

To:
NEWPCC

CC:
faris.alobaidy@aecom.com

Addendum

Subject: Primary Clarification New Scum Building

1. Introduction

This addendum provides an additional evaluation of the pile design parameters for the New Scum Building and should be read in conjunction with the geotechnical report titled, "NEWPCC Primary Clarification Upgrade New Scum Building – Geotechnical Investigation" dated May 24, 2022. The provided report titled "NEWPCC Upgrade: Headworks Facilities Project Geotechnical and Hydrogeological Report" by Red River Solutions dated November 22, 2021 was reviewed and used to provide the pile rock socket parameters. The report indicated the following:

- Test hole RRS-01 drilled to a depth of 43,3 m below the ground surface (mBGS) was used to get bedrock information.
- Bedrock was encountered at approximately 23 mBGS (Elev, 208 m above sea level (mASL)) and was classified as Limestone.

This addendum will include revised design parameters for Cast-in-Place (CIP) concrete piles socketed into bedrock.

2. New Scum Building Subsurface Conditions

In the year 2021, AECOM drilled one test hole TH21-01 at the proposed new scum building location. The test hole extended to a depth of 20.7 mBGS and consisted of a layer of topsoil of 150 mm thick at the surface, overlying 450 mm thick granular fill layer, overlying clay which extended to 18.3 mBGS (EL. 212.7 m) followed by glacial till which extended to test hole termination depth of 20.3 mBGS (EL. 210.7 m). Details about the afore mentioned test hole can be found in the report titled, "NEWPCC Primary Clarification Upgrade New Scum Building –Geotechnical Investigation" dated May 24, 2022.

Since the test hole TH21-01 was terminated in glacial till, test hole RRS-01 in the Red River Solutions report titled "NEWPCC Upgrade: Headworks Facilities Project Geotechnical and Hydrogeological Report" dated November 22, 2021 was reviewed to provide subsurface conditions and pile design parameters below the elevation of 210.7 m.

Silt till was encountered at a depth of 20.6 mBGS (EL. 210.5 m) and extended to a depth of 23.1 mBGS (EL. 207.9 m). The silt till contained trace clay, trace to some sand, trace gravel and was of low plasticity, moist and light grey in color. Below 21.3 mBGS the quantity of gravel increases in silt till. An SPT 'N' value of 30 measured in silt till indicated that the silt till was of compact to dense consistency.

The till was prone to sloughing and considerable seepage, softening/disturbance and loss of bearing resistance upon unloading, as well as heave due to excess groundwater pressure from the underlying bedrock aquifer. Measures will need to be taken for all deep excavations to manage these conditions.

Coring was initiated upon auger refusal at a depth of 22.3 mBGS. Bedrock was encountered at a depth of 23.1 mBGS (EL. 207.9 m) and extended to the test hole termination depth of 43.3 mBGS (EL. 187.7 m). The bedrock generally consisted of dolomite and limestone, which was highly weathered (i.e fractured). The unconfined compressive strengths ranged from 44 to 154 MPa with an average of 78 MPa. The Rock Quality Designation (RQD) of the bedrock was evaluated for the bedrock encountered within the test hole. RQD values along with recovery provide an indication of rock fracturing and overall bedrock quality. The upper 13 m of the bedrock was of poor to very poor rock quality improving to fair to excellent at greater depths. The test hole log did not provide any indication of artesian pressure in till or bedrock however historically artesian pressure has been encountered in the NEWPCC area therefore if artesian pressure is encountered during drilling, pile installation should be terminated immediately and the hole backfilled with concrete or bentonite to prevent the flow of water.

2.1 Groundwater Conditions

Based on the instrumentation data provided in the Red River Solutions report, the groundwater level elevations within the various strata ranges based on 2020 and 2021 monitoring data are provided in the **Table 2-1**, no depths were provided in the report:

Table 2-1: Summary of Groundwater Levels

Strata	Elevations (mASL)
Clay	229.1 to 223.8
Till	225.6 to 222.7
Bedrock	226.4 to 223.6

3. Foundation Evaluation

It should be noted that this Addendum should be read in conjunction with the original AECOM geotechnical report titled, "NEWPCC Primary Clarification Upgrade New Scum Building –Geotechnical Investigation" dated May 24, 2022. All the sections and recommendations in the original geotechnical report should be followed. Only "**Section 5.2.3 CIP Concrete Pile Design Parameters**" is being revised and is provided below.

The axial capacity of CIP piles may be determined using parameters provided in the revised **Table 5-1** and the equation provided in **Section 5.2.2**. The CIP concrete pile parameters are for the proposed new scum dewatering building location. A 600 mm diameter pile has been assumed. In order to reduce ambiguity, parameters are presented in terms of elevation for this area.

Table 5-1: Ultimate Design Parameters for CIP Concrete Piles

Elevation (m)	Ultimate Skin Friction (kPa)	Ultimate End Bearing Resistance (kPa)
231 – 228	-	-

Memo

228 – 226.5	32	-
226.5 – 223.2	40	-
223.2 – 219.5	15	-
219.5 – 212.7	32	-
212.7 – 210.5	35	-
210.5 – 208	85	-
208 – 204.5	500	-

The pile design parameters in the above revised **Table 5-1** are considered applicable for downward (compressive) static loads. Recommendations for uplift loads are provided in **Section 5.4** of the original geotechnical report. Recommendations for laterally loaded piles are provided in **Section 5.6** of the original geotechnical report.

Negative skin friction due to settlement of fill and native soils should be considered in design of the piles in areas where fill will be placed (**Section 5.5** of the original geotechnical report).

General design and construction recommendations for CIP concrete piles are provided in **Section 5.2.4** of the original geotechnical report.

We trust this addendum meets your requirements. Please contact the undersigned at your convenience should you have any questions.

AECOM Canada Ltd.

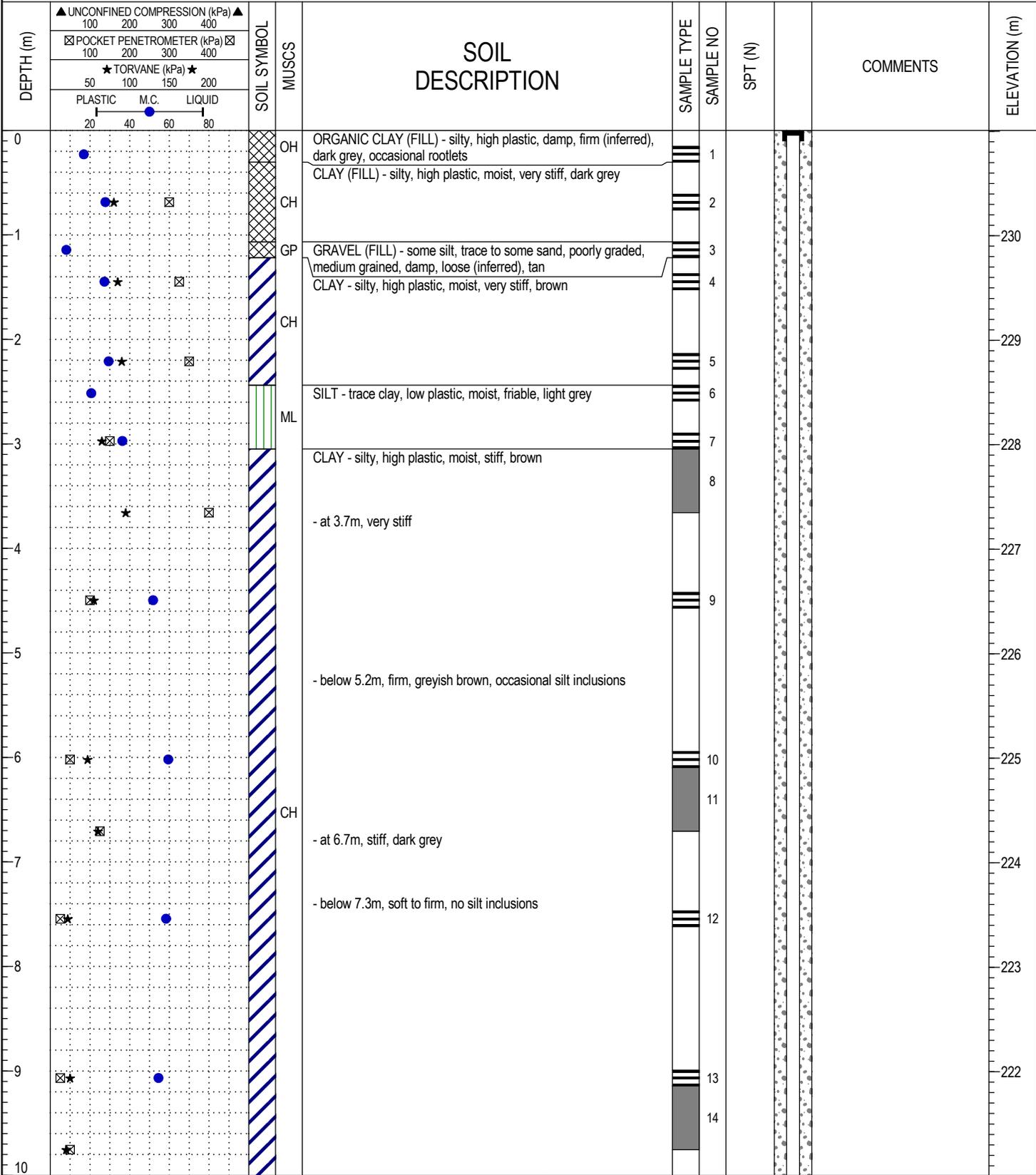
Prepared by:

Usman Raja, P.Eng.
Geotechnical Engineer
usman.raja@aecom.com

Faris Alobaidy, M. Sc., P.Eng.
Senior Geotechnical Engineer
faris.alobaidy@aecom.com

PROJECT: NEWPCC Headworks Facilities Project	DRILLER: Maple Leaf Drilling Ltd.	TEST HOLE ID: RRS-01
CLIENT: Red River Solutions	DRILL RIG: Geo Probe	PROJECT No: WX1905601
LOCATION: N5534953.6 E635792.9	DRILL METHOD: 125mm SSA/HQ Core	ELEVATION: 231.01 m

SAMPLE TYPE	<input checked="" type="checkbox"/> Shelby Tube	<input type="checkbox"/> No Recovery	<input checked="" type="checkbox"/> SPT (N)	<input type="checkbox"/> Grab Sample	<input type="checkbox"/> Split-Pen	<input type="checkbox"/> Core
BACKFILL TYPE	<input checked="" type="checkbox"/> Bentonite	<input type="checkbox"/> Pea Gravel	<input checked="" type="checkbox"/> Drill Cuttings	<input type="checkbox"/> Grout	<input type="checkbox"/> Slough	<input type="checkbox"/> Sand



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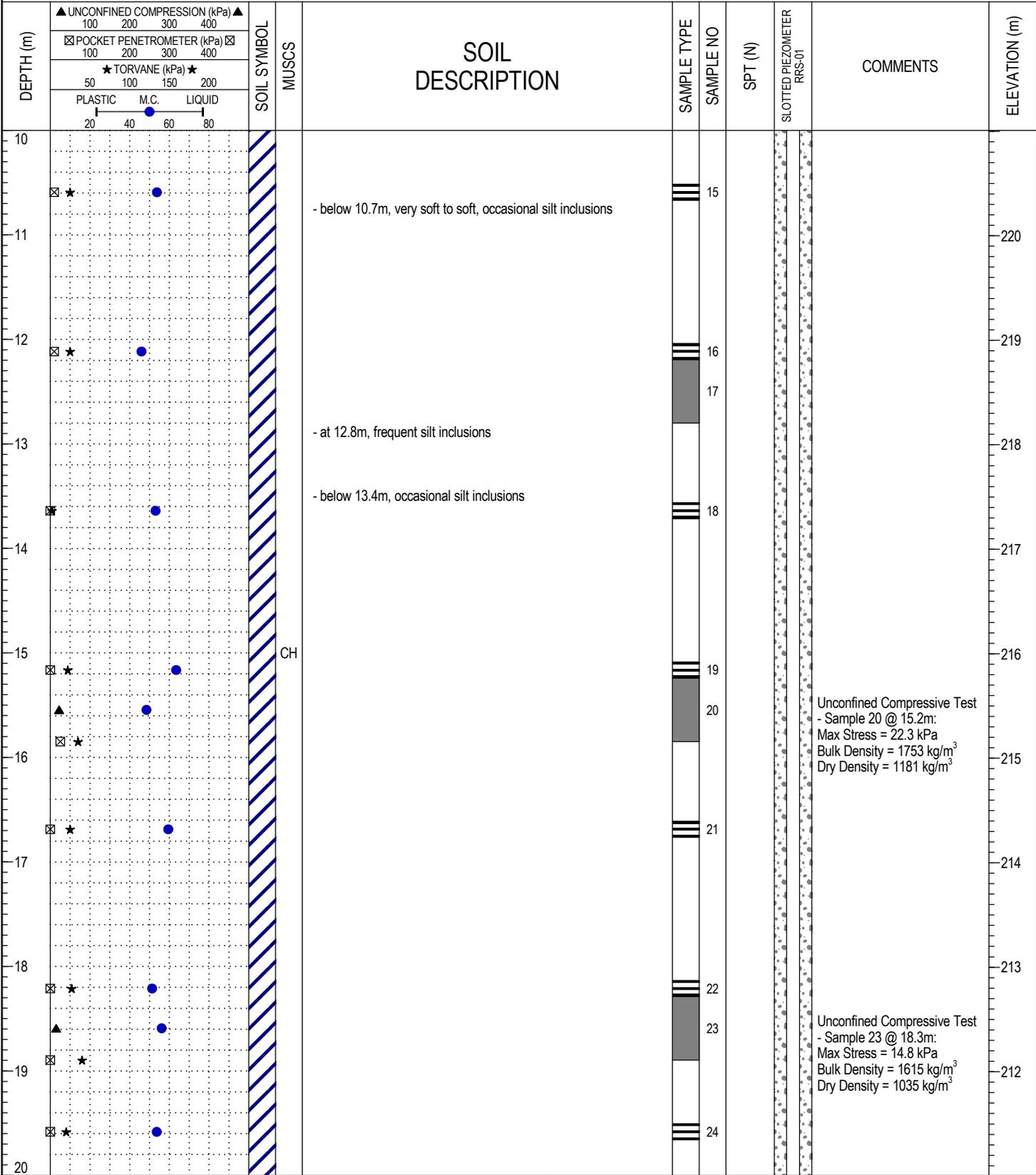


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LOGGED BY: JB	COMPLETION DEPTH: 43.3 m
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Figure No.	Sheet 1 of 5

PROJECT: NEWPCC Headworks Facilities Project	DRILLER: Maple Leaf Drilling Ltd.	TEST HOLE ID: RRS-01
CLIENT: Red River Solutions	DRILL RIG: Geo Probe	PROJECT No: WX1905601
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PROJECT: NEWPCC Headworks Facilities Project		DRILLER: Maple Leaf Drilling Ltd.		TEST HOLE ID: RRS-01							
CLIENT: Red River Solutions		DRILL RIG: Geo Probe		PROJECT No: WX1905601							
LOCATION: N5534953.6 E635792.9		DRILL METHOD: 125mm SSA/HQ Core		ELEVATION: 231.01 m							
SAMPLE TYPE		<input checked="" type="checkbox"/> Shelby Tube	<input type="checkbox"/> No Recovery	<input checked="" type="checkbox"/> SPT (N)	<input type="checkbox"/> Grab Sample	<input type="checkbox"/> Split-Pen	<input type="checkbox"/> Core				
BACKFILL TYPE		<input checked="" type="checkbox"/> Bentonite	<input type="checkbox"/> Pea Gravel	<input checked="" type="checkbox"/> Drill Cuttings	<input type="checkbox"/> Grout	<input type="checkbox"/> Slough	<input type="checkbox"/> Sand				
DEPTH (m)	▲ UNCONFINED COMPRESSION (kPa) ▲ 100 200 300 400 ☒ POCKET PENETROMETER (kPa) ☒ 100 200 300 400 ★ TORVANE (kPa) ★ 50 100 150 200 PLASTIC M.C. LIQUID 20 40 60 80		SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	SLOTTED PIEZOMETER RRS-01	COMMENTS	ELEVATION (m)
	20	CH									
21		SILT (TILL) - trace clay, trace to some sand, trace gravel, low plastic, moist, compact (inferred), light grey					25				210
22		- below 21.3m, some gravel, moist to very moist, compact to dense		ML			26	30			209
23							27				208
24		LIMESTONE (BEDROCK)					28			- auger refusal at 22.3m, switched to coring Sample 28 from 22.5m to 23.4m: RQD = 79% Recovery = 62%	208
25							29			Sample 29 from 23.4m to 24.8m: RQD = 58% Recovery = 84%	207
26							30			Sample 30 from 24.8m to 26.2m: RQD = 9% Recovery = 87% Compressive Strength Test from 24.8m to 25.0m Density = 2301 kg/m ³ Max Stress = 76.3 MPa	206
27							31			Sample 31 from 26.2m to 27.4m: RQD = 42% Recovery = 100%	205
28							32			Sample 32 from 27.4m to 27.8m: RQD = 0% Recovery = 82%	204
29							33			Sample 33 from 27.8m to 29.5m: RQD = 42% Recovery = 72%	203
30										Sample 34 from 29.5m to 30.9m: RQD = 36%	202

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PROJECT: NEWPCC Headworks Facilities Project	DRILLER: Maple Leaf Drilling Ltd.	TEST HOLE ID: RRS-01
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LOCATION: N5534953.6 E635792.9	DRILL METHOD: 125mm SSA/HQ Core	ELEVATION: 231.01 m

SAMPLE TYPE	<input checked="" type="checkbox"/> Shelby Tube	<input type="checkbox"/> No Recovery	<input checked="" type="checkbox"/> SPT (N)	<input type="checkbox"/> Grab Sample	<input type="checkbox"/> Split-Pen	<input type="checkbox"/> Core
BACKFILL TYPE	<input checked="" type="checkbox"/> Bentonite	<input type="checkbox"/> Pea Gravel	<input checked="" type="checkbox"/> Drill Cuttings	<input type="checkbox"/> Grout	<input type="checkbox"/> Slough	<input type="checkbox"/> Sand

DEPTH (m)	UNCONFINED COMPRESSION (kPa)		SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	SLOTTED PIEZOMETER RRS-01	COMMENTS	ELEVATION (m)
	▲	□									
	100	200									
	POCKET PENETROMETER (kPa)										
	100	200									
	TORVANE (kPa)										
	50	100									
	PLASTIC M.C. LIQUID										
	20	40									
30										Recovery = 75% Compressive Strength Test from 29.5m to 29.8m Density = 2438 kg/m ³ Max Stress = 52.7 MPa	
31										Sample 35 from 30.9m to 32.5m: RQD = 30% Recovery = 85%	200
32										Sample 36 from 32.5m to 33.9m: RQD = 0% Recovery = 50%	199
33										Sample 37 from 33.9m to 35.5m: RQD = 0% Recovery = 57%	198
34										Sample 38 from 35.5m to 37.0m: RQD = 54% Recovery = 95%	197
35										Sample 39 from 37.0m to 38.6m: RQD = 72% Recovery = 100%	196
36										Compressive Strength Test from 37.7m to 37.8m Density = 2488 kg/m ³ Max Stress = 46.8 MPa	195
37										Sample 40 from 38.6m to 40.1m: RQD = 86% Recovery = 100%	194
38											193
39											192
40											

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CLIENT: Red River Solutions	DRILL RIG: Geo Probe	PROJECT No: WX1905601
LOCATION: N5534953.6 E635792.9	DRILL METHOD: 125mm SSA/HQ Core	ELEVATION: 231.01 m

SAMPLE TYPE	<input checked="" type="checkbox"/> Shelby Tube	<input type="checkbox"/> No Recovery	<input checked="" type="checkbox"/> SPT (N)	<input type="checkbox"/> Grab Sample	<input type="checkbox"/> Split-Pen	<input type="checkbox"/> Core
BACKFILL TYPE	<input checked="" type="checkbox"/> Bentonite	<input type="checkbox"/> Pea Gravel	<input checked="" type="checkbox"/> Drill Cuttings	<input type="checkbox"/> Grout	<input type="checkbox"/> Slough	<input type="checkbox"/> Sand

DEPTH (m)	UNCONFINED COMPRESSION (kPa)			SOIL SYMBOL	MUSCS	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE NO	SPT (N)	SLOTTED PIEZOMETER RRS-01	COMMENTS	ELEVATION (m)
	▲ 100	200	300									
	POCKET PENETROMETER (kPa)											
	★ TORVANE (kPa) ★											
	PLASTIC M.C. LIQUID											
40											Sample 41 from 40.1m to 41.7m: RQD = 100% Recovery = 100%	190
41												
42											Sample 42 from 41.7m to 43.3m: RQD = 83% Recovery = 100%	189
43												188
44						TEST HOLE TERMINATED AT 43.3m BELOW EXISTING GRADE Notes: - Sloughing was observed below 13.7m during auger drilling. - No seepage was observed during auger drilling. - Test hole remained open to 17.5m with no water accumulation above slough prior to coring. - 2" PVC monitoring well with 3.0m slotted tip installed to 28.0m.						187
45												186
46												185
47												184
48												183
49												182
50												

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