Terraprobe

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

# GEOTECHNICAL INVESTIGATION
# PROPOSED MOTEL STRUCTURE
# 261 ESSA ROAD
# BARRIE, ONTARIO

**PREPARED FOR:** 1834129 Ontario Inc.
1790 Albion Road, Unit 102
Toronto, Ontario
M9V 4J8

Attention: Mr. Gurpreet Dass

**File No.: 31-13-9012**
**Revised: February 25, 2013**


**Distribution:**

3cc: 1834129 Ontario Inc.
2cc: Terraprobe Inc.

**Terraprobe Inc.**

**Greater Toronto**
11 Indell Lane
**Brampton**, Ontario L6T 3Y3
(905) 796-2650 Fax 796-2250
brampton@terraprobe.ca

**Hamilton - Niagara**
903 Barton Street, Unit 22
**Stoney Creek**, Ontario L8E 5P5
(905) 643-7560 Fax 643-7559
stoneycreek@terraprobe.ca

**Central Ontario**
220 Bayview Drive, Unit 25
**Barrie**, Ontario L4N 4Y8
(705) 739-8355 Fax 739-8369
barrie@terraprobe.ca

**Northern Ontario**
1012 Kelly Lake Rd.
**Sudbury**, Ontario P3E 5P4
(705) 670-0460 Fax 670-0558
sudbury@terraprobe.ca

www.terraprobe.ca

Terraprobe
*Consulting Geotechnical & Environmental Engineering*
*Construction Materials Inspection & Testing*

February 25, 2013 File No. 31-13-9012

1834129 Ontario Inc.
1790 Albion Road, Unit 102
Toronto, Ontario
M9V 4J8

Attention: Mr. Gurpreet Dass

**RE: GEOTECHNICAL INVESTIGATION**
**PROPOSED MOTEL STRUCTURE**
**261 ESSA ROAD**
**BARRIE, ONTARIO**

Dear Sir;

Terraprobe Limited is pleased to present the findings of our subsurface investigation conducted at the above site. The initial work was authorized by Mr. Rajinder Chaku on January 24, 2006. A geotechnical report was prepared under File No. 3-06-2016, dated March 6, 2006.

The purpose of the investigation was to determine the soil and groundwater conditions in order to provide geotechnical recommendations for the design and construction of building foundations, slab-on-grade floors, and pavements with comments on excavation, dewatering and backfill.

This revised report is being presented as an update to the 2006 report as the project evolved to a 3 storey motel with basement. Excavations and footings were reported completed in November 2011 with onsite inspections provided for the structure by SOILTEST Services Ltd.

## 1. SITE AND PROJECT DESCRIPTION

The site is located on the west side of Essa Road (#261), just south of Ardagh Road, in Barrie, Ontario and is currently landscaped with gently sloping terrain (see Figure 1).

The site is being developed for a new three-storey motel with basement. The site will be serviced with municipal water and sewers.

Original site grades fall from south to north.

## 2. FIELD WORK

The field work comprised of the drilling of eight (8) boreholes at the above site.

The boreholes were advanced February 15, 2006 at the locations selected by Terraprobe to provide general coverage of the proposed building and parking area as shown on Figure 2. A crawler-mounted power auger supplied by a specialist soil drilling contractor was used to carry out Standard Penetration Tests at regular 0.75 to 1.5m intervals.

The drilling was supervised by a senior soil technician from Terraprobe, who also transported the soil samples in sealed plastic containers to our laboratory.

Underground services were cleared by Terraprobe prior to commencing our drilling program.

The ground surface elevation at each borehole was surveyed by Terraprobe following drilling. The elevations are referenced to a local benchmark being the top of a catchbasin on Essa Road near the northeast corner of the site. This point was taken to have an elevation of 100.00m.

## 3. SUBSURFACE CONDITIONS

The details of the soil and ground water conditions encountered are presented on the attached Borehole Logs and discussed below.

It should be noted that the soil and groundwater conditions are confirmed at the borehole locations only and that these conditions could vary between and beyond the boreholes. In addition, the boundaries between the various soil strata, indicated on the Borehole Logs, have been determined from non-continuous sampling. In this regard, these boundaries should be interpreted as inferred transitions rather than exact planes of geologic change.

In general, the boreholes encountered 200mm to 2.1m of topsoil and silty sand to sandy silt fill with trace organics. The surficial fills and organics were underlain by fine to medium silty sand, to sand with trace to some silt and gravel. Silt till with trace sand, gravel and clay was encountered below 2.1 to 5.4m in Boreholes 6 to 8.

Standard Penetration Test 'N' values ranged from 4 to greater than 50 blows per 0.3m of penetration in the loose to very dense, native soils. The 'N' values generally increased with depth.

All boreholes remained open and dry upon completion of drilling and were backfilled with native soils. Water levels may vary seasonally and be higher during wetter seasons/years.

Slotted standpipe type piezometers were installed in Boreholes 1 to 8 to allow for monitoring of the static water level at a later date. A return visit was made to the site on February 21, 2006 when all standpipes were measured to be dry to the installed depths.

## 4. DISCUSSION AND RECOMMENDATIONS

The following discussion and recommendations are based on the factual data obtained from this investigation and are intended for use by the design engineers and architects only. Contractor's bidding on or conducting work associated with this project should make their own assessment of the factual data to assess their effect on the proposed construction methods and scheduling. If significant changes are made to the project, they should be reviewed by Terraprobe to determine what effect the changes might have on this discussion.

### 4.1 Foundations

Based on the soil conditions encountered in the boreholes, the native, compact to very dense silt and sand soil is capable of supporting conventional foundations. Localized stepping of footings downward should be anticipated where loose soil is encountered.

Based on our understanding that the proposed final grades at the site will be similar to existing grades, we would suggest the approach to foundations be to design all footings for 200 kPa on native, compact to very dense soils at least 0.5m to 1.0m below topsoil and/or surficial fills.

No major ground water problems are anticipated to carry out this operation.

A minimum foundation width to be used in conjunction with the above soil bearing pressures would be 0.5m for continuous footings and 0.8m for individual footings.

A letter inspection report by SOILTEST Services Ltd., dated November 10, 2011 summarized basically a site visit to inspect excavation and perimeter footing bases. Native dry sand capable of supporting 200kPa soil bearing capacity was reported with some localized fill to be further removed. This is generally consistent with the 2006 geotechnical investigation findings.

All exterior or footings in unheated areas should be provided with at least 1.2m of earth cover or equivalent insulation for frost protection.

Due to the fill and buried topsoil encountered at the site, any fill and/or organics will need to be subexcavated from the bases. The requirements for further sub-excavation should be made on site at the time of inspection by Terraprobe.

If construction should proceed during freezing weather conditions, adequate temporary frost protection for the foundation subgrade soils, and completed concrete foundation must be provided. Where footings at different elevations are required, the footing steps should be no steeper than 2 horizontal to 1 vertical. The maximum change is elevation at a footing step should not exceed 0.6m.

In all cases, foundations should be placed on engineered fill or dry, undisturbed native mineral soil which has been cleaned of topsoil or other deleterious matter, loosened material and debris. If the footings are placed on disturbed or dilated soil, unacceptable post construction settlements could occur. Rain water or seepage entering the excavation should be drained away and pumped (not allowed to pond) and any disturbed soils removed from the foundation line subgrade.

All foundation subgrade should be inspected by Terraprobe or retained geotechnical engineer prior to placing the foundation concrete to confirm the bearing pressures with respect to the soil conditions encountered across the entire site.

## 4.2 Floor Slabs

The silty sand present below the topsoil and/or fill is generally suitable for the support of a slab-on-grade/basement floor design.

It is essential that the removal of the topsoil and/or fill soil be inspected by a geotechnical engineer to ensure adequate removal of the deleterious material without over-excavating the site.

The exposed approved subgrade should be heavily compacted to 98% of Standard Proctor Maximum Dry Density (SPMDD) under geotechnical supervision prior to placing additional fills. Native material used as fill to raise grades should be placed in maximum 150mm loose lifts and be compacted uniformly to 95% of SPMDD below floor slabs. A moisture break comprising of 150mm of OPSS Granular 'A' compacted to 100% SPMDD placed directly below the concrete floor is also recommended.

The basement floor is anticipated to be above a groundwater table. No special provisions for underfloor drains are anticipated but this should be verified during construction. A conventional perimeter weeping tile foundation drain system should be implemented as per OBC requirements. The drains must lead to a positive outlet such as sump pump or gravity sewer. The basement walls should be designed to withstand horizontal earth pressure assuming a soil unit weight of 20kN/m$^3$ and a coefficient of lateral "at rest" soil pressure of 0.5. This assumes horizontal grades around the immediate exterior and no water.

## 4.3 Excavation and Backfill

The following safe side slope configurations are recommended for temporary excavations through the soils expected on the site;

| **Stratum** | **Allowable Slope (horizontal to vertical)** |
|---|---|
| Silty Sand | Above the water table the slope configuration would be 1:1 |

It is noted that where workmen must enter trench excavations carried deeper than 1.2m, the trench walls should be inspected and certified by a qualified geotechnical engineer or suitably sloped and/or braced in accordance with the Occupational Health and Safety Act. The moist silty sand soils encountered at the site are considered a Type 3 soil, therefore requiring excavations cut at 1:1 from the excavation base to the surface.

It is our opinion that the native silty sand soils encountered at the borehole locations will make acceptable backfill material when properly compacted.

All backfill materials in settlement sensitive areas such as below sidewalks and parking areas should be compacted uniformly to a minimum of 95% of SPMDD.

Inspection and testing of backfill by Terraprobe is recommended to confirm that the contract specifications are achieved.

### 4.4 Pavement Design

The following pavement design is recommended for a silty sand subgrade with car parking and access routes at this site.

| Material | Car Parking Only (mm) | Access Routes (mm) |
|---|---|---|
| HL 3 (surface course) | 40 | 50 |
| HL 8 (binder course) | 40 | 50 |
| OPSS Granular 'A' | 150 | 150 |
| OPSS Granular 'B' | 250 | 350 |
| Total Thickness | 480 | 600 |
| Granular Base Equivalents | 476 | 585 |

All topsoil and/or organic rich fills must be removed from below proposed parking areas.

Immediately prior to placement of the granular subbase, the subgrade should be proof rolled with a heavy rubber tired vehicle and inspected for any loose, soft or unstable areas which should be subexcavated and backfilled with compacted earth materials.

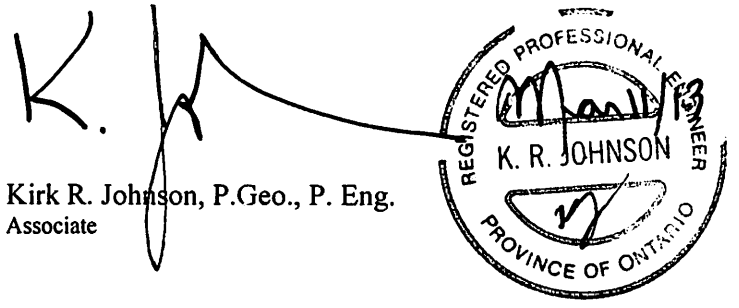
All granular pavement components should be uniformly compacted to a minimum 100% of Standard Proctor Maximum Dry Density (SPMDD). The hot laid asphaltic concrete materials should be compacted uniformly to a minimum of 97% of Marshall Bulk Density as tested with a nuclear gauge.

The above pavement design thicknesses are considered adequate for the design traffic. If however, the pavement construction occurs in inclement weather, it may be necessary to provide additional subgrade support for heavy construction traffic by increasing the thickness of the granular structure. Furthermore, the main traffic areas for construction equipment may experience areas of unstable conditions which may be stabilized by applying additional layers of a granular fill.

It is recommended that geotechnical inspection and testing be carried out during all phases of construction through to the parking lot construction.

We trust that this report adequately documents our findings and recommendations. If you should have any questions, or if we can be of further assistance, please do not hesitate to contact the undersigned.

Sincerely,
**Terraprobe Inc.**

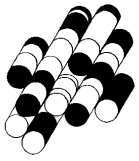



Kirk R. Johnson, P.Geo., P. Eng.
Associate

KRJ/ct
Barrie Office

Attached: Borehole Logs 1 to 8
Figures 1 and 2

# BOREHOLE LOGS



Terraprobe Inc.

Terraprobe

# 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 - 16 |
| very stiff | 100 - 200 | 16 - 32 |
| hard | > 200 | > 32 |

### 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 |
| $\gamma$ | soil unit weight, bulk |
| $\phi'$ | 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.

# Terraprobe

# LOG OF BOREHOLE ..1..

PROJECT NAME: 261 Essa Road
PROJECT No.: 3-06-2016
CLIENT: Woodbine Banquet & Convention Hall Ltd.
BORING DATE: February 15, 2006
LOCATION: Barrie, Ontario
ELEVATION DATUM: Local

BORING METHOD: D50 Crawler-mounted Drill Rig / 108mm Diameter Solid Stem Augers

DEPTH SCALE IN METRES

| DESCRIPTION | STRATA PLOT | ELEV. / DEPTH (m) | SAMPLES NUMBER | TYPE | "N" VALUE |
|---|---|---|---|---|---|
| GROUND SURFACE | | 97.9 | | | |
| 50mm – TOPSOIL & SAND, FILL<br>Brown Compact Moist<br>SANDY SILT, trace organics, FILL | | 0.0 | 1 | SS | 12 |
| | | 96.8 | 2 | SS | 14 |
| Brown Compact to Very Dense Moist<br>SILTY SAND, to some silt, trace gravel | | 1.1 | 3 | SS | 45 |
| | | | 4 | SS | 47 |
| | | 94.4 | 5 | SS | 90 |
| End of Borehole | | 3.5 | | | |

PENETRATION RESISTANCE PLOT
20 40 60 80
SHEAR STRENGTH kPa
nat.V – + Q – ●
rem.V – ⊕ U – ○
20 40 60 80

WATER CONTENT (%)
P w w_L
10 20 30

INSTALLATION INFORMATION


1. Borehole remained open and dry upon completion of drilling.

2. Water level on February 21, 2006 measured dry to 3.3m.

# Terraprobe

# LOG OF BOREHOLE ..2..

PROJECT NAME: 261 Essa Road
PROJECT No.: 3-06-2016
CLIENT: Woodbine Banquet & Convention Hall Ltd.
BORING DATE: February 15, 2006
LOCATION: Barrie, Ontario
ELEVATION DATUM: Local

BORING METHOD: D50 Crawler-mounted Drill Rig / 108mm Diameter Solid Stem Augers

DEPTH SCALE IN METRES

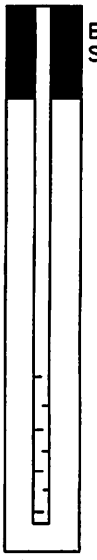
| DESCRIPTION | STRATA PLOT | ELEV. / DEPTH (m) | NUMBER | TYPE | "N" VALUE |
|---|---|---|---|---|---|
| GROUND SURFACE | | 98.3 | | | |
| 225mm – TOPSOIL<br>Brown Loose to Compact Moist<br>SANDY SILT, trace wood, FILL | | 0.0 | 1 | SS | 4 |
| | | | 2 | SS | 15 |
| | | 97.0 | | | |
| Brown Compact Moist<br>SAND & SILT | | 1.3 | 3 | SS | 15 |
| | | 96.2 | | | |
| Brown Very Dense Moist to Dry<br>SAND, some silt, trace gravel | | 2.1 | 4 | SS | 50/75mm |
| | | | 5 | SS | 60 |
| | | 94.8 | | | |
| End of Borehole | | 3.5 | | | |

PENETRATION RESISTANCE PLOT
20 40 60 80

SHEAR STRENGTH kPa
nat.V – +  Q – ●
rem.V – ⊕  U – ○
20 40 60 80

WATER CONTENT (%)
wP  w  wL
10 20 30

INSTALLATION INFORMATION




1. Borehole remained open and dry upon completion of drilling.

2. Water level on February 21, 2006 measured dry to 3.3m.

# Terraprobe

# LOG OF BOREHOLE ..3..

PROJECT NAME: 261 Essa Road
PROJECT No.: 3-06-2016
CLIENT: Woodbine Banquet & Convention Hall Ltd.
BORING DATE: February 15, 2006
LOCATION: Barrie, Ontario
ELEVATION DATUM: Local

BORING METHOD: D50 Crawler-mounted Drill Rig / 108mm Diameter Solid Stem Augers

DEPTH SCALE IN METRES

| DESCRIPTION | STRATA PLOT | ELEV. / DEPTH (m) | SAMPLES NUMBER | TYPE | "N" VALUE | PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa (nat.V - +, rem.V - ⊕, Q - ●, U - ○) | WATER CONTENT (%) (P, W, WL) |
|---|---|---|---|---|---|---|---|
| GROUND SURFACE | | 98.7 | | | | | |
| 150mm - TOPSOIL<br>Brown Loose Moist<br>SILTY SAND, with topsoil layers and wood frgaments, FILL | | 0.0 | 1 | SS | 8 | x | |
| | | | 2 | SS | 6 | x | |
| | | 96.6 | 3 | SS | 7 | x | |
| Brown Loose to Very Dense Moist<br>SAND, some silt | | 2.1 | 4 | SS | 4 | x | |
| | | | 5 | SS | 59 | x | |
| | | 95.2 | | | | | |
| End of Borehole | | 3.5 | | | | | |

INSTALLATION INFORMATION

Bentonite Seal

1. Borehole remained open and dry upon completion of drilling.

2. Water level on February 21, 2006 measured dry to 3.3m.

# Terraprobe

# LOG OF BOREHOLE ..4..

PROJECT NAME: 261 Essa Road
PROJECT No.: 3-06-2016
CLIENT: Woodbine Banquet & Convention Hall Ltd.
BORING DATE: February 15, 2006
LOCATION: Barrie, Ontario
ELEVATION DATUM: Local

BORING METHOD: D50 Crawler-mounted Drill Rig / 108mm Diameter Solid Stem Augers

DEPTH SCALE IN METRES: 0 1 2 3 4 5 6 7 8 9

| DESCRIPTION | STRATA PLOT | ELEV. / DEPTH (m) | SAMPLES NUMBER | SAMPLES TYPE | SAMPLES "N" VALUE |
|---|---|---|---|---|---|
| GROUND SURFACE | | 101.6 | | | |
| 250mm – TOPSOIL<br>Brown Loose to Very Dense Moist to Dry | | 0.0 | 1 | SS | 6 |
| | | | 2 | SS | 8 |
| SAND, trace to some silt, trace to some gravel | | | 3 | SS | 58 |
| | | | 4 | SS | 11 |
| | | 98.1 | 5 | SS | 63 |
| End of Borehole | | 3.5 | | | |

PENETRATION RESISTANCE PLOT
20 40 60 80
SHEAR STRENGTH kPa
nat.V – + Q – ●
rem.V – ⊕ U – ○
20 40 60 80

WATER CONTENT (%)
10 20 30

INSTALLATION INFORMATION


1. Borehole remained open and dry upon completion of drilling.

2. Water level on February 21, 2006 measured dry to 3.3m.

# Terraprobe

# LOG OF BOREHOLE ..5..

PROJECT NAME: 261 Essa Road
PROJECT No.: 3-06-2016
CLIENT: Woodbine Banquet & Convention Hall Ltd.
BORING DATE: February 15, 2006
LOCATION: Barrie, Ontario
ELEVATION DATUM: Local

BORING METHOD: D50 Crawler-mounted Drill Rig / 108mm Diameter Solid Stem Augers

DEPTH SCALE IN METRES

| DESCRIPTION | STRATA PLOT | ELEV. / DEPTH (m) | NUMBER | TYPE | "N" VALUE |
|---|---|---|---|---|---|
| GROUND SURFACE | | 97.6 | | | |
| 275mm – TOPSOIL<br>Brown Loose to Moist<br>Very Dense | | 0.0 | 1 | SS | 3 |
| | | | 2 | SS | 39 |
| SAND, silty to some silt, trace to some gravel | | | 3 | SS | 34 |
| | | | 4 | SS | 40 |
| | | | 5 | SS | 53 |
| | | | 6 | SS | 50/150mm |
| | | | 7 | SS | 87 |
| | | 91.0 | | | |
| End of Borehole | | 6.6 | | | |

PENETRATION RESISTANCE PLOT
20 40 60 80

SHEAR STRENGTH kPa
nat.V – + Q – ●
rem.V – ⊕ U – ○
20 40 60 80

WATER CONTENT (%)
wp w wl
10 20 30

INSTALLATION INFORMATION

Bentonite Seal

1. Borehole remained open and dry upon completion of drilling.

2. Water level on February 21, 2006 measured dry to 6.5m.

# Terraprobe

# LOG OF BOREHOLE ..6..

PROJECT NAME: 261 Essa Road
PROJECT No.: 3-06-2016
CLIENT: Woodbine Banquet & Convention Hall Ltd.
BORING DATE: February 15, 2006
LOCATION: Barrie, Ontario
ELEVATION DATUM: Local

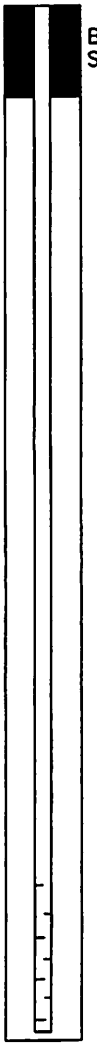
BORING METHOD: D50 Crawler-mounted Drill Rig / 108mm Diameter Solid Stem Augers

| DEPTH SCALE IN METRES | DESCRIPTION | STRATA PLOT | ELEV. / DEPTH (m) | NUMBER | TYPE | "N" VALUE |
|---|---|---|---|---|---|---|
| 0 | GROUND SURFACE | | 100.9 | | | |
| | 200mm – TOPSOIL | | 0.0 | | | |
| | Brown Loose to Compact Moist | | | 1 | SS | 3 |
| 1 | SAND, some silt | | | 2 | SS | 5 |
| | | | | 3 | SS | 25 |
| 2 | | | 98.8 | | | |
| | Brown Compact to Very Dense Moist | | 2.1 | 4 | SS | 23 |
| 3 | SILT TILL, trace sand, trace gravel, trace to some clay | | | 5 | SS | 34 |
| 4 | | | | | | |
| | | | | 6 | SS | 41 |
| 5 | | | | | | |
| 6 | | | | 7 | SS | 64 |
| | | | 94.3 | | | |
| | End of Borehole | | 6.6 | | | |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | | | | |

PENETRATION RESISTANCE PLOT
20 40 60 80
SHEAR STRENGTH kPa
nat.V – +  Q – ●
rem.V – ⊕  U – ○
20 40 60 80

WATER CONTENT (%)
10 20 30

INSTALLATION INFORMATION




1. Borehole remained open and dry upon completion of drilling.

2. Water level on February 21, 2006 measured dry to 6.5m.

# Terraprobe

# LOG OF BOREHOLE ..7..

PROJECT NAME: 261 Essa Road
PROJECT No.: 3-06-2016
CLIENT: Woodbine Banquet & Convention Hall Ltd.
BORING DATE: February 15, 2006
LOCATION: Barrie, Ontario
ELEVATION DATUM: Local

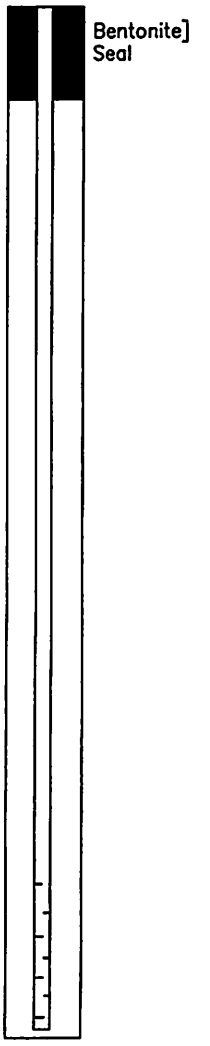
BORING METHOD: D50 Crawler-mounted Drill Rig / 108mm Diameter Solid Stem Augers

| DEPTH SCALE IN METRES | DESCRIPTION | STRATA PLOT | ELEV. / DEPTH (m) | NUMBER | TYPE | "N" VALUE |
|---|---|---|---|---|---|---|
| | GROUND SURFACE | | 99.7 | | | |
| 0 | 300mm – TOPSOIL<br>Dark Brown Compact Moist | | 0.0 | 1 | SS | 10 |
| 1 | SILTY SAND, trace organics, trace gravel (FILL) | | | 2 | SS | 13 |
| | | | 97.7 | 3 | SS | 14 |
| 2 | Brown Very Dense Moist | | 2.0 | 4 | SS | 56 |
| 3 | SILTY SAND, trace gravel | | | 5 | SS | 61 |
| 4 | | | | | | |
| 5 | | | 94.3 | 6 | SS | 55 |
| | Brown Very Dense Moist | | 5.4 | | | |
| 6 | SILT TILL, trace gravel, some sand | | | 7 | SS | 60 |
| | | | 93.1 | | | |
| | End of Borehole | | 6.6 | | | |
| 7 | | | | | | |
| 8 | | | | | | |
| 9 | | | | | | |

PENETRATION RESISTANCE PLOT (x) 20 40 60 80
SHEAR STRENGTH kPa
nat.V – + Q – ●
rem.V – ⊕ U – ○
20 40 60 80

WATER CONTENT (%)
P — w — L
10 20 30

INSTALLATION INFORMATION




1. Borehole remained open and dry upon completion of drilling.

2. Water level on February 21, 2006 measured dry to 6.5m.

# Terraprobe

# LOG OF BOREHOLE ..8..

PROJECT NAME: 261 Essa Road
PROJECT No.: 3-06-2016
CLIENT: Woodbine Banquet & Convention Hall Ltd.
BORING DATE: February 15, 2006
LOCATION: Barrie, Ontario
ELEVATION DATUM: Local

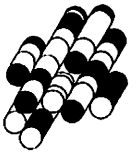
BORING METHOD: D50 Crawler-mounted Drill Rig / 108mm Diameter Solid Stem Augers

| DEPTH SCALE IN METRES | DESCRIPTION | STRATA PLOT | ELEV. / DEPTH (m) | NUMBER | TYPE | "N" VALUE | PENETRATION RESISTANCE PLOT / SHEAR STRENGTH kPa (nat.V – +, rem.V – ⊕, Q – ●, U – ○) | WATER CONTENT (%) (wP, w, wL) | INSTALLATION INFORMATION |
|---|---|---|---|---|---|---|---|---|---|
| | GROUND SURFACE | | 100.3 | | | | | | |
| 0 | 175mm – TOPSOIL<br>Dark Brown Loose Moist<br>SILTY SAND, trace organics, FILL | | 0.0 | 1 | SS | 5 | x | | Bentonite Seal |
| 1 | | | | 2 | SS | 7 | x | | |
| | Brown Compact to Very Dense Moist<br>SAND & SILT, | | 98.9<br>1.4 | 3 | SS | 26 | x | | |
| 2 | | | | 4 | SS | 46 | x | | |
| 3 | | | | 5 | SS | 61 | x | | |
| | Brown Very Dense Moist<br>SILT TILL, trace gravel, trace sand, trace clay | | 96.3<br>4.0 | 6 | SS | 64 | x | | |
| 4 | | | | | | | | | |
| 5 | | | | 7 | SS | 50/150mm | | | |
| 6 | | | 93.7 | | | | | | |
| | End of Borehole | | 6.6 | | | | | | |
| 7 | | | | | | | | | |
| 8 | | | | | | | | | |
| 9 | | | | | | | | | |

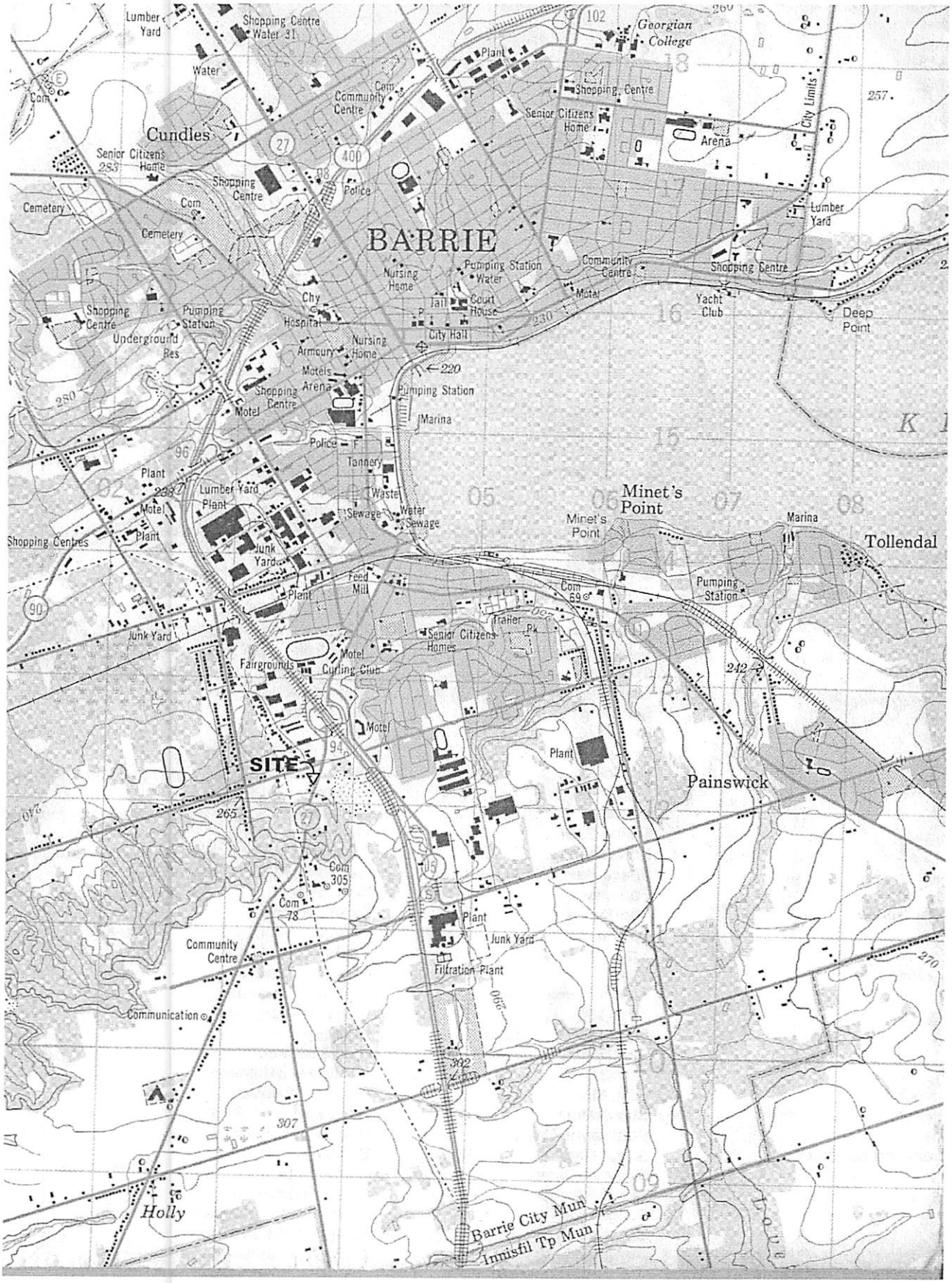
1. Borehole remained open and dry upon completion of drilling.

2. Water level on February 21, 2006 measured dry to 6.5m.

# FIGURES



Terraprobe Inc.



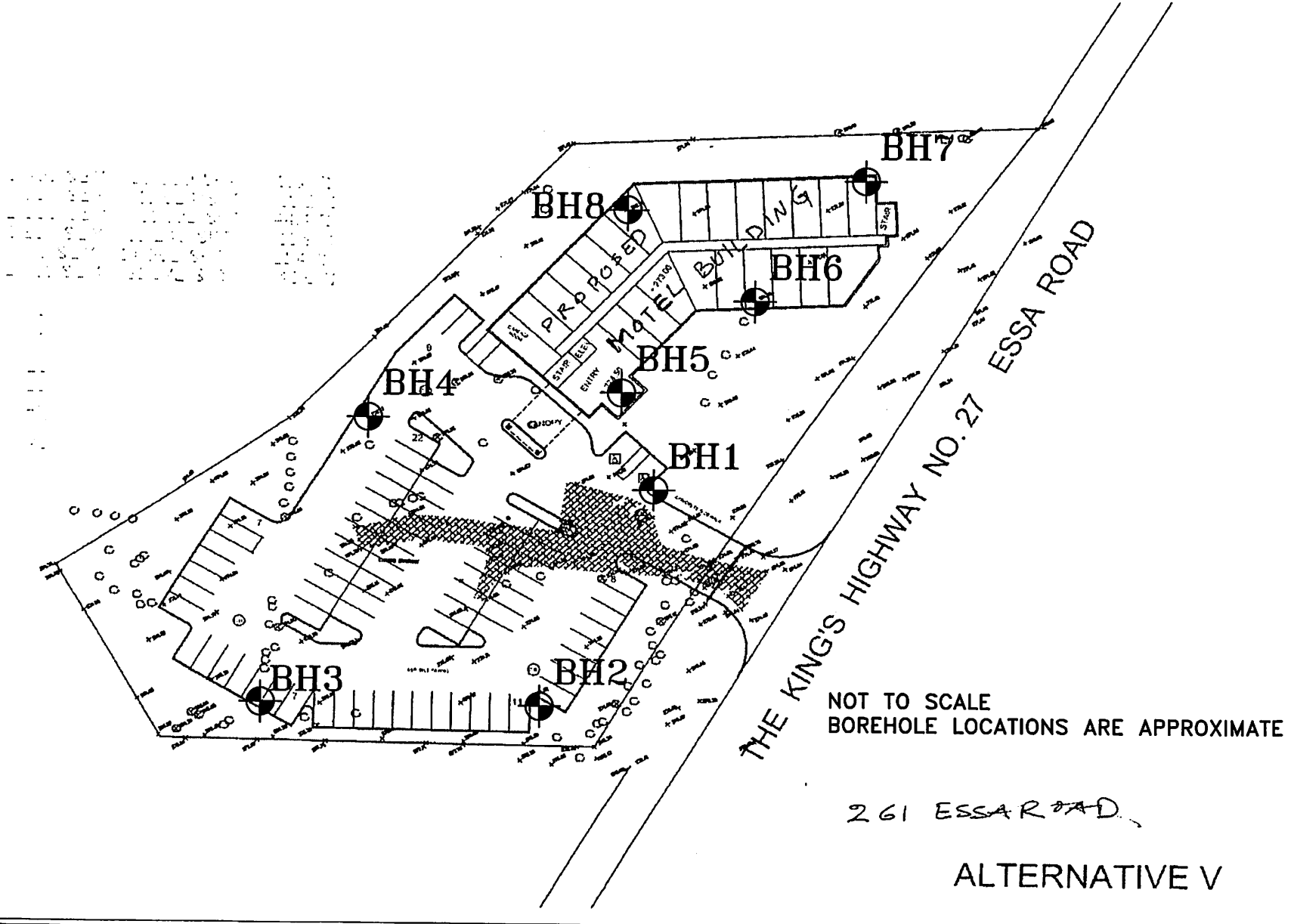

FEBRUARY 2006

# SITE LOCATION PLAN

3-06-2016

Terraprobe

FIGURE 1




FEBRUARY 2006

# BOREHOLE LOCATION PLAN

3-06-2016

Terraprobe

FIGURE 2