GEOTECHNICAL INVESTIGATION

241 REACH STREET
UXBRIDGE, ONTARIO

Mr. Robert Kennedy

Project No. 141-19775-00

April 2015

Distribution:
23 c Client
1 c Electronic (PDF)
1 c File

WSP Canada Inc.
126 Don Hillock Drive, Unit 2
Aurora, Ontario L4G 0G9

Phone: +1 905-750-3080
Fax: +1 905-727-0463
www.wspgroup.com

April 17, 2015

Mr. Robert Kennedy
9-110 Konrad Crescent
Markham, Ontario
L3R 9X2

Re: Geotechnical Investigation
241 Reach Street, Uxbridge, Ontario
Project No. 141-19775-00

Dear Sir:

WSP Canada Inc. (WSP) is pleased to submit the attached Geotechnical Investigation report to support the design and construction of the proposed 56 condominium townhouse residential development to be located at 241 Reach Street, in the Township of Uxbridge, Ontario.

This report is based on information obtained from a subsurface soil investigation and a laboratory testing program conducted in February and March 2015.

We trust that this report satisfies your requirements. Please contact me if you have any questions.

Yours truly,
WSP Canada Inc.

Oswin Li, P.Eng.
Geotechnical Engineer

OL:nah

WSP Canada Inc.
126 Don Hillock Drive. Unit 2
Aurora, Ontario
L4G 4G9
www.wspgroup.com

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

1 INTRODUCTION

WSP Canada Inc. (WSP) was retained by Mr. Robert Kennedy to undertake a geotechnical investigation pertaining to the proposed 55 condominium townhouse residential development to be located at 241 Reach Street, Township of Uxbridge, Ontario. The location of the subject property (hereafter referred to as the Site) is as shown in Figure 1.

At the present time the Site is occupied by a single family residential dwelling. It is proposed that the lands will be developed for a 55 unit residential condominium townhouse development with access from Reach Street.

The geotechnical investigation provides information on subsurface conditions beneath the Site, including a description of the soil profile and groundwater conditions. Based on a Site Plan (revised on March 3, 2015) prepared by Robert Reimers Architect Ltd. and the investigation findings, WSP has provided geotechnical recommendations for consideration in the design and construction of the proposed residential townhouse development at the Site.

2 INVESTIGATION METHODOLOGY

2.1 FIELD INVESTIGATION

Prior to the field investigation, public utility companies were consulted to identify where existing public utilities entered the Site boundaries. In addition, given that the Site is a private property, WSP retained the services of a private utility locator, OnSite Locates Inc., to clear the specific borehole locations from potential interference with private utilities.

The borehole program was carried out on February 24, 2015. A total of six (6) boreholes, designated as BH15-1 to BH15-6, were advanced and installed at the approximate locations shown on Figure 2.

Boreholes BH15-1 to BH15-6 were advanced to a depth of approximately 6.5 m below the existing ground surface using a track-mounted drill rig equipped with 110 mm outside diameter continuous flight solid stem augers. WSP field personnel supervised the drilling operations and recorded the conditions encountered in the boreholes at the time of the investigation. Soil samples were recovered from the boreholes at approximately 0.75 m to 1.5 m intervals using a 51 mm outside diameter split spoon sampler, driven in accordance with Standard Penetration Test (SPT) procedures (ASTM D1586). The results of SPTs in terms of N values are referred to in this report to define the relative density for the non-cohesive (non-plastic) materials encountered at the Site.

The boreholes were checked for groundwater seepage and general stability prior to backfilling. All soil samples recovered from the boreholes were placed in moisture proof bags and transported to our laboratory for detailed classification and testing as required.

The ground surface elevations at the respective borehole locations were interpolated from the existing elevations as shown on a topographic survey plan prepared by H.F. Grander Co. Ltd. (Project No. 6092-TP), the elevations are considered to be accurate only to within ±0.5 m. The ground surface elevations at the borehole locations are presented on Figure 2 and Borehole Logs in Appendix A.

2.2 LABORATORY TESTING

The field investigation was supplemented with a laboratory testing program. Upon completion of drilling, all recovered soil samples were transported to our geotechnical laboratory for detailed visual examination and classification. Moisture Content Tests and Particle Size Distribution analyses were conducted respectively on thirty-one (31) and four (4) selected soil samples. The laboratory test results are summarized on the Borehole Logs in Appendix A and the individual Particle Size Distribution curves are included in Appendix B.

A total of four (4) selected soil samples were submitted to AGAT Laboratories (AGAT) located at Mississauga, Ontario. Chemical testing of selected metals and inorganic parameters were conducted on three (3) of the four (4) selected soil samples to evaluate the environmental quality and suitability of the soils for off-site disposal, if required. The remaining one (1) selected soil sample was submitted for analysis of pH, resistivity, redox potential, and sulphide and soluble sulphate concentrations. These tests were conducted to assess the conditions associated with the corrosive potential of the soils in accordance to the evaluation criteria established by the American Water Work Association (AWWA) and the American National Standards Institute (ANSI). The results of the soluble sulphates test were used to evaluate the potential for degradation of concrete in accordance with the criteria outlined in Canadian Standards Association (CSA) document A23.1-04.

A copy of the Certificate of Analysis provided by AGAT is presented in Appendix C.

Unless requested in advance, the soil samples from this investigation will be stored in our laboratory facility for a period of up to three (3) months after the issuance of this report.

3 FINDINGS

3.1 SOIL PROFILE

Based on the information obtained from BH15-1 to BH15-6, the Site soil profile predominantly consists of non-cohesive (non-plastic) native sand and silt / silty sand / sandy silt soils. The borehole logs are presented in Appendix A. Individual soil units encountered in the boreholes are described as follows.

3.1.1 TOPSOIL

With the exception of BH15-6, a layer of topsoil was encountered at the ground surface in all other boreholes. The topsoil has a thickness of approximately 300 mm to 600 mm.

3.1.2 SAND AND GRAVEL FILL

A layer of sand and gravel fill consisting of a trace of silt was encountered at the ground surface in BH15-6. This fill material has a thickness of approximately 600 mm.

Based on the N-values obtained from the Standard Penetration Tests (SPTs), the sand and gravel fill has a very dense relative density.

3.1.3 NATIVE SAND AND SILT/ SILTY SAND / SANDY SILT

As indicated above, the predominant native soils encountered in the boreholes advanced on the Site consisted of sand and silt / silty sand / sandy silt. These soils were encountered underlying either the topsoil in BH15-1 to BH15-5 or beneath the sand and gravel fill in BH15-6. All six (6) boreholes were terminated in the aforementioned soil conditions at a depth of approximately 6.5 m below existing ground surface.

At the time of the investigation, the native sand and silt / silty sand / sandy silt soils were assessed as moist to wet. The natural moisture content as determined by the laboratory tests ranges from 3% to 18%, with an average of 7.9%.

Based on the N-values obtained from the Standard Penetration Tests (SPTs), the relative density of the native sand and silt/silty sand/sandy silt varies from very loose to very dense, but is more typically compact to dense.

Four (4) laboratory particle size distribution analyses were completed on selected samples of the native soils obtained from BH15-1, BH15-2, BH15-5 and BH15-6. The test results are summarized in the Borehole Logs included in Appendix A and the particle size distribution curves are presented in Appendix B. The test results are as follows (MIT classification):

- Gravel (Coarser than 2 mm sieve size) 0% to 6%
- Sand (0.06 mm to 2 mm sieve size) 29% to 60%
- Silt (0.002 mm to 0.06 mm sieve size) 29% to 61%
- Clay (Finer than 0.002 mm sieve size) 5% to 10%

3.2 GROUNDWATER

All six (6) boreholes advanced on the Site remained open and dry to the termination depth of approximately 6.5 m below existing grade on completion of drilling.

It should, however, be noted that the groundwater level observed immediately after drilling and may not reflect the time required for water table equilibration in relatively fine-grained soils. The groundwater elevations will fluctuate seasonally and in response to precipitation events.

4 GEOTECHNICAL RECOMMENDATIONS

The following recommendations for the proposed Site development are based on the information obtained from the boreholes investigation and laboratory testing, which we believe fairly represents the subsurface conditions of the Site. These recommendations are intended for designers and should not be construed as instructions to contractors. If significant differences in the subsurface conditions described above are found, we request to be contacted immediately to review and revise our findings and recommendations, if necessary.

4.1 SITE PREPARATION

It is understood that the existing house on the Site including foundations, floor slabs, buried services and other associated infrastructures will be demolished prior to commencement of general site preparation activities. The material should be disposed of at an approved facility.

The excavations created by the demolition and removal of the existing foundations and underground structures are recommended to be backfilled with structural (engineered) fill as specified below.

At the time of our investigation, the Site is covered by dense trees. Removal of the existing trees will be required to facilitate the proposed development on the Site.

With the exception of BH15-6, a layer of topsoil was observed at the ground surface in all other boreholes. Removal of the topsoil will be required to facilitate the proposed development on the Site. Based on the conditions recorded at the boreholes, we anticipate that stripping depths will be in the order of 300 mm to 600 mm, but are subject to confirmation during construction.

Subsequent to the completion of the required stripping and removal of unsuitable materials, the sub-grade should be proof-rolled and inspected by qualified geotechnical engineering personnel. The proof-rolling and compaction of the exposed sub-grade is recommended to be conducted using a vibratory compactor with a minimum static weight of 10 tonnes. The proof-rolling program should consist of a minimum of six passes per unit area and be tested to assure that the sub-grade is compacted to a minimum of 98% of the exposed material's Standard Proctor Maximum Dry Density (SPMDD). Any loose/soft or wet areas identified at the time of proof-rolling that cannot be uniformly compacted are recommended to be sub-excavated and backfilled with approved engineered fill consistent with the recommendations provided below.

Where engineered fill is required to develop the design grades and elevations or for use in backfilling excavations created through the removal of unsuitable materials or soils as described above, the excavated on-site materials may be re-used, subject that these are free of organic and other unsuitable materials, have adequate moisture content and do not contains boulders larger than 100 mm in diameter. Alternatively, Ontario Provincial Standard Specification (OPSS) Granular B – Type I, OPSS Select Subgrade Material (SSM) or approved equal may be used.

All fill materials imported to the Site must meet all applicable municipal, provincial and federal guidelines and requirements associated with environmental characterization of the materials.

Engineered fill is to be placed in maximum 200 mm thick loose lifts. Each lift is to be uniformly compacted to achieve a minimum of 98% of the material's Standard Proctor Maximum Dry Density (SPMDD).

4.2 REUSE OF SITE MATERIALS

As stated above, the existing topsoil is recommended to be stripped and removed from the area of planned development. The topsoil may be reused in landscaping applications.

It was not possible to implement standard aggregate sampling (5 kg -10 kg for Granular 'A' and 25 kg for Granular 'B') and testing techniques at this phase of the project. Additional laboratory tests are recommended during the construction phase to re-evaluate and confirm that the existing sand and gravel fill materials as encountered at the ground surface in BH15-6 meet project specifications for reuse or leave in place for pavement structure of future roadways during construction.

For the purpose of minor grade adjustments and trench backfill to finished sub-grade level it is anticipated that the existing native sand and silt, silty sand or sandy silt soils will be suitable for reuse if these become available from localized excavations.

Based on our observations at the time of the investigation, portions of the native soils have in-situ moisture contents above the optimum required for handling, placing and compaction and some drying may be required if considerations are given to reuse these soils on the Site.

Based on the results of the grain size distribution tests completed on selected samples of the on-site soils, the predominant native soils are considered to be frost susceptible. Therefore, the native soils are not recommended for use as perimeter foundation backfill, as granular base and sub-base materials, or for similar applications where development of frost would be detrimental to the performance of the proposed structures on the Site.

4.3 FOUNDATIONS AND BUILDING FLOOR SLABS

4.3.1 CONVENTIONAL STRIP AND SPREAD FOOTING FOUNDATIONS

Details of the proposed residential development such as Finished Floor Elevation (FFE) were not available at the time when this report was prepared. WSP requests to be provided the opportunity to review that information at a later time to verify these findings.

Based on the soil conditions encountered in the boreholes and provided that the Site is prepared in accordance with the recommendations presented in Section 4.1 of this report, conventional strip and spread footings may be used for foundation support. The soil conditions at the founding elevations are recommended to be confirmed by field inspections at the time of construction. Any loose, soft, wet or deleterious materials observed at the exposed bearing soil surface is recommended to be sub-excavated and replaced with approved and compacted engineered fill as described in this report.

The recommended minimum earth cover for frost protection of exterior building footings or footings in unheated areas is 1.2 m below finished grade. Where construction is undertaken during winter conditions, the footing subgrade must be protected from freezing and build up of snow and ice.

Table 4-1 provides the recommended geotechnical resistances at Ultimate Limit States (U.L.S.), geotechnical reactions at Serviceability Limit States (S.L.S.), anticipated founding soil conditions and recommended founding elevations specific to the boreholes advanced on the Site for the proposed structures. The geotechnical resistances at U.L.S. provided above include a resistance factor of 0.5. The geotechnical reactions at S.L.S. are based on a total settlement of approximately 25 mm.

Table 4-1: Recommended Geotechnical Resistances and Reactions

Borehole No.	Recommended Founding Elevation (mASL)	Anticipated Founding Soil Conditions	Geotechnical Resistances at U.L.S. (kPa)	Geotechnical Reactions at S.L.S. (kPa)
BH15-1	282.1	Compact Sand and Silt, trace clay	150	100
BH15-2	279.2	Compact Sand and Silt to Sandy Silt, trace clay	150	100
BH15-3	278.3	Compact Silty Sand, trace clay	150	100
BH15-4	278.3	Compact Silty Sand, trace gravel, trace clay	150	100
BH15-5	282.1	Compact Silty Sand, trace clay	150	100
BH15-6	282.3	Compact Sandy Silt, trace to some clay	150	100

For the case of conventional strip and spread footing foundations placed on approved engineered fill as described herein, a geotechnical resistance of 225 kPa at ULS and a geotechnical reaction of 150 kPa at SLS can be considered for the design.

4.3.2 SLAB ON GRADE FLOOR SLABS

Based on the conditions encountered in the boreholes, the Site is considered suitable for the use of a conventional slab on grade floor slab provided that all site preparation activities and recommendations as stated herein are adopted.

It is recommended that the floor slab be constructed on a layer of compacted granular fill, to provide a suitable supporting base for the slab, and to act as a moisture break. For this purpose, the drainage layer is recommended to consist of 200 mm of OPSS Granular A, compacted to a minimum of 98% of the materials' Standard Proctor Maximum Dry Density (SPMDD).

A modulus of sub-grade reaction, Ks, of 12 MN/m^3 may be used for the design of the floor slab constructed in accordance with the recommendations provided herein. The floor slab is not to be connected to any load bearing wall and / or columns.

A permanent under floor drainage system will not be required provided that the proposed Finished Floor Elevation is a minimum of 150 mm higher than the exterior grade and the surrounding area slopes away from the structures and all related infrastructure.

4.4 EXCAVATIONS

Temporary excavations for the construction of footings or installation of underground structures and/or services are to be carried out in accordance with the latest edition of the Occupational Health and Safety Act (OHSA). It is anticipated that excavations in the encountered native soils will be relatively straight forward using conventional excavation equipment.

For the purpose of this report, we assumed that temporary excavations will only be open for short periods (i.e. 12 hours or less). Sloughing and caving of side slopes of excavations can be anticipated for excavations that remain open for longer periods, and appropriate protection measures are to be taken (e.g. temporary backfilling, slope flattening).

Based on the anticipated excavation depths, the predominant native soils encountered in the boreholes within the upper 2 m from the existing ground surface can be classified as Type 3 soils in accordance with the OHSA. Consistent with the OHSA, temporary excavation side slopes in Type 3 soils should not exceed 1.0 horizontal to 1.0 vertical.

The native soils as encountered in the boreholes between 2 m to 6.5 m generally have a compact to very dense relative density above the groundwater level and these can be classified as Type 2 soils in accordance with the OHSA. The minimum excavation side slope for Type 2 soils is 1 : 1 (Horizontal : Vertical) from the base of the excavation in accordance with the OHSA. A vertical cut extending 1.2 m up from the base of the excavation is permitted in Type 2 soils.

Excavation side slopes are to be protected from exposure to precipitation and associated ground surface runoff, and should be inspected regularly for signs of instability. If localized instability is noted during excavation or if wet conditions are encountered, the side slopes are to be flattened as required to maintain safe working conditions.

If space is restricted such that the side slope cannot be safely cut back in accordance with the OHSA regulation, or sloughing and cave-in are encountered in the excavations, temporary shoring is to be provided. Shoring shall be designed by a qualified Professional Engineer.

4.5 BACKFILL

It is recommended that foundation backfill consist of free-draining, non-frost susceptible granular fill material, such as OPSS 1010 Granular ‘B’ Type I materials or approved equivalent. The backfill is to be placed in 300 mm thick loose lifts and compacted to a minimum of 95% SPMDD. Care is to be taken immediately adjacent to walls to avoid over compaction of the soil, which may result in damage to the walls.

Pipe bedding materials specifications for underground utilities is recommended to be in accordance with the manufacturer’s and / or the designer’s recommendations. Granular bedding materials are considered to be adequate for service installations for the proposed Site development.

It is suggested that the bedding material be placed around the service pipes with a minimum of 300 mm cover on all sides, per OPSD 802.010. The granular bedding is to be compacted to 98% SPMDD.

Service trench backfill may consist of approved portions of the native soils, subject to the constraints and limitations stated above with respect to reuse. Alternatively, imported materials, such as OPSS 1010 Granular ‘B’ Type I, Select Subgrade Materials (SSM), or approved equivalent may be used.

In settlement sensitive areas, trench backfill is to be placed in maximum 200 mm thick loose lifts and compacted to a minimum of 98% of the materials’ SPMDD. In non-settlement sensitive landscaped areas the backfill may be placed in 300 mm thick lifts and compacted to a minimum of 95% of the material’s SPMDD.

Water and sewer lines installed outside of heated areas are recommended to be provided with a minimum of 1.2 m soil cover or equivalent insulation for frost protection.

4.6 GROUNDWATER CONTROL

All boreholes remained open and dry to the termination depth of approximately 6.5 m below existing ground surface.

It is anticipated the shallow excavations for foundations or installation of services above the aforementioned depths will remain dry. Localized seepage may be encountered where the existing grades and ground surface cover promote accumulation of precipitation and ground surface runoff, or in localized zones in the underlying native soils. The quantity of seepage is expected to be limited, and should be manageable using conventional filtered sumps and pumps for the short time required.

4.7 PRELIMINARY PAVEMENT STRUCTURE

The comments and recommendations provided herein, with respect to the design and construction of the proposed paved driveways, presume that the exposed subgrade surface is prepared in accordance with the recommendations provided in Section 4.1 of this report. It is recommended that pavement design for the Site will match the local municipality standards for paved driveways at residential property.

Base and sub-base granular materials are recommended to be compacted to 100% of the material's SPMDD. The asphaltic concrete are to be compacted to between 92% to 96.5% of the Maximum Marshall Relative Density (MRD).

For all applications, the sub-grade should be free of depressions and properly crowned towards catch basin structures at a minimum crossfall of 3%. It is recommended that full-length perforated pipe subdrains be installed on both sides of the roadway. The subdrain pipes are to be fully wrapped in a suitable geotextile filter fabric to prevent the infiltration of soil fine particles; and are to be laid below the granular sub-base course in a trench with an approximate dimension of 300 mm deep and 300 mm wide.

4.8 EXCESS SOIL DISPOSAL

Three (3) selected soil samples from the boreholes investigation were submitted to AGAT, a CALA-certified laboratory for chemical analyses of specific metals and inorganic parameters. The soil samples submitted for testing were obtained from BH15-1 SS2, BH15-4 SS3 and BH15-6 SS2. The test results were compared to Table 1 of Soil, Groundwater and Sediment Standards for use under Part XV.1 of the Environmental Protection Act (April 15, 2011). The tested soil sample met the relevant Site Condition Standard and therefore may be treated as non-hazardous waste for off-site disposal. A copy of AGAT's laboratory certificate of analysis is included in Appendix C.

4.9 SOIL CORROSIVITY POTENTIAL

One (1) selected soil sample was submitted to AGAT Laboratories (AGAT) for laboratory analysis of pH, resistivity, redox potential, and sulphide concentrations to determine the corrosive potential of the soil. The tested sample was obtained from Sample No. SS4 of BH15-2. The following Table 4-2 summarizes the ANSI/AWWA rating for the potential for corrosion of the tested soil sample.

Table 4-2: ANSI/AWWA Rating of Corrosion Potential

Sample Details	BH15-2 Sample No. SS4	
Depth (m)	2.3 m to 3.8 m	
Soil Type	Native Sand and Silt / Sandy Silt	
Parameter	**Parameter Concentrations**	**ANSI/AWWA Point Rating**
Resistivity (Ohms-cm)	17500	0
pH	8.61	3
Redox Potential (mV)	+287	0
Sulphide (ug/g)	Trace	2
Moisture Content (%)	Fair Drainage, Moist	1
Total Points	-	6

Based on the ANSI/AWWA rating system, the tested soil sample is considered as non-corrosive. Other factors may influence the corrosion potential, such as; the nature of effluent conveyed, the application of de-icing salts on the roadway and subsequent leaching into the subsoils; and stray currents.

4.10 CEMENT TYPE

The soil sample noted above was also submitted for laboratory analysis of soluble sulphates to assess the potential for degradation of buried concrete in contact with the native material. The soluble sulphate concentration of the tested sample was less than 2 ug/g (2 ppm). Based on the result, the potential for sulphate attack on concrete is considered negligible. Therefore, in accordance with the Canadian Standard Association (CSA) document A23.1-04, General Use, Type GU, Portland Cement may be used.

5 DESIGN REVIEW, TESTING AND INSPECTIONS

WSP requests to be afforded the opportunity to complete a final design review of the facilities discussed in this report to verify that geotechnical recommendations are appropriate. If not given this opportunity, we cannot assume liability for omissions, misinterpretations or deficiencies in our recommendations.

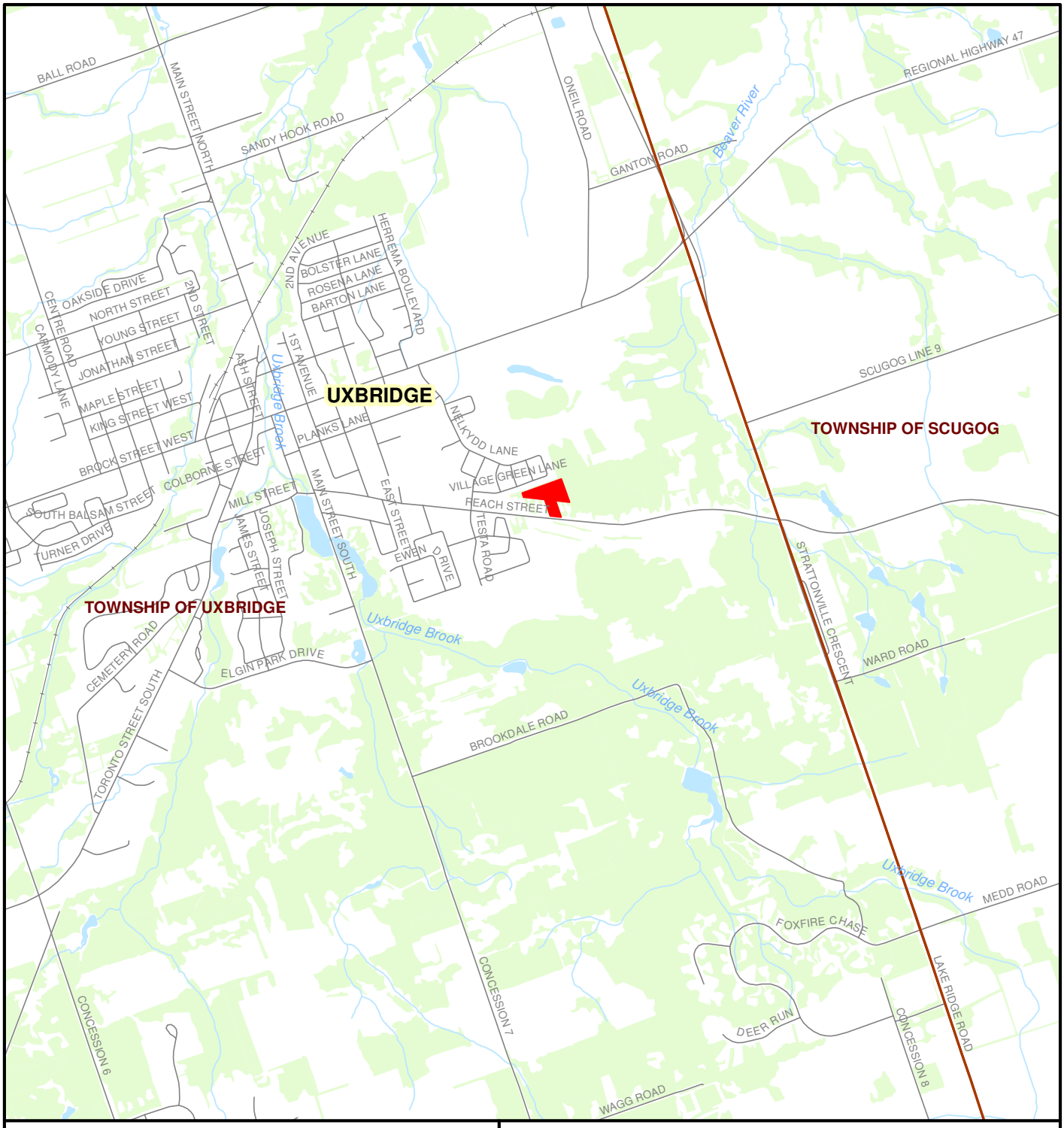
WSP requests to be contacted to provide geotechnical testing and inspections during construction operations. Exposed subgrade soils for all structures are to be inspected to confirm the material is stable and competent. Inspections of seepage and groundwater conditions during construction are also required, as discussed in this report, to confirm that dewatering is not required. Testing and inspections for general QA/QC are to include sampling and laboratory testing of fill materials and asphalt, compaction testing for the placement of fill materials and asphalt, and field and laboratory testing of concrete (including mix design reviews).

We trust that this report satisfies your requirements. Please contact our office if you have any questions.

Yours truly,
WSP Canada Inc.

Oswin Li, P.Eng.
Geotechnical Engineer

Figures



LEGEND

APPROXIMATE SITE LOCATION

N
W E
S

300 150 0 300 Metres

Data Source: Ministry of Natural Resources, Ontario Base Mapping, March 2014.

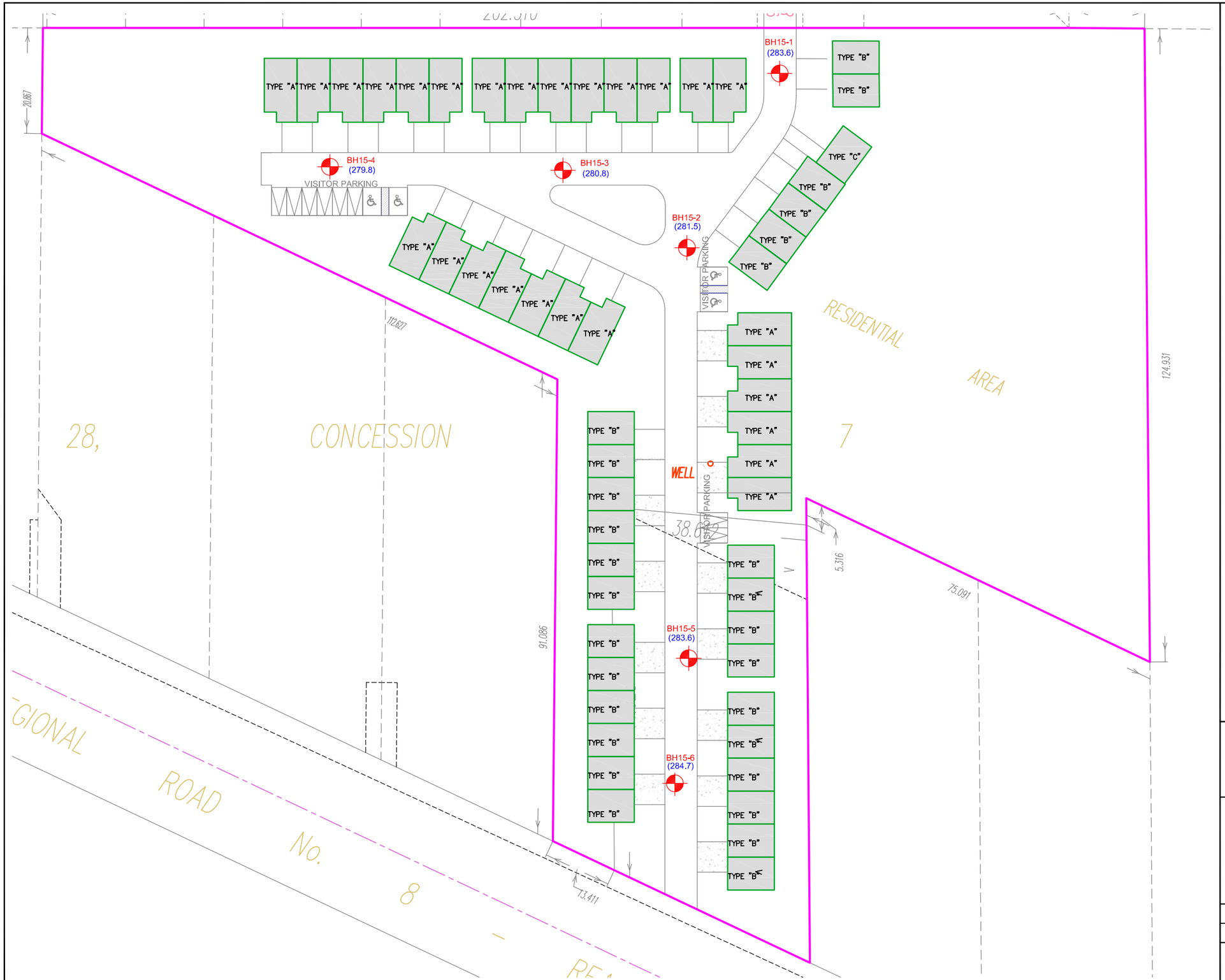
SITE LOCATION MAP

GEOTECHNICAL INVESTIGATION
241 Reach Street, Uxbridge, Ontario
For Mr. Robert Kennedy

DATE: MARCH 2015	SCALE: 1:30000
PROJECT: 141-19775-00 132	FILE. NO.:141-19775-00 132 F1

WSP

FIGURE 1



LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- BH15-1 BOREHOLE LOCATION AND DESIGNATION
- (283.6) GROUND SURFACE ELEVATION (mASL)

20 0 20.0

BOREHOLE LOCATIONS PLAN

GEOTECHNICAL INVESTIGATION
241 Reach Street, Uxbridge, Ontario
For Mr. Robert Kennedy

DATE: APRIL 2015	SCALE: 1:750
PROJECT: 141-19775-00 132	FILE NO.: 141-19775-00 132 F2-SP

WSP

FIGURE 2

Appendices

Appendix A

BOREHOLE LOGS

BOREHOLE LOG EXPLANATION FORM

This explanatory section provides the background to assist in the use of the borehole logs. Each of the headings used on the borehole log, is briefly explained.

DEPTH

This column gives the depth of interpreted geologic contacts in metres below ground surface.

STRATIGRAPHIC DESCRIPTION

This column gives a description of the soil based on a tactile examination of the samples and/or laboratory test results. Each stratum is described according to the following classification and terminology.

Soil Classification*		Terminology	Proportion
Clay	<0.002 mm		
Silt	0.002 to 0.06 mm	"trace" (e.g. trace sand)	<10%
Sand	0.06 to 2 mm	"some" (e.g. some sand)	10% - 20%
Gravel	2 to 60 mm	adjective (e.g. sandy)	20% - 35%
Cobbles	60 to 200 mm	"and" (e.g. and sand)	35% - 50%
Boulders	>200 mm	noun (e.g. sand)	>50%

* Extension of MIT Classification system unless otherwise noted.

The use of the geologic term "till" implies that both disseminated coarser grained (sand, gravel, cobbles or boulders) particles and finer grained (silt and clay) particles may occur within the described matrix.

The compactness of cohesionless soils and the consistency of cohesive soils are defined by the following:

COHESIONLESS SOIL		COHESIVE SOIL	
Compactness	Standard Penetration Resistance "N", Blows / 0.3 m	Consistency	Standard Penetration Resistance "N", Blows / 0.3 m
Very Loose	0 to 4	Very Soft	0 to 2
Loose	4 to 10	Soft	2 to 4
Compact	10 to 30	Firm	4 to 8
Dense	30 to 50	Stiff	8 to 15
Very Dense	Over 50	Very Stiff	15 to 30
		Hard	Over 30

The moisture conditions of cohesionless and cohesive soils are defined as follows.

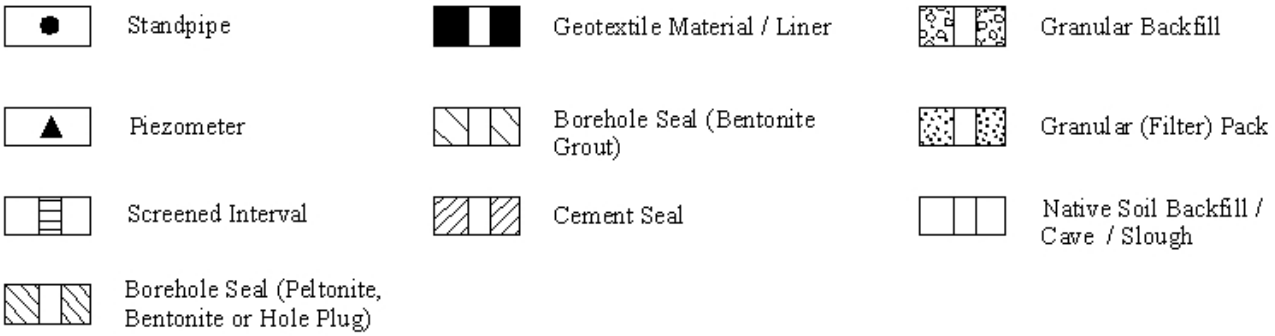
COHESIONLESS SOILS	COHESIVE SOILS		
Dry	DTPL	-	Drier Than Plastic Limit
Moist	APL	-	About Plastic Limit
Wet	WTPL	-	Wetter Than Plastic Limit
Saturated	MWTPL	-	Much Wetter Than Plastic Limit

STRATIGRAPHY

Symbols may be used to pictorially identify the interpreted stratigraphy of the soil and rock strata.

MONITOR DETAILS

This column shows the position and designation of standpipe and/or piezometer ground water monitors installed in the borehole. Also the water level may be shown for the date indicated.



Where monitors are placed in separate boreholes, these are shown individually in the "Monitor Details" column. Otherwise, monitors are in the same borehole. For further data regarding seals, screens, etc., the reader is referred to the summary of monitor details table.

SAMPLE

These columns describe the sample type and number, the "N" value, the water content, the percentage recovery, and Rock Quality Designation (RQD), of each sample obtained from the borehole where applicable. The information is recorded at the approximate depth at which the sample was obtained. The legend for sample type is explained below.

SS	=	Split Spoon	GS	=	Grab Sample
ST	=	Thin Walled Shelby Tube	CS	=	Channel Sample
AS	=	Auger Flight Sample	WS	=	Wash Sample
CC	=	Continuous Core	RC	=	Rock Core

$$\% \text{ Recovery} = \frac{\text{Length of Core Recovered Per Run}}{\text{Total Length of Run}} \times 100$$

Where rock drilling was carried out, the term RQD (Rock Quality Designation) is used. The RQD is an indirect measure of the number of fractures and soundness of the rock mass. It is obtained from the rock cores by summing the length of core recovered, counting only those pieces of sound core that are 100 mm or more in length. The RQD value is expressed as a percentage and is the ratio of the summed core lengths to the total length of core run. The classification based on the RQD value is given below.

RQD Classification	RQD (%)
Very poor quality	< 25
Poor quality	25 - 50
Fair quality	50 - 75
Good quality	75 - 90
Excellent quality	90 - 100

TEST DATA

The central section of the log provides graphs which are used to plot selected field and laboratory test results at the depth at which they were carried out. The plotting scales are shown at the head of the column.

Dynamic Penetration Resistance - The number of blows required to advance a 51 mm diameter, 60º steel cone fitted to the end of 45 mm OD drill rods, 0.3 m into the subsoil. The cone is driven with a 63.5 kg hammer over a fall of 750 mm.

Standard Penetration Resistance - Standard Penetration Test (SPT) "N" Value - The number of blows required to advance a 51 mm diameter standard split-spoon sampler 300 mm into the subsoil, driven by means of a 63.5 kg hammer falling freely a distance of 750 mm. In cases where the split spoon does not penetrate 300 mm, the number of blows over the distance of actual penetration in millimetres is shown as $\frac{xBlows}{mm}$

Water Content - The ratio of the mass of water to the mass of oven-dry solids in the soil expressed as a percentage.

W_P - Plastic Limit of a fine-grained soil expressed as a percentage as determined from the Atterberg Limit Test.

W_L - Liquid Limit of a fine-grained soil expressed as a percentage as determined from the Atterberg Limit Test.

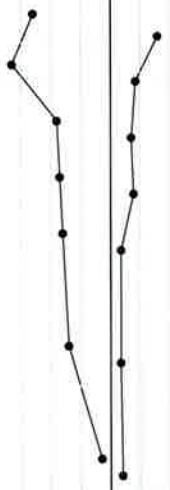
REMARKS

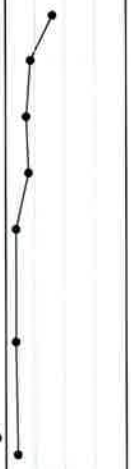
The last column describes pertinent drilling details, field observations and/or provides an indication of other field or laboratory tests that were performed.

BOREHOLE NO. BH15-1

PROJECT NAME: 241 REACH STREET, UXBRIDGE
PROJECT NO.: 141-19775-00
CLIENT: MR. ROBERT KENNEDY
DATE COMPLETED: Feb 24, 2015
BOREHOLE TYPE: 51mm SOLID STEM AUGER / 51 mm O.D. SPLIT SPOON
SUPERVISOR: DAO
GROUND ELEVATION: 283.6 mASL
REVIEWER: OSL

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0	TOPSOIL: 600mm TOPSOIL			SS1	14	16					UTM CO-ORDINATES UTM Zone: NAD: Easting: Northing:
0.6	SAND AND SILT: BROWN SAND AND SILT, TRACE CLAY, LOOSE TO DENSE, MOIST			SS2	7	8					
				SS3	22	7					GSA SS3: GRAVEL: 0% SAND: 53% SILT: 42% CLAY: 5%
				SS4	23	8					
				SS5	24	4					
				SS6	26	3					
				SS7	37	4					
6.6	BOREHOLE TERMINATED AT 6.5m IN SAND AND SILT STRATUM										BOREHOLE OPEN AND DRY ON COMPLETION OF DRILLING





BOREHOLE NO. BH15-2

PROJECT NAME: 241 REACH STREET, UXBRIDGE
PROJECT NO.: 141-19775-00
CLIENT: MR. ROBERT KENNEDY
DATE COMPLETED: Feb 24, 2015
BOREHOLE TYPE: 51mm SOLID STEM AUGER / 51 mm O.D. SPLIT SPOON
SUPERVISOR: DAO
GROUND ELEVATION: 281.5 mASL
REVIEWER: OSL

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0	TOPSOIL: 600mm TOPSOIL			SS1	22	22					UTM CO-ORDINATES UTM Zone: NAD: Easting: Northing:
0.6	SAND AND SILT TO SANDY SILT: BROWN SAND AND SILT TO SANDY SILT, TRACE CLAY, VERY LOOSE TO VERY DENSE, MOIST			SS2	4	16					
				SS3	5	11					
				SS4	15	7					
				SS5	31	5					
				SS6	35	5					GSA SS7: GRAVEL: 0% SAND: 35% SILT: 60% CLAY: 5%
				SS7	53	12			53		
6.6	BOREHOLE TERMINATED AT 6.5m IN SANDY SILT STRATUM										BOREHOLE OPEN AND DRY ON COMPLETION OF DRILLING

BOREHOLE NO. BH15-3

PROJECT NAME: 241 REACH STREET, UXBRIDGE
PROJECT NO.: 141-19775-00
CLIENT: MR. ROBERT KENNEDY
DATE COMPLETED: Feb 24, 2015
BOREHOLE TYPE: 51mm SOLID STEM AUGER / 51 mm O.D. SPLIT SPOON
SUPERVISOR: DAO
GROUND ELEVATION: 280.8 mASL
REVIEWER: OSL

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	UTM CO-ORDINATES / REMARKS
0.0	TOPSOIL: 600mm TOPSOIL			SS1	57				57		UTM Zone: NAD: Easting: Northing:
0.6	SILTY SAND: BROWN SILTY SAND, TRACE CLAY, LOOSE TO VERY LOOSE, MOIST			SS2	6						
				SS3	4						
	-COMPACT TO DENSE BELOW 2.5m			SS4	12						
				SS5	34						
				SS6	38						
				SS7	43				43		
6.6	BOREHOLE TERMINATED AT 6.5m IN SILTY SAND STRATUM										BOREHOLE OPEN AND DRY ON COMPLETION OF DRILLING

BOREHOLE NO. BH15-4

PROJECT NAME: 241 REACH STREET, UXBRIDGE
PROJECT NO.: 141-19775-00
CLIENT: MR. ROBERT KENNEDY
DATE COMPLETED: Feb 24, 2015
BOREHOLE TYPE: 51mm SOLID STEM AUGER / 51 mm O.D. SPLIT SPOON
SUPERVISOR: DAO
GROUND ELEVATION: 279.8 mASL
REVIEWER: OSL

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	N VALUE	% WATER	% RECOVERY	RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											**UTM CO-ORDINATES** UTM Zone: NAD: Easting: Northing:
0.3	TOPSOIL: 300mm TOPSOIL										
	SILTY SAND: BROWN SILTY SAND, TRACE GRAVEL, TRACE CLAY, VERY LOOSE TO DENSE, MOIST			SS1	32	32					
				SS2	4	6					
				SS3	31	5					
				SS4	20	7					GSA SS4: GRAVEL: 6% SAND: 60% SILT: 29% CLAY: 5%
				SS5	36	5					
				SS6	42	7			42		
				SS7	40	18					
6.6	BOREHOLE TERMINATED AT 6.5m IN SILTY SAND STRATUM										BOREHOLE OPEN AND DRY ON COMPLETION OF DRILLING
7.0											
8.0											
9.0											
10.0											
11.0											
12.0											
13.0											
14.0											
15.0											
16.0											
17.0											
18.0											
19.0											
20.0											

BOREHOLE NO. BH15-5

PROJECT NAME: 241 REACH STREET, UXBRIDGE
PROJECT NO.: 141-19775-00
CLIENT: MR. ROBERT KENNEDY
DATE COMPLETED: Feb 24, 2015
BOREHOLE TYPE: 51mm SOLID STEM AUGER / 51 mm O.D. SPLIT SPOON
SUPERVISOR: DAO
GROUND ELEVATION: 283.6 mASL
REVIEWER: OSL

DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	UTM CO-ORDINATES / REMARKS
0.0											UTM Zone: NAD: Easting: Northing:
0.3	TOPSOIL: 300mm TOPSOIL										
	SILTY SAND: BROWN SILTY SAND, TRACE CLAY, LOOSE TO VERY DENSE, MOIST			SS1	27	23	100				
				SS2	10	17	44				
				SS3	37		89				
				SS4	33		89				
				SS5	40	8	78				
				SS6	52	6	78		52		
				SS7	52	11	44		52		
				SS8	66	3	66		66		
				SS9	52		94		52		
6.6	BOREHOLE TERMINATED AT 6.5m IN SILTY SAND STRATUM										BOREHOLE OPEN AND DRY ON COMPLETION OF DRILLING

WSP GEOLOGIC (METRIC) WITH UTM GINT LOGS 141-19775-00.GPJ WSP_ENV_V1.GDT 3/18/15

BOREHOLE NO. BH15-6

PROJECT NAME: 241 REACH STREET, UXBRIDGE
PROJECT NO.: 141-19775-00
CLIENT: MR. ROBERT KENNEDY
DATE COMPLETED: Feb 24, 2015
BOREHOLE TYPE: 51mm SOLID STEM AUGER / 51 mm O.D. SPLIT SPOON
SUPERVISOR: DAO
GROUND ELEVATION: 284.7 mASL
REVIEWER: OSL

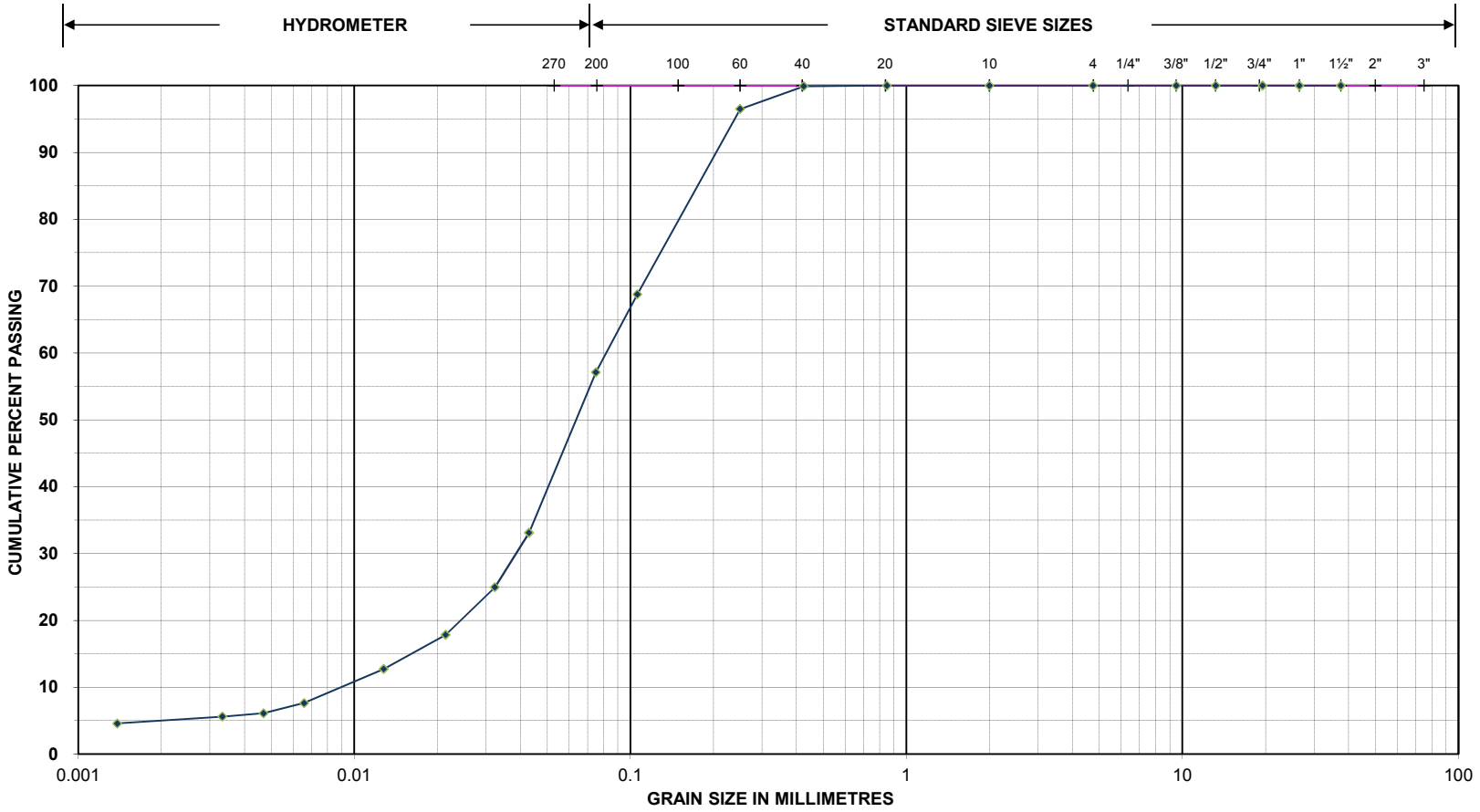
DEPTH (m)	STRATIGRAPHIC DESCRIPTION	STRATIGRAPHY	MONITOR DETAILS	SAMPLE TYPE	SAMPLE N VALUE	SAMPLE % WATER	SAMPLE % RECOVERY	SAMPLE RQD (%)	CONE PENETRATION "N" VALUE / SHEAR STRENGTH	WATER CONTENT % (W_P – W_L)	REMARKS
0.0											**UTM CO-ORDINATES** UTM Zone: NAD: Easting: Northing:
0.6	SAND AND GRAVEL: 600mm OF ROAD GRANULARS			SS1	50		11				
1.0	SILTY SAND: BROWN SAND, TRACE CLAY, LOOSE TO COMPACT, MOIST			SS2	8		22				
2.0				SS3	6		78				
2.3	SANDY SILT: BROWN SANDY SILT, TRACE TO SOME CLAY, COMPACT TO VERY DENSE, MOIST TO WET			SS4	10		39				GSA SS4: GRAVEL: 0% SAND: 29% SILT: 61% CLAY: 10%
3.0				SS5	46		72		46		
4.0											
5.0				SS6	72		56		72		
6.0	-DENSE			SS7	45		78		45		
6.6	BOREHOLE TERMINATED AT 6.5m IN SANDY SILT STRATUM										BOREHOLE OPEN AND DRY ON COMPLETION OF DRILLING
7.0											
8.0											
9.0											
10.0											
11.0											
12.0											
13.0											
14.0											
15.0											
16.0											
17.0											
18.0											
19.0											
20.0											

WSP GEOLOGIC (METRIC) WITH UTM GINT LOGS 141-19775-00.GPJ WSP_ENV_V1.GDT 3/18/15

Appendix B

GEOTECHNICAL LABORATORY TEST RESULTS

PARTICLE SIZE DISTRIBUTION ASTM D422



MIT Classification System

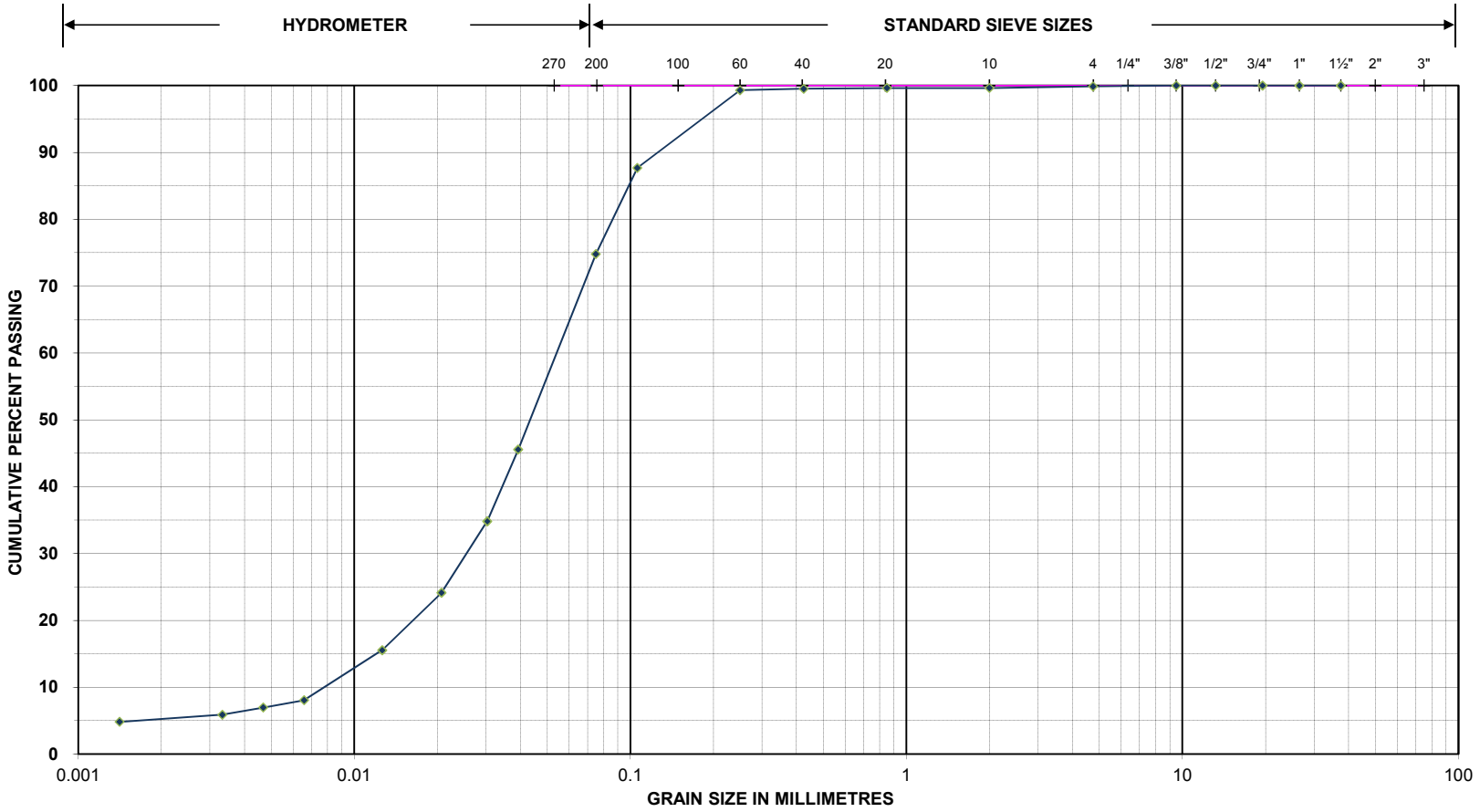
CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	

Project Name: 241 Reach Street, Uxbridge **Project No.:** 141-19775-00

Location ID.: BH15-1 **Sample No./Depth:** SS3 / 1.5-2.0m

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine	Hydrometer (mm)	% Passing
26.5 mm	100.0	**0.850 mm**	100.0	**0.043**	33.1
13.2 mm	100.0	**0.425 mm**	99.9	**0.021**	17.8
9.50 mm	100.0	**0.250 mm**	96.5	**0.007**	7.6
4.75 mm	100.0	**0.106 mm**	68.8	**0.003**	5.6
2.00 mm	100.0	**0.075 mm**	57.1	**0.001**	4.6

PARTICLE SIZE DISTRIBUTION ASTM D422



MIT Classification System

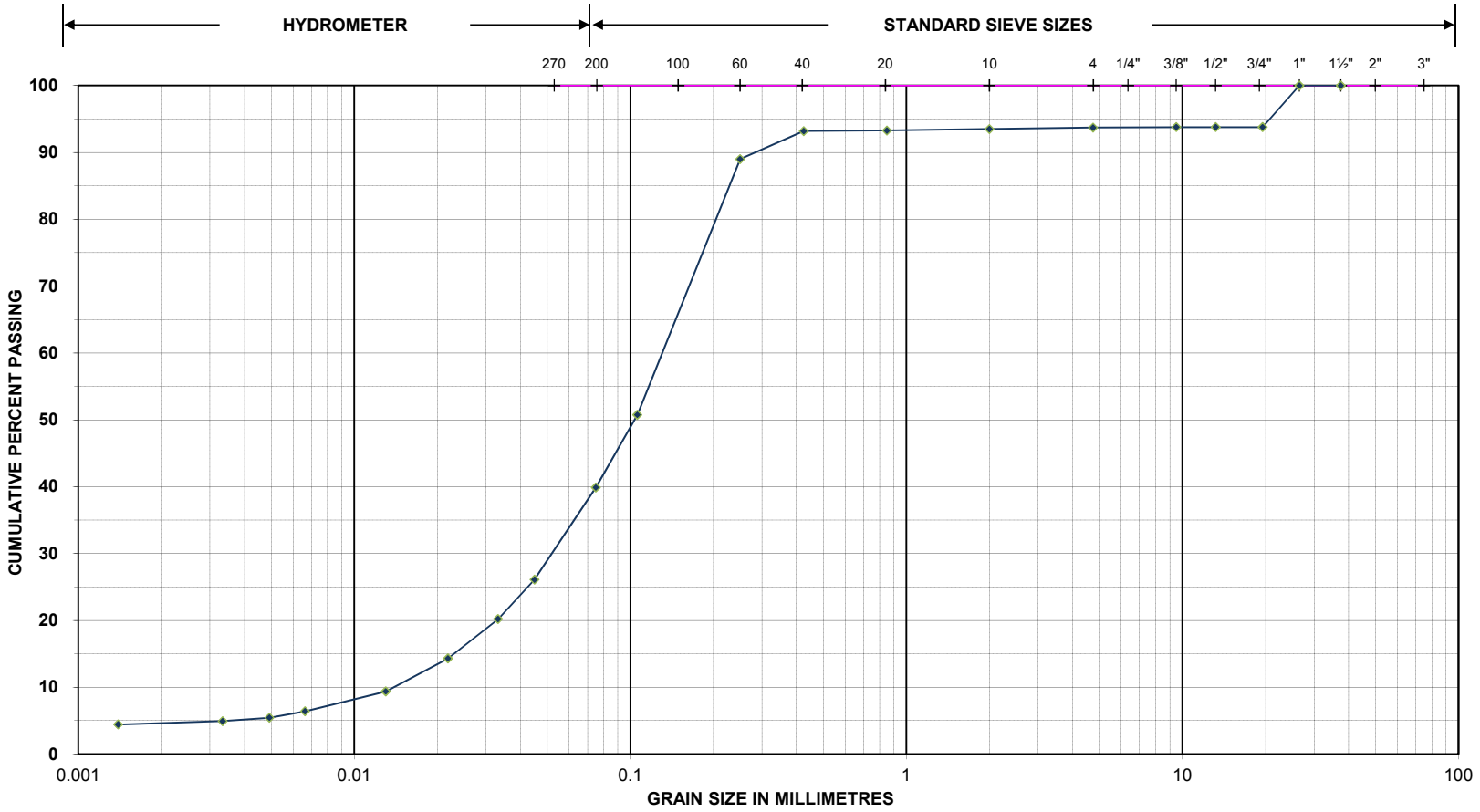
CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	

Project Name: 241 Reach Street, Uxbridge **Project No.:** 141-19775-00

Location ID.: BH15-2 **Sample No./Depth:** SS7 / 6.1-6.6 m

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine	Hydrometer (mm)	% Passing
26.5 mm	100.0	**0.850 mm**	99.6	**0.039**	45.6
13.2 mm	100.0	**0.425 mm**	99.5	**0.021**	24.1
9.50 mm	100.0	**0.250 mm**	99.3	**0.007**	8.0
4.75 mm	99.9	**0.106 mm**	87.7	**0.003**	5.9
2.00 mm	99.6	**0.075 mm**	74.8	**0.001**	4.8

PARTICLE SIZE DISTRIBUTION ASTM D422



MIT Classification System

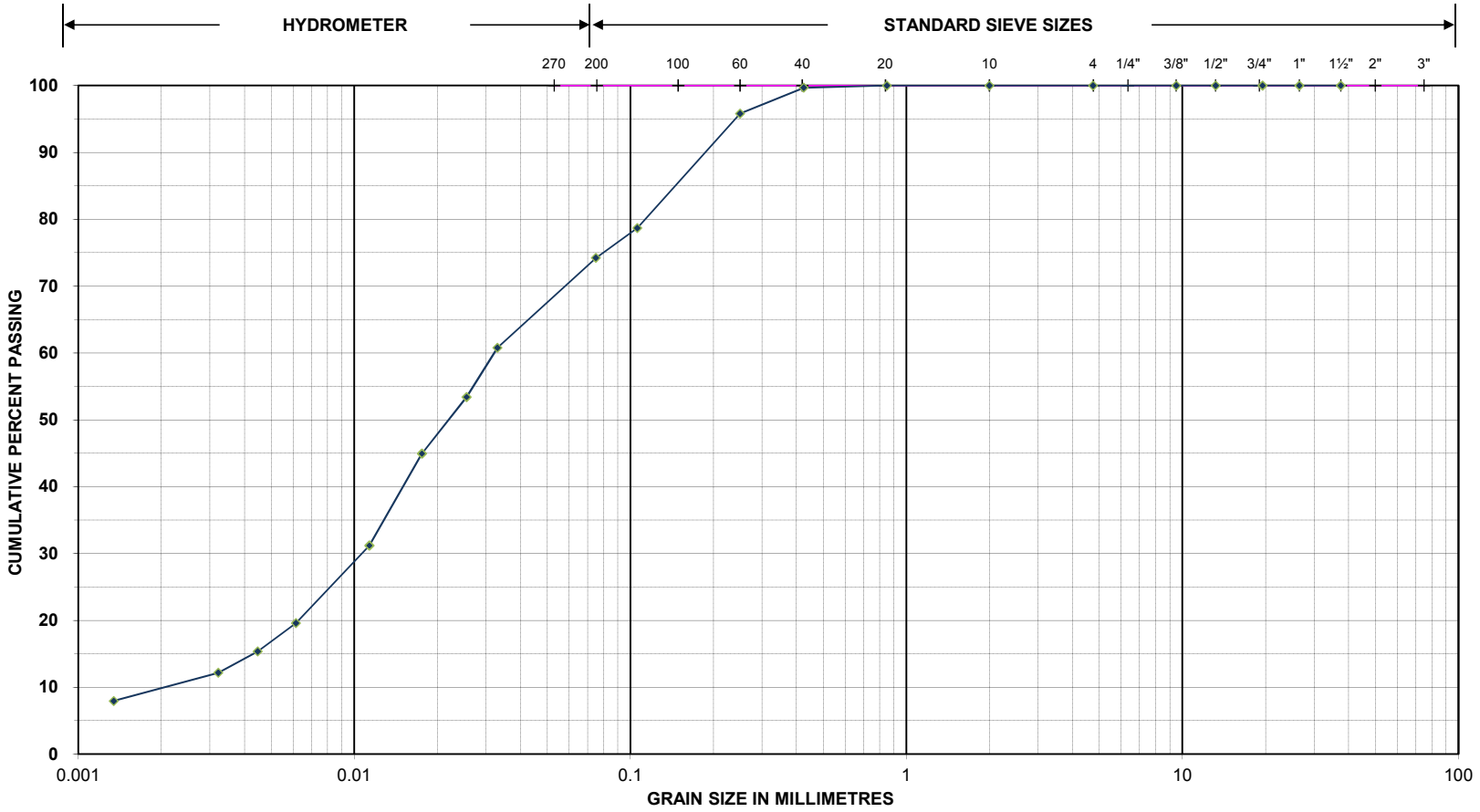
CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	

Project Name: 241 Reach Street, Uxbridge **Project No.:** 141-19775-00

Location ID.: BH15-4 **Sample No./Depth:** SS4 / 2.3-2.7m

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine	Hydrometer (mm)	% Passing
26.5 mm	100.0	**0.850 mm**	93.3	**0.045**	26.1
13.2 mm	93.8	**0.425 mm**	93.2	**0.022**	14.3
9.50 mm	93.8	**0.250 mm**	89.0	**0.007**	6.4
4.75 mm	93.7	**0.106 mm**	50.8	**0.003**	4.9
2.00 mm	93.5	**0.075 mm**	39.9	**0.001**	4.4

PARTICLE SIZE DISTRIBUTION ASTM D422



MIT Classification System

CLAY	SILT			SAND			GRAVEL			COBBLES
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	

Project Name: 241 Reach Street, Uxbridge **Project No.:** 141-19775-00

Location ID.: BH15-6 **Sample No./Depth:** SS4 / 2.3-2.7m

Sieve Size	% Passing Coarse	Sieve Size	% Passing Fine	Hydrometer (mm)	% Passing
26.5 mm	100.0	**0.850 mm**	100.0	**0.033**	60.8
13.2 mm	100.0	**0.425 mm**	99.7	**0.018**	44.9
9.50 mm	100.0	**0.250 mm**	95.8	**0.006**	19.6
4.75 mm	100.0	**0.106 mm**	78.7	**0.003**	12.2
2.00 mm	100.0	**0.075 mm**	74.2	**0.001**	7.9

Appendix C

AGAT CERTIFICATE OF ANALYSIS

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

CLIENT NAME: WSP CANADA INC.
126 DON HILLOCK DRIVE
AURORA, ON L4G0G9
(905) 750-3080

ATTENTION TO: Oswin Li

PROJECT: 141-19775-00

AGAT WORK ORDER: 15T949205

SOIL ANALYSIS REVIEWED BY: Anthony Dapaah, PhD (Chem), Inorganic Lab Manager

DATE REPORTED: Mar 06, 2015

PAGES (INCLUDING COVER): 7

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

*NOTES

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 15T949205

PROJECT: 141-19775-00

CLIENT NAME: WSP CANADA INC.

ATTENTION TO: Oswin Li

SAMPLING SITE:

SAMPLED BY:Daniel Oliveira

Corrosivity Package

DATE RECEIVED: 2015-02-27

DATE REPORTED: 2015-03-06

		SAMPLE DESCRIPTION:		BH15 - 2 (SS4)
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		2/24/2015
Parameter	**Unit**	**G / S**	**RDL**	**6342142**
Sulfide	%		0.01	<0.01
Chloride (2:1)	µg/g	NA	2	<2
Sulphate (2:1)	µg/g		2	<2
pH (2:1)	pH Units		NA	8.61
Electrical Conductivity (2:1)	mS/cm	0.57	0.005	0.057
Resistivity (2:1)	ohm.cm		1	17500
Redox Potential (2:1)	mV		5	287

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to T1(ALL) - Current

6342142 * Sulphide analysis was performed at AGAT Laboratories Vancouver.

EC/Resistivity, pH, Chloride, Sulphate and Redox Potential were determined on the extract obtained from the 2:1 leaching procedure (2 parts DI water: 1 part soil).

Certified By:

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Certificate of Analysis

AGAT WORK ORDER: 15T949205

PROJECT: 141-19775-00

CLIENT NAME: WSP CANADA INC.

ATTENTION TO: Oswin Li

SAMPLING SITE:

SAMPLED BY:Daniel Oliveira

O. Reg. 153(511) - Metals & Inorganics (Soil)

DATE RECEIVED: 2015-02-27

DATE REPORTED: 2015-03-06

		SAMPLE DESCRIPTION:		BH15 - 1 (SS2)	BH15 - 4 (SS3)	BH15 - 6 (SS2)
		SAMPLE TYPE:		Soil	Soil	Soil
		DATE SAMPLED:		2/24/2015	2/24/2015	2/24/2015
Parameter	Unit	G / S	RDL	6342144	6342147	6342148
Antimony	µg/g	1.3	0.8	<0.8	<0.8	<0.8
Arsenic	µg/g	18	1	1	2	1
Barium	µg/g	220	2	13	12	31
Beryllium	µg/g	2.5	0.5	<0.5	<0.5	<0.5
Boron	µg/g	36	5	<5	<5	<5
Boron (Hot Water Soluble)	µg/g	NA	0.10	<0.10	<0.10	<0.10
Cadmium	µg/g	1.2	0.5	<0.5	<0.5	<0.5
Chromium	µg/g	70	2	6	6	11
Cobalt	µg/g	21	0.5	2.2	2.8	4.0
Copper	µg/g	92	1	4	4	6
Lead	µg/g	120	1	3	3	5
Molybdenum	µg/g	2	0.5	<0.5	<0.5	<0.5
Nickel	µg/g	82	1	4	4	6
Selenium	µg/g	1.5	0.4	<0.4	<0.4	<0.4
Silver	µg/g	0.5	0.2	<0.2	<0.2	<0.2
Thallium	µg/g	1	0.4	<0.4	<0.4	<0.4
Uranium	µg/g	2.5	0.5	0.5	<0.5	<0.5
Vanadium	µg/g	86	1	12	13	18
Zinc	µg/g	290	5	12	13	19
Chromium VI	µg/g	0.66	0.2	<0.2	<0.2	<0.2
Cyanide	µg/g	0.051	0.040	<0.040	<0.040	<0.040
Mercury	µg/g	0.27	0.10	<0.10	<0.10	<0.10
Electrical Conductivity	mS/cm	0.57	0.005	0.094	0.074	0.135
Sodium Adsorption Ratio	NA	2.4	NA	0.046	0.099	0.504
pH, 2:1 CaCl2 Extraction	pH Units		NA	7.17	7.67	7.70

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to T1(ALL) - Current

6342144-6342148 EC & SAR were determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil). pH was determined on the 0.01M CaCl2 extract prepared at 2:1 ratio.

Certified By:

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Quality Assurance

CLIENT NAME: WSP CANADA INC.

AGAT WORK ORDER: 15T949205

PROJECT: 141-19775-00

ATTENTION TO: Oswin Li

SAMPLING SITE:

SAMPLED BY:Daniel Oliveira

Soil Analysis

RPT Date: Mar 06, 2015			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Corrosivity Package															
Sulfide	6344267		0.02	<0.01	NA	< 0.01	90%	80%	120%	NA			NA		
Chloride (2:1)	6342142	6342142	<2	<2	0.0%	< 2	99%	80%	120%	106%	80%	120%	115%	70%	130%
Sulphate (2:1)	6342142	6342142	<2	<2	0.0%	< 2	105%	80%	120%	104%	80%	120%	104%	70%	130%
pH (2:1)	6342142	6342142	8.61	8.61	0.0%	NA	101%	90%	110%	NA			NA		
Electrical Conductivity (2:1)	6342142	6342142	0.057	0.055	3.6%	< 0.005	100%	90%	110%	NA			NA		
Redox Potential (2:1)	6342142	6342142	287	282	1.7%	< 5	98%	70%	130%	NA			NA		
O. Reg. 153(511) - Metals & Inorganics (Soil)															
Antimony	6342144	6342144	<0.8	<0.8	0.0%	< 0.8	75%	70%	130%	91%	80%	120%	89%	70%	130%
Arsenic	6342144	6342144	1	1	0.0%	< 1	105%	70%	130%	97%	80%	120%	97%	70%	130%
Barium	6342144	6342144	13	13	0.0%	< 2	100%	70%	130%	99%	80%	120%	96%	70%	130%
Beryllium	6342144	6342144	<0.5	<0.5	0.0%	< 0.5	97%	70%	130%	104%	80%	120%	104%	70%	130%
Boron	6342144	6342144	<5	<5	0.0%	< 5	80%	70%	130%	107%	80%	120%	109%	70%	130%
Boron (Hot Water Soluble)	6342144	6342144	<0.10	<0.10	0.0%	< 0.10	101%	60%	140%	93%	70%	130%	95%	60%	140%
Cadmium	6342144	6342144	<0.5	<0.5	0.0%	< 0.5	98%	70%	130%	104%	80%	120%	93%	70%	130%
Chromium	6342144	6342144	6	7	15.4%	< 2	93%	70%	130%	106%	80%	120%	107%	70%	130%
Cobalt	6342144	6342144	2.2	2.4	8.7%	< 0.5	91%	70%	130%	97%	80%	120%	96%	70%	130%
Copper	6342144	6342144	4	4	0.0%	< 1	96%	70%	130%	107%	80%	120%	105%	70%	130%
Lead	6342144	6342144	3	3	0.0%	< 1	97%	70%	130%	98%	80%	120%	97%	70%	130%
Molybdenum	6342144	6342144	<0.5	<0.5	0.0%	< 0.5	81%	70%	130%	87%	80%	120%	85%	70%	130%
Nickel	6342144	6342144	4	4	0.0%	< 1	94%	70%	130%	96%	80%	120%	95%	70%	130%
Selenium	6342144	6342144	<0.4	<0.4	0.0%	< 0.4	86%	70%	130%	86%	80%	120%	86%	70%	130%
Silver	6342144	6342144	<0.2	<0.2	0.0%	< 0.2	84%	70%	130%	102%	80%	120%	101%	70%	130%
Thallium	6342144	6342144	<0.4	<0.4	0.0%	< 0.4	92%	70%	130%	89%	80%	120%	88%	70%	130%
Uranium	6342144	6342144	0.5	0.6	18.2%	< 0.5	88%	70%	130%	91%	80%	120%	92%	70%	130%
Vanadium	6342144	6342144	12	13	8.0%	< 1	87%	70%	130%	95%	80%	120%	97%	70%	130%
Zinc	6342144	6342144	12	12	0.0%	< 5	102%	70%	130%	106%	80%	120%	111%	70%	130%
Chromium VI	6342144	6342144	<0.2	<0.2	0.0%	< 0.2	104%	70%	130%	98%	80%	120%	97%	70%	130%
Cyanide	6341117		<0.040	<0.040	0.0%	< 0.040	102%	70%	130%	108%	80%	120%	109%	70%	130%
Mercury	6342144	6342144	<0.10	<0.10	0.0%	< 0.10	99%	70%	130%	94%	80%	120%	93%	70%	130%
Sodium Adsorption Ratio	6342144	6342144	0.046	0.043	6.7%	NA	NA			NA			NA		
pH, 2:1 CaCl2 Extraction	6342144	6342144	7.17	7.24	1.0%	NA	101%	80%	120%	NA			NA		

Comments: NA Signifies Not Applicable.
RPD Qualifier for Sulphide: As the average value for the sample and a duplicate is less than 5X RDL, lab's RPD acceptance criteria is not applicable.

Comments: NA signifies Not Applicable.

Certified By:

AGAT Laboratories
5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Quality Assurance

CLIENT NAME: WSP CANADA INC.

AGAT WORK ORDER: 15T949205

PROJECT: 141-19775-00

ATTENTION TO: Oswin Li

SAMPLING SITE:

SAMPLED BY:Daniel Oliveira

Soil Analysis (Continued)

RPT Date: Mar 06, 2015			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

AGAT Laboratories

5835 COOPERS AVENUE
MISSISSAUGA, ONTARIO
CANADA L4Z 1Y2
TEL (905)712-5100
FAX (905)712-5122
http://www.agatlabs.com

Method Summary

CLIENT NAME: WSP CANADA INC.

AGAT WORK ORDER: 15T949205

PROJECT: 141-19775-00

ATTENTION TO: Oswin Li

SAMPLING SITE:

SAMPLED BY:Daniel Oliveira

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Sulfide			GRAVIMETRIC
Chloride (2:1)	INOR-93-6004	McKeague 4.12 & SM 4110 B	ION CHROMATOGRAPH
Sulphate (2:1)	INOR-93-6004	McKeague 4.12 & SM 4110 B	ION CHROMATOGRAPH
pH (2:1)	INOR 93-6031	MSA part 3 & SM 4500-H+ B	PH METER
Electrical Conductivity (2:1)	INOR-93-6036	McKeague 4.12, SM 2510 B	EC METER
Resistivity (2:1)	INOR-93-6036		CALCULATION
Redox Potential (2:1)		McKeague 4.12 & SM 2510 B	REDOX POTENTIAL ELECTRODE
Antimony	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Arsenic	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Barium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Beryllium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Boron	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Boron (Hot Water Soluble)	MET-93-6104	EPA SW 846 6010C; MSA, Part 3, Ch.21	ICP/OES
Cadmium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Chromium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Cobalt	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Copper	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Lead	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Molybdenum	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Nickel	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Selenium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Silver	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Thallium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Uranium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Vanadium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Zinc	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Chromium VI	INOR-93-6029	SM 3500 B; MSA Part 3, Ch. 25	SPECTROPHOTOMETER
Cyanide	INOR-93-6052	MOE CN-3015 & E 3009 A;SM 4500 CN	TECHNICON AUTO ANALYZER
Mercury	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Electrical Conductivity	INOR-93-6036	McKeague 4.12, SM 2510 B	EC METER
Sodium Adsorption Ratio	INOR-93-6007	McKeague 4.12 & 3.26 & EPA SW-846 6010B	ICP/OES
pH, 2:1 CaCl2 Extraction	INOR-93-6031	MSA part 3 & SM 4500-H+ B	PH METER

15T949205

AGAT Laboratories

5835 Coopers Avenue
Mississauga, Ontario
L4Z 1Y2
www.agatlabs.com · webearth.agatlabs.com
Ph.: 905.712.5100 · Fax: 905.712.5122 · Toll Free: 800.856.6261

Chain of Custody Record

Laboratory Use Only
Arrival Temperature: 3.2/4.3/3.8
AGAT WO #:
Lab Temperature:
Notes:

Client Information:

Company: WSP Canada Inc.
Contact: Oswin Li
Address: 126 Don Hillock Drive, Unit 2
Aurora, Ontario L4G0G9 Canada
Phone: 1-905-750-3080 x16829 Fax:
Project: 141-19775-00 PO:
AGAT Quotation #:

Please note, if quotation number is not provided, client will be billed full price for analysis.

Regulatory Requirements:

- [x] Regulation 153/09 (reg. 511 Amend.) — Table 1 (Indicate one)
  - [ ] Ind/Com
  - [x] Res/Park
  - [ ] Agriculture
- Soil Texture (check one): [ ] Coarse [x] Fine
- [ ] Sewer Use — Region (Indicate one)
  - [ ] Sanitary
  - [ ] Storm
- [ ] Regulation 558
- [ ] CCME
- [ ] Other (specify)
- [ ] Prov. Water Quality Objectives (PWQO)
- [ ] None

Turnaround Time Required (TAT) Required*

Regular TAT
[x] 5 to 7 Working Days

Rush TAT (please provide prior notification)
Rush Surcharges Apply
[ ] 3 Working Days
[ ] 2 Working Days
[ ] 1 Working Day

OR
Date Required (Rush surcharges may apply):

*TAT is exclusive of weekends and statutory holidays

Invoice To:

Same: Yes [x] No [ ]
Company:
Contact:
Address:

Is this a drinking water sample? (potable water intended for human consumption) [ ] Yes [x] No
If "Yes", please use the *Drinking Water Chain of Custody Form*

Is this submission for a **Record of Site Condition?** [ ] Yes [ ] No

Legend Matrix

GW Ground Water **O** Oil
SW Surface Water **P** Paint
SD Sediment **S** Soil

Report Information – reports to be sent to:

1. Name: Oswin Li
   Email: Oswin.Li@wspgroup.com
2. Name: Daniel Oliveira
   Email: Daniel.Oliveira@wspgroup.com

Sample Identification	Date Sampled	Time Sampled	Sample Matrix	# of Containers	Comments Site/Sample Information	Metals and Inorganics	Metal Scan	Hydride Forming Metals	Client Custom Metals	ORPs: B-HWS, Cl-, CN-, EC, FOC, Cr+6-, SAR, NO3/NO2, N-Total, Hg, pH	Nutrients: TP, NH3, TKN, NO3, NO2, NO3/NO3	VOC: VOC, THM, BTEX	CCME Fractions 1 to 4	ABNs	PAHs	Chlorophenols	PCBs	Organochlorine Pesticides	TCLP Metals/Inorganics	TCLP:	Sewer Use	
BH 15-2 (SS4)	Feb24/15		S	1																	X	Corrosivity
BH 15-1 (SS2)	"		S	1		X																
BH 15-4 (SS3)	"		S	1		X																
BH 15-6 (SS2)	"		S	1		X																

Samples Relinquished by (print name & sign): Daniel Oliveira
Date/Time: Feb 26/15 @ 5:00pm
Samples Received by (Print name & sign):
Date/Time: Feb 27 9:30
Samples Relinquished by (print name & sign):
Date/Time:
Samples Received by (Print name & sign):
Date/Time:

Pink Copy – Client
Yellow + Golden Copy – AGAT
White Copy – AGAT

Page 1 of 1
NO: