GEOTECHNICAL INVESTIGATION REPORT
PROPOSED ABOVEGROUND STORAGE TANK
CORRECTIONAL SERVICES CANADA – BEAVER CREEK INSTITUTION
2000 BEAVER CREEK DRIVE
GRAVENHURST, ONTARIO
CANADA

Submitted to:

Public Works and Government Services Canada
4900 Yonge Street
Toronto, Ontario
M2N 6A6

Submitted by:

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15 February 2008

TT82005

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1.0 INTRODUCTION

AMEC Earth and Environmental, a division of AMEC Americas Limited (AMEC), Consulting Geotechnical, Construction Quality Control and Environmental Engineers, was retained by Public Works and Government Services Canada ("PWGSC") to conduct a geotechnical investigation for the proposed aboveground storage tanks at the Correctional Services Canada –Beaver Creek Institution, 2000 Beaver Creek Drive in Gravenhurst, Ontario, (the "site") as shown on Figure No. 1.

The purpose of this geotechnical investigation was to obtain information on the subsurface conditions at the site by means of a limited number of boreholes, and laboratory tests of selected soil samples. Based on AMEC's interpretation of the data obtained, recommendations are provided on the geotechnical aspects of the development.

The work carried out for this investigation was completed in accordance with AMEC's proposal and the instructions received from PWGSC (ref. no. P28018 dated 15 January 2008). Authorization to proceed with this investigation was received from PWGSC.

This report contains the findings of AMEC's geotechnical investigation, together with recommendations and comments. These recommendations and comments are based on factual information and are intended only for use of the design engineers. The number of boreholes may not be sufficient to determine all the factors that may affect construction methods and costs. Subsurface and groundwater conditions between and beyond the boreholes may differ from those encountered at the borehole locations, and conditions may become apparent during construction, which could not be detected or anticipated at the time of the site investigation. The anticipated construction conditions are also discussed, but only to the extent that they may influence design decisions. Construction methods discussed, however, express AMEC's opinion only and are not intended to direct the contractors on how to carry out the construction. Contractors should also be aware that the data and their interpretation presented in this report may not be sufficient to assess all the factors that may have an effect upon the construction.

The report is prepared with the condition that the design will be in accordance with all applicable standards and codes, regulations of authorities having jurisdiction, and good engineering practice. Further, the recommendations and opinions in this report are applicable only to the proposed project as described above.

On-going liaison with AMEC Earth & Environmental during the final design and construction phase of the project is recommended to confirm that the recommendations in this report are applicable and / or correctly interpreted and implemented. Also, any queries concerning the geotechnical aspects of the proposed project should be directed to AMEC Earth & Environmental for further elaboration and/or clarification.

2.0 INVESTIGATION PROCEDURE

The fieldwork was performed on 31 January 2008, and consisted of drilling and sampling two boreholes (BH1 and BH2). The boreholes were drilled to a depth of about 5 m below the existing ground surface. The borehole locations were marked on the site and the ground surface elevation at the borehole locations were surveyed with reference to a local temporary benchmark (top of the fire hydrant located at about 60 m west of the site) to which an elevation of 100.00 m was assigned. The temporary benchmark (TBM) and the approximate borehole locations are shown on Figure No. 2.

The boreholes were advanced using hollow-stem continuous-flight auger, with a truck-mounted power-auger drilling rig, under the full-time supervision of experienced geotechnical personnel from AMEC Earth & Environmental. Soil samples were generally taken at 0.76 m to 1.5 m intervals while performing the Standard Penetration Test (SPT) in accordance with ASTM D1586. This consisted of freely dropping a 63.5 kg (140 lb) hammer a vertical distance of 0.76 m (30 inches) to drive a 51 mm (2 inches) diameter O.D. split-barrel (split-spoon) sampler into the ground. The number of blows of the hammer required to drive the sampler into the relatively undisturbed ground by a vertical distance of 0.30 m (12 inches) was recorded as SPT ‘N’ value of the soil which indicated the consistency of cohesive soils or the relative density of non-cohesive soils.

The groundwater levels in the boreholes were measured during and upon completion of drilling.

Upon completion of drilling, the boreholes were backfilled with bentonite and the soil samples were transported to AMEC’s Advanced Soil Laboratory in Scarborough (Toronto), Ontario for further examination.

The soil conditions, groundwater levels, and the results of in-situ tests are presented on the corresponding Record of Boreholes.

3.0 SUBSURFACE CONDITIONS

Based on the subsurface conditions encountered in the boreholes, the soil profile consisted predominantly of gravel surface cover overlying native sand. A pocket of sand and gravel fill was found underlying the gravel surface in one borehole.

The stratigraphic units and groundwater conditions are discussed in the following sections. Records of Boreholes are attached for detailed information.

Please note that the following summary is to assist the designers of the project with an understanding of the anticipated soil conditions across the site. However, it should be noted that the soil and groundwater conditions might vary between these borehole locations.

3.1 Ground Surface Cover

The boreholes were advanced through a gravel layer covering the ground surface, the thickness of which was about 150 mm.

3.2 Sand and Gravel Fill

Underlying the gravel surface in Borehole BH1 was a pocket of sand and gravel fill that extended to a depth of about 0.6 m below the existing ground surface. The SPT ‘N’ value of the sand and gravel fill was 84 blows per 0.3 m (very dense relative density), possibly due to the presence of gravel.

3.3 Native Sand

Sand was encountered below the sand and gravel fill in BH1 and the gravel layer in BH2, and extended down to the termination of the boreholes. Based on the visual and tactile examination of the soil samples, the sand was brown in colour and was generally wet.

The Standard Penetration Test (SPT ‘N’ values) performed in this deposit ranged from 7 to 19 blows per 0.3 m penetration, indicating a loose to compact relative density. However, a low SPT value of 2 blows per 0.3 m penetration (very loose relative density) was recorded at a depth of about 1.5 m in Borehole BH1.

3.4 Groundwater Condition

Groundwater was encountered in both boreholes BH1and BH2 and the measured groundwater levels upon completion of drilling were 1.1 m and 0.9 m, respectively.

It should be pointed out that the groundwater at the site would fluctuate seasonally and can be expected to be somewhat higher during the spring months and in response to major weather events.

4.0 DISCUSSIONS AND RECOMMENDATIONS

Based on the site plan, key plan and the information provided to AMEC, the proposed work consists of the construction of a concrete pad (approximately 9.25 m X 14.8 m in plan area) supporting two aboveground fuel storage tanks with a capacity of 11340 litres and 5670 litres, respectively.

From the results of the investigation, a concrete pad can be founded on properly prepared subgrade. The concrete pad should be designed as a mat foundation that supports both tanks and associated equipment. Because the groundwater level is about 1 m below the existing ground surface, the base of the concrete pad should not be deeper than 0.5 m below the existing ground surface in order to stay above the groundwater level and avoid significant dewatering in the excavation. Due to the presence of very loose sand in the subgrade, the site preparation and the foundation design should follow the recommendations provided in the following sections.

4.1 Site Grading/Preparation

The existing ground surface should be cleared of any deleterious materials, including any grass, organic matters, etc. The subgrade should subsequently be proof-rolled with a 10-ton vibratory compactor or equivalent. The entire concrete pad area should be inspected and approved by the geotechnical engineer. During proof-rolling, spongy, wet or soft/loose spots should be sub-excavated to a stable subgrade and replaced with approved soil, compatible with subgrade conditions, as directed by the geotechnical engineer. The prepared subgrade should be protected from construction traffic and should not remain exposed for a long period of time. Surface water, if any, should not be permitted to enter and/or pond within the concrete pad area.

If the site grade is to be raised, granular fill soils should be used and compacted in 200 mm loose lifts, each lift compacted to a minimum of 100 % Standard Proctor Maximum Dry Density.

4.2 Concrete Pad

The proposed concrete pad for the aboveground fuel storage tanks may be built on properly prepared subgrade.

Underneath the concrete slab, a 200 mm thick base course, consisting of Granular A should be placed to improve the support for the concrete pad. This base course should be compacted with vibratory equipment to a minimum of 100 % Standard Proctor Maximum Dry Density. If the subgrade is wet, the Granular A base should be separated from the subgrade by an approved filter fabric (e.g. Terrafix 270R or equivalent). The Granular A material will also function as a drainage layer, if required. The existing granular surface layer should not be considered as the Granular A base.

The thickness of the 9.25 m X 14.8 m concrete pad and the reinforcement requirements should be designed by a structural engineer to support the two tanks and account for potential differential settlements. The concrete pad should be designed with an allowable bearing capacity of 40 kPa and a modulus of subgrade reaction (k_s) of 7,000 kN/m^3. The total and differential settlements should be less than 30 mm and 20 mm, respectively. The maximum depth of the concrete pad base should be 0.5 m below the existing ground surface.

The design frost penetration depth should be 1.7 m to prevent frost heave. However, due to the presence of shallow groundwater level, the base of the concrete pad may be founded at a depth of about 0.5 m below the existing grade or shallower. In this case, a thermal insulation equivalent to a 1.7 m thick soil cover is required for the frost protection of the concrete pad. Around the perimeter of the concrete pad, the ground surface should be sloped at about 3 % away from the pad to promote surface drainage.

4.3 Excavation and Dewatering

All excavations should be carried out in accordance with the Ontario Health and Safety Regulations. The soils to be excavated can be classified as follows:

Existing soils above groundwater level	Type 3
Sand (saturated)	Type 4

Accordingly, bank slopes of 1H:1V for Type 3 soils and 3H:1V for Type 4 soils are required for excavation in accordance with the Ontario Health and Safety Regulations.

Stockpiles of excavated soils should be kept at least 3.0 m from the edge of the excavation to avoid slope instability, subject to confirmation by the geotechnical engineer. Care should also be taken to avoid overloading of any underground services / structures by stockpiles.

Based on the subsurface conditions encountered in the boreholes, any excavation for the proposed concrete pad that is deeper than about 0.5 m will likely encounter a high rate of groundwater seepage into the excavation through sandy soils. Dewatering may be achievable by a number of filtered sumps and pumps and a major effort for dewatering will likely be required. Such sumps should be dug outside the footprint of the concrete pad to minimize disturbance to the subgrade.

4.4 Earthquake Consideration

In conformance to the criteria in Table 4.1.8.4A, Part 4, Division B of the National Building Code (NBC 2005), the project site may be classified as Site Class “E-Soft Soil”. The four values of the Spectral response acceleration S_a (T) for different periods and the Peak Ground Acceleration (PGA) can be obtained from Table C-2 in Appendix C, Division B of the NBC (2005). The design values of F_a and F_v for the project site should be calculated in accordance to Table 4.1.8.4 B and C.

5.0 CLOSURE

The sub-soil information and recommendations contained in this report should be used solely for the purpose of geotechnical investigation of this development.

It is recommended that AMEC be retained to review the recommendations for this specific applicability, once the details of the proposed development are finalized and prior to the final design stage of the project. Additional investigation may be required to provide geotechnical information for the final design.

The Report Limitations is an integral part of this report.

Sincerely,

AMEC Earth & Environmental,
A Division of AMEC Americas Limited

Sedaghat

for Ramana Mullapudi, P.Eng.
Geotechnical Engineer

Prapote Boonsinsuk, Ph.D., P.Eng.
Group Leader, Geotechnical Engineering

LICENSED PROFESSIONAL ENGINEER
P. BOONSINSUK
PROVINCE OF ONTARIO

…/…

AMEC Earth & Environmental, a division of AMEC Americas Limited

REPORT LIMITATIONS

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

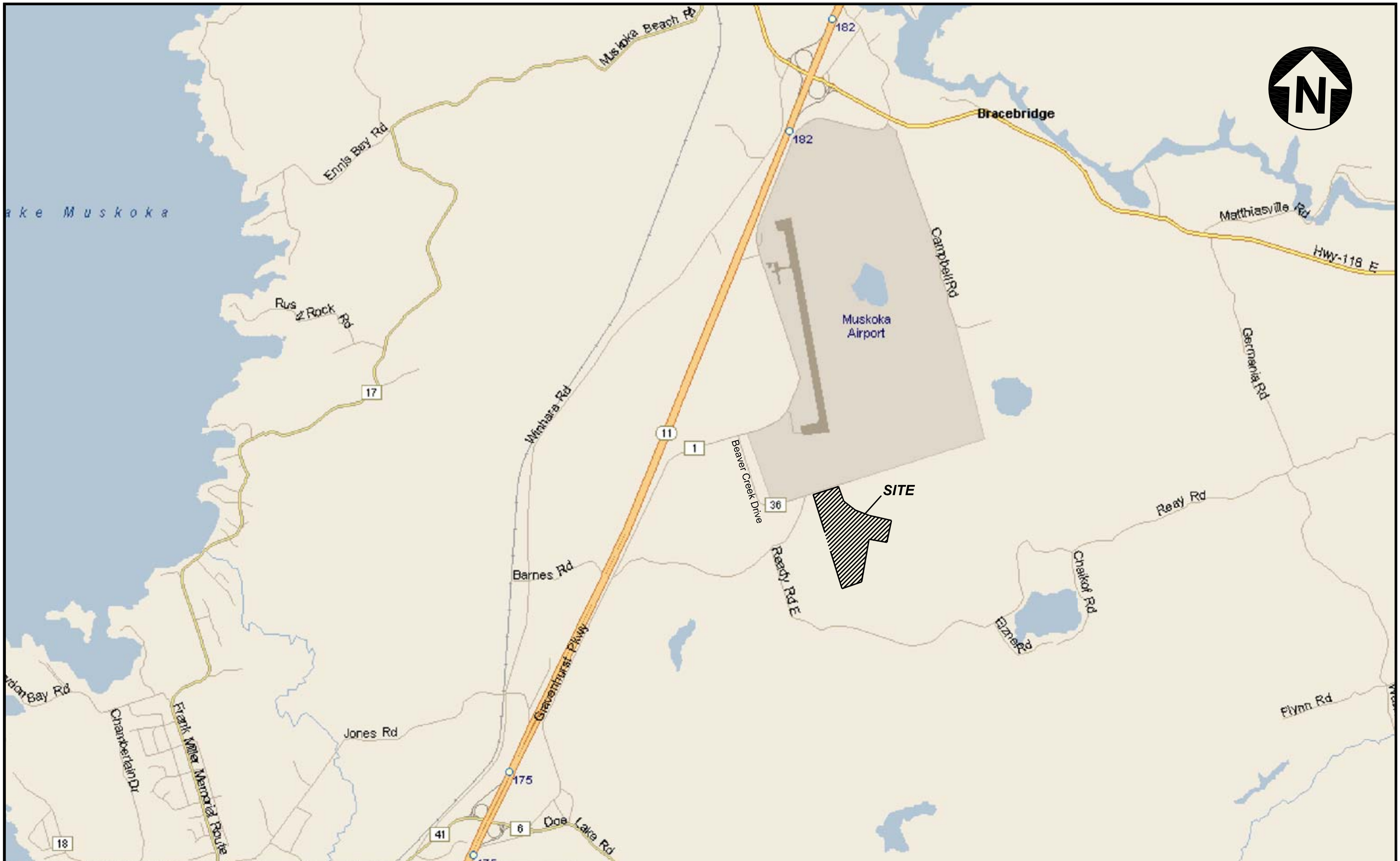
The design recommendations given in this report are applicable only to the project described in the text, and then only if constructed substantially in accordance with the details stated in this report. Since all details of the design may not be known, we recommend that we be retained during the final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

The comments made in this report relating to potential construction problems and possible methods of construction are intended only for the guidance of the designer. The number of testholes may not be sufficient to determine all the factors that may affect construction methods and costs. For example, the thickness of surficial topsoil or fill layers may vary markedly and unpredictably. The contractors bidding on this project or undertaking the construction should, therefore, make their own interpretation of the factual information presented and draw their own conclusions as to how the subsurface conditions may affect their work. This work has been undertaken in accordance with normally accepted geotechnical engineering practices. No other warranty is expressed or implied.

The benchmark and elevations mentioned in this report were obtained strictly for use by this office in the geotechnical design of the project. They should not be used by any other party for any other purpose.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. AMEC Earth & Environmental accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

FIGURES



CLIENT LOGO Public Works and Government Services Canada	CLIENT PUBLIC WORK AND GOVERNMENT SERVICES CANADA	DWN BY: KW CHK'D BY: VKM	TITLE SITE LOCATION PLAN	REV. NO.: A DATE: FEBRUARY 2008
AMEC Earth & Environmental a Division of AMEC Americas Limited 104 Crockford Blvd, Scarborough, Ontario, M1R 3C3	amec	DATUM: - PROJECTION: - SCALE: N.T.S.	PROJECT GEOTECHNICAL INVESTIGATION PROPOSED ABOVE GROUND STORAGE TANK CORRECTIONAL SERVICES CANADA BEAVER CREEK INSTITUTION 2000 Beaver Creek Drive, Gravenhurst, Ontario	PROJECT NO: TT82005 FIGURE No. 1

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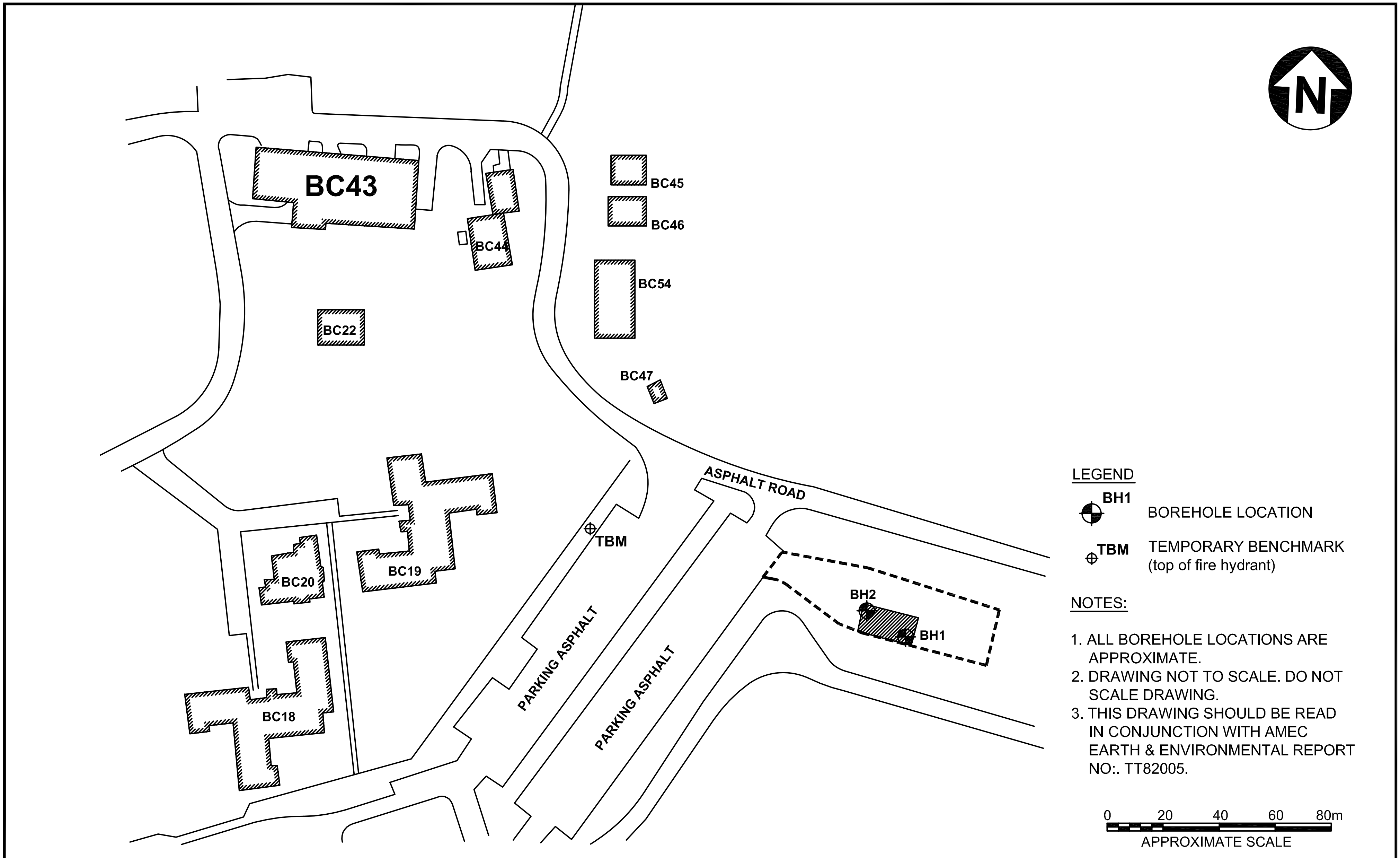

CLIENT LOGO Public Works and Government Services Canada	CLIENT PUBLIC WORK AND GOVERNMENT SERVICES CANADA	DWN BY: KW CHK'D BY: VKM	TITLE BOREHOLE LOCATION PLAN	REV. NO.: A DATE: FEBRUARY 2008
AMEC Earth & Environmental a Division of AMEC Americas Limited 104 Crockford Blvd, Scarborough, Ontario, M1R 3C3	amec	DATUM: - PROJECTION: - SCALE: AS SHOWN	PROJECT GEOTECHNICAL INVESTIGATION PROPOSED ABOVE GROUND STORAGE TANK CORRECTIONAL SERVICES CANADA BEAVER CREEK INSTITUTION 2000 Beaver Creek Drive, Gravenhurst, Ontario	PROJECT NO: TT82005 FIGURE No. 2

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RECORD OF BOREHOLES

EXPLANATION OF BOREHOLE LOG

This form describes some of the information provided on the borehole logs, which is based primarily on examination of the recovered samples, and the results of the field and laboratory tests. Additional description of the soil/rock encountered is given in the accompanying geotechnical report.

GENERAL INFORMATION

Project details, borehole number, location coordinates and type of drilling equipment used are given at the top of the borehole log.

SOIL LITHOLOGY

Elevation and Depth

This column gives the elevation and depth of inferred geologic layers. The elevation is referred to the datum shown in the Description column.

Lithology Plot

This column presents a graphic depiction of the soil and rock stratigraphy encountered within the borehole.

Description

This column gives a description of the soil stratums, based on visual and tactile examination of the samples augmented with field and laboratory test results. Each stratum is described according to the *Modified Unified Soil Classification System*.

The compactness condition of cohesionless soils (SPT) and the consistency of cohesive soils (undrained shear strength) are defined as follows *(Ref. Canadian Foundation Engineering Manual)*:

Compactness of Cohesionless Soils	SPT N-Value*
Very loose	0 to 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very Dense	> 50

Consistency of Cohesive Soils	Undrained Shear Strength 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

* For penetration of less than 0.3 m, N-values are indicated as the number of blows for the penetration achieved (e.g. 50/25: 50 blows for 25 centimeter penetration).

Soil Sampling

Sample types are abbreviated as follows:

SS Split Spoon	TW Thin Wall Open (Pushed)	RC Rock Core	GS Grab Sample
AS Auger Sample	TP Thin Wall Piston (Pushed)	WS Washed Sample	AR Air Return Sample

Additional information provided in this section includes sample numbering, sample recovery and numerical testing results.

Field and Laboratory Testing

Results of field testing (e.g., SPT, pocket penetrometer, and vane testing) and laboratory testing (e.g., natural moisture content, and limits) executed on the recovered samples are plotted in this section.

Instrumentation Installation

Instrumentation installations (monitoring wells, piezometers, inclinometers, etc.) are plotted in this section. Water levels, if measured during fieldwork, are also plotted. These water levels may or may not be representative of the static groundwater level depending on the nature of soil stratum where the piezometer tips are located, the time elapsed from installation to reading and other applicable factors.

Comments

This column is used to describe non-standard situations or notes of interest.

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MODIFIED * UNIFIED CLASSIFICATION SYSTEM FOR SOILS

*The soil of each stratum is described using the Unified Soil Classification System (Technical Memorandum 36-357 prepared by Waterways Experiment Station, Vicksburg, Mississippi, Corps of Engineers, U.S Army. Vol. 1 March 1953.) modified slightly so that an inorganic clay of "medium plasticity" is recognized.

MAJOR DIVISION			GROUP SYMBOL	TYPICAL DESCRIPTION	LABORATORY CLASSIFICATION CRITERIA
COARSE GRAINED SOILS (MORE THAN HALF BY WEIGHT LARGER THAN 75µm)	GRAVELS MORE THAN HALF THE COARSE FRACTION LARGER THAN 4.75mm	CLEAN GRAVELS (TRACE OR NO FINES)	GW	WELL GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	$C_u = \frac{D_{60}}{D_{10}} > 4$; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ = 1 to 3
			GP	POORLY GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	NOT MEETING ABOVE REQUIREMENTS
		DIRTY GRAVELS (WITH SOME OR MORE FINES)	GM	SILTY GRAVELS, GRAVEL-SAND- SILT MIXTURES	ATTERBERG LIMITS BELOW "A" LINE OR P.I MORE THAN 4
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES	ATTERBERG LIMITS BELOW "A" LINE OR P.I MORE THAN 7
	SANDS MORE THAN HALF THE COARSE FRACTION SMALLER THAN 4.75mm	CLEAN SANDS (TRACE OR NO FINES)	SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES	$C_u = \frac{D_{60}}{D_{10}} > 6$; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ = 1 to 3
			SP	POORLY GRADED GRAVELS, GRAVEL- SAND MIXTURES, LITTLE OR NO FINES	NOT MEETING ABOVE REQUIREMENTS
		DIRTY SANDS (WITH SOME OR MORE FINES)	SM	SILTY SANDS, SAND-SILT MIXTURES	ATTERBERG LIMITS BELOW "A" LINE OR P.I MORE THAN 4
			SC	CLAYEY SANDS, SAND-CLAY MIXTURES	ATTERBERG LIMITS BELOW "A" LINE OR P.I MORE THAN 7
FINE-GRAINED SOILS (MORE THAN HALF BY WEIGHT SMALLER THAN 75µm)	SILTS BELOW "A" LINE NEGLIGIBLE ORGANIC CONTENT	$W_L < 50\%$	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY SANDS OF SLIGHT PLASTICITY	CLASSIFICATION IS BASED UPON PLASTICITY CHART (SEE BELOW)
		$W_L < 50\%$	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS, FINE SANDY OR SILTY SOILS	
	CLAYS ABOVE "A" LINE NEGLIGIBLE ORGANIC CONTENT	$W_L < 30\%$	CL	INORGANIC CLAYS OF LOW PLASTICITY, GRAVELLY, SANDY OR SILTY CLAYS, LEAN CLAYS	
		$30\% < W_L < 50\%$	CI	INORGANIC CLAYS OF MEDIUM PLASTICITY, SILTY CLAYS	
		$W_L < 50\%$	CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS	
	ORGANIC SLITS & CLAYS BELOW "A" LINE	$W_L < 50\%$	OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY	WHENEVER THE NATURE OF THE FINES CONTENT HAS NOT BEEN DETERMINED, IT IS DESIGNATED BY THE LETTER "F", E.G SF IS A MIXTURE OF SAND WITH SILT OR CLAY
		$W_L < 50\%$	OH	ORGANIC CLAYS OF HIGH PLASTICITY	
HIGH ORGANIC SOILS			Pt	PEAT AND OTHER HIGHLY ORGANIC SOILS	STRONG COLOUR OR ODOUR, AND OFTEN FIBROUS TEXTURE

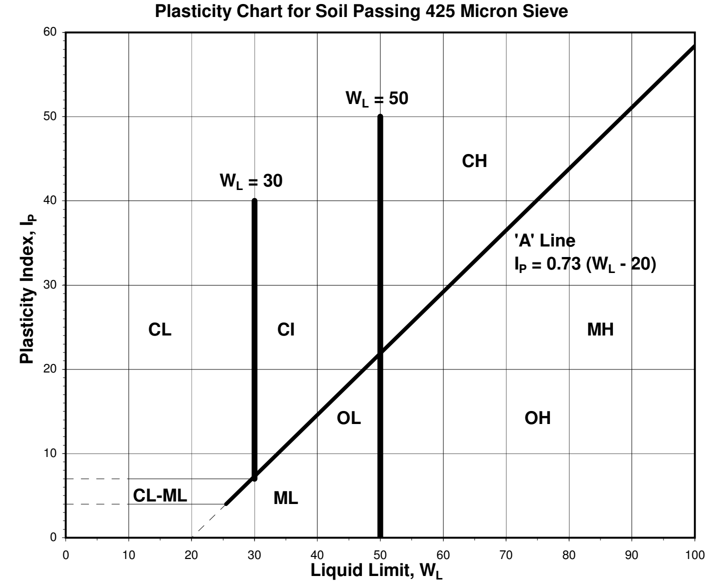
SOIL COMPONENTS

FRACTION	U.S STANDARD SIEVE SIZE			DEFINING RANGES OF PERCENTAGE BY WEIGHT OF MINOR COMPONENTS	
		PASSING	RETAINED	PERCENT	DESCRIPTOR
GRAVEL	COARSE	76 mm	19 mm	35-50	AND
				20-35	Y/EY
	FINE	19 mm	4.75 mm	10-20	SOME
SAND	COARSE	4.75 mm	2.00 mm	1-10	TRACE
	MEDIUM	2.00 mm	425 µm		
	FINE	425 µm	75 µm		
FINES (SILT OR CLAY BASED ON PLASTICITY)		75 µm			

OVERSIZED MATERIAL

ROUNDED OR SUBROUNDED:	NOT ROUNDED:
COBBLES 76 mm TO 200 mm BOULDERS > 200 mm	ROCK FRAGMENTS > 76 mm ROCKS > 0.76 CUBIC METRE IN VOLUME

Plasticity Chart for Soil Passing 425 Micron Sieve



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Note 1: Soils are classified and described according to their engineering properties and behaviour.

Note 2: The modifying adjectives used to define the actual or estimated percentage range by weight of minor components are consistent with the Canadian Foundation Engineering Manual (4th Edition, Canadian Geotechnical Society, 2006.)

RECORD OF BOREHOLE No. BH 1

amec

Project Number:	TT82005	Drilling Location:	BH 1	Logged by:	RM
Project Client:	Public Works & Government Services	Drilling Method:	200 mm Hollow Stem Augering	Compiled by:	SN
Project Name:	Geotechnical Investigation	Drilling Machine:	Truck Mounted Drill	Reviewed by:	RM
Project Location:	Beaver Creek Institution	Date Started:	31 Jan 08 / Date Completed: 31 Jan 08	Revision No.:	0, 15/2/08

LITHOLOGY PROFILE | SOIL SAMPLING | FIELD TESTING | LAB TESTING | INSTRUMENTATION INSTALLATION | COMMENTS

Field Testing legend: Penetration Testing: O SPT, □ PPT, ● DCPT; MTO Vane*: △ Intact, ▲ Remould; Nilcon Vane*: ◇ Intact, ◆ Remould; * Undrained Shear Strength (kPa) 20 40 60 80

Lab Testing legend: ★ Rinse pH Values 2 4 6 8 10 12; △ Soil Vapour Reading parts per million (ppm) 100 200 300 400; ▲ Lower Explosive Limit (LEL); W_P W W_L Plastic – Liquid 20 40 60 80

Local Ground Surface Elevation: 98.1 m

Description	Elev. / Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value
about 150 mm Gravel FILL	98.0 / 0.2				
brown **Sand and Gravel FILL** damp	97.5 / 0.6	SS	1	50	84
brown **SAND** trace gravel in SS2 very loose to compact damp to wet		SS	2	78	19
		SS	3	0	2
		SS	4		16
		SS	5		7
	93.1 / 5.0	SS	6		11
End of Borehole					

Depth scale (m): 1, 2, 3, 4, 5; Elevation scale (m): 98, 97, 96, 95, 94

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∇ Groundwater depth on completion of drilling: 1.1 m.

Scale: 1 : 32

RECORD OF BOREHOLE No. BH 2

amec

Project Number:	TT82005	Drilling Location:	BH 2	Logged by:	RM
Project Client:	Public Works & Government Services	Drilling Method:	200 mm Hollow Stem Augering	Compiled by:	SN
Project Name:	Geotechnical Investigation	Drilling Machine:	Truck Mounted Drill	Reviewed by:	RM
Project Location:	Beaver Creek Institution	Date Started:	31 Jan 08 Date Completed: 31 Jan 08	Revision No.:	0, 15/2/08

LITHOLOGY PROFILE | SOIL SAMPLING | FIELD TESTING | LAB TESTING | INSTRUMENTATION INSTALLATION | COMMENTS

Field Testing legend: Penetration Testing: O SPT, □ PPT, ● DCPT; MTO Vane*: △ Intact, ▲ Remould; Nilcon Vane*: ◇ Intact, ◆ Remould; * Undrained Shear Strength (kPa) 20 40 60 80

Lab Testing legend: ★ Rinse pH Values 2 4 6 8 10 12; △ Soil Vapour Reading parts per million (ppm) 100 200 300 400; ▲ Lower Explosive Limit (LEL); W_P W W_L; Plastic 20 40 60 80 Liquid

Local Ground Surface Elevation: 98.8 m

Description	Elev./Depth (m)	Sample Type	Sample Number	Recovery (%)	SPT 'N' Value	Depth (m)
about 150 mm Gravel FILL	98.6 / 0.2					
brown **SAND** compact damp to wet		SS	1	78	12	
		SS	2	56	11	1
--------- trace gravel		SS	3	67	18	
		SS	4	67	16	2–3
		SS	5	89	17	3
		SS	6		14	4–5
End of Borehole	93.8 / 5.0					5

Elevation scale (m): 98, 97, 96, 95, 94

Groundwater level symbol shown at about 0.9 m depth.

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Groundwater depth on completion of drilling: 0.9 m.

Borehole details as presented, do not constitute a thorough understanding of all potential conditions present and requires interpretative assistance from a qualified Geotechnical Engineer. Also, borehole information should be read in conjunction with the geotechnical report for which it was commisioned and the accompanying'Explanation of Borehole Log'.

Scale: 1 : 32