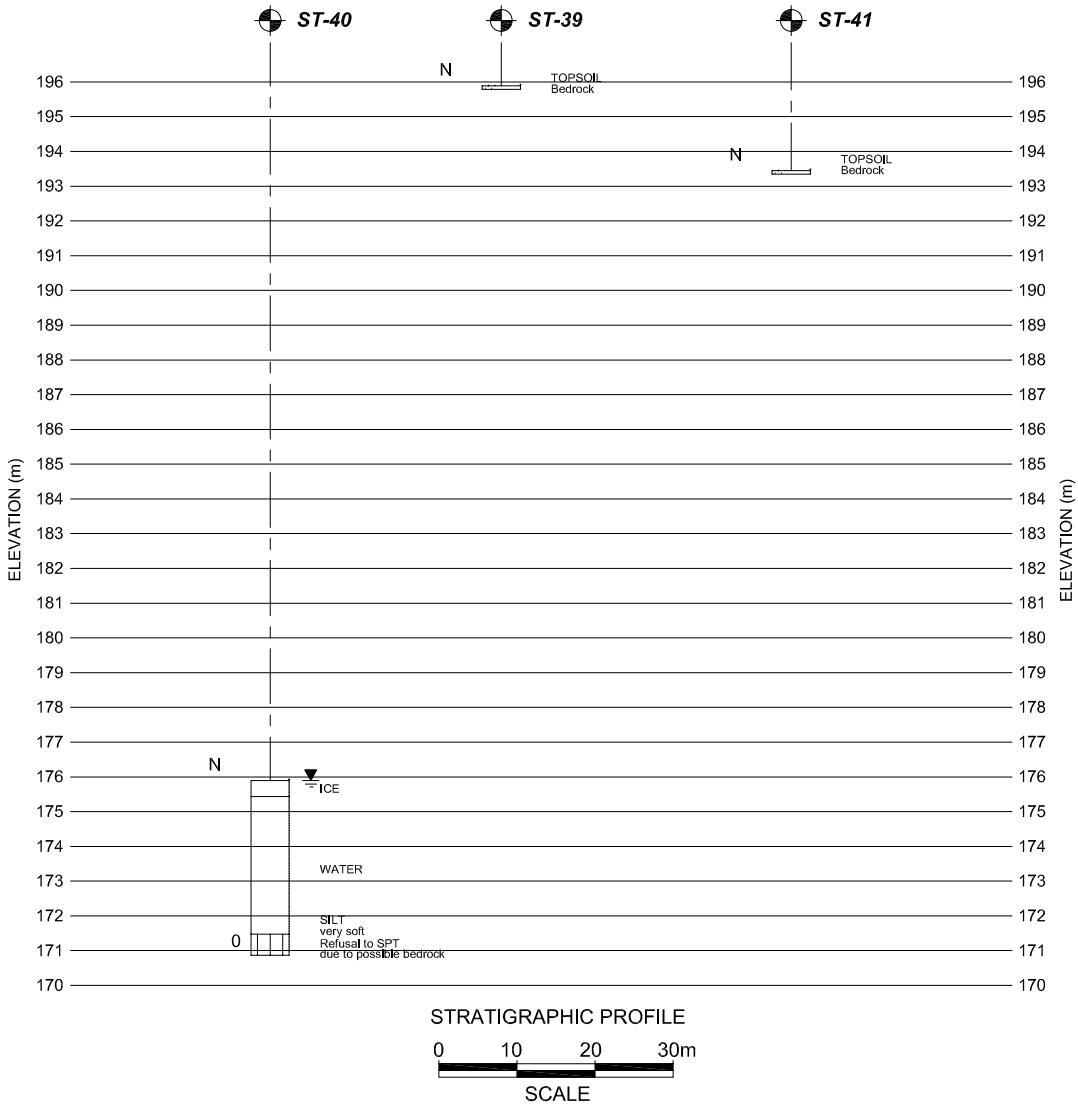
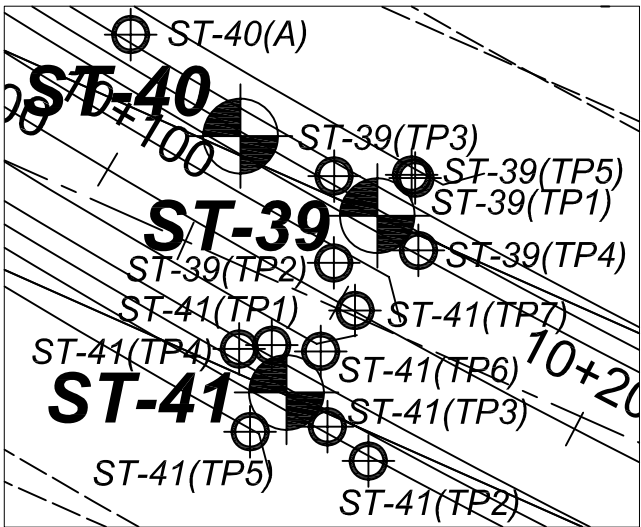
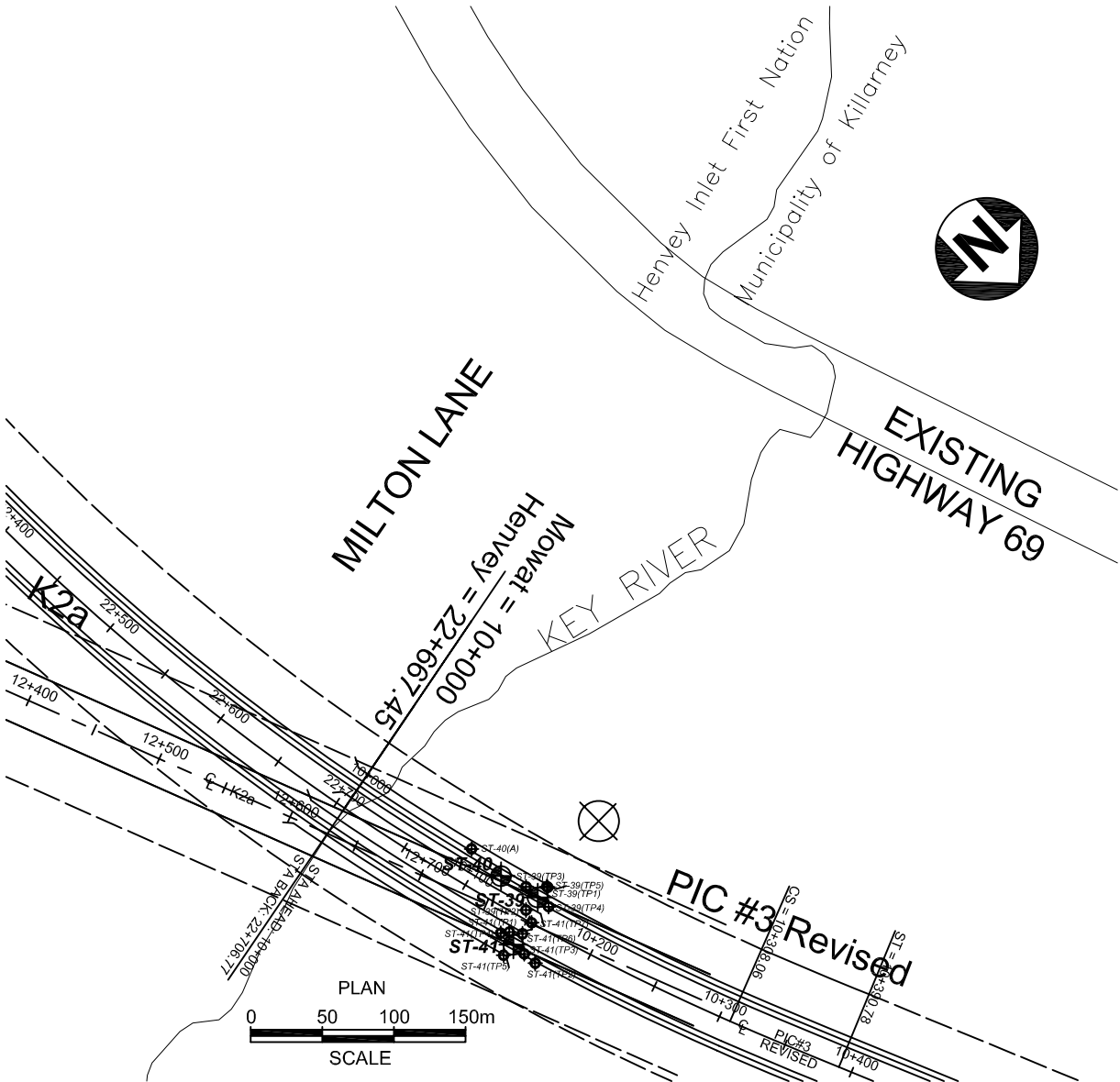
**LEGEND**

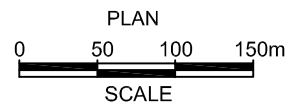
- BOREHOLE IN STRUCTURAL AREA
- BOREHOLE IN SWAMP AREA
- (TP) - TEST PIT
- (A) - ADDITIONAL BOREHOLE

BOREHOLE	MTM COORDINATES		ELEVATION (m)
	NORTHING	EASTING	
<b>ST-39</b>	<b>5084234</b>	<b>222514</b>	<b>195.89</b>
ST-39(TP1)	5084235	222504	196.89
ST-39(TP2)	5084234	222526	178.39
ST-39(TP3)	5084223	222514	178.89
ST-39(TP4)	5084244	222514	198.89
ST-39(TP5)	5084234	222504	197.29
<b>ST-40</b>	<b>5084205</b>	<b>222522</b>	<b>175.90</b>
ST-40(A)	5084177	222522	175.90
<b>ST-41</b>	<b>5084245</b>	<b>222550</b>	<b>193.45</b>
ST-41(TP1)	5084237	222545	192.94
ST-41(TP2)	5084265	222550	197.57
ST-41(TP3)	5084255	222550	195.95
ST-41(TP4)	5084233	222550	180.95
ST-41(TP5)	5084245	222560	183.45
ST-41(TP6)	5084245	222540	193.95
ST-41(TP7)	5084245	222530	196.95

**NOTES**

For boreholes located in swamp areas, please refer to AMEC's report. Ref.: TT53126-Swamps.





**NOTES**  
For boreholes located in swamp areas, please refer to AMEC's report. Ref.: TT53126-Swamps.

**APPENDIX C**  
**RECORD OF BOREHOLES / TEST HOLES**

## AMEC EARTH AND ENVIRONMENTAL NOTES TO BOREHOLE LOGS

### DRILLING DATA

Method:		
SolSt Augering	-	Solid Stem Augering
HolSt Augering	-	Hollow Stem Augering
WB	-	Washed Boring

### SAMPLES

TYPE:		
SS	-	Split Spoon
AS	-	Auger Sample
GS	-	Grab Sample
TW	-	Thinwall Open
TP	-	Thinwall Piston
WS	-	Washed Sample
BS	-	Block Sample
RC	-	Rock Core
PH	-	Sample Advanced Hydraulically
PM	-	Sample Advanced Manually

### LABORATORY DATA

WP	-	Plastic Limit
W	-	Water Content (%)
WL	-	Liquid Limit
$\gamma$	-	Natural Unit Weight (kN/m <sup>3</sup> )
UNDR STRNG or $C_u$	-	Undrained Shear Strength (kPa)
		Field Vane: St-sensitivity
pp	-	Pocket Penetrometer
UC	-	Unconfined Compression
UU	-	Unconsolidated Undrained at Overburden Pressure
CU	-	Consolidated Undrained
CD	-	Consolidated Drained
TOV	-	Total Organic Vapours

**Standard Penetration Test:** The Standard Penetration Test (SPT) 'N'-values are the number of blows required to cause a standard 51 millimetres o.d. split barrel sampler to penetrate 0.3 metre into undisturbed ground in a borehole when driven by a hammer with a mass of 63.5 kilograms falling freely a distance of 0.76 metre. For penetrations of less than 0.3 metre, N-values are indicated as the number of blows for the penetration achieved (e.g. 50/25: 50 blows for 25 centimetres penetration).

**Dynamic Cone Penetration Test:** Continuous penetration of a conical steel point (51 millimetres o.d. 60° cone angle) driven by 475 J impact energy on a size drill rods. The resistance to cone penetration is measured as the number of blows for each 0.3 metre advance of the conical point into the undisturbed ground.

### Soils are described by their composition and consistency or relative density

**CONSISTENCY:** Cohesive soils are described on the basis of their undrained shear strength ( $C_u$ ) or 'N'-values as follows:

$C_u$ (kPa)	0 - 12	12 - 25	25 - 50	50 - 100	100 - 200	>200
	VERY SOFT	SOFT	FIRM	STIFF	VERY STIFF	HARD
N (blows/0.3 metres)	0 - 2	2 - 4	4 - 8	8 - 15	15 - 30	>30

**RELATIVE DENSITY:** Cohesionless soils are described on the basis of relative density as indicated by 'N'-values as follows:

N (blows/0.3 metres)	0 - 4	4 - 10	10 - 30	30 - 50	>50
	VERY LOOSE	LOOSE	COMPACT	DENSE	VERY DENSE

### Rocks are described by their composition and structural features and/or strength

**RECOVERY:** Sum of all recovered rock core pieces from a coring run expressed as a percent of the total length of the coring run.

### ROCK QUALITY

**DESIGNATION (RQD):** Sum of those intact core pieces, 100 millimetres in length expressed as a percent of the length of the coring run. Classification of a rock based on the RQD value as follows:

RQD (%)	0 - 25	25 - 50	50 - 75	75 - 90	90 - 100
	VERY POOR	POOR	FAIR	GOOD	EXCELLENT

### JOINTING AND BEDDING:

SPACING	50 millimetres	50 - 300 millimetres	0.3 - 1.0 metre	1.0 - 3.0 metres	>3.0 metres
JOINTING	VERY CLOSE	CLOSE	MOD. CLOSE	WIDE	VERY WIDE
BEDDING	VERY THIN	THIN	MEDIUM	THICK	VERY THICK

# RECORD OF BOREHOLE No ST-FN-1

1 OF 1

G.W.P. 5377-02-00 LOCATION New Shebeshekong Road, Shawanaga First Nation, Co-ords: 5044051 N; 245214 E ORIGINATED BY JF  
DIST 54 HWY 69 BOREHOLE TYPE Portable Drilling Equipment COMPILED BY SN  
DATUM Geodetic DATE 4 March 2006 CHECKED BY IH  
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa									
214.9									20	40	60	80	100					
0.0	about 180 mm TOPSOIL								○ UNCONFINED	+	FIELD VANE							
214.7	SAND AND GRAVEL		1	SS	108/20				● QUICK TRIAXIAL	×	LAB VANE							
0.2	grey, very dense, wet								20	40	60	80	100		10	20	30	
214.5	End of Borehole																	
0.4	Refusal to Standard Penetration Test at 0.4 m depth due to possible bedrock							214										
	No noticeable groundwater in open borehole on completion																	
	Another borehole ST-FN-1 (A) was drilled at 10 m east of ST-FN-1.																	
	Additional 3 test pits were investigated as follows:																	
	ST-FN-1 (TP1) - 10 m west of ST-FN-1																	
	ST-FN-1 (TP2) - 17 m north of ST-FN-1																	
	ST-FN-1 (TP3) - 10 m south of ST-FN-1																	

# RECORD OF BOREHOLE No ST-FN-1 (A)

1 OF 1

G.W.P. 5377-02-00 LOCATION New Shebeshekong Road, Shawanaga First Nation, Co-ords: 5044051 N; 245224 E ORIGINATED BY JF  
DIST 54 HWY 69 BOREHOLE TYPE Portable Drilling Equipment COMPILED BY SN  
DATUM Geodetic DATE 4 March 2006 CHECKED BY IH  
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				20	40	60	80	100					
215.6	about 150 mm TOPSOIL		1	SS	112/15													
215.3	SILTY SAND trace gravel																	
215.3	dark brown to dark grey, very dense, wet																	
0.3	End of Borehole																	
	Refusal to Standard Penetration Test at 0.3 m depth due to possible bedrock																	
	No noticeable groundwater in open borehole on completion																	
	ST-FN-1 (A) was drilled at 10 m east of ST-FN-1.																	



# RECORD OF BOREHOLE No ST-FN-1 (TP1)

1 OF 1


G.W.P. 5377-02-00 LOCATION New Shebeshekong Road, Shawanaga First Nation, Co-ords: 5044051 N; 245204 E ORIGINATED BY JF  
DIST 54 HWY 69 BOREHOLE TYPE Test Pit COMPILED BY SN  
DATUM Geodetic DATE 4 March 2006 CHECKED BY IH  
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa									
214.0									20	40	60	80	100					
0.0	about 180 mm TOPSOIL																	
213.8	SAND AND GRAVEL																	
0.2	grey, wet																	
213.6	End of Test Pit																	
0.4	Refusal to excavation at 0.4 m due to bedrock																	
	No noticeable groundwater in open test pit on completion																	
	ST-FN-1 (TP1) was excavated 10 m west of ST-FN-1.																	

# RECORD OF BOREHOLE No ST-FN-1 (TP2)

1 OF 1

G.W.P. 5377-02-00 LOCATION New Shebeshekong Road, Shawanaga First Nation, Co-ords: 5044068 N; 245214 E ORIGINATED BY JF  
DIST 54 HWY 69 BOREHOLE TYPE Test Pit COMPILED BY SN  
DATUM Geodetic DATE 4 March 2006 CHECKED BY IH  
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT w <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa										WATER CONTENT (%)		
216.0									○ UNCONFINED + FIELD VANE										w <sub>p</sub> w      w <sub>L</sub>		
									● QUICK TRIAXIAL × LAB VANE										20   40   60   80   100		
0.0	about 550 mm TOPSOIL																				
215.5																					
0.6	<b>End of Test Pit</b>  Refusal to excavation at 0.5 m due to bedrock  No noticeable groundwater in open test pit on completion  ST-FN-1 (TP2) was excavated 17 m north of ST-FN-1.																				

# RECORD OF BOREHOLE No ST-FN-1 (TP3)

1 OF 1

G.W.P. 5377-02-00	LOCATION New Shebeshekong Road, Shawanaga First Nation,	ORIGINATED BY JF
DIST 54 HWY 69	Co-ords: 5044041 N; 245214 E	COMPILED BY SN
DATUM Geodetic	BOREHOLE TYPE Test Pit	CHECKED BY IH
DATE 4 March 2006	PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522	JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa										WATER CONTENT (%)		
									20	40	60	80	100						○ UNCONFINED	+ FIELD VANE	● QUICK TRIAXIAL
214.0																					
0.0	about 500 mm TOPSOIL																				
213.5																					
0.5	End of Test Pit																				
	Refusal to excavation at 0.5 m due to bedrock																				
	No noticeable groundwater in open test pit on completion																				
	ST-FN-1 (TP3) was excavated 10 m south of ST-FN-1.																				

# RECORD OF BOREHOLE No ST-FN-2

1 OF 1

G.W.P. 5377-02-00 LOCATION New Shebeshekong Road, Shawanaga First Nation, Co-ords: 5043990 N; 245163 E ORIGINATED BY JF  
DIST 54 HWY 69 BOREHOLE TYPE Test Pit COMPILED BY SN  
DATUM Geodetic DATE 4 March 2006 CHECKED BY IH  
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa									
216.8									20	40	60	80	100					
216.9	about 100 mm TOPSOIL								20	40	60	80	100					
0.1	End of Test Pit																	
	Refusal to excavation at 0.1 m due to bedrock																	
	No noticeable groundwater in open test pit on completion							216										
	Additional 2 boreholes and 2 test pits were investigated as follows:																	
	ST-FN-2 (A) - 10 m east of ST-FN-2																	
	ST-FN-2 (B) - 9 m north of ST-FN-2																	
	ST-FN-2 (TP1) - 10 m south of ST-FN-2																	
	ST-FN-2 (TP2) - 10 m west of ST-FN-2																	

# RECORD OF BOREHOLE No ST-FN-2 (A)

1 OF 1

G.W.P. 5377-02-00 LOCATION New Shebeshekong Road, Shawanaga First Nation, Co-ords: 5043990 N; 245173E ORIGINATED BY JF  
DIST 54 HWY 69 BOREHOLE TYPE Portable Drilling Equipment COMPILED BY SN  
DATUM Geodetic DATE 4 March 2006 CHECKED BY IH  
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				20	40	60	80	100					
217.5																		
217.4	about 130 mm TOPSOIL		1	SS	110/20													
0.1	SILTY SAND																	
217.1	trace gravel																	
0.4	dark grey, very dense, wet																	
	End of Borehole																	
	Refusal to Standard Penetration Test at 0.4 m due to possible bedrock																	
	No noticeable groundwater in open borehole on completion																	
	ST-FN-2 (A) was drilled 10 m east of ST-FN-2.																	

# RECORD OF BOREHOLE No ST-FN-2 (B)

1 OF 1

G.W.P. 5377-02-00 LOCATION New Shebeshekong Road, Shawanaga First Nation, Co-ords: 5043999 N, 245163 E ORIGINATED BY JF  
DIST 54 HWY 69 BOREHOLE TYPE Portable Drilling Equipment COMPILED BY SN  
DATUM Geodetic DATE 4 March 2006 CHECKED BY IH  
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				20	40	60	80	100					
217.1																		
217.0	about 100 mm TOPSOIL		1	SS	106/15		217											
216.4	SILTY SAND																	
0.2	dark grey, very dense, wet																	
	End of Borehole																	
	Refusal to Standard Penetration Test at 0.2 m due to possible bedrock																	
	No noticeable groundwater in open borehole on completion																	
	ST-FN-2 (B) was drilled 9 m north of ST-FN-2.																	

# RECORD OF BOREHOLE No ST-FN-2 (TP1)

1 OF 1

G.W.P. 5377-02-00 LOCATION New Shebeshekong Road, Shawanaga First Nation, Co-ords: 5043980 N; 245163 E ORIGINATED BY JF  
DIST 54 HWY 69 BOREHOLE TYPE Test Pit COMPILED BY SN  
DATUM Geodetic DATE 4 March 2006 CHECKED BY IH  
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				20	40	60	80	100					
216.0 0.0	about 500 mm TOPSOIL																	
215.5 0.5	<p><b>End of Test Pit</b></p> <p>Refusal to excavation at 0.5 m due to bedrock</p> <p>No noticeable groundwater in open test pit on completion</p> <p>ST-FN-2 (TP1) was excavated 10 m south of ST-FN-2.</p>																	

# RECORD OF BOREHOLE No ST-FN-2 (TP2)

1 OF 1

G.W.P. 5377-02-00 LOCATION New Shebeshekong Road, Shawanaga First Nation, Co-ords: 5043990 N; 245153 E ORIGINATED BY JF  
DIST 54 HWY 69 BOREHOLE TYPE Test Pit COMPILED BY SN  
DATUM Geodetic DATE 4 March 2006 CHECKED BY IH  
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa										WATER CONTENT (%)		
									20	40	60	80	100						○ UNCONFINED	+ FIELD VANE	● QUICK TRIAXIAL
215.3									20	40	60	80	100	10	20	30	kN/m <sup>3</sup>	GR SA SI CL			
0.0	about 400 mm TOPSOIL																				
214.9								215													
0.4	<b>End of Test Pit</b>  Refusal to excavation at 0.4 m due to bedrock  No noticeable groundwater in open test pit on completion  ST-FN-2 (TP2) was excavated 10 m west of ST-FN-2.																				



G.W.P. 5377-02-00		LOCATION Dumont Road, Township of the Archipelago, Co-ords: 5046453 N; 242742 E	ORIGINATED BY MAH
DIST 54	HWY 69	BOREHOLE TYPE Solid Stem Augering	COMPILED BY SN
DATUM Geodetic	DATE 30 January 2006		CHECKED BY IH
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522			JOB NO. TT53126

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

# RECORD OF BOREHOLE No ST-3

G.W.P. 5377-02-00	LOCATION Dumont Road, Township of the Archipelago, Co-ords: 5046453 N; 242742 E	2 OF 2	ORIGINATED BY MAH
DIST 54 HWY 69	BOREHOLE TYPE Solid Stem Augering	COMPILED BY SN	
DATUM Geodetic	DATE 30 January 2006	CHECKED BY IH	
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522			JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT w <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w <sub>L</sub>	UNIT WEIGHT γ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL			
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa										WATER CONTENT (%)		
									○ UNCONFINED	+ FIELD VANE	● QUICK TRIAXIAL	× LAB VANE									
	<b>SAND</b> brown, very loose to very dense, moist to wet																				
	with silt		7	SS	10													0 70 (30)			
201.5	<b>End of Borehole</b>		9	SS	50/0																
12.2	Auger refusal at 12.2 m depth																DCPT blow				
201.3	Dynamic Cone Penetration Test was conducted below 12.2 m depth.																count = 100 / 20				
12.4	Groundwater in open borehole on completion: 1.0 m																cm at 12.4 m				
	<b>End of DCPT</b>																				
	Refusal to Dynamic Cone Penetration Test at 12.4 m depth due to possible bedrock																				
	DCPT was conducted in another location ST-3 (DCPT) located at 10 m west of ST-3.																				
	Borehole was backfilled with bentonite.																				

G.W.P. <u>5377-02-00</u>		LOCATION <u>Dumont Road, Township of the Archipelago, Co-ords: 5046453 N; 242732 E</u>	ORIGINATED BY <u>JF</u>
DIST <u>54</u>	HWY <u>69</u>	BOREHOLE TYPE <u>Dynamic Cone Penetration</u>	COMPILED BY <u>SN</u>
DATUM <u>Geodetic</u>	DATE <u>22 February 2006</u>	CHECKED BY <u>IH</u>	
PROJECT <u>Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522</u>			JOB NO. <u>TT53126</u>

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

# RECORD OF BOREHOLE No ST-3 (DCPT)

G.W.P. 5377-02-00	LOCATION Dumont Road, Township of the Archipelago, Co-ords: 5046453 N; 242732 E	2 OF 2	ORIGINATED BY JF
DIST 54 HWY 69	BOREHOLE TYPE Dynamic Cone Penetration	COMPILED BY SN	
DATUM Geodetic	DATE 22 February 2006	CHECKED BY IH	
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522		JOB NO.	TT53126

SOIL PROFILE				SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT w <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w <sub>L</sub>	UNIT WEIGHT γ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL	
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	SHEAR STRENGTH kPa				WATER CONTENT (%)							
						○ UNCONFINED ● QUICK TRIAXIAL				+ FIELD VANE × LAB VANE							
										20 40 60 80 100							
	DCPT																
201.0																	
12.0	<b>End of DCPT</b>  Refusal to Dynamic Cone Penetration Test at 12.1 m depth due to possible bedrock  ST-3 (DCPT) was located at 10 m west of ST-3.															DCPT blow count = 100/15 cm at 12.0 m	

G.W.P. <u>5377-02-00</u>		LOCATION <u>Dumont Road, Township of the Archipelago, Co-ords: 5046413 N; 242663 E</u>	ORIGINATED BY <u>MAH</u>
DIST <u>54</u>	HWY <u>69</u>	BOREHOLE TYPE <u>Solid Stem Augering</u>	COMPILED BY <u>SN</u>
DATUM <u>Geodetic</u>	DATE <u>30 January 2006</u>	CHECKED BY <u>IH</u>	
PROJECT <u>Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522</u>			JOB NO. <u>TT53126</u>

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

# RECORD OF BOREHOLE No ST-4

G.W.P. 5377-02-00	LOCATION Dumont Road, Township of the Archipelago, Co-ords: 5046413 N; 242663 E	2 OF 2	ORIGINATED BY MAH
DIST 54 HWY 69	BOREHOLE TYPE Solid Stem Augering	COMPILED BY SN	
DATUM Geodetic	DATE 30 January 2006	CHECKED BY IH	
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522			JOB NO. TT53126

SOIL PROFILE				SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	SHEAR STRENGTH kPa				WATER CONTENT (%)						
201.9 8.1	<p><b>End of Borehole</b></p> <p>Groundwater in open borehole on completion: 1.0 m</p> <p>Dynamic Cone Penetration Test was conducted below 8.1 m depth.</p>															
199.4 10.5	<p><b>End of DCPT</b></p> <p>Refusal to Dynamic Cone Penetration Test at 10.5 m depth due to possible bedrock</p> <p>DCPT was conducted in another location ST-4 (DCPT) located at 10 m northwest of ST-4.</p> <p>Borehole was backfilled with bentonite.</p>															DCPT blow count = 100 / 28 cm at 10.5 m

# RECORD OF BOREHOLE No ST-4 (DCPT)

1 OF 2

G.W.P. 5377-02-00 LOCATION Township of the Archipelago, Co-ords: 5046420 N; 242655 E ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration COMPILED BY SN  
 DATUM Geodetic DATE 22 February 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE				SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT w <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	SHEAR STRENGTH kPa				WATER CONTENT (%)							
210.0						○ UNCONFINED				+ FIELD VANE	● QUICK TRIAXIAL						× LAB VANE
0.0	Dynamic cone penetration testing (DCPT) from ground surface																

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

# RECORD OF BOREHOLE No ST-4 (DCPT)

2 OF 2

G.W.P. 5377-02-00 LOCATION Township of the Archipelago, Co-ords: 5046420 N; 242655 E ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE Dynamic Cone Penetration COMPILED BY SN  
 DATUM Geodetic DATE 22 February 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE				SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	<div>DYNAMIC CONE PENETRATION RESISTANCE PLOT</div> <div><div><div>20406080100</div><div>SHEAR STRENGTH kPa</div><div>○ UNCONFINED + FIELD VANE</div><div>● QUICK TRIAXIAL × LAB VANE</div></div><div><div>PLASTIC LIMIT</div><div>NATURAL MOISTURE CONTENT</div><div>LIQUID LIMIT</div></div><div><div>W<sub>p</sub></div><div>W</div><div>W<sub>L</sub></div></div><div>WATER CONTENT (%)</div></div>	UNIT WEIGHT γ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)  GR SA SI CL	
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES								
201.8	DCPT												
8.2	<div>End of DCPT</div> <div>Refusal to Dynamic Cone Penetration Test at 8.2 m depth due to possible bedrock</div> <div>ST-4 (DCPT) was located 10 m northwest of ST-4.</div>						201						DCPT blow count = 128 at 8.2 m



# RECORD OF BOREHOLE No ST-5

1 OF 1

G.W.P. 5377-02-00 LOCATION Highway 529 Interchange, Township of the Archipelago. Co-ords: 5048993 N; 238255 E ORIGINATED BY JF  
DIST 54 HWY 69 BOREHOLE TYPE Test Pit COMPILED BY SN  
DATUM Geodetic DATE 25 January 2006 CHECKED BY IH  
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40	60	80	100					
208.2	about 70 mm TOPSOIL																
208.2 0.1	End of Test Pit																
	Refusal to excavation at 0.1 m depth due to bedrock						208										
	No noticeable groundwater in open test pit on completion																
	Additional 3 test pits were investigated as follows:																
	ST-5 (TP1) - 10 m north & 2 m east of ST-5																
	ST-5 (TP2) - 10 m south & 43 m east of ST-5																
	ST-5 (TP3) - 10 m north & 3 m west of ST-5																

# RECORD OF BOREHOLE No ST-5 (TP1)

1 OF 1

G.W.P. 5377-02-00	LOCATION Highway 529 Interchange, Township of the Archipelago.	ORIGINATED BY JF
DIST 54 HWY 69	BOREHOLE TYPE Test Pit	COMPILED BY SN
DATUM Geodetic	DATE 25 January 2006	CHECKED BY IH
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522		JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa						
206.3									20 40 60 80 100						GR SA SI CL
0.0	about 300 mm TOPSOIL some peat and rootlets														
206.0	dark brown														
205.9	PEAT														
0.5	fibrous														
	dark brown, wet														
205.5	SILTY SAND														
0.9	brown, wet														
	End of Test Pit														
	Refusal to excavation at 0.9 m depth due to bedrock														
	No noticeable groundwater in open test pit on completion														
	ST-5 (TP1) was excavated 10 m north & 2 m east of ST-5.														



# RECORD OF BOREHOLE No ST-5 (TP3)

1 OF 1

G.W.P. 5377-02-00 LOCATION Highway 529 Interchange, Township of the Archipelago. ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE Test Pit Co-ords: 5049003 N; 238252 E COMPILED BY SN  
 DATUM Geodetic DATE 25 January 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa									
207.9									20	40	60	80	100					
207.9	<b>about 50 mm TOPSOIL</b>								○ UNCONFINED	+	FIELD VANE							GR SA SI CL
207.9	<b>End of Test Pit</b>								● QUICK TRIAXIAL	×	LAB VANE							Grass on surface
	Refusal to excavation at 0.1 m depth due to bedrock																	
	No noticeable groundwater in open test pit on completion							207										
	ST-5 (TP3) was excavated 10 m north & 3 m west of ST-5.																	

G.W.P. <u>5377-02-00</u>	LOCATION <u>Highway 529 Interchange, Township of the Archipelago,</u>	ORIGINATED BY <u>MAH</u>
DIST <u>54</u> HWY <u>69</u>	Co-ords: <u>5048925 N; 238223 E</u>	COMPILED BY <u>SN</u>
DATUM <u>Geodetic</u>	BOREHOLE TYPE <u>Solid Stem Augering</u>	CHECKED BY <u>IH</u>
DATE <u>31 January 2006 - 1 February 2006</u>		JOB NO. <u>TT53126</u>
PROJECT <u>Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522</u>		

[illegible]

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

G.W.P. <u>5377-02-00</u>	LOCATION <u>Highway 529 Interchange, Township of the Archipelago,</u>	2 OF 2	ORIGINATED BY <u>MAH</u>
DIST <u>54</u> HWY <u>69</u>	Co-ords: <u>5048925 N; 238223 E</u>		COMPILED BY <u>SN</u>
DATUM <u>Geodetic</u>	BOREHOLE TYPE <u>Solid Stem Augering</u>		CHECKED BY <u>IH</u>
DATE <u>31 January 2006 - 1 February 2006</u>			
PROJECT <u>Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522</u>			JOB NO. <u>TT53126</u>


SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa		WATER CONTENT (%)				
									○ UNCONFINED ● QUICK TRIAXIAL	+ FIELD VANE × LAB VANE	W <sub>p</sub>	W	W <sub>L</sub>		
								20 40 60 80 100							

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

# RECORD OF BOREHOLE No ST-7

1 OF 1

G.W.P. 5377-02-00 LOCATION Highway 529 Extension, Township of the Archipelago. ORIGINATED BY MAH  
 DIST 54 HWY 69 BOREHOLE TYPE Solid Stem Augering Co-ords: 5050451 N; 237053 E COMPILED BY SN  
 DATUM Geodetic DATE 1 February 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa										WATER CONTENT (%)
									○ UNCONFINED	+ FIELD VANE	● QUICK TRIAXIAL	× LAB VANE							
191.1									20	40	60	80	100						
191.1	about 60 mm ASPHALT Sand and Gravel FILL brown, coarse grained, very dense, moist		1	SS	50/0														
190.0							1												
1.1	<b>End of Borehole</b>  Auger refusal at 1.1 m depth due to possible bedrock  No noticeable groundwater in open borehole on completion  Borehole ST-7 was moved to east shoulder from the specified location (5050449 N; 237048 E) which is on the existing HWY69 pavement.  Another borehole ST-7 (A) was investigated at 2 m south of ST-7.																		

# RECORD OF BOREHOLE No ST-7 (A)

1 OF 1

G.W.P. 5377-02-00	LOCATION Highway 529 Extension, Township of the Archipelago.	ORIGINATED BY MAH
DIST 54 HWY 69	Co-ords: 5050449 N; 237053 E	COMPILED BY SN
DATUM Geodetic	BOREHOLE TYPE Solid Stem Augering	CHECKED BY IH
DATE 1 February 2006		
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522	JOB NO. TT53126	

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				20	40	60	80	100					
191.1																		
0.0	<b>Sand and Gravel FILL</b> brown, moist							191										
190.3																		
0.8	<b>End of Borehole</b>  Auger refusal at 0.8 m depth due to possible bedrock  No noticeable groundwater in open borehole on completion  Borehole ST-7 (A) was drilled at 2 m south of ST-7.																	



# RECORD OF BOREHOLE No ST-8

1 OF 1

G.W.P. 5377-02-00 LOCATION Highway 529 Extension, Township of the Archipelago. ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE Test Pit Co-ords: 5050464 N; 237084 E COMPILED BY SN  
 DATUM Geodetic DATE 30 January 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa						
200.3									20 40 60 80 100						
0.0	about 250 mm TOPSOIL														
200.1	dark brown														
0.3	SILTY SAND						200								
199.9	some gravel														
0.5	brown, moist														
	End of Test Pit														
	Refusal to excavation at 0.45 m depth due to bedrock														
	No noticeable groundwater in open test pit on completion														
	Additional 2 test pits were investigated as follows:														
	ST-8 (TP1) - 10 m north & 5 m east of ST-8														
	ST-8 (TP2) - 14 m south & 5 m west of ST-8														

# RECORD OF BOREHOLE No ST-8 (TP1)

1 OF 1

G.W.P. 5377-02-00 LOCATION Highway 529 Extension, Township of the Archipelago. ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE Test Pit Co-ords: 5050474 N; 237089 E COMPILED BY SN  
 DATUM Geodetic DATE 30 January 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				20	40	60	80	100					
200.0																		
199.8	about 200 mm TOPSOIL dark brown																	
0.2	End of Test Pit																	
	Refusal to excavation at 0.2 m depth due to bedrock																	
	No noticeable groundwater in open test pit on completion																	
	ST-8 (TP1) was excavated 10 m north & 5 m east of ST-8.																	

# RECORD OF BOREHOLE No ST-8 (TP2)

1 OF 1

G.W.P. 5377-02-00 LOCATION Highway 529 Extension, Township of the Archipelago. Co-ords: 5050450 N; 237079 E ORIGINATED BY JF  
DIST 54 HWY 69 BOREHOLE TYPE Test Pit COMPILED BY SN  
DATUM Geodetic DATE 30 January 2006 CHECKED BY IH  
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT w <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa									
208.0									20	40	60	80	100					
0.0	about 300 mm TOPSOIL dark brown																	
207.7																		
0.3	End of Test Pit																	
	Refusal to excavation at 0.3 m depth due to bedrock																	
	No noticeable groundwater in open test pit on completion																	
	ST-8 (TP2) was excavated 14 m south & 5 m west of ST-8.																	

# RECORD OF BOREHOLE No ST-9

1 OF 1

G.W.P. 5377-02-00	LOCATION Near Moose Lake Road, Township of the Archipelago,	ORIGINATED BY MAH
DIST 54 HWY 69	Co-ords: 5054227 N; 235354 E	COMPILED BY SN
DATUM Geodetic	BOREHOLE TYPE Solid Stem Augering	CHECKED BY IH
DATE 1 February 2006		
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522	JOB NO. TT53126	

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa									
206.9									20 40 60 80 100									
206.9	about 100 mm ASPHALT								○ UNCONFINED + FIELD VANE									
0.1	Sand FILL								● QUICK TRIAXIAL × LAB VANE									
206.6	some gravel		1	SS	74/18				20 40 60 80 100									
0.3	brown, coarse grained, moist																	
	SAND																	
	some gravel and silt																	
	brown, very dense, moist		2	AS	-		1	206						○				19 61 19 1 hard augering
205.7	End of Borehole																	
1.2	Auger refusal at 1.2 m depth due to possible bedrock																	
	No noticeable groundwater in open borehole on completion																	
	Borehole was moved to west shoulder from the specified location (5054227 N; 235359 E) which is on the existing south bound lane.																	
	Additional borehole ST-9 (A) was investigated at 20 m west ST-9.																	

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1 OF 1

G.W.P.	5377-02-00	LOCATION	Near Moose Lake Road, Township of the Archipelago.	ORIGINATED BY	MAH
DIST	54	HWY	69	BOREHOLE TYPE	Co-ords: 5054227 N; 235334 E
DATUM	Geodetic	DATE	1 February 2006	COMPILED BY	SN
PROJECT	Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522			CHECKED BY	IH
				JOB NO.	TT53126

[illegible]

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

# RECORD OF BOREHOLE No ST-10

1 OF 1

G.W.P. 5377-02-00 LOCATION Near Moose Lake Road, Township of the Archipelago, Co-ords: 5054199 N; 235300 E ORIGINATED BY MAH  
DIST 54 HWY 69 BOREHOLE TYPE Solid Stem Augering COMPILED BY SN  
DATUM Geodetic DATE 31 January 2006 CHECKED BY IH  
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa									
206.0									20	40	60	80	100					
0.0	<b>PEAT</b> some sand and rootlets trace gravel fibrous dark brown, wet		1	AS	-													For AS1: w <sub>n</sub> =41%
205.2	<b>End of Borehole</b>  Auger refusal at 0.8 m depth due to possible bedrock  No noticeable groundwater in open borehole on completion  Another borehole ST-10 (A) was investigated at 5 m south & 1 m east of ST-10.							205										
0.8																		

# RECORD OF BOREHOLE No ST-10 (A)

1 OF 1

G.W.P. 5377-02-00 LOCATION Near Moose Lake Road, Township of the Archipelago, Co-ords: 5054194 N; 235301 E ORIGINATED BY MAH  
DIST 54 HWY 69 BOREHOLE TYPE Solid Stem Augering COMPILED BY SN  
DATUM Geodetic DATE 31 January 2006 CHECKED BY IH  
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				20	40	60	80	100					
205.0																		
204.9																		
0.2	<p><b>PEAT</b> some rootlets fibrous dark brown, wet <b>End of Borehole</b></p> <p>Auger refusal at 0.2 m depth due to possible bedrock</p> <p>No noticeable groundwater in open borehole on completion</p> <p>Borehole ST10 (A) - 5 m south &amp; 1 m east of ST-10</p>																	

# RECORD OF BOREHOLE No ST-11

1 OF 1

G.W.P. 5377-02-00 LOCATION Harris Lake Road Interchange, Wallbridge Township. ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE Test Pit Co-ords: 5061468 N; 230858 E COMPILED BY SN  
 DATUM Geodetic DATE 25 January 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				20	40	60	80	100					
196.3																		
196.2	about 150 mm TOPSOIL																	Grass on surface
0.2	End of Test Pit																	
	Refusal to excavation at 0.2 m depth due to bedrock							196										
	No noticeable groundwater in open test pit on completion																	
	An additional test pit was investigated as follows:																	
	ST-11 (TP) - 3 m north & 10 m west of ST-11																	
	Flat bedrock visible around ST-11																	



# RECORD OF BOREHOLE No ST-11 (TP)

1 OF 1

G.W.P. 5377-02-00 LOCATION Harris Lake Road Interchange, Wallbridge Township. ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE Test Pit Co-ords: 5061471 N; 230848 E COMPILED BY SN  
 DATUM Geodetic DATE 25 January 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				20	40	60	80	100					
196.0																		
0.0	<b>about 300 mm TOPSOIL</b> dark brown, moist		1	GS	-													For GS1: w <sub>p</sub> =80%
195.7																		
0.3	<b>SAND and GRAVEL</b> some silt, occasional cobbles brown, moist		2	GS	-													
195.1																		
0.9	<b>End of Test Pit</b>  Refusal to excavation at 0.9 m depth due to bedrock  No noticeable groundwater in open test pit on completion  ST-11 (TP) was excavated 3 m north & 10 m west of ST-11.																	

# RECORD OF BOREHOLE No ST-12

1 OF 1

G.W.P. 5377-02-00 LOCATION Harris Lake Road Interchange, Wallbridge Township. ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE Test Pit Co-ords: 5061498 N; 230933 E COMPILED BY SN  
 DATUM Geodetic DATE 25 January 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT	NATURAL MOISTURE CONTENT	LIQUID LIMIT	UNIT WEIGHT  γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa				WATER CONTENT (%)					
199.4									20	40	60	80	100	W <sub>p</sub>	W	W <sub>L</sub>	kN/m <sup>3</sup>	GR SA SI CL
199.4	<b>about 50 mm TOPSOIL</b> <b>End of Test Pit</b>																	
199.4	Refusal to excavation at 0.1 m depth due to bedrock							199										
199.4	No noticeable groundwater in open test pit on completion																	
199.4	Additional test pit ST-12 (TP) was investigated 4 m north & 10 m east of ST-12.																	

# RECORD OF BOREHOLE No ST-12 (TP)

1 OF 1

G.W.P. 5377-02-00 LOCATION Harris Lake Road Interchange, Wallbridge Township. ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE Test Pit Co-ords: 5061502 N; 230943 E COMPILED BY SN  
 DATUM Geodetic DATE 25 January 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa									
199.0									20	40	60	80	100					
0.0	<b>about 400 mm TOPSOIL</b> dark brown, moist		1	GS					○ UNCONFINED	+	FIELD VANE							
198.6									● QUICK TRIAXIAL	×	LAB VANE							
0.4	<b>ROCK FRAGMENTS</b> some sand, silt and gravel brown, damp								20	40	60	80	100					
198.0																		
1.0	<b>End of Test Pit</b>  Refusal to excavation at 1.0 m depth due to bedrock  No noticeable groundwater in open test pit on completion  ST-12 (TP) was excavated 4 m north & 10 m east of ST-12.																	

# RECORD OF BOREHOLE No ST-FN-13

1 OF 1

G.W.P. 5377-02-00 LOCATION New Shebeshekong Road, Magnetawan First Nation, Co-ords: 5071008 N, 227318 E ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE Portable Drilling Equipment COMPILED BY SN  
 DATUM Geodetic DATE 4 March 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT w <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa									
178.9									20	40	60	80	100					
0.0	about 180 mm TOPSOIL																	
178.7	CLAYEY SILT		1	SS	12													
0.2	some sand, gravel and rootlets																	
178.3	dark brown to grey, stiff to hard, moist		2	SS	100/0													
0.5	End of Borehole																	
	Refusal to Standard Penetration Test at 0.5 m due to possible bedrock							178										
	No noticeable groundwater in open borehole on completion																	
	Another borehole ST-FN-13 (A) was drilled at 10 m east of ST-FN-13.																	
	Additional 3 test pits were investigated as follows:																	
	ST-FN-13 (TP1) - 10 m north of ST-FN-13																	
	ST-FN-13 (TP2) - 12 m south of ST-FN-13																	
	ST-FN-13 (TP3) - 10 m west of ST-FN-13																	

# RECORD OF BOREHOLE No ST-FN-13 (A)

1 OF 1

G.W.P. 5377-02-00 LOCATION New Shebeshekong Road, Magnetawan First Nation, Co-ords: 5071008 N, 227328 E ORIGINATED BY JF  
DIST 54 HWY 69 BOREHOLE TYPE Portable Drilling Equipment COMPILED BY SN  
DATUM Geodetic DATE 4 March 2006 CHECKED BY IH  
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>P</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa										WATER CONTENT (%)		
									20	40	60	80	100						○ UNCONFINED	+ FIELD VANE	● QUICK TRIAXIAL
178.0																					
0.0	about 200 mm TOPSOIL																				
177.8																					
0.2	CLAYEY SILT		1	SS	14																
	some sand, trace gravel and rootlets																				
177.5	dark brown to grey, stiff to hard,		2	SS	100/6																
0.5	moist																				
	End of Borehole																				
	Refusal to Standard Penetration Test at 0.5 m due to possible bedrock																				
	No noticeable groundwater in open borehole on completion																				
	ST-FN-13 (A) was drilled at 10 m east of ST-FN-13.																				

# RECORD OF BOREHOLE No ST-FN-13 (TP1)

1 OF 1

G.W.P. 5377-02-00 LOCATION New Shebeshekong Road, Magnetawan First Nation, Co-ords: 5071018 N; 227318 E ORIGINATED BY JF  
DIST 54 HWY 69 BOREHOLE TYPE COMPILED BY SN  
DATUM Geodetic DATE 4 March 2006 CHECKED BY IH  
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	<div>DYNAMIC CONE PENETRATION RESISTANCE PLOT</div> <div><div><div></div><div></div><div></div><div></div><div></div></div><div>20406080100</div></div> <div>SHEAR STRENGTH kPa</div> <div>○ UNCONFINED + FIELD VANE</div> <div>● QUICK TRIAXIAL × LAB VANE</div> <div>20406080100</div>	<div>PLASTIC LIMIT</div> <div>NATURAL MOISTURE CONTENT</div> <div>LIQUID LIMIT</div> <div><div><div></div><div></div><div></div></div><div><math>w_p</math><math>w</math><math>w_L</math></div><div>102030</div></div> <div>WATER CONTENT (%)</div>	UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) <div>GR SA SI CL</div>
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES							
176.5												

0.0	Bedrock on surface																
	ST-FN-13 (TP1) was located at 10 m north of ST-FN-13.																

# RECORD OF BOREHOLE No ST-FN-13 (TP2)

1 OF 1

G.W.P. 5377-02-00 LOCATION New Shebeshekong Road, Magnetawan First Nation, Co-ords: 5070996 N; 227318 E ORIGINATED BY JF  
DIST 54 HWY 69 BOREHOLE TYPE COMPILED BY SN  
DATUM Geodetic DATE 4 March 2006 CHECKED BY IH  
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL			
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa										WATER CONTENT (%)		
181.9									○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE										20 40 60 80 100		
0.0	Bedrock on surface  ST-FN-13 (TP2) was located at 12 m south of ST-FN-13.																				

# RECORD OF BOREHOLE No ST-FN-13 (TP3)

1 OF 1

G.W.P. 5377-02-00 LOCATION New Shebeshekong Road, Magnetawan First Nation, Co-ords: 5071008 N; 227308 E ORIGINATED BY JF  
DIST 54 HWY 69 BOREHOLE TYPE Test Pit COMPILED BY SN  
DATUM Geodetic DATE 4 March 2006 CHECKED BY IH  
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa									
179.4									20	40	60	80	100					
0.0	<b>about 180 mm TOPSOIL</b>																	
179.2	<b>CLAYEY SILT</b>																	
0.2	some sand and gravel dark brown to grey, moist						179											
178.8	<b>End of Test Pit</b>																	
0.6	Refusal to excavation at 0.6 m due to bedrock																	
	No noticeable groundwater in open test pit on completion																	
	ST-FN-13 (TP3) was excavated 10 m west of ST-FN-13.																	



# RECORD OF BOREHOLE No ST-14

1 OF 1


G.W.P. 5377-02-00 LOCATION Near Magnetawan River Road, Wallbridge Township. ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE Test Pit Co-ords: 5071072 N; 227304 E COMPILED BY SN  
 DATUM Geodetic DATE 26 January 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa									
181.3									20	40	60	80	100					
181.2	about 100 mm TOPSOIL								20	40	60	80	100					Grass on surface
0.1	End of Test Pit																	
	Refusal to excavation at 0.1 m depth due to bedrock						181											
	No noticeable groundwater in open test pit on completion																	
	Additional 2 test pits were investigated as follows:																	
	ST-14 (TP1) - 10 m north & 2 m west of ST-14																	
	ST-14 (TP2) - 20 m north & 4 m west of ST-14																	

# RECORD OF BOREHOLE No ST-14 (TP1)

1 OF 1


G.W.P. 5377-02-00 LOCATION Near Magnetawan River Road, Wallbridge Township. ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE Test Pit Co-ords: 5071082 N; 227302 E COMPILED BY SN  
 DATUM Geodetic DATE 26 January 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa										WATER CONTENT (%)		
									20	40	60	80	100						○ UNCONFINED	+ FIELD VANE	● QUICK TRIAXIAL
183.2																					
0.0	<b>about 400 mm TOPSOIL</b> dark brown, moist		1	GS	-			183													
182.8																					
0.4	<b>End of Test Pit</b>  Refusal to excavation at 0.4 m depth due to bedrock  No noticeable groundwater in open test pit on completion  ST-14 (TP1) was excavated 10 m north & 2 m west of ST-14.																				

# RECORD OF BOREHOLE No ST-14 (TP2)

1 OF 1


G.W.P. 5377-02-00 LOCATION Near Magnetawan River Road, Wallbridge Township. ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE Test Pit Co-ords: 5071092 N; 227300 E COMPILED BY SN  
 DATUM Geodetic DATE 26 January 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa									
185.1									20	40	60	80	100					
0.0	<b>about 300 TOPSOIL</b> dark brown, moist		1	GS			—	185										
184.8																		
0.3	<b>End of Test Pit</b>  Refusal to excavation at 0.3 m depth due to bedrock  No noticeable groundwater in open test pit on completion  ST-14 (TP2) was excavated 20 m north & 4 m west of ST-14.																	

# RECORD OF BOREHOLE No ST-15

1 OF 1

G.W.P. 5377-02-00 LOCATION Near Station Road, Henvey Township, Co-ords: 5073313 N; 224503 E ORIGINATED BY MAH  
DIST 54 HWY 69 BOREHOLE TYPE Solid Stem Augering COMPILED BY SN  
DATUM Geodetic DATE 31 January 2006 CHECKED BY IH  
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT w <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w <sub>L</sub>	UNIT WEIGHT γ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa										WATER CONTENT (%)		
									○ UNCONFINED	+	FIELD VANE	● QUICK TRIAXIAL	×						LAB VANE		
186.9									20	40	60	80	100								
0.0	SILTY CLAY / CLAYEY SILT trace sand grey, firm, low plasticity, moist CL		1	SS	5													0 4 79 27			
185.7			2	AS	-		1	186													
1.2	End of Borehole																				
	Auger refusal at 1.2 m depth due to possible bedrock																				
	No noticeable groundwater in open borehole on completion																				
	Original borehole was located in a ditch adjacent to Highway 69. The borehole was moved 3 m south.																				
	Another borehole ST-15 (A) was investigated at 2 m south of ST-15.																				

[illegible]

# RECORD OF BOREHOLE No ST-16

1 OF 1

G.W.P. 5377-02-00 LOCATION Near Station Road, Henvey Township, Co-ords: 5073381 N; 224430 E ORIGINATED BY JF  
DIST 54 HWY 69 BOREHOLE TYPE Test Pit COMPILED BY SN  
DATUM Geodetic DATE 27 January 2006 CHECKED BY IH  
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT w <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa									
190.2									20	40	60	80	100					
0.0	about 200 mm TOPSOIL		1	GS	-			190										
190.0	dark brown, moist																	
0.2	ROCK FRAGMENTS																	
	some sand, silt and gravel																	
	brown, damp																	
189.5																		
0.7	End of Test Pit																	
	Refusal to excavation at 0.7 m depth due to bedrock																	
	No noticeable groundwater in open test pit on completion																	
	Additional 3 test pits were investigated as follows:																	
	ST-16 (TP1) - 9 m north & 5 m west of ST-16																	
	ST-16 (TP2) - 18 m north & 14 m west of ST-16																	
	ST-16 (TP3) - 25 m west of ST-16																	

# RECORD OF BOREHOLE No ST-16 (TP1)

G.W.P. 5377-02-00	LOCATION Near Station Road, Henvey Township, Co-ords: 5073390 N; 224425 E	1 OF 1	ORIGINATED BY JF
DIST 54 HWY 69	BOREHOLE TYPE Test Pit	COMPILED BY SN	
DATUM Geodetic	DATE 27 January 2006	CHECKED BY IH	
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522			JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC NATURAL LIQUID LIMIT MOISTURE CONTENT LIMIT			UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa					WATER CONTENT (%)				
189.3									20 40 60 80 100									
0.0	about 450 mm TOPSOIL dark brown to black, moist		1	GS	-				20 40 60 80 100								For GS1: w <sub>n</sub> =91%	
188.9								189										
0.5	End of Test Pit  Refusal to excavation at 0.45 m depth due to bedrock  No noticeable groundwater in open test pit on completion  ST-16 (TP1) was excavated 9 m north & 5 m west of ST-16.																	

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



# RECORD OF BOREHOLE No ST-16 (TP3)

G.W.P. 5377-02-00	LOCATION Near Station Road, Henvey Township, Co-ords: 5073381 N; 224405 E	1 OF 1	ORIGINATED BY JF
DIST 54 HWY 69	BOREHOLE TYPE Test Pit	COMPILED BY SN	
DATUM Geodetic	DATE 27 January 2006	CHECKED BY IH	
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522			JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	<div><div>DYNAMIC CONE PENETRATION RESISTANCE PLOT</div><div><div><div>20406080100</div><div><div><div></div></div></div><div>SHEAR STRENGTH kPa</div><div><div>○ UNCONFINED</div><div>+ FIELD VANE</div><div>● QUICK TRIAXIAL</div><div>× LAB VANE</div></div><div>20406080100</div></div></div></div> <div><div>PLASTIC LIMIT</div><div>NATURAL MOISTURE CONTENT</div><div>LIQUID LIMIT</div></div> <div><div>W<sub>p</sub></div><div>W</div><div>W<sub>L</sub></div></div> <div>WATER CONTENT (%)</div> <div>102030</div> <div>kN/m<sup>3</sup></div> <th rowspan="2">UNIT WEIGHT γ</th> <th rowspan="2">REMARKS &amp; GRAIN SIZE DISTRIBUTION (%)</th> <th rowspan="2">GR</th> <th rowspan="2">SA</th> <th rowspan="2">SI</th> <th rowspan="2">CL</th>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)	GR	SA	SI	CL																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
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G.W.P. 5377-02-00	LOCATION	Near HWY 526, Henvey Township, Co-ords: 5073550 N; 224109 E	ORIGINATED BY	JF
DIST 54	HWY 69	BOREHOLE TYPE	COMPILED BY	SN
DATUM Geodetic	DATE	27 January 2006	CHECKED BY	IH
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522			JOB NO.	TT53126

[illegible]

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

# RECORD OF BOREHOLE No ST-17 (TP)

1 OF 1

G.W.P. 5377-02-00 LOCATION Near HWY 526, Henvey Township, Co-ords: 5073557 N; 224105 E ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE Test Pit COMPILED BY SN  
 DATUM Geodetic DATE 27 January 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa									
178.0									20	40	60	80	100					
0.0	ICE								○ UNCONFINED	+	FIELD VANE							
177.8									● QUICK TRIAXIAL	×	LAB VANE							
0.2	WATER								20	40	60	80	100					
177.3																		
0.7	End of Test Pit																	
	Refusal to excavation at 0.7 m depth due to bedrock							177										
	ST-17 (TP) was excavated 7 m north & 4 m west of ST-17.																	

# RECORD OF BOREHOLE No ST-18

1 OF 1

G.W.P. 5377-02-00	LOCATION Near HWY 526, Henvey Township, Co-ords: 5073564 N; 224026 E	ORIGINATED BY MAH
DIST 54 HWY 69	BOREHOLE TYPE Solid Stem Augering	COMPILED BY SN
DATUM Geodetic	DATE 31 January 2006	CHECKED BY IH
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522		JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT w <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa										WATER CONTENT (%)		
									○ UNCONFINED	+ FIELD VANE	● QUICK TRIAXIAL	× LAB VANE	20						40	60	80
179.0																		GR SA SI CL			
0.0	<b>GRAVELLY SAND</b> some silt, trace clay brown / grey, dense, moist		1	SS	33													32 55 12 1			
177.8																					
1.2	<b>End of Borehole</b>  Auger refusal at 1.2 m depth due to possible bedrock  Groundwater in open borehole on completion: 0.8 m  Borehole was moved to shoulder from the specified location (5073563 N; 224026 E) which is on the existing highway.  Another borehole ST-18 (A) was investigated at 1 m north & 2 m west of ST-18.  Borehole was backfilled with bentonite.																				

# RECORD OF BOREHOLE No ST-18 (A)

1 OF 1

G.W.P. 5377-02-00	LOCATION Near HWY 526, Henvey Township, Co-ords: 5073565 N; 224024 E	ORIGINATED BY MAH
DIST 54 HWY 69	BOREHOLE TYPE Solid Stem Augering	COMPILED BY SN
DATUM Geodetic	DATE 31 January 2006	CHECKED BY IH
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522		JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT w <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa										WATER CONTENT (%)		
									○ UNCONFINED	+	FIELD VANE	● QUICK TRIAXIAL	×						LAB VANE		
179.0									20	40	60	80	100								
0.0	<b>GRAVELLY SAND</b> moist																				
177.9							1	178													
1.1	<b>End of Borehole</b>  Auger refusal at 1.1 m depth due to possible bedrock  No noticeable groundwater in open borehole on completion  Borehole ST-18 (A) was drilled at 1 m north & 2 m west of ST-18.																				

# RECORD OF BOREHOLE No ST-19

1 OF 1

G.W.P. 5377-02-00	LOCATION Near HWY 526, Henvey Township, Co-ords: 5073612 N; 224023 E	ORIGINATED BY JF
DIST 54 HWY 69	BOREHOLE TYPE Hand Drilling	COMPILED BY SN
DATUM Geodetic	DATE 1 March 2006	CHECKED BY IH
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522		JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT w <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa										WATER CONTENT (%)		
									○ UNCONFINED	+ FIELD VANE	● QUICK TRIAXIAL	× LAB VANE	20						40	60	80
182.6																					
0.0	about 360 mm TOPSOIL dark brown, moist		1	SS	3																
182.2	SILT AND SAND trace clay brown to grey, very loose to very dense, moist to wet		2	SS	6		1														
0.4			3	SS	6																
			4	SS	100/3												0 41 57 2				
180.9	End of Borehole																				
1.7	Refusal to Standard Penetration Testing at 1.7 m depth due to possible bedrock																				
	No noticeable groundwater in open borehole on completion																				
	Additional 3 test pits were investigated as follows:																				
	ST-19 (TP1) - 2 m east of ST-19																				
	ST-19 (TP2) - 5 m south & 4 m west of ST-19																				
	ST-19 (TP3) - 10 m south & 6 m east of ST-19																				

# RECORD OF BOREHOLE No ST-19 (TP1)

1 OF 1

G.W.P. 5377-02-00	LOCATION Near HWY 526, Henvey Township, Co-ords: 5073612 N; 224025 E	ORIGINATED BY JF
DIST 54 HWY 69	BOREHOLE TYPE Test Pit	COMPILED BY SN
DATUM Geodetic	DATE 31 January 2006	CHECKED BY IH
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522		JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT w <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa										WATER CONTENT (%)		
									○ UNCONFINED	+ FIELD VANE	● QUICK TRIAXIAL	× LAB VANE	20						40	60	80
183.0																					
0.0	about 300 mm TOPSOIL dark brown, moist		1	GS												○					
182.7																					
0.3	SILTY SAND / SANDY SILT trace clay, trace gravel in GS2 brown, moist		2	GS																	
			3	GS			1	182								○	0 56 37 7				
			4	GS																	
181.3																					
1.7	End of Test Pit  Refusal to excavation at 1.7 m depth due to bedrock  No noticeable groundwater in open test pit on completion  ST-19 (TP1) was excavated 2 m east of ST-19.																				

G.W.P. 5377-02-00		LOCATION Near HWY 526, Henvey Township, Co-ords: 5073607 N: 224019 E		1 OF 1		ORIGINATED BY JF														
DIST 54 HWY 69		BOREHOLE TYPE Test Pit				COMPILED BY SN														
DATUM Geodetic		DATE 31 January 2006				CHECKED BY IH														
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522						JOB NO. TT53126														
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)		
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa										WATER CONTENT (%)	
183.9										20	40	60	80	100						
183.9	about 100 mm TOPSOIL																			
0.1	End of Test Pit																			
	Refusal to excavation at 0.1 m depth due to bedrock																			
	No noticeable groundwater in open test pit on completion								183											
	ST-19 (TP2) was excavated 5 m south & 4 m west of ST-19.																			



# RECORD OF BOREHOLE No ST-19 (TP3)

1 OF 1

G.W.P. 5377-02-00 LOCATION Near HWY 526, Henvey Township, Co-ords: 5073602 N; 224029 E ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE Test Pit COMPILED BY SN  
 DATUM Geodetic DATE 31 January 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT w <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa									
179.2									20	40	60	80	100					
0.0	about 350 mm TOPSOIL							179										
178.9																		
178.4	SAND																	
178.7	brown, moist																	
0.5	End of Test Pit																	
	Refusal to excavation at 0.5 m depth due to bedrock																	
	No noticeable groundwater in open test pit on completion																	
	ST-19 (TP3) was excavated 10 m south & 6 m east of ST-19.																	

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

# RECORD OF BOREHOLE No ST-20 (TP1)

G.W.P. 5377-02-00	LOCATION South of Still River, Henvey Township, Co-ords: 5073952 N; 225477 E	1 OF 1	ORIGINATED BY JF
DIST 54 HWY 69	BOREHOLE TYPE Test Pit	COMPILED BY SN	
DATUM Geodetic	DATE 31 January 2006	CHECKED BY IH	
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522			JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	<div><div>DYNAMIC CONE PENETRATION RESISTANCE PLOT</div><div><div><div>20406080100</div><div>SHEAR STRENGTH kPa</div><div>○ UNCONFINED + FIELD VANE</div><div>● QUICK TRIAXIAL × LAB VANE</div></div><div><div>20406080100</div><div>WATER CONTENT (%)</div><div>102030</div></div></div></div>	PLASTIC LIMIT	NATURAL MOISTURE CONTENT	LIQUID LIMIT	UNIT WEIGHT <div>γ</div> kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL		
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES											
196.1																
0.0	about 200 mm TOPSOIL							196								
195.9																
0.2	<div>End of Test Pit</div> <div>Refusal to excavation at 0.2 m depth due to bedrock</div> <div>No noticeable groundwater in open test pit on completion</div> <div>ST-20 (TP1) was excavated 10 m south &amp; 1 m west of ST-20.</div>															



[illegible]

# RECORD OF BOREHOLE No ST-20 (TP4)

G.W.P. 5377-02-00	LOCATION South of Still River, Henvey Township, Co-ords: 5073960 N; 225458 E	1 OF 1	ORIGINATED BY JF
DIST 54 HWY 69	BOREHOLE TYPE Test Pit	COMPILED BY SN	
DATUM Geodetic	DATE 31 January 2006	CHECKED BY IH	
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522			JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC NATURAL LIQUID LIMIT MOISTURE CONTENT LIMIT			UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa		WATER CONTENT (%)				
195.8									20 40 60 80 100		W <sub>p</sub> W W <sub>L</sub>				
195.8	<b>about 50 mm TOPSOIL</b> <b>End of Test Pit</b>								20 40 60 80 100		10 20 30				
195.8	Refusal to excavation at 0.05 m depth due to bedrock														
195.8	No noticeable groundwater in open test pit on completion							195							
195.8	ST-20 (TP4) was excavated 2 m south & 20 m west of ST-20.														

# RECORD OF BOREHOLE No ST-21

G.W.P. 5377-02-00	LOCATION South of Still River, Henvey Township, Co-ords: 5073936 N; 225403 E	1 OF 1	ORIGINATED BY JF
DIST 54 HWY 69	BOREHOLE TYPE Test Pit	COMPILED BY SN	
DATUM Geodetic	DATE 31 January 2006	CHECKED BY IH	
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522			JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC NATURAL LIQUID LIMIT MOISTURE LIMIT CONTENT			UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa					WATER CONTENT (%)				
197.0									20	40	60	80	100	W <sub>p</sub>	W	W <sub>L</sub>		
0.0	<b>about 600 mm TOPSOIL</b> mixed with Peat dark brown, wet		1	GS	-													
196.4	<b>End of Test Pit</b>  Refusal to excavation at 0.6 m depth due to bedrock  No noticeable groundwater in open test pit on completion  Additional 5 test pits were investigated as follows:  ST-21 (TP1) - 10 m north of ST-21 ST-21 (TP2) - 20 m north & 1 m east of ST-21 ST-21 (TP3) - 10 m south of ST-21 ST-21 (TP4) - 20 m south of ST-21 ST-21 (TP5) - 20 m west of ST-21																	
0.6																		

# RECORD OF BOREHOLE No ST-21 (TP1)

G.W.P. 5377-02-00	LOCATION South of Still River, Henvey Township, Co-ords: 5073946 N; 225403 E	1 OF 1	ORIGINATED BY JF
DIST 54 HWY 69	BOREHOLE TYPE Test Pit	COMPILED BY SN	
DATUM Geodetic	DATE 31 January 2006	CHECKED BY IH	
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522			JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa					WATER CONTENT (%)				
197.8									20 40 60 80 100									
0.0	about 600 mm TOPSOIL peat, silty sand and rootlets dark brown, wet																	
197.2																		
0.6	End of Test Pit  Refusal to excavation at 0.6 m depth due to bedrock  No noticeable groundwater in open test pit on completion  ST-21 (TP1) was excavated 10 m north of ST-21.							197										



# RECORD OF BOREHOLE No ST-21 (TP2)

G.W.P. 5377-02-00	LOCATION South of Still River, Henvey Township, Co-ords: 5073956 N; 225404 E	1 OF 1	ORIGINATED BY JF
DIST 54 HWY 69	BOREHOLE TYPE	COMPILED BY SN	
DATUM Geodetic	DATE 31 January 2006	CHECKED BY IH	
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522			JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	<div><div>DYNAMIC CONE PENETRATION RESISTANCE PLOT</div><div><div><div>20406080100</div><div><div><div></div><div></div><div></div></div></div><div>SHEAR STRENGTH kPa</div><div><div>○ UNCONFINED</div><div>● QUICK TRIAXIAL</div><div>+ FIELD VANE</div><div>× LAB VANE</div></div></div></div></div>	<div><div>PLASTIC LIMIT</div><div>NATURAL MOISTURE CONTENT</div><div>LIQUID LIMIT</div></div> <div><div>W<sub>p</sub></div><div>W</div><div>W<sub>L</sub></div></div> <div>WATER CONTENT (%)</div>	UNIT WEIGHT γ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES							
198.9												
0.0	Bedrock at surface											
	ST-21 (TP2) was located 20 m north & 1 m east of ST-21.											

# RECORD OF BOREHOLE No ST-21 (TP3)

G.W.P. 5377-02-00	LOCATION South of Still River, Henvey Township, Co-ords: 5073926 N; 225403 E	1 OF 1	ORIGINATED BY JF
DIST 54 HWY 69	BOREHOLE TYPE Test Pit	COMPILED BY SN	
DATUM Geodetic	DATE 31 January 2006	CHECKED BY IH	
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522			JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC NATURAL LIQUID LIMIT MOISTURE LIMIT CONTENT			UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa		WATER CONTENT (%)				
197.0									20 40 60 80 100		W <sub>p</sub> W W <sub>L</sub>				
196.9	<div><div>about 50 mm TOPSOIL</div><div>End of Test Pit</div><div>Refusal to excavation at 0.1 m depth due to bedrock</div><div>No noticeable groundwater in open test pit on completion</div><div>ST-21 (TP3) was excavated 10 m south of ST-21.</div></div>														

# RECORD OF BOREHOLE No ST-21 (TP4)

G.W.P. 5377-02-00	LOCATION South of Still River, Henvey Township, Co-ords: 5073916 N; 225403 E	1 OF 1	ORIGINATED BY JF
DIST 54 HWY 69	BOREHOLE TYPE Test Pit	COMPILED BY SN	
DATUM Geodetic	DATE 31 January 2006	CHECKED BY IH	
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522			JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT   NATURAL MOISTURE CONTENT   LIQUID LIMIT			UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa					WATER CONTENT (%)							
198.2									20	40	60	80	100	W <sub>p</sub>	W	W <sub>L</sub>	kN/m <sup>3</sup>	GR	SA	SI	CL
0.0	about 300 mm TOPSOIL							198													
197.9																					
0.3	End of Test Pit																				
	Refusal to excavation at 0.3 m depth due to bedrock																				
	No noticeable groundwater in open test pit on completion																				
	ST-21 (TP4) was excavated 20 m south of ST-21.																				

# RECORD OF BOREHOLE No ST-21 (TP5)

G.W.P. 5377-02-00	LOCATION South of Still River, Henvey Township, Co-ords: 5073936 N; 225383 E	1 OF 1	ORIGINATED BY JF
DIST 54 HWY 69	BOREHOLE TYPE Test Pit	COMPILED BY SN	
DATUM Geodetic	DATE 31 January 2006	CHECKED BY IH	
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522			JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC NATURAL LIQUID LIMIT MOISTURE LIMIT CONTENT			UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa					WATER CONTENT (%)				
197.2									20 40 60 80 100					W <sub>p</sub> W W <sub>L</sub>				
0.0	about 700 mm TOPSOIL						197											
196.5																		
0.7	End of Test Pit  Refusal to excavation at 0.7 m depth due to bedrock  No noticeable groundwater in open test pit on completion  ST-21 (TP5) was excavated 20 m west of ST-21.																	

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

2 OF 5

G.W.P. <u>5377-02-00</u>	LOCATION <u>South of Still River, Henvey Township, Co-ords: 5074832 N; 225102 E</u>	ORIGINATED BY <u>JF</u>
DIST <u>54</u> HWY <u>69</u>	BOREHOLE TYPE <u>Portable Drilling Equipment - Wash Boring</u>	COMPILED BY <u>SN</u>
DATUM <u>Geodetic</u>	DATE <u>23 February 2006 - 24 February 2006</u>	CHECKED BY <u>IH</u>
PROJECT <u>Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522</u>		JOB NO. <u>TT53126</u>

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

# RECORD OF BOREHOLE No ST-22

3 OF 5

G.W.P. 5377-02-00 LOCATION South of Still River, Henvey Township, Co-ords: 5074832 N; 225102 E ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE Portable Drilling Equipment - Wash Boring COMPILED BY SN  
 DATUM Geodetic DATE 23 February 2006 - 24 February 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa									
									20	40	60	80	100					
	CLAY AND SILT trace sand grey, firm to stiff, high plasticity, wet CH						165											
								164										
								163										
					11	SS	9											
								162										
								161										
								160										
								159										
								158										

Continued Next Page

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

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G.W.P. 5377-02-00 LOCATION South of Still River, Henvey Township, Co-ords: 5074832 N; 225102 E ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE Portable Drilling Equipment - Wash Boring COMPILED BY SN  
 DATUM Geodetic DATE 23 February 2006 - 24 February 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

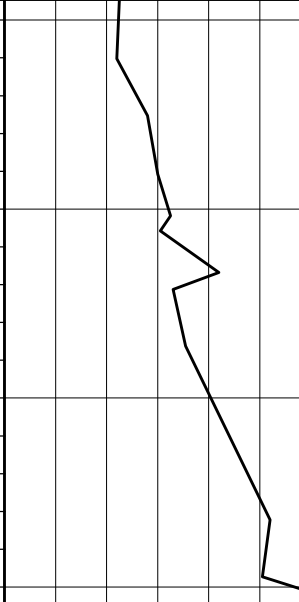
[illegible]

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



G.W.P. 5377-02-00 LOCATION South of Still River, Henvey Township, Co-ords: 5074832 N; 225102 E ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE Portable Drilling Equipment - Wash Boring COMPILED BY SN  
 DATUM Geodetic DATE 23 February 2006 - 24 February 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE								DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT		UNIT WEIGHT		REMARKS & GRAIN SIZE DISTRIBUTION (%)	
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	SHEAR STRENGTH kPa		WATER CONTENT (%)		γ	kN/m³	GR SA SI CL
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE		w <sub>p</sub> w w <sub>L</sub>					
	DCPT						149								
145.8	End of DCPT						35	146							DCPT blow count = 150/20 cm at 35.3 m
35.3	Refusal to Dynamic Cone Penetration Test at 35.3 m depth due to possible bedrock  Borehole was backfilled with bentonite.														

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

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1 OF 4

G.W.P. <u>5377-02-00</u>	LOCATION <u>South of Still River, Henvey Township, Co-ords: 5074865 N; 225048 E</u>	ORIGINATED BY <u>JF</u>
DIST <u>54</u> HWY <u>69</u>	BOREHOLE TYPE <u>Portable Drilling Equipment - Wash Boring</u>	COMPILED BY <u>SN</u>
DATUM <u>Geodetic</u>	DATE <u>25 February 2006</u>	CHECKED BY <u>IH</u>
PROJECT <u>Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522</u>		JOB NO. <u>TT53126</u>

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

# RECORD OF BOREHOLE No ST-23

2 OF 4

G.W.P. 5377-02-00 LOCATION South of Still River, Henvey Township, Co-ords: 5074865 N; 225048 E ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE Portable Drilling Equipment - Wash Boring COMPILED BY SN  
 DATUM Geodetic DATE 25 February 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa				WATER CONTENT (%)				
									20 40 60 80 100								
									○ UNCONFINED + FIELD VANE								
									● QUICK TRIAXIAL × LAB VANE								
									20 40 60 80 100								
												</					

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

For SS7:  
w<sub>L</sub>=41%  
0 0 75 25

3 OF 4

G.W.P. 5377-02-00 LOCATION South of Still River, Henvey Township, Co-ords: 5074865 N; 225048 E ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE Portable Drilling Equipment - Wash Boring COMPILED BY SN  
 DATUM Geodetic DATE 25 February 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

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

G.W.P. <u>5377-02-00</u>	LOCATION <u>South of Still River, Henvey Township, Co-ords: 5074865 N; 225048 E</u>	ORIGINATED BY <u>JF</u>
DIST <u>54</u> HWY <u>69</u>	BOREHOLE TYPE <u>Portable Drilling Equipment - Wash Boring</u>	COMPILED BY <u>SN</u>
DATUM <u>Geodetic</u>	DATE <u>25 February 2006</u>	CHECKED BY <u>IH</u>
PROJECT <u>Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522</u>		JOB NO. <u>TT53126</u>

[illegible]

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

[illegible]

# RECORD OF BOREHOLE No ST-24 (TP1)

G.W.P. 5377-02-00	LOCATION East Service Road, Henvey Township, Co-ords: 5075834 N; 223510 E	1 OF 1	ORIGINATED BY JF
DIST 54 HWY 69	BOREHOLE TYPE Test Pit	COMPILED BY SN	
DATUM Geodetic	DATE 31 January 2006	CHECKED BY IH	
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522			JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT   NATURAL MOISTURE CONTENT   LIQUID LIMIT			UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa					WATER CONTENT (%)							
193.2									20	40	60	80	100	W <sub>p</sub>	W	W <sub>L</sub>		GR	SA	SI	CL
0.0	about 400 mm TOPSOIL mixed with peat dark brown, wet						—	193													
192.8																					
0.4	End of Test Pit  Refusal to excavation at 0.4 m depth due to bedrock  No noticeable groundwater in open test pit on completion  ST-24 (TP1) was excavated 13 m north & 11 m east of ST-24.																				

# RECORD OF BOREHOLE No ST-24 (TP2)

G.W.P. 5377-02-00	LOCATION East Service Road, Henvey Township, Co-ords: 5075800 N; 223516 E	1 OF 1	ORIGINATED BY JF
DIST 54 HWY 69	BOREHOLE TYPE Test Pit	COMPILED BY SN	
DATUM Geodetic	DATE 31 January 2006	CHECKED BY IH	
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522			JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT   NATURAL MOISTURE CONTENT   LIQUID LIMIT			UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR   SA   SI   CL
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa ○ UNCONFINED   + FIELD VANE ● QUICK TRIAXIAL   × LAB VANE					WATER CONTENT (%) w <sub>p</sub> w   w <sub>L</sub>				
194.6									20	40	60	80	100	10	20	30		
194.6	<div><div>about 50 mm TOPSOIL</div><div>End of Test Pit</div><div>Refusal to excavation at 0.05 m depth due to bedrock</div><div>No noticeable groundwater in open test pit on completion</div><div>ST-24 (TP2) was excavated 21 m south &amp; 17 m east of ST-24.</div></div>						194											



# RECORD OF BOREHOLE No ST-25

G.W.P. 5377-02-00	LOCATION East of East Service Road, Henvey Township, Co-ords: 5075954 N; 223485 E	1 OF 1	ORIGINATED BY MAH
DIST 54 HWY 69	BOREHOLE TYPE Solid Stem Augering	COMPILED BY SN	
DATUM Geodetic	DATE 2 February 2006	CHECKED BY IH	
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522			JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC NATURAL LIQUID LIMIT MOISTURE CONTENT			UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE					WATER CONTENT (%) w <sub>p</sub> w w <sub>L</sub>				
191.0									20 40 60 80 100									
190.9	about 130 mm ASPHALT																	
0.1	Sand and Gravel FILL brown, moist		1	SS	50/10													
190.5																		
0.5	End of Borehole																	
	Auger refusal at 0.5 m depth due to possible bedrock																	
	No noticeable groundwater in open borehole on completion																	
	Borehole was moved to east shoulder from the specified location (5075954 N; 223483 E) which is on the existing highway pavement.																	
	Another borehole ST-25 (A) was investigated at 2 m north of ST-25.																	

# RECORD OF BOREHOLE No ST-25 (A)

G.W.P. 5377-02-00	LOCATION East of East Service Road, Henvey Township, Co-ords: 5075956 N; 223485 E	1 OF 1	ORIGINATED BY MAH
DIST 54 HWY 69	BOREHOLE TYPE Solid Stem Augering	COMPILED BY SN	
DATUM Geodetic	DATE 2 February 2006	CHECKED BY IH	
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522			JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	<div>DYNAMIC CONE PENETRATION RESISTANCE PLOT</div> <div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></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# RECORD OF BOREHOLE No ST-26

G.W.P. 5377-02-00 LOCATION Old Still River Road, Henvey Township, Co-ords: 5076403 N; 223600 E 1 OF 4  
 DIST 54 HWY 69 BOREHOLE TYPE Solid Stem Augering ORIGINATED BY MAH  
 DATUM Geodetic DATE 1 February 2006 COMPILED BY SN  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 CHECKED BY IH  
 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)										
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa		WATER CONTENT (%)														
182.8 0.0	<b>SAND</b> some silt, trace clay trace organics and rootlets grey, loose, moist		1	SS	6		182	20	40	60	80	100	10	20	30	0 79 17 4									
181.7 1.1			<b>SILTY CLAY / SILT AND CLAY</b> trace sand grey, very soft to firm, medium plasticity, moist to wet CI	2	SS												5	181	20	40	60	80	100	10	20
				180	20	40	60	80	100	10	20	30	0 2 46 52												
														3	SS	2	179								
				4	SS	3	178	20	40	60	80	100	10	20	30	0 28 65 7									
176.9 5.9	<b>SANDY SILT</b> trace clay grey, very loose, moist to wet ML		5	SS	0	177											20	40	60	80	100	10	20	30	0 2 76 22
175.8 7.0			<b>SILT</b> trace to some sand, with to some clay grey, very soft to soft, low plasticity, moist to wet CL, CL-ML	6	SS		2	176	20	40	60	80	100	10	20	30									
						175	20										40	60	80	100	10	20	30		

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

G.W.P. <u>5377-02-00</u>	LOCATION <u>Old Still River Road, Henvey Township, Co-ords: 5076403 N; 223600 E</u>	OF <u>4</u>	ORIGINATED BY <u>MAH</u>
DIST <u>54</u> HWY <u>69</u>	BOREHOLE TYPE <u>Solid Stem Augering</u>		COMPILED BY <u>SN</u>
DATUM <u>Geodetic</u>	DATE <u>1 February 2006</u>		CHECKED BY <u>IH</u>
PROJECT <u>Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522</u>			JOB NO. <u>TT53126</u>

[illegible]

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

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3 OF 4

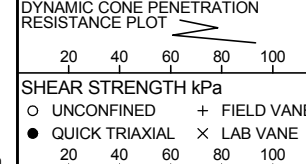
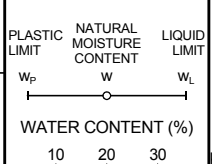
G.W.P. 5377-02-00 LOCATION Old Still River Road, Henvey Township, Co-ords: 5076403 N; 223600 E ORIGINATED BY MAH  
 DIST 54 HWY 69 BOREHOLE TYPE Solid Stem Augering COMPILED BY SN  
 DATUM Geodetic DATE 1 February 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

[illegible]

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

G.W.P. <u>5377-02-00</u>	LOCATION <u>Old Still River Road, Henvey Township, Co-ords: 5076403 N; 223600 E</u>	ORIGINATED BY <u>MAH</u>
DIST <u>54</u> HWY <u>69</u>	BOREHOLE TYPE <u>Solid Stem Augering</u>	COMPILED BY <u>SN</u>
DATUM <u>Geodetic</u>	DATE <u>1 February 2006</u>	CHECKED BY <u>IH</u>
PROJECT <u>Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522</u>		JOB NO. <u>TT53126</u>

SOIL PROFILE												
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER TYPE "N" VALUES	GROUND WATER CONDITIONS	DEPTH m	DYNAMIC CONE PENETRATION RESISTANCE PLOT						REMARKS & GRAIN SIZE DISTRIBUTION (%)
												
	DCPT											
153.4 29.4	End of DCPT  Refusal to Dynamic Cone Penetration Test at 29.4 m depth due to possible bedrock  DCPT was conducted in another location ST-26 (DCPT) located at about 2 m east of ST-26.  Borehole was backfilled with bentonite.											DCPT blow count = 100 / 13 cm at 29.4 m

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

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1 OF 4

G.W.P. <u>5377-02-00</u>	LOCATION <u>Old Still River Road, Henvey Township, Co-ords: 5076403 N; 223602 E</u>	ORIGINATED BY <u>MAH</u>
DIST <u>54</u> HWY <u>69</u>	BOREHOLE TYPE <u>Dynamic Cone Penetration</u>	COMPILED BY <u>SN</u>
DATUM <u>Geodetic</u>	DATE <u>7 March 2006</u>	CHECKED BY <u>IH</u>
PROJECT <u>Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522</u>		JOB NO. <u>TT53126</u>

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

2 OF 4

G.W.P. 5377-02-00	LOCATION Old Still River Road, Henvey Township, Co-ords: 5076403 N; 223602 E	OF 4	ORIGINATED BY MAH
DIST 54 HWY 69	BOREHOLE TYPE Dynamic Cone Penetration		COMPILED BY SN
DATUM Geodetic	DATE 7 March 2006		CHECKED BY IH
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522			JOB NO. TT53126

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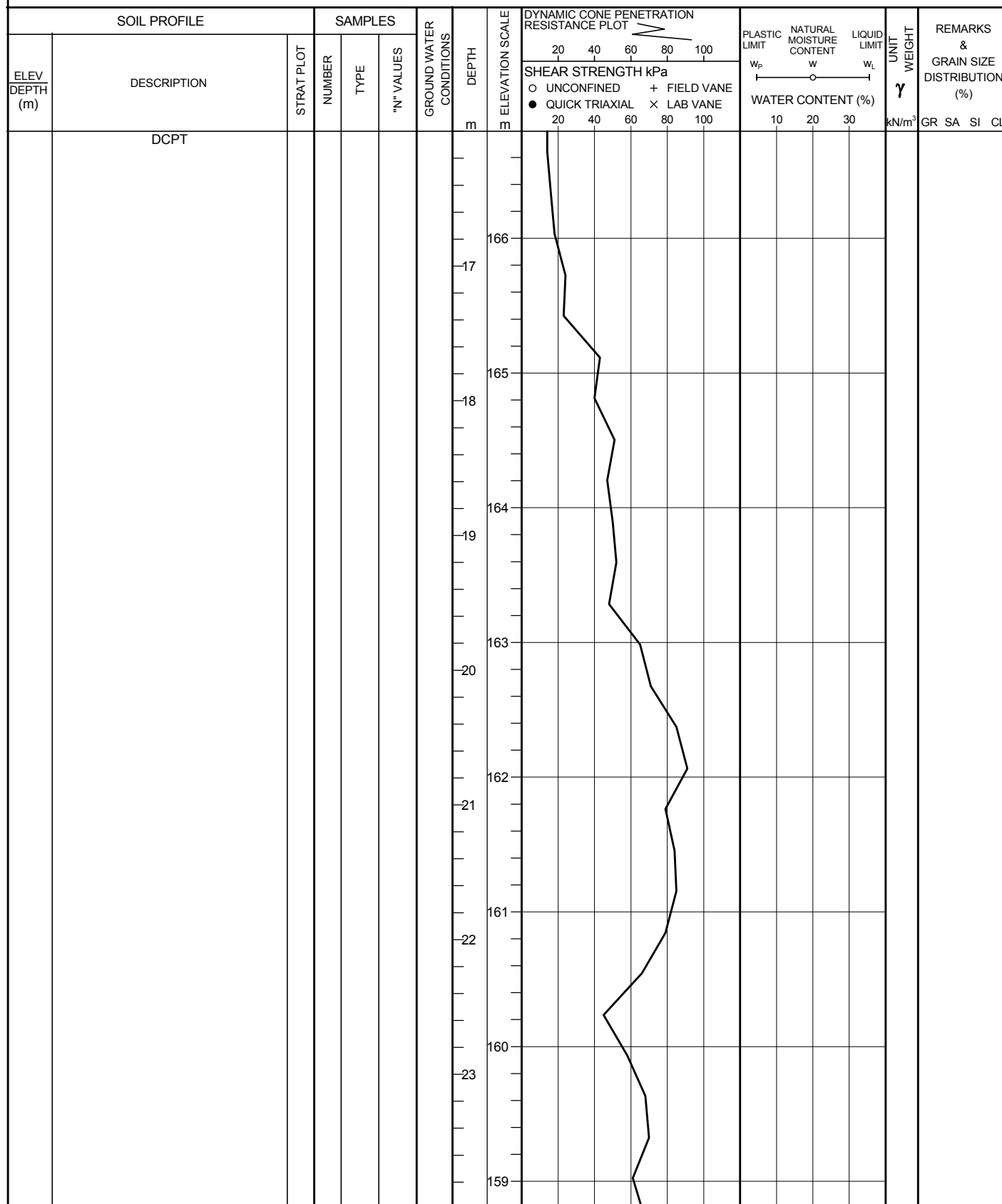
+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity      ○<sup>3%</sup> STRAIN AT FAILURE



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3 OF 4

G.W.P. 5377-02-00	LOCATION Old Still River Road, Henvey Township, Co-ords: 5076403 N; 223602 E	3 OF 4	ORIGINATED BY MAH
DIST 54 HWY 69	BOREHOLE TYPE Dynamic Cone Penetration		COMPILED BY SN
DATUM Geodetic	DATE 7 March 2006		CHECKED BY IH
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522			JOB NO. TT53126



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

# RECORD OF BOREHOLE No ST-26 (DCPT)

G.W.P. 5377-02-00	LOCATION Old Still River Road, Henvey Township, Co-ords: 5076403 N; 223602 E	4 OF 4	ORIGINATED BY MAH
DIST 54 HWY 69	BOREHOLE TYPE Dynamic Cone Penetration	COMPILED BY SN	
DATUM Geodetic	DATE 7 March 2006	CHECKED BY IH	
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522			JOB NO. TT53126

SOIL PROFILE				SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT w <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w <sub>L</sub>	UNIT WEIGHT γ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	SHEAR STRENGTH kPa										
										<div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></d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1 OF 2

G.W.P. <u>5377-02-00</u>	LOCATION <u>Old Still River Road, Henvey Township, Co-ords: 5076552 N; 223585 E</u>	ORIGINATED BY <u>HSU</u>
DIST <u>54</u> HWY <u>69</u>	BOREHOLE TYPE <u>Solid Stem Augering</u>	COMPILED BY <u>SN</u>
DATUM <u>Geodetic</u>	DATE <u>10 February 2006</u>	CHECKED BY <u>IH</u>
PROJECT <u>Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522</u>		JOB NO. <u>TT53126</u>

[illegible]

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

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2 OF 2

G.W.P. <u>5377-02-00</u>	LOCATION <u>Old Still River Road, Henvey Township, Co-ords: 5076552 N; 223585 E</u>	ORIGINATED BY <u>HSU</u>
DIST <u>54</u> HWY <u>69</u>	BOREHOLE TYPE <u>Solid Stem Augering</u>	COMPILED BY <u>SN</u>
DATUM <u>Geodetic</u>	DATE <u>10 February 2006</u>	CHECKED BY <u>IH</u>
PROJECT <u>Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522</u>		JOB NO. <u>TT53126</u>

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT W <sub>P</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL			
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa								WATER CONTENT (%)		
									○ UNCONFINED	+ FIELD VANE	● QUICK TRIAXIAL						× LAB VANE		
									20 40 60 80 100										
									20 40 60 80 100										

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

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1 OF 2

G.W.P. 5377-02-00	LOCATION Old Still River Road, Henvey Township, Co-ords: 5076547 N; 223587 E	ORIGINATED BY HSU
DIST 54 HWY 69	BOREHOLE TYPE Dynamic Cone Penetration	COMPILED BY SN
DATUM Geodetic	DATE 10 February 2006	CHECKED BY IH
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522		JOB NO. TT53126

SOIL PROFILE					
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	SAMPLES	GROUND WATER CONDITIONS	DEPTH
180.9			NUMBER	"N" VALUES	m
0.0	Dynamic cone penetration testing (DCPT) from ground surface				
<div>DYNAMIC CONE PENETRATION RESISTANCE PLOT<div><div>20406080100</div><div>○ UNCONFINED + FIELD VANE● QUICK TRIAXIAL × LAB VANE</div></div><div>PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMITW<sub>p</sub> W W<sub>L</sub></div><div>WATER CONTENT (%)</div><div>UNIT WEIGHT γ kN/m³ GR SA SI CL</div></div>					

Continued Next Page

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

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2 OF 2

G.W.P. <u>5377-02-00</u>	LOCATION <u>Old Still River Road, Henvey Township, Co-ords: 5076547 N; 223587 E</u>	ORIGINATED BY <u>HSU</u>
DIST <u>54</u> HWY <u>69</u>	BOREHOLE TYPE <u>Dynamic Cone Penetration</u>	COMPILED BY <u>SN</u>
DATUM <u>Geodetic</u>	DATE <u>10 February 2006</u>	CHECKED BY <u>IH</u>
PROJECT <u>Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522</u>		JOB NO. <u>TT53126</u>

SOIL PROFILE						SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	SHEAR STRENGTH kPa						WATER CONTENT (%)							
						○ UNCONFINED	+ FIELD VANE	● QUICK TRIAXIAL				× LAB VANE	W <sub>p</sub>	W	W <sub>L</sub>				
	DCPT																		
170.3 10.6	<b>End of DCPT</b>  Refusal to Dynamic Cone Penetration Test at 10.6 m depth due to possible bedrock  ST-27 (DCPT) was located 5 m south & 2 m east of ST-27.																	DCPT blow count = 100/25 cm at 10.6 m	

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

# RECORD OF BOREHOLE No ST-FN-28

1 OF 1

G.W.P. 5377-02-00 LOCATION North of Bikanon Road, Hervey Inlet First Nation, Co-ords: 5079959 N; 222071 E ORIGINATED BY  
DIST 54 HWY 69 BOREHOLE TYPE COMPILED BY  
DATUM Geodetic DATE CHECKED BY  
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC NATURAL LIQUID LIMIT MOISTURE LIMIT CONTENT			UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE				"N" VALUES	SHEAR STRENGTH kPa					WATER CONTENT (%)			
0.0	CANCELLED																

# RECORD OF BOREHOLE No ST-FN-29

1 OF 1

G.W.P. 5377-02-00 LOCATION North of Bikanon Road, Hervey Inlet First Nation, Co-ords: 5079966 N; 221991 E ORIGINATED BY  
DIST 54 HWY 69 BOREHOLE TYPE COMPILED BY  
DATUM Geodetic DATE CHECKED BY  
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC NATURAL LIQUID LIMIT MOISTURE CONTENT			UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE				"N" VALUES	SHEAR STRENGTH kPa					WATER CONTENT (%)			
0.0	CANCELLED																



# RECORD OF BOREHOLE No ST-30

G.W.P. 5377-02-00	LOCATION South of Straight Lake, Henvey Township, Co-ords: 5081053 N; 223088 E	1 OF 1	ORIGINATED BY JF
DIST 54 HWY 69	BOREHOLE TYPE Test Pit	COMPILED BY SN	
DATUM Geodetic	DATE 11 February 2006	CHECKED BY IH	
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522			JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT <div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></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# RECORD OF BOREHOLE No ST-30 (TP1)

G.W.P. 5377-02-00	LOCATION South of Straight Lake, Henvey Township, Co-ords: 5081043 N; 223088 E	1 OF 1	ORIGINATED BY JF
DIST 54 HWY 69	BOREHOLE TYPE Test Pit	COMPILED BY SN	
DATUM Geodetic	DATE 11 February 2006	CHECKED BY IH	
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522			JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa					WATER CONTENT (%)				
202.0																		
0.0	about 200 mm TOPSOIL		1	GS	-												For GS1: w <sub>n</sub> =62%	
201.8	dark brown, moist																	
0.2	ROCK FRAGMENTS		2	GS	-													
	some silt and sand																	
201.3	reddish brown, moist																	
0.7	End of Test Pit																	
	Refusal to excavation at 0.7 m depth due to bedrock																	
	No noticeable groundwater in open test pit on completion																	
	ST-30 (TP1) was excavated 10 m south of ST-30.																	

# RECORD OF BOREHOLE No ST-30 (TP2)

G.W.P. 5377-02-00	LOCATION South of Straight Lake, Henvey Township, Co-ords: 5081038 N; 223070 E	1 OF 1	ORIGINATED BY JF
DIST 54 HWY 69	BOREHOLE TYPE Test Pit	COMPILED BY SN	
DATUM Geodetic	DATE 11 February 2006	CHECKED BY IH	
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522			JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC NATURAL LIQUID LIMIT MOISTURE CONTENT LIMIT			UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL			
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa					WATER CONTENT (%)							
200.2									20 40 60 80 100					W <sub>p</sub> W W <sub>L</sub>							
0.0	about 300 mm TOPSOIL dark brown, moist						200														
199.9																					
0.3	SILTY SAND																				
199.7	some rootlets, occasional cobbles																				
0.6	reddish brown, moist																				
199.2	ROCK FRAGMENTS reddish brown, moist																				
1.0	End of Test Pit						1														
	Refusal to excavation at 1.0 m depth due to bedrock																				
	Groundwater in open test pit on completion: 0.8 m																				
	ST-30 (TP2) was excavated 15 m south & 18 m west of ST-30.																				

# RECORD OF BOREHOLE No ST-30 (TP3)

G.W.P. 5377-02-00	LOCATION South of Straight Lake, Henvey Township, Co-ords: 5081035 N; 223069 E	1 OF 1	ORIGINATED BY JF
DIST 54 HWY 69	BOREHOLE TYPE Test Pit	COMPILED BY SN	
DATUM Geodetic	DATE 11 February 2006	CHECKED BY IH	
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522			JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa						
200.4									20 40 60 80 100						GR SA SI CL
0.0	about 400 mm TOPSOIL dark brown, moist														
200.0															
0.4	ROCK FRAGMENTS							200							
199.8	some silt and sand														
0.6	reddish brown, moist														
	End of Test Pit														
	Refusal to excavation at 0.6 m depth due to bedrock														
	No noticeable groundwater in open test pit on completion														
	ST-30 (TP3) was excavated 18 m south & 19 m west of ST-30.														

# RECORD OF BOREHOLE No ST-31

G.W.P. 5377-02-00 LOCATION South of Straight Lake, Henvey Township, Co-ords: 5081081 N; 223013 E 1 OF 1 ORIGINATED BY JF  
DIST 54 HWY 69 BOREHOLE TYPE Test Pit COMPILED BY SN  
DATUM Geodetic DATE 11 February 2006 CHECKED BY IH  
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa									
199.3									20	40	60	80	100					
199.2	about 100 mm TOPSOIL							199										
0.1	reddish brown, moist																	
198.8	ROCK FRAGMENTS																	
0.5	mixed with silty sand and rootlets																	
	brown, moist																	
	End of Test Pit																	
	Refusal to excavation at 0.5 m depth due to bedrock																	
	No noticeable groundwater in open test pit on completion																	
	Additional 4 test pits were investigated as follows:																	
	ST-31 (TP1) - 25 m east of ST-31																	
	ST-31 (TP2) - 1 m south & 13 m west of ST-31																	
	ST-31 (TP3) - 30 m south & 5 m east of ST-31																	
	ST-31 (TP4) - 29 m north & 5 m east of ST-31																	

G.W.P. <u>5377-02-00</u>		LOCATION <u>South of Straight Lake, Henvey Township, Co-ords: 5081081 N: 223038 E</u>	1 OF 1	ORIGINATED BY <u>JF</u>
DIST <u>54</u>	HWY <u>69</u>	BOREHOLE TYPE _____	COMPILED BY <u>SN</u>	
DATUM <u>Geodetic</u>	DATE <u>11 February 2006</u>	CHECKED BY <u>IH</u>		
PROJECT <u>Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522</u>			JOB NO.	<u>TT53126</u>

[illegible]

# RECORD OF BOREHOLE No ST-31 (TP2)

G.W.P. 5377-02-00	LOCATION South of Straight Lake, Henvey Township, Co-ords: 5081080 N; 223000 E	1 OF 1	ORIGINATED BY JF
DIST 54 HWY 69	BOREHOLE TYPE Test Pit	COMPILED BY SN	
DATUM Geodetic	DATE 11 February 2006	CHECKED BY IH	
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522			JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	<div>DYNAMIC CONE PENETRATION RESISTANCE PLOT</div> <div><div><div></div><div></div><div></div></div><div>20406080100</div></div>	<div>PLASTIC LIMIT</div> <div>NATURAL MOISTURE CONTENT</div> <div>LIQUID LIMIT</div> <div><div><div></div><div></div><div></div></div><div><math>w_p</math><math>w</math><math>w_L</math></div></div> <div>WATER CONTENT (%)</div>	UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES							
199.0												
0.0	about 200 mm TOPSOIL											
198.8	reddish brown, moist											
0.2	SILTY SAND											
198.5	trace rootlets, occasional cobbles											
0.5	reddish brown, moist											
	End of Test Pit											
	Refusal to excavation at 0.5 m depth due to bedrock											
	No noticeable groundwater in open test pit on completion											
	ST-31 (TP2) was excavated 1 m south & 13 m west of ST-31.											

# RECORD OF BOREHOLE No ST-31 (TP3)

G.W.P. 5377-02-00	LOCATION South of Straight Lake, Henvey Township, Co-ords: 5081051 N; 223018 E	1 OF 1	ORIGINATED BY JF
DIST 54 HWY 69	BOREHOLE TYPE	COMPILED BY SN	
DATUM Geodetic	DATE 11 February 2006	CHECKED BY IH	
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522		JOB NO. TT53126	

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC NATURAL LIQUID LIMIT MOISTURE LIMIT CONTENT			UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%)				
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa					W <sub>p</sub>	W	W <sub>L</sub>		GR	SA	SI	CL	
200.9									○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE					WATER CONTENT (%)								
0.0	Bedrock at surface  ST-31 (TP3) was located 30 m south & 5 m east of ST-31.																					



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1 OF 1

G.W.P. 5377-02-00	LOCATION South of Straight Lake, Henvey Township, Co-ords: 5081100 N; 223018 E	ORIGINATED BY JF
DIST 54 HWY 69	BOREHOLE TYPE	COMPILED BY SN
DATUM Geodetic	DATE 11 February 2006	CHECKED BY IH
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522		JOB NO. TT53126

[illegible]

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

# RECORD OF BOREHOLE No ST-FN-32

1 OF 1

G.W.P. 5377-02-00 LOCATION South bank of Straight Lake, Henvey Inlet First Nation, Co-ords: 5082403 N; 222295 E ORIGINATED BY  
DIST 54 HWY 69 BOREHOLE TYPE COMPILED BY  
DATUM Geodetic DATE CHECKED BY  
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE				"N" VALUES	SHEAR STRENGTH kPa					WATER CONTENT (%)			
0.0	CANCELLED																

# RECORD OF BOREHOLE No ST-FN-33

1 OF 1

G.W.P. 5377-02-00 LOCATION North of Straight Lake, Henvey Inlet First Nation, Co-ords: 5082710 N; 222408 E ORIGINATED BY  
 DIST 54 HWY 69 BOREHOLE TYPE COMPILED BY  
 DATUM Geodetic DATE CHECKED BY  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC NATURAL LIQUID LIMIT MOISTURE LIMIT CONTENT			UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa					WATER CONTENT (%)				
									20	40	60	80	100	W <sub>p</sub>	W	W <sub>L</sub>		
0.0	CANCELLED																	

# RECORD OF BOREHOLE No ST-34

1 OF 1

G.W.P. 5377-02-00 LOCATION South of CPR & Straight Lake, Mowat Township. ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE Test Pit Co-ords: 5082667 N; 223121 E COMPILED BY SN  
 DATUM Geodetic DATE 12 February 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				20	40	60	80	100					
199.9	about 50 mm TOPSOIL																	
199.9	End of Test Pit																	
	Refusal to excavation at 0.1 m depth due to bedrock																	
	No noticeable groundwater in open test pit on completion																	
	Additional 4 test pits were investigated as follows:																	
	ST-34 (TP1) - 20 m north of ST-34																	
	ST-34 (TP2) - 21 m west of ST-34																	
	ST-34 (TP3) - 20 m south of ST-34																	
	ST-34 (TP4) - 20 m east of ST-34																	

# RECORD OF BOREHOLE No ST-34 (TP1)

1 OF 1

G.W.P. 5377-02-00 LOCATION South of CPR & Straight Lake, Mowat Township. ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE Test Pit Co-ords: 5082687 N; 223121 E COMPILED BY SN  
 DATUM Geodetic DATE 12 February 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa										WATER CONTENT (%)		
									20	40	60	80	100						○ UNCONFINED	+ FIELD VANE	● QUICK TRIAXIAL
197.4																					
0.0																					
197.2	about 200 mm TOPSOIL																				
0.2	End of Test Pit																				
	Refusal to excavation at 0.2 m depth due to bedrock							197													
	No noticeable groundwater in open test pit on completion																				
	ST-34 (TP1) was excavated 20 m north of ST-34.																				

# RECORD OF BOREHOLE No ST-34 (TP2)

1 OF 1

G.W.P. 5377-02-00 LOCATION South of CPR & Straight Lake, Mowat Township. ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE Test Pit Co-ords: 5082667 N; 223100 E COMPILED BY SN  
 DATUM Geodetic DATE 12 February 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				20	40	60	80	100					
197.0																		
0.0	about 400 mm TOPSOIL																	
196.6																		
0.4	End of Test Pit  Refusal to excavation at 0.4 m depth due to bedrock  No noticeable groundwater in open test pit on completion  ST-34 (TP2) was excavated 21 m west of ST-34.																	

# RECORD OF BOREHOLE No ST-34 (TP3)

1 OF 1

G.W.P. 5377-02-00	LOCATION South of CPR & Straight Lake, Mowat Township.	ORIGINATED BY JF
DIST 54 HWY 69	BOREHOLE TYPE Test Pit	COMPILED BY SN
DATUM Geodetic	DATE 12 February 2006	CHECKED BY IH
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522		JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT w <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa										WATER CONTENT (%)		
									○ UNCONFINED	+	FIELD VANE	● QUICK TRIAXIAL	×						LAB VANE		
198.0									20	40	60	80	100								
0.0	about 300 mm TOPSOIL																				
197.7																					
0.3	End of Test Pit																				
	Refusal to excavation at 0.3 m depth due to bedrock																				
	No noticeable groundwater in open test pit on completion																				
	ST-34 (TP3) was excavated 20 m south of ST-34.																				

G.W.P.	5377-02-00	LOCATION	South of CPR & Straight Lake, Mowat Township.	ORIGINATED BY	JF
DIST	54	BOREHOLE TYPE	Co-ords: 5082667 N; 223141 E	COMPILED BY	SN
DATUM	Geodetic	DATE	12 February 2006	CHECKED BY	IH
PROJECT	Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522			JOB NO.	TT53126

SOIL PROFILE					
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	SAMPLES	GROUND WATER CONDITIONS	DEPTH
202.9			NUMBER	"N" VALUES	m
0.0					
<div>DYNAMIC CONE PENETRATION RESISTANCE PLOT</div> <div><div>20406080100</div><div>○ UNCONFINED + FIELD VANE</div><div>● QUICK TRIAXIAL × LAB VANE</div><div>W<sub>p</sub> W W<sub>L</sub></div><div>PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT</div><div>WATER CONTENT (%)</div><div>10 20 30</div><div>kN/m³</div></div>					
<div>REMARKS &amp; GRAIN SIZE DISTRIBUTION (%)</div> <div>GR SA SI CL</div>					
<div>ST-34 (TP4) was located 20 m east of ST-34.</div>					

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



# RECORD OF BOREHOLE No ST-35

1 OF 1

G.W.P. 5377-02-00 LOCATION North of CPR, South of Straight Lake, Mowat Township. ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE Test Pit Co-ords: 5082755 N; 223127 E COMPILED BY SN  
 DATUM Geodetic DATE 19 February 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	<div>DYNAMIC CONE PENETRATION RESISTANCE PLOT</div> <div><div><div></div><div>20</div><div>40</div><div>60</div><div>80</div><div>100</div></div><div>SHEAR STRENGTH kPa</div><div>○ UNCONFINED      + FIELD VANE</div><div>● QUICK TRIAXIAL    × LAB VANE</div></div>	<div>PLASTIC LIMIT W<sub>p</sub></div> <div>NATURAL MOISTURE CONTENT W</div> <div>LIQUID LIMIT W<sub>L</sub></div> <div>WATER CONTENT (%)</div>	UNIT WEIGHT γ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES							
195.3												
0.0	about 260 mm TOPSOIL											
195.1												
0.3	<b>End of Test Pit</b>  Refusal to excavation at 0.3 m depth due to bedrock  No noticeable groundwater in open test pit on completion  Additional 4 test pits were investigated as follows:  ST-35 (TP1) - 25 m west of ST-35 ST-35 (TP2) - 25 m east of ST-35 ST-35 (TP3) - 25 m north of ST-35 ST-35 (TP4) - 21 m south of ST-35						195					

# RECORD OF BOREHOLE No ST-35 (TP1)

1 OF 1

G.W.P. 5377-02-00 LOCATION North of CPR, South of Straight Lake, Mowat Township. ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE Test Pit Co-ords: 5082755 N; 223102 E COMPILED BY SN  
 DATUM Geodetic DATE 19 February 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				20	40	60	80	100					
196.8																		
196.7	about 150 mm TOPSOIL																	
0.2	End of Test Pit																	
	Refusal to excavation at 0.2 m depth due to bedrock																	
	No noticeable groundwater in open test pit on completion							196										
	ST-35 (TP1) was excavated 25 m west of ST-35.																	

# RECORD OF BOREHOLE No ST-35 (TP2)

1 OF 1

G.W.P. 5377-02-00 LOCATION North of CPR, South of Straight Lake, Mowat Township. ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE Test Pit Co-ords: 5082755 N; 223152 E COMPILED BY SN  
 DATUM Geodetic DATE 19 February 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa										WATER CONTENT (%)		
									○ UNCONFINED	+	FIELD VANE	● QUICK TRIAXIAL	×						LAB VANE		
194.0									20	40	60	80	100		10	20	30	GR SA SI CL			
0.0	about 300 mm TOPSOIL						—	—										Grass on surface			
193.7																					
0.3	End of Test Pit																				
	Refusal to excavation at 0.3 m depth due to bedrock																				
	No noticeable groundwater in open test pit on completion																				
	ST-35 (TP2) was excavated 25 m east of ST-35.																				

# RECORD OF BOREHOLE No ST-35 (TP3)

1 OF 1

G.W.P. 5377-02-00 LOCATION North of CPR, South of Straight Lake, Mowat Township. ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE Test Pit Co-ords: 5082780 N; 223127 E COMPILED BY SN  
 DATUM Geodetic DATE 19 February 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa										WATER CONTENT (%)		
199.8									20	40	60	80	100						○ UNCONFINED	+ FIELD VANE	● QUICK TRIAXIAL
0.0	about 400 mm TOPSOIL																				
199.4																					
0.4	<b>End of Test Pit</b>  Refusal to excavation at 0.4 m depth due to bedrock  No noticeable groundwater in open test pit on completion  ST-35 (TP3) was excavated 25 m north of ST-35.							199													

# RECORD OF BOREHOLE No ST-35 (TP4)

1 OF 1

G.W.P. 5377-02-00 LOCATION North of CPR, South of Straight Lake, Mowat Township. ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE Test Pit Co-ords: 5082734 N; 223127 E COMPILED BY SN  
 DATUM Geodetic DATE 19 February 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa									
191.0									20	40	60	80	100					
0.0	about 300 mm TOPSOIL								○ UNCONFINED	+	FIELD VANE							
190.7									● QUICK TRIAXIAL	×	LAB VANE							
0.3	SILTY SAND some gravel occasional cobbles brown, wet								20	40	60	80	100					
190.2																		
0.8	CLAYEY SILT some sand occasional cobbles brown, moist																	
189.5																		
1.5	End of Test Pit  Refusal to excavation at 1.5 m depth due to bedrock  No noticeable groundwater in open test pit on completion  ST-35 (TP4) was excavated 21 m south of ST-35.																	

# RECORD OF BOREHOLE No ST-36

1 OF 1

G.W.P. 5377-02-00 LOCATION South of Straight Lake, Mowat Township, Co-ords: 5082893 N; 223033 E ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE Test Pit COMPILED BY SN  
 DATUM Geodetic DATE 19 February 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa									
183.7									20	40	60	80	100					
0.0	about 200 mm TOPSOIL								○ UNCONFINED	+	FIELD VANE							
183.5									● QUICK TRIAXIAL	×	LAB VANE							
0.2	End of Test Pit								20	40	60	80	100					
	Refusal to excavation at 0.2 m depth due to bedrock							183										
	No noticeable groundwater in open test pit on completion																	
	Additional 4 test pits were investigated as follows:																	
	ST-36 (TP1) - 22 m north of ST-36																	
	ST-36 (TP2) - 25 m south of ST-36																	
	ST-36 (TP3) - 25 m east of ST-36																	
	ST-36 (TP4) - 25 m west of ST-36																	

# RECORD OF BOREHOLE No ST-36 (TP1)

1 OF 1

G.W.P. 5377-02-00 LOCATION South of Straight Lake, Mowat Township, Co-ords: 5082915 N; 223033 E ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE Test Pit COMPILED BY SN  
 DATUM Geodetic DATE 19 February 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE				SHEAR STRENGTH kPa									
178.0								20	40	60	80	100					
0.0	about 600 mm ICE																
177.4																	
0.6	End of Test Pit  Refusal to excavation at 0.6 m depth due to bedrock  ST-36 (TP1) was excavated 22 m north of ST-36.																

# RECORD OF BOREHOLE No ST-36 (TP2)

1 OF 1

G.W.P. 5377-02-00 LOCATION South of Straight Lake, Mowat Township, Co-ords: 5082868 N; 223033 E ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE Test Pit COMPILED BY SN  
 DATUM Geodetic DATE 19 February 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa									
182.0									20	40	60	80	100					
0.0	about 600 mm TOPSOIL								○ UNCONFINED	+	FIELD VANE							
									● QUICK TRIAXIAL	×	LAB VANE							
181.4									20	40	60	80	100					
0.6	End of Test Pit																	
	Refusal to excavation at 0.6 m depth due to bedrock																	
	No noticeable groundwater in open test pit on completion																	
	ST-36 (TP2) was excavated 25 m south of ST-36.																	



# RECORD OF BOREHOLE No ST-36 (TP3)

1 OF 1

G.W.P. 5377-02-00 LOCATION South of Straight Lake, Mowat Township, Co-ords: 5082893 N; 223058 E ORIGINATED BY JF  
DIST 54 HWY 69 BOREHOLE TYPE Test Pit COMPILED BY SN  
DATUM Geodetic DATE 19 February 2006 CHECKED BY IH  
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa									
180.0									20	40	60	80	100					
0.0	about 400 mm TOPSOIL																	
179.6																		
0.4	<b>End of Test Pit</b>  Refusal to excavation at 0.4 m depth due to bedrock  No noticeable groundwater in open test pit on completion  ST-36 (TP3) was excavated 25 m east of ST-36.																	

# RECORD OF BOREHOLE No ST-36 (TP4)

1 OF 1

G.W.P. 5377-02-00 LOCATION South of Straight Lake, Mowat Township, Co-ords: 5082893 N; 223008 E ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE COMPILED BY SN  
 DATUM Geodetic DATE 19 February 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE				"N" VALUES	SHEAR STRENGTH kPa					WATER CONTENT (%)			
185.6							20	40	60	80	100	W <sub>p</sub>	W	W <sub>L</sub>			
0.0	Bedrock at surface  ST-36 (TP4) was located 25 m west of ST-36.																

# RECORD OF BOREHOLE No ST-37

G.W.P. 5377-02-00 LOCATION Center of Straight Lake, Mowat Township, Co-ords: 5083027 N; 223022 E 1 OF 5  
 DIST 54 HWY 69 BOREHOLE TYPE Portable Drilling Equipment - Wash Boring ORIGINATED BY JF  
 DATUM Geodetic DATE 18 February 2006 - 21 February 2006 COMPILED BY SN  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 CHECKED BY IH  
 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE ELEVATION m	DYNAMIC CONE PENETRATION RESISTANCE PLOT <div><div><div></div><div>20406080100</div></div><div>SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE</div><div>20406080100</div></div>	PLASTIC LIMIT w <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w <sub>L</sub>	UNIT WEIGHT γ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES									
178.5 0.0	about 500 mm ICE													
178.0 0.5	WATER							178						
							1							
								177						
							2							
								176						
175.5 3.1	SILTY CLAY / SILT AND CLAY / CLAYEY SILT trace sand, trace organics grey, very soft to hard, medium plasticity, wet CI		1	SS	0		3							
								175						
							4							
								174						
							5							
								173						
							6							
								172						
							7							
								171						
			2	SS	4									

For SS2:  
w<sub>L</sub>=44%

054550

Continued Next Page

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

2 OF 5

G.W.P. 5377-02-00 LOCATION Center of Straight Lake, Mowat Township, Co-ords: 5083027 N; 223022 E ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE Portable Drilling Equipment - Wash Boring COMPILED BY SN  
 DATUM Geodetic DATE 18 February 2006 - 21 February 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

[illegible]

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

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

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4 OF 5

G.W.P. <u>5377-02-00</u>	LOCATION <u>Center of Straight Lake, Mowat Township, Co-ords: 5083027 N: 223022 E</u>	ORIGINATED BY <u>JF</u>
DIST <u>54</u> HWY <u>69</u>	BOREHOLE TYPE <u>Portable Drilling Equipment - Wash Boring</u>	COMPILED BY <u>SN</u>
DATUM <u>Geodetic</u>	DATE <u>18 February 2006 - 21 February 2006</u>	CHECKED BY <u>IH</u>
PROJECT <u>Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522</u>		JOB NO. <u>TT53126</u>

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT W <sub>P</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa									WATER CONTENT (%)
									○ UNCONFINED	+ FIELD VANE	● QUICK TRIAXIAL	× LAB VANE						
									20 40 60 80 100									
									20 40 60 80 100									

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

G.W.P. 5377-02-00 LOCATION Center of Straight Lake, Mowat Township, Co-ords: 5083027 N; 223022 E ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE Portable Drilling Equipment - Wash Boring COMPILED BY SN  
 DATUM Geodetic DATE 18 February 2006 - 21 February 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

[illegible]

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

# RECORD OF BOREHOLE No ST-FN-38

1 OF 1

G.W.P. 5377-02-00 LOCATION North of Straight Lake, Henvey Inlet First Nation, Co-ords: 5083101 N; 222953 E ORIGINATED BY  
DIST 54 HWY 69 BOREHOLE TYPE COMPILED BY  
DATUM Geodetic DATE CHECKED BY  
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC NATURAL LIQUID LIMIT MOISTURE LIMIT CONTENT			UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE				"N" VALUES	SHEAR STRENGTH kPa					WATER CONTENT (%)			
180.2 0.0																	
	CANCELLED																



[illegible]

# RECORD OF BOREHOLE No ST-39 (TP1)

1 OF 1

G.W.P. 5377-02-00 LOCATION North of Key River, Mowat Township, Co-ords: 5084235 N; 222504 E ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE COMPILED BY SN  
 DATUM Geodetic DATE 3 March 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC NATURAL LIQUID LIMIT MOISTURE LIMIT CONTENT			UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE				"N" VALUES	SHEAR STRENGTH kPa					WATER CONTENT (%)			
196.9							20	40	60	80	100	W <sub>p</sub>	W	W <sub>L</sub>			
0.0	Bedrock at surface  ST-39 (TP1) was located at 1 m north & 10 m west of ST-39.																

# RECORD OF BOREHOLE No ST-39 (TP2)

1 OF 1

G.W.P. 5377-02-00 LOCATION North of Key River, Mowat Township, Co-ords: 5084234 N; 222526 E ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE COMPILED BY SN  
 DATUM Geodetic DATE 3 March 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	<div>DYNAMIC CONE PENETRATION RESISTANCE PLOT</div> <div><div><div></div><div></div><div></div><div></div><div></div></div><div>20406080100</div></div> <div>SHEAR STRENGTH kPa</div> <div>○ UNCONFINED + FIELD VANE</div> <div>● QUICK TRIAXIAL × LAB VANE</div> <div>20406080100</div>	<div>PLASTIC LIMIT</div> <div>NATURAL MOISTURE CONTENT</div> <div>LIQUID LIMIT</div> <div><div><div></div><div></div><div></div></div><div><math>w_p</math>   <math>w</math>   <math>w_L</math></div><div>WATER CONTENT (%)</div><div>102030</div></div>	<div>UNIT WEIGHT</div> <div><math>\gamma</math></div> <div>kN/m<sup>3</sup></div>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL	
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES								
178.4													
0.0	Bedrock at surface												
	ST-39 (TP2) was located at 12 m east of ST-39.												

# RECORD OF BOREHOLE No ST-39 (TP3)

1 OF 1

G.W.P. 5377-02-00 LOCATION North of Key River, Mowat Township, Co-ords: 5084223 N; 222514 E ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE COMPILED BY SN  
 DATUM Geodetic DATE 3 March 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC NATURAL LIQUID LIMIT MOISTURE CONTENT LIMIT			UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE				"N" VALUES	20	40	60	80	100	W <sub>p</sub>	W		
178.9	Bedrock at surface																
0.0	ST-39 (TP3) was located at 11 m south of ST-39.																

# RECORD OF BOREHOLE No ST-39 (TP4)

1 OF 1

G.W.P. 5377-02-00 LOCATION North of Key River, Mowat Township, Co-ords: 5084244 N; 222514 E ORIGINATED BY JF  
DIST 54 HWY 69 BOREHOLE TYPE COMPILED BY SN  
DATUM Geodetic DATE 3 March 2006 CHECKED BY IH  
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC NATURAL LIQUID LIMIT MOISTURE CONTENT			UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE				"N" VALUES	SHEAR STRENGTH kPa					WATER CONTENT (%)			
198.9							20	40	60	80	100	W <sub>p</sub>	W	W <sub>L</sub>			
0.0	Bedrock at surface  ST-39 (TP4) was located at 10 m north of ST-39.																

G.W.P. 5377-02-00	LOCATION North of Key River, Mowat Township, Co-ords: 5084234 N; 222504 E	ORIGINATED BY JF
DIST 54 HWY 69	BOREHOLE TYPE	COMPILED BY SN
DATUM Geodetic	DATE 3 March 2006	CHECKED BY IH
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522		JOB NO. TT53126

[illegible]

# RECORD OF BOREHOLE No ST-40

G.W.P. 5377-02-00 LOCATION South Bank of Key River, Mowat Township, Co-ords: 5084205 N; 222522 E 1 OF 1  
 DIST 54 HWY 69 BOREHOLE TYPE Portable Drilling Equipment ORIGINATED BY JF  
 DATUM Geodetic DATE 16 February 2006 COMPILED BY SN  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 CHECKED BY IH  
 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT w <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa										WATER CONTENT (%)		
									20	40	60	80	100						20	40	60
175.9																		GR SA SI CL			
0.0	about 460 mm ICE																				
175.4	WATER																				
0.5																					

# RECORD OF BOREHOLE No ST-40 (A)

G.W.P. 5377-02-00 LOCATION South Bank of Key River, Mowat Township, Co-ords: 5084177 N; 222522 E 1 OF 4  
 DIST 54 HWY 69 BOREHOLE TYPE Portable Drilling Equipment - Wash Boring ORIGINATED BY JF  
 DATUM Geodetic DATE 16 February 2006 COMPILED BY SN  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 CHECKED BY IH  
 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				20	40	60	80	100		
175.9 0.0	about 470 mm ICE														
175.4 0.5	WATER														
							1	175							
							2	174							
							3	173							
							4	172							
							5	171							
							6	170							
							7	169							
								168							

Continued Next Page

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



# RECORD OF BOREHOLE No ST-40 (A)

G.W.P. 5377-02-00 LOCATION South Bank of Key River, Mowat Township, Co-ords: 5084177 N; 222522 E 2 OF 4  
 DIST 54 HWY 69 BOREHOLE TYPE Portable Drilling Equipment - Wash Boring ORIGINATED BY JF  
 DATUM Geodetic DATE 16 February 2006 COMPILED BY SN  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 CHECKED BY IH  
 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				20 40 60 80 100	20 40 60 80 100	20 40 60 80 100	20 40 60 80 100	20 40 60 80 100		
167.1	WATER														
8.8	CLAYEY SILT / SILTY CLAY trace sand, trace peat in upper portion of SS1 dark grey, very soft, wet MH-OH		1	SS	0			167							
								166							
								165							
								164							
								163							
								162							
								161							
								160							
161.6	End of Borehole														
14.3	Groundwater in open borehole on completion: at surface  Dynamic Cone Penetration Test was conducted below 14.3 m depth.														

Continued Next Page

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

For SS2:  
w<sub>n</sub>=124%,  
w<sub>L</sub>=59, w<sub>p</sub>=42  
0 2 68 30

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3 OF 4

G.W.P. <u>5377-02-00</u>	LOCATION <u>South Bank of Key River, Mowat Township, Co-ords: 5084177 N; 222522 E</u>	ORIGINATED BY <u>JF</u>
DIST <u>54</u> HWY <u>69</u>	BOREHOLE TYPE <u>Portable Drilling Equipment - Wash Boring</u>	COMPILED BY <u>SN</u>
DATUM <u>Geodetic</u>	DATE <u>16 February 2006</u>	CHECKED BY <u>IH</u>
PROJECT <u>Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522</u>		JOB NO. <u>TT53126</u>

SOIL PROFILE						SAMPLES		
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	GROUND WATER CONDITIONS	DEPTH m	DYNAMIC CONE PENETRATION RESISTANCE PLOT
								SHEAR STRENGTH kPa ○ UNCONFINED    + FIELD VANE ● QUICK TRIAXIAL    × LAB VANE
								WATER CONTENT (%) w <sub>p</sub> w                  w <sub>L</sub>
								UNIT WEIGHT $\gamma$
								REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

Continued Next Page

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

# RECORD OF BOREHOLE No ST-40 (A)

G.W.P. 5377-02-00	LOCATION South Bank of Key River, Mowat Township, Co-ords: 5084177 N; 222522 E	4 OF 4	ORIGINATED BY JF
DIST 54 HWY 69	BOREHOLE TYPE Portable Drilling Equipment - Wash Boring	COMPILED BY SN	
DATUM Geodetic	DATE 16 February 2006	CHECKED BY IH	
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522			JOB NO. TT53126

SOIL PROFILE				SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	<div><div>DYNAMIC CONE PENETRATION RESISTANCE PLOT</div><div><div><div>20406080100</div><div><div><div></div></div></div><div>SHEAR STRENGTH kPa</div><div><div>○ UNCONFINED</div><div>+ FIELD VANE</div><div>● QUICK TRIAXIAL</div><div>× LAB VANE</div></div><div><div>20406080100</div></div></div></div></div>	<div><div>PLASTIC LIMIT</div><div>NATURAL MOISTURE CONTENT</div><div>LIQUID LIMIT</div></div> <div><div><div><div><div>W<sub>p</sub></div><div>W</div><div>W<sub>L</sub></div></div></div><div>WATER CONTENT (%)</div></div></div>	UNIT WEIGHT <div>γ</div> kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) <div>GR SA SI CL</div>																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																														
<div><div>ELEV DEPTH</div><div>(m)</div></div>	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
<div>151.7</div> <div>24.2</div>										<div><div></div><div></div></div>																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	

# RECORD OF BOREHOLE No ST-41

1 OF 1

G.W.P. 5377-02-00 LOCATION North of Key River, Mowat Township, Co-ords: 5084245 N; 222550 E ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE Test Pit COMPILED BY SN  
 DATUM Geodetic DATE 3 March 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa										WATER CONTENT (%)		
									20	40	60	80	100						○ UNCONFINED	+ FIELD VANE	● QUICK TRIAXIAL
193.4							m	m	20	40	60	80	100	10	20	30	kN/m <sup>3</sup>	GR SA SI CL			
193.3	about 100 mm TOPSOIL																				
0.1	End of Test Pit																				
	Refusal to excavation at 0.1 m depth due to bedrock							193													
	No noticeable groundwater in open test pit on completion																				
	Additional 7 test pits were investigated as follows:																				
	ST-41 (TP1) - 8 m south & 5 m west of ST-41																				
	ST-41 (TP2) - 20 m north of ST-41																				
	ST-41 (TP3) - 10 m north of ST-41																				
	ST-41 (TP4) - 12 m south of ST-41																				
	ST-41 (TP5) - 10 m east of ST-41																				
	ST-41 (TP6) - 10 m west of ST-41																				
	ST-41 (TP7) - 20 m west of ST-41																				

# RECORD OF BOREHOLE No ST-41 (TP1)

1 OF 1

G.W.P. 5377-02-00 LOCATION North of Key River, Mowat Township, Co-ords: 5084237 N; 222545 E ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE Test Pit COMPILED BY SN  
 DATUM Geodetic DATE 3 March 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC NATURAL LIQUID LIMIT MOISTURE LIMIT CONTENT			UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE				"N" VALUES	SHEAR STRENGTH kPa					WATER CONTENT (%)			
192.9							20	40	60	80	100	W <sub>p</sub>	W	W <sub>L</sub>			
0.0	about 500 mm TOPSOIL																
192.4	End of Test Pit																
0.5	Refusal to excavation at 0.5 m depth due to bedrock																
	No noticeable groundwater in open test pit on completion																
	ST-41 (TP1) was excavated at 8 m south & 5 m west of ST-41.																

# RECORD OF BOREHOLE No ST-41 (TP2)

1 OF 1

G.W.P. 5377-02-00 LOCATION North of Key River, Mowat Township, Co-ords: 5084265 N; 222550 E ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE COMPILED BY SN  
 DATUM Geodetic DATE 3 March 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT w <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa										WATER CONTENT (%)		
197.6									20	40	60	80	100						20	40	60
0.0	Bedrock at surface  ST-41 (TP2) was located at 20 m north of ST-41.																				

# RECORD OF BOREHOLE No ST-41 (TP3)

1 OF 1

G.W.P. 5377-02-00 LOCATION North of Key River, Mowat Township, Co-ords: 5084255 N; 222550 E ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE Test Pit COMPILED BY SN  
 DATUM Geodetic DATE 3 March 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa								WATER CONTENT (%)		
195.9									20	40	60	80	100						
195.9	<b>about 80 mm TOPSOIL</b>								○ UNCONFINED	+	FIELD VANE								
0.1	<b>End of Test Pit</b>								● QUICK TRIAXIAL	×	LAB VANE								
	Refusal to excavation at 0.1 m depth due to bedrock								20	40	60	80	100						
	No noticeable groundwater in open test pit on completion																		
	ST-41 (TP3) was located at 10 m north of ST-41.							195											
							</												

# RECORD OF BOREHOLE No ST-41 (TP4)

1 OF 1

G.W.P. 5377-02-00 LOCATION North of Key River, Mowat Township, Co-ords: 5084233 N; 222550 E ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE COMPILED BY SN  
 DATUM Geodetic DATE 3 March 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	<div>DYNAMIC CONE PENETRATION RESISTANCE PLOT</div> <div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></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G.W.P. 5377-02-00	LOCATION North of Key River, Mowat Township, Co-ords: 5084245 N; 222560 E	ORIGINATED BY JF
DIST 54 HWY 69	BOREHOLE TYPE	COMPILED BY SN
DATUM Geodetic	DATE 3 March 2006	CHECKED BY IH
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522		JOB NO. TT53126

[illegible]

# RECORD OF BOREHOLE No ST-41 (TP6)

1 OF 1

G.W.P. 5377-02-00 LOCATION North of Key River, Mowat Township, Co-ords: 5084245 N; 222540 E ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE COMPILED BY SN  
 DATUM Geodetic DATE 3 March 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT w <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa										WATER CONTENT (%)		
193.9									○ UNCONFINED	● QUICK TRIAXIAL	+	×	FIELD VANE						LAB VANE		
0.0	Bedrock at surface																				
	ST-41 (TP6) was located at 10 m west of ST-41.																				

# RECORD OF BOREHOLE No ST-41 (TP7)

1 OF 1

G.W.P. 5377-02-00 LOCATION North of Key River, Mowat Township, Co-ords: 5084245 N; 222530 E ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE COMPILED BY SN  
 DATUM Geodetic DATE 3 March 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE				SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL	
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	SHEAR STRENGTH kPa														
196.9											20	40	60	80	100					
0.0	Bedrock at surface  ST-41 (TP7) was located at 20 m west of ST-41.																			

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

2 OF 4

G.W.P. <u>5377-02-00</u>	LOCATION <u>South of CNR, Mowat Township, Co-ords: 5086057 N; 221873 E</u>	ORIGINATED BY <u>JF</u>
DIST <u>54</u> HWY <u>69</u>	BOREHOLE TYPE <u>Solid Stem Augering</u>	COMPILED BY <u>SN</u>
DATUM <u>Geodetic</u>	DATE <u>7 February 2006 - 8 February 2006</u>	CHECKED BY <u>IH</u>
PROJECT <u>Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522</u>		JOB NO. <u>TT53126</u>

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

# RECORD OF BOREHOLE No ST-42

3 OF 4

G.W.P. 5377-02-00 LOCATION South of CNR, Mowat Township, Co-ords: 5086057 N; 221873 E ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE Solid Stem Augering COMPILED BY SN  
 DATUM Geodetic DATE 7 February 2006 - 8 February 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION m	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa						
	CLAYEY SILT / SILTY CLAY trace sand grey, very soft, low plasticity, wet CL						164		1.5						
163.2 17.0	SILT AND CLAY / CLAYEY SILT grey, soft to very stiff, medium plasticity, wet CI						163								
			11	SS	3		162								For SS11: w <sub>n</sub> =50% 0 0 60 40
							161		1.7						
							160								
							159								
			12	SS	17		158								
							157								
156.8 23.5	SILT some sand, trace clay grey, stiff, wet														

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



# RECORD OF BOREHOLE No ST-43

1 OF 6

G.W.P. 5377-02-00 LOCATION North of CNR, Mowat Township, Co-ords: 5086089 N, 221905 E ORIGINATED BY MAH/JF  
 DIST 54 HWY 69 BOREHOLE TYPE Solid Stem Augering COMPILED BY SN  
 DATUM Geodetic DATE 2 February 2006 - 3 February 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				20	40	60	80	100		
180.4									SHEAR STRENGTH kPa						
									○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL X LAB VANE						
									20	40	60	80	100		
									WATER CONTENT (%)						
									W <sub>p</sub> ——— W ——— W <sub>L</sub> PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT						
180.2	about 130 mm TOPSOIL														
0.1	CLAYEY SILT / SILT														
	dark grey, very soft to very stiff, moist to wet ML		1	SS	4		180								
							1								
							179								
			2	SS	0		2								
							178								
							3								
			3	SS	0		177								
							4								
							176								
							175								
							174								
							173								
	trace gravel		4	SS	0										
							6								
			5	SS	0										
							7								
							173								
	some sand, trace clay		6	SS	19										

Continued Next Page

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



G.W.P. 5377-02-00 LOCATION North of CNR, Mowat Township, Co-ords: 5086089 N; 221905 E ORIGINATED BY MAH/JF  
 DIST 54 HWY 69 BOREHOLE TYPE Solid Stem Augering COMPILED BY SN  
 DATUM Geodetic DATE 2 February 2006 - 3 February 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE M	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT W <sub>P</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa								WATER CONTENT (%)
									○ UNCONFINED	+ FIELD VANE	● QUICK TRIAXIAL						
									20 40 60 80 100								
									20 40 60 80 100								
									</								

Continued Next Page

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

G.W.P. <u>5377-02-00</u>	LOCATION <u>North of CNR, Mowat Township, Co-ords: 5086089 N; 221905 E</u>	ORIGINATED BY <u>MAH/JF</u>
DIST <u>54</u> HWY <u>69</u>	BOREHOLE TYPE <u>Solid Stem Augering</u>	COMPILED BY <u>SN</u>
DATUM <u>Geodetic</u>	DATE <u>2 February 2006 - 3 February 2006</u>	CHECKED BY <u>IH</u>
PROJECT <u>Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522</u>		JOB NO. <u>TT53126</u>

[illegible]

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

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4 OF 6

G.W.P. <u>5377-02-00</u>	LOCATION <u>North of CNR, Mowat Township, Co-ords: 5086089 N; 221905 E</u>	ORIGINATED BY <u>MAH/JF</u>
DIST <u>54</u> HWY <u>69</u>	BOREHOLE TYPE <u>Solid Stem Augering</u>	COMPILED BY <u>SN</u>
DATUM <u>Geodetic</u>	DATE <u>2 February 2006 - 3 February 2006</u>	CHECKED BY <u>IH</u>
PROJECT <u>Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522</u>		JOB NO. <u>TT53126</u>

[illegible]

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

# RECORD OF BOREHOLE No ST-43

5 OF 6

G.W.P. 5377-02-00 LOCATION North of CNR, Mowat Township, Co-ords: 5086089 N, 221905 E ORIGINATED BY MAH/JF  
 DIST 54 HWY 69 BOREHOLE TYPE Solid Stem Augering COMPILED BY SN  
 DATUM Geodetic DATE 2 February 2006 - 3 February 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa					WATER CONTENT (%)				
						20 40 60 80 100 ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL X LAB VANE 20 40 60 80 100					W <sub>p</sub> W W <sub>L</sub> 10 20 30							
147.4	<b>SILT</b> with to some sand, trace gravel grey, stiff to very stiff, moist						148											
33.0	<b>SAND AND SILT</b> trace clay grey, compact to dense, wet						33											
			17	SS	17		147											
							34											
							146											
							35											
							145											
							36											
							144											
			18	SS	19		37											
							143											
							38											
							142											
							39											
							141											
			19	SS	33													

Continued Next Page

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

G.W.P. <u>5377-02-00</u>	LOCATION <u>North of CNR, Mowat Township, Co-ords: 5086089 N; 221905 E</u>	ORIGINATED BY <u>MAH/JF</u>
DIST <u>54</u> HWY <u>69</u>	BOREHOLE TYPE <u>Solid Stem Augering</u>	COMPILED BY <u>SN</u>
DATUM <u>Geodetic</u>	DATE <u>2 February 2006 - 3 February 2006</u>	CHECKED BY <u>IH</u>
PROJECT <u>Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522</u>		JOB NO. <u>TT53126</u>

SOIL PROFILE						SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT W <sub>P</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ kN/m³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	SHEAR STRENGTH kPa						WATER CONTENT (%)							
						○ UNCONFINED	+ FIELD VANE	● QUICK TRIAXIAL					× LAB VANE						
140.3 40.1	<b>End of borehole</b>  Groundwater in open borehole on completion: 1.2 m  Dynamic Cone Penetration Test was conducted below 40.1 m depth.	1:31																	
136.3 44.1	<b>End of DCPT</b>  Refusal to Dynamic Cone Penetration Test at 44.1 m depth due to possible bedrock  A test pit ST-43 (TP) was investigated at 11 m north of ST-43.  Borehole was backfilled with bentonite.																	DCPT blow count = 100/3 cm at 44.1 m	

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



[illegible]







# RECORD OF BOREHOLE No ST-45

1 OF 1

G.W.P. 5377-02-00 LOCATION HWY 522, Mowat Township, Co-ords: 5086553 N; 221735 E ORIGINATED BY MAH  
 DIST 54 HWY 69 BOREHOLE TYPE Solid Stem Augering COMPILED BY SN  
 DATUM Geodetic DATE 2 February 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT w <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa										WATER CONTENT (%)		
									○ UNCONFINED	+ FIELD VANE	● QUICK TRIAXIAL	× LAB VANE									
185.4 0.0	about 250 mm TOPSOIL mixed with peat dark brown, moist SILTY CLAY some peat and rootlets grey, firm, moist		1	SS	5	▽	185														
185.2 0.3																					
184.3 1.1	SILTY SAND trace clay and gravel grey, fine to medium grained, very dense, moist						184														
183.5 1.9	End of borehole  Auger refusal at 1.9 m depth due to possible bedrock  Groundwater in open borehole on completion: 1.2 m  Another borehole ST-45 (A) was investigated at 9 m south of ST-45.  One test pit ST-45 (TP) was investigated at 11 m south of ST-45.  Borehole was backfilled with bentonite.		2	SS	100/20												6 59 31 4				

# RECORD OF BOREHOLE No ST-44 (A)


G.W.P. 5377-02-00	LOCATION Near HWY 522, Mowat Township, Co-ords: 5086497 N; 221791 E	1 OF 1	ORIGINATED BY MAH
DIST 54 HWY 69	BOREHOLE TYPE Solid Stem Augering	COMPILED BY SN	
DATUM Geodetic	DATE 2 February 2006	CHECKED BY IH	
PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522			JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC NATURAL LIQUID LIMIT MOISTURE LIMIT CONTENT			UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa					WATER CONTENT (%)				
184.5									20 40 60 80 100									
0.0	<b>SAND</b> brown, moist																	
			</															

# RECORD OF BOREHOLE No ST-45 (A)

1 OF 1

G.W.P. 5377-02-00 LOCATION HWY 522, Mowat Township, Co-ords: 5086544 N; 221735 E ORIGINATED BY MAH  
 DIST 54 HWY 69 BOREHOLE TYPE Solid Stem Augering COMPILED BY SN  
 DATUM Geodetic DATE 2 February 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT w <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)			
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa										WATER CONTENT (%)		
									○ UNCONFINED	+	FIELD VANE	● QUICK TRIAXIAL	×						LAB VANE		
185.0									20	40	60	80	100								
0.0	<b>SAND</b> trace gravel grey, moist																		Topsoil on surface		
183.3																					
1.7	<b>End of borehole</b>  Auger refusal at 1.7 m depth due to possible bedrock  No noticeable groundwater in open borehole on completion  Borehole ST-45 (A) was drilled at 9 m south of ST-45.																				

# RECORD OF BOREHOLE No ST-45 (TP)

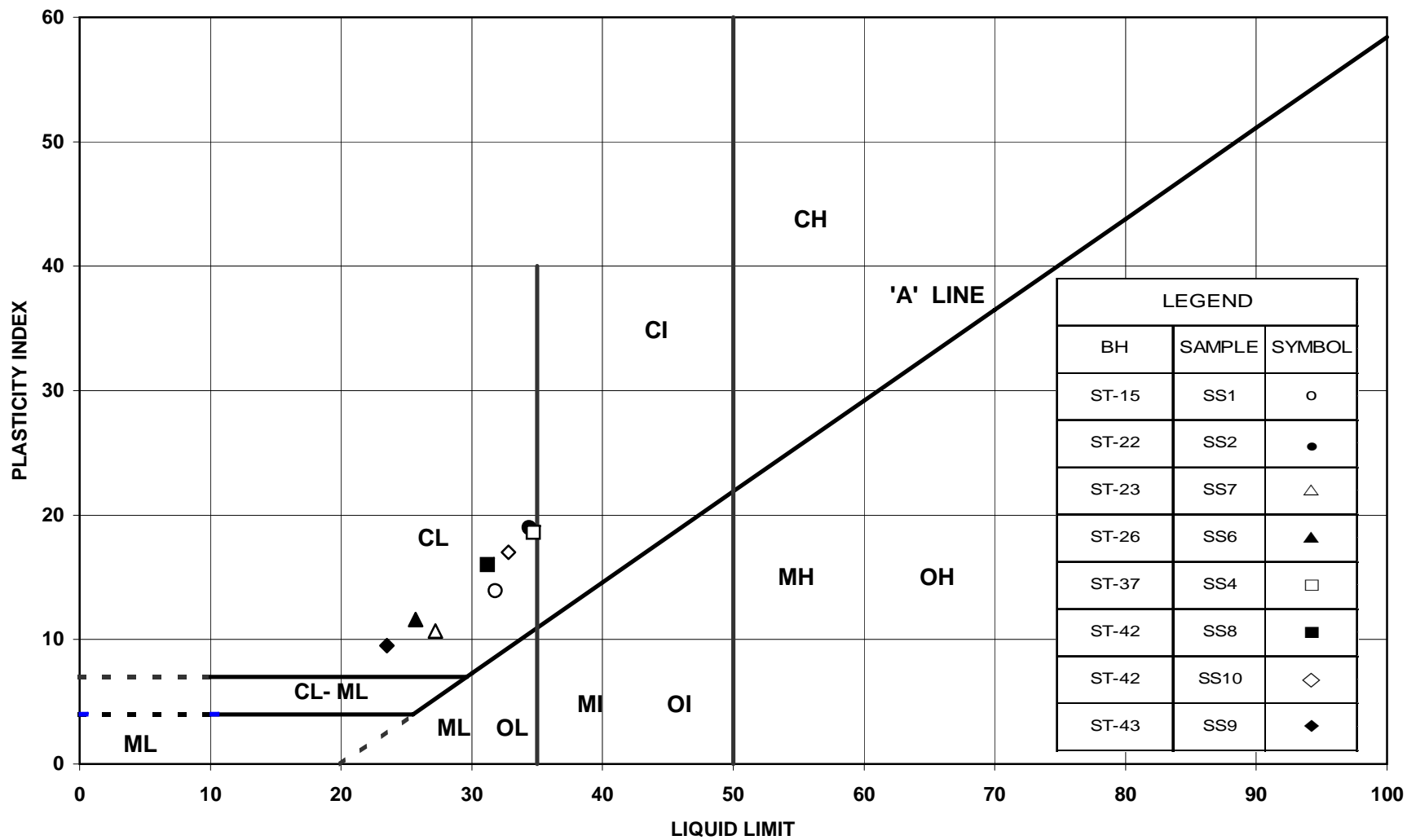
1 OF 1

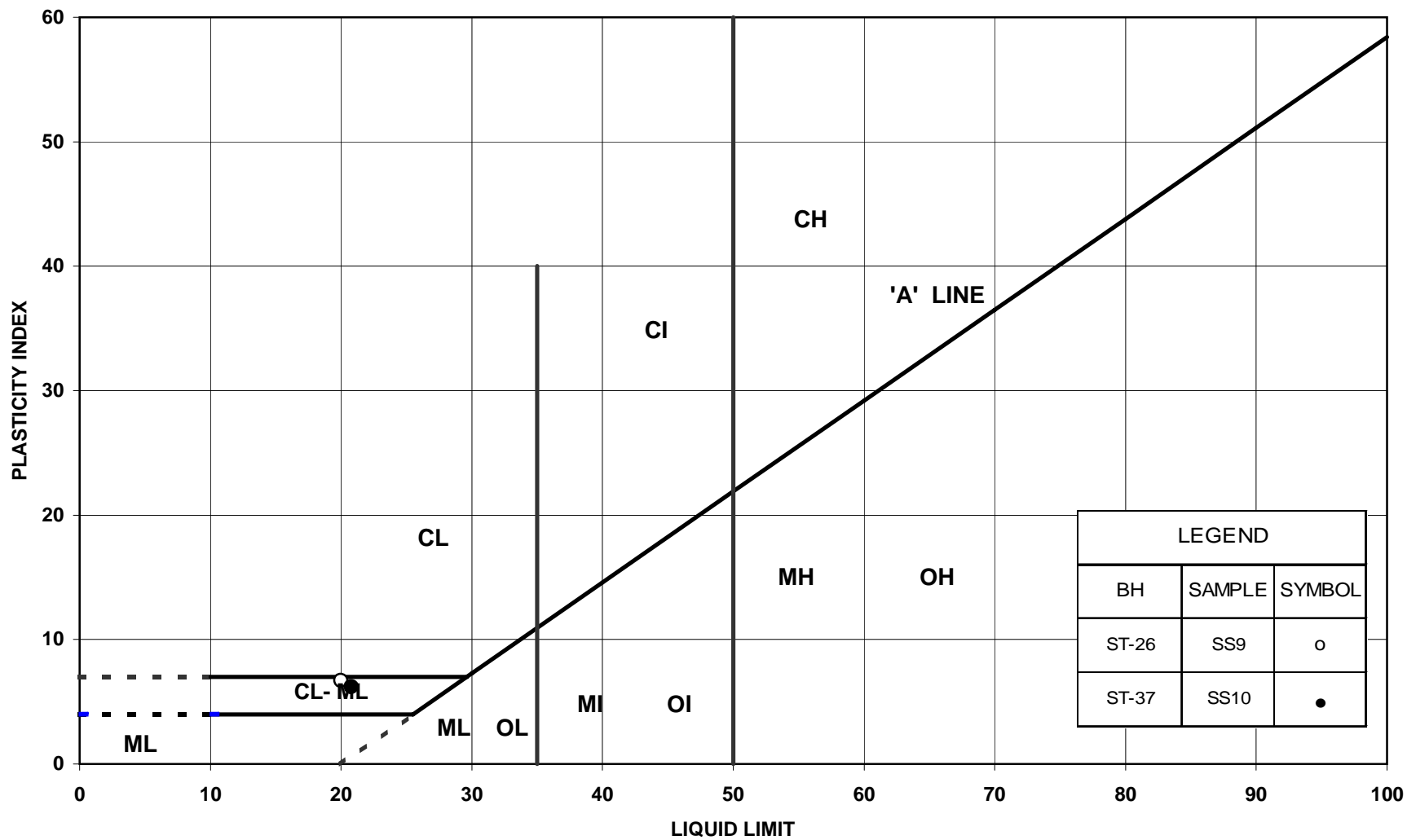
G.W.P. 5377-02-00 LOCATION HWY 522, Mowat Township, Co-ords: 5086542 N; 221735 E ORIGINATED BY JF  
 DIST 54 HWY 69 BOREHOLE TYPE Test Pit COMPILED BY SN  
 DATUM Geodetic DATE 2 February 2006 CHECKED BY IH  
 PROJECT Highway 69 Route Selection Study, from 3.5 km North of HWY 559 to 3.8 km North of HWY 522 JOB NO. TT53126

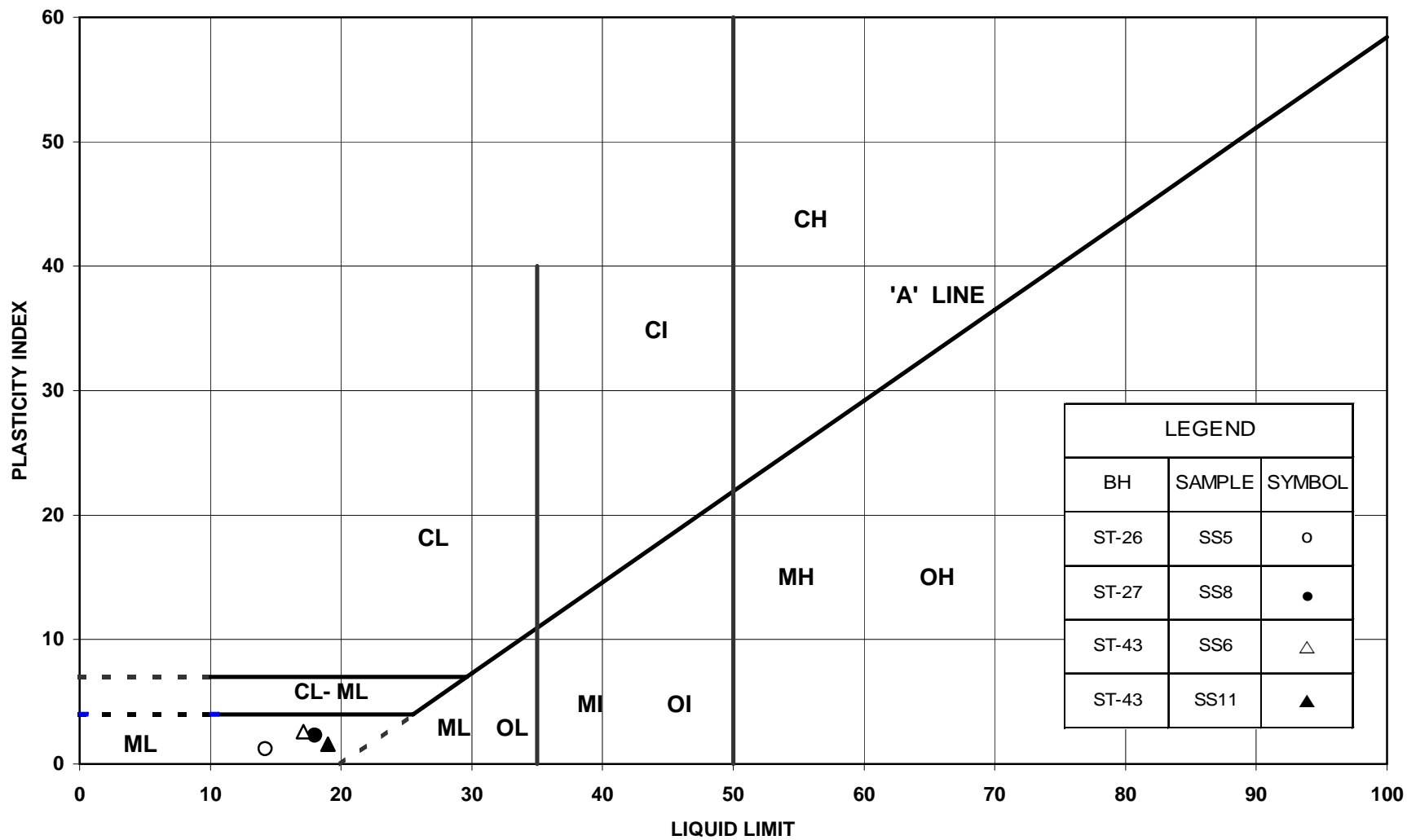
SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DEPTH m	ELEVATION SCALE m	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT w <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w <sub>L</sub>	UNIT WEIGHT γ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL		
ELEV DEPTH (m)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES				SHEAR STRENGTH kPa							WATER CONTENT (%)	
									○ UNCONFINED	+ FIELD VANE						● QUICK TRIAXIAL	× LAB VANE
184.3																	
0.0	about 300 mm TOPSOIL mixed with peat dark brown, moist		1	GS	-												
184.0	SILTY CLAY trace sand and gravel in GS1 & GS2 brown, high plasticity, moist CH		2	GS	-												
0.3																	
			3	GS	-												
182.3																	
2.0	SILTY SAND brown, wet		4	GS	-												
181.9																	
2.4	End of Test Pit  Refusal to excavation at 2.4 m depth due to bedrock  No noticeable groundwater in open test pit on completion  ST-45 (TP) was excavated 11 m south of ST-45.																

## **APPENDIX D**

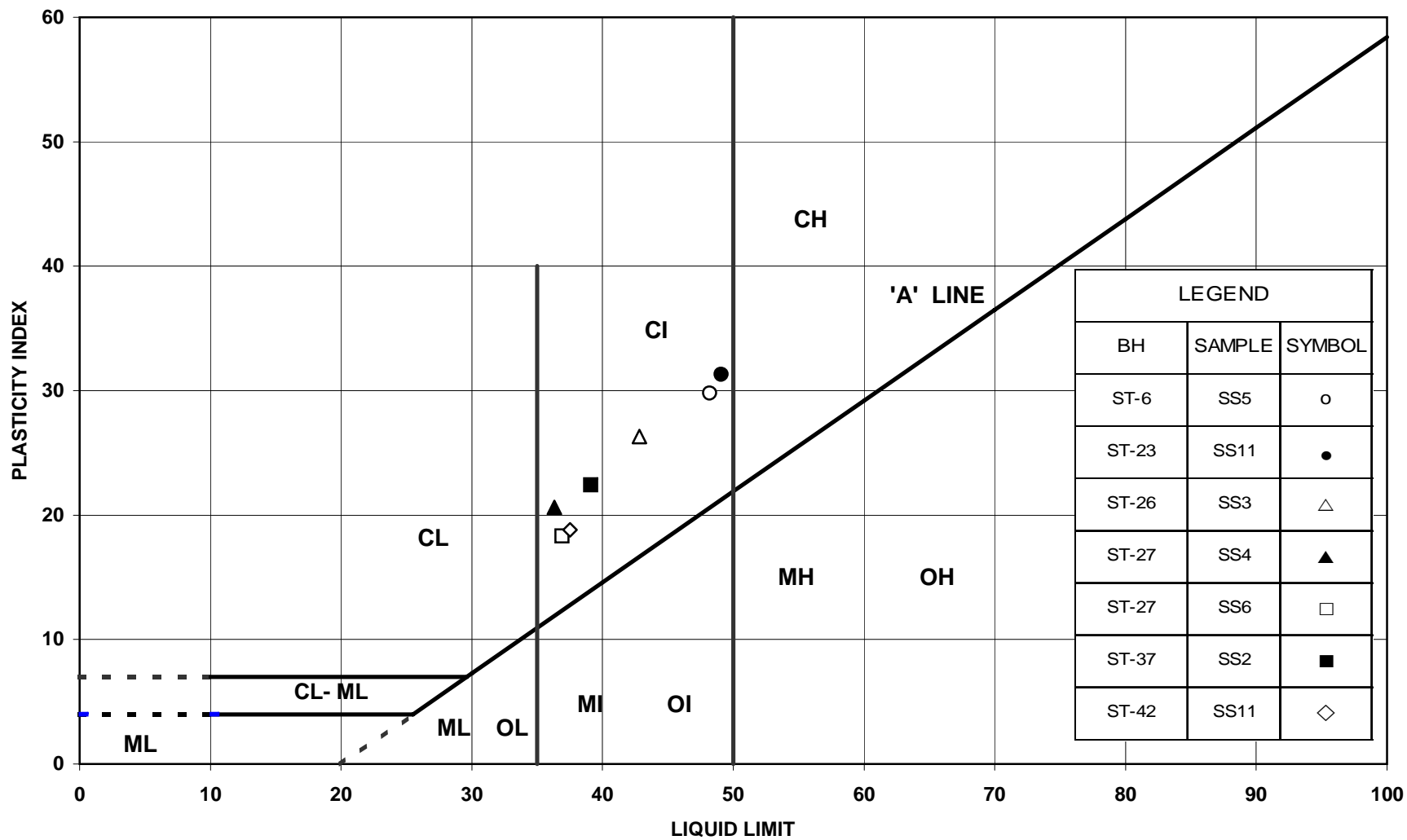
### **LABORATORY TEST RESULTS**

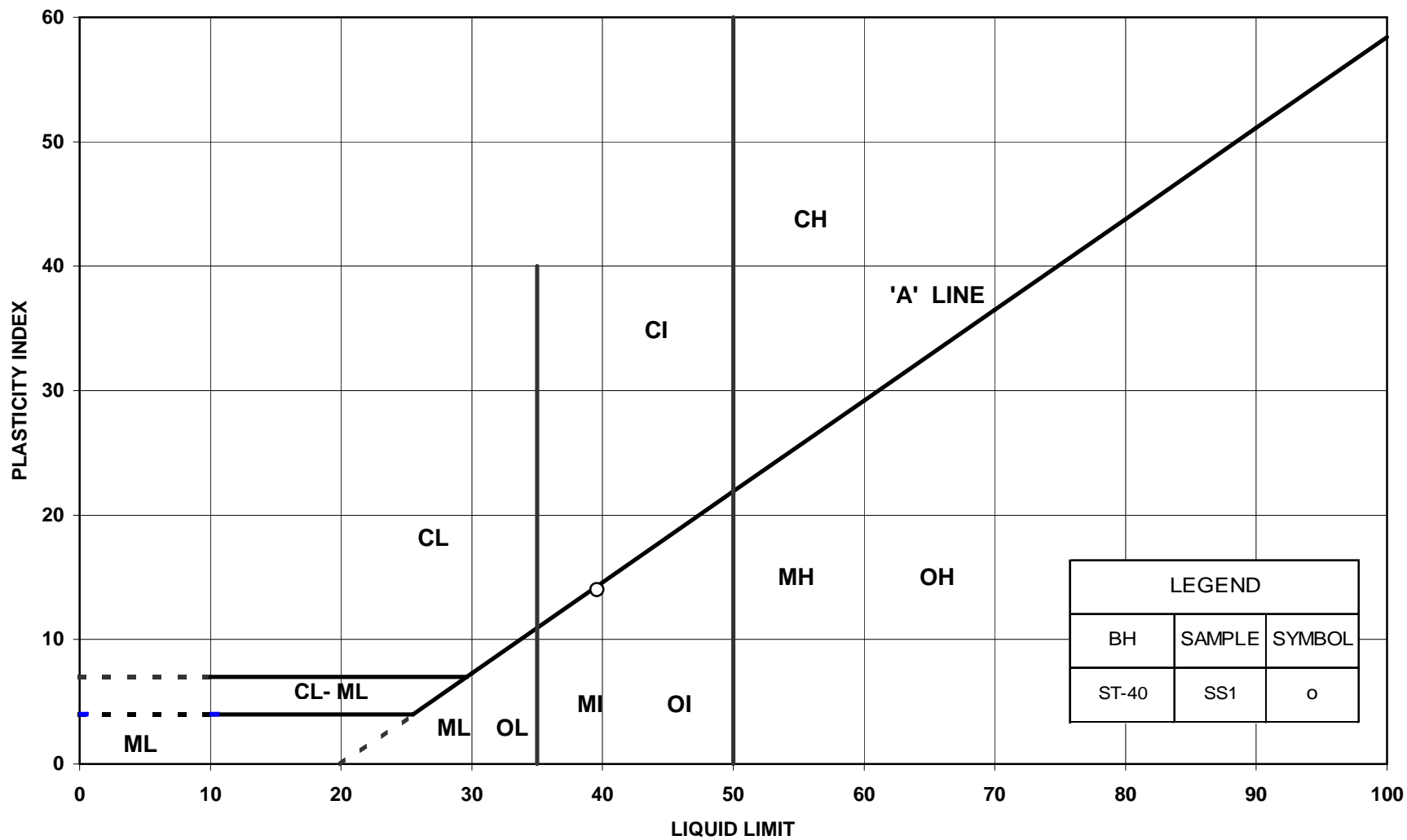


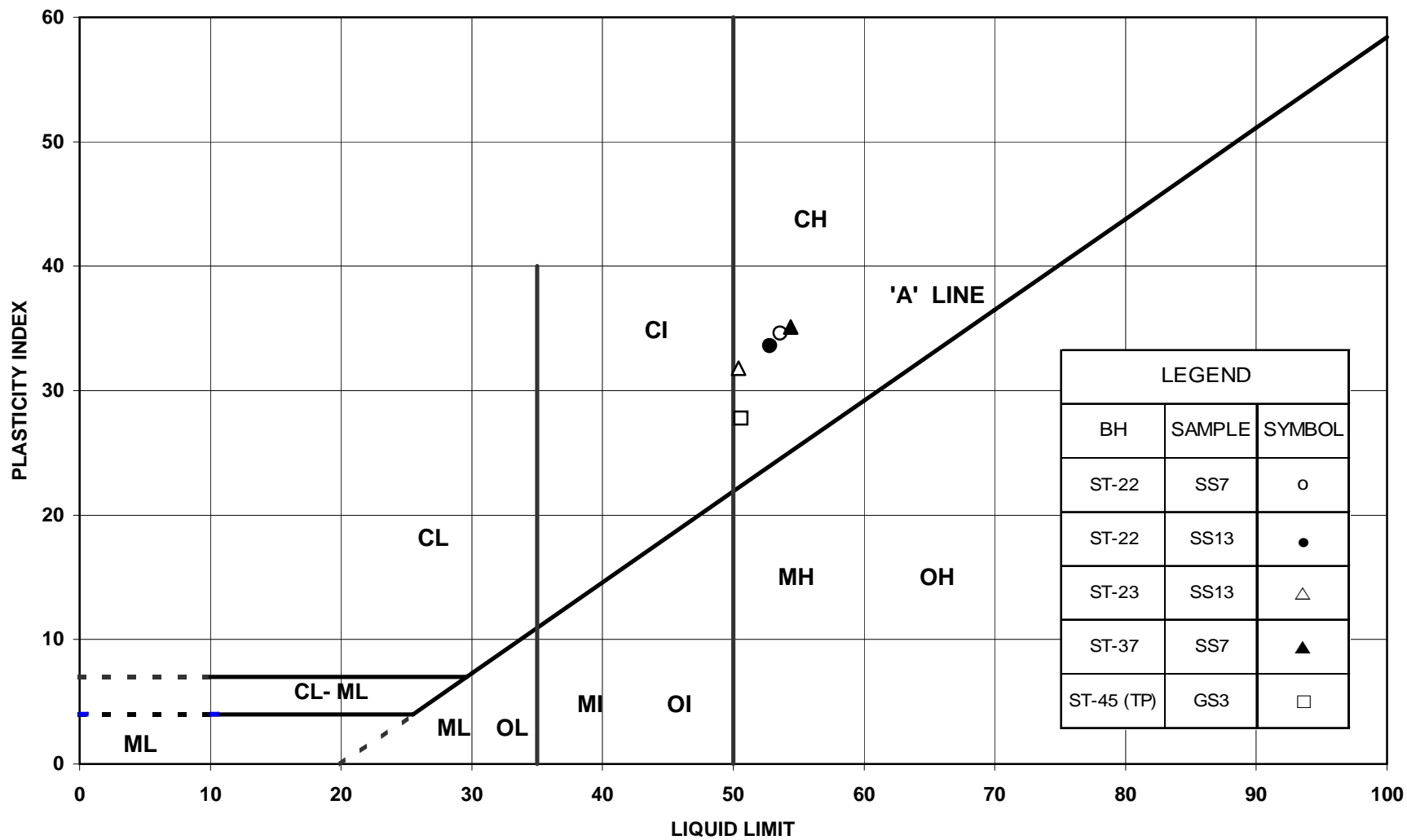


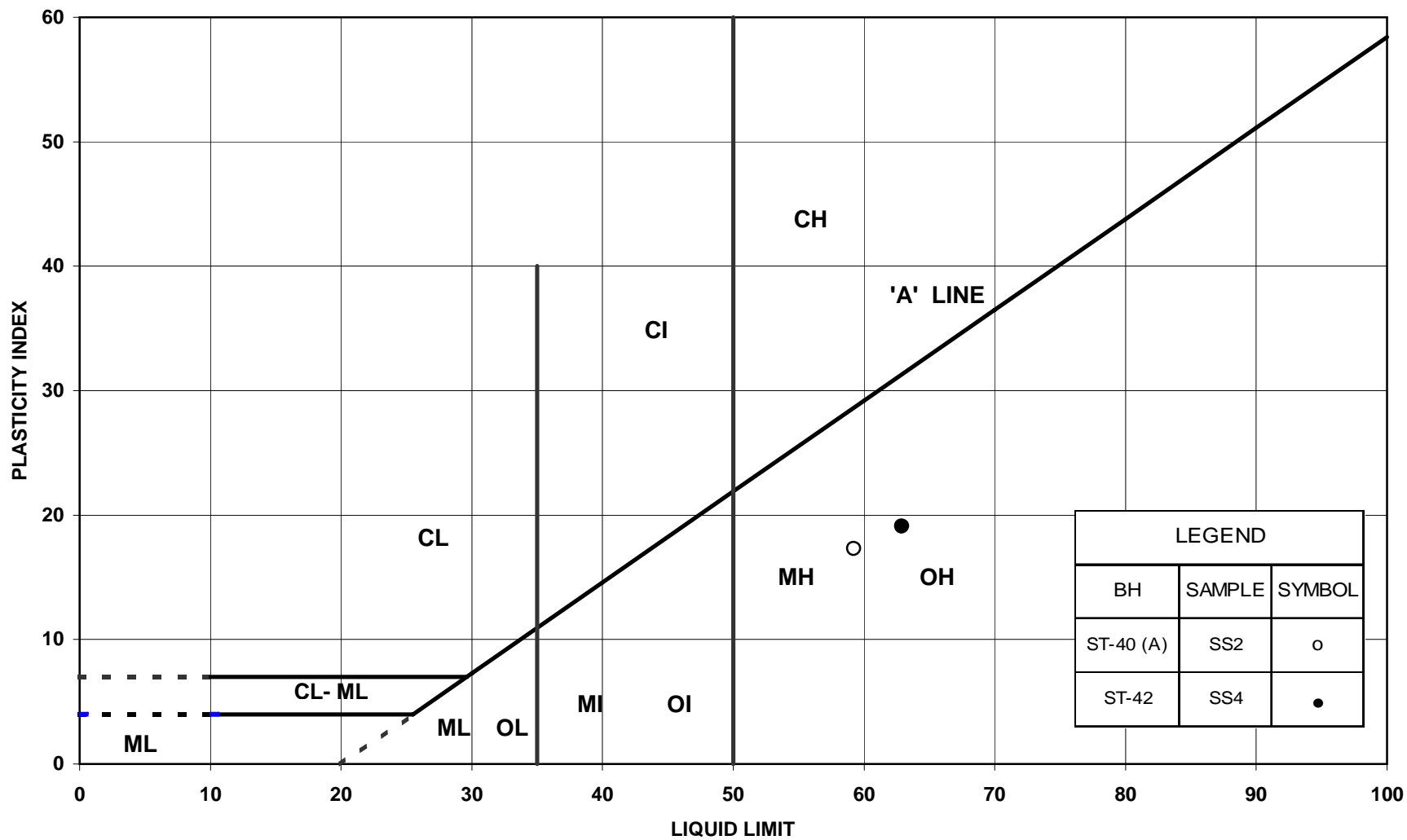






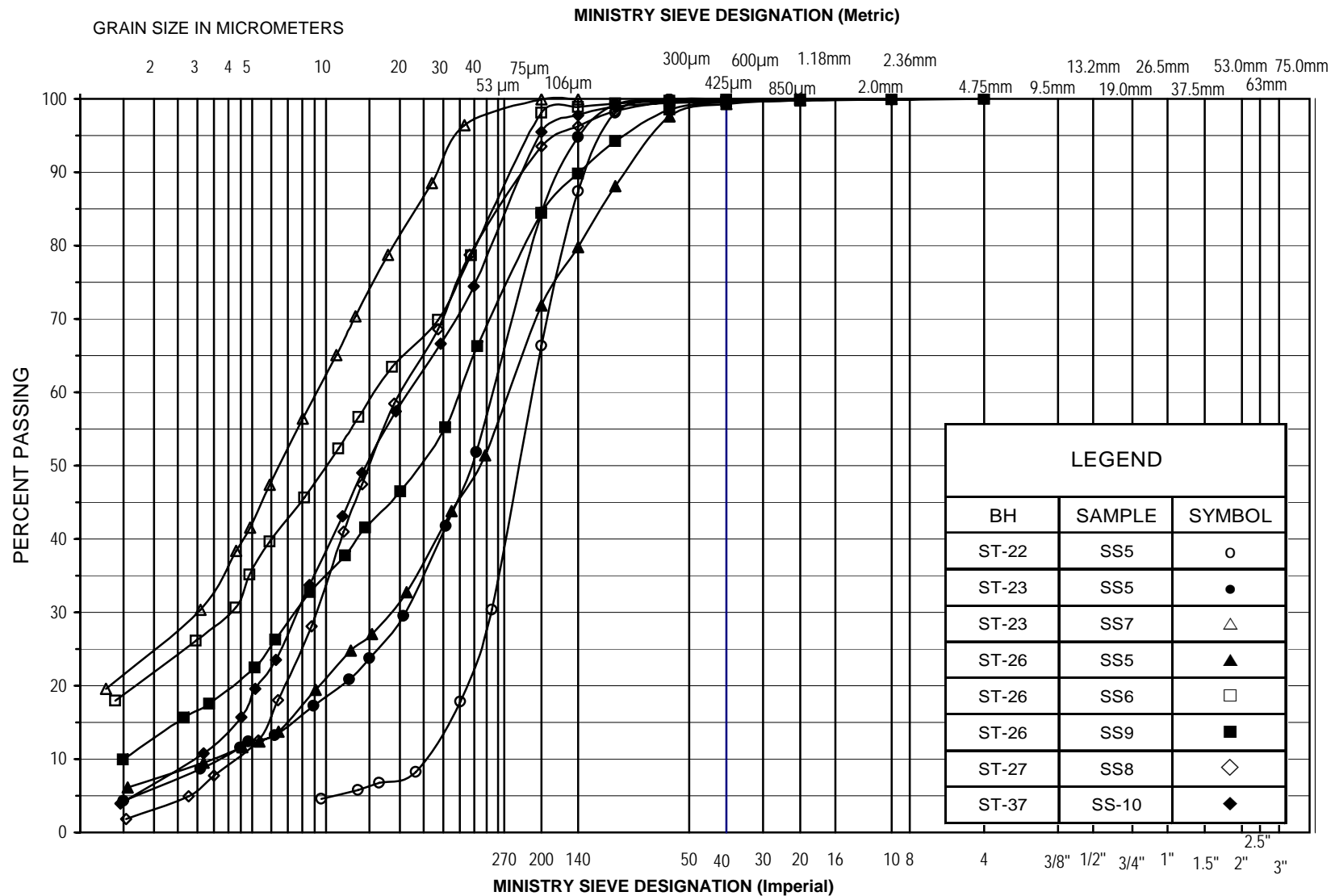






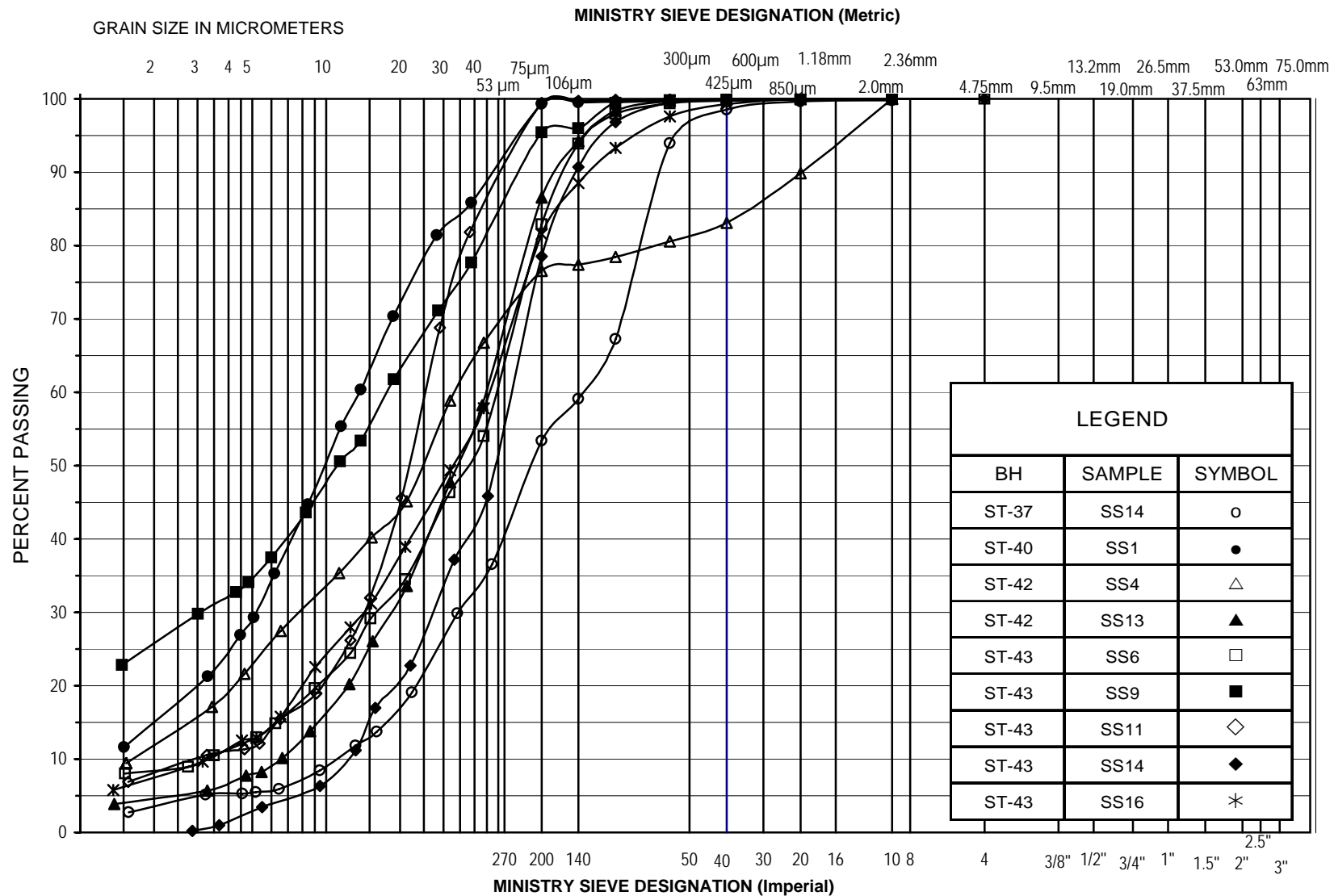
# UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY & SILT	SAND			GRAVEL	
	Fine	Medium	Coarse	Fine	Coarse



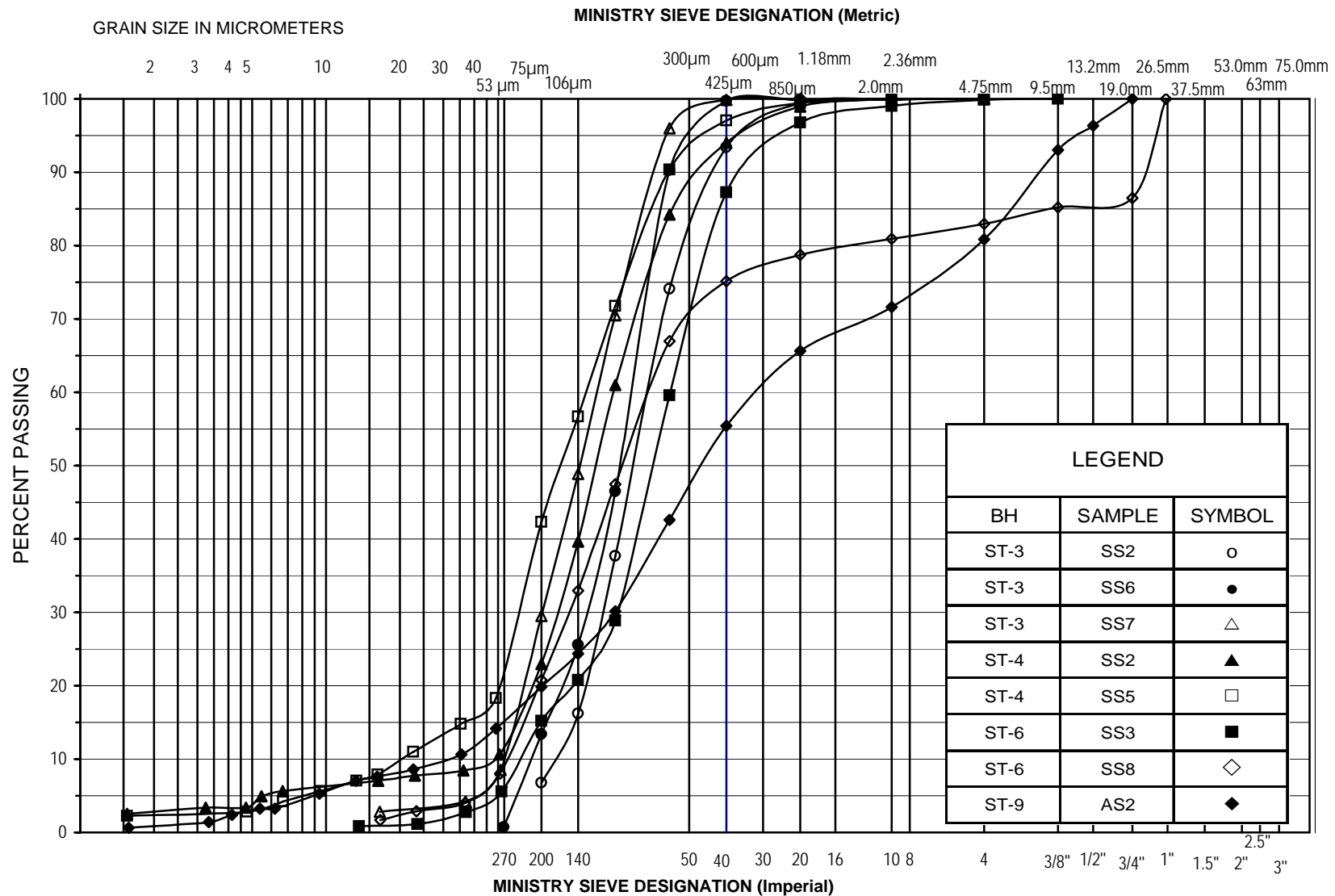
# UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY & SILT	SAND			GRAVEL	
	Fine	Medium	Coarse	Fine	Coarse



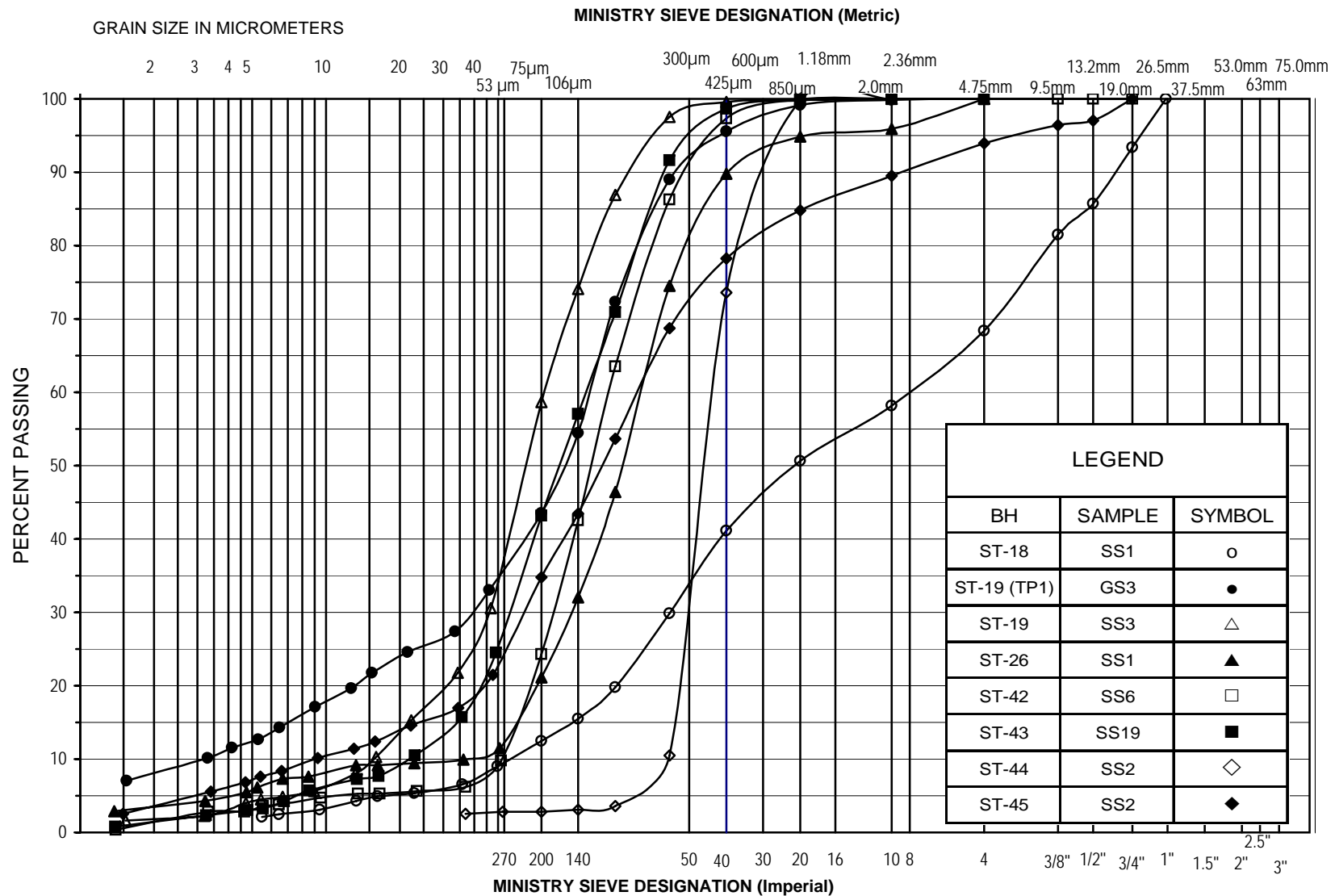
# UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY & SILT	SAND			GRAVEL	
	Fine	Medium	Coarse	Fine	Coarse



# UNIFIED SOIL CLASSIFICATION SYSTEM

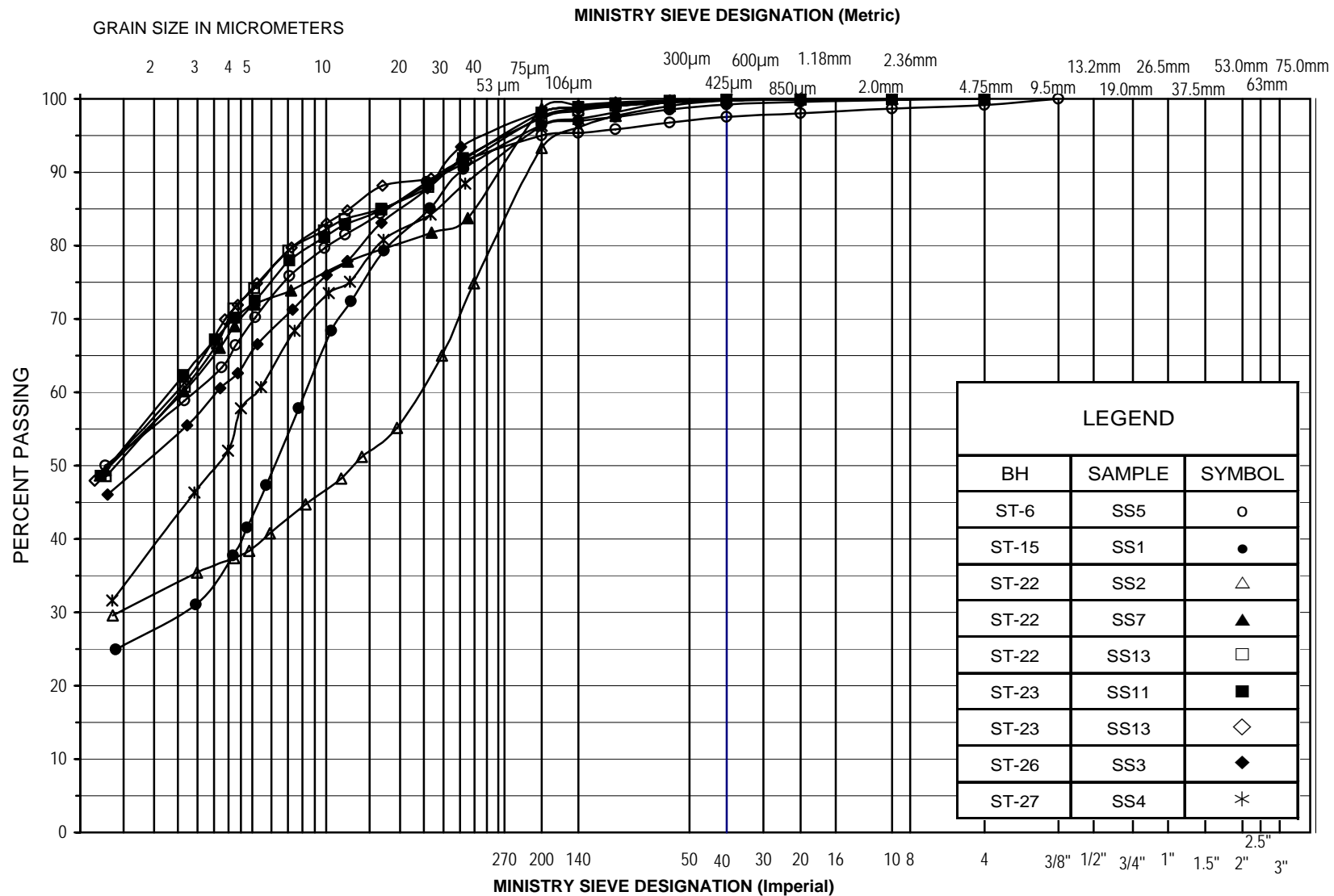
CLAY & SILT	SAND			GRAVEL	
	Fine	Medium	Coarse	Fine	Coarse





# UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY & SILT	SAND			GRAVEL	
	Fine	Medium	Coarse	Fine	Coarse



# UNIFIED SOIL CLASSIFICATION SYSTEM

CLAY & SILT	SAND			GRAVEL	
	Fine	Medium	Coarse	Fine	Coarse

