

**FOUNDATION  
INVESTIGATION  
REPORT**

**Contract 2004-5114**



# MERLEX ENGINEERING LTD.

CONSULTING GEOTECHNICAL ENGINEERS

## FINAL FOUNDATION INVESTIGATION REPORT (FIR)

Highway 518  
From 4.0 km East of Highway 69, Easterly 4.2 km  
M.T.O. District 52, Huntsville  
W.P. 85-89-00

MEL Ref. No.: 00/03/0012

July 2000

Prepared For:

Triton Engineering Services Limited  
18 Robb Boulevard, Unit 8  
Orangeville, Ontario  
L9W 3L2



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Merlex Reference No. 00/03/00012

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Submitted to

Triton Engineering Services Limited  
18 Robb Boulevard, Unit 8  
Orangeville, Ontario  
L9W 3L2

Prepared by  
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## **1.0 INTRODUCTION**

Merlex Engineering Ltd. has been retained by Triton Engineering Services Limited under TPM Agreement No. PO 5005-A-000096 to carry out a foundation investigation along the proposed re-alignment of Highway 518. The affected section of Highway 518 is located some 4.0 km east of Highway 69. The location of the proposed realignment is shown in plan on Figure 1.

The purpose of the investigation was to determine the subsurface conditions at fill locations along the proposed realignment (designated Areas 1 to 5, inclusive) by drilling boreholes, carrying out in-situ tests, including dynamic cone penetration tests, and performing laboratory tests on selected samples. Based on an interpretation of the data obtained, recommendations for the foundation engineering aspects of embankment fill design are provided.

The plan of the proposed Highway 518 alignment was provided to Merlex Engineering Ltd. (MEL) by Triton Engineering Services Limited. It is understood the profile was based on geometric criteria to bring this roadway to a RLU 80 design standard in the five areas requiring foundation investigation. The centreline and stations of the proposed alignment were surveyed by Simpson Osburne Surveyors prior to commencing the foundation investigation program. The terms of reference for the scope of work are outlined in the RFP and Merlex's proposal (P-99-105 dated January 11, 2000) which form part of the consultant's agreement for this project. The work on this project was carried out in accordance with Merlex's Quality Control Plan dated March 1, 2000.

## **2.0 SITE DESCRIPTION**

The project area covered by this foundation report extends along the proposed re-alignment of Highway 518, from approximately Station 14+300 (some 4.0 km east of Hwy 69) to Station 17+600, in the Township of Foley. The project is divided into five areas (designated Areas 1 to 5, inclusive) as shown on Figures 2. The overall project length is 4.2 km and extends beyond Area 5.

The proposed construction consists of minor fill and cut adjustments to the vertical profile in Areas 1 and 2, with fills of some 1.5 m to 6.0 m in Areas 3 to 5. The area locations and field investigation program are summarized in Table 1.

### **3.0 INVESTIGATION PROCEDURES**

The field work for this investigation was carried out from March 20 to 24, 2000. A total of 27 boreholes and 5 auger probes were advanced, generally with adjacent dynamic cone penetration tests, along the proposed realignment.

A summary of the field investigation program is shown on Table 1. The investigated locations are shown in plan and profile on Figures 3 to 7.

Boreholes and auger probes put down during this investigation were advanced using a track mounted CME drill rig. The boreholes were advanced using 170 mm outside diameter continuous flight hollow stem augers. Soil samples were obtained at regular intervals of depth, ranging from 0.75 m to 1.5 m, with a 50 mm O.D. split spoon sampler driven into the soil according to the specifications of the Standard Penetration Test (ASTM D1586). In cohesive deposits, the in-situ undrained shear strength was measured with a standard MTO field vane and torque meter. A 50 mm O.D. thin walled open shelby tube sampler was used at the location of Borehole 10 to obtain relatively undisturbed samples of the cohesive soil. Generally, the boreholes were drilled or attempted to be drilled to a depth equal to the height of fill. At the majority of the borehole locations, a dynamic cone penetration test was advanced to practical refusal, or generally to a depth 1.5 m greater than the depth of the nearest borehole. The groundwater conditions in the open boreholes were observed during drilling operations and are described on the enclosed Record of Boreholes.

The field work was under the full time supervision of a senior member of our engineering staff who was responsible for locating the boreholes, sampling and in-situ testing operations, logging the boreholes, examination and transport of soil samples plus overall drill supervision. Soils samples were identified in the field and placed in labeled air tight containers for transport to our



North Bay laboratory. One shelby tube sample was wax sealed in the field and shipped to the Mississauga laboratory of Golder Associates for consolidation testing. The laboratory testing on other representative samples consisted of natural water content determinations, Atterberg limits, and grain size analysis, which were carried out at MEL's North Bay laboratory. The results of laboratory tests are given on the Record of Boreholes and are summarized in Table 2.

The locations of the boreholes were established by the firms of Triton Engineering Services Limited and Simpson Osborne Surveying. Elevations contained in this report are referenced to geodetic datum.

#### **4.0 SUBSURFACE CONDITIONS**

The subsurface conditions encountered at the borehole locations are presented on the Record of Borehole sheets, along with the laboratory test results. The stratigraphic boundaries indicated on the Records of Borehole are inferred from non-continuous sampling, observations taken during drilling, the results of Standard Penetration Tests (SPT's), and dynamic cone penetration resistance test values. The boundaries between various strata shown on the Record of Borehole generally represent transition from one soil type to another and should not be regarded as exact planes of geological change. Furthermore, subsurface conditions will vary between and beyond the borehole locations.

In general, the subsurface conditions consist of silts and silty sands frequently overlain with a thin accumulation of peat, except in Area 2 where a soft to firm silty clay deposit was encountered below the peat or sandy deposits.

Laboratory test results for the predominant soil types are included in Appendix A. The laboratory testing was carried out in accordance with ASTM standards.

A general summary of the subsurface conditions at each of the areas is as follows.

#### **4.1 Area 1: Township of Foley, Station 14+300 to 14+450**

Area 1 is shown in plan and profile on Figure No. 3. Boreholes 00-1, 00-2, 00-2A, 00-3 and 00-4 were placed on left side of the existing highway embankment in this area. The subsurface conditions in this area consisted of a surficial layer of fine fibrous peat, occasionally mixed with silt and sand, underlain by a fine or silty fine sand, except at Borehole 00-4. At Borehole 00-4, a thin layer of sand overlies a 700 mm thick layer of reddish brown, stiff, silty clay extending to a depth of some 1.4 m. At this depth, the silty clay was underlain by a silty sand changing to a medium fine sand with depth. Based on SPT 'N' values and dynamic cone penetration resistance test values, the relative density of the silty sand deposit varied from loose to dense with depth, being generally compact. At borehole 00-03, below a 0.7 m thick surficial layer of clay fill, silty sand and sand, generally compact, was encountered to the depth of auger refusal at a depth of 4.7 m below grade. At boreholes 00-01 and 00-02, in-situ vane tests in the fine fibrous peat deposit gave undrained shear strength values ranging from 18 to 40 kPa. The natural moisture content in the peat was in the order of 80%. All these boreholes were advanced to auger refusal, which varied between 3.0 to 4.7 m below grade. At Borehole 00-01, the dynamic cone advanced some 1.7 m beyond auger refusal, indicating auger refusal was probably met on a boulder. However, at Boreholes 00-02 and 00-04, auger refusal was met at a depth similar to the dynamic cone refusal depth, which probably indicates refusal on bedrock.

#### **4.2 Area 2: Township of Foley, Station 14+550 to 15+000**

Area 2 is shown in plan and profile on Figure No. 4. Throughout this area, Boreholes 00-05 to 00-14, inclusive were advanced along with dynamic cone penetration tests offset generally 1 m to 2 m from the borehole location.

A peat deposit or granular fill overlying the peat deposit was encountered at all boreholes in this area except in Borehole 00-12 where a thin layer of black organic silt was penetrated from ground surface to a depth of 350 mm, and in Borehole 00-13 where silty sand fill was underlain by native granular materials, not peat.

The thickness of peat varied, being up to 4 - 5 m at Boreholes 00-05, 00-10, and 00-14, and slightly less at the other borehole locations, where present. Frequently, the peat was intermixed, at the surface, with the overlying granular fill. The results of in-situ undrained shear strength measurements in the peat deposit are plotted on Figure 8. The natural moisture content of the peat varied from approximately 40% to 480%; however, the majority of values were between 140% and 380%, as shown on Figure 9.

In the western part of this area, the peat was underlain by sand or silty sand extending to the depth of auger refusal.. However, east of approximately Station 14+900, the peat was underlain by a grey silty clay in Boreholes 00-10, 00-11, 00-12 and 00-14. The in-situ undrained shear strength of the silty clay deposit ranged between 18 kPa and 43 kPa, as shown on Figure 10. Atterberg limit tests on the silty clay are plotted on Figure A-1. The majority of samples classify as CL ( clayey silt, or clay of low plasticity) with the lower portion of the clay in Borehole 00-10 being CH ( clay of high plasticity).

Underlying the clayey silt - clay deposit, a grey silty sand was penetrated in all boreholes except Borehole 00-12 where refusal was encountered in the clay at a depth of 4.8 m (at about elevation 191.1 m). The silty sand deposit was also encountered under the peat in Boreholes 00-05, 00-06 and 00-08. SPT 'N' values in the silty sand deposit ranged from weight of hammer to 8 blows/30 cm, indicating the deposit to be very loose to loose.. The corresponding dynamic cone penetration resistance test values were slightly higher.

A summary of the geotechnical data from this area is contained on Figure 4. Detailed descriptions are contained on the Record of Boreholes 00-05 to 00-14 inclusive.

#### **4.3 Area 3: Township of Foley, Station 15+850 to 15+975**

A plan and profile showing the stratigraphy for Area 3 is shown on Figure No. 5.

Detailed descriptions of the soil types encountered in the individual boreholes are shown on the Record of Boreholes No. 00-15 to 00-17.

At the location of Borehole 00-15, a surficial layer of black organic silt was penetrated to a depth of approximately 100 mm. This material was underlain by a brown to brownish yellow fine sand with silt and a trace of gravel, occasional cobbles and boulders. Refusal to further penetration of the augers was met at a depth of 1.3 m below grade (about elevation 254.9). A dynamic cone penetration resistance test, at an offset of approximately 1.0 m south of the borehole, was driven through dense materials, meeting refusal at a depth of 3.7 m (elevation 252.6).

At the location of Borehole 00-16, a surficial deposit, some 1.1 m thick, of black sandy peat was penetrated. This deposit was underlain by a brown fine and medium sand with a trace of silt,

gravel and occasional cobbles and boulders. The SPT 'N' value in the sand was 50+ blows/0.3 m, indicating it to be dense to very dense. Underlying this dense sand deposit, a grey fine sand with some silt was penetrated to auger refusal at 3.8 m below grade. The measured SPT 'N' values of 19 blows/0.3 m and 30 blows/0.3 m indicate this deposit to be compact to dense.

At Borehole 00-17, 100 mm of silty sand with organics was penetrated at the surface, underlain by a brown fine to medium sand, with trace of gravel and silt. Auger refusal was met at a depth of 1.0 m below grade. Two additional auger probes were put down in the vicinity of Borehole 00-17 and met refusal, probably on bedrock, at depths of 0.9 m and 1.0 m below grade.

#### **4.4 Area 4: Township of Foley, Station 16+450 to 16+600**

Boreholes 00-18 to 00-22 were put down in the vicinity of Area 4. A plan and profile showing the borehole locations and stratigraphy are shown on Figure 6.

At the location of Borehole 00-18, a 300 mm thick surficial layer of black silty topsoil was immediately underlain by a brown fine to medium sand, trace of organics, trace of silt. SPT 'N' values of about 25 blows/0.3 m indicate the sand is compact. Auger refusal was met at a depth of some 1.4 m at the borehole location. Refusal to further dynamic cone penetration resistance test advance was measured at a depth of 3.0 m below grade, some 2.0 m west of the borehole (BH 00-18).

At the location of Boreholes 00-19, 100 mm of silty organics was underlain by a brown silty fine sand in which SPT 'N' values of 8 blows/0.3 m and 14 blows/0.3 m indicate a loose to compact

state of relative density. The silty fine sand was directly underlain by a thin layer of reddish brown silty clay, some 300 mm thick. Underlying the silty clay layer, the same sand was penetrated to a depth of 3.8 m below grade. The SPT and dynamic cone penetration resistance tests suggest the silty sand is compact. The compact silty sand is underlain by a grey fine and medium sand with a trace of silt to the end of the borehole at 4.8 m below grade. Based on dynamic cone penetration resistance testing, it is estimated that this lower sand is also compact. Refusal to dynamic cone penetration was met at a depth of approximately 5.2 m below grade at a location of 1.0 m east of the borehole (BH 00-19).

At the location of Borehole 00-20, underlying a surficial layer of silty sandy organics some 200 mm thick, a brown silty sand with a trace of gravel was penetrated to a depth of approximately 0.8 m below grade. This deposit was underlain by a thin stratum of reddish brown silty clay, some 300 mm thick. Directly underlying the silty clay, a deposit of grey fine sandy silt to silt with a trace of fine sand was penetrated to a depth at which auger refusal was met (elevation 256.3 m). Interbedded with the sandy silt to silt deposit was a 600 mm thick layer of grey medium fine sand, trace of silt, trace of gravel. Based on SPT 'N' values and the dynamic cone penetration resistance values, the silt and sand deposits are estimated to be compact. Refusal to further advance of the augers and further advance of the dynamic cone penetration test was met at elevations 256.3 m and 256.2 m, respectively.

At the location of Borehole 00-21, underlying a thin 100 mm layer of crushed gravel, a brown fine to medium sand with a trace of silt and trace of gravel (fill) was penetrated to a depth of 0.7 m below grade. Based on dynamic cone penetration resistance, this deposit is estimated to be very loose. Underlying the fill, a 300 mm thick layer of black silty sand with a trace of organics was penetrated. Directly underlying the black silty sand, the predominant stratum was a yellow to grey, fine to medium sand, with trace to some silt was penetrated to 3.7 m below

grade, at which depth sampling was ended. Based on the measured SPT 'N' values, the relative density of the sand is estimated to be loose to compact. At a location some 2.0 m east of the borehole, a dynamic cone penetration test was carried out to a depth of 8.5 m, where refusal to further advance was met.

At the location of Borehole 00-22 underlying a 100 mm surficial layer of crushed gravel, a sand fill was penetrated. The sand was dark brown, fine to medium, with trace of silt, trace of gravel, trace of organics/ peat. This deposit extended to a depth of approximately 1.3 m below grade. Underlying the sand fill, a grey fine to medium sand with trace of silt and gravel was penetrated to a depth of some 3.7 m below grade at which the sampling was discontinued. Based on the measured SPT "N" values of 2 - 5 blows/0.3 m, and the corresponding dynamic cone penetration resistance test values, the sand deposit is considered to be very loose to compact. Refusal to further advance of a dynamic penetration test, some 2.0 m east of the borehole, was met at a depth of about 5.6 m below grade.

#### **4.5 Area 5: Township of Foley, Station 17+500 to 17+600**

Boreholes 00-23 to 00-25 inclusive were put down in Area 5. A plan and profile showing the stratigraphy for Area 5 is shown on Figure 7.

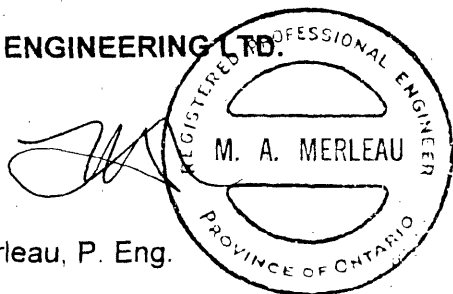
At the location of Boreholes 00-23, a deposit of peat was penetrated to a depth of some 900 mm below grade. Directly underlying the peat, a grey fine to medium sand with a trace of silt was penetrated for a depth of some 150 mm at which refusal to further advance of the augers was met. Refusal to further dynamic cone advance was met at a depth of some 1.4 m below grade at a distance some 2.0 m east of the borehole. Based on drill reaction and geological features in the area, it is estimated that refusal was probably met on bedrock.

At the location of Borehole 00-24, a brown fibrous peat was penetrated to a depth of some 1.3 m below grade. The peat was underlain by a grey fine to medium sand, trace of silt and gravel, to a depth of some 2.7 m below grade. Based on one SPT 'N' value of 5 blows/0.3 m and the results of the dynamic cone penetration resistance testing, it is estimated that this deposit is generally loose. Underlying the sand, at a depth of some 2.7 m below grade, a grey silty fine sand with a trace of gravel and clay was encountered to a depth of some 4.1 m below grade. Based on dynamic cone penetration resistance test values, it is estimated the silty sand is in a compact state of relative density. Underlying the silty sand, a deposit of silty clay was penetrated to some 5.0 m below grade. The consistency of the silty clay stratum is estimated to be firm to stiff, based on tactile examinations. Underlying the silty clay deposit, a fine sand with a trace of gravel was penetrated to a depth of 6.1 m below grade where sampling was ended. Refusal to further dynamic cone advance was met at a depth of some 6.5 m below grade at a location of some 2.0 m north of Borehole 00-24.

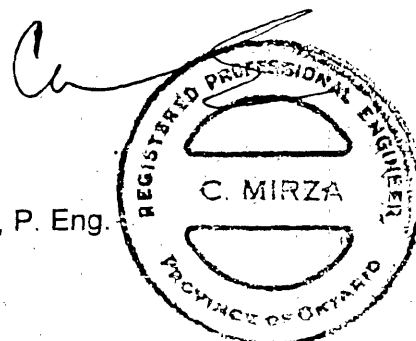
At the location of Borehole 00-25, a black peat deposit was penetration to a depth of some 0.6 m below grade. This deposit was underlain by a grey silty fine sand, trace gravel, to a depth of some 1.0 m below grade where refusal to further advance of the augers was met. Refusal to further dynamic cone advance was met at a similar depth at a location some 1.0 m west of Borehole 00-25.

MERLEX ENGINEERING LTD.

M. A. Merleau, P. Eng.  
Principal



C. Mirza, P. Eng.





## LIST OF ABBREVIATIONS & DESCRIPTION OF TERMS

The abbreviations and terms commonly employed on the borehole logs, on the figures and in the report are as follows:

### 1. ABBREVIATIONS

AS	Auger Sample
CS	Chunk Sample
DO	Drive Open
DS	Denison type sample
FS	Foil Sample
HB	Hammer Bouncing
PH	Sampler advanced by hydraulic pressure
PM	Sampler advanced by manual pressure
RC	Rock core with size & percentage of recovery
SS	Split Spoon
ST	Slotted Tube
TO	Thin-walled, open
TP	Thin-walled, piston
WH	Sampler Advanced by static weight (weight of hammer/rods)
WS	Wash Sample

### 2. PENETRATION RESISTANCE/"N"

*Dynamic Cone Penetration Test (DCPT):*

A continuous profile showing the number of blows for each 300 mm of penetration of a 50 mm diameter 90° point cone driven by a 63 kg hammer falling 760 mm.

Plotted as —●—●—●—●—

*Standard Penetration Test (SPT) or "N" Values*

The number of blows of a 63 kg hammer falling 760 mm required to advance a 50 mm O.D. drive open sampler 300 mm.

### 3. SOIL DESCRIPTION

a) *Cohesionless Soils:*

"N" (blows/0.3 m)	Relative Density
0 to 4	very loose
4 to 10	loose
10 to 30	compact
30 to 50	dense
over 50	very dense

### 3. SOIL DESCRIPTION (Cont'd)

b) *Cohesive Soils:*

Undrained Shear Strength (kPa)	Consistency
Less than 12	very soft
12 to 25	soft
25 to 50	firm
50 to 100	stiff
100 to 200	very stiff
over 200	hard

c) *Method of Determination of Undrained Shear Strength of Cohesive Soils:*

+ 3.2 - Field Vane test in borehole.  
The number denotes the sensitivity to remoulding.

D - Laboratory Vane Test

" - Compression test in laboratory

For a saturated cohesive soil the undrained shear strength is taken as one-half of the undrained compressive strength.

### 4. TERMINOLOGY

Terminology used for describing soil strata is based on the proportion of individual particle sizes present:

Trace, or occasional	Less than 10%
Some	10 to 20%
With	20 to 30%
Adjective (i.e. silty or sandy)	30 to 40%
And (i.e. sand and gravel)	40 to 60%

### 5. LABORATORY TESTS

P	Standard Proctor Test
A	Atterberg Limit Test
GS	Grain Size Analysis
H	Hydrometer Analysis
C	Consolidation

ENCLOSURE NO.:

**METRIC**

# RECORD OF BOREHOLE No. 00-1

1 OF 1



REFERENCE 00/02/0012

DATUM Geodetic

LOCATION N'y 502238.238 E'y 270280.426

ORIGINATED BY ELS

PROJECT Foundation Component: GWP 85-89-00, Hwy 518

BOREHOLE TYPE CME Powered Auger

COMPILED BY JRB

CLIENT Ministry of Transportation Ontario

DATE (Started/Completed) 20/3/00 - 20/3/00

TIME 5:50:00 PM

CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	DYNAMIC CONE PENETRATION RESISTANCE PLOT				PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT  γ  kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL									
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES		ELEVATION SCALE	SHEAR STRENGTH kPa								WATER CONTENT (%)								
								○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL X LAB VANE																
201.84	Ground Surface						20	40	60	80	100	20	40	60										
0.0	PEAT							10																
201.59	Black fibrous peat		1	AS				9																
0.25	SILT																							
201.26	Grey silt trace fine sand																							
0.58	PEAT																							
	Fine fibrous peat		2	SS	WH			19																
200.01			3	SS	4																			
1.83	SAND																							
	Grey fine to medium sand trace silt trace to gravelly occasional cobbles (Compact)		4	SS	18											47 44 (9)								
			5	SS	11																			
197.83																								
4.01	Auger Refusal (Probably Boulder)																							
	End of Sampling																							
196.12																								
5.72	Refusal to further Dynamic Cone Advance																							
	End of Borehole																							
COMMENTS							+ <sup>3</sup> , X <sup>3</sup> : Numbers refer to Sensitivity				WATER LEVEL RECORDS													
1) Dynamic Cone Penetration Test advanced ±1 m west of BH No. 00-1. 2) Water levels taken in open borehole.							○ 3% STRAIN AT FAILURE				<table><tr><th>Date (dd/mm/yy)/Time</th><th>Water Depth (m)</th><th>Cave In Level (m)</th></tr><tr><td>20/3/00; 5:55:00 PM</td><td>0.20</td><td>1.52</td></tr><tr><td>21/3/00; 8:27:00 AM</td><td>0.051</td><td>0.84</td></tr></table>					Date (dd/mm/yy)/Time	Water Depth (m)	Cave In Level (m)	20/3/00; 5:55:00 PM	0.20	1.52	21/3/00; 8:27:00 AM	0.051	0.84
Date (dd/mm/yy)/Time	Water Depth (m)	Cave In Level (m)																						
20/3/00; 5:55:00 PM	0.20	1.52																						
21/3/00; 8:27:00 AM	0.051	0.84																						

MEL-GEO 00012FND.GPJ MEL-GEO.GDT 27/7/00

ENCLOSURE NO.:

## METRIC

## RECORD OF BOREHOLE No. 00-2

1 OF 1



REFERENCE 00/02/0012 DATUM Geodetic LOCATION N'y 5022263.609 E'y 270318.443 ORIGINATED BY ELS  
 PROJECT Foundation Component: GWP 85-89-00, Hwy 518 BOREHOLE TYPE CME Powered Auger COMPILED BY JRB  
 CLIENT Ministry of Transportation Ontario DATE (Started/Completed) 21/3/00 - 21/3/00 TIME 8:54:00 AM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	"N" VALUES								
199.86	Ground Surface												
0.0	PEAT												
	Black fibrous peat												
199.19													
0.67	SILTY SAND												
198.89													
0.97	Grey silty fine sand		1	SS	31								
	(Compact) SAND												
	Grey fine and medium sand some silt, occasional cobbles and boulders		2	SS	20								
	(Compact to Dense)												
			3	SS	47								
196.91													
2.95	Auger Refusal												
	Refusal to further Dynamic Cone Advance												
	End of Borehole												
COMMENTS								WATER LEVEL RECORDS					
1) Dynamic Cone Penetration Test advanced ±1 m east of BH No. 00-2.								Date (dd/mm/yy)/Time			Water Depth (m)		
2) Water levels taken in open borehole.								21/3/00; 9:00:00 AM			0.20		
											Cave In Level (m)		
											0.61		

MEL-GEO 00012FND.GPJ MEL-GEO.GDT 27/7/00

ENCLOSURE NO.:

METRIC

RECORD OF BOREHOLE No. 00-2A

1 OF 1



REFERENCE 00/02/0012 DATUM Geodetic LOCATION N'ly 5022258.286 E'ly 270326.236 ORIGINATED BY ELS  
PROJECT Foundation Component: GWP 85-89-00, Hwy 518 BOREHOLE TYPE Hand Operated Auger COMPILED BY JRB  
CLIENT Ministry of Transportation Ontario DATE (Started/Completed) 21/3/00 - 21/3/00 TIME \_\_\_\_\_ CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT $\gamma$	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40	60	80	100	W <sub>p</sub>	W	W <sub>L</sub>		
202.05	Ground Surface																
201.89	ORGANICS																
0.16	Black silty organics		1	AS													
	SILTY SAND																
	Brown silty fine sand some clay																
200.83																	
1.22	SAND																
	Fine sand trace to some silt																
200.22			2	AS													
1.83	End of Borehole																
COMMENTS								+ <sup>3</sup> , X <sup>3</sup> : Numbers refer to Sensitivity  ○ 3% STRAIN AT FAILURE					WATER LEVEL RECORDS			Cave In Level (m)	
													Date (dd/mm/yy)/Time	Water Depth (m)			

MEL-GEO 00012FND.GPJ MEL-GEO.GDT 27/7/00

ENCLOSURE NO.:

**METRIC**

**RECORD OF BOREHOLE No. 00-3**

1 OF 1



REFERENCE 00/02/0012 DATUM Geodetic LOCATION N'y 5022280.120 E'y 270372.612 ORIGINATED BY ELS  
 PROJECT Foundation Component: GWP 85-89-00, Hwy 518 BOREHOLE TYPE CME Powered Auger COMPILED BY JRB  
 CLIENT Ministry of Transportation Ontario DATE (Started/Completed) 21/3/00 - 21/3/00 TIME 10:30:00 AM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT $w_p$	NATURAL MOISTURE CONTENT $w$	LIQUID LIMIT $w_L$	UNIT WEIGHT $\gamma$	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa	WATER CONTENT (%)					
200.54 0.0	Ground Surface CLAY (FILL)		1	AS										
199.87 0.67	SILTY SAND													
199.57 0.97	Grey silty fine sand (Compact) SAND		2	SS	20									
	Grey fine and medium sand some silt to silty, some gravel, occasional cobbles and boulders (Compact/Dense)		3	SS	19									
			4	SS	13									
			5	SS	41									
195.82 4.72	Auger Refusal End of Borehole		6	SS	35									

**COMMENTS**

1) Dynamic Cone Penetration Test advanced  $\pm 1$  m east of BH No. 00-3.  
 2) Water levels taken in open borehole.

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

$\bigcirc$  3% STRAIN AT FAILURE

WATER LEVEL RECORDS		
Date (dd/mm/yy)/Time	Water Depth (m)	Cave In Level (m)
21/3/00; 10:30:00 AM	0.76	3

MEL-GEO 00012FND.GPJ MEL-GEO.GDT 27/7/00

ENCLOSURE NO.:

**METRIC****RECORD OF BOREHOLE No. 00-4**

1 OF 1



REFERENCE 00/02/0012 DATUM Geodetic LOCATION N'y 5022291.266 E'y 270424.161 ORIGINATED BY ELS  
 PROJECT Foundation Component: GWP 85-89-00, Hwy 518 BOREHOLE TYPE CME Powered Auger COMPILED BY JRB  
 CLIENT Ministry of Transportation Ontario DATE (Started/Completed) 21/3/00 - 21/3/00 TIME 11:06:00 AM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES								
205.73 0.0	Ground Surface SAND												
205.03 0.70	Black fine to medium sand some silt trace gravel		1	AS									
204.30 1.43	SILTY CLAY Reddish Brown Silty Clay (Stiff)		2	SS	17								
	SILTY SAND Fine silty sand to silt and fine sand (Compact)		3	SS	12								
202.83 2.90	SAND Fine to medium sand trace fine gravel, cobbles with depth (Compact)		4	SS	17								
			5	SS	9								
201.51 4.22	Auger Refusal Refusal to further Dynamic Cone Advance  End of Borehole												

COMMENTS		WATER LEVEL RECORDS	
1) Dynamic Cone Penetration Test advanced ±1 m east of BH No. 00-4.	+ <sup>3</sup> , × <sup>3</sup> : Numbers refer to Sensitivity	Date (dd/mm/yy)/Time	Water Depth (m)
2) Water levels taken in open borehole.	○ 3% STRAIN AT FAILURE	21/3/00; 11:47:00 AM	Dry
			Cave In Level (m)
			3.35

MEL-GEO\_00012FND.GPJ MEL-GEO.GDT 27/7/00

ENCLOSURE NO.:

**METRIC**

**RECORD OF BOREHOLE No. 00-5**

1 OF 1



REFERENCE 00/02/0012 DATUM Geodetic LOCATION N/y 5022306.340 E/y 270669.194 ORIGINATED BY ELS  
 PROJECT Foundation Component: GWP 85-89-00, Hwy 518 BOREHOLE TYPE CME Powered Auger COMPILED BY JRB  
 CLIENT Ministry of Transportation Ontario DATE (Started/Completed) 21/3/00 - 21/3/00 TIME 2:50:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT w <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40					
194.93 0.0	Ground Surface PEAT													
	Black peat trace fibrous - some silty fine sand upper 450 mm		1	AS										
			2	SS	1									
			3	SS	WH									
			4	SS	WH									
190.66 4.27	SAND													
	Grey fine to medium sand trace silt trace gravel		5	SS	WH									
189.90 5.03	(Very Loose) SILTY SAND													
	Grey silty fine sand trace gravel (Very Loose to Compact)													
188.83 6.10	End of Sampling													
186.17 8.76	Refusal to further Dynamic Cone advance End of Borehole													

COMMENTS 1) Dynamic Cone Penetration Test advanced ±1 m east of BH No. 00-5. 2) Water levels taken in open borehole.	+ <sup>3</sup> , X <sup>3</sup> : Numbers refer to Sensitivity  ○ 3% STRAIN AT FAILURE	WATER LEVEL RECORDS		
		Date (dd/mm/yy)/Time	Water Depth (m)	Cave In Level (m)
		21/3/00; 3:00:00 PM	3.66	3.96

MEL-GEO 000:2FND.GPJ MEL-GEO.GDT 2/7/7/00

ENCLOSURE NO.:		<b>METRIC</b>		<b>RECORD OF BOREHOLE No. 00-6</b>		1 OF 1			
REFERENCE 00/02/0012		DATUM Geodetic		LOCATION N'ly 5022319.060 E'ly 270714.953		ORIGINATED BY ELS			
PROJECT Foundation Component: GWP 85-89-00, Hwy 518		BOREHOLE TYPE CME Powered Auger		COMPILED BY JRB					
CLIENT Ministry of Transportation Ontario		DATE (Started/Completed) 21/3/00 - 21/3/00		TIME 4:50:00 PM		CHECKED BY MAM			

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa						
195.54 0.0	PEAT	▽												
	Black peat and shot rock mix	▽	1	AS										
194.47 1.07	SILT		2	AS										
	Grey silt trace fine sand (Very Loose)		3	AS										
193.56 1.98	PEAT	▽												
	Black fibrous peat	▽												
192.19 3.35	SAND		4	SS	WH									
	Grey fine to medium sand trace silt trace gravel (Loose)		5	AS										
191.12 4.42	SILT		6	SS	2									
	Grey silt with 25 mm grey clay layers to grey silt trace fine sand at depth (Very Loose to Loose)													
190.34 5.20	End of Sampling													
187.56 7.98	End of Dynamic Cone End of Borehole													

COMMENTS

1) Dynamic Cone Penetration Test advanced ±1 m east of BH No. 00-6.

2) Water levels taken in open borehole.

+ 3, X<sup>3</sup>: Numbers refer to Sensitivity

○ 3% STRAIN AT FAILURE

WATER LEVEL RECORDS		
Date (dd/mm/yy)/Time	Water Depth (m)	Cave In Level (m)
21/3/00; 4:55:00 PM	0	0.6

MEL-GEO 00012FND.GPJ MEL-GEO.GDT 27/7/00



24

ENCLOSURE NO.:

METRIC

RECORD OF BOREHOLE No. 00-7

1 OF 1



REFERENCE 00/02/0012 DATUM Geodetic LOCATION N'y 5022354.223 E'y 270755.247 ORIGINATED BY ELS  
PROJECT Foundation Component: GWP 85-89-00, Hwy 518 BOREHOLE TYPE CME Powered Auger COMPILED BY JRB  
CLIENT Ministry of Transportation Ontario DATE (Started/Completed) 17/3/00 - 17/3/00 TIME 5:47:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES								
195.88	Ground Surface												
195.70 0.15	SILTY SAND Black silty sand and organics SAND												
195.13 0.75	Brown fine and medium sand with silt trace gravel		1	AS									
194.81 1.07	Shot rock encountered in several auger probes at ±0.5 m PEAT		2	SS	4								
194.03 1.85	Black fibrous peat SAND		3	SS	6								
193.86 1.92	Grey fine to medium sand trace silt to silty trace gravel (Loose) Auger Refusal Possible Bedrock  End of Sampling Refusal to further Dynamic Cone advance  End of Borehole												

COMMENTS

1) Dynamic Cone Penetration Test advanced ±1 m east of BH No. 00-7.  
2) Water levels taken in open borehole.

+ 3, × 3 : Numbers refer to Sensitivity

○ 3% STRAIN AT FAILURE

WATER LEVEL RECORDS		
Date (dd/mm/yy)/Time	Water Depth (m)	Cave In Level (m)
22/3/00; 5:51:00 PM	0.6	0.9
22/3/00; 9:07:00 AM	0.3	0.6

MEL-GEO\_00012END.GPJ MEL-GEO.GDT\_27/7/00

ENCLOSURE NO.:

METRIC

RECORD OF BOREHOLE No. 00-8

1 OF 1



REFERENCE 00/02/0012 DATUM Geodetic LOCATION N'y 5022373.782 E'y 270797.465 ORIGINATED BY ELS  
 PROJECT Foundation Component: GWP 85-89-00, Hwy 518 BOREHOLE TYPE CME Powered Auger COMPILED BY JRB  
 CLIENT Ministry of Transportation Ontario DATE (Started/Completed) 22/3/00 - 22/3/00 TIME 10:14:00 AM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT W <sub>P</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES								
194.92 0.0	Ground Surface SILTY SAND												
	Black silty sand and gravel mix trace organics (Probably Fill)		1	AS									
194.07 0.85	(Very Loose) PEAT		2	SS	2								
	Black fibrous peat												
	Grey organic silt mix at ±3.3 m		3	SS	WH								
			4	SS	WH								
			5	SS	WH								
191.27 3.65	SILT												
	Grey silt some fine sand trace clay occasional cobbles												
190.45 4.47	Auger Refusal End of Borehole		6	AS									

COMMENTS

1) Dynamic Cone Penetration Test advanced ±2 m west of BH No. 00-8.

2) Water levels taken in open borehole.

+ 3, X 3: Numbers refer to Sensitivity

○ 3% STRAIN AT FAILURE

WATER LEVEL RECORDS		
Date (dd/mm/yy)/Time	Water Depth (m)	Cave In Level (m)
22/3/00; 10:14:00 AM		3

MEL-GEO 00012FND.GPJ MEL-GEO.GDT 27/7/00

ENCLOSURE NO.:

## METRIC

## RECORD OF BOREHOLE No. 00-9

1 OF 1



REFERENCE 00/02/0012 DATUM Geodetic LOCATION N'y 5022360.156 E'y 270826.877 ORIGINATED BY ELS  
 PROJECT Foundation Component: GWP 85-89-00, Hwy 518 BOREHOLE TYPE CME Powered Auger COMPILED BY JRB  
 CLIENT Ministry of Transportation Ontario DATE (Started/Completed) 22/3/00 - 22/3/00 TIME 10:50:00 AM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa						
194.93 0.0	Ground Surface SAND													
	Brown fine and medium sand with silt (Possible Fill)		1	AS										5 84 (11)
193.73 1.20	SILT		2	SS	WH									
193.89 1.35	Grey organic silt PEAT		3	SS	WH									
	Brown to black peat trace fibrous													
192.73 2.20	SAND													
192.63 2.40	Grey fine and medium sand trace silt		4	SS	9									
192.19 2.74	PEAT													
	Brown peat some fibrous Auger Refusal Possible Bedrock End of Borehole													

COMMENTS		WATER LEVEL RECORDS	
1) Water levels taken in open borehole.		Date (dd/mm/yy)/Time	Water Depth (m)
+ <sup>3</sup> , × <sup>3</sup> : Numbers refer to Sensitivity		22/3/00; 10:53:00 AM	0.38
○ 3% STRAIN AT FAILURE		22/3/00; 6:13:00 PM	0.61

MEL-GEO\_00012END.GPJ MEL-GEO.GDT 27/7/00



ENCLOSURE NO.:

**METRIC**

# RECORD OF BOREHOLE No. 00-10

2 OF 2



REFERENCE 00/02/0012

DATUM Geodetic

LOCATION N'ly 5022381.646 E'ly 270854.624

ORIGINATED BY ELS

PROJECT Foundation Component: GWP 85-89-00, Hwy 518

BOREHOLE TYPE CME Powered Auger

COMPILED BY JRB

CLIENT Ministry of Transportation Ontario

DATE (Started/Completed) 22/3/00 - 22/3/00

TIME 4:10:00 PM

CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa								WATER CONTENT (%)
								○ UNCONFINED	+ FIELD VANE	● QUICK TRIAXIAL						
182.45 12.20	SILTY SAND Grey silty fine sand		9	TW	WH		184									
181.85 12.80	(Loose to Compact) End of Sampling		10	SS	4		183									
176.95 17.70	Refusal to further Dynamic Cone advance End of Borehole						182									
							181									
							180									
							179									
							178									
							177									

MEL-GEO 00012FND.GPJ MEL-GEO.GDT 27/7/00

ENCLOSURE NO.:

**METRIC**

**RECORD OF BOREHOLE No. 00-10A**

1 OF 1



REFERENCE 00/02/0012 DATUM Geodetic LOCATION N'y 5022400.021 E'y 270841.238 ORIGINATED BY ELS  
 PROJECT Foundation Component: GWP 85-89-00, Hwy 518 BOREHOLE TYPE CME Powered Auger COMPILED BY JRB  
 CLIENT Ministry of Transportation Ontario DATE (Started/Completed) 23/3/00 - 23/3/00 TIME 5:05:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT w <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES										
194.77	Ground Surface														
0.0															
193.55															
1.22	Refusal to further Dynamic Cone advance														
193.27															
1.50	Auger Refusal														
	End of Borehole														
COMMENTS								+ 3, X 3: Numbers refer to Sensitivity		WATER LEVEL RECORDS					
								O 3% STRAIN AT FAILURE		Date (dd/mm/yy)/Time		Water Depth (m)		Cave In Level (m)	

MEL-GEO\_00012FND.GPJ MEL-GEO.GDT 27/7/00

ENCLOSURE NO.:

METRIC

## RECORD OF BOREHOLE No. 00-11

1 OF 2



REFERENCE 00/02/0012 DATUM Geodetic LOCATION N'y 5022408.811 E'y 270903.801

ORIGINATED BY ELS

PROJECT Foundation Component: GWP 85-89-00, Hwy 518

BOREHOLE TYPE CME Powered Auger

COMPILED BY JRB

CLIENT Ministry of Transportation Ontario

DATE (Started/Completed) 23/3/00 - 23/3/00

TIME 9:35:00 AM

CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT $w_p$	NATURAL MOISTURE CONTENT $w$	LIQUID LIMIT $w_L$	UNIT WEIGHT $\gamma$	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40					
194.55	Ground Surface													
194.38	200 mm WATER													
194.38	SILTY SAND (FILL)													
193.95	Grey silty sand		1	AS										
193.95	(Very Loose) SAND and PEAT MIX		2	SS	2									
193.27	PEAT													
193.27	Brown peat some fine fibrous		3	SS	WH									
			4	SS	WH									
191.35	SAND		5	SS	2									
191.35	Grey fine sand some silt (Loose)													
189.80	CLAY		6	SS	1									
189.80	Grey clay with reddish-brown clay layers 3 - 10 mm thick every $\pm 15$ mm (Soft)													
188.00	SILTY SAND		7	SS	WH									
188.00	Brown to grey silty fine sand (Loose)													
186.32	End of Sampling		8	SS	WH									
186.32														
Continued Next Page														
COMMENTS 1) Dynamic Cone Penetration Test advanced $\pm 2$ m west of BH No. 00-11. 2) Water levels taken in open borehole.								+ <sup>3</sup> , X <sup>3</sup> : Numbers refer to Sensitivity  O 3% STRAIN AT FAILURE		WATER LEVEL RECORDS				
										Date (dd/mm/yy)/Time		Water Depth (m)		Cave In Level (m)
										23/3/00; 9:40:00 AM		0.3		3.96
										23/3/00; 6:12:00 PM		0		3.35

MEL-GEO 00012END.GPJ MEL-GEO.GDT 27/7/00

ENCLOSURE NO.:

### METRIC

# RECORD OF BOREHOLE No. 00-11

2 OF 2



REFERENCE 00/02/0012 DATUM Geodetic LOCATION N'y 5022408.811 E'y 270903.801

ORIGINATED BY ELS

PROJECT Foundation Component: GWP 85-89-00, Hwy 518

BOREHOLE TYPE CME Powered Auger

COMPILED BY JRB

CLIENT Ministry of Transportation Ontario

DATE (Started/Completed) 23/3/00 - 23/3/00

TIME 9:35:00 AM

CHECKED BY MAM

[illegible]



ENCLOSURE NO.:

METRIC

RECORD OF BOREHOLE No. 00-12

1 OF 1



REFERENCE 00/02/0012 DATUM Geodetic LOCATION N'y 5022424.822 E'y 270927.980 ORIGINATED BY ELS  
PROJECT Foundation Component: GWP 85-89-00, Hwy 518 BOREHOLE TYPE CME Powered Auger COMPILED BY JRB  
CLIENT Ministry of Transportation Ontario DATE (Started/Completed) 23/3/00 - 23/3/00 TIME 8:00:00 AM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT w <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES								
195.88	Ground Surface												
0.0	ORGANICS												
195.63	Black silty organics with clay		1	AS									
0.25	SILTY CLAY												
195.28	Brown to Black Silty Clay												
0.60	(Soft) SILTY SAND		2	SS	3								
	Brown silty sand trace gravel												
	(Very Loose)												
194.08	SAND		3	SS	8								
1.80	Grey fine sand some/with silt												
	(Loose/Compact)												
			4	SS	15								
192.53	CLAY		5	SS	WH								
3.35	Grey clay with reddish-brown clay layers												
	(Soft)												
191.13	Auger Refusal		6	SS	2								
4.75	End of Borehole												

COMMENTS

1) Dynamic Cone Penetration Test advanced ±1 m east of BH No. 00-12.

2) Water levels taken in open borehole.

+ 3, X<sup>3</sup>: Numbers refer to Sensitivity

○ 3% STRAIN AT FAILURE

WATER LEVEL RECORDS		
Date (dd/mm/yy)/Time	Water Depth (m)	Cave In Level (m)
23/3/00; 8:03:00 AM	2.1	2.3
23/3/00; 6:08:00 PM	0.91	1.2

MEL-GEO\_00012FND.GPJ MEL-GEO.GDT 27/7/00

ENCLOSURE NO.:

## METRIC

## RECORD OF BOREHOLE No. 00-13

1 OF 1



REFERENCE 00/02/0012 DATUM Geodetic LOCATION N'y 5022445.929 E'y 270909.745 ORIGINATED BY ELS  
 PROJECT Foundation Component: GWP 85-89-00, Hwy 518 BOREHOLE TYPE CME Powered Auger COMPILED BY JRB  
 CLIENT Ministry of Transportation Ontario DATE (Started/Completed) 23/3/00 - 23/3/00 TIME 11:10:00 AM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC NATURAL LIQUID LIMIT MOISTURE CONTENT			UNIT WEIGHT $\gamma$	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40	60	80	100		
196.52 0.0	Ground Surface SILTY SAND (FILL) Black silty sand trace organics (Very Loose)		1	AS										
			2	SS	2									
195.02 1.50	SAND Grey fine sand with silt (Loose)		3	SS	1									
194.12 2.40	SILT Grey silt trace fine sand (Loose)		4	SS	WH									
			5	SS	8									
192.62 3.90	SANDS Brownish yellow fine and medium sand trace silt some cobbles (Compact/Dense)		6	SS	18									
191.49 5.03	Auger Refusal End of Sampling													
191.01 5.51	Refusal to further Dynamic Cone advance End of Borehole													
							30 blows / 25 mm							

COMMENTS		WATER LEVEL RECORDS	
1) Dynamic Cone Penetration Test advanced $\pm 1$ m east of BH No. 00-13. 2) Water levels taken in open borehole.		Date (dd/mm/yy)/Time	Water Depth (m)
		23/3/00; 11:12:00 AM	1.2
		23/3/00; 6:06:00 PM	0.9

ENCLOSURE NO.:

METRIC

RECORD OF BOREHOLE No. 00-14

1 OF 2



REFERENCE 00/02/0012 DATUM Geodetic LOCATION N'ly 5022426.501 E'ly 270878.895 ORIGINATED BY ELS  
PROJECT Foundation Component: GWP 85-89-00, Hwy 518 BOREHOLE TYPE CME Powered Auger COMPILED BY JRB  
CLIENT Ministry of Transportation Ontario DATE (Started/Completed) 23/3/00 - 23/3/00 TIME 3:40:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE	PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV. DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES								
194.72	Ground Surface												
194.57	150 mm WATER SAND (FILL)												
193.97	Brown fine to medium sand trace silt trace gravel		1	AS									
193.75	SAND and PEAT MIX		2	AS									
193.12	PEAT		3	SS	5								
193.12	Brown to black fibrous peat trace wood		4	SS	3							346.8	
			5	SS								475.3	
190.00	SAND		6	SS								110.5	
189.69	Grey fine sand some silt		7	SS									
189.69	(Loose) CLAY												
	Grey clay to reddish-brown clay (Soft)		8	SS	WH								
186.80	SILT		9	SS	3								
186.80	Grey silt trace fine sand (Loose)												
			10	SS	WH								
184.97	End of Sampling Continued Next Page												
184.97													

COMMENTS

1) Dynamic Cone Penetration Test advanced ±2 m east of BH No. 00-14.  
2) Water levels taken in open borehole.

+ 3, x 3 : Numbers refer to Sensitivity

○ 3% STRAIN AT FAILURE

WATER LEVEL RECORDS		
Date (dd/mm/yy)/Time	Water Depth (m)	Cave In Level (m)
	0	

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ENCLOSURE NO.:

METRIC

RECORD OF BOREHOLE No. 00-14

2 OF 2



REFERENCE 00/02/0012 DATUM Geodetic LOCATION N'ly 5022426.501 E'ly 270878.895 ORIGINATED BY ELS  
PROJECT Foundation Component: GWP 85-89-00, Hwy 518 BOREHOLE TYPE CME Powered Auger COMPILED BY JRB  
CLIENT Ministry of Transportation Ontario DATE (Started/Completed) 23/3/00 - 23/3/00 TIME 3:40:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40					
181.05														
13.67	Refusal to further Dynamic Cone advance End of Borehole							20 blows / 0 mm						
COMMENTS								+ 3, X <sup>3</sup> : Numbers refer to Sensitivity		WATER LEVEL RECORDS				
1) Dynamic Cone Penetration Test advanced ±2 m east of BH No. 00-14. 2) Water levels taken in open borehole.								O 3% STRAIN AT FAILURE		Date (dd/mm/yy)/Time	Water Depth (m)	Cave In Level (m)		
											0			

MEL-GEO\_00012FND.GPJ MEL-GEO.GDT 27/7/00

ENCLOSURE NO.:

METRIC

## RECORD OF BOREHOLE No. 00-15

1 OF 1



REFERENCE 00/02/0012 DATUM Geodetic LOCATION N'y 5022799.947 E'y 271655.718 ORIGINATED BY ELS  
 PROJECT Foundation Component: GWP 85-89-00, Hwy 518 BOREHOLE TYPE CME Powered Auger COMPILED BY JRB  
 CLIENT Ministry of Transportation Ontario DATE (Started/Completed) 24/3/00 - 24/3/00 TIME 8:30:00 AM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES								
256.26	Ground Surface												
256.06 0.10	SILTY ORGANICS		1	AS									
	Black silty organics												
	SAND												
	Brown to Brownish yellow fine sand with silt trace gravel occasional cobbles/boulders		2	SS	40								
254.94 1.32	(Dense) Auger Refusal (Probably Boulder) End of Sampling												
252.56 3.70	Refusal to further Dynamic Cone advance End of Borehole												

COMMENTS

1) Dynamic Cone Penetration Test advanced ±1 m south of BH No. 00-15.  
 2) Water levels taken in open borehole.

+<sup>3</sup>, ×<sup>3</sup>: Numbers refer to Sensitivity

○ 3% STRAIN AT FAILURE

WATER LEVEL RECORDS		
Date (dd/mm/yy)/Time	Water Depth (m)	Cave In Level (m)
24/3/00; 8:32:00 AM	0.2	0.36
24/3/00; 10:21:00 AM	0	0.13

MEL-GEO 00012END.GPJ MEL-GEO GDT 27/7/00

ENCLOSURE NO.:

**METRIC****RECORD OF BOREHOLE No. 00-16**

1 OF 1



REFERENCE 00/02/0012 DATUM Geodetic LOCATION N'ly 5022835.594 E'ly 271687.986 ORIGINATED BY ELS  
 PROJECT Foundation Component: GWP 85-89-00, Hwy 518 BOREHOLE TYPE CME Powered Auger COMPILED BY JRB  
 CLIENT Ministry of Transportation Ontario DATE (Started/Completed) 24/3/00 - 24/3/00 TIME 9:46:00 AM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)								
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES																
255.92	Ground Surface																				
0.0	PEAT																				
	Black sandy peat		1	AS																	
254.79			2	SS	7																
1.13	SAND																				
	Brown fine to medium sand trace silt trace gravel occasional cobbles and boulders (Dense)		3	SS	50																
253.49			4	SS	30																
2.43	SAND																				
	Grey fine sand some/with silt (Compact to Dense)		5	SS	19																
252.08																					
3.84	Auger Refusal Refusal to further Dynamic Cone advance																				
	Probably Bedrock																				
	End of Borehole																				
COMMENTS 1) Dynamic Cone Penetration Test advanced ±2 m west of BH No. 00-16. 2) Water levels taken in open borehole.								+ <sup>3</sup> , X <sup>3</sup> : Numbers refer to Sensitivity  ○ 3% STRAIN AT FAILURE		WATER LEVEL RECORDS <table border="1"> <thead> <tr> <th>Date (dd/mm/yy) Time</th> <th>Water Depth (m)</th> <th>Cave In Level (m)</th> </tr> </thead> <tbody> <tr> <td>24/3/00; 9:46:00 AM</td> <td>0.1</td> <td>1.04</td> </tr> <tr> <td>24/3/00; 10:19:00 AM</td> <td>0</td> <td>1.02</td> </tr> </tbody> </table>			Date (dd/mm/yy) Time	Water Depth (m)	Cave In Level (m)	24/3/00; 9:46:00 AM	0.1	1.04	24/3/00; 10:19:00 AM	0	1.02
Date (dd/mm/yy) Time	Water Depth (m)	Cave In Level (m)																			
24/3/00; 9:46:00 AM	0.1	1.04																			
24/3/00; 10:19:00 AM	0	1.02																			

MEL-GEO 00012FND.GPJ MEL-GEO GDT 27/7/00

ENCLOSURE NO.:

**METRIC****RECORD OF BOREHOLE No. 00-17**

1 OF 1



REFERENCE 00/02/0012 DATUM Geodetic LOCATION N'y 5022870.979 E'y 271722.407 ORIGINATED BY ELS  
 PROJECT Foundation Component: GWP 85-89-00, Hwy 518 BOREHOLE TYPE CME Powered Auger COMPILED BY JRB  
 CLIENT Ministry of Transportation Ontario DATE (Started/Completed) 24/3/00 - 24/3/00 TIME \_\_\_\_\_ CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT $\gamma$	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40	60	80	100	W <sub>p</sub>	W	W <sub>L</sub>		
258.57	Ground Surface																
258.02 0.10	SILTY SAND Silty fine sand trace organics SAND		1	AS													
257.55	Brown fine to medium sand trace gravel trace silt																
1.02	Auger Refusal (Possibly Boulder/Bedrock) End of Borehole  Auger Probe at 15+951.2 m Rt: Auger Refusal at 0.91 m  Auger Probe at 15+948.2 m Rt: Auger Refusal at 1.02 m																

COMMENTS 1) Water levels taken in open borehole.	+ <sup>3</sup> , X <sup>3</sup> : Numbers refer to Sensitivity  O 3% STRAIN AT FAILURE	WATER LEVEL RECORDS		
		Date (dd/mm/yy)/Time	Water Depth (m)	Cave In Level (m)
		24/3/00;	0.76	

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ENCLOSURE NO.:

**METRIC**

**RECORD OF BOREHOLE No. 00-18**

1 OF 1



REFERENCE 00/02/0012 DATUM Geodetic LOCATION N'ly 5022960.517 E'ly 272204.418 ORIGINATED BY ELS  
 PROJECT Foundation Component: GWP 85-89-00, Hwy 518 BOREHOLE TYPE CME Powered Auger COMPILED BY JRB  
 CLIENT Ministry of Transportation Ontario DATE (Started/Completed) 24/3/00 - 24/3/00 TIME 10:59:00 AM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT			PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40	60					
258.77 0.0	Ground Surface														
258.47 0.30	SILT Black silt (topsoil)		1	AS											
	(Loose) SAND														
	Brown fine to medium sand trace organics some silt trace gravel		2	AS	25										
257.42 1.35	(Compact) Auger Refusal Possible Boulders														
256.74 2.03	End of Sampling														
	Refusal to further Dynamic Cone advance Probably Bedrock														
	End of Borehole														
	Exposed Bedrock at Sta 16+438±														
COMMENTS							+ <sup>3</sup> , X <sup>3</sup> : Numbers refer to Sensitivity			WATER LEVEL RECORDS					
1) Dynamic Cone Penetration Test advanced ±2 m west of BH No. 00-18.							O 3% STRAIN AT FAILURE			Date (dd/mm/yy)/Time					
										Water Depth (m)					
										Cave In Level (m)					

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ENCLOSURE NO.:

**METRIC**

**RECORD OF BOREHOLE No. 00-19**

1 OF 1

REFERENCE 00/02/0012 DATUM Geodetic LOCATION N'y 5022986.240 E'y 272290.082 ORIGINATED BY ELS  
 PROJECT Foundation Component: GWP 85-89-00, Hwy 518 BOREHOLE TYPE CME Powered Auger COMPILED BY JRB  
 CLIENT Ministry of Transportation Ontario DATE (Started/Completed) 24/3/00 - 24/3/00 TIME 12:04:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT w <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40						60
258.72	Ground Surface														
258.62	ORGANICS														
0.10	Black silty organics SAND		1	AS											
	Brown silty fine sand to fine sand some silt (Compact)		2	SS	14										
256.74			3	SS	6										
1.98	SILTY CLAY														
256.43	Reddish-brown silty clay		4	SS	7										
2.29	SILTY SAND														
	Grey silty fine sand (Compact)		5	AS											
254.91															
3.81	SAND		6	AS											
	Grey fine and medium sand trace/some silt (Compact)														
253.89															
4.83	End of Sampling (No Refusal)														
253.54															
5.18	Refusal to further Dynamic Cone Advance														
	End of Borehole														
COMMENTS								+ 3 X 3: Numbers refer to Sensitivity		WATER LEVEL RECORDS					
1) Dynamic Cone Penetration Test advanced ±1 m east of BH No. 00-19. 2) Water levels taken in open borehole.								○ 3% STRAIN AT FAILURE		Date (dd/mm/yy)/Time		Water Depth (m)		Cave In Level (m)	
										24/3/00; 12:07:00 PM		0.46		0.91	

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ENCLOSURE NO.:

METRIC

RECORD OF BOREHOLE No. 00-20

1 OF 1



REFERENCE 00/02/0012 DATUM Geodetic LOCATION N'y 5023025.123 E'y 272331.992 ORIGINATED BY ELS  
PROJECT Foundation Component: GWP 85-89-00, Hwy 518 BOREHOLE TYPE CME Powered Auger COMPILED BY JRB  
CLIENT Ministry of Transportation Ontario DATE (Started/Completed) 24/3/00 - 24/3/00 TIME 1:04:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES								
259.06	Ground Surface												
0.0	SILTY SAND												
	Black to brown silty fine sand trace gravel; top 200 mm with organics		1	AS									
258.30													
0.76	SILTY CLAY												
257.99			2	SS	13								
1.07	Redish-brown to grey silty clay SILT												
	Grey fine sandy silt												
257.23			3	SS	22								
1.83	SAND												
	Grey fine to medium sand trace silt trace gravel												
256.62			4	SS	14								
2.44	SILT												
256.32													
256.74	Grey silt trace fine sand												
2.87	Auger Refusal												
	End of Sampling												
	Refusal to further Dynamic Cone Advance												
	End of Borehole												

COMMENTS

1) Dynamic Cone Penetration Test advanced ±1 m west of BH No. 00-20.  
2) Water levels taken in open borehole.

+ 3, X<sup>3</sup>: Numbers refer to Sensitivity

○ 3% STRAIN AT FAILURE

WATER LEVEL RECORDS

Date (dd/mm/yy)/Time	Water Depth (m)	Cave In Level (m)
24/3/00; 1:08:00 PM	0.23	0.66

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ENCLOSURE NO.:

METRIC

RECORD OF BOREHOLE No. 00-21

1 OF 1

REFERENCE 00/02/0012 DATUM Geodetic LOCATION N'y 5023002.765 E'y 272287.268 ORIGINATED BY ELS  
PROJECT Foundation Component: GWP 85-89-00, Hwy 518 BOREHOLE TYPE CME Powered Auger COMPILED BY JRB  
CLIENT Ministry of Transportation Ontario DATE (Started/Completed) 24/3/00 - 24/3/00 TIME 2:20:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE 20 40 60 80 100	PLASTIC LIMIT W <sub>p</sub> NATURAL MOISTURE CONTENT W LIQUID LIMIT W <sub>L</sub> WATER CONTENT (%) 20 40 60	UNIT WEIGHT γ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						
258.42	Ground Surface										
258.00 0.10	100 mm CRUSHED GRAVEL SAND (FILL)										
257.72 0.70	Brown fine to medium sand trace silt trace gravel		1	AS							
257.42 1.00	(Very Loose) SILTY SAND		2	SS	16						
	Black silty sand trace organics SAND										
	Yellow to grey fine to medium sand trace to with silt (Loose to Compact)		3	SS	6						
			4	SS	14						
			5	SS	10						
254.76 3.66	End of Sampling (No Refusal)										
249.89 8.53	Refusal to further Dynamic Cone advance End of Borehole										

COMMENTS

1) Dynamic Cone Penetration Test advanced ±2 m east of BH No. 00-21.  
2) Water levels taken in open borehole.

+<sup>3</sup>, x<sup>3</sup>: Numbers refer to Sensitivity

○ 3% STRAIN AT FAILURE

WATER LEVEL RECORDS

Date (dd/mm/yy)/Time	Water Depth (m)	Cave In Level (m)
24/3/00; 2:24:00 PM	0.91	1.06

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ENCLOSURE NO.:

# METRIC

## RECORD OF BOREHOLE No. 00-22

1 OF 1



REFERENCE 00/02/0012 DATUM Geodetic LOCATION N'ly 5022978.269 E'ly 272243.634 ORIGINATED BY ELS  
PROJECT Foundation Component: GWP 85-89-00, Hwy 518 BOREHOLE TYPE CME Powered Auger COMPILED BY JRB  
CLIENT Ministry of Transportation Ontario DATE (Started/Completed) 24/3/00 - 24/3/00 TIME 3:16:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT w <sub>p</sub>	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40						60
257.59	Ground Surface														
257.09 0.10	100 mm CRUSHED GRAVEL SAND (FILL)														
256.89 0.70	Dark Brown fine to medium sand trace silt trace gravel trace organics and peat		1	AS											
256.29 1.30	(Very Loose) SAND		2	SS	8										
	Black sand trace silt trace organics														
	(Loose) SAND		3	SS	5										
	Grey fine to medium sand trace silt to silty trace gravel 150 mm silty clay seam at ±3 m														
	(Loose/Compact)		4	SS	3										
			5	SS	2										
253.93 3.66	End of Sampling														
252.00 5.59	Refusal to further Dynamic Cone advance End of Borehole														
COMMENTS								+ 3, X <sup>3</sup> : Numbers refer to Sensitivity		WATER LEVEL RECORDS					
1) Dynamic Cone Penetration Test advanced ±2 m east of BH No. 00-22. 2) Water levels taken in open borehole.								O 3% STRAIN AT FAILURE		Date (dd/mm/yy)/Time		Water Depth (m)		Cave In Level (m)	
										24/3/00; 3:17:00 PM		0.74		1.07	

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1 OF 1

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ENCLOSURE NO.:

METRIC

RECORD OF BOREHOLE No. 00-24

1 OF 1



REFERENCE 00/02/0012 DATUM Geodetic LOCATION N'ly 5023437.968 E'ly 273188.116 ORIGINATED BY ELS  
PROJECT Foundation Component: GWP 85-89-00, Hwy 518 BOREHOLE TYPE CME Powered Auger COMPILED BY JRB  
CLIENT Ministry of Transportation Ontario DATE (Started/Completed) 24/3/00 - 24/3/00 TIME 5:17:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT $w_p$	NATURAL MOISTURE CONTENT $w$	LIQUID LIMIT $w_L$	UNIT WEIGHT $\gamma$ kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40					
265.06 0.0	Ground Surface													
	PEAT													
	Brown fibrous peat		1	AS										
			2	AS										
263.72 1.34	SAND													
	Grey fine to medium sand trace silt trace gravel		3	SS	5									
	(Loose to Compact)													
262.32 2.74	SILTY SAND													
	Grey silty fine sand trace gravel trace clay with depth		4	AS										
	(Compact)		5	AS										
260.95 4.11	SILTY CLAY													
	Grey silty clay		6	AS										
	(Firm)													
260.09 4.97	SAND													
	Grey fine sand with silt trace gravel		7	AS										
	(Compact)													
258.96 6.10	End of Sampling													
258.58 6.48	(No Refusal)													
	Refusal to further Dynamic Cone advance													
	End of Borehole													
COMMENTS							+ 3, X <sup>3</sup> : Numbers refer to Sensitivity		WATER LEVEL RECORDS					
1) Dynamic Cone Penetration Test advanced $\pm 2$ m north of BH No. 00-24.							O 3% STRAIN AT FAILURE		Date (dd/mm/yy)/Time		Water Depth (m)		Cave In Level (m)	
2) Water levels taken in open borehole.									24/3/00; 5:18:00 PM		0		1.8	

MEL-GEO 00012FND.GPJ MEL-GEO.GDT 27/7/00

ENCLOSURE NO.:

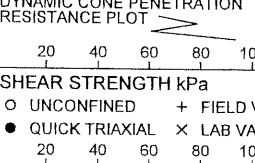





**METRIC**

# RECORD OF BOREHOLE No. 00-25

1 OF 1



REFERENCE	00/02/0012	DATUM	Geodetic	LOCATION	N'ly 5023422.593 E'ly 273170.427	ORIGINATED BY	ELS
PROJECT	Foundation Component: GWP 85-89-00, Hwy 518			BOREHOLE TYPE	CME Powered Auger	COMPILED BY	JRB
CLIENT	Ministry of Transportation Ontario			DATE (Started/Completed)	24/3/00 - 24/3/00	TIME	5:42:00 PM
						CHECKED BY	MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 	PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT  w <sub>p</sub> w      w <sub>L</sub>	UNIT WEIGHT  γ  kN/m <sup>3</sup>	REMARKS & GRAIN SIZE DISTRIBUTION (%)  GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES						
265.20	Ground Surface										
0.0	PEAT		1	AS			265				
264.65	Black peat										
0.55	SAND		2	AS							
264.23	Grey silty fine sand trace gravel										
268.97	(Compact) Auger Refusal End of Sampling Refusal to further Dynamic Cone advance End of Borehole										
0.99											
COMMENTS							+ <sup>3</sup> , X <sup>3</sup> : Numbers refer to Sensitivity		WATER LEVEL RECORDS		
1) Dynamic Cone Penetration Test advanced ±1 m west of BH No. 00-25.							○ 3% STRAIN AT FAILURE		Date (dd/mm/yy)/Time		
									Water Depth (m)		
									Cave In Level (m)		

ENCLOSURE NO.:

**METRIC**

**RECORD OF AUGER PROBE No. 1**

1 OF 1



REFERENCE 00/02/0012 DATUM Geodetic LOCATION N'y E'y ORIGINATED BY ELS  
 PROJECT Foundation Component: GWP 85-89-00, Hwy 518 BOREHOLE TYPE CME Powered Auger COMPILED BY JRB  
 CLIENT Ministry of Transportation Ontario DATE (Started/Completed) 23/3/00 - 23/3/00 TIME 5:30:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES		GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC NATURAL LIQUID LIMIT MOISTURE CONTENT			UNIT WEIGHT $\gamma$	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES	SHEAR STRENGTH kPa					$w_p$	$w$		
							20	40	60	80	100					
0.0	Ground Surface															
-0.20	200 mm CRUSHED GRAVEL															
0.20	SAND															
	Fine to medium sand trace silt trace gravel															
-1.20																
1.20	SILTY CLAY															
-1.50																
1.50	SAND															
	Fine to medium sand trace silt trace gravel															
-2.74																
2.74	Auger Refusal															
	End of Auger Probe															
COMMENTS							$+^3, \times^3$ : Numbers refer to Sensitivity  $\bigcirc$ 3% STRAIN AT FAILURE					WATER LEVEL RECORDS				
												Date (dd/mm/yy)/Time	Water Depth (m)	Cave In Level (m)		

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ENCLOSURE NO.:

**METRIC**

**RECORD OF AUGER PROBE No. 2**

1 OF 1



REFERENCE 00/02/0012 DATUM Geodetic LOCATION N'ly E'ly ORIGINATED BY ELS  
 PROJECT Foundation Component: GWP 85-89-00, Hwy 518 BOREHOLE TYPE CME Powered Auger COMPILED BY JRB  
 CLIENT Ministry of Transportation Ontario DATE (Started/Completed) 23/3/00 - 23/3/00 TIME 6:03:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W <sub>p</sub>	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W <sub>L</sub>	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40	60	80	100					
0.0	Ground Surface SAND Fine to medium sand trace silt trace gravel		1	AS													
-4.27 4.27	PEAT Brown to black peat		2	AS													
-5.79 5.79	End of Auger Probe																

COMMENTS

+ 3, X<sup>3</sup> : Numbers refer to Sensitivity

○ 3% STRAIN AT FAILURE

WATER LEVEL RECORDS		
Date (dd/mm/yy)/Time	Water Depth (m)	Cave In Level (m)

MEL-GEO-00012FND.GPJ MEL-GEO.GDT 27/7/00



49

**TABLE 1**  
**SUMMARY OF AREAS AND FIELD INVESTIGATION PROGRAM**

**Project:** Hwy 518, From 4 km E of Hwy 69, E'ly 4.2 km  
**G.W.P.:** 85-89-00

**Reference No.:** 00/02/00012-F  
**Date:** 06-Jun-00

Area	Borehole No.	Station	Offset from Centerline	N'ly	E'ly	Geodetic Elevation
1	1	14+300	12 m Lt	5022238.238	270280.426	201.837
	2	14+345	20 m Lt	5022263.609	270318.443	199.858
	2A	14+350	12 m Lt	5022258.286	270326.236	202.049
	3	14+400	15 m Lt	5022280.120	270372.612	200.538
	4	14+450	14 m Lt	5022291.266	270424.161	205.725
2	5	14+700	18 m Lt	5022306.340	270669.194	194.933
	6	14+750	11.5 m Lt	5022319.060	270714.953	195.544
	7	14+804	20 m Lt	5022354.223	270755.247	195.882
	8	14+850	13 m Lt	5022373.782	270797.465	194.924
	9	14+867	14.6 m Rt	5022360.156	270826.877	194.932
	10	14+902	12 m Rt	5022381.646	270854.624	194.654
	10A	14+901	10.7 m Lt	5022400.021	270841.238	194.766
	11	14+958	16.5 m Rt	5022408.811	270903.801	194.551
	12	14+987	16.5 m Rt	5022424.822	270927.980	195.880
	13	14+984	12m Lt	5022445.929	270909.745	196.516
	14	14+947	12m Lt	5022426.501	270878.895	194.718
3	15	15+850	10 m Rt	5022799.947	271655.718	256.261
	16	15+900	10 m Rt	5022835.594	271687.986	255.919
	17	15+950	2 m Rt	5022870.979	271722.407	258.570
4	18	16+457	12 m Lt	5022960.517	272204.418	258.774
	19	16+545	4 m Rt	5022986.240	272290.082	258.723
	20	16+600	11.6 m Lt	5023025.123	272331.992	259.055
	21	16+550	12 m Lt	5023002.765	272287.268	258.415
	22	16+500	10 m Lt	5022978.269	272243.634	257.587
5	23	17+595	0 m (On CL)	5023446.247	273233.112	265.137
	24	17+550	8 m Lt	5023437.968	273188.116	265.063
	25	17+528	0 m (On CL)	5023422.593	273170.427	265.197
	Auger Probe	14+652	12 m Lt	5022291.027	270626.410	197.948
	Auger Probe	14+652	13 m Lt	5022292.021	270626.294	197.682
	Auger Probe	14+652	15 m Lt	5022294.007	270626.062	197.311
	Auger Probe	14+888.5	6 m Lt	5022389.201	270833.431	195.858
	Auger Probe	14+889	6 m Lt	5022389.477	270833.848	195.850

**TABLE 2**  
**SUMMARY OF LABORATORY TESTS**

**Project:** Hwy 518, From 4 km E of Hwy 69, E'ly 4.2 km  
**G.W.P.:** 85-89-00

**Reference No:** 00/02/00012-F  
**Date:** June 6, 2000

Area	Description	Borehole No.	Sample No.	Water Content	Atterberg Limits	Grain Size	Other
1	FILL/CUT (MINOR)	00-1	1	Y			
			2	Y			
			3	Y			
			4	Y		Y	
			5	Y			
		00-2	2	Y			
			3	Y			
			4	Y			
		00-3	1	Y			
			2	Y			
			3	Y			
			4	Y			
		00-4	1	Y			
			2	Y			
			3	Y			
			4	Y		Y	
			5	Y			
2	FILL (MINOR)	00-5	1	Y			
			2	Y			
			3	Y			
			4	Y			
			5	Y			
		00-6	1	Y			
			2	Y			
			3	Y			
			4	Y			
			5	Y			
			6	Y			
		00-8	1	Y			
			2	Y			
			4	Y			
			5	Y			
		00-9	1	Y		Y	
			2	Y			

**TABLE 2**  
**SUMMARY OF LABORATORY TESTING**

**Project:** Hwy 518, From 4 km E of Hwy 69, E'ly 4.2 km  
**G.W.P.:** 85-89-00

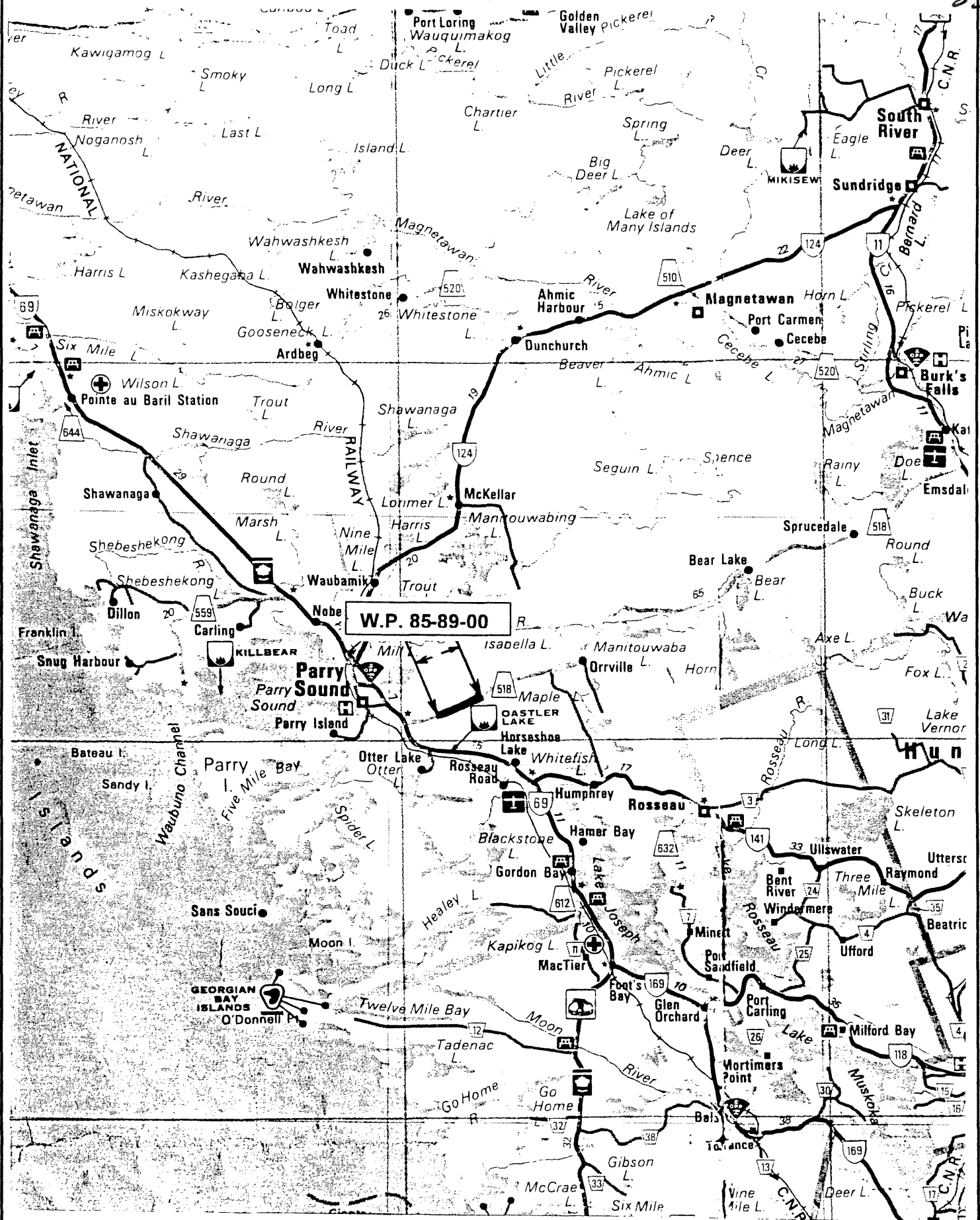
**Reference No:** 00/02/00012-F  
**Date:** June 6, 2000

Area	Description	Borehole No.	Sample No.	Water Content	Atterberg Limits	Grain Size	Other
2	FILL (MINOR)	00-9	2	Y			
			3	Y			
		00-10	1	Y			
			2	Y			
			3	Y			
			4	Y			
			5	Y			
			6	Y	Y		
			7	Y	Y		
			8	Y	Y		
			9	Y			Consolidation
			10	Y			
		00-11	1	Y			
			2	Y			
			3	Y			
			4	Y			
			5	Y			
			6	Y	Y		
			7	Y	Y		
			8	Y			
		00-12	1	Y			
			2	Y			
			3	Y			
			4	Y			
			5	Y	Y		
		00-13	1	Y			
			2	Y			
			3	Y			
			4	Y			
			5	Y			
			6	Y			
		00-14	1	Y			
			2	Y			
			3	Y			
			4	Y			
			5	Y			
			6	Y			

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Reference No: 00/02/00012-F  
Date: June 6, 2000

Pg. 3 of 3



**MERLEX ENGINEERING LTD.**

CONSULTING GEOTECHNICAL ENGINEERS

**KEY PLAN**  
Hwy 518, From 4.0 km East of Hwy 69, Easterly 4.2 km  
W.P. 85-89-00

75

HWY 518  
FOUNDATION INVESTIGATION  
AREA LOCATION PLAN

METRIC



**MERLEX ENGINEERING LTD.**  
Consulting Geotechnical Engineers

PROJECT: HWY. 518, Foundation Investigation	DATE: May 20, 2000
REFERENCE NO.: 00012F	CHECKED BY: MAM
DRAWN BY: M.R.	

CONT. NO.  
W.P. NO. 85-89-00

HWY 518  
FOUNDATION INVESTIGATION - AREA 1  
BOREHOLE LOCATIONS AND SOIL STRATA

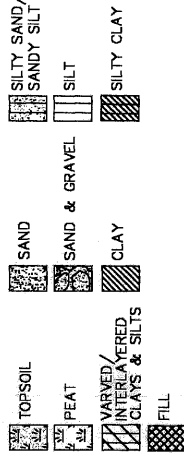
FIGURE  
3



SCALE



STRATIGRAPHY LEGEND



METRIC

LEGEND

- Borehole and Dynamic Cone Penetration Test
- Borehole
- N Blows/0.3 m
- W Water Level at Time of Investigation
- A/M Auger Refusal at Elevation

Borehole No.	Co-ordinates North East	Elevation
BOREHOLE No. 00-1	5022238.238 270280.426	201.837
BOREHOLE No. 00-2	5022236.605 270318.443	199.858
BOREHOLE No. 00-2A	5022236.286 270326.236	202.049
BOREHOLE No. 00-3	5022280.120 270372.612	200.338
BOREHOLE No. 00-4	5022291.266 270424.161	205.725

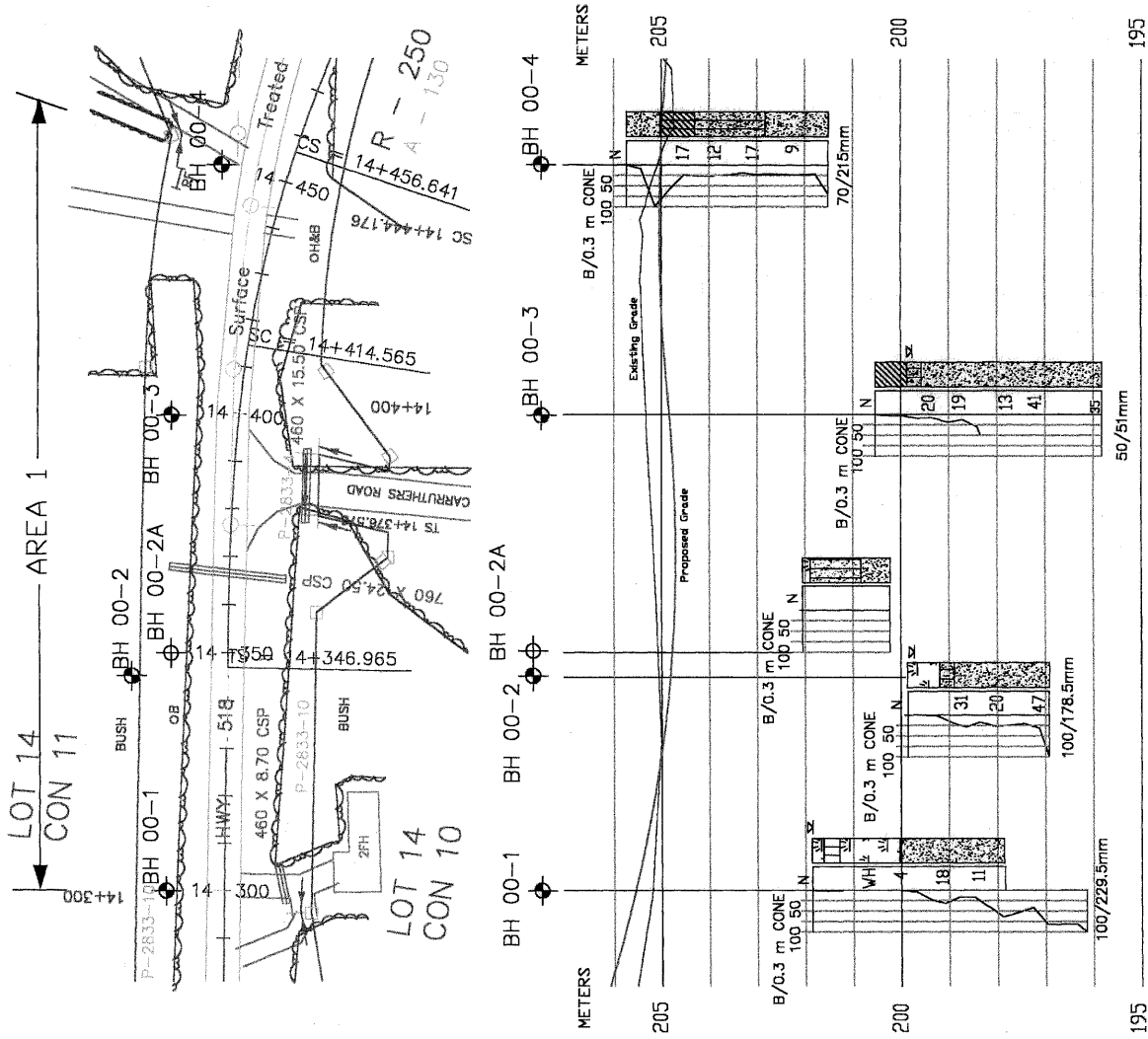
NOTE 1:

The boundaries between soil strata have been established at the borehole locations only. The boundaries between boreholes are assumed based on borehole data.



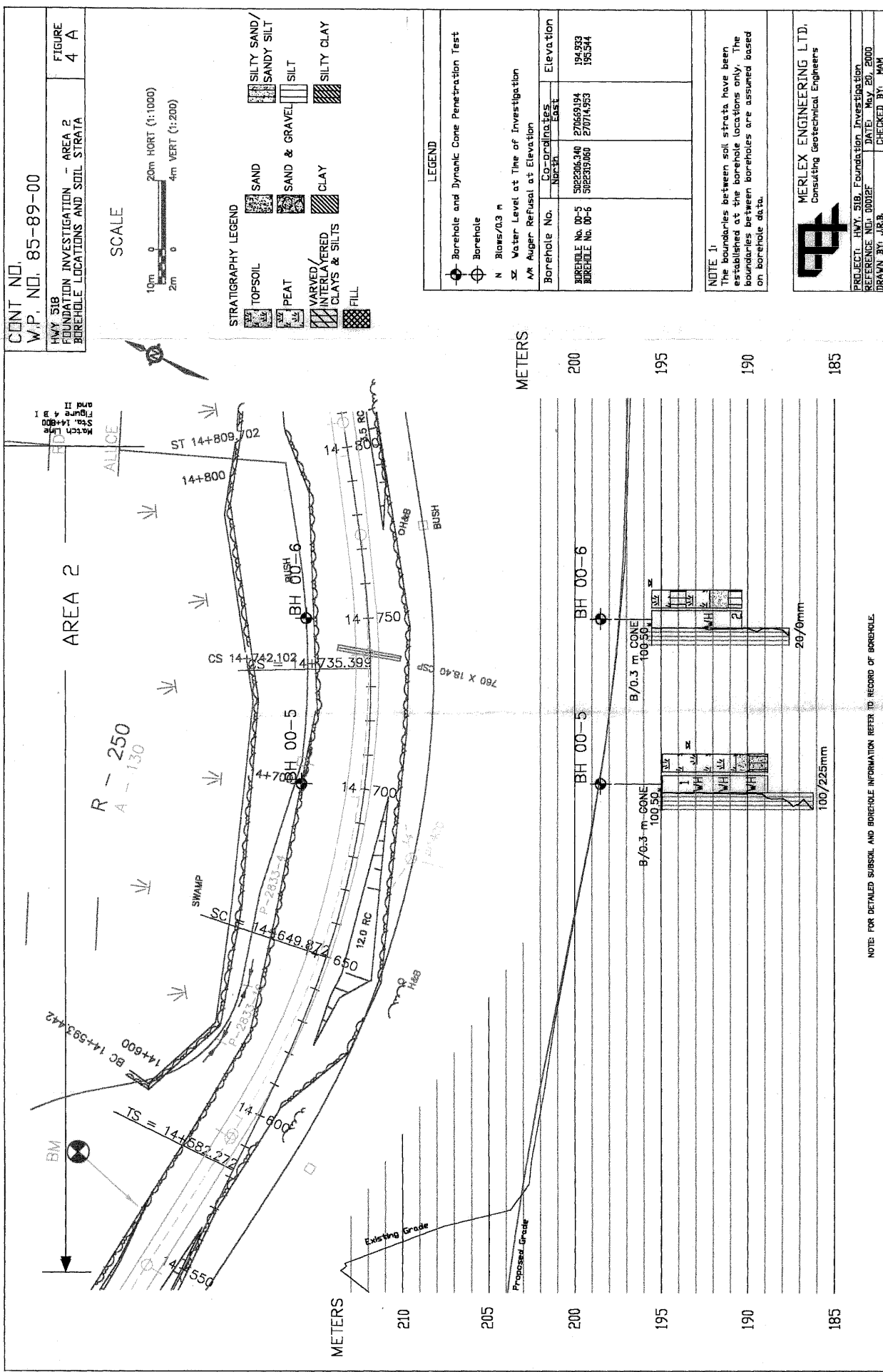
MERLEX ENGINEERING LTD.  
Consulting Geotechnical Engineers

PROJECT: HWY 518, Foundation Investigation  
REFERENCE: NEL 0008P DATE: May 20, 2000  
DRAWN BY: MCKINVILLE CHECKED BY: MAN



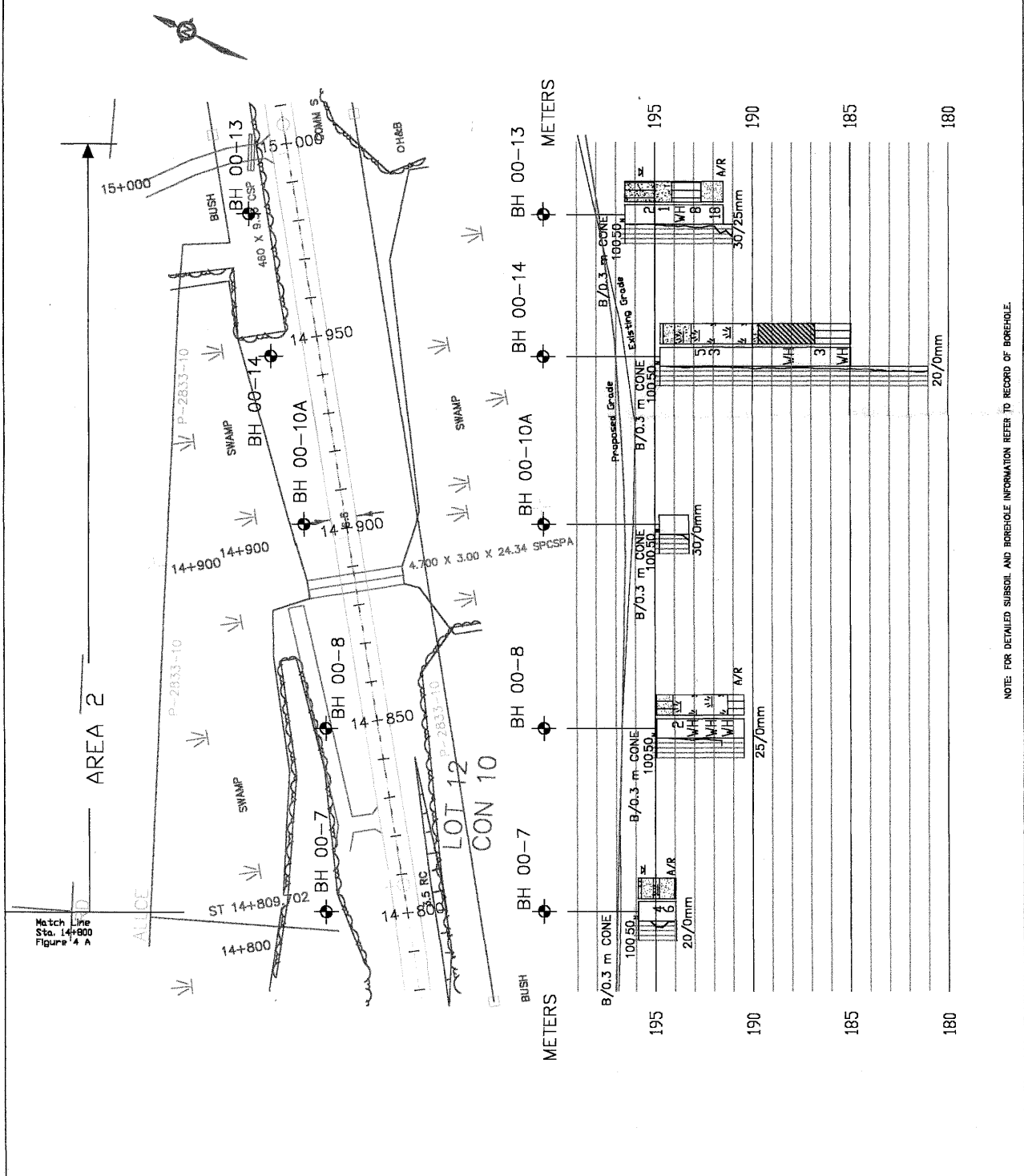
NOTE: FOR DETAILED SUBSOL AND BOREHOLE INFORMATION REFER TO RECORD OF BOREHOLE.





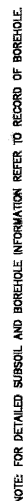
CONT. NO. 85-89-00  
 W.P. NO. 85-89-00  
 HWY 518  
 FOUNDATION INVESTIGATION - AREA 2  
 BOREHOLE LOCATIONS AND SOIL STRATA



FIGURE  
 4 B I



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NOTE: FOR DETAILED SUBSOIL AND BOREHOLE INFORMATION REFER TO RECORD OF BOREHOLE.



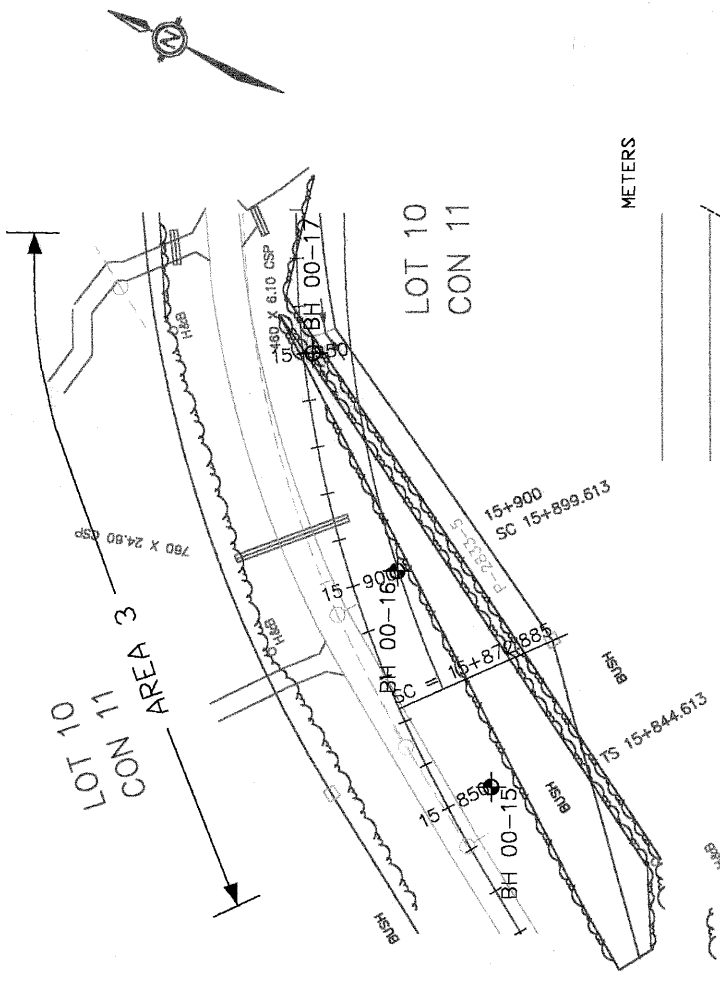
LEGEND			
	Borehole and Dynamic Cone Penetration Test		
	Borehole		
	N Blows/0.3 m		
	sz Water Level at Time of Investigation		
	VR Auger Refusal at Elevation		
Borehole No.	Co-ordinates North East	Elevation	
BOREHOLE No. 00-9	5022360.156 270826.877	194.932	
BOREHOLE No. 00-10	5022381.646 270854.624	194.654	
BOREHOLE No. 00-11	5022408.811 270903.601	194.351	
BOREHOLE No. 00-12	5022424.022 270927.980	195.080	

NOTE 1  
The boundaries between soil strata have been established at the borehole locations only. The boundaries between boreholes are assumed based on borehole data.

**ER** **MERLEX ENGINEERING LTD,**  
Consulting Geotechnical Engineers

CONT NO.  
W.P. NO. 85-89-00

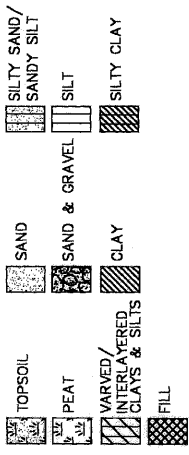
HWY 518  
FOUNDATION INVESTIGATION - AREA 1  
BOREHOLE LOCATIONS AND SOIL STRATA  
FIGURE  
5



SCALE



STRATIGRAPHY LEGEND



LEGEND

- Borehole and Dynamic Cone Penetration Test
- Borehole
- N Blows/0.3 m
- Water Level at Time of Investigation
- Auger Refusal at Elevation

Borehole No.	Co-ordinates North East	Elevation
BOREHOLE No. 00-15	5022799.947	271655.718
BOREHOLE No. 00-16	5022835.594	271687.986
BOREHOLE No. 00-17	5022870.979	271722.407

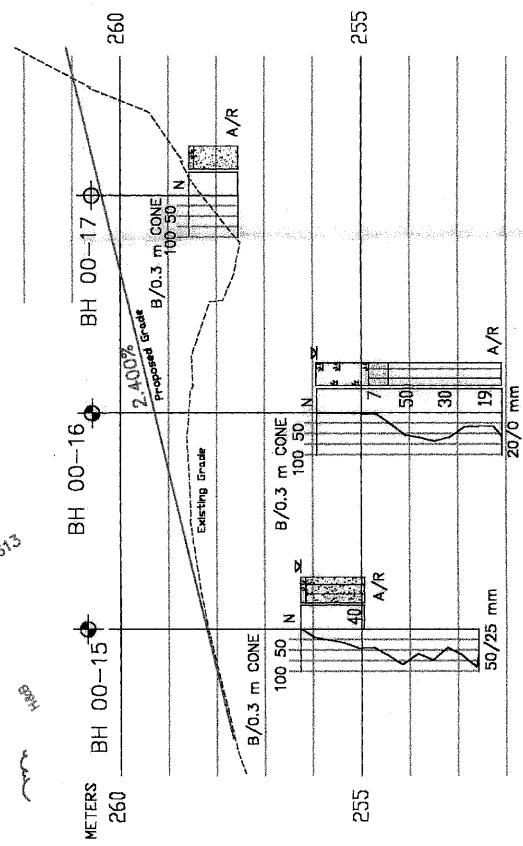
NOTE 1

The boundaries between soil strata have been established at the borehole locations only. The boundaries between boreholes are assumed based on borehole data.



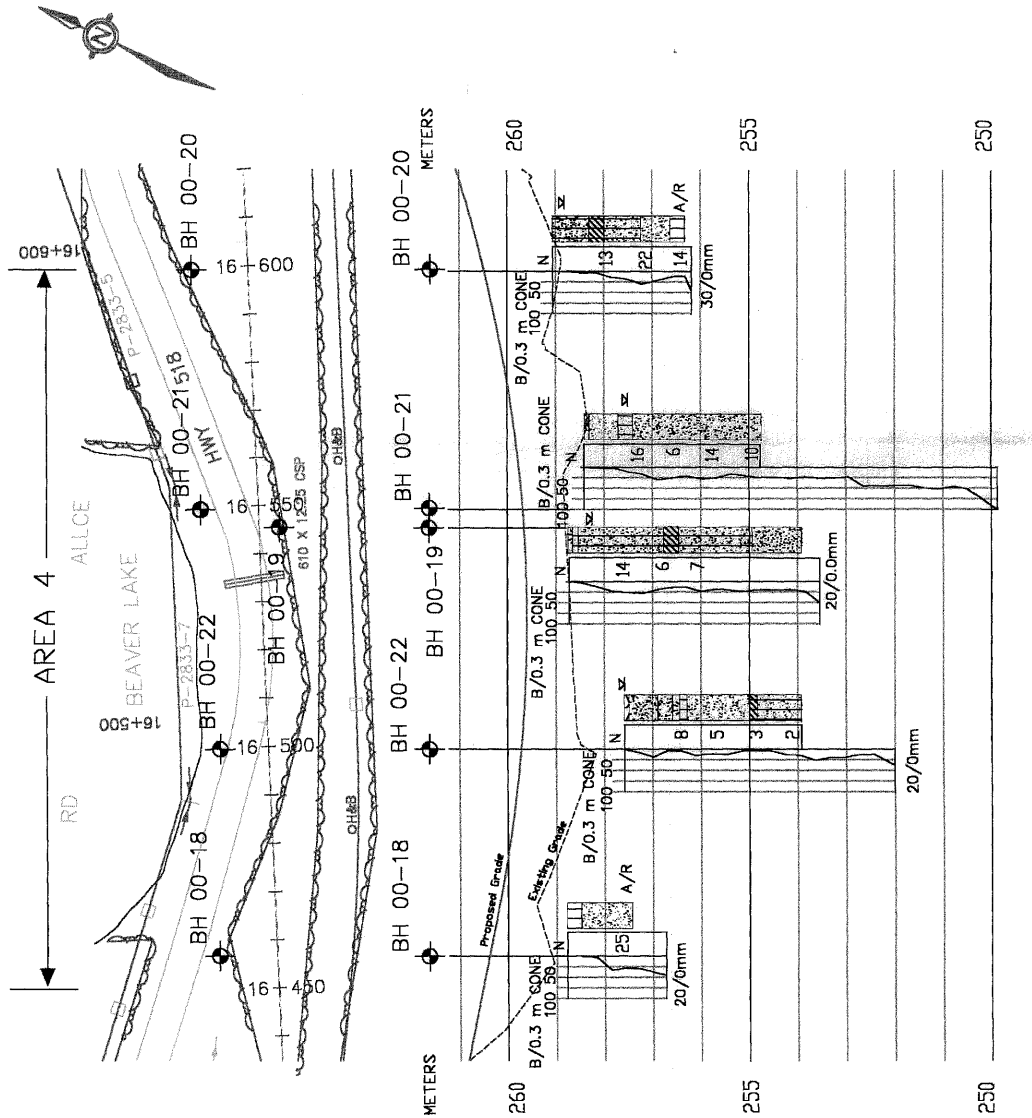
MERLEX ENGINEERING LTD.  
Consulting Geotechnical Engineers

PROJECT: HWY. 518, Foundation Investigation  
REFERENCE: NJ 00012F  
DATE: May 20, 2000  
DRAWN BY: MRS. CHECKED BY: MAM



NOTE: FOR DETAILED SUBSOIL AND BOREHOLE INFORMATION REFER TO RECORD OF BOREHOLE.

LOT 9  
 CON 11



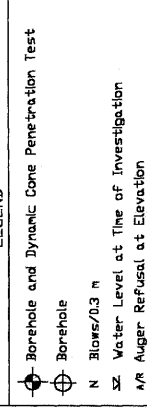
SCALE



STRATIGRAPHY LEGEND



LEGEND



Borehole No.	Coordinates	Elevation
BOREHOLE No. 00-18	5025966.517	272204.418
BOREHOLE No. 00-19	5025986.240	272200.082
BOREHOLE No. 00-20	5026025.123	272331.592
BOREHOLE No. 00-21	5026002.765	272287.268
BOREHOLE No. 00-22	5025978.269	272243.634
BOREHOLE No. 00-23	5025966.517	258.774
BOREHOLE No. 00-19	5025986.240	258.723
BOREHOLE No. 00-20	5026025.123	259.055
BOREHOLE No. 00-21	5026002.765	258.415
BOREHOLE No. 00-22	5025978.269	257.987

NOTE 1:

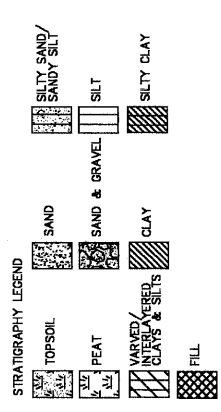
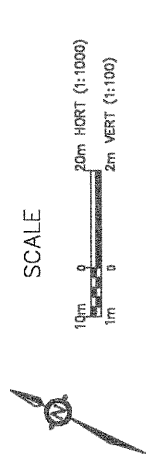
The boundaries between soil strata have been established at the borehole locations only. The boundaries between boreholes are assumed based on borehole data.



MERLEX ENGINEERING LTD.  
 Consulting Geotechnical Engineers

PROJECT: HWY. 518, Foundation Investigation	DATE: May 20, 2000
REFERENCE NO. 00012F	CHECKED BY: MAM
DRAWN BY: MAM	

NOTE: FOR DETAILED SUBSOIL AND BOREHOLE INFORMATION REFER TO RECORD OF BOREHOLE.

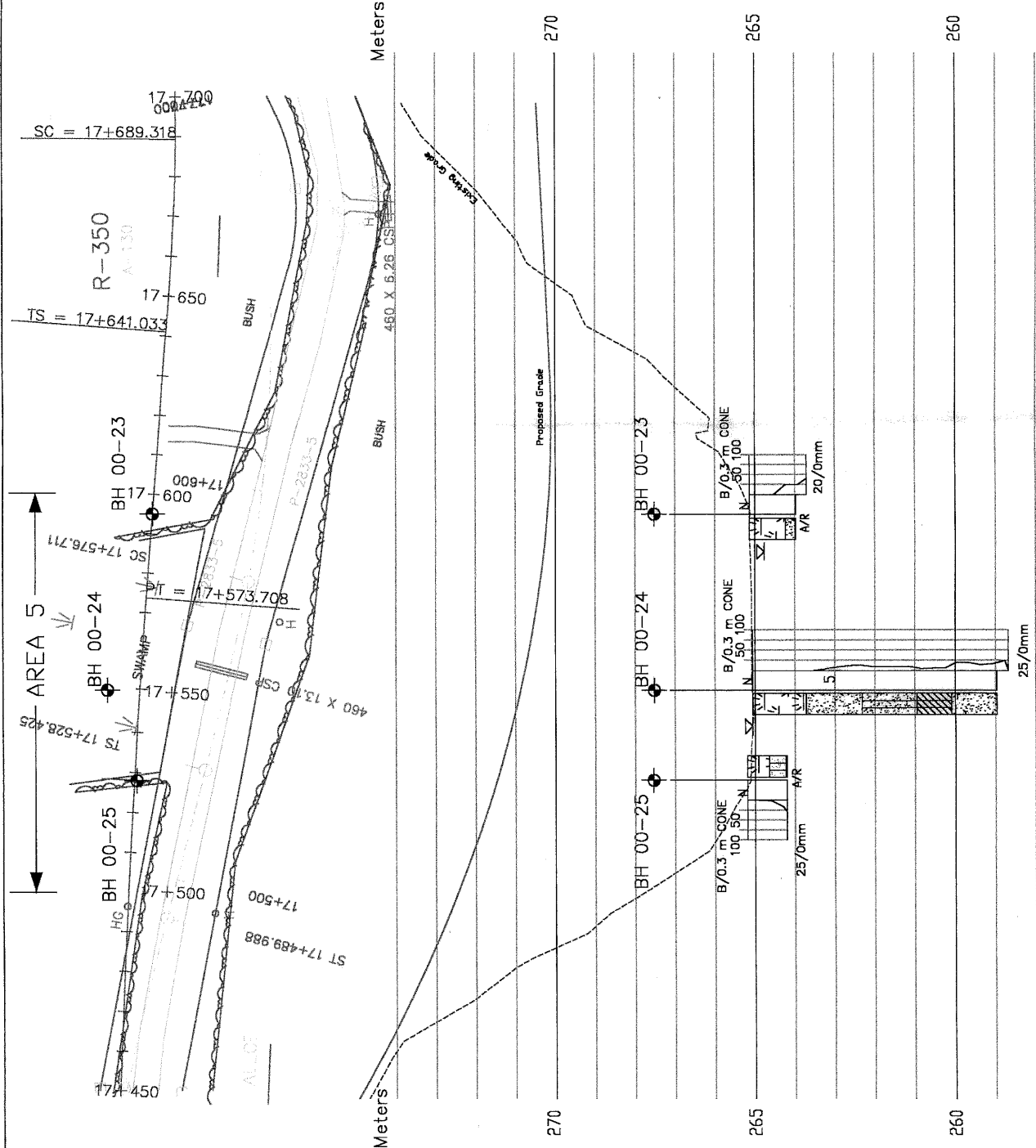


METRIC

LEGEND  
Borehole and Dynamic Cone Penetration Test  
Borehole  
N Blows/0.3 m  
SZ Water Level at Time of Investigation  
AR Auger Refusal at Elevation

Borehole No.	Co-Ordinates North East	Elevation
BOREHOLE No. 00-23	5023446.247	273233112
BOREHOLE No. 00-24	5023437.968	273188116
BOREHOLE No. 00-25	5023422.593	273170427

NOTE 1:  
The boundaries between soil strata have been established at the borehole locations only. The boundaries between boreholes are assumed based on borehole data.



NOTE: FOR DETAILED SUBSOIL AND BOREHOLE INFORMATION REFER TO RECORD OF BOREHOLE.

**FIGURE 8**  
**UNDRAINED SHEAR STRENGTH DESIGN CURVE - PEAT**

**Project:** Hwy 518, From 4 km E of Hwy 69, E'ly 4.2 km  
**G.W.P.:** 85-89-00

**Reference No:** 00/02/00012-F  
**Date:** June 6, 2000

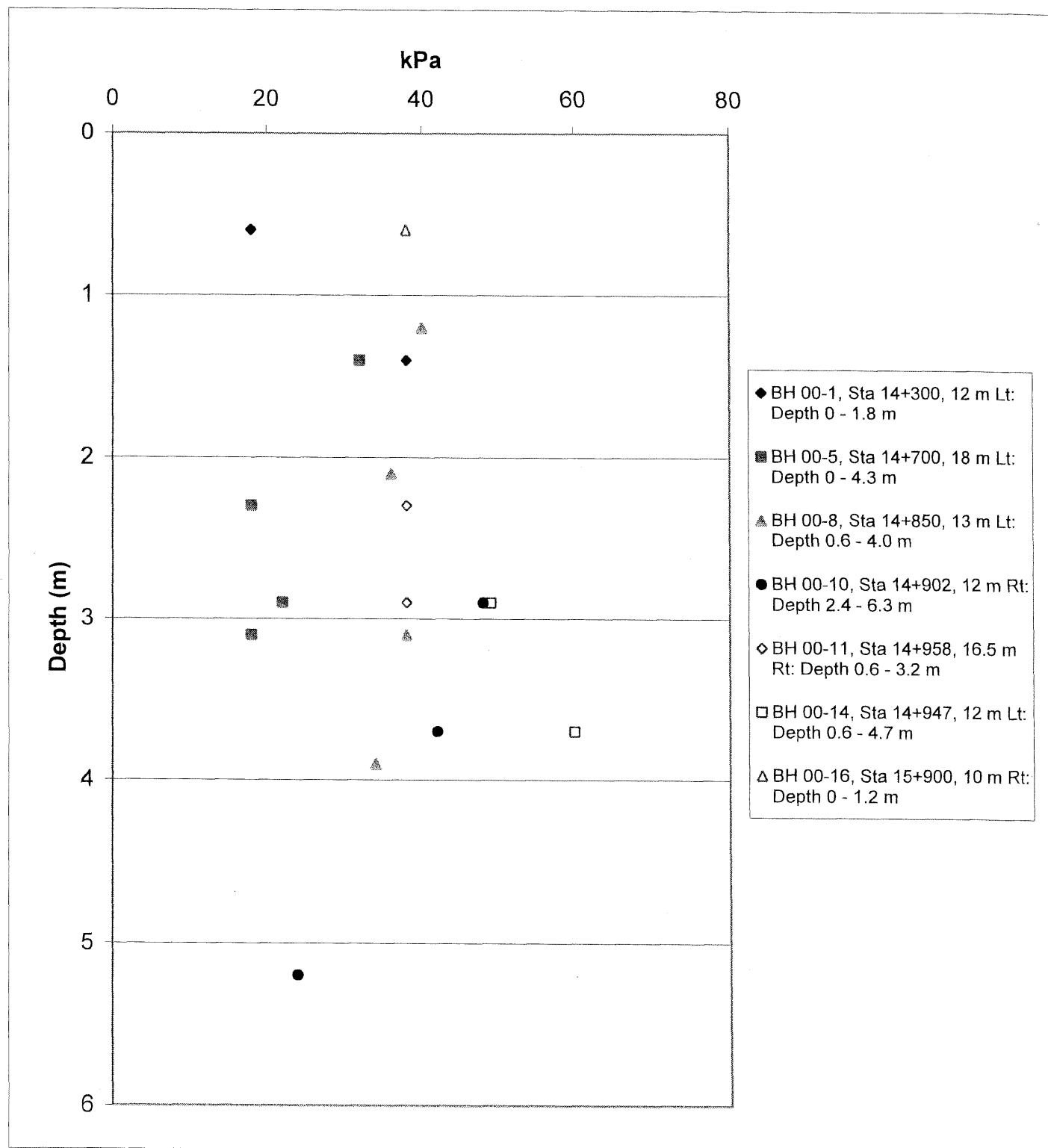
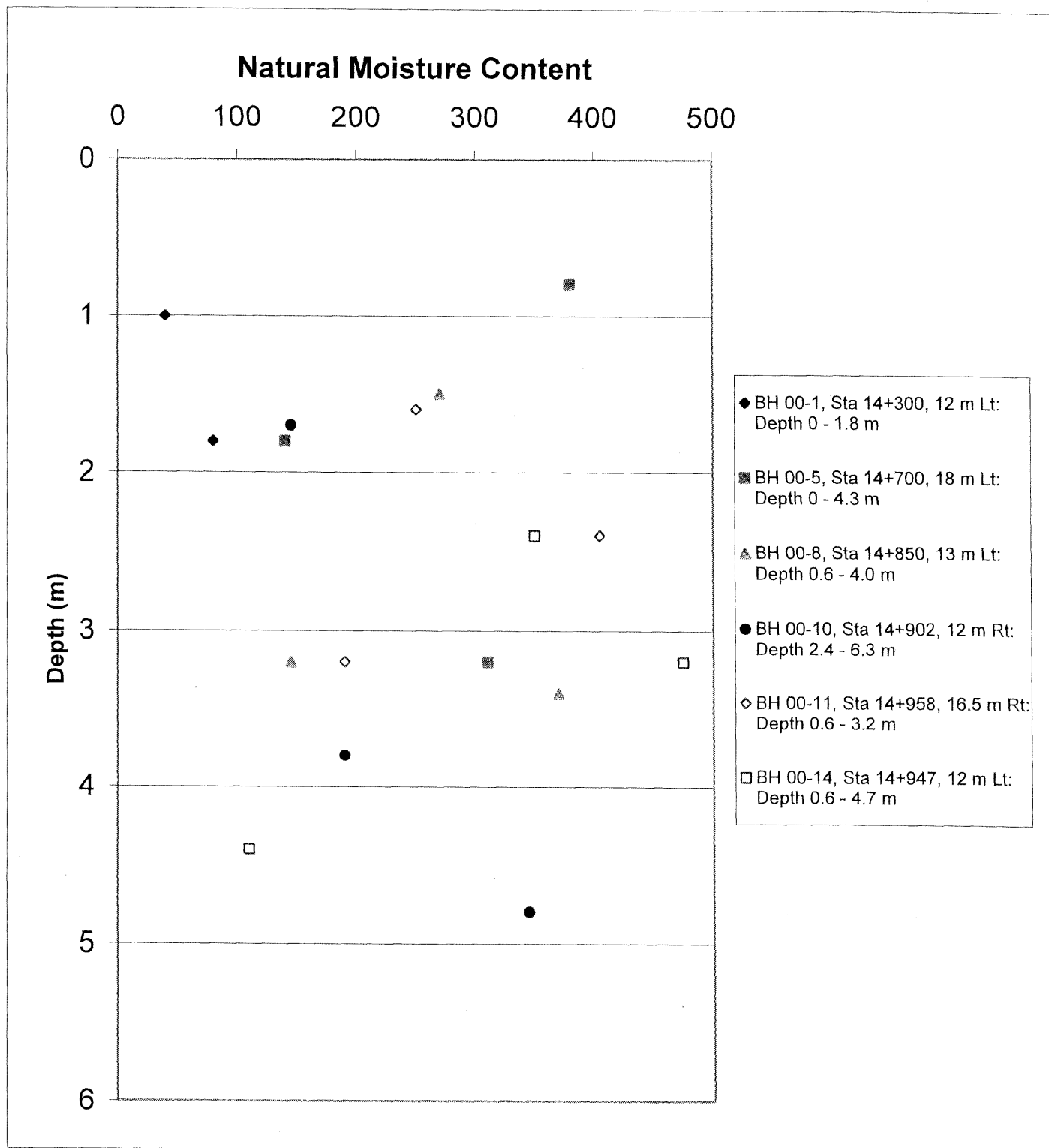


FIGURE 9  
NATURAL MOISTURE CONTENT - PEAT

Project: Hwy 518, From 4 km E of Hwy 69, E'ly 4.2 km  
G.W.P.: 85-89-00

Reference No: 00/02/00012-F  
Date: June 6, 2000

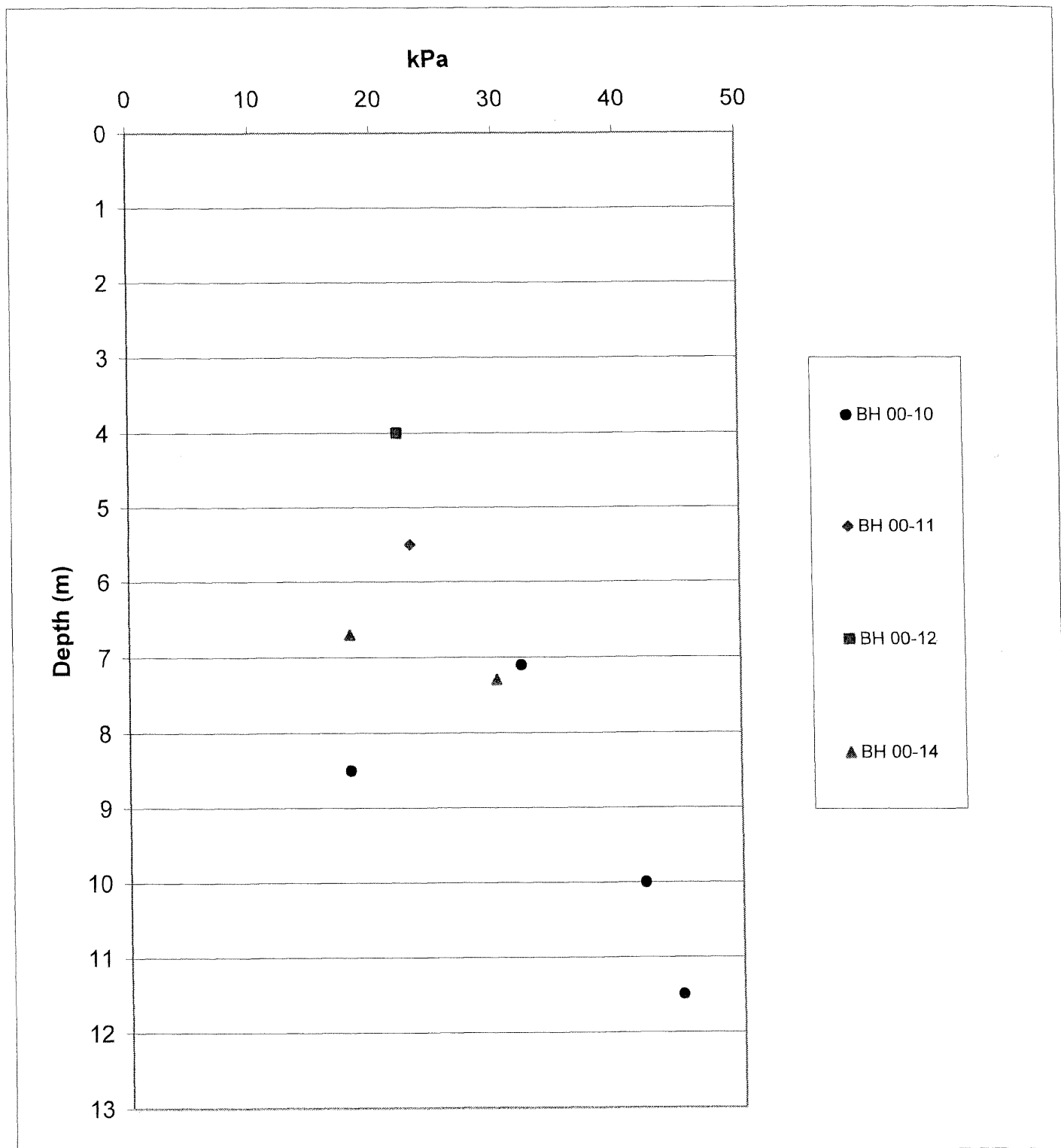




**FIGURE 10**  
**UNDRAINED SHEAR STRENGTH DESIGN CURVE - CLAY**

**Project:** Hwy 518, From 4 km E of Hwy 69, E'ly 4.2 km  
**G.W.P.:** 85-89-00

**Reference No:** 00/02/00012-F  
**Date:** June 6, 2000



## **APPENDIX A**

Laboratory Test Data

Figure A-1

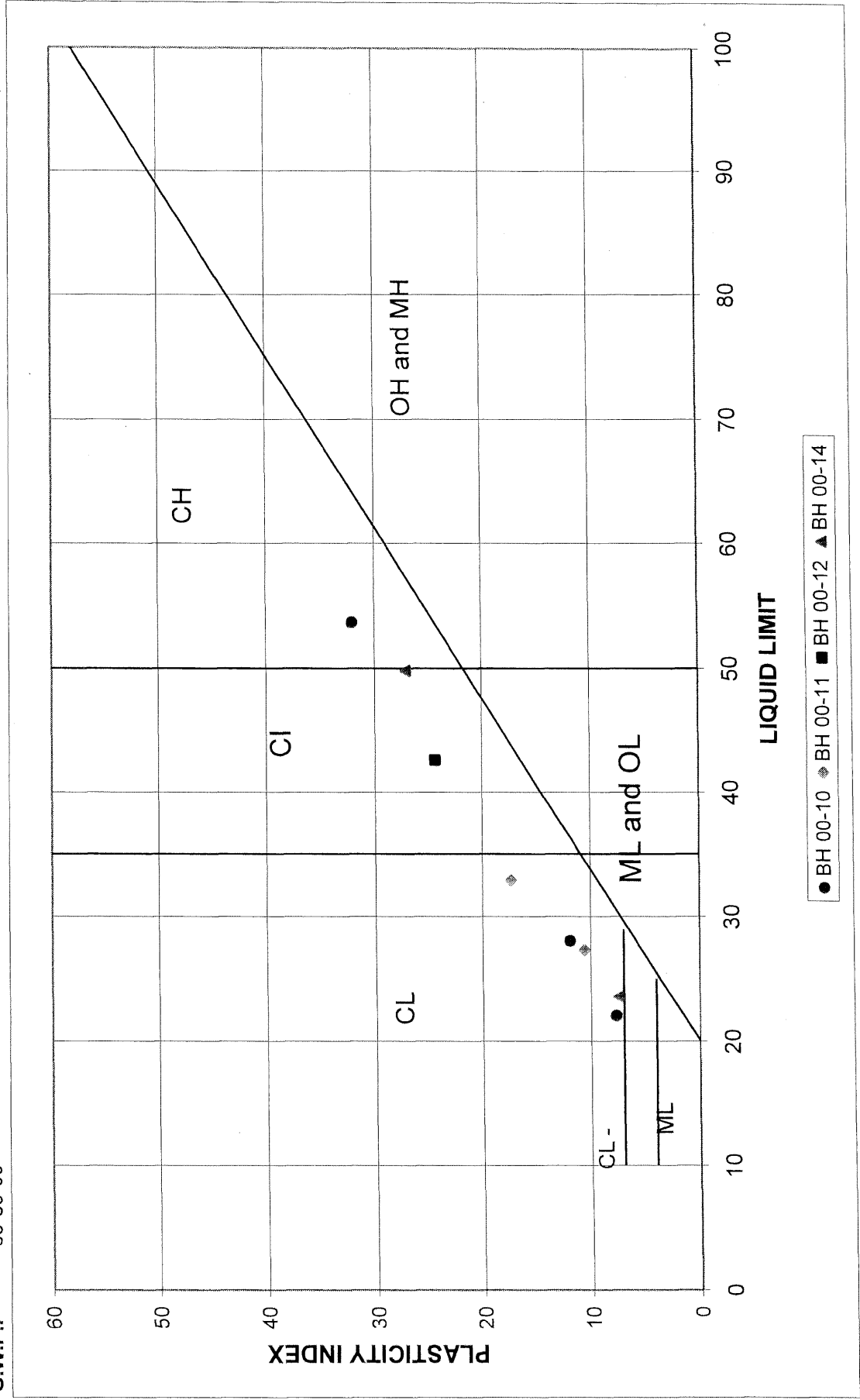
Figure A-2

Consolidation Test



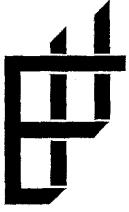
FIGURE A-1  
SUMMARY OF ATTERBERG LIMITS

Project: Hwy 518, From 4 km E of Hwy 69, E'ly 4.2 km  
G.W.P.: 85-89-00  
Reference: 00/02/00012-F  
Date: June 6, 2000



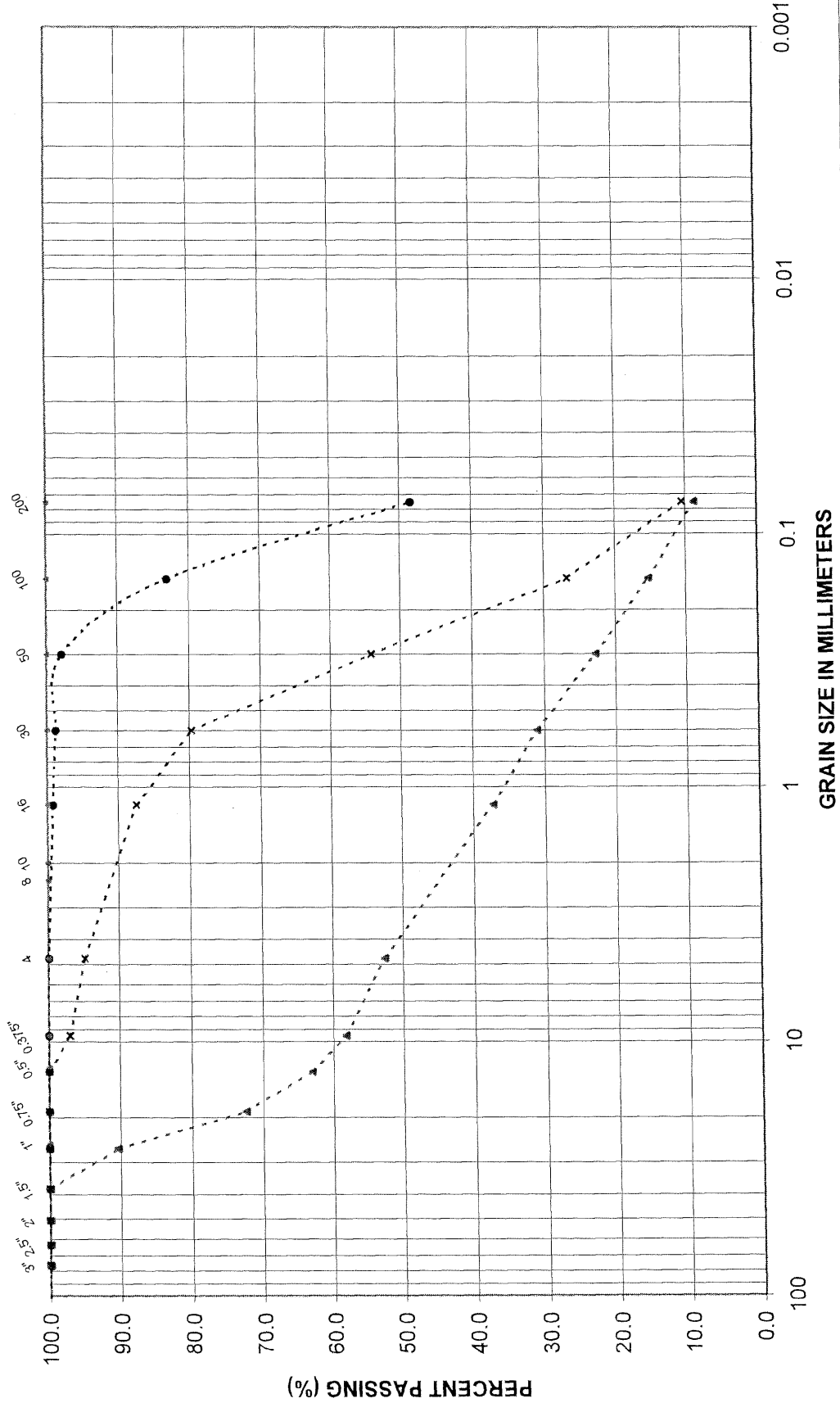
Reference No.: 00/02/00012-F  
Date: June 6, 2000

FIGURE A-2



# SUMMARY OF GRAIN SIZE ANALYSIS

GRAVEL		SAND			SILT & CLAY	
Coarse	Fine	Coarse	Medium	Fine		



---●--- BH 00-4, Sa 4A (2.3 - 2.7 m)      ---x--- BH No. 00-1, Sa 4 (2.3 - 2.7 m)      ---▲--- BH 00-9, Sa 1 (0.3 - 0.6 m)

PROJECT: Hwy 518, From 4.0 km E of Hwy 69, E'ly 4.2 km, Foundation Component

MERLEX ENGINEERING LTD.

# OEDOMETER CONSOLIDATION SUMMARY

## SAMPLE IDENTIFICATION

Project Number	001-101025	Sample Number	9
Borehole Number	10	Sample Depth, m	10.7-11.3

## TEST CONDITIONS

Test Type	Standard	Load Duration, hr	24
Oedometer Number	7		
Date Started	00-05-19		
Date Completed	00-05-29		

## SAMPLE DIMENSIONS AND PROPERTIES - INITIAL

Sample Height, cm	1.27	Unit Weight, kN/m <sup>3</sup>	16.69
Sample Diameter, cm	4.97	Dry Unit Weight, kN/m <sup>3</sup>	10.71
Area, cm <sup>2</sup>	19.36	Specific Gravity, assumed	2.70
Volume, cm <sup>3</sup>	24.49	Solids Height, cm	0.512
Water Content, %	55.79	Volume of Solids, cm <sup>3</sup>	9.91
Wet Mass, g	41.69	Volume of Voids, cm <sup>3</sup>	14.58
Dry Mass, g	26.76	Degree of Saturation, %	102.4

## TEST COMPUTATIONS

Pressure kPa	Corr. Height cm	Void Ratio	Average Height cm	t <sub>90</sub> sec	cv, cm <sup>2</sup> /s	mv m <sup>2</sup> /kN	k cm/s
0.00	1.265	1.471	1.265				
9.97	1.258	1.457	1.261	44	7.67E-03	5.87E-04	4.41E-07
20.00	1.250	1.442	1.254	38	8.77E-03	5.75E-04	4.95E-07
40.00	1.244	1.430	1.247	86	3.83E-03	2.45E-04	9.21E-08
80.01	1.233	1.409	1.239	28	1.16E-02	2.19E-04	2.50E-07
160.01	1.140	1.227	1.186	151	1.98E-03	9.21E-04	1.78E-07
320.02	1.017	0.986	1.078	357	6.90E-04	6.09E-04	4.12E-08
639.99	0.937	0.830	0.977	137	1.48E-03	1.97E-04	2.85E-08
1279.98	0.866	0.692	0.902	60	2.87E-03	8.71E-05	2.45E-08
2559.95	0.806	0.574	0.836	37	4.00E-03	3.74E-05	1.47E-08
640.01	0.823	0.607	0.814				
80.01	0.860	0.679	0.841				
10.01	0.901	0.759	0.880				

Notes:

k calculated using cv based on t<sub>90</sub> values.

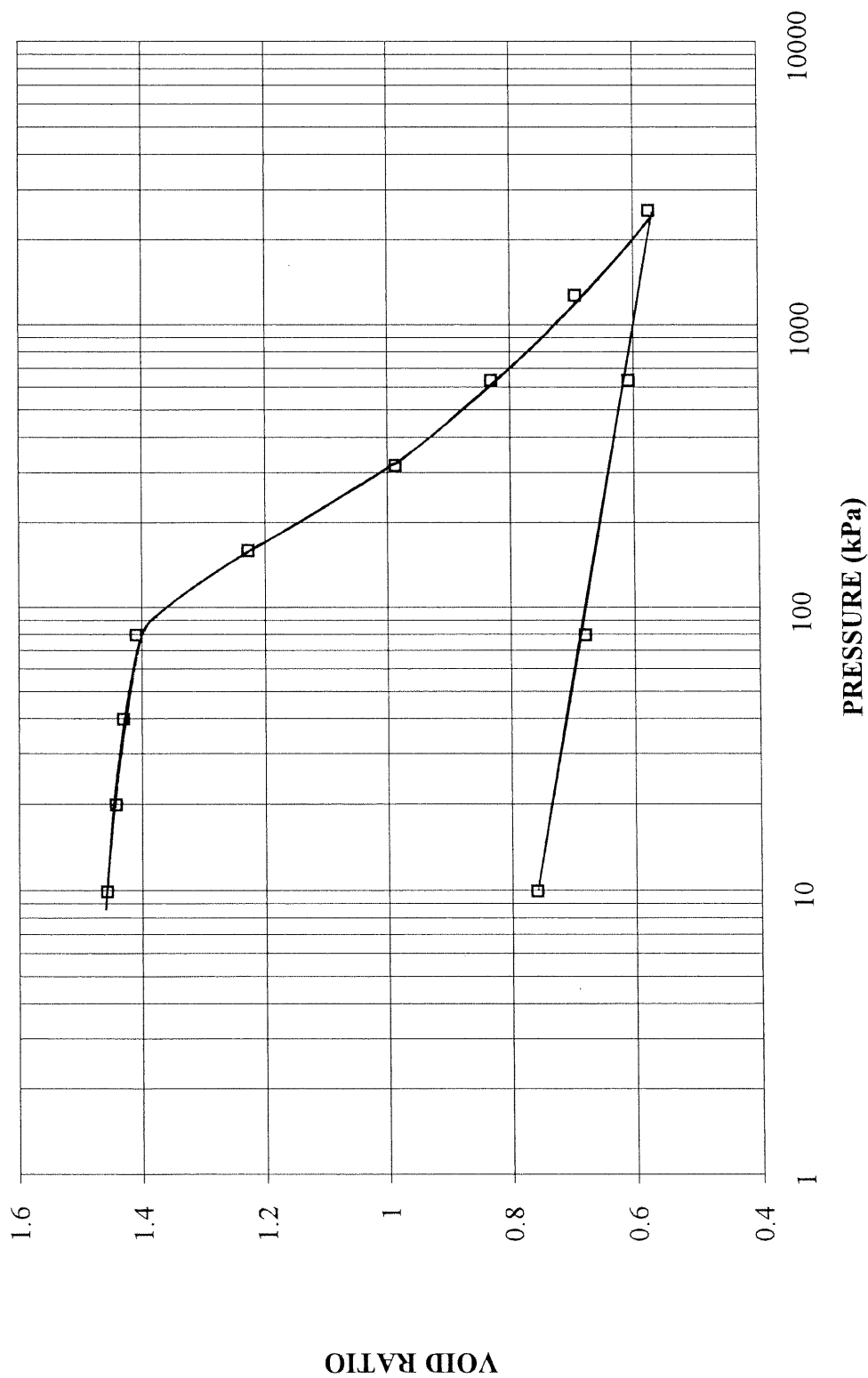
## SAMPLE DIMENSIONS AND PROPERTIES - FINAL

Sample Height, cm	0.90	Unit Weight, kN/m <sup>3</sup>	19.51
Sample Diameter, cm	4.97	Dry Unit Weight, kN/m <sup>3</sup>	15.04
Area, cm <sup>2</sup>	19.36	Specific Gravity, assumed	2.70
Volume, cm <sup>3</sup>	17.44	Solids Height, cm	0.512
Water Content, %	29.71	Volume of Solids, cm <sup>3</sup>	9.91
Wet Mass, g	34.71	Volume of Voids, cm <sup>3</sup>	7.53
Dry Mass, g	26.76		

CONSOLIDATION TEST  
VOID RATIO VS. LOG PRESSURE

FIGURE

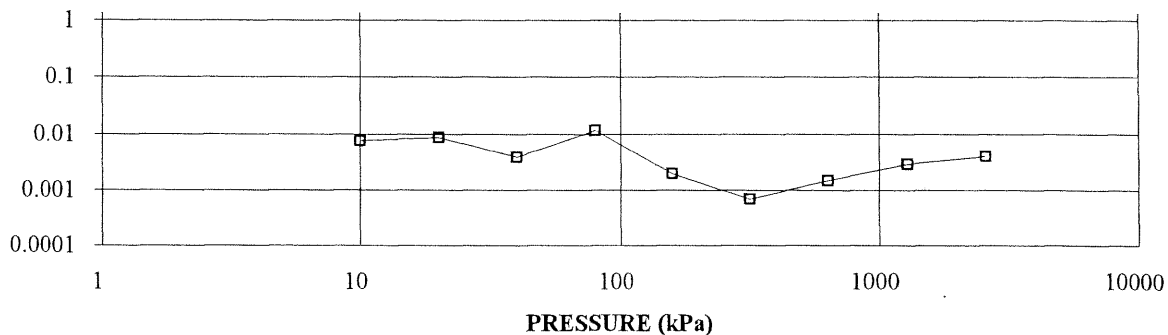
CONSOLIDATION TEST  
VOID RATIO vs LOG. PRESSURE  
BH 10 SA 9



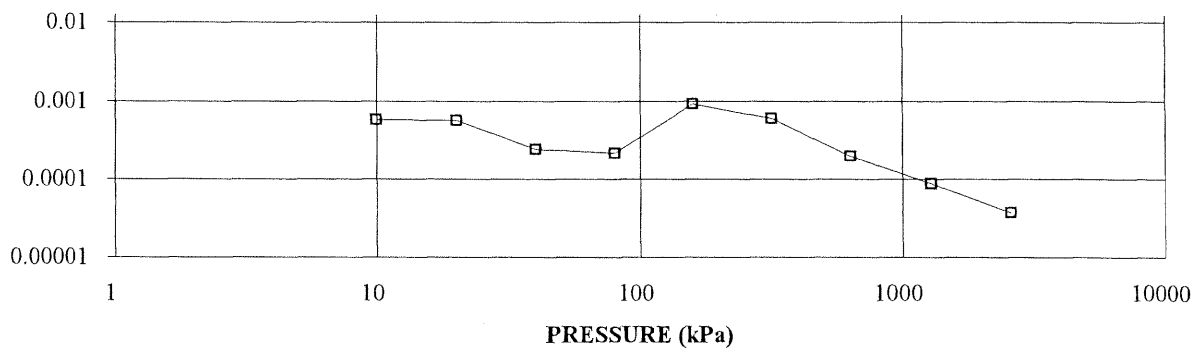
## OEDOMETER CONSOLIDATION SUMMARY

COEFFICIENT OF CONSOLIDATION,  $\text{cm}^2/\text{s}$ 

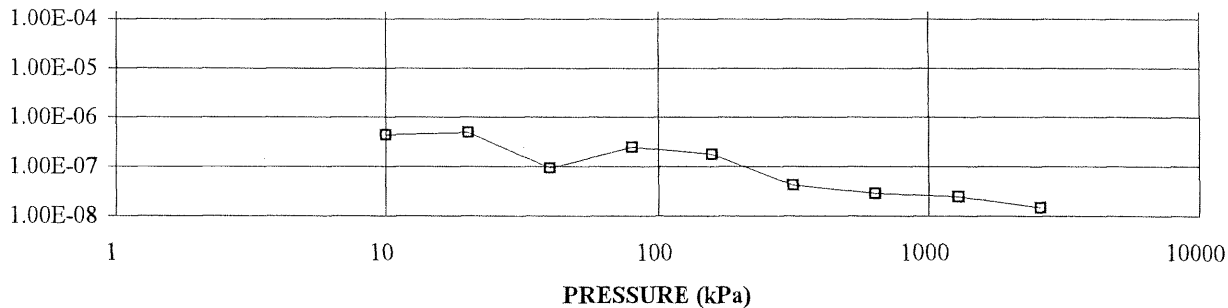
CONSOLIDATION TEST  
LOG.  $c_v \text{ cm}^2/\text{s}$  vs LOG. PRESSURE (kPa)  
BH 10 SA 9

VOLUME  
COMPRESSIBILITY,  
 $\text{m}^2/\text{kN}$ 

CONSOLIDATION TEST  
LOG.  $m_v, \text{m}^2/\text{kN}$  vs LOG. PRESSURE (kPa)  
BH 10 SA 9

HYDRAULIC  
CONDUCTIVITY,  $\text{cm}/\text{s}$ 

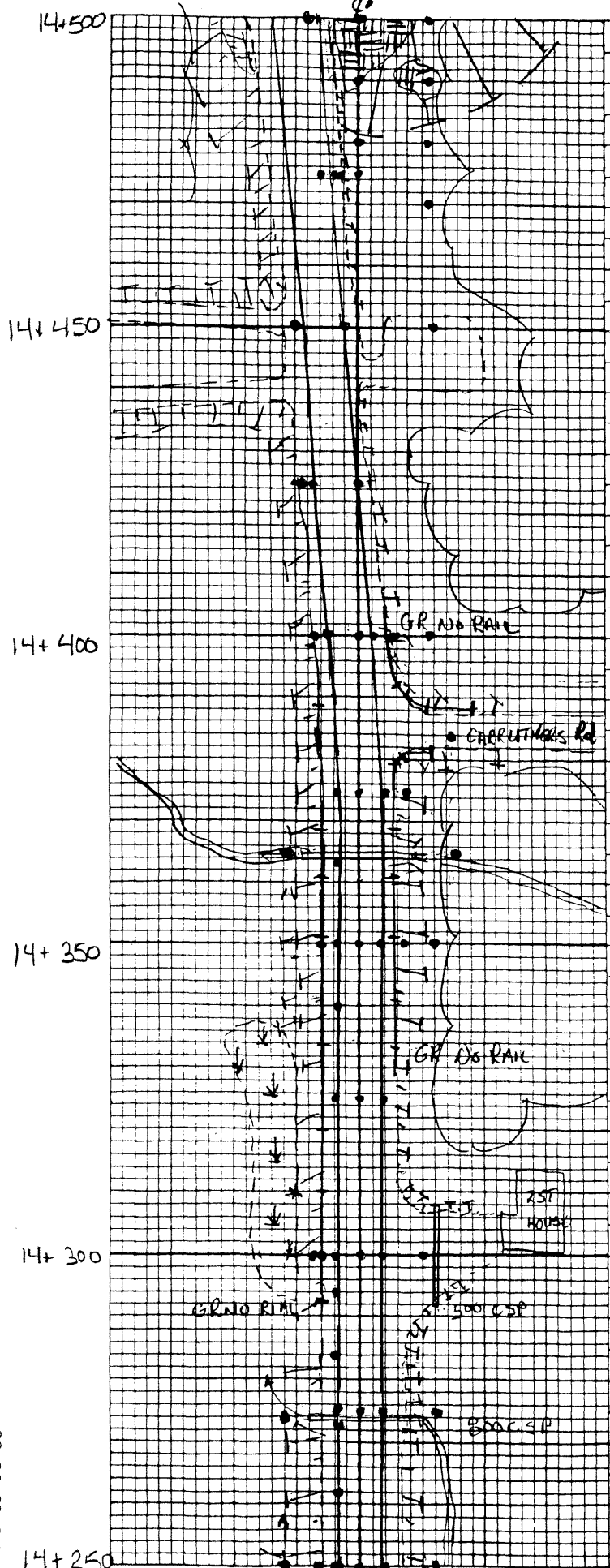
CONSOLIDATION TEST  
HYDRAULIC CONDUCTIVITY vs LOG. PRESSURE  
BH 10 SA 9



## **APPENDIX B**

Geotechnical Data and Pedo - Area 1  
Geotechnical Data and Pedo - Area 2  
Geotechnical Data and Pedo - Area 3  
Geotechnical Data and Pedo - Area 4  
Geotechnical Data and Pedo - Area 5





AREA 1

PH-D-25 90-08

W.P. 85-89-00  
HWY 518  
FROM 4.0 KM E OF HWY 69, E'LY 4.2 KM

TOWNSHIP OF FOLEY

AREA 1: Station 14+300 to 14+450

14+300	7.0 m Lt C/L	D-800
0 - 150	Si Sa Org	
50 - 500	Med F Sa	
500	NFP Sh Rk	
14+300	6.0 m Lt C/L	D0
0 - 500	Med F Sa	
500	NFP Sh Rk	
14+300	3.6 m Lt C/L	D0
0 - 50	PST	
50 - 150	Cr Gr	
150 - 700	Med F Sa Tr Gr Tr Si	
	00ELS111	
	Accep GRANULAR B TYPE I	
1.0	NFP Sh Rk	
14+300	On C/L	
0 - 40	PST	
40 - 90	Cr Gr	
90 - 1.0	Med F Sa Tr Gr Tr Si	
	00ELS107	
	Accep GRANULAR B TYPE I	
1.0	NFP Sh Rk	
14+300	3.5 m Rt C/L	D0
0 - 60	PST	
60 - 110	Cr Gr	
110 - 1.5	Med F Sa Tr Gr Tr Si	
1.5 - 2.0	Si Some F Sa, wet	
14+300	10.0 m Rt C/L	D-200
0 - 1.0	Med F Sa Tr Gr Tr Si	
	wet @ 300	
1.0	NFP Bld	
14+325	3.6 m Lt C/L	D0
0 - 50	PST	
50 - 130	Cr Gr	
130 - 800	Med F Sa Tr Gr Tr Si	
800	NFP Sh Rk	

14+325	On C/L
0 - 50	PST
50 - 110	Cr Gr
110 - 750	Med F Sa Tr Gr Tr Si
750	NFP Sh Rk
14+325	3.5 m Rt C/L D0
0 - 60	PST
60 - 110	Cr Gr
110 - 750	Med F Sa
750	NFP Sh Rk
14+340	3.8 m Lt C/L D0
0 - 50	PST
50 - 140	Cr Gr
140 - 550	Med F Sa Tr Gr Tr Si
550	NFP Sh Rk
14+350	6.0 m Lt C/L D-200
0 - 100	Si Sa Org
100 - 500	Med F Sa Tr Gr Tr Si
500	NFP Sh Rk
14+350	3.8 m Lt C/L D0
0 - 50	PST
50 - 140	Cr Gr
140 - 500	Med F Sa Tr Gr Tr Si
500	NFP Sh Rk
14+350	On C/L
0 - 50	PST
50 - 110	Cr Gr
110 - 750	Med F Sa Tr Gr Tr Si
750	NFP Sh Rk
14+350	3.5 m Rt C/L D0
0 - 60	PST
60 - 110	Cr Gr
110 - 700	Med F Sa Tr Gr Tr Si
700	NFP Sh Rk
14+350	7.0 m Rt C/L D-1.3
0 - 100	Si Sa Org, wet
100 - 900	Med F Sa Tr Gr Tr Si, wet
900	NFP Sh Rk

14+350	12.0 m Rt C/L	D-3.7	14+400	7.8 m Lt C/L	D-500
0 - 200	Si Sa Org, wet		0 - 100	Si Sa Org	
200 - 1.2	Si Sa, wet		100 - 400	Med F Sa Tr Gr Tr Si	
1.2	NFP Bld		400	NFP Sh Rk	
14+364	3.8 m Lt C/L	D0	14+400	5.0 m Lt C/L	D0
0 - 50	PST		0 - 50	PST	
50 - 140	Cr Gr		50 - 140	Cr Gr	
140 - 600	Med F Sa Tr Gr Tr Si		140 - 400	Med F Sa Tr Gr Tr Si	
600	NFP Sh Rk		400 - 1.6	Si Sa Gr Sh Rk mix (wet)	
			1.6	NFP Sh Rk	
14+365	12.0 m Lt C/L	D-4.3	14+400	On C/L	
0 - 300	Si Sa Org		0 - 60	PST	
300 - 900	Si Sa W Cl, wet		60 - 160	Cr Gr	
900	NFP Bld		160 - 500	Med Sa Tr Gr Tr Si	
			500	NFP Sh Rk	
14+365	15.0 m Rt C/L	D-4.1	14+400	2.0 m Rt C/L	D0
0 - 200	Si Sa Org		0 - 80	PST	
200 - 1.3	F Sa W Si, wet		80 - 130	Cr Gr	
1.3	NFP Bld		130 - 700	Med F Sa Tr Gr Tr Si	
14+375	3.6 m Lt C/L	D0	700	NFP Sh Rk	
0 - 50	PST		14+400	4.0 m Rt C/L	D-700
50 - 140	Cr Gr		0 - 250	Si Sa Org	
140 - 600	Med F Sa Tr Gr Tr Si		250 - 600	F Sa W Si	
600	NFP Sh Rk			00ELS109	
14+375	On C/L			w @ 600 = 29.9%	
0 - 40	PST			% Passing 4.75 mm = 100	
40 - 110	Cr Gr			2.00 mm = 99	
110 - 510	Med F Sa Tr Gr Tr Si			425 um = 96	
510	NFP Sh Rk			75 um = 79	
				5 um = 19 HSFH	
14+375	3.5 m Rt C/L	D0		2 um = 14	
0 - 90	PST			'K' Factor = 0.53	
90 - 500	Med F Sa Tr		600 - 1.5	Sh Rk Si mix	
500 - 1.0	Sh Rk Sa mix		1.5	NFP Sh Rk	
1.0	NFP Sh Rk		14+400	5.0 m Rt C/L	D-300
14+375	7.5 m Rt C/L	D-1.0	0 - 150	Si Sa Org	
0 - 200	Si Sa Org		150	NFP Sh Rk	
200 - 500	Med F Sa Tr Gr Tr Si		14+400	11.0 m Rt C/L	D-2.2
500 - 700	F Sa W Si		0 - 100	Si Sa Org	
700	NFP Sh Rk		100 - 1.5	Si Sa W Cl	
14+384	15.0 m Rt C/L	D-100		wet @ 500	
0 - 50	Cr Gr				
50 - 700	Med F Sa Sh Rk mix				
700	NFP Sh Rk				

14+425                      9.0 m Lt C/L                      D0

0       -    150              Cr Gr  
150   -    700              Med F Sa Tr Gr Tr Si  
700                          NFP Sh Rk

14+425                      7.0 m Lt C/L                      D0

0       -    50                PST  
50      -    140              Cr Gr  
140   -    750              Med F Sa Tr Gr Tr Si  
750                          NFP Sh Rk

14+425                      On C/L

0       -    50                PST  
50      -    110              Cr Gr  
110   -    500              Med F Sa Tr Gr Tr Si  
500   -    1.2              Med F Sa Sh Rk mix  
1.2                          NFP Sh Rk

14+450                      10.0 m Lt C/L                      D0

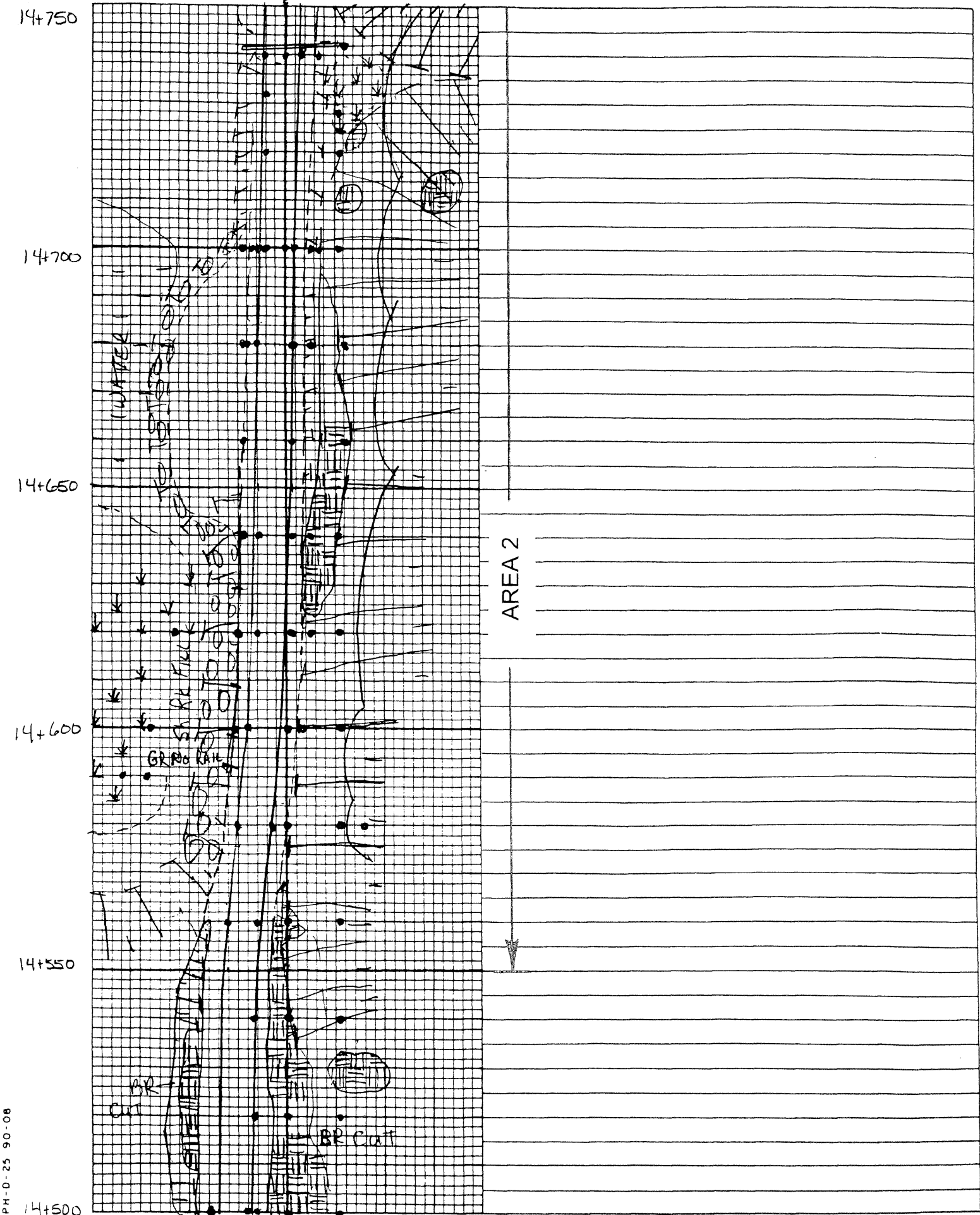
0       -    100              Cr Gr  
100   -    600              Med F Sa Tr Gr Tr Si  
600   -    1.8              Cl Si  
1.8      -    2.0              Si Tr F Sa

14+450                      2.0 m Lt C/L                      D0

0       -    50                PST  
50      -    110              Cr Gr  
110   -    800              Med F Sa Tr Gr Tr Si  
                             wet @ 800  
800   -    1.2              Si Cl  
1.2      -    2.0              F Sa W Si

14+450                      12.0 m Rt /C/L                      D0

0       -    200              F Sa Some Si  
200   -    2.0              Cl W Si



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TWP. Foley

W.P. NO. 85-89-00

DATE March 28/2000 <sup>77</sup>

15+000

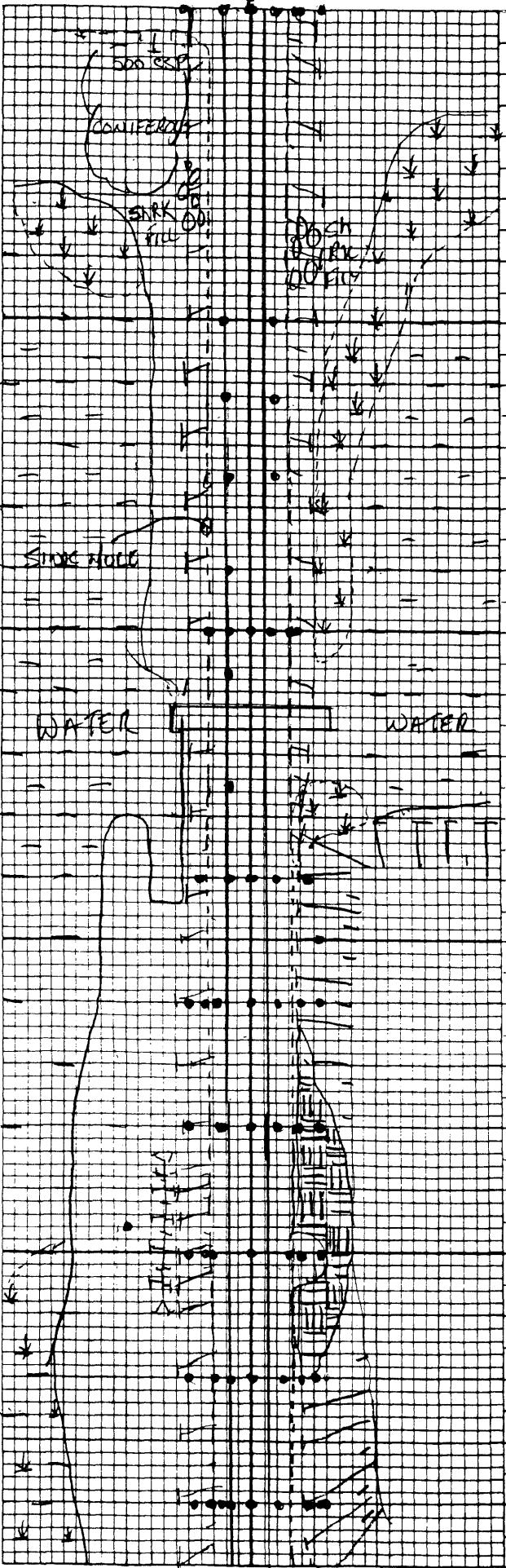
14+950

14+900

14+850

14+800

14+750



AREA 2

3  
25  
3

HWY. NO. 518

LOCATION From 4.0 to 8.2km East of Hwy 69

ENGINEER ELS

W.P. 85-89-00  
 HWY 518  
 FROM 4.0 KM E OF HWY 69, E'LY 4.2 KM  
 TOWNSHIP OF FOLEY

AREA 2: Station 14+550 to 15+000

14+560	12.0 m Lt C/L	D0	14+580	16.0 m Rt C/L	D+1.7
0 - 40	PST		0 - 300	Si Sa Org	
40 - 140	Cr Gr		300 - 1.4	Si F Sa Tr Gr	
140 - 600	Med F Sa Tr Gr Tr Si		1.4	NFP Bld/BR	
600	NFP Sh Rk/BR				
14+560	6.5 m Lt C/L	D-6.0	14+590	34.0 m Lt C/L	D-6.3
0 - 40	PST		0 - 200	water	
40 - 140	Cr Gr		200 - 2.2	Muck Amor	
140 - 400	Med F Sa Tr Gr Tr Si		2.2 - 2.5	Med F Sa	
400	NFP Sh Rk/BR				
14+560	On C/L		14+590	29.0 m Lt C/L	D-6.3
0	NFP BR		0 - 100	Si Sa Org	
40 - 140			100 - 400	wet @ Surf	
140 - 400	Med F Sa Tr Gr Tr Si		400	Med F Sa W Gr	
400	NFP Sh Rk/BR			NFP Bld	
14+560	On C/L		14+600	28.0 m Lt C/L	D-6.3
0	NFP BR		0 - 200	water	
14+560	11.0 m Rt C/L	D+2.3	200 - 2.2	Muck Amor	
0	NFP BR		2.2 - 2.5	Med F Sa Tr Gr	
14+580	10.0 m Lt C/L	D0	14+600	11.0 m Lt C/L	D0
0 - 40	PST		0 - 50	Cr Gr	
40 - 150	Cr Gr		50 - 700	Med F Sa Tr Gr Tr Si	
150 - 700	Med F Sa Tr Gr Tr Si		700	NFP Sh Rk	
700	NFP Sh Rk		14+600	8.0 m Lt C/L	D0
14+580	3.2 m Lt C/L	D+300	0 - 40	PST	
0 - 40	PST		40 - 110	Cr Gr	
40 - 150	Cr Gr		110 - 750	Med F Sa Tr Gr Tr Si	
150 - 500	Med F Sa Tr Gr Tr Si		750	NFP Sh Rk	
500	NFP Sh Rk/BR		14+600	On C/L	
14+580	On C/L		0 - 120	Cr Gr	
0 - 350	Med F Sa Tr Gr Tr Si		120 - 800	Med F Sa Tr Gr Tr Si	
350 - 1.7	F Sa Some Si Tr Sh Rk		800	NFP Sh Rk/BR	
1.7	wet @ 1.0		14+600	3.5 m Rt C/L	D-500
	NFP Sh Rk		0 - 100	Si Sa Org	
14+580	11.0 m Rt C/L	D+1.5	100 - 1.3	Med F Sa Some Gr Some Si	
0 - 300	Si Sa Org		1.3	NFP Bld/BR	
300 - 900	Si Sa Tr Gr (wet)				
900	NFP Bld/BR				

14+600	11.0 m Rt C/L	D+2.1	14+620	11.0 m Rt C/L	D+2.9
0 - 100	Si Sa Org		0 - 200	Si Sa Org Tr Gr	
100 - 300	Si F Sa, wet		200	NFP Bld BR	
	00ELS102				
	w @ 200 = 20.3%		14+640	9.0 m Lt C/L	D-400
	% Passing 4.75 mm = 94		0 - 120	Cr Gr	
	2.00 mm = 88		120 - 400	Med F Sa Tr Gr Tr Si	
	425 um = 78		400	NFP Sh Rk	
	75 um = 30				
	5 um = 5 LSFH		14+640	6.0 m Lt C/L	D0
	2 um = 3		0 - 40	PST	
	'K' Factor = 0.18		40 - 150	Cr Gr	
300	NFP Bld		150 - 650	Med F Sa Tr Gr Tr Si	
14+620	23.0 m Lt C/L	D-5.0	650	NFP Sh Rk	
0 - 200	Wat		14+640	1.0 m Rt C/L	D0
200 - 3.3	Muck Amour		0 - 50	PST	
14+620	10.0 m Lt C/L	D-1.5	50 - 250	Cr Gr	
0 - 100	Si Sa Org		250 - 800	Med F Sa Tr Gr Tr Si	
100 - 400	Si Sa		800	NFP Sh Rk	
400	NFP Sh Rk		14+640	5.0 m Rt C/L	D-500
14+620	6.0 m Lt C/L	D0	0 - 100	Si Sa Org	
0 - 50	Cr Gr		100 - 1.0	Med F Sa Tr Gr Tr Si	
50 - 150	Med F Sa Tr Gr Tr Si		1.0	NFP Sh Rk/BR	
150	NFP Sh Rk			Rock Face @ 5.5 Rt	
14+620	1.0 m Rt C/L	D0	14+640	11.0 m Rt C/L	D+9.0
0 - 50	PST		0	NFP BR	
50 - 170	Cr Gr		14+660	9.0 m Lt C/L	D0
	00ELS113		0 - 150	Cr Gr	
	NOT Accep GRANULAR A		150 - 500	Med F Sa Tr Gr Tr Si	
	95% PASSING 13.2 mm		500	NFP Sh Rk	
	82% PASSING 9.5 mm				
	67% PASSING 4.75 mm		14+660	1.0 m Rt C/L	D0
	50% PASSING 1.18 mm		0 - 70	PST	
	25% PASSING 300 um		70 - 650	Cr Gr	
	Accep GRANULAR B TYPE I		650 - 700	Med F Sa Tr Gr Tr Si	
170 - 650	Med F Sa Tr Gr Tr Si		700	NFP Sh Rk	
650	NFP Sh Rk/BR			Rock Face @ 6.0 m Rt	
14+620	5.0 m Rt C/L	D0	14+660	12.0 m Rt C/L	D+11.0
0 - 50	Si Sa Org		0	NFP BR	
50 - 300	Med F Sa Tr Gr Tr Si				
300 - 1.7	F Sa Some Si Some Gr				
	00ELS112				
	NOT Accep GRANULAR B TYPE I				
	8.5% PASSING 75 um				
	Accep SSM				
1.7	NFP Sh Rk				



14+680	9.0 m Lt C/L	D-700	14+700	4.0 m Lt C/L	D0
0 - 50	Si Sa Org		0 - 40	PST	
50 - 400	Med F Sa Tr Gr Tr Si		40 - 130	Cr Gr	
400	NFP Sh Rk		400 - 700	Med F Sa Tr Gr Tr Si	
			700	NFP Sh Rk	
14+680	8.0 m Lt C/L	D-700	14+700	On C/L	
0 - 400	Med F Sa Tr Gr Tr Si		0 - 120	PST	
400	NFP Sh Rk		120 - 250	Cr Gr	
14+680	6.0 m Lt C/L	D-400	250 - 700	Med F Sa Tr Gr Tr Si	
0 - 40	PST		700	NFP Sh Rk	
40 - 150	Cr Gr		14+700	2.0 m Rt C/L	D0
150 - 700	Med F Sa Tr Gr Tr Si		0 - 50	PST	
700	NFP Sh Rk		50 - 150	Cr Gr	
14+680	1.0 m Rt C/L	D0	150 - 1.0	Med F Sa Tr Gr Tr Si	
0 - 50	PST		1.0	NFP Sh Rk	
50 - 170	Cr Gr		14+700	5.0 m Rt C/L	D0
170 - 800	Med F Sa Tr Gr Tr Si		0 - 1.0	Med F Sa Tr Gr Tr Si	
800	NFP Sh Rk		1.0	NFP Sh Rk/BR	
14+680	5.3 m Rt C/L	D-600	14+700	6.5 m Rt C/L	D-500
0 - 100	Si Sa Org		0 - 100	Si Sa Org	
100 - 750	Med F Sa Tr Gr Tr Si		100 - 1.0	Med F Tr Gr Tr Si	
750	NFP Sh Rk		1.0	NFP Sh Rk/BR	
14+680	12.0 m Rt C/L	D+6.2	14+700	11.0 m Rt C/L	D+1.5
0 - 300	Si Sa Org		0 - 200	Si Sa Org	
300	NFP BR		200 - 700	Si Some F Sa	
14+700	9.0 m Lt C/L	D-500	700	NFP Bld/BR	
0 - 50	Si Sa Org		14+720	4.0 m Lt C/L	D0
50 - 400	Med F Sa Tr Gr		0 - 50	PST	
400	NFP Sh Rk		50 - 120	Cr Gr	
14+700	7.0 m Lt C/L	D-400	120 - 650	Med F Sa Tr Gr Tr Si	
0 - 50	Si Sa Org		650	NFP Sh Rk	
50 - 400	Med F Sa Some Gr Tr Si		14+720	11.0 m Rt C/L	D-1.4
400	NFP Sh Rk		0 - 100	Si Sa Org	
14+700	6.0 m Lt C/L	D0	100 - 2.0	Si F Sa Tr Gr	
0 - 40	Cr Gr		14+728	11.0 m Rt C/L	D-1.9
40 - 700	Med F Sa Tr Si Tr Gr		0 - 2.0	Si Sa Tr Gr	
700	NFP Sh Rk				

14+732	4.0 m Lt C/L	D0	14+760	6.5 m Lt C/L	D-300
0 - 40	PST		0 - 700	Si F Sa Tr Cl	
40 - 150	Cr Gr		700 - 2.25	Si F Sa Tr Gr	
150 - 500	Med F Sa Tr Gr Tr Si				
500	NFP Sh Rk		14+760	5.0 m Lt C/L	D0
14+740	4.0 m Lt C/L	D0	0 - 300	Med F Sa	
0 - 40	PST		300 - 2.25	Si F Sa Tr Cl	
40 - 120	Cr Gr		2.25	NFP Sh Rk	
120 - 700	Med F Sa Tr Gr Tr Si		14+760	3.8 m Lt C/L	D0
700	NFP Sh Rk		0 - 50	PST	
14+740	On C/L		50 - 150	Cr Gr	
0 - 80	PST		150 - 450	Med F Sa Tr Gr Tr Si	
80 - 160	Cr Gr		450	NFP Sh Rk	
160 - 500	Med F Sa Tr Gr Tr Si		14+760	On C/L	
500	NFP Sh Rk		0 - 110	PST	
14+740	3.5 m Rt C/L	D0	110 - 240	Cr Gr	
0 - 50	PST		240 - 500	Med F Sa Tr Gr Tr Si	
50 - 120	Cr Gr		500	NFP Sh Rk	
120 - 800	Med F Sa Tr Gr Tr Si		14+760	4.0 m Rt C/L	
800	NFP Sh Rk		0 - 50	PST	
14+740	7.0 m Rt C/L	D-500	50 - 240	Cr Gr	
0 - 100	Si Sa Org		240 - 700	Med F Sa Tr Gr Tr Si	
100	NFP Sh Rk/Bld		700	NFP Sh Rk	
14+741	4.0 m Lt C/L	D0	14+760	9.0 m Rt C/L	D-400
0 - 40	PST		0 - 100	Si Sa Org	
40 - 120	Cr Gr		100 - 750	F Sa W Si Tr Gr	
120 - 700	Med F Sa Tr Gr Tr Si		750	wet @ 500	
700	NFP Sh Rk			NFP Bld/BR	
14+742	12.0 m Rt C/L	D-1.9	14+760	11.0 m Rt C/L	D+500
0 - 100	Si Sa Org		0 - 50	Si Sa Org	
100 - 2.3	Si F Sa		50 - 600	Si F Sa	
	Wet @ Surf		600	NFP Bld	
14+760	9.0 m Lt C/L	D-1.0	14+780	10.0 m Lt C/L	D-1.0
0 - 100	Si Sa Tr Org		0 - 1.1	Si Sa Some Org mix	
100 - 1.5	F Sa Some Si Tr Org		1.1 - 1.9	Med F Sa W Si	
1.5 - 2.1	Muck Amor W Co Fibers			wet @ 600	
2.5	Med F Sa W Si		14+780	6.0 m Lt C/L	D0
			0 - 230	Cr Gr	
			230 - 900	Med F Sa Tr Gr Tr Si	
			900	NFP Sh Rk	

14+780	3.0 m Lt C/L	D0	14+800	4.0 m Rt C/L	D0
0 - 50	PST		0 - 50	PST	
50 - 230	Cr Gr		50 - 200	Cr Gr	
230 - 900	Med F Sa Tr Gr Tr Si		200 - 650	Med F Sa Tr Gr Tr Si	
900	NFP Sh Rk		650	NFP Sh Rk	
14+780	On C/L		14+800	8.0 m Rt C/L	D0
0 - 100	PST		0 - 100	Si F Sa Some Org	
100 - 200	Cr Gr		100 - 700	Med F Sa Tr Gr Tr Si	
200 - 800	Med F Sa Tr Gr Tr Si		700	wet @ 500	
800	NFP Sh Rk/BR			NFP Sh Rk/BR	
14+780	5.0 m Rt C/L	D0	14+800	11.0 m Rt C/L	D+3.0
0 - 220	Cr Gr		0 - 50	Si Sa Org	
220 - 850	Med F Sa Tr Gr Tr Si		50 - 200	Med F Sa Tr Gr	
850	NFP Sh Rk		200	NFP BR	
14+780	8.0 m Rt C/L	D-200	14+820	10.0 m Lt C/L	D-1.0
0 - 200	Si Sa Org		0 - 600	Si F Sa Some Sh Rk	
200 - 1.3	Med F Sa Tr Gr Tr Si		600	NFP Bld BR	
1.3	Fr Wat @ 700		14+820	5.5 m Lt C/L	D0
	NFP Sh Rk/BR				
14+780	11.0 m Rt C/L	D+2.3	0 - 150	Cr Gr	
0 - 100	Si Sa Org		150 - 500	Med F Sa Tr Gr Tr Si	
100 - 600	Med F Sa Tr Gr		500	NFP Sh Rk	
600	NFP Bld		14+820	On C/L	
14+800	10.0 m Lt C/L	D-1.2	0 - 80	PST	
0 - 600	Si F Sa Sh Rk Gr mix		80 - 170	Cr Gr	
600	NFP Bld		170 - 300	Med F Sa Tr Gr Tr Si	
14+800	7.0 m Lt C/L	D-400	300	NFP Sh Rk/BR	
0 - 100	Si Sa Org		14+820	4.0 m Rt C/L	D0
100 - 400	Si Sa		0 - 80	PST	
400	NFP Sh Rk		80 - 220	Cr Gr	
14+800	6.0 m Lt C/L	D0	220 - 600	Med F Sa Tr Gr Tr Si	
0 - 160	Cr Gr		600	NFP Sh Rk	
160 - 800	Med F Sa Tr Gr Tr Si			Rock Face @ 7.8 Rt	
800	NFP Sh Rk		14+820	7.0 m Rt C/L	D0
14+800	On C/L		0 - 100	Si Sa Org	
0 - 100	PST		100 - 1.2	Sa Sh Rk mix	
100 - 330	Cr Gr		1.2	NFP Sh Rk/BR	
330 - 600	Med F Sa Tr Gr Tr Si		14+820	11.0 m Rt C/L	D+3.5
600	NFP Sh Rk		0	NFP BR	

14+840	10.0 m Lt C/L	D-1.1	14+860	On C/L
0 - 1.3	Si F Sa Tr Gr Tr Sh Rk wet @ 900		0 - 110	PST
1.3	NFP Bld		110 - 250	Cr Gr
			250 - 800	Med F Sa Tr Gr Tr Si
14+840	7.0 m Lt C/L	D-700	800	NFP Sh Rk/BR
0 - 100	Si F Sa Tr Org		14+860	4.0 m Rt C/L
100 - 1.2	Si F Sa Some Si		0 - 180	Cr Gr
1.2	NFP Sh Rk			00ELS114
14+840	5.5 m Lt C/L	D0		NOT Accep GRANULAR A
0 - 120	Cr Gr			76% PASSING 9.5 mm
120 - 500	Med F Sa Tr Gr Tr Si			64% PASSING 4.75 mm
500	NFP Sh Rk			48% PASSING 1.18 mm
				28% PASSING 300 um
14+840	On C/L		180 - 900	Accep GRANULAR B TYPE I
0 - 70	PST			Med F Sa Tr Gr Tr Si
70 - 230	Cr Gr		900	00ELS115
230 - 400	Med F Sa Tr Gr Tr Si			Accep GRANULAR B TYPE I
400	NFP Sh Rk		14+860	NFP Sh Rk/BR
				9.0 m Rt C/L D-500
14+840	4.0 m Rt C/L	D0	0 - 200	Si Sa Org
0 - 50	PST		200 - 1.0	F Sa Some Si
50 - 200	Cr Gr		1.0 - 1.5	Si F Sa
200 - 300	Med F Sa Tr Gr Tr Si		1.5 - 2.0	Org Si
300	NFP Sh Rk/BR		14+875	3.5 m Lt C/L D0
14+840	8.0 m Rt C/L	D-600	0 - 110	PST
0 - 100	Si F Sa Some Org		110 - 270	Cr Gr
100 - 2.3	Med F Sa Some Si		270 - 2.0	Med F Sa Tr Gr Tr Si
2.3	wet @ 400		2.0	NFP Bld
	NFP Sh Rk/BR		14+893	3.6 m Lt C/L D0
14+840	11.0 m Rt C/L	D+2.3	0 - 110	PST
0 - 100	Si Sa Org		110 - 190	Cr Gr
100 - 900	Si F Sa Tr Gr		190 - 1.8	Med F Sa Tr Gr Tr Si
900	NFP BR			Fr Wat @ 800
			1.8 - 2.3	Med F Sa Some Si
14+850	11.0 m Rt C/L	D-300	2.3	NFP Bld
0 - 50	Si Sa Org		14+900	7.0 m Lt C/L D0
50 - 900	F Sa W Si		0 - 150	Med F Sa
900	NFP BR		150 - 750	F Sa Some Si
14+860	8.0 m Lt C/L	D0		00ELS117
0 - 110	PST			NOT Accep GRANULAR B TYPE I
110 - 270	Cr Gr			63% PASSING 300 um
270 - 1.0	Med F Sa Tr Gr Tr Si			18% PASSING 75 um
1.0	NFP Sh Rk		750	Accep SSM
				NFP Sh Rk

14+900	6.5m Lt C/L	D0	14+925	4.0 m Rt C/L	D0
0 - 150	Cr Gr		0 - 110	PST	
150 - 750	Med F Sa Tr Gr Tr Si		110 - 180	Cr Gr	
	00ELS118		180 - 900	Med F Sa Tr Gr Tr Si	
750	Accep GRANULAR B TYPE I		900	NFP Sh Rk	
14+900	3.7 m Lt C/L	D0	14+938	4.5 m Lt C/L	D0
0 - 110	PST		0 - 50	PST	
110 - 190	Cr Gr		50 - 150	Cr Gr	
190 - 750	Med F Sa Tr Gr Tr Si		150 - 800	Med F Sa Tr Gr Tr Si	
750	NFP Bld		800	NFP Sh Rk	
14+900	On C/L		14+938	4.0 m Rt C/L	D0
0 - 120	PST		0 - 50	PST	
120 - 300	Cr Gr		50 - 140	Cr Gr	
300 - 700	Med F Sa Tr Gr Tr Si		140 - 750	Med F Sa Tr Gr Tr Si	
700	NFP Sh Rk		750	NFP Sh Rk	
14+900	3.0 m Rt C/L	D0	14+950	4.5 m Lt C/L	D0
0 - 110	PST		0 - 40	PST	
110 - 190	Cr Gr		40 - 200	Cr Gr	
190 - 800	Med F Sa Tr Gr Tr Si		200 - 900	Med F Sa Tr Gr Tr Si	
800	NFP Sh Rk		900	NFP Sh Rk	
14+900	6.2 m Rt C/L	D-200	14+950	3.6 m Rt C/L	D0
0 - 160	Cr Gr		0 - 70	PST	
160 - 750	Med F Sa Tr Gr Tr Si		70 - 200	Cr Gr	
750	NFP Sh Rk		200 - 750	Med F Sa Tr Gr Tr Si	
14+900	7.0 m Rt C/L	D-300	750	NFP Sh Rk	
0 - 160	Med F Sa		15+000	11.0 m Lt C/L	D-700
160 - 750	F Sa Some Si		0 - 200	Cr Gr	
750	NFP Sh Rk		200 - 700	Med F Sa Tr Gr Tr Si	
14+910	3.6 m Lt C/L	D0	700	NFP Bld	
0 - 90	PST		15+000	6.0 m Lt C/L	D0
90 - 180	Cr Gr		0 - 200	Cr Gr	
180 - 800	Med F Sa Tr Gr Tr Si		200 - 500	Med F Sa Tr Gr Tr Si	
800	NFP Sh Rk		500 - 800	Si F Sa	
14+925	3.5 m Lt C/L	D0	800	NFP Sh Rk	
0 - 40	PST		15+000	4.0 m Lt C/L	D0
40 - 150	Cr Gr		0 - 80	PST	
150 - 750	Med F Sa Tr Gr Tr Si		80 - 200	Cr Gr	
750	NFP Sh Rk		200 - 750	Med F Sa Tr Gr Tr Si	
			750	NFP Sh Rk	

15+000		On C/L	
0	-	130	PST
130	-	300	Cr Gr
300	-	600	Med F Sa Tr Gr Tr Si
600			NFP Sh Rk
15+000		4.0 m Rt C/L	D0
0	-	150	Cr Gr
150	-	750	Med F Sa Tr Gr Tr Si
750			NFP Sh Rk
15+000		7.0 m Rt C/L	D-300
0	-	120	Cr Gr
120	-	750	Med F Sa Tr Gr Tr Si
750			NFP Sh Rk
15+000		8.0 m Rt C/L	D-400
0	-	200	Med F Sa Tr Gr Tr Si
200	-	400	Si F Sa W Org
400	-	750	F Sa W Si
750			NFP Sh Rk
15+000		11.0 m Rt C/L	D-2.0
0	-	100	Si Org
100	-	2.0	Med F Sa Tr Gr Tr Si
2.0			NFP Bld

AGE NO. \_\_\_\_\_ TWP. Foley

W.P. NO. 85-89-00

86  
DATE March 28/2000

16+000

15+950

15+900

15+850

15+800

15+750

AREA 3

HWY. NO. 518 LOCATION From 4.0 to 9.2 km east of Hwy 67 ENGINEER ECS

W.P. 85-89-00  
 HWY 518  
 FROM 4.0 KM E OF HWY 69, E'LY 4.2 KM  
 TOWNSHIP OF FOLEY

AREA 3: Station 15+850 to 15+975

15+850	9.0 m Lt C/L	D-1.6
0 - 100	Si Sa Org	
	wet @ Surf	
100 - 2.0	Med F Sa Tr Si	
15+850	8.0 m Lt C/L	D0
0 - 200	Med F Sa Tr Gr Tr Si	
200 - 400	Si F Sa	
400 - 1.1	F Sa W Si	
1.1	NFP Sh Rk	
15+850	7.0 m Lt C/L	D0
0 - 130	Cr Gr	
130 - 650	Med F Sa Tr Gr Tr Si	
650	NFP Sh Rk	
15+850	On C/L	
0 - 60	PST	
60 - 120	Cr Gr	
112 - 700	Med F Sa Tr Gr Tr Si	
700	NFP Sh Rk	
15+850	4.0 m Rt C/L	D0
0 - 80	Cr Gr	
80 - 850	Med F Sa Tr Gr Tr Si	
850	NFP Sh Rk	
15+850	8.0 m Rt C/L	D0
0 - 80	Cr Gr	
80 - 850	Med F Sa Tr Gr Tr Si	
850	NFP Sh Rk	
15+875	On C/L	
0 - 60	PST	
60 - 100	Cr Gr	
100 - 750	Med F Sa Tr Gr Tr Si	
750	NFP Sh Rk	
15+900	15.0 m Lt C/L	D-2.0
0 - 300	Si F Sa Tr Org	
300	NFP BR	

15+900	9.0 m Lt C/L	D-900
0 - 170	Cr Gr	
170 - 850	Med F Sa Tr Gr Tr Si	
850	NFP Sh Rk/BR	
15+900	On C/L	
0 - 100	Cr Gr	
100 - 750	Med F Sa Tr Gr Tr Si	
750	NFP Sh Rk	
15+900	2.0 m Rt C/L	D-500
0 - 200	Si Sa Org	
200 - 300	Med F Sa Tr Gr Tr Si	
300 - 500	Sh Rk	
500 - 3.5	F Sa Some Si	
	wet @ 2.2	
15+900	9.0 m Rt C/L	D-2.4
0 - 1.2	Sa Muck Amour	
1.2 - 2.7	Med F Sa Tr Gr Tr Si Tr Cob	
2.7 - 3.0	F Sa Some Si	
15+910	3.0 m Lt C/L	D+300
0 - 100	Cr Gr	
100 - 650	Med F Sa Tr Gr Tr Si	
650	NFP Sh Rk/BR	
15+914	3.0 m Lt C/L	D+500
0 - 100	Cr Gr	
100 - 700	Med F Sa Tr Gr Tr Si	
700	NFP Sh Rk	
15+918	4.6 m Lt C/L	D+500
0 - 100	Cr Gr	
100 - 700	Med F Sa Tr Gr Tr Si	
700	NFP Sh Rk/BR	
15+925	4.0 m Lt C/L	D+1.4
0 - 140	Cr Gr	
140 - 600	Med F Sa Tr Gr Tr Si	
600	NFP Sh Rk	
15+925	On C/L	
0 - 100	Si Sa Org	
100 - 500	Med F Sa Tr Gr Tr Si	
500	NFP Sh Rk/BR	



15+927	4.0 m Rt C/L	D-900	15+960	10.0 m Rt C/L	D+1.4
0 - 100	Si Sa Org wet @ Surf		0	NFP BR	
100 - 1.3	F Sa W Si Tr Gr		15+975	On C/L	
1.3	NFP Bld/BR		0 - 200	Si Sa Org	
15+927	10.0 m Rt C/L	D-900	200	Bld/BR	
0 - 100	Si Sa Org W Asph				
100 - 700	F Sa W Si Tr Gr				
700 - 1.7	Muck Amor				
1.7 - 2.5	Si F Sa, wet				
15+940	10.0 m Rt C/L	D-1.0			
0	NFP Sh Rk				
15+950	10.0 m Lt C/L	D+2.3			
0 - 70	PST				
70 - 110	Cr Gr				
110 - 500	Med F Sa Tr Gr Tr Si				
500	NFP Sh Rk/BR				
15+950	8.0 m Lt C/L	D+2.2			
0 - 100	Cr Gr				
100 - 750	Med F Sa Tr Gr Tr Si				
750	NFP Sh Rk/BR				
15+950	7.0 m Lt C/L	D+2.1			
0 - 100	Si Sa Org				
100 - 750	F Sa Some Si				
750	NFP Sh Rk				
15+950	On C/L				
0 - 100	Si F Sa Tr Org				
100 - 800	Med F Sa Tr Gr Tr Si				
800	Wet @ 750				
	NFP Bld/BR				
15+950	9.0 m Rt C/L	D-300			
0	NFP BR				
15+960	9.0 m Lt C/L	D+1.5			
0 - 100	Cr Gr				
100 - 1.5	Med F Sa Tr Gr Tr Si				
1.5	NFP Sh Rk/BR				
15+960	On C/L				
0	NFP BR				

16+500

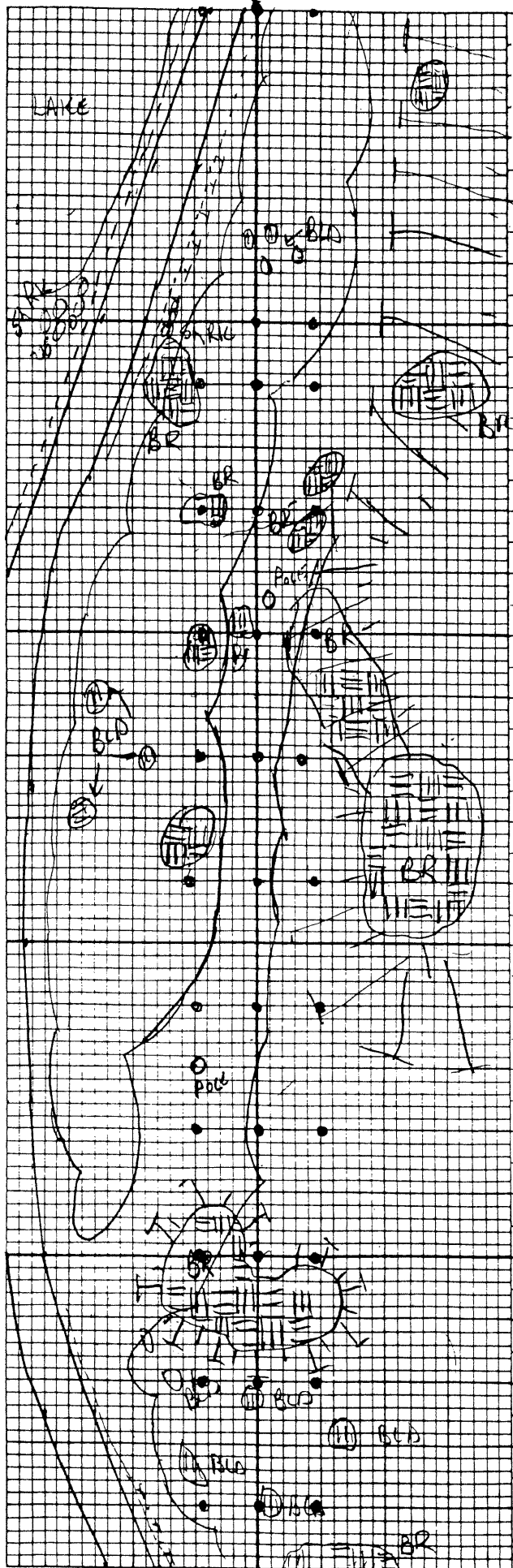
16+450

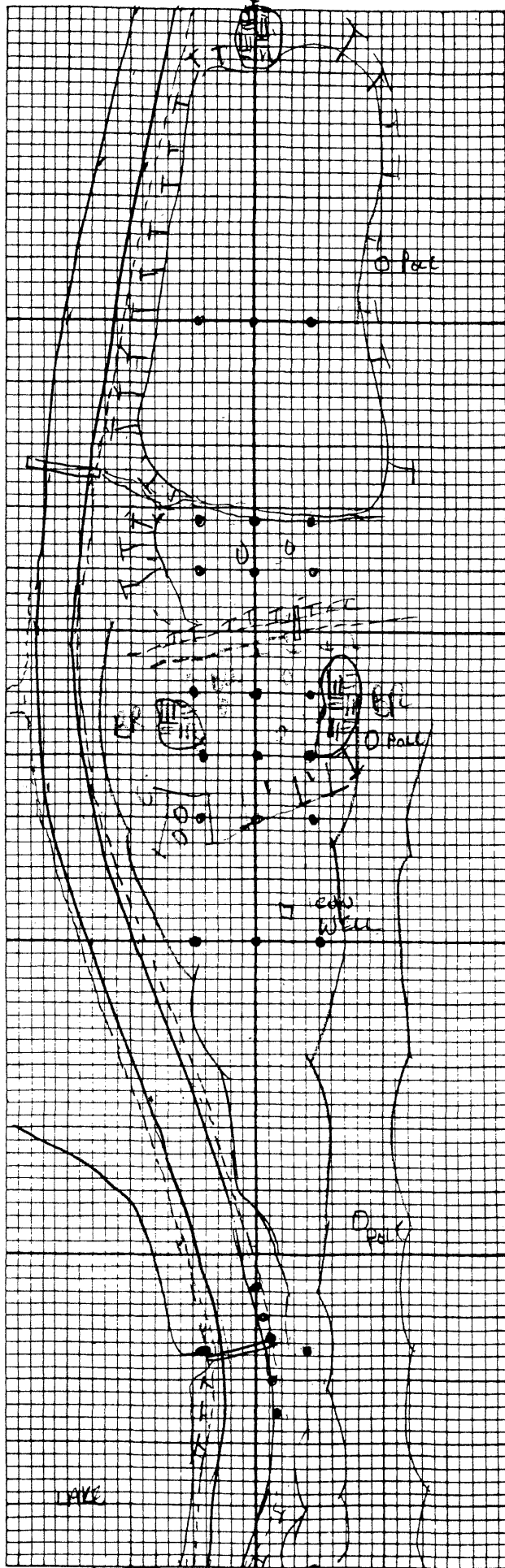
16+400

16+350

16+300

16+250



$16 + 500$ 

## AREA 4

W.P. 85-89-00

HWY 518

FROM 4.0 KM E OF HWY 69, E'LY 4.2 KM  
TOWNSHIP OF FOLEY

AREA 4: Station 16+450 to 16+600

16+450	On C/L	
0 - 200	Si Sa Org	
200 - 500	Med F Sa W Si	
500	NFP BR	
16+450	9.0 m Rt C/L	D0
0 - 200	Si Sa Org	
200 - 1.2	Med F Sa W Si	
16+500	On C/L	
0 - 140	Cr Gr	
140 - 1.0	Med F Sa Tr Gr Tr Si	
1.0	wet @ 1.0	
	NFP Bld	
16+500	9.0 m Rt C/L	D0
0 - 200	Si Sa Org	
200	NFP Bld/BR	
16+525	3.0 m Rt C/L	D0
0 - 210	Cr Gr	
210 - 1.0	Med F Sa Tr Gr Tr Si	
1.0 - 1.4	Si Sa Org	
	wet @ 1.4	
1.4 - 2.0	Med F Sa Some Si	
16+530	2.0 m Rt C/L	D0
0 - 200	Cr Gr	
200 - 1.9	Med F Sa Tr Gr Tr Si	
	wet @ 1.7	
1.9 - 2.5	Med F Sa Some Si Tr Gr	
16+535	9.0 m Lt C/L	D-1.2
0 - 1.0	Med F Sa Some Si	
1.0 - 1.5	F Sa W Si	
16+535	8.0 m Rt C/L	D-1.2
0 - 200	Si Sa Org	
200 - 1.0	Med F Sa Some Si	
1.0 - 1.5	F Sa W Si	

16+536	1.5 m Rt C/L	D0
0 - 200	Cr Gr	
200 - 1.8	Med F Sa Tr Gr Tr Si	
	wet @ 1.3	
1.8 - 2.5	Med F Sa Some Si Tr Gr	

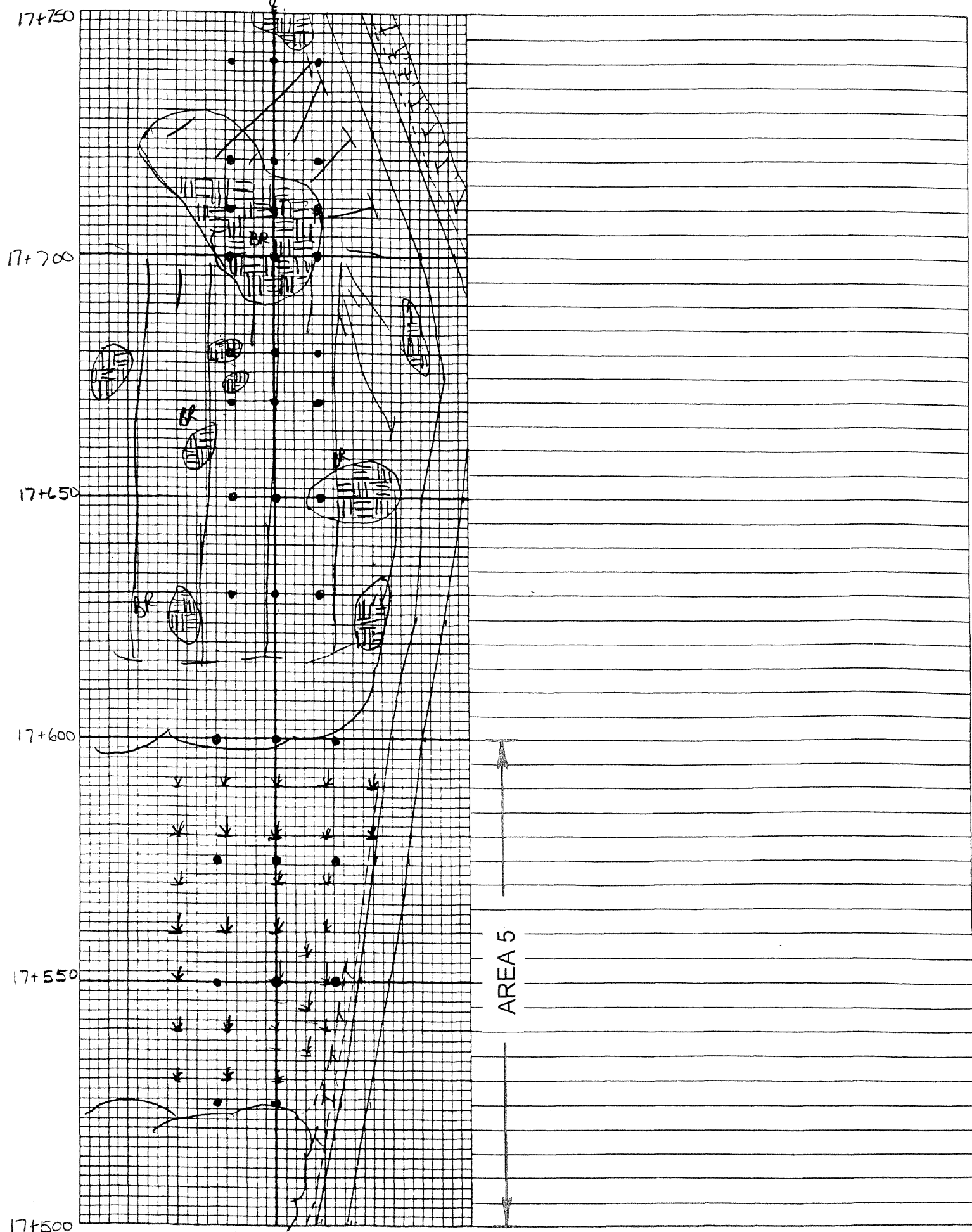
16+540	1.0 m Rt C/L	D0
0 - 200	Cr Gr	
200 - 1.1	Med F Sa Tr Gr Tr Si	
	wet @ 1.0	
1.1 - 2.5	Med F Sa Some Si Tr Gr	

16+545	On C/L	
0 - 200	Cr Gr	
200 - 1.0	Med F Sa Tr Gr Tr Si	
	wet @ 1.0	
1.0 - 2.0	Med F Sa Some Si Tr Gr	

16+600	10.0 m Lt C/L	D-400
0 - 200	Si Sa Org	
200 - 1.2	Med F Sa W Si	
1.2 - 1.9	Si F Sa Tr Cl	
1.9	NFP Bld	

16+600	On C/L	
0 - 200	Si Sa Org	
200 - 1.4	Med F Sa W Si	
1.4 - 2.4	Si F Sa Tr Gr	
2.4	NFP Bld	

16+600	10.0 m Rt C/L	D+600
0 - 200	Si Sa Org	
200 - 1.2	Med F Sa W Si	
1.2 - 2.1	Si F Sa Tr Cl	
2.1	NFP Bld	



0-25 -- 08

W.P. 85-89-00  
HWY 518  
FROM 4.0 KM E OF HWY 69, ELY 4.2 KM  
TOWNSHIP OF FOLEY

AREA 5: Station 17+500 to 17+600

17+525		12.0 m Lt C/L	D0
0	-	300	Muck Amour
300	-	600	Med F Sa Tr Si
600			NFP Bld/BR
17+525		On C/L	D0
0	-	300	Muck Amour
300	-	500	Med F Sa Tr Si
500			NFP Bld/BR
17+550		12.0 m Lt C/L	D0
0	-	1.1	Muck Amour
1.1	-	1.8	Med F Sa Tr Si
17+550		On C/L	D0
0	-	1.2	Muck Amour
1.2	-	1.8	Med F Sa Tr Si
17+550		12.0 m Rt C/L	D0
0	-	1.1	Muck Amour
1.1	-	1.8	Med F Sa Tr Si
17+575		12.0 m Lt C/L	D0
0	-	1.3	Muck Amour
1.3	-	1.8	Med F Sa Tr Si
17+575		On C/L	D0
0	-	1.1	Muck Amour
1.1	-	1.8	Med F Sa Tr Si
17+575		12.0 m Rt C/L	D0
0	-	1.0	Muck Amour
1.0	-	1.8	Med F Sa Tr Si
17+600		12.0 m Lt C/L	D0
0	-	300	Muck Amour
300	-	1.8	Med F Sa Tr Si
17+600		12.0 m Rt C/L	D0
0	-	600	Muck Amour
600	-	1.8	Med F Sa Tr Si