DUE DILIGENCE GEOTECHNICAL INVESTIGATION REPORT

FOR THE PROPOSED RESIDENTIAL AND COMMERCIAL DEVELOPMENT AT

971 GLADSTONE AVENUE AND 145 LORETTA AVENUE

OTTAWA, ONTARIO

Prepared for:

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APPENDICES

1. INTRODUCTION

DST Consulting Engineers Inc. (DST) was retained by Trinity Development Group Inc. (TDG) to conduct a geotechnical investigation and provide general foundation and earthworks design recommendations for the potential acquisition and construction of the proposed residential and commercial development with two or four levels of underground parking at the north-east corner of Gladstone Avenue and Loretta Avenue North, Ottawa, Ontario.

A limited preliminary geotechnical investigation was completed by DST in 2009 consisting of three (3) boreholes drilled at the west and the south sides of the 955 and 953 Gladstone Avenue building. That preliminary investigation did not cover the entire area of the proposed development. Therefore, additional geotechnical investigation was required to characterize the subsurface conditions across the site.

The primary objectives of this investigation and report are to obtain the necessary subsurface information and provide the general recommendations for conceptual design of the proposed development and to assist Trinity Development Group Inc. (TDG), in due diligence prior to the property acquisition. The investigation focused on the important issues from both geotechnical and environmental standpoints which could lead to potential cost premiums for the proposed multi-storey development.

The current geotechnical investigation was completed in general accordance with the work plan described in DST's proposal dated May 17, 2017. Written authorization to proceed with the investigation was provided by Mr. Ryan Moore, senior development manager of TDG in an email dated May 29, 2017.

This report is prepared for the sole use of TDG. The use of the report, or any reliance on it by any third party, is the responsibility of such third party. This preliminary geotechnical engineering report is also subject to the limitations shown in Appendix A and is not intended for detailed design purposes. It should be noted that the details of proposed development such as proposed grades, vertical extent of the proposed underground parking structure and anticipated loading information have not been specified by TDG and/or made available to DST at this stage.

2. PROJECT DESCRIPTION

The proposed project for the site is a multi-storey residential and commercial development, including mid and high rise residential buildings, commercial/retail spaces, ground surface parking lots, two to

four levels of below ground parking, sewers and water pipes installation. The proposed new buildings include one 18-storey tower, one 20-storey tower, one building with 20-story at one side and 5-story at another side, and one 5-storey residential building. The proposed buildings are as follows;

1) Building 1, for residential and retail, approximately 160,000 square feet (SF) and 1,900 SF, respectively.
2) Building 2, for residential and retail, approximately 177,000 SF and 4,300 SF, respectively.
3) Building 3, for residential and retail, approximately 216,500 SF and 12,340 SF, respectively.
4) Building 4, for residential and retail, approximately 33,660 SF and 3,600 SF, respectively.

The actual number of underground parking levels and proposed elevations of the underground parking structure had not been provided to DST at this stage. However, the proposed tentative development plan, provided by the client, includes construction of two levels of underground parking and deep excavation to approximately 7 to 8 m below existing grades for the two levels of underground parking option over the entire development site. Another option provided by the client includes four levels of underground parking to approximately 14 m below grade. . The proposed towers and mid-rise residential buildings will be built over the underground parking structure.

This geotechnical investigation is intended to confirm the subsurface conditions in general across the site and to provide preliminary foundation and geotechnical recommendations for the proposed development.

A site plan with the borehole locations are shown in Figure 1, Appendix B.

3. SITE DESCRIPTION

The project site is surrounded by Gladstone Avenue at the south, Loretta Avenue at the west, a small commercial property at the north and rail track at the east and north-east. The site is relatively flat and sloping ground to the rail track at the east and north-east boundary of the property. The project site is approximately 100 m wide at Gladstone Avenue, approximately 30 m wide at the north side, and approximately 150 m long at Loretta Avenue. The site is occupied with Gladstone center buildings and surface parking lots presently.

4. REGIONAL GEOLOGY

Based on the Ontario Geological Survey Open File Report 5770, and the surficial geological map of Ottawa, this general area is predominantly underlain by fine grained deposits of silt and clay. Based on the geological survey report, fine-grained soils are deposited in the potentially marine environment, named by geologists as Champlain Sea deposits.

Bedrock geology in the area is predominantly underlain by limestone, dolostone, shale, arkose, sandstone of Ottawa Group, Simcoe Group, and Shadow Lake Formation, respectively.

5. FIELD INVESTIGATION AND LABORATORY TESTING

5.1 Field Investigation

The geotechnical field investigation was conducted between June 27 and July 10, 2017 and consisted of thirteen (13) boreholes drilling, depths between 1.8 m and 13.5 m. The boreholes were distributed across the site, as shown in the borehole location plan, Figure 1, Appendix B.

Before the drilling work, underground and above ground utility services were located by CCC drilling to make sure the drilling locations are clear of the underground services. Boreholes were drilled using a specialize drilling contractor, CCC Drilling Inc. A truck mounted drill rig was used for the drilling work. Standard Penetration Test (SPT) was carried out at 0.75 m interval up to auger refusal depth. The SPT sampler was advanced by dropping a 63.5 kg hammer (auto trip) for approximately 760 mm height, in accordance with the Standard Penetration Test (SPT) method (ASTM D1586). The results of these penetration tests are reported as SPT ‘N’ values on the borehole logs at the corresponding depths.

Disturbed soil samples were collected from the SPT samplers. All the collected soil samples were inspected upon retrieval and classified the soil types, colour and kept in the airtight plastic bags, labelled the sample identifications and sent back to the DST laboratory using cooler boxes. After arrival of the samples at the laboratory, soil samples were examined by a geotechnical engineer and assigned the appropriate laboratory tests.

Boreholes locations were surveyed using GPS readings and borehole elevations were surveyed using a survey bench mark located at mid of north east of the property (near BH2017-09) marked by Benchmarks (PK nail and S.I.B.), as shown on the borehole location plan on Drawing 1 in Appendix B. Groundwater monitoring wells were installed at eleven (11) drilled boreholes.

All boreholes were backfilled with bentonite pellets to the near ground surface and capped with auger cuttings at the near ground surface. The borehole locations are shown on the borehole location plan on Figure 1 in Appendix B. Summary of borehole coordinates are presented in Table 5.1 below.

Table 5-1: Summary of Boreholes Coordinates and Termination Depths

Borehole/Well ID	Ground Surface Elevation (m)	Location (UTM Zone 18T)		Borehole Termination Depth, m
		Nothing, m	Easting, m	
BH2017-01	104.9	5028029	443991.0	7.6
BH2017-02	104.2	5028045	444017.3	6.5
BH2017-03	103.4	5028054	444056.8	13.5
BH2017-04	100.7	5028076	444057.7	4.6
BH2017-05A	102.7	5028096	444019.2	1.8
BH2017-05	102.7	5028096	444017.3	13.5
BH2017-06	104.3	5028066	443975.0	7.8
BH2017-07	102.4	5028127	443952.3	8.0
BH2017-08	103.9	5028091	443979.6	13.6
BH2017-09	99.6	5028115	444005.2	4.5
BH2017-10	102.3	5028139	443965.7	16.6
BH2017-11	102.1	5028155	443947.7	8.4
BH2017-12	102.1	5028159	443963.2	8.5
BH2017-13	102.2	5028143	443977.7	1.8

5.2 Laboratory Testing Program

The laboratory geotechnical tests were completed for confirmation of soil classification. Chemical analysis were carried out for evaluation of corrossivity of subsoil. The laboratory geotechnical testing program consisted of determination of moisture content (for all recovered soil samples), particle size

analysis, and Atterberg limit test. Compressive strength of rock cores were tested on selected rock core samples.

A total of four (4) particle size analyses, and five (5) Atterberg limit tests were completed. One (1) soil sample was analysed for corrosion package consisting of measurement of chlorides, sulphides, sulphate, conductivity, pH, resistivity of soil, and oxidation-reduction potential to assess the potential for subsoil corrossivity. The results of the moisture content determination and grain size analysis are shown on the borehole logs. The moisture contents and grain size analysis results are shown on the borehole logs in Appendix C and the laboratory test results shown in Appendix D.

6. DESCRIPTION OF SUBSURFACE CONDITIONS

Based on the subsurface conditions encountered in the boreholes, the generalized subsoil profile consists of fill underlain by clay deposit and limestone bedrock. A sand and gravel, and sandy clay layer were also encountered in some boreholes between clay and bedrock, as shown in the borehole logs and summarized in Table 6-1 below.

Table 6-1: Summary of Stratigraphy at Exploratory Boreholes

Borehole ID	Fill (m)	Depth of Clay Layer (m)	Sand and Gravel/Probable Till (m)	Bedrock/Auger Refusal (EOB) (m)
BH2017-01	0 – 2.3	2.3 – 7.3	7.3 – 7.6	Auger Refusal
BH2017-02	0 – 2.1	2.1 – 6.5	-	Auger Refusal
BH2017-03	0 – 2.4	2.4 – 6.4	-	6.4 – 13.5
BH2017-04	0 – 1.8	1.8 – 4.6	-	Auger Refusal
BH2017-05	0 – 3.1	3.1 – 6.9	-	6.9 – 13.5
BH2017-06	0 – 1.4	1.4 – 7.8	-	Auger Refusal
BH2017-07	0 – 4.3	4.3 – 7.3	7.3 – 8.0	Auger Refusal
BH2017-08	0 - 2.5	2.5 – 7.0	-	7.0 – 13.6
BH2017-09	0 – 0.7	0.7 – 4.5	-	Auger Refusal
BH2017-10	0 – 4.3	4.3 – 8.3	8.3 – 9.0	9.0 -16.6
BH2017-11	0 – 3.4	3.4 – 7.3	7.3 – 8.4	Auger Refusal
BH2017-12	0 – 3.0	3.0 – 7.9	7.9 – 8.5	Auger Refusal
BH2017-13	0 – 1.4	1.4 – 1.8 (EOB)	-	Auger Refusal

EOB = Termination Depth/End of Borehole

The details of the subsurface conditions encountered in the boreholes can be reviewed in the borehole logs shown in Appendix C. The soil type was classified in accordance with Unified Soil Classification System and as per Section 3 of 2006 Canadian Foundation Engineering Manual, Fourth Edition (CFEM), entitled identification and classification of soil and rock.

6.1 Fill

A fill layer was encountered in all boreholes. The fill depths were found between 1.4 m and 4.3 m. Fill material generally consisted of sand and gravel, gravelly sand, and sand and clay. A clay fill layer was also encountered in the BH2017-10 at about 3 m depth. Standard penetration test (SPT) N

values varied widely across the site ranging between 1 and over 100 indicating very loose to very dense conditions. The moisture contents of the fill ranged between 1 and 30%. The results of Particle size analyses are summarized in Table 6.2.

Table 6-2: Summary of Particle Size Analysis Result

Sample ID	Sample Depth (m)	Gravel, %	Sand, %	Silt/Clay, %
BH2017-5/SS-4	1.7 – 2.1	52	37	11
BH2017-9/SS-2	0.4 – 1.1	5	42	53
BH2017-10/SS-4	1.7 – 2.1	32	59	9
BH2017-11/SS6	3.0 – 3.6	7	60	43

6.2 Clay

Clay was encountered in all boreholes except Borehole BH2017-5A, where the borehole was terminated in fill at 0.7 m depth. Clay soil layer was encountered at depths between 1.4 and 8.3 m depths. Detailed clay soil depths are shown in Table 6.1.

Standard penetration test (SPT) N values tested in the clay layer ranged between 5 and 30 indicating soft to very stiff in consistency. A few SPT results in the clay layers were below 5 blows, and the result indicating very soft. A few SPT tests at near the bedrock surface are resulted over 100 blows, it could be due to the SPT sampler reached to the bedrock surface during the test. Field vane test results varied from 19 kPa to over 200 kPa. The moisture contents of the clay ranged between 5 and 50 %. The clay soil layer becomes sandy at deeper depth. Atterberg Limit test results are shown in Table 6.3.

Table 6-3: Summary of Atterberg Limit Test Results

Sample ID	Sample Depth (m)	Plastic Limit, %	Liquid Limit, %	Plasticity Index, PI
BH2017-2, SS4	1.7 – 2.1	48	24	24
BH2017-3, SS7	3.6 – 4.1	38	19	19
BH2017-3, SS10	5.4 – 5.9	33	15	18
BH2017-6, SS-8	4.1 – 4.6	15	12	3
BH2017-8, SS7	3.6 – 4.1	47	24	23

6.3 Sand and Gravel

A sand and gravel layer was encountered between clay and bedrock in Boreholes BH2017-1 at between 7.3 m to 7.6 m depth, BH2017-7 at between 7.3 m and 8.0 m depth, BH2017-10 at between 8.3 m and 9.0 m depth, and BH2017-11 at between 7.3 m and 8.4 m depth. Standard penetration test (SPT) N values tested in the sand and gravel layers ranged between 17 and 100+ indicating compact to very dense in compactness. The moisture content of the sand and gravel ranged between 6 and 11 %.

6.4 Sandy Clay Till

Sandy clay till was encountered in BH2017-12 at between 7.9 m and 8.5 m depth, below the clay soil layer. Standard penetration test (SPT) N value tested in the sandy clay layer was 100+. However, SPT test is partially on the bedrock, therefore, SPT blow count number is not representative to soil compactness condition. The sandy clay is evaluated as firm in consistency. The moisture content of the sandy clay was 15 %.

6.5 Bedrock

Bedrock coring was completed in Boreholes BH2017-3 (7.0 m to 13.5 m depth), BH2017-5 (6.9 m to 7.4 m depth), BH2017-8 (6.9 m to 13.6 m depth) and BH2017-10 (9.0 m to 16.6 m depth). All the recovered cores are classified as grey limestone. Total core recovery, solid core recovery and rock quality designation of the rock cores were evaluated and reported in the rock core photos (Appendix E) and shown in Table 6.4. Unconfined compressive strength (UCS) of the rock test was carried out on the selected rock core samples. Summary of UCS test results is shown in Table 6.5. The UCS test results are provided in Appendix D.

Table 6-4: Summary of Rock Cores Logging

BH No.	Core Run No.	Depth (m)	TCR (%)	SCR (%)	RQD (%)
BH2017-03	1	6.4 – 7.5	100	79	58
BH2017-03	2	7.5 – 9.0	100	92	90
BH2017-03	3	9.0 – 10.4	93	93	92
BH2017-03	4	10.4 – 11.9	100	100	92

BH2017-03	5	11.9 – 13.5	100	100	95
BH2017-05	1	6.9 – 7.4	100	100	100
BH2017-05	2	7.4 – 8.8	100	98	95
BH2017-05	3	8.8 – 10.3	100	100	100
BH2017-05	4	10.3 – 11.8	100	100	96
BH2017-05	5	11.8 – 13.5	100	100	100
BH2017-08	1	7.0 – 7.6	100	96	93
BH2017-08	2	7.6 – 9.1	85	78	75
BH2017-08	3	9.1 – 10.6	100	100	98
BH2017-08	4	10.6 – 12.1	98	98	90
BH2017-08	5	12.1 – 13.6	100	100	100
BH2017-10	1	9.0 – 10.5	98	92	85
BH2017-10	2	10.5 – 12.1	100	100	100
BH2017-10	3	12.1 – 13.6	98	98	98
BH2017-10	4	13.6 – 15.1	100	100	100
Bh2017-10	5	15.1 – 16.6	100	100	100

Table 6-5: Summary of Limestone Bedrock Field and Laboratory Test Results

BH No.	Core Run No.	Depth, (m)	Unconfined Compressive Strength, (MPa)
BH2017-3	1	96.1 – 95.9	127.6
BH2017-3	5	90.1 – 89.8	125.7
BH2017-5	2	94.5 – 94.1	121.5
BH2017-8	3	93.5 – 93.3	113.1
BH2017-10	1	93.2 – 92.9	97.2
BH2017-10	4	88.1 – 87.8	129.6

6.6 Groundwater

The groundwater depths were measured in the installed monitoring wells. The measured groundwater depths are summarized in Table 6.6. The groundwater elevations varied with location and over time between 1.7 m and 4.4 m below grade (Elevations 101.0 m and 97.9 m).

Table 6-6: Summary of Groundwater Measurement in the Installed Monitoring Wells

Borehole/Well ID	Ground Surface Elevation (m)	Measured Date	Groundwater Depth (m)	Groundwater Elevation (m)
BH2017-02	104.2	July 17, 2017	4.4	99.8
BH2017-03	103.4	July 20, 2017	5.0	98.4
BH2017-04	100.7	July 17, 2017	2.2	98.5
BH2017-05	102.7	July 20, 2017	3.3	99.4
BH2017-06	104.3	July 17, 2017	3.3	101.0
BH2017-07	102.4	July 17, 2017	4.1	98.3
BH2017-08	103.9	July 20, 2017	5.6	98.3
BH2017-09	99.6	July 17, 2017	1.7	97.9
BH2017-10	102.3	July 20, 2017	4.1	98.2
BH2017-11	102.1	July 17, 2017	3.9	98.2

It shall be noted that the groundwater levels measured at the time of geotechnical field investigation may not be representative of the stabilized groundwater conditions at the site during the construction period. It should be noted that the groundwater levels are transient and tend to fluctuate with the seasons and periods of precipitation potentially up to 1 or 2 m compared to the recorded short-term measurements.

7. PRELIMINARY GEOTECHNICAL DESIGN RECOMMENDATIONS

The geotechnical recommendations presented herein are intended for conceptual design of the proposed development and for the sole use of the designers/planners of the project and are also subject to the limitations in Appendix A. All recommendations presented in this report are based on the assumptions that preliminary foundation design will be reviewed by DST during subsequent detailed design stage and an adequate level of construction monitoring of excavations and installations will be provided at the time of construction.

An adequate level of construction monitoring is expected to include periodic to full time monitoring of excavations and shoring installations, footing base evaluations, inspection and testing by a professional engineer specialized in geotechnical engineering.

7.1 Geotechnical Design parameters

The general site stratigraphy found in the boreholes consists of fill underlain by native clay deposit and some till/sand and gravel and limestone bedrock, as summarized in Table 6.1. A layer of sand & gravel (0.3 to 0.7 m thick) was encountered between clay and bedrock formation. The clay layer was found sandy at the deeper depth. The detailed subsurface conditions can be seen in the borehole logs, which are provided in Appendix C.

The stratigraphy and engineering parameters recommendations are provided for Tables 7.1. The internal friction angles of granular materials were estimated from standard penetration tests (SPTs) applying Wolff (1989) which provides an empirical correlation between SPT and internal friction angle. Internal friction angles of normally consolidated clay were estimated from the Plasticity Index of the sample. Undrained shear strengths of the cohesive soils were estimated based on the in-situ vane shear test results as well as from the SPT test results.

Table 7-1: Geotechnical Soil Design Parameters

Soil Type	Depths, m	Elevation, m	Unit weight, γ (kN/m^3)	c, kPa	ϕ	K_0	K_a	K_p
Fill	0 – 4.3	104.8 – 98.0	18	-	(30) 28 - 42	0.50	0.33	3.00
Clay	1.4 – 8.3	102.9 – 94.0	17	-	(26)* 26 - 30	0.56	0.39	2.56
Sand & Gravel	7.3 – 9.0	94.8 – 93.3	20	-	(32)* 32 - 33	0.47	0.30	3.25
Sandy Clay Till	7.9 – 8.5	94.2 – 93.6	19	-	30	0.50	0.33	3.00

*value in ( ) are recommended value

7.2 Bedrock Profile and Bedrock Quality

7.2.1 Bedrock Profile

The bedrock depths were estimated from the rock core data and the depth of auger refusal encountered in the boreholes. The bedrock could be encountered at depths between 4.5 m and 9.0 m (Elevations 97.7 m and 93.3 m). The depths and elevations of the bedrock are tabulated and shown in the Table 7.2.

Bedrock excavation quantities for foundation preparation were estimated and provided in the Table 7.3. Used total area of the bedrock excavation for the volume calculation is 10,030 m^2. Bedrock excavation quantity will vary with the elevation of the bedrock excavation. Based on the boreholes data, bedrock surface was found to be sloping to the northeast side. It should be noted that actual bedrock depths may vary between the boreholes, and therefore the estimated volume may vary from the actual excavation volume.

Table 7-2: Inferred and Confirmed Bedrock Depths and Elevations

Borehole/Well ID	Ground Surface Elevation (m)	Inferred Bedrock Depth, (m)	Inferred Bedrock Elevation (m)	Remark
BH2017-01	104.9	7.6	97.3*	Possible bedrock/Auger Refusal
BH2017-02	104.2	6.5	97.7*	Possible bedrock/Auger Refusal
BH2017-03	103.4	6.4	97.0	Confirmed Top of Bedrock
BH2017-04	100.7	4.6	96.1*	Possible bedrock/Auger Refusal
BH2017-05	102.7	6.9	95.8	Confirmed Top of Bedrock
BH2017-06	104.3	7.8	96.5*	Possible bedrock/Auger Refusal
BH2017-07	102.4	8.0	94.4*	Possible bedrock/Auger Refusal
BH2017-08	103.9	7.0	96.9	Confirmed Top of Bedrock
BH2017-09	99.6	4.5	95.1*	Possible bedrock/Auger Refusal
BH2017-10	102.3	9.0	93.3	Confirmed Top of Bedrock
BH2017-11	102.1	8.4	93.7*	Possible bedrock/Auger Refusal
BH2017-12	102.1	8.5	93.6*	Possible bedrock/Auger Refusal

*No bedrock coring was carried out – Top of bedrock elevation to be confirmed during detailed stage and/or construction.

Table 7-3: Possible Bedrock Excavation Volumes

Assumed Excavation to Elevation (m)	Cumulative Rock Excavation Volume (m^3)	-15% estimate (m^3)	+ 15% estimate (m^3)	Remark
104.9	-	-	-	The highest ground surface elevation at BH2017-01 location
101.0	-	-	-	-
99.0	-	-	-	-
97.4	165	143	190	-
96.4	2,670	2,322	3,071	-
95.4	8,545	7,430	9,827	-
94.4	16,100	14,000	18,515	-
93.4	25,205	21,917	28,986	-
92.4	35,230	30,634	40,514	-
91.4	45,260	39,356	52,049	-
90.4	55,290	48,078	63,584	-
89.4	65,320	56,800	75,118	-

7.2.2 Bedrock Quality

Type of the bedrock are predominantly grey limestone bedrock. The rock core samples collected were logged for Total Core Recovery (TCR), Solid Core Recovery (SCR) and Rock Quality Designation (RQD) and provided in Table 6.4 and the rock core photos, provided in the Appendix E. The TCR of rock cores were between 85% and 100 %, SCR of rock cores were between 78 % and 100 %, RQD of rock cores were between 58 % and 100 % and indicating fair to good quality. The unconfined compressive strengths of the tested samples were between 97.2 MPa and 129.6 MPa, indicating strong to very strong rocks and can be classified as Grade R4, accordance with ISRM (1981) classification, (Ref.: Table 3.5 of CFEM 2006 document).

The Rock mass qualities of recovered rock core samples were generally evaluated as fair (near top) to good rock below. It is recommended that further detailed evaluation bedrock quality should be carried out once the elevation of the bottom of excavation for underground parking structure is known and can be rated using Rock Mass Rating (RMR) System (After Bieniawski, 1989). The RMR rating will include the compressive strength of rock core, RQD, the bedrock fracture spacing, fracture condition, groundwater conditions at all cored locations across the site.

If the extent of bedrock excavation is deemed to be limited to the top bedrock, the upper bedrock could potentially be ripped with heavy duty rock rippers, due of the weaker and fractured rock at the top layer of limestone bedrock. It is recommended that the rippability of top of the bedrock (whether fractured rocks up to excavation depth) should be further evaluated when the bedrock exact depth is confirmed.

7.2.3 Bedrock Excavation by Blasting

The limestone bedrock mass below overburden and at depth is found to be generally strong to very strong and the fracture frequency generally drops with depth. Rock mass quality of rock cores could be rated as Class I to III. Rock mass quality Classes I to III required rock blasting, to loosen or fracture the bedrock for the excavation. Where relatively sound bedrock is encountered, blasting is generally required for fragmentation of very strong bedrock, as per OPSS 120 (governing the procedure for blasting).

A pre-construction survey of all buildings and facilities located within 50 meters of the excavation site shall be carried out by the firm specializing in pre-construction surveys and is independent of the contractor (similar to pre-blast survey as described in OPSS 120). Vibration monitoring will be required for the blasting work. Acceptable vibration levels induced by the excavation operations shall be determined following a risk assessment carried out by the independent vibration specialist.

7.3 Foundation Recommendations

Based on the information provided by the client, excavation for the entire site area for about 8 m depth (Elevation 96.7 m) is anticipated for the construction of two-levels underground parking. Therefore, the subsurface condition below the foundation for the proposed building could be on the bedrock and partially on the soil (e.g. 3 m of clay soil between foundation and bedrock at BH2017-10, if foundation is at Election 96.7 m).

It shall be noted that the clay soil is not recommended for the foundation bearing soil since it has low bearing resistance as well as it may cause excessive settlement for the proposed development. Clay soil shall be removed up to the bedrock surface depth. Foundation could be founded directly on the bedrock surface.

7.3.1 Spread Footings and Mat Foundation on Bedrock

Based on the borehole log, the type of bedrock encountered at the foundation depth is limestone. Limestone has fair to good RQD in first core run of BH2017-03, BH2017-10 and second core run of BH2017-08. Other core runs were excellent RQD condition (RQD 90 – 100).

The compressive strengths of tested sound rock core samples were 97 MPa to 129 MPa. Where spread footings/mat foundations are considered to support commercial building, due to the fair rock mass quality at the upper rock cores, an allowable design bearing pressure of 1,000 kPa is recommended for the foundation on the upper limestone bedrock formation. At this preliminary design stage, a modulus of deformation of 20 GPa can be used for the rock formation.

If more than 1,000 kPa design bearing capacity of the foundation is required, the mat foundations or cast-in-place concrete caissons, founded on competent bedrock could be considered. Competent bedrock has excellent rock mass quality and provide higher bearing capacity for the foundation. It is recommended that the potential for the presence of fractured/rubble zones should be checked for the entire footprint of the proposed tower. Further foundation consultations will be required for the detailed foundation design.

Limestone bedrock is susceptible to chemical erosion and may develop underground cavity. However, no significant open fractures or cavity was encountered in the four (4) boreholes cored up to 6.5 to 7.6 m below top of the bedrock (for). Therefore, relatively intact bedrock is expected underneath the proposed two levels of underground parking structure and the building foundation. A geophysical method such as ground-penetrating-radar (GPR), electromagnetic conductivity measurement (EM), could be used for detecting the cavities at a deeper depth.

Prepared bearing surface for the foundation should be free of disturbed soil, and free of unsuitable materials such as organic material, loose materials. All the disturbed soil during excavation should be removed for off side removal. A minimum 300 mm thick Granular A material, compacted to 100%

standard proctor maximum dry density, shall be prepared on top of the prepared foundation bedrock surface. The mat/raft foundation could be founded on the prepared 300 mm thick Granular "A" layer.

Considering the reported high ground water table, waterproofing layer is required below the floor slab and around the basement wall. The waterproofing design for the basement wall is required to protect from the water and moisture intrusion into the basement. Waterproofing design and specifications should be incorporated in the basement floor and walls construction design drawings.

Preparation and construction of mat/raft foundation requires shoring system and dewatering work for the anticipated deep excavations. Foundation shoring system should be designed to provide the sufficient support for the lateral earth pressure. Significant dewatering work is expected and further discussed in Section 7.6.2.

7.4 Slab-on-Grade

Should the basement foundation be on the bedrock, slab-on-grade construction will not be required for the basement floor construction. However, if foundation is planned on the overburden soil, the slab-on-grade for the foundation could be required.

Clay soil layer encountered in the boreholes at before the bedrock surface is not suitable for the foundation. Therefore, this unsuitable soil shall be removed up to bedrock surface and backfilled with engineered fills. Once the exposed excavated bedrock surface has been inspected and approved, the site grades within the floor slab area could be raised by the placement of engineered fill to the underside of the granular base of the slab. The engineered fill should consist of Ontario Provincial Standard Specification (OPSS) Granular "A", placed in 300 mm maximum loose lift thicknesses, with each lift compacted to 100% standard Proctor maximum dry density (SPMDD). The slab subgrade could be constructed on a 300 mm thick bed of OPSS Granular material. The subgrade beneath the slab-on-grade should be protected at all times from rain, snow, freezing temperatures, excessive drying, and the ingress of water. This applies during and after the construction period. The prepared subgrade should be inspected by a geotechnical engineer prior to the placement of the engineered fill.

If the ground is disturbed, the disturbed soil should be removed and replaced with Granular "A" and compacted to 100 % maximum standard Proctor dry density.

The finished exterior grade at the ground surface of the surrounding building, should be sloped away from the building to prevent ponding of surface water close to the exterior walls of the building.

7.5 Lateral Earth Pressure

Shoring for excavation support and foundation walls require design with resistance to the lateral earth pressures and groundwater pressures. The lateral earth pressure for the static condition, could be estimated using the following equation:

$$P = K_O \gamma h + K_O (\gamma - \gamma_w)(H-h) + \gamma_w (H - h) + K_O q$$

Where:

P	=	Total static lateral earth pressure in kPa;
K_o	=	coefficient of earth pressure for at rest condition
γ	=	estimated bulk unit weight of soil
γ_w	=	unit weight of water = 9.81 kN/m^3
H	=	height of wall (m)
h	=	depth of groundwater table below ground surface (m)
q	=	any surcharge pressure at ground level (kPa)

The thrust against the foundation wall during a seismic event may be estimated from the following equation (Wood, 1973):

$$P = \gamma H^2 (ah/g)$$

Where:

P = dynamic thrust component (kN/m)

γ = unit weight

H = height of wall (m)

(ah/g) = dimensionless horizontal pseudostatic coefficient

Active and passive earth pressures coefficients for the various soil types encountered at the site are provided in the Table 7.1.

7.6 Excavation and Dewatering

7.6.1 Excavations and Shoring System

Excavation must be undertaken in accordance with the Occupational Health and Safety Act (OHSA). The soil between ground surface and up to 8 m depth could be considered as Types 2 to 4 soils for excavation work as per Occupational Health and Safety Act and Regulation for Construction Projects. The excavation in overburden may be carried out with a cut slope of 2H:1V or using a suitable shoring system designed by a professional engineer.

Deep excavations of 8 - 9 m deep for the 2-levels basement parking construction and up to 14 m for 4-level parking option will require a specially designed shoring system. The potential shoring systems are tangent pile wall and secant pile wall. Given the reported bedrock elevations, it will be difficult to drive sufficient embedment pile lengths to anchor soldier piles into the bedrock. However, boring into the upper fractured bedrock may be considered given the reported bedrock qualities. Bracing, raking, anchoring should be considered for the excavation support of tangent and secant pile shoring systems. Shoring system should be considered for the needs for groundwater control (cut off wall) and the needs for the temporary and permanent retaining for the basement parking structure. The base heave during excavation with shoring is not expected for bedrock formation at the base of the excavation.

Instrumentation and monitoring during excavation will be required to monitor the performance of the shoring system as well as monitoring ground movement. The instrumentation and monitoring plan should be prepared for the shoring excavation.

7.6.2 Dewatering

Based on the groundwater levels encountered during the geotechnical investigations and subsequent groundwater monitoring results, perched groundwater could be encountered at shallow depth between 1.7 m and 5.6 m (Elevations 101.0 m and 97.9 m) above clay deposit, as well as below the clay deposit in the fractured limestone bedrock. Therefore, potentially significant groundwater control work will be required during construction and potentially afterwards. Evaluation of the hydraulic properties of the bedrock and overburden soil formations will be required for the dewatering analysis. Hydrogeological investigation is recommended for the detailed dewatering analysis and groundwater control work.

It shall be noted that the groundwater elevations vary with location, precipitation and seasons. Groundwater elevations at the site varied from elevation 101 m at west of the property to elevation 97.9 m at northeast of the property.

Based on present information, the potential dewatering/groundwater control systems are cut-off walls with collection pond and sump pump system or cut-off wall with wells points system. It should be noted that dewatering effort will depend on a number of factors, including excavation depth, season and weather conditions and the length of time the excavation is left open. The suitable dewatering system should be selected based on the size, depth, and required volume of groundwater removal during the excavation work. It is recommended that the dewatering work be designed and inspected by an experienced hydrogeologist/qualified professional engineer for the dewatering work. Ground settlement analysis and impact assessment due to dewatering shall also be analysed and evaluated during detailed design stage.

Note that dewatering volumes in excess of 50,000 L/day will require a Permit to Take Water (PTTW) or Environmental Activity Sector Registry (EASR), depending on the total dewatering volumes. PTTW application require supporting document of a hydrogeological assessment report as well as impact assessment by dewatering work carried out by a qualified person.

7.7 Pipe Installations

Installation of utilities services including pipes will be in overburden soils. Based on the depth of the pipe installation, dewatering requirements should be evaluated for the installation of the utilities. If installation trench is in the clay soil, it may be possible to use sump pumping techniques for dewatering, since clay has low permeability and less water to handle. It should be determined by the contractor on the methods of dewatering necessary to meet the project requirements and align with their construction methodology and schedule.

It should be noted that soft clay soil was encountered in the boreholes. Therefore, the pipe, which is installed in the clay formation, may encounter ground settlement and pipes shall be designed to resist and allow the large ground settlement.

7.7.1 Pipe Bedding

Pipe bedding should be in accordance with the following Ontario Provincial Standard Drawings (OPSD) design standards for the class and size of pipe being used as well as manufactures recommendations. The applicable standards for the pipe bedding are:

- OPSD 0802.010 Flexible Pipe Embedment and Backfill – Earth Excavation
- OPSD 0802.013 Flexible Pipe Embedment and Backfill – Rock Excavation
- OPSD 0802.030 Rigid Pipe Bedding, Cover and Backfill – Type 1 and 2 Soil - Earth Excavation
- OPSD 0802.031 Rigid Pipe Bedding, Cover and Backfill – Type 3 Soil - Earth Excavation
- OPSD 0802.033 Rigid Pipe Bedding, Cover and Backfill – Rock Excavation

Other OPSD Standards or manufacturer requirements may apply to the construction of the buried services and the designer should consult these as appropriate for the materials being employed.

It is recommended that a minimum 0.3 m of compacted bedding below the pipe shall be included in the bedding design.

Clear stone could be used for bedding and backfilling; if bedding is placed below groundwater.

7.7.2 Trench Backfill and Compaction Standard

Compaction of the trench backfill will be necessary in some cases for the following reasons:

- To control settlement of the trench fill;
- To provide lateral support to the trench sidewall; and
- To minimize soil loads on the pipe.

A Granular “B” Type I material could be used for the backfill above the pipe. Trench backfill should be compacted to 95% of standard Proctor maximum dry density. Heavy compaction equipment should not be used until at least 1 m of compacted backfill exists above the pipe. During backfilling, care should be taken to ensure the backfill proceeds in equal stages simultaneously on both sides of the pipe. If organic soils are encountered at the pipe bedding surface, this organic soil should be removed. No frozen material should be used as backfill; neither should the trench base be allowed

to freeze. The quality and workmanship in the construction is as important as the compaction standards themselves. It is imperative that the guidelines for the compaction be followed for the full depth of the trench to achieve satisfactory performance.

7.8 Corrosiveness of Soil

A selected soil sample at potential foundation depth was submitted to Maxxam Analytics, for chemical analyses to assess the potential sulphate attack on buried concrete and ductile iron structures (Soluble Chloride - Cl, Conductivity, Available pH, Resistivity, Soluble Sulphate – SO4). The Laboratory Certificate of analysis from Maxxam is provided in Appendix G. A summary of the results is provided in Table 7.4. The analytical results of the soil samples were compared with applicable Canadian Standards Association (CSA) standards and are given in Table 7.5.

Table 7-4: Summary of Corrosivity Analytical Test Results

Sample ID	pH	Soluble Sulphate (%)	Resistivity, ohm-cm	Soluble Chloride (20:1) (ug/g)	Conductivity (mS/cm)
BH2017-10, SS10	7.83	0.038	690	700	1.5

Table 7.5 Sulphate Content and Exposure Class

Class of Exposer	Degree of Exposure	Water soluble Sulphate in soil sample (%)	Cementing Material to be used
S-1	Very Severe	> 2.0	HS or HSb
S-2	Severe	0.20 – 2.0	HS or HSb
S-3	Moderate	0.10 – 0.20	MS, MSb, LH, HS, or HSb

*Information from Table 3 of CSA Standards A23.1-04

The sulphate content for the selected soil sample resulted a concentration of 0.038 %. The result was compared with Canadian Standards Association (CSA) Standards A23.1 for sulphate attack potential on concrete structures and possess a “negligible” risk for sulphate attack on concrete material. Accordingly, conventional GU or MS Portland cement may be used in the construction of the proposed concrete elements. pH result was 7.8 and it indicates it is not a corrosive environment for ductile iron pipes.

Soluble chloride content result was 700 ug/g and considered as negligible harmful environment for concrete or steel reinforcement. The resistivity of clay soil was 700 ohm-cm, which indicate poor drainage soil condition and could be considered as corrosive environment.

7.9 Seismic Site Classification

Based on the soil profile above the bedrock formation, it could be concluded that seismic site class for the overburden clay soil formation is classified as Site Class E. However, if the foundation is to be founded on the bedrock, seismic site class for the bedrock could be classified as Site Class “B”.

The site coefficients Fa and Fv could be assumed based on Table 6.1B and Table 6.1C of the Canadian Foundation Engineering Manual (CFEM, 4th edition, 2006) as well as NBCC 2005 Table 4.1.8.4.B and Table 4.1.8.4.C.

The seismic hazard from 2015 National Building Code Seismic Hazard Calculation for the site is provided in Appendix F.

7.10 Liquefaction Potential of Soils

The soil formation at the site is soft to hard clay soils. Majority of tested clay samples resulted plasticity index of 19 to 24 and therefore clay soil is considered non-liquefiable soil.

Two tests results of soil samples from sandy clay layer, resulted plasticity index 3 and non-plastic clay. The sandy clay soil, could be considered as liquefiable soil, therefore, DST recommend not to use as foundation bearing formation on sandy clay soil. It shall be further tested for the liquification potential and seismic loading capacities.

If the proposed development will use the bedrock formation as the foundation bearing, further analyses for liquefaction potential of the sandy clay soil may not be required.

7.11 Frost Protection and Foundation Insulation Requirements

Based on the Ministry of Environment published data, which is based on an 85% probability, the design freezing index for Ottawa area has been estimated to be 1,050 degrees-days Celsius (1,922

degree-days Fahrenheit). The estimated frost penetration depth for an engineered fill is approximately 1.8 m. The soil at the site is silt/clay in nature and highly frost susceptible soil.

All footings subject to frost action should be provided with the minimum 1.8 m of soil cover. If required soil cover over foundation footing is not feasible, foundation insulation can be used. Insulation detail design shall be prepared with the insulation product manufacture's design guidelines.

Present proposed development with foundation at below 10 m depth, will not require insulation for the foundation since the foundation will be beyond the potential frost penetration depth. However, the project requires shallow foundations, DST can review the foundation and provide design recommendation for frost protection.

7.12 Pavement

DST provided pavement structure recommendations for parking lot and drive way for light and heavy vehicle and provided in Table 7.6 and Table 7.7.

Table 7.6 Pavement Structure Recommendation for Parking Lot and Drive Way (car only)

Pavement Layer	Compaction Requirement	Recommended Minimum Thickness (mm)
Surface Course, Asphaltic Concrete	As per OPSS 310	40
Binder Course, Asphaltic Concrete	As per OPSS 310	60
Granular 'A', Base Course (OPSS 1010)	100 % SPMDD	150
Granular 'B', Type II, Subbase (OPSS 1010)	100 % SPMDD	300

Table 7.7 Pavement Structure Recommendation for Truck and Heavy Vehicle

Pavement Layer	Compaction Requirement	Recommended Minimum Thickness (mm)
Surface Course, Asphaltic Concrete	As per OPSS 310	40
Upper Binder Course, Asphaltic Concrete	As per OPSS 310	50
Lower Binder Course, Asphaltic Concrete	As per OPSS 310	50
Granular 'A', Base Course (OPSS 1010)	100 % SPMDD	150
Granular 'B', Type II, Subbase (OPSS 1010)	100 % SPMDD	450

Note:

1) OPSS – Ontario Provincial Standard Specifications
2) All pavement layer materials should meet OPSS requirements and/or municipality standards.
3) Granular materials should be compacted to 100% standard Proctor maximum dry density (SPMDD) and placed in lifts not exceeding 150 mm thick.
4) SPMDD – Standard Proctor Maximum Dry Density (ASTM-D698)
5) All granular and asphalt construction methods are to meet local standards (City of Ottawa OPSS).

8. MONITORING DURING CONSTRUCTION

All foundation and earth works recommendations presented in this report are based on the assumptions that an adequate level of construction monitoring by qualified geotechnical personnel during construction will be provided. An adequate level of construction monitoring is considered to be:

a) Foundations: full-time monitoring and design review during construction.
b) Earthworks: full-time quality control and compaction testing.

An important purpose of providing an adequate level of monitoring is to check that recommendations, based on data obtained at discrete borehole locations, are relevant to other areas of the Site. To provide an adequate level of construction monitoring, qualified geotechnical personnel should manage and supervise the following tasks during construction:

Foundations:

- Confirm that materials and methods meet specifications.
- Inspect foundation subgrades.
- Inspect excavation.
- Inspect shoring structures.
- Review shallow foundation installation/testing methods.
- Review compaction testing records.
- Provide review comments, including any discrepancies found with respect to specifications as well as this report, and the need for any modifications to the design or methods.

Earthworks:

- Confirm that materials and methods meet specifications.
- Inspect subgrade prior to fill placement.
- Quality control of fill material.
- Review compaction testing records.

DST can review the final design and layout of structures and foundation elements for the proposed development. DST can be contacted to offer additional recommendations.

9. CLOSURE

We trust this report meets your present requirements. Should you have any questions, please do not hesitate to contact our office. A description of limitations which are inherent in carrying out site investigation studies is given in Appendix A and forms an integral part of this report.

Sincerely,

For DST CONSULTING ENGINEERS INC.

Tun Lwin, P.Eng., P.Geo, M.Eng., M.Sc.
Senior Geotechnical Engineer

F. Saadat

Farbod Saadat, Ph.D., P.Eng.
Chief Geotechnical Engineer

10. REFERENCES

Bowles Joseph E., (1988), Fifth Edition, McGraw-Hill Companies Inc., Foundation Analysis and Design.

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Ontario Building Code, 17 May, 2017

APPENDIX A

LIMITATIONS OF REPORT

LIMITATIONS OF REPORT

GEOTECHNICAL STUDIES

The data, conclusions and recommendations which are presented in this report, and the quality thereof, are based on a scope of work authorized by the Client. Note that no scope of work, no matter how exhaustive, can identify all conditions below ground. Subsurface and groundwater conditions between and beyond the boreholes may differ from those encountered at the specific locations tested, and conditions may become apparent during construction which were not detected and could not be anticipated at the time of the site investigation. Conditions can also change with time. It is recommended practice that DST Consulting Engineers Inc. be retained during construction to confirm that the subsurface conditions throughout the site do not deviate materially from those encountered in the boreholes.

The design recommendations given in this report are applicable only to the project described in the text and then only if constructed substantially in accordance with details stated in this report. Since all details of the design may not be known, we recommend that we be retained during the final stage to verify that the design is consistent with our recommendations, and that assumptions made in our analysis are valid. Unless otherwise noted, the information contained herein in no way reflects on environmental aspects of either the site or the subsurface conditions.

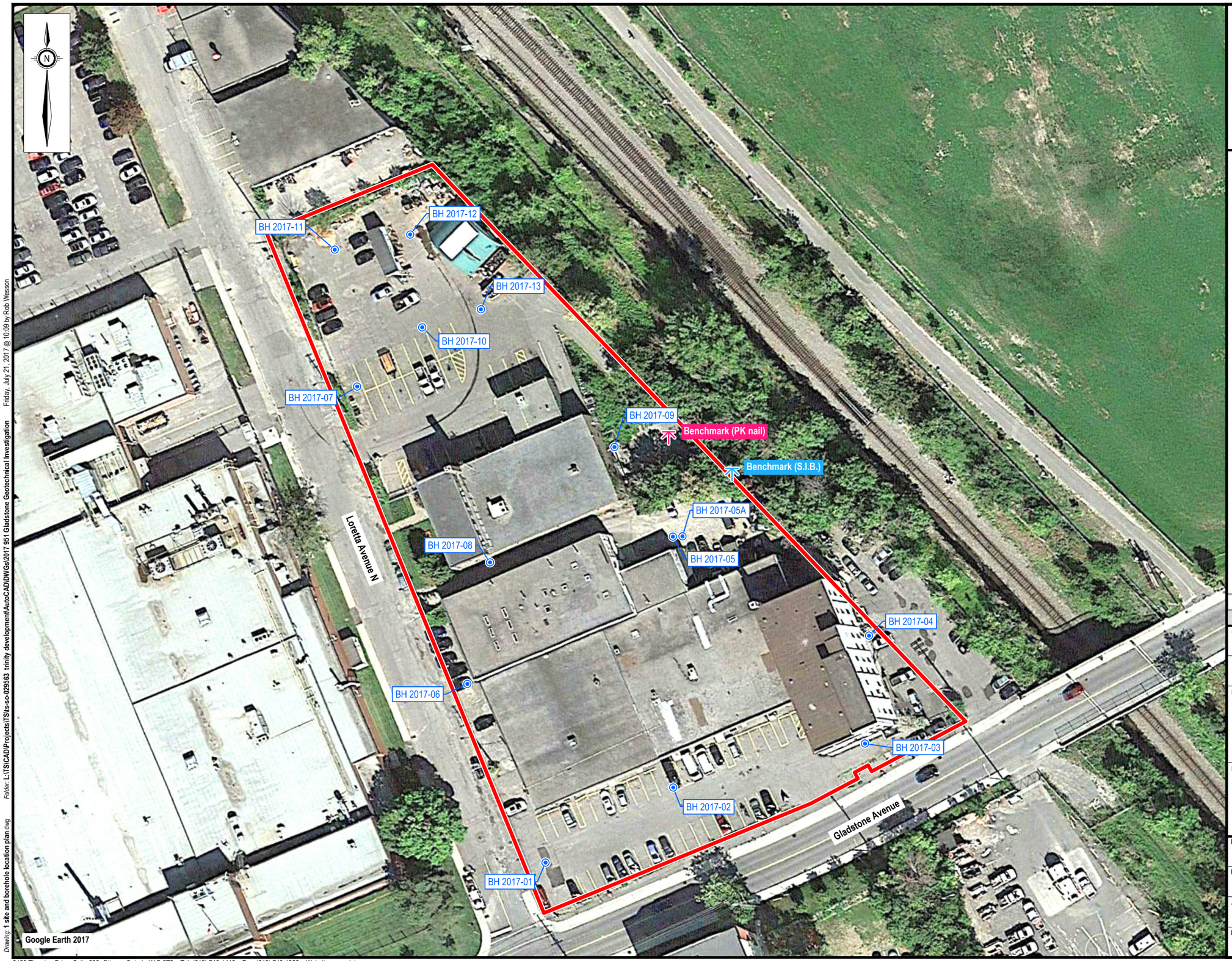
The comments given in this report on potential construction problems and possible methods are intended only for the guidance of the designer. The number of boreholes may not be sufficient to determine all the factors that may affect construction methods and costs, e.g. the thickness of surficial topsoil or fill layers may vary markedly and unpredictably. The contractors bidding on this project or undertaking the construction should, therefore, make their own interpretation of the factual information presented and draw their own conclusion as to how the subsurface conditions may affect their work.

Any results from an analytical laboratory or other subcontractor reported herein have been carried out by others, and DST Consulting Engineers Inc. cannot warranty their accuracy. Similarly, DST cannot warranty the accuracy of information supplied by the Client.

APPENDIX B

SITE AND BOREHOLES

LOCATION PLAN



DST consulting engineers

Notes

1. This drawing shall be read in conjunction with the associated technical report.
2. Do not scale drawing.

Legend

- Property boundary
- Borehole location
- Benchmark

0 5 10 20 30 m

Scale 1:750

Revision	Date	Issue	Approval
A	17.07.17	Preliminary	S.V.

Client: **Trinity**

Site: **951 Gladstone Avenue, Ottawa, Ontario**

Report Title: **Geotechnical Investigation Gladstone Avenue and Loretta Avenue North, Ottawa**

Drawing Title: **Site and Borehole Location Plan**

Designed By: S.V.	Scale: As shown
Drawn By: R.W.	Date: July 2017
Approved By: S.V.	Project No.: TS-SO-029563
Figure No.: 1	DRAFT

Drawing: 1 site and borehole location plan.dwg Folder: L:\TS\CAD\Projects\TS\ts-so-029563 trinity development\AutoCAD\DWGs\2017 951 Gladstone Geotechnical Investigation Friday, July 21, 2017 @ 10:09 by Rob Wesson

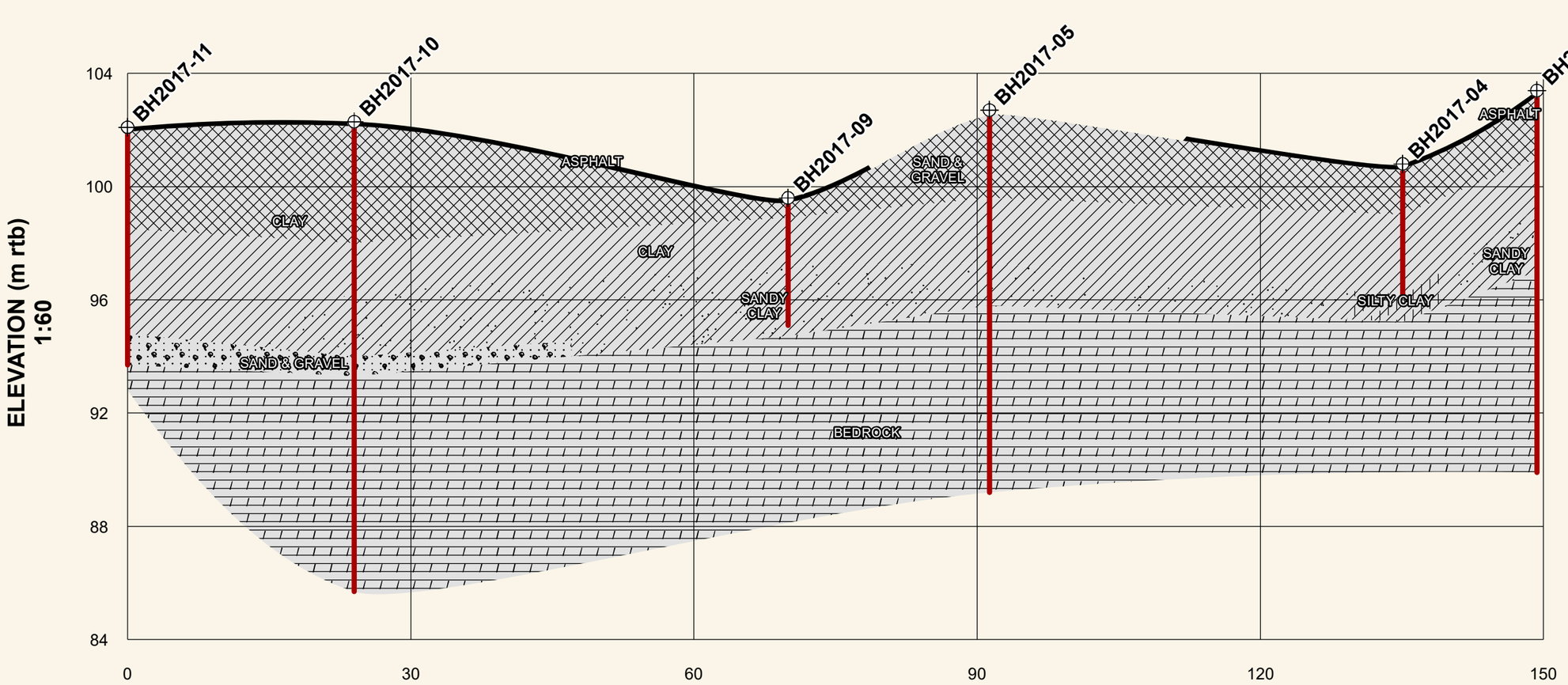
2150 Thurston Drive, Suite 203, Ottawa, Ontario K1G 5T9 Tel: (613) 748-1415 Fax: (613) 748-1356 Website: www.dstgroup.com

APPENDIX C
BOREHOLE LOGS &
CROSS SECTION

A

CROSS SECTION A-A'

A'



ELEVATION (m rtb)
1:60

DISTANCE ALONG BASELINE (m)
1:500

Figure 1
Geological Cross Section A-A'
Phase II Environmental Site Assessment
Trinity
951 Gladstone Avenue
Toronto, ON
TS-SO-029563 (GIS 00547)

Legend

- Asphalt
- Fill
- Clay
- Sand & Gravel
- Sandy Clay
- Silty Clay
- Bedrock

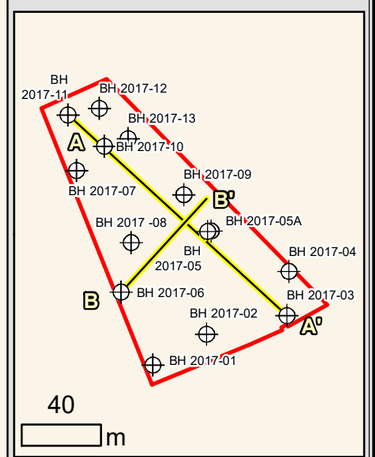


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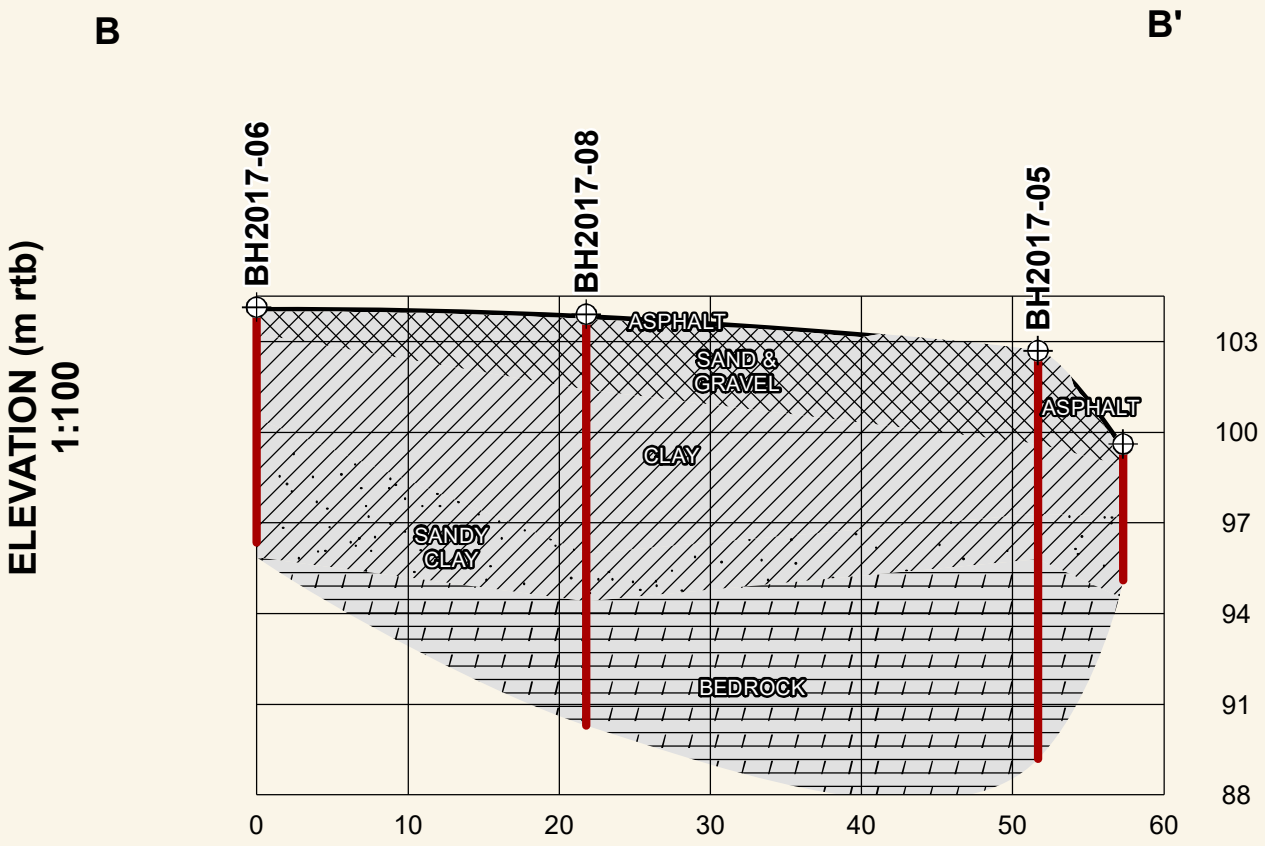
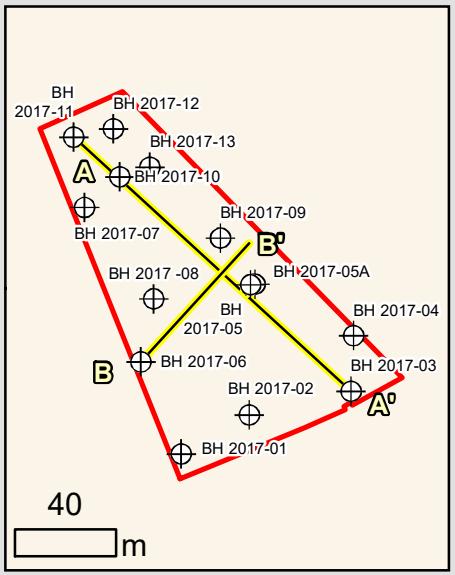
Figure 2
Geological Cross Section B-B'

Phase II Environmental Site Assessment
Trinity
951 Gladstone Avenue
Toronto, ON
TS-SO-029563 (GIS 00547)



Legend

- Asphalt
- Fill
- Clay
- Sandy Clay
- Bedrock



consulting engineers

A:\GIS\TS-SO-29563 TRINITY DEVELOPMENT GROUP - LORETTA GLADSTONE\MAP DOCUMENTS\CROSS-SECTIONS\20170606_TRINITY_FIGURE1_GEOLOGICALCROSSSECTIONB.MXD

LOG OF BOREHOLE BH2017-01

DST REF. No.: **TS-SO-29563**
CLIENT: **Trinity Development Group Inc.**
PROJECT: **Geotechnical Drilling for the Proposed Development**
LOCATION: **951 Gladstone Avenue, Ottawa, ON**
SURFACE ELEV.: **104.9 metres**

Drilling Data
METHOD: **Hollow Stem Auger**
START DATE: **7/5/2017**
COMPLETION DATE: **7/5/2017**
COORDINATES: **5028029** m N, **443991** m E

DEPTH (m)	ELEV. (m)	Water Data	% MOISTURE (W_p W W_l)	Symbol	MATERIAL DESCRIPTION	SAMPLE #	SAMPLE TYPE	'N' VALUE	VANE (kPa) × / SPT (N) □ Blows/0.3m / DCPT ◆	REMARKS & GRAINSIZE DISTRIBUTION (%) GR SA SI CL
0.0	104.9				ASPHALT (75 mm)					
					FILL - SAND and GRAVEL to trace Gravel, Brown, Loose to Compact	SS1		17		
1.0	104					SS2		5		
						SS3		16		
2.0	103					SS4		14		
					CLAY, Brown to Grey, Firm to Very Stiff	SS5		9		
3.0	102					SS6		6		
						SS7		23		Odour in samples from 3.7 m to 7.6 m
4.0	101				SANDY, trace Gravel					
						SS8		3		
5.0	100					SS9		6		
						SS10		6		
6.0	99					SS11		7		
						SS12		5		
7.0	98				SAND and GRAVEL, Grey, Very Dense	SS13		100+		
					End of Borehole at 7.6 m due to Auger Refusal.					
8.0	97									
	96									

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Web: www.dstgroup.com

SAMPLE TYPE LEGEND

- Auger Sample
- Split Spoon Sample
- Bulk Sample
- Rock Core
- Hiller Peat Sampler
- Shelby Tube
- Bentonite
- Sand
- ×3 Numbers refers to Sensitivity

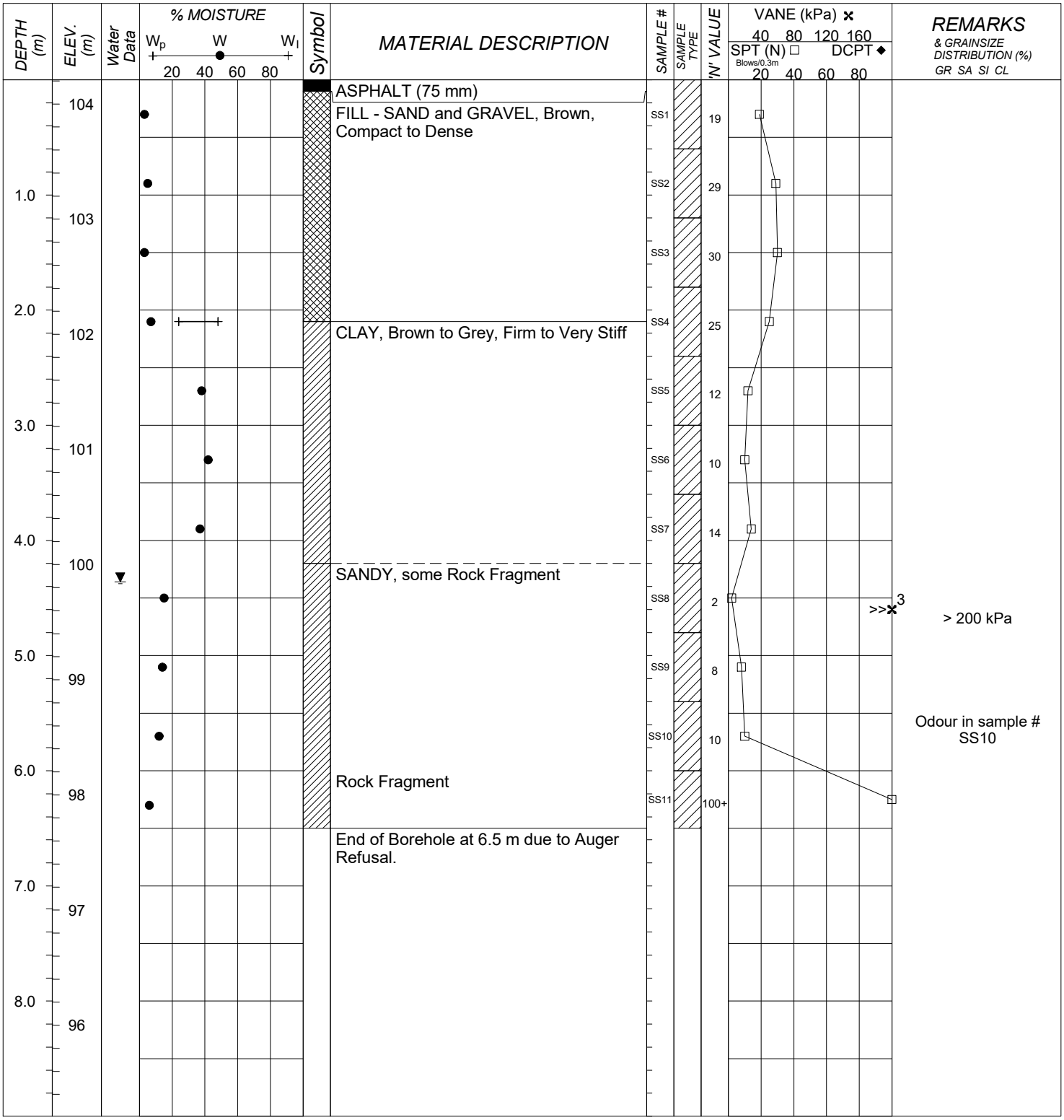
ENCLOSURE 1

BOREHOLE (OTTAWA) TS-SO-29563.GPJ DATA TEMPLATE.GDT 28/7/17

LOG OF BOREHOLE BH2017-02

DST REF. No.: **TS-SO-29563**
CLIENT: **Trinity Development Group Inc.**
PROJECT: **Geotechnical Drilling for the Proposed Development**
LOCATION: **951 Gladstone Avenue, Ottawa, ON**
SURFACE ELEV.: **104.2 metres**

Drilling Data
METHOD: **Hollow Stem Auger**
START DATE: **7/6/2017**
COMPLETION DATE: **7/6/2017**
COORDINATES: **5028045** m N, **444017** m E



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Web: www.dstgroup.com

SAMPLE TYPE LEGEND

- Auger Sample
- Split Spoon Sample
- Bulk Sample
- Rock Core
- Hiller Peat Sampler
- Shelby Tube
- Bentonite
- Sand
- ×3 Numbers refers to Sensitivity

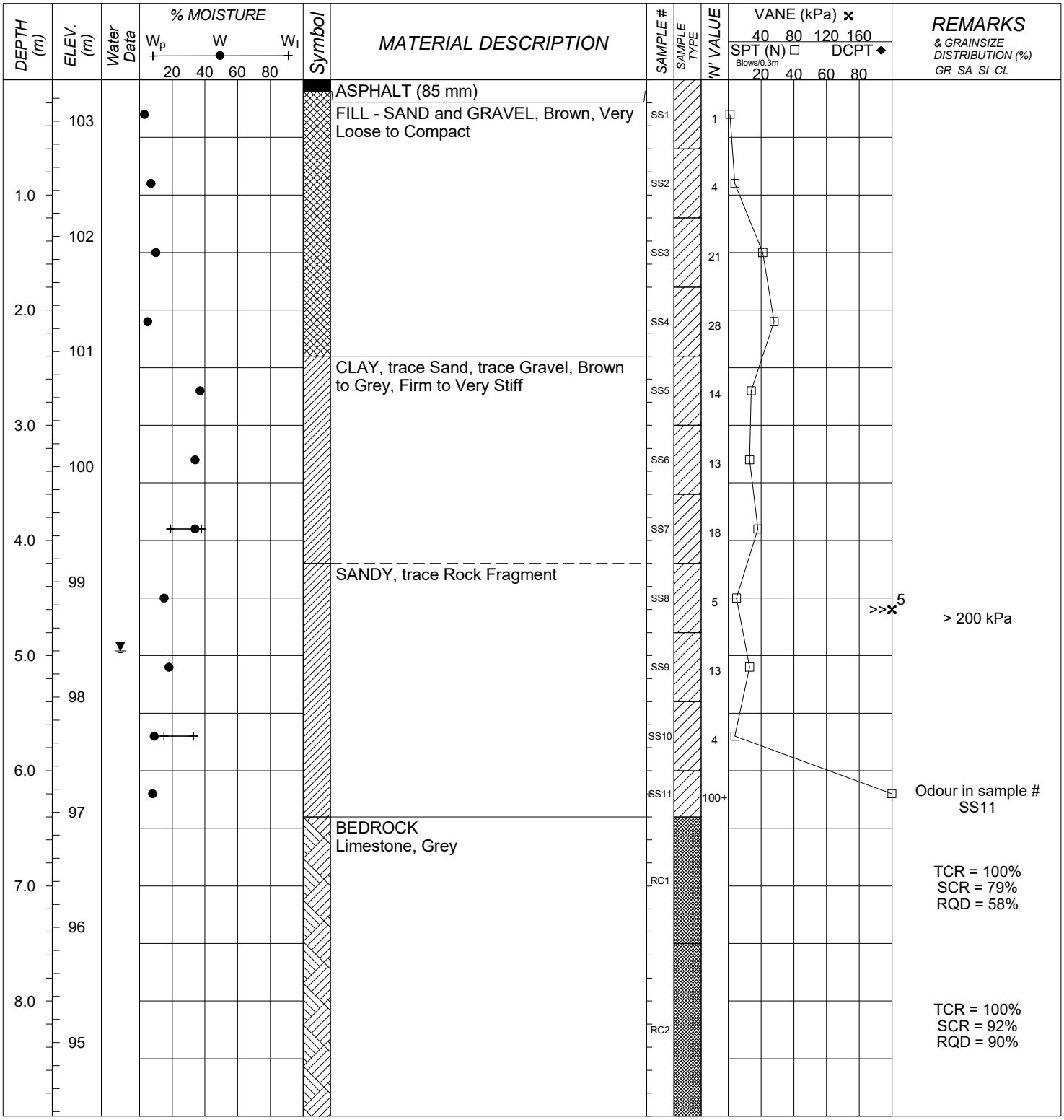
ENCLOSURE 2

BOREHOLE (OTTAWA) TS-SO-29563.GPJ DATA TEMPLATE.GDT 28/7/17

LOG OF BOREHOLE BH2017-03

DST REF. No.: **TS-SO-29563**
CLIENT: **Trinity Development Group Inc.**
PROJECT: **Geotechnical Drilling for the Proposed Development**
LOCATION: **951 Gladstone Avenue, Ottawa, ON**
SURFACE ELEV.: **103.4 metres**

Drilling Data
METHOD: **Hollow Stem Auger**
START DATE: **7/5/2017**
COMPLETION DATE: **7/5/2017**
COORDINATES: **5028054** m N, **444057** m E



TS-SO-29563.GPJ DATA TEMPLATE.GDT 28/7/17

BOREHOLE (OTTAWA)

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FX: 1-613-748-1356
Email: ottawa@dstgroup.com
Web: www.dstgroup.com

SAMPLE TYPE LEGEND

- Auger Sample
- Split Spoon Sample
- Bulk Sample
- Rock Core
- Hiller Peat Sampler
- Shelby Tube
- Bentonite
- Sand
- ×3 Numbers refers to Sensitivity

ENCLOSURE 3

LOG OF BOREHOLE BH2017-03

DST REF. No.: **TS-SO-29563**
CLIENT: **Trinity Development Group Inc.**
PROJECT: **Geotechnical Drilling for the Proposed Development**
LOCATION: **951 Gladstone Avenue, Ottawa, ON**
SURFACE ELEV.: **103.4 metres**

Drilling Data
METHOD: **Hollow Stem Auger**
START DATE: **7/5/2017**
COMPLETION DATE: **7/5/2017**
COORDINATES: **5028054** m N, **444057** m E

DEPTH (m)	ELEV. (m)	Water Data	% MOISTURE W_p W W_l (20 40 60 80)	Symbol	MATERIAL DESCRIPTION	SAMPLE #	SAMPLE TYPE	'N' VALUE	VANE (kPa) × (40 80 120 160) SPT (N) □ Blows/0.3m DCPT ◆ (20 40 60 80)	REMARKS & GRAINSIZE DISTRIBUTION (%) GR SA SI CL
10.0	94					RC3				TCR = 93% SCR = 93% RQD = 92%
	93									
11.0	92					RC4				TCR = 100% SCR = 100% RQD = 92%
12.0	91									
13.0	90					RC5				TCR = 100% SCR = 100% RQD = 95%
					End of Borehole at 13.5 m					
14.0	89									
15.0	88									
16.0	87									
17.0	86									

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FX: 1-613-748-1356
Email: ottawa@dstgroup.com
Web: www.dstgroup.com

SAMPLE TYPE LEGEND

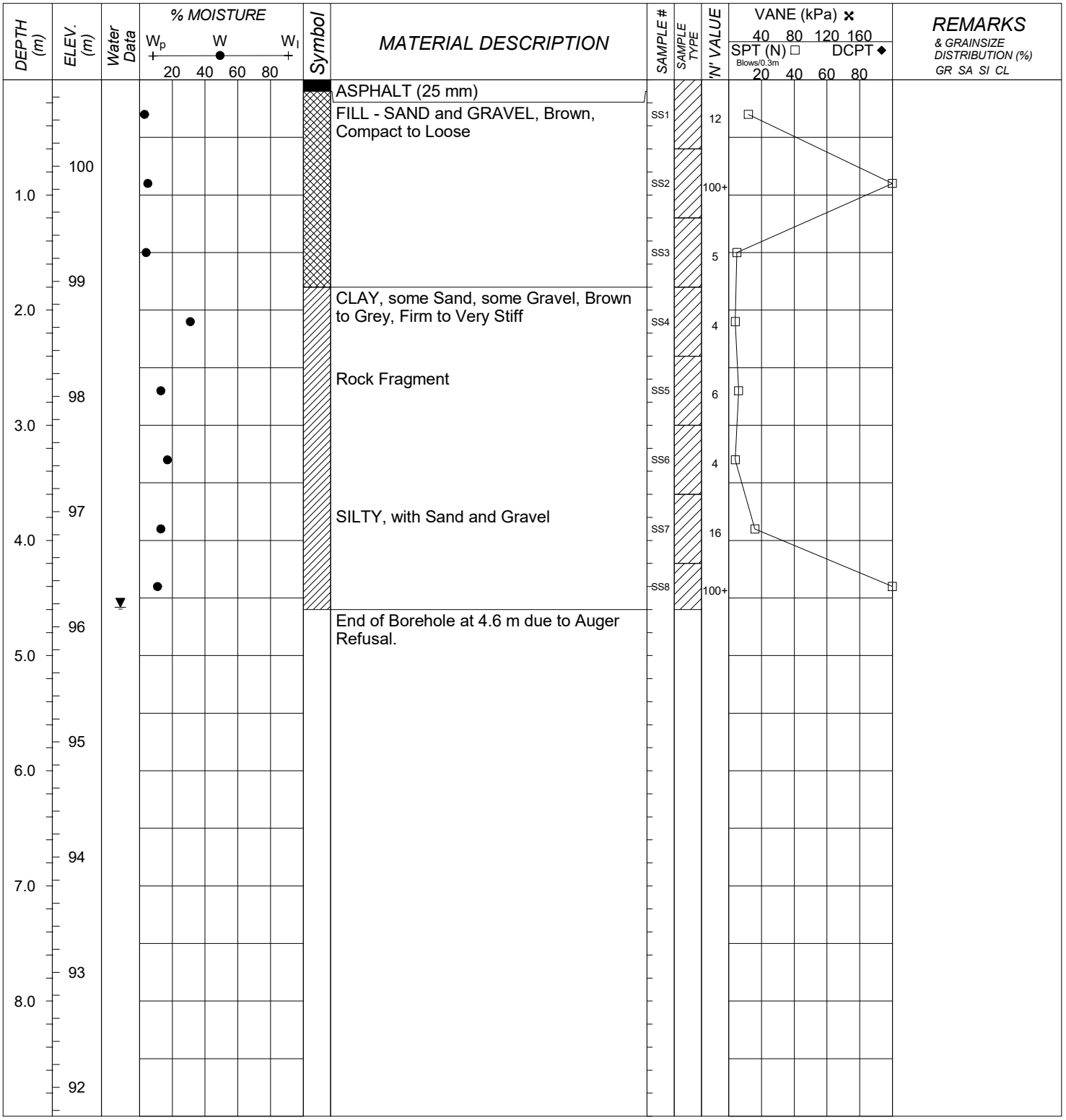
- Auger Sample
- Split Spoon Sample
- Bulk Sample
- Rock Core
- Hiller Peat Sampler
- Shelby Tube
- Bentonite
- Sand
- ×3 Numbers refers to Sensitivity

ENCLOSURE 4

LOG OF BOREHOLE BH2017-04

DST REF. No.: **TS-SO-29563**
CLIENT: **Trinity Development Group Inc.**
PROJECT: **Geotechnical Drilling for the Proposed Development**
LOCATION: **951 Gladstone Avenue, Ottawa, ON**
SURFACE ELEV.: **100.8 metres**

Drilling Data
METHOD: **Hollow Stem Auger**
START DATE: **7/6/2017**
COMPLETION DATE: **7/6/2017**
COORDINATES: **5028076** m N, **444058** m E



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SAMPLE TYPE LEGEND

- Auger Sample
- Split Spoon Sample
- Bulk Sample
- Rock Core
- Hiller Peat Sampler
- Shelby Tube
- Bentonite
- Sand
- ×3 Numbers refers to Sensitivity

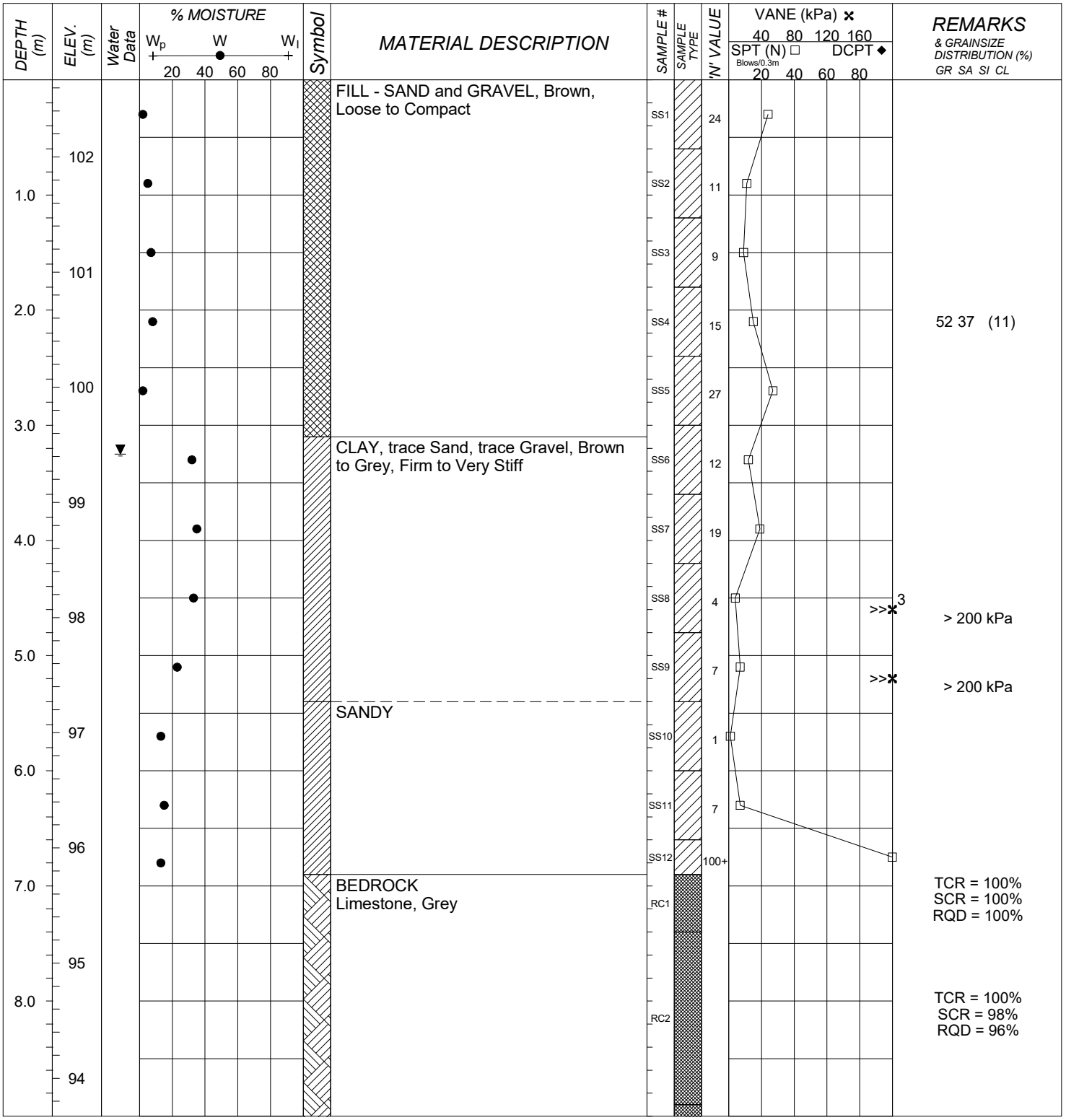
ENCLOSURE 5

BOREHOLE (OTTAWA) TS-SO-29563.GPJ DATA TEMPLATE.GDT 28/7/17

LOG OF BOREHOLE BH2017-05

DST REF. No.: **TS-SO-29563**
CLIENT: **Trinity Development Group Inc.**
PROJECT: **Geotechnical Drilling for the Proposed Development**
LOCATION: **951 Gladstone Avenue, Ottawa, ON**
SURFACE ELEV.: **102.7 metres**

Drilling Data
METHOD: **Hollow Stem Auger**
START DATE: **7/7/2017**
COMPLETION DATE: **7/7/2017**
COORDINATES: **5028096** m N, **444017** m E



BOREHOLE (OTTAWA) TS-SO-29563.GPJ DATA TEMPLATE.GDT 28/7/17

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SAMPLE TYPE LEGEND

- Auger Sample
- Split Spoon Sample
- Bulk Sample
- Rock Core
- Hiller Peat Sampler
- Shelby Tube
- Bentonite
- Sand
- ×3 Numbers refers to Sensitivity

ENCLOSURE 6

LOG OF BOREHOLE BH2017-05

DST REF. No.: **TS-SO-29563**
CLIENT: **Trinity Development Group Inc.**
PROJECT: **Geotechnical Drilling for the Proposed Development**
LOCATION: **951 Gladstone Avenue, Ottawa, ON**
SURFACE ELEV.: **102.7 metres**

Drilling Data
METHOD: **Hollow Stem Auger**
START DATE: **7/7/2017**
COMPLETION DATE: **7/7/2017**
COORDINATES: **5028096** m N, **444017** m E

DEPTH (m)	ELEV. (m)	Water Data	% MOISTURE W_p W W_l (20 40 60 80)	Symbol	MATERIAL DESCRIPTION	SAMPLE #	SAMPLE TYPE	'N' VALUE	VANE (kPa) × (40 80 120 160) SPT (N) □ Blows/0.3m DCPT ◆ (20 40 60 80)	REMARKS & GRAINSIZE DISTRIBUTION (%) GR SA SI CL
10.0	93					RC3				TCR = 100% SCR = 100% RQD = 100%
11.0	92					RC4				TCR = 100% SCR = 100% RQD = 96%
12.0	91									
13.0	90					RC5				TCR = 100% SCR = 100% RQD = 100%
14.0	89				End of Borehole at 13.5 m					
15.0	88									
16.0	87									
17.0	86									
	85									

BOREHOLE (OTTAWA) TS-SO-29563.GPJ DATA TEMPLATE.GDT 28/7/17

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SAMPLE TYPE LEGEND

- Auger Sample
- Split Spoon Sample
- Bulk Sample
- Rock Core
- Hiller Peat Sampler
- Shelby Tube
- Bentonite
- Sand
- ×3 Numbers refers to Sensitivity

ENCLOSURE 7

LOG OF BOREHOLE BH2017-05A

DST REF. No.: **TS-SO-29563**
CLIENT: **Trinity Development Group Inc.**
PROJECT: **Geotechnical Drilling for the Proposed Development**
LOCATION: **951 Gladstone Avenue, Ottawa, ON**
SURFACE ELEV.: **102.7 metres**

Drilling Data
METHOD: **Hollow Stem Auger**
START DATE: **7/7/2017**
COMPLETION DATE: **7/7/2017**
COORDINATES: **5028096** m N, **444019** m E

DEPTH (m)	ELEV. (m)	Water Data	% MOISTURE (W_p W W_l) 20 40 60 80	Symbol	MATERIAL DESCRIPTION	SAMPLE #	SAMPLE TYPE	'N' VALUE	VANE (kPa) × 40 80 120 160; SPT (N) □ Blows/0.3m; DCPT ◆ 20 40 60 80	REMARKS & GRAINSIZE DISTRIBUTION (%) GR SA SI CL
0.0	102				FILL - SAND and GRAVEL, Brown, Loose to Compact	SS1		11		
1.0						SS2		12		
	101					SS3		4		
2.0					End of Borehole at 1.8 m due to Auger Refusal.					Hit possibly old engine tank; smells like engine oil
3.0	100									
4.0	99									
5.0	98									
6.0	97									
7.0	96									
8.0	95									
	94									

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SAMPLE TYPE LEGEND

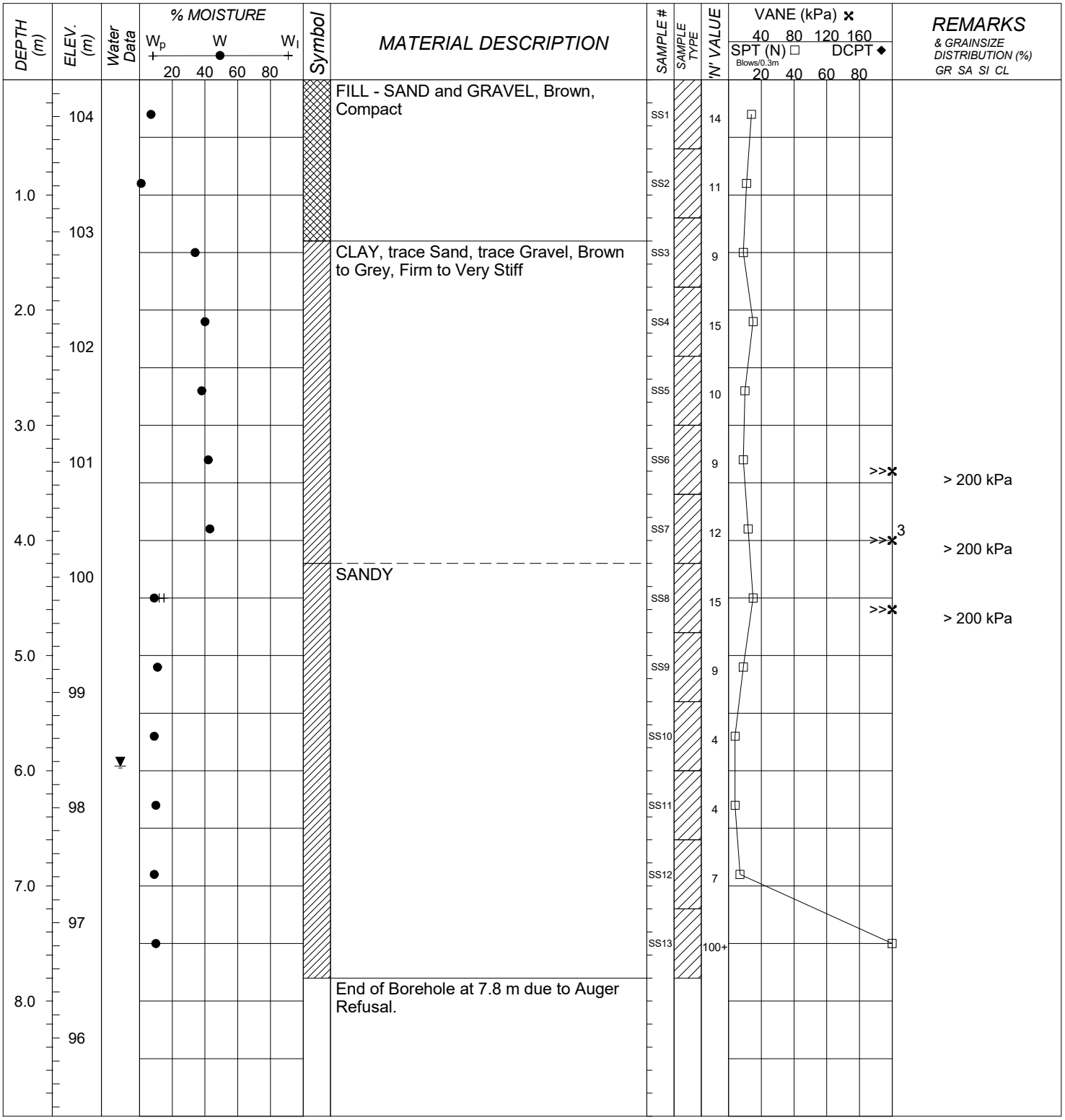
- Auger Sample
- Split Spoon Sample
- Bulk Sample
- Rock Core
- Hiller Peat Sampler
- Shelby Tube
- Bentonite
- Sand
- ×3 Numbers refers to Sensitivity

ENCLOSURE 8

LOG OF BOREHOLE BH2017-06

DST REF. No.: **TS-SO-29563**
CLIENT: **Trinity Development Group Inc.**
PROJECT: **Geotechnical Drilling for the Proposed Development**
LOCATION: **951 Gladstone Avenue, Ottawa, ON**
SURFACE ELEV.: **104.3 metres**

Drilling Data
METHOD: **Hollow Stem Auger**
START DATE: **7/7/2017**
COMPLETION DATE: **7/7/2017**
COORDINATES: **5028066** m N, **443975** m E



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SAMPLE TYPE LEGEND

- Auger Sample
- Split Spoon Sample
- Bulk Sample
- Rock Core
- Hiller Peat Sampler
- Shelby Tube
- Bentonite
- Sand
- ×3 Numbers refers to Sensitivity

ENCLOSURE 9

BOREHOLE (OTTAWA) TS-SO-29563.GPJ DATA TEMPLATE.GDT 28/7/17

LOG OF BOREHOLE BH2017-07

DST REF. No.: **TS-SO-29563**
CLIENT: **Trinity Development Group Inc.**
PROJECT: **Geotechnical Drilling for the Proposed Development**
LOCATION: **951 Gladstone Avenue, Ottawa, ON**
SURFACE ELEV.: **102.4 metres**

Drilling Data
METHOD: **Hollow Stem Auger**
START DATE: **6/27/2017**
COMPLETION DATE: **6/27/2017**
COORDINATES: **5028127** m N, **443952** m E

DEPTH (m)	ELEV. (m)	Water Data	% MOISTURE (W_p W W_l)	Symbol	MATERIAL DESCRIPTION	SAMPLE #	SAMPLE TYPE	'N' VALUE	VANE (kPa) / SPT (N) Blows/0.3m / DCPT	REMARKS & GRAINSIZE DISTRIBUTION (%) GR SA SI CL
0.0	102				ASPHALT (75 mm)					
					FILL - SAND and GRAVEL, trace Silt, Brown, Compact to Very Dense	SS1		11		
1.0	101					SS2		13		
						SS3		35		
2.0	100					SS4		11		
						SS5		53		
3.0	99					SS6		32		
						SS7		13		
4.0	98				SILTY CLAY, Brown to Grey, Soft to Very Stiff	SS8		5		
5.0						SS9		6	×	
	97				SANDY, trace Gravel	SS10		2	×3	
6.0	96					SS11		12		
7.0						SS12		18		
	95	▼			SAND and GRAVEL, Dark Grey, Compact	SS13		24		
8.0						SS14		100+		
	94				End of Borehole at 8.0 m due to Auger Refusal.					

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SAMPLE TYPE LEGEND

- Auger Sample
- Split Spoon Sample
- Bulk Sample
- Rock Core
- Hiller Peat Sampler
- Shelby Tube
- Bentonite
- Sand
- ×3 Numbers refers to Sensitivity

ENCLOSURE 10

BOREHOLE (OTTAWA) TS-SO-29563.GPJ DATA TEMPLATE.GDT 28/7/17

LOG OF BOREHOLE BH2017-08

DST REF. No.: **TS-SO-29563**
CLIENT: **Trinity Development Group Inc.**
PROJECT: **Geotechnical Drilling for the Proposed Development**
LOCATION: **951 Gladstone Avenue, Ottawa, ON**
SURFACE ELEV.: **103.9 metres**

Drilling Data
METHOD: **Hollow Stem Auger**
START DATE: **7/10/2017**
COMPLETION DATE: **7/10/2017**
COORDINATES: **5028091** m N, **443980** m E

DEPTH (m)	ELEV. (m)	Water Data	% MOISTURE (W_p W W_l)	Symbol	MATERIAL DESCRIPTION	SAMPLE #	SAMPLE TYPE	'N' VALUE	VANE (kPa) × / SPT (N) □ Blows/0.3m / DCPT ◆	REMARKS & GRAINSIZE DISTRIBUTION (%) GR SA SI CL
0.0	103.9				ASPHALT (25 mm)					
					FILL - SAND and GRAVEL, Brown, Loose to Compact	SS1		20		
1.0	103					SS2		8		
						SS3		8		
2.0	102					SS4		11		
					CLAY, some Sand, some Gravel, Brown to Grey, Soft to Very Stiff	SS5		8		
3.0	101					SS6		10		
						SS7		9	>>×	> 200 kPa
4.0	100					SS8		6	>>×3	> 200 kPa
						SS9		13	>>×	> 200 kPa
5.0	99				SANDY, trace Rock Fragment					
		▼				SS10		3		
6.0	98					SS11		10		
						SS12		100+		
7.0	97				BEDROCK Limestone, Grey	RC1				TCR = 100% SCR = 96% RQD = 93%
8.0	96					RC2				TCR = 85% SCR = 78% RQD = 75%
	95									

TS-SO-29563.GPJ DATA TEMPLATE.GDT 28/7/17

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SAMPLE TYPE LEGEND

- Auger Sample
- Split Spoon Sample
- Bulk Sample
- Rock Core
- Hiller Peat Sampler
- Shelby Tube
- Bentonite
- Sand
- ×3 Numbers refers to Sensitivity

ENCLOSURE 11

LOG OF BOREHOLE BH2017-08

DST REF. No.: **TS-SO-29563**
CLIENT: **Trinity Development Group Inc.**
PROJECT: **Geotechnical Drilling for the Proposed Development**
LOCATION: **951 Gladstone Avenue, Ottawa, ON**
SURFACE ELEV.: **103.9 metres**

Drilling Data
METHOD: **Hollow Stem Auger**
START DATE: **7/10/2017**
COMPLETION DATE: **7/10/2017**
COORDINATES: **5028091** m N, **443980** m E

DEPTH (m)	ELEV. (m)	Water Data	% MOISTURE W_p W W_l (20 40 60 80)	Symbol	MATERIAL DESCRIPTION	SAMPLE #	SAMPLE TYPE	'N' VALUE	VANE (kPa) × (40 80 120 160) SPT (N) □ Blows/0.3m DCPT ◆ (20 40 60 80)	REMARKS & GRAINSIZE DISTRIBUTION (%) GR SA SI CL
10.0	94					RC3				TCR = 100% SCR = 100% RQD = 98%
11.0	93					RC4				TCR = 98% SCR = 98% RQD = 90%
12.0	92									
13.0	91					RC5				TCR = 100% SCR = 100% RQD = 100%
					End of Borehole at 13.6 m.					
14.0	90									
15.0	89									
16.0	88									
17.0	87									
	86									

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SAMPLE TYPE LEGEND

- Auger Sample
- Split Spoon Sample
- Bulk Sample
- Rock Core
- Hiller Peat Sampler
- Shelby Tube
- Bentonite
- Sand
- ×3 Numbers refers to Sensitivity

ENCLOSURE 12

LOG OF BOREHOLE BH2017-09

DST REF. No.: **TS-SO-29563**
CLIENT: **Trinity Development Group Inc.**
PROJECT: **Geotechnical Drilling for the Proposed Development**
LOCATION: **951 Gladstone Avenue, Ottawa, ON**
SURFACE ELEV.: **99.6 metres**

Drilling Data
METHOD: **Hollow Stem Auger**
START DATE: **7/6/2017**
COMPLETION DATE: **7/6/2017**
COORDINATES: **5028115** m N, **444005** m E

DEPTH (m)	ELEV. (m)	Water Data	% MOISTURE W_p W W_l (20 40 60 80)	Symbol	MATERIAL DESCRIPTION	SAMPLE #	SAMPLE TYPE	'N' VALUE	VANE (kPa) × (40 80 120 160) SPT (N) □ Blows/0.3m DCPT ◆ (20 40 60 80)	REMARKS & GRAINSIZE DISTRIBUTION (%) GR SA SI CL
0.0	99.6				ASPHALT (125 mm)					
					FILL - SAND and GRAVEL, Brown, Compact	SS1		17		
1.0	99				CLAY, trace Sand, trace Gravel, Brown to Grey, Soft to Very Stiff	SS2		11		5 42 (53)
	98					SS3		7		
2.0						SS4		17	>>× 2	> 200 kPa
	97				SANDY, some Gravel	SS5		4	>>×	> 200 kPa
3.0						SS6		26		
	96					SS7		11		
4.0		▼			some Gravel	SS8		100+		
	95				End of Borehole at 4.5 m due to Auger Refusal.					
5.0										
	94									
6.0										
	93									
7.0										
	92									
8.0										
	91									

TS-SO-29563.GPJ DATA TEMPLATE.GDT 28/7/17

BOREHOLE (OTTAWA)

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SAMPLE TYPE LEGEND

- Auger Sample
- Split Spoon Sample
- Bulk Sample
- Rock Core
- Hiller Peat Sampler
- Shelby Tube
- Bentonite
- Sand
- ×3 Numbers refers to Sensitivity

ENCLOSURE 13

LOG OF BOREHOLE BH2017-10

DST REF. No.: **TS-SO-29563**
CLIENT: **Trinity Development Group Inc.**
PROJECT: **Geotechnical Drilling for the Proposed Development**
LOCATION: **951 Gladstone Avenue, Ottawa, ON**
SURFACE ELEV.: **102.3 metres**

Drilling Data
METHOD: **Hollow Stem Auger**
START DATE: **6/27/2017**
COMPLETION DATE: **6/27/2017**
COORDINATES: **5028139** m N, **443966** m E

DEPTH (m)	ELEV. (m)	Water Data	% MOISTURE (W_p W W_l)	Symbol	MATERIAL DESCRIPTION	SAMPLE #	SAMPLE TYPE	'N' VALUE	VANE (kPa) × / SPT (N) □ Blows/0.3m / DCPT ◆	REMARKS & GRAINSIZE DISTRIBUTION (%) GR SA SI CL
0.0	102				ASPHALT (75 mm)					
					FILL - SAND and GRAVEL, Brown, Very Loose to Dense	SS1		36		
1.0	101					SS2		35		
						SS3		17		
2.0	100					SS4		13		32 59 (9)
						SS5		3		
3.0	99				FILL - CLAY	SS6		5		
						SS7		11		
4.0	98	▼				SS8		8		
					CLAY, Brown to Grey, Soft to Stiff	SS9		7	×	
5.0	97					SS10		3	×	
6.0	96				SANDY, trace Gravel	SS11		1	×	
						SS12		9		
7.0	95				Rock Fragment	SS13		8		
8.0	94					SS14		29		
					SAND and GRAVEL, Grey	SS15		100+		

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SAMPLE TYPE LEGEND

- Auger Sample
- Split Spoon Sample
- Bulk Sample
- Rock Core
- Hiller Peat Sampler
- Shelby Tube
- Bentonite
- Sand
- ×3 Numbers refers to Sensitivity

ENCLOSURE 14

BOREHOLE (OTTAWA) TS-SO-29563.GPJ DATA TEMPLATE.GDT 28/7/17

LOG OF BOREHOLE BH2017-10

DST REF. No.: **TS-SO-29563**
CLIENT: **Trinity Development Group Inc.**
PROJECT: **Geotechnical Drilling for the Proposed Development**
LOCATION: **951 Gladstone Avenue, Ottawa, ON**
SURFACE ELEV.: **102.3 metres**

Drilling Data
METHOD: **Hollow Stem Auger**
START DATE: **6/27/2017**
COMPLETION DATE: **6/27/2017**
COORDINATES: **5028139** m N, **443966** m E

DEPTH (m)	ELEV. (m)	Water Data	% MOISTURE (W_p W W_l) 20 40 60 80	Symbol	MATERIAL DESCRIPTION	SAMPLE #	SAMPLE TYPE	'N' VALUE	VANE (kPa) × 40 80 120 160; SPT (N) □ Blows/0.3m; DCPT ◆ 20 40 60 80	REMARKS & GRAINSIZE DISTRIBUTION (%) GR SA SI CL
	93				BEDROCK Limestone, Grey					
10.0	92					RC1				TCR = 98% SCR = 92% RQD = 85%
11.0	91					RC2				TCR = 100% SCR = 100% RQD = 100%
12.0	90									
13.0	89					RC3				TCR = 98% SCR = 98% RQD = 98%
14.0	88					RC4				TCR = 100% SCR = 100% RQD = 100%
15.0	87									
16.0	86					RC5				TCR = 100% SCR = 100% RQD = 100%
					End of Borehole at 16.6 m.					
17.0	85									

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SAMPLE TYPE LEGEND

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- Split Spoon Sample
- Bulk Sample
- Rock Core
- Hiller Peat Sampler
- Shelby Tube
- Bentonite
- Sand
- ×3 Numbers refers to Sensitivity

ENCLOSURE 15

LOG OF BOREHOLE BH2017-11

DST REF. No.: **TS-SO-29563**
CLIENT: **Trinity Development Group Inc.**
PROJECT: **Geotechnical Drilling for the Proposed Development**
LOCATION: **951 Gladstone Avenue, Ottawa, ON**
SURFACE ELEV.: **102.1 metres**

Drilling Data
METHOD: **Hollow Stem Auger**
START DATE: **7/4/2017**
COMPLETION DATE: **7/4/2017**
COORDINATES: **5028155** m N, **443948** m E

DEPTH (m)	ELEV. (m)	Water Data	% MOISTURE W_p W W_l (20 40 60 80)	Symbol	MATERIAL DESCRIPTION	SAMPLE #	SAMPLE TYPE	'N' VALUE	VANE (kPa) × 40 80 120 160; SPT (N) □ Blows/0.3m; DCPT ◆ 20 40 60 80	REMARKS & GRAINSIZE DISTRIBUTION (%) GR SA SI CL
0.0	102				ASPHALT					
					FILL - SAND and GRAVEL, Brown, Loose to Compact	SS1		10		
1.0	101					SS2		8		
						SS3		11		
2.0	100					SS4		16		
						SS5		14		
3.0	99				CLAYEY	SS6		9		7 50 (43)
		▼			CLAY, Brown to Grey, Soft to Very Stiff	SS7		19		
4.0	98					SS8		8		
						SS9		9		
5.0	97					SS10		3	×3	
6.0	96					SS11		2		
						SS12		13		
7.0	95				SAND and GRAVEL, Grey, Compact to Very Dense	SS13		17		
8.0	94					SS14		100+		
					End of Borehole at 8.4 m due to Auger Refusal.					

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SAMPLE TYPE LEGEND

- Auger Sample
- Split Spoon Sample
- Bulk Sample
- Rock Core
- Hiller Peat Sampler
- Shelby Tube
- Bentonite
- Sand
- ×3 Numbers refers to Sensitivity

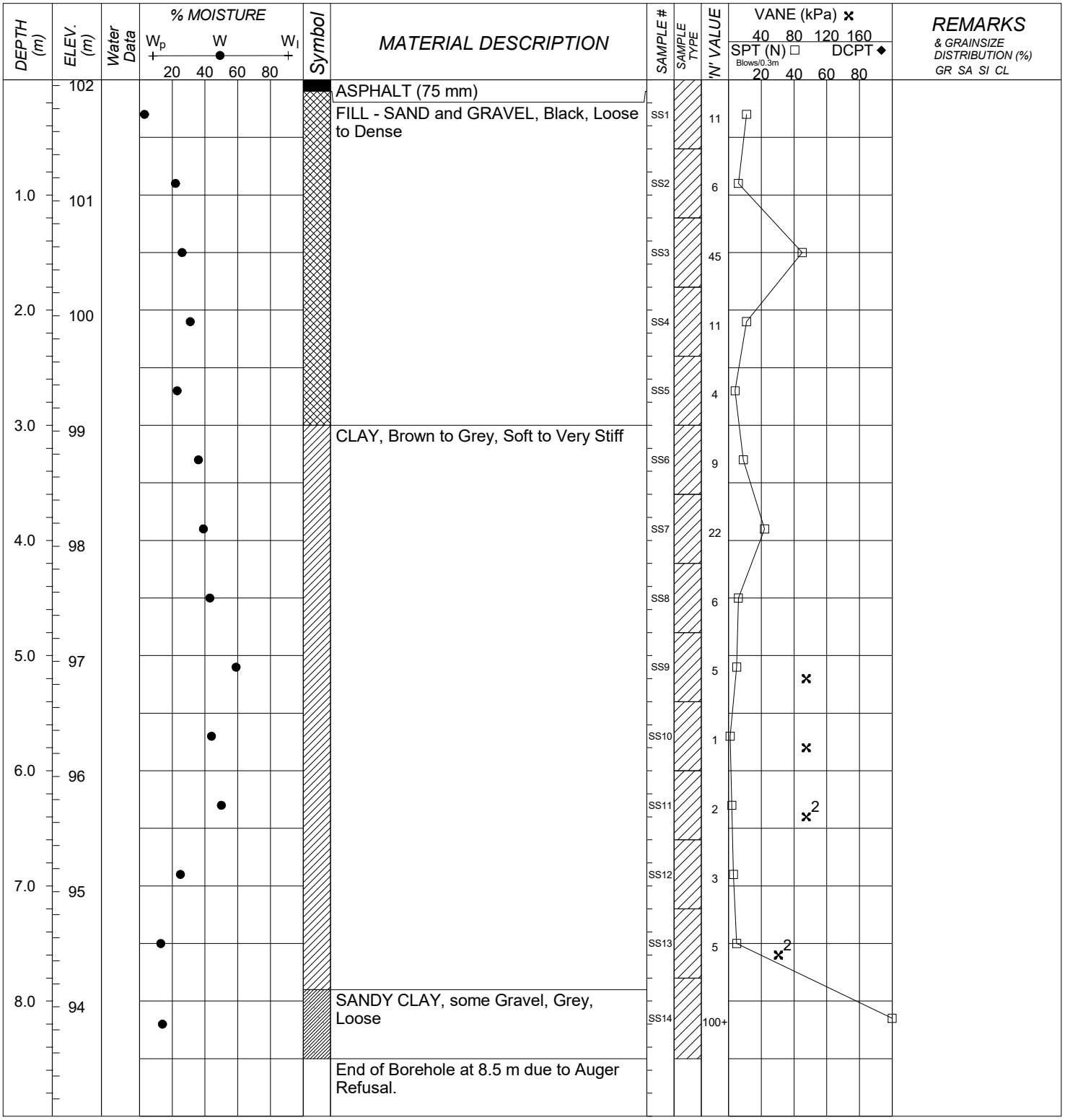
ENCLOSURE 16

BOREHOLE (OTTAWA) TS-SO-29563.GPJ DATA TEMPLATE.GDT 28/7/17

LOG OF BOREHOLE BH2017-12

DST REF. No.: **TS-SO-29563**
CLIENT: **Trinity Development Group Inc.**
PROJECT: **Geotechnical Drilling for the Proposed Development**
LOCATION: **951 Gladstone Avenue, Ottawa, ON**
SURFACE ELEV.: **102.1 metres**

Drilling Data
METHOD: **Hollow Stem Auger**
START DATE: **7/4/2017**
COMPLETION DATE: **7/4/2017**
COORDINATES: **5028159** m N, **443963** m E



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Web: www.dstgroup.com

SAMPLE TYPE LEGEND

- Auger Sample
- Split Spoon Sample
- Bulk Sample
- Rock Core
- Hiller Peat Sampler
- Shelby Tube
- Bentonite
- Sand
- ×3 Numbers refers to Sensitivity

ENCLOSURE 17

LOG OF BOREHOLE BH2017-13

DST REF. No.: **TS-SO-29563**
CLIENT: **Trinity Development Group Inc.**
PROJECT: **Geotechnical Drilling for the Proposed Development**
LOCATION: **951 Gladstone Avenue, Ottawa, ON**
SURFACE ELEV.: **102.2 metres**

Drilling Data
METHOD: **Hollow Stem Auger**
START DATE: **6/28/2017**
COMPLETION DATE: **6/28/2017**
COORDINATES: **5028143** m N, **443978** m E

DEPTH (m)	ELEV. (m)	Water Data	% MOISTURE W_p W W_l (20 40 60 80)	Symbol	MATERIAL DESCRIPTION	SAMPLE #	SAMPLE TYPE	'N' VALUE	VANE (kPa) × (40 80 120 160) SPT (N) □ Blows/0.3m DCPT ◆ (20 40 60 80)	REMARKS & GRAINSIZE DISTRIBUTION (%) GR SA SI CL
0.0	102				ASPHALT (75 mm)					
					FILL - SAND and GRAVEL, Brown	SS1		15		
1.0	101					SS2		14		
					CLAY, trace Gravel, Brown, Stiff	SS3		9		
2.0	100				End of Borehole at 1.8 m due to Auger Refusal.					
3.0	99									
4.0	98									
5.0	97									
6.0	96									
7.0	95									
8.0	94									

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SAMPLE TYPE LEGEND

- Auger Sample
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- Bulk Sample
- Rock Core
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- Shelby Tube
- Bentonite
- Sand
- ×3 Numbers refers to Sensitivity

ENCLOSURE 18

APPENDIX D

GEOTECHNICAL LABORATORY TEST RESULTS

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MOISTURE CONTENT DATA SHEET

PROJECT NO.: TS-SO-29563 **PROJECT:** Trinity Development Group Geotech Investigation

TEST DATE: 2017-07-18 **TECH :** E.RP.

SAMPLE #	DEPTH (m)	DATE SAMPLED (mm/dd/yy)	WET WT. + TARE	DRY WT. + TARE	TARE	PAN #	% MOISTURE	DESCRIPTION
BH2017-1 SS-1	Refer to borehole logs	2017-07-05	282.7	273.2	70		4.7	Refer to borehole logs
BH2017-1 SS-2	Refer to borehole logs	2017-07-05	262.8	252.8	109.8		7.0	Refer to borehole logs
BH2017-1 SS-3	Refer to borehole logs	2017-07-05	298.6	289.9	109.1		4.8	Refer to borehole logs
BH2017-1 SS-4	Refer to borehole logs	2017-07-05	262.8	230.3	110.4		27.1	Refer to borehole logs
BH2017-1 SS-5	Refer to borehole logs	2017-07-05	257.2	218	110.3		36.4	Refer to borehole logs
BH2017-1 SS-6	Refer to borehole logs	2017-07-05	277.6	239.9	123.5		32.4	Refer to borehole logs
BH2017-1 SS-7	Refer to borehole logs	2017-07-05	308.7	288.7	98.6		10.5	Refer to borehole logs
BH2017-1 SS-8	Refer to borehole logs	2017-07-05	323	306.6	115.6		8.6	Refer to borehole logs
BH2017-1 SS-9	Refer to borehole logs	2017-07-05	353	331.8	93.3		8.9	Refer to borehole logs
BH2017-1 SS-10	Refer to borehole logs	2017-07-05	288.7	273.3	120.9		10.1	Refer to borehole logs
BH2017-1 SS-11	Refer to borehole logs	2017-07-05	283.5	276.8	126.7		4.5	Refer to borehole logs
BH2017-1 SS-12	Refer to borehole logs	2017-07-05	628.5	609.8	403.5		9.1	Refer to borehole logs
BH2017-1 SS-13	Refer to borehole logs	2017-07-05	511.3	505.2	402.2		5.9	Refer to borehole logs

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MOISTURE CONTENT DATA SHEET

PROJECT NO.: TS-SO-29563 **PROJECT:** Trinity Development Group Geotech Investigation

TEST DATE: 2017-07-18 **TECH :** E.RP.

SAMPLE #	DEPTH (m)	DATE SAMPLED (mm/dd/yy)	WET WT. + TARE	DRY WT. + TARE	TARE	PAN #	% MOISTURE	DESCRIPTION
BH2017-2 SS-1	Refer to borehole logs	2017-07-06	140.71	136.56	4.25	M36	3.1	Refer to borehole logs
BH2017-2 SS-2	Refer to borehole logs	2017-07-06	148.14	141.84	4.28	M33	4.6	Refer to borehole logs
BH2017-2 SS-3	Refer to borehole logs	2017-07-06	108.73	105.31	4.24	M6	3.4	Refer to borehole logs
BH2017-2 SS-4	Refer to borehole logs	2017-07-06	137.25	128.28	4.25	M21	7.2	Refer to borehole logs
BH2017-2 SS-5	Refer to borehole logs	2017-07-06	31.53	24.01	4.39	M29	38.3	Refer to borehole logs
BH2017-2 SS-6	Refer to borehole logs	2017-07-06	1046.67	761.27	85.33	A4	42.2	Refer to borehole logs
BH2017-2 SS-7	Refer to borehole logs	2017-07-06	110.82	81.77	4.24	M4	37.5	Refer to borehole logs
BH2017-2 SS-8	Refer to borehole logs	2017-07-06	200.08	174.2	4.3	M3	15.2	Refer to borehole logs
BH2017-2 SS-9	Refer to borehole logs	2017-07-06	145.22	127.76	4.28	M7	14.1	Refer to borehole logs
BH2017-2 SS-10	Refer to borehole logs	2017-07-06	124.22	111.48	4.28	M38	11.9	Refer to borehole logs
BH2017-2 SS-11	Refer to borehole logs	2017-07-06	131.44	124.52	4.32	M15	5.8	Refer to borehole logs
BH2017-3 SS-1	Refer to borehole logs	2017-07-05	93.06	90.89	4.33	M5	2.5	Refer to borehole logs
BH2017-3 SS-2	Refer to borehole logs	2017-07-05	108.97	101.84	4.56	M11	7.3	Refer to borehole logs
BH2017-3 SS-3	Refer to borehole logs	2017-07-05	86.48	78.79	4.18	M23	10.3	Refer to borehole logs
BH2017-3 SS-4	Refer to borehole logs	2017-07-05	177.3	169.06	4.86	M2	5.0	Refer to borehole logs
BH2017-3 SS-5	Refer to borehole logs	2017-07-05	149	110.31	4.49	M35	36.6	Refer to borehole logs
BH2017-3 SS-6	Refer to borehole logs	2017-07-05	176.7	133.26	4.37	M32	33.7	Refer to borehole logs
BH2017-3 SS-7	Refer to borehole logs	2017-07-05	862.93	686.16	167.33	B16	34.1	Refer to borehole logs
BH2017-3 SS-8	Refer to borehole logs	2017-07-05	184.43	161.38	4.18	M18	14.7	Refer to borehole logs
BH2017-3 SS-9	Refer to borehole logs	2017-07-05	210.03	178.23	4.2	M22	18.3	Refer to borehole logs
BH2017-3 SS-10	Refer to borehole logs	2017-07-05	228.03	209.48	4.25	M25	9.0	Refer to borehole logs
BH2017-3 SS-11	Refer to borehole logs	2017-07-05	113.53	104.98	4.39	M12	8.5	Refer to borehole logs
BH2017-4 SS-1	Refer to borehole logs	2017-07-06	89.35	86.89	4.38	M31	3.0	Refer to borehole logs
BH2017-4 SS-2	Refer to borehole logs	2017-07-06	107.97	103.06	4.67	M39	5.0	Refer to borehole logs
BH2017-4 SS-3	Refer to borehole logs	2017-07-06	107.66	103.38	4.46	M40	4.3	Refer to borehole logs
BH2017-4 SS-4	Refer to borehole logs	2017-07-06	146.85	113.02	4.56	M26	31.2	Refer to borehole logs
BH2017-4 SS-5	Refer to borehole logs	2017-07-06	92.78	82.83	4.29	M17	12.7	Refer to borehole logs

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MOISTURE CONTENT DATA SHEET

PROJECT NO.: TS-SO-29563 **PROJECT:** Trinity Development Group Geotech Investigation

TEST DATE: 7/18/2017 & 7/24/17 **TECH :** E.RP. / M.C.

SAMPLE #	DEPTH (m)	DATE SAMPLED (mm/dd/yy)	WET WT. + TARE	DRY WT. + TARE	TARE	PAN #	% MOISTURE	DESCRIPTION
BH2017-4 SS-6	Refer to borehole logs	2017-07-06	167.91	143.81	4.33	M37	17.3	Refer to borehole logs
BH2017-4 SS-7	Refer to borehole logs	2017-07-06	173.17	153.86	4.37	M14	12.9	Refer to borehole logs
BH2017-4 SS-8	Refer to borehole logs	2017-07-06	92.91	84.41	4.32	M27	10.6	Refer to borehole logs
BH2017-5 SS-1	Refer to borehole logs	2017-07-07	139.51	136.67	4.34	M30	2.1	Refer to borehole logs
BH2017-5 SS-2	Refer to borehole logs	2017-07-07	144.94	138.12	4.29	M9	5.1	Refer to borehole logs
BH2017-5 SS-3	Refer to borehole logs	2017-07-07	120.79	112.97	4.3	M10	7.2	Refer to borehole logs
BH2017-5 SS-4	Refer to borehole logs	2017-07-07	546.28	517.73	179.86	B11	8.4	Refer to borehole logs
BH2017-5 SS-5	Refer to borehole logs	2017-07-07	109.67	107.51	4.27	M8	2.1	Refer to borehole logs
BH2017-5 SS-6	Refer to borehole logs	2017-07-07	95.07	72.85	4.38	M16	32.5	Refer to borehole logs
BH2017-5 SS-7	Refer to borehole logs	2017-07-07	103.67	78.08	4.24	M34	34.7	Refer to borehole logs
BH2017-5 SS-8	Refer to borehole logs	2017-07-07	83.21	63.42	4.28	M24	33.5	Refer to borehole logs
BH2017-5 SS-9	Refer to borehole logs	2017-07-07	201.28	164.95	4.37	M41	22.6	Refer to borehole logs
BH2017-5 SS-10	Refer to borehole logs	2017-07-07	206.99	184.28	4.36	M13	12.6	Refer to borehole logs
BH2017-5 SS-11	Refer to borehole logs	2017-07-07	172.3	150.2	4.4	M11	15.2	Refer to borehole logs
BH2017-5 SS-12	Refer to borehole logs	2017-07-07	159.5	141.6	4.1	M23	13.0	Refer to borehole logs
BH2017-6 SS-1	Refer to borehole logs	2017-07-07	124.4	117	4.2	M36	6.6	Refer to borehole logs
BH2017-6 SS-2	Refer to borehole logs	2017-07-07	111.5	110.2	4.1	M33	1.2	Refer to borehole logs
BH2017-6 SS-3	Refer to borehole logs	2017-07-07	155.7	117	4	M6	34.2	Refer to borehole logs
BH2017-6 SS-4	Refer to borehole logs	2017-07-07	158.7	114.3	4.2	M21	40.3	Refer to borehole logs
BH2017-6 SS-5	Refer to borehole logs	2017-07-07	159.9	117.3	4.3	M29	37.7	Refer to borehole logs
BH2017-6 SS-6	Refer to borehole logs	2017-07-07	157.8	112.4	4.3	M41	42.0	Refer to borehole logs
BH2017-6 SS-7	Refer to borehole logs	2017-07-07	161.9	114.5	4.2	M3	43.0	Refer to borehole logs
BH2017-6 SS-8	Refer to borehole logs	2017-07-07	801.1	747.48	177.02	B7	9.4	Refer to borehole logs
BH2017-6 SS-9	Refer to borehole logs	2017-07-07	160	145	4.3	M15	10.7	Refer to borehole logs
BH2017-6 SS-10	Refer to borehole logs	2017-07-07	159.6	146.4	4.3	M5	9.3	Refer to borehole logs
BH2017-6 SS-11	Refer to borehole logs	2017-07-07	161.8	148	4.1	M38	9.6	Refer to borehole logs
BH2017-6 SS-12	Refer to borehole logs	2017-07-07	158.9	146.6	4.4	M35	8.6	Refer to borehole logs

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MOISTURE CONTENT DATA SHEET

PROJECT NO.: TS-SO-29563 **PROJECT:** Trinity Development Group Geotech Investigation

TEST DATE: 2017-07-24 **TECH :** M.C.

SAMPLE #	DEPTH (m)	DATE SAMPLED (mm/dd/yy)	WET WT. + TARE	DRY WT. + TARE	TARE	PAN #	% MOISTURE	DESCRIPTION
BH2017-6 SS-13	Refer to borehole logs	2017-07-07	158.1	144.7	4.1	M32	9.5	Refer to borehole logs
BH2017-7 SS-1	Refer to borehole logs	2017-06-27	99.1	96.3	4.1	M11	3.0	Refer to borehole logs
BH2017-7 SS-2	Refer to borehole logs	2017-06-27	154	136.5	4.4	M23	13.2	Refer to borehole logs
BH2017-7 SS-3	Refer to borehole logs	2017-06-27	107.1	101.4	4.1	M18	5.9	Refer to borehole logs
BH2017-7 SS-4	Refer to borehole logs	2017-06-27	107.8	105.6	4.3	M23	2.2	Refer to borehole logs
BH2017-7 SS-5	Refer to borehole logs	2017-06-27	156.8	145.3	4.3	M22	8.2	Refer to borehole logs
BH2017-7 SS-6	Refer to borehole logs	2017-06-27	161.9	153.8	4.2	M25	5.4	Refer to borehole logs
BH2017-7 SS-7	Refer to borehole logs	2017-06-27	158	140.5	4.3	M12	12.8	Refer to borehole logs
BH2017-7 SS-8	Refer to borehole logs	2017-06-27	158	114.7	4.3	M31	39.2	Refer to borehole logs
BH2017-7 SS-9	Refer to borehole logs	2017-06-27	159.3	115.5	4.4	M39	39.4	Refer to borehole logs
BH2017-7 SS-10	Refer to borehole logs	2017-06-27	128.8	114.3	4.2	M40	13.2	Refer to borehole logs
BH2017-7 SS-11	Refer to borehole logs	2017-06-27	159.4	144.2	4.4	M26	10.9	Refer to borehole logs
BH2017-7 SS-12	Refer to borehole logs	2017-06-27	164	148.3	4.5	M17	10.9	Refer to borehole logs
BH2017-7 SS-13	Refer to borehole logs	2017-06-27	158	145.8	4.2	M37	8.6	Refer to borehole logs
BH2017-7 SS-14	Refer to borehole logs	2017-06-27	162.8	150.7	4.2	M14	8.3	Refer to borehole logs
BH2017-8 SS-1	Refer to borehole logs	2017-07-10	154.9	150.8	4.2	M10	2.8	Refer to borehole logs
BH2017-8 SS-2	Refer to borehole logs	2017-07-10	160.7	151.4	4.2	M9	6.3	Refer to borehole logs
BH2017-8 SS-3	Refer to borehole logs	2017-07-10	151.6	143.3	4.1	M8	6.0	Refer to borehole logs
BH2017-8 SS-4	Refer to borehole logs	2017-07-10	170	161.7	4.2	M34	5.3	Refer to borehole logs
BH2017-8 SS-5	Refer to borehole logs	2017-07-10	154.1	113.2	4.1	M24	37.5	Refer to borehole logs
BH2017-8 SS-6	Refer to borehole logs	2017-07-10	157	109.9	4.2	M41	44.6	Refer to borehole logs
BH2017-8 SS-7	Refer to borehole logs	2017-07-10	1323.85	973.91	169.39	B5	43.5	Refer to borehole logs
BH2017-8 SS-8	Refer to borehole logs	2017-07-10	157.2	115.8	4.2	M16	37.1	Refer to borehole logs
BH2017-8 SS-9	Refer to borehole logs	2017-07-10	160.8	121.4	4.3	M13	33.6	Refer to borehole logs
BH2017-8 SS-10	Refer to borehole logs	2017-07-10	168.1	144.3	4.2	M28	17.0	Refer to borehole logs
BH2017-8 SS-11	Refer to borehole logs	2017-07-10	158	141.3	4.3	M1	12.2	Refer to borehole logs
BH2017-8 SS-12	Refer to borehole logs	2017-07-10	253.8	235.7	89.6	A3	12.4	Refer to borehole logs

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MOISTURE CONTENT DATA SHEET

PROJECT NO.: TS-SO-29563 **PROJECT:** Trinity Development Group Geotech Investigation

TEST DATE: 7/24/2017 & 7/25/17 **TECH :** M.C.

SAMPLE #	DEPTH (m)	DATE SAMPLED (mm/dd/yy)	WET WT. + TARE	DRY WT. + TARE	TARE	PAN #	% MOISTURE	DESCRIPTION
BH2017-9 SS-1	Refer to borehole logs	2017-07-10	253.5	251.1	94.8	A8	1.5	Refer to borehole logs
BH2017-9 SS-2	Refer to borehole logs	2017-07-10	394.4	347.53	168.98	B2	26.3	Refer to borehole logs
BH2017-9 SS-3	Refer to borehole logs	2017-07-10	257.7	213.8	94	A1	36.6	Refer to borehole logs
BH2017-9 SS-4	Refer to borehole logs	2017-07-10	240.6	208.6	84.5	A6	25.8	Refer to borehole logs
BH2017-9 SS-5	Refer to borehole logs	2017-07-10	53	49.1	14.2	A6	11.2	Refer to borehole logs
BH2017-9 SS-6	Refer to borehole logs	2017-07-10	320.4	306.5	169.5	B5	10.1	Refer to borehole logs
BH2017-9 SS-7	Refer to borehole logs	2017-07-10	321.1	306.2	164	B17	10.5	Refer to borehole logs
BH2017-9 SS-8	Refer to borehole logs	2017-07-10	No Recovery					Refer to borehole logs
BH2017-10 SS-1	Refer to borehole logs	2017-06-27	324.9	319.9	164.6	B8	3.2	Refer to borehole logs
BH2017-10 SS-2	Refer to borehole logs	2017-06-27	253.1	247	166.6	B10	7.6	Refer to borehole logs
BH2017-10 SS-3	Refer to borehole logs	2017-06-27	320.4	303.9	173.5	B6	12.7	Refer to borehole logs
BH2017-10 SS-4	Refer to borehole logs	2017-06-27	586.57	518.01	171.22	B3	19.8	Refer to borehole logs
BH2017-10 SS-5	Refer to borehole logs	2017-06-27	88.1	80.05	4.2	M15	10.6	Refer to borehole logs
BH2017-10 SS-6	Refer to borehole logs	2017-06-27	155.6	124.88	4.2	M3	25.5	Refer to borehole logs
BH2017-10 SS-7	Refer to borehole logs	2017-06-27	111	98.62	4.2	M32	13.1	Refer to borehole logs
BH2017-10 SS-8	Refer to borehole logs	2017-06-27	163	124.71	4.2	M6	31.8	Refer to borehole logs
BH2017-10 SS-9	Refer to borehole logs	2017-06-27	166.8	114.07	4.3	M35	48.0	Refer to borehole logs
BH2017-10 SS-10	Refer to borehole logs	2017-06-27	158.6	119.58	4.2	M38	33.8	Refer to borehole logs
BH2017-10 SS-11	Refer to borehole logs	2017-06-27	160	137.92	4	M18	16.5	Refer to borehole logs
BH2017-10 SS-12	Refer to borehole logs	2017-06-27	168.6	153.26	4.1	M23	10.3	Refer to borehole logs
BH2017-10 SS-13	Refer to borehole logs	2017-06-27	163	151.16	4.3	M11	8.1	Refer to borehole logs
BH2017-10 SS-14	Refer to borehole logs	2017-06-27	165.4	152.01	4.2	M22	9.1	Refer to borehole logs
BH2017-10 SS-15	Refer to borehole logs	2017-06-27	380.66	367.03	164.82	B8	6.7	Refer to borehole logs
BH2017-11 SS-1	Refer to borehole logs	2017-07-04	166.5	149.23	4.3	M25	11.9	Refer to borehole logs
BH2017-11 SS-2	Refer to borehole logs	2017-07-04	70.1	64.64	4.4	M2	9.1	Refer to borehole logs
BH2017-11 SS-3	Refer to borehole logs	2017-07-04	114.1	98.12	4.2	M39	17.0	Refer to borehole logs
BH2017-11 SS-4	Refer to borehole logs	2017-07-04	146	142.18	4.2	M31	2.8	Refer to borehole logs

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MOISTURE CONTENT DATA SHEET

PROJECT NO.: TS-SO-29563 **PROJECT:** Trinity Development Group Geotech Investigation

TEST DATE: 2017-07-25 **TECH :** M.C.

SAMPLE #	DEPTH (m)	DATE SAMPLED (mm/dd/yy)	WET WT. + TARE	DRY WT. + TARE	TARE	PAN #	% MOISTURE	DESCRIPTION
BH2017-11 SS-5	Refer to borehole logs	2017-07-04	169.5	136.17	4.3	M12	25.3	Refer to borehole logs
BH2017-11 SS-6	Refer to borehole logs	2017-07-04	914.4	726.02	173.88	B20	34.1	Refer to borehole logs
BH2017-11 SS-7	Refer to borehole logs	2017-07-04	157.4	113.4	4.2	M33	40.3	Refer to borehole logs
BH2017-11 SS-8	Refer to borehole logs	2017-07-04	161.8	118.26	4.3	M36	38.2	Refer to borehole logs
BH2017-11 SS-9	Refer to borehole logs	2017-07-04	161.8	101.76	4.1	M4	61.5	Refer to borehole logs
BH2017-11 SS-10	Refer to borehole logs	2017-07-04	166.3	121.91	4.4	M29	37.8	Refer to borehole logs
BH2017-11 SS-11	Refer to borehole logs	2017-07-04	165.2	139.5	4.3	M21	19.0	Refer to borehole logs
BH2017-11 SS-12	Refer to borehole logs	2017-07-04	186.2	159.56	4.2	M5	17.1	Refer to borehole logs
BH2017-11 SS-13	Refer to borehole logs	2017-07-04	200.5	180.66	4.3	M14	11.2	Refer to borehole logs
BH2017-11 SS-14	Refer to borehole logs	2017-07-04	172.4	163.2	4.2	M17	5.8	Refer to borehole logs
BH2017-12 SS-1	Refer to borehole logs	2017-07-04	156.4	152.52	4.3	M37	2.6	Refer to borehole logs
BH2017-12 SS-2	Refer to borehole logs	2017-07-04	178.1	146.42	4.5	M40	22.3	Refer to borehole logs
BH2017-12 SS-3	Refer to borehole logs	2017-07-04	156.7	125.59	4.3	M26	25.6	Refer to borehole logs
BH2017-12 SS-4	Refer to borehole logs	2017-07-04	161.8	124.92	4.3	M30	30.6	Refer to borehole logs
BH2017-12 SS-5	Refer to borehole logs	2017-07-04	167.3	136.59	4.3	M27	23.2	Refer to borehole logs
BH2017-12 SS-6	Refer to borehole logs	2017-07-04	165.3	122.82	4.2	M10	35.8	Refer to borehole logs
BH2017-12 SS-7	Refer to borehole logs	2017-07-04	161.9	117.66	4.1	M9	39.0	Refer to borehole logs
BH2017-12 SS-8	Refer to borehole logs	2017-07-04	163.3	115.72	4	M8	42.6	Refer to borehole logs
BH2017-12 SS-9	Refer to borehole logs	2017-07-04	160.6	102.62	4.2	M34	58.9	Refer to borehole logs
BH2017-12 SS-10	Refer to borehole logs	2017-07-04	1523.12	1105.73	163.96	B17	44.3	Refer to borehole logs
BH2017-12 SS-11	Refer to borehole logs	2017-07-04	168.4	113.66	4.2	M24	50.0	Refer to borehole logs
BH2017-12 SS-12	Refer to borehole logs	2017-07-04	155	125.1	4.1	M41	24.7	Refer to borehole logs
BH2017-12 SS-13	Refer to borehole logs	2017-07-04	164.1	145.58	4.4	M16	13.1	Refer to borehole logs
BH2017-12 SS-14	Refer to borehole logs	2017-07-04	164.2	144.01	4.3	M13	14.5	Refer to borehole logs

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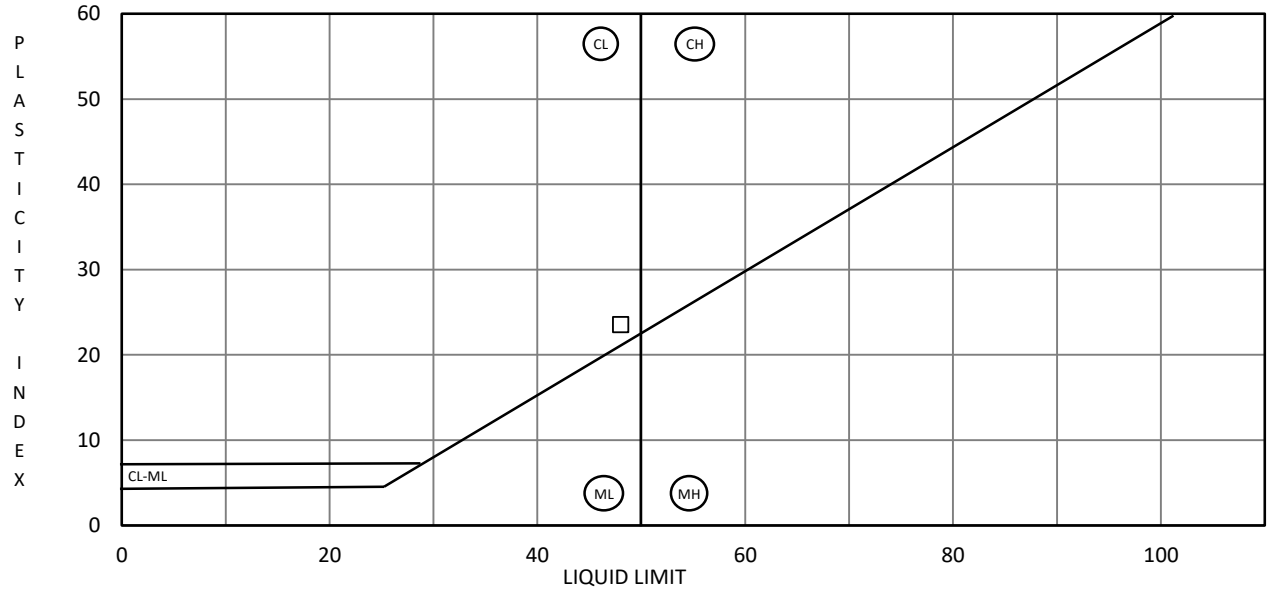
www.dstgroup.com

DST Ref. No.:	TS-SO-29563	**Date Sampled:**	
Project:	Trinity Development Group Geotech Investiga	**Sampled By:**	
Client:	Trinity Development Group	**Source:**	BH2017-2, SS-4
Project Location:		**Location:**	
Sample #:	**KWG-016-4**		
Description:			



ATTERBERG LIMIT AND MOISTURE RESULTS:

SUMMARY OF ATTERBERG AND MOISTURE CONTENT:	
Liquid Limit, LL	48
Plastic Limit, PL	24
Plasticity Index, PI	24
In Place Moisture Content (ASTM D2216) %	0.0

TESTING EQUIPMENT USED		
Plastic Limit	Hand Rolled	X
	Mechanical Rolling Device	
Liquid Limit Apparatus	Manual	X
	Mechanical	
Casagrande ASTM Tool	Metal	X
	Plastic	

SPECIMEN PREPARATION			
Wet		Washed on #40 Sieve	
Dry (Air)		Dry Sieved on #40 Sieve	X
Dry (Oven)	X		

25-Jul-17

Hugh Arthur - Laboratory Supervisor

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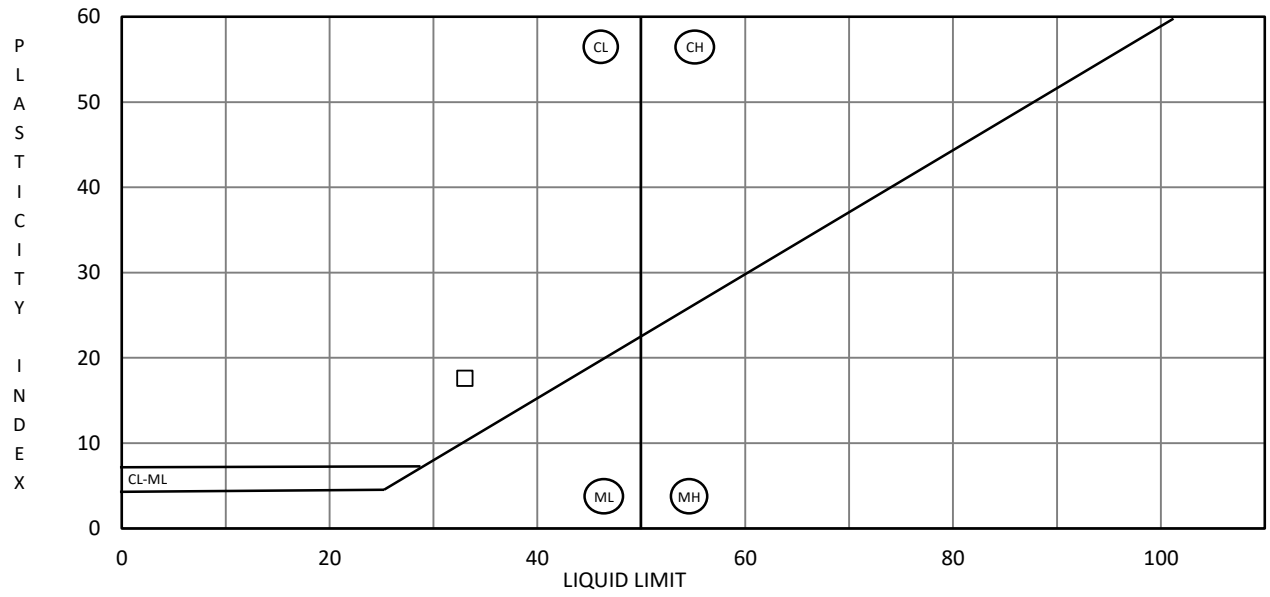
DST Ref. No.:	TS-SO-29563	**Date Sampled:**	
Project:	Trinity Development Group Geotech Investiga	**Sampled By:**	
Client:	Trinity Development Group	**Source:**	BH2017-3, SS-10
Project Location:		**Location:**	
Sample #:	**KWG-016-13**		
Description:			



ATTERBERG LIMIT AND MOISTURE RESULTS:

SUMMARY OF ATTERBERG AND MOISTURE CONTENT:	
Liquid Limit, LL	33
Plastic Limit, PL	15
Plasticity Index, PI	18
In Place Moisture Content (ASTM D2216) %	0.0

TESTING EQUIPMENT USED		
Plastic Limit	Hand Rolled	X
	Mechanical Rolling Device	
Liquid Limit Apparatus	Manual	X
	Mechanical	
Casagrande ASTM Tool	Metal	X
	Plastic	

SPECIMEN PREPARATION			
Wet		Washed on #40 Sieve	
Dry (Air)		Dry Sieved on #40 Sieve	X
Dry (Oven)	X		

25-Jul-17

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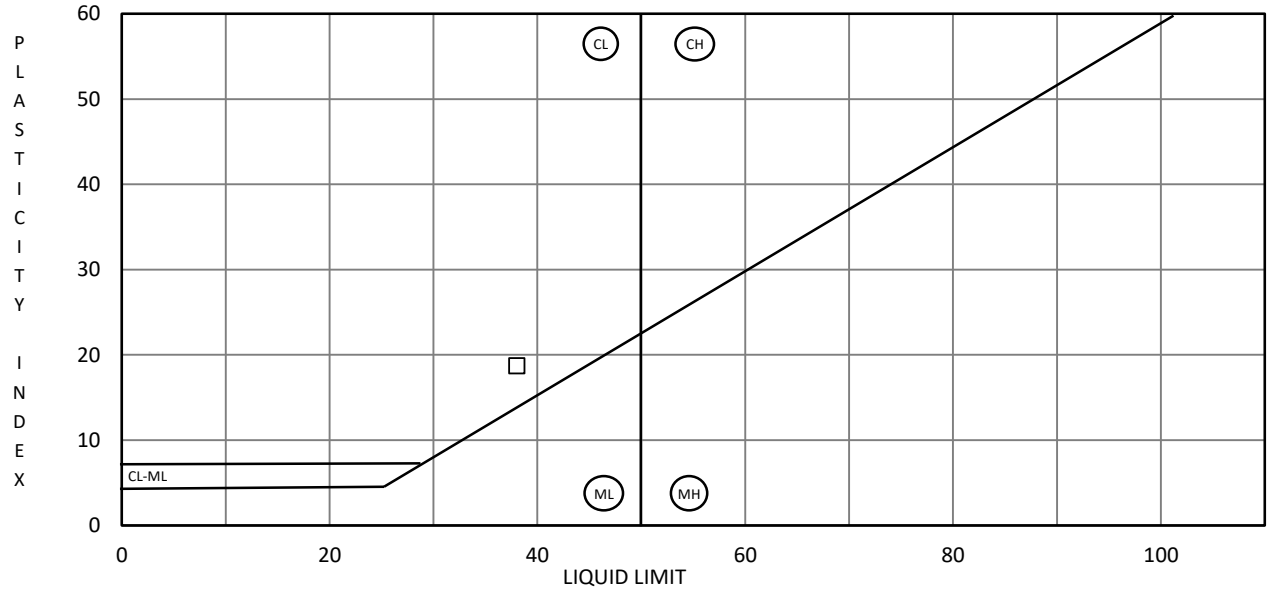
www.dstgroup.com

DST Ref. No.:	TS-SO-29563	**Date Sampled:**	
Project:	Trinity Development Group Geotech Investiga	**Sampled By:**	
Client:	Trinity Development Group	**Source:**	BH2017-3, SS-7
Project Location:		**Location:**	
Sample #:	**KWG-016-5**		
Description:			



ATTERBERG LIMIT AND MOISTURE RESULTS:

SUMMARY OF ATTERBERG AND MOISTURE CONTENT:	
Liquid Limit, LL	38
Plastic Limit, PL	19
Plasticity Index, PI	19
In Place Moisture Content (ASTM D2216) %	0.0

TESTING EQUIPMENT USED		
Plastic Limit	Hand Rolled	X
	Mechanical Rolling Device	
Liquid Limit Apparatus	Manual	X
	Mechanical	
Casagrande ASTM Tool	Metal	X
	Plastic	

SPECIMEN PREPARATION			
Wet		Washed on #40 Sieve	
Dry (Air)		Dry Sieved on #40 Sieve	X
Dry (Oven)	X		

25-Jul-17

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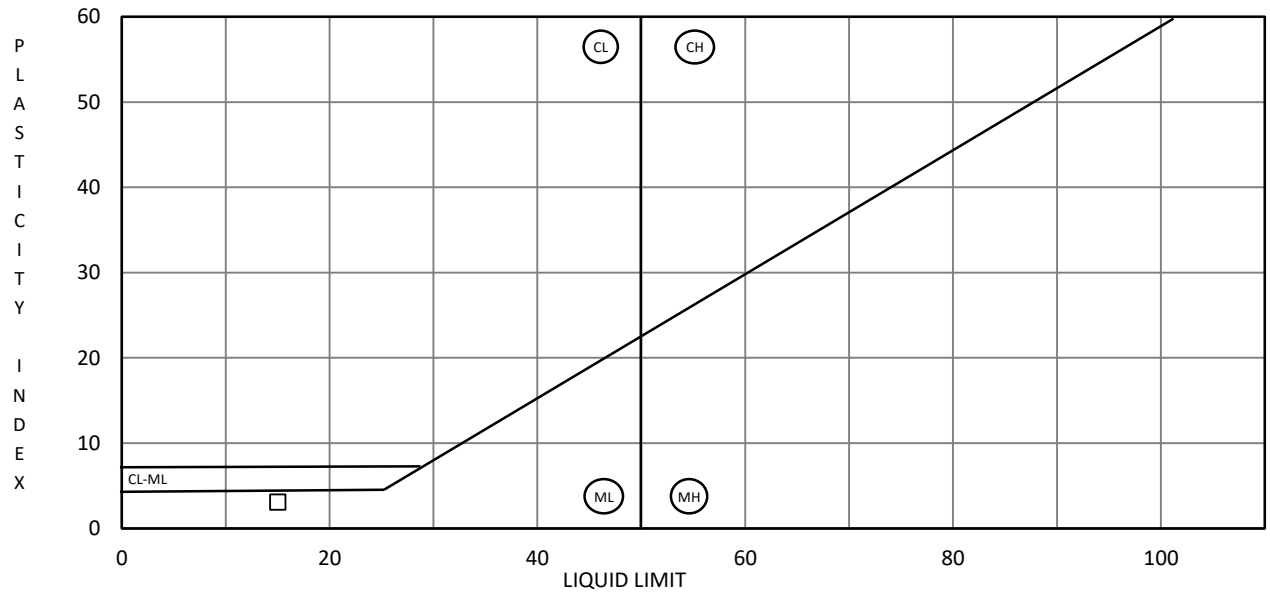
DST Ref. No.:	TS-SO-29563	**Date Sampled:**	
Project:	Trinity Development Group Geotech Investiga	**Sampled By:**	
Client:	Trinity Development Group	**Source:**	BH2017-6, SS-8
Project Location:		**Location:**	
Sample #:	**KWG-016-7**		
Description:			



ATTERBERG LIMIT AND MOISTURE RESULTS:

SUMMARY OF ATTERBERG AND MOISTURE CONTENT:	
Liquid Limit, LL	15
Plastic Limit, PL	12
Plasticity Index, PI	3
In Place Moisture Content (ASTM D2216) %	0.0

TESTING EQUIPMENT USED		
Plastic Limit	Hand Rolled	X
	Mechanical Rolling Device	
Liquid Limit Apparatus	Manual	X
	Mechanical	
Casagrande ASTM Tool	Metal	X
	Plastic	

SPECIMEN PREPARATION			
Wet		Washed on #40 Sieve	
Dry (Air)		Dry Sieved on #40 Sieve	X
Dry (Oven)	X		

25-Jul-17

Hugh Arthur - Laboratory Supervisor

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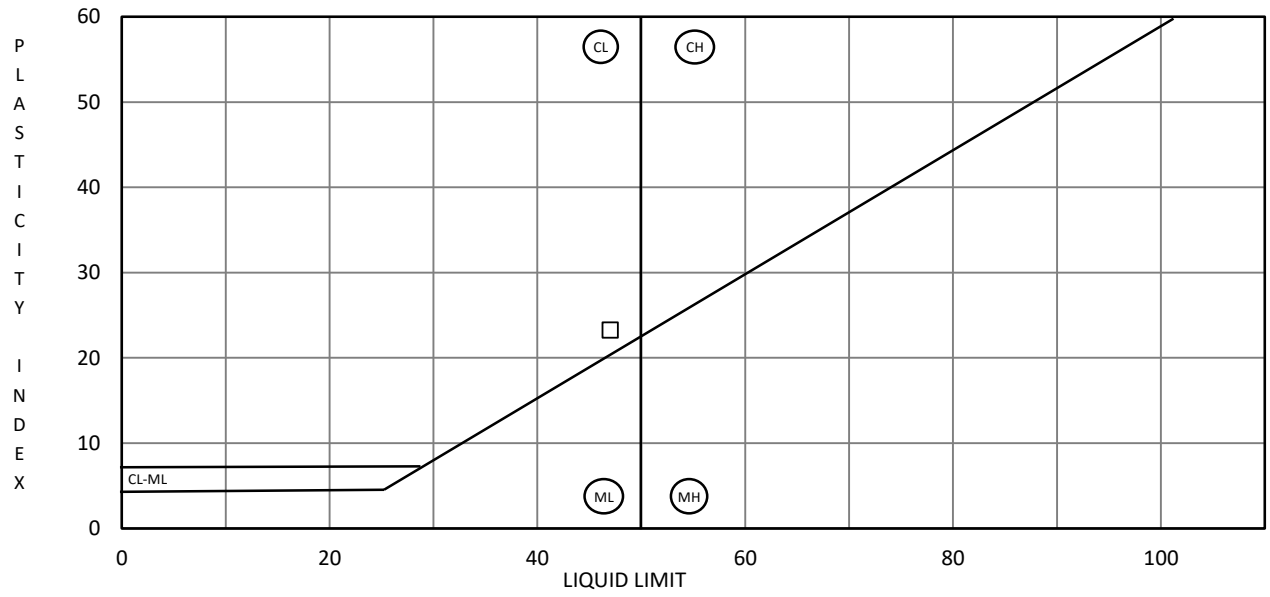
waterloo@dstgroup.com
www.dstgroup.com

DST Ref. No.:	TS-SO-29563	**Date Sampled:**	
Project:	Trinity Development Group Geotech Investiga	**Sampled By:**	
Client:	Trinity Development Group	**Source:**	BH2017-8, SS-7
Project Location:		**Location:**	
Sample #:	**KWG-016-8**		
Description:			



ATTERBERG LIMIT AND MOISTURE RESULTS:

SUMMARY OF ATTERBERG AND MOISTURE CONTENT:	
Liquid Limit, LL	47
Plastic Limit, PL	24
Plasticity Index, PI	23
In Place Moisture Content (ASTM D2216) %	0.0

TESTING EQUIPMENT USED		
Plastic Limit	Hand Rolled	X
	Mechanical Rolling Device	
Liquid Limit Apparatus	Manual	X
	Mechanical	
Casagrande ASTM Tool	Metal	X
	Plastic	

SPECIMEN PREPARATION			
Wet		Washed on #40 Sieve	
Dry (Air)		Dry Sieved on #40 Sieve	X
Dry (Oven)	X		

25-Jul-17

Hugh Arthur - Laboratory Supervisor

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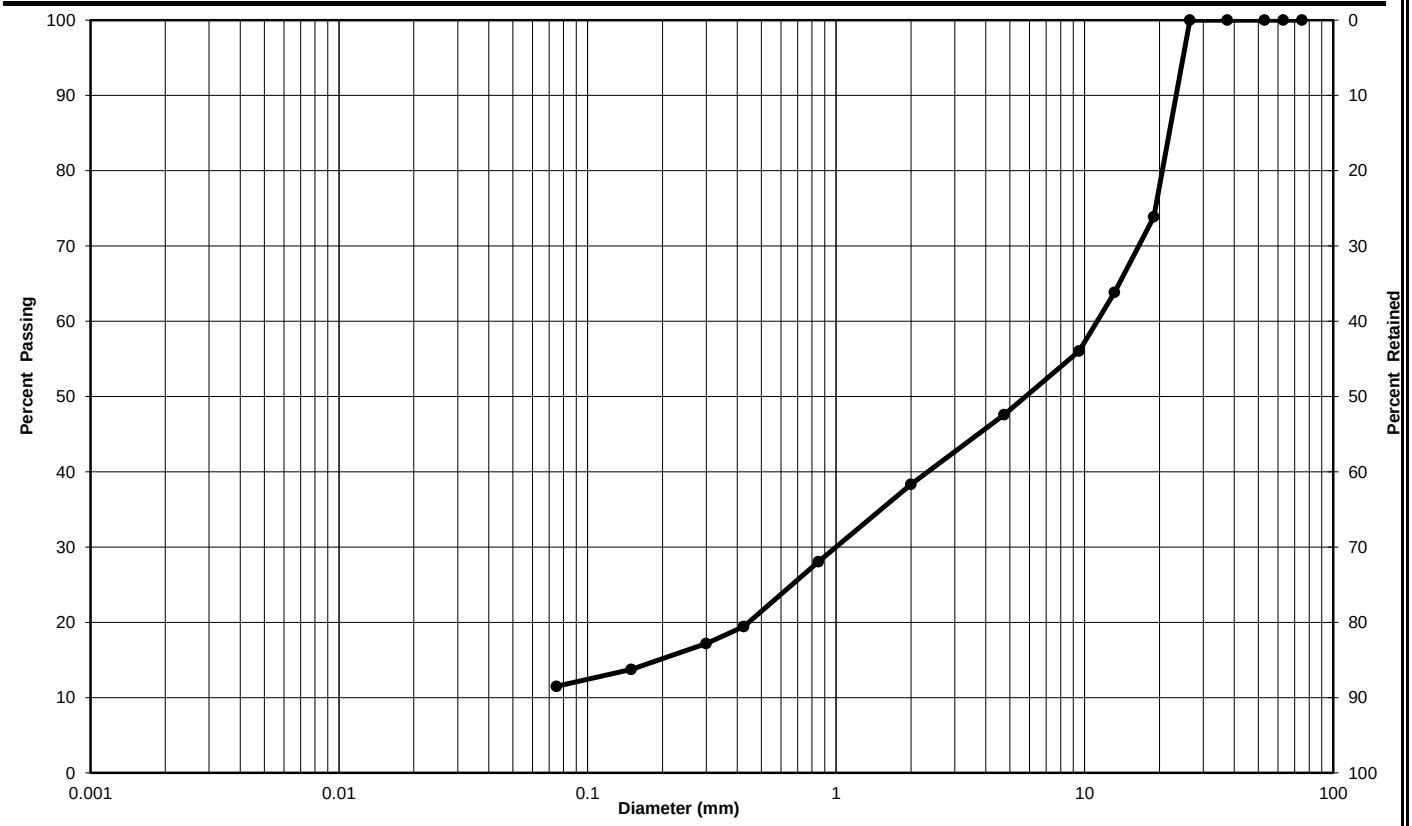
PARTICLE SIZE ANALYSIS OF SOILS

DST Ref. No.:	TS-SO-29563	**Date Sampled:**	January 0, 1900
Project:	Trinity Development Group Geotech Investig	**Sampled By:**	1900-01-00
Client:	Trinity Development Group	**Source:**	BH2017-5, SS-4
Project Location:	Ottawa, ON	**Location:**	0
Sample #:	KWG-016-6	**Description:**	Gravel and Sand, trace Clay/Silt



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Particle-Size Limits as per USCS (ASTM D-2487)					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Gravel and Sand, trace Clay/Silt	52	37	11

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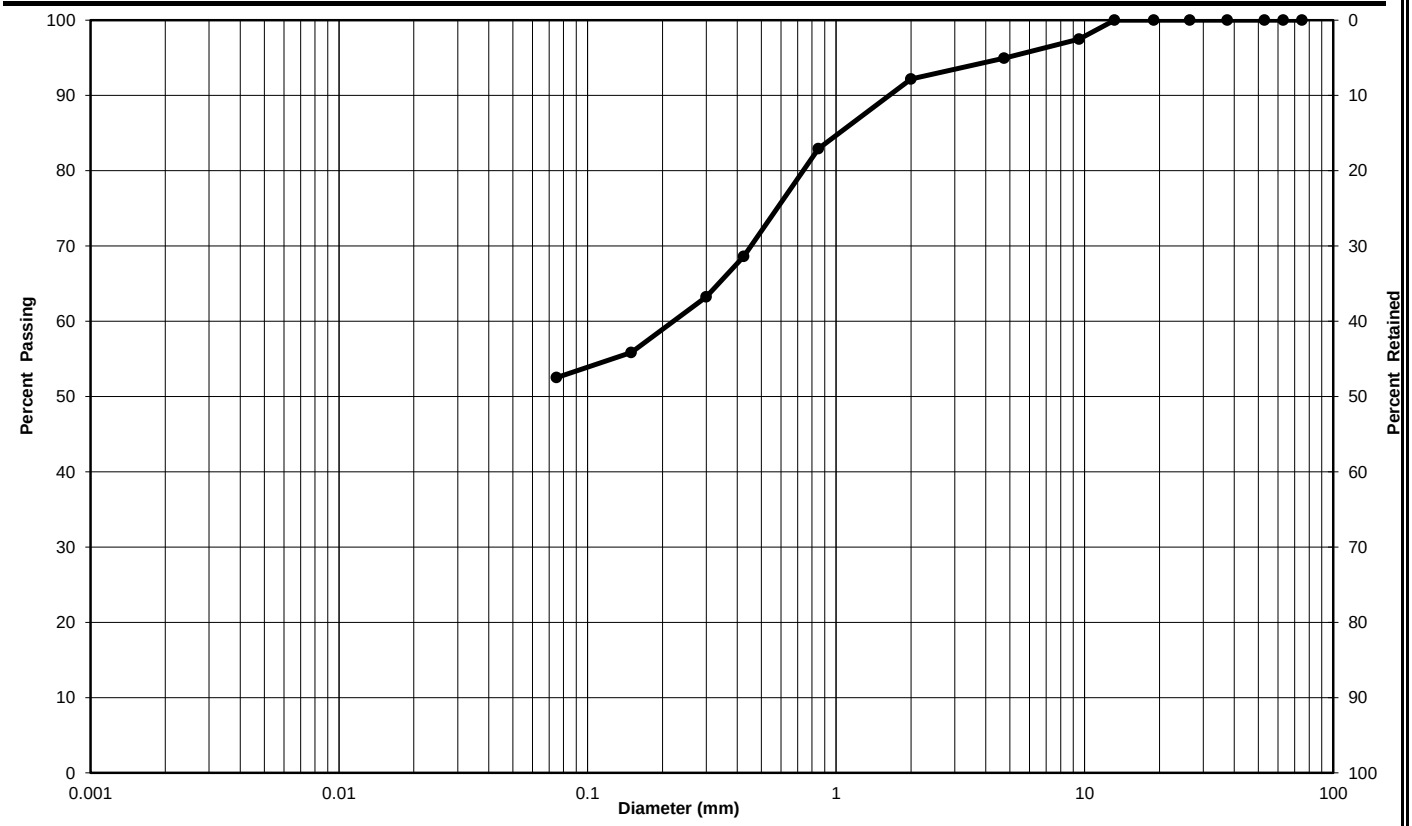
PARTICLE SIZE ANALYSIS OF SOILS

DST Ref. No.:	TS-SO-29563	**Date Sampled:**	January 0, 1900
Project:	Trinity Development Group Geotech Investig	**Sampled By:**	1900-01-00
Client:	Trinity Development Group	**Source:**	BH2017-9, SS-2
Project Location:	Ottawa, ON	**Location:**	0
Sample #:	KWG-016-9	**Description:**	Sand and Clay/Silt, trace Gravel



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Particle-Size Limits as per USCS (ASTM D-2487)					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Sand and Clay/Silt, trace Gravel	5	42	53

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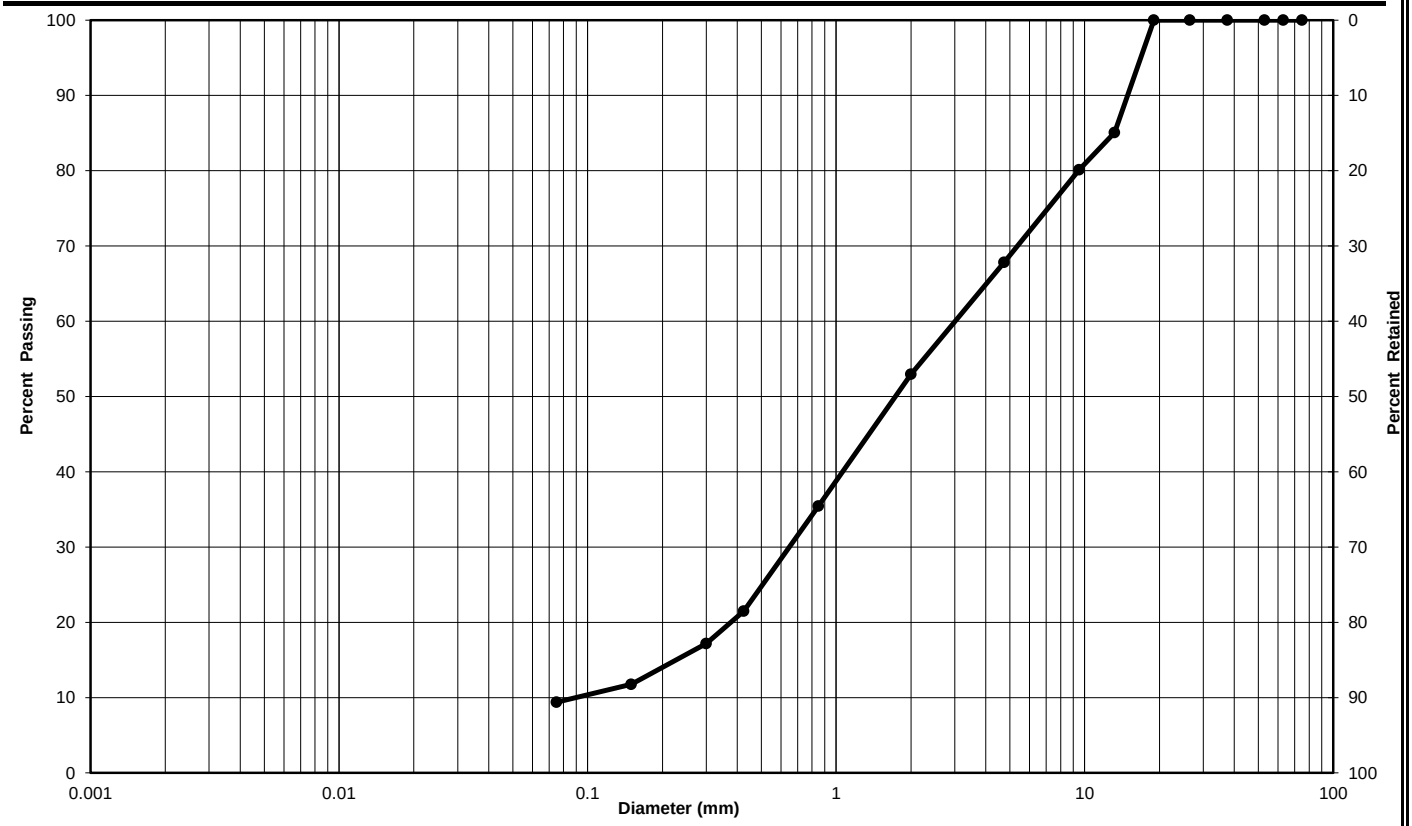
PARTICLE SIZE ANALYSIS OF SOILS

DST Ref. No.:	TS-SO-29563	**Date Sampled:**	January 0, 1900
Project:	Trinity Development Group Geotech Investig	**Sampled By:**	1900-01-00
Client:	Trinity Development Group	**Source:**	BH2017-10, SS-4
Project Location:	Ottawa, ON	**Location:**	0
Sample #:	KWG-016-10	**Description:**	Gravelley Sand, trace Clay & Silt



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Particle-Size Limits as per USCS (ASTM D-2487)					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Gravelley Sand, trace Clay & Silt	32	59	9

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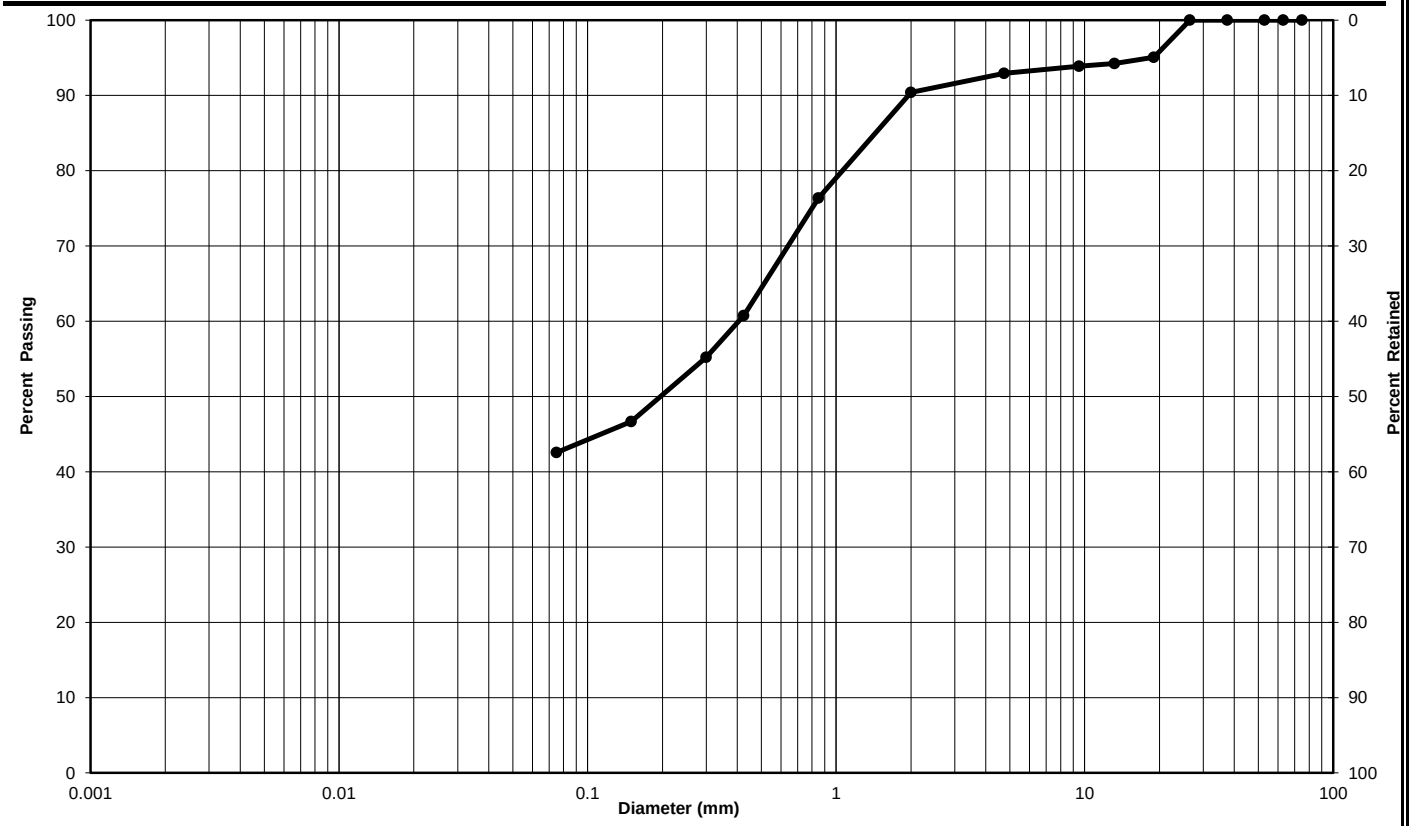
PARTICLE SIZE ANALYSIS OF SOILS

DST Ref. No.:	TS-SO-29563	**Date Sampled:**	January 0, 1900
Project:	Trinity Development Group Geotech Investig	**Sampled By:**	1900-01-00
Client:	Trinity Development Group	**Source:**	BH2017-11, SS-6
Project Location:	Ottawa, ON	**Location:**	0
Sample #:	KWG-016-12	**Description:**	Clay/Silt and Sand, trace Gravel



Clay & Silt	Sand			Gravel	
	Fine	Medium	Coarse	Fine	Coarse
Particle-Size Limits as per USCS (ASTM D-2487)					

Soil Description	Gravel (%)	Sand (%)	Clay & Silt (%)
Clay/Silt and Sand, trace Gravel	7	50	43

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CONSULTING ENGINEERS •
Materials Testing •
and Inspection

File: L17-0460RC

DST Consulting Engineers Inc.
2150 Thurston Drive, Suite 203
Ottawa, Ontario
K1G 5T9

July 19, 2017

Attn: Mr. Amer Mohammad
amohammad@dstgroup.com

Dear Sir;

Unconfined Compressive Strength Testing
Rock Core Sample
Trinity Development – Geotechnical Investigation
DST Project No.: TS-SO-29563

Further to receipt of six (6) 60.5 to 63.5 mm diameter size rock core samples in our laboratory on July 18, 2017, Davroc Testing Laboratories Inc. is pleased to report the results of our tests.

As instructed, the core sample ends were ground, and the prepared core samples were tested for compressive strength in accordance with ASTM D 7012 Standard Test Method for "Compressive Strength and Elastic Moduli of Intact Rock Core Specimens under Varying States of Stress and Temperatures".

Test Results

The results of our tests are summarized on the following Table No. 1, and detailed test data are shown on the attached Rock Core Test Certificates.

Table No. 1
Trinity Development – Geotechnical Investigation
DST Project No.: TS-SO-29563
Rock Core Unconfined Compressive Strength Test Result Summary

Davroc Sample No.	Borehole/Core No.	Depth	Unconfined Compressive Strength (MPa)
C974-1	BH2017-3/CR1	96.081 – 95.916	*127.6
C974-2	BH2017-3/CR5	90.124 – 89.845	125.7
C974-3	BH2017-5/CR2	94.468 – 94.138	121.5
C974-4	BH2017-8/CR3	93.526 – 93.348	*113.1
C974-5	BH2017-10/CR1	93.198 - 92.919	97.2
C974-6	BH2017-10/CR4	88.117 – 87.787	129.6

*- L/D ratio for these samples were <2.0.

We trust the above is satisfactory. Should you require any further information, please do not hesitate to contact the undersigned.

Yours very truly,
Davroc Testing Laboratories Inc.

Kateryna Fiyalko, C.E.T.
Concrete Laboratory Supervisor

Sal Fasullo, C.E.T.
Vice President

SF/kf
17-0460-1RC

ROCK CORE TEST REPORT

File No.: L17-0460RC
Davroc Sample No.: C974
DST Project No.: TS-SO-29563
Project Name: Trinity Development – Geological Investigation

Core No.	1	2	3
Borehole/Core No.	BH2017-3/CR1	BH2017-3/CR5	BH2017-5/CR2
Depth	96.081 – 95.916	90.124 – 89.845	94.468 – 94.138
Date Cored	N/R	N/R	N/R
Date Tested	July 19, 2017	July 19, 2017	July 19, 2017
Height (mm)	95.4	151.0	151.0
Average Diameter (mm)	62.5	60.5	60.5
L/D Ratio	1.53	2.50	2.50
Density (kg/m^3)	-	-	-
Compressive Strength (MPa)	127.6	125.7	121.5
Mode of Failure	*	*	*
Direction of Loading	Not Known	Not Known	Not Known
Moisture Condition at Time of Test	As Received	As Received	As Received

Remarks: * - See attached photographs.

Date: July 19, 2017 **Signed:** _____

Sal Fasullo, C.E.T.

ROCK CORE TEST REPORT

File No.: L17-0460RC
Davroc Sample No.: C974
DST Project No.: TS-SO-29563
Project Name: Trinity Development – Geological Investigation

Core No.	4	5	6
Borehole/Core No.	BH2017-8/CR3	BH2017-10/CR1	BH2017-10/CR4
Depth	93.526 – 93.348	93.198 – 92.919	88.117 – 87.787
Date Cored	N/R	N/R	N/R
Date Tested	July 19, 2017	July 19, 2017	July 19, 2017
Height (mm)	115.0	152.5	152.5
Average Diameter (mm)	62.5	63.5	63.5
L/D Ratio	1.84	2.40	2.40
Density (kg/m^3)	-	-	-
Compressive Strength (MPa)	113.1	97.2	129.6
Mode of Failure	*	*	*
Direction of Loading	Not Known	Not Known	Not Known
Moisture Condition at Time of Test	As Received	As Received	As Received

Remarks: * - See attached photographs.

Date: July 19, 2017 **Signed:**_____

Sal Fasullo, C.E.T.

Photograph No. 1, Davroc Sample C974 -1 to 6 before testing.

Photograph No. 1, Davroc Sample C974 -1 to 6, break failure after testing.

APPENDIX E

CORE PHOTOS

Project: Geotechnical Investigation – Gladstone and Loretta Avenue, Ottawa

Client: Trinity Development Group Inc.

BH2017-03

Core Run	Depth, m	Description	TCR	SCR	RQD
CR1	6.4 – 7.5	Limestone, grey	100%	79%	58%
CR2	7.5 – 9.0	Limestone, grey	100%	92%	90%
CR3	9.0 – 10.4	Limestone, grey	93%	93%	92%
CR4	10.4 – 11.9	Limestone, grey	100%	100%	92%
CR5	11.9 – 13.5	Limestone, grey	100%	100%	95%

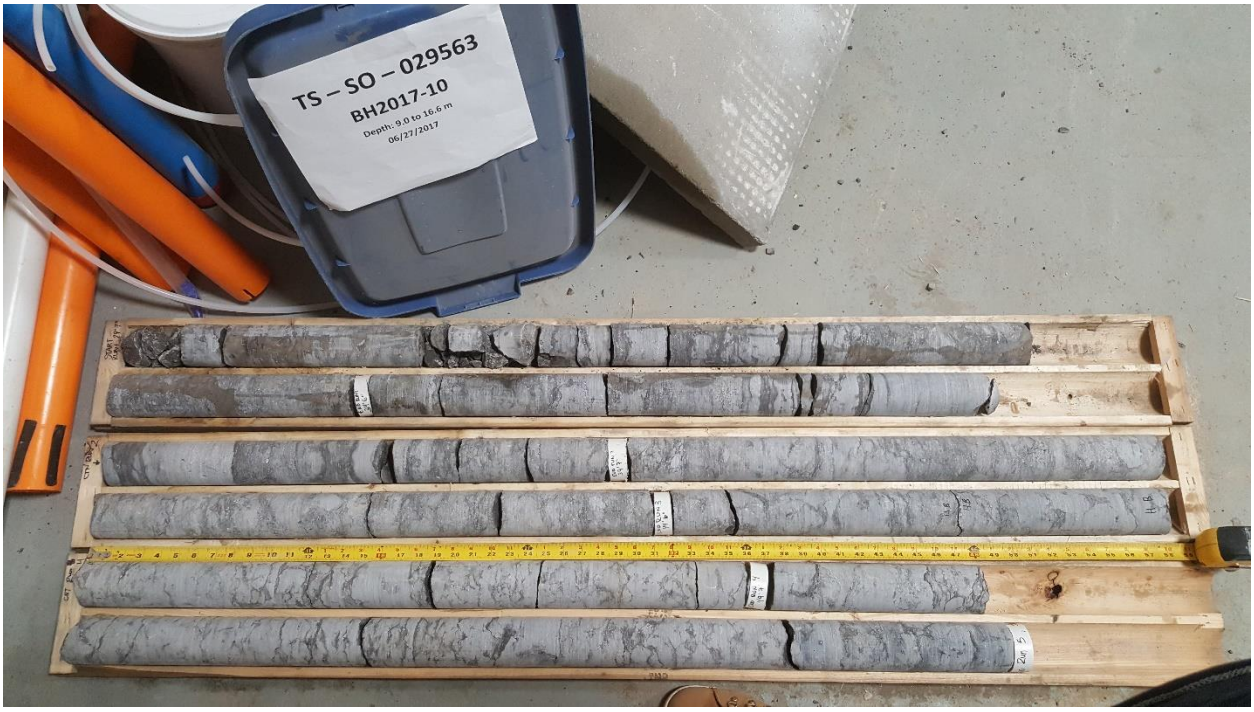
BH2017-05

Core Run	Depth, m	Description	TCR	SCR	RQD
CR1	6.9 – 7.4	Limestone, grey	100%	100%	100%
CR2	7.4 – 8.8	Limestone, grey	100%	98%	96%
CR3	8.8 – 10.3	Limestone, trace calcite, grey	100%	100%	100%
CR4	10.3 – 11.8	Limestone, trace calcite, grey	100%	100%	96%
CR5	11.8 – 13.5	Limestone, trace calcite, grey	100%	100%	100%

BH2017-08

Core Run	Depth, m	Description	TCR	SCR	RQD
CR1	7.0 – 7.6	Limestone, grey	100%	96%	93%
CR2	7.6 – 9.1	Limestone, grey	85%	78%	75%
CR3	9.1 – 10.6	Limestone, grey	100%	100%	98%
CR4	10.6 – 12.1	Limestone, grey	98%	98%	90%
CR5	12.1 – 13.6	Limestone, grey	100%	100%	100%

BH2017-10



Core Run	Depth, m	Description	TCR	SCR	RQD
CR1	9.0 – 10.5	Limestone, grey	98%	92%	85%
CR2	10.5 – 12.1	Limestone, grey	100%	100%	100%
CR3	12.1 – 13.6	Limestone, grey	98%	98%	98%
CR4	13.6 – 15.1	Limestone, grey	100%	100%	100%
CR5	15.1 – 16.6	Limestone, grey	100%	100%	100%

APPENDIX F

2015 NATIONAL BUILDING CODE SEISMIC HAZARD CALCULATION

2015 National Building Code Seismic Hazard Calculation

INFORMATION: Eastern Canada English (613) 995-5548 français (613) 995-0600 Facsimile (613) 992-8836
Western Canada English (250) 363-6500 Facsimile (250) 363-6565

July 17, 2017

Site: 45.4039 N, 75.7154 W User File Reference: Gladstone

Requested by: , DST Consulting Engineers Inc.

National Building Code ground motions: 2% probability of exceedance in 50 years (0.000404 per annum)

Sa(0.05)	Sa(0.1)	**Sa(0.2)**	Sa(0.3)	**Sa(0.5)**	**Sa(1.0)**	**Sa(2.0)**	**Sa(5.0)**	**Sa(10.0)**	**PGA (g)**	**PGV (m/s)**
0.445	0.521	**0.437**	0.332	**0.236**	**0.117**	**0.056**	**0.015**	**0.0054**	**0.279**	**0.196**

Notes. Spectral (Sa(T), where T is the period in seconds) and peak ground acceleration (PGA) values are given in units of g (9.81 m/s^2). Peak ground velocity is given in m/s. Values are for "firm ground" (NBCC 2015 Site Class C, average shear wave velocity 450 m/s). NBCC2015 and CSAS6-14 values are specified in **bold** font. Three additional periods are provided - their use is discussed in the NBCC2015 Commentary. Only 2 significant figures are to be used. ***These values have been interpolated from a 10-km-spaced grid of points. Depending on the gradient of the nearby points, values at this location calculated directly from the hazard program may vary. More than 95 percent of interpolated values are within 2 percent of the directly calculated values.***

Ground motions for other probabilities:

Probability of exceedance per annum	0.010	0.0021	0.001
Probability of exceedance in 50 years	40%	10%	5%
Sa(0.05)	0.044	0.147	0.245
Sa(0.1)	0.060	0.185	0.298
Sa(0.2)	0.055	0.160	0.253
Sa(0.3)	0.043	0.123	0.194
Sa(0.5)	0.031	0.088	0.138
Sa(1.0)	0.015	0.044	0.069
Sa(2.0)	0.0061	0.020	0.032
Sa(5.0)	0.0012	0.0047	0.0081
Sa(10.0)	0.0006	0.0019	0.0032
PGA	0.032	0.101	0.162
PGV	0.021	0.067	0.110

References

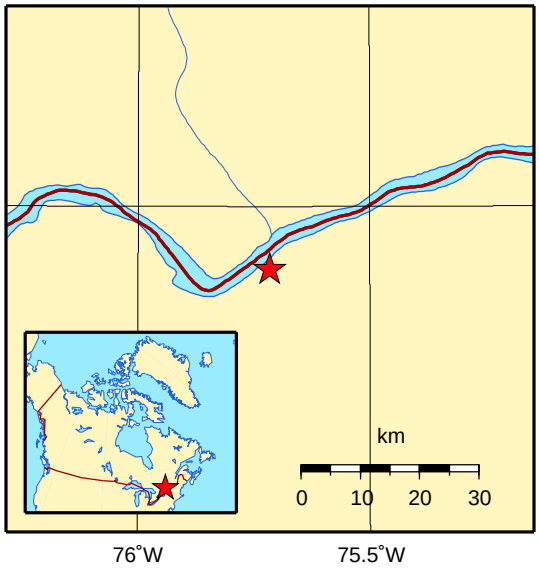
National Building Code of Canada 2015 NRCC no. 56190;
Appendix C: Table C-3, Seismic Design Data for Selected Locations in Canada

User's Guide - NBC 2015, Structural Commentaries NRCC no. xxxxxx (in preparation)
Commentary J: Design for Seismic Effects

Geological Survey of Canada Open File 7893 Fifth Generation Seismic Hazard Model for Canada: Grid values of mean hazard to be used with the 2015 National Building Code of Canada

See the websites *www.EarthquakesCanada.ca* and *www.nationalcodes.ca* for more information

Aussi disponible en français



APPENDIX G

CORROSION ANALYSES (SOIL) TEST RESULTS

Your Project #: TS-SO-29563
Your C.O.C. #: 100264

Attention:Tun Lwin

DST Consulting Engineers Inc
Waterloo - Standing Offer
550 Parkside Drve
Unit C10
Waterloo, ON
CANADA N2L 5V4

Report Date: 2017/07/28
Report #: R4618965
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7F4617
Received: 2017/07/20, 15:09

Sample Matrix: Soil
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Chloride (20:1 extract)	1	N/A	2017/07/26	CAM SOP-00463	EPA 325.2 m
Conductivity	1	2017/07/25	2017/07/25	CAM SOP-00414	OMOE E3530 v1 m
pH CaCl2 EXTRACT	1	2017/07/25	2017/07/25	CAM SOP-00413	EPA 9045 D m
Resistivity of Soil	1	2017/07/20	2017/07/25	CAM SOP-00414	SM 22 2510 m
Sulphate (20:1 Extract)	1	N/A	2017/07/26	CAM SOP-00464	EPA 375.4 m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported: unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Your Project #: TS-SO-29563
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Attention:Tun Lwin

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CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B7F4617
Received: 2017/07/20, 15:09

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Augustyna Dobosz, Project Manager
Email: ADobosz@maxxam.ca
Phone# (905)817-5700 Ext:5798

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Maxxam Job #: B7F4617
Report Date: 2017/07/28

DST Consulting Engineers Inc
Client Project #: TS-SO-29563

RESULTS OF ANALYSES OF SOIL

Maxxam ID		EUC556	EUC556		
Sampling Date		2017/06/27	2017/06/27		
COC Number		100264	100264		
	UNITS	BH2017-10, SS-10	BH2017-10, SS-10 Lab-Dup	RDL	QC Batch
Calculated Parameters					
Resistivity	ohm-cm	690			5085001
Inorganics					
Soluble (20:1) Chloride (Cl)	ug/g	700	690	20	5090772
Conductivity	mS/cm	1.5		0.002	5089376
Available (CaCl2) pH	pH	7.83			5088780
Soluble (20:1) Sulphate (SO4)	%	0.038	0.039	0.002	5090773

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

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Maxxam Job #: B7F4617
Report Date: 2017/07/28

DST Consulting Engineers Inc
Client Project #: TS-SO-29563

TEST SUMMARY

Maxxam ID: EUC556
Sample ID: BH2017-10, SS-10
Matrix: Soil

Collected: 2017/06/27
Shipped:
Received: 2017/07/20

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride (20:1 extract)	KONE/EC	5090772	N/A	2017/07/26	Alina Dobreanu
Conductivity	AT	5089376	2017/07/25	2017/07/25	Xuanhong Qiu
pH CaCl2 EXTRACT	AT	5088780	2017/07/25	2017/07/25	Tahir Anwar
Resistivity of Soil		5085001	2017/07/25	2017/07/25	Automated Statchk
Sulphate (20:1 Extract)	KONE/EC	5090773	N/A	2017/07/26	Alina Dobreanu

Maxxam ID: EUC556 Dup
Sample ID: BH2017-10, SS-10
Matrix: Soil

Collected: 2017/06/27
Shipped:
Received: 2017/07/20

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride (20:1 extract)	KONE/EC	5090772	N/A	2017/07/26	Alina Dobreanu
Sulphate (20:1 Extract)	KONE/EC	5090773	N/A	2017/07/26	Alina Dobreanu

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	6.0°C

Results relate only to the items tested.

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Maxxam Job #: B7F4617
Report Date: 2017/07/28

DST Consulting Engineers Inc
Client Project #: TS-SO-29563

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
5088780	TA1	Spiked Blank	Available (CaCl2) pH	2017/07/25		99	%	97 - 103
5088780	TA1	RPD	Available (CaCl2) pH	2017/07/25	0.083		%	N/A
5089376	XQI	Spiked Blank	Conductivity	2017/07/25		101	%	90 - 110
5089376	XQI	Method Blank	Conductivity	2017/07/25	<0.002		mS/cm	
5089376	XQI	RPD	Conductivity	2017/07/25	6.5		%	10
5090772	ADB	Matrix Spike [EUC556-01]	Soluble (20:1) Chloride (Cl)	2017/07/26		NC	%	70 - 130
5090772	ADB	Spiked Blank	Soluble (20:1) Chloride (Cl)	2017/07/26		103	%	70 - 130
5090772	ADB	Method Blank	Soluble (20:1) Chloride (Cl)	2017/07/26	<20		ug/g	
5090772	ADB	RPD [EUC556-01]	Soluble (20:1) Chloride (Cl)	2017/07/26	0.74		%	35
5090773	ADB	Matrix Spike [EUC556-01]	Soluble (20:1) Sulphate (SO4)	2017/07/26		NC	%	70 - 130
5090773	ADB	Spiked Blank	Soluble (20:1) Sulphate (SO4)	2017/07/26		104	%	70 - 130
5090773	ADB	Method Blank	Soluble (20:1) Sulphate (SO4)	2017/07/26	<0.002		%	
5090773	ADB	RPD [EUC556-01]	Soluble (20:1) Sulphate (SO4)	2017/07/26	1.6		%	35

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

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Maxxam Job #: B7F4617
Report Date: 2017/07/28

DST Consulting Engineers Inc
Client Project #: TS-SO-29563

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Cristina Carriere

Cristina Carriere, Scientific Services

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Maxxam
A Bureau Veritas Group Company

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CAM FCD-01191/3

CHAIN OF CUSTODY RECORD 100264

Page 1 of 1

Invoice Information		Report Information (if differs from invoice)		Project Information (where applicable)	
Company Name:	PST Consulting Engineers	Company Name:		Quotation #:	
Contact Name:	Tun Dan Lwin	Contact Name:		P.O. #/ AFE#:	
Address:	550 Parkside Dr, unit C1-B, Waterloo ON, N2L 5V4	Address:		Project #:	TS-SO-29563
Phone:	(519) 772-4521 Fax: (519) 725-3789	Phone:	Fax:	Site Location:	
Email:	tlwin@pstgroup.com	Email:		Site #:	
				Sampled By:	

Turnaround Time (TAT) Required

- [X] Regular TAT (5-7 days) Most analyses

PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS

Rush TAT (Surcharges will be applied)

- [ ] 1 Day
- [ ] 2 Days
- [ ] 3-4 Days

Date Required:

Rush Confirmation #:

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY

Regulation 153

- [ ] Table 1
- [ ] Table 2
- [ ] Table 3
- [ ] Table ____
- [ ] Res/Park
- [ ] Ind/Comm
- [ ] Agri/ Other
- [ ] Med/ Fine
- [ ] Coarse

FOR RSC (PLEASE CIRCLE) Y / N

Other Regulations

- [ ] CCME
- [ ] MISA
- [ ] PWQO
- [ ] Sanitary Sewer Bylaw
- [ ] Storm Sewer Bylaw
- Region
- [ ] Other (Specify)
- [ ] REG 558 (MIN. 3 DAY TAT REQUIRED)

Include Criteria on Certificate of Analysis: Y / N

SAMPLES MUST BE KEPT COOL (< 10 °C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED (CIRCLE) Metals / Hg / CrVI	BTEX / PHC F1	PHCs F2 - F4	VOCs	REG 153 METALS & INORGANICS	REG 153 ICPMS METALS	REG 153 METALS (Hg, Cr VI, ICPMS Metals, HWS - B)	pH	Chloride Content	Sulphate Content	Water Soluble Sulphates	Conductivity	Resistivity	HOLD - DO NOT ANALYZE
1	BH2017-10, SS-10	2017/06/27		Soil									X	X	X	X	X	X	
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			

20-Jul-17 15:09
Augustyna Dobosz
B7F4617
SSR ENV-883

LABORATORY USE ONLY

CUSTODY SEAL Y / N		COOLER TEMPERATURES
Present	Intact	
		6/6/6
N	N	23/23/23 NOTE
		#401207

COOLING MEDIA PRESENT: Y / N NO ICE

COMMENTS

Please test against these standards:
pH - MOEE E3137A
Chlorides - EPA 300.0
Sulphates - EPA 300.0
Soluble Sulphates - CSA A23.2-3B (concrete)
Conductivity - MOEE E3138
Resistivity - APHA 2510B

REC'D IN WATERL

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
Hugh Arthur	2017/07/20	15:06	Waverly Kozak	17/07/20	15:09	

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COC-1004 (03/17)

White: Maxxam ~ Yellow: Client