Template Version: eC120200131 - C BCivil

Appendix A

Test Hole Logs

APPENDIX A - TEST HOLE LOGS

X:\A-G\CITY OF WINNIPEG - WATER & WASTE DEPARTMENT - 0012\10001203.00 - FERRY ROAD\CONTRACT 7\GEOTECH\CONTRACT 7C TEST HOLE LOCATIONS.DWG 20.09.08 2:07 PM

DYREGROV ROBINSON INC.

CONSULTING GEOTECHNICAL ENGINEERS

AUTHORIZED BY: AUTHORIZED

DATE: 20.09.04

CLIENT DRAWING NO.

CLIENT

TETRA TECH

Complex World
Clear Solutions

DRAWING DESCRIPTION

TEST HOLE LOCATION FOR FERRY ROAD
CSR WORKS CONTRACT 7C

DESIGNED BY:	DRAWN BY: ML	DRAWING NO.	REV.
REVIEWED BY:	SCALE: NTS	FIGURE_1	A

EXPLANATION OF TERMS & SYMBOLS

Description				TH Log Symbols	USCS Classification	Laboratory Classification Criteria			
						Fines (%)	Grading	Plasticity	Notes
COARSE GRAINED SOILS	GRAVELS (More than 50% of coarse fraction of gravel size)	CLEAN GRAVELS (Little or no fines)	Well graded gravels, sandy gravels, with little or no fines		GW	0-5	$C_U > 4$ $1 < C_C < 3$		Dual symbols if 5-12% fines. Dual symbols if above "A" line and $4<W_P<7$ $C_U = \frac{D_{60}}{D_{10}}$ $C_C = \frac{(D_{30})^2}{D_{10} x D_{60}}$
			Poorly graded gravels, sandy gravels, with little or no fines		GP	0-5	Not satisfying GW requirements		
		DIRTY GRAVELS (With some fines)	Silty gravels, silty sandy gravels		GM	> 12		Atterberg limits below "A" line or $W_P<4$	
			Clayey gravels, clayey sandy gravels		GC	> 12		Atterberg limits above "A" line or $W_P<7$	
	SANDS (More than 50% of coarse fraction of sand size)	CLEAN SANDS (Little or no fines)	Well graded sands, gravelly sands, with little or no fines		SW	0-5	$C_U > 6$ $1 < C_C < 3$		
			Poorly graded sands, gravelly sands, with little or no fines		SP	0-5	Not satisfying SW requirements		
		DIRTY SANDS (With some fines)	Silty sands, sand-silt mixtures		SM	> 12		Atterberg limits below "A" line or $W_P<4$	
			Clayey sands, sand-clay mixtures		SC	> 12		Atterberg limits above "A" line or $W_P<7$	
FINE GRAINED SOILS	SILTS (Below 'A' line negligible organic content)	$W_L<50$	Inorganic silts, silty or clayey fine sands, with slight plasticity		ML			Classification is Based upon Plasticity Chart	
		$W_L>50$	Inorganic silts of high plasticity		MH				
	CLAYS (Above 'A' line negligible organic content)	$W_L<30$	Inorganic clays, silty clays, sandy clays of low plasticity, lean clays		CL				
		$30<W_L<50$	Inorganic clays and silty clays of medium plasticity		CI				
		$W_L>50$	Inorganic clays of high plasticity, fat clays		CH				
	ORGANIC SILTS & CLAYS (Below 'A' line)	$W_L<50$	Organic silts and organic silty clays of low plasticity		OL				
		$W_L>50$	Organic clays of high plasticity		OH				
HIGHLY ORGANIC SOILS			Peat and other highly organic soils		Pt	Von Post Classification Limit		Strong colour or odour, and often fibrous texture	

	Asphalt		Glacial Till		Bedrock (Igneous)
	Concrete		Clay Shale		Bedrock (Limestone)
	Fill				Bedrock (Undifferentiated)

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FRACTION		PARTICLE SIZE (mm) Min.	Max.	RELATIVE PROPORTIONS (by weight) Percent	Descriptor
Boulders		>300			
Cobbles		75	300	>35%	main fraction
Gravel	Coarse	19	75	35 - 50	"and"
	Fine	4.75	19		
Sand	Coarse	2.0	4.75	20 – 35	Adjective e.g. silty, clayey
	Medium	0.425	2.0		
	Fine	0.075	0.425	10 – 20	"some"
Silt (non-plastic) or Clay (plastic)		< 0.075 mm		1 - 10	"trace"

Soil Classification Example

Clay 50% (main fraction), Silt 25%, Sand 17%, Gravel 8%

Clay – silty, some sand, trace gravel

TERMS and SYMBOLS

Laboratory and field tests are identified as follows:

Unconfined Comp.: undrained shear strength (kPa or psf) derived from unconfined compression testing.

Torvane: undrained shear strength (kPa or psf) measured using a Torvane

Pocket Pen.: undrained shear strength (kPa or psf) measured using a pocket penetrometer.

Unit Weight bulk unit weight of soil or rock (kN/m^3 or pcf).

SPT – N Standard Penetration Test: The number of blows (N) required to drive a 51 mm O.D. split barrel sampler 300 mm into the soil using a 63.5 kg hammer with a free fall drop height of 760 mm.

DCPT Dynamic Cone Penetration Test. The number of blows (N) required to drive a 50 mm diameter cone 300 mm into the soil using a 63.5 kg hammer with a free fall drop height of 760 mm.

M/C insitu soil moisture content in percent

PL Plastic limit, moisture content in percent

LL Liquid limit, moisture content in percent

The undrained shear strength (Su) of cohesive soil is related to its consistency as follows:

Su (kPa)	Su (psf)	CONSISTENCY
<12	250	very soft
12 – 25	250 – 525	soft
25 – 50	525 – 1050	firm
50 – 100	1050 – 2100	stiff
100 – 200	2100 – 4200	very stiff
200	4200	hard

The SPT - N of non-cohesive soil is related to compactness condition as follows:

N – Blows / 300 mm	COMPACTNESS
0 - 4	very loose
4 - 10	loose
10 - 30	compact
30 - 50	dense
50 +	very dense

References:

ASTM D2487 – Classification of Soils For Engineering Purposes (Unified Soil Classification System)

Canadian Foundation Engineering Manual, 4th Edition, Canadian Geotechnical Society, 2006

DYREGROV ROBINSON INC. CONSULTING GEOTECHNICAL ENGINEERS	PROJECT #	TEST HOLE NO.
	113324	12-4

PROJECT:	Ferry Road LDS	LOGGED BY:	RB
LOCATION:	AssiniboineAve. At Ferry Rd.	REVIEWED BY:	AOD
CONTRACTOR:	Paddock Drilling Ltd.	DRILL DATE:	April 17, 2012
METHOD:	Acker Soil Sentry - 125 mm SSA	DRILL DEPTH (m):	7.6

DEPTH (m)	ELEVATION (m)	SOIL SYMBOL	SOIL DESCRIPTION	
0.00	230.82		0 - 0.076 m	SAND AND GRAVEL (Fill)
0.50	230.32		0.076 - 0.9 m	CLAY (Fill) - silty, trace sand, trace gravel - dark brown - stiff, moist, high plasticity
1.00	229.82		0.9 - 7.2 m	CLAY (Alluvial) - stratified with silt and sand - brown
1.50	229.32			- stiff, moist, high plasticity
2.00	228.82			- firm below 1.5 m
2.50	228.32			
3.00	227.82			
3.50	227.32			
4.00	226.82			
4.50	226.32			
5.00	225.82			
5.50	225.32			- grey, soft below 5.3 m
6.00	224.82			
6.50	224.32			- decomposed wood between 6.1 and 7.2 m
7.00	223.82			
7.50	223.32		7.2 - 7.6 m	SAND (Alluvial) - silty - grey, compact, wet, - fine to medium grained, poorly graded
8.00	222.82		7.6 m	END OF TEST HOLE AT 7.6 m IN SAND

Notes:
1. Seepage below 7.2 m from sand layer. Water level at 5.5 m 3 minutes after drilling.
2. Sloughing below 7.2 m in sand layer.
3. Test hole backfilled with auger cuttings.

UNDRAINED SHEAR STRENGTH Su	
QU	UNCONFINED COMPRESSION
TV	TORVANE
PP	POCKET PEN.
γ	UNIT WEIGHT

PP = 37 kPa

DYREGROV ROBINSON INC. CONSULTING GEOTECHNICAL ENGINEERS	**PROJECT #** 113324	**TEST HOLE NO.** 12-33

PROJECT:	Ferry Road LDS	**LOGGED BY:**	RB
LOCATION:	Bourkevale Park - Riverbank	**REVIEWED BY:**	AOD
CONTRACTOR:	Paddock Drilling Ltd.	**DRILL DATE:**	May 22, 2012
METHOD:	Acker Soil Sentry - 125 mm SSA	**DRILL DEPTH (m):**	10.4

DEPTH (m)	ELEVATION (m)	SOIL SYMBOL	SOIL DESCRIPTION		SPT (N) (blows / 300 mm)	UNDRAINED SHEAR STRENGTH Su QU UNCONFINED COMPRESSION TV TORVANE PP POCKET PEN. γ UNIT WEIGHT
0.00	231.10		0 - 0.2 m	CLAY (Topsoil) - silty, trace sand, trace rootlets - black, moist		
0.50	230.60		0.2 - 0.5 m	CLAY - silty, brown, stiff, moist, high plasticity		
1.00	230.10		0.5 - 1.5 m	SAND (Alluvial) - silty - brown, dry - fine grained		
1.50	229.60		1.5 - 6.7 m	CLAY (Alluvial) - stratified with silt and sand - brown - firm, moist, intermediate plasticity		
2.00	229.10					
2.50	228.60					
3.00	228.10					TV = 51 kPa PP = 58 kPa
3.50	227.60					
4.00	227.10					
4.50	226.60					
5.00	226.10					
5.50	225.60			- grey below 5.6 m		
6.00	225.10					TV = 35 kPa PP = 25 kPa
6.50	224.60					
7.00	224.10		6.7 - 9.9 m	SAND (Alluvial) - silty - grey - compact, wet - fine to medium grained - poorly graded		
7.50	223.60					
8.00	223.10			- light grey below 7.8 m	11	
8.50	222.60					
9.00	222.10					
9.50	221.60				15	
10.00	221.10		9.9 - 10.4 m	SILT (Till) - some sand, trace gravel - tan - dense, dry		
10.50	220.60		10.4 m	END OF TEST HOLE AT AUGER REFUSAL AT 10.4 m IN SILT TILL Notes: 1. Seepage below 6.1 m from sand layer. 2. Sloughing below 6.7 m in sand layer. 3. Water level at 6.1 m below ground surface immediately after drilling. 4. Sloughing below 6.1 m in sand layer. 5. Test hole backfilled with auger cuttings to 6.1 m and bentonite chips to ground surface.		

DYREGROV ROBINSON INC.
CONSULTING GEOTECHNICAL ENGINEERS

PROJECT #	TEST HOLE NO.
113324	12-34

PROJECT:	Ferry Road LDS	**LOGGED BY:**	RB
LOCATION:	Bourkevale Park - Riverbank	**REVIEWED BY:**	AOD
CONTRACTOR:	Paddock Drilling Ltd.	**DRILL DATE:**	May 22, 2012
METHOD:	Acker Soil Sentry - 125 mm SSA	**DRILL DEPTH (m):**	7.5

DEPTH (m)	ELEVATION (m)	SOIL SYMBOL	SOIL DESCRIPTION	SPT (N) (blows / 300 mm)	PIEZOMETER	UNDRAINED SHEAR STRENGTH Su
0.00	227.83		0 - 0.46 m SAND (Alluvial) - clayey, silty, trace gravel - black, moist			
0.50	227.33		0.46 - 3.0 m CLAY (Alluvial) - stratified with silt and sand - brown			
1.00	226.83		- stiff, moist, intermediate plasticity			
1.50	226.33		- grey, firm, wet below 1.5 m			Qu = 15 kPa TV = 38 kPa PP = 41 kPa γ = 17.4 kN/m³
2.00	225.83					
2.50	225.33					
3.00	224.83		3.0 - 6.6 m SAND (Alluvial) - silty, some gravel - trace cobbles			
3.50	224.33		- grey - loose, wet			
4.00	223.83					
4.50	223.33					
5.00	222.83					
5.50	222.33		- compact below 5.3 m			
6.00	221.83					
6.50	221.33			20		blows per 150 mm
7.00	220.83		6.6 - 7.5 m SILT (Till) - some sand, trace gravel - tan - dense, dry	24		blows per 75 mm refusal to penetration
7.50	220.33					
8.00	219.83		7.5 m END OF TEST HOLE AT AUGER REFUSAL AT 7.5 m IN SILT TILL			

Notes:
1. Seepage below 1.5 m from clay layer. Water level at 2.7 m immediately after drilling.
2. Sloughing below 3.0 m in sand layer.
3. No soil recovery in silt till.
4. Standpipe piezometer with Casagrande tip installed to 6.1 m.
5. Water level measured at 1.33 m below ground surface on June 12, 2012.
6. Test hole backfilled with sand to 5.3 m, bentonite chips to ground surface. Piezometer protected with a flushmount cover.

UNDRAINED SHEAR STRENGTH Su	
QU	UNCONFINED COMPRESSION
TV	TORVANE
PP	POCKET PEN.
γ	UNIT WEIGHT

PROJECT: Ferry Road Riverbend CSR - Contract 7	CLIENT: Tetra Tech Canada Inc.	TEST HOLE NO: **19-191**
LOCATION: UTM 14U: 5526223 m N, 627960 m E - Assiniboine Ave.		PROJECT NO.: 143691
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Ranger 24 Drill Rig w/125mm SS augers	ELEVATION (m): 230.704

SAMPLE TYPE: GRAB, SHELBY TUBE, SPLIT SPOON, BULK, NO RECOVERY, CORE

BACKFILL TYPE: BENTONITE, GRAVEL, SLOUGH, GROUT, CUTTINGS, SAND

ELEVATION (m)	DEPTH (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #
		TOPSOIL (100 mm thick) - black, moist		
230		CLAY (ALLUVIAL) - silty - brown, moist, firm, high plasticity		G1
	1	SILT (ALLUVIAL) - brown, moist, loose		G2
229	2	CLAY (ALLUVIAL) - variable silt content (some silt to AND silt), trace fine sand, trace gravel - brown - moist, firm, intermediate plasticity		G3
228	3			
227	4	- at 3.7 m; moist to wet, soft		G4
226	5	G4) 19.2% Sand, 35.3% Silt, 45.1% Clay Plastic Limit = 18, Liquid Limit = 37 Liquidity Index = 0.84		G5
225	6	- grey below 5.5 m		T6
224	7	CLAY (LACUSTRINE) - trace silt to silty, trace fine sand - grey - moist, firm, high plasticity - trace silt inclusions		
223	8	T7) 4.9% Sand, 9.4% Silt, 85.7% Clay Plastic Limit = 24, Liquid Limit = 62 Liquidity Index = 0.5		T7
222	9	SILT - some clay to clayey, some till inclusions, trace sand, trace gavel - grey, wet, soft, low plasticity		G9

END OF TEST HOLE AT 9.1 m IN CLAY

NOTES:
1. Slight seepage observed below 6 m.
2. No sloughing observed during drilling.
3. Upon completion of drilling, test hole open to 6.4 m b/l grade & water level 4.9 m b/l grade.
4. Test hole backfilled with auger cuttings and bentonite chips.

DYREGROV ROBINSON INC.
Consulting Geotechnical Engineers

LOGGED BY: CR	COMPLETION DEPTH: 9.14 m
REVIEWED BY: GR	COMPLETION DATE: 10-7-19
PROJECT ENGINEER: Gil Robinson	Page 1 of 1

BH GEOTECH PLOTS-AUGUST 2013 143691_TETRA TECH_FERRY ROAD_CONTRACT 7.GPJ DATA TEMPLATE - AUGUST 2, 2013.GDT 12-6-20

PROJECT: Ferry Road Riverbend CSR - Contract 7	CLIENT: Tetra Tech Canada Inc.	TEST HOLE NO: **19-192**
LOCATION: UTM 14U: 5526223 m N, 627977 m E - Assiniboine Ave.		PROJECT NO.: 143691
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Ranger 24 Drill Rig w/125mm SS augers	ELEVATION (m): 230.522

SAMPLE TYPE: GRAB, SHELBY TUBE, SPLIT SPOON, BULK, NO RECOVERY, CORE

BACKFILL TYPE: BENTONITE, GRAVEL, SLOUGH, GROUT, CUTTINGS, SAND

ELEVATION (m)	DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #
			TOPSOIL (50 mm thick) - black, moist		
230			CLAY (ALLUVIAL) - variable silt content (some silt to silty), - brown, moist, firm, intermediate plasticity		
	1				G10
			- silty below 1.2 m		G11
229					
	2				
228					G12
	3				
227					
	4				G13
226					
	5		- grey below 5 m		
225					G14
	6				
224					
	7		CLAY (LACUSTRINE) - silty - grey, moist, stiff, high plasticity		G15
223					
	8		SILT - some clay to clayey, some till inclusions - grey , wet, soft - low plasticity		
222					G16
	9				

END OF TEST HOLE AT 9.1 m IN CLAY

NOTES:

1. Heavy seepage observed after drilling to 4.6 m.
2. Minor sloughing observed during drilling.
3. Upon completion of drilling, test hole open to 8.2 m b/l grade & water level 4.3 m b/l grade.
4. Test hole backfilled with auger cuttings and bentonite chips.

DYREGROV ROBINSON INC.
Consulting Geotechnical Engineers

LOGGED BY: CR	COMPLETION DEPTH: 9.14 m
REVIEWED BY: GR	COMPLETION DATE: 10-7-19
PROJECT ENGINEER: Gil Robinson	Page 1 of 1

BH GEOTECH PLOTS-AUGUST 2013 143691_TETRA TECH_FERRY ROAD_CONTRACT 7.GPJ DATA TEMPLATE - AUGUST 2, 2013.GDT 12-6-20

PROJECT: Ferry Road Riverbend CSR - Contract 7	CLIENT: Tetra Tech Canada Inc.	TEST HOLE NO: **19-199**
LOCATION: UTM 14U: 5526292 m N, 627938 m E - Ferry Road		PROJECT NO.: 143691
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Acker SS drill rig w/ 125mm SS augers	ELEVATION (m): 231.285

SAMPLE TYPE: GRAB, SHELBY TUBE, SPLIT SPOON, BULK, NO RECOVERY, CORE

BACKFILL TYPE: BENTONITE, GRAVEL, SLOUGH, GROUT, CUTTINGS, SAND

ELEVATION (m)	DEPTH (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #
231		TOPSOIL - black, moist		
		SILT - trace to some clay, brown - dry, loose		G235
230	1			G236
229	2	CLAY (Alluvial) - some silt to silty (variable) - brown - moist to wet, firm, intermediate plasticity - trace silt inclusions		G237
228	3			
227	4	- dark grey below 3.7 m		
226	5			T238
				G239
225	6	CLAY (Lacustrine) - silty - grey, moist, firm - high plasticity		
224	7			G240
223	8	- trace till inclusions below 8.2 m		
	9			

END OF TEST HOLE AT 9.1 m IN CLAY

NOTES:

1. Trace seepage below 4.6 m from alluvial clay.
2. Upon completion of drilling, test hole open to 4.9 m b/l grade & water level at 4.6 m b/l grade.
3. Test hole backfilled with auger cuttings and bentonite chips.

DYREGROV ROBINSON INC.
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LOGGED BY: CR	COMPLETION DEPTH: 9.14 m
REVIEWED BY: GR	COMPLETION DATE: 19-7-19
PROJECT ENGINEER: Gil Robinson	Page 1 of 1

BH GEOTECH PLOTS-AUGUST 2013 143691_TETRA TECH_FERRY ROAD_CONTRACT 7.GPJ DATA TEMPLATE - AUGUST 2, 2013.GDT 12-6-20

PROJECT: Ferry Road Riverbend CSR - Contract 7	CLIENT: Tetra Tech Canada Inc.	TEST HOLE NO: **19-200**
LOCATION: UTM 14U: 5526337 m N, 627939 m E - Ferry Road		PROJECT NO.: 143691
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Acker SS drill rig w/ 125mm SS augers	ELEVATION (m): 230.576

SAMPLE TYPE: GRAB, SHELBY TUBE, SPLIT SPOON, BULK, NO RECOVERY, CORE

BACKFILL TYPE: BENTONITE, GRAVEL, SLOUGH, GROUT, CUTTINGS, SAND

ELEVATION (m)	DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #
			TOPSOIL - black, moist, 50 mm thick		
230			CLAY (Alluvial) - silty to AND Silt (variable) - mottled brown and grey - firm to stiff, moist, intermediate plasticity - trace silt inclusions		G230
	1				G231
229					
	2				
228					G232
	3				
227					
	4				G233
226					
	5				
225			- firm, moist to wet, grey below 5.5 m		G234
	6				

END OF TEST HOLE AT 6.1 m IN CLAY

NOTES:

1. No sloughing or seepage observed during drilling.
2. Test hole backfilled with auger cuttings and bentonite chips.

DYREGROV ROBINSON INC. Consulting Geotechnical Engineers	LOGGED BY: CR	COMPLETION DEPTH: 6.10 m
	REVIEWED BY: GR	COMPLETION DATE: 19-7-19
	PROJECT ENGINEER: Gil Robinson	Page 1 of 1

BH GEOTECH PLOTS-AUGUST 2013 143691_TETRA TECH_FERRY ROAD_CONTRACT 7.GPJ DATA TEMPLATE - AUGUST 2, 2013.GDT 12-6-20

PROJECT: Ferry Road Riverbend CSR - Contract 7	CLIENT: Tetra Tech Canada Inc.	TEST HOLE NO: **19-201**
LOCATION: UTM 14U: 5526357 m N, 627940 m E - Ferry Road		PROJECT NO.: 143691
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Acker SS drill rig w/ 125mm SS augers	ELEVATION (m): 231.109

SAMPLE TYPE: GRAB, SHELBY TUBE, SPLIT SPOON, BULK, NO RECOVERY, CORE

BACKFILL TYPE: BENTONITE, GRAVEL, SLOUGH, GROUT, CUTTINGS, SAND

ELEVATION (m)	DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #
231			TOPSOIL - black, moist, 50 mm thick		
			CLAY (Alluvial) - silty to AND Silt (variable)		
			- mottled brown and grey		
			- firm to stiff, moist, intermediate plasticity		
230	1		- trace silt inclusions		
					G225
					G226
229	2				
					G227
228	3				
227	4				G228
226	5				
	6				G229

END OF TEST HOLE AT 6.1 m IN CLAY

NOTES:

1. No sloughing or seepage observed during drilling.
2. Test hole backfilled with auger cuttings and bentonite chips.

DYREGROV ROBINSON INC.
Consulting Geotechnical Engineers

LOGGED BY: CR	COMPLETION DEPTH: 6.10 m
REVIEWED BY: GR	COMPLETION DATE: 19-7-19
PROJECT ENGINEER: Gil Robinson	Page 1 of 1

BH GEOTECH PLOTS-AUGUST 2013 143691_TETRA TECH_FERRY ROAD_CONTRACT 7.GPJ DATA TEMPLATE - AUGUST 2, 2013.GDT 12-6-20

PROJECT: Ferry Road Riverbend CSR - Contract 7	CLIENT: Tetra Tech Canada Inc.	TEST HOLE NO: **19-202**
LOCATION: UTM 14 U: 5526440 m N, 627943 m E - Ferry Road		PROJECT NO.: 143691
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Acker SS drill rig w/ 125mm SS augers	ELEVATION (m): 232.649

SAMPLE TYPE: GRAB, SHELBY TUBE, SPLIT SPOON, BULK, NO RECOVERY, CORE

BACKFILL TYPE: BENTONITE, GRAVEL, SLOUGH, GROUT, CUTTINGS, SAND

ELEVATION (m)	DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #
			CLAY (FILL) - trace gravel - black, moist		G220
232	1		CLAY (Lacustrine) - silty - black with trace organics to 1.5 m - mottled brown and grey below 1.5 m - moist, stiff, high plasticity - trace silt inclusions		G221
231	2				
230	3				
229					T222
	4				G223
228	5				
227	6				G224

END OF TEST HOLE AT 6.1 m IN CLAY

NOTES:

1. No sloughing or seepage observed during drilling.
2. Test hole backfilled with auger cuttings and bentonite chips.

DYREGROV ROBINSON INC.
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LOGGED BY: CR	COMPLETION DEPTH: 6.10 m
REVIEWED BY: GR	COMPLETION DATE: 19-7-19
PROJECT ENGINEER: Gil Robinson	Page 1 of 1

BH GEOTECH PLOTS-AUGUST 2013 143691_TETRA TECH_FERRY ROAD_CONTRACT 7.GPJ DATA TEMPLATE - AUGUST 2, 2013.GDT 12-6-20

PROJECT: Ferry Road Riverbend CSR - Contract 7	CLIENT: Tetra Tech Canada Inc.	TEST HOLE NO: **19-203**
LOCATION: UTM 14U: 5526491 m N, 627945 m E - Ferry Road		PROJECT NO.: 143691
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Acker SS drill rig w/ 125mm SS augers	ELEVATION (m): 233.388

SAMPLE TYPE: GRAB, SHELBY TUBE, SPLIT SPOON, BULK, NO RECOVERY, CORE

BACKFILL TYPE: BENTONITE, GRAVEL, SLOUGH, GROUT, CUTTINGS, SAND

ELEVATION (m)	DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #
			CLAY (FILL) - trace gravel, black, moist	GRAB	G215
233			SAND (FILL) - some silt - brown - moist, loose		
	1			GRAB	G216
232			CLAY (Lacustrine) - silty - mottled brown and grey - moist, stiff, high plasticity - trace silt inclusions		
	2				
231				GRAB	G217
	3				
230					
	4				
229				GRAB	G218
	5				
228					
	6			GRAB	G219

END OF TEST HOLE AT 6.1 m IN CLAY

NOTES:

1. No sloughing or seepage observed during drilling.
2. Test hole backfilled with auger cuttings and bentonite chips.

DYREGROV ROBINSON INC.
Consulting Geotechnical Engineers

LOGGED BY: CR	COMPLETION DEPTH: 6.10 m
REVIEWED BY: GR	COMPLETION DATE: 19-7-19
PROJECT ENGINEER: Gil Robinson	Page 1 of 1

BH GEOTECH PLOTS-AUGUST 2013 143691_TETRA TECH_FERRY ROAD_CONTRACT 7.GPJ DATA TEMPLATE - AUGUST 2, 2013.GDT 12-6-20

PROJECT: Ferry Road Riverbend CSR - Contract 7	CLIENT: Tetra Tech Canada Inc.	TEST HOLE NO: **19-204**
LOCATION: UTM 14U: 5526524 m N, 627947 m E - Ferry Road		PROJECT NO.: 143691
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Acker SS drill rig w/ 125mm SS augers	ELEVATION (m): 233.569

SAMPLE TYPE: GRAB, SHELBY TUBE, SPLIT SPOON, BULK, NO RECOVERY, CORE

BACKFILL TYPE: BENTONITE, GRAVEL, SLOUGH, GROUT, CUTTINGS, SAND

ELEVATION (m)	DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #
			CLAY (FILL) - trace gravel, black, moist		G210
233	1		SILT - some sand - brown - moist, loose		G211
232	2		CLAY (Lacustrine) - silty - mottled brown and grey - moist, stiff, high plasticity - trace silt inclusions		G212
231	3				
230	4				G213
229	5				
228	6				G214

END OF TEST HOLE AT 6.1 m IN CLAY

NOTES:

1. No sloughing or seepage observed during drilling.
2. Test hole backfilled with auger cuttings and bentonite chips.

DYREGROV ROBINSON INC.
Consulting Geotechnical Engineers

LOGGED BY: CR	COMPLETION DEPTH: 6.10 m
REVIEWED BY: GR	COMPLETION DATE: 19-7-19
PROJECT ENGINEER: Gil Robinson	Page 1 of 1

BH GEOTECH PLOTS-AUGUST 2013 143691_TETRA TECH_FERRY ROAD_CONTRACT 7.GPJ DATA TEMPLATE - AUGUST 2, 2013.GDT 12-6-20

PROJECT: Ferry Road Riverbend CSR - Contract 7	CLIENT: Tetra Tech Canada Inc.	TEST HOLE NO: **19-205**
LOCATION: UTM 14 U: 5526579 m N, 627949 m E - Ferry Road		PROJECT NO.: 143691
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Acker SS drill rig w/ 125mm SS augers	ELEVATION (m): 233.846

SAMPLE TYPE: GRAB, SHELBY TUBE, SPLIT SPOON, BULK, NO RECOVERY, CORE

BACKFILL TYPE: BENTONITE, GRAVEL, SLOUGH, GROUT, CUTTINGS, SAND

ELEVATION (m)	DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #
			CLAY (FILL) - trace gravel, black, moist		G205
233	1		SILT - brown - moist, loose		G206
232	2		CLAY (Lacustrine) - silty - mottled brown and grey - moist, stiff, high plasticity - trace silt inclusions		G207
231	3				
230	4				G208
229	5				
228	6				G209

END OF TEST HOLE AT 6.1 m IN CLAY

NOTES:

1. No sloughing or seepage observed during drilling.
2. Test hole backfilled with auger cuttings and bentonite chips.

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LOGGED BY: CR	COMPLETION DEPTH: 6.10 m
REVIEWED BY: GR	COMPLETION DATE: 19-7-19
PROJECT ENGINEER: Gil Robinson	Page 1 of 1

BH GEOTECH PLOTS-AUGUST 2013 143691_TETRA TECH_FERRY ROAD_CONTRACT 7.GPJ DATA TEMPLATE - AUGUST 2, 2013.GDT 12-6-20

PROJECT: Ferry Road Riverbend CSR - Contract 7	CLIENT: Tetra Tech Canada Inc.	TEST HOLE NO: **19-206**
LOCATION: UTM 14U: 5526625 m N, 627951 m E - Ferry Road		PROJECT NO.: 143691
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Acker SS drill rig w/ 125mm SS augers	ELEVATION (m): 233.78

SAMPLE TYPE: GRAB, SHELBY TUBE, SPLIT SPOON, BULK, NO RECOVERY, CORE

BACKFILL TYPE: BENTONITE, GRAVEL, SLOUGH, GROUT, CUTTINGS, SAND

ELEVATION (m)	DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #
			TOPSOIL - black, moist		
233	1		SILT - brown - moist, loose		G201
232	2		CLAY (Lacustrine) - silty - mottled brown and grey - moist, stiff, high plasticity - trace silt inclusions		G202
231	3				
230	4				
229	5				T203
228	6				G204

END OF TEST HOLE AT 6.1 m IN CLAY

NOTES:

1. No sloughing or seepage observed during drilling.
2. Test hole backfilled with auger cuttings and bentonite chips.

DYREGROV ROBINSON INC. Consulting Geotechnical Engineers	LOGGED BY: CR	COMPLETION DEPTH: 6.10 m
	REVIEWED BY: GR	COMPLETION DATE: 19-7-19
	PROJECT ENGINEER: Gil Robinson	Page 1 of 1

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PROJECT: Ferry Road Riverbend CSR - Contract 7	CLIENT: Tetra Tech Canada Inc.	TEST HOLE NO: **19-241**
LOCATION: UTM 14U: 5526181 m N, 627916 m E		PROJECT NO.: 143691
CONTRACTOR: Maple Leaf Drilling Ltd.	METHOD: CME 55 drill rig w/ 125 mm SS Augers	ELEVATION (m): 231.05

SAMPLE TYPE: GRAB, SHELBY TUBE, SPLIT SPOON, BULK, NO RECOVERY, CORE

BACKFILL TYPE: BENTONITE, GRAVEL, SLOUGH, GROUT, CUTTINGS, SAND

ELEVATION (m)	DEPTH (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #
		ASPHALT - 150 mm thick		
		CLAY and SILT (ALLUVIAL) - trace fine sand - brown - moist to wet, firm, intermediate plasticity		
230	1			
229	2			
228	3		GRAB	G12
227	4			
			GRAB	G13
226	5	- grey below 5.5 m G14) Plastic Limit = 18, Liquid Limit = 43, Liquidity Index = 0.62		
225	6		GRAB	G14
		SAND - some silt, fine grained - grey - wet, loose		
224	7			
			GRAB	G15
223	8			
		SILT (Till) - trace sand - grey - loose, wet	GRAB	G16
222	9			

END OF TEST HOLE AT 9.1 m IN SILT(TILL)

Notes:
1. Frost to 0.9 m.
2. Test hole was moved 2 m north from original location due to sand fill down to 3 m.
3. Sloughing and seepage observed from 6 to 8.2 m.
4. Upon completion of drilling, test hole open to 5.8 m b/l grade and water level 5.5 m b/l grade.
5. Test hole backfilled with auger cuttings and bentonite chips.

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LOGGED BY: CR	COMPLETION DEPTH: 9.14 m
REVIEWED BY: GR	COMPLETION DATE: 18-12-19
PROJECT ENGINEER: Gil Robinson	Page 1 of 1

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PROJECT: Ferry Road Riverbend CSR - Contract 7	CLIENT: Tetra Tech Canada Inc.	TEST HOLE NO: **19-242**
LOCATION: UTM 14U: 5526198 m N, 627939 m E		PROJECT NO.: 143691
CONTRACTOR: Maple Leaf Drilling Ltd.	METHOD: CME 55 drill rig w/ 125 mm SS Augers	ELEVATION (m): 230.69

SAMPLE TYPE: GRAB, SHELBY TUBE, SPLIT SPOON, BULK, NO RECOVERY, CORE

BACKFILL TYPE: BENTONITE, GRAVEL, SLOUGH, GROUT, CUTTINGS, SAND

ELEVATION (m)	DEPTH (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #
		GRAVEL (Fill) - 100 mm thick		
230	1	CLAY and SILT (ALLUVIAL) - trace fine sand - brown - moist, firm - low to intermediate plasticity (variable)		
229	2			
228	3			G1
227	4			
226	5	- grey, soft below 4.6 m		G2
225	6			G3
		G3) Plastic Limit = 19, Liquid Limit = 39, Liquidity Index = 0.71		
224	7	- loose, wet below 6 m		
		CLAY (LACUSTRINE) - silty - grey - soft, wet		
223	8			G4
		G4) Plastic Limit = 20, Liquid Limit = 69, Liquidity Index = 0.84		
222	9			
221		SILT (Till) - trace sand, trace gravel - grey, loose, wet		G5

END OF TEST HOLE AT 9.8 m IN SILT(TILL)

Notes:
1. Frost to 1 m.
2. Sloughing and seepage observed at 6 m.
3. Upon completion of drilling, test hole open to 9.8 m b/l grade and water level 6.7 m b/l grade.
4. Test hole backfilled with auger cuttings and bentonite chips.

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LOGGED BY: CR	COMPLETION DEPTH: 9.75 m
REVIEWED BY: GR	COMPLETION DATE: 18-12-19
PROJECT ENGINEER: Gil Robinson	Page 1 of 1

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PROJECT: Ferry Road Riverbend CSR - Contract 7	CLIENT: Tetra Tech Canada Inc.	TEST HOLE NO: **19-243**
LOCATION: UTM 14U: 5526215 m N, 627960 m E		PROJECT NO.: 143691
CONTRACTOR: Maple Leaf Drilling Ltd.	METHOD: CME 55 drill rig w/ 125 mm SS Augers	ELEVATION (m): 230.71

SAMPLE TYPE: GRAB, SHELBY TUBE, SPLIT SPOON, BULK, NO RECOVERY, CORE

BACKFILL TYPE: BENTONITE, GRAVEL, SLOUGH, GROUT, CUTTINGS, SAND

ELEVATION (m)	DEPTH (m)	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #
230	1	CLAY (ALLUVIAL) - silty, trace sand - brown - moist, firm - high plasticity		
229	2			
228	3			G6
227	4	CLAY and SILT (ALLUVIAL) below 3 m - trace fine sand - moist to wet, soft to firm - low to intermediate plasticity		
226	5			G7
225	6	- grey, wet below 5.5 m G8) Plastic Limit = 18, Liquid Limit = 33, Liquidity Index = 0.88		G8
224	7	CLAY (LACUSTRINE) - silty - grey - moist, firm - high plasticity G9) Plastic Limit = 16, Liquid Limit = 55, Liquidity Index = 0.64		
223	8			G9
222	9			G10
221	10	SILT (Till) - trace sand, trace gravel - grey - wet, loose		G11

END OF TEST HOLE AT 10.7 m IN SILT(TILL)

Notes:
1. Frost to 1 m.
2. Seepage observed at 4.6 m.
3. Upon completion of drilling, test hole open to 7.9 m b/l grade and water level 7 m b/l grade.
4. Test hole backfilled with auger cuttings and bentonite chips.

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LOGGED BY: CR	COMPLETION DEPTH: 10.67 m
REVIEWED BY: GR	COMPLETION DATE: 18-12-19
PROJECT ENGINEER: Gil Robinson	Page 1 of 1

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