

## **AECOM Canada Ltd.**

### **GENERAL STATEMENT**

#### **NORMAL VARIABILITY OF SUBSURFACE CONDITIONS**

The scope of the investigation presented herein is limited to an investigation of the subsurface conditions as to suitability for the proposed project. This report has been prepared to aid in the evaluation of the site and to assist the engineer in the design of the facilities. Our description of the project represents our understanding of the significant aspects of the project relevant to the design and construction of earth work, foundations and similar. In the event of any changes in the basic design or location of the structures as outlined in this report or plan, we should be given the opportunity to review the changes and to modify or reaffirm in writing the conclusions and recommendations of this report.

The analysis and recommendations presented in this report are based on the data obtained from the borings and test pit excavations made at the locations indicated on the site plans and from other information discussed herein. This report is based on the assumption that the subsurface conditions everywhere are not significantly different from those disclosed by the borings and excavations. However, variations in soil conditions may exist between the excavations and, also, general groundwater levels and conditions may fluctuate from time to time. The nature and extent of the variations may not become evident until construction. If subsurface conditions differ from those encountered in the exploratory borings and excavations, are observed or encountered during construction, or appear to be present beneath or beyond excavations, we should be advised at once so that we can observe and review these conditions and reconsider our recommendations where necessary.

Since it is possible for conditions to vary from those assumed in the analysis and upon which our conclusions and recommendations are based, a contingency fund should be included in the construction budget to allow for the possibility of variations which may result in modification of the design and construction procedures.

In order to observe compliance with the design concepts, specifications or recommendations and to allow design changes in the event that subsurface conditions differ from those anticipated, we recommend that all construction operations dealing with earth work and the foundations be observed by an experienced soils engineer. We can be retained to provide these services for you during construction. In addition, we can be retained to review the plans and specifications that have been prepared to check for substantial conformance with the conclusions and recommendations contained in our report.

## EXPLANATION OF FIELD & LABORATORY TEST DATA

The field and laboratory test results, as shown for each hole, are described below.

### 1. NATURAL MOISTURE CONTENT

The relationship between the natural moisture content and depth is significant in determining the subsurface moisture conditions. The Atterberg Limits for a sample should be compared to its natural moisture content and plotted on the Plasticity Chart in order to determine the soil classification.

### 2. SOIL PROFILE AND DESCRIPTION

Each soil stratum is classified and described noting any special conditions. The Modified Unified Classification System (MUCS) is used. The soil profile refers to the existing ground level at the time the hole was done. Where available, the ground elevation is shown. The soil symbols used are shown in detail on the soil classification chart.

### 3. TESTS ON SOIL SAMPLES

Laboratory and field tests are identified by the following and are on the logs:

- N - Standard Penetration Test (SPT) Blow Count. The SPT is conducted in the field to assess the in-situ consistency of cohesive soils and the relative density of non-cohesive soils. The N value recorded is the number of blows from a 63.5 kg hammer dropped 760 mm which is required to drive a 51 mm split spoon sampler 300 mm into the soil.
  
- SO<sub>4</sub> - Water Soluble Sulphate Content. Expressed in percent. Conducted primarily to determine requirements for the use of sulphate resistant cement. Further details on the water-soluble sulphate content are given in Section 6.
  
- $\gamma_D$  - Dry Unit Weight. Usually expressed in kN/m<sup>3</sup>.
  
- $\gamma_T$  - Total Unit Weight. Usually expressed in kN/m<sup>3</sup>.
  
- Q<sub>u</sub> - Unconfined Compressive Strength. Usually expressed in kPa and may be used in determining allowable bearing capacity of the soil.

- C<sub>u</sub> - Undrained Shear Strength. Usually expressed in kPa. This value is determined by either a direct shear test or by an unconfined compression test and may also be used in determining the allowable bearing capacity of the soil.
  
- C<sub>PEN</sub> - Pocket Penetrometer Reading. Usually expressed in kPa. Estimate of the undrained shear strength as determined by a pocket penetrometer.

The following tests may also be performed on selected soil samples and the results are given on separate sheets enclosed with the logs:

- Grain Size Analysis
- Standard or Modified Proctor Compaction Test
- California Bearing Ratio Test
- Direct Shear Test
- Permeability Test
- Consolidation Test
- Triaxial Test

#### 4. SOIL DENSITY AND CONSISTENCY

The SPT test described above may be used to estimate the consistency of cohesive soils and the density of cohesionless soils. These approximate relationships are summarized in the following tables:

**Table 1 Cohesive Soils**

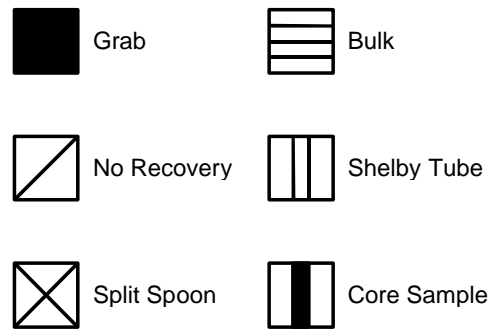
N	Consistency	C <sub>u</sub> (kPa) approx.
0 - 1	Very Soft	<10
1 - 4	Soft	10 - 25
4 - 8	Firm	25 - 50
8 - 15	Stiff	50 - 100
15 - 30	Very Stiff	100 - 200
30 - 60	Hard	200 - 300
>60	Very Hard	>300

**Table 2 Cohesionless Soils**

N	Density
0 - 5	Very Loose
5 - 10	Loose
10 - 30	Compact
30 - 50	Dense
>50	Very Dense

## 5. SAMPLE CONDITION AND TYPE

The depth, type, and condition of samples are indicated on the logs by the following symbols:



## 6. WATER SOLUBLE SULPHATE CONCENTRATION

The following table, from CSA Standard A23.1-14, indicates the requirements for concrete subjected to sulphate attack based upon the percentage of water-soluble sulphate as presented on the logs. CSA Standard A23.1-14 should be read in conjunction with the table.

**Table 3 Requirements for Concrete Subjected to Sulphate Attack\***

Class of exposure	Degree of exposure	Water-soluble sulphate (SO <sub>4</sub> ) <sup>†</sup> in soil sample, %	Sulphate (SO <sub>4</sub> ) <sup>‡</sup> in groundwater samples, mg/L <sup>‡</sup>	Water soluble sulphate (SO <sub>4</sub> ) in recycled aggregate sample, %	Cementing materials to be used <sup>§††</sup>	Performance requirements <sup>§,§§</sup>		
						Maximum expansion when tested using CSA A3004-C8 Procedure A at 23 °C, %		Maximum expansion when tested using CSA A3004-C8 Procedure B at 5 °C, % <sup>†††</sup>
						At 6 months	At 12 months <sup>††</sup>	At 18 months <sup>‡‡</sup>
S-1	Very severe	> 2.0	> 10 000	> 2.0	HS <sup>**</sup> , HSb, HSLb <sup>***</sup> or HSe	0.05	0.10	0.10
S-2	Severe	0.20–2.0	1500–10 000	0.60–2.0	HS <sup>**</sup> , HSb, HSLb <sup>***</sup> or HSe	0.05	0.10	0.10
S-3	Moderate (including seawater exposure*)	0.10–0.20	150–1500	0.20–0.60	MS, MSb, MSe, MSLb <sup>***</sup> , LH, LHb, HS <sup>**</sup> , HSb, HSLb <sup>***</sup> or HSe	0.10		0.10

\*For sea water exposure, also see Clause 4.1.1.5.

<sup>†</sup>In accordance with CSA A23.2-3B.

<sup>‡</sup>In accordance with CSA A23.2-2B.

<sup>§</sup>Where combinations of supplementary cementing materials and portland or blended hydraulic cements are to be used in the concrete mix design instead of the cementing materials listed, and provided they meet the performance requirements demonstrating equivalent performance against sulphate exposure, they shall be designated as MS equivalent (MSe) or HS equivalent (HSe) in the relevant sulphate exposures (see Clauses 4.1.1.6.2, 4.2.1.1, and 4.2.1.3, and 4.2.1.4).

<sup>\*\*</sup>Type HS cement shall not be used in reinforced concrete exposed to both chlorides and sulphates, including seawater. See Clause 4.1.1.6.3.

††The requirement for testing at 5 °C does not apply to MS, HS, MSb, HSb, and MSe and HSe combinations made without portland limestone cement.

‡‡ If the increase in expansion between 12 and 18 months exceeds 0.03%, the sulphate expansion at 24 months shall not exceed 0.10% in order for the cement to be deemed to have passed the sulphate resistance requirement.

§§For demonstrating equivalent performance, use the testing frequency in Table 1 of CSA A3004-A1 and see the applicable notes to Table A3 in A3001 with regard to re-establishing compliance if the composition of the cementing materials used to establish compliance changes.

\*\*\*Where MSLb or HSLb cements are proposed for use, or where MSe or HSe combinations include Portland-limestone cement, they must also contain a minimum of 25% Type F fly ash or 40% slag or 15% metakaolin (meeting Type N pozzolan requirements) or a combination of 5% Type SF silica fume with 25% slag or a combination of 5% Type SF silica fume with 20% Type F fly ash. For some proposed MSLb, HSLb, and MSe or HSe combinations that include Portland-limestone cement, higher SCM replacement levels may be required to meet the A3004-C8 Procedure B expansion limits. Due to the 18-month test period, SCM replacements higher than the identified minimum levels should also be tested. In addition, sulphate resistance testing shall be run on MSLb and HSLb cement and MSe or HSe combinations that include Portland-limestone cement at both 23 °C and 5 °C as specified in the table.

†††If the expansion is greater than 0.05% at 6 months but less than 0.10% at 1 year, the cementing materials combination under test shall be considered to have passed.

## 7. SOIL CORROSIVITY

The following table, from the Handbook of Corrosion Engineering (Roberge, 1999) indicates the corrosivity rating can be obtained from the soil resistivity, presented on the logs.

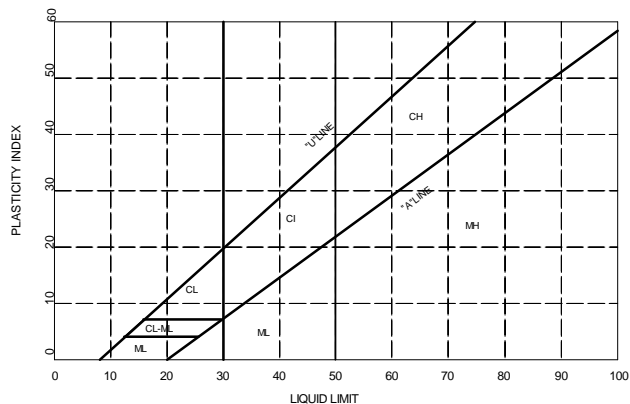
**Table 4 Corrosivity Ratings Based on Soil Resistivity**

Soil Resistivity (ohm-cm)	Corrosivity Rating
>20,000	Essentially non-corrosive
10,000 – 20,000	Mildly corrosive
5,000 – 10,000	Moderately corrosive
3,000 – 5,000	Corrosive
1,000 – 3,000	Highly corrosive
<1,000	Extremely corrosive

## 8. GROUNDWATER TABLE

The groundwater table is indicated by the equilibrium level of water in a standpipe installed in a testhole or test pit. This level is generally taken at least 24 hours after installation of the standpipe. The groundwater level is subject to seasonal variations and is usually highest in the spring. The symbol on the logs indicating the groundwater level is an inverted solid triangle (▼).

MAJOR DIVISION		LOG SYMBOLS	UCS	TYPICAL DESCRIPTION	LABORATORY CLASSIFICATION CRITERIA
COARSE GRAINED SOILS	GRAVELS (MORE THAN HALF COARSE GRAINS LARGER THAN 4.75 mm)	CLEAN GRAVELS (LITTLE OR NO FINES)	GW	WELL GRADED GRAVELS, LITTLE OR NO FINES	$C_u - \frac{D_{60}}{D_{10}} > 4$ $C_c - \frac{(D_{30})^2}{D_{10} \times D_{60}} = 1$ to 3
		GRAVELS WITH FINES	GP	POORLY GRADED GRAVELS AND GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	NOT MEETING ABOVE REQUIREMENTS
			GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES	CONTENT OF FINES EXCEEDS 12% ATTERBERG LIMITS BELOW 'A' LINE $W_p$ LESS THAN 4 ATTERBERG LIMITS ABOVE 'A' LINE $W_p$ MORE THAN 7
		GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES		
	SANDS (MORE THAN HALF COARSE GRAINS SMALLER THAN 4.75 mm)	CLEAN SANDS (LITTLE R NO FINES)	SW	WELL GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES	$C_u - \frac{D_{60}}{D_{10}} > 6$ $C_c - \frac{(D_{30})^2}{D_{10} \times D_{60}} = 1$ to 3
			SP	POORLY GRADED SANDS, LITTLE OR NO FINES	NOT MEETING ABOVE REQUIREMENTS
		SANDS WITH FINES	SM	SILTY SANDS, SAND-SILT MIXTURES	CONTENT OF FINES EXCEEDS 12% ATTERBERG LIMITS BELOW 'A' LINE $W_p$ LESS THAN 4 ATTERBERG LIMITS ABOVE 'A' LINE $W_p$ MORE THAN 7
			SC	CLAYEY SANDS, SAND-CLAY MIXTURES	
FINE GRAINED SOILS	SILTS (BELOW 'A' LINE NEGLIGIBLE ORGANIC CONTENT)	$W_L < 50$	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY SANDS OF SLIGHT PLASTICITY	CLASSIFICATION IS BASED UPON PLASTICITY CHART (SEE BELOW)  WHENEVER THE NATURE OF THE FINE CONTENT HAS NOT BEEN DETERMINED, IT IS DESIGNATED BY THE LETTER 'F'. E.G. SF IS A MIXTURE OF SAND WITH SILT OR CLAY
		$W_L > 50$	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS	
	CLAYS (ABOVE 'A' LINE NEGLIGIBLE ORGANIC CONTENT)	$W_L < 30$	CL	INORGANIC CLAYS OF LOW PLASTICITY, GRAVELLY, SANDY, OR SILTY CLAYS, LEAN CLAYS	
		$30 < W_L < 50$	CI	INORGANIC CLAYS OF MEDIUM PLASTICITY, SILTY CLAYS	
		$W_L > 50$	CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS	
	ORGANIC SILTS & CLAYS (BELOW 'A' LINE)	$W_L < 50$	OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY	
		$W_L > 50$	OH	ORGANIC CLAYS OF HIGH PLASTICITY	
	HIGHLY ORGANIC SOILS			Pt	
BEDROCK			BR	SEE REPORT DESCRIPTION	
FILL			FILL	SEE REPORT DESCRIPTION	



SOIL COMPONENTS					
FRACTION		SIEVE SIZE (mm)		DEFINING RANGES OF PERCENTAGE BY WEIGHT OF MINOR COMPONENTS	
		PASSING	RETAINED	PERCENT	IDENTIFIER
GRAVEL	COARSE	75	19	50 - 35	AND
	FINE	19	4.75		
SAND	COARSE	4.75	2.00	35 - 20	Y
	MEDIUM	2.00	0.425		
	FINE	0.425	0.080		
SILT (non-plastic) or CLAY (plastic)		0.080		20 - 10	SOME
				10 - 1	TRACE
OVERSIZE MATERIALS					
ROUNDED OR SUB-ROUNDED COBBLES 75 mm TO 200 mm BOULDERS >200 mm			ANGULAR ROCK FRAGMENTS ROCKS > 0.75 m3 IN VOLUME		

**MODIFIED UNIFIED SOIL CLASSIFICATION SYSTEM**

August 2015

## EXPLANATION OF ROCK DESCRIPTION TERMS

### 1. CORE CONDITION

**Total Core Recovery (TCR):** Total length of core recovered expressed as percentage of core run length.

**Solid Core Recovery (SCR):** Total length of solid full diameter core expressed as percentage of core run length.

**Rock Quality Designation (RQD):** Sum of lengths of solid core pieces longer than 100 mm expressed as percentage of core run length.

**Fracture Index (FI):** Number of fractures per meter of core.

### 2. ROCK CLASSIFICATION WITH RESECT TO RQD

RQD (%)	RQD Classification
0 – 25	Very Poor Quality
25 – 50	Poor Quality
50 – 75	Fair Quality
75 – 90	Good Quality
90 – 100	Excellent Quality

### 3. ROCK CLASSIFICATION WITH RESPECT UNIAXIAL COMPRESSIVE STRENGTH (UCS)

Rock Grade	Term	UCS (MPa)
R6	Extremely Strong	> 250
R5	Very Strong	100 – 250
R4	Strong	50 – 100
R3	Medium Strong	25 – 50
R2	Weak	5 – 25
R1	Very Weak	1 – 5
R0	Extremely Weak	0.25 – 1

### 4. Discontinuity (Joint) Spacing

Spacing Classification	Spacing Width
Extremely Close	< 0.02 m
Very Close	0.02 m – 0.06 m
Close	0.06 m – 0.2 m
Moderately Close	0.2 m – 0.6 m
Wide	0.6 m – 2.0 m
Very Wide	2.0 m – 6.0 m
Extremely Wide	> 6 m

## 5. Bedding Inclination

Term	Inclination (degrees from the horizontal)
Sub-horizontal	0 – 5
Gently Inclined	6 – 15
Moderately Inclined	16 – 30
Steeply Inclined	31 – 60
Very Steeply Inclined	61 – 80
Sub-vertical	81 – 90

## 6. Grain Size

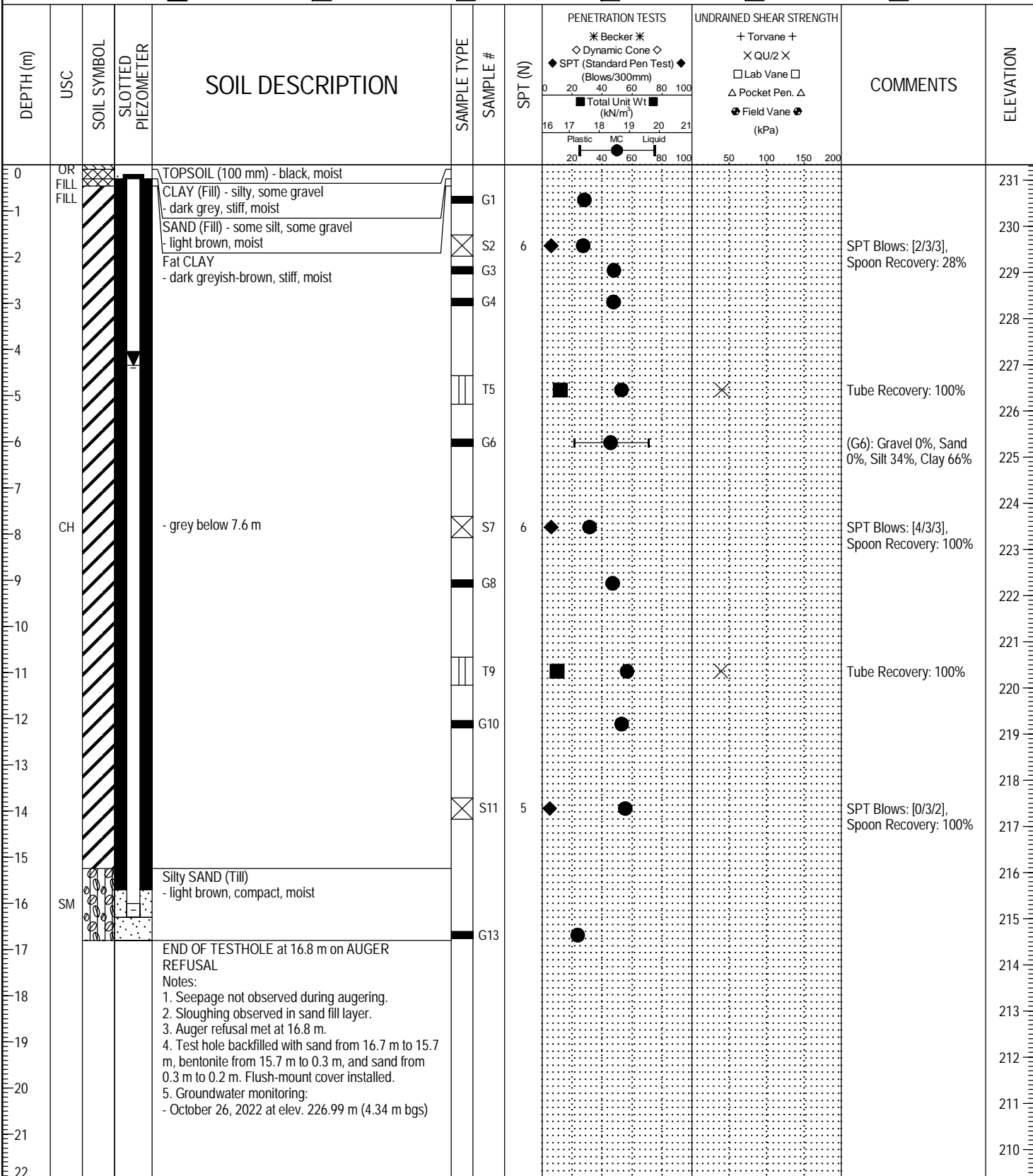
Term	Size
Very Coarse Grained	> 60 mm
Coarse Grained	2 mm – 60 mm
Medium Grained	60 microns – 2 mm
Fine Grained	2 microns – 60 microns
Very Fine Grained	< 2 microns

## 7. Classification of Discontinuities depending upon Water Flow

Class	Description
1	Water flow not possible
2	No evidence of water flow
3	Evidence of water flow (e.g. rust staining)
4	Dampness
5	Seepage
6	Glow (volume per unit of time)



PROJECT: Jefferson East CSR Works (Contract 8A & 9)		CLIENT: City of Winnipeg		TESTHOLE NO: TH22-14			
LOCATION: UTM 14 - 5533577 m N, 634284m E				PROJECT NO.: 60680190			
CONTRACTOR: Maple Leaf Drilling		METHOD: B54X - 125 mm SSA		ELEVATION (m): 231.33			
SAMPLE TYPE		GRAB	SHELBY TUBE	SPLIT SPOON	BULK	NO RECOVERY	CORE
BACKFILL TYPE		BENTONITE	GRAVEL	SLOUGH	GROUT	CUTTINGS	SAND



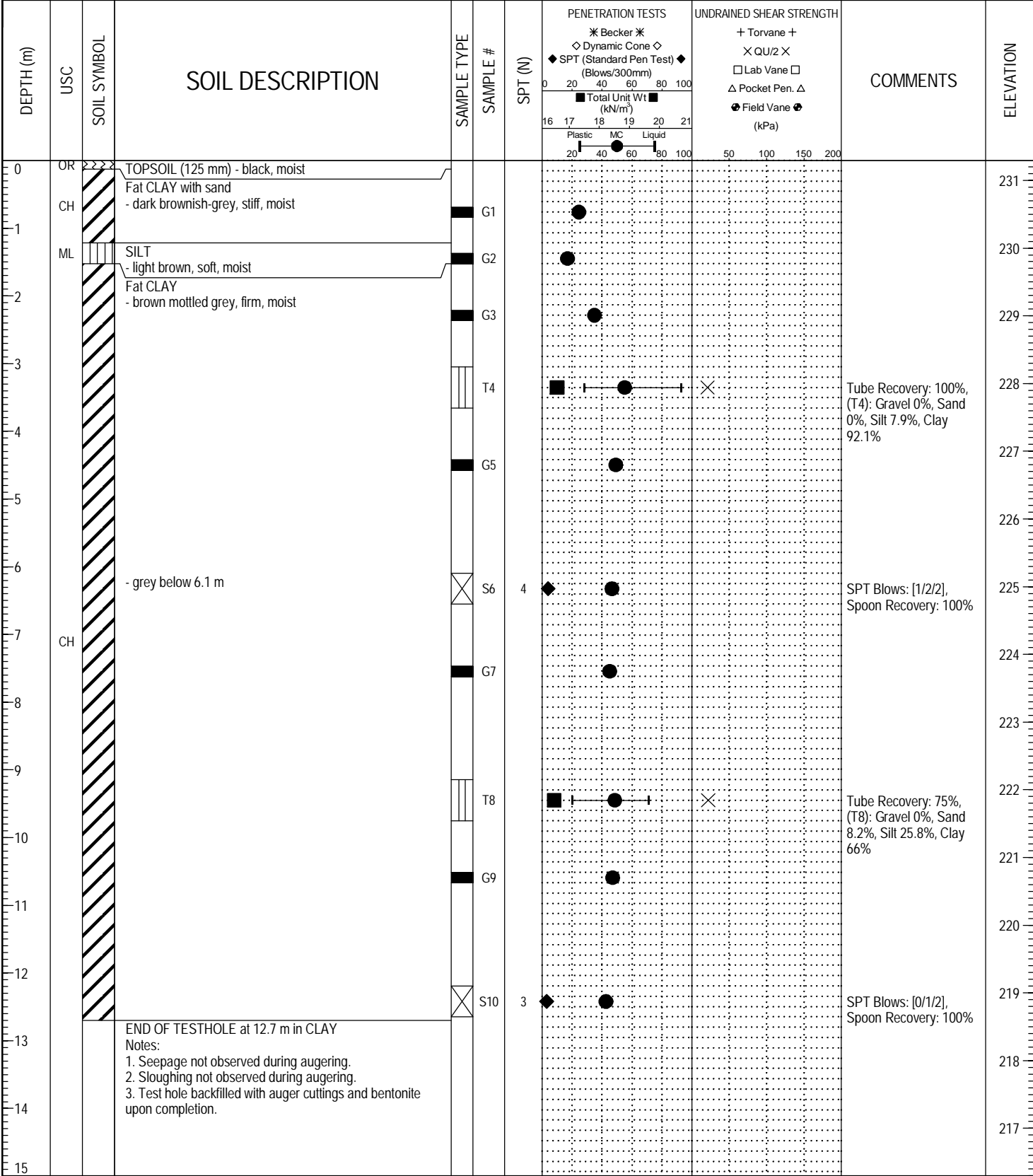
LOG OF TEST HOLE 60680190 - CONTRACT 8A & 9 - GL.GPJ - UMA WINN.GDT - 22-12-16



LOGGED BY: Ryan Harras	COMPLETION DEPTH: 16.80 m
REVIEWED BY: German Leal	COMPLETION DATE: 22-9-13
PROJECT ENGINEER: Jordan Thompson	Page 1 of 1

PROJECT: Jefferson East CSR Works (Contract 8A & 9)      CLIENT: City of Winnipeg      TESTHOLE NO: TH22-15  
 LOCATION: UTM 14 - 5533670 m N, 634097m E      PROJECT NO.: 60680190  
 CONTRACTOR: Maple Leaf Drilling      METHOD: B54X - 125 mm SSA      ELEVATION (m): 231.29

SAMPLE TYPE    GRAB    SHELBY TUBE    SPLIT SPOON    BULK    NO RECOVERY    CORE



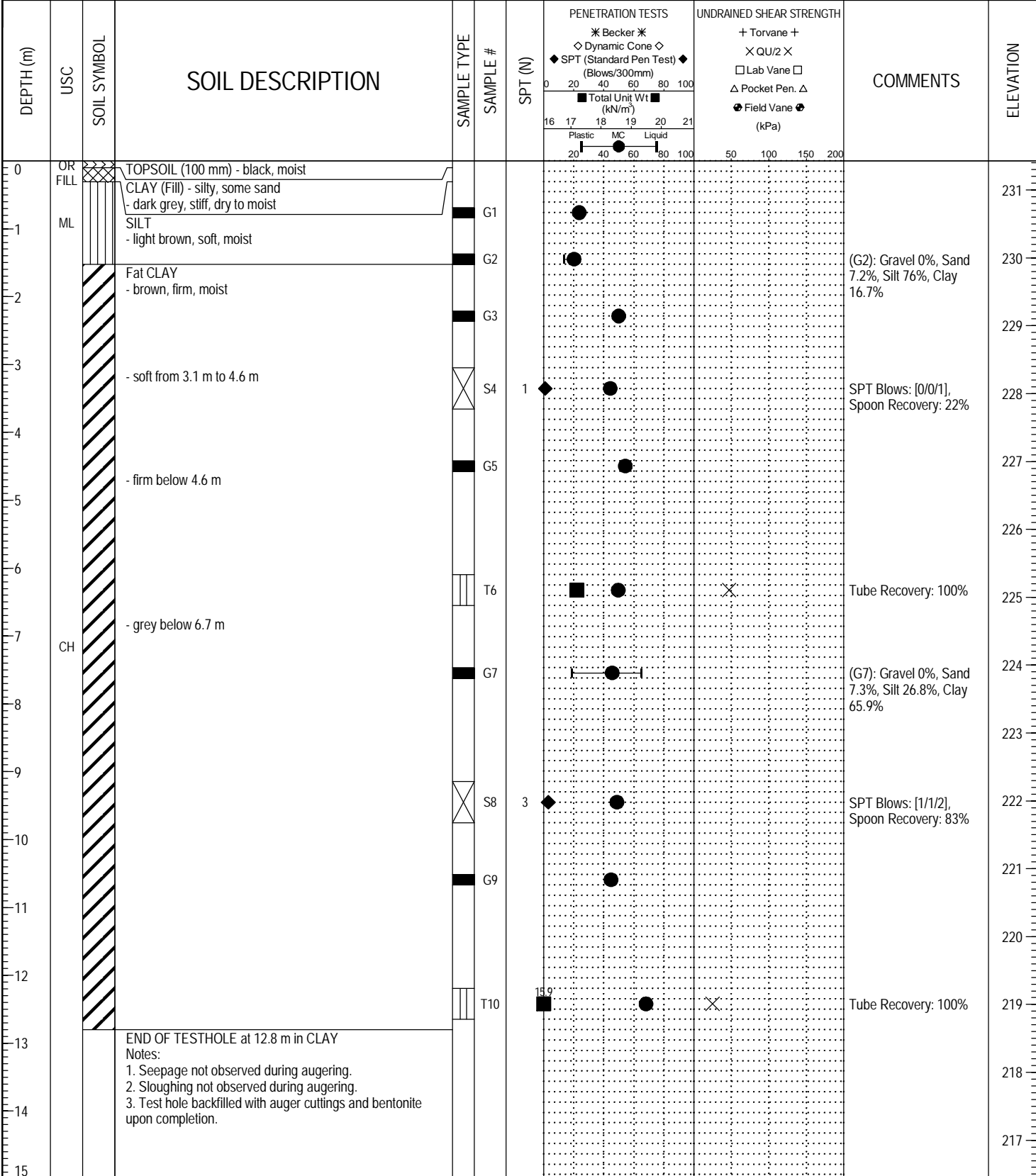
END OF TESTHOLE at 12.7 m in CLAY  
 Notes:  
 1. Seepage not observed during augering.  
 2. Sloughing not observed during augering.  
 3. Test hole backfilled with auger cuttings and bentonite upon completion.

LOG OF TEST HOLE 60680190 - CONTRACT 8A & 9 - GL.GPJ - UMA WINN.GDT - 22-12-16



LOGGED BY: Ryan Harras      COMPLETION DEPTH: 12.70 m  
 REVIEWED BY: German Leal      COMPLETION DATE: 22-9-13  
 PROJECT ENGINEER: Jordan Thompson      Page 1 of 1

PROJECT: Jefferson East CSR Works (Contract 8A & 9)	CLIENT: City of Winnipeg	TESTHOLE NO: TH22-16
LOCATION: UTM 14 - 5533749 m N, 634364m E		PROJECT NO.: 60680190
CONTRACTOR: Maple Leaf Drilling	METHOD: B54X - 125 mm SSA	ELEVATION (m): 231.43
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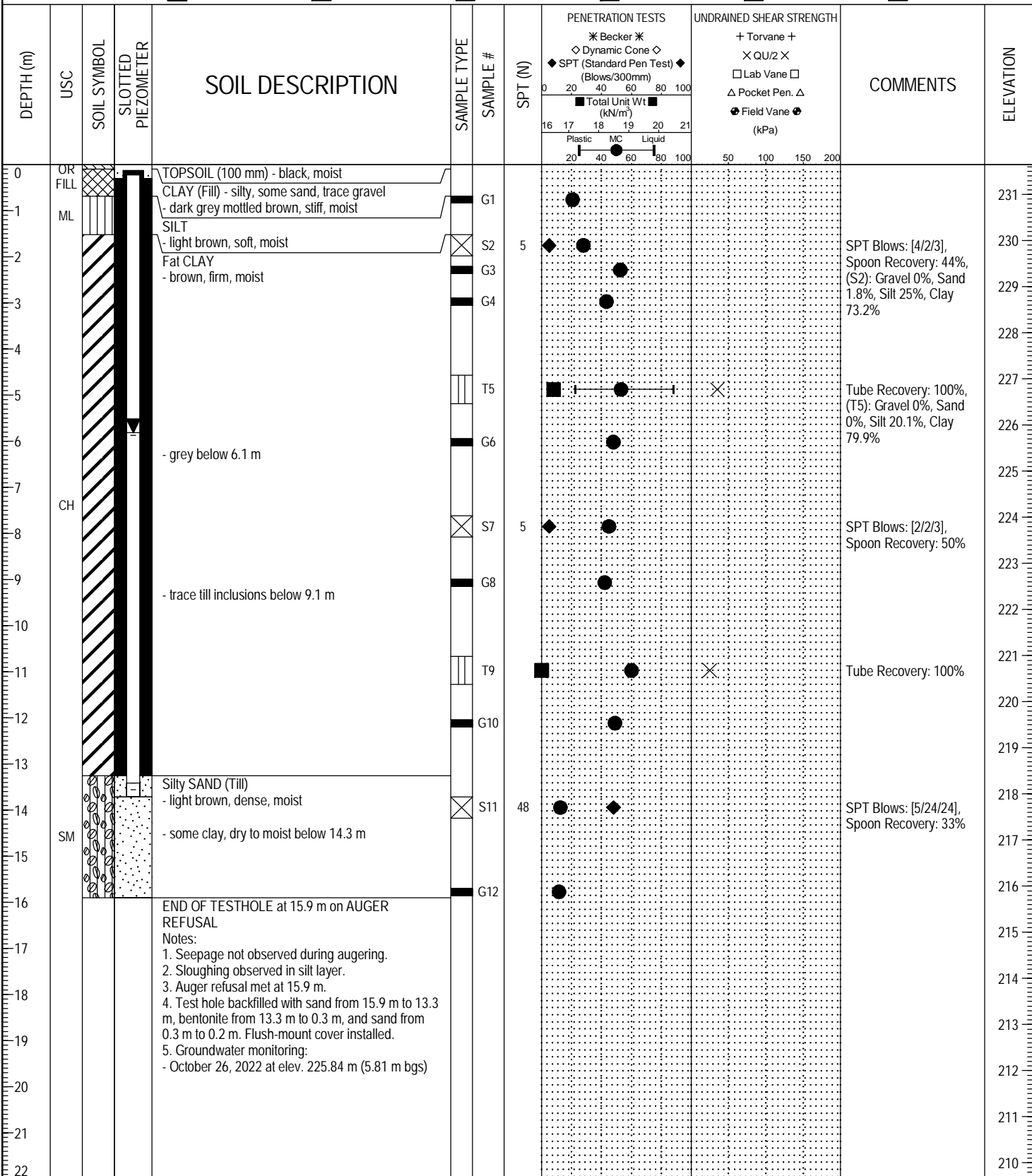


LOG OF TEST HOLE 60680190 - CONTRACT 8A & 9 - GL.GPJ - UMA WINN.GDT - 22-12-16



LOGGED BY: Ryan Harras	COMPLETION DEPTH: 12.80 m
REVIEWED BY: German Leal	COMPLETION DATE: 22-9-13
PROJECT ENGINEER: Jordan Thompson	Page 1 of 1

PROJECT: Jefferson East CSR Works (Contract 8A & 9)		CLIENT: City of Winnipeg		TESTHOLE NO: TH22-17			
LOCATION: UTM 14 - 5533815 m N, 634202m E		METHOD: B54X - 125 mm SSA		PROJECT NO.: 60680190			
CONTRACTOR: Maple Leaf Drilling		METHOD: B54X - 125 mm SSA		ELEVATION (m): 231.65			
SAMPLE TYPE		GRAB	SHELBY TUBE	SPLIT SPOON	BULK	NO RECOVERY	CORE
BACKFILL TYPE		BENTONITE	GRAVEL	SLOUGH	GROUT	CUTTINGS	SAND

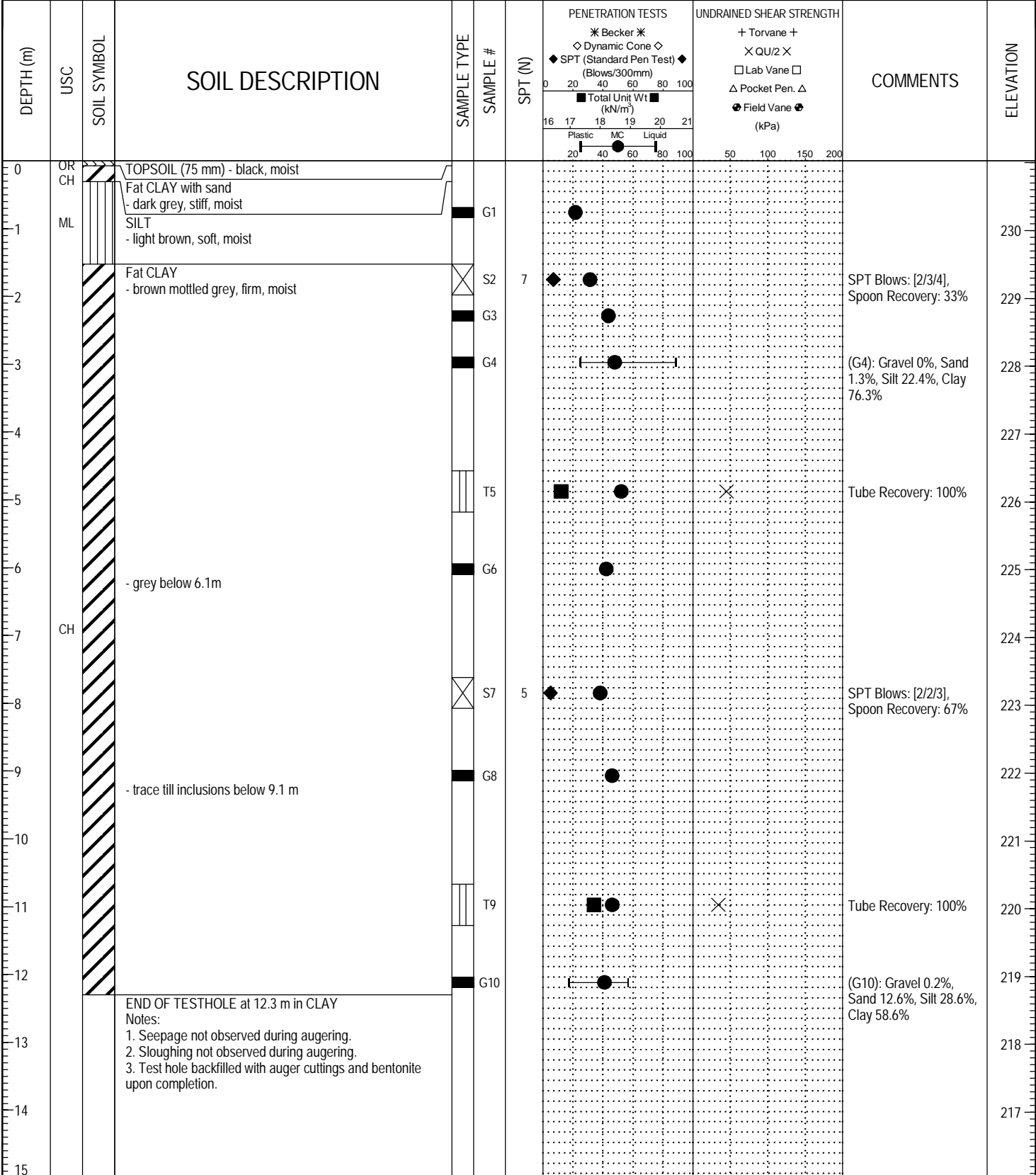


LOG OF TEST HOLE 60680190 - CONTRACT 8A & 9 - GL.GPJ - UMA WINN.GDT - 22-12-16



LOGGED BY: Ryan Harras	COMPLETION DEPTH: 15.90 m
REVIEWED BY: German Leal	COMPLETION DATE: 22-9-14
PROJECT ENGINEER: Jordan Thompson	Page 1 of 1

PROJECT: Jefferson East CSR Works (Contract 8A & 9)	CLIENT: City of Winnipeg	TESTHOLE NO: TH22-18
LOCATION: UTM 14 - 5534071 m N, 634367m E		PROJECT NO.: 60680190
CONTRACTOR: Maple Leaf Drilling	METHOD: B54X - 125 mm SSA	ELEVATION (m): 231.03
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	



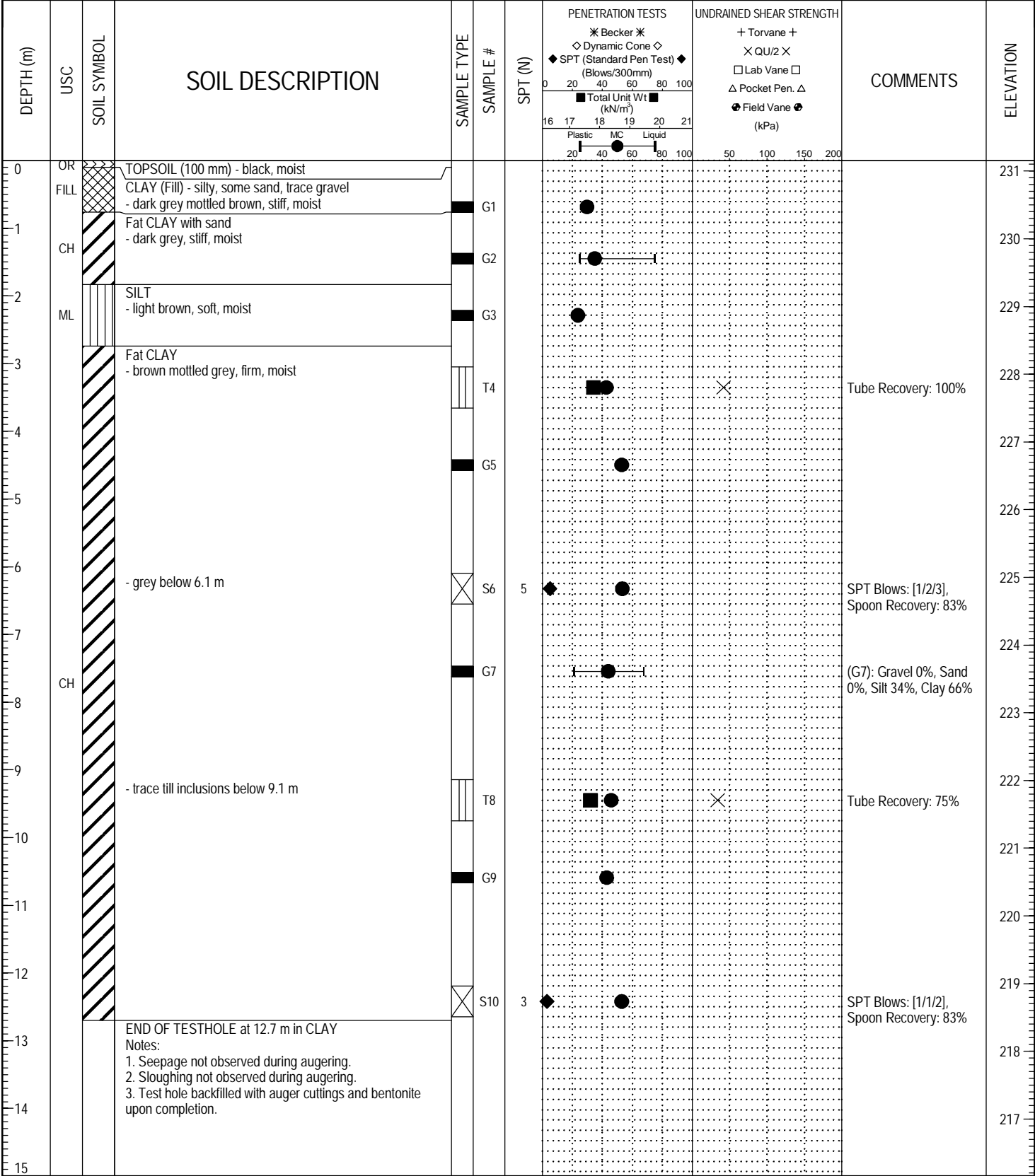
LOG OF TEST HOLE 60680190 - CONTRACT 8A & 9 - GL.GPJ - UMA WINN.GDT - 22-12-16



LOGGED BY: Ryan Harras	COMPLETION DEPTH: 12.30 m
REVIEWED BY: German Leal	COMPLETION DATE: 22-9-14
PROJECT ENGINEER: Jordan Thompson	Page 1 of 1

PROJECT: Jefferson East CSR Works (Contract 8A & 9)      CLIENT: City of Winnipeg      TESTHOLE NO: TH22-19  
 LOCATION: UTM 14 - 5534126 m N, 634477m E      PROJECT NO.: 60680190  
 CONTRACTOR: Maple Leaf Drilling      METHOD: B54X - 125 mm SSA      ELEVATION (m): 231.16

SAMPLE TYPE      GRAB      SHELBY TUBE      SPLIT SPOON      BULK      NO RECOVERY      CORE

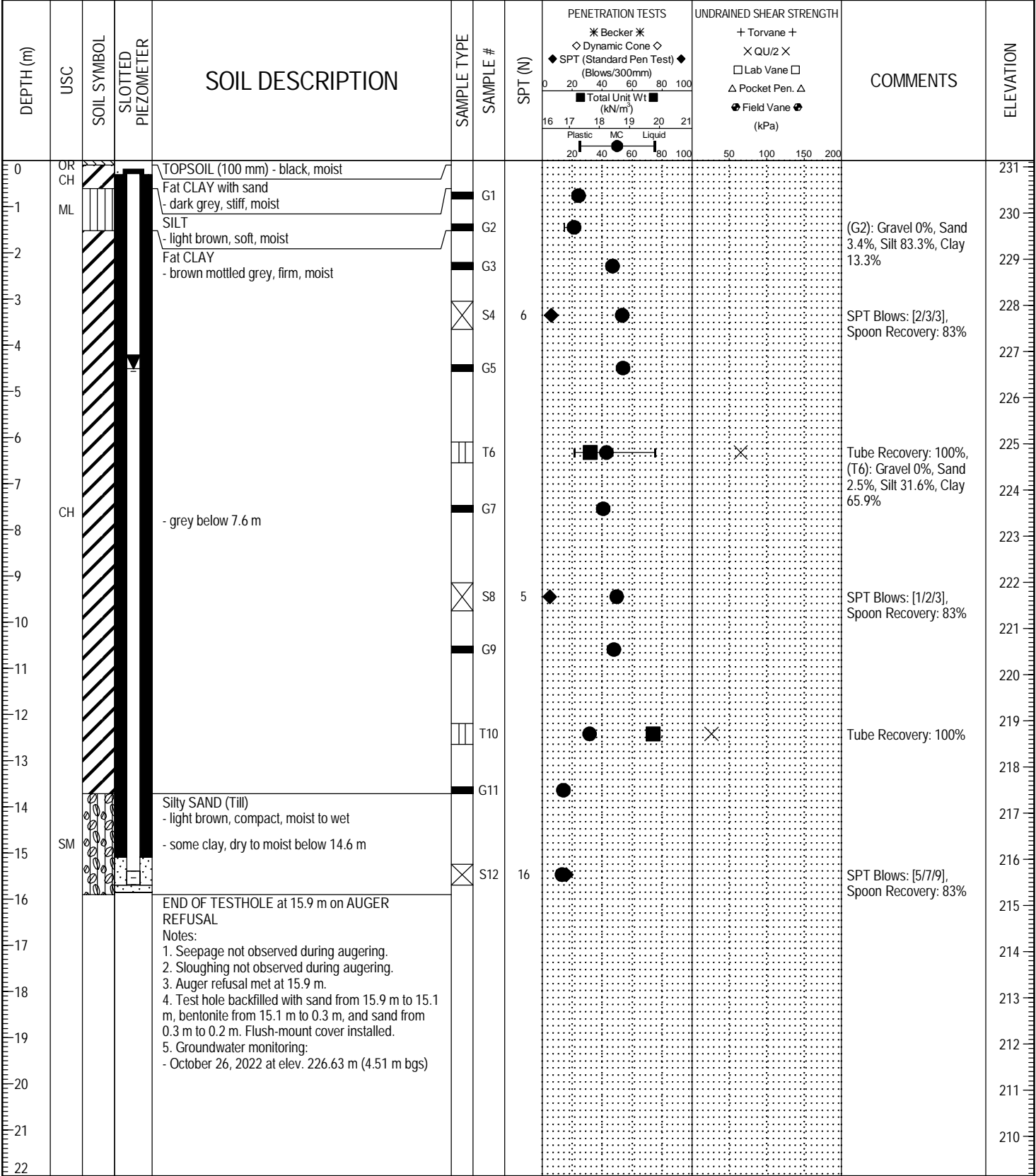


LOG OF TEST HOLE 60680190 - CONTRACT 8A & 9 - GL.GPJ - UMA WINN.GDT - 22-12-16



LOGGED BY: Ryan Harras      COMPLETION DEPTH: 12.70 m  
 REVIEWED BY: German Leal      COMPLETION DATE: 22-9-14  
 PROJECT ENGINEER: Jordan Thompson      Page 1 of 1

PROJECT: Jefferson East CSR Works (Contract 8A & 9)		CLIENT: City of Winnipeg		TESTHOLE NO: TH22-20			
LOCATION: UTM 14 - 5534198 m N, 634325m E				PROJECT NO.: 60680190			
CONTRACTOR: Maple Leaf Drilling			METHOD: B54X - 125 mm SSA		ELEVATION (m): 231.14		
SAMPLE TYPE		GRAB	SHELBY TUBE	SPLIT SPOON	BULK	NO RECOVERY	CORE
BACKFILL TYPE		BENTONITE	GRAVEL	SLOUGH	GROUT	CUTTINGS	SAND



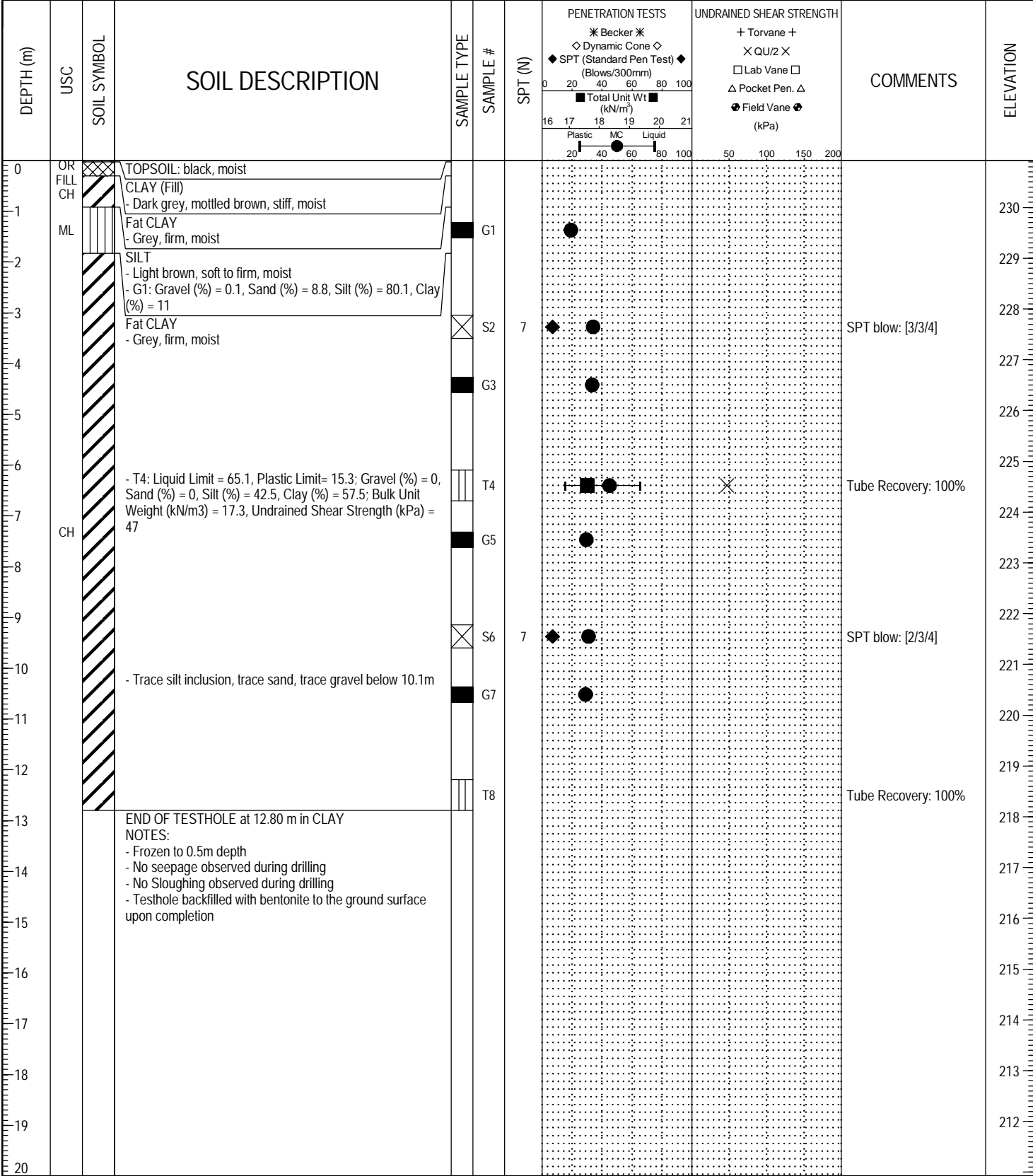
LOG OF TEST HOLE 60680190 - CONTRACT 8A & 9 - GL.GPJ - UMA WINN.GDT - 22-12-16



LOGGED BY: Ryan Harras	COMPLETION DEPTH: 15.90 m
REVIEWED BY: German Leal	COMPLETION DATE: 22-9-15
PROJECT ENGINEER: Jordan Thompson	Page 1 of 1

PROJECT: Jefferson East CSR Works (Contract 8B & 10) CLIENT: City of Winnipeg TESTHOLE NO: TH23-21  
 LOCATION: West of House 355 Burrin Ave.; UTM: 14U, 5533833.2 m N, 634639.6 m E PROJECT NO.: 60680190  
 CONTRACTOR: Paddock Drilling METHOD: Solid Stem Auger ELEVATION (m): 230.92

SAMPLE TYPE  GRAB  SHELBY TUBE  SPLIT SPOON  BULK  NO RECOVERY  CORE



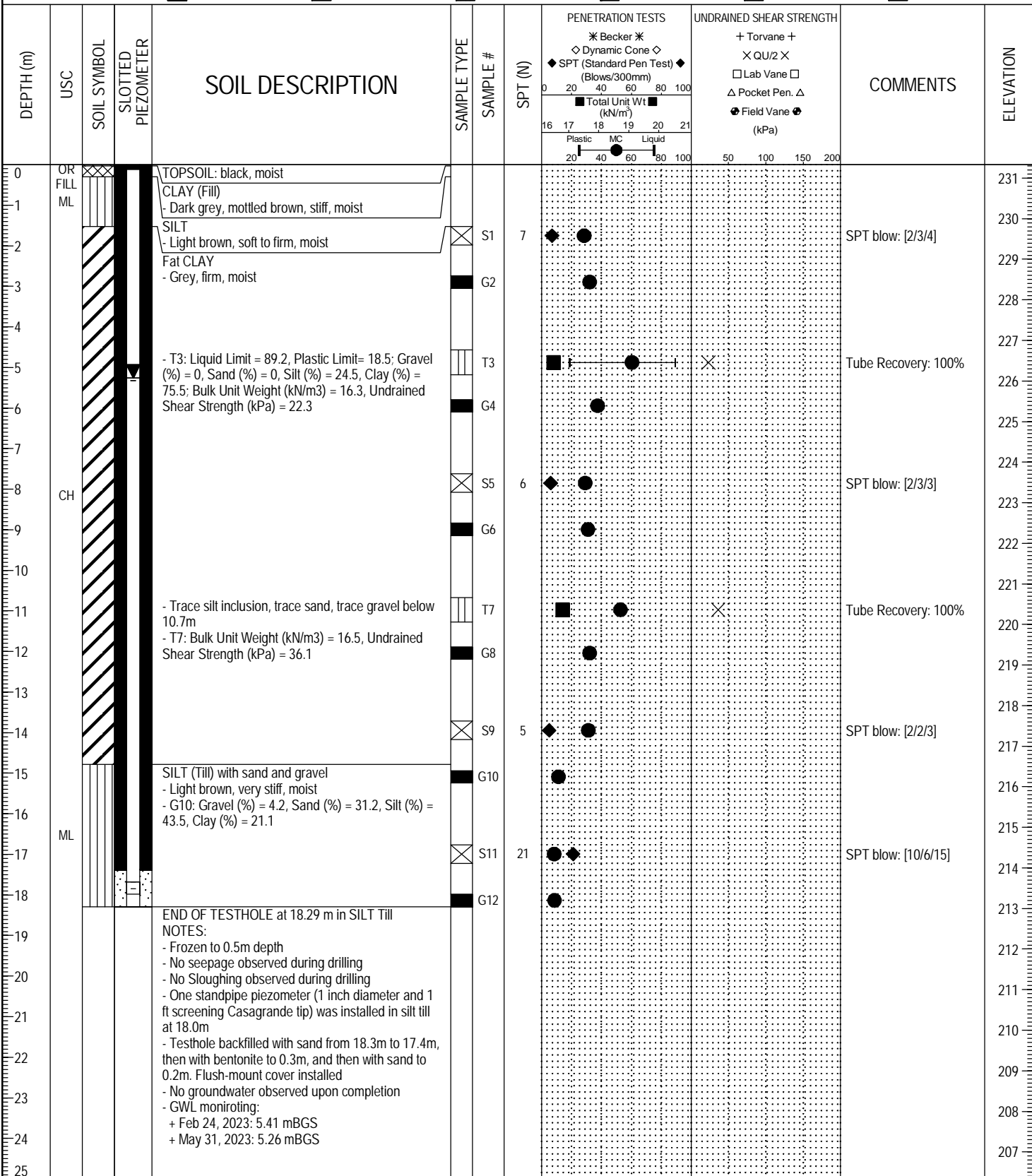
LOG OF TEST HOLE 60680190\_JEFFERSON CSR-8B AND 10\_TESTHOLE LOGS.GPJ UMA WINN.GDT 23-6-1



LOGGED BY: Linh Trinh COMPLETION DEPTH: 12.80 m  
 REVIEWED BY: German Leal COMPLETION DATE: 23-1-11  
 PROJECT ENGINEER: Jordan Thompson Page 1 of 1



PROJECT: Jefferson East CSR Works (Contract 8B & 10)	CLIENT: City of Winnipeg	TESTHOLE NO: TH23-22
LOCATION: East of House 414 Burrin Ave.; UTM: 14U, 5533895.9 m N, 634434.3 m E		PROJECT NO.: 60680190
CONTRACTOR: Paddock Drilling	METHOD: Solid Stem Auger	ELEVATION (m): 231.33
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		



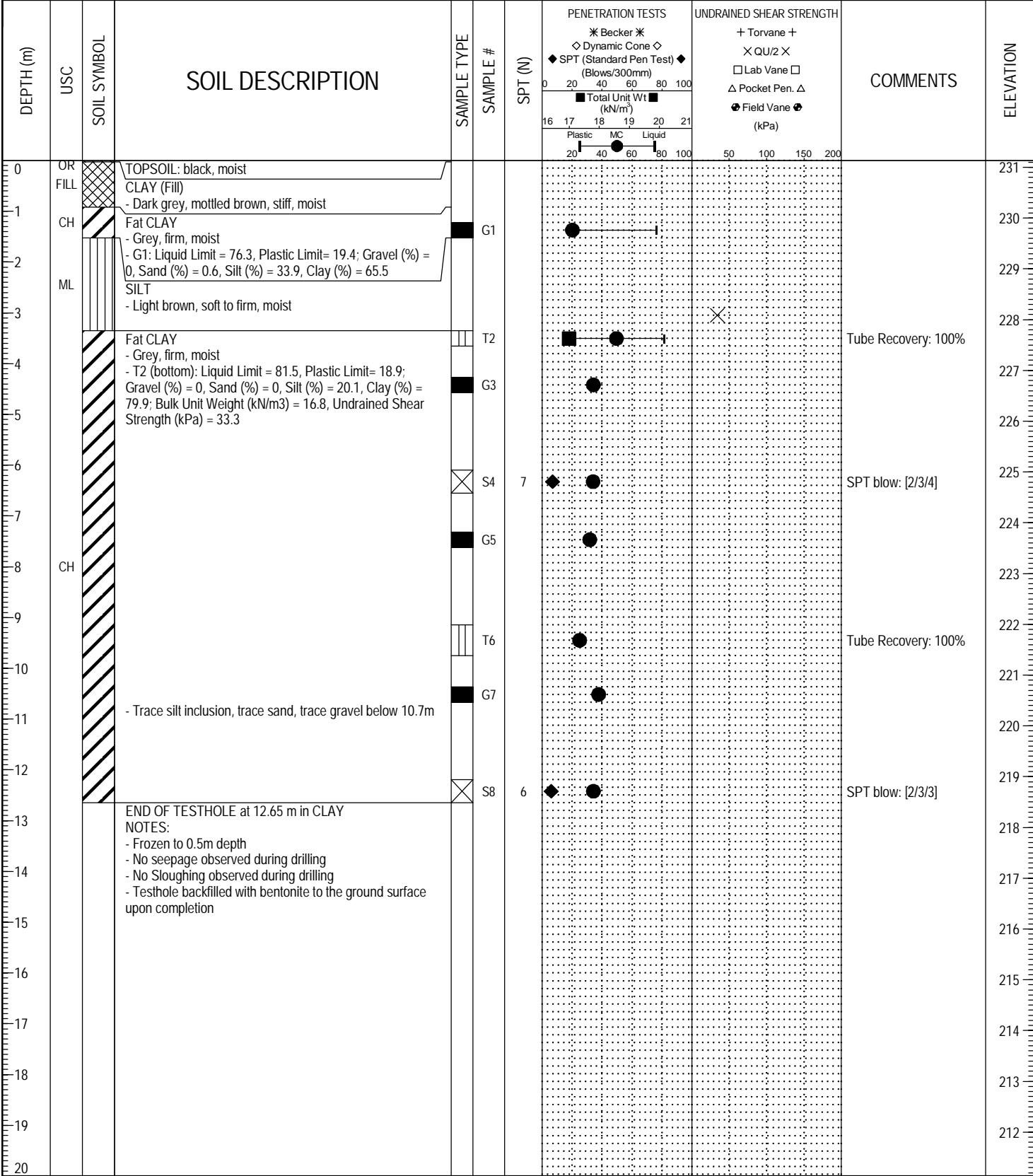
LOG OF TEST HOLE 60680190\_JEFFERSON CSR-8B AND 10\_TESTHOLE LOGS.GPJ UMA WINN.GDT 23-6-1



LOGGED BY: Linh Trinh	COMPLETION DEPTH: 18.29 m
REVIEWED BY: German Leal	COMPLETION DATE: 23-1-11
PROJECT ENGINEER: Jordan Thompson	Page 1 of 1

PROJECT: Jefferson East CSR Works (Contract 8B & 10) CLIENT: City of Winnipeg TESTHOLE NO: TH23-23  
 LOCATION: East of House 417 Royal Ave.; UTM: 14U, 5534021.7 m N, 634492.8 m E PROJECT NO.: 60680190  
 CONTRACTOR: Paddock Drilling METHOD: Solid Stem Auger ELEVATION (m): 231.13

SAMPLE TYPE  GRAB  SHELBY TUBE  SPLIT SPOON  BULK  NO RECOVERY  CORE



LOG OF TEST HOLE 60680190\_JEFFERSON CSR-8B AND 10\_TESTHOLE LOGS.GPJ UMA WINN.GDT 23-6-1

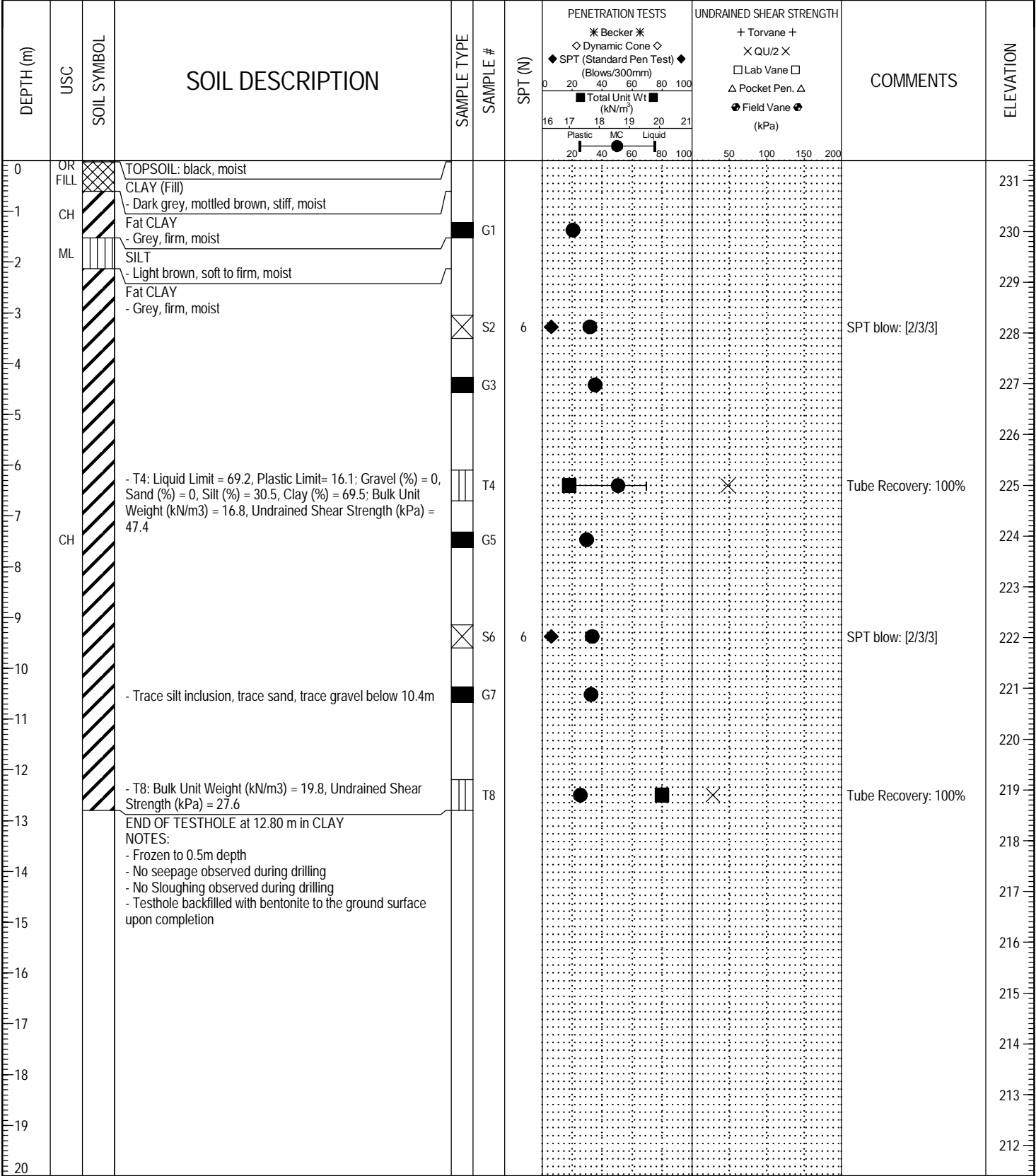
END OF TESTHOLE at 12.65 m in CLAY  
 NOTES:  
 - Frozen to 0.5m depth  
 - No seepage observed during drilling  
 - No Sloughing observed during drilling  
 - Testhole backfilled with bentonite to the ground surface upon completion



LOGGED BY: Linh Trinh COMPLETION DEPTH: 12.65 m  
 REVIEWED BY: German Leal COMPLETION DATE: 23-1-11  
 PROJECT ENGINEER: Jordan Thompson Page 1 of 1

PROJECT: Jefferson East CSR Works (Contract 8B & 10) CLIENT: City of Winnipeg TESTHOLE NO: TH23-24  
 LOCATION: West of House 514 Kilbride Ave.; UTM: 14U, 5533892.4 m N, 634002 m E PROJECT NO.: 60680190  
 CONTRACTOR: Paddock Drilling METHOD: Solid Stem Auger ELEVATION (m): 231.40

SAMPLE TYPE  GRAB  SHELBY TUBE  SPLIT SPOON  BULK  NO RECOVERY  CORE



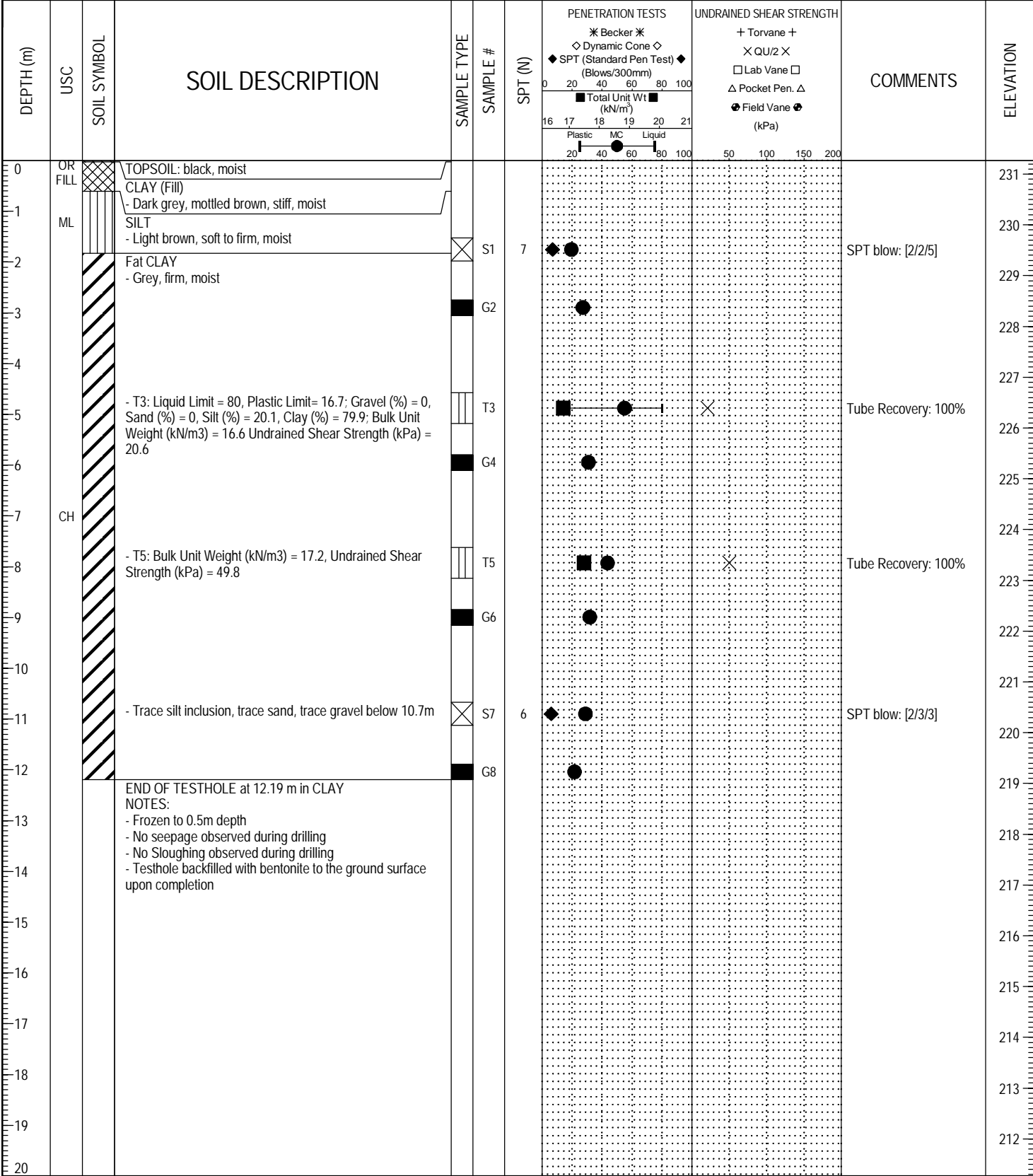
LOG OF TEST HOLE 60680190\_JEFFERSON CSR-8B AND 10\_TESTHOLE LOGS.GPJ UMA WINN.GDT 23-6-1



LOGGED BY: Linh Trinh COMPLETION DEPTH: 12.80 m  
 REVIEWED BY: German Leal COMPLETION DATE: 23-1-12  
 PROJECT ENGINEER: Jordan Thompson Page 1 of 1

PROJECT: Jefferson East CSR Works (Contract 8B & 10) CLIENT: City of Winnipeg TESTHOLE NO: TH23-25  
 LOCATION: In Front of House 499 Belmont Ave.; UTM: 14U, 5533806 m N, 634031.1 m E PROJECT NO.: 60680190  
 CONTRACTOR: Paddock Drilling METHOD: Solid Stem Auger ELEVATION (m): 231.27

SAMPLE TYPE  GRAB  SHELBY TUBE  SPLIT SPOON  BULK  NO RECOVERY  CORE



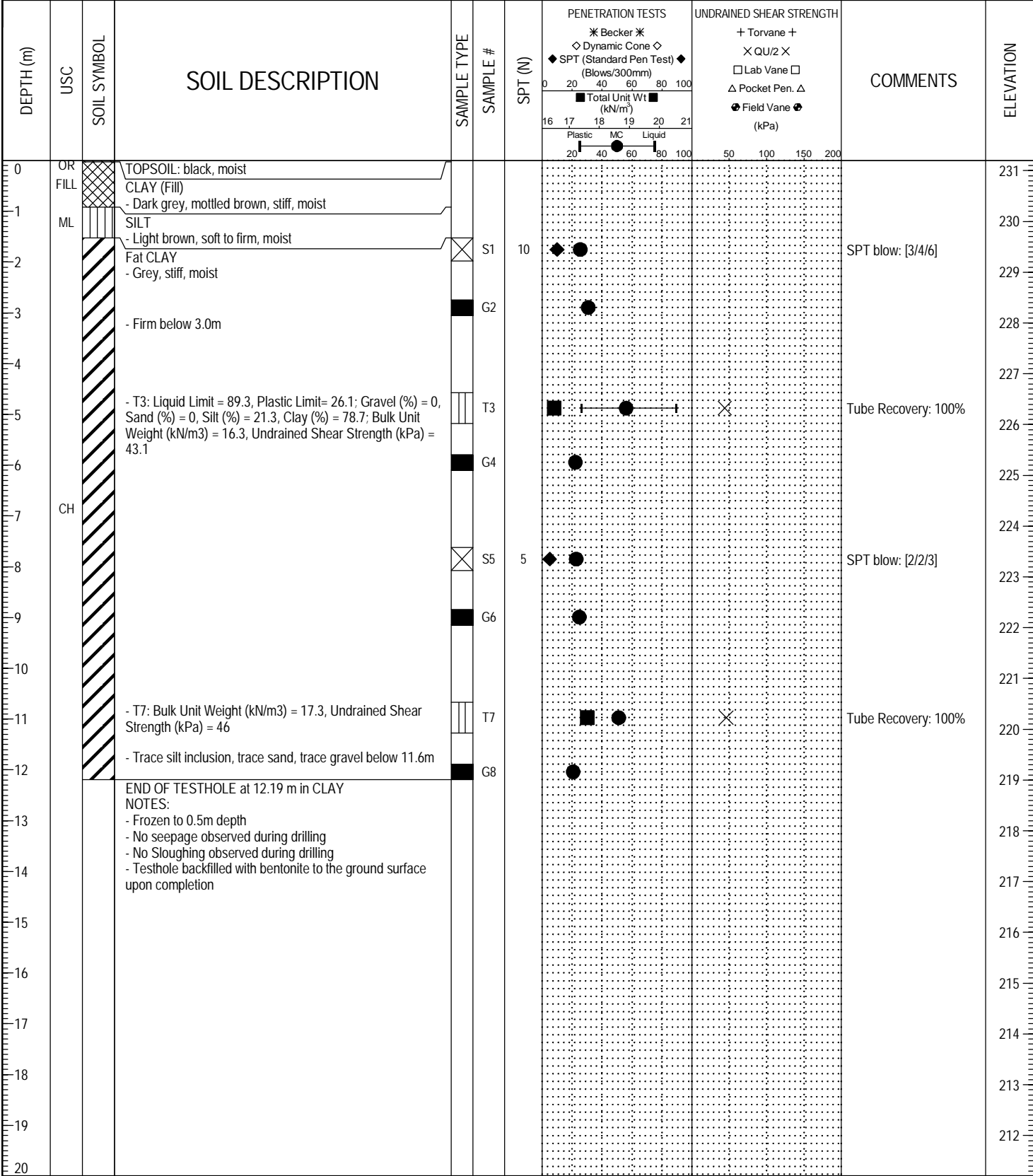
LOG OF TEST HOLE 60680190\_JEFFERSON CSR-8B AND 10\_TESTHOLE LOGS.GPJ UMA WINN.GDT 23-6-1



LOGGED BY: Linh Trinh COMPLETION DEPTH: 12.19 m  
 REVIEWED BY: German Leal COMPLETION DATE: 23-1-12  
 PROJECT ENGINEER: Jordan Thompson Page 1 of 1

PROJECT: Jefferson East CSR Works (Contract 8B & 10) CLIENT: City of Winnipeg TESTHOLE NO: TH23-26  
 LOCATION: In Front of House 503 Hartford Ave.; UTM: 14U, 5533742.5 m N, 633974.9 m E PROJECT NO.: 60680190  
 CONTRACTOR: Paddock Drilling METHOD: Solid Stem Auger ELEVATION (m): 231.20

SAMPLE TYPE  GRAB  SHELBY TUBE  SPLIT SPOON  BULK  NO RECOVERY  CORE



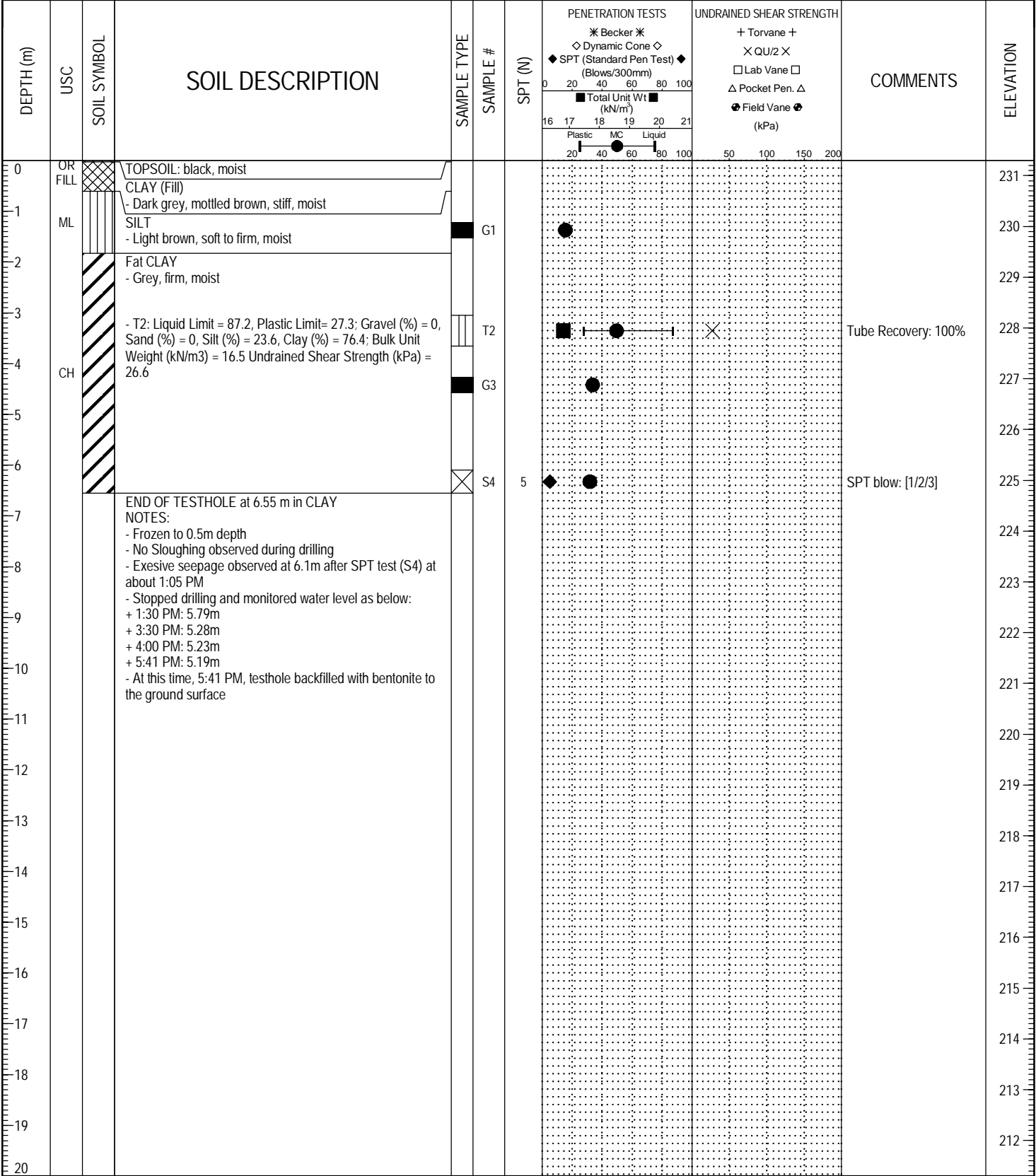
LOG OF TEST HOLE 60680190\_JEFFERSON CSR-8B AND 10\_TESTHOLE LOGS.GPJ UMA WINN.GDT 23-6-1



LOGGED BY: Linh Trinh COMPLETION DEPTH: 12.19 m  
 REVIEWED BY: German Leal COMPLETION DATE: 23-1-12  
 PROJECT ENGINEER: Jordan Thompson Page 1 of 1

PROJECT: Jefferson East CSR Works (Contract 8B & 10) CLIENT: City of Winnipeg TESTHOLE NO: TH23-27  
 LOCATION: West of House 550 Hartford Ave.; UTM: 14U, 5533797.7 m N, 633806.2 m E PROJECT NO.: 60680190  
 CONTRACTOR: Paddock Drilling METHOD: Solid Stem Auger ELEVATION (m): 231.30

SAMPLE TYPE  GRAB  SHELBY TUBE  SPLIT SPOON  BULK  NO RECOVERY  CORE

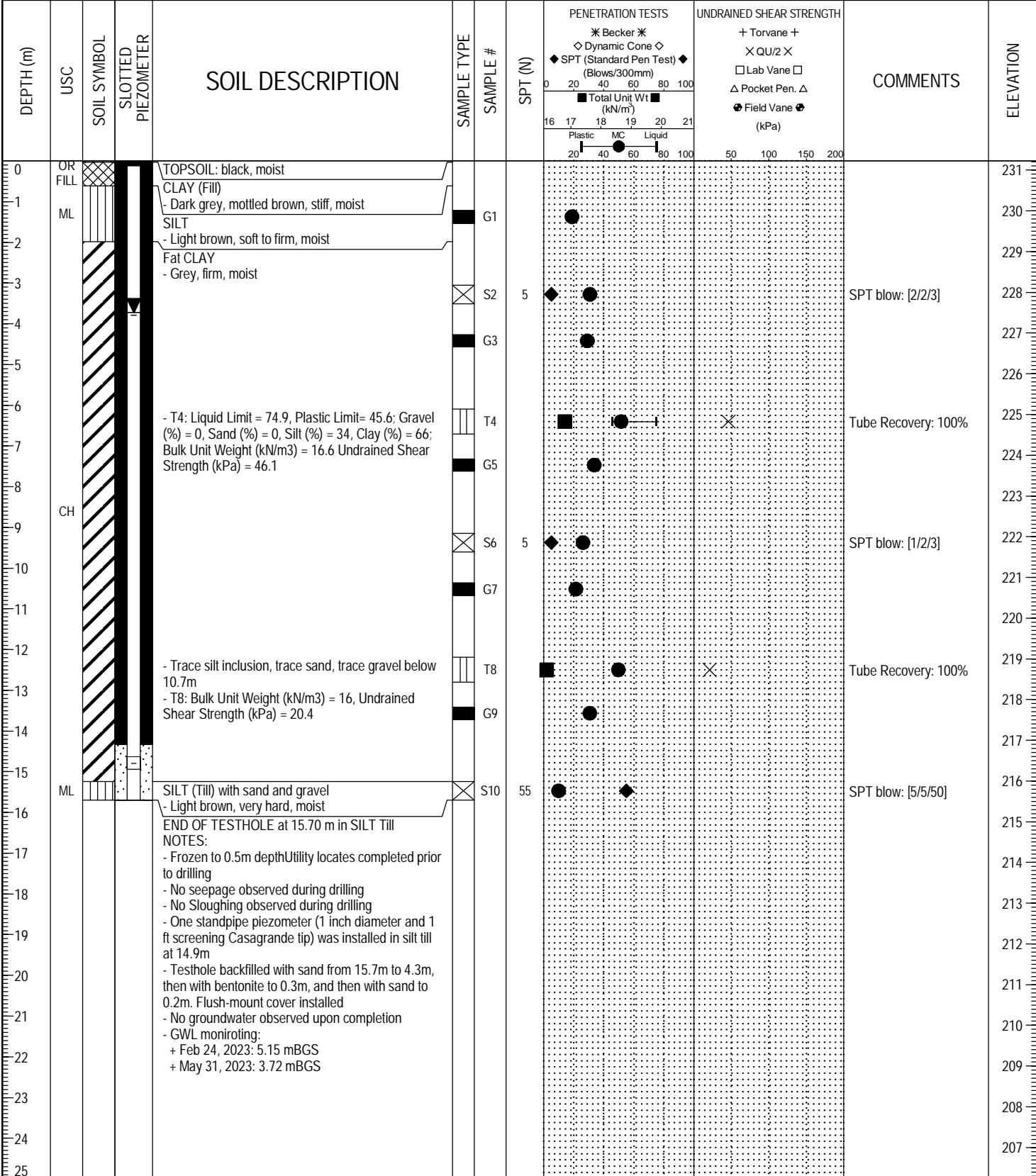


LOG OF TEST HOLE 60680190\_JEFFERSON CSR-8B AND 10\_TESTHOLE LOGS.GPJ UMA WINN.GDT 23-6-1



LOGGED BY: Linh Trinh COMPLETION DEPTH: 6.55 m  
 REVIEWED BY: German Leal COMPLETION DATE: 23-1-12  
 PROJECT ENGINEER: Jordan Thompson Page 1 of 1

PROJECT: Jefferson East CSR Works (Contract 8B & 10)	CLIENT: City of Winnipeg	TESTHOLE NO: TH23-28
LOCATION: East of House 529 St Anthony Ave.; UTM: 14U, 5533593.7 m N, 633849.1 m E		PROJECT NO.: 60680190
CONTRACTOR: Paddock Drilling	METHOD: Solid Stem Auger	ELEVATION (m): 231.23
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		



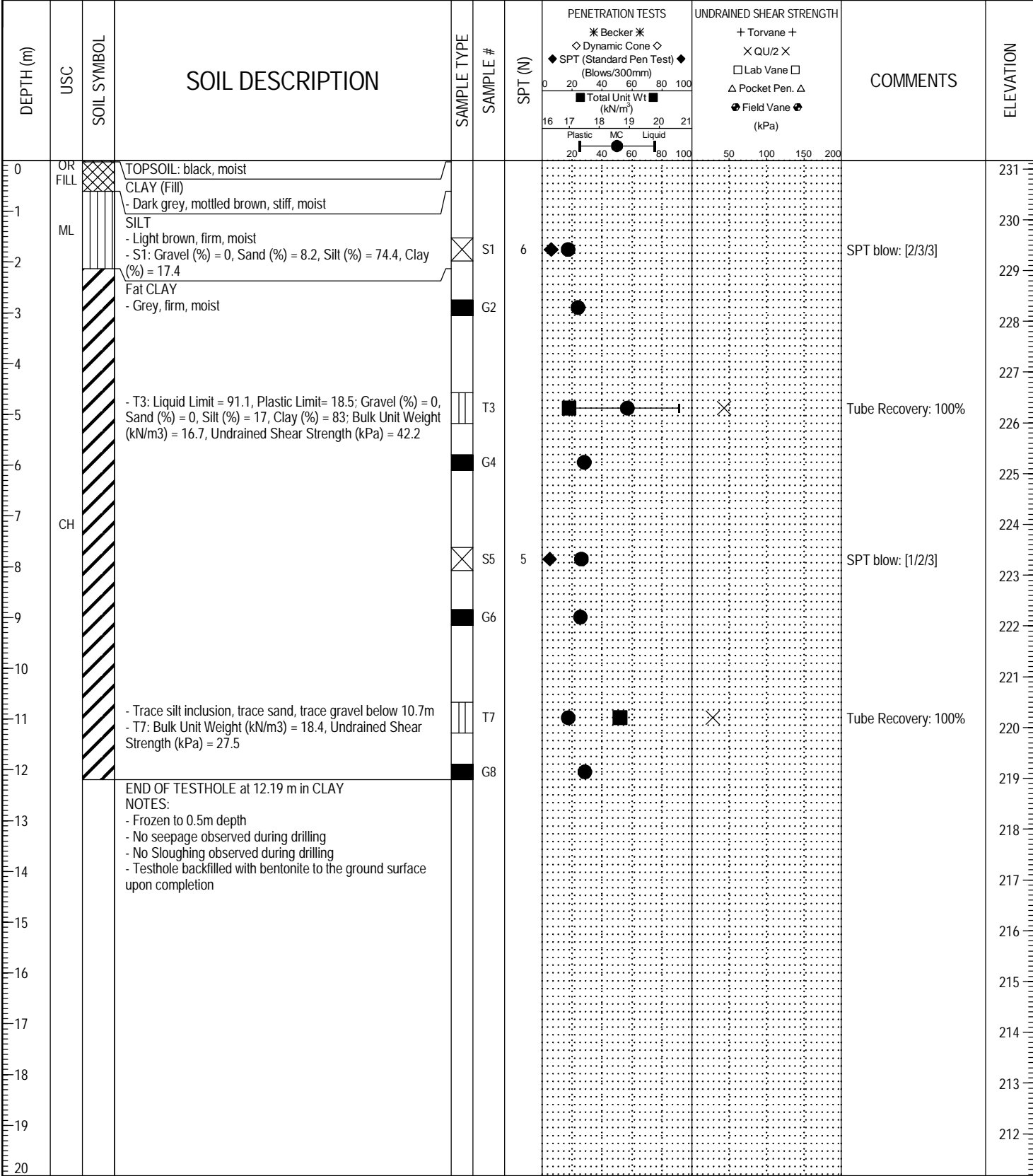
LOG OF TEST HOLE 60680190\_JEFFERSON CSR-8B AND 10\_TESTHOLE LOGS.GPJ UMA WINN.GDT 23-6-1



LOGGED BY: Linh Trinh	COMPLETION DEPTH: 15.70 m
REVIEWED BY: Gernan Leal	COMPLETION DATE: 23-1-13
PROJECT ENGINEER: Jordan Thompson	Page 1 of 1

PROJECT: Jefferson East CSR Works (Contract 8B & 10) CLIENT: City of Winnipeg TESTHOLE NO: TH23-29  
 LOCATION: East of House 578 St Anthony Ave.; UTM: 14U, 5533649.2 m N, 633667.2 m E PROJECT NO.: 60680190  
 CONTRACTOR: Paddock Drilling METHOD: Solid Stem Auger ELEVATION (m): 231.17

SAMPLE TYPE  GRAB  SHELBY TUBE  SPLIT SPOON  BULK  NO RECOVERY  CORE



LOG OF TEST HOLE 60680190\_JEFFERSON CSR-8B AND 10\_TESTHOLE LOGS.GPJ UMA WINN.GDT 23-6-1



LOGGED BY: Linh Trinh COMPLETION DEPTH: 12.19 m  
 REVIEWED BY: German Leal COMPLETION DATE: 23-1-12  
 PROJECT ENGINEER: Jordan Thompson Page 1 of 1



## Memorandum

To Ryan Harras Page 1

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CC

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Subject Jefferson East Phase 3 (Contract 8A & 9) – City of Winnipeg – Test Results

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From Elliott E. Drumright

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Date November 18, 2022 Project Number 60680190.2.3 & 2.4

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Please find attached the following material test result(s) on sample(s) submitted to the Winnipeg Geotechnical Laboratory:

- Seventy-two (62) Moisture Content Determination Test
- Twelve (12) Atterberg Limits (3 Points) Test
- Twelve (12) Grain Size Distribution (Hydrometer Method) Test
- Fourteen (14) Torvane, Pocket Penetrometer, Moisture Content, Bulk Density and Visual Description with Unconfined Compressive Strength on Shelby tube Samples.

If you have any questions, please contact the undersigned.

Sincerely,



**Elliott E. Drumright, Ph.D.**  
Associate Geotechnical Engineer

Att.



AECOM Canada Ltd.  
 Winnipeg Geotechnical Laboratory  
 99 Commerce Drive  
 Winnipeg, Manitoba  
 R3P 0Y7  
 Phone: 204 477 5381



Fax: 431 800 1210

Project Name:	Jefferson CSR - Contracts 8A & 9
Project Number:	60680190
Client:	CoW
Sample Location:	Jefferson
Sample Depth:	Varies
Sample Number:	Varies

Supplier:	AECOM
Specification:	N/A
Field Technician:	RHarras
Sample Date:	Varies
Lab Technician:	EManimbao
Date Tested:	October 3, 2022

## Moisture Content (ASTM D2216-10)

Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

Location	Sample	Depth (m)	Moisture Content (%)
TH22-14	G1	0.76 - 0.91 m	28.2%
	S2	1.52 - 1.98 m	27.4%
	G3	2.29 - 2.44 m	47.9%
	G4	3.05 - 3.20 m	47.7%
	T5	4.57 - 5.18 m	53.0%
	G6	6.10 - 6.25 m	45.7%
	S7	7.62 - 8.08 m	31.7%
	G8	9.14 - 9.30 m	47.1%
	T9	10.67 - 11.28 m	56.7%
	G10	12.19 - 12.34 m	53.1%
	S11	13.72 - 14.17 m	55.5%
	G13	16.76 - 16.92 m	23.7%
	TH22-15	G1	0.76 - 0.91 m
G2		1.52 - 1.68 m	16.9%
G3		2.29 - 2.44 m	34.9%
T4		3.05 - 3.66 m	55.1%
G5		4.57 - 4.72 m	49.2%
S6		6.10 - 6.55 m	46.6%
G7		7.62 - 7.77 m	45.1%
T8		9.14 - 9.75 m	48.5%
G9		10.67 - 10.82 m	47.1%
S10		12.19 - 12.65 m	42.6%
TH22-16	G1	0.76 - 0.91 m	23.6%
	G2	1.52 - 1.68 m	20.2%
	G3	2.29 - 2.44 m	49.9%
	S4	3.05 - 3.51 m	44.3%
	G5	4.57 - 4.72 m	54.3%
	T6	6.10 - 6.71 m	49.6%
	G7	7.62 - 7.77 m	45.6%
	S8	9.14 - 9.60 m	48.7%
	G9	10.67 - 10.82 m	44.8%
	T10	12.19 - 12.80 m	68.1%
TH22-17	G1	0.76 - 0.91 m	20.7%
	S2	1.52 - 1.98 m	27.9%
	G3	2.29 - 2.44 m	52.6%
	G4	3.05 - 3.20 m	43.3%
	T5	4.57 - 5.18 m	53.1%
	G6	6.10 - 6.25 m	48.0%

Location	Sample	Depth (m)	Moisture Content (%)	
	S7	7.62 - 8.08 m	45.0%	
	G8	9.14 - 9.30 m	42.2%	
	T9	10.67 - 11.28 m	60.1%	
	G10	12.19 - 12.34 m	49.0%	
	S11	13.72 - 14.17 m	12.5%	
	G12	15.85 - 16.00 m	11.6%	
	TH22-18	G1	0.76 - 0.91 m	21.6%
		S2	1.52 - 1.98 m	31.4%
		G3	2.29 - 2.44 m	43.6%
		G4	3.05 - 3.20 m	47.8%
		T5	4.57 - 5.18 m	52.2%
		G6	6.10 - 6.25 m	42.2%
S7		7.62 - 8.08 m	38.1%	
G8		9.14 - 9.30 m	46.1%	
T9		10.67 - 11.28 m	46.2%	
G10		12.19 - 12.34 m	41.0%	
TH22-19	G1	0.76 - 0.91 m	29.7%	
	G2	1.52 - 1.68 m	34.9%	
	G3	2.29 - 2.44 m	23.6%	
	T4	3.05 - 3.66 m	42.6%	
	G5	4.57 - 4.72 m	52.9%	
	S6	6.10 - 6.55 m	53.3%	
	G7	7.62 - 7.77 m	43.9%	
	T8	9.14 - 9.75 m	45.9%	
	G9	10.67 - 10.82 m	42.9%	
	S10	12.19 - 12.65 m	52.9%	
TH22-20	G1	0.76 - 0.91 m	24.2%	
	G2	1.52 - 1.68 m	21.2%	
	G3	2.29 - 2.44 m	46.9%	
	S4	3.05 - 3.51 m	53.4%	
	G5	4.57 - 4.72 m	53.9%	
	T6	6.10 - 6.71 m	42.9%	
	G7	7.62 - 7.77 m	40.7%	
	S8	9.14 - 9.60 m	49.7%	
	G9	10.67 - 10.82 m	47.8%	
	T10	12.19 - 12.80 m	31.6%	
	G11	13.72 - 13.87 m	14.1%	
	S12	15.24 - 15.70 m	13.2%	



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Phone: 204 477 5381



Fax: 204 284 2040

Project Name: Jefferson CSR Contract 8A & 9  
Project Number: 60680190  
Client: CoW  
Sample Location: TH22-14  
Sample Depth: 6.10 - 6.25 m  
Sample Number: G6

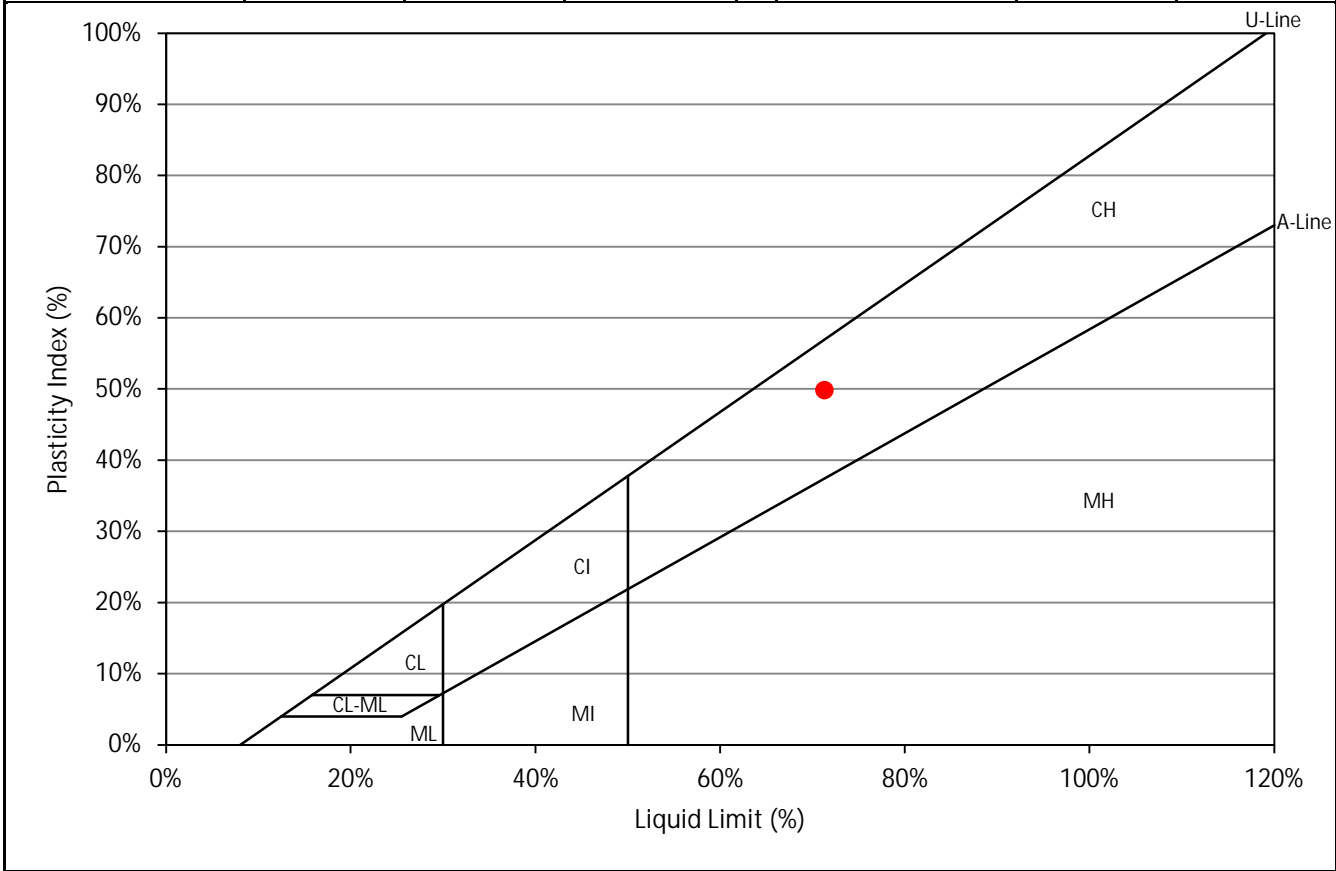
Supplier: AECOM  
Specification: N/A  
Field Technician: RHarras  
Sample Date: Varies  
Lab Technician: EManimbao  
Date Tested: November 9, 2022

### Atterberg Limits (ASTM D4318)

Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

	Liquid Limit		
Blows	33	26	17
Wet Sample (g)	8.9	10.0	8.8
Dry Sample (g)	5.3	5.8	5.0
Water Content (%)	68.9%	70.9%	74.5%

	Plastic Limit	
Trial	1	2
Wet Sample (g)	6.2	6.2
Dry Sample (g)	5.1	5.1
Water Content (%)	21.1%	21.9%



Liquid Limit (%): 71.3%      Plastic Limit (%): 21.5%      Plasticity Index (%): 49.8%



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Project Name: Jefferson CSR Contract 8A & 9  
Project Number: 60680190  
Client: CoW  
Sample Location: TH22-15  
Sample Depth: 3.05 - 3.66 m  
Sample Number: T4

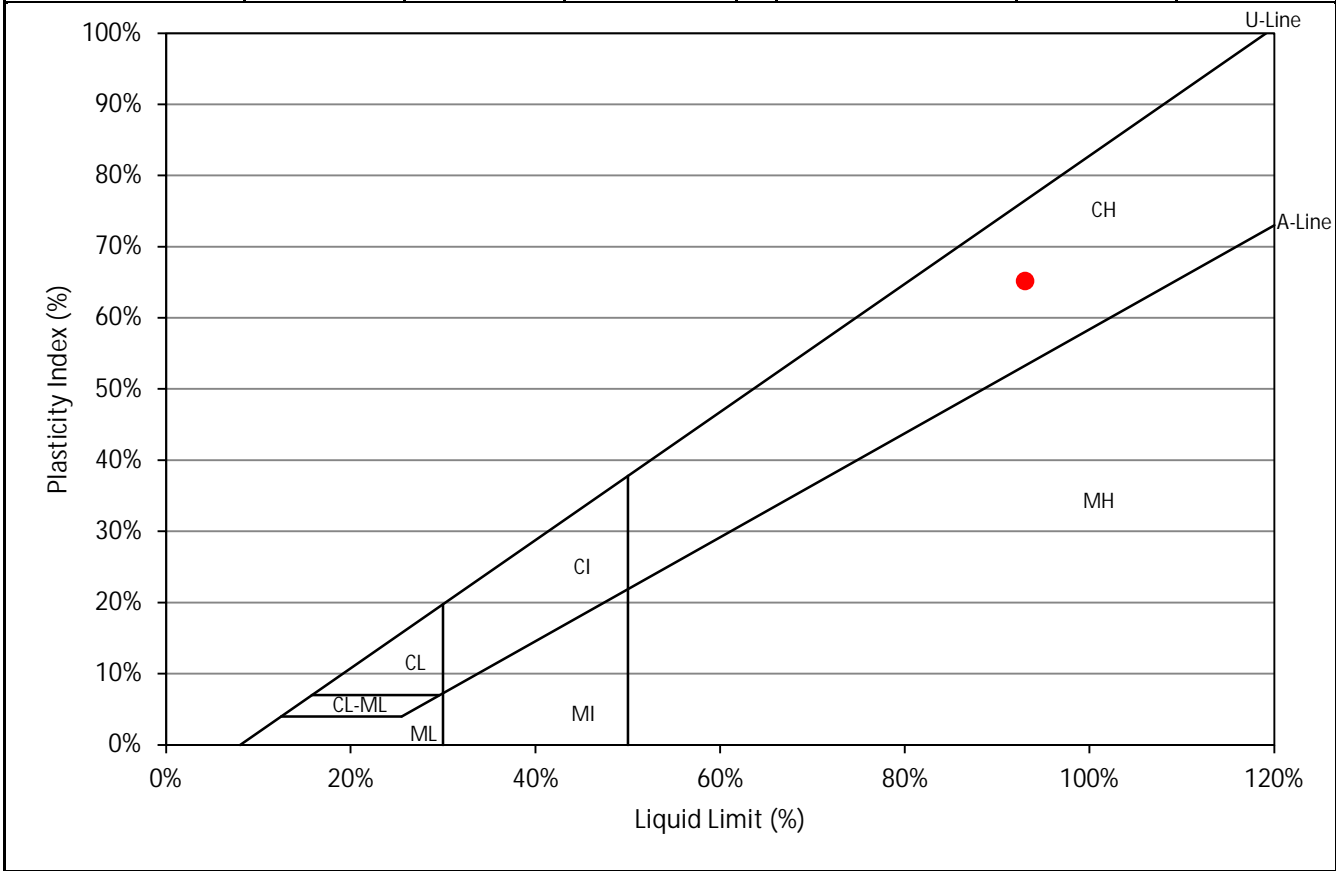
Supplier: AECOM  
Specification: N/A  
Field Technician: RHarras  
Sample Date: Varies  
Lab Technician: EManimbao  
Date Tested: November 8, 2022

## Atterberg Limits (ASTM D4318)

Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

Liquid Limit			
Blows	29	24	20
Wet Sample (g)	9.8	8.9	9.3
Dry Sample (g)	5.1	4.6	4.8
Water Content (%)	91.5%	93.1%	95.3%

Plastic Limit		
Trial	1	2
Wet Sample (g)	5.6	5.2
Dry Sample (g)	4.4	4.1
Water Content (%)	27.7%	28.0%



Liquid Limit (%): 93.0%	Plastic Limit (%): 27.9%	Plasticity Index (%): 65.1%
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Project Name: Jefferson CSR Contract 8A & 9  
Project Number: 60680190  
Client: CoW  
Sample Location: TH22-15  
Sample Depth: 9.14 - 9.75 m  
Sample Number: T8

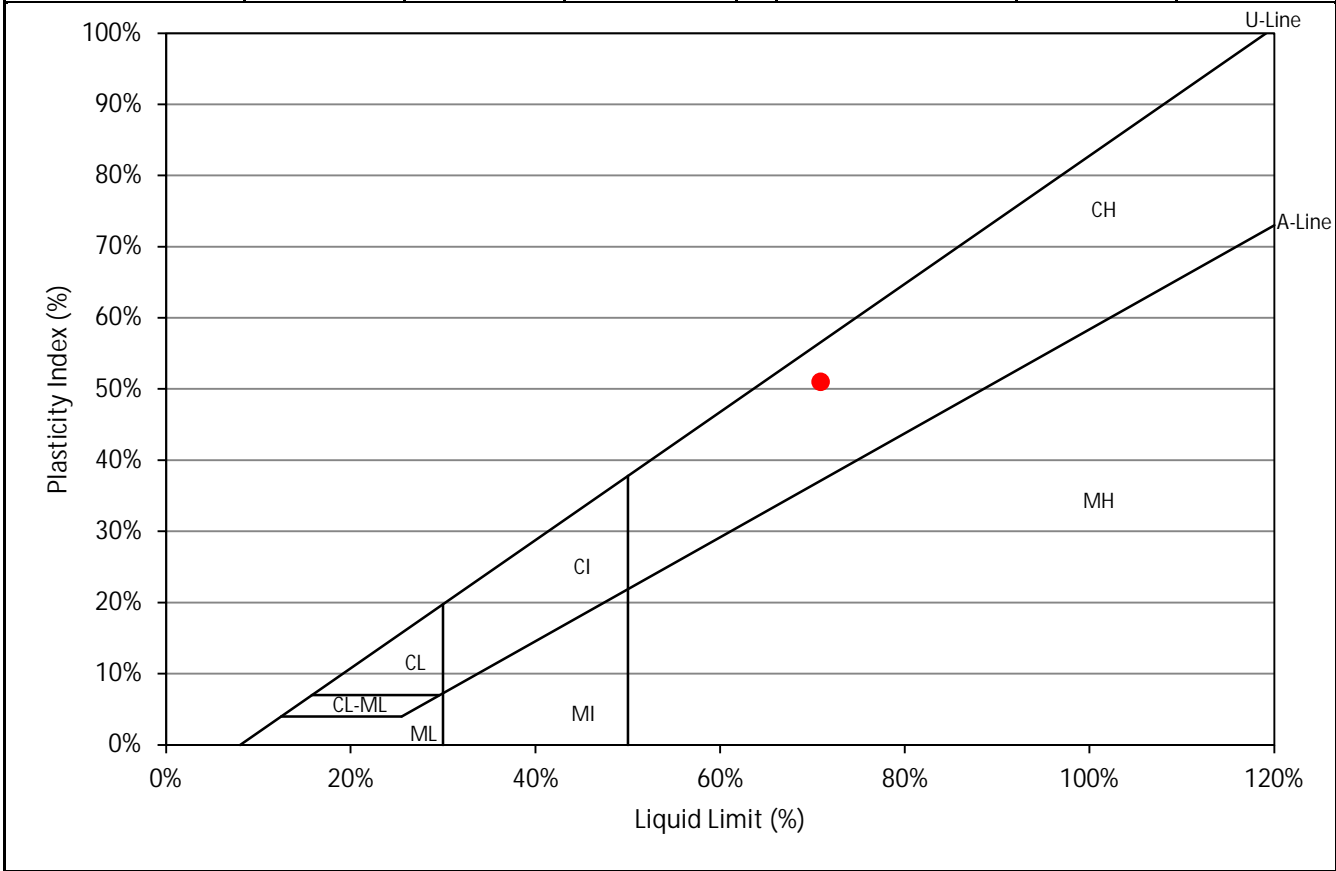
Supplier: AECOM  
Specification: N/A  
Field Technician: RHarras  
Sample Date: Varies  
Lab Technician: EManimbao  
Date Tested: November 8, 2022

### Atterberg Limits (ASTM D4318)

Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

Liquid Limit			
Blows	28	24	19
Wet Sample (g)	9.1	9.1	7.8
Dry Sample (g)	5.3	5.3	4.5
Water Content (%)	70.0%	71.5%	73.3%

Plastic Limit		
Trial	1	2
Wet Sample (g)	6.2	6.5
Dry Sample (g)	5.2	5.4
Water Content (%)	19.8%	20.0%



Liquid Limit (%): 70.9%      Plastic Limit (%): 19.9%      Plasticity Index (%): 51.0%



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Project Name: Jefferson CSR Contract 8A & 9  
Project Number: 60680190  
Client: CoW  
Sample Location: TH22-16  
Sample Depth: 1.52 - 1.68 m  
Sample Number: G2

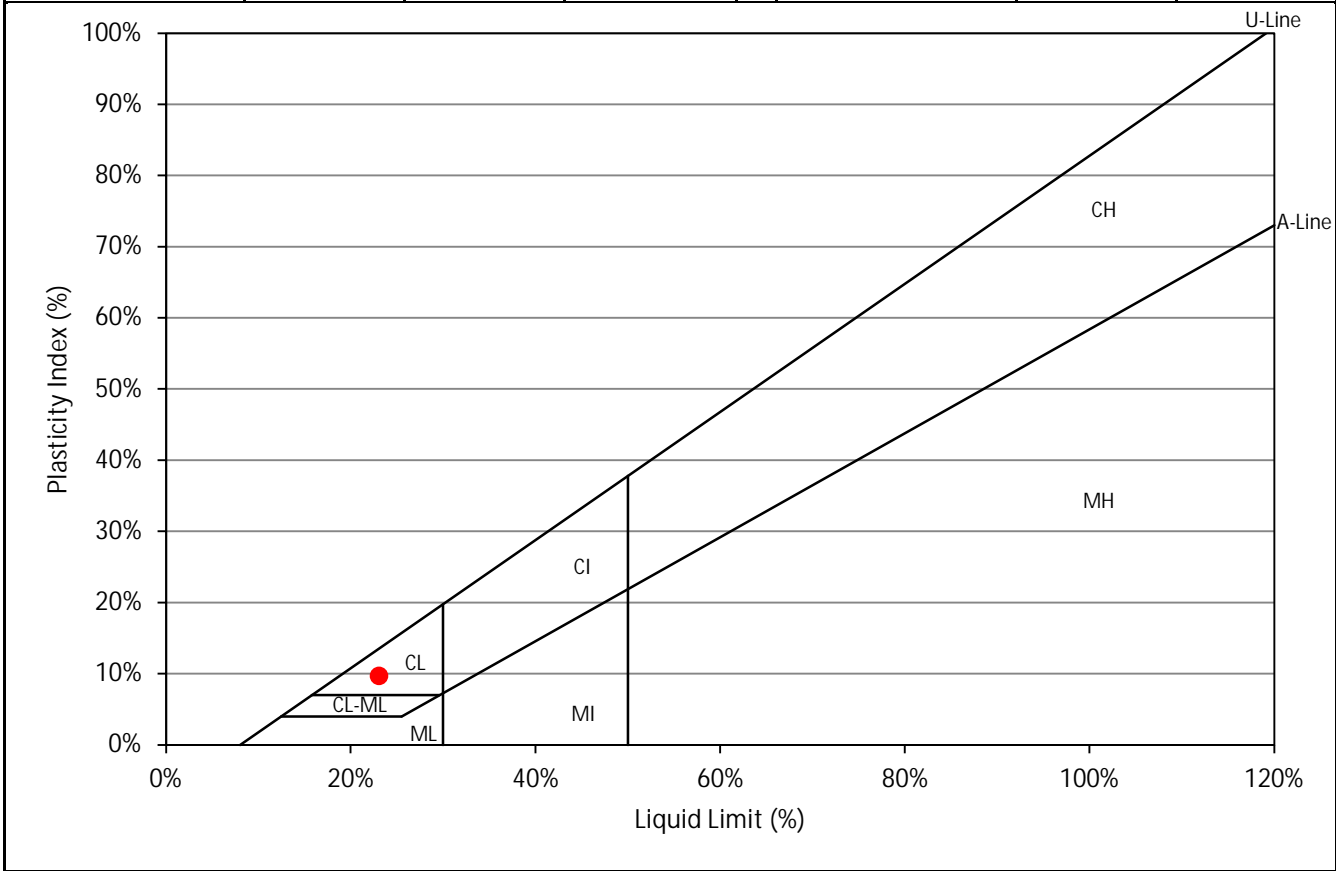
Supplier: AECOM  
Specification: N/A  
Field Technician: RHarras  
Sample Date: Varies  
Lab Technician: EManimbao  
Date Tested: November 8, 2022

### Atterberg Limits (ASTM D4318)

Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

Liquid Limit			
Blows	29	22	16
Wet Sample (g)	15.6	9.1	12.4
Dry Sample (g)	12.7	7.4	10.0
Water Content (%)	22.5%	23.7%	24.9%

Plastic Limit		
Trial	1	2
Wet Sample (g)	6.5	6.1
Dry Sample (g)	5.8	5.4
Water Content (%)	13.3%	13.4%



Liquid Limit (%): 23.1%      Plastic Limit (%): 13.4%      Plasticity Index (%): 9.7%



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Project Name: Jefferson CSR Contract 8A & 9  
Project Number: 60680190  
Client: CoW  
Sample Location: TH22-16  
Sample Depth: 7.62 - 7.77 m  
Sample Number: G7

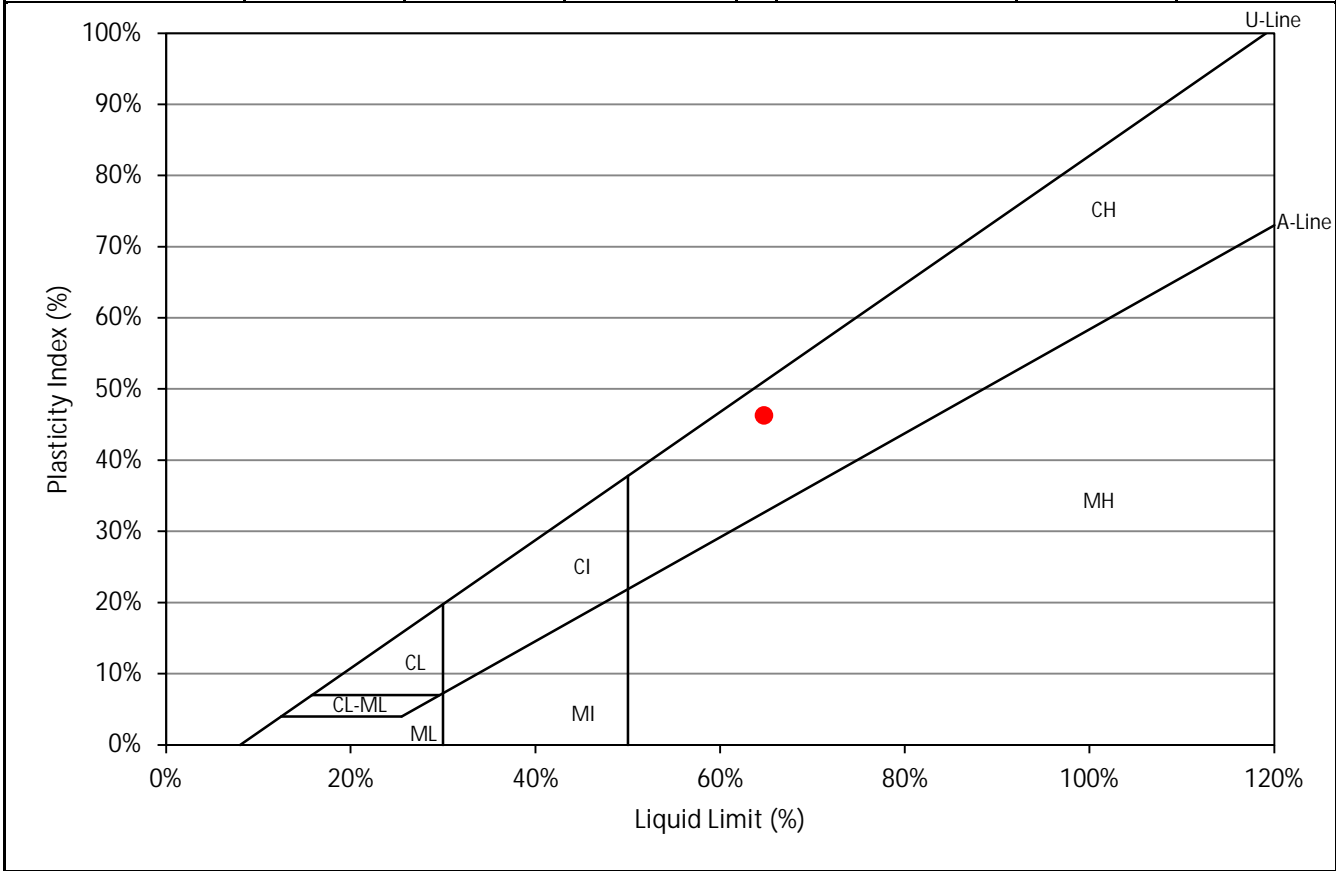
Supplier: AECOM  
Specification: N/A  
Field Technician: RHarras  
Sample Date: Varies  
Lab Technician: EManimbao  
Date Tested: November 9, 2022

### Atterberg Limits (ASTM D4318)

Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

Liquid Limit			
Blows	29	23	18
Wet Sample (g)	8.9	9.4	10.5
Dry Sample (g)	5.5	5.7	6.2
Water Content (%)	63.4%	65.3%	67.8%

Plastic Limit		
Trial	1	2
Wet Sample (g)	6.2	6.0
Dry Sample (g)	5.2	5.1
Water Content (%)	18.6%	18.3%



Liquid Limit (%): 64.8%      Plastic Limit (%): 18.5%      Plasticity Index (%): 46.3%



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Project Name: Jefferson CSR Contract 8A & 9  
Project Number: 60680190  
Client: CoW  
Sample Location: TH22-17  
Sample Depth: 4.57 - 5.18 m  
Sample Number: T5

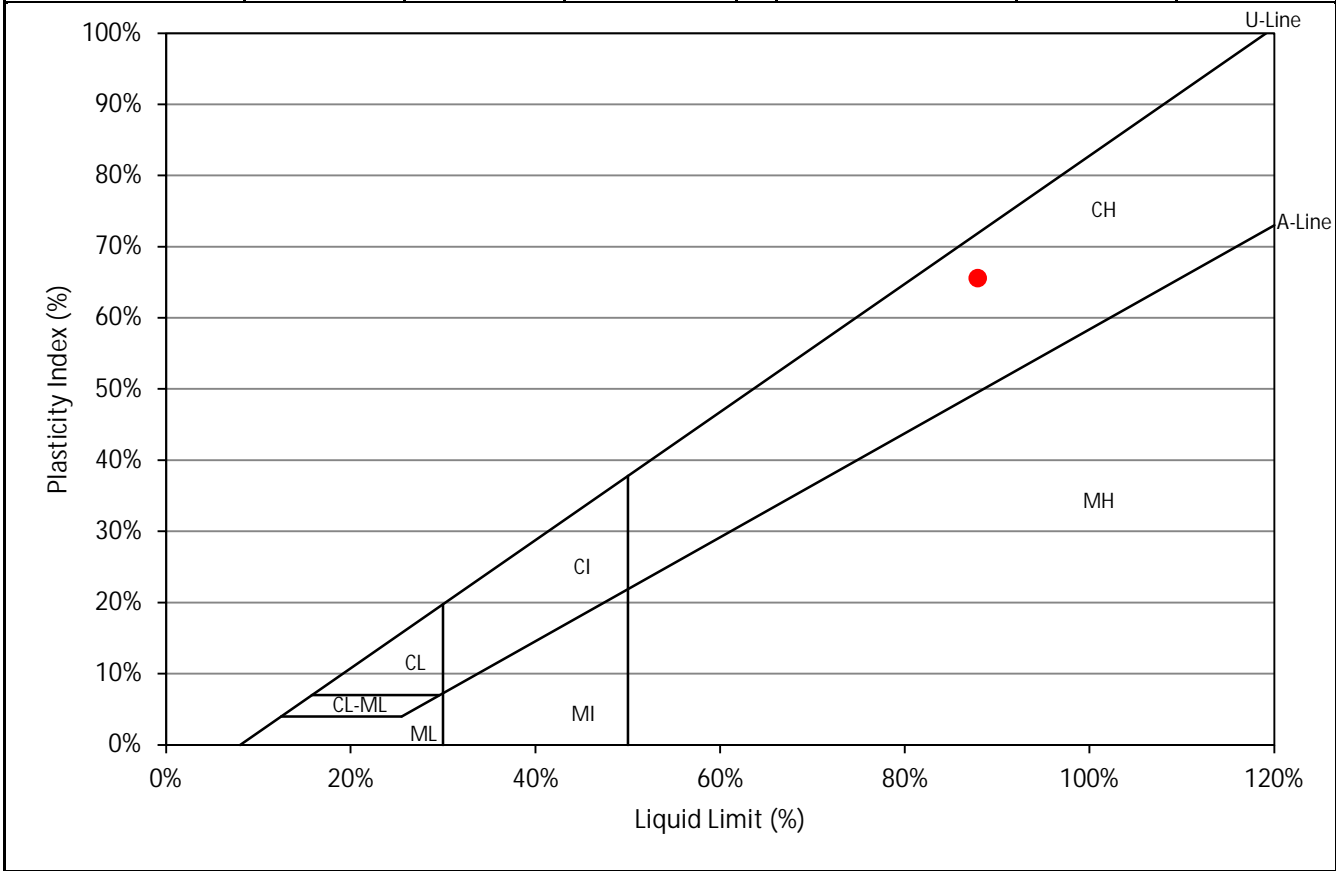
Supplier: AECOM  
Specification: N/A  
Field Technician: RHarras  
Sample Date: Varies  
Lab Technician: EManimbao  
Date Tested: November 8, 2022

### Atterberg Limits (ASTM D4318)

Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

Liquid Limit			
Blows	26	23	19
Wet Sample (g)	9.4	8.0	9.1
Dry Sample (g)	5.0	4.2	4.8
Water Content (%)	87.7%	88.6%	89.8%

Plastic Limit		
Trial	1	2
Wet Sample (g)	6.2	6.3
Dry Sample (g)	5.1	5.1
Water Content (%)	22.3%	22.4%



Liquid Limit (%): 87.9%      Plastic Limit (%): 22.3%      Plasticity Index (%): 65.6%





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Fax: 204 284 2040

Project Name: Jefferson CSR Contract 8A & 9  
Project Number: 60680190  
Client: CoW  
Sample Location: TH22-18  
Sample Depth: 3.05 - 3.20 m  
Sample Number: G4

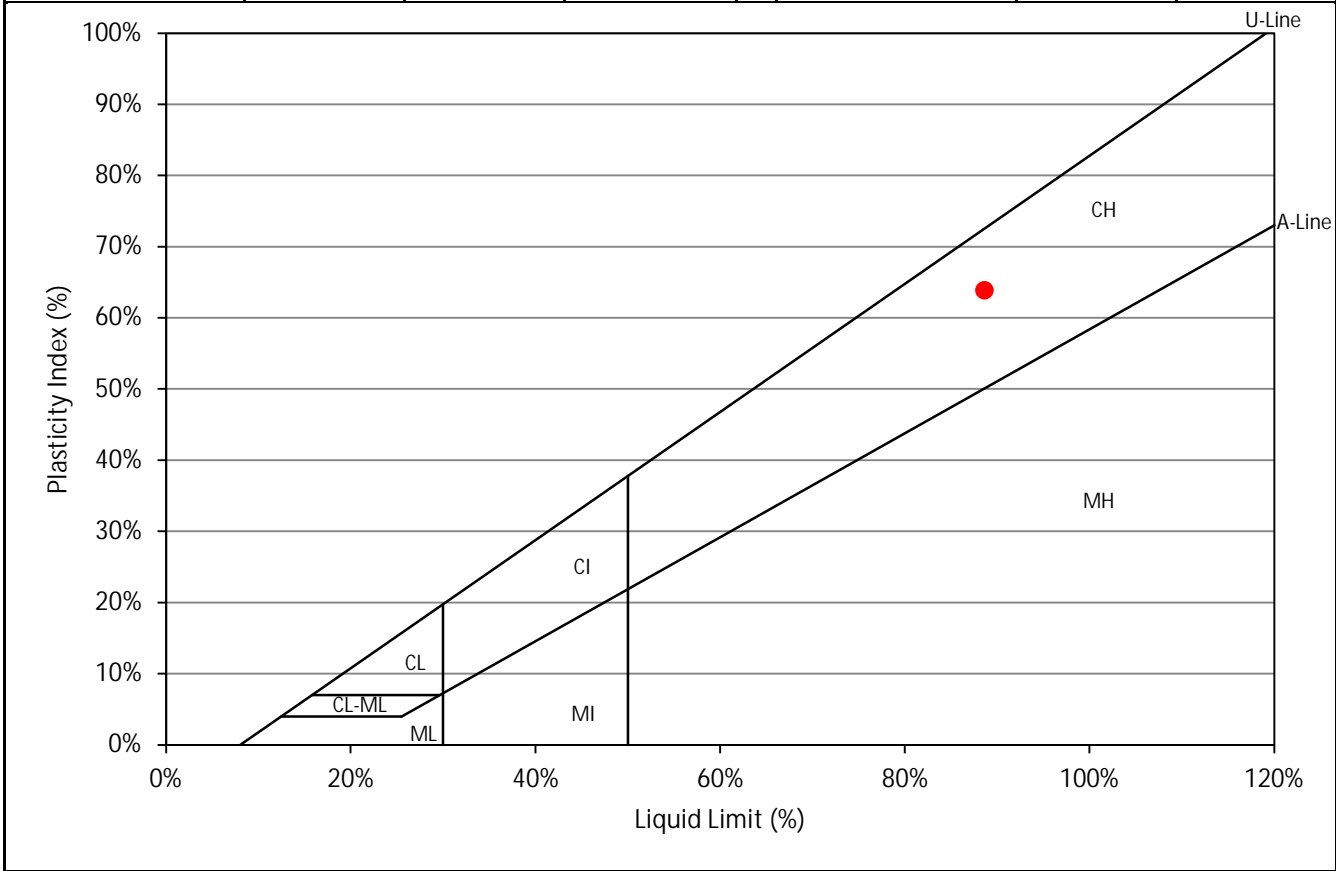
Supplier: AECOM  
Specification: N/A  
Field Technician: RHarras  
Sample Date: Varies  
Lab Technician: EManimbao  
Date Tested: November 9, 2022

### Atterberg Limits (ASTM D4318)

Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

	Liquid Limit		
Blows	27	21	17
Wet Sample (g)	10.0	9.5	8.6
Dry Sample (g)	5.3	5.0	4.5
Water Content (%)	88.1%	90.3%	92.0%

	Plastic Limit	
Trial	1	2
Wet Sample (g)	6.4	6.7
Dry Sample (g)	5.1	5.3
Water Content (%)	25.0%	24.5%



Liquid Limit (%): 88.6%      Plastic Limit (%): 24.8%      Plasticity Index (%): 63.9%



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Project Name: Jefferson CSR Contract 8A & 9  
Project Number: 60680190  
Client: CoW  
Sample Location: TH22-18  
Sample Depth: 12.19 - 12.34 m  
Sample Number: G10

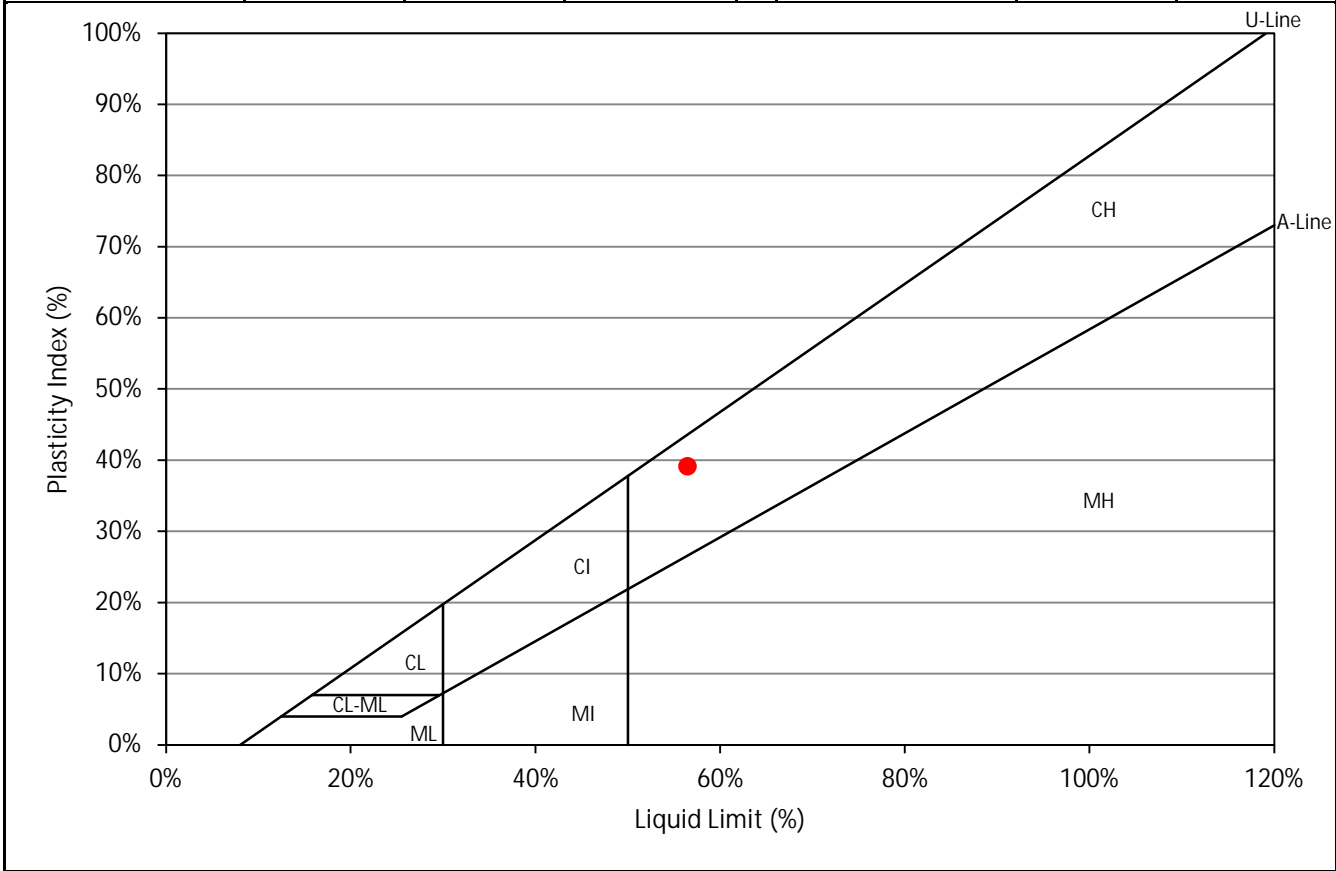
Supplier: AECOM  
Specification: N/A  
Field Technician: RHarras  
Sample Date: Varies  
Lab Technician: EManimbao  
Date Tested: November 8, 2022

### Atterberg Limits (ASTM D4318)

Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

Liquid Limit			
Blows	34	25	18
Wet Sample (g)	10.5	11.2	11.3
Dry Sample (g)	6.8	7.2	7.1
Water Content (%)	54.8%	56.5%	58.2%

Plastic Limit		
Trial	1	2
Wet Sample (g)	6.2	6.3
Dry Sample (g)	5.3	5.4
Water Content (%)	17.1%	17.5%



Liquid Limit (%): 56.5%      Plastic Limit (%): 17.3%      Plasticity Index (%): 39.2%



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Project Name: Jefferson CSR Contract 8A & 9  
Project Number: 60680190  
Client: CoW  
Sample Location: TH22-19  
Sample Depth: 1.52 - 1.68 m  
Sample Number: G2

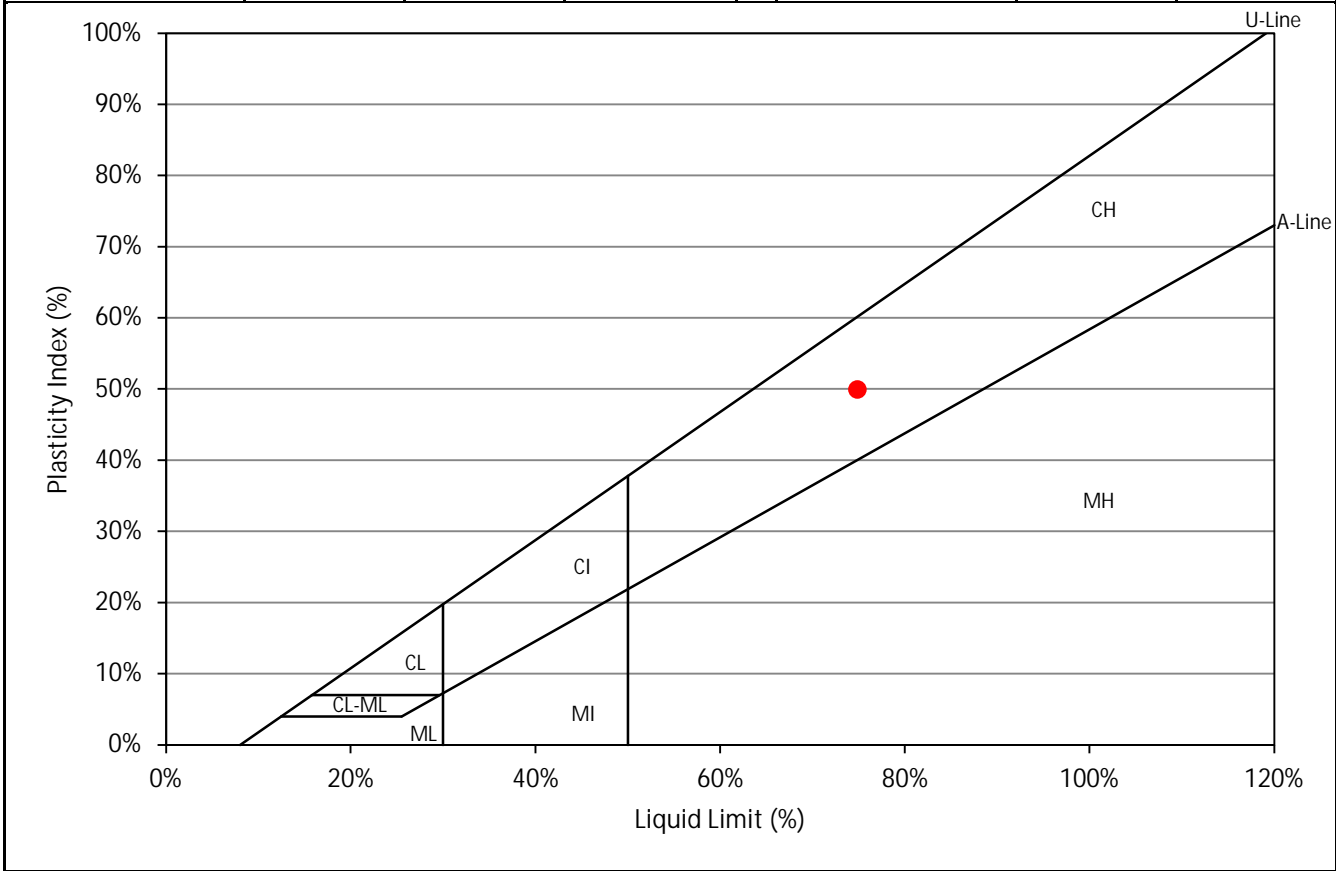
Supplier: AECOM  
Specification: N/A  
Field Technician: RHarras  
Sample Date: Varies  
Lab Technician: EManimbao  
Date Tested: November 8, 2022

### Atterberg Limits (ASTM D4318)

Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

Liquid Limit			
Blows	28	22	16
Wet Sample (g)	9.8	9.1	6.3
Dry Sample (g)	5.6	5.2	3.6
Water Content (%)	74.2%	75.7%	77.2%

Plastic Limit		
Trial	1	2
Wet Sample (g)	6.2	6.1
Dry Sample (g)	4.9	4.9
Water Content (%)	25.0%	24.9%



Liquid Limit (%): 74.9%      Plastic Limit (%): 24.9%      Plasticity Index (%): 49.9%



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Project Name: Jefferson CSR Contract 8A & 9  
Project Number: 60680190  
Client: CoW  
Sample Location: TH22-19  
Sample Depth: 7.62 - 7.77 m  
Sample Number: G7

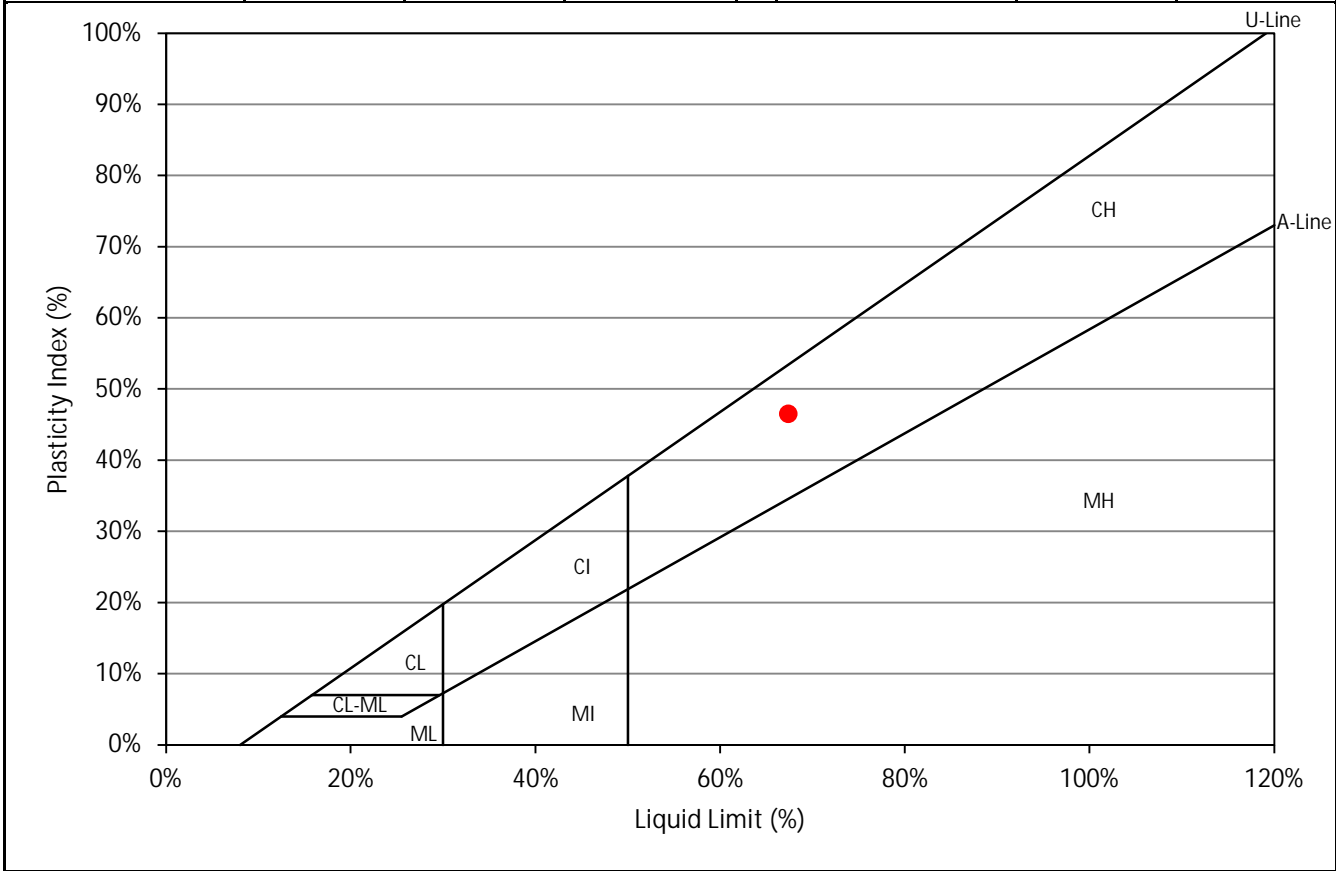
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Specification: N/A  
Field Technician: RHarras  
Sample Date: Varies  
Lab Technician: EManimbao  
Date Tested: November 8, 2022

### Atterberg Limits (ASTM D4318)

Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

Liquid Limit			
Blows	28	23	18
Wet Sample (g)	8.1	9.7	9.5
Dry Sample (g)	4.9	5.8	5.6
Water Content (%)	66.3%	68.2%	70.1%

Plastic Limit		
Trial	1	2
Wet Sample (g)	6.7	6.3
Dry Sample (g)	5.5	5.2
Water Content (%)	20.6%	21.1%



Liquid Limit (%): 67.4%      Plastic Limit (%): 20.9%      Plasticity Index (%): 46.5%



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Project Name: Jefferson CSR Contract 8A & 9  
Project Number: 60680190  
Client: CoW  
Sample Location: TH22-20  
Sample Depth: 1.52 - 1.68 m  
Sample Number: G2

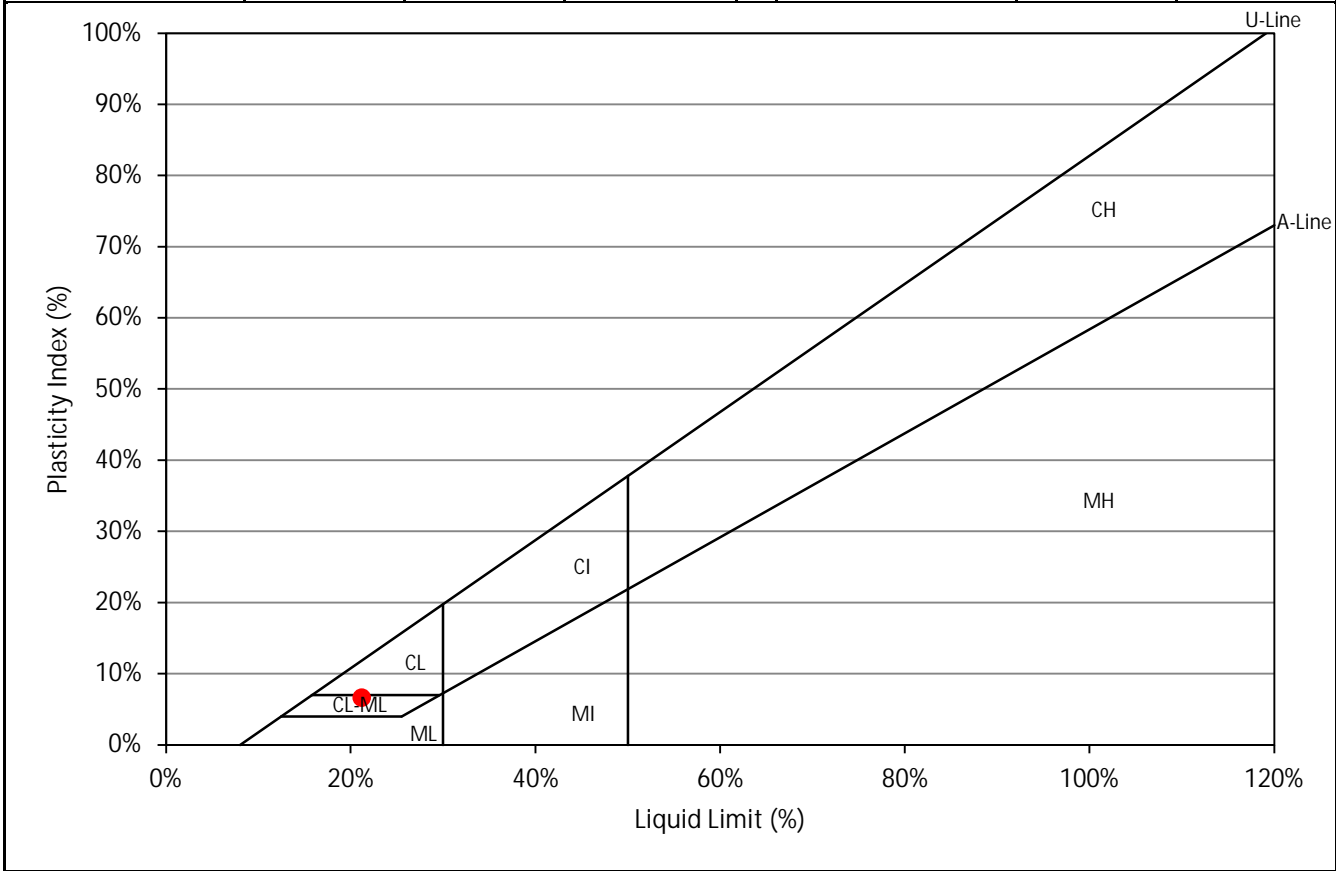
Supplier: AECOM  
Specification: N/A  
Field Technician: RHarras  
Sample Date: Varies  
Lab Technician: EManimbao  
Date Tested: November 8, 2022

### Atterberg Limits (ASTM D4318)

Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

Liquid Limit			
Blows	26	22	17
Wet Sample (g)	17.5	13.8	10.8
Dry Sample (g)	14.4	11.4	8.8
Water Content (%)	21.1%	21.5%	21.9%

Plastic Limit		
Trial	1	2
Wet Sample (g)	6.9	6.4
Dry Sample (g)	6.0	5.6
Water Content (%)	14.7%	14.3%



Liquid Limit (%): 21.2%      Plastic Limit (%): 14.5%      Plasticity Index (%): 6.6%



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Project Name: Jefferson CSR Contract 8A & 9  
Project Number: 60680190  
Client: CoW  
Sample Location: TH22-20  
Sample Depth: 6.10 - 6.71 m  
Sample Number: T6

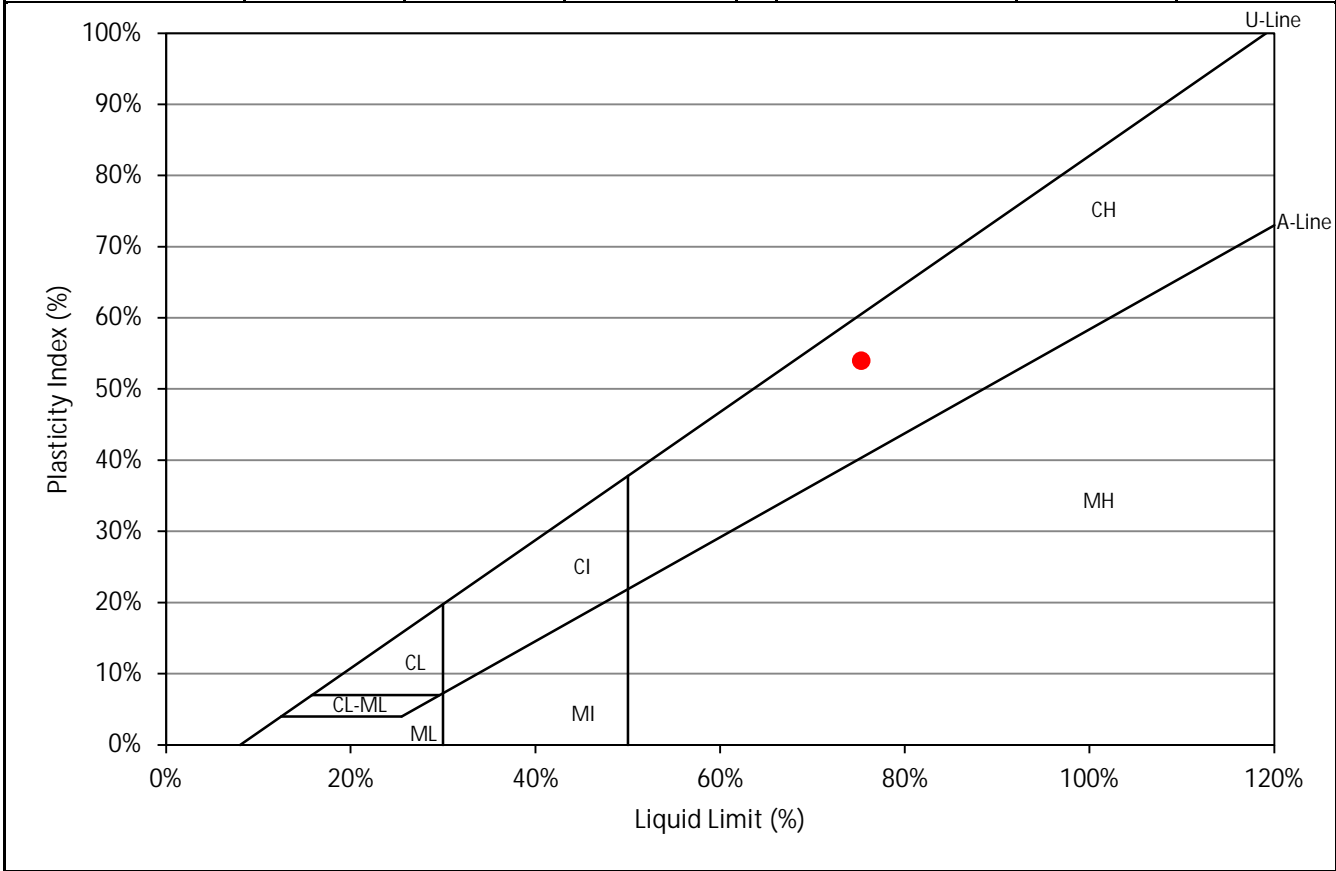
Supplier: AECOM  
Specification: N/A  
Field Technician: RHarras  
Sample Date: Varies  
Lab Technician: EManimbao  
Date Tested: November 8, 2022

### Atterberg Limits (ASTM D4318)

Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

Liquid Limit			
Blows	34	27	19
Wet Sample (g)	8.1	8.8	8.3
Dry Sample (g)	4.7	5.0	4.7
Water Content (%)	73.3%	74.9%	76.8%

Plastic Limit		
Trial	1	2
Wet Sample (g)	6.3	6.3
Dry Sample (g)	5.2	5.2
Water Content (%)	21.7%	20.9%



Liquid Limit (%): 75.3%      Plastic Limit (%): 21.3%      Plasticity Index (%): 54.0%

**GRAIN SIZE DISTRIBUTION**  
(ASTM D422-63)



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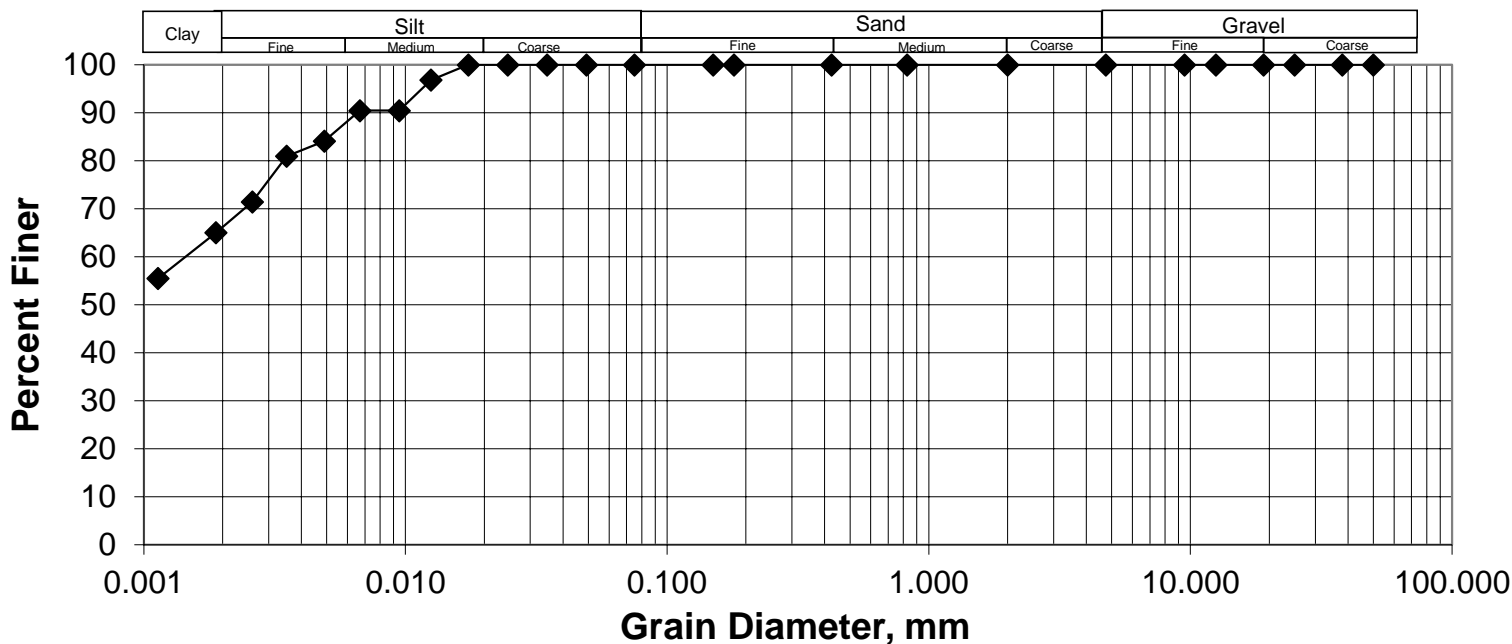


Job No.: 60680190  
Client: City of Winnipeg  
Project: Jefferson CSR Contract 8A & 9  
Date Tested: 28-Oct-22  
Tested By: EManimbao

Hole No.: TH22-14  
Sample No.: G6  
Depth: 6.10 - 6.25 m  
Date Sampled: Varies  
Sampled By: AECOM

GRAVEL SIZES		SAND SIZES		FINES	
Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing
50.0	100.0	4.75	100.0	0.0750	100.0
38.0	100.0	2.00	100.0	0.0491	100.0
25.0	100.0	0.825	100.0	0.0347	100.0
19.0	100.0	0.425	100.0	0.0246	100.0
12.5	100.0	0.18	100.0	0.0174	100.0
9.5	100.0	0.15	100.0	0.0125	96.8
4.75	100.0	0.075	100.0	0.0095	90.5
				0.0067	90.5
				0.0049	84.1
				0.0035	80.9
				0.0026	71.4
				0.0019	65.1
				0.0011	55.5

**GRAIN SIZE DISTRIBUTION CURVE**



Gravel	0.0%	Silt	34.0%
Sand	0.0%	Clay	66.0%

**GRAIN SIZE DISTRIBUTION**  
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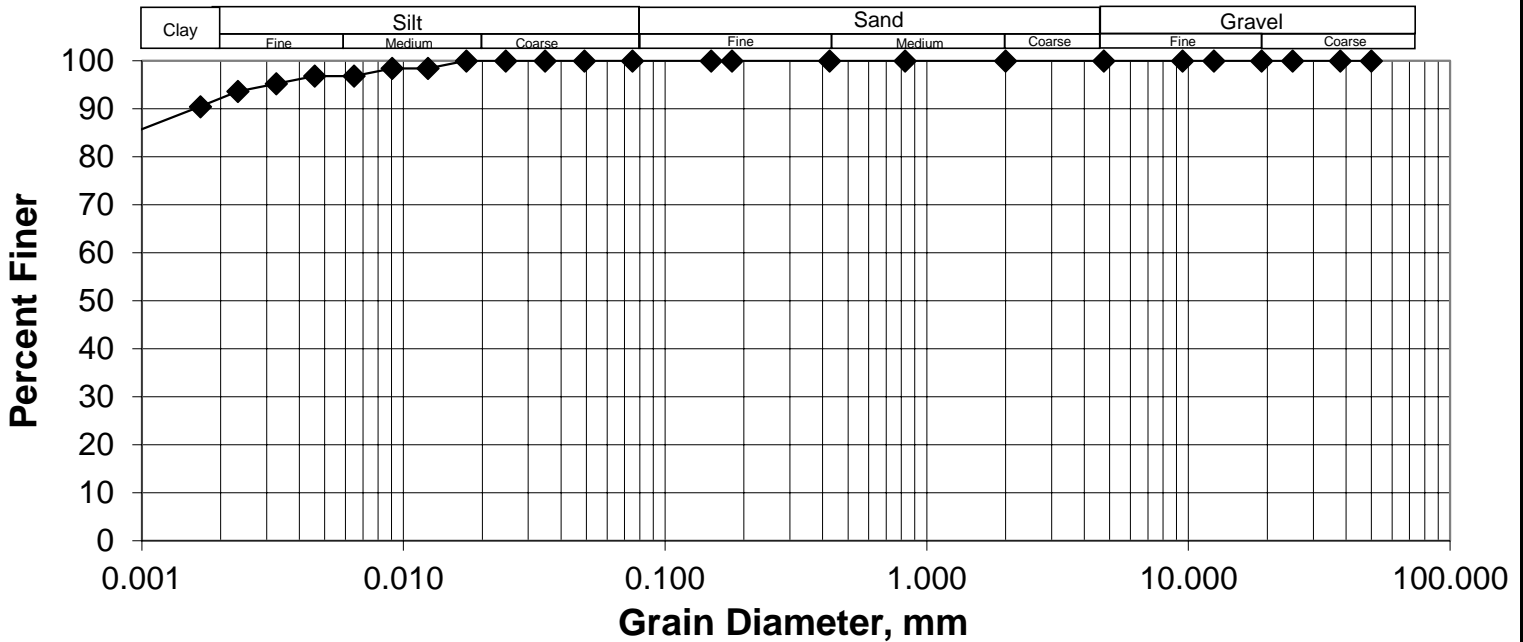


Job No.: 60680190  
Client: City of Winnipeg  
Project: Jefferson CSR Contract 8A & 9  
Date Tested: 28-Oct-22  
Tested By: EManimbao

Hole No.: TH22-15  
Sample No.: T4  
Depth: 3.05 - 3.66 m  
Date Sampled: Varies  
Sampled By: AECOM

GRAVEL SIZES		SAND SIZES		FINES	
Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing
50.0	100.0	4.75	100.0	0.0750	100.0
38.0	100.0	2.00	100.0	0.0491	100.0
25.0	100.0	0.825	100.0	0.0347	100.0
19.0	100.0	0.425	100.0	0.0246	100.0
12.5	100.0	0.18	100.0	0.0174	100.0
9.5	100.0	0.15	100.0	0.0124	98.4
4.75	100.0	0.075	100.0	0.0091	98.4
				0.0065	96.8
				0.0046	96.8
				0.0033	95.2
				0.0023	93.6
				0.0017	90.5
				0.0010	85.7

**GRAIN SIZE DISTRIBUTION CURVE**



Gravel	0.0%	Silt	7.9%
Sand	0.0%	Clay	92.1%



**GRAIN SIZE DISTRIBUTION**  
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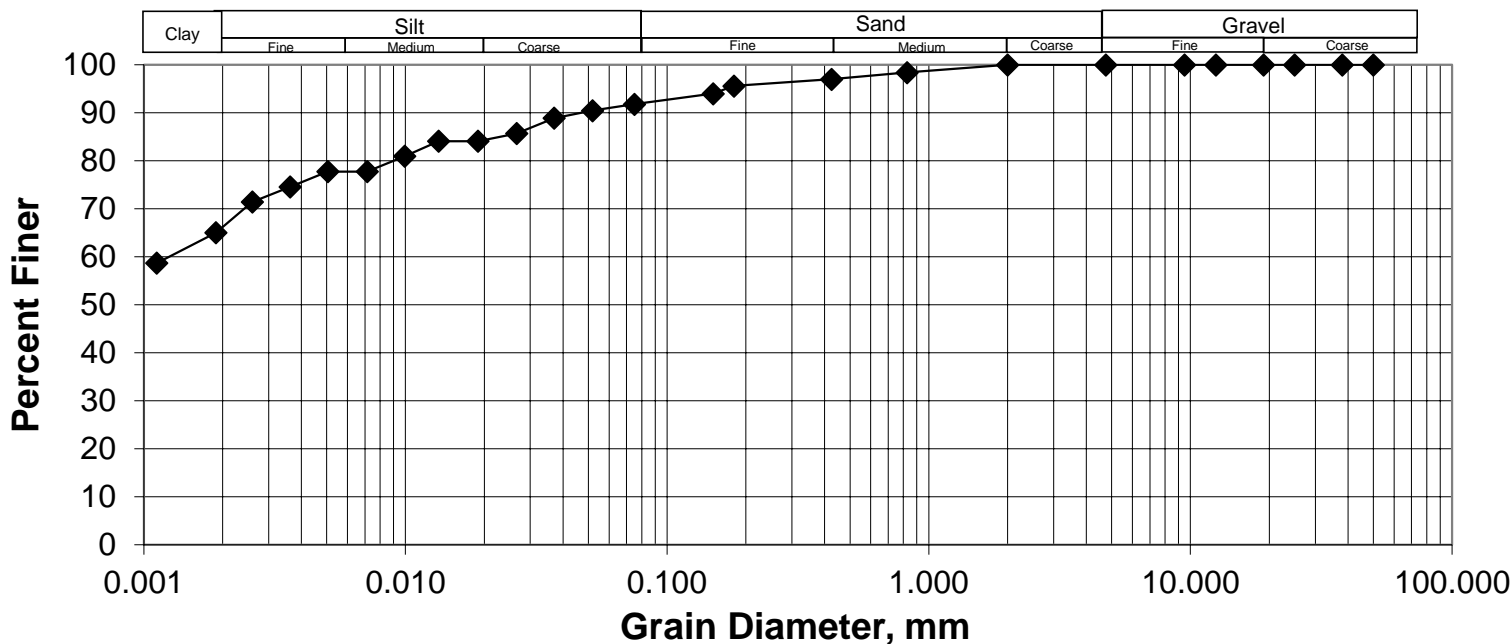


Job No.: 60680190  
Client: City of Winnipeg  
Project: Jefferson CSR Contract 8A & 9  
Date Tested: 28-Oct-22  
Tested By: EManimbao

Hole No.: TH22-15  
Sample No.: T8  
Depth: 9.14 - 9.75 m  
Date Sampled: Varies  
Sampled By: AECOM

GRAVEL SIZES		SAND SIZES		FINES	
Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing
50.0	100.0	4.75	100.0	0.0750	91.8
38.0	100.0	2.00	100.0	0.0518	90.5
25.0	100.0	0.825	98.4	0.0370	88.9
19.0	100.0	0.425	97.0	0.0266	85.7
12.5	100.0	0.18	95.6	0.0189	84.1
9.5	100.0	0.15	94.0	0.0134	84.1
4.75	100.0	0.075	91.8	0.0099	80.9
				0.0071	77.8
				0.0050	77.8
				0.0036	74.6
				0.0026	71.4
				0.0019	65.1
				0.0011	58.7

**GRAIN SIZE DISTRIBUTION CURVE**



Gravel	0.0%	Silt	25.8%
Sand	8.2%	Clay	66.0%

**GRAIN SIZE DISTRIBUTION**  
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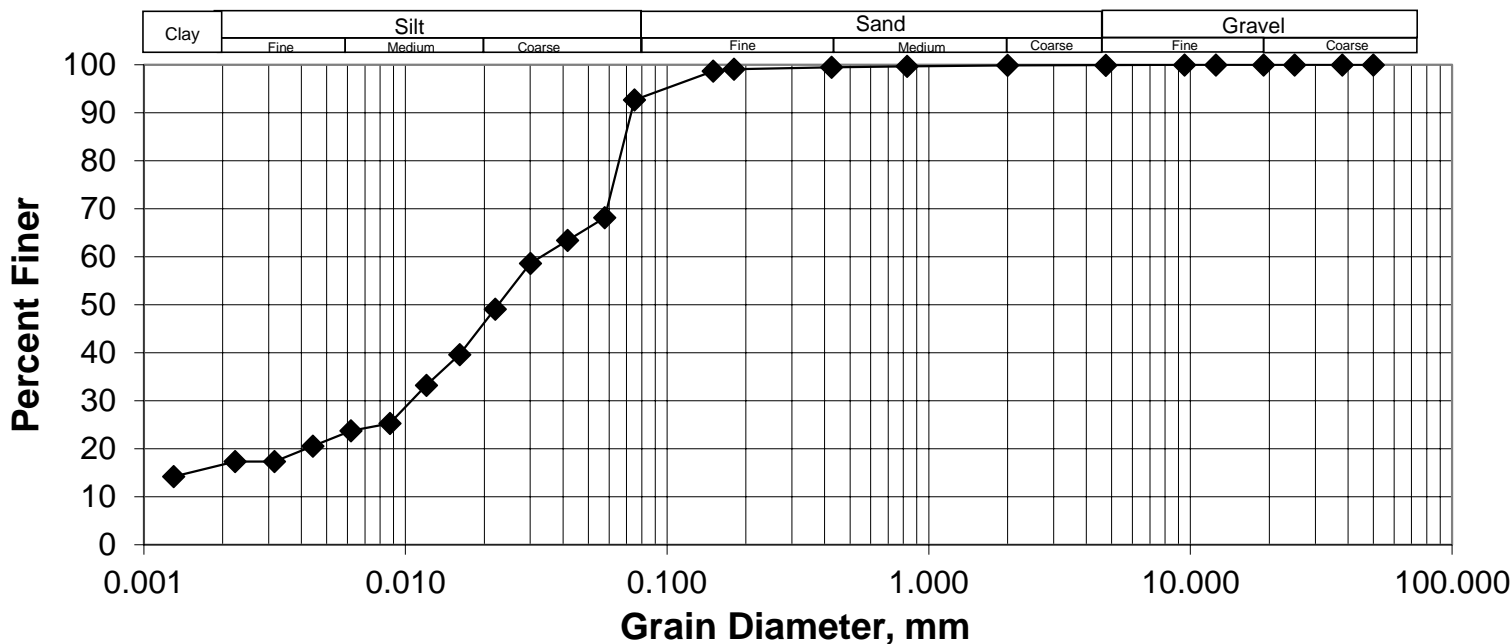


Job No.: 60680190  
Client: City of Winnipeg  
Project: Jefferson CSR Contract 8A & 9  
Date Tested: 28-Oct-22  
Tested By: EManimbao

Hole No.: TH22-16  
Sample No.: G2  
Depth: 1.52 - 1.68 m  
Date Sampled: Varies  
Sampled By: AECOM

GRAVEL SIZES		SAND SIZES		FINES	
Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing
50.0	100.0	4.75	99.9	0.0750	92.7
38.0	100.0	2.00	99.9	0.0577	68.2
25.0	100.0	0.825	99.7	0.0416	63.4
19.0	100.0	0.425	99.5	0.0300	58.6
12.5	100.0	0.18	99.1	0.0220	49.1
9.5	100.0	0.15	98.7	0.0161	39.6
4.75	99.9	0.075	92.7	0.0120	33.3
				0.0087	25.3
				0.0062	23.7
				0.0044	20.6
				0.0032	17.4
				0.0022	17.4
				0.0013	14.2

**GRAIN SIZE DISTRIBUTION CURVE**



Gravel	0.1%	Silt	76.0%
Sand	7.2%	Clay	16.7%

**GRAIN SIZE DISTRIBUTION**  
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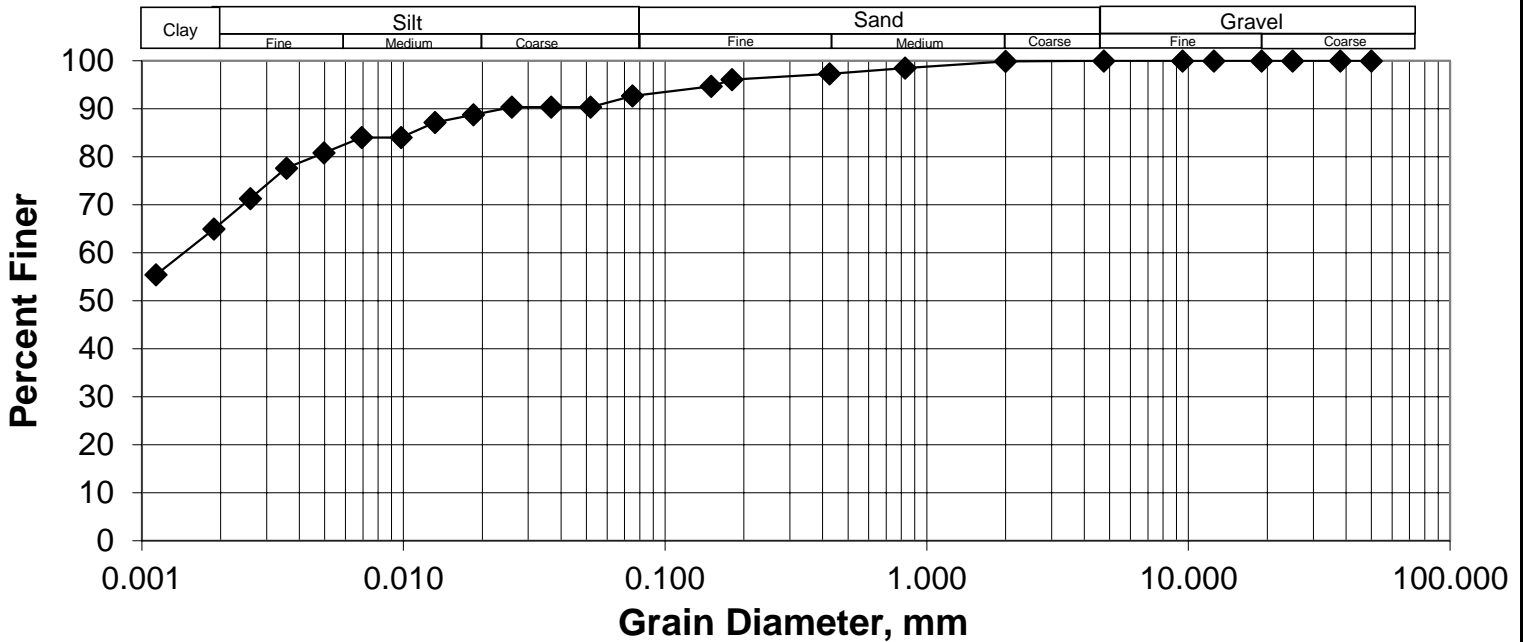


Job No.: 60680190  
Client: City of Winnipeg  
Project: Jefferson CSR Contract 8A & 9  
Date Tested: 28-Oct-22  
Tested By: EManimbao

Hole No.: TH22-16  
Sample No.: G7  
Depth: 7.62 - 7.77 m  
Date Sampled: Varies  
Sampled By: AECOM

GRAVEL SIZES		SAND SIZES		FINES	
Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing
50.0	100.0	4.75	100.0	0.0750	92.7
38.0	100.0	2.00	99.9	0.0518	90.4
25.0	100.0	0.825	98.5	0.0367	90.4
19.0	100.0	0.425	97.3	0.0259	90.4
12.5	100.0	0.18	96.1	0.0185	88.8
9.5	100.0	0.15	94.7	0.0132	87.2
4.75	100.0	0.075	92.7	0.0098	84.0
				0.0069	84.0
				0.0050	80.8
				0.0036	77.7
				0.0026	71.3
				0.0019	65.0
				0.0011	55.5

**GRAIN SIZE DISTRIBUTION CURVE**



Gravel	0.0%	Silt	26.8%
Sand	7.3%	Clay	65.9%

**GRAIN SIZE DISTRIBUTION**  
(ASTM D422-63)



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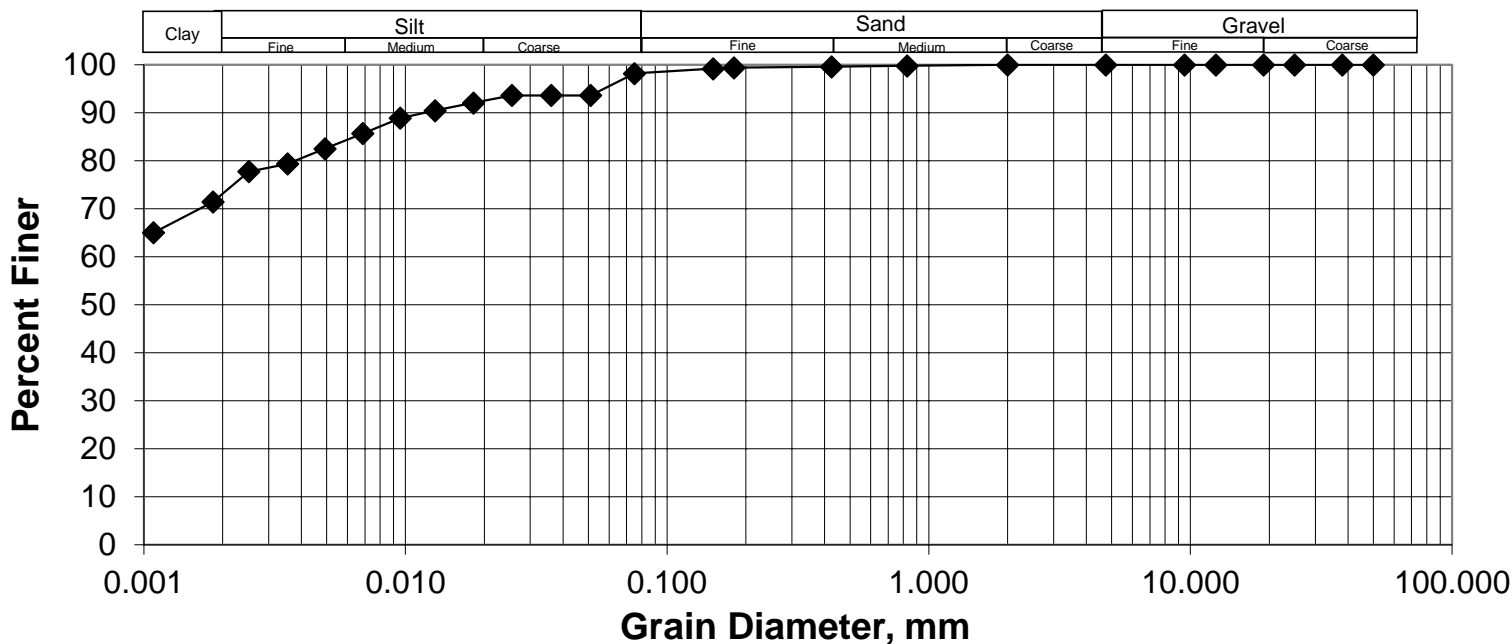


Job No.: 60680190  
Client: City of Winnipeg  
Project: Jefferson CSR Contract 8A & 9  
Date Tested: 28-Oct-22  
Tested By: EManimbao

Hole No.: TH22-17  
Sample No.: G2  
Depth: 1.52 - 1.68 m  
Date Sampled: Varies  
Sampled By: AECOM

GRAVEL SIZES		SAND SIZES		FINES	
Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing
50.0	100.0	4.75	100.0	0.0750	98.2
38.0	100.0	2.00	100.0	0.0510	93.6
25.0	100.0	0.825	99.8	0.0360	93.6
19.0	100.0	0.425	99.6	0.0255	93.6
12.5	100.0	0.18	99.4	0.0182	92.1
9.5	100.0	0.15	99.2	0.0130	90.5
4.75	100.0	0.075	98.2	0.0095	88.9
				0.0069	85.7
				0.0049	82.5
				0.0035	79.3
				0.0025	77.8
				0.0018	71.4
				0.0011	65.1

**GRAIN SIZE DISTRIBUTION CURVE**



Gravel	0.0%	Silt	25.0%
Sand	1.8%	Clay	73.2%

**GRAIN SIZE DISTRIBUTION**  
(ASTM D422-63)



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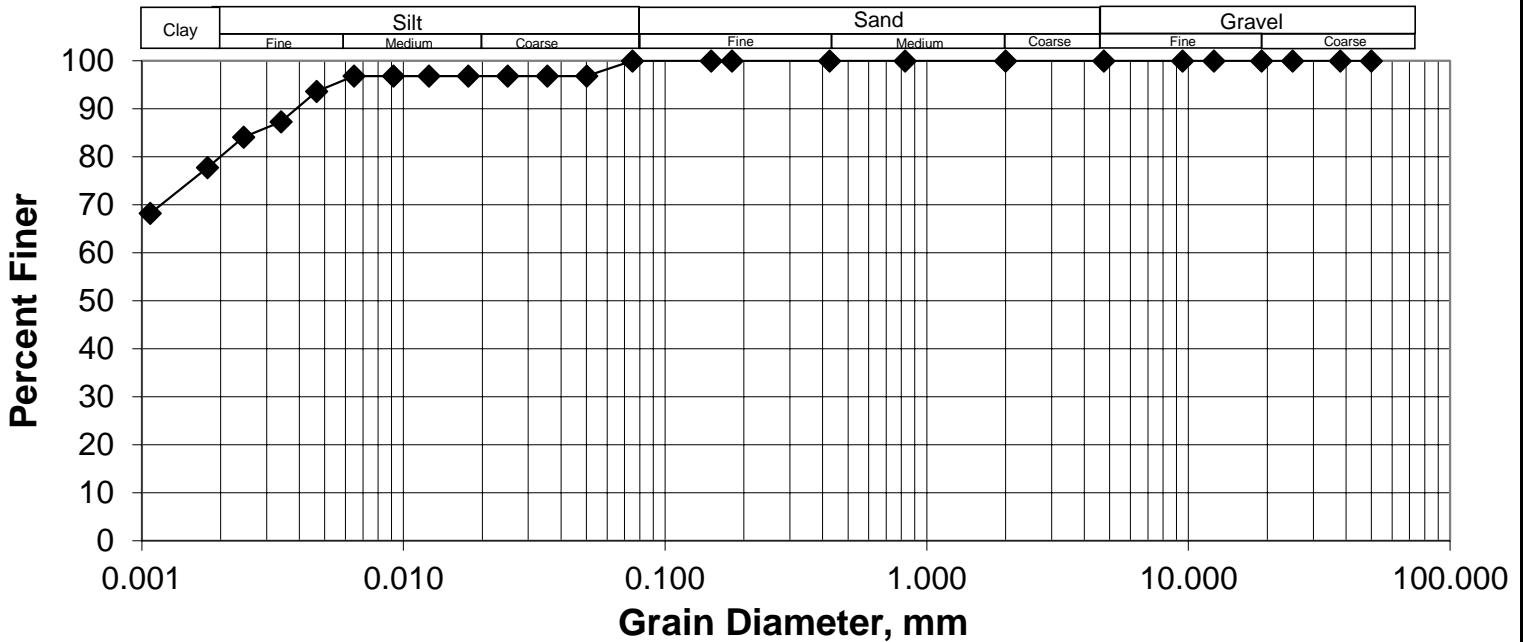


Job No.: 60680190  
Client: City of Winnipeg  
Project: Jefferson CSR Contract 8A & 9  
Date Tested: 28-Oct-22  
Tested By: EManimbao

Hole No.: TH22-17  
Sample No.: T5  
Depth: 4.57 - 5.18 m  
Date Sampled: Varies  
Sampled By: AECOM

GRAVEL SIZES		SAND SIZES		FINES	
Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing
50.0	100.0	4.75	100.0	0.0750	100.0
38.0	100.0	2.00	100.0	0.0500	96.8
25.0	100.0	0.825	100.0	0.0354	96.8
19.0	100.0	0.425	100.0	0.0250	96.8
12.5	100.0	0.18	100.0	0.0177	96.8
9.5	100.0	0.15	100.0	0.0125	96.8
4.75	100.0	0.075	100.0	0.0091	96.8
				0.0065	96.8
				0.0047	93.6
				0.0034	87.3
				0.0024	84.1
				0.0018	77.8
				0.0011	68.2

**GRAIN SIZE DISTRIBUTION CURVE**



Gravel	0.0%	Silt	20.1%
Sand	0.0%	Clay	79.9%

**GRAIN SIZE DISTRIBUTION**  
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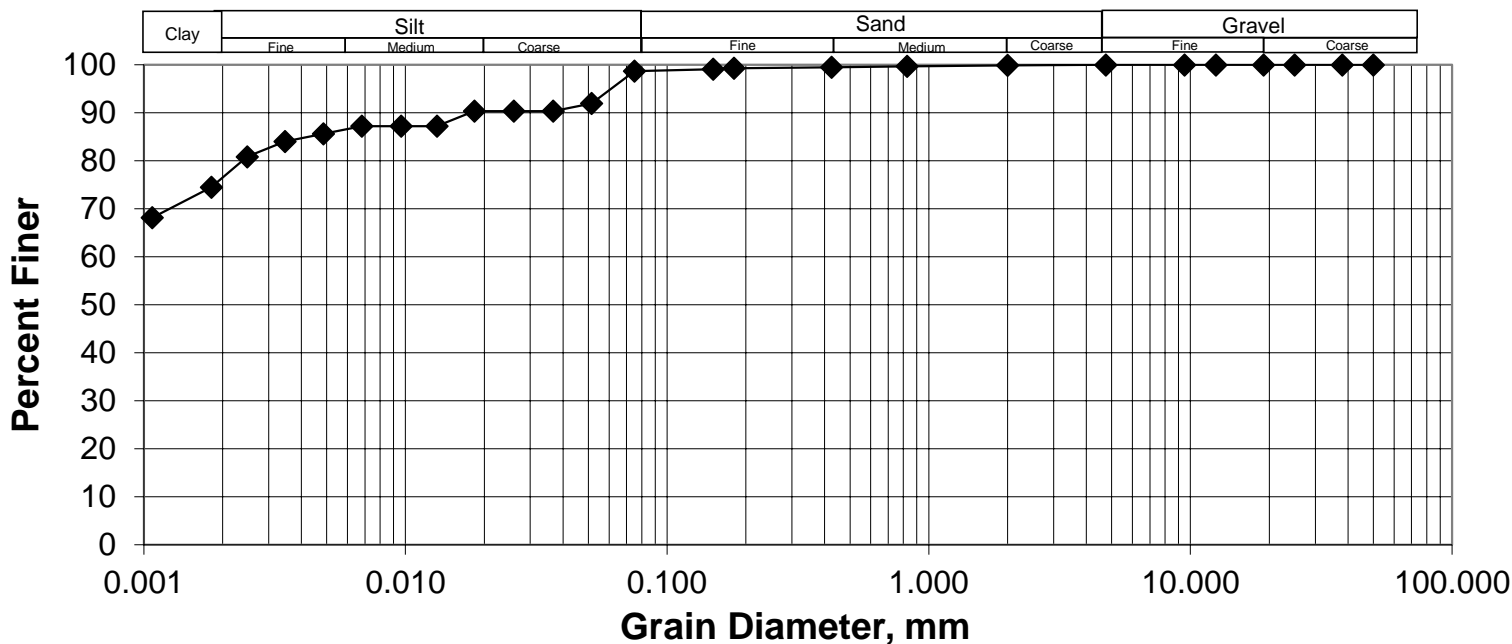


Job No.: 60680190  
Client: City of Winnipeg  
Project: Jefferson CSR Contract 8A & 9  
Date Tested: 28-Oct-22  
Tested By: EManimbao

Hole No.: TH22-18  
Sample No.: G4  
Depth: 3.05 - 3.20 m  
Date Sampled: Varies  
Sampled By: AECOM

GRAVEL SIZES		SAND SIZES		FINES	
Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing
50.0	100.0	4.75	100.0	0.0750	98.7
38.0	100.0	2.00	99.9	0.0514	92.0
25.0	100.0	0.825	99.7	0.0367	90.4
19.0	100.0	0.425	99.5	0.0259	90.4
12.5	100.0	0.18	99.3	0.0183	90.4
9.5	100.0	0.15	99.1	0.0132	87.2
4.75	100.0	0.075	98.7	0.0096	87.2
				0.0068	87.2
				0.0049	85.6
				0.0035	84.0
				0.0025	80.9
				0.0018	74.5
				0.0011	68.2

**GRAIN SIZE DISTRIBUTION CURVE**



Gravel	0.0%	Silt	22.4%
Sand	1.3%	Clay	76.3%

**GRAIN SIZE DISTRIBUTION**  
(ASTM D422-63)



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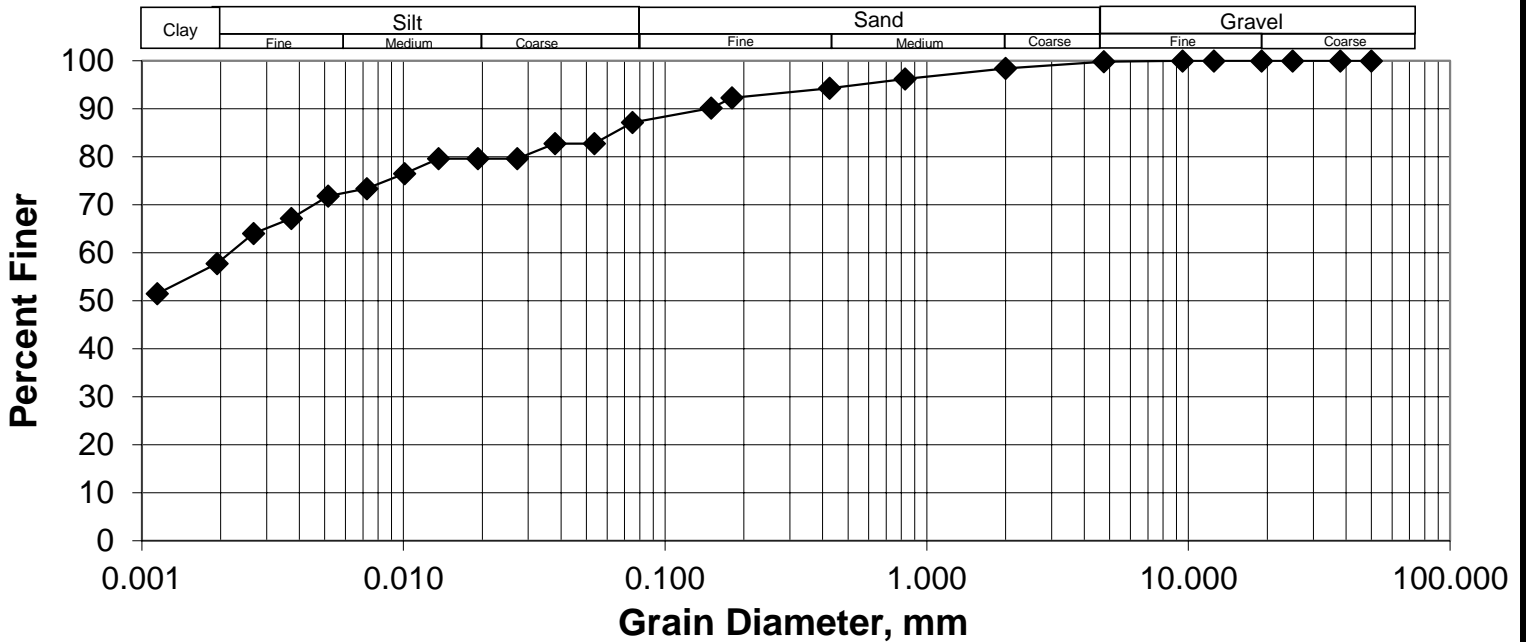


Job No.: 60680190  
Client: City of Winnipeg  
Project: Jefferson CSR Contract 8A & 9  
Date Tested: 28-Oct-22  
Tested By: EManimbao

Hole No.: TH22-18  
Sample No.: G10  
Depth: 12.19 - 12.34 m  
Date Sampled: Varies  
Sampled By: AECOM

GRAVEL SIZES		SAND SIZES		FINES	
Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing
50.0	100.0	4.75	99.8	0.0750	87.2
38.0	100.0	2.00	98.4	0.0536	82.8
25.0	100.0	0.825	96.2	0.0379	82.8
19.0	100.0	0.425	94.3	0.0272	79.6
12.5	100.0	0.18	92.3	0.0192	79.6
9.5	100.0	0.15	90.1	0.0136	79.6
4.75	99.8	0.075	87.2	0.0101	76.5
				0.0072	73.4
				0.0052	71.8
				0.0037	67.1
				0.0027	64.0
				0.0019	57.8
				0.0011	51.5

**GRAIN SIZE DISTRIBUTION CURVE**



Gravel	0.2%	Silt	28.6%
Sand	12.6%	Clay	58.6%

**GRAIN SIZE DISTRIBUTION**  
(ASTM D422-63)



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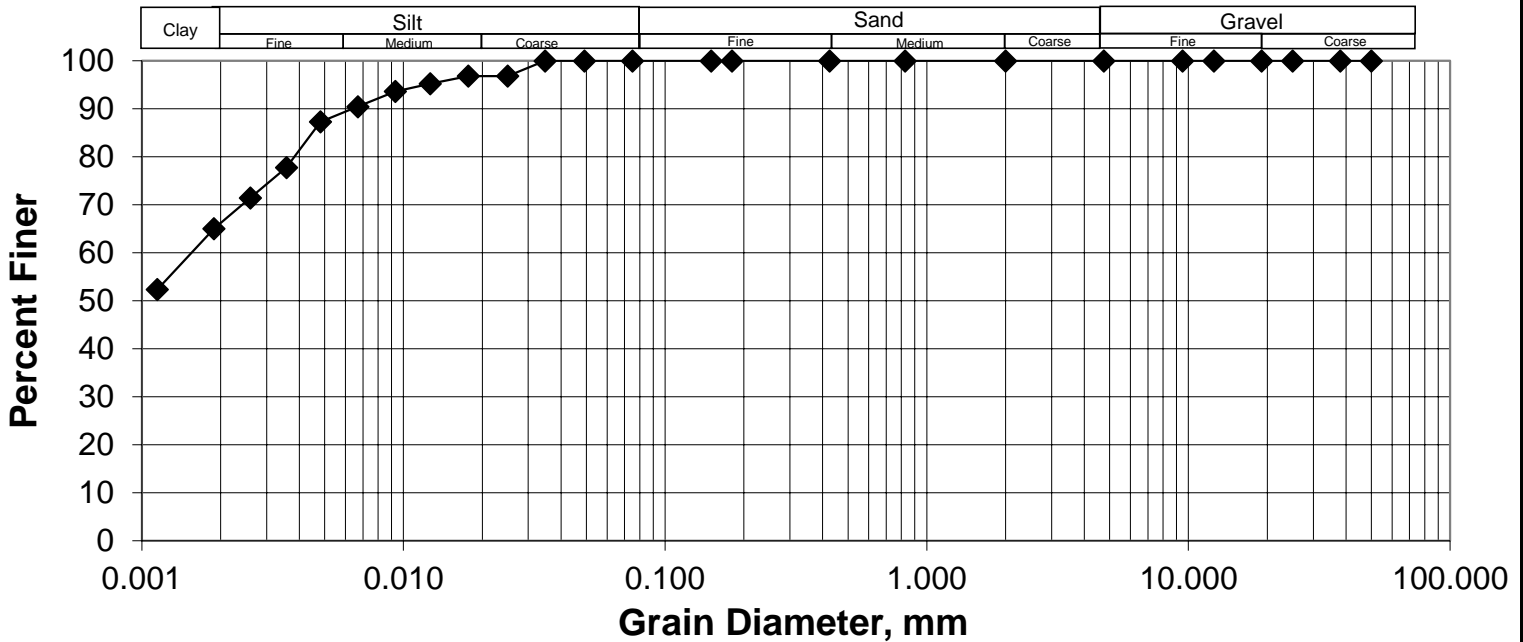


Job No.: 60680190  
Client: City of Winnipeg  
Project: Jefferson CSR Contract 8A & 9  
Date Tested: 28-Oct-22  
Tested By: EManimbao

Hole No.: TH22-19  
Sample No.: G7  
Depth: 7.62 - 7.77 m  
Date Sampled: Varies  
Sampled By: AECOM

GRAVEL SIZES		SAND SIZES		FINES	
Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing
50.0	100.0	4.75	100.0	0.0750	100.0
38.0	100.0	2.00	100.0	0.0491	100.0
25.0	100.0	0.825	100.0	0.0347	100.0
19.0	100.0	0.425	100.0	0.0250	96.8
12.5	100.0	0.18	100.0	0.0177	96.8
9.5	100.0	0.15	100.0	0.0126	95.2
4.75	100.0	0.075	100.0	0.0093	93.6
				0.0067	90.5
				0.0048	87.3
				0.0036	77.8
				0.0026	71.4
				0.0019	65.1
				0.0011	52.3

**GRAIN SIZE DISTRIBUTION CURVE**



Gravel	0.0%	Silt	34.0%
Sand	0.0%	Clay	66.0%



**GRAIN SIZE DISTRIBUTION**  
(ASTM D422-63)



WINNIPEG GEOTECHNICAL LABORATORY  
99 Commerce Dr., Winnipeg, MB R3P 0Y7 Canada  
tel (204) 477-5381 fax (431) 800-1210

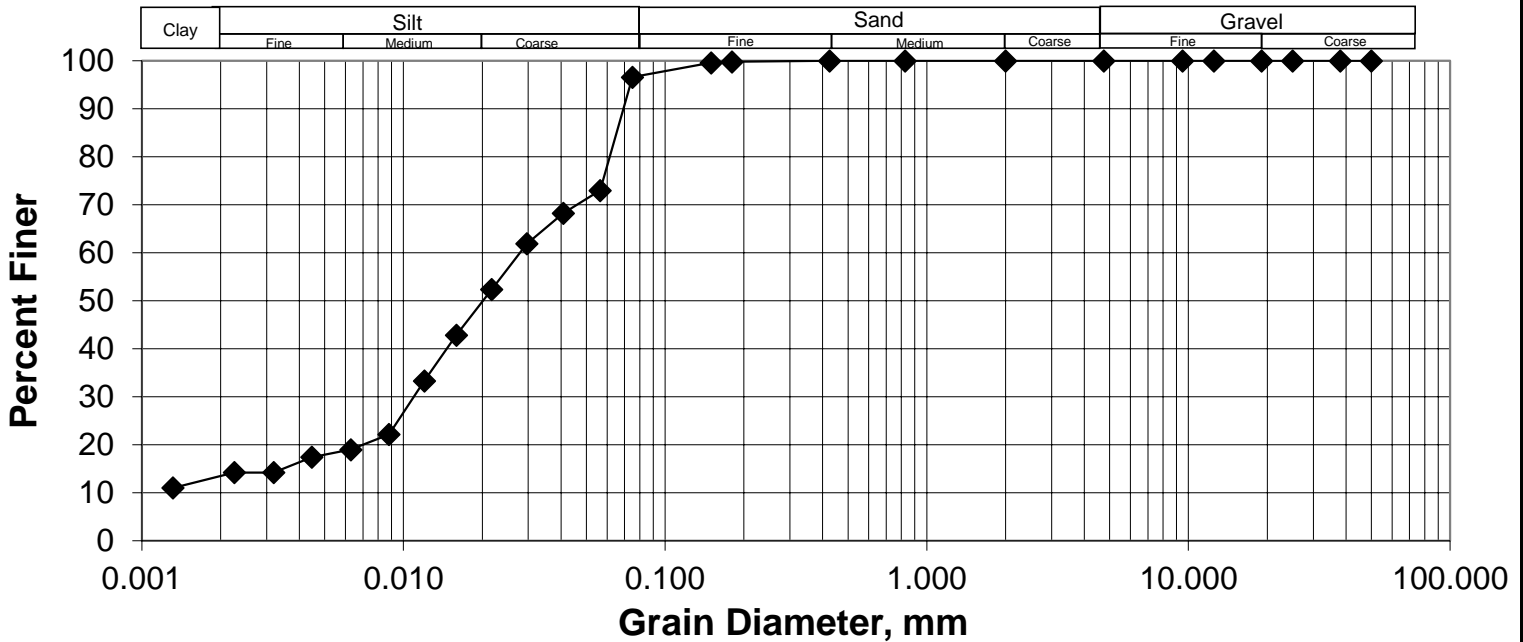


Job No.: 60680190  
Client: City of Winnipeg  
Project: Jefferson CSR Contract 8A & 9  
Date Tested: 28-Oct-22  
Tested By: EManimbao

Hole No.: TH22-20  
Sample No.: G2  
Depth: 1.52 - 1.68 m  
Date Sampled: Varies  
Sampled By: AECOM

GRAVEL SIZES		SAND SIZES		FINES	
Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing
50.0	100.0	4.75	100.0	0.0750	96.6
38.0	100.0	2.00	100.0	0.0565	73.0
25.0	100.0	0.825	100.0	0.0408	68.2
19.0	100.0	0.425	100.0	0.0296	61.9
12.5	100.0	0.18	99.8	0.0217	52.3
9.5	100.0	0.15	99.6	0.0159	42.8
4.75	100.0	0.075	96.6	0.0120	33.3
				0.0088	22.2
				0.0063	19.0
				0.0045	17.4
				0.0032	14.2
				0.0023	14.2
				0.0013	11.1

**GRAIN SIZE DISTRIBUTION CURVE**



Gravel	0.0%	Silt	83.3%
Sand	3.4%	Clay	13.3%

**GRAIN SIZE DISTRIBUTION**  
(ASTM D422-63)



WINNIPEG GEOTECHNICAL LABORATORY  
99 Commerce Dr., Winnipeg, MB R3P 0Y7 Canada  
tel (204) 477-5381 fax (431) 800-1210

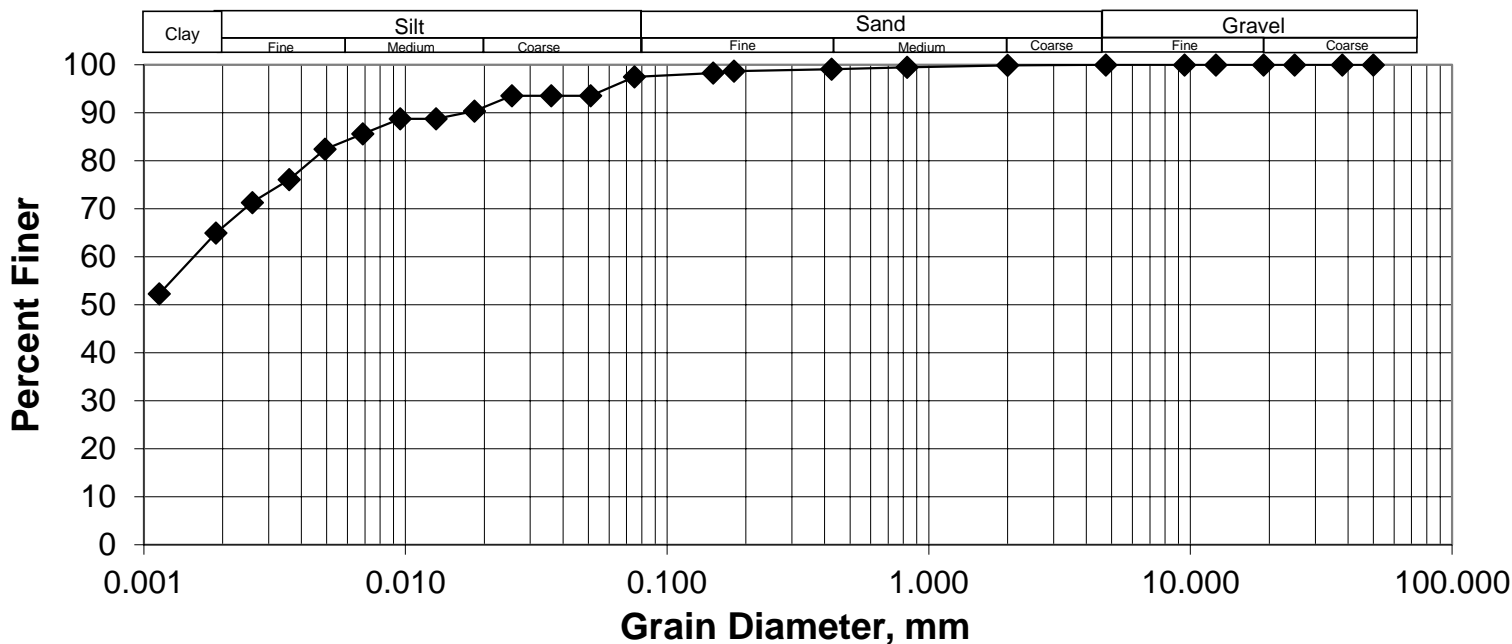


Job No.: 60680190  
Client: City of Winnipeg  
Project: Jefferson CSR Contract 8A & 9  
Date Tested: 28-Oct-22  
Tested By: EManimbao

Hole No.: TH22-20  
Sample No.: T6  
Depth: 6.10 - 6.71 m  
Date Sampled: Varies  
Sampled By: AECOM

GRAVEL SIZES		SAND SIZES		FINES	
Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing
50.0	100.0	4.75	100.0	0.0750	97.5
38.0	100.0	2.00	99.9	0.0510	93.5
25.0	100.0	0.825	99.5	0.0360	93.5
19.0	100.0	0.425	99.1	0.0255	93.5
12.5	100.0	0.18	98.7	0.0183	90.4
9.5	100.0	0.15	98.3	0.0131	88.8
4.75	100.0	0.075	97.5	0.0095	88.8
				0.0069	85.6
				0.0049	82.4
				0.0036	76.1
				0.0026	71.3
				0.0019	65.0
				0.0011	52.3

**GRAIN SIZE DISTRIBUTION CURVE**



Gravel	0.0%	Silt	31.6%
Sand	2.5%	Clay	65.9%

**AECOM - SOILS LABORATORY**  
**SHEAR STRENGTH, MOISTURE CONTENT & DENSITY CALCULATIONS**



CLIENT: City of Winnipeg  
 PROJECT: Jefferson CSR Contract 8A & 9  
 JOB NO.: 60680190

<b>TEST HOLE NO.:</b>	<b>TH22-14</b>
<b>SAMPLE NO.:</b>	<b>T5</b>
<b>SAMPLE DEPTH:</b>	4.57 - 5.18 m
<b>DATE TESTED:</b>	25-Oct-22
<b>SHEAR STRENGTH TESTS</b>	
<b>TORVANE</b>	
Reading	0.70
Vane Size (S, M, L)	M
Undrained Shear Strength (kPa)	68.7
Undrained Shear Strength (ksf)	1.43
<b>POCKET PENETROMETER</b>	
Reading - Qu (tsf)	1.00
Undrained Shear Strength (kPa)	47.9
Reading - Qu (tsf)	1.00
Undrained Shear Strength (kPa)	47.9
Reading - Qu (tsf)	1.25
Undrained Shear Strength (kPa)	59.9
<b>UNCONFINED COMPRESSIVE STRENGTH TEST</b>	
Unconfined compressive strength (kPa)	80.0
Unconfined compressive strength (ksf)	1.7
Undrained Shear Strength (kPa)	40.0
Undrained Shear Strength (ksf)	0.835
<b>MOISTURE CONTENT</b>	
Tare Number	E30
Wt. Sample wet + tare (g)	520.1
Wt. Sample dry + tare (g)	343.1
Wt. Tare (g)	9.4
Moisture Content %	53.0
<b>BULK DENSITY</b>	
Sample Wt. (g)	1053.3
Diameter 1 (cm)	7.20
Diameter 2 (cm)	7.20
Diameter 3 (cm)	7.10
<b>Avg. Diameter (cm)</b>	<b>7.17</b>
Length 1 (cm)	15.40
Length 2 (cm)	15.50
Length 3 (cm)	15.40
<b>Avg. Length (cm)</b>	<b>15.43</b>
Volume (cm <sup>3</sup> )	622.6
Moisture content (%)	53.0
Bulk Density (g/cm <sup>3</sup> )	1.692
<b>Bulk Unit Weight (kN/m<sup>3</sup>)</b>	<b>16.6</b>
<b>Bulk Unit Weight (pcf)</b>	<b>105.6</b>
<b>Dry Unit Weight (kN/m<sup>3</sup>)</b>	<b>10.84</b>

**AECOM - SOILS LABORATORY**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS (ASTM D2166)**

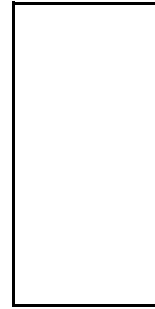


CLIENT:	City of Winnipeg
PROJECT:	Jefferson CSR Contract 8A & 9
JOB NO.:	60680190

TEST HOLE NO.:	TH22-14
SAMPLE NO.:	T5
SAMPLE DEPTH:	4.57 - 5.18 m
SAMPLE DATE:	
TEST DATE:	25-Oct-22

<b>SOIL DESCRIPTION:</b>	
CLAY - trace silt, trace sand, trace gravel, moist, firm, grey, high plasticity	
MOISTURE CONTENT:	53.0

SAMPLE DIAM.(Do):	71.67	(mm)	INITIAL AREA, A <sub>o</sub> :	4033.9	(mm <sup>2</sup> )
SAMPLE LENGTH, (L <sub>o</sub> ):	154.33	(mm)	PISTON RATE:	0.0602	(inches / minute)
L / D RATIO:	2.15	(2 < L/D < 2.5)	AXIAL STRAIN RATE, R:	0.99	(0.5 < R < 2 % / minute)



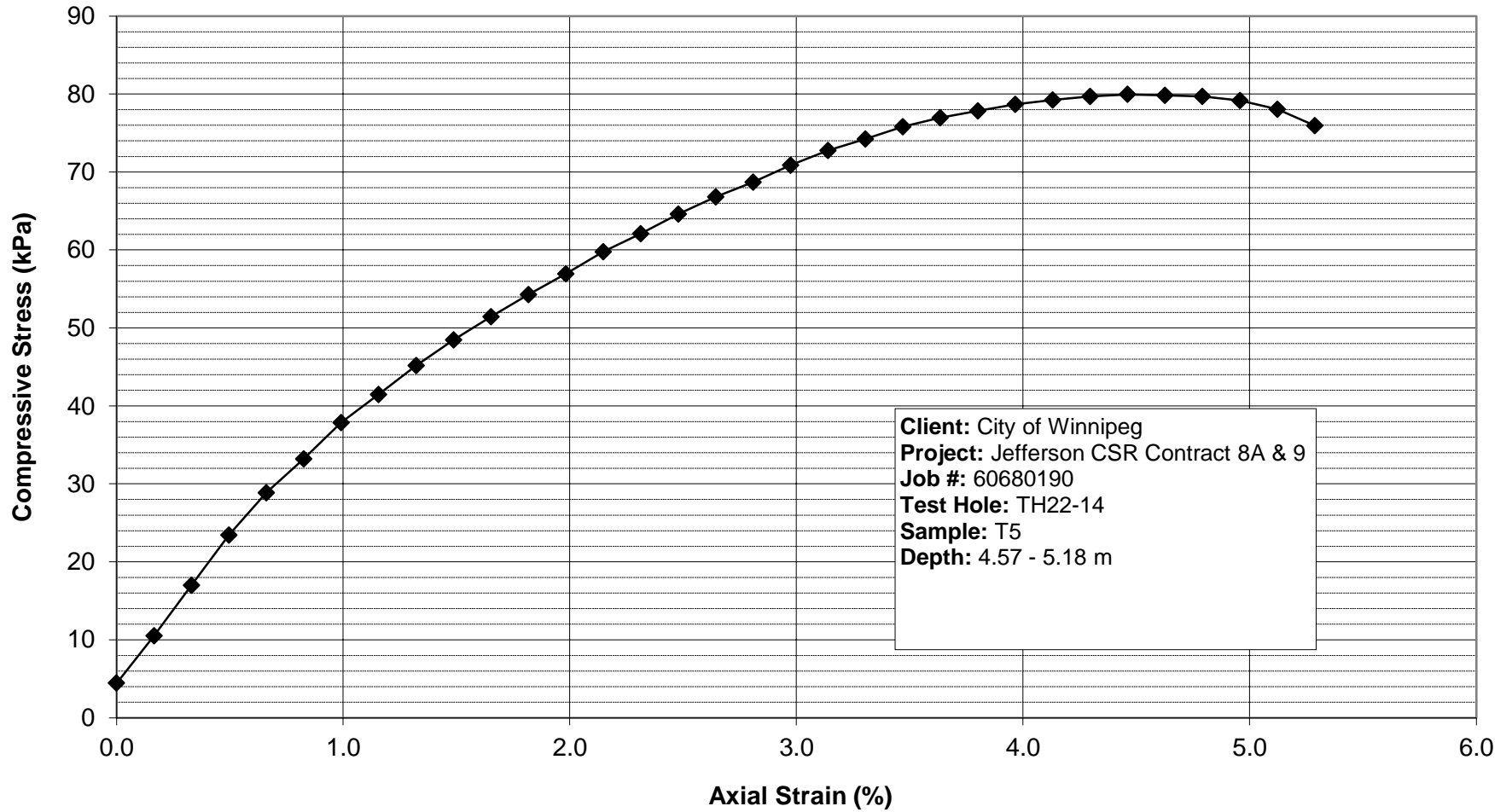
FAILURE SKETCH

TEST DATA - DIAL READINGS							
AXIAL COMPRESSION	PROVING RING	TOTAL AXIAL STRAIN, E <sub>t</sub>	AVERAGE CROSS-SECTIONAL AREA, A	APPLIED AXIAL LOAD, P	COMPRESSIVE STRESS, σ <sub>c</sub>		
					(inches)	(inches)	(%)
(inches)	(inches)	(%)	(inches <sup>2</sup> )	(lbs)	(psi)	(ksf)	(kPa)
0.01	0.0004	0.00	6.25	4.03	0.64	0.093	4.4
0.02	0.0010	0.17	6.26	9.56	1.53	0.220	10.5
0.03	0.0017	0.33	6.27	15.46	2.46	0.355	17.0
0.04	0.0023	0.50	6.28	21.36	3.40	0.490	23.4
0.05	0.0028	0.66	6.29	26.33	4.18	0.602	28.8
0.06	0.0032	0.83	6.30	30.36	4.82	0.683	33.2
0.07	0.0037	0.99	6.32	34.67	5.49	0.791	37.9
0.08	0.0041	1.16	6.33	38.04	6.01	0.866	41.5
0.09	0.0044	1.32	6.34	41.51	6.55	0.943	45.2
0.10	0.0048	1.49	6.35	44.60	7.03	1.012	48.5
0.11	0.0051	1.65	6.36	47.41	7.46	1.074	51.4
0.12	0.0054	1.82	6.37	50.13	7.87	1.134	54.3
0.13	0.0056	1.98	6.38	52.66	8.26	1.189	56.9
0.14	0.0059	2.15	6.39	55.38	8.67	1.248	59.8
0.15	0.0062	2.31	6.40	57.63	9.00	1.296	62.1
0.16	0.0064	2.48	6.41	60.06	9.37	1.349	64.6
0.17	0.0066	2.64	6.42	62.22	9.69	1.395	66.8
0.18	0.0068	2.81	6.43	64.09	9.96	1.435	68.7
0.19	0.0071	2.97	6.44	66.25	10.28	1.480	70.9
0.20	0.0073	3.14	6.46	68.12	10.55	1.520	72.8
0.21	0.0074	3.30	6.47	69.62	10.77	1.550	74.2
0.22	0.0076	3.47	6.48	71.21	10.99	1.583	75.8
0.23	0.0077	3.63	6.49	72.43	11.16	1.607	77.0
0.24	0.0078	3.80	6.50	73.37	11.29	1.625	77.8
0.25	0.0079	3.97	6.51	74.30	11.41	1.643	78.7
0.26	0.0080	4.13	6.52	74.96	11.49	1.655	79.2
0.27	0.0081	4.30	6.53	75.52	11.56	1.665	79.7
0.28	0.0081	4.46	6.54	75.90	11.60	1.670	80.0
0.29	0.0081	4.63	6.56	75.90	11.58	1.667	79.8
0.30	0.0081	4.79	6.57	75.90	11.56	1.664	79.7
0.31	0.0081	4.96	6.58	75.52	11.48	1.653	79.2
0.32	0.0080	5.12	6.59	74.59	11.32	1.630	78.0
0.33	0.0078	5.29	6.60	72.71	11.01	1.586	75.9

UNCONFINED COMPRESSIVE STRENGTH, q <sub>u</sub> :	79.96	kPa
(based on maximum q <sub>u</sub> value)	1.670	ksf
UNDRAINED SHEAR STRENGTH, S <sub>u</sub> :	39.98	kPa
(based on maximum q <sub>u</sub> value)	0.835	ksf

**NOTES:**

**AECOM**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS**  
**(ASTM D2166)**







**AECOM - SOILS LABORATORY**  
**SHEAR STRENGTH, MOISTURE CONTENT & DENSITY CALCULATIONS**



CLIENT: City of Winnipeg  
 PROJECT: Jefferson CSR Contract 8A & 9  
 JOB NO.: 60680190

TEST HOLE NO.:	TH22-14
SAMPLE NO.:	T9
SAMPLE DEPTH:	10.67 - 11.28 m
DATE TESTED:	25-Oct-22
<b>SHEAR STRENGTH TESTS</b>	
<b>TORVANE</b>	
Reading	0.45
Vane Size (S, M, L)	M
Undrained Shear Strength (kPa)	44.1
Undrained Shear Strength (ksf)	0.92
<b>POCKET PENETROMETER</b>	
Reading - Qu (tsf)	0.50
Undrained Shear Strength (kPa)	23.9
Reading - Qu (tsf)	0.50
Undrained Shear Strength (kPa)	23.9
Reading - Qu (tsf)	0.75
Undrained Shear Strength (kPa)	35.9
<b>UNCONFINED COMPRESSIVE STRENGTH TEST</b>	
Unconfined compressive strength (kPa)	77.5
Unconfined compressive strength (ksf)	1.6
Undrained Shear Strength (kPa)	38.8
Undrained Shear Strength (ksf)	0.810
<b>MOISTURE CONTENT</b>	
Tare Number	M27
Wt. Sample wet + tare (g)	443.9
Wt. Sample dry + tare (g)	286.5
Wt. Tare (g)	8.9
Moisture Content %	56.7
<b>BULK DENSITY</b>	
Sample Wt. (g)	1050.8
Diameter 1 (cm)	7.20
Diameter 2 (cm)	7.20
Diameter 3 (cm)	7.10
<b>Avg. Diameter (cm)</b>	<b>7.17</b>
Length 1 (cm)	15.50
Length 2 (cm)	15.50
Length 3 (cm)	15.40
<b>Avg. Length (cm)</b>	<b>15.47</b>
Volume (cm <sup>3</sup> )	623.9
Moisture content (%)	56.7
Bulk Density (g/cm <sup>3</sup> )	1.684
<b>Bulk Unit Weight (kN/m<sup>3</sup>)</b>	<b>16.5</b>
<b>Bulk Unit Weight (pcf)</b>	<b>105.1</b>
<b>Dry Unit Weight (kN/m<sup>3</sup>)</b>	<b>10.54</b>



**AECOM - SOILS LABORATORY**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS (ASTM D2166)**

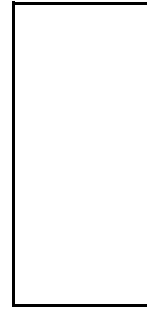


CLIENT:	City of Winnipeg
PROJECT:	Jefferson CSR Contract 8A & 9
JOB NO.:	60680190

TEST HOLE NO.:	TH22-14
SAMPLE NO.:	T9
SAMPLE DEPTH:	10.67 - 11.28 m
SAMPLE DATE:	
TEST DATE:	25-Oct-22

<b>SOIL DESCRIPTION:</b>	
CLAY - trace silt, trace sand, trace gravel, moist, firm, grey, high plasticity	
<b>MOISTURE CONTENT:</b> 56.7	

SAMPLE DIAM.(Do):	71.67	(mm)	INITIAL AREA, A <sub>o</sub> :	4033.9	(mm <sup>2</sup> )
SAMPLE LENGTH, (L <sub>o</sub> ):	154.67	(mm)	PISTON RATE:	0.0602	(inches / minute)
L / D RATIO:	2.16	(2 < L/D < 2.5)	AXIAL STRAIN RATE, R:	0.99	(0.5<R<2 % / minute)



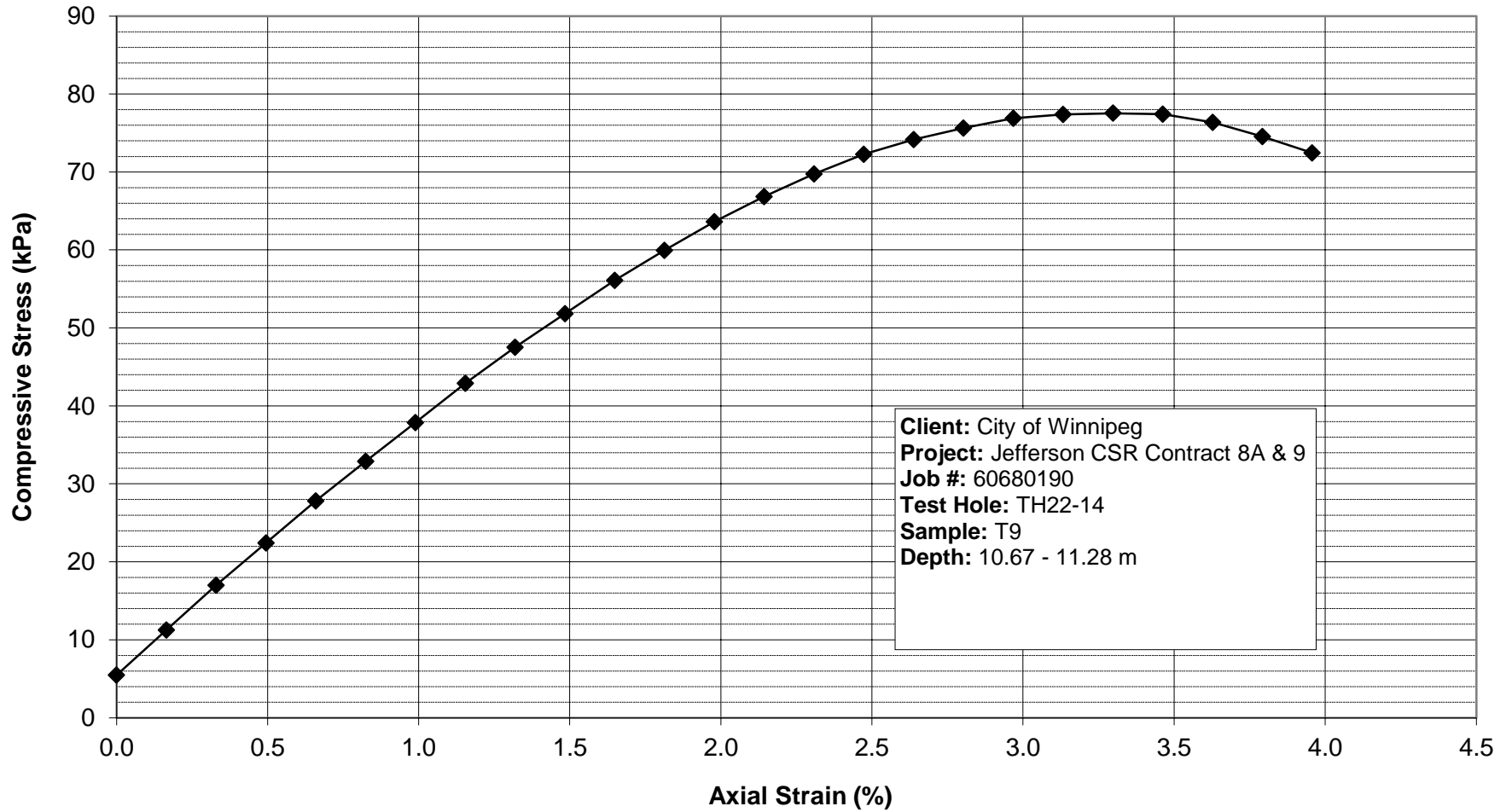
FAILURE SKETCH

TEST DATA - DIAL READINGS							
AXIAL COMPRESSION	PROVING RING	TOTAL AXIAL STRAIN, E <sub>t</sub>	AVERAGE CROSS-SECTIONAL AREA, A	APPLIED AXIAL LOAD, P	COMPRESSIVE STRESS, σ <sub>c</sub>		
					(inches)	(inches)	(inches <sup>2</sup> )
0.01	0.0005	0.00	6.25	4.97	0.79	0.114	5.5
0.02	0.0011	0.16	6.26	10.21	1.63	0.235	11.2
0.03	0.0017	0.33	6.27	15.46	2.46	0.355	17.0
0.04	0.0022	0.49	6.28	20.43	3.25	0.468	22.4
0.05	0.0027	0.66	6.29	25.39	4.03	0.581	27.8
0.06	0.0032	0.82	6.30	30.08	4.77	0.687	32.9
0.07	0.0037	0.99	6.32	34.67	5.49	0.791	37.9
0.08	0.0042	1.15	6.33	39.35	6.22	0.896	42.9
0.09	0.0047	1.32	6.34	43.66	6.89	0.992	47.5
0.10	0.0051	1.48	6.35	47.69	7.51	1.082	51.8
0.11	0.0055	1.65	6.36	51.72	8.14	1.172	56.1
0.12	0.0059	1.81	6.37	55.38	8.70	1.252	60.0
0.13	0.0063	1.98	6.38	58.84	9.22	1.328	63.6
0.14	0.0066	2.14	6.39	61.94	9.69	1.396	66.8
0.15	0.0069	2.31	6.40	64.75	10.12	1.457	69.7
0.16	0.0072	2.47	6.41	67.18	10.48	1.509	72.3
0.17	0.0074	2.64	6.42	69.06	10.75	1.548	74.1
0.18	0.0075	2.80	6.43	70.56	10.97	1.579	75.6
0.19	0.0077	2.97	6.44	71.87	11.15	1.606	76.9
0.20	0.0077	3.13	6.45	72.43	11.22	1.616	77.4
0.21	0.0078	3.30	6.47	72.71	11.25	1.619	77.5
0.22	0.0078	3.46	6.48	72.71	11.23	1.617	77.4
0.23	0.0077	3.63	6.49	71.87	11.08	1.595	76.4
0.24	0.0075	3.79	6.50	70.28	10.81	1.557	74.6
0.25	0.0073	3.96	6.51	68.40	10.51	1.513	72.4

UNCONFINED COMPRESSIVE STRENGTH, q <sub>u</sub> :	77.54	kPa
(based on maximum q <sub>u</sub> value)	1.619	ksf
UNDRAINED SHEAR STRENGTH, S <sub>u</sub> :	38.77	kPa
(based on maximum q <sub>u</sub> value)	0.810	ksf

**NOTES:**

AECOM  
UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS  
(ASTM D2166)







**AECOM - SOILS LABORATORY**  
**SHEAR STRENGTH, MOISTURE CONTENT & DENSITY CALCULATIONS**



CLIENT: City of Winnipeg  
 PROJECT: Jefferson CSR Contract 8A & 9  
 JOB NO.: 60680190

<b>TEST HOLE NO.:</b>	<b>TH22-15</b>
<b>SAMPLE NO.:</b>	<b>T4</b>
<b>SAMPLE DEPTH:</b>	3.05 - 3.66 m
<b>DATE TESTED:</b>	25-Oct-22
<b>SHEAR STRENGTH TESTS</b>	
<b>TORVANE</b>	
Reading	0.50
Vane Size (S, M, L)	M
Undrained Shear Strength (kPa)	49.0
Undrained Shear Strength (ksf)	1.02
<b>POCKET PENETROMETER</b>	
Reading - Qu (tsf)	0.75
Undrained Shear Strength (kPa)	35.9
Reading - Qu (tsf)	0.75
Undrained Shear Strength (kPa)	35.9
Reading - Qu (tsf)	0.75
Undrained Shear Strength (kPa)	35.9
<b>UNCONFINED COMPRESSIVE STRENGTH TEST</b>	
Unconfined compressive strength (kPa)	42.1
Unconfined compressive strength (ksf)	0.9
Undrained Shear Strength (kPa)	21.0
Undrained Shear Strength (ksf)	0.439
<b>MOISTURE CONTENT</b>	
Tare Number	J10
Wt. Sample wet + tare (g)	587.5
Wt. Sample dry + tare (g)	381.9
Wt. Tare (g)	8.5
Moisture Content %	55.1
<b>BULK DENSITY</b>	
Sample Wt. (g)	1048.3
Diameter 1 (cm)	7.20
Diameter 2 (cm)	7.10
Diameter 3 (cm)	7.20
<b>Avg. Diameter (cm)</b>	<b>7.17</b>
Length 1 (cm)	15.40
Length 2 (cm)	15.50
Length 3 (cm)	15.50
<b>Avg. Length (cm)</b>	<b>15.47</b>
Volume (cm <sup>3</sup> )	623.9
Moisture content (%)	55.1
Bulk Density (g/cm <sup>3</sup> )	1.680
<b>Bulk Unit Weight (kN/m<sup>3</sup>)</b>	<b>16.5</b>
<b>Bulk Unit Weight (pcf)</b>	<b>104.9</b>
<b>Dry Unit Weight (kN/m<sup>3</sup>)</b>	<b>10.63</b>

**AECOM - SOILS LABORATORY**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS (ASTM D2166)**

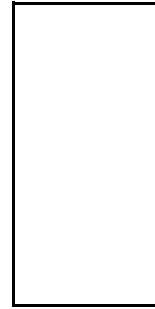


CLIENT:	City of Winnipeg
PROJECT:	Jefferson CSR Contract 8A & 9
JOB NO.:	60680190

TEST HOLE NO.:	TH22-15
SAMPLE NO.:	T4
SAMPLE DEPTH:	3.05 - 3.66 m
SAMPLE DATE:	
TEST DATE:	25-Oct-22

<b>SOIL DESCRIPTION:</b>	
CLAY - trace silt, trace sand, trace gravel, moist, firm, grey, high plasticity	
MOISTURE CONTENT:	55.1

SAMPLE DIAM.(Do):	71.67	(mm)	INITIAL AREA, A <sub>o</sub> :	4033.9	(mm <sup>2</sup> )
SAMPLE LENGTH, (L <sub>o</sub> ):	154.67	(mm)	PISTON RATE:	0.0602	(inches / minute)
L / D RATIO:	2.16	(2 < L/D < 2.5)	AXIAL STRAIN RATE, R:	0.99	(0.5<R<2 % / minute)



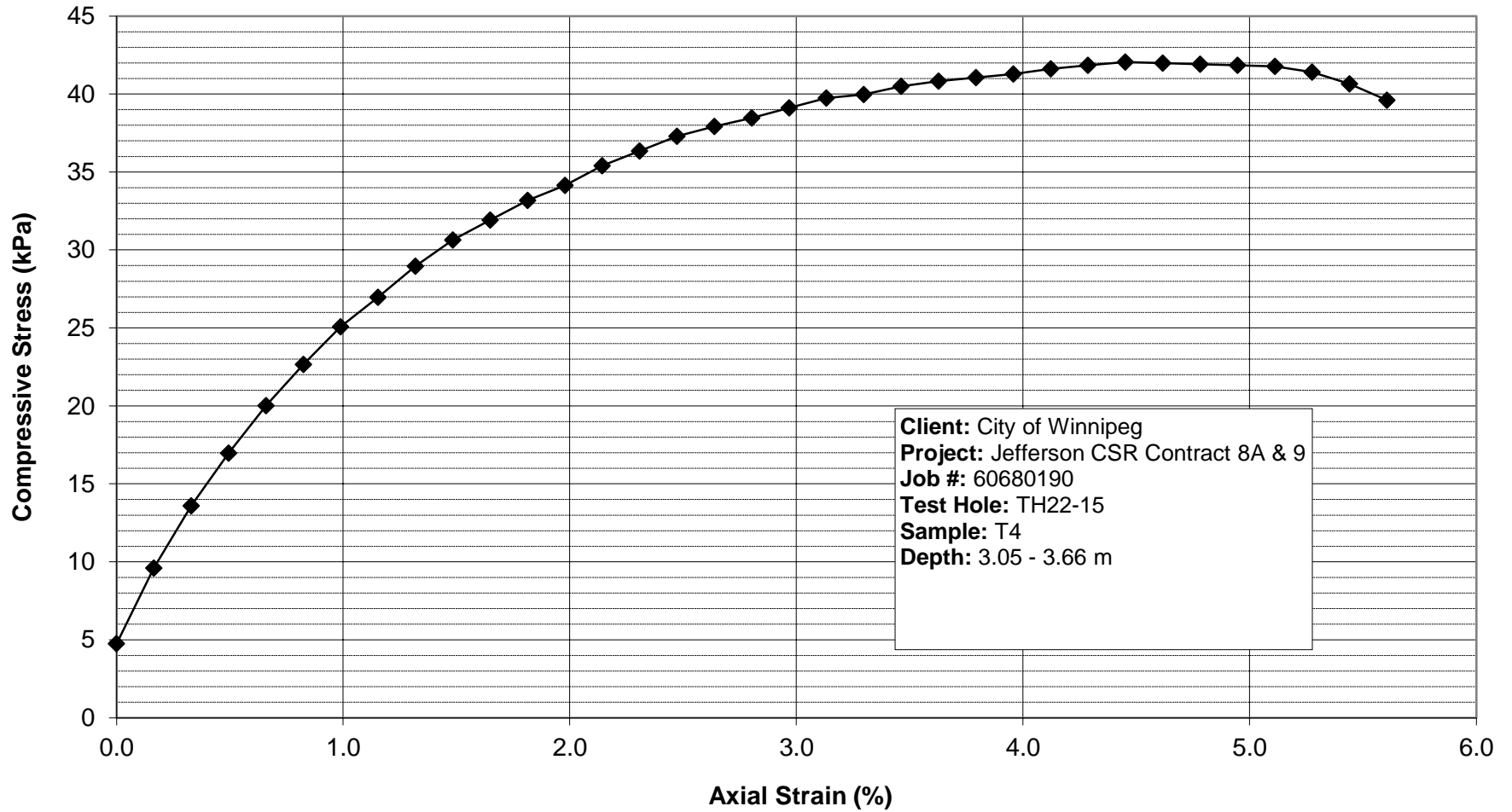
FAILURE SKETCH

TEST DATA - DIAL READINGS							
AXIAL COMPRESSION	PROVING RING	TOTAL AXIAL STRAIN, E <sub>t</sub>	AVERAGE CROSS-SECTIONAL AREA, A	APPLIED AXIAL LOAD, P	COMPRESSIVE STRESS, σ <sub>c</sub>		
(inches)	(inches)	(%)	(inches <sup>2</sup> )	(lbs)	(psi)	(ksf)	(kPa)
0.01	0.0005	0.00	6.25	4.31	0.69	0.099	4.8
0.02	0.0009	0.16	6.26	8.71	1.39	0.200	9.6
0.03	0.0013	0.33	6.27	12.37	1.97	0.284	13.6
0.04	0.0017	0.49	6.28	15.46	2.46	0.354	17.0
0.05	0.0020	0.66	6.29	18.27	2.90	0.418	20.0
0.06	0.0022	0.82	6.30	20.71	3.28	0.473	22.6
0.07	0.0025	0.99	6.32	22.96	3.64	0.523	25.1
0.08	0.0026	1.15	6.33	24.74	3.91	0.563	27.0
0.09	0.0028	1.32	6.34	26.61	4.20	0.605	29.0
0.10	0.0030	1.48	6.35	28.20	4.44	0.640	30.6
0.11	0.0031	1.65	6.36	29.42	4.63	0.666	31.9
0.12	0.0033	1.81	6.37	30.64	4.81	0.693	33.2
0.13	0.0034	1.98	6.38	31.58	4.95	0.713	34.1
0.14	0.0035	2.14	6.39	32.80	5.13	0.739	35.4
0.15	0.0036	2.31	6.40	33.73	5.27	0.758	36.3
0.16	0.0037	2.47	6.41	34.67	5.41	0.779	37.3
0.17	0.0038	2.64	6.42	35.32	5.50	0.792	37.9
0.18	0.0038	2.80	6.43	35.89	5.58	0.803	38.5
0.19	0.0039	2.97	6.44	36.54	5.67	0.817	39.1
0.20	0.0040	3.13	6.45	37.20	5.76	0.830	39.7
0.21	0.0040	3.30	6.47	37.48	5.80	0.835	40.0
0.22	0.0041	3.46	6.48	38.04	5.87	0.846	40.5
0.23	0.0041	3.63	6.49	38.42	5.92	0.853	40.8
0.24	0.0041	3.79	6.50	38.70	5.95	0.857	41.1
0.25	0.0042	3.96	6.51	38.98	5.98	0.862	41.3
0.26	0.0042	4.12	6.52	39.35	6.03	0.869	41.6
0.27	0.0042	4.29	6.53	39.64	6.07	0.874	41.8
0.28	0.0043	4.45	6.54	39.92	6.10	0.878	42.1
0.29	0.0043	4.62	6.56	39.92	6.09	0.877	42.0
0.30	0.0043	4.78	6.57	39.92	6.08	0.875	41.9
0.31	0.0043	4.95	6.58	39.92	6.07	0.874	41.8
0.32	0.0043	5.11	6.59	39.92	6.06	0.872	41.8
0.33	0.0042	5.28	6.60	39.64	6.00	0.865	41.4
0.34	0.0042	5.44	6.61	38.98	5.89	0.849	40.6
0.35	0.0041	5.61	6.62	38.04	5.74	0.827	39.6

UNCONFINED COMPRESSIVE STRENGTH, q <sub>u</sub> :	42.06	kPa
(based on maximum q <sub>u</sub> value)	0.878	ksf
UNDRAINED SHEAR STRENGTH, S <sub>u</sub> :	21.03	kPa
(based on maximum q <sub>u</sub> value)	0.439	ksf

**NOTES:**

**AECOM**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS**  
**(ASTM D2166)**









**AECOM - SOILS LABORATORY**  
**SHEAR STRENGTH, MOISTURE CONTENT & DENSITY CALCULATIONS**



CLIENT: City of Winnipeg  
 PROJECT: Jefferson CSR Contract 8A & 9  
 JOB NO.: 60680190

TEST HOLE NO.:	TH22-15
SAMPLE NO.:	T8
SAMPLE DEPTH:	9.14 - 9.75 m
DATE TESTED:	25-Oct-22
<b>SHEAR STRENGTH TESTS</b>	
<b>TORVANE</b>	
Reading	0.50
Vane Size (S, M, L)	M
Undrained Shear Strength (kPa)	49.0
Undrained Shear Strength (ksf)	1.02
<b>POCKET PENETROMETER</b>	
Reading - Qu (tsf)	0.50
Undrained Shear Strength (kPa)	23.9
Reading - Qu (tsf)	0.50
Undrained Shear Strength (kPa)	23.9
Reading - Qu (tsf)	0.75
Undrained Shear Strength (kPa)	35.9
<b>UNCONFINED COMPRESSIVE STRENGTH TEST</b>	
Unconfined compressive strength (kPa)	43.9
Unconfined compressive strength (ksf)	0.9
Undrained Shear Strength (kPa)	22.0
Undrained Shear Strength (ksf)	0.459
<b>MOISTURE CONTENT</b>	
Tare Number	M12
Wt. Sample wet + tare (g)	573.1
Wt. Sample dry + tare (g)	388.8
Wt. Tare (g)	8.6
Moisture Content %	48.5
<b>BULK DENSITY</b>	
Sample Wt. (g)	1051.7
Diameter 1 (cm)	7.20
Diameter 2 (cm)	7.20
Diameter 3 (cm)	7.20
<b>Avg. Diameter (cm)</b>	<b>7.20</b>
Length 1 (cm)	15.40
Length 2 (cm)	15.50
Length 3 (cm)	15.50
<b>Avg. Length (cm)</b>	<b>15.47</b>
Volume (cm <sup>3</sup> )	629.7
Moisture content (%)	48.5
Bulk Density (g/cm <sup>3</sup> )	1.670
<b>Bulk Unit Weight (kN/m<sup>3</sup>)</b>	<b>16.4</b>
<b>Bulk Unit Weight (pcf)</b>	<b>104.3</b>
<b>Dry Unit Weight (kN/m<sup>3</sup>)</b>	<b>11.03</b>

**AECOM - SOILS LABORATORY**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS (ASTM D2166)**

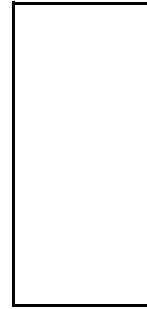


CLIENT:	City of Winnipeg
PROJECT:	Jefferson CSR Contract 8A & 9
JOB NO.:	60680190

TEST HOLE NO.:	TH22-15
SAMPLE NO.:	T8
SAMPLE DEPTH:	9.14 - 9.75 m
SAMPLE DATE:	
TEST DATE:	25-Oct-22

<b>SOIL DESCRIPTION:</b>	
CLAY - trace silt, trace sand, trace gravel, moist, firm, grey, high plasticity	
MOISTURE CONTENT:	48.5

SAMPLE DIAM.(Do):	72.00	(mm)	INITIAL AREA, A <sub>0</sub> :	4071.5	(mm <sup>2</sup> )
SAMPLE LENGTH, (L <sub>0</sub> ):	154.67	(mm)	PISTON RATE:	0.0602	(inches / minute)
L / D RATIO:	2.15	(2 < L/D < 2.5)	AXIAL STRAIN RATE, R:	0.99	(0.5 < R < 2 % / minute)



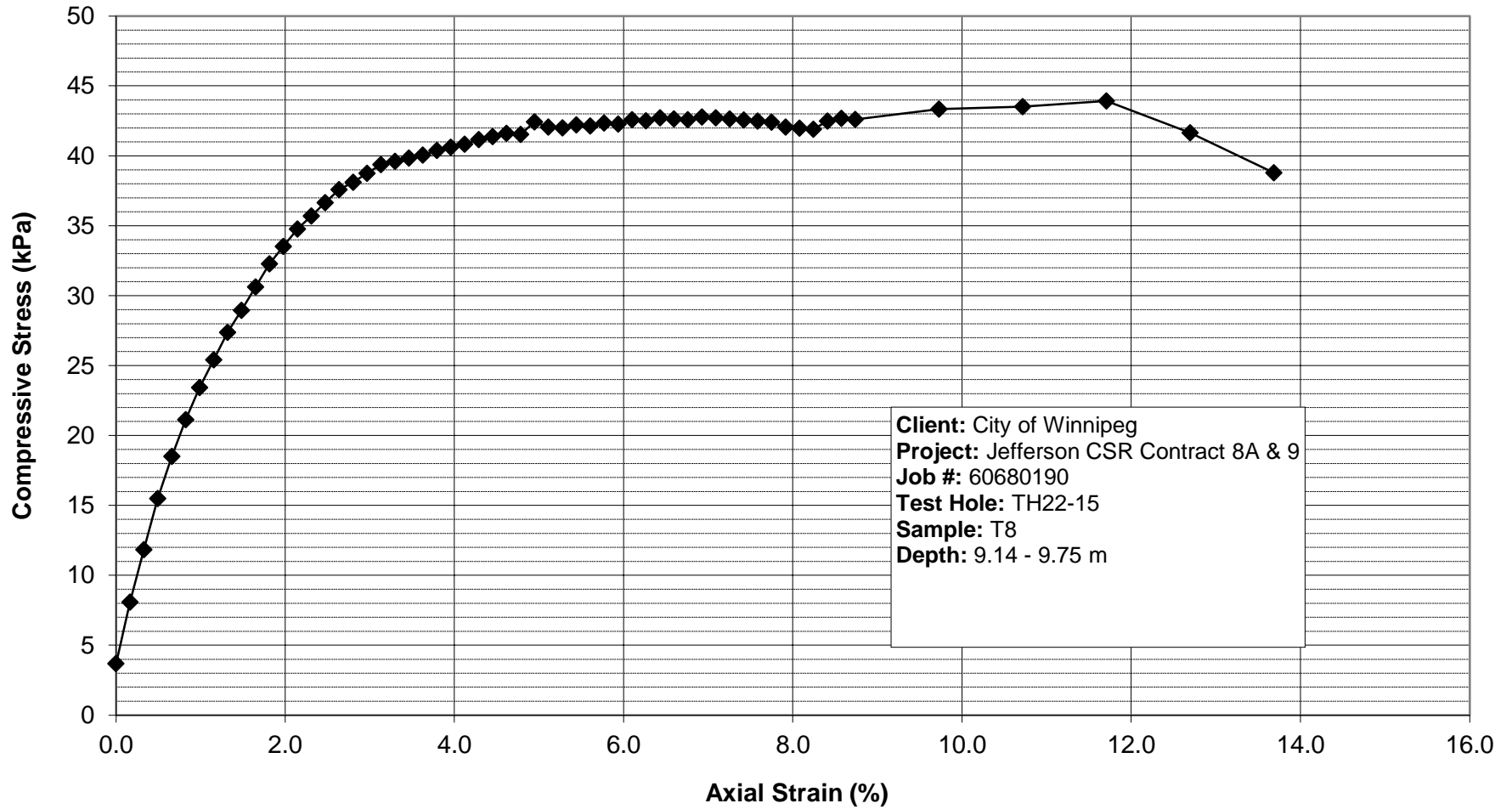
FAILURE SKETCH

TEST DATA - DIAL READINGS							
AXIAL COMPRESSION	PROVING RING	TOTAL AXIAL STRAIN, E <sub>t</sub>	AVERAGE CROSS-SECTIONAL AREA, A	APPLIED AXIAL LOAD, P	COMPRESSIVE STRESS, σ <sub>c</sub>		
(inches)	(inches)	(%)	(inches <sup>2</sup> )	(lbs)	(psi)	(ksf)	(kPa)
0.01	0.0004	0.00	6.31	3.37	0.53	0.077	3.7
0.02	0.0008	0.16	6.32	7.40	1.17	0.169	8.1
0.03	0.0012	0.33	6.33	10.87	1.72	0.247	11.8
0.04	0.0015	0.49	6.34	14.24	2.25	0.323	15.5
0.05	0.0018	0.66	6.35	17.05	2.68	0.387	18.5
0.06	0.0021	0.82	6.36	19.49	3.06	0.441	21.1
0.07	0.0023	0.99	6.37	21.64	3.40	0.489	23.4
0.08	0.0025	1.15	6.38	23.52	3.68	0.530	25.4
0.09	0.0027	1.32	6.40	25.39	3.97	0.572	27.4
0.10	0.0029	1.48	6.41	26.89	4.20	0.605	28.9
0.11	0.0030	1.65	6.42	28.48	4.44	0.639	30.6
0.12	0.0032	1.81	6.43	30.08	4.68	0.674	32.3
0.13	0.0033	1.98	6.44	31.30	4.86	0.700	33.5
0.14	0.0035	2.14	6.45	32.51	5.04	0.726	34.8
0.15	0.0036	2.31	6.46	33.45	5.18	0.746	35.7
0.16	0.0037	2.47	6.47	34.39	5.31	0.765	36.6
0.17	0.0038	2.64	6.48	35.32	5.45	0.785	37.6
0.18	0.0038	2.80	6.49	35.89	5.53	0.796	38.1
0.19	0.0039	2.97	6.50	36.54	5.62	0.809	38.7
0.20	0.0040	3.13	6.51	37.20	5.71	0.822	39.4
0.21	0.0040	3.30	6.53	37.48	5.74	0.827	39.6
0.22	0.0040	3.46	6.54	37.76	5.78	0.832	39.8
0.23	0.0041	3.63	6.55	38.04	5.81	0.837	40.1
0.24	0.0041	3.79	6.56	38.42	5.86	0.843	40.4
0.25	0.0041	3.96	6.57	38.70	5.89	0.848	40.6
0.26	0.0042	4.12	6.58	38.98	5.92	0.853	40.8
0.27	0.0042	4.29	6.59	39.35	5.97	0.859	41.2
0.28	0.0042	4.45	6.60	39.64	6.00	0.864	41.4
0.29	0.0043	4.62	6.62	39.92	6.03	0.869	41.6
0.30	0.0043	4.78	6.63	39.92	6.02	0.867	41.5
0.31	0.0044	4.95	6.64	40.85	6.15	0.886	42.4
0.32	0.0043	5.11	6.65	40.57	6.10	0.878	42.1
0.33	0.0043	5.28	6.66	40.57	6.09	0.877	42.0
0.34	0.0044	5.44	6.67	40.85	6.12	0.881	42.2
0.35	0.0044	5.61	6.69	40.85	6.11	0.880	42.1
0.36	0.0044	5.77	6.70	41.13	6.14	0.884	42.3
0.37	0.0044	5.94	6.71	41.13	6.13	0.883	42.3
0.38	0.0044	6.10	6.72	41.51	6.18	0.889	42.6
0.39	0.0044	6.27	6.73	41.51	6.17	0.888	42.5
0.40	0.0045	6.43	6.74	41.79	6.20	0.892	42.7
0.41	0.0045	6.59	6.76	41.79	6.19	0.891	42.6
0.42	0.0045	6.76	6.77	41.79	6.17	0.889	42.6
0.43	0.0045	6.92	6.78	42.07	6.20	0.894	42.8
0.44	0.0045	7.09	6.79	42.07	6.19	0.892	42.7
0.45	0.0045	7.25	6.80	42.07	6.18	0.890	42.6
0.46	0.0045	7.42	6.82	42.07	6.17	0.889	42.6
0.47	0.0045	7.58	6.83	42.07	6.16	0.887	42.5
0.48	0.0045	7.75	6.84	42.07	6.15	0.886	42.4
0.49	0.0045	7.91	6.85	41.79	6.10	0.878	42.0
0.50	0.0045	8.08	6.87	41.79	6.09	0.877	42.0
0.51	0.0045	8.24	6.88	41.79	6.08	0.875	41.9
0.52	0.0045	8.41	6.89	42.45	6.16	0.887	42.5
0.53	0.0046	8.57	6.90	42.73	6.19	0.891	42.7
0.54	0.0046	8.74	6.92	42.73	6.18	0.890	42.6
0.60	0.0047	9.73	6.99	43.95	6.29	0.905	43.3
0.66	0.0048	10.72	7.07	44.60	6.31	0.909	43.5
0.72	0.0049	11.71	7.15	45.54	6.37	0.917	43.9
0.78	0.0047	12.70	7.23	43.66	6.04	0.870	41.6
0.84	0.0044	13.68	7.31	41.13	5.63	0.810	38.8

UNCONFINED COMPRESSIVE STRENGTH, q <sub>u</sub> :	43.93	kPa
(based on maximum q <sub>u</sub> value)	0.917	ksf
UNDRAINED SHEAR STRENGTH, S <sub>u</sub> :	21.96	kPa
(based on maximum q <sub>u</sub> value)	0.459	ksf

**NOTES:**

AECOM  
UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS  
(ASTM D2166)







**AECOM - SOILS LABORATORY**  
**SHEAR STRENGTH, MOISTURE CONTENT & DENSITY CALCULATIONS**



CLIENT: City of Winnipeg  
 PROJECT: Jefferson CSR Contract 8A & 9  
 JOB NO.: 60680190

<b>TEST HOLE NO.:</b>	<b>TH22-16</b>
<b>SAMPLE NO.:</b>	<b>T6</b>
<b>SAMPLE DEPTH:</b>	6.10 - 6.71 m
<b>DATE TESTED:</b>	25-Oct-22
<b>SHEAR STRENGTH TESTS</b>	
<b>TORVANE</b>	
Reading	0.70
Vane Size (S, M, L)	M
Undrained Shear Strength (kPa)	68.7
Undrained Shear Strength (ksf)	1.43
<b>POCKET PENETROMETER</b>	
Reading - Qu (tsf)	1.00
Undrained Shear Strength (kPa)	47.9
Reading - Qu (tsf)	1.50
Undrained Shear Strength (kPa)	71.8
Reading - Qu (tsf)	1.00
Undrained Shear Strength (kPa)	47.9
<b>UNCONFINED COMPRESSIVE STRENGTH TEST</b>	
Unconfined compressive strength (kPa)	94.4
Unconfined compressive strength (ksf)	2.0
Undrained Shear Strength (kPa)	47.2
Undrained Shear Strength (ksf)	0.986
<b>MOISTURE CONTENT</b>	
Tare Number	X6
Wt. Sample wet + tare (g)	515.0
Wt. Sample dry + tare (g)	347.1
Wt. Tare (g)	8.5
Moisture Content %	49.6
<b>BULK DENSITY</b>	
Sample Wt. (g)	1098.5
Diameter 1 (cm)	7.20
Diameter 2 (cm)	7.20
Diameter 3 (cm)	7.20
<b>Avg. Diameter (cm)</b>	<b>7.20</b>
Length 1 (cm)	15.50
Length 2 (cm)	15.50
Length 3 (cm)	15.40
<b>Avg. Length (cm)</b>	<b>15.47</b>
Volume (cm <sup>3</sup> )	629.7
Moisture content (%)	49.6
Bulk Density (g/cm <sup>3</sup> )	1.744
<b>Bulk Unit Weight (kN/m<sup>3</sup>)</b>	<b>17.1</b>
<b>Bulk Unit Weight (pcf)</b>	<b>108.9</b>
<b>Dry Unit Weight (kN/m<sup>3</sup>)</b>	<b>11.44</b>

**AECOM - SOILS LABORATORY**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS (ASTM D2166)**

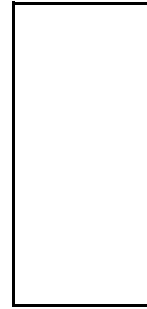


CLIENT:	City of Winnipeg
PROJECT:	Jefferson CSR Contract 8A & 9
JOB NO.:	60680190

TEST HOLE NO.:	TH22-16
SAMPLE NO.:	T6
SAMPLE DEPTH:	6.10 - 6.71 m
SAMPLE DATE:	
TEST DATE:	25-Oct-22

<b>SOIL DESCRIPTION:</b>	
CLAY - trace silt, trace sand, trace gravel, moist, firm, grey, high plasticity	
MOISTURE CONTENT:	49.6

SAMPLE DIAM.(Do):	72.00	(mm)	INITIAL AREA, A <sub>o</sub> :	4071.5	(mm <sup>2</sup> )
SAMPLE LENGTH, (L <sub>o</sub> ):	154.67	(mm)	PISTON RATE:	0.0602	(inches / minute)
L / D RATIO:	2.15	(2 < L/D < 2.5)	AXIAL STRAIN RATE, R:	0.99	(0.5<R<2 % / minute)



FAILURE SKETCH

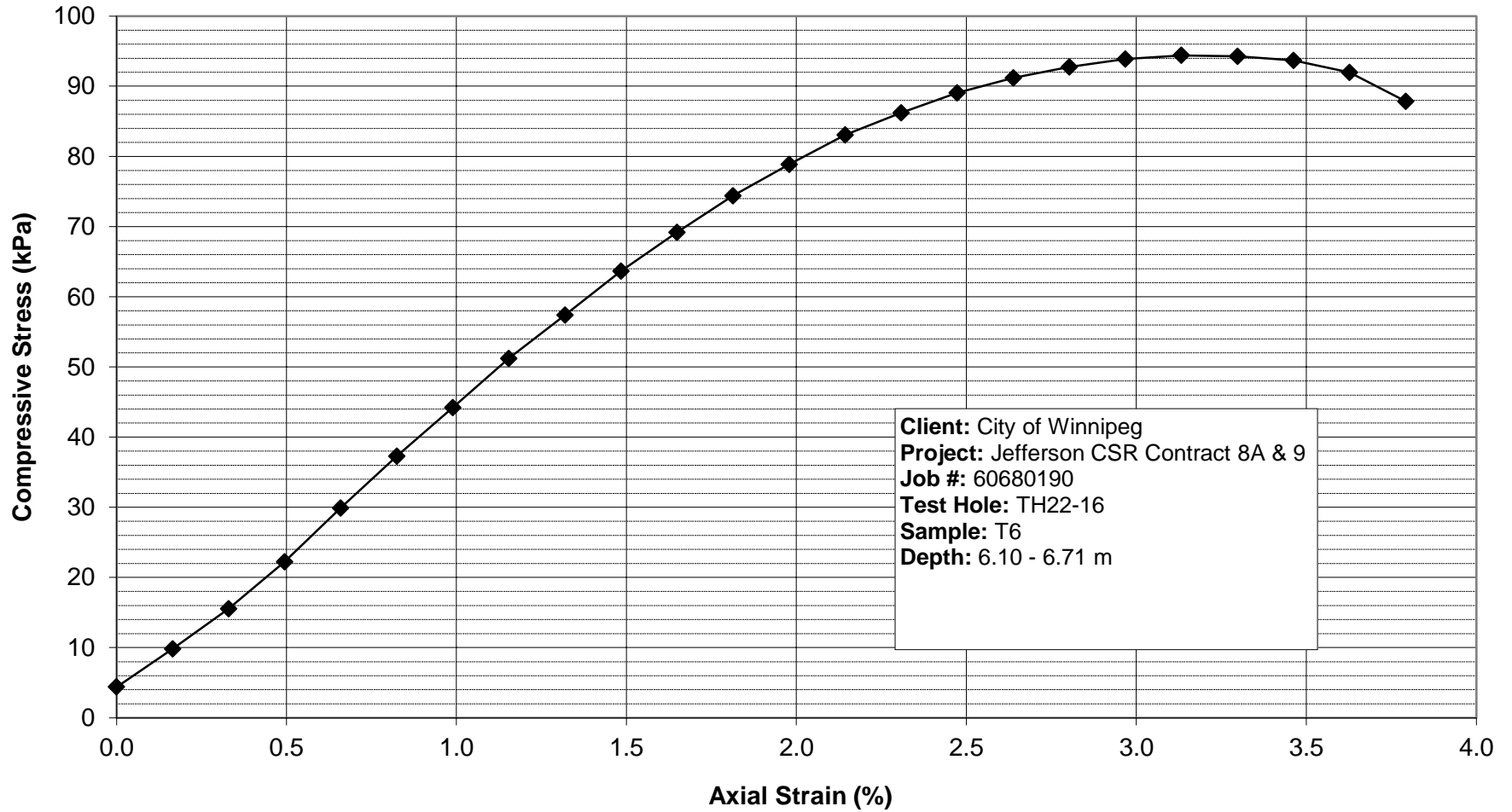
TEST DATA - DIAL READINGS							
AXIAL COMPRESSION	PROVING RING	TOTAL AXIAL STRAIN, E <sub>t</sub>	AVERAGE CROSS-SECTIONAL AREA, A	APPLIED AXIAL LOAD, P	COMPRESSIVE STRESS, σ <sub>c</sub>		
					(inches)	(inches)	(inches <sup>2</sup> )
0.01	0.0004	0.00	6.31	4.03	0.64	0.092	4.4
0.02	0.0010	0.16	6.32	9.00	1.42	0.205	9.8
0.03	0.0015	0.33	6.33	14.24	2.25	0.324	15.5
0.04	0.0022	0.49	6.34	20.43	3.22	0.464	22.2
0.05	0.0029	0.66	6.35	27.55	4.34	0.624	29.9
0.06	0.0037	0.82	6.36	34.39	5.40	0.778	37.3
0.07	0.0044	0.99	6.37	40.85	6.41	0.923	44.2
0.08	0.0051	1.15	6.38	47.41	7.43	1.069	51.2
0.09	0.0057	1.32	6.40	53.22	8.32	1.198	57.4
0.10	0.0063	1.48	6.41	59.12	9.23	1.329	63.6
0.11	0.0069	1.65	6.42	64.37	10.03	1.445	69.2
0.12	0.0074	1.81	6.43	69.34	10.79	1.553	74.4
0.13	0.0079	1.98	6.44	73.65	11.44	1.647	78.9
0.14	0.0083	2.14	6.45	77.68	12.04	1.734	83.0
0.15	0.0086	2.31	6.46	80.77	12.50	1.800	86.2
0.16	0.0089	2.47	6.47	83.58	12.92	1.860	89.1
0.17	0.0092	2.64	6.48	85.74	13.23	1.905	91.2
0.18	0.0093	2.80	6.49	87.33	13.45	1.937	92.7
0.19	0.0095	2.97	6.50	88.55	13.61	1.960	93.9
0.20	0.0095	3.13	6.51	89.20	13.69	1.972	94.4
0.21	0.0095	3.30	6.53	89.20	13.67	1.968	94.2
0.22	0.0095	3.46	6.54	88.83	13.59	1.957	93.7
0.23	0.0093	3.63	6.55	87.33	13.34	1.920	91.9
0.24	0.0089	3.79	6.56	83.58	12.74	1.835	87.9

UNCONFINED COMPRESSIVE STRENGTH, q <sub>u</sub> :	94.40	kPa
(based on maximum q <sub>u</sub> value)	1.972	ksf
UNDRAINED SHEAR STRENGTH, S <sub>u</sub> :	47.20	kPa
(based on maximum q <sub>u</sub> value)	0.986	ksf

**NOTES:**



**AECOM**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS**  
**(ASTM D2166)**







**AECOM - SOILS LABORATORY**  
**SHEAR STRENGTH, MOISTURE CONTENT & DENSITY CALCULATIONS**



CLIENT: City of Winnipeg  
 PROJECT: Jefferson CSR Contract 8A & 9  
 JOB NO.: 60680190

<b>TEST HOLE NO.:</b>	<b>TH22-16</b>
<b>SAMPLE NO.:</b>	<b>T10</b>
<b>SAMPLE DEPTH:</b>	12.19 - 12.80 m
<b>DATE TESTED:</b>	25-Oct-22
<b>SHEAR STRENGTH TESTS</b>	
<b>TORVANE</b>	
Reading	0.40
Vane Size (S, M, L)	M
Undrained Shear Strength (kPa)	39.2
Undrained Shear Strength (ksf)	0.82
<b>POCKET PENETROMETER</b>	
Reading - Qu (tsf)	0.25
Undrained Shear Strength (kPa)	12.0
Reading - Qu (tsf)	0.25
Undrained Shear Strength (kPa)	12.0
Reading - Qu (tsf)	0.25
Undrained Shear Strength (kPa)	12.0
<b>UNCONFINED COMPRESSIVE STRENGTH TEST</b>	
Unconfined compressive strength (kPa)	50.5
Unconfined compressive strength (ksf)	1.1
Undrained Shear Strength (kPa)	25.3
Undrained Shear Strength (ksf)	0.528
<b>MOISTURE CONTENT</b>	
Tare Number	A8
Wt. Sample wet + tare (g)	417.2
Wt. Sample dry + tare (g)	251.6
Wt. Tare (g)	8.4
Moisture Content %	68.1
<b>BULK DENSITY</b>	
Sample Wt. (g)	1023.1
Diameter 1 (cm)	7.20
Diameter 2 (cm)	7.20
Diameter 3 (cm)	7.20
<b>Avg. Diameter (cm)</b>	<b>7.20</b>
Length 1 (cm)	15.50
Length 2 (cm)	15.50
Length 3 (cm)	15.40
<b>Avg. Length (cm)</b>	<b>15.47</b>
Volume (cm <sup>3</sup> )	629.7
Moisture content (%)	68.1
Bulk Density (g/cm <sup>3</sup> )	1.625
<b>Bulk Unit Weight (kN/m<sup>3</sup>)</b>	<b>15.9</b>
<b>Bulk Unit Weight (pcf)</b>	<b>101.4</b>
<b>Dry Unit Weight (kN/m<sup>3</sup>)</b>	<b>9.48</b>

**AECOM - SOILS LABORATORY**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS (ASTM D2166)**

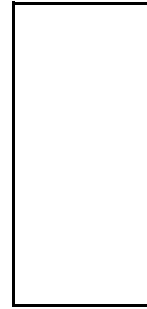


CLIENT:	City of Winnipeg
PROJECT:	Jefferson CSR Contract 8A & 9
JOB NO.:	60680190

TEST HOLE NO.:	TH22-16
SAMPLE NO.:	T10
SAMPLE DEPTH:	12.19 - 12.80 m
SAMPLE DATE:	
TEST DATE:	25-Oct-22

<b>SOIL DESCRIPTION:</b>	
CLAY - trace silt, trace sand, trace gravel, moist, firm, grey, high plasticity	
MOISTURE CONTENT:	68.1

SAMPLE DIAM.(Do):	72.00	(mm)	INITIAL AREA, A <sub>o</sub> :	4071.5	(mm <sup>2</sup> )
SAMPLE LENGTH, (L <sub>o</sub> ):	154.67	(mm)	PISTON RATE:	0.0602	(inches / minute)
L / D RATIO:	2.15	(2 < L/D < 2.5)	AXIAL STRAIN RATE, R:	0.99	(0.5<R<2% / minute)



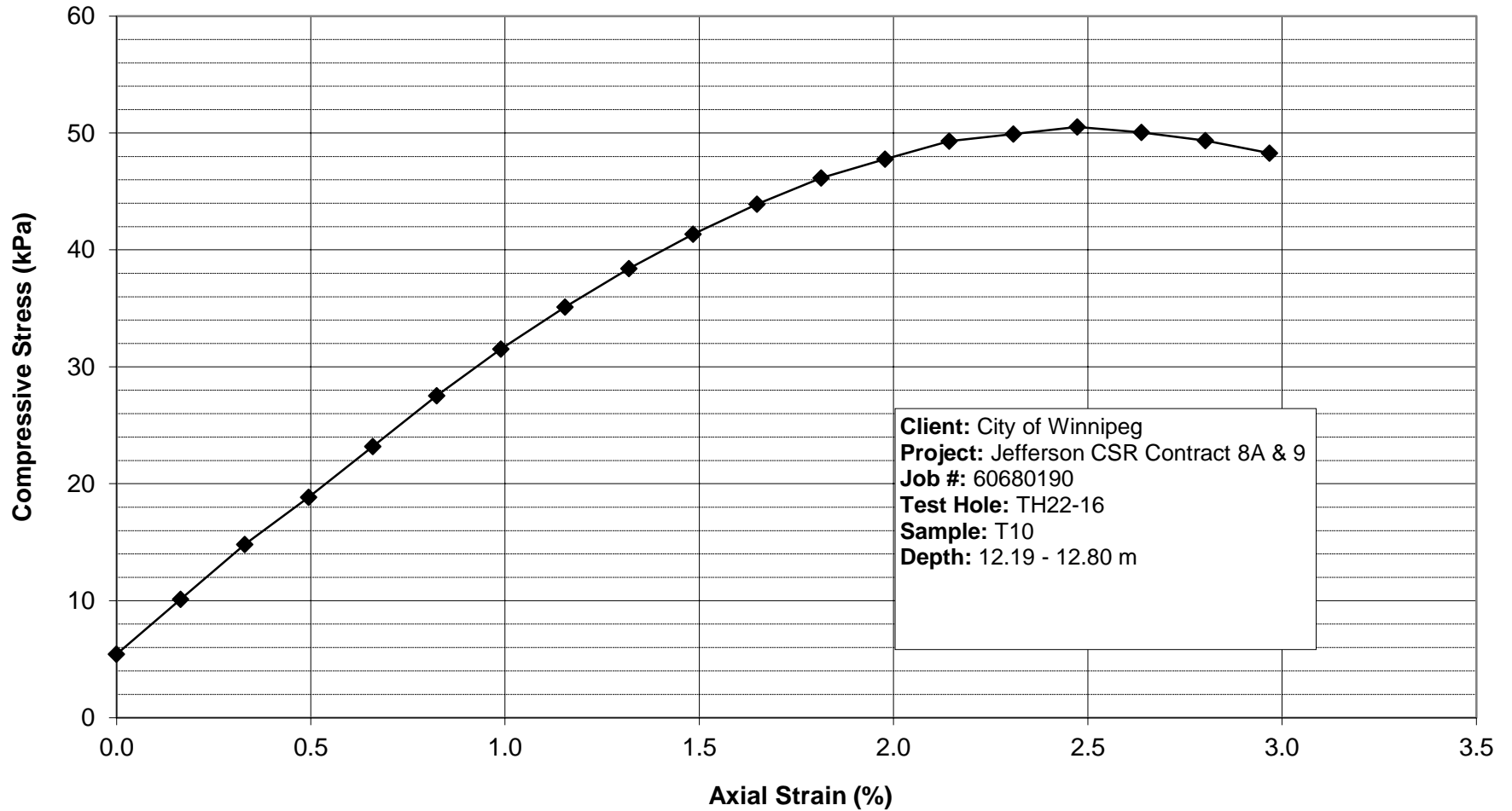
FAILURE SKETCH

TEST DATA - DIAL READINGS							
AXIAL COMPRESSION	PROVING RING	TOTAL AXIAL STRAIN, E <sub>t</sub>	AVERAGE CROSS-SECTIONAL AREA, A	APPLIED AXIAL LOAD, P	COMPRESSIVE STRESS, σ <sub>c</sub>		
					(inches)	(inches)	(%)
0.01	0.0005	0.00	6.31	4.97	0.79	0.113	5.4
0.02	0.0010	0.16	6.32	9.28	1.47	0.211	10.1
0.03	0.0015	0.33	6.33	13.59	2.15	0.309	14.8
0.04	0.0019	0.49	6.34	17.33	2.73	0.394	18.8
0.05	0.0023	0.66	6.35	21.36	3.36	0.484	23.2
0.06	0.0027	0.82	6.36	25.39	3.98	0.575	27.5
0.07	0.0031	0.99	6.37	29.14	4.57	0.658	31.5
0.08	0.0035	1.15	6.38	32.51	5.09	0.733	35.1
0.09	0.0038	1.32	6.40	35.61	5.57	0.802	38.4
0.10	0.0041	1.48	6.41	38.42	6.00	0.864	41.3
0.11	0.0044	1.65	6.42	40.85	6.37	0.917	43.9
0.12	0.0046	1.81	6.43	43.01	6.69	0.964	46.1
0.13	0.0048	1.98	6.44	44.60	6.93	0.998	47.8
0.14	0.0049	2.14	6.45	46.10	7.15	1.029	49.3
0.15	0.0050	2.31	6.46	46.76	7.24	1.042	49.9
0.16	0.0051	2.47	6.47	47.41	7.33	1.055	50.5
0.17	0.0050	2.64	6.48	47.04	7.26	1.045	50.0
0.18	0.0050	2.80	6.49	46.48	7.16	1.031	49.4
0.19	0.0049	2.97	6.50	45.54	7.00	1.008	48.3

UNCONFINED COMPRESSIVE STRENGTH, q <sub>u</sub> :	50.52	kPa
(based on maximum q <sub>u</sub> value)	1.055	ksf
UNDRAINED SHEAR STRENGTH, S <sub>u</sub> :	25.26	kPa
(based on maximum q <sub>u</sub> value)	0.528	ksf

**NOTES:**

**AECOM**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS**  
**(ASTM D2166)**









**AECOM - SOILS LABORATORY**  
**SHEAR STRENGTH, MOISTURE CONTENT & DENSITY CALCULATIONS**



CLIENT: City of Winnipeg  
 PROJECT: Jefferson CSR Contract 8A & 9  
 JOB NO.: 60680190

<b>TEST HOLE NO.:</b>	<b>TH22-17</b>
<b>SAMPLE NO.:</b>	<b>T5</b>
<b>SAMPLE DEPTH:</b>	4.57 - 5.18 m
<b>DATE TESTED:</b>	25-Oct-22
<b>SHEAR STRENGTH TESTS</b>	
<b>TORVANE</b>	
Reading	0.50
Vane Size (S, M, L)	M
Undrained Shear Strength (kPa)	49.0
Undrained Shear Strength (ksf)	1.02
<b>POCKET PENETROMETER</b>	
Reading - Qu (tsf)	0.75
Undrained Shear Strength (kPa)	35.9
Reading - Qu (tsf)	0.75
Undrained Shear Strength (kPa)	35.9
Reading - Qu (tsf)	1.00
Undrained Shear Strength (kPa)	47.9
<b>UNCONFINED COMPRESSIVE STRENGTH TEST</b>	
Unconfined compressive strength (kPa)	70.6
Unconfined compressive strength (ksf)	1.5
Undrained Shear Strength (kPa)	35.3
Undrained Shear Strength (ksf)	0.737
<b>MOISTURE CONTENT</b>	
Tare Number	F2S
Wt. Sample wet + tare (g)	497.9
Wt. Sample dry + tare (g)	328.1
Wt. Tare (g)	8.4
Moisture Content %	53.1
<b>BULK DENSITY</b>	
Sample Wt. (g)	1043.7
Diameter 1 (cm)	7.20
Diameter 2 (cm)	7.20
Diameter 3 (cm)	7.10
<b>Avg. Diameter (cm)</b>	<b>7.17</b>
Length 1 (cm)	15.50
Length 2 (cm)	15.50
Length 3 (cm)	15.40
<b>Avg. Length (cm)</b>	<b>15.47</b>
Volume (cm <sup>3</sup> )	623.9
Moisture content (%)	53.1
Bulk Density (g/cm <sup>3</sup> )	1.673
<b>Bulk Unit Weight (kN/m<sup>3</sup>)</b>	<b>16.4</b>
<b>Bulk Unit Weight (pcf)</b>	<b>104.4</b>
<b>Dry Unit Weight (kN/m<sup>3</sup>)</b>	<b>10.71</b>

**AECOM - SOILS LABORATORY**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS (ASTM D2166)**

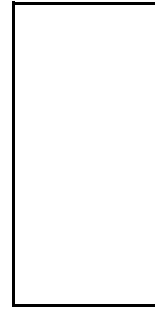


CLIENT:	City of Winnipeg
PROJECT:	Jefferson CSR Contract 8A & 9
JOB NO.:	60680190

TEST HOLE NO.:	TH22-17
SAMPLE NO.:	T5
SAMPLE DEPTH:	4.57 - 5.18 m
SAMPLE DATE:	
TEST DATE:	25-Oct-22

<b>SOIL DESCRIPTION:</b>	
CLAY - trace silt, trace sand, trace gravel, moist, firm, grey, high plasticity	
MOISTURE CONTENT:	53.1

SAMPLE DIAM.(Do):	71.67	(mm)	INITIAL AREA, A <sub>o</sub> :	4033.9	(mm <sup>2</sup> )
SAMPLE LENGTH, (L <sub>o</sub> ):	154.67	(mm)	PISTON RATE:	0.0602	(inches / minute)
L / D RATIO:	2.16	(2 < L/D < 2.5)	AXIAL STRAIN RATE, R:	0.99	(0.5<R<2 % / minute)



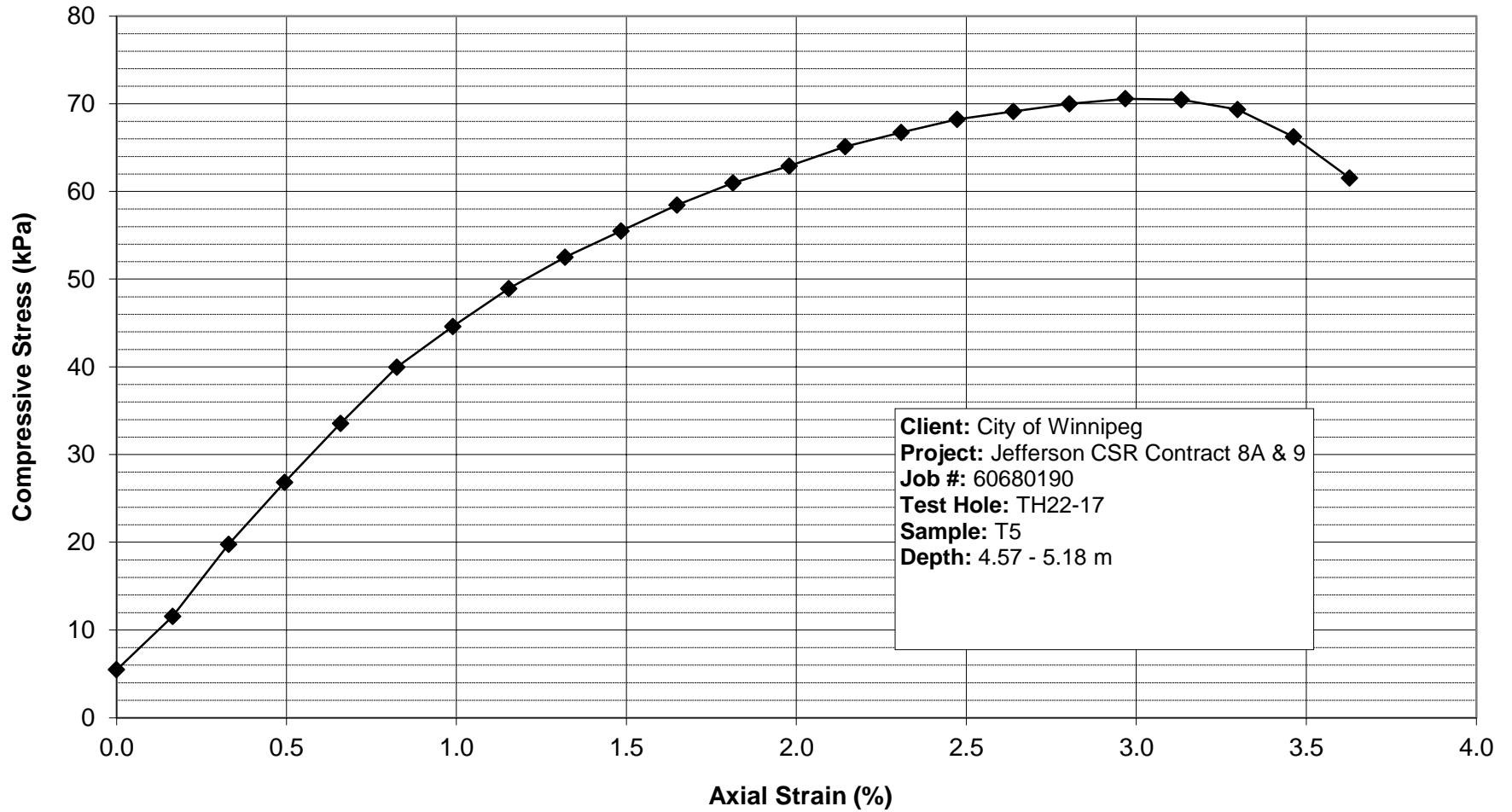
FAILURE SKETCH

TEST DATA - DIAL READINGS							
AXIAL COMPRESSION	PROVING RING	TOTAL AXIAL STRAIN, E <sub>t</sub>	AVERAGE CROSS-SECTIONAL AREA, A	APPLIED AXIAL LOAD, P	COMPRESSIVE STRESS, σ <sub>c</sub>		
					(inches)	(inches)	(inches <sup>2</sup> )
0.01	0.0005	0.00	6.25	4.97	0.79	0.114	5.5
0.02	0.0011	0.16	6.26	10.49	1.68	0.241	11.6
0.03	0.0019	0.33	6.27	17.99	2.87	0.413	19.8
0.04	0.0026	0.49	6.28	24.46	3.89	0.560	26.8
0.05	0.0033	0.66	6.29	30.64	4.87	0.701	33.6
0.06	0.0039	0.82	6.30	36.54	5.80	0.835	40.0
0.07	0.0044	0.99	6.32	40.85	6.47	0.932	44.6
0.08	0.0048	1.15	6.33	44.88	7.10	1.022	48.9
0.09	0.0052	1.32	6.34	48.26	7.62	1.097	52.5
0.10	0.0055	1.48	6.35	51.07	8.05	1.159	55.5
0.11	0.0058	1.65	6.36	53.88	8.47	1.220	58.4
0.12	0.0060	1.81	6.37	56.31	8.84	1.273	61.0
0.13	0.0062	1.98	6.38	58.19	9.12	1.314	62.9
0.14	0.0064	2.14	6.39	60.34	9.44	1.360	65.1
0.15	0.0066	2.31	6.40	61.84	9.68	1.393	66.7
0.16	0.0068	2.47	6.41	63.43	9.89	1.425	68.2
0.17	0.0069	2.64	6.42	64.37	10.02	1.443	69.1
0.18	0.0070	2.80	6.43	65.31	10.15	1.462	70.0
0.19	0.0070	2.97	6.44	65.96	10.24	1.474	70.6
0.20	0.0070	3.13	6.45	65.96	10.22	1.472	70.5
0.21	0.0069	3.30	6.47	65.03	10.06	1.448	69.3
0.22	0.0066	3.46	6.48	62.22	9.61	1.383	66.2
0.23	0.0062	3.63	6.49	57.91	8.93	1.285	61.5

UNCONFINED COMPRESSIVE STRENGTH, q <sub>u</sub> :	70.58	kPa
(based on maximum q <sub>u</sub> value)	1.474	ksf
UNDRAINED SHEAR STRENGTH, S <sub>u</sub> :	35.29	kPa
(based on maximum q <sub>u</sub> value)	0.737	ksf

**NOTES:**

AECOM  
UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS  
(ASTM D2166)







**AECOM - SOILS LABORATORY**  
**SHEAR STRENGTH, MOISTURE CONTENT & DENSITY CALCULATIONS**



CLIENT: City of Winnipeg  
 PROJECT: Jefferson CSR Contract 8A & 9  
 JOB NO.: 60680190

TEST HOLE NO.:	TH22-17
SAMPLE NO.:	T9
SAMPLE DEPTH:	10.67 - 11.28 m
DATE TESTED:	20-Oct-22
<b>SHEAR STRENGTH TESTS</b>	
<b>TORVANE</b>	
Reading	0.30
Vane Size (S, M, L)	M
Undrained Shear Strength (kPa)	29.4
Undrained Shear Strength (ksf)	0.61
<b>POCKET PENETROMETER</b>	
Reading - Qu (tsf)	0.25
Undrained Shear Strength (kPa)	12.0
Reading - Qu (tsf)	0.25
Undrained Shear Strength (kPa)	12.0
Reading - Qu (tsf)	0.25
Undrained Shear Strength (kPa)	12.0
<b>UNCONFINED COMPRESSIVE STRENGTH TEST</b>	
Unconfined compressive strength (kPa)	49.9
Unconfined compressive strength (ksf)	1.0
Undrained Shear Strength (kPa)	25.0
Undrained Shear Strength (ksf)	0.521
<b>MOISTURE CONTENT</b>	
Tare Number	SG13
Wt. Sample wet + tare (g)	421.4
Wt. Sample dry + tare (g)	266.4
Wt. Tare (g)	8.6
Moisture Content %	60.1
<b>BULK DENSITY</b>	
Sample Wt. (g)	1039
Diameter 1 (cm)	7.20
Diameter 2 (cm)	7.20
Diameter 3 (cm)	7.30
<b>Avg. Diameter (cm)</b>	<b>7.23</b>
Length 1 (cm)	15.50
Length 2 (cm)	15.50
Length 3 (cm)	15.40
<b>Avg. Length (cm)</b>	<b>15.47</b>
Volume (cm <sup>3</sup> )	635.6
Moisture content (%)	60.1
Bulk Density (g/cm <sup>3</sup> )	1.635
<b>Bulk Unit Weight (kN/m<sup>3</sup>)</b>	<b>16.0</b>
<b>Bulk Unit Weight (pcf)</b>	<b>102.1</b>
<b>Dry Unit Weight (kN/m<sup>3</sup>)</b>	<b>10.01</b>

**AECOM - SOILS LABORATORY**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS (ASTM D2166)**

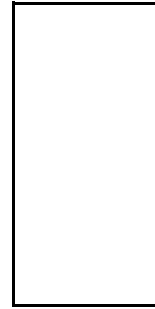


CLIENT:	City of Winnipeg
PROJECT:	Jefferson CSR Contract 8A & 9
JOB NO.:	60680190

TEST HOLE NO.:	TH22-17
SAMPLE NO.:	T9
SAMPLE DEPTH:	10.67 - 11.28 m
SAMPLE DATE:	
TEST DATE:	20-Oct-22

<b>SOIL DESCRIPTION:</b>	
CLAY - trace silt, trace sand, trace gravel, moist, firm, grey, high plasticity	
MOISTURE CONTENT:	60.1

SAMPLE DIAM.(Do):	72.33	(mm)	INITIAL AREA, A <sub>o</sub> :	4109.3	(mm <sup>2</sup> )
SAMPLE LENGTH, (L <sub>o</sub> ):	154.67	(mm)	PISTON RATE:	0.0602	(inches / minute)
L / D RATIO:	2.14	(2 < L/D < 2.5)	AXIAL STRAIN RATE, R:	0.99	(0.5<R<2 % / minute)



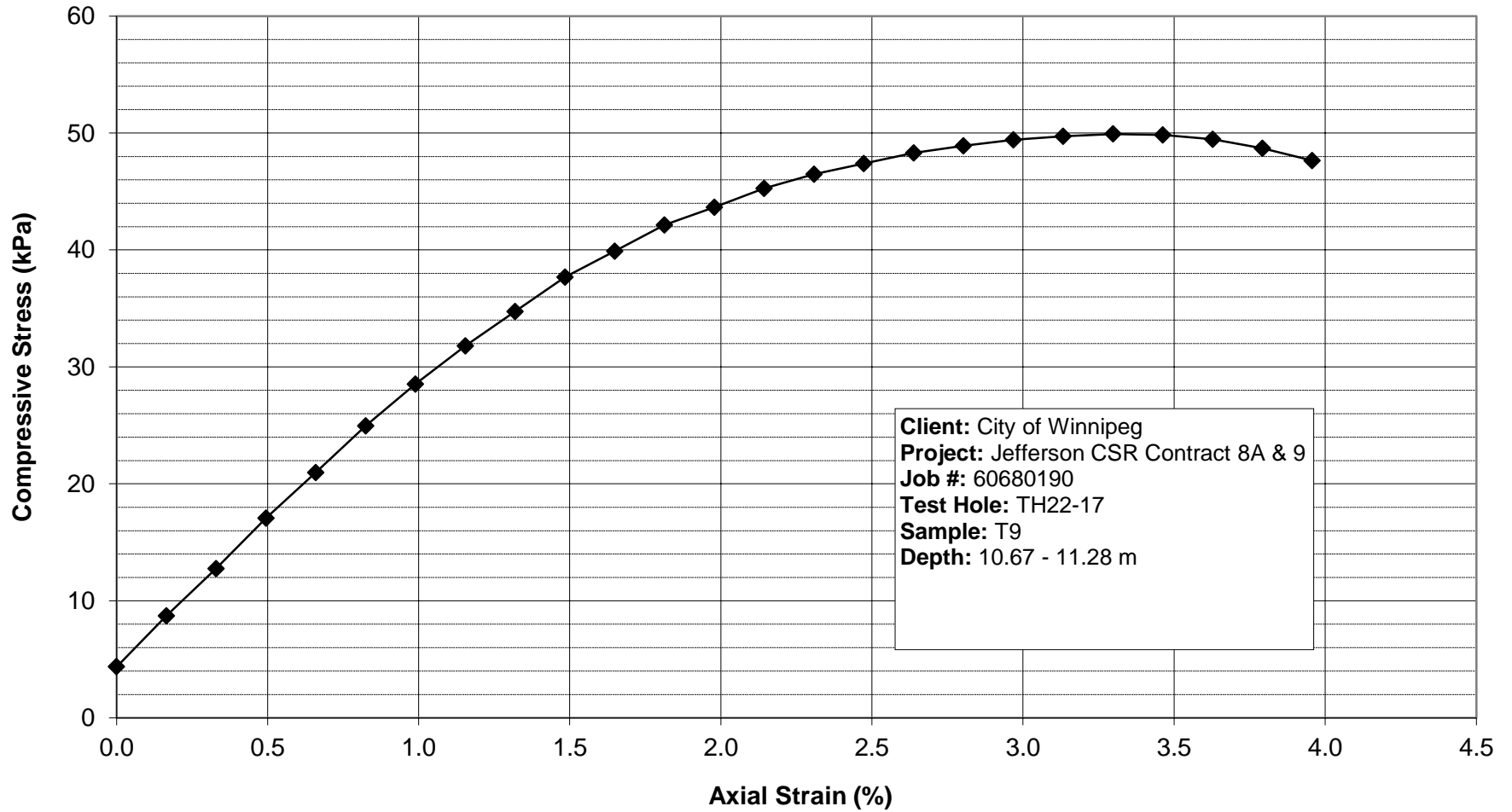
FAILURE SKETCH

TEST DATA - DIAL READINGS							
AXIAL COMPRESSION	PROVING RING	TOTAL AXIAL STRAIN, E <sub>t</sub>	AVERAGE CROSS-SECTIONAL AREA, A	APPLIED AXIAL LOAD, P	COMPRESSIVE STRESS, σ <sub>c</sub>		
					(inches)	(inches)	(%)
0.01	0.0004	0.00	6.37	4.03	0.63	0.091	4.4
0.02	0.0009	0.16	6.38	8.06	1.26	0.182	8.7
0.03	0.0013	0.33	6.39	11.81	1.85	0.266	12.7
0.04	0.0017	0.49	6.40	15.84	2.47	0.356	17.1
0.05	0.0021	0.66	6.41	19.49	3.04	0.438	21.0
0.06	0.0025	0.82	6.42	23.24	3.62	0.521	24.9
0.07	0.0028	0.99	6.43	26.61	4.14	0.596	28.5
0.08	0.0032	1.15	6.44	29.70	4.61	0.664	31.8
0.09	0.0035	1.32	6.45	32.51	5.04	0.725	34.7
0.10	0.0038	1.48	6.47	35.32	5.46	0.787	37.7
0.11	0.0040	1.65	6.48	37.48	5.79	0.833	39.9
0.12	0.0042	1.81	6.49	39.64	6.11	0.880	42.1
0.13	0.0044	1.98	6.50	41.13	6.33	0.912	43.6
0.14	0.0046	2.14	6.51	42.73	6.56	0.945	45.3
0.15	0.0047	2.31	6.52	43.95	6.74	0.971	46.5
0.16	0.0048	2.47	6.53	44.88	6.87	0.990	47.4
0.17	0.0049	2.64	6.54	45.82	7.00	1.009	48.3
0.18	0.0050	2.80	6.55	46.48	7.09	1.021	48.9
0.19	0.0050	2.97	6.56	47.04	7.17	1.032	49.4
0.20	0.0051	3.13	6.58	47.41	7.21	1.038	49.7
0.21	0.0051	3.30	6.59	47.69	7.24	1.043	49.9
0.22	0.0051	3.46	6.60	47.69	7.23	1.041	49.8
0.23	0.0051	3.63	6.61	47.41	7.17	1.033	49.5
0.24	0.0050	3.79	6.62	46.76	7.06	1.017	48.7
0.25	0.0049	3.96	6.63	45.82	6.91	0.985	47.6

UNCONFINED COMPRESSIVE STRENGTH, q <sub>u</sub> :	49.92	kPa
(based on maximum q <sub>u</sub> value)	1.043	ksf
UNDRAINED SHEAR STRENGTH, S <sub>u</sub> :	24.96	kPa
(based on maximum q <sub>u</sub> value)	0.521	ksf

**NOTES:**

AECOM  
UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS  
(ASTM D2166)









**AECOM - SOILS LABORATORY**  
**SHEAR STRENGTH, MOISTURE CONTENT & DENSITY CALCULATIONS**



CLIENT: City of Winnipeg  
 PROJECT: Jefferson CSR Contract 8A & 9  
 JOB NO.: 60680190

TEST HOLE NO.:	TH22-18
SAMPLE NO.:	T5
SAMPLE DEPTH:	4.57 - 5.18 m
DATE TESTED:	25-Oct-22
<b>SHEAR STRENGTH TESTS</b>	
<b>TORVANE</b>	
Reading	0.80
Vane Size (S, M, L)	M
Undrained Shear Strength (kPa)	78.5
Undrained Shear Strength (ksf)	1.64
<b>POCKET PENETROMETER</b>	
Reading - Qu (tsf)	1.25
Undrained Shear Strength (kPa)	59.9
Reading - Qu (tsf)	1.25
Undrained Shear Strength (kPa)	59.9
Reading - Qu (tsf)	1.25
Undrained Shear Strength (kPa)	59.9
<b>UNCONFINED COMPRESSIVE STRENGTH TEST</b>	
Unconfined compressive strength (kPa)	90.6
Unconfined compressive strength (ksf)	1.9
Undrained Shear Strength (kPa)	45.3
Undrained Shear Strength (ksf)	0.946
<b>MOISTURE CONTENT</b>	
Tare Number	T22
Wt. Sample wet + tare (g)	514.0
Wt. Sample dry + tare (g)	340.5
Wt. Tare (g)	8.3
Moisture Content %	52.2
<b>BULK DENSITY</b>	
Sample Wt. (g)	1076.8
Diameter 1 (cm)	7.20
Diameter 2 (cm)	7.20
Diameter 3 (cm)	7.30
<b>Avg. Diameter (cm)</b>	<b>7.23</b>
Length 1 (cm)	15.50
Length 2 (cm)	15.50
Length 3 (cm)	15.40
<b>Avg. Length (cm)</b>	<b>15.47</b>
Volume (cm <sup>3</sup> )	635.6
Moisture content (%)	52.2
Bulk Density (g/cm <sup>3</sup> )	1.694
<b>Bulk Unit Weight (kN/m<sup>3</sup>)</b>	<b>16.6</b>
<b>Bulk Unit Weight (pcf)</b>	<b>105.8</b>
<b>Dry Unit Weight (kN/m<sup>3</sup>)</b>	<b>10.91</b>

**AECOM - SOILS LABORATORY**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS (ASTM D2166)**

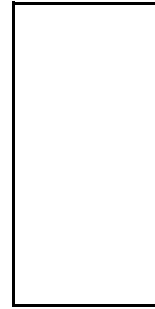


CLIENT:	City of Winnipeg
PROJECT:	Jefferson CSR Contract 8A & 9
JOB NO.:	60680190

TEST HOLE NO.:	TH22-18
SAMPLE NO.:	T5
SAMPLE DEPTH:	4.57 - 5.18 m
SAMPLE DATE:	
TEST DATE:	25-Oct-22

<b>SOIL DESCRIPTION:</b>	
CLAY - trace silt, trace sand, trace gravel, moist, firm, grey, high plasticity	
<b>MOISTURE CONTENT:</b>	52.2

SAMPLE DIAM.(Do):	72.33	(mm)	INITIAL AREA, A <sub>o</sub> :	4109.3	(mm <sup>2</sup> )
SAMPLE LENGTH, (L <sub>o</sub> ):	154.67	(mm)	PISTON RATE:	0.0602	(inches / minute)
L / D RATIO:	2.14	(2 < L/D < 2.5)	AXIAL STRAIN RATE, R:	0.99	(0.5<R<2 % / minute)



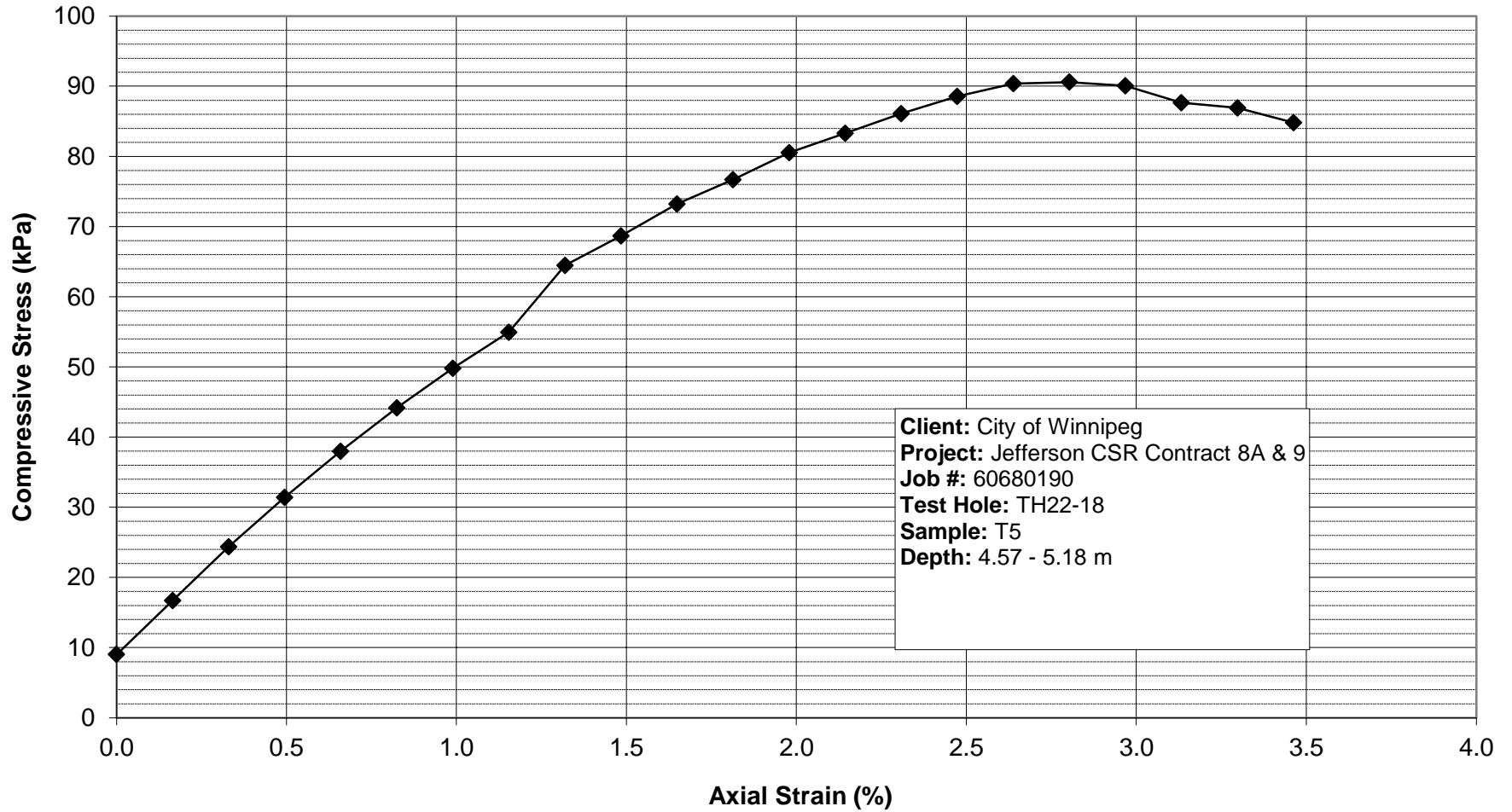
FAILURE SKETCH

TEST DATA - DIAL READINGS							
AXIAL COMPRESSION	PROVING RING	TOTAL AXIAL STRAIN, E <sub>t</sub>	AVERAGE CROSS-SECTIONAL AREA, A	APPLIED AXIAL LOAD, P	COMPRESSIVE STRESS, σ <sub>c</sub>		
					(inches)	(inches)	(%)
0.01	0.0009	0.00	6.37	8.34	1.31	0.189	9.0
0.02	0.0017	0.16	6.38	15.46	2.42	0.349	16.7
0.03	0.0024	0.33	6.39	22.58	3.53	0.509	24.4
0.04	0.0031	0.49	6.40	29.14	4.55	0.656	31.4
0.05	0.0038	0.66	6.41	35.32	5.51	0.793	38.0
0.06	0.0044	0.82	6.42	41.13	6.40	0.922	44.2
0.07	0.0050	0.99	6.43	46.48	7.22	1.040	49.8
0.08	0.0055	1.15	6.44	51.35	7.97	1.147	54.9
0.09	0.0064	1.32	6.45	60.34	9.35	1.346	64.5
0.10	0.0069	1.48	6.47	64.37	9.96	1.434	68.6
0.11	0.0073	1.65	6.48	68.78	10.62	1.529	73.2
0.12	0.0077	1.81	6.49	72.15	11.12	1.602	76.7
0.13	0.0081	1.98	6.50	75.90	11.68	1.682	80.5
0.14	0.0084	2.14	6.51	78.61	12.08	1.739	83.3
0.15	0.0087	2.31	6.52	81.43	12.49	1.798	86.1
0.16	0.0090	2.47	6.53	83.86	12.84	1.849	88.5
0.17	0.0092	2.64	6.54	85.74	13.11	1.887	90.4
0.18	0.0092	2.80	6.55	86.11	13.14	1.892	90.6
0.19	0.0092	2.97	6.56	85.74	13.06	1.881	90.1
0.20	0.0089	3.13	6.58	83.58	12.71	1.830	87.6
0.21	0.0089	3.30	6.59	83.02	12.60	1.815	86.9
0.22	0.0087	3.46	6.60	81.14	12.30	1.771	84.8

UNCONFINED COMPRESSIVE STRENGTH, q <sub>u</sub> :	90.60	kPa
(based on maximum q <sub>u</sub> value)	1.892	ksf
UNDRAINED SHEAR STRENGTH, S <sub>u</sub> :	45.30	kPa
(based on maximum q <sub>u</sub> value)	0.946	ksf

**NOTES:**

**AECOM**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS**  
**(ASTM D2166)**







**AECOM - SOILS LABORATORY**  
**SHEAR STRENGTH, MOISTURE CONTENT & DENSITY CALCULATIONS**



CLIENT: City of Winnipeg  
 PROJECT: Jefferson CSR Contract 8A & 9  
 JOB NO.: 60680190

<b>TEST HOLE NO.:</b>	<b>TH22-18</b>
<b>SAMPLE NO.:</b>	<b>T9</b>
<b>SAMPLE DEPTH:</b>	10.67 - 11.28 m
<b>DATE TESTED:</b>	20-Oct-22
<b>SHEAR STRENGTH TESTS</b>	
<b>TORVANE</b>	
Reading	0.40
Vane Size (S, M, L)	M
Undrained Shear Strength (kPa)	39.2
Undrained Shear Strength (ksf)	0.82
<b>POCKET PENETROMETER</b>	
Reading - Qu (tsf)	0.50
Undrained Shear Strength (kPa)	23.9
Reading - Qu (tsf)	0.75
Undrained Shear Strength (kPa)	35.9
Reading - Qu (tsf)	0.75
Undrained Shear Strength (kPa)	35.9
<b>UNCONFINED COMPRESSIVE STRENGTH TEST</b>	
Unconfined compressive strength (kPa)	68.2
Unconfined compressive strength (ksf)	1.4
Undrained Shear Strength (kPa)	34.1
Undrained Shear Strength (ksf)	0.712
<b>MOISTURE CONTENT</b>	
Tare Number	J19
Wt. Sample wet + tare (g)	497.2
Wt. Sample dry + tare (g)	342.7
Wt. Tare (g)	8.5
Moisture Content %	46.2
<b>BULK DENSITY</b>	
Sample Wt. (g)	1127.3
Diameter 1 (cm)	7.20
Diameter 2 (cm)	7.10
Diameter 3 (cm)	7.20
<b>Avg. Diameter (cm)</b>	<b>7.17</b>
Length 1 (cm)	15.40
Length 2 (cm)	15.40
Length 3 (cm)	15.50
<b>Avg. Length (cm)</b>	<b>15.43</b>
Volume (cm <sup>3</sup> )	622.6
Moisture content (%)	46.2
Bulk Density (g/cm <sup>3</sup> )	1.811
<b>Bulk Unit Weight (kN/m<sup>3</sup>)</b>	<b>17.8</b>
<b>Bulk Unit Weight (pcf)</b>	<b>113.0</b>
<b>Dry Unit Weight (kN/m<sup>3</sup>)</b>	<b>12.14</b>



**AECOM - SOILS LABORATORY**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS (ASTM D2166)**

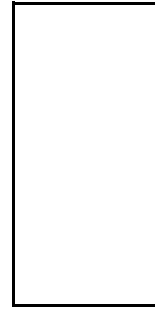


CLIENT:	City of Winnipeg
PROJECT:	Jefferson CSR Contract 8A & 9
JOB NO.:	60680190

TEST HOLE NO.:	TH22-18
SAMPLE NO.:	T9
SAMPLE DEPTH:	10.67 - 11.28 m
SAMPLE DATE:	
TEST DATE:	20-Oct-22

<b>SOIL DESCRIPTION:</b>	
CLAY - silt pockets (5mm), trace sand, trace gravel, moist, firm, grey, high plasticity	
<b>MOISTURE CONTENT:</b>	46.2

SAMPLE DIAM.(Do):	71.67	(mm)	INITIAL AREA, A <sub>o</sub> :	4033.9	(mm <sup>2</sup> )
SAMPLE LENGTH, (L <sub>o</sub> ):	154.33	(mm)	PISTON RATE:	0.0602	(inches / minute)
L / D RATIO:	2.15	(2 < L/D < 2.5)	AXIAL STRAIN RATE, R:	0.99	(0.5<R<2 % / minute)



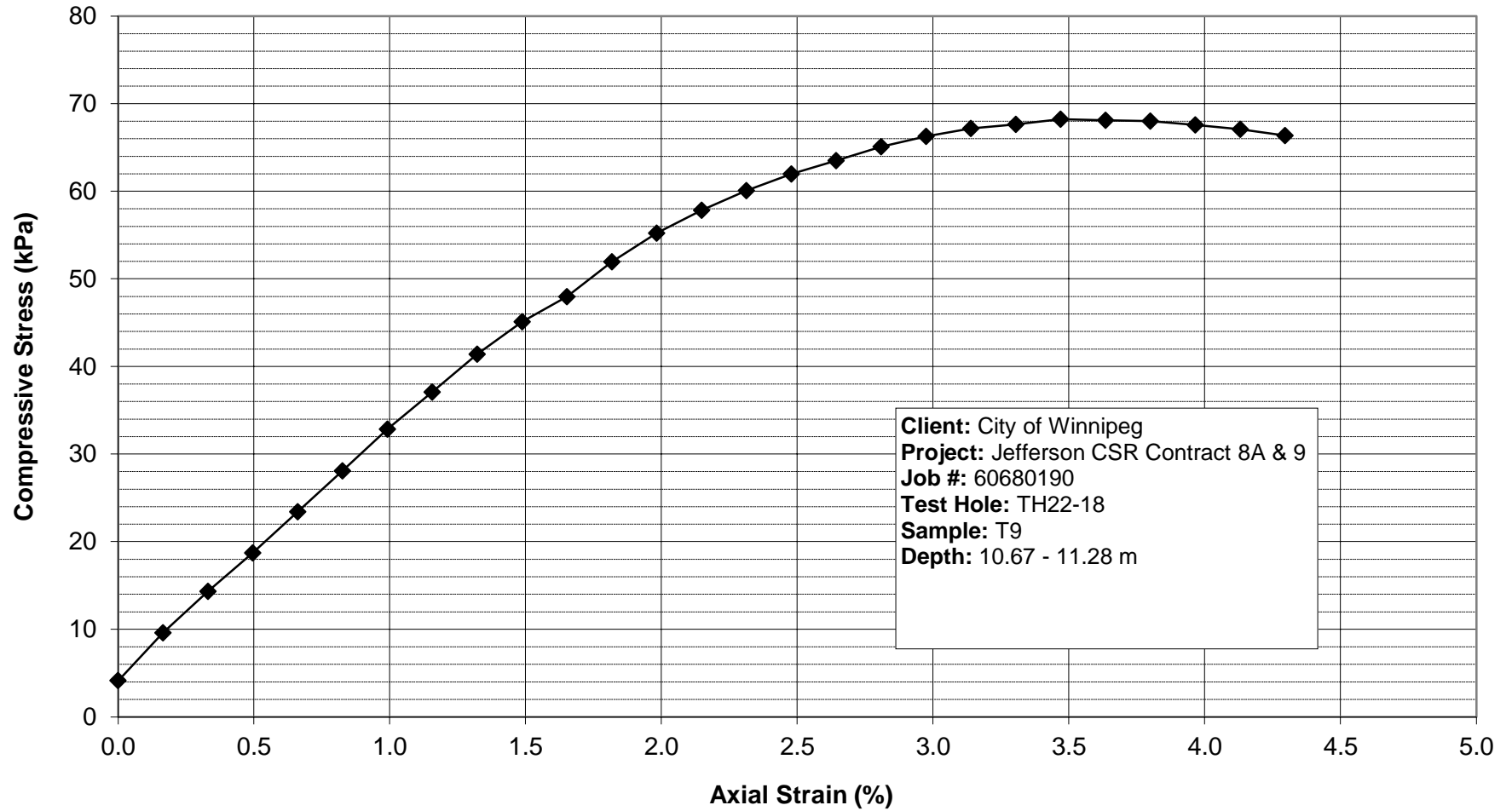
FAILURE SKETCH

TEST DATA - DIAL READINGS							
AXIAL COMPRESSION	PROVING RING	TOTAL AXIAL STRAIN, E <sub>t</sub>	AVERAGE CROSS-SECTIONAL AREA, A	APPLIED AXIAL LOAD, P	COMPRESSIVE STRESS, σ <sub>c</sub>		
					(inches)	(inches)	(inches <sup>2</sup> )
0.01	0.0004	0.00	6.25	3.75	0.60	0.086	4.1
0.02	0.0009	0.17	6.26	8.71	1.39	0.200	9.6
0.03	0.0014	0.33	6.27	13.02	2.08	0.299	14.3
0.04	0.0018	0.50	6.28	17.05	2.71	0.391	18.7
0.05	0.0023	0.66	6.29	21.36	3.39	0.489	23.4
0.06	0.0027	0.83	6.30	25.67	4.07	0.586	28.1
0.07	0.0032	0.99	6.32	30.08	4.76	0.686	32.8
0.08	0.0036	1.16	6.33	34.01	5.38	0.774	37.1
0.09	0.0041	1.32	6.34	38.04	6.00	0.865	41.4
0.10	0.0044	1.49	6.35	41.51	6.54	0.942	45.1
0.11	0.0047	1.65	6.36	44.23	6.96	1.002	48.0
0.12	0.0051	1.82	6.37	47.97	7.53	1.085	51.9
0.13	0.0055	1.98	6.38	51.07	8.01	1.153	55.2
0.14	0.0057	2.15	6.39	53.60	8.39	1.208	57.8
0.15	0.0060	2.31	6.40	55.75	8.71	1.254	60.1
0.16	0.0062	2.48	6.41	57.63	8.99	1.294	62.0
0.17	0.0063	2.64	6.42	59.12	9.21	1.326	63.5
0.18	0.0065	2.81	6.43	60.72	9.44	1.359	65.1
0.19	0.0066	2.97	6.44	61.94	9.61	1.384	66.3
0.20	0.0067	3.14	6.46	62.87	9.74	1.403	67.2
0.21	0.0068	3.30	6.47	63.43	9.81	1.413	67.6
0.22	0.0068	3.47	6.48	64.09	9.89	1.425	68.2
0.23	0.0068	3.63	6.49	64.09	9.88	1.422	68.1
0.24	0.0068	3.80	6.50	64.09	9.86	1.420	68.0
0.25	0.0068	3.97	6.51	63.81	9.80	1.411	67.6
0.26	0.0068	4.13	6.52	63.43	9.73	1.401	67.1
0.27	0.0067	4.30	6.53	62.87	9.62	1.386	66.4

UNCONFINED COMPRESSIVE STRENGTH, q <sub>u</sub> :	68.22	kPa
(based on maximum q <sub>u</sub> value)	1.425	ksf
UNDRAINED SHEAR STRENGTH, S <sub>u</sub> :	34.11	kPa
(based on maximum q <sub>u</sub> value)	0.712	ksf

**NOTES:**

**AECOM**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS**  
**(ASTM D2166)**







**AECOM - SOILS LABORATORY**  
**SHEAR STRENGTH, MOISTURE CONTENT & DENSITY CALCULATIONS**



CLIENT: City of Winnipeg  
 PROJECT: Jefferson CSR Contract 8A & 9  
 JOB NO.: 60680190

<b>TEST HOLE NO.:</b>	<b>TH22-19</b>
<b>SAMPLE NO.:</b>	<b>T4</b>
<b>SAMPLE DEPTH:</b>	3.05 - 3.66 m
<b>DATE TESTED:</b>	25-Oct-22
<b>SHEAR STRENGTH TESTS</b>	
<b>TORVANE</b>	
Reading	0.85
Vane Size (S, M, L)	M
Undrained Shear Strength (kPa)	83.4
Undrained Shear Strength (ksf)	1.74
<b>POCKET PENETROMETER</b>	
Reading - Qu (tsf)	2.75
Undrained Shear Strength (kPa)	131.7
Reading - Qu (tsf)	2.75
Undrained Shear Strength (kPa)	131.7
Reading - Qu (tsf)	2.75
Undrained Shear Strength (kPa)	131.7
<b>UNCONFINED COMPRESSIVE STRENGTH TEST</b>	
Unconfined compressive strength (kPa)	84.0
Unconfined compressive strength (ksf)	1.8
Undrained Shear Strength (kPa)	42.0
Undrained Shear Strength (ksf)	0.877
<b>MOISTURE CONTENT</b>	
Tare Number	B10
Wt. Sample wet + tare (g)	498.5
Wt. Sample dry + tare (g)	352.1
Wt. Tare (g)	8.8
Moisture Content %	42.6
<b>BULK DENSITY</b>	
Sample Wt. (g)	1124
Diameter 1 (cm)	7.20
Diameter 2 (cm)	7.10
Diameter 3 (cm)	7.20
<b>Avg. Diameter (cm)</b>	<b>7.17</b>
Length 1 (cm)	15.50
Length 2 (cm)	15.40
Length 3 (cm)	15.50
<b>Avg. Length (cm)</b>	<b>15.47</b>
Volume (cm <sup>3</sup> )	623.9
Moisture content (%)	42.6
Bulk Density (g/cm <sup>3</sup> )	1.802
<b>Bulk Unit Weight (kN/m<sup>3</sup>)</b>	<b>17.7</b>
<b>Bulk Unit Weight (pcf)</b>	<b>112.5</b>
<b>Dry Unit Weight (kN/m<sup>3</sup>)</b>	<b>12.39</b>

**AECOM - SOILS LABORATORY**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS (ASTM D2166)**

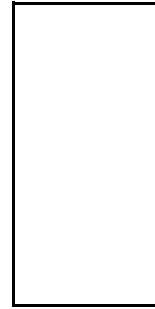


CLIENT:	City of Winnipeg
PROJECT:	Jefferson CSR Contract 8A & 9
JOB NO.:	60680190

TEST HOLE NO.:	TH22-19
SAMPLE NO.:	T4
SAMPLE DEPTH:	3.05 - 3.66 m
SAMPLE DATE:	
TEST DATE:	25-Oct-22

<b>SOIL DESCRIPTION:</b>	
CLAY - trace silt, trace sand, trace gravel, moist, firm, greyish brown, intermediate to high plasticity	
<b>MOISTURE CONTENT:</b>	42.6

SAMPLE DIAM.(Do):	71.67	(mm)	INITIAL AREA, A <sub>o</sub> :	4033.9	(mm <sup>2</sup> )
SAMPLE LENGTH, (L <sub>o</sub> ):	154.67	(mm)	PISTON RATE:	0.0602	(inches / minute)
L / D RATIO:	2.16	(2 < L/D < 2.5)	AXIAL STRAIN RATE, R:	0.99	(0.5<R<2 % / minute)



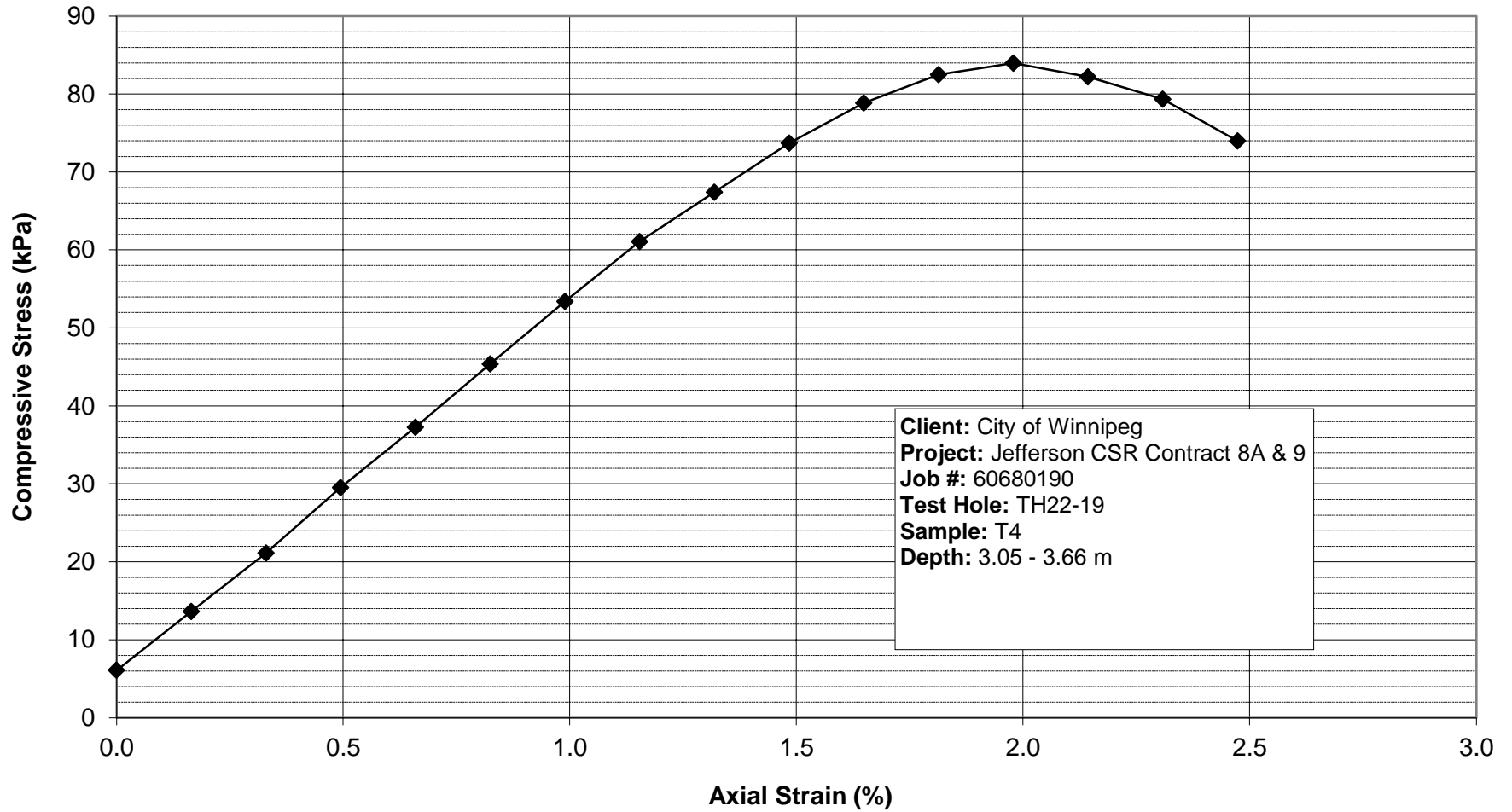
FAILURE SKETCH

TEST DATA - DIAL READINGS							
AXIAL COMPRESSION	PROVING RING	TOTAL AXIAL STRAIN, E <sub>t</sub>	AVERAGE CROSS-SECTIONAL AREA, A	APPLIED AXIAL LOAD, P	COMPRESSIVE STRESS, σ <sub>c</sub>		
					(psi)	(ksf)	(kPa)
(inches)	(inches)	(%)	(inches <sup>2</sup> )	(lbs)			
0.01	0.0006	0.00	6.25	5.53	0.88	0.127	6.1
0.02	0.0013	0.16	6.26	12.37	1.97	0.284	13.6
0.03	0.0021	0.33	6.27	19.21	3.06	0.441	21.1
0.04	0.0029	0.49	6.28	26.89	4.28	0.616	29.5
0.05	0.0036	0.66	6.29	34.01	5.40	0.778	37.3
0.06	0.0044	0.82	6.30	41.51	6.58	0.948	45.4
0.07	0.0052	0.99	6.32	48.91	7.75	1.115	53.4
0.08	0.0060	1.15	6.33	56.03	8.86	1.276	61.1
0.09	0.0066	1.32	6.34	61.94	9.78	1.408	67.4
0.10	0.0072	1.48	6.35	67.84	10.69	1.539	73.7
0.11	0.0078	1.65	6.36	72.71	11.44	1.647	78.9
0.12	0.0081	1.81	6.37	76.18	11.96	1.723	82.5
0.13	0.0083	1.98	6.38	77.68	12.18	1.754	84.0
0.14	0.0081	2.14	6.39	76.18	11.92	1.717	82.2
0.15	0.0079	2.31	6.40	73.65	11.51	1.657	79.3
0.16	0.0073	2.47	6.41	68.78	10.73	1.545	74.0

UNCONFINED COMPRESSIVE STRENGTH, q <sub>u</sub> :	83.96	kPa
(based on maximum q <sub>u</sub> value)	1.754	ksf
UNDRAINED SHEAR STRENGTH, S <sub>u</sub> :	41.98	kPa
(based on maximum q <sub>u</sub> value)	0.877	ksf

**NOTES:**

AECOM  
UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS  
(ASTM D2166)









**AECOM - SOILS LABORATORY**  
**SHEAR STRENGTH, MOISTURE CONTENT & DENSITY CALCULATIONS**



CLIENT: City of Winnipeg  
 PROJECT: Jefferson CSR Contract 8A & 9  
 JOB NO.: 60680190

<b>TEST HOLE NO.:</b>	<b>TH22-19</b>
<b>SAMPLE NO.:</b>	<b>T8</b>
<b>SAMPLE DEPTH:</b>	9.14 - 9.75 m
<b>DATE TESTED:</b>	25-Oct-22
<b>SHEAR STRENGTH TESTS</b>	
<b>TORVANE</b>	
Reading	0.55
Vane Size (S, M, L)	M
Undrained Shear Strength (kPa)	53.9
Undrained Shear Strength (ksf)	1.13
<b>POCKET PENETROMETER</b>	
Reading - Qu (tsf)	1.00
Undrained Shear Strength (kPa)	47.9
Reading - Qu (tsf)	0.75
Undrained Shear Strength (kPa)	35.9
Reading - Qu (tsf)	0.50
Undrained Shear Strength (kPa)	23.9
<b>UNCONFINED COMPRESSIVE STRENGTH TEST</b>	
Unconfined compressive strength (kPa)	67.2
Unconfined compressive strength (ksf)	1.4
Undrained Shear Strength (kPa)	33.6
Undrained Shear Strength (ksf)	0.701
<b>MOISTURE CONTENT</b>	
Tare Number	J45
Wt. Sample wet + tare (g)	542.2
Wt. Sample dry + tare (g)	374.4
Wt. Tare (g)	8.5
Moisture Content %	45.9
<b>BULK DENSITY</b>	
Sample Wt. (g)	1118.9
Diameter 1 (cm)	7.10
Diameter 2 (cm)	7.20
Diameter 3 (cm)	7.20
<b>Avg. Diameter (cm)</b>	<b>7.17</b>
Length 1 (cm)	15.40
Length 2 (cm)	15.40
Length 3 (cm)	15.50
<b>Avg. Length (cm)</b>	<b>15.43</b>
Volume (cm <sup>3</sup> )	622.6
Moisture content (%)	45.9
Bulk Density (g/cm <sup>3</sup> )	1.797
<b>Bulk Unit Weight (kN/m<sup>3</sup>)</b>	<b>17.6</b>
<b>Bulk Unit Weight (pcf)</b>	<b>112.2</b>
<b>Dry Unit Weight (kN/m<sup>3</sup>)</b>	<b>12.08</b>

**AECOM - SOILS LABORATORY**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS (ASTM D2166)**

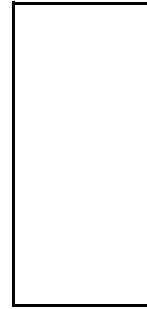


CLIENT:	City of Winnipeg
PROJECT:	Jefferson CSR Contract 8A & 9
JOB NO.:	60680190

TEST HOLE NO.:	TH22-19
SAMPLE NO.:	T8
SAMPLE DEPTH:	9.14 - 9.75 m
SAMPLE DATE:	
TEST DATE:	25-Oct-22

<b>SOIL DESCRIPTION:</b>	
CLAY - trace silt, trace sand, trace gravel, moist, firm, grey, high plasticity	
MOISTURE CONTENT:	45.9

SAMPLE DIAM.(Do):	71.67	(mm)	INITIAL AREA, A <sub>o</sub> :	4033.9	(mm <sup>2</sup> )
SAMPLE LENGTH, (L <sub>o</sub> ):	154.33	(mm)	PISTON RATE:	0.0602	(inches / minute)
L / D RATIO:	2.15	(2 < L/D < 2.5)	AXIAL STRAIN RATE, R:	0.99	(0.5<R<2 % / minute)



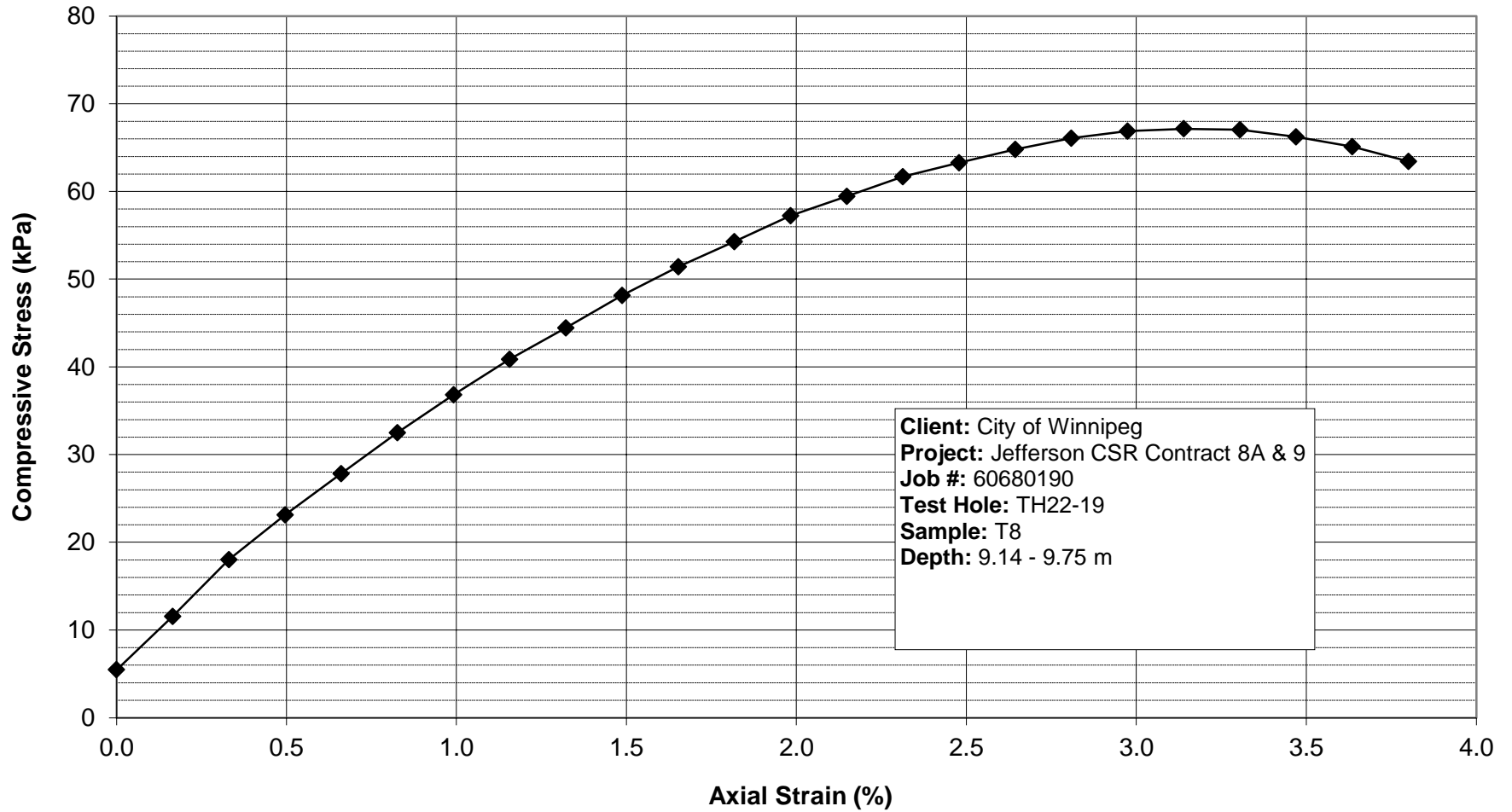
FAILURE SKETCH

TEST DATA - DIAL READINGS							
AXIAL COMPRESSION	PROVING RING	TOTAL AXIAL STRAIN, E <sub>t</sub>	AVERAGE CROSS-SECTIONAL AREA, A	APPLIED AXIAL LOAD, P	COMPRESSIVE STRESS, σ <sub>c</sub>		
					(inches)	(inches)	(%)
0.01	0.0005	0.00	6.25	4.97	0.79	0.114	5.5
0.02	0.0011	0.17	6.26	10.49	1.68	0.241	11.6
0.03	0.0018	0.33	6.27	16.40	2.61	0.376	18.0
0.04	0.0023	0.50	6.28	21.08	3.36	0.483	23.1
0.05	0.0027	0.66	6.29	25.39	4.03	0.581	27.8
0.06	0.0032	0.83	6.30	29.70	4.71	0.678	32.5
0.07	0.0036	0.99	6.32	33.73	5.34	0.769	36.8
0.08	0.0040	1.16	6.33	37.48	5.93	0.853	40.9
0.09	0.0044	1.32	6.34	40.85	6.45	0.928	44.5
0.10	0.0047	1.49	6.35	44.32	6.98	1.006	48.1
0.11	0.0051	1.65	6.36	47.41	7.46	1.074	51.4
0.12	0.0054	1.82	6.37	50.13	7.87	1.134	54.3
0.13	0.0057	1.98	6.38	52.94	8.30	1.195	57.2
0.14	0.0059	2.15	6.39	55.10	8.62	1.242	59.4
0.15	0.0061	2.31	6.40	57.25	8.94	1.288	61.7
0.16	0.0063	2.48	6.41	58.84	9.18	1.322	63.3
0.17	0.0064	2.64	6.42	60.34	9.40	1.353	64.8
0.18	0.0066	2.81	6.43	61.65	9.58	1.380	66.1
0.19	0.0067	2.97	6.44	62.50	9.70	1.397	66.9
0.20	0.0067	3.14	6.46	62.87	9.74	1.403	67.2
0.21	0.0067	3.30	6.47	62.87	9.72	1.400	67.0
0.22	0.0066	3.47	6.48	62.22	9.61	1.383	66.2
0.23	0.0065	3.63	6.49	61.28	9.44	1.360	65.1
0.24	0.0064	3.80	6.50	59.78	9.20	1.324	63.4

UNCONFINED COMPRESSIVE STRENGTH, q <sub>u</sub> :	67.15	kPa
(based on maximum q <sub>u</sub> value)	1.403	ksf
UNDRAINED SHEAR STRENGTH, S <sub>u</sub> :	33.58	kPa
(based on maximum q <sub>u</sub> value)	0.701	ksf

**NOTES:**

**AECOM**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS**  
**(ASTM D2166)**







**AECOM - SOILS LABORATORY**  
**SHEAR STRENGTH, MOISTURE CONTENT & DENSITY CALCULATIONS**



CLIENT: City of Winnipeg  
 PROJECT: Jefferson CSR Contract 8A & 9  
 JOB NO.: 60680190

<b>TEST HOLE NO.:</b>	<b>TH22-20</b>
<b>SAMPLE NO.:</b>	<b>T6</b>
<b>SAMPLE DEPTH:</b>	6.10 - 6.71 m
<b>DATE TESTED:</b>	20-Oct-22
<b>SHEAR STRENGTH TESTS</b>	
<b>TORVANE</b>	
Reading	0.65
Vane Size (S, M, L)	M
Undrained Shear Strength (kPa)	63.8
Undrained Shear Strength (ksf)	1.33
<b>POCKET PENETROMETER</b>	
Reading - Qu (tsf)	1.00
Undrained Shear Strength (kPa)	47.9
Reading - Qu (tsf)	0.75
Undrained Shear Strength (kPa)	35.9
Reading - Qu (tsf)	1.00
Undrained Shear Strength (kPa)	47.9
<b>UNCONFINED COMPRESSIVE STRENGTH TEST</b>	
Unconfined compressive strength (kPa)	130.9
Unconfined compressive strength (ksf)	2.7
Undrained Shear Strength (kPa)	65.4
Undrained Shear Strength (ksf)	1.367
<b>MOISTURE CONTENT</b>	
Tare Number	B23
Wt. Sample wet + tare (g)	551.5
Wt. Sample dry + tare (g)	388.5
Wt. Tare (g)	8.6
Moisture Content %	42.9
<b>BULK DENSITY</b>	
Sample Wt. (g)	1058.7
Diameter 1 (cm)	7.00
Diameter 2 (cm)	7.00
Diameter 3 (cm)	7.00
<b>Avg. Diameter (cm)</b>	<b>7.00</b>
Length 1 (cm)	15.40
Length 2 (cm)	15.40
Length 3 (cm)	15.30
<b>Avg. Length (cm)</b>	<b>15.37</b>
Volume (cm <sup>3</sup> )	591.4
Moisture content (%)	42.9
Bulk Density (g/cm <sup>3</sup> )	1.790
<b>Bulk Unit Weight (kN/m<sup>3</sup>)</b>	<b>17.6</b>
<b>Bulk Unit Weight (pcf)</b>	<b>111.8</b>
<b>Dry Unit Weight (kN/m<sup>3</sup>)</b>	<b>12.29</b>

**AECOM - SOILS LABORATORY**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS (ASTM D2166)**

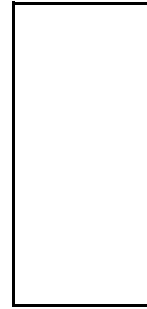


CLIENT:	City of Winnipeg
PROJECT:	Jefferson CSR Contract 8A & 9
JOB NO.:	60680190

TEST HOLE NO.:	TH22-20
SAMPLE NO.:	T6
SAMPLE DEPTH:	6.10 - 6.71 m
SAMPLE DATE:	
TEST DATE:	20-Oct-22

<b>SOIL DESCRIPTION:</b>	
CLAY - silt pockets (5mm), trace sand, trace gravel, moist, firm, grey, high plasticity	
<b>MOISTURE CONTENT:</b> 42.9	

SAMPLE DIAM.(Do):	70.00	(mm)	INITIAL AREA, A <sub>o</sub> :	3848.5	(mm <sup>2</sup> )
SAMPLE LENGTH, (L <sub>o</sub> ):	153.67	(mm)	PISTON RATE:	0.0602	(inches / minute)
L / D RATIO:	2.20	(2 < L/D < 2.5)	AXIAL STRAIN RATE, R:	1.00	(0.5<R<2 % / minute)



FAILURE SKETCH

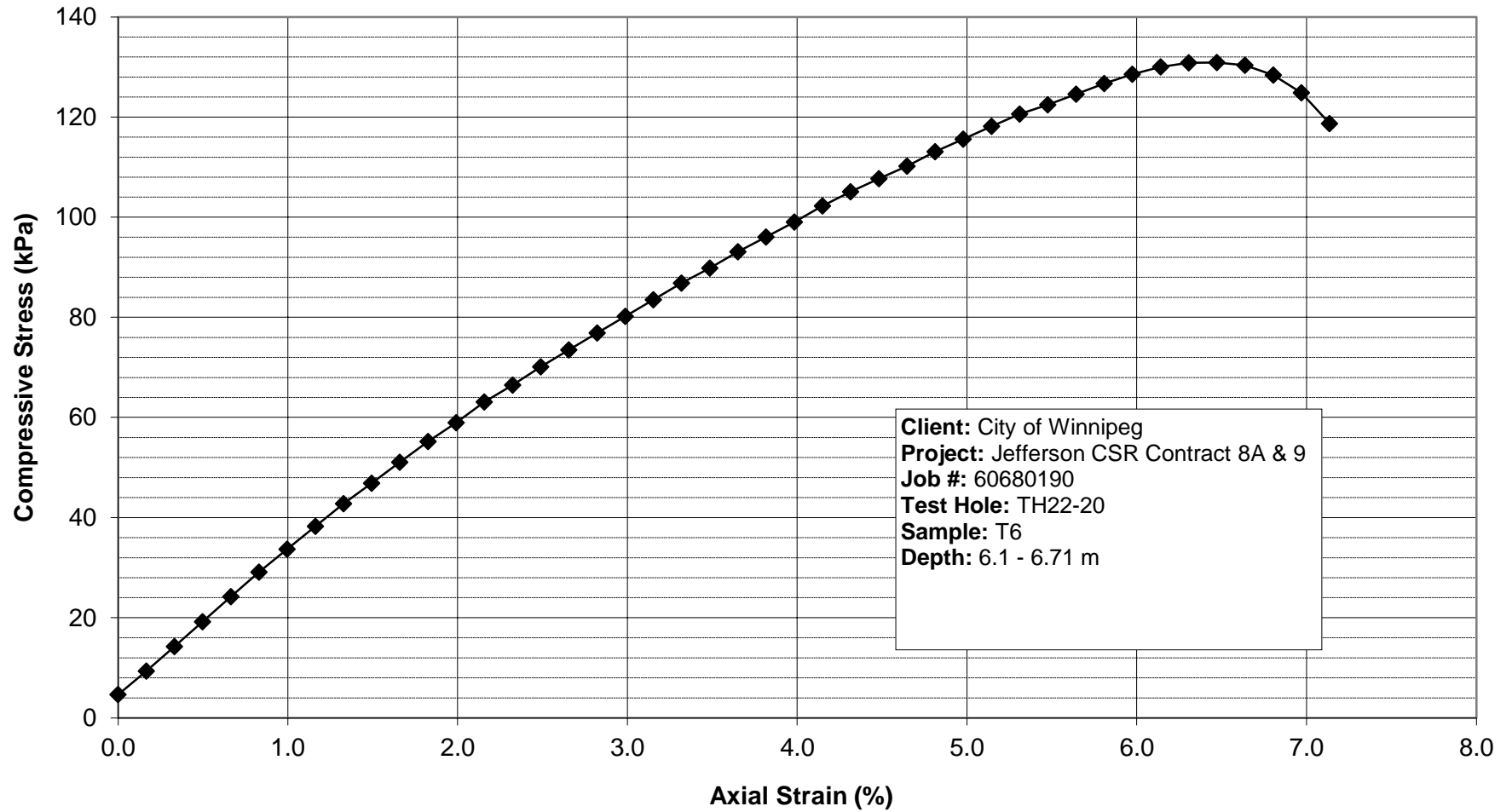
TEST DATA - DIAL READINGS							
AXIAL COMPRESSION	PROVING RING	TOTAL AXIAL STRAIN, E <sub>t</sub>	AVERAGE CROSS-SECTIONAL AREA, A	APPLIED AXIAL LOAD, P	COMPRESSIVE STRESS, σ <sub>c</sub>		
					(inches)	(inches)	(%)
(inches)	(inches)	(%)	(inches <sup>2</sup> )	(lbs)	(psi)	(ksf)	(kPa)
0.01	0.0004	0.00	5.97	4.03	0.68	0.097	4.7
0.02	0.0009	0.17	5.98	8.06	1.35	0.194	9.3
0.03	0.0013	0.33	5.98	12.37	2.07	0.298	14.2
0.04	0.0018	0.50	5.99	16.68	2.78	0.401	19.2
0.05	0.0023	0.66	6.00	21.08	3.51	0.505	24.2
0.06	0.0027	0.83	6.02	25.39	4.22	0.608	29.1
0.07	0.0031	1.00	6.03	29.42	4.88	0.703	33.7
0.08	0.0036	1.16	6.04	33.45	5.54	0.796	38.2
0.09	0.0040	1.33	6.05	37.48	6.20	0.893	42.7
0.10	0.0044	1.49	6.06	41.13	6.79	0.978	46.8
0.11	0.0048	1.66	6.07	44.88	7.40	1.065	51.0
0.12	0.0052	1.83	6.08	48.63	8.00	1.153	55.2
0.13	0.0056	1.99	6.09	52.00	8.54	1.230	58.9
0.14	0.0060	2.16	6.10	55.75	9.14	1.317	63.1
0.15	0.0063	2.32	6.11	58.84	9.64	1.388	66.4
0.16	0.0066	2.49	6.12	62.22	10.17	1.455	70.1
0.17	0.0070	2.66	6.13	65.31	10.66	1.535	73.5
0.18	0.0073	2.82	6.14	68.40	11.14	1.605	76.8
0.19	0.0076	2.99	6.15	71.49	11.63	1.674	80.2
0.20	0.0080	3.15	6.16	74.59	12.11	1.744	83.5
0.21	0.0083	3.32	6.17	77.68	12.59	1.813	86.8
0.22	0.0086	3.48	6.18	80.49	13.02	1.875	89.8
0.23	0.0089	3.65	6.19	83.58	13.50	1.944	93.1
0.24	0.0092	3.82	6.20	86.39	13.93	2.006	96.0
0.25	0.0095	3.98	6.21	89.20	14.36	2.068	99.0
0.26	0.0099	4.15	6.22	92.29	14.83	2.136	102.3
0.27	0.0101	4.31	6.23	95.01	15.24	2.195	105.1
0.28	0.0104	4.48	6.24	97.54	15.62	2.249	107.7
0.29	0.0107	4.65	6.26	99.98	15.98	2.301	110.2
0.30	0.0110	4.81	6.27	102.79	16.40	2.362	113.1
0.31	0.0112	4.98	6.28	105.23	16.76	2.414	115.6
0.32	0.0115	5.14	6.29	107.76	17.13	2.467	118.1
0.33	0.0118	5.31	6.30	110.19	17.49	2.519	120.6
0.34	0.0120	5.48	6.31	112.07	17.76	2.557	122.4
0.35	0.0122	5.64	6.32	114.22	18.07	2.602	124.6
0.36	0.0124	5.81	6.33	116.38	18.38	2.646	126.7
0.37	0.0126	5.97	6.34	118.25	18.64	2.684	128.5
0.38	0.0128	6.14	6.36	119.84	18.86	2.715	130.0
0.39	0.0129	6.31	6.37	120.78	18.97	2.732	130.8
0.40	0.0129	6.47	6.38	121.06	18.98	2.733	130.9
0.41	0.0129	6.64	6.39	120.78	18.90	2.722	130.3
0.42	0.0127	6.80	6.40	119.19	18.62	2.681	128.4
0.43	0.0124	6.97	6.41	116.09	18.11	2.607	124.8
0.44	0.0118	7.14	6.42	110.57	17.21	2.479	118.7

UNCONFINED COMPRESSIVE STRENGTH, q <sub>u</sub> :	130.87	kPa
(based on maximum q <sub>u</sub> value)	2.733	ksf
UNDRAINED SHEAR STRENGTH, S <sub>u</sub> :	65.44	kPa
(based on maximum q <sub>u</sub> value)	1.367	ksf

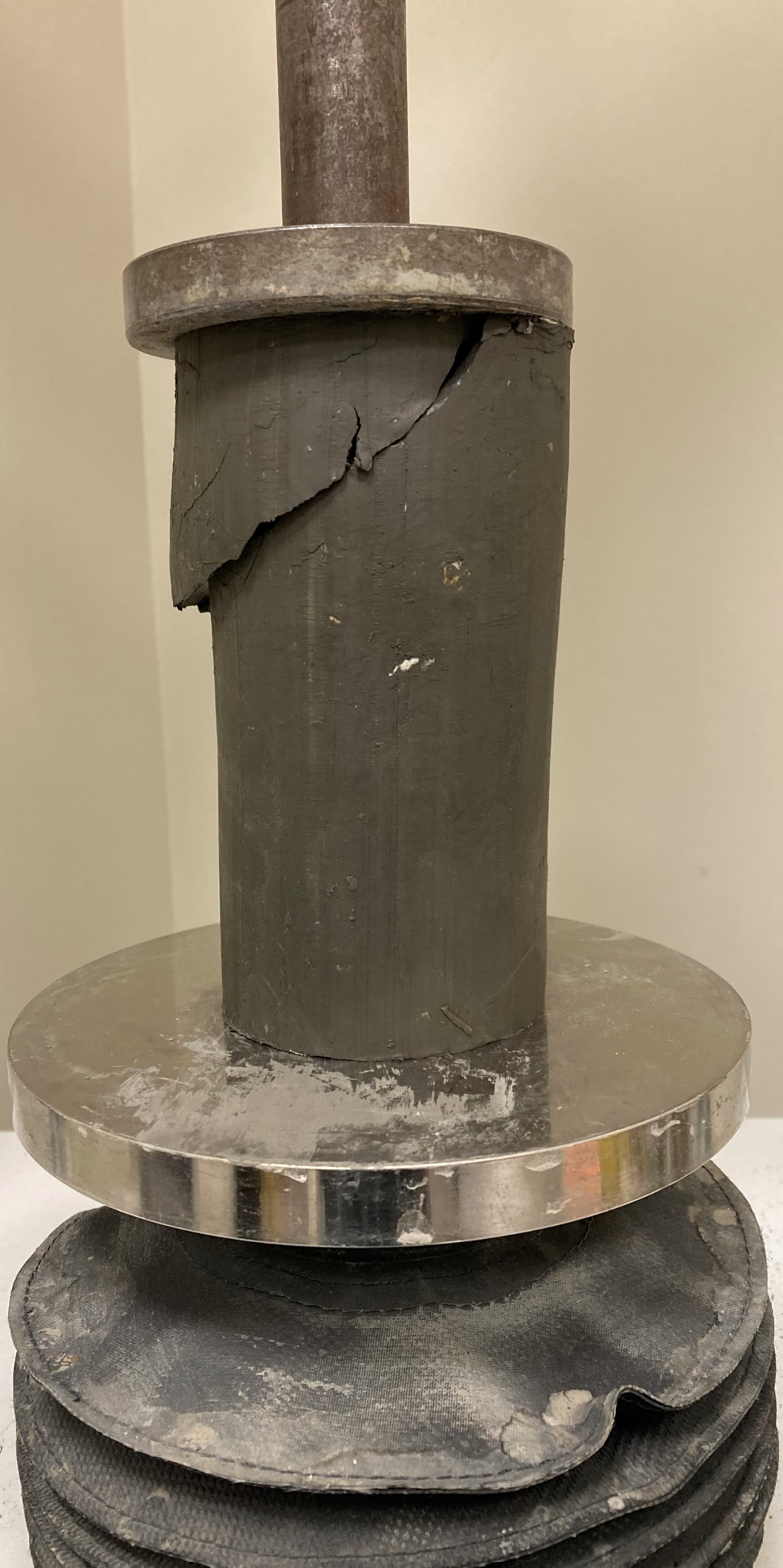
**NOTES:**



**AECOM**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS**  
**(ASTM D2166)**







**AECOM - SOILS LABORATORY**  
**SHEAR STRENGTH, MOISTURE CONTENT & DENSITY CALCULATIONS**



CLIENT: City of Winnipeg  
 PROJECT: Jefferson CSR Contract 8A & 9  
 JOB NO.: 60680190

<b>TEST HOLE NO.:</b>	<b>TH22-20</b>
<b>SAMPLE NO.:</b>	<b>T10</b>
<b>SAMPLE DEPTH:</b>	12.19 - 12.80 m
<b>DATE TESTED:</b>	20-Oct-22
<b>SHEAR STRENGTH TESTS</b>	
<b>TORVANE</b>	
Reading	0.45
Vane Size (S, M, L)	M
Undrained Shear Strength (kPa)	44.1
Undrained Shear Strength (ksf)	0.92
<b>POCKET PENETROMETER</b>	
Reading - Qu (tsf)	0.50
Undrained Shear Strength (kPa)	23.9
Reading - Qu (tsf)	0.50
Undrained Shear Strength (kPa)	23.9
Reading - Qu (tsf)	0.50
Undrained Shear Strength (kPa)	23.9
<b>UNCONFINED COMPRESSIVE STRENGTH TEST</b>	
Unconfined compressive strength (kPa)	52.5
Unconfined compressive strength (ksf)	1.1
Undrained Shear Strength (kPa)	26.3
Undrained Shear Strength (ksf)	0.548
<b>MOISTURE CONTENT</b>	
Tare Number	X35
Wt. Sample wet + tare (g)	407.1
Wt. Sample dry + tare (g)	311.4
Wt. Tare (g)	8.5
Moisture Content %	31.6
<b>BULK DENSITY</b>	
Sample Wt. (g)	1279.3
Diameter 1 (cm)	7.30
Diameter 2 (cm)	7.20
Diameter 3 (cm)	7.30
<b>Avg. Diameter (cm)</b>	<b>7.27</b>
Length 1 (cm)	15.40
Length 2 (cm)	15.30
Length 3 (cm)	15.40
<b>Avg. Length (cm)</b>	<b>15.37</b>
Volume (cm <sup>3</sup> )	637.3
Moisture content (%)	31.6
Bulk Density (g/cm <sup>3</sup> )	2.007
<b>Bulk Unit Weight (kN/m<sup>3</sup>)</b>	<b>19.7</b>
<b>Bulk Unit Weight (pcf)</b>	<b>125.3</b>
<b>Dry Unit Weight (kN/m<sup>3</sup>)</b>	<b>14.96</b>

**AECOM - SOILS LABORATORY**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS (ASTM D2166)**

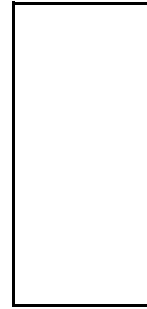


CLIENT:	City of Winnipeg
PROJECT:	Jefferson CSR Contract 8A & 9
JOB NO.:	60680190

TEST HOLE NO.:	TH22-20
SAMPLE NO.:	T10
SAMPLE DEPTH:	12.19 - 12.80 m
SAMPLE DATE:	
TEST DATE:	20-Oct-22

<b>SOIL DESCRIPTION:</b>	
CLAY - silt pockets (10mm), trace sand, trace gravel, moist, firm, grey, high plasticity	
<b>MOISTURE CONTENT:</b>	31.6

SAMPLE DIAM.(Do):	72.67	(mm)	INITIAL AREA, A <sub>o</sub> :	4147.3	(mm <sup>2</sup> )
SAMPLE LENGTH, (L <sub>o</sub> ):	153.67	(mm)	PISTON RATE:	0.0602	(inches / minute)
L / D RATIO:	2.11	(2 < L/D < 2.5)	AXIAL STRAIN RATE, R:	1.00	(0.5<R<2 % / minute)



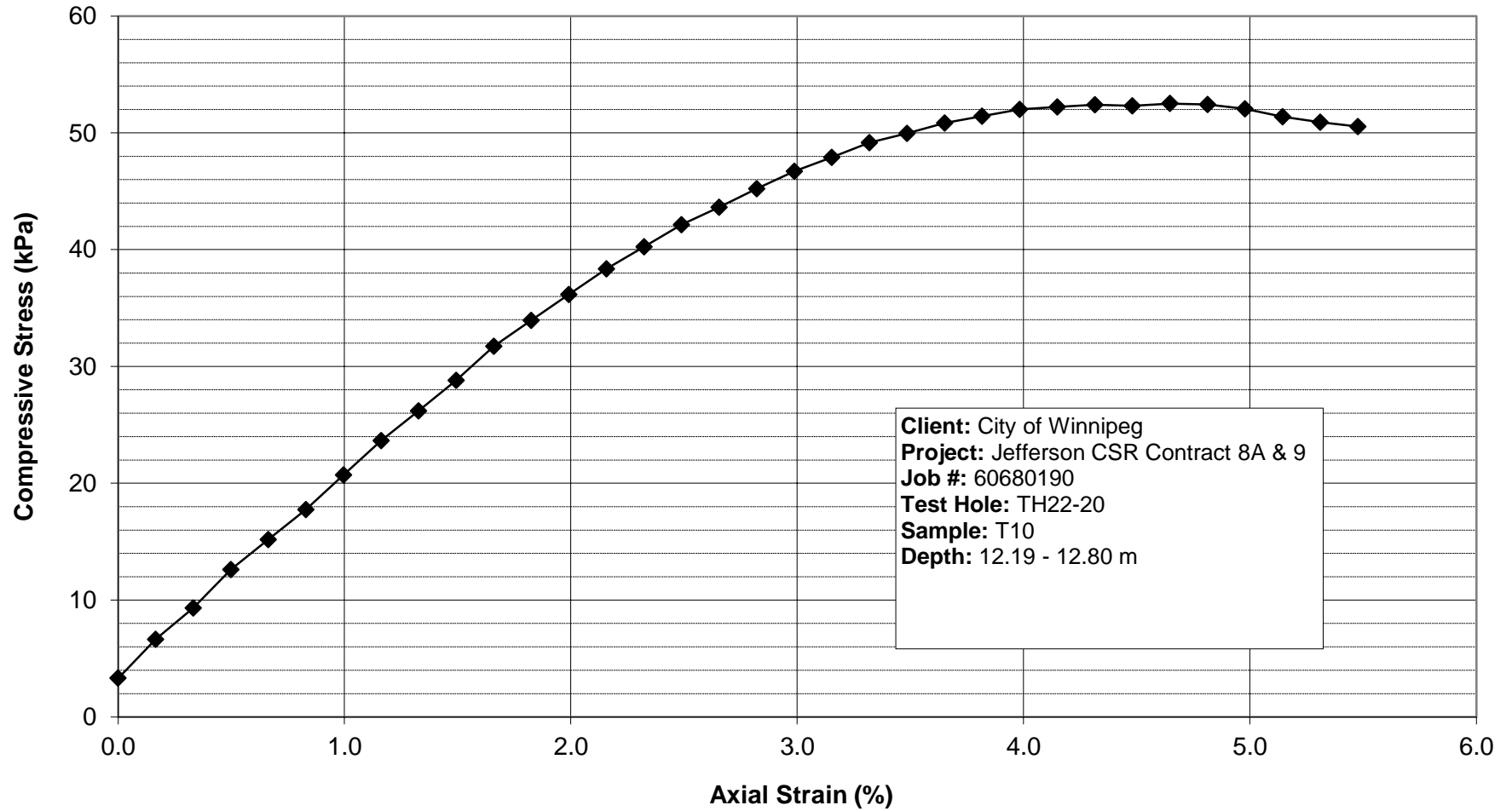
FAILURE SKETCH

TEST DATA - DIAL READINGS							
AXIAL COMPRESSION	PROVING RING	TOTAL AXIAL STRAIN, E <sub>t</sub>	AVERAGE CROSS-SECTIONAL AREA, A	APPLIED AXIAL LOAD, P	COMPRESSIVE STRESS, σ <sub>c</sub>		
					(inches)	(inches)	(inches <sup>2</sup> )
0.01	0.0003	0.00	6.43	3.09	0.48	0.069	3.3
0.02	0.0007	0.17	6.44	6.18	0.96	0.138	6.6
0.03	0.0009	0.33	6.45	8.71	1.35	0.195	9.3
0.04	0.0013	0.50	6.46	11.81	1.83	0.263	12.6
0.05	0.0015	0.66	6.47	14.24	2.20	0.317	15.2
0.06	0.0018	0.83	6.48	16.68	2.57	0.371	17.7
0.07	0.0021	1.00	6.49	19.49	3.00	0.432	20.7
0.08	0.0024	1.16	6.50	22.30	3.43	0.494	23.6
0.09	0.0026	1.33	6.51	24.74	3.80	0.547	26.2
0.10	0.0029	1.49	6.53	27.27	4.18	0.602	28.8
0.11	0.0032	1.66	6.54	30.08	4.60	0.663	31.7
0.12	0.0034	1.83	6.55	32.23	4.92	0.709	33.9
0.13	0.0037	1.99	6.56	34.39	5.24	0.755	36.1
0.14	0.0039	2.16	6.57	36.54	5.56	0.801	38.3
0.15	0.0041	2.32	6.58	38.42	5.84	0.841	40.2
0.16	0.0043	2.49	6.59	40.29	6.11	0.880	42.1
0.17	0.0045	2.66	6.60	41.79	6.33	0.911	43.6
0.18	0.0046	2.82	6.61	43.38	6.56	0.944	45.2
0.19	0.0048	2.99	6.63	44.88	6.77	0.975	46.7
0.20	0.0049	3.15	6.64	46.10	6.95	1.000	47.9
0.21	0.0051	3.32	6.65	47.41	7.13	1.027	49.2
0.22	0.0052	3.48	6.66	48.26	7.25	1.043	50.0
0.23	0.0053	3.65	6.67	49.19	7.37	1.062	50.8
0.24	0.0053	3.82	6.68	49.85	7.46	1.074	51.4
0.25	0.0054	3.98	6.69	50.50	7.54	1.086	52.0
0.26	0.0054	4.15	6.71	50.79	7.57	1.090	52.2
0.27	0.0055	4.31	6.72	51.07	7.60	1.095	52.4
0.28	0.0055	4.48	6.73	51.07	7.59	1.093	52.3
0.29	0.0055	4.65	6.74	51.35	7.62	1.097	52.5
0.30	0.0055	4.81	6.75	51.35	7.60	1.095	52.4
0.31	0.0055	4.98	6.77	51.07	7.55	1.087	52.0
0.32	0.0054	5.14	6.78	50.50	7.45	1.073	51.4
0.33	0.0054	5.31	6.79	50.13	7.38	1.063	50.9
0.34	0.0053	5.48	6.80	49.85	7.33	1.056	50.5

UNCONFINED COMPRESSIVE STRENGTH, q <sub>u</sub> :	52.52	kPa
(based on maximum q <sub>u</sub> value)	1.097	ksf
UNDRAINED SHEAR STRENGTH, S <sub>u</sub> :	26.26	kPa
(based on maximum q <sub>u</sub> value)	0.548	ksf

**NOTES:**

AECOM  
UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS  
(ASTM D2166)









## Memorandum

To Linh Trinh Page 1

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CC

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Subject Jefferson CSR Contract 8B – CoW - Test Results

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From German Leal

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Date March 24, 2023 Project Number 60680190.2.3 & 2.5

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Please find attached the following material test result(s) on sample(s) submitted to the Winnipeg Geotechnical Laboratory:

- Fifty-eight (58) Moisture Content Determination Test.
- Ten (10) Atterberg Limits (3 Points) Test.
- Thirteen (13) Grain Size Distribution (Hydrometer method) Test.
- Sixteen (16) Torvane, Pocket Penetrometer, Moisture Content, Bulk Density and Visual Description with Unconfined Compressive Strength on Shelby tube Samples.

If you have any questions, please contact the undersigned.

Sincerely,



**German Leal, M.Eng., P.Eng.**  
Discipline Lead, Geotechnical

Att.



AECOM Canada Ltd.  
 Winnipeg Geotechnical Laboratory  
 99 Commerce Drive  
 Winnipeg, Manitoba  
 R3P 0Y7  
 Phone: 204 477 5381 Fax: 204 284 2040

Project Name:	Jefferson CSR Contract 8B & 10
Project Number:	60680190
Client:	CoW
Sample Location:	Winnipeg
Sample Depth:	Varies
Sample Number:	Varies

Supplier:	AECOM
Specification:	N/A
Field Technician:	LTrinh
Sample Date:	1/24-25/2023
Lab Technician:	LBoughton
Date Tested:	February 13, 2023

## Moisture Content (ASTM D2216-10)

Standard Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass

Location	Sample	Depth (m)	Moisture Content (%)
TH23-21	G1	1.37 - 1.52 m	19.2%
	S2	3.05 - 3.51 m	34.0%
	G3	4.42 - 4.57 m	33.4%
	T4	6.10 - 6.71 m	45.0%
	G5	7.47 - 7.62 m	29.5%
	S6	9.14 - 9.60 m	31.0%
	G7	10.52 - 10.67 m	29.0%
	T8	12.19 - 12.80 m	-
TH23-22	S1	0.61 - 1.07 m	28.4%
	G2	2.90 - 3.05 m	32.1%
	T3	4.57 - 5.18 m	60.4%
	G4	5.94 - 6.10 m	37.4%
	S5	7.62 - 8.08 m	29.1%
	G6	8.99 - 9.14 m	31.0%
	T7	10.67 - 11.28 m	52.7%
	G8	12.04 - 12.19 m	32.1%
	S9	13.72 - 14.17 m	31.2%
	G10	15.09 - 15.24 m	11.2%
	S11	16.76 - 17.22 m	8.4%
	G12	18.14 - 18.29 m	8.6%
TH23-23	G1	1.37 - 1.52 m	20.2%
	T2 (Clay)	3.05 - 3.66 m	49.6%
	G3	4.42 - 4.57 m	34.2%
	S4	6.10 - 6.55 m	34.0%
	G5	7.47 - 7.62 m	31.8%
	T6	9.14 - 9.75 m	25.0%
	G7	10.52 - 10.67 m	37.7%
	S8	12.19 - 12.65 m	34.2%
	G1	1.37 - 1.52 m	20.5%
TH23-24	S2	3.05 - 3.51 m	31.8%
	G3	4.42 - 4.57 m	35.3%
	T4	6.10 - 6.71 m	50.6%
	G5	7.47 - 7.62 m	29.6%
	S6	9.14 - 9.60 m	33.3%
	G7	10.52 - 10.67 m	32.6%
	T8	12.19 - 12.80 m	25.4%
	S1	1.52 - 1.98 m	19.5%
TH23-25	G2	2.90 - 3.05 m	27.2%

Location	Sample	Depth (m)	Moisture Content (%)	
	T3	4.57 - 5.18 m	55.0%	
	G4	5.94 - 6.10 m	30.9%	
	T5	7.62 - 8.23 m	43.7%	
	G6	8.99 - 9.14 m	31.8%	
	S7	10.67 - 11.13 m	28.9%	
	G8	12.04 - 1.52 m	21.6%	
	TH23-26	S1	1.52 - 1.98 m	25.4%
		G2	2.90 - 3.05 m	30.8%
T3		4.57 - 5.18 m	56.1%	
G4		5.94 - 6.10 m	22.2%	
S5		7.62 - 8.08 m	22.7%	
G6		8.99 - 9.14 m	24.8%	
T7		10.67 - 11.28 m	51.1%	
G8		12.04 - 12.19 m	20.7%	
TH23-27	G1	1.37 - 1.52 m	15.4%	
	T2	3.05 - 3.66 m	49.6%	
	G3	4.42 - 4.57 m	33.7%	
	S4	6.10 - 6.55 m	31.8%	
TH23-28	G1	1.37 - 1.52 m	18.8%	
	S2	3.05 - 3.51 m	30.8%	
	G3	4.42 - 4.57 m	29.0%	
	T4	6.10 - 6.71 m	51.5%	
	G5	7.47 - 7.62 m	33.6%	
	S6	9.14 - 9.60 m	26.1%	
	G7	10.52 - 10.67 m	21.4%	
	T8	12.19 - 12.80 m	49.7%	
	G9	13.56 - 13.72 m	30.7%	
	S10	15.24 - 15.70 m	9.9%	
TH23-29	S1	1.52 - 1.98 m	17.3%	
	G2	2.90 - 3.05 m	23.9%	
	T3	4.57 - 5.18 m	56.9%	
	G4	5.94 - 6.10 m	28.1%	
	S5	7.62 - 8.08 m	26.2%	
	G6	8.99 - 9.14 m	25.5%	
	T7	10.67 - 11.28 m	17.4%	
	G8	12.04 - 12.19 m	28.5%	



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Winnipeg Geotechnical Laboratory  
99 Commerce Drive  
Winnipeg, Manitoba  
R3P 0Y7  
Phone: 204 477 5381



Fax: 204 284 2040

Project Name: Jefferson CSR Contract 8B & 10  
Project Number: 60680190  
Client: CoW  
Sample Location: TH23-21  
Sample Depth: 6.10 - 6.71 m  
Sample Number: T4

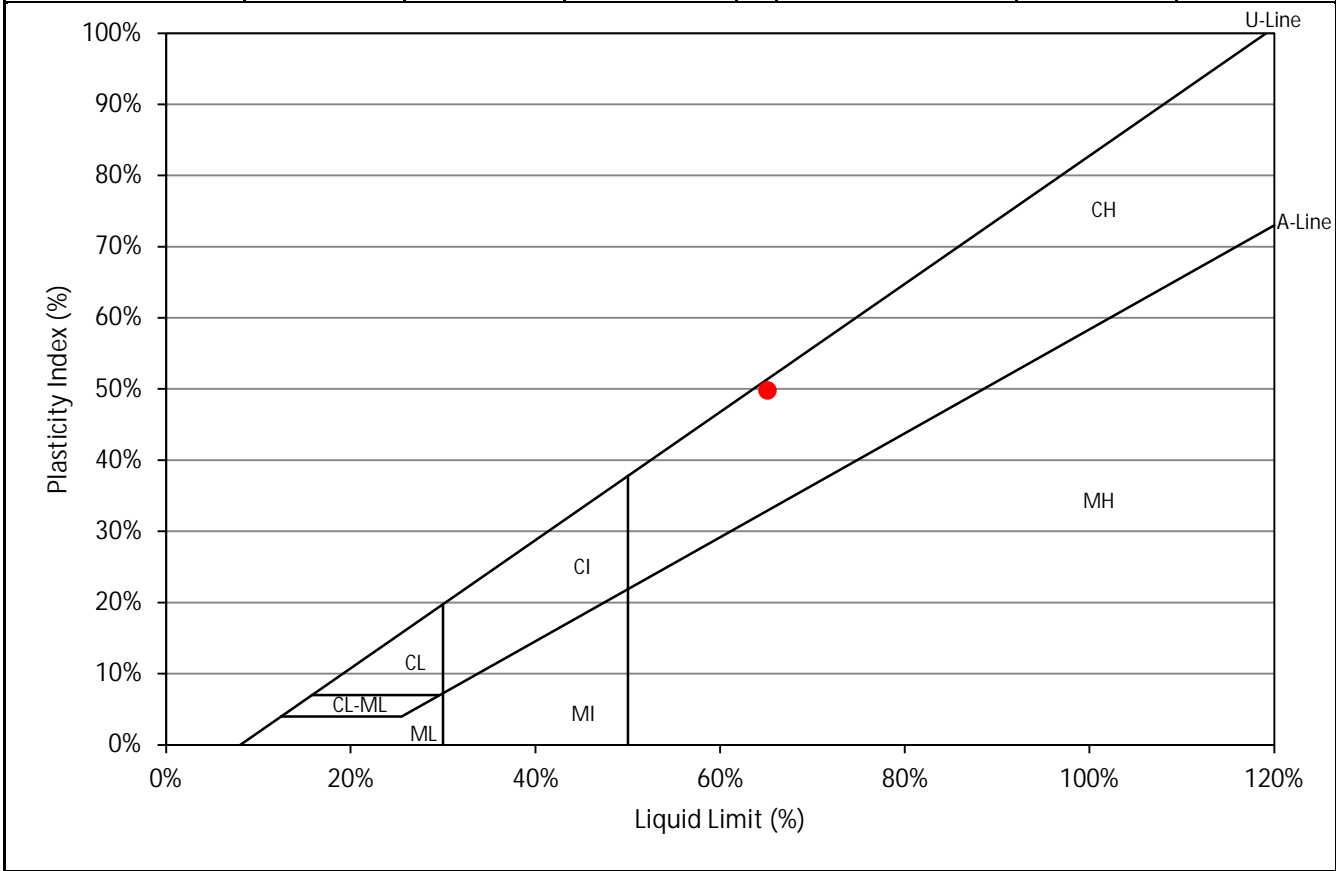
Supplier: AECOM  
Specification: N/A  
Field Technician: LTrinh  
Sample Date: Varies  
Lab Technician: LBoughton  
Date Tested: March 17, 2023

### Atterberg Limits (ASTM D4318)

Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

Liquid Limit			
Blows	35	22	16
Wet Sample (g)	11.7	10.9	9.7
Dry Sample (g)	7.2	6.5	5.8
Water Content (%)	63.1%	66.0%	67.8%

Plastic Limit		
Trial	1	2
Wet Sample (g)	5.6	5.5
Dry Sample (g)	4.9	4.8
Water Content (%)	15.2%	15.5%



Liquid Limit (%): 65.1%      Plastic Limit (%): 15.3%      Plasticity Index (%): 49.8%



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Project Name: Jefferson CSR Contract 8B & 10  
Project Number: 60680190  
Client: CoW  
Sample Location: TH23-22  
Sample Depth: 4.57 - 5.18 m  
Sample Number: T3

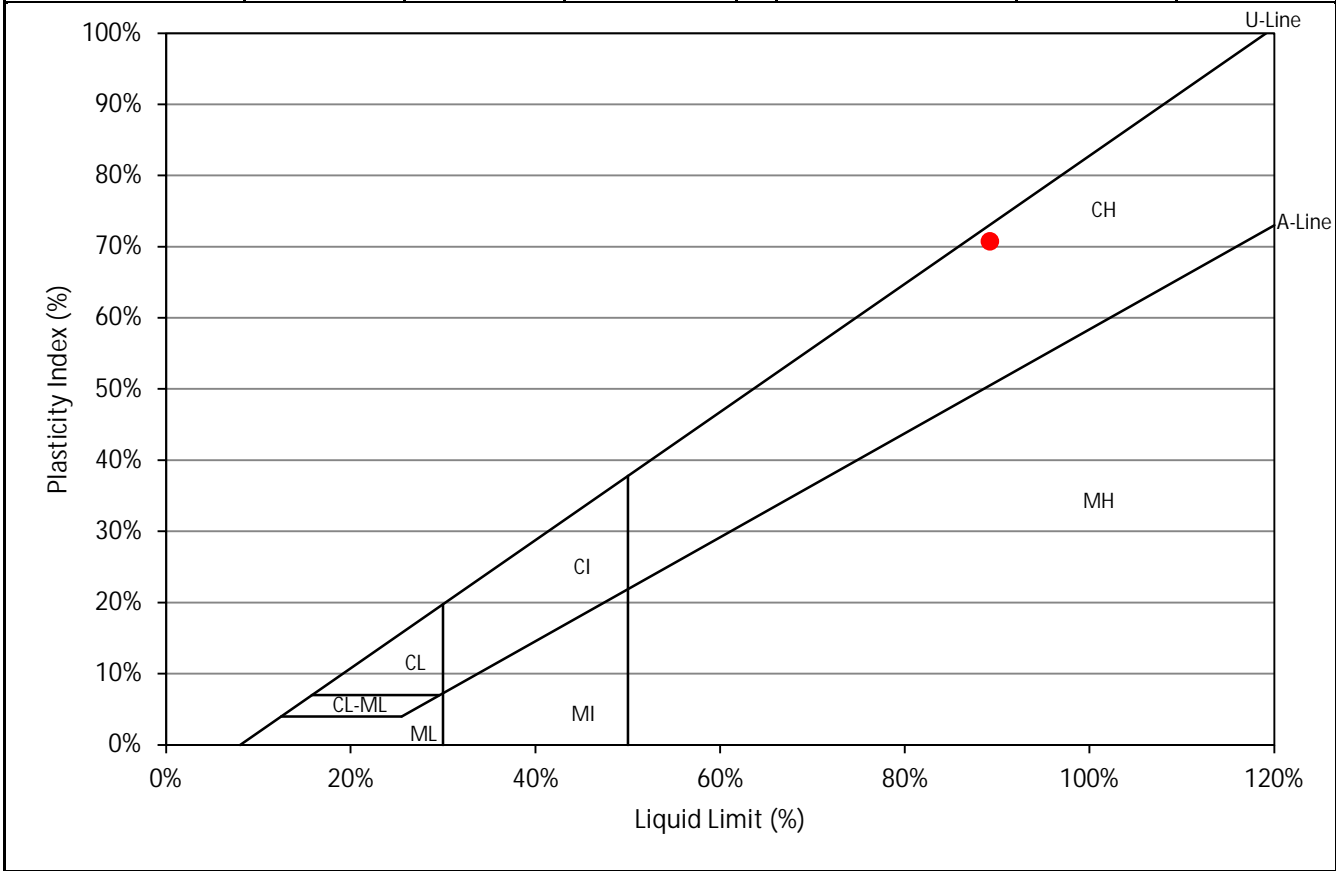
Supplier: AECOM  
Specification: N/A  
Field Technician: LTrinh  
Sample Date: Varies  
Lab Technician: LBoughton  
Date Tested: March 17, 2023

### Atterberg Limits (ASTM D4318)

Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

Liquid Limit			
Blows	30	22	15
Wet Sample (g)	10.0	10.0	9.5
Dry Sample (g)	5.3	5.3	4.9
Water Content (%)	88.0%	89.7%	93.2%

Plastic Limit		
Trial	1	2
Wet Sample (g)	6.0	6.0
Dry Sample (g)	5.1	5.1
Water Content (%)	17.9%	19.1%



Liquid Limit (%): 89.2%      Plastic Limit (%): 18.5%      Plasticity Index (%): 70.7%



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Project Name: Jefferson CSR Contract 8B & 10  
Project Number: 60680190  
Client: CoW  
Sample Location: TH23-23  
Sample Depth: 1.52 - 2.13 m  
Sample Number: G1

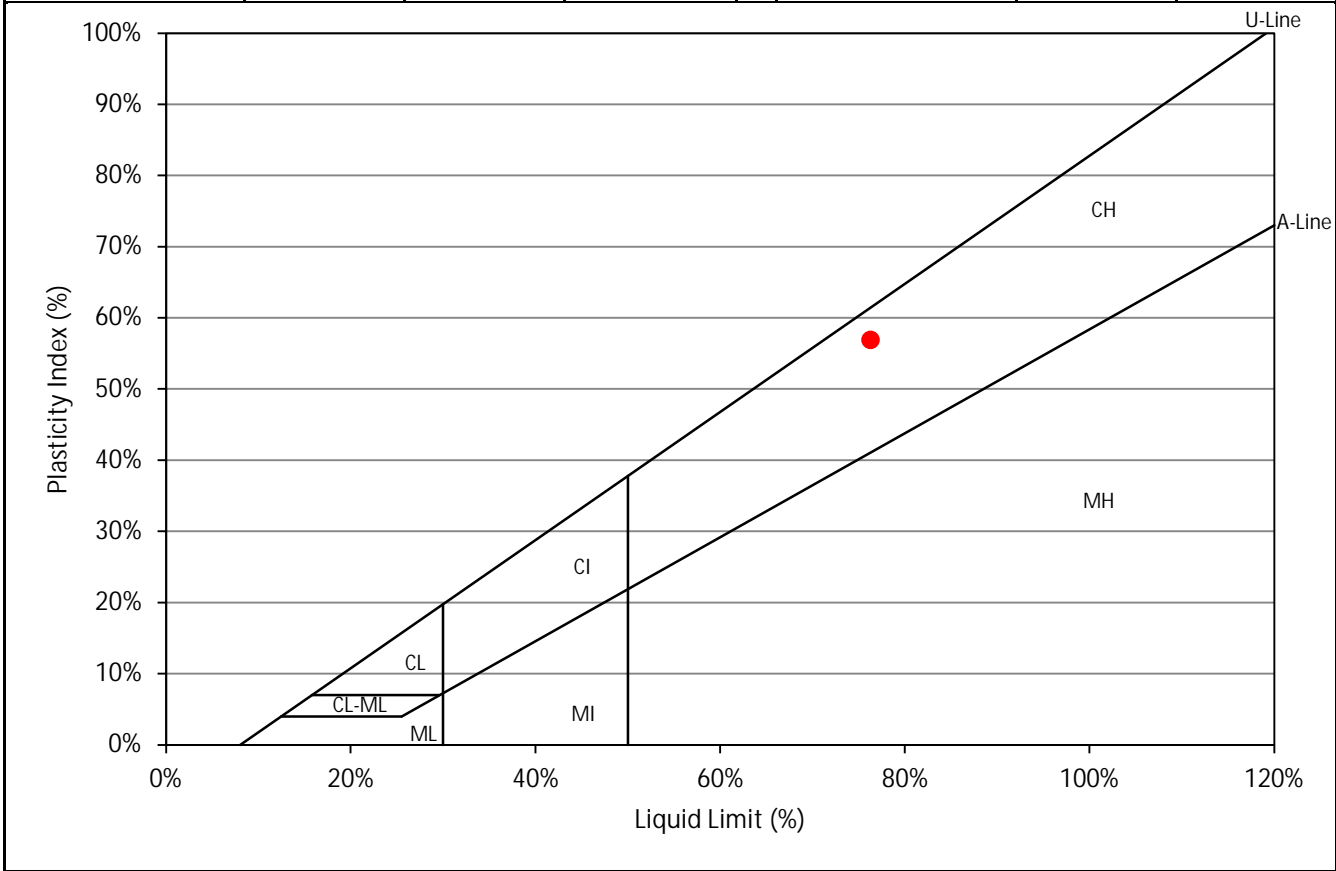
Supplier: AECOM  
Specification: N/A  
Field Technician: LTrinh  
Sample Date: Varies  
Lab Technician: LBoughton  
Date Tested: March 2, 2023

### Atterberg Limits (ASTM D4318)

Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

	Liquid Limit		
Blows	35	28	20
Wet Sample (g)	11.0	12.0	13.6
Dry Sample (g)	6.3	6.8	7.7
Water Content (%)	74.4%	76.1%	77.3%

	Plastic Limit	
Trial	1	2
Wet Sample (g)	5.8	7.1
Dry Sample (g)	4.9	6.0
Water Content (%)	19.3%	19.5%



Liquid Limit (%): 76.3%      Plastic Limit (%): 19.4%      Plasticity Index (%): 56.9%



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Project Number: 60680190  
Client: CoW  
Sample Location: TH23-23  
Sample Depth: 3.05 - 3.66 m  
Sample Number: T2

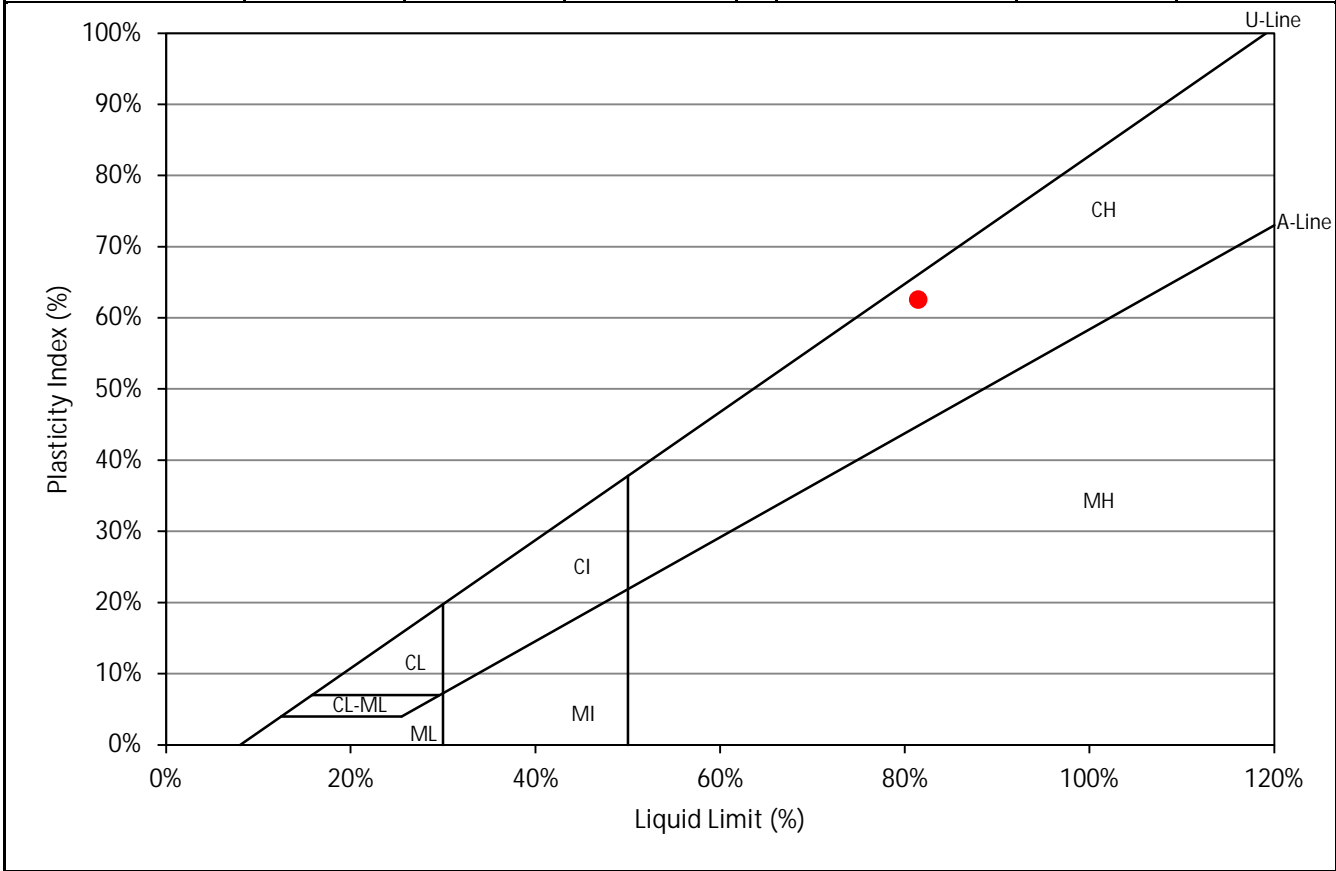
Supplier: AECOM  
Specification: N/A  
Field Technician: LTrinh  
Sample Date: Varies  
Lab Technician: LBoughton  
Date Tested: March 17, 2023

### Atterberg Limits (ASTM D4318)

Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

Liquid Limit			
Blows	30	26	16
Wet Sample (g)	12.8	9.5	10.1
Dry Sample (g)	7.2	5.2	5.5
Water Content (%)	79.1%	82.0%	85.1%

Plastic Limit		
Trial	1	2
Wet Sample (g)	5.4	4.9
Dry Sample (g)	4.6	4.1
Water Content (%)	18.7%	19.1%



Note: Sample tested was clay.



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Project Name: Jefferson CSR Contract 8B & 10  
Project Number: 60680190  
Client: CoW  
Sample Location: TH23-24  
Sample Depth: 6.10 - 6.71 m  
Sample Number: T4

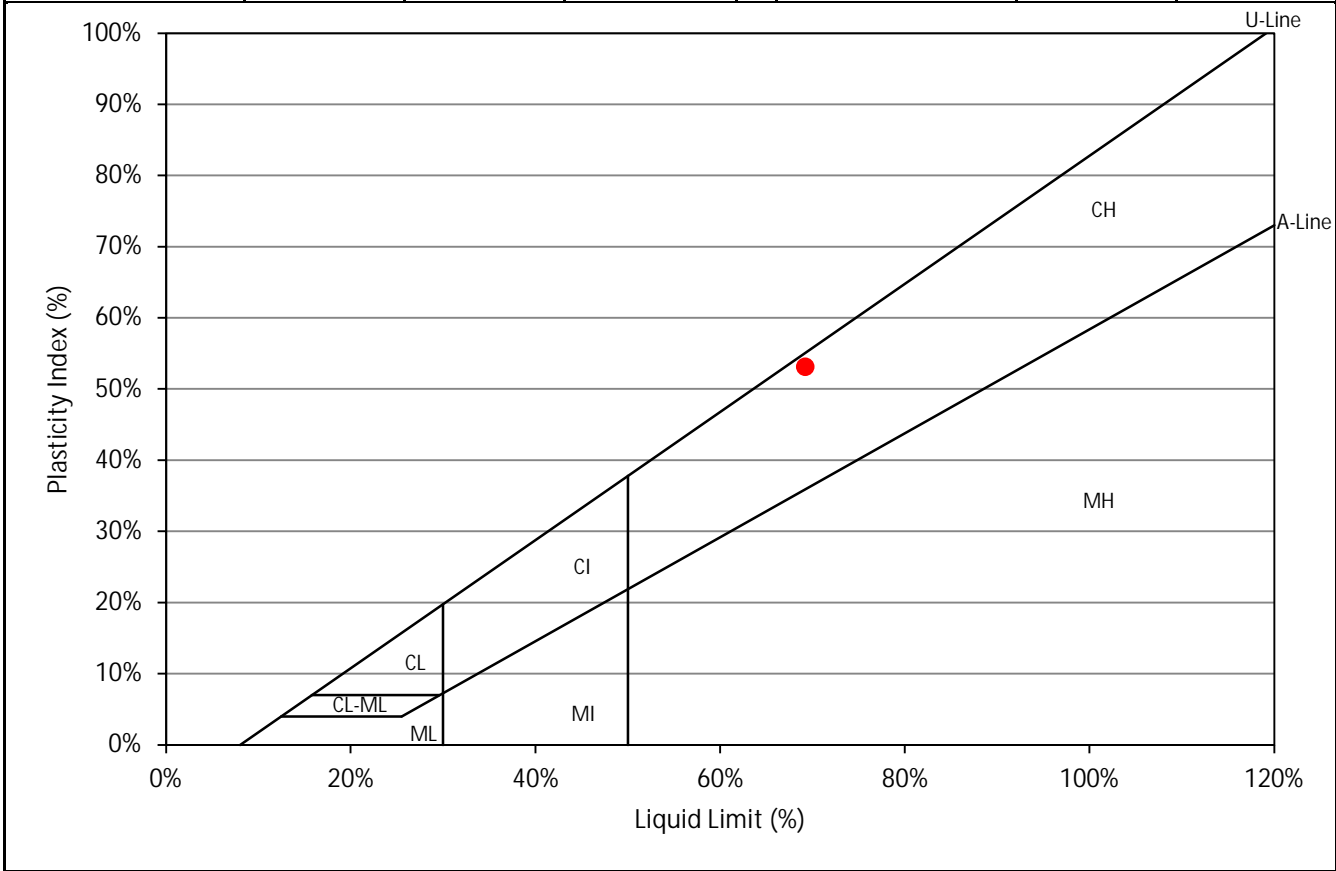
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Specification: N/A  
Field Technician: LTrinh  
Sample Date: Varies  
Lab Technician: LBoughton  
Date Tested: March 17, 2023

### Atterberg Limits (ASTM D4318)

Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

Liquid Limit			
Blows	31	20	17
Wet Sample (g)	11.2	9.4	10.6
Dry Sample (g)	6.7	5.5	6.1
Water Content (%)	67.9%	70.3%	72.2%

Plastic Limit		
Trial	1	2
Wet Sample (g)	6.0	5.7
Dry Sample (g)	5.2	5.0
Water Content (%)	16.6%	15.6%



Liquid Limit (%): 69.2%	Plastic Limit (%): 16.1%	Plasticity Index (%): 53.1%
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Project Name: Jefferson CSR Contract 8B & 10  
Project Number: 60680190  
Client: CoW  
Sample Location: TH23-25  
Sample Depth: 4.57 - 5.18 m  
Sample Number: T3

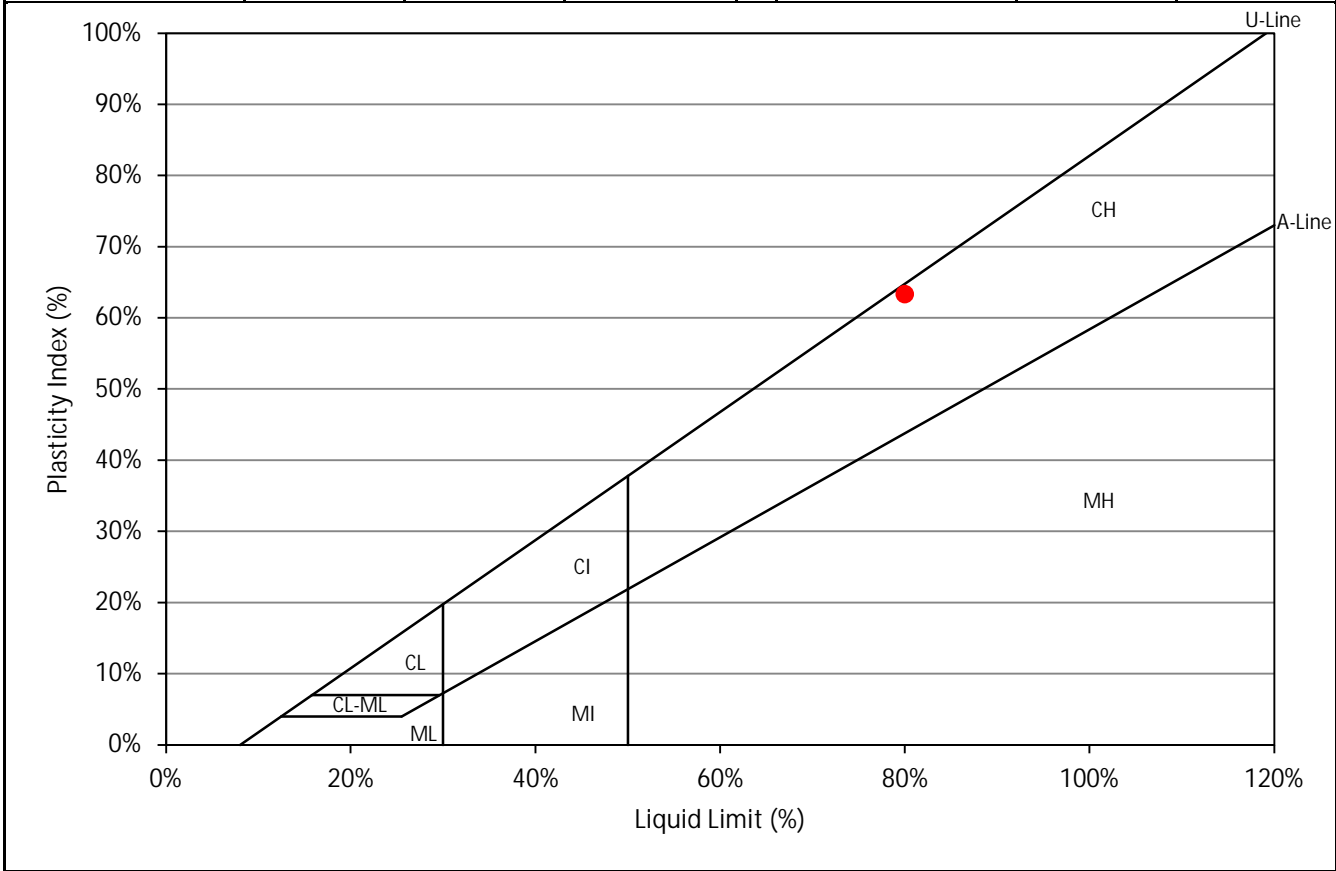
Supplier: AECOM  
Specification: N/A  
Field Technician: LTrinh  
Sample Date: Varies  
Lab Technician: LBoughton  
Date Tested: March 17, 2023

### Atterberg Limits (ASTM D4318)

Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

Liquid Limit			
Blows	30	21	17
Wet Sample (g)	12.3	8.7	9.4
Dry Sample (g)	6.9	4.8	5.1
Water Content (%)	78.7%	80.6%	83.1%

Plastic Limit		
Trial	1	2
Wet Sample (g)	6.6	5.6
Dry Sample (g)	5.7	4.8
Water Content (%)	16.3%	17.1%



Liquid Limit (%): 80.0%	Plastic Limit (%): 16.7%	Plasticity Index (%): 63.3%
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Project Name: Jefferson CSR Contract 8B & 10  
Project Number: 60680190  
Client: CoW  
Sample Location: TH23-26  
Sample Depth: 4.57 - 5.18 m  
Sample Number: T3

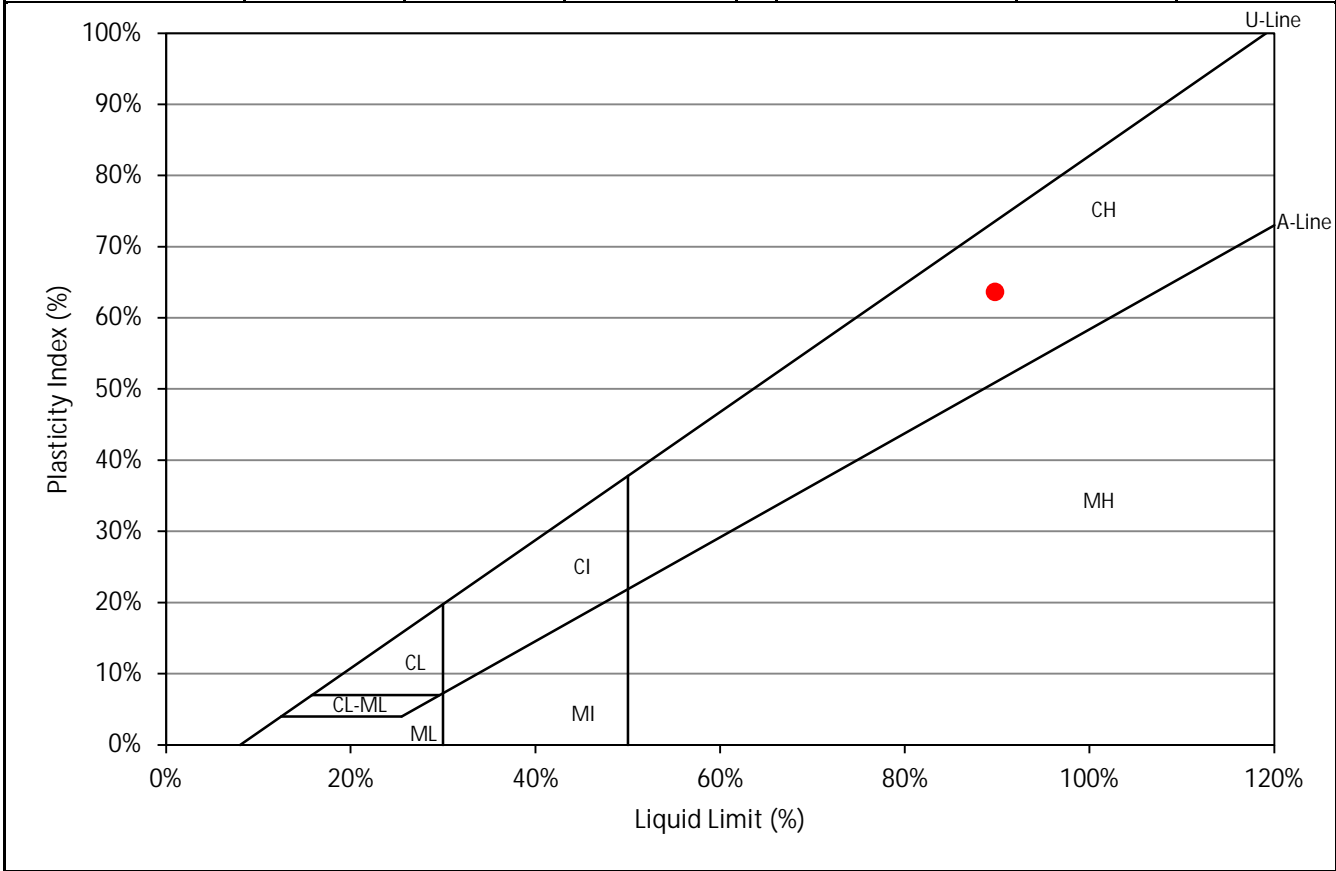
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Specification: N/A  
Field Technician: LTrinh  
Sample Date: Varies  
Lab Technician: LBoughton  
Date Tested: March 21, 2023

### Atterberg Limits (ASTM D4318)

Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

Liquid Limit			
Blows	34	28	23
Wet Sample (g)	8.8	10.1	8.2
Dry Sample (g)	4.7	5.3	4.3
Water Content (%)	86.6%	88.4%	90.6%

Plastic Limit		
Trial	1	2
Wet Sample (g)	6.4	6.9
Dry Sample (g)	5.1	5.5
Water Content (%)	26.1%	26.2%



Liquid Limit (%): 89.8%      Plastic Limit (%): 26.1%      Plasticity Index (%): 63.6%



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Project Name: Jefferson CSR Contract 8B & 10  
 Project Number: 60680190  
 Client: CoW  
 Sample Location: TH23-27  
 Sample Depth: 3.05 - 3.66 m  
 Sample Number: T2

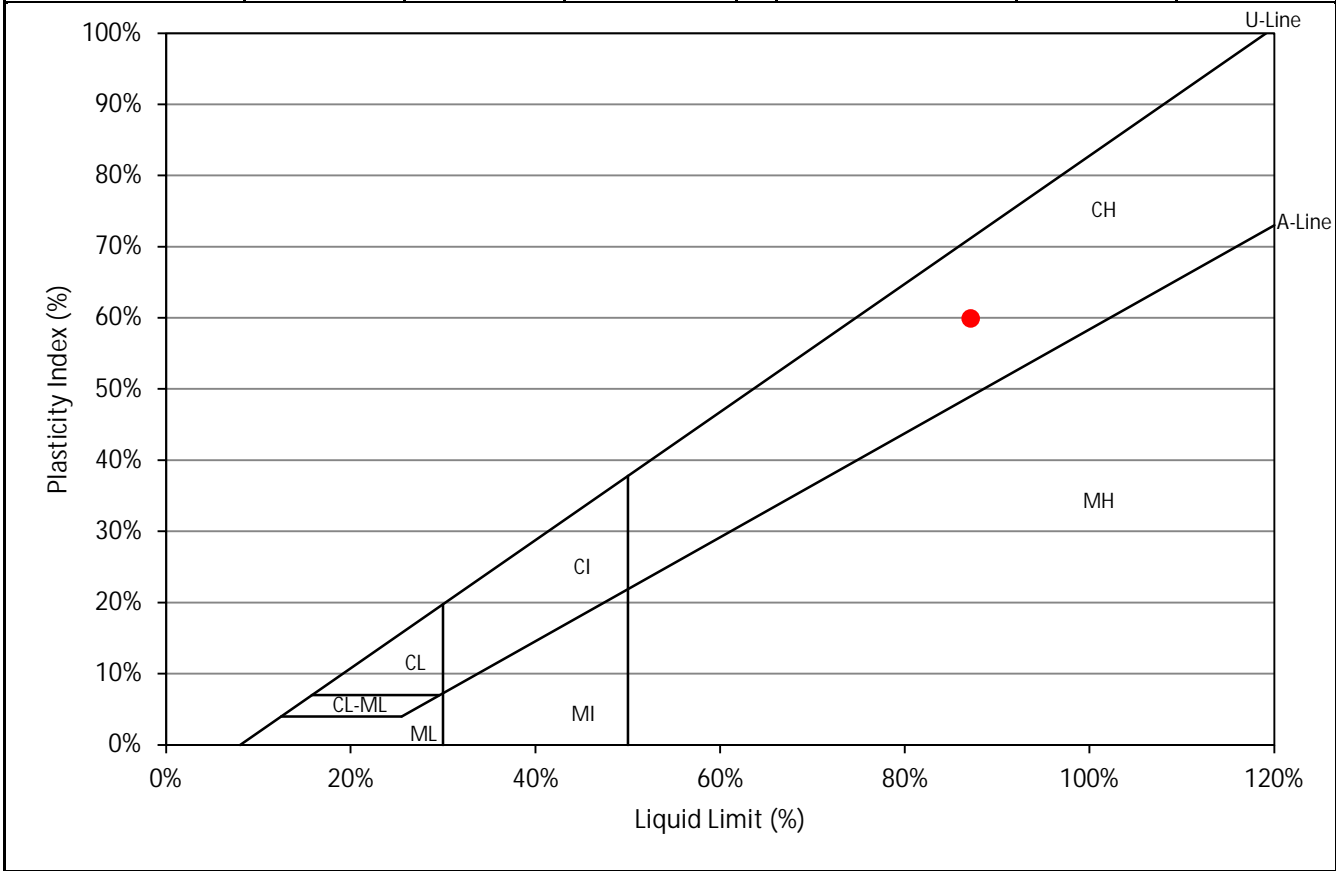
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 Specification: N/A  
 Field Technician: LTrinh  
 Sample Date: Varies  
 Lab Technician: LBoughton  
 Date Tested: March 17, 2023

## Atterberg Limits (ASTM D4318)

Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

Liquid Limit			
Blows	31	23	19
Wet Sample (g)	10.3	11.2	9.0
Dry Sample (g)	5.6	6.0	4.7
Water Content (%)	85.6%	87.2%	89.7%

Plastic Limit		
Trial	1	2
Wet Sample (g)	6.5	6.5
Dry Sample (g)	5.1	5.1
Water Content (%)	27.4%	27.2%



Liquid Limit (%): 87.2%	Plastic Limit (%): 27.3%	Plasticity Index (%): 59.9%
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Project Name: Jefferson CSR Contract 8B & 10  
Project Number: 60680190  
Client: CoW  
Sample Location: TH23-28  
Sample Depth: 6.10 - 6.71 m  
Sample Number: T4

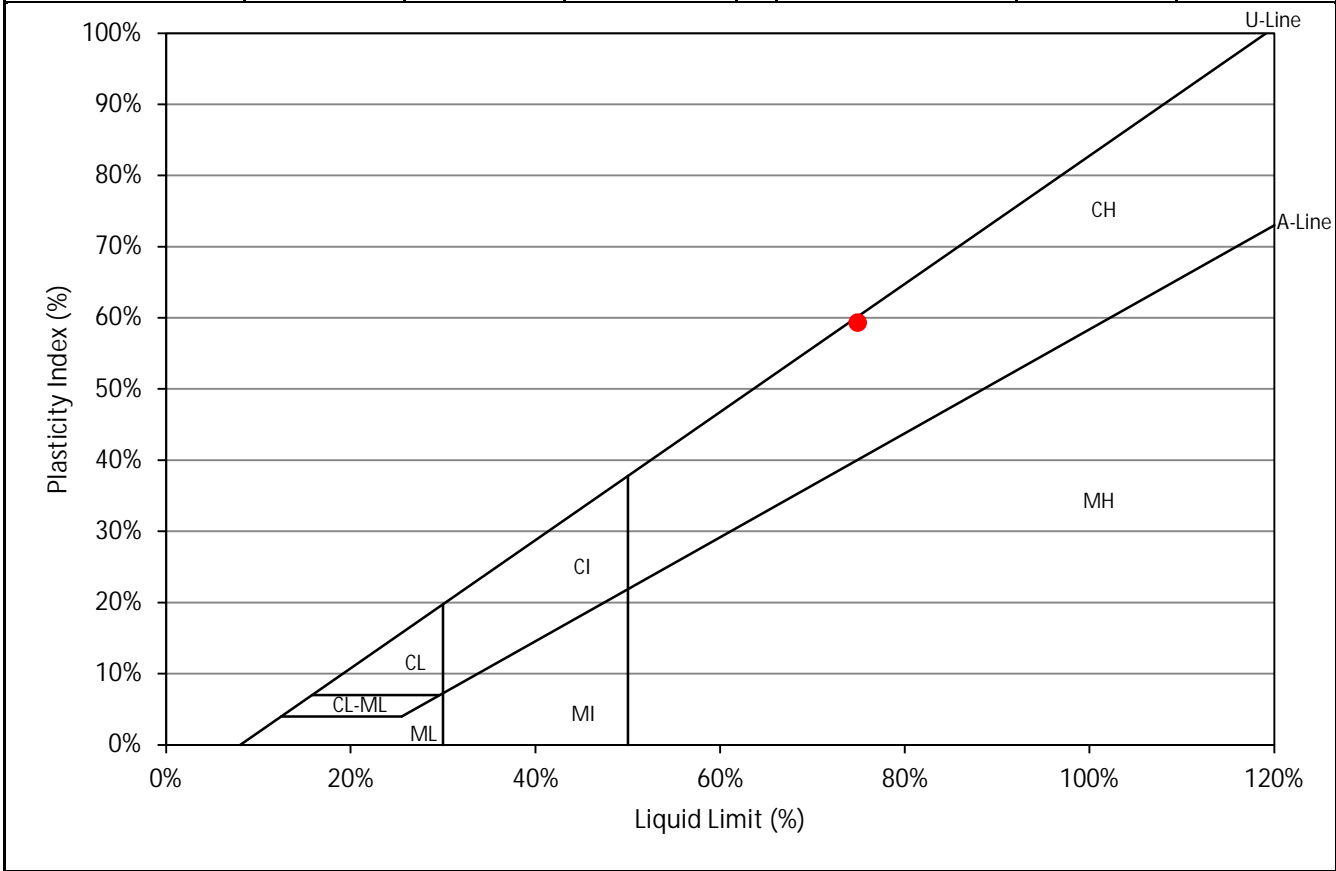
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Specification: N/A  
Field Technician: LTrinh  
Sample Date: Varies  
Lab Technician: LBoughton  
Date Tested: March 17, 2023

### Atterberg Limits (ASTM D4318)

Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

Liquid Limit			
Blows	35	29	20
Wet Sample (g)	8.4	9.7	8.7
Dry Sample (g)	4.9	5.6	4.9
Water Content (%)	72.3%	73.9%	76.9%

Plastic Limit		
Trial	1	2
Wet Sample (g)	5.4	5.7
Dry Sample (g)	4.7	4.9
Water Content (%)	15.4%	15.8%



Liquid Limit (%): 74.9%      Plastic Limit (%): 15.6%      Plasticity Index (%): 59.3%



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Project Name: Jefferson CSR Contract 8B & 10  
Project Number: 60680190  
Client: CoW  
Sample Location: TH23-29  
Sample Depth: 4.57 - 5.18 m  
Sample Number: T3

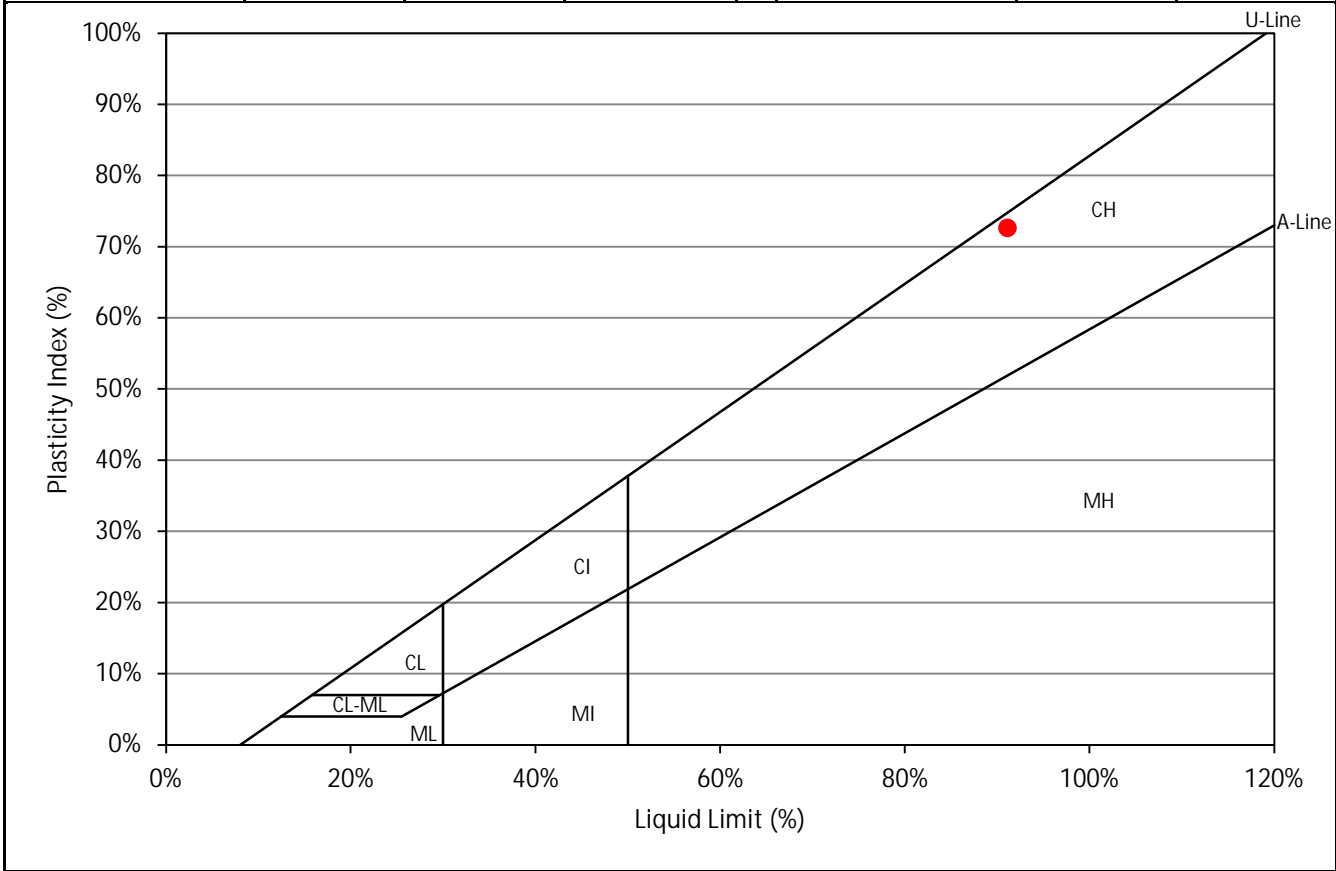
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Specification: N/A  
Field Technician: LTrinh  
Sample Date: Varies  
Lab Technician: LBoughton  
Date Tested: March 2, 2023

### Atterberg Limits (ASTM D4318)

Standard Test Methods for Liquid Limit, Plastic Limit, and Plasticity Index of Soils

Liquid Limit			
Blows	35	22	19
Wet Sample (g)	8.3	8.9	9.0
Dry Sample (g)	4.4	4.7	4.7
Water Content (%)	88.3%	91.5%	94.0%

Plastic Limit		
Trial	1	2
Wet Sample (g)	5.9	5.4
Dry Sample (g)	5.0	4.5
Water Content (%)	18.5%	18.5%



Liquid Limit (%): 91.1%	Plastic Limit (%): 18.5%	Plasticity Index (%): 72.6%
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**GRAIN SIZE DISTRIBUTION**  
(ASTM D422-63)



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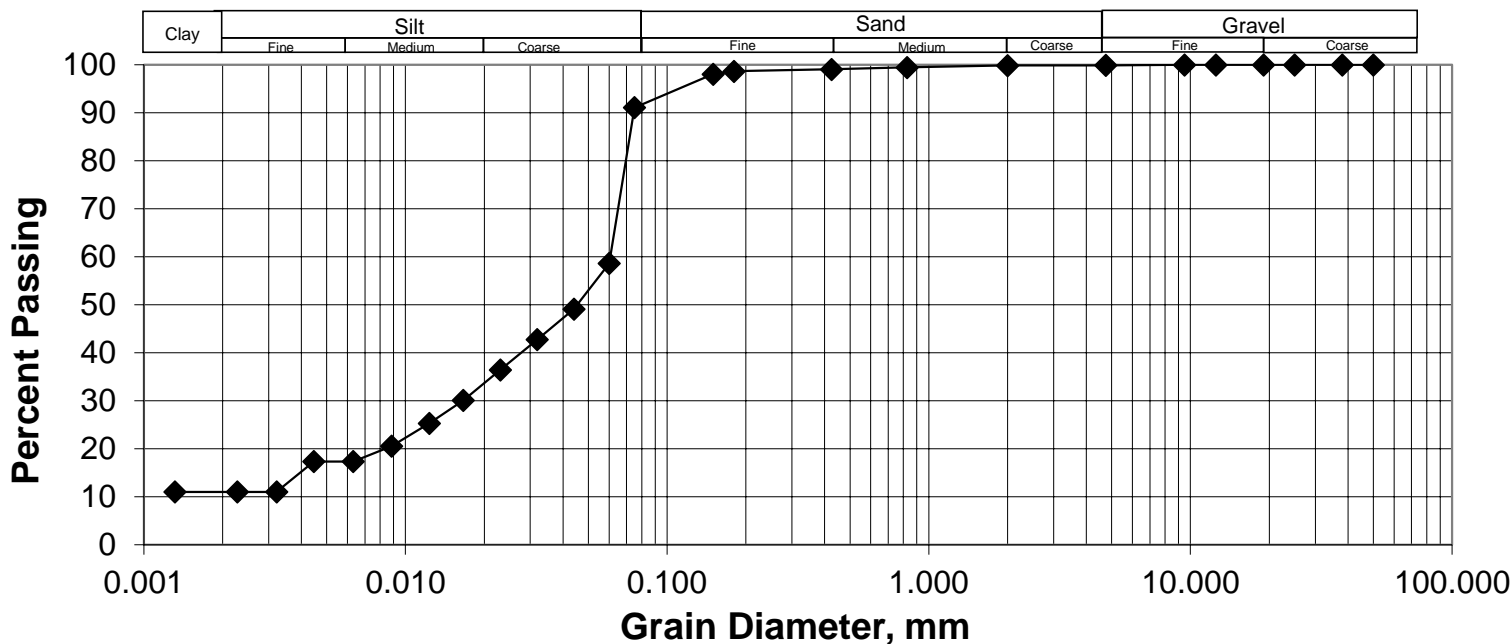


Job No.: 60680190  
Client: COW  
Project: Jefferson CSR Contract 8B & 10  
Date Tested: 24-Feb-23  
Tested By: Lee Boughton

Hole No.: TH23-21  
Sample No.: G1  
Depth: 1.52 - 1.68 m  
Date Sampled: Varies  
Sampled By: AECOM

GRAVEL SIZES		SAND SIZES		FINES	
Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing
50.0	100.0	4.75	99.9	0.0750	91.1
38.0	100.0	2.00	99.9	0.0600	58.6
25.0	100.0	0.825	99.5	0.0440	49.1
19.0	100.0	0.425	99.1	0.0318	42.8
12.5	100.0	0.18	98.7	0.0230	36.4
9.5	100.0	0.15	98.1	0.0166	30.1
4.75	99.9	0.075	91.1	0.0123	25.3
				0.0088	20.6
				0.0063	17.4
				0.0045	17.4
				0.0032	11.0
				0.0023	11.0
				0.0013	11.0

**GRAIN SIZE DISTRIBUTION CURVE**



Gravel	0.1%	Silt	80.1%
Sand	8.8%	Clay	11.0%

**GRAIN SIZE DISTRIBUTION**  
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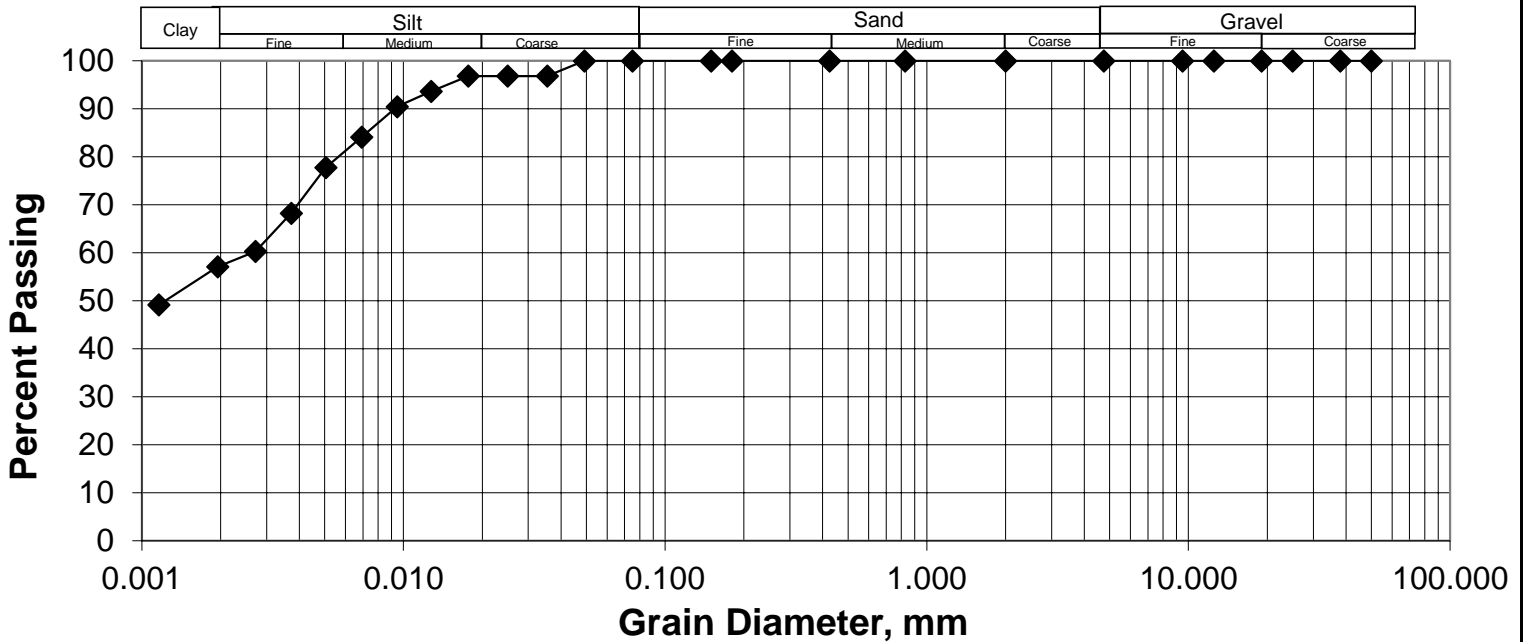


Job No.: 60680190  
Client: City of Winnipeg  
Project: Jefferson CSR Contract 8B & 10  
Date Tested: 14-Mar-23  
Tested By: Lee Boughton

Hole No.: TH23-21  
Sample No.: T4  
Depth: 6.10 - 6.71 m  
Date Sampled: Varies  
Sampled By: AECOM

GRAVEL SIZES		SAND SIZES		FINES	
Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing
50.0	100.0	4.75	100.0	0.0750	100.0
38.0	100.0	2.00	100.0	0.0491	100.0
25.0	100.0	0.825	100.0	0.0354	96.8
19.0	100.0	0.425	100.0	0.0250	96.8
12.5	100.0	0.18	100.0	0.0177	96.8
9.5	100.0	0.15	100.0	0.0127	93.6
4.75	100.0	0.075	100.0	0.0095	90.5
				0.0069	84.1
				0.0050	77.8
				0.0037	68.2
				0.0027	60.3
				0.0019	57.1
				0.0012	49.2

**GRAIN SIZE DISTRIBUTION CURVE**



Gravel	0.0%	Silt	42.5%
Sand	0.0%	Clay	57.5%

**GRAIN SIZE DISTRIBUTION**  
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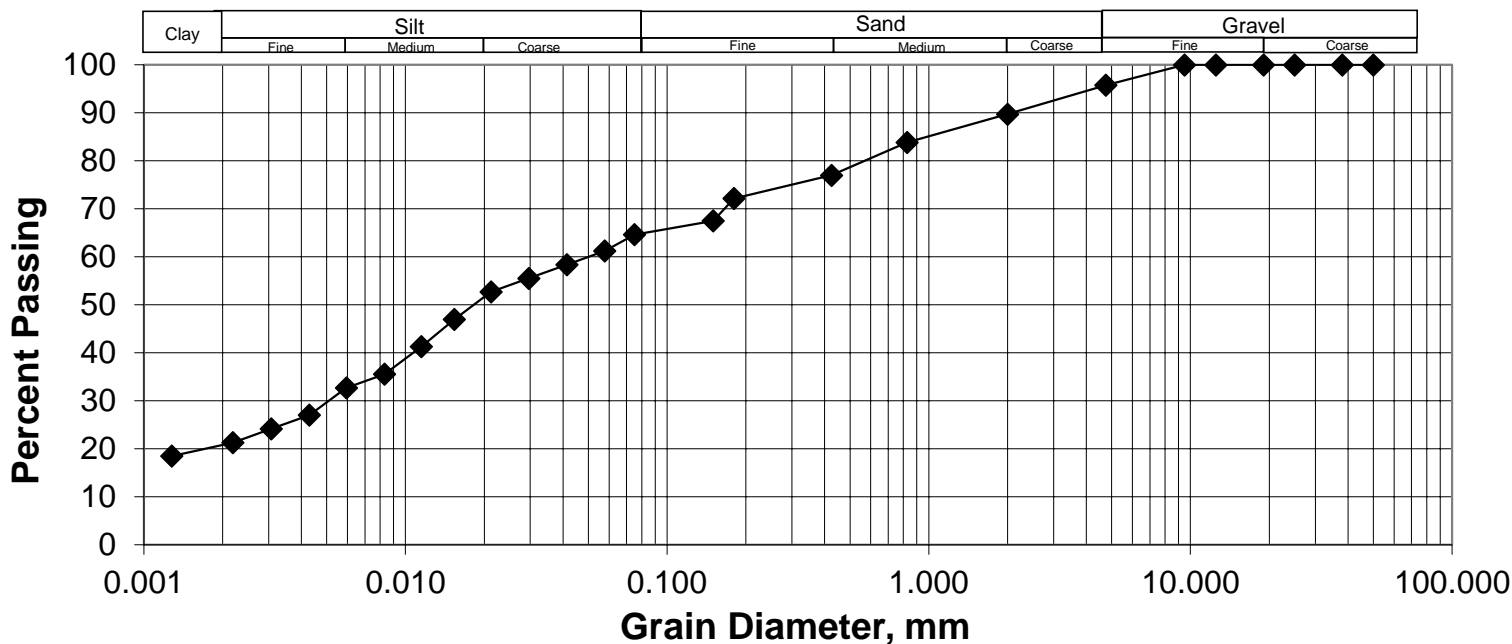


Job No.: 60680190  
Client: City of Winnipeg  
Project: Jefferson CSR Contract 8B & 10  
Date Tested: 14-Mar-23  
Tested By: Lee Boughton

Hole No.: TH23-22  
Sample No.: G10  
Depth: 15.24 - 15.39 m  
Date Sampled: Varies  
Sampled By: AECOM

GRAVEL SIZES		SAND SIZES		FINES	
Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing
50.0	100.0	4.75	95.8	0.0750	64.6
38.0	100.0	2.00	89.7	0.0577	61.2
25.0	100.0	0.825	83.8	0.0413	58.4
19.0	100.0	0.425	77.0	0.0296	55.5
12.5	100.0	0.18	72.1	0.0212	52.7
9.5	100.0	0.15	67.5	0.0154	47.0
4.75	95.8	0.075	64.6	0.0115	41.3
				0.0083	35.6
				0.0059	32.7
				0.0043	27.0
				0.0031	24.2
				0.0022	21.3
				0.0013	18.5

**GRAIN SIZE DISTRIBUTION CURVE**



Gravel	4.2%	Silt	43.5%
Sand	31.2%	Clay	21.1%

**GRAIN SIZE DISTRIBUTION**  
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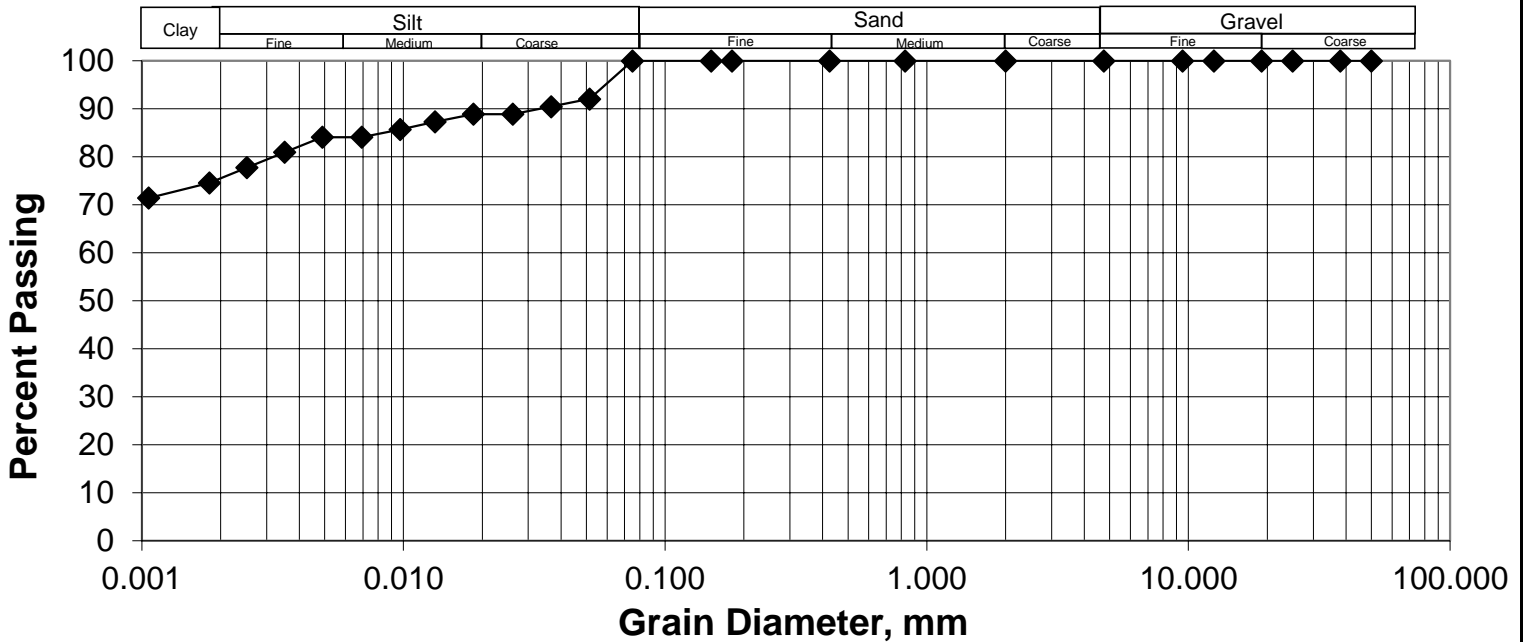


Job No.: 60680190  
Client: City of Winnipeg  
Project: Jefferson CSR Contract 8B & 10  
Date Tested: 14-Mar-23  
Tested By: Lee Boughton

Hole No.: TH23-22  
Sample No.: T3  
Depth: 4.57 - 5.18 m  
Date Sampled: Varies  
Sampled By: AECOM

GRAVEL SIZES		SAND SIZES		FINES	
Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing
50.0	100.0	4.75	100.0	0.0750	100.0
38.0	100.0	2.00	100.0	0.0514	92.1
25.0	100.0	0.825	100.0	0.0367	90.5
19.0	100.0	0.425	100.0	0.0261	88.9
12.5	100.0	0.18	100.0	0.0185	88.9
9.5	100.0	0.15	100.0	0.0132	87.3
4.75	100.0	0.075	100.0	0.0097	85.7
				0.0069	84.1
				0.0049	84.1
				0.0035	80.9
				0.0025	77.8
				0.0018	74.6
				0.0011	71.4

**GRAIN SIZE DISTRIBUTION CURVE**



Gravel	0.0%	Silt	24.5%
Sand	0.0%	Clay	75.5%



**GRAIN SIZE DISTRIBUTION**  
(ASTM D422-63)



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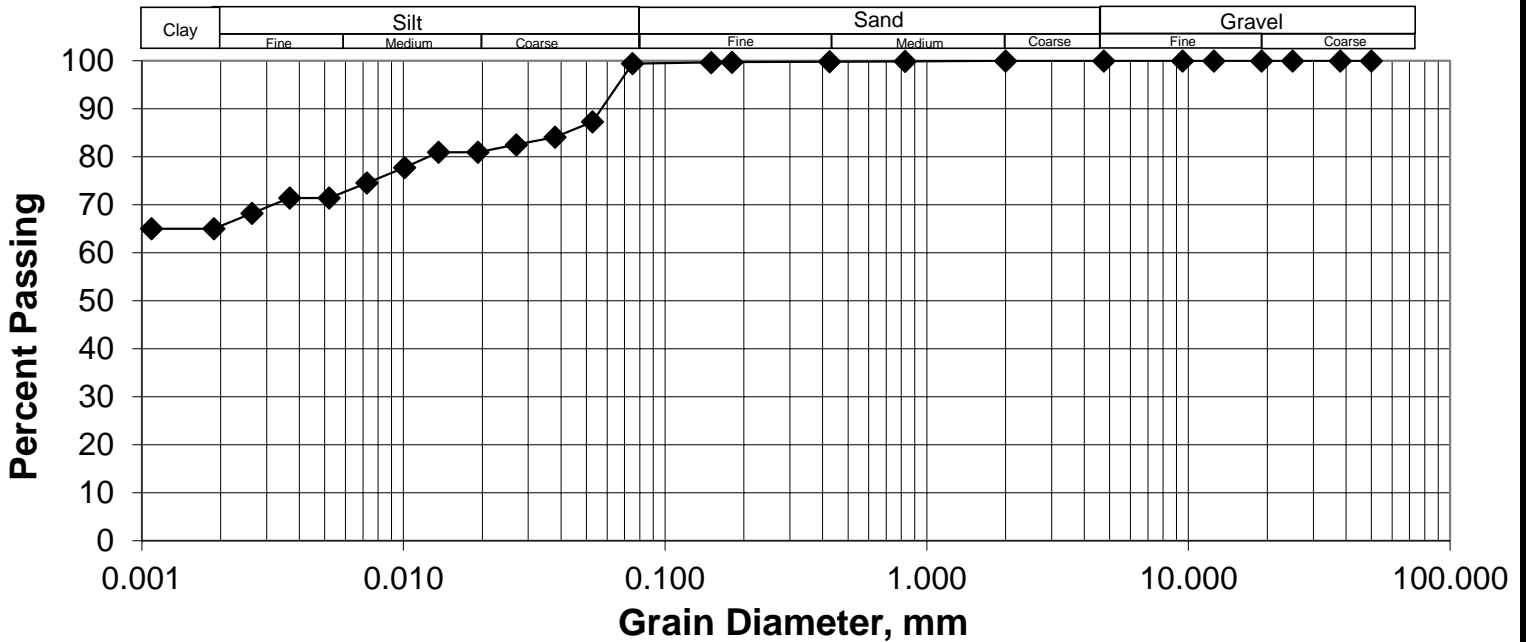


Job No.: 60680190  
Client: COW  
Project: Jefferson CSR Contract 8B & 10  
Date Tested: 24-Feb-23  
Tested By: Lee Boughton

Hole No.: TH23-23  
Sample No.: G1  
Depth: 1.52 - 1.68 m  
Date Sampled: Varies  
Sampled By: AECOM

GRAVEL SIZES		SAND SIZES		FINES	
Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing
50.0	100.0	4.75	100.0	0.0750	99.4
38.0	100.0	2.00	100.0	0.0527	87.3
25.0	100.0	0.825	99.9	0.0379	84.1
19.0	100.0	0.425	99.8	0.0270	82.5
12.5	100.0	0.18	99.7	0.0192	80.9
9.5	100.0	0.15	99.7	0.0136	80.9
4.75	100.0	0.075	99.4	0.0101	77.8
				0.0072	74.6
				0.0052	71.4
				0.0037	71.4
				0.0026	68.2
				0.0019	65.1
				0.0011	65.1

**GRAIN SIZE DISTRIBUTION CURVE**



Gravel	0.0%	Silt	33.9%
Sand	0.6%	Clay	65.5%

**GRAIN SIZE DISTRIBUTION**  
(ASTM D422-63)



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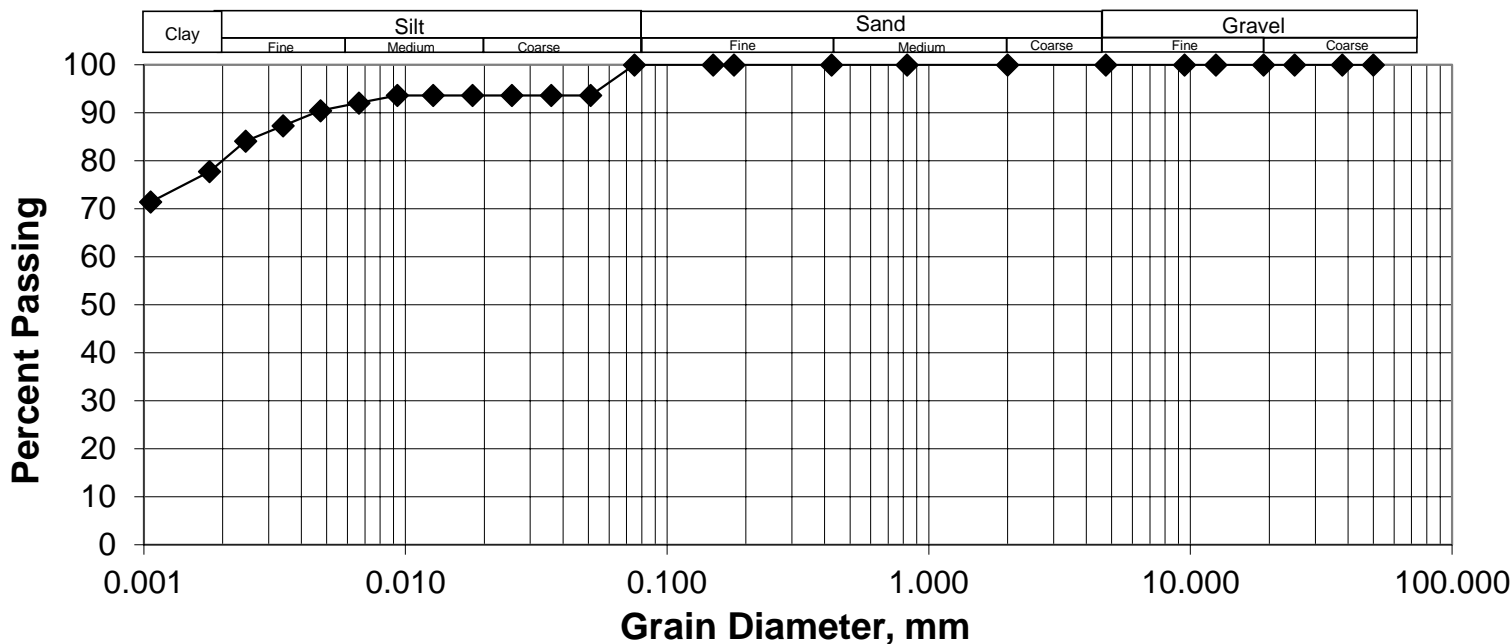


Job No.: 60680190  
Client: City of Winnipeg  
Project: Jefferson CSR Contract 8B & 10  
Date Tested: 14-Mar-23  
Tested By: Lee Boughton

Hole No.: TH23-23  
Sample No.: T2  
Depth: 3.05 - 3.66 m  
Date Sampled: Varies  
Sampled By: AECOM

GRAVEL SIZES		SAND SIZES		FINES	
Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing
50.0	100.0	4.75	100.0	0.0750	100.0
38.0	100.0	2.00	100.0	0.0510	93.6
25.0	100.0	0.825	100.0	0.0360	93.6
19.0	100.0	0.425	100.0	0.0255	93.6
12.5	100.0	0.18	100.0	0.0180	93.6
9.5	100.0	0.15	100.0	0.0127	93.6
4.75	100.0	0.075	100.0	0.0093	93.6
				0.0066	92.1
				0.0047	90.5
				0.0034	87.3
				0.0024	84.1
				0.0018	77.8
				0.0011	71.4

**GRAIN SIZE DISTRIBUTION CURVE**



Gravel	0.0%	Silt	20.1%
Sand	0.0%	Clay	79.9%

Note: Sample tested was clay.

**GRAIN SIZE DISTRIBUTION**  
(ASTM D422-63)



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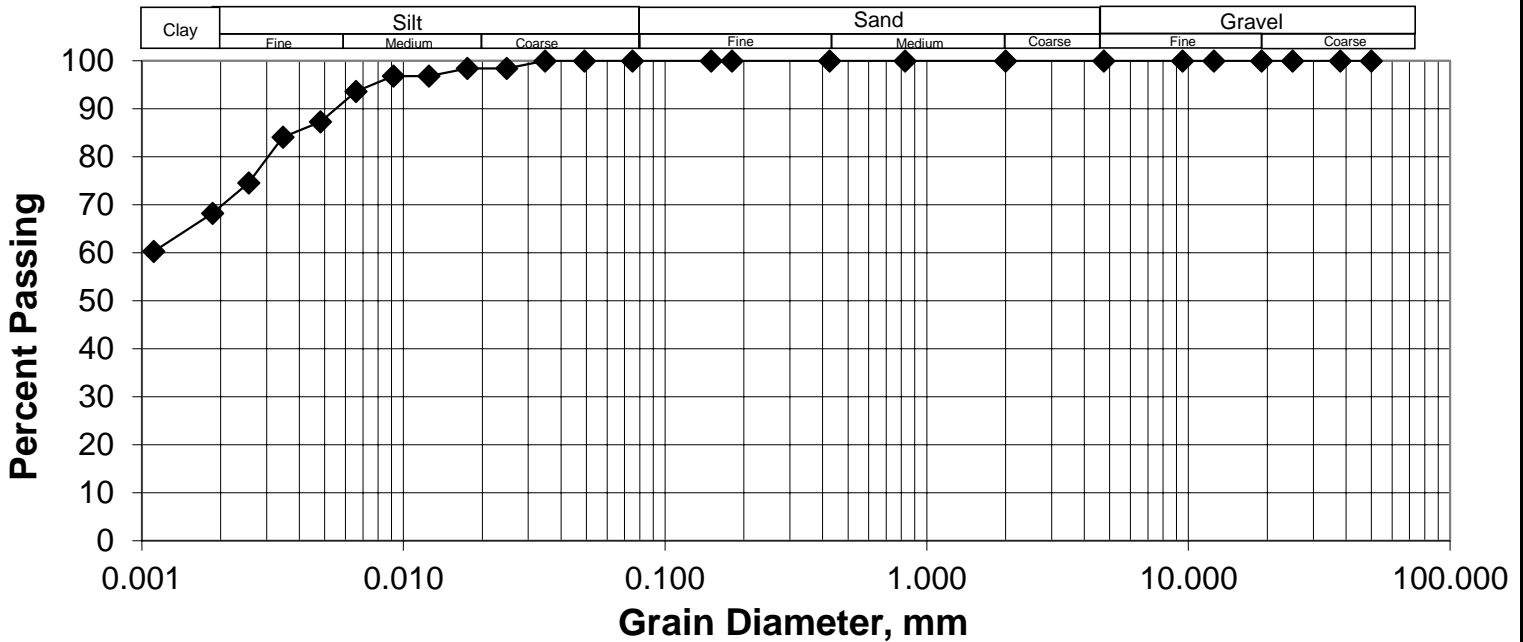


Job No.: 60680190  
Client: City of Winnipeg  
Project: Jefferson CSR Contract 8B & 10  
Date Tested: 14-Mar-23  
Tested By: Lee Boughton

Hole No.: TH23-24  
Sample No.: T4  
Depth: 6.10 - 6.71 m  
Date Sampled: Varies  
Sampled By: AECOM

GRAVEL SIZES		SAND SIZES		FINES	
Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing
50.0	100.0	4.75	100.0	0.0750	100.0
38.0	100.0	2.00	100.0	0.0491	100.0
25.0	100.0	0.825	100.0	0.0347	100.0
19.0	100.0	0.425	100.0	0.0248	98.4
12.5	100.0	0.18	100.0	0.0175	98.4
9.5	100.0	0.15	100.0	0.0125	96.8
4.75	100.0	0.075	100.0	0.0091	96.8
				0.0066	93.6
				0.0048	87.3
				0.0035	84.1
				0.0026	74.6
				0.0019	68.2
				0.0011	60.3

**GRAIN SIZE DISTRIBUTION CURVE**



Gravel	0.0%	Silt	30.5%
Sand	0.0%	Clay	69.5%

**GRAIN SIZE DISTRIBUTION**  
(ASTM D422-63)



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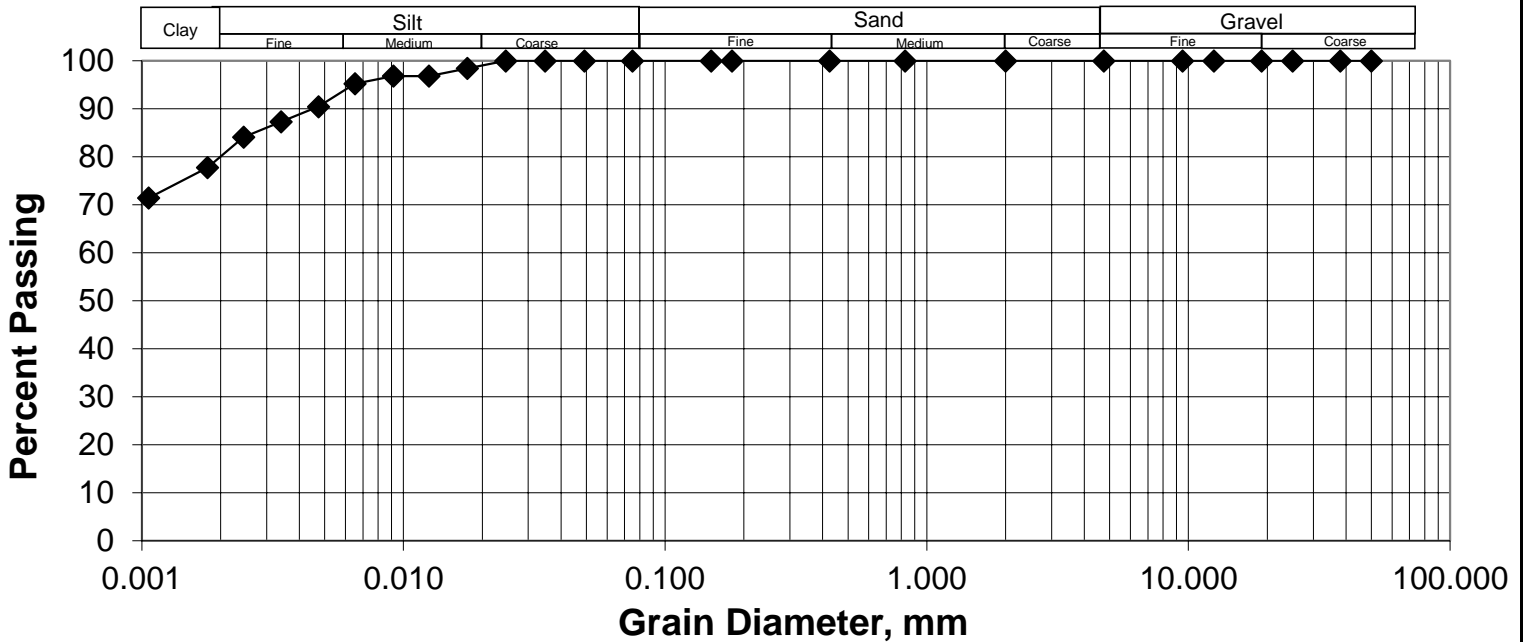


Job No.: 60680190  
Client: City of Winnipeg  
Project: Jefferson CSR Contract 8B & 10  
Date Tested: 14-Mar-23  
Tested By: Lee Boughton

Hole No.: TH23-25  
Sample No.: T3  
Depth: 4.57 - 5.18 m  
Date Sampled: Varies  
Sampled By: AECOM

GRAVEL SIZES		SAND SIZES		FINES	
Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing
50.0	100.0	4.75	100.0	0.0750	100.0
38.0	100.0	2.00	100.0	0.0491	100.0
25.0	100.0	0.825	100.0	0.0347	100.0
19.0	100.0	0.425	100.0	0.0246	100.0
12.5	100.0	0.18	100.0	0.0175	98.4
9.5	100.0	0.15	100.0	0.0125	96.8
4.75	100.0	0.075	100.0	0.0091	96.8
				0.0065	95.2
				0.0047	90.5
				0.0034	87.3
				0.0024	84.1
				0.0018	77.8
				0.0011	71.4

**GRAIN SIZE DISTRIBUTION CURVE**



Gravel	0.0%	Silt	20.1%
Sand	0.0%	Clay	79.9%

**GRAIN SIZE DISTRIBUTION**  
(ASTM D422-63)



WINNIPEG GEOTECHNICAL LABORATORY  
99 Commerce Dr., Winnipeg, MB R3P 0Y7 Canada  
tel (204) 477-5381 fax (431) 800-1210

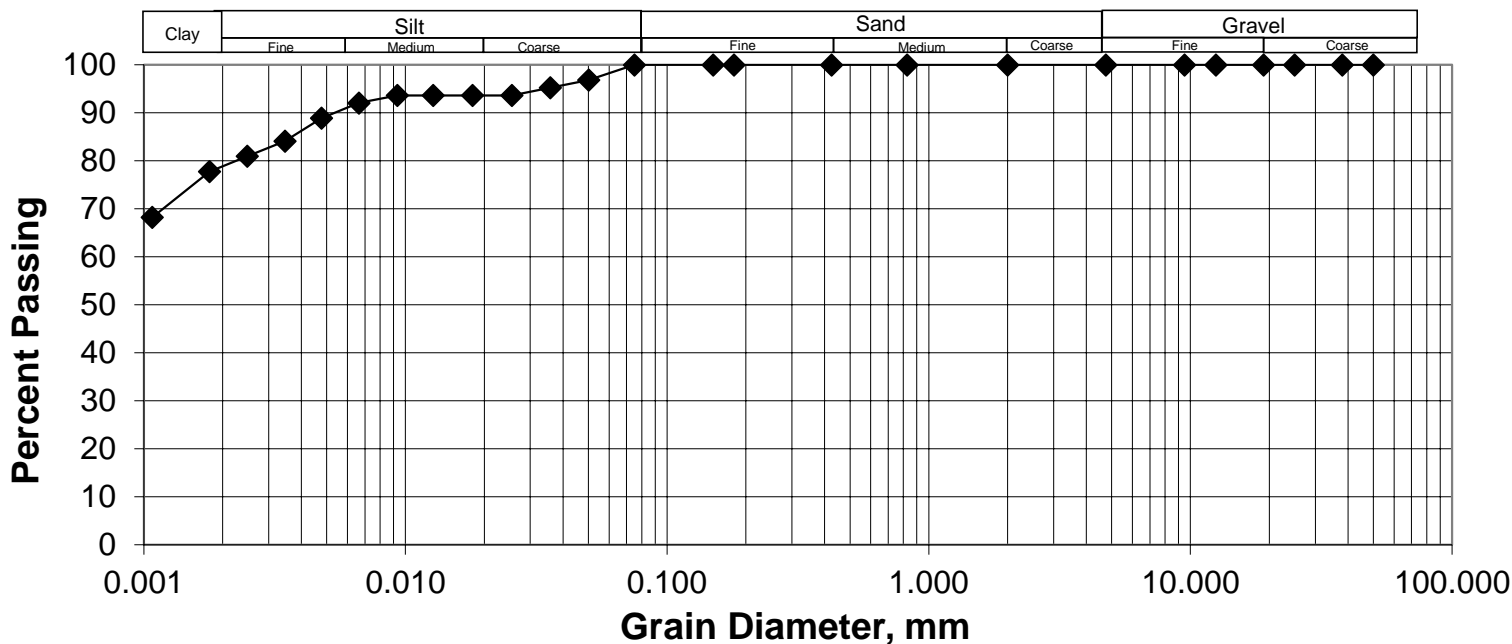


Job No.: 60680190  
Client: City of Winnipeg  
Project: Jefferson CSR Contract 8B & 10  
Date Tested: 14-Mar-23  
Tested By: Lee Boughton

Hole No.: TH23-26  
Sample No.: T3  
Depth: 4.57 - 5.18 m  
Date Sampled: Varies  
Sampled By: AECOM

GRAVEL SIZES		SAND SIZES		FINES	
Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing
50.0	100.0	4.75	100.0	0.0750	100.0
38.0	100.0	2.00	100.0	0.0500	96.8
25.0	100.0	0.825	100.0	0.0357	95.2
19.0	100.0	0.425	100.0	0.0255	93.6
12.5	100.0	0.18	100.0	0.0180	93.6
9.5	100.0	0.15	100.0	0.0127	93.6
4.75	100.0	0.075	100.0	0.0093	93.6
				0.0066	92.1
				0.0048	88.9
				0.0035	84.1
				0.0025	80.9
				0.0018	77.8
				0.0011	68.2

**GRAIN SIZE DISTRIBUTION CURVE**



Gravel	0.0%	Silt	21.3%
Sand	0.0%	Clay	78.7%

**GRAIN SIZE DISTRIBUTION**  
(ASTM D422-63)



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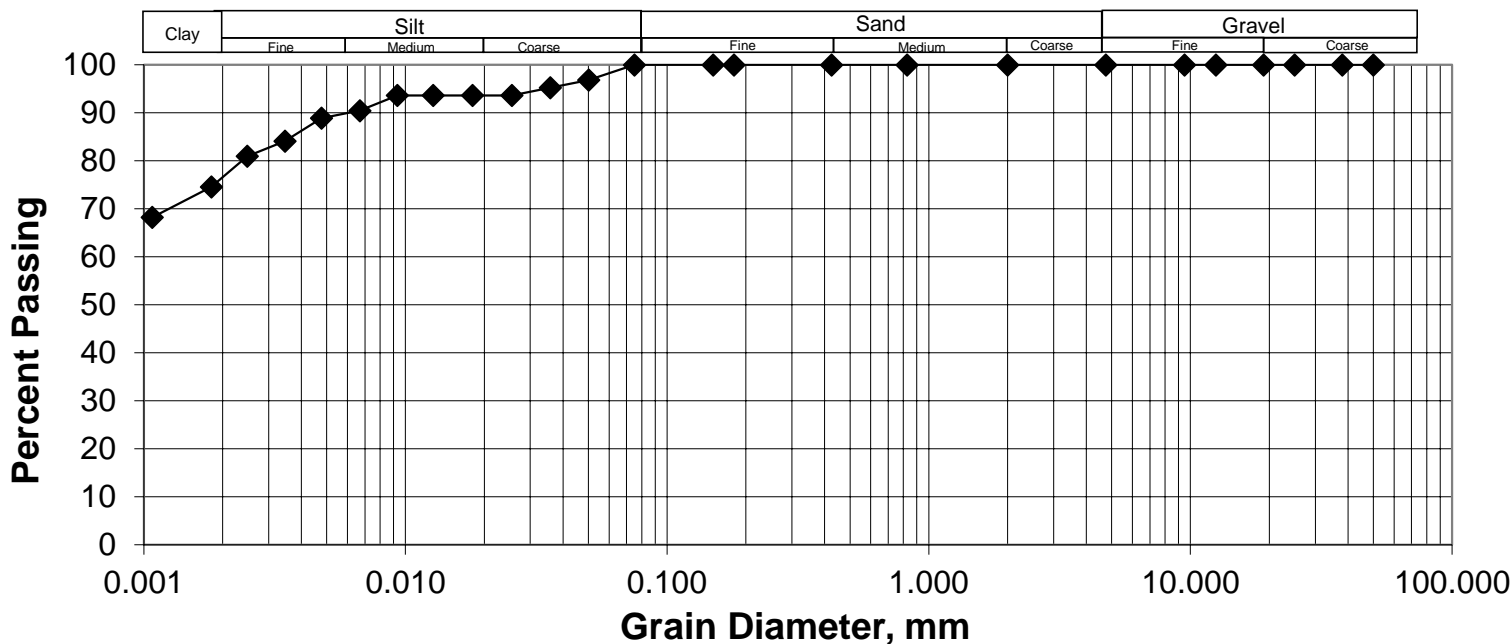


Job No.: 60680190  
Client: City of Winnipeg  
Project: Jefferson CSR Contract 8B & 10  
Date Tested: 14-Mar-23  
Tested By: Lee Boughton

Hole No.: TH23-27  
Sample No.: T2  
Depth: 3.05 - 3.66 m  
Date Sampled: Varies  
Sampled By: AECOM

GRAVEL SIZES		SAND SIZES		FINES	
Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing
50.0	100.0	4.75	100.0	0.0750	100.0
38.0	100.0	2.00	100.0	0.0500	96.8
25.0	100.0	0.825	100.0	0.0357	95.2
19.0	100.0	0.425	100.0	0.0255	93.6
12.5	100.0	0.18	100.0	0.0180	93.6
9.5	100.0	0.15	100.0	0.0127	93.6
4.75	100.0	0.075	100.0	0.0093	93.6
				0.0067	90.5
				0.0048	88.9
				0.0035	84.1
				0.0025	80.9
				0.0018	74.6
				0.0011	68.2

**GRAIN SIZE DISTRIBUTION CURVE**



Gravel	0.0%	Silt	23.6%
Sand	0.0%	Clay	76.4%

**GRAIN SIZE DISTRIBUTION**  
(ASTM D422-63)



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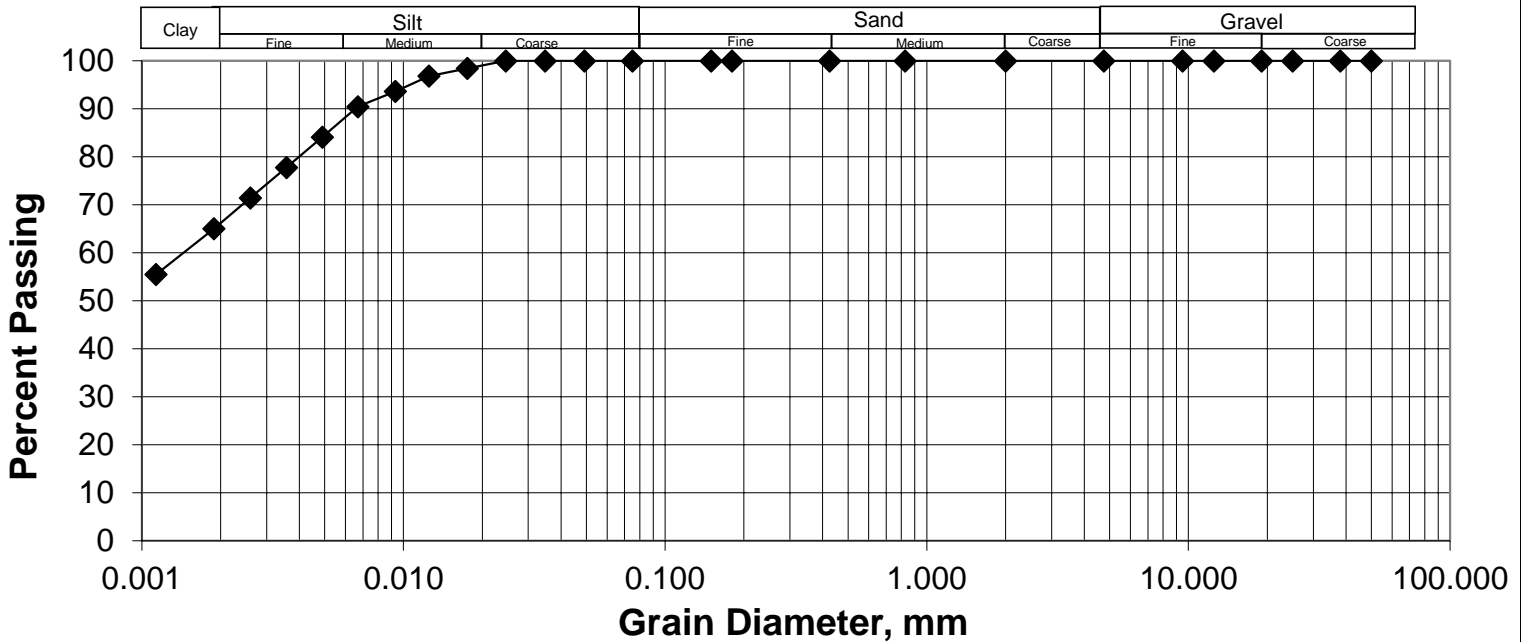


Job No.: 60680190  
Client: City of Winnipeg  
Project: Jefferson CSR Contract 8B & 10  
Date Tested: 14-Mar-23  
Tested By: Lee Boughton

Hole No.: TH23-28  
Sample No.: T4  
Depth: 6.10 - 6.71 m  
Date Sampled: Varies  
Sampled By: AECOM

GRAVEL SIZES		SAND SIZES		FINES	
Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing
50.0	100.0	4.75	100.0	0.0750	100.0
38.0	100.0	2.00	100.0	0.0491	100.0
25.0	100.0	0.825	100.0	0.0347	100.0
19.0	100.0	0.425	100.0	0.0246	100.0
12.5	100.0	0.18	100.0	0.0175	98.4
9.5	100.0	0.15	100.0	0.0125	96.8
4.75	100.0	0.075	100.0	0.0093	93.6
				0.0067	90.5
				0.0049	84.1
				0.0036	77.8
				0.0026	71.4
				0.0019	65.1
				0.0011	55.5

**GRAIN SIZE DISTRIBUTION CURVE**



Gravel	0.0%	Silt	34.0%
Sand	0.0%	Clay	66.0%

**GRAIN SIZE DISTRIBUTION**  
(ASTM D422-63)



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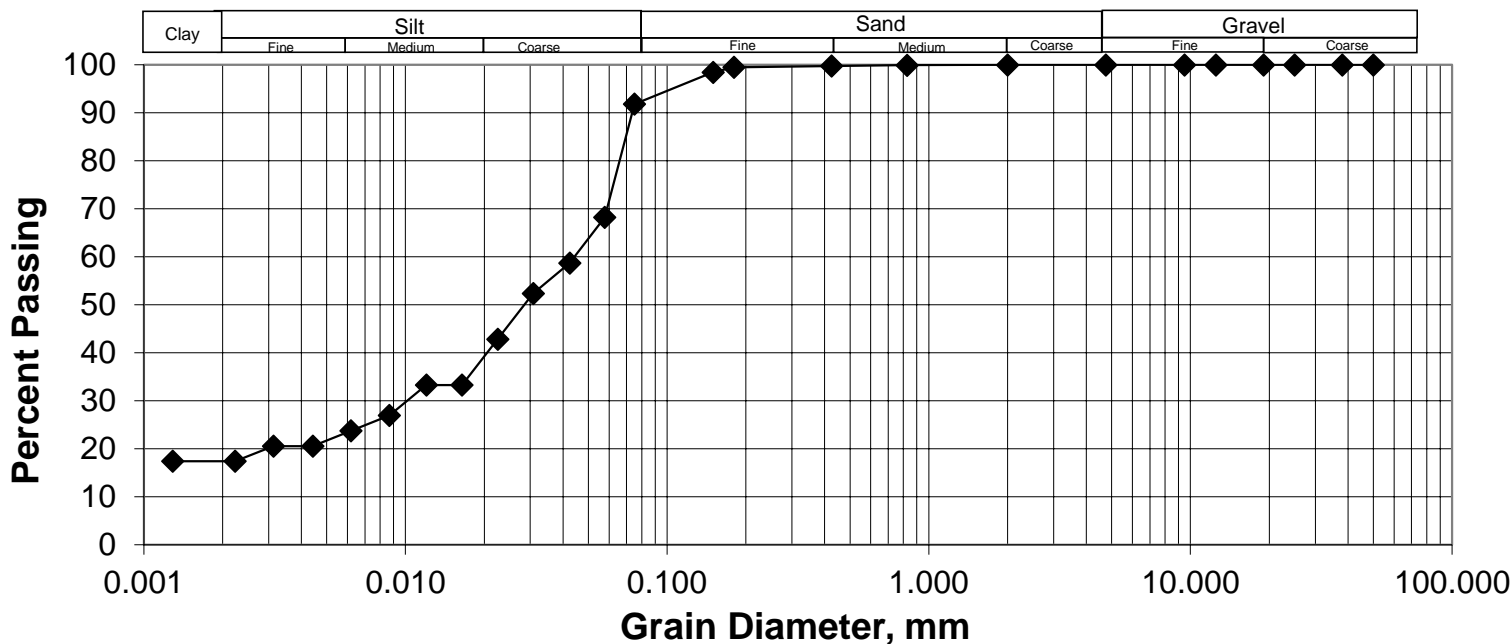


Job No.: 60680190  
Client: COW  
Project: Jefferson CSR Contract 8B & 10  
Date Tested: 24-Feb-23  
Tested By: Lee Boughton

Hole No.: TH23-29  
Sample No.: S1  
Depth: 1.52 - 1.98 m  
Date Sampled: Varies  
Sampled By: AECOM

GRAVEL SIZES		SAND SIZES		FINES	
Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing
50.0	100.0	4.75	100.0	0.0750	91.8
38.0	100.0	2.00	100.0	0.0577	68.2
25.0	100.0	0.825	99.9	0.0424	58.7
19.0	100.0	0.425	99.8	0.0307	52.3
12.5	100.0	0.18	99.5	0.0225	42.8
9.5	100.0	0.15	98.5	0.0164	33.3
4.75	100.0	0.075	91.8	0.0120	33.3
				0.0087	26.9
				0.0062	23.8
				0.0044	20.6
				0.0031	20.6
				0.0022	17.4
				0.0013	17.4

**GRAIN SIZE DISTRIBUTION CURVE**



Gravel	0.0%	Silt	74.4%
Sand	8.2%	Clay	17.4%



**GRAIN SIZE DISTRIBUTION**  
(ASTM D422-63)



WINNIPEG GEOTECHNICAL LABORATORY  
99 Commerce Dr., Winnipeg, MB R3P 0Y7 Canada  
tel (204) 477-5381 fax (431) 800-1210

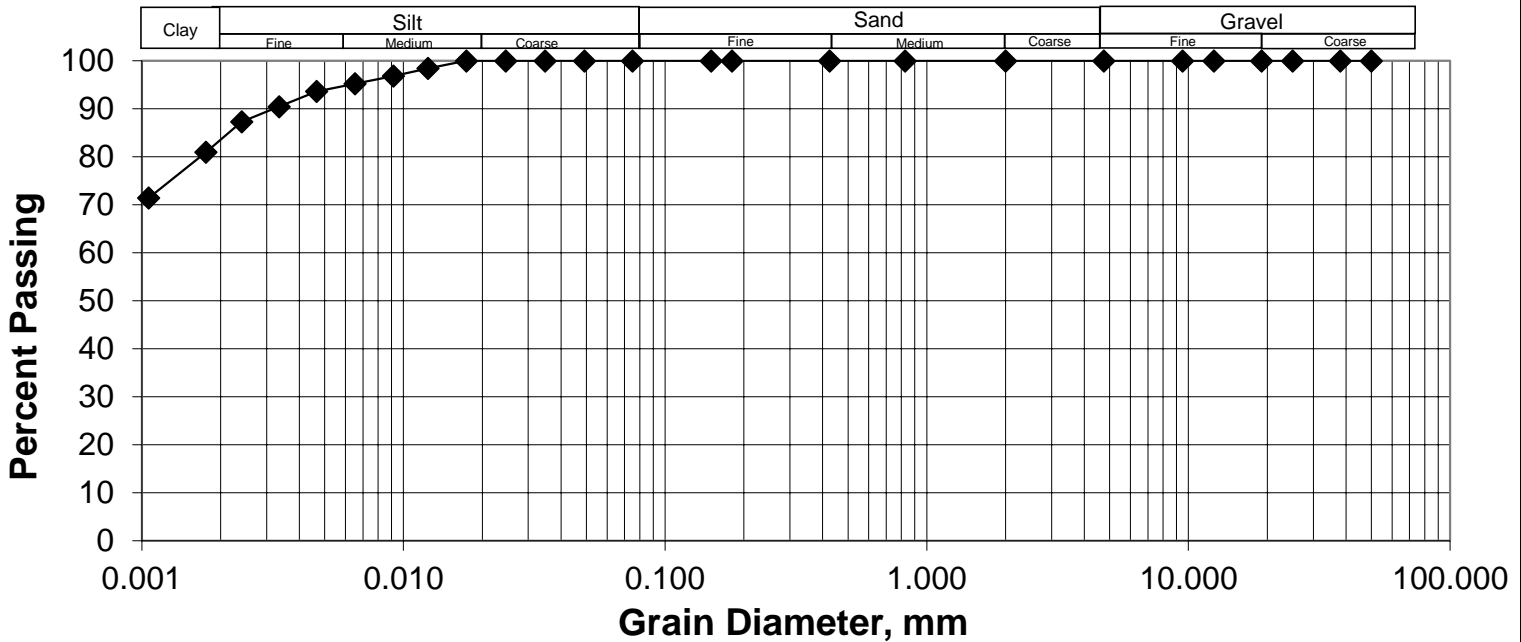


Job No.: 60680190  
Client: City of Winnipeg  
Project: Jefferson CSR Contract 8B & 10  
Date Tested: 14-Mar-23  
Tested By: Lee Boughton

Hole No.: TH23-29  
Sample No.: T3  
Depth: 4.57 - 5.18 m  
Date Sampled: Varies  
Sampled By: AECOM

GRAVEL SIZES		SAND SIZES		FINES	
Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing	Grain Size (mm.)	Total Percent Passing
50.0	100.0	4.75	100.0	0.0750	100.0
38.0	100.0	2.00	100.0	0.0491	100.0
25.0	100.0	0.825	100.0	0.0347	100.0
19.0	100.0	0.425	100.0	0.0246	100.0
12.5	100.0	0.18	100.0	0.0174	100.0
9.5	100.0	0.15	100.0	0.0124	98.4
4.75	100.0	0.075	100.0	0.0091	96.8
				0.0065	95.2
				0.0047	93.6
				0.0033	90.5
				0.0024	87.3
				0.0018	80.9
				0.0011	71.4

**GRAIN SIZE DISTRIBUTION CURVE**



Gravel	0.0%	Silt	17.0%
Sand	0.0%	Clay	83.0%

**AECOM - SOILS LABORATORY**  
**SHEAR STRENGTH, MOISTURE CONTENT & DENSITY CALCULATIONS**



CLIENT: City of Winnipeg  
 PROJECT: Jefferson CSR Contract 8B & 10  
 JOB NO.: 60680190

TEST HOLE NO.:	TH23-21
SAMPLE NO.:	T4
SAMPLE DEPTH:	6.10 - 6.71 m
DATE TESTED:	10-Mar-23
<b>SHEAR STRENGTH TESTS</b>	
<b>TORVANE</b>	
Reading	0.60
Vane Size (S, M, L)	M
Undrained Shear Strength (kPa)	58.8
Undrained Shear Strength (ksf)	1.23
<b>POCKET PENETROMETER</b>	
Reading - Qu (tsf)	1.50
Undrained Shear Strength (kPa)	71.8
Reading - Qu (tsf)	1.50
Undrained Shear Strength (kPa)	71.8
Reading - Qu (tsf)	1.25
Undrained Shear Strength (kPa)	59.9
<b>UNCONFINED COMPRESSIVE STRENGTH TEST</b>	
Unconfined compressive strength (kPa)	93.9
Unconfined compressive strength (ksf)	2.0
Undrained Shear Strength (kPa)	47.0
Undrained Shear Strength (ksf)	0.981
<b>MOISTURE CONTENT</b>	
Tare Number	F31
Wt. Sample wet + tare (g)	474.7
Wt. Sample dry + tare (g)	330.1
Wt. Tare (g)	8.6
Moisture Content %	45.0
<b>BULK DENSITY</b>	
Sample Wt. (g)	1113.9
Diameter 1 (cm)	7.20
Diameter 2 (cm)	7.30
Diameter 3 (cm)	7.20
<b>Avg. Diameter (cm)</b>	<b>7.23</b>
Length 1 (cm)	15.40
Length 2 (cm)	15.40
Length 3 (cm)	15.40
<b>Avg. Length (cm)</b>	<b>15.40</b>
Volume (cm <sup>3</sup> )	632.8
Moisture content (%)	45.0
Bulk Density (g/cm <sup>3</sup> )	1.760
<b>Bulk Unit Weight (kN/m<sup>3</sup>)</b>	<b>17.3</b>
<b>Bulk Unit Weight (pcf)</b>	<b>109.9</b>
<b>Dry Unit Weight (kN/m<sup>3</sup>)</b>	<b>11.91</b>

**AECOM - SOILS LABORATORY**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS (ASTM D2166)**



CLIENT:	City of Winnipeg
PROJECT:	Jefferson CSR Contract 8B & 10
JOB NO.:	60680190

TEST HOLE NO.:	TH23-21
SAMPLE NO.:	T4
SAMPLE DEPTH:	6.10 - 6.71 m
SAMPLE DATE:	
TEST DATE:	10-Mar-23

<b>SOIL DESCRIPTION:</b>	
CLAY - grey, moist, firm, silty	
high plasticity	
<b>MOISTURE CONTENT:</b>	45.0

See attached  
photo

SAMPLE DIAM.(Do):	72.33	(mm)	INITIAL AREA, A <sub>o</sub> :	4109.3	(mm <sup>2</sup> )
SAMPLE LENGTH, (L <sub>o</sub> ):	154.00	(mm)	PISTON RATE:	0.0602	(inches / minute)
L / D RATIO:	2.13	(2 < L/D < 2.5)	AXIAL STRAIN RATE, R:	0.99	(0.5<R<2 % / minute)

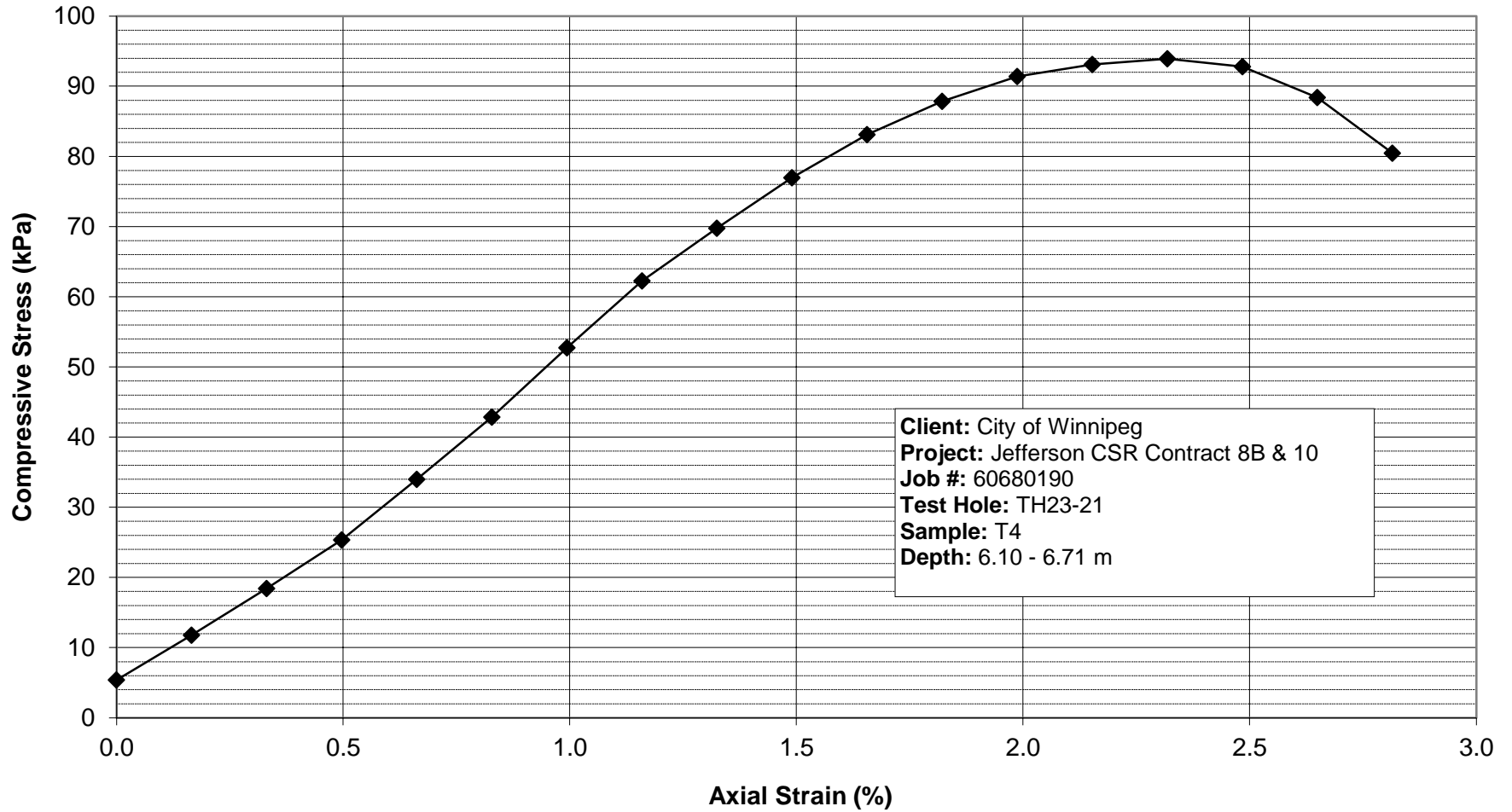
FAILURE SKETCH

TEST DATA - DIAL READINGS							
AXIAL COMPRESSION	PROVING RING	TOTAL AXIAL STRAIN, E <sub>t</sub>	AVERAGE CROSS-SECTIONAL AREA, A	APPLIED AXIAL LOAD, P	COMPRESSIVE STRESS, σ <sub>c</sub>		
					(inches)	(inches)	(%)
0.01	0.0005	0.00	6.37	4.97	0.78	0.112	5.4
0.02	0.0012	0.17	6.38	10.87	1.70	0.245	11.7
0.03	0.0018	0.33	6.39	17.05	2.67	0.384	18.4
0.04	0.0025	0.50	6.40	23.52	3.67	0.529	25.3
0.05	0.0034	0.66	6.41	31.58	4.92	0.708	34.0
0.06	0.0043	0.83	6.42	39.92	6.21	0.895	42.9
0.07	0.0053	0.99	6.43	49.19	7.65	1.101	52.7
0.08	0.0062	1.16	6.44	58.19	9.03	1.300	62.3
0.09	0.0070	1.32	6.45	66.31	10.12	1.457	69.8
0.10	0.0077	1.49	6.47	72.15	11.16	1.607	76.9
0.11	0.0083	1.66	6.48	78.05	12.05	1.735	83.1
0.12	0.0088	1.82	6.49	82.64	12.74	1.834	87.8
0.13	0.0092	1.99	6.50	86.11	13.25	1.908	91.4
0.14	0.0094	2.15	6.51	87.89	13.50	1.944	93.1
0.15	0.0095	2.32	6.52	88.83	13.62	1.962	93.9
0.16	0.0094	2.48	6.53	87.89	13.46	1.938	92.8
0.17	0.0090	2.65	6.54	83.86	12.82	1.846	88.4
0.18	0.0082	2.81	6.55	76.46	11.67	1.690	80.4

UNCONFINED COMPRESSIVE STRENGTH, q <sub>u</sub> :	93.93	kPa
(based on maximum q <sub>u</sub> value)	1.962	ksf
UNDRAINED SHEAR STRENGTH, S <sub>u</sub> :	46.96	kPa
(based on maximum q <sub>u</sub> value)	0.981	ksf

**NOTES:**

**AECOM**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS**  
**(ASTM D2166)**





TH23-21, T4

**AECOM - SOILS LABORATORY**  
**SHEAR STRENGTH, MOISTURE CONTENT & DENSITY CALCULATIONS**



CLIENT: City of Winnipeg  
PROJECT: Jefferson CSR Contract 8B & 10  
JOB NO.: 60680190

TEST HOLE NO.:	TH23-22
SAMPLE NO.:	T3
SAMPLE DEPTH:	4.57 - 5.18 m
DATE TESTED:	10-Mar-23
<b>SHEAR STRENGTH TESTS</b>	
<b>TORVANE</b>	
Reading	0.55
Vane Size (S, M, L)	M
Undrained Shear Strength (kPa)	53.9
Undrained Shear Strength (ksf)	1.13
<b>POCKET PENETROMETER</b>	
Reading - Qu (tsf)	0.75
Undrained Shear Strength (kPa)	35.9
Reading - Qu (tsf)	1.00
Undrained Shear Strength (kPa)	47.9
Reading - Qu (tsf)	0.75
Undrained Shear Strength (kPa)	35.9
<b>UNCONFINED COMPRESSIVE STRENGTH TEST</b>	
Unconfined compressive strength (kPa)	44.6
Unconfined compressive strength (ksf)	0.9
Undrained Shear Strength (kPa)	22.3
Undrained Shear Strength (ksf)	0.466
<b>MOISTURE CONTENT</b>	
Tare Number	C27
Wt. Sample wet + tare (g)	532.3
Wt. Sample dry + tare (g)	335.1
Wt. Tare (g)	8.6
Moisture Content %	60.4
<b>BULK DENSITY</b>	
Sample Wt. (g)	1038.2
Diameter 1 (cm)	7.20
Diameter 2 (cm)	7.10
Diameter 3 (cm)	7.20
<b>Avg. Diameter (cm)</b>	<b>7.17</b>
Length 1 (cm)	15.50
Length 2 (cm)	15.50
Length 3 (cm)	15.40
<b>Avg. Length (cm)</b>	<b>15.47</b>
Volume (cm <sup>3</sup> )	623.9
Moisture content (%)	60.4
Bulk Density (g/cm <sup>3</sup> )	1.664
<b>Bulk Unit Weight (kN/m<sup>3</sup>)</b>	<b>16.3</b>
<b>Bulk Unit Weight (pcf)</b>	<b>103.9</b>
<b>Dry Unit Weight (kN/m<sup>3</sup>)</b>	<b>10.17</b>

**AECOM - SOILS LABORATORY**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS (ASTM D2166)**



CLIENT:	City of Winnipeg
PROJECT:	Jefferson CSR Contract 8B & 10
JOB NO.:	60680190

TEST HOLE NO.:	TH23-22
SAMPLE NO.:	T3
SAMPLE DEPTH:	4.57 - 5.18 m
SAMPLE DATE:	
TEST DATE:	10-Mar-23

SOIL DESCRIPTION:	
CLAY - brown, moist, firm, silty high plasticity	
MOISTURE CONTENT:	60.4

See attached  
photo

SAMPLE DIAM.(Do):	71.67	(mm)	INITIAL AREA, A <sub>o</sub> :	4033.9	(mm <sup>2</sup> )
SAMPLE LENGTH, (L <sub>o</sub> ):	154.67	(mm)	PISTON RATE:	0.0602	(inches / minute)
L / D RATIO:	2.16	(2 < L/D < 2.5)	AXIAL STRAIN RATE, R:	0.99	(0.5<R<2 % / minute)

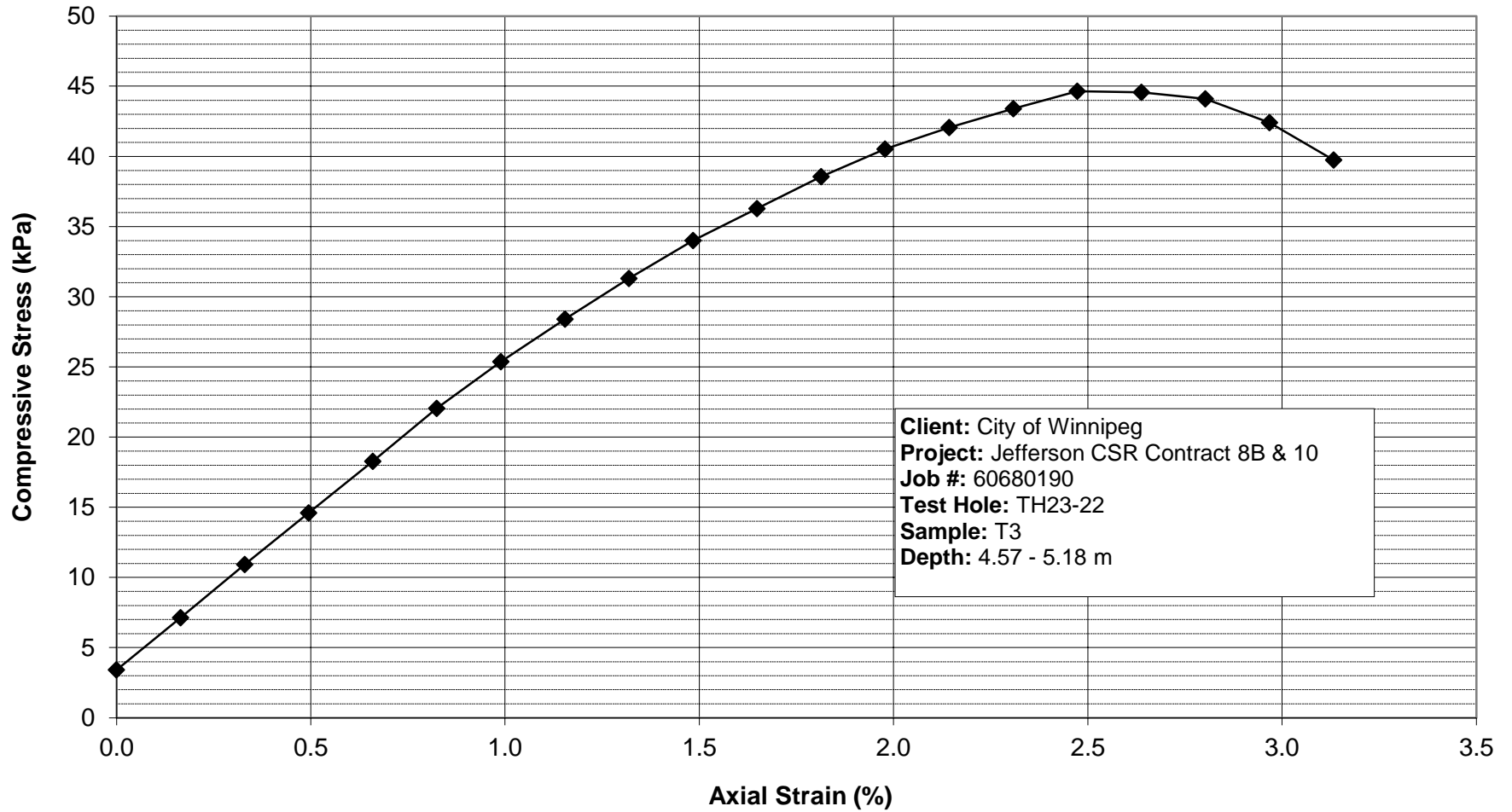
FAILURE SKETCH

TEST DATA - DIAL READINGS							
AXIAL COMPRESSION	PROVING RING	TOTAL AXIAL STRAIN, E <sub>t</sub>	AVERAGE CROSS-SECTIONAL AREA, A	APPLIED AXIAL LOAD, P	COMPRESSIVE STRESS, σ <sub>c</sub>		
					(psi)	(ksf)	(kPa)
(inches)	(inches)	(%)	(inches <sup>2</sup> )	(lbs)			
0.01	0.0003	0.00	6.25	3.09	0.49	0.071	3.4
0.02	0.0007	0.16	6.26	6.47	1.03	0.149	7.1
0.03	0.0011	0.33	6.27	9.93	1.58	0.228	10.9
0.04	0.0014	0.49	6.28	13.31	2.12	0.305	14.6
0.05	0.0018	0.66	6.29	16.68	2.65	0.382	18.3
0.06	0.0022	0.82	6.30	20.15	3.20	0.460	22.0
0.07	0.0025	0.99	6.32	23.24	3.68	0.530	25.4
0.08	0.0028	1.15	6.33	26.05	4.12	0.593	28.4
0.09	0.0031	1.32	6.34	28.77	4.54	0.654	31.3
0.10	0.0033	1.48	6.35	31.30	4.93	0.710	34.0
0.11	0.0036	1.65	6.36	33.45	5.26	0.758	36.3
0.12	0.0038	1.81	6.37	35.61	5.59	0.805	38.6
0.13	0.0040	1.98	6.38	37.48	5.88	0.846	40.5
0.14	0.0042	2.14	6.39	38.98	6.10	0.878	42.1
0.15	0.0043	2.31	6.40	40.29	6.30	0.907	43.4
0.16	0.0044	2.47	6.41	41.51	6.47	0.932	44.6
0.17	0.0044	2.64	6.42	41.51	6.46	0.931	44.6
0.18	0.0044	2.80	6.43	41.13	6.39	0.921	44.1
0.19	0.0042	2.97	6.44	39.64	6.15	0.886	42.4
0.20	0.0040	3.13	6.45	37.20	5.76	0.830	39.7

UNCONFINED COMPRESSIVE STRENGTH, q <sub>u</sub> :	44.64	kPa
(based on maximum q <sub>u</sub> value)	0.932	ksf
UNDRAINED SHEAR STRENGTH, S <sub>u</sub> :	22.32	kPa
(based on maximum q <sub>u</sub> value)	0.466	ksf

**NOTES:**

**AECOM**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS**  
**(ASTM D2166)**







TH23-22, T3

**AECOM - SOILS LABORATORY**  
**SHEAR STRENGTH, MOISTURE CONTENT & DENSITY CALCULATIONS**



CLIENT: City of Winnipeg  
 PROJECT: Jefferson CSR Contract 8B & 10  
 JOB NO.: 60680190

TEST HOLE NO.:	TH23-22
SAMPLE NO.:	T7
SAMPLE DEPTH:	10.67 - 11.28 m
DATE TESTED:	16-Mar-23
<b>SHEAR STRENGTH TESTS</b>	
<b>TORVANE</b>	
Reading	0.40
Vane Size (S, M, L)	M
Undrained Shear Strength (kPa)	39.2
Undrained Shear Strength (ksf)	0.82
<b>POCKET PENETROMETER</b>	
Reading - Qu (tsf)	0.50
Undrained Shear Strength (kPa)	23.9
Reading - Qu (tsf)	0.60
Undrained Shear Strength (kPa)	28.7
Reading - Qu (tsf)	0.75
Undrained Shear Strength (kPa)	35.9
<b>UNCONFINED COMPRESSIVE STRENGTH TEST</b>	
Unconfined compressive strength (kPa)	72.2
Unconfined compressive strength (ksf)	1.5
Undrained Shear Strength (kPa)	36.1
Undrained Shear Strength (ksf)	0.754
<b>MOISTURE CONTENT</b>	
Tare Number	AT15
Wt. Sample wet + tare (g)	336.2
Wt. Sample dry + tare (g)	223.1
Wt. Tare (g)	8.3
Moisture Content %	52.7
<b>BULK DENSITY</b>	
Sample Wt. (g)	1043.7
Diameter 1 (cm)	7.20
Diameter 2 (cm)	7.20
Diameter 3 (cm)	7.20
<b>Avg. Diameter (cm)</b>	<b>7.20</b>
Length 1 (cm)	15.20
Length 2 (cm)	15.20
Length 3 (cm)	15.20
<b>Avg. Length (cm)</b>	<b>15.20</b>
Volume (cm <sup>3</sup> )	618.9
Moisture content (%)	52.7
Bulk Density (g/cm <sup>3</sup> )	1.686
<b>Bulk Unit Weight (kN/m<sup>3</sup>)</b>	<b>16.5</b>
<b>Bulk Unit Weight (pcf)</b>	<b>105.3</b>
<b>Dry Unit Weight (kN/m<sup>3</sup>)</b>	<b>10.83</b>

**AECOM - SOILS LABORATORY**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS (ASTM D2166)**



CLIENT:	City of Winnipeg
PROJECT:	Jefferson CSR Contract 8B & 10
JOB NO.:	60680190

TEST HOLE NO.:	TH23-22
SAMPLE NO.:	T7
SAMPLE DEPTH:	10.67 - 11.28 m
SAMPLE DATE:	
TEST DATE:	16-Mar-23

SOIL DESCRIPTION:	
CLAY - grey, moist, firm, silty, silt inclusions high plasticity	
MOISTURE CONTENT:	52.7

See attached  
photo

SAMPLE DIAM.(Do):	72.00	(mm)	INITIAL AREA, A <sub>o</sub> :	4071.5	(mm <sup>2</sup> )
SAMPLE LENGTH, (L <sub>o</sub> ):	152.00	(mm)	PISTON RATE:	0.0602	(inches / minute)
L / D RATIO:	2.11	(2 < L/D < 2.5)	AXIAL STRAIN RATE, R:	1.01	(0.5<R<2 % / minute)

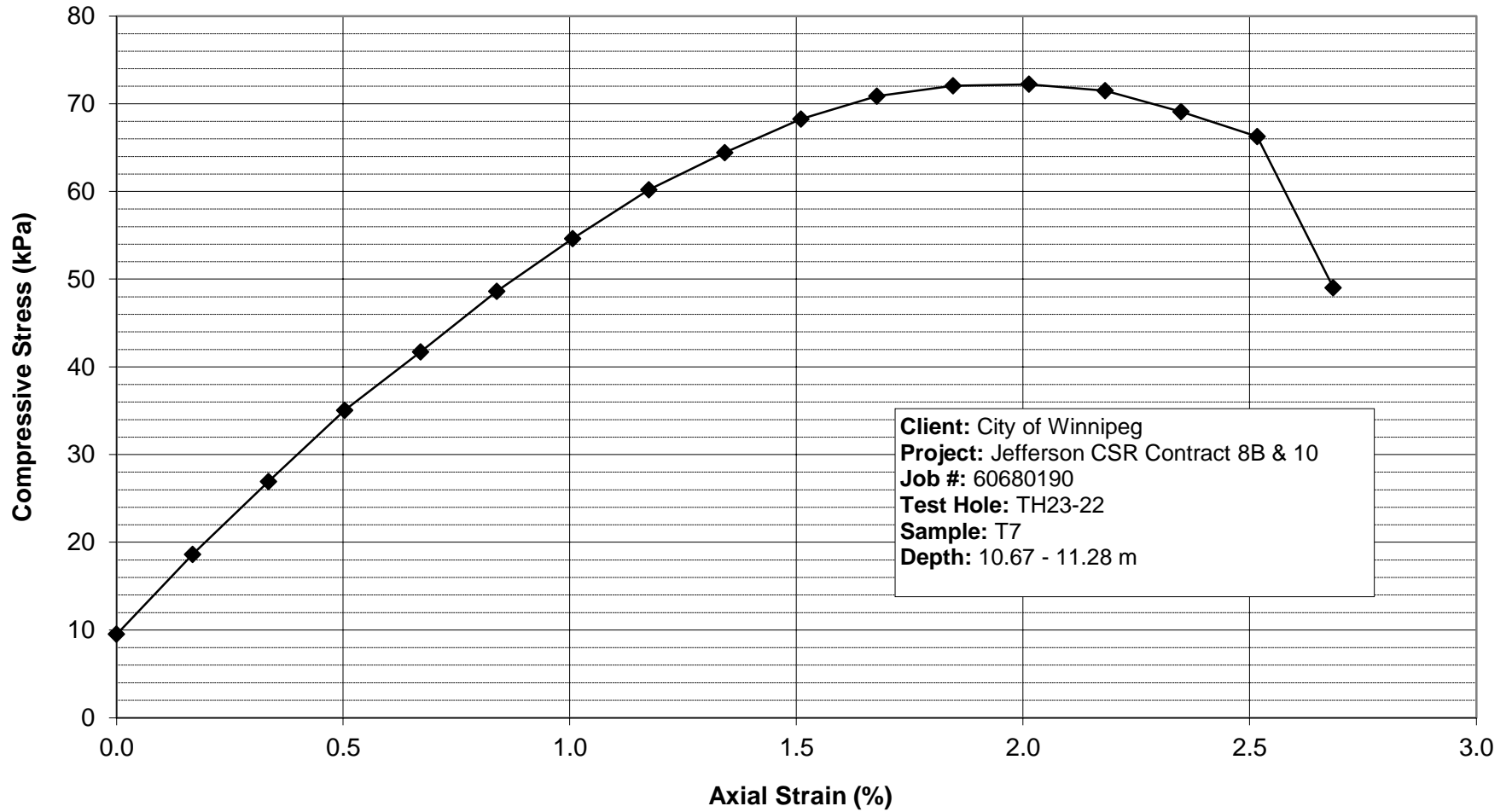
FAILURE SKETCH

TEST DATA - DIAL READINGS							
AXIAL COMPRESSION	PROVING RING	TOTAL AXIAL STRAIN, E <sub>t</sub>	AVERAGE CROSS-SECTIONAL AREA, A	APPLIED AXIAL LOAD, P	COMPRESSIVE STRESS, σ <sub>c</sub>		
					(inches)	(inches)	(inches <sup>2</sup> )
0.01	0.0009	0.00	6.31	8.71	1.38	0.199	9.5
0.02	0.0018	0.17	6.32	17.05	2.70	0.388	18.6
0.03	0.0026	0.34	6.33	24.74	3.91	0.563	26.9
0.04	0.0034	0.50	6.34	32.23	5.08	0.732	35.0
0.05	0.0041	0.67	6.35	38.42	6.05	0.871	41.7
0.06	0.0048	0.84	6.36	44.88	7.05	1.016	48.6
0.07	0.0054	1.01	6.38	50.50	7.92	1.141	54.6
0.08	0.0060	1.17	6.39	55.75	8.73	1.257	60.2
0.09	0.0064	1.34	6.40	59.78	9.35	1.346	64.4
0.10	0.0068	1.51	6.41	63.43	9.90	1.426	68.3
0.11	0.0070	1.68	6.42	65.96	10.28	1.480	70.9
0.12	0.0072	1.85	6.43	67.18	10.45	1.505	72.0
0.13	0.0072	2.01	6.44	67.46	10.47	1.508	72.2
0.14	0.0071	2.18	6.45	66.90	10.37	1.493	71.5
0.15	0.0069	2.35	6.46	64.75	10.02	1.443	69.1
0.16	0.0066	2.52	6.47	62.22	9.61	1.384	66.3
0.17	0.0049	2.68	6.48	46.10	7.11	1.024	49.0

UNCONFINED COMPRESSIVE STRENGTH, q <sub>u</sub> :	72.22	kPa
(based on maximum q <sub>u</sub> value)	1.508	ksf
UNDRAINED SHEAR STRENGTH, S <sub>u</sub> :	36.11	kPa
(based on maximum q <sub>u</sub> value)	0.754	ksf

**NOTES:**

**AECOM**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS**  
**(ASTM D2166)**





TH23-22, T7

**AECOM - SOILS LABORATORY**  
**SHEAR STRENGTH, MOISTURE CONTENT & DENSITY CALCULATIONS**



CLIENT: City of Winnipeg  
 PROJECT: Jefferson CSR Contract 8B & 10  
 JOB NO.: 60680190

TEST HOLE NO.:	TH23-23
SAMPLE NO.:	T2
SAMPLE DEPTH:	3.05 - 3.66 m
DATE TESTED:	10-Mar-23
<b>SHEAR STRENGTH TESTS</b>	
<b>TORVANE</b>	
Reading	0.65
Vane Size (S, M, L)	M
Undrained Shear Strength (kPa)	63.8
Undrained Shear Strength (ksf)	1.33
<b>POCKET PENETROMETER</b>	
Reading - Qu (tsf)	1.25
Undrained Shear Strength (kPa)	59.9
Reading - Qu (tsf)	1.25
Undrained Shear Strength (kPa)	59.9
Reading - Qu (tsf)	1.25
Undrained Shear Strength (kPa)	59.9
<b>UNCONFINED COMPRESSIVE STRENGTH TEST</b>	
Unconfined compressive strength (kPa)	66.6
Unconfined compressive strength (ksf)	1.4
Undrained Shear Strength (kPa)	33.3
Undrained Shear Strength (ksf)	0.696
<b>MOISTURE CONTENT</b>	
Tare Number	4
Wt. Sample wet + tare (g)	724.4
Wt. Sample dry + tare (g)	487.7
Wt. Tare (g)	8.4
Moisture Content %	49.4
<b>BULK DENSITY</b>	
Sample Wt. (g)	1089.2
Diameter 1 (cm)	7.20
Diameter 2 (cm)	7.20
Diameter 3 (cm)	7.20
<b>Avg. Diameter (cm)</b>	<b>7.20</b>
Length 1 (cm)	15.60
Length 2 (cm)	15.60
Length 3 (cm)	15.60
<b>Avg. Length (cm)</b>	<b>15.60</b>
Volume (cm <sup>3</sup> )	635.2
Moisture content (%)	49.4
Bulk Density (g/cm <sup>3</sup> )	1.715
<b>Bulk Unit Weight (kN/m<sup>3</sup>)</b>	<b>16.8</b>
<b>Bulk Unit Weight (pcf)</b>	<b>107.1</b>
<b>Dry Unit Weight (kN/m<sup>3</sup>)</b>	<b>11.26</b>

**AECOM - SOILS LABORATORY**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS (ASTM D2166)**



CLIENT:	City of Winnipeg
PROJECT:	Jefferson CSR Contract 8B & 10
JOB NO.:	60680190

TEST HOLE NO.:	TH23-23
SAMPLE NO.:	T2
SAMPLE DEPTH:	3.05 - 3.66 m
SAMPLE DATE:	
TEST DATE:	10-Mar-23

SOIL DESCRIPTION:	
CLAY - brown, moist, stiff, silty	
high plasticity	
MOISTURE CONTENT:	49.4

See attached photo

SAMPLE DIAM.(Do):	72.00	(mm)	INITIAL AREA, A <sub>o</sub> :	4071.5	(mm <sup>2</sup> )
SAMPLE LENGTH, (L <sub>o</sub> ):	156.00	(mm)	PISTON RATE:	0.0602	(inches / minute)
L / D RATIO:	2.17	(2 < L/D < 2.5)	AXIAL STRAIN RATE, R:	0.98	(0.5<R<2 % / minute)

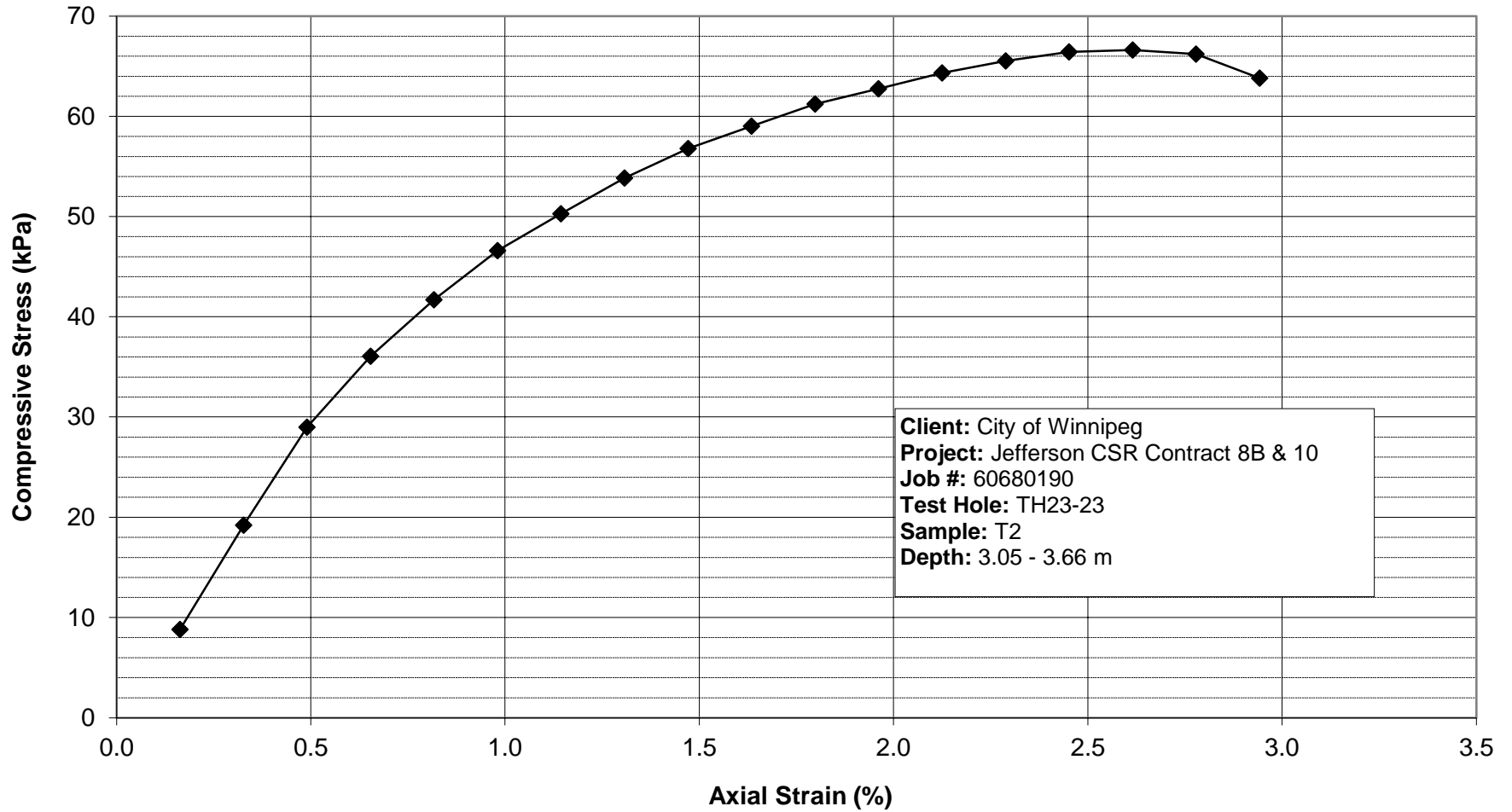
FAILURE SKETCH

TEST DATA - DIAL READINGS							
AXIAL COMPRESSION	PROVING RING	TOTAL AXIAL STRAIN, E <sub>t</sub>	AVERAGE CROSS-SECTIONAL AREA, A	APPLIED AXIAL LOAD, P	COMPRESSIVE STRESS, σ <sub>c</sub>		
					(psi)	(ksf)	(kPa)
(inches)	(inches)	(%)	(inches <sup>2</sup> )	(lbs)			
0.01	0.0009	0.00	6.31	8.06	1.28	0.184	8.8
0.02	0.0019	0.16	6.32	17.62	2.79	0.401	19.2
0.03	0.0028	0.33	6.33	26.61	4.20	0.605	29.0
0.04	0.0035	0.49	6.34	33.17	5.23	0.753	36.1
0.05	0.0041	0.65	6.35	38.42	6.05	0.871	41.7
0.06	0.0046	0.82	6.36	43.01	6.76	0.973	46.6
0.07	0.0050	0.98	6.37	46.48	7.29	1.050	50.3
0.08	0.0053	1.14	6.38	49.85	7.81	1.124	53.8
0.09	0.0056	1.31	6.39	52.66	8.24	1.186	56.8
0.10	0.0059	1.47	6.41	54.81	8.56	1.232	59.0
0.11	0.0061	1.63	6.42	56.97	8.88	1.279	61.2
0.12	0.0062	1.80	6.43	58.47	9.10	1.310	62.7
0.13	0.0064	1.96	6.44	60.06	9.33	1.344	64.3
0.14	0.0065	2.12	6.45	61.28	9.50	1.369	65.5
0.15	0.0066	2.29	6.46	62.22	9.63	1.387	66.4
0.16	0.0067	2.45	6.47	62.50	9.66	1.391	66.6
0.17	0.0066	2.62	6.48	62.22	9.60	1.383	66.2
0.18	0.0064	2.78	6.49	60.06	9.25	1.332	63.8
0.19	0.0062	2.94	6.50	57.91	8.91	1.282	61.4

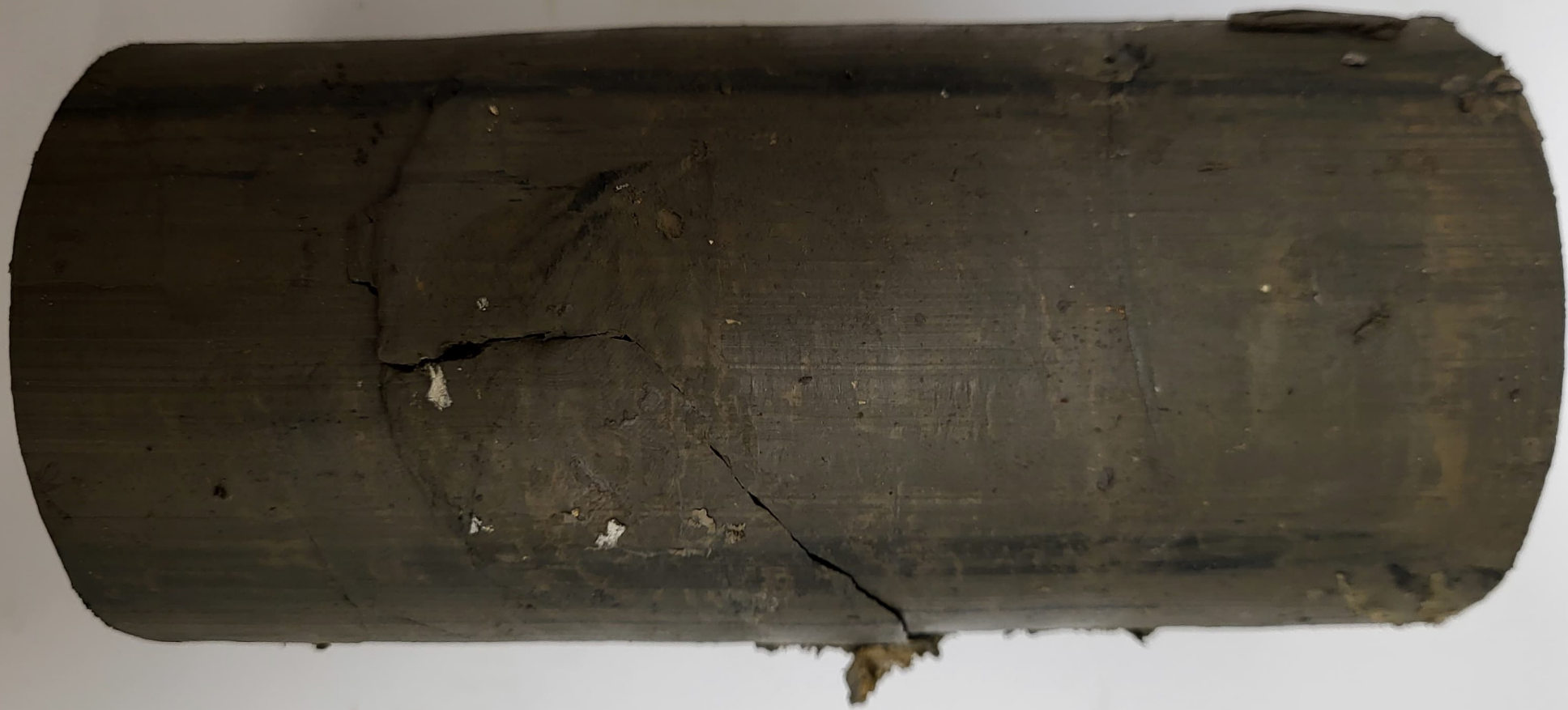
UNCONFINED COMPRESSIVE STRENGTH, q <sub>u</sub> :	66.61	kPa
(based on maximum q <sub>u</sub> value)	1.391	ksf
UNDRAINED SHEAR STRENGTH, S <sub>u</sub> :	33.30	kPa
(based on maximum q <sub>u</sub> value)	0.696	ksf

**NOTES:**  
 Sample tested was clay portion.

AECOM  
UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS  
(ASTM D2166)







TH23-23, T2

**AECOM - SOILS LABORATORY**  
**SHEAR STRENGTH, MOISTURE CONTENT & DENSITY CALCULATIONS**

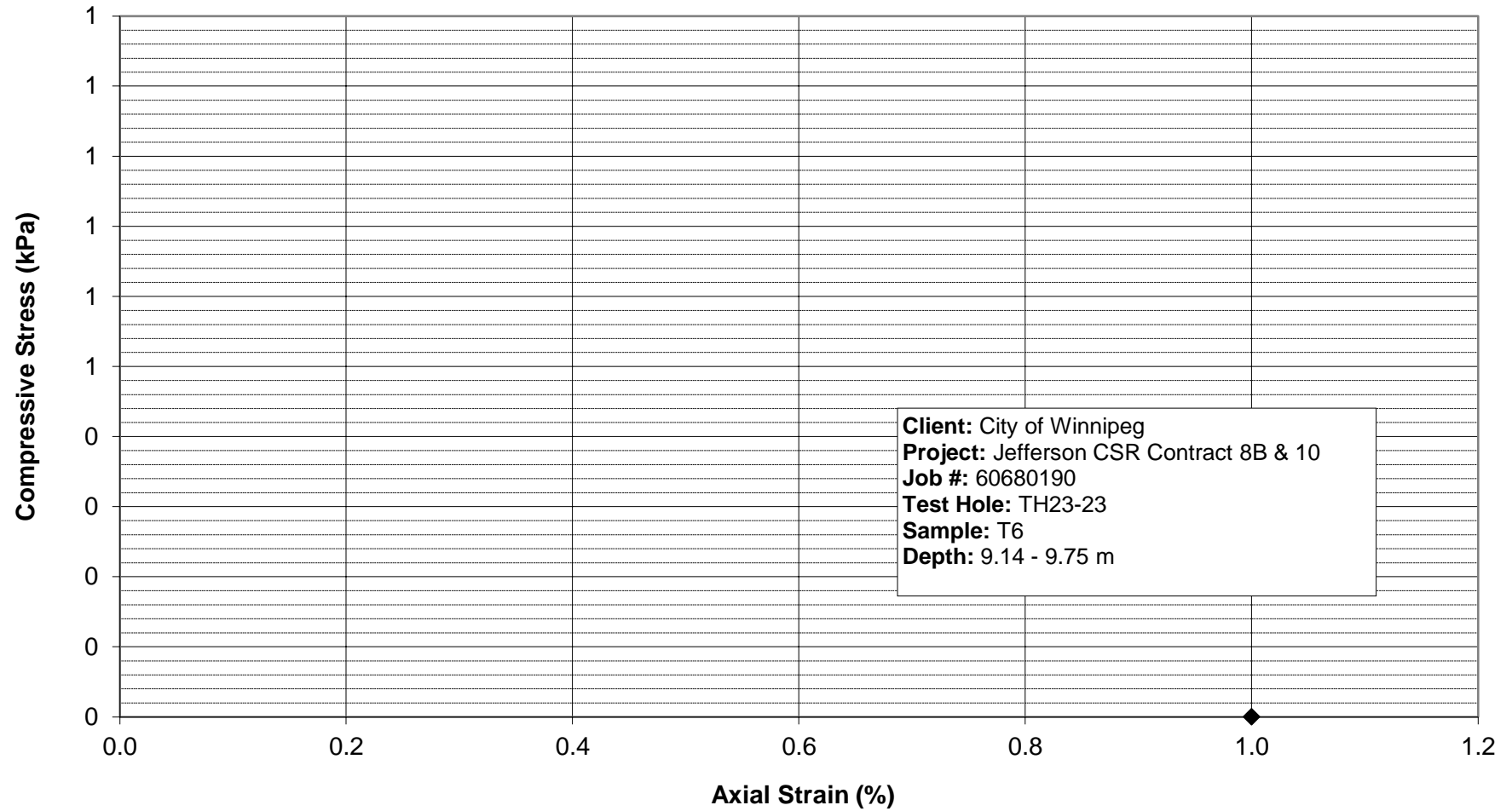


CLIENT: City of Winnipeg  
 PROJECT: Jefferson CSR Contract 8B & 10  
 JOB NO.: 60680190

TEST HOLE NO.:	TH23-23
SAMPLE NO.:	T6
SAMPLE DEPTH:	9.14 - 9.75 m
DATE TESTED:	16-Mar-23
<b>SHEAR STRENGTH TESTS</b>	
<b>TORVANE</b>	
Reading	0.00
Vane Size (S, M, L)	M
Undrained Shear Strength (kPa)	0.0
Undrained Shear Strength (ksf)	0.00
<b>POCKET PENETROMETER</b>	
Reading - Qu (tsf)	0.00
Undrained Shear Strength (kPa)	0.0
Reading - Qu (tsf)	0.00
Undrained Shear Strength (kPa)	0.0
Reading - Qu (tsf)	0.00
Undrained Shear Strength (kPa)	0.0
<b>UNCONFINED COMPRESSIVE STRENGTH TEST</b>	
Unconfined compressive strength (kPa)	#VALUE!
Unconfined compressive strength (ksf)	#VALUE!
Undrained Shear Strength (kPa)	#VALUE!
Undrained Shear Strength (ksf)	#VALUE!
<b>MOISTURE CONTENT</b>	
Tare Number	MAK5
Wt. Sample wet + tare (g)	584.2
Wt. Sample dry + tare (g)	469.2
Wt. Tare (g)	8.8
Moisture Content %	25.0
<b>BULK DENSITY</b>	
Sample Wt. (g)	0
Diameter 1 (cm)	0.00
Diameter 2 (cm)	0.00
Diameter 3 (cm)	0.00
<b>Avg. Diameter (cm)</b>	<b>0.00</b>
Length 1 (cm)	0.00
Length 2 (cm)	0.00
Length 3 (cm)	0.00
<b>Avg. Length (cm)</b>	<b>0.00</b>
Volume (cm <sup>3</sup> )	0.0
Moisture content (%)	25.0
Bulk Density (g/cm <sup>3</sup> )	#DIV/0!
<b>Bulk Unit Weight (kN/m<sup>3</sup>)</b>	<b>#DIV/0!</b>
<b>Bulk Unit Weight (pcf)</b>	<b>#DIV/0!</b>
<b>Dry Unit Weight (kN/m<sup>3</sup>)</b>	<b>#DIV/0!</b>



**AECOM**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS**  
**(ASTM D2166)**



DER

TH23-23, T6



**AECOM - SOILS LABORATORY**  
**SHEAR STRENGTH, MOISTURE CONTENT & DENSITY CALCULATIONS**



CLIENT: City of Winnipeg  
 PROJECT: Jefferson CSR Contract 8B & 10  
 JOB NO.: 60680190

<b>TEST HOLE NO.:</b>	<b>TH23-24</b>
<b>SAMPLE NO.:</b>	<b>T4</b>
<b>SAMPLE DEPTH:</b>	6.10 - 6.71 m
<b>DATE TESTED:</b>	10-Mar-23
<b>SHEAR STRENGTH TESTS</b>	
<b>TORVANE</b>	
Reading	0.50
Vane Size (S, M, L)	M
Undrained Shear Strength (kPa)	49.0
Undrained Shear Strength (ksf)	1.02
<b>POCKET PENETROMETER</b>	
Reading - Qu (tsf)	1.25
Undrained Shear Strength (kPa)	59.9
Reading - Qu (tsf)	1.50
Undrained Shear Strength (kPa)	71.8
Reading - Qu (tsf)	1.50
Undrained Shear Strength (kPa)	71.8
<b>UNCONFINED COMPRESSIVE STRENGTH TEST</b>	
Unconfined compressive strength (kPa)	94.7
Unconfined compressive strength (ksf)	2.0
Undrained Shear Strength (kPa)	47.4
Undrained Shear Strength (ksf)	0.989
<b>MOISTURE CONTENT</b>	
Tare Number	SG30
Wt. Sample wet + tare (g)	842.7
Wt. Sample dry + tare (g)	562.5
Wt. Tare (g)	8.7
Moisture Content %	50.6
<b>BULK DENSITY</b>	
Sample Wt. (g)	1043.9
Diameter 1 (cm)	7.20
Diameter 2 (cm)	7.30
Diameter 3 (cm)	7.20
<b>Avg. Diameter (cm)</b>	<b>7.23</b>
Length 1 (cm)	14.80
Length 2 (cm)	14.80
Length 3 (cm)	14.80
<b>Avg. Length (cm)</b>	<b>14.80</b>
Volume (cm <sup>3</sup> )	608.2
Moisture content (%)	50.6
Bulk Density (g/cm <sup>3</sup> )	1.716
<b>Bulk Unit Weight (kN/m<sup>3</sup>)</b>	<b>16.8</b>
<b>Bulk Unit Weight (pcf)</b>	<b>107.2</b>
<b>Dry Unit Weight (kN/m<sup>3</sup>)</b>	<b>11.18</b>

**AECOM - SOILS LABORATORY**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS (ASTM D2166)**



CLIENT:	City of Winnipeg
PROJECT:	Jefferson CSR Contract 8B & 10
JOB NO.:	60680190

TEST HOLE NO.:	TH23-24
SAMPLE NO.:	T4
SAMPLE DEPTH:	6.10 - 6.71 m
SAMPLE DATE:	
TEST DATE:	10-Mar-23

SOIL DESCRIPTION:	
CLAY - grey, moist, firm, silty, silt inclusions high plasticity	
MOISTURE CONTENT:	50.6

See attached photo

SAMPLE DIAM.(Do):	72.33	(mm)	INITIAL AREA, A <sub>o</sub> :	4109.3	(mm <sup>2</sup> )
SAMPLE LENGTH, (L <sub>o</sub> ):	148.00	(mm)	PISTON RATE:	0.0602	(inches / minute)
L / D RATIO:	2.05	(2 < L/D < 2.5)	AXIAL STRAIN RATE, R:	1.03	(0.5<R<2 % / minute)

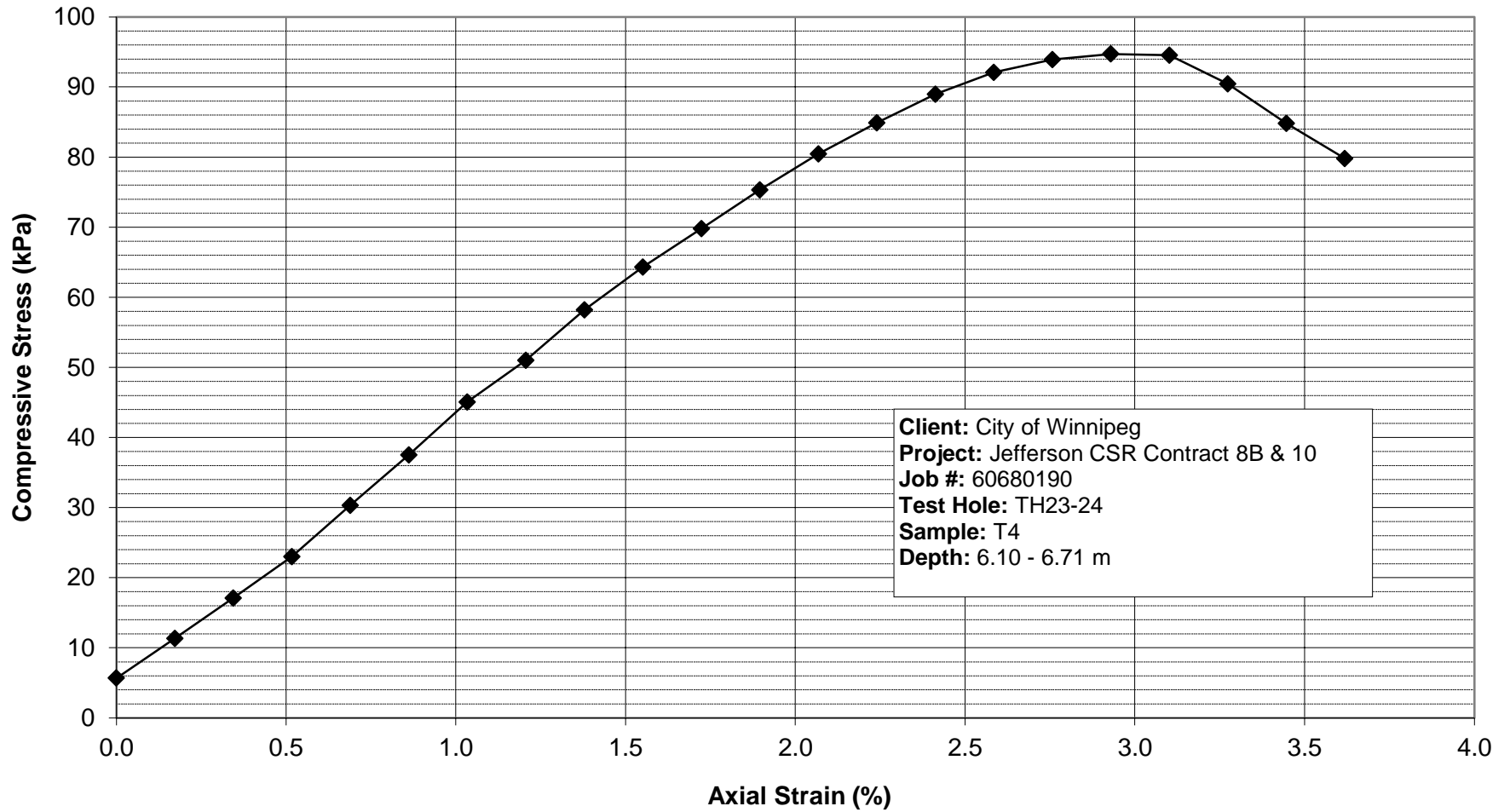
FAILURE SKETCH

TEST DATA - DIAL READINGS							
AXIAL COMPRESSION	PROVING RING	TOTAL AXIAL STRAIN, E <sub>t</sub>	AVERAGE CROSS-SECTIONAL AREA, A	APPLIED AXIAL LOAD, P	COMPRESSIVE STRESS, σ <sub>c</sub>		
					(inches)	(inches)	(%)
0.01	0.0006	0.00	6.37	5.25	0.82	0.119	5.7
0.02	0.0011	0.17	6.38	10.49	1.64	0.237	11.3
0.03	0.0017	0.34	6.39	15.84	2.48	0.357	17.1
0.04	0.0023	0.52	6.40	21.36	3.34	0.480	23.0
0.05	0.0030	0.69	6.41	28.20	4.40	0.633	30.3
0.06	0.0037	0.86	6.42	34.95	5.44	0.783	37.5
0.07	0.0045	1.03	6.44	42.07	6.54	0.941	45.1
0.08	0.0051	1.21	6.45	47.69	7.40	1.065	51.0
0.09	0.0058	1.38	6.46	54.53	8.44	1.216	58.2
0.10	0.0064	1.55	6.47	60.34	9.33	1.343	64.3
0.11	0.0070	1.72	6.48	65.59	10.12	1.457	69.8
0.12	0.0076	1.90	6.49	70.93	10.93	1.573	75.3
0.13	0.0081	2.07	6.50	75.90	11.67	1.680	80.5
0.14	0.0086	2.24	6.52	80.21	12.31	1.773	84.9
0.15	0.0090	2.41	6.53	84.24	12.91	1.858	89.0
0.16	0.0093	2.58	6.54	87.33	13.36	1.923	92.1
0.17	0.0095	2.76	6.55	89.20	13.62	1.961	93.9
0.18	0.0096	2.93	6.56	90.14	13.74	1.978	94.7
0.19	0.0096	3.10	6.57	90.14	13.71	1.975	94.5
0.20	0.0092	3.27	6.58	86.39	13.12	1.889	90.5
0.21	0.0087	3.45	6.60	81.14	12.30	1.771	84.8
0.22	0.0082	3.62	6.61	76.46	11.57	1.666	79.8

UNCONFINED COMPRESSIVE STRENGTH, q <sub>u</sub> :	94.72	kPa
(based on maximum q <sub>u</sub> value)	1.978	ksf
UNDRAINED SHEAR STRENGTH, S <sub>u</sub> :	47.36	kPa
(based on maximum q <sub>u</sub> value)	0.989	ksf

**NOTES:**

AECOM  
UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS  
(ASTM D2166)







TH23-24, T4

**AECOM - SOILS LABORATORY**  
**SHEAR STRENGTH, MOISTURE CONTENT & DENSITY CALCULATIONS**



CLIENT: City of Winnipeg  
 PROJECT: Jefferson CSR Contract 8B & 10  
 JOB NO.: 60680190

TEST HOLE NO.:	TH23-24
SAMPLE NO.:	T8
SAMPLE DEPTH:	12.19 - 12.80 m
DATE TESTED:	15-Mar-23
<b>SHEAR STRENGTH TESTS</b>	
<b>TORVANE</b>	
Reading	0.25
Vane Size (S, M, L)	M
Undrained Shear Strength (kPa)	24.5
Undrained Shear Strength (ksf)	0.51
<b>POCKET PENETROMETER</b>	
Reading - Qu (tsf)	0.20
Undrained Shear Strength (kPa)	9.6
Reading - Qu (tsf)	0.20
Undrained Shear Strength (kPa)	9.6
Reading - Qu (tsf)	0.25
Undrained Shear Strength (kPa)	12.0
<b>UNCONFINED COMPRESSIVE STRENGTH TEST</b>	
Unconfined compressive strength (kPa)	55.2
Unconfined compressive strength (ksf)	1.2
Undrained Shear Strength (kPa)	27.6
Undrained Shear Strength (ksf)	0.577
<b>MOISTURE CONTENT</b>	
Tare Number	E2
Wt. Sample wet + tare (g)	311.3
Wt. Sample dry + tare (g)	250.1
Wt. Tare (g)	9.4
Moisture Content %	25.4
<b>BULK DENSITY</b>	
Sample Wt. (g)	1196.9
Diameter 1 (cm)	6.50
Diameter 2 (cm)	7.20
Diameter 3 (cm)	7.20
<b>Avg. Diameter (cm)</b>	<b>6.97</b>
Length 1 (cm)	15.50
Length 2 (cm)	15.60
Length 3 (cm)	15.60
<b>Avg. Length (cm)</b>	<b>15.57</b>
Volume (cm <sup>3</sup> )	593.4
Moisture content (%)	25.4
Bulk Density (g/cm <sup>3</sup> )	2.017
<b>Bulk Unit Weight (kN/m<sup>3</sup>)</b>	<b>19.8</b>
<b>Bulk Unit Weight (pcf)</b>	<b>125.9</b>
<b>Dry Unit Weight (kN/m<sup>3</sup>)</b>	<b>15.77</b>

**AECOM - SOILS LABORATORY**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS (ASTM D2166)**



<b>CLIENT:</b>	City of Winnipeg
<b>PROJECT:</b>	Jefferson CSR Contract 8B & 10
<b>JOB NO.:</b>	60680190

<b>TEST HOLE NO.:</b>	TH23-24
<b>SAMPLE NO.:</b>	T8
<b>SAMPLE DEPTH:</b>	12.19 - 12.80 m
<b>SAMPLE DATE:</b>	
<b>TEST DATE:</b>	15-Mar-23

<b>SOIL DESCRIPTION:</b>	
CLAY - grey, moist, soft, silty, trace sand, trace gravel, silt inclusions high plasticity	
<b>MOISTURE CONTENT:</b>	25.4

See attached photo

<b>SAMPLE DIAM.(Do):</b>	69.67	(mm)	<b>INITIAL AREA, A<sub>o</sub>:</b>	3811.9	(mm <sup>2</sup> )
<b>SAMPLE LENGTH, (L<sub>o</sub>):</b>	155.67	(mm)	<b>PISTON RATE:</b>	0.0602	(inches / minute)
<b>L / D RATIO:</b>	2.23	(2 < L/D < 2.5)	<b>AXIAL STRAIN RATE, R:</b>	0.98	(0.5<R<2 % / minute)

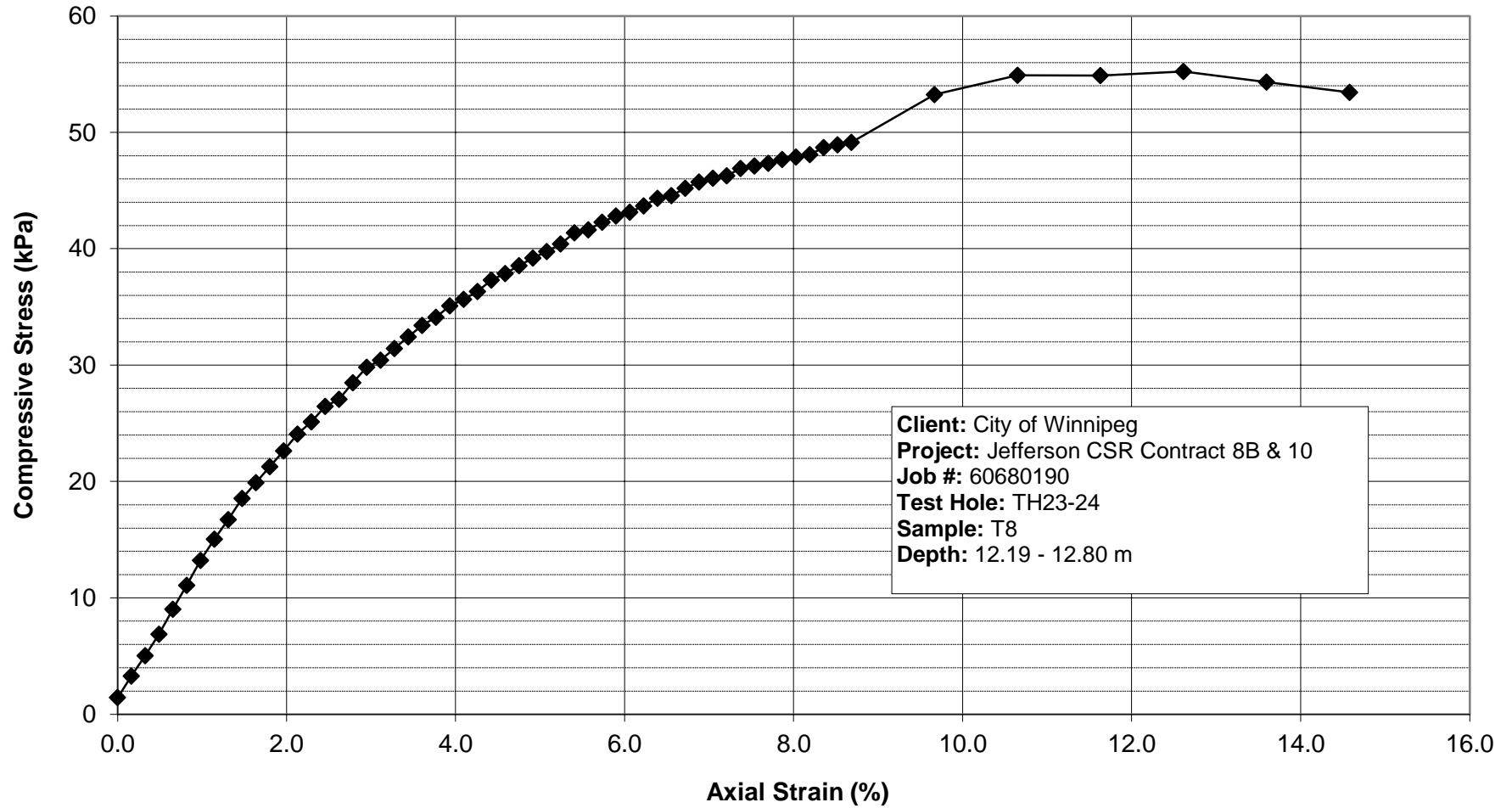
FAILURE SKETCH

TEST DATA - DIAL READINGS							
AXIAL COMPRESSION	PROVING RING	TOTAL AXIAL STRAIN, E <sub>t</sub>	AVERAGE CROSS-SECTIONAL AREA, A	APPLIED AXIAL LOAD, P	COMPRESSIVE STRESS, σ <sub>c</sub>		
(inches)	(inches)	(%)	(inches <sup>2</sup> )	(lbs)	(psi)	(ksf)	(kPa)
0.01	0.0001	0.00	5.91	1.22	0.21	0.030	1.4
0.02	0.0003	0.16	5.92	2.81	0.47	0.068	3.3
0.03	0.0005	0.33	5.93	4.31	0.73	0.105	5.0
0.04	0.0006	0.49	5.94	5.90	0.99	0.143	6.9
0.05	0.0008	0.66	5.95	7.78	1.31	0.188	9.0
0.06	0.0010	0.82	5.96	9.56	1.60	0.231	11.1
0.07	0.0012	0.98	5.97	11.43	1.92	0.276	13.2
0.08	0.0014	1.15	5.98	13.02	2.18	0.314	15.0
0.09	0.0016	1.31	5.99	14.52	2.43	0.349	16.7
0.10	0.0017	1.47	6.00	16.12	2.69	0.387	18.5
0.11	0.0019	1.64	6.01	17.33	2.89	0.416	19.9
0.12	0.0020	1.80	6.02	18.55	3.08	0.444	21.3
0.13	0.0021	1.97	6.03	19.77	3.28	0.472	22.6
0.14	0.0023	2.13	6.04	21.08	3.49	0.503	24.1
0.15	0.0024	2.29	6.05	22.02	3.64	0.524	25.1
0.16	0.0025	2.46	6.06	23.24	3.84	0.552	26.5
0.17	0.0025	2.62	6.07	23.80	3.92	0.565	27.0
0.18	0.0027	2.78	6.08	25.11	4.13	0.595	28.5
0.19	0.0028	2.95	6.09	26.33	4.32	0.623	29.8
0.20	0.0029	3.11	6.10	26.89	4.41	0.635	30.4
0.21	0.0030	3.28	6.11	27.83	4.56	0.656	31.4
0.22	0.0031	3.44	6.12	28.77	4.70	0.677	32.4
0.23	0.0032	3.60	6.13	29.70	4.85	0.698	33.4
0.24	0.0032	3.77	6.14	30.36	4.94	0.712	34.1
0.25	0.0033	3.93	6.15	31.30	5.09	0.733	35.1
0.26	0.0034	4.10	6.16	31.86	5.17	0.745	35.7
0.27	0.0035	4.26	6.17	32.51	5.27	0.759	36.3
0.28	0.0036	4.42	6.18	33.45	5.41	0.779	37.3
0.29	0.0036	4.59	6.19	34.01	5.49	0.791	37.9
0.30	0.0037	4.75	6.20	34.67	5.59	0.805	38.5
0.31	0.0038	4.91	6.21	35.32	5.68	0.819	39.2
0.32	0.0038	5.08	6.22	35.89	5.77	0.830	39.8
0.33	0.0039	5.24	6.24	36.54	5.86	0.844	40.4
0.34	0.0040	5.41	6.25	37.48	6.00	0.864	41.4
0.35	0.0040	5.57	6.26	37.76	6.04	0.869	41.6
0.36	0.0041	5.73	6.27	38.42	6.13	0.883	42.3
0.37	0.0042	5.90	6.28	38.98	6.21	0.894	42.8
0.38	0.0042	6.06	6.29	39.35	6.26	0.901	43.1
0.39	0.0043	6.22	6.30	39.92	6.34	0.912	43.7
0.40	0.0043	6.39	6.31	40.57	6.43	0.926	44.3
0.41	0.0044	6.55	6.32	40.85	6.46	0.930	44.5
0.42	0.0044	6.72	6.33	41.51	6.55	0.944	45.2
0.43	0.0045	6.88	6.34	42.07	6.63	0.955	45.7
0.44	0.0045	7.04	6.36	42.45	6.68	0.962	46.0
0.45	0.0046	7.21	6.37	42.73	6.71	0.966	46.3
0.46	0.0046	7.37	6.38	43.38	6.80	0.979	46.9
0.47	0.0047	7.54	6.39	43.66	6.83	0.984	47.1
0.48	0.0047	7.70	6.40	43.95	6.87	0.989	47.3
0.49	0.0047	7.86	6.41	44.32	6.91	0.995	47.7
0.50	0.0048	8.03	6.42	44.60	6.94	1.000	47.9
0.51	0.0048	8.19	6.44	44.88	6.97	1.004	48.1
0.52	0.0049	8.35	6.45	45.54	7.06	1.017	48.7
0.53	0.0049	8.52	6.46	45.82	7.09	1.022	48.9
0.54	0.0049	8.68	6.47	46.10	7.13	1.026	49.1
0.60	0.0054	9.86	6.54	50.50	7.72	1.112	53.2
0.66	0.0056	10.65	6.61	52.66	7.96	1.147	54.9
0.72	0.0057	11.63	6.69	53.22	7.96	1.146	54.9
0.78	0.0058	12.61	6.76	54.16	8.01	1.153	55.2
0.84	0.0058	13.60	6.84	53.88	7.88	1.135	54.3
0.90	0.0057	14.58	6.92	53.60	7.75	1.116	53.4

UNCONFINED COMPRESSIVE STRENGTH, q <sub>u</sub> :	55.23	kPa
(based on maximum q <sub>u</sub> value)	1.153	ksf
UNDRAINED SHEAR STRENGTH, S <sub>u</sub> :	27.61	kPa
(based on maximum q <sub>u</sub> value)	0.577	ksf

**NOTES:**

AECOM  
UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS  
(ASTM D2166)





TH23-24, T8

**AECOM - SOILS LABORATORY**  
**SHEAR STRENGTH, MOISTURE CONTENT & DENSITY CALCULATIONS**



CLIENT: City of Winnipeg  
PROJECT: Jefferson CSR Contract 8B & 10  
JOB NO.: 60680190

<b>TEST HOLE NO.:</b>	<b>TH23-25</b>
<b>SAMPLE NO.:</b>	<b>T3</b>
<b>SAMPLE DEPTH:</b>	4.57 - 5.18 m
<b>DATE TESTED:</b>	10-Mar-23
<b>SHEAR STRENGTH TESTS</b>	
<b>TORVANE</b>	
Reading	0.46
Vane Size (S, M, L)	M
Undrained Shear Strength (kPa)	45.1
Undrained Shear Strength (ksf)	0.94
<b>POCKET PENETROMETER</b>	
Reading - Qu (tsf)	1.25
Undrained Shear Strength (kPa)	59.9
Reading - Qu (tsf)	1.30
Undrained Shear Strength (kPa)	62.2
Reading - Qu (tsf)	1.40
Undrained Shear Strength (kPa)	67.0
<b>UNCONFINED COMPRESSIVE STRENGTH TEST</b>	
Unconfined compressive strength (kPa)	41.2
Unconfined compressive strength (ksf)	0.9
Undrained Shear Strength (kPa)	20.6
Undrained Shear Strength (ksf)	0.430
<b>MOISTURE CONTENT</b>	
Tare Number	SG63
Wt. Sample wet + tare (g)	717.0
Wt. Sample dry + tare (g)	465.6
Wt. Tare (g)	8.3
Moisture Content %	55.0
<b>BULK DENSITY</b>	
Sample Wt. (g)	1083.6
Diameter 1 (cm)	7.20
Diameter 2 (cm)	7.30
Diameter 3 (cm)	7.20
<b>Avg. Diameter (cm)</b>	<b>7.23</b>
Length 1 (cm)	15.60
Length 2 (cm)	15.60
Length 3 (cm)	15.50
<b>Avg. Length (cm)</b>	<b>15.57</b>
Volume (cm <sup>3</sup> )	639.7
Moisture content (%)	55.0
Bulk Density (g/cm <sup>3</sup> )	1.694
<b>Bulk Unit Weight (kN/m<sup>3</sup>)</b>	<b>16.6</b>
<b>Bulk Unit Weight (pcf)</b>	<b>105.8</b>
<b>Dry Unit Weight (kN/m<sup>3</sup>)</b>	<b>10.72</b>

**AECOM - SOILS LABORATORY**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS (ASTM D2166)**



CLIENT:	City of Winnipeg
PROJECT:	Jefferson CSR Contract 8B & 10
JOB NO.:	60680190

TEST HOLE NO.:	TH23-25
SAMPLE NO.:	T3
SAMPLE DEPTH:	4.57 - 5.18 m
SAMPLE DATE:	
TEST DATE:	10-Mar-23

SOIL DESCRIPTION:	
CLAY - brown, moist, firm, silty, trace precipitates	
high plasticity	
MOISTURE CONTENT:	55.0

See attached photo

SAMPLE DIAM.(Do):	72.33	(mm)	INITIAL AREA, A <sub>o</sub> :	4109.3	(mm <sup>2</sup> )
SAMPLE LENGTH, (L <sub>o</sub> ):	155.67	(mm)	PISTON RATE:	0.0602	(inches / minute)
L / D RATIO:	2.15	(2 < L/D < 2.5)	AXIAL STRAIN RATE, R:	0.98	(0.5<R<2 % / minute)

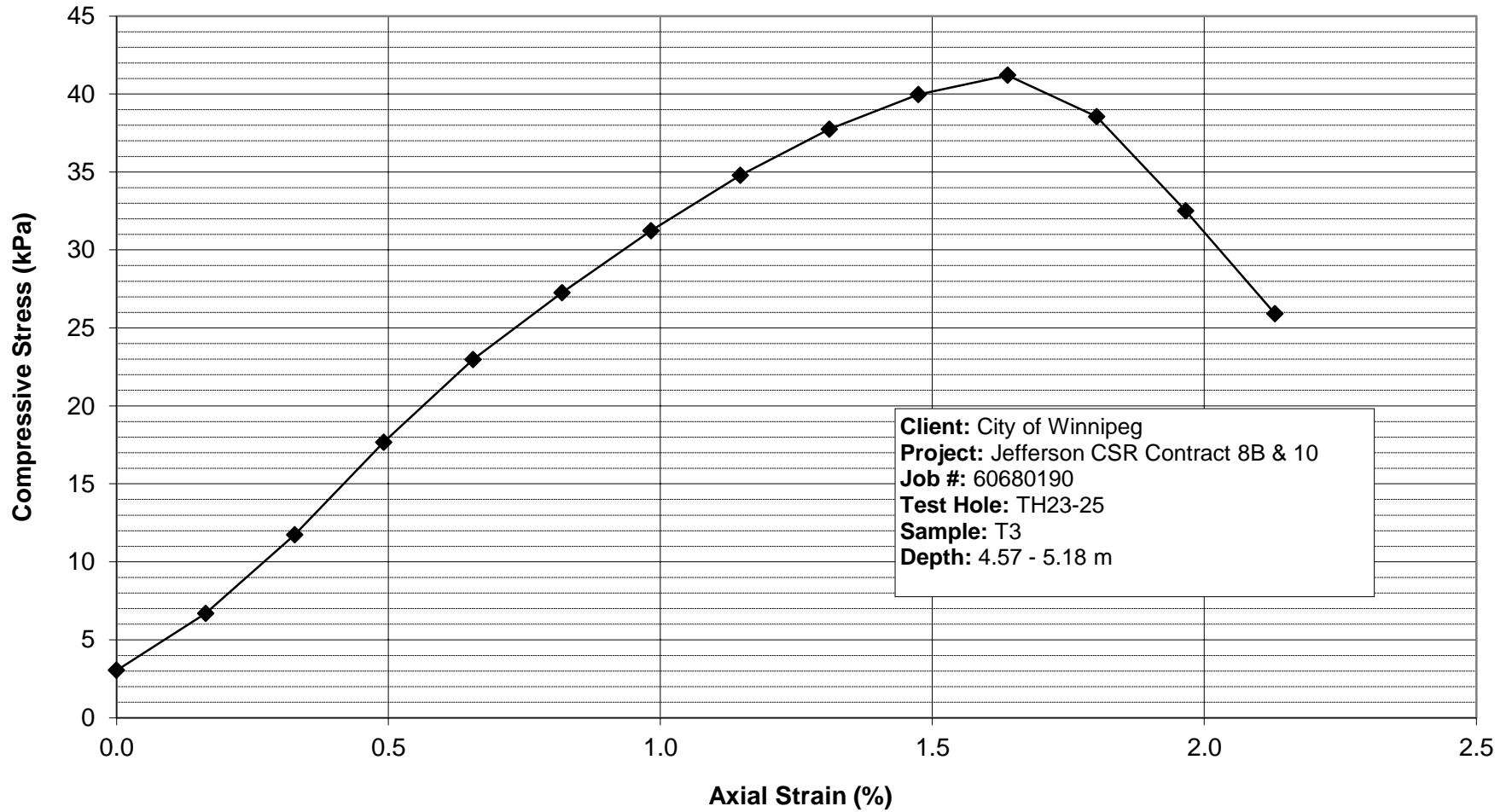
FAILURE SKETCH

TEST DATA - DIAL READINGS							
AXIAL COMPRESSION	PROVING RING	TOTAL AXIAL STRAIN, E <sub>t</sub>	AVERAGE CROSS-SECTIONAL AREA, A	APPLIED AXIAL LOAD, P	COMPRESSIVE STRESS, σ <sub>c</sub>		
					(inches)	(inches)	(%)
0.01	0.0003	0.00	6.37	2.81	0.44	0.064	3.0
0.02	0.0007	0.16	6.38	6.18	0.97	0.140	6.7
0.03	0.0012	0.33	6.39	10.87	1.70	0.245	11.7
0.04	0.0018	0.49	6.40	16.40	2.56	0.369	17.7
0.05	0.0023	0.66	6.41	21.36	3.33	0.480	23.0
0.06	0.0027	0.82	6.42	25.39	3.95	0.569	27.3
0.07	0.0031	0.98	6.43	29.14	4.53	0.652	31.2
0.08	0.0035	1.15	6.44	32.51	5.05	0.727	34.8
0.09	0.0038	1.31	6.45	35.32	5.47	0.788	37.7
0.10	0.0040	1.47	6.46	37.48	5.80	0.835	40.0
0.11	0.0041	1.64	6.48	38.70	5.98	0.861	41.2
0.12	0.0039	1.80	6.49	36.26	5.59	0.805	38.5
0.13	0.0033	1.97	6.50	30.64	4.72	0.679	32.5
0.14	0.0026	2.13	6.51	24.46	3.76	0.541	25.9

UNCONFINED COMPRESSIVE STRENGTH, q <sub>u</sub> :	41.20	kPa
(based on maximum q <sub>u</sub> value)	0.861	ksf
UNDRAINED SHEAR STRENGTH, S <sub>u</sub> :	20.60	kPa
(based on maximum q <sub>u</sub> value)	0.430	ksf

**NOTES:**

AECOM  
UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS  
(ASTM D2166)







TH23-25, T3

**AECOM - SOILS LABORATORY**  
**SHEAR STRENGTH, MOISTURE CONTENT & DENSITY CALCULATIONS**



CLIENT: City of Winnipeg  
 PROJECT: Jefferson CSR Contract 8B & 10  
 JOB NO.: 60680190

TEST HOLE NO.:	TH23-25
SAMPLE NO.:	T5
SAMPLE DEPTH:	7.62 - 8.23 m
DATE TESTED:	16-Mar-23
<b>SHEAR STRENGTH TESTS</b>	
<b>TORVANE</b>	
Reading	0.50
Vane Size (S, M, L)	M
Undrained Shear Strength (kPa)	49.0
Undrained Shear Strength (ksf)	1.02
<b>POCKET PENETROMETER</b>	
Reading - Qu (tsf)	1.00
Undrained Shear Strength (kPa)	47.9
Reading - Qu (tsf)	1.10
Undrained Shear Strength (kPa)	52.7
Reading - Qu (tsf)	1.20
Undrained Shear Strength (kPa)	57.5
<b>UNCONFINED COMPRESSIVE STRENGTH TEST</b>	
Unconfined compressive strength (kPa)	99.6
Unconfined compressive strength (ksf)	2.1
Undrained Shear Strength (kPa)	49.8
Undrained Shear Strength (ksf)	1.041
<b>MOISTURE CONTENT</b>	
Tare Number	F12
Wt. Sample wet + tare (g)	348.9
Wt. Sample dry + tare (g)	245.6
Wt. Tare (g)	9.4
Moisture Content %	43.7
<b>BULK DENSITY</b>	
Sample Wt. (g)	1113.6
Diameter 1 (cm)	7.20
Diameter 2 (cm)	7.20
Diameter 3 (cm)	7.20
<b>Avg. Diameter (cm)</b>	<b>7.20</b>
Length 1 (cm)	15.60
Length 2 (cm)	15.60
Length 3 (cm)	15.60
<b>Avg. Length (cm)</b>	<b>15.60</b>
Volume (cm <sup>3</sup> )	635.2
Moisture content (%)	43.7
Bulk Density (g/cm <sup>3</sup> )	1.753
<b>Bulk Unit Weight (kN/m<sup>3</sup>)</b>	<b>17.2</b>
<b>Bulk Unit Weight (pcf)</b>	<b>109.5</b>
<b>Dry Unit Weight (kN/m<sup>3</sup>)</b>	<b>11.96</b>

**AECOM - SOILS LABORATORY**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS (ASTM D2166)**



CLIENT:	City of Winnipeg
PROJECT:	Jefferson CSR Contract 8B & 10
JOB NO.:	60680190

TEST HOLE NO.:	TH23-25
SAMPLE NO.:	T5
SAMPLE DEPTH:	7.62 - 8.23 m
SAMPLE DATE:	
TEST DATE:	16-Mar-23

SOIL DESCRIPTION:	
CLAY - grey, moist, firm, silty, trace gravel, silt inclusions	
high plasticity	
MOISTURE CONTENT:	43.7

See attached photo

SAMPLE DIAM.(Do):	72.00	(mm)	INITIAL AREA, A <sub>o</sub> :	4071.5	(mm <sup>2</sup> )
SAMPLE LENGTH, (L <sub>o</sub> ):	156.00	(mm)	PISTON RATE:	0.0602	(inches / minute)
L / D RATIO:	2.17	(2 < L/D < 2.5)	AXIAL STRAIN RATE, R:	0.98	(0.5<R<2 % / minute)

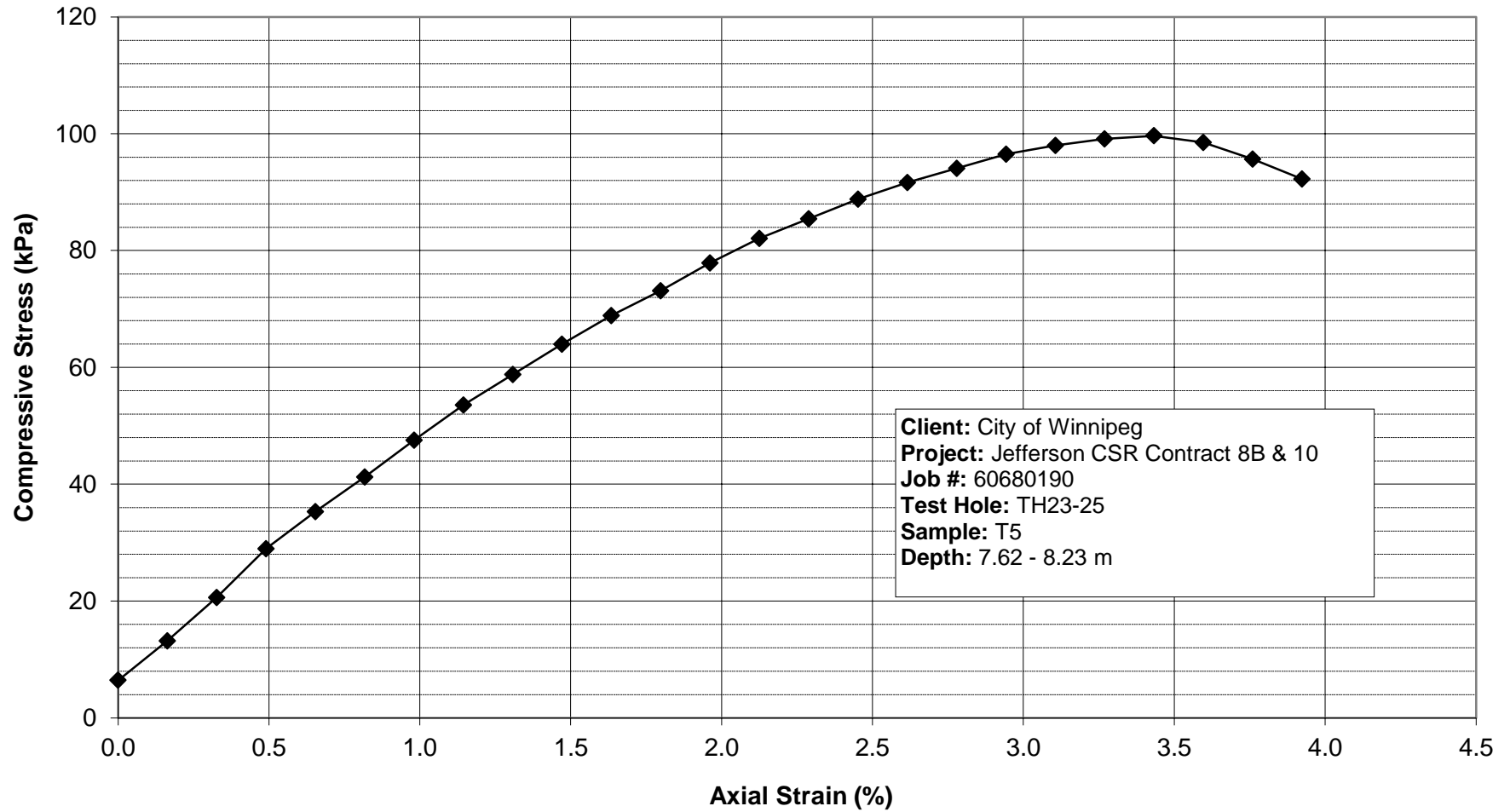
FAILURE SKETCH

TEST DATA - DIAL READINGS							
AXIAL COMPRESSION	PROVING RING	TOTAL AXIAL STRAIN, E <sub>t</sub>	AVERAGE CROSS-SECTIONAL AREA, A	APPLIED AXIAL LOAD, P	COMPRESSIVE STRESS, σ <sub>c</sub>		
					(psi)	(ksf)	(kPa)
(inches)	(inches)	(%)	(inches <sup>2</sup> )	(lbs)			
0.01	0.0006	0.00	6.31	5.90	0.94	0.135	6.4
0.02	0.0013	0.16	6.32	12.09	1.91	0.275	13.2
0.03	0.0020	0.33	6.33	18.93	2.99	0.430	20.6
0.04	0.0028	0.49	6.34	26.61	4.20	0.604	28.9
0.05	0.0035	0.65	6.35	32.51	5.12	0.737	35.3
0.06	0.0041	0.82	6.36	38.04	5.98	0.861	41.2
0.07	0.0047	0.98	6.37	43.95	6.90	0.993	47.5
0.08	0.0053	1.14	6.38	49.57	7.76	1.118	53.5
0.09	0.0058	1.31	6.39	54.53	8.53	1.228	58.8
0.10	0.0063	1.47	6.41	59.41	9.27	1.336	63.9
0.11	0.0068	1.63	6.42	64.09	9.99	1.439	68.9
0.12	0.0073	1.80	6.43	68.12	10.60	1.526	73.1
0.13	0.0078	1.96	6.44	72.71	11.30	1.627	77.9
0.14	0.0082	2.12	6.45	76.74	11.90	1.714	82.1
0.15	0.0085	2.29	6.46	80.02	12.39	1.784	85.4
0.16	0.0089	2.45	6.47	83.30	12.88	1.854	88.8
0.17	0.0092	2.62	6.48	86.11	13.29	1.913	91.6
0.18	0.0095	2.78	6.49	88.55	13.64	1.964	94.1
0.19	0.0097	2.94	6.50	90.98	13.99	2.015	96.5
0.20	0.0099	3.11	6.51	92.58	14.21	2.047	98.0
0.21	0.0100	3.27	6.52	93.79	14.38	2.070	99.1
0.22	0.0101	3.43	6.54	94.45	14.45	2.081	99.6
0.23	0.0100	3.60	6.55	93.51	14.28	2.057	98.5
0.24	0.0097	3.76	6.56	90.98	13.87	1.998	95.7
0.25	0.0094	3.92	6.57	87.89	13.38	1.927	92.3

UNCONFINED COMPRESSIVE STRENGTH, q <sub>u</sub> :	99.65	kPa
(based on maximum q <sub>u</sub> value)	2.081	ksf
UNDRAINED SHEAR STRENGTH, S <sub>u</sub> :	49.82	kPa
(based on maximum q <sub>u</sub> value)	1.041	ksf

**NOTES:**

**AECOM**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS**  
**(ASTM D2166)**





TH23-25, T5

**AECOM - SOILS LABORATORY**  
**SHEAR STRENGTH, MOISTURE CONTENT & DENSITY CALCULATIONS**



CLIENT: City of Winnipeg  
 PROJECT: Jefferson CSR Contract 8B & 10  
 JOB NO.: 60680190

TEST HOLE NO.:	TH23-26
SAMPLE NO.:	T3
SAMPLE DEPTH:	4.57 - 5.18 m
DATE TESTED:	10-Mar-23
<b>SHEAR STRENGTH TESTS</b>	
<b>TORVANE</b>	
Reading	0.60
Vane Size (S, M, L)	M
Undrained Shear Strength (kPa)	58.8
Undrained Shear Strength (ksf)	1.23
<b>POCKET PENETROMETER</b>	
Reading - Qu (tsf)	1.10
Undrained Shear Strength (kPa)	52.7
Reading - Qu (tsf)	1.10
Undrained Shear Strength (kPa)	52.7
Reading - Qu (tsf)	1.25
Undrained Shear Strength (kPa)	59.9
<b>UNCONFINED COMPRESSIVE STRENGTH TEST</b>	
Unconfined compressive strength (kPa)	86.2
Unconfined compressive strength (ksf)	1.8
Undrained Shear Strength (kPa)	43.1
Undrained Shear Strength (ksf)	0.900
<b>MOISTURE CONTENT</b>	
Tare Number	MAC10
Wt. Sample wet + tare (g)	742.6
Wt. Sample dry + tare (g)	478.8
Wt. Tare (g)	8.7
Moisture Content %	56.1
<b>BULK DENSITY</b>	
Sample Wt. (g)	1078.9
Diameter 1 (cm)	7.20
Diameter 2 (cm)	7.30
Diameter 3 (cm)	7.30
<b>Avg. Diameter (cm)</b>	<b>7.27</b>
Length 1 (cm)	15.70
Length 2 (cm)	15.70
Length 3 (cm)	15.70
<b>Avg. Length (cm)</b>	<b>15.70</b>
Volume (cm <sup>3</sup> )	651.1
Moisture content (%)	56.1
Bulk Density (g/cm <sup>3</sup> )	1.657
<b>Bulk Unit Weight (kN/m<sup>3</sup>)</b>	<b>16.3</b>
<b>Bulk Unit Weight (pcf)</b>	<b>103.4</b>
<b>Dry Unit Weight (kN/m<sup>3</sup>)</b>	<b>10.41</b>

**AECOM - SOILS LABORATORY**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS (ASTM D2166)**



CLIENT:	City of Winnipeg
PROJECT:	Jefferson CSR Contract 8B & 10
JOB NO.:	60680190

TEST HOLE NO.:	TH23-26
SAMPLE NO.:	T3
SAMPLE DEPTH:	4.57 - 5.18 m
SAMPLE DATE:	
TEST DATE:	10-Mar-23

SOIL DESCRIPTION:	
CLAY - brown, moist, firm, silty, silt inclusions	
high plasticity	
MOISTURE CONTENT:	56.1

See attached photo

SAMPLE DIAM.(Do):	72.67	(mm)	INITIAL AREA, A <sub>o</sub> :	4147.3	(mm <sup>2</sup> )
SAMPLE LENGTH, (L <sub>o</sub> ):	157.00	(mm)	PISTON RATE:	0.0602	(inches / minute)
L / D RATIO:	2.16	(2 < L/D < 2.5)	AXIAL STRAIN RATE, R:	0.97	(0.5<R<2 % / minute)

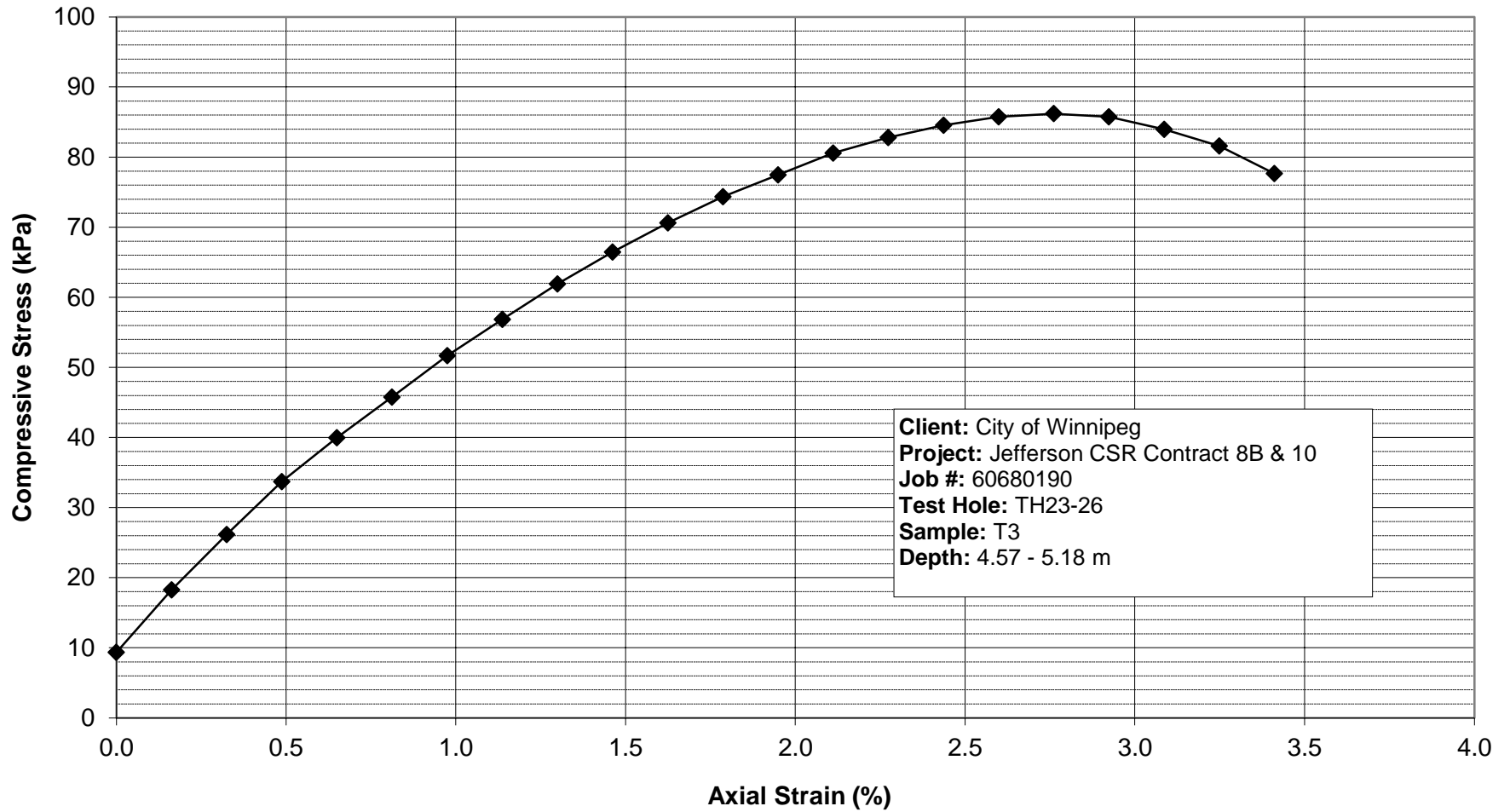
FAILURE SKETCH

TEST DATA - DIAL READINGS							
AXIAL COMPRESSION	PROVING RING	TOTAL AXIAL STRAIN, E <sub>t</sub>	AVERAGE CROSS-SECTIONAL AREA, A	APPLIED AXIAL LOAD, P	COMPRESSIVE STRESS, σ <sub>c</sub>		
					(inches)	(inches)	(%)
0.01	0.0009	0.00	6.43	8.71	1.36	0.195	9.3
0.02	0.0018	0.16	6.44	17.05	2.65	0.381	18.3
0.03	0.0026	0.32	6.45	24.46	3.79	0.546	26.1
0.04	0.0034	0.49	6.46	31.58	4.89	0.704	33.7
0.05	0.0040	0.65	6.47	37.48	5.79	0.834	39.9
0.06	0.0046	0.81	6.48	43.01	6.64	0.956	45.8
0.07	0.0052	0.97	6.49	48.63	7.49	1.079	51.7
0.08	0.0057	1.14	6.50	53.60	8.24	1.187	56.8
0.09	0.0062	1.30	6.51	58.47	8.98	1.293	61.9
0.10	0.0067	1.46	6.52	62.87	9.64	1.388	66.4
0.11	0.0071	1.62	6.53	66.90	10.24	1.474	70.6
0.12	0.0075	1.79	6.55	70.56	10.78	1.552	74.3
0.13	0.0079	1.95	6.56	73.65	11.23	1.618	77.5
0.14	0.0082	2.11	6.57	76.74	11.69	1.683	80.6
0.15	0.0084	2.27	6.58	78.99	12.01	1.728	82.8
0.16	0.0086	2.44	6.59	80.77	12.26	1.765	84.5
0.17	0.0088	2.60	6.60	82.08	12.44	1.791	85.8
0.18	0.0088	2.76	6.61	82.64	12.50	1.800	86.2
0.19	0.0088	2.92	6.62	82.36	12.44	1.791	85.8
0.20	0.0086	3.09	6.63	80.77	12.18	1.753	84.0
0.21	0.0084	3.25	6.64	78.61	11.83	1.704	81.6
0.22	0.0080	3.41	6.66	74.96	11.26	1.622	77.7

UNCONFINED COMPRESSIVE STRENGTH, q <sub>u</sub> :	86.19	kPa
(based on maximum q <sub>u</sub> value)	1.800	ksf
UNDRAINED SHEAR STRENGTH, S <sub>u</sub> :	43.10	kPa
(based on maximum q <sub>u</sub> value)	0.900	ksf

**NOTES:**

AECOM  
UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS  
(ASTM D2166)







TH23-26, T3

**AECOM - SOILS LABORATORY**  
**SHEAR STRENGTH, MOISTURE CONTENT & DENSITY CALCULATIONS**



CLIENT: City of Winnipeg  
 PROJECT: Jefferson CSR Contract 8B & 10  
 JOB NO.: 60680190

TEST HOLE NO.:	TH23-26
SAMPLE NO.:	T7
SAMPLE DEPTH:	10.67 - 11.28 m
DATE TESTED:	16-Mar-23
<b>SHEAR STRENGTH TESTS</b>	
<b>TORVANE</b>	
Reading	0.50
Vane Size (S, M, L)	M
Undrained Shear Strength (kPa)	49.0
Undrained Shear Strength (ksf)	1.02
<b>POCKET PENETROMETER</b>	
Reading - Qu (tsf)	0.90
Undrained Shear Strength (kPa)	43.1
Reading - Qu (tsf)	0.90
Undrained Shear Strength (kPa)	43.1
Reading - Qu (tsf)	0.90
Undrained Shear Strength (kPa)	43.1
<b>UNCONFINED COMPRESSIVE STRENGTH TEST</b>	
Unconfined compressive strength (kPa)	91.9
Unconfined compressive strength (ksf)	1.9
Undrained Shear Strength (kPa)	46.0
Undrained Shear Strength (ksf)	0.960
<b>MOISTURE CONTENT</b>	
Tare Number	F22
Wt. Sample wet + tare (g)	303.4
Wt. Sample dry + tare (g)	203.8
Wt. Tare (g)	8.9
Moisture Content %	51.1
<b>BULK DENSITY</b>	
Sample Wt. (g)	1114.1
Diameter 1 (cm)	7.20
Diameter 2 (cm)	7.20
Diameter 3 (cm)	7.20
<b>Avg. Diameter (cm)</b>	<b>7.20</b>
Length 1 (cm)	15.50
Length 2 (cm)	15.50
Length 3 (cm)	15.50
<b>Avg. Length (cm)</b>	<b>15.50</b>
Volume (cm <sup>3</sup> )	631.1
Moisture content (%)	51.1
Bulk Density (g/cm <sup>3</sup> )	1.765
<b>Bulk Unit Weight (kN/m<sup>3</sup>)</b>	<b>17.3</b>
<b>Bulk Unit Weight (pcf)</b>	<b>110.2</b>
<b>Dry Unit Weight (kN/m<sup>3</sup>)</b>	<b>11.46</b>

**AECOM - SOILS LABORATORY**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS (ASTM D2166)**



CLIENT:	City of Winnipeg
PROJECT:	Jefferson CSR Contract 8B & 10
JOB NO.:	60680190

TEST HOLE NO.:	TH23-26
SAMPLE NO.:	T7
SAMPLE DEPTH:	10.67 - 11.28 m
SAMPLE DATE:	
TEST DATE:	16-Mar-23

SOIL DESCRIPTION:	
CLAY - grey, moist, firm, silty, silt inclusions high plasticity	
MOISTURE CONTENT:	51.1

See attached photo

SAMPLE DIAM.(Do):	72.00	(mm)	INITIAL AREA, A <sub>o</sub> :	4071.5	(mm <sup>2</sup> )
SAMPLE LENGTH, (L <sub>o</sub> ):	155.00	(mm)	PISTON RATE:	0.0602	(inches / minute)
L / D RATIO:	2.15	(2 < L/D < 2.5)	AXIAL STRAIN RATE, R:	0.99	(0.5<R<2 % / minute)

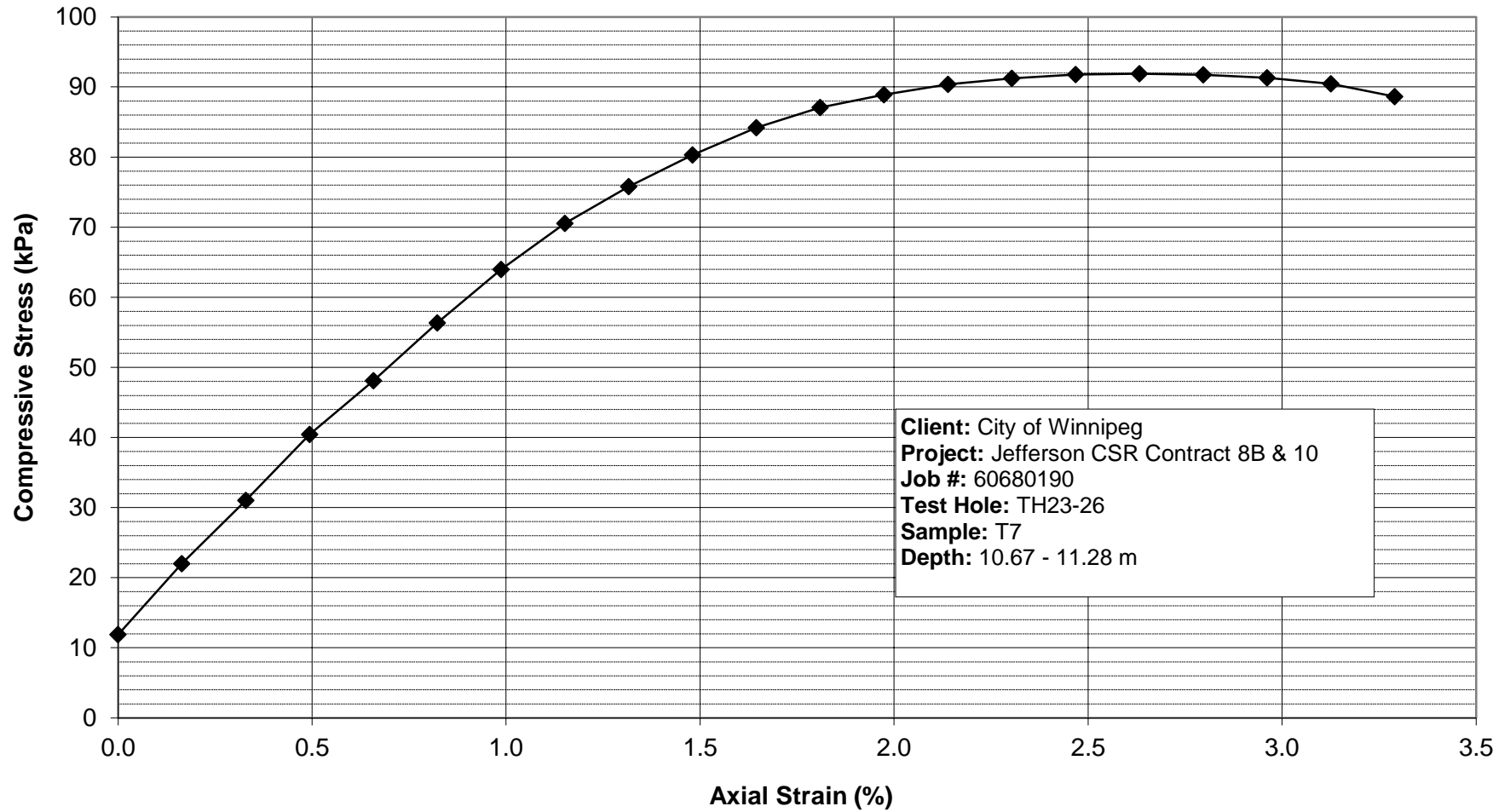
FAILURE SKETCH

TEST DATA - DIAL READINGS							
AXIAL COMPRESSION	PROVING RING	TOTAL AXIAL STRAIN, E <sub>t</sub>	AVERAGE CROSS-SECTIONAL AREA, A	APPLIED AXIAL LOAD, P	COMPRESSIVE STRESS, σ <sub>c</sub>		
					(psi)	(ksf)	(kPa)
(inches)	(inches)	(%)	(inches <sup>2</sup> )	(lbs)			
0.01	0.0012	0.00	6.31	10.87	1.72	0.248	11.9
0.02	0.0022	0.16	6.32	20.15	3.19	0.459	22.0
0.03	0.0030	0.33	6.33	28.48	4.50	0.648	31.0
0.04	0.0040	0.49	6.34	37.20	5.87	0.845	40.4
0.05	0.0047	0.66	6.35	44.32	6.98	1.005	48.1
0.06	0.0056	0.82	6.36	52.00	8.17	1.177	56.3
0.07	0.0063	0.99	6.37	59.12	9.28	1.336	64.0
0.08	0.0070	1.15	6.38	65.31	10.23	1.473	70.5
0.09	0.0075	1.32	6.40	70.28	10.99	1.582	75.8
0.10	0.0080	1.48	6.41	74.59	11.64	1.677	80.3
0.11	0.0084	1.65	6.42	78.33	12.21	1.758	84.2
0.12	0.0087	1.81	6.43	81.14	12.63	1.818	87.0
0.13	0.0089	1.97	6.44	83.02	12.90	1.857	88.9
0.14	0.0090	2.14	6.45	84.52	13.11	1.887	90.4
0.15	0.0091	2.30	6.46	85.45	13.23	1.905	91.2
0.16	0.0092	2.47	6.47	86.11	13.31	1.916	91.8
0.17	0.0092	2.63	6.48	86.39	13.33	1.919	91.9
0.18	0.0092	2.80	6.49	86.39	13.31	1.916	91.7
0.19	0.0092	2.96	6.50	86.11	13.24	1.907	91.3
0.20	0.0091	3.13	6.51	85.45	13.12	1.889	90.4
0.21	0.0090	3.29	6.53	83.86	12.85	1.851	88.6

UNCONFINED COMPRESSIVE STRENGTH, q <sub>u</sub> :	91.90	kPa
(based on maximum q <sub>u</sub> value)	1.919	ksf
UNDRAINED SHEAR STRENGTH, S <sub>u</sub> :	45.95	kPa
(based on maximum q <sub>u</sub> value)	0.960	ksf

**NOTES:**

**AECOM**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS**  
**(ASTM D2166)**





TH23-26, T7

**AECOM - SOILS LABORATORY**  
**SHEAR STRENGTH, MOISTURE CONTENT & DENSITY CALCULATIONS**



CLIENT: City of Winnipeg  
 PROJECT: Jefferson CSR Contract 8B & 10  
 JOB NO.: 60680190

TEST HOLE NO.:	TH23-27
SAMPLE NO.:	T2
SAMPLE DEPTH:	3.05 - 3.66 m
DATE TESTED:	10-Mar-23
<b>SHEAR STRENGTH TESTS</b>	
<b>TORVANE</b>	
Reading	0.63
Vane Size (S, M, L)	M
Undrained Shear Strength (kPa)	61.8
Undrained Shear Strength (ksf)	1.29
<b>POCKET PENETROMETER</b>	
Reading - Qu (tsf)	1.10
Undrained Shear Strength (kPa)	52.7
Reading - Qu (tsf)	1.20
Undrained Shear Strength (kPa)	57.5
Reading - Qu (tsf)	1.25
Undrained Shear Strength (kPa)	59.9
<b>UNCONFINED COMPRESSIVE STRENGTH TEST</b>	
Unconfined compressive strength (kPa)	53.2
Unconfined compressive strength (ksf)	1.1
Undrained Shear Strength (kPa)	26.6
Undrained Shear Strength (ksf)	0.556
<b>MOISTURE CONTENT</b>	
Tare Number	J51
Wt. Sample wet + tare (g)	687.6
Wt. Sample dry + tare (g)	452.7
Wt. Tare (g)	8.5
Moisture Content %	52.9
<b>BULK DENSITY</b>	
Sample Wt. (g)	1067.8
Diameter 1 (cm)	7.20
Diameter 2 (cm)	7.20
Diameter 3 (cm)	7.20
<b>Avg. Diameter (cm)</b>	<b>7.20</b>
Length 1 (cm)	15.50
Length 2 (cm)	15.60
Length 3 (cm)	15.60
<b>Avg. Length (cm)</b>	<b>15.57</b>
Volume (cm <sup>3</sup> )	633.8
Moisture content (%)	52.9
Bulk Density (g/cm <sup>3</sup> )	1.685
<b>Bulk Unit Weight (kN/m<sup>3</sup>)</b>	<b>16.5</b>
<b>Bulk Unit Weight (pcf)</b>	<b>105.2</b>
<b>Dry Unit Weight (kN/m<sup>3</sup>)</b>	<b>10.81</b>

**AECOM - SOILS LABORATORY**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS (ASTM D2166)**



CLIENT:	City of Winnipeg
PROJECT:	Jefferson CSR Contract 8B & 10
JOB NO.:	60680190

TEST HOLE NO.:	TH23-27
SAMPLE NO.:	T2
SAMPLE DEPTH:	3.05 - 3.66 m
SAMPLE DATE:	
TEST DATE:	10-Mar-23

SOIL DESCRIPTION:	
CLAY - brown, moist, stiff, silty, silt inclusions, trace precipitates	
high plasticity	
MOISTURE CONTENT:	52.9

See attached photo

SAMPLE DIAM.(Do):	72.00	(mm)	INITIAL AREA, A <sub>o</sub> :	4071.5	(mm <sup>2</sup> )
SAMPLE LENGTH, (L <sub>o</sub> ):	155.67	(mm)	PISTON RATE:	0.0602	(inches / minute)
L / D RATIO:	2.16	(2 < L/D < 2.5)	AXIAL STRAIN RATE, R:	0.98	(0.5<R<2 % / minute)

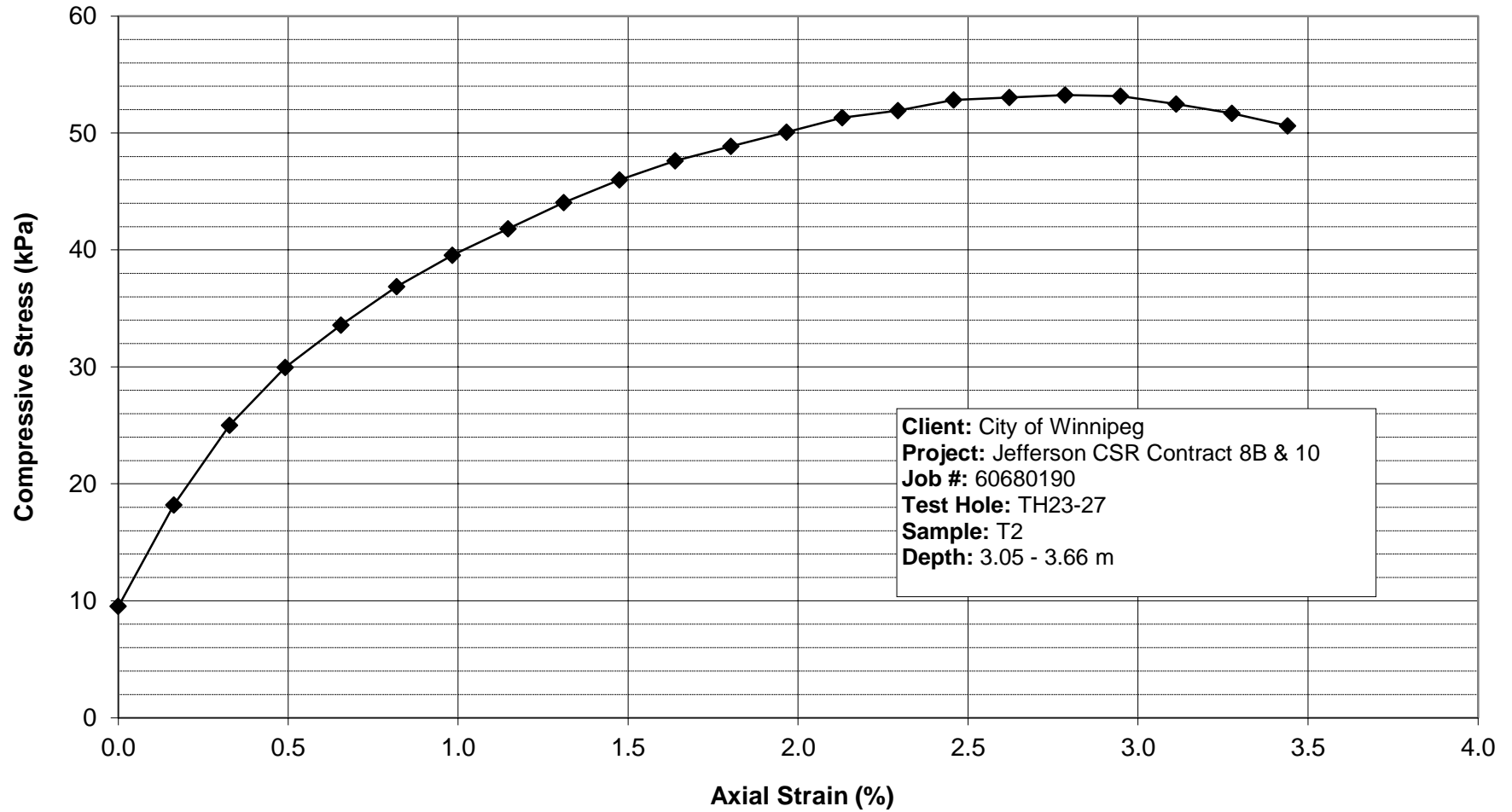
FAILURE SKETCH

TEST DATA - DIAL READINGS							
AXIAL COMPRESSION	PROVING RING	TOTAL AXIAL STRAIN, E <sub>t</sub>	AVERAGE CROSS-SECTIONAL AREA, A	APPLIED AXIAL LOAD, P	COMPRESSIVE STRESS, σ <sub>c</sub>		
					(psi)	(ksf)	(kPa)
(inches)	(inches)	(%)	(inches <sup>2</sup> )	(lbs)			
0.01	0.0009	0.00	6.31	8.71	1.38	0.199	9.5
0.02	0.0018	0.16	6.32	16.68	2.64	0.380	18.2
0.03	0.0025	0.33	6.33	22.96	3.63	0.522	25.0
0.04	0.0029	0.49	6.34	27.55	4.34	0.625	29.9
0.05	0.0033	0.66	6.35	30.92	4.87	0.701	33.6
0.06	0.0036	0.82	6.36	34.01	5.35	0.770	36.9
0.07	0.0039	0.98	6.37	36.54	5.73	0.828	39.5
0.08	0.0041	1.15	6.38	38.70	6.06	0.873	41.8
0.09	0.0044	1.31	6.39	40.85	6.39	0.920	44.0
0.10	0.0046	1.47	6.41	42.73	6.67	0.961	46.0
0.11	0.0047	1.64	6.42	44.32	6.91	0.995	47.6
0.12	0.0049	1.80	6.43	45.54	7.09	1.020	48.9
0.13	0.0050	1.97	6.44	46.76	7.26	1.046	50.1
0.14	0.0051	2.13	6.45	47.97	7.44	1.071	51.3
0.15	0.0052	2.29	6.46	48.63	7.53	1.084	51.9
0.16	0.0053	2.46	6.47	49.57	7.66	1.103	52.8
0.17	0.0053	2.62	6.48	49.85	7.69	1.108	53.0
0.18	0.0054	2.78	6.49	50.13	7.72	1.112	53.2
0.19	0.0054	2.95	6.50	50.13	7.71	1.110	53.2
0.20	0.0053	3.11	6.51	49.57	7.61	1.096	52.5
0.21	0.0052	3.28	6.52	48.91	7.50	1.079	51.7
0.22	0.0051	3.44	6.54	47.97	7.34	1.057	50.6

UNCONFINED COMPRESSIVE STRENGTH, q <sub>u</sub> :	53.24	kPa
(based on maximum q <sub>u</sub> value)	1.112	ksf
UNDRAINED SHEAR STRENGTH, S <sub>u</sub> :	26.62	kPa
(based on maximum q <sub>u</sub> value)	0.556	ksf

**NOTES:**

AECOM  
UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS  
(ASTM D2166)







TH23-27, T2

**AECOM - SOILS LABORATORY**  
**SHEAR STRENGTH, MOISTURE CONTENT & DENSITY CALCULATIONS**



CLIENT: City of Winnipeg  
 PROJECT: Jefferson CSR Contract 8B & 10  
 JOB NO.: 60680190

TEST HOLE NO.:	TH23-28
SAMPLE NO.:	T4
SAMPLE DEPTH:	6.10 - 6.71 m
DATE TESTED:	10-Mar-23
<b>SHEAR STRENGTH TESTS</b>	
<b>TORVANE</b>	
Reading	0.65
Vane Size (S, M, L)	M
Undrained Shear Strength (kPa)	63.8
Undrained Shear Strength (ksf)	1.33
<b>POCKET PENETROMETER</b>	
Reading - Qu (tsf)	1.00
Undrained Shear Strength (kPa)	47.9
Reading - Qu (tsf)	1.10
Undrained Shear Strength (kPa)	52.7
Reading - Qu (tsf)	1.20
Undrained Shear Strength (kPa)	57.5
<b>UNCONFINED COMPRESSIVE STRENGTH TEST</b>	
Unconfined compressive strength (kPa)	92.2
Unconfined compressive strength (ksf)	1.9
Undrained Shear Strength (kPa)	46.1
Undrained Shear Strength (ksf)	0.963
<b>MOISTURE CONTENT</b>	
Tare Number	32
Wt. Sample wet + tare (g)	749.6
Wt. Sample dry + tare (g)	497.8
Wt. Tare (g)	8.7
Moisture Content %	51.5
<b>BULK DENSITY</b>	
Sample Wt. (g)	1072
Diameter 1 (cm)	7.20
Diameter 2 (cm)	7.30
Diameter 3 (cm)	7.20
<b>Avg. Diameter (cm)</b>	<b>7.23</b>
Length 1 (cm)	15.40
Length 2 (cm)	15.40
Length 3 (cm)	15.40
<b>Avg. Length (cm)</b>	<b>15.40</b>
Volume (cm <sup>3</sup> )	632.8
Moisture content (%)	51.5
Bulk Density (g/cm <sup>3</sup> )	1.694
<b>Bulk Unit Weight (kN/m<sup>3</sup>)</b>	<b>16.6</b>
<b>Bulk Unit Weight (pcf)</b>	<b>105.8</b>
<b>Dry Unit Weight (kN/m<sup>3</sup>)</b>	<b>10.97</b>

**AECOM - SOILS LABORATORY**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS (ASTM D2166)**



CLIENT:	City of Winnipeg
PROJECT:	Jefferson CSR Contract 8B & 10
JOB NO.:	60680190

TEST HOLE NO.:	TH23-28
SAMPLE NO.:	T4
SAMPLE DEPTH:	6.10 - 6.71 m
SAMPLE DATE:	
TEST DATE:	10-Mar-23

<b>SOIL DESCRIPTION:</b>	
CLAY - brown, moist, stiff, silty, silt inclusions high plasticity	
MOISTURE CONTENT:	51.5

See attached  
photo

SAMPLE DIAM.(Do):	72.33	(mm)	INITIAL AREA, A <sub>o</sub> :	4109.3	(mm <sup>2</sup> )
SAMPLE LENGTH, (L <sub>o</sub> ):	154.00	(mm)	PISTON RATE:	0.0602	(inches / minute)
L / D RATIO:	2.13	(2 < L/D < 2.5)	AXIAL STRAIN RATE, R:	0.99	(0.5<R<2 % / minute)

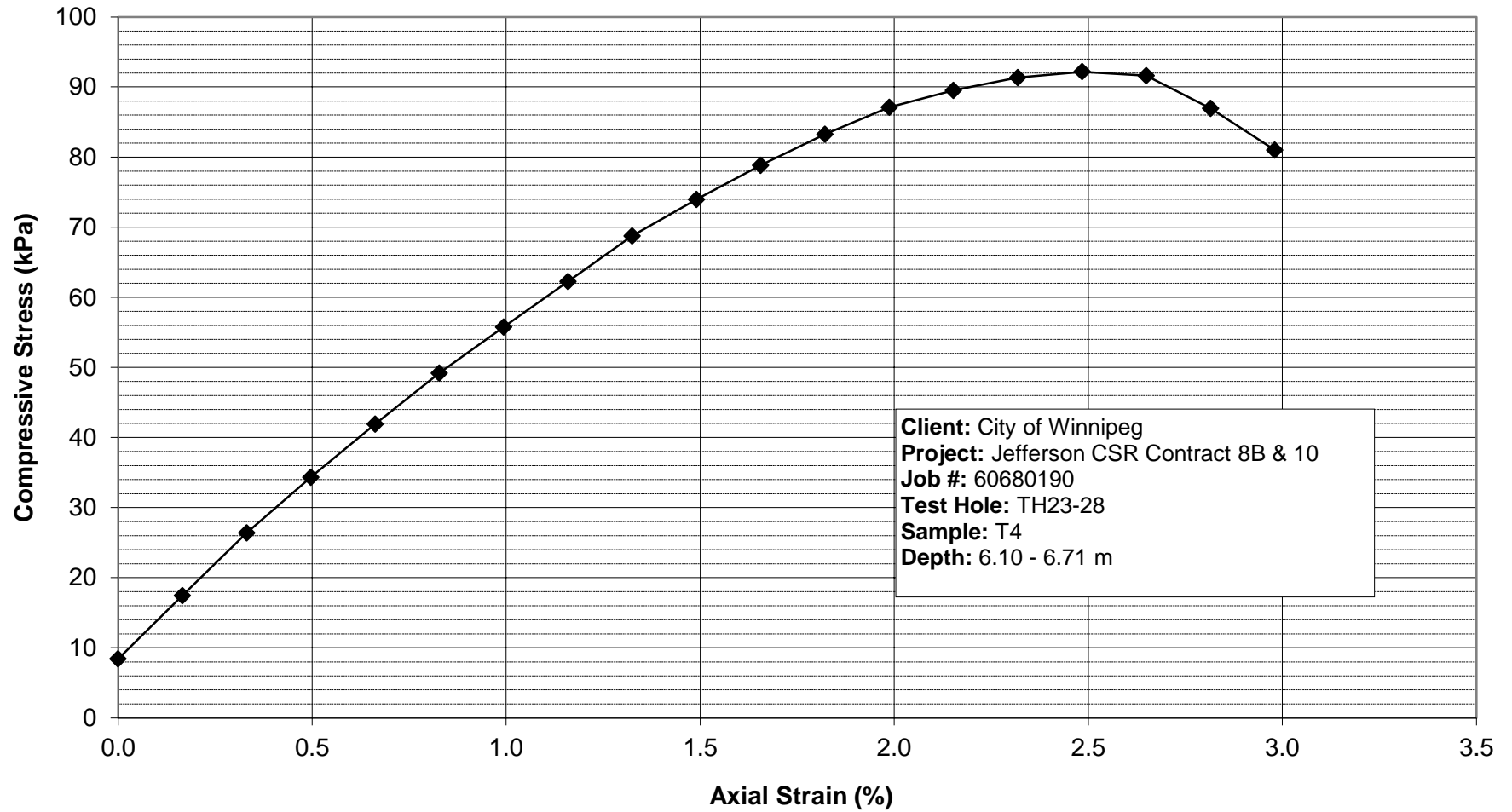
FAILURE SKETCH

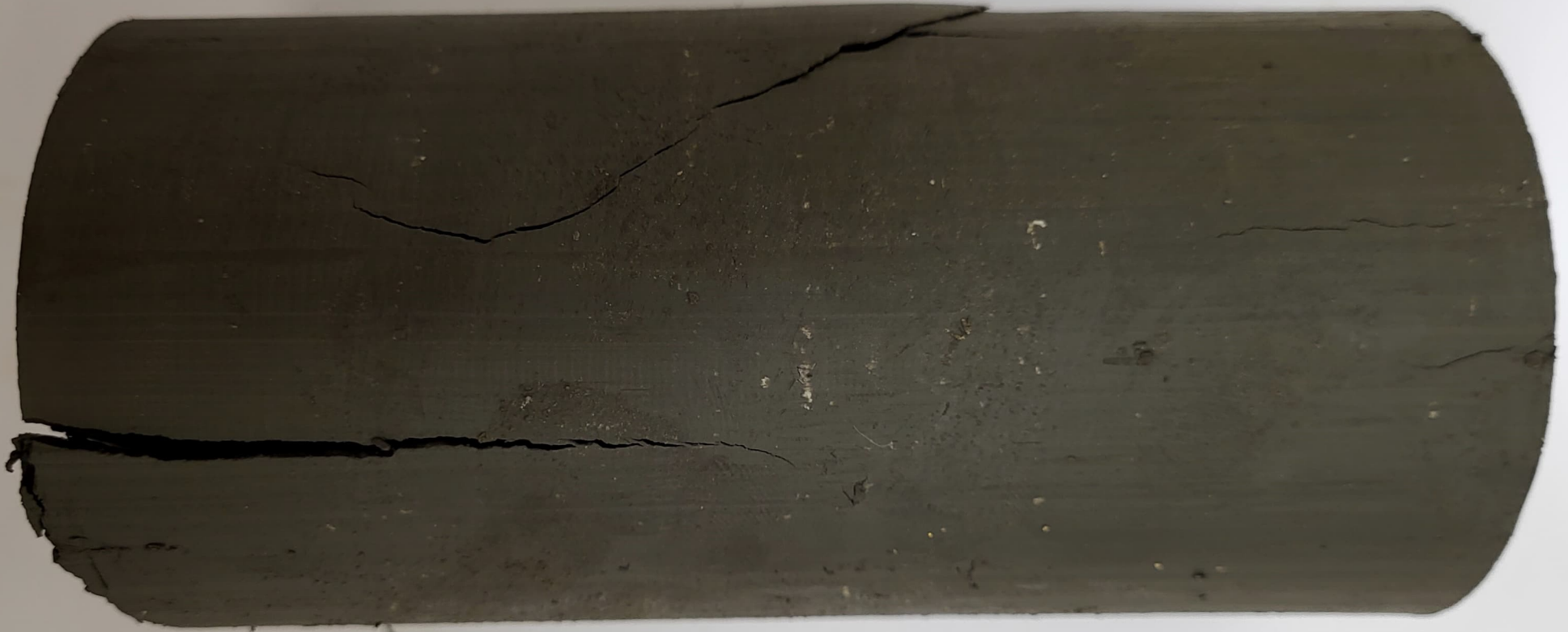
TEST DATA - DIAL READINGS							
AXIAL COMPRESSION	PROVING RING	TOTAL AXIAL STRAIN, E <sub>t</sub>	AVERAGE CROSS-SECTIONAL AREA, A	APPLIED AXIAL LOAD, P	COMPRESSIVE STRESS, σ <sub>c</sub>		
					(inches)	(inches)	(%)
0.01	0.0008	0.00	6.37	7.78	1.22	0.176	8.4
0.02	0.0017	0.17	6.38	16.12	2.53	0.364	17.4
0.03	0.0026	0.33	6.39	24.46	3.83	0.551	26.4
0.04	0.0034	0.50	6.40	31.86	4.98	0.717	34.3
0.05	0.0042	0.66	6.41	38.98	6.08	0.875	41.9
0.06	0.0049	0.83	6.42	45.82	7.13	1.027	49.2
0.07	0.0056	0.99	6.43	52.00	8.08	1.164	55.7
0.08	0.0062	1.16	6.44	58.19	9.03	1.300	62.3
0.09	0.0069	1.32	6.45	64.37	9.97	1.436	68.8
0.10	0.0074	1.49	6.47	69.34	10.72	1.544	73.9
0.11	0.0079	1.66	6.48	74.02	11.43	1.646	78.8
0.12	0.0084	1.82	6.49	78.33	12.07	1.739	83.2
0.13	0.0088	1.99	6.50	82.08	12.63	1.819	87.1
0.14	0.0090	2.15	6.51	84.52	12.98	1.870	89.5
0.15	0.0092	2.32	6.52	86.39	13.25	1.908	91.3
0.16	0.0093	2.48	6.53	87.33	13.37	1.925	92.2
0.17	0.0093	2.65	6.54	86.95	13.29	1.914	91.6
0.18	0.0088	2.81	6.55	82.64	12.61	1.815	86.9
0.19	0.0082	2.98	6.57	77.12	11.75	1.691	81.0

UNCONFINED COMPRESSIVE STRENGTH, q <sub>u</sub> :	92.18	kPa
(based on maximum q <sub>u</sub> value)	1.925	ksf
UNDRAINED SHEAR STRENGTH, S <sub>u</sub> :	46.09	kPa
(based on maximum q <sub>u</sub> value)	0.963	ksf

**NOTES:**

AECOM  
UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS  
(ASTM D2166)





TH23-28, T4

**AECOM - SOILS LABORATORY**  
**SHEAR STRENGTH, MOISTURE CONTENT & DENSITY CALCULATIONS**



CLIENT: City of Winnipeg  
 PROJECT: Jefferson CSR Contract 8B & 10  
 JOB NO.: 60680190

TEST HOLE NO.:	TH23-28
SAMPLE NO.:	T8
SAMPLE DEPTH:	12.19 - 12.80 m
DATE TESTED:	16-Mar-23
<b>SHEAR STRENGTH TESTS</b>	
<b>TORVANE</b>	
Reading	0.46
Vane Size (S, M, L)	M
Undrained Shear Strength (kPa)	45.1
Undrained Shear Strength (ksf)	0.94
<b>POCKET PENETROMETER</b>	
Reading - Qu (tsf)	1.00
Undrained Shear Strength (kPa)	47.9
Reading - Qu (tsf)	0.75
Undrained Shear Strength (kPa)	35.9
Reading - Qu (tsf)	0.75
Undrained Shear Strength (kPa)	35.9
<b>UNCONFINED COMPRESSIVE STRENGTH TEST</b>	
Unconfined compressive strength (kPa)	40.8
Unconfined compressive strength (ksf)	0.9
Undrained Shear Strength (kPa)	20.4
Undrained Shear Strength (ksf)	0.426
<b>MOISTURE CONTENT</b>	
Tare Number	57
Wt. Sample wet + tare (g)	253.6
Wt. Sample dry + tare (g)	172.2
Wt. Tare (g)	8.5
Moisture Content %	49.7
<b>BULK DENSITY</b>	
Sample Wt. (g)	1040.1
Diameter 1 (cm)	7.20
Diameter 2 (cm)	7.30
Diameter 3 (cm)	7.20
<b>Avg. Diameter (cm)</b>	<b>7.23</b>
Length 1 (cm)	15.50
Length 2 (cm)	15.50
Length 3 (cm)	15.50
<b>Avg. Length (cm)</b>	<b>15.50</b>
Volume (cm <sup>3</sup> )	636.9
Moisture content (%)	49.7
Bulk Density (g/cm <sup>3</sup> )	1.633
<b>Bulk Unit Weight (kN/m<sup>3</sup>)</b>	<b>16.0</b>
<b>Bulk Unit Weight (pcf)</b>	<b>101.9</b>
<b>Dry Unit Weight (kN/m<sup>3</sup>)</b>	<b>10.70</b>

**AECOM - SOILS LABORATORY**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS (ASTM D2166)**



CLIENT:	City of Winnipeg
PROJECT:	Jefferson CSR Contract 8B & 10
JOB NO.:	60680190

TEST HOLE NO.:	TH23-28
SAMPLE NO.:	T8
SAMPLE DEPTH:	12.19 - 12.80 m
SAMPLE DATE:	
TEST DATE:	16-Mar-23

SOIL DESCRIPTION:	
CLAY - grey, moist, firm, silty, silt inclusions high plasticity	
MOISTURE CONTENT:	49.7

See attached photo

SAMPLE DIAM.(Do):	72.33	(mm)	INITIAL AREA, A <sub>o</sub> :	4109.3	(mm <sup>2</sup> )
SAMPLE LENGTH, (L <sub>o</sub> ):	155.00	(mm)	PISTON RATE:	0.0602	(inches / minute)
L / D RATIO:	2.14	(2 < L/D < 2.5)	AXIAL STRAIN RATE, R:	0.99	(0.5<R<2 % / minute)

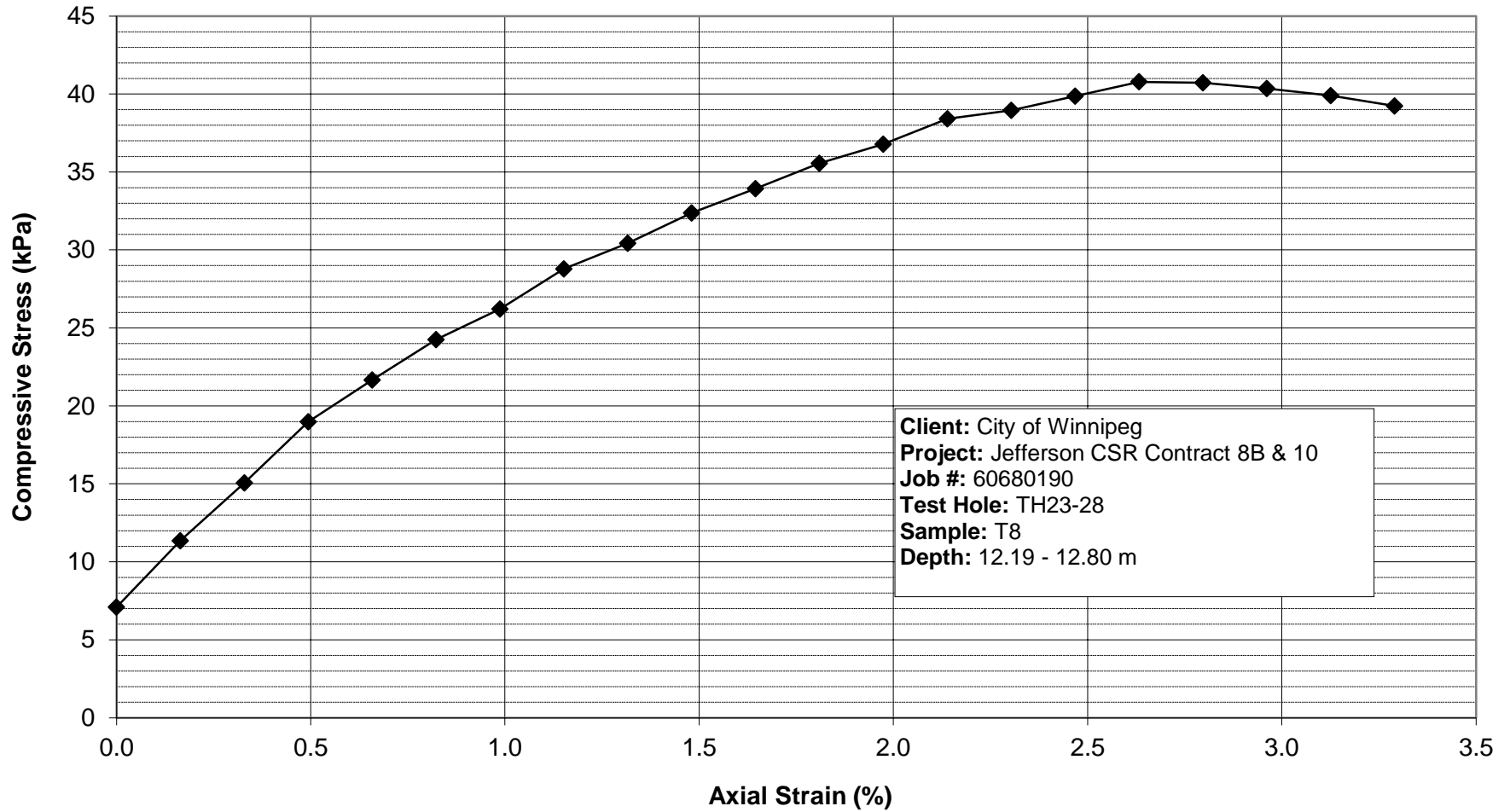
FAILURE SKETCH

TEST DATA - DIAL READINGS							
AXIAL COMPRESSION	PROVING RING	TOTAL AXIAL STRAIN, E <sub>t</sub>	AVERAGE CROSS-SECTIONAL AREA, A	APPLIED AXIAL LOAD, P	COMPRESSIVE STRESS, σ <sub>c</sub>		
					(psi)	(ksf)	(kPa)
(inches)	(inches)	(%)	(inches <sup>2</sup> )	(lbs)			
0.01	0.0007	0.00	6.37	6.56	1.03	0.148	7.1
0.02	0.0011	0.16	6.38	10.49	1.64	0.237	11.3
0.03	0.0015	0.33	6.39	13.96	2.18	0.315	15.1
0.04	0.0019	0.49	6.40	17.62	2.75	0.396	19.0
0.05	0.0022	0.66	6.41	20.15	3.14	0.452	21.7
0.06	0.0024	0.82	6.42	22.58	3.52	0.506	24.2
0.07	0.0026	0.99	6.43	24.46	3.80	0.547	26.2
0.08	0.0029	1.15	6.44	26.89	4.17	0.601	28.8
0.09	0.0030	1.32	6.45	28.48	4.41	0.636	30.4
0.10	0.0032	1.48	6.47	30.36	4.70	0.676	32.4
0.11	0.0034	1.65	6.48	31.86	4.92	0.708	33.9
0.12	0.0036	1.81	6.49	33.45	5.16	0.743	35.6
0.13	0.0037	1.97	6.50	34.67	5.34	0.768	36.8
0.14	0.0039	2.14	6.51	36.26	5.57	0.802	38.4
0.15	0.0039	2.30	6.52	36.82	5.65	0.813	38.9
0.16	0.0040	2.47	6.53	37.76	5.78	0.833	39.9
0.17	0.0041	2.63	6.54	38.70	5.92	0.852	40.8
0.18	0.0041	2.80	6.55	38.70	5.91	0.850	40.7
0.19	0.0041	2.96	6.56	38.42	5.85	0.843	40.4
0.20	0.0041	3.13	6.57	38.04	5.79	0.833	39.9
0.21	0.0040	3.29	6.59	37.48	5.69	0.819	39.2

UNCONFINED COMPRESSIVE STRENGTH, q <sub>u</sub> :	40.79	kPa
(based on maximum q <sub>u</sub> value)	0.852	ksf
UNDRAINED SHEAR STRENGTH, S <sub>u</sub> :	20.39	kPa
(based on maximum q <sub>u</sub> value)	0.426	ksf

**NOTES:**

**AECOM**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS**  
**(ASTM D2166)**







TH23-28, T8

**AECOM - SOILS LABORATORY**  
**SHEAR STRENGTH, MOISTURE CONTENT & DENSITY CALCULATIONS**



CLIENT: City of Winnipeg  
 PROJECT: Jefferson CSR Contract 8B & 10  
 JOB NO.: 60680190

TEST HOLE NO.:	TH23-29
SAMPLE NO.:	T3
SAMPLE DEPTH:	4.57 - 5.18 m
DATE TESTED:	10-Mar-23
<b>SHEAR STRENGTH TESTS</b>	
<b>TORVANE</b>	
Reading	0.55
Vane Size (S, M, L)	M
Undrained Shear Strength (kPa)	53.9
Undrained Shear Strength (ksf)	1.13
<b>POCKET PENETROMETER</b>	
Reading - Qu (tsf)	1.25
Undrained Shear Strength (kPa)	59.9
Reading - Qu (tsf)	1.00
Undrained Shear Strength (kPa)	47.9
Reading - Qu (tsf)	1.50
Undrained Shear Strength (kPa)	71.8
<b>UNCONFINED COMPRESSIVE STRENGTH TEST</b>	
Unconfined compressive strength (kPa)	84.5
Unconfined compressive strength (ksf)	1.8
Undrained Shear Strength (kPa)	42.2
Undrained Shear Strength (ksf)	0.882
<b>MOISTURE CONTENT</b>	
Tare Number	AK11
Wt. Sample wet + tare (g)	736.2
Wt. Sample dry + tare (g)	472.2
Wt. Tare (g)	8.5
Moisture Content %	56.9
<b>BULK DENSITY</b>	
Sample Wt. (g)	1074.3
Diameter 1 (cm)	7.20
Diameter 2 (cm)	7.20
Diameter 3 (cm)	7.20
<b>Avg. Diameter (cm)</b>	<b>7.20</b>
Length 1 (cm)	15.50
Length 2 (cm)	15.50
Length 3 (cm)	15.40
<b>Avg. Length (cm)</b>	<b>15.47</b>
Volume (cm <sup>3</sup> )	629.7
Moisture content (%)	56.9
Bulk Density (g/cm <sup>3</sup> )	1.706
<b>Bulk Unit Weight (kN/m<sup>3</sup>)</b>	<b>16.7</b>
<b>Bulk Unit Weight (pcf)</b>	<b>106.5</b>
<b>Dry Unit Weight (kN/m<sup>3</sup>)</b>	<b>10.66</b>

**AECOM - SOILS LABORATORY**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS (ASTM D2166)**



CLIENT:	City of Winnipeg
PROJECT:	Jefferson CSR Contract 8B & 10
JOB NO.:	60680190

TEST HOLE NO.:	TH23-29
SAMPLE NO.:	T3
SAMPLE DEPTH:	4.57 - 5.18 m
SAMPLE DATE:	
TEST DATE:	10-Mar-23

SOIL DESCRIPTION:	
CLAY - brown, moist, stiff, silty, silt inclusions	
high plasticity	
MOISTURE CONTENT:	56.9

See attached photo

SAMPLE DIAM.(Do):	72.00	(mm)	INITIAL AREA, A <sub>o</sub> :	4071.5	(mm <sup>2</sup> )
SAMPLE LENGTH, (L <sub>o</sub> ):	154.67	(mm)	PISTON RATE:	0.0602	(inches / minute)
L / D RATIO:	2.15	(2 < L/D < 2.5)	AXIAL STRAIN RATE, R:	0.99	(0.5<R<2 % / minute)

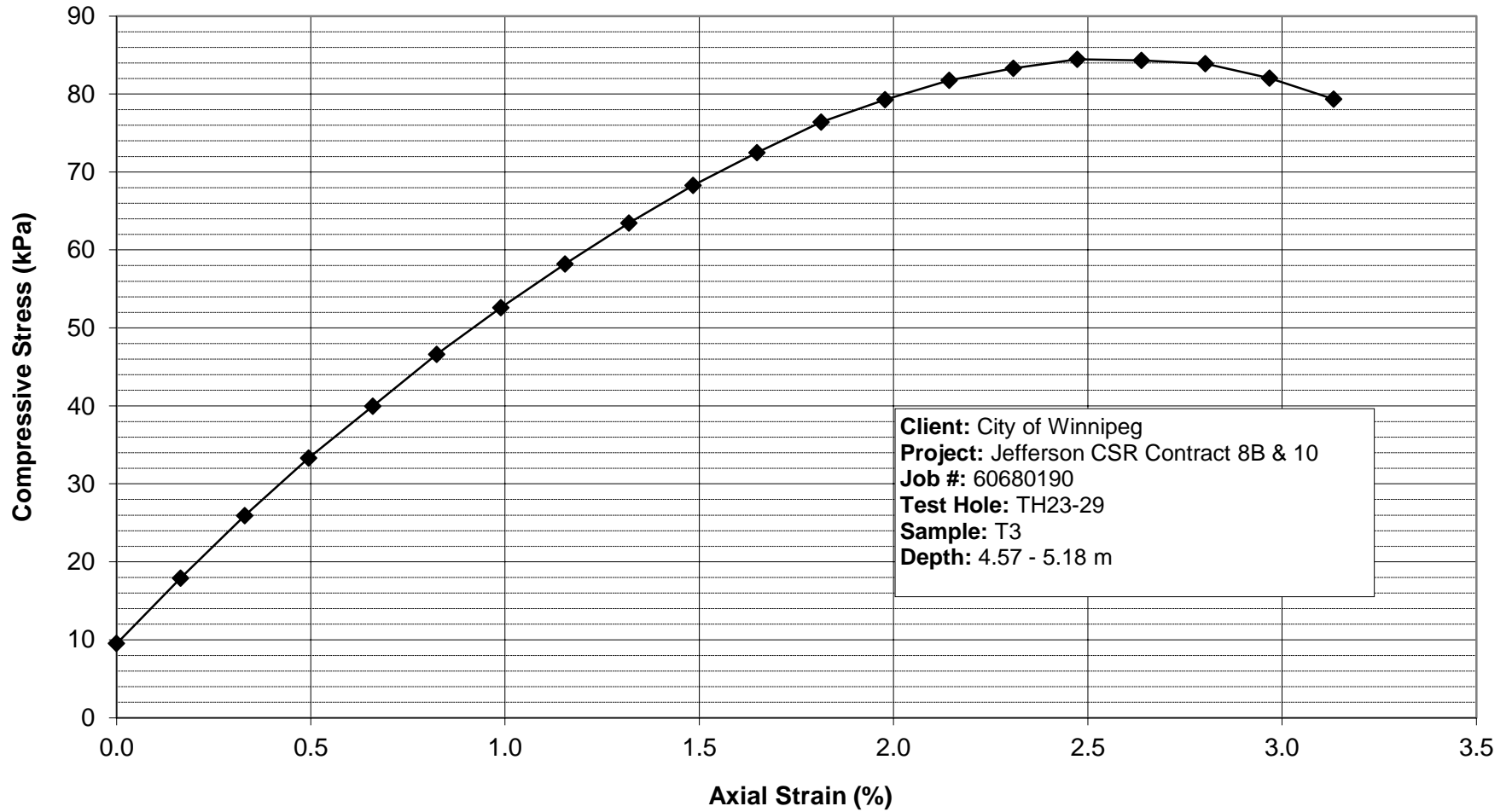
FAILURE SKETCH

TEST DATA - DIAL READINGS							
AXIAL COMPRESSION	PROVING RING	TOTAL AXIAL STRAIN, E <sub>t</sub>	AVERAGE CROSS-SECTIONAL AREA, A	APPLIED AXIAL LOAD, P	COMPRESSIVE STRESS, σ <sub>c</sub>		
					(inches)	(inches)	(%)
0.01	0.0009	0.00	6.31	8.71	1.38	0.199	9.5
0.02	0.0018	0.16	6.32	16.40	2.59	0.374	17.9
0.03	0.0025	0.33	6.33	23.80	3.76	0.541	25.9
0.04	0.0033	0.49	6.34	30.64	4.83	0.696	33.3
0.05	0.0039	0.66	6.35	36.82	5.80	0.835	40.0
0.06	0.0046	0.82	6.36	43.01	6.76	0.973	46.6
0.07	0.0052	0.99	6.37	48.63	7.63	1.099	52.6
0.08	0.0058	1.15	6.38	53.88	8.44	1.215	58.2
0.09	0.0063	1.32	6.40	58.84	9.20	1.325	63.4
0.10	0.0068	1.48	6.41	63.43	9.90	1.426	68.3
0.11	0.0072	1.65	6.42	67.46	10.51	1.514	72.5
0.12	0.0076	1.81	6.43	71.21	11.08	1.595	76.4
0.13	0.0079	1.98	6.44	74.02	11.50	1.656	79.3
0.14	0.0082	2.14	6.45	76.46	11.86	1.707	81.7
0.15	0.0083	2.31	6.46	78.05	12.08	1.740	83.3
0.16	0.0085	2.47	6.47	79.27	12.25	1.764	84.5
0.17	0.0085	2.64	6.48	79.27	12.23	1.761	84.3
0.18	0.0084	2.80	6.49	78.99	12.17	1.752	83.9
0.19	0.0083	2.97	6.50	77.40	11.90	1.714	82.0
0.20	0.0080	3.13	6.51	74.96	11.51	1.657	79.3

UNCONFINED COMPRESSIVE STRENGTH, q <sub>u</sub> :	84.46	kPa
(based on maximum q <sub>u</sub> value)	1.764	ksf
UNDRAINED SHEAR STRENGTH, S <sub>u</sub> :	42.23	kPa
(based on maximum q <sub>u</sub> value)	0.882	ksf

**NOTES:**

**AECOM**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS**  
**(ASTM D2166)**





TH23-29, T3

**AECOM - SOILS LABORATORY**  
**SHEAR STRENGTH, MOISTURE CONTENT & DENSITY CALCULATIONS**



CLIENT: City of Winnipeg  
 PROJECT: Jefferson CSR Contract 8B & 10  
 JOB NO.: 60680190

<b>TEST HOLE NO.:</b>	<b>TH23-29</b>
<b>SAMPLE NO.:</b>	<b>T7</b>
<b>SAMPLE DEPTH:</b>	10.67 - 11.28 m
<b>DATE TESTED:</b>	<b>16-Mar-23</b>
<b>SHEAR STRENGTH TESTS</b>	
<b>TORVANE</b>	
Reading	0.45
Vane Size (S, M, L)	M
Undrained Shear Strength (kPa)	<b>44.1</b>
Undrained Shear Strength (ksf)	0.92
<b>POCKET PENETROMETER</b>	
Reading - Qu (tsf)	0.50
Undrained Shear Strength (kPa)	<b>23.9</b>
Reading - Qu (tsf)	0.75
Undrained Shear Strength (kPa)	<b>35.9</b>
Reading - Qu (tsf)	0.50
Undrained Shear Strength (kPa)	<b>23.9</b>
<b>UNCONFINED COMPRESSIVE STRENGTH TEST</b>	
Unconfined compressive strength (kPa)	<b>55.1</b>
Unconfined compressive strength (ksf)	1.2
Undrained Shear Strength (kPa)	<b>27.5</b>
Undrained Shear Strength (ksf)	<b>0.575</b>
<b>MOISTURE CONTENT</b>	
Tare Number	A8
Wt. Sample wet + tare (g)	346.3
Wt. Sample dry + tare (g)	338.9
Wt. Tare (g)	8.3
Moisture Content %	<b>2.2</b>
<b>BULK DENSITY</b>	
Sample Wt. (g)	1185.9
Diameter 1 (cm)	7.20
Diameter 2 (cm)	7.20
Diameter 3 (cm)	7.20
<b>Avg. Diameter (cm)</b>	<b>7.20</b>
Length 1 (cm)	15.50
Length 2 (cm)	15.50
Length 3 (cm)	15.50
<b>Avg. Length (cm)</b>	<b>15.50</b>
Volume (cm <sup>3</sup> )	631.1
Moisture content (%)	2.2
Bulk Density (g/cm <sup>3</sup> )	1.879
<b>Bulk Unit Weight (kN/m<sup>3</sup>)</b>	<b>18.4</b>
<b>Bulk Unit Weight (pcf)</b>	<b>117.3</b>
<b>Dry Unit Weight (kN/m<sup>3</sup>)</b>	<b>18.03</b>

**AECOM - SOILS LABORATORY**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS (ASTM D2166)**



<b>CLIENT:</b>	City of Winnipeg
<b>PROJECT:</b>	Jefferson CSR Contract 8B & 10
<b>JOB NO.:</b>	60680190

<b>TEST HOLE NO.:</b>	TH23-29
<b>SAMPLE NO.:</b>	T7
<b>SAMPLE DEPTH:</b>	10.67 - 11.28 m
<b>SAMPLE DATE:</b>	
<b>TEST DATE:</b>	16-Mar-23

<b>SOIL DESCRIPTION:</b>	
CLAY - grey, moist, firm, silty, trace gravel, silt inclusions high plasticity	
<b>MOISTURE CONTENT:</b>	2.2

See attached photo

<b>SAMPLE DIAM.(Do):</b>	72.00	(mm)	<b>INITIAL AREA, A<sub>o</sub>:</b>	4071.5	(mm <sup>2</sup> )
<b>SAMPLE LENGTH, (L<sub>o</sub>):</b>	155.00	(mm)	<b>PISTON RATE:</b>	0.0602	(inches / minute)
<b>L / D RATIO:</b>	2.15	(2 < L/D < 2.5)	<b>AXIAL STRAIN RATE, R:</b>	0.99	(0.5<R<2% / minute)

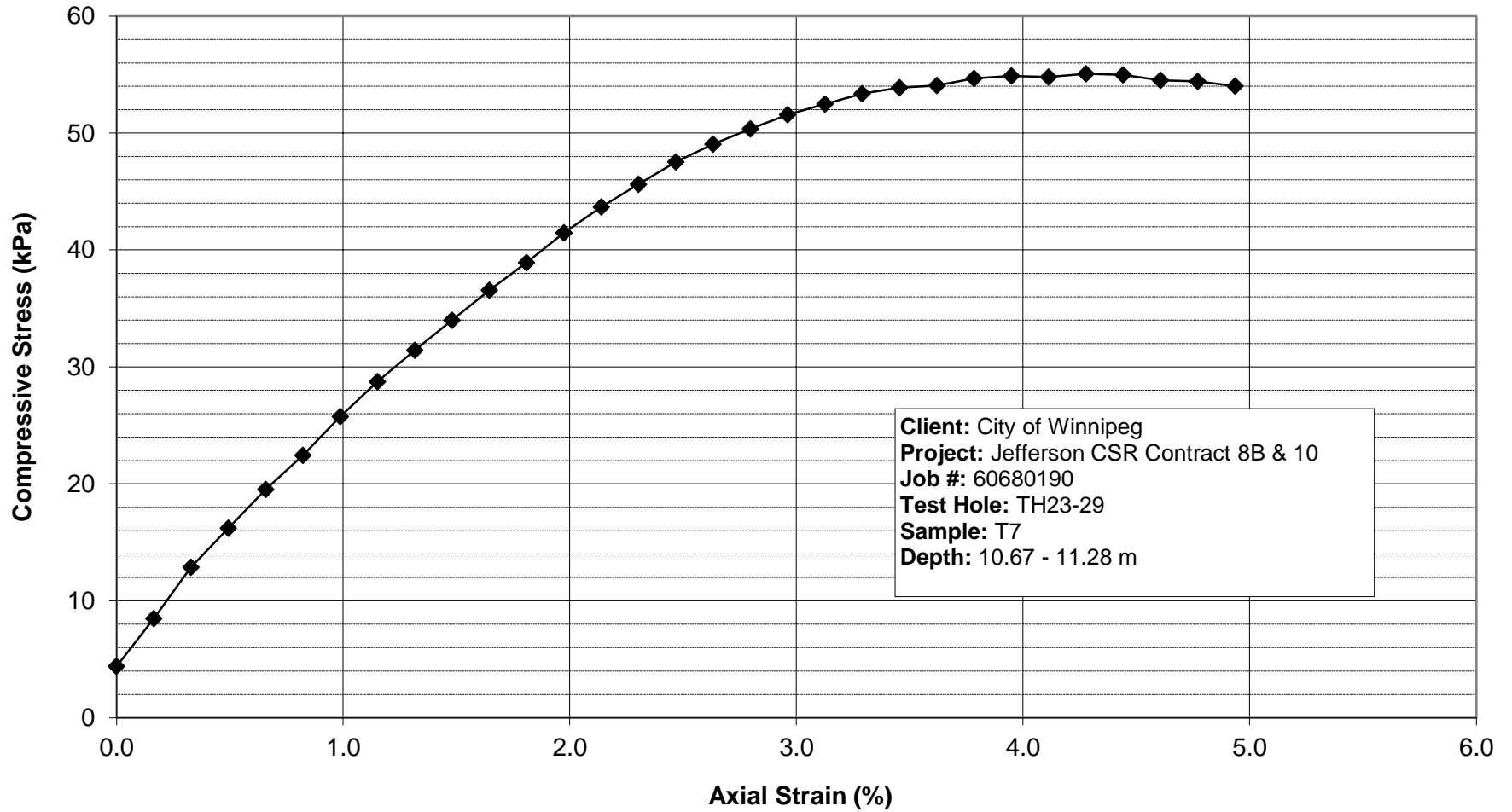
FAILURE SKETCH

TEST DATA - DIAL READINGS							
AXIAL COMPRESSION	PROVING RING	TOTAL AXIAL STRAIN, $\epsilon_1$	AVERAGE CROSS-SECTIONAL AREA, A	APPLIED AXIAL LOAD, P	COMPRESSIVE STRESS, $\sigma_c$		
					(inches)	(inches)	(%)
0.01	0.0004	0.00	6.31	4.03	0.64	0.092	4.4
0.02	0.0008	0.16	6.32	7.78	1.23	0.177	8.5
0.03	0.0013	0.33	6.33	11.81	1.86	0.269	12.9
0.04	0.0016	0.49	6.34	14.90	2.35	0.338	16.2
0.05	0.0019	0.66	6.35	17.99	2.83	0.408	19.5
0.06	0.0022	0.82	6.36	20.71	3.25	0.469	22.4
0.07	0.0025	0.99	6.37	23.80	3.73	0.538	25.7
0.08	0.0028	1.15	6.38	26.61	4.17	0.600	28.7
0.09	0.0031	1.32	6.40	29.14	4.56	0.656	31.4
0.10	0.0034	1.48	6.41	31.58	4.93	0.710	34.0
0.11	0.0036	1.65	6.42	34.01	5.30	0.763	36.5
0.12	0.0039	1.81	6.43	36.26	5.64	0.812	38.9
0.13	0.0041	1.97	6.44	38.70	6.01	0.866	41.4
0.14	0.0044	2.14	6.45	40.85	6.34	0.912	43.7
0.15	0.0046	2.30	6.46	42.73	6.61	0.952	45.6
0.16	0.0048	2.47	6.47	44.60	6.89	0.993	47.5
0.17	0.0049	2.63	6.48	46.10	7.11	1.024	49.0
0.18	0.0051	2.80	6.49	47.41	7.30	1.052	50.4
0.19	0.0052	2.96	6.50	48.63	7.48	1.077	51.6
0.20	0.0053	3.13	6.51	49.57	7.61	1.096	52.5
0.21	0.0054	3.29	6.53	50.50	7.74	1.114	53.4
0.22	0.0055	3.45	6.54	51.07	7.81	1.125	53.9
0.23	0.0055	3.62	6.55	51.35	7.84	1.129	54.1
0.24	0.0056	3.78	6.56	52.00	7.93	1.142	54.7
0.25	0.0056	3.95	6.57	52.28	7.96	1.146	54.9
0.26	0.0056	4.11	6.58	52.28	7.94	1.144	54.8
0.27	0.0056	4.28	6.59	52.66	7.99	1.150	55.1
0.28	0.0056	4.44	6.60	52.66	7.97	1.148	55.0
0.29	0.0056	4.61	6.62	52.28	7.90	1.138	54.5
0.30	0.0056	4.77	6.63	52.28	7.89	1.136	54.4
0.31	0.0056	4.94	6.64	52.00	7.83	1.128	54.0

UNCONFINED COMPRESSIVE STRENGTH, $q_u$ :	55.07	kPa
(based on maximum $q_u$ value)	1.150	ksf
UNDRAINED SHEAR STRENGTH, $S_u$ :	27.54	kPa
(based on maximum $q_u$ value)	0.575	ksf

**NOTES:**

**AECOM**  
**UNCONFINED COMPRESSIVE STRENGTH OF COHESIVE SOILS**  
**(ASTM D2166)**







TH23-27, T7