GEOCRES No:
30M12-315

Terraprobe

Consulting Geotechnical & Environmental Engineering
Construction Materials Engineering, Inspection & Testing

GEOTECHNICAL INVESTIGATION
NOISE BARRIER WALLS
VALLEYWOOD COMMUNITY
THE REGIONAL MUNICIPALITY OF PEEL
CALEDON, ONTARIO

Prepared for: Giffels Associates Ltd.
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Toronto, Ontario
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Attention: Mr. Stephen Chiu, P.Eng.
Senior Project Manager

File No. 1-07-2030

March 09, 2007

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ENCLOSURES

1. INTRODUCTION

Terraprobe Limited (Terraprobe) was retained by Giffels Associates Ltd. (Giffels) to provide geotechnical design information for two noise barrier walls proposed at the rear of the properties of the Valleywood subdivision in the Regional Municipality of Peel, Caledon, Ontario. A site location plan is provided as Figure 1 and a borehole location plan is provided as Figure 2.

The purpose of this investigation was to determine the subsurface conditions along the alignment of the noise walls and provide geotechnical design recommendations.

2. PROJECT AND SITE DESCRIPTION

The site is located north of the proposed four lanes of Highway 410 and behind the existing properties located on Garden Wood Avenue, Vista View Court and Treeview Crescent. One wall is about 391 m long and is located behind the properties on Garden Wood Avenue and Vista View Court and north of the proposed Highway 410. The second wall is about 183 m long and is located behind the properties on Treeview Crescent and north of the Hwy 410S-S/N ramp of the Valleywood Boulevard interchange.

The terrain is generally flat within the project limits and vegetation is light consisting mainly of small shrubs and grass.

It is understood that the proposed walls will about 2.4 m high and will most probably consist of stacked horizontal panels secured to vertical posts.

3. FIELD PROCEDURE

The field investigation for this project consisted of drilling and sampling a total of five boreholes on February 05, 2007. The investigation was carried out using a track mounted drill rig supplied and operated by Drill Tech Drilling of Newmarket, Ontario.

Representative samples of the strata penetrated were obtained at varying depths from the boreholes, using a split-barrel sampler advanced by a 63.5 kg hammer dropping approximately 760 mm. The results of these Penetration Tests are reported as "N" values on the borehole logs at corresponding depths.

Groundwater conditions in the open boreholes were observed during and immediately after completing the drilling operations.

Samples obtained from the boreholes were inspected in the field then sealed in clean plastic containers and transferred to Terraprobe's laboratory for further detailed examination by a geotechnical engineer.

Geotechnical laboratory testing consisted of water content determination, visual identification on all samples and pocket penetrometer tests on selected samples. Grain size distribution analyses and an Atterberg Limits test were also conducted on selected samples and these results are presented in Appendix B and also on the Log of Borehole sheets in Appendix A.

The boreholes were laid out in the field in relation to the existing features by Terraprobe's technical staff who also obtained utility clearances prior to drilling. The fieldwork was conducted under the full time supervision of Terraprobe's field engineering staff who directed the drilling, sampling and in situ testing operations and logged the boreholes. The results of the boreholes are presented in Appendix A.

The geodetic elevations and co-ordinates (northings and eastings) of the borehole locations were surveyed by Giffels who forwarded this data to Terraprobe.

4. SUBSURFACE CONDITIONS

The subsurface conditions were confirmed at the borehole locations only and conditions may vary between and beyond. The boundaries between the various strata as shown on the logs are based on non-continuous sampling. These boundaries represent an inferred transition between the various strata, rather than a precise plane of stratigraphic change.

An overall description of the subsurface conditions is described in the following paragraphs. However, the factual data presented in the Log of Boreholes govern any interpretation of the site conditions.

4.1 Topsoil

The topsoil thickness ranges from 100 mm to 150 mm at the borehole locations.

4.2 Sand Fill

A 600 mm thick layer of sand with some silt and trace gravel was encountered below the topsoil layer at Borehole 5. At the time of the investigation this granular fill is considered to be in a frozen state based on a SPT "N" value of 58 blows for 0.3 m penetration. The moisture content of a sample of this fill was 12% by weight.

4.3 Clayey Silt Fill

In all five boreholes a layer of clayey silt fill was encountered extending to depths ranging from 0.7 m to 2.9 m below ground surface or to elevations ranging from 260.8 m to 257.6 m.

The grain size distribution curve of a sample of the clayey silt fill is illustrated in Fig. B1, Appendix B. These results show a grain size distribution consisting of 7% gravel, 23% sand, 45% silt and 25% clay size particles.

The clayey silt fill is considered to have a soft to very stiff consistency based on SPT "N" values that ranged from 4 to 21 blows for 0.3 m penetration. In some of the boreholes the upper region of the clayey silt fill is inferred to be frozen based on higher SPT "N" values of 26 to 33 blows for 0.3 m penetration. The moisture content of samples of this fill ranged from 12% to 26% by weight.

4.4 Clayey Silt Till

A layer of clayey silt till was encountered across the site. The clayey silt till extends to a depth of 5.6 m (Elev. 256.6 m) in Borehole 1 and to borehole termination depths ranging from 6.2 m to 6.5 m in the remaining boreholes.

The grain size distribution curve of a sample of the clayey silt till is illustrated in Fig. B2, Appendix B. These results show a grain size distribution consisting of 9% gravel, 31% sand, 39% silt and 21% clay size particles. Till soils are also known to contain cobbles and boulders due to their mode of deposition.

A sample of the clayey silt till was also subjected to an Atterberg Limits test and the results are presented in Figure B3. The index values from these tests are summarized below:

Liquid Limit:	18%
Plastic Limit:	27%
Plasticity Index:	9%
Natural Moisture Content:	13%

These values are characteristic of clayey soils of low plasticity.

Standard Penetration tests in this clayey silt till layer yielded "N" values ranging from 30 to more than 50 blows for 0.3 m penetration indicating a hard consistency. Pocket penetrometer tests on relatively undisturbed samples gave undrained shear strengths ranging from 85 kPa to more than 225 kPa. The moisture content of samples from this deposit ranged from 8% to 17% by weight.

4.5 Sand

A native deposit of sand was encountered in Borehole 1 at a depth of 5.6 m (Elev. 256.6 m) below ground surface and it extends to the borehole termination depth of 6.2 m and possibly beyond.

Refer to Fig. B4, Appendix B for the grain size distribution curve of a sample of this soil. These results show a grain size distribution consisting of 3% gravel, 87% sand, 10% silt and clay size particles.

The sand is considered to have a very dense relative density based on an SPT "N" value of more than 50 blows for 0.3 m penetration. The moisture content of a sample of the sand was 3% by weight.

4.6 Groundwater

Groundwater observations were made in each borehole during and after completion of drilling. In Borehole 4 an unstabilized water level was encountered at a depth of 5.2 m (Elev. 254.2 m) after drilling was complete. The remainder of the boreholes were dry.

Based on the borehole data it is believed that the permanent groundwater table exists at Elev. 254.5± m. All groundwater observations at this site are short term and the levels are expected to fluctuate seasonally and after severe weather events.

Perched water conditions can also be expected to occur where relatively permeable soils (e.g. the surficial granular fill) are overlain by the relatively impermeable clayey silt soils.

5. DISCUSSION AND RECOMMENDATIONS

5.1 General

The following discussion and recommendations are based on the data obtained from this investigation and are intended for use by the owner and the design engineer. Contractors bidding or providing services on this project should review the data and determine their own conclusions regarding construction methods and scheduling.

This report is provided based on the terms of reference and on the assumption that the design features relevant to the geotechnical analyses will be in accordance with applicable codes, standards and guidelines of practice. If there are any changes to the site development features, or there is any additional information relevant to the interpretations made of the subsurface information with respect to the geotechnical analyses or other recommendations, then Terraprobe should be retained to review the implications of these changes with respect to the contents of this report.

It is understood that two noise barrier walls are being proposed behind properties of the Valleywood subdivision. One wall will be about 391 m long and the second will be about 183 m in length. It is also understood that the height of these walls will likely be about 2.4 m and will most probably consist of panels secured to vertical posts.

5.2 Foundation Design Parameters

For design of the noise barrier wall foundation, reference may be made to the following documents:

- Canadian Highway Bridge Design Code and Commentary (2000). CAN/CSA-S6-00 and S6.1-00.
- Ministry of Transportation, Ontario (1994) "Procedures for the Design of High Mast Pole Foundations," Design Section, Structural Office.

It is anticipated that the proposed noise barrier walls will be supported on conventional augered caissons (i.e. drilled shafts). The recommended soil parameters for the design of augered caisson foundation units are given in Table 5.0 below.

TABLE 5.0
RECOMMENDED SOIL PARAMETERS FOR THE DESIGN OF AUGERED CAISSON FOUNDATION UNITS

Reference Boreholes	Recommended Subsurface Stratigraphy for Design	Recommended Depth Below Ground Surface (m)	Foundation Design Parameters					
			C_u (kPa)	ϕ (deg.)	γ (kN/m ^{3})	γ' (kN/m ^{3})	K_p	Ground Water Elevation (m)
BH1, BH2, BH3	Fill	0.2 - 1.8	0	28	19	-	2.7	254.5±
	Clayey Silt Till	1.8 - 6.0	225	-	20	10	-	
	Sand	6.0 - 6.5	0	33	20	-	3.3	
BH4, BH5	Fill	0.1 - 0.7	0	26	19	-	2.5	254.5±
	Fill	0.7 - 2.9	0	28	19	-	2.7	
	Clayey Silt Till	2.9 - 6.3	225	-	20	10	-	

C_u = Undrained shear strength.
ϕ = Angle of Internal Friction
γ = Unit Weight of soil
γ' = Submerged unit weight of soil
K_p = Rankine Coefficient of passive earth pressure [$K_p = \tan^2(45+\phi/2)$]

In order to take into account frost action and surficial disturbance, the ultimate lateral passive resistance in front of the caisson and caisson sidewall adhesion within the upper 1.2 m below final grade, should be neglected in the foundation design. It is also recommended that all surficial weak or variable soils such as topsoil, be neglected in determining the lateral resistance.

A reduced lateral passive resistance should be taken into account during design if it is anticipated that sloping ground will exist in front of the foundation units. When designing for the portion of a caisson below the groundwater level, the submerged unit weight should be used. The required depth of the drilled shaft will be governed by lateral loads, including wind loads, acting on the wall. The length of the caisson should also be sufficient to counteract frost jacking (upward) forces.

An equivalent caisson width equal to 3 times the caisson diameter may be assumed for lateral resistance calculations. Appropriate load and resistance factors should be applied for caisson design.

5.3 Excavation and Groundwater Control

Caisson construction is likely to be carried out through cohesionless and cohesive fill.

Although the ground water level generally exists below the anticipated construction depths at most of the borehole locations, there may be minor water seepage from the existing fill (perched water), and probably from water-bearing layers at some caisson holes. Dry cave-ins may also occur in unsupported holes especially in the cohesionless fill material and the native sand.

In view of these conditions, it is recommended that temporary liner(s) be available on site to support the caisson sidewalls and to provide seepage cut-off as and where required. It is recommended that the concrete be placed by the tremie method as soon as the hole reaches its desired depth. The liner should be withdrawn as concrete is placed. During liner withdrawal, the level of concrete in the caisson hole must always be at least 0.6 m above the bottom of the temporary liner.

5.4 Construction Concerns

Being of glacial origin, the glacial till deposit can be expected to contain random cobbles and boulders. Concerns during construction involve possible contact with cobbles and boulders which can cause problems during caisson installation, such as increasing the time required for drilling, the employment of special equipment etc. The contractor should be prepared for difficulties in penetrating and removing cobbles and boulders from the caisson holes and be prepared for over-digging of the holes.

5.5 Construction Inspection and Testing

Caisson construction should be monitored by qualified geotechnical personnel to verify the soil conditions and to confirm that those conditions are consistent with the design assumptions in this report.

6. LIMITATIONS AND RISK

6.1 Procedures

This investigation has been carried out using investigation techniques and engineering analysis methods consistent with those ordinarily exercised by Terraprobe and other engineering practitioners, working under similar conditions and subject to the time, financial and physical constraints applicable to this project. The discussions and recommendations that have been presented are based on the factual data obtained by Terraprobe.

It must be recognized that there are special risks whenever engineering or related disciplines are applied to identify subsurface conditions. Even a comprehensive sampling and testing programme implemented in accordance with the most stringent level of care may fail to detect certain conditions. Terraprobe has assumed for the purposes of providing design parameters and advice, that the conditions that exist between sampling points are similar to those found at the sample locations. The conditions that Terraprobe has interpreted as existing between sampling points can differ from those that actually exist.

It may not be possible to drill a sufficient number of boreholes or sample and report them in a way that would provide all the subsurface information that could affect construction costs, techniques, equipment and scheduling. Contractors bidding on or undertaking work on the project should be directed to draw their own conclusions as to how the subsurface conditions may affect them, based on their own investigations and their own interpretations of the factual investigation results, cognizant of the risks implicit in the subsurface investigation activities.

6.2 Changes In Site And Scope

It must also be recognized that the passage of time, natural occurrences, and direct or indirect human intervention at or near the site have the potential to alter subsurface conditions. Groundwater conditions are particularly susceptible to change as a result of seasonal variation and alterations in drainage conditions.

The discussion and recommendations are based on the factual data obtained from this investigation made at the site by Terraprobe and are intended for use by the owner and its retained designers in the design phase of the project. If there are changes to the project scope and development features, the interpretations made of the subsurface information, the geotechnical design parameters and comments relating to constructibility issues and quality control may not be relevant or complete for the revised project. Terraprobe should be retained to review the implications of such changes with respect to the contents of this report

Terraprobe Limited

Rehman Abdul, P.Eng.
Senior Geotechnical Engineer, Associate

Michael Tanos, P.Eng.
Principal

ENCLOSURES

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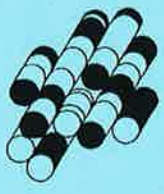

FIGURES

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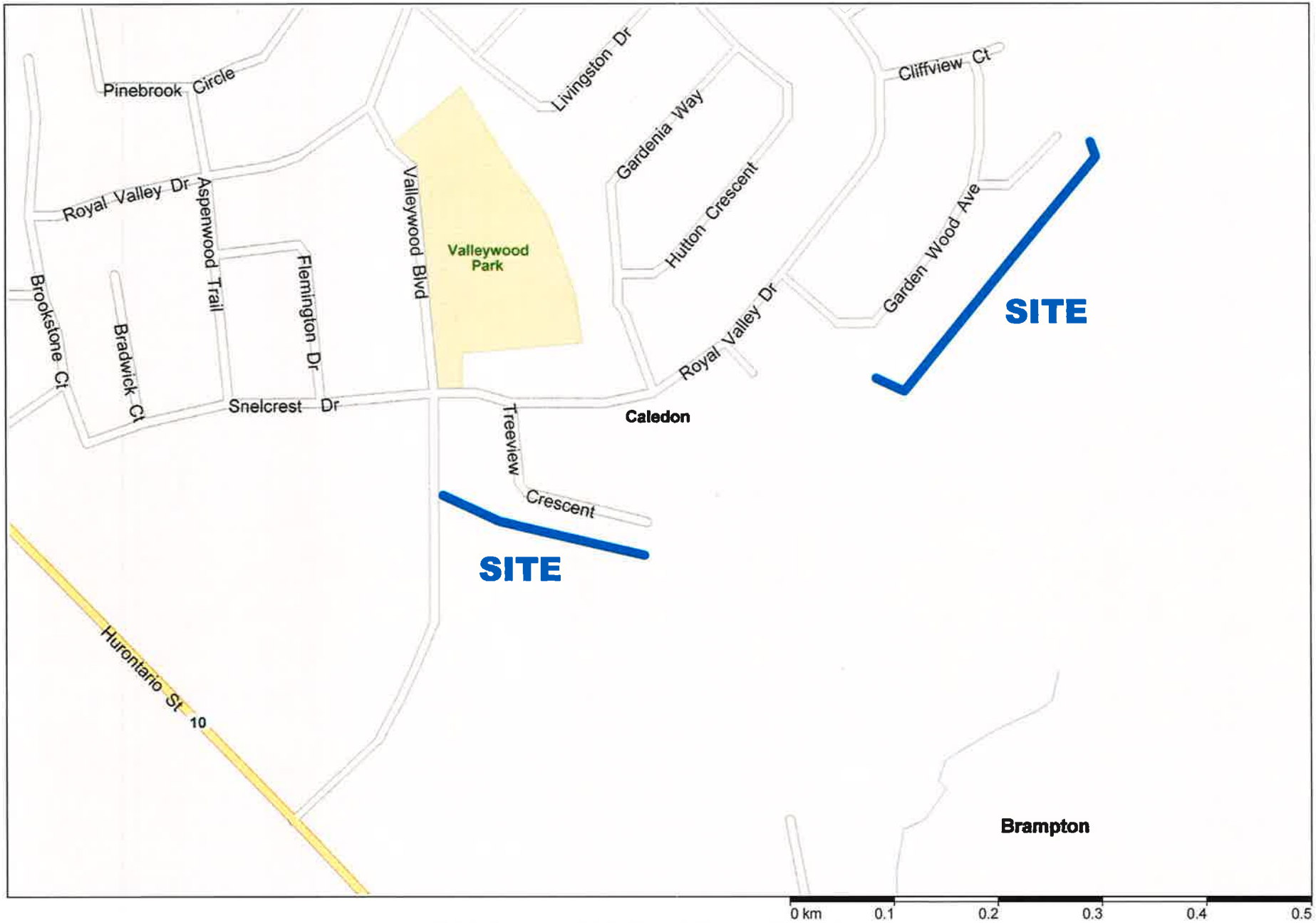
Noise Barrier Walls, Valleywood Subdivision, Caledon, Ontario

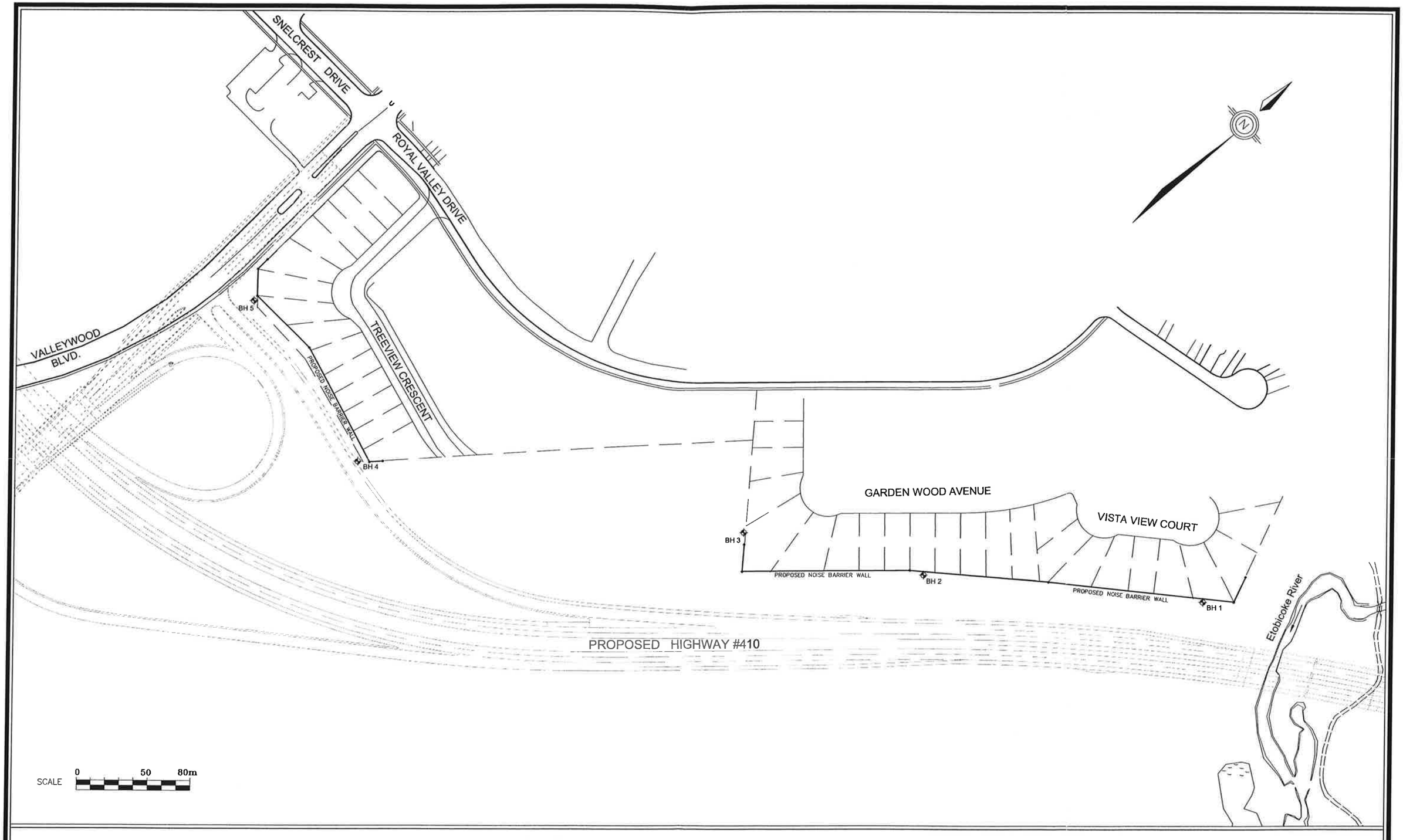


SITE LOCATION PLAN

TERRAPROBE

File No. 1-07-2030

FIGURE 1



BOREHOLE LOCATION PLAN

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FIGURE 2

APPENDIX A

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ABBREVIATIONS, TERMINOLOGY, GENERAL INFORMATION

BOREHOLE LOGS

SAMPLING METHOD

SS	split spoon
ST	Shelby tube
AS	auger sample
WS	wash sample
RC	rock core
WH	weight of hammer
PH	pressure, hydraulic

PENETRATION RESISTANCE

Standard Penetration Test (SPT) resistance ('N' values) is defined as the number of blows by a hammer weighing 63.6 kg (140 lb.) falling freely for a distance of 0.76 m (30 in.) required to advance a standard 50 mm (2 in.) diameter split spoon sampler for a distance of 0.3 m (12 in.).

Dynamic Cone Test (DCT) resistance is defined as the number of blows by a hammer weighing 63.6 kg (140 lb.) falling freely for a distance of 0.76 m (30 in.) required to advance a conical steel point of 50 mm (2 in.) diameter and with 60° sides on 'A' size drill rods for a distance of 0.3 m (12 in.).

SOIL DESCRIPTION - COHESIONLESS SOILS

Relative Density	'N' value
very loose	< 4
loose	4 - 10
compact	10 - 30
dense	30 - 50
very dense	> 50

SOIL DESCRIPTION - COHESIVE SOILS

Consistency	Undrained Shear Strength, kPa	'N' value
very soft	< 12	< 2
soft	12 - 25	2 - 4
firm	25 - 50	4 - 8
stiff	50 - 100	8 - ~~10~~ 15
very stiff	100 - 200	15 ~~15 - 32~~ 30
hard	> 200	> ~~32~~ 30

SOIL COMPOSITION

	% by weight
'trace' (e.g. trace silt)	< 10
'some' (e.g. some gravel)	10 - 20
adjective (e.g. sandy)	20 - 35
'and' (e.g. sand and gravel)	35 - 50

TESTS, SYMBOLS

MH	mechanical sieve and hydrometer analysis
w, w_c	water content
w_l	liquid limit
w_p	plastic limit
I_p	plasticity index
k	coefficient of permeability
γ	soil unit weight, bulk
ϕ'	angle of internal friction
c'	cohesion shear strength
C_c	compression index

GENERAL INFORMATION, LIMITATIONS

The conclusions and recommendations provided in this report are based on the factual information obtained from the boreholes and/or test pits. Subsurface conditions between the test holes may vary.

The engineering interpretation and report recommendations are given only for the specific project detailed within, and only for the original client. Any third party decision, reliance, or use of this report is the sole and exclusive responsibility of such third party. The number and siting of boreholes and/or test pits may not be sufficient to determine all factors required for different purposes.

It is recommended Terraprobe be retained to review the project final design and to provide construction inspection and testing.

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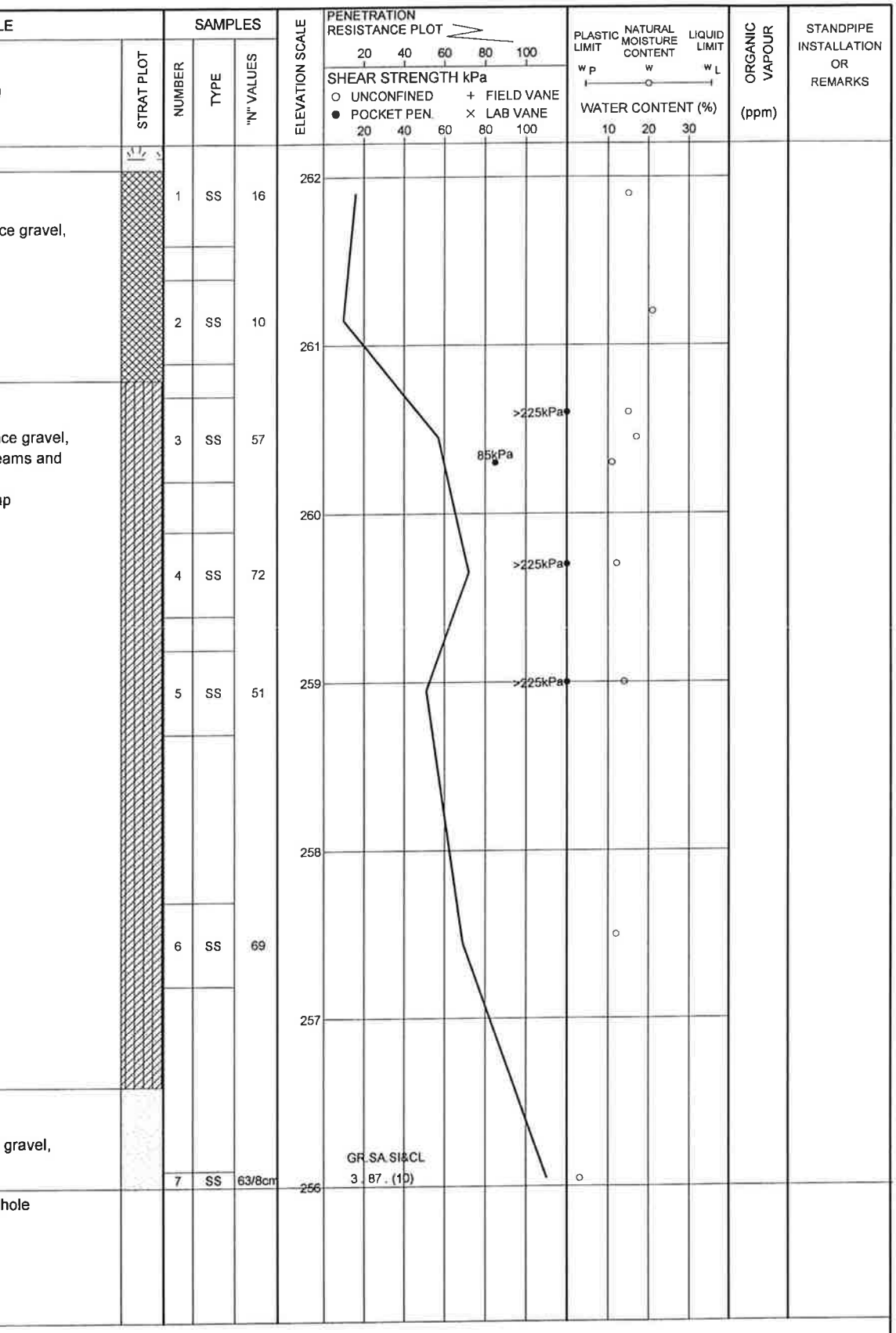
LOG OF BOREHOLE 1

PROJECT: Noise Barrier Walls
LOCATION: Valleywood Subdivision, Caledon
CLIENT: Giffels Associates Ltd.

DATE: 05 February 2007
EQUIPMENT: Solid Stem Augers Coords:N4845174.3 E278707.1
ELEVATION DATUM: Geodetic
FILE: 1-07-2030

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES
262.2	Ground Surface				
0.0 / 262.1	150mm TOPSOIL				
0.2	FILL - Clayey Silt, trace to some sand, trace gravel, stiff to very stiff, brown, damp to moist		1	SS	16
			2	SS	10
260.8					
1.4	CLAYEY SILT trace sand to sandy, trace gravel, occasional silty sand seams and partings, hard, grey / brown, damp (GLACIAL TILL)		3	SS	57
			4	SS	72
			5	SS	51
			6	SS	69
256.6					
5.6	SAND trace to some silt, trace gravel, very dense, brown, dry		7	SS	63/8cm
256.0					
6.2	End of Borehole				



ORGANIC VAPOUR (ppm)

STANDPIPE INSTALLATION OR REMARKS

NOTES:
Borehole was open and dry upon completion of drilling.

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LOG OF BOREHOLE 2

PROJECT: Noise Barrier Walls
LOCATION: Valleywood Subdivision, Caledon
CLIENT: Giffels Associates Ltd.

DATE: 05 February 2007
EQUIPMENT: Solid Stem Augers Coords:N4845038.4 E278558.6
ELEVATION DATUM: Geodetic
FILE: 1-07-2030

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES "N" VALUES
260.9	Ground Surface				
0.0 / 260.8	150mm TOPSOIL				
0.2	FILL - Clayey Silt, trace to some sand, trace gravel, trace organics, trace rootlets, stiff to very stiff, dark brown / grey, damp to moist		1	SS	15
			2	SS	15
259.1			3	SS	30
1.8	CLAYEY SILT some sand to sandy, trace gravel, occasional silty sand seams and partings, hard, brown, damp (GLACIAL TILL)		4	SS	73
			5	SS	92
			6	SS	70
254.7			7	SS	50/8cm
6.2	End of Borehole				

PENETRATION RESISTANCE PLOT
SHEAR STRENGTH kPa
○ UNCONFINED + FIELD VANE
● POCKET PEN. × LAB VANE
ELEVATION SCALE: 260, 259, 258, 257, 256, 255
>225kPa

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)

ORGANIC VAPOUR (ppm)

STANDPIPE INSTALLATION OR REMARKS

NOTES:
Borehole was open and dry upon completion of drilling.

Terraprobe

LOG OF BOREHOLE 3

PROJECT: Noise Barrier Walls
LOCATION: Valleywood Subdivision, Caledon
CLIENT: Giffels Associates Ltd.

DATE: 05 February 2007
EQUIPMENT: Solid Stem Augers **Coords:N4844963.7 E278450.6**
ELEVATION DATUM: Geodetic **FILE:** 1-07-2030

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES
260.8	Ground Surface				
0.0	100mm TOPSOIL				
0.1	FILL - Clayey Silt, trace sand, trace gravel, some topsoil and rootlets, brown, frozen		1	SS	26
260.1					
0.7	CLAYEY SILT some sand to sandy, trace gravel, occasional silty sand seams and partings, hard, brown, damp (GLACIAL TILL)		2	SS	37
			3	SS	82
			4	SS	54
			5	SS	70
			6	SS	84
			7	SS	94/28cm
254.3					
6.5	End of Borehole				

PENETRATION RESISTANCE PLOT: 20 40 60 80 100
SHEAR STRENGTH kPa: ○ UNCONFINED ● POCKET PEN. + FIELD VANE × LAB VANE
ELEVATION SCALE: 260 259 258 257 256 255
>225kPa
GR.SA.SI.CL 9 .31 .39.21
PLASTIC LIMIT w_P NATURAL MOISTURE CONTENT w LIQUID LIMIT w_L
WATER CONTENT (%): 10 20 30
ORGANIC VAPOUR (ppm)
STANDPIPE INSTALLATION OR REMARKS

NOTES:
Borehole was open and dry upon completion of drilling.

Terraprobe

LOG OF BOREHOLE 4

PROJECT: Noise Barrier Walls
LOCATION: Valleywood Subdivision, Caledon
CLIENT: Giffels Associates Ltd.

DATE: 05 February 2007
EQUIPMENT: Solid Stem Augers Coords:N4844792.9 E278229.1
ELEVATION DATUM: Geodetic
FILE: 1-07-2030

ELEV / DEPTH	DESCRIPTION	NUMBER	TYPE	"N" VALUES
259.4	Ground Surface			
0.0	100mm TOPSOIL			
0.1	FILL - Clayey Silt, some sand, trace gravel, some topsoil and rootlets, trace organics, frozen to 0.7m, soft to firm below, dark brown / brown, damp to moist	1	SS	33
		2	SS	4
257.6		3	SS	20
1.8	CLAYEY SILT sandy, trace gravel, occasional silty sand seams and partings, hard, brown, damp (GLACIAL TILL)	4	SS	51
		5	SS	51
	---- grey	6	SS	50/13cm
253.1		7	SS	50/8cm
6.3	End of Borehole			

PENETRATION RESISTANCE PLOT
SHEAR STRENGTH kPa
○ UNCONFINED + FIELD VANE
● POCKET PEN. × LAB VANE
>225kPa

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L
WATER CONTENT (%)

ORGANIC VAPOUR (ppm)

STANDPIPE INSTALLATION OR REMARKS

NOTES:
Borehole was open and water level at 5.2m (Elev. 254.2m) upon completion of drilling.

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LOG OF BOREHOLE 5

PROJECT: Noise Barrier Walls
LOCATION: Valleywood Subdivision, Caledon
CLIENT: Giffels Associates Ltd.

DATE: 05 February 2007
EQUIPMENT: Solid Stem Augers **Coords:N4844813.8 E278094.2**
ELEVATION DATUM: Geodetic **FILE:** 1-07-2030

ELEV / DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES
260.9	Ground Surface				
0.0	100mm TOPSOIL				
0.1	FILL - Sand, some silt, trace gravel, frozen, brown, damp		1	SS	58
260.2					
0.7	FILL - Clayey Silt, sandy, trace gravel, very stiff to hard, brown, damp to moist		2	SS	30
	---- grey		3	SS	21
			4	SS	24
258.0					
2.9	CLAYEY SILT trace to some sand, trace gravel, hard, brown, damp (GLACIAL TILL)		5	SS	37
			6	SS	68
254.7			7	SS	50/8cm
6.2	End of Borehole				

ELEVATION SCALE: 260, 259, 258, 257, 256, 255

PENETRATION RESISTANCE PLOT: 20 40 60 80 100

SHEAR STRENGTH kPa
○ UNCONFINED + FIELD VANE
● POCKET PEN. × LAB VANE
20 40 60 80 100

GR SA SI CL
7 23 45 25

>225kPa
175kPa
>225kPa

PLASTIC LIMIT w_P | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w_L

WATER CONTENT (%)
10 20 30

ORGANIC VAPOUR (ppm)

STANDPIPE INSTALLATION OR REMARKS

NOTES:
Borehole was open and dry upon completion of drilling.

APPENDIX B

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SIEVE AND HYDROMETER ANALYSIS TEST REPORT

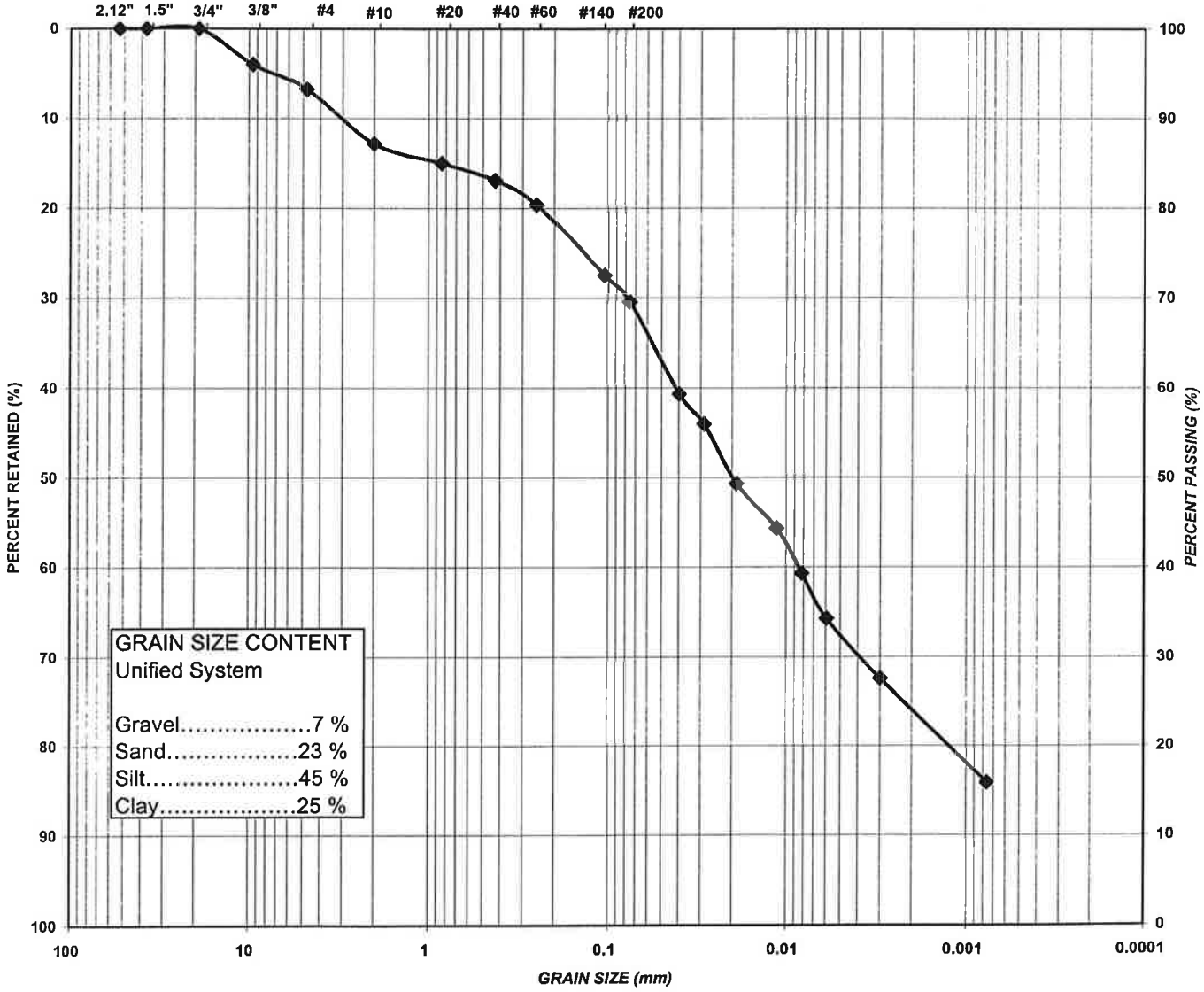
PROJECT: **Noise Wall Barrier**
LOCATION: **Caledon, Ontario**
CLIENT: **Giffels Associates Ltd.**
BOREHOLE: **5**
SAMPLE NUMBER: **3**
SAMPLE DEPTH: **1.5 - 1.9 m**
SAMPLE DESCRIPTION: **FILL - CLAYEY SILT, sandy, trace gravel**

FILE NO.: **1-07-2030**
LAB NO.: **1059B**
SAMPLE DATE: **February 5, 2007**
SAMPLED BY: **J.S.**

FIG B1

GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE SIZES



MIT SYSTEM	GRAVEL		COARSE	MEDIUM	FINE	SILT	CLAY	
			SAND					
UNIFIED SYSTEM	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY		
	GRAVEL		SAND					

Terraprobe

SIEVE AND HYDROMETER ANALYSIS TEST REPORT

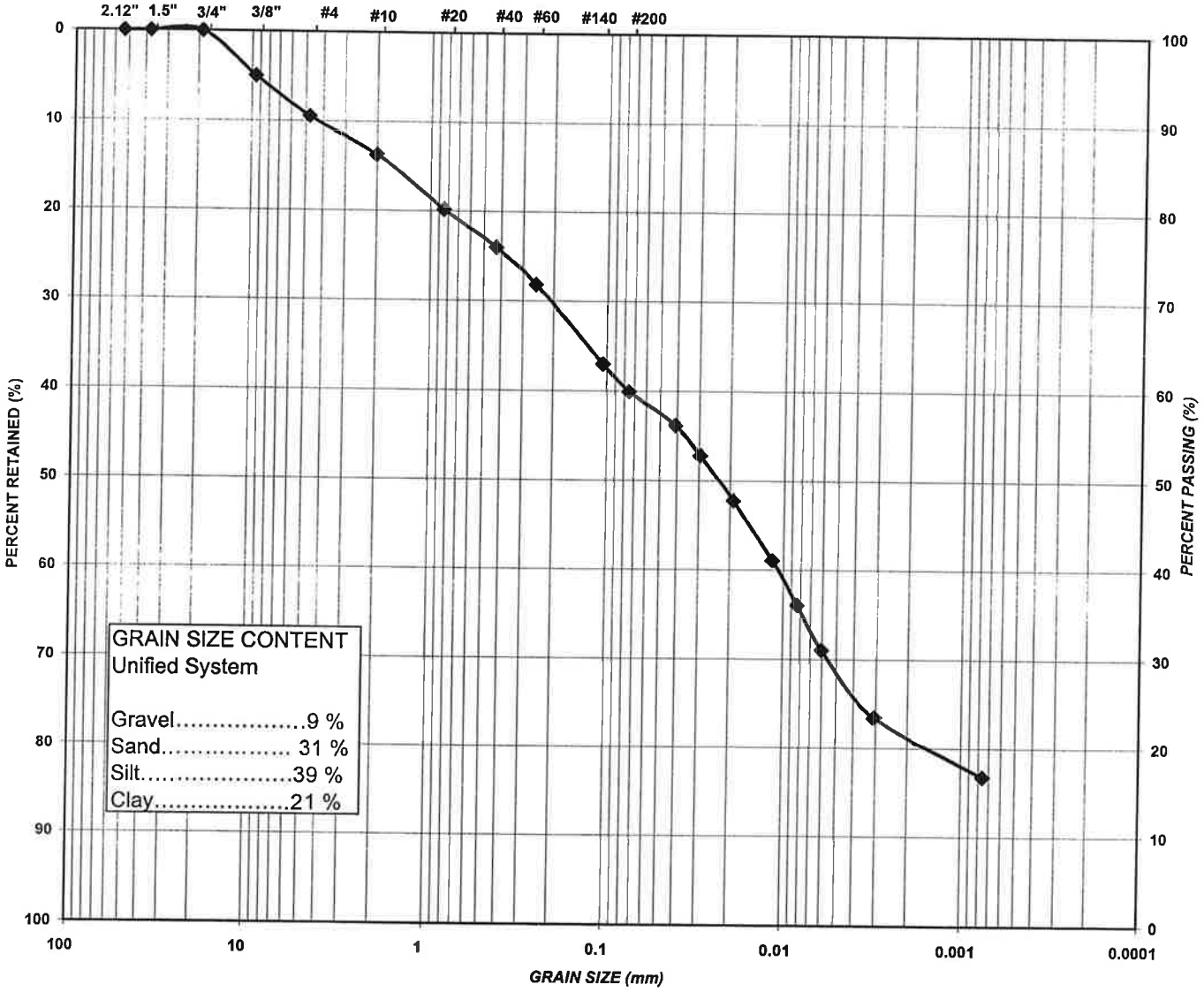
PROJECT: **Noise Wall Barrier**
LOCATION: **Caledon, Ontario**
CLIENT: **Giffels Associates Ltd.**
BOREHOLE: **3**
SAMPLE NUMBER: **4**
SAMPLE DEPTH: **2.2 - 2.7 m**
SAMPLE DESCRIPTION: **CLAYEY SILT sandy, trace gravel (TILL)**

FILE NO.: **1-07-2030**
LAB NO.: **1059A**
SAMPLE DATE: **February 5, 2007**
SAMPLED BY: **J.S.**

Fig B2

GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE SIZES

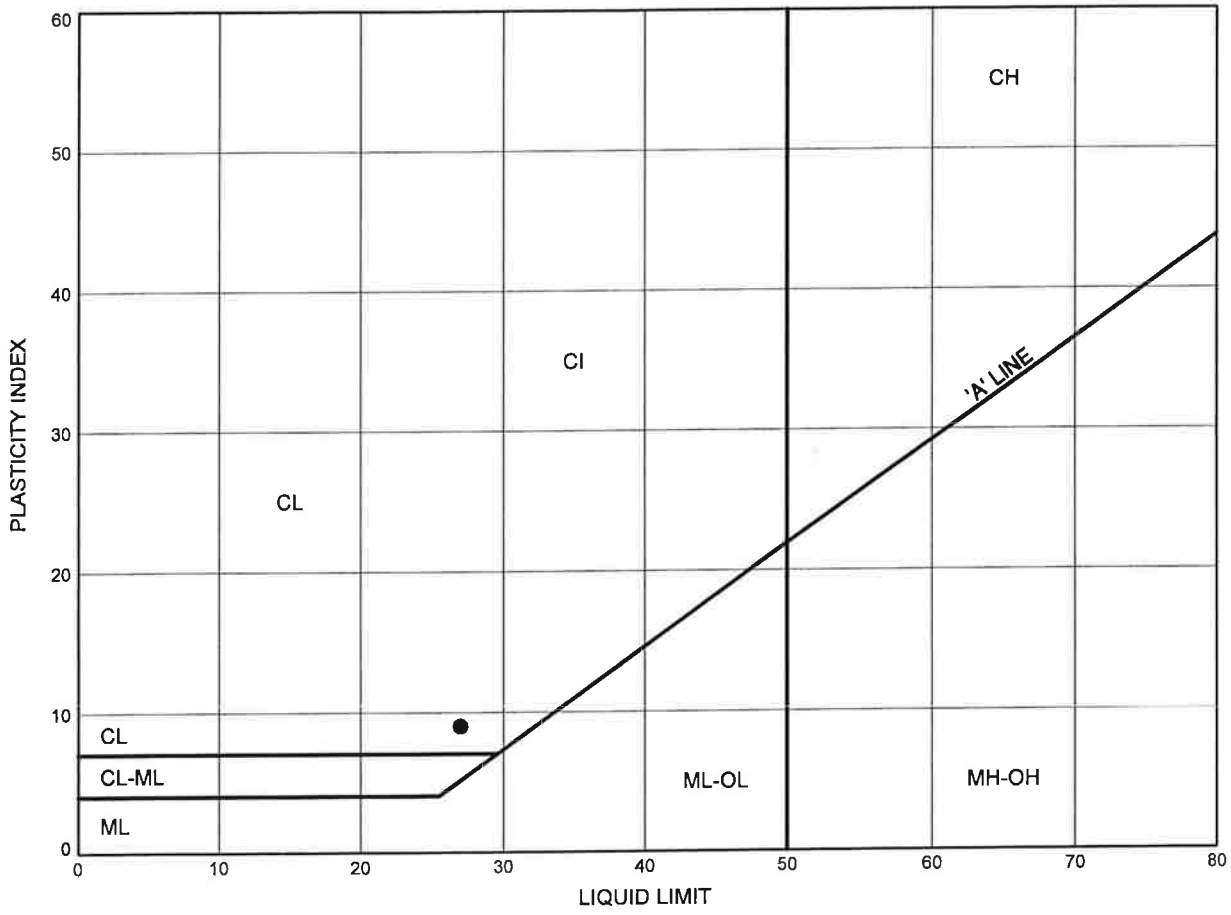


MIT SYSTEM	GRAVEL		COARSE	MEDIUM	FINE	SILT	CLAY
			SAND				
UNIFIED SYSTEM	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY	
	GRAVEL		SAND				

ATTERBERG LIMITS TEST RESULTS

FIGURE B3

Clayey Silt Till



SYMBOL	BOREHOLE	DEPTH (m)	ELEVATION (m)
●	3	2.5	258.3

Date February 2007

Project 1-07-2030

Prep'd DB

Chkd. RA

ALTR 1-07-2030 NOISE BARRIER.GPJ 20/02/07

Terraprobe

SIEVE AND HYDROMETER ANALYSIS TEST REPORT

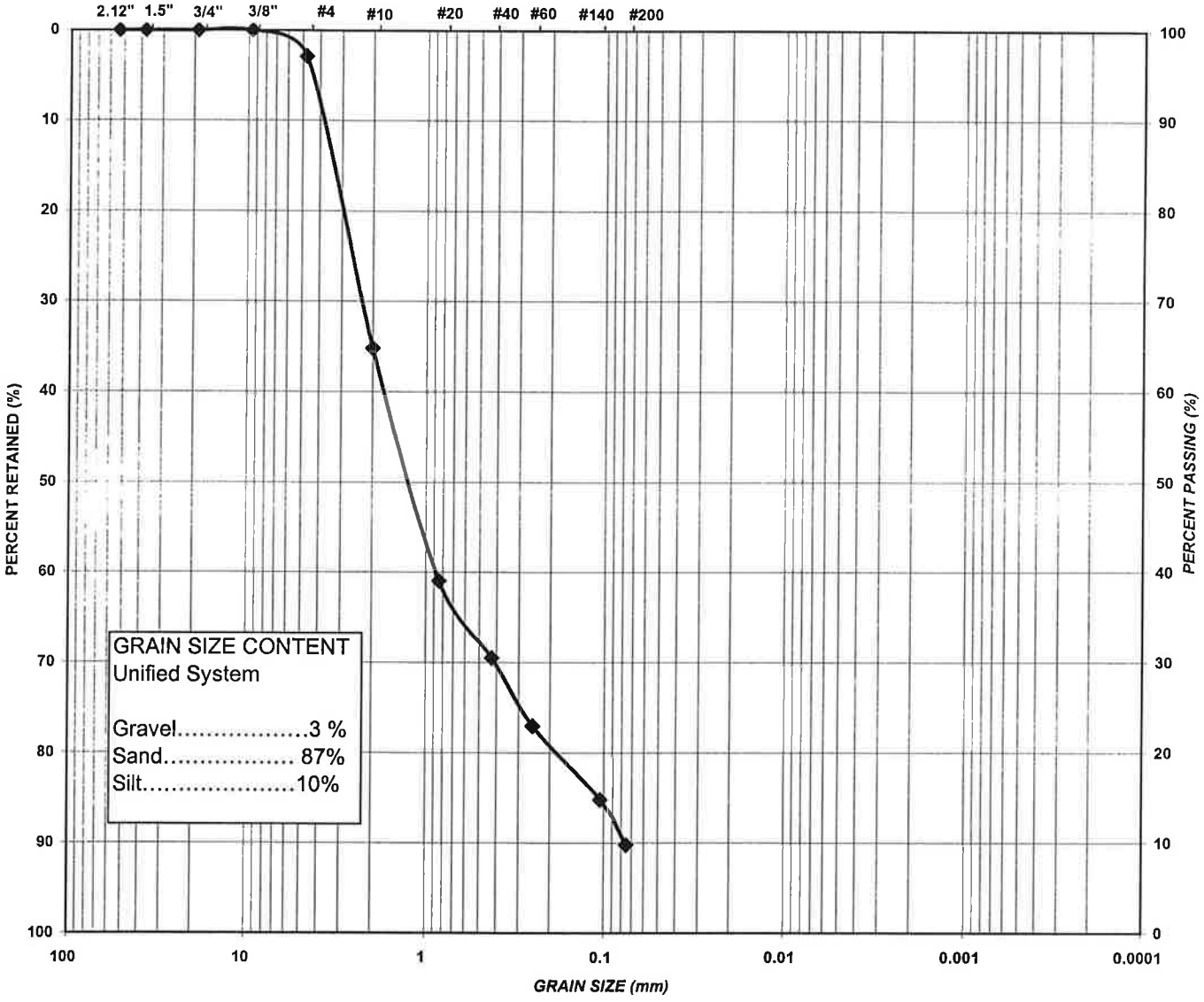
PROJECT: **Noise Wall Barrier**
LOCATION: **Caledon, Ontario**
CLIENT: **Giffels Associates Ltd.**
BOREHOLE: **1**
SAMPLE NUMBER: **7**
SAMPLE DEPTH: **6.1 - 6.2 m**
SAMPLE DESCRIPTION: **SAND, trace gravel, trace to some silt**

FILE NO.: **1-07-2030**
LAB NO.: **1059C**
SAMPLE DATE: **February 5, 2007**
SAMPLED BY: **J.S.**

Fig B4

GRAIN SIZE DISTRIBUTION

U.S. STANDARD SIEVE SIZES



MIT SYSTEM	GRAVEL		COARSE	MEDIUM	FINE	SILT	CLAY
			SAND				
UNIFIED SYSTEM	COARSE	FINE	COARSE	MEDIUM	FINE	SILT AND CLAY	
	GRAVEL		SAND				