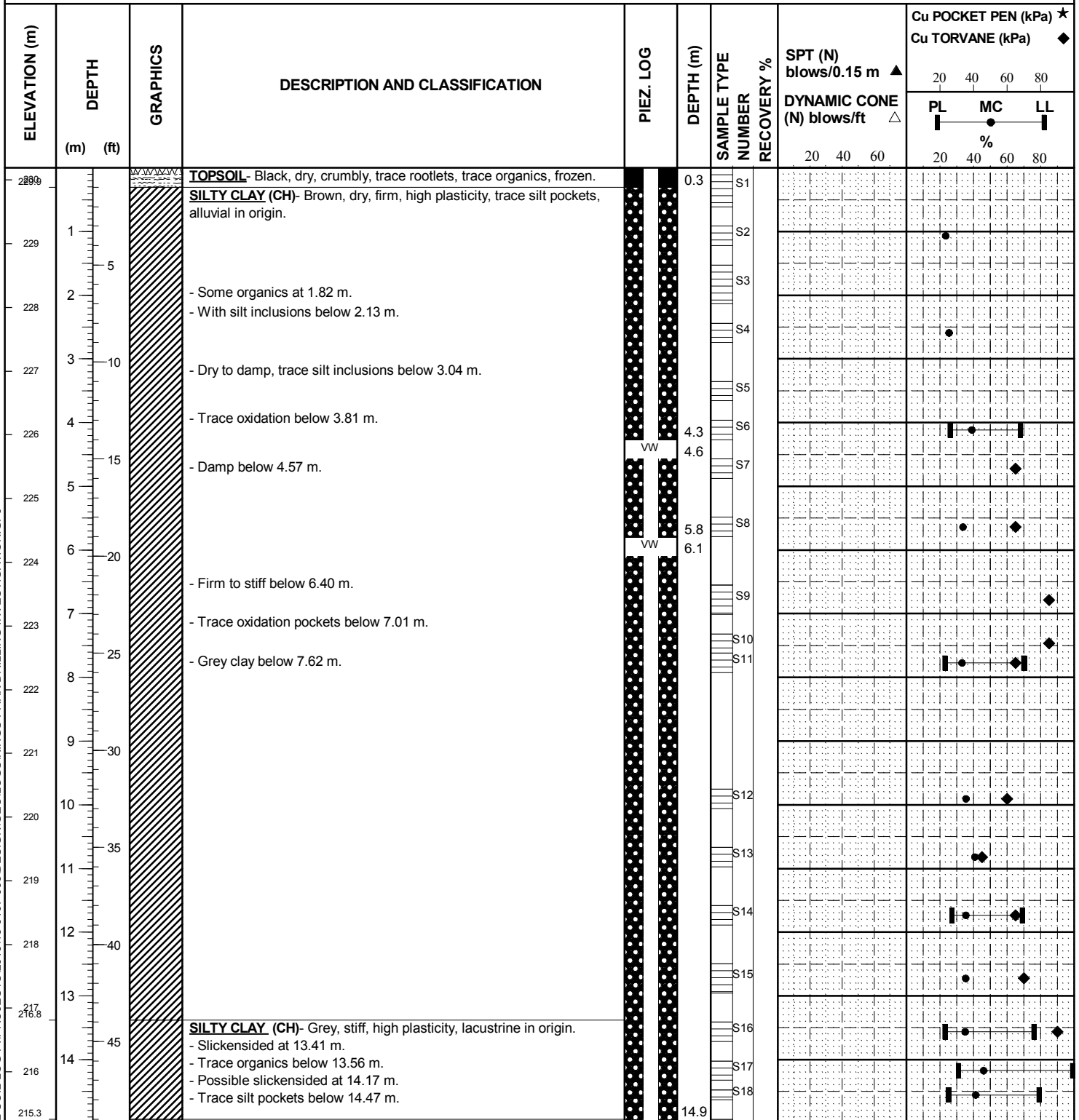



CLIENT CITY OF WINNIPEG- WATERWAYS
PROJECT KING'S PARK RIVERBANK ASSESSMENT
SITE KING'S PARK RIVERBANK ASSESSMENT
LOCATION UPPER BANK
DRILLING METHOD 200 mm ø Hollow Stem Auger, ACKER SS Drill Rig

JOB NO. 13-0107-08
GROUND ELEV. 230.19 m
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 25/03/2013
UTM (m) N 5,517,859
 E 634,895



SAMPLE TYPE  Continuous

CONTRACTOR
 Paddock Drilling Ltd.

INSPECTOR
 J. WILCOX

APPROVED
 T. Ng

DATE
 8/12/14

ELEVATION (m)	DEPTH (m) (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲	Cu POCKET PEN (kPa) ★
								DYNAMIC CONE (N) blows/ft △	Cu TORVANE (kPa) ◆
215	50		SILT TILL - Tan, wet, very soft, some coarse grained gravel.		15.2	S19			
214	55		END OF HOLE at 16.38 m		16.4				
213	60		Notes: 1. Auger refusal at 15.24 m. 2. Casing advancer used from 15.24 to 16.38 m. 3. Installed V.W. (SN 24758) at 15.24 m below ground surface. 4. Installed V.W. (SN 24757) at 6.10 m below ground surface. 5. Installed V.W. (SN 24751) at 4.57 m below ground surface. 6. Installed Slope Indicator (SI) at 16.38 m below ground surface. 7. Backfilled TH13-01 with grout from 15.24 m to 0.3 m and bentonite chips from 0.3 m to surface.						
212	65								
211	70								
210	75								
209	80								
208	85								
207	90								
206	95								
205	100								
204	105								

SAMPLE TYPE Continuous

CONTRACTOR
Paddock Drilling Ltd.

INSPECTOR
J. WILCOX

APPROVED
T. Ng

DATE
8/12/14

CLIENT CITY OF WINNIPEG- WATERWAYS
PROJECT KING'S PARK RIVERBANK ASSESSMENT
SITE KING'S PARK RIVERBANK ASSESSMENT
LOCATION LOWER BANK
DRILLING METHOD 200 mm ø Hollow Stem Auger, ACKER SS Drill Rig

JOB NO. 13-0107-08
GROUND ELEV. 223.50 m
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 19/03/2013
UTM (m) N 5,517,837
 E 634,887

ELEVATION (m)	DEPTH		GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲	DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★			Cu TORVANE (kPa) ◆		
	(m)	(ft)										PL	MC	LL	PL	MC	LL
223.2				TOPSOIL - Black, dry, crumbly, trace rootlets, trace organics, frozen.													
223				SILTY CLAY (CH) - Brown to grey, damp to moist, firm, high plasticity, trace oxidation pockets, trace silt pockets, alluvial in origin.													
222	1	5		- Some oxidation below 1.52 m.													
221	2	10		- Trace oxidation, grey clay, some organic pockets below 2.13 m.													
220	3	15		- Trace silt inclusions below 3.35 m.													
219	4	20															
218	5	25															
217	6	30															
216.5	7	35															
216.2	8	40		SILTY SAND WITH GRAVEL (SP) - Brown, wet, medium to coarse grained sand, poorly graded.													
216				- Grain Size Distribution: Gravel (25.1%), Sand (29.4%), Silt (9.6%) & Clay (35.9%) at 7.0 m.													
215	9	45		SILTY CLAY (CH) - Grey, moist, firm, high plasticity, trace oxidation pockets, trace silt pockets, lacustrine in origin.													
214.7	10	50		SILT TILL - Tan, wet, some coarse grained gravel, fine to medium grained sand.													
214				- Grain Size Distribution: Gravel (0.0%), Sand (4.0%), Silt (85.9%) & Clay (10.1%) at 8.8 m.													
213.4	11	55		END OF HOLE AT 10.06 m													
213	12	60		Notes: 1. Auger refusal at 9.14 m. 2. Used casing advancer from 9.14 m to 10.06 m. 3. Installed V.W. (SN 024756) at 8.99 m below ground surface. 4. Installed Slope Indicator (SI) at 10.06 m below ground surface. 5. Backfilled TH13-04 with grout from 9.14 m to surface.													
212	13	65															
211	14	70															
210																	
209																	

SAMPLE TYPE Continuous

CONTRACTOR Paddock Drilling Ltd.

INSPECTOR J. WILCOX

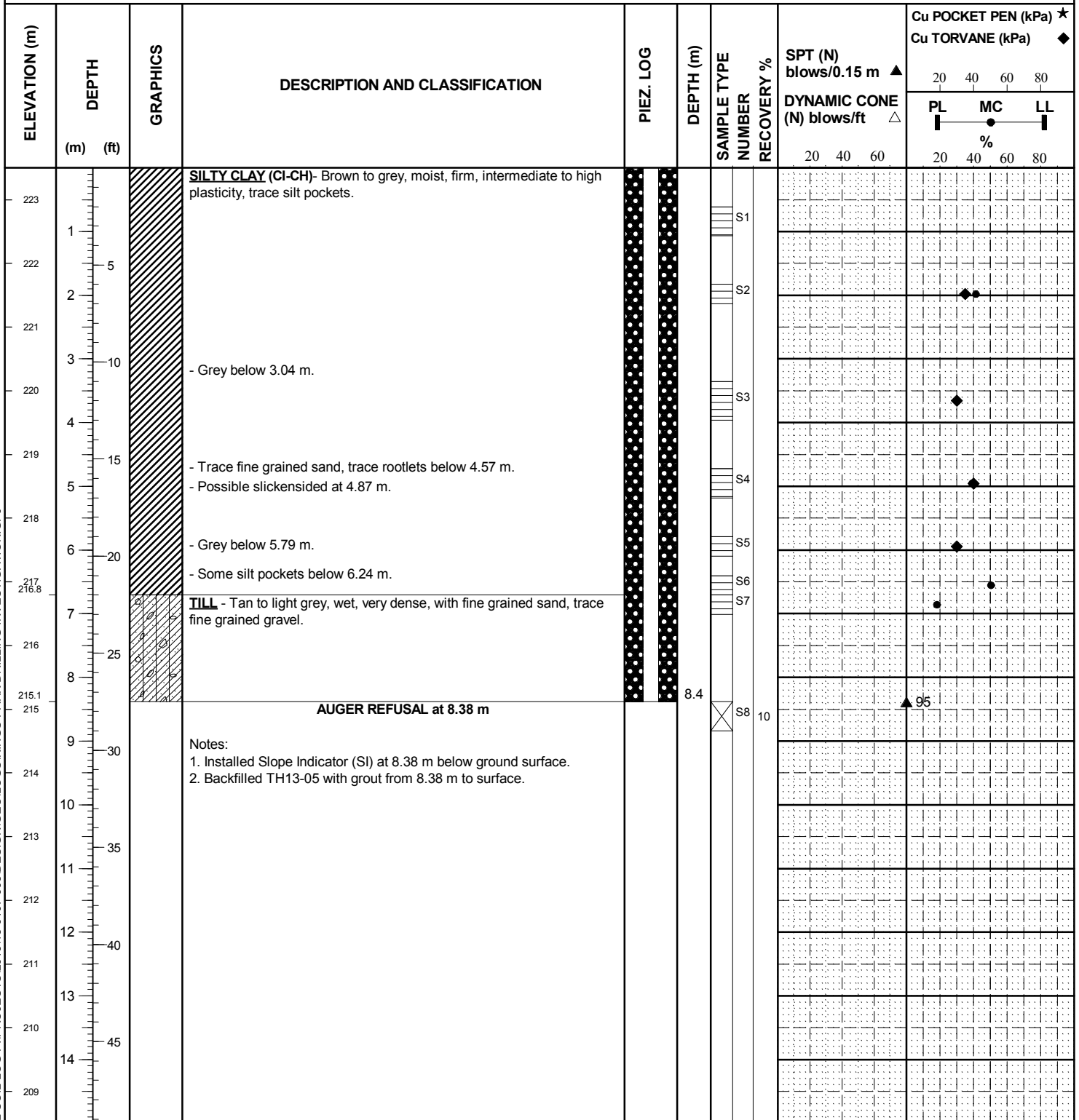
APPROVED T. Ng

DATE 8/12/14

GEO TECHNICAL-SOIL LOG P:\PROJECTS\2013\13-0107-008\DESIGN\GEOLOGS\KINGS PARK DRILLING INVESTIGATION.GPJ

CLIENT CITY OF WINNIPEG- WATERWAYS
PROJECT KING'S PARK RIVERBANK ASSESSMENT
SITE KING'S PARK RIVERBANK ASSESSMENT
LOCATION LOWER BANK
DRILLING METHOD 200 mm ø Hollow Stem Auger, ACKER SS Drill Rig

JOB NO. 13-0107-08
GROUND ELEV. 223.50 m
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 26/03/2013
UTM (m) N 5,517,720
 E 635,000



SAMPLE TYPE Continuous Split Spoon

CONTRACTOR
 Paddock Drilling Ltd.

INSPECTOR
 J. WILCOX


APPROVED
 T. Ng

DATE
 8/12/14

CLIENT CITY OF WINNIPEG- WATERWAYS
PROJECT KING'S PARK RIVERBANK ASSESSMENT
SITE KING'S PARK RIVERBANK ASSESSMENT
LOCATION MID BANK
DRILLING METHOD 200 mm ø Hollow Stem Auger, ACKER SS Drill Rig

JOB NO. 13-0107-08
GROUND ELEV. 228.14 m
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 27/03/2013
UTM (m) N 5,517,849
 E 634,884

ELEVATION (m)	DEPTH		GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲ DYNAMIC CONE (N) blows/ft △	Cu POCKET PEN (kPa) ★ Cu TORVANE (kPa) ◆	
	(m)	(ft)								PL	MC
228.8				TOPSOIL - Black, dry, crumbly, trace rootlets, trace organics, frozen.							
227.8				SILTY CLAY (CI-CH) - Brown, dry, firm, intermediate to high plasticity, trace rootlets, alluvial in origin.							
227	1	5		- Trace oxidation, trace organics, damp to moist below 2.43 m.							
226	2	10		- Occasional oxidation pockets below 4.57 m.							
225	3	15		- Trace organics layer with rootlets at 6.85 m. - Grey below 7.01 m.							
224	4	20		- Trace organics below 7.62 m.							
223	5	25		- Trace coarse grained sand, shells at 10.66 m.							
222	6	30		SILTY CLAY (CH) - Grey, stiff, high plasticity, probably lacustrine in origin. - Trace silt inclusions below 10.97 m.							
221	7	35		TILL - Tan to light grey, wet, very dense, with fine grained sand.							
220	8	40		AUGER REFUSAL at 13.11 m							
219	9	45		Notes: 1. Installed V.W. (SN 24755) at 6.10 m below ground surface. 2. Backfilled TH13-07 with grout from 13.11 m to 0.30 m and bentonite chips from 0.30 m to surface.							
218	10										
217.2	11										
217											
215.0											
215											
214											

 SAMPLE TYPE  Continuous

 CONTRACTOR **Paddock Drilling Ltd.**

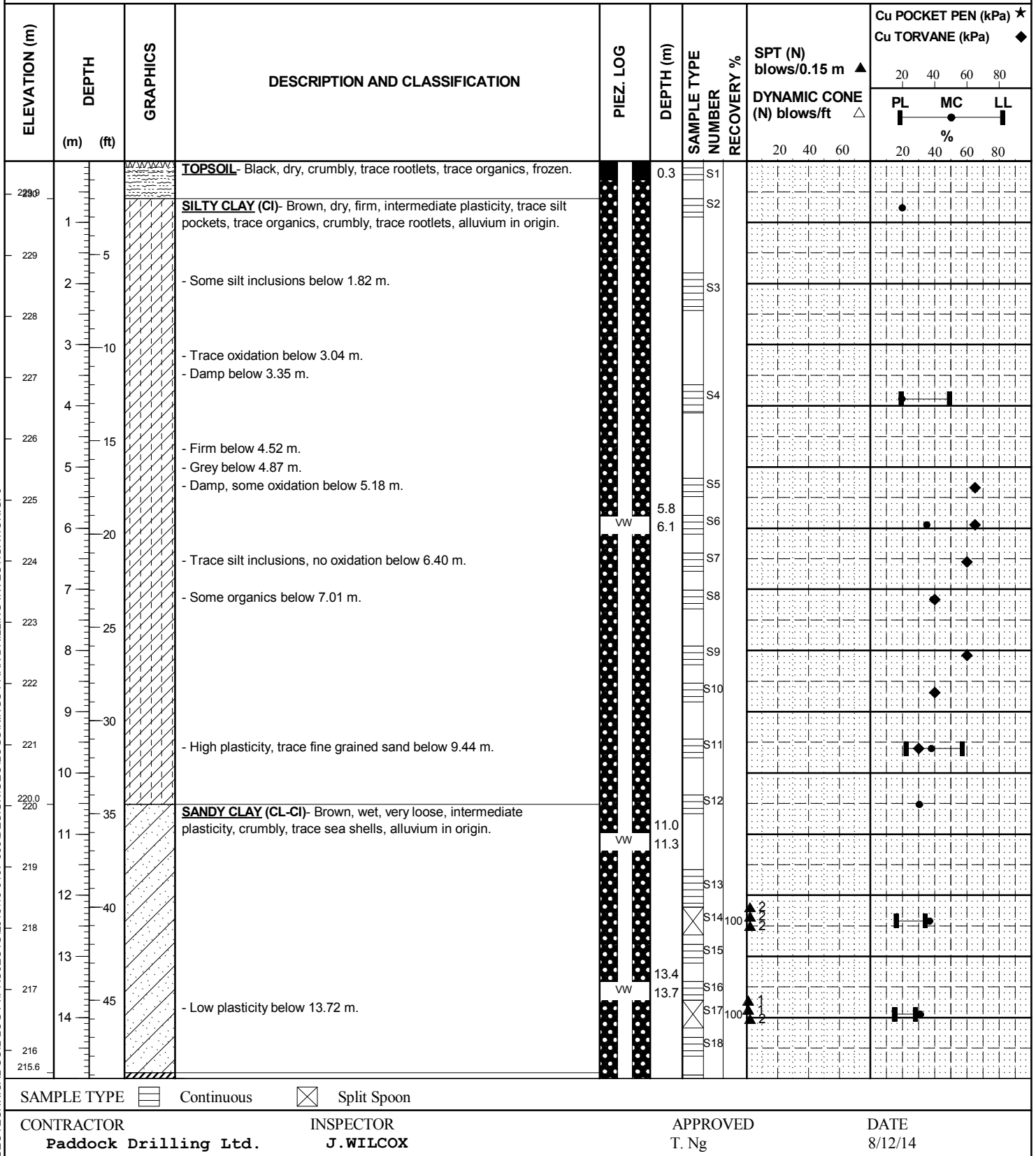
 INSPECTOR **J. WILCOX**

 APPROVED **T. Ng**



 DATE **8/12/14**

CLIENT CITY OF WINNIPEG- WATERWAYS
PROJECT KING'S PARK RIVERBANK ASSESSMENT
SITE KING'S PARK RIVERBANK ASSESSMENT
LOCATION UPPER BANK
DRILLING METHOD 200 mm ø Hollow Stem Auger, ACKER SS Drill Rig

JOB NO. 13-0107-08
GROUND ELEV. 230.54 m
TOP OF PVC ELEV.
WATER ELEV.
DATE DRILLED 21/03/2013
UTM (m) N 5,517,410
 E 635,250



GEOTECHNICAL-SOIL LOG P:\PROJECTS\2013\13-0107-008\DESIGN\GEOLOGS\KINGS PARK DRILLING INVESTIGATION.GPJ

SAMPLE TYPE  Continuous  Split Spoon

CONTRACTOR
 Paddock Drilling Ltd.

INSPECTOR
 J. WILCOX

APPROVED
 T. Ng

DATE
 8/12/14

ELEVATION (m)	DEPTH (m) (ft)	GRAPHICS	DESCRIPTION AND CLASSIFICATION	PIEZ. LOG	DEPTH (m)	SAMPLE TYPE	NUMBER	RECOVERY %	SPT (N) blows/0.15 m ▲	Cu POCKET PEN (kPa) ★
									DYNAMIC CONE (N) blows/ft △	Cu TORVANE (kPa) ◆
										20 40 60 80 PL MC LL %
215	50		SILTY CLAY (CH) - Grey, high plasticity, lacustrine in origin.							
214.1	55		SILT TILL - Tan to light grey, wet, very dense, with fine to medium grained sand, some coarse grained gravel. - Grain Size Distribution: Gravel (2.2%), Sand (2.1%), Silt (80.6%) & Clay (15.1%) at 16.8 m.		17.4				▲ 19	
213	60				17.7				▲ 20	
212	65		AUGER REFUSAL at 18.75 m		18.7					
211.8	70		Notes: 1. Installed V.W. (SN 24759) at 17.68 m below ground surface. 2. Installed V.W. (SN 24752) at 13.72 m below ground surface. 3. Installed V.W. (SN 24753) at 11.28 m below ground surface. 4. Installed V.W. (SN 24754) at 6.10 m below ground surface. 5. Installed Slope Indicator (SI) at 18.75 m below ground surface. 6. Backfilled TH13-08 with grout from 18.75 m to 0.3 m and bentonite chips from 0.3 m to surface.							
210	75									
209	80									
208	85									
207	90									
206	95									
205	100									
204	105									
203										
202										
201										
200										
199										
198										

GEO TECHNICAL - SOIL LOG.P:\PROJECTS\2013\13-0107-008\DESIGN\GEOLOGS\KINGS PARK DRILLING INVESTIGATION.GPJ

SAMPLE TYPE Continuous Split Spoon

CONTRACTOR
Paddock Drilling Ltd.

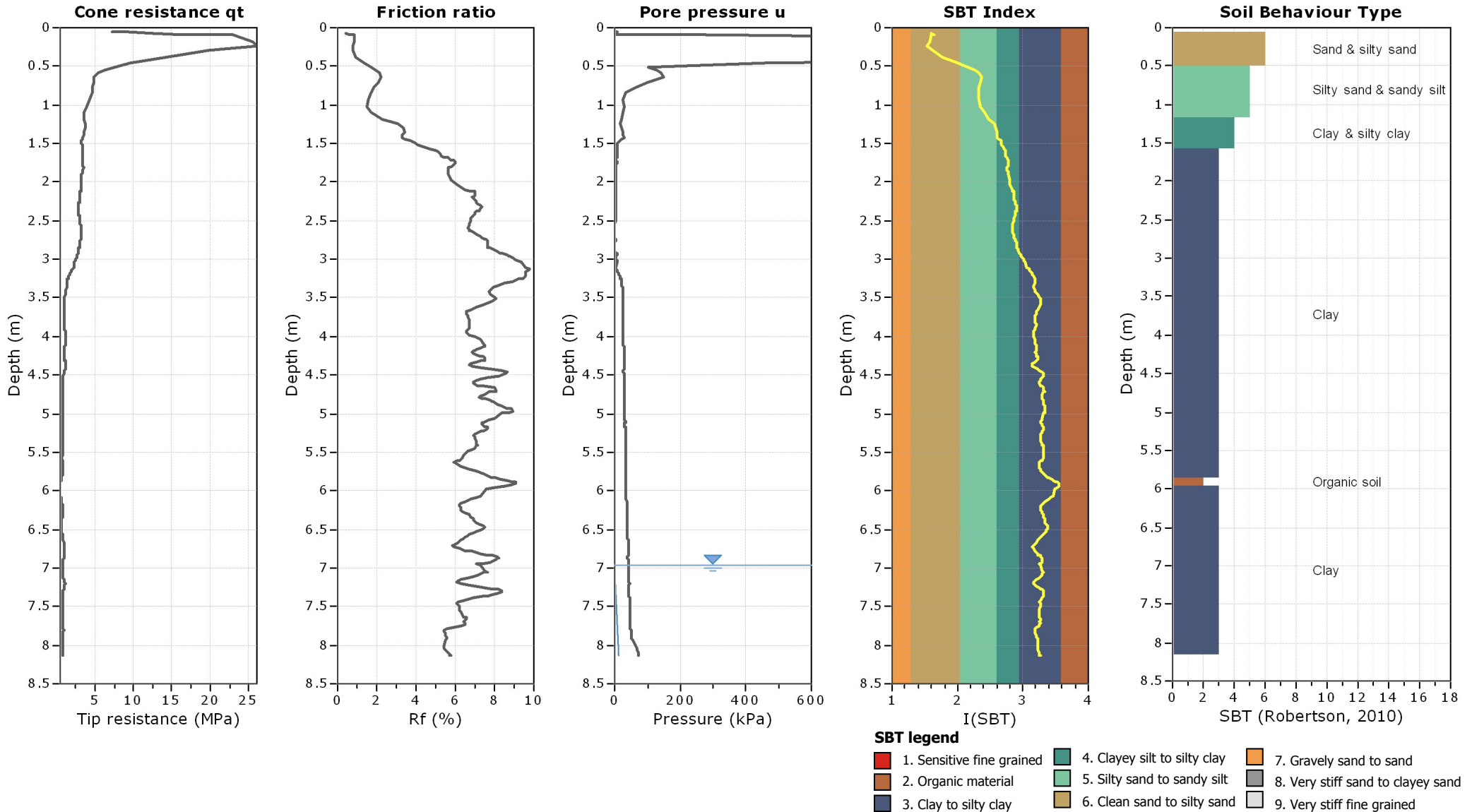
INSPECTOR
J. WILCOX

APPROVED
T. Ng

DATE
8/12/14

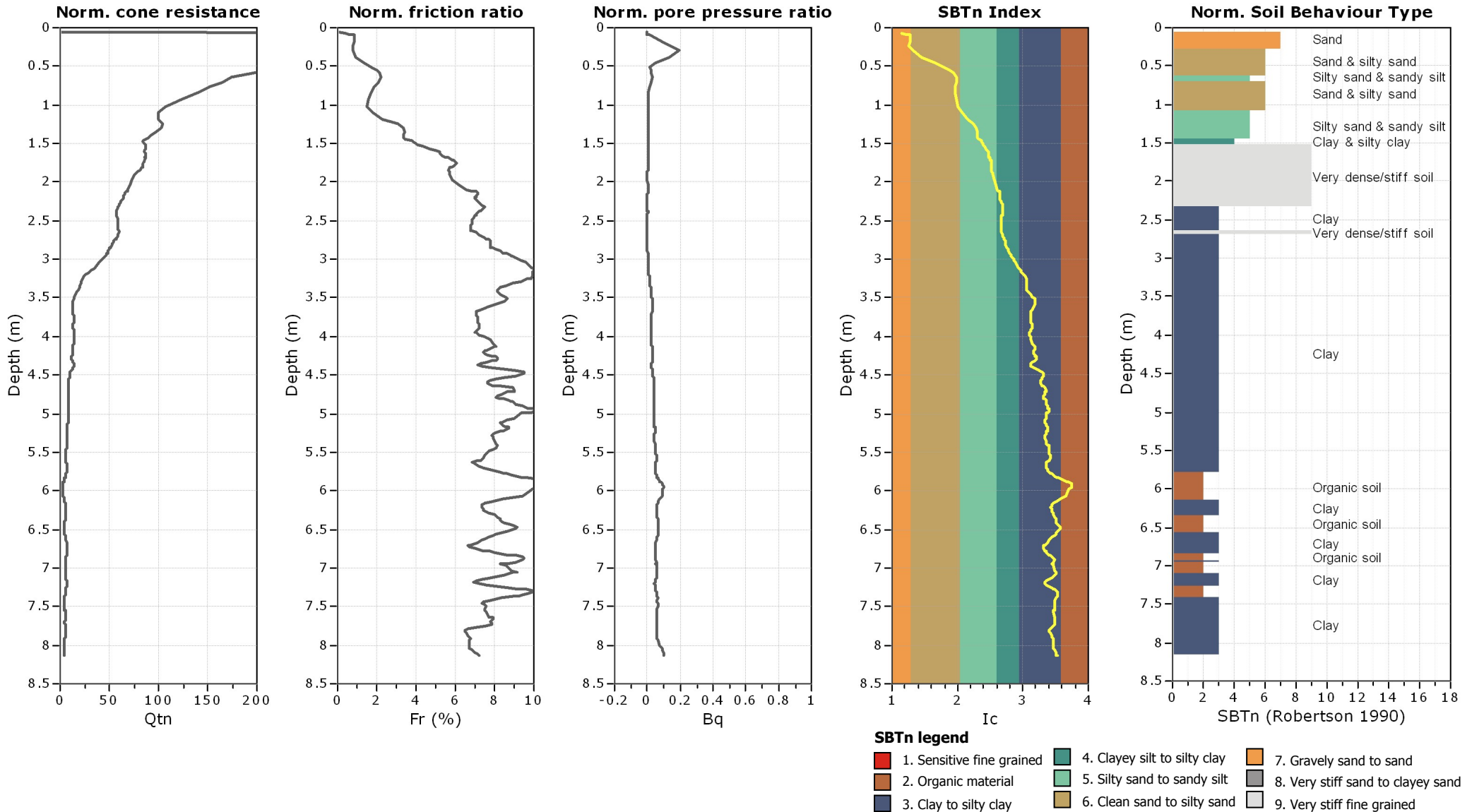
Project: 13-0107-008 - City of Winnipeg

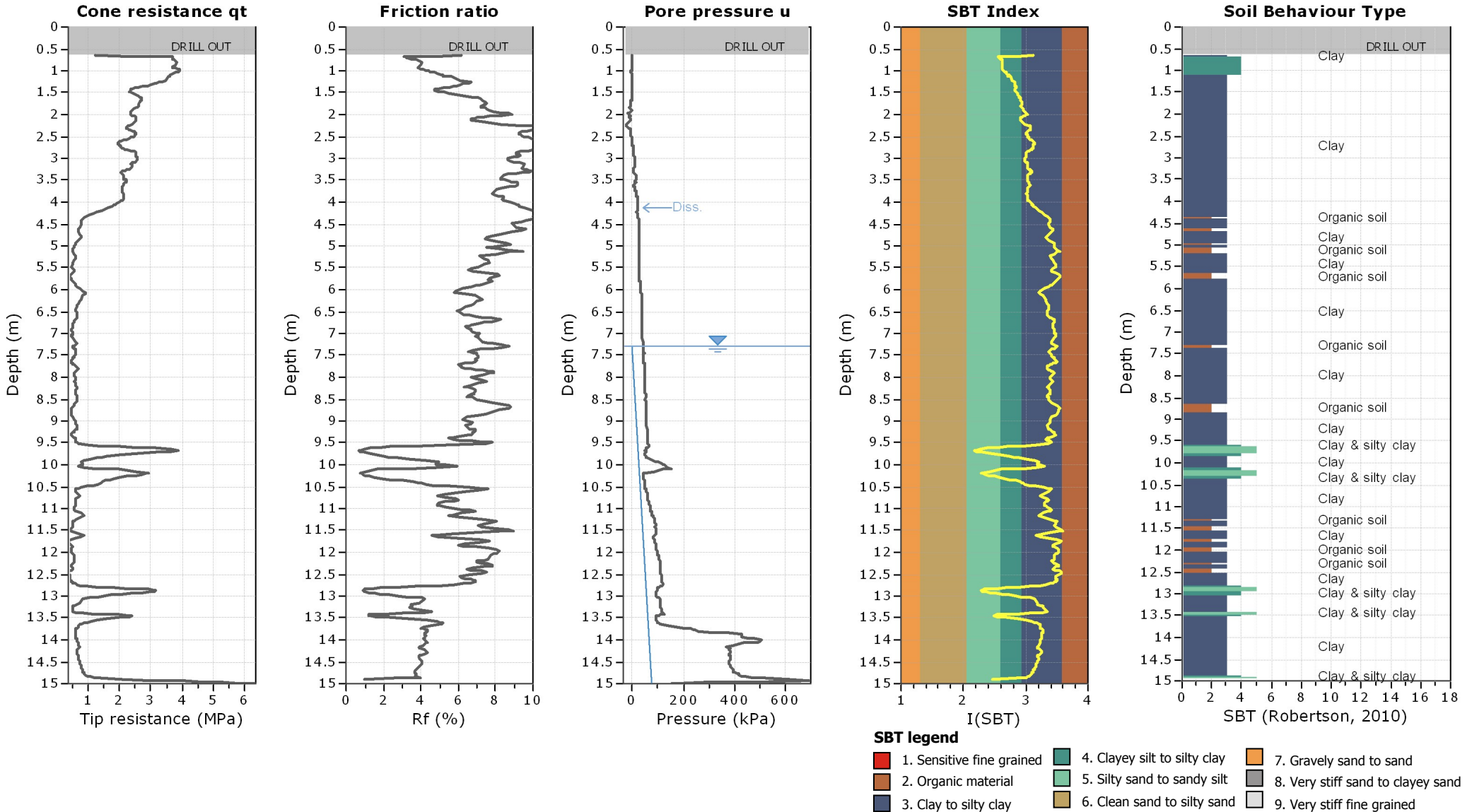
Location: Kings Park



Project: 13-0107-008 - City of Winnipeg

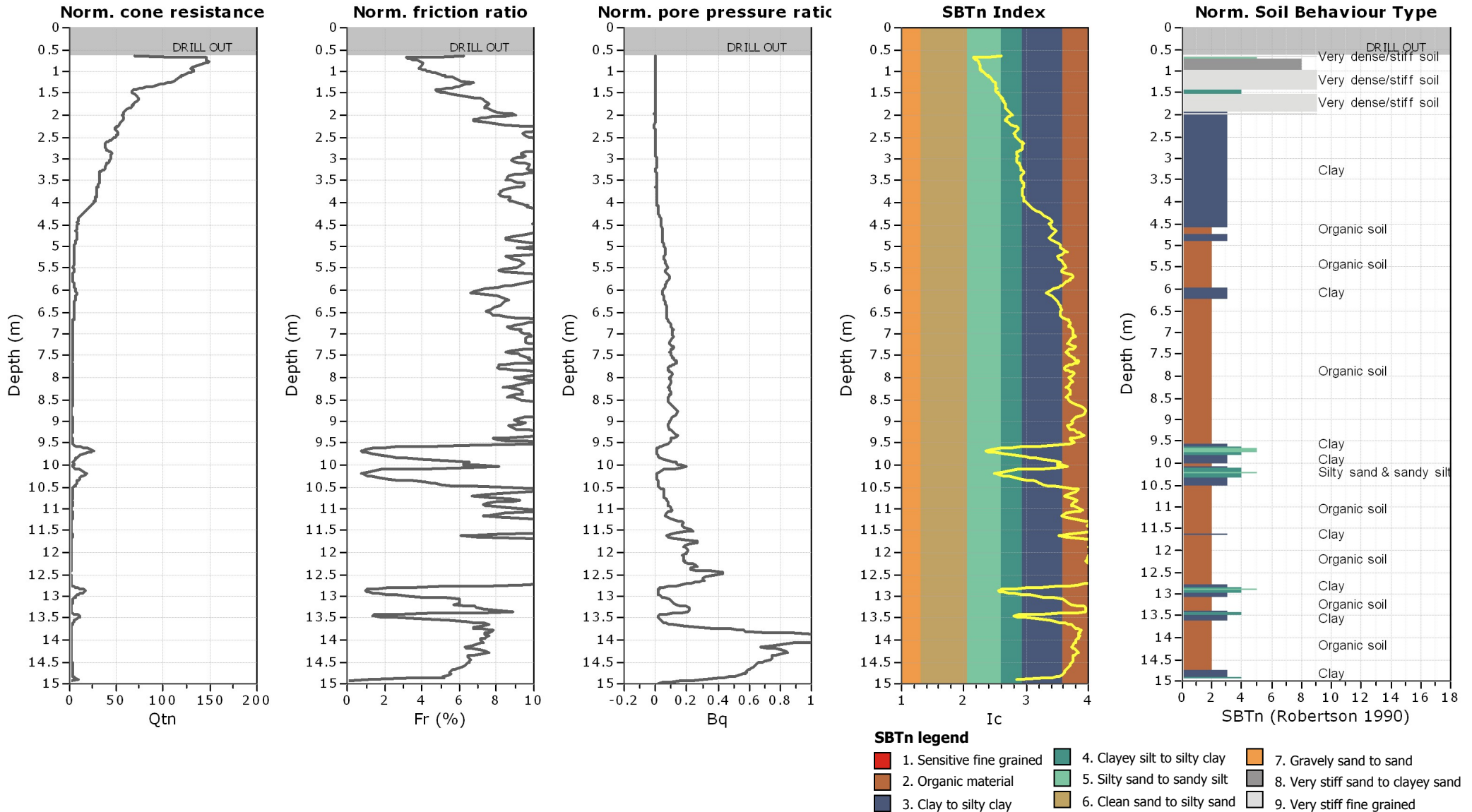
Location: Kings Park





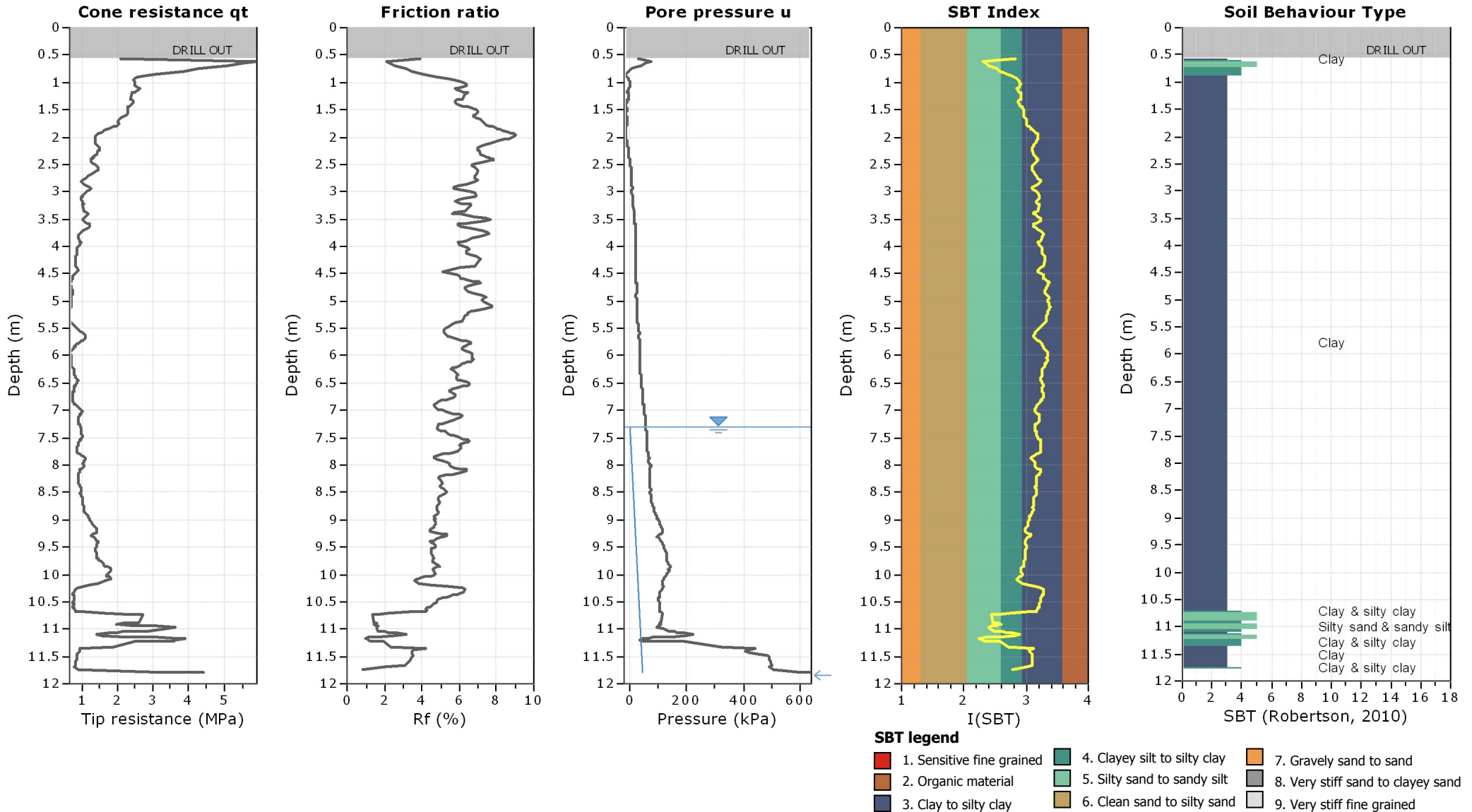
Project: 13-0107-008 - City of Winnipeg

Location: Kings Park



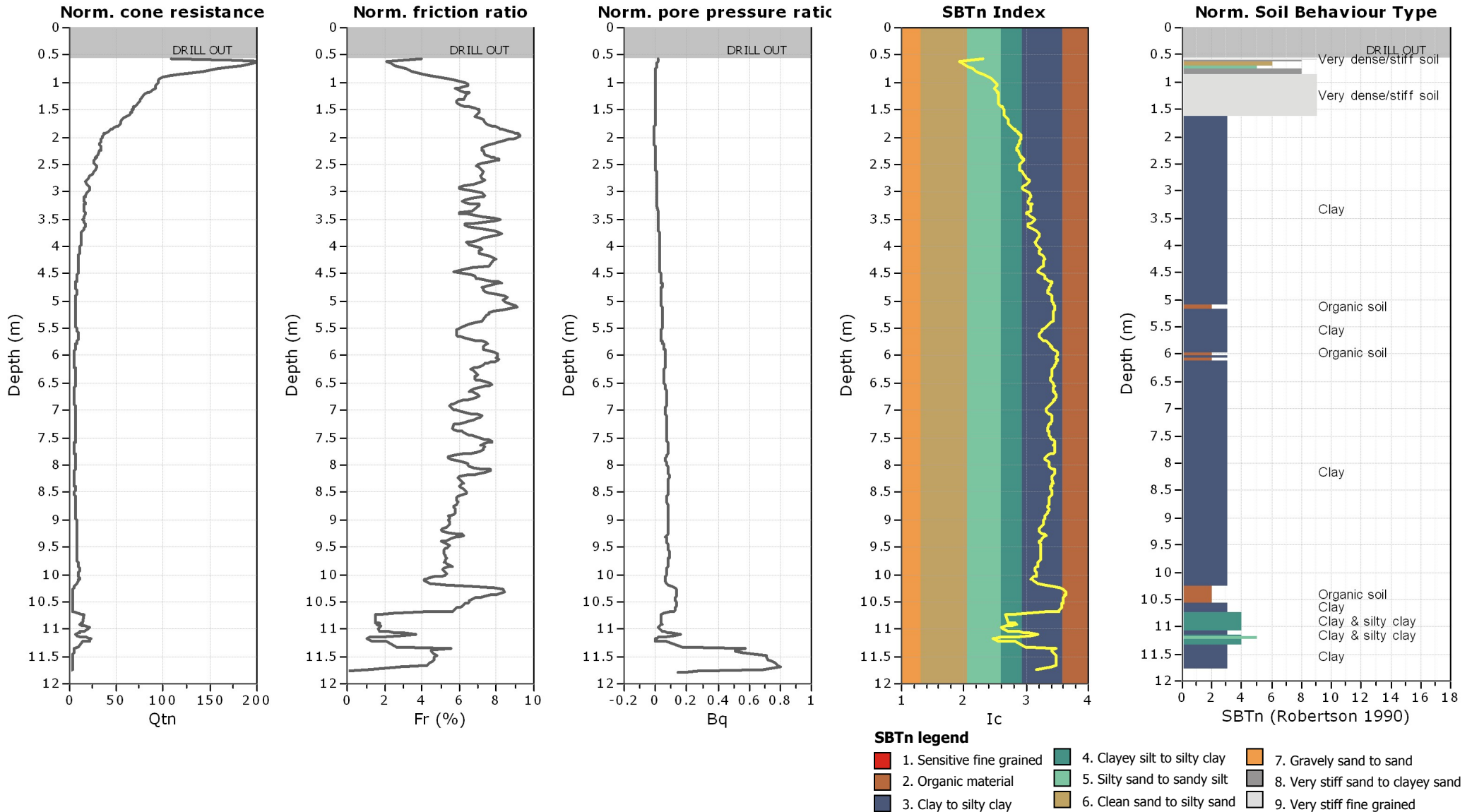
Project: 13-0107-008 - City of Winnipeg

Location: Kings Park



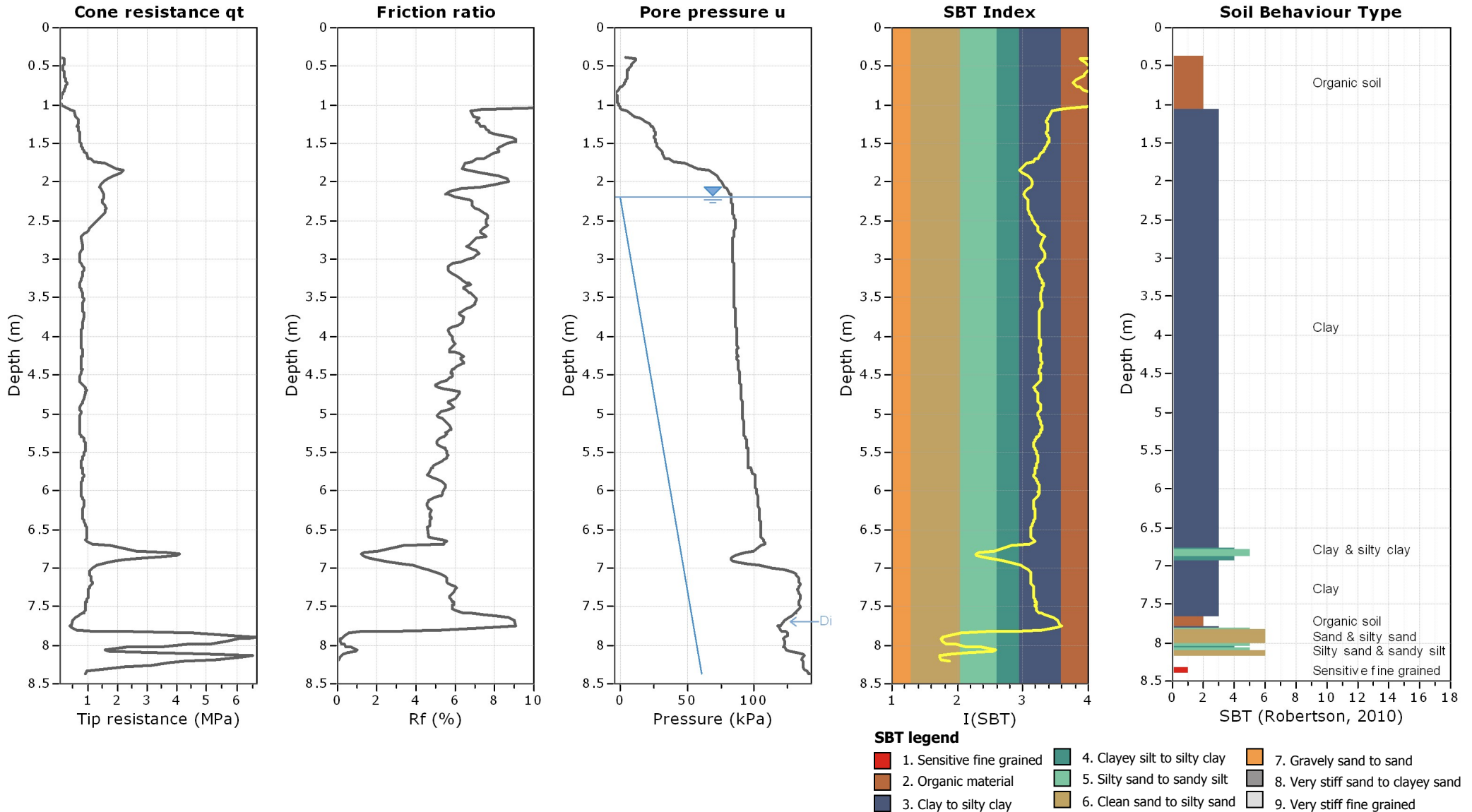
Project: 13-0107-008 - City of Winnipeg

Location: Kings Park



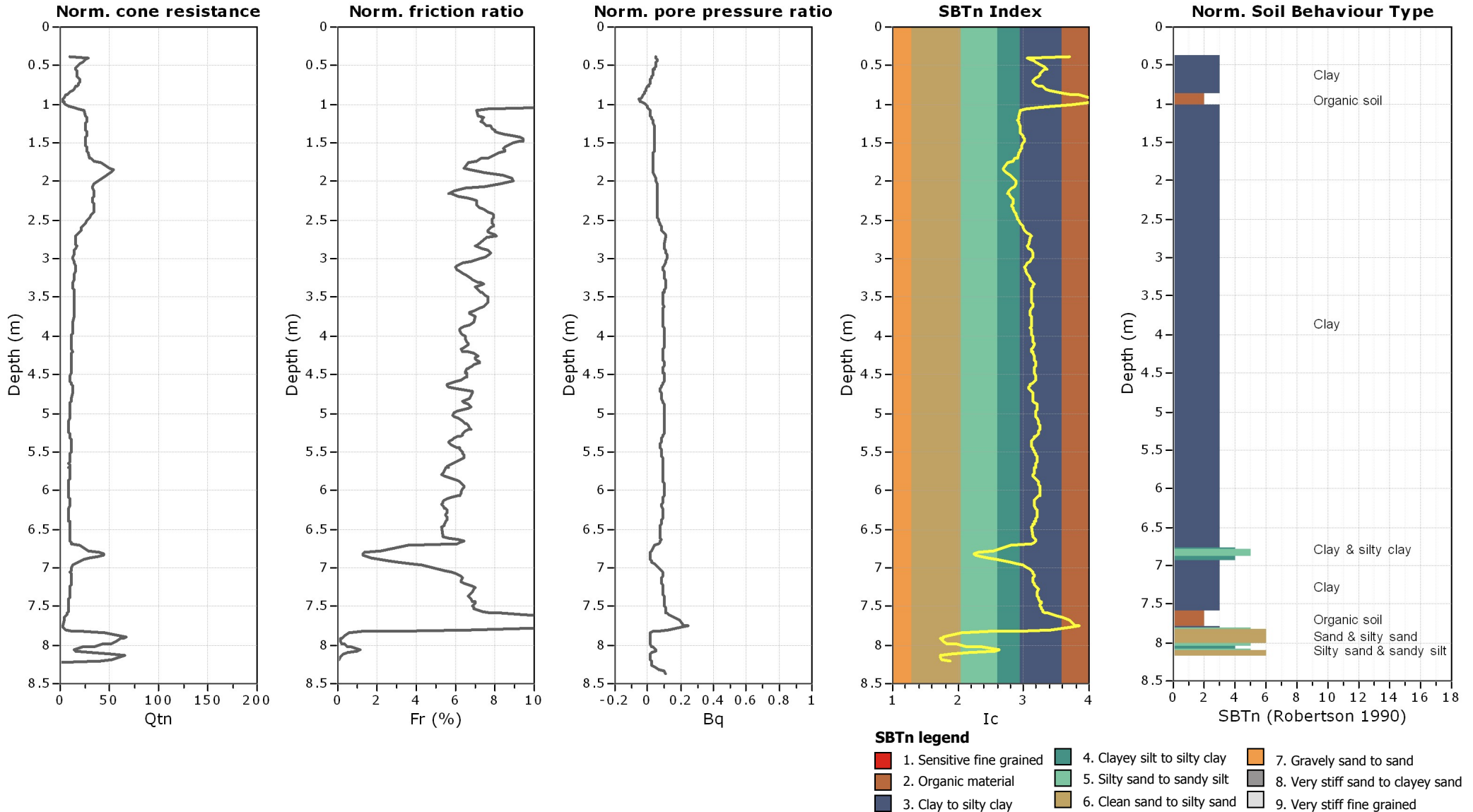
Project: 13-0107-008 - City of Winnipeg

Location: Kings Park



Project: 13-0107-008 - City of Winnipeg

Location: Kings Park





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KGS Group Inc.
3rd Floor-865 Waverly Street
Winnipeg, Manitoba
R3T 5P4

Attention: Jen Wilcox

April 30, 2013

Project: King's Park Drilling
(13-0107-08)

Soil samples were submitted to our laboratory on April 23, 2013. The following tests were conducted on selected soil samples:

- Water content (ASTM D2216)
- Particle-Size Analysis (ASTM D422)
- Liquid limit (one-point), plastic limit, and plasticity index (ASTM D4318)

The test results are summarized in the attached tables and particle size analysis and Atterberg limits reports.

We appreciate the opportunity to assist you in this project. Please call if you have any questions regarding this report.

Farouk Fourar-laidi, B.Sc., EIT
Geotechnical Engineering

**TABLE 1
WATER CONTENT TEST DATA
KING'S PARK DRILLING (13-0107-08)**

Testhole	Sample ID	Water Content (%)	Testhole	Sample ID	Water Content (%)
TH13-01	S2	23.4	TH13-05	S2	41.4
TH13-01	S4	25.4	TH13-05	S4	39.2
TH13-01	S6	39.0	TH13-05	S6	50.4
TH13-01	S8	33.7	TH13-05	S7	18.2
TH13-01	S11	33.1	TH13-07	S3	31.9
TH13-01	S12	35.5	TH13-07	S5	35.0
TH13-01	S13	40.8	TH13-07	S7	41.4
TH13-01	S14	35.4	TH13-07	S9	53.2
TH13-01	S15	35.3	TH13-07	S11	50.4
TH13-01	S16	35.0	TH13-08	S2	19.8
TH13-01	S17	46.0	TH13-08	S4	19.6
TH13-01	S18	41.3	TH13-08	S6	35.0
TH13-01	S19	17.4	TH13-08	S8	39.0
TH13-04	S2	39.8	TH13-08	S11	37.9
TH13-04	S7	35.9	TH13-08	S12	30.4
TH13-04	S8	50.1	TH13-08	S14	36.8
TH13-04	S9	51.7	TH13-08	S17	31.1
TH13-04	S10	15.7	TH13-08	S19	26.4
TH13-04	S5	36.5	TH13-08	S21	22.0

**TABLE 2
PARTICLE SIZE AND ATTERBERG LIMITS TEST DATA
KING'S PARK DRILLING (13-0107-08)**

Testhole	Sample ID	Particle Size Analysis					Atterberg Limits		
		Gravel (%) 75 to 4.75 mm	Sand (%) <4.75 to 0.075 mm	Silt (%) <0.075 to 0.002 mm	Clay (%) <0.002 mm	Colloids (%) <0.001 mm	Liquid Limit	Plastic Limit	Plasticity Index
TH13-01	S6	NT					68	26	42
TH13-01	S11	NT					70	23	47
TH13-01	S14	NT					69	27	42
TH13-01	S16	NT					76	23	53
TH13-01	S17	NT					99	31	68
TH13-01	S18	NT					79	25	54
TH13-04	S5	NT					67	24	43
TH13-04	S8	25.1	29.4	9.6	35.9	30.7	NT		
TH13-04	S9	NT					101	31	70
TH13-04	S10	0.0	4.0	85.9	10.1	8.7	NT		
TH13-07	S11	NT					84	23	61
TH13-08	S4	NT					49	19	30
TH13-08	S11	NT					57	22	35
TH13-08	S14	NT					34	16	18
TH13-08	S17	NT					28	15	13
TH13-08	S19	NT					52	14	38
TH13-08	S21	2.2	2.1	80.6	15.1	12.6	NT		

Notes:

1. A high speed stirring device was used for 1 minute to disperse the test samples for particle size analysis
2. Atterberg limits conducted in accordance with ASTM D4318 Method B (one-point liquid limit)
3. The soil samples were air-dried during sample preparation for Atterberg limits and particle size analysis
4. NT denote not tested

PARTICLE SIZE ANALYSIS ASTM D422

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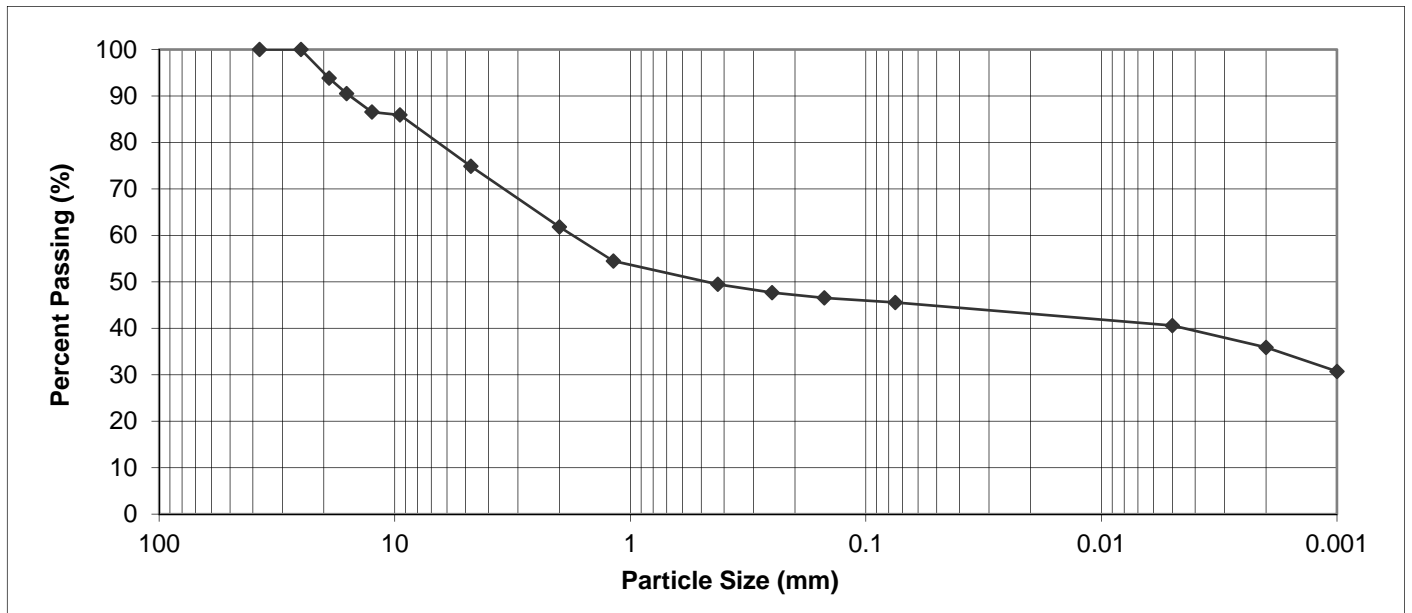
PROJECT: King's Park Drilling
 (13-0107-08)

Attention: Jen Wilcox

PROJECT NO.: KGS-1310

SAMPLED BY: Client
 SAMPLE ID: TH13-04-S8

DATE RECEIVED: April 23, 2013
 TESTED BY: Nestor Abarca



PARTICLE SIZE	PERCENT PASSING
37.50 mm	100.0
25.00 mm	100.0
19.00 mm	93.8
16.00 mm	90.5
12.50 mm	86.5
9.50 mm	85.9
4.75 mm	74.9
2.00 mm	61.8

PARTICLE SIZE	PERCENT PASSING
1.18 mm	54.5
0.425 mm	49.5
0.250 mm	47.7
0.150 mm	46.5
0.075 mm	45.5
0.005 mm	40.6
0.002 mm	35.9
0.001 mm	30.7

Gravel, % 75 to 4.75 mm	Sand, %			Silt, % <0.075 to 0.002 mm	Clay, % <0.002 mm	Colloids, % < 0.001 mm
	Coarse <4.75 to 2.0 mm	Medium <2.0 to 0.425 mm	Fine <0.425 to 0.075 mm			
25.1	13.1	12.3	4.0	9.6	35.9	30.7

April 30, 2013

REVIEWED BY: Farouk Fourar-Laidi, B.Sc., EIT

PARTICLE SIZE ANALYSIS ASTM D422

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 Winnipeg, Manitoba
 R3T 5P4

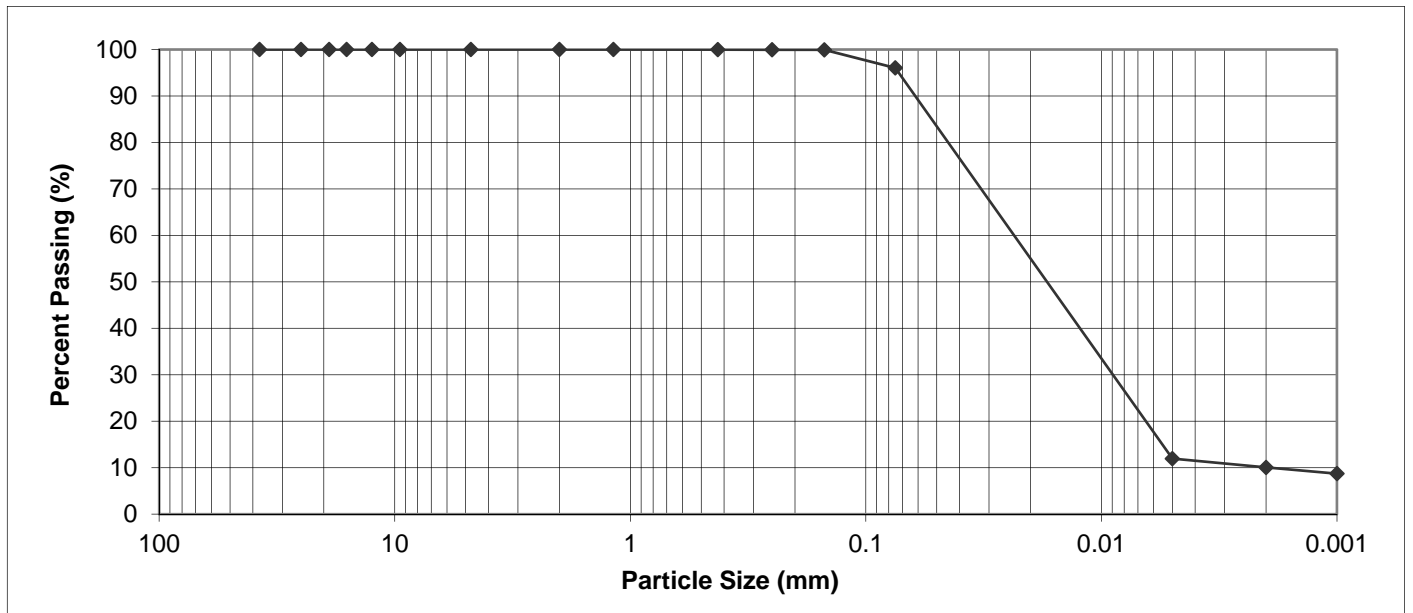
PROJECT: King's Park Drilling
 (13-0107-08)

Attention: Jen Wilcox

PROJECT NO.: KGS-1310

SAMPLED BY: Client
 SAMPLE ID: TH13-04-S10

DATE RECEIVED: April 23, 2013
 TESTED BY: Nestor Abarca



PARTICLE SIZE	PERCENT PASSING
37.50 mm	100.0
25.00 mm	100.0
19.00 mm	100.0
16.00 mm	100.0
12.50 mm	100.0
9.50 mm	100.0
4.75 mm	100.0
2.00 mm	100.0

PARTICLE SIZE	PERCENT PASSING
1.18 mm	100.0
0.425 mm	100.0
0.250 mm	99.9
0.150 mm	99.9
0.075 mm	96.0
0.005 mm	11.9
0.002 mm	10.1
0.001 mm	8.7

Gravel, % 75 to 4.75 mm	Sand, %			Silt, % <0.075 to 0.002 mm	Clay, % <0.002 mm	Colloids, % < 0.001 mm
	Coarse <4.75 to 2.0 mm	Medium <2.0 to 0.425 mm	Fine <0.425 to 0.075 mm			
0.0	0.0	0.0	4.0	85.9	10.1	8.7

April 30, 2013

REVIEWED BY: Farouk Fourar-Laidi, B.Sc., EIT

PARTICLE SIZE ANALYSIS ASTM D422

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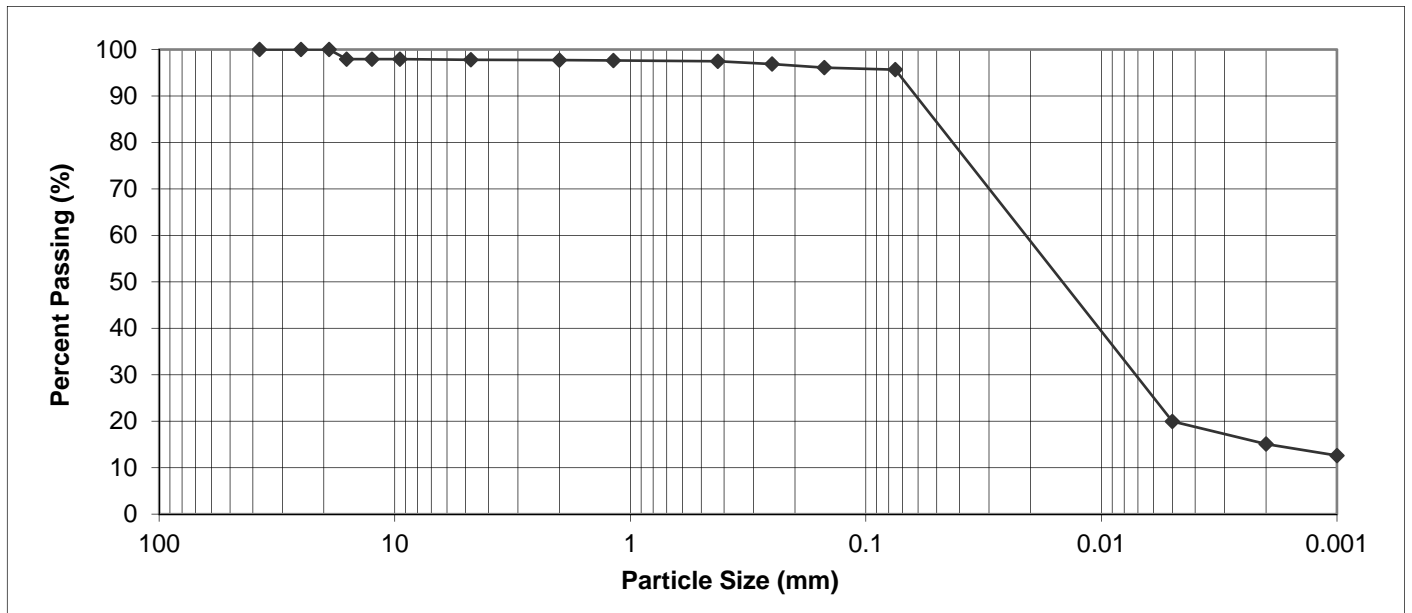
PROJECT: King's Park Drilling
 (13-0107-08)

Attention: Jen Wilcox

PROJECT NO.: KGS-1310

SAMPLED BY: Client
 SAMPLE ID: TH13-08-S21

DATE RECEIVED: April 23, 2013
 TESTED BY: Nestor Abarca



PARTICLE SIZE	PERCENT PASSING
37.50 mm	100.0
25.00 mm	100.0
19.00 mm	100.0
16.00 mm	97.9
12.50 mm	97.9
9.50 mm	97.9
4.75 mm	97.8
2.00 mm	97.7

PARTICLE SIZE	PERCENT PASSING
1.18 mm	97.6
0.425 mm	97.5
0.250 mm	96.9
0.150 mm	96.1
0.075 mm	95.7
0.005 mm	20.0
0.002 mm	15.1
0.001 mm	12.6

Gravel, % 75 to 4.75 mm	Sand, %			Silt, % <0.075 to 0.002 mm	Clay, % <0.002 mm	Colloids, % < 0.001 mm
	Coarse <4.75 to 2.0 mm	Medium <2.0 to 0.425 mm	Fine <0.425 to 0.075 mm			
2.2	0.1	0.2	1.8	80.6	15.1	12.6

April 30, 2013

REVIEWED BY: Farouk Fourar-Laidi, B.Sc., EIT

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS ASTM 4318

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Winnipeg, Manitoba
R3T 5P4

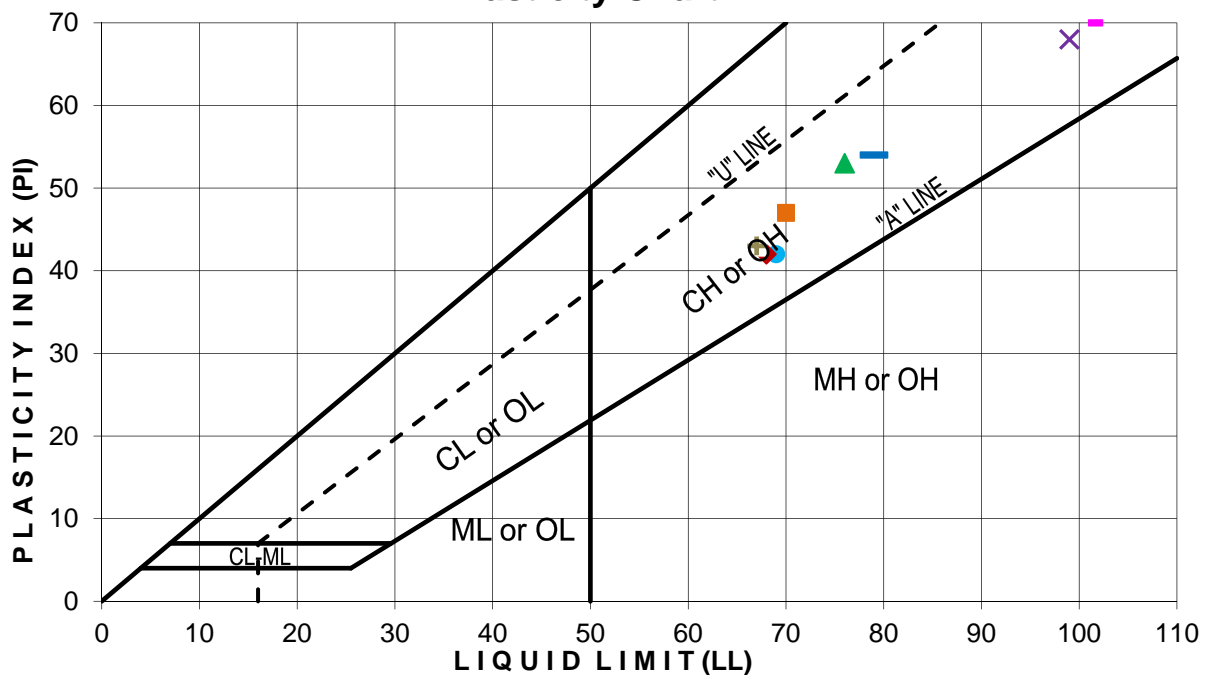
PROJECT: King's Park Drilling
(13-0101-08)

Attention: Jen Wilcox

PROJECT NO.: KGS-1310

Symbol	Testhole No.	Sample ID	Liquid Limit	Plastic Limit	Plasticity Index	USCS
u	TH13-01	S6	68	26	42	CH
<	TH13-01	S11	70	23	47	CH
=	TH13-01	S14	69	27	42	CH
p	TH13-01	S16	76	23	53	CH
x	TH13-01	S17	99	31	68	CH
—	TH13-01	S18	79	25	54	CH
+	TH13-04	S5	67	24	43	CH
-	TH13-04	S9	101	31	70	CH

Plasticity Chart



April 30, 2013

Reviewed by: Farouk Fourar-Laidi, B.Sc., EIT

LIQUID LIMIT, PLASTIC LIMIT, AND PLASTICITY INDEX OF SOILS ASTM 4318

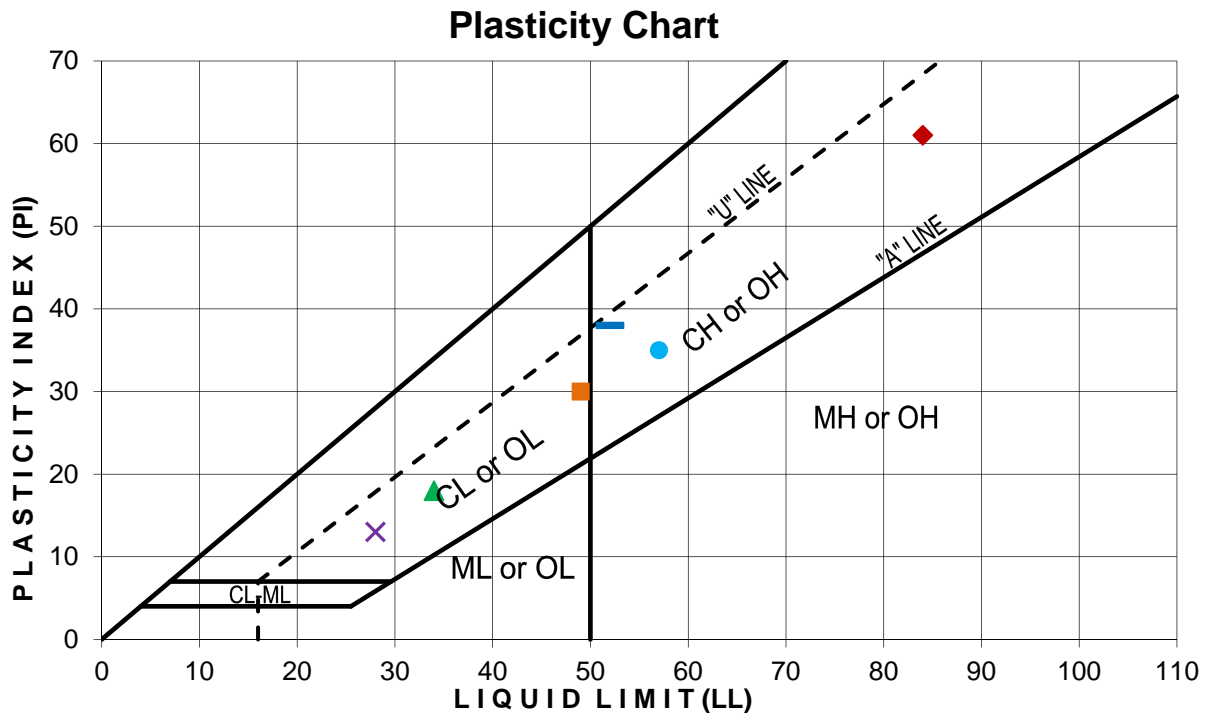
KGS Group Inc.
 3rd Floor- 865 Waverley Street
 Winnipeg, Manitoba
 R3T 5P4

PROJECT: King's Park Drilling
 (13-0101-08)

Attention: Jen Wilcox

PROJECT NO.: KGS-1310

Symbol	Testhole No.	Sample ID	Liquid Limit	Plastic Limit	Plasticity Index	USCS
u	TH13-07	S11	84	23	61	CH
<	TH13-08	S4	49	19	30	CL
=	TH13-08	S11	57	22	35	CH
p	TH13-08	S14	34	16	18	CL
x	TH13-08	S17	28	15	13	CL
—	TH13-08	S19	52	14	38	CH



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