

Geotechnical
Engineering

Environmental
Engineering

Hydrogeology

Geological
Engineering

Materials Testing

Building Science

Archaeological Services

Geotechnical Investigation

Proposed Building Additions
2431 Bank Street
Ottawa, Ontario

Prepared For

Southway Hotel

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Report PG3273-1

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1.0 INTRODUCTION

Paterson Group (Paterson) was commissioned by Southway Hotel to conduct a geotechnical investigation for the proposed building additions to be constructed at the existing building located at 2431 Bank Street, in the City of Ottawa, Ontario (refer to Figure 1 - Key Plan in Appendix 2).

The objectives of the investigation were to:

- determine the subsurface soil and groundwater conditions by means of existing borehole information.
- provide geotechnical recommendations for the design of the proposed development including construction considerations which may affect the design.

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

2.0 PROPOSED PROJECT

It is understood that the proposed project will consist of three (3) additions to the existing structures. The existing 3-storey and 6-storey hotel buildings will be connected with a two storey building addition. The open area between the existing structures and the proposed 2-storey building addition will become a one storey enclosed courtyard. Additionally, a one storey building addition will be constructed on the east face of the 6-storey building. It is anticipated that a portion of the existing parking area and access lanes will be modified as part of the proposed project.

3.0 AVAILABLE SOILS INFORMATION

A geotechnical investigation was completed by John D. Paterson and Associates Limited between September 1999 and September 2000. At that time, eight (8) boreholes were advanced to a maximum 24 m depth, and three (3) test pits were excavated to a maximum depth of 2.7 m. The locations of the test holes are shown on Drawing PG3237-1 - Test Hole Location Plan included in Appendix 2.

Generally, the subsurface profile at the borehole locations consisted of a pavement structure or topsoil overlying silty sand fill mixed with occasional brick pieces. A grey clayey silt deposit was encountered below the silty sand fill followed by inferred till deposit and bedrock. Practical refusal to dynamic cone penetration testing was encountered at BH 1 to BH 4 at depths ranging between 16.8 and 24.7 m. Reference should be made to the Soil Profile and Test Data sheets in Appendix 1 for specific details of the profile at each location.

Based on the available geological mapping, the bedrock in this area mostly consists of shale of the Carlsbad formation with an overburden drift thickness of 15 to 25 m depth.

Groundwater level readings were taken at the borehole locations in October 1999. The groundwater measurements are presented in the Soil Profile and Test Data sheets in Appendix 1. It is important to note that groundwater level readings could be influenced by surface water infiltrating the backfilled borehole, which can lead to higher water levels than noted during the investigation. The long-term 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 long-term groundwater level is expected at a depth of approximately 3 m depth below existing grade.

Groundwater levels are subject to seasonal fluctuations and, therefore, groundwater levels could vary at the time of construction.

4.0 DISCUSSION

4.1 Geotechnical Assessment

Based on the existing soils information available, the subject site is considered satisfactory for the proposed building additions. It is understood that both the 6-storey and 3-storey hotel buildings are founded on deep foundations while the existing link structure is founded on conventional shallow foundations founded on silty sand/sandy silt bearing surface. It is expected that the design loads of the proposed building additions will be relatively low and can be adequately supported by a conventional style shallow foundation placed over a compact silty sand/sandy silt bearing surface. Alternatively, where the subgrade at footing level consists of a silty sand/sandy silt in a loose state of compactness. It is recommended to sub-excavate a minimum 300 mm below underside of footing level and proof-roll the subgrade level using suitable compaction equipment. The sub-excavated area should be in-filled with a Granular A crushed stone or Granular B Type II in maximum 300 mm loose lifts compacted to a minimum 98% of its SPMDD.

It is further recommended that the foundations of the proposed structures not be connected to the existing structures and that a construction joint should be considered to allow for movement which minimizes the possibility of concrete cracking due to differential settlement.

The above and other considerations are discussed in the following paragraphs.

4.2 Site Grading and Preparation

Stripping Depth

Topsoil, asphalt, and deleterious fill, such as those containing organic materials, should be stripped from under the proposed building footprints and other settlement sensitive structures.

Fill Placement

Fill used for grading beneath the building footprint, unless otherwise specified, should consist of clean imported granular fill, such as Ontario Provincial Standard Specifications (OPSS) Granular A or Granular B Type II. The fill should be tested and approved prior to delivery to the site. It 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 area should be compacted to at least 98% of its standard Proctor maximum dry density (SPMDD).

Site-excavated soil can be used as general landscaping fill where settlement of the ground surface is of minor concern. These materials should be spread in thin lifts and at least compacted by the tracks of the spreading equipment to minimize voids. If these materials are to be used to build up the subgrade level for areas to be paved, they should be compacted in thin lifts to a minimum density of 95% of their respective SPMDD. Site-excavated soils are not suitable for use as backfill against foundation walls unless a composite drainage blanket connected to a perimeter drainage system is provided.

Fill used for grading beneath the base and subbase layers of paved areas should consist, unless otherwise specified, of clean imported granular fill, such as OPSS Granular A, Granular B Type II or select subgrade material. 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 paved areas should be compacted to at least 95% of its SPMDD.

4.3 Foundation Design

Footings placed on an undisturbed, compact silty sand/sandy silt bearing surface can be designed using a bearing resistance value at serviceability limit states (SLS) of **75 kPa** and a factored bearing resistance value at ultimate limit states (ULS) of **125 kPa**.

Footings placed on an undisturbed, firm clayey silt bearing surface can be designed using a bearing resistance value at SLS of **50 kPa** and a factored bearing resistance value at ULS of **75 kPa**.

Footings founded over an engineered fill pad placed as detailed in Subsection 4.1 and approved by the geotechnical consultant can be designed using a bearing resistance value at SLS of **75 kPa** and a factored bearing resistance value at ULS of **125 kPa**.

Footings designed using the above-noted bearing resistance values at SLS will be subjected to potential post-construction total and differential settlements of 25 and 20 mm, respectively.

An undisturbed soil bearing surface consists of a surface 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.

A permissible grade raise restriction of 0.5 m is recommended for the subject site.

4.4 Design for Earthquakes

The site class for seismic site response is a **Class D** for the foundations considered for buildings founded on the overburden soils. The soils underlying the subject site are not susceptible to liquefaction. Reference should be made to the latest revision of the Ontario Building Code for a full discussion of the earthquake design requirements.

4.5 Slab on Grade Construction

With the removal of all topsoil and deleterious materials, within the footprint of the proposed building additions, the native soil or engineered fill surface will be considered to be an acceptable subgrade surface on which to commence backfilling for the floor slab. The upper 150 mm of sub-slab fill should consist of an OPSS Granular A crushed stone. All backfill material within the footprint of the proposed building additions should be placed in maximum 300 mm thick loose lifts and compacted to at least 98% of its SPMDD.

Any soft areas should be removed and backfilled with appropriate backfill material. OPSS Granular B Type II, with a maximum particle size of 50 mm, are recommended for backfilling below the floor slab.

4.6 Pavement Design

Modifications to the car only parking areas and access lanes are anticipated at this site. The proposed pavement structures are shown in Tables 1 and 2.

Table 1 - Recommended Pavement Structure - Car Only Parking Areas	
Thickness (mm)	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 2 - Recommended Pavement Structure - Access Lanes	
Thickness (mm)	Material Description
40	Wear Course - Superpave 12.5 Asphaltic Concrete
50	Binder Course - Superpave 19.0 Asphaltic Concrete
150	BASE - OPSS Granular A Crushed Stone
400	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

Minimum Performance Graded (PG) 58-34 asphalt cement should be used for this project. 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. The pavement granular base and subbase should be placed in maximum 300 mm thick lifts and compacted to a minimum of 98% of the material's SPMDD using suitable vibratory equipment.

5.0 DESIGN AND CONSTRUCTION PRECAUTIONS

5.1 Foundation Drainage and Backfill

It is recommended that a perimeter foundation drainage system be provided for the proposed structures. The system should consist of a 100 mm to 150 mm diameter 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.

Backfill against the exterior sides of the foundation walls should consist of free-draining non frost susceptible granular materials. The greater part of the site excavated materials will be frost susceptible and, as such, are not recommended for re-use as backfill against the foundation walls, unless used in conjunction with a drainage geocomposite, such as Miradrain G100N or Delta Drain 6000, connected to the perimeter foundation drainage system. Imported granular materials, such as clean sand or OPSS Granular B Type I granular material, should otherwise be used for this purpose.

5.2 Protection of Footings Against Frost Action

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

Exterior unheated footings, such as those for isolated exterior piers, are more prone to deleterious movement associated with frost action than the exterior walls of the structure proper and require additional protection, such as soil cover of 2.1 m or a combination of soil cover and foundation insulation.

5.3 Excavation Side Slopes

The side slopes of excavations in the soil and fill overburden materials should either be cut back at acceptable slopes or should be retained by shoring systems from the start of the excavation until the structure is backfilled. It is assumed that sufficient room will be available for the greater part of the excavation to be undertaken by open-cut methods (i.e. unsupported excavations).

The excavation side slopes above the groundwater level extending to a maximum depth of 3 m should be cut back at 1H:1V or flatter. The flatter slope is required for excavation below groundwater level. 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.

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 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.

5.4 Pipe Bedding and Backfill

Bedding and backfill materials should be in accordance with the most recent Material Specifications & Standard Detail Drawings from the Department of Public Works and Services, Infrastructure Services Branch of the City of Ottawa.

At least 150 mm of OPSS Granular A should be used for bedding for sewer and water pipes when placed on soil subgrade. The bedding should extend to the spring line of the pipe. Cover material, from the spring line to at least 300 mm above the obvert of the pipe should consist of OPSS Granular A (concrete or PSM PVC pipes) or sand (concrete pipe). The bedding and cover materials should be placed in maximum 225 mm thick lifts compacted to a minimum of 95% of the material's SPMDD.

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.

5.5 Groundwater Control

It is anticipated that pumping from open sumps will be sufficient to control the groundwater influx through the sides of the excavations.

A temporary MOE permit to take water (PTTW) will be required for this project if more than 50,000 L/day are to be pumped during the construction phase. At least 4 to 5 months should be allowed for completion of the application and issuance of the permit by the MOE.

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.

5.6 Winter Construction

Precautions must be taken if winter construction is considered for this project.

The subsoil conditions at this site consist of frost susceptible materials. In the presence of water and freezing conditions, ice could form within the soil mass. Heaving and settlement upon thawing could occur.

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.

Trench excavations and pavement construction are also difficult activities to complete during freezing conditions without introducing frost in the subgrade or in the excavation walls and bottoms. Precautions should be taken if such activities are to be carried out during freezing conditions. Additional information could be provided, if required.

6.0 RECOMMENDATIONS

A materials testing and observation services program is a requirement for the provided foundation design data to be applicable. The following aspects of the program should be performed by the geotechnical consultant:

- Observation of all bearing surfaces prior to the placement of concrete.
- Sampling and testing of the concrete and fill materials used.
- 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.
- Sampling and testing of the bituminous concrete including mix design reviews.

A report confirming these works have been completed in general accordance with our recommendations could be issued following the completion of a satisfactory materials testing and observation program by the geotechnical consultant.

7.0 STATEMENT OF LIMITATIONS

The recommendations provided in this report are in accordance with our present understanding of the project.

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. 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 Southway Hotel, 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 Abou-Seido, B.Eng.



David J. Gilbert, P.Eng

Report Distribution:

- Southway Hotel (3 copies)
- Paterson Group (1 copy)

APPENDIX 1

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS



JOHN D. PATERSON & ASSOCIATES LTD.
 Consulting Geotechnical and Environmental Engineers
 28 Concourse Gate, Nepean, Ont. K2E 7T7

SOIL PROFILE & TEST DATA

Geotechnical Investigation
 Proposed Southway Inn Addition, 2431 Bank St.
 Ottawa, Ontario

DATUM TBM - Top of floor slab @ main entrance to existing hotel reception.
 Assumed elevation = 100.00m.

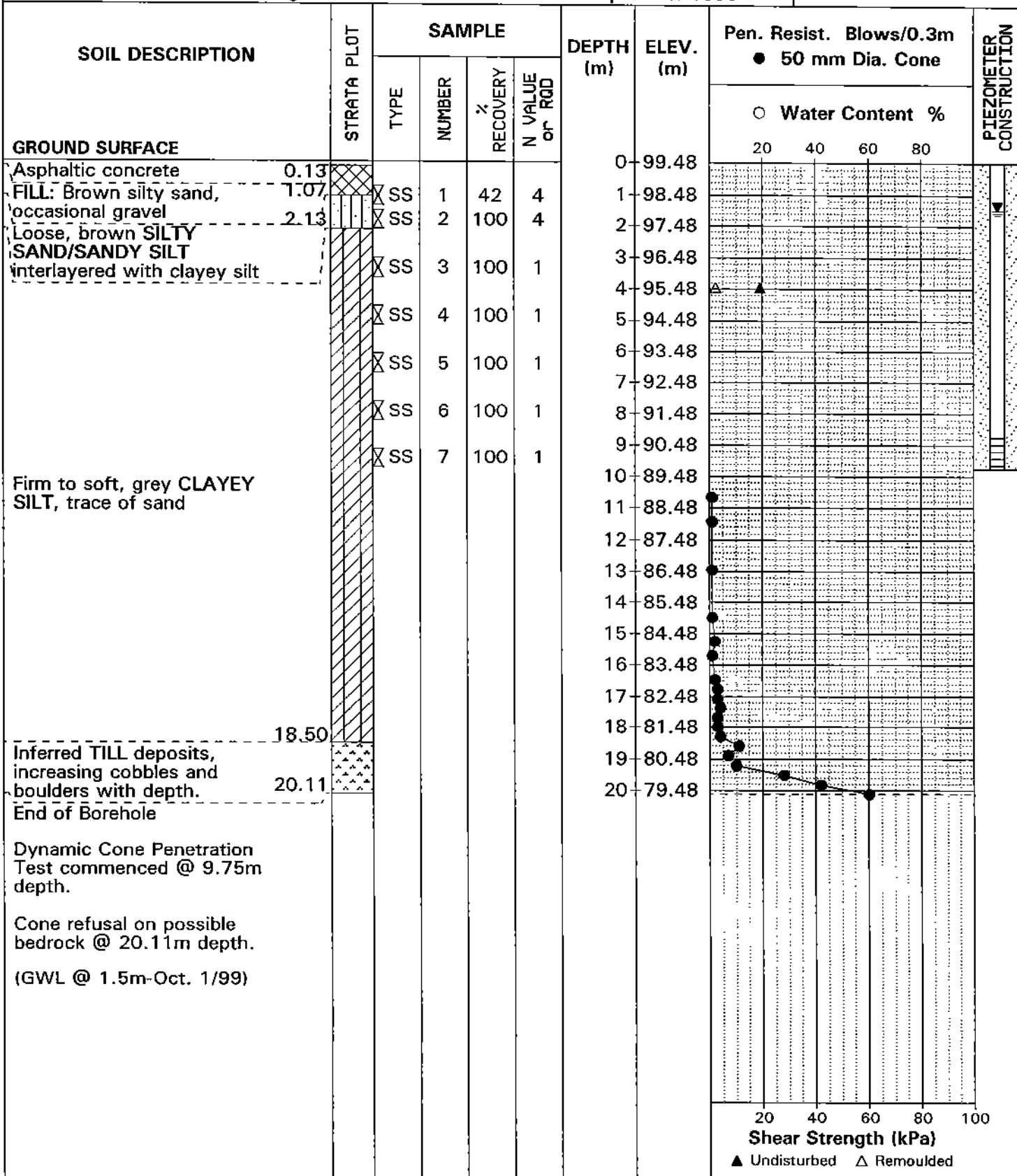
FILE NO.
G7535

REMARKS

HOLE NO.
BH 1

BORINGS BY CME 55 Power Auger

DATE 23 September 1999





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SOIL PROFILE & TEST DATA

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 Ottawa, Ontario

DATUM TBM - Top of floor slab @ main entrance to existing hotel reception.
 Assumed elevation = 100.00m.

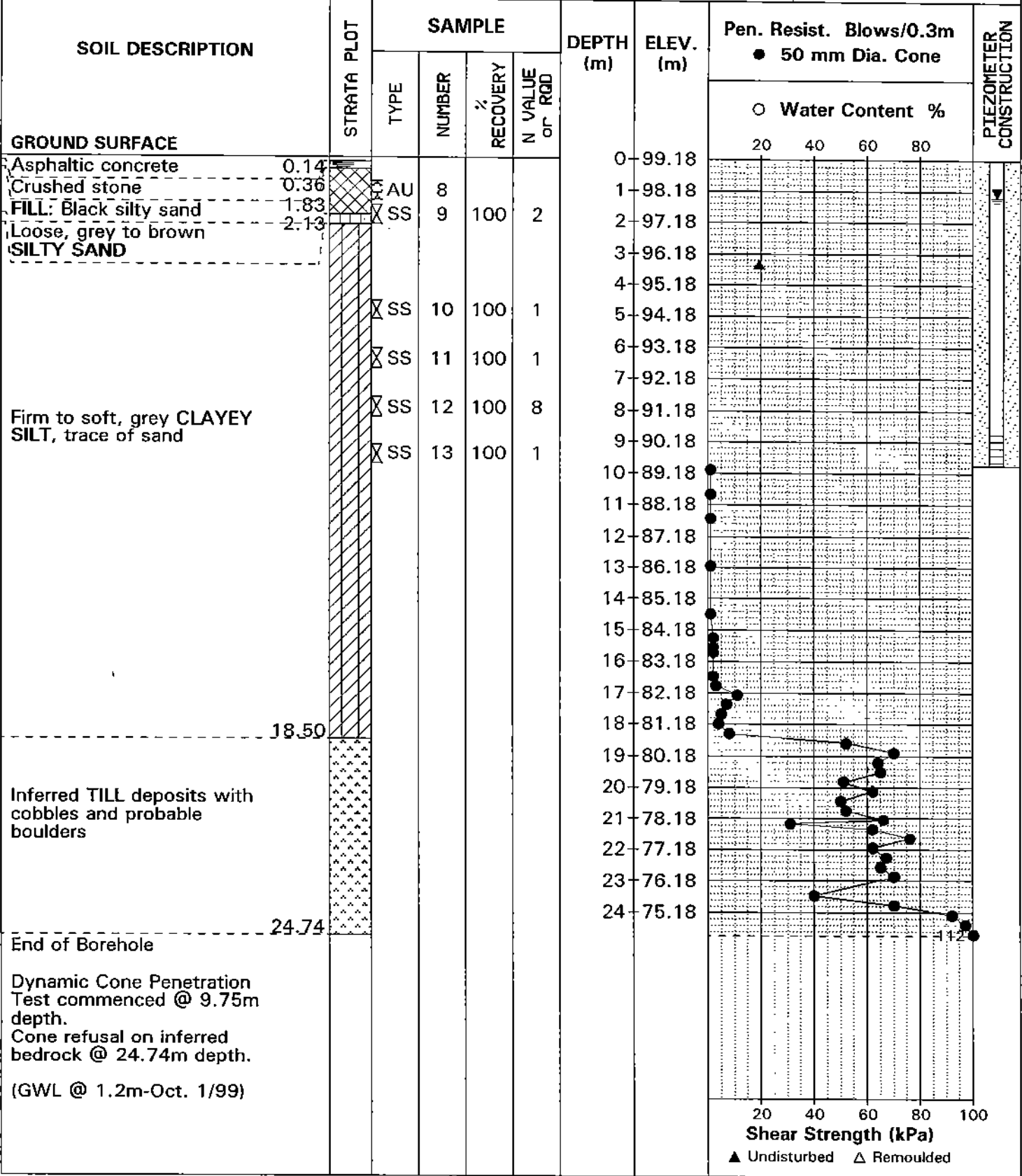
FILE NO.
G7535

REMARKS

HOLE NO.
BH 2

BORINGS BY CME 55 Power Auger

DATE 23 September 1999





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SOIL PROFILE & TEST DATA

Geotechnical Investigation
 Proposed Southway Inn Addition, 2431 Bank St.
 Ottawa, Ontario

DATUM TBM - Top of floor slab @ main entrance to existing hotel reception.
 Assumed elevation = 100.00m.

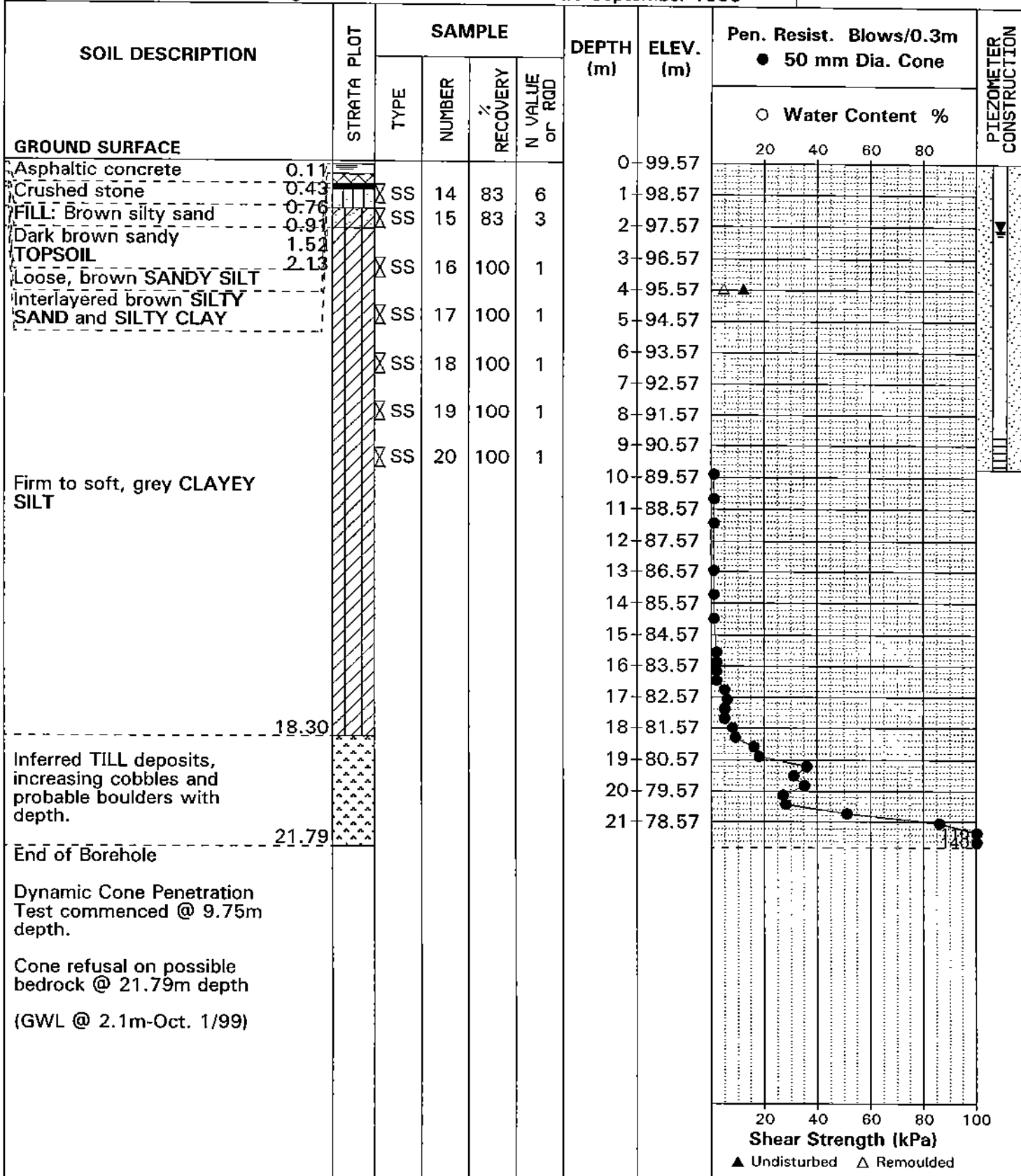
FILE NO.
G7535

REMARKS

HOLE NO.
BH 3

BORINGS BY CME 55 Power Auger

DATE 23 September 1999





JOHN D. PATERSON & ASSOCIATES LTD.
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SOIL PROFILE & TEST DATA

Geotechnical Investigation
 Proposed Southway Inn Addition, 2431 Bank St.
 Ottawa, Ontario

DATUM TBM - Top of floor slab @ main entrance to existing hotel reception.
 Assumed elevation = 100.00m.

FILE NO.
G7535

REMARKS

HOLE NO.
BH 4

BORINGS BY CME 55 Power Auger

DATE 24 September 1999

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				PIEZOMETER CONSTRUCTION
		TYPE	NUMBER	% RECOVERY	N VALUE or RQD			○ Water Content %				
								20	40	60	80	
GROUND SURFACE						0	99.95					
Topsoil	0.10					1	98.95					
FILL: Dark brown to brown silty sand, occasional brick pieces		AU	21			2	97.95					
	3.05	SS	22	83	3	3	96.95					
						4	95.95					
		SS	23	100	1	5	94.95					
		SS	24	100	1	6	93.95					
		SS	25	100	1	7	92.95					
		SS	26	100	1	8	91.95					
Firm to soft, grey CLAYEY SILT, trace of sand						9	90.95					
						10	89.95					
						11	88.95					
						12	87.95					
						13	86.95					
						14	85.95					
						15	84.95					
	16.76					16	83.95					
End of Borehole												
Dynamic Cone Penetration Test commenced @ 9.75m depth.												
Cone refusal on possible bedrock @ 16.76m depth.												
(Piezometer blocked-Oct. 1/99)												

20 40 60 80 100
Shear Strength (kPa)
 ▲ Undisturbed △ Remoulded



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SOIL PROFILE & TEST DATA

Geotechnical Investigation
 Proposed Southway Inn Addition, 2431 Bank St.
 Ottawa, Ontario

DATUM TBM - Top of floor slab @ main entrance to existing hotel reception.
 Assumed elevation = 100.00m.

FILE NO.
G7535

REMARKS

HOLE NO.
BH 5

BORINGS BY CME 55 Power Auger

DATE 24 September 1999

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				PIEZOMETER CONSTRUCTION
		TYPE	NUMBER	% RECOVERY	N VALUE OF ROD			○ Water Content %				
								20	40	60	80	
GROUND SURFACE						0	99.09					
Topsoil	0.13	⊗ AU	27									
FILL: Brown silty sand	0.76	⊗ SS	28	92	6	1	98.09					
Loose, brownish grey SANDY SILT	1.37											
End of Borehole												
(BH dry upon completion)												
								20	40	60	80	100
								Shear Strength (kPa)				
								▲ Undisturbed Δ Remoulded				



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SOIL PROFILE & TEST DATA

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Proposed Southway Inn Addition, 2431 Bank St.
Ottawa, Ontario

DATUM TBM - Top of floor slab @ main entrance to existing hotel reception.
Assumed elevation = 100.00m.

FILE NO.
G7535

REMARKS

HOLE NO.
BH 7

BORINGS BY CME 55 Power Auger

DATE 24 September 1999

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Pen. Resist. Blows/0.3m ● 50 mm Dia. Cone				PIEZOMETER CONSTRUCTION
		TYPE	NUMBER	% RECOVERY	N VALUE or R _{qd}			○ Water Content %				
								20	40	60	80	
GROUND SURFACE						0	99.89					
Topsoil	0.13	⊗	AU 31									
FILL: Brown silt and sand, some organics	1.22	⊗	SS 32	92	6	1	98.89					
Dark brown sandy silt	1.37											
TOPSOIL												
End of Borehole												
(BH dry upon completion)												

20 40 60 80 100
Shear Strength (kPa)
▲ Undisturbed △ 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, %
LL	-	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)
D _{xx}	-	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
D ₁₀	-	Grain size at which 10% of the soil is finer (effective grain size)
D ₆₀	-	Grain size at which 60% of the soil is finer
C _c	-	Concavity coefficient = $(D_{30})^2 / (D_{10} \times D_{60})$
C _u	-	Uniformity coefficient = D_{60} / D_{10}

C_c and C_u are used to assess the grading of sands and gravels:

Well-graded gravels have: $1 < C_c < 3$ and $C_u > 4$

Well-graded sands have: $1 < C_c < 3$ and $C_u > 6$

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

C_c and C_u 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

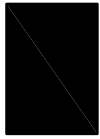
p' _o	-	Present effective overburden pressure at sample depth
p' _c	-	Preconsolidation pressure of (maximum past pressure on) sample
C _{cr}	-	Recompression index (in effect at pressures below p' _c)
C _c	-	Compression index (in effect at pressures above p' _c)
OC Ratio		Overconsolidation ratio = p'_c / p'_o
Void Ratio		Initial sample void ratio = volume of voids / volume of solids
W _o	-	Initial water content (at start of consolidation test)

PERMEABILITY TEST

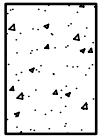
k	-	Coefficient of permeability or hydraulic conductivity is a measure of the ability of water to flow through the sample. The value of k is measured at a specified unit weight for (remoulded) cohesionless soil samples, because its value will vary with the unit weight or density of the sample during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

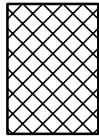
STRATA PLOT



Topsoil



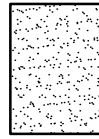
Asphalt



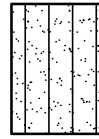
Fill



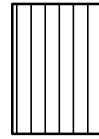
Peat



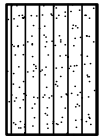
Sand



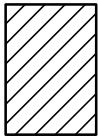
Silty Sand



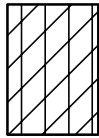
Silt



Sandy Silt



Clay



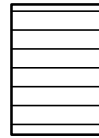
Silty Clay



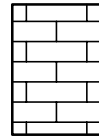
Clayey Silty Sand



Glacial Till



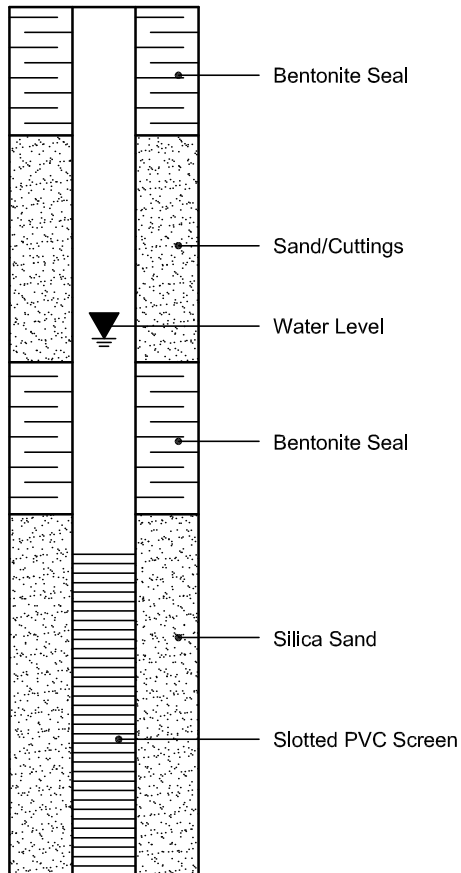
Shale



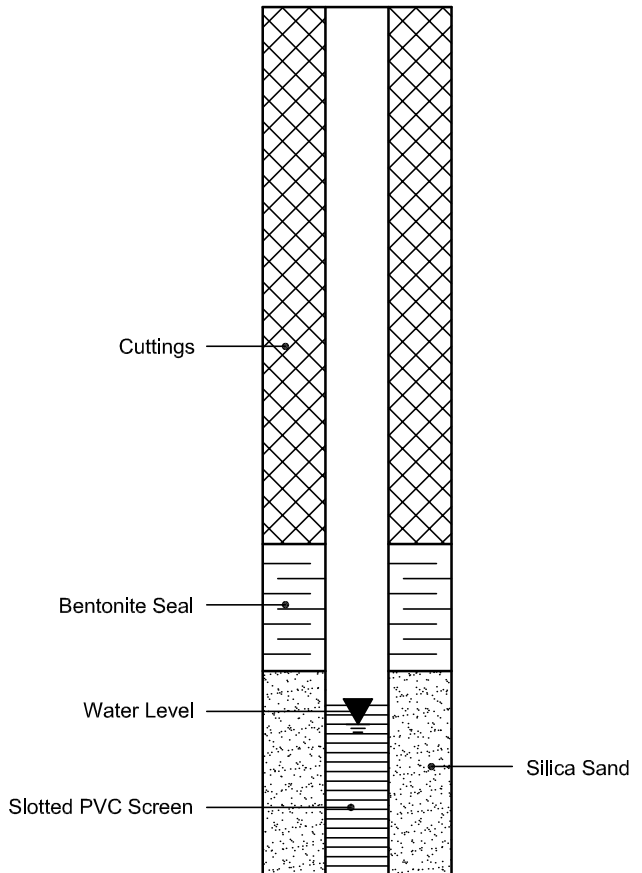
Bedrock

MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



APPENDIX 2

FIGURE 1 - KEY PLAN

DRAWING PG3273-1 - TEST HOLE LOCATION PLAN

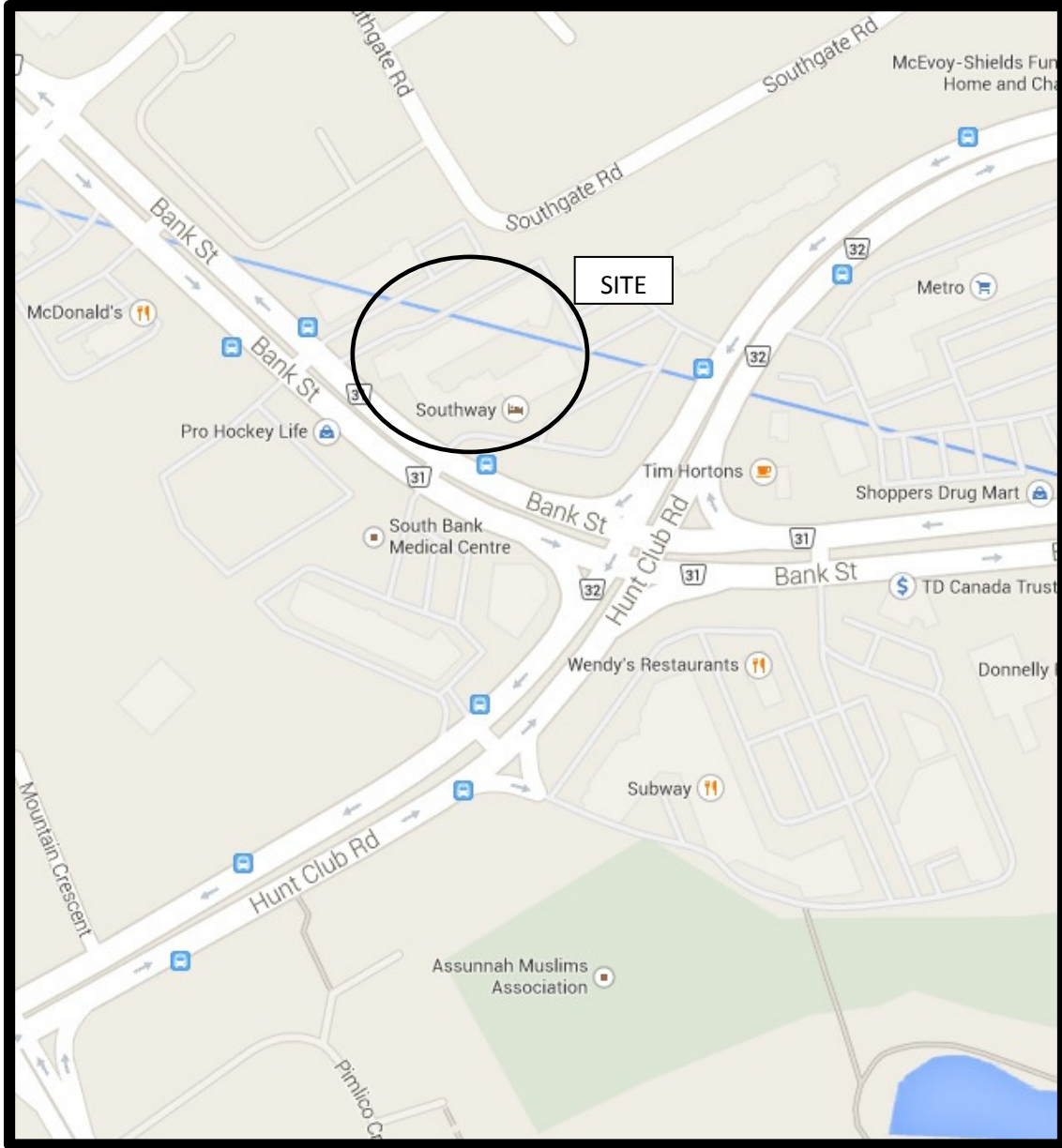
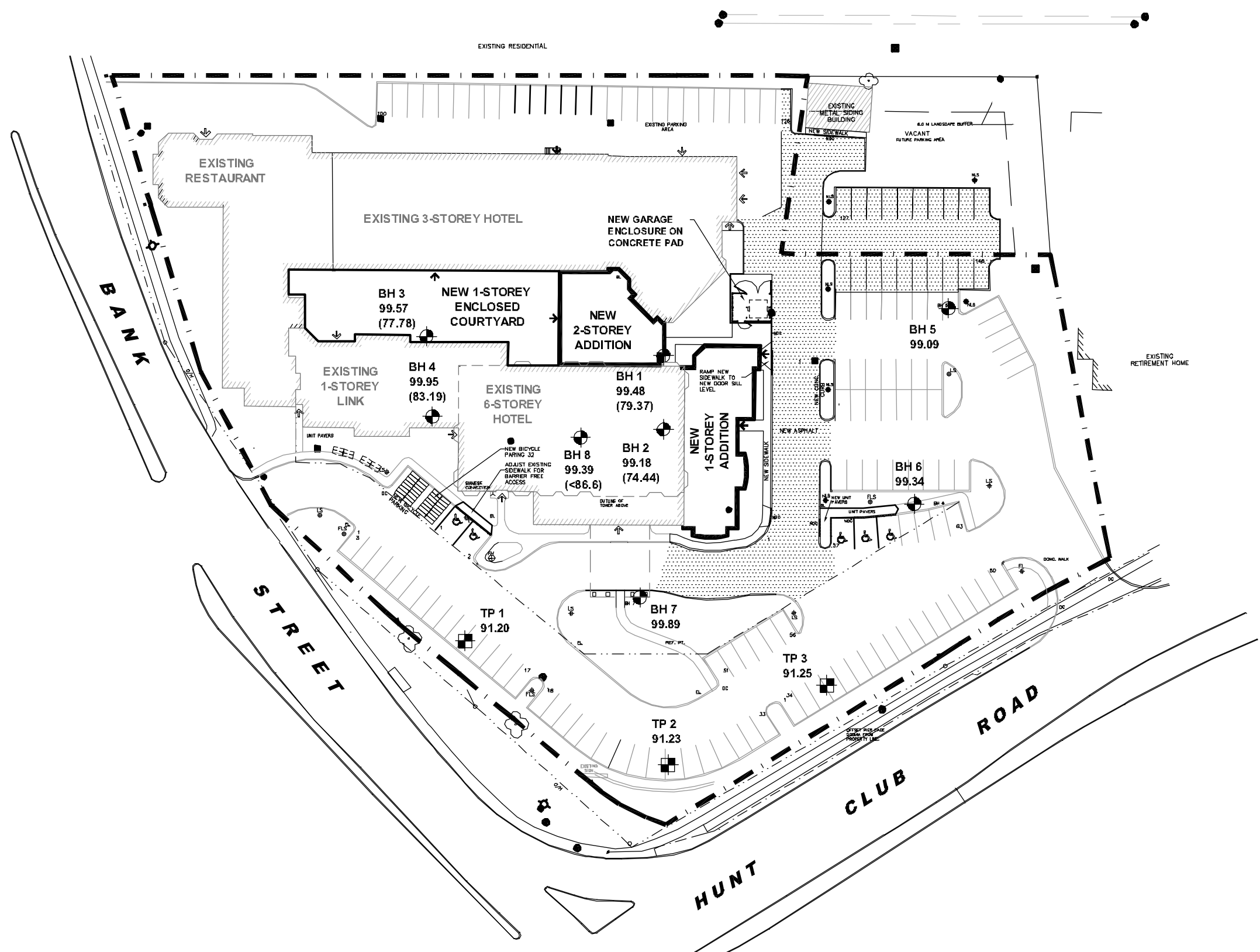




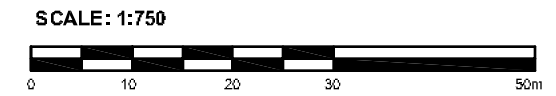
FIGURE 1
KEY PLAN



LEGEND:

-  BOREHOLE LOCATION, PATERSON GROUP REPORT G7535
-  TEST PIT LOCATION, PATERSON GROUP REPORT G7535
- 99.57 GROUND SURFACE ELEVATION (m)
- (77.78) PRACTICAL REFUSAL TO AUGERING ELEVATION (m)

TBM - FINISHED FLOOR LEVEL OF EXISTING HOTEL. AN ARBITRAR ELEVATION OF 100.00m WAS ASSIGNED TO THE TBM.



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NO.	REVISIONS	DATE	INITIAL

SOUTHWAY HOTEL
GEOTECHNICAL INVESTIGATION
PROPOSED BUILDING ADDITIONS - 2431 BANK STREET

OTTAWA, ONTARIO

TEST HOLE LOCATION PLAN

Drawn by: MPG	Checked by: DJG	Date: 06/2014
Scale: 1:750		Drawing No.:
Report No.:		PG3273-1
PG3273-1		

p:\autocad drawings\geotechnical\pg3273-1.dwg