

**APPENDIX C**

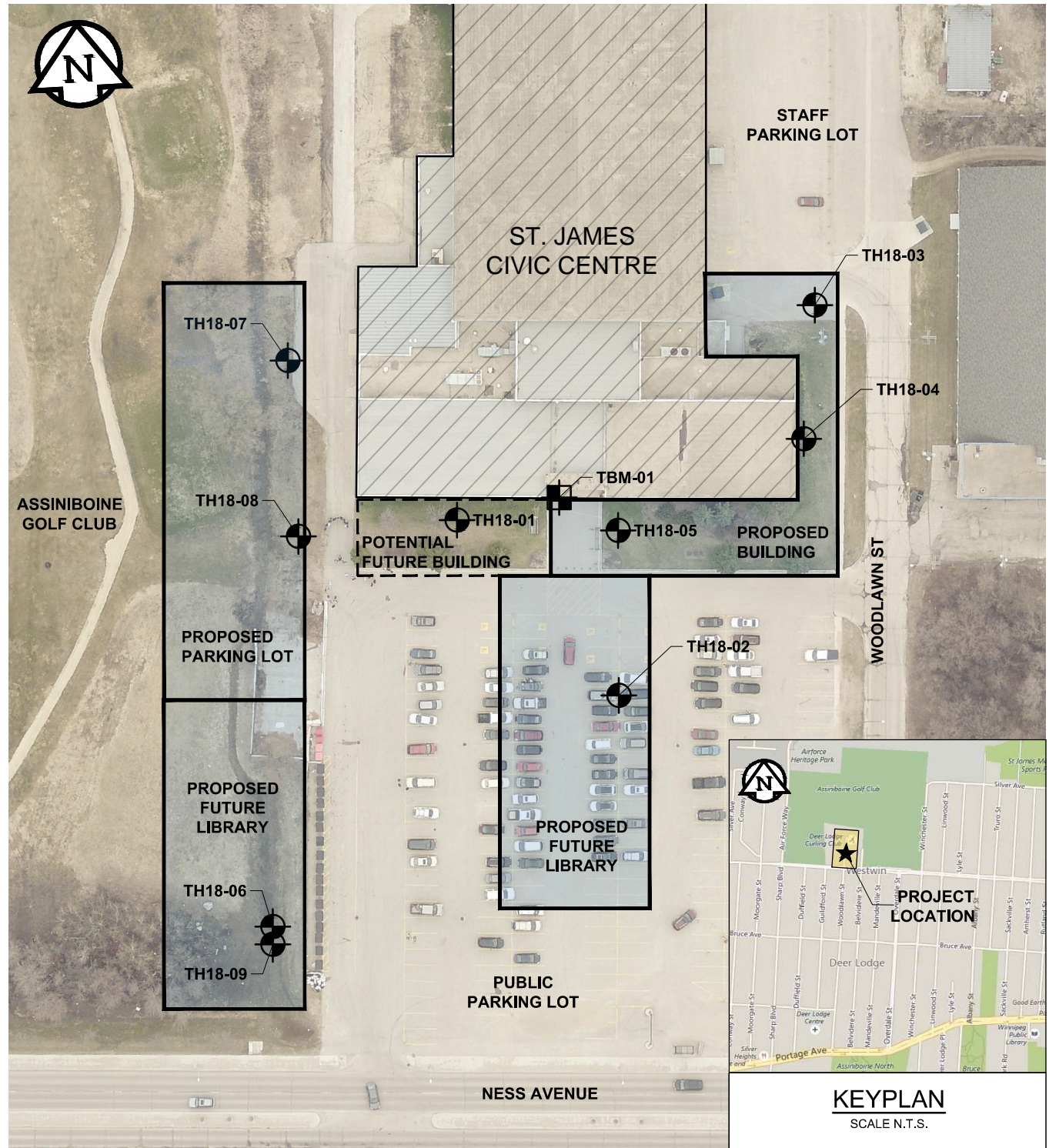
**GEOTECHNICAL - TEST HOLE LOGS**

**prepared by Trek Geotechnical Inc.**



**dated May 9, 2019**

ANSI full bleed A (8.50 x 11.00 Inches)

Z:\Projects\0015 City of Winnipeg\0015 024 00 St. James Civic Centre\3 Survey and Dwg\3.4 CAD\3.4.3 Working Folder\Fig.001 2018-04-11 0\_A\_SL\_0015 024 00.dwg, 5/8/2018 9:57:17 AM

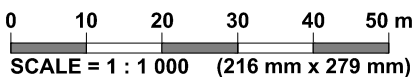


**LEGEND:**

-  TEST HOLE (TEST HOLE APRIL 9-10, 2018)
-  TEMPORARY BENCHMARK TBM-01 LOCATED ON MAIN FLOOR AT ENTRANCE

**NOTE:**

1. AERIAL IMAGE FROM CITY OF WINNIPEG, FALL 2016



**Figure 01**  
Test Hole Location Plan

## GENERAL NOTES

- Classifications are based on the United Soil Classification System and include consistency, moisture, and color. Field descriptions have been modified to reflect results of laboratory tests where deemed appropriate.
- Descriptions on these test hole logs apply only at the specific test hole locations and at the time the test holes were drilled. Variability of soil and groundwater conditions may exist between test hole locations.
- When the following classification terms are used in this report or test hole logs, the primary and secondary soil fractions may be visually estimated.

Major Divisions	USCS Classification	Symbols	Typical Names	Laboratory Classification Criteria		Particle Size			
<b>Coarse-Grained soils</b> (More than half the material is larger than No. 200 sieve size)	<b>Gravels</b> (More than half of coarse fraction is larger than 4.75 mm)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines	Determine percentages of sand and gravel from grain size curve, depending on percentage of fines (fraction smaller than No. 200 sieve) coarse-grained soils are classified as follows:  Less than 5 percent..... GM, GP, SW, SP More than 12 percent..... GM, GC, SM, SC 6 to 12 percent..... Borderline cases requiring dual symbols*	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3	ASTM Sieve sizes			
		GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines		Not meeting all gradation requirements for GW		#10 to #4 #40 to #10 #200 to #40 < #200		
		GM	Silty gravels, gravel-sand-silt mixtures		Atterberg limits below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols	mm		
		GC	Clayey gravels, gravel-sand-silt mixtures		Atterberg limits above "A" line or P.I. greater than 7	Atterberg limits above "A" line or P.I. greater than 7			
	<b>Sands</b> (More than half of coarse fraction is smaller than 4.75 mm)	<b>Clean gravel</b> (Little or no fines)	SW		Well-graded sands, gravelly sands, little or no fines	$C_u = \frac{D_{60}}{D_{10}}$ greater than 6; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3	mm		
			SP		Poorly-graded sands, gravelly sands, little or no fines	Not meeting all gradation requirements for SW		2.00 to 4.75 0.425 to 2.00 0.075 to 0.425 < 0.075	
		<b>Sands with fines</b> (Appreciable amount of fines)	SM		Silty sands, sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols	Material	
			SC		Clayey sands, sand-clay mixtures	Atterberg limits above "A" line or P.I. greater than 7	Atterberg limits above "A" line or P.I. greater than 7		
			<b>Silt and Clays</b> (Liquid limit less than 50)		ML	Inorganic silts and very fine sands, rock floor, silty or clayey fine sands or clayey silts with slight plasticity	<div style="text-align: center;"> <b>Plasticity Chart</b>            Plasticity chart for silt fraction with particles smaller than 0.425 mm            </div>		
					CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays			
OL	Organic silts and organic silty clays of low plasticity								
<b>Silt and Clays</b> (Liquid limit greater than 50)	MH	Inorganic silts, micaceous or distomaceous fine sandy or silty soils, organic silts							
	CH	Inorganic clays of high plasticity, fat clays							
	OH	Organic clays of medium to high plasticity, organic silts							
<b>Highly Organic Soils</b>	Pt	Peat and other highly organic soils	Von Post Classification Limit	Strong colour or odour, and often fibrous texture	Material				
						<b>Particle Size</b> ASTM Sieve Sizes mm > 300 75 to 300 19 to 75 4.75 to 19 > 12 in. 3 in. to 12 in. 3/4 in. to 3 in. #4 to 3/4 in.			
						<b>Material</b> Boulders Cobbles Gravel Coarse Fine Silt or Clay			

\* Borderline classifications used for soils possessing characteristics of two groups are designated by combinations of groups symbols. For example; GW-GC, well-graded gravel-sand mixture with clay binder.

## Other Symbol Types

	Asphalt		Bedrock (undifferentiated)		Cobbles
	Concrete		Limestone Bedrock		Boulders and Cobbles
	Fill		Cemented Shale		Silt Till
			Non-Cemented Shale		Clay Till

## LEGEND OF ABBREVIATIONS AND SYMBOLS

LL - Liquid Limit (%)	▽ Water Level at Time of Drilling
PL - Plastic Limit (%)	▼ Water Level at End of Drilling
PI - Plasticity Index (%)	▽ Water Level After Drilling as Indicated on Test Hole Logs
MC - Moisture Content (%)	
SPT - Standard Penetration Test	
RQD- Rock Quality Designation	
Qu - Unconfined Compression	
Su - Undrained Shear Strength	
VW - Vibrating Wire Piezometer	
SI - Slope Inclinometer	

## FRACTION OF SECONDARY SOIL CONSTITUENTS ARE BASED ON THE FOLLOWING TERMINOLOGY

TERM	EXAMPLES	PERCENTAGE
and	and CLAY	35 to 50 percent
"y" or "ey"	clayey, silty	20 to 35 percent
some	some silt	10 to 20 percent
trace	trace gravel	1 to 10 percent

## TERMS DESCRIBING CONSISTENCY OR COMPACTION CONDITION

The Standard Penetration Test blow count (N) of a non-cohesive soil can be related to compactness condition as follows:

<u>Descriptive Terms</u>	<u>SPT (N) (Blows/300 mm)</u>
Very loose	< 4
Loose	4 to 10
Compact	10 to 30
Dense	30 to 50
Very dense	> 50

The Standard Penetration Test blow count (N) of a cohesive soil can be related to its consistency as follows:

<u>Descriptive Terms</u>	<u>SPT (N) (Blows/300 mm)</u>
Very soft	< 2
Soft	2 to 4
Firm	4 to 8
Stiff	8 to 15
Very stiff	15 to 30
Hard	> 30

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

<u>Descriptive Terms</u>	<u>Undrained Shear Strength (kPa)</u>
Very soft	< 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very stiff	100 to 200
Hard	> 200



# Sub-Surface Log

Test Hole TH18-01

1 of 2

Client: City of Winnipeg Project Number: 0015 024 00  
 Project Name: St. James Civic Centre New Additions and Building, Winnipeg, MB Location: Refer to Figure 01 for Test Hole locations  
 Contractor: Subterranean Ltd. Ground Elevation: 99.73 m  
 Method: 406 mm Auger, Soilmec STM-20 Date Drilled: April 9, 2018

Sample Type:  Grab (G)  Shelby Tube (T)  Split Spoon (SS)  Split Barrel (SB)  Core (C)

Particle Size Legend:  Fines  Clay  Silt  Sand  Gravel  Cobbles  Boulders

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m <sup>3</sup> )					Undrained Shear Strength (kPa)						
						16	17	18	19	20	21	Test Type					
						Particle Size (%)											
						0	20	40	60	80	100						
						PL _____ MC _____ LL _____ 0 20 40 60 80 100											
						0	20	40	60	80	100	0	40	80	120	160	200
99.4			ORGANIC CLAY - silty, trace to some sand, trace gravel (<10 mm diam.), trace rootlets, black, frozen, moist and stiff when thawed, low to intermediate plasticity		G01												
98.8	-0.5		CLAY (FILL) - silty, trace sand, trace gravel (<10 mm diam.), trace organics - dark brown - frozen, moist and firm when thawed - intermediate plasticity		G02												
98.5	-1.0		SILT - trace clay, trace sand, trace gravel (<5 mm diam.) - brown, frozen, moist and soft when thawed, low plasticity		G03												
	-1.5		CLAY - silty, trace sand, trace gravel (<5 mm diam.), trace oxidation, trace silt inclusions (<15 mm diam.) - brown - frozen to 2.1 m, moist and stiff when thawed - high plasticity		G04												
	-2.0		- grey below 2.1 m		G05												
	-2.5		- stiff to very stiff below 2.7 m		G06												
	-3.0				G06												
	-3.5																
	-4.0																
	-4.5																
	-5.0				T07												
	-5.5																
	-6.0		- firm below 6.1 m		G08												
	-6.5																
	-7.0																
	-7.5		- trace till inclusions, soft to firm below 7.6 m		G09												

SUB-SURFACE LOG LOGS 2018-04-11 ST. JAMES CIVIC CENTRE\_0\_FINAL 0015 024 00.GPJ TREK GEOTECHNICAL\_GDT 5/8/18

Logged By: Beta Taryana Reviewed By: Nelson Ferreira Project Engineer: Nelson Ferreira



# Sub-Surface Log

Test Hole TH18-01

2 of 2

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m <sup>3</sup> )		Undrained Shear Strength (kPa)									
						16	17	18	19	20	21						
91.5	8.0					Particle Size (%)		Test Type									
						0 20 40 60 80 100		△ Torvane △ ⊕ Pocket Pen. ⊕ ⊠ Qu ⊠ ○ Field Vane ○									
						PL MC LL		0 40 80 120 160 200									
						0	20	40	60	80	100	0	40	80	120	160	200
	8.5		SILT (TILL) - trace clay, trace sand, trace gravel (<25 mm diam.) - light grey - wet, compact - no to low plasticity		G10												
	9.0																
	10.0		- moist below 10.1 m		G11												
	10.5																
	11.0																
	11.5																
	12.0																
	12.5																
	13.0																
	13.5																
	14.0		- dense below 13.7 m		G12												
	14.5																
85.1	14.5																

POWER AUGER REFUSAL AT 14.6 m IN SILT (TILL)

Notes:

1. Seepage observed between 8.2 m depth and 10.1 m depth in SILT (TILL) layer.
2. Sloughing observed between 9.8 m depth and 13.7 m depth in SILT (TILL) layer.
3. Unable to recover soil sample between 10.7 m and 13.7 m due to slough material.
4. Test Hole open to 9.4 m depth and groundwater level at 9.1 m depth fifteen minutes after drilling.
5. Test Hole backfilled with auger cuttings.
6. Elevation relative to the main floor located at south entrance of existing building, which was assigned a temporary benchmark elevation of 100.00 m.

SUB-SURFACE LOG LOGS 2018-04-11 ST JAMES CIVIC CENTRE\_0\_FINAL 0015 024 00.GPJ TREK GEOTECHNICAL\_GDT 5/8/18

Logged By: Beta Taryana

Reviewed By: Nelson Ferreira

Project Engineer: Nelson Ferreira



# Sub-Surface Log

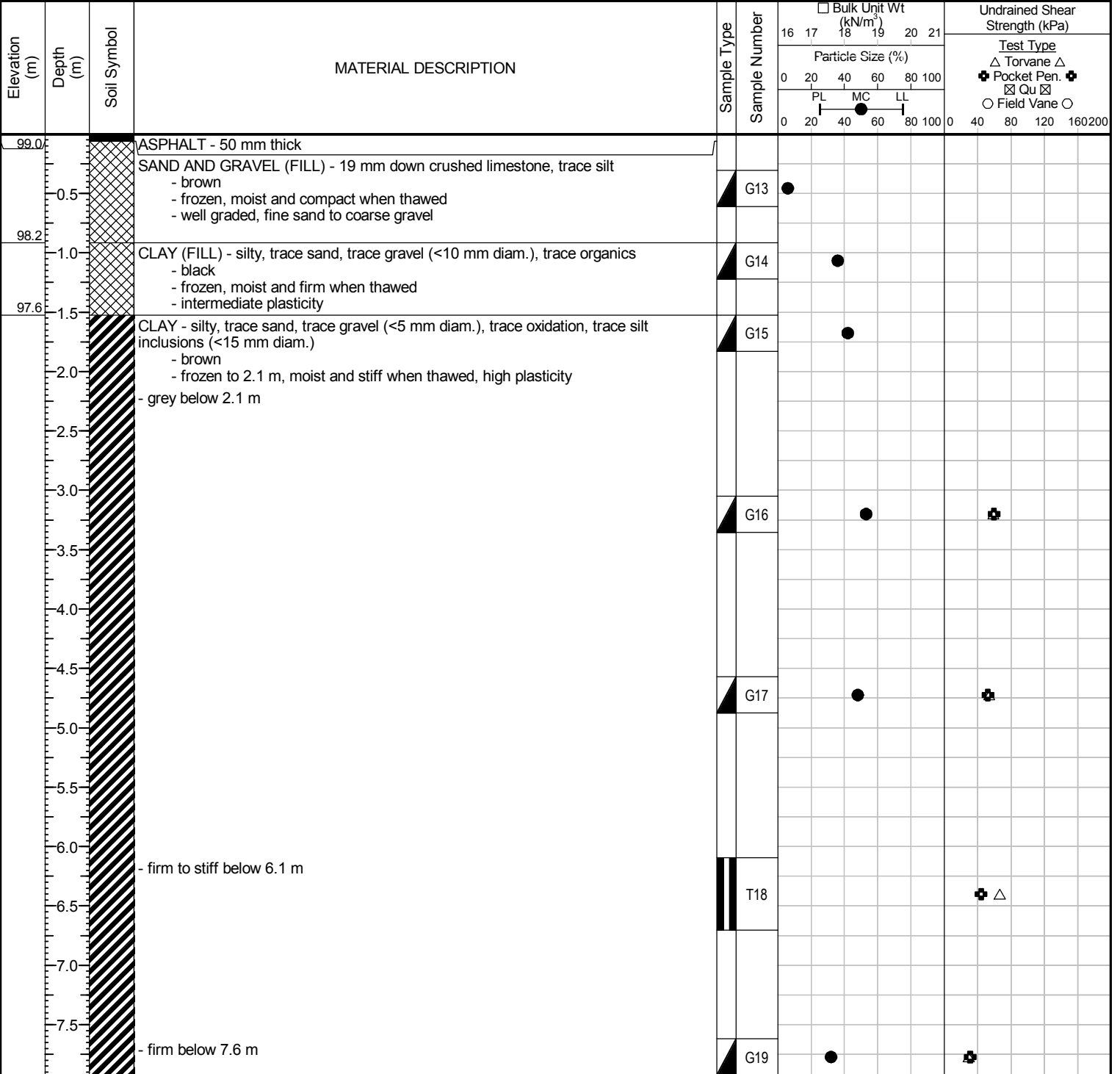
Test Hole TH18-02

1 of 2

Client: City of Winnipeg Project Number: 0015 024 00  
 Project Name: St. James Civic Centre New Additions and Building, Winnipeg, MB Location: Refer to Figure 01 for Test Hole locations  
 Contractor: Subterranean Ltd. Ground Elevation: 99.10 m  
 Method: 406 mm Auger, Soilmec STM-20 Date Drilled: April 9, 2018

Sample Type:  Grab (G)  Shelby Tube (T)  Split Spoon (SS)  Split Barrel (SB)  Core (C)

Particle Size Legend:  Fines  Clay  Silt  Sand  Gravel  Cobbles  Boulders



SUB-SURFACE LOG LOGS 2018-04-11 ST. JAMES CIVIC CENTRE\_0\_FINAL 0015 024 00.GPJ TREK GEOTECHNICAL\_GDT 5/8/18

Logged By: Beta Taryana Reviewed By: Nelson Ferreira Project Engineer: Nelson Ferreira



# Sub-Surface Log

Test Hole TH18-02

2 of 2

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m <sup>3</sup> )		Undrained Shear Strength (kPa)
						16 17 18 19 20 21	0 20 40 60 80 100	
						Particle Size (%)		Test Type
						PL MC LL		<input type="checkbox"/> Torvane <input type="checkbox"/> <input checked="" type="checkbox"/> Pocket Pen. <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Qu <input checked="" type="checkbox"/> <input type="checkbox"/> Field Vane <input type="checkbox"/>
						0 20 40 60 80 100		0 40 80 120 160 200
90.9	8.0		- trace till inclusions, soft to firm below 7.9 m					
	8.5		SILT (TILL) - trace clay, trace sand, trace gravel (<30 mm diam.) - light grey - moist to wet, compact - no to low plasticity	▲	G20	●		
	9.0		- trace cobbles, moist and dense below 9.1 m					
	9.5			▲	G21	●		
	10.0							
	10.5			▲	G22	●		
	11.0							
	11.5			▲	G23	●		
	12.0		- reddish grey and very dense below 11.9 m					
	12.5							
	13.0							
	13.5							
	14.0			▲	G24	●		
	14.5							
	15.0			▲	G25	●		
83.6	15.5							

POWER AUGER REFUSAL AT 15.5 m IN SILT (TILL)  
 Notes:  
 1. Seepage observed between 8.2 m depth and 9.1 m depth in SILT (TILL) layer.  
 2. Sloughing observed between 0.1 m depth and 0.9 m depth in SAND AND GRAVEL (FILL) layer.  
 3. Test Hole open to 15.5 m depth and dry fifteen minutes after drilling.  
 4. Test Hole backfilled with auger cuttings and topped with granular material and cold patch asphalt.  
 5. Elevation relative to the main floor located at south entrance of existing building, which was assigned a temporary benchmark elevation of 100.00 m.

SUB-SURFACE LOG LOGS 2018-04-11 ST. JAMES CIVIC CENTRE\_0\_FINAL 0015 024 00.GPJ TREK GEOTECHNICAL\_GDT 5/8/18





# Sub-Surface Log

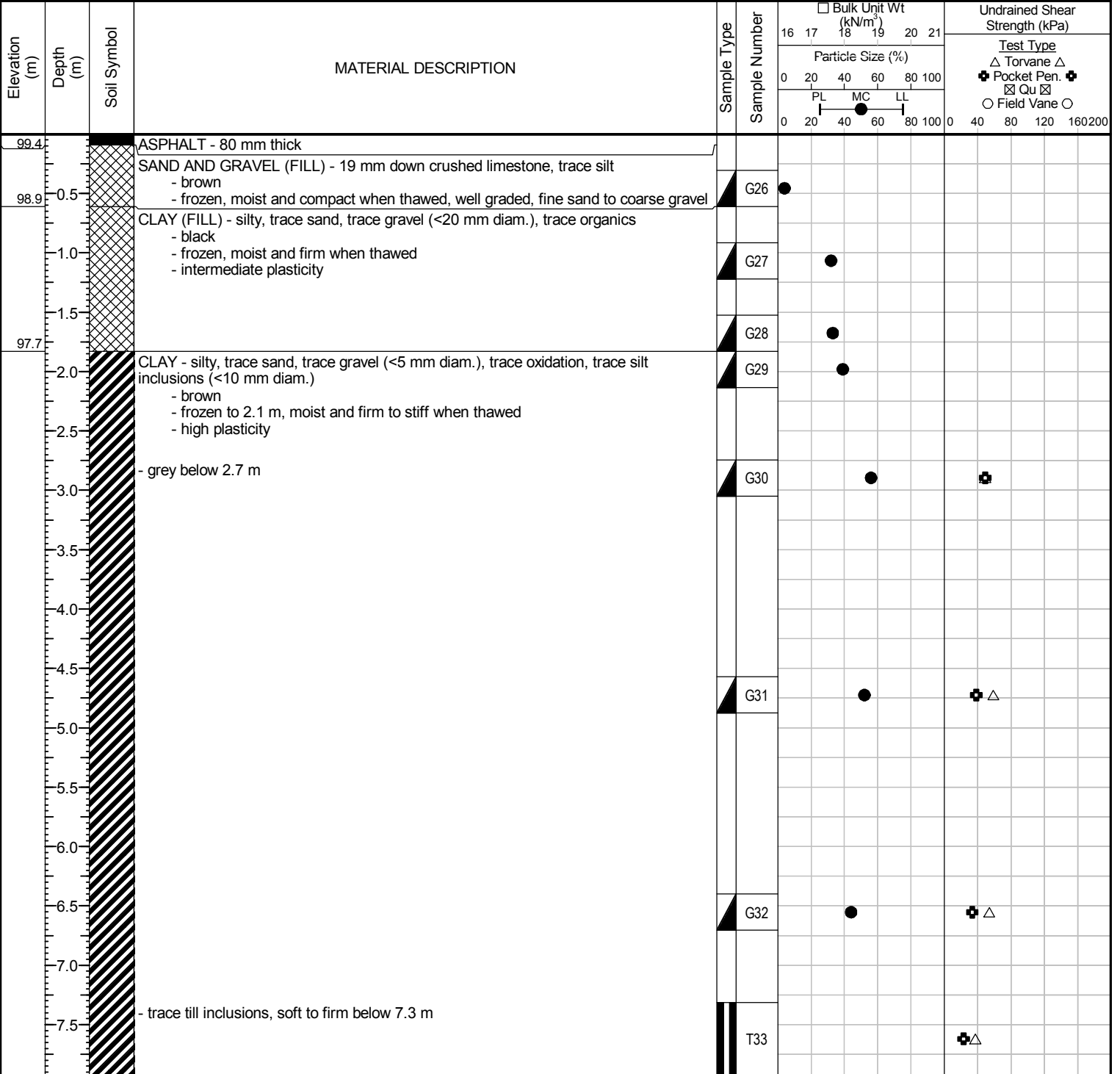
Test Hole TH18-03

1 of 2

Client: City of Winnipeg Project Number: 0015 024 00  
 Project Name: St. James Civic Centre New Additions and Building, Winnipeg, MB Location: Refer to Figure 01 for Test Hole locations  
 Contractor: Subterranean Ltd. Ground Elevation: 99.52 m  
 Method: 406 mm Auger, Soilmec STM-20 Date Drilled: April 9, 2018

Sample Type:  Grab (G)  Shelby Tube (T)  Split Spoon (SS)  Split Barrel (SB)  Core (C)

Particle Size Legend:  Fines  Clay  Silt  Sand  Gravel  Cobbles  Boulders



SUB-SURFACE LOG LOGS 2018-04-11 ST. JAMES CIVIC CENTRE\_0\_FINAL 0015 024 00.GPJ TREK GEOTECHNICAL\_GDT 5/8/18

Logged By: Beta Taryana Reviewed By: Nelson Ferreira Project Engineer: Nelson Ferreira



# Sub-Surface Log

Test Hole TH18-03

2 of 2

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m <sup>3</sup> )		Undrained Shear Strength (kPa)			
						16	17				
						Particle Size (%)		Test Type <input type="checkbox"/> Torvane <input type="checkbox"/> <input checked="" type="checkbox"/> Pocket Pen. <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Qu <input checked="" type="checkbox"/> <input type="checkbox"/> Field Vane <input type="checkbox"/>			
						0	100				
						PL	MC	LL			
						0	20	40	60	80	100
91.3	8.0										
	8.5		SILT (TILL) - trace clay, trace sand, trace gravel (<25 mm diam.) - light grey - moist, compact		G34	●					
	9.0										
	9.5		- trace cobbles, dense below 9.1 m								
	10.0										
	10.5										
	11.0				G35	●					
	11.5										
	12.0										
	12.5				G36	●					
	13.0										
	13.5										
	14.0				G37	●					
	14.5		- 50 mm thick of wet sand seam at 14.0 m								
	15.0										
84.0	15.5				G38	●					

END OF TEST HOLE AT 15.5 m IN SILT (TILL)

Notes:

1. Seepage observed between 14.0 m depth and 14.1 m depth in sand seam.
2. No sloughing observed.
3. Test Hole open to 15.5 m depth and dry fifteen minutes after drilling.
4. Test Hole backfilled with auger cuttings and topped with granular material and cold patch asphalt.
5. TH18-03 moved 0.7 m north and 0.7 m east from its original location due to auger refusal on suspected concrete pad at 0.6 m below existing grade.
6. Elevation relative to the main floor located at south entrance of existing building, which was assigned a temporary benchmark elevation of 100.00 m.

Logged By: Beta Taryana

Reviewed By: Nelson Ferreira

Project Engineer: Nelson Ferreira



# Sub-Surface Log

Test Hole TH18-04

1 of 2

Client: City of Winnipeg Project Number: 0015 024 00  
 Project Name: St. James Civic Centre New Additions and Building, Winnipeg, MB Location: Refer to Figure 01 for Test Hole locations  
 Contractor: Subterranean Ltd. Ground Elevation: 99.77 m  
 Method: 406 mm Auger, Soilmec STM-20 Date Drilled: April 9, 2018

Sample Type:  Grab (G)  Shelby Tube (T)  Split Spoon (SS)  Split Barrel (SB)  Core (C)

Particle Size Legend:  Fines  Clay  Silt  Sand  Gravel  Cobbles  Boulders

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m <sup>3</sup> )					Undrained Shear Strength (kPa)	
						16	17	18	19	20		21
99.2	-0.5		ORGANIC CLAY - silty, trace sand, trace gravel (<10 mm diam.), trace rootlets - black - frozen, moist and stiff when thawed - low to intermediate plasticity		G39							
98.2	-1.0		CLAY (FILL) - silty, some sand, trace gravel (<15 mm diam.) - brown - frozen, moist and firm when thawed - intermediate plasticity		G40							
97.6	-1.5		SILT - trace clay, trace sand, trace gravel (<5 mm diam.) - brown - moist to wet, soft - low plasticity		G41							
	-2.0		CLAY - silty, trace sand, trace gravel (<5 mm diam.), trace silt inclusions (<25 mm diam.) - grey - moist, firm to stiff - high plasticity		G42							△ +
	-2.5				G43							△ +
	-3.0				G44							⊠ +
	-3.5				G45							△ +
	-4.0				G46							⊠ +
	-4.5											
	-5.0											
	-5.5											
	-6.0											
	-6.5											
	-7.0											
	-7.5		- firm below 7.6 m									

SUB-SURFACE LOG LOGS 2018-04-11 ST. JAMES CIVIC CENTRE\_0\_FINAL 0015 024 00.GPJ TREK GEOTECHNICAL\_GDT 5/8/18

Logged By: Beta Taryana Reviewed By: Nelson Ferreira Project Engineer: Nelson Ferreira

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m <sup>3</sup> )		Undrained Shear Strength (kPa)
						16 17 18 19 20 21	0 20 40 60 80 100	
						Particle Size (%)		Test Type
						PL MC LL		<input type="checkbox"/> Torvane <input type="checkbox"/> <input checked="" type="checkbox"/> Pocket Pen. <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Qu <input checked="" type="checkbox"/> <input type="checkbox"/> Field Vane <input type="checkbox"/>
						0 20 40 60 80 100		0 40 80 120 160 200
	8.0		- trace till inclusions, soft to firm below 7.9 m					
91.2	8.5		SILT (TILL) - trace clay, trace sand, trace gravel (<30 mm diam.) - light grey - moist to wet, compact - no to low plasticity		G47	●		
	9.0		- reddish grey to 9.8 m and moist below 9.1 m		G48	●		
	9.5							
	10.0							
	10.5		- trace cobbles, dense below 10.4 m		G49	●		
	11.0							
	11.5							
	12.0							
	12.5				G50	●		
	13.0							
	13.5				G51	●		
	14.0							
	14.5							
84.5	15.0				G52	●		

END OF TEST HOLE AT 15.2 m IN SILT (TILL)  
 Notes:  
 1. Seepage observed between 1.5 m depth and 2.1 m depth in SILT layer and between 8.5 m depth and 9.1 m depth in SILT (TILL) layer.  
 2. No sloughing observed.  
 3. Test Hole open to 15.2 m depth and dry fifteen minutes after drilling.  
 4. Test Hole backfilled with auger cuttings.  
 5. Elevation relative to the main floor located at south entrance of existing building, which was assigned a temporary benchmark elevation of 100.00 m.

SUB-SURFACE LOG LOGS 2018-04-11 ST JAMES CIVIC CENTRE\_0\_FINAL 0015 024 00.GPJ TREK GEOTECHNICAL\_GDT 5/8/18



# Sub-Surface Log

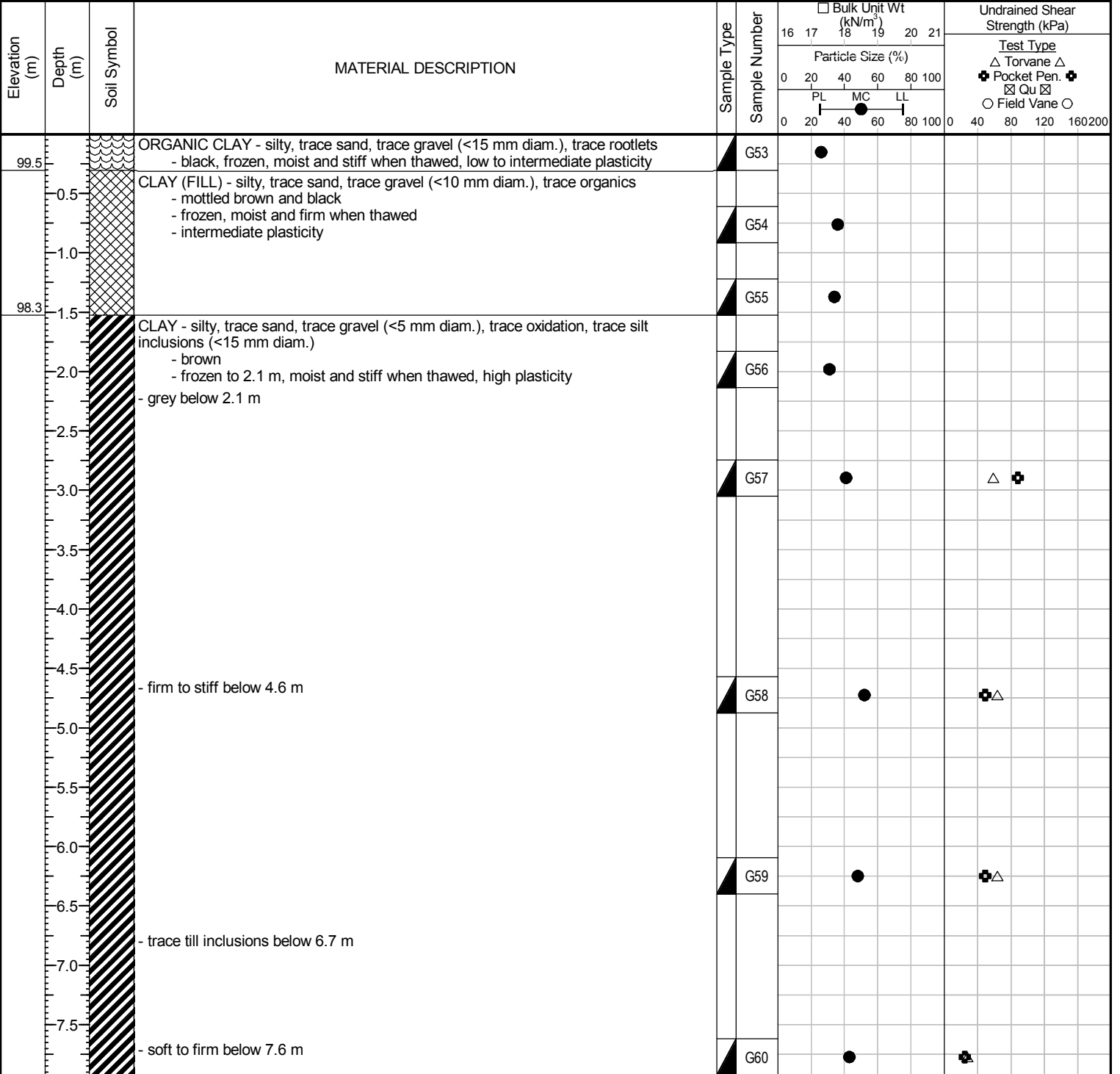
Test Hole TH18-05

1 of 2

Client: City of Winnipeg Project Number: 0015 024 00  
 Project Name: St. James Civic Centre New Additions and Building, Winnipeg, MB Location: Refer to Figure 01 for Test Hole locations  
 Contractor: Subterranean Ltd. Ground Elevation: 99.83 m  
 Method: 406 mm Auger, Soilmec STM-20 Date Drilled: April 9, 2018

Sample Type:  Grab (G)  Shelby Tube (T)  Split Spoon (SS)  Split Barrel (SB)  Core (C)

Particle Size Legend:  Fines  Clay  Silt  Sand  Gravel  Cobbles  Boulders



SUB-SURFACE LOG LOGS 2018-04-11 ST. JAMES CIVIC CENTRE\_0\_FINAL 0015 024 00.GPJ TREK GEOTECHNICAL\_GDT 5/8/18

Logged By: Beta Taryana Reviewed By: Nelson Ferreira Project Engineer: Nelson Ferreira



# Sub-Surface Log

Test Hole TH18-05

2 of 2

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m <sup>3</sup> )		Undrained Shear Strength (kPa)
						16 17 18 19 20 21	0 20 40 60 80 100	
						Particle Size (%)		Test Type
						PL MC LL		<input type="checkbox"/> Torvane <input type="checkbox"/> <input checked="" type="checkbox"/> Pocket Pen. <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Qu <input checked="" type="checkbox"/> <input type="checkbox"/> Field Vane <input type="checkbox"/>
						0 20 40 60 80 100		0 40 80 120 160 200
91.3	8.5		SILT (TILL) - trace clay, trace sand, trace gravel (<25 mm diam.) - light grey - wet, compact - no to low plasticity - moist below 9.1 m		G61	●		
					G62	●		
					G63	●		
					G64	●		
					G65	●		
					G66	●		

END OF TEST HOLE AT 15.5 m IN SILT (TILL)  
 Notes:  
 1. Seepage observed between 8.5 m depth and 9.1 m depth in SILT (TILL) layer.  
 2. No sloughing observed.  
 3. Test Hole open to 15.5 m depth and dry fifteen minutes after drilling.  
 4. Test Hole backfilled with auger cuttings.  
 5. Elevation relative to the main floor located at south entrance of existing building, which was assigned a temporary benchmark elevation of 100.00 m.

SUB-SURFACE LOG LOGS 2018-04-11 ST JAMES CIVIC CENTRE\_0\_FINAL 0015 024 00.GPJ TREK GEOTECHNICAL\_GDT 5/8/18



# Sub-Surface Log

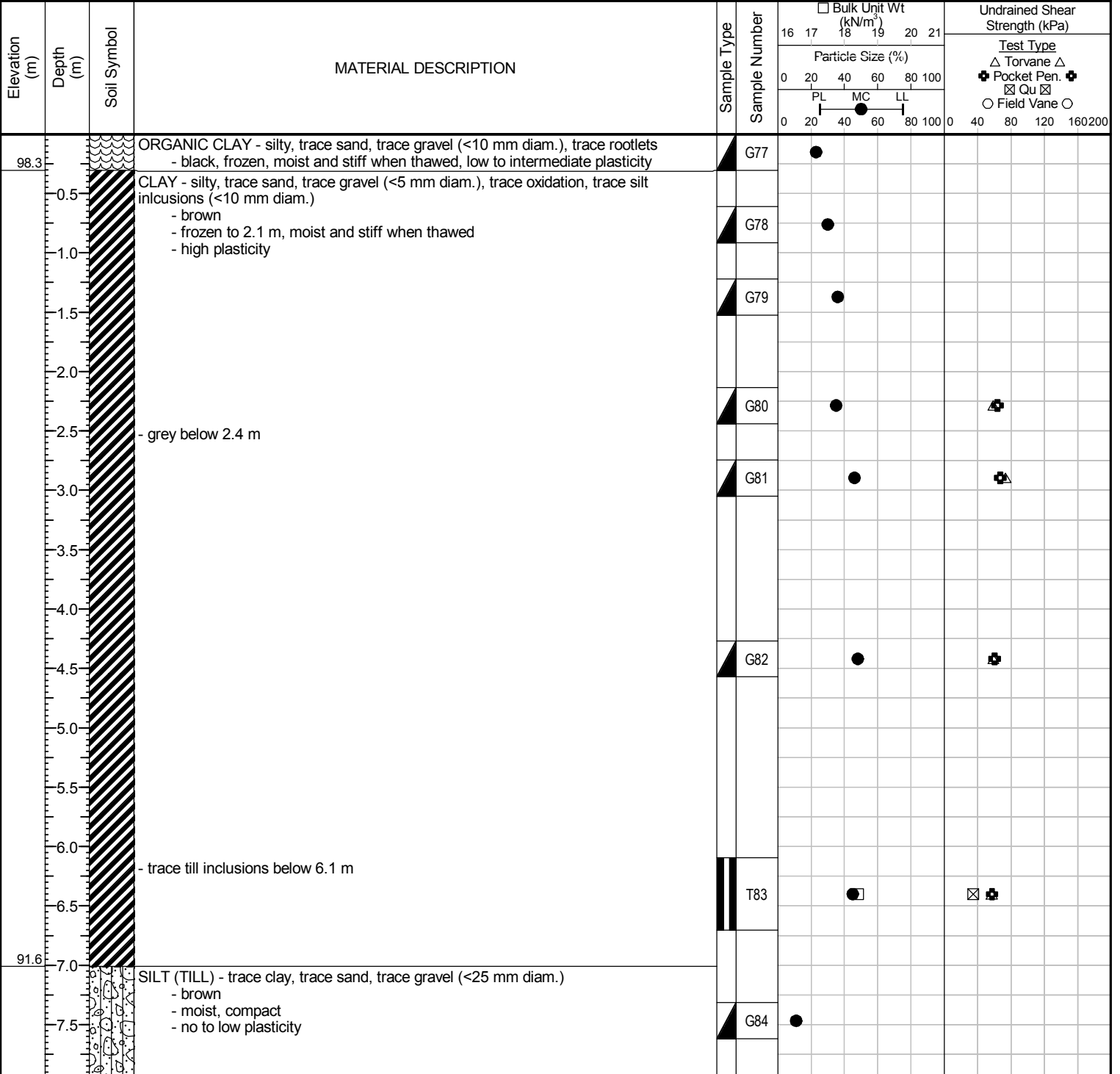
Test Hole TH18-06

1 of 2

Client: City of Winnipeg Project Number: 0015 024 00  
 Project Name: St. James Civic Centre New Additions and Building, Winnipeg, MB Location: Refer to Figure 01 for Test Hole locations  
 Contractor: Subterranean Ltd. Ground Elevation: 98.65 m  
 Method: 406 mm Auger, Soilmec STM-20 Date Drilled: April 10, 2018

Sample Type:  Grab (G)  Shelby Tube (T)  Split Spoon (SS)  Split Barrel (SB)  Core (C)

Particle Size Legend:  Fines  Clay  Silt  Sand  Gravel  Cobbles  Boulders



SUB-SURFACE LOG LOGS 2018-04-11 ST. JAMES CIVIC CENTRE\_0\_FINAL 0015 024 00.GPJ TREK GEOTECHNICAL\_GDT 5/8/18

Logged By: Beta Taryana Reviewed By: Nelson Ferreira Project Engineer: Nelson Ferreira



# Sub-Surface Log

Test Hole TH18-06

2 of 2

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m <sup>3</sup> )		Undrained Shear Strength (kPa)
						16 17 18 19 20 21	0 20 40 60 80 100	
						Particle Size (%)		Test Type
						PL MC LL		△ Torvane △ ⊕ Pocket Pen. ⊕ ⊠ Qu ⊠ ○ Field Vane ○
						0 20 40 60 80 100		0 40 80 120 160 200
8.0			- reddish grey to 9.1 m below 8.2 m					
8.5					G85			
9.0								
9.5								
10.0								
10.5					G86			
11.0								
11.5								
12.0					G87			
12.5								
13.0					G88			

POWER AUGER REFUSAL AT 13.1 m IN SILT (TILL)

Notes:

1. No seepage observed.
2. Sloughing observed between 8.5 m depth and 8.7 m depth in SILT (TILL) layer 30 minutes after belling.
3. Test bell performed at 8.7 m below existing ground in SILT (TILL) layer.
4. Test bell remained open with about 100 mm of slough at the base 30 minutes after belling.
5. Drilling continued to power auger refusal 30 minutes after test bell performed.
6. Test Hole open to 13.1 m depth and dry fifteen minutes after drilling.
7. Test Hole backfilled with auger cuttings.
8. Elevation relative to the main floor located at south entrance of existing building, which was assigned a temporary benchmark elevation of 100.00 m.

SUB-SURFACE LOG LOGS 2018-04-11 ST JAMES CIVIC CENTRE\_0\_FINAL 0015 024 00.GPJ TREK GEOTECHNICAL\_GDT 5/8/18





# Sub-Surface Log

Test Hole TH18-07

1 of 1

Client: City of Winnipeg Project Number: 0015 024 00  
 Project Name: St. James Civic Centre New Additions and Building, Winnipeg, MB Location: Refer to Figure 01 for Test Hole locations  
 Contractor: Subterranean Ltd. Ground Elevation: 99.21 m  
 Method: 406 mm Auger, Soilmec STM-20 Date Drilled: April 10, 2018

Sample Type:  Grab (G)  Shelby Tube (T)  Split Spoon (SS)  Split Barrel (SB)  Core (C)

Particle Size Legend:  Fines  Clay  Silt  Sand  Gravel  Cobbles  Boulders

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m <sup>3</sup> )					Undrained Shear Strength (kPa)						
						16	17	18	19	20	21	Test Type					
						Particle Size (%)											
						0	20	40	60	80	100						
						PL ——— MC ——— LL ———  ----- ----- ----- ----- -----											
						0	20	40	60	80	100	0	40	80	120	160	200
98.9			ORGANIC CLAY - silty, trace sand, trace gravel (<10 mm diam.), trace rootlets - black, frozen, moist and stiff when thawed, low to intermediate plasticity		G67			●									
98.6	-0.5		SILT - trace clay, trace sand, trace gravel (<5 mm diam.) - brown, frozen, moist and soft when thawed, low plasticity		G68		●										
	-1.0		CLAY - silty, trace sand, trace gravel (<5 mm diam.), trace oxidation, trace silt inclusions (<15 mm diam.) - brown - frozen to 2.1 m, moist and stiff when thawed - high plasticity		G69		●						△	+			
	-2.0				G70			●					△	+			
	-2.5		- grey below 2.4 m		G71								△	+			
96.2	-3.0		- soft to firm below 2.7 m		G71								△	+			

END OF TEST HOLE AT 3.0 m IN CLAY  
 Notes:  
 1. No seepage or sloughing observed.  
 2. Test Hole open to 3.0 m depth and dry fifteen minutes after drilling.  
 3. Test Hole backfilled with auger cuttings.  
 4. Elevation relative to the main floor located at south entrance of existing building, which was assigned a temporary benchmark elevation of 100.00 m.

SUB-SURFACE LOG LOGS 2018-04-11 ST JAMES CIVIC CENTRE\_0\_FINAL 0015 024 00.GPJ TREK GEOTECHNICAL\_GDT 5/8/18

Logged By: Beta Taryana Reviewed By: Nelson Ferreira Project Engineer: Nelson Ferreira



# Sub-Surface Log

Test Hole TH18-08

1 of 1

Client: City of Winnipeg Project Number: 0015 024 00  
 Project Name: St. James Civic Centre New Additions and Building, Winnipeg, MB Location: Refer to Figure 01 for Test Hole locations  
 Contractor: Subterranean Ltd. Ground Elevation: 99.12 m  
 Method: 406 mm Auger, Soilmec STM-20 Date Drilled: April 10, 2018

Sample Type:  Grab (G)  Shelby Tube (T)  Split Spoon (SS)  Split Barrel (SB)  Core (C)

Particle Size Legend:  Fines  Clay  Silt  Sand  Gravel  Cobbles  Boulders

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m <sup>3</sup> )					Undrained Shear Strength (kPa)						
						16	17	18	19	20	21	Test Type					
						Particle Size (%)											
						0	20	40	60	80	100						
						PL ——— MC ——— LL 0 20 40 60 80 100											
						0	20	40	60	80	100	0	40	80	120	160	200
98.8			ORGANIC CLAY - silty, trace sand, trace gravel (<15 mm diam.), trace rootlets - black, frozen, moist and stiff when thawed, low to intermediate plasticity		G72												
	0.5		SILT - trace clay, trace sand, trace gravel (<5 mm diam.) - brown - wet, soft - low plasticity		G73												
97.9	1.0		CLAY - silty, trace sand, trace gravel (<5 mm diam.), trace oxidation, trace silt inclusions (<15 mm diam.) - brown - moist, stiff - high plasticity		G74												
	1.5																
	2.0																
	2.5		- grey below 2.4 m		G75												
	3.0				G76												

END OF TEST HOLE AT 3.0 m IN CLAY  
 Notes:  
 1. Seepage observed between 0.3 m depth and 1.2 m depth in SILT layer.  
 2. No sloughing observed.  
 3. Test Hole open to 3.0 m depth and dry fifteen minutes after drilling.  
 4. Test Hole backfilled with auger cuttings.  
 5. Elevation relative to the main floor located at south entrance of existing building, which was assigned a temporary benchmark elevation of 100.00 m.

SUB-SURFACE LOG LOGS 2018-04-11 ST. JAMES CIVIC CENTRE\_0\_FINAL 0015 024 00.GPJ TREK GEOTECHNICAL\_GDT 5/8/18

Logged By: Beta Taryana Reviewed By: Nelson Ferreira Project Engineer: Nelson Ferreira



# Sub-Surface Log

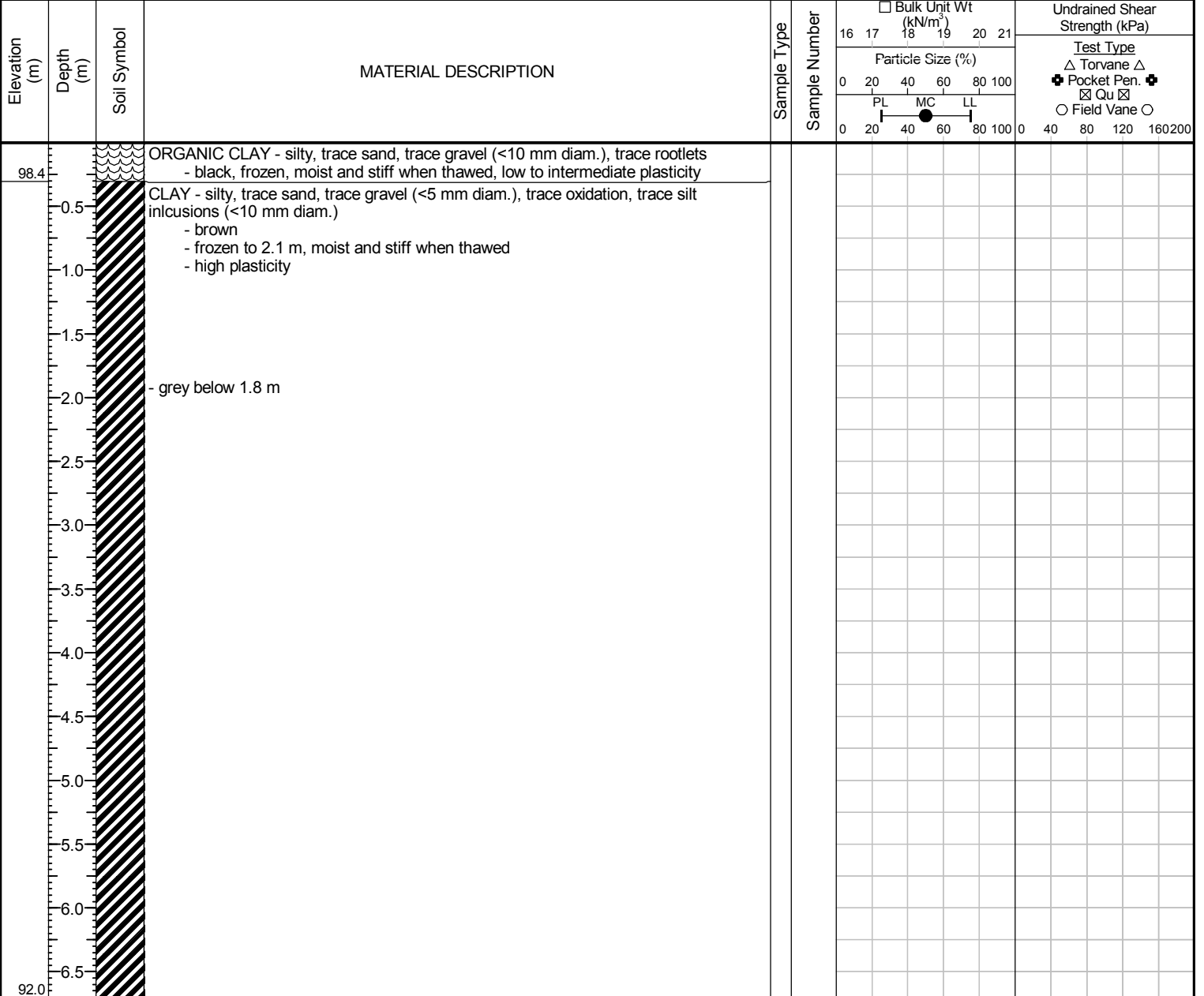
Test Hole TH18-09

1 of 1

Client: City of Winnipeg Project Number: 0015 024 00  
 Project Name: St. James Civic Centre New Additions and Building, Winnipeg, MB Location: Refer to Figure 01 for Test Hole locations  
 Contractor: Subterranean Ltd. Ground Elevation: 98.66 m  
 Method: 406 mm Auger, Soilmec STM-20 Date Drilled: April 10, 2018

Sample Type:  Grab (G)  Shelby Tube (T)  Split Spoon (SS)  Split Barrel (SB)  Core (C)

Particle Size Legend:  Fines  Clay  Silt  Sand  Gravel  Cobbles  Boulders



END OF TEST HOLE AT 6.7 m IN CLAY (CLAY and SILT (TILL) CONTACT)  
 Notes:  
 1. No seepage or sloughing observed.  
 2. Test bell performed at 6.7 m below existing grade in CLAY layer.  
 3. Test Hole open to 6.7 m depth and dry 30 minutes after belling.  
 4. Test Hole backfilled with auger cuttings.  
 5. Elevation relative to the main floor located at south entrance of existing building, which was assigned a temporary benchmark elevation of 100.00 m.

Logged By: Beta Taryana Reviewed By: Nelson Ferreira Project Engineer: Nelson Ferreira