Geotechnical Engineering

Environmental Engineering

Hydrogeology

Geological Engineering

Materials Testing

Building Science

Archaeological Services

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Proposed Residential Development Half Moon Bay West Greenbank Road at Cambrian Road Ottawa, Ontario

Prepared For

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Report: PG2246-1 Revision 6



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1.0 Introduction

Paterson Group (Paterson) was commissioned by Mattamy Homes (Mattamy) to conduct a geotechnical investigation for the proposed residential development Half Moon Bay West to be located north of Cambrian Road, and west of the future Greenbank Road re-alignment, in the City of Ottawa (refer to Figure 1 - Key Plan presented in Appendix 2).

The following report has been prepared specifically and solely for the aforementioned project which is described herein. It contains our findings and includes geotechnical recommendations pertaining to the design and construction of the proposed development as it is understood at the time of writing this report.

Investigating the presence or potential presence of contamination on the subject property was not part of the scope of work of the present investigation. Therefore, the present report does not address environmental issues.

Previous geotechnical investigations were completed by John D. Paterson and Associates (JDPA) and Paterson Group (Paterson) at the subject site and surrounding areas. The relevant Soil Profile and Test Data sheets and Unidimensional Consolidation Testing Results Sheets from previous geotechnical investigations are presented in Appendix 1.

2.0 Proposed Development

It is understood that the current phase of the proposed residential development will consist of townhouses, single family residential dwellings and parklands. It is expected that the development will be municipally serviced with local paved roadways.

The current phase of Half Moon Bay west is located north of Cambrian Road and west of the future Greenbank Road re-alignment.



3.0 Method of Investigation

3.1 Field Investigation

Field Program

The field programs for the geotechnical investigations were carried out on November 26, 27 2003, December 1, 2003, April 15 and 20, 2004, June 28, 2005, October 6, 2005, December 14 and 18, 2006, January 4 to 11, 2007, June 1, 4 and 14, 2007, March 17 to 26, 2008, April 1 and 2, 2008, October 27 to 29, 2010, November 1, 2, 12, 15, 16 and 17, 2010, February 11, 14 to 16, 18, and 22 to 25, 2011 and February 27 to 29, 2012 and March 1, 2 and 5, 2012. The locations of all test holes completed in the immediate vicinity of the subject site are illustrated on Drawing PG2246-4 - Test Hole Location Plan included in Appendix 2.

The boreholes were drilled using a track-mounted auger drill rig operated by a two person crew. The test pits were completed using a hydraulic shovel at selected locations. The test hole procedure consisted of augering or excavated to the required depths at the selected locations and sampling the overburden soils. All fieldwork was conducted under the full-time supervision of personnel from Paterson's geotechnical division under the direction of a senior engineer.

Sampling and In Situ Testing

Soil samples were collected from the boreholes using a 50 mm diameter split-spoon (SS) sampler, or using 73 mm diameter thin walled (TW) Shelby tubes in conjunction with a piston sampler. Soil samples from the test pits were recovered from the side walls of the open excavation and all soil samples were initially classified on site. The split-spoon and grab samples were placed in sealed plastic bags and the Shelby tubes were sealed at both ends on site. All samples were transported to our laboratory for further examination and classification. The depths at which the split-spoon, grab and Shelby tube samples were recovered from the boreholes are shown as SS, G and TW, respectively, on the Soil Profile and Test Data sheets presented in Appendix 1.

The grab samples were placed in sealed plastic bags and all samples were transported to our laboratory. The depths at which the grab samples were recovered from the test holes are shown as 'G', on the Soil Profile and Test Data sheets presented in Appendix 1.

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Standard Penetration Testing (SPT) was conducted in conjunction with the recovery of the split-spoon samples. The SPT results are recorded as "N" values on the Soil Profile and Test Data sheets. The "N" value is the number of blows required to drive the split-spoon sampler 300 mm into the soil after a 150 mm initial penetration using a 63.5 kg hammer falling from a height of 760 mm.

Undrained shear strength testing was carried out in cohesive soils using a field vane apparatus.

Also, undrained shear strength testing was carried out using a frictionless vane borer apparatus at BH 1-12, BH 3-12, BH 5-12, BH 6-12, BH 8-12, BH 9-12, BH 11-12, BH 12-12 and BH 14-12. The undrained shear strength readings were recorded by a crank operated torque head device, which prepares a complete, accurate and permanent test record. The vane resistance, rod friction and angular rotation are all recorded as part of the test record. The calibrated undrained shear strength readings from the frictionless vane apparatus are presented on the Soil Profile and Test Data sheets in Appendix 1.

The subsurface conditions observed in the test holes were recorded in detail in the field. The soil profiles are presented on the Soil Profile and Test Data sheets in Appendix 1 of this report.

Groundwater

Flexible polyethylene standpipes or monitoring wells were installed in all boreholes to permit monitoring of the groundwater levels subsequent to the completion of the sampling program.

Sample Storage

All samples from the current investigation will be stored in the laboratory for a period of one month after issuance of this report. They will then be discarded unless we are directed otherwise. The samples collected from the site during the previous investigations have already been discarded.

3.2 Field Survey

The test hole locations along with ground surface elevations were determined in the field by J.D. Barnes Limited and ASL. It is understood that the ground surface elevations at the borehole locations are referenced to a geodetic datum.



The locations of the boreholes and the ground surface elevations for each test hole location are presented on Drawing PG2246-4 - Test Hole Location Plan in Appendix 2.

3.3 Laboratory Testing

Soil samples were collected from the subject site during the investigation and were visually examined in our laboratory to review the results of the field logging. A total of thirty-seven (37) Shelby tube samples were submitted for unidimensional consolidation testing. The results of the testing are shown on the Consolidation Test sheets in Appendix 1.

The results of the geotechnical laboratory testing program are discussed in Subsections 4.2 and 5.3 of this report.

3.4 Analytical Testing

Three (3) soil samples were submitted for analytical testing to assess the corrosion potential for exposed ferrous metals and the potential of sulphate attacks against subsurface concrete structures. The samples were submitted to determine the concentration of sulphate and chloride, the resistivity and the pH of the sample. The results are presented in Appendix 1 and are discussed further in Subsection 6.8.



4.0 Observations

4.1 Surface Conditions

Currently, the majority of the site has been stripped of topsoil. The site consisted formerly of agricultural fields with the exception of the southwest portion of the site where a treed area formerly existed. The former treed area located within the southwest portion of the site was stripped of topsoil and peat in late 2008. Five (5) test fill piles, which are approximately 30 m by 30 m and 1.7 to 2.1 m high, are distributed throughout the subject phase. Also, the east portion of the site is currently occupied by a surcharge fill pile within a future roadway and housing area adjacent to Greenbank Road. The surcharge pile is approximately 2 m above the proposed finished grades and covers an area of approximately 65 m by 125 m.

4.2 Subsurface Profile

Subsoil Conditions

Generally, the soil profile at the test hole locations consists of silty sand to silty clay fill or topsoil at ground surface underlain by a relatively deep deposit of silty clay overlying glacial till.

Reference should be made to the Soil Profile and Test Data sheets presented in Appendix 1 for details of the soil profiles encountered at the test hole locations completed during the geotechnical investigation.

Silty Clay

A total of thirty-seven (37) samples of silty clay were subjected to unidimensional consolidation (oedometer) testing. The test results are presented in Subsection 5.3 and on the Consolidation Test sheets in Appendix 1. The consolidation test results indicate that the silty clay is overconsolidated with overconsolidation ratios (OCR) for the tested samples varying between 1.3 and 3.2. The OCR is the ratio of the preconsolidation pressure to the effective pressure at the sample depth. This is further discussed in Subsection 5.3.



Thirteen (13) silty clay samples were submitted for Atterberg Limits testing. The tested material was classified as Inorganic Clays of Low Plasticity (CL). The results are summarized in Table 1 and presented on the Atterberg Limits Results sheet in Appendix 1.

Table 1 - Summary of Atterberg Limits Tests									
Sample	Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity Index %	Classification				
BH23-10 TW6	51.7	31	20	11	CL				
BH12-10 TW3	49.2	30	18	13	CL				
BH7-10 TW3	54.3	34	20	13	CL				
BH3-10 TW7	63.6	41	26	15	CL				
BH1-10 TW7	60.8	38	19	19	CL				
BH18A-06 TW5	50.4	32	20	12	CL				
BH17-06 TW5	57	31	20	10	CL				
BH16-06 TW6	60.8	27	19	8	CL				
BH5-06 TW2	56.4	26	18	8	CL				
BH12-05 TW6	66.1	38	23	15	CL				
BH11A-05 TW3	45.6	29	17	11	CL				
BH11A-05 TW1	39.4	33	18	15	CL				
BH10-5 TW5	62	37	19	18	CL				

4.3 Groundwater

Groundwater levels (GWLs) were measured in the piezometers and monitoring wells installed in the boreholes and results are presented in the Soil Profile and Test Data sheets in Appendix 1. Based on the groundwater readings at the monitoring wells, it is suspected that artesian pressure, which is present at depth, influenced the groundwater readings observed within the deeper monitoring wells. The groundwater level can also be estimated based on moisture levels and colour of the recovered soil samples. Based on these observations at the borehole locations, the groundwater table is expected between 1 to 2 m below original ground surface. It should be noted that groundwater levels are subject to seasonal fluctuations. Therefore, the groundwater levels could vary at the time of construction.



5.0 Discussion

5.1 Geotechnical Assessment

Due to the presence of the sensitive silty clay layer, the subject site will be subjected to grade raise restrictions. Permissible grade raise areas are outlined in Drawing PG2246-5 - Permissible Grade Raise Plan - Housing and Drawing PG2246-6 - Permissible Grade Raise Plan - Roadways based on the existing borehole information and test fill settlement program data.

The above and other considerations are further discussed in the following sections.

5.2 Site Grading and Preparation

Stripping Depth

Topsoil and organic containing soils should be stripped from under any buildings, paved areas, pipe bedding and other settlement sensitive structures.

Fill Placement

Fill used for grading beneath the building areas should consist of a clean imported granular fill, such as Ontario Provincial Standard Specifications (OPSS) Granular A or Granular B Type II. This material should be tested and approved prior to delivery to the site. The fill should be placed in lifts no greater than 300 mm thick and compacted using suitable compaction equipment for the lift thickness. Fill placed beneath the building areas should be compacted to at least 98% of its standard Proctor maximum dry density (SPMDD).



5.3 Foundation Design

Lightly loaded structures, such as the buildings anticipated, could be founded on shallow footings placed on an undisturbed, stiff silty clay bearing surface. Strip footings, up to 2 m wide, and pad footings, up to 3 m wide, placed on an undisturbed, stiff silty clay bearing surface can be designed using a bearing resistance value at serviceability limit states (SLS) of **100 kPa** and a factored bearing resistance value at ultimate limit states (ULS) of **225 kPa**. A geotechnical resistance factor of 0.5 was applied to the bearing resistance values at ULS.

The above noted bearing resistance values should be considered applicable for footings placed on select subgrade material or engineered fill as described in Subsection 5.2.

Strip footings, up to 2 m wide, and pad footings, up to 4 m wide, placed on an undisturbed, firm silty clay bearing surface can be designed using a bearing resistance value at SLS of **60 kPa** and a factored bearing resistance value at ULS of **180 kPa**.

An undisturbed soil bearing surface consists of one from which all topsoil and deleterious materials, such as loose, frozen or disturbed soil, whether in situ or not, have been removed, in the dry, prior to the placement of concrete for footings.

Lateral Support

The bearing medium under footing-supported structures is required to be provided with adequate lateral support with respect to excavations and different foundation levels. Adequate lateral support is provided to an engineered fill, stiff to firm silty clay or engineered fill above the groundwater table when a plane extending down and out from the bottom edge of the footing at a minimum of 1.5H:1V passes only through in situ soil of the same or higher capacity as the bearing medium soil.



Settlement/Grade Raise

Consideration must be given to potential settlements which could occur due to the presence of the silty clay deposit and the combined loads from the proposed footings, any groundwater lowering effects, and grade raise fill. The foundation loads to be considered for the settlement case are the continuously applied loads which consist of the unfactored dead loads and the portion of the unfactored live load that is considered to be continuously applied. For dwellings, a minimum value of 50% of the live load is often recommended by Paterson.

Thirty seven (37) site specific consolidation tests were carried out for the subject site. The results of the consolidation tests are presented in Tables 2 to 5 on the following pages and in Appendix 1.

Value p'_c is the preconsolidation pressure of the sample and p'_o is the effective overburden pressure. It should be noted that the effective overburden pressure has been calculated from original ground surface at borehole locations. The difference between these values is the theoretical available preconsolidation.

The values $C_{\rm cr}$ and $C_{\rm c}$ are the recompression and compression indices, respectively, and are a measure of the compressibility of the soil due to stress increases below and above the preconsolidation pressures. The higher values for the $C_{\rm cr}$, as compared to the $C_{\rm cr}$, illustrate the increased settlement potential above, as compared to below, the preconsolidation pressure.



Proposed Residential Development - Half Moon Bay West Greenbank Road at Cambrian Road - Ottawa

Table 2 - Su	mmary of C	onsolidation	Test Resul	ts (PG224	6)		
Borehole No.		Elevation (m)	p' _c (kPa)	p'。 (kPa)		C _c	Q (*)
BH 1-10	TW 7	84.54	93.0	58.3	0.019	1.228	Α
BH 2-10	TW 4	89.13	67.7	36.0	0.023	1.024	G
BH 3-10	TW 7	76.39	153.1	116.0	0.012	1.208	Α
BH 4-10	TW 8	86.66	100.0	49.6	0.020	1.585	G
BH 5-10	TW 5	88.27	87.2	41.0	0.019	1.186	G
BH 5-10	TW 7	82.87	118.7	74.4	-	1.114	G
BH 7-10	TW 3	88.67	101.0	41.2	0.022	0.927	G
BH 10-10	TW 3	90.37	55.5	29.1	0.012	0.472	Α
BH 11-10	TW 6	80.97	141.0	85.0	0.014	1.259	G
BH 12-10	TW 3	89.09	92.0	39.8	0.022	0.721	G
BH 14-10	TW 7	83.25	90.0	67.7	0.021	0.961	G
BH 15-10	TW 4	86.11	87.0	55.2	0.021	1.133	Р
BH 15-10	TW 4	86.01	87.9	55.0	0.015	0.778	G
BH 18-10	TW5	89.05	73.0	40.5	0.023	1.010	Α
BH 20-10	TW 7	88.78	90.0	38.0	0.019	0.763	G
BH 23-10	TW 6	89.66	74.0	35.8	0.022	0.903	G
BH 24-10	TW 4	86.52	90.0	55.3	0.017	0.784	G

^{* -} Q - Quality assessment of sample -

G: Good A: Acceptable P: Likely disturbed



Table 3 - Summary of Consolidation Test Results (PG1618)										
Borehole No.	Sample	Elevation (m)	p' _c (kPa)	p'。 (kPa)	\mathbf{C}_{cr}	C _c	Q (*)			
BH 14-08	TW 6	87.85	92.0	44.5	0.016	1.214	G			
BH 15-08	TW 5	89.00	69.0	30.5	0.011	0.761	Α			
BH 20-08	TW 6	88.26	88.0	42.2	0.015	0.763	Α			
BH 22-08	TW 4	87.99	85.0	45.5	0.010	0.902	G			
BH 29-08	TW 5	84.79	78.0	48.3	0.014	0.905	G			

^{* -} Q - Quality assessment of sample -

G: Good A: Acceptable P: Likely disturbed

Table 4 - Summary of Consolidation Test Results (PG0177)										
Borehole No.		Elevation (m)	p' _c (kPa)	p' _o (kPa)	C _{cr}	C _c	Q (*)			
BH 2A	TW 3	-	88.0	52.9	0.022	0.850	G			
BH 2B	TW 1	-	107.0	77.7	0.026	1.420	G			
BH 10-05	TW 5	86.96	82.0	48.2	0.017	1.460	G			
BH 11A-05	TW 1	89.41	83.0	25.8	0.020	0.737	G			
BH 11A-05	TW 3	84.71	110.0	54.9	0.014	0.942	G			
BH 12-05	TW 6	82.44	115.0	75.8	0.020	2.510	G			
BH 5-06	TW 2	88.24	96.0	38.5	0.026	1.185	G			
BH 16-06	TW 6	84.74	89.0	64.8	0.022	1.483	G			
BH 17-06	TW 5	82.71	106.0	72.9	0.310	1.671	Α			
BH 18A-06	TW 5	87.73	75.0	44.8	0.017	0.606	Р			
BH 20–06	TW 4	85.65	71.0	49.0	0.020	0.943	G			
BH 24-06	TW 3	86.53	84.0	54.9	0.018	1.309	G			

^{* -} Q - Quality assessment of sample -

G: Good A: Acceptable P: Likely disturbed

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Table 5 - Summary of Consolidation Test Results (G9132)										
Borehole No.	Sample	Depth (m)	p' _c (kPa)	p'。 (kPa)	C _{cr}	C _c	Q (*)			
BH 1	TW 4	2.80	82.0	36.2	0.018	0.702	G			
BH 3	TW 3	2.65	50.0	31.7	0.019	0.252	G			
BH 3	TW 5	5.80	90.0	51.2	0.029	1.090	G			

^{* -} Q - Quality assessment of sample -

It should be noted that the values of p'_c , p'_o , C_{cr} and C_c are determined using standard engineering practices and are estimates only. In addition, natural variations within the soil deposit would also affect the results. Furthermore, the p'_o parameter is directly influenced by the groundwater level. While the groundwater levels were measured at the time of the fieldwork, the levels vary with time and this has an impact on the available preconsolidation. Lowering the groundwater level increases the p'_o and therefore reduces the available preconsolidation. Unacceptable settlements could be induced by a significant lowering of the groundwater level. The p'_o values for the consolidation tests carried out for the present investigation are based on the long term groundwater level observed at each borehole location. The long term groundwater level is based on the colour and undrained shear strength profile of the silty clay.

The total and differential settlements will be dependent of the characteristics of the buildings. For design purposes, the total and differential settlements associated with the combination of proposed grade raises and design footing loading conditions are estimated to be 25 mm and 20 mm, respectively. A post-development groundwater lowering of 0.5 m was assumed.

The potential post construction total and differential settlements are dependent on the position of the long term groundwater level when building over deposits of compressible silty clay. While efforts can be made to reduce the impacts of the development on the long term level of the groundwater by placing clay dykes in the service trenches, reducing the sizes of paved areas, leaving green spaces to allow for groundwater recharge, limiting planting of trees to areas away from the buildings, it is not economically possible to control the level of the groundwater.

March 7, 2019

G: Good A: Acceptable P: Likely disturbed



To reduce potential long term liabilities, consideration should be given to accounting for a larger groundwater lowering and to providing means to reduce long term groundwater lowering (e.g. clay dykes, restriction on planting around the stores, etc). It should be noted that building over silty clay deposits increases the likelihood of building movements and therefore of cracking. The use of steel reinforcement in foundations placed at key structural locations will tend to reduce foundation cracking as compared to unreinforced foundations.

5.4 Test Fill Piles and Settlement Monitoring Programs

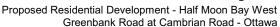
In June 2016, a test fill pile program consisting of five (5) test fill piles (Piles A to E) were strategically placed across the subject site to provide additional information regarding our permissible grade raise recommendations for the area. The test fill piles consisted of a 30 m x 30 m pile, ranging in height from 1.7 to 2.1 m. Two (2) settlement plates were installed in each of the five (5) test fill piles. At that time, a settlement monitoring program was implemented, with the initial survey taking place on June 27, 2016.

In July 2017, an additional six (6) test fill piles were constructed as part of our settlement monitoring program and an additional 0.3 m of fill was placed over the existing test fill piles.

The test fill pile areas are outlined in Drawing PG2246-4 - Test Hole Location Plan in Appendix 2. The periodic readings, including most recent results, from our test fill settlement monitoring program are presented in Figures 2A and 2B - Test Fill Settlement Monitoring Program in Appendix 2.

A former settlement monitoring program between December 2007 and August 2011, consisting of three (3) test fill piles with a total of nine (9) settlement plates (SP1,SP2,SP3,SP4,SP5,SP6,SP7,SP8, and SP9) was completed within the west portion of subject site. The settlement plates were installed on December 13, 2007 and initially surveyed on December 14, 2007. The purpose of the program was to monitor potential settlement resulting from preloading the soils with various fill heights.

The results of the 2007 to 2011 test fill pile program can be summarized as follows: the 1.5 m surcharge pile (SP1 to SP3) indicated negligible settlement (maximum 8 mm). The 2.5 m surcharge pile (SP4 to SP6) indicated settlement up to 92 mm. The 3.5 m surcharge pile (SP7 to SP9) indicated settlement up to 189 mm. The results of the four year settlement monitoring program are presented in Figure 3 - Test Fill Pile (2007 to 2011) Settlement Monitoring Program in appendix 2.





Based on the results of the former and current settlement monitoring programs and existing borehole data, our permissible grade raise recommendations have been updated. Our permissible grade raise recommendations are presented in Drawing PG2246-5 - Permissible Grade Raise Plan - Housing and Drawing PG2246-6 - Permissible Grade Raise Plan - Roadways in Appendix 2.

A settlement surcharge program was initiated in an area where finished grades had exceeded our original permissible grade raise recommendations. The current surcharge area is outlined in Drawing PG2246-4 - Test Hole Location Plan in Appendix 2.

The settlement monitoring began in September 2016 upon completion of the fill placement for the surcharge pile within the subject section of River Run Avenue. Four (4) settlement monitoring plates (SP15, SP16, SP17, SP18) were installed within the surcharge pile on September 1, 2016 with the initial survey taking place on September 2, 2016. The settlement surcharge program was designed to eliminate the excessive settlement anticipated due to the proposed grading and the underlying silty clay deposit. The surcharge pile height was determined based on the proposed grading information at that time. The surcharge pile height provides a 2.0 m high surcharge at the housing based on the current grading information.

To date, settlement of up to 220 mm has been recorded at the four (4) settlement plates (SP15, SP16, SP17 and SP18). Based on the results of our current settlement survey and existing soils information the settlement survey program is still on going. The results are presented in Figure 4 - Settlement Surcharge Monitoring Program.

5.5 Design for Earthquakes

The proposed site can be taken as seismic site response **Class E** as defined in the Ontario Building Code 2012 (OBC 2012; Table 4.1.8.4.A) for foundations considered at this site. The soils underlying the site are not susceptible to liquefaction.

5.6 Basement Slab

With the removal of all topsoil and fill containing organic matter within the footprints of the proposed buildings, the native soil surface or engineered fill will be considered to be an acceptable subgrade surface on which to commence backfilling for floor slab construction. Provision should be made for proof-rolling the soil subgrade using heavy vibratory compaction equipment prior to placing any fill. Any soft areas should be removed and backfilled with appropriate backfill material. OPSS Granular B Type II is recommended for backfilling below the floor slab. It is recommended that the upper 200 mm of sub-slab fill consist of 19 mm clear crushed stone.



5.7 Pavement Structure

For design purposes, the pavement structure presented in the following tables could be used for the design of car parking areas and local roadways.

Table 6 - Recommended Pavement Structure - Driveways							
Thickness Material Description							
50	Wear Course - HL 3 or Superpave 12.5 Asphaltic Concrete						
150	BASE - OPSS Granular A Crushed Stone						
300	SUBBASE - OPSS Granular B Type II						

SUBGRADE - Either fill, in situ soil or OPSS Granular B Type I or II material placed over in situ soil or fill

Table 7 - Recommended Pavement Structure - Local Residential Roadways						
Thickness (mm)	Material Description					
40	Wear Course - HL-3 or Superpave 12.5 Asphaltic Concrete					
50	Binder Course - HL-8 or Superpave 19.0 Asphaltic Concrete					
150	BASE - OPSS Granular A Crushed Stone					
450	SUBBASE - OPSS Granular B Type II					
SUBGRADE - Either fill, in situ soil or OPSS Granular B Type I or II material placed over in situ soil						

Table 8 - Recommended Pavement Structure - Residential Collectors and Arterial Roadways with Bus Traffic						
Thickness (mm)	Material Description					
40	Wear Course - HL-3 or Superpave 12.5 Asphaltic Concrete					
50	Upper Binder Course - HL-8 or Superpave 19.0 Asphaltic Concrete					
50	Lower Binder Course - HL-8 or Superpave 19.0 Asphaltic Concrete					
150	BASE - OPSS Granular A Crushed Stone					
600	SUBBASE - OPSS Granular B Type II					
SUBGRADE - Either fill, in situ soil or OPSS Granular B Type I or II material placed over in situ soil						





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Minimum Performance Graded (PG) 58-34 asphalt cement should be used for local roadways and PG64-34 for residential collectors and arterial roadways. If soft spots develop in the subgrade during compaction or due to construction traffic, the affected areas should be excavated and replaced with OPSS Granular B Type II material. Weak subgrade conditions may be experienced over service trench fill materials. This may require the use of a geotextile, thicker subbase or other measures that can be recommended at the time of construction as part of the field observation program.

The pavement granular base and subbase should be placed in maximum 300 mm thick lifts and compacted to a minimum of 100% of the material's SPMDD using suitable vibratory equipment.



6.0 Design and Construction Precautions

6.1 Foundation Drainage and Backfill

It is recommended that a perimeter foundation drainage system be provided for proposed structures. The system should consist of a 150 mm diameter, geotextile-wrapped, perforated, corrugated, plastic pipe, surrounded on all sides by 150 mm of 10 mm clear crushed stone, placed at the footing level around the exterior perimeter of the structure. The pipe should have a positive outlet, such as a gravity connection to the storm sewer or direct the collected water to the building sump pit, which should be connected to the storm sewer. Recommendations regarding the building sump pump and pit are presented in Subsection 6.5.

Backfill against the exterior sides of the foundation walls should consist of free-draining, non frost susceptible granular materials. The site materials will be frost susceptible and, as such, are not recommended for re-use as backfill unless a composite drainage system (such as system Platon or Miradrain G100N) connected to a drainage system is provided.

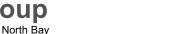
6.2 Protection Against Frost Action

Perimeter footings of heated structures are required to be insulated against the deleterious effect of frost action. A minimum 1.5 m thick soil cover (or equivalent) should be provided in this regard.

A minimum of 2.1 m thick soil cover (or equivalent) should be provided for other exterior unheated footings.

6.3 Excavation Side Slopes

The excavation for the proposed development will be mostly through sand fill and/or silty clay. Above the groundwater level, for excavations to depths of approximately 3 m, the excavation side slopes should be stable in the short term at 1H:1V. The lowermost 1.2 m can be vertical provided the material consists of stiff in situ silty clay. Flatter slopes could be required for deeper excavations or for excavation below the groundwater level. Where such side slopes are not permissible or practical, temporary shoring should be used. The subsoil at this site is considered to be mainly a Type 2 and 3 soil according to the Occupational Health and Safety Act and Regulations for Construction Projects.



Proposed Residential Development - Half Moon Bay West Greenbank Road at Cambrian Road - Ottawa

The slope cross-sections recommended above are for temporary slopes. Excavated soil should not be stockpiled directly at the top of excavations and heavy equipment should be kept away from the excavation sides.

Slopes in excess of 3 m in height should be periodically inspected by the geotechnical consultant in order to detect if the slopes are exhibiting signs of distress.

It is recommended that a trench box approved by a structural engineer be used at all times to protect personnel working in trenches with steep or vertical sides. It is expected that services will be installed by "cut and cover" methods and excavations will not be left open for extended periods of time.

6.4 Pipe Bedding and Backfill

Kingston

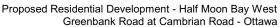
The pipe bedding for sewer and water pipes should consist of at least 150 mm of OPSS Granular A material. Where the bedding is located within the soft to firm grey silty clay, the thickness of the bedding material should be increased to a minimum of 300 mm. The material should be placed in maximum 300 mm thick lifts and compacted to a minimum of 95% of its SPMDD. The bedding material should extent at least to the spring line of the pipe.

The cover material, which should consist of OPSS Granular A, should extend from the spring line of the pipe to at least 300 mm above the obvert of the pipe. The material should be placed in maximum 300 mm thick lifts and compacted to a minimum of 95% of its SPMDD.

It should generally be possible to re-use the moist (not wet) brown silty clay above the cover material if the excavation and filling operations are carried out in dry weather conditions. Wet silty clay materials will be difficult to re-use, as the high water contents make compacting impractical without an extensive drying period.

Where hard surface areas are considered above the trench backfill, the trench backfill material within the frost zone (about 1.8 m below finished grade) should match the soils exposed at the trench walls to minimize differential frost heaving. The trench backfill should be placed in maximum 300 mm thick loose lifts and compacted to a minimum of 95% of the material's SPMDD.

Page 18





To reduce long-term lowering of the groundwater level at this site, clay seals should be provided in the service trenches. The seals should be at least 1.5 m long (in the trench direction), and should extend from trench wall to trench wall. Generally, the seals should extend from the frost line and fully penetrate the bedding, subbedding and cover material. The barriers should consist of relatively dry and compactable brown silty clay placed in maximum 225 mm thick loose layers and compacted to a minimum of 95% of the material's SPMDD. The clay seals should be placed at the site boundaries and at strategic locations at no more than 60 m intervals in the service trenches.

6.5 Groundwater Control

Construction Phase

It is anticipated that groundwater infiltration into the excavations should be low and controllable using open sumps. Pumping from open sumps should be sufficient to control the groundwater influx through the sides of shallow excavations. The contractor should be prepared to direct water away from all bearing surfaces and subgrades, regardless of the source, to prevent disturbance to the founding medium.

A temporary Ministry of the Environment and Climate Change (MOECC) permit to take water (PTTW) may be required for this project if more than 400,000 L/day of ground and/or surface water is to be pumped during the construction phase. A minimum 4 to 5 months should be allowed for completion of the PTTW application package and issuance of the permit by the MOECC.

For typical ground or surface water volumes, being pumped during the construction phase, between 50,000 to 400,000 L/day, it is required to register on the Environmental Activity and Sector Registry (EASR). A minimum of two to four weeks should be allotted for completion of the EASR registration and the Water Taking and Discharge Plan to be prepared by a Qualified Person as stipulated under O.Reg. 63/16. If a project qualifies for a PTTW based upon anticipated conditions, an EASR will not be allowed as a temporary dewatering measure while awaiting the MOECC review of the PTTW application.



Groundwater Control Using Sump Pits

It is understood that the proposed residential buildings within the subject site will include a basement level and sump pit and pump installed below the basement slab to provide an outlet for any storm water or spring melt water collected from the perimeter foundation drainage system. Based on our observations of the recovered soil samples from the borehole locations, the long-term groundwater level varies between 89.7 to 90.5 m elevation across the site. It is recommended that the design underside of footing elevation be placed at least 0.3 m above the long-term groundwater level to ensure adequate separation between the design underside of footing elevation. It is anticipated that the subject site is suitable for a development, which includes the use of sump pumps, from a geotechnical perspective provided the abovenoted separation distance is adhered to.

6.6 Winter Construction

The subsoil conditions at this site mostly consist of frost susceptible materials. In presence of water and freezing conditions ice could form within the soil mass. Heaving and settlement upon thawing could occur. Precautions should be taken if winter construction is considered for this project.

In the event of construction during below zero temperatures, the founding stratum should be protected from freezing temperatures by the use of straw, propane heaters and tarpaulins or other suitable means. In this regard, the base of the excavations

should be insulated from sub-zero temperatures immediately upon exposure and until such time as heat is adequately supplied to the building and the footings are protected with sufficient soil cover to prevent freezing at founding level.

The trench excavations should be carried out in a manner that will avoid the introduction of frozen materials into the trenches. As well, pavement construction is difficult during winter. The subgrade consists of frost susceptible soils which will experience total and

differential frost heaving as the work takes place. In addition, the introduction of frost, snow or ice into the pavement materials, which is difficult to avoid, could adversely affect the performance of the pavement structure. Additional information could be provided, if required.



6.7 Landscaping and Exterior Structure Considerations

Tree Planting Restrictions

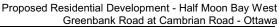
Based on the results of the representative soil samples tested between the design underside of footing (USF) and 3.5 m from the proposed design grades at the residential dwellings, the subject site is considered as a low/medium sensitive area for tree planting according to the City of Ottawa Tree Planting in Sensitive Marine Clay Soils (2017 Guidelines)

Since the modified plasticity limit (PI) does not exceed 40% based on our testing results, large trees (mature height over 14 m) can be planted at Half Moon Bay West provided a tree to foundation setback equal to the full mature height of the tree can be provided (e.g. in a park or other green space). Tree planting setback limits may be reduced to 4.5 m for small (mature tree height up to 7.5m) and medium size trees (mature tree height 7.5 m to 14 m) provided that the following conditions are met:

	be satisfied for footing (USF) is 2.1 m or greater below the lowest finished grade must be satisfied for footings within 10 m from the tree, as measured from the centre of the tree trunk and verified by means of the Grading Plan as indicated procedural changes below.
۵	A small tree must be provided with a minimum of 25 m³ of available soil volume while a medium tree must be provided with a minimum of 30 m³ of available soil volume, as determined by the Landscape Architect. The developer is to ensure that the soil is generally un-compacted when backfilling in street tree planting locations.
	The tree species must be small (mature tree height up to 7.5 m) to medium size (mature tree height 7.5 m to 14 m) as confirmed by the Landscape Architect.
	The foundation walls are to be reinforced at least nominally (minimum of two upper and two lower 15M bars in the foundation wall).
	Grading surrounding the tree must promote drainage to the tree root zone (in such a manner as not to be detrimental to the tree), as noted on the subdivision Grading Plan.

In-Ground Swimming Pools

The in-situ soils are considered to be acceptable for the installation of in-ground swimming pools. The soil removed to accommodate an in-ground swimming pool weighs more than the water filled in-ground pool. Therefore, no additional load is being applied to the underlying sensitive clays.





Aboveground Swimming Pools, Hot Tubs and Exterior Decks

If consideration is given to construction of an above ground swimming pool, a hot tub or an exterior deck, a geotechnical consultant should be retained by the homeowner to review the site conditions. No additional grading should be placed around the exterior structure. The swimming pool should be located at least 3 m away from the existing foundation to avoid adding localized loading to the foundation and the hot tub should be located at least 2 m away from the existing foundation. Otherwise, construction is considered routine, and can be constructed in accordance with the manufacturer's specifications.

6.8 Corrosion Potential and Sulphate

The results of analytical testing show that the sulphate content is less than 0.1%. These results are indicative that Type 10 Portland cement (normal cement) would be appropriate for this site. The results of the chloride content, pH and resistivity indicate the presence of a non-aggressive to aggressive environment for exposed ferrous metals.



7.0 Recommendations

It is re	commended that the following be carried out during the development stage:
	Review detailed grading plan(s) from a geotechnical perspective.
	Observation of all bearing surfaces prior to the placement of concrete.
	Periodic observation of the condition of unsupported excavation side slopes in excess of 3 m in height, if applicable.
	Observation of all subgrades prior to backfilling.
	Field density tests to ensure that the specified level of compaction has been achieved.
	Sampling and testing of the bituminous concrete including mix design reviews.
with o	ort confirming that the above program has been conducted in general accordance ur recommendations could be issued upon request, following the completion of factory material testing and observation program by the geotechnical consultant.



8.0 Statement of Limitations

The recommendations made in this report are in accordance with our present understanding of the project. We request that we be permitted to review the grading plan once available and our recommendations when the drawings and specifications are complete.

A geotechnical investigation of this nature is a limited sampling of a site. The recommendations are based on information gathered at the specific test locations and can only be extrapolated to an undefined limited area around the test locations. The extent of the limited area depends on the soil, bedrock and groundwater conditions, as well the history of the site reflecting natural, construction, and other activities. Should any conditions at the site be encountered which differ from those at the test locations, we request notification immediately in order to permit reassessment of our recommendations.

The present report applies only to the project described in this document. Use of this report for purposes other than those described herein or by person(s) other than Mattamy Homes or their agent(s) is not authorized without review by Paterson Group for the applicability of our recommendations to the altered use of the report.

Paterson Group Inc.

Faisal I. Abou-Seido, P.Eng.

Report Distribution:

- ☐ Mattamy Homes (6 copies)
- ☐ Paterson Group (1 copy)

D. J. GILBERT 100116130

David J. Gilbert, P. Eng.

APPENDIX 1

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

UNIDIMENSIONAL CONSOLIDATION TEST RESULTS

ATTERBERG LIMITS' RESULTS

ANALYTICAL TESTING RESULTS

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Half-Moon Bay West - Cambrian Road Ottawa, Ontario

DATUM Ground surface elevations provided by ASL. FILE NO.

PG2246

REMARKS

HOLE NO.

RH 1-12

BORINGS BY CME 75 Power Auger			DATE February 27, 2012					BH 1-			12
SOIL DESCRIPTION	PLOT		SAN	IPLE	ı	DEPTH	ELEV.		esist. Blo 0 mm Dia		₩.
	STRATA E	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)		Vater Con		Monitoring Well
GROUND SURFACE	62		Z	R.	z °		00.00	20	40 60	80	Σ
\ PEAT 0.10] 0-	-92.99				
Stiff, brown SILTY CLAY						1-	-91.99				
<u></u>						2-	-90.99				
							-89.99)		
						3-	-09.99	*			
						4-	-88.99				
						5-	-87.99				,
						6-	-86.99				4
Firm, grey SILTY CLAY						7-	-85.99				1
Tilli, grey Sich i GLAT						Q_	-84.99		*		

						9-	-83.99				
						10-	-82.99				***
- stiff by 11.2m depth						11-	-81.99		1		,
						12-	-80.99		*		***************************************
						13-	-79.99				***
13.51 End of Borehole							7 0.00				*
								20	40 60) 80 1	100
								Shea	ar Strengt		

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Half-Moon Bay West - Cambrian Road Ottawa, Ontario

DATUM Ground surface elevations provided by ASL. FILE NO. **PG2246 REMARKS** HOLF NO

BORINGS BY CME 55 Power Auger				D	ATE	February 2	28, 2012		HOLE	NO. BH	12-12
SOIL DESCRIPTION	PLOT		SAN	IPLE	I	DEPTH	ELEV.	Pen. F		Blows/0.3 Dia. Cone	3m
	STRATA P	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)			content %	
ROUND SURFACE	\ \o		Z	R.	z o			20	40	60 8	0 2
PEAT 0.13	3					0-	_				× × × × ×
_oose, brown SILTY SAND	1111										
Stiff, brown SILTY CLAY	レレメ	ss	1		4	1-	-				
						2-	-		\		
irm to soft, grey SILTY CLAY									*		
						3-	_	*			
4 5-	,					4-	-	*			
4.57 nd of Borehole	YXX										
								20 She	40 ar Strei ★ Fric	60 8 ngth (kPa ctionless Val	1)

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Half-Moon Bay West - Cambrian Road Ottawa, Ontario

DATUM Ground surface elevations provided by ASL.

FILE NO.

PG2246

REMARKS

BORINGS BY CME 55 Power Auge	r				D	ATE I	February 2	28, 2012		HOLE N	o. BH 3	-12
SOIL DESCRIPTION		PLOT		SAMPLE			DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ◆ 50 mm Dia. Cone			
		STRATA	TYPE	NUMBER	NUMBER * RECOVERY N VALUE OF ROD			0 V	/ater Co	ntent %	Monitoring Well	
GROUND SURFACE		01		4	R	z °	n-	93.30	20	40	60 80	2
PEAT	0.91 <u>=</u>	- <u></u>						92.30				4
Stiff, brown SILTY CLAY, some sand	2.15											
	2.15						2-	91.30			*	
							3-	-90.30	*			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
Firm, grey SILTY CLAY							4-	-89.30	*	*		
- inferred silty sand seam at 4.2m depth							5-	-88.30	*			
							6-	87.30	*	*		
							7-	-86.30		/:		
							8-	85.30				
							9-	-84.30				
	10.21							-83.30	*			
End of Borehole	10.21							00.00	*			
									20 Shea	ır Strenç	60 80 gth (kPa)	100
										★ Friction	onless Vane	

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Half-Moon Bay West - Cambrian Road Ottawa, Ontario

Ground surface elevations provided by ASL. **DATUM**

REMARKS

FILE NO.

PG2246

HOLF NO

BORINGS BY CME 55 Power Auger					ATE	February 2	28, 2012		НО	LE NO). Bł	1 4-12	2			
SOIL DESCRIPTION	PLOT		SAN	IPLE		DEPTH	ELEV.	Pen. F			ows/0. a. Con		Monitoring Well Construction			
	STRATA E	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)				ntent 9		onitorina			
GROUND SURFACE	01		2	R.	z o	0-	93.40	20	40		3 06	30	2			
FILL: Brown silty sand with		∑ ss	1	47	50+		93.40									
gravel, cobbles, boulders and clay2.06		∑ ∑ss	2	100	50+		91.40									
Loose, brown SILTY SAND , trace clay 2.97		ss	3	42	7											
		ss	4	54	2		90.40									
Fim, grey SILTY CLAY							89.40									
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						6-	87.40		*							
								20 She		reng	50 8 th (kPa	a)	 00			

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Half-Moon Bay West - Cambrian Road Ottawa, Ontario

DATUM Ground surface elevations provided by ASL. FILE NO.

PG2246

REMARKS

HOLF NO

BORINGS BY CME 55 Power Auger					OATE	February 2	29, 2012		HOLI	E NO.	BH 5-12	2
SOIL DESCRIPTION	PLOT		SAN	IPLE		DEPTH	ELEV.			Blows Dia. Co		Well
	STRATA	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	0 V	Vater (Conten	t %	Monitoring Well
ROUND SURFACE	J			N	z °		-92.49	20	40	60	80	
FILL: Brown silty sand with gravel, cobbles, boulders, clay 0.60	9	⊗ AU	1				92.49					
Compact, brown SILTY SAND <u>1.5</u> 0		Ss	2	58	12	1 -	-91.49					
Stiff, brown SILTY CLAY)	X ss	3	50	1	2-	-90.49					
- -						3-	-89.49		\			-
						4-	-88.49		*			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
									*			4
						5-	-87.49		*			4
rm, grey SILTY CLAY						6-	-86.49		*			
						7-	-85.49		*			-
						8-	-84.49		<i>(</i>			
						9-	-83.49		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \			1
						10	00.40					
44.0							-82.49		*			
nd of Borehole	2////					11-	-81.49		*			
								20 Shea	40 ar Stre	60 ength (l	80 1 kPa)	00
								300		ictionless		

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Half-Moon Bay West - Cambrian Road Ottawa, Ontario

Ground surface elevations provided by ASL. **DATUM**

REMARKS

FILE NO. **PG2246**

HOLE NO.

BORINGS BY CME 55 Power Auger				D	ATE I	ebruary 2	29, 2012	BH 6-12	
SOIL DESCRIPTION	PLOT		SAN	IPLE		DEPTH		Pen. Resist. Blows/0.3m • 50 mm Dia. Cone	Well W
	STRATA	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	O Water Content %	Monitoring Well
ROUND SURFACE			2	A.	z o	0-	-91.75	20 40 60 80	≥
oose, brown SILTY SAND vith clay1.	10	s ss	1	100	4	1-	-90.75		
	35					2-	-89.75		
						3-	-88.75	***************************************	
						4-	-87.75	***************************************	
Firm, grey SILTY CLAY						5-	-86.75	*	
						6-	-85.75		
						7-	-84.75		
, g.o, c. c.						8-	-83.75	*	
						9-	-82.75		
						10-	-81.75		
						11 -	80.75		
						12-	-79.75		
						13-	-78.75		
nd of Borehole	02///					14-	-77.75	***************************************	
								20 40 60 80 100 Shear Strength (kPa) ★ Frictionless Vane	0

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Half-Moon Bay West - Cambrian Road Ottawa, Ontario

DATUM Ground surface elevations provided by ASL. FILE NO. **PG2246 REMARKS** HOLE NO.

BORINGS BY CME 55 Power Auger			D	ATE	February 2		BH 7-12					
SOIL DESCRIPTION			SAN	IPLE	Г	DEPTH				t. Blows/0.3m m Dia. Cone		
	STRATA PLOT	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)			ntent %	Monitorina Well	
ROUND SURFACE	σ σ		Z	ES.	z °	0-	91.69	20	40	60 80	Σ	
ery loose, brown SILTY AND with clay		ss	1	75	2		90.69				<u> </u>	
	.00				_		89.69			4	20 *	
rm, grey SILTY CLAY , trace nd seams	25					3-	-88.69			1	20 ★	
3 d of Borehole	.35											
								20 Shea	40 or ar Streng	60 80 1 gth (kPa)	100	
										onless Vane		

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Half-Moon Bay West - Cambrian Road Ottawa, Ontario

Ground surface elevations provided by ASL. **DATUM**

FILE NO.

PG2246

REMARKS HOLE NO. **BH 8-12 BORINGS BY** CME 55 Power Auger DATE March 1, 2012

BORINGS BY CME 55 Power Au	ATE	March 1, 2	2012		D110-12						
SOIL DESCRIPTION			SAN	MPLE		DEPTH		Pen. Resist. Blows/0.3m 50 mm Dia. Cone			
	STRATA 1		NUMBER	% RECOVERY	VALUE r RQD	(m)	(m)	0 '	Water Co	ontent %	Monitoring Well
GROUND SURFACE	<u> </u>	5 5	¥	REC	N O N		93.44	20	40	60 80	Ž
FILL: Brown silty sand with gravel, cobbles and boulders		AU	1								********
oose, brown SILTY SAND	1.40	∭ ss ∭ ss	3	50	12 5		92.44				
vith clay Stiff, brown SILTY CLAY with eand seams	2. <u>10</u> 2.60	ss			2	2-	91.44				
alu sealis						3-	90.44	*			
						4-	89.44	*			
						5-	-88.44	1			
						6-	87.44	1			
Soft to firm, grey SILTY CLAY						7-	86.44		*		,
						8-	85.44	*	*		
						Q -	-84.44		*		
	_10.88					10-	83.44				
End of Borehole											
								<u> </u>	45	M M	
								20 She		gth (kPa)	00
									★ Frict	ionless Vane	

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Half-Moon Bay West - Cambrian Road Ottawa, Ontario

DATUM Ground surface elevations provided by ASL.

REMARKS

FILE NO. **PG2246**

HOLE NO.

RH 0_12

	PLOT		SAM	IPLE				Per	ı. Res	ist. B	Blows/0).3m	=
						DEPTH (m)	ELEV.	•	50	mm D	ia. Cor	1е	W L
	STRATA	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(111)	(m)) Wa	ter Co	ontent	%	Monitoring Well
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0.80		 											
- – – 🗸		X SS	1		2	1-	-91.06						淐
		_											
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						4-	-88.06		*				-
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						5-	87.06		*				
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						6-	-86.06			1			
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<u>7.49</u>							00.00				· · · · · · · · · · · · · · · · · · ·		
								: :					
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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Half-Moon Bay West - Cambrian Road Ottawa, Ontario

Ground surface elevations provided by ASL. DATUM

FILE NO.

PG2246

REMARKS

BORINGS BY CME 55 Power Auger					DATE	March 1, 2	2012		НО	LE NO	BH	110-12	2
SOIL DESCRIPTION	PLOT		SAN	/IPLE		DEPTH (m)	ELEV. (m)	Pen. F			ows/0. a. Cond		ן We∥
	STRATA	TYPE	NUMBER	RECOVERY	N VALUE or RQD	(111)	(111)	O 1	Nater	Cor	ntent 9	%	Monitorina Well
GROUND SURFACE	0,		-4	8	z °	0-	93.93	20	40	6	δ 0 ε	80	<u> </u>
		X					30.30						₩
III • Brown silty sand with		∜ ss	1	50	3	1-	92.93						
ILL: Brown silty sand with ravel, cobbles, boulders, clay		X	2	58	12								
) 	2	56	12	2-	91.93						
2.9	ю 💢	∭ ss	3		4		00.00						
tiff, brown SILTY CLAY	.3	∏ ss	4		2	3-	90.93						
						4-	89.93						
oft, grey SILTY CLAY													
on, grey Sier i OLAT						5-	88.93	*					
								*					
6.4	.o	1				6-	87.93						ان ا
nd of Borehole													
								20 She	40 ar St	6 rena	อ 8 th (kPa	30 10 a))0
											nless Va		

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Half-Moon Bay West - Cambrian Road Ottawa, Ontario

DATUM Ground surface elevations provided by ASL. FILE NO.

PG2246

REMARKS

BORINGS BY CME 55 Power Auger					ATE	March 2, 2	2012	,	HOLEN	^{o.} BH11-1	2
SOIL DESCRIPTION	PLOT		SAN	IPLE	ı	DEPTH	ELEV.	1		lows/0.3m ia. Cone	Well Stion
	STRATA	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)		Vater Co	ontent %	Monitoring Well Construction
GROUND SURFACE				Щ.		0-	93.03	20	40	60 80	
FILL: Brown silty sand with clay, trace gravel	.50	ss	1	58	18	1-	-92.03				
Loose, brown SILTY SAND , some clay	2.20	ss	2	42	6	2-	91.03				
Stiff, brown SILTY CLAY	2.80	SS	3	100	1	3-	90.03				
						4-	89.03		*		-
						5-	-88.03		*		
						6-	87.03		*		
						7-	-86.03		<u>)</u>		
Firm, grey SILTY CLAY						8-	85.03				
						9-	84.03		*		
						10-	-83.03		<i>(</i>		
						11-	82.03				
						12-	-81.03				
						13-	-80.03				-
						14-	-79.03				
14 End of Borehole	.92										-
								20	40	60 80 1	00
								Shea	ar Stren	gth (kPa)	- J-
									★ Fricti	onless Vane	

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Half-Moon Bay West - Cambrian Road Ottawa, Ontario

DATUM Ground surface elevations provided by ASL.

FILE NO.

PG2246

REMARKS

HOLE NO.

RH12-12

BORINGS BY CME 55 Power Auger				D	ATE	March 2, 2012		BH12-1	2
SOIL DESCRIPTION	PLOT		SAN	IPLE		DEPTH ELEV.		Resist. Blows/0.3m 50 mm Dia. Cone	Well
	STRATA P	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m) (m)		Water Content %	Monitoring Well
GROUND SURFACE	0,			R	z	0-91.78	20	40 60 80	2
Stiff, brown SILTY CLAY , some sand		√ ss	1	21	3	1+90.78			
	70					2+89.78			
						3-88.78		*	; ; ,
						4-87.78			
						5-86.78			
Firm, grey SILTY CLAY						6-85.78		*	
- trace sand to 3.0m depth						7-84.78			
						8 - 83.78		*	
						9-82.78			;
						10-81.78			
						11-80.78		*	
12.	97					12+79.78		*	
End of Borehole								*	
							20 Shea	40 60 80 1 ar Strength (kPa) ★ Frictionless Vane	00

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation Half-Moon Bay West - Cambrian Road Ottawa, Ontario

DATUM Ground surface elevations provided by ASL.

FILE NO.

PG2246

REMARKS

HOLF NO.

BORINGS BY CME 55 Power Aug	ger					ATE	March 5, 2	2012		HOLE N	o. BH13-1	2
SOIL DESCRIPTION		PLOT		SAN	/IPLE		DEPTH (m)			Resist. Bl 50 mm Di	lows/0.3m a. Cone	g Well
		STRATA	TYPE	NUMBER	RECOVERY	N VALUE or RQD	()	(,		Water Co		Monitoring Well
GROUND SURFACE	0.00				<u> </u>	-	0-	91.94	20	40	60 80	<u></u>
PEAT	0.30											
Very loose, brown SILTY SAND with clay			∑ ss	1	12	3	1-	90.94				
	<u>1.52</u>		V 66									
			∑ ss	2	50	1	2-	89.94				
O-# OILTY OLAV									*			丨目
Soft, grey SILTY CLAY							3-	88.94	1			} 目
								07.04				丨目
							4-	87.94	*			
End of Borehole	<u>4</u> . <u>8</u> 8	<i>XX</i>							*			
End of borenole												
									20	40	60 80 10	00
									She	ear Streng	yth (kPa) onless Vane	
										A FIICUIO	niiess valie	

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Half-Moon Bay West - Cambrian Road Ottawa, Ontario

DATUM Ground surface elevations provided by ASL. FILE NO.

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REMARKS BORINGS BY CME 55 Power Auger				D	ATE	March 5, 2	2012	HOLE NO. BH14-12)
SOIL DESCRIPTION	PLOT		SAN	IPLE		DEPTH	ELEV.	Pen. Resist. Blows/0.3m • 50 mm Dia. Cone	
SOIL DESCRIPTION	STRATA P	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	Water Content %	Monitoring Well
GROUND SURFACE	ST	H	Z	REC	Z Q		00.00	20 40 60 80	80
FILL: Brown silty sand with gravel and cobbles		V 00	_				93.62		
gravel and cobbles 1.83		ss	1			1	92.02		
		∇				2-	91.62		
Stiff, brown SILTY CLAY with sand		∑ ss	2		4	3-	90.62		
3.90						4-	89.62	***************************************	
						5-	88.62	*	
						6-	87.62	*	
						7-	86.62		
Firm, grey SILTY CLAY						8-	85.62	*	
						9-	84.62	*	
						10-	83.62	*	
						11.	82.62		
11.91						''	02.02	\(\)	
End of Borehole									
								20 40 60 80 100 Shear Strength (kPa) ★ Frictionless Vane	1

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation Half-Moon Bay West - Cambrian Road Ottawa, Ontario

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REMARKS

FILE NO. **PG2246**

BORINGS BY CME 55 Power Auger				D	ATE (October 2	7, 2010			П	JLE IN	. B	H 1-10)
SOIL DESCRIPTION	PLOT		SAN	IPLE	ı	DEPTH						ows/0 a. Con		Well
	4.	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	(ntent		Monitorina Well
ROUND SURFACE	01		4	N. H.	z °	0-	93.99	2	20	40			80	2
ILL: Brown silty clay with gravel nd cobbles 1.24		SS	1	100	3		92.99		- (1 - (1 - (1 - (1 - (1 - (1 - (1 - (1					
rm, brown SILTY CLAY with sand	YX =	ss	2	33	2	2-	91.99							
2.97	4/KE	ss	3	92	6		90.99							
		SS TW	4 5	100	1		89.99							
		1 44	3	100			-88.99	· · · · · · · · · · · · · · · · · · ·						
							87.99		4					
m, grey SILTY CLAY		TW	6	100			86.99							
							85.99		*					
							84.99				7			
10.21		TW	7	100			83.99					o :		
nd of Borehole							00.99	 		1				
GWL @ 1.96m-March 3/11)														
									20	40		60	80 1	00
									Shea	ar S	treng	งบ jth (kP	a)	JU
								1	ndist		_	Remo		

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation Half-Moon Bay West - Cambrian Road Ottawa, Ontario

154 Colonnade Road South, Ottawa, Ontario K2E 7J5DATUM Ground surface elevations provided by ASL.

FILE NO.

PG2246

REMARKS

HOLE NO.

BH 2-10 BORINGS BY CME 55 Power Auger DATE October 28, 2010 **SAMPLE** Pen. Resist. Blows/0.3m Piezometer Construction STRATA PLOT **DEPTH** ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPEWater Content % 80 **GROUND SURFACE** 0+91.77Topsoil 0.30 Loose, brown SILTY SAND 0.43 1+90.772 4 4 Stiff to firm, brown SILTY CLAY 1.50 with sand 3 100 1 2+89.77 4 100 Q 3 + 88.77 4 + 87.77 5 + 86.77Firm, grey SILTY CLAY 6 + 85.775 100 7+84.77 8 + 83.77 9 + 82.776 100 <u> 10.21</u> 10 + 81.77End of Borehole 40 60 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation Half-Moon Bay West - Cambrian Road Ottawa, Ontario

154 Colonnade Road South, Ottawa, Ontario K2E 7J5DATUM Ground surface elevations provided by ASL.

FILE NO.

PG2246

BH 3-10

REMARKS

HOLE NO.

40

▲ Undisturbed

Shear Strength (kPa)

60

△ Remoulded

100

BORINGS BY CME 55 Power Auger

DATE October 28, 2010

SAMPLE Pen. Resist. Blows/0.3m Piezometer Construction STRATA PLOT **DEPTH** ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPEWater Content % 80 **GROUND SURFACE** 20 0 + 92.06Stiff to firm, brown SILTY CLAY ΑU 2 with sand and silt seams SS 1 + 91.063 83 5 SS 4 100 1 2+90.06 3 + 89.06 4 + 88.06 5 100 5 + 87.066 + 86.067+85.06 6 100 Soft to firm, grey SILTY CLAY 8 + 84.06 9 + 83.0610 + 82.0611 + 81.06 12+80.06 13 + 79.06- stiff by 13.5m depth 14 + 78.0615 + 77.067 100 O 16+76.06 16.46 End of Borehole (GWL @ 0.48m-Jan. 10/11)

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation Half-Moon Bay West - Cambrian Road Ottawa, Ontario

Ground surface elevations provided by ASL. DATUM

FILE NO.

PG2246

REMARKS

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation Half-Moon Bay West - Cambrian Road Ottawa, Ontario

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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

REMARKS

FILE NO. PG2246

BORINGS BY CME 55 Power Auger				D	ATE (October 2	9, 2010		HOLE N	o. BH 5-	10
SOIL DESCRIPTION	PLOT		SAN	IPLE	ı	DEPTH	ELEV.	1		lows/0.3m ia. Cone	Well Stion
	STRATA 1	TYPE	NUMBER	RECOVERY	N VALUE or RQD	(m)	(m)	0 W	ater Co	ntent %	Monitoring Well Construction
GROUND SURFACE	ß		z	E	z °		00.54	20	40	60 80	Ž
FILL: Brown silty clay with sand0.60		⊠ AU E AU	1 2			0-	92.51				
Stiff to firm, brown SILTY CLAY with sand		<u>∦</u> ss	3	83	21	1-	91.51				
2.10		X ss	4	92	3	2-	90.51				
						3-	89.51	<u> </u>			
		TW	5	100		4-	88.51	<u> </u>	O		
						5-	87.51				
Soft to firm, grey SILTY CLAY		TW	6	100		6-	86.51				
						7-	85.51				
						8-	84.51				
						9-	83.51				
10.21		TW	7	100		10-	-82.51		0		
End of Borehole											
(GWL @ 1.15m-March 3/11)											
								20 Shea ▲ Undist		60 80 gth (kPa) △ Remoulded	100

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Half-Moon Bay West - Cambrian Road Ottawa, Ontario

Ground surface elevations provided by ASL. **DATUM**

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FILE NO.

PG2246

REMARKS

HOLE NO.

BH 6-10 BORINGS BY CME 55 Power Auger DATE November 1, 2010 **SAMPLE** Pen. Resist. Blows/0.3m Monitoring Well Construction STRATA PLOT DEPTH ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPE Water Content % 20 80 **GROUND SURFACE** 0+91.63FILL: Compact silty sand with clay 0.20 1 1 + 90.632 92 3 Firm, brown SILTY CLAY, some sand 2.10 2+89.63 3 + 88.63 4 + 87.633 100 5 + 86.63Soft to firm, grey SILTY CLAY 6 + 85.634 100 7 + 84.63 - soft to firm by 7.5m depth 8 + 83.63 9 + 82.635 100 10+81.63 End of Borehole (GWL @ 0.86m-March 3/11) 20 40 60 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Half-Moon Bay West - Cambrian Road Ottawa, Ontario

154 Colonnade Road South, Ottawa, Ontario K2E 7J5 Ground surface elevations provided by ASL. **DATUM**

FILE NO.

Shear Strength (kPa)

△ Remoulded

▲ Undisturbed

PG2246

REMARKS

HOLE NO.

BH 7-10 BORINGS BY CME 55 Power Auger DATE November 1, 2010 **SAMPLE** Pen. Resist. Blows/0.3m Piezometer Construction STRATA PLOT **DEPTH** ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPEWater Content % 20 **GROUND SURFACE** 0 + 91.711 + 90.71SS 2 38 1 Soft, brown SILTY CLAY 2 + 89.71- grey by 1.4m depth 3 100 O 3 + 88.714 + 87.71 - firm by 4.4m depth 5 ± 86.71 6 + 85.717 + 84.71 8 + 83.719 + 82.7110+81.71 11 + 80.7112+79.71 4 100 13+78.71 14 + 77.7115 + 76.715 100 16+75.71 6 100 <u> 17.0</u>7 17 + 74.71 End of Borehole (GWL @ 4.76m-Jan. 10/11) 40 60 100

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Half-Moon Bay West - Cambrian Road Ottawa, Ontario

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REMARKS

DATUM

FILE NO. **PG2246**

STRATA PLOT	TYPE TYPE	NUMBER	* ALL SECOVERY ALL	VALUE r RQD	DEPTH (m)	ELEV. (m)		esist. Bl 0 mm Di	ows/0.3m a. Cone	heter
	≨ AU	NUMBER	% COVERY	LUE	(m)	(m)				۷ ا
	E		l ŭ	N VZ					ntent %	Piezometer
	E		A		0-	95.50	20	40	60 80	
		1								
XXX	∑ ss	2	38	15	1-	-94.50				
$\qquad \qquad $	₽	3			2-	93.50	- 0 - 1 - 0 - 1 - 0 - 1			
	Ħ	4	33	25	3-	-92 50				***************************************
	∑ ss	5	75	42						
4	∑ ss	6	92	27	4-	91.50				
	ss	7	92	4	5-	-90.50				*******
7	∑ ss	8	100	1	6-	90 50				
					0-	09.50	<u> </u>			
					7-	-88.50		<i>/</i>		
	TW	9	100		8-	-87.50				
	Γ					00.50				
					9-	86.50				
					10-	85.50	T			
	Tw	10	100		11-	-84 50		<u> </u>		
					12-	83.50				
					13-	82.50				
	■ ⊤\∧/	11	100		1.1-	- 91 50				
8	1 00	' '	100		14	01.50				
							20 Chas			100
	7	SS SS SS TW	SS 4 SS 5 SS 6 SS 7 SS 8 TW 9	SS 4 33 SS 5 75 SS 6 92 SS 7 92 SS 8 100 TW 9 100 TW 10 100	SS 4 33 25 SS 5 75 42 SS 6 92 27 SS 7 92 4 SS 8 100 1 TW 9 100 TW 10 100	SS 4 33 25 3-4	SS 4 33 25 3-92.50 SS 5 75 42 4-91.50 SS 7 92 4 5-90.50 TW 9 100 8-87.50 9-86.50 10-85.50 11-84.50 12-83.50 13-82.50 TW 11 100 14-81.50	SS 4 33 25 3-92.50 42 4-91.50 5-90.50 7-88.50	SS 4 33 25 3-92.50 SS 5 75 42 4-91.50 SS 7 92 4 5-90.50 7-88.50 7-88.50 9-86.50 10-85.50 11-84.50 12-83.50 13-82.50 14-81.50	SS

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SOIL PROFILE AND TEST DATA

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FILE NO.

PG2246

REMARKS

BORINGS BY CME 55 Power Auger				D	ATE	Novembe	r 16, 2010	0 BH 9-10
SOIL DESCRIPTION	PLOT		SAN	IPLE	I	DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ◆ 50 mm Dia. Cone
	STRATA	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(111)	(111)	Pen. Resist. Blows/0.3m
GROUND SURFACE	XXX	φ <u>ς</u>		A		0-	94.47	20 40 60 80
FILL: Brown silty clay with sand		₿AU	1				00.47	
FILL: Brown silty sand with clay,		∑ss	2	62	40		93.47 92.47	
trace gravel							01.47	
3.58 Firm to stiff, brown SILTY CLAY with sand		∑ss ∑ss	3 4	75 92	20 8		91.47	
						_	90.47	
5.20						5-	89.47	
		TW	5	100		6-	88.47	
		1 00	3	100		7-	87.47	
						8-	86.47	
						9-	85.47	1
Soft to firm, grey SILTY CLAY						10-	84.47	
Solitio IIIIII, grey SIETT CEAT						11-	83.47	1
						12-	82.47	
		TW	6	100			81.47	
						14-	80.47	
						15-	79.47	
						16-	78.47	
- stiff by 16.6m depth						17-	77.47	
						18-	76.47	
GLACIAL TILL: Stiff, grey silty clay9.35 with sand, gravel, cobbles and		TW	7	100		19-	-75.47	
boulders End of Borehole	<u> </u>							
(GWL @ 0.68m-Jan. 10/11)								
								20 40 60 80 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

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REMARKS

BORINGS BY CME 55 Power Auger			0	DATE	Novembe	r 12, 201()	HOLE N	o. BH10	-10
SOIL DESCRIPTION	PLOT	SAN	/IPLE		DEPTH (m)	ELEV.			lows/0.3m ia. Cone	ia Well
	STRATA	NUMBER	% RECOVERY	N VALUE or RQD	(,	()	0 V	Vater Co	ntent %	 Monitoring Well
GROUND SURFACE	ν .	Z	R	z °	0-	93.85	20	40	60 80	Σ
FILL: Brown silty sand with clay						92.85				
1.83 FILL: Grey silty clay 2.13 Firm, brown SILTY CLAY with some.44	S S		100	3 W		91.85				
and	TΛ		100		3-	90.85	-0.000000000000000000000000000000000000			
					4-	89.85	<u> </u>			
						88.85				
irm, grey SILTY CLAY	TΛ	V 4	100			-87.85 -86.85				
						85.85				
	Tτ	V 5	100		9-	84.85				
10.21		V	100		10-	83.85				
End of Borehole GWL @ 1.15m-March 3/11)										
							20 Shea ▲ Undist	ar Strenç	60 80 gth (kPa) △ Remoulded	100

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SOIL PROFILE AND TEST DATA

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REMARKS							10.001	_	HOLI	E NO.	RH	111-	10
BORINGS BY CME 55 Power Auger	PLOT		SAN	IPLE	ATE I	November DEPTH	r 12, 2010 	Pen. Re			ws/0.	3m	
SOIL DESCRIPTION	STRATA PI	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)		0 mm /ater				Piezometer
GROUND SURFACE	SI	L	DN.	REC	NO		93.69	20	40	60	8	30	
FILL: Brown silty sand with clay,		00		40			93.69						
gravel, cobbles and boulders		SS SS	1 2	42 12	20 13								
2.21 Firm, brown SILTY CLAY , some 2.72 sand		SS	3	90	1		91.69						
dilu 		TW	4	100			90.69						
							89.69	^					
						5-	88.69						
						6-	-87.69						
						7-	86.69						
oft to firm, grey SILTY CLAY						8-	85.69	1					
, g.o, c		ltw	5	100		9-	84.69						
		' ' '	J	100		10-	83.69						
						11-	82.69						
						12-	81.69						
		TW	6	100		13-	80.69			0			
stiff by 13.6m depth						14-	79.69						
1 <u>4.78</u> End of Borehole													
GWL @ 1.20m-Jan. 10/11)													
,													
								20	40	60			100
								Shea ▲ Undist	r Stre	engtl		a)	

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SOIL PROFILE AND TEST DATA

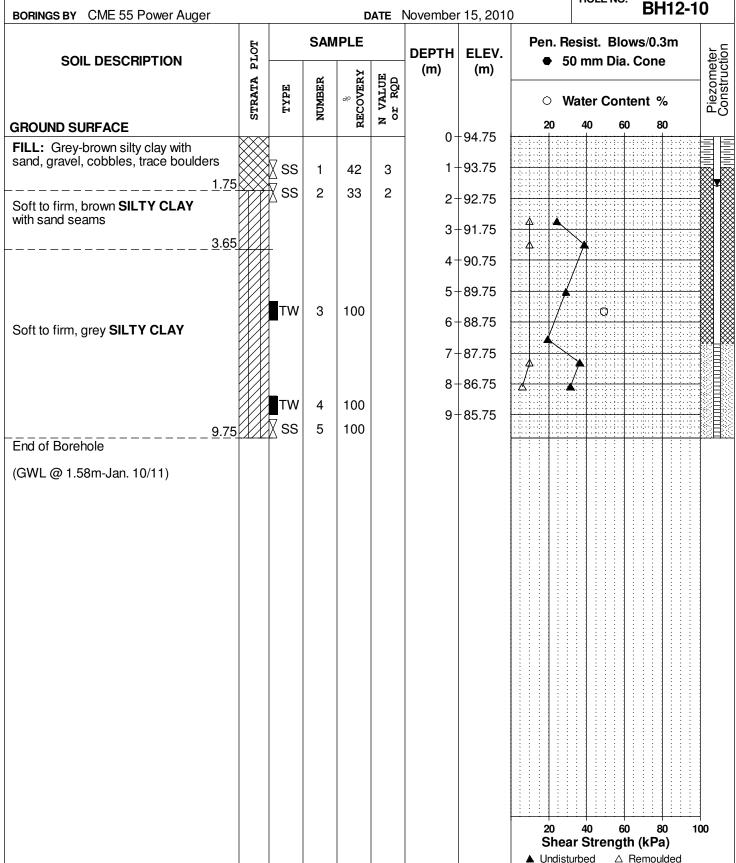
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REMARKS

FILE NO. PG2246

BORINGS BY CME 55 Power Auger			D	ATE	Novembe	r 15, 201	0	HOLE NO.	BH13-1	10
SOIL DESCRIPTION		SAM	PLE		DEPTH	ELEV.		esist. Blo 0 mm Dia		ster stion
STRATA		NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)		Vater Con		Piezometer Construction
GROUND SURFACE	1	z	Æ	z °		00.14	20	40 60	0 80	
FULL Durant all the allowable and	∭ ss	1	42	2] 0-	93.14				
FILL: Brown silty clay with sand, gravel and cobbles, trace boulders	∭ ss	2	12	1	1-	92.14				
2.10	∭ ss	3	33	3	2-	91.14				
Firm to soft, brown SILTY CLAY with sand 2.97	ss	4	92	8		00.14				
	ss	5	100	2	3-	90.14				
	ss	6	100	W	4-	89.14				
					5-	88.14	A			
Firm, grey SILTY CLAY with sand					6-	87.14				
					7-	-86.14			· · · · · · · · · · · · · · · · · · ·	
						85.14	Δ	^		
						84.14				
End of Borehole	ss	7	100		9	04.14				
(GWL @ 1.65m-Jan. 10/11)										
							20 Shee	40 60 ar Strengt) 80 1 b (kPa)	⊣ 100
							▲ Undist		Remoulded	

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SOIL PROFILE AND TEST DATA

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REMARKS

DATUM

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FILE NO. PG2246

BORINGS BY CME 55 Power Auger					ATE	Novembe	r 16, 201	0	HOLE	NO. BH	1 14-10
SOIL DESCRIPTION	PLOT		SAN	IPLE	1	DEPTH	ELEV.	1		Blows/0. Dia. Con	3m eter
	STRATA	TYPE	NUMBER	RECOVERY	N VALUE or RQD	(m)	(m)	0 V	/ater C	ontent s	e e Piezometer Construction
GROUND SURFACE		\ <u>00</u>		''		0-	92.80	20	40	60 8	80
FILL: Brown silty sand with gravel, cobbles, boulders, some clay		⊠ ss ⊠ ss	1 2	67 29	50+ 50+		91.80				
<u>2.0</u> 6		ss	3	75	9	2-	90.80				
Firm to soft, brown SILTY CLAY	1/1/ // .	ss	4	90	w		90.60				
with sand						3-	89.80				
						4-	88.80				
		TW	5			5-	87.80				
		ss	6	100			00.00				
							-86.80				
Soft to firm, grey SILTY CLAY							85.80 84.80				
							83.80				
		TW	7			9	63.60				
		Γ				10-	82.80				
						11-	81.80				
						12-	80.80				
13.26		TW	8			13-	79.80				
End of Borehole											
(GWL @ 1.18m-Jan. 10/11)								20	40	60 8	30 100
								Shea	ır Strei	ngth (kPa	a)
								▲ Undist	urbed	△ Remou	ılded

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Half-Moon Bay West - Cambrian Road Ottawa, Ontario

Ground surface elevations provided by ASL. DATUM

FILE NO.

HOLE NO.

PG2246

REMARKS

BORINGS BY CME 55 Power Auger				DATE	Novembe	r 17, 201	0	HOLE NO	[*] BH15-	·10
SOIL DESCRIPTION	PLOT	SAN	IPLE		DEPTH	ELEV.		esist. Bl	ows/0.3m a. Cone	eter
	STRATA I	NUMBER	* RECOVERY	N VALUE or RQD	(m)	(m)	○ V	/ater Cor	ntent %	Piezometer
ROUND SURFACE	σ	Z	RE	z °	0-	92.61	20	40 6	80 80	
FILL: Brown silty sand with clay										
1.00	S:		60	12	1-	91.61				
Soft, brown SILTY CLAY	S:		44	4	2-	90.61				
2.90	X S	3	78	W	3-	89.61				
							4			
						88.61	A	*		
					5-	87.61				
	∎тv	V 4	100		6-	86.61				
THE ALL PARTY OF AV	- I V	V 4	100		7-	85.61		00		
irm to stiff, grey SILTY CLAY						84.61				
	∎тv	v 5	100		9-	83.61	1			
					10-	82.61				
					11-	81.61				
					12-	80.61	1			
13.56					13-	79.61		<u> </u>		
ACIAL TILL: Grey silty clay with 3.70 and, gravel, cobbles and boulders	1									
nd of Borehole										
GWL @ 1.59m-Jan. 10/11)										
							20 Shea	r Streng	60 80 th (kPa) Remoulded	100

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Consulting Engineers **SOIL PROFILE AND TEST DATA**

40

▲ Undisturbed

Shear Strength (kPa)

60

△ Remoulded

100

Geotechnical Investigation Half-Moon Bay West - Cambrian Road 154 Colonnade Road South, Ottawa, Ontario K2E 7J5 Ottawa, Ontario DATUM Ground surface elevations provided by ASL. FILE NO. **PG2246 REMARKS** HOLE NO. **BH16-10 BORINGS BY** CME 75 Power Auger DATE February 11, 2011 **SAMPLE** Pen. Resist. Blows/0.3m Piezometer Construction STRATA PLOT DEPTH ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPEWater Content % 80 **GROUND SURFACE** 20 FILL: Brown silty sand with gravel, 0.60 0 + 92.70ΑU 2 cobbles, trace boulders and clay 1 + 91.70SS 3 75 2 Very Toose, brown SILTY SAND, 1.45 ∖trace clay 4 92 2 2.21 2+90.70 Brown SILTY CLAY with sand seams 3+89.70 100 5 4 + 88.70 Firm, grey SILTY CLAY 5 + 87.706 + 86.707 + 85.70 End of Borehole

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Half-Moon Bay West - Cambrian Road Ottawa, Ontario

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

Ground surface elevations provided by ASL.

FILE NO.

PG2246

REMARKS

DATUM

HOLE NO.

RH17-10

ORINGS BY CME 75 Power Auger					ATE	February ¹	11, 2011	1				BH	17-1	U
SOIL DESCRIPTION	PLOT		SAN	/IPLE	ı	DEPTH	ELEV.	Pen	. Res			s/0.3 Cone		eter
	STRATA E	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	0				nt %		Piezometer
ROUND SURFACE	S.		¥	REC	ZÖ			20)	40	60	80)	1
ILL: Brown silty sand with gravel nd cobbles, trace boulders and clay		Ø AU Ø AU	1 2	0.5			92.63 91.63							
rown SILTY CLAY with sand	5	X ss	3 4	25 42	3 2		90.63							
eams 2.2							-89.63	Δ	<u></u>					
off array CIL TV CL AV		TW	5	100			88.63		/					
oft, grey SILTY CLAY		TW	6	100			87.63							
6.5						6-	86.63)					
and of Borehole		1												
								20) hear	40 Stro	60	80 (kBa	1	00
		1			1	I .	İ	. 5	near	ວເre	nath	ıĸPa)	

patersongroup

Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Half-Moon Bay West - Cambrian Road Ottawa, Ontario

DATUM Ground surface elevations provided by ASL.

REMARKS

FILE NO.

PG2246

HOLE NO.

PULCE 10

BH18-10 BORINGS BY CME 75 Power Auger DATE February 14, 2011 **SAMPLE** Pen. Resist. Blows/0.3m Monitoring Well Construction STRATA PLOT DEPTH ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPEWater Content % 80 **GROUND SURFACE** 20 0 + 94.08FILL: Brown silty sand with gravel ΑU 2 and cobbles, trace clay and boulders 1 + 93.08SS 3 100 8 1.83 SS 4 42 2 2+92.08 Stiff, brown SILTY CLAY with sand seams 2.90 3+91.08 4 + 90.085 100 5 + 89.08Soft to firm, grey SILTY CLAY 6 + 88.087 + 87.08 6 100 8+86.08 9 + 85.08End of Borehole 20 40 60 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Half-Moon Bay West - Cambrian Road Ottawa, Ontario

154 Colonnade Road South, Ottawa, Ontario K2E 7J5 Ground surface elevations provided by ASL. DATUM

REMARKS

PG2246

FILE NO.

HOLE NO.

BORINGS BY CME 75 Power Auger				D	ATE	February ⁻	15, 2011	HOLE NO. BH19-10
SOIL DESCRIPTION	PLOT		SAN	IPLE		DEPTH		Pen. Resist. Blows/0.3m ■ 50 mm Dia. Cone
	STRATA	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	Pen. Resist. Blows/0.3m ■ 50 mm Dia. Cone ○ Water Content %
GROUND SURFACE	XXX	S AU	1	<u> </u>		0-	93.85	20 40 60 80
FILL: Brown silty sand with gravel 0.60		AU SS	2 3	62	6		92.85	
Very stiff, brown SILTY CLAY with sand		ss	4	100	7	2-	91.85	
<u>2.90</u>		_				3-	90.85	
		TW	5	100		4-	89.85	
						5-	-88.85	
Firm, grey SILTY CLAY		TW	6	100		6-	87.85	
illii, grey Sici i CLAI							86.85	A
							85.85	
							84.85 83.85	
							82.85	
		TW	7	100			81.85	1
							80.85	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
						14-	79.85	
						15-	78.85	
stiff by 15.7m depth						16-	77.85	
17.22 End of Borehole		<u> </u>				17-	76.85	
THE OF DOTATIONS								
								20 40 60 80 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Half-Moon Bay West - Cambrian Road Ottawa, Ontario

Ground surface elevations provided by ASL. DATUM

FILE NO.

PG2246

REMARKS BORINGS BY CME 75 Power Auger				г	ATE	February 1	6 2011		HOLE	NO.	BH20-	10
SOIL DESCRIPTION	PLOT		SAN	IPLE		DEPTH	ELEV.	Pen. Re	esist. 0 mm			ter
COL DECOM HON	STRATA P	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)		/ater C			Piezometer Construction
GROUND SURFACE	Į.		N	REC	zö		94.58	20	40	60	80	
FILL: Brown silty snd with gravel and cobbles, trace clay and boulders		AU AU SS SS	1 2 4 3	50 75	18 13	1-	93.58					
2.74		≖ SS	5	67	50+	2+	92.58					
Compact, brown SILTY SAND 3.35	T 1 T.	ss	6	70	14	3+	91.58				······································	
Stiff, brown SILTY CLAY with sand and sand seams 4.42						4-	90.58	<u> </u>				
						5+	89.58	4				
		TW	7	100		6+	88.58		Q			
						7+	87.58	 				
							86.58					
		TW	8	100								
							85.58		X			
Firm, grey SILTY CLAY						10+	84.58					
						11+	83.58		\			
						12	82.58					
						13	81.58					
						14	80.58					
		TW	9	100		15+	79.58		1			
							78.58		\			
<u>16.46</u> End of Borehole							10.00					
								20 Shea	40 ir Stre	60 ngth (1		100
								▲ Undistu			moulded	

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

Geotechnical Investigation Half-Moon Bay West - Cambrian Road Ottawa, Ontario

SOIL PROFILE AND TEST DATA

DATUM

Ground surface elevations provided by ASL.

REMARKS

PG2246

FILE NO.

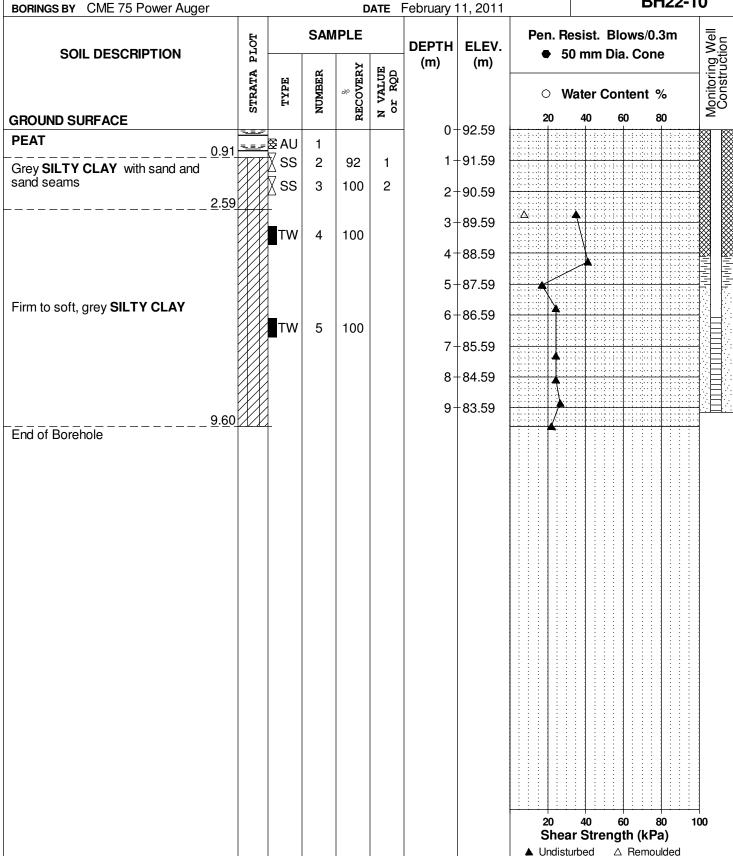
BORINGS BY CME 75 Power Auger			D	ATE	February ⁻	16, 2011		HOLE	INU.	BH21-1	0
SOIL DESCRIPTION		SAN	IPLE	I	DEPTH		Pen. R		Blows Dia. C		Well Chick
	I	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	○ V	Vater (Conter	nt %	Monitoring Well
GROUND SURFACE	·	Z	RE	z °		94.56	20	40	60	80	Σ
TFILL: Brown silty sand with clay and 30	AU AU SS	1 2 3	83	1		93.56					
FILL: Brown silty clay, trace sand	ss		42	1		92.56					
and gravel		5	90	3	3-	91.56					
Brown SILTY SAND , trace clay					4-	90.56			<u> </u>		
Stiff, brown SILTY CLAY, trace 5.18					5-	89.56	4				
	TW	6	100			88.56		<i>*</i>			
						87.56					
Firm, grey SILTY CLAY						86.56 85.56					
	TW	7	100			84.56					
						83.56					
10.05					12-	82.56		\			
End of Borehole	44							*			
(GWL @ 1.96m-March 3/11)											
									60 ength (kPa)	100
							▲ Undist	urbed	△ Re	moulded	

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Half-Moon Bay West - Cambrian Road Ottawa, Ontario

Ground surface elevations provided by ASL. DATUM FILE NO. **PG2246 REMARKS** HOLE NO. **BH22-10**



SOIL PROFILE AND TEST DATA

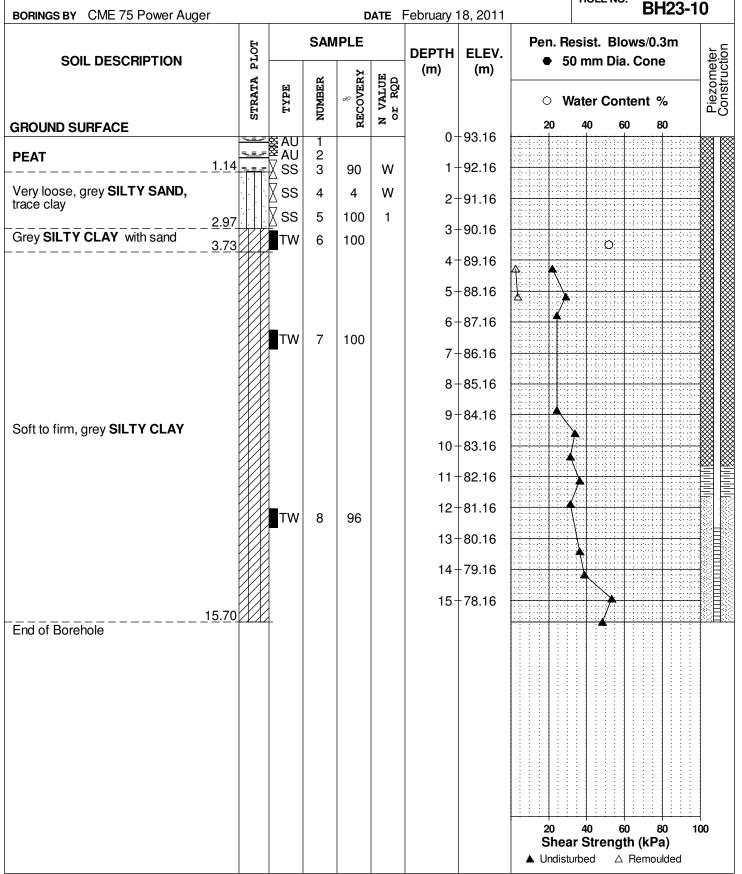
Geotechnical Investigation Half-Moon Bay West - Cambrian Road Ottawa, Ontario

154 Colonnade Road South, Ottawa, Ontario K2E 7J5 Ground surface elevations provided by ASL. **DATUM**

FILE NO.

PG2246

REMARKS



SOIL PROFILE AND TEST DATA

Geotechnical Investigation Half-Moon Bay West - Cambrian Road Ottawa, Ontario

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

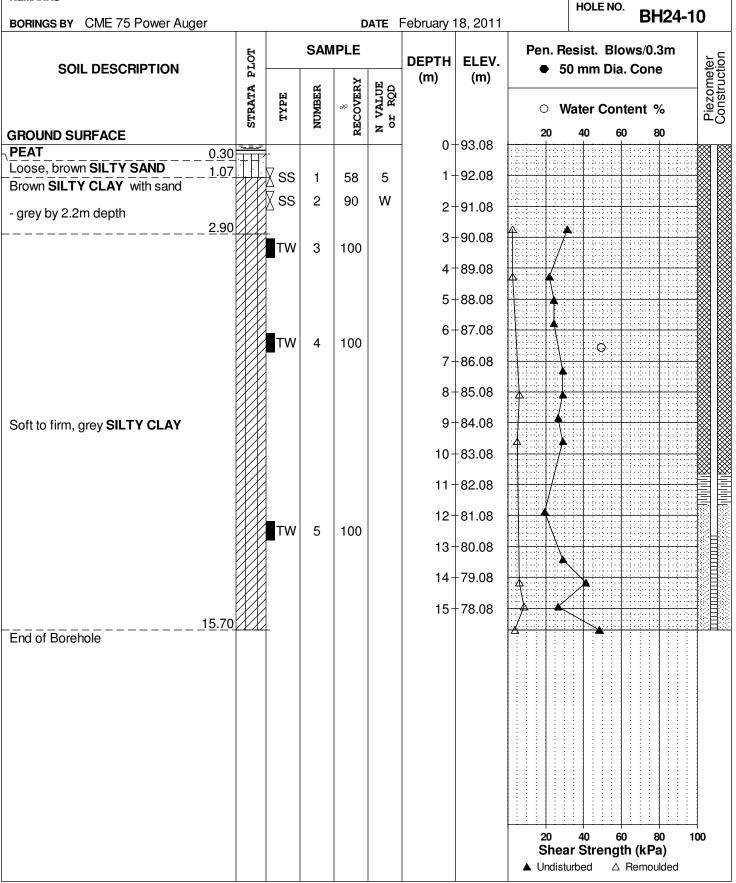
Ground surface elevations provided by ASL.

REMARKS

DATUM

PG2246

FILE NO.



154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

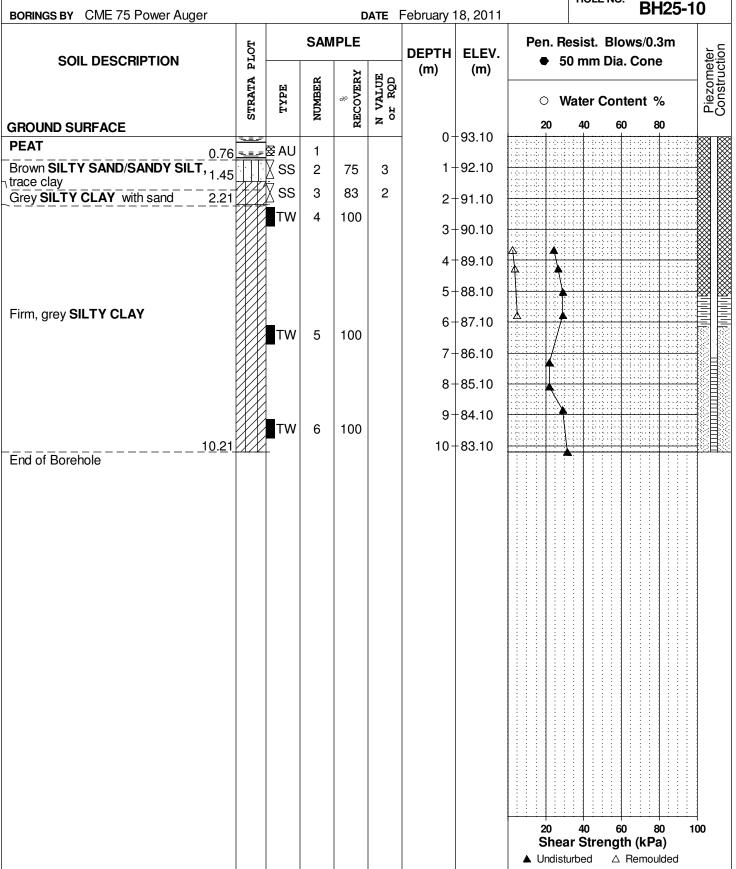
Geotechnical Investigation Half-Moon Bay West - Cambrian Road Ottawa, Ontario

Ground surface elevations provided by ASL. **DATUM**

FILE NO.

PG2246

REMARKS



Geotechnical Investigation Half-Moon Bay West - Cambrian Road Ottawa, Ontario

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

Ground surface elevations provided by ASL.

DATUM

REMARKS

FILE NO.

SOIL PROFILE AND TEST DATA

PG2246

BORINGS BY CME 75 Power Auger				D	ATE	February 2	24, 2011		HOLI	E NO.	BH26-	10
SOIL DESCRIPTION	PLOT		SAN	IPLE		DEPTH (m)	ELEV. (m)	1		Blows		eter
	STRATA	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(111)	(111)	0 V	Vater (Conten	nt %	Piezometer
GROUND SURFACE	···	DC		Z	Z	0-	93.67	20	40	60	80	- XXI P
FILL: Brown silty sand with clay, 0.69 gravel and cobbles 1.07		⊗ AU	1									
Brown Sili Y Sand with gravel,	YXXX	∦ ss	2	29	2	'-	92.67			3.1		
cobbles and clay Firm, grey SILTY CLAY with sand 2.21		SS	3	75	2	2-	91.67					
		TW	4	79		3-	90.67					
		TW	5	100		4-	89.67	A :				
						5-	88.67					
						6-	87.67					
						7-	86.67					
						8-	85.67		A			
Soft to firm, grey SILTY CLAY		TW	6	100		9-	84.67		(
						10-	83.67					
						11-	82.67					
						12-	81.67					
						13-	80.67		1			
						14-	79.67		A			
		TW	7	100		15-	78.67					
16.46						16-	77.67	4)			
End of Borehole		_						<u> </u>				
								20 Shea	40 ar Stre	60 ength (l	80 kPa)	100
								▲ Undist			moulded	

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Half-Moon Bay West - Cambrian Road Ottawa, Ontario

DATUM Ground surface elevations provided by ASL. FILE NO. **PG2246 REMARKS** HOLF NO.

BORINGS BY CME 55 Power Auger			Г	ATE	February 2	23. 2011		HOLE NO	D. BH27-	10
SOIL DESCRIPTION	PLOT	SAN	/IPLE		DEPTH (m)	ELEV.		lesist. Bl	ows/0.3m a. Cone	eter
	STRATA 1	NUMBER	RECOVERY	N VALUE or RQD	(111)	(m)	0 N	Vater Co	ntent %	Piezometer
GROUND SURFACE	-		R	z °		93.34	20	40	60 80	
1.14	===	1 2 3	92	2		93.34				
Firm, brown SILTY CLAY with sand and sand seams					2-	91.34	<u> </u>			
grey by 1.5m depth 2.97	TW	4	21		3-	90.34				
					4-	89.34				
Firm, grey SILTY CLAY	∎тw	5	62			88.34				
iiii, giey Sici i CLAi						87.34		A .		
						-86.34 -85.34				
8.99 End of Borehole						05.54				
							20 Shea	ar Streng		100

Geotechnical Investigation Half-Moon Bay West - Cambrian Road

SOIL PROFILE AND TEST DATA

154 Colonnade Road South, Ottawa, Ontario K2E 7J5 Ottawa, Ontario Ground surface elevations provided by ASL. DATUM FILE NO. **PG2246 REMARKS** HOLE NO. **BH27A-10 BORINGS BY** CME 55 Power Auger DATE February 23, 2011 **SAMPLE** Pen. Resist. Blows/0.3m Piezometer Construction STRATA PLOT DEPTH ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPE Water Content % 20 80 **GROUND SURFACE** 0+93.311 + 92.31**OVERBURDEN** 2+91.31 2.29 1 100 Firm, grey SILTY CLAY 3+90.31 End of Borehole 60 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Half-Moon Bay West - Cambrian Road Ottawa, Ontario

Ground surface elevations provided by ASL. DATUM

FILE NO.

HOLE NO.

PG2246

REMARKS

BORINGS BY CME 55 Power Auger					ATE	February 2	25, 2011	BH28-10
SOIL DESCRIPTION	PLOT		SAN	IPLE	1	DEPTH	ELEV.	Pen. Resist. Blows/0.3m • 50 mm Dia. Cone
	STRATA E	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	Pen. Hesist. Blows/0.3m ◆ 50 mm Dia. Cone ○ Water Content %
GROUND SURFACE	~~	≨ AU	1	22	z °	0-	93.05	20 40 60 80
FILL: Brown silty sand with clay and gravel		Ž AU SS	2	83	42		92.05	
1.90 Compact to loose, brown SILTY		∑ ss	4	75	23	2-	91.05	
SAND, trace clay 2.95		ss	5	75	6	3-	90.05	
		TW	6	83			89.05	
						5-	88.05	A
		TW	7	100		6-	87.05	
						7-	86.05	
oft to firm, grey SILTY CLAY						8-	85.05	
						9-	84.05)
						10-	83.05	A S S S S S S S S S S
						11-	82.05	<u> </u>
		-		400		12-	81.05	
13.26		TW	8	100		13-	80.05	
end of Borehole								
GWL @ 1.56m-March 3/11)								
								20 40 60 80 100
								Shear Strength (kPa)
								▲ Undisturbed △ Remoulded

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Consulting Engineers

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

Ground surface elevation at borehole locations provided by JD Barnes.

REMARKS

DATUM

PG1618

FILE NO.

REMARKS BORINGS BY CME 55 Power Auger			Г	ATE 2	25 March	2008	HOLE NO. BH10-08
	PLOT	SAI	MPLE		DEPTH	ELEV.	Pen. Resist. Blows/0.3m
SOIL DESCRIPTION	STRATA PI	NUMBER	RECOVERY	N VALUE or RQD	(m)	(m)	Pen. Resist. Blows/0.3m ■ 50 mm Dia. Cone □ Water Content %
GROUND SURFACE	SI	N	REC	N			20 40 60 80
Firm brown CLAYEY SILT , some sand	Æ Al		100	5		-92.34 -91.34	
Stiff, brown SILTY CLAY	S:	3			2-	-90.34	***
-firm to stiff and grey by 2.4m depth	S	S 5	13	1		-89.34 -88.34	
<u>5</u> .33	ти	V 4				-87.34	
GLACIAL TILL: Very loose to compact grey silty clay with gravel 6.71	^^^^^ ^^^^ ^^^^		13 83	1 14	6-	-86.34	
End of Borehole							
(GWL @ 0.65m-Apr. 9/08)							20 40 60 80 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

Consulting Engineers

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7 DATUM

Ground surface elevation at borehole locations provided by JD Barnes.

FILE NO. **PG1618**

REMARKS

BORINGS BY CME 55 Power Auger				D	ATE 2	20 March 2008		BH11-0	B
SOIL DESCRIPTION	PLOT		SAN	IPLE	Ι	DEPTH ELEV.		desist. Blows/0.3m 0 mm Dia. Cone	eter
	STRATA I	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m) (m)		Vater Content % 40 60 80	Piezometer Construction
GROUND SURFACE FILL: Brown silty sand with gravel 0	.61	⊠ AU	1			0+92.25			
Very soft to soft, brown SILTY CLAY		ss	2	83	2	1-91.25			
firm to stiff and grey by 1.5m depth		SS	3	100	1	2-90.25			
		TW	4			3-89.25	<u> </u>		
						4-88.25			
						5-87.25	· · · · · · · · · · · · · · · · · · ·		
						6-86.25	· · · · · · · · · · · · · · · · · · ·		
						7-85.25	· · · · · · · · · · · · · · · · · · ·		
						8-84.25			
9	.55					9-83.25			
nd of Borehole Surficial water surrounding							4		-3-12-E
orehole - April 9/08)									
							20	40 60 80 10	0
								ar Strength (kPa)	•

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

Consulting Engineers

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

DATUM

Ground surface elevation at borehole locations provided by JD Barnes.

FILE NO.

HOLE NO.

REMARKS

PG1618

BORINGS BY CMF 55 Power Auger

BH12-08

BORINGS BY CME 55 Power Auger				D	ATE 2	BH12-08		
SOIL DESCRIPTION	PLOT		SAN	IPLE		DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ■ 50 mm Dia. Cone
	STRATA	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(111)	(,	Pen. Resist. Blows/0.3m ■ 50 mm Dia. Cone □ Water Content %
GROUND SURFACE	52		4	R	zö	0-	92.36	20 40 60 80
FILL: Brown silty sand with gravel		AU	1					
		SS S	2	17	6	1-	91.36	
Soft to firm, brown SILTY CLAY		SS	3	100	2	2-	90.36	
- grey by 2.7m depth						3-	89.36	
						4-	-88.36	
		TW	4	100		5-	87.36	
		TW	5	100		6-	86.36	
						7-	-85.36	
						8-	-84.36	
9.55						9-	83.36	
<u>9.5</u> c End of Borehole	עעע	1						
(GWL @ 3.65m - April 9/08)								20 40 60 80 100
								Shear Strength (kPa) ▲ Undisturbed △ Remoulded

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

Consulting Engineers

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

DATUM

Ground surface elevation at borehole locations provided by JD Barnes.

FILE NO.

HOLE NO.

PG1618

REMARKS

BH13-08

BORINGS BY CME 55 Power Auger				D	ATE 2	24 March	2008		BH 13-0	0
SOIL DESCRIPTION	PLOT		SAN	IPLE		DEPTH (m)	ELEV. (m)		desist. Blows/0.3m 0 mm Dia. Cone	eter ction
	STRATA	TYPE	NUMBER	* RECOVERY	N VALUE or RQD	(111)	(111)	0 V	Vater Content %	Piezometer Construction
GROUND SURFACE	"		_	X	zö		05.00	20	40 60 80	
FILL: Brown silty sand with gravel		⊠ AU	1				-95.20			
gravoi		S AU	1				-94.20			
							-93.20			
3.96		ss	2	42	10	3-	-92.20			
Firm to stiff brown SILTY CLAY		ss	3	67	4		-91.20			
- soft to firm and grey by 5.3m depth							-90.20			
		TW	4	100			-89.20			
						7-	-88.20		4	<u> </u>
						8-	-87.20			
		TW	4	83		9-	-86.20			
						10-	-85.20	4	•	
						11-	-84.20			
12.65						12-	-83.20			
End of Borehole (GWL @ 7.60m - April 9/08)										
								20 She ▲ Undist	ar Strength (kPa)	00

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

Consulting Engineers

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

DATUM Ground surface elevation at borehole locations provided by JD Barnes.

REMARKS

FILE NO. **PG1618**

HOLE NO.

BH14-08

BORINGS BY CME 55 Power Auger				D	ATE 2	25 March 20	800		BH14-0	<u> </u>
SOIL DESCRIPTION	PLOT		SAN	IPLE	1	- I	ELEV.		Resist. Blows/0.3m 50 mm Dia. Cone	eter Stion
	STRATA 1	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	0 \	Nater Content %	Piezometer Construction
GROUND SURFACE	"		_	22	Z		95.87	20	40 60 80	
FILL: Prown cilty cond with		⊠ AU	1				94.87			
FILL: Brown silty sand with gravel and clay						2-9	93.87			
		⊠ AU	2			3-9	92.87			
4.27	,	ss	3	75	18	4-9	91.87			
Stiff to firm, brown SILTY CLAY		ss	4	83	3	5-9	90.87			
- firm and grey by 5.6m depth						6-8	39.87	Δ:		
		TW	5	0		7-8	38.87			
		TW	6	100		8-8	37.87			
						9-8	36.87			
						10-8	35.87			
		TW	7	75		11-8	34.87			
						12-8	33.87			
						13-8	32.87	<u></u>		
(52 & 5.52 pin 6/50)							•	20 She	ear Strength (kPa)	1 00

Consulting Engineers

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

Ottawa, Ontario Ground surface elevation at borehole locations provided by JD Barnes.

REMARKS

DATUM

PG1618 HOLE NO.

FILE NO.

BORINGS BY CME 55 Power Auger				D	ATE 2	20 March	2008	_	HOLE NO	BH1	5-08
SOIL DESCRIPTION	PLOT		SAN	IPLE	I	DEPTH	ELEV.		esist. Bl	ows/0.3m a. Cone	eter
	STRATA 1	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)		ater Cor		Piezometer Construction
GROUND SURFACE						0-	-93.28	20	40 (60 80	;;;
FILL: Brown silty sand with gravel, cobbles and boulders			2	75	23	1-	-92.28				
Stiff, brown SILTY CLAY		ss	3	50	13	2-	-91.28				
- firm to stiff and grey by 2.1m depth		ss	4	50	1	3-	-90.28				
		TW	5	100			-89.28				<u></u>
			_				-88.28 -87.28				
		TW	6	100		7-	-86.28				
						8-	-85.28	X	***		
9.55	5					9-	-84.28				
End of Borehole											
(GWL @ 4.43m-Apr. 9/08)								20	40	60 80	100
								Shea A Undistu	r Streng	th (kPa) Remoulded	

Consulting Engineers

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7 DATUM

Ground surface elevation at borehole locations provided by JD Barnes.

FILE NO.

HOLE NO.

PG1618

REMARKS

BORINGS BY CME 55 Power Auger				D	ATE 2	20 March 20	800		BH16-08	3
SOIL DESCRIPTION	PLOT		SAN	/IPLE	ı	- 1	ELEV.		esist. Blows/0.3m) mm Dia. Cone	ster tion
GROUND SURFACE	STRATA F	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)		/ater Content %	Piezometer Construction
FILL: Brown silty sand with).61	⊠ AU	1			0+9	2.16			
Brown SILTY CLAY		ss	2	67	3	1-9	1.16			¥
- grey by 1.7m depth		ss	3			2-9	0.16			
							39.16			
		TW	4	100			38.16 37.16			
		TW	5	100		6-8	86.16	A : : : : : : : : : : : : : : : : : : :		
							35.16			
							34.16	4		
End of Borehole).55					9+8	33.16			
(GWL @ 1.10m-Apr. 9/08)										
								20 Shea ▲ Undistu	40 60 80 100 ar Strength (kPa) urbed △ Remoulded)

Consulting Engineers

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

Ground surface elevation at borehole locations provided by JD Barnes.

FILE NO.

HOLE NO.

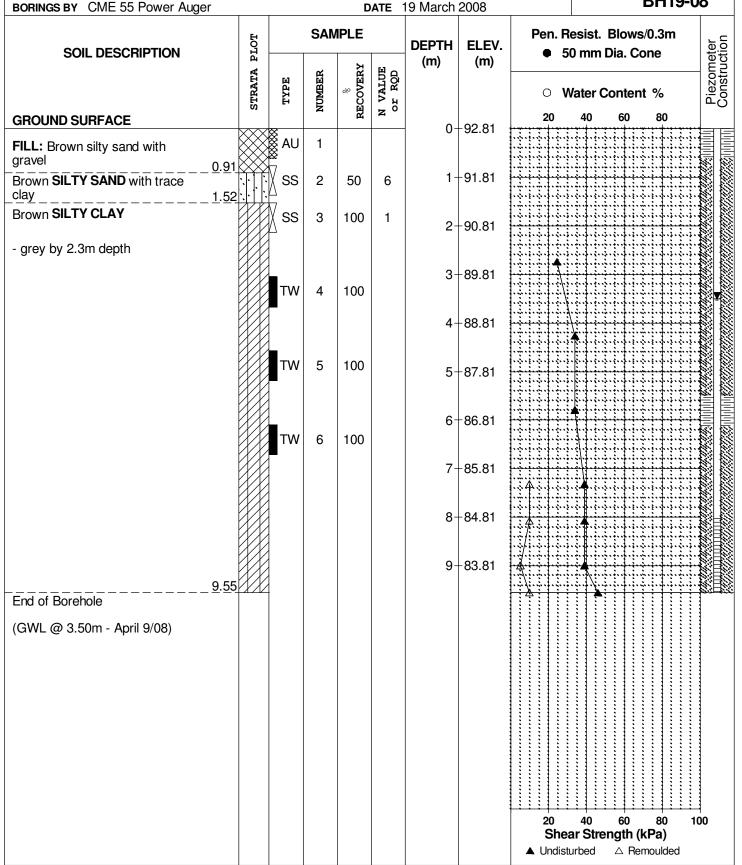
REMARKS

DATUM

PG1618

DATE 19 March 2008

BH19-08



Consulting Engineers

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

Ground surface elevation at borehole locations provided by JD Barnes.

FILE NO.

HOLE NO.

PG1618

REMARKS

DATUM

BORINGS BY CME 55 Power Auger

DATE 18 March 2008

BH20-08

BORINGS BY CME 55 Power Auger	, , , , , , , , , , , , , , , , , , , ,				ATE	18 March	2008	Di 120-00
SOIL DESCRIPTION	PLOT		SAN	IPLE	1	DEPTH	ELEV.	Pen. Resist. Blows/0.3m ■ 50 mm Dia. Cone
	STRATA E	TYPE	NUMBER	* RECOVERY	N VALUE or RQD	(m)	(m)	O Water Content %
GROUND SURFACE				н.		0-	94.05	20 40 60 80
FILL: Brown silty sand with gravel		AU SS	1 2	0	+50	1-	93.05	
	2.13	ss	3	33	6	2-	-92.05	
Brown SILTY SAND	3.05	ss ss	4 5	50	17	3-	91.05	
Brown SILTY CLAY - grey by 4.0m depth) 	J	100	4	4-	90.05	
- grey by 4.om depm						5-	-89.05	
		TW	6	100		6-	-88.05	
						7-	87.05	
		TW	7	50		8-	86.05	
	9.55					9-	-85.05	
End of Borehole	<u>5.55</u> ////							
(GWL @ 6.45m - April 9/08)								
								20 40 60 80 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

Consulting Engineers

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

Ground surface elevation at borehole locations provided by JD Barnes. **DATUM**

REMARKS

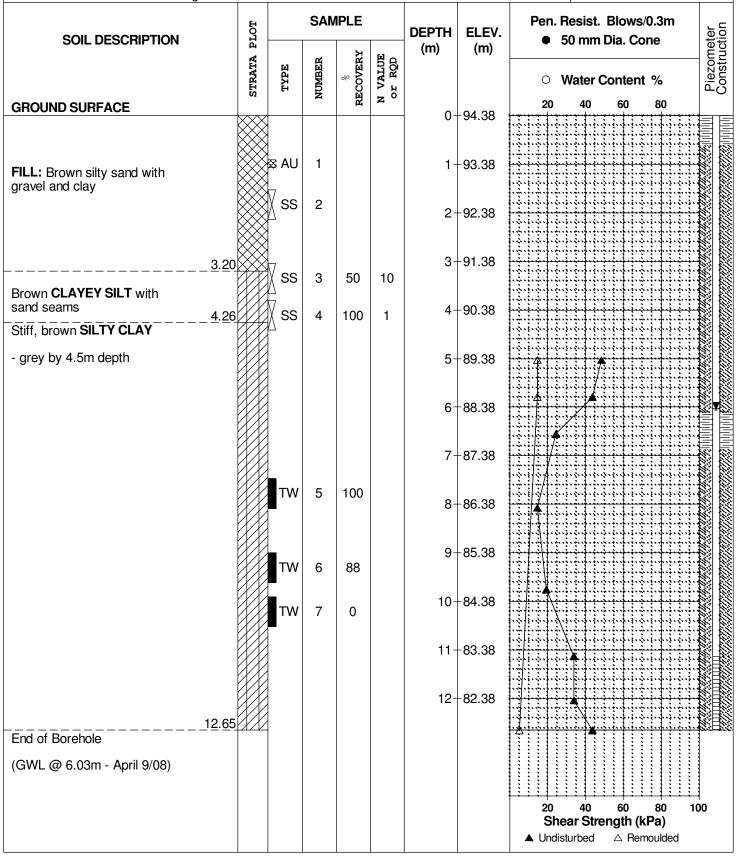
FILE NO. **PG1618**

HOLE NO.

BORINGS BY CME 55 Power Auger

DATE 24 March 2008

BH21-08



28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

Consulting Engineers

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

DATUM Ground surface elevation at borehole locations provided by JD Barnes.

FILE NO. PG1618

REMARKS

HOLENO

newants				_		47.14	0000		HOLE NO.	BH22-0	าล
BORINGS BY CME 55 Power Aug	ger			D	ATE	17 March	2008				
SOIL DESCRIPTION	A PLOT			#PLE	ы о	DEPTH (m)	ELEV. (m)		esist. Blow 0 mm Dia.		Piezometer
	STRATA	TYPE	NUMBER	% RECOVERY	N VALUE or RQD			0 V	Vater Conte	ent %	Piezo
GROUND SURFACE				2	z °	0-	92.26	20	40 60	80	<u>.</u>
TOPSOIL	0.20						02.20				
Grey-brown CLAYEY SILT	1.37	S AU SS	1 2	67	1	1-	91.26				
		ss	3	83	1	2-	90.26				
						3-	89.26				
		TW	4			4-	-88.26				
Soft, grey SILTY CLAY						5-	87.26				
						6-	86.26				
		TW	5			7-	85.26				
						8-	84.26				
	9.60					9-	83.26				
End of Borehole (Surificial water surrounding											
borehole - April 9/08)											
								20	40 60	80	100
								20 Shea	40 60 ar Strength	80 1 n (kPa)	100
								▲ Undist		Remoulded	

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

DATUM Ground surface elevation at borehole locations provided by JD Barnes.

FILE NO. **PG1618**

REMARKS

BORINGS BY CMF 55 Power Auger

HOLE NO. **BH23-08**

BORINGS BY CME 55 Power Auger				D	ATE 2	26 March 20	800		BH23-0	0
SOIL DESCRIPTION	PLOT		SAN	IPLE	I	4 1	ELEV.		Resist. Blows/0.3m 60 mm Dia. Cone	ter tion
	STRATA F	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)		Vater Content %	Piezometer Construction
GROUND SURFACE				22	Z	0+9	2 54	20	40 60 80	<u>.</u>
FILL: Brown silty sand with gravel and clay0.91	\sim	≅ AU	1	50	_		1.54			
Brown SILTY SAND with trace clay1. <u>68</u>		X ss	2	50	7		1.54			
		\ ss	3	100	2		0.54	A .		
		TW	4	100			9.54			
Grey SILTY CLAY		TW	5	100		4+8				
						6+8	6 54			
						7-8				
						8-8				
(Surfical water surrounding borehole- April 9/08)										
,										
							;	20	40 60 80 1	00
									ar Strength (kPa)	
								▲ Undist	turbed △ Remoulded	

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

DATUM Ground surface elevation at borehole locations provided by JD Barnes.

FILE NO.

PG1618

REMARKS

BORINGS BY CME 55 Power Au	ger			D	ATE	17 March	2008		BH24-0	8
SOIL DESCRIPTION	PLOT		SAN	/IPLE		DEPTH	ELEV.		esist. Blows/0.3m mm Dia. Cone	ter tion
	STRATA F	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)		ater Content % 40 60 80	Piezometer Construction
GROUND SURFACE PEAT	0.20	⊠ AU	1			0-	-92.29	20	***************************************	
Grey CLAYEY SILT with sand and seashells	1.22	X ss	2	50	4	1-	-91.29			
	1.22	√ ss	3	100	1					
) 	3	100	I	2-	-90.29			
		TW	4	83		3-	-89.29			
						4-	-88.29			
Dark grey SILTY CLAY						5-	-87.29		<u>}</u>	
		TW	5	100		6-	-86.29			
						7-	-85.29			
						8-	-84.29			
	9.55					9-	-83.29			
End of Borehole (Surficial water surrounding borehole - April 9/08)										
								20 Shoo	40 60 80 10	00
								Snea ▲ Undistu	r Strength (kPa) rbed △ Remoulded	
								_ GIUISIU		

Consulting Engineers

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7 DATUM

Ground surface elevation at borehole locations provided by JD Barnes.

REMARKS

PG1618 HOLE NO.

FILE NO.

DU20 00

BORINGS BY CME 55 Power Auger				D	ATE	18 March	2008	BH29-08
SOIL DESCRIPTION	PLOT		SAN	IPLE	ı	DEPTH	ELEV.	Pen. Resist. Blows/0.3m ■ 50 mm Dia. Cone
	STRATA P	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	Pen. Resist. Blows/0.3m ■ 50 mm Dia. Cone ○ Water Content % 20 40 60 80
Brown SILTY SAND with trace clay 0.6	11:1:1:	₩ AU	1			0-	-91.99	20 70 80 80
CLAYEY SILT		ss	2	67	1	1-	-90.99	
Soft to firm, brown SILTY CLAY		ss	3	100	1	2-	-89.99	
- grey by 2.1m depth						3-	-88.99	A A
		TW	4	100		4-	-87.99	
						5-	-86.99	
						6-	-85.99	
		TW	5	67		7-	-84.99	
						8-	-83.99	
9.5	55					9-	-82.99	<u> </u>
End of Borehole								
(GWL @ 2.81m - April 9/08)								
								20 40 60 80 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

Consulting Engineers

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

DATUM Ground surface elevation at borehole locations provided by JD Barnes.

FILE NO.

PG1618

REMARKS

HOLE NO.

BORINGS BY CME 55 Power Auger	-			0	DATE	1 April 200)8		BH32-0	8
SOIL DESCRIPTION	PLOT		SAN	/IPLE		DEPTH	ELEV.	1	esist. Blows/0.3m mm Dia. Cone	eter ition
	STRATA E	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	0 W	ater Content %	Piezometer Construction
GROUND SURFACE				р.		0-	-94.15	20	40 60 80	
FILL: Brown silty sand with gravel		ss	1	50	8		-93.15			
1	. <u>5</u> 2	∯ ∭ ss	2	33	4					
Grey CLAYEY SILT with sand		∭ ss	3	42	3	2-	-92.15			
3	3.05	ss	4	100	2	3-	-91.15			
						4-	-90.15			
		TW	5	83		5-	-89.15			
Soft to firm, grey SILTY CLAY		TW	6	0			-88.15	4		
						7-	-87.15			
		TW	7	67		8-	-86.15			
						9-	-85.15			
10 End of Borehole).21					10-	-84.15			
(GWL @ 2.65m - April 9/08)										
								20 Shea ▲ Undistu	r Strength (kPa)	00

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

Consulting Engineers

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

DATUM Ground surface elevation at borehole locations provided by JD Barnes.

FILE NO.

HOLE NO.

REMARKS

PG1618

BH33-08

BORINGS BY CME 55 Power Auger				D	ATE 2	2 April 200)8		BH33-0	<u> </u>
SOIL DESCRIPTION	PLOT		SAN	IPLE		DEPTH	ELEV.		esist. Blows/0.3m 0 mm Dia. Cone	eter ction
	STRATA 1	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	0 W	/ater Content %	Piezometer Construction
GROUND SURFACE				2	Z	0	-95.37	20	40 60 80	
							-95.37			
FILL: Peat and topsoil		⊠ AU	1				-93.37			
							-92.37			
Brown SILTY SAND , trace clay		SS S	2	67	9		-91.37			
4.2	7	SS SS	3 4	8	2		-91.37			<u> </u>
		<u>/</u> _								
		TW	5	79			-89.37			
Soft to firm, grey SILTY CLAY							-88.37	4		
		TW	6	0			-87.37			
							-86.37			
							-85.37			
						11-	-84.37			
12.6 End of Borehole	5					12-	-83.37			
(GWL @ 4.43m - April 9/08)										
								20 Shea	40 60 80 10 ar Strength (kPa)	00
								▲ Undist		

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

Consulting Engineers

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

Ground surface elevations provided by J.D. Barnes Limited. DATUM

FILE NO.

PG0177

REMARKS								HOLE NO.
BORINGS BY CME 55 Power Auger				D	ATE	14 Decem	ber 2006	
SOIL DESCRIPTION	PLOT		SAN	IPLE	ı	DEPTH	ELEV.	Pen. Resist. Blows/0.3m ■ 50 mm Dia. Cone
	STRATA P	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	Pen. Resist. Blows/0.3m ■ 50 mm Dia. Cone O Water Content %
GROUND SURFACE	, g		Ħ	REC	z ö			20 40 60 80
TOPSOIL 0.30)					0+	-92.61	
Stiff to firm, brown SILTY CLAY, trace sand		ss	1	75	3	1-	-91.61	
- firm to soft and grey by 1.5m depth						2-	-90.61	
						3-	-89.61	
		TW	2	96		4-	-88.61	
						5-	-87.61	
							-86.61	***
- firm by 7.0m depth		TW	3	100			-85.61	
							-84.61	
		_					-83.61	
		TW	4	100			-82.61 -81.61	
			4	100			-80.61	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \
(GWL @ 350mm above ground surface - Feb. 5/07)							-79.61	4
14.17	7	TW	5				-78.61	
GLACIAL TILL: Firm, grey silty clay with sand, gravel, cobbles and boulders End of Borehole	3\^^^^ /	SS SS	6	71	26			
								20 40 60 80 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

Consulting Engineers

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

Ground surface elevations provided by J.D. Barnes Limited.

FILE NO.

HOLE NO.

PG0177

REMARKS

DATUM

BORINGS BY CME 75 Power Auger				D	ATE 4	4 January	2007	BH16-06
SOIL DESCRIPTION	PLOT		SAN	IPLE	ı	DEPTH	ELEV.	Pen. Resist. Blows/0.3m ■ 50 mm Dia. Cone
GROUND SURFACE	STRATA P	TYPE	NUMBER	» RECOVERY	N VALUE or RQD	(m)	(m)	Pen. Resist. Blows/0.3m ■ 50 mm Dia. Cone □ Water Content % 20 40 60 80
TOPSOIL 0.28	2		_			0-	-91.93	
Loose, brown SILTY SAND , 0.76		∝ AU	1					
trace clay		∏ ss	2	0	4	1-	-90.93	
Firm to soft, brown SILTY		ss	3	75	3	2-	-89.93	
CLAY with sand to 2.4m depth		Tw	4	92		_	00.00	
- grey by 2.4m depth			•			3-	-88.93	↑
		ss	5	100	1	4-	-87.93	
						5-	-86.93	
						6-	-85.93	
		TW	6	100			-84.93	
						8-	-83.93	
- firm by 9.0m depth		ss	7	8	1	9-	-82.93	
						10-	-81.93	
						11-	-80.93	
		TW	8	100		12-	-79.93	
				100		13-	-78.93	
		TW	9	100		14-	-77.93	
1 <u>5.0</u> 4	4	=				15-	-76.93	
End of Borehole								
(GWL @ 0.10m-Feb. 5/07)								
								20 40 60 80 100 Shear Strength (kPa)
								Snear Strength (kPa) ▲ Undisturbed △ Remoulded
								_ Chalata Sou _ A remodiada

Consulting Engineers

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

Ground surface elevations provided by J.D. Barnes Limited.

FILE NO.

HOLE NO.

PG0177

REMARKS

DATUM

RH17-06

BORINGS BY CME 75 Power Auger				D	ATE 3	3 January 2007		BH17-06	1
SOIL DESCRIPTION	PLOT		SAN	IPLE		DEPTH ELEV.		esist. Blows/0.3m	ier ion
	STRATA F	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m) (m)	0 W		Piezometer
GROUND SURFACE	0.00			Д,		0-92.24	20	40 60 80	লৈ হ
	0.28		1	75	8	1-91.24			<u>.</u>
Stiff to firm, brown SILTY CLAY with sand						2+90.24			
- grey by 1.7m depth		ss	2	100	1	3+89.24			
		TW	3	100		4-88.24			
		_							
		_				5+87.24			/%//%/ /**/**/
		TW	4	88		6+86.24			
		_				7+85.24			
		_ _ _				8+84.24			/%//%/ ///////////////////////////////
		TW	5	100		9-83.24			
		_				10-82.24			
						11-81.24			
		TW	6	92		12-80.24			
		-		32		13-79.24			
		ss	7	50	1	14-78.24			
		- ■.				15-77.24			
1	6.25	TW	8	88		16-76.24			
End of Borehole (GWL @ 0.80m-Feb. 5/07)									
							20	40 60 80 100	ı
							Shea	r Strength (kPa)	
							▲ Undistu	urbed △ Remoulded	

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

Consulting Engineers

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

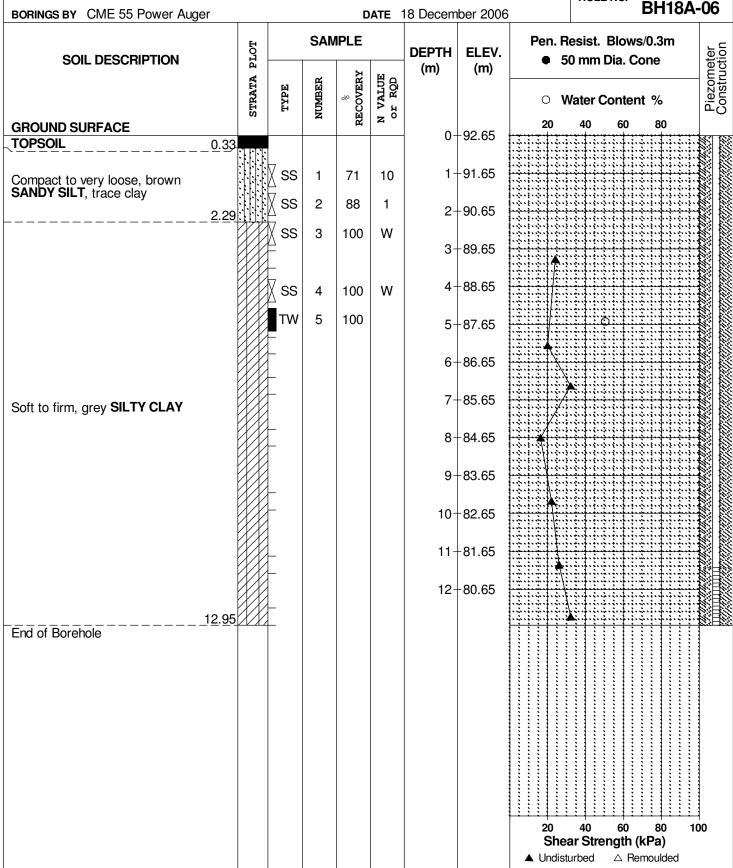
DATUM

Ground surface elevations provided by J.D. Barnes Limited.

REMARKS

PG0177 HOLE NO.

FILE NO.



28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

Consulting Engineers

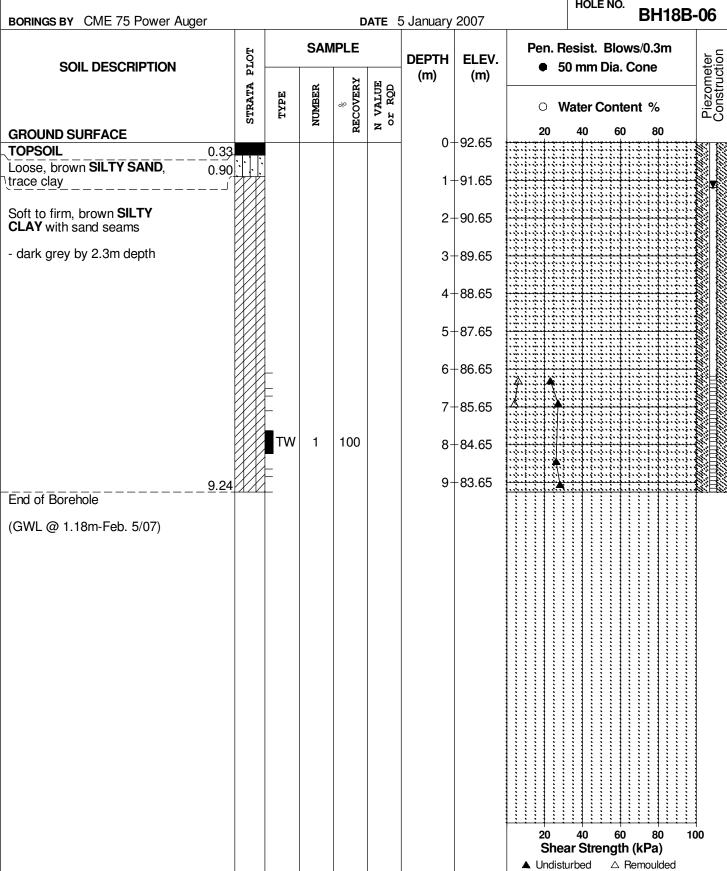
SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

DATUM Ground surface elevations provided by J.D. Barnes Limited.

FILE NO. PG0177

HOLE NO. PLICED OF



28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

Consulting Engineers

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

DATUM

Ground surface elevations provided by J.D. Barnes Limited.

FILE NO.

HOLE NO.

PG0177

REMARKS

BORINGS BY CME 75 Power Auger				D	ATE !	5 January	2007	BH19-06
SOIL DESCRIPTION	PLOT		SAN	/IPLE	ı	DEPTH	ELEV.	Pen. Resist. Blows/0.3m ■ 50 mm Dia. Cone
GROUND SURFACE	STRATA P	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	Pen. Resist. Blows/0.3m ■ 50 mm Dia. Cone ○ Water Content % 20 40 60 80
	.36					0+	92.43	
Loose, brown SILTY SAND , otrace clay	.60	x ss	1	75	3	1 -	91.43	
Firm, grey-brown SILTY CLAY with sand	-	∑ ss	2	88	3			
- grey by 2.3m depth		33		00	3		90.43	
							89.43	1
		TW	3	83			-88.43	
							87.43	4
		TW	4	100			86.43	
		X ss	5	100	1		85.43	
				100			83.43	
							82.43	
		TW	6	100			81.43	
				100			80.43	
							79.43	
		√ √ ss	7	100	1		73.43	
4-	24		,				77.43	
15 End of Borehole	.34	1						
(GWL @ 0.64m-Feb. 5/07)								
								20 40 60 80 100 Shear Strength (kPa)
								▲ Undisturbed △ Remoulded

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

Consulting Engineers

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

Ground surface elevations provided by J.D. Barnes Limited. **DATUM**

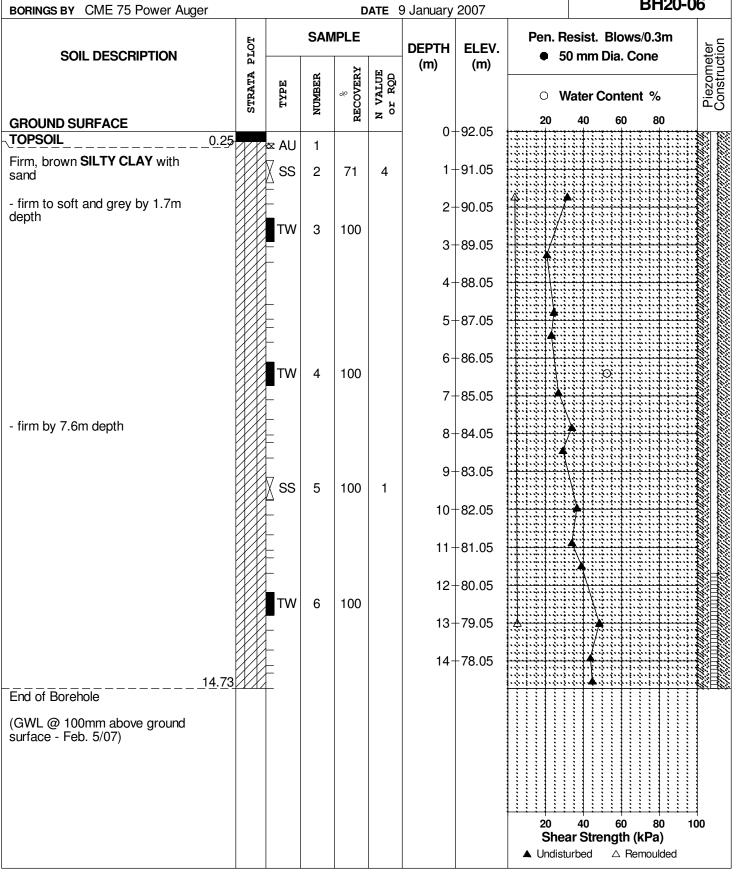
FILE NO.

HOLE NO.

PG0177

REMARKS

BH20-06



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

DATUM Ground surface elevations provided by J.D. Barnes Limited.

FILE NO.

PG0177

REMARKS								HOLE NO.
BORINGS BY CME 75 Power Auger				D	ATE 8	3 January 2	2007	BH21-06
SOIL DESCRIPTION	PLOT		SAN	/IPLE		DEPTH	ELEV.	Pen. Resist. Blows/0.3m ■ 50 mm Dia. Cone
	STRATA 1	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	Pen. Resist. Blows/0.3m ■ 50 mm Dia. Cone in the content %
GROUND SURFACE			4	M. M.	z		92.00	20 40 60 80
TOPSOIL 0.3	9						92.00	
Firm, grey-brown SILTY CLAY with sand		ss	1	75	5	1-	91.00	
- grey by 1.7m depth		SS	2	75	1	2-	90.00	
		TW	3	96			89.00	
		TW	4	100			88.00	
			- T	100			87.00	•
		ss	5	100	1		85.00	
							84.00	<u> </u>
		TW	6	100		9+	83.00	
- firm by 9.7m depth						10	82.00	
						11-	81.00	
		ss	7	100	1	12-	80.00	
		1					79.00	
14.7 End of Borehole	3					14+	78.00	
(GWL @ 50mm above ground surface - Feb. 5/07)								
								20 40 60 80 100 Shear Strength (kPa)
								■ Undisturbed △ Remoulded

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

DATUM Ground surface elevations provided by J.D. Barnes Limited.

FILE NO.

PG0177

REMARKS

ROBINGO DY CME 75 Downey Avenue				_		10 lemmen	. 0007		HOLE NO.	BH22-0	6
BORINGS BY CME 75 Power Auger					AIE	10 January	y 2007				
SOIL DESCRIPTION	PLOT		SAN	IPLE		DEPTH (m)	ELEV. (m)		esist. Blow 0 mm Dia. C		eter
	STRATA	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(,	(,	0 V	Vater Conter	nt %	Piezometer Construction
CDOUND CUDEACE	ST	H	N D	REC	N N			20	40 60	80	₽.Ö
GROUND SURFACE TOPSOIL 0.2	28					0-	-91.95	3.1.3.1.3.1		::::::::::::::::::::::::::::::::::::::	 88
101.0012	<u>-</u>										
Firm to soft, brown SILTY		∬ ss	1	75	5	1-	-90.95				
Firm to soft, brown SILTY CLAY with sand		∏ ss	2	0	4						
grov by 2.0m donth		<u> </u>	2	0	4	2-	-89.95				
- grey by 2.0m depth		1						<u> </u>			
		}				3-	-88.95			*	
								$:: \mathcal{T}::$			
- firm by 4.0m depth		TW	3	100		4-	-87.95			*************************************	
3		F						7			
		‡				5-	-86.95	<i>7</i> :::::::			
		}									
		 			١.	6-	-85.95				
		∬ ss	4	100	1						
		}				7-	-84.95				
			_								
		TW	5	100		8-	-83.95				
		1							*		
		17				9-	-82.95				
		∬ ss	6		1						
		_				10-	-81.95		· · · · · · · · · · · · · · · · · · ·	*****	
		1									
		1				11-	-80.95				
		_							· • • • • • • • • • • • • • • • • • • •		
		1				12-	-79.95		:::/:::::::::::::::::::::::::::::::::		
		1							1		
		}				13-	-78.95		***********		
		 									
- stiff by 14.0m depth		∦ ss	7	100	1	14+	-77.95				
14.7 End of Borehole	73 ///	1							.	<u> </u>	
(GWL @ 400mm above ground											
surface - Feb. 5/07)											
,											
								1 : : : : : i	40 60	90 40	100
								20 Shea	40 60 ar Strength (80 10 (kPa)	JU
								▲ Undist		emoulded	

Consulting Engineers

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

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FILE NO.

PG0177

REMARKS

DATUM

REWARKS									HOLE NO.	BH23-0	16
BORINGS BY CME 75 Power Auger				D	ATE	12 Januar	y 2007	I		DI 123-0	
SOIL DESCRIPTION	PLOT		SAN	/IPLE		DEPTH (m)	ELEV. (m)		esist. Blow 0 mm Dia. 0		nețer
	STRATA	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(,	()	0 V	Vater Conte	nt %	Piezometer
GROUND SURFACE			~	2	z °		00.75	20	40 60	80	
	.28					1 0-	-92.75				
	.60	ss	1	50	3	1-	-91.75				
sand		ss	2	50	1	2-	-90.75				
grey by 1.6m depth		TW	3	100		2_	-89.75				
		∦ ss	4	100	1		-89.75 -88.75				
		TW	5	100			-87.75				
		 					-86.75				
- firm by 7.6m depth						7-	-85.75				
- mm by 7.om α e μm		TW	6	100		8-	-84.75				
		ss	7	100	1	9-	-83.75				
						10-	-82.75		\		
						11-	-81.75				
		∜ ss	8	100	1	12-	-80.75				
						13-	-79.75				
		TW	9	100		14-	-78.75				
15	.65	 				15-	-77.75			· · · · · · · · · · · · · · · · · · ·	
End of Borehole	.99////								***************************************		
(Standpipe damaged - Feb. 5/07)											
							,		40 60 ar Strength	(kPa)	00
								▲ Undist		emoulded	

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

DATUM Ground surface elevations provided by J.D. Barnes Limited.

FILE NO.

PG0177

REMARKS

BORINGS BY CME 75 Power Auger				D	ATE	11 January	y 2007		BH24-06	6
SOIL DESCRIPTION	PLOT		SAN	IPLE		DEPTH	ELEV.		sist. Blows/0.3m mm Dia. Cone	eter Xion
	STRATA E	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)			Piezometer Construction
GROUND SURFACE				i i	4	0	-93.08	20	40 60 80	
TOPSOIL0.33	// X						30.00			
Soft, brown SILTY CLAY with sand		ss	1	50	2	1-	-92.08			
- grey by 1.7m depth							-91.08	ΔΔ: : : : : : : : : : : : : : : : : : :		
		TW	2	79			-90.08 -89.08			
							-88.08			
		Tw	3	100		6-	-87.08			
			J	100		7-	-86.08			
		ss	4	100	1	8-	-85.08			
- firm by 9.0m depth		TW	5	100			-84.08			
		_					-83.08 -82.08			
							-81.08			
		ss	6	100	3	13-	-80.08			
- stiff by 13.4m depth						14-	-79.08			
GLACIAL TILL: Compact, gray sith sand with slav 15.85	\^^^	⊢ ∑ ss	7	50	20	15-	-78.08			
grey silty sand with clay, 15.85 gravel, cobbles and boulders / End of Borehole (GWL @ 950mm above ground surface - Feb. 5/07)		<u>v </u>								<i>∞</i> ~—8%
								20 Shear	40 60 80 100 r Strength (kPa) rbed △ Remoulded	0

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SOIL PROFILE AND TEST DATA

FILE NO.

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7 Ground surface elevations provided by J.D. Barnes Limited. DATUM

REMARKS

PG0177 HOLE NO.

BORINGS BY CME 55 Power Auger				D	ATE (5 July 2005			HOLE NO. BH 4-0)5
SOIL DESCRIPTION	PLOT		SAN	/IPLE	Ι	DEPTH ELEV.		Pen. Resist. Blows/0.3m ■ 50 mm Dia. Cone		eter
	STRATA	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(11)	(11)	0 W	later Content %	Piezometer Construction
GROUND SURFACE	02			M. M.	z	0+9-	1.50	20	40 60 80	
TOPSOIL Loose, dark brown SILTY fine SAND with organic matter		& AU	1			0+9	1.50			
SAND with organic matter 0.76		SS SS	2	67	2	1-90	0.50			
Stiff, brown SILTY CLAY with sand seams		ss	3	100	1	2-89	9.50			
- grey by 2.6m depth		ss	4	100	1	3-88	8.50	X		
- firm by 3.8m depth						4-87	7.50			
		ss	5	100	1	5-86	6.50			
		ss	6	100	1	6-85	5.50			
						7-84	4.50			
		TW	7	100		8-83	3.50	20	40 60 80	100
								Shea Undist	ar Strength (kPa) urbed △ Remoulded	

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

DATUM Ground surface elevations provided by J.D. Barnes Limited.

FILE NO.

PG0177

REMARKS

BORINGS BY CME 55 Power Auger				D	ATE :	5 July 200	5		BH 4-05	
SOIL DESCRIPTION	PLOT		SAN	IPLE		DEPTH	ELEV.		esist. Blows/0.3m	tion tion
	STRATA I	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)		/ater Content %	Construction
GROUND SURFACE	, w		Z	E.	zo		00.50	20	40 60 80	J
						8-	-83.50	<u>A</u>		
		ss	8	75	1	9-	-82.50			
Firm, grey SILTY CLAY						10-	-81.50			
						11-	-80.50	<u>***</u>		
		ss	9	75	1		-79.50			
GLACIAL TILL: Loose, grey silty fine sand with gravel, cobbles and boulders	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	abla				13-	-78.50			
	3 ^^^^^	SS	10	90	6	14-	-77.50			
(GWL @ 0.67m-July 18/05)										
								20 Shea • Undistu	40 60 80 100 ar Strength (kPa) urbed △ Remoulded	

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

Ground surface elevations provided by J.D. Barnes Limited.

REMARKS

DATUM

PG0177

HOLE NO.

FILE NO.

BORINGS BY CME 55 Power Auger				D	ATE !	5 July 200	5	BH 5-05
SOIL DESCRIPTION	PLOT		SAMPLE			DEPTH	ELEV.	Pen. Resist. Blows/0.3m ■ 50 mm Dia. Cone
GROUND SURFACE	STRATA	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	Pen. Resist. Blows/0.3m ■ 50 mm Dia. Cone ○ Water Content % 20 40 60 80
TOPSOIL 0.2	00					0-	-92.31	
Loose, brown SILTY SAND, some clay		ss Ss	1	8	4	1-	-91.31	
1.8	33	ss	2	100	1	2-	-90.31	<u></u>
		ss	3	100	1	3-	-89.31	
						4-	-88.31	
Firm to stiff, grey SILTY CLAY		TW	4	96		5-	-87.31	
		ss	5	100	1	6-	-86.31	
						7-	-85.31	***************************************
						8-	-84.31	20 40 60 80 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

DATUM Ground surface elevations provided by J.D. Barnes Limited.

FILE NO.

PG0177

REMARKS								HOLE NO.	
BORINGS BY CME 55 Power Auger				D	ATE !	5 July 2005		BH 5-05	
SOIL DESCRIPTION	PLOT	SAMPLE					_EV. 💂 5	Pen. Resist. Blows/0.3m ■ 50 mm Dia. Cone	
	STRATA I	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m) (i	m)	O mm Dia. Cone Vater Content %	
GROUND SURFACE	מֿ		N N	REC	ző	0 04	20	40 60 80	
						8+84.	.31		
		SS	6	100	1	9-83.	.31		
		1				10-82.	.31		
Firm to stiff, grey SILTY CLAY						11-81.	.31		
		SS	7	75	1	12-80.	.31		
						13-79.	.31		
End of Borehole	.02					14-78.	.31		
(GWL @ 3.61m-July 18/05)							20 Shea ▲ Undist	40 60 80 100 ar Strength (kPa) urbed △ Remoulded	

Consulting Engineers

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

Ground surface elevations provided by J.D. Barnes Limited.

FILE NO.

HOLE NO.

PG0177

REMARKS

DATUM

BORINGS BY CME 55 Power Auger		1		D	BH10-05				
SOIL DESCRIPTION GROUND SURFACE	PLOT		SAMPLE			DEPTH	ELEV.	Pen. Resist. Blows/0.3m • 50 mm Dia. Cone O Water Content %	
	STRATA E	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	 Water Content % 40 60 80 	
						0-	-91.66		
Compact, brown SANDY	.70	AU	1						
Stiff to firm, brown SILTY CLAY , some fine sand		SS	2	25	4	1-	-90.66		
- firm and grey by 2.0m depth		SS	3	67	1	2-	-89.66		
		ss	4	100	1	3-	-88.66		
						4-	-87.66		
		TW	5	98		5-	-86.66		
		ss	6	100	1	6-	-85.66		
						7-	-84.66	A:	
		\ \ \ SS	7	100	1	8-	-83.66	20 40 60 80 100	
								Shear Strength (kPa) ▲ Undisturbed △ Remoulded	

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

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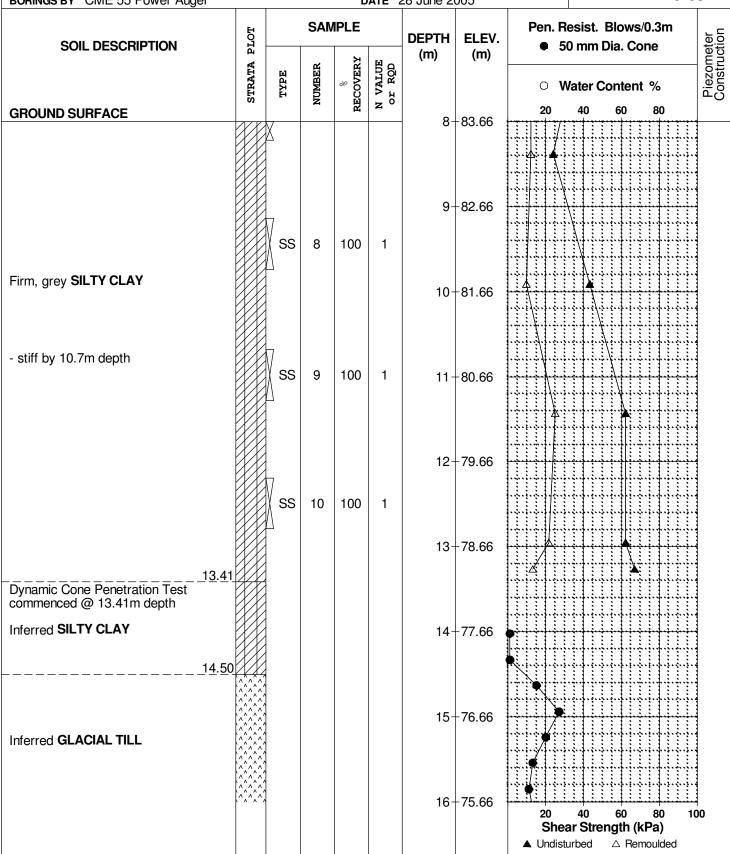
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REMARKS

BORINGS BY CME 55 Power Auger

DATE 28 June 2005

BH10-05



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7 DATUM

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FILE NO.

PG0177

REMARKS BORINGS BY CME 55 Power Auger				П	ΔTF 2	28 June 20	005	HOLE NO. BH10-05	
SOIL DESCRIPTION	PLOT					DEPTH	ELEV.	Pen. Resist. Blows/0.3m ■ 50 mm Dia. Cone	
	STRATA P	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	Pen. Resist. Blows/0.3m ■ 50 mm Dia. Cone ○ Water Content %	
GROUND SURFACE	ST	F	N	REC	N v	16		20 40 60 80	
	× × × × × × × × × × × × × × × × × × ×					10-	-75.66		
Inferred GLACIAL TILL						17-	-74.66		
						18-	-73.66		
18.57 End of Borehole	7 \^,^,^,								
DCPT refusal @ 18.57m depth									
								20 40 60 80 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded	

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SOIL PROFILE AND TEST DATA

FILE NO.

Geotechnical Investigation Proposed Residential Development-Half Moon Bay

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

Ground surface elevations provided by J.D. Barnes Limited.

Ottawa, Ontario

DATUM

PG0177

REMARKS BORINGS BY CME 55 Power Auger	HOLE NO. BH11-05								
SOIL DESCRIPTION	PLOT	0414015				4 July 2005 DEPTH ELEV	,	Pen. Resist. Blows/0.3m ■ 50 mm Dia. Cone	
	STRATA P	TYPE	NUMBER	» RECOVERY	N VALUE or RQD	(m) (m)		Vater Content %	
GROUND SURFACE				2	Z	0+91.91	20	40 60 80	
Brown CLAYEY SILT , some sand seams	.75	& AU	1			0 01101			
Compact, brown SILTY fine 0. SAND Brown SANDY SILT with clay	.50	ss	2	67	3	1-90.91			
	.50 (1)(1)	ss	3	0	1	2-89.91			
		SS	4	100	1	3-88.91	<u> </u>		
Firm, grey SILTY CLAY		ss	5	100	1	4-87.91			
- soft by 4.5m depth						5-86.91			
		SS	6	100	P	6-85.91			
		SS	7	100	1	7-84.91			
						8-83.91	20 Shea	40 60 80 100 ar Strength (kPa)	
							▲ Undist		

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

Ground surface elevations provided by J.D. Barnes Limited. **DATUM**

REMARKS

FILE NO.

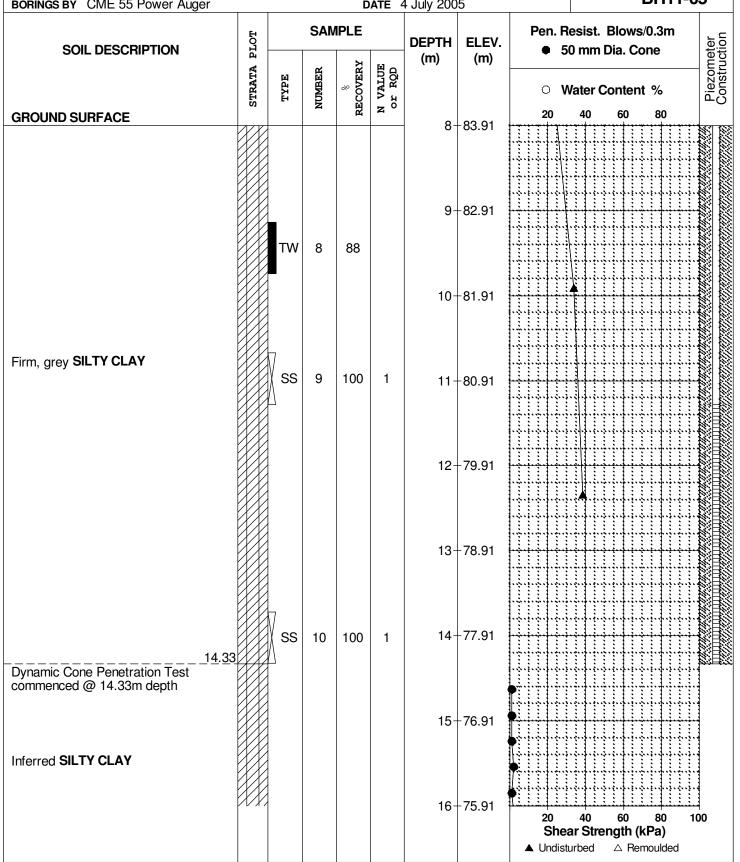
HOLE NO.

PG0177

BORINGS BY CME 55 Power Auger

DATE 4 July 2005

BH11-05



28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

DATUM Ground surface elevations provided by J.D. Barnes Limited.

REMARKS

FILE NO.

PG0177

HOLE NO. **BH11-05 BORINGS BY** CME 55 Power Auger **DATE** 4 July 2005 SAMPLE Pen. Resist. Blows/0.3m Piezometer Construction STRATA PLOT **DEPTH** ELEV. 50 mm Dia. Cone **SOIL DESCRIPTION** (m) (m) RECOVERY N VALUE or RQD NUMBER TYPE Water Content % 80 **GROUND SURFACE** 16 + 75.91 17 + 74.91 18+73.91 Inferred SILTY CLAY 19+72.91 20+71.91 21 + 70.91Inferred GLACIAL TILL 21.95 End of borehole (GWL @ 1.15m-July 18/05) 40 60 80 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

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FILE NO.

PG0177

REMARKS

HOLE NO.

BH11A-05 **BORINGS BY** CME 55 Power Auger **DATE** 7 July 2005 **SAMPLE** Pen. Resist. Blows/0.3m Piezometer Construction STRATA PLOT **DEPTH** ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPE Water Content % 80 **GROUND SURFACE** 0 + 91.91**TOPSOIL** 0.25 Brown CLAYEY SILT, some 1A sand seams 0.75 Compact, brown SILTY fine SAND 0.90 1 + 90.91Brown SANDY SILT with clay 1.50 2+89.91 1 96 -88.91 2 97 4+87.91 Firm, grey SILTY CLAY 5 ± 86.91 6 + 85.917 + 84.913 100 8+83.91 40 60 80 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

Ground surface elevations provided by J.D. Barnes Limited. **DATUM**

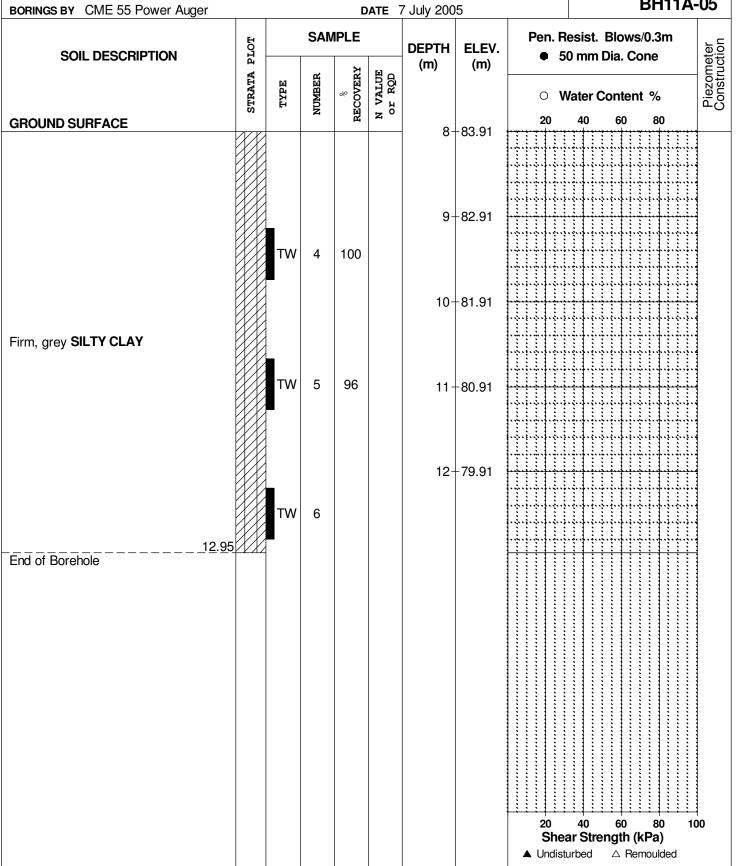
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PG0177

REMARKS

HOLE NO.

BH11A-05



28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

DATUM

REMARKS

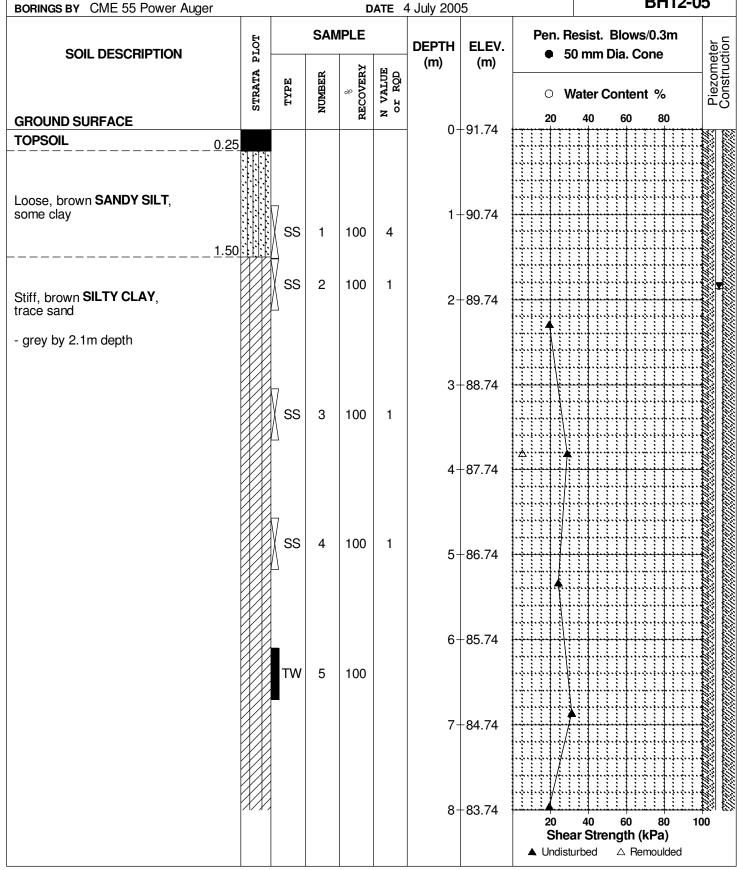
Ground surface elevations provided by J.D. Barnes Limited.

FILE NO.

HOLE NO.

PG0177

BH12-05



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SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

Ground surface elevations provided by J.D. Barnes Limited.

DATUM

PG0177

FILE NO.

REMARKS BORINGS BY CME 55 Power Auger				D	ATE 4	1 July 200	5	HOLE NO. BH12-05
SOIL DESCRIPTION	PLOT		SAN	IPLE		DEPTH	ELEV.	Pen. Resist. Blows/0.3m ■ 50 mm Dia. Cone
	STRATA P	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	O Water Content %
GROUND SURFACE				M.	4	8-	-83.74	20 40 60 80
		TW	6	100		9-	-82.74	
						10-	-81.74	
Firm, grey SILTY CLAY		SS	7	100	1	11-	-80.74	
						12-	-79.74	
						13-	-78.74	
1 <u>4</u> . End of Borehole (GWL @ 1.87m-July 18/05)	33	SS	8	100	1	14-	-77.74	
								20 40 60 80 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7 Ground surface elevations provided by J.D. Barnes Limited. DATUM

FILE NO.

PG0177

REMARKS								HOLE NO. BH14-05	
SOIL DESCRIPTION	PLOT		SAN	IPLE	ATE (October DEPTH	ELEV.		
SOIL DESCRIPTION	STRATA P	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	• Water Content %	Plezometer
GROUND SURFACE	01		Z	RE	z o	0-	92.50	20 40 60 80	
TOPSOIL 0.28							02.00		
Stiff SILTY CLAY/CLAYEY SILT						1-	-91.50		፟
1.50 End of Borehole									
(Open hole WL @ 0.95m depth)									
								20 40 60 80 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded	

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

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Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

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FILE NO.

PG0177

REMARKS								HOLE NO.	
BORINGS BY CME 75 Power Auger				D	ATE	15 April 20	04	BH 2A	
SOIL DESCRIPTION	PLOT		SAN	/IPLE		DEPTH	ELEV.	Pen. Resist. Blows/0.3m • 50 mm Dia. Cone	eter tion
	STRATA E	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	O Water Content %	Piezometer Construction
GROUND SURFACE	ß		Z	RE	zö			20 40 60 80	_0
TOPSOIL 0.46	6					0+	-		
Vory stiff brown SILTV		ss	1	100	1	1+	-		
Very stiff, brown SILTY CLAY , some sand, trace shells									₽
shells		∬ ss	2	83	1	2-	-		
						3+	-		
- firm and grey by 3.0m depth		TW	3						
		I VV	ر ا			4+	-		
of the A O controlle		1				5-	_		
- soft by 4.9m depth								::::/::::::::::::::::::::::::::::::::	
						6-	-		
		∬ ss	4	100	W				
						7-	-		
						8-	-		
9.00		∏ ss∣	5	100	W				
Dynamic Cone Penetration Test commenced @ 9.0m depth.						9+	-		
commenced @ 9.0m depth. Cone pushed to 15.70m depth.						40			
Oone pushed to 13.70m depth.						10	-		
						11-	_		
						''			
L C LOUTY OLAY						12-	-		
Inferred SILTY CLAY									
						13-	-		
						14-	-		
(GWL @ 1.40m-May 1/04)									
• •						15-	-		
1 <u>5.7</u> 0 End of Borehole	YXX	1							
BH terminated on inferred glacial till surface @ 15.70m									
depth								20 40 60 80 10	ın.
								Shear Strength (kPa)	U
								▲ Undisturbed △ Remoulded	

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

Consulting Engineers

SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

Ground surface elevations provided by J.D. Barnes Limited. DATUM

FILE NO.

PG0177

REMARKS

HEMAINS									HOLE NO.	BH 2B	
BORINGS BY CME 75 Power Auger	1			D	ATE 2	20 April 20	004			ВП 2В	T
SOIL DESCRIPTION	PLOT			/IPLE		DEPTH (m)	ELEV. (m)		esist. Blov 0 mm Dia. 0		neter uction
	STRATA	TYPE	NUMBER	% RECOVERY	N VALUE or RQD				/ater Conte		Piezometer Construction
GROUND SURFACE				K		0-	_	20	40 60	80	
OVERBURDEN 7.62 Grey SILTY CLAY End of Borehole		TW	1 2	X		0- 1- 2- 3- 4- 5- 6- 7- 8-	-		40 60	80	
								20 Shea • Undistr	40 60 ar Strength	80 10 (kPa) Remoulded	00

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

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SOIL PROFILE AND TEST DATA

Preliminary Geotechnical Investigation Nepean South Lands, South of Jock River Ottawa (Nepean), Ontario

DATUM

REMARKS

PORINCE BY CME 45 Power Augus

PATE 36 November 2003

BH 1

BORINGS BY CME 45 Power Auger				D	ATE 2	26 Novem	ber 2003		HOLE NO. BH 1	
SOIL DESCRIPTION	PLOT		SAN	/IPLE		DEPTH (m)	ELEV.		esist. Blows/0.3m 0 mm Dia. Cone	eter ction
	STRATA 1	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	0 W	Vater Content %	Piezometer Construction
GROUND SURFACE				Z	Z •			20	40 60 80	
Remoulded SILTY CLAY with organic matter 0.76						0- 1-	-			
Firm, brown SILTY CLAY						2-	_	313131		¥
- soft and grey by 2.2m depth						3-	-			
						4-	_			
- firm by 5.6m depth						5- 6-	-	313131		
- soil running up the augers						7-	-	·	· · · · · · · · · · · · · · · · · · ·	
upon removing auger plug starting @ 6.1m depth - soft by 7.0m depth						8-	_			
control riom dopin						9-	-			
- firm by 10.0m depth						10-	_			
						11- 12-	-			
						13-	-			
						14-	-			
						15-	_			
commenced @ 15.24m depth Inferred SILTY CLAY						16- 17-	-			
17. <u>5</u> 3 End of Borehole	8/3/2/									
Cone refusal @ 17.53m depth										
(GWL @ 1.43m-Dec. 11/03)										
								20 Shea	ar Strength (kPa)	00

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

Consulting Engineers

SOIL PROFILE AND TEST DATA

Preliminary Geotechnical Investigation Nepean South Lands, South of Jock River Ottawa (Nepean), Ontario

DATUM

REMARKS

BORINGS BY CME 45 Power Auger

DATE 27 November 2003

BH 2

BORINGS BY CME 45 Power Auger				D	ATE 2	27 Novem	ber 2003		HOLE NO. BH 2	
SOIL DESCRIPTION	PLOT		SAN	IPLE	ı	DEPTH	ELEV.		esist. Blows/0.3m 0 mm Dia. Cone	eter stion
	STRATA 1	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)	0 W	/ater Content %	Piezometer Construction
GROUND SURFACE	"		~	2	z			20	40 60 80	
Frozen remoulded SILTY						0-	-			
CLAY with organic matter 0.7	6////					1-				_
Stiff, brown SILTY CLAY						'				T
						2-	_			
- organic matter in upper 750mm						_				
73011111						3-	_			
- firm and grey by 2.2m depth								1:3:1:3:1:3:3		
						4-	_		• (• • • • • • • • • • • • • • • • • •	
- firm by 4.9m depth						5-	-			
		}								
- soil running up the augers upon removing the auger plug	Y					6-	=			
starting at 6.1m depth						_				
Dynamic Cone Penetration Test		1				7-	-			
commenced @ 6.10m depth.						8-	L			
commenced @ 6.10m depth. Cone pushed to 14.94m depth.						0				
						9-	_	-3-1-3-1-3-1		
						10-	_			
Inferred SILTY CLAY						11-	-		· · · · · · · · · · · · · · · · · · ·	
Interred SILTY CLAY										
						12-	_			
						13-	_			
						4.4				
						14-				
						15-	_			
15.8		1								
						16-	-			
Inferred GLACIAL TILL		1								
17.3	2 \^^^	7				17-	-			
End of Borehole										
Cone refusal @ 17.32m depth										
(GWL @ 1.11m-Dec. 11/03)										
(GVVL @ 1.11111-Dec. 11/03)										
								20	40 60 80 10	0
									ar Strength (kPa)	
								▲ Undist	urbed △ Remoulded	

Consulting Engineers

SOIL PROFILE AND TEST DATA

40

▲ Undisturbed

Shear Strength (kPa)

60

80

△ Remoulded

100

Preliminary Geotechnical Investigation Nepean South Lands, South of Jock River Ottawa (Nepean). Ontario

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7 Ottawa (Nepean), Ontario **DATUM** FILE NO. G9132 **REMARKS** HOLE NO. BH3 **BORINGS BY** CME 45 Power Auger DATE 27 November 2003 SAMPLE Pen. Resist. Blows/0.3m STRATA PLOT **DEPTH** ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) N VALUE or RQD RECOVERY NUMBER TYPE Water Content % **GROUND SURFACE** 0 TOPSOIL 0.15 Stiff, brown SILTY CLAY - organic matter in upper 2 150mm 3 - soft to firm and grey by 2.3m depth - soil running up the augers upon removing the auger plug 5 starting at 6.1m depth 6.10 6 Dynamic Cone Penetration Test commenced @ 6.10m depth. Cone pushed to 17.37m depth. 8 9 10 11 Inferred SILTY CLAY 12 13-14 15 16 17 17.40 18-Inferred GLACIAL TILL 19

19.43

End of Borehole

Cone refusal @ 19.43m depth (GWL @ 0.10m-Dec. 11/03)

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

DATUM Ground surface elevations provided by J.D. Barnes Limited.

PG0177

REMARKS

BORINGS BY Backhoe

DATE 1.lune 2007

TP 6-07

BORINGS BY Backhoe				D	ATE	1 June 200	07		HOLE NO. TP 6-07
SOIL DESCRIPTION	PLOT		SAN	IPLE		DEPTH (m)	ELEV. (m)	1	esist. Blows/0.3m 0 mm Dia. Cone
	STRATA	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(111)	(111)	0 V	esist. Blows/0.3m 0 mm Dia. Cone Vater Content %
GROUND SURFACE	03		Z	RE	zö	0-		20	40 60 80
TOPSOIL	0.33					0-			
Very stiff to stiff, brown SILTY CLAY						1-	_		128
Stiff to firm, grey SILTY CLAY	2.13					2-	-		✓
End of Test Pit	3.05					3-	-		
(Open hole GWL @ 2.2m depth)								20	40 60 80 100
								20 Shea ▲ Undist	40 60 80 100 ar Strength (kPa) urbed △ Remoulded

Consulting Engineers

SOIL PROFILE AND TEST DATA

40

▲ Undisturbed

Shear Strength (kPa)

60

80

 \triangle Remoulded

100

Geotechnical Investigation
Proposed Residential Development-Half Moon Bay
Ottawa. Ontario

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7 Ottawa, Ontario Ground surface elevations provided by J.D. Barnes Limited. **DATUM** FILE NO. **PG0177 REMARKS** HOLE NO. **TP18-07 BORINGS BY** Backhoe **DATE** 4 June 2007 **SAMPLE** Pen. Resist. Blows/0.3m Piezometer Construction STRATA PLOT **DEPTH** ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPE Water Content % 80 **GROUND SURFACE** 0 **TOPSOIL** 0.30 Very stiff to stiff, brown **SILTY CLAY** 1 Firm, grey SILTY CLAY

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

DATUM Ground surface elevations provided by J.D. Barnes Limited.

FILE NO. PG0177

HOLE NO. The standard of th

BORINGS BY Backhoe				D	ATE 4	4 June 20	07	_	HOL	E NO.	TP22-0)7
SOIL DESCRIPTION	PLOT			/IPLE	E.	DEPTH (m)	ELEV. (m)			Blow Dia. C	s/0.3m Cone	neter
	STRATA	TYPE	NUMBER	* RECOVERY	N VALUE or RQD			0 V	Vater	Conte		Piezomețer
GROUND SURFACE				Ĭ Ř	4	0-	92.73	20	40	60	80	
Brown SAND	<u>25</u> 46											
Very stiff to stiff, brown SILTY CLAY						1-	-91.73			*********		103
1. Stiff to firm, grey SILTY CLAY	50										A	
	13					2-	-90.73					
								20 She	40 ar Str	60 ength	80 (kPa) emoulded	100

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

DATUM Ground surface elevations provided by J.D. Barnes Limited.

REMARKS

BORINGS BY Backhoe

DATE 1 June 2007

FILE NO. PG0177

HOLE NO. TP23-07

BORINGS BY Backhoe				D	ATE	1 June 20	07		HOLE NO	TP23-0	7
SOIL DESCRIPTION	PLOT		SAN	/IPLE		DEPTH	ELEV.		esist. Blo 0 mm Dia.		ier
SOIL DESCRIPTION	STRATA PI	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(m)	(m)		Vater Cont		Piezometer
GROUND SURFACE	ι σ		E	RE	zö			20	40 60	0 80	-0
TOPSOIL	0.30	G	1			0-	_				
Very stiff to stff, brown SILTY CLAY						1-	-			- 1 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2	
	1.50										128 ♣,
Firm, grey SILTY CLAY						2-	-				
End of Test Pit	3.05					3-	-				• • •
LIM OF TEST TIL								20 Shea ▲ Undistu	40 60 ar Strengt urbed △	0 80 1 h (kPa)	100

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SOIL PROFILE AND TEST DATA

FILE NO.

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

Ground surface elevations provided by J.D. Barnes Limited.

DATUM **REMARKS**

PG0177 HOI E NO

BORINGS BY Backhoe				D	ATE	1 June 20	07		HOLE	NO.	P26-0	7
SOIL DESCRIPTION	PLOT		SAN	IPLE		DEPTH (m)	ELEV. (m)			Blows/0 ia. Con		neter action
	STRATA	TYPE	NUMBER	% RECOVERY	N VALUE or RQD	(,	(,	0 V	/ater Co	ontent '	%	Piezometer Construction
GROUND SURFACE				2	z °	0-	93.41	20	40	60	80	_
TOPSOIL 	0.30					Ü	30.41					*
Now a stiff to a stiff away because						1-	-92.41					***************************************
Very stiff to stiff, grey-brown SILTY CLAY, some sand						2-	-91.41			4	1	08
- stiff and grey by 2.3m depth	3.35					3-	-90.41				1 1 1 1 1 1 1 1 1 1	□
End of Test Pit (Groundwater infiltration @ 2.6m depth)												
								20 She	40 ar Stren	60 gth (kP	80 1 Pa)	00
								▲ Undist	urbed	△ Remo	oulded	

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

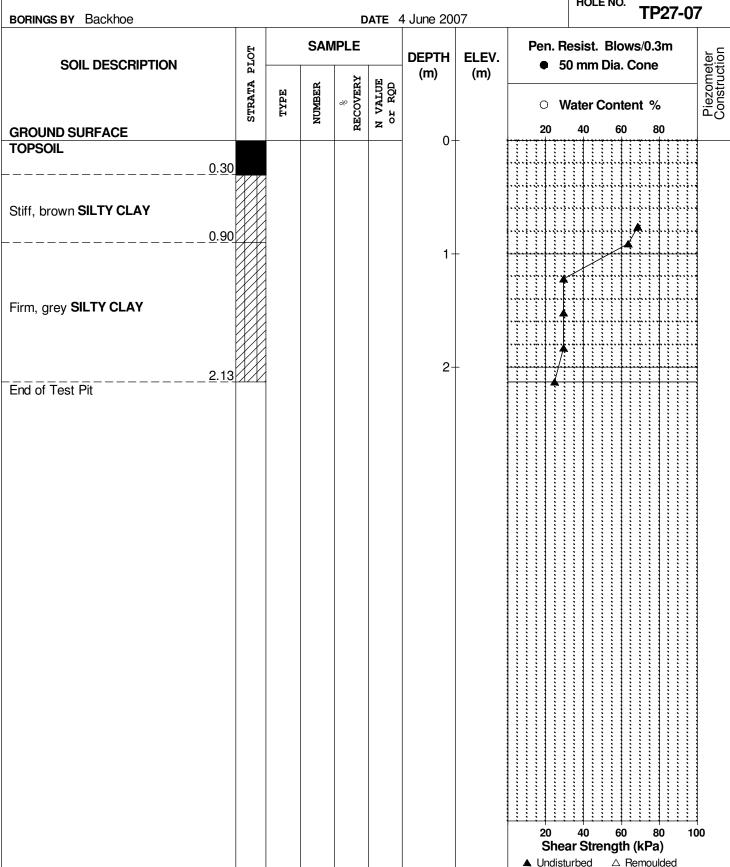
DATUM Ground surface elevations provided by J.D. Barnes Limited.

REMARKS

BORINGS BY Backhoe

PG0177

HOLE NO.
TP27-07



28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

DATUM Ground surface elevations provided by J.D. Barnes Limited.

PG0177

REMARKS

POPINGS BY Packbox

PATE 14 lune 2007

BORINGS BY Backhoe				0	ATE	14 June 2	007		HOLE N	^{o.} TP50-0	7
SOIL DESCRIPTION	PLOT		SAN	/IPLE		DEPTH (m)	ELEV. (m)		esist. Bl 0 mm Dia	ows/0.3m a. Cone	neter uction
	STRATA	TYPE	NUMBER	% RECOVERY	N VALUE or RQD		(,		Vater Cor		Piezometer Construction
TOPSOIL 0	30			_ н		0-	-92.32	20	40 (60 80	
Stiff, grey-brown, dessicated CLAYEY SILT , some shells						1-	-91.32				***************************************
1	80					2-	-90.32				⊽
Firm to soft, grey SILTY CLAY						3-	-89.32				
End of Test Pit	30					4-	-88.32				
(Open hole GWL @ 2.2m depth)											
								20 Shea	ar Streng	50 80 1 th (kPa) A Remoulded	00

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SOIL PROFILE AND TEST DATA

Geotechnical Investigation Proposed Residential Development-Half Moon Bay Ottawa, Ontario

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7 DATUM

Ground surface elevations provided by J.D. Barnes Limited.

FILE NO.

PG0177

REMARKS								HOLE NO. TP51-07	
BORINGS BY Backhoe	E		SAN	(IPLE	ATE	14 June 2			
SOIL DESCRIPTION	ATA PLOT	ři			COE	DEPTH (m)	ELEV. (m)	• 50 mm Dia. Cone	Construction
CDOLIND CLIDEACE	STRATA	TYPE	NUMBER	% RECOVERY	N VALUE or RQD			O Water Content %	
GROUND SURFACE TOPSOIL						0-	-92.29		
Brown CLAYEY SILT , trace silt in upper 300mm	<u>2</u> 5								
- some shells by 1.0m depth	20					1-	91.29		
Stiff to firm, brown SILTY CLAY 1	80								⊽
						2-	-90.29		
Firm to soft, grey SILTY CLAY						3-	-89.29		
						4-	-88.29		
End of Test Pit (Open hole GWL @ 1.8m depth)	00					5-	-87.29		
								20 40 60 80 100 Shear Strength (kPa) ▲ Undisturbed △ Remoulded	

Consulting Engineers

SOIL PROFILE AND TEST DATA

Preliminary Geotechnical Investigation Nepean South Lands, South of Jock River Ottawa (Nepean), Ontario

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7 **DATUM** FILE NO. G9132 **REMARKS** HOLE NO. **TP13 BORINGS BY** Backhoe DATE 1 December 2003 **SAMPLE** Pen. Resist. Blows/0.3m STRATA PLOT **DEPTH** ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPE Water Content % 80 **GROUND SURFACE** 0 **TOPSOIL** 0.40 Grey-brown SANDY SILT, trace shells 2 Stiff to firm, grey SILTY CLAY 3 End of Test Pit (Open hole GWL @ 1.4m depth) 40 60 80 100 Shear Strength (kPa) ▲ Undisturbed \triangle Remoulded

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

Consulting Engineers

SOIL PROFILE AND TEST DATA

Preliminary Geotechnical Investigation Nepean South Lands, South of Jock River Ottawa (Nepean), Ontario

DATUM FILE NO. G9132 **REMARKS** HOLE NO. **TP14 BORINGS BY** Backhoe DATE 1 December 2003 **SAMPLE** Pen. Resist. Blows/0.3m STRATA PLOT **DEPTH** ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPE Water Content % **GROUND SURFACE** 0 **TOPSOIL** 0.40 ⊻ Stiff, brown SILTY CLAY - firm and grey by 1.8m depth 2 3.00 3 End of Test Pit (Open hole GWL @ 1.0m depth) 40 60 80 100 Shear Strength (kPa) ▲ Undisturbed \triangle Remoulded

Consulting Engineers

SOIL PROFILE AND TEST DATA

Preliminary Geotechnical Investigation Nepean South Lands, South of Jock River Ottawa (Nepean), Ontario

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7 **DATUM** FILE NO. G9132 **REMARKS** HOLE NO. **TP15 BORINGS BY** Backhoe DATE 1 Dec 03 SAMPLE Pen. Resist. Blows/0.3m STRATA PLOT **DEPTH** ELEV. **SOIL DESCRIPTION** 50 mm Dia. Cone (m) (m) RECOVERY N VALUE or RQD NUMBER TYPE Water Content % **GROUND SURFACE** 0 **TOPSOIL** 0.40 ∇ Stiff, brown SILTY CLAY - firm and grey by 1.8m depth 2 G 1 3.00 3 End of Test Pit (Open hole GWL @ 0.8m depth) 40 60 80 100 Shear Strength (kPa) ▲ Undisturbed \triangle Remoulded

SYMBOLS AND TERMS

SOIL DESCRIPTION

Behavioural properties, such as structure and strength, take precedence over particle gradation in describing soils. Terminology describing soil structure are as follows:

Desiccated	-	having visible signs of weathering by oxidation of clay minerals, shrinkage cracks, etc.
Fissured	-	having cracks, and hence a blocky structure.
Varved	-	composed of regular alternating layers of silt and clay.
Stratified	-	composed of alternating layers of different soil types, e.g. silt and sand or silt and clay.
Well-Graded	-	Having wide range in grain sizes and substantial amounts of all intermediate particle sizes (see Grain Size Distribution).
Uniformly-Graded	-	Predominantly of one grain size (see Grain Size Distribution).

The standard terminology to describe the strength of cohesionless soils is the relative density, usually inferred from the results of the Standard Penetration Test (SPT) 'N' value. The SPT N value is the number of blows of a 63.5 kg hammer, falling 760 mm, required to drive a 51 mm O.D. split spoon sampler 300 mm into the soil after an initial penetration of 150 mm.

Relative Density	'N' Value	Relative Density %		
Very Loose	<4	<15		
Loose	4-10	15-35		
Compact	10-30	35-65		
Dense	30-50	65-85		
Very Dense	>50	>85		

The standard terminology to describe the strength of cohesive soils is the consistency, which is based on the undisturbed undrained shear strength as measured by the in situ or laboratory vane tests, penetrometer tests, unconfined compression tests, or occasionally by Standard Penetration Tests.

Consistency	Undrained Shear Strength (kPa)	'N' Value	
Very Soft	<12	<2	
Soft	12-25	2-4	
Firm	25-50	4-8	
Stiff	50-100	8-15	
Very Stiff	100-200	15-30	
Hard	>200	>30	

SYMBOLS AND TERMS (continued)

SOIL DESCRIPTION (continued)

Cohesive soils can also be classified according to their "sensitivity". The sensitivity is the ratio between the undisturbed undrained shear strength and the remoulded undrained shear strength of the soil.

Terminology used for describing soil strata based upon texture, or the proportion of individual particle sizes present is provided on the Textural Soil Classification Chart at the end of this information package.

ROCK DESCRIPTION

The structural description of the bedrock mass is based on the Rock Quality Designation (RQD).

The RQD classification is based on a modified core recovery percentage in which all pieces of sound core over 100 mm long are counted as recovery. The smaller pieces are considered to be a result of closely-spaced discontinuities (resulting from shearing, jointing, faulting, or weathering) in the rock mass and are not counted. RQD is ideally determined from NXL size core. However, it can be used on smaller core sizes, such as BX, if the bulk of the fractures caused by drilling stresses (called "mechanical breaks") are easily distinguishable from the normal in situ fractures.

RQD %	ROCK QUALITY
90-100	Excellent, intact, very sound
75-90	Good, massive, moderately jointed or sound
50-75	Fair, blocky and seamy, fractured
25-50	Poor, shattered and very seamy or blocky, severely fractured
0-25	Very poor, crushed, very severely fractured

SAMPLE TYPES

SS	-	Split spoon sample (obtained in conjunction with the performing of the Standard Penetration Test (SPT))
TW	-	Thin wall tube or Shelby tube
PS	-	Piston sample
AU	-	Auger sample or bulk sample
WS	-	Wash sample
RC	-	Rock core sample (Core bit size AXT, BXL, etc.). Rock core samples are obtained with the use of standard diamond drilling bits.

SYMBOLS AND TERMS (continued)

GRAIN SIZE DISTRIBUTION

MC% - Natural moisture content or water content of sample, %

Liquid Limit, % (water content above which soil behaves as a liquid)
 PL - Plastic limit, % (water content above which soil behaves plastically)

PI - Plasticity index, % (difference between LL and PL)

Dxx - Grain size which xx% of the soil, by weight, is of finer grain sizes

These grain size descriptions are not used below 0.075 mm grain size

D10 - Grain size at which 10% of the soil is finer (effective grain size)

D60 - Grain size at which 60% of the soil is finer

Cc - Concavity coefficient = $(D30)^2 / (D10 \times D60)$

Cu - Uniformity coefficient = D60 / D10

Cc and Cu are used to assess the grading of sands and gravels:

Well-graded gravels have: 1 < Cc < 3 and Cu > 4 Well-graded sands have: 1 < Cc < 3 and Cu > 6

Sands and gravels not meeting the above requirements are poorly-graded or uniformly-graded.

Cc and Cu are not applicable for the description of soils with more than 10% silt and clay

(more than 10% finer than 0.075 mm or the #200 sieve)

CONSOLIDATION TEST

p'₀ - Present effective overburden pressure at sample depth

p'_c - Preconsolidation pressure of (maximum past pressure on) sample

Ccr - Recompression index (in effect at pressures below p'c)
Cc - Compression index (in effect at pressures above p'c)

OC Ratio Overconsolidaton ratio = p'_c/p'_o

Void Ratio Initial sample void ratio = volume of voids / volume of solids

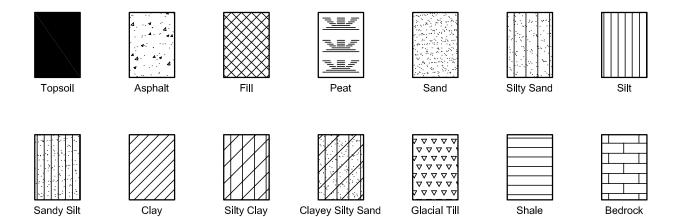
Wo - Initial water content (at start of consolidation test)

PERMEABILITY TEST

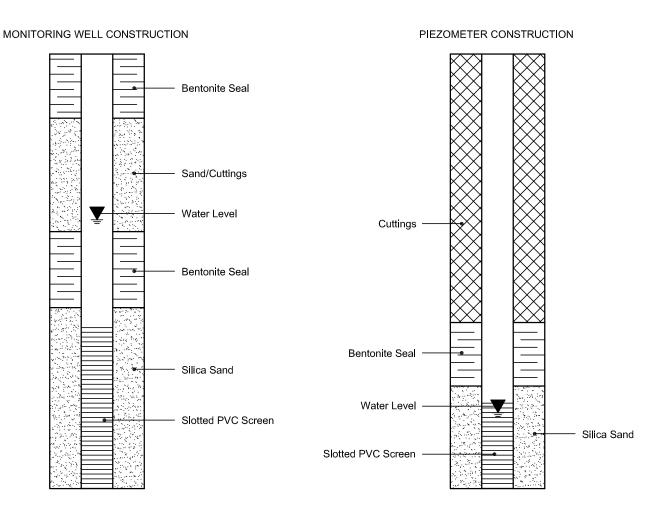
Coefficient of permeability or hydraulic conductivity is a measure of the ability of water to flow through the sample. The value of k is measured at a specified unit weight for (remoulded) cohesionless soil samples, because its value will vary with the unit weight or density of the sample during the test.

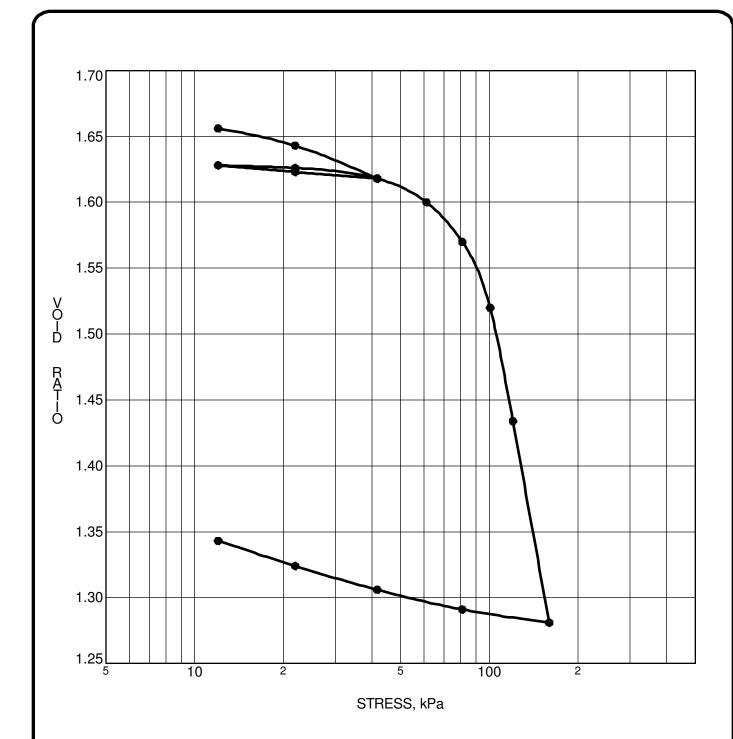
SYMBOLS AND TERMS (continued)

STRATA PLOT



MONITORING WELL AND PIEZOMETER CONSTRUCTION





CONSOLIDATION TEST DATA SUMMARY							
Borehole No.	BH 1-10	p'o	58.3 kPa	Ccr	0.019		
Sample No.	TW7	p'c	93 kPa	Сс	1.228		
Sample Depth	9.45 m	OC Ratio	1.6	Wo	60.8 %		
Sample Elev.	84.54 m	Void Ratio	1.673	Unit Wt.	16.1 kN/m ³		

Note: Overburden stress calculated from original ground surface (92.30m)

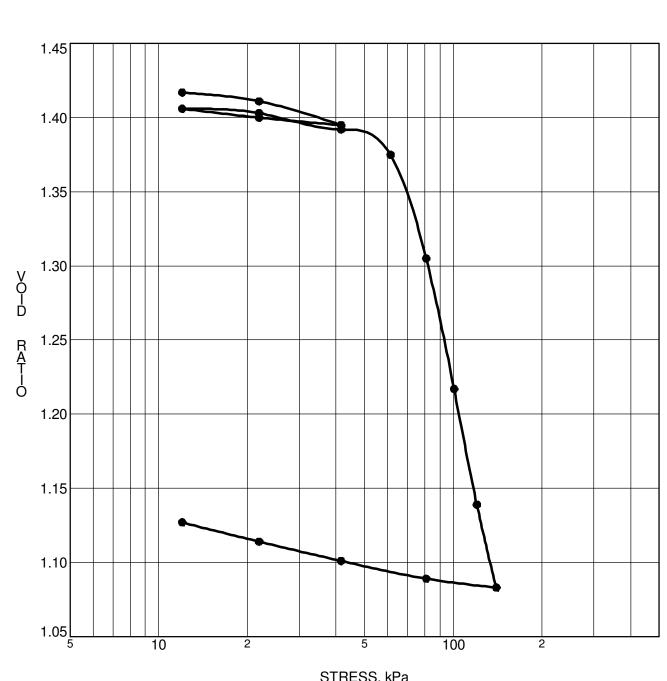
CLIENTMattamy HomesFILE NO.PG2246PROJECTGeotechnical Investigation - Half-Moon Bay West -DATE11/03/2010

patersongroup

Cambrian Road

Consulting Engineers CONSOLIDATION TEST

154 Colonnade Road South, Ottawa, Ontario K2E 7J5



CONSOLIDATION TEST DATA SUMMARY							
Borehole No.	BH 2-10	p'o	36 kPa	Ccr	0.023		
Sample No.	TW 4	p'c	67.7 kPa	Сс	1.024		
Sample Depth	2.64 m	OC Ratio	1.9	Wo	51.9 %		
Sample Elev.	89.13 m	Void Ratio	1.428	Unit Wt.	17.0 kN/m ³		

Note: Overburden stress calculated from original ground surface (91.77m)

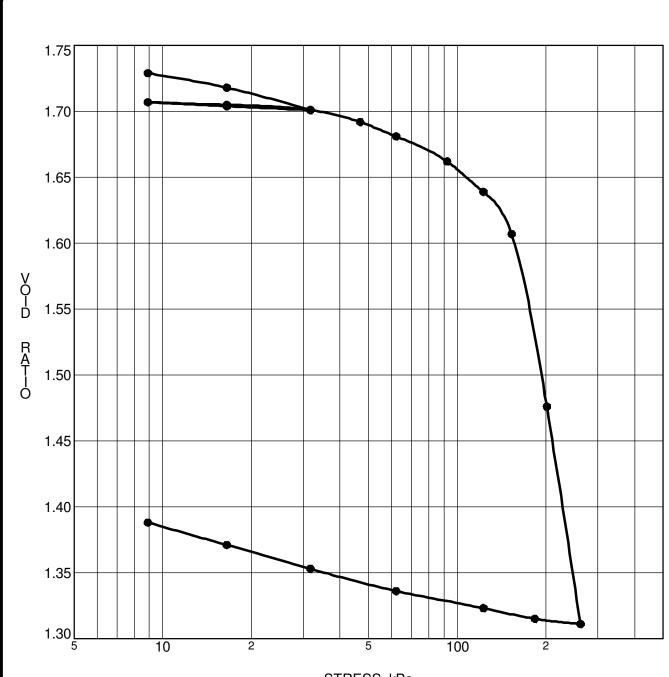
PG2246 CLIENT **Mattamy Homes** FILE NO. **PROJECT** Geotechnical Investigation - Half-Moon Bay West -11/04/2010 DATE

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Cambrian Road

Consulting **Engineers**

CONSOLIDATION TEST



STRESS, kPa

CONSOLIDATION TEST DATA SUMMARY							
Borehole No.	BH 3-10	p'o	116 kPa	Ccr	0.012		
Sample No.	TW 7	p' _c	153.1 kPa	Cc	1.208		
Sample Depth	15.67 m	OC Ratio	1.3	Wo	63.6 %		
Sample Elev.	76.39 m	Void Ratio	1.749	Unit Wt.	16.3 kN/m ³		

Note: Overburden stress calculated from original ground surface (92.00m)

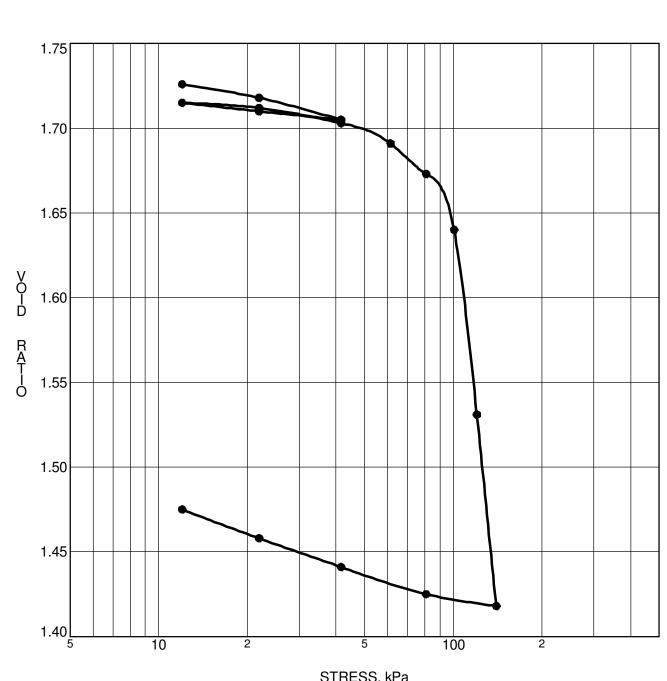
CLIENTMattamy HomesFILE NO.PG2246PROJECTGeotechnical Investigation - Half-Moon Bay West -DATE11/08/2010

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28 Concouse Gate, Unit 1, Ottawa, Ontario K2E 7T7

Cambrian Road

Consulting Engineers CONSOLIDATION TEST



CONSOLIDATION TEST DATA SUMMARY						
Borehole No.	BH 4-10	p'o	49.6 kPa	Ccr	0.020	
Sample No.	TW 8	p'c	100 kPa	Сс	1.585	
Sample Depth	7.13 m	OC Ratio	2.0	Wo	63.2 %	
Sample Elev.	86.66 m	Void Ratio	1.738	Unit Wt.	16.2 kN/m ³	

Note: Overburden stress calculated from original ground surface (92.50m)

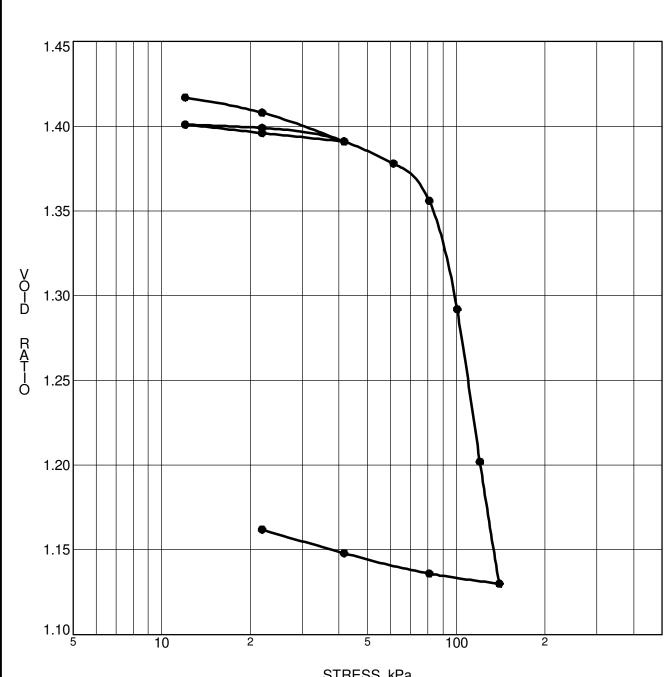
PG2246 CLIENT **Mattamy Homes** FILE NO. **PROJECT** Geotechnical Investigation - Half-Moon Bay West -11/11/2010 DATE

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Cambrian Road

Consulting **Engineers**

CONSOLIDATION TEST



CONSOLIDATION TEST DATA SUMMARY							
Borehole No.	BH 5-10	p'o	41 kPa	Ccr	0.019		
Sample No.	TW 5	p'c	87.17 kPa	Cc	1.186		
Sample Depth	4.24 m	OC Ratio	2.1	Wo	52.0 %		
Sample Elev.	88.27 m	Void Ratio	1.43	Unit Wt.	16.9 kN/m ³		

Note: Overburden stress calculated from original ground surface (92.26m)

PG2246 CLIENT **Mattamy Homes** FILE NO. **PROJECT** Geotechnical Investigation - Half-Moon Bay West -11/08/2010 DATE

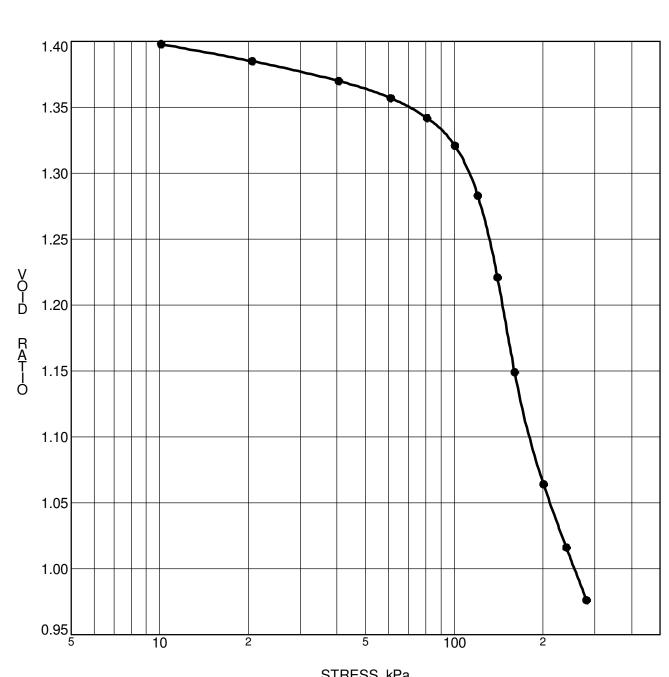
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Cambrian Road

Consulting **Engineers**

CONSOLIDATION TEST



CONSOLIDATION TEST DATA SUMMARY						
Borehole No.	BH 5-10	p' ₀ 74.4 kPa	Ccr			
Sample No.	TW 7	p' _c 118.66 kPa	Cc	1.114		
Sample Depth	9.64 m	OC Ratio 1.6	Wo	51.5 %		
Sample Elev.	82.87 m	Void Ratio 1.417	Unit Wt.	17.2 kN/m ³		

Note: Overburden stress calculated from original ground surface (92.26m)

PG2246 CLIENT **Mattamy Homes** FILE NO. **PROJECT** Geotechnical Investigation - Half-Moon Bay West -11/08/2010 DATE

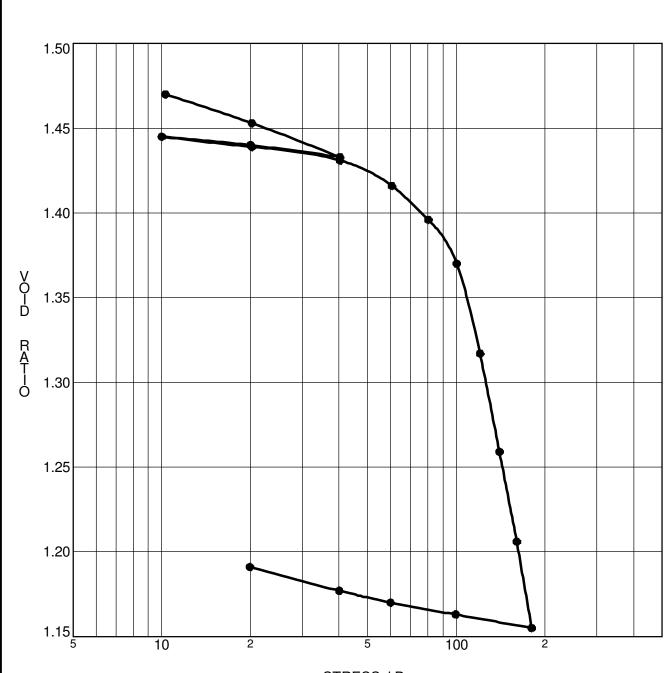
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Consulting **Engineers**

CONSOLIDATION TEST

28 Concouse Gate, Unit 1, Ottawa, Ontario K2E 7T7

Cambrian Road



STRESS, kPa

CONSOLIDATION TEST DATA SUMMARY						
Borehole No.	BH 7-10	p'o	41.2 kPa	Ccr	0.022	
Sample No.	TW 3	p' _c	101 kPa	Сс	0.927	
Sample Depth	2.74 m	OC Ratio	2.5	Wo	54.3 %	
Sample Elev.	88.67 m	Void Ratio	1.493	Unit Wt.	16.9 kN/m ³	

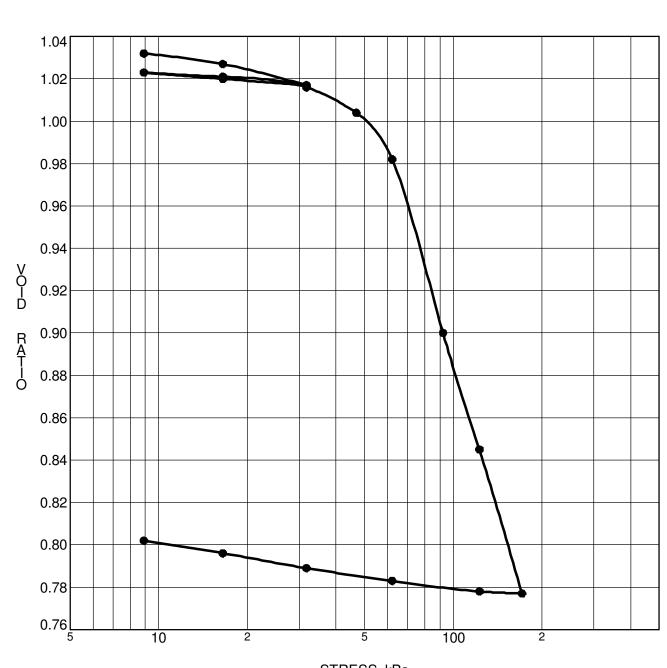
Note: Overburden stress calculated from original ground surface (92.10m)

CLIENTMattamy HomesFILE NO.PG2246PROJECTGeotechnical Investigation - Half-Moon Bay West -DATE02/22/2011

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Cambrian Road

Consulting Engineers CONSOLIDATION TEST



CONSOLIDATION TEST DATA SUMMARY					
Borehole No.	BH10-10	p'o	29.1 kPa	Ccr	0.012
Sample No.	TW 3	p'c	55.46 kPa	Cc	0.472
Sample Depth	3.48 m	OC Ratio	1.9	Wo	37.8 %
Sample Elev.	90.37 m	Void Ratio	1.039	Unit Wt.	18.2 kN/m ³

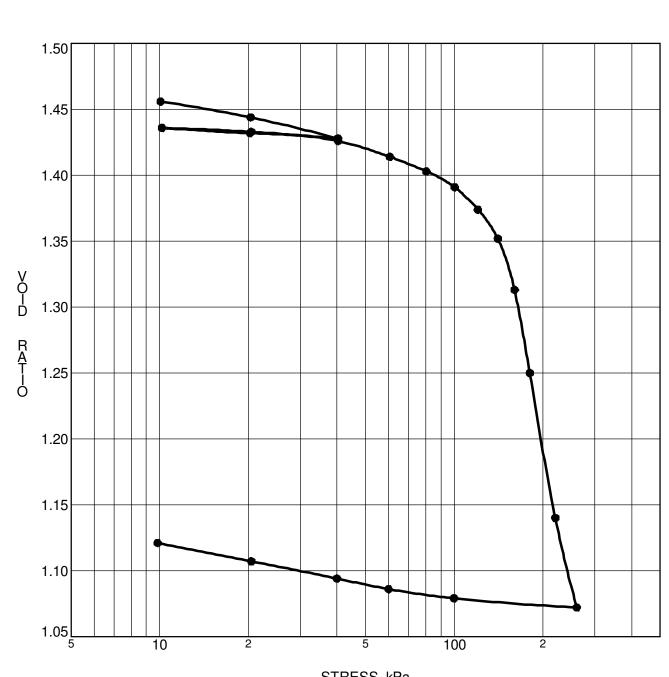
Note: Overburden stress calculated from original ground surface (92.90m)

CLIENTMattamy HomesFILE NO.PG2246PROJECTGeotechnical Investigation - Half-Moon Bay West -DATE11/30/2010

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Cambrian Road

Consulting Engineers CONSOLIDATION TEST



CONSOLIDATION TEST DATA SUMMARY					
Borehole No.	BH11-10	p'o	85 kPa	Ccr	0.014
Sample No.	TW 6	p' _c	141 kPa	Сс	1.259
Sample Depth	12.72 m	OC Ratio	1.7	Wo	53.8 %
Sample Elev.	80.97 m	Void Ratio	1.48	Unit Wt.	17.1 kN/m ³

Note: Overburden stress calculated from original ground surface (92.70m)

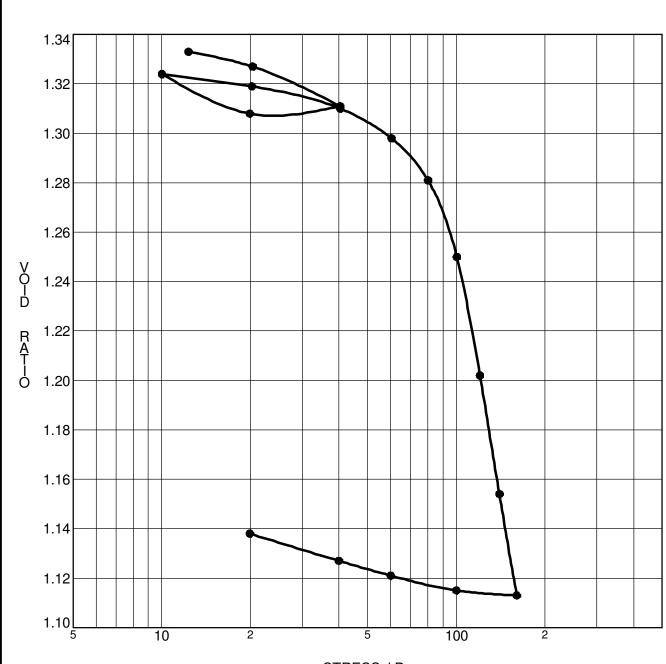
PG2246 CLIENT **Mattamy Homes** FILE NO. **PROJECT** Geotechnical Investigation - Half-Moon Bay West -02/10/2011 DATE

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Cambrian Road

Consulting **Engineers**

CONSOLIDATION TEST



CONSOLIDATION TEST DATA SUMMARY					
Borehole No.	BH12-10	p'o	39.8 kPa	Ccr	0.022
Sample No.	TW 3	p'c	92 kPa	Сс	0.721
Sample Depth	5.66 m	OC Ratio	2.3	Wo	49.2 %
Sample Elev.	89.09 m	Void Ratio	1.353	Unit Wt.	17.4 kN/m ³

Note: Overburden stress calculated from original ground surface (93.00m)

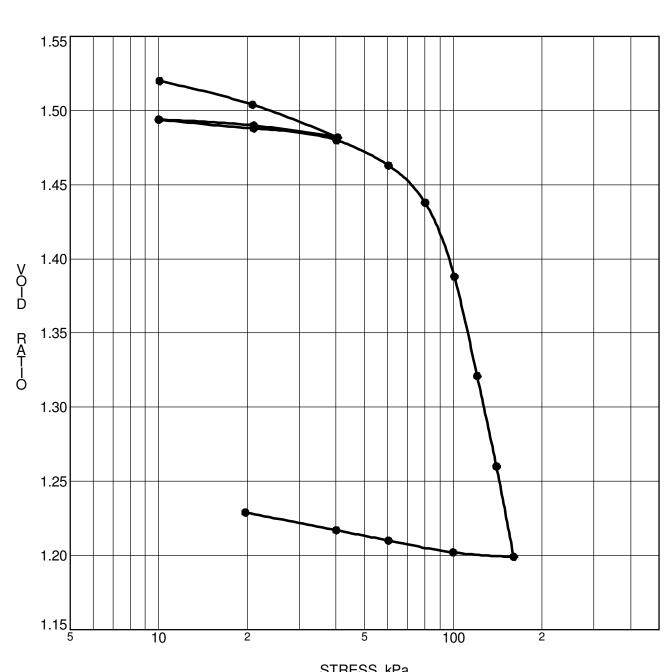
CLIENTMattamy HomesFILE NO.PG2246PROJECTGeotechnical Investigation - Half-Moon Bay West -DATE02/10/2011

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Cambrian Road

Consulting Engineers

CONSOLIDATION TEST



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CONSOLIDATION TEST DATA SUMMARY					
Borehole No.	BH14-10	p'o	67.7 kPa	Ccr	0.021
Sample No.	TW 7	p'c	90 kPa	Сс	0.961
Sample Depth	9.55 m	OC Ratio	1.3	Wo	56.3 %
Sample Elev.	83.25 m	Void Ratio	1.548	Unit Wt.	16.9 kN/m ³

Note: Overburden stress calculated from original ground surface (92.00m)

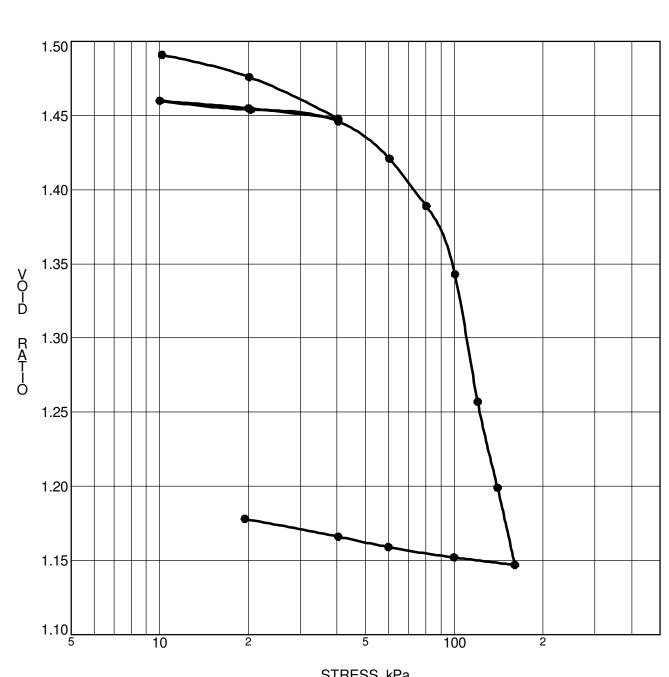
CLIENT **Mattamy Homes** FILE NO. PG2246 **PROJECT** Geotechnical Investigation - Half-Moon Bay West -02/22/2011 DATE

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CONSOLIDATION TEST



CONSOLIDATION TEST DATA SUMMARY						
Borehole No.	BH15-10	p'o	55.2 kPa	Ccr	0.021	
Sample No.	TW 4	p'c	87 kPa	Сс	1.133	
Sample Depth	6.50 m	OC Ratio	1.6	Wo	54.9 %	
Sample Elev.	86.11 m	Void Ratio	1.508	Unit Wt.	16.9 kN/m ³	

Note: Overburden stress calculated from original ground surface (91.80m)

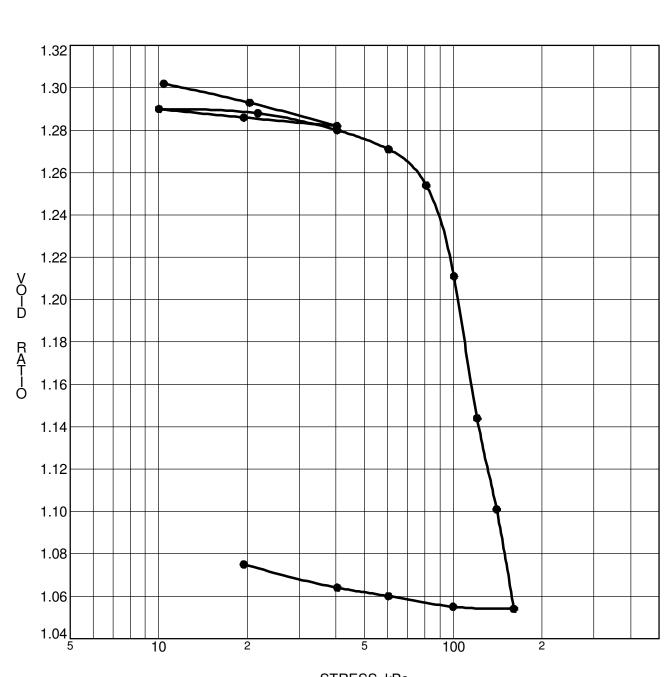
CLIENT **Mattamy Homes** FILE NO. PG2246 **PROJECT** Geotechnical Investigation - Half-Moon Bay West -02/22/2011 DATE

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CONSOLIDATION TEST



STRESS, kPa

CONSOLIDATION TEST DATA SUMMARY							
Borehole No.	BH15-10	p'o	54.3 kPa	Ccr	0.015		
Sample No.	TW 4	p'c	87.9 kPa	Сс	0.778		
Sample Depth	6.60 m	OC Ratio	1.6	Wo	47.7 %		
Sample Elev.	86.01 m	Void Ratio	1.313	Unit Wt.	17.4 kN/m ³		

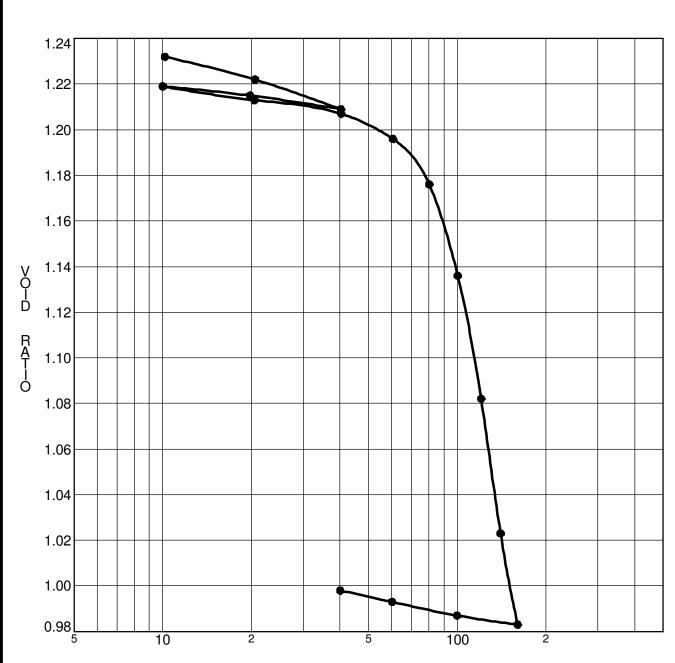
Note: Overburden stress calculated from original ground surface (91.80m)

CLIENTMattamy HomesFILE NO.PG2246PROJECTGeotechnical Investigation - Half-Moon Bay West -DATE02/10/2011

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Consulting Engineers CONSOLIDATION TEST



STRESS, kPa

CONSOLIDATION TEST DATA SUMMARY						
Borehole No.	BH20-10	p'o	38 kPa	Ccr	0.019	
Sample No.	TW 7	p'c	90 kPa	Сс	0.763	
Sample Depth	5.80 m	OC Ratio	2.4	Wo	45.3 %	
Sample Elev.	88.78 m	Void Ratio	1.244	Unit Wt.	17.6 kN/m ³	

Note: Overburden stress calculated from original ground surface (92.20m)

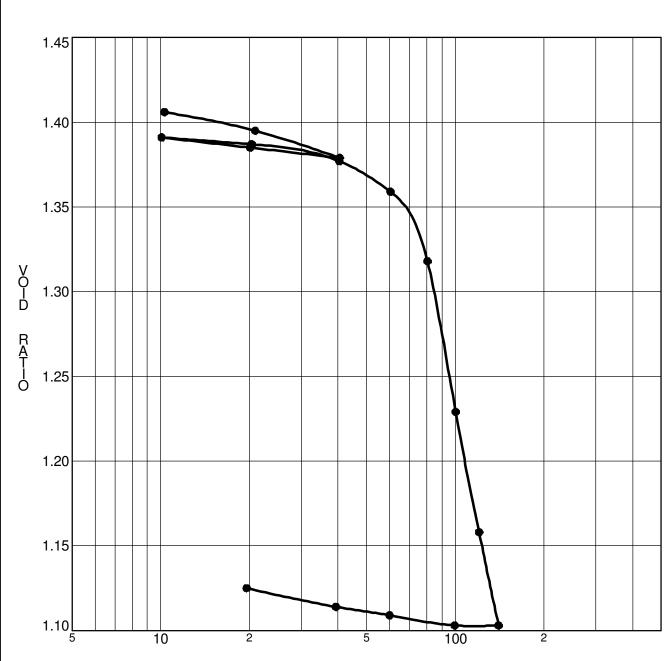
CLIENTMattamy HomesFILE NO.PG2246PROJECTGeotechnical Investigation - Half-Moon Bay West -DATE03/01/2011

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CONSOLIDATION TEST



STRESS, kPa

CONSOLIDATION TEST DATA SUMMARY							
Borehole No.	BH23-10	p'o	35.8 kPa	Ccr	0.022		
Sample No.	TW 6	p' _c	74 kPa	Сс	0.903		
Sample Depth	3.50 m	OC Ratio	2.1	Wo	51.7 %		
Sample Elev.	89.66 m	Void Ratio	1.422	Unit Wt.	17.2 kN/m ³		

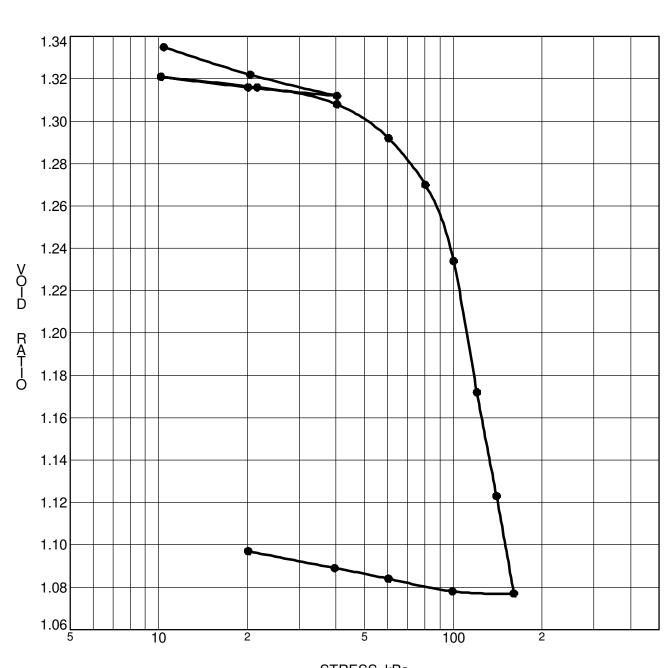
Note: Overburden stress calculated from original ground surface (93.10m)

CLIENTMattamy HomesFILE NO.PG2246PROJECTGeotechnical Investigation - Half-Moon Bay West -DATE03/01/2011

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Consulting Engineers CONSOLIDATION TEST



CONSOLIDATION TEST DATA SUMMARY							
Borehole No.	BH24-10	p'o	55.3 kPa	Ccr	0.017		
Sample No.	TW 4	p'c	90 kPa	Сс	0.784		
Sample Depth	6.56 m	OC Ratio	1.6	Wo	49.3 %		
Sample Elev.	86.52 m	Void Ratio	1.356	Unit Wt.	17.4 kN/m ³		

Note: Overburden stress calculated from original ground surface (93.10m)

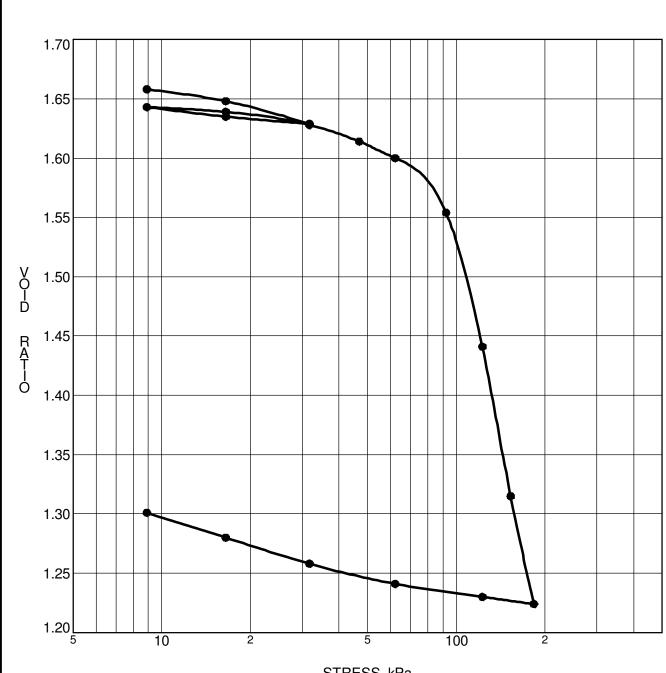
CLIENTMattamy HomesFILE NO.PG2246PROJECTGeotechnical Investigation - Half-Moon Bay West -DATE03/01/2011

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Consulting Engineers

CONSOLIDATION TEST



CONSOLIDATION TEST DATA SUMMARY							
Borehole No.	BH14-08	p'o	44.5 kPa	Ccr	0.016		
Sample No.	TW 6	p'c	92 kPa	Сс	1.214		
Sample Depth	8.02 m	OC Ratio	2.1	Wo	60.6 %		
Sample Elev.	87.85 m	Void Ratio	1.667	Unit Wt.	16.3 kN/m ³		

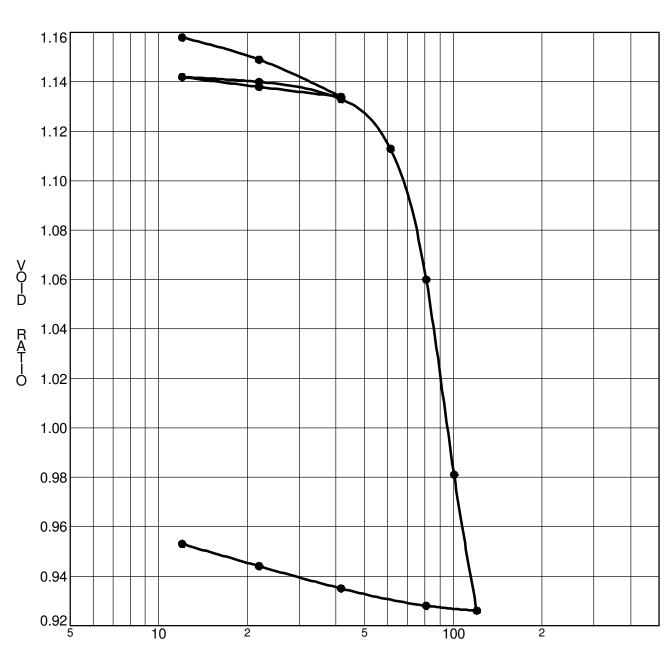
Note: Overburden stress calculated from original ground surface (92.2m)

CLIENT **Mattamy Homes** FILE NO. **PG1618 PROJECT** Geotechnical Investigation - Proposed Residential DATE Apr 7/08 **Development-Half Moon Bay**

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CONSOLIDATION TEST



CONSOLIDATION TEST DATA SUMMARY							
Borehole No.	BH15-08	p'o	30.5 kPa	Ccr	0.011		
Sample No.	TW 5	p'c	69 kPa	Cc	0.761		
Sample Depth	4.28 m	OC Ratio	2.3	Wo	42.5 %		
Sample Elev.	89.00 m	Void Ratio	1.168	Unit Wt.	17.8 kN/m ³		

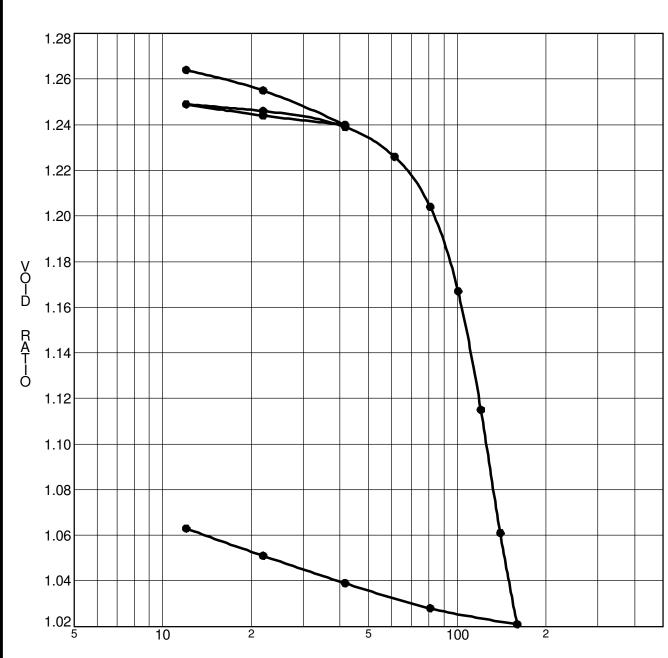
Note: Overburden stress calculated from original ground surface (92.40m)

CLIENTMattamy HomesFILE NO.PG1618PROJECTGeotechnical Investigation - Proposed ResidentialDATEApril 27/08

Development-Half Moon Bay

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Consulting Engineers CONSOLIDATION TEST



STRESS, kPa

CONSOLIDATION TEST DATA SUMMARY							
Borehole No.	BH20-08	p'o	42.2 kPa	Ccr	0.015		
Sample No.	TW 6	p' _c	88 kPa	Сс	0.763		
Sample Depth	5.79 m	OC Ratio	2.1	Wo	46.5 %		
Sample Elev.	88.26 m	Void Ratio	1.278	Unit Wt.	17.3 kN/m ³		

Note: Overburden stress calculated from original ground surface (92.20m)

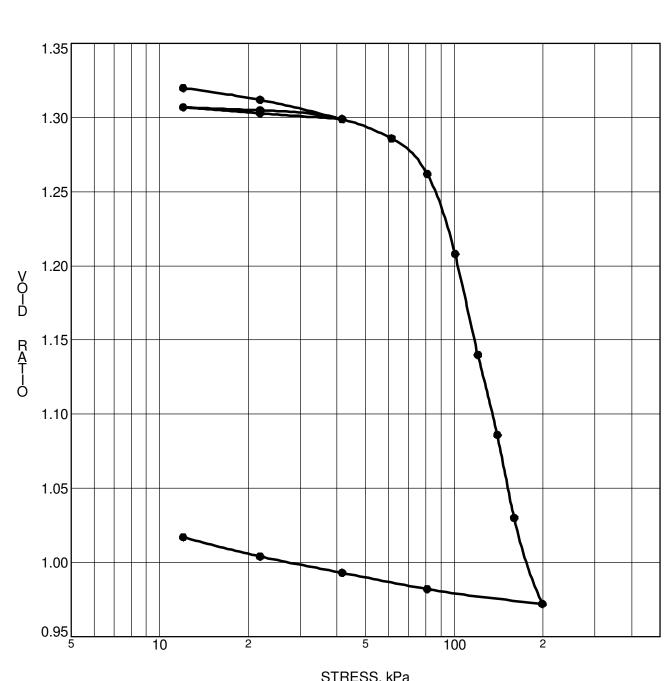
CLIENTMattamy HomesFILE NO.PG1618PROJECTGeotechnical Investigation - Proposed ResidentialDATEApril 3/08

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Consulting Engineers CONSOLIDATION TEST

28 Concouse Gate, Unit 1, Ottawa, Ontario K2E 7T7

Development-Half Moon Bay



CONSOLIDATION TEST DATA SUMMARY							
Borehole No.	BH22-08	p'o	45.5 kPa	Ccr	0.010		
Sample No.	TW 4	p'c	85 kPa	Cc	0.902		
Sample Depth	4.27 m	OC Ratio	1.9	Wo	48.4 %		
Sample Elev.	87.99 m	Void Ratio	1.33	Unit Wt.	17.1 kN/m ³		

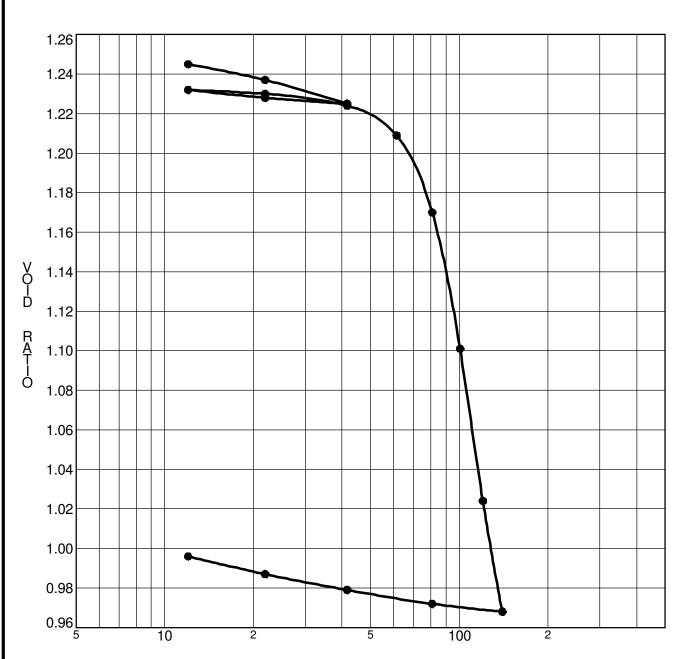
Note: Overburden stress calculated from original ground surface (92.80m)

CLIENT **Mattamy Homes** FILE NO. **PG1618 PROJECT** Geotechnical Investigation - Proposed Residential DATE Mar 31/08 **Development-Half Moon Bay**

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Consulting **Engineers**

CONSOLIDATION TEST



STRESS, kPa

CONSOLIDATION TEST DATA SUMMARY							
Borehole No.	BH29-08	p'o	48.3 kPa	Ccr	0.014		
Sample No.	TW 5	p'c	78 kPa	Сс	0.905		
Sample Depth	7.20 m	OC Ratio	1.6	Wo	45.6 %		
Sample Elev.	84.79 m	Void Ratio	1.254	Unit Wt.	17.4 kN/m ³		

Note: Overburden stress calculated from original ground surface (91.90m)

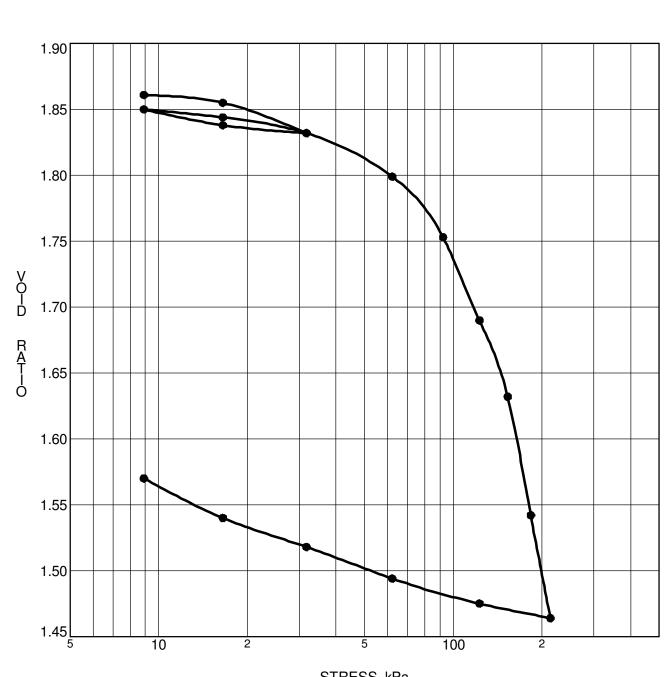
CLIENT Mattamy Homes FILE NO. PG1618

PROJECT Geotechnical Investigation - Proposed Residential DATE April 28/2008

Development-Half Moon Bay

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CONSOLIDATION TEST DATA SUMMARY						
Borehole No.	BH 1-07	p'o	58 kPa	Ccr	0.033	
Sample No.	TW 3	p'c	108 kPa	Cc	1.165	
Sample Depth	3.25 m	OC Ratio	1.9	Wo	67.7 %	
Sample Elev.	89.01 m	Void Ratio	1.862	Unit Wt.	15.8 kN/m ³	

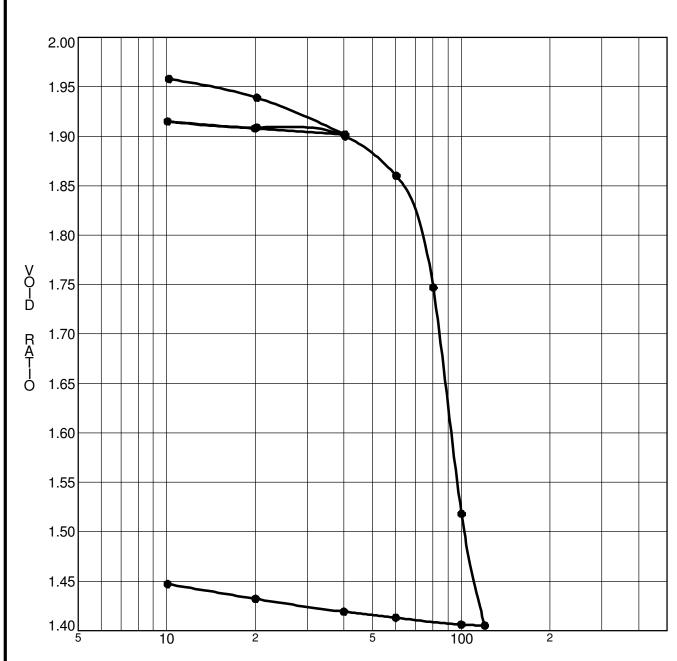
CLIENT **Mattamy Homes** FILE NO. PG0177 **PROJECT** DATE 07/23/2007 Geotechnical Investigation - Proposed Residential **Development-Half Moon Bay**

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28 Concouse Gate, Unit 1, Ottawa, Ontario K2E 7T7

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CONSOLIDATION TEST



STRESS, kPa

CONSOLIDATION TEST DATA SUMMARY						
Borehole No.	BH 1-07	p'o	59 kPa	Ccr	0.024	
Sample No.	TW 4	p'c	71 kPa	Сс	2.352	
Sample Depth	5.54 m	OC Ratio	1.2	Wo	71.9 %	
Sample Elev.	86.72 m	Void Ratio	1.978	Unit Wt.	15.6 kN/m ³	

CLIENT Mattamy Homes FILE NO. PG0177

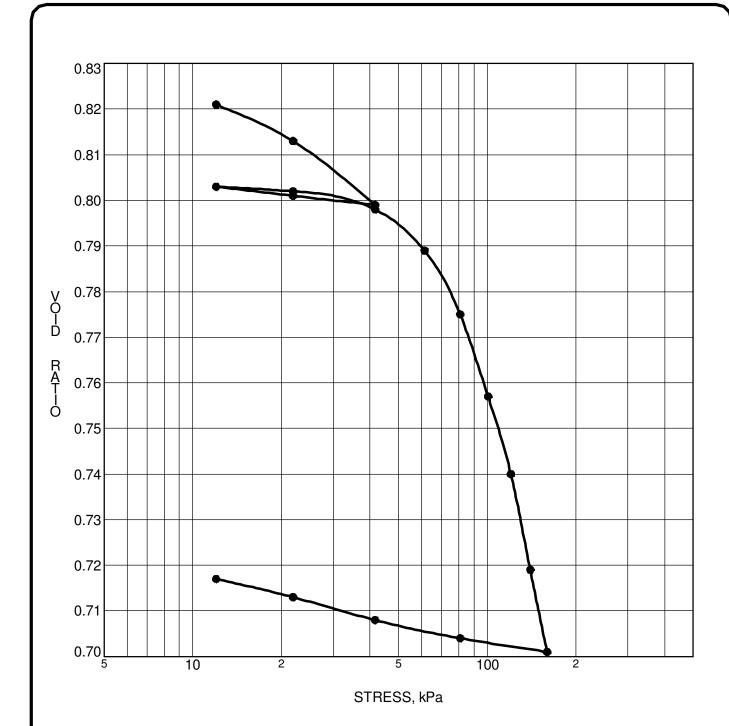
PROJECT Geotechnical Investigation - Proposed Residential DATE 07/27/2007

Development-Half Moon Bay

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28 Concouse Gate, Unit 1, Ottawa, Ontario K2E 7T7

Consulting Engineers CONSOLIDATION TEST



CONSOLIDATION TEST DATA SUMMARY						
Borehole No.	BH 2-07	p'o	53 kPa	Ccr	0.009	
Sample No.	TW 4	p' _c	87 kPa	Сс	0.324	
Sample Depth	4.95 m	OC Ratio	1.6	Wo	30.2 %	
Sample Elev.	87.62 m	Void Ratio	0.829	Unit Wt.	19.2 kN/m ³	

CLIENT Mattamy Homes FILE NO. PG0177

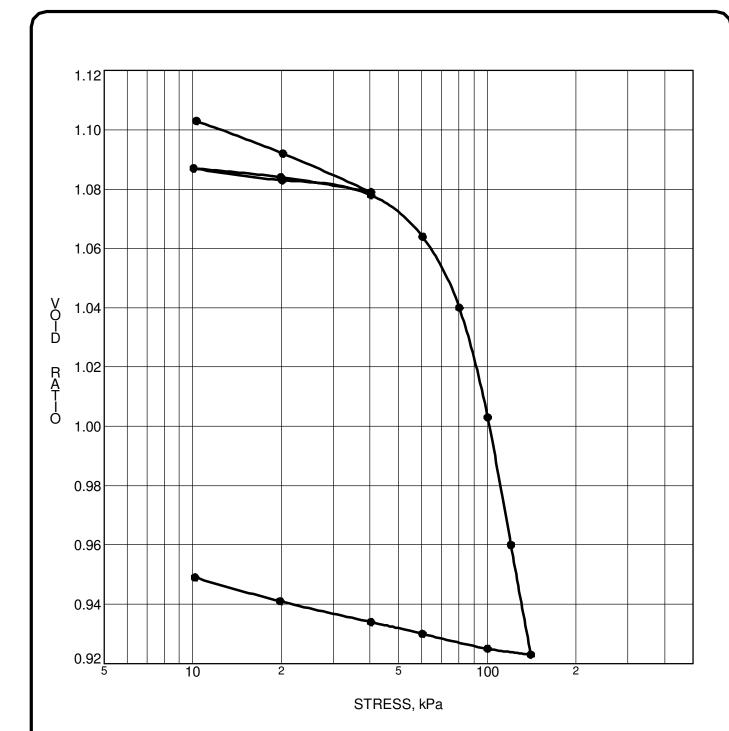
PROJECT Geotechnical Investigation - Proposed Residential DATE 07/23/2007

Development-Half Moon Bay

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28 Concouse Gate, Unit 1, Ottawa, Ontario K2E 7T7

Consulting Engineers CONSOLIDATION TEST



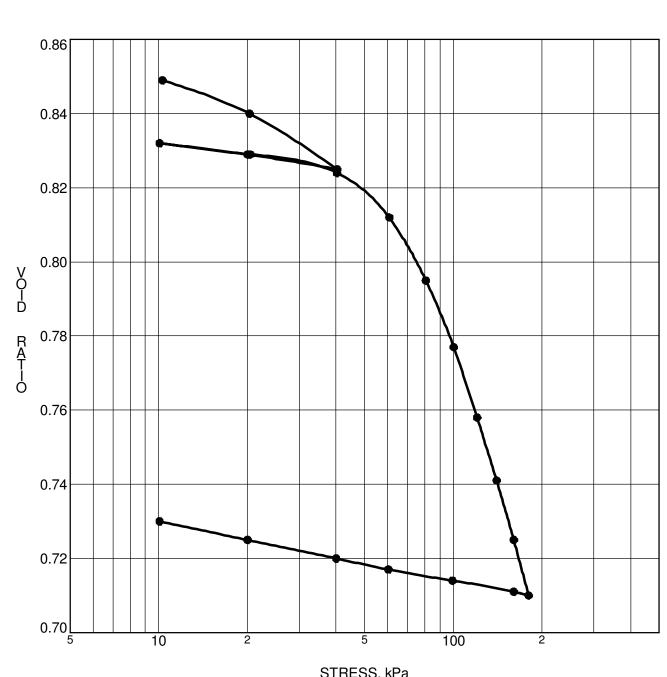
CONSOLIDATION TEST DATA SUMMARY						
Borehole No.	BH 3-07	p'o	34 kPa	Ccr	0.014	
Sample No.	TW 3	p' _c	81 kPa	Сс	0.550	
Sample Depth	2.54 m	OC Ratio	2.4	Wo	40.6 %	
Sample Elev.	90.13 m	Void Ratio	1.115	Unit Wt.	17.9 kN/m ³	

CLIENT Mattamy Homes FILE NO. PG0177
PROJECT Geotechnical Investigation - Proposed Residential DATE 07/31/2007
Development-Half Moon Bay

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28 Concouse Gate, Unit 1, Ottawa, Ontario K2E 7T7

Consulting Engineers CONSOLIDATION TEST



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CONSOLIDATION TEST DATA SUMMARY						
Borehole No.	BH 3-07	p'o	45 kPa	Ccr	0.013	
Sample No.	TW 4	p' _c	71 kPa	Сс	0.253	
Sample Depth	4.19 m	OC Ratio	1.6	Wo	31.5 %	
Sample Elev.	88.48 m	Void Ratio	0.866	Unit Wt.	19.0 kN/m ³	

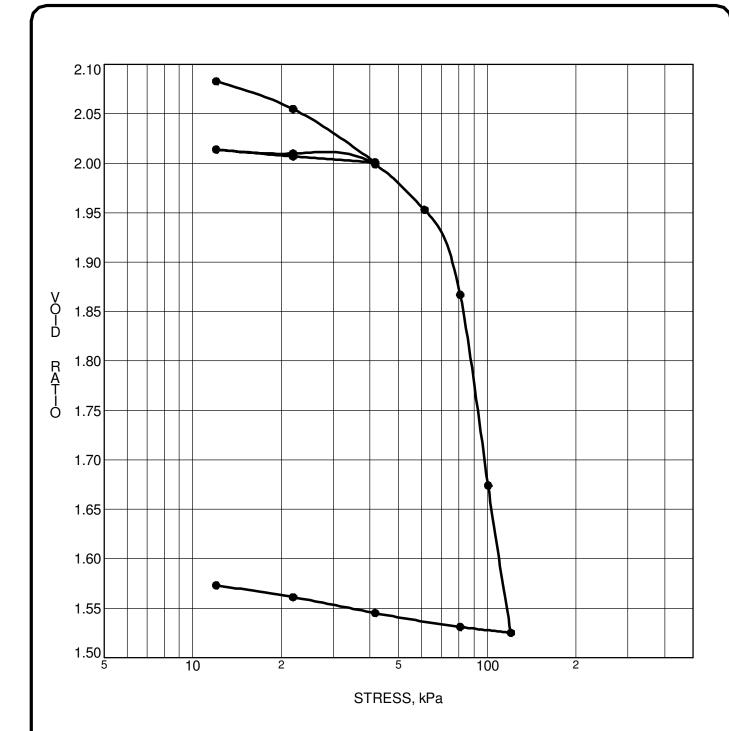
CLIENT **Mattamy Homes** FILE NO. PG0177 **PROJECT** DATE 07/27/2007 Geotechnical Investigation - Proposed Residential **Development-Half Moon Bay**

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28 Concouse Gate, Unit 1, Ottawa, Ontario K2E 7T7

Consulting **Engineers**

CONSOLIDATION TEST



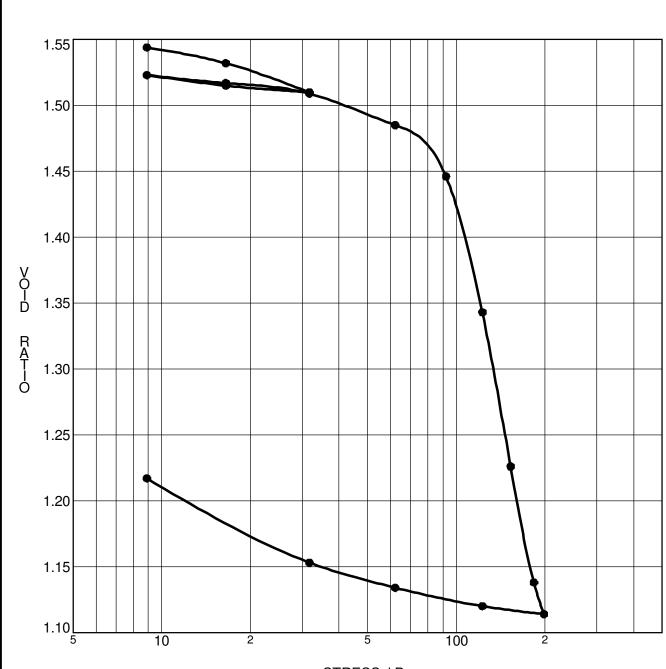
CONSOLIDATION TEST DATA SUMMARY						
Borehole No.	BH 3-06	p'o	47 kPa	Ccr	0.027	
Sample No.	TW 4	p' _c	72 kPa	Сс	2.044	
Sample Depth	4.85 m	OC Ratio	1.5	Wo	76.6 %	
Sample Elev.	87.15 m	Void Ratio	2.106	Unit Wt.	15.3 kN/m ³	

CLIENT Mattamy Homes FILE NO. PG0177
PROJECT Geotechnical Investigation - Proposed Residential DATE 02/19/207
Development-Half Moon Bay

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28 Concouse Gate, Unit 1, Ottawa, Ontario K2E 7T7

Consulting Engineers CONSOLIDATION TEST



CONSOLIDATION TEST DATA SUMMARY						
Borehole No.	BH 5-06	p'o	38.5 kPa	Ccr	0.026	
Sample No.	TW 2	p' _c	96 kPa	Cc	1.185	
Sample Depth	4.37 m	OC Ratio	2.5	Wo	56.4 %	
Sample Elev.	88.24 m	Void Ratio	1.55	Unit Wt.	16.5 kN/m ³	

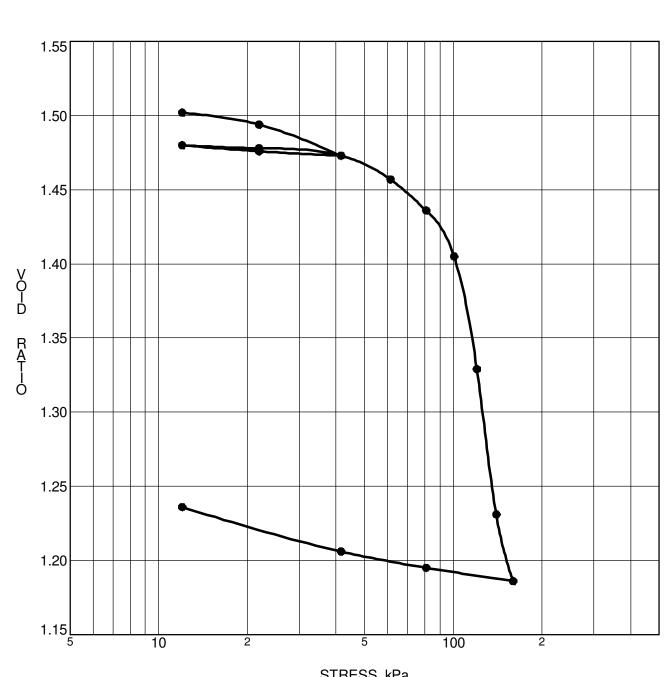
Note: Overburden stress calculated from original ground surface (92.61m)

CLIENTMattamy HomesFILE NO.PG0177PROJECTGeotechnical Investigation - Proposed ResidentialDATE02/16/2007

Development-Half Moon Bay

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Consulting Engineers CONSOLIDATION TEST



CONSOLIDATION TEST DATA SUMMARY						
Borehole No.	BH 6B-06	p'o	32 kPa	Ccr	0.014	
Sample No.	TW 1	p' _c	101 kPa	Сс	1.527	
Sample Depth	2.67 m	OC Ratio	3.2	Wo	54.9 %	
Sample Elev.	89.98 m	Void Ratio	1.51	Unit Wt.	16.6 kN/m ³	

CLIENT **Mattamy Homes** FILE NO. PG0177 **PROJECT** DATE 02/20/2007 Geotechnical Investigation - Proposed Residential

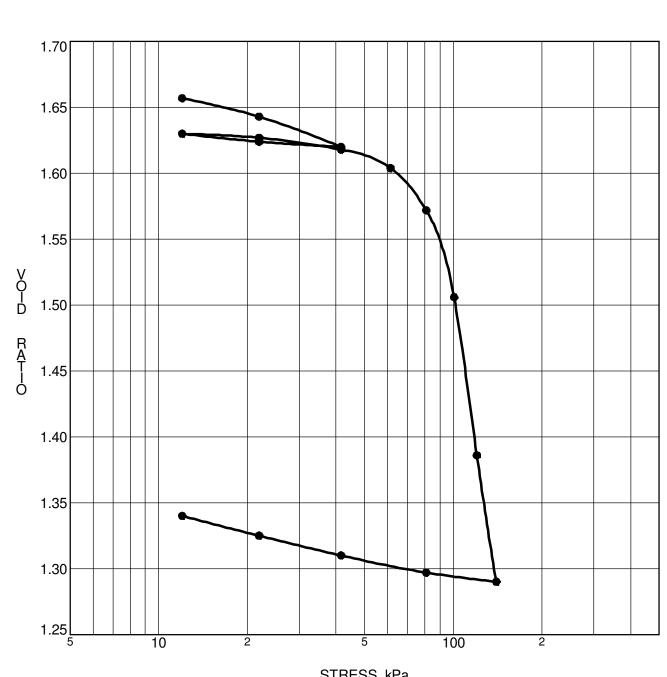
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Consulting **Engineers**

CONSOLIDATION TEST

28 Concouse Gate, Unit 1, Ottawa, Ontario K2E 7T7

Development-Half Moon Bay



CONSOLIDATION TEST DATA SUMMARY						
Borehole No.	BH16-06	p'o	64.8 kPa	Ccr	0.022	
Sample No.	TW 6	p'c	89 kPa	Сс	1.483	
Sample Depth	7.19 m	OC Ratio	1.4	Wo	60.8 %	
Sample Elev.	84.74 m	Void Ratio	1.672	Unit Wt.	16.2 kN/m ³	

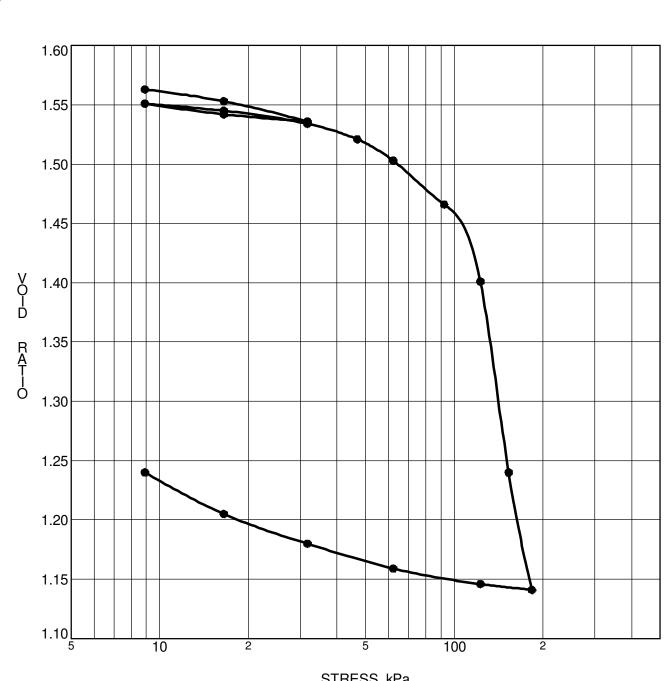
Note: Overburden stress calculated from original ground surface (91.93m)

CLIENT **Mattamy Homes** FILE NO. PG0177 **PROJECT** 02/27/2007 Geotechnical Investigation - Proposed Residential DATE

Development-Half Moon Bay patersongroup

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CONSOLIDATION TEST



CONSOLIDATION TEST DATA SUMMARY						
Borehole No.	BH17-06	p'o	72.9 kPa	Ccr	0.310	
Sample No.	TW 5	p'c	106 kPa	Cc	1.671	
Sample Depth	9.53 m	OC Ratio	1.5	Wo	57.0 %	
Sample Elev.	82.71 m	Void Ratio	1.568	Unit Wt.	16.5 kN/m ³	

Note: Overburden stress calculated from original ground surface (92.24m)

CLIENT **Mattamy Homes** FILE NO. PG0177 **PROJECT** 02/27/2007 Geotechnical Investigation - Proposed Residential DATE

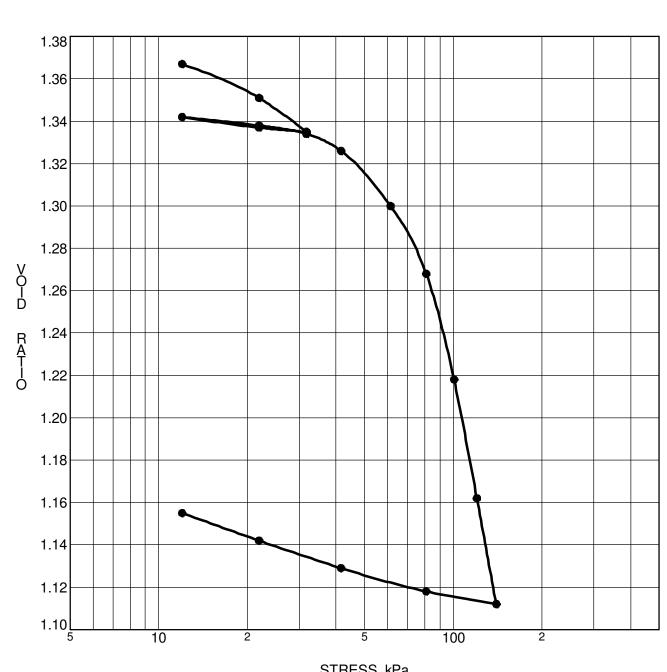
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Consulting **Engineers**

CONSOLIDATION TEST

28 Concouse Gate, Unit 1, Ottawa, Ontario K2E 7T7

Development-Half Moon Bay



STRESS,	kPa
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CONSOLIDATION TEST DATA SUMMARY						
Borehole No.	BH18A-06	p'o	44.8 kPa	Ccr	0.017	
Sample No.	TW 5	p' _c	75 kPa	Cc	0.606	
Sample Depth	4.92 m	OC Ratio	1.7	Wo	50.4 %	
Sample Elev.	87.73 m	Void Ratio	1.386	Unit Wt.	17.0 kN/m ³	

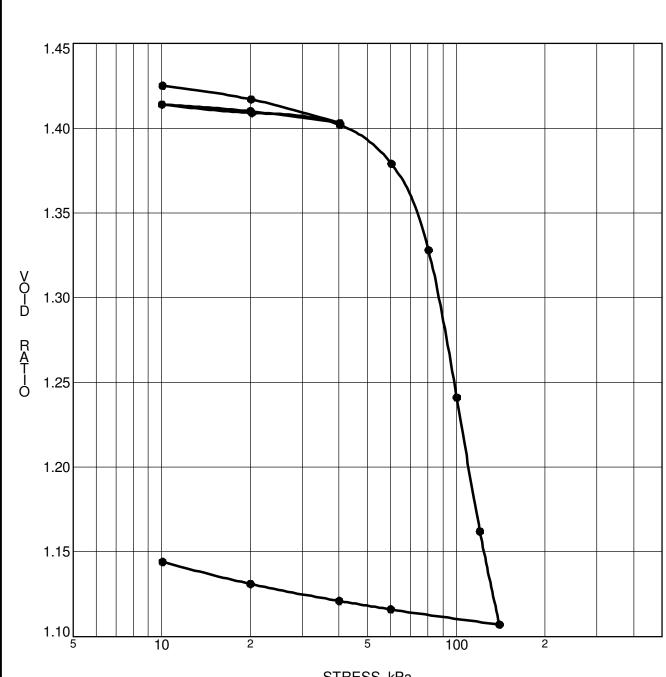
Note: Overburden stress calculated from original ground surface (92.35m)

CLIENTMattamy HomesFILE NO.PG0177PROJECTGeotechnical Investigation - Proposed ResidentialDATE02/27/2007

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Development-Half Moon Bay

Consulting Engineers CONSOLIDATION TEST



STRESS, kPa

CONSOLIDATION TEST DATA SUMMARY							
Borehole No.	BH20-06	p'o	49 kPa	Ccr	0.020		
Sample No.	TW 4	p'c	71 kPa	Сс	0.943		
Sample Depth	6.40 m	OC Ratio	1.4	Wo	52.2 %		
Sample Elev.	85.65 m	Void Ratio	1.436	Unit Wt.	16.8 kN/m ³		

Note: Overburden stress calculated from original ground surface (92.05m)

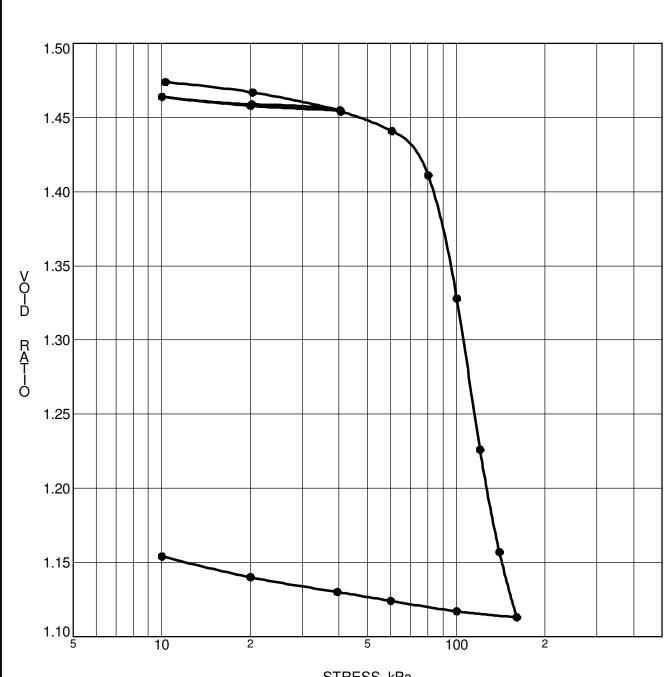
CLIENT Mattamy Homes FILE NO. PG0177

PROJECT Geotechnical Investigation - Proposed Residential DATE 03/10/2007

Development-Half Moon Bay

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Consulting Engineers CONSOLIDATION TEST



STRESS, kPa

CONSOLIDATION TEST DATA SUMMARY							
Borehole No.	BH24-06	p'o	54.9 kPa	Ccr	0.018		
Sample No.	TW 3	p'c	84 kPa	Сс	1.309		
Sample Depth	6.55 m	OC Ratio	1.5	Wo	54.0 %		
Sample Elev.	86.53 m	Void Ratio	1.486	Unit Wt.	16.7 kN/m ³		

Note: Overburden stress calculated from original ground surface (93.08m)

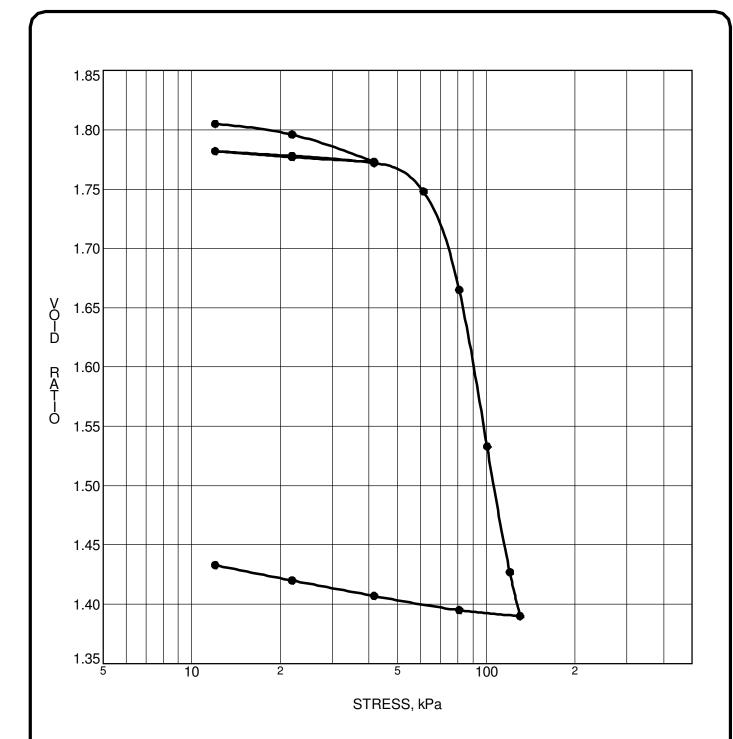
CLIENT Mattamy Homes FILE NO. PG0177

PROJECT Geotechnical Investigation - Proposed Residential DATE 03/10/2007

Development-Half Moon Bay

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Consulting Engineers CONSOLIDATION TEST



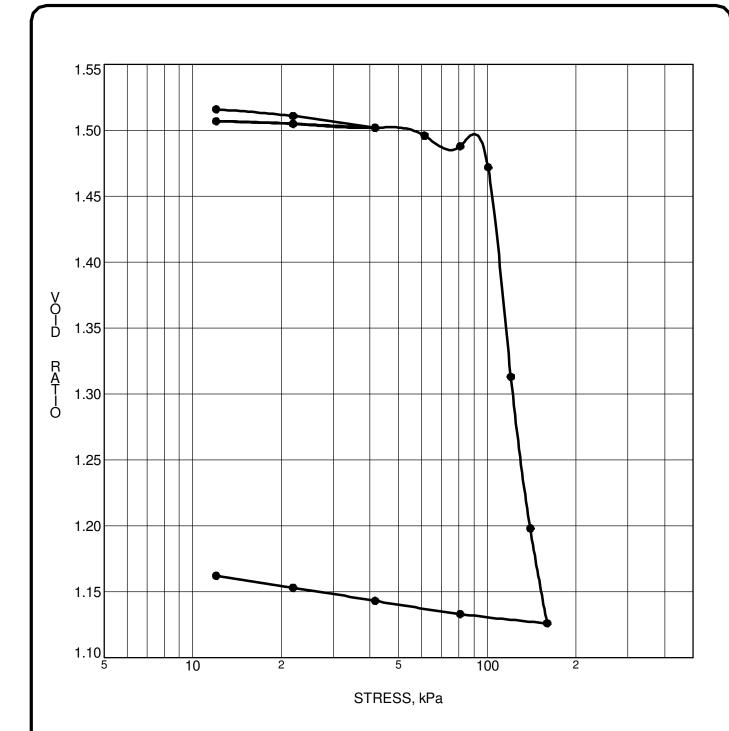
CONSOLIDATION TEST DATA SUMMARY							
Borehole No.	BH 2-05	p'o	50 kPa	Ccr	0.016		
Sample No.	TW 4	p' _c	70 kPa	Сс	1.380		
Sample Depth	4.70 m	OC Ratio	1.4	Wo	66.0 %		
Sample Flev	87 80 m	Void Batio	1 81	LInit Wt	15.9 kN/m ³		

CLIENT Mattamy Homes FILE NO. PG0177
PROJECT Geotechnical Investigation - Proposed Residential DATE 07/24/2005
Development-Half Moon Bay

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Consulting Engineers CONSOLIDATION TEST

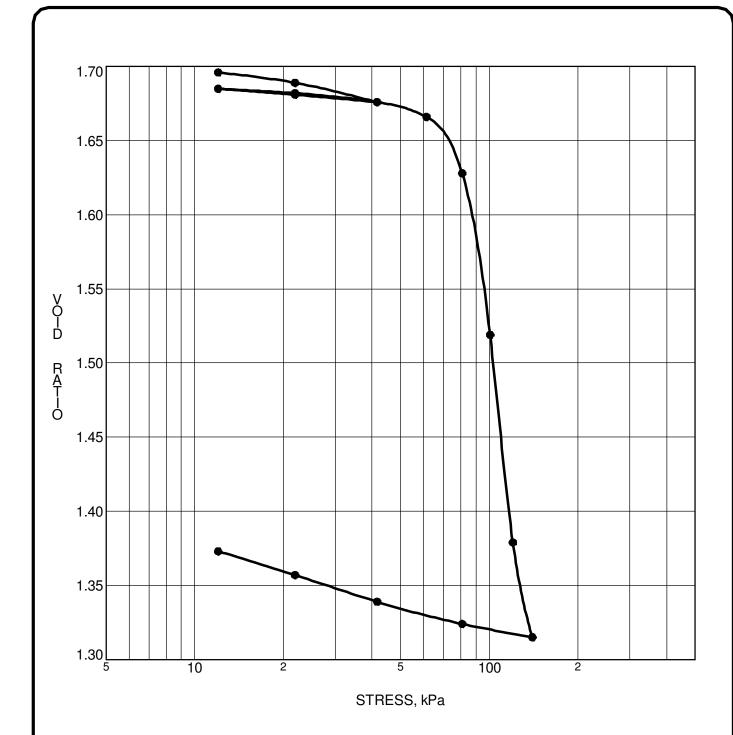


CONSOLIDATION TEST DATA SUMMARY							
Borehole No.	BH 3-05	p'o	42 kPa	Ccr	0.010		
Sample No.	TW 3	p' _c	99 kPa	Сс	1.709		
Sample Depth	3.50 m	OC Ratio	2.4	Wo	55.3 %		
Sample Elev.	88.96 m	Void Ratio	1.52	Unit Wt.	16.6 kN/m ³		

CLIENT Mattamy Homes FILE NO. PG0177
PROJECT Geotechnical Investigation - Proposed Residential DATE 07/25/2005
Development-Half Moon Bay

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CONSOLIDATION TEST DATA SUMMARY							
Borehole No.	BH10-05	p'o	48.2 kPa	Ccr	0.017		
Sample No.	TW 5	p' _c	82 kPa	Сс	1.460		
Sample Depth	4.70 m	OC Ratio	1.7	Wo	62.0 %		
Sample Elev.	86.96 m	Void Ratio	1.71	Unit Wt.	16.1 kN/m ³		

Note: Overburden stress calculated from original ground surface (91.76m)

CLIENT Mattamy Homes FILE NO. PG0177

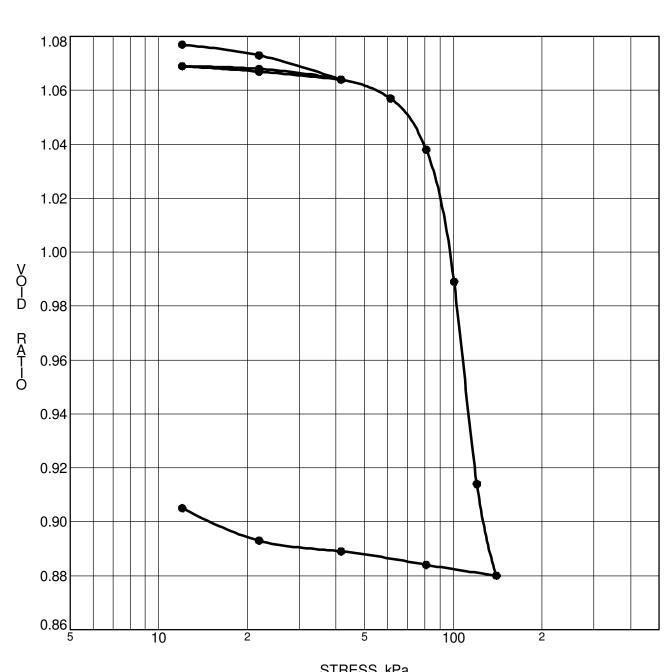
PROJECT Geotechnical Investigation - Proposed Residential DATE 07/15/2005

Development-Half Moon Bay

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CONSOLIDATION TEST



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- 5 1	BE55	. KPa

CONSOLIDATION TEST DATA SUMMARY							
Borehole No.	BH11A-05	p'o	25.8 kPa	Ccr	0.020		
Sample No.	TW 1	p' _c	83 kPa	Cc	0.737		
Sample Depth	2.50 m	OC Ratio	3.2	Wo	39.4 %		
Sample Elev.	89.41 m	Void Ratio	1.08	Unit Wt.	17.9 kN/m ³		

Note: Overburden stress calculated from original ground surface (91.91m)

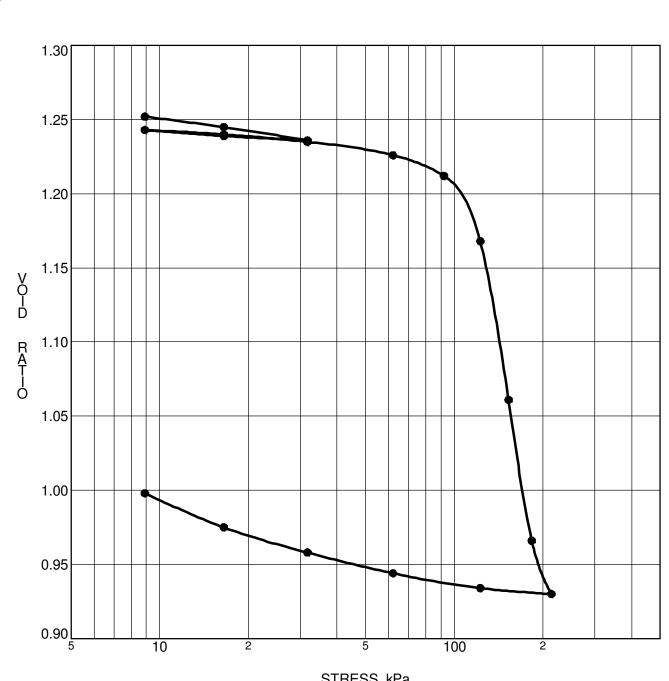
CLIENT **Mattamy Homes** FILE NO. PG0177 **PROJECT** 07/15/2005 Geotechnical Investigation - Proposed Residential DATE

Development-Half Moon Bay

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CONSOLIDATION TEST



CONSOLIDATION TEST DATA SUMMARY							
Borehole No.	BH11A-05	p'o	54.9 kPa	Ccr	0.014		
Sample No.	TW 3	p' _c	110 kPa	Сс	0.942		
Sample Depth	7.20 m	OC Ratio	2.0	Wo	45.6 %		
Sample Elev.	84.71 m	Void Ratio	1.25	Unit Wt.	17.4 kN/m ³		

Note: Overburden stress calculated from original ground surface (91.10m)

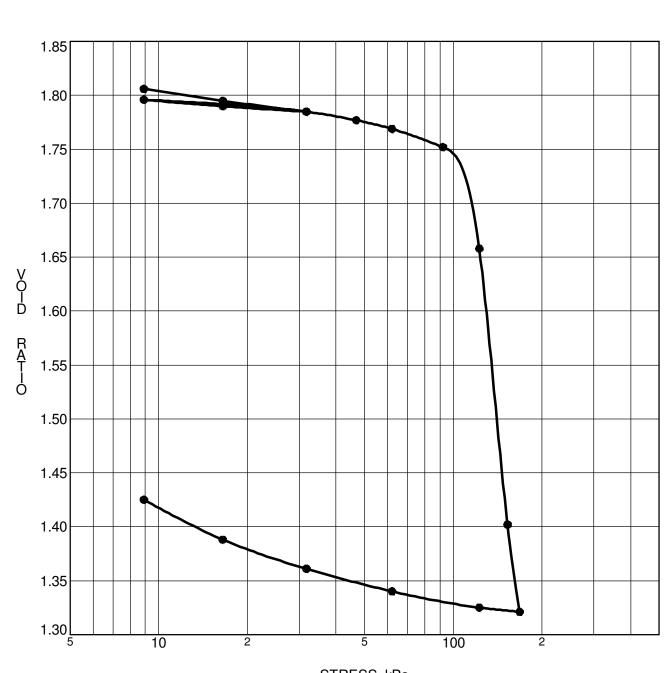
CLIENT **Mattamy Homes** FILE NO. PG0177 **PROJECT** 07/15/2005 Geotechnical Investigation - Proposed Residential DATE

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Development-Half Moon Bay

Consulting **Engineers**

CONSOLIDATION TEST



CONSOLIDATION TEST DATA SUMMARY							
Borehole No.	BH12-05	p'o	75.8 kPa	Ccr	0.020		
Sample No.	TW 6	p'c	115 kPa	Сс	2.510		
Sample Depth	9.30 m	OC Ratio	1.5	Wo	66.1 %		
Sample Elev.	82.44 m	Void Ratio	1.82	Unit Wt.	16.2 kN/m ³		

Note: Overburden stress calculated from original ground surface (91.74m)

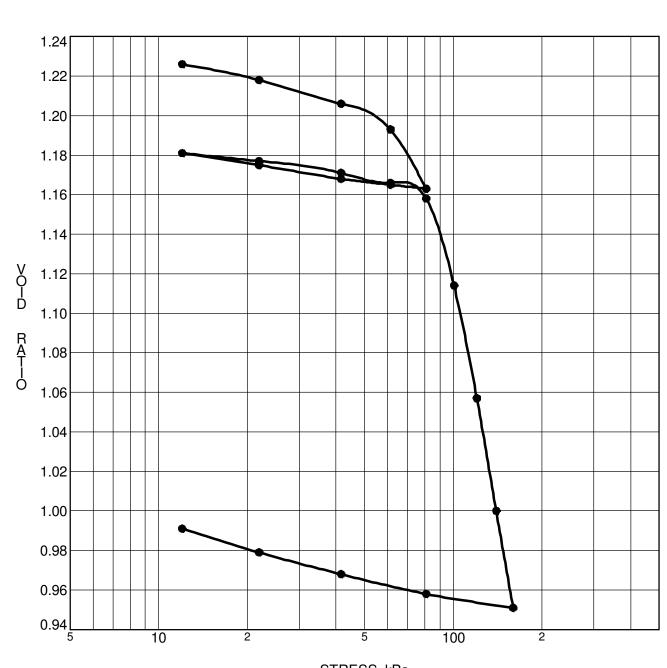
CLIENT Mattamy Homes FILE NO. PG0177

PROJECT Geotechnical Investigation - Proposed Residential DATE 07/19/2005

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Consulting Engineers CONSOLIDATION TEST



CONSOLIDATION TEST DATA SUMMARY							
Borehole No.	BH 2A	p'o	52.9 kPa	Ccr	0.022		
Sample No.	TW 3	p'c	88 kPa	Сс	0.850		
Sample Depth	4.00 m	OC Ratio	1.7	Wo	45.0 %		
Sample Elev.	m	Void Ratio	1.24	Unit Wt.	17.5 kN/m ³		

Note: Overburden stress calculated from original ground surface (92.60m)

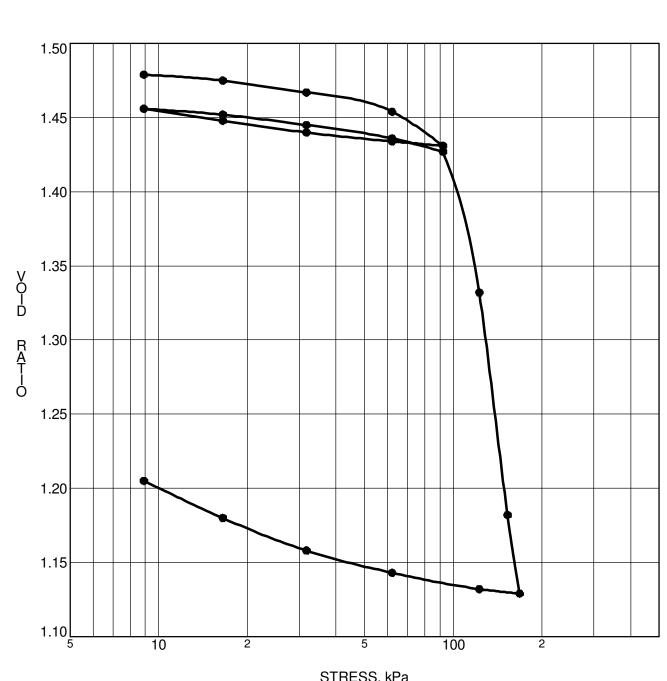
CLIENT Mattamy Homes FILE NO. PG0177

PROJECT Geotechnical Investigation - Proposed Residential DATE 04/22/2004

Development-Half Moon Bay

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Consulting Engineers CONSOLIDATION TEST



CONSOLIDATION TEST DATA SUMMARY							
Borehole No.	BH 2B	p'o	71 kPa	Ccr	0.026		
Sample No.	TW 1	p' _c	107 kPa	Сс	1.420		
Sample Depth	8.00 m	OC Ratio	1.5	Wo	53.9 %		
Sample Elev.	m	Void Ratio	1.48	Unit Wt.	16.7 kN/m ³		

CLIENT **Mattamy Homes** FILE NO. PG0177 **PROJECT** Geotechnical Investigation - Proposed Residential DATE 04/22/2004

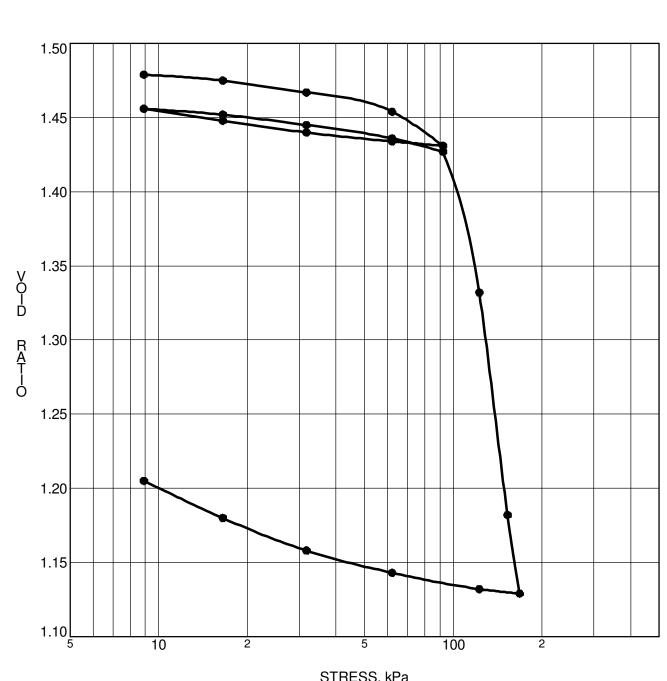
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28 Concouse Gate, Unit 1, Ottawa, Ontario K2E 7T7

Development-Half Moon Bay

Consulting **Engineers**

CONSOLIDATION TEST



CONSOLIDATION TEST DATA SUMMARY							
Borehole No.	BH 2B	p'o	77.7 kPa	Ccr	0.026		
Sample No.	TW 1	p'c	107 kPa	Cc	1.420		
Sample Depth	8.00 m	OC Ratio	1.4	Wo	53.9 %		
Sample Elev.	m	Void Ratio	1.48	Unit Wt.	16.7 kN/m ³		

Note: Overburden stress calculated from original ground surface (92.60m)

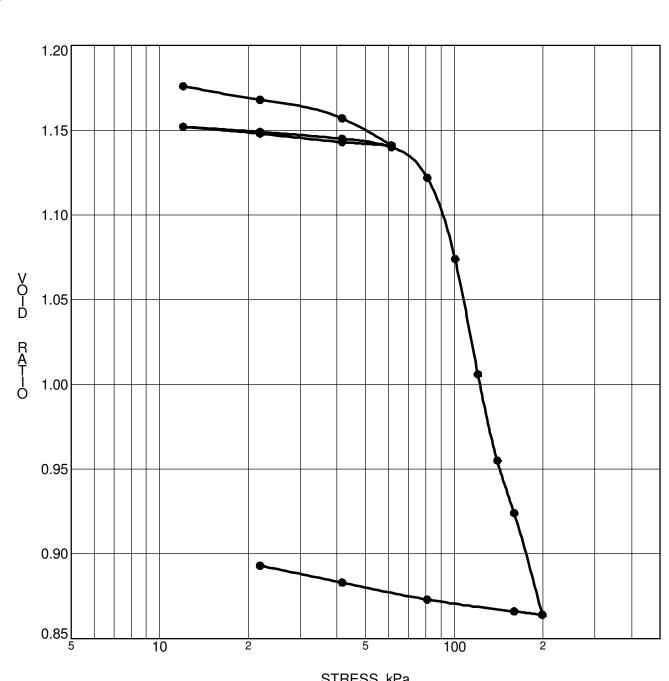
CLIENT **Mattamy Homes** FILE NO. PG0177 04/22/2004 **PROJECT** Geotechnical Investigation - Proposed Residential DATE

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Development-Half Moon Bay

Consulting **Engineers**

CONSOLIDATION TEST



CONSOLIDATION TEST DATA SUMMARY						
Borehole No.	BH 1	p'o	36.2 kPa	Ccr	0.018	
Sample No.	TW 4	p'c	82 kPa	Cc	0.702	
Sample Depth	2.80 m	OC Ratio	2.3	Wo	43.0 %	
Sample Elev.	m	Void Ratio	1.18	Unit Wt.	17.7 kN/m ³	

Note: Overburden stress calculated from original ground surface (92.20m)

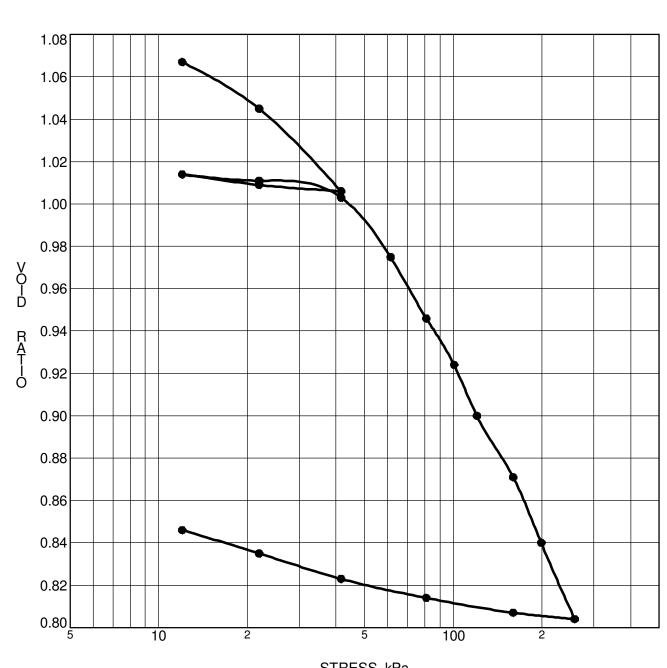
CLIENT **Brickland Timberlay** FILE NO. G9132 **PROJECT** 12/06/2003 **Preliminary Geotechnical Investigation - Nepean** DATE

South Lands, South of Jock River

patersongroup

Consulting **Engineers**

CONSOLIDATION TEST



STRESS,	kPa
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CONSOLIDATION TEST DATA SUMMARY						
Borehole No.	BH 3	p'o	31.7 kPa	Ccr	0.019	
Sample No.	TW 3	p'c	50 kPa	Cc	0.252	
Sample Depth	2.65 m	OC Ratio	1.6	Wo	39.8 %	
Sample Elev.	m	Void Ratio	1.09	Unit Wt.	18.1 kN/m ³	

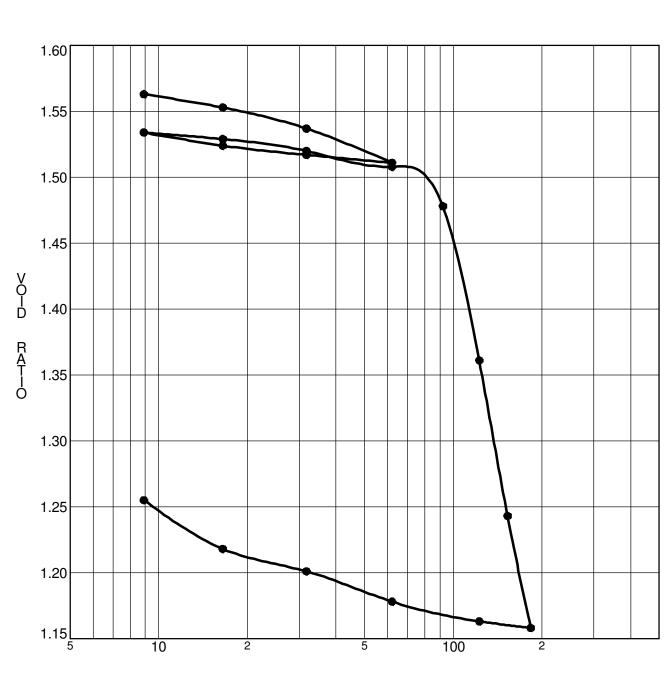
Note: Overburden stress calculated from original ground surface (92.60m)

CLIENTBrickland TimberlayFILE NO.G9132PROJECTPreliminary Geotechnical Investigation - NepeanDATE12/15/2003

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South Lands, South of Jock River

Consulting Engineers CONSOLIDATION TEST



CONSOLIDATION TEST DATA SUMMARY						
Borehole No.	BH 3	p'o	51.2 kPa	Ccr	0.029	
Sample No.	TW 5	p' _c	90 kPa	Сс	1.090	
Sample Depth	5.80 m	OC Ratio	1.8	Wo	57.1 %	
Sample Elev.	m	Void Ratio	1.57	Unit Wt.	16.5 kN/m ³	

Note: Overburden stress calculated from original ground surface (92.60m)

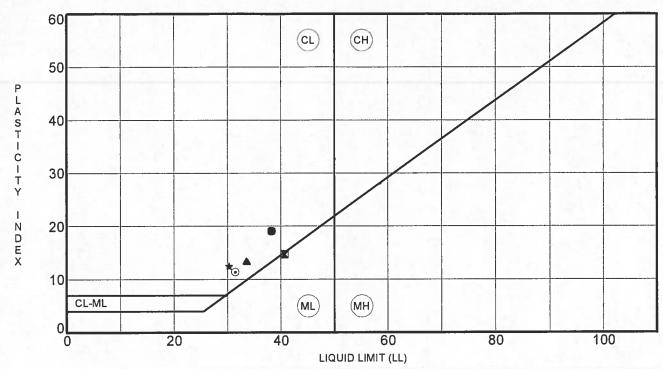
CLIENTBrickland TimberlayFILE NO.G9132PROJECTPreliminary Geotechnical Investigation - NepeanDATE12/15/2003

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Consulting Engineers CONSOLIDATION TEST

28 Concouse Gate, Unit 1, Ottawa, Ontario K2E 7T7

South Lands, South of Jock River



S	pecimen Idei	ntification	LL	PL	PI	Fines	Classification
•	BH 1-10	TW 7	38	19	19		CL-Low to medium plasticity inorganic clay
×	BH 3-10	TW 7	41	26	15		CL-Low to medium plasticity inorganic clays
Δ	BH 7-10	TW 3	34	20	13		CL-Low to medium plasticity inorganic clays
*	BH12-10	TW 3	30	18	13		CL-Low to medium plasticity inorganic clays
•	BH23-10	TW 6	31	20	11		CL-Low to medium plasticity inorganic clays
	· <u>-</u>						

CLIENT Mattamy Homes FILE NO. PG2246

PROJECT Geotechnical Investigation - Half-Moon Bay West DATE 18 Feb 11

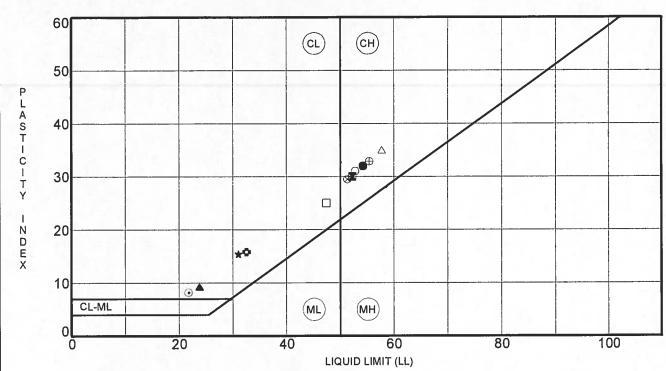
- Cambrian Road

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Consulting Engineers

28 Concouse Gate, Unit 1, Ottawa, Ontario K2E 7T7

ATTERBERG LIMITS' RESULTS



Specimen Identification		LL	PL	PI	Fines	Classification			
	BH 1-07	TW 3	54	22	32		CH - Clays with high plasticity		
×	BH 1-07	TW 4	52	22	30	1 .	CH - Clays with high plasticity		
A	BH 2-07	TW 4	24	14	9		CL - Clays with low plasticity		
*	BH 3-07	TW 3	31	16	16		CL - Clays with low plasticity		
9	BH 3-07	TW 4	22	14	8		CL - Clays with low plasticity		
0	BH 4-07	TW 4	33	17	16		CL - Clays with low plasticity		
	BH 5-07	TW 4	53	22	31		CH - Clays with high plasticity		
Δ	BH 6A-07	TW 1	58	23	35		CH - Clays with high plasticity		
8	BH 7-07	TW 4	51	22	29		CH - Clays with high plasticity		
①	BH10-07	TW 5	55	23	33		CH - Clays with high plasticity		
	BH11-07	TW 7	47	22	25		CL - Clays with low plasticity		
-									
+									
+									
+									
+			•						

CLIENT Mattamy Homes FILE NO.
PROJECT Geotechnical Investigation - Proposed DATE

Residential Development-Half Moon Bay

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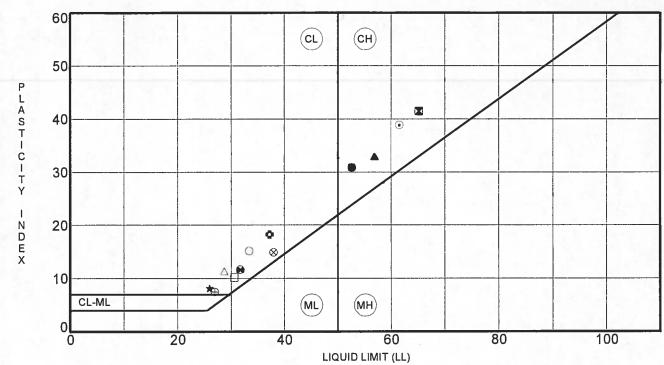
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28 Concouse Gate, Unit 1, Ottawa, Ontario K2E 7T7

ATTERBERG LIMITS' RESULTS

PG0177

7 Dec 07



I 2-05 I 3-05 I 3-06 I 5-06 I 6B-06 I10-05 I11A-05 I112-05	TW 4 TW 3 TW 4 TW 2 TW 1 TW 5 TW 1 TW 3	53 65 57 26 62 37 33 29	22 24 24 18 23 19	31 41 33 8 39 18		CH - Clays with high plasticity CH - Clays with high plasticity CH - Clays with high plasticity CL - Clays with low plasticity CH - Clays with high plasticity CL - Clays with low plasticity	
1 3-06 1 5-06 1 6B-06 110-05 111A-05	TW 4 TW 2 TW 1 TW 5 TW 1 TW 3	57 26 62 37 33	24 18 23 19 18	33 8 39 18		CH - Clays with high plasticity CL - Clays with low plasticity CH - Clays with high plasticity	
I 5-06 I 6B-06 I10-05 I11A-05	TW 2 TW 1 TW 5 TW 1 TW 3	26 62 37 33	18 23 19 18	39 18		CL - Clays with low plasticity CH - Clays with high plasticity	
1 6B-06 110-05 111A-05 111A-05	TW 1 TW 5 TW 1 TW 3	62 37 33	23 19 18	39 18		CH - Clays with high plasticity	
110-05 111A-05 111A-05	TW 5 TW 1 TW 3	37 33	19 18	18			
111A-05 111A-05	TW 1 TW 3	33	18			CL - Clays with low plasticity	
111A-05	TW 3			15	1		
		29		••		CL - Clays with low plasticity	
112-05	TMC		17	11		CL - Clays with low plasticity	
	TW 6	38	23	15		CL - Clays with low plasticity	
116-06	TW 6	27	19	8		CL - Clays with low plasticity	
117-06	TW 5	31	20	10		CL - Clays with low plasticity	
118A-06	TW 5	32	20	12		CL - Clays with low plasticity	
1							

CLIENT Mattamy Homes FILE NO. PG0177

PROJECT Geotechnical Investigation - Proposed DATE 18 Dec 06

Residential Development-Half Moon Bay

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28 Concouse Gate, Unit 1, Ottawa, Ontario K2E 7T7

ATTERBERG LIMITS' RESULTS



Order #: 1112209

Certificate of Analysis
Client: Paterson Group Consulting Engineers

Client PO: 10293

Project Description: PG2246

Report Date: 23-Mar-2011 Order Date:17-Mar-2011

AIGHT G. TOZOG		T TOTO OF DOOD ID			
	Client ID:	BH 15-10 SS2 17-Mar-11	BH 9-10 SS4 17-Mar-11	BH 23-10 SS5 17-Mar-11	
	Sample Date: Sample ID:	1112209-01	1112209-02	1112209-03	
	MDL/Units	Soil	Soil	Soil	
Physical Characteristics				Richard Street	
% Solids	0.1 % by Wt.	80.3	81.0	77.9	
General Inorganics					
рН	0.05 pH Units	7.44	7.52	7.47	
Resistivity	0.10 Ohm.m	54.1	46.3	10.7	
Anions					
Chloride	5 ug/g dry	13	16	7	
Sulphate	5 ug/g dry	55	134	548	-

APPENDIX 2

FIGURE 1 - KEY PLAN

FIGURES 2A and 2B - TEST FILL PILE SETTLEMENT MONITORING PROGRAM

FIGURE 3 - TEST FILL PILE (2007 TO 2011) SETTLEMENT MONITORING PROGRAM

FIGURE 4 - SETTLEMENT SURCHARGE MONITORING PROGRAM

DRAWING PG2246-4 - TEST HOLE LOCATION PLAN

DRAWING PG2246-5 - PERMISSIBLE GRADE RAISE PLAN - HOUSING

DRAWING PG2246-6 - PERMISSIBLE GRADE RAISE PLAN - ROADWAYS

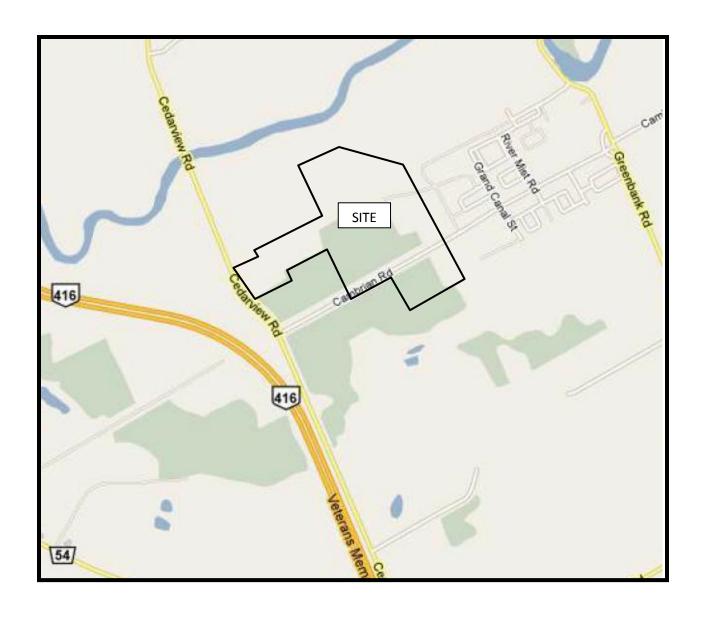
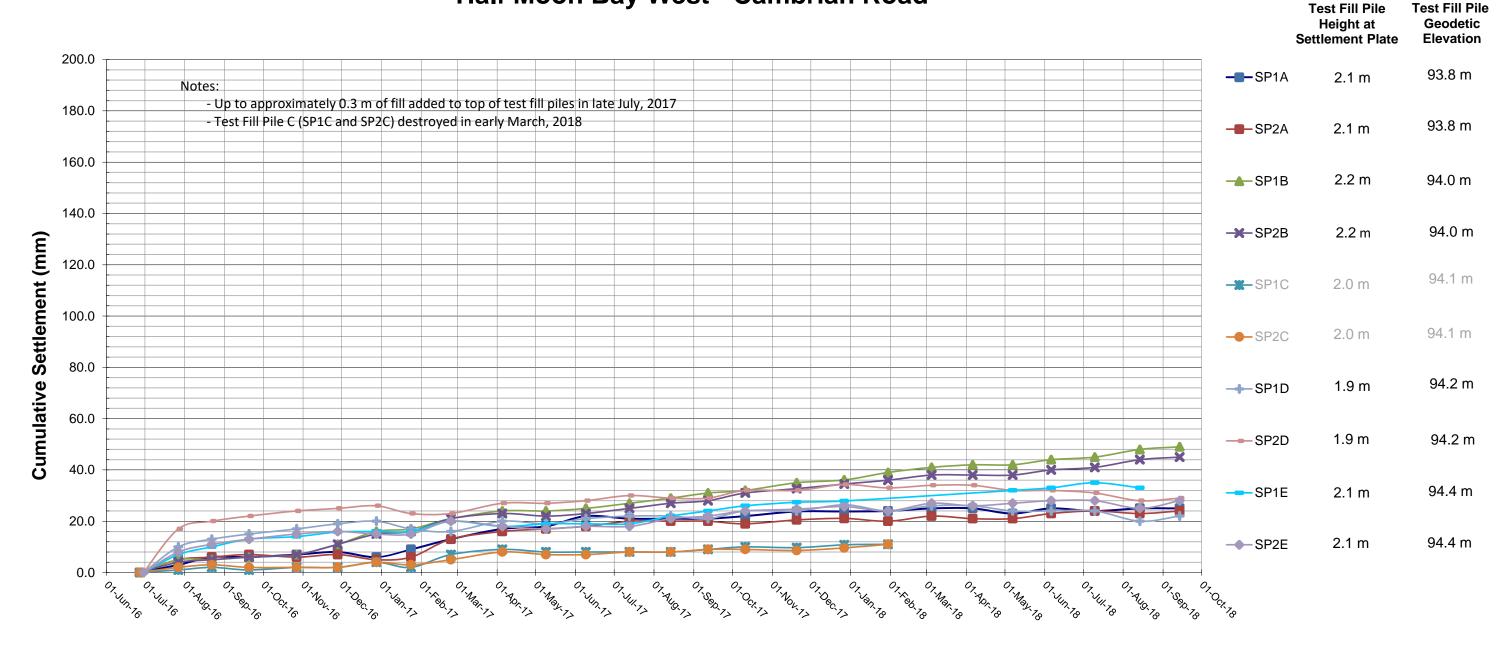


FIGURE 1 KEY PLAN



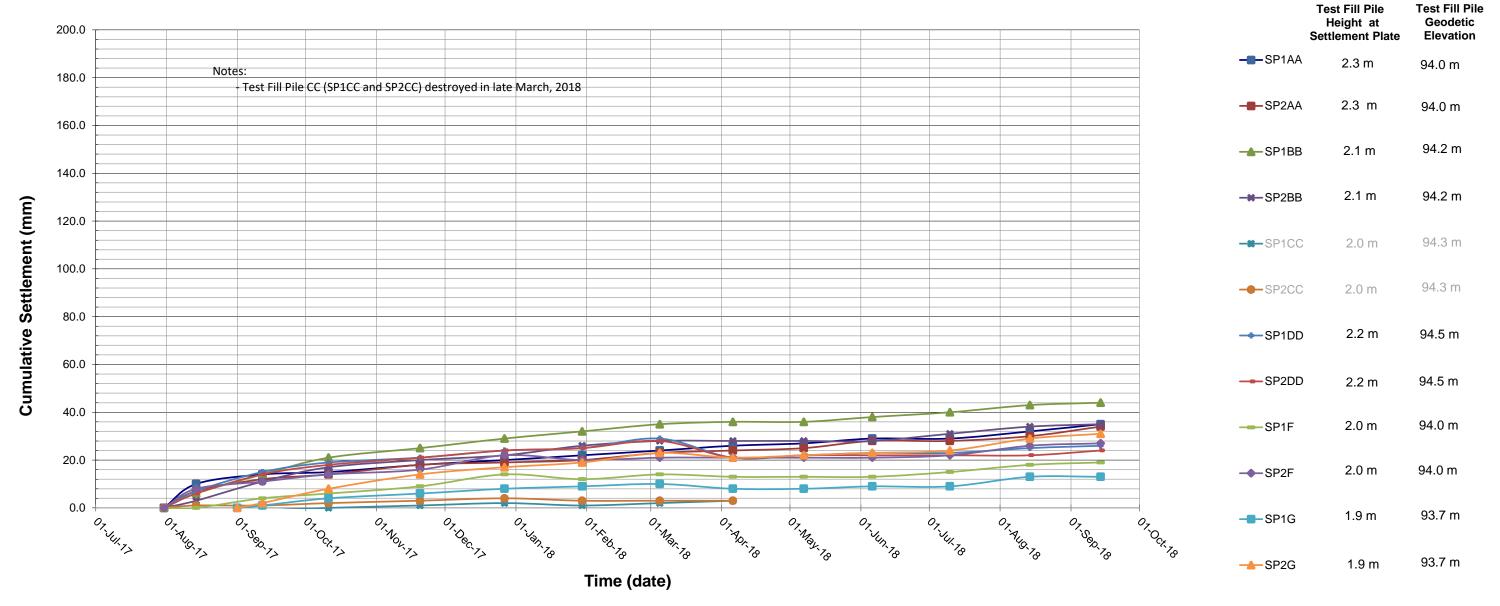
Figure 2A - Test Fill Pile Settlement Monitoring Program
Half Moon Bay West - Cambrian Road



Time (date)



Figure 2B - Test Fill Pile Settlement Monitoring Program
Half Moon Bay West - Cambrian Road



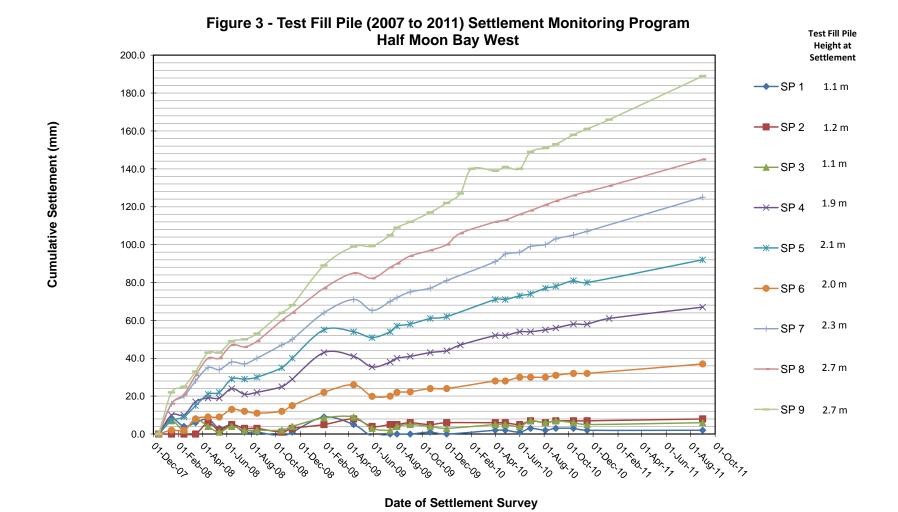




Figure 4 - Settlement Surcharge Monitoring Program Half Moon Bay West - River Run Avenue

