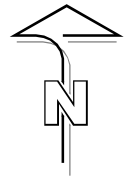
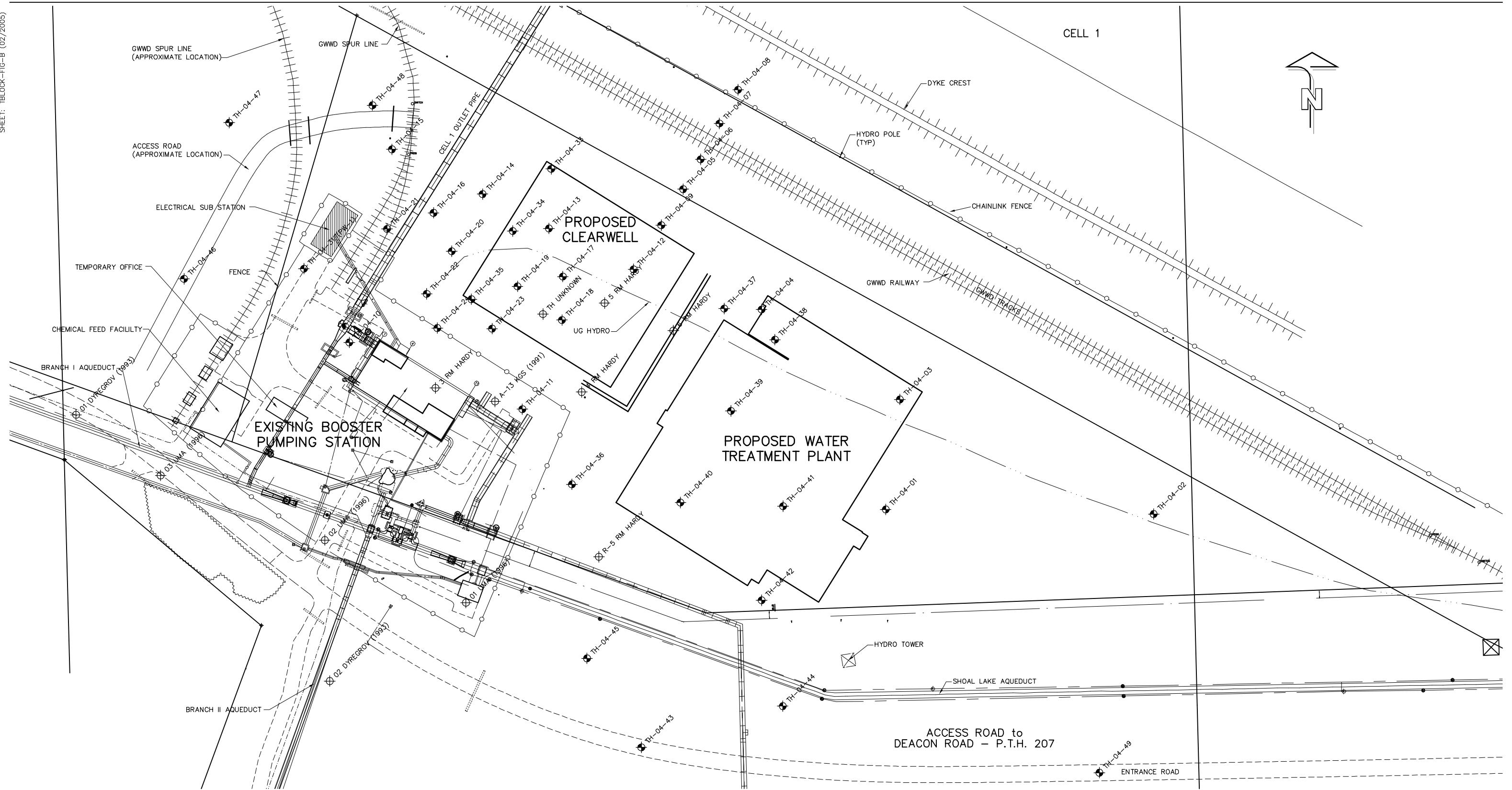
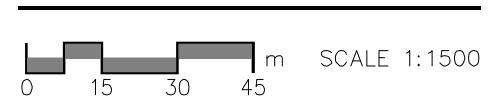


Appendix A

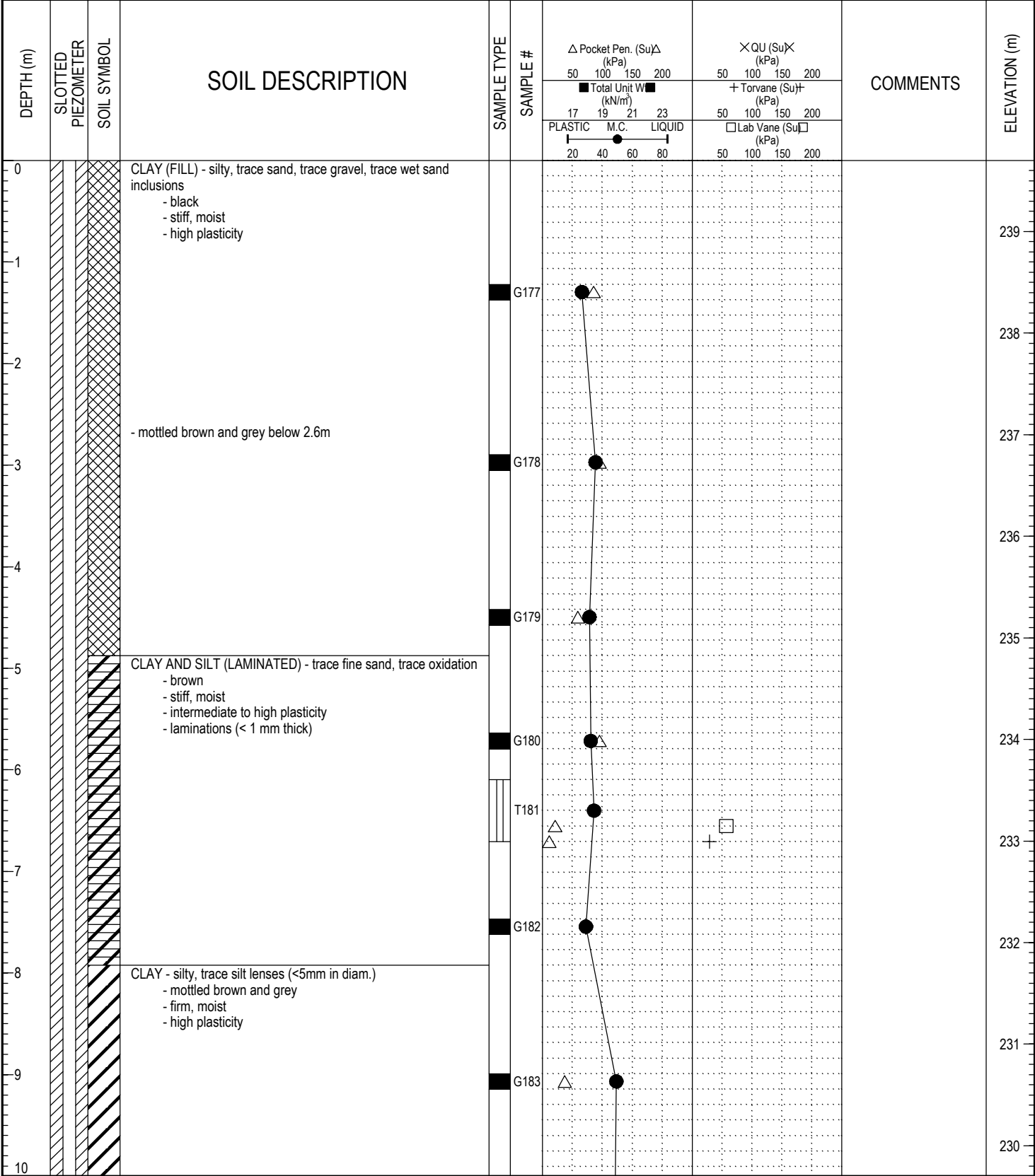
Test Hole Logs



- ⊕ TESTHOLES
- ⊕ TESTHOLES BY OTHERS



PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-01
LOCATION: WTP - N 5524018.031 E 647939.000		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Paddock Drilling Ltd.	METHOD: RM 30 - 125 mm Solid Stem Augers	ELEVATION (m): 239.7
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 <input type="checkbox"/> CORE		
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"/> SAND		

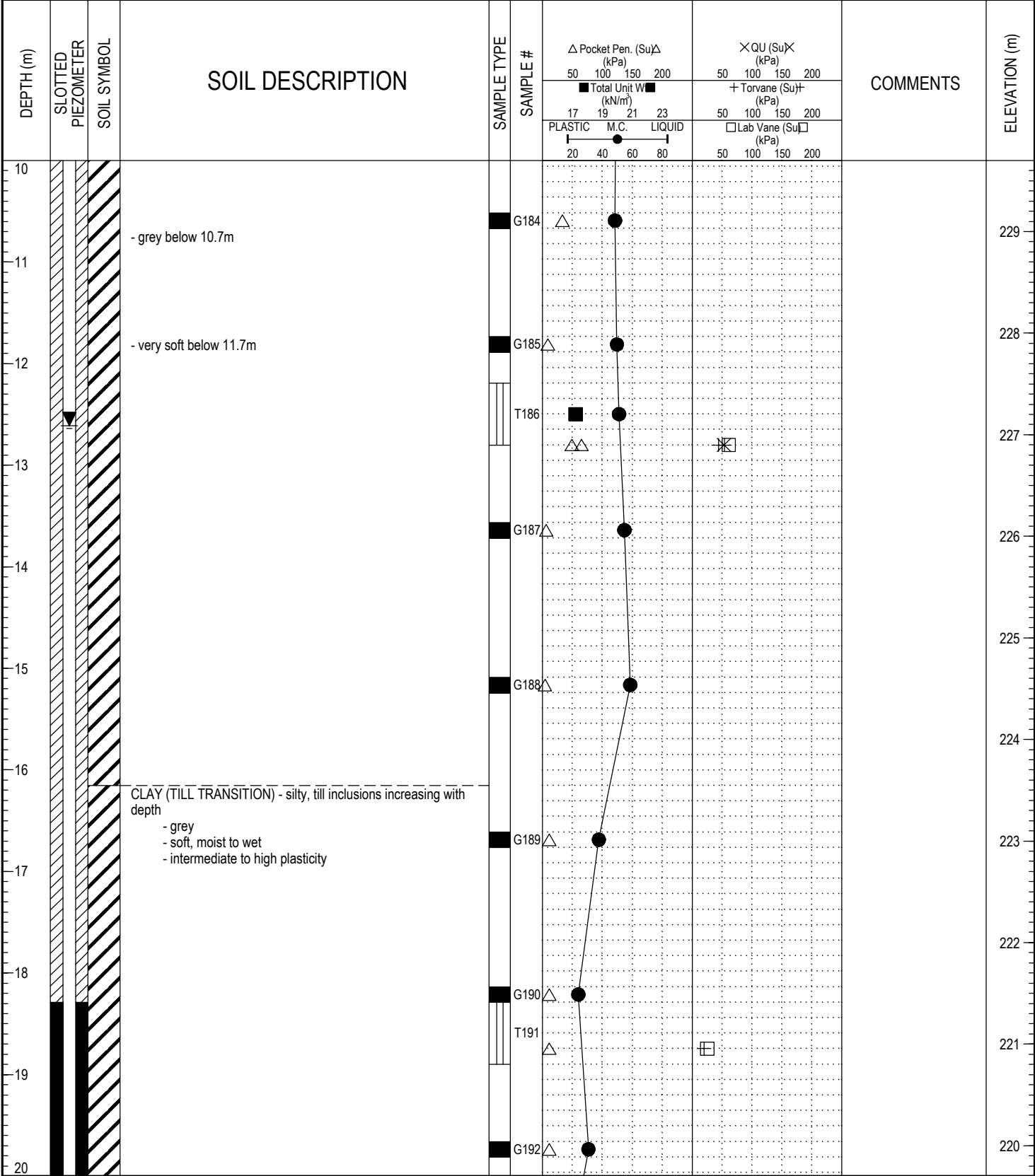


LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA GDT 17/2/05



LOGGED BY: Kate Franklin	COMPLETION DEPTH: 23.77 m
REVIEWED BY:	COMPLETION DATE: 5/10/04
PROJECT ENGINEER: Ken Skaffeld	Page 1 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-01
LOCATION: WTP - N 5524018.031 E 647939.000		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Paddock Drilling Ltd.	METHOD: RM 30 - 125 mm Solid Stem Augers	ELEVATION (m): 239.7
SAMPLE TYPE	<input type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE	
BACKFILL TYPE	<input type="checkbox"/> BENTONITE <input type="checkbox"/> GRAVEL <input type="checkbox"/> SLOUGH <input type="checkbox"/> GROUT <input type="checkbox"/> CUTTINGS <input type="checkbox"/> SAND	

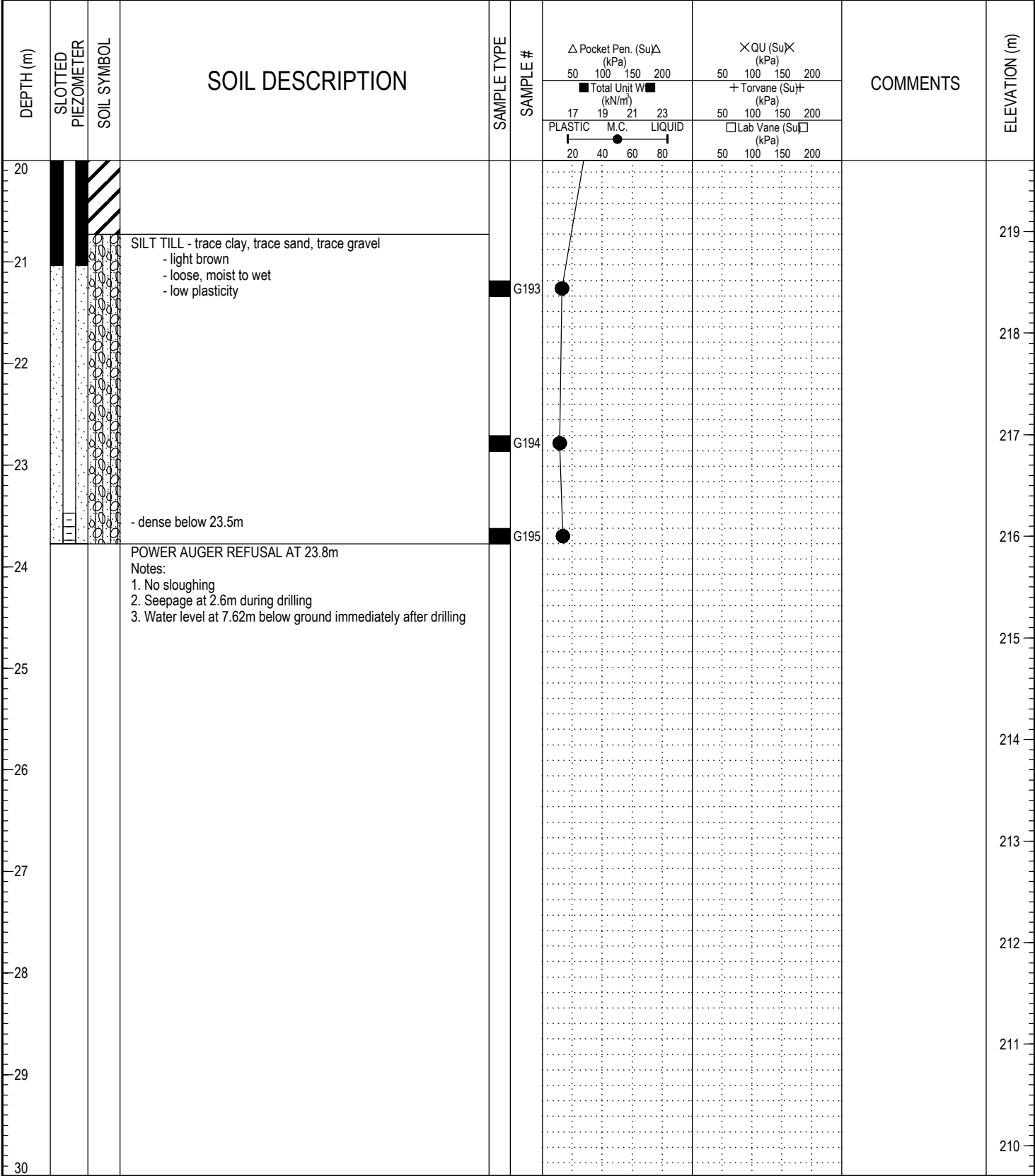


LOG OF TESTHOLE - WINNIPEG WATER TREATMENT PLANT.GPJ - UMA.GDT 17/2/05



LOGGED BY: Kate Franklin	COMPLETION DEPTH: 23.77 m
REVIEWED BY:	COMPLETION DATE: 5/10/04
PROJECT ENGINEER: Ken Skaffeld	Page 2 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-01
LOCATION: WTP - N 5524018.031 E 647939.000	PROJECT NO.: 3398-055-00-01-00	
CONTRACTOR: Paddock Drilling Ltd.	METHOD: RM 30 - 125 mm Solid Stem Augers	ELEVATION (m): 239.7
SAMPLE TYPE	<input type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE	
BACKFILL TYPE	<input type="checkbox"/> BENTONITE <input type="checkbox"/> GRAVEL <input type="checkbox"/> SLOUGH <input type="checkbox"/> GROUT <input type="checkbox"/> CUTTINGS <input type="checkbox"/> SAND	



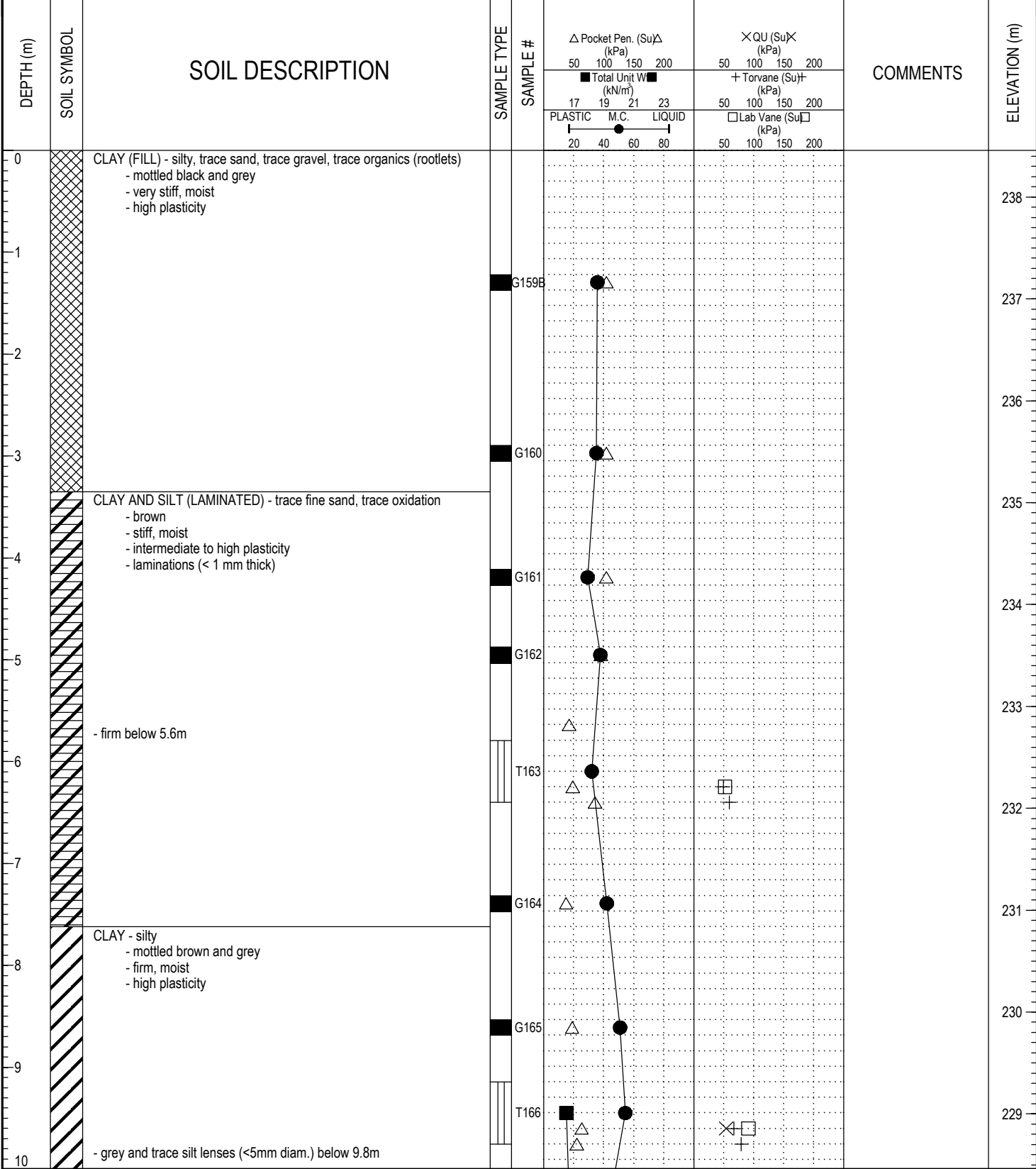
LOG OF TESTHOLE - WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Kate Franklin	COMPLETION DEPTH: 23.77 m
REVIEWED BY:	COMPLETION DATE: 5/10/04
PROJECT ENGINEER: Ken Skaffeld	Page 3 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-02
LOCATION: WTP - N 5524039.025 E 648058.040		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Paddock Drilling Ltd.	METHOD: RM 30 - 125 mm Solid Stem Augers	ELEVATION (m): 238.458

SAMPLE TYPE GRAB SHELBY TUBE SPLIT SPOON BULK NO RECOVERY CORE

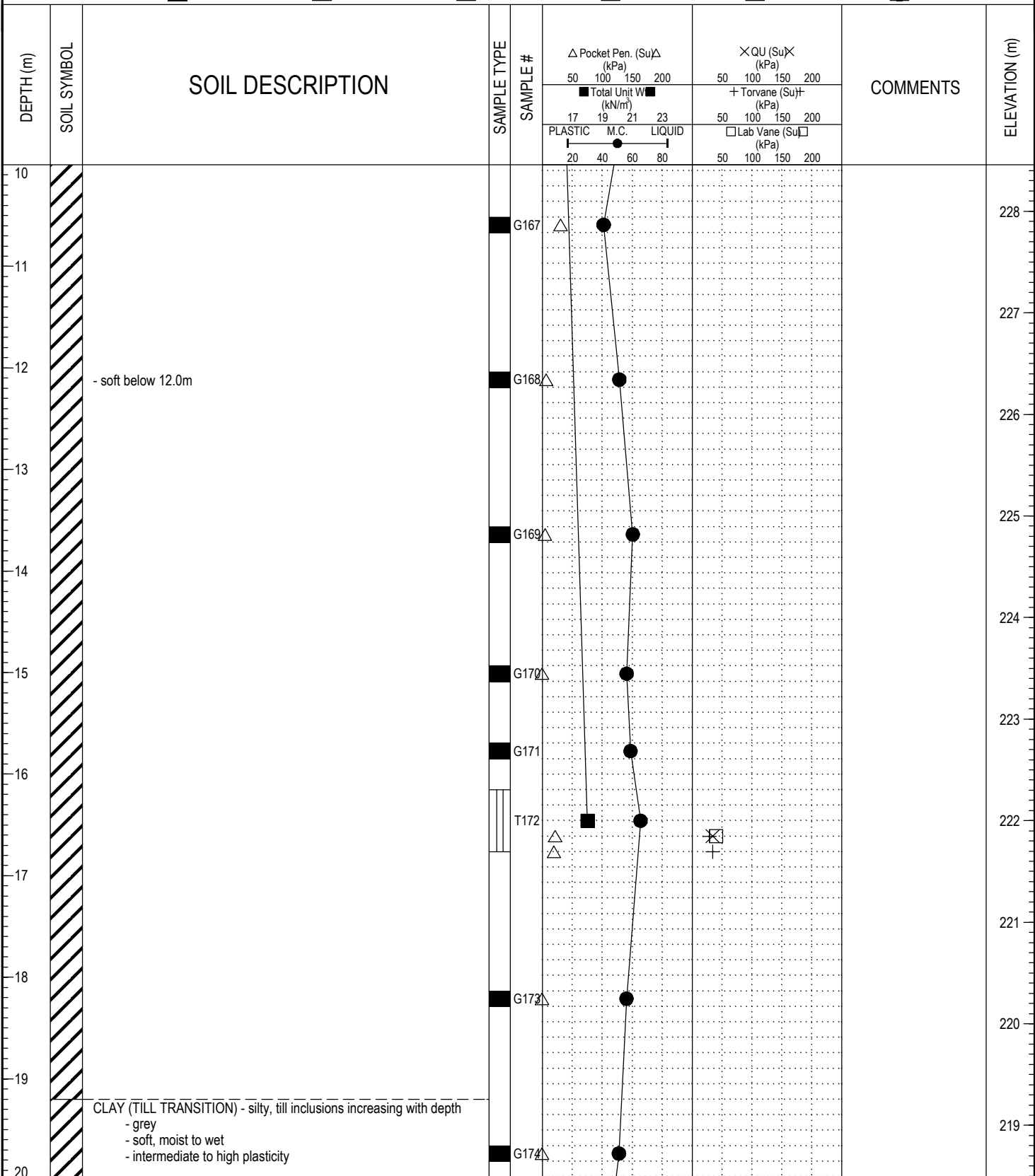


LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Kate Franklin	COMPLETION DEPTH: 22.86 m
REVIEWED BY:	COMPLETION DATE: 4/10/04
PROJECT ENGINEER: Ken Skaffeld	Page 1 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-02
LOCATION: WTP - N 5524039.025 E 648058.040		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Paddock Drilling Ltd.	METHOD: RM 30 - 125 mm Solid Stem Augers	ELEVATION (m): 238.458
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 <input type="checkbox"/> CORE	

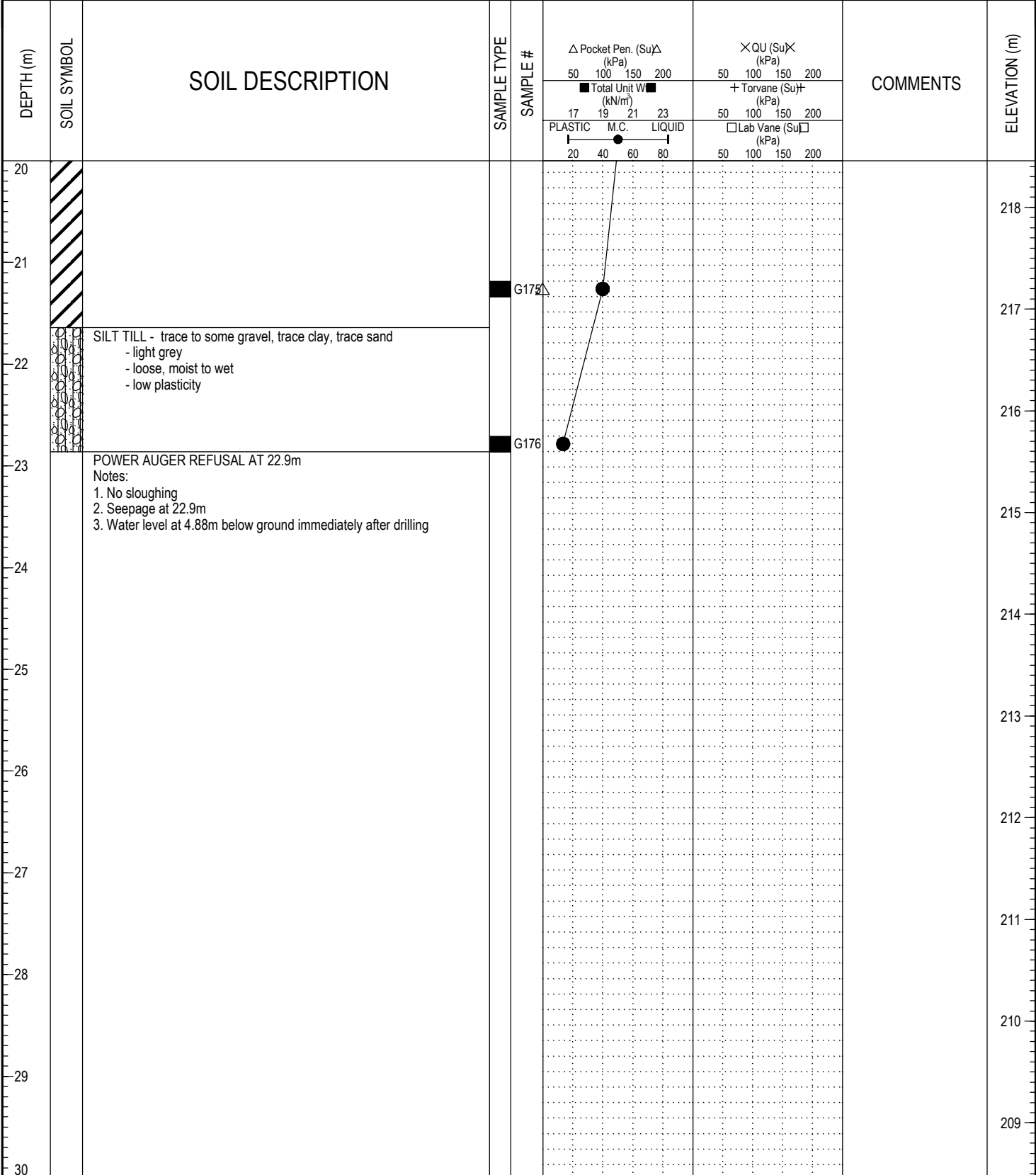


LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Kate Franklin	COMPLETION DEPTH: 22.86 m
REVIEWED BY:	COMPLETION DATE: 4/10/04
PROJECT ENGINEER: Ken Skaffeld	Page 2 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-02
LOCATION: WTP - N 5524039.025 E 648058.040		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Paddock Drilling Ltd.	METHOD: RM 30 - 125 mm Solid Stem Augers	ELEVATION (m): 238.458
SAMPLE TYPE <input checked="" type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input checked="" type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK <input checked="" type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE		



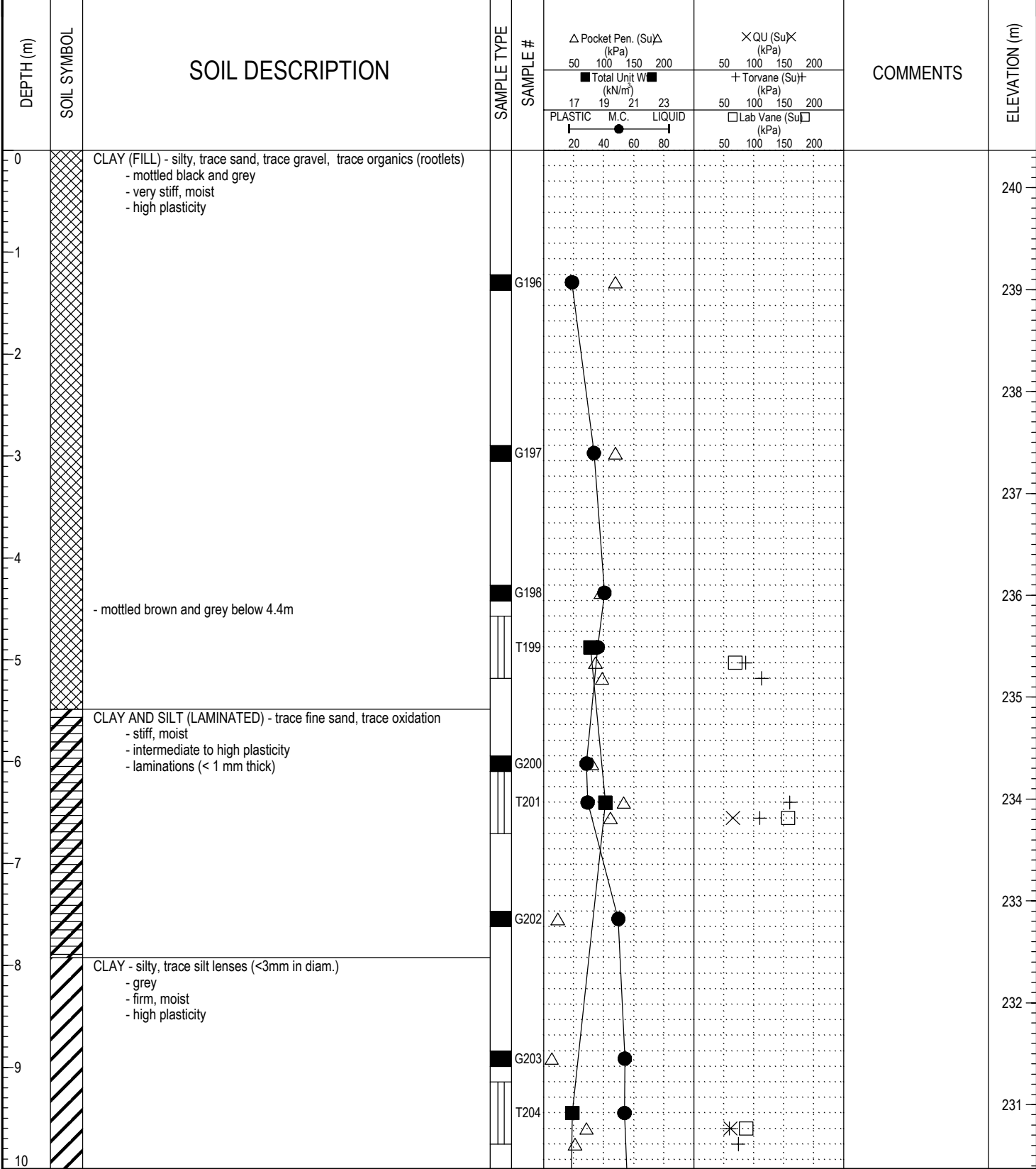
LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Kate Franklin	COMPLETION DEPTH: 22.86 m
REVIEWED BY:	COMPLETION DATE: 4/10/04
PROJECT ENGINEER: Ken Skaffeld	Page 3 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-03
LOCATION: WTP - N 5524091.980 E 647959.997		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Paddock Drilling Ltd.	METHOD: RM 30 - 125 mm Solid Stem Augers	ELEVATION (m): 240.367

SAMPLE TYPE GRAB SHELBY TUBE SPLIT SPOON BULK NO RECOVERY CORE



LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Kate Franklin	COMPLETION DEPTH: 23.77 m
REVIEWED BY:	COMPLETION DATE: 5/10/04
PROJECT ENGINEER: Ken Skaffeld	Page 1 of 3

PROJECT: Winnipeg Water Treatment Plant CLIENT: City of Winnipeg (Earth Tech Canada Ltd.) TESTHOLE NO: **04-03**
 LOCATION: WTP - N 5524091.980 E 647959.997 PROJECT NO.: 3398-055-00-01-00
 CONTRACTOR: Paddock Drilling Ltd. METHOD: RM 30 - 125 mm Solid Stem Augers ELEVATION (m): 240.367

SAMPLE TYPE GRAB SHELBY TUBE SPLIT SPOON BULK NO RECOVERY CORE

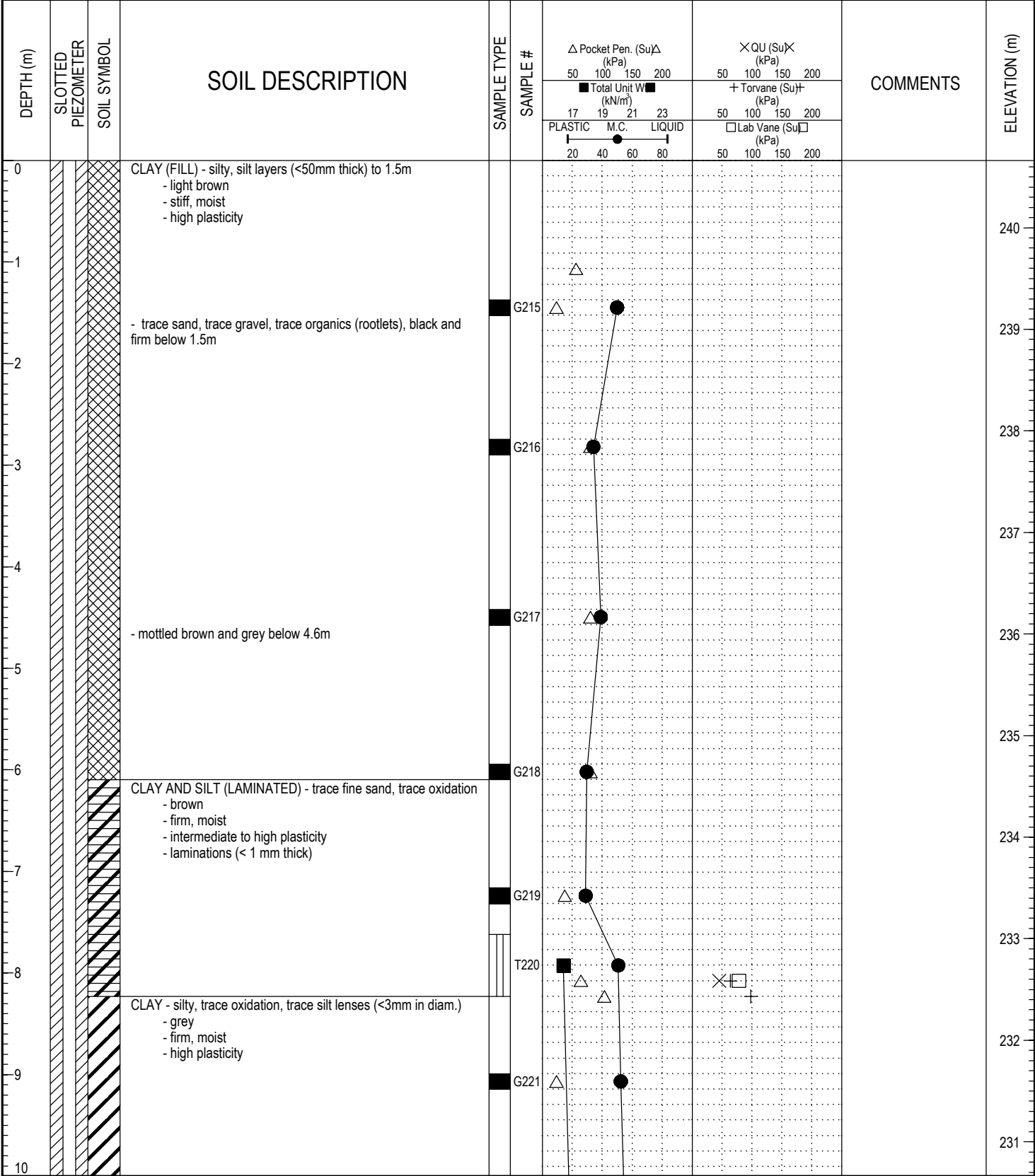
DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	Penetration Test Results		COMMENTS	ELEVATION (m)
					△ Pocket Pen. (Su)△ (kPa)	× QU (Su)× (kPa)		
20								220
21								219
22		SILT TILL - trace clay, trace sand, trace gravel - light brown - loose to compact, moist - low plasticity		G213	50	50		218
23		- some gravel below 22.9m		G214	100	100		217
24		POWER AUGER REFUSAL AT 23.8m Notes: 1. No sloughing, seepage at 6.1m 2. Water level at 7.62m below ground immediately after drilling						216
25								215
26								214
27								213
28								212
29								211
30								210

LOG OF TESTHOLE - WINNIPEG WATER TREATMENT PLANT.GPJ - UMA.GDT - 17/2/05



LOGGED BY: Kate Franklin COMPLETION DEPTH: 23.77 m
 REVIEWED BY: COMPLETION DATE: 5/10/04
 PROJECT ENGINEER: Ken Skafffeld Page 3 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-04
LOCATION: WTP - N 5524124.018 E 647902.002		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Paddock Drilling Ltd.	METHOD: RM 30 - 125 mm Solid Stem Augers	ELEVATION (m): 240.662
SAMPLE TYPE	<input type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE	
BACKFILL TYPE	<input type="checkbox"/> BENTONITE <input type="checkbox"/> GRAVEL <input type="checkbox"/> SLOUGH <input type="checkbox"/> GROUT <input type="checkbox"/> CUTTINGS <input type="checkbox"/> SAND	

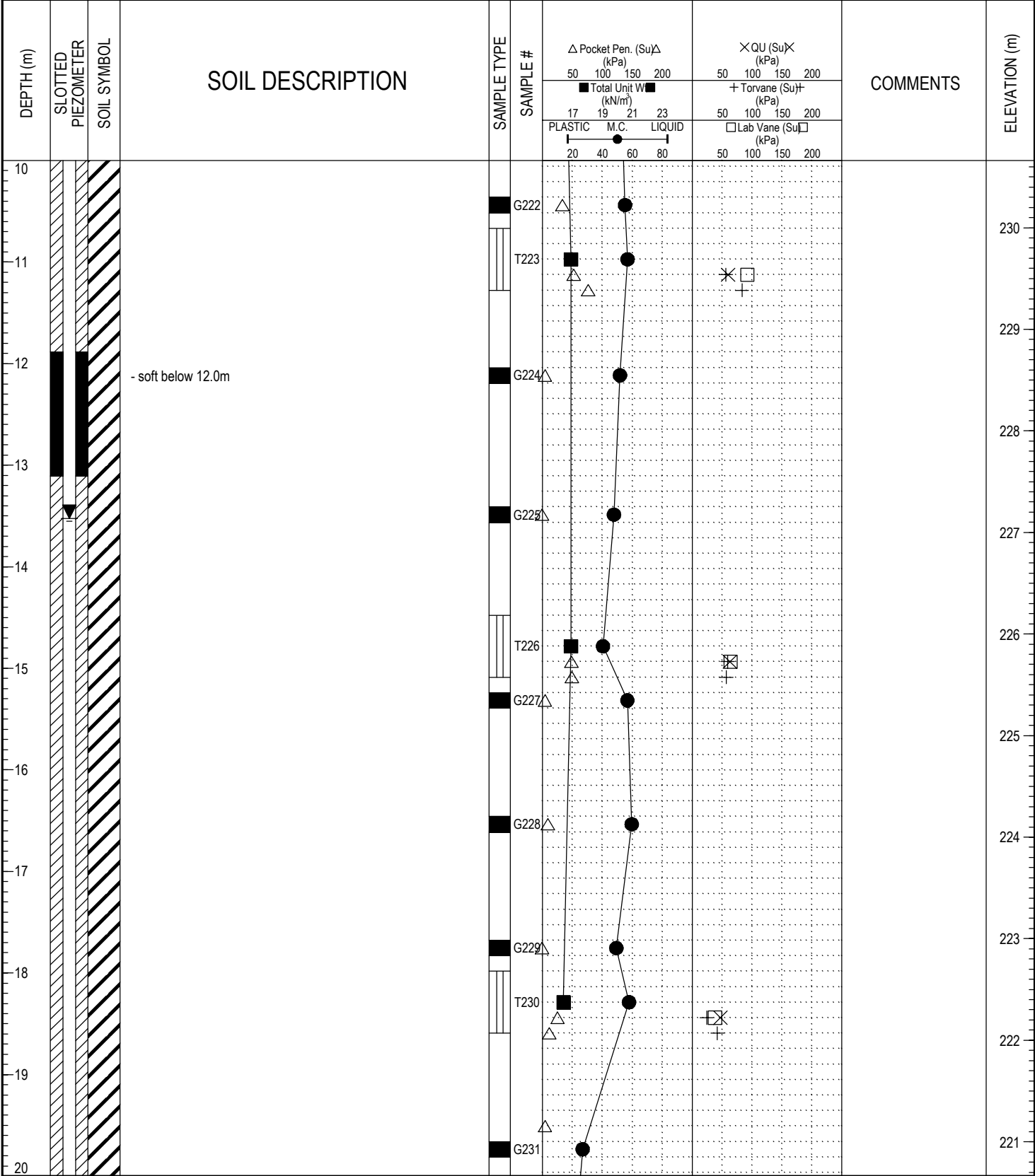


LOG OF TESTHOLE - WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Kate Franklin	COMPLETION DEPTH: 29.41 m
REVIEWED BY:	COMPLETION DATE: 6/10/04
PROJECT ENGINEER: Ken Skaffeld	Page 1 of 4

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-04
LOCATION: WTP - N 5524124.018 E 647902.002		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Paddock Drilling Ltd.	METHOD: RM 30 - 125 mm Solid Stem Augers	ELEVATION (m): 240.662
SAMPLE TYPE	<input type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE	
BACKFILL TYPE	<input type="checkbox"/> BENTONITE <input type="checkbox"/> GRAVEL <input type="checkbox"/> SLOUGH <input type="checkbox"/> GROUT <input type="checkbox"/> CUTTINGS <input type="checkbox"/> SAND	

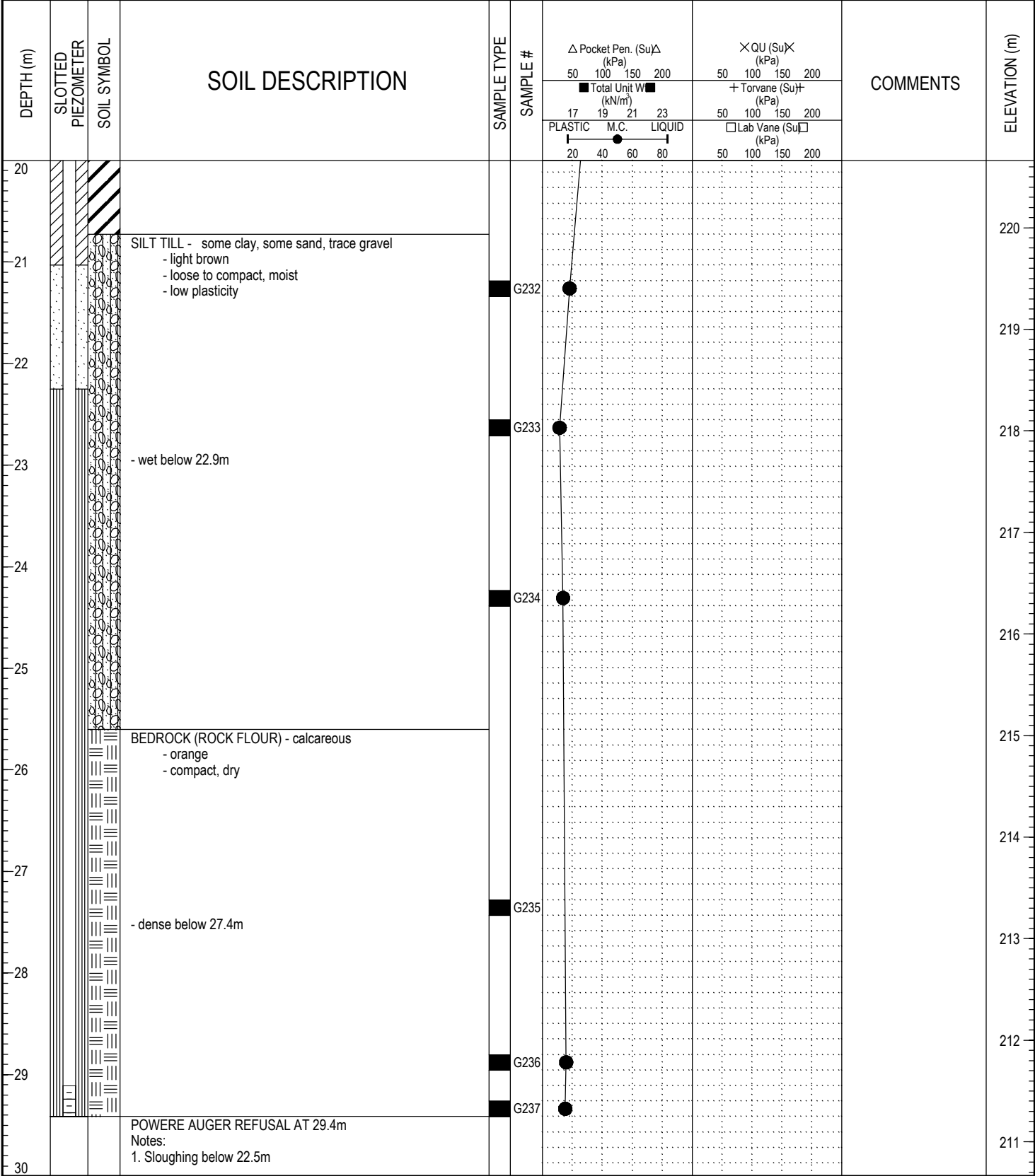


LOG OF TESTHOLE - WINNIPEG WATER TREATMENT PLANT.GPJ - UMA.GDT - 17/2/05



LOGGED BY: Kate Franklin	COMPLETION DEPTH: 29.41 m
REVIEWED BY:	COMPLETION DATE: 6/10/04
PROJECT ENGINEER: Ken Skaffeld	Page 2 of 4

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-04
LOCATION: WTP - N 5524124.018 E 647902.002		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Paddock Drilling Ltd.	METHOD: RM 30 - 125 mm Solid Stem Augers	ELEVATION (m): 240.662
SAMPLE TYPE	<input type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE	
BACKFILL TYPE	<input type="checkbox"/> BENTONITE <input type="checkbox"/> GRAVEL <input type="checkbox"/> SLOUGH <input type="checkbox"/> GROUT <input type="checkbox"/> CUTTINGS <input type="checkbox"/> SAND	



LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Kate Franklin	COMPLETION DEPTH: 29.41 m
REVIEWED BY:	COMPLETION DATE: 6/10/04
PROJECT ENGINEER: Ken Skaffeld	Page 3 of 4

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-04
LOCATION: WTP - N 5524124.018 E 647902.002		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Paddock Drilling Ltd.	METHOD: RM 30 - 125 mm Solid Stem Augers	ELEVATION (m): 240.662
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 <input type="checkbox"/> CORE
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"/> SAND

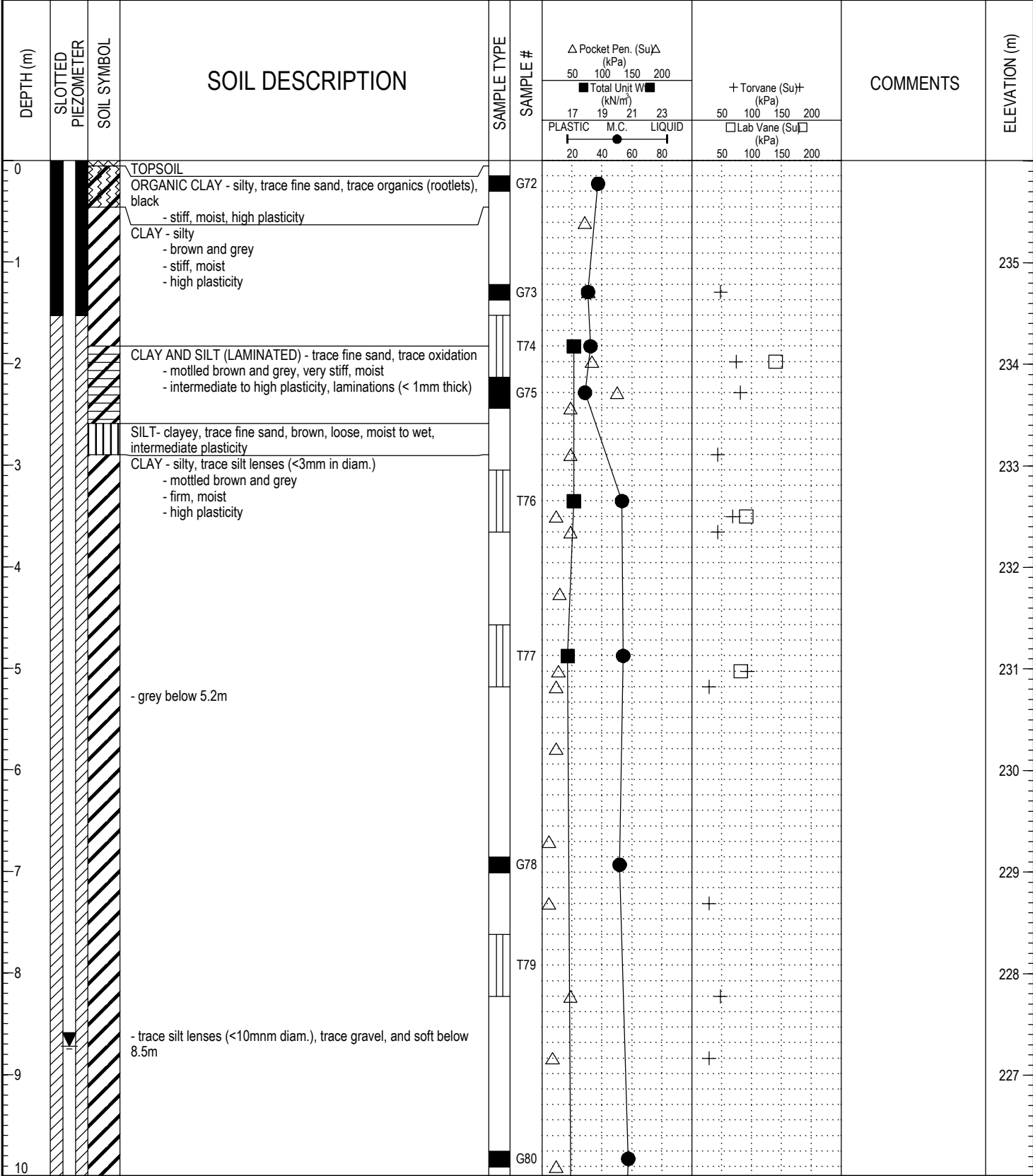
DEPTH (m)	SLOTTED PIEZOMETER	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	Δ Pocket Pen. (Su)Δ (kPa) 50 100 150 200		× QU (Su)× (kPa) 50 100 150 200		COMMENTS	ELEVATION (m)
						■ Total Unit W (kN/m) 17 19 21 23		+ Torvane (Su)+ (kPa) 50 100 150 200			
						PLASTIC M.C. LIQUID 20 40 60 80		<input type="checkbox"/> Lab Vane (Su) (kPa) 50 100 150 200			
30			2. Seepage at 3.1m 3. Water level at 11.89m below ground immediately after drilling								240
31											239
32											238
33											237
34											236
35											235
36											234
37											233
38											232
39											231
40											230

LOG OF TESTHOLE - WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Kate Franklin	COMPLETION DEPTH: 29.41 m
REVIEWED BY:	COMPLETION DATE: 6/10/04
PROJECT ENGINEER: Ken Skaffeld	Page 4 of 4

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-05
LOCATION: WTP - N 5524149.497 E 647855.683		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Nodwell	ELEVATION (m): 236.006
SAMPLE TYPE	<input type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK	<input type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE
BACKFILL TYPE	<input type="checkbox"/> BENTONITE <input type="checkbox"/> GRAVEL <input type="checkbox"/> SLOUGH <input type="checkbox"/> GROUT	<input type="checkbox"/> CUTTINGS <input type="checkbox"/> SAND

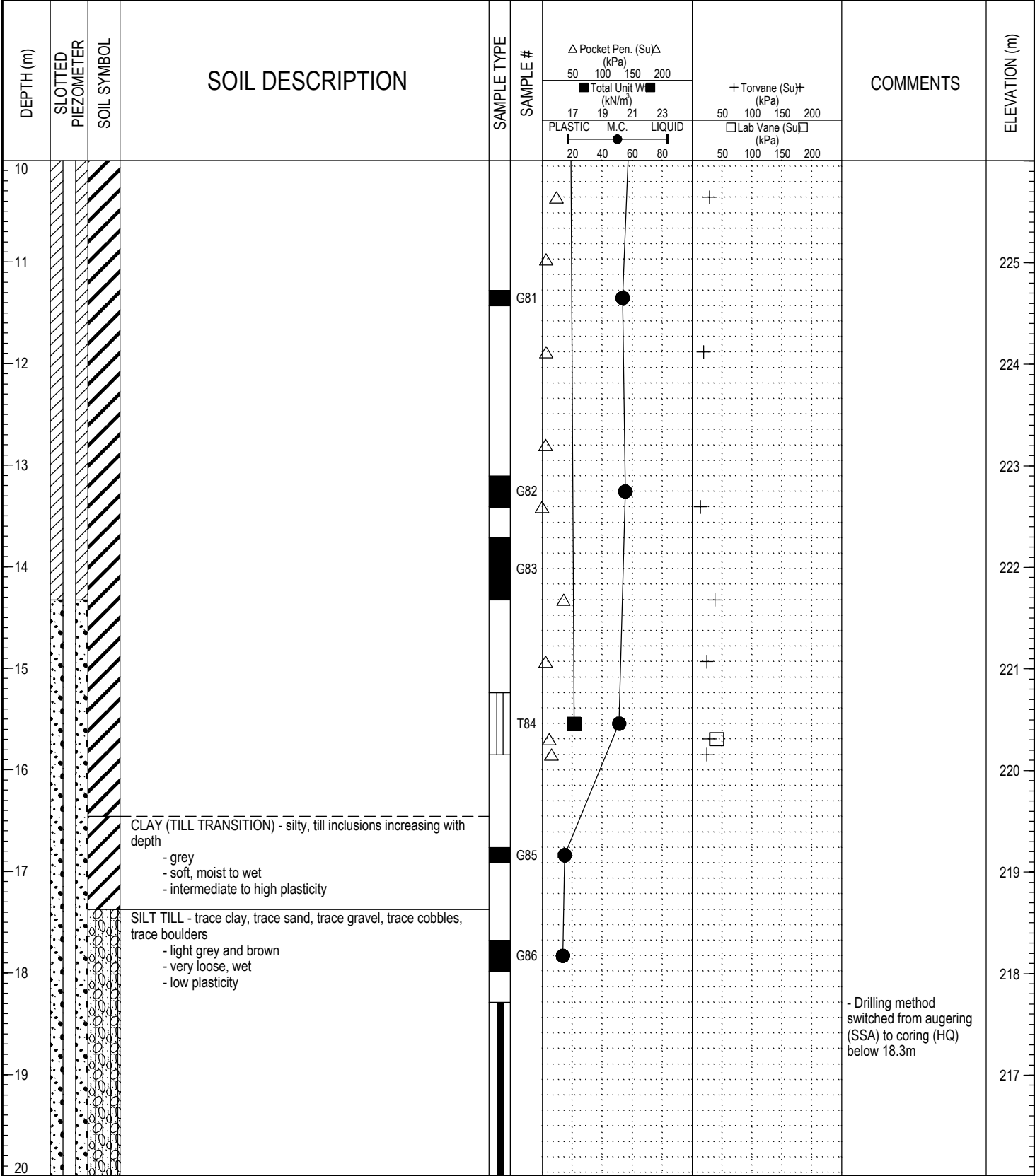


LOG OF TESTHOLE - WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 22.70 m
REVIEWED BY:	COMPLETION DATE: 15/9/04
PROJECT ENGINEER: Ken Skafffeld	Page 1 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-05
LOCATION: WTP - N 5524149.497 E 647855.683		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Nodwell	ELEVATION (m): 236.006
SAMPLE TYPE	<input type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE	
BACKFILL TYPE	<input type="checkbox"/> BENTONITE <input type="checkbox"/> GRAVEL <input type="checkbox"/> SLOUGH <input type="checkbox"/> GROUT <input type="checkbox"/> CUTTINGS <input type="checkbox"/> SAND	



LOG OF TESTHOLE - WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 22.70 m
REVIEWED BY:	COMPLETION DATE: 15/9/04
PROJECT ENGINEER: Ken Skaffeld	Page 2 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-05
LOCATION: WTP - N 5524149.497 E 647855.683		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Nodwell	ELEVATION (m): 236.006
SAMPLE TYPE	<input type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK	<input type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE
BACKFILL TYPE	<input type="checkbox"/> BENTONITE <input type="checkbox"/> GRAVEL <input type="checkbox"/> SLOUGH <input type="checkbox"/> GROUT	<input type="checkbox"/> CUTTINGS <input type="checkbox"/> SAND

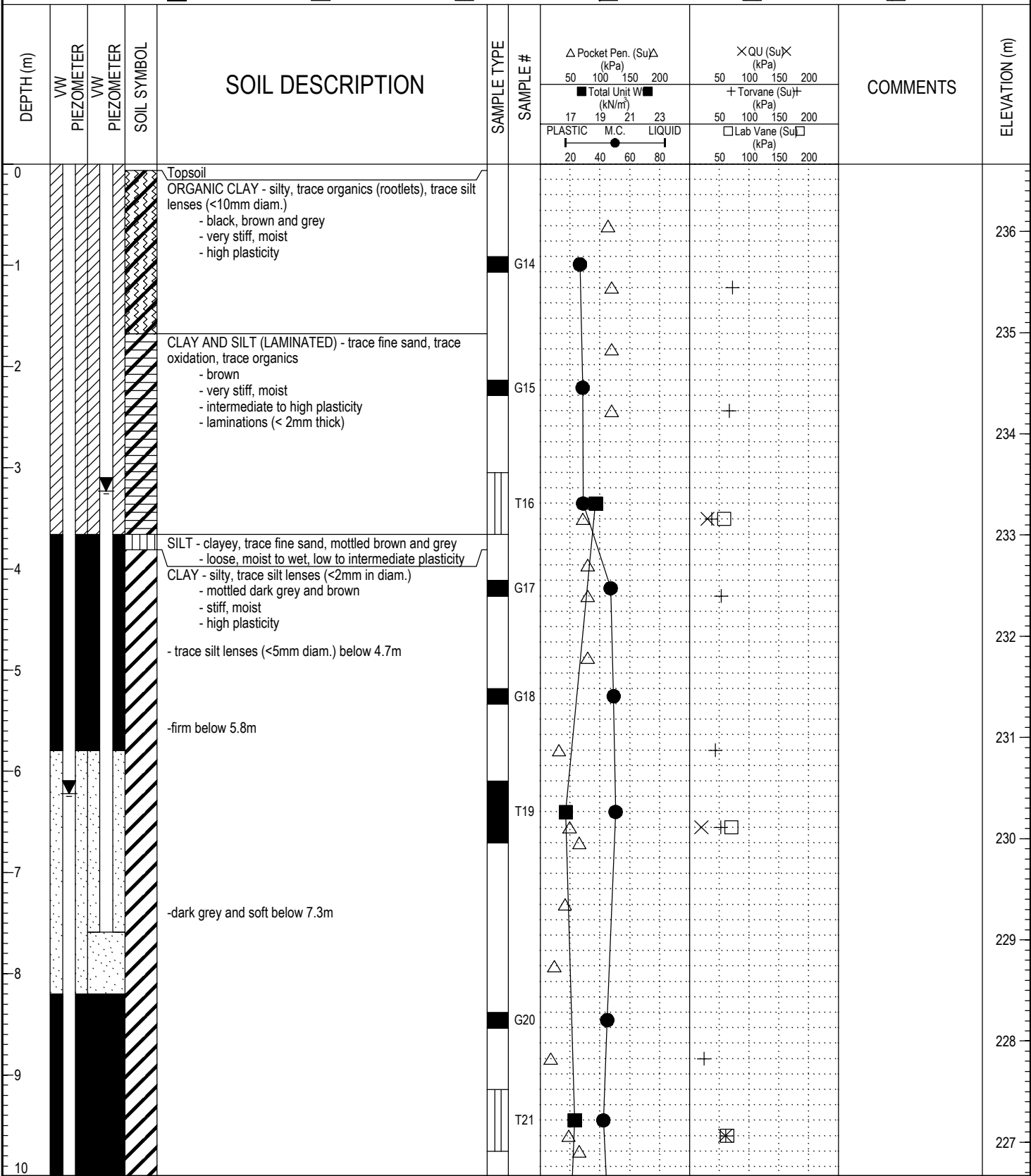
DEPTH (m)	SLOTTED PIEZOMETER	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	Pocket Pen. (Su)Δ (kPa)		+ Torvane (Su)† (kPa)	COMMENTS	ELEVATION (m)
						50	100			
20			LIMESTONE BEDROCK - 150mm fracture at 20.4m							
21										215
22										214
23			END OF TEST HOLE AT 22.7m in LIMESTONE BEDROCK Notes: 1. No sloughing 2. Seepage at 2.61m 3. Standpipe SP-5 installed - Tip for SP-5 at Elevation 213.31m							213
24										212
25										211
26										210
27										209
28										208
29										207
30										

LOG OF TESTHOLE - WINNIPEG WATER TREATMENT PLANT.GPJ - UMA.GDT - 17/2/05



LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 22.70 m
REVIEWED BY:	COMPLETION DATE: 15/9/04
PROJECT ENGINEER: Ken Skaffeld	Page 3 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-06
LOCATION: WTP - N 5524161.864 E 647862.951		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Acker - RM 5 - 125 mm Solid Stem Augers	ELEVATION (m): 236.665
SAMPLE TYPE	<input type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE	
BACKFILL TYPE	<input type="checkbox"/> BENTONITE <input type="checkbox"/> GRAVEL <input type="checkbox"/> SLOUGH <input type="checkbox"/> GROUT <input type="checkbox"/> CUTTINGS <input type="checkbox"/> SAND	

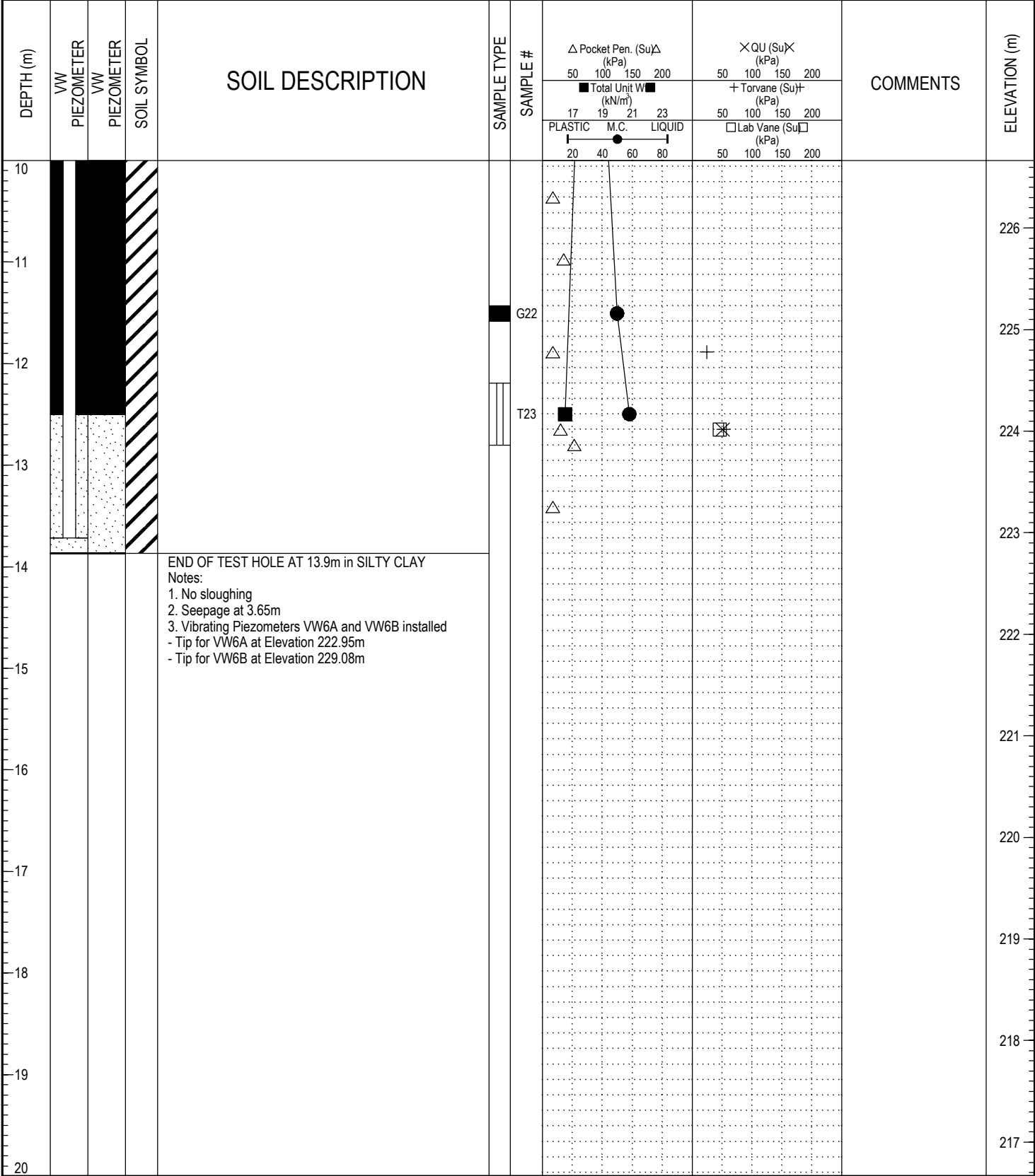


LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 13.90 m
REVIEWED BY:	COMPLETION DATE: 8/9/04
PROJECT ENGINEER: Ken Skaffeld	Page 1 of 2

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-06
LOCATION: WTP - N 5524161.864 E 647862.951	PROJECT NO.: 3398-055-00-01-00	
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Acker - RM 5 - 125 mm Solid Stem Augers	ELEVATION (m): 236.665
SAMPLE TYPE	<input type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE	
BACKFILL TYPE	<input type="checkbox"/> BENTONITE <input type="checkbox"/> GRAVEL <input type="checkbox"/> SLOUGH <input type="checkbox"/> GROUT <input type="checkbox"/> CUTTINGS <input type="checkbox"/> SAND	

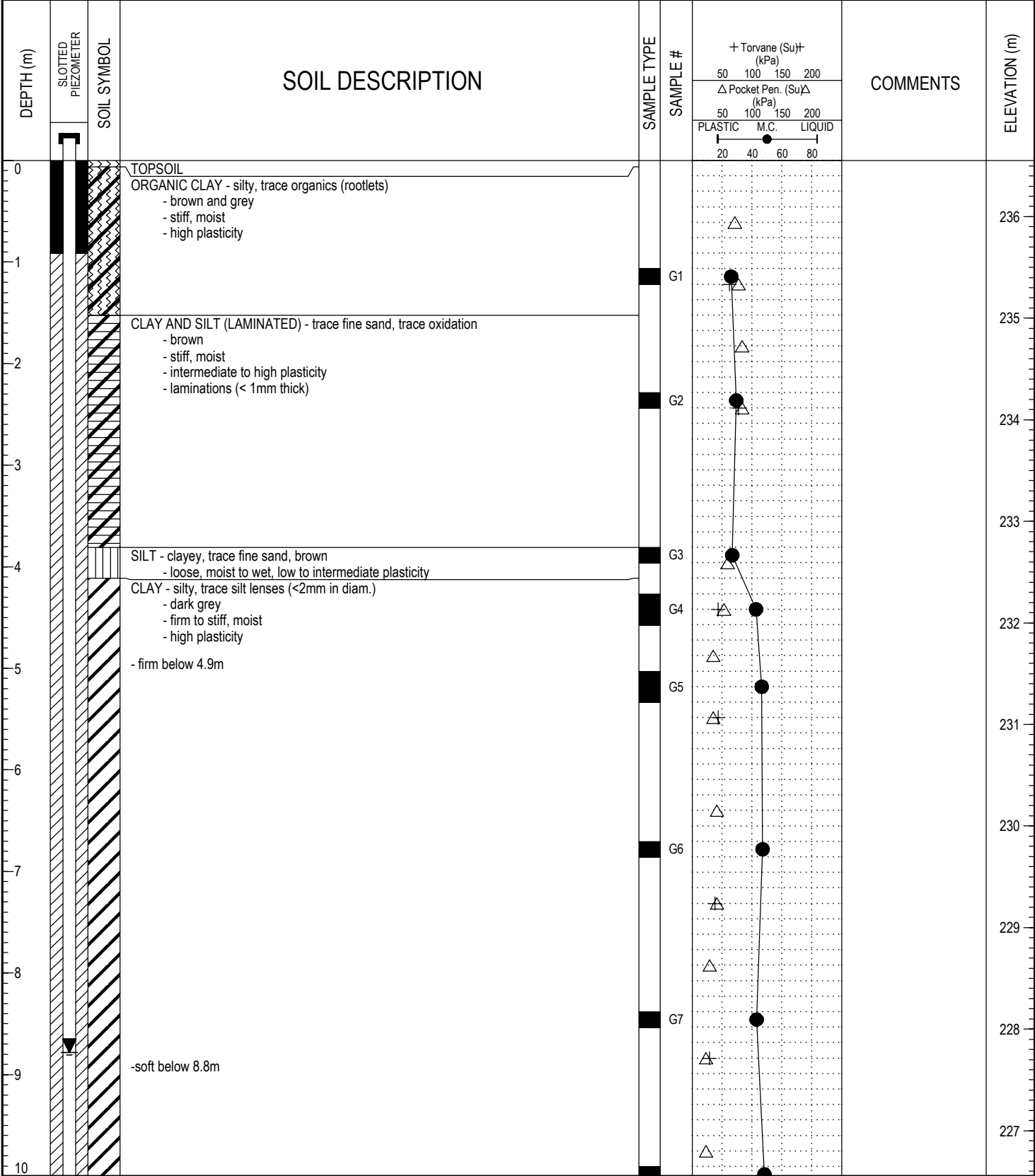


LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



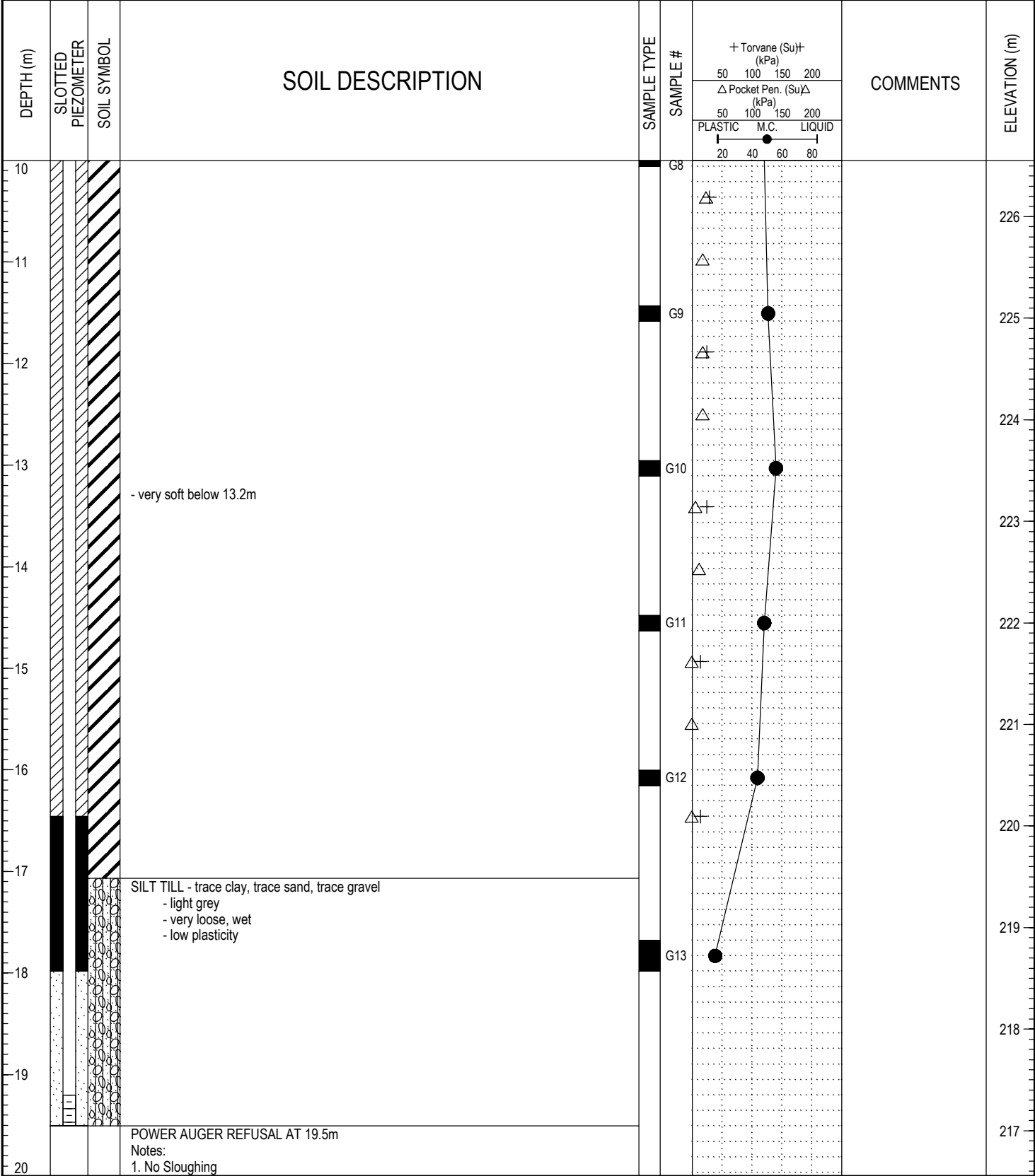
LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 13.90 m
REVIEWED BY:	COMPLETION DATE: 8/9/04
PROJECT ENGINEER: Ken Skaffeld	Page 2 of 2

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-07
LOCATION: WTP - N 5524176.733 E 647870.72		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Acker - RM 5 - 125 mm Solid Stem Augers	ELEVATION (m): 236.552
SAMPLE TYPE	<input type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE	
BACKFILL TYPE	<input type="checkbox"/> BENTONITE <input type="checkbox"/> GRAVEL <input type="checkbox"/> SLOUGH <input type="checkbox"/> GROUT <input type="checkbox"/> CUTTINGS <input type="checkbox"/> SAND	



LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 19.51 m
REVIEWED BY:	COMPLETION DATE: 8/9/04
PROJECT ENGINEER: Ken Skaffeld	Page 1 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-07
LOCATION: WTP - N 5524176.733 E 647870.72		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Acker - RM 5 - 125 mm Solid Stem Augers	ELEVATION (m): 236.552
SAMPLE TYPE	<input type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE	
BACKFILL TYPE	<input type="checkbox"/> BENTONITE <input type="checkbox"/> GRAVEL <input type="checkbox"/> SLOUGH <input type="checkbox"/> GROUT <input type="checkbox"/> CUTTINGS <input type="checkbox"/> SAND	



LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 19.51 m
REVIEWED BY:	COMPLETION DATE: 8/9/04
PROJECT ENGINEER: Ken Skaffeld	Page 2 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-07
LOCATION: WTP - N 5524176.733 E 647870.72	PROJECT NO.: 3398-055-00-01-00	
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Acker - RM 5 - 125 mm Solid Stem Augers	ELEVATION (m): 236.552
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 <input type="checkbox"/> CORE
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"/> SAND

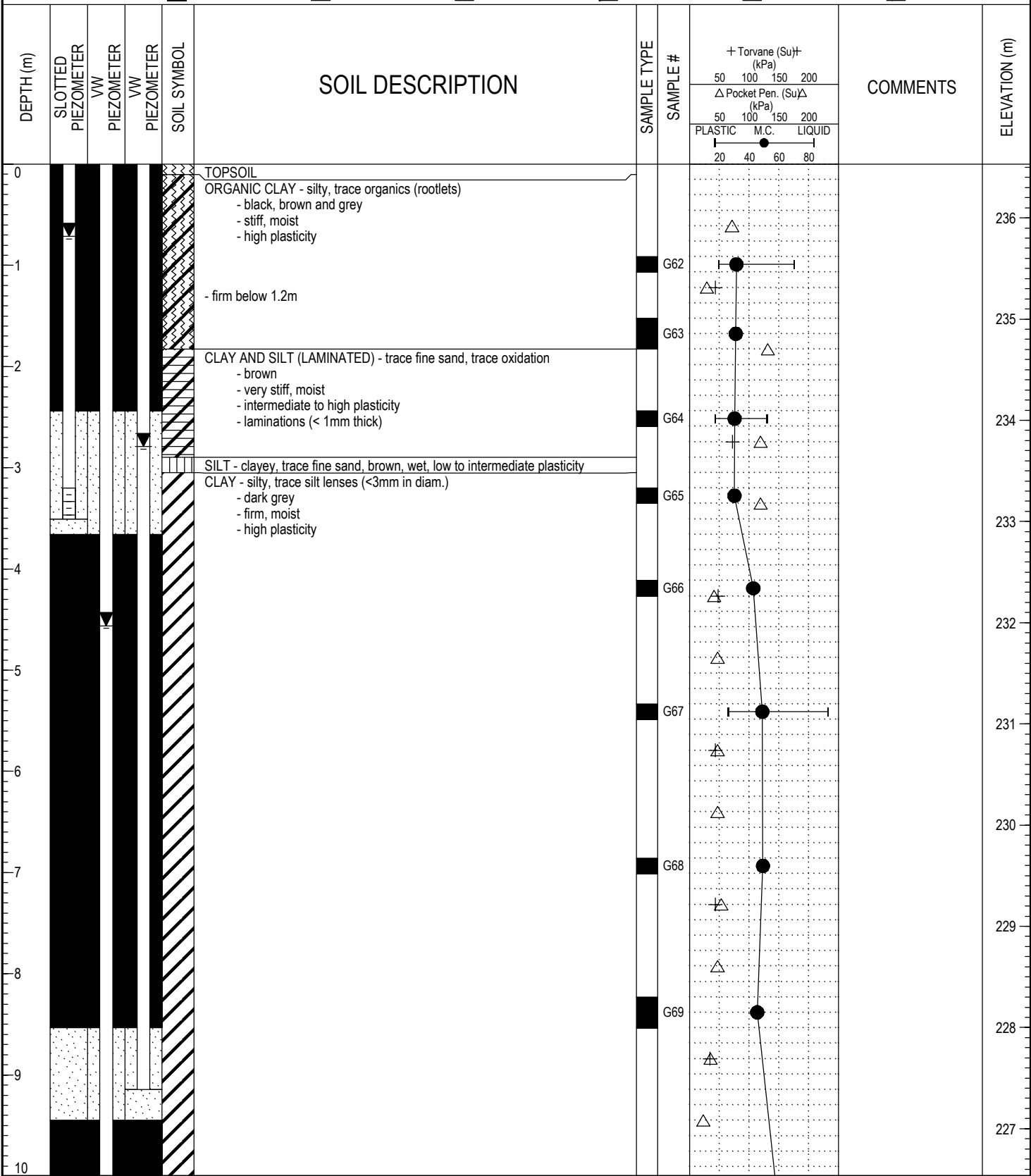
DEPTH (m)	SLOTTED PIEZOMETER	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	+ Torvane (Su) [†] (kPa)		COMMENTS	ELEVATION (m)
						50	100		
						△ Pocket Pen. (Su)△ (kPa)			
						50	100		
						PLASTIC M.C. LIQUID			
						20	40	60	80
20			2. Seepage at 3.80m and 17.10m below ground 3. Water level at 7.90m below ground immediately after drilling 4. Standpipe SP-7 installed at Elevation 217.05m						216
21									215
22									214
23									213
24									212
25									211
26									210
27									209
28									208
29									207
30									207

LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 19.51 m
REVIEWED BY:	COMPLETION DATE: 8/9/04
PROJECT ENGINEER: Ken Skaffeld	Page 3 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-08
LOCATION: WTP - N 5524190.678 E 647878.442	PROJECT NO.: 3398-055-00-01-00	
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Acker - RM 5 - 125 mm Solid Stem Augers	ELEVATION (m): 236.531
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 <input type="checkbox"/> CORE	
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"/> SAND	



LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 12.19 m
REVIEWED BY:	COMPLETION DATE: 9/9/04
PROJECT ENGINEER: Ken Skaffeld	Page 1 of 2

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-08
LOCATION: WTP - N 5524190.678 E 647878.442	PROJECT NO.: 3398-055-00-01-00	
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Acker - RM 5 - 125 mm Solid Stem Augers	ELEVATION (m): 236.531
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 <input type="checkbox"/> CORE	
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"/> SAND	

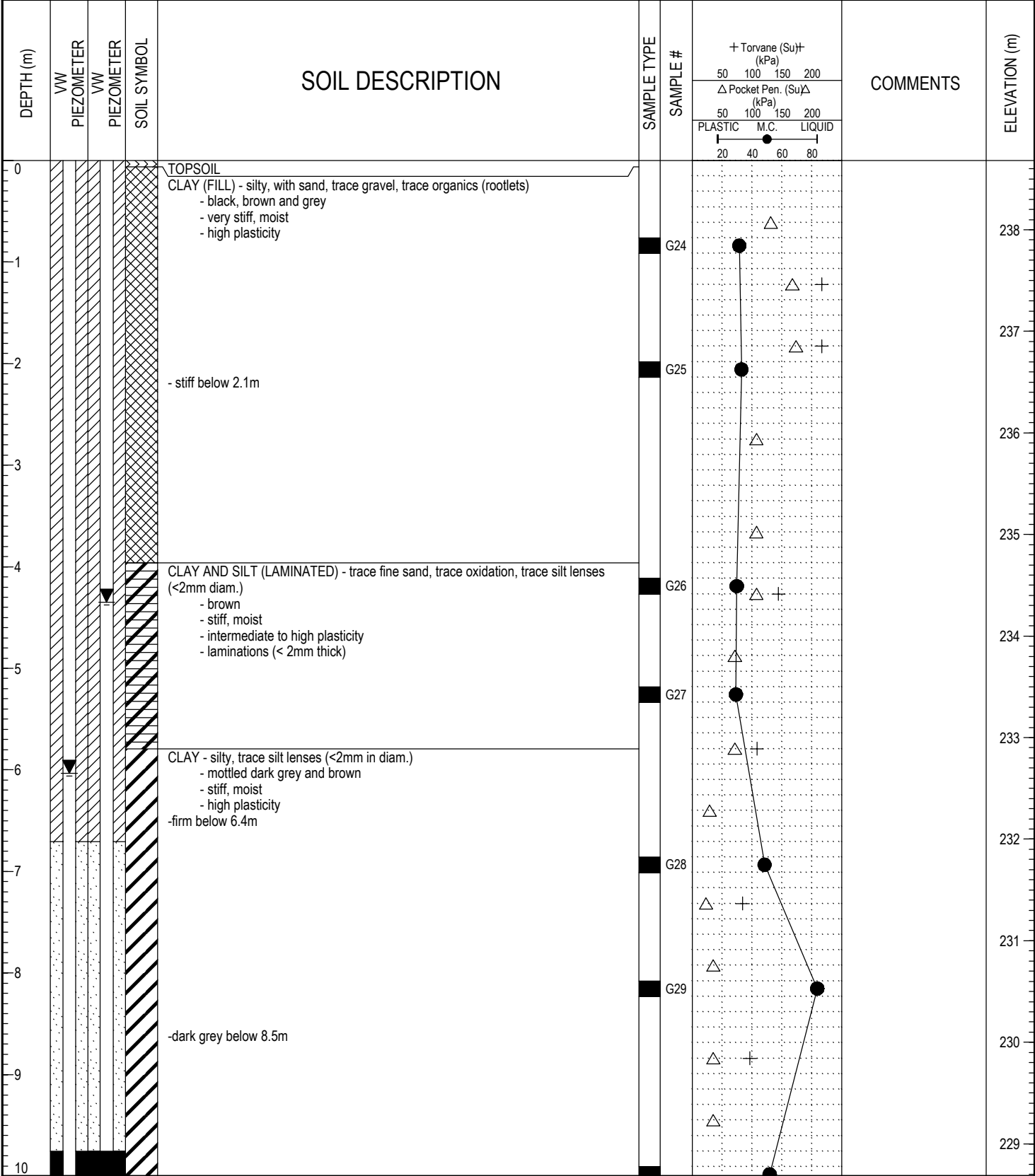
DEPTH (m)	SLOTTED PIEZOMETER	VW PIEZOMETER	VW PIEZOMETER	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	+ Torvane (Su) [†] (kPa)		COMMENTS	ELEVATION (m)	
								50	100			
								Δ Pocket Pen. (Su)Δ (kPa)				
								50	100	150	200	
								PLASTIC M.C.		LIQUID		
								20	40	60	80	
10							G70					226
11												
12							G71					225
13					END OF TEST HOLE AT 12.2m in SILTY CLAY							224
14					Notes:							223
15					1. No sloughing							222
16					2. Seepage at 3.10m							221
17					3. Standpipe SP-8 and Vibrating Piezometers VW8A and VW8B installed							220
18					- Tip for SP-8 at Elevation 233.02m							219
19					- Tip for VW8A at Elevation 224.49m							218
20					- Tip for VW8B at Elevation 227.39m							217

LOG OF TESTHOLE - WINNIPEG WATER TREATMENT PLANT.GPJ - UMA.GDT - 17/2/05



LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 12.19 m
REVIEWED BY:	COMPLETION DATE: 9/9/04
PROJECT ENGINEER: Ken Skaffeld	Page 2 of 2

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-09
LOCATION: WTP - N 5524134.541 E 647846.631		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Acker - RM 5 - 125 mm Solid Stem Augers	ELEVATION (m): 238.682
SAMPLE TYPE	<input type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE	
BACKFILL TYPE	<input type="checkbox"/> BENTONITE <input type="checkbox"/> GRAVEL <input type="checkbox"/> SLOUGH <input type="checkbox"/> GROUT <input type="checkbox"/> CUTTINGS <input type="checkbox"/> SAND	

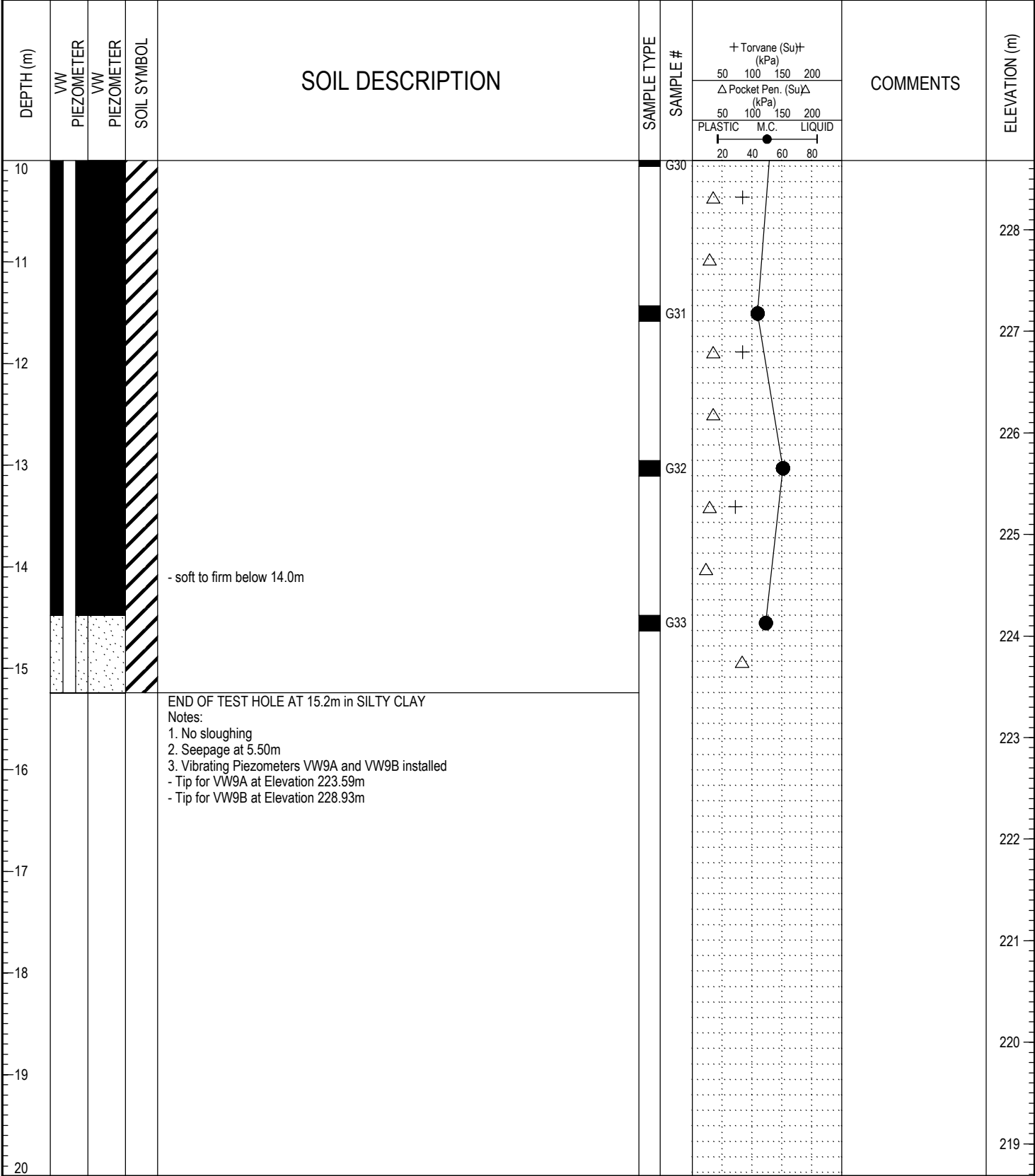


LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 15.24 m
REVIEWED BY:	COMPLETION DATE: 8/9/04
PROJECT ENGINEER: Ken Skaffeld	Page 1 of 2

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-09
LOCATION: WTP - N 5524134.541 E 647846.631	PROJECT NO.: 3398-055-00-01-00	
CONTRACTOR: Paddock Drilling Ltd.	METHOD: Acker - RM 5 - 125 mm Solid Stem Augers	ELEVATION (m): 238.682
SAMPLE TYPE	<input type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE	
BACKFILL TYPE	<input type="checkbox"/> BENTONITE <input type="checkbox"/> GRAVEL <input type="checkbox"/> SLOUGH <input type="checkbox"/> GROUT <input type="checkbox"/> CUTTINGS <input type="checkbox"/> SAND	

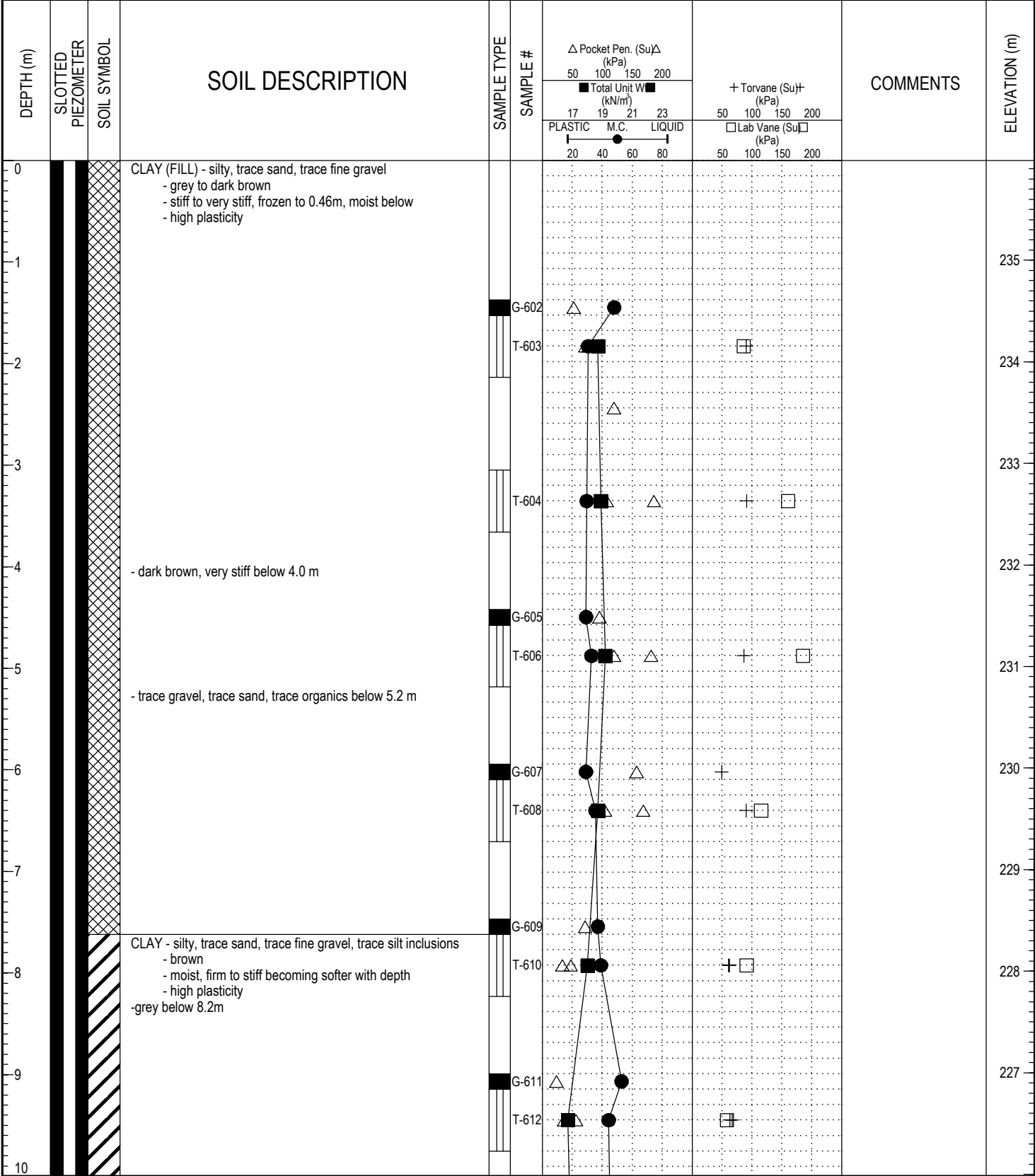


LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 15.24 m
REVIEWED BY:	COMPLETION DATE: 8/9/04
PROJECT ENGINEER: Ken Skaffeld	Page 2 of 2

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-10
LOCATION: WTP - N 5524085.998 E 647717.370		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Maple Leaf Drilling	METHOD: DR 150 - 125 mm Solid Stem Auger	ELEVATION (m): 235.982
SAMPLE TYPE	<input type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE	
BACKFILL TYPE	<input type="checkbox"/> BENTONITE <input type="checkbox"/> GRAVEL <input type="checkbox"/> SLOUGH <input type="checkbox"/> GROUT <input type="checkbox"/> CUTTINGS <input type="checkbox"/> SAND	

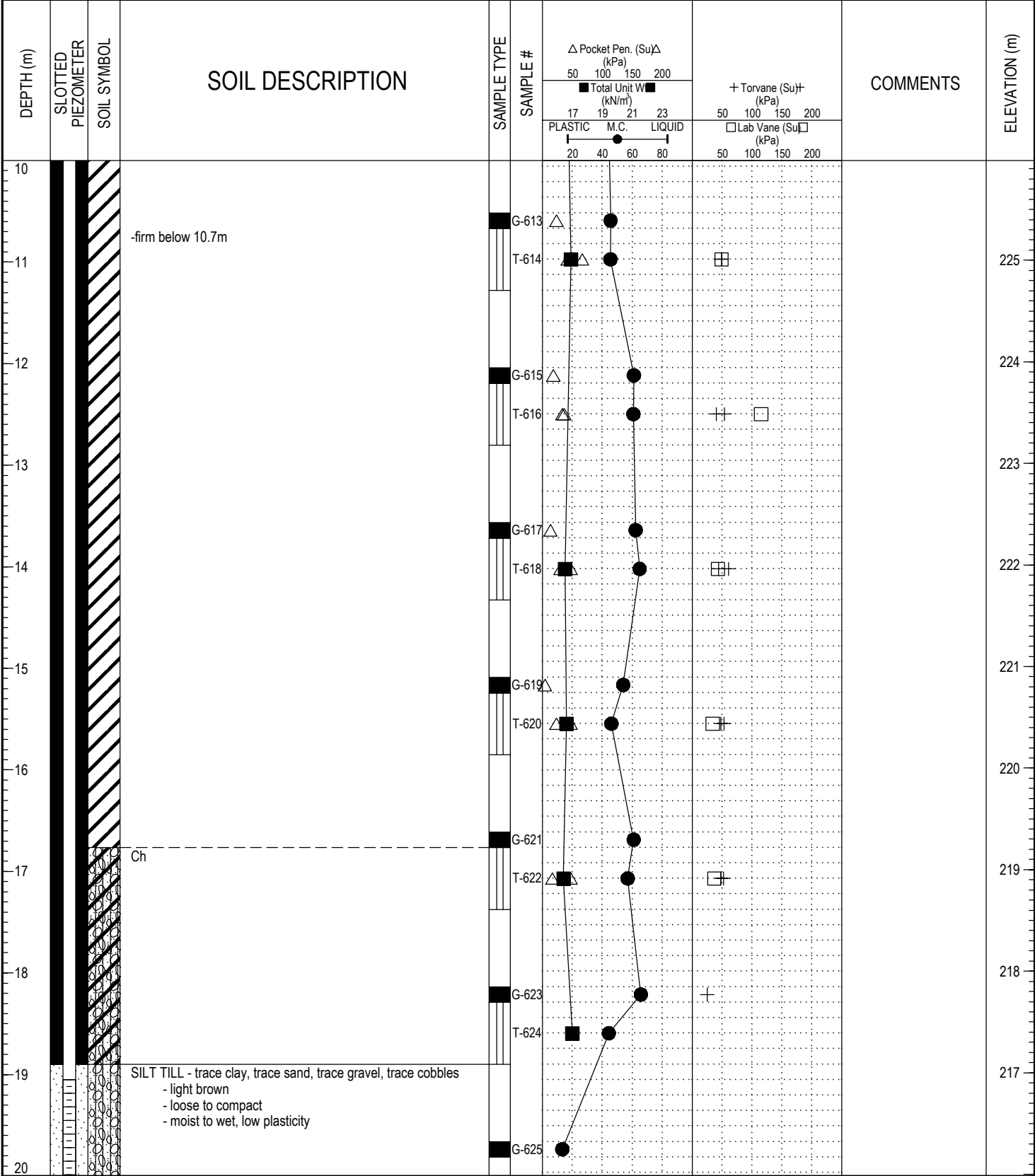


LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Kate Franklin	COMPLETION DEPTH: 20.57 m
REVIEWED BY:	COMPLETION DATE: 17/12/04
PROJECT ENGINEER: Ken Skaffeld	Page 1 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-10
LOCATION: WTP - N 5524085.998 E 647717.370		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Maple Leaf Drilling	METHOD: DR 150 - 125 mm Solid Stem Auger	ELEVATION (m): 235.982
SAMPLE TYPE	<input type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE	
BACKFILL TYPE	<input type="checkbox"/> BENTONITE <input type="checkbox"/> GRAVEL <input type="checkbox"/> SLOUGH <input type="checkbox"/> GROUT <input type="checkbox"/> CUTTINGS <input type="checkbox"/> SAND	



LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Kate Franklin	COMPLETION DEPTH: 20.57 m
REVIEWED BY:	COMPLETION DATE: 17/12/04
PROJECT ENGINEER: Ken Skaffeld	Page 2 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-10
LOCATION: WTP - N 5524085.998 E 647717.370		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Maple Leaf Drilling	METHOD: DR 150 - 125 mm Solid Stem Auger	ELEVATION (m): 235.982
SAMPLE TYPE	<input type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK	<input type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE
BACKFILL TYPE	<input type="checkbox"/> BENTONITE <input type="checkbox"/> GRAVEL <input type="checkbox"/> SLOUGH <input type="checkbox"/> GROUT	<input type="checkbox"/> CUTTINGS <input type="checkbox"/> SAND

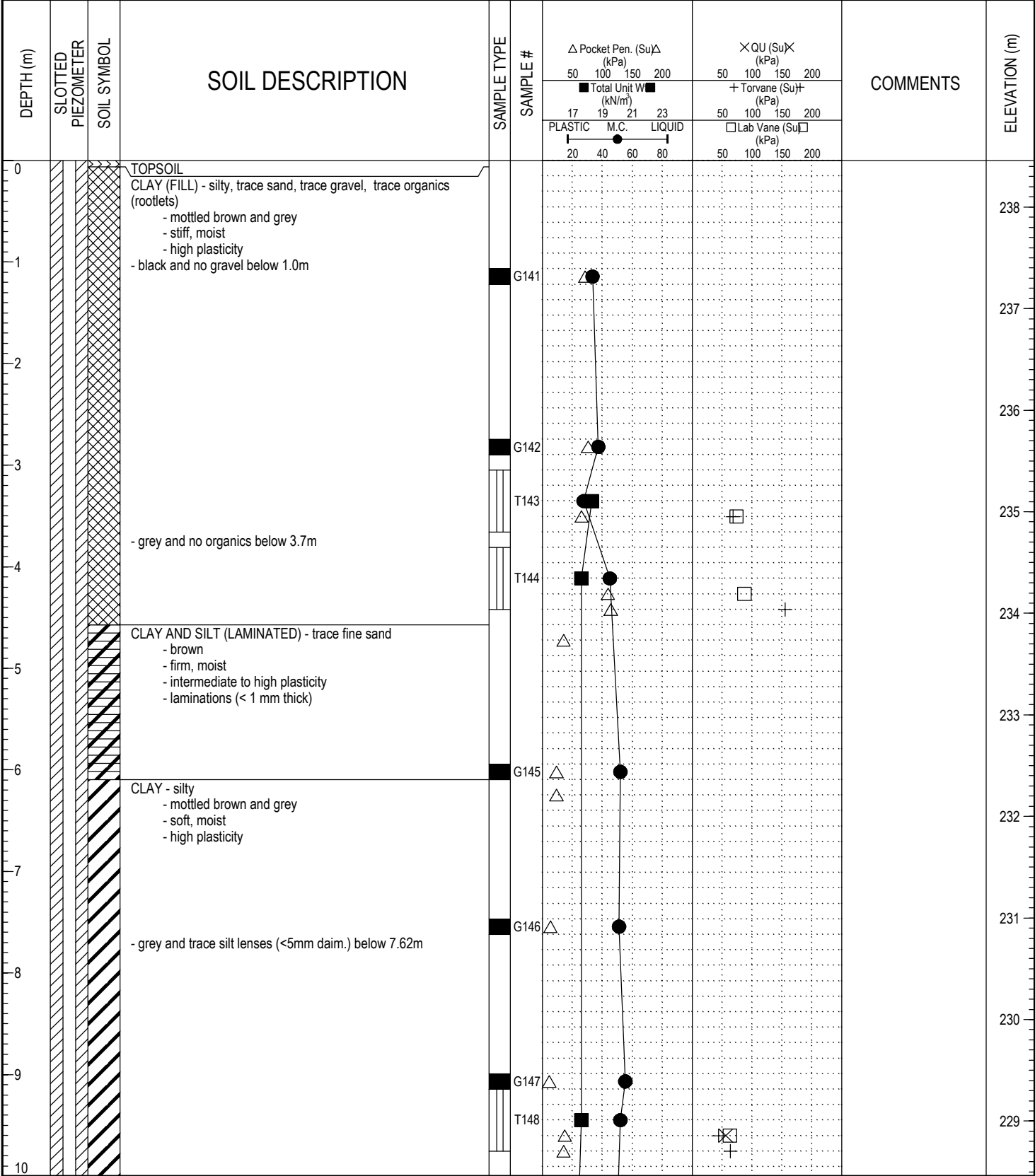
DEPTH (m)	SLOTTED PIEZOMETER	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	Pocket Pen. (Su)Δ (kPa)		+ Torvane (Su)† (kPa)	COMMENTS	ELEVATION (m)
						50	100			
20										
21			POWER AUGER REFUSAL AT 20.6 m Notes: 1. Sloughing below 18.9m 2. Seepage at 20.5m 3. Water level at 8.5m		G-626					215
22										214
23										213
24										212
25										211
26										210
27										209
28										208
29										207
30										

LOG OF TESTHOLE - WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Kate Franklin	COMPLETION DEPTH: 20.57 m
REVIEWED BY:	COMPLETION DATE: 17/12/04
PROJECT ENGINEER: Ken Skaffeld	Page 3 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-12
LOCATION: WTP - N 5524116.025 E 647832.961		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Paddock Drilling Ltd.	METHOD: RM 30 - 125 mm Solid Stem Augers	ELEVATION (m): 238.458
SAMPLE TYPE	<input type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE	
BACKFILL TYPE	<input type="checkbox"/> BENTONITE <input type="checkbox"/> GRAVEL <input type="checkbox"/> SLOUGH <input type="checkbox"/> GROUT <input type="checkbox"/> CUTTINGS <input type="checkbox"/> SAND	

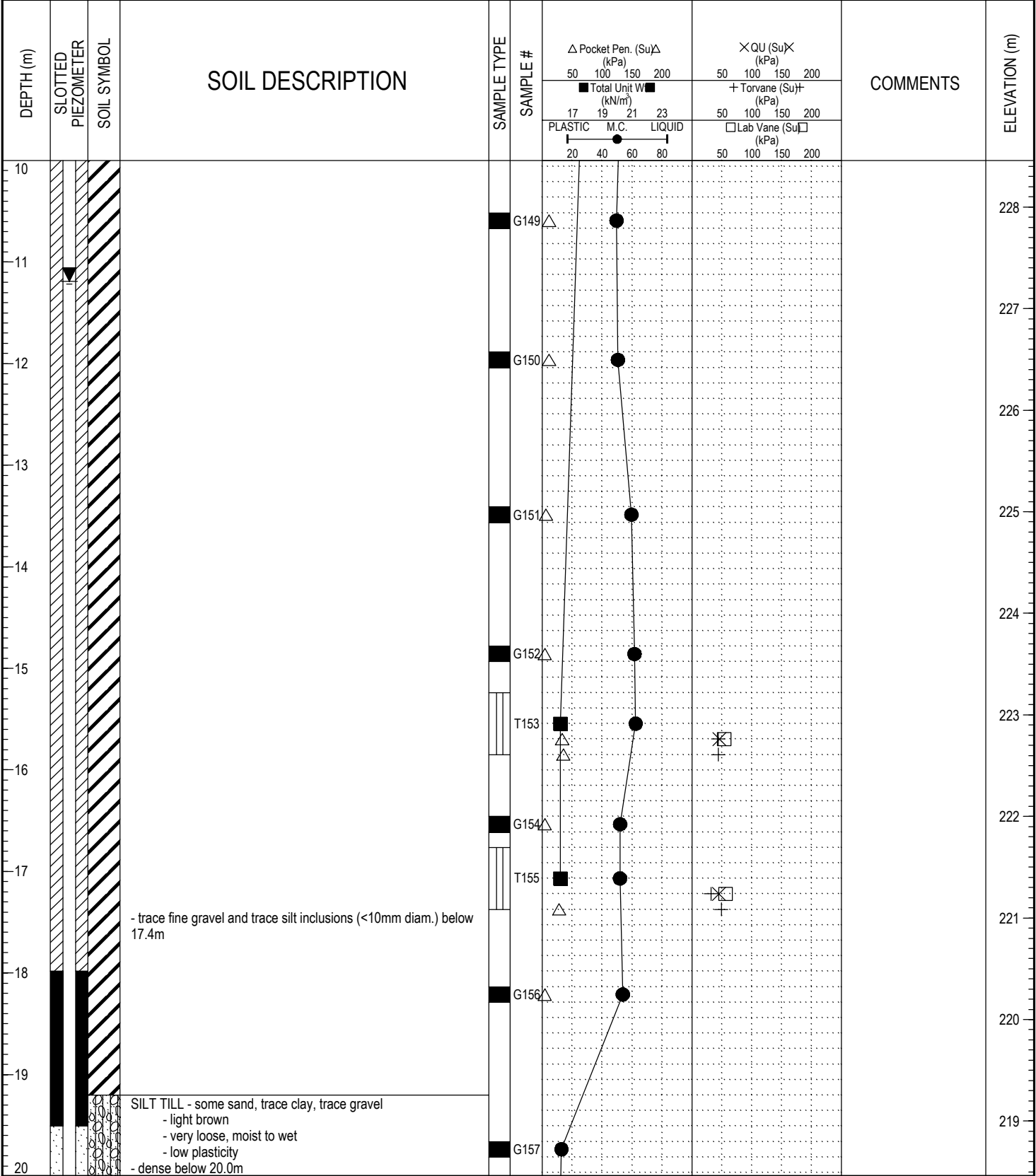


LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA GDT 17/2/05



LOGGED BY: Kate Franklin	COMPLETION DEPTH: 22.86 m
REVIEWED BY:	COMPLETION DATE: 4/10/04
PROJECT ENGINEER: Ken Skaffeld	Page 1 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-12
LOCATION: WTP - N 5524116.025 E 647832.961		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Paddock Drilling Ltd.	METHOD: RM 30 - 125 mm Solid Stem Augers	ELEVATION (m): 238.458
SAMPLE TYPE	<input type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE	
BACKFILL TYPE	<input type="checkbox"/> BENTONITE <input type="checkbox"/> GRAVEL <input type="checkbox"/> SLOUGH <input type="checkbox"/> GROUT <input type="checkbox"/> CUTTINGS <input type="checkbox"/> SAND	



LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Kate Franklin	COMPLETION DEPTH: 22.86 m
REVIEWED BY:	COMPLETION DATE: 4/10/04
PROJECT ENGINEER: Ken Skaffeld	Page 2 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-12
LOCATION: WTP - N 5524116.025 E 647832.961		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Paddock Drilling Ltd.	METHOD: RM 30 - 125 mm Solid Stem Augers	ELEVATION (m): 238.458
SAMPLE TYPE	<input type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE	
BACKFILL TYPE	<input type="checkbox"/> BENTONITE <input type="checkbox"/> GRAVEL <input type="checkbox"/> SLOUGH <input type="checkbox"/> GROUT <input type="checkbox"/> CUTTINGS <input type="checkbox"/> SAND	

DEPTH (m)	SLOTTED PIEZOMETER	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	Penetration Test Results		COMMENTS	ELEVATION (m)
						Δ Pocket Pen. (Su) Δ (kPa) 50 100 150 200 ■ Total Unit W (kN/m ²) 17 19 21 23 PLASTIC M.C. LIQUID 20 40 60 80	\times QU (Su) \times (kPa) 50 100 150 200 + Torvane (Su)+ (kPa) 50 100 150 200 □ Lab Vane (Su) (kPa) 50 100 150 200		
20									218
21					G158				217
22					G159				216
23			POWER AUGER REFUSAL AT 22.9m						215
24			Notes: 1. No sloughing 2. Seepage at 22.9m 3. Standpipe SP-12 installed - Tip for SP-12 at Elevation 215.60m						214
25									213
26									212
27									211
28									210
29									209
30									

LOG OF TESTHOLE - WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Kate Franklin	COMPLETION DEPTH: 22.86 m
REVIEWED BY:	COMPLETION DATE: 4/10/04
PROJECT ENGINEER: Ken Skaffeld	Page 3 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-13
LOCATION: WTP - N 5524133.038 E 647799.960		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Paddock Drilling Ltd.	METHOD: RM 30 - 125 mm Solid Stem Augers	ELEVATION (m): 237.271
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 <input type="checkbox"/> CORE	

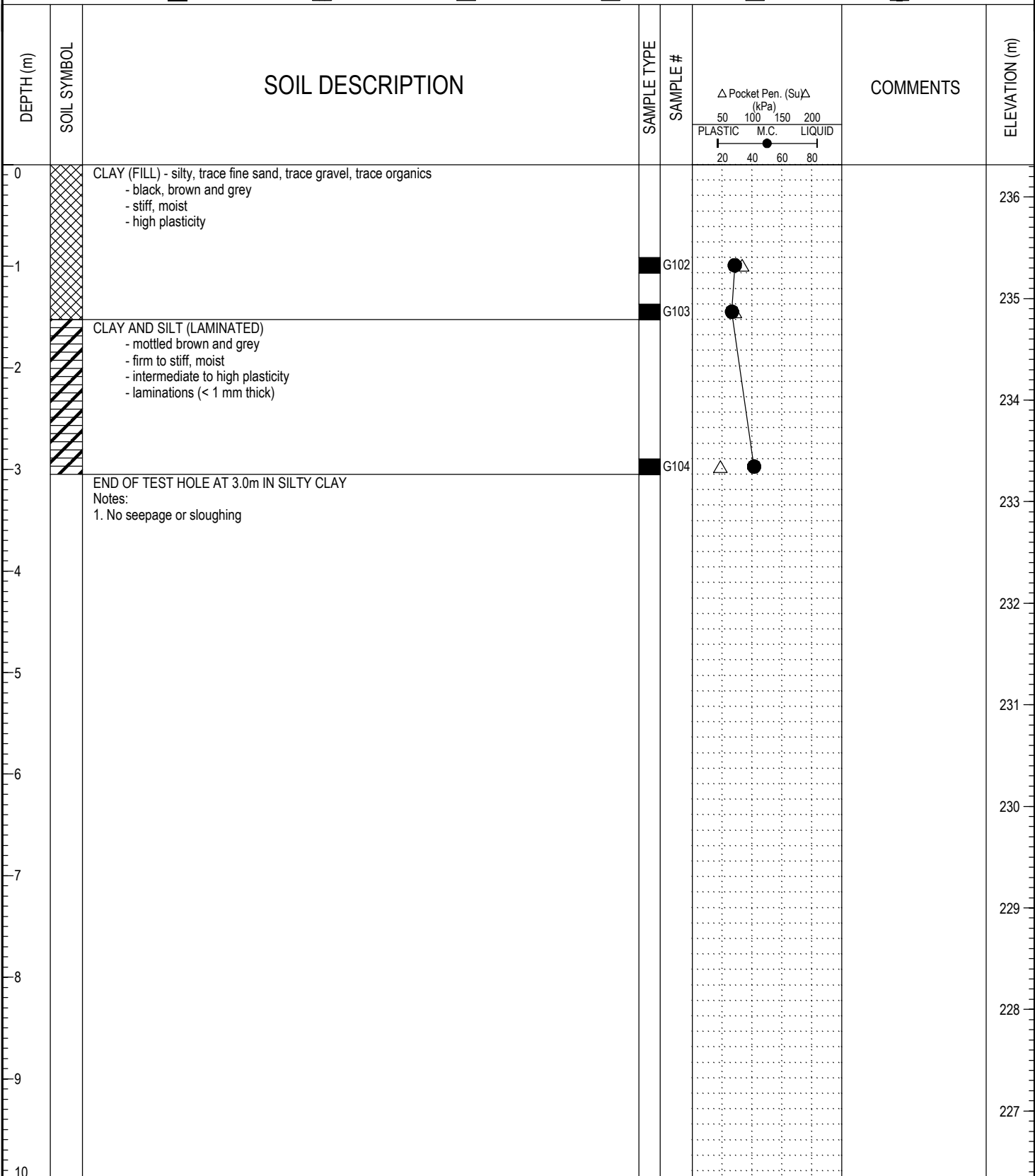
DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	Δ Pocket Pen. (Su)Δ (kPa) 50 100 150 200 PLASTIC M.C. LIQUID 20 40 60 80	COMMENTS	ELEVATION (m)
0		CLAY (FILL) - silty, trace fine sand, trace gravel, trace organics - black, brown and grey - stiff, moist - high plasticity					237
1		-some organics (topsoil) at 1.2m - black and brown and no gravel below 1.5m	<input checked="" type="checkbox"/>	G105			236
2			<input checked="" type="checkbox"/>	G106			235
3		CLAY AND SILT (LAMINATED) - brown - firm to stiff, moist - intermediate to high plasticity - laminations (< 1 mm thick)	<input checked="" type="checkbox"/>	G107			234
4			<input checked="" type="checkbox"/>	G108			233
5		END OF TEST HOLE AT 4.6m IN SILTY CLAY Notes: 1. No seepage or sloughing					232
6							231
7							230
8							229
9							228
10							228

LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Kate Franklin	COMPLETION DEPTH: 4.57 m
REVIEWED BY:	COMPLETION DATE: 1/10/04
PROJECT ENGINEER: Ken Skaffeld	Page 1 of 1

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-14
LOCATION: WTP - N 5524147.035 E 647773.020		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Paddock Drilling Ltd.	METHOD: RM 30 - 125 mm Solid Stem Augers	ELEVATION (m): 236.317
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK	<input checked="" type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE

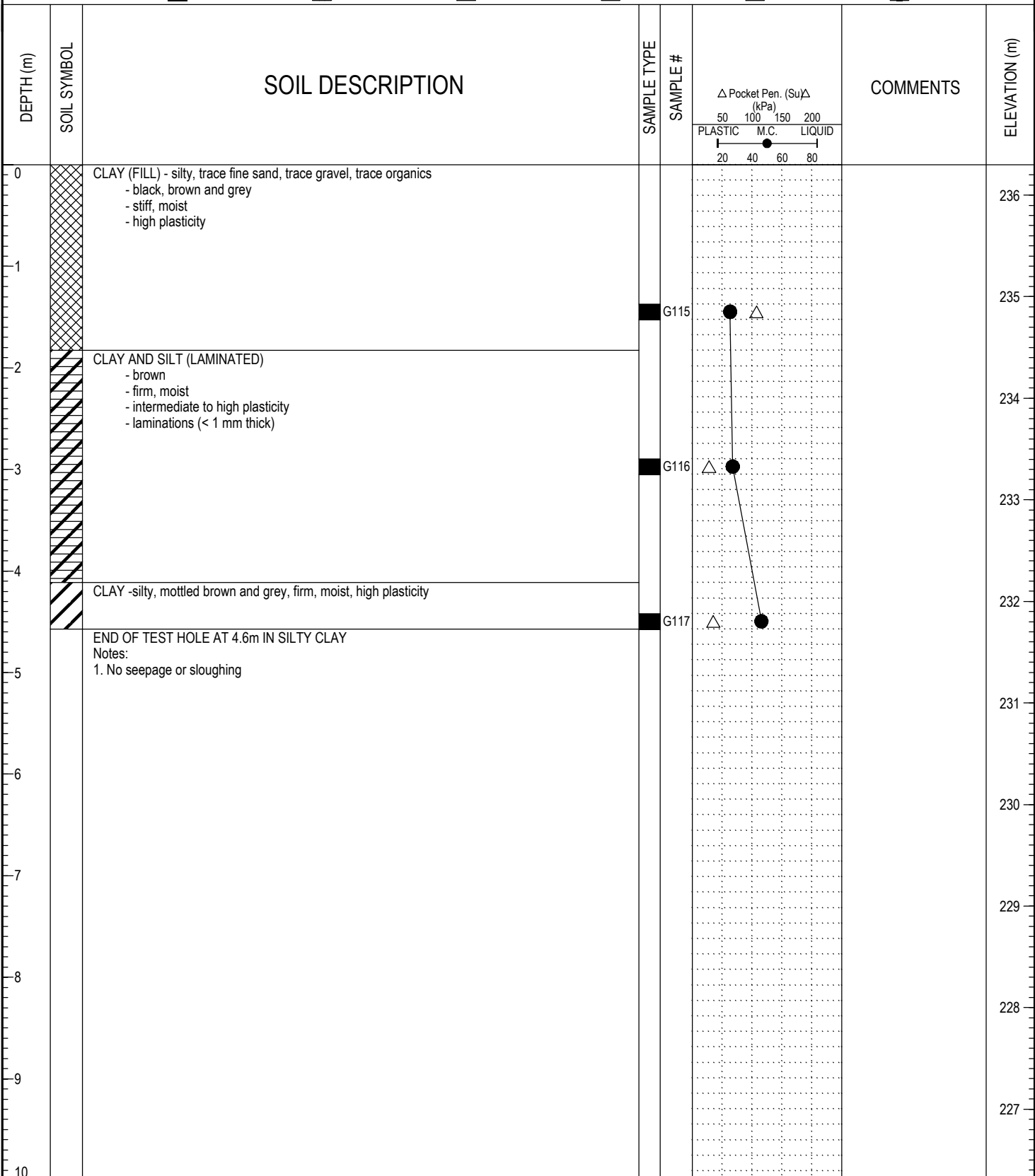


LOG OF TESTHOLE - WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Kate Franklin	COMPLETION DEPTH: 3.05 m
REVIEWED BY:	COMPLETION DATE: 1/10/04
PROJECT ENGINEER: Ken Skaffeld	Page 1 of 1

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-15
LOCATION: WTP - N 5524166.008 E 647735.023		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Paddock Drilling Ltd.	METHOD: RM 30 - 125 mm Solid Stem Augers	ELEVATION (m): 236.299
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input checked="" type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK	<input checked="" type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE

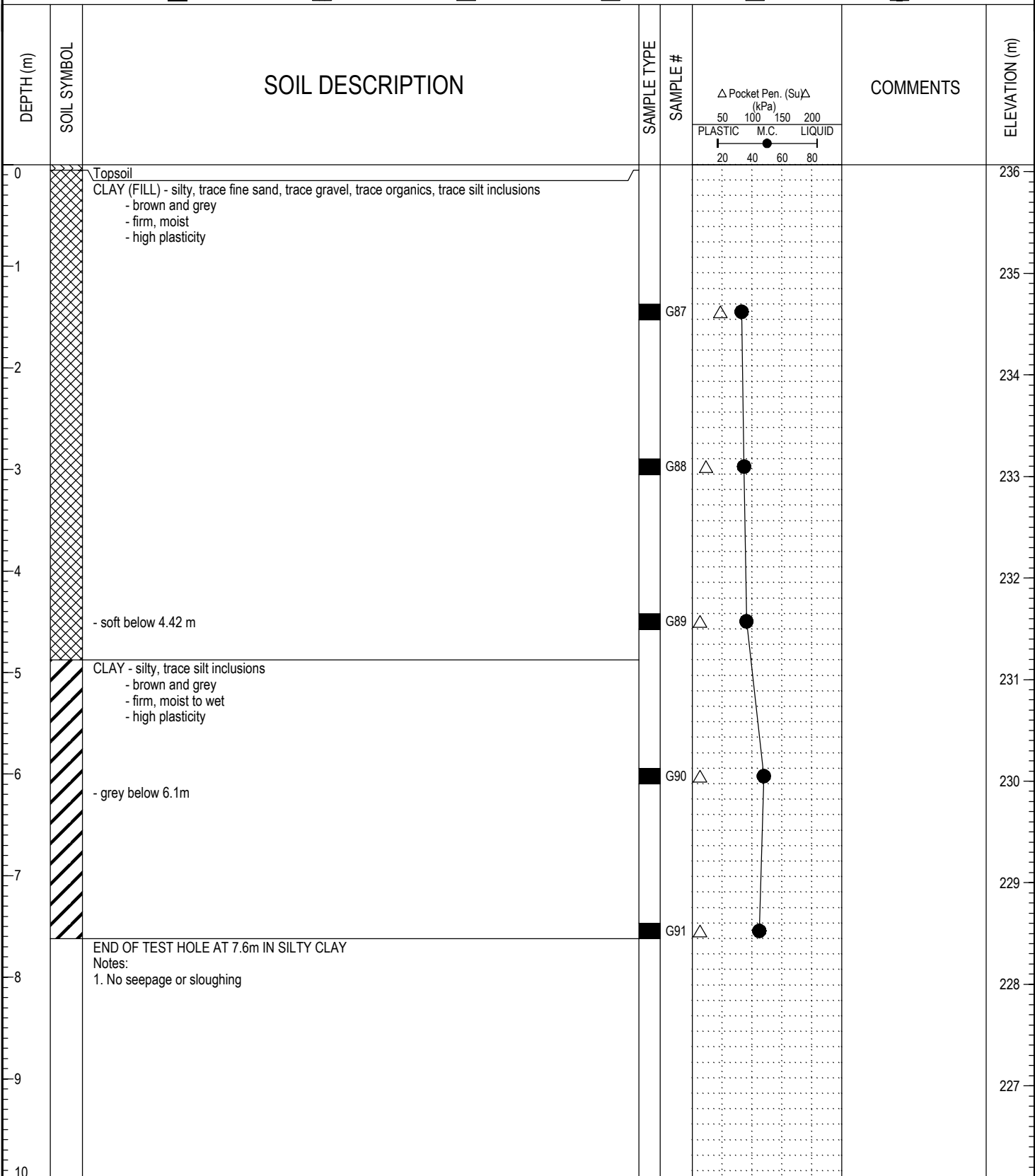


LOG OF TESTHOLE - WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Kate Franklin	COMPLETION DEPTH: 4.57 m
REVIEWED BY:	COMPLETION DATE: 1/10/04
PROJECT ENGINEER: Ken Skaffeld	Page 1 of 1

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-16
LOCATION: WTP - N 5524139.981 E 647752.000		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Paddock Drilling Ltd.	METHOD: RM 30 - 125 mm Solid Stem Augers	ELEVATION (m): 236.069
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK	<input checked="" type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE



LOG OF TESTHOLE - WINNIPEG WATER TREATMENT PLANT.GPJ - UMA.GDT - 17/2/05

END OF TEST HOLE AT 7.6m IN SILTY CLAY
Notes:
1. No seepage or sloughing



LOGGED BY: Kate Franklin	COMPLETION DEPTH: 7.62 m
REVIEWED BY:	COMPLETION DATE: 1/10/04
PROJECT ENGINEER: Ken Skaffeld	Page 1 of 1

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-17
LOCATION: WTP - N 5524113.008 E 647806.004		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Paddock Drilling Ltd.	METHOD: RM 30 - 125 mm Solid Stem Augers	ELEVATION (m): 237.339
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK	<input checked="" type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #		COMMENTS	ELEVATION (m)
0		CLAY (FILL) - silty, trace fine sand, trace gravel, trace organics - black, brown and grey - firm to stiff, moist - high plasticity					237
1		- some organics (topsoil) at 1.2 m - brown and no gravel below 1.5m	<input checked="" type="checkbox"/>	G109			236
2							235
3			<input checked="" type="checkbox"/>	G110			234
4		CLAY AND SILT (LAMINATED) - brown - stiff, moist - intermediate to high plasticity - laminations (< 1 mm thick)					234
4.3		CLAY - silty, mottled brown and grey, firm, moist, high plasticity - firm, mottled brown and grey below 4.3m	<input checked="" type="checkbox"/>	G111			233
4.6		END OF TEST HOLE AT 4.6m IN SILTY CLAY Notes: 1. No seepage or sloughing					232
5							232
6							231
7							230
8							229
9							228
10							228

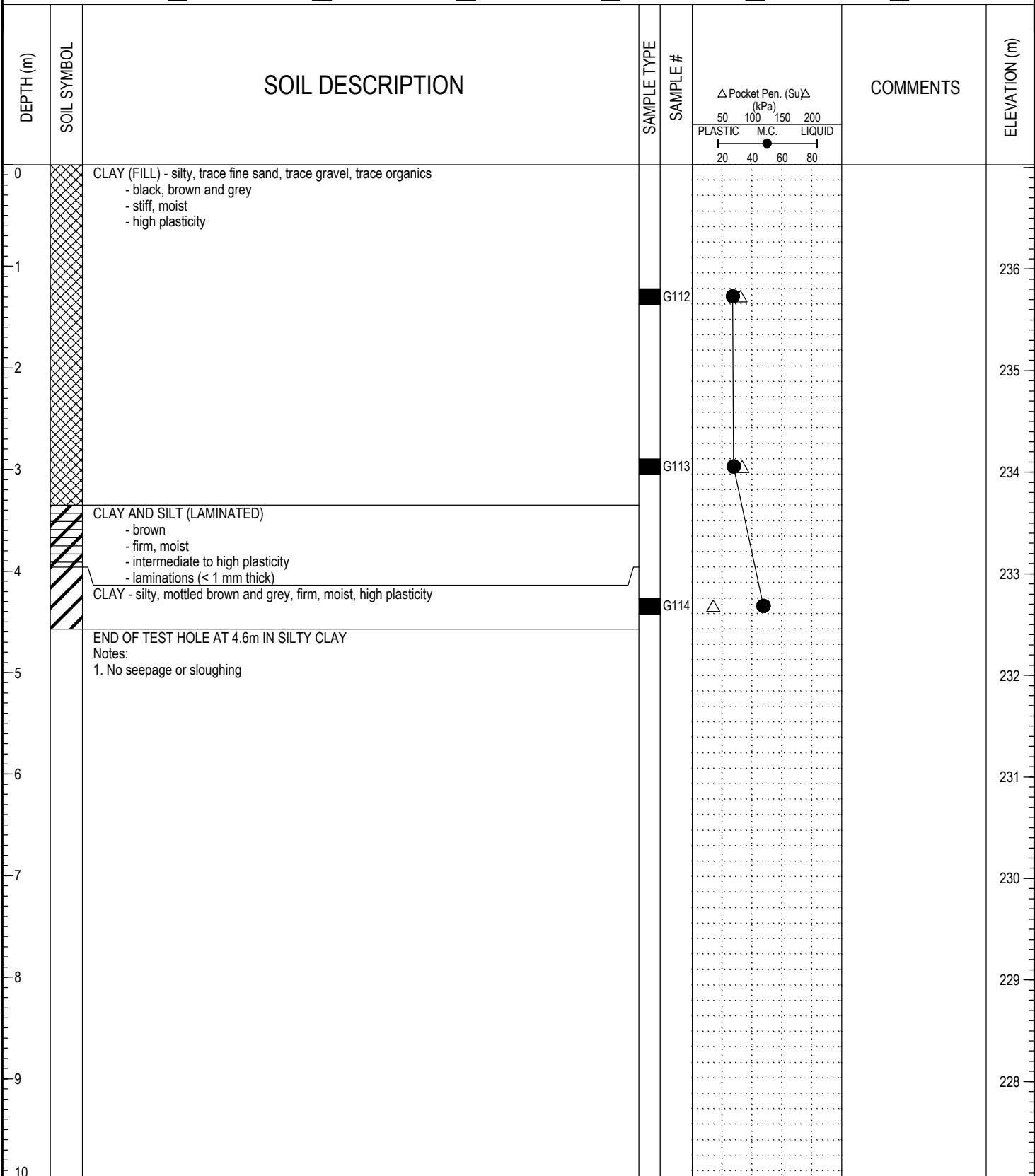
LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Kate Franklin	COMPLETION DEPTH: 4.57 m
REVIEWED BY:	COMPLETION DATE: 1/10/04
PROJECT ENGINEER: Ken Skaffeld	Page 1 of 1

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-18
LOCATION: WTP - N 5524094.878 E 647805.042		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Paddock Drilling Ltd.	METHOD: RM 30 - 125 mm Solid Stem Augers	ELEVATION (m): 237.027

SAMPLE TYPE GRAB SHELBY TUBE SPLIT SPOON BULK NO RECOVERY CORE

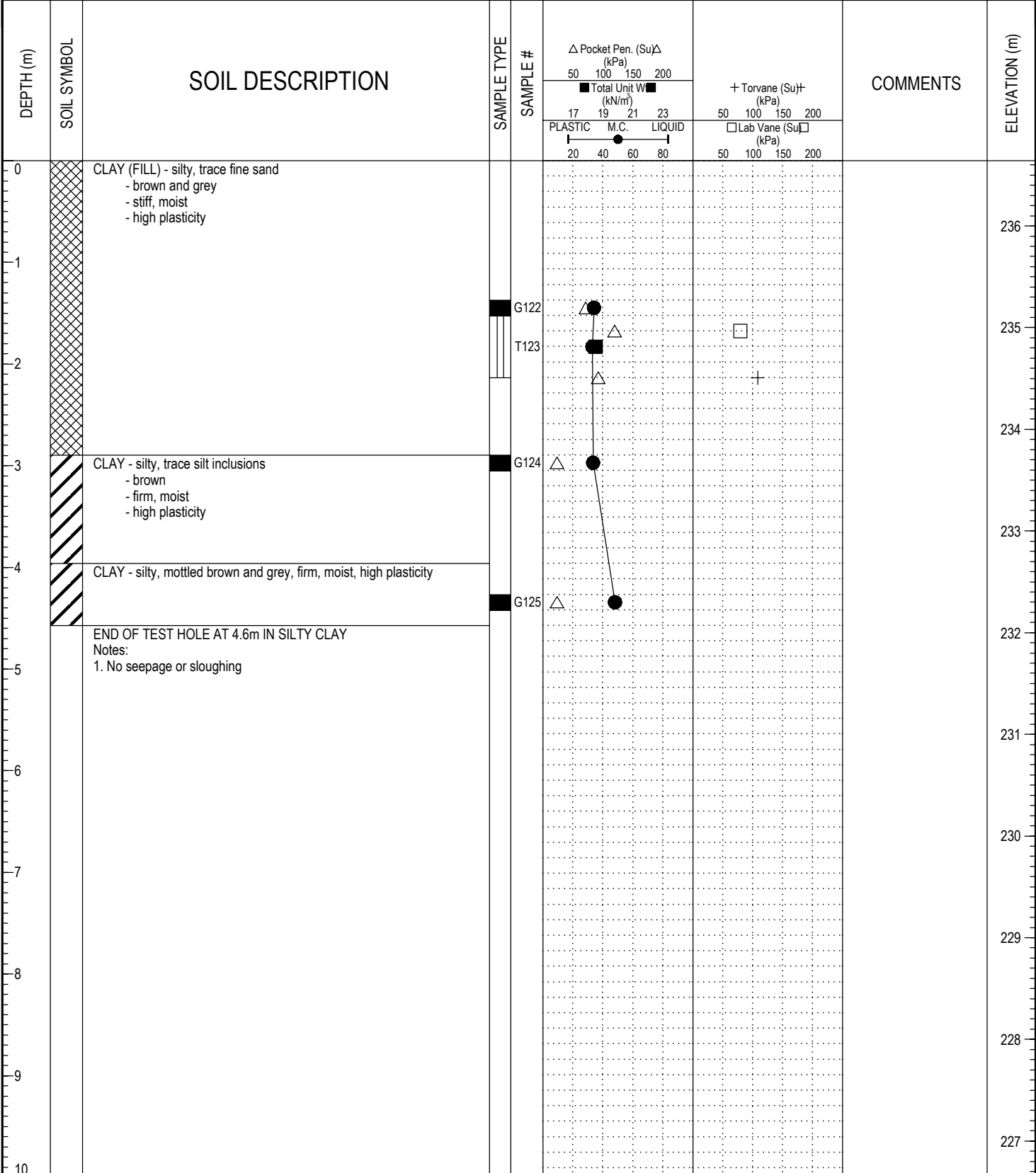


LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Kate Franklin	COMPLETION DEPTH: 4.57 m
REVIEWED BY:	COMPLETION DATE: 1/10/04
PROJECT ENGINEER: Ken Skaffeld	Page 1 of 1

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-19
LOCATION: WTP - N 5524110.001 E 647787.020		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Paddock Drilling Ltd.	METHOD: RM 30 - 125 mm Solid Stem Augers	ELEVATION (m): 236.642
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 <input type="checkbox"/> CORE		

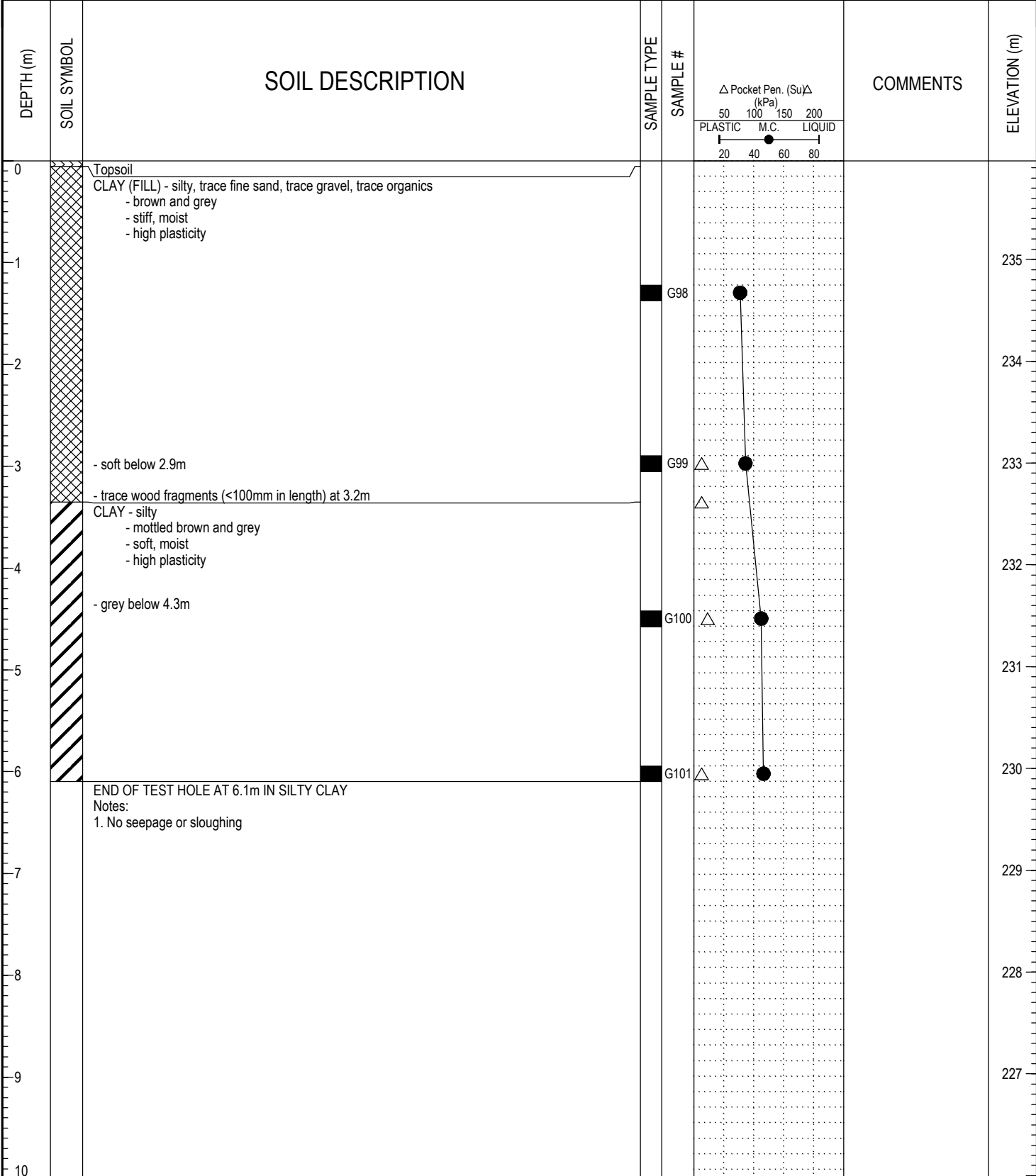


LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Kate Franklin	COMPLETION DEPTH: 4.57 m
REVIEWED BY:	COMPLETION DATE: 1/10/04
PROJECT ENGINEER: Ken Skafffeld	Page 1 of 1

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-20
LOCATION: WTP - N 5524123.005 E 647759.997		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Paddock Drilling Ltd.	METHOD: RM 30 - 125 mm Solid Stem Augers	ELEVATION (m): 235.968
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK	<input checked="" type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE

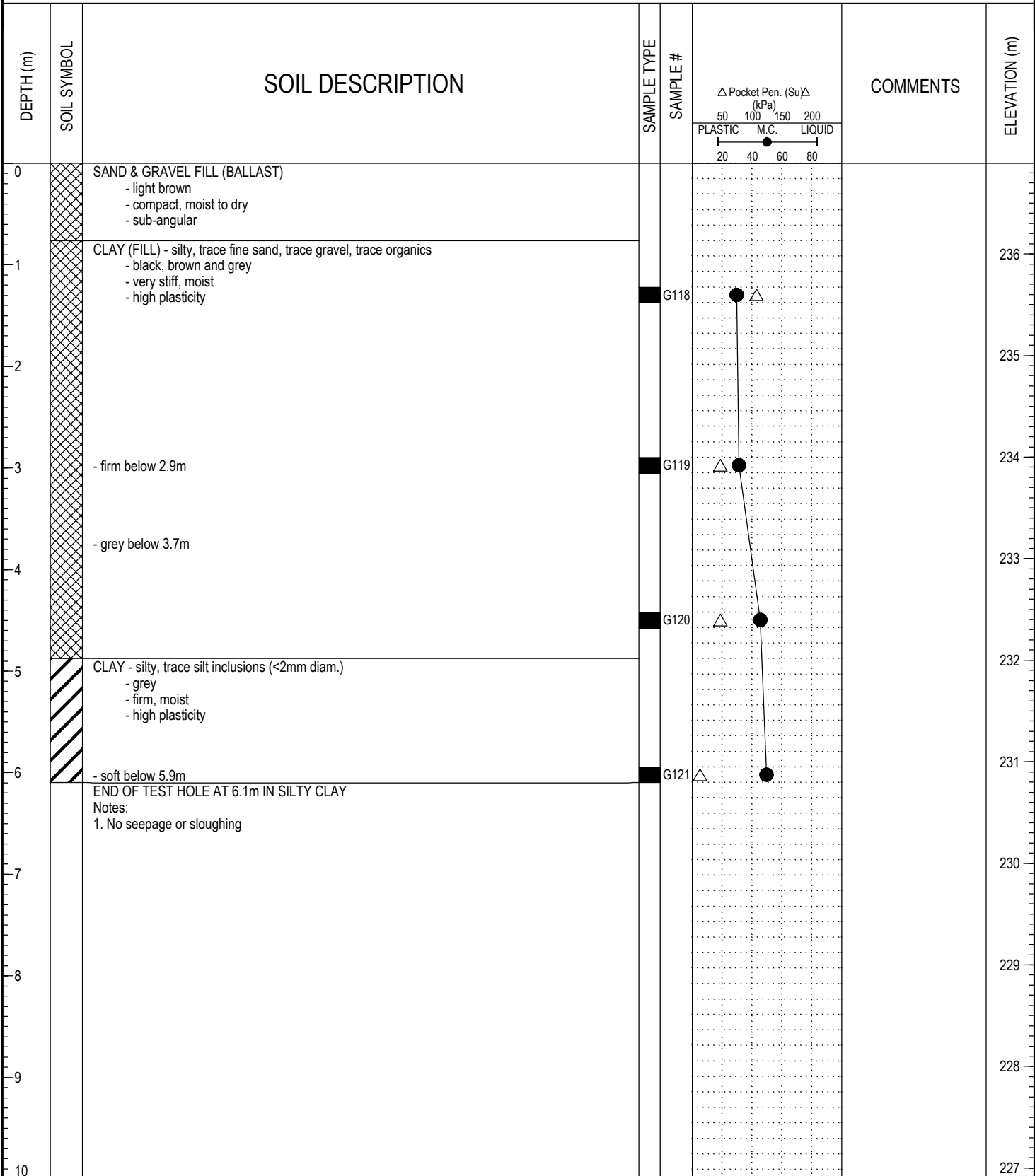


LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Kate Franklin	COMPLETION DEPTH: 6.10 m
REVIEWED BY:	COMPLETION DATE: 1/10/04
PROJECT ENGINEER: Ken Skaffeld	Page 1 of 1

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-21
LOCATION: WTP - N 5524133.016 E 647733.030		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Paddock Drilling Ltd.	METHOD: RM 30 - 125 mm Solid Stem Augers	ELEVATION (m): 236.892
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 <input type="checkbox"/> CORE	

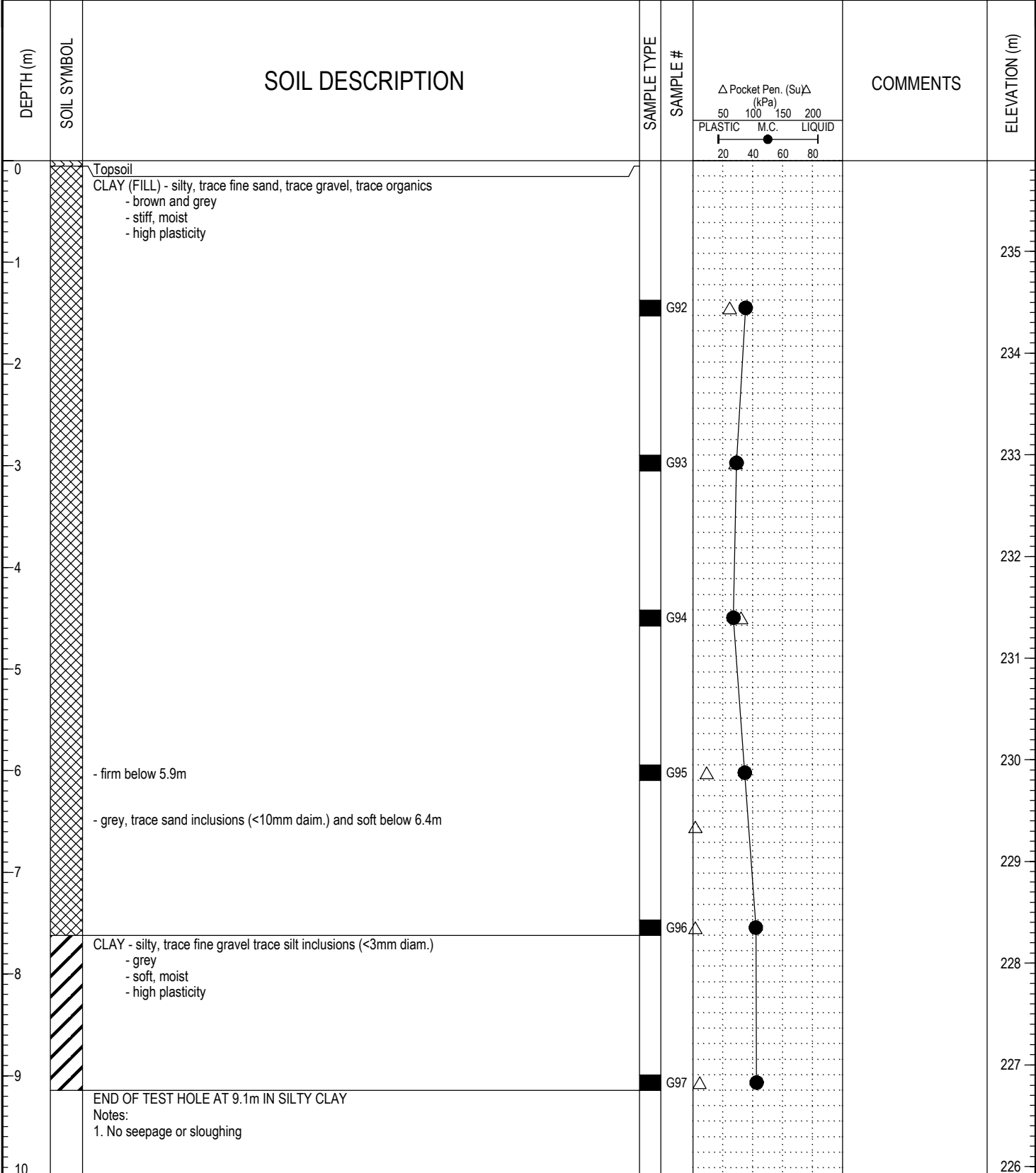


LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Kate Franklin	COMPLETION DEPTH: 6.10 m
REVIEWED BY:	COMPLETION DATE: 1/10/04
PROJECT ENGINEER: Ken Skaffeld	Page 1 of 1

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-22
LOCATION: WTP - N 5524106.018 E 647749.981		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Paddock Drilling Ltd.	METHOD: RM 30 - 125 mm Solid Stem Augers	ELEVATION (m): 235.893
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK	<input checked="" type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE



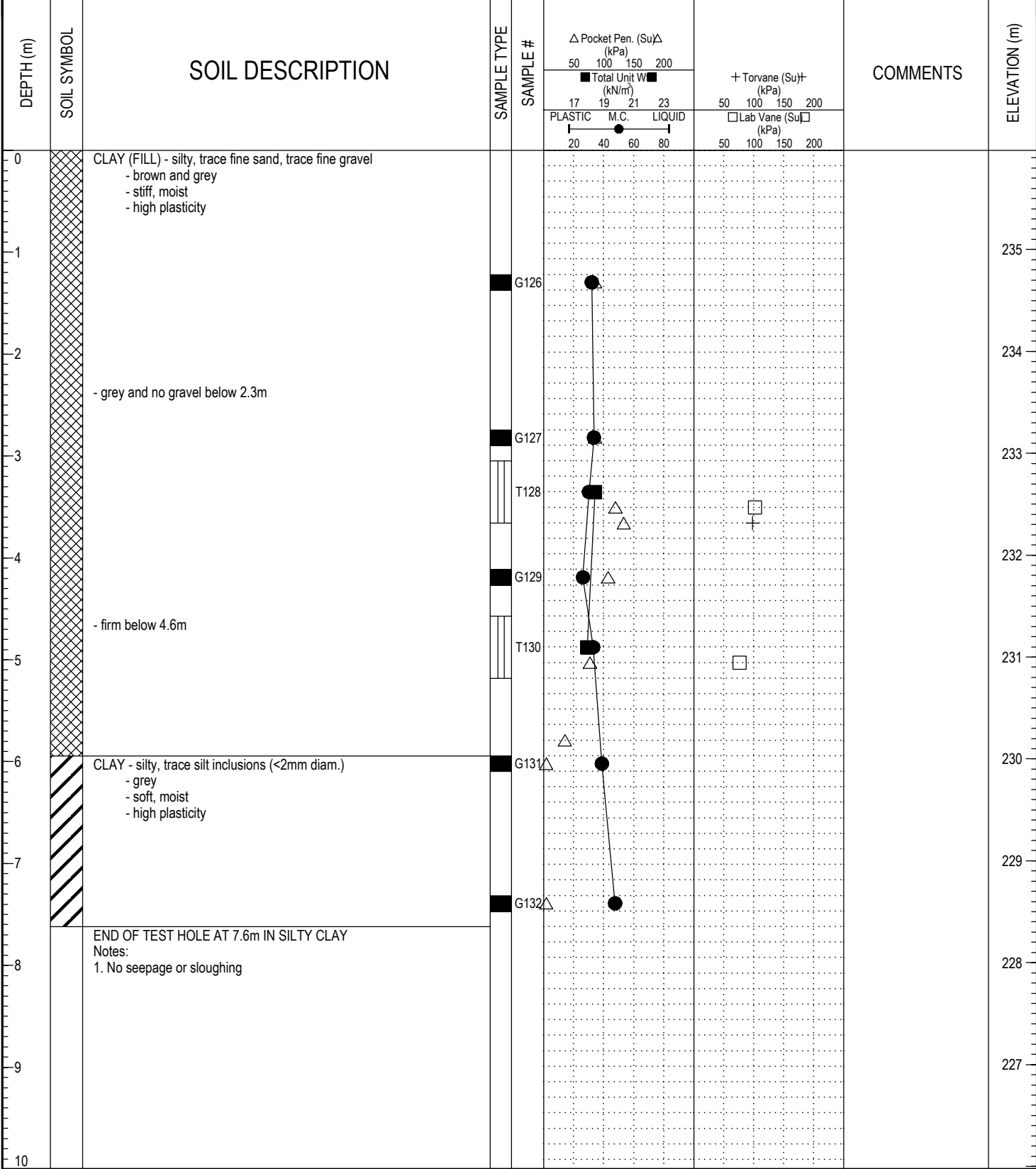
LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Kate Franklin	COMPLETION DEPTH: 7.62 m
REVIEWED BY:	COMPLETION DATE: 1/10/04
PROJECT ENGINEER: Ken Skaffeld	Page 1 of 1

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-23
LOCATION: WTP - N 5524091.975 E 647777.015		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Paddock Drilling Ltd.	METHOD: RM 30 - 125 mm Solid Stem Augers	ELEVATION (m): 235.973

SAMPLE TYPE GRAB SHELBY TUBE SPLIT SPOON BULK NO RECOVERY CORE



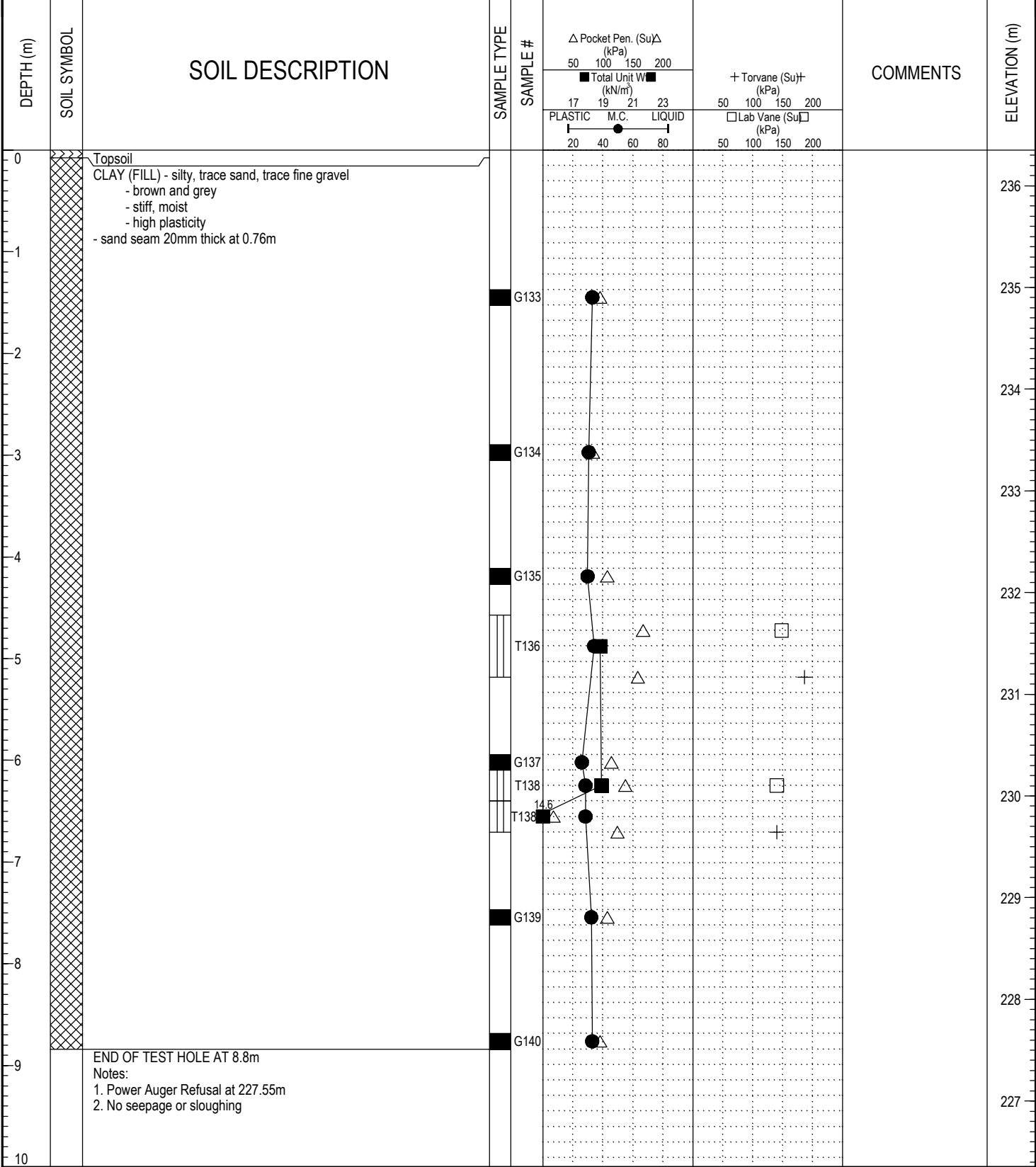
LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Kate Franklin	COMPLETION DEPTH: 7.62 m
REVIEWED BY:	COMPLETION DATE: 1/10/04
PROJECT ENGINEER: Ken Skaffeld	Page 1 of 1

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-24
LOCATION: WTP - N 5524089.009 E 647752.003		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Paddock Drilling Ltd.	METHOD: RM 30 - 125 mm Solid Stem Augers	ELEVATION (m): 236.35

SAMPLE TYPE GRAB SHELBY TUBE SPLIT SPOON BULK NO RECOVERY CORE

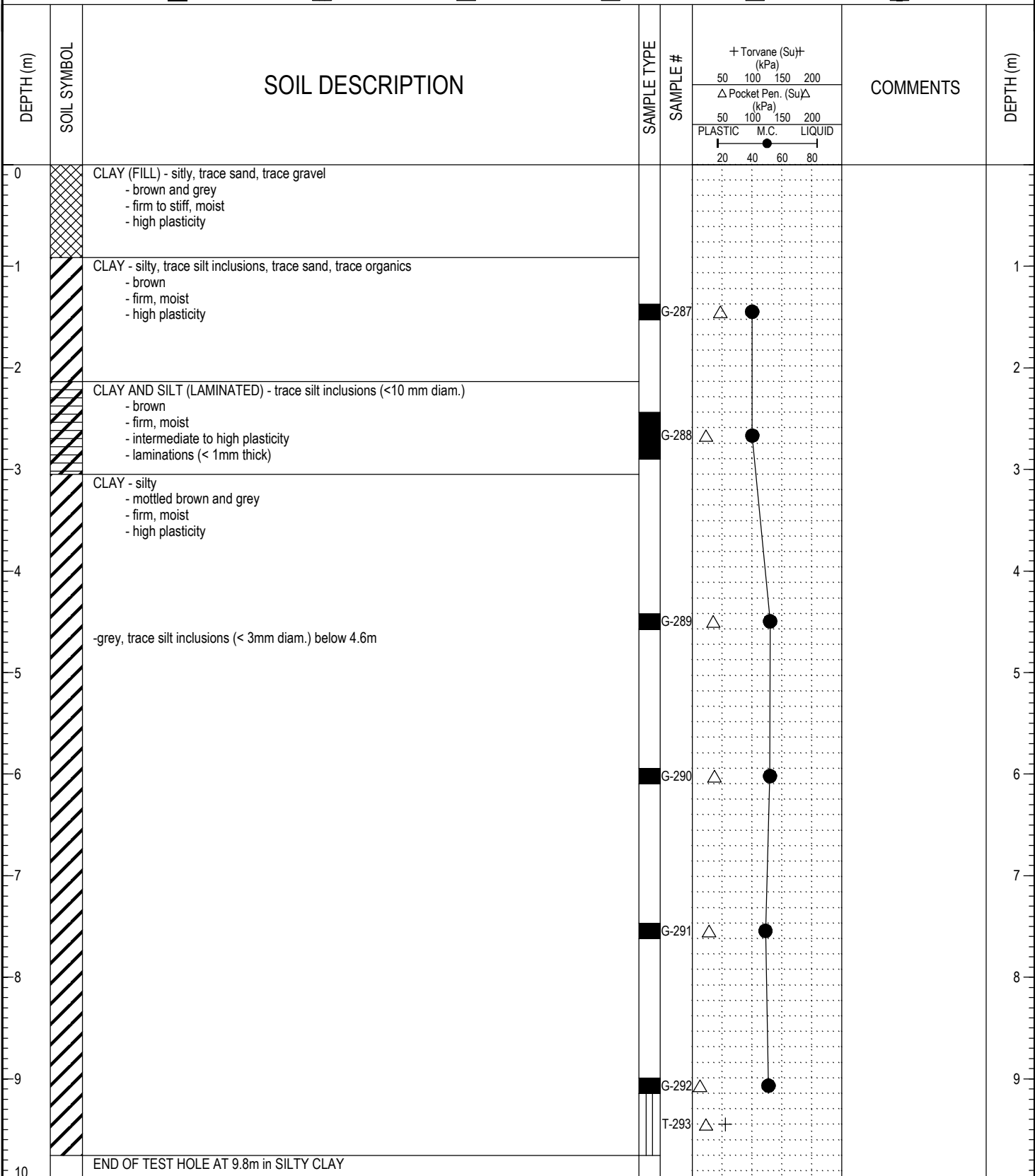


LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA GDT 17/2/05



LOGGED BY: Kate Franklin	COMPLETION DEPTH: 8.84 m
REVIEWED BY:	COMPLETION DATE: 1/10/04
PROJECT ENGINEER: Ken Skaffeld	Page 1 of 1

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-31
LOCATION: At Pumping Well PW-1		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Maple Leaf Drilling	METHOD: B-40 - 125 mm Solid Stem Augers	ELEVATION (m):
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 <input type="checkbox"/> CORE	



LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Kate Franklin	COMPLETION DEPTH: 9.75 m
REVIEWED BY:	COMPLETION DATE: 12/10/04
PROJECT ENGINEER: Ken Skaffeld	Page 1 of 2

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-31
LOCATION: At Pumping Well PW-1		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Maple Leaf Drilling	METHOD: B-40 - 125 mm Solid Stem Augers	ELEVATION (m):
SAMPLE TYPE <input checked="" type="checkbox"/> GRAB	<input type="checkbox"/> SHELBY TUBE	<input checked="" type="checkbox"/> NO RECOVERY
	<input checked="" type="checkbox"/> SPLIT SPOON	<input type="checkbox"/> CORE
	<input type="checkbox"/> BULK	

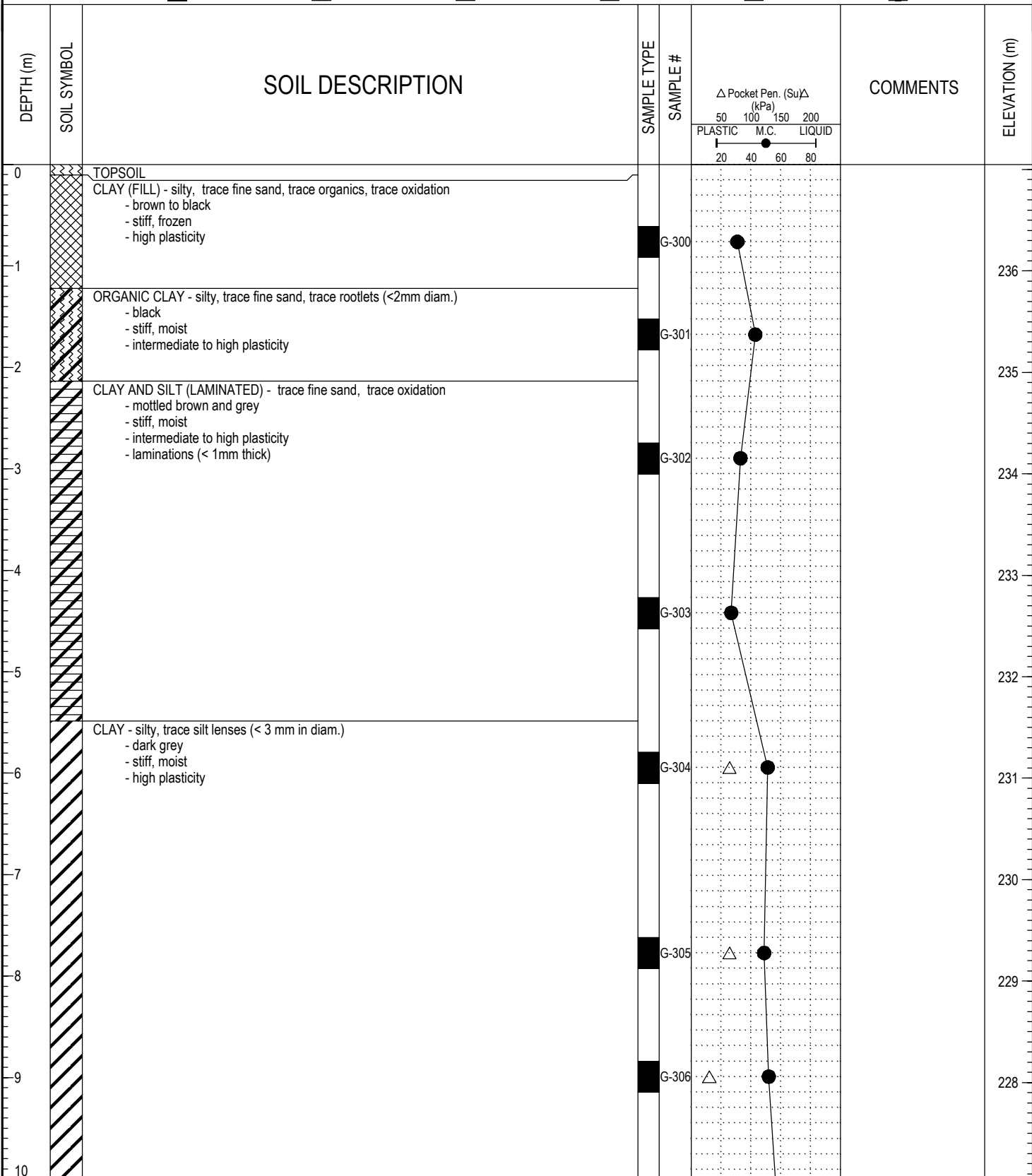
DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	+ Torvane (Su) ⁺ (kPa) 50 100 150 200 Δ Pocket Pen. (Su)Δ (kPa) 50 100 150 200 PLASTIC M.C. LIQUID 20 40 60 80	COMMENTS	DEPTH (m)
10		Notes: 1. No sloughing or seepage 2. Vibrating Wire VW-31 installed - Tip for VW-31 at a depth of 10.7m					10
11							11
12							12
13							13
14							14
15							15
16							16
17							17
18							18
19							19
20							20

LOG OF TESTHOLE - WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Kate Franklin	COMPLETION DEPTH: 9.75 m
REVIEWED BY:	COMPLETION DATE: 12/10/04
PROJECT ENGINEER: Ken Skaffeld	Page 2 of 2

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-33
LOCATION: WTP - N 5524157.897 E 647801.041		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Subterranean	METHOD: SoilMech D-312HB, 450mm Auger	ELEVATION (m): 237.049
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 <input type="checkbox"/> CORE	

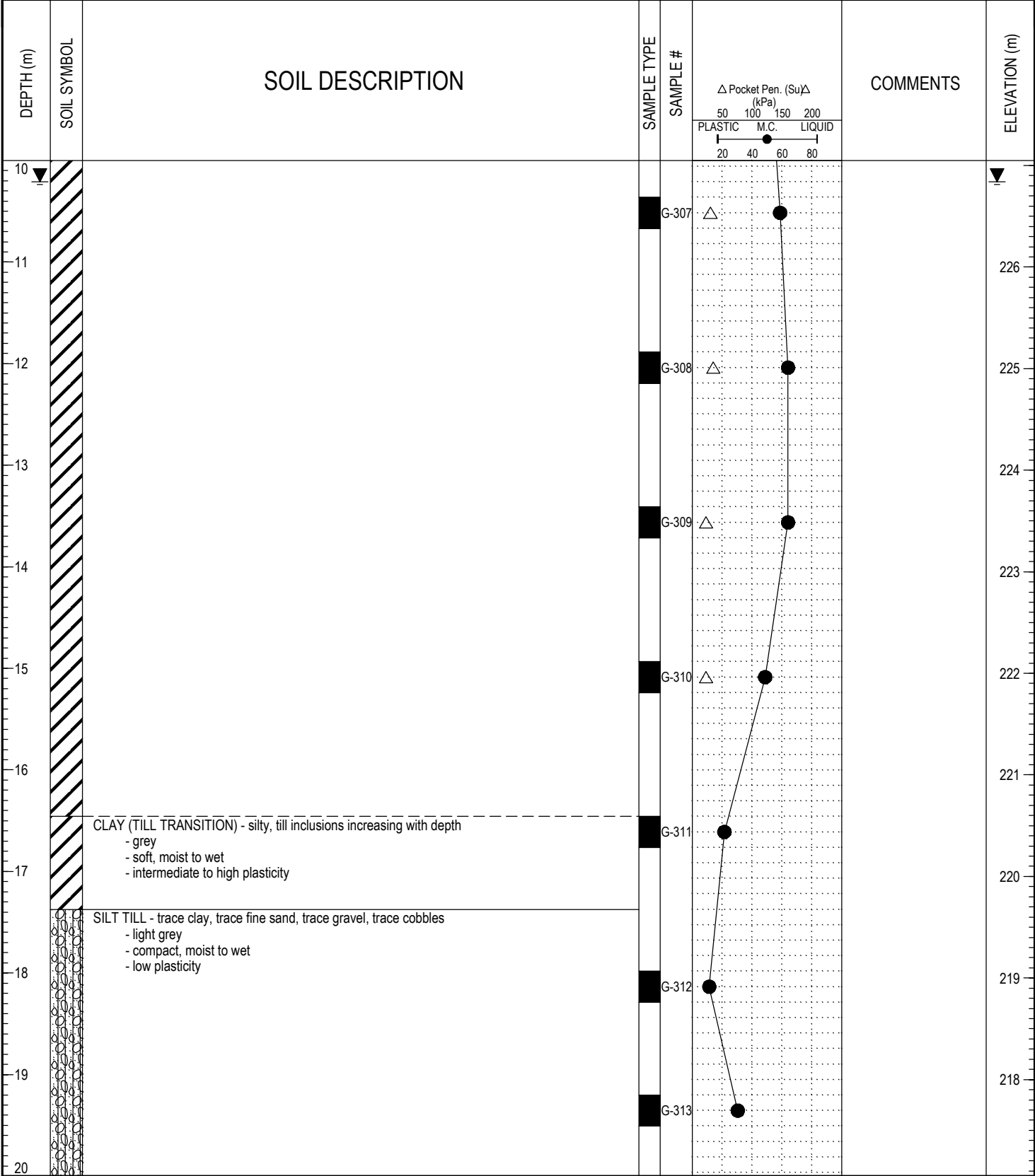


LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 21.34 m
REVIEWED BY:	COMPLETION DATE: 13/12/04
PROJECT ENGINEER: Ken Skaffeld	Page 1 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-33
LOCATION: WTP - N 5524157.897 E 647801.041		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Subterranean	METHOD: SoilMech D-312HB, 450mm Auger	ELEVATION (m): 237.049
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 <input type="checkbox"/> CORE	



LOG OF TESTHOLE - WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05




LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 21.34 m
REVIEWED BY:	COMPLETION DATE: 13/12/04
PROJECT ENGINEER: Ken Skaffeld	Page 2 of 3

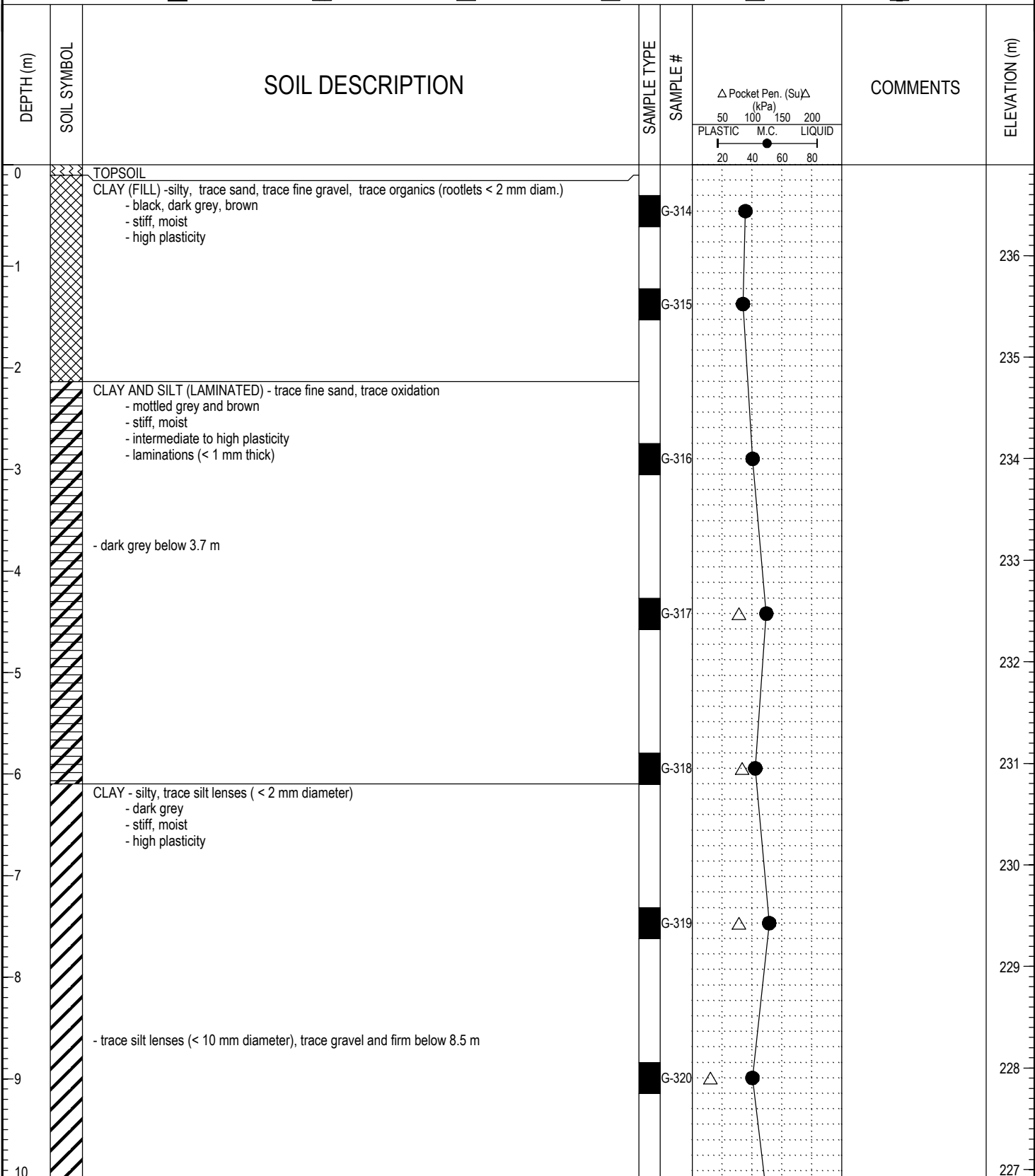
PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-33
LOCATION: WTP - N 5524157.897 E 647801.041		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Subterranean	METHOD: SoilMech D-312HB, 450mm Auger	ELEVATION (m): 237.049
SAMPLE TYPE <input checked="" type="checkbox"/> GRAB	<input type="checkbox"/> SHELBY TUBE	<input checked="" type="checkbox"/> SPLIT SPOON
<input type="checkbox"/> BULK	<input checked="" type="checkbox"/> NO RECOVERY	<input type="checkbox"/> CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	COMMENTS	ELEVATION (m)
20	○					
21	○		<input checked="" type="checkbox"/>	G-314		216
22		POWER AUGER REFUSAL AT 21.3 m Notes: 1. Sloughing below 17.4m 2. Seepage at 19.8m 4. Water level at 10.2m below ground surface 3 hours after completion of drilling 5. Test hole grouted to 3.7m below ground surface and backfilled with cuttings to surface				215
23						214
24						213
25						212
26						211
27						210
28						209
29						208
30						

LOG OF TESTHOLE - WINNIPEG WATER TREATMENT PLANT.GPJ - UMA.GDT - 17/2/05

	LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 21.34 m
	REVIEWED BY:	COMPLETION DATE: 13/12/04
	PROJECT ENGINEER: Ken Skaffeld	Page 3 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-34
LOCATION: WTP - N 5524132.146 E 647785.051		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Subterranean	METHOD: SoilMech D-312HB, 450mm Auger	ELEVATION (m): 236.894
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 <input type="checkbox"/> CORE	

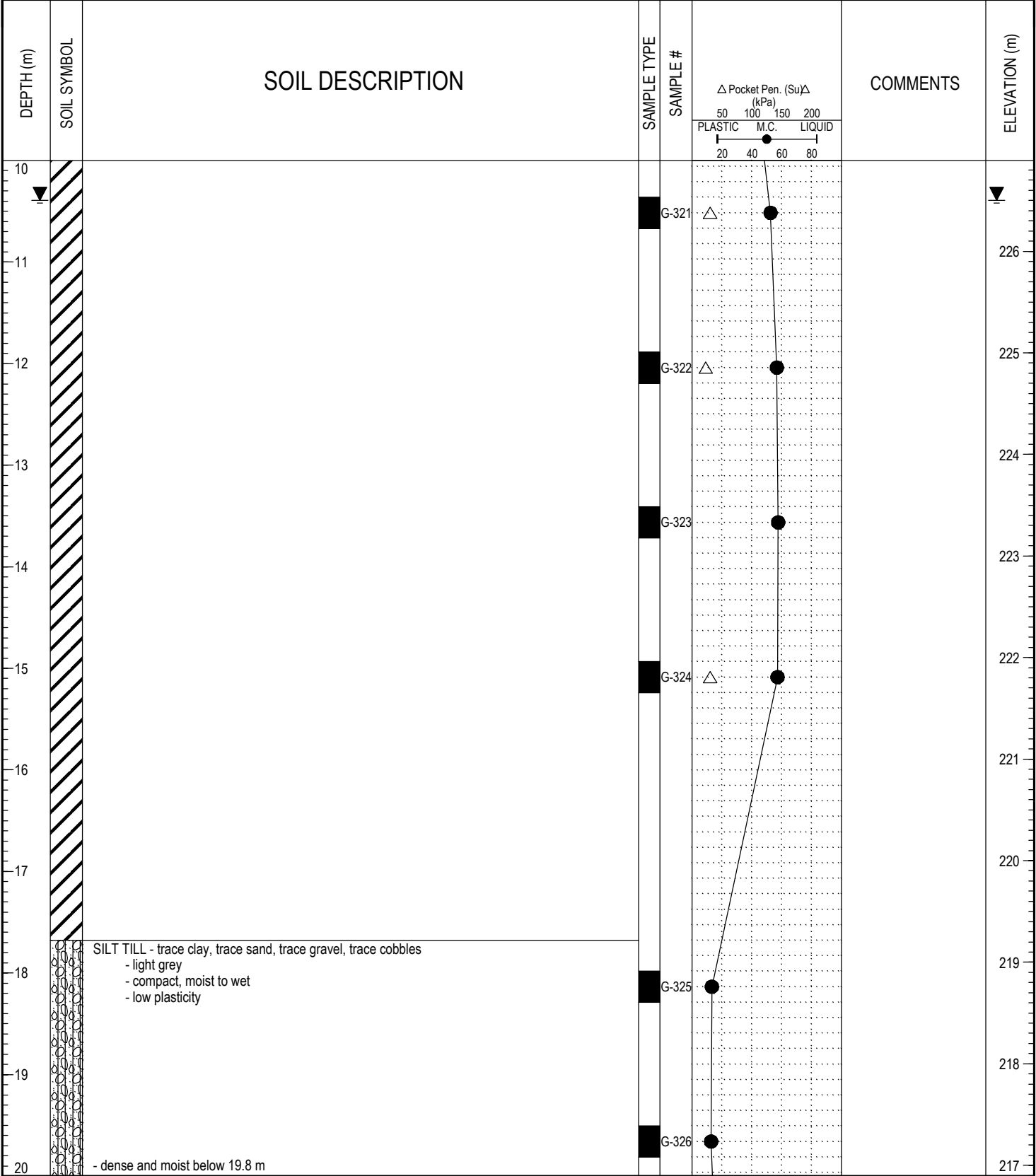


LOG OF TESTHOLE - WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 24.38 m
REVIEWED BY:	COMPLETION DATE: 13/12/04
PROJECT ENGINEER: Ken Skaffeld	Page 1 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-34
LOCATION: WTP - N 5524132.146 E 647785.051		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Subterranean	METHOD: SoilMech D-312HB, 450mm Auger	ELEVATION (m): 236.894
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 <input type="checkbox"/> CORE	



LOG OF TESTHOLE - WINNIPEG WATER TREATMENT PLANT.GPJ - UMA.GDT - 17/2/05



LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 24.38 m
REVIEWED BY:	COMPLETION DATE: 13/12/04
PROJECT ENGINEER: Ken Skaffeld	Page 2 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-34
LOCATION: WTP - N 5524132.146 E 647785.051		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Subterranean	METHOD: SoilMech D-312HB, 450mm Auger	ELEVATION (m): 236.894
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK	<input checked="" type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE

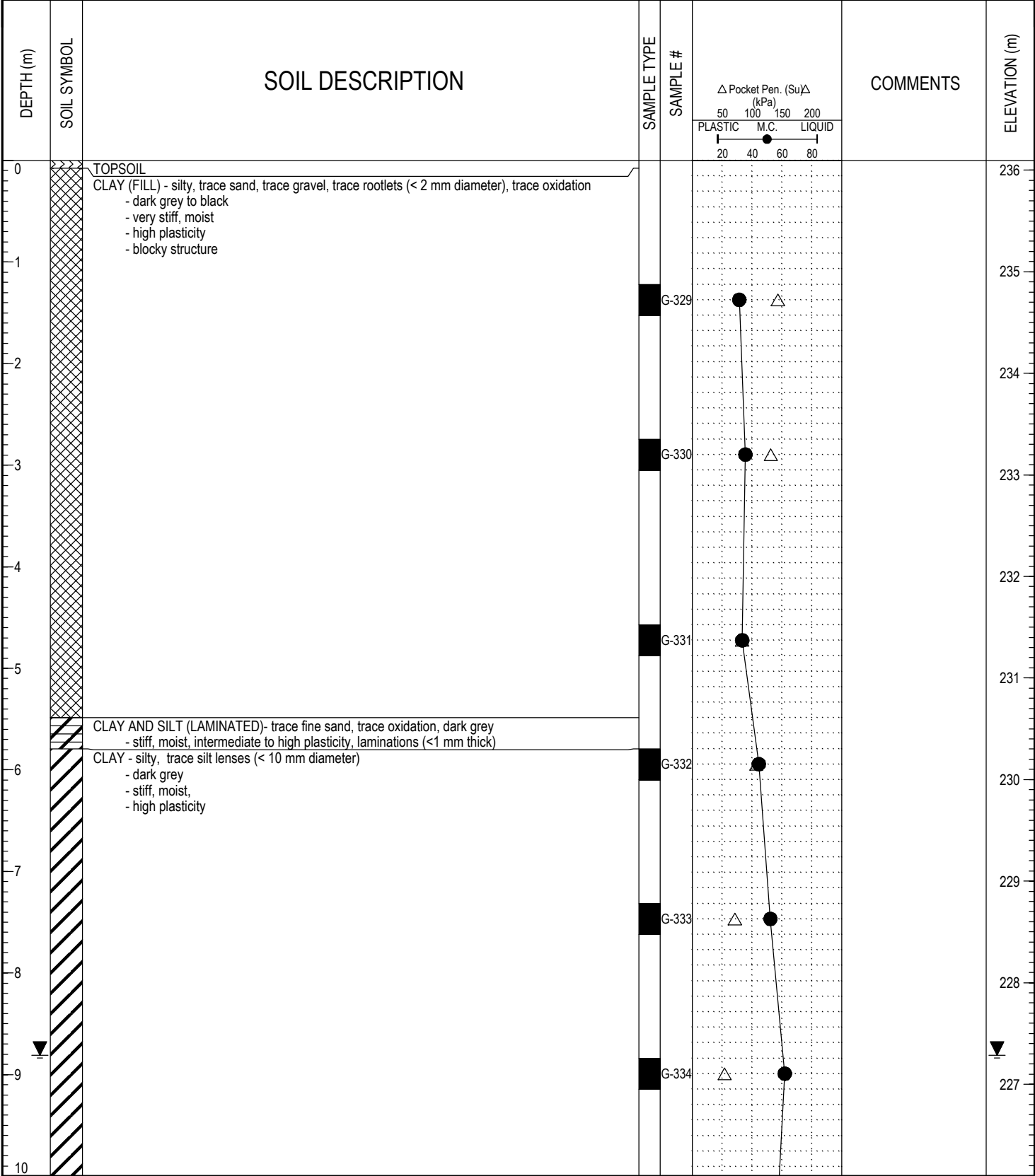
DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #		COMMENTS	ELEVATION (m)
20			<input checked="" type="checkbox"/>	G-327			216
21				G-328			215
22							214
23							213
24							212
25		POWER AUGER REFUSAL AT 24.4 m Notes: 1. Sloughing below 22.3m 2. Seepage (heavy) at 22.3 m 4. Water level at 17.4m below ground surface immediately at completion of drilling 5. Water level at 10.4m below ground surface 2 hours after completion of drilling 6. Test hole grouted to ground surface				211	
26							210
27							209
28							208
29							207
30							207

LOG OF TESTHOLE - WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 24.38 m
REVIEWED BY:	COMPLETION DATE: 13/12/04
PROJECT ENGINEER: Ken Skaffeld	Page 3 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-35
LOCATION: WTP - N 5524103.892 E 647767.976		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Subterranean	METHOD: SoilMech D-312HB, 450mm Auger	ELEVATION (m): 236.095
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 <input type="checkbox"/> CORE	



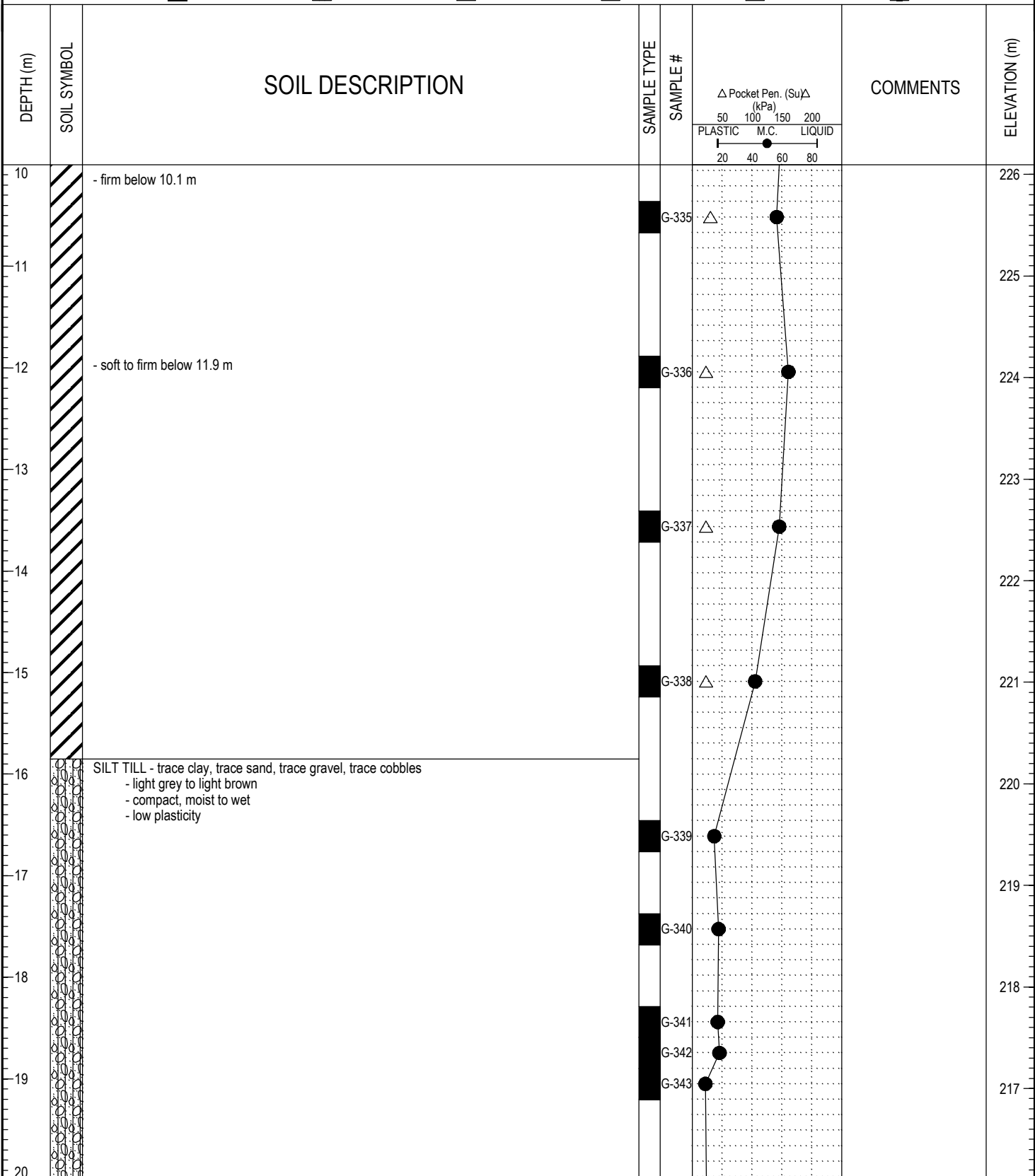
LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 21.34 m
REVIEWED BY:	COMPLETION DATE: 13/12/04
PROJECT ENGINEER: Ken Skafffeld	Page 1 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-35
LOCATION: WTP - N 5524103.892 E 647767.976		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Subterranean	METHOD: SoilMech D-312HB, 450mm Auger	ELEVATION (m): 236.095

SAMPLE TYPE GRAB SHELBY TUBE SPLIT SPOON BULK NO RECOVERY CORE



LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA GDT 17/2/05

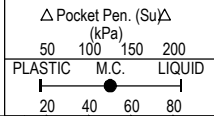


LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 21.34 m
REVIEWED BY:	COMPLETION DATE: 13/12/04
PROJECT ENGINEER: Ken Skaffeld	Page 2 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-35
LOCATION: WTP - N 5524103.892 E 647767.976		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Subterranean	METHOD: SoilMech D-312HB, 450mm Auger	ELEVATION (m): 236.095
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input checked="" type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK	<input checked="" type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE

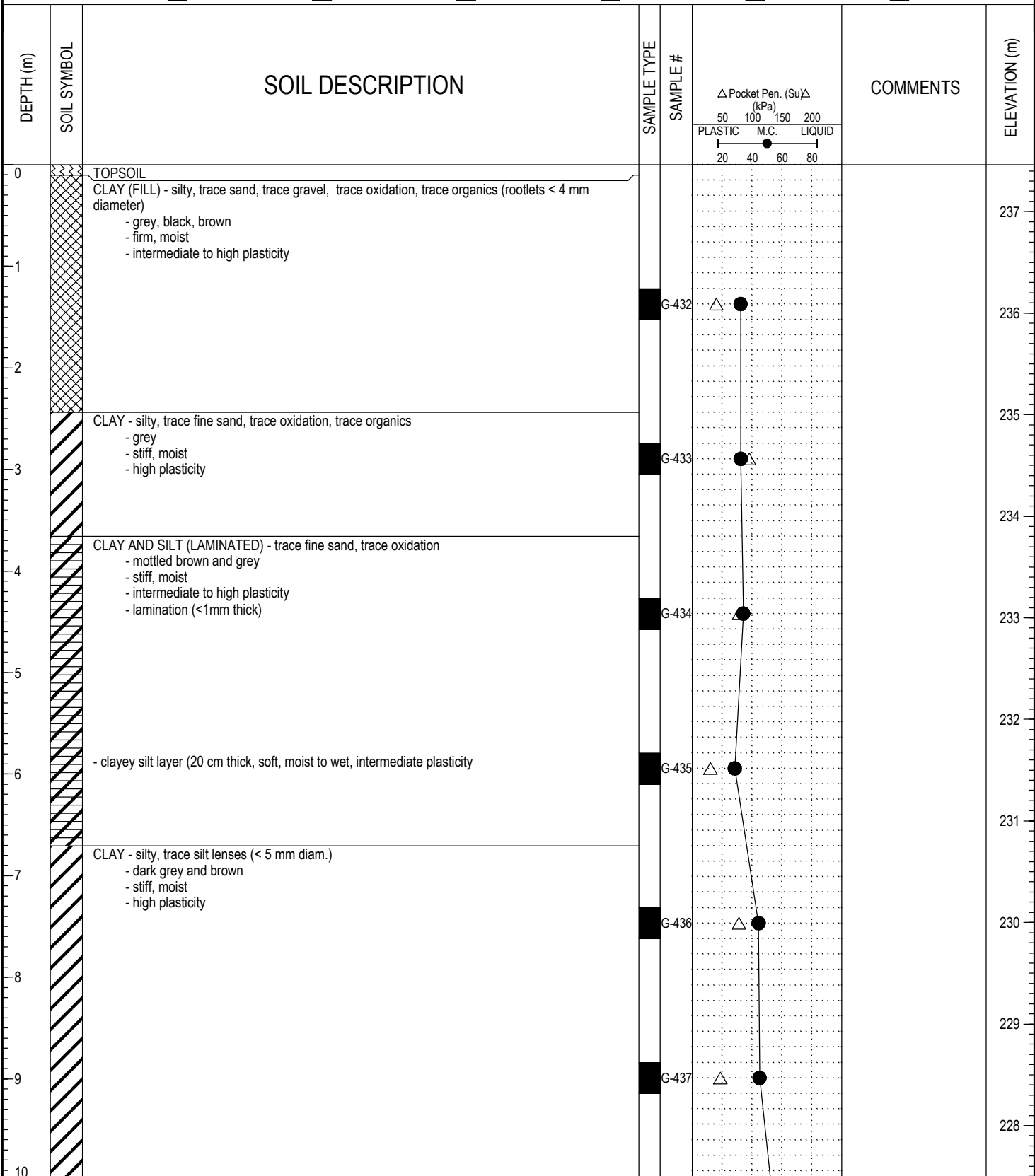
DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	COMMENTS	ELEVATION (m)
20						216
21			<input checked="" type="checkbox"/>	G-344		215
22		POWER AUGER REFUSAL AT 21.3 m Notes: 1. Sloughing below 30.5m 3. Seepage at 21.0m 4. Water level at 9.1m below ground surface 3 hours after completion of drilling 5. Test hole grouted to 3.7m below ground surface and backfilled with cuttings to surface				214
23						213
24						212
25						211
26						210
27						209
28						208
29						207
30						207

LOG OF TESTHOLE - WINNIPEG WATER TREATMENT PLANT.GPJ - UMA.GDT - 17/2/05



LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 21.34 m
REVIEWED BY:	COMPLETION DATE: 13/12/04
PROJECT ENGINEER: Ken Skaffeld	Page 3 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-36
LOCATION: WTP - N 5524027.267 E 647809.570		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Subterranean	METHOD: SoilMech D-312HB, 600mm Auger	ELEVATION (m): 237.461
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 <input type="checkbox"/> CORE	

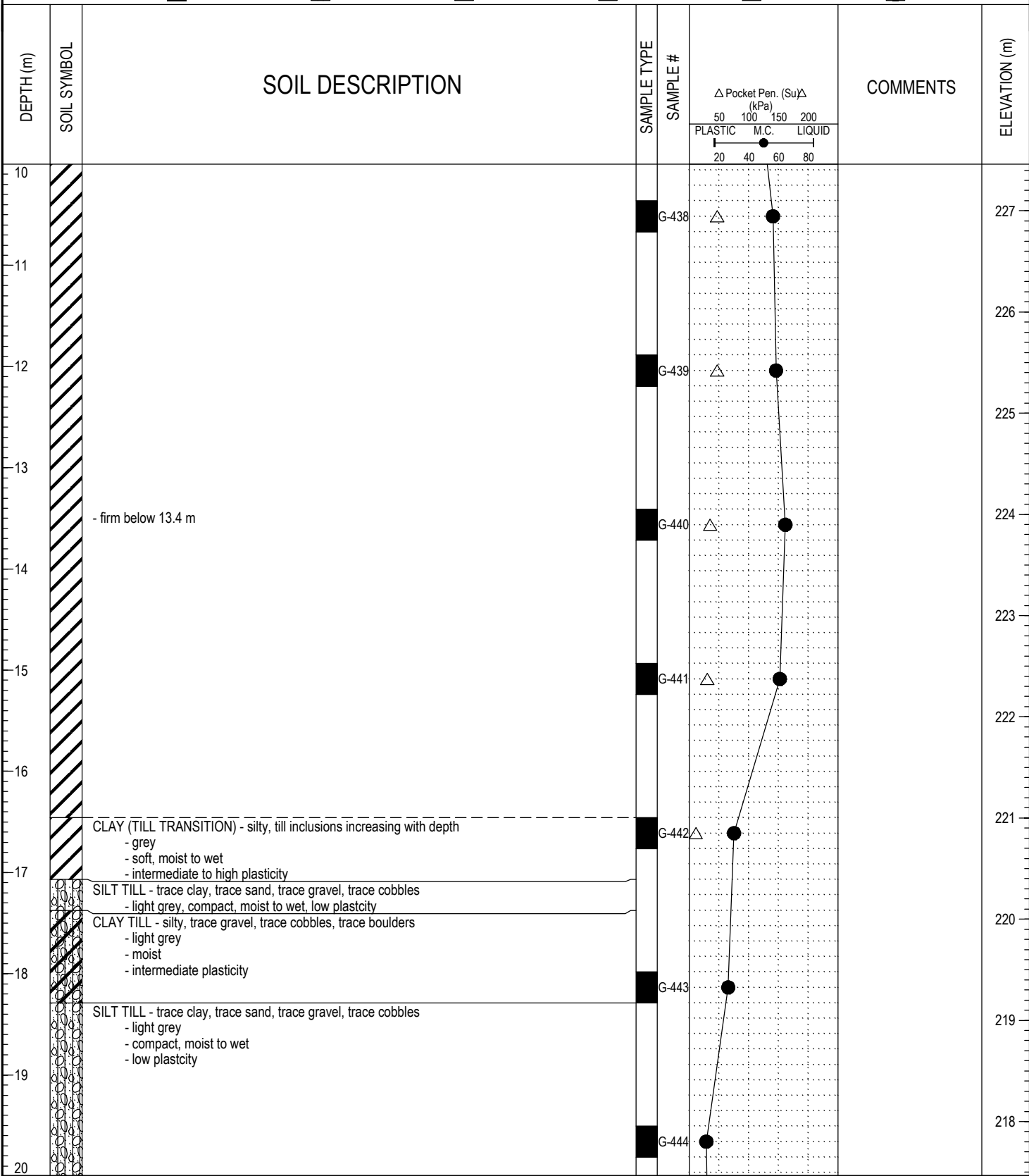


LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 22.25 m
REVIEWED BY:	COMPLETION DATE: 15/12/04
PROJECT ENGINEER: Ken Skaffeld	Page 1 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-36
LOCATION: WTP - N 5524027.267 E 647809.570		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Subterranean	METHOD: SoilMech D-312HB, 600mm Auger	ELEVATION (m): 237.461
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 <input type="checkbox"/> CORE	



LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 22.25 m
REVIEWED BY:	COMPLETION DATE: 15/12/04
PROJECT ENGINEER: Ken Skaffeld	Page 2 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-36
LOCATION: WTP - N 5524027.267 E 647809.570		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Subterranean	METHOD: SoilMech D-312HB, 600mm Auger	ELEVATION (m): 237.461
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input checked="" type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK	<input checked="" type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE

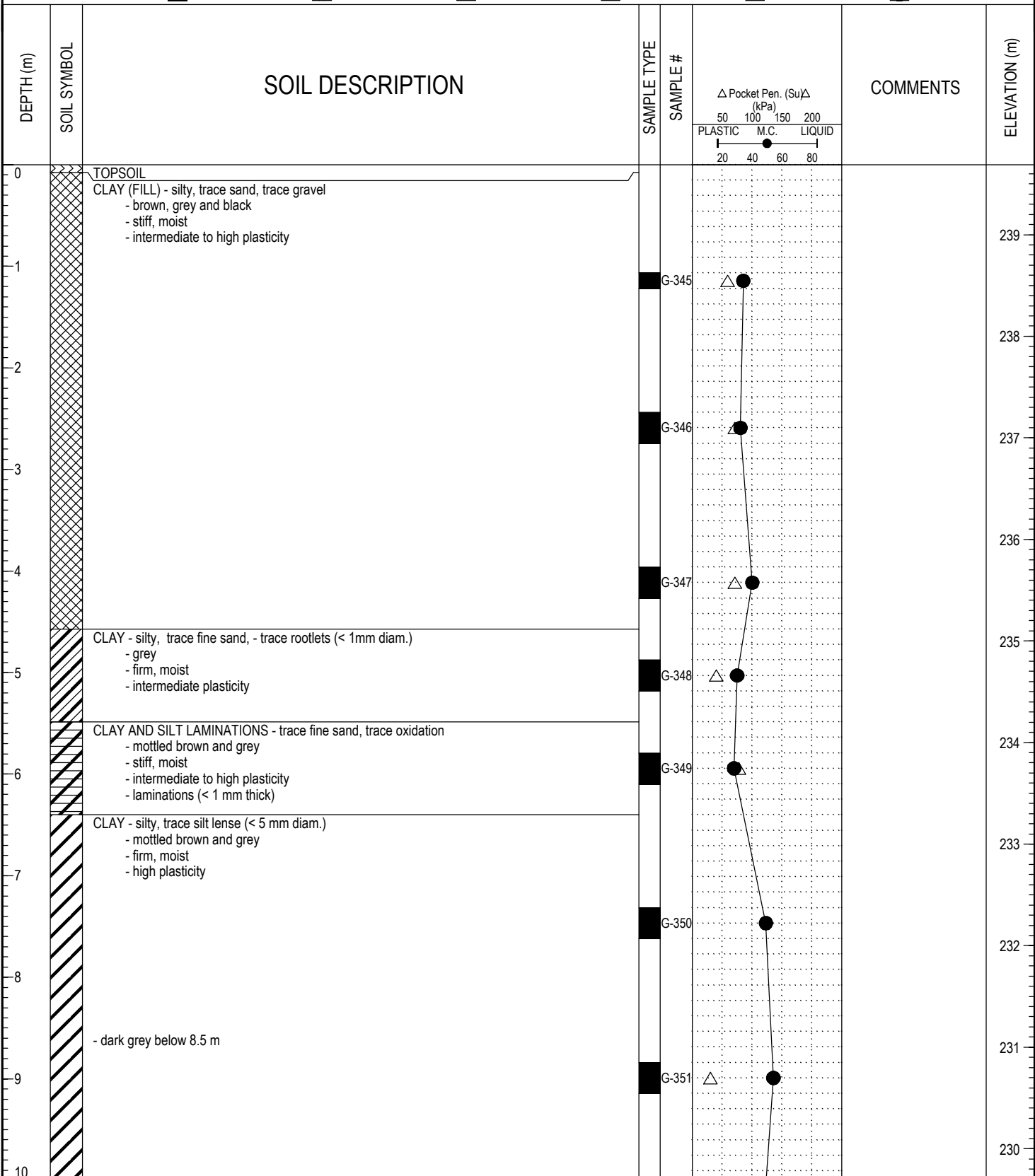
DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	Δ Pocket Pen. (Su)Δ (kPa) 50 100 150 200 PLASTIC M.C. LIQUID 20 40 60 80	COMMENTS	ELEVATION (m)
20							217
21							
22							215
23		POWER AUGER REFUSAL AT 22.3m Notes: 1. Seepage at 22.3 m 2. Test hole grouted to 12.2m below ground surface and backfilled with cuttings to surface					214
24							213
25							212
26							211
27							210
28							209
29							208
30							208

LOG OF TESTHOLE - WINNIPEG WATER TREATMENT PLANT.GPJ - UMA.GDT - 17/2/05



LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 22.25 m
REVIEWED BY:	COMPLETION DATE: 15/12/04
PROJECT ENGINEER: Ken Skaffeld	Page 3 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-37
LOCATION: WTP - N 5524100.010 E 647872.679		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Subterranean	METHOD: SoilMech D-312HB, 600mm Auger	ELEVATION (m): 239.689
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 <input type="checkbox"/> CORE	

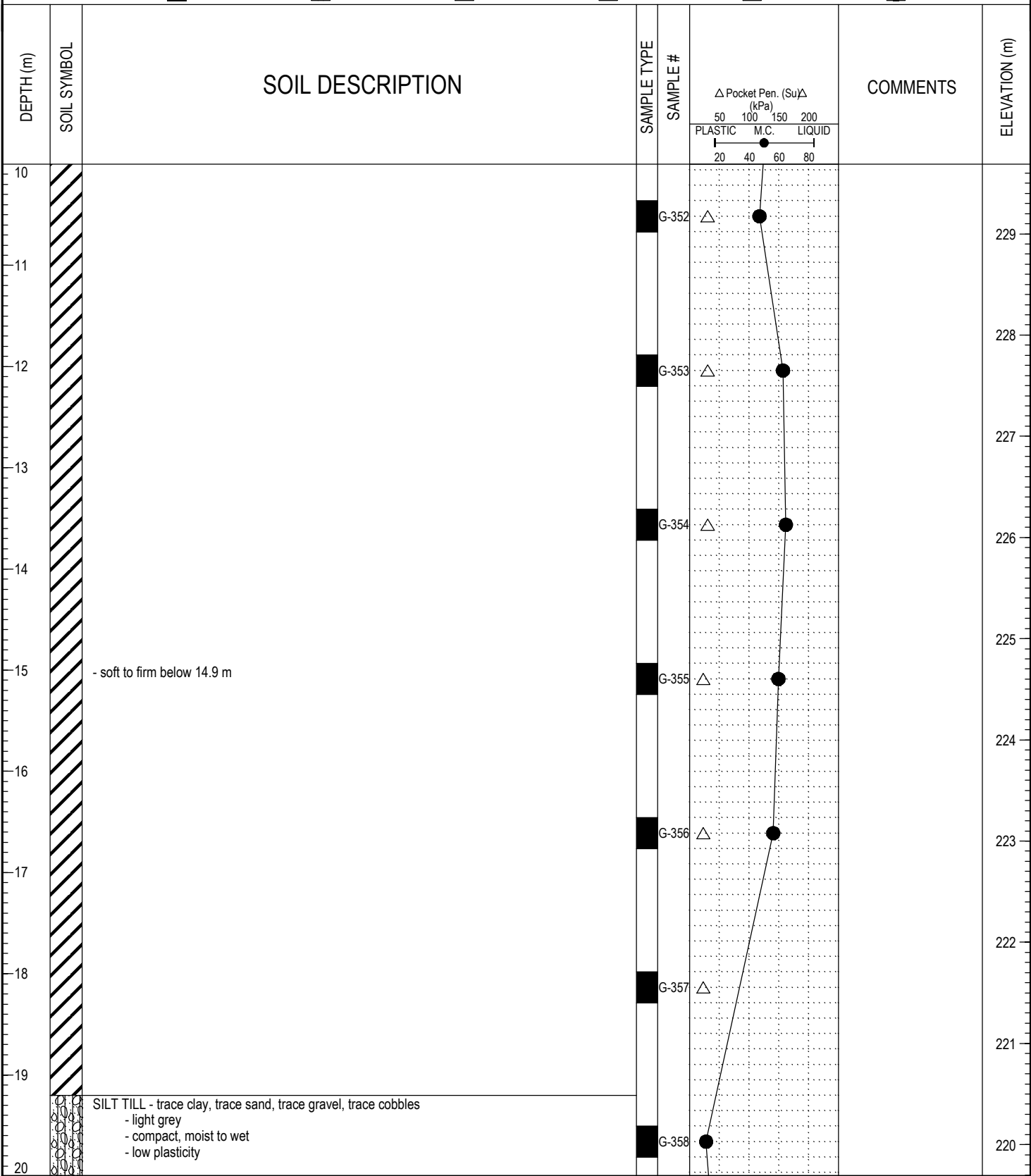


LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 22.86 m
REVIEWED BY:	COMPLETION DATE: 13/12/04
PROJECT ENGINEER: Ken Skaffeld	Page 1 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-37
LOCATION: WTP - N 5524100.010 E 647872.679		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Subterranean	METHOD: SoilMech D-312HB, 600mm Auger	ELEVATION (m): 239.689
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 <input type="checkbox"/> CORE	





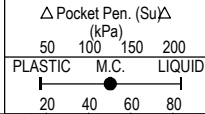
LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 22.86 m
REVIEWED BY:	COMPLETION DATE: 13/12/04
PROJECT ENGINEER: Ken Skaffeld	Page 2 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-37
LOCATION: WTP - N 5524100.010 E 647872.679		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Subterranean	METHOD: SoilMech D-312HB, 600mm Auger	ELEVATION (m): 239.689
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK	<input checked="" type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	COMMENTS	ELEVATION (m)
20		CLAY TILL - trace fine sand, trace gravel, trace cobbles - dark grey - firm, moist - intermediate plasticity				219
21			<input checked="" type="checkbox"/>	G-359		
22		SILT TILL - trace clay, trace sand, trace gravel, trace cobbles - light grey - compact, moist to wet - low plasticity				218
22			<input checked="" type="checkbox"/>	G-360		
23			<input checked="" type="checkbox"/>	G-361		217
25		POWER AUGER REFUSAL AT 25.0 m Notes: 1. Sloughing below 21.3m 2. Seepage at 22.3m 3. Test hole grouted to 8.5m below ground surface and backfilled with auger cuttings to surface				214
26						213
27						212
28						211
29						210
30						210

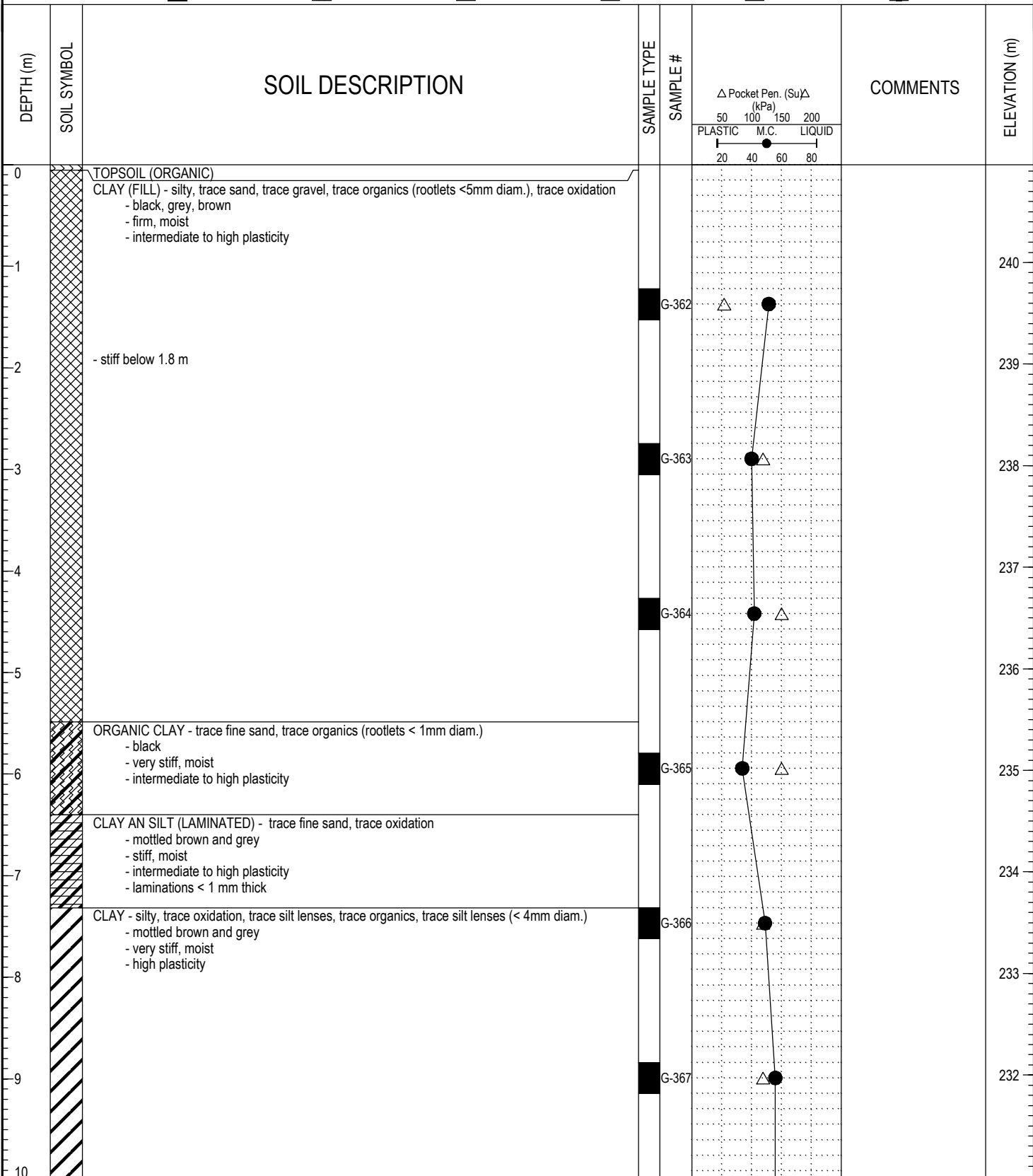


LOG OF TESTHOLE - WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 22.86 m
REVIEWED BY:	COMPLETION DATE: 13/12/04
PROJECT ENGINEER: Ken Skaffeld	Page 3 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-38
LOCATION: WTP - N 5524087.124 E 647893.710		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Subterranean	METHOD: SoilMech D-312HB, 450mm Auger	ELEVATION (m): 240.963
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 <input type="checkbox"/> CORE	

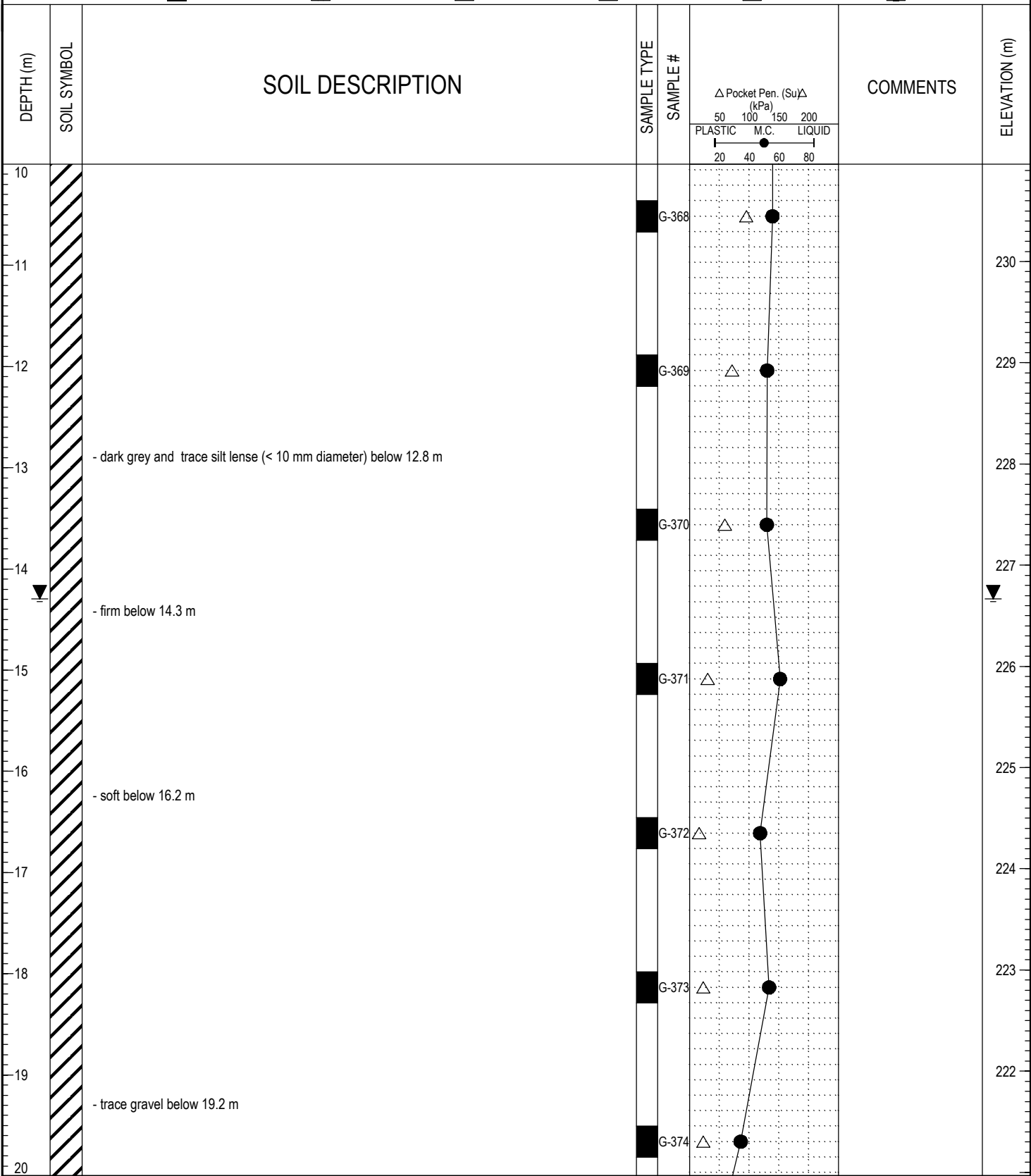


LOG OF TESTHOLE - WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 22.86 m
REVIEWED BY:	COMPLETION DATE: 14/12/04
PROJECT ENGINEER: Ken Skaffeld	Page 1 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-38
LOCATION: WTP - N 5524087.124 E 647893.710		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Subterranean	METHOD: SoilMech D-312HB, 450mm Auger	ELEVATION (m): 240.963
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 <input type="checkbox"/> CORE	

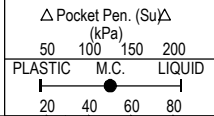


LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 22.86 m
REVIEWED BY:	COMPLETION DATE: 14/12/04
PROJECT ENGINEER: Ken Skaffeld	Page 2 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-38
LOCATION: WTP - N 5524087.124 E 647893.710	PROJECT NO.: 3398-055-00-01-00	
CONTRACTOR: Subterranean	METHOD: SoilMech D-312HB, 450mm Auger	ELEVATION (m): 240.963
SAMPLE TYPE <input checked="" type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input checked="" type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK <input checked="" type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE		

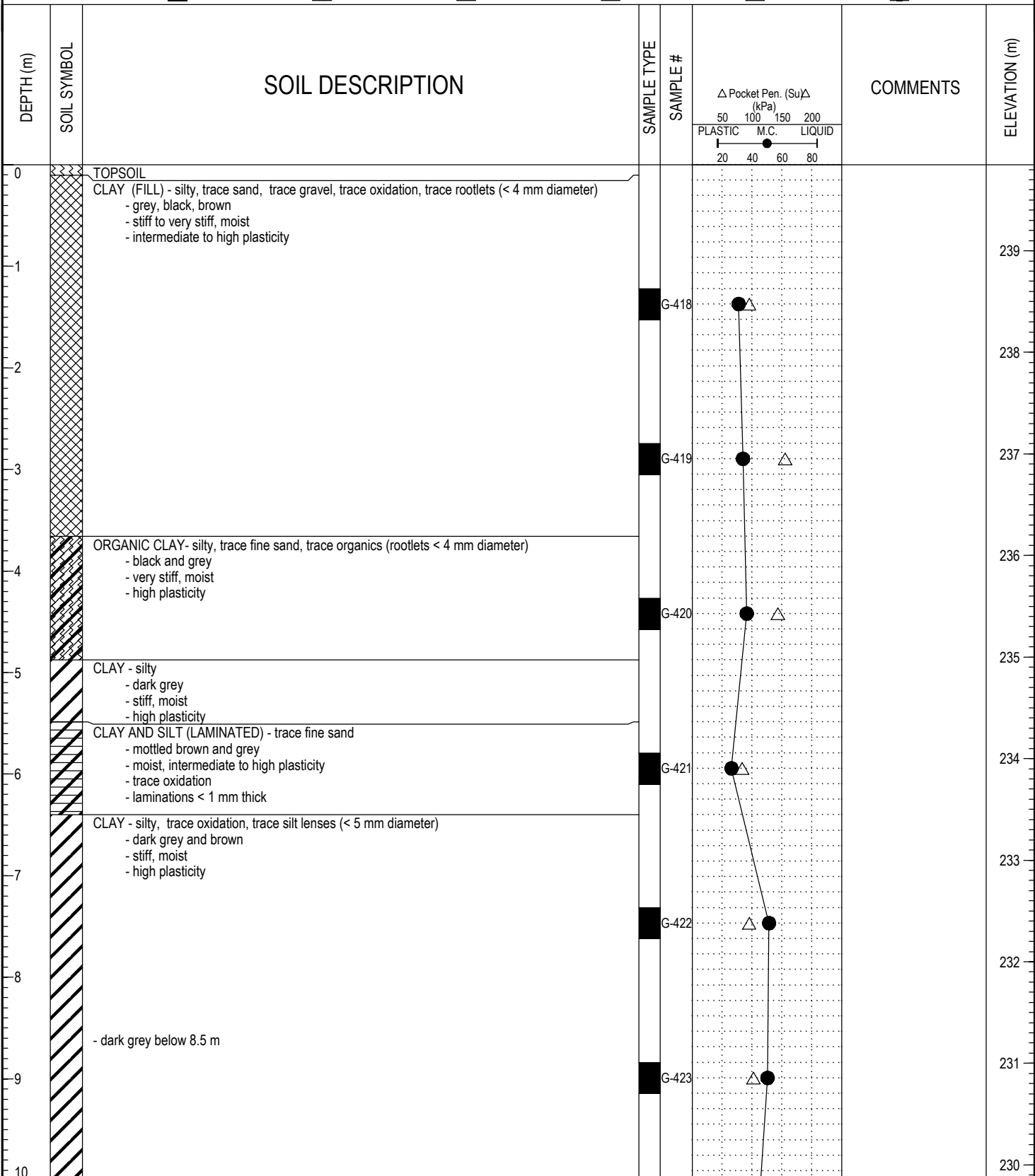
DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	COMMENTS	ELEVATION (m)
20	▨					
21	○	SILT TILL - trace clay, trace sand, trace gravel, trace cobbles - light grey to light brown - compact, moist to wet - low plasticity	■	G-375		220
22	○	- moist below 21.9 m				219
23	○	- seepage below 22.6 m	■	G-376		218
23		END OF TEST HOLE AT 22.9 m IN TILL Notes: 1. Power auger refusal not reached due to excessive sloughing and seepage in till layer 2. Sloughing below 22.3 m 3. Seepage (heavy) at 22.6 m 4. Water level at 14.3 m below ground surface 2 hours after completion of drilling 4. Test hole grouted to 8.5 m below ground surface and backfilled with auger cuttings to surface				218
24						217
25						216
26						215
27						214
28						213
29						212
30						211

LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 22.86 m
REVIEWED BY:	COMPLETION DATE: 14/12/04
PROJECT ENGINEER: Ken Skaffeld	Page 3 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-39
LOCATION: WTP - N 5524057.650 E 647875.469		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Subterranean	METHOD: SoilMech D-312HB, 600mm Auger	ELEVATION (m): 239.847
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 <input type="checkbox"/> CORE	

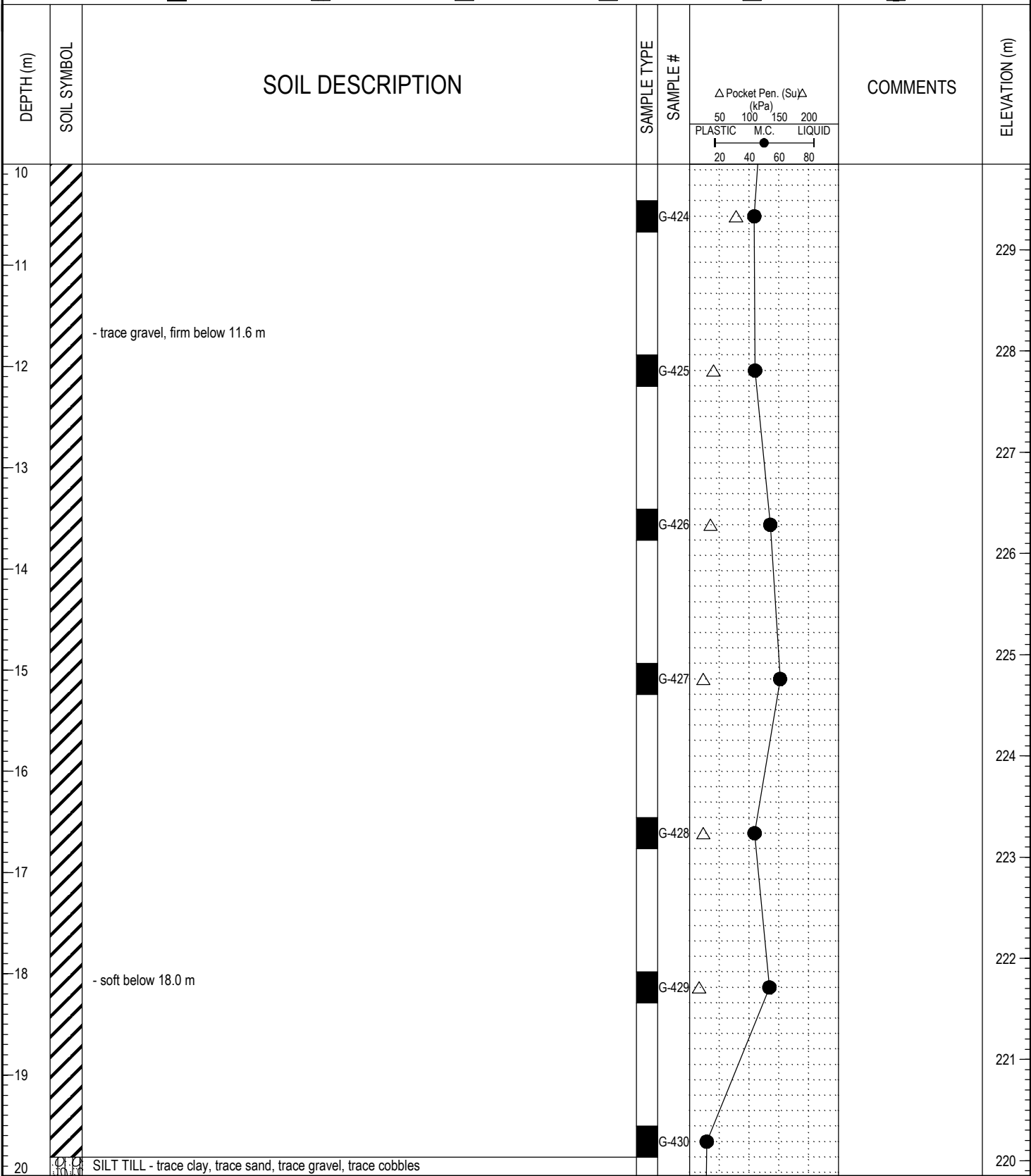


LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 22.86 m
REVIEWED BY:	COMPLETION DATE: 15/12/04
PROJECT ENGINEER: Ken Skaffeld	Page 1 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-39
LOCATION: WTP - N 5524057.650 E 647875.469		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Subterranean	METHOD: SoilMech D-312HB, 600mm Auger	ELEVATION (m): 239.847
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 <input type="checkbox"/> CORE	



LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 22.86 m
REVIEWED BY:	COMPLETION DATE: 15/12/04
PROJECT ENGINEER: Ken Skaffeld	Page 2 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-39
LOCATION: WTP - N 5524057.650 E 647875.469		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Subterranean	METHOD: SoilMech D-312HB, 600mm Auger	ELEVATION (m): 239.847

SAMPLE TYPE GRAB SHELBY TUBE SPLIT SPOON BULK NO RECOVERY CORE

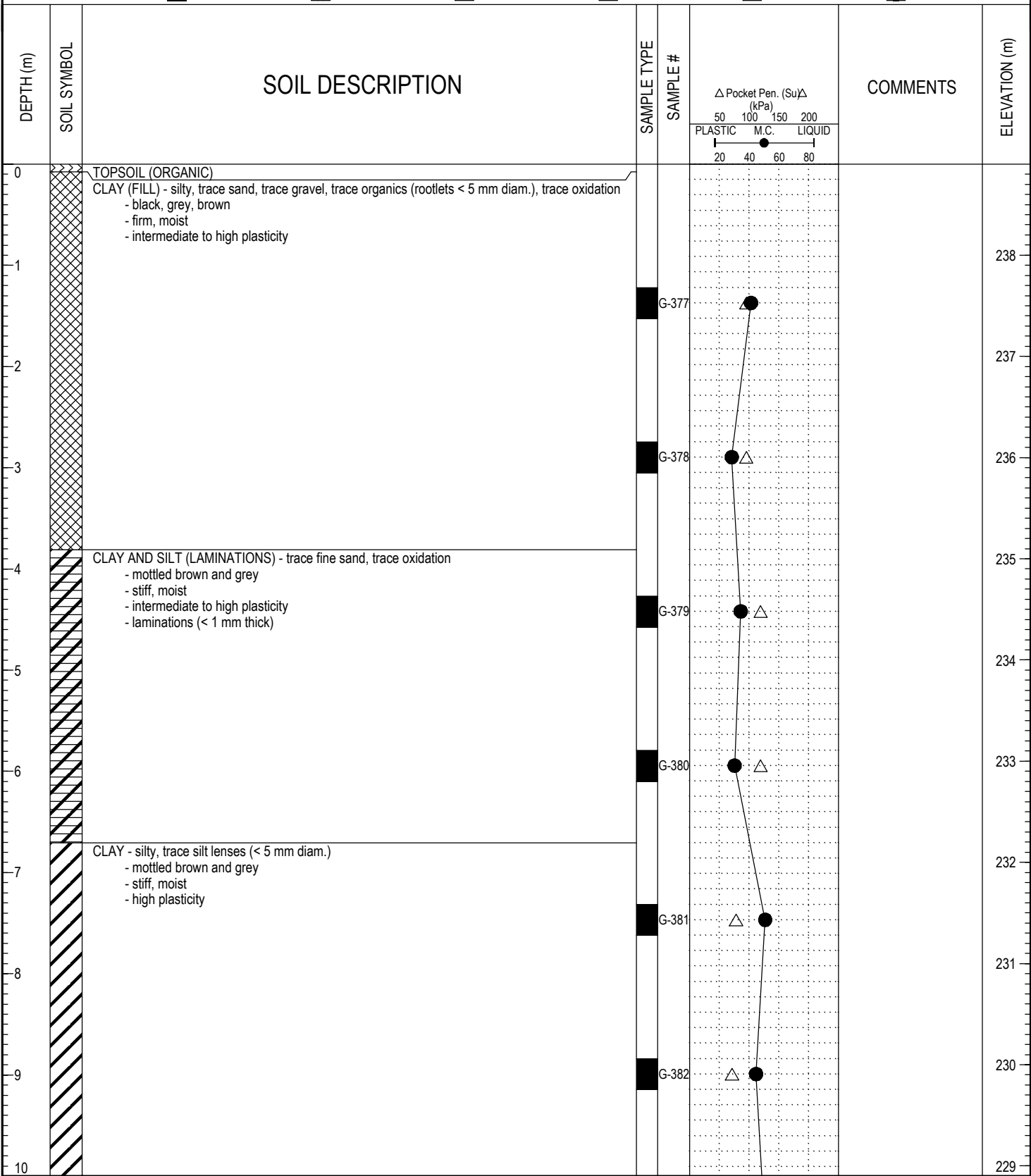
DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	Pocket Pen. (Su) (kPa)	COMMENTS	ELEVATION (m)
20		- light grey - compact, moist to wet - low plasticity					219
21				G-431			218
22							217
23		POWER AUGER REFUSAL AT 22.9 m Notes: 1. Sloughing below 21.9m 2. Water level at 12.8m below ground surface 1 hour after completion of drilling 3. Test hole grouted to 8.1m below ground surface and backfilled with cuttings to surface					216
24							215
25							214
26							213
27							212
28							211
29							210
30							210

LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 22.86 m
REVIEWED BY:	COMPLETION DATE: 15/12/04
PROJECT ENGINEER: Ken Skaffeld	Page 3 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-40
LOCATION: WTP - N 5524019.655 E 647854.567		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Subterranean	METHOD: SoilMech D-312HB, 600mm Auger	ELEVATION (m): 238.899
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK	<input checked="" type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE

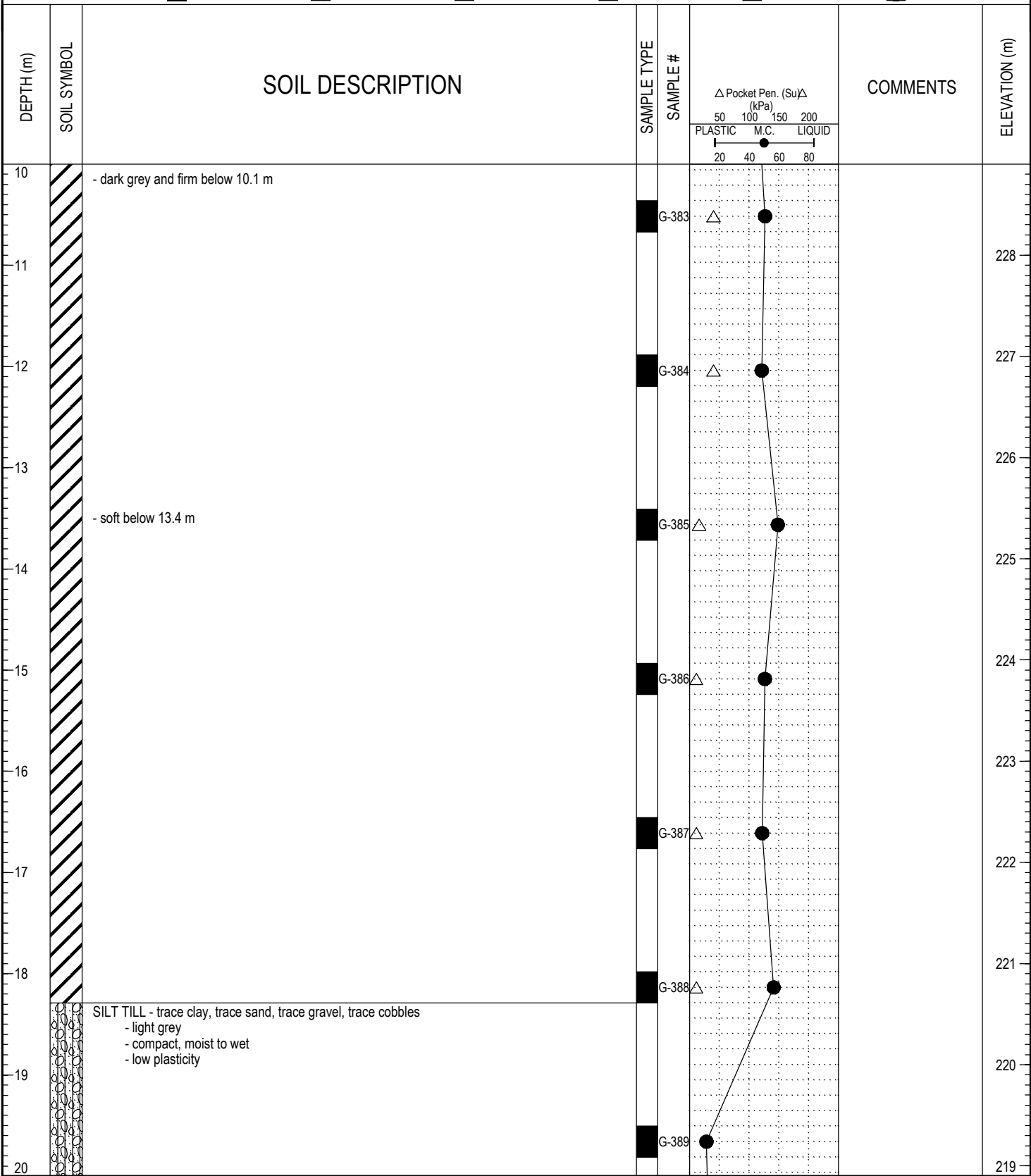


LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 22.56 m
REVIEWED BY:	COMPLETION DATE: 14/12/04
PROJECT ENGINEER: Ken Skaffeld	Page 1 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-40
LOCATION: WTP - N 5524019.655 E 647854.567		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Subterranean	METHOD: SoilMech D-312HB, 600mm Auger	ELEVATION (m): 238.899
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 <input type="checkbox"/> CORE	



LOG OF TESTHOLE - WINNIPEG WATER TREATMENT PLANT.GPJ - UMA.GDT - 17/2/05

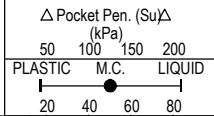


LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 22.56 m
REVIEWED BY:	COMPLETION DATE: 14/12/04
PROJECT ENGINEER: Ken Skaffeld	Page 2 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-40
LOCATION: WTP - N 5524019.655 E 647854.567		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Subterranean	METHOD: SoilMech D-312HB, 600mm Auger	ELEVATION (m): 238.899
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input checked="" type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK	<input checked="" type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	COMMENTS	ELEVATION (m)
20		- till is gravelly and cobbly below 21.9 m				218
21						217
22		END OF TEST HOLE AT 22.6 m IN SILT TILL				216
23		Notes: 1. Power auger refusal not reached due to excessive sloughing and seepage in till layer 2. Sloughing below 22.3 m 3. Seepage at 3.8m (laminated clay) and at 20.7 m (silt till) 4. Water level at 12.2 m below ground surface 2 hours after completion of drilling 5. Test hole grouted to 8.5m below ground surface and backfilled with cuttings to surface				215
24						214
25						213
26						212
27						211
28						210
29						209
30						209

LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 22.56 m
REVIEWED BY:	COMPLETION DATE: 14/12/04
PROJECT ENGINEER: Ken Skaffeld	Page 3 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-41
LOCATION: WTP - N 5524018.150 E 647897.056		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Subterranean	METHOD: SoilMech D-312HB, 600mm Auger	ELEVATION (m): 239.399
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 <input type="checkbox"/> CORE	

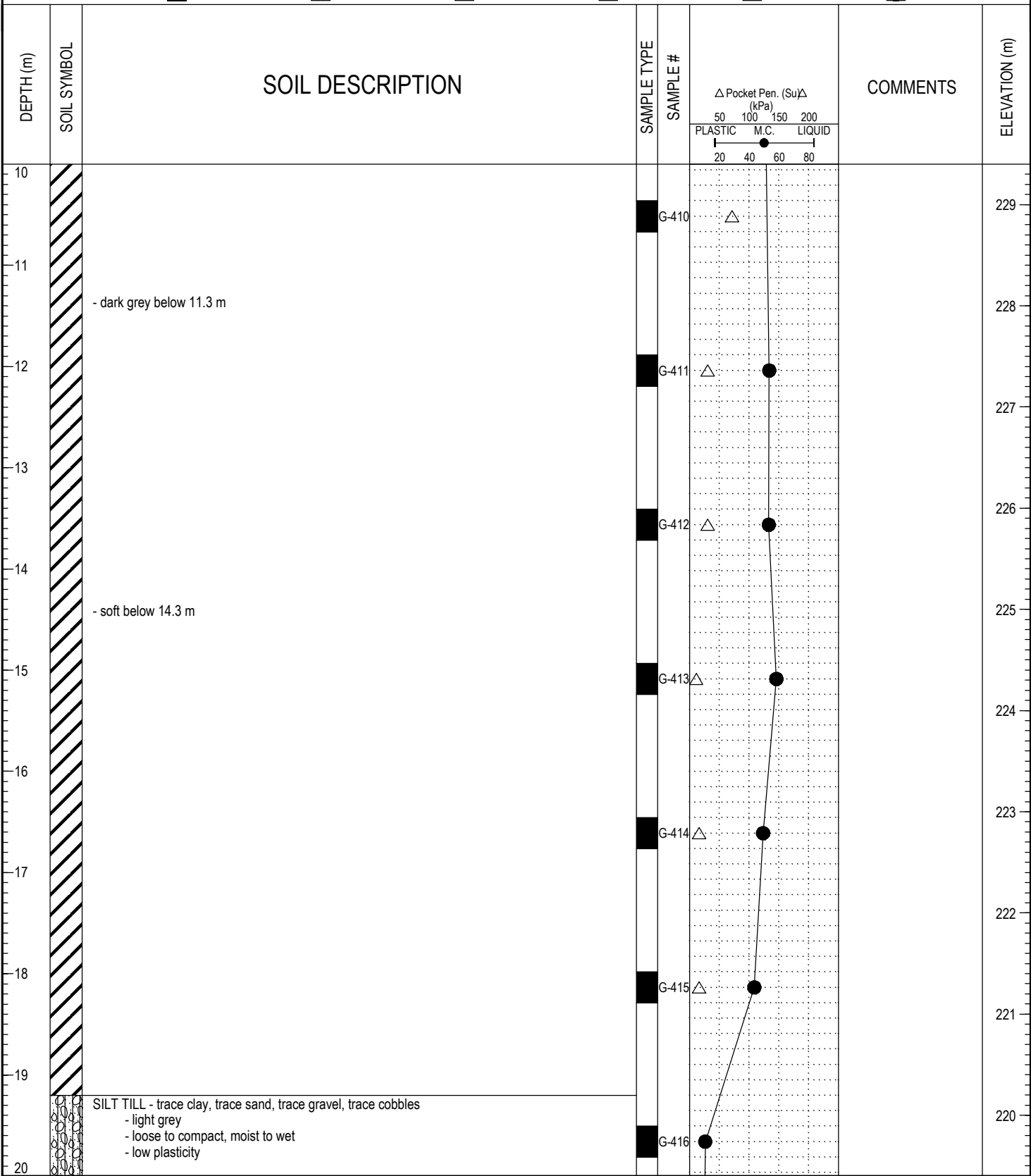
DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	Δ Pocket Pen. (Su)Δ (kPa) 50 100 150 200 PLASTIC M.C. LIQUID 20 40 60 80	COMMENTS	ELEVATION (m)
0	TOPSOIL	CLAY (FILL) - silty, trace gravel, trace sand, trace oxidation, trace rootlets (< 4 mm diam.) - grey, black, brown - stiff, moist - intermediate to high plasticity					239
1				G-404	●		238
3		ORGANIC CLAY - silty, trace fine sand, trace organics (rootlets < 3 mm diam.) - black - stiff, moist - high plasticity - dark grey, no rootlets below 3.7 m		G-405	●		236
4				G-406	●		235
5		CLAY AND SILT (LAMINATED) - trace fine sand, trace to some oxidation - mottled brown and grey - stiff, moist - intermediate to high plasticity - laminations < 1 mm thick		G-407	●		234
6				G-408	●		232
8		CLAY - silty, trace silt lenses (< 8 mm diameter) - dark grey and brown - stiff, moist - high plasticity		G-409	●		231
9					△		230

LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 21.64 m
REVIEWED BY:	COMPLETION DATE: 15/12/04
PROJECT ENGINEER: Ken Skaffeld	Page 1 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-41
LOCATION: WTP - N 5524018.150 E 647897.056		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Subterranean	METHOD: SoilMech D-312HB, 600mm Auger	ELEVATION (m): 239.399
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 <input type="checkbox"/> CORE	



LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05

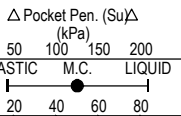


LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 21.64 m
REVIEWED BY:	COMPLETION DATE: 15/12/04
PROJECT ENGINEER: Ken Skaffeld	Page 2 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-41
LOCATION: WTP - N 5524018.150 E 647897.056		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Subterranean	METHOD: SoilMech D-312HB, 600mm Auger	ELEVATION (m): 239.399
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input checked="" type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK	<input checked="" type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE

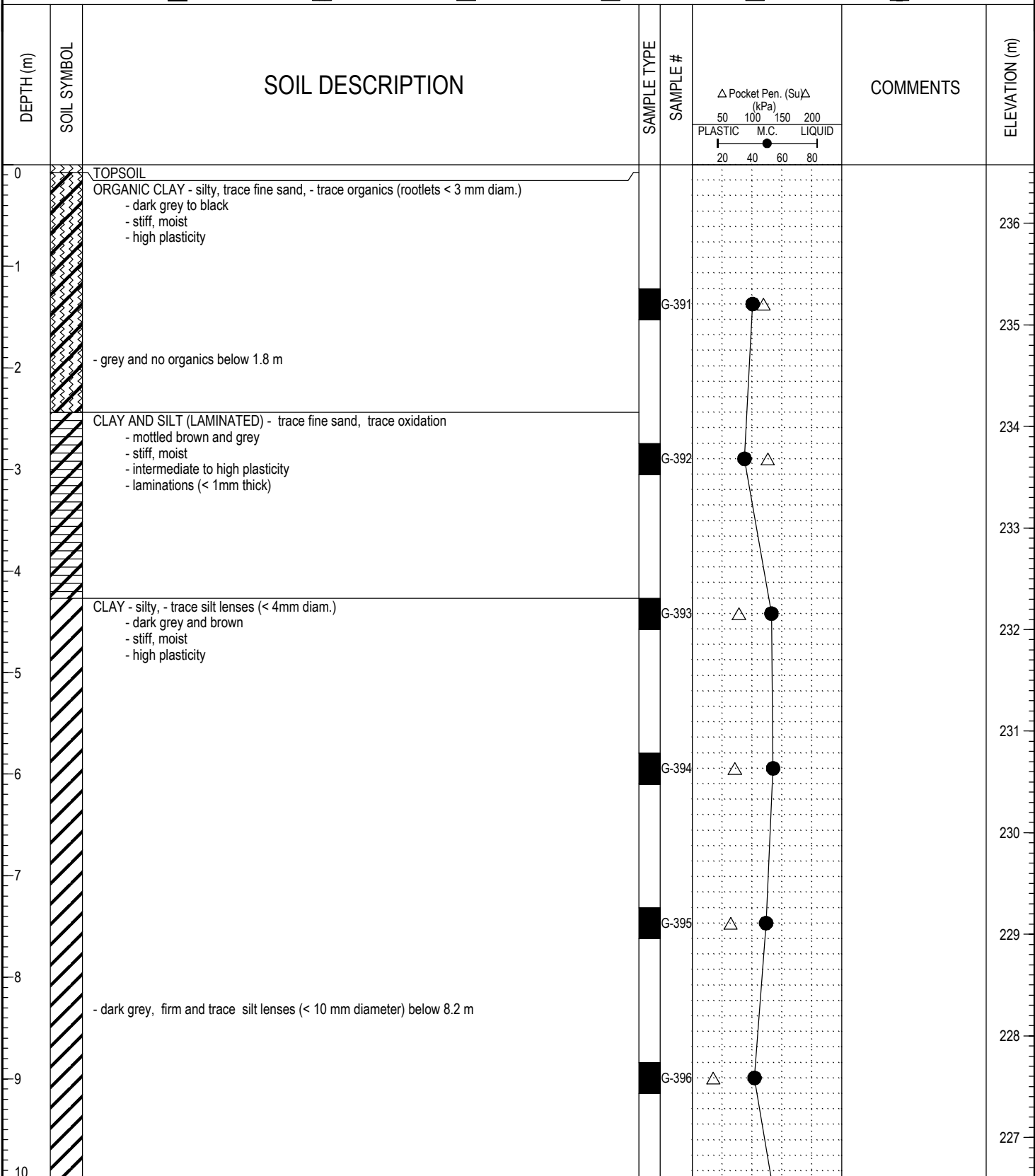
DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	COMMENTS	ELEVATION (m)
20						219
21			<input checked="" type="checkbox"/>	G-417		218
22		POWER AUGER REFUSAL AT 21.6 m Notes: 1. Sloughing below 21.5m 2. Seepage at 21.0m 3. Water level at 19.7m below ground surface 30 minutes after completion of drilling 4. Test hole grouted to 7.7m below ground surface and backfilled to surface				217
23						216
24						215
25						214
26						213
27						212
28						211
29						210
30						210

LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 21.64 m
REVIEWED BY:	COMPLETION DATE: 15/12/04
PROJECT ENGINEER: Ken Skaffeld	Page 3 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-42
LOCATION: WTP - N 5523979.163 E 647888.166		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Subterranean	METHOD: SoilMech D-312HB, 600mm Auger	ELEVATION (m): 236.577
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 <input type="checkbox"/> CORE	

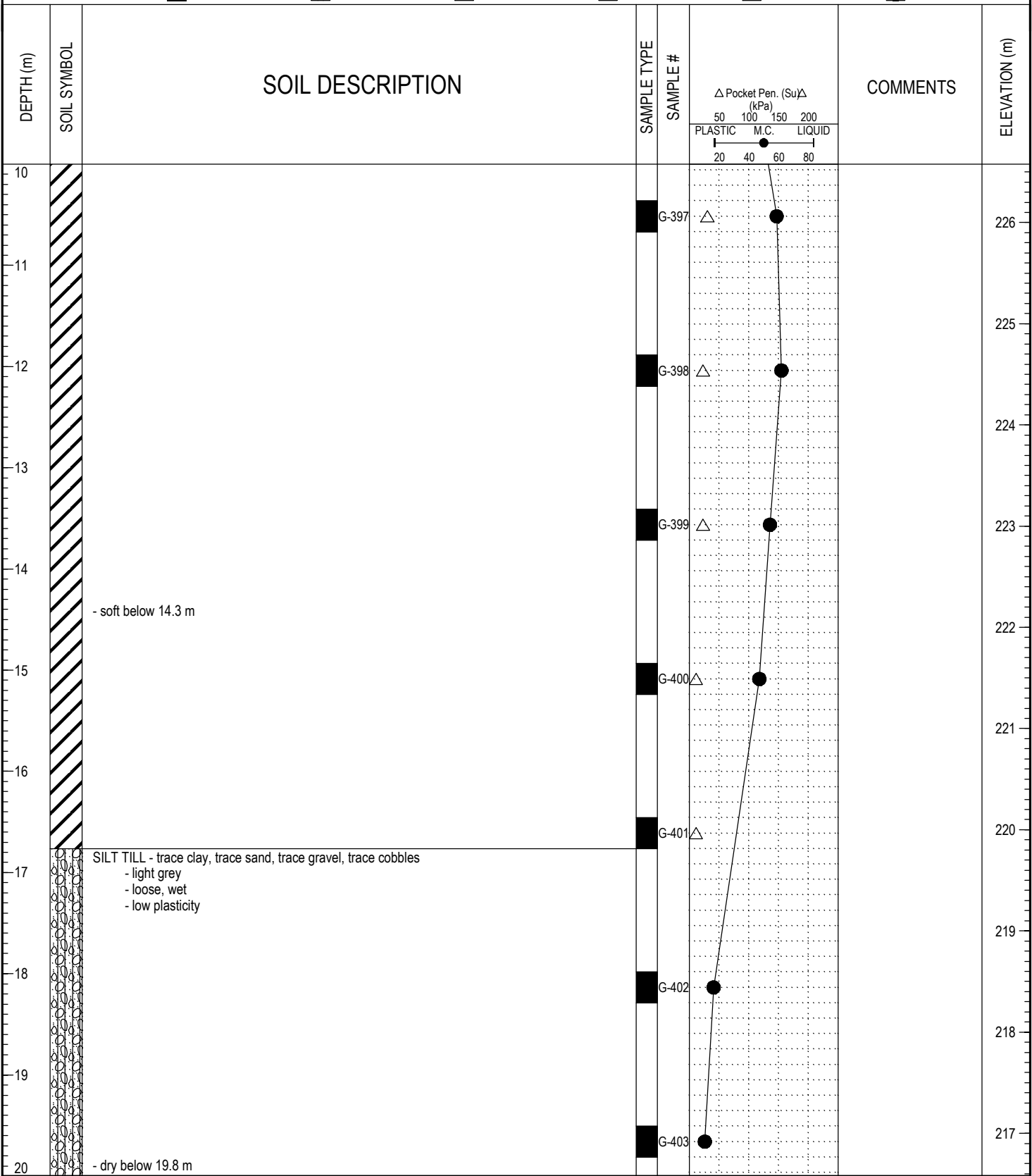


LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 20.12 m
REVIEWED BY:	COMPLETION DATE: 15/12/04
PROJECT ENGINEER: Ken Skaffeld	Page 1 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-42
LOCATION: WTP - N 5523979.163 E 647888.166		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Subterranean	METHOD: SoilMech D-312HB, 600mm Auger	ELEVATION (m): 236.577
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 <input type="checkbox"/> CORE	



LOG OF TESTHOLE - WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 20.12 m
REVIEWED BY:	COMPLETION DATE: 15/12/04
PROJECT ENGINEER: Ken Skaffeld	Page 2 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-42
LOCATION: WTP - N 5523979.163 E 647888.166	PROJECT NO.: 3398-055-00-01-00	
CONTRACTOR: Subterranean	METHOD: SoilMech D-312HB, 600mm Auger	ELEVATION (m): 236.577
SAMPLE TYPE	<input type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input checked="" type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK	<input checked="" type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE

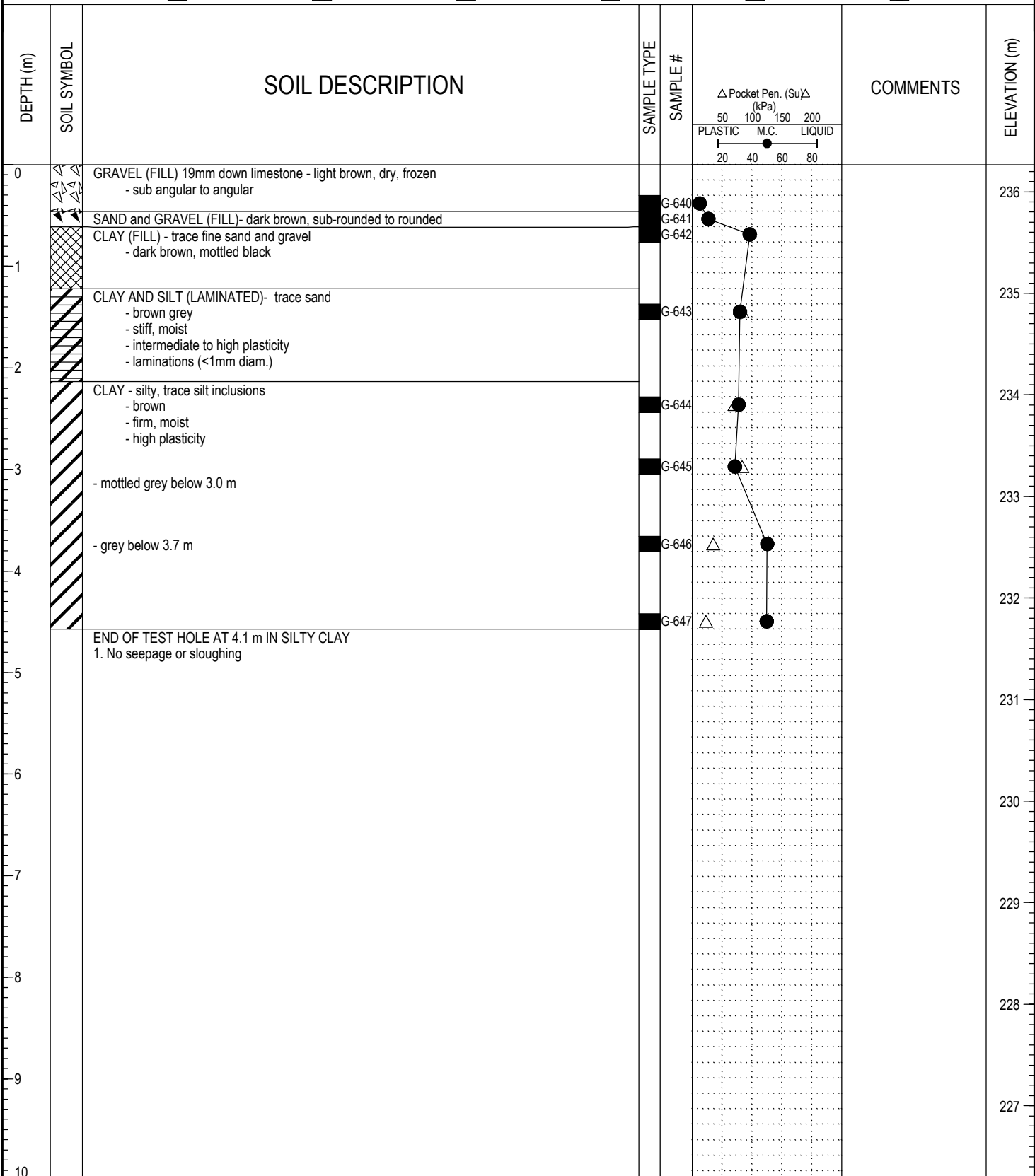
DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	Pocket Pen. (Su) (kPa)	COMMENTS	ELEVATION (m)
					50 100 150 200 PLASTIC M.C. LIQUID 20 40 60 80		
20		POWER AUGER REFUSAL AT 20.1 m Notes: 1. Sloughing below 19.2m 2. Seepage at 19.2m 3. Water level at 9.6m below ground surface 4.5 hours after completion of drilling 4. Test hole grouted to 5.4m below ground surface and backfilled to surface					216
21							215
22							214
23							213
24							212
25							211
26							210
27							209
28							208
29							207
30							

LOG OF TESTHOLE - WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 20.12 m
REVIEWED BY:	COMPLETION DATE: 15/12/04
PROJECT ENGINEER: Ken Skaffeld	Page 3 of 3

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-43
LOCATION: Access Roads - N 5523918.260 E 647838.376		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Maple Leaf Drilling	METHOD: DR 150 - 125 mm Solid Stem Auger	ELEVATION (m): 236.266
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input checked="" type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK	<input checked="" type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE



LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Kate Franklin	COMPLETION DEPTH: 4.57 m
REVIEWED BY:	COMPLETION DATE: 17/12/04
PROJECT ENGINEER: Ken Skaffeld	Page 1 of 1

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-44
LOCATION: Access Roads - N 5523935.322 E 647896.922		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Subterranean	METHOD: SoilMech D-312HB, 600mm Auger	ELEVATION (m): 236.799
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input checked="" type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK	<input checked="" type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	Δ Pocket Pen. (Su)Δ (kPa) 50 100 150 200 PLASTIC M.C. LIQUID 20 40 60 80	COMMENTS	ELEVATION (m)
0		TOPSOIL					
0 - 1		CLAY (FILL)- silty, trace fine sand, trace gravel, trace oxidation, trace organics (rootlets < 2 mm diam) - brown and grey - stiff, moist - intermediate plasticity - desiccated below 0.91 m	<input checked="" type="checkbox"/>	G-467			236
1 - 2		- black, trace sand, trace large gravel and dry to moist below 1.5 m	<input checked="" type="checkbox"/>	G-468			235
2 - 3		CLAY - silty, trace fine sand, trace fine gravel, trace (< 3%) oxidation, trace organics (rootlets < 1 mm diam) - dark grey to brown - very stiff, moist - high plasticity - desiccated below 2.4 m	<input checked="" type="checkbox"/>	G-469			234
3 - 4		CLAY AND SILT (LAMINATED)- trace fine sand,-trace to some oxidation, trace organics (< 1%, rootlets < 1 mm diam) - mottled brown and grey - stiff, moist - intermediate to high plasticity - laminations (<1 mm diam.)	<input checked="" type="checkbox"/>	G-470			233
4 - 4.6		CLAY- silty, trace organics (< 2%, rootlets < 2 mm diameter), trace silt lenses (< 4 mm diam) - dark grey to brown - stiff, moist - high plasticity	<input checked="" type="checkbox"/>	G-471			232
4.6 - 5		END OF TEST HOLE AT 4.6 m IN SILTY CLAY Notes: 1. No seepage or sloughing					232
5 - 6							231
6 - 7							230
7 - 8							229
8 - 9							228
9 - 10							227

LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 4.57 m
REVIEWED BY:	COMPLETION DATE: 15/12/04
PROJECT ENGINEER: Ken Skafffeld	Page 1 of 1

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-45
LOCATION: Access Roads - 5523955.117 E 647815.851		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Subterranean	METHOD: SoilMech D-312HB, 600mm Auger	ELEVATION (m): 236.772
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 <input type="checkbox"/> CORE	

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	Δ Pocket Pen. (Su)Δ (kPa) 50 100 150 200 PLASTIC M.C. LIQUID 20 40 60 80	COMMENTS	ELEVATION (m)
0	TOPSOIL	CLAY (FILL) - silty, trace gravel, trace fine sand, - trace oxidation, trace organics (rootlets < 2 mm diam) - brown and grey - stiff, moist - intermediate to high plasticity	GRAB	G-463	●		236
2		CLAY- silty, trace fine sand, trace fine gravel, trace (< 3%) oxidation, trace organics (rootlets < 1 mm diam) - dark grey to brown - very stiff, moist - high plasticity - desiccated - stiff below 2.0 m	GRAB	G-464	●	△	235
3		CLAY AND SILT (LAMINATED)- trace fine sand, trace to some oxidation, trace organics (< 1%, rootlets < 1 mm diam.) - mottled brown and grey - stiff, moist - intermediate to high plasticity - laminations (< 1mm thick)	GRAB	G-465	●	△	234
4		CLAY -silty, trace organics (< 2%, rootlets < 2 mm diam), trace silt lenses (< 4 mm diam) - dark grey to brown - stiff, moist - high plasticity	GRAB	G-466	●	△	233
5		END OF TEST HOLE AT 4.6 m IN CLAY Notes: 1. No seepage or sloughing					232
6							231
7							230
8							229
9							228
10							227

LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 4.57 m
REVIEWED BY:	COMPLETION DATE: 15/12/04
PROJECT ENGINEER: Ken Skaffeld	Page 1 of 1

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-46
LOCATION: Access Roads - N 5524112.335 647648.893		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Subterranean	METHOD: SoilMech D-312HB, 600mm Auger	ELEVATION (m): 236.479
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK	<input checked="" type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	Δ Pocket Pen. (Su)Δ (kPa) 50 100 150 200 PLASTIC M.C. LIQUID 20 40 60 80	COMMENTS	ELEVATION (m)
0	TOPSOIL						
0		ORGANIC CLAY -silty, trace fine sand, trace to some oxidation, trace organics (rootlets < 5 mm diam.) - dark grey to black - stiff, moist - high plasticity - dessicated		G-458			236
1		CLAY - silty, trace organics (<4%, rootlets, < 2 mm diam.) - grey - stiff, moist - high plasticity		G-459			235
2		CLAY AND SILT (LAMINATED)- trace fine sand, trace to some oxidation, trace organics (rootlets < 1 mm diam.) - mottled brown and grey - stiff, moist - high plasticity - laminations (< 1 mm thick)		G-460			234
3		CLAY - silty, trace organics (< 2%, rootlets, < 2 mm diam.), silt lenses (< 4 mm diam.) - dark grey to brown - stiff, moist - high plasticity		G-461			233
4		CLAY - silty, trace organics (< 2%, rootlets, < 2 mm diam.), silt lenses (< 4 mm diam.) - dark grey to brown - stiff, moist - high plasticity		G-462			232
5		END OF TEST HOLE AT 4.6 m IN SILTY CLAY Notes: 1. No seepage or sloughing					232
6							231
7							230
8							229
9							228
10							227

LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 4.57 m
REVIEWED BY:	COMPLETION DATE: 15/12/04
PROJECT ENGINEER: Ken Skaffeld	Page 1 of 1

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-47
LOCATION: Access Roads - N 5524177.032 E 647667.626		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Subterranean	METHOD: SoilMech D-312HB	ELEVATION (m): 236.976

SAMPLE TYPE GRAB SHELBY TUBE SPLIT SPOON BULK NO RECOVERY CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	Δ Pocket Pen. (Su)Δ (kPa) 50 100 150 200 PLASTIC M.C. LIQUID 20 40 60 80	COMMENTS	ELEVATION (m)
0	TOPSOIL	CLAY - silty, trace fine sand, trace gravel, trace organics (<4%, rootlets < 2 mm diameter), trace oxidation - brown and grey - firm, moist - high plasticity - dessicated		G-453			236
1		CLAY AND SILT (LAMINATED) - trace sand, trace oxidation - mottled brown and grey - stiff, moist - intermediate to high plasticity - laminations (< 1 mm thick)		G-454			235
2		CLAY - silty - grey and brown - stiff, moist - high plasticity - dessicated		G-455			234
3		CLAY AND SILT (LAMINATED) - silty, trace sand, trace oxidation - mottled brown and grey - stiff, moist - intermediate to high plasticity - laminations (< 1 mm thick)		G-456			233
4		END OF TEST HOLE AT 4.6 m IN SILTY CLAY Notes: 1. No seepage or sloughing		G-457			232
5							231
6							230
7							229
8							228
9							228
10							228

LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 4.57 m
REVIEWED BY:	COMPLETION DATE: 15/12/04
PROJECT ENGINEER: Ken Skaffeld	Page 1 of 1

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-48
LOCATION: Access Roads - N 5524184.233 E 647726.958		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Subterranean	METHOD: SoilMech D-312HB, 600mm Auger	ELEVATION (m): 236.211
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK	<input checked="" type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE

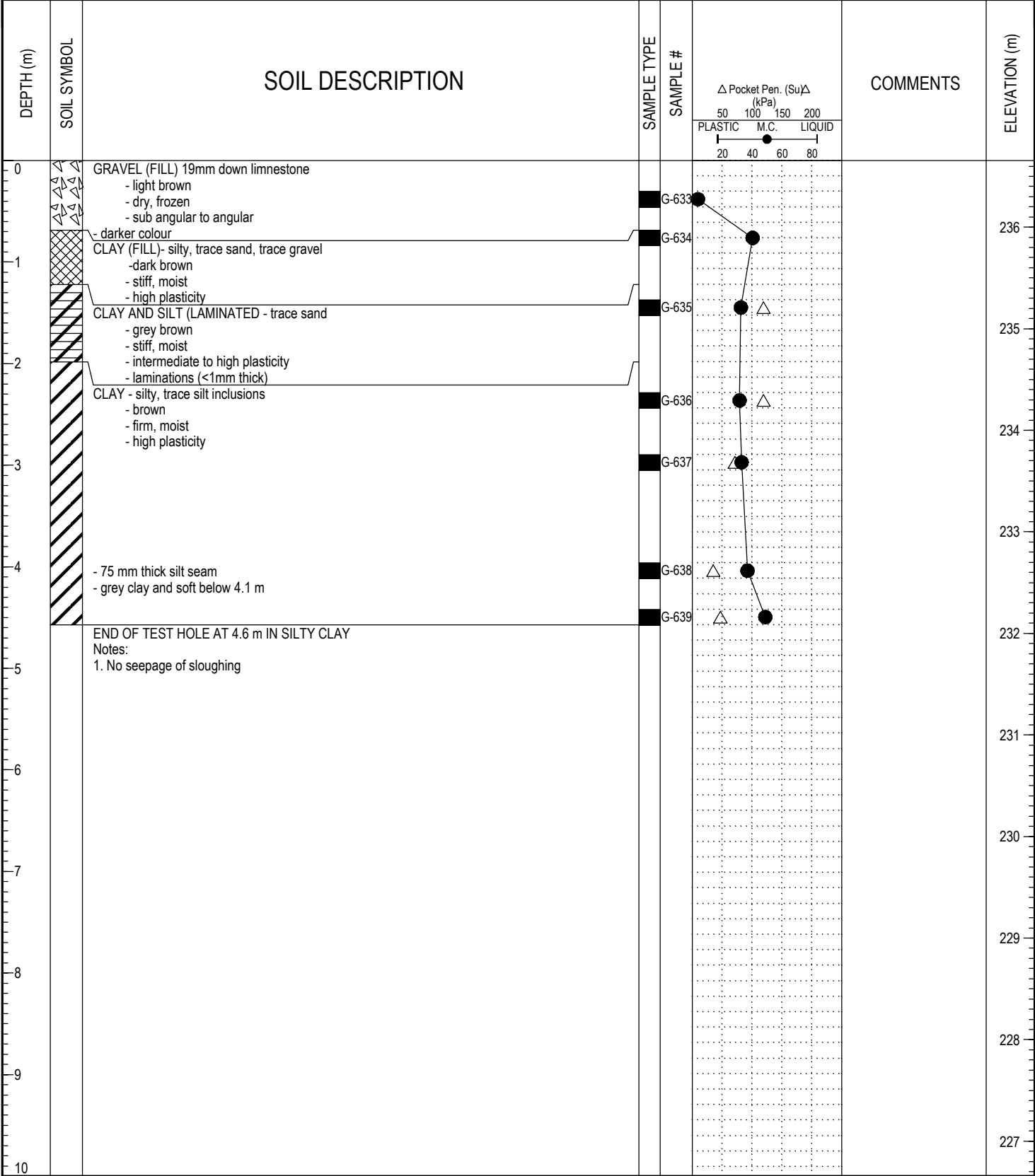
DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	Δ Pocket Pen. (Su)Δ (kPa) 50 100 150 200 PLASTIC M.C. LIQUID 20 40 60 80	COMMENTS	ELEVATION (m)
0	TOPSOIL	CLAY - silty, trace fine sand, trace gravel, trace oxidation, trace organics (<4%, rootlets < 2 mm diam.) - brown - firm, moist - high plasticity		G-447	●		236
1				G-448	▲		235
2				G-449	▲		234
3		CLAY AND SILT (LAMINATED)- trace sand, trace oxidation - mottled brown and grey - stiff, moist - intermediate to high plasticity - laminations (< 1mm thick)		G-450	●		233
4		CLAY- silty, trace oxidation, trace silt lenses (< 4 mm diam) - grey and brown - stiff, moist - high plasticity		G-451	●		232
4.57		END OF TEST HOLE AT 4.6 m IN SILTY CLAY Notes: 1. No seepage or sloughing		G-452	●		231
5							230
6							229
7							228
8							227
9							
10							

LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Nelson Ferreira	COMPLETION DEPTH: 4.57 m
REVIEWED BY:	COMPLETION DATE: 15/12/04
PROJECT ENGINEER: Ken Skaffeld	Page 1 of 1

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-49
LOCATION: Access Roads - N 5523907.744 E 648028.131		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Maple Leaf Drilling	METHOD: DR 150 - 125 mm Solid Stem Auger	ELEVATION (m): 236.656
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 <input type="checkbox"/> CORE	

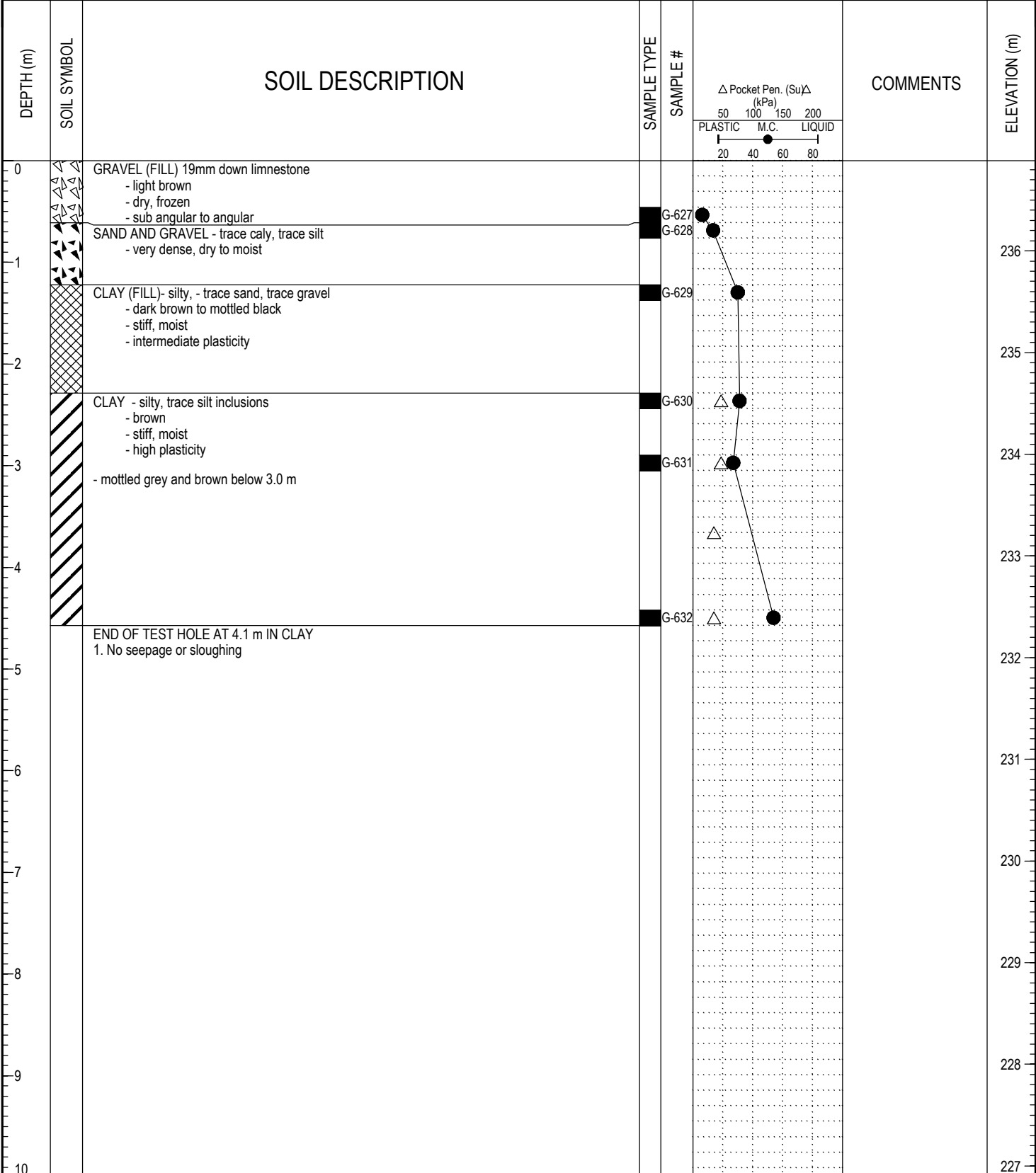


LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Kate Franklin	COMPLETION DEPTH: 4.57 m
REVIEWED BY:	COMPLETION DATE: 17/12/04
PROJECT ENGINEER: Ken Skaffeld	Page 1 of 1

PROJECT: Winnipeg Water Treatment Plant	CLIENT: City of Winnipeg (Earth Tech Canada Ltd.)	TESTHOLE NO: 04-50
LOCATION: Access Roads - N 5523911.437 E 648218.067		PROJECT NO.: 3398-055-00-01-00
CONTRACTOR: Maple Leaf Drilling	METHOD: DR 150 - 125 mm Solid Stem Auger	ELEVATION (m): 236.888
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 <input type="checkbox"/> CORE	

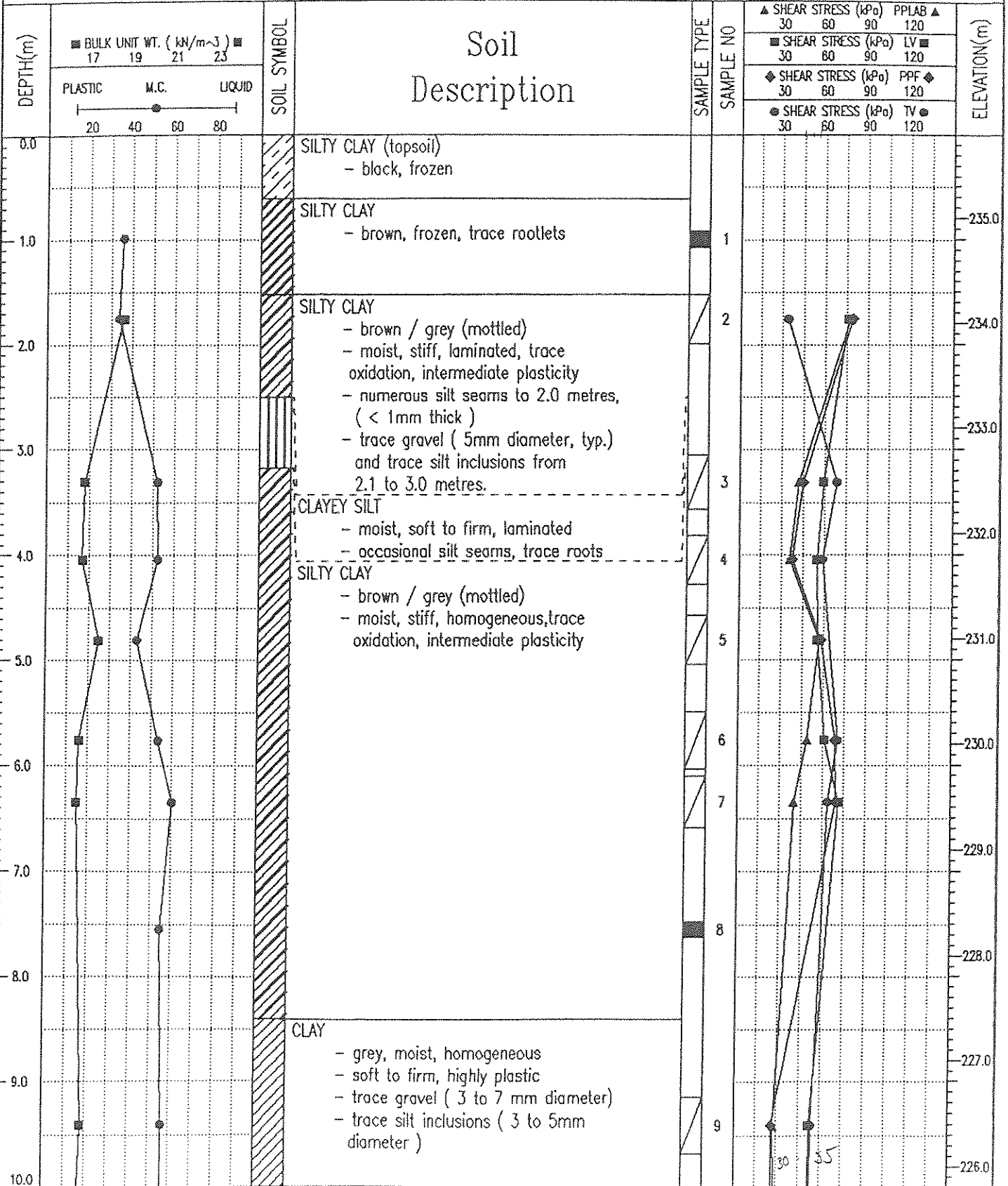


LOG OF TESTHOLE WINNIPEG WATER TREATMENT PLANT.GPJ UMA.GDT 17/2/05



LOGGED BY: Kate Franklin	COMPLETION DEPTH: 4.57 m
REVIEWED BY:	COMPLETION DATE: 17/12/04
PROJECT ENGINEER: Ken Skaffeld	Page 1 of 1

PROJECT: DEACON DRAINAGE STRUCTURE	DRILLED BY: PADDOCK DRILLING LIMITED	BOREHOLE NO: TH-1
CLIENT: CH2M G&S / CITY OF WINNIPEG	DRILL TYPE: ACKER MP5, 125 mm SS AUGERS	PROJECT NO: 4895-006-07-01
PROJECT ENGINEER: DY	LOCATION: STN 20693.3, 14m S OF BR-1 C/L	ELEVATION: 235.794 (m)
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB SAMPLE <input checked="" type="checkbox"/> SHELBY TUBE <input checked="" type="checkbox"/> DISTURBED <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> WIRE LINE-TYPE	

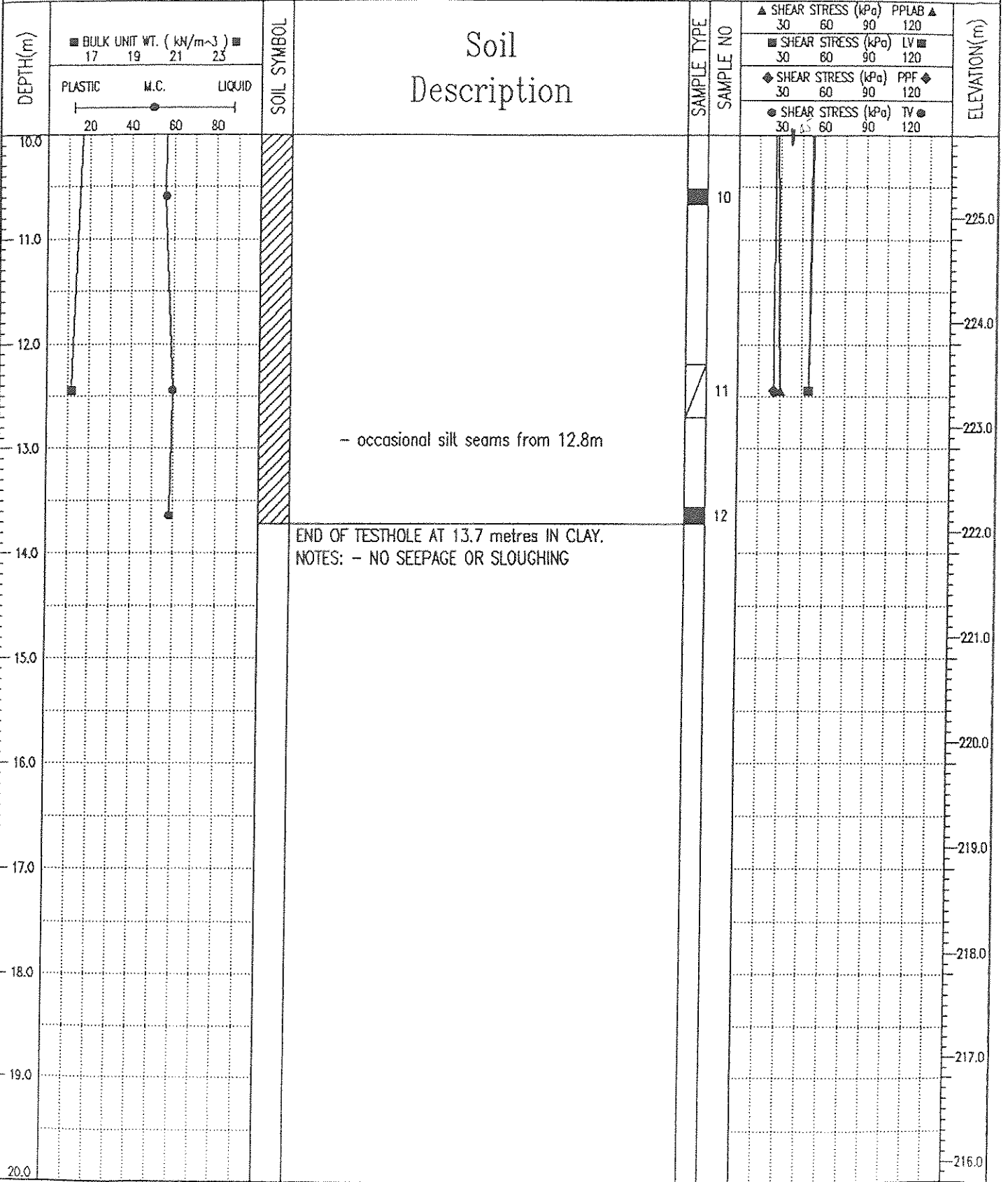


UMA Environmental
Winnipeg Manitoba

LOGGED BY: CR
REVIEWED BY: KS
Fig. No:

COMPLETION DEPTH: 13.7 m
COMPLETE: 16/02/96

PROJECT: DEACON DRAINAGE STRUCTURE	DRILLED BY: PADDOCK DRILLING LIMITED	BOREHOLE NO: TH-1
CLIENT: CH2M G&S / CITY OF WINNIPEG	DRILL TYPE: ACKER MP5, 125 mm SS AUGERS	PROJECT NO: 4895-006-07-01
PROJECT ENGINEER: DY	LOCATION: STN 20693.3, 14m S OF BR-1 C/L	ELEVATION: 235.794 (m)
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB SAMPLE <input checked="" type="checkbox"/> SHELBY TUBE <input checked="" type="checkbox"/> DISTURBED <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> WIRE LINE-TYPE	

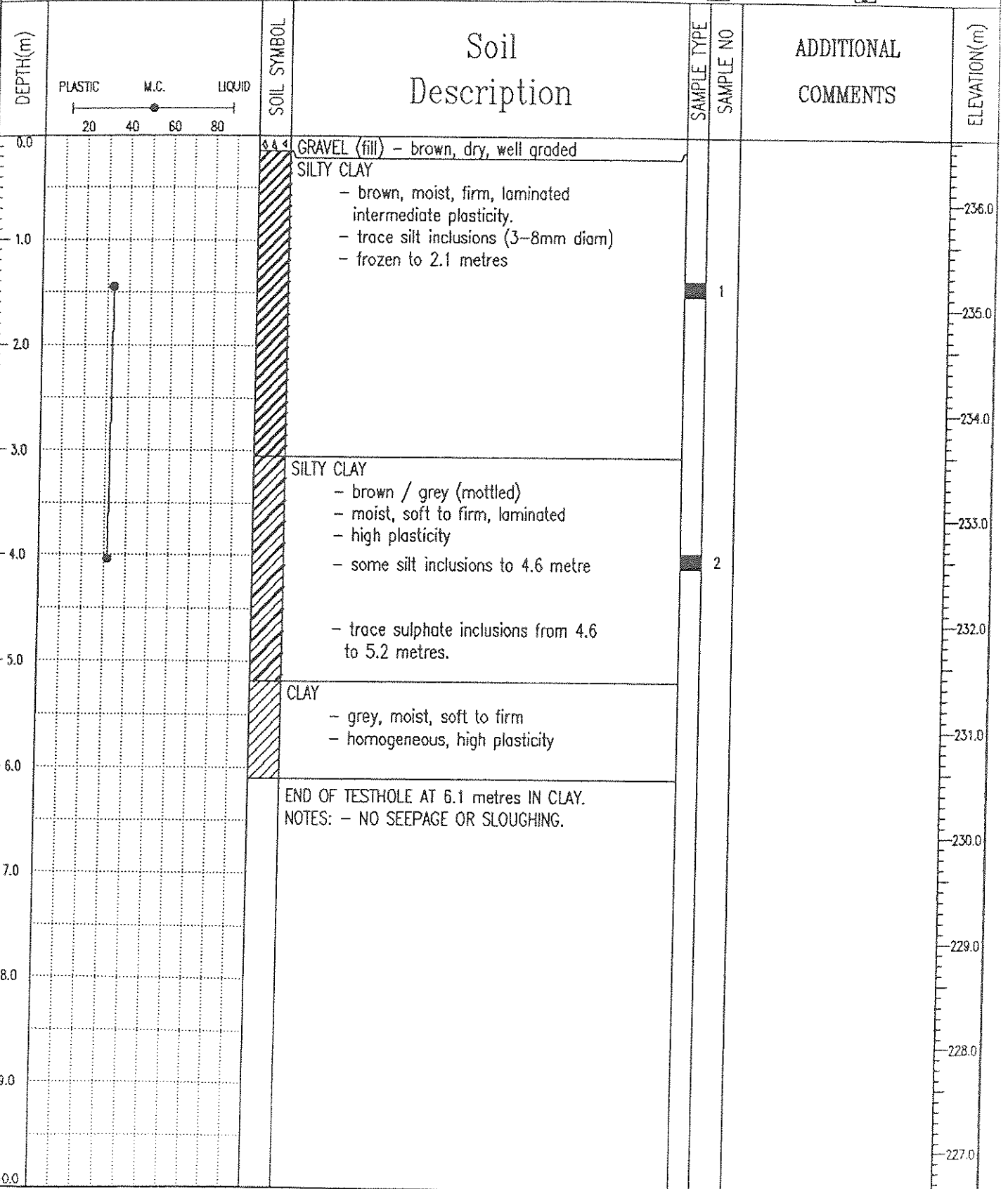


UMA Environmental
Winnipeg, Manitoba

LOGGED BY: GR
REVIEWED BY: KS
Fig. No:

COMPLETION DEPTH: 13.7 m
COMPLETE: 16/02/96

PROJECT: DEACON DRAINAGE STRUCTURE	DRILLED BY: PADDOCK DRILLING LIMITED	BOREHOLE NO: TH-2
CLIENT: CH2M G&S / CITY OF WINNIPEG	DRILL TYPE: ACKER MP5, 125 mm SS AUGERS	PROJECT NO: 4895-006-07-01
PROJECT ENGINEER: DY	LOCATION: STN 20629m, 10m S OF BR-1 C/L	ELEVATION: 236.633 (m)
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB SAMPLE	<input checked="" type="checkbox"/> SHELBY TUBE
	<input checked="" type="checkbox"/> DISTURBED	<input type="checkbox"/> NO RECOVERY
	<input type="checkbox"/> SPLIT SPOON	<input type="checkbox"/> WIRE LINE-TYPE




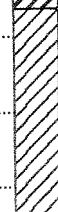
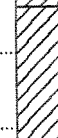


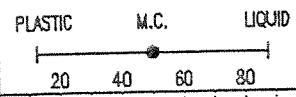
UMA Environmental
Winnipeg, Manitoba

LOGGED BY: GR	COMPLETION DEPTH: 6.1 m
REVIEWED BY: KS	COMPLETE: 16/02/96
Fig. No:	Page 1 of 1

PROJECT: DEACON DRAINAGE STRUCTURE	DRILLED BY: PADDOCK DRILLING LIMITED	BOREHOLE NO: TH-3
CLIENT: CH2M G&S / CITY OF WINNIPEG	DRILL TYPE: ACKER MP5, 125 mm SS AUGERS	PROJECT NO: 4895-006-07-01
PROJECT ENGINEER: DY	LOCATION: STN 20556m, 8m S OF BR-1 C/L	ELEVATION: 236.222 (m)

SAMPLE TYPE GRAB SAMPLE SHELBY TUBE DISTURBED NO RECOVERY SPLIT SPOON WIRE LINE-TYPE

DEPTH(m)	SOIL SYMBOL	Soil Description	SAMPLE TYPE	SAMPLE NO	ADDITIONAL COMMENTS	ELEVATION(m)
0.0		SILTY CLAY (fill) - brown, frozen - trace gravel				236.0
1.0		SILTY CLAY (topsoil) - black, frozen				235.0
2.0		SILTY CLAY - brown, moist, firm, laminated - high plasticity - trace gravel (3mm diameter typ.)				234.0
3.0						233.0
4.0		CLAY - grey, moist, firm, homogeneous - high plasticity - some silt inclusions - trace gravel (4mm diameter typ.) - soft to firm from 4.8 to 5.2metres				232.0
5.0						231.0
6.0		CLAY - grey, moist, firm, homogeneous - high plasticity, trace silt inclusions				230.0
7.0		END OF TESTHOLE AT 6.1 metres IN CLAY. NOTES: - NO SEEPAGE OR SLOUGHING.				229.0
8.0						228.0
9.0						227.0
10.0						



UMA Environmental
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LOGGED BY: GR	COMPLETION DEPTH: 6.1 m
REVIEWED BY: KS	COMPLETE: 16/02/96
Fig. No:	Page 1 of 1



R.M. HARDY & ASSOCIATES LTD.
CONSULTING ENGINEERING & TESTING

SUMMARY OF SAMPLING & LABORATORY TESTS

PROJECT

DEACON RESERVOIR

CK'D

DATE OF INVESTIGATION

JOB NO W-0420

HOLE 3

CONTENT				SOIL PROFILE				SOIL SAMPLES			
				SOIL DESCRIPTION	SOIL SYMBOL	UNIFIED CLASSIF	CONDITION	TYPE	PENETRATION RESISTANCE	RECOVERY %	OTHER TESTS
WATER CONTENT - %				DEPTH DATUM							
w _p - □				FEET							
w - ○											
w _L - Δ											
SURFACE ELEVATION											
				36	CLAY, SILTY, STIFF						$q_u = 2060 \text{ psf}$ $e_f = 4.4\%$ $\gamma = 105.2 \text{ pcf}$ $\gamma_d = 71.8 \text{ pcf}$
				37							
				38							
				39							
				40							
				41							
				42							
				43							
				44							
				45							
				46	TILL, LIGHT BROWN, SILT WITH SOME SAND, CLAY, GRAVEL UP TO 3" SIZE VERY DENSE, 65'						$q_u = 2067 \text{ psf}$ $e_f = 6.6\%$ $\gamma = 112.0 \text{ pcf}$ $\gamma_d = 73.3 \text{ pcf}$
				47							
				48							
				49							
				50							
				51							
				52							
				53							
				54							
				55							
				56	SEEPAGE ON ROCK SURFACE AT 70' END OF HOLE (REVIS'D)						
				57							
				58							
				59							
				60							
				61							
				62							
				63							
				64							
				65							
				66	SEEPAGE ON ROCK SURFACE AT 70' END OF HOLE (REVIS'D)						
				67							
				68							
				69							
				70							



R.M. HARDY & ASSOCIATES LTD.
CONSULTING ENGINEERING & TESTING

SUMMARY OF SAMPLING & LABORATORY TESTS

PROJECT
DEACON RESERVOIR

BY A.L.B.

CXD

DATE OF INVESTIGATION MARCH 23, 1971

JOB NO W-0420

HOLE 3

TEST CONTENT

SOIL PROFILE

SOIL SAMPLES

SOIL DESCRIPTION

DAYUM

SOIL SYMBOL

UNITED CLAMPS

CONDITION

TYPE

PENETRATION RESISTANCE

RECOVERY %

OTHER TESTS

SURFACE ELEVATION

DEPTH FEET

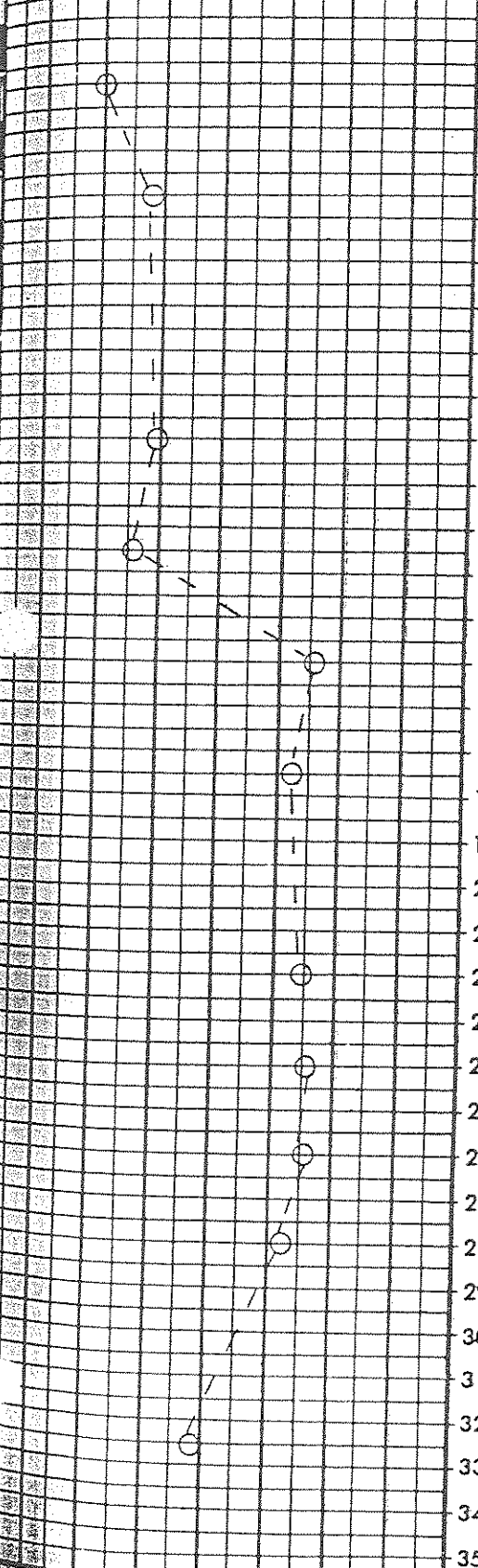
WATER CONTENT - %

10 20 30 40 50 60 70

w_p - □

w - ○

w_L - △



1 TOPSOIL, SILT

4 CLAYEY SILT
TO
6 SILTY CLAY,
FIRM

13 CLAY, GREY,
SILTY, STIFF

CH

$q_u = 1903$ psf
 $e_f = 7.5\%$
 $\gamma = 117.7$ pcf
 $\gamma_d = 87.7$ pcf

$q_u = 2778$ psf
 $e_f = 3.0\%$
 $\gamma = 109.7$ pcf
 $\gamma_d = 71.4$ pcf

$q_u = 2930$ psf
 $e_f = 3.2\%$
 $\gamma = 119.1$ pcf
 $\gamma_d = 78.8$ pcf

PLATE 8

PROJECT

DEACON RESERVOIR

L.B.

C'D

DATE OF INVESTIGATION MAR 24 1957

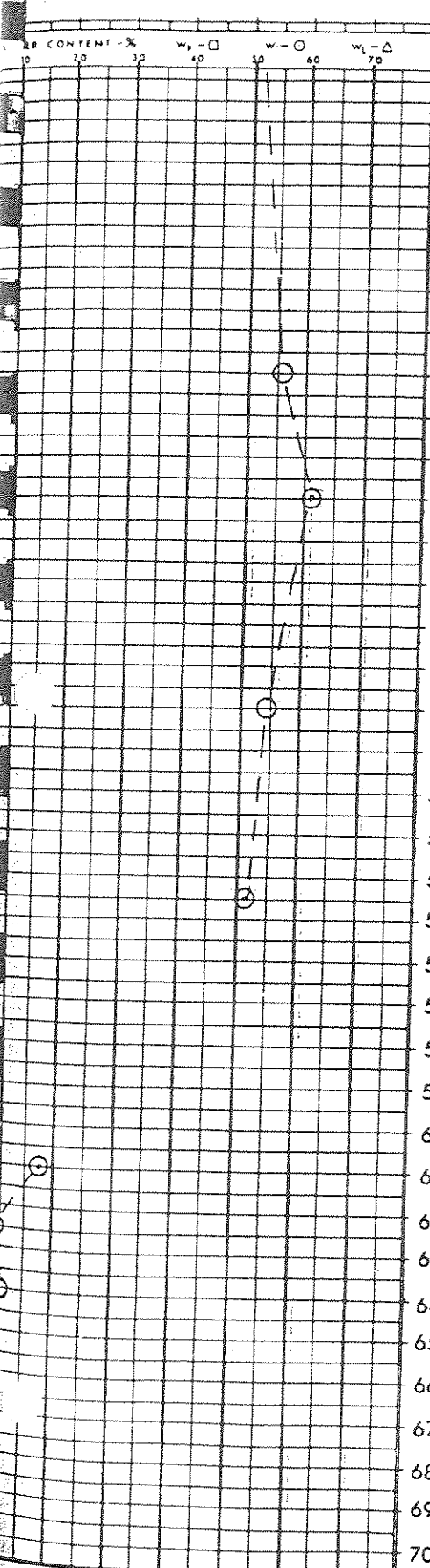
LOG NO W-0420

HOLE 4

WATER CONTENT

SOIL PROFILE

SOIL SAMPLES



DEPTH FEET	SOIL DESCRIPTION	SOIL SYMBOL	UNIFIED CLASSIF.
36	CLAY, STIFF		
37			
38		CH	
39			
40			
41			
42			
43			
44			
45			
46			
47			
48			
49			
50			
51			
52			
53			
54			
55			
56	GLACIAL SILT TILL		
57	- GRAVELLY		
58	- FREQUENT		
59	COBBLES, BOULDERS		
60	- FIRM		
61			
62			
63	- DENSE		
64			
65			
66	END OF HOLE (ROCK ENCOUNTERED)		
67			
68	GROUNDWATER LEVEL AT 66'		
69			
70			

DATUM	CONDITION	TYPE	PERMEATION RESISTANCE	RECOVERY %	OTHER TESTS
					$q_u = 2348 \text{ psf}$ $e_f = 2.3\%$ $\gamma = 105.1 \text{ pcf}$ $\gamma_d = 67.4 \text{ pcf}$
					$q_u = 2353 \text{ psf}$ $e_f = 3.3\%$ $\gamma = 107.0 \text{ pcf}$ $\gamma_d = 69.4 \text{ pcf}$



R.M. HARDY & ASSOCIATES LTD.
CONSULTING ENGINEERING & TESTING

SUMMARY OF SAMPLING & LABORATORY TESTS

PROJECT
DEACON RESERVOIR

DATE OF INVESTIGATION **MARCH 24, 1977** | JOB NO **W-0420** | HOLE **4**

L.B.
C.K.D.

SOIL PROFILE				SOIL SAMPLES			
DEPTH FEET	DATUM	SOIL DESCRIPTION	SOIL SYMBOL	UNIFIED CLASSIF.	CORRECTION	TYPE	OTHER TESTS
1	SURFACE ELEVATION	CLAY, BROWN, SILTY (CONTAINS SILT LAYERS 4'-12')	[Hatched pattern]	CI			
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22			[Hatched pattern]				$q_u = 3521 \text{ psf}$ $e_f = 2.0\%$ $\gamma = 107.0 \text{ pcf}$ $\gamma_d = 70.3 \text{ pcf}$
23							
24							
25							
26							
27							
28							
29							
30							
31							
32							
33							
34							
35							



R.M. HARDY & ASSOCIATES LTD.
CONSULTING ENGINEERING & TESTING

SUMMARY OF SAMPLING & LABORATORY TESTS

PROJECT
DEACON RESERVOIR

BY A. L. B.

CKD

DATE OF INVESTIGATION MARCH 24, 1977

LOG NO W-0420

HOLE 5

WATER CONTENT

SOIL PROFILE

SOIL SAMPLES

WATER CONTENT - %
10 20 30 40 50 60 70

w_p - □

w - ○

w_L - △

DEPTH DATUM
FEET

SOIL DESCRIPTION

SOIL
SYMBOL

UNIFIED
CLASSIF.

CONDITION

TYPE

PENETRATION
RESISTANCE

RECOVERY %

OTHER TESTS

SURFACE ELEVATION

36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51
52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70

CLAY

CH

$f_u = 1700$
 $\gamma = 104$

$f_u = 1600$
 $\gamma = 107$

TILL (MOIST),
LIGHT BROWN
SILT WITH SOME
SAND, GRAVEL
AND CLAY,
MEDIUM DENSE,
FREQUENT
COBBLES AND
OCCASIONAL
BOULDERS

END OF HOLE

WATER LEVEL
AT 66'



R.M. HARDY & ASSOCIATES LTD.
CONSULTING ENGINEERING & TESTING

SUMMARY OF SAMPLING & LABORATORY TESTS

PROJECT DEACON RESERVOIR

BY A.L.B.

CKD

DATE OF INVESTIGATION MARCH 24, 1957 JOB NO W-0420

NO. 5

WATER CONTENT

SOIL PROFILE

SOIL SAMPLES

WATER CONTENT - %
10 20 30 40 50 60 70
w_p - □ w - ○ w_l - △

DEPTH FEET

DATUM

SURFACE ELEVATION

TOP SOIL

SOIL SYMBOL

UNIFIED CLASSIF.

CONDITION

TYPE

PENETRATION RESISTANCE

RECOVERY %

OTHER TESTS

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
27
28
29
30
31
32
33
34
35

CLAY, FIRM TO STIFF
(CONTAINS NUMEROUS SILT LAYERS TO 11')
SOME COARSE SAND 0.3' - 1.5'

CI-ML

$q_u = 1039 \text{ psf}$
 $e_f = 2.3\%$
 $\gamma = 104.6 \text{ pcf}$
 $\gamma_d = 67.7 \text{ pcf}$

$q_u = 2034 \text{ psf}$
 $e_f = 2.5\%$
 $\gamma = 108.7 \text{ pcf}$
 $\gamma_d = 72.2 \text{ pcf}$

$q_u = 2200$
 $\gamma = 106$



R.M. HARDY & ASSOCIATES LTD.
CONSULTING ENGINEERING & TESTING

SUMMARY OF SAMPLING & LABORATORY TESTS

PROJECT
DEACON RESERVOIR

BY A.L.B.

CEO

DATE OF INVESTIGATION MARCH 24, 1957

JOB NO W-0420

NO. 6

WATER CONTENT

SOIL PROFILE

SOIL SAMPLES

WATER CONTENT - %
10 20 30 40 50 60 70

DEPTH
FEET

DATUM

SOIL DESCRIPTION

SOIL
SYMBOL

UNIFIED
CLASSIF

CONDITION

TYPE

PENETRATION
RESISTANCE

RECOVERY %

OTHER TESTS

SURFACE ELEVATION

CLAY, GREY
FIRM TO
STIFF

$q_u = 1662 \text{ psf}$
 $e_f = 7.1\%$
 $\gamma = 106.0 \text{ pcf}$
 $\gamma_d = 63.5 \text{ pcf}$

SILT TILL
- GRAVELLY
- MOIST
- FIRM
- VERY DENSE

$q_u = 2200 \text{ psf}$
 $e_f = 6.5\%$
 $\gamma = 109.5 \text{ pcf}$
 $\gamma_d = 75.5 \text{ pcf}$

WATER LEVEL AT 69'

END OF HOLE
(REFUSAL)



BY A. L. B.

CEO

DATE OF INVESTIGATION MARCH 24, 1977 JOB NO M-0420 HOLE 6

WATER CONTENT

SOIL PROFILE

SOIL SAMPLES

SOIL DESCRIPTION

DEPTH DATUM

SOIL
SYMBOL
UNIFIED
CLASSIF.

CONDITION

TYPE

PENETRATION
RESISTANCE

RECOVERY %

OTHER TESTS

WATER CONTENT - %
10 20 30 40 50 60 70
w_p - □ w - ○ w_L - △

SURFACE ELEVATION

SILTY SAND

1 TOPSOIL, TREE
2 ROOTS

4 CLAY, BROWN,
5 SILTY, FIRM
6 (CONTAINS SILT
7 LAYERS 3-11',
8 TRACE OF SAND)

12 CLAY, GREY,
13 STIFF
14 OCC. SILT POCKETS

CI-ML

CH

$q_u = 1470$
 $e_f = 2.2$
 $\gamma = 107.1 \text{ pcf}$
 $\gamma_d = 70.9 \text{ pcf}$

$q_u = 2002 \text{ psf}$
 $e_f = 2.4\%$
 $\gamma = 105.2 \text{ pcf}$
 $\gamma_d = 66.8 \text{ pcf}$

$q_u = 2264 \text{ psf}$
 $e_f = 3.7\%$
 $\gamma = 106.0 \text{ pcf}$
 $\gamma_d = 67.9 \text{ pcf}$



R.M. HARDY & ASSOCIATES LTD.
CONSULTING ENGINEERING & TESTING

SUMMARY OF SAMPLING & LABORATORY TEST

PROJECT

DEACON RESERVOIR

BWN. A.L.B.

CK'D.

DATE APRIL 21/77 HOLE R-5

JOB NO. W-0420

PLATE

WATER CONTENT

SOIL PROFILE

SOIL SAMPLES

SOIL DESCRIPTION

DEPTH-DATUM
FEET

SOIL
SYMBOL

UNIFIED
CLASSIF.

CONDITION

TYPE

PENETRATION
RESISTANCE

RECOVERY %

OTHER TEST:

WATER CONTENT - %
10 20 30 40 50 60 70
w_p - □ w - ○ w_L - △

SURFACE ELEVATION

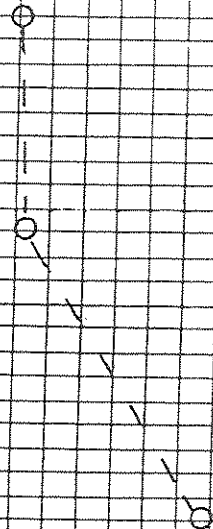
CLAY AND GRAVEL

SAND AND GRAVEL

CLAY, BROWN
(SILTY 4'-11')

END OF HOLE

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DYREGROV CONSULTANTS

BOREHOLE LOG

PROJECT

Proposed Venturi Chambers
Deacon Reservoir

LOGGED/OWN.	SDG	CKD.	AOD.	DATE OF INVEST.	JOB NO.	HOLE NO.				
				21/05/93	931176	1				
WATER CONTENT			DEPTH (M)	SOIL SYMBOL	SOIL DESCRIPTION		SOIL SAMPLE			DRILL TYPE
W _p - □	W - ○	W _L - △			DATUM	CONDITION	TYPE	PENETRATION RESISTANCE	OTHER TESTS	
PERCENT										
10	20	30	40	50	60					
			0	⊗	Fill -clay -some gravel					
			1	⊗						
			2	⊗						
			3	⊗	Clay -mottled brown -highly plastic -silt seams and lenses to 5.2 m					
			4	⊗						
			5	⊗		U			qu=204.6kpa γ _w =18.6kn/m ³ pp=222.6kpa Tv=95.8kpa	
			6	⊗	---grey					
			7	⊗						
			8	⊗		U			qu=130.4kpa γ _w =17.0kn/m ³ pp=138.9kpa Tv=69.2kpa	
			9	⊗						
			10	⊗						
			11	⊗		U			qu=157.7kpa γ _w =16.5kn/m ³ pp=107.7kpa Tv=57.5kpa	
			12	⊗						
			13	⊗						
			14	⊗		U			qu=156.1kpa γ _w =15.9kn/m ³ pp=110.1kpa Tv=54.6kpa	
			15	⊗						
			16	⊗						
			17	⊗						
			18	⊗						
			19	⊗						
					Note: Hole terminated at 19.0 m on glacial till.					

PROJECT

Proposed Venturi Chambers
Deacon Reservoir

GED/DWN

SDG

CKD

AOD

DATE OF INVEST. 21/05/93

JOB NO. 931176

HOLE NO. 2

WATER CONTENT

W_D - □ W - ○ W_L - △
PERCENT %
10 20 30 40 50 60

DEPTH
(M)

SOIL SYMBOL

SOIL DESCRIPTION

SOIL SAMPLE

DRILL TYPE

DATUM

CONDITION

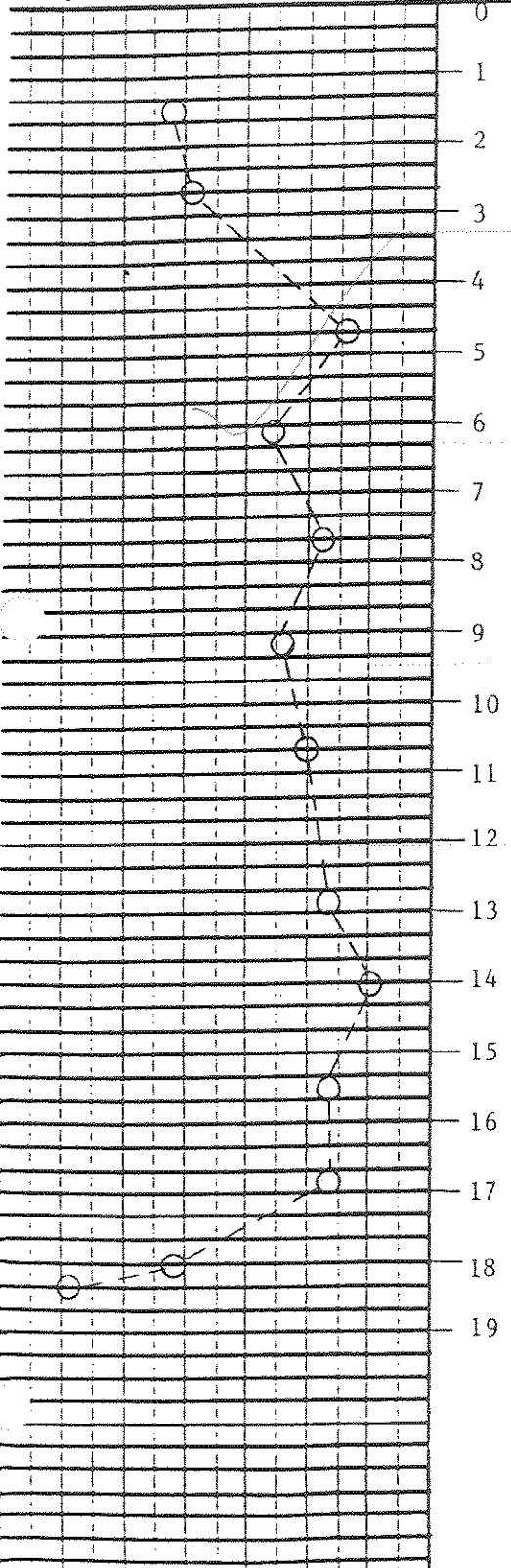
TYPE

PENETRATION
RESISTANCE

400 mm Auger

SURFACE ELEVATION 236.04 M

OTHER TESTS



Fill -clay, trace gravel

Clay -mottled brown
-highly plastic
-silt seams and lenses to 3.8 m
-stiff to firm

grey

Glacial Till

-silty, sandy, gravelly
-tan, clay seams
-cobble and bouldery
-wet
-compact to medium dense below 18.2 m

Note:

Hole terminated at 18.9 m in glacial till.

qu=60.5kpa
 $\gamma_w = 17.6 \text{kn/m}^3$
pp=117.3kpa
Tv=81.4kpa

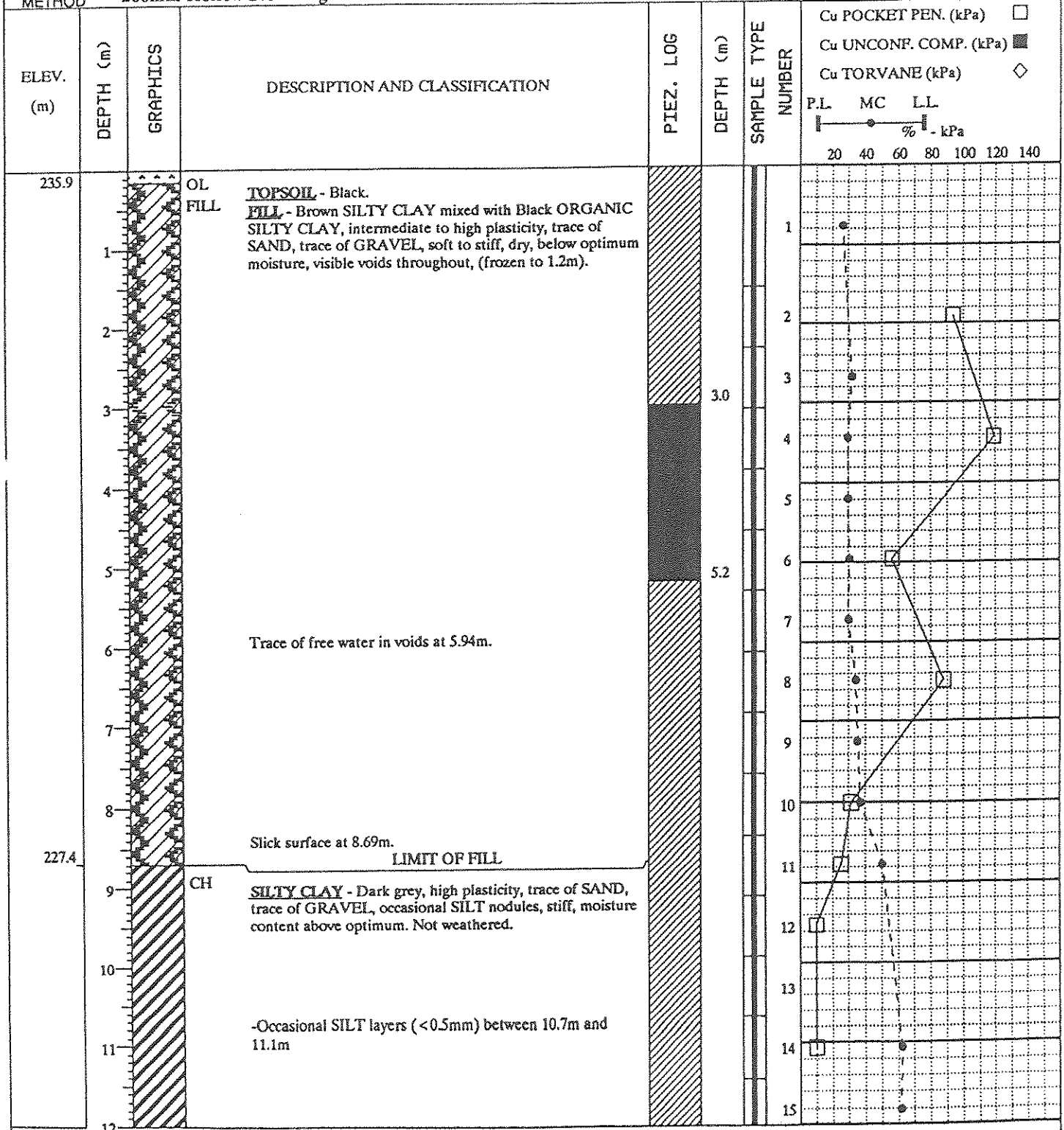
qu=93.8kpa
 $\gamma_w = 16.6 \text{kn/m}^3$
pp=151.3
Tv=64.6kpa

qu=142.1kpa
 $\gamma_w = 16.4 \text{kn/m}^3$
pp=112.5kpa
Tv=58.4kpa

qu=120.1kpa
 $\gamma_w = 15.8 \text{kn/m}^3$
pp=95.8kpa
Tv=52.7kpa

CLIENT **CITY OF WINNIPEG, WATERWORKS, WASTE AND DISPOSAL**
 PROJECT **DEACON RESERVOIR - PROPOSED EXPANSION**
 SITE **BOOSTER STATION**
 LOCATION **(LOCAL) N 5,171 E 4,367**
 DRILLING METHOD **200mm Hollow Stem Auger**

JOB NO. **90-107-04**
 GROUND ELEV. **236.0**
 WATER ELEV.
 DATE DRILLED **91/1/22**



ELEV. (m)	DEPTH (m)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE	NUMBER	Cu POCKET PEN. (kPa) <input type="checkbox"/> Cu UNCONF. COMP. (kPa) <input checked="" type="checkbox"/> Cu TORVANE (kPa) <input type="checkbox"/> P.L. MC LL (%)
220.8	12		CH SILTY CLAY - Dark grey, high plasticity, trace of SAND, trace of GRAVEL, occasional SILT nodules, stiff, moisture content above optimum. Not weathered. -Occasional STONES (angular, diam. <25mm) below 13.7m		13.7		16	[Symbol] [Symbol] [Symbol] [Symbol] [Symbol] [Symbol]
	13						17	
	14						18	
	15				15.2		19	
	16		END OF HOLE NOTE: The unweathered SILTY CLAY below 8.7m is stiffer in hole A13 than it is in the other holes.					
	17							
	18							
	19							
	20							
	21							
	22							
	23							
	24							
	25							
	26							