APPENDIX B

Geotechnical Investigation (KGS Group 2019)



Conservation Ontario Class EA Rehab -Pickering & Ajax Flood Control Dykes -2019 Geotechnical Investigation Report

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STATEMENT OF LIMITATIONS AND CONDITIONS

Limitations

This report has been prepared for Toronto and Region Conservation Authority "[TRCA]" in accordance with the agreement between KGS Group and TRCA (the "Agreement"). This report represents KGS Group's professional judgment and exercising due care consistent with the preparation of similar reports. The information, data, recommendations and conclusions in this report are subject to the constraints and limitations in the Agreement and the qualifications in this report. This report must be read as a whole, and sections or parts should not be read out of context.

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KGS Group prepared the geo-environmental conclusions and recommendations for this report in a professional manner using the degree of skill and care exercised for similar projects under similar conditions by reputable and competent environmental consultants. The information contained in this report is based on the information that was made available to KGS Group during the investigation and upon the services described, which were performed within the time and budgetary requirements of Toronto and Region Conservation Authority. As this report is based on the available information, some of its conclusions could be different if the information upon which it is based is determined to be false, inaccurate or contradicted by additional information. KGS Group makes no representation concerning the legal significance of its findings or the value of the property investigated.

Geotechnical Investigation Statement of Limitations

The geotechnical investigation findings and recommendations of this report were prepared in accordance with generally accepted professional engineering principles and practice. The findings and recommendations are based on the results of field and laboratory investigations, combined with an interpolation of soil and groundwater conditions found at and within the depth of the test holes drilled by KGS Group at the site at the time of drilling. If conditions encountered during construction appear to be different from those shown by the test holes drilled by KGS Group or if the assumptions stated herein are not in keeping with the design, KGS Group should be notified in order that the recommendations can be reviewed and modified if necessary.

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1.0 INTRODUCTION

KGS Group was retained by Toronto and Region Conservation Authority (TRCA) to undertake a geotechnical investigation in support of *a Conservation Ontario Class Environmental Assessment for Remedial Flood and Erosion Control Projects* (Conservation Ontario 2002, amended 2013) to rehabilitate the Pickering and Ajax Dykes. The goal of the rehabilitation is to ensure that the dykes meet current engineering standards while maintaining, at minimum, the existing flood protection levels.

The purposes of the geotechnical investigation, specifically, were to:

- confirm dyke and foundation conditions,
- expand upon the existing geotechnical information,
- determine if the dykes are comprised of any impacted soils warranting special handling or disposal considerations

This report summarizes previous geotechnical information and the results of the geotechnical investigations completed as part of this assignment.



2.0 BACKGROUND

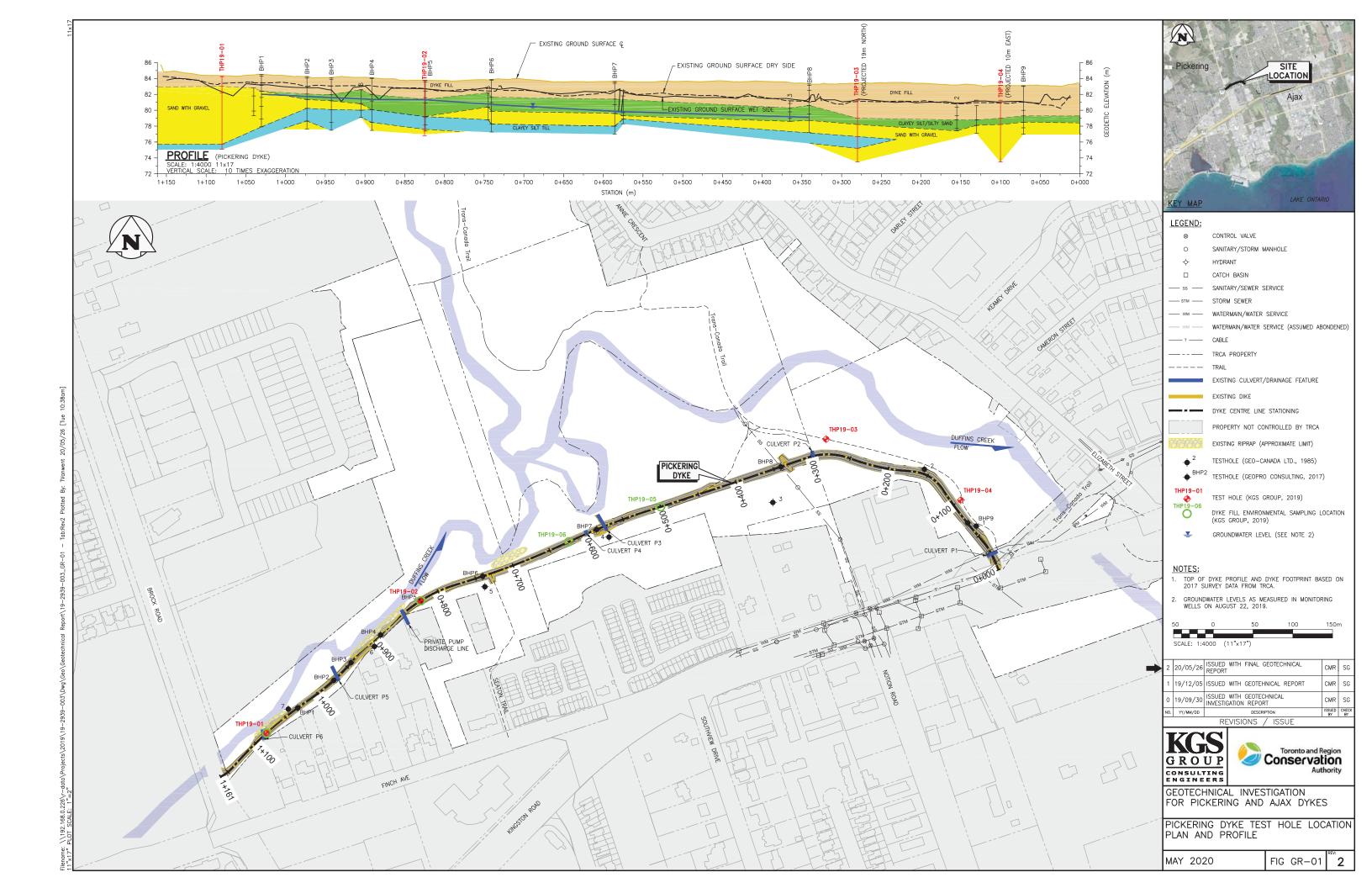
The Pickering Dyke is located in the City of Pickering and the Town of Ajax approximately 950 m north of Highway 401 as illustrated in Figure GR-01. This dyke is approximately 1,150 m long and traverses TRCA controlled property behind residences along Finch Ave and Kingston Road West from Brock Road, approximately 70 m north of the Finch Ave intersection, to Kingston Road West, approximately 150 m east of the Notion Road intersection.

The Ajax Dyke is located within the Town of Ajax, approximately 170 m north of Highway 401 as illustrated in Figure GR-02. This dyke is approximately 340 m long and extends from Church Street at the Mill Street intersection to the southwest corner of the private property located at 92 Church Street (the location of a commercial/residential development known as Village Garden).

Scaled-down copies of the construction drawings for the dykes are included in Appendix A. In general, the dykes were constructed to have a minimum 3 m crest width and 2H:1V side slopes but localized areas exist along the Pickering Dyke where the minimum dyke crest width was relaxed to 2 m.

The Pickering Dyke was intended to have a top of dyke crest elevation that varied from 84.6 m to 82.9 m and the Ajax Dyke was intended to have a consistent top of dyke crest elevation of 81.2 m once the datum conversion to the CGVD 28 - 78 is applied.







2.1 Previous Geotechnical Investigations

There have been three (3) geotechnical investigations along the alignments of the Pickering and Ajax Dykes:

- A 1984 investigation completed by Geo-Canada Ltd. in support of construction of the Ajax Dyke.
- A 1985 investigation completed by Geo-Canada Ltd. in support construction of the Pickering Dyke.
- A 2017 investigation completed by GeoPro consulting in support of Valdor Engineering Inc's Dyke Level of Service and Rehabilitation Report for the Pickering and Ajax SPA's.

The results of these investigations are summarized below.

2.1.1 1984 AJAX DYKE INVESTIGATION

Geo-Canada Ltd. advanced three (3) test holes (BH1 to BH3) through the foundation soils of the Ajax Dyke in 1984 prior to construction of the dyke. The locations of these test holes are illustrated on Figure GR-02 and the test hole logs and supporting laboratory soil index tests have been compiled in Appendix B.

It was determined that the foundation conditions for the Ajax Dyke consisted of four general soil units including the following in order of descending elevation:

- 1. Topsoil
- 2. Silt (Low Plasticity, contained pieces of wood and shells)
- 3. Silty Sand and Gravel
- 4. Sandy Silt Till (BH3 only)

The proposed Ajax dyke location was underlain by a 0.3 m thick topsoil at surface, followed by a silt layer to a depth of 2.6 m to 3.2 m overlying compact silty sand and gravel. Dense/Hard sandy silt till was encountered only in test hole BH3 at a depth of 3.1 m (El. 75.5 m) below the existing ground and the permeability of the till is estimated to be very low.

Groundwater elevations at the time of the investigations varied from 76.4 m to 77.0 m which corresponds to depths of 1.5 m to 2.1 m below the original ground surface prior to construction of the dyke.

2.1.2 1985 PICKERING DYKE INVESTIGATION

Geo-Canada Ltd. advanced six (6) test holes (BH1 to BH6) through the foundation soils of the Pickering Dyke in 1985, prior to construction of the dyke. The locations of these test holes are illustrated on Figure GR-01 and the test hole logs and supporting a laboratory soil index tests have been compiled in Appendix C.

It was determined that the foundation conditions for the Pickering Dyke were somewhat variable, though distinct trends were apparent with five general soil units including the following in order of descending elevation:

1. Fill (Silty Sand with some gravel fill)	(BH1 and BH2 only)				
2. Fine Sand with Silt					
3. Silt (Contained shells and decaying wood)	(BH1 to BH4 only)				
4. Sand and Gravel					
5. Clayey Silt with trace gravel	(BH5 only)				

6. Clayey Silt Till (Well cemented, Hard) (BH4 and BH6 only)



Groundwater elevations at the time of the investigations varied from 78.7 m to 81.4 m which correspond to depths of 1.3 m to 2.1 m below the original ground surface prior to construction of the dyke.

2.1.3 2017 PICKERING AND AJAX DYKE INVESTIGATION

GeoPro Consulting Ltd. advanced nine (9) test holes (BHP1 to BHP9) through the Pickering Dyke and three (3) test holes (BHA1 to BHA3) through the Ajax Dyke in 2017. The locations of these test holes are illustrated on Figures GR-01 and GR-02 for the Pickering and Ajax Dykes, respectively. Test hole logs and supporting laboratory soil index tests have been compiled in Appendix D.

GeoPro summarized the general site stratigraphy at both sites with nine distinct soil units:

- 1. Topsoil
- 2. Granular Fill
- 3. Fill Materials
- 4. Probable Fill Material
- 5. Gravelly Sand, Sand and Gravel and Sandy Gravel
- 6. Upper (Fine) Sand, Silty (Fine) Sandy Silt and (Fine) Sand and Silt
- 7. Lower (Fine) Sand, Silty Sand, (Fine) Sand and Silt, Sandy Silt and Silt
- 8. Sand and Silt Till and Sandy Silt till
- 9. Organic Silty Sand to Organic Sand and Silt and Organic Silt

As part of this investigation, six (6) groundwater monitoring wells were installed in the Pickering Dyke foundations, two (2) groundwater monitoring wells were installed in the Pickering Dyke fill, and three (3) groundwater monitoring wells were installed in the foundation soils of the Ajax Dyke. These wells were read at least once between October 10 and October 19, 2017. Groundwater elevations in the dyke foundation soils at the time of the readings varied from 78.6 m to 82 m for the Pickering Dyke and from 76.8 m to 77.5 m for the Ajax Dyke with a distinct decrease in the observed elevations from the upstream to downstream ends of the sites. The two groundwater monitoring wells installed in the Pickering Dyke Fill were dry at the time of the readings.



3.0 2019 INVESTIGATION PROGRAM

KGS group completed geotechnical investigations of the Ajax and Pickering Dykes between June 18 and August 22, 2019. These investigations included:

- Utility locates in advance of the drilling program both to update the inventory buried infrastructure beneath the dykes and avoid conflicts with buried utilities during the drilling program,
- A drilling and sampling program to characterize the existing dyke fill material for disposal and also to supplement existing geotechnical information,
- Assessment of the foundation conditions at the dykes,
- Installation of standpipe piezometers to measure the groundwater conditions within the dyke fill and the foundation soils,
- Falling head tests on new and existing standpipe piezometers to better understand the range of potential seepage behaviour of the in-situ soils.

3.1 Drilling and Sampling Program

KGS Group completed a drilling and soil sampling program from July 6th to 7th, 2019. A total of six (6) test holes were drilled between the Ajax and Pickering Dyke sites and an additional two dyke samples were obtained (THP19-05 and THP19-06) outside of the four test hole locations at the Pickering Dyke for purposes of O.Reg 558 TCLP - Metals and Inorganics analyses.

Four (4) test holes (THP19-01 to THP19-04) were drilled at Pickering Dyke site with two (2) of the test holes (THP19-01 and THP19-02) drilled through the crest of the dyke and the other two (2) drilled at the wet side toe of dyke (THP19-03 and THP19-04), as illustrated in Figure GR-01. Two (2) test holes (THA19-01 and THA19-02) were drilled at the Ajax Dyke site with both test holes drilled through the crest of the dyke, as illustrated in Figure GR-02. The test holes were advanced to depths ranging from 6.7 m to 9.8 m below grade, depending on whether the test hole was advanced from the crest of the dyke or from beyond the wet side toe of the dyke. A summary of the 2019 drilling program is presented on Table 1. The approximate locations of the test holes and additional dyke fill sampling locations are shown on Figures GR-01 and GR-02.

Location	Test Hole #	Northing (M)	(M) Easting (M) Total Dept Drilled (Approx.) (M)		Fill Thickness (M)	Foundation Soil Thickness Explored (M)
Pickering Dyke Crest (Sta. 0+1080)	THP19-01	4857133	654730	9.1	1.5	7.6
Pickering Dyke Crest	THP19-02	4857299	654924	6.7	4.4	2.3

TABLE 1: SUMMARY OF 2019 DRILLING PROGRAM



Location	Test Hole #	Northing (M)	Easting (M)	Total Depth Drilled (Approx.) (M)	Fill Thickness (M)	Foundation Soil Thickness Explored (M)
(Sta. 0+0825)						
Pickering Dyke Wet Side Toe (Sta. 0+0280)	THP19-03	4857503	655435	7.8	2.2	5.6
Pickering Dyke Wet Side Toe (Sta. 0+0100)	THP19-04	4857426	655604	7.8	2.2	5.6
Pickering Dyke Crest (Sta. 0+0500)	THP19-05	4857418	655226	1.5	O.Reg 558 TCLI	P Sample
Pickering Dyke Crest (Sta. 0+0625)	THP19-06	4857374	655111	1.5	O.Reg 558 TCLP Sample	
Ajax Dyke Crest (Sta. 0+160)	THA19-01	4856906	656349	9.8	3.0	6.8
Ajax Dyke Crest (Sta. 0+060)	THA19-02	4856892	656446	8.2	3.0	5.2

A drilling and sampling program was completed by Landshark Drilling of Brantford, Ontario, using a track mounted Mobile B57 drill rig equipped with 200 mm diameter hollow stem augers and an automatic hammer. The drilling and sampling program was supervised by a KGS Group geotechnical engineer.

Typically soil samples from the dyke were collected using a split spoon sampler with Standard Penetration Tests (SPT) completed at intervals ranging from nearly continuous to 1.5 m. All samples were visually classified in the field according to the Unified Soil Classification System (USCS).

Photographs of samples from the geotechnical investigations are included in Appendix E and detailed test hole logs are included in Appendix F.

3.2 Laboratory Testing

A laboratory testing program was performed on select soil samples to:



- characterize soil for disposal purposes; and
- determine the relevant engineering properties of the dyke fill and foundation soils for use in the stability assessment.

The testing included: six (6) O.Reg 558 Toxicity Characterization Leachate Procedure (TCLP) for Metals and Inorganics analyses, thirty-one (31) moisture content analyses, four (4) Atterberg limit tests, ten (10) grain size analyses, and one (1) organic content test.

(CALA). O.Reg 558 TCLP - Metals and Inorganics analyses test results are compiled in Appendix G. REG 558 Metal and Inorganics (TCLP) laboratory testing was completed at AGAT Laboratories in Mississauga, Ontario. AGAT is an environmental soil testing laboratory accredited by the Canadian Association for Laboratory Accreditation Inc.

Soil index test results are compiled in Appendix H. The laboratory testing for soil index tests was completed at the Golder Associates Ltd. Soil Laboratory in Mississauga, Ontario with the following American Society for Testing and Materials (ASTM) Standards used for the soil testing:

- ASTM D422 Standard Test Method for Particle-Size Analysis of Soils;
- ASTM D1140 Test Method for Amount of Material in Soils Finer than the No. 200 Sieve;
- ASTM D2216 Standard Test Method for Laboratory Determination of Water (Moisture); and
- ASTM D4318 Standard Test Method for Liquid Limit, Plastic Limit and Plasticity.

3.3 Groundwater Monitoring Instrumentation

Four (4) standpipe piezometers were installed in six of the test holes advanced as part of the drilling and sampling program. Two (2) of the four standpipe piezometers were installed in the foundations of the Ajax Dyke (one in test hole THA19-01 and the other in test hole THA19-02). The other two standpipe piezometers were installed in the foundations of the Pickering Dyke (one in test hole THP19-02 and the other in test hole THP19-03).

Falling head tests were completed on all four standpipe piezometers that were installed as part of the drilling and sampling program after allowing the instruments time to stabilize. Falling head tests were also performed on five of the nine standpipe piezometers previously installed by GeoPro Consulting Ltd. In 2017 (BHA1, BHP1, BHP4, BHP6, and BHP7). The five standpipe piezometers selected for falling head tests from previous geotechnical investigations were those where the initial water levels measured in the standpipes would completely submerge the well screen.



4.0 INVESTIGATION RESULTS

4.1 Stratigraphy

The subsurface conditions at the test hole locations of the sites were inferred from the information obtained from the exploratory test holes, laboratory test data and our understanding of the site geology. The stratigraphy and engineering properties of the subsurface soils are described in this section. A summary of the drilling program is presented in Table 1. The approximate locations of the test holes are shown in Figures GR-01 and GR-02 with detailed test hole logs included in Appendix F. Table 2 and Table 3 summarize all available soil index laboratory test results at the Pickering Dyke and Ajax Dyke site, respectively.

4.1.1 PICKERING DYKE

4.1.1.1 Dyke Fill

Topsoil was encountered in all four test holes to a depth of approximately 0.1 m±. The topsoil was generally dark brown and damp.

The fill material encountered within the dyke generally consisted of clayey silt till fill. The clayey silt till fill material was encountered below the topsoil. The dyke fill extended to depths that varied between 1.4 m and 4.4 m at the test hole locations. The clayey silt till fill was generally brown in colour, moist, firm to stiff, of low plasticity, and contained varying amounts of sand and trace organics. The moisture content of the fill material varied from 11% to 33%. An Atterberg Limits test on a sample of the fine fraction indicated that the clayey silt till fill was of low plasticity with a measured Liquid Limit of 21%, Plastic Limit of 12% and Plasticity Index of 9%. Grain size analyses on one (1) sample indicated that the dyke fill consisted of 5% gravel, 38% sand, and 57% fines. Generally, the uncorrected SPT N-values in the dyke fill varied from 9 to 30.

4.1.1.2 Foundation Soils

The foundation soils encountered at the Pickering dyke consisted of Silty Sand, Clayey Silt, Sand with Gravel and Clayey Silt Till within the investigated depth.

Silty Sand – A layer of silty sand, measuring 0.8 m, was observed beneath the dyke fill in test hole THP19-01. The silty sand was generally brown in colour, fine grained, moist, loose, poorly graded and contained trace to some fines. Uncorrected SPT N-values in the silty sand was 7.

Clayey Silt – A layer of clayey silt, measuring 0.7 m thick, was observed beneath the fill in test holes THP19-03 and THP19-04. The clayey silt was generally brown and grey in colour, moist, soft, of low plasticity and contained trace sand with organics. Moisture contents in the clayey silt varied from 25% to 31%. Uncorrected SPT N-values in the clayey silt varied from 2 to 3.

Sand with Gravel – A layer of sand with gravel was encountered below the silty sand in test hole THP19-01 and below the clayey silt in test holes THP19-03 and THP19-04. Layers of sand with gravel were also encountered between the clayey silt and underlying clayey silt till in THP19-03 and beneath the underlying clayey silt till in THP19-02. The sand with gravel was generally grey in colour, wet, compact to very dense, contained fine to coarse grained sand, fine to coarse grained gravel, and trace to some fines. The moisture content ranged from 5.4% to 24.5%. Grain size analyses on three (3) samples indicated that the sand with



gravel consisted of 17% to 36% gravel, 51% to 72% sand, and 9% to 25% fines. Uncorrected SPT N-values in the sand with gravel generally varied from 10 to 61 with higher SPT values encountered at depth.

Clayey Silt Till – Clayey silt till was encountered in test holes THP19-01, THP19-02 and THP19-03. In THP19-01, the clayey silt till was grey in colour, wet, very hard, of low plasticity and contained varying amounts of sand. Very hard augering was observed in this layer in THP19-01 and pieces of shale fragments were recovered before test hole refusal. In THP19-02 and THP19-03, the clayey silt till was brown to grey in colour, moist, firm to hard, of low plasticity and contained varying amounts of sand. Grain size analyses on one (1) sample indicated that the clayey silt till was comprised of 11% gravel, 38% sand, and 51% fines. Uncorrected SPT N-values in the clayey silt till varied from 16 to over 130 blows (partial penetration of 125 mm).



			Plasticity (%)				Grain Size Distribution				
Test Hole #	Sample Depth (M) / Sample	Moisture Content (%)			PL PI			San	d		
	No.		u	PL		Gravel	Coarse (<4.75 to 2.0 mm)	Medium (<2.0 TO 0.425 MM)	Fine (<0.425 TO 0.075 MM)	Sand Total	Silt and Clay (<0.075 mm)
	0.76 (S2)	48.2									
	1.52 (s3)	18.8									
THP19-01	3.05 (S5)	5.4									
	6.10 (S7)	11.5									
	7.62 (S9)	14.0				17.5	9	19	43.5	71.5	
	0.76 (S2)	11.8									
	1.52 (S3)	10.9	20.6	12.1	8.5	5	5	7	26	38	57
THP19-02	2.29 (S4)	24.5									
111713-02	3.05 (S5)	14.1									
	4.57 (S6)	10.1	18.5	11.9	6.6	11	7	10	21.5	38.5	50.5
	6.10 (S7)	15.4				21	10	20	24	54	25
	0.67 (S2	33.7									
THP19-03	1.52 (S3)	19.3									
1117 1 <i>3</i> -03	2.29 (S4)	37.1									
	3.05 (S5)	15.3									

TABLE 2: PICKERING DYKE: SUMMARY OF SOIL INDEX CHARACTERISTICS



			Plasticity (%)			%)	Grain Size Distribution				
Sample Depth Test Hole # (M) / Sample No.	Moisture Content						Sand				
	(%)	u	PL	PI	Gravel	Coarse (<4.75 to 2.0 mm)	Medium (<2.0 TO 0.425 MM)	Fine (<0.425 TO 0.075 MM)	Sand Total	Silt and Clay (<0.075 mm)	
	4.57 (S6)	8.7									
	6.10 (S7)	9.2				36	18	22	11	51	13
	0.61 (S2)	24.4									
THP19-04	2.29 (S4)	24.6									
	4.57 (S6)	11.6				25	17	30	19	66	9



4.1.2 AJAX DYKE

4.1.2.1 Dyke Fill

Trail topping (quarry dust) was encountered in both test holes to a depth of approximately 75 mm±.

The fill material encountered within the dyke generally consisted of a clayey silt till fill. The clayey silt till fill material was encountered below the trail topping. The dyke fill extended to a depth of 3.0 m at both test hole locations from the crest of the dyke. The clayey silt till fill was generally brown in colour, moist, firm to stiff, of low plasticity, and contained varying amounts of sand and trace organics. The moisture content of the fill material varied from 10% to 18%. An Atterberg Limits test on a sample of the fine fraction indicated that the clayey silt till fill was of low plasticity with a measured Liquid Limit of 25%, Plastic Limit of 14% and Plasticity Index of 12%. Grain size analyses on one (1) sample indicated that the dyke fill consisted of 6% gravel, 33% sand, and 61% fines. Generally, the uncorrected SPT N-values in the dyke fill varied from 13 to 26.

4.1.2.2 Foundation Soils

The foundation soils encountered at the Ajax dyke consisted of Clayey Silt, Sand and Sand with Gravel within the investigated depth.

Clayey Silt – A layer of clayey silt, measuring 3.0 m± thick, was observed beneath the fill in both test holes. The clayey silt was generally brown to greenish brown, moist, soft to stiff and contained trace to some sand and trace gravel with organics. Moisture contents in the clayey silt varied from 11% to 29%. Atterberg Limits tests on two (2) samples of the fine fraction indicated that the clayey silt till fill was of low plasticity with a measured Liquid Limit between 21% and 24%, Plastic Limit between 18% and 20% and Plasticity Index of 3% to 4%. Grain size analyses on two (2) samples indicated that the clayey silt consisted of 1% gravel, 23% to 48% sand, and 52% to 76% fines. Uncorrected SPT N-values in the clayey silt varied from 2 to 14 with lower SPT values located near the east tie-in. One sample of silt was also submitted for organic content testing. It was found to have 2.8% organic content.

Sand – Sand was encountered below the clayey silt at test hole THA19-01. The sand was generally grey in colour, fine to coarse grained, wet, loose to very dense and contained trace fine to coarse sub-angular to angular gravel and trace to some fines. Moisture contents in the sand varied from 9% to 14%. Uncorrected SPT N-values in the sand varied from 3 to 90 with higher SPT values encountered at depth.

Sand with Gravel – Sand with gravel was encountered below the clayey silt at test hole THA19-02. The sand with gravel was generally grey in colour, fine to coarse grained, wet, very dense and contained trace fine to coarse sub-angular to angular gravel and trace to some fines. One (1) moisture content test in the sand with gravel indicated 9% moisture. Uncorrected SPT N-values in the sand varied from 50 to 70 with higher SPT values encountered at depth.



			Plasticity (%)				Grain Size Distribution				
Test Hole #	Sample Depth (M) / Sample	Moisture Content (%)						San	d		
٦	No.		u	PL	PI	Gravel	Coarse (<4.75 to 2.0 mm)	Medium (<2.0 TO 0.425 MM)	Fine (<0.425 TO 0.075 MM)	Sand Total	Silt and Clay (<0.075 mm)
	0.76 (S1)	9.4									
	1.52 (S2)	14.4									
THA19-01	3.05 (S4)	16.2									
	4.57 (S5)	13.5	24	20.3	3.7	1	1	2	20	23	76
	7.62 (S7)	9.1				4	6	19	54	79	17
	0.76 (S1)	13.8									
	1.52 (S2)	10.7									
THA19-02	3.05 (S3)	18.1	25.5	13.9	11.6	6	8	5	20	33	61
	4.57 (S4)	23.8				0	0	0	48	48	52
	6.10 (S5)	27.7	9.6	21.3	18.3	3.0					

TABLE 3: AJAX DYKE: SUMMARY OF SOIL INDEX CHARACTERISTICS



4.2 Groundwater Conditions

The four (4) standpipe piezometers installed as part of this geotechnical investigation as well as five (5) of the GeoPro Consulting Ltd. standpipe piezometers installed in 2017 were read at least once as part of this assignment between August 6th, 2019 and August 22nd, 2019. Table 4 summarizes the groundwater monitoring results.

Groundwater monitoring results for the Pickering Dyke varied from elevation 79.1 to 82.0 with a gradient that is assumed to closely follow the hydraulic gradient of Duffin's Creek (i.e. in a north to south direction).

Groundwater monitoring results for the Ajax Dyke varied from elevation 76.5 to 77.5. No clear groundwater gradient is apparent in the recent readings due to an anomalously higher reading in BHA1, located between TH19A-01 and TH19A-02.

4.2.1 FALLING HEAD PERMEABILITY TEST RESULTS

Falling head tests were completed on the following monitoring wells:

- THA19-01 (Ajax Dyke)
- BHA1 (Ajax Dyke)
- THA19-02 (Ajax Dyke)
- BHP1 (Pickering Dyke)
- BHP4 (Pickering Dyke)
- THP19-02 (Pickering Dyke)
- BHP6 (Pickering Dyke)
- BHP7 (Pickering Dyke)
- THP19-03 (Pickering Dyke)

The falling head tests were completed according to the Hvorslev Slug-Test method. The standpipe piezometers selected for the falling head tests were chosen specifically because the screened length of the standpipe was completely saturated prior to the tests. The results of the falling head tests (i.e. the estimated saturated hydraulic conductivity – K_{sat}) are summarized in Table 5 and detailed test results are included in Appendix I.

The estimated K_{sat} value of one of the falling head tests (BHP4) could not be determined because the monitoring well could not be filled without immediately dissipating the excess head pressure. K_{sat} values for preliminary design are summarized along with the material properties for general soil units in the Section 4.4. The high permeability in the underlying sand and gravel layers for the Pickering Dyke is based on the free draining conditions observed in BHP4.



Dyke Name:	Ajax Dyke			Pickering Dy	/ke				
Test Hole:	THA19-01	BHA1	THA19-02	BHP1	BHP4	THP19-02	BHP6	BHP7	THP19-03
Approximate Station:	0+160	0+100	0+060	1+030	0+890	0+825	0+745	0+585	0+280
Ground Elevation ⁽²⁾ (m):	81.00	81.25	81.00	84.50	84.00	83.75	83.75	83.50	81.25
Tip Elevation (m):	71.90	75.15	73.40	79.90	79.40	77.65	79.15	77.40	73.55
Monitoring Zone:	Sand	Sandy Silt / Clayey Silt	Sand with Gravel	Sand and Gravel	Silty Sand / Silt Till	Clayey Silt Till	Sand and Gravel	Sand and Gravel	Sand with Gravel
Date		S	S			N	*	•	·
06-Aug-19				82.02	81.22		80.75	79.86	
07-Aug-19		77.45		82.00	81.25		80.75	80.00	
19-Aug-19	76.53		76.94						
22-Aug-19		77.37		82.02	81.35	81.33	80.73	79.86	79.10

TABLE 4:	PIEZOMETRIC	MONITORING	RESULTS
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Notes:

1. Standpipe piezometer at test hole BHA1, BHP1, BHP4, BHP6, BHP7 were installed by GeoProConsulting in 2017.

2. The ground elevations at all test holes are approximate and based on interpretation of the available topography survey (2017) and LiDAR (2015) provided by TRCA.



DYKE	TEST HOLE ID (Monitoring Zone)	Station	Screen Depth Range (m)	Static Water Level Depth (m)	Falling Head Test K _{SAT} (cm/s)	Notes
	THA19-01 (Sand)	0+160	7.6 - 9.1	3.43	3.8E-04	
Ajax Dyke	BHA1 (Sandy Silt / Clayey Silt)	0+100	4.6 - 6.1	3.65	2.0E-06	
	THA19-02 (Sand with Gravel)	0+060	4.6 - 6.1	3.84	7.7E-04	
	BHP1 (Sand and Gravel)	1+030	3.1 - 4.6	2.33	3.8E-03	
	BHP4 (Silty Sand / Silt Till	0+890	3.1 - 4.6	2.49	N/A	1
Pickering Dyke	THP19-02	0+825	4.6 - 6.1	2.21	5.5E-04	
		0+745	3.1 - 4.6	2.94	2.7E-03	
		0+585	4.6 - 6.1	3.47	4.8E-04	
	BHP4	0+280	6.1 - 7.6	1.99	2.8E-03	

TABLE 5: FALLING HEAD TEST RESULTS AND EXPECTED PERMEABILITY COMPARISONS

Notes:

1. Excess head pressure dissipated too quickly. Open conditions.



5.0 GEOTECHNICAL ENGINEERING ASSESSMENT

5.1 General Stratigraphic Profiles

Figures GR-01 and GR-02 illustrate general stratigraphic profiles that consider the results of all four geotechnical site investigations completed at the sites of the Ajax and Pickering Dykes. In general, the stratigraphic profiles consist of four distinct soil layers, as described in Section 2.3.

Representative estimated shear strength and permeability parameters for the four primary soil layers at the sites of the Ajax and Pickering Dykes are presented on Table 6. The soil strength parameters were estimated from Standard Penetration Tests (SPT), laboratory index testing using empirical correlations, as well as previous experience with similar soil materials. It should be noted that advanced laboratory tests were not completed on the dyke fill and foundation soils as part of this scope of work.

Material (USCS Soil Types)	Saturated Hydraulic Conductivity, K _{SAT} (cm/s)	UNIT WEIGHT, Y (kN/m³)	Effective Friction Angle Φ'	UNIT Cohesion C' (kPa)
Dyke Fill (Clayey Silt Till Fill)	1 x 10 ⁻⁵	19.5	30°	0
Clayey Sil / Silty Sand	1 x 10 ⁻³ – Pickering 1 x10 ⁻⁵ - Ajax	18.0	30°	0
Sand with Gravel	1 x 10-1 – Pickering 1 x10 ⁻³ - Ajax	21.0	34°	0
Clayey Silt Till	1 x 10 ⁻⁵	21.5	35	0

TABLE 6: EFFEECTIVE SHEAR STRENGTH AND HYDRAULIC CONDUCTIVITY PARAMETERS

*may contain cobbles and boulders

The recommended hydraulic conductivity values consider the results of the falling head tests as follows:

- No falling head tests were completed in dyke fill material. The recommended K_{sat} of 1x10-5 cm/s is a reasonable estimate considering the typical permeability for a clayey silt till fill (firm to stiff).
- 2) No hydraulic conductivity test was available in the upper Clayey Silt / Silty Sand of the Pickering Dyke. The recommended K_{sat} (1x10-3 cm/s) for the upper Clayey Silt / Silty Sand is a reasonable estimate based on the range of soil gradation test results in this upper material.
- 3) A single falling head test result was obtained from a piezometer installed in the upper Clayey Silt of BHA1 at the Ajax Dyke. The estimated K_{sat} from the falling head test was 2x10-6 cm/s. The recommended permeability (K_{sat} = 1x10-5 cm/s) is conservative and rounded up to the next highest order of magnitude relative to the applicable test results. The permeability is consistent with that recommended for the overlying dyke fill.



- 4) The results of falling head tests that could successfully be completed in the sand and gravel layer at the Pickering Dyke varied from a K_{sat} of 4.8x10-4 cm/s to 3.8x10-3 cm/s. The recommended permeability primarily considers the result in BHP4 in which the standpipe piezometer could not be filled quickly enough to maintain excess head. The recommended K_{sat} of 1x10-1 cm/s would be consistent with a test that could be successfully completed in less than 1 second.
- 5) The results of falling head test results that were completed in the sand and gravel layer at the Ajax Dyke varied from a K_{sat} of $3.8 \times 10-4$ cm/s to $7.7 \times 10-4$ cm/s. The recommended permeability ($K_{sat} = 1 \times 10-3$ cm/s) is conservative and rounded up to the next highest order of magnitude relative to the applicable test results.
- 6) The recommended K_{sat} (1x10-5 cm/s) for the Clayey Silt Till is a reasonable estimate based on the range of soil gradation test results.



6.0 CHEMICAL TESTING AND ANALYSIS

Composite soil samples were collected from test holes THP19-01, THP19-02, THP19-05 and THP19-06 on the Pickering Dyke and test holes THA-01 and THA-02 on the Ajax Dyke. Test hole locations are shown on Figures GR-01 and GR-02. Observations made at the time of drilling are provided on the stratigraphic logs provided in Appendix F, and show no visual (hydrocarbon staining) or olfactory (hydrocarbon odour) evidence of soil contamination. Representative soil samples were submitted under chain of custody to AGAT Laboratory in Mississauga for toxicity characteristic leaching procedure (TCLP) analysis, specifically for inorganic and metal parameters as per Ontario Regulation (O.Reg) 558. It is recommended that additional soil samples be collected from the dykes and submitted for analysis of O.Reg. 153/04 parameters at the detailed design stage as part of the planning and development of the Excess Soil Management Plan (described at the end of this section).

Table 7 provides a summary of the results as compared to O.Reg 558 Schedule 4 Leachate Quality Criteria. A copy of the laboratory certificate of analysis is provided in Appendix G.

Leachate		La	aboratory Re	esults (mg/L)		O. Reg. 558 - Schedule 4
Parameter	THA-01	THA-02	THP-01	THP-02	THP-05	HPP-06	Leachate Quality Criteria
Arsenic	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	2.5
Barium	0.74	0.688	0.623	0.611	0.0675	0.688	100
Boron	0.053	<0.05	0.059	0.05	0.06	0.067	500
Cadmium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.5
Chromium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	5
Lead	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	5
Mercury	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.1
Selenium	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1
Silver	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	5
Uranium	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	10
Fluoride	0.21	0.21	0.13	0.17	0.09	0.16	150
Cyanide	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	20
Nitrate+Nitrite as N	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	1000

TABLE 7: TCLP RESULTS-SOIL



TCLP is a chemical analysis process used to determine whether there are hazardous elements present in a material, in this case soil. The test involves a simulation of leaching through a landfill and can provide a rating that can prove if the soil is leachate toxic. Leachate toxic means producing leachate containing any of the contaminants listed in Schedule 4 of O.Reg 588 at a concentration equal to or in excess of the concentration specified for that contaminant in Schedule 4 using the TCLP Method 1311 that appears in the United States Environmental Protection Agency Publication SW-846 entitled "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods", as amended from time to time, or an equivalent test method approved by the Ministry of Environment Conservation and Parks.

All TCLP results where below their respective O.Reg 588 Schedule 4 criteria, with most below reported detection limits, indicating that soils sampled from the Pickering and Ajax are not leachate toxic, and can be disposed of at any solid non-hazardous landfill. Additional tests would be required during development of the Excess Soil Management Plan (discussed below) to dispose of these soils at other willingly receiving sites, such as construction sites.

During the detailed design phase an Excess Soil Management Plan will need to be developed in compliance with Ontario's new On-Site and Excess Soil Regulation (O.Reg. 406/19) detailing how soil removed from the site will be managed. On December 4, 2019 the Government of Ontario announced that it had finalized and is implementing O.Reg.406/19 under the *Environmental Protection Act (EPA)*. The new regulatory framework provides clarification on the responsibilities for both generators and receivers of excess soil in Ontario. <u>The regulation defines excess soil as soil that has been excavated that must be removed from the project area (including any sediment).</u> The Regulation will hold proponents responsible for the proper management of excess soil generated by their project. Non-compliance could lead to fines and orders issued under the EPA.

The new regulation is being phased in as follows:

- July 1, 2020: reuse rules, including risk-based standards, waste designation and approvals
- January 1, 2022: testing, tracking and registration
- January 1, 2025: restrictions on landfilling soils
- grandfathering provisions applicable from January 1, 2021 to January 1, 2026, to recognize where work to be done is already stipulated in a contract.

The main components of excess soil management as defined under O.Reg 406/19 include the following:

- Assessment of Past Uses Report this report includes the following:
 - a) Records Review;
 - b) Interviews with persons familiar with the site;
 - c) Site Reconnaissance;
 - d) A review and evaluation of information gathered;
 - e) Determine areas of actual or potential environmental concern and chemicals of concern; and
 - f) Preparation of an Assessment of Past Uses Report.
- Sampling and Analysis Plan
 - a) Determine number of samples (this depends on volume to be removed from the site minimum of 3 samples for < 600 m3 with additional samples per additional volume);



- b) Develop laboratory program based on the standard parameter list provided in O.Reg. 409/19 and potential chemicals of concern identified in the Assessment of Past Uses Report.
- c) Collect and analyze samples, with number of samples dependent on the volume of soil to be removed from the site.
- Preparation of Characterization Report Including Review and Evaluation
 - a) Incudes date assessment and comparison to excess soil quality guidelines, cross sections, figures, tables and narrative description.

<u>Excess Soil Destination Report</u>

a) Report detailing the logistics of soil removal (dates, final depths, volumes, destination etc.)

<u>Tracking System Development</u>

a) Plan on how each load leaving the site will be tracked.

Ultimately the purpose of the new regulation is to promote the on-site re-use of soils where appropriate. The Excess Soil Management Plan need to determine and plan for a beneficial end of soil removed from the site.



7.0 CLOSURE

- A geotechnical investigation program was undertaken in 2019 at the sites of the Ajax and Pickering Dykes to confirm dyke and foundation conditions, expand upon the existing geotechnical information, and determine if the dykes are comprised of any impacted soils warranting special handling or disposal considerations.
- 2. Four (4) test holes were advanced at the site of the Pickering Dyke and two (2) test holes were advanced at the site of the Ajax Dyke. An additional two (2) dyke samples of the Pickering Dyke were also obtained as part of four (4) samples submitted for O.Reg 558 Metals and Inorganics analyses.
- 3. The dyke fill materials encountered at both dykes consisted of clayey silt till fill. In general, the clayey silt till fill was brown in colour, moist, firm to stiff, of low plasticity, and contained varying amounts of sand and trace organics.
- 4. The foundation soils encountered at the Pickering Dyke consisted of Silty Sand, Clayey Silt, Sand with Gravel and Clayey Silt Till. In THP19-01, very hard augering was observed in the Clayey Silt Till layer (9 m depth) and pieces of shale fragments were recovered before test hole refusal.
- 5. The foundation soils encountered at the Ajax Dyke consisted of Clayey Silt, Sand and Sand with Gravel.
- 6. Piezometric data revealed that the groundwater levels beneath the dykes varied from elevation 76.5 m to 82.0 m between August 19 and 22, 2019. The variation is assumed to closely follow the hydraulic gradient of Duffin's Creek. Falling head tests were also completed on new and previously installed monitoring wells.
- 7. Based on the chemical testing and analysis, the soil sampled from the Pickering and Ajax Dykes was not leachate toxic. Observations made at the time of drilling indicated no potential contamination of soil.
- 8. The recommended soil strength and hydraulic conductivity parameters for the dyke fill and foundation soils to be used in the analyses as part of the dykes' rehabilitation were estimated based on the SPT testing, laboratory testing results with empirical correlations, falling head testing and previous experience with similar materials.



8.0 REFERENCES

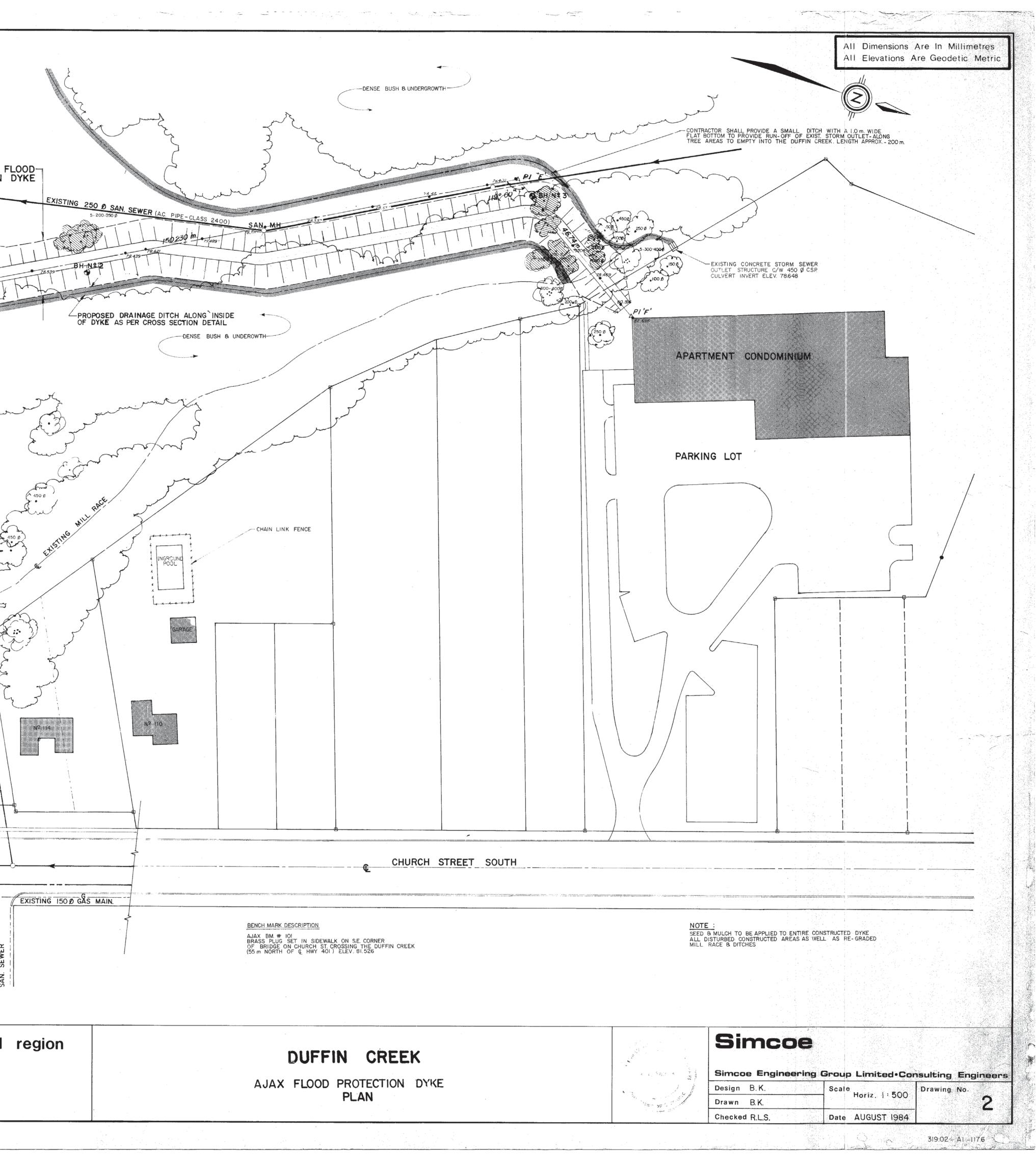
- 1. Geo-Canada, Geotechnical Investigation Proposed Dyking Duffin Creek Pickering, Ontario, August 1984
- 2. Geo-Canada, Subsurface Investigation Proposed Dyking Duffin Creek Pickering, Ontario, August 1985
- 3. Valdor Engineering, Dyke Level of Service and Rehabilitation Report Pickering / Ajax SPA's, March 2018



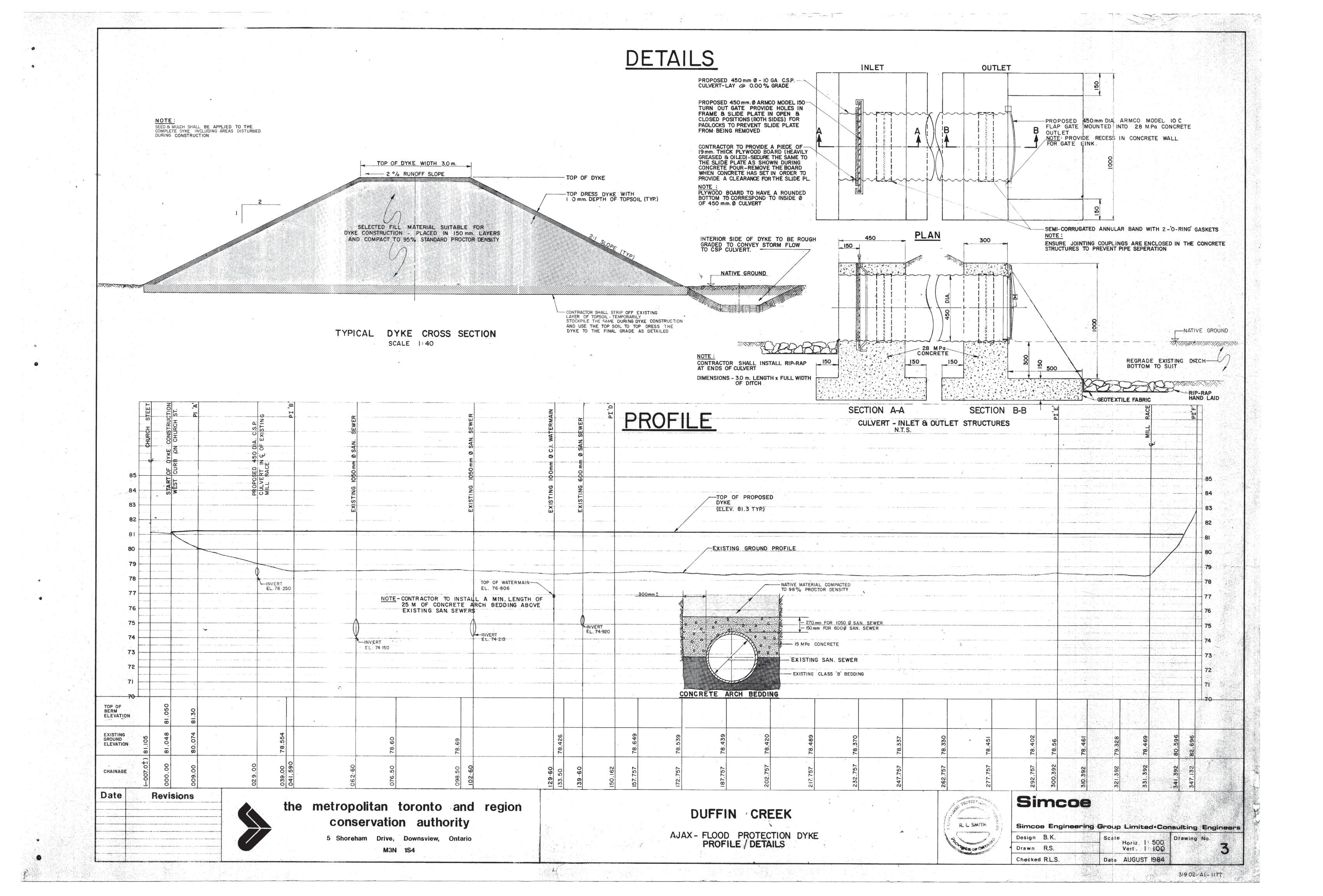
APPENDIX A

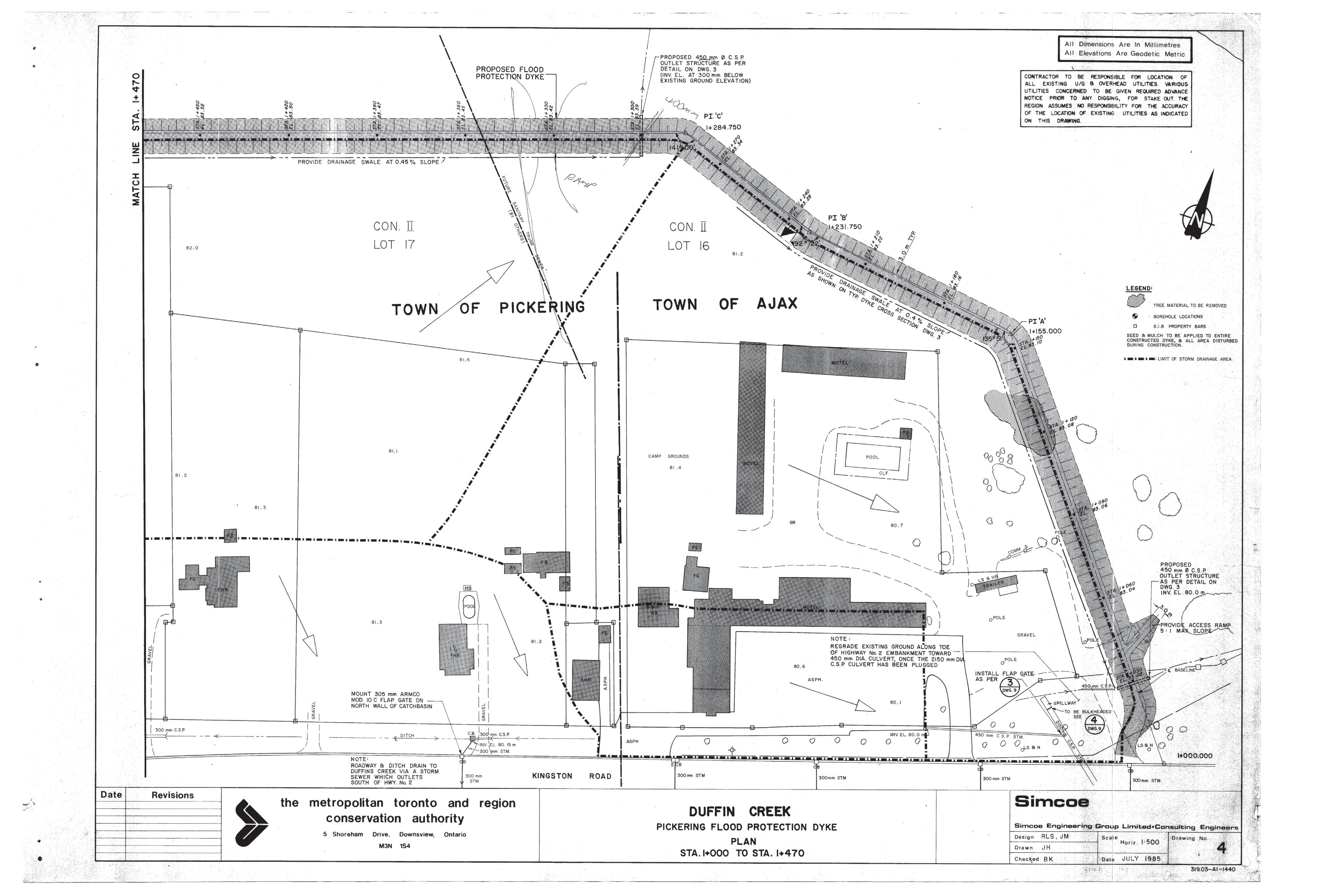
Construction Drawings for the Ajax and Pickering Dykes

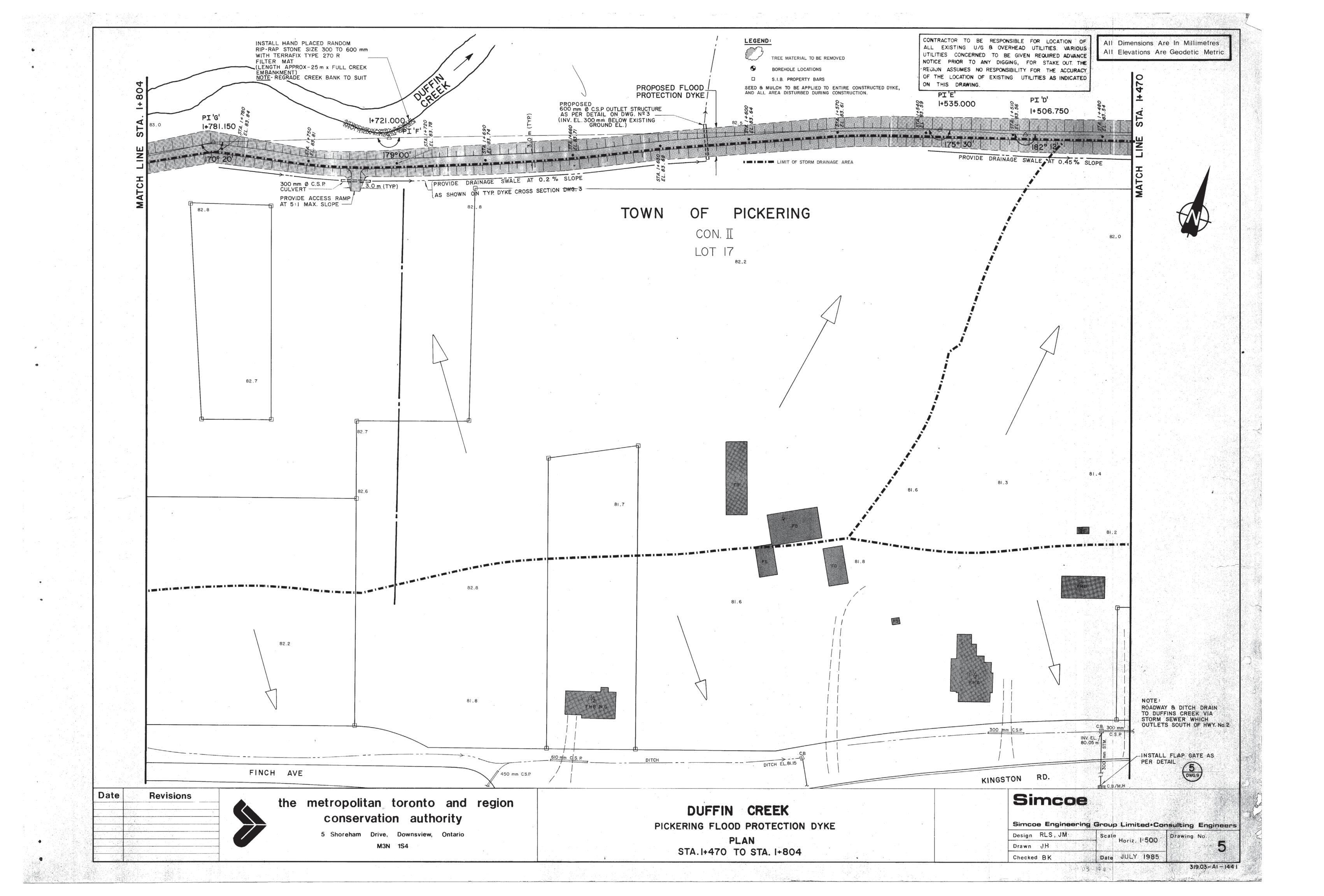
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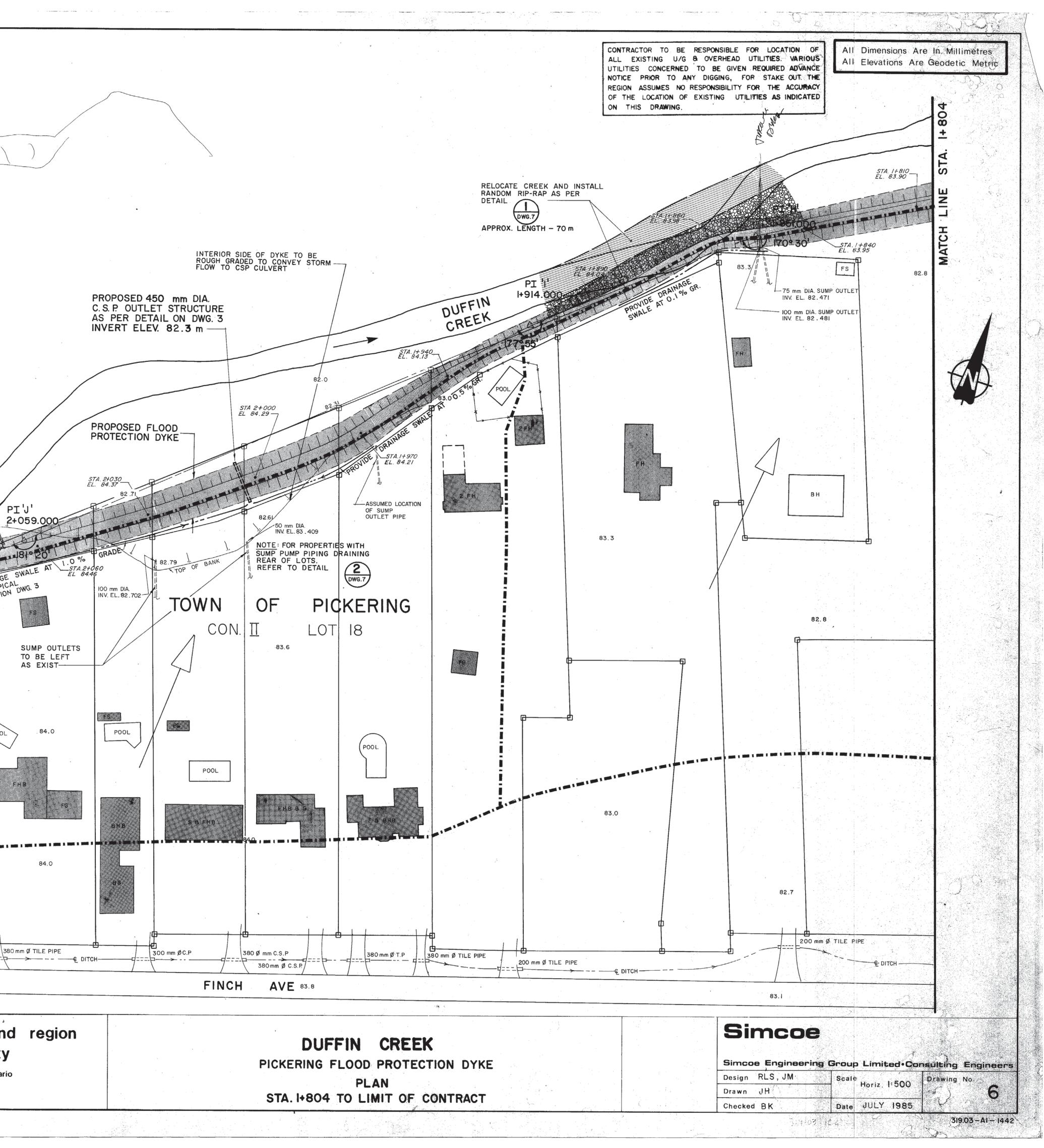
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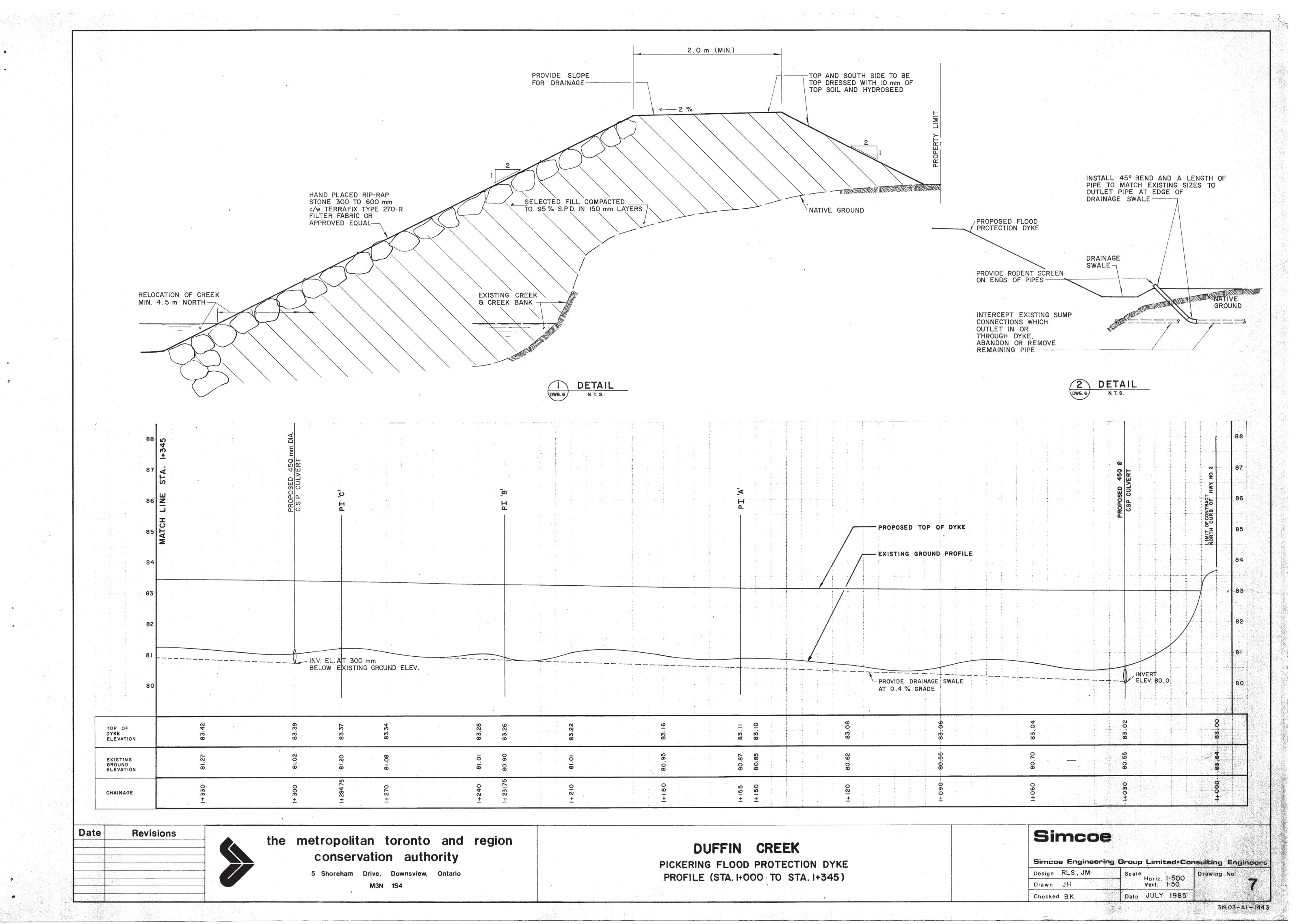






BENCH MARK DESCRIPTION GOEDETIC B.M. 67-U-002 PICKERING TOWNSHIP MUNICIPAL BUILDING, at northeast corner of intersection of HWY #2 and Brock Road, tablet in southwest concrete foundation wall at northeast side of main entrance, 150 mm from south corner, 60 mm below brick, 60 mm above concrete sidewalk. Elevation 87.580 m. LEGEND: (IIIIAII) TREE MATERIAL TO BE REMOVED BOREHOLE LOCATIONS S.I.B. PROPERTY BARS SEED & MULCH TO BE APPLIED TO ENTIRE CONSTRUCTED DYKE, AND ALL AREA DISTURBED DURING CONSTRUCTION. LIMIT OF STORM DRAINAGE AREA PROPOSED 300 mm DIA. C.S.P. OUTLET STRUCTURE AS PER DETAIL ON DWG. 3 (INV. EL. IOO mm BELOW EXIST. GROUND LEVEL) INSTALL HAND PLACED RANDOM RIP-RAP STONE SIZE 300 TO 600 mm WITH TERRAFIX TYPE 270 R FILTER MAT -(LENGTH APPROX-47 m x FULL CREEK EMBANKMENT TO TOP OF DYKE) NOTE : REGRADE CREEK BANK PI'J' STA. 2+090 EL. 84.46 AS SHICROSS STA. 2+150 EL 84.70 2+163.850 (POOL 84 . 6 0 ROA FG BROCK BHB 380 mm Ø TILE PIPE 86.4 Date Revisions the metropolitan toronto and region conservation authority 5 Shoreham Drive, Downsview, Ontario M3N 1S4





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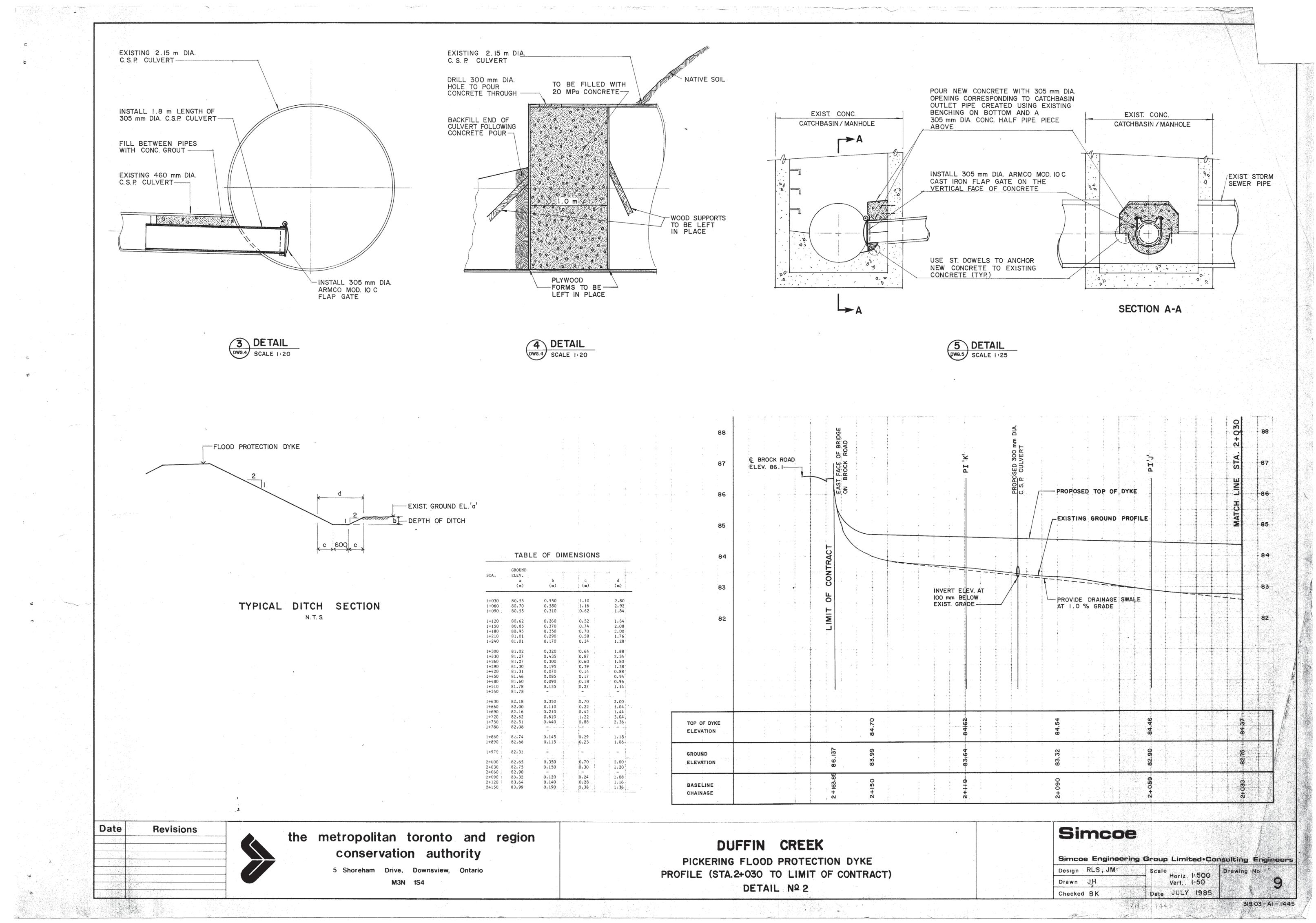
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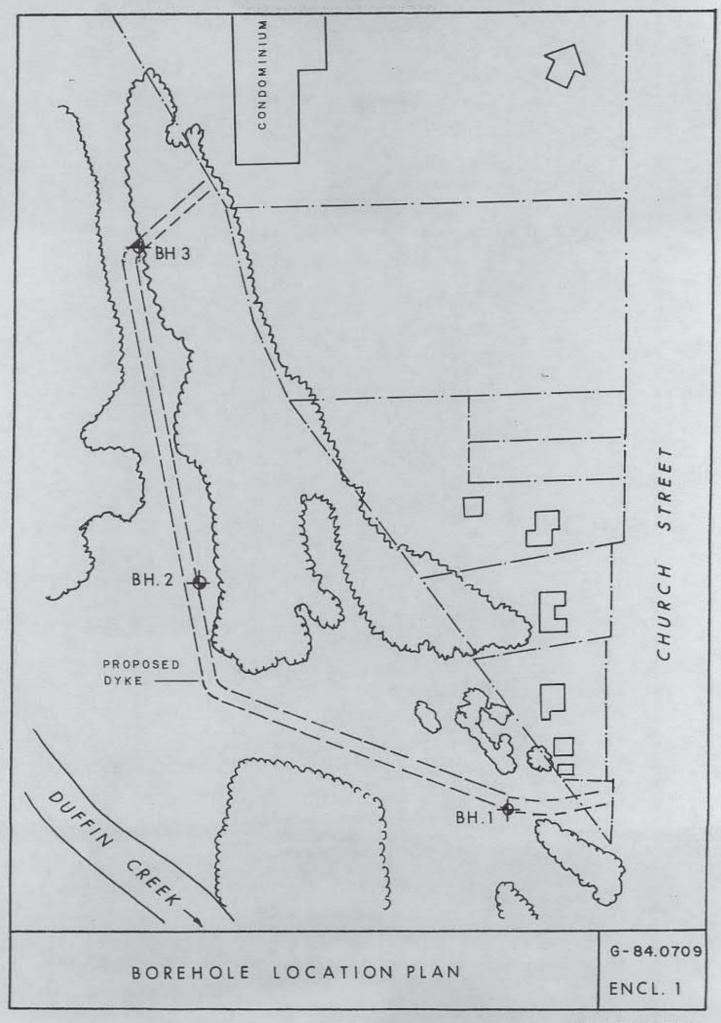
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APPENDIX B

1984 Ajax Dyke Geotechnical Investigation Logs



GEO-CANADA LTD.

LOG OF BOREHOLE

Our Reference NE C-84.0709

CLIENT: SIMCOE ENGINEERING LTD. PROJECT: DUFFIN CREEK DYKE LOCATION PICKERING, ONTARIO DATUM ELEVATION: GEODETIC

RILLING	DATA	
Arthod:	AUCERING	
liometers	125 mm	
orei	August 3,	1984

	SOIL PROFILE		5	AMPL	E\$	S S	SCALE	DYNAMIC CONE PE RESISTANCE FLOT	NETRATION	PLASTIC	HATURAL LIQUO	H	REMARKS
ELEV DEPTH m 78.6	, DESCRIPTION Ground Surface	STRAT PLOT	NUMBER	TYPE	'N' VALUES	GROUND WATER CONDITIONS	ELEVATION SC	ZO 40 60 SHEAR STRENGTI O UNCONFINED O QUICK TRIAXIAL	BO 100 H + FIELD VANE × LAB VANE	Wp	CONTENT (%)	X WEIGHT	GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	TOPSOIL	12 2	1	SS	24								
0.3	SILT Organic Some Sand, Shells,	4					78 -		_		_		
	Very Slightly Plastic Very Loose to Loose	-	z	S5	7								
	Hoist Wet	-	3	SS	4		77 -						
	 	~				4	W.L. 76.5						
	Sandy	-	4	SS	3		76 -						
75.4	SILEY SAND & GRAVEL		5	SS	25								
75.1	Compact Vet END OF BOREHOLE	0	-	-	-		-						

GEO-CANADA LTD.

Enclosure Ne 2

LOG OF BOREHOLE .. 2

Our Reference Nº G-84.0709

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CLIENT' SINCOE ENGINEERING LTD. PROJECT' DUFFIN CREEK DYKE LOCATION PICKERING, ONTARIO DATUM ELEVATION' GEODETIC DRILLING DATA Method: AUCERING Diameter: 125 mm Date: August 3, 1984 Enclosure NT 3

7

-	SOIL PROFILE		5	AMPI	LE5	S ER	ALE		NCE PU			TION		ASTIC	MATURA	AL LIC	000	H	REMARKS
ELEV DEPTH m 78.4	DESCRIPTION Ground Surface	STRAT PLOT	NUMBER	TYPE	'N' VALUES	GROUND WATER CONDITIONS	ELEVATION SCAL	SHEAR	40 STREN ONFINED K TRIAXI	GTH	+ FI	100 ELD VAN	VE U			WE LD	₩i 	A WEIGHT	& GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0 78.1 0.3	TOPSOIL	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	1	S \$	4		78 -										_		
0,5	Brown SILT Organic Some Sand, Shells ,	+ 1 + 2	2	SS	8										,	-0-4			-,30, 70
	Moist Wet	-	1		17		77 -		-	-			-	-	-	-			
	Slightly Plastic Loose	~ ~	3	SS	5	÷.	W.L. 76.6									0			
75.8		T	4	\$\$	6		76			-	+		+	-		0			20, 69, 11, -
2.6	Grey Wet Silty SAND & GRAVEL Some Organic Matter Compact	0																	
74.9			1.1	55	16		75				_	_	_	_	_	_			
							1											1	

LOG OF BOREHOLE .. 3

Our Reference Nº G-84.0709

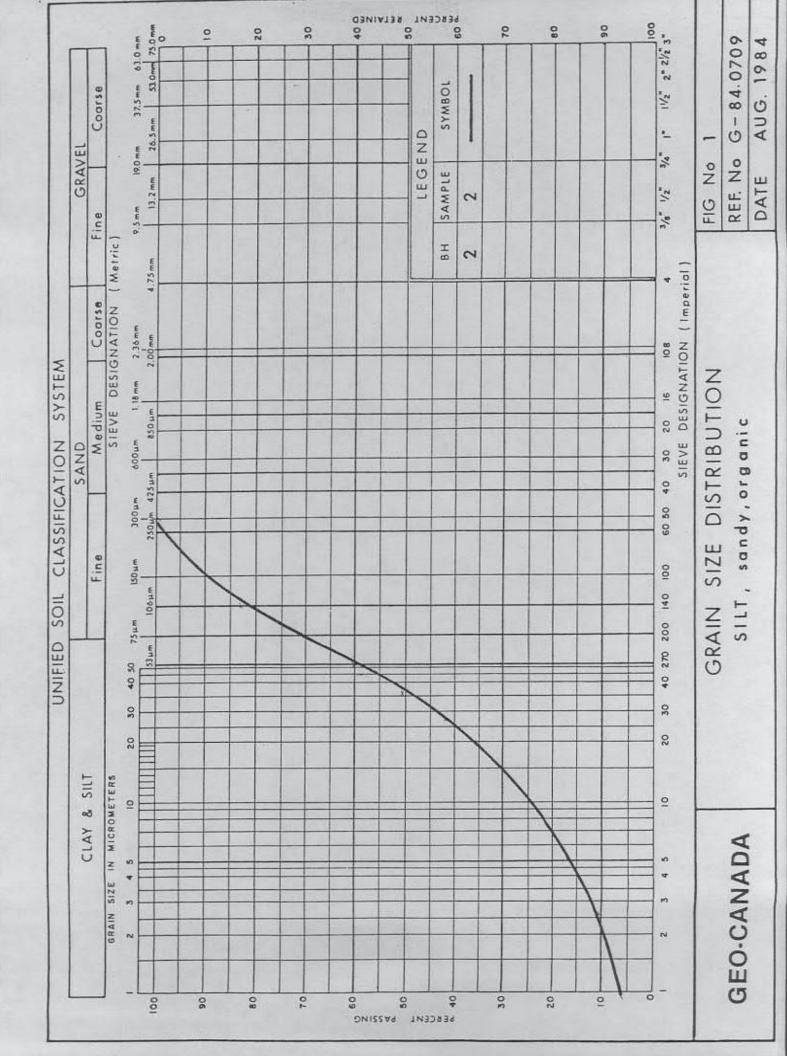
CLIENT: SIMCOE ENGINEERING LTD. PROJECT: DUFFIN CREEK DYKE LOCATION: PICKERING, ONTARIO DATUM ELEVATION: GEODETIC

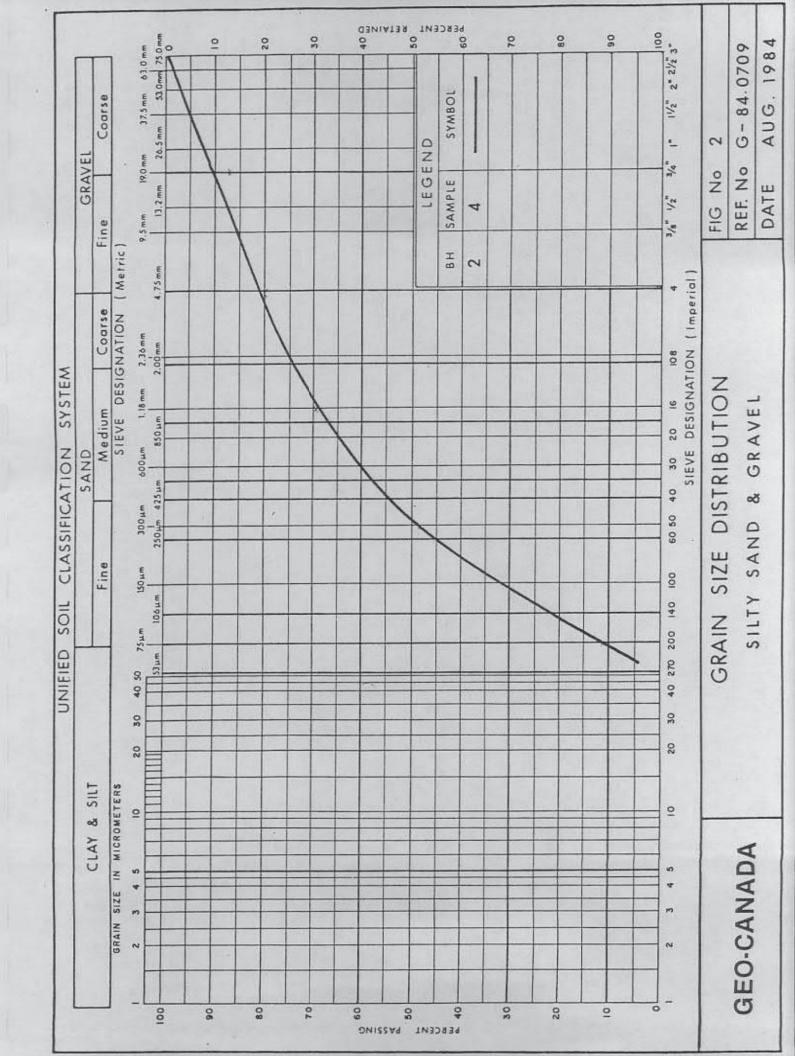
DRILLING DATA Method: AUGERING Diameter: 125 mm Date: August 3, 1984

9	SOIL PROFILE		S	AMPL	ES	S	SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC	NATURAL MOSTURE LIQUE CONTENT LIMIT	HI	REMARKS
ELEV DEPTH m 78.6	DESCRIPTION Ground Surface	STRAT PLOT	NUMBER	TYPE	'N' VALUES	GROUND WATER CONDITIONS	ELEVATION SC	SHEAR STRENGTH	Wp 	CONTENT (%	Ne vo	& GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
0.0	TOPSOIL	222	1	55	7							
0.3	Brown SILT Organic	+ +					78 -				-	
	Some Sand, Shells Slightly Plastic Loose	-	2	55	7		W.L.					
		+	3	55	4	Ţ	77.1					
76.0		T	4	SS	15		76					
2.6	Grey, Compact wet Silty SAND & GRAVEL		-									
75.5 3.1 75.1	Grey, Dense Sandy Silt TILL	何	5	SS	30				4			

GEO-CANADA LTD.

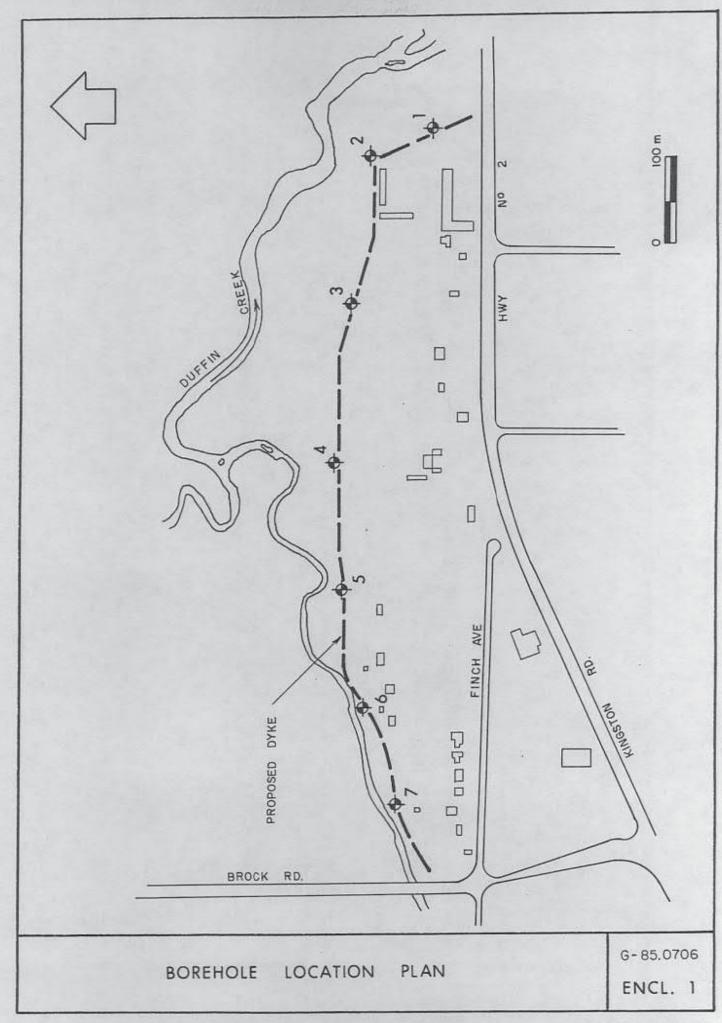
: Enclosure Nº





APPENDIX C

1985 Pickering Dyke Geotechnical Investigation Logs



GEO-CANADA LTD.

PROJECT No. G-85.0706 LOG OF BOREHOLE ... 1

CLIENT: M.T.R.C.A. c/o Simcoe Engineering

PROJECT: Duffin Creek Dyke

LOCATION: Pickering, Ontario

DRILLING DATA

Method: Augering

July 22, 1985

Diameter: 100 mm

Date:

DATUM ELEVATION: Geodetic

SAMPLE SOIL PROFILE m 10.3 NUMBER SYMBOL ELEV. GROUND TYPE REMARKS BLS. WATER DESCRIPTION DEPTH. (%) Z 80.6 Ground Surface SA. SI. CL. 22 GR. W 0.0 300 mm Topsoil 1 SS 47 FILL 5 silty sand, some gravel brown dense to compact 2 SS 18 0 damp moist V (----78.8 3 SS 7 W.L. 1.8 79.1 m Organic SANDY SILT trace gravel grey, black mottled wet, loose 78.1 ~ 4 SS 25 2.5 SAND AND GRAVEL 0. trace silt grey, saturated . 6 compact 5 SS 27 65 30 5 0 17 B . 0 77.1 3.5 END OF BOREHOLE

PROJECT No G-85.0706 LOG OF BOREHOLE ... 2

CLIENT: M.T.R.C.A. c/o Simcoe Engineering

PROJECT: Duffin Creek Dyke

LOCATION: Pickering, Ontario

DATUM ELEVATION: Geodetic

m	SOIL PROFILE		SI	AMP	LE						
ELEV. DEPTH. 80.9	DESCRIPTION Ground Surface	SYMBOL	NUMBER	TYPE	N' BLS /0.3	GROUNE WATE R		REN	AAR %	КS	
0.0	FILL brown	ふし			-		GR.	SA.	SI.	CL.	W
0.5	silty sand, some gravel 50 mm Topsoil brown SILTY SAND	. .	1	SS	24						
79.3	compact to dry loose moist SANDY SILT	· ·	2	SS	7		1	49	50	0	24
1.6	ORGANIC SILT with fine sand dark brown wet		3	SS	2	<u>↓</u> W.L. 78.8 m				1	
78.3	very loose	117	2	22	2	/о.о ш					
2.6	SAND fine to medium, trace shells grey, wet, loose	• • • •									
3.2 79.4	SAND AND GRAVEL wet, loose	°. °	4	SS	8	21					
3.5	END OF BOREHOLE										

GEO-CANADA LTD.

DRILLING DATA

Method:	Augering	
Diameter:	100 mm	
Date:	July 22,	1985

DOLLINIC	DA

PROJECT No. G-85.0706 LOG OF BOREHOLE

CLIENT: M.T.R.C.A. c/o Simcoe Engineering

PROJECT: Duffin Creek Dyke

LOCATION: Pickering, Ontario

DATUM ELEVATION: Geodetic

m	SOIL PROFILE		S	AMP	LE						
ELEV. DEPTH. 81.2	DESCRIPTION Ground Surface	SYMBOL	NUMBER	ТҮРЕ	N' BLS /0.3	GROUNE WATE R		REN	AR %	КS	
0.0	Topsoil VERY FINE SAND brown, damp loose	555	1	SS	10		GR.	SA.	SI.	CL.	W
80.3	ORGANIC SILT sandy		2	SS	6		2	48	50	0	13
79.8	brown, loose SAND fine to medium some silt, shells brown, moist, compact		3	SS	16	Ā	4	76	20	0	19
79.0 2.2 78.6 2.6	SILT brown, wet, loose		4	SS	8	W.L. 79.3 m					
77.7	SAND AND GRAVEL trace of silt brown wet very dense	b	5	SS	52		60	35	5	0	15
2.5	END OF BOREHOLE										

DRILLING DATA

Method:	Augering					
Diameter:	100 mm					
Date:	July 22, 1985					

PROJECT No. G-85.0706 LOG OF BOREHOLE 4 ... • •

M.T.R.C.A. c/o Simcoe Engineering DRILLING DATA CLIENT:

PROJECT: Duffin Creek Dyke

LOCATION: Pickering, Ontario

DATUM ELEVATION: Geodetic

	SOIL PROFILE		S	AMP	LE		
ELEV. DEPTH. 81.8	DESCRIPTION Ground Surface	SYMBOL	NUMBER	TYPE	N' BLS /0.3	GROUND WATE R	REMARKS
0.0	FINE SAND damp to moist loose to compact		1	SS	7		
		· · ·	2	SS	11		
79.7	brownshells	18. a	A 3 B	SS	10	<u> </u>	
12.1 79.3 2.5 78.9	ORGANIC SILT black, wet, loose SAND AND GRAVEL grey, wet, dense	Ĩ+ 	A 4 B	SS	38		
2.9	CLAYEY SILT TILL grey well cemented, hard	1	5	SS	36		
3.5	END OF BOREHOLE						*
	-						

Method:	Augering					
Diameter:	100 mm					
Date:	July 22, 198					

PROJECT No. G-85.0706 LOG OF BOREHOLE

CLIENT: M.T.R.C.A. c/o Simcoe Engineering

PROJECT: Duffin Creek Dyke

LOCATION: Pickering, Ontario

renormal, oncarro

DRILLING DATA

Method: Augering

July 22, 1985

Diameter: 100 mm

Date:

DATUM ELEVATION : Geodetic

m c		SOIL PROFILE		S	AMF	PLE		
0.0FINE SAND trace silt brown, dry loose \sim 1SS380.4shells \sim \sim \sim \sim 1.8SAND AND GRAVEL trace silt, shells grey, wet compact \circ \sim \sim \sim 78.8 \circ \sim \sim \sim \sim \sim 78.8 \circ \sim \sim \sim \sim \sim 78.8 \circ \circ \circ \sim \sim \circ 78.8 \circ <tr<tr <="" td=""><td>ELEV. DEPTH.</td><td></td><td>SYMBOL</td><td>NUMBER</td><td>ТҮРЕ</td><td>N' BLS /0.3</td><td></td><td>KEMARDJ</td></tr<tr>	ELEV. DEPTH.		SYMBOL	NUMBER	ТҮРЕ	N' BLS /0.3		KEMARDJ
Trace silt 1.8 SAND AND GRAVEL 1.8 SS 13 0.12 0.2 1.8 0.2 1.8 0.2 1.8 0.2 1.8 0.2 1.8 0.2 1.8 0.2 1.8 0.2 1.8 0.2 1.8 0.2 1.8 0.2 1.8 0.2 1.8 0.2 1.8 0.2 1.8 0.2 1.8 0.2 <t< td=""><td></td><td>FINE SAND</td><td>255</td><td>1</td><td>SS</td><td>3</td><td></td><td></td></t<>		FINE SAND	255	1	SS	3		
80.4 3 shells $2 \text{ ss } 8$ 1.8 SAND AND CRAVEL $3 \text{ ss } 14$ 80.2 m trace silt, shells $6 \text{ ss } 13$ $6 \text{ ss } 13$ 78.8 $6 \text{ ss } 4$ $6 \text{ ss } 4$ 78.8 78.8 $6 \text{ ss } 4$ 78.8 78.8 $6 \text{ ss } 4$ 78.8 78.8 $6 \text{ ss } 4$ 78.8 $6 \text{ ss } 4$ $6 \text{ ss } 4$ 78.8 78.8 $6 \text{ ss } 4$ 78.8 78.8 $6 \text{ ss } 4$ 78.8 $6 \text{ ss } 4$ $6 \text{ ss } 4$ 78.8 78.8 $6 \text{ ss } 8$ 78.8 78.8 78.8 $6 \text{ ss } 8$ 78.8 78.8 78.8 78.8 78.8 78.8 78.8 78.8 78.8 78.8 78.8 78.8 78.8 7		brown, dry						
80.4 shells \overline{v} 1.8 SAND AND GRAVEL \overline{v} \overline{shells} \overline{v} 1.8 SAND AND GRAVEL \overline{v} \overline{a} \overline{a} $\overline{compact}$ \overline{a} \overline{a} \overline{a} \overline{a} 78.8 $\overline{compact}$ \overline{a} \overline{c} \overline{a} \overline{c} 78.8 \overline{c} \overline{c} \overline{c} \overline{c} \overline{c} 78.8 \overline{c}		loose		-				
1.8 SAND AND GRAVEL trace silt, shells grey, wet compact \circ \bullet 78.8 \circ \bullet \bullet \circ \bullet \bullet \bullet \circ \circ \bullet \bullet \bullet \circ \circ \bullet \bullet \bullet \circ \circ \bullet \bullet \bullet \bullet \circ \bullet \bullet \bullet				2	SS	8		
1.8 SAND AND GRAVEL trace silt, shells grey, wet compact \circ \bullet 78.8 \circ \bullet \bullet \circ \bullet \bullet \bullet \circ \circ \bullet \bullet \bullet \circ \circ \bullet \bullet \bullet \circ \circ \bullet \bullet \bullet \bullet \circ \bullet \bullet \bullet			· _				⊻	
trace silt, shells u <				3	SS	14	80.2 m	
$ \begin{array}{c} compact \\ \hline 78.8 \\ \hline 78.8 \\ \hline 3.4 \\ \hline CLAYEY SILT \\ trace sand, gravel \\ grey \\ soft \\ \hline 6 \\ \hline 7 \\ \hline 8 \\ \hline 7 \\ \hline 8 \\ \hline 8 \\ \hline 7 \\ \hline 8 \\ \hline 8 \\ \hline 7 \\ \hline$	1.0	trace silt, shells	a second					
78.8 3.4 CLAYEY SILT trace sand, gravel grey soft 6 SS 6 SS 7 SS 7 SS 8 SS 8 SS 75.3 Cu = 28 KPa			0	4	SS	13		
78.8 o 5 SS 3 3.4 CLAYEY SILT a a a $c_u = 19$ KPa grey a a a $c_u = 36$ KPa $c_u = 45$ KPa u u u 75.3 u u u $c_u = 28$ KPa					-			
3.4 CLAYEY SILT trace sand, gravel grey soft 6 SS 4 7 SS 4 $C_u = 19$ KPa $C_u = 36$ KPa $C_u = 45$ KPa $C_u = 28$ KPa $C_u = 28$ KPa			1000					
$\begin{array}{c} grey \\ soft \\ \hline \\ $				5	SS	3		
soft 6 SS 4 7 SS 4 7 SS 4 8 SS 4 8 SS 4 75.3 0 0			/					C _u = 19 KPa
$ \begin{array}{c} 7 & SS & 4 \\ \hline $		soft	/	6	SS	4		
$\begin{array}{c} \hline \\ \hline $								C _u = 36 KPa
75.3 C _u = 28 KPa				7	SS	4		
75.3 C _u = 28 KPa		-	/					$C_u = 45 \text{ KPa}$
75.3 C _u = 28 KPa								
75.3 C _u = 28 KPa								
75.3 C _u = 28 KPa			/					
			/	8	SS	4		
	75.3		1					$C_u = 28 \text{ KPa}$
		END OF BOREHOLE						

DRILLING DATA

Diameter: 100 mm

Date:

Method: Augering

July 22, 1985

CLIENT: M.T.R.C.A. c/o Simcoe Engineering

PROJECT: Duffin Creek Dyke

LOCATION: Pickering, Ontario

DATUM ELEVATION: Geodetic

	SOIL PROFILE		SA	AMP	LE						
m ELEV. DEPTH. 82.6	DESCRIPTION Ground Surface	SYMBOL	NUMBER	ТҮРЕ	N' BLS /0.3	GROUND WATE R	F	REM 2	ARK	s	
0.0	FINE SAND some silt brown		1	SS	5		GR.	SA.	SI.	CL.	W
	dry to wet loose	· ·	2	SS	7		0	70	30	0	16
80.8	SAND AND GRAVEL		A 3 B	SS	18	<u>↓</u> W.L. 81.1 m	10	85	5	0	13
80.0	with some silt brown, wet compact	·0 · · 0 ·	4	SS	41						
2.6	CLAYEY SILT TILL grey well cemented	IF	4		41						
79.1	hard	H	5	SS	100						
3.5	END OF BOREHOLE										

PROJECT No..... LOG OF BOREHOLE

CLIENT: M.T.R.C.A. c/o Simcoe Engineering

PROJECT: Duffin Creek Dyke

LOCATION: Pickering, Ontario

DATUM ELEVATION: Geodetic

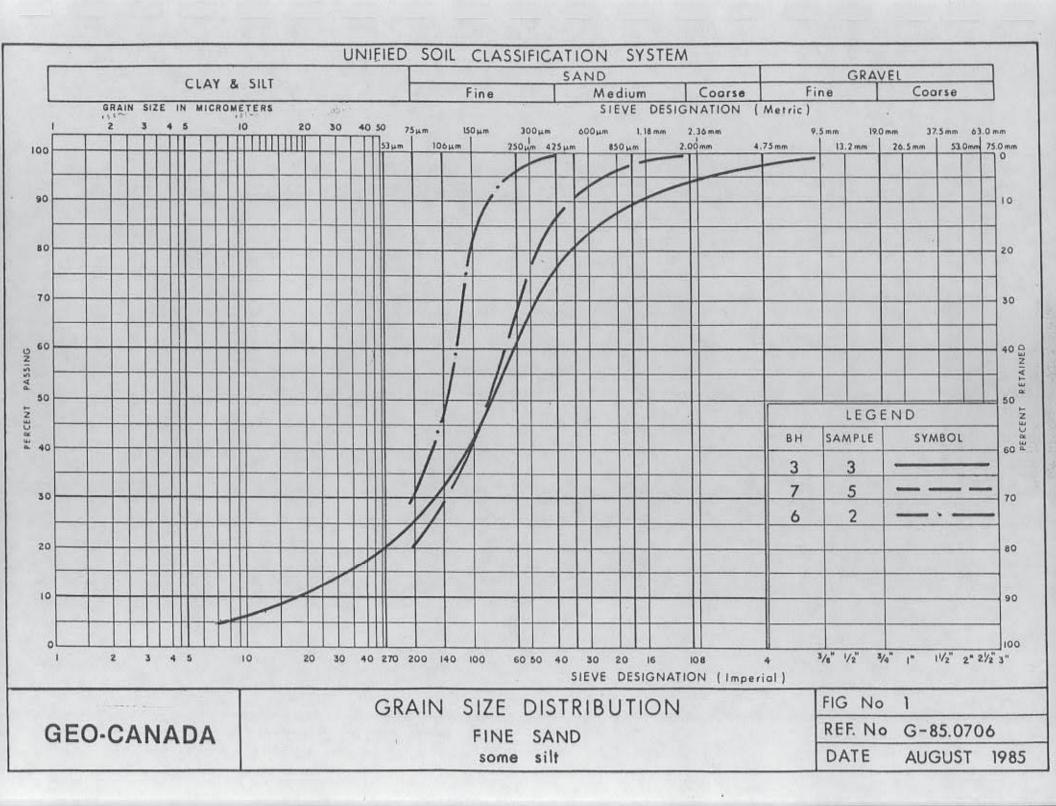
	SOIL PROFILE		S	AMF	PLE					84	
DE PTH.	DESCRIPTION Ground Surface	SYMBOL	NUMBER	TYPE	N' BLS /0.3	GROUNE WATER		REM	AR %	K S	
0.0	FINE SAND trace silt brown dry	• •	1	SS	5		GR.	SA.	SI.	CL.	W
81.8	loose SAND AND GRAVEL with some silt		2	SS	17	<u> </u>					
	brown moist to wet compact	· · · · · · · · · · · · · · · · · · ·	3	SS	24	W.L. 81.5 m	45	50	5	0	11
79.9		· · · · · · · · · · · · · · · · · · ·	4	SS	18						11
2.9 79.3	FINE SAND with some silt grey, saturated, compact	• • •	5	SS	11		0	85	15	0	
3.5	END OF BOREHOLE										

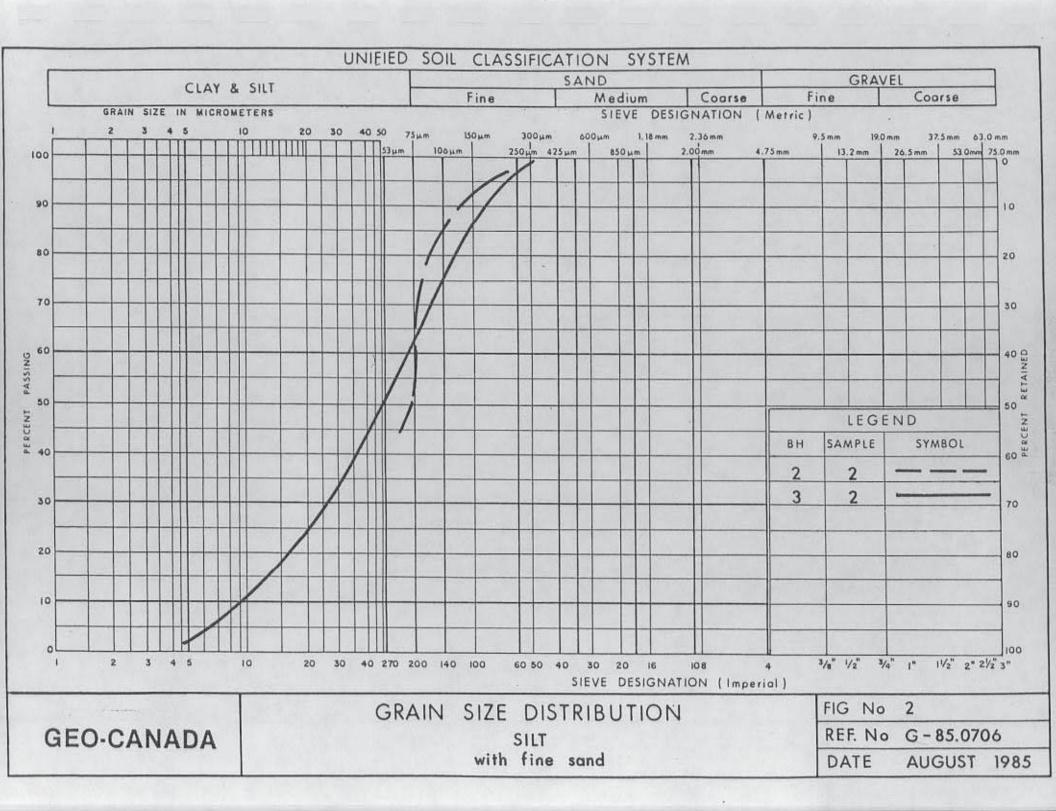
GEO-CANADA LTD.

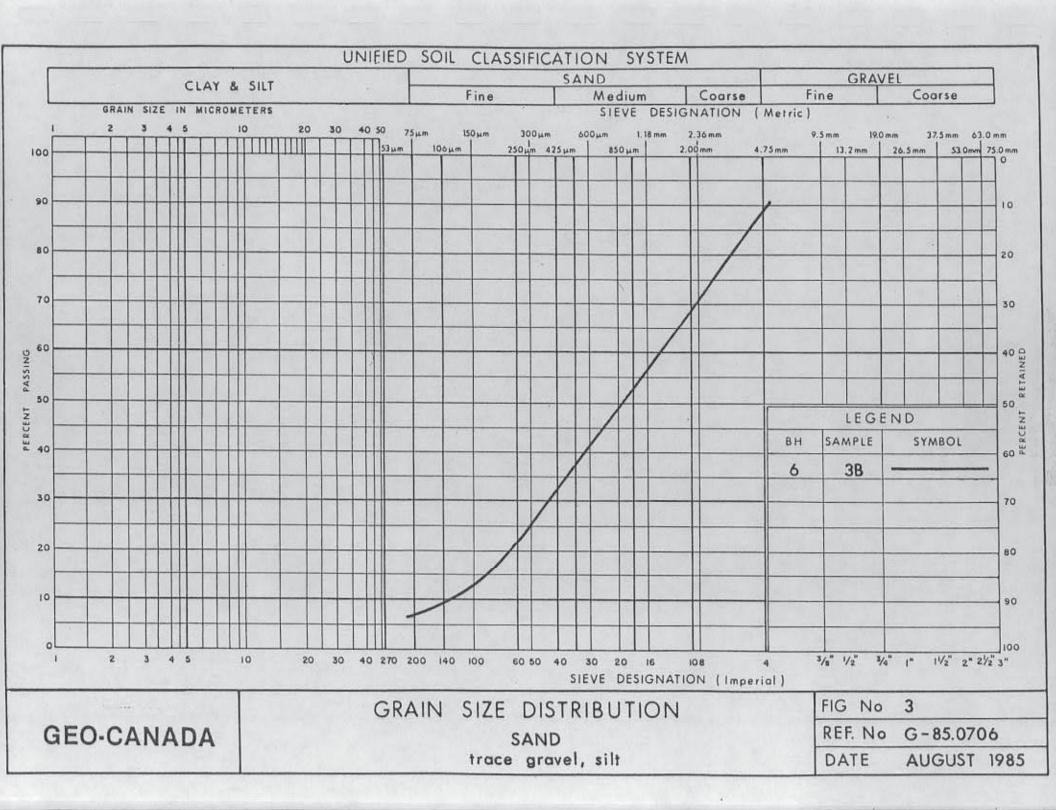
DRILLING DATA

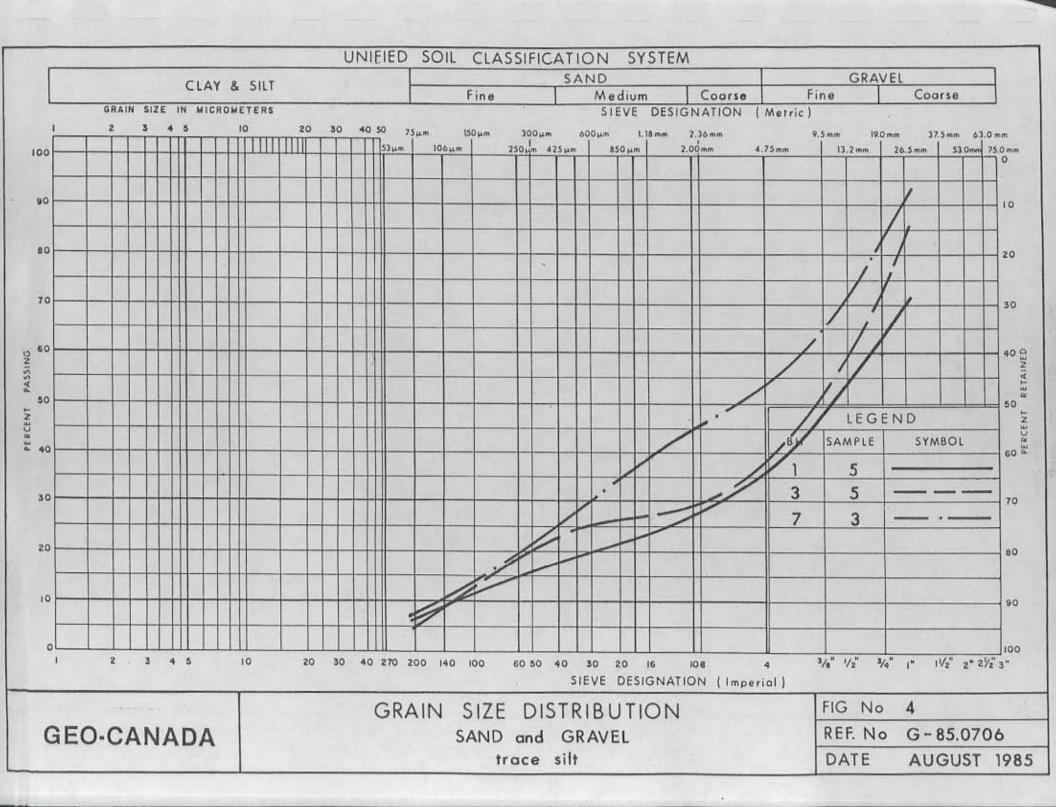
Nethod:	Augering
Diameter:	100 mm

Date: July 22, 1985









APPENDIX D

2017 Ajax and Pickering Dyke Geotechnical Investigation Logs



Enclosure 1A: Notes on Sample Descriptions

- Each soil stratum is described according to the Modified Unified Soil Classification System. The compactness
 condition of cohesionless soils (SPT) and the consistency of cohesive soils (undrained shear strength) are defined
 according to Canadian Foundation Engineering Manual, 4th Edition. Different soil classification systems may be
 used by others. Please note that a description of the soil stratums is based on visual and tactile examination of
 the samples augmented with field and laboratory test results, such as a grain size analysis and/or Atterberg
 Limits testing. Visual classification is not sufficiently accurate to provide exact grain sizing or precise
 differentiation between size classification systems.
- Fill: Where fill is designated on the borehole log it is defined as indicated by the sample recovered during the 2. boring process. The reader is cautioned that fills are heterogeneous in nature and variable in density or degree of compaction. The borehole description may therefore not be applicable as a general description of site fill materials. All fills should be expected to contain obstruction such as wood, large concrete pieces or subsurface basements, floors, tanks, etc., none of these may have been encountered in the boreholes. Since boreholes cannot accurately define the contents of the fill, test pits are recommended to provide supplementary information. Despite the use of test pits, the heterogeneous nature of fill will leave some ambiguity as to the exact composition of the fill. Most fills contain pockets, seams, or layers of organically contaminated soil. This organic material can result in the generation of methane gas and/or significant ongoing and future settlements. Fill at this site may have been monitored for the presence of methane gas and, if so, the results are given on the borehole logs. The monitoring process does not indicate the volume of gas that can be potentially generated nor does it pinpoint the source of the gas. These readings are to advise of the presence of gas only, and a detailed study is recommended for sites where any explosive gas/methane is detected. Some fill material may be contaminated by toxic/hazardous waste that renders it unacceptable for deposition in any but designated land fill sites; unless specifically stated the fill on this site has not been tested for contaminants that may be considered toxic or hazardous. This testing and a potential hazard study can be undertaken if requested. In most residential/commercial areas undergoing reconstruction, buried oil tanks are common and are generally not detected in a conventional preliminary geotechnical site investigation.
- 3. Till: The term till on the borehole logs indicates that the material originates from a geological process associated with glaciation. Because of this geological process the till must be considered heterogeneous in composition and as such may contain pockets and/or seams of material such as sand, gravel, silt or clay. Till often contains cobbles (60 to 200 mm) or boulders (over 200 mm). Contractors may therefore encounter cobbles and boulders during excavation, even if they are not indicated by the borings. It should be appreciated that normal sampling equipment cannot differentiate the size or type of any obstruction. Because of the horizontal and vertical variability of till, the sample description may be applicable to a very limited zone; caution is therefore essential when dealing with sensitive excavations or dewatering programs in till materials.



Enclosure 1B: Explanation of Terms Used in the Record of Boreholes

Sample Type

- AS Auger sample
- BS Block sample
- CS Chunk sample
- DO Drive open
- DS Dimension type sample
- FS Foil sample
- NR No recovery
- RC Rock core
- SC Soil core
- SS Spoon sample
- SH Shelby tube Sample
- ST Slotted tube
- TO Thin-walled, open
- TP Thin-walled, piston
- WS Wash sample

Penetration Resistance

Standard Penetration Resistance (SPT), N:

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in) required to drive a 50 mm (2 in) drive open sampler for a distance of 300 mm (12 in).

PM – Samples advanced by manual pressure WR – Samples advanced by weight of sampler and rod WH – Samples advanced by static weight of hammer

Dynamic Cone Penetration Resistance, Nd:

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in) to drive uncased a 50 mm (2 in) diameter, 60° cone attached to "A" size drill rods for a distance of 300 mm (12 in).

Piezo-Cone Penetration Test (CPT):

An electronic cone penetrometer with a 60 degree conical tip and a projected end area of 10 cm² pushed through ground at a penetration rate of 2 cm/s. Measurement of tip resistance (Q_t), porewater pressure (PWP) and friction along a sleeve are recorded electronically at 25 mm penetration intervals.

Textural Classification of Soils (ASTM D2487)

Classification	Particle Size			
Boulders	> 300 mm			
Cobbles	75 mm - 300 mm			
Gravel	4.75 mm - 75 mm			
Sand	0.075 mm – 4.75 mm			
Silt	0.002 mm-0.075 mm			
Clay	<0.002 mm(*)			
(*) Canadian Foundation Engineering Manual (4 th Edition)				

Coarse Grain Soil Description (50% greater than 0.075 mm)

Terminology	Proportion
Trace	0-10%
Some	10-20%
Adjective (e.g. silty or sandy)	20-35%
And (e.g. sand and gravel)	> 35%

Soil Description

a) Cohesive Soils(*)

Consistency	Undrained Shear Strength (kPa)	SPT "N" Value
Very soft	<12	0-2
Soft	12-25	2-4
Firm	25-50	4-8
Stiff	50-100	8-15
Very stiff	100-200	15-30
Hard	>200	>30

(*) Hierarchy of Shear Strength prediction

- 1. Lab triaxial test
- 2. Field vane shear test
- 3. Lab. vane shear test
- 4. SPT "N" value
- 5. Pocket penetrometer

b) Cohesionless Soils

Compactness Condition (Formerly Relative Density)	SPT "N" Value
Very loose	<4
Loose	4-10
Compact	10-30
Dense	30-50

>50

Soil Tests

Very dense

- w Water content
- w_p Plastic limit
- wı Liquid limit
- C Consolidation (oedometer) test
- CID Consolidated isotropically drained triaxial test
- CIU consolidated isotropically undrained triaxial test with porewater pressure measurement
- D_R Relative density (specific gravity, Gs)
- DS Direct shear test
- ENV Environmental/ chemical analysis
- M Sieve analysis for particle size
- MH Combined sieve and hydrometer (H) analysis
- MPC Modified proctor compaction test
- SPC Standard proctor compaction test
- OC Organic content test
- U Unconsolidated Undrained Triaxial Test
- V Field vane (LV-laboratory vane test)
- γ Unit weight



NT: Valdor Engineering Inc.									~																
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Notes: 1) Water encountered at a depth of 5.8 m below ground surface (mBGS) during drilling. 2) Borehole was open and dry upon completion of drilling. 3) 38 mm dia. monitoring well was installed in borehole upon completion of drilling. Water Level Readings Date W. L. Depth (mBGS) Oct. 10, 2017 4.45 Oct. 19, 2017 4.48																									
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▲ ^{■=3%} Strain at Failure



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 $\frac{\text{GRAPH}}{\text{NOTES}} + {}^3, \times {}^3: \begin{array}{c} \text{Numbers refer} \\ \text{to Sensitivity} \end{array}$



ſ	PRO	JECT: Geotechnical Investigation for D	uffins	Cree	ek Dy	/ke F	Reha	bilitation									DR	LL	NG D	ATA							
	CLIEI	NT: Valdor Engineering Inc.							MET	НС	DD: Co	ntinu	lous	s Spl	lit S	роо	n				[DIAM	ETER	: 51	mm		
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01710		5.2 m below ground surface (mBGS) during drilling.																									
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▲ ^{■=3%} Strain at Failure



	PRO	IECT: Geotechnical Investigation for D	uffins	Cree	ek Dy	/ke R	Reha	bilitation									DR	LL	NG D	ATA							
	CLIE	NT: Valdor Engineering Inc.							ME	THO	D: C	ont	inuoı	us Fl	ight	Aug	er	Autc	Ham	mer	[DIAME	ETER	205	mm		
	PRO.	IECT LOCATION: Pickering & Ajax, O	N						FIE	LD E	ING	INE	ER: (GΗ							[DATE	: 201	7-09-	07		
	DATL	JM: N/A							SA	MPLE	e re	EVI	EW: I	ЭΧ							F	REF. I	NO.: 1	7-19	67G		
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	-	wood fragments, dark brown to	\bigotimes																								
	1	brown, moist, loose to compact		2	ss	14				6										0							
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	-	dark brown to brown, moist, loose	\bigotimes	3	ss	9				0										ο							
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	2.1	GRAVELLY SAND: trace silt,	<u>k</u>																								
	-	containing cobbles and boulders, brown, wet, compact	o () (2.5 mBGLC																			_
		brown, wet, compact	0	4	SS	13	¥	2.5 IIIBGLC		0										0					20 7	(4	7
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	-	brown, wet, compact		5	ss	15	旧			0	0									D							
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	4.0	GRAVELLY SAND: trace silt,	eQ.C				ŀΞ.	:																			
	-	containing cobbles and boulders,	l. O.				目																				
	-	grey, wet, compact	0																								
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2017-10-25 09:18	- 5.6	SAND: some gravel, trace to some						a–Natural pack																			
201	-	silt, layers of gravelly sand, grey,					×	Pack																			
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ΕW	-	 layers of silty sand 		7	SS	31						P								0							
1020	6.6	END OF BOREHOLE																									
2017		Notes:																									
DATA		1) Water encountered at a depth of 2.3 m below ground surface																									
CT		(mBGS) during drilling.																									
ROJE		2) 51 mm dia. monitoring well was installed in borehole upon																									
DG PI		completion of drilling.																									
BH Lo		Water Level Readings																									
7GT I		Date W. L. Depth (mBGS)																									
7-196		Oct. 10, 2017 2.53																									
RO 1																											
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01 - GEOPRO SOIL LOG GEOPRO 17-1967GT BH LOG PROJECT DATA 20171020 - EW - JY GPJ																											
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LOG OF BOREHOLE BHP2

1 OF 1

| JECT: Geotechnical Investigation for D | uffins | Cree | ek Dy | ke R | ehabilitation |

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NT: Valdor Engineering Inc.			

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 | r - Auto | Ham | nmer | C | DIAM
 | ETER | : 155 | mm |
| JECT LOCATION: Pickering & Ajax, OI | N | | | | | FI

 | ELD | ENGINEEF | R: GH | |
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 | : 201 | 7-09- | 07 |
| JM: N/A | | | | | | SA

 | MP | E REVIEW | : DX | |
 | | | | F | REF.
 | NO.: 1 | 7-19 | 67G |
| OCATION: See Borehole Location Plar | ı | | | | | CH

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| SOIL PROFILE | | SA | AMPL | .ES | |

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(%) | JNIT WT (| REMARKS
AND
GRAIN SIZE
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(%)
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| FILL: sandy silt, trace to some
clay, trace gravel, trace to some
organics, trace rootlets, containing
wood fragments, layers of clayey | | 1 | SS | 10 | |

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| brown to brown, moist, loose to compact | \bigotimes | 2 | ss | 6 | |

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| ORGANIC SILTY SAND TO
ORGANIC SAND AND SILT: trace
clay, trace rootlets, trace gravel,
brown to grey, wet, very loose | | 4 | ss | 3 | |

 | 0 | | | | | |
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| SANDY GRAVEL: trace to some | ¢
0 | | | | |

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| silt, greyish brown, saturated,
compact | 0 | 5 | ss | 17 | |

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| trace gravel, layers of silty sand, containing cobbles and boulders, | 0 | | | | |

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| SAND AND GRAVEL: trace silt, greyish brown, saturated, compact | | • | | | |

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| END OF BOREHOLE | | | | | |

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| Notes:
1) Water encountered at a depth of
3.0 m below ground surface
(mBGS) during drilling.
2) Water was at a depth of 2.7
mBGS upon completion of drilling.
3) Borehole caved at a depth of 3.5
mBGS upon completion of drilling. | | | | | |

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| | NT: Valdor Engineering Inc.
JECT LOCATION: Pickering & Ajax, OI
JM: N/A
OCATION: See Borehole Location Plar
SOIL PROFILE
DESCRIPTION
FILL: sandy silt, trace to some
clay, trace gravel, trace to some
clay, trace gravel, trace to some
clay, trace gravel, trace to some
organics, trace rootlets, containing
wood fragments, layers of clayey
silt, layers/zones of silty sand, dark
brown to brown, moist, loose to
compact
ORGANIC SILTY SAND TO
ORGANIC SAND AND SILT: trace
clay, trace rootlets, trace gravel,
brown to grey, wet, very loose
SANDY GRAVEL: trace to some
silt, greyish brown, saturated,
compact
SAND AND SILT TILL: trace clay,
trace gravel, layers of silty sand,
containing cobbles and boulders,
grey, moist to wet, compact
SAND AND GRAVEL: trace silt,
greyish brown, saturated, compact
Notes:
1) Water encountered at a depth of
3.0 m below ground surface
(mBGS) during drilling.
2) Water was at a depth of 2.7
mBGS upon completion of drilling.
3) Borehole caved at a depth of 3.5 | NT: Valdor Engineering Inc.
JECT LOCATION: Pickering & Ajax, ON
JM: N/A
OCATION: See Borehole Location Plan
SOIL PROFILE
DESCRIPTION
TOPSOIL: (150 mm)
FILL: sandy silt, trace to some
clay, trace gravel, trace to some
organics, trace rootlets, containing
wood fragments, layers of clayey
silt, layers/zones of silty sand, dark
brown to brown, moist, loose to
compact
ORGANIC SILTY SAND TO
ORGANIC SILTY SAND TO
ORGANIC SAND AND SILT: trace
clay, trace rootlets, trace gravel,
brown to grey, wet, very loose
SANDY GRAVEL: trace to some
silt, greyish brown, saturated,
compact
SAND AND SILT TILL: trace clay,
trace gravel, layers of silty sand,
containing cobbles and boulders,
grey, moist to wet, compact
SAND AND GRAVEL: trace silt,
greyish brown, saturated, compact
SAND AND GRAVEL: trace silt,
greyish brown, saturated, compact
Notes:
1) Water encountered at a depth of
3.0 m below ground surface
(mBGS) during drilling.
2) Water was at a depth of 2.7
mBGS upon completion of drilling.
3) Borehole caved at a depth of 3.5 | NT: Valdor Engineering Inc.
JECT LOCATION: Pickering & Ajax, ON
JM: N/A
OCATION: See Borehole Location Plan
SOIL PROFILE SA
DESCRIPTION 14 Yer of
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DESCRIPTION 14 Yer of
TOPSOIL: (150 mm)
FILL: sandy silt, trace to some
clay, trace gravel, trace to some
organics, trace rootlets, containing
wood fragments, layers of clayey
silt, layers/zones of silty sand, dark
brown to brown, moist, loose to
compact 2
ORGANIC SILTY SAND TO
ORGANIC SILTY SAND TO
ORGANIC SAND AND SILT: trace
clay, trace rootlets, trace gravel,
brown to grey, wet, very loose
SANDY GRAVEL: trace to some
silt, greyish brown, saturated,
compact 5
SAND AND SILT TILL: trace clay,
trace gravel, layers of silty sand,
containing cobbles and boulders,
grey, moist to wet, compact 6
SAND AND GRAVEL: trace silt,
greyish brown, saturated, compact 7
CREND OF BOREHOLE
Notes:
1) Water encountered at a depth of
3.0 Borehole caved at a depth of 3.5
Define the strace of diffing.
2) Water was at a depth of 2.7
mBGS upno completion of drilling.
3) Borehole caved at a depth of 3.5 | NT: Valdor Engineering Inc.
JECT LOCATION: Pickering & Ajax, ON
JM: N/A
OCATION: See Borehole Location Plan
SOIL PROFILE SAMPL
DESCRIPTION VELLS
TOPSOIL: (150 mm)
FILL: sandy silt, trace to some
organics, trace rootlets, containing
wood fragments, layers of clayey
silt, layers/zones of silty sand, dark
brown to brown, moist, loose to
compact 2 SS
ORGANIC SILTY SAND TO
ORGANIC SAND AND SILT: trace
clay, trace rootlets, trace gravel,
brown to grey, wet, very loose
SANDY GRAVEL: trace to some
silt, greyish brown, saturated,
compact 5 SS
SAND AND SILT TILL: trace clay,
trace gravel, layers of silty sand,
containing cobbles and boulders,
grey, moist to wet, compact 6 SS
SAND AND GRAVEL: trace silt,
greyish brown, saturated, compact 7 SS
END OF BOREHOLE 6 SS
Notes:
1) Water encountered at a depth of
3.0 m below ground dirling.
2) Water was at a depth of 2.7
mBGS upon completion of drilling.
2) Water was at a depth of 3.5 | NT: Valdor Engineering Inc.
JECT LOCATION: Pickering & Ajax, ON
JM: N/A
OCATION: See Borehole Location Plan
SOIL PROFILE SAMPLES
DESCRIPTION 1 V V V V V V V V V V V V V V V V V V | JECT LOCATION: Pickering & Ajax, ON JANN DECRIPTION SAMPLES SAMPLES SOIL PROFILE DESCRIPTION DESCRIPTION TOPSOIL: (150 mm) FILL: sandy silt, trace to some day, trace gravel, trace to some organics, trace orotlets, containing wood fragments, layers of clayey suit, layers/zones of silty sand, dark brown, moist, loose to compact 1 SS 10 ORGANIC SILTY SAND TO ORGANIC SAND AND SILT: trace day, trace rootlets, trace gravel, layers orotlets, race gravel, brown to grey, wet, very loose 4 SS 3 SANDY GRAVEL: trace to some silt, greyish brown, saturated, compact 6 SS 22 SS 17 SAND AND SILT TILL: trace clay, trace gravel, layers of sitty sand, containing cobbles and boulders, grey, moist to wet, compact 6 SS 22 SAND AND GRAVEL: trace sitt, greyish brown, saturated, compact OR FOREHOLE Notes:: SAND OF BOREHOLE 7 SS 22 1 SAND AND SILT TILL: trace clay, trace gravel, layers of sitty sand, containing cobbles and boulders, grey moist to wet, compact 7 SS <th7< td=""><td>NT: Valdor Engineering Inc. ME
JECT LOCATION: Pickering & Ajax, ON FIE
JECT LOCATION: Pickering & Ajax, ON FIE
Mathematical Set Borehole Location Plan
CATION: See Borehole Location Plan
CATION: See Borehole Location Plan
CATION: See Borehole Location Plan
DESCRIPTION
TOPSOIL: (150 mm)
FILL: sandy silt, trace to some
organics, trace rootlets, containing
wood fragments, layers of clayey
silt, layers/zones of silty sand, dark
brown to brown, moist, loose to
compact
ORGANIC SILTY SAND TO
ORGANIC SAND AND SILT: trace
tay, trace provellaty, trace gravel,
brown to grey, wet, very loose
SANDY GRAVEL: trace to some
silt, greyish brown, saturated,
containing obbles and boulders,
grey, moist to wet, compact
SAND AND GRAVEL: trace silt,
greyish brown, saturated, compact
SAND AND GRAVEL: trace silt,
greyish brown saturated,</td><td>NT: Valdor Engineering Inc. METHO
JECT LOCATION: Pickering & Ajax, ON FIELD
JAX: N/A SAMPL
COATION: See Borehole Location Plan
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JECT LOCATION: Pickering & Ajax, ON
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COATION: See Borehole Location Plan
SOIL PROFILE
SOIL PROFILE
DESCRIPTION
TOPSOIL: (150 mm)
FILL: sandy silt, trace to some
clay, trace gravel, trace to some
clay, trace rotelets, containing
wood fragments, layers of clayers
silt, layers/scondents, loose to
compact
ORGANIC SLITY SAND TO
ORGANIC SLITY SAND TO
ORGANIC SLITY TADE to some
silt, greyish brown, saturated,
compact
SAND AND SLIT TILL: trace clay,
grey, moist to wet, compact
CARDY GRAVEL: trace to some
silt, greyish brown, saturated, compact
CARDY GRAVEL: trace silt,
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TOPSOLE (150 mm)
FILL: sandy silt, trace silt,
greyish brown, saturated, compact
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CARDY GRAVEL: trace d to some
silt, greyish brown, saturated, compact
CARDY GRAVEL: trace d to some
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CARDY GRAVEL: trace d to some
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CARDY GRAVEL: trace d to some
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CARDY GRAVEL: trace d to some
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CARDY GRAVEL: trace d to some
silt, greyish brown, saturated, compact
CARDY GRAVEL: trace d to depth of
SAND AND SILT TILL: trace clay,
greyish brown, saturated, compact
CARDY GRAVEL: trace d to depth of
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SAND AND SILT TILL: trace clay,
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SAND AND SILT TILL:</td><td>NT: Valdor Engineering Inc.
JECT LOCATION: Pickering & Ajax, ON
JECT LOCATION: Pickering & Ajax, ON
JECT LOCATION: Pickering & Ajax, ON
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SOIL PROFILE
TOPSOIL: (150 mm)
TOPSOIL: (150 mm</td><td>NT: Valdor Engineering Inc.
JECT LOCATION: Pickering & Ajax, ON
JM: NA
SAMPLE REVIEW: DX
COCATION: See Borehole Location Plan
SOIL PROFILE
SOIL PROFIL</td><td>NT: Valdor Engineering Inc.
JECT LOCATION: Pickering & Ajax, ON
JM: N/A
COCATION: See Borehole Location Plan
SOL PROFILE
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SAMPLES
TOPSOL: (150 mm)
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TOPSOL: (150 mm)
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SAMPLES
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clay, trace trace of subtract
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SAMD AND SILT TILL: trace elay,
trace gravel, trace to some
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SAMD AND SILT TILL: trace elay,
trace gravel, trace to some
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SAND AND SILT TILL: trace elay,
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SAND AND SILT TILL: trace elay,
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SAND AND SILT TILL: trace elay,
trace gravel, targe to some
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SAND AND GRAVEL: trace sitt,
greysh brown, saturated, compact
CHECKED CHE
NOES:
1) Water encountered at a depth of 3.5
SAND AND SILT TILL: trace of 3.5
SAND AND SILT TILL: trace of 3.5
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trace gravel, targe to some
compact
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trace gravel, targe to some
compact
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SAND AND GRAVEL: trace some
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SAND AND GRAVEL: trace some
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SAND AND GRAVEL: trace some
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SAND AND GRAVEL: trace some
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SAND</td><td>NT: Valdor Engineering Inc. METHOD: Continuous Flight Auger - Auto LECT LOCATION: Pickening & Ajax, ON FIELD ENGINEER: GH JM: N/A SAMPLE REVIEW: DX OCATION: See Borehole Location Plan CHECKED: DL TOPSOL: (150 mm) Topsol: 150 mm FLL: sandy sili, trace to some right, frace to some right, grayesh brown, saturated, compact 1 SS 10 0 1 SS 10 Image: Single Auger Auger</td><td>NT: Valdor Engineering Inc.
IECT LOCATION: Pickering & Ajax, ON
JM: WA
DECT LOCATION: Pickering & Ajax, ON
JM: WA
DECT IOX: See Borehole Location Plan
TOPSOIL: (50 mm)
TOPSOIL: (50 mm)
TOPSOIL: (150 mm)
TOPSOIL: (</td><td>NT: Valdor Engineering Inc:
IECT LOCATION: Pickering & Ajax, ON
MR NA
OCATION: See Borehole Location Plan
COLTRON: See Borehole Location Plan
SOLL PROFILE
SOLL PROFILE
SOLL PROFILE
TOPSOL: (150 mm)
TOPSOL: (150 mm)
TOP</td><td>NT: Valdor Engineering Inc. METHOD: Continuous Flight Auger - Auto Hammer I LECT LOCATION. Pickering & Ajax, ON FIELD ENGINEER: CH FIELD ENGINEER: CH FIELD ENGINEER: CH DOUTON: See Borehole Location Plan CHECKED: DL CHECKED: DL FIELD ENGINEER: CH FIELD ENGINEER: CH DESCRIPTION Total of the standard sta</td><td>NT. Valdor Engineering Inc. METHOD: Continuous Flight Auger- Auto Hammer DIAM M. NA FIELD ENGINEER: GH DATE M. NA SAMPLER: SUPPLY: DX DATE COLCATION: See Borahole Location Plan CHECKED: DL CHECKED: DL TOPBOIL: (50 mm) Top of the set of th</td><td>NT. Vakkor Engineering k.: METHOD: Continuous Filght Auger - Auto Hammer DAMETER LECT LOCATION: Pickering & Ajax, ON FIELD ENGINEER: GH DATE: 201 MINA SAMPLE REVIEW. DX REF. NO: 1 COLTION: See Borehole Location Plan CHECKED. DL ENCL. NO: 0 SOLL PROFILE SAMPLE REVIEW. DX ENCL. NO: 0 TOPSOL: (160 mm) Top set the basened by and a dame by and a dam</td><td>NT. Vakore Engineering Inc. METHOD: Continuous Flight Auger - Auto Hamm: DUMETER: 155 LECT LOCATION: Proceeding & Ajack ON Description Desc</td></th7<> | NT: Valdor Engineering Inc. ME
JECT LOCATION: Pickering & Ajax, ON FIE
JECT LOCATION: Pickering & Ajax, ON FIE
Mathematical Set Borehole Location Plan
CATION: See Borehole Location Plan
CATION: See Borehole Location Plan
CATION: See Borehole Location Plan
DESCRIPTION
TOPSOIL: (150 mm)
FILL: sandy silt, trace to some
organics, trace rootlets, containing
wood fragments, layers of clayey
silt, layers/zones of silty sand, dark
brown to brown, moist, loose to
compact
ORGANIC SILTY SAND TO
ORGANIC SAND AND SILT: trace
tay, trace provellaty, trace gravel,
brown to grey, wet, very loose
SANDY GRAVEL: trace to some
silt, greyish brown, saturated,
containing obbles and boulders,
grey, moist to wet, compact
SAND AND GRAVEL: trace silt,
greyish brown, saturated, compact
SAND AND GRAVEL: trace silt,
greyish brown saturated, | NT: Valdor Engineering Inc. METHO
JECT LOCATION: Pickering & Ajax, ON FIELD
JAX: N/A SAMPL
COATION: See Borehole Location Plan
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JECT LOCATION: Pickering & Ajax, ON
JM: N/A
COATION: See Borehole Location Plan
SOIL PROFILE
SOIL PROFILE
DESCRIPTION
TOPSOIL: (150 mm)
FILL: sandy silt, trace to some
clay, trace gravel, trace to some
clay, trace rotelets, containing
wood fragments, layers of clayers
silt, layers/scondents, loose to
compact
ORGANIC SLITY SAND TO
ORGANIC SLITY SAND TO
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silt, greyish brown, saturated,
compact
SAND AND SLIT TILL: trace clay,
grey, moist to wet, compact
CARDY GRAVEL: trace to some
silt, greyish brown, saturated, compact
CARDY GRAVEL: trace silt,
greyish brown, saturated, compact
TOPSOLE (150 mm)
FILL: sandy silt, trace silt,
greyish brown, saturated, compact
CARDY GRAVEL: trace d to some
silt, greyish brown, saturated, compact
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CARDY GRAVEL: trace d to some
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CARDY GRAVEL: trace d to depth of
SAND AND SILT TILL: trace clay,
greyish brown, saturated, compact
CARDY GRAVEL: trace d to depth of
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SAND AND SILT TILL: trace clay,
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SAND AND SILT TILL: | NT: Valdor Engineering Inc.
JECT LOCATION: Pickering & Ajax, ON
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JECT LOCATION: See Borehole Location Plan
SOIL PROFILE
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SOIL PROFILE
TOPSOIL: (150 mm)
TOPSOIL: (150 mm | NT: Valdor Engineering Inc.
JECT LOCATION: Pickering & Ajax, ON
JM: NA
SAMPLE REVIEW: DX
COCATION: See Borehole Location Plan
SOIL PROFILE
SOIL PROFIL | NT: Valdor Engineering Inc.
JECT LOCATION: Pickering & Ajax, ON
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COCATION: See Borehole Location Plan
SOL PROFILE
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SAMPLES
TOPSOL: (150 mm)
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TOPSOL: (150 mm)
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SAMPLES
TABLE sandy subtract to some
clay, trace trace of subtract
trace gravel, trace to some
compact
SAMD AND SILT TILL: trace elay,
trace gravel, trace to some
compact
SAMD AND SILT TILL: trace elay,
trace gravel, trace to some
compact
SAND AND SILT TILL: trace elay,
trace gravel, targe to some
compact
SAND AND SILT TILL: trace elay,
trace gravel, targe to some
compact
SAND AND SILT TILL: trace elay,
trace gravel, targe to some
compact
SAND AND SILT TILL: trace elay,
trace gravel, targe to some
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SAND AND SILT TILL: trace elay,
trace gravel, targe to some
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SAND AND SILT TILL: trace elay,
trace gravel, targe to some
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SAND AND SILT TILL: trace elay,
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SAND AND SILT TILL: trace elay,
trace gravel, targe to some
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SAND AND SILT TILL: trace elay,
trace gravel, targe to some
compact
SAND AND SILT TILL: trace elay,
trace gravel, targe to some
compact
SAND AND SILT TILL: trace elay,
trace gravel, targe to some
compact
SAND AND SILT TILL: trace elay,
trace gravel, targe to some
compact
SAND AND SILT TILL: trace elay,
trace gravel, targe to some
compact
SAND AND GRAVEL: trace sitt,
greysh brown, saturated, compact
CHECKED CHE
NOES:
1) Water encountered at a depth of 3.5
SAND AND SILT TILL: trace of 3.5
SAND AND SILT TILL: trace of 3.5
SAND AND SILT TILL: trace diay,
trace gravel, targe to some
compact
SAND AND SILT TILL: trace olay,
trace gravel, targe to some
compact
SAND AND GRAVEL: trace some
some
SAND | NT: Valdor Engineering Inc. METHOD: Continuous Flight Auger - Auto LECT LOCATION: Pickening & Ajax, ON FIELD ENGINEER: GH JM: N/A SAMPLE REVIEW: DX OCATION: See Borehole Location Plan CHECKED: DL TOPSOL: (150 mm) Topsol: 150 mm FLL: sandy sili, trace to some right, frace to some right, grayesh brown, saturated, compact 1 SS 10 0 1 SS 10 Image: Single Auger | NT: Valdor Engineering Inc.
IECT LOCATION: Pickering & Ajax, ON
JM: WA
DECT LOCATION: Pickering & Ajax, ON
JM: WA
DECT IOX: See Borehole Location Plan
TOPSOIL: (50 mm)
TOPSOIL: (50 mm)
TOPSOIL: (150 mm)
TOPSOIL: (| NT: Valdor Engineering Inc:
IECT LOCATION: Pickering & Ajax, ON
MR NA
OCATION: See Borehole Location Plan
COLTRON: See Borehole Location Plan
SOLL PROFILE
SOLL PROFILE
SOLL PROFILE
TOPSOL: (150 mm)
TOPSOL: (150 mm)
TOP | NT: Valdor Engineering Inc. METHOD: Continuous Flight Auger - Auto Hammer I LECT LOCATION. Pickering & Ajax, ON FIELD ENGINEER: CH FIELD ENGINEER: CH FIELD ENGINEER: CH DOUTON: See Borehole Location Plan CHECKED: DL CHECKED: DL FIELD ENGINEER: CH FIELD ENGINEER: CH DESCRIPTION Total of the standard sta | NT. Valdor Engineering Inc. METHOD: Continuous Flight Auger- Auto Hammer DIAM M. NA FIELD ENGINEER: GH DATE M. NA SAMPLER: SUPPLY: DX DATE COLCATION: See Borahole Location Plan CHECKED: DL CHECKED: DL TOPBOIL: (50 mm) Top of the set of th | NT. Vakkor Engineering k.: METHOD: Continuous Filght Auger - Auto Hammer DAMETER LECT LOCATION: Pickering & Ajax, ON FIELD ENGINEER: GH DATE: 201 MINA SAMPLE REVIEW. DX REF. NO: 1 COLTION: See Borehole Location Plan CHECKED. DL ENCL. NO: 0 SOLL PROFILE SAMPLE REVIEW. DX ENCL. NO: 0 TOPSOL: (160 mm) Top set the basened by and a dame by and a dam | NT. Vakore Engineering Inc. METHOD: Continuous Flight Auger - Auto Hamm: DUMETER: 155 LECT LOCATION: Proceeding & Ajack ON Description Desc |

A $^{\bullet=3\%}$ Strain at Failure



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Γ	PRO	IECT: Geotechnical Investigation for D	Duffins	Cree	ek Dy	/ke R	ehabilitation									DR	LL	NG E	ATA	1						٦
	CLIE	NT: Valdor Engineering Inc.						M	ТНС	DD: (Cor	ntinuo	ous	Flight	Aug	er -	Auto	Ham	nmer		DIAN	1ETER	: 155	mm		
	PRO.	IECT LOCATION: Pickering & Ajax, C	N					FI	ELD I	ENG	GINE	EER	:G⊦	ł							DAT	E: 201	7-09-	07		
	DATU	JM: N/A						SA	MPL	E R	REV	IEW	: DX	C							REF.	NO.: 1	17-19	67G		
	BH LO	OCATION: See Borehole Location Pla	n					CH	IECK	ED	: DL	-									ENC	L. NO.	: 4			
		SOIL PROFILE		SA	MPL		с			YNA D SF						TES		Plas	stic	Natu Moistu	al Jre	Liquid	n ³)		MARKS	;
			OT			"N" BLOWS/0.3m	GROUND WATER			20)	40		60	8	30		Limi w _P	t	Conte w	ent	Limit w _L	(kN/m ³)		AND JIN SIZI	ε
	ELEV DEPTH	DESCRIPTION	STRATA PLOT	н		SWC		EVATION						NGT Vane				i i		-0-			WT (ЛС
ľ	(m)		IRAT	NUMBER	TYPE	" BL(Soul			uick 1	Triax	ial 🛛	Pen	etrome	ter +	Lab '					ITEN	()	UNIT		(%)	
ŀ	0.0	TOPSOIL: (150 mm)	S 14.	ž		Z	Ū	Щ		20)	40		60	3	30			0	20	30	40) D	GR S.	A SI (
Ē	0.2	FILL: sandy silt, trace to some	$\overline{\mathbb{X}}$	1	ss	7			0																	
Ŀ		clay, trace gravel, trace organics, trace rootlets, pockets of organics,				'																				
ŀ		containing wood fragments, brown to greyish brown, moist, loose to																								
F	1	dense		2	ss	10													0							
E	_				33	10													ľ							
ł																										
F																										
Ē		 containing rock fragments 		3	SS	35						0						(
F	2																									
F	2.1	SILTY SAND: trace clay, trace organics, trace rootlets, layers of	집합																							
ŀ		sandy silt, brown, moist, compact		4	ss	23				0	0								c	,						
F																										
E	₃ 2.9	SAND AND GRAVEL: some silt to																								
ł		silty, trace clay, trace rootlets, layers of sandy silt, containing																								
ł		cobbles and boulders, brown, wet,	00%	5	SS	38						0						0								
F		dense	000																							
E			000																							
Ē	4 4.0	SANDY SILT: some clay, trace																								
ŀ		gravel, grey, wet, very loose																								
-																										
ł				6	ss	3			0											0						
ŀ	5																									
9:18																										
17-10-25 09:18																										
017-1	5.6	SAND AND SILT TILL: trace clay,																								
201	6	trace gravel, containing cobbles and boulders, grey, moist to wet,																								
₹.GP	-	very dense		_		78 /																				
- N				7	ss	280										>	 >100 (0								
320-F	6.6	END OF BOREHOLE		\vdash	-	mm			\vdash	+		+	+			-	-									\neg
GEOPRO 17-1967GT BH LOG PROJECT DATA 20171020 - EW - JY GPJ	2.5	Notes:																								
ATA 2		1) Water encountered at a depth of																								
CTD		3.0 m below ground surface (mBGS) during drilling.																								
ROJE		2) Water was at a depth of 2.6																								
DG PF		mBGS upon completion of drilling. 3) Borehole was caved in 4.0																								
BH LO		mBGS upon completion of drilling.																								
37GT																										
17-196																										
PRO																										
GEO.																										
PRO S																										
01 - GEOPRO SOIL LOG																										
<u>-</u>																										



PROJ	IECT: Geotechnical Investigation for D	uttins	Cree	ек Dy	ke F	lehal	oilitation								D	RILLI	NG D	ATA							
CLIEN	NT: Valdor Engineering Inc.						n	ИE	тно	D: C	ontii	nuou	s Flig	ght A	uger	- Auto	Ham	ner	۵	DIAM	ETER	205	mm		
PROJ	IECT LOCATION: Pickering & Ajax, Ol	N					F	FIEI	LD E	ENGI	NEE	ER: G	iΗ						[DATE	E: 201	7-09-	07		
DATL	JM: N/A						S	SAN	MPL	E RE	VIE	W: D	Х						F	REF.	NO.: 1	7-19	67G		
BH LO	OCATION: See Borehole Location Plar	n					(СНЕ	ECK	ED: [DL								E	ENCL	NO.:	5			
	SOIL PROFILE		SA	MPL	.ES			Τ				PENI		ATIC	DN TI	EST			Natura	ı			RF	MA	RKS
					3m	IER			0	SPT 20		∼ (40	Cone 6		blows 80	/0.3m	Plast Limit	ic l	Moistur Conten	e I It	Liquid Limit	(kN/m ³)		ANI	D
ELEV		STRATA PLOT			"N" BLOWS/0.3m	GROUND WATER	Ā	ξŀ				STR					Wp		w		WL	- (k			SIZE UTION
DEPTH	DESCRIPTION	ITAI	BER		LOW		H	Į	Ə Uno	confin	ed	X Fie	eld Va	ne &	Sensi	tivity	WA	TER	CONT	FENT	(%)	- WT		(%	
(m)		STR/	NUMBER	TYPE	R Z	SRO	Ĺ		≜ Qui	ick Tri 20	axial	⊠ Pe 40	netroi 6		+ La 80	ıb Vane	1(40	UNIT	GR	SA	SI CL
0.0	_TOPSOIL: (125 mm)	NA 14.	-		=	нй	-Concrete	-		T		Ť		-							Ť			0, (0. 02
- 0.1	FILL: sandy silt, trace to some clay, trace gravel, trace organics,	\bigotimes	1	ss	14	2)]Z			C	5							0								
-	trace rootlets, pockets of organics,						∉ —Bentonite																		
	dark brown to greyish brown, moist, compact						- -																		
- 1	compact	\otimes	2	ss	20					0							0								
-																									
-							∎–Sand																		
-		\otimes					Screen																		
-			3	SS	23		Scieen			0							¢						3 3	37 4	40 20
2			}—																						
2.1	FINE SAND AND SILT: trace clay,						∎—Bentonite																		
-	trace organics, layers of fine sandy silt, brown, moist, compact		4	ss	11				0										D				0	26 6	69 5
-						<u>بر</u>	2.8 mBGLOct	10	Ĩ															20 (
- <u> </u>	SILTY SAND: some gravel, trace							Ĭ																	
- 2.9	clay, some organics, trace rootlets,		1																						
-	layers of sand and silt, layers of gravelly sand, grey, wet, compact		5	SS	16					0								0							
-	graveny sand, grey, wet, compact	招告	-				∎—Sand																		
-							Screen																		
4																									
4.0	SAND AND SILT TILL: trace to some clay, trace gravel, layers of	0																							
-	sand, containing cobbles and																								
-	boulders, grey, moist, dense	0	┢─			1. H																			
_			6	SS	38							0					o								
-			\vdash																						
-	— auger grinding																								
-		.					■Bentonite																		
5.6	SAND: trace to some silt, trace gravel, grey, wet, compact						C Dontonito																		
6	gravel, grey, wet, compact																								
			⊢																						
-			7	SS	25					С								0							
- 6.6	END OF BOREHOLE	<u></u>	┣─					+	+	_	+	+			-+						-				
0.0																									
	Notes: 1) Water encountered at a depth of																								
	3.0 m below ground surface (mBGS) during drilling.																								
	2) 51 mm dia. monitoring well																								
	(deep) was installed in borehole upon completion of drilling.																								
	3) 19 mm dia. piezometer (shallow)																								
	was installed in borehole upon completion of drilling.																								
	Water Level Readings Deep Well																								
	Date W. L. Depth (mBGS) Oct. 10, 2017 2.77																								
	Shallow Well																								
	Date W. L. Depth (mBGS)																								
	Oct. 10, 2017 Dry																								
		1		1	1				1	1	1	1	1 1	L L	1					1	1				

01 - GEOPRO SOIL LOG GEOPRO 17-1967GT BH LOG PROJECT DATA 20171020 - EW - JY GPJ 2017-10-25 09:18

 $\frac{\text{GRAPH}}{\text{NOTES}} + {}^3, \times {}^3: \begin{array}{c} \text{Numbers refer} \\ \text{to Sensitivity} \end{array}$

▲ ^{■=3%} Strain at Failure

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Ι.	UГ	- I

P	RO	IECT: Geotechnical Investigation for D	uffins	Cree	k Dy	ke R	ehabilitation					C	RILL	NG D	ΑΤΑ						
c	LIEN	NT: Valdor Engineering Inc.						M	ETHOD: Cor	tinuou	s Flight	Auge	r - Auto	b Ham	mer	D	DIAME	ETER	: 155	mm	
P	RO	IECT LOCATION: Pickering & Ajax, O	N					FI		ER: C	θH					D	DATE	: 2017	7-09-	08	
D	ΑΤι	JM: N/A						SA	MPLE REV	EW: D	ЭХ					R	REF. N	NO.: 1	7-19	67G	
В	H LO	OCATION: See Borehole Location Pla	า					Cł	HECKED: DL							Е	NCL.	. NO.:	6		
		SOIL PROFILE		SA	MPL	ES			DYNAMI		ETRATI	ON T	EST			Natural				DEN	IARKS
_				0,1			Ж		O SPT	2	Cone	blow	s/0.3m	Plast Limit	tic N	Addisture Content	e L	iquid Limit	(kN/m ³)		ND
			STRATA PLOT			"N" BLOWS/0.3m	GROUND WATER	z	20	40	60	80		W _P		w		W _L	(kN		IN SIZE
	EV PTH	DESCRIPTION	TAP	ER		ŇO	Q	EVATION	SHEA		RENGTH eld Vane &				TED	o CONT			≥		IBUTION
(r	n)		TRA	NUMBER	ТҮРЕ	I" BL	ROL		Quick Triax	al 🛛 P	enetromete	er 🕂 La	ab Vane					. ,	UNIT		
	0.0	TOPSOIL: (180 mm)	N 14.	z	Ĥ	÷	0	Ш	20	40	60	80	,		0 2	0 30	0 4	0	\neg	GR SA	A SI CL
	0.2	FILL: sandy silt, trace to some		1	SS	15			0												
È		clay, trace gravel, trace to some organics, trace rootlets, seams of	\mathbb{X}		00	10			Ũ						-						
È		sand, containing shale fragments,	\bigotimes																		
-		containing wood fragments, brown to dark brown, moist, compact	\bigotimes																		
-		to dark brown, moist, compact	\bigotimes	2	SS	13			0						0						
÷			\otimes																		
-	1.4	FILL: silty fine sand, trace clay,	\boxtimes																		
-		trace organics, trace rootlets, layers of fine sandy silt, brown, mosit,	\otimes																		
2		compact	\mathbb{X}	3	SS	21			O						0						
-			\bigotimes																		
-	2.2	SAND: trace clay, trace to some																			
F		silt, trace to some gravel, trace rootlets, layers of coarse sand,		4	SS	9			0						0						
Ŀ		layers of organic silt, brown to grey,																			
3	2.9	wet, loose GRAVELLY SAND: trace to some	. V.																		
È		silt, brown to grey, saturated,	0.0																		
È		compact to very dense	0	5	SS	17			0						0					28 63	39
F			°. ().																		
÷			0.0																		
4			. O																		
÷			0.0																		
-			0																		
F			°. ().	6A	SS										0						
1	4.7	SANDY SILT TILL: some clay,			ss	60					\$				0						
5		trace gravel, zones of silty fine sand, containing cobbles and																			
09:18		boulders, grey, moist to wet, very	•																		
0-25		dense	.																		
2017-10-25 09:18	5.6	SILT: some clay, trace to some																			
L L		sand, grey, moist to wet, very dense																			
GPJ						E0 /															
5-				7	SS	50 / 150							> >1000	•	0						
- - -	6.4	END OF BOREHOLE				mmy															
GEOPRO 17-1967GT BH LOG PROJECT DATA 20171020 - EW - JY. GPJ		Notes:																			
A 201		1) Water encountered at a depth of																			
DAT		2.3 m below ground surface (mBGS) during drilling.																			
ECT		2) Water was at 2.7 mBGS upon																			
ROJ		completion of drilling. 3) Borehole caved at a depth of 3.0																			
00		mBGS upon completion of drilling.																			
BHL																					
7GT																					
7-196																					
201																					
EOP																					
01 - GEOPRO SOIL LOG																					
sol																					
DPRC																					
GEC																					
5																					



PROJ	ECT: Geotechnical Investigation for D	uffins	Cree	ek Dy	ke R	Rehal	oilitation								E	DRII		NG D	ΑΤΑ							
CLIEN	IT: Valdor Engineering Inc.							METI	HOD:	Cor	ntinu	ous	Flig	ht A	uge	r - A	Auto	Ham	mer	[DIAM	ETER	: 205	mm		
PROJ	ECT LOCATION: Pickering & Ajax, O	N						FIEL	D EN	GIN	EEF	:GF	ł							[DATE	: 201	7-09	-08		
DATU	M: N/A							SAM	PLE	REV	ΊEW	': DX	<							F	REF.	NO.: 1	17-19	67G		
BH LC	CATION: See Borehole Location Pla	n						CHE												E	ENCL	NO.:	: 7			_
	SOIL PROFILE		SA	MPL		TER			DYN os			C C C			N T blow 80	s/0.3		P l ast Limit	tic M	Natura Aoistur Conter	e L	_iquid Limit	(kN/m ³)		MARI AND	
ELEV EPTH	DESCRIPTION	STRATA PLOT	BER		"N" BLOWS/0.3m	GROUND WATER		ELEVATION		HEA	AR S	TRE	ENG	TH	(kPa	a)	,	₩ _P 	TER			w _L →	1		AIN S RIBU ⁻ (%)	
(m)		STRA	NUMBER	ТҮРЕ		GROL			Quick 2	Tria>	kial ⊠ 4		etron 60		+ L 80		ane	1				(70) 40 	UNIT	GR S	SA SI	
0.0	TOPSOIL: (125 mm) FILL: sandy silt, some clay, trace gravel, trace to some organics, trace rootlets, containing wood pieces, dark brown to brown, moist,		1	ss	12		⊲ -Concrete		0										o							
	compact		2	ss	11				0									c	þ							
							∎—Bentonite																			
	 layers of silty sand, layers of clayey silt 		3	SS	17				0										0							
2.2	SILTY FINE SAND TO FINE SAND AND SILT: trace clay, trace orgaincs, trace rootlets, brown, moist, loose		4	SS	7			(>										0							
2.9	SAND: trace to some silt, trace gravel, containing shell fragments, brown, wet, very loose to loose		5	ss	4		3.2 mBGLO	t ¹⁰												o						
4.0	SAND AND GRAVEL: some silt to						—Screen																			
4.0	silty, trace clay, layers of calyey silt, grey, wet, compact																									
			6	SS	16				0									o								
5.6	SAND AND SILT TILL: some clay,						⊲ –Natural																			
0.0	trace gravel, layers/zones of sandy silt, containing cobbles and boulders, grey, moist to wet, very						pack																			
	dense		7	ss	59								0					0						4 3	36 45	;
6.6	END OF BOREHOLE Notes: 1) Water encountered at a depth of 3.0 m below ground surface (mBGS) during drilling. 2) 51 mm dia. monitoring well was installed in borehole upon completion of drilling. Water Level Readings Date W. L. Depth (mBGS) Oct. 10, 2017 3.23																									

▲ ^{■=3%} Strain at Failure



PRO	JECT: Geotechnical Investigation for D	Ouffins	Cree	ek Dy	/ke F	Reha	bilitation									DR	LL	NG D	ATA									
CLIEI	NT: Valdor Engineering Inc.							ME	THOE): Cc	ontinu	Jous	s Flig	ght /	Auge	ər - ,	Auto	Ham	mer	[DIAM	ETER	: 205	5 m	m			
PRO.	JECT LOCATION: Pickering & Ajax, O	N						FIEI	D EN	IGIN	NEEF	R: G	Н							[DATE	: 201	7-09-	-08				
DATU	JM: N/A							SAN	/IPLE	RE	VIEV	V: D	Х							F	REF.	NO.: 1	17-19	967	G			
BH L	OCATION: See Borehole Location Pla	n						CHE	ECKE	D: D)L									E	ENCL	NO.:	: 8					
	SOIL PROFILE		SA	MPL	.ES	~			DYN					ATI						Natura	J .		3)	Γ	RE	MA	RK	s
		T			.3m	GROUND WATER				SPT 20		z C		50		vs/0.: 0	3m	Plas Limi	tic i	Moistur Conter	re L nt	Liquid Limit	(kN/m ³)		GRA			7⊏
ELEV	DESCRIPTION	STRATA PLOT	~		"N" BLOWS/0.3m	1×		S	S	SHE.	AR S	STR	ENC	GTH	(kP	a)		W _P		w —0—		W _L	WT (k		STF			
DEPTH (m)	DESCRIPTION	RATA	NUMBER	_ س	BLO	NN			Unco Quic									WA	TER	CON	FENT	(%)	∣≤			(%)	
		STF	Ň	ТҮРЕ	ž	GRO				20		0		50			and	1	0 2	20 3	80 4	40	UNIT	GI	r s	A	sı	С
- 0.0	GRANULAR FILL: (205 mm)		1A	SS			-Concrete																					
0.2	FILL: silty sand, trace gravel, trace organics, layers of organic sandy		1B	ss	16	"	4		С										0									
-	silt, brown, moist, compact						₄ —Bentonite																					
-			\vdash																									
1			2	ss	12				0										o					9	5	8 3	24	9
-			}																									
-																												
-	— layers of organic silt, zones of		1																									
-	sandy silt		3	SS	19		∎a–Sand			9									0									
-			_				-Sanu																					
2.2	FINE SAND: some silt, trace		1—			┨┋╡	Screen																					
F	orgaincs, layers of sand and silt, brown, moist, loose		4	ss	9		*		0									0						0	7	9	18	3
-			 			1EI I																						
3 2.9			<u> </u>																									
-	silt, brown, moist, loose to compact		5	ss	10													0										
E]	33			₄ —Bentonite		Ĭ									0										
							3.8 mBGLO																					
-							3.0 IIIBGLO																					
4 4.0	SAND AND GRAVEL: trace to	- v v c																										
-	some silt, brown, wet, loose																											
-		00																										
		0. 0. 0.	6	ss	7				0										0									
5		000	Ľ		ĺ.		∎ Sand																					
<u>•</u>		0. 0. 0.																										
ol:so cz-ol-vioz							Screen																					
5.6	FINE SAND AND SILT: trace clay,																											
	layers of sandy silt, grey, saturated, dense																											
<u>6</u>			1																									
			7	ss	33		-Bentonite				0								c	}								
		11	1		-			\dashv	_		-													\vdash				
	END OF BOREHOLE																											
	Notes: 1) Water encountered at a depth of																											
5	4.6 m below ground surface																											
	(mBGS) during drilling. 2) 51 mm dia. monitoring well																											
	(deep) was installed in borehole																											
	upon completion of drilling. 3) 19 mm dia. piezometer (shallow)																											
	was installed in borehole upon																											
Inc	completion of drilling.																											
	Water Level Readings Deep Well																											
	Date W. L. Depth (mBGS)																											
	Oct. 10, 2017 3.75																											
2	Shallow Well Date W. L. Depth (mBGS)																											
	Oct. 10, 2017 Dry																											
2																												
5																												

▲ ^{■=3%} Strain at Failure



LOG OF BOREHOLE BHP8

PF	RO.	IECT: Geotechnical Investigation for D	uffins	Cree	ek Dy	/ke F	Reha	bilitation									DR	LL	NG D	ΑΤΑ	ı.						
CL	IEI	NT: Valdor Engineering Inc.	/aldor Engineering Inc.									Conti	nuo	us	Split	Spoo	on				[DIAM	ETER	: 51	mm		
PF	RO.	IECT LOCATION: Pickering & Ajax, Ol	N						FIE	LD E	NG	INE	ER:	GH							[DATE	: 201	7-09-	11		
DA	λΤL	JM: N/A							SA	ИРLE	ERI	EVIE	W:	DX							F	REF.	NO.: 1	7-19	67G		
BH	I LO	OCATION: See Borehole Location Plar	ו						СН	ECKE	ED:	DL									E	ENCL	. NO.:	9			
		SOIL PROFILE		SA	MPL		~				NA SP			NET Cor	TRAT		TES ws/0		Plas	tic I	Natura Moistur	l re l	.iquid	п ³)		MARK	ŝ
			OT			"N" BLOWS/0.3m	GROUND WATER				20		40		60		80		Limi w _P		Conter w	nt –	Limit	UNIT WT (kN/m ³)		AND JIN SI	ZE
ELE DEP		DESCRIPTION	APL	н К		SWC	≤ 2		TION I						NGT I Vane			.	i-		-0-			NT (DISTF		ION
(m			STRATA PLOT	NUMBER	ТҮРЕ	" BLO	Sou		ELEVATION	Quio	ck T	riaxia		Pene	etrome	eter +	Lab	Vane			CON		• •	LIN		(%)	
	0.0	TOPSOIL: (180 mm)	5 5	ž	F			٩ _			20		40		60		80		1	0 2	20 3	80 4	10 	5	GR S	A SI	CL
).2	FILL: sandy silt, trace to some					L	v ⊲–Concrete																			
	-	clay, trace gravel, trace to some organics, trace rootlets, containing shale fragments, dark brown to brown, moist, compact/		1	SS	11				o									c	>							
(J.8	FILL: sand and silt to silty sand,	\bigotimes																								
-		trace clay, trace gravel, brown to grey, moist, dense		2	SS	34						C							0								
-			\bigotimes					∎—Bentonite	•																		
Ē			\mathbb{X}	3	00	43							c						。 								
-2			\bigotimes		00	43								ĺ					ľ								
	2.3		\bigotimes	\vdash	-																						
	2.7	gravel, trace to some organics, layers of silty sand, dark brown to brown, moist, compact		4A		22	100 10				0									0							
3		SILTY FINE SAND: layers/zones of organic silt, layers of sandy silt,	間	4B	SS																						
-		brown, moist, compact																									
-				5	SS	15	H	:		C										0							
-	3.8	SAND: some silt to silty, some						Sand																			
4	.0	gravel, layers of sandy silt, brown,		1			旧	Screen																			
-		wet, compact		6	SS	13		1		0										0							
-	1.0						ľ	4.4 mBGLC																			
- "	1.6	SAND AND GRAVEL: trace to some silt, layers of sandy silt,																									
<u>5</u>		brown, wet, compact		7	SS	21	逐				þ									0					54 3	6 1	0
7-10-25 09:18			0.0				R																				
10-25			000				æ	-Natural pack																			
2017-				8	ss	29	佬					0							0								
							Ŕ																				
×- (5.1	END OF BOREHOLE																									
GEOPRO 17-1967GT BH LOG PROJECT DATA 20171020 - EW - JY. GPJ		Notes: 1) Water encountered at a depth of 4.6 m below ground surface (mBGS) during drilling.																									
ECT DATA		 38 mm dia. monitoring well was installed in borehole upon completion of drilling. 																									
OG PROJ		Water Level Readings Date W. L. Depth (mBGS) Oct. 10, 2017 4.42																									
67GT BH I																											
PRO 17-19																											
DG GEO																											
01 - GEOPRO SOIL LOG																											
- GEOPI																											

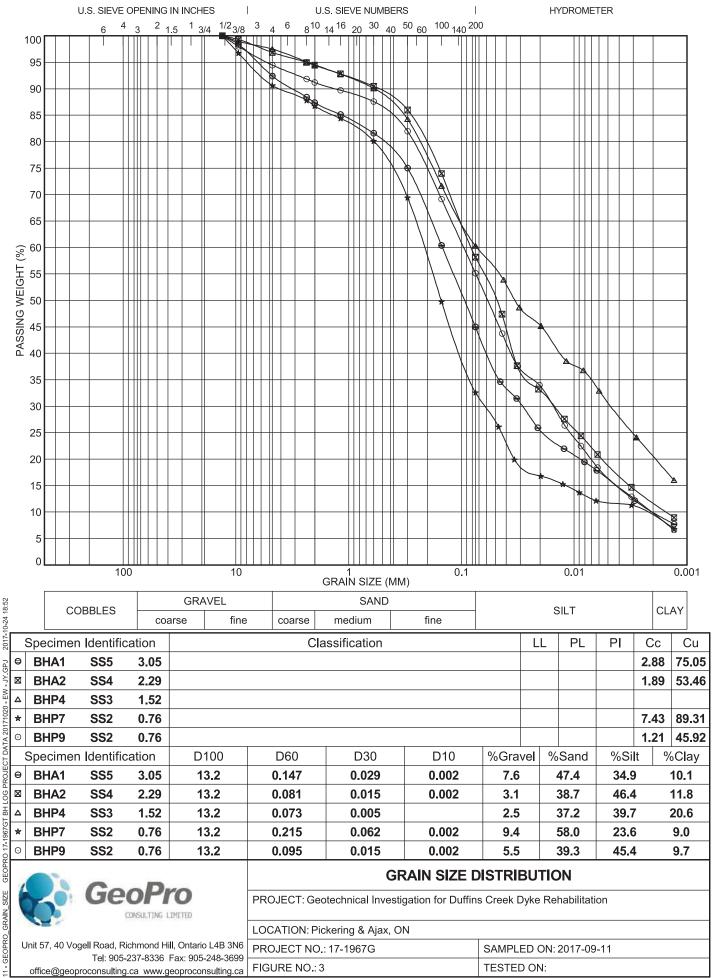


LOG OF BOREHOLE BHP9

PROJ	IECT: Geotechnical Investigation for D	uffins	Cree	k Dy	ke F	lehal	bilitation									0	RIL	LIN	IG D	ΑΤΑ									1
CLIEN	NT: Valdor Engineering Inc.							M	ETHO	D:	Cont	inu	ous \$	Spli	t Sp	oon						DIAM	ETER	R: 51	m	n			
PROJ	IECT LOCATION: Pickering & Ajax, O	N						FI	ELD E	INC	SINE	ER	: GH									DATE	: 201	7-09	-11				
DATL	JM: N/A							SA	MPLE	ER	EVIE	ΞW	: DX									REF.	NO.: 1	17-19	967	G			
BHLC	OCATION: See Borehole Location Plan	۱ ا						Cł	IECK													ENCL	NO.	: 10	_				_
	SOIL PROFILE		SA	MPL		Ľ				'NA SF							EST s/0.3r		Plasi		Natura Moistu		Liquid).)			MAF		
		DT .			N" BLOWS/0.3m	GROUND WATER		_		20		40		60		80		_	Limit w _P		Contei w	nt	Limit w _L	(kN/m ³)	(AND AN S	SIZE	
ELEV DEPTH	DESCRIPTION	STRATA PLOT	К		SWC	≤ ∠		EVATION.	θ Uno				TRE								_ 0 _			WT (D			IOIT	1
(m)		TRAT	NUMBER	ТҮРЕ	" BL	Sou l		ĒVA	A Qui	ick ⁻	riaxia	al 🛛	Pene	etrom	neter	+ L	ab Va					TENT	• •	UNIT			(%)		
0.0	_ TOPSOIL: (125 mm)	5	Ĩ	Ĥ	ŗ			Ц		20		40)	60)	80)	+	1	0 2	20 3	30	40	5	G	R S	A S	I CL	-
0.1	FILL: sandy silt to sand and silt,	$\overline{\mathbb{X}}$					←Concrete																						
-	trace clay, trace gravel, trace organics, trace rootlets, layers of	\otimes	1	SS	4				0										0										
-	clayey silt, zones of silty sand,	\bigotimes																											
- - _1	containing shale fragments, dark brown to brown, moist, very loose to	\bigotimes																											
-	dense	\otimes	2	ss	31						0								0						6	3	94	5 10)
-		\bigotimes																											
-		\otimes																											
-		\bigotimes					∎—Bentonite																						
2			3	SS	37							0							0										
-		\bigotimes																											
-		\bigotimes																											
-		\bigotimes	4	ss	31						0								0										
-		\otimes																											
<u>3</u> 3.1	PROBABLE FILL: silty fine sand,	\bigotimes																											
-	trace clay, trace organics, trace rootlets, layers of organic silt, dark	\bigotimes	_																										
-	brown to brown, moist, compact		5	SS	21					¢										0									
-		\bigotimes				目																							
- 3.8 - <u>4</u>	SILTY SAND TO SANDY SILT: trace clay, trace to some organics,	집합				: <u> </u>].																							
-	layers of organic silt, brown to dark	出出	6	SS	8		.∎_Sand		0												о								
-	brown, moist, loose						4.4 mBGLO Screen	ct 1																					
4.6	GRAVELLY SAND: trace clay,	0.01																											
-	trace to some organics, zones of silty sand, greenish brown, wet,	lo O	7	~~																	0								
-	compact	. o . C	7	SS	11	¦:∄:	·														0								
-		N				X	2																						
- 5.3	SAND AND GRAVEL: trace silt, greyish brown, saturated, compact	000				X																							
-		h00	8	SS	12		A −Natural Pack		0											0									
6		000				X																							
6.1	END OF BOREHOLE	n U·C									+	+					+	+							t				1
	Notes:																												
	1) Water encountered at a depth of 4.6 m below ground surface																												
	(mBGS) during drilling.																												
	2) 38 mm dia. monitoring well was installed in borehole upon																												
	completion of drilling.																												
	Water Level Readings																												
	Date W. L. Depth (mBGS) Oct. 10, 2017 4.36																												
	4.00																												
																								1					

				ININCHES		S. SIEVE NUMBER			HYDROME	TER		
	100	6 4	3 2	1.5 1 3/4 1/2 3/8	³ 4 ⁶ 8 ¹⁰	14 ¹⁶ 20 ³⁰ 40	⁵⁰ 60 ¹⁰⁰ 140 ²⁰	0				_
	95											
	85											
	80						N I N					
	75											
	70 65											
(60											
T (%												
PASSING WEIGHT (%)	55											
SING	45					N						
PASS	40							× ·				
	35											
	30											
	25							× ×				
	20						\checkmark					
	15							*				
	10								* *			
	5											
	0											5
		10	0	10	(1 GRAIN SIZE (MI	0.1		0.01			0.00
	С	OBBLES		GRAVEL		SAND			SILT		CL	AY
				arse fine		medium	fine					
•	Specime BHA2	n Identific SS8A	ation 5.33		Cla	assification		L	L PL	PI	Cc 2.17	Cu 8.1
	BHP1	SS4	2.29								0.65	8.0
_ _	BHP2	SS5	3.05								2.69	152.
*	BHP4	SS4	2.29								2.78	8.3
		n Identific		D100	D60	D30	D10	%Gravel	%Sand	%Silt	9	6Clay
•	BHA2	SS8A	5.33	13.2	0.2	0.103	0.024	3.2	79.5	13.4		3.9
	BHP1	SS4 SS5	2.29	19 26.5	0.804	0.228	0.1	19.7 53.8	73.6		6.7 11.9	
*	BHP2 BHP4	555 SS4	3.05 2.29	0.3	8.483 0.06	1.128 0.035	0.007	0.0	34.3 26.3	69.3	11.9	4.3
^	DITE	004	2.23	0.5	0.00	0.000	0.007	0.0	20.5	03.5		4.5
						G	RAIN SIZE D					
6	Ro		oP		PROJECT: Geo	otechnical Investi				n		
		\$	CONSULTING	LIMITED	LOCATION: Pic	kering & Ajax, To	pronto, ON					
	Unit 57, 40 V	ogell Road, F	Richmond H	lill, Ontario L4B 3N6				SAMPLED	ON: 2017-09	-07		
		Tel: 905		Fax: 905-248-3699 geoproconsulting.ca	FIGURE NO.: 1			TESTED O				

		U.S. SIEVE	OPENI	NG IN	INCHES	l		U.S. SIE	VE NI	JMBEF	RS		I			HYE	ROM	ETEF	٦		
		6 '	4 3	² 1,5	¹ 3/4 ^{1/2} 3/8	3 4	6 ₈ 1	⁰ 14 ¹⁶	20 3	⁰ 40	⁵⁰ 60	¹⁰⁰ 14	.0 200								
	100					╢║			╫┼╻												
	95			- ·	$\mathbf{\mathbf{h}}$					+									_		_
	90				\mathbf{A}																_
	85									\mathbb{A}									_		_
	80										*/										
	75					N															
	70																				
	65											$\left - \right\rangle$									
(%)	60										_	+									
HT	55				N							-		\mathbb{N}^+							_
WEIG	50					N					_										
SING	45																				
PASSING WEIGHT (%)	40						\backslash														
-							×			\mathbb{N}			[[]]				X				
	35							*									N				
	30								\mathbb{N}	k I	\backslash		NII								
	25									X	╲		N								
	20										\mathbf{X}									<	
	15																				
	10																				
	5																				
	0	1(00		10			1 GRAII		E (MI	<u></u>	0	.1				0.01				0.00
					GRAVEL						vi)										
	C	OBBLES		coars		с	oarse	me	dium		1	fine				SI	T			CL	AY
	Specime	en Identifie	cation				0	Classifi	catio	n					LI		PL		PI	Сс	Cı
•	BHP5	SS5	3.0	5																0.75	23.0
	BHP6	SS7	6.1	0																	
	BHP7	SS4	2.2	9																1.25	4.5
*	BHP8	SS7	4.5	7]	1.20	136.
	Specime	en Identifi	cation		D100	Г	060		D30)		D10		%Gr	avel	%	Sand		%Sil	t o	6Clay
•	BHP5	SS5	3.0	5	26.5		005		0.36			0.087		⁷⁸ Gr			3.4	+	7001	<u> </u>	Jula
•	BHP6	SS7	6.1	-	13.2		076		0.00					4.			5.9		45.2		14.5
	BHP7	SS4	2.2	9	4.75	0.	175		0.09	2		0.038		0.	0	78	8.6		18.1		3.3
*	BHP8	SS7	4.5	7	37.5	9.	847		0.92	6				53	.6	3	6.2			10.1	
6		Ge	oF	Pro	0	PROI	FCT	eotechr	nical I									ion			
	Q.		CONSULTI											JICCK	Jyne I	(C) Idl	Jinal	511			
	Unit 57 40		Richmon	에 LLIII	Ontario L4B 3N6			Pickerin	-	-	oronto	, ON					- / -				
		Tel: 90	5-237-83	36 Fa	ax: 905-248-3699			0.:17-1	967G	i											
	office@ge	eoproconsultir	ng.ca wv	w.geo	oproconsulting.ca	FIGUF	KE NO.	:2						TEST	ED ON	v: 201	7-10	-09			



APPENDIX E

Photographs of 2019 Geotechnical Investigation Soil Samples



THA19-01 Sample 1 (2'6"-4'6") Recovery 1'6"







THA19-01 Sample 5 (15'-17') Recovery 2'



THA19-01 Sample 2 (5'-7') Recovery 1'6"



THA19-01 Sample 4 (10'-12') Recovery 1'6"



THA19-01 Sample 6 (20'-22') Recovery 4"





THA19-01 Sample 7 (25' – 27') Recovery 1'



THA19-02 Sample 1 (2'6"-4'6") Recovery 2'



THA19-02 Sample 3 (10'-12') Recovery 2'



THA19-01 Sample 8 (30'-32') Recovery 2'



THA19-02 Sample 2 (5'-7') Recovery 2'



THA19-02 Sample 4 (15'-17') Recovery 2'



September 2019 KGS 19-2939-003











THP19-01 Sample 3 (5'-7') Recovery 1'6"



THA19-02 Sample 6 (25'-27') Recovery 6"



THP19-01 Sample 2 (2'6"-4'6") Recovery 1'



THP19-01 Sample 4 (7'6"-9'6") Recovery 8"







THP19-01 Sample 5 (10'-12') Recovery 6"



THP19-01 Sample 7 (15'-17') Recovery 2"



THP19-01 Sample 9 (25'-27') Recovery 2'



THP19-01 Sample 6 (12'6"-14'6") Recovery 3"



THP19-01 Sample 8 (20'-22') Recovery 1'6"



THP19-02 Sample 1 (0'-2') Recovery 1'











THP19-02 Sample 4 (7'6"-9'6") Recovery 1'6"



THP19-02 Sample 6 (15'-17') Recovery 1'



THP19-02 Sample 3 (5'-7') Recovery 1'9"



THP19-02 Sample 5 (10'-12') Recovery 4"



THP19-02 Sample 7 (20'-22') Recovery 1'



September 2019 KGS 19-2939-003





THP19-03 Sample 1 (0'-2') Recovery 1'3"



THP19-03 Sample 3 (5'-7') Recovery 1'3"



THP19-03 Sample 5 (10'-12') Recovery 1'

THP19-03 Sample 2 (2'-4') Recovery 1'6"



THP19-03 Sample 4 (7'6"-9'6") Recovery 1'3"



THP19-03 Sample 6 (15'-17') Recovery 1'3"





THP19-03 Sample 7 (20'-22') Recovery 1'6"



THP19-04 Sample 1 (0'-2') Recovery 1'



THP19-04 Sample 3 (5'-7') Recovery 2'



THP19-03 Sample 8 (25'-27') Recovery 1'6"



THP19-04 Sample 2 (2'-4') Recovery 1'6"



THP19-04 Sample 4 (7'6"-9'6") Recovery 1'6"





THP19-04 Sample 5 (10'-12') Recovery 1'6"



THP19-04 Sample 7 (20'-22') Recovery 2'



THP19-04 Sample 6 (15'-17') Recovery 2'



APPENDIX F

2019 Ajax and Pickering Dyke Geotechnical Investigation Logs

K	GS ROUP		REFERENCE NO.			DLE HA	NO. 19-	-01	SHEET 1 of 1
PR	OJECT E	Pickeri Ajax Dy	NTO & REGION CONSERVATION AUTHORITY ng and Ajax Dykes Environmental Assessment ke 160 on Dyke Crest					JOB NO. GROUND ELEV. TOP OF CASING WATER ELEV. DATE DRILLED	
DR			ø Hollow Stem Auger, Mobile B57 Track Mounted, Trip	Hamn	ner			UTM (m)	N
ELEVATION (m)	DEPTH (m) (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZO. LOG	DEPTH (m)	SAMPLE TYPE	NUMBER RECOVERY %	SPT (N) blows/0.15 m ▲ DYNAMIC CONE (N) blows/ft △ 20 40 60	Cu POCKET PEN (kPa) ★ Cu TORVANE (kPa) 20 40 60 80 PL MC LL % 20 40 60 80
80.9 - 80			TRAIL TOPPING (75 mm) - Quarry dust. CLAYEY SILT TILL FILL (EMBANKMENT FILL) - Brown, moist, firm to stiff, low plasticity, with with varying amounts of sand and clay, trace organics.		0.9		51 75	7.1 8.1 8.1 7.1	
- 79	2		 Greenish-brown with organics (topsoil mixed fill) below +/- 1.52 m. Trace to some organics below +/- 2.28 m. 			$\left \right\rangle$	52 ₇₅	4	
- 7 78 0			<u>CLAYEY SILT</u> - Brown and greenish-brown, moist, firm to stiff, low plasticity, trace to some sand, trace fine gravel, with organics.			$\left \right $	^{S3} 75		
- 777 - 70010-0010 - 77 - 77 - 77 - 77 - 77 - 77 - 77 - 7			- Grain Size Distribution (S5): Gravel (1.0%), Sand (23.0%), Fines (76.0%) at +/- 4.57 m - Organic Content (S5): 2.8% - More sand content below +/- 4.57 m				⁵⁵ 100		
			SAND - Grey, wet, loose, poorly graded, fine to coarse grained sand, trace fine to coarse grained sub-angular to angular gravel, trace to some fines.		7.3		56 ₀		
939-003 PICKERIN - 73	8		- Very dense below +/- 7.60 m. - Increased fines content below +/- 7.62 m.		7.6	X	57 ₁₀₀	40 5 0	
AU/DESKTOP/19-22	9 - - -		- Grain Size Distribution (S8): Gravel (4.0%), Sand (79.0%), Fines (17.0%) at +/- 9.14 m. END OF HOLE AT 9.75 m		9.1	X:	58 ₁₀₀	▲20 35 40 ▲40 ▲50	
COL C			Notes: 1. Installed standpipe piezometer at 9.14 m below grade with protective flushmount casing. 2. Backfilled the test hole with cement bentonite chips and topped with sand in the upper 0.9 m. 3. The UTM coordinates (Northing, Easting, and Elevation) are approximate and based on the available topographic survey (2017) and LiDAR (2015) provided by TRCA.						
SAN COLECTIN	MPLE TYP NTRACTO Landsha	R	Split Spoon INSPECTOR Illing D.D.			APPR G	OVE		DATE 12/3/19

K GR	GS OUP		SUMMARY LOG REFERENCE NO.			DLE HA	NO. 19	-02	SHEET 1 of 1	
SITE	JECT	Pickeri Ajax Dy Sta. 0+0	NTO & REGION CONSERVATION AUTHORITY ng and Ajax Dykes Environmental Assessment ke 960 on Dyke Crest of Hollow Stem Auger, Mobile B57 Track Mounted, Trip	Hamm	er			JOB NO. GROUND ELEV. TOP OF CASING WATER ELEV. DATE DRILLED UTM (m)	ELEV. 81.00 m 7/8/2019 N	
ELEVATION (m)	HOD DEPTH (m) (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZO. LOG	DEPTH (m)	SAMPLE TYPE	NUMBER RECOVERY %	SPT (N) blows/0.15 m ▲ DYNAMIC CONE (N) blows/ft △ 20 40 60	E Cu POCKET PEN (kPa) \star Cu TORVANE (kPa) \bullet 20 40 60 80 PL MC LL % 20 40 60 80	
80.9 - - 80 - 79	1-1-5 2-1-		TRAIL TOPPING (75 mm) - Quarry dust. CLAYEY SILT TILL FILL (EMBANKMENT FILL) - Brown, moist, firm to stiff, low plasticity, with varying amounts of sand and clay, trace organics. - Grain Size Distribution (S2): Gravel (6.0%), Sand (33.0%), Fines (61.0%) at +/- 1.52 m.		0.9	X	⁵¹ 100	13 17 17 16 10		
- 7 6 80 _	3 		<u>CLAYEY SILT</u> - Brown and greenish-brown, moist, soft, slightly plastic, trace to some sand, trace fine gravel, with organics.			X	53 100			
03DEC2019_DD.GPJ 	5-15		- Grain Size Distribution (S4): Gravel (0.0%), Sand (48.0%), Fines (52.0%) at +/- 4.57 m.		5.8	X	54 100			
- 100 - 100	6 <u>-</u> 20 		SAND WITH GRAVEL - Grey, wet, very dense, poorly graded, fine to coarse grained sand, with fine to coarse grained sub-angular to angular gravel, trace to some fines.		7.6		⁵⁵ 50	▲8 8 20 ▲20 ▲50 ↓ 50 ↓ 127 mm		
CON CN SAM CON CN C	0 		END OF HOLE AT 8.22 m Notes: 1. Installed standpipe piezometer at 7.62 m below grade with protective flushmount casing. 2. Backfilled the test hole with cement bentonite chips and topped with sand in the upper 0.9 m. 3. The UTM coordinates (Northing, Easting, and Elevation) are approximate and based on the available topographic survey (2017) and LiDAR (2015) provided by TRCA.							
AND SAM CON	MPLE TYPE Split Spoon NTRACTOR INSPECTOR APPROVED DATE Landshark Drilling D.D. SG 12/3/19									

	K	GS				HOLE FH			01			s	HEET :	1 of 1
P		INT JECT	Pie	ckeriı	ITO & REGION CONSERVATION AUTHORITY ng and Ajax Dykes Environmental Assessment ng Dyke				JOB N GROU TOP O	ND EI F CAS	SING	ELEV	84.25	39-003 m
					g Dyke 80 on Dyke Crest				WATEI DATE				6/8/20	19
		LING			-				UTM (r			N		
		HOD	100	u mm	ø Hollow Stem Auger, Mobile B57 Track Mounted, Trip Hammer				Í			E		
EI EVATION (m)		(m) (m)	it)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N blows/ DYNAN (N) blo	Ó.15 r /IIC C(ws/ft			2000 ORVANE (40 . MC %	60 80
- 84	4 ¹	-	Ř		TOPSOIL (100 mm) - Dark brown, damp. CLAYEY SILT TILL FILL (EMBANKMENT FILL) - Brown, moist, firm to stiff, low	-1	S1	50	7 1					
- 83	3				plasticity, with varying amounts of sand, trace organics.		S2	50	20 ▲4 ▲5 ▲5					
82		2-1 2-1	5		<u>SILTY SAND</u> - Brown, moist, loose, poorly graded, fine grained, trace to some fines.		S3	75	3. 4. 3.		 			
- 82	20 _		0.000		SAND WITH GRAVEL - Grey, wet, compact to dense, poorly graded, fine to coarse grained sand with fine to coarse grained sub-angular to angular gravel, trace to some fines.		S4	33	▲ 5 ▲ 5 ▲ 6 ▲ 7					
- 81	1				- Trace shells at 3.0 m. - Compact below 3.0 m.		S5	25	▲6 ▲7 ▲7 11	-				
- 80	D	4	0.0.0)-2°C (-			S6	12	▲ 4 5 115					
19_DD.GPJ			15				s7	100	1 3 8 15					
	3	6 7 7	20		- Dense below 6.1 m.	X	58	75	10 18 22	1 1 31 2 1				
39-003 PICKERING 39-003 PICKERING	6	8	25		- Grain Size Distribution (S9): Gravel (17.5%), Sand (71.5%), Fines (11.0%) at +/- 7.62 m.		S9	100	▲ 5 ▲ 8 ▲ 115 ▲ 13					
19-293					CLAYEY SILT TILL - Grey, wet, very hard, low plasticity, with varying amounts of sand.									
75 - 75		9	30		- Very hard augering, shale fragments at 8.5 m. END OF HOLE AT 9.14 m	-×	S10	0				130 i 127: mi	n penetra	tion
DG C:\USERS\DDUBEAU\			35		Notes: 1. Backfilled the test hole with cement bentonite chips and topped with sand in the uppe 0.9 m. 2. The UTM coordinates (Northing, Easting, and Elevation) are approximate and based on the available topographic survey (2017) and LiDAR (2015) provided by TRCA.	r								
SOILL										-	<u></u>			┥ <u>-</u> ┥-┥-┥-
o IICAL-;	<u></u>		DE	\square	Split Speen						1			1
N S.		PLE TY		\square	Split Spoon INSPECTOR	APP	RO	VF	D		1	DATE		
GEOI				Dri	lling D.D.	SG						12/3/1		

K GF	GS OUP		SUMMARY LOG REFERENCE NO.			DLE I HP		02	SHEET 1 of	1
SITI LOC DRII	DJECT F	Pickeri Pickerir Sta. 0+8	NTO & REGION CONSERVATION AUTHORITY ng and Ajax Dykes Environmental Assessment ng Dyke 325 on Dyke Crest nø Hollow Stem Auger, Mobile B57 Track Mounted, Trip	Hamm	er			JOB NO. GROUND ELEV. TOP OF CASING WATER ELEV. DATE DRILLED UTM (m)	19-2939-003 83.73 m ELEV. 83.73 m 6/8/2019 N E	3
ELEVATION (m)	(m) (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZO. LOG	DEPTH (m)	SAMPLE TYPE	RECOVERY %	SPT (N) blows/0.15 m ▲ DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) Cu TORVANE (kPa) 20 40 60 80 PL MC LL % 20 40 60 80 %) L
83.6 ⁻ - 83			TOPSOIL (100 mm) - Dark brown, damp. CLAYEY SILT TILL FILL (EMBANKMENT FILL) - Brown, moist, firm to stiff, low plasticity, with varying amounts of sand, trace organics.		0.9	$\left \right $	⁵¹ 50 ⁵² 75	5		
- 82	2 2 - - - - - - - - - - - - - - - - - -		- Grain Size Distribution (S3): Gravel (5.0%), Sand (38.0%), Fines (57.0%) at 1.5 m.			S	³ 87	591		
- 81	3 - 10		- Organics (topsoil mixed fill, rootlets) below 2.4 m. - More sand content below 3.0 m.			A	⁵⁴ 75			
- 80 - 2.07 - 90 - 2.07 - 79 - 79 - 79 - 79 - 79 - 79 - 79 - 7	4 4 5 5 6 6		<u>CLAYEY SILT TILL</u> - Brown, moist, firm to stiff, low plasticity, with varying amounts of sand, trace organics. - Grain Size Distribution (S6): Gravel (11.0%), Sand (38.5%), Fines (50.5%) at 4.6 m.		3.74.66.1	× ×	6 ₅₀			
77.0 - 77.0 - 77.0 - 77.0 -	7 - 20		SAND WITH GRAVEL - Grey, wet, compact, poorly graded, fine to coarse grained sand, with fine to coarse grained sub-angular to angular gravel, trace to some fines. - Grain Size Distribution (S7): Gravel (21.0%), Sand (54.0%), Fines (25.0%) at 6.1 m. END OF HOLE AT 6.70 m			۶	57 50	99. 88. 5. 5. 		
7° 77.6 - 77.7 -	8 25 8		Notes: 1. Installed standpipe piezometer at 6.09 m below grade with protective flushmount casing. 2. Backfilled the test hole with cement bentonite chips and topped with sand in the upper 0.9 m. 3. The UTM coordinates (Northing, Easting, and Elevation) are							
	9		approximate and based on the available topographic survey (2017) and LiDAR (2015) provided by TRCA.							
- 73 - 73011 LOG C:/USERS/										
CON CON CON CON	Image: Approved and the second sec									

K GF	GS ROUP		SUMMARY LOG REFERENCE NO.			OLE 'HF	NO. 19-	-03	SHEET 1 of 1
PRC SIT	CATION	Pickeri Pickerii	NTO & REGION CONSERVATION AUTHORITY ing and Ajax Dykes Environmental Assessment ng Dyke 280 on Wet Side of Dyke, 19 m Offset from Dyke Center	line				JOB NO. GROUND ELEV. TOP OF CASING WATER ELEV. DATE DRILLED UTM (m)	
	LLING THOD	100 mm	e ø Hollow Stem Auger, Mobile B57 Track Mounted, Tri	p Hamm	ner	<u>.</u>			E
ELEVATION (m)	HL H U (m) (ft	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZO. LOG	DEPTH (m)	SAMPLE TYPE	NUMBER RECOVERY %		Cu POCKET PEN (kPa) \star Cu TORVANE (kPa) \bullet 20 40 60 80 PL MC LL % 20 40 60 80
- 812 -			TOPSOIL (100 mm) - Dark brown, damp. CLAYEY SILT TILL FILL - Brown, moist, firm to stiff, low plasticity, with varying amounts of sand, trace organics.		0.9		S1 62 52 75 53 62		
- 7 <u>9</u> 9 - 78.2 <u>-</u> - 78			CLAYEY SILT - Brown and grey, moist, soft, low plasticity, trace sand. SAND WITH GRAVEL - Grey, wet, compact, poorly graded, fine to coarse grained sand, with fine to coarse grained sub-angular to angular gravel, trace to some fines.			A	S4 62		
C3019 DD.GPJ - 7.57 - 7.57 - 7.52 - 7.57 - 7.52 - 7			CLAYEY SILT TILL - Grey, moist, hard, low plasticity, with varying amounts of sand, trace organics.		5.7		S6 ₆₂		
CKERING AND AJAX DXD	7		SAND WITH GRAVEL - Grey, wet, dense, poorly graded, fine to coarse grained sand, with medium to coarse grained sub-angular to angular gravel, trace to some fines. - Grain Size Distribution (S7): Gravel (36.0%), Sand (51.0%), Fines (13.0%) at +/- 6.10 m. END OF HOLE AT 7.77 m		7.6		S7 75		90 127 mm. pehetration
COTECHNICAL-SOIL LOG C:USERSIDDUBEAUNDESKTOP/19-2939-003 PICKERING AND AJAX DYKES 03DEC2019 DD.GPU 22 - 25 - 27 - 23 24 - 25 - 27 - 23 25 - 26 - 20 26 - 20 27 -	8		Notes: 1. Installed standpipe piezometer at 7.62 m below grade with protective flushmount casing. 2. Backfilled the test hole with cement bentonite chips and topped with sand in the upper 0.9 m. 3. The UTM coordinates (Northing, Easting, and Elevation) are approximate and based on the available topographic survey (2017) and LiDAR (2015) provided by TRCA.						
07 - CHNICAL-SOIL LOG C:USEF	11 - 3: 11	PE 🔀	Split Spoon						
	NTRACTO Landsha		INSPECTOR D.D.			APPF G	OVE		DATE 12/3/19

	KG	S UP			hole THI						SH	EET (1 o í	f 1
P	LIENT Roje	ст Р	Pickeri	NTO & REGION CONSERVATION AUTHORITY ng and Ajax Dykes Environmental Assessment			GR		D ELE\ CASIN			19-29 81.26		03
L	ITE OCAT RILLI	ION S	Sta. 0+1	ng Dyke 00 on Wet Side of Dyke, 10 m Offset from Dyke Centerline			DA		ELEV. RILLEC		N	7/8/20)19	
	IETHO		00 mm	ø Hollow Stem Auger, Mobile B57 Track Mounted, Trip Hammer							E			
EI EVATION (m)		(tt) (tt)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	SAMPLE TYPE		blo DY (N)	NAMIC blows		¢	20 PL	MC %	(kPa)	80 − LL −
- 81	r ²	1		TOPSOIL (100 mm) - Dark brown, damp.	Λ Λ	Z 0 S1 50	7	20 40) 60		<u>20</u>	40	60 8 :1::1::	8 <u>0</u> :1::1::
— 8C	2-	5		<u>CLAYEY SILT TILL FILL</u> - Brown, moist, firm to stiff, low plasticity, with varying amounts of sand, trace organics.		S2 7!				· · · · · · · · · · · · · · · · · · ·				
- 7%	9 ⁰ _			CLAYEY SILT - Brown and grey, moist, soft, low plasticity, trace sand, with organics. - Grey below 2.4 m. - Grey below +/- 2.44 m.		S4 7	0			· · · · · · · · · · · · · · · · · · ·				
78. - 78	- 1 °			SAND WITH GRAVEL - Grey, wet, very dense, poorly graded, fine to coarse grained sand, with fine to coarse grained sub-angular to angular gravel, trace to some fines.	X	S5 7	5	14 11 10						
03DEC2019_DD.GPJ 	5 -			- Grain Size Distribution (S6): Gravel (25.0%), Sand (66.0%), Fines (9.0%) at 6.1 m.	X	S6 ₁₀	0							
ND AJAX DYKES	5	20			X	87 ₁₀	0	17. 23	45	· · · · · · · · · · · · · · · · · · ·				
VERING - 74		25				S8 0					00 7 mm		- -	
OP\19-2939-003 PI(8 - 3 9 -			END OF HOLE AT 7.77 m Notes: 1. Backfilled the test hole with cement bentonite chips and topped with sand in the uppe 0.9 m. 2. The UTM coordinates (Northing, Easting, and Elevation) are approximate and based on the available topographic survey (2017) and LiDAR (2015) provided by TRCA.										
	10 -									· · · · · · · · · · · · · · · · · · ·				
GEOTECHNICAL-SOIL LOG C:USERSIDDUBEAUIDESKTOP119-2939-003 PICKERING AND AJAX DYKES_03DEC2019_DD.GPJ 	11 -													
	AMPLE	+ TYPF		Split Spoon				1			·· ··		<u> </u>	<u>. </u>]
C CECH	ONTRA	ACTOF	<u> </u>	INSPECTOR Llling D.D.	APPF SG	ROV	ED				ATE /3/19			

APPENDIX G

O.Reg 558 TCLP – Metals and Inorganics Analyses Test Results



Page 1 of 5

CLIENT NAME: KGS GROUP SUITE 402, 4310 SHERWOODTOWNE BLVD MISSISSAUGA, ON L4Z4C4 (905) 848-2473

ATTENTION TO: S.Gnanasunthar

PROJECT: Pickering/Ajax Dykes 19-2939-003

AGAT WORK ORDER: 19T508259

SOIL ANALYSIS REVIEWED BY: Parvathi Malemath, Data Reviewer

DATE REPORTED: Sep 03, 2019

PAGES (INCLUDING COVER): 5

VERSION*: 1

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

<u>*NOTES</u>		

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

AGAT Laboratories (V1)

Member of: Association of Professional Engineers and Geoscientists of Alberta	AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory
(APEGA)	Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the
Western Enviro-Agricultural Laboratory Association (WEALA)	scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian
Environmental Services Association of Alberta (ESAA)	Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations
	are location and parameter specific. A complete listing of parameters for each location is available
	from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in
	the scope of accreditation. Measurement Uncertainty is not taken into consideration when stating
	conformity with a specified requirement

Results relate only to the items tested. Results apply to samples as received. All reportable information as specified by ISO 17025:2017 is available from AGAT Laboratories upon request



Certificate of Analysis

AGAT WORK ORDER: 19T508259 PROJECT: Pickering/Ajax Dykes 19-2939-003

ATTENTION TO: S.Gnanasunthar

SAMPLED BY:D. D.

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

CLIENT NAME: KGS GROUP

SAMPLING SITE:Pickering + Ajax, On

O. Reg. 558 Metals and Inorganics

DATE RECEIVED: 2019-08-22								DATE REPORTED: 2019-09-03		
		SAMPLE DES	CRIPTION:	TPA19-01	TPA19-02	TPP19-01	TPP19-02	TPP19-05	TPP19-06	
		SAMPLE TYPE: DATE SAMPLED:		Soil 2019-08-07	Soil 2019-08-07	Soil 2019-08-06	Soil 2019-08-06	Soil 2019-08-07	Soil 2019-08-07	
Parameter	Unit	G/S	RDL	461448	461453	461454	461455	461458	461459	
Arsenic Leachate	mg/L	2.5	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
Barium Leachate	mg/L	100	0.100	0.740	0.688	0.623	0.611	0.675	0.688	
Boron Leachate	mg/L	500	0.050	0.053	<0.050	0.059	<0.050	0.060	0.067	
Cadmium Leachate	mg/L	0.5	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
Chromium Leachate	mg/L	5	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
_ead Leachate	mg/L	5	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
Mercury Leachate	mg/L	0.1	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	
Selenium Leachate	mg/L	1	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
Silver Leachate	mg/L	5	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	
Jranium Leachate	mg/L	10	0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	
Fluoride Leachate	mg/L	150	0.05	0.21	0.21	0.13	0.17	0.09	0.16	
Cyanide Leachate	mg/L	20	0.05	< 0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
(Nitrate + Nitrite) as N Leachate	mg/L	1000	0.70	<0.70	<0.70	<0.70	<0.70	<0.70	<0.70	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to O. Reg. 558 - Schedule IV Leachate Quality Criteria

Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation. Analysis performed at AGAT Toronto (unless marked by *)



Certified By: