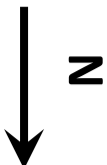


APPENDIX 'A'

GEOTECHNICAL INFORMATION

APPENDIX A - TEST HOLE LOGS



TEST HOLE
LOCATIONS



FERRY ROAD - CONTRACT 4
APPROXIMATE TEST HOLE LOCATIONS

DYREGROV ROBINSON INC.
CONSULTING GEOTECHNICAL ENGINEERS

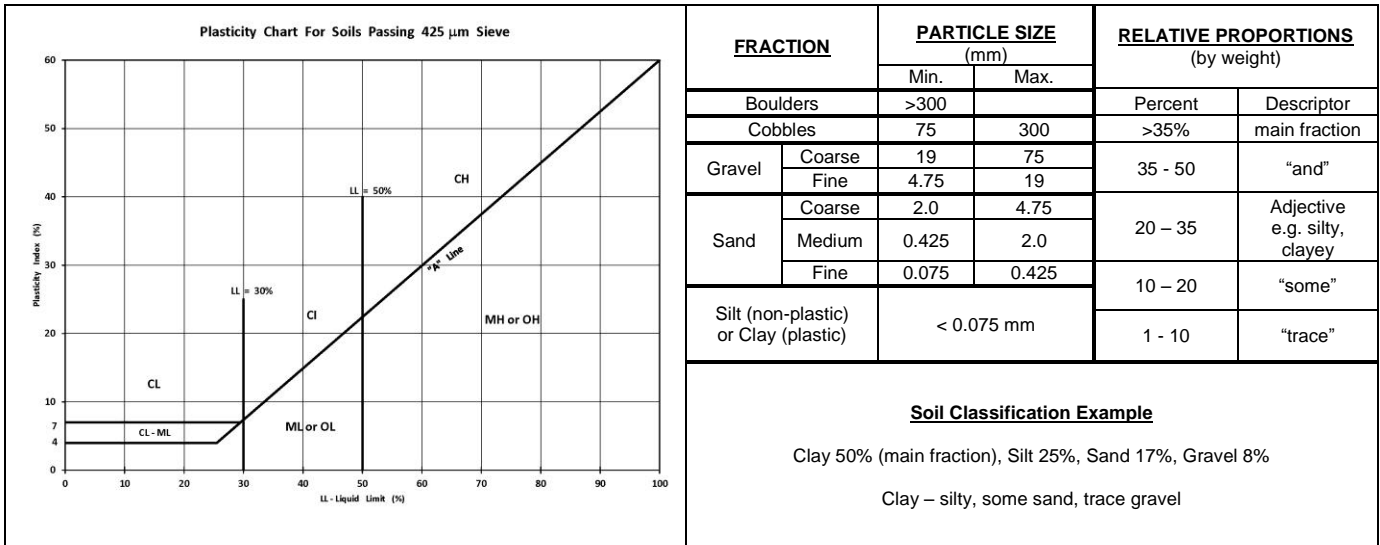
SCALE: NTS	MADE BY: CR	CHKD BY: GR	PROJECT NO. 143691	DATE: JULY 2014	FIGURE 1
---------------	----------------	----------------	-----------------------	--------------------	----------

APPENDIX A - TEST HOLE LOGS

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 $4 < W_p < 7$ $C_u = \frac{D_{60}}{D_{10}}$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$	
			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)	DYREGROV ROBINSON INC. CONSULTING GEOTECHNICAL ENGINEERS			
	Concrete		Clay Shale		Bedrock (Limestone)				
	Fill				Bedrock (Undifferentiated)				

APPENDIX A - TEST HOLE LOGS



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/m³ 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 (S_u) 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

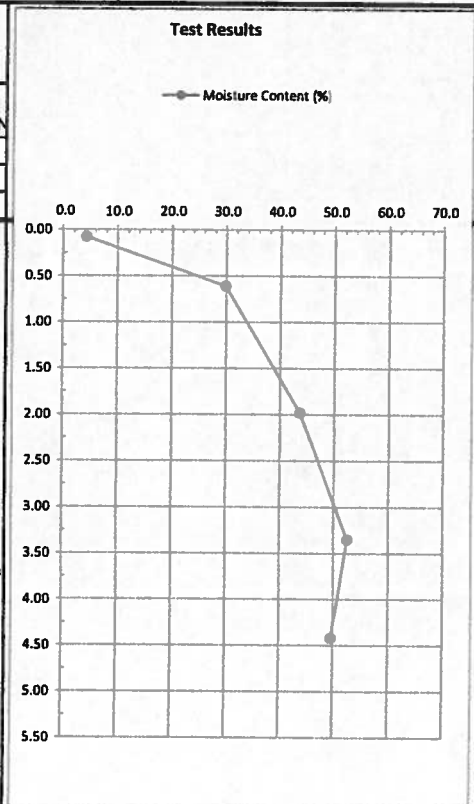
References:

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

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

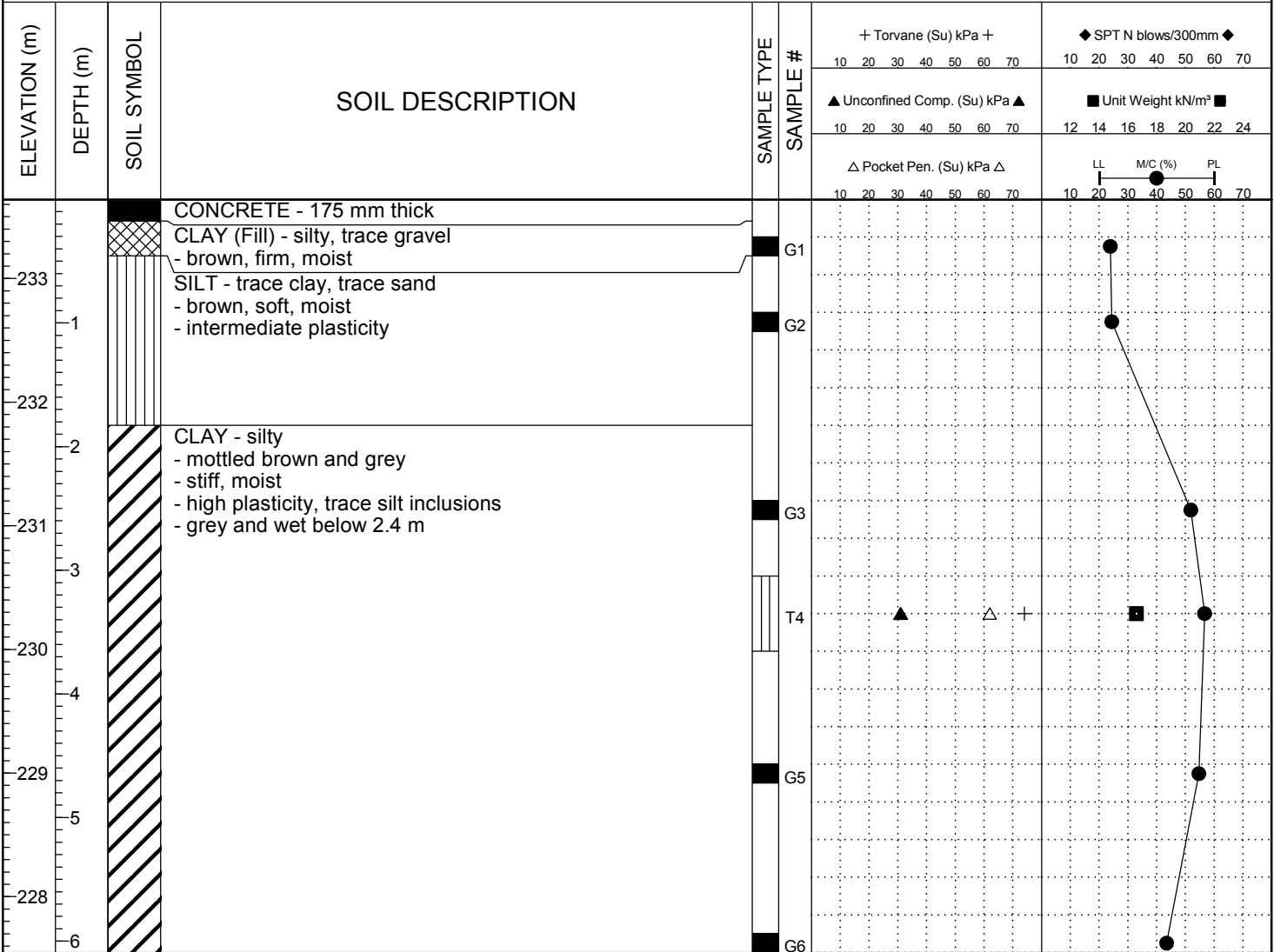
APPENDIX A - TEST HOLE LOGS

DYREGROV ROBINSON INC. CONSULTING GEOTECHNICAL ENGINEERS			PROJECT # 113324	TEST HOLE NO. 12-16	
PROJECT: Ferry Road LDS			LOGGED BY: RB		
LOCATION: St. Mathews Ave. at Madison St.			REVIEWED BY: AOD		
CONTRACTOR: Paddock Drilling Ltd.			DRILL DATE: May 7, 2012		
METHOD: Acker MP8 - 125 mm SSA			DRILL DEPTH (m): 5.0		
DEPTH (m)	ELEVATION (m)	SOIL SYMBOL	SOIL DESCRIPTION	UNDRAINED SHEAR STRENGTH Su	
				QU	UNCONFINED COMPRESSION
				TV	TORVANE
				PP	POCKET PEN.
				Y	UNIT WEIGHT
0.00	234.30		0 - 0.20 m SAND AND GRAVEL (Fill) - silty - brown, dry, poorly graded		
0.50	233.80		0.20 - 0.9 m CLAY (Fill) - silty, trace sand, trace gravel - black, stiff, moist, high plasticity		
1.00	233.30		0.9 - 5.0 m CLAY - silty - mottled brown and grey - silty, moist, high plasticity - trace silt inclusions	TV = 69 kPa PP = 74 kPa	
1.50	232.80				
2.00	232.30			Qu = 41 kPa TV = 55 kPa PP = 80 kPa Y = 16.5 kN/m ³	
2.50	231.80				
3.00	231.30				
3.50	230.80				
4.00	230.30				
4.50	229.80			TV = 37 kPa PP = 61 kPa	
5.00	229.30				
5.50	228.80		5.0 m END OF TEST HOLE AT 5.0 m IN CLAY Notes: 1. Test hole backfilled with auger cuttings.		



APPENDIX A - TEST HOLE LOGS

PROJECT: Ferry Road & Riverbend CSR Works - Contract 4		CLIENT: Tetra Tech		TESTHOLE NO: 14-87		
LOCATION: UTM Coordinates: 5528014.8, 628948.8				PROJECT NO.: 143691		
CONTRACTOR: Paddock Drilling Ltd.		METHOD: Acker MP5 - 125 mm diameter SS augers		ELEVATION (m): 233.794		
SAMPLE TYPE	GRAB	SHELBY TUBE	SPLIT SPOON	BULK	NO RECOVERY	CORE
BACKFILL TYPE	BENTONITE	GRAVEL	SLOUGH	GROUT	CUTTINGS	SAND

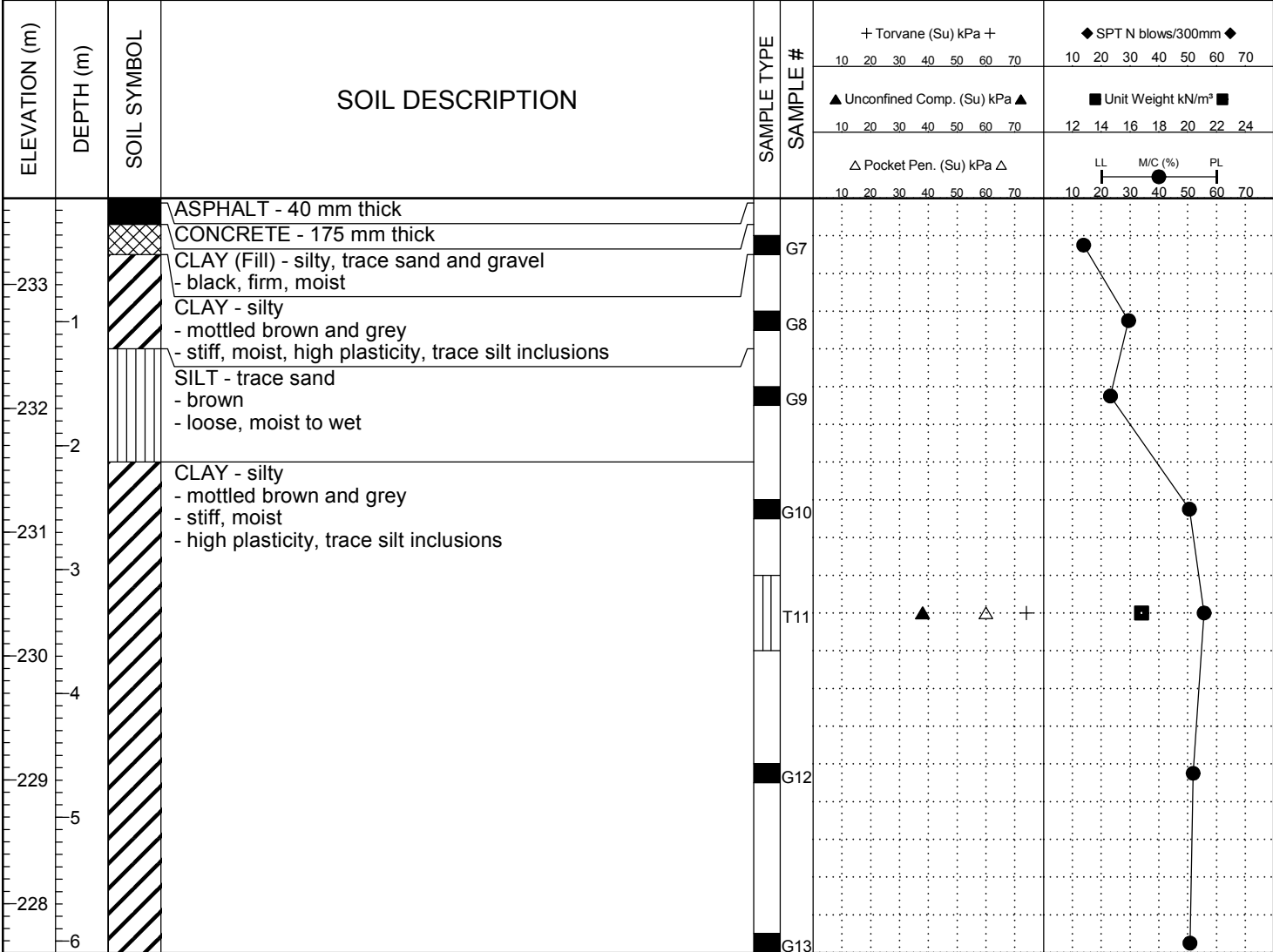


END OF TEST HOLE AT 6.1 m IN CLAY
 Notes:
 1. No sloughing or seepage observed.
 2. Test hole backfilled with auger cuttings.
 3. Concrete patched with cold mix asphalt.

2013 143691) FERRY RD CONTRACT 4.GPJ DATA TEMPLATE - AUGUST 2, 2013.GDT 18/09/14

APPENDIX A - TEST HOLE LOGS

PROJECT: Ferry Road & Riverbend CSR Works - Contract 4		CLIENT: Tetra Tech		TESTHOLE NO: 14-88	
LOCATION: UTM Coordinates: 5528019.6, 628827.6				PROJECT NO.: 143691	
CONTRACTOR: Paddock Drilling Ltd.		METHOD: Acker MP5 - 125 mm diameter SS augers		ELEVATION (m): 233.852	
SAMPLE TYPE	■ GRAB	▨ SHELBY TUBE	⊠ SPLIT SPOON	▩ BULK	☐ NO RECOVERY
BACKFILL TYPE	■ BENTONITE	▨ GRAVEL	▨ SLOUGH	▩ GROUT	☐ CUTTINGS

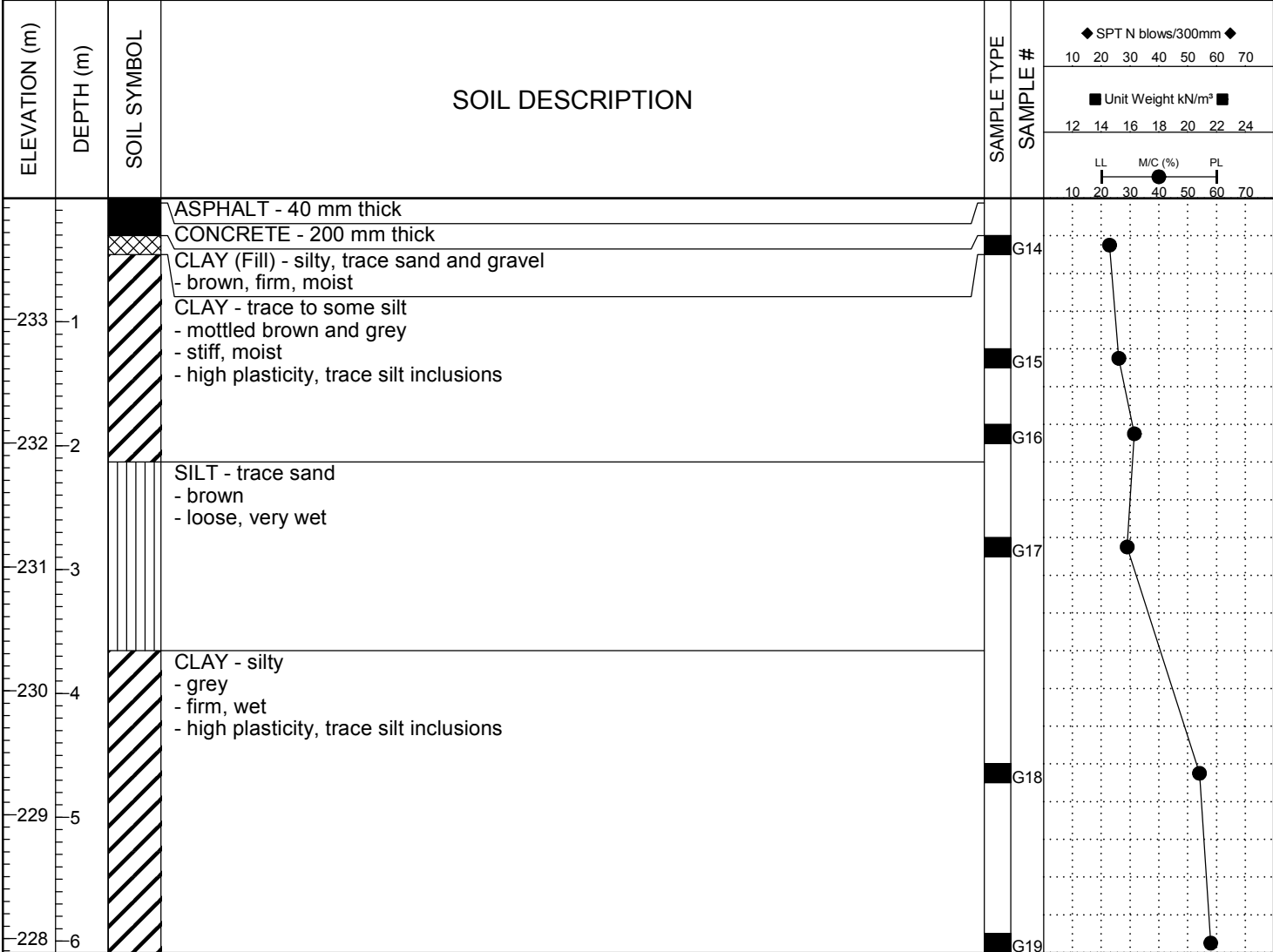


END OF TEST HOLE AT 6.1 m IN CLAY
 Notes:
 1. No sloughing or seepage observed.
 2. Test hole backfilled with auger cuttings.
 3. Concrete patched with cold mix asphalt.

2013 143691) FERRY RD CONTRACT 4.GPJ DATA TEMPLATE - AUGUST 2, 2013.GDT 18/09/14

APPENDIX A - TEST HOLE LOGS

PROJECT: Ferry Road & Riverbend CSR Works - Contract 4		CLIENT: Tetra Tech		TESTHOLE NO: 14-89	
LOCATION: UTM Coordinates: 5528022.8, 628750.8				PROJECT NO.: 143691	
CONTRACTOR: Paddock Drilling Ltd.		METHOD: Acker MP5 - 125 mm diameter SS augers		ELEVATION (m): 234.133	
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB	<input type="checkbox"/> SHELBY TUBE	<input type="checkbox"/> SPLIT SPOON	<input type="checkbox"/> BULK	<input type="checkbox"/> NO RECOVERY
BACKFILL TYPE	<input checked="" type="checkbox"/> BENTONITE	<input type="checkbox"/> GRAVEL	<input type="checkbox"/> SLOUGH	<input type="checkbox"/> GROUT	<input type="checkbox"/> CUTTINGS
				<input type="checkbox"/> CORE	<input type="checkbox"/> SAND

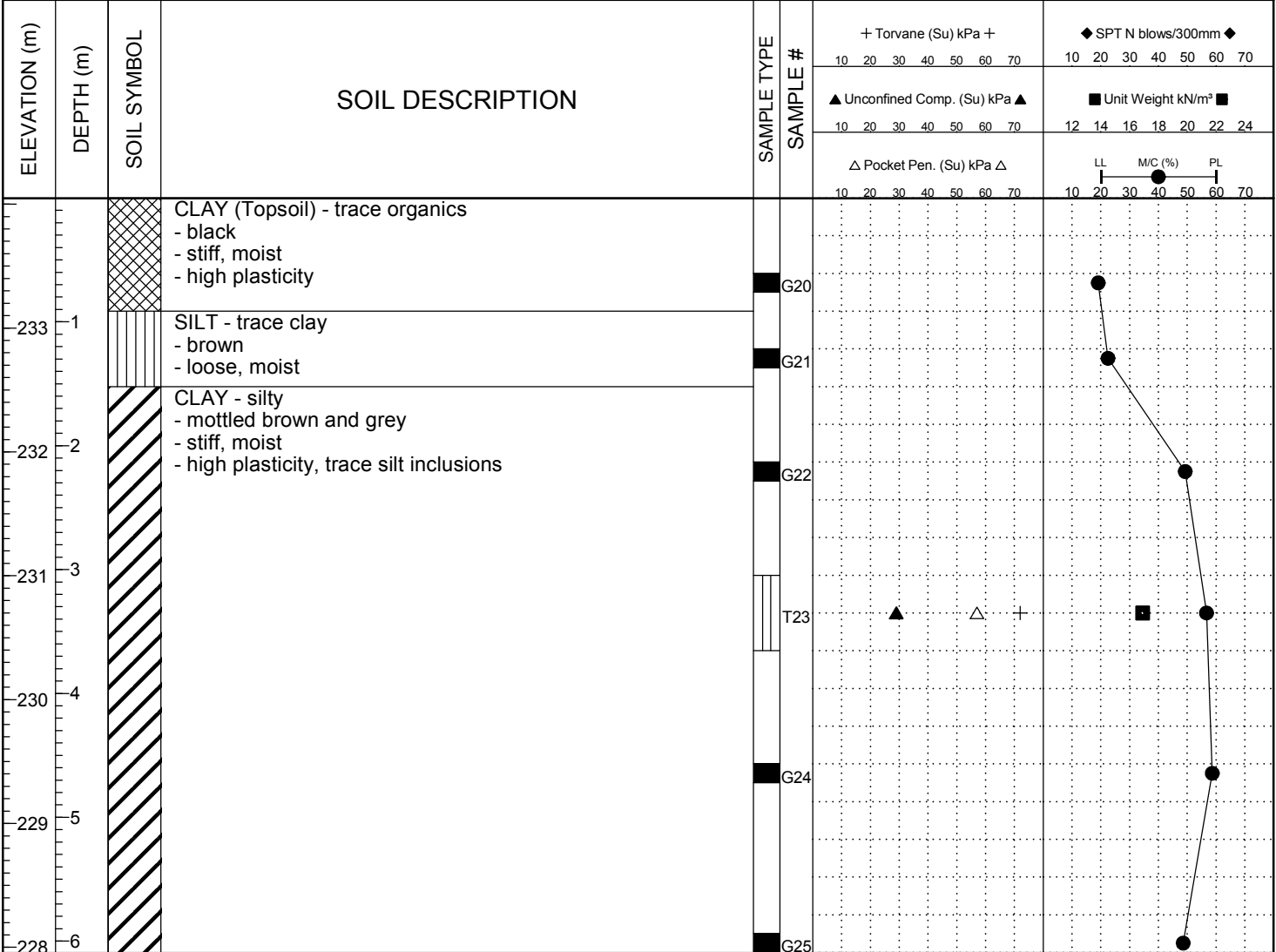


END OF TEST HOLE AT 6.1 m IN CLAY
 Notes:
 1. Minor sloughing and seepage observed from silt layer.
 2. Test hole backfilled with auger cuttings.
 3. Concrete patched with cold mix asphalt.

2013 143691 FERRY RD CONTRACT 4.GPJ DATA TEMPLATE - AUGUST 2, 2013.GDT 18/09/14

APPENDIX A - TEST HOLE LOGS

PROJECT: Ferry Road & Riverbend CSR Works - Contract 4		CLIENT: Tetra Tech		TESTHOLE NO: 14-90	
LOCATION: UTM Coordinates: 5528266.3, 628729.9				PROJECT NO.: 143691	
CONTRACTOR: Paddock Drilling Ltd.		METHOD: Acker MP5 - 125 mm diameter SS augers		ELEVATION (m): 234.204	
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB	<input type="checkbox"/> SHELBY TUBE	<input type="checkbox"/> SPLIT SPOON	<input type="checkbox"/> BULK	<input type="checkbox"/> NO RECOVERY
BACKFILL TYPE	<input checked="" type="checkbox"/> BENTONITE	<input type="checkbox"/> GRAVEL	<input type="checkbox"/> SLOUGH	<input type="checkbox"/> GROUT	<input type="checkbox"/> CUTTINGS
					<input type="checkbox"/> CORE
					<input type="checkbox"/> SAND

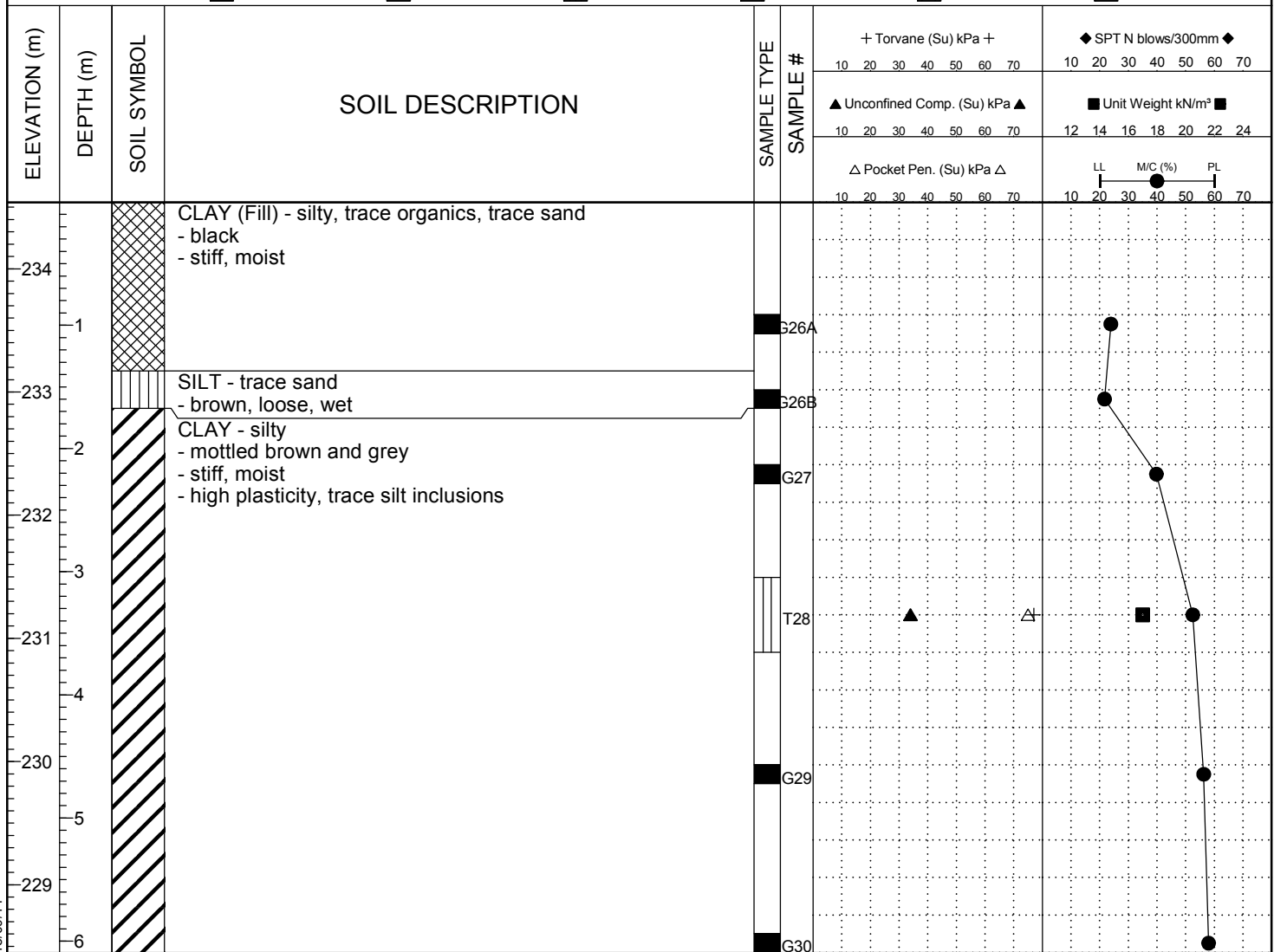


END OF TEST HOLE AT 6.1 m IN CLAY
 Notes:
 1. No sloughing or seepage observed.
 2. Test hole backfilled with auger cuttings.

2013 143691) FERRY RD CONTRACT 4.GPJ DATA TEMPLATE - AUGUST 2, 2013.GDT 18/09/14

APPENDIX A - TEST HOLE LOGS

PROJECT: Ferry Road & Riverbend CSR Works - Contract 4		CLIENT: Tetra Tech		TESTHOLE NO: 14-91	
LOCATION: UTM Coordinates: 5528143.7, 628878.8				PROJECT NO.: 143691	
CONTRACTOR: Paddock Drilling Ltd.		METHOD: Acker MP5 - 125 mm diameter SS augers		ELEVATION (m): 234.696	
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB	<input type="checkbox"/> SHELBY TUBE	<input type="checkbox"/> SPLIT SPOON	<input type="checkbox"/> BULK	<input type="checkbox"/> NO RECOVERY
BACKFILL TYPE	<input checked="" type="checkbox"/> BENTONITE	<input type="checkbox"/> GRAVEL	<input type="checkbox"/> SLOUGH	<input type="checkbox"/> GROUT	<input type="checkbox"/> CUTTINGS
					<input type="checkbox"/> CORE
					<input type="checkbox"/> SAND

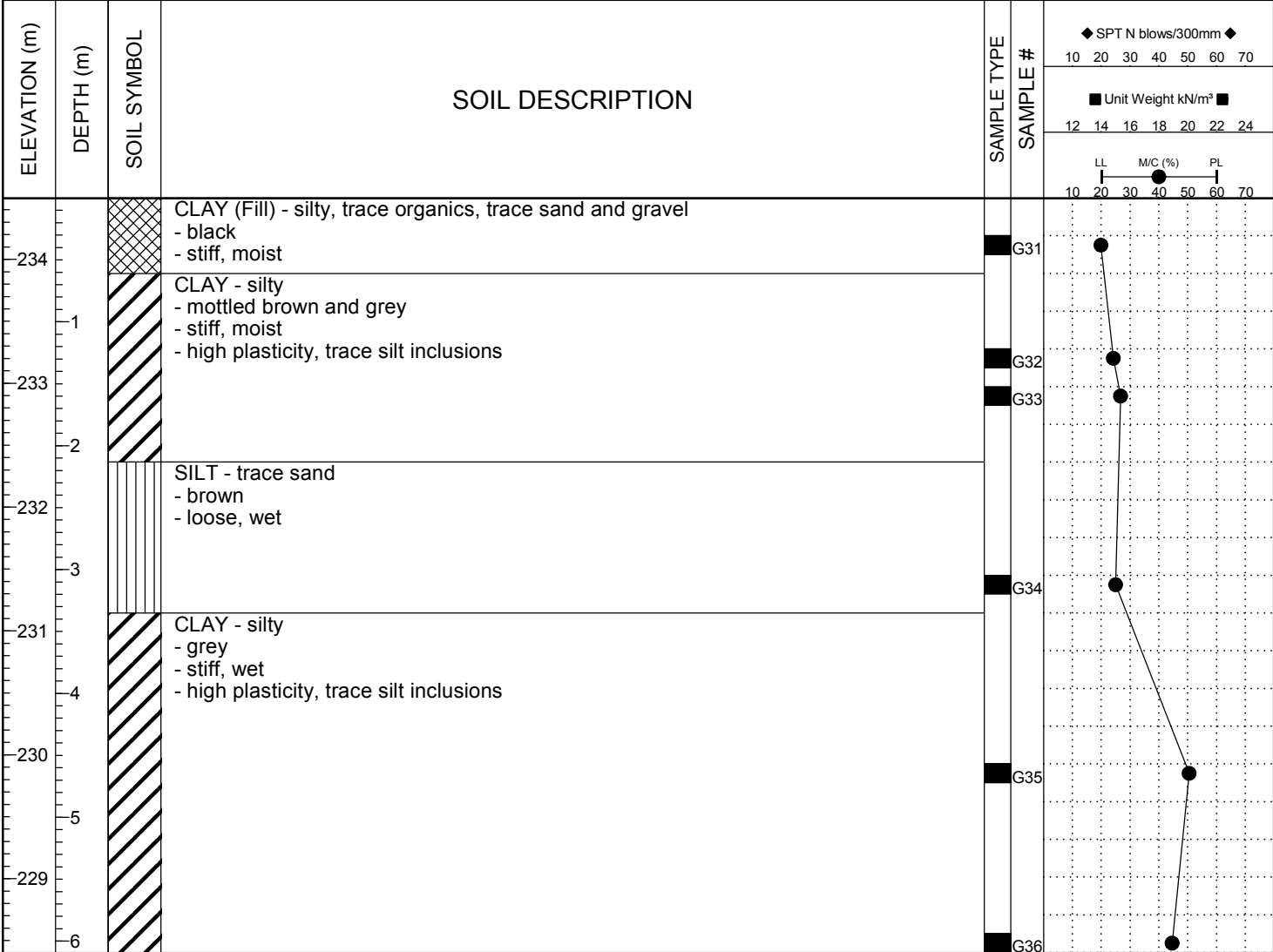


END OF TEST HOLE AT 6.1 m IN CLAY
 Notes:
 1. No sloughing or seepage observed.
 2. Test hole backfilled with auger cuttings.

2013 143691) FERRY RD CONTRACT 4.GPJ DATA TEMPLATE - AUGUST 2, 2013.GDT 18/09/14

APPENDIX A - TEST HOLE LOGS

PROJECT: Ferry Road & Riverbend CSR Works - Contract 4		CLIENT: Tetra Tech		TESTHOLE NO: 14-92	
LOCATION: UTM Coordinates: 5528184.1, 628954.4				PROJECT NO.: 143691	
CONTRACTOR: Paddock Drilling Ltd.		METHOD: Acker MP5 - 125 mm diameter SS augers		ELEVATION (m): 234.65	
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB	<input type="checkbox"/> SHELBY TUBE	<input type="checkbox"/> SPLIT SPOON	<input type="checkbox"/> BULK	<input type="checkbox"/> NO RECOVERY
BACKFILL TYPE	<input checked="" type="checkbox"/> BENTONITE	<input type="checkbox"/> GRAVEL	<input type="checkbox"/> SLOUGH	<input type="checkbox"/> GROUT	<input type="checkbox"/> CUTTINGS
				<input type="checkbox"/> CORE	<input type="checkbox"/> SAND

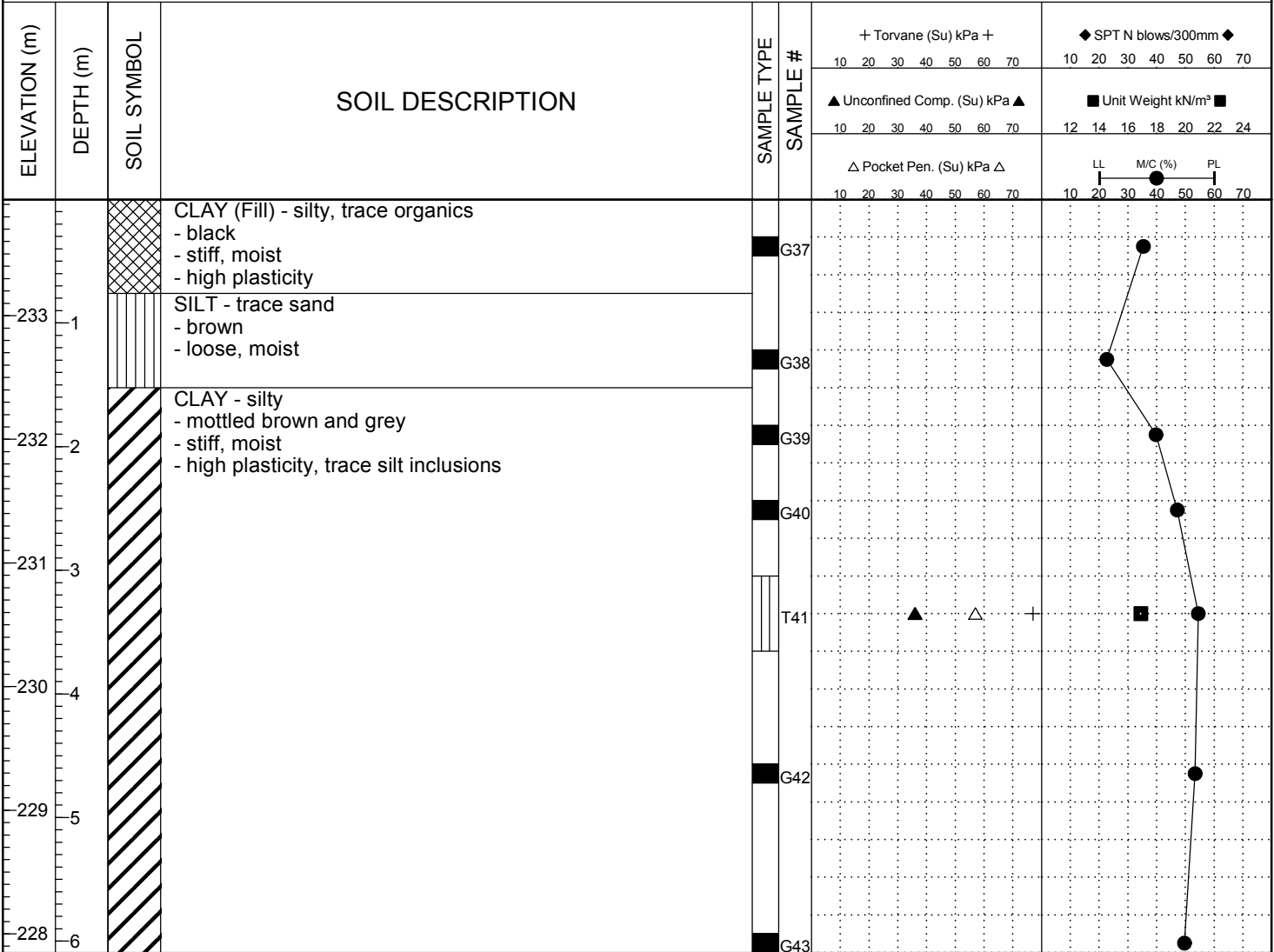


END OF TEST HOLE AT 6.1 m IN CLAY
 Notes:
 1. Minor sloughing and seepage observed from silt layer.
 2. Test hole backfilled with auger cuttings.

2013 143691) FERRY RD CONTRACT 4.GPJ DATA TEMPLATE - AUGUST 2, 2013.GDT 18/09/14

APPENDIX A - TEST HOLE LOGS

PROJECT: Ferry Road & Riverbend CSR Works - Contract 4		CLIENT: Tetra Tech		TESTHOLE NO: 14-93		
LOCATION: UTM Coordinates: 5528266.0, 629039.3				PROJECT NO.: 143691		
CONTRACTOR: Paddock Drilling Ltd.		METHOD: Acker MP5 - 125 mm diameter SS augers		ELEVATION (m): 234.095		
SAMPLE TYPE	GRAB	SHELBY TUBE	SPLIT SPOON	BULK	NO RECOVERY	CORE
BACKFILL TYPE	BENTONITE	GRAVEL	SLOUGH	GROUT	CUTTINGS	SAND



END OF TEST HOLE AT 6.1 m IN CLAY
 Notes:
 1. No sloughing or seepage observed.
 2. Test hole backfilled with auger cuttings.

2013 143691) FERRY RD CONTRACT 4.GPJ DATA TEMPLATE - AUGUST 2, 2013.GDT 18/09/14