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# PRELIMINARY GEOTECHNICAL ASSESSMENT

## **New Trout Lake Ice Rink**

JOHN HENDRY PARK  
VANCOUVER, BC

VANCOUVER ORGANIZING  
COMMITTEE

**PROJECT NO. 1011457**

**Jacques  
Whitford**

**An Environment  
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# PROJECT NO. 1011457

REPORT TO **Phillips Farevaag Smallemberg**  
**2327 Yew Street**  
**Vancouver, B.C., V6K 3H1**

ON **Preliminary Geotechnical Assessment**  
**New Trout Lake Ice Rink**  
**John Hendry Park, Vancouver, B.C.**

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**May 9, 2006**

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## Table of Contents

1.0	INTRODUCTION.....	1
2.0	SITE CONDITIONS AND BACKGROUND INFORMATION .....	1
3.0	GEOTECHNICAL FIELD INVESTIGATION PROGRAM .....	2
4.0	SOIL AND GROUNDWATER CONDITIONS .....	3
5.0	DISCUSSION AND MAIN FINDINGS.....	4
5.1	General.....	4
6.0	CLOSURE.....	5

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## List of Appendices

APPENDIX	Drawings.....	A
APPENDIX	Auger Hole Logs and.....	B
	Geotechnical Laboratory Test Results	



## 1.0 INTRODUCTION

At the request of Phillips Farevaag Smallemberg, Jacques Whitford Limited (Jacques Whitford) has completed a preliminary geotechnical assessment for the new Trout Lake Ice Rink at John Hendry Park located in Vancouver, B.C. The Vancouver Park Board (VPB) are planning to design and construct the ice rink as a practice facility for the 2010 Olympics, and a new community centre to be constructed adjacent to the new rink at some time in the future.

Based on the Phillips Farevaag Smallemberg letter and drawings received on March 16, 2006, the pertinent details of the proposed development are as follows:

- The site of the new Trout Lake Ice Rink has been culled down to two general locations (Site A and B) within the southwest corner of John Hendry Park. Site A is in the vicinity of the existing rink and the adjacent tennis courts, and Site B is in the area of the existing parking lot to the north of the existing community center and the all-weather field to the east.
- There are three (3) possible building configurations at each site.
- Building elevations have not been finalized, but it is understood that a ground floor elevation below existing site grades may be desirable to minimize visual impacts.

The scope of work consisted of a site investigation program, visual assessment of the site conditions, soil laboratory work, geotechnical engineering analyses, and preparation of this report. Our work has been completed in general accordance with the Jacques Whitford proposal 1011011, dated March 20, 2006.

Details of the existing site and subsurface conditions, field investigation program and analysis, main findings and preliminary geotechnical recommendations are presented in the following sections of this report.

## 2.0 SITE CONDITIONS AND BACKGROUND INFORMATION

As shown on Drawing 1 (Appendix A), John Hendry Park is located south of 19<sup>th</sup> Avenue and east of Victoria Drive. John Hendry Park consists of playfields, walking trails, grass covered areas and Trout Lake, which is located near the center of the park. The general topography of the park is gently sloping towards Trout Lake.

The existing Trout Lake Community Center is located at the southwest corner of the park, the highest area of the park, which is 3 m or more above the elevation of Trout Lake. The elevation of the ice rink is approximately 1.5 m above the grades of the adjacent tennis courts to the east. In general, at the time of the site investigation, the grassed areas within the Site A and B footprints were wet and very soft.

Geotechnical information at John Hendry Park is available from site investigations carried out by Terra Engineering Limited in 1998 and 1999 for new sports courts for the community center. Our review of the Terra test pit and auger hole logs, the Geological Survey of Canada map (Map 1486A, Vancouver sheet) and Jacques



Whitford file information from adjacent sites indicates the following soil and groundwater conditions at Site A and B:

- Poor quality fills varying in composition and thickness (up to 3 m or more in thickness), underlain by
- Soft, native peat and clay deposits, further underlain by
- Competent glacial till deposits, consisting of dense to very dense silty sands
- Groundwater seepage encountered at shallow depths ranging from 0.6 to 3.8 m below existing site grades.

### **3.0 GEOTECHNICAL FIELD INVESTIGATION PROGRAM**

The Jacques Whitford geotechnical field investigation program was carried out on March 28 and 29, 2006, and consisted of:

- Six (6) solid-stem auger holes (AH06-1A to AH06-6A and AH06-1B to AH06-6B) at each of the potential locations for development (Site A and Site B), to provide overall coverage of the three building configurations. The auger holes were advanced to depths ranging from 2 to 8.8 m below existing site grades into the competent dense glacial till deposit.
- A standpipe piezometer was installed in auger hole AH06-5B and used to measure the elevation of the local groundwater table. The standpipe piezometers consist of 25 mm diameter PVC pipe (bottom 1.5 m with 010 size slots). The annular space around the piezometer was filled with silica sand to a minimum of 0.6 m above the slotted section and a minimum 0.6 m thick bentonite seal was placed above the sand pack. The remainder of the annular space was filled with auger cuttings to grade. The standpipe piezometer was protected with a flush mounted well casing.

The auger holes were completed on March 28, 2006 (AH06-1B to AH06-6B, AH06-1A and AH06-6A) with a truck-mounted drill rig, and the auger holes completed on March 29, 2006 (AH06-2A to AH06-5A) were carried out with a track-mounted drill rig. The locations of the auger holes are shown on Drawing 1 (Appendix A).

The field work was monitored by a Jacques Whitford representative. The Jacques Whitford representative located and surveyed the test holes, selected the sampling locations, classified the soils, kept a detailed log of each auger hole, and observed and recorded pertinent site features. Representative soil samples collected from the auger holes were brought to the Jacques Whitford Burnaby laboratory for visual identification and classification, and natural water content measurements. The auger hole and geotechnical laboratory test results are presented in Appendix B.

## 4.0 SOIL AND GROUNDWATER CONDITIONS

The results of the site investigation indicated that the general soil and groundwater conditions at both Site A and B consisted of; poor quality fills varying in composition and thickness (3.5 m thick or more at Site A), underlain by soft, native peat and clay deposits, further underlain by competent glacial till deposits, consisting of dense to very dense silty sands. At Site B, local groundwater table was encountered a minimum of 2 m below existing sites grades.

The inferred soil conditions at Site A and B are shown on Drawing 1 (attached). Additional details regarding the different fills, native soil strata and groundwater conditions are described below.

### **Fill**

Fill was encountered in all auger holes (with the exception of AH06-2A) and typically consisted of soft sandy silt to loose silty sand, with trace gravel and organics. The fill thickness is variable and ranged from 0.3 to 3.5 m. The thickest fills were encountered in the area of the tennis courts. The fills are considered to be of poor quality.

### **Native Topsoil**

The native topsoil was encountered in the majority of the auger holes and ranged from 0.2 to 0.3 m in thickness. The topsoil consists of silt, with variable amounts of sand and organics.

### **Native Peat**

The peat is dark brown, amorphous and very soft. The thickness of the peat deposit is variable and where encountered in the auger holes, ranged from less than 1 m to up to 3.4 m thick. In general, the thickness of the peat deposit increases towards the east. Measured water contents of the peat ranged from 273% and 646%.

### **Native Clayey Silt Deposit**

The underlying native clayey silt deposit is very soft to firm, and generally contained trace sand. The thickness of the clayey silt deposit is variable and where encountered in the auger holes, ranged from 1 m to up to 2.4 m thick. In general, the thickness of the silt deposit increases towards the east.

### **Native Silty Sand (Till Deposit)**

The underlying native silty sand (till deposit) is dense to very dense, and generally contains trace clay and gravel. The till deposit was encountered near the surface in the auger holes located along the west side of John Hendry Park and at depths of up to 7.9 and 5.5 m in the auger holes to the east at Sites A and B, respectively.

### **Groundwater Conditions**

The groundwater table was encountered at Site B in auger hole AH06-5B at a depth of approximately 2 m (elevation 29.5 m). The groundwater table was not

encountered in the auger holes at Site A. The measured water level at Trout Lake was 28.5 m

## 5.0 DISCUSSION AND MAIN FINDINGS

### 5.1 General

Based on the results of the Jacques Whitford field work, laboratory testing and engineering analysis, the main geotechnical findings are as follows:

1. The poor quality fills, and peat and clay deposits are not suitable to support buildings and slab loads from the new community center building and ice rink. Feasible foundations options include:
  - excavation of these materials and supporting the building on conventional strip and pad foundation placed directly on the glacial till deposit or on structural fill placed directly on the glacial till soils
  - pile foundations
  - or a combination of the above (spread footings and pile foundations)
2. As shown on Drawing 1, the most significant geotechnical finding from the site investigation is that the depth and slope of the glacial till surface (towards Trout Lake) at Site A and Site B are similar. Therefore, the geotechnical costs for Site A and B are similar (using the examples that were generated by the VPB in February/March 2006). There is no major advantage from a geotechnical perspective for one or the other site.
3. Based on the shallow depths of the glacial till encountered in auger holes located closest to Victoria Drive, building foundation costs at both sites would be minimized by locating the building as far west as possible (close to Victoria Drive as possible).
4. The local groundwater table at Site A is at a greater depth than Site B. The groundwater table was not encountered in the auger holes at Site A. At Site B, the groundwater table was encountered at a depth of approximately 2 m (elevation 29.5 m) in auger hole AH06-5B. Therefore, there is more latitude for depressing a building at Site A than at Site B, without encountering groundwater problems. It should be noted that the level of Trout Lake is currently at elevation 28.5 m. The building floor elevation must be above the lake level in order to minimize building drainage inflows and potential interaction with Trout Lake.

Once the location and footprint of the new Trout Lake Ice Rink and community center have been selected, additional site investigation work (test holes) is required to confirm the soil and groundwater conditions and to develop detailed geotechnical recommendations for design and construction of the proposed facility.

## 6.0 CLOSURE

The main findings contained in this report are based on the conceptual building layouts, and continuity of soil conditions between test hole locations.

This report has been prepared for the exclusive use of VPB and their designated agents for specific application to the development of the subject site. Any use of this report or the material contained herein by third parties, or for other than the intended purpose, should first be approved in writing by Jacques Whitford.

If you have any questions, please contact us.

Respectfully submitted,

**JACQUES WHITFORD LIMITED**

**Reviewed by:**

***Original signed by:***

***Original signed by:***

Wayne Quong, P. Eng.  
Principal/Senior Geotechnical Engineer

Carl Kelman, M. Eng., P.Eng.  
Geotechnical Project Engineer

WQ/ND/jc

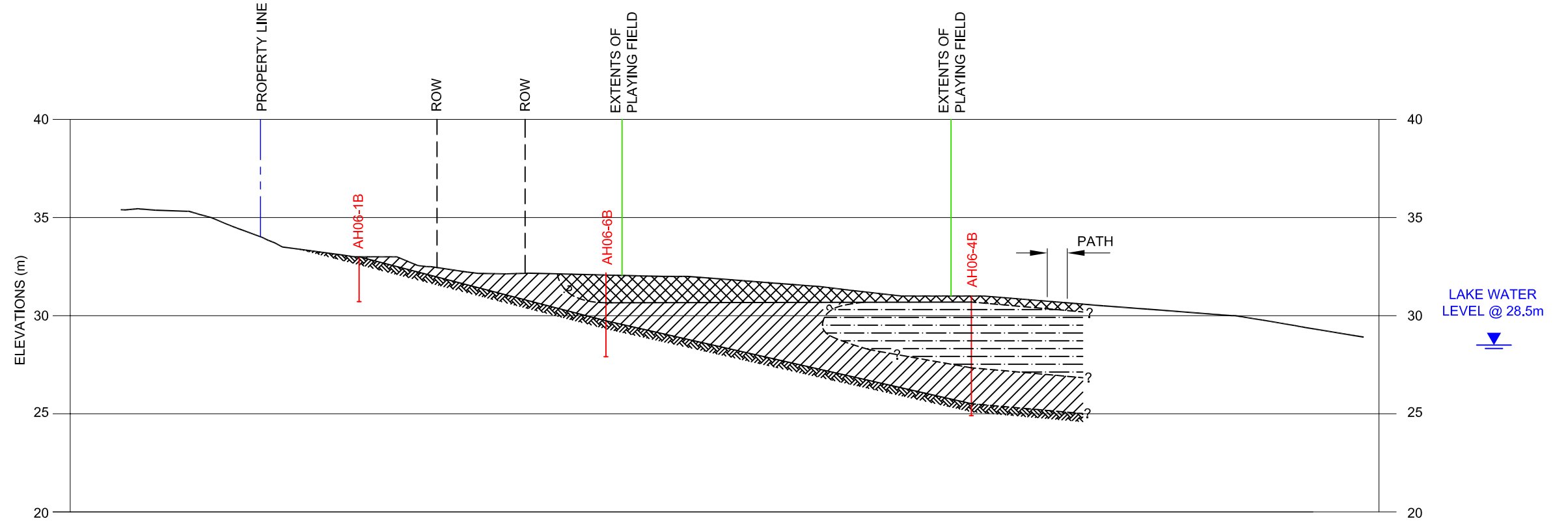
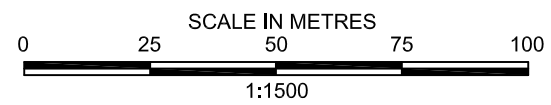
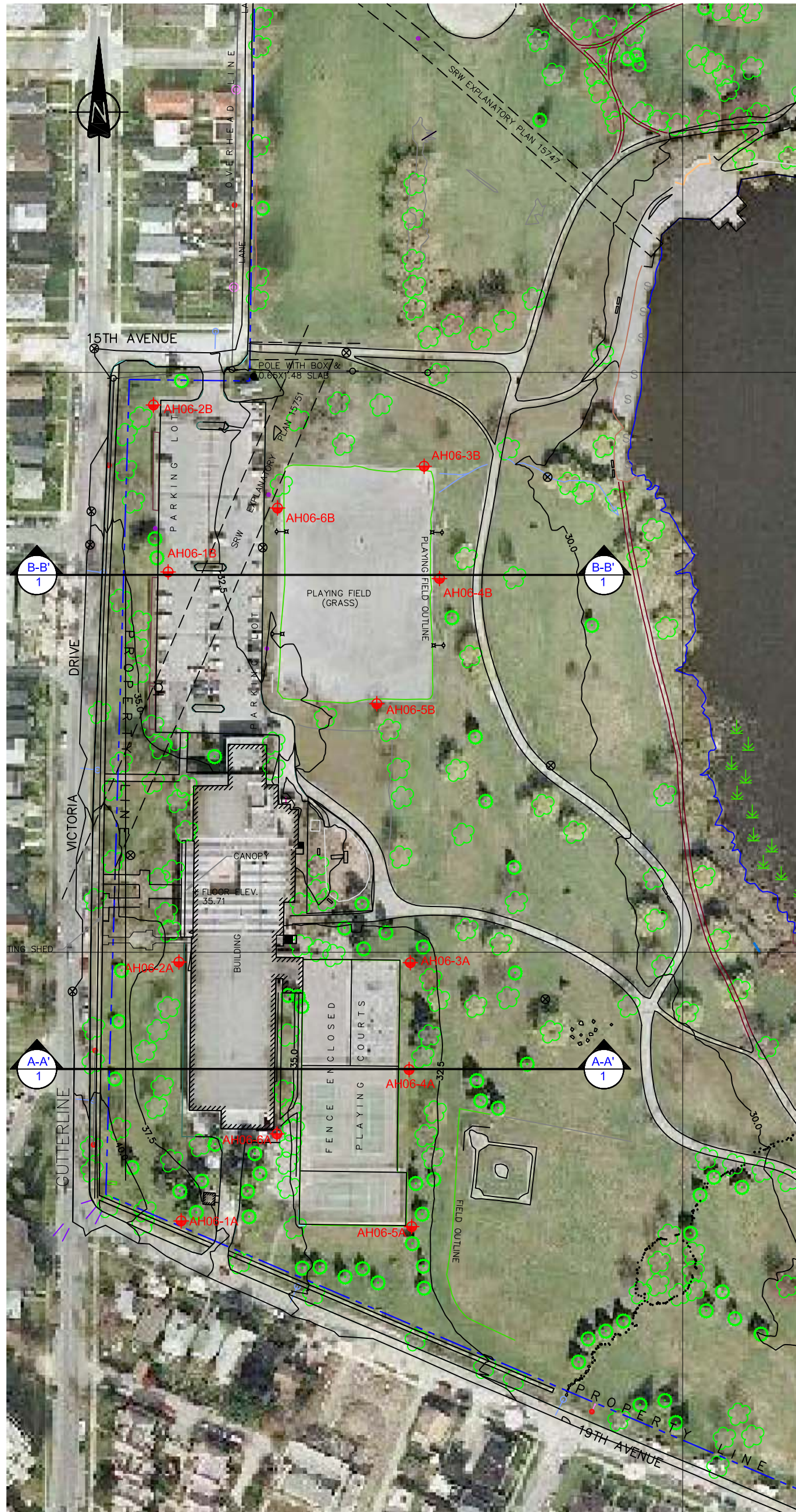
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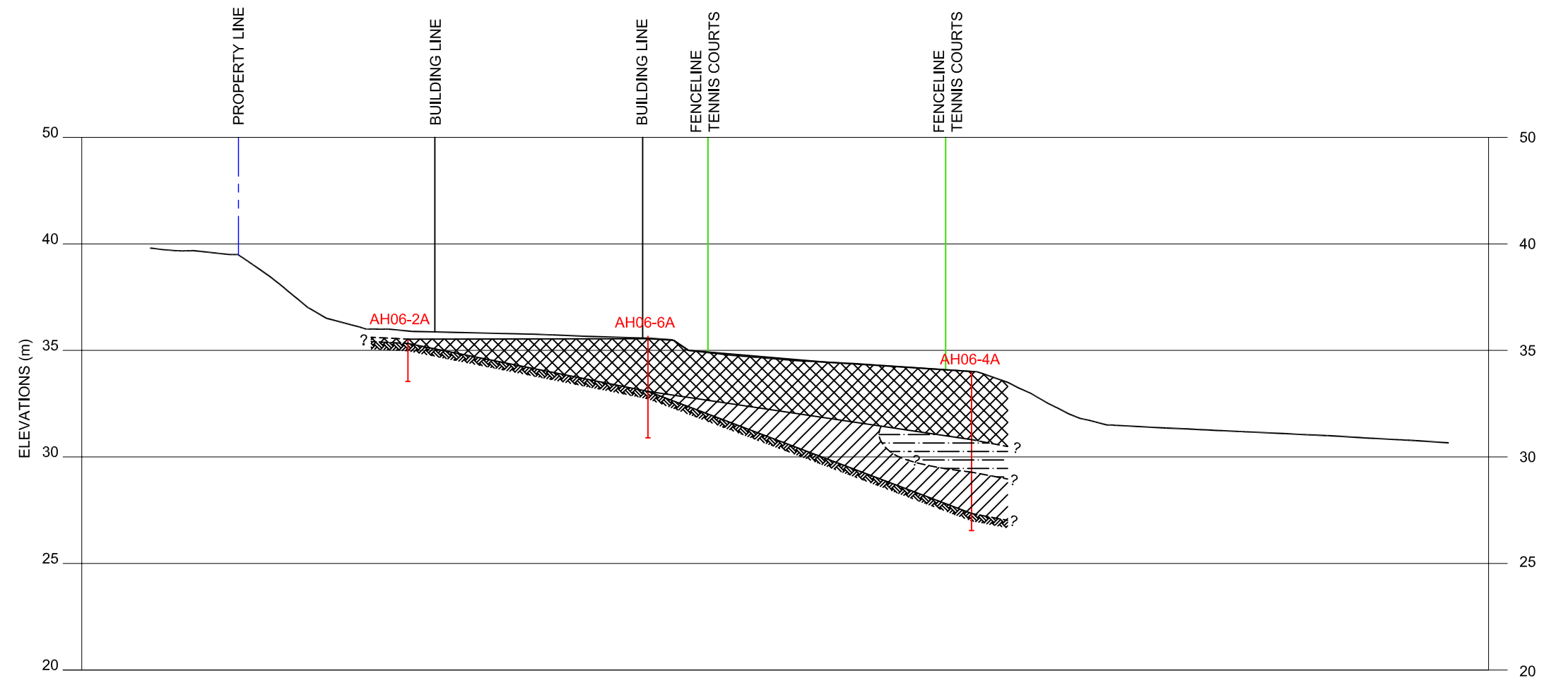
# APPENDIX A

## Drawings





**CROSS SECTION B-B'**  
1:750 HORIZONTAL  
1:250 VERTICAL



**CROSS SECTION A-A'**  
1:750 HORIZONTAL  
1:250 VERTICAL

LEGEND	
AH06-1A	AUGER HOLE
[Cross-hatched pattern]	FILL
[Horizontal line pattern]	PEAT
[Diagonal line pattern]	CLAY
[Wavy line pattern]	TILL

FILENAME: 1011457 D01 R0

REV	DESCRIPTION	DATE	BY	CHK'D	REV	DESCRIPTION	DATE	BY	CHK'D
0	ORIGINAL ISSUE	04-Apr-06	NP						

THIS DRAWING WAS ORIGINALLY PRODUCED IN COLOUR



CLIENT: VANCOUVER PARKS BOARD  
 SITE: JOHN HENDRY PARK  
 19th AVENUE & VICTORIA DRIVE, VANCOUVER, BC  
 PROJECT No: 1011457

**PRELIMINARY AUGER HOLE  
 TEST PLAN & CROSS SECTIONS**  
 TROUT LAKE ICE RINK

DWG No:

**1**

# APPENDIX B

## Auger Hole Logs and Geotechnical Laboratory Test Results



# BOREHOLE RECORD

**AH06 - 1A**

CLIENT VANCOUVER PARK BOARD PROJECT No. 1011457  
 PROJECT Geotechnical Assessment DATUM \_\_\_\_\_ NORTHING \_\_\_\_\_  
 LOCATION John Hendry Park - 3350 Victoria Drive, Van. BC ELEVATION \_\_\_\_\_ EASTING \_\_\_\_\_  
 DRILLING DATE March 28-06 DRILLING CO. Downrite Drilling Company DRILLING METHOD Solid Stem Auger

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLES			Moisture Content & Atterberg Limits				DEPTH (ft)	
				TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa		
0			FILL - 200mm dark brown/brown sandy Silt, some organics (topsoil-fill) over brown silty Sand, some gravel, loose	GS	1a1							0
1			Brown sandy SILT, trace organics, gravel (Topsoil), loose	GS	2a2							2
1			Brown SILT & SAND, some gravel, trace organics, medium dense	GS	3a3							4
2			Brown glacial TILL (gravelly silty Sand), dense to very dense	GS	4a4	9						6
3			-grey	GS	5a5	7						10
4			End of Auger Hole at 3.8m (Refusal due to dense ground)									12
5												14
6												16
7												18
8												20
9												22
												24
												26
												28
												30
												32

Sample Type: GS - Grab Sample SPT - Standard Penetration Test  
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test  
 Piezometer Backfill Type:  Bentonite  Pea Gravel  Drill Cuttings  Sand

Logged by: JP/RI  
 Reviewed by: WQ/ND  
 Date: March 29 2006



**Jacques Whitford**

Consulting Engineers  
 Environmental Scientists  
 Information Consultants

# BOREHOLE RECORD

**AH06 - 1B**

CLIENT VANCOUVER PARK BOARD PROJECT No. 1011457  
 PROJECT Geotechnical Assessment DATUM \_\_\_\_\_ NORTHING \_\_\_\_\_  
 LOCATION John Hendry Park - 3350 Victoria Drive, Van. BC ELEVATION \_\_\_\_\_ EASTING \_\_\_\_\_  
 DRILLING DATE March 28-06 DRILLING CO. Downrite Drilling Company DRILLING METHOD Solid Stem Auger

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input checked="" type="checkbox"/> Remoulded Shear Vane (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa)				DEPTH (ft)
				TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa	
0	FL		FILL 40mm Asphalt over Drain Rock, medium dense								0
1	TL		Grey mottled weathered TILL (Sand, some silt & gravel), dense	GS	1b1						2
2	TL		-silty -very dense	GS	1b2	10					4
3			-gravelly, some cobbles	GS	1b3						6
3			End of Auger Hole at 2.3m (Refusal on Cobble) Asphalt patched								8
4											10
5											12
6											14
7											16
8											18
9											20
											22
											24
											26
											28
											30
											32

Sample Type: GS - Grab Sample SPT - Standard Penetration Test  
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test  
 Piezometer Backfill Type:  Bentonite  Pea Gravel  Drill Cuttings  Sand

Logged by: JP/RI  
 Reviewed by: WQ/ND  
 Date: March 29 2006



**Jacques Whitford**

Consulting Engineers  
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# BOREHOLE RECORD

**AH06 - 2A**

CLIENT VANCOUVER PARK BOARD PROJECT No. 1011457  
 PROJECT Geotechnical Assessment DATUM \_\_\_\_\_ NORTHING \_\_\_\_\_  
 LOCATION John Hendry Park - 3350 Victoria Drive, Van. BC ELEVATION \_\_\_\_\_ EASTING \_\_\_\_\_  
 DRILLING DATE March 29-06 DRILLING CO. Downrite Drilling Company DRILLING METHOD Solid Stem Auger

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input checked="" type="checkbox"/> Remoulded Shear Vane (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa)				DEPTH (ft)	
				TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa		
0	TP		Dark brown SILT, some clay, sand & organics (Topsoil), loose	GS	2a1						0	
1	SM		Brown silty SAND, trace clay & gravel, medium dense to dense	GS	2a2						2	
1	TL		Grey glacial TILL (gravelly silty Sand), dense to very dense	GS	2a3	7	○					4
2				GS	2a4	8	○					
2			End of Auger Hole at 2.0m (Refusal due to dense ground)								8	
3											10	
4											12	
5											14	
6											16	
7											18	
8											20	
9											22	
											24	
											26	
											28	
											30	
											32	

Sample Type: GS - Grab Sample SPT - Standard Penetration Test  
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test  
 Piezometer Backfill Type:  Bentonite  Pea Gravel  Drill Cuttings  Sand

Logged by: JP/RI  
 Reviewed by: WQ/ND  
 Date: March 29 2006



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# BOREHOLE RECORD

**AH06 - 2B**

CLIENT VANCOUVER PARK BOARD PROJECT No. 1011457  
 PROJECT Geotechnical Assessment DATUM \_\_\_\_\_ NORTHING \_\_\_\_\_  
 LOCATION John Hendry Park - 3350 Victoria Drive, Van. BC ELEVATION \_\_\_\_\_ EASTING \_\_\_\_\_  
 DRILLING DATE March 28-06 DRILLING CO. Downrite Drilling Company DRILLING METHOD Solid Stem Auger

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input checked="" type="checkbox"/> Remoulded Shear Vane (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa)				DEPTH (ft)
				TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa	
0			FILL - 200mm dark brown sandy Silt, some organics (topsoil-fill) over brown silty Sand, some gravel, medium dense								0
	FL			XGS 2b1	13						2
1	TP		Dark brown Peatty TOPSOIL, soft	XGS 2b2							4
	OL		Brown organic SILT, some clay, soft	XGS 2b3	115						4
2	MH		Grey mottled clayey SILT, trace gravel & sand, stiff to very stiff	XGS 2b4	18						6
3			Grey glacial TILL (silty Sand, some gravel, trace clay), dense to very dense	XGS 2b5	15						10
	TL			XGS 2b6	8						12
4			End of Auger Hole at 4.3m (Refusal on Cobble)								14
5											16
6											18
7											20
8											22
9											24
											26
											28
											30
											32

Sample Type: GS - Grab Sample SPT - Standard Penetration Test  
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test  
 Piezometer Backfill Type:  Bentonite  Pea Gravel  Drill Cuttings  Sand

Logged by: JP/RI  
 Reviewed by: WQ/ND  
 Date: March 29 2006



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# BOREHOLE RECORD

**AH06 - 3A**

CLIENT VANCOUVER PARK BOARD PROJECT No. 1011457  
 PROJECT Geotechnical Assessment DATUM \_\_\_\_\_ NORTHING \_\_\_\_\_  
 LOCATION John Hendry Park - 3350 Victoria Drive, Van. BC ELEVATION \_\_\_\_\_ EASTING \_\_\_\_\_  
 DRILLING DATE March 29-06 DRILLING CO. Downrite Drilling Company DRILLING METHOD Solid Stem Auger

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input checked="" type="checkbox"/> Remoulded Shear Vane (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa)				DEPTH (ft)	
				TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa		
0			FILL - 200mm dark brown sandy Silt, some organics (topsoil-fill) over brown mottled sandy Silt, some gravel & clay, loose to medium dense									0
1												2
2		FL	-gravelly	GS	3a1							4
3												6
4												8
5		PT	Dark brown PEAT (amorphous), very soft -light brown	GS	3a3							10
6												12
7												14
8												16
9		MH	Grey clayey SILT, soft to firm -some gravel, firm to stiff	GS	3a5							18
10												20
11												22
12												24
13		TL	Grey glacial TILL (silty Sand, some gravel & clay), dense to very dense	GS	3a7	14						26
14												28
15			End of Auger Hole at 8.8m (Refusal due to dense ground) Hole sealed from 0.9 to 1.8m									30
16												32

Sample Type: GS - Grab Sample SPT - Standard Penetration Test  
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test  
 Piezometer Backfill Type:  Bentonite  Pea Gravel  Drill Cuttings  Sand

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# BOREHOLE RECORD

**AH06 - 3B**

CLIENT VANCOUVER PARK BOARD PROJECT No. 1011457  
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 LOCATION John Hendry Park - 3350 Victoria Drive, Van. BC ELEVATION \_\_\_\_\_ EASTING \_\_\_\_\_  
 DRILLING DATE March 28-06 DRILLING CO. Downrite Drilling Company DRILLING METHOD Solid Stem Auger

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input checked="" type="checkbox"/> Remoulded Shear Vane (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa)				DEPTH (ft)	
				TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa		
0			FILL - 100mm dark brown sandy Silt, some organics (topsoil-fill) over brown silty Sand, some gravel, loose	GS	3b1							0
1			Dark brown PEAT (amorphous), very soft	GS	3b2	273						2
2				GS	3b3							4
3				GS	3b4							6
4				GS	3b5							8
5				GS	3b6							10
6				GS	3b7							12
7				GS	3b8	9						14
8												16
9												18
10												20
11												22
12												24
13												26
14												28
15												30
16												32

Sample Type: GS - Grab Sample SPT - Standard Penetration Test  
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test  
 Piezometer Backfill Type:  Bentonite  Pea Gravel  Drill Cuttings  Sand

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# BOREHOLE RECORD

**AH06 - 4A**

CLIENT VANCOUVER PARK BOARD PROJECT No. 1011457  
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 DRILLING DATE March 29-06 DRILLING CO. Downrite Drilling Company DRILLING METHOD Solid Stem Auger

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input checked="" type="checkbox"/> Remoulded Shear Vane (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa)				DEPTH (ft)	
				TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa		
0			FILL - 300mm brown sandy Silt, trace organics (topsoil-fill) over brown mottled clayey sandy Silt, some gravel, trace organics, soft to firm	GS	4a1							0
1			-brick fragments	GS	4a2							2
2	FL			GS	4a3							4
3				GS	4a4							6
4	PT		Dark brown PEAT (amorphous), very soft	GS	4a5							8
5				GS	4a6							10
6	MH		Grey clayey SILT, some gravel, trace sand, soft to firm	GS	4a7							12
7	TL		Grey glacial TILL (silty Sand, some gravel, trace clay), dense to very dense	GS	4a8	10						14
8			End of Auger Hole at 7.5m (Refusal due to dense ground) Hole sealed from 0.9 to 2.1m (Bentonite)									16
9												18
												20
												22
												24
												26
												28
												30
												32

Sample Type: GS - Grab Sample SPT - Standard Penetration Test  
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test  
 Piezometer Backfill Type:  Bentonite  Pea Gravel  Drill Cuttings  Sand

Logged by: JP/RI  
 Reviewed by: WQ/ND  
 Date: March 29 2006



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# BOREHOLE RECORD

**AH06 - 4B**

CLIENT VANCOUVER PARK BOARD PROJECT No. 1011457  
 PROJECT Geotechnical Assessment DATUM \_\_\_\_\_ NORTHING \_\_\_\_\_  
 LOCATION John Hendry Park - 3350 Victoria Drive, Van. BC ELEVATION \_\_\_\_\_ EASTING \_\_\_\_\_  
 DRILLING DATE March 28-06 DRILLING CO. Downrite Drilling Company DRILLING METHOD Solid Stem Auger

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLES			Moisture Content & Atterberg Limits				DEPTH (ft)
				TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa	
0	FL	⊗	FILL - brown sandy Silt, some organics (topsoil-fill) loose	GS	4b1						0
0.5		⊗	Dark brown PEAT (amorphous), very soft	GS	4b2						2
2	PT	⊗		GS	4b3						6
2.5		⊗		GS	4b4						8
3.5		⊗		GS	4b5	418					10
4	MH		Grey clayey SILT, trace sand, very soft to soft	GS	4b6						12
5.5				GS	4b7						18
6	TL	Δ	Grey glacial TILL (silty Sand, some gravel, trace clay), dense to very dense	GS	4b8	10					20
6.1			End of Auger Hole at 6.1m (Refusal due to dense ground) Hole sealed from 0.3 to 1.2m (Bentonite)								22
7											24
8											26
9											28
9.5											30
10											32

Sample Type: GS - Grab Sample SPT - Standard Penetration Test  
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test  
 Piezometer Backfill Type:  Bentonite  Pea Gravel  Drill Cuttings  Sand

Logged by: JP/RI  
 Reviewed by: WQ/ND  
 Date: March 29 2006



**Jacques Whitford**

Consulting Engineers  
 Environmental Scientists  
 Information Consultants

# BOREHOLE RECORD

**AH06 - 5A**

CLIENT VANCOUVER PARK BOARD PROJECT No. 1011457  
 PROJECT Geotechnical Assessment DATUM \_\_\_\_\_ NORTHING \_\_\_\_\_  
 LOCATION John Hendry Park - 3350 Victoria Drive, Van. BC ELEVATION \_\_\_\_\_ EASTING \_\_\_\_\_  
 DRILLING DATE March 29-06 DRILLING CO. Downrite Drilling Company DRILLING METHOD Solid Stem Auger

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input checked="" type="checkbox"/> Remoulded Shear Vane (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa)				DEPTH (ft)	
				TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa		
0			FILL - 300mm grey/brown Sand over brown sandy Silt, some gravel, trace organics & clay (till fill), medium dense	GS	5a1							0
1				GS	5a2							2
2	FL		-some dark brown organics pocket	GS	5a3							4
3			Dark brown PEAT (amorphous), very soft	GS	5a4							6
4	PT			GS	5a5							8
5			Grey mottled clayey SILT, soft									10
6	MH		-some coarse sand pockets	GS	5a6							12
7			Grey glacial TILL (sandy Silt, some clay & gravel), dense to very dense	GS	5a7	12						14
8	TL											16
9			End of Auger Hole at 6.1m (Refusal due to dense ground) Hole sealed from 0.6 to 1.5m									18
10												20
11												22
12												24
13												26
14												28
15												30
16												32

Sample Type: GS - Grab Sample SPT - Standard Penetration Test  
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test  
 Piezometer Backfill Type:  Bentonite  Pea Gravel  Drill Cuttings  Sand

Logged by: JP/RI  
 Reviewed by: WQ/ND  
 Date: March 29 2006

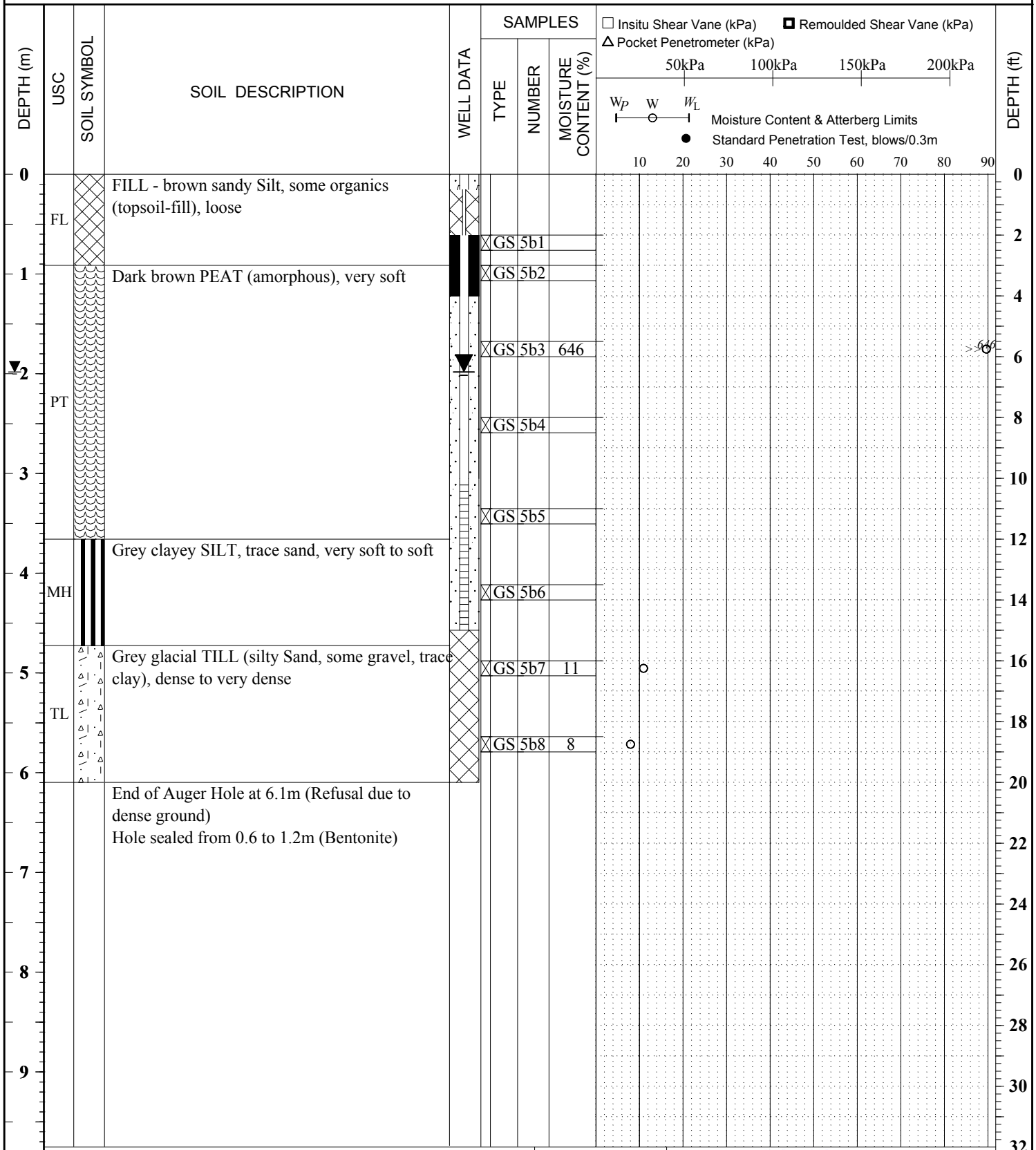


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# BOREHOLE RECORD

**AH06 - 5B**

CLIENT VANCOUVER PARK BOARD PROJECT No. 1011457  
 PROJECT Geotechnical Assessment DATUM \_\_\_\_\_  
 LOCATION John Hendry Park - 3350 Victoria Drive, Van. BC ELEVATION \_\_\_\_\_  
 DRILLING DATE March 28-06 DRILLING CO. Downrite Drilling Company DRILLING METHOD Solid Stem/ Well



Sample Type: GS - Grab Sample SPT - Standard Penetration Test  
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test  
 Piezometer Backfill Type: Bentonite Pea Gravel Drill Cuttings Sand

Logged by: JP/RI  
 Reviewed by: WQ/ND  
 Date: March 29 2006



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# BOREHOLE RECORD

CLIENT VANCOUVER PARK BOARD PROJECT No. 1011457  
 PROJECT Geotechnical Assessment DATUM \_\_\_\_\_ NORTHING \_\_\_\_\_  
 LOCATION John Hendry Park - 3350 Victoria Drive, Van. BC ELEVATION \_\_\_\_\_ EASTING \_\_\_\_\_  
 DRILLING DATE March 28-06 DRILLING CO. Downrite Drilling Company DRILLING METHOD Solid Stem Auger

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLES			Moisture Content & Atterberg Limits				DEPTH (ft)
				TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa	
0			FILL - dark brown & brown sandy Silt, trace gravel & organics, loose								0
	FL			GS 6a1							2
1			FILL - brown sandy Silt, some gravel, trace clay (till fill), medium dense								4
	FL			GS 6a2							6
2			Brown SILT, some sand, trace organics (Topsoil), loose			69					8
	TP			GS 6a3							10
	MH		Grey clayey SILT, some sand, soft to firm								12
	MH		Grey mottled clayey SILT, some sand & gravel, very stiff			19					14
3			Grey glacial TILL (silty Sand, some gravel), dense to very dense			13					16
	MH			GS 6a4							18
	MH			GS 6a5							20
4			Grey glacial TILL (silty Sand, some gravel), dense to very dense			8					22
	TL			GS 6a6							24
	TL			GS 6a7							26
5			End of Auger Hole at 4.9m (Refusal due to dense ground)			10					28
	TL			GS 6a8							30

Sample Type: GS - Grab Sample SPT - Standard Penetration Test  
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test  
 Piezometer Backfill Type: Bentonite Pea Gravel Drill Cuttings Sand

Logged by: JP/RI  
 Reviewed by: WQ/ND  
 Date: March 29 2006



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# BOREHOLE RECORD

**AH06 - 6B**

CLIENT VANCOUVER PARK BOARD PROJECT No. 1011457  
 PROJECT Geotechnical Assessment DATUM \_\_\_\_\_ NORTHING \_\_\_\_\_  
 LOCATION John Hendry Park - 3350 Victoria Drive, Van. BC ELEVATION \_\_\_\_\_ EASTING \_\_\_\_\_  
 DRILLING DATE March 28-06 DRILLING CO. Downrite Drilling Company DRILLING METHOD Solid Stem Auger

DEPTH (m)	USC	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input checked="" type="checkbox"/> Remoulded Shear Vane (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa)				DEPTH (ft)	
				TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa		
0	FL		FILL - 300mm dark brown sandy Silt, some organics (topsoil-fill) over brown silty Sand, some gravel, medium dense	GS	6b1							0
1	TP		Dark brown Peatty TOPSOIL, soft	GS	6b2							2
1	ML		Brown SILT, some organics & clay, soft	GS	6b3							4
2	MH		Grey clayey SILT, trace sand & gravel, very soft	GS	6b4							6
2	MH			GS	6b5							6
3	TL		Grey glacial TILL (silty Sand, some gravel, trace clay), dense to very dense	GS	6b6	8						8
4	TL			GS	6b7	8						10
4			End of Auger Hole at 4.3m (Refusal due to dense ground)									14
5												16
6												18
7												20
8												22
9												24
												26
												28
												30
												32

Sample Type: GS - Grab Sample SPT - Standard Penetration Test  
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test  
 Piezometer Backfill Type:  Bentonite  Pea Gravel  Drill Cuttings  Sand

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