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REPORT ON

**FOUNDATION INVESTIGATION AND DESIGN
ADDITIONAL RETAINING WALL
HIGHWAY 26 REHABILITATION, GWP 33-94-00
FROM 1.5 KM WEST OF THE OWEN SOUND EAST LIMITS
EASTERLY 15.25 KM TO 0.3 KM EAST OF THE FORMER
SYDENHAM/ST. VINCENT TOWNSHIP BOUNDARY
AGREEMENT NUMBER 3005-A-000262**

Submitted to:

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PART A - FOUNDATION INVESTIGATION REPORT

ADDITIONAL RETAINING WALL

**HIGHWAY 26 REHABILITATION, GWP 33-94-00
FROM 1.5 KM WEST OF THE OWEN SOUND EAST LIMITS
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AGREEMENT NUMBER 3005-A-000262
MINISTRY OF TRANSPORTATION – SOUTHWESTERN REGION**

1.0 INTRODUCTION

Golder Associates Ltd. (Golder) has been retained by Transenco Limited (Transenco) on behalf of the Ministry of Transportation, Ontario (MTO) to carry out foundation investigations for the detail design work as part of GWP 33-94-00. The project involves design work for the upgrading of about 15 kilometres of Highway 26 from 1.5 kilometres west of the Owen Sound east limits to 0.3 kilometres east of the former Sydenham/St. Vincent Township boundary. The work includes highway upgrades and widening. The foundation component of the project includes a swamp crossing with grade raise, a number of culvert replacements, replacement of an abandoned Canadian Pacific Rail (CPR) structure with a trail underpass, widening of a high embankment, a deep cut and a retaining wall. This report addresses an additional retaining wall to be constructed adjacent to Grey County Road 15 (formerly Grey County Road 20).

The purpose of the foundation investigation was to determine the subsurface conditions at the proposed retaining wall location by drilling boreholes and carrying out in situ and laboratory tests on selected samples. The terms of reference for the scope of work are outlined in Golder's proposal letter dated May 15, 2003. The work was carried out in accordance with our Quality Control Plan for Foundation Investigation and Design Services, dated July 24, 2002.

The centreline and stations of the alignment were surveyed by others prior to commencing the foundation investigation field program. Transenco provided Golder with preliminary drawings and survey data for this project in digital format.

2.0 SITE DESCRIPTION

GWP 33-94-00 comprises about 15 kilometres of Highway 26 from 1.5 kilometres west of the Owen Sound east limits to 0.3 kilometres east of the former Sydenham/St. Vincent Township boundary. The location of the project is shown on the Key Plan, Figure 1. The project chainages extend from Station 10+000 to Station 25+252 in the Municipality of Meaford, and from Station 10+000 in the former Sydenham Township to Station 10+300 in the former St. Vincent Township.

This portion of Highway 26 is a two lane highway. The existing pavement cross-section is two 3.35 metre wide lanes typically with 2.4 metre wide shoulders. The pavements are to be rehabilitated and the lanes widened to improve the level of service, safety and comfort. The work includes the realignment of vertical curves, providing paved shoulders in areas with steep grades, construction of a truck climbing lane, drainage improvements, repairs or replacement of culverts and the replacement of the CPR structure.

This report addresses the subsurface conditions for an additional retaining wall to be constructed 9 metres right of the centreline of Grey County Road 15 (formerly Grey County Road 20) between about Station 9+917 and Station 9+940. The height of soil to be retained will be between 1.0 and 2.5 metres.

2.1 Site Geology

The Highway 26 alignment crosses the physiographic regions of the Cape Rich steps, which are a series of steps rising from Georgian Bay, and the Niagara Escarpment. The Niagara Escarpment, in this area, has shallower soils, more irregular rock types, and more water bodies than portions further south. Drumlins occur throughout the region and were observed near the eastern limits of the project. The underlying bedrock geology is dominated by Silurian sandstone, shale, dolostone and siltstone.

3.0 INVESTIGATION PROCEDURES

The field work for this investigation was carried out on June 26, 2003 at which time two (2) boreholes were put down in the subject area. The table below summarizes the borehole locations, ground surface elevations and borehole depths:

<u>BOREHOLE</u>	<u>CHAINAGE AND OFFSET</u> (m)	<u>GROUND SURFACE ELEVATION</u> (m)	<u>BOREHOLE DEPTH</u> (m)
1	9+916.3, 2.0m right	246.84	6.34
2	9+926.9, 1.7m right	247.22	6.40

The investigation was carried out using an all-terrain vehicle mounted CME 750 drill rig supplied and operated by Lantech Drilling Services Inc. In the boreholes, samples of the overburden were obtained at suitable intervals of depth using 50 millimetre outside diameter split-spoon samplers in accordance with the Standard Penetration Test (SPT) procedures. The boreholes were terminated at depths between 6.3 and 6.4 metres below existing ground surface. Groundwater conditions in the boreholes were observed throughout the drilling operations and a piezometer was installed in borehole 1 as indicated on the Record of Borehole sheet. Both boreholes were backfilled with bentonite and auger cuttings and compacted on completion of drilling.

The field work was supervised on a full-time basis by a member of our engineering staff who located the boreholes in the field, directed the drilling, sampling and in-situ testing operations and logged the boreholes. The samples were identified in the field, placed in labeled containers and transported to our laboratory in London for further examination. Index and classification tests consisting of grain size analyses, water content determinations and Atterberg limits were carried out on selected samples. The results of the testing are shown on the Record of Borehole sheets and in Appendix A.

The as-drilled borehole locations and elevations were surveyed by our staff on completion of drilling and sampling. The locations of the boreholes are shown on the Record of Borehole sheets and on Drawing 1, attached.

4.0 SUBSURFACE CONDITIONS

4.1 Site Stratigraphy

The detailed subsurface soil and groundwater conditions encountered in the boreholes, together with the results of the in-situ and laboratory tests carried out on selected soil samples, are given on the attached Record of Borehole sheets following the text of this report and in Appendix A. The stratigraphic boundaries shown on the borehole sheets are inferred from non-continuous sampling and, therefore, may represent transitions between soil types rather than exact planes of geological change. Subsurface conditions will vary between and beyond the borehole locations.

In summary, the boreholes drilled through the roadway encountered the existing pavement structure and associated fill materials over layers of topsoil. The fill and topsoil deposits were underlain by layers of sandy silt till and clayey silt till.

The locations and elevations of the borings, together with the interpreted stratigraphic profiles, are shown on the attached Drawing 1. A detailed description of the subsurface conditions encountered in the boreholes is provided on the Record of Boreholes sheets and summarized in the following sections.

4.1.1 Soil Conditions

Fill and Topsoil

Boreholes 1 and 2 were drilled through the existing pavement for Grey County Road 15 as close as possible to the proposed retaining wall location and encountered the existing asphalt and granular base materials. The asphalt was 90 millimetres thick at both borehole locations and the granular base materials were 310 and 210 millimetres thick in boreholes 1 and 2, respectively.

Beneath the granular base, both boreholes encountered 1.0 to 1.2 metres of sandy silt fill materials. The fill was noted to contain traces of clay and gravel and had SPT 'N' values of 75 and 47 blows per 0.3 metres penetration and a water content of about 7 per cent.

Some 0.5 to 0.6 metres of silty topsoil was encountered beneath the fill in both boreholes. The topsoil was noted to contain cinders in borehole 1 and had 'N' values of 18 and 28 blows per 0.3 metres penetration and a natural water content of about 15 to 17 per cent.

Sandy Silt Till

Beneath the topsoil, both boreholes encountered a deposit of sandy silt till at about elevation 245 metres. The till deposit was 3.2 metres thick in borehole 1 and borehole 2 was terminated in the sandy silt till after penetrating it for some 4.4 metres. The sandy silt till deposit was noted to contain cobbles and boulders and had SPT 'N' values of 8 blows per 0.3 metres penetration to over 100 blows per 100 millimetres penetration, with a typical 'N' value of 47 blows per 0.3 metres penetration. The natural water content of the till ranged between about 8 and 14 per cent, with an average of about 11 per cent. Atterberg limits testing carried out on a sample of the till from borehole 1 indicated plastic and liquid limits of 13 and 18 per cent, respectively. These results are shown graphically on Figure A-1. Grain size distribution curves for samples of the sandy silt till from each of the boreholes are shown on Figure A-2.

Clayey Silt Till

Beneath the sandy silt till, borehole 1 encountered and was terminated in a deposit of clayey silt till after penetrating it for 1.2 metres. This till deposit was noted to contain sand seams and gravel and had SPT 'N' values of 100 and 109 blows per 0.3 metres penetration and a natural water content of about 8 per cent.

4.2 Groundwater Conditions

Groundwater conditions were observed during and on completion of drilling operations. A piezometer was installed in borehole 1 on completion of drilling operations. Details of the groundwater conditions are provided on the attached Record of Borehole sheets and are summarized in the following table.

BOREHOLE	GROUND SURFACE ELEVATION (m)	GROUNDWATER LEVELS			
		ENCOUNTERED JUNE 26, 2003		MEASURED JULY 1, 2003	
		DEPTH	ELEVATION	DEPTH	ELEVATION
		(m)	(m)	(m)	(m)
1	246.84	3.05	243.79	2.35	244.49
2	247.22	4.57	242.65	-	-

The groundwater levels are expected to fluctuate seasonally and are expected to be higher during wet periods.

GOLDER ASSOCIATES LTD.

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AMH/PRB/FJH/cr
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PART B - FOUNDATION DESIGN REPORT

ADDITIONAL RETAINING WALL

**HIGHWAY 26 REHABILITATION, GWP 33-94-00
FROM 1.5 KM WEST OF THE OWEN SOUND EAST LIMITS
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5.0 ENGINEERING RECOMMENDATIONS

5.1 General

This section of the report provides our recommendations on the foundation aspects of the design and construction of a retaining wall on the south side of Grey County Road 15 (formerly Grey County Road 20) approximately 70 metres north of Highway 26.

Our recommendations are based on our interpretation of the factual information obtained during the investigation. It should be noted that the interpretation and recommendations are intended for use only by the design engineer. Where comments are made on construction they are provided only in order to highlight those aspects which could affect the design of the project.

The other foundation investigations undertaken for this project include an embankment grade raise at a swamp crossing, culvert replacements, replacement of a CPR bridge structure and deep cuts and high fills.

5.2 Retaining Wall Foundations

It is understood that it is proposed to construct a 23 metre long retaining wall some 1.0 to 2.5 metres in height between Station 9+917 and 9+940 on the south side of Grey County Road 15 to facilitate a grade change and a municipal road entrance. It is understood that the retaining wall will likely consist of a retained soil system (RSS).

The subsurface conditions encountered in the two boreholes put down in the area of the retaining wall during this investigation typically consist of a thin pavement structure over about 1.6 to 1.7 metres of fill and topsoil materials underlain by a relatively thick deposit of loose to very dense sandy silt till. The till was noted to contain cobbles and boulders. The surface of the sandy silt till deposit was encountered at about elevation 245 metres in both boreholes and was underlain by hard clayey silt till in borehole 1.

Based on the subsurface information noted above, and depending on the type of wall, consideration may be given to supporting the retaining wall on spread footings or on a 0.3 metre thick compacted Granular A leveling pad constructed on the surface of the sandy silt till. The use of deep foundations has not been considered due to the presence of competent founding soils at relatively shallow depth.

5.2.1 Geotechnical Resistance

For design purposes, for footings some 2 metres in width founded at or below elevation 245 metres, a factored bearing resistance at Ultimate Limit States (ULS) of 400 kilopascals (kPa) and a bearing resistance at Serviceability Limit States (SLS) of 250 kPa may be assumed. The above-noted geotechnical resistances assume that appropriate construction procedures are adopted during footing construction to ensure that the till is not softened/disturbed prior to concrete placement. The settlement of a retaining wall founded on the glacial till should be less than 15 millimetres.

5.2.2 Resistance to Lateral Forces

The lateral pressures acting on the proposed retaining wall will depend on the backfill soils, the type and method of placement of the backfill materials behind the wall, provision of reinforcement grids, as well as the subsequent lateral movement of the structure. The following recommendations are made concerning the design of the retaining wall in accordance with the Canadian Highway Bridge Design Code (CHBDC).

Backfill behind the wall should consist of select, free-draining granular fill meeting the specifications of Ontario Provincial Standard Specifications (OPSS) Granular A or Granular B but with less than 5 per cent passing the No. 200 sieve.

Where backfill soils are placed and compacted behind the wall, such as is the case for an RSS wall, a compaction surcharge equal to 16 kPa should be included in the lateral earth pressures for structural design, in accordance with the CHBDC. Compaction equipment should be used in accordance with OPSS 501.06.

The free draining granular fill should be placed in a zone with a width equal to at least 1.2 metres behind the wall. For backfill placed as noted above, the following parameters (unfactored) may be assumed:

Fill unit weight:	22 kN/m ³	
Coefficients of lateral earth pressure:	<u>Backfill Behind Wall</u>	
	<u>Horizontal</u>	<u>Sloping</u> (2H:1V maximum)
'active', K_a	0.31	0.44
'passive', K_p	<u>Horizontal Surface in Front of Wall</u>	
	3.1	

If the backfill surface is sloping, the coefficients of lateral earth pressure would have to be adjusted accordingly.

Resistance to sliding may be based on an unfactored angle of shearing resistance of 32 degrees.

5.2.3 Frost Protection

All footings should be provided with a minimum of 1.4 metres of earth cover for frost protection purposes.

5.2.4 Construction Considerations

It is anticipated that the excavation for the retaining wall footing will be above the groundwater level and any seepage through the fill or till deposits is expected to be minimal. There is potential for some seepage, however, pumping from well filtered sumps placed at the base of the excavation should generally provide sufficient groundwater control during foundation construction. Sumps should be maintained outside of the footing area. It should be noted that the water levels could be higher during wet periods of the year.

The founding soils are sensitive to disturbance and softening due to water seepage and/or ponding. Depending on the type of retaining wall, placement of a 75 millimetre thick lean concrete working slab or a 0.3 metre thick pad of compacted Granular A will be required at the base of excavation for the footing. Exposure without protection of the lean concrete or granular pad will result in softening of the founding soils. The cleaned excavation base should be inspected by qualified geotechnical personnel prior to placing the lean concrete or granular pad. It is recommended that the footing excavation be carried out such that the final 0.5 metres of excavation is completed with the geotechnical personnel on site and that the lean concrete or granular pad be placed immediately after footing inspection.

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LIST OF ABBREVIATIONS

The abbreviations commonly employed on each "Record of Borehole", on the figures and in the text of the report, are as follows:

I. SAMPLE TYPES

<i>AS</i>	auger sample
<i>CS</i>	chunk sample
<i>DO</i>	drive open
<i>DS</i>	Denison type sample
<i>FS</i>	foil sample
<i>RC</i>	rock core
<i>ST</i>	slotted tube
<i>TO</i>	thin-walled, open
<i>TP</i>	thin-walled, piston
<i>WS</i>	wash sample
<i>SS</i>	split spoon

II. PENETRATION RESISTANCES

Dynamic Penetration Resistance:

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) to drive uncased a 50 mm (2 in.) diameter, 60° cone attached to "A" size drill rods for a distance of 0.3 m (12 in.).

Standard Penetration Resistance, N:

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) required to drive a 50 mm (2 in.) drive open sampler for a distance of 0.3 m (12 in.).

<i>WH</i>	sampler advanced by static weight-weight, hammer
<i>PH</i>	sampler advanced by hydraulic force
<i>PM</i>	sampler advanced by manual force

III. SOIL DESCRIPTION

(a) Cohesionless Soils

Relative Density	"N" Blows/0.3 m or Blow/ft.
Very loose	0 to 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very dense	over 50

(b) Cohesive Soils

Consistency	"Cu" = "Su" kPa	psf
Very soft	0 to 12	0 to 250
Soft	12 to 25	250 to 500
Firm	25 to 50	500 to 1000
Stiff	50 to 100	1000 to 2000
Very stiff	100 to 200	2000 to 4000
Hard	over 200	over 4000

IV. SOIL TESTS

<i>C</i>	consolidation test
<i>H</i>	hydrometer analysis
<i>M</i>	sieve analysis
<i>MH</i>	combined analysis, sieve and hydrometer ¹
<i>Q</i>	undrained triaxial ²
<i>R</i>	consolidated undrained triaxial ²
<i>S</i>	drained triaxial
<i>U</i>	unconfined compression
<i>V</i>	field vane test
<i>Chem</i>	chemical analysis

NOTES:

1. Combined analyses when 5 to 95 per cent of the material passes the No. 200 sieve.
2. Undrained triaxial tests in which pore pressures are measured are shown as Q or R.

LIST OF SYMBOLS

I. GENERAL

π	= 3.1416
e	= base of natural logarithms 2.7183
\log_e	a or \ln a, natural logarithm of a
\log_{10}	a or \log a, logarithm of a to base 10
t	time
g	acceleration due to gravity
V	volume
W	weight
m	mass
M	moment
F	factor of safety

II. STRESS AND STRAIN

u	pore pressure
σ	normal stress
σ'	normal effective stress (σ is also used)
τ	shear stress
ε	linear strain
ε_{sy}	shear strain
ν	Poisson's ration (μ is also used)
E	modulus of linear deformation (Young's modulus)
G	modulus of shear deformation
K	modulus of compressibility
η	coefficient of viscosity

III. SOIL PROPERTIES

(a) Unit weight

γ	unit weight of soil (bulk density)
γ_s	unit weight of solid particles
γ_w	unit weight of water
γ_d	unit dry weight of soil (dry density)
γ'	unit weight of submerged soil
G_s	specific gravity of solid particles $G_s = \gamma_s/\gamma_w$
e	void ratio
n	porosity
w	water content
S_r	degree of saturation

(b) Consistency

w_L	liquid limit
w_P	plastic limit
I_P	plasticity index
w_S	shrinkage limit
I_L	liquidity index = $(w - w_P)/I_P$
I_C	consistency index = $(w_L - w)/I_P$
e_{max}	void ratio in loosest state
e_{min}	void ratio in densest state
D_r	relative density = $(e_{max} - e)/(e_{max} - e_{min})$

(c) Permeability

h	hydraulic head or potential
q	rate of discharge
v	velocity of flow
i	hydraulic gradient
κ	coefficient of permeability
j	seepage force per unit volume

(d) Consolidation (one-dimensional)

m_v	coefficient of volume change = $-\Delta e/(1+e)\Delta\sigma'$
C_c	compression index = $-\Delta e/\Delta\log_{10}\sigma'$
c_v	coefficient of consolidation
T_F	time factor = $c_v t/d^2$ (d , drainage path)
U	degree of consolidation

(e) Shear strength

τ_f	shear strength	$\left. \begin{array}{l} \text{in terms} \\ \text{of effective} \\ \text{stress} \end{array} \right\} \tau_f = c' + \sigma' \tan \phi$
c'	effective cohesion intercept	
ϕ'	effective angle of shearing resistance, or friction	
S_u	apparent cohesion*	
ϕ_u	apparent angle of shearing resistance, or friction	$\left. \begin{array}{l} \text{in terms of} \\ \text{total stress} \end{array} \right\} \tau_f = cu + \sigma \tan \phi_u$
μ	coefficient of friction	
S_t	sensitivity	

*For the case of a saturated cohesive soil, $\phi_u = 0$ and the undrained shear strength $\tau_f = S_u$ is taken as half the undrained compressive strength.

RECORD OF BOREHOLE No 1

1 OF 1

METRIC

PROJECT 021-3158-2-5

G.W.P. 33-94-00

LOCATION STA 9+916.33 2.0m RT OF C/L

ORIGINATED BY DJM

DIST 30 HWY 26

BOREHOLE TYPE POWER AUGER (UNCASED)

COMPILED BY BG

DATUM GEODETIC

DATE 26 June 2003

CHECKED BY DJM

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 γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
								○ UNCONFINED	+ FIELD VANE	● QUICK TRIAXIAL	× LAB VANE	WATER CONTENT (%)					
246.84							20	40	60	80	100						
0.09 246.44	ASPHALT FILL, granular road base																
0.40	FILL, sandy silt, trace clay, trace gravel Very dense Brown		1	SS	75							○					
245.47																	
1.37	TOPSOIL, silty, trace cinders, trace sand Compact Black		2	SS	18								○				
244.86																	
1.98	SANDY SILT, trace clay, trace gravel with cobbles and boulders from 3.44m to 4.57m depth, (TILL) Compact to dense Brown		3	SS	14							○					
			4	SS	44/ 250mm							○	—				
			5	SS	14								○				
			6	SS	37							○					
241.66																	
5.18	CLAYEY SILT, trace gravel with sand seams (TILL) Hard Grey		7	SS	100							○					8 31 49 12
240.44			8	SS	109							○					
6.40	END OF BOREHOLE																
	Note: Groundwater encountered at elev. 243.79m during drilling June 26, 2003 Water level measured at elev. 244.49m July 1, 2003																

RECORD OF BOREHOLE No 2

1 OF 1

METRIC

PROJECT 021-3158-2-5

G.W.P. 33-94-00

LOCATION STA 9+926.90 1.7m RT OF C/L

ORIGINATED BY DJM

DIST 30 HWY 26

BOREHOLE TYPE POWER AUGER (UNCASED)

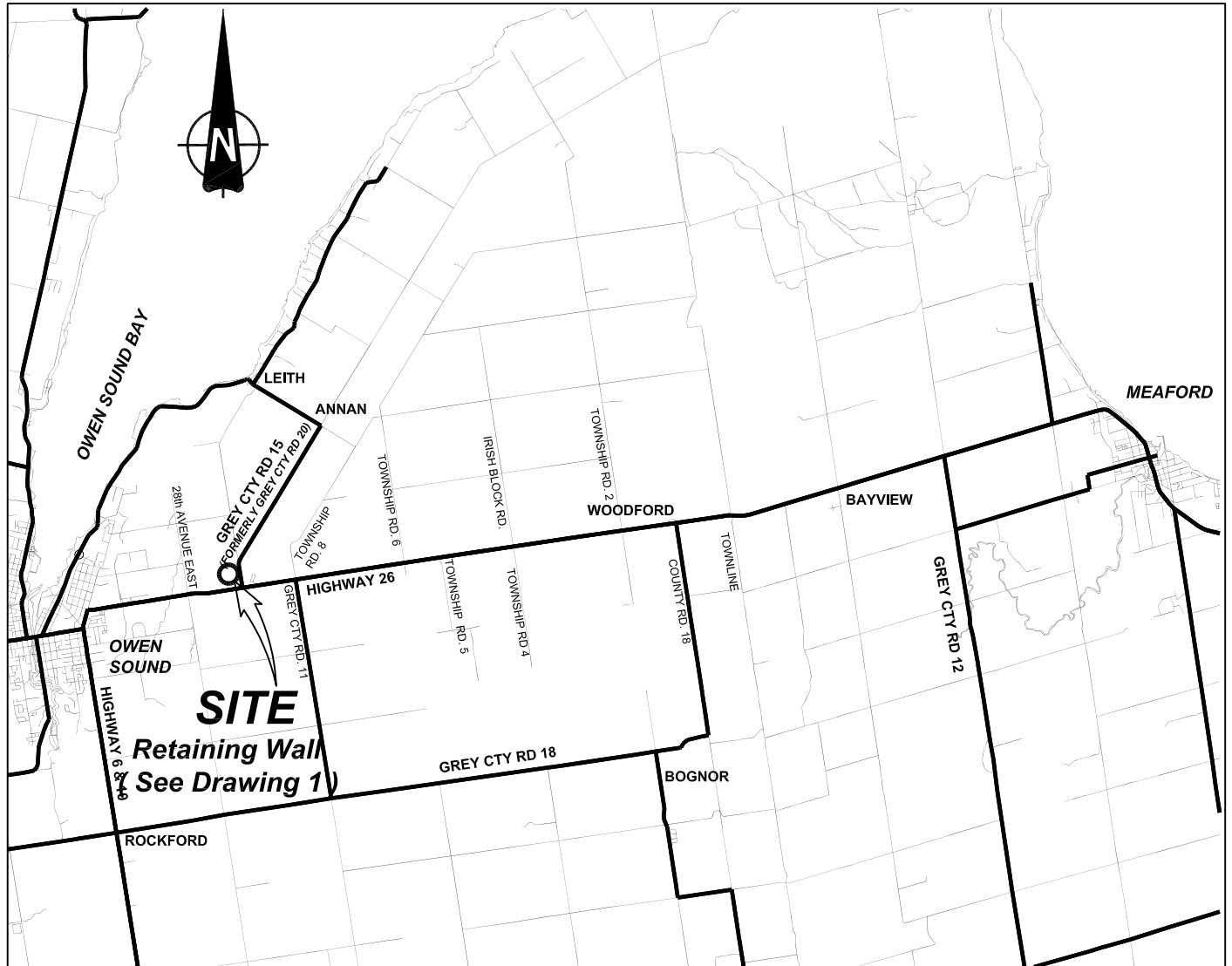
COMPILED BY BG

DATUM GEODETIC

DATE 26 June 2003

CHECKED BY DJM

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 γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
								○ UNCONFINED	+ FIELD VANE	● QUICK TRIAXIAL	× LAB VANE	WATER CONTENT (%)					
247.22							20	40	60	80	100						
0.09	ASPHALT																
0.30	FILL, granular road base																
	FILL, sandy silt, trace clay, trace gravel		1	SS	47												
	Dense																
	Brown																
245.70																	
1.52	TOPSOIL, silty, trace sand		2	SS	28												
245.24	Compact																
	Black																
1.98	SANDY SILT, trace clay, trace gravel with cobbles and boulders below 3.66m depth, (TILL)		3	SS	20												
	Loose to very dense																
	Brown becoming grey at about elev. 241.43m		4	SS	29												
			5	SS	8												
			6	SS	100/100mm												
			7	SS	99												
			8	SS	100/250mm												
240.88	END OF BOREHOLE																
6.34	Note: Groundwater encountered at elev. 242.65m during drilling June 26, 2003																



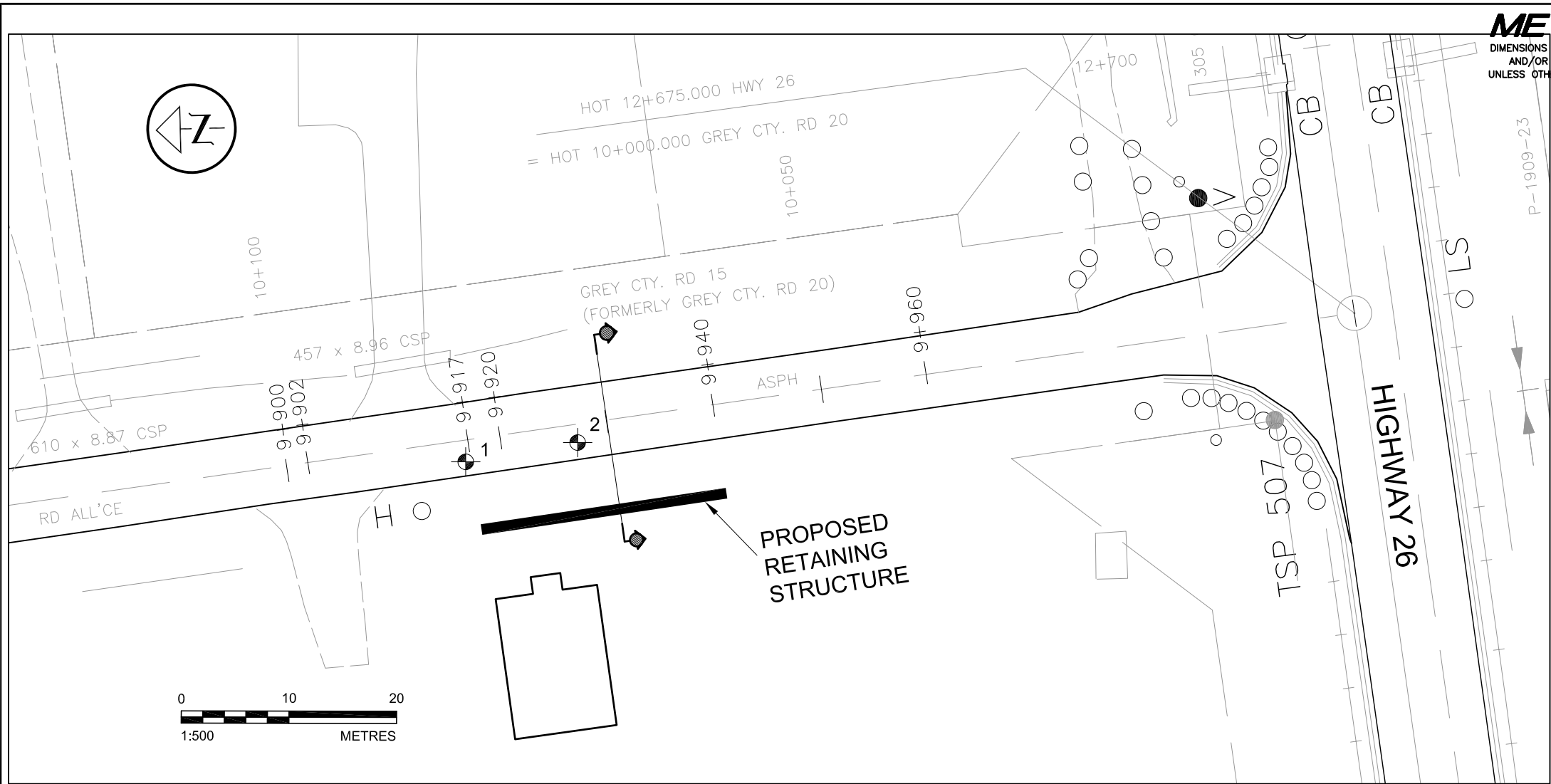
THIS DRAWING IS APPROXIMATE ONLY AND IS
TO BE READ IN CONJUNCTION WITH
ACCOMPANYING TEXT.

PROJECT		GWP 33-94-00 REHABILITATION OF HIGHWAY 26 OWEN SOUND, ONTARIO			
TITLE		KEY PLAN			
PROJECT No.		021-3158-2-5		FILE No.	
				021315825D001	
CADD		BG	03/07/03	SCALE	AS SHOWN
CHECK		AMH	03/07/03	REV.	0
		FIGURE 1			



D size dwg 22" x 32" 11" x 17" plot half scale
1 = 1 metric

0013225D001.DWG



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

DIST
CONT. No.
WP No. 33-94-00

GREY CTY. RD 15
RETAINING STRUCTURE
BOREHOLE LOCATIONS & SOIL STRATA

Golder Associates Ltd.
LONDON, ONTARIO, CANADA

REFERENCE
DRAWING SUPPLIED BY TRANSENCO LIMITED
ENTITLED: NEW CONSTRUCTION STA. 12+650 to STA. 13+000
HWY. 26 AT GREY COUNTY ROAD 15
DATED APRIL 14, 2003

HWY. 26

SHEET

Borehole

Seal

Piezometer

Blows/0.3m (Std. Pen. Test, 475 j/blow)

WL in piezometer

WL during drilling

No.	ELEVATION (metres)	LOCATION	
		STATION	OFFSET
1	246.84	9+916.33	2m RT of C/L (CTY RD. 15)
2	247.22	9+926.90	1.7m RT of C/L (CTY RD. 15)

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

NO.	DATE	BY	REVISION

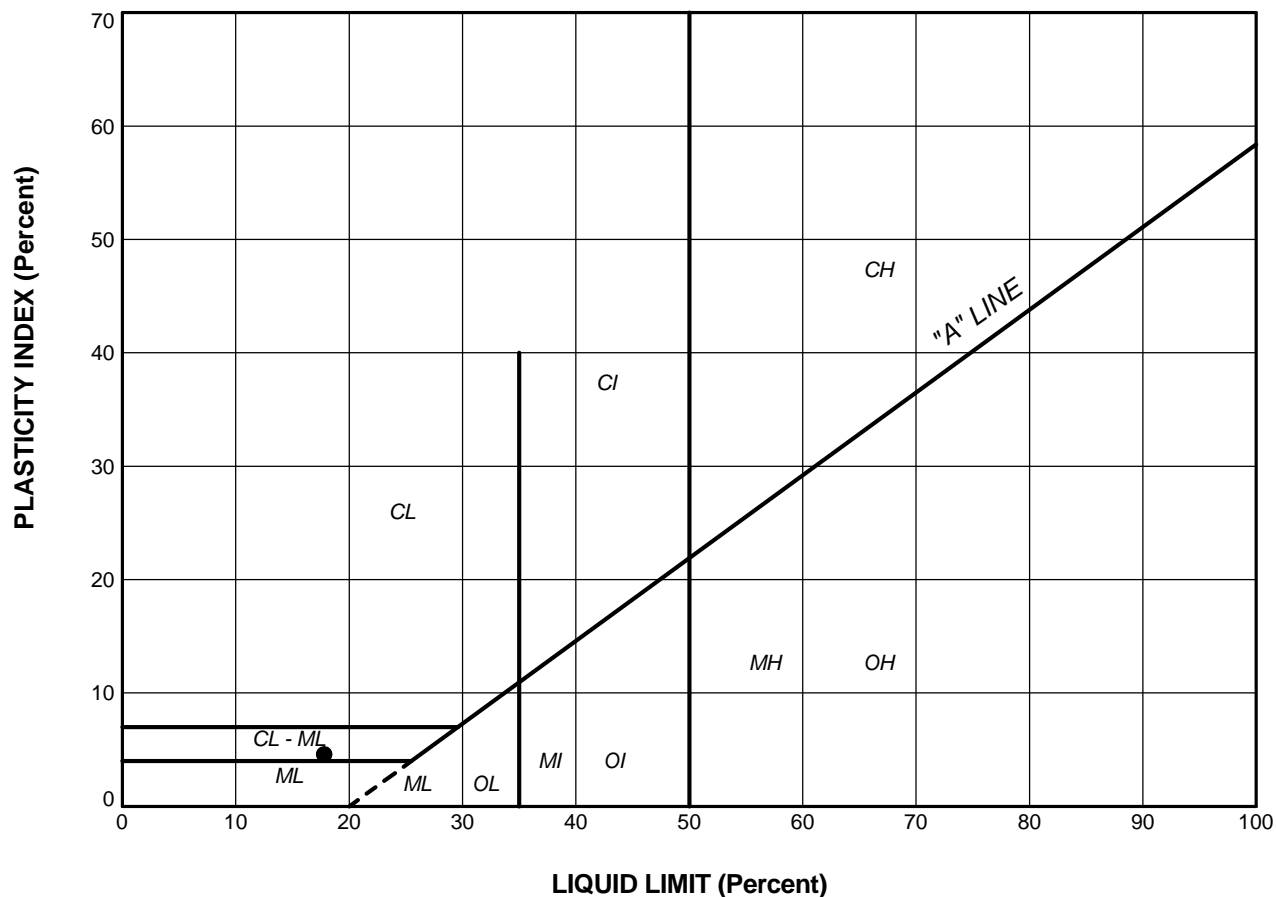
Geocres No. 41 A00-74

HWY. No. 26	PROJECT NO.: 021-3158-2-5	
SUBM'D. -	CHKD: -	DATE: JULY 3, 2003
DRAWN: BG	CHKD. AMH	APPD.

DWG. 1

APPENDIX A

LABORATORY DATA

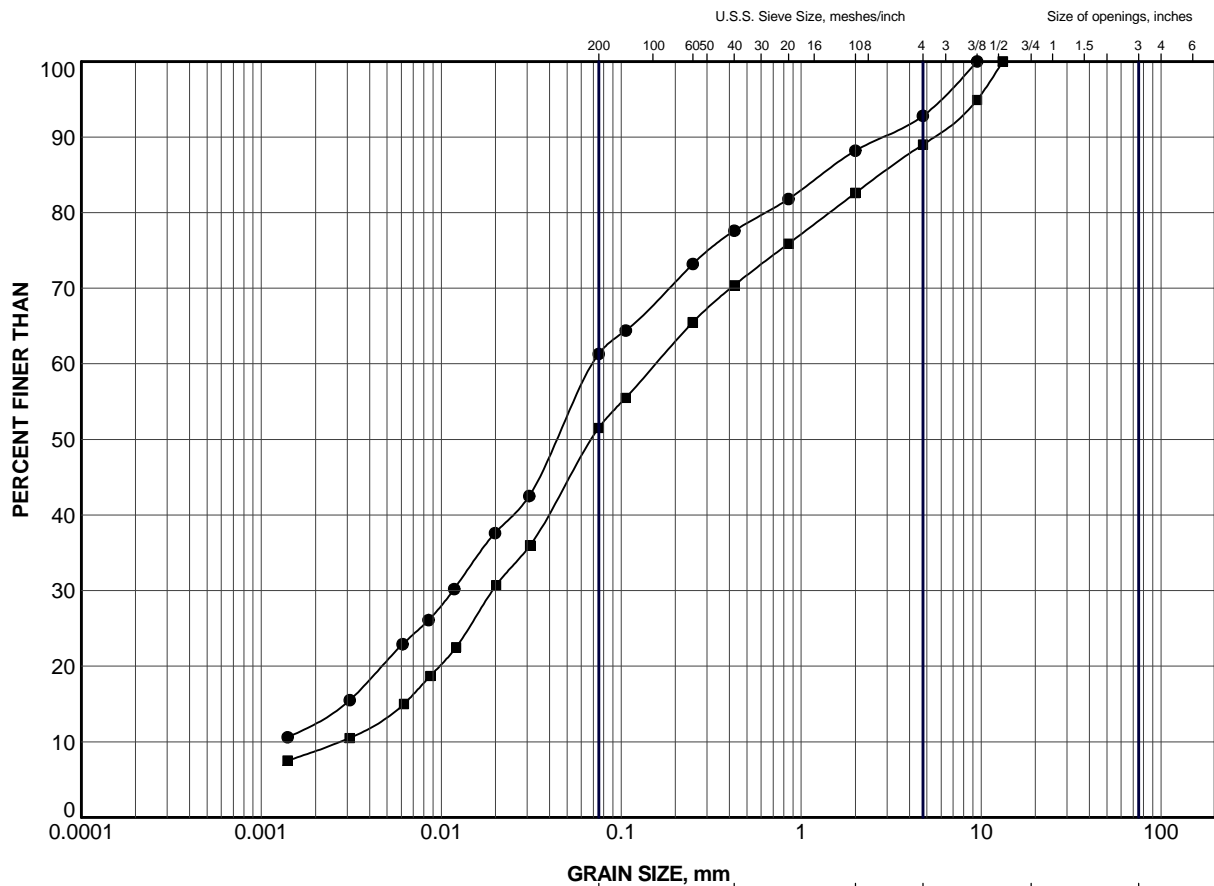


LEGEND

SYMBOL	BOREHOLE	SAMPLE	ELEV (m)	LL(%)	PL(%)	PI
●	1	4	243.8	17.8	13.2	4.6

PROJECT			GWP 33-94-00 HIGHWAY 26 REHABILITATION		
TITLE			PLASTICITY CHART		
PROJECT No.		021-3158-2-5	FILE No.		021-3158-3.GPJ
DRAWN	BG	09/12/03	SCALE	N/A	REV.
CHECK	AMH	09/12/03	FIGURE A-1		





GRAVEL SIZE, mm						
CLAY AND SILT	fine	medium	coarse	fine	coarse	Cobble Size
	SAND SIZE			GRAVEL SIZE		

LEGEND

SYMBOL	BOREHOLE	SAMPLE	ELEV (m)
●	1	6	242.0
■	2	4	243.9

PROJECT		GWP 33-94-00 HIGHWAY 26 REHABILITATION		
TITLE		GRAIN SIZE DISTRIBUTION SANDY SILT TILL		
PROJECT No.		021-3158-2-5	FILE No. 021-3158-3.GPJ	
DRAWN		BG	09/12/03	SCALE N/A REV.
CHECK		AMH	09/12/03	FIGURE A-2

