

Schedule 18

Appendix 18S – Geotechnical Investigation

SECTION A. DEFINITIONS

A.1 General

- A.1.1 Capitalized terms used in this Appendix 18S have the meanings given in Schedule 18 – Technical Requirements or the Design Build Agreement.

SECTION B. GEOTECHNICAL INVESTIGATION

B.1 Introduction

- B.1.1 The City carried out a geotechnical investigation at the NEWPCC site in 2016 in preparation for upgrades to the facility. The raw data collected during the investigations are provided in Attachment 1 – Geotechnical Data.
- B.1.2 Design Builder may rely on the geotechnical data provided in the attachments of this Appendix S. The City does not guarantee that sufficient data are provided for design of the Infrastructure, nor that the data will be applicable for Design Builder's design. Design Builder shall do its own due diligence in reviewing the data and the applicability thereof before using the data in its design.
- B.1.3 Design Builder is encouraged to conduct its own investigations as needed for its own design. If Design Builder requires additional geotechnical data, Design Builder shall be responsible for all costs related to the investigation. Investigations shall be carried out in accordance with Schedule 18 – Technical Requirements Section C.6.2.

[NOTE TO PROPONENTS: Data collected during the RFP Open Period will be added to this Appendix 18S as Attachment 2]

ATTACHMENT 1
GEO TECHNICAL DATA

Table 1 – Vibrating Wire Piezometer Installations Summary

Testhole No.	Serial Number	Installation Date	Installation Depth	Installation Elevation
TH16	100D161235	Sep 30, 2016	7.88 m	224.44 m
TH16	100D161233	Sep 30, 2016	13.97 m	218.35 m
TH24	100D161234	Sep 30, 2016	7.51 m	223.38 m
TH24	100D161232	Sep 30, 2016	13.61 m	217.28 m

Table 2 – Vibrating Wire Piezometers Data

Testhole	Installation Date	Installation Depth	Date of Measurement	Groundwater Level Depth	Groundwater Level Elevation
TH24	Sep 30, 2016	7.51 m	Oct 6, 2016	5.40 m	225.49 m
			Oct 24, 2016	5.04 m	225.85 m
			Oct 31, 2016	5.24 m	225.65 m
			Nov 2, 2016	5.05 m	225.84 m
			Nov 8, 2016	4.95 m	225.94 m
TH24	Sep 30, 2016	13.61 m	Oct 6, 2016	5.57 m	225.32 m
			Oct 24, 2016	5.18 m	225.71 m
			Oct 31, 2016	5.38 m	225.51 m
			Nov 2, 2016	5.19 m	225.70 m
			Nov 8, 2016	5.08 m	225.81 m
TH16	Sep 30, 2016	7.88 m	Oct 6, 2016	3.37 m	228.95 m
			Oct 24, 2016	3.23 m	229.09 m
			Oct 31, 2016	3.54 m	228.78 m
			Nov 2, 2016	3.38 m	228.94 m
			Nov 8, 2016	3.34 m	228.98 m
TH16	Sep 30, 2016	13.97 m	Oct 6, 2016	4.86 m	227.46 m
			Oct 24, 2016	4.40 m	227.92 m
			Oct 31, 2016	4.68 m	227.64 m
			Nov 2, 2016	4.47 m	227.85 m
			Nov 8, 2016	4.40 m	227.92 m

Table 3 – Monitoring Wells Data

Testhole No.	Installation Date	Installation Elevation	Screened Elevation	Date of Measurement	Water Level Depth	Water Elevation
TH01	Oct 13, 2016	201.1 m	201.1 – 204.8 m	Oct 31, 2016	5.04 m	225.39 m
				Nov 2, 2016	6.10 m	224.33 m
				Nov 8, 2016	6.10 m	224.33 m
				Nov 15, 2016	6.96 m	223.47 m
TH27	Sep 29, 2016	203.4 m	203.4 m – 207.1 m	Oct 7, 2016	6.38 m	224.92 m
				Oct 31, 2016	6.20 m	225.10 m
				Nov 2, 2016	7.27 m	224.03 m
				Nov 8, 2016	7.25 m	224.05 m
				Nov 15, 2016	7.14 m	224.16 m

Table 4 – Standpipe Data

Testhole No.	Installation Date	Installation Elevation	Screened Elevation	Date of Measurement	Water Level Depth	Water Elevation
TH12	Oct 7, 2016	228.3 m	228.3 m – 229.3 m	Oct 31, 2016	1.04 m	230.34 m
				Nov 2, 2016	2.05 m	229.33 m
				Nov 8, 2016	2.06 m	229.32 m
				Nov 15, 2016	2.00 m	229.38 m
TH18	Oct 3, 2016	228.0 m	228.0 m – 228.6 m	Oct 31, 2016	1.86 m	230.15m
				Nov 2, 2016	1.90 m	230.11 m
				Nov 8, 2016	1.90 m	230.11 m
				Nov 15, 2016	1.76 m	230.25 m
TH25	Oct 3, 2016	227.3 m	227.3 m – 228.5 m	Oct 31, 2016	2.25 m	228.72 m
				Nov 2, 2016	2.80 m	228.17 m
				Nov 8, 2016	2.80 m	228.17 m
				Nov 15, 2016	2.71 m	228.26 m

NORTH END SEWAGE TREATMENT PLANT UPGRADE

Appendix C
Testhole Location Plans
June 26, 2017

Appendix C TESTHOLE LOCATION PLANS



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 2016/11/16 4:38 PM By: Bun_Sothea

ORIGINAL SHEET - ISO 8.5x11 H - v14.06

November, 2016
 111216800



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 Suite 500, 311 Portage Avenue
 Winnipeg MB Canada R3B 2B9
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 www.stantec.com

Legend

- TESTHOLE
- TESTHOLE WITH CORING
- TESTHOLE AND PUMP TEST
- TESTHOLE WITH SLUG TEST
- TESTHOLE WITH CORING AND MONITORING WELL

Notes

Client/Project

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 NORTH END POLLUTION CONTROL CENTRE UPGRADE
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Figure No.

C1

Title

TESTHOLE LOCATION PLAN
 PARCEL B



V:\1233\active\111216800\245\0300_drawing\drawings\16800_rhp_zone2.dwg 2
 2016/11/10 5:20 PM By: Bun_Sothea





ORIGINAL SHEET - ISO 8.5x11 H - v14.06

November, 2016
 111216800



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Legend

-  TESTHOLE
-  TESTHOLE WITH CORING
-  TESTHOLE WITH VW
PIEZOMETER
-  TESTHOLE WITH SLUG TEST

Notes

Client/Project

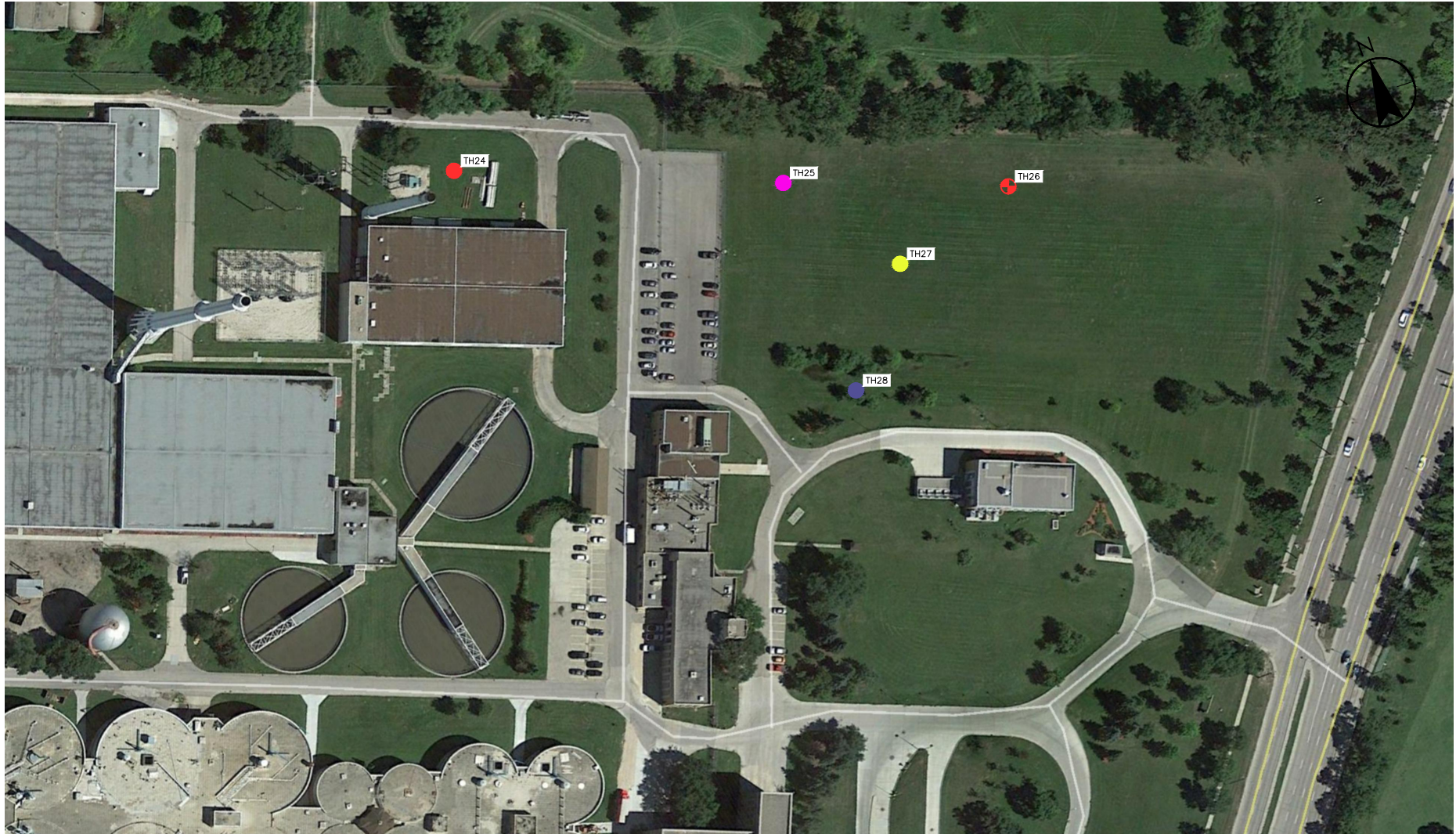
AECOM CANADA LTD.
 NORTH END POLLUTION CONTROL CENTRE UPGRADE
 WINNIPEG, MB

Figure No.

C2

Title

TESTHOLE LOCATION PLAN
 PARCEL A WEST



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ORIGINAL SHEET - ISO 8.5x11 H - v14.06

November, 2016
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Legend

- TESTHOLE
- TESTHOLE WITH CORING AND PUMP TEST
- TESTHOLE WITH SLUG TEST
- TESTHOLE WITH CORING AND MONITORING WELL
- TESTHOLE WITH VW PIEZOMETER

Notes

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 WINNIPEG, MB

Figure No.

C3

Title

TESTHOLE LOCATION PLAN
 PARCEL A EAST

NORTH END SEWAGE TREATMENT PLANT UPGRADE

Appendix D
Testhole Logs
June 26, 2017

Appendix D TESTHOLE LOGS

SYMBOLS AND TERMS USED ON BOREHOLE AND TEST PIT RECORDS**SOIL DESCRIPTION****Terminology describing common soil genesis:**

<i>Rootmat</i>	- vegetation, roots and moss with organic matter and topsoil typically forming a mattress at the ground surface
<i>Topsoil</i>	- mixture of soil and humus capable of supporting vegetative growth
<i>Peat</i>	- mixture of visible and invisible fragments of decayed organic matter
<i>Till</i>	- unstratified glacial deposit which may range from clay to boulders
<i>Fill</i>	- material below the surface identified as placed by humans (excluding buried services)

Terminology describing soil structure:

<i>Desiccated</i>	- having visible signs of weathering by oxidization of clay minerals, shrinkage cracks, etc.
<i>Fissured</i>	- having cracks, and hence a blocky structure
<i>Varved</i>	- composed of regular alternating layers of silt and clay
<i>Stratified</i>	- composed of alternating successions of different soil types, e.g. silt and sand
<i>Layer</i>	- > 75 mm in thickness
<i>Seam</i>	- 2 mm to 75 mm in thickness
<i>Parting</i>	- < 2 mm in thickness

Terminology describing soil types:

The classification of soil types are made on the basis of grain size and plasticity in accordance with the Unified Soil Classification System (USCS) (ASTM D 2487 or D 2488) which excludes particles larger than 75 mm. For particles larger than 75 mm, and for defining percent clay fraction in hydrometer results, definitions proposed by Canadian Foundation Engineering Manual, 4th Edition are used. The USCS provides a group symbol (e.g. SM) and group name (e.g. silty sand) for identification.

Terminology describing cobbles, boulders, and non-matrix materials (organic matter or debris):

Terminology describing materials outside the USCS, (e.g. particles larger than 75 mm, visible organic matter, and construction debris) is based upon the proportion of these materials present:

<i>Trace, or occasional</i>	Less than 10%
<i>Some</i>	10-20%
<i>Frequent</i>	> 20%

Terminology describing compactness of cohesionless soils:

The standard terminology to describe cohesionless soils includes compactness (formerly "relative density"), as determined by the Standard Penetration Test (SPT) N-Value - also known as N-Index. The SPT N-Value is described further on page 3. A relationship between compactness condition and N-Value is shown in the following table.

Compactness Condition	SPT N-Value
<i>Very Loose</i>	<4
<i>Loose</i>	4-10
<i>Compact</i>	10-30
<i>Dense</i>	30-50
<i>Very Dense</i>	>50

Terminology describing consistency of cohesive soils:

The standard terminology to describe cohesive soils includes the consistency, which is based on undrained shear strength as measured by *in situ* vane tests, penetrometer tests, or unconfined compression tests. Consistency may be crudely estimated from SPT N-Value based on the correlation shown in the following table (Terzaghi and Peck, 1967). The correlation to SPT N-Value is used with caution as it is only very approximate.

Consistency	Undrained Shear Strength		Approximate SPT N-Value
	kips/sq.ft.	kPa	
<i>Very Soft</i>	<0.25	<12.5	<2
<i>Soft</i>	0.25 - 0.5	12.5 - 25	2-4
<i>Firm</i>	0.5 - 1.0	25 - 50	4-8
<i>Stiff</i>	1.0 - 2.0	50 - 100	8-15
<i>Very Stiff</i>	2.0 - 4.0	100 - 200	15-30
<i>Hard</i>	>4.0	>200	>30

Except where specified below, terminology for describing rock is as defined by the International Society for Rock Mechanics (ISRM) 2007 publication "The Complete ISRM Suggested Methods for Rock Characterization, Testing and Monitoring: 1974-2006"

Terminology describing rock quality:

RQD	Rock Mass Quality
0-25	Very Poor Quality
25-50	Poor Quality
50-75	Fair Quality
75-90	Good Quality
90-100	Excellent Quality

Alternate (Colloquial) Rock Mass Quality	
Very Severely Fractured	Crushed
Severely Fractured	Shattered or Very Blocky
Fractured	Blocky
Moderately Jointed	Sound
Intact	Very Sound

RQD (Rock Quality Designation) denotes the percentage of intact and sound rock retrieved from a borehole of any orientation. All pieces of intact and sound rock core equal to or greater than 100 mm (4 in.) long are summed and divided by the total length of the core run. RQD is determined in accordance with ASTM D6032.

SCR (Solid Core Recovery) denotes the percentage of solid core (cylindrical) retrieved from a borehole of any orientation. All pieces of solid (cylindrical) core are summed and divided by the total length of the core run (It excludes all portions of core pieces that are not fully cylindrical as well as crushed or rubble zones).

Fracture Index (FI) is defined as the number of naturally occurring fractures within a given length of core. The Fracture Index is reported as a simple count of natural occurring fractures.

Terminology describing rock with respect to discontinuity and bedding spacing:

Spacing (mm)	Discontinuities	Bedding
>6000	Extremely Wide	-
2000-6000	Very Wide	Very Thick
600-2000	Wide	Thick
200-600	Moderate	Medium
60-200	Close	Thin
20-60	Very Close	Very Thin
<20	Extremely Close	Laminated
<6	-	Thinly Laminated

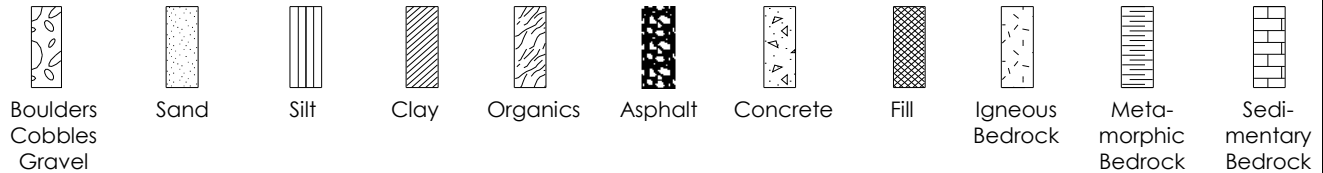
Terminology describing rock strength:

Strength Classification	Grade	Unconfined Compressive Strength (MPa)
Extremely Weak	R0	<1
Very Weak	R1	1 – 5
Weak	R2	5 – 25
Medium Strong	R3	25 – 50
Strong	R4	50 – 100
Very Strong	R5	100 – 250
Extremely Strong	R6	>250

Terminology describing rock weathering:

Term	Symbol	Description
Fresh	W1	No visible signs of rock weathering. Slight discoloration along major discontinuities
Slightly	W2	Discoloration indicates weathering of rock on discontinuity surfaces. All the rock material may be discolored.
Moderately	W3	Less than half the rock is decomposed and/or disintegrated into soil.
Highly	W4	More than half the rock is decomposed and/or disintegrated into soil.
Completely	W5	All the rock material is decomposed and/or disintegrated into soil. The original mass structure is still largely intact.
Residual Soil	W6	All the rock converted to soil. Structure and fabric destroyed.

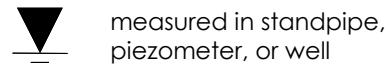
Strata plots symbolize the soil or bedrock description. They are combinations of the following basic symbols. The dimensions within the strata symbols are not indicative of the particle size, layer thickness, etc.



SAMPLE TYPE

SS	Split spoon sample (obtained by performing the Standard Penetration Test)
ST	Shelby tube or thin wall tube
DP	Direct-Push sample (small diameter tube sampler hydraulically advanced)
PS	Piston sample
BS	Bulk sample
HQ, NQ, BQ, etc.	Rock core samples obtained with the use of standard size diamond coring bits.

WATER LEVEL MEASUREMENT



measured in standpipe, piezometer, or well



inferred

RECOVERY

For soil samples, the recovery is recorded as the length of the soil sample recovered. For rock core, recovery is defined as the total cumulative length of all core recovered in the core barrel divided by the length drilled and is recorded as a percentage on a per run basis.

N-VALUE

Numbers in this column are the field results of the Standard Penetration Test: the number of blows of a 140 pound (63.5 kg) hammer falling 30 inches (760 mm), required to drive a 2 inch (50.8 mm) O.D. split spoon sampler one foot (300 mm) into the soil. In accordance with ASTM D1586, the N-Value equals the sum of the number of blows (N) required to drive the sampler over the interval of 6 to 18 in. (150 to 450 mm). However, when a 24 in. (610 mm) sampler is used, the number of blows (N) required to drive the sampler over the interval of 12 to 24 in. (300 to 610 mm) may be reported if this value is lower. For split spoon samples where insufficient penetration was achieved and N-Values cannot be presented, the number of blows are reported over sampler penetration in millimetres (e.g. 50/75). Some design methods make use of N-values corrected for various factors such as overburden pressure, energy ratio, borehole diameter, etc. No corrections have been applied to the N-values presented on the log.

DYNAMIC CONE PENETRATION TEST (DCPT)

Dynamic cone penetration tests are performed using a standard 60 degree apex cone connected to 'A' size drill rods with the same standard fall height and weight as the Standard Penetration Test. The DCPT value is the number of blows of the hammer required to drive the cone one foot (300 mm) into the soil. The DCPT is used as a probe to assess soil variability.

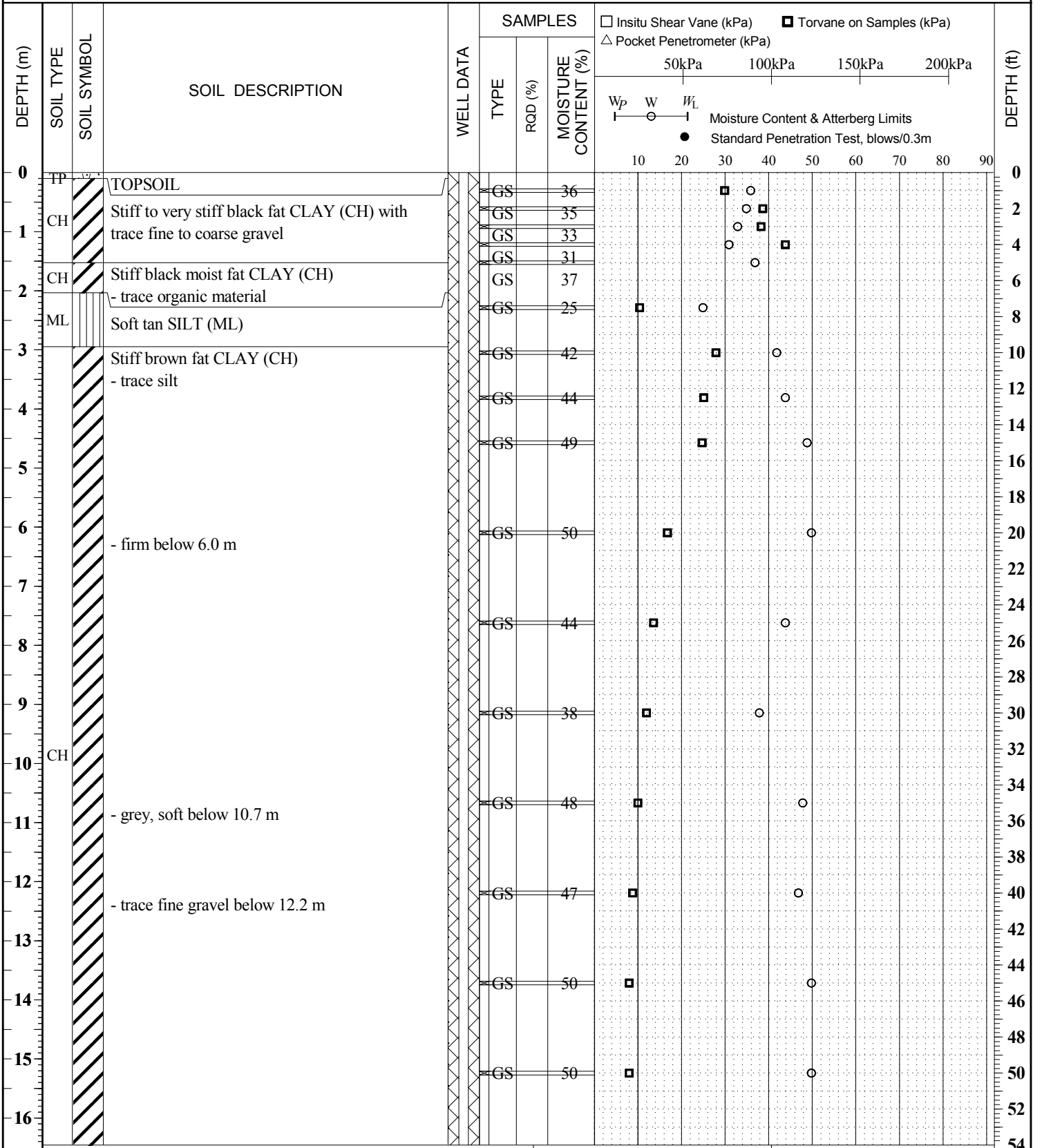
OTHER TESTS

S	Sieve analysis
H	Hydrometer analysis
k	Laboratory permeability
y	Unit weight
G _s	Specific gravity of soil particles
CD	Consolidated drained triaxial
CU	Consolidated undrained triaxial with pore pressure measurements
UU	Unconsolidated undrained triaxial
DS	Direct Shear
C	Consolidation
Q _u	Unconfined compression
I _p	Point Load Index (I _p on Borehole Record equals I _p (50) in which the index is corrected to a reference diameter of 50 mm)

	Single packer permeability test; test interval from depth shown to bottom of borehole
	Double packer permeability test; test interval as indicated
	Falling head permeability test using casing
	Falling head permeability test using well point or piezometer

TH01 TESTHOLE RECORD

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535456
 LOCATION Winnipeg, Manitoba ELEVATION 230.43 m EASTING 634995
 DRILLING DATE October 13, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

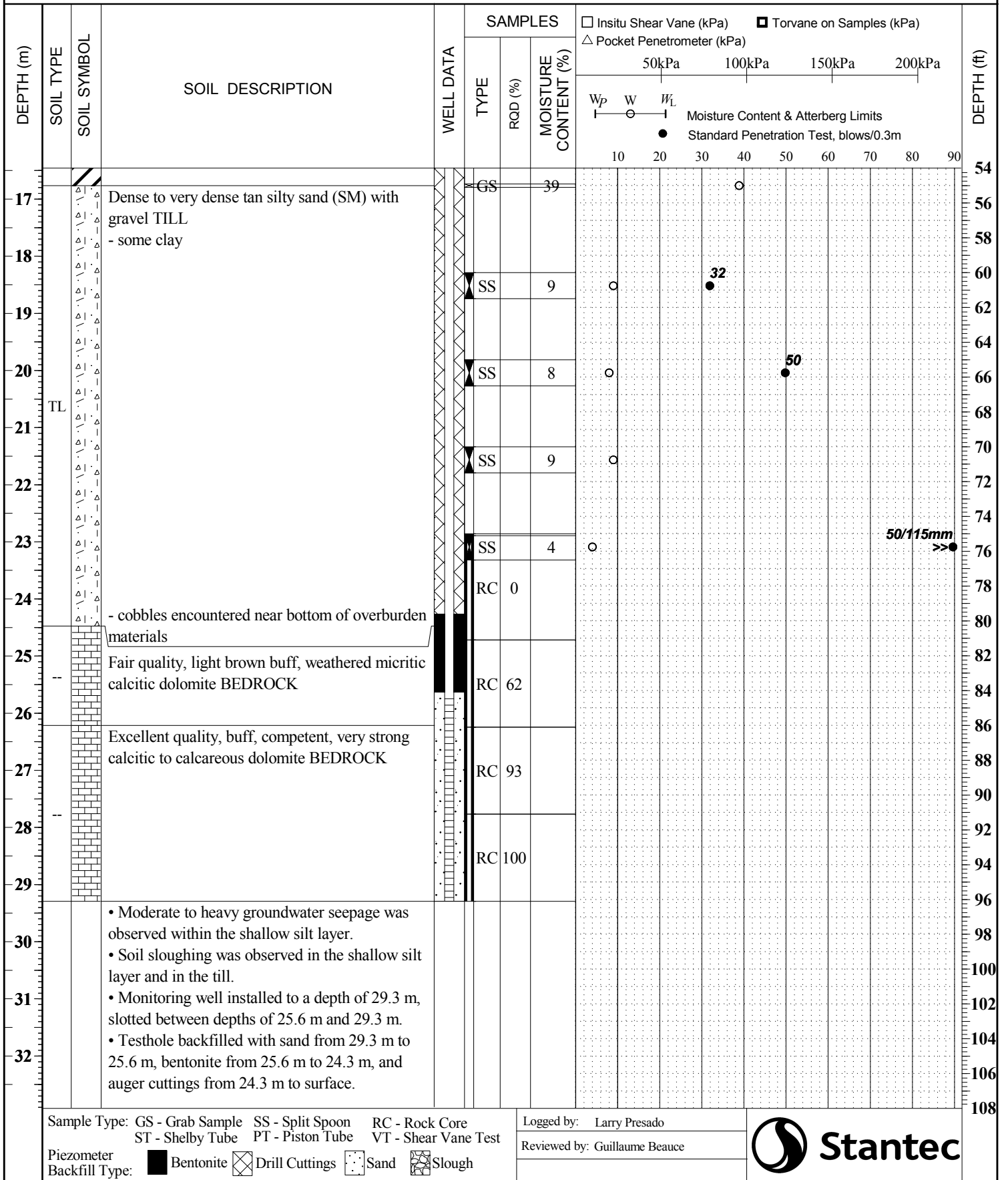
Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH01 TESTHOLE RECORD

cont'd

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535456
 LOCATION Winnipeg, Manitoba ELEVATION 230.43 m EASTING 634995
 DRILLING DATE October 13, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



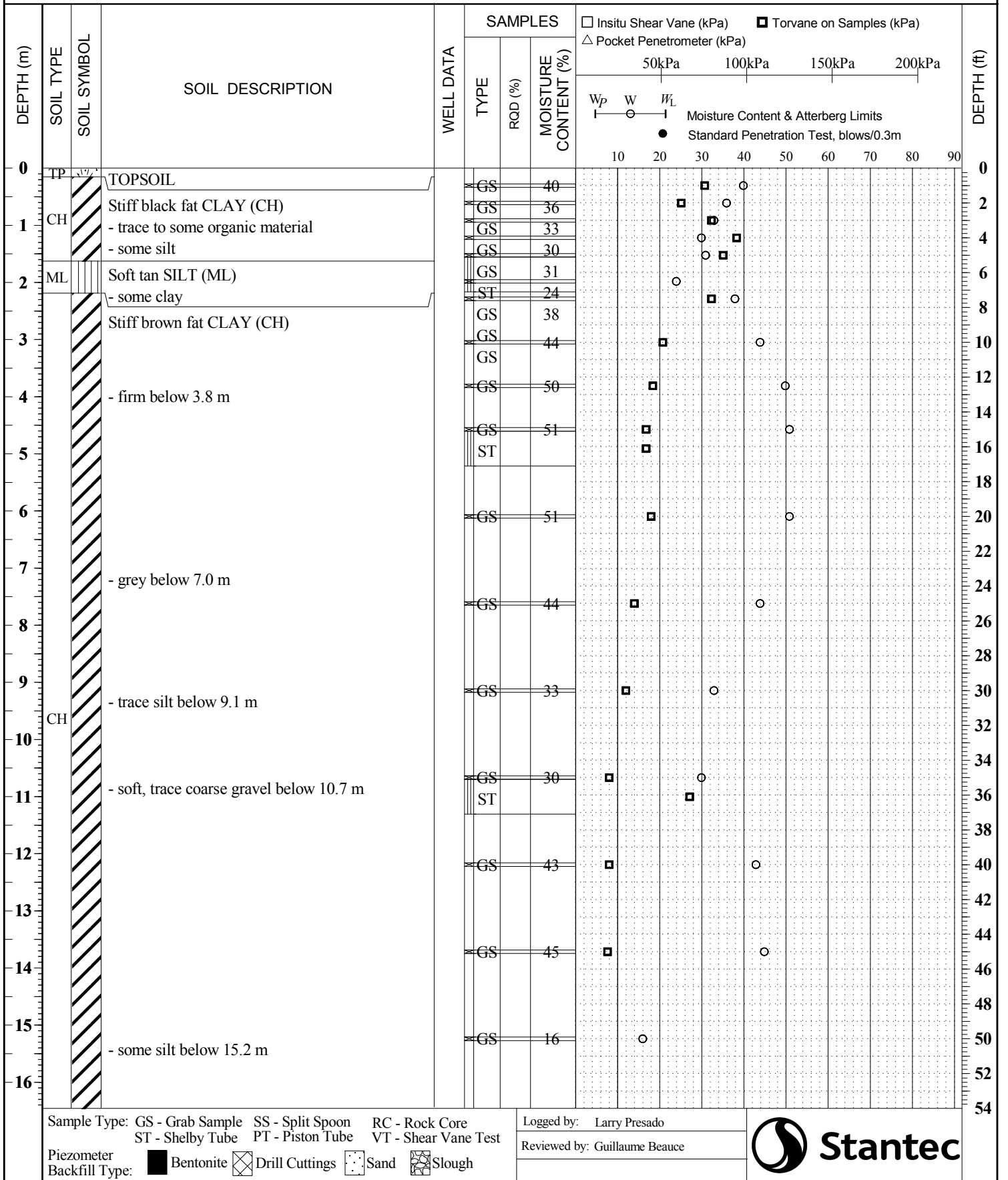
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 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: ■ Bentonite ⊠ Drill Cuttings □ Sand ⊞ Slough

Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH02 TESTHOLE RECORD

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535418
 LOCATION Winnipeg, Manitoba ELEVATION 230.70 m EASTING 635076
 DRILLING DATE October 12, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: ■ Bentonite ⊠ Drill Cuttings □ Sand ⊞ Slough

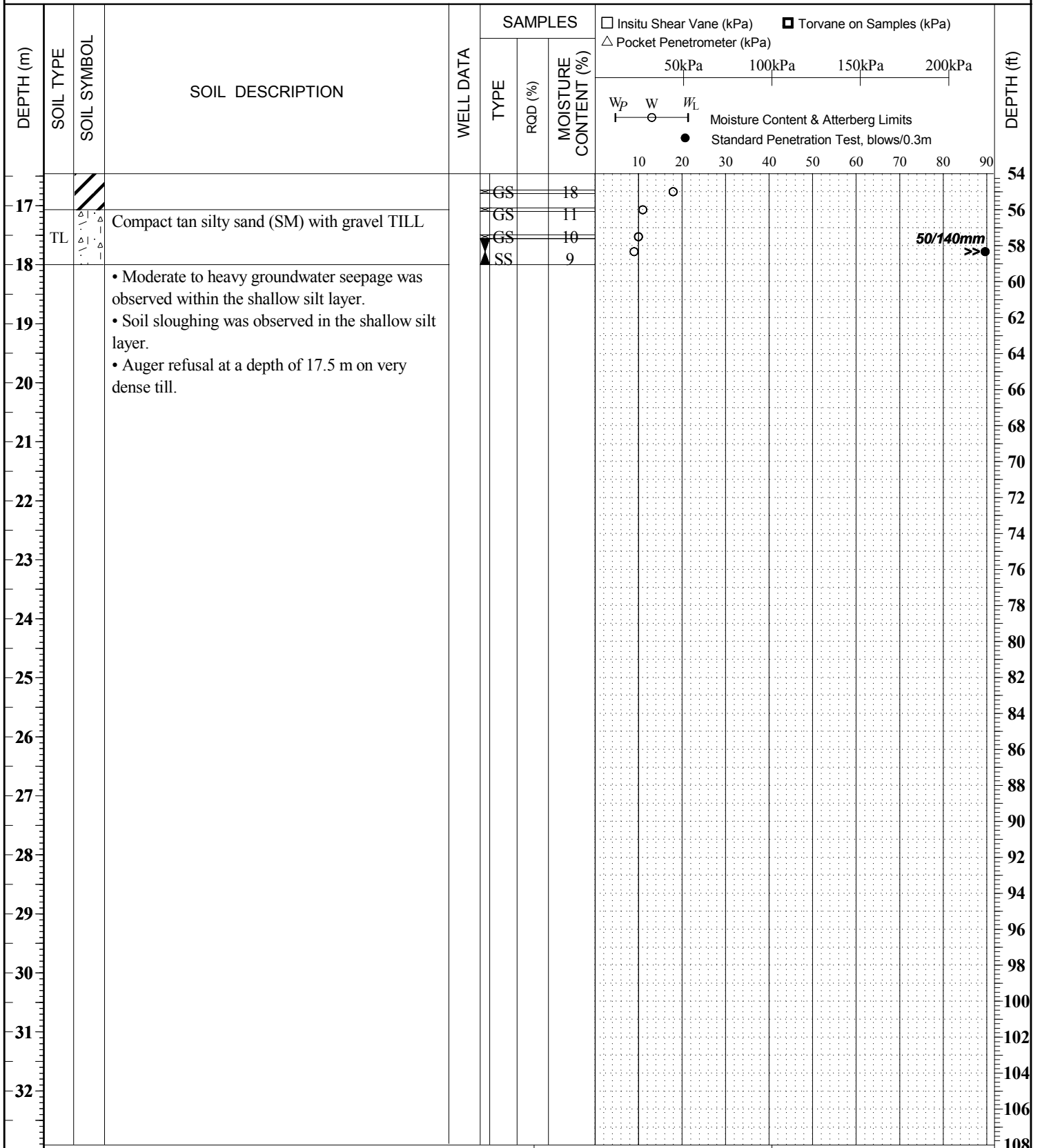
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 Reviewed by: Guillaume Beauce



TH02 TESTHOLE RECORD

cont'd

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535418
 LOCATION Winnipeg, Manitoba ELEVATION 230.70 m EASTING 635076
 DRILLING DATE October 12, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



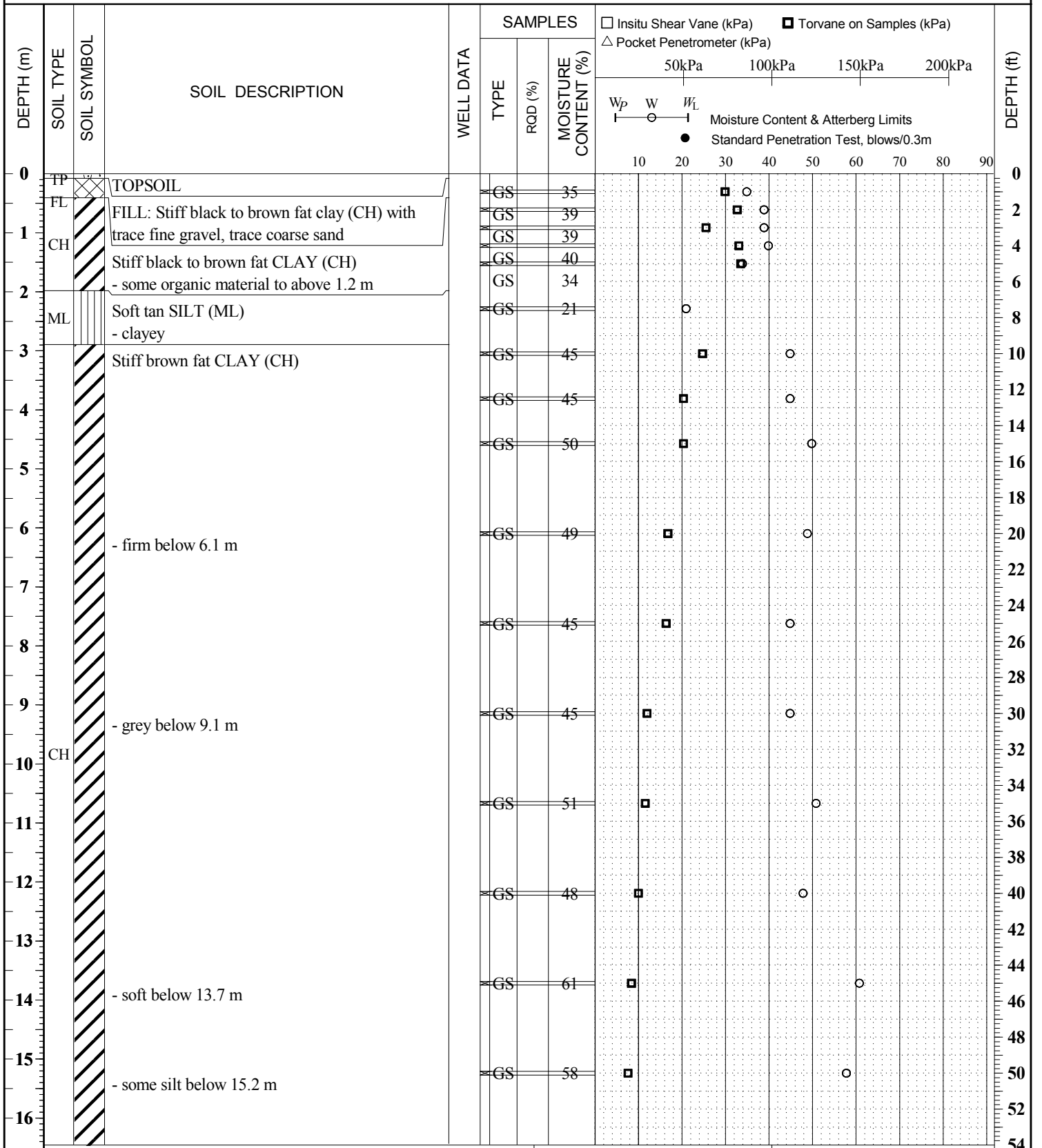
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 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH03 TESTHOLE RECORD

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535376
 LOCATION Winnipeg, Manitoba ELEVATION 231.01 m EASTING 635146
 DRILLING DATE October 12, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: ■ Bentonite ⊠ Drill Cuttings □ Sand ⊞ Slough

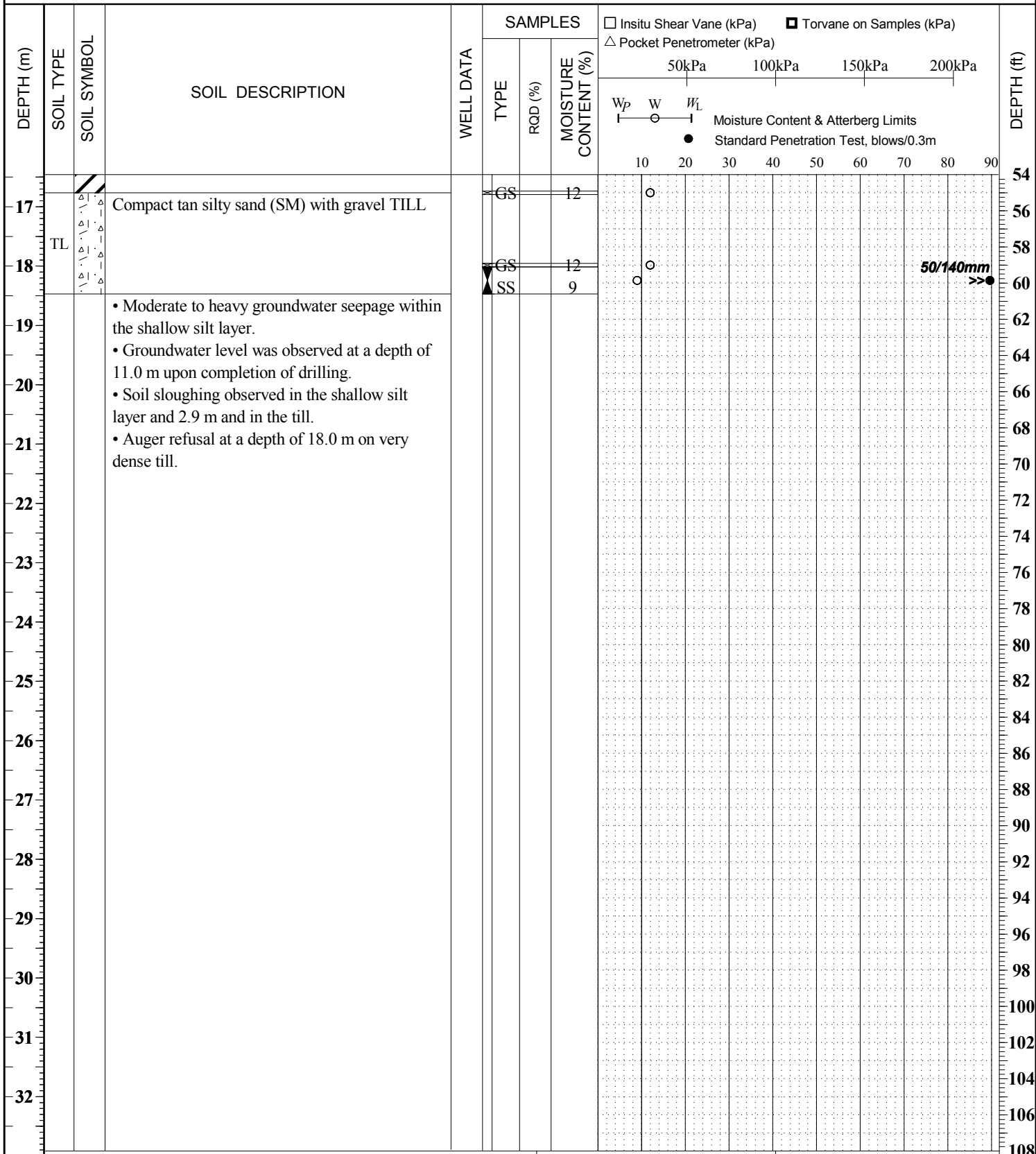
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 Reviewed by: Guillaume Beauce



TH03 TESTHOLE RECORD

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 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535376
 LOCATION Winnipeg, Manitoba ELEVATION 231.01 m EASTING 635146
 DRILLING DATE October 12, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



50/140mm >>>

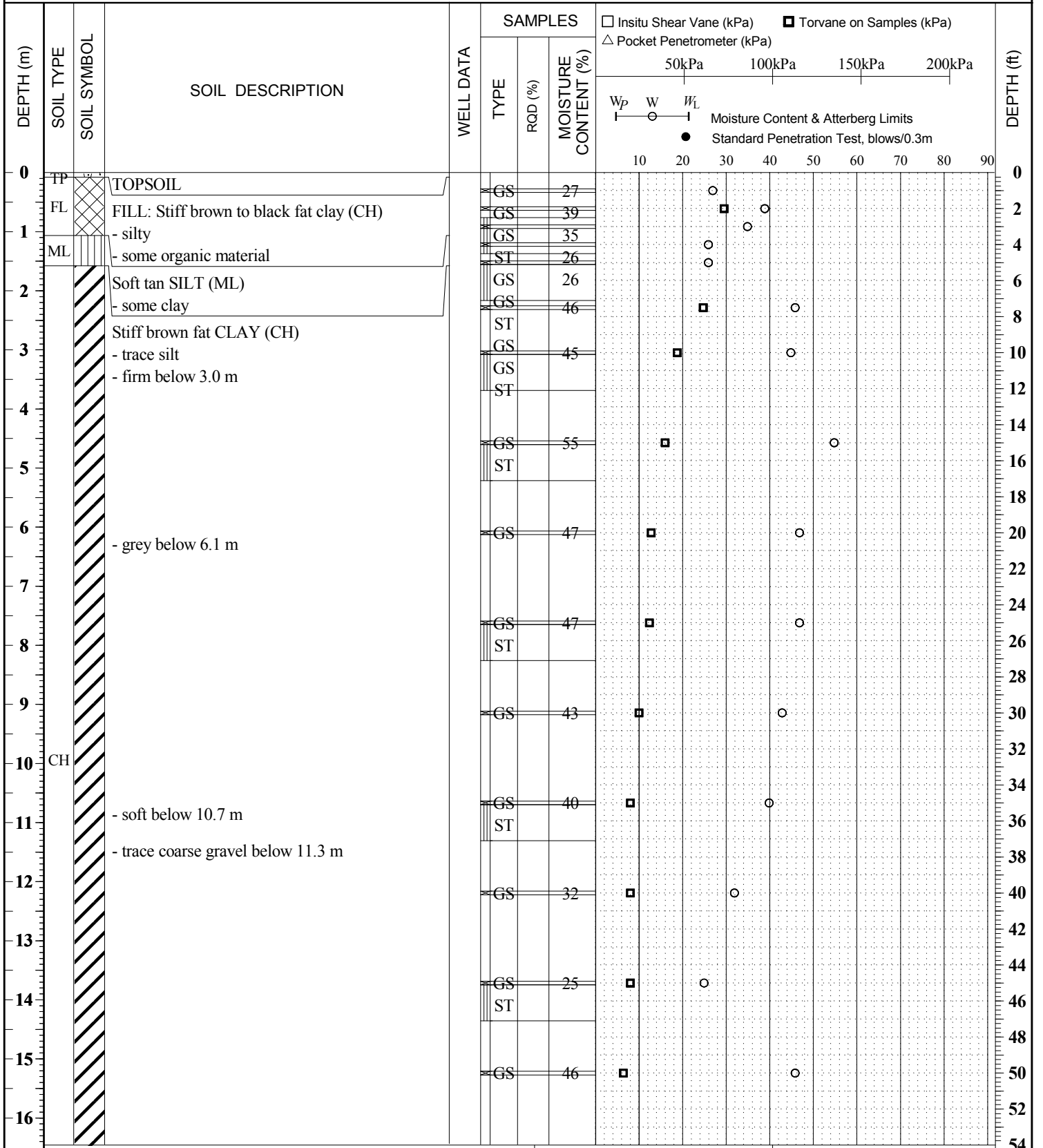
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 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH04 TESTHOLE RECORD

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535345
 LOCATION Winnipeg, Manitoba ELEVATION 231.00 m EASTING 635210
 DRILLING DATE October 12, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: ■ Bentonite ⊠ Drill Cuttings □ Sand ⊞ Slough

Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH04 TESTHOLE RECORD

cont'd

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535345
 LOCATION Winnipeg, Manitoba ELEVATION 231.00 m EASTING 635210
 DRILLING DATE October 12, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA

DEPTH (m)	SOIL TYPE	SOIL SYMBOL	SOIL DESCRIPTION	WELL DATA		SAMPLES		Moisture Content & Atterberg Limits				DEPTH (ft)
				TYPE	RQD (%)	MOISTURE CONTENT (%)	Moisture Content & Atterberg Limits	Moisture Content & Atterberg Limits	Moisture Content & Atterberg Limits	Moisture Content & Atterberg Limits		
17			- some silt below 17.7 m	GS	37							54
18												56
19	TL		Compact to dense tan silty sand (SM) with gravel TILL - some clay	GS	10							60
20				GS	11							64
21			• Moderate to heavy groundwater seepage was observed within the shallow silt layer. • Groundwater level was observed at a depth of 13.7 m upon completion of drilling. • Soil sloughing was observed in the shallow silt layer and in the till. • Auger refusal at a depth of 20.4 m on very dense till.	GS	12							68
22												70
23												72
24												74
25												76
26												78
27												80
28												82
29												84
30												86
31												88
32												90

Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

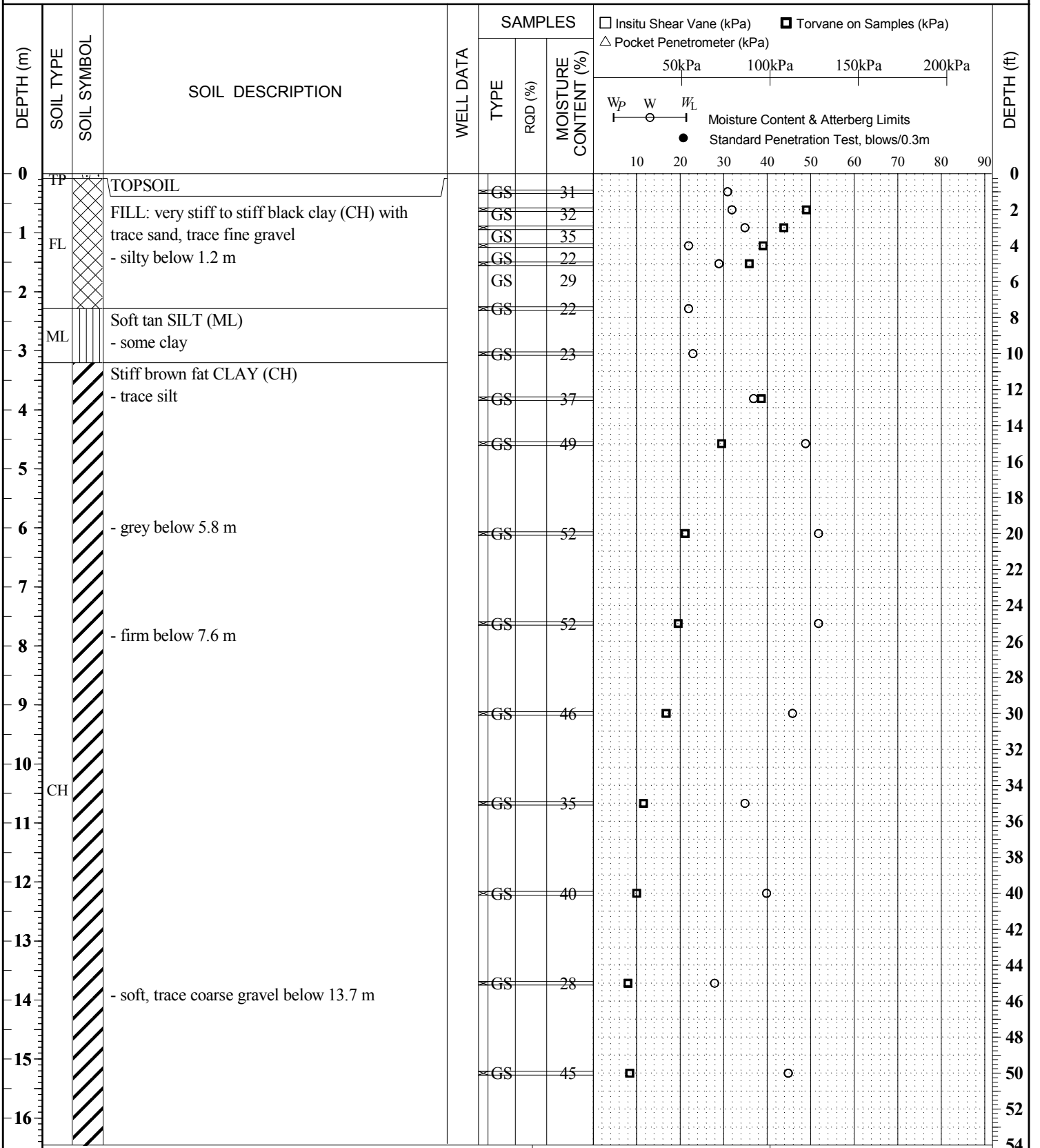
Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



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TH05 TESTHOLE RECORD

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535384
 LOCATION Winnipeg, Manitoba ELEVATION 231.97 m EASTING 634960.2
 DRILLING DATE October 5, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



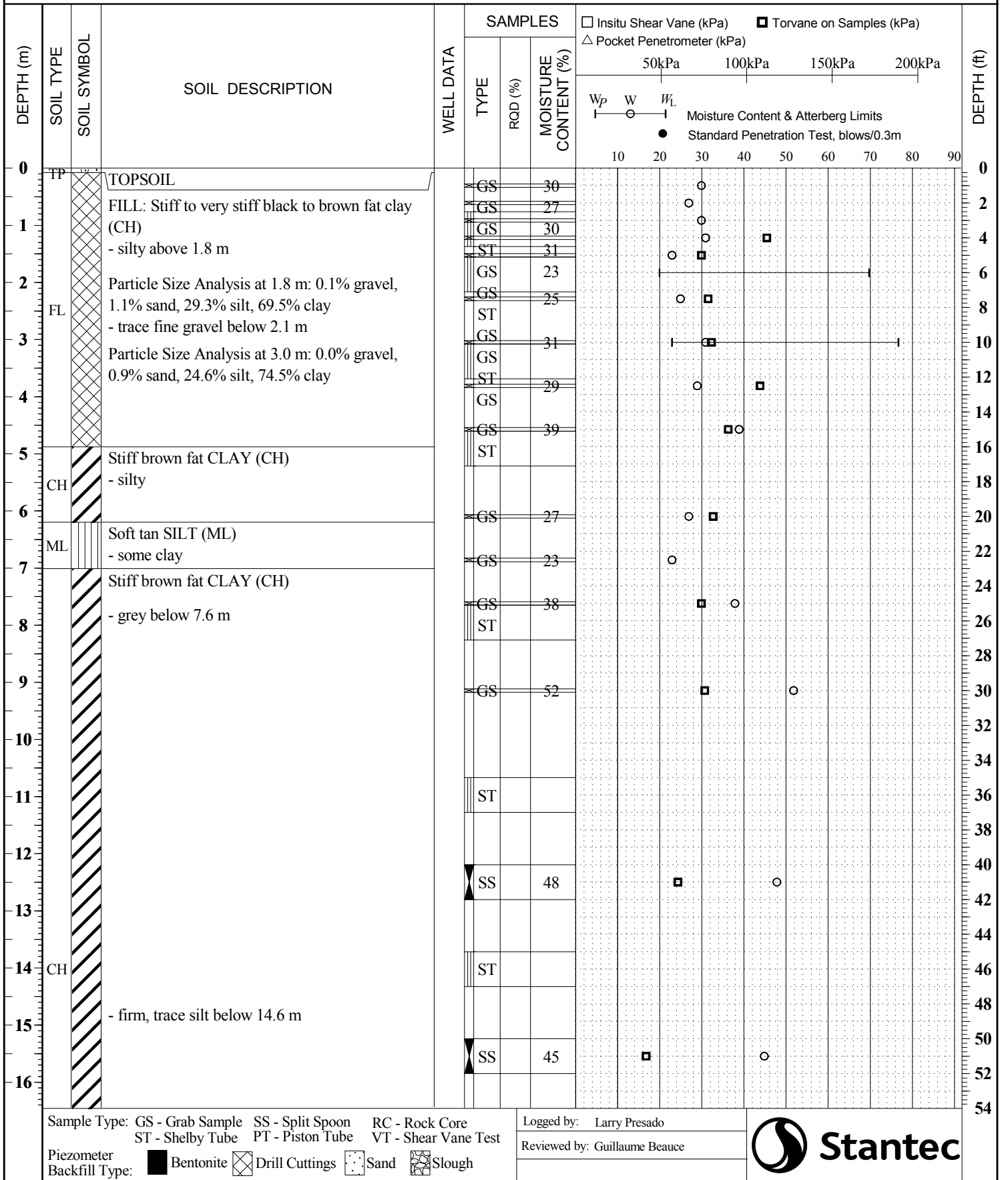
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 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: ■ Bentonite ⊠ Drill Cuttings □ Sand ⊞ Slough

Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH06 TESTHOLE RECORD

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535348
 LOCATION Winnipeg, Manitoba ELEVATION 235.50 m EASTING 635032
 DRILLING DATE October 6, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: ■ Bentonite ⊠ Drill Cuttings □ Sand ⊞ Slough

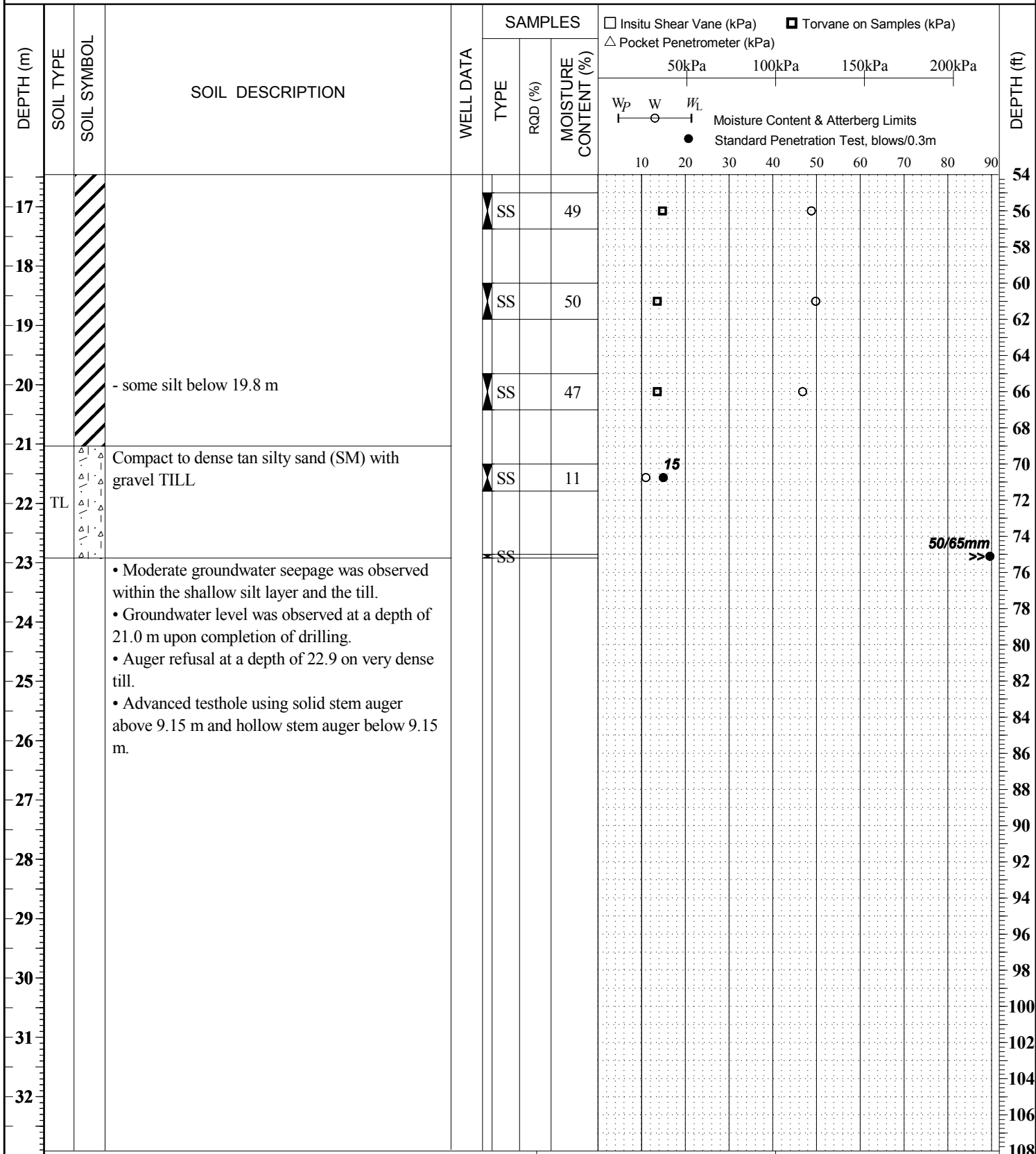
Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH06 TESTHOLE RECORD

cont'd

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535348
 LOCATION Winnipeg, Manitoba ELEVATION 235.50 m EASTING 635032
 DRILLING DATE October 6, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



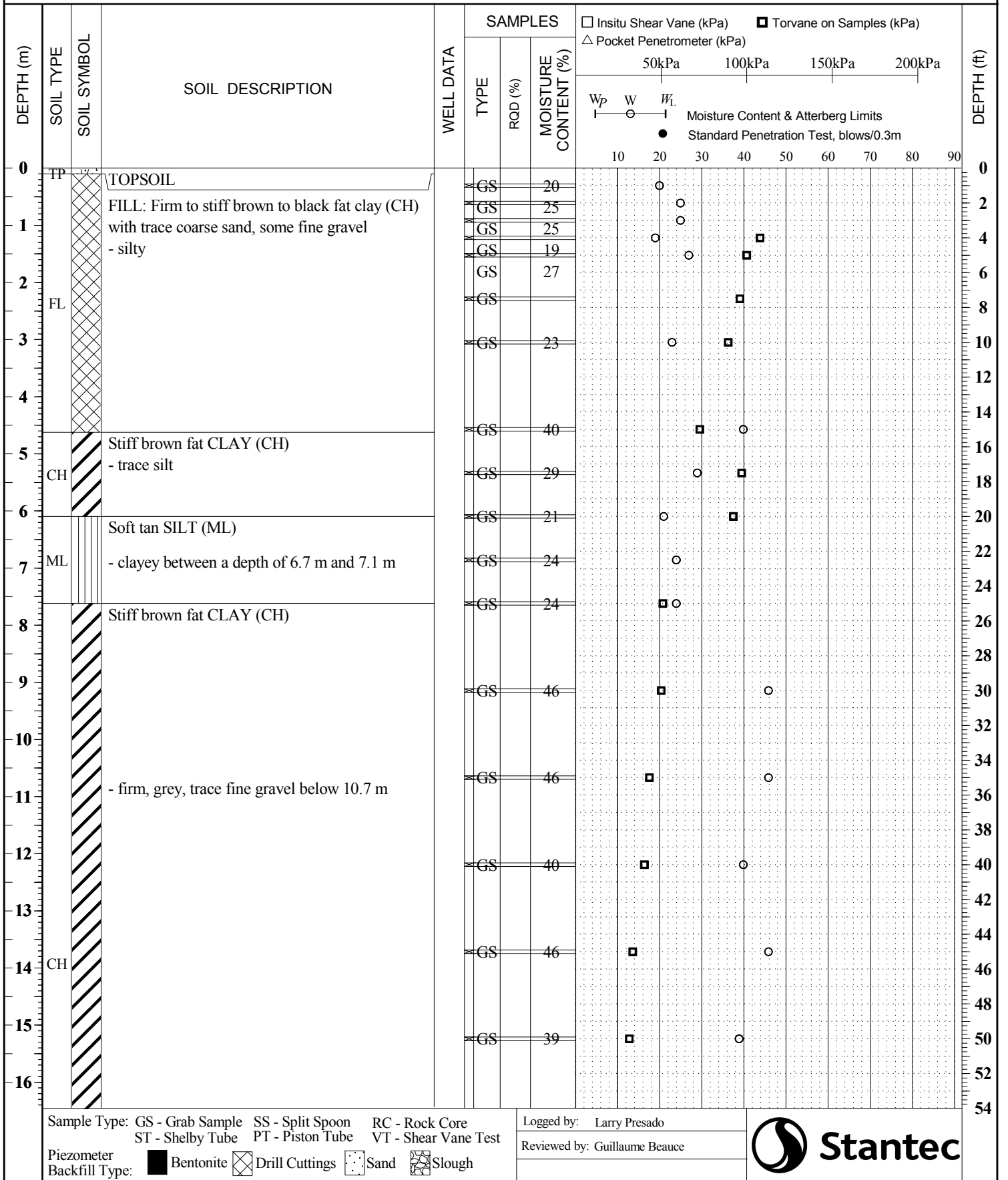
Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: ■ Bentonite ⊠ Drill Cuttings □ Sand ⊞ Slough

Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH07 TESTHOLE RECORD

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535314
 LOCATION Winnipeg, Manitoba ELEVATION 235.23 m EASTING 635103
 DRILLING DATE October 11, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: ■ Bentonite ⊠ Drill Cuttings □ Sand ⊞ Slough

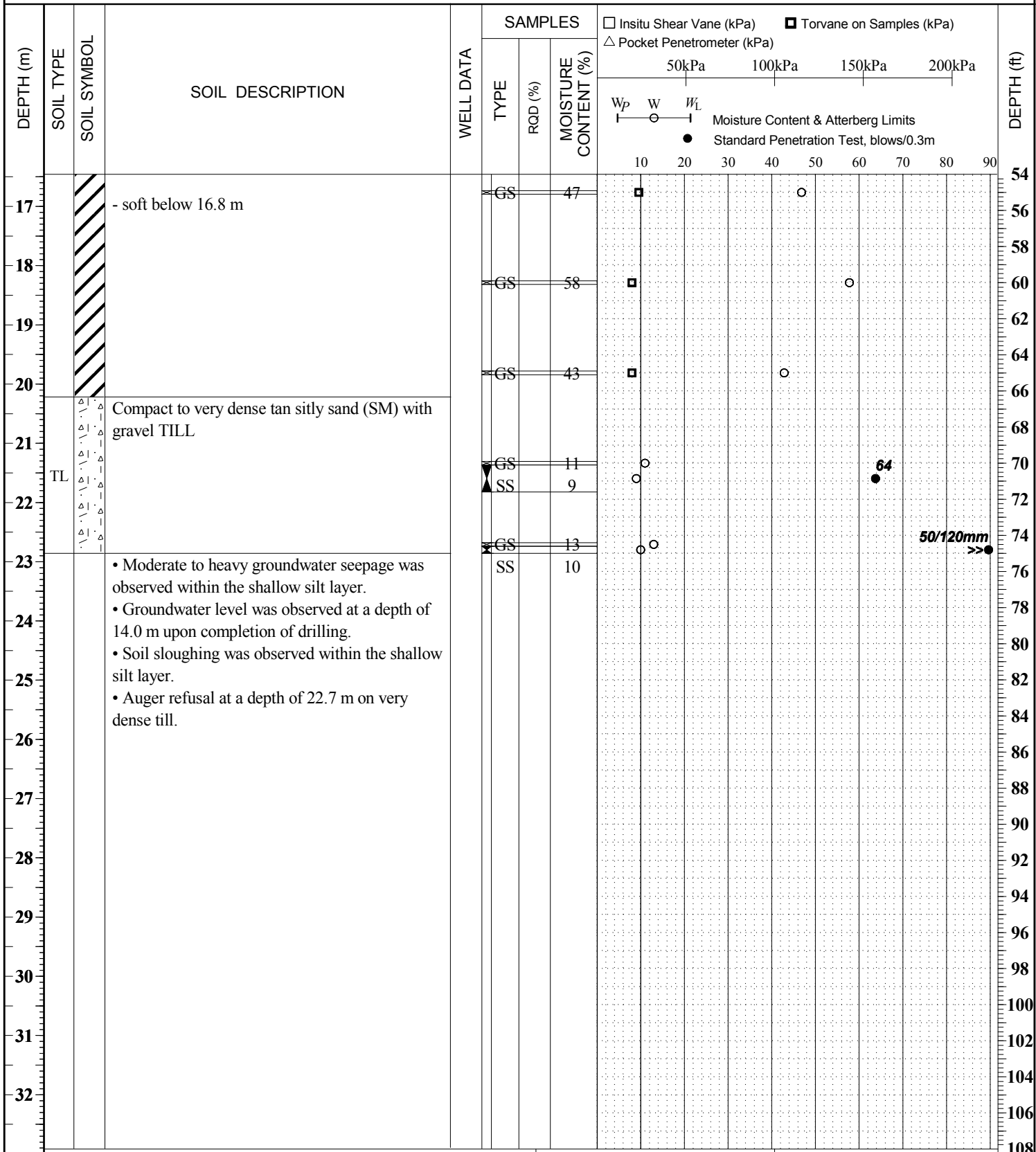
Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH07 TESTHOLE RECORD

cont'd

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535314
 LOCATION Winnipeg, Manitoba ELEVATION 235.23 m EASTING 635103
 DRILLING DATE October 11, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



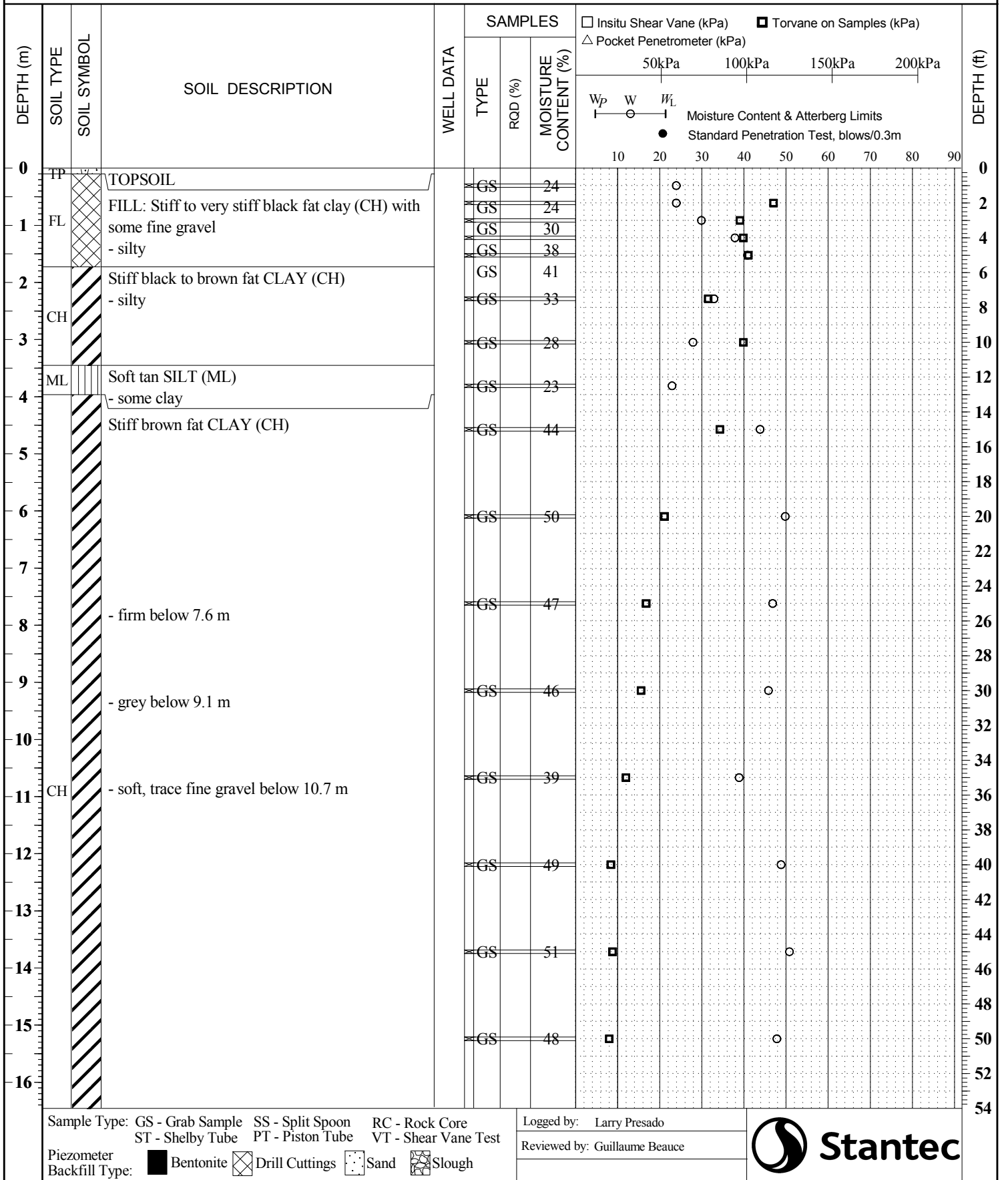
Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: ■ Bentonite ⊠ Drill Cuttings □ Sand ⊞ Slough

Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH08 TESTHOLE RECORD

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535273
 LOCATION Winnipeg, Manitoba ELEVATION 232.11 m EASTING 635164
 DRILLING DATE October 11, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: ■ Bentonite [Cross-hatch] Drill Cuttings [Dotted] Sand [Diagonal lines] Slough [Cross-hatch]

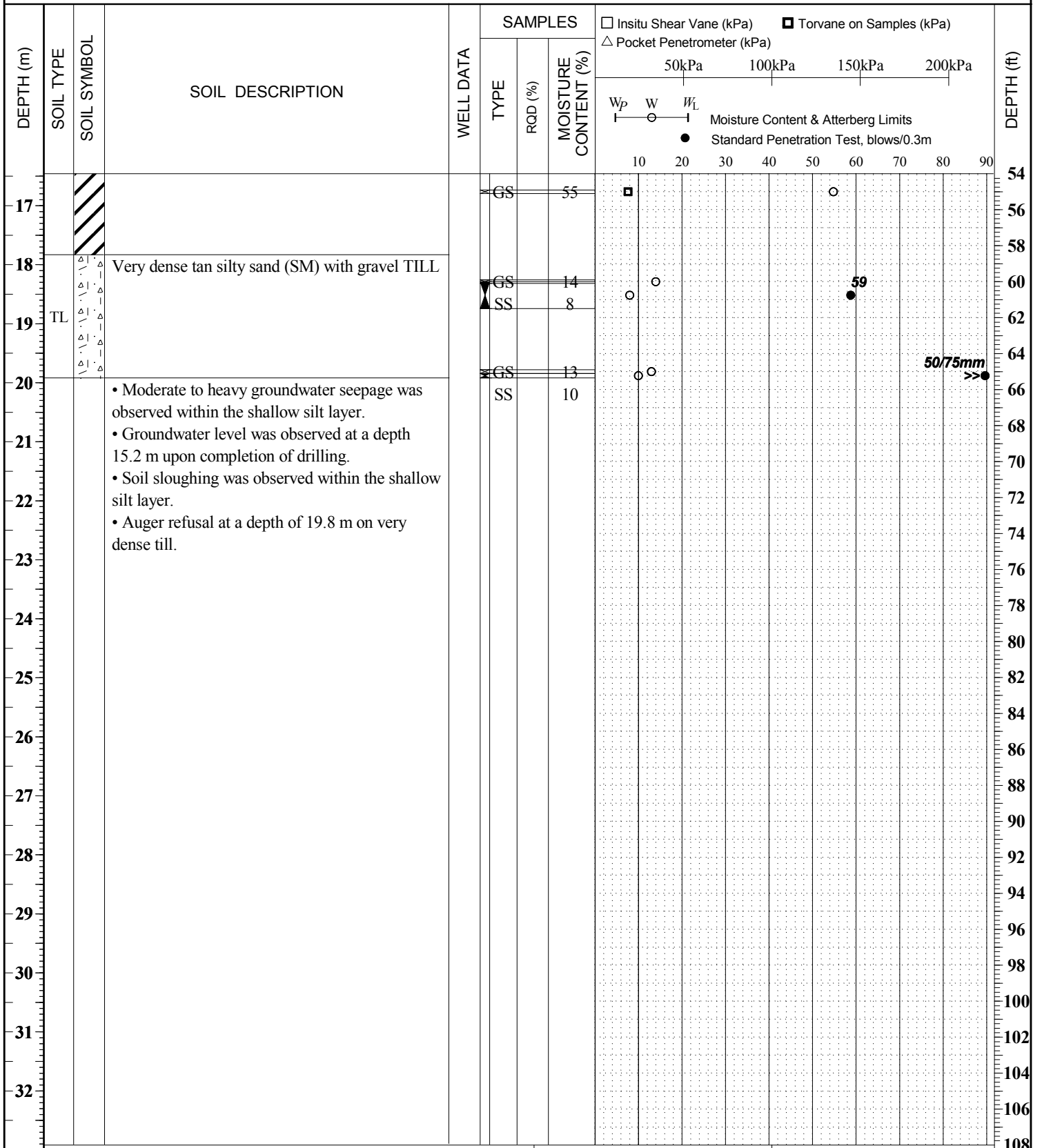
Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH08 TESTHOLE RECORD

cont'd

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535273
 LOCATION Winnipeg, Manitoba ELEVATION 232.11 m EASTING 635164
 DRILLING DATE October 11, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



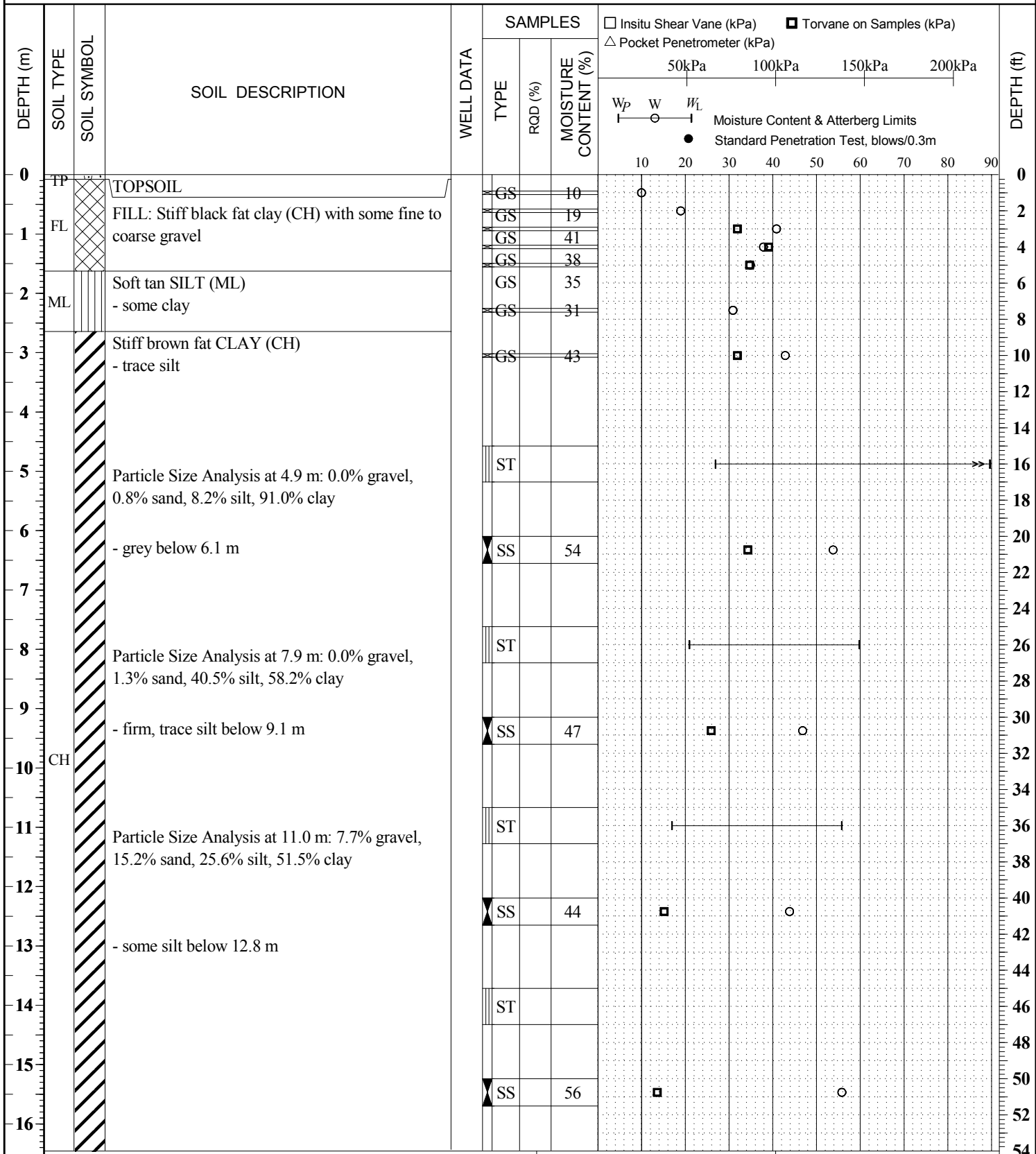
Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH09 TESTHOLE RECORD

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535334.75
 LOCATION Winnipeg, Manitoba ELEVATION 231.27 m EASTING 634922.07
 DRILLING DATE October 5, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: ■ Bentonite ⊠ Drill Cuttings □ Sand ⊞ Slough

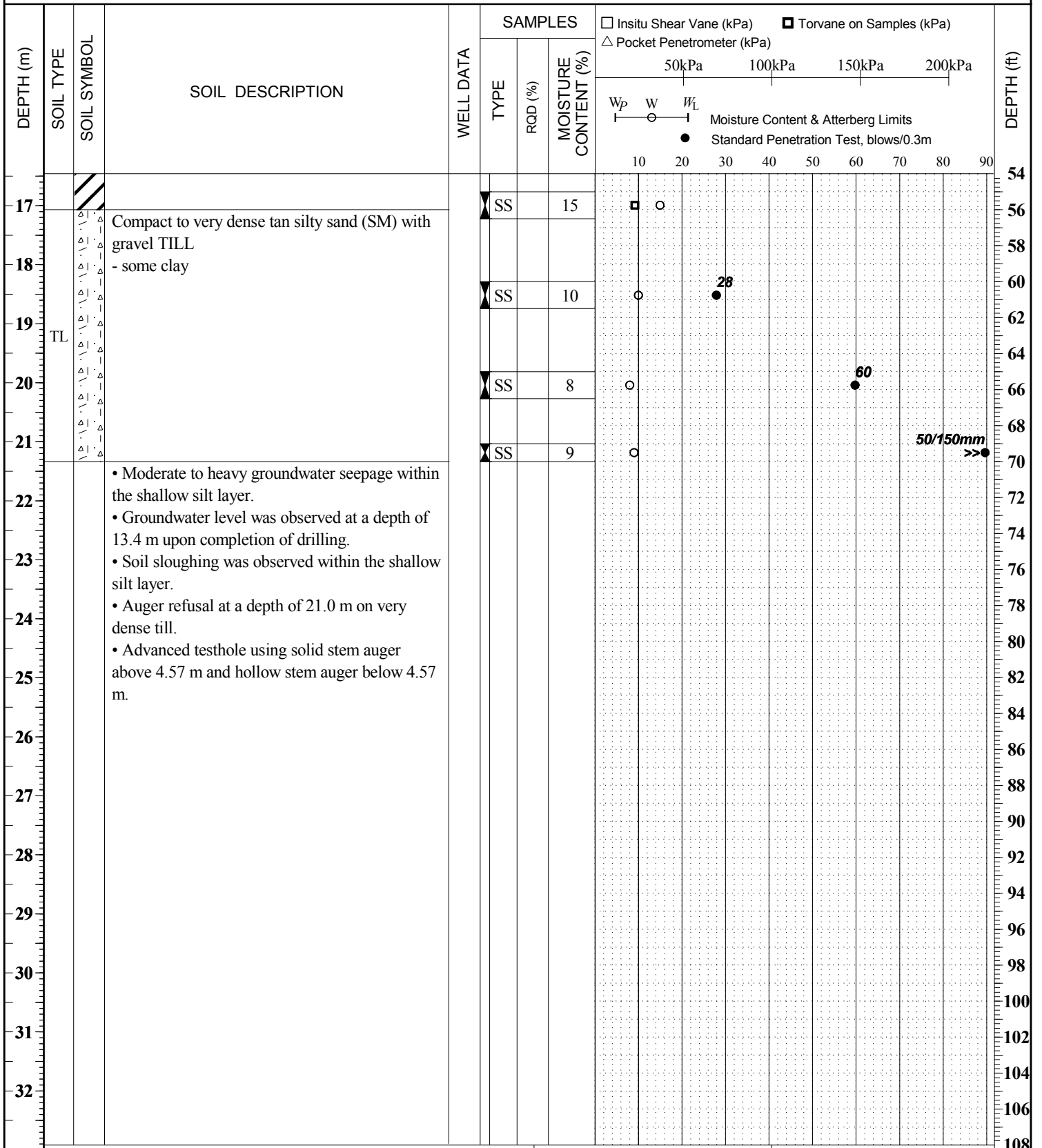
Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH09 TESTHOLE RECORD

cont'd

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535334.75
 LOCATION Winnipeg, Manitoba ELEVATION 231.27 m EASTING 634922.07
 DRILLING DATE October 5, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



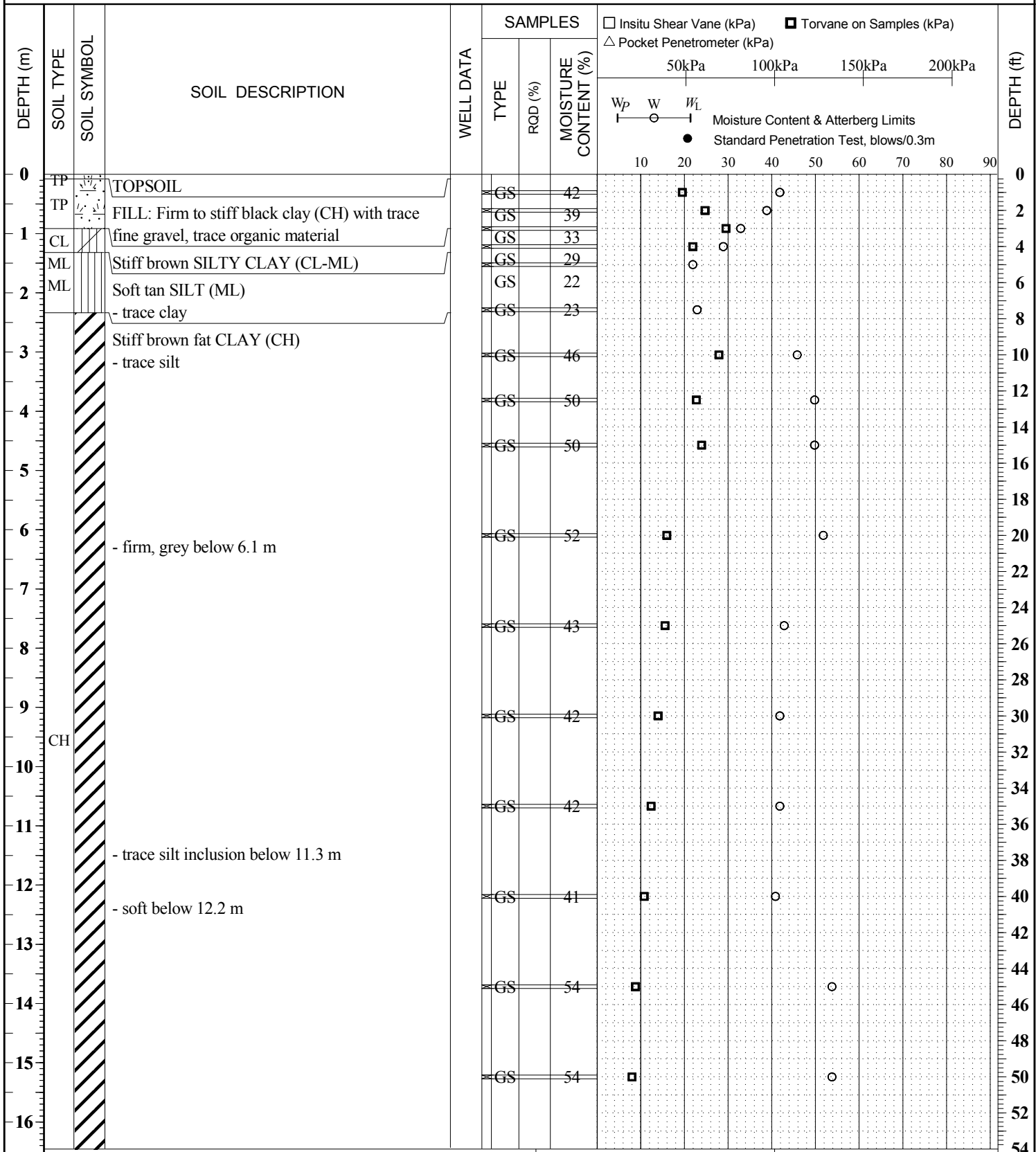
Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: ■ Bentonite ⊠ Drill Cuttings □ Sand ⊞ Slough

Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH10 TESTHOLE RECORD

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535307.26
 LOCATION Winnipeg, Manitoba ELEVATION 230.68 m EASTING 634993.01
 DRILLING DATE October 6, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

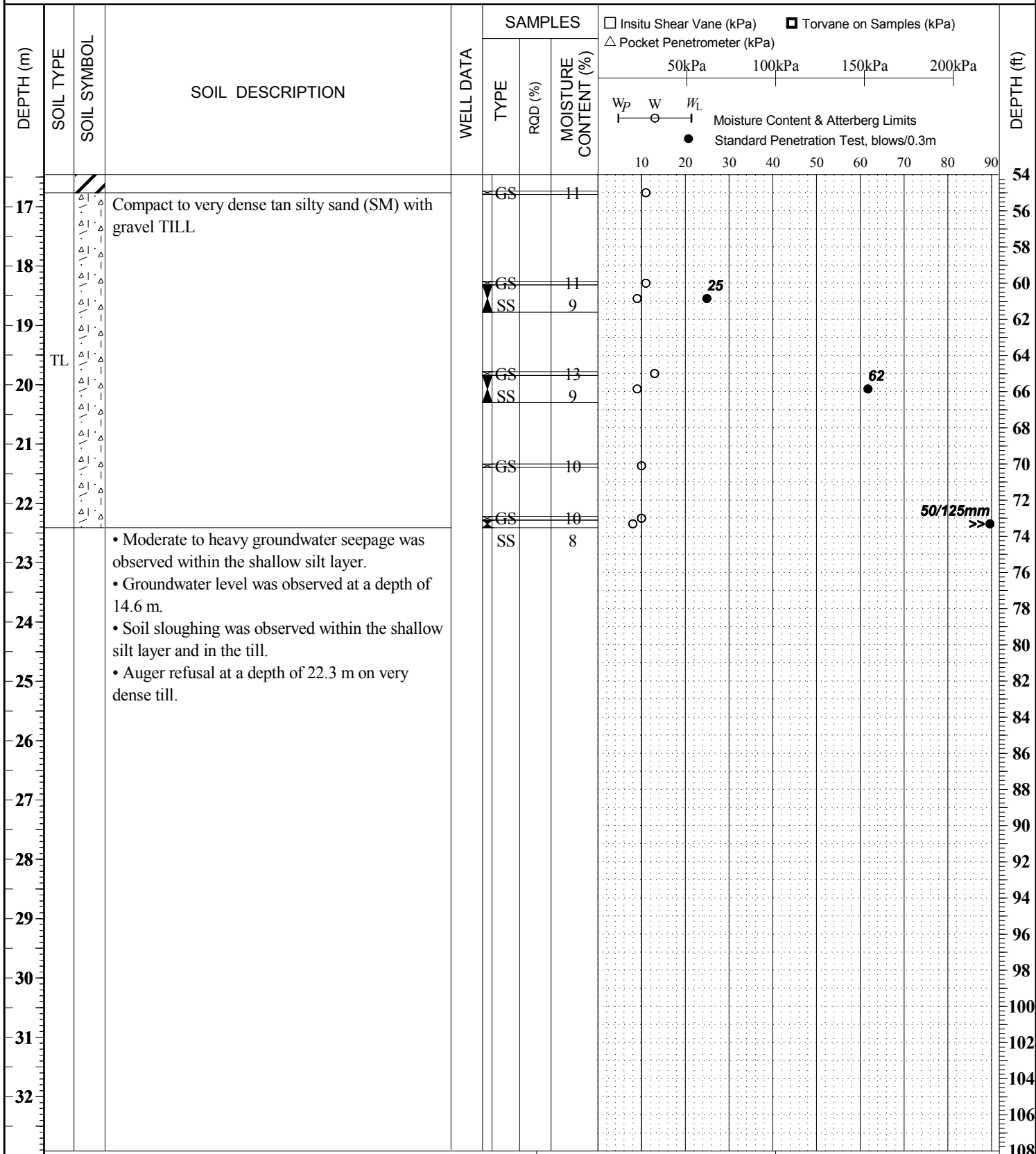
Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH10 TESTHOLE RECORD

cont'd

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535307.26
 LOCATION Winnipeg, Manitoba ELEVATION 230.68 m EASTING 634993.01
 DRILLING DATE October 6, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



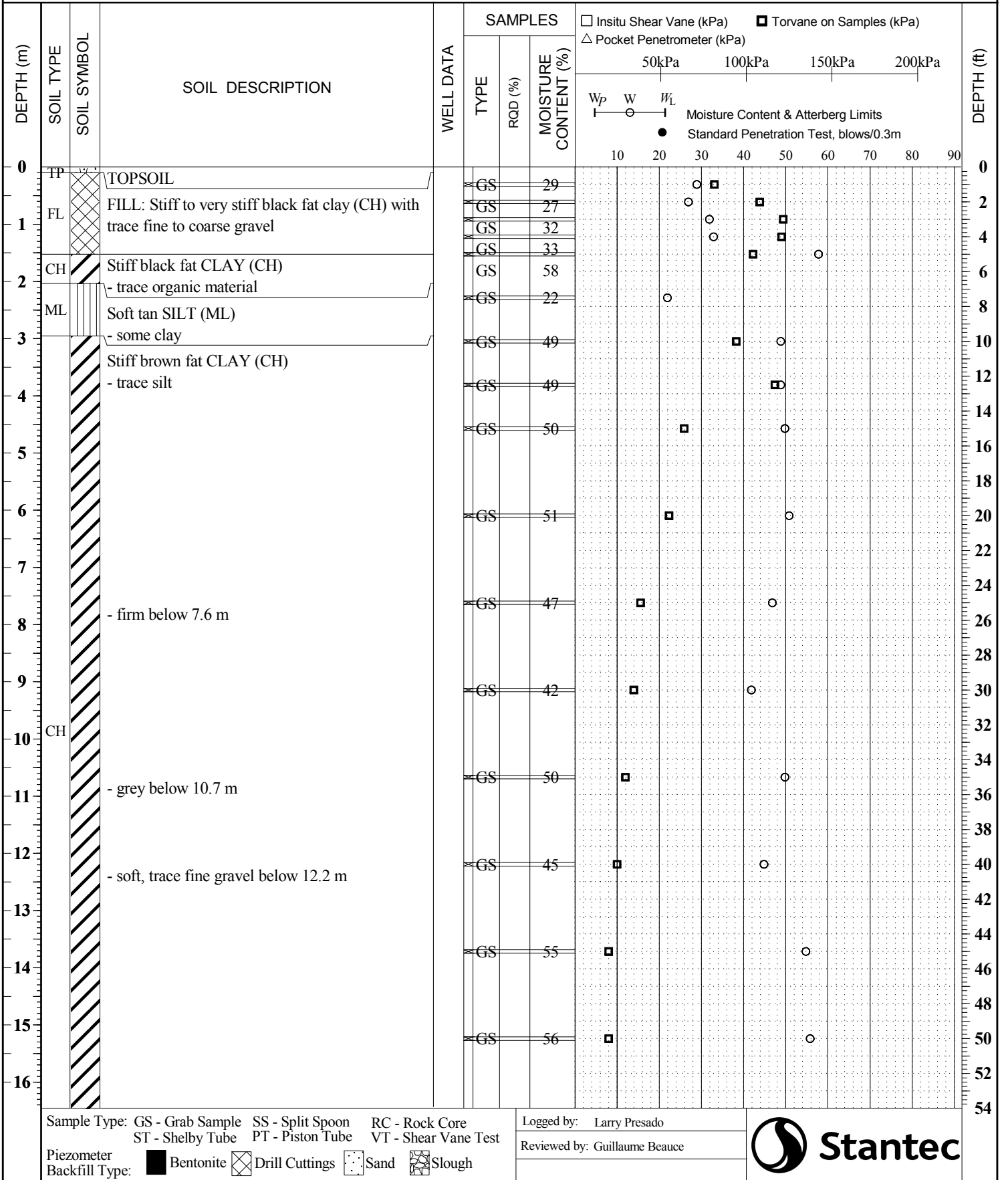
Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: ■ Bentonite ⊠ Drill Cuttings □ Sand ⊞ Slough

Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH11 TESTHOLE RECORD

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535288.04
 LOCATION Winnipeg, Manitoba ELEVATION 231.31 m EASTING 635051.97
 DRILLING DATE October 13, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: ■ Bentonite [Cross-hatch] Drill Cuttings [Dotted] Sand [Diagonal lines] Slough [Cross-hatch]

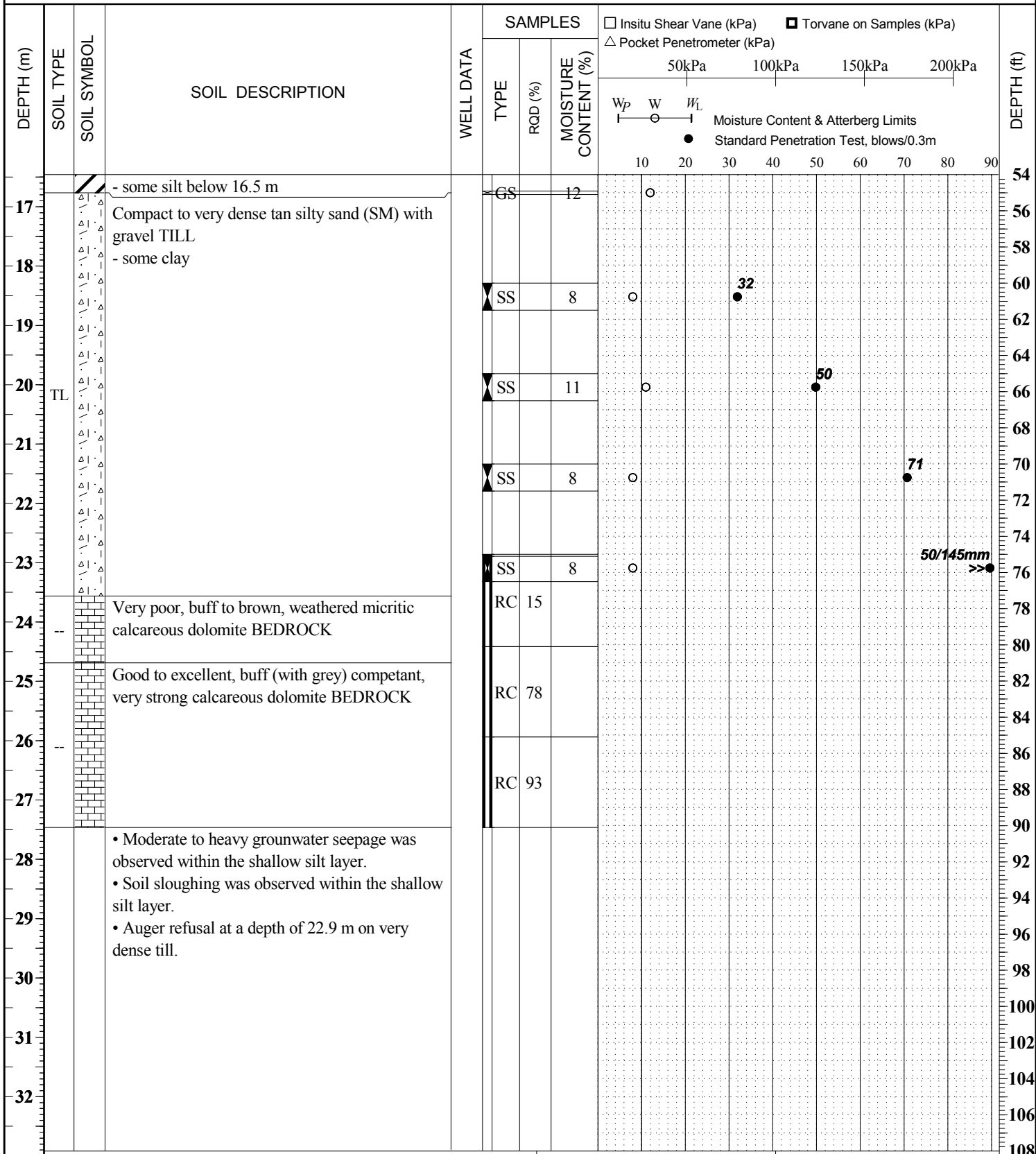
Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH11 TESTHOLE RECORD

cont'd

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535288.04
 LOCATION Winnipeg, Manitoba ELEVATION 231.31 m EASTING 635051.97
 DRILLING DATE October 13, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



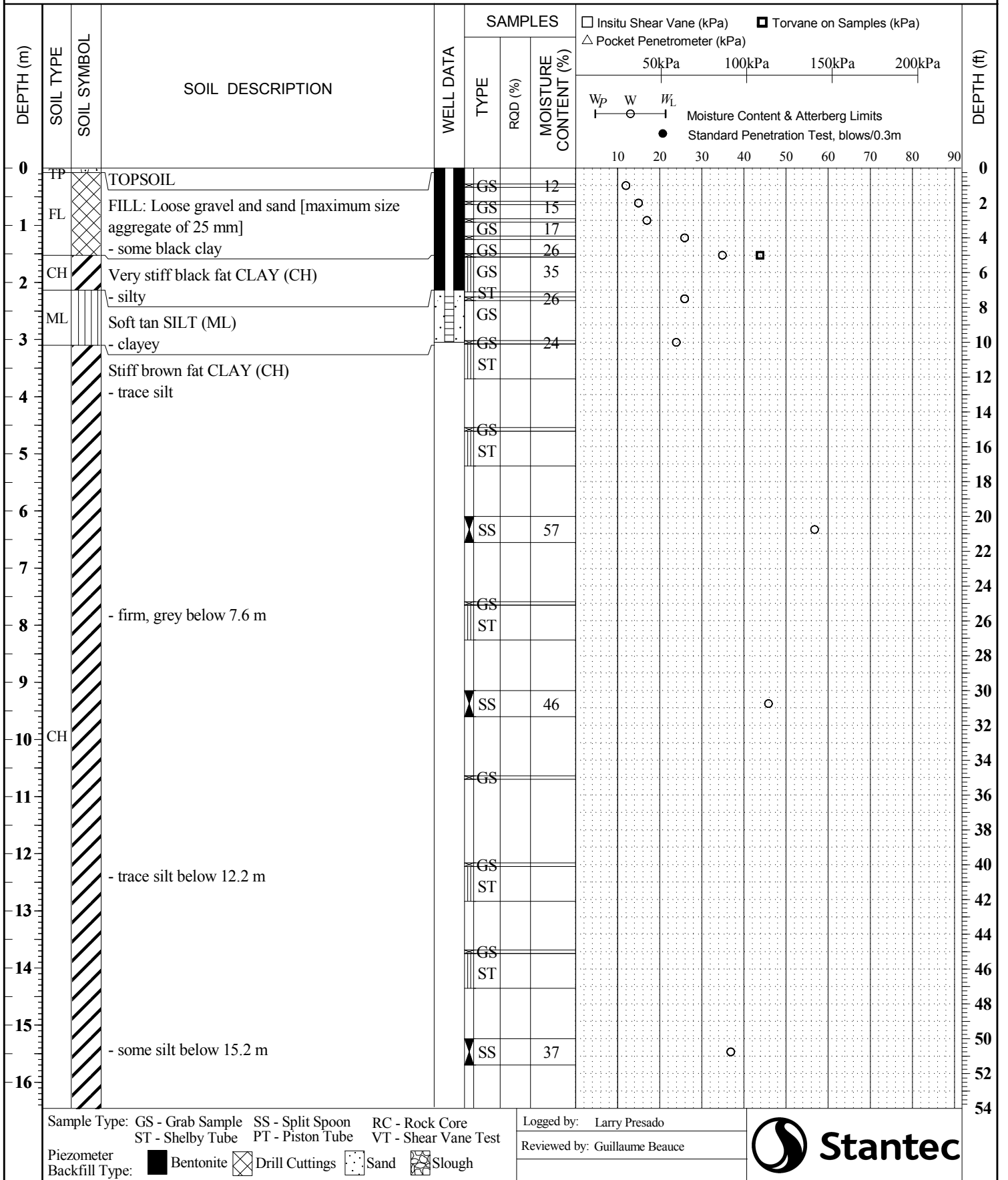
Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH12 TESTHOLE RECORD

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535245.59
 LOCATION Winnipeg, Manitoba ELEVATION 231.38 m EASTING 635123.03
 DRILLING DATE October 7, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: ■ Bentonite ⊠ Drill Cuttings □ Sand ⊞ Slough

Logged by: Larry Presado

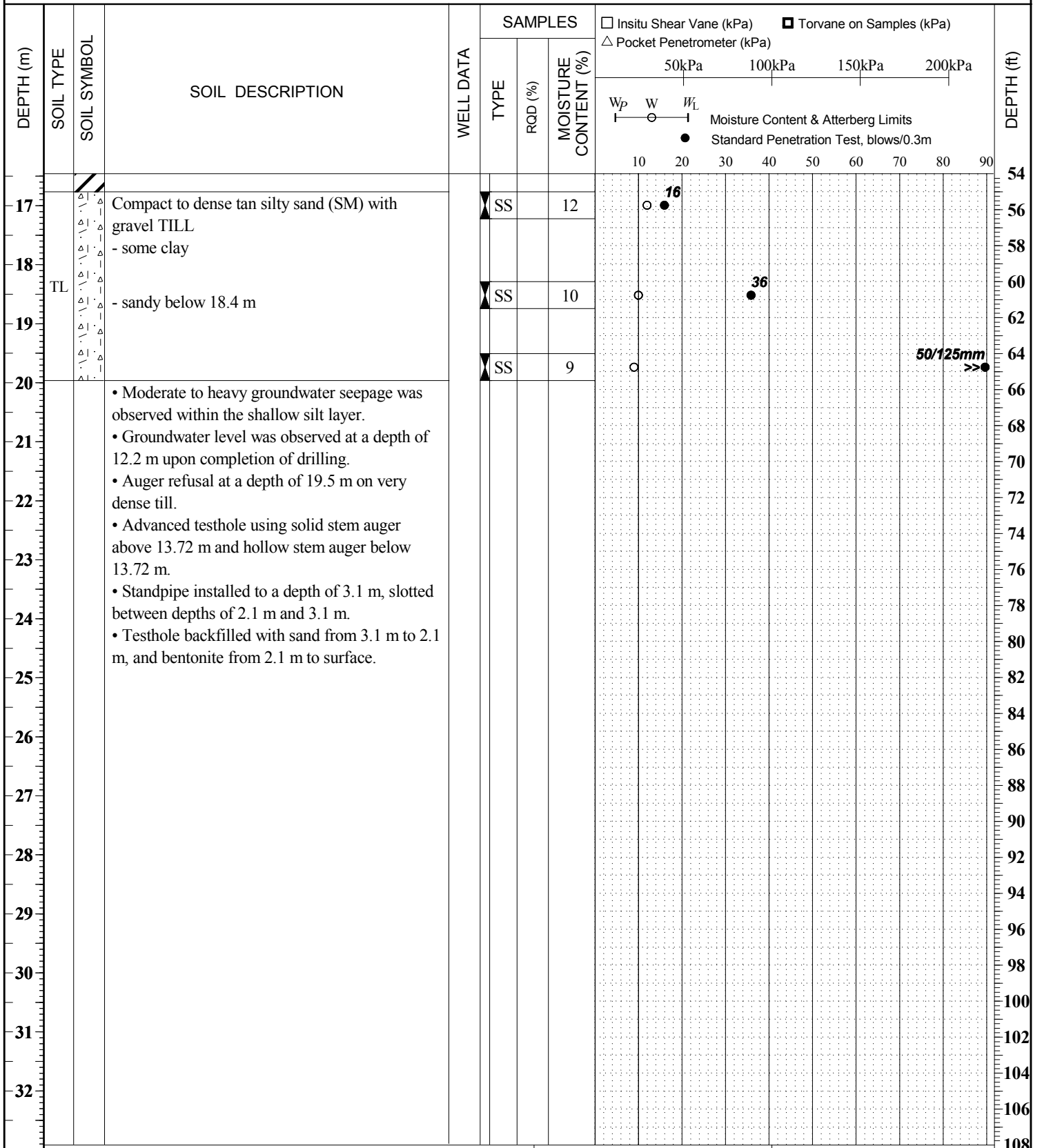
Reviewed by: Guillaume Beauce



TH12 TESTHOLE RECORD

cont'd

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535245.59
 LOCATION Winnipeg, Manitoba ELEVATION 231.38 m EASTING 635123.03
 DRILLING DATE October 7, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



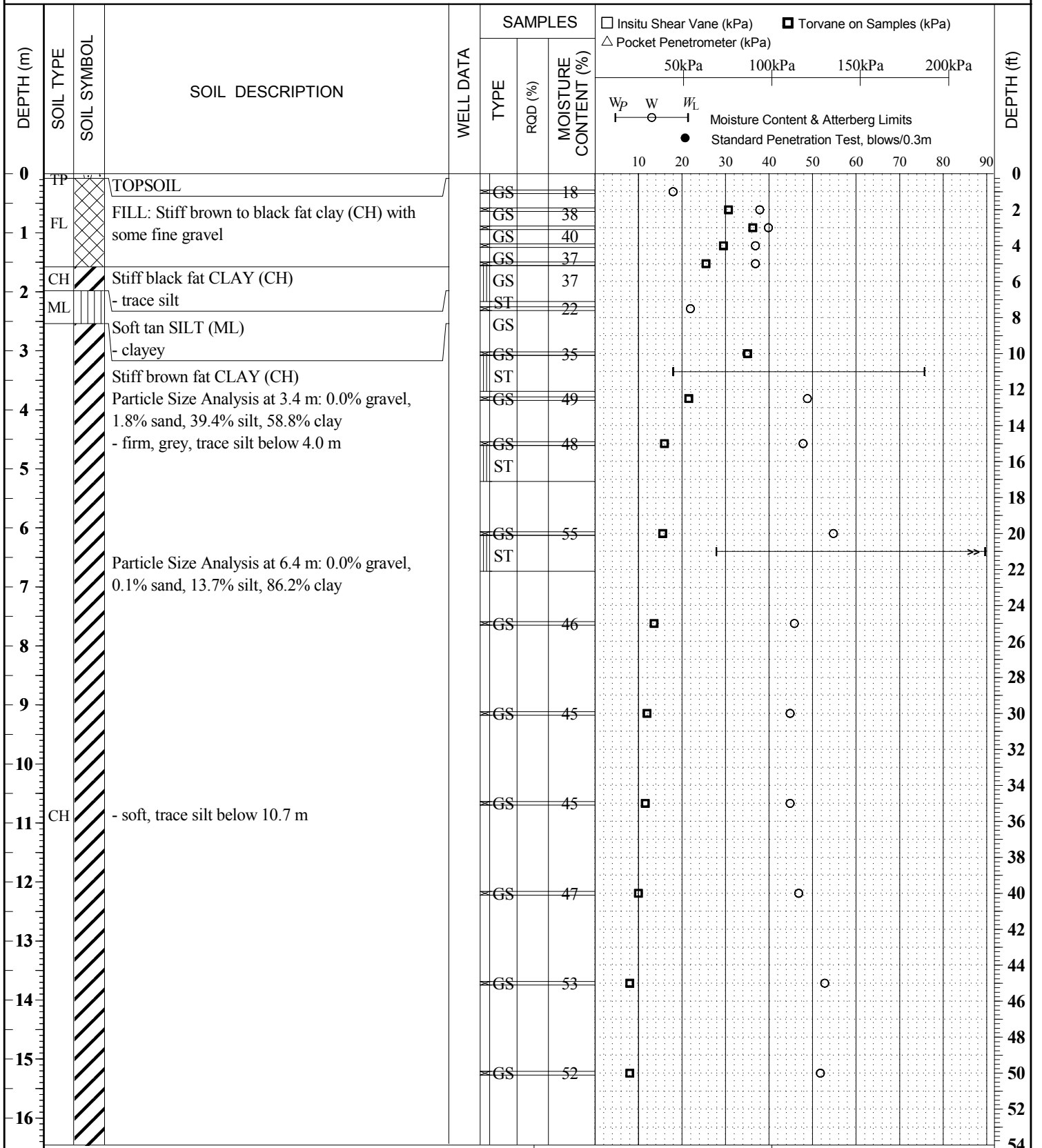
Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH13 TESTHOLE RECORD

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535288
 LOCATION Winnipeg, Manitoba ELEVATION 231.32 m EASTING 635203
 DRILLING DATE October 11, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: ■ Bentonite [Cross-hatch] Drill Cuttings [Dotted] Sand [Diagonal lines] Slough [Cross-hatch]

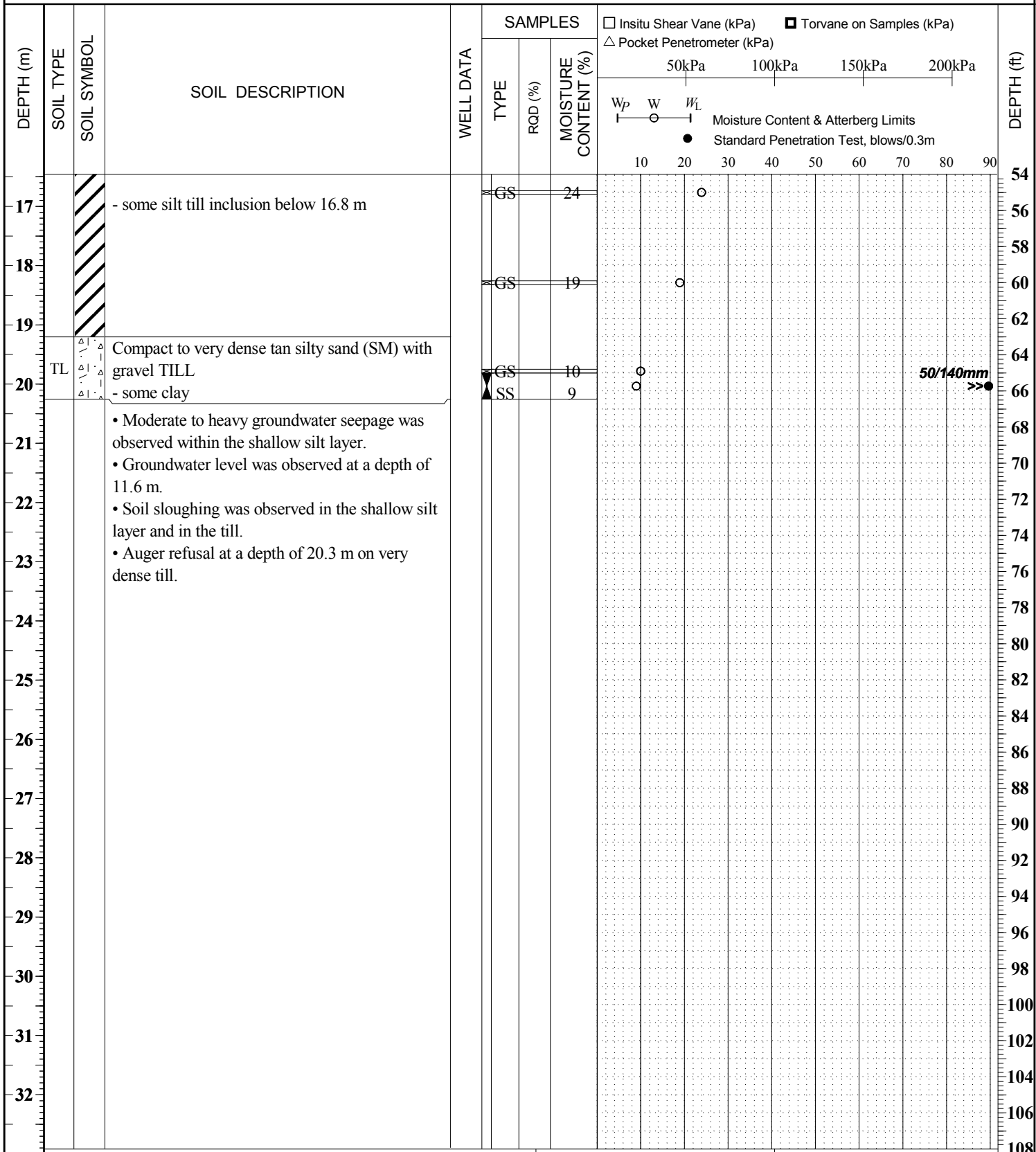
Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH13 TESTHOLE RECORD

cont'd

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535288
 LOCATION Winnipeg, Manitoba ELEVATION 231.32 m EASTING 635203
 DRILLING DATE October 11, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



50/140mm >>>

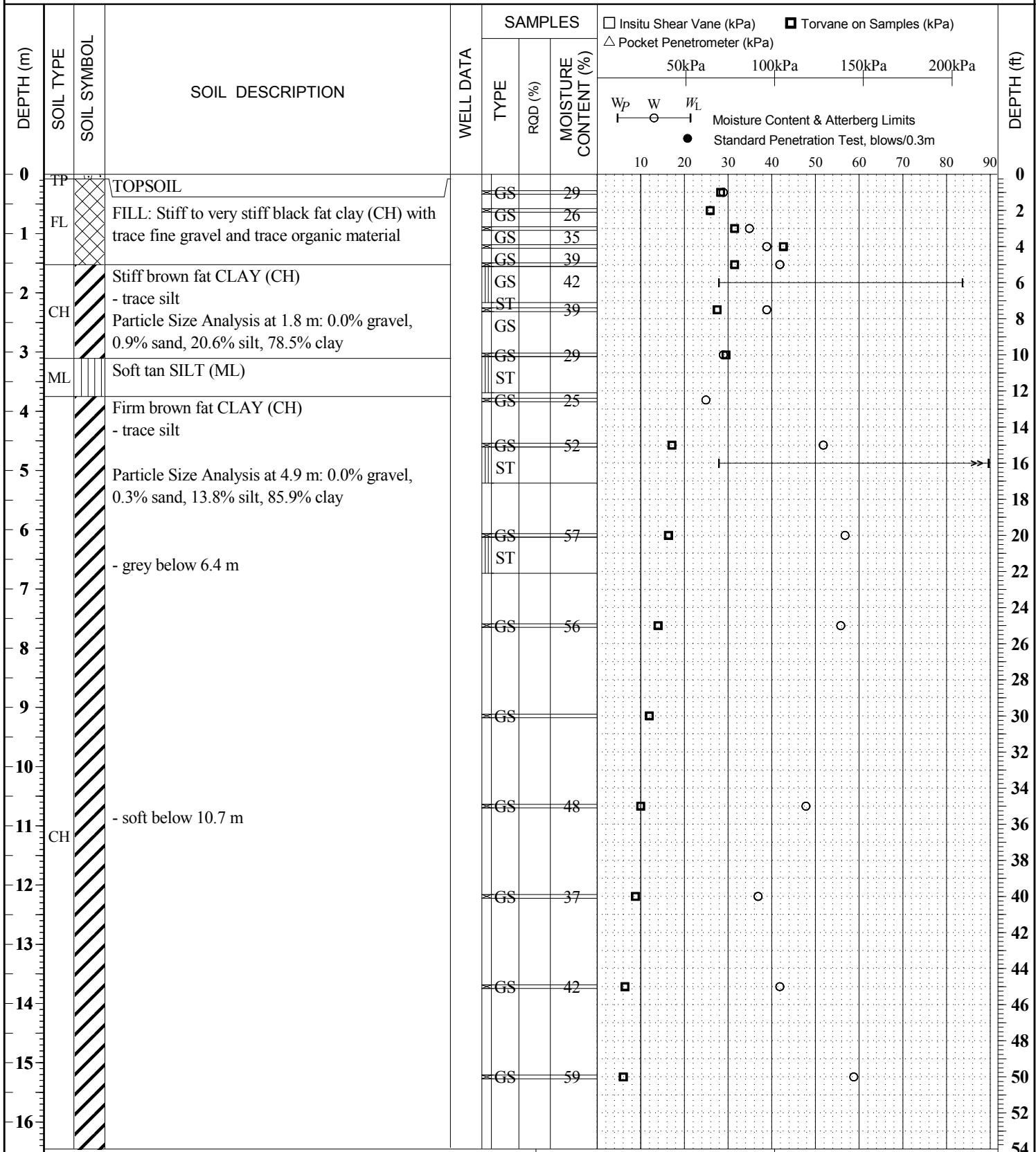
Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH14 TESTHOLE RECORD

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535209.871
 LOCATION Winnipeg, Manitoba ELEVATION 231.73 m EASTING 635202.526
 DRILLING DATE September 22, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: ■ Bentonite ⊠ Drill Cuttings □ Sand ⊞ Slough

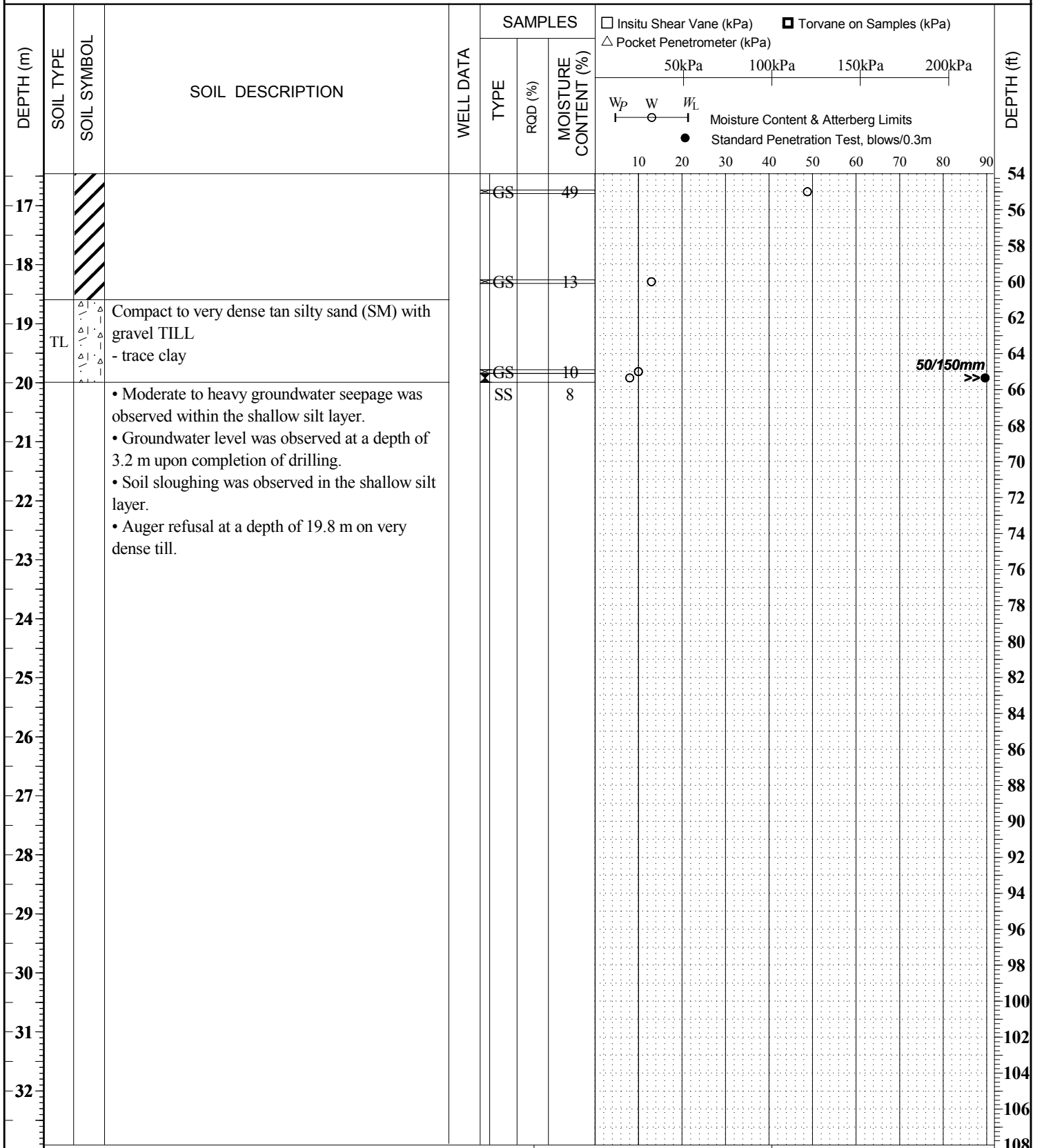
Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH14 TESTHOLE RECORD

cont'd

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535209.871
 LOCATION Winnipeg, Manitoba ELEVATION 231.73 m EASTING 635202.526
 DRILLING DATE September 22, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



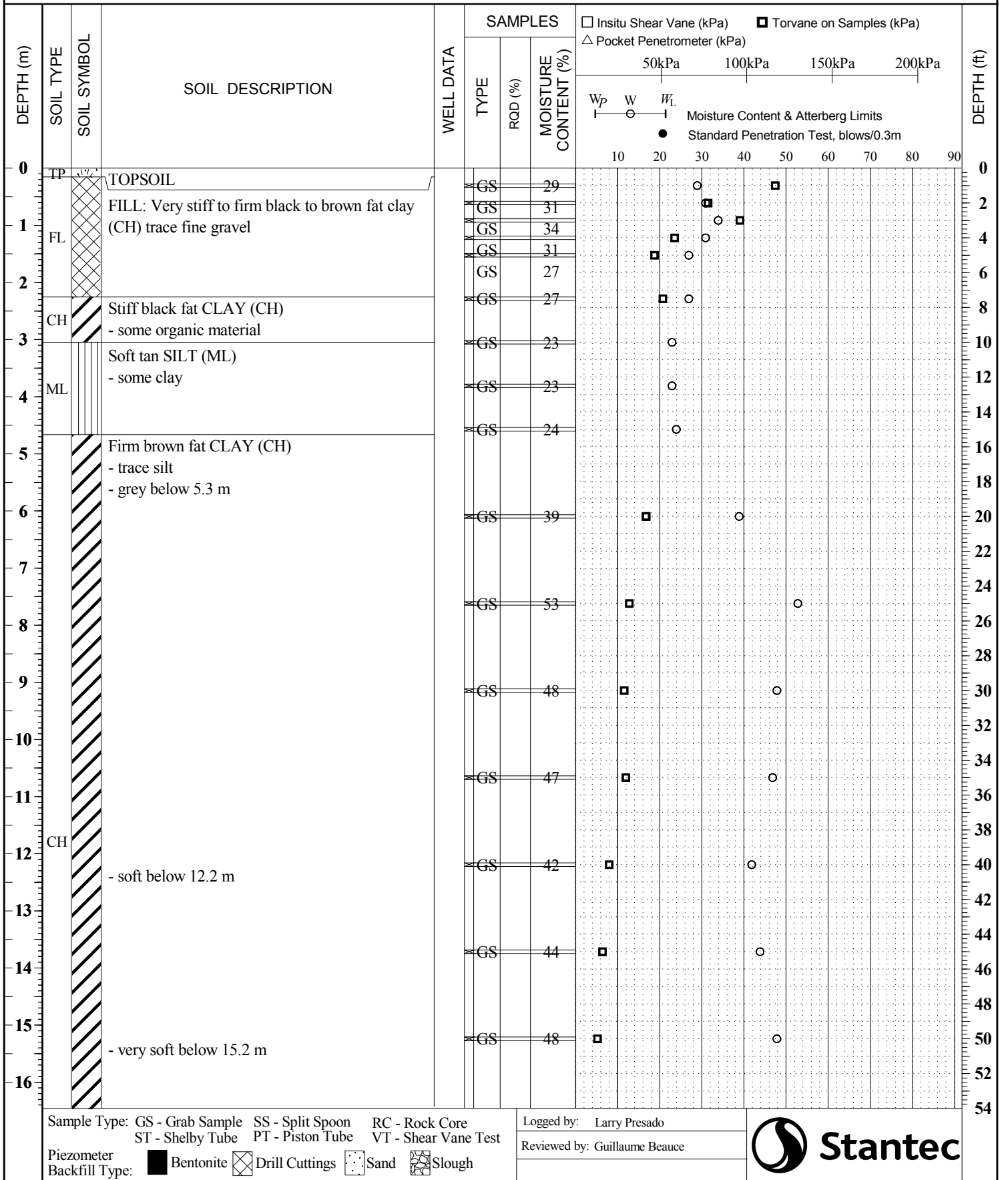
Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH15 TESTHOLE RECORD

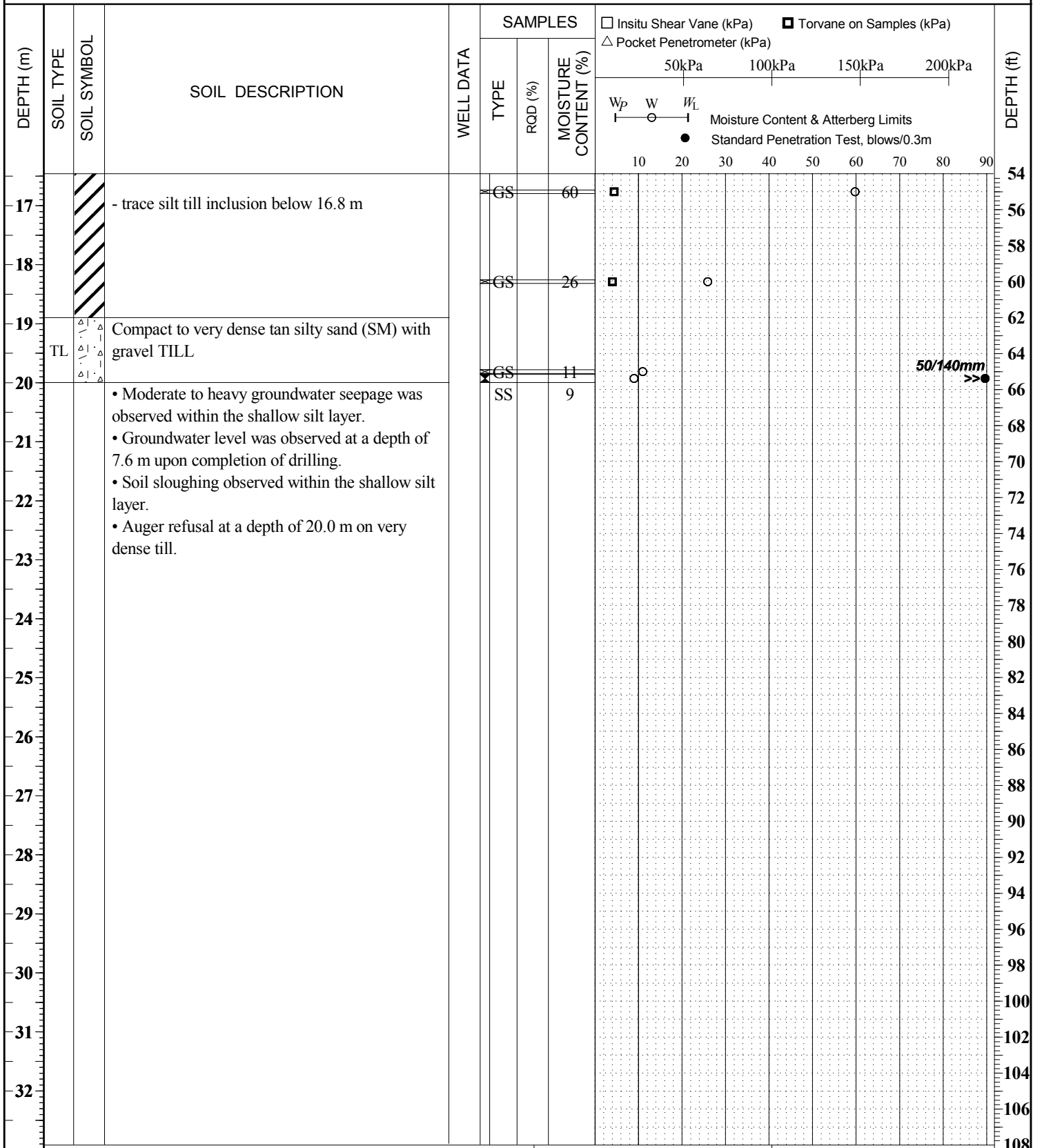
CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535294.543
 LOCATION Winnipeg, Manitoba ELEVATION 232.18 m EASTING 635340.298
 DRILLING DATE September 21, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



TH15 TESTHOLE RECORD

cont'd

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535294.543
 LOCATION Winnipeg, Manitoba ELEVATION 232.18 m EASTING 635340.298
 DRILLING DATE September 21, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



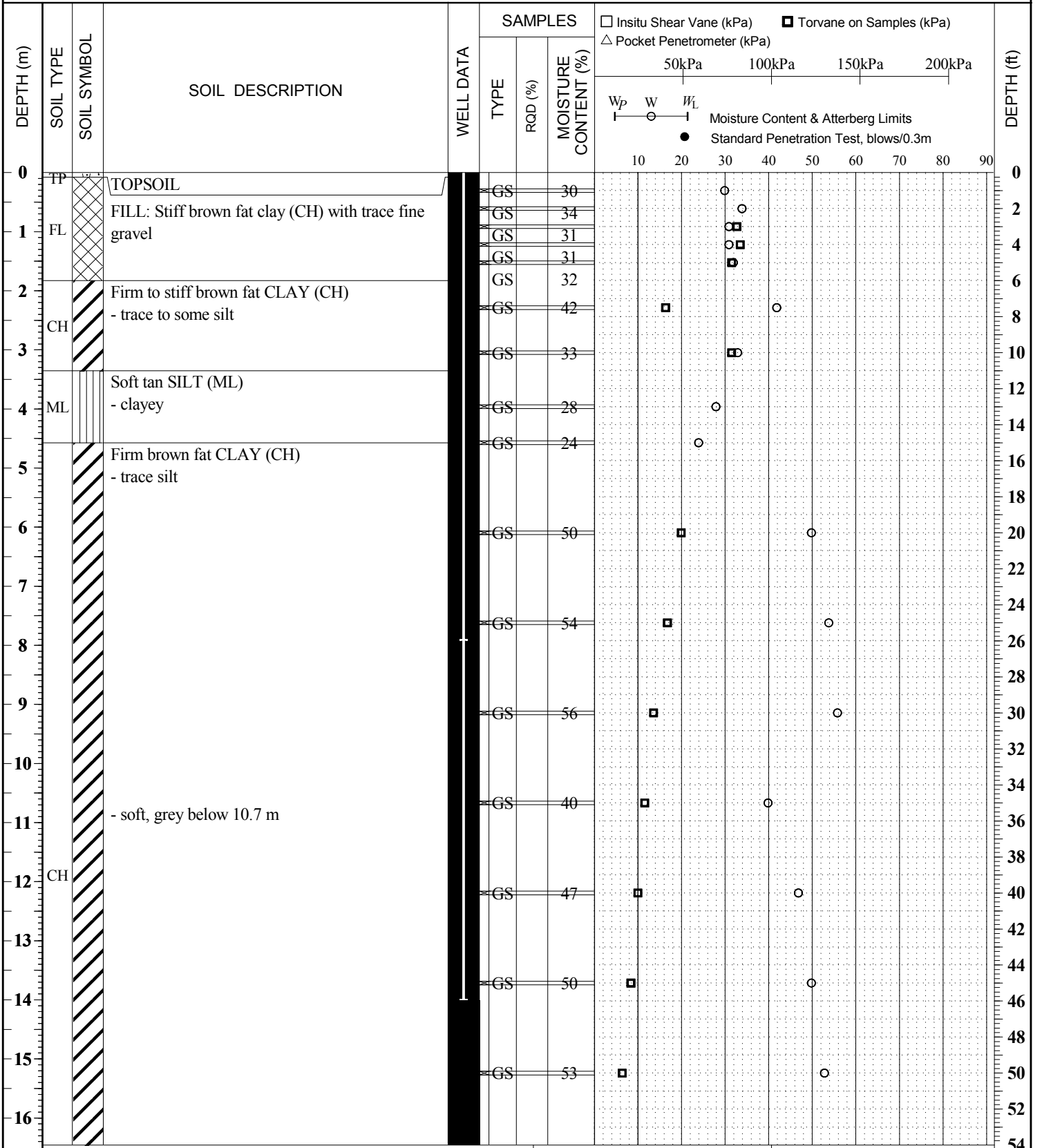
Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: ■ Bentonite ⊠ Drill Cuttings □ Sand ⊞ Slough

Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH16 TESTHOLE RECORD

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535205
 LOCATION Winnipeg, Manitoba ELEVATION 232.32 m EASTING 635252
 DRILLING DATE September 30, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

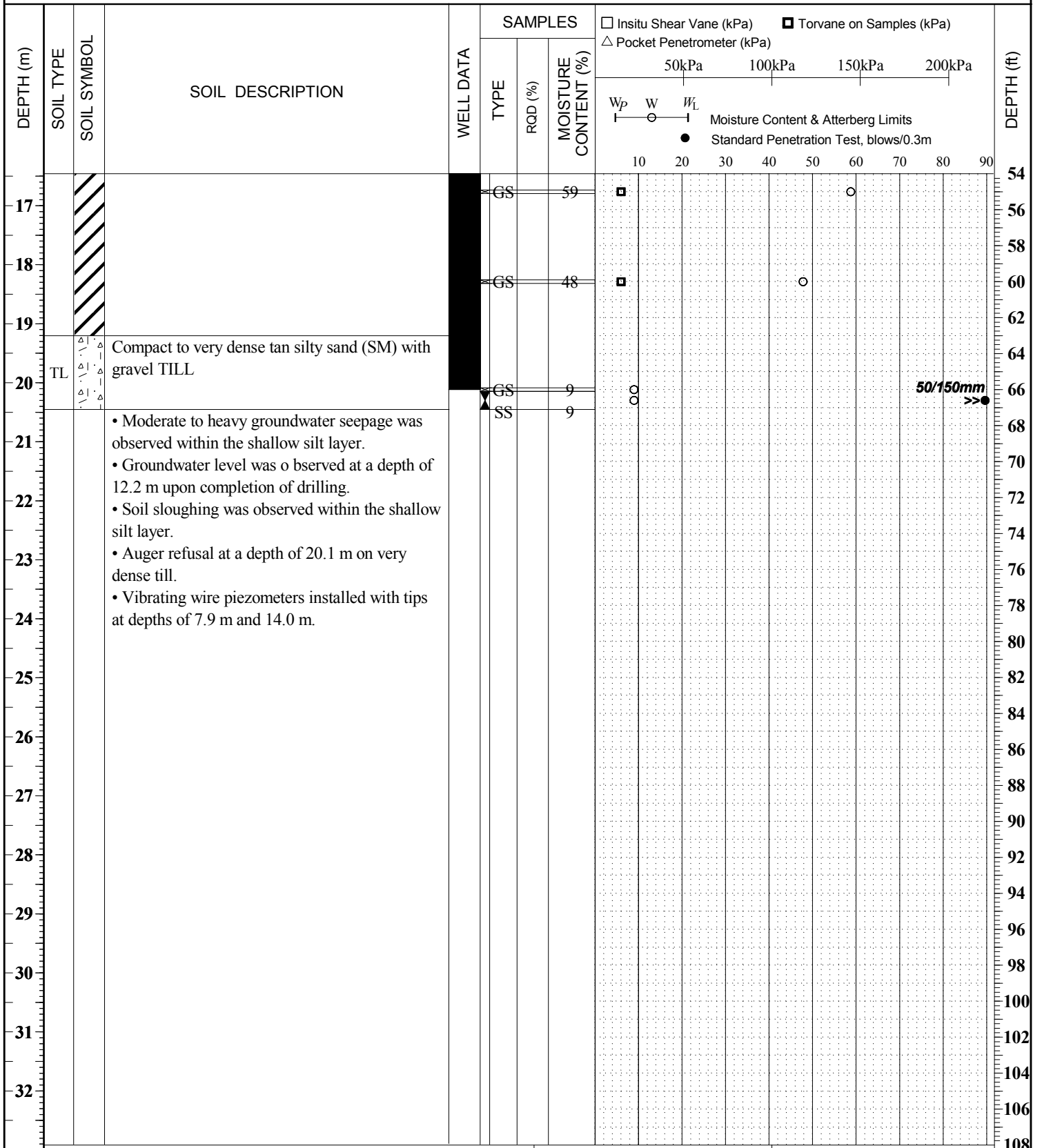
Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH16 TESTHOLE RECORD

cont'd

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535205
 LOCATION Winnipeg, Manitoba ELEVATION 232.32 m EASTING 635252
 DRILLING DATE September 30, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



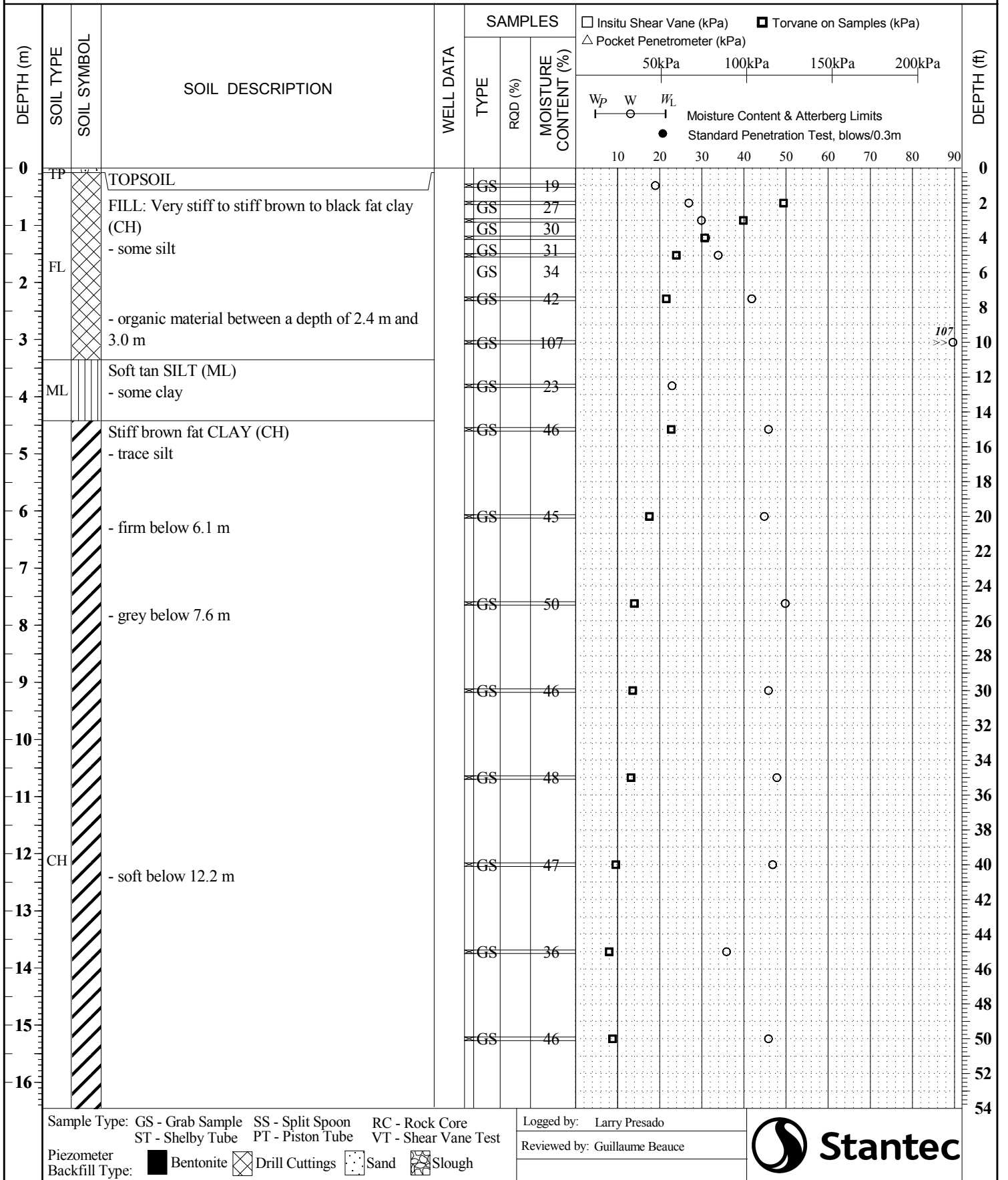
Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH17 TESTHOLE RECORD

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535182
 LOCATION Winnipeg, Manitoba ELEVATION 232.52 m EASTING 635292
 DRILLING DATE September 27, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: ■ Bentonite ⊠ Drill Cuttings □ Sand ⊞ Slough

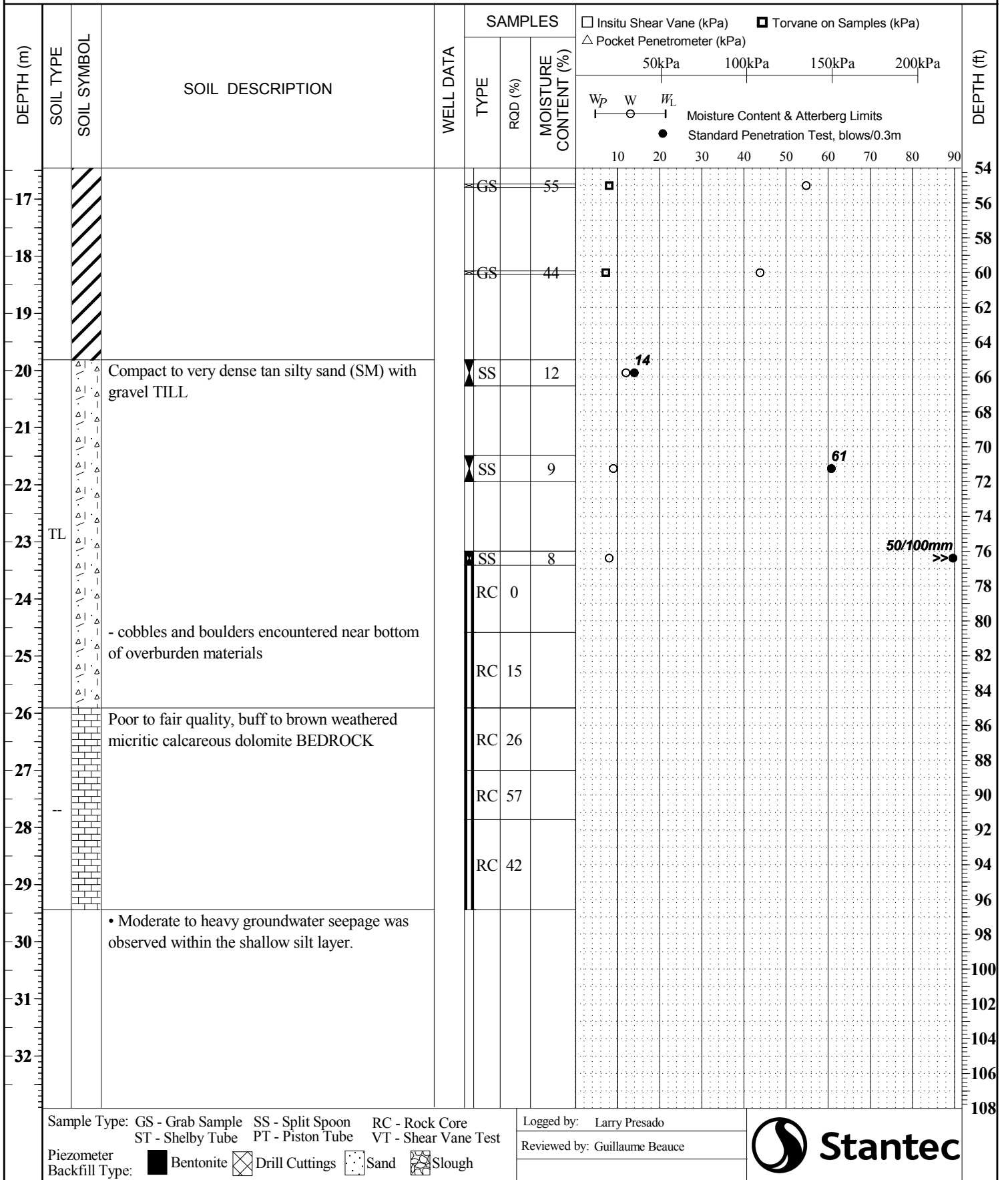
Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH17 TESTHOLE RECORD

cont'd

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535182
 LOCATION Winnipeg, Manitoba ELEVATION 232.52 m EASTING 635292
 DRILLING DATE September 27, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



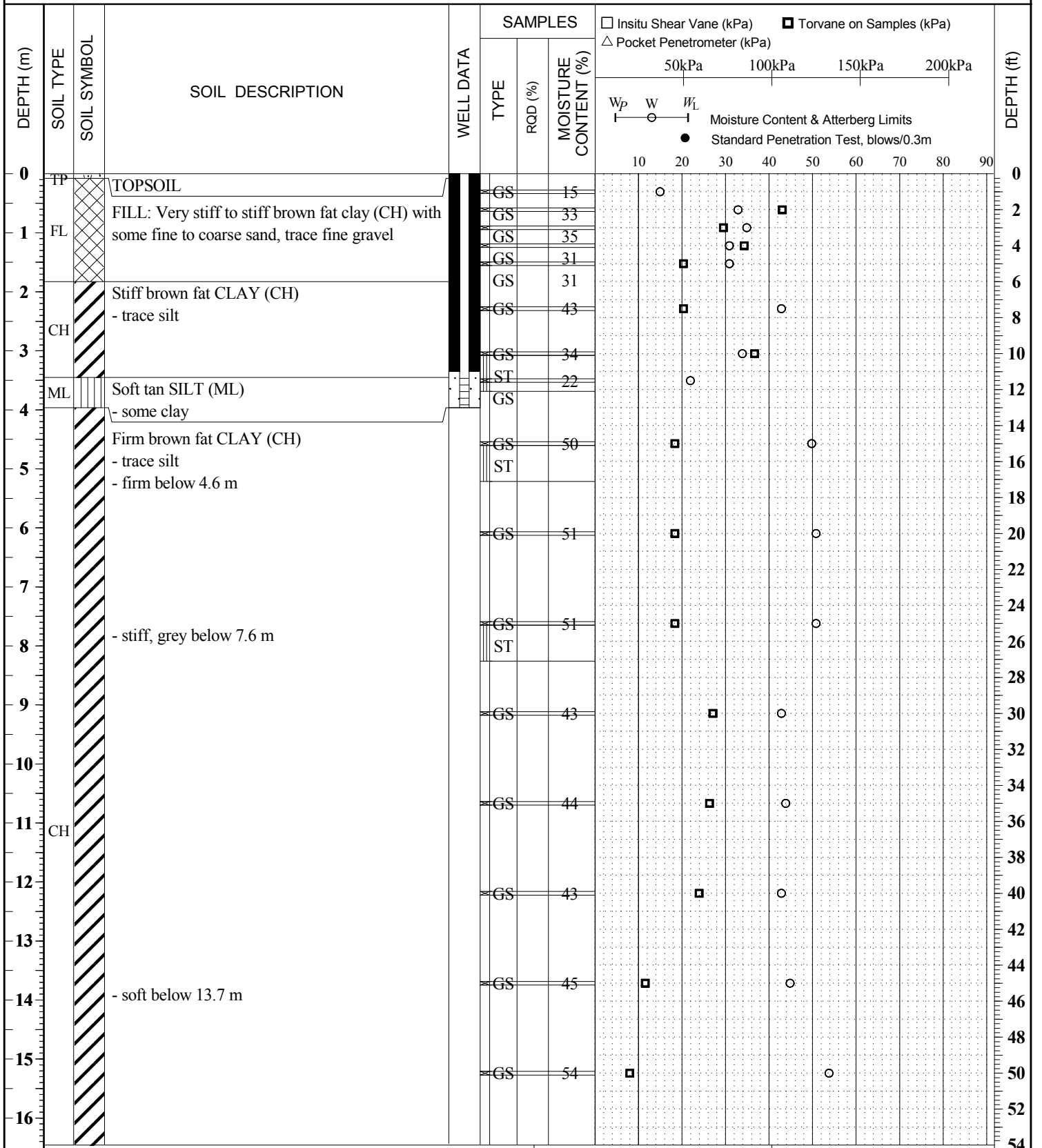
Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: ■ Bentonite ⊠ Drill Cuttings □ Sand ⊞ Slough

Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH18 TESTHOLE RECORD

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535160
 LOCATION Winnipeg, Manitoba ELEVATION 232.01 m EASTING 635334
 DRILLING DATE October 3, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: ■ Bentonite ⊠ Drill Cuttings □ Sand ⊞ Slough

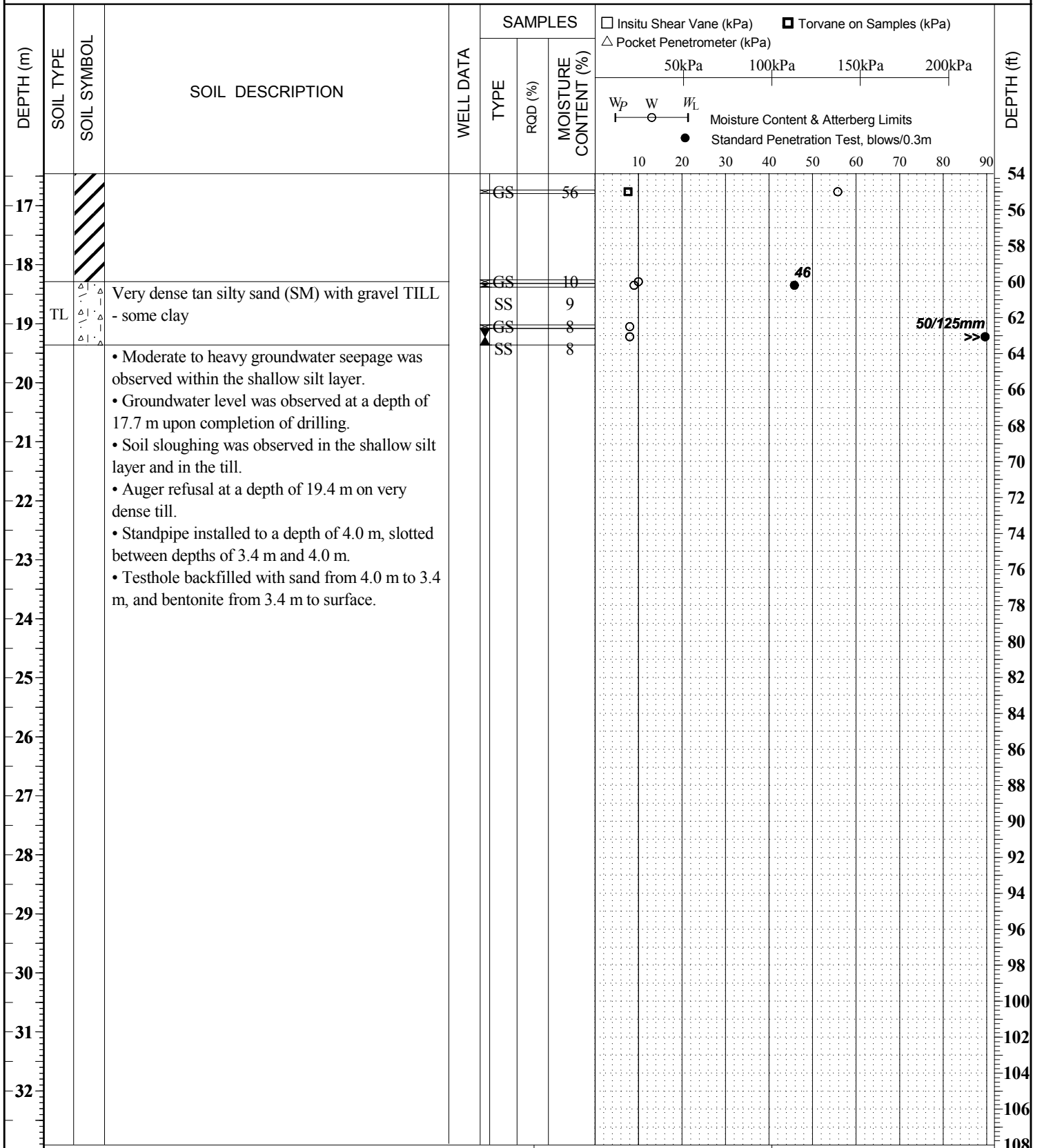
Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH18 TESTHOLE RECORD

cont'd

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535160
 LOCATION Winnipeg, Manitoba ELEVATION 232.01 m EASTING 635334
 DRILLING DATE October 3, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



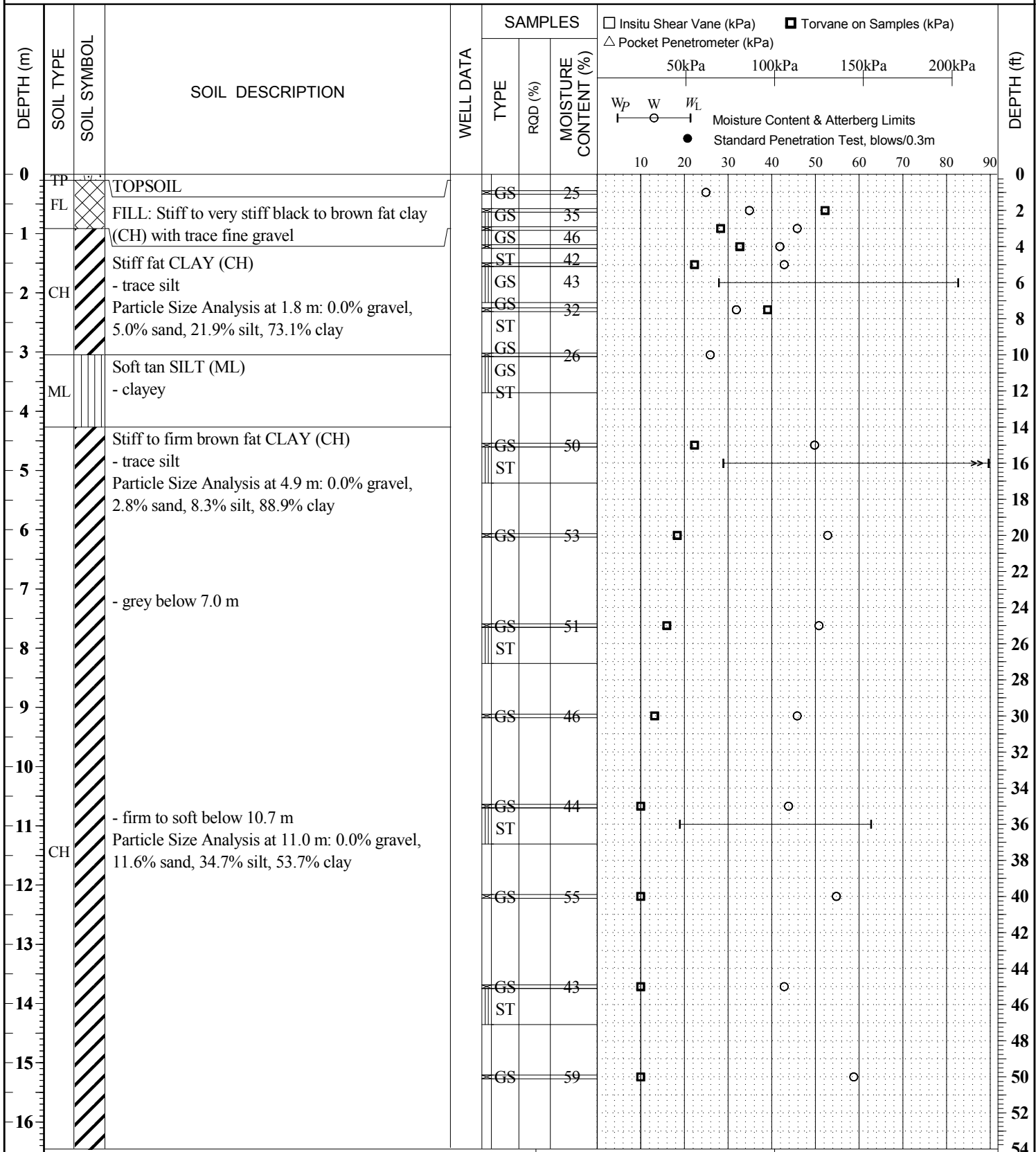
Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH19 TESTHOLE RECORD

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535147.021
 LOCATION Winnipeg, Manitoba ELEVATION 231.15 m EASTING 635377.014
 DRILLING DATE September 21, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: ■ Bentonite ⊠ Drill Cuttings □ Sand ⊞ Slough

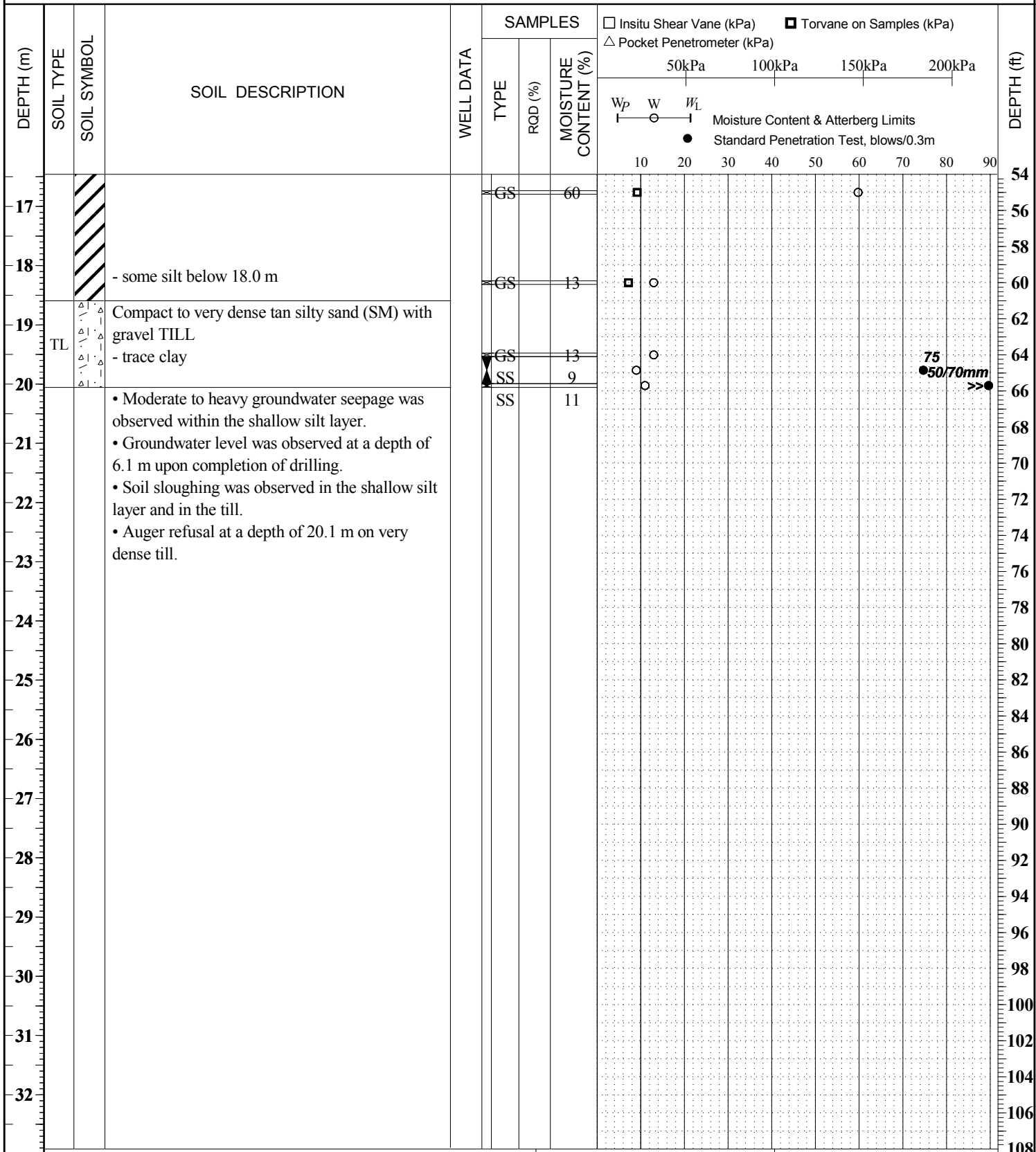
Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH19 TESTHOLE RECORD

cont'd

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535147.021
 LOCATION Winnipeg, Manitoba ELEVATION 231.15 m EASTING 635377.014
 DRILLING DATE September 21, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



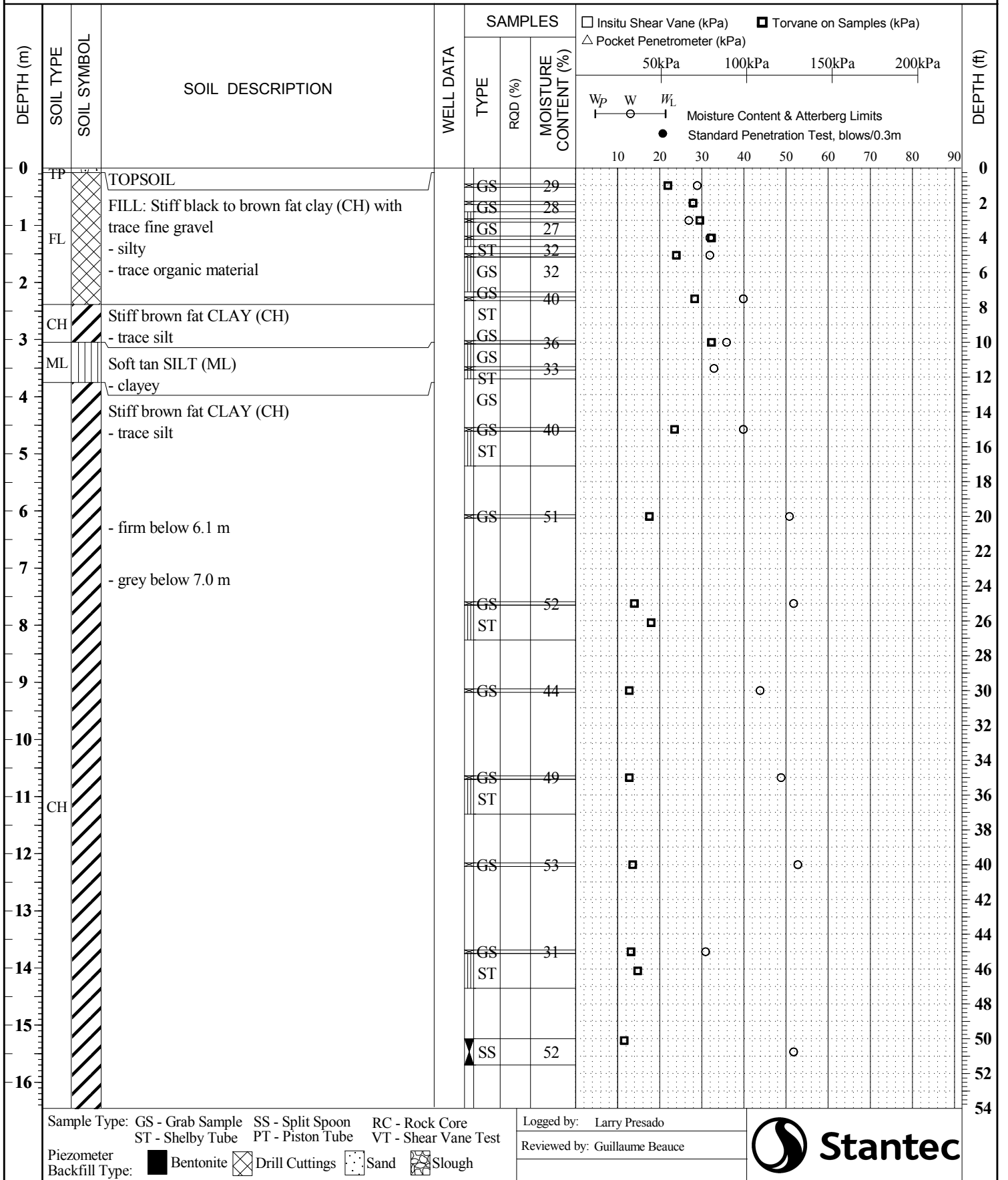
Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH20 TESTHOLE RECORD

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535147.011
 LOCATION Winnipeg, Manitoba ELEVATION 232.04 m EASTING 635221.993
 DRILLING DATE September 23, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: ■ Bentonite ⊠ Drill Cuttings □ Sand ⊞ Slough

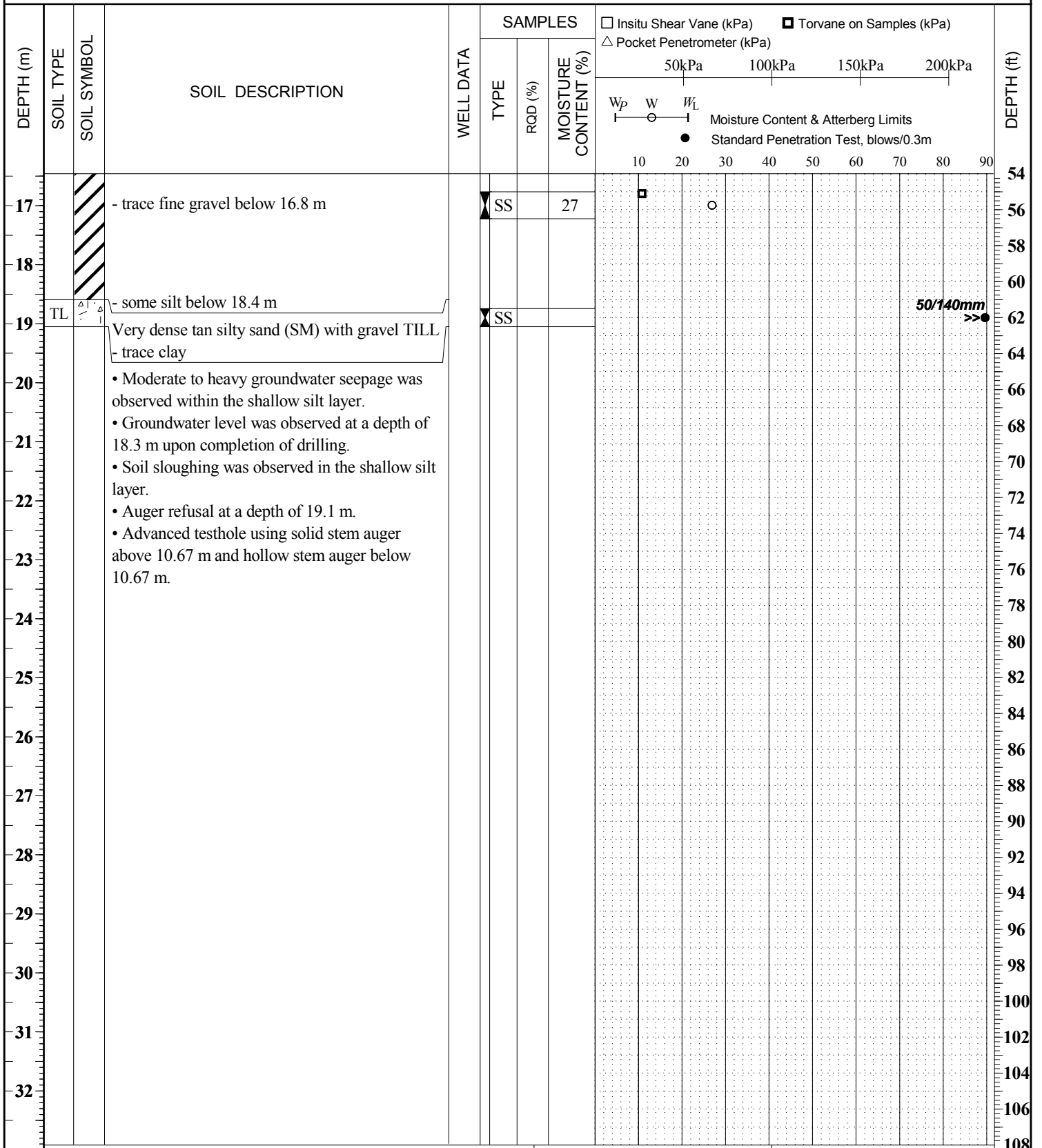
Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH20 TESTHOLE RECORD

cont'd

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535147.011
 LOCATION Winnipeg, Manitoba ELEVATION 232.04 m EASTING 635221.993
 DRILLING DATE September 23, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



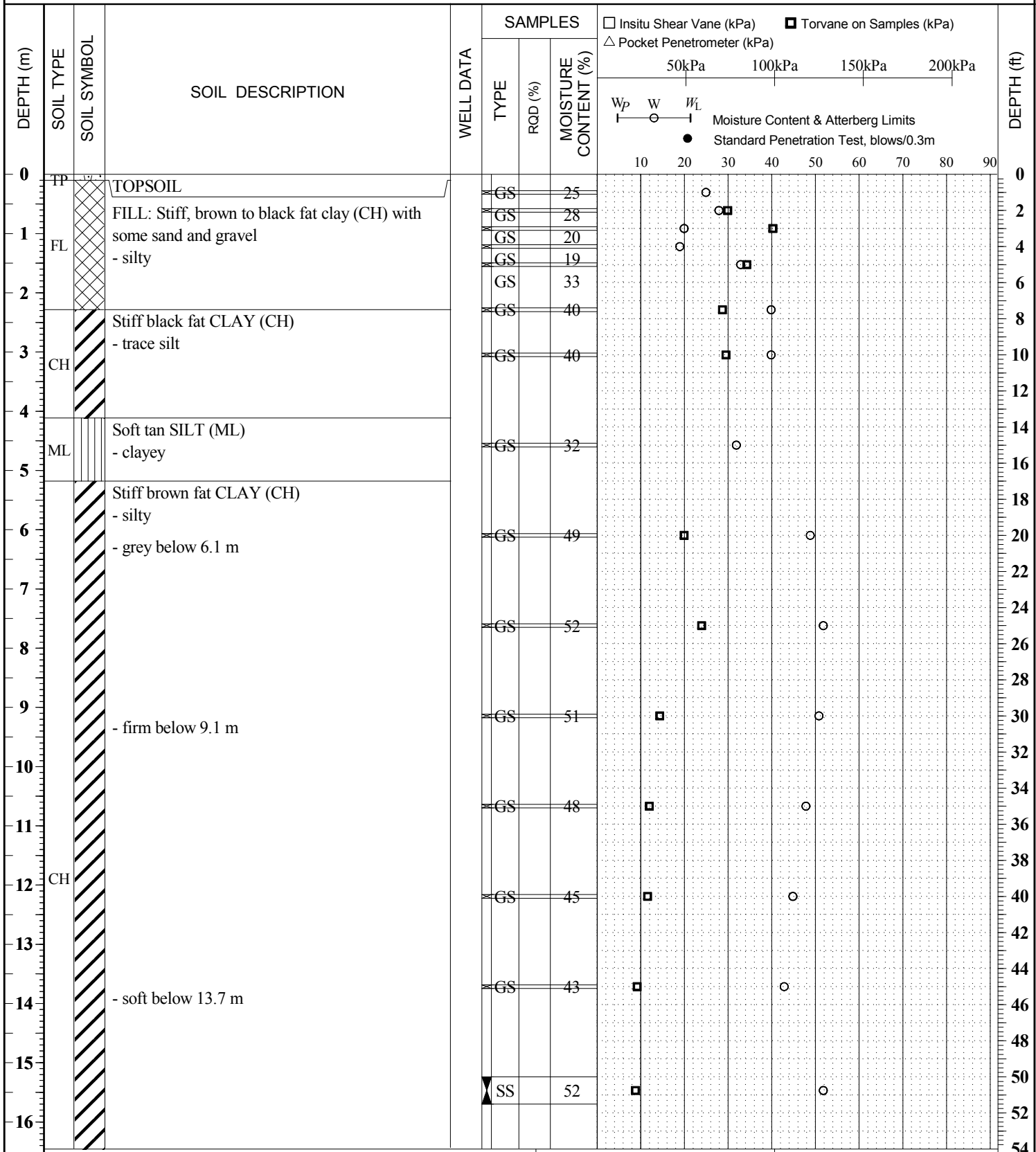
Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH21 TESTHOLE RECORD

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535117.956
 LOCATION Winnipeg, Manitoba ELEVATION 232.34 m EASTING 635258.987
 DRILLING DATE September 23, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: ■ Bentonite ⊠ Drill Cuttings □ Sand ⊞ Slough

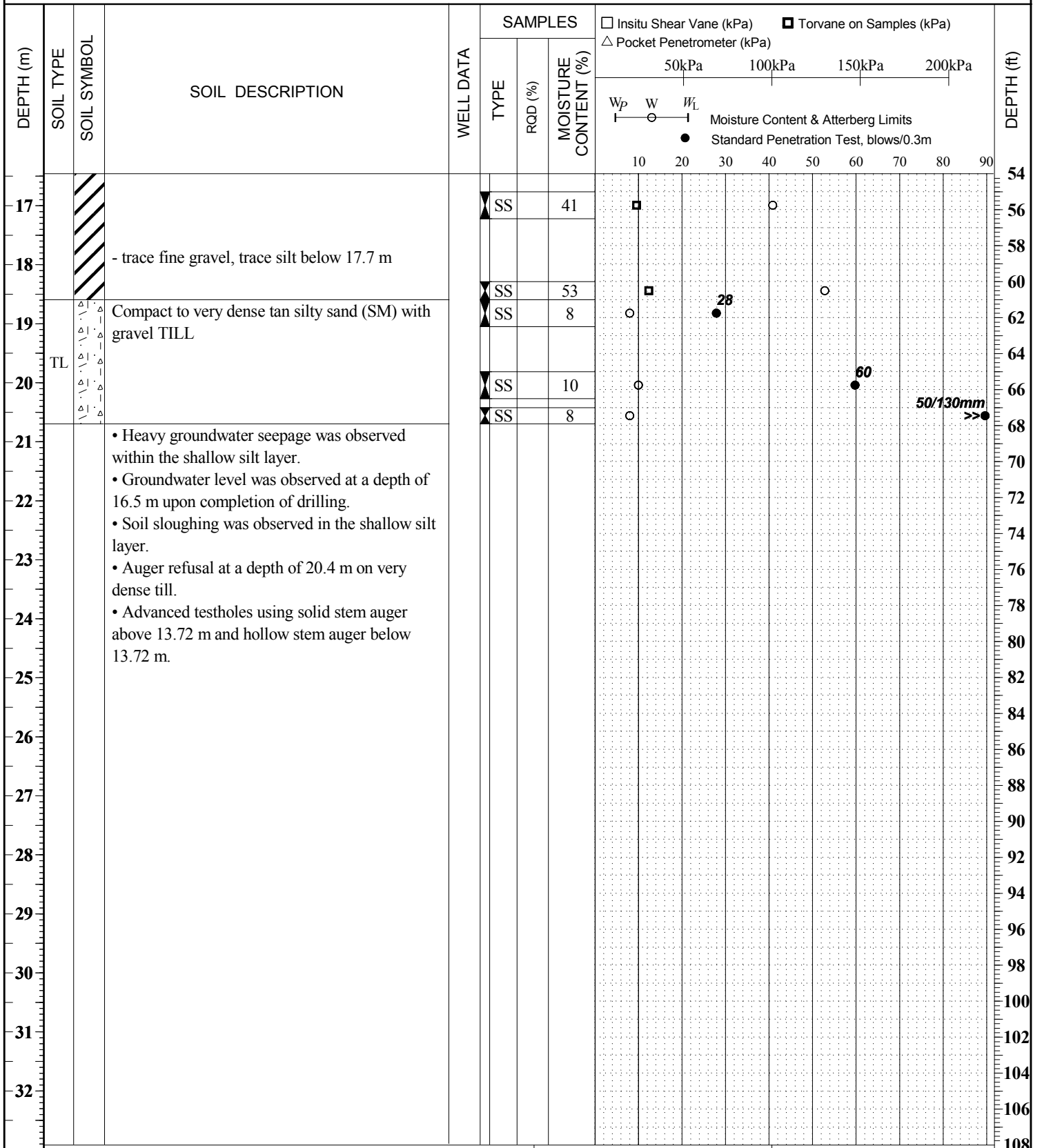
Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH21 TESTHOLE RECORD

cont'd

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535117.956
 LOCATION Winnipeg, Manitoba ELEVATION 232.34 m EASTING 635258.987
 DRILLING DATE September 23, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



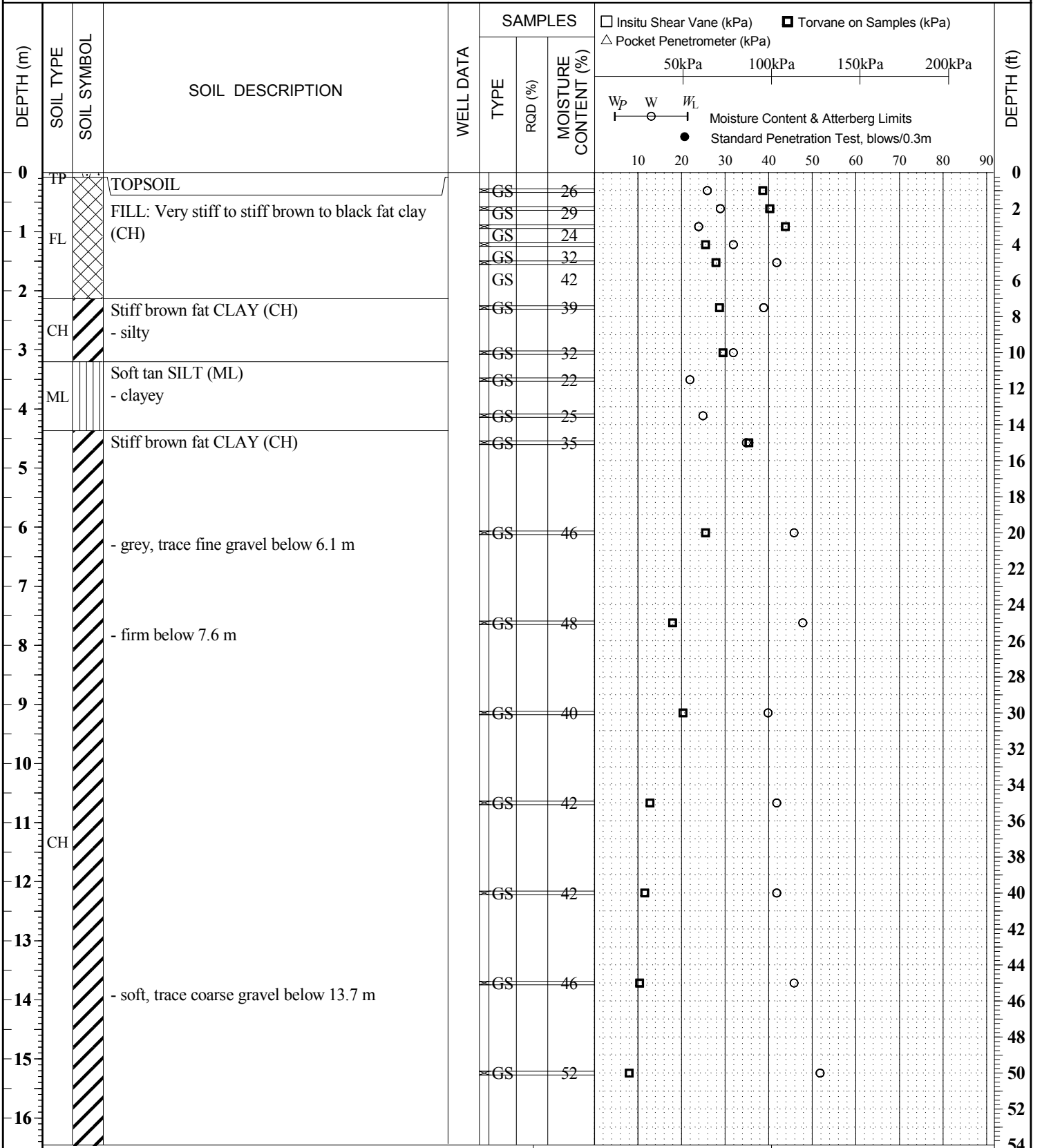
Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH22 TESTHOLE RECORD

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535092.945
 LOCATION Winnipeg, Manitoba ELEVATION 232.07 m EASTING 635300.956
 DRILLING DATE September 26, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: ■ Bentonite ☒ Drill Cuttings □ Sand ☒ Slough

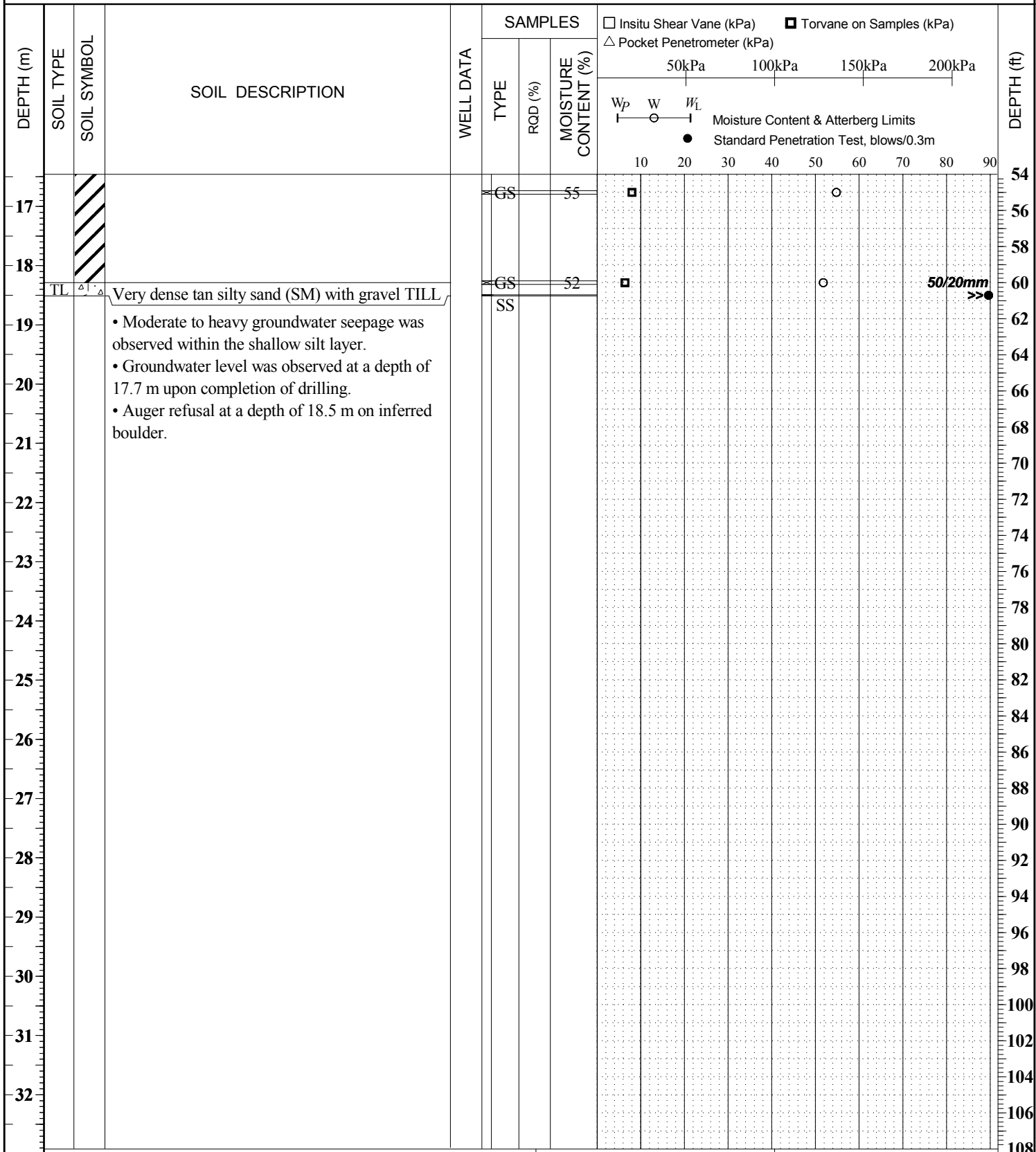
Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH22 TESTHOLE RECORD

cont'd

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535092.945
 LOCATION Winnipeg, Manitoba ELEVATION 232.07 m EASTING 635300.956
 DRILLING DATE September 26, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



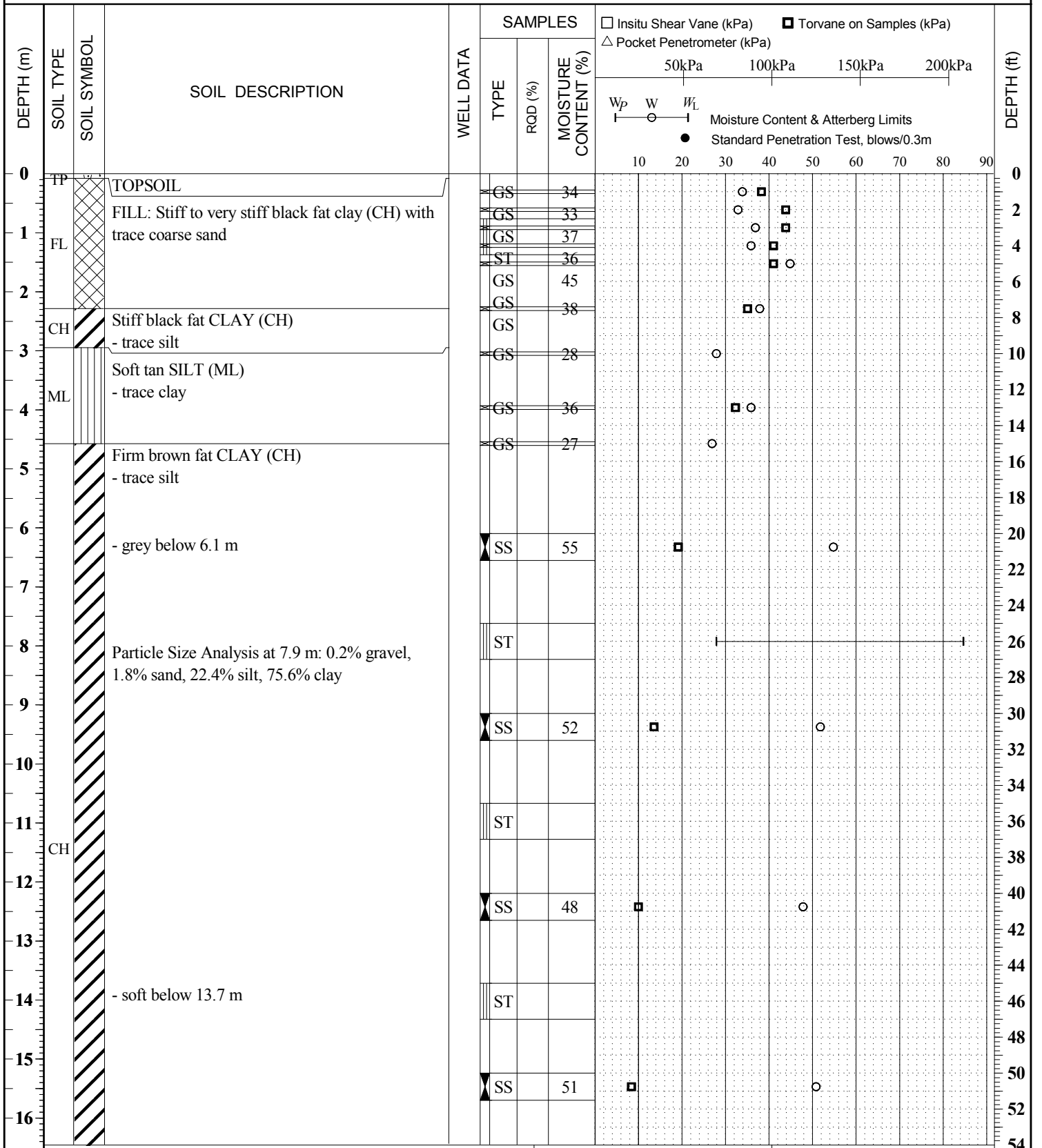
Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH23 TESTHOLE RECORD

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535077.997
 LOCATION Winnipeg, Manitoba ELEVATION 231.95 m EASTING 635344.98
 DRILLING DATE September 26, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: ■ Bentonite ⊠ Drill Cuttings □ Sand ⊞ Slough

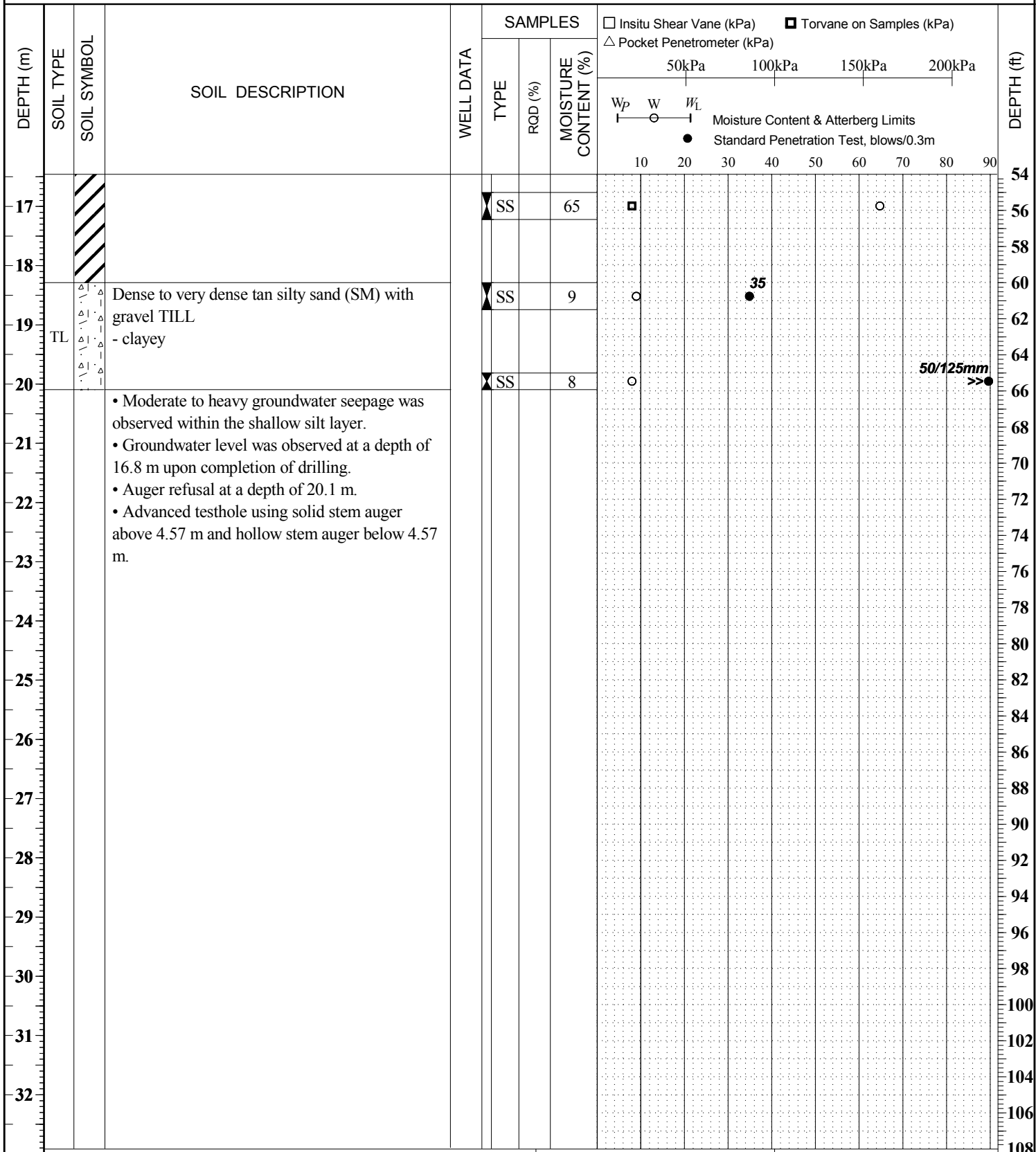
Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH23 TESTHOLE RECORD

cont'd

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535077.997
 LOCATION Winnipeg, Manitoba ELEVATION 231.95 m EASTING 635344.98
 DRILLING DATE September 26, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



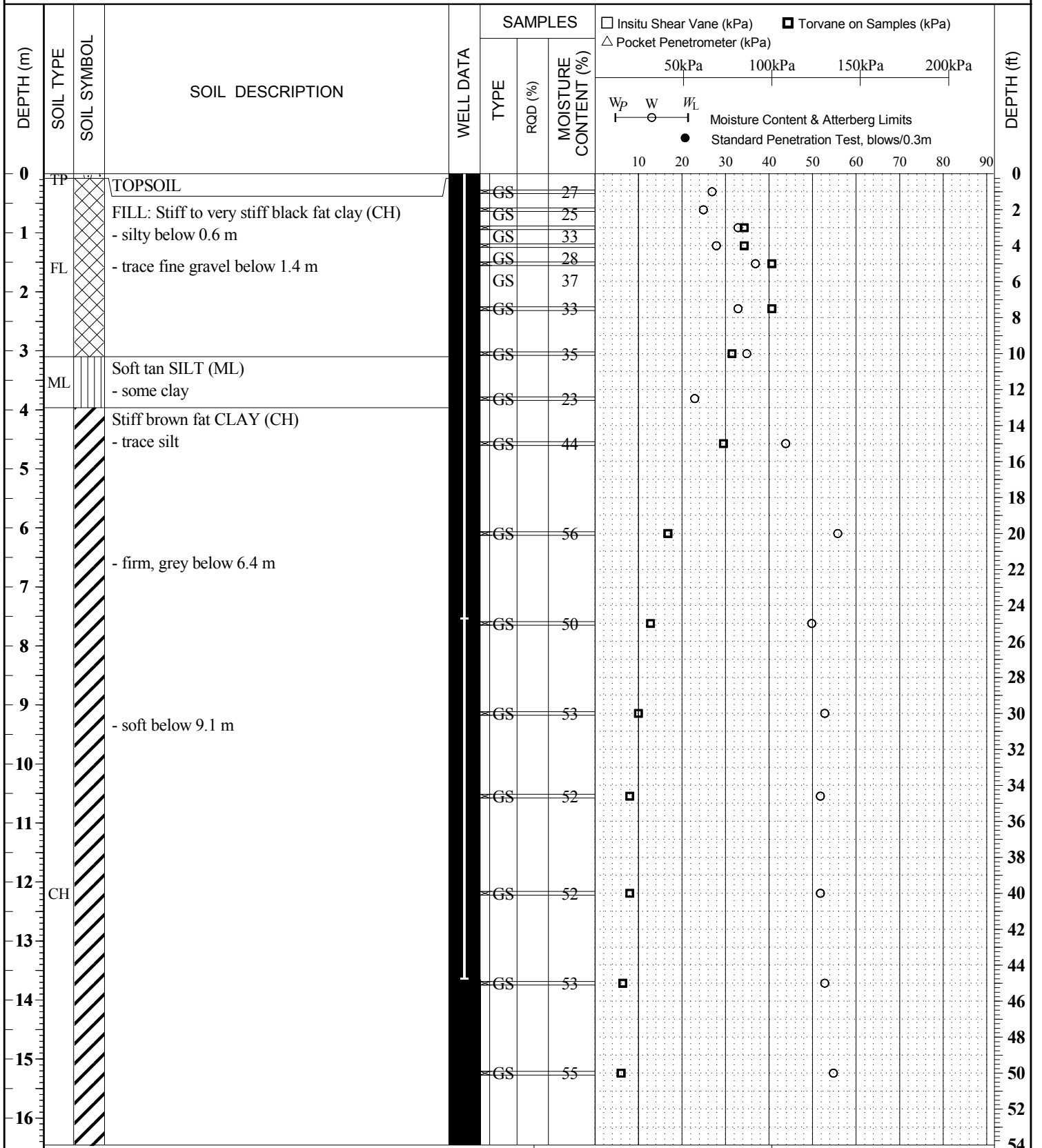
Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH24 TESTHOLE RECORD

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535125
 LOCATION Winnipeg, Manitoba ELEVATION 230.89 m EASTING 635737
 DRILLING DATE September 30, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

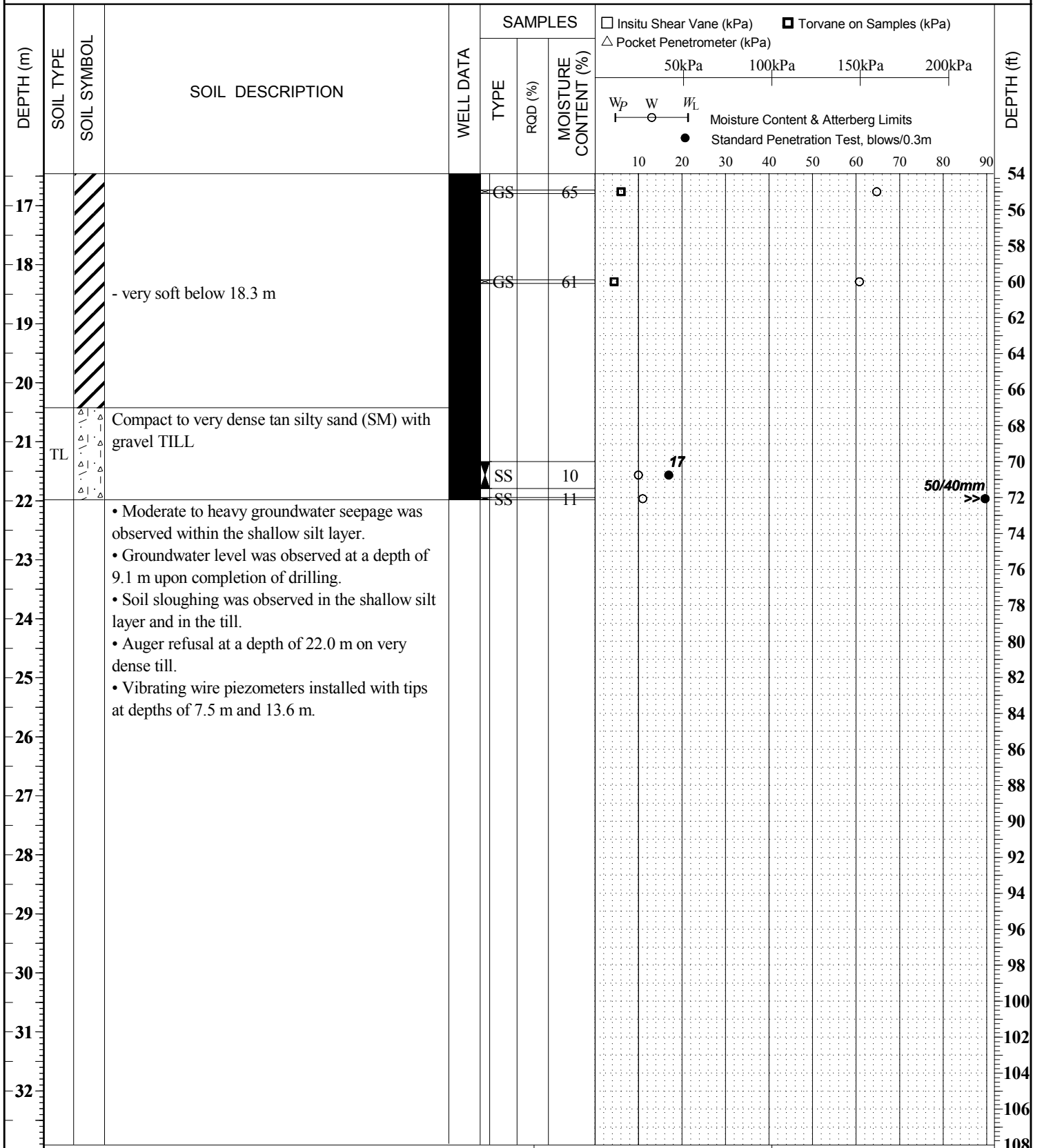
Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH24 TESTHOLE RECORD

cont'd

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535125
 LOCATION Winnipeg, Manitoba ELEVATION 230.89 m EASTING 635737
 DRILLING DATE September 30, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



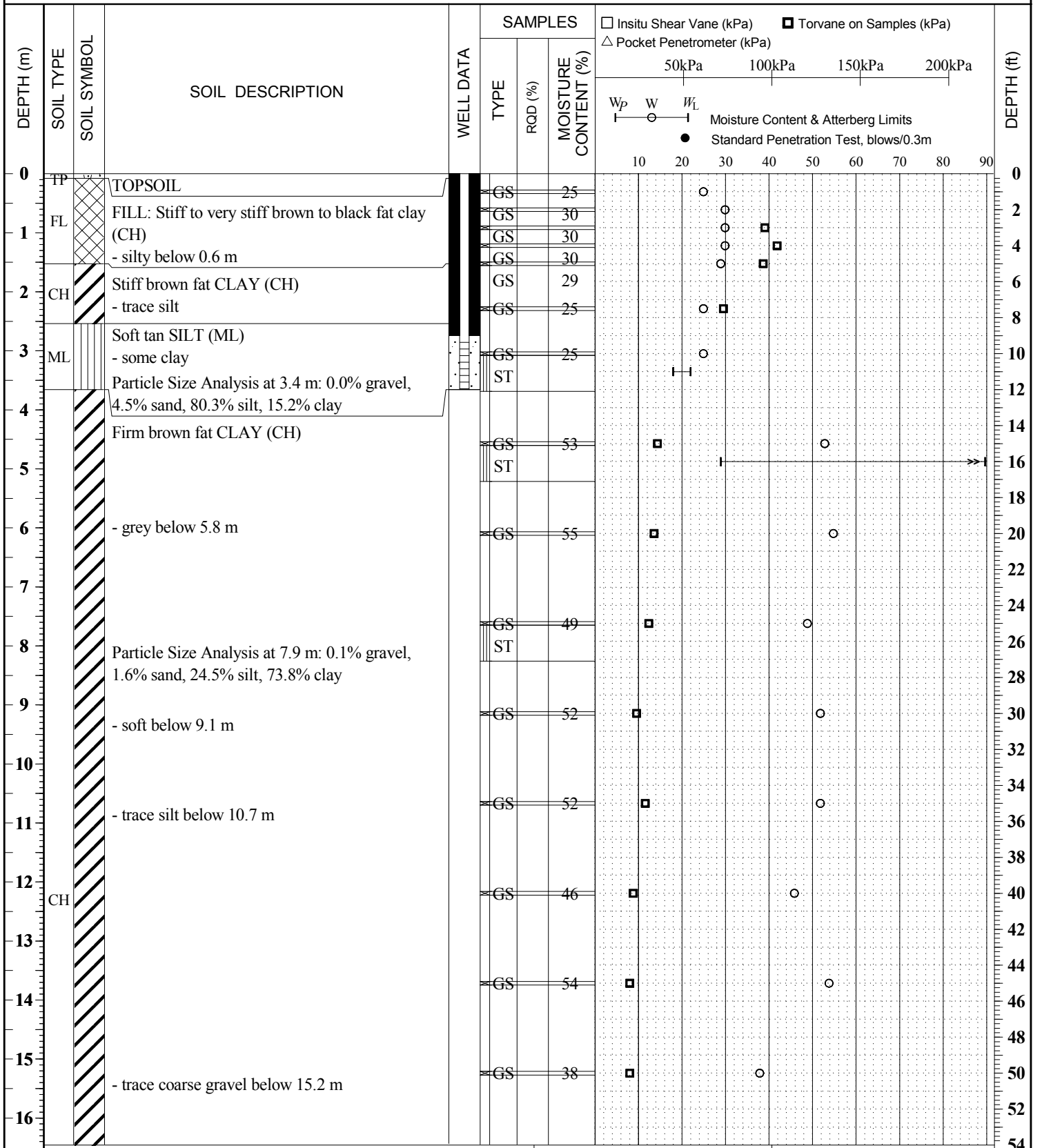
Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH25 TESTHOLE RECORD

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535076
 LOCATION Winnipeg, Manitoba ELEVATION 230.97 m EASTING 635837
 DRILLING DATE October 3, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: [Solid] Bentonite [Cross-hatch] Drill Cuttings [Dotted] Sand [Diagonal lines] Slough

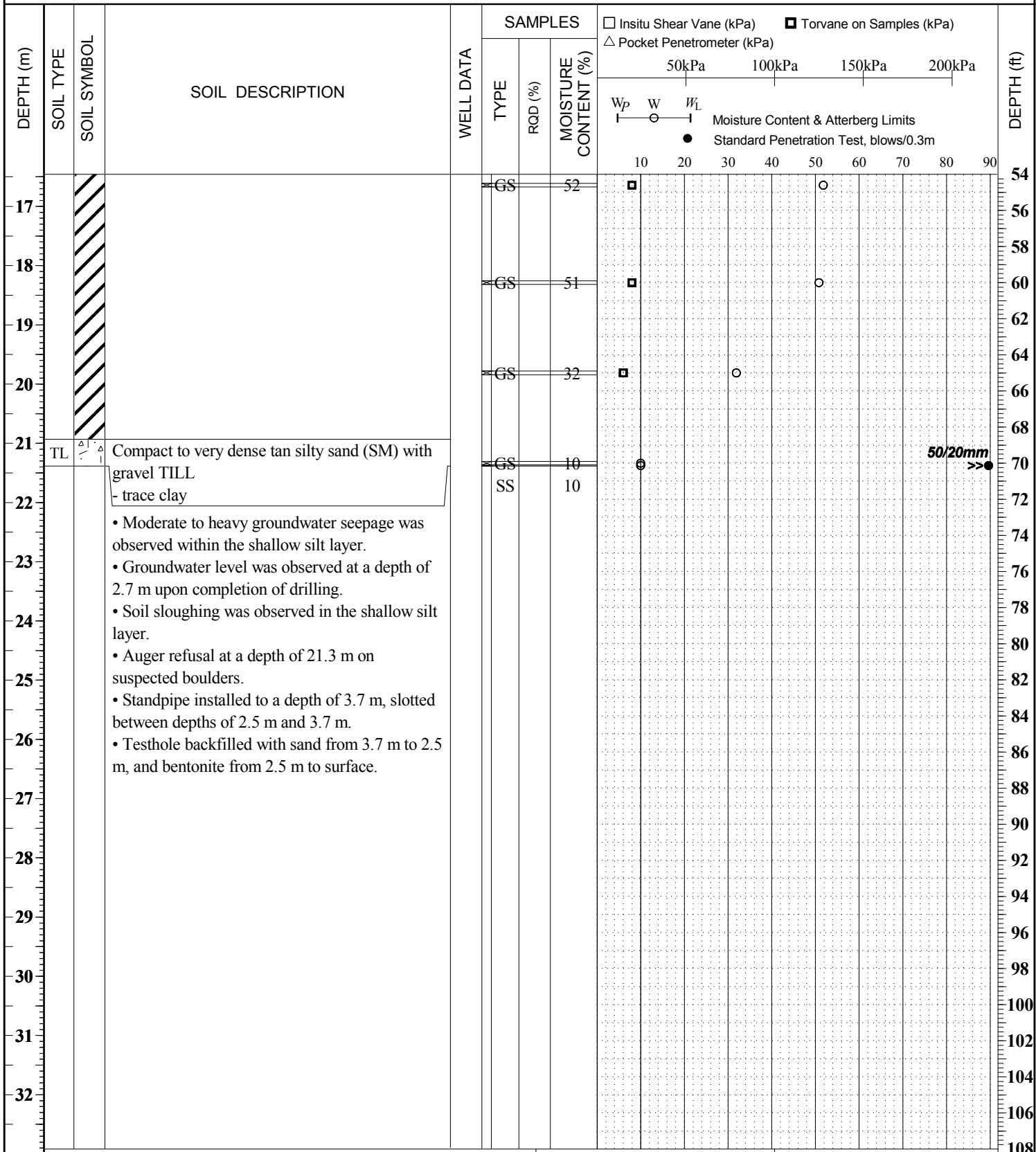
Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH25 TESTHOLE RECORD

cont'd

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535076
 LOCATION Winnipeg, Manitoba ELEVATION 230.97 m EASTING 635837
 DRILLING DATE October 3, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



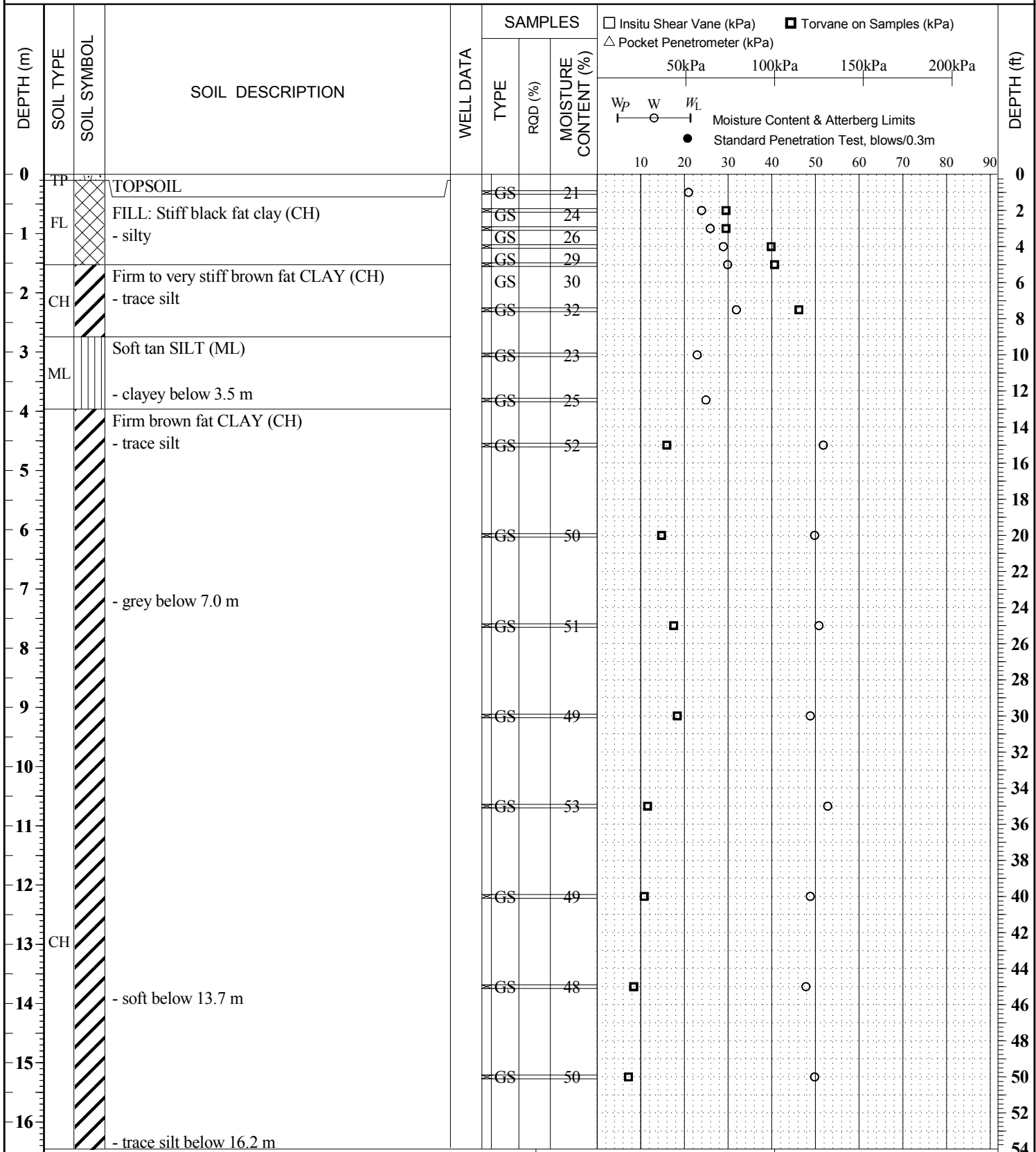
Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH26 TESTHOLE RECORD

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535043.984
 LOCATION Winnipeg, Manitoba ELEVATION 230.91 m EASTING 635905.996
 DRILLING DATE September 21, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: ■ Bentonite ⊠ Drill Cuttings □ Sand ⊞ Slough

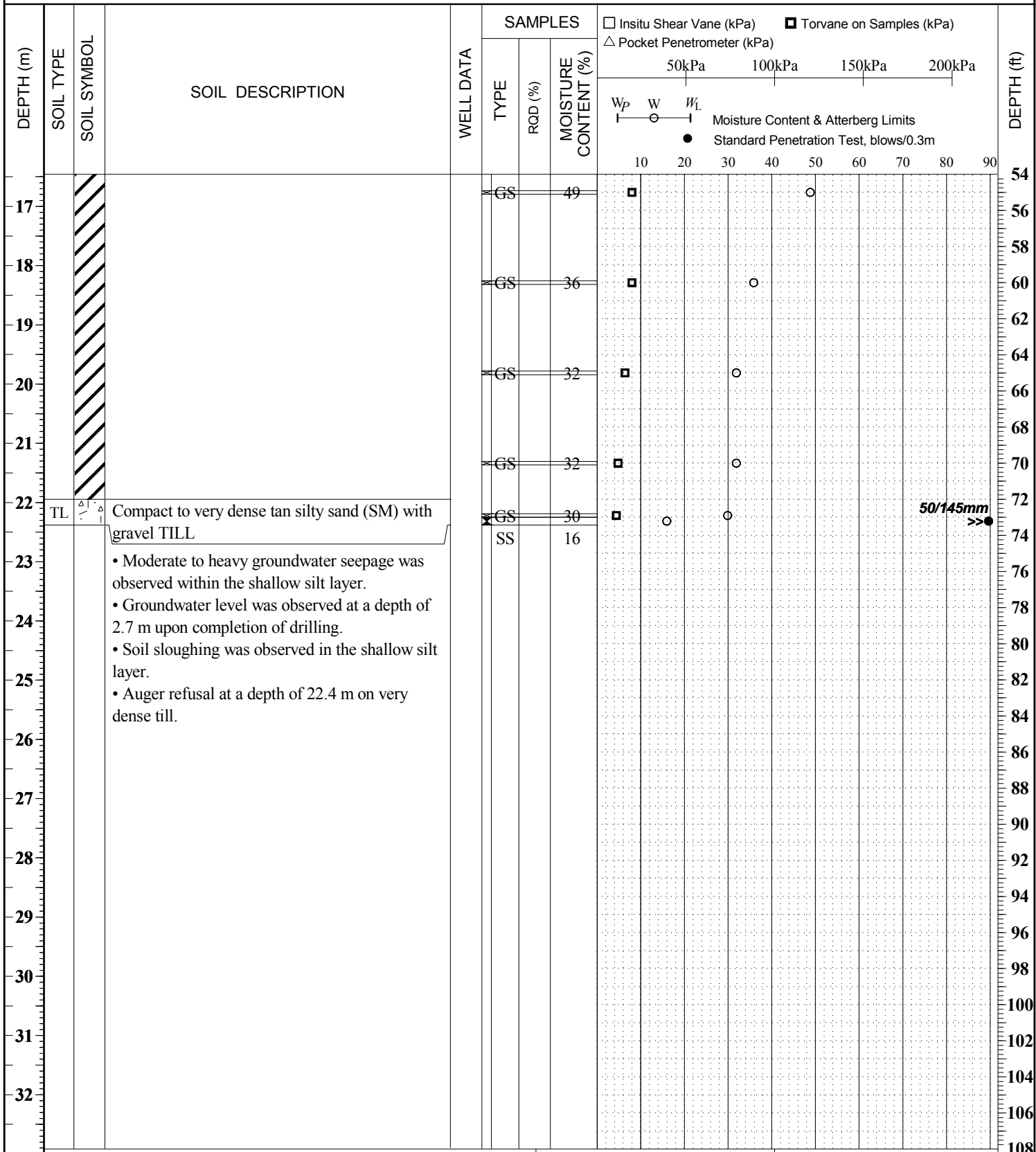
Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH26 TESTHOLE RECORD

cont'd

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535043.984
 LOCATION Winnipeg, Manitoba ELEVATION 230.91 m EASTING 635905.996
 DRILLING DATE September 21, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



50/145mm >>>

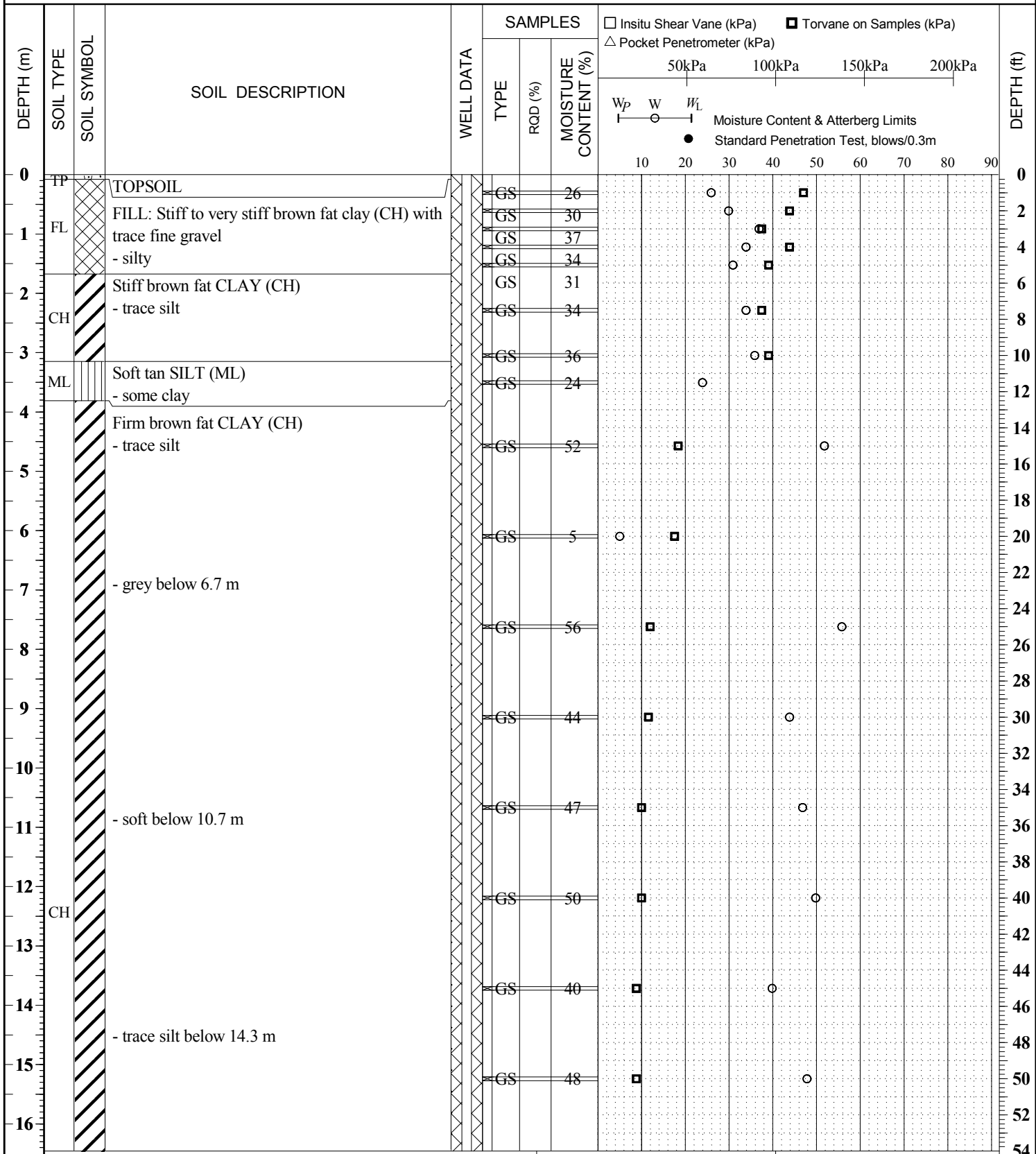
Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: ■ Bentonite ⊠ Drill Cuttings □ Sand ⊞ Slough

Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH27 TESTHOLE RECORD

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535035
 LOCATION Winnipeg, Manitoba ELEVATION 231.30 m EASTING 635862
 DRILLING DATE September 29, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: ■ Bentonite ⊠ Drill Cuttings □ Sand ⊞ Slough

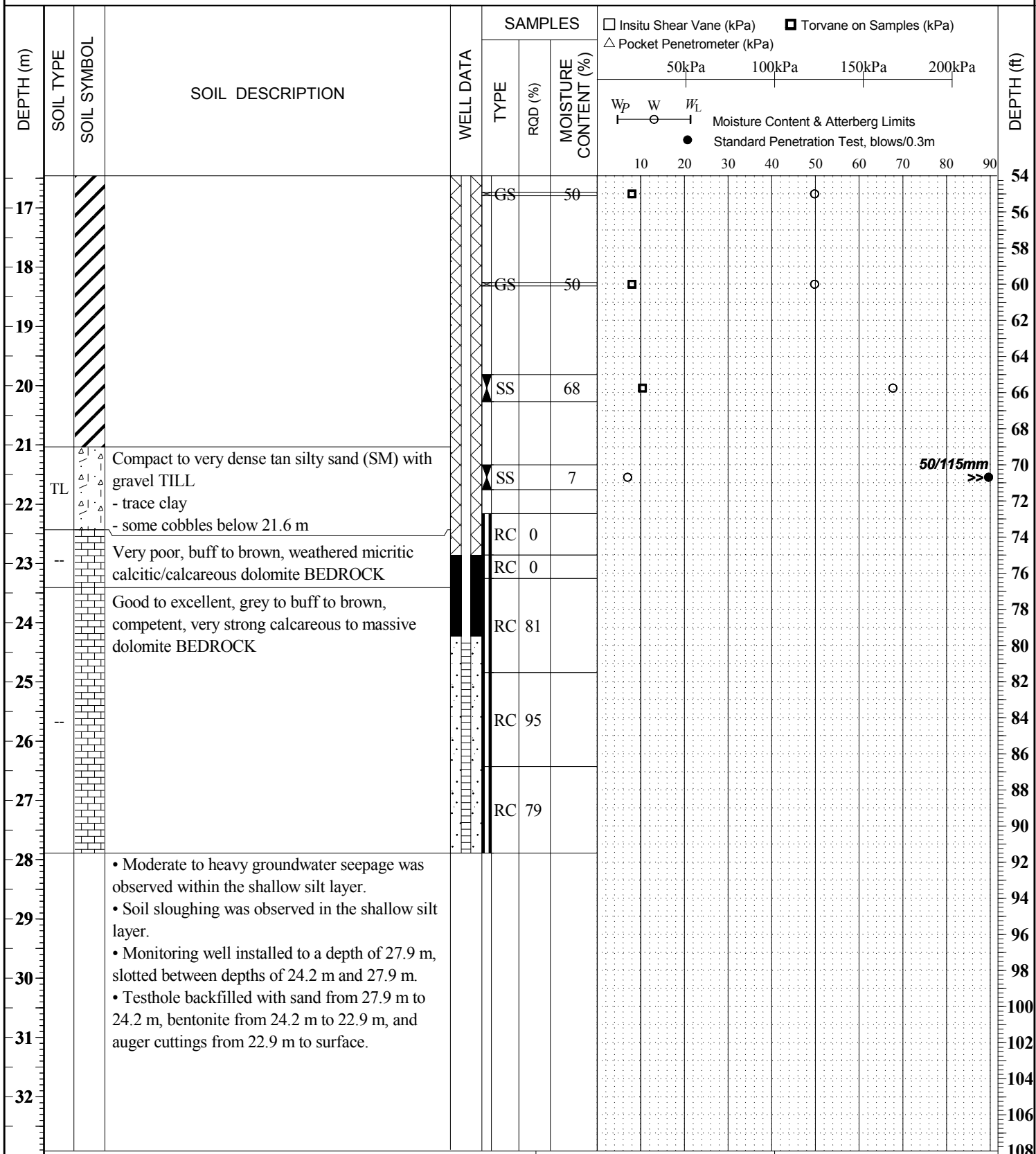
Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH27 TESTHOLE RECORD

cont'd

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535035
 LOCATION Winnipeg, Manitoba ELEVATION 231.30 m EASTING 635862
 DRILLING DATE September 29, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



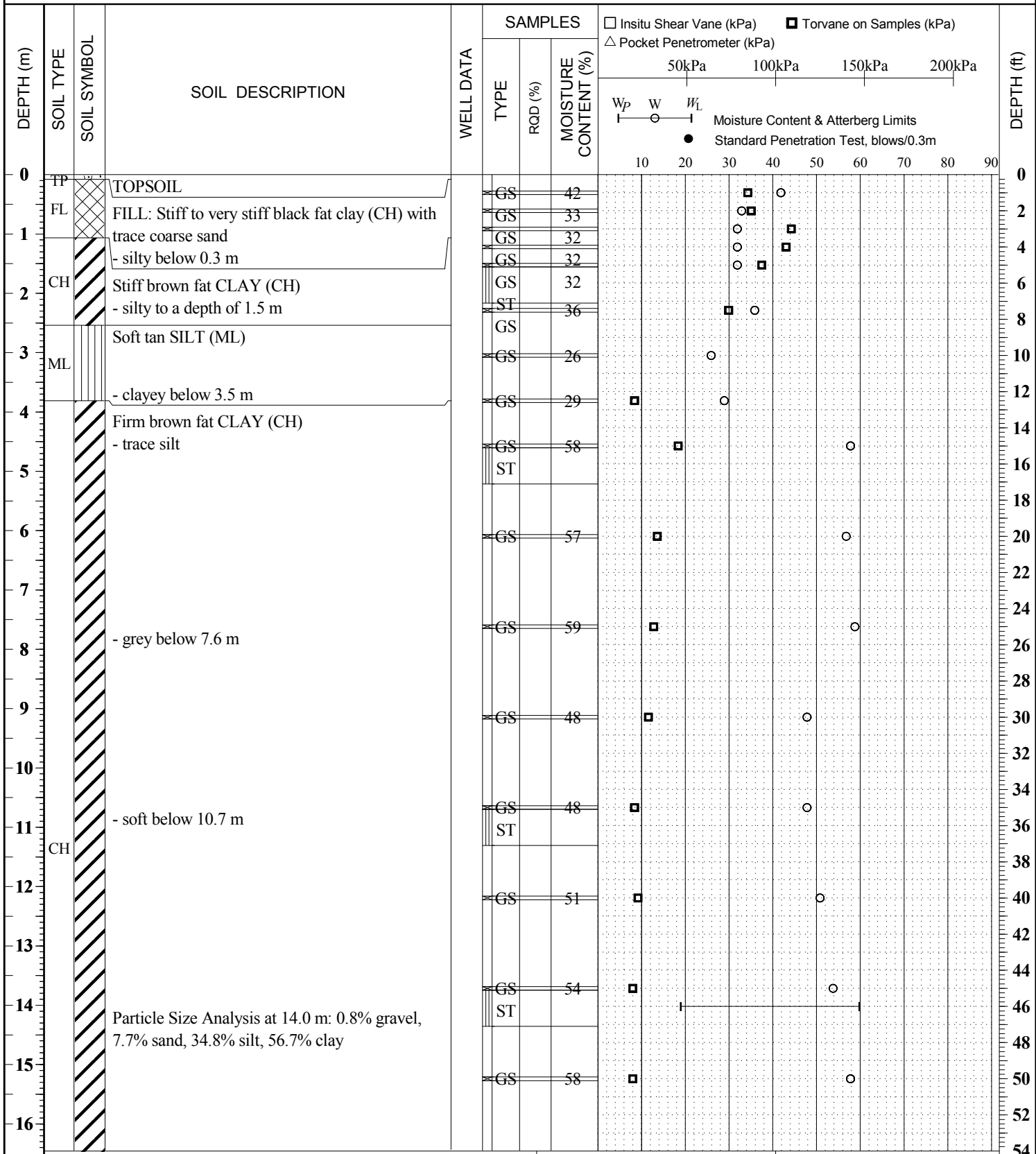
Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: ■ Bentonite ⊠ Drill Cuttings □ Sand ⊞ Slough

Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH28 TESTHOLE RECORD

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535002
 LOCATION Winnipeg, Manitoba ELEVATION 230.46 m EASTING 635831
 DRILLING DATE October 17, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: ■ Bentonite [Cross-hatch] Drill Cuttings [Dotted] Sand [Diagonal lines] Slough [Cross-hatch]

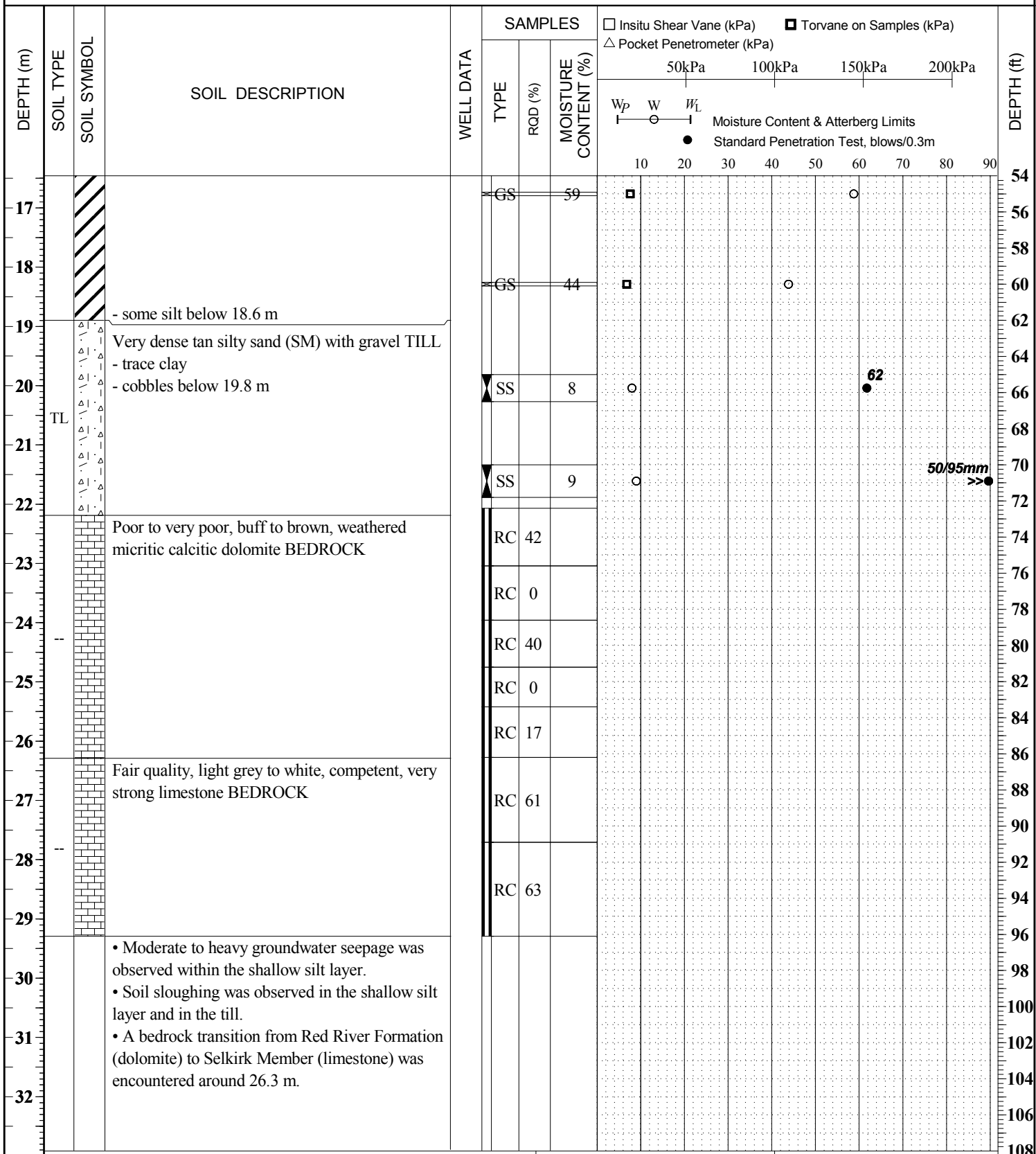
Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH28 TESTHOLE RECORD

cont'd

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535002
 LOCATION Winnipeg, Manitoba ELEVATION 230.46 m EASTING 635831
 DRILLING DATE October 17, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



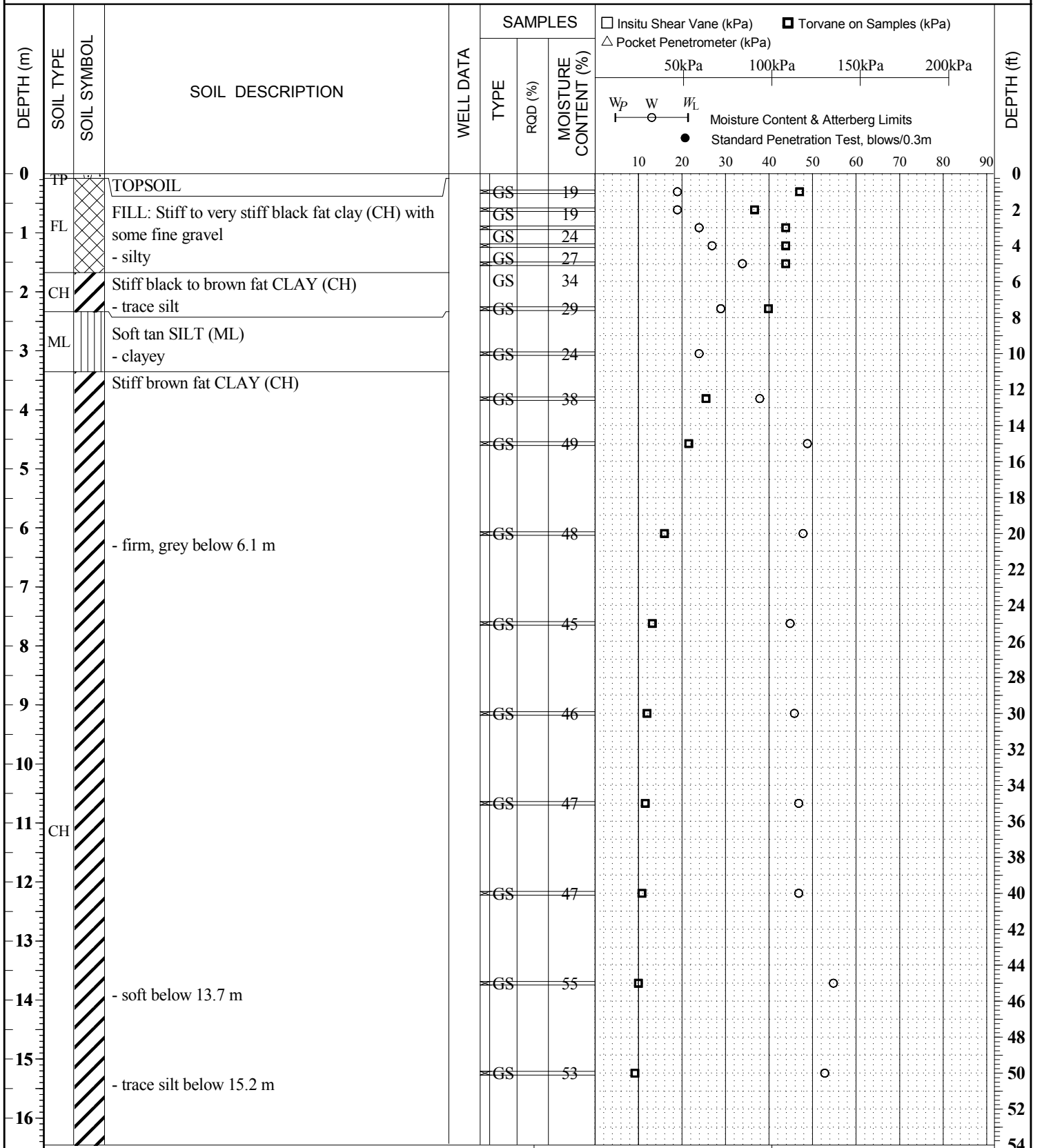
Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH29 TESTHOLE RECORD

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535065
 LOCATION Winnipeg, Manitoba ELEVATION 231.09 m EASTING 635517
 DRILLING DATE September 28, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: ■ Bentonite ⊠ Drill Cuttings □ Sand ⊞ Slough

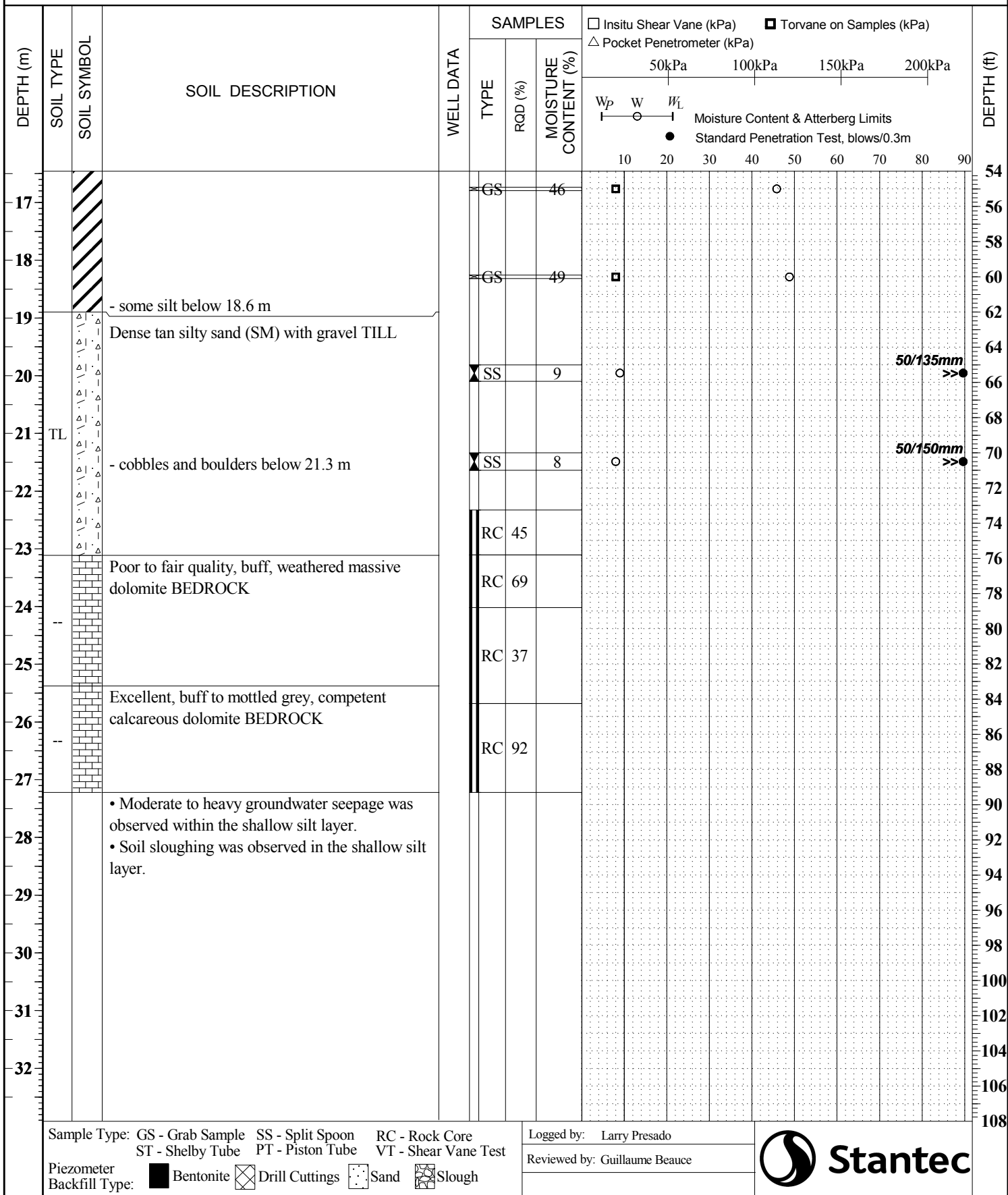
Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH29 TESTHOLE RECORD

cont'd

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535065
 LOCATION Winnipeg, Manitoba ELEVATION 231.09 m EASTING 635517
 DRILLING DATE September 28, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



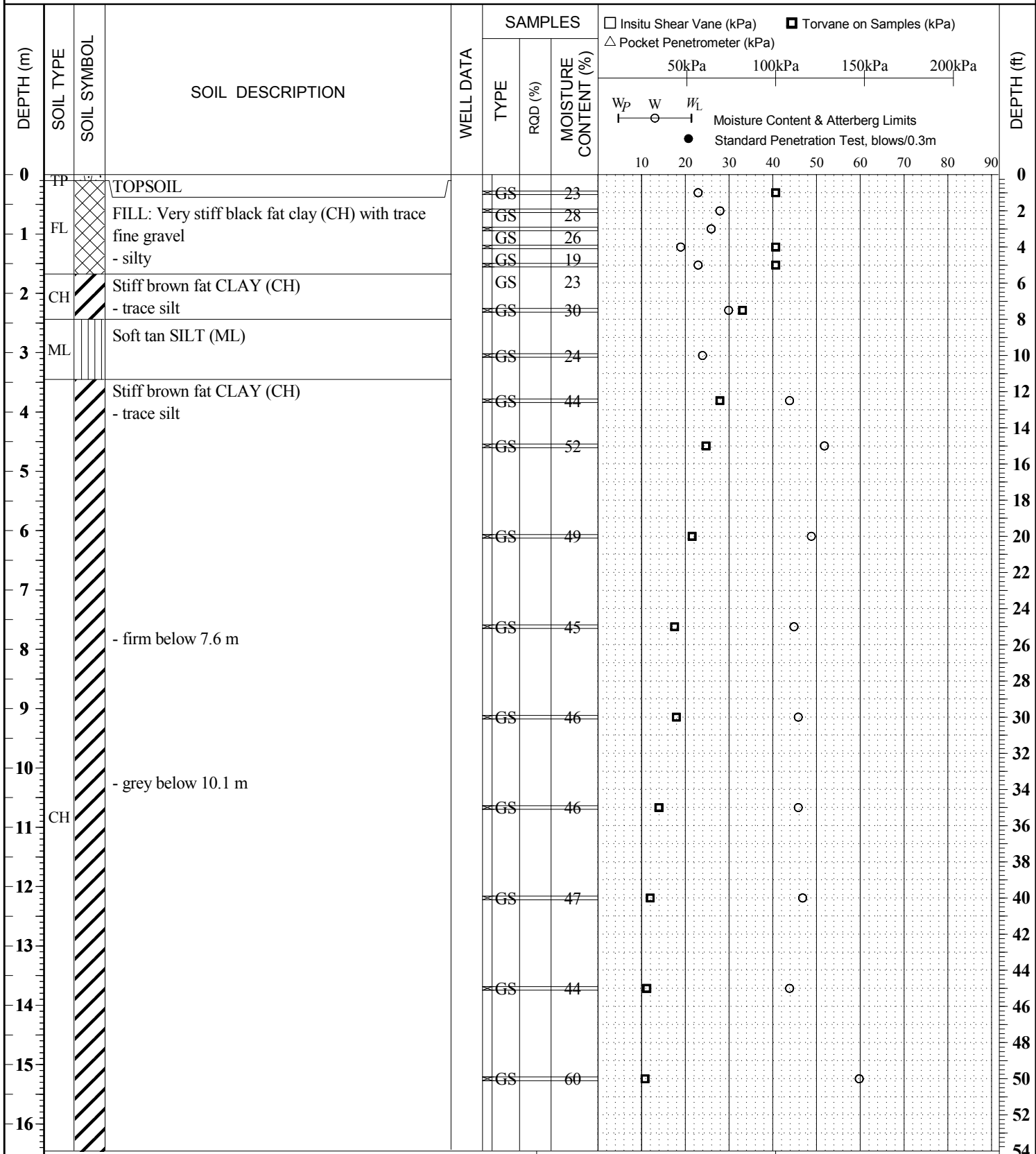
Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: ■ Bentonite ⊠ Drill Cuttings □ Sand ⊞ Slough

Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH30 TESTHOLE RECORD

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535007.01
 LOCATION Winnipeg, Manitoba ELEVATION 231.19 m EASTING 635471.991
 DRILLING DATE September 22, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: ■ Bentonite ⊠ Drill Cuttings □ Sand ⊞ Slough

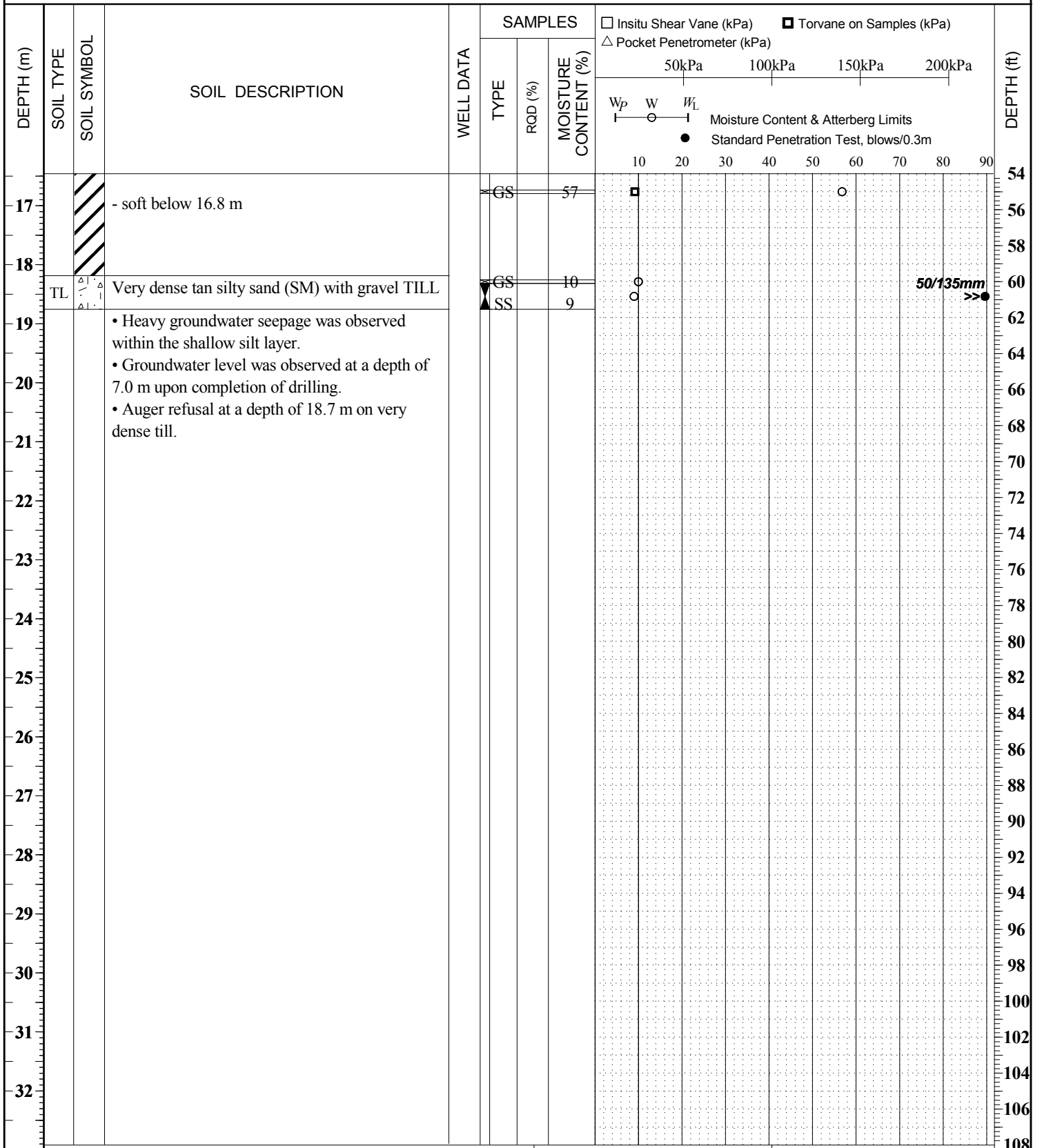
Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



TH30 TESTHOLE RECORD

cont'd

CLIENT AECOM Canada Ltd. PROJECT No. 111216800
 PROJECT North End Water Pollution Control Centre Upgrade DATUM NAD83 NORTHING 5535007.01
 LOCATION Winnipeg, Manitoba ELEVATION 231.19 m EASTING 635471.991
 DRILLING DATE September 22, 2016 DRILLING CO. Paddock Drilling Ltd. DRILLING METHOD 125 mm SSA/95 mm HSA



Sample Type: GS - Grab Sample SS - Split Spoon RC - Rock Core
 ST - Shelby Tube PT - Piston Tube VT - Shear Vane Test
 Piezometer Backfill Type: Bentonite Drill Cuttings Sand Slough

Logged by: Larry Presado
 Reviewed by: Guillaume Beauce



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NORTH END SEWAGE TREATMENT PLANT UPGRADE

Appendix E
Summary of Soil Profile Elevations
June 26, 2017

Appendix E SUMMARY OF SOIL PROFILE ELEVATIONS

NORTH END WATER POLLUTION CONTROL CENTRE UPGRADE


Soil Profile Elevations

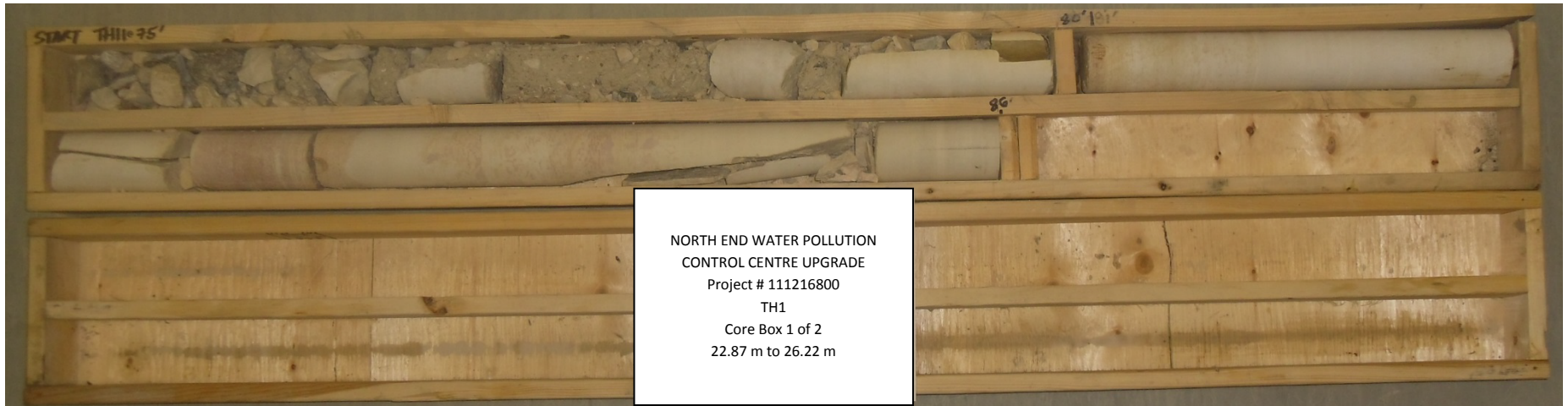
Testhole	Elevation	Clay Fill / Organic	Black / Brown Clay	Silt	Brown Clay	Grey Clay	Till	Weathered Bedrock	Sound Bedrock								
TH01	230.43 m	230.4 m	228.9 m	228.9 m	228.4 m	228.4 m	227.4 m	219.7 m	219.7 m	213.6 m	213.6 m	205.9 m	205.9 m	204.2 m	204.2 m	201.1 m	
TH02	230.70 m	230.7 m	230.5 m	230.5 m	229.1 m	228.8 m	228.5 m	228.5 m	223.7 m	223.7 m	213.6 m	213.6 m	212.7 m	R	--	--	
TH03	231.01 m	231.0 m	230.6 m	230.6 m	229.0 m	229.0 m	228.1 m	228.1 m	221.9 m	221.9 m	214.2 m	214.2 m	212.5 m	R	--	--	
TH04	231.00 m	231.0 m	229.9 m	--	--	229.9 m	229.4 m	229.4 m	224.9 m	224.9 m	212.7 m	212.7 m	210.6 m	R	--	--	
TH05	231.97 m	232.0 m	229.7 m	--	--	229.7 m	228.8 m	228.8 m	226.2 m	226.2 m	214.3 m	214.3 m	212.0 m	R	--	--	
TH06	235.50 m	235.5 m	230.6 m	230.6 m	229.3 m	225.8 m	228.5 m	228.5 m	227.9 m	227.9 m	214.5 m	214.5 m	212.6 m	R	--	--	
TH07	235.23 m	235.2 m	230.6 m	230.6 m	229.1 m	229.1 m	228.1 m	228.1 m	224.5 m	224.5 m	215.0 m	215.0 m	212.3 m	R	--	--	
TH08	232.11 m	232.1 m	230.9 m	230.9 m	228.6 m	231.7 m	228.1 m	228.1 m	223.0 m	223.0 m	214.3 m	214.3 m	212.2 m	R	--	--	
TH09	231.27 m	231.3 m	229.7 m	--	--	229.7 m	228.7 m	228.7 m	225.2 m	225.2 m	214.2 m	214.2 m	210.0 m	R	--	--	
TH10	230.68 m	230.7 m	229.8 m	229.8 m	229.4 m	230.0 m	228.3 m	228.3 m	224.6 m	224.6 m	213.9 m	213.9 m	208.3 m	R	--	--	
TH11	231.31 m	231.3 m	229.8 m	229.8 m	229.3 m	229.3 m	228.3 m	228.3 m	220.6 m	220.6 m	214.5 m	214.5 m	207.7 m	207.7 m	206.6 m	206.6 m	203.8 m
TH12	231.38 m	231.4 m	229.9 m	229.9 m	229.3 m	229.2 m	228.3 m	228.3 m	223.8 m	223.8 m	214.6 m	214.6 m	211.4 m	R	--	--	
TH13	231.32 m	231.3 m	229.7 m	229.7 m	229.3 m	229.3 m	228.8 m	228.8 m	227.3 m	227.3 m	212.1 m	212.1 m	211.0 m	R	--	--	
TH14	231.73 m	231.7 m	230.2 m	230.2 m	228.6 m	228.2 m	227.9 m	227.9 m	225.3 m	225.3 m	213.1 m	213.1 m	211.7 m	R	--	--	
TH15	232.18 m	232.2 m	229.9 m	229.9 m	229.1 m	229.1 m	227.5 m	227.5 m	226.9 m	226.9 m	213.3 m	213.3 m	212.2 m	R	--	--	
TH16	232.32 m	232.3 m	230.5 m	230.5 m	228.9 m	228.8 m	227.7 m	227.7 m	221.6 m	221.6 m	213.1 m	213.1 m	211.8 m	R	--	--	
TH17	232.52 m	232.5 m	230.4 m	230.4 m	229.1 m	229.1 m	228.1 m	228.1 m	224.9 m	224.9 m	212.7 m	212.7 m	206.6 m	206.6 m	203.1 m	--	--
TH18	232.01 m	232.0 m	230.2 m	230.2 m	228.5 m	229.0 m	228.0 m	228.0 m	224.4 m	224.4 m	213.7 m	213.7 m	212.6 m	R	--	--	
TH19	231.15 m	231.1 m	230.2 m	230.2 m	228.1 m	228.1 m	226.8 m	226.8 m	224.1 m	224.1 m	212.5 m	212.5 m	211.0 m	R	--	--	
TH20	232.04 m	232.0 m	229.6 m	229.6 m	228.6 m	227.7 m	228.2 m	228.2 m	225.0 m	225.0 m	213.4 m	213.4 m	212.9 m	R	--	--	
TH21	232.34 m	232.3 m	230.0 m	230.0 m	228.2 m	228.2 m	227.1 m	227.1 m	226.2 m	226.2 m	213.7 m	213.7 m	211.6 m	R	--	--	
TH22	232.07 m	232.1 m	230.0 m	230.0 m	228.9 m	229.1 m	227.7 m	227.7 m	226.0 m	226.0 m	213.8 m	213.8 m	213.6 m	R	--	--	
TH23	231.95 m	232.0 m	229.7 m	229.7 m	229.0 m	229.0 m	227.4 m	227.4 m	225.9 m	225.9 m	213.7 m	213.7 m	211.9 m	R	--	--	
TH24	230.89 m	230.9 m	227.8 m	--	--	228.9 m	226.9 m	226.9 m	224.5 m	224.5 m	210.5 m	210.5 m	208.9 m	R	--	--	
TH25	230.97 m	231.0 m	229.5 m	229.5 m	228.5 m	228.5 m	227.3 m	227.3 m	225.2 m	225.2 m	210.1 m	210.1 m	209.6 m	R	--	--	
TH26	230.91 m	230.9 m	229.4 m	229.4 m	228.6 m	228.7 m	226.9 m	226.9 m	223.9 m	223.9 m	209.0 m	209.0 m	208.5 m	R	--	--	
TH27	231.30 m	231.3 m	229.6 m	229.6 m	228.2 m	228.2 m	227.5 m	227.5 m	224.6 m	224.6 m	210.3 m	210.3 m	208.9 m	208.9 m	207.9 m	207.9 m	203.4 m
TH28	230.46 m	230.5 m	229.4 m	229.4 m	228.0 m	228.8 m	226.7 m	226.7 m	222.9 m	222.9 m	211.6 m	211.6 m	208.3 m	208.3 m	204.2 m	204.2 m	201.2 m
TH29	231.09 m	231.1 m	229.5 m	229.5 m	228.7 m	228.7 m	227.7 m	227.7 m	225.0 m	225.0 m	212.2 m	212.2 m	208.0 m	208.0 m	205.7 m	205.7 m	203.9 m
TH30	231.19 m	231.2 m	229.6 m	229.6 m	228.8 m	228.7 m	227.7 m	227.7 m	221.1 m	221.1 m	213.0 m	213.0 m	212.4 m	R	--	--	

NORTH END SEWAGE TREATMENT PLANT UPGRADE

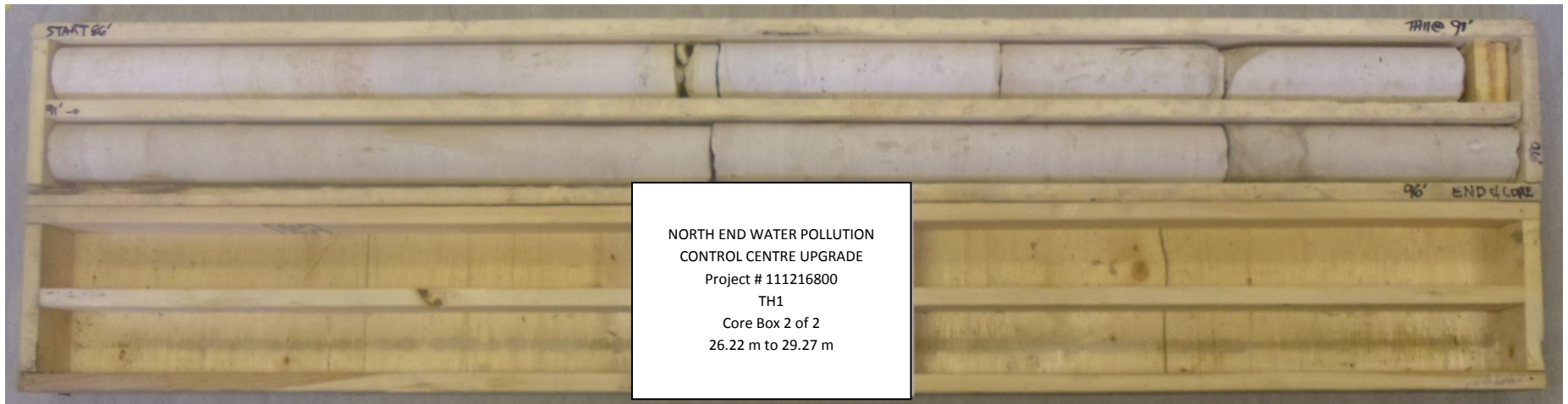
Appendix F
Rock Core Photographs
June 26, 2017

Appendix F ROCK CORE PHOTOGRAPHS


	Project No.: 111216800	Rock Core Photographs
	Project Name: NEWPCC Upgrade	

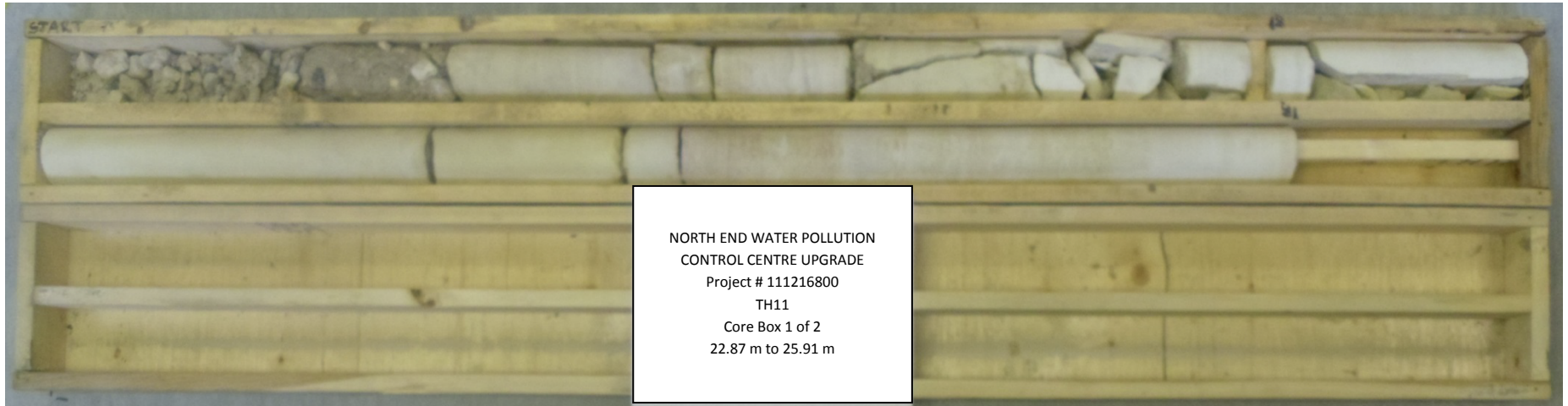


Rock Core Photo No.: 1	Borehole: TH01	Depth: 22.87 m to 26.22 m
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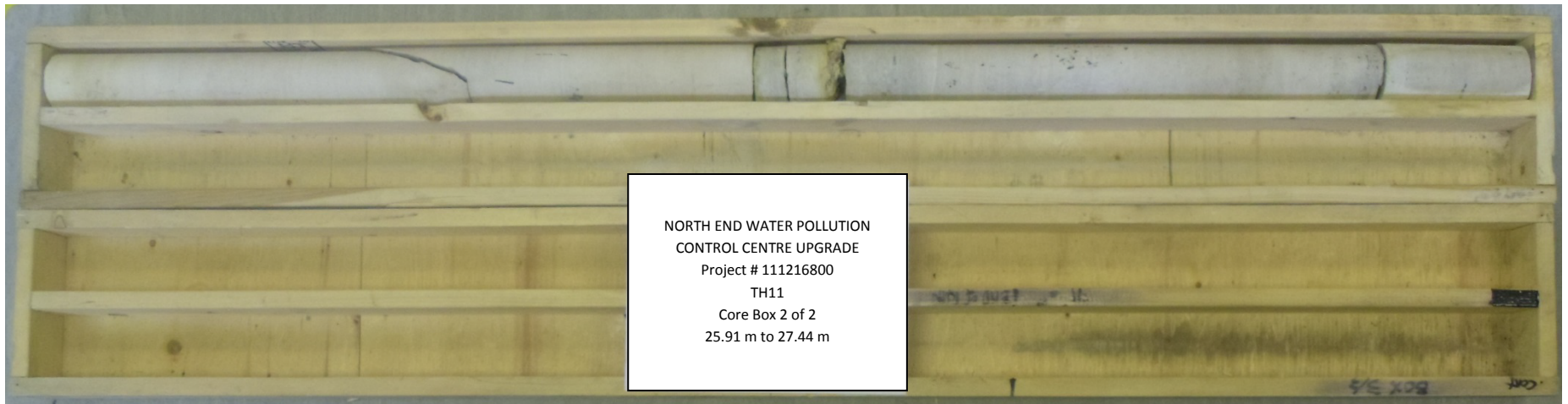


Rock Core Photo No.: 2	Borehole: TH01	Depth: 26.22 m to 29.27 m
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	Project No.: 111216800	Rock Core Photographs
	Project Name: NEWPCC Upgrade	

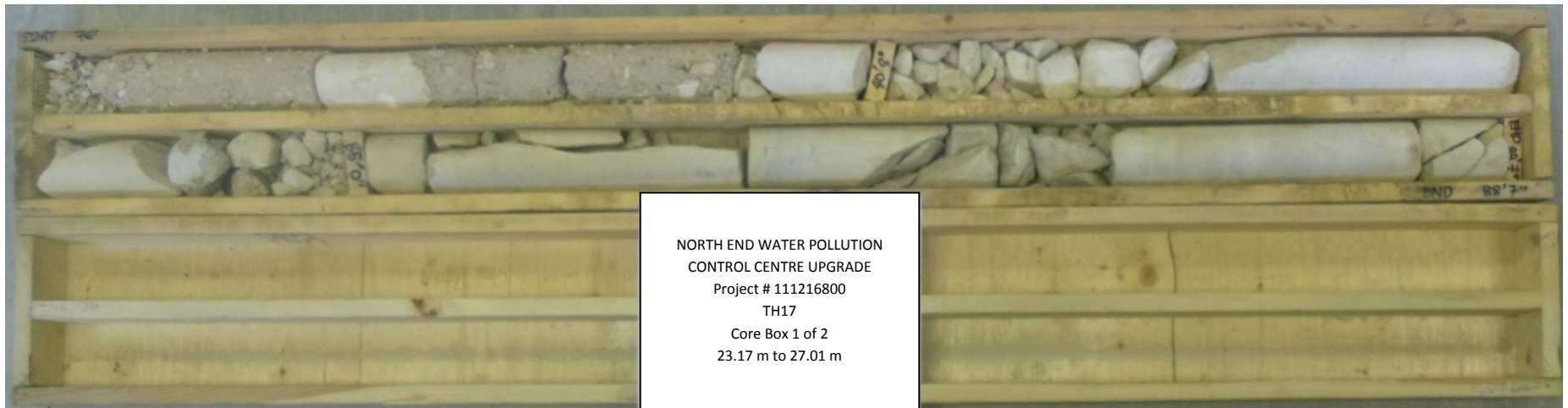


Rock Core Photo No.: 1	Borehole: TH11	Depth: 22.87 m to 25.91 m
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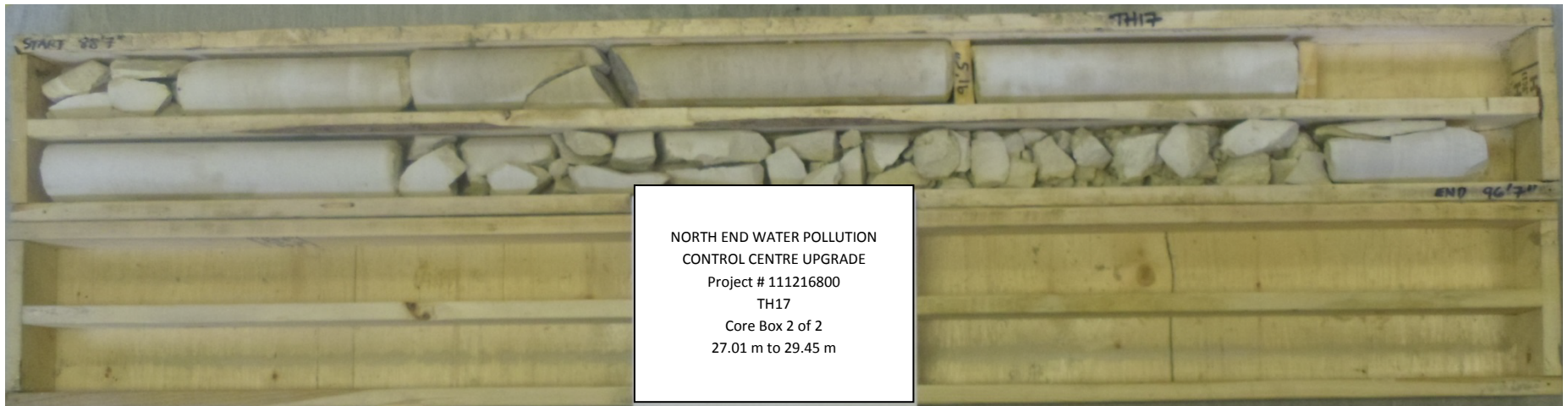
Rock Core Photo No.: 2	Borehole: TH11	Depth: 25.91 m to 27.44 m
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	Project No.: 111216800	Rock Core Photographs
	Project Name: NEWPCC Upgrade	




NORTH END WATER POLLUTION
 CONTROL CENTRE UPGRADE
 Project # 111216800
 TH17
 Core Box 1 of 2
 23.17 m to 27.01 m

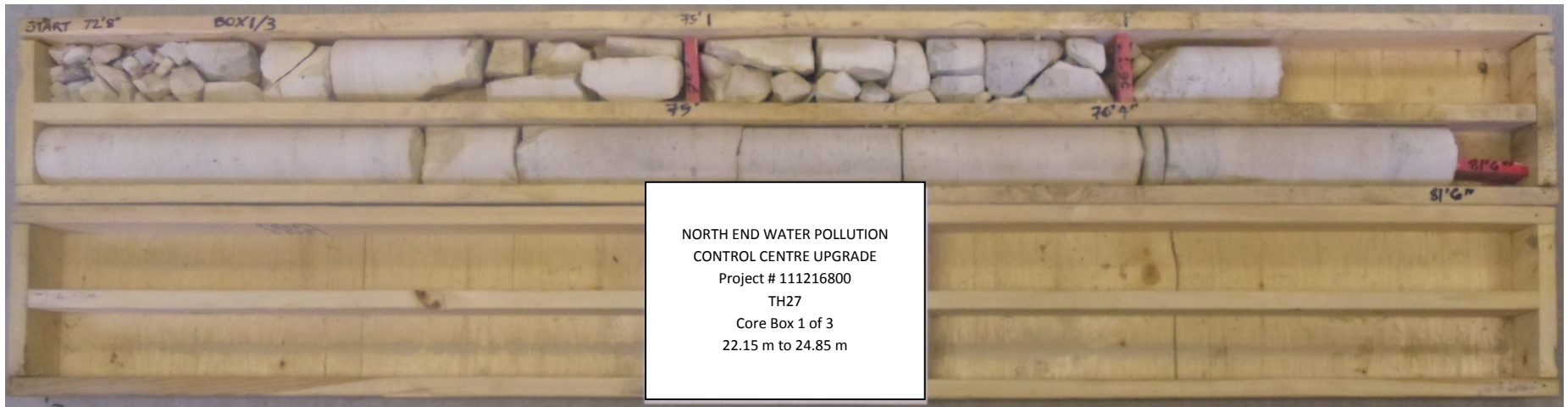
Rock Core Photo No.: 1	Borehole: TH17	Depth: 23.17 m to 27.01 m
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NORTH END WATER POLLUTION
 CONTROL CENTRE UPGRADE
 Project # 111216800
 TH17
 Core Box 2 of 2
 27.01 m to 29.45 m

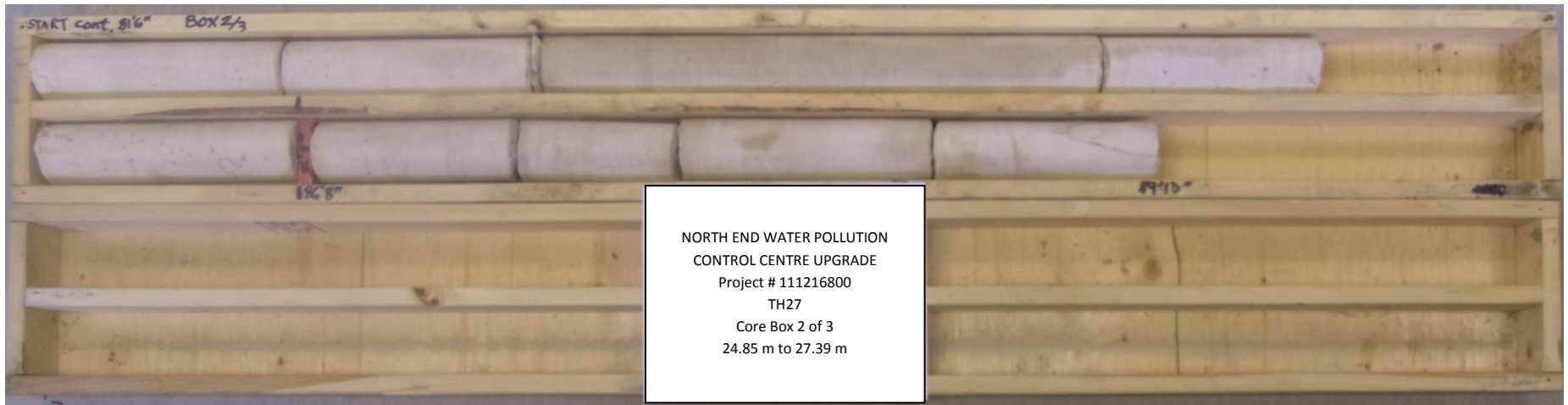
Rock Core Photo No.: 2	Borehole: TH17	Depth: 27.01 m to 29.45 m
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	Project No.: 111216800	Rock Core Photographs
	Project Name: NEWPCC Upgrade	




NORTH END WATER POLLUTION
 CONTROL CENTRE UPGRADE
 Project # 111216800
 TH27
 Core Box 1 of 3
 22.15 m to 24.85 m

Rock Core Photo No.: 1	Borehole: TH27	Depth: 22.15 m to 24.85 m
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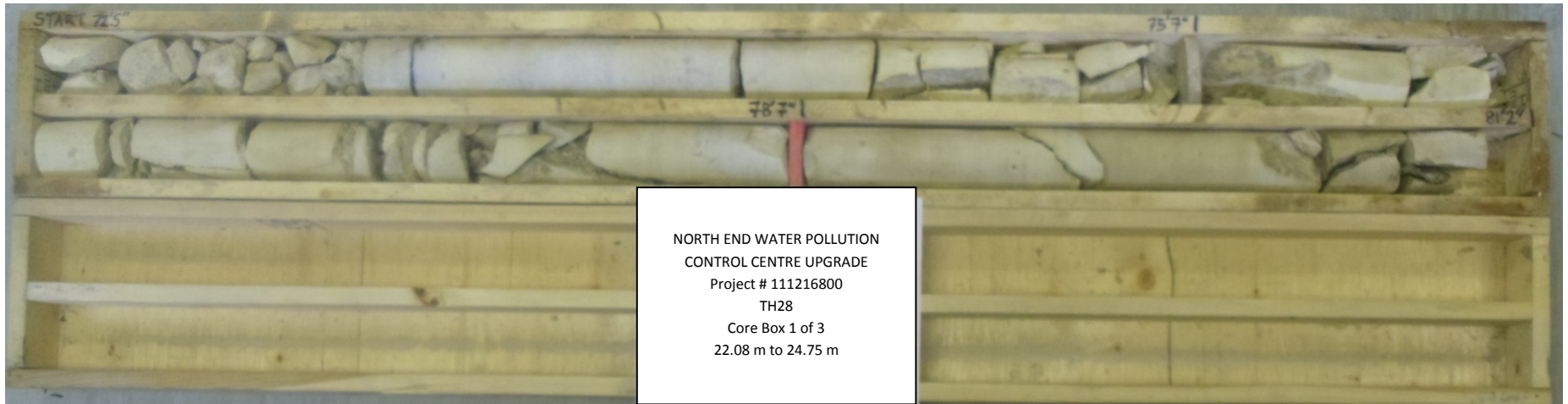
NORTH END WATER POLLUTION
 CONTROL CENTRE UPGRADE
 Project # 111216800
 TH27
 Core Box 2 of 3
 24.85 m to 27.39 m

Rock Core Photo No.: 2	Borehole: TH27	Depth: 24.85 m to 27.39 m
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	Project No.: 111216800	Rock Core Photographs
	Project Name: NEWPCC Upgrade	

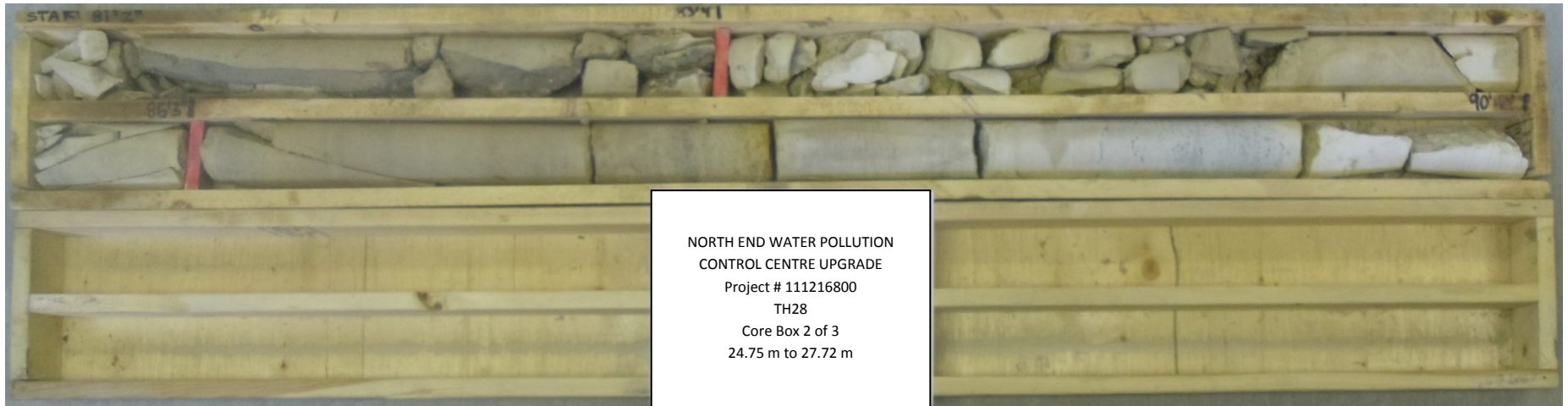


Rock Core Photo No.: 3	Borehole: TH27	Depth: 27.39 m to 27.90 m
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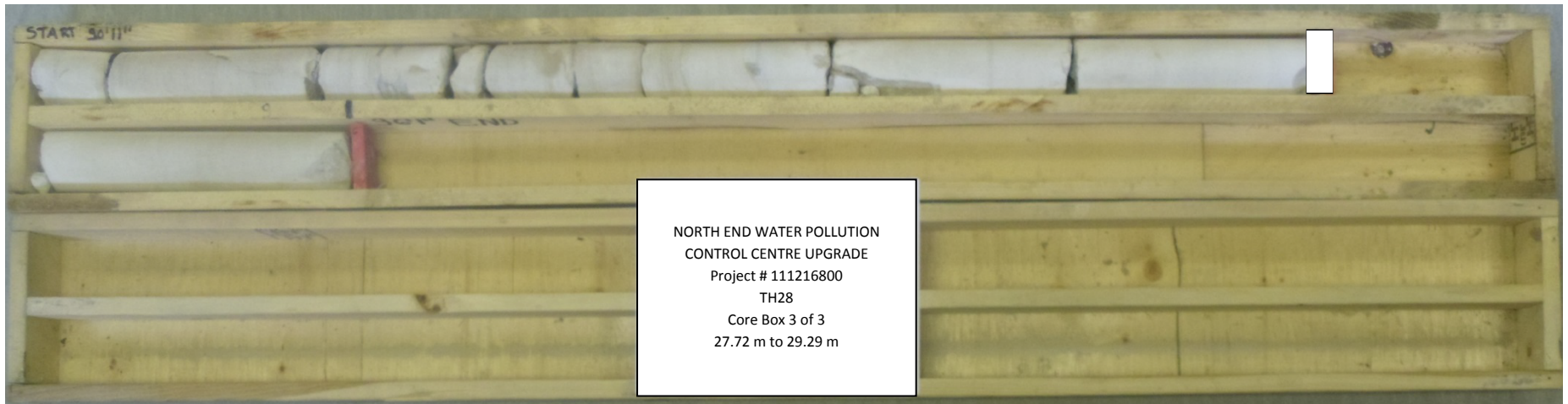
Rock Core Photo No.: 1	Borehole: TH28	Depth: 22.08 m to 24.75 m
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	Project No.: 111216800	Rock Core Photographs
	Project Name: NEWPCC Upgrade	




NORTH END WATER POLLUTION
 CONTROL CENTRE UPGRADE
 Project # 111216800
 TH28
 Core Box 2 of 3
 24.75 m to 27.72 m

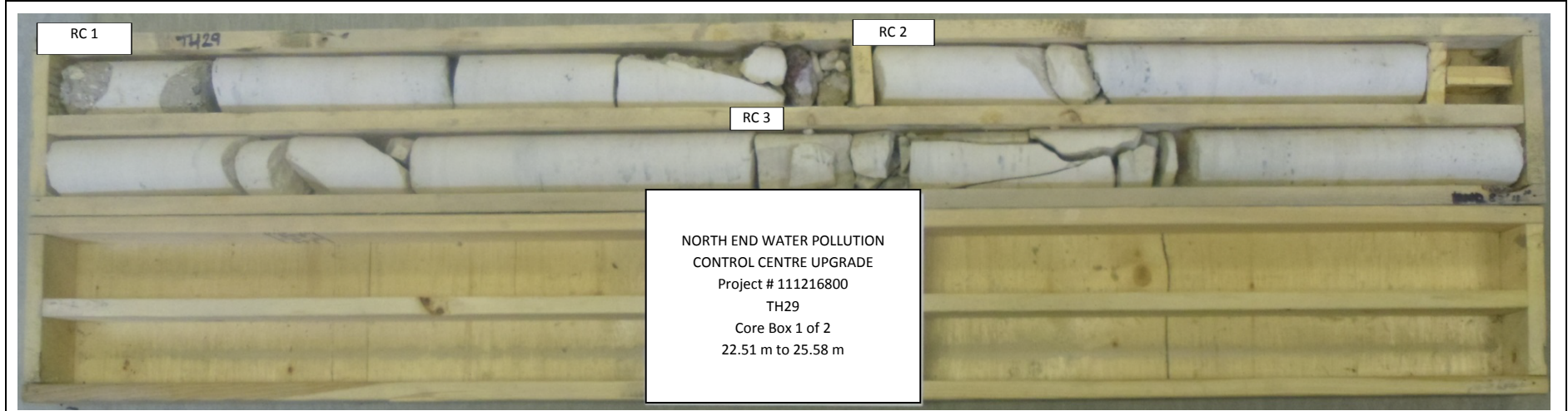
Rock Core Photo No.: 2	Borehole: TH28	Depth: 24.75 m to 27.72 m
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NORTH END WATER POLLUTION
 CONTROL CENTRE UPGRADE
 Project # 111216800
 TH28
 Core Box 3 of 3
 27.72 m to 29.29 m

Rock Core Photo No.: 3	Borehole: TH28	Depth: 27.72 m to 29.29 m
------------------------	----------------	---------------------------

	Project No.: 111216800	Rock Core Photographs
	Project Name: NEWPCC Upgrade	



Rock Core Photo No.: 1	Borehole: TH29	Depth: 22.51 m to 25.58 m
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Rock Core Photo No.: 2	Borehole: TH29	Depth: 25.58 m to 27.24 m
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NORTH END SEWAGE TREATMENT PLANT UPGRADE

Appendix G
Laboratory Test Reports
June 26, 2017

Appendix G LABORATORY TEST REPORTS



LABORATORY
 199 Henlow Bay
 Winnipeg MB R3Y 1G4
 Tel: (204) 488-6999

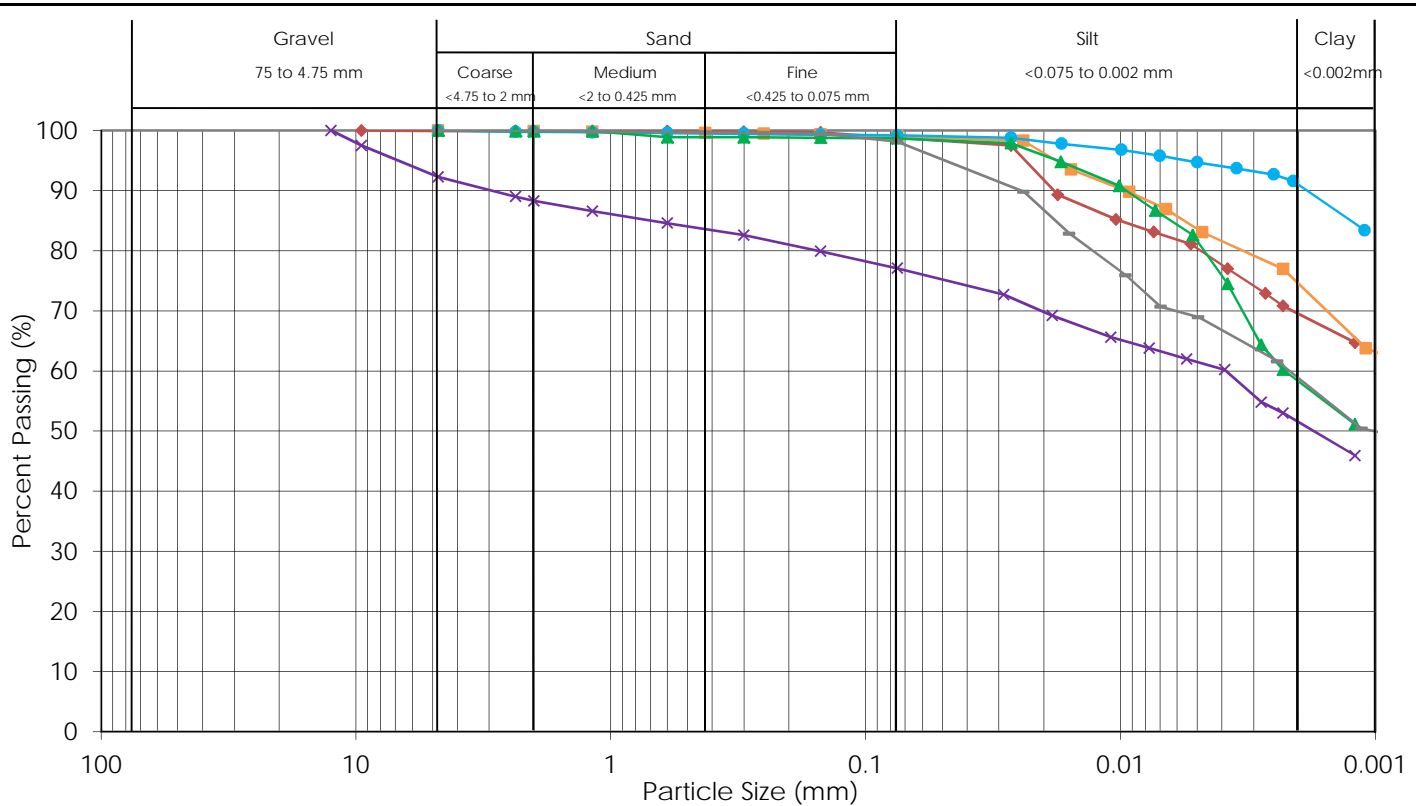
PARTICLE SIZE ANALYSIS

ASTM D422

AECOM Canada Inc.
 99 Commerce Drive
 Winnipeg, MB
 R3B 2B9

Project No.: 111216800.245
 Project Name: North End Water Pollution Control
 Centre Upgrade

Date Samples Received: September 21, 2016
 Tested By: Larry Presado



Symbol	Sample ID	Gravel, % 75 to 4.75 mm	Sand, %			Silt, % <0.075 to 0.002 mm	Clay, % <0.002 mm	Colloids, % < 0.001 mm
			Coarse <4.75 to 2.0 mm	Medium <2.0 to 0.425 mm	Fine <0.425 to 0.075 mm			
◆	TH06 - 1.8m	0.1	0.0	0.0	1.1	29.3	69.5	NT*
■	TH06 - 3.0m	0.0	0.1	0.3	0.5	24.6	74.5	63.2
●	TH09 - 4.9m	0.0	0.2	0.2	0.4	8.2	91.0	NT*
▲	TH09 - 7.9m	0.0	0.1	1.0	0.2	40.5	58.2	NT*
×	TH09 - 11.0m	7.7	4.0	4.7	6.5	25.6	51.5	NT*
-	TH13 - 3.4m	0.0	0.0	0.3	1.5	39.4	58.8	50.0

NT*: Sample not tested for colloids.



Reviewed By: Nathan Boenders, B.Sc., EIT
 Date Reviewed: November 11, 2016



LABORATORY
 199 Henlow Bay
 Winnipeg MB R3Y 1G4
 Tel: (204) 488-6999

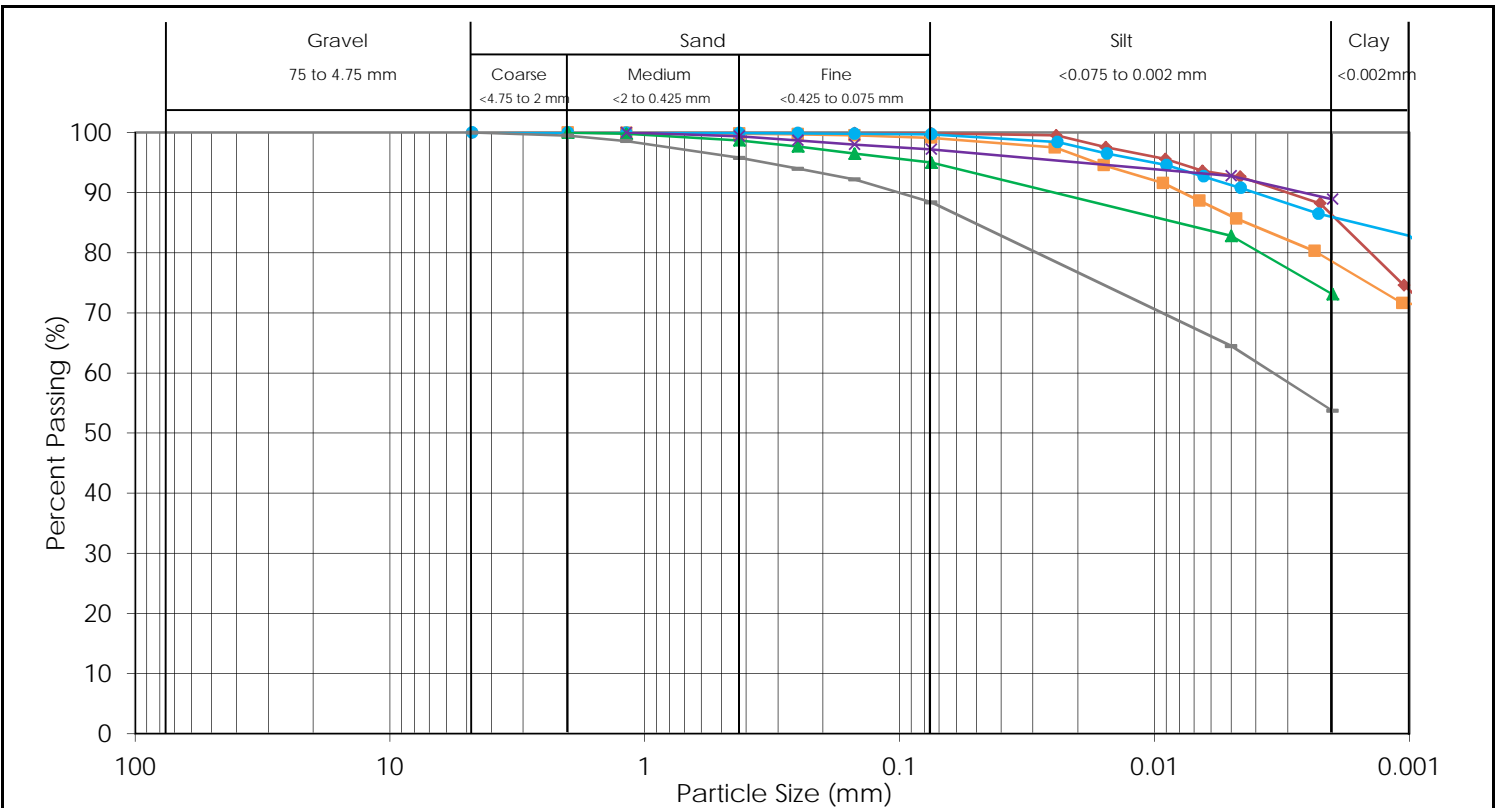
PARTICLE SIZE ANALYSIS

ASTM D422

AECOM Canada Inc.
 99 Commerce Drive
 Winnipeg, MB
 R3B 2B9

Project No.: 111216800.245
 Project Name: North End Water Pollution Control
 Centre Upgrade

Date Samples Received: September 21, 2016
 Tested By: Larry Presado



Symbol	Sample ID	Gravel, % 75 to 4.75 mm	Sand, %			Silt, % <0.075 to 0.002 mm	Clay, % <0.002 mm	Colloids, % < 0.001 mm
			Coarse <4.75 to 2.0 mm	Medium <2.0 to 0.425 mm	Fine <0.425 to 0.075 mm			
◆	TH13 - 6.4m	0.0	0.0	0.1	0.0	13.7	86.2	73.8
■	TH14 - 1.8m	0.0	0.0	0.2	0.7	20.6	78.5	71.5
●	TH14 - 4.9m	0.0	0.0	0.1	0.2	13.8	85.9	82.8
▲	TH19 - 1.8m	0.0	0.0	1.3	3.7	21.9	73.1	NT*
×	TH19 - 4.9m	0.0	0.0	0.6	2.2	8.3	88.9	NT*
-	TH19 - 11.0m	0.0	0.5	3.7	7.4	34.7	53.7	NT*

NT*: Sample not tested for colloids.



Reviewed By: Nathan Boenders, B.Sc., EIT
 Date Reviewed: November 10, 2016



LABORATORY
 199 Henlow Bay
 Winnipeg MB R3Y 1G4
 Tel: (204) 488-6999

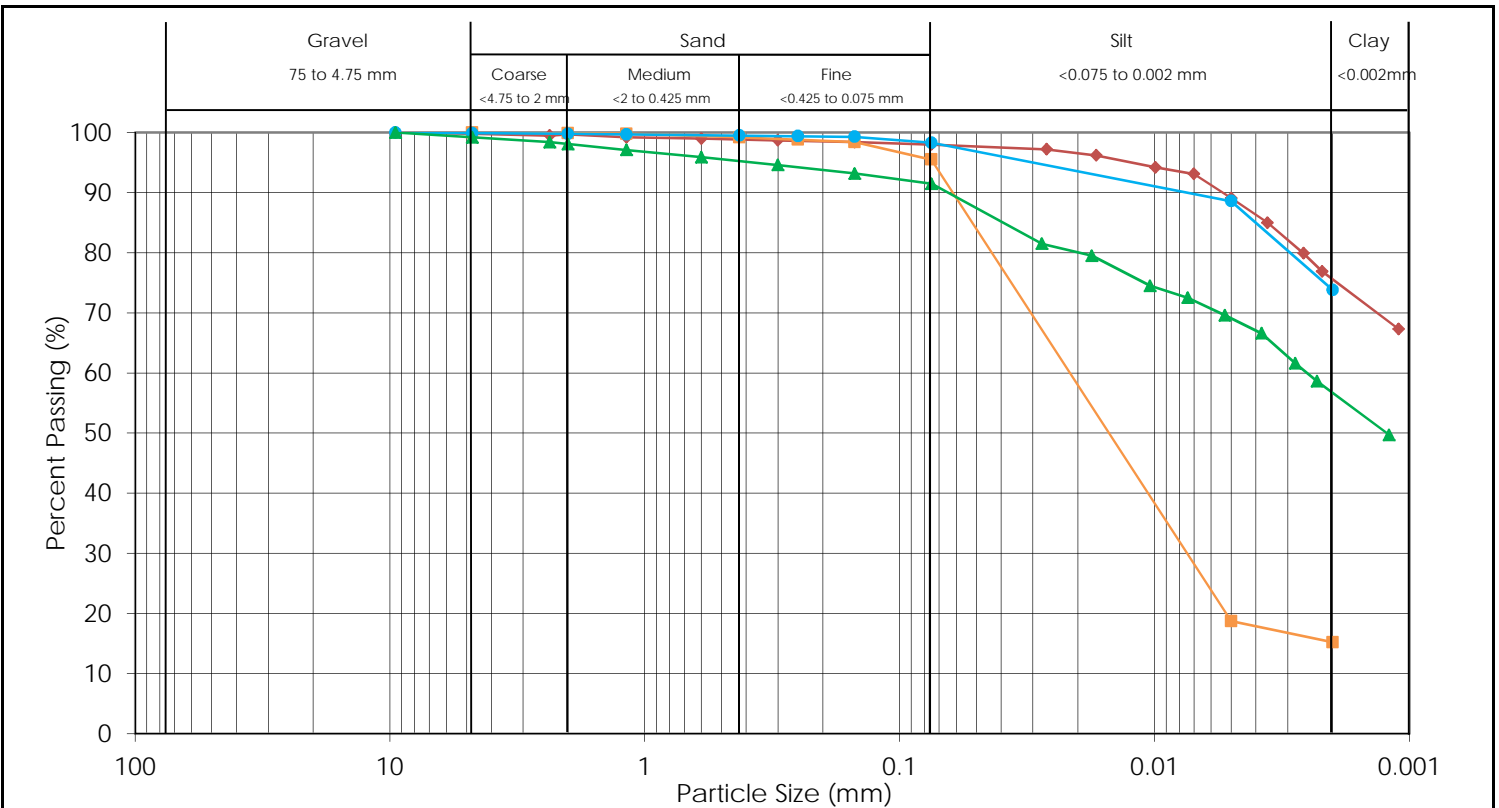
PARTICLE SIZE ANALYSIS

ASTM D422

AECOM Canada Inc.
 99 Commerce Drive
 Winnipeg, MB
 R3B 2B9

Project No.: 111216800.245
 Project Name: North End Water Pollution Control
 Centre Upgrade

Date Samples Received: September 21, 2016
 Tested By: Larry Presado



Symbol	Sample ID	Gravel, % 75 to 4.75 mm	Sand, %			Silt, % <0.075 to 0.002 mm	Clay, % <0.002 mm	Colloids, % < 0.001 mm
			Coarse <4.75 to 2.0 mm	Medium <2.0 to 0.425 mm	Fine <0.425 to 0.075 mm			
◆	TH23 - 7.9m	0.2	0.1	0.8	0.9	22.4	75.6	NT*
■	TH25 - 3.4m	0.0	0.1	0.7	3.7	80.3	15.2	NT*
●	TH25 - 7.9m	0.1	0.1	0.3	1.2	24.5	73.8	NT*
▲	TH28 - 14.0m	0.8	1.1	2.8	3.8	34.8	56.7	NT*

NT*: Sample not tested for colloids.



Reviewed By: Nathan Boenders, B.Sc., EIT
 Date Reviewed: November 10, 2016



LABORATORY
 199 Henlow Bay
 Winnipeg MB R3Y 1G4
 Tel: (204) 488-6999

**LIQUID LIMIT, PLASTIC LIMIT,
 AND PLASTICITY INDEX OF SOILS
 ASTM D4318**

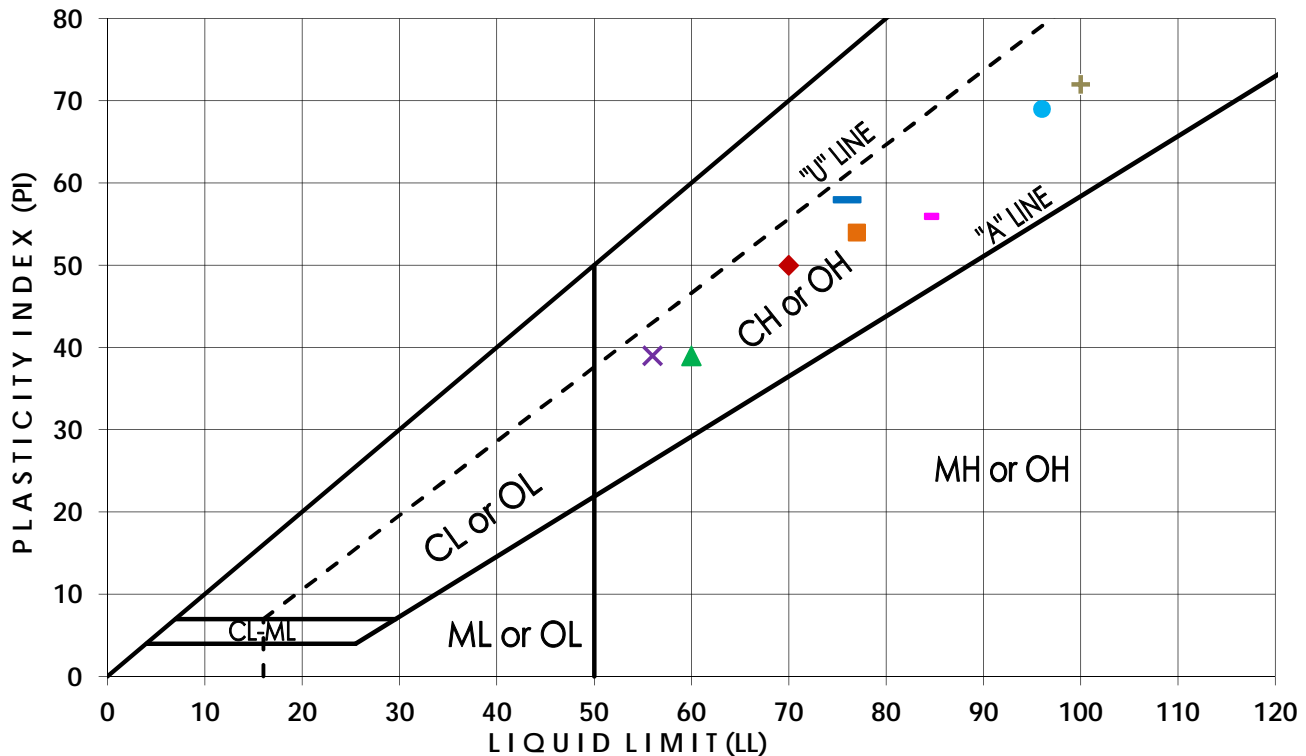
AECOM Canada Inc.
 99 Commerce Drive
 Winnipeg, MB
 R3B 2B9

Project No.: 111216800.245
 Project Name: North End Water Pollution Control
 Centre Upgrade

Date Samples Received: September 21, 2016
 Tested By: N. Abarca & C. Woods

Symbol	Testhole No.	Depth (m)	Liquid Limit	Plastic Limit	Plasticity Index	USCS
◆	TH06	1.8	70	20	50	CH
■	TH06	3.1	77	23	54	CH
●	TH09	4.9	96	27	69	CH
▲	TH09	7.9	60	21	39	CH
x	TH09	11.0	56	17	39	CH
—	TH13	3.4	76	18	58	CH
+	TH13	6.4	100	28	72	CH
-	TH14	1.8	84	28	56	CH

Plasticity Chart



Reviewed By: Nathan Boenders, B.Sc., EIT
 Date Reviewed: November 10, 2016



LABORATORY
 199 Henlow Bay
 Winnipeg MB R3Y 1G4
 Tel: (204) 488-6999

**LIQUID LIMIT, PLASTIC LIMIT,
 AND PLASTICITY INDEX OF SOILS
 ASTM D4318**

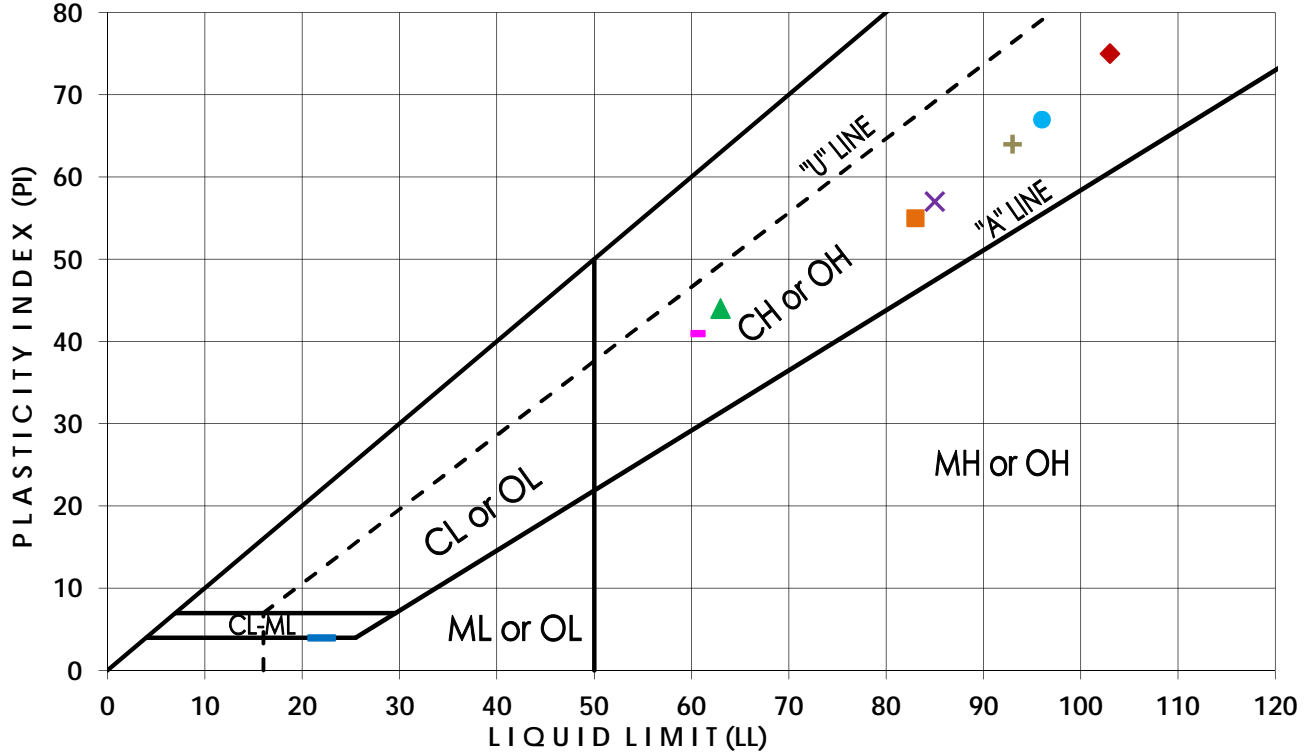
AECOM Canada Inc.
 99 Commerce Drive
 Winnipeg, MB
 R3B 2B9

Project No.: 111216800.245
 Project Name: North End Water Pollution Control
 Centre Upgrade

Date Samples Received: September 21, 2016
 Tested By: N. Abarca & C. Woods

Symbol	Testhole No.	Depth (m)	Liquid Limit	Plastic Limit	Plasticity Index	USCS
◆	TH14	4.9	103	28	75	CH
■	TH19	1.8	83	28	55	CH
●	TH19	4.9	96	29	67	CH
▲	TH19	11.0	63	19	44	CH
x	TH23	7.9	85	28	57	CH
—	TH25	3.4	22	18	4	CL-ML
+	TH25	7.9	93	29	64	CH
-	TH28	14.0	60	19	41	CH

Plasticity Chart



Reviewed By: Nathan Boenders, B.Sc., EIT
 Date Reviewed: November 10, 2016



LABORATORY
 199 Henlow Bay
 Winnipeg MB R3Y 1G4
 Tel: (204) 488-6999

**UNCONFINED COMPRESSIVE
 STRENGTH OF COHESIVE SOIL
 ASTM D2166**

Stantec Consulting Ltd.
 500-311 Portage Avenue
 Winnipeg, Manitoba
 R3B 2B9

PROJECT: NEWPCC Upgrade

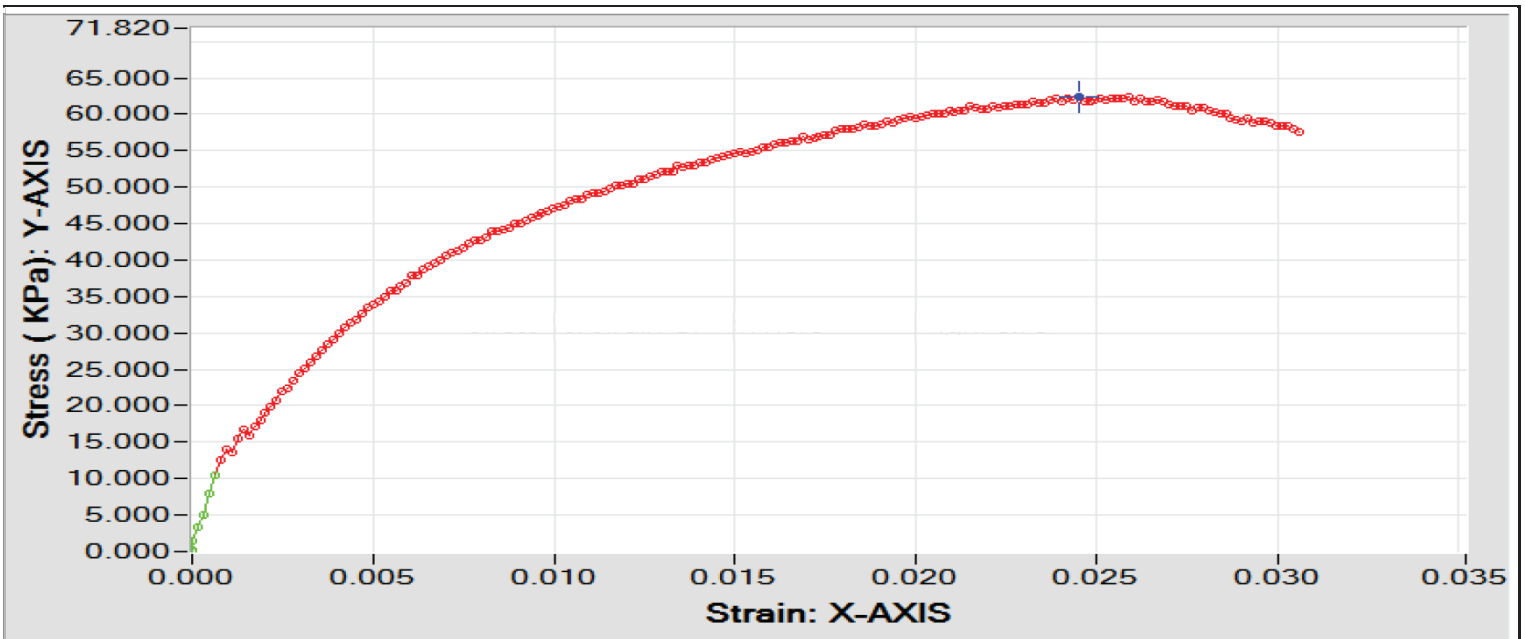
Attention: Guillaume Beauce

PROJECT NO.: 111216800

SAMPLED BY: Larry Presado
 SAMPLE ID: TH13 @ 3.1 - 3.7 m

REPORT NO.:
 DATE RECEIVED: October 11, 2016
 TESTED BY: Nestor Abarca

Soil Description: silty clay, brown, firm, moist, medium plasticity
clayey below 3.6 m



Failure Description: diagonal shear failure



Diameter, mm:	72.40
Height, mm:	162.67
Height/Diameter Ratio:	2.25
Sample Weight, g:	1192.75
Moisture Content, %:	36.5
Wet Unit Weight, kN/m³:	17.45
Dry Unit Weight, kN/m³:	12.78
Void ratio:	1.11
Saturation, %:	90.65
Unconfined Compressive Strength, kPa:	62.45
Strain at Failure, %:	2.45

REPORT DATE: November 7, 2016

REVIEWED BY: Guillaume Beauce, P.Eng.



LABORATORY
 199 Henlow Bay
 Winnipeg MB R3Y 1G4
 Tel: (204) 488-6999

**UNCONFINED COMPRESSIVE
 STRENGTH OF COHESIVE SOIL
 ASTM D2166**

Stantec Consulting Ltd.
 500-311 Portage Avenue
 Winnipeg, Manitoba
 R3B 2B9

PROJECT: NEWPCC Upgrade

PROJECT NO.: 111216800

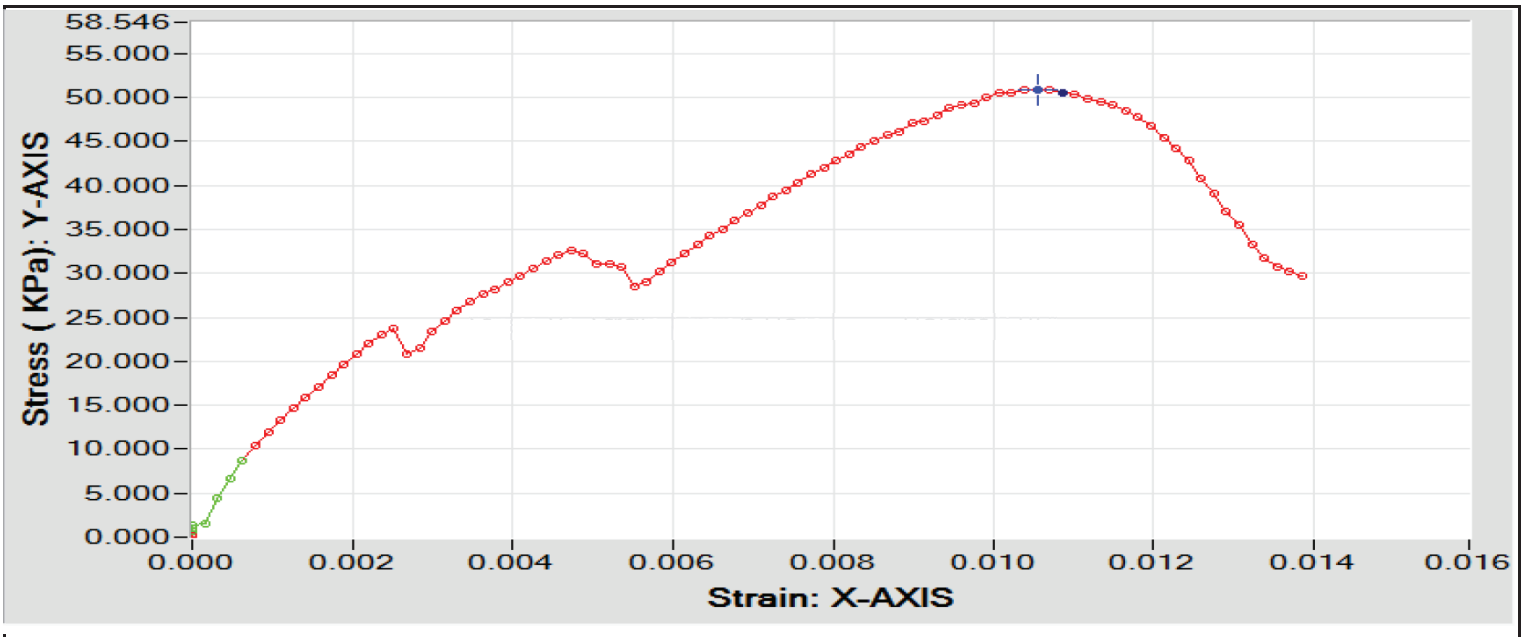
Attention: Guillaume Beauce

REPORT NO.:

SAMPLED BY: Larry Presado
 SAMPLE ID: TH13 @ 6.1 - 6.9 m

DATE RECEIVED: October 11, 2016
 TESTED BY: Nestor Abarca

Soil Description: clay, brown, stiff, moist, high plasticity



Failure Description: diagonal shear failure



Diameter, mm:	72.77
Height, mm:	161.36
Height/Diameter Ratio:	2.22
Sample Weight, g:	1133.43
Moisture Content, %:	55.4
Wet Unit Weight, kN/m³:	16.55
Dry Unit Weight, kN/m³:	10.65
Void ratio:	1.53
Saturation, %:	99.56
Unconfined Compressive Strength, kPa:	50.91
Strain at Failure, %:	1.05

REPORT DATE: November 7, 2016

REVIEWED BY: Guillaume Beauce, P.Eng.



LABORATORY
 199 Henlow Bay
 Winnipeg MB R3Y 1G4
 Tel: (204) 488-6999

**UNCONFINED COMPRESSIVE
 STRENGTH OF COHESIVE SOIL
 ASTM D2166**

Stantec Consulting Ltd.
 500-311 Portage Avenue
 Winnipeg, Manitoba
 R3B 2B9

PROJECT: NEWPCC Upgrade

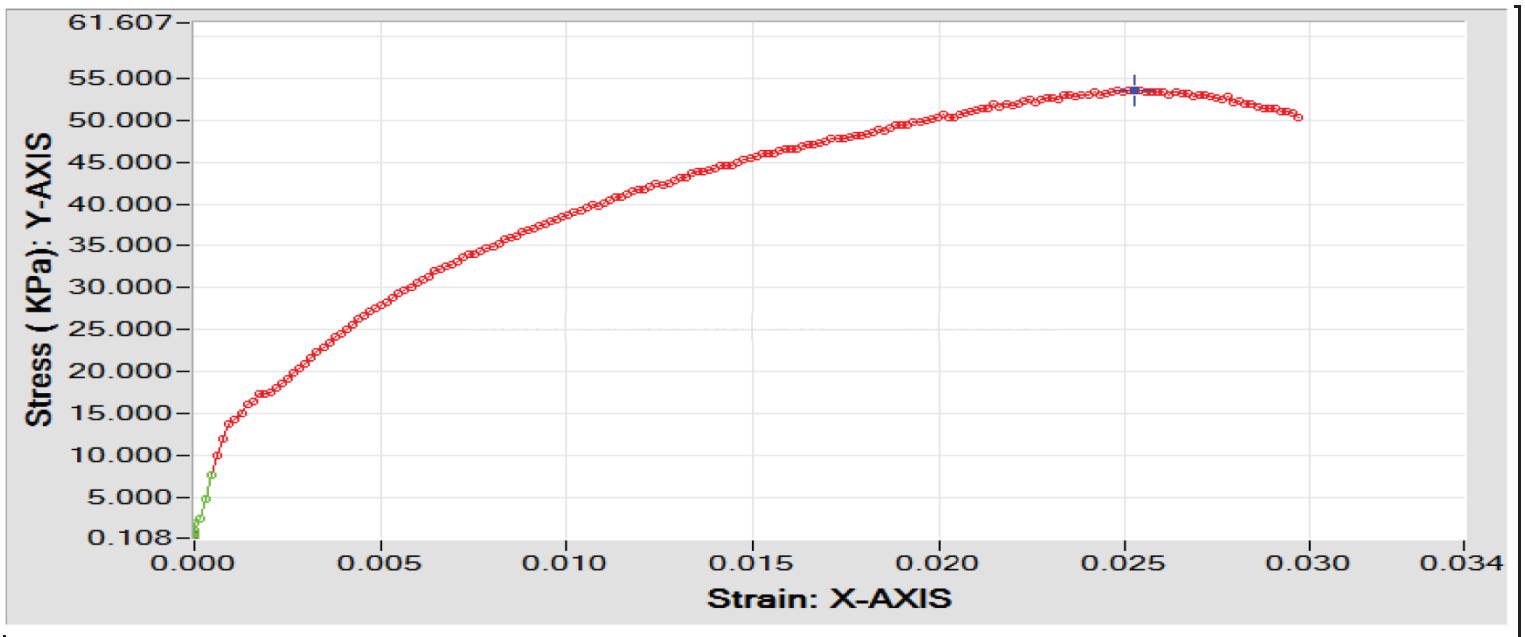
Attention: Guillaume Beauce

PROJECT NO.: 111216800

SAMPLED BY: Larry Presado
 SAMPLE ID: TH14 @ 1.5 - 2.1 m

REPORT NO.:
 DATE RECEIVED: October 3, 2016
 TESTED BY: Nestor Abarca

Soil Description: clay, brown, stiff, moist, high plasticity



Failure Description: diagonal shear failure in the mid section of test specimen



Diameter, mm:	72.56
Height, mm:	161.74
Height/Diameter Ratio:	2.23
Sample Weight, g:	1171.02
Moisture Content, %:	24.9
Wet Unit Weight, kN/m ³ :	17.16
Dry Unit Weight, kN/m ³ :	13.74
Void ratio:	0.96
Saturation, %:	71.21
Unconfined Compressive Strength, kPa:	53.57
Strain at Failure, %:	2.53

REPORT DATE: November 7, 2016

REVIEWED BY: Guillaume Beauce, Eng.



LABORATORY
 199 Henlow Bay
 Winnipeg MB R3Y 1G4
 Tel: (204) 488-6999

**UNCONFINED COMPRESSIVE
 STRENGTH OF COHESIVE SOIL
 ASTM D2166**

Stantec Consulting Ltd.
 500-311 Portage Avenue
 Winnipeg, Manitoba
 R3B 2B9

PROJECT: NEWPCC Upgrade

PROJECT NO.: 111216800

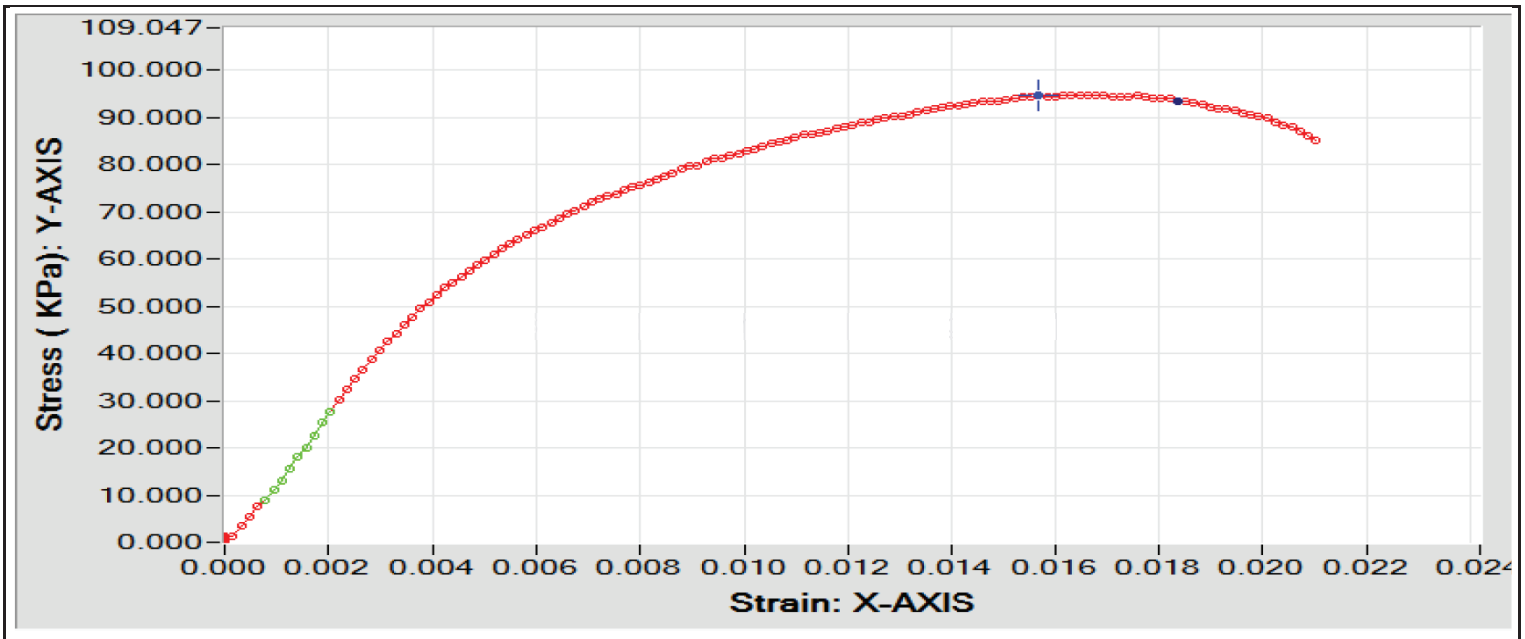
Attention: Guillaume Beauce

REPORT NO.:

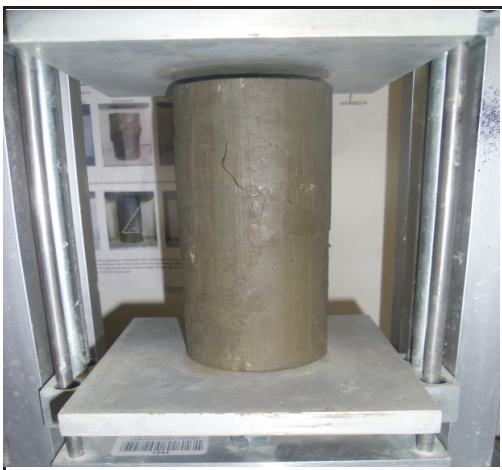
SAMPLED BY: Larry Presado
 SAMPLE ID: TH14 @ 4.6 - 5.2 m

DATE RECEIVED: September 22, 2016
 TESTED BY: Nestor Abarca

Soil Description: clay, brown, stiff, moist, high plasticity
trace silt



Failure Description: diagonal shear failure



Diameter, mm:	72.54
Height, mm:	161.85
Height/Diameter Ratio:	2.23
Sample Weight, g:	1144.85
Moisture Content, %:	54.0
Wet Unit Weight, kN/m³:	16.77
Dry Unit Weight, kN/m³:	10.89
Void ratio:	1.47
Saturation, %:	100.71
Unconfined Compressive Strength, kPa:	94.82
Strain at Failure, %:	1.57

REPORT DATE: November 7, 2016

REVIEWED BY: Guillaume Beauce, P.Eng.



LABORATORY
 199 Henlow Bay
 Winnipeg MB R3Y 1G4
 Tel: (204) 488-6999

**UNCONFINED COMPRESSIVE
 STRENGTH OF COHESIVE SOIL
 ASTM D2166**

Stantec Consulting Ltd.
 500-311 Portage Avenue
 Winnipeg, Manitoba
 R3B 2B9

PROJECT: NEWPCC Upgrade

PROJECT NO.: 111216800

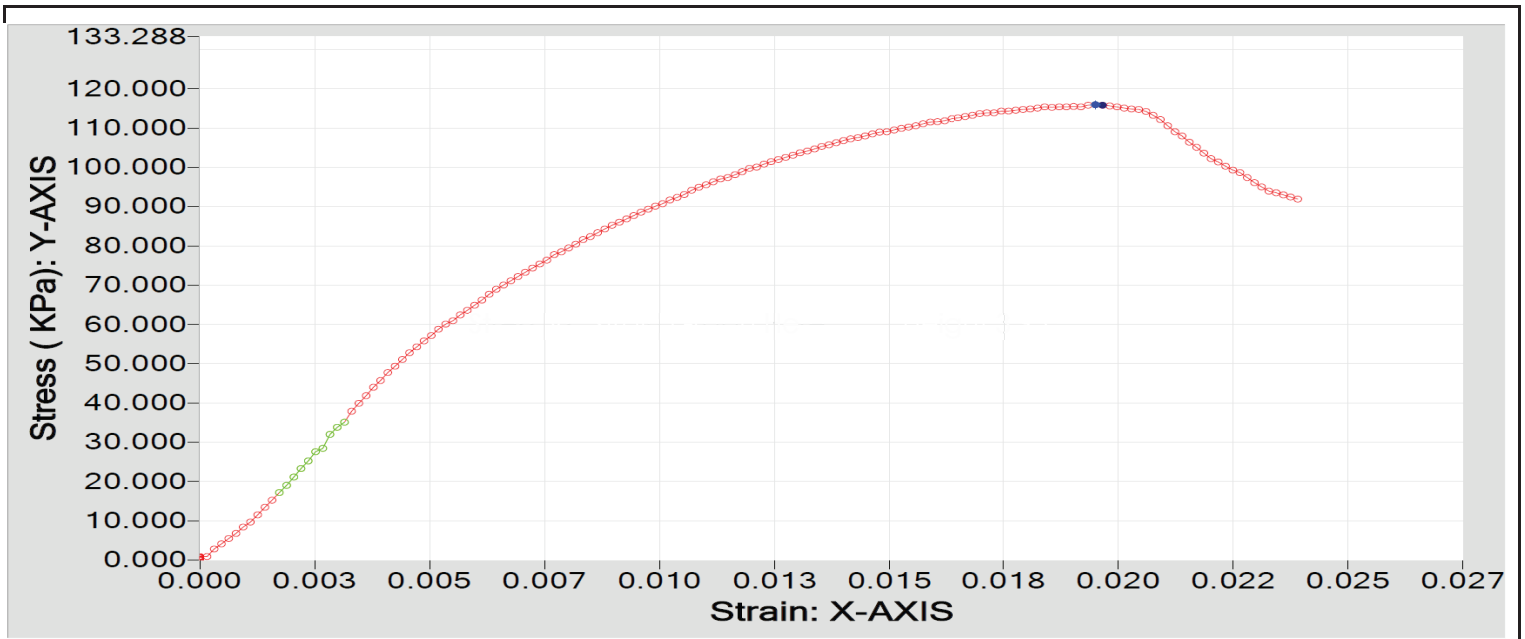
Attention: Guillaume Beauce

REPORT NO.:

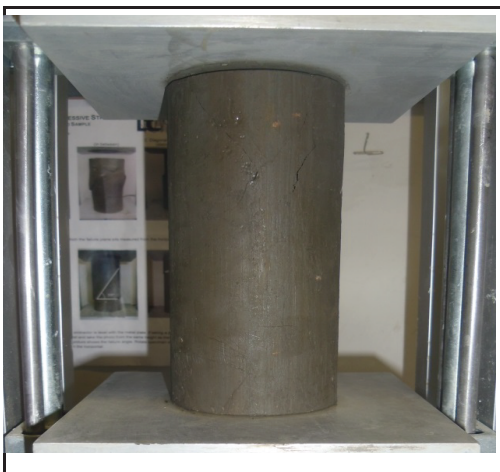
SAMPLED BY: Larry Presado
 SAMPLE ID: TH23 @10.7 - 11.3 m

DATE RECEIVED: September 26, 2016
 TESTED BY: Nestor Abarca

Soil Description: clay, grey, firm, moist, high plasticity
trace silt



Failure Description: daigonal shear failure bottom and top sections of test specimen



Diameter, mm:	72.68
Height, mm:	161.50
Height/Diameter Ratio:	2.22
Sample Weight, g:	1126.57
Moisture Content, %:	54.4
Wet Unit Weight, kN/m³:	16.48
Dry Unit Weight, kN/m³:	10.67
Void ratio:	1.52
Saturation, %:	98.06
Unconfined Compressive Strength, kPa:	115.90
Strain at Failure, %:	1.95

REPORT DATE: November 7, 2016

REVIEWED BY: Guillaume Beauce, P.Eng.



LABORATORY
 199 Henlow Bay
 Winnipeg MB R3Y 1G4
 Tel: (204) 488-6999

**UNCONFINED COMPRESSIVE
 STRENGTH OF COHESIVE SOIL
 ASTM D2166**

Stantec Consulting Ltd.
 500-311 Portage Avenue
 Winnipeg, Manitoba
 R3B 2B9

PROJECT: NEWPCC Upgrade

PROJECT NO.: 111216800

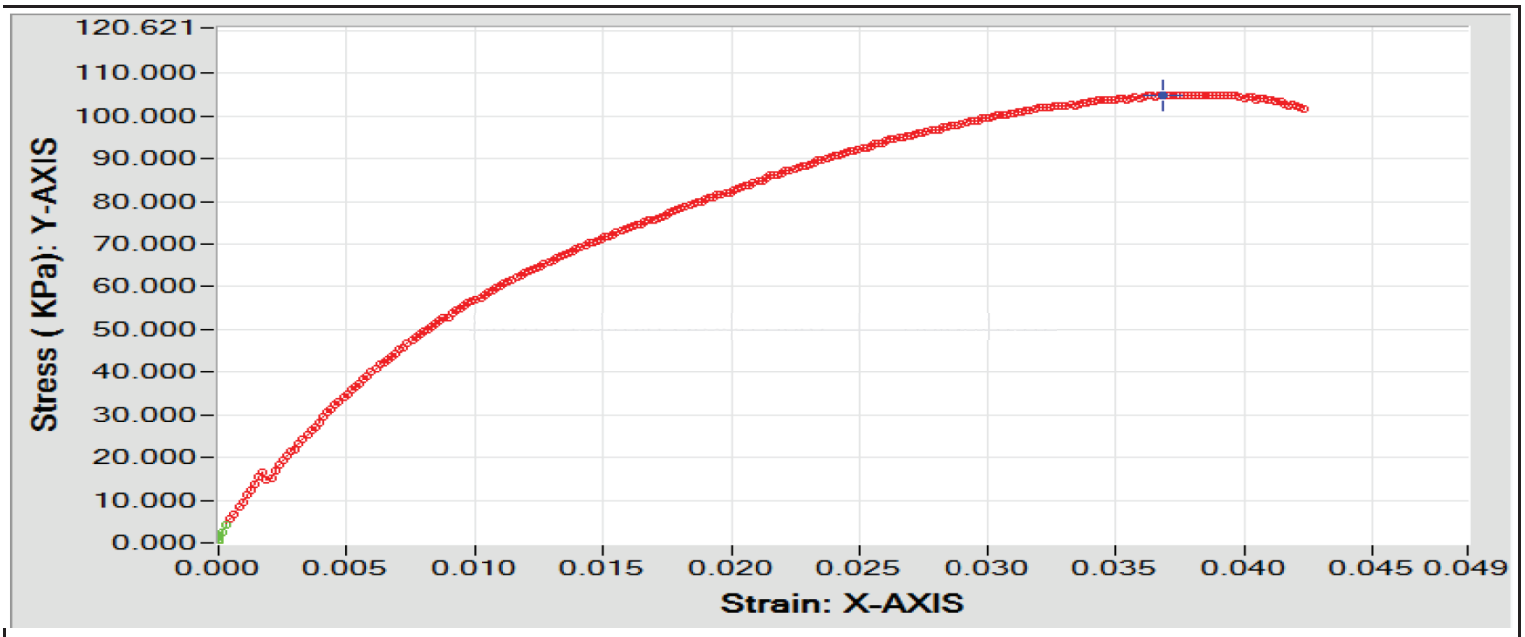
Attention: Guillaume Beauce

REPORT NO.:

SAMPLED BY: Larry Presado
 SAMPLE ID: TH23 @13.7 - 14.3 m

DATE RECEIVED: September 26, 2016
 TESTED BY: Nestor Abarca

Soil Description: clay, grey, firm, moist, high plasticity
trace coarse sand, trace fine gravel



Failure Description: diagonal shear failure at the bottom of test specimen



Diameter, mm:	72.26
Height, mm:	161.93
Height/Diameter Ratio:	2.24
Sample Weight, g:	1168.64
Moisture Content, %:	52.7
Wet Unit Weight, kN/m ³ :	17.25
Dry Unit Weight, kN/m ³ :	11.29
Void ratio:	1.39
Saturation, %:	104.58
Unconfined Compressive Strength, kPa:	104.89
Strain at Failure, %:	3.69

REPORT DATE: November 7, 2016

REVIEWED BY: Guillaume Beauce, P.Eng.



LABORATORY
 199 Henlow Bay
 Winnipeg MB R3Y 1G4
 Tel: (204) 488-6999

**UNCONFINED COMPRESSIVE
 STRENGTH OF COHESIVE SOIL
 ASTM D2166**

Stantec Consulting Ltd.
 500-311 Portage Avenue
 Winnipeg, Manitoba
 R3B 2B9

PROJECT: NEWPCC Upgrade

PROJECT NO.: 111216800

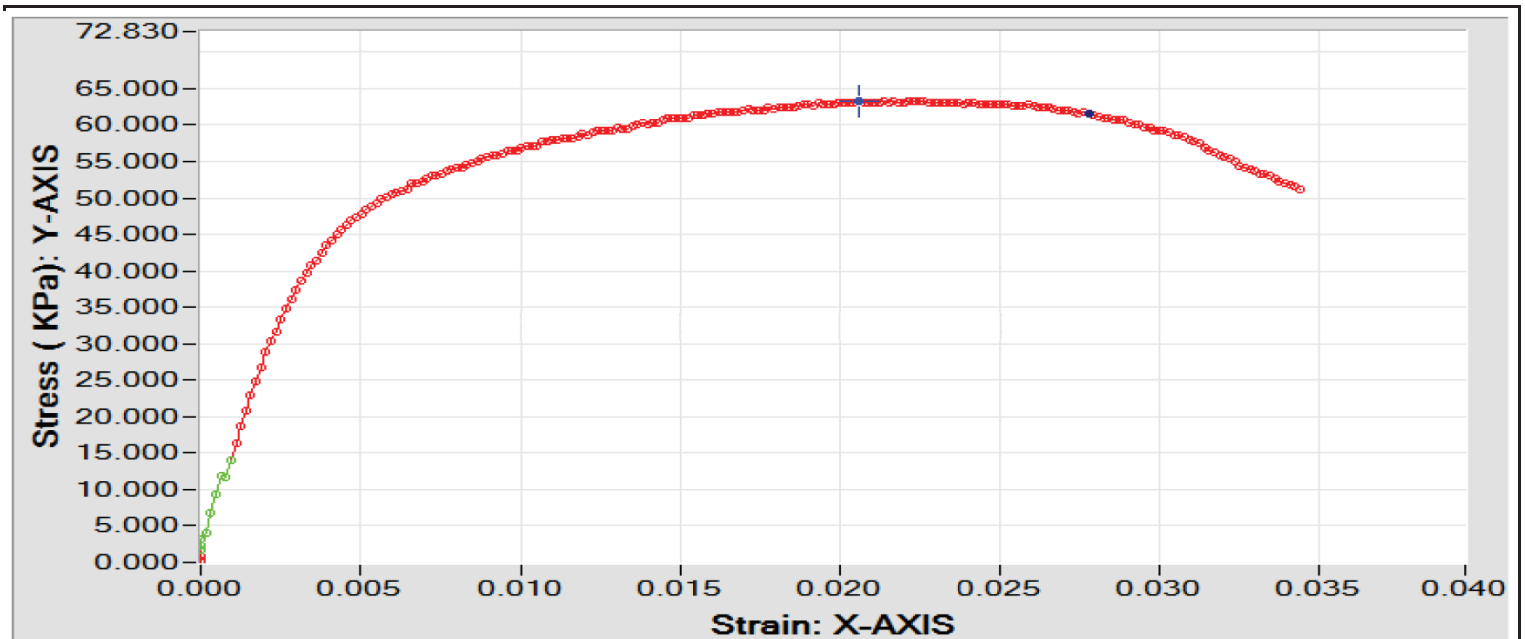
Attention: Guillaume Beauce

REPORT NO.:

SAMPLED BY: Larry Presado
 SAMPLE ID: TH25 @ 4.6 - 5.2 m

DATE RECEIVED: October 3, 2016
 TESTED BY: Nestor Abarca

Soil Description: clay, brown, stiff, moist, high plasticity



Failure Description: diagonal shear failure top section of test specimen



Diameter, mm:	72.33
Height, mm:	161.79
Height/Diameter Ratio:	2.24
Sample Weight, g:	1096.00
Moisture Content, %:	57.2
Wet Unit Weight, kN/m³:	16.16
Dry Unit Weight, kN/m³:	10.28
Void ratio:	1.62
Saturation, %:	96.97
Unconfined Compressive Strength, kPa:	63.33
Strain at Failure, %:	2.06

REPORT DATE: November 7, 2016

REVIEWED BY: Guillaume Beauce, P.Eng.



LABORATORY
 199 Henlow Bay
 Winnipeg MB R3Y 1G4
 Tel: (204) 488-6999

**UNCONFINED COMPRESSIVE
 STRENGTH OF COHESIVE SOIL
 ASTM D2166**

Stantec Consulting Ltd.
 500-311 Portage Avenue
 Winnipeg, Manitoba
 R3B 2B9

PROJECT: NEWPCC Upgrade

PROJECT NO.: 111216800

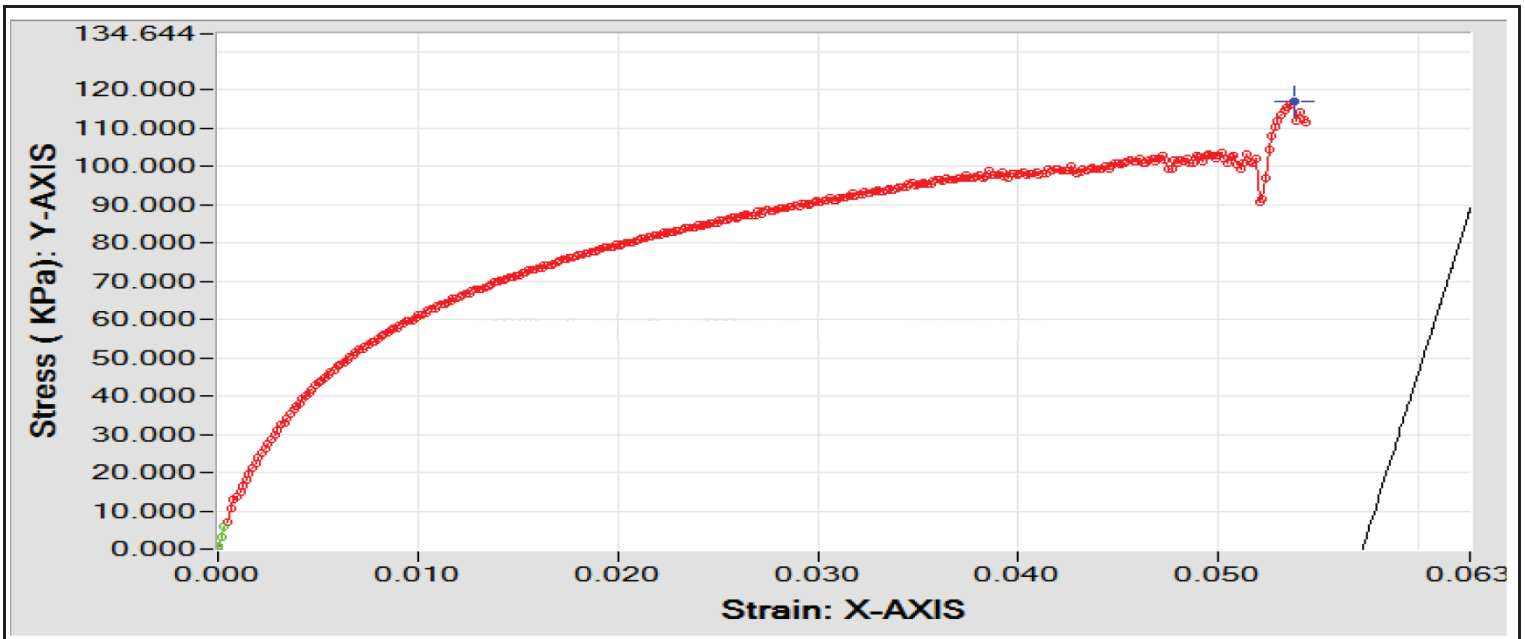
Attention: Guillaume Beauce

REPORT NO.:

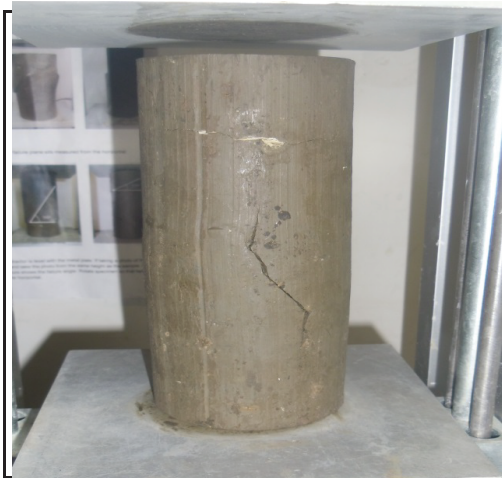
SAMPLED BY: Larry Presado
 SAMPLE ID: TH28 @ 1.5- 2.1 m

DATE RECEIVED: October 17, 2016
 TESTED BY: Nestor Abarca

Soil Description: clay, brown, stiff, moist, high plasticity



Failure Description: diagonal shear failure and bulged in the mid-section of test specimen



Diameter, mm:	72.68
Height, mm:	162.04
Height/Diameter Ratio:	2.23
Sample Weight, g:	1244.09
Moisture Content, %:	33.2
Wet Unit Weight, kN/m ³ :	18.14
Dry Unit Weight, kN/m ³ :	13.61
Void ratio:	0.98
Saturation, %:	93.30
Unconfined Compressive Strength, kPa:	117.08
Strain at Failure, %:	5.38

REPORT DATE: November 7, 2016

REVIEWED BY: Guillaume Beauce, P.Eng.



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**UNCONFINED COMPRESSIVE
 STRENGTH OF COHESIVE SOIL
 ASTM D2166**

Stantec Consulting Ltd.
 500-311 Portage Avenue
 Winnipeg, Manitoba
 R3B 2B9

PROJECT: NEWPCC Upgrade

PROJECT NO.: 111216800

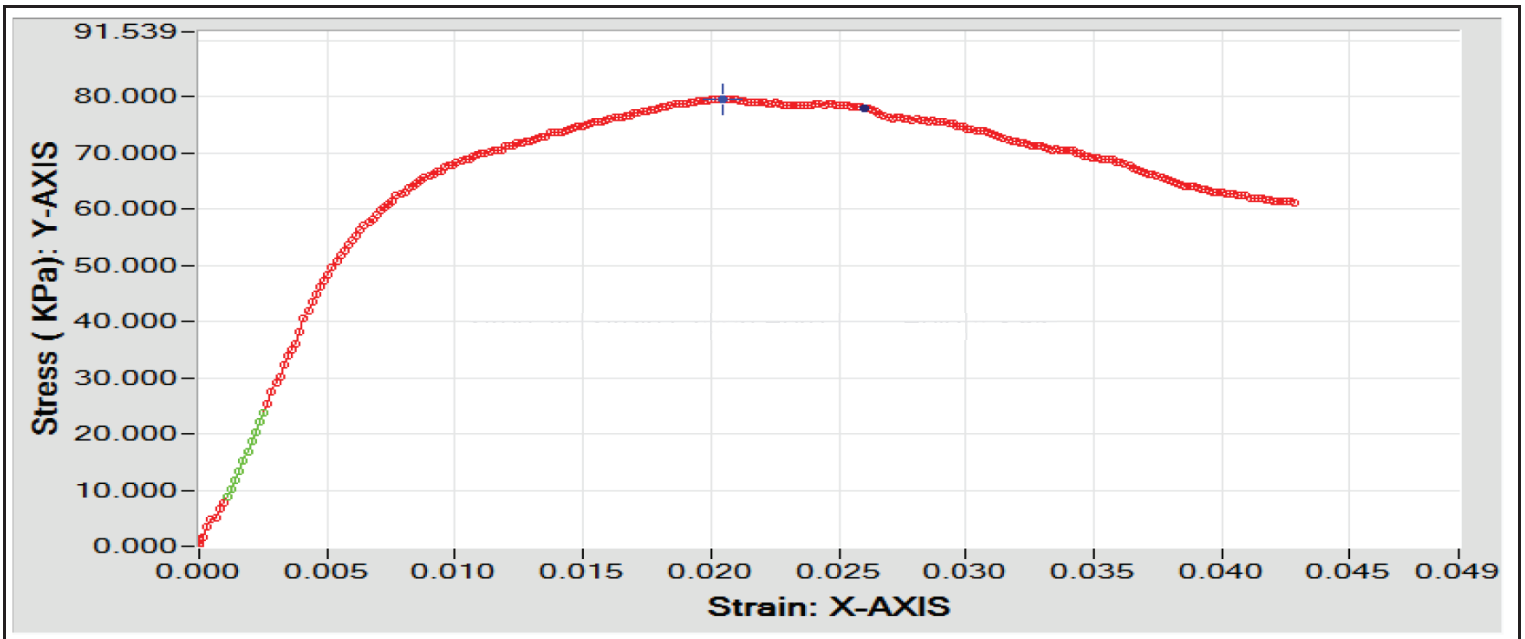
Attention: Guillaume Beauce

REPORT NO.:

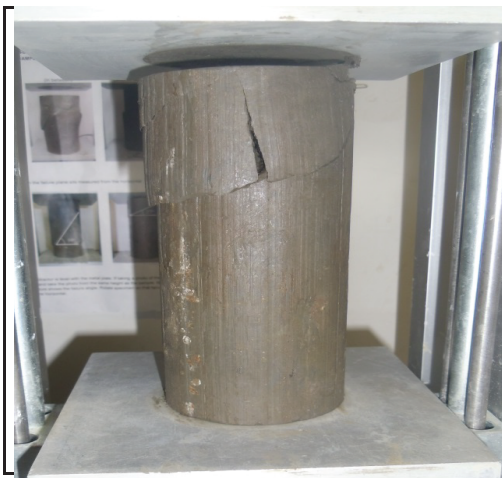
SAMPLED BY: Larry Presado
 SAMPLE ID: TH28 @ 4.6 - 5.2 m

DATE RECEIVED: October 17, 2016
 TESTED BY: Nestor Abarca

Soil Description: clay, brown, stiff, moist, high plasticity



Failure Description: Failure along slickenside of test specimen.



Diameter, mm:	72.66
Height, mm:	161.30
Height/Diameter Ratio:	2.22
Sample Weight, g:	1108.54
Moisture Content, %:	59.8
Wet Unit Weight, kN/m ³ :	16.24
Dry Unit Weight, kN/m ³ :	10.16
Void ratio:	1.65
Saturation, %:	99.55
Unconfined Compressive Strength, kPa:	79.60
Strain at Failure, %:	2.05

REPORT DATE: November 7, 2016

REVIEWED BY: Guillaume Beauce, P.Eng.



LABORATORY
 199 Henlow Bay
 Winnipeg MB R3Y 1G4
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**UNCONFINED COMPRESSIVE
 STRENGTH OF COHESIVE SOIL
 ASTM D2166**

Stantec Consulting Ltd.
 500-311 Portage Avenue
 Winnipeg, Manitoba
 R3B 2B9

PROJECT: NEWPCC Upgrade

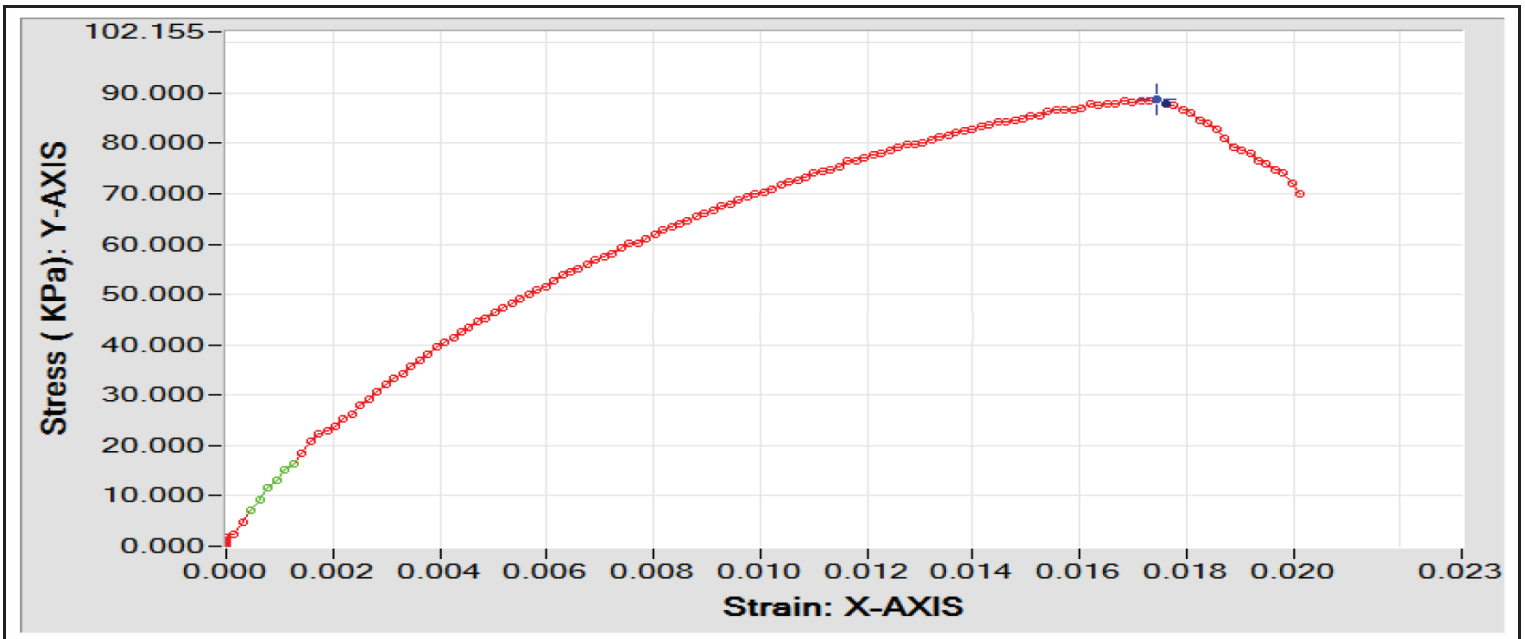
Attention: Guillaume Beauce

PROJECT NO.: 111216800

SAMPLED BY: Larry Presado
 SAMPLE ID: 10.7 - 11.3 m

REPORT NO.:
 DATE RECEIVED: October 17, 2016
 TESTED BY: Nestor Abarca

Soil Description: clay, grey, firm, moist, high plasticity



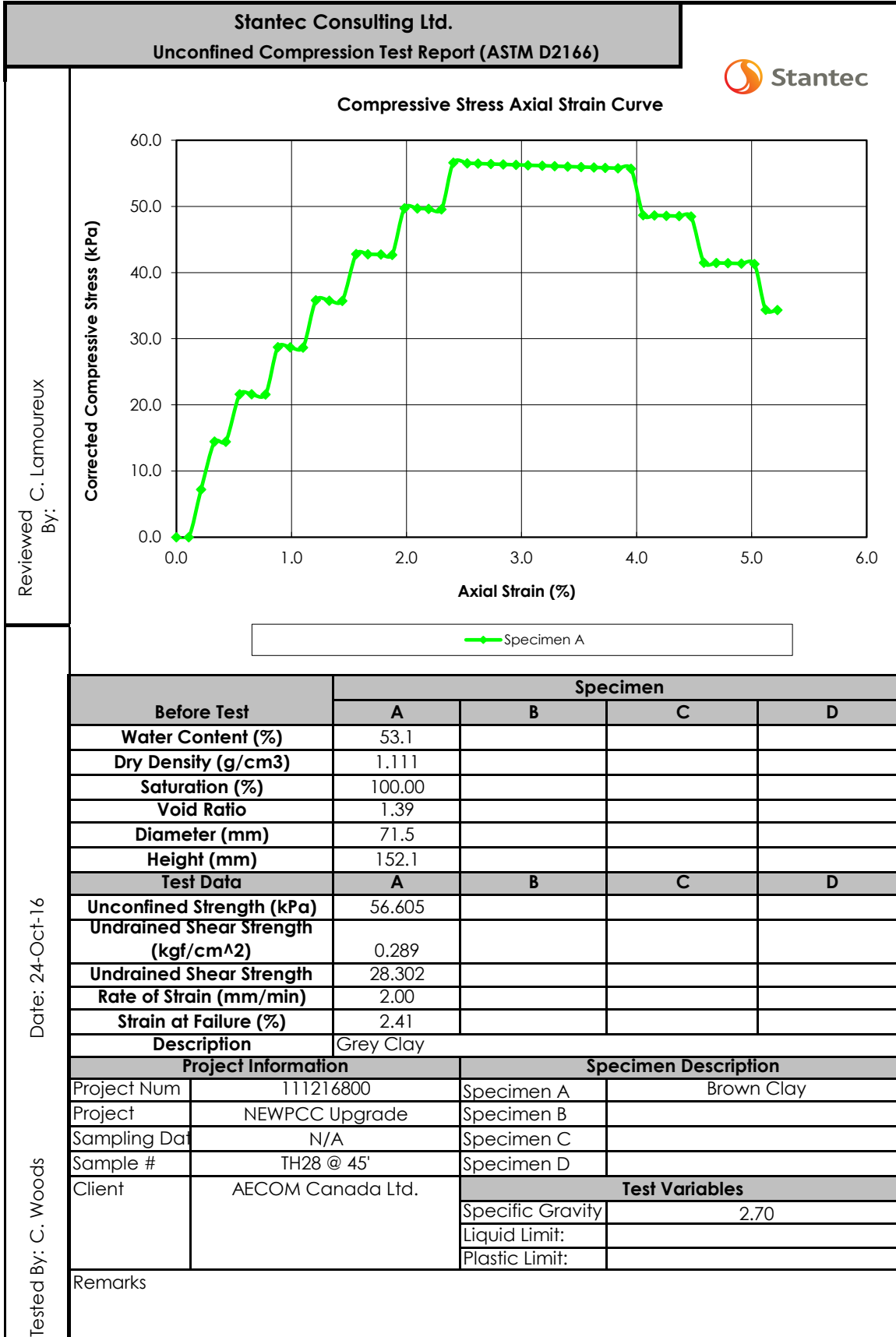
Failure Description: diagonal shear failure bottom section of test specimen



Diameter, mm:	72.35
Height, mm:	161.47
Height/Diameter Ratio:	2.23
Sample Weight, g:	1139.67
Moisture Content, %:	49.8
Wet Unit Weight, kN/m³:	16.82
Dry Unit Weight, kN/m³:	11.23
Void ratio:	1.40
Saturation, %:	97.81
Unconfined Compressive Strength, kPa:	88.83
Strain at Failure, %:	1.75

REPORT DATE: November 7, 2016

REVIEWED BY: Guillaume Beauce, P.Eng.





Specific Gravity of Soil
 ASTM D854 - Method A
 Procedure For Moist Specimens

OFFICE
 325 - 25th Street SE
 Suite 200
 Calgary, Alberta
 Canada T2A 7H8
 Tel: (403) 716-8000
 Fax: (403) 716-8099

LABORATORY
 10830 - 46th Street SE
 Calgary, Alberta
 Canada T2H 0T2
 Tel: (403) 253-7876
 Fax: (403) 253-0021

Client: AECOM Canada Ltd.
 Project Name: NEWPCC Upgrade
 Project No.: 111216800.245
 Soil Description: Clay (CH)
 Notes: Max. Particle Size of Test Specimen = 4.75mm
Sample deaired using rapid boiling method

Sample: TH09 @ 15'
 Tested By: C, Woods
 Date: 10/25/2016

Soil Type	Minimum Specimen Dry Weight (g)
SP, SP-SM	100 +/- 10
SP-SC, SM, SC	75 +/- 10
Silt or Clay	50 +/- 10

Moisture Content (ASTM D2216)		
Tare no.	BL	
Wet Wt. & Tare	16.34	g
Dry Wt. & Tare	15.72	g
Wt. of Water	0.62	g
Tare Wt.	1.48	g
Wt. of Dry Soil	14.24	g
Moisture Content	0.04	%

{A} Calibration of Pycnometers (Revised 03-10-16)

Pycnometer No.		H1	A	Z1
Mean Mass of Pycnometer		161.40	166.32	170.46
Mean Calibrated Volume of Pycnometer (g/mL)	Vp	499.19	499.36	499.74

{B} Specific Gravity Determination

		Trial # 1	Trial #2	Trial #3
Mass of Pycnometer (g)*		161.40	166.31	170.45
Mass of Tare (g)		238.90	589.90	285.50
Mass of Tare & Soil (g)		287.50	638.60	333.90
Mass of Oven-Dried Solids	Ms	48.60	48.70	48.40
Mass of Deaired Water, Pycnometer & Soil (g)	Mpws,ti	689.94	694.95	699.40
Temperature of Deaired Water, Pycnometer & Soil	Tt	20.50	20.50	20.50
Density of Water @ Tt (g/mL)	pw,t	0.99810	0.99810	0.99810
Mass of Water & Pycnometer at Test	Mpw,t	659.64	664.73	669.25
Conversion Factor for (Tt)	K	0.99990	0.99990	0.99990
Specific Gravity (0.001)	Gt	2.66	2.63	2.65

*max tolerance of 0.06g from calibration

2.65
 (maximum tolerance of 0.02 between trials)

Reviewed By: _____



Specific Gravity of Soil
 ASTM D854 - Method A
 Procedure For Moist Specimens

OFFICE
 325 - 25th Street SE
 Suite 200
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LABORATORY
 10830 - 46th Street SE
 Calgary, Alberta
 Canada T2H 0T2
 Tel: (403) 253-7876
 Fax: (403) 253-0021

Client: AECOM Canada Ltd.
 Project Name: NEWPCC Upgrade
 Project No.: 111216800.245
 Soil Description: Clay (CH)
 Notes: Max. Particle Size of Test Specimen = 4.75mm
Sample deaired using rapid boiling method

Sample: TH09 @ 35'
 Tested By: C, Woods
 Date: 10/26/2016

Soil Type	Minimum Specimen Dry Weight (g)
SP, SP-SM	100 +/- 10
SP-SC, SM, SC	75 +/- 10
Silt or Clay	50 +/- 10

Moisture Content (ASTM D2216)		
Tare no.	GB	
Wet Wt. & Tare	12.05	g
Dry Wt. & Tare	11.77	g
Wt. of Water	0.28	g
Tare Wt.	1.39	g
Wt. of Dry Soil	10.38	g
Moisture Content	0.03	%

{A} Calibration of Pycnometers (Revised 03-10-16)

Pycnometer No.		H1	A	Z1
Mean Mass of Pycnometer		161.40	161.40	170.46
Mean Calibrated Volume of Pycnometer (g/mL)	V _p	499.19	499.19	499.74

{B} Specific Gravity Determination

		Trial # 1	Trial #2	Trial #3
Mass of Pycnometer (g)*		161.40	161.40	170.45
Mass of Tare (g)		285.70	367.60	239.20
Mass of Tare & Soil (g)		334.40	417.00	288.30
Mass of Oven-Dried Solids	M _s	48.70	49.40	49.10
Mass of Deaired Water, Pycnometer & Soil (g)	M _{pws,ti}	689.94	690.52	700.05
Temperature of Deaired Water, Pycnometer & Soil	T _t	21.90	21.90	21.90
Density of Water @ T _t (g/mL)	p _{w,t}	0.99780	0.99780	0.99780
Mass of Water & Pycnometer at Test	M _{pw,t}	659.49	659.49	669.10
Conversion Factor for (T _t)	K	0.99959	0.99959	0.99959
Specific Gravity (0.001)	G _t	2.67	2.69	2.70

*max tolerance of 0.06g from calibration

2.69
 (maximum tolerance of 0.02 between trials)

Reviewed By: 



LABORATORY
 199 Henlow Bay
 Winnipeg MB R3Y 1G4
 Tel: (204) 488-6999

**HYDRAULIC CONDUCTIVITY
 ASTM D5084**

Stantec Consulting Ltd.
 500 - 311 Portage Avenue
 Winnipeg, Manitoba
 R3B 2B0

PROJECT: NEWPCC

REPORT NO.: 1

Attention: Guillaume Beauce

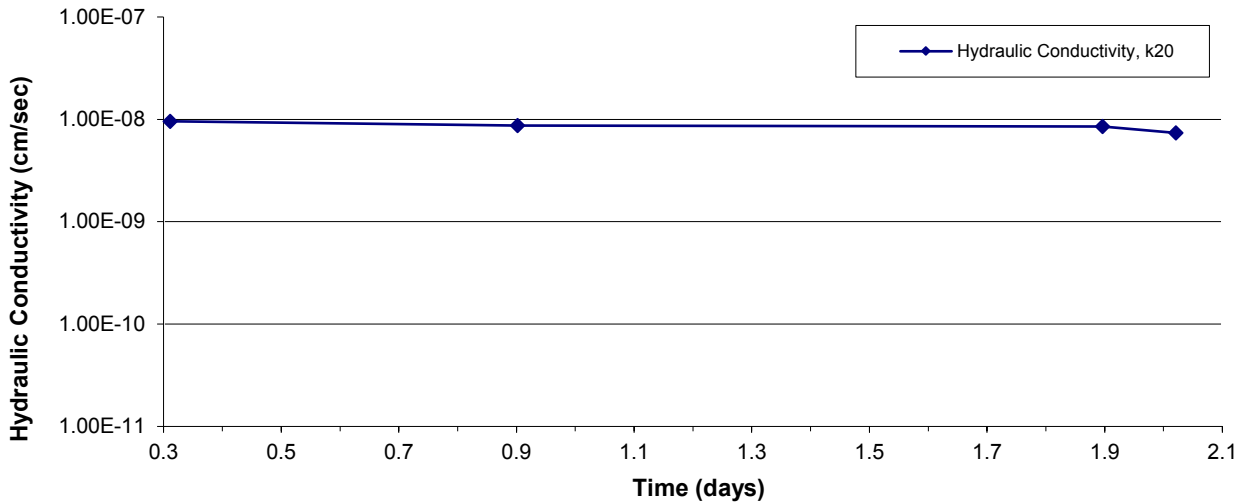
PROJECT NO.: 111216800

SAMPLE FIELD I.D.: TH18, 15' - 17'

SOIL DESCRIPTION: Clay, brown, moist, stiff to firm, high plasticity, trace silt inclusions

DATE TESTED: October 21 to October 28, 2016
 CONFINING PRESSURE (kPa): 137.9
 EFFECTIVE SATURATION STRESS (kPa): 82.7
 ASSUMED SPECIFIC GRAVITY: 2.71
 HYDRAULIC GRADIENT: 18.9
 TYPE OF PERMEANT LIQUID: De-aired Water
 HYDRAULIC CONDUCTIVITY, "k" (cm/s): 8.9E-09
HYDRAULIC CONDUCTIVITY, "k₂₀" (cm/s): 8.5E-09

	Height (mm)	Diameter (mm)	Wet Mass (g)	Dry Density (g/cm ³)	Water Content (%)	Saturation (%)
Initial Reading	77.4	72.4	546.0	1.126	52.1	100.3
Final Reading	78.4	72.9	552.0	1.093	54.3	99.4



REPORT DATE: October 29, 2016

REVIEWED BY: Jason Thompson, C.E.T.



LABORATORY
 199 Henlow Bay
 Winnipeg MB R3Y 1G4
 Tel: (204) 488-6999

**HYDRAULIC CONDUCTIVITY
 ASTM D5084**

Stantec Consulting Ltd.
 500 - 311 Portage Avenue
 Winnipeg, Manitoba
 R3B 2B0

PROJECT: NEWPCC

REPORT NO.: 2

Attention: Guillaume Beauce

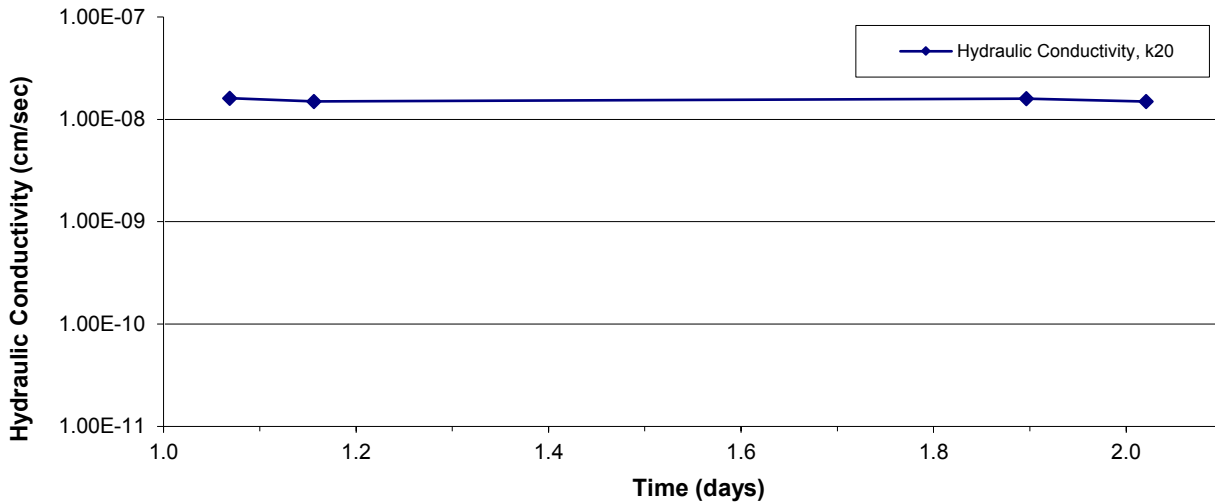
PROJECT NO.: 111216800

SAMPLE FIELD I.D.: TH28, 35' - 37'

SOIL DESCRIPTION: Clay, grey, moist, firm, high plasticity, trace silt till inclusions, trace fine gravel


DATE TESTED: October 21 to October 28, 2016
 CONFINING PRESSURE (kPa): 137.9
 EFFECTIVE SATURATION STRESS (kPa): 34.5
 ASSUMED SPECIFIC GRAVITY: 2.71
 HYDRAULIC GRADIENT: 19.1
 TYPE OF PERMEANT LIQUID: De-aired Water
 HYDRAULIC CONDUCTIVITY, "k" (cm/s): 1.7E-08
HYDRAULIC CONDUCTIVITY, "k₂₀" (cm/s): 1.6E-08

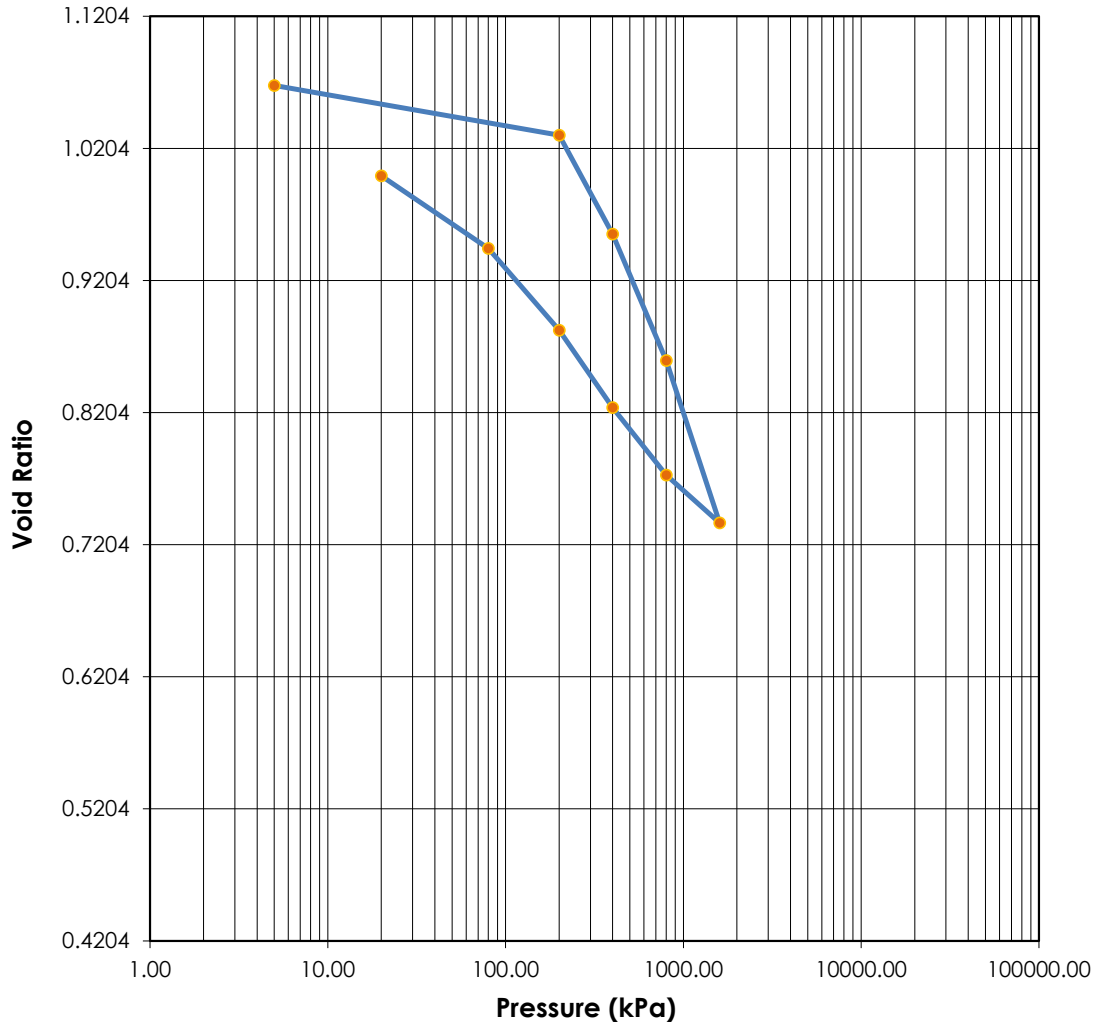
	Height (mm)	Diameter (mm)	Wet Mass (g)	Dry Density (g/cm ³)	Water Content (%)	Saturation (%)
Initial Reading	77.2	73.2	553.7	1.130	50.9	98.5
Final Reading	77.8	72.6	560.4	1.143	52.1	103.1



REPORT DATE: October 29, 2016

REVIEWED BY: Jason Thompson, C.E.T.

	Stantec Consulting Ltd. One-Dimensional Consolidation Test ASTM D2435 Test Results	Calgary Laboratory 10830 - 46th Street SE Calgary, Alberta T2C 1G4 Tel: (403) 253-7876
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	Before	After	Liquid Limits:	-	Test Date: 18-Oct-16
Moisture (%):	34.5	43.7	Plastic Limits:	-	
Dry Density (g/cm³):	1.303	1.265	Plasticity Index (%):	-	
Saturation (%):	87.00	100.00	Specific Gravity:	2.70	Assumed
Void Ratio:	1.0694	1.0010			
Soil Description: Brown Clay					
Project Number:	111216800		Depth:	1.5m	
Sample Number:	TH6 @ 5'	Boring Number:	Remarks: Loads at 10kPa, 40kPa, 80kPa, and 100kPa omitted due to swelling.		
Project:	NEWPCC Upgrades				
Client:	AECOM Canada Ltd.				
Location:					

Tested By: C. woods

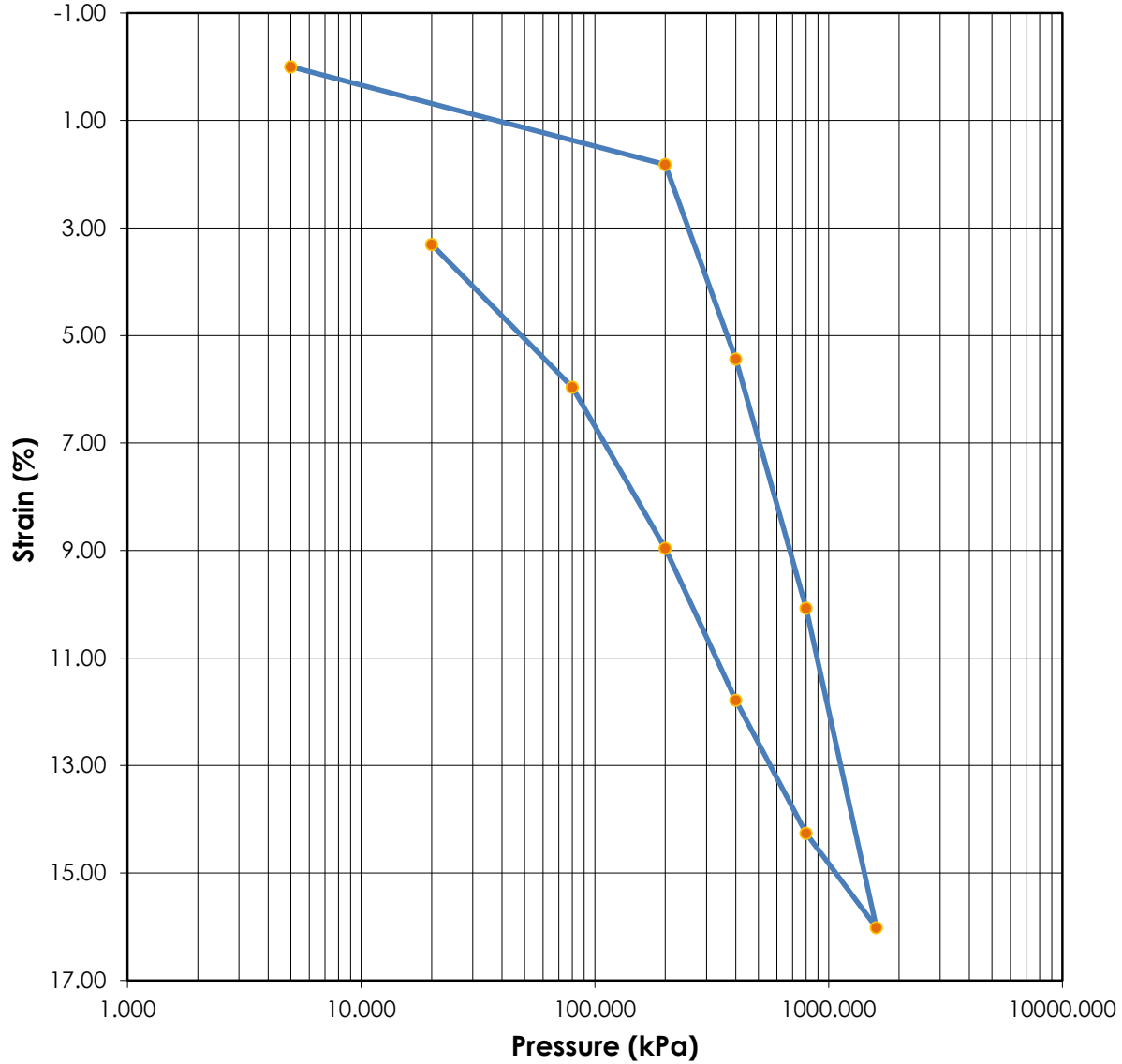
Reviewed By:

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of the test results is provided only on written request. The data presented above is for the sole use of the client stipulated above. Stantec is not responsible, nor can be held liable, for the use of this report by any other party, with or without the knowledge of Stantec.




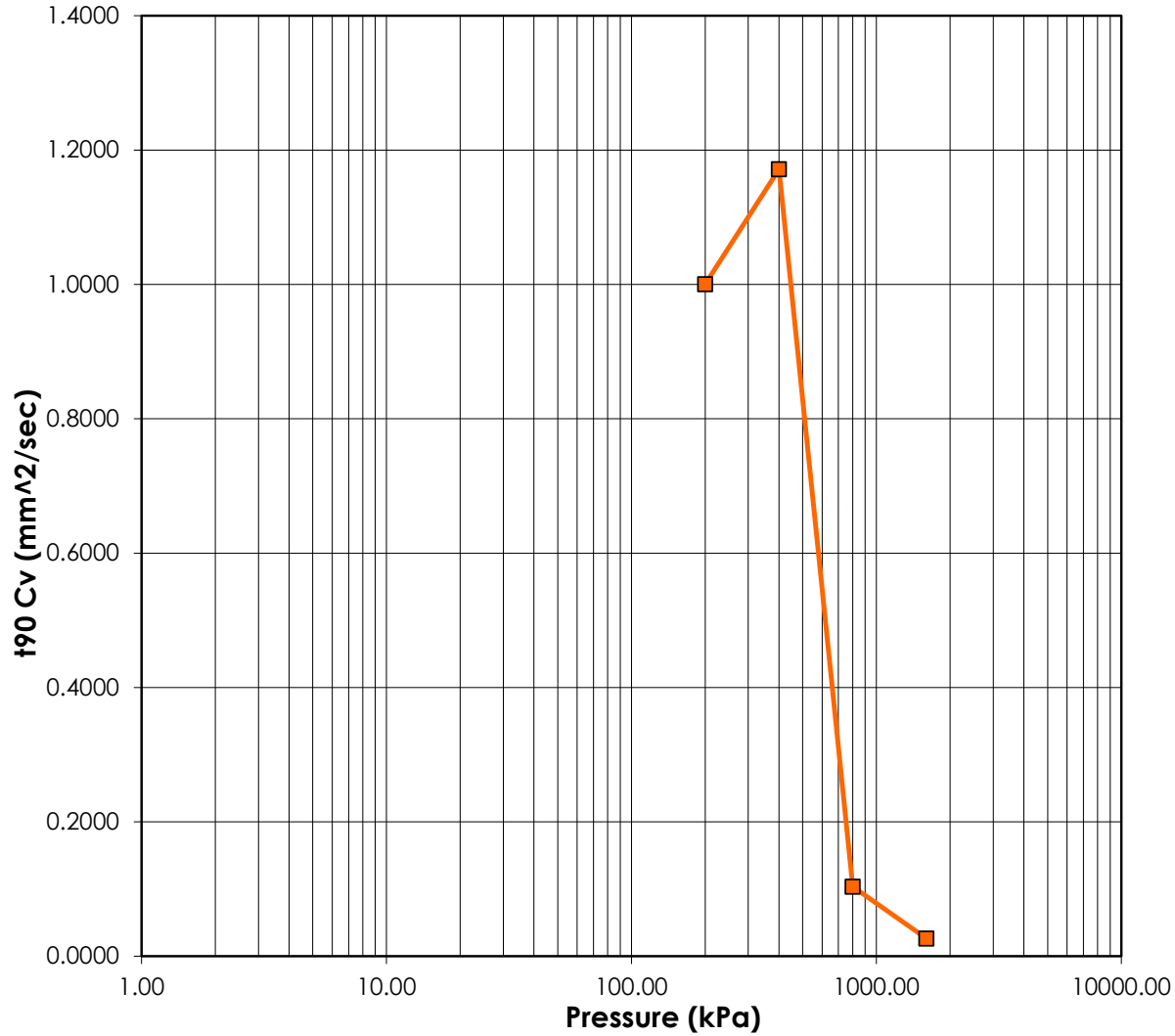
Stantec Consulting Ltd.
One-Dimensional Consolidation Test
ASTM D2435
Test Results

Calgary Laboratory
 10830 - 46th Street SE
 Calgary, Alberta T2C 1G4
 Tel: (403) 253-7876




	Before	After	Liquid Limits:	-	Test Date:	18-Oct-16
Moisture (%):	34.5	43.7	Plastic Limits:	-		
Dry Density (g/cm ³):	1.303	1.265	Plasticity Index (%):	-		
Saturation (%):	87.00	100.00	Specific Gravity:	2.70	Assumed	
Void Ratio:	1.0694	1.0010				
Sample Description:	Brown Clay					
Project Number:	111216800	Depth:	1.5m	Remarks:		
Sample Number:	TH6 @ 5'	Boring Number:		Loads at 10kPa, 40kPa, 80kPa,		
Project:	NEWPCC Upgrades			and 100kPa omitted due to		
Client:	AECOM Canada Ltd.			swelling.		
Location:						

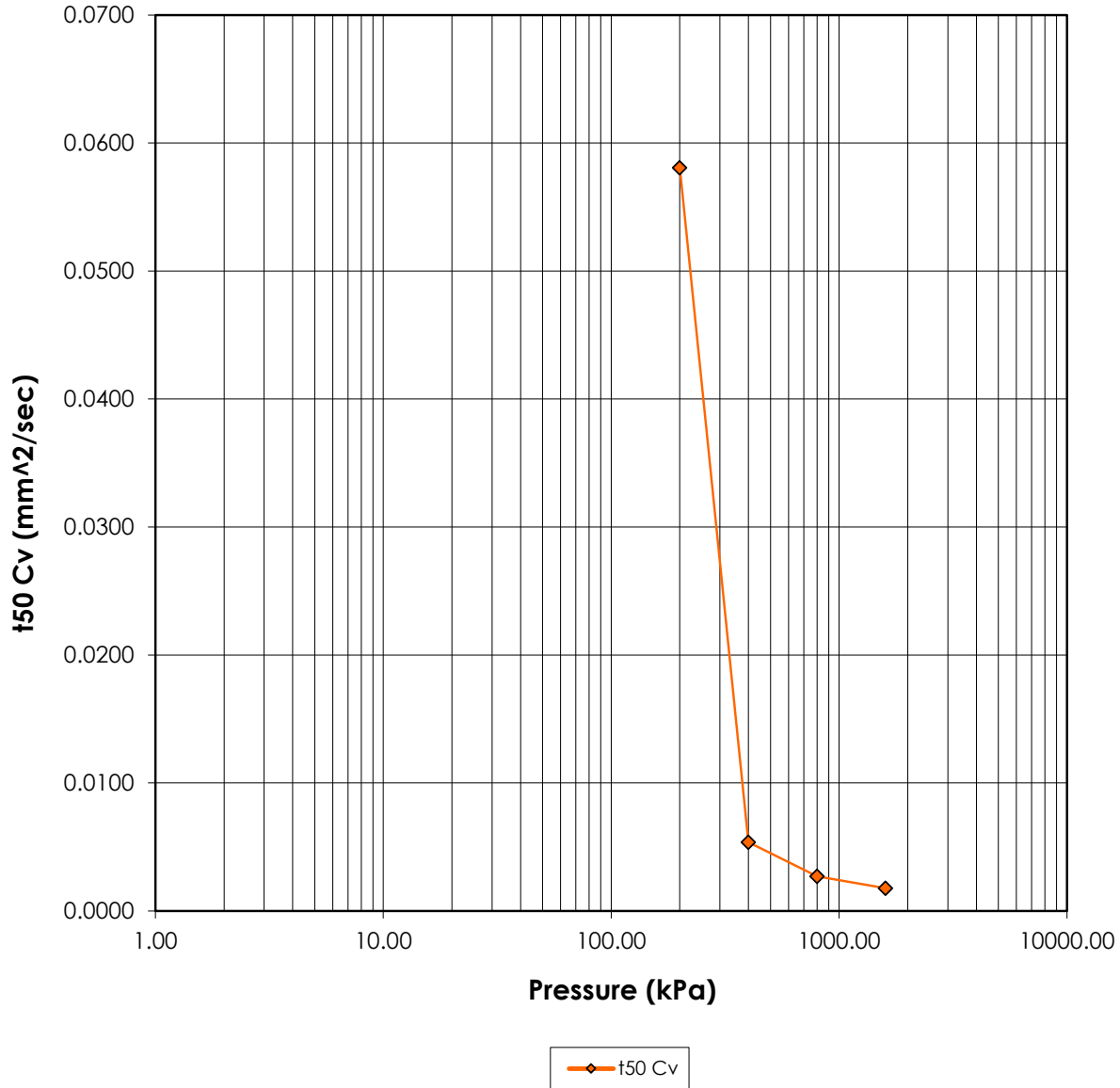
	Stantec Consulting Ltd. One-Dimensional Consolidation Test ASTM D2435 Test Results	Calgary Laboratory 10830 - 46th Street SE Calgary, Alberta T2C 1G4 Tel: (403) 253-7876
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—■— $t_{90} C_v$

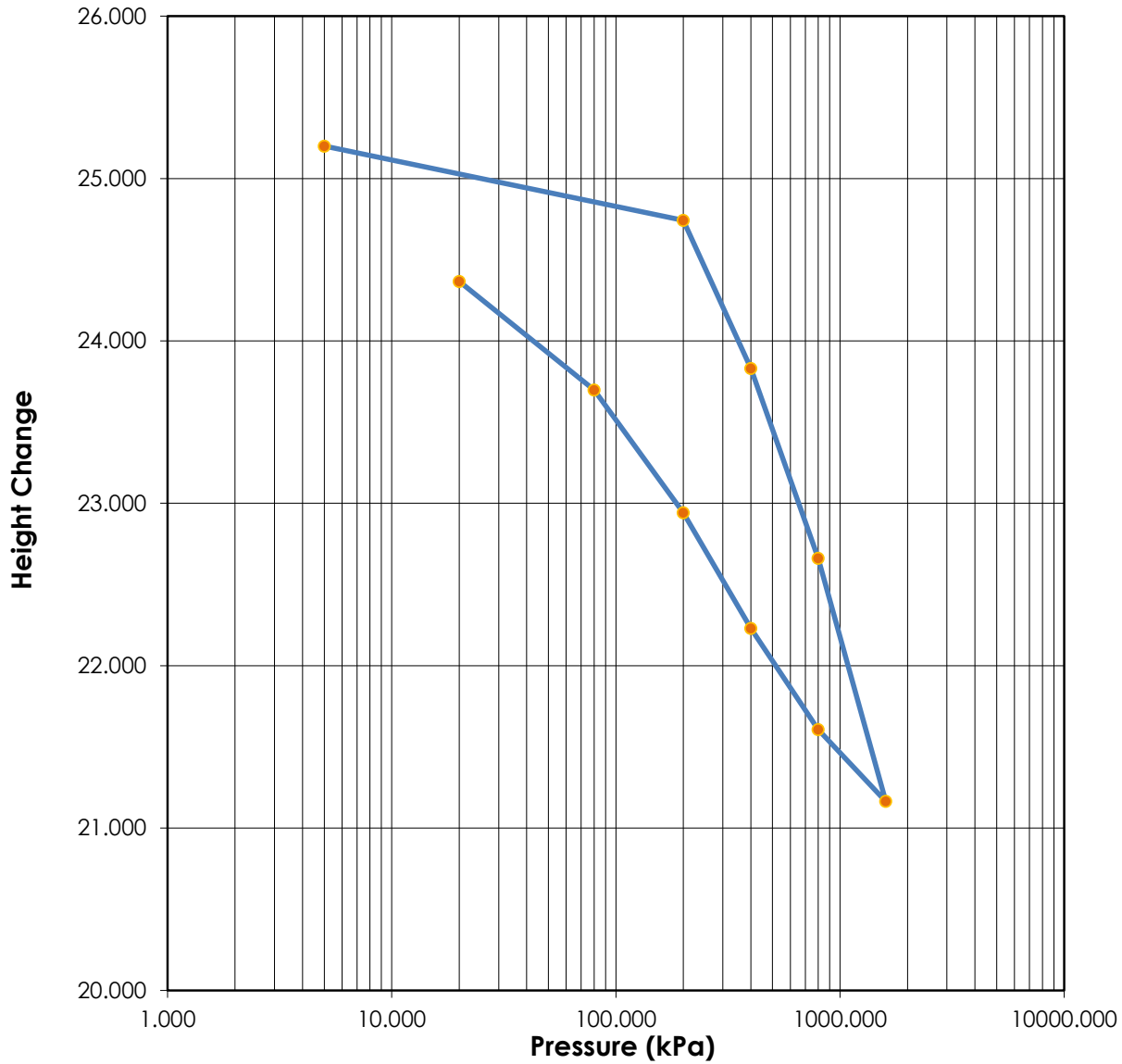
	Before	After	Liquid Limits:	-	Test Date:	18-Oct-16
Moisture (%):	34.5	43.7	Plastic Limits:	-		
Dry Density (g/cm³):	1.303	1.265	Plasticity Index (%):	-		
Saturation (%):	87.00	100.00	Specific Gravity:	2.70	Assumed	
Void Ratio:	1.0694	1.0010				
Soil Description:	Brown Clay					
Project Number:	111216800		Depth:	1.5m		
Sample Number:	TH6 @ 5'		Boring Number:			
Project:	NEWPCC Upgrades			Remarks:	Loads at 10kPa, 40kPa, 80kPa, and 100kPa omitted due to swelling.	
Client:	AECOM Canada Ltd.					
Location:						

	Stantec Consulting Ltd. One-Dimensional Consolidation Test ASTM D2435 Test Results	Calgary Laboratory 10830 - 46th Street SE Calgary, Alberta T2C 1G4 Tel: (403) 253-7876
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	Before	After	Liquid Limits:	-	Test Date:	18-Oct-16
Moisture (%):	34.5	43.7	Plastic Limits:	-		
Dry Density (g/cm³):	1.303	1.265	Plasticity Index (%):	-		
Saturation (%):	87.00	100.00	Specific Gravity:	2.70	Assumed	
Void Ratio:	1.0694	1.0010				
Soil Description:	Brown Clay					
Project Number:	111216800		Depth:	1.5m		
Sample Number:	TH6 @ 5'		Boring Number:			
Project:	NEWPCC Upgrades			Remarks:	Loads at 10kPa, 40kPa, 80kPa, and 100kPa omitted due to swelling.	
Client:	AECOM Canada Ltd.					
Location:						

	Stantec Consulting Ltd. One-Dimensional Consolidation Test ASTM D2435 Test Results	Calgary Laboratory 10830 - 46th Street SE Calgary, Alberta T2C 1G4 Tel: (403) 253-7876
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	Before	After	Liquid Limits:	-	Test Date:	18-Oct-16
Moisture (%):	34.5	43.7	Plastic Limits:	-		
Dry Density (g/cm³):	1.303	1.265	Plasticity Index (%):	-		
Saturation (%):	87.00	100.00	Specific Gravity:	2.70	Assumed	
Void Ratio:	1.0694	1.0010				
Soil Description:	Brown Clay					
Project Number:	111216800		Depth:	1.5m		
Sample Number:	TH6 @ 5'		Boring Number:			
Project:	NEWPCC Upgrades			Remarks: Loads at 10kPa, 40kPa, 80kPa, and 100kPa omitted due to swelling.		
Client:	AECOM Canada Ltd.					
Location:						

**Consolidation Test Results
 Summary**

Project: NEWPCC Upgrades
Location:
Job Number:

Project Number: 111216800


Sample Number: TH6 @ 5'
Boring Number:
Depth: 1.5m
Sample Type: Undisturbed

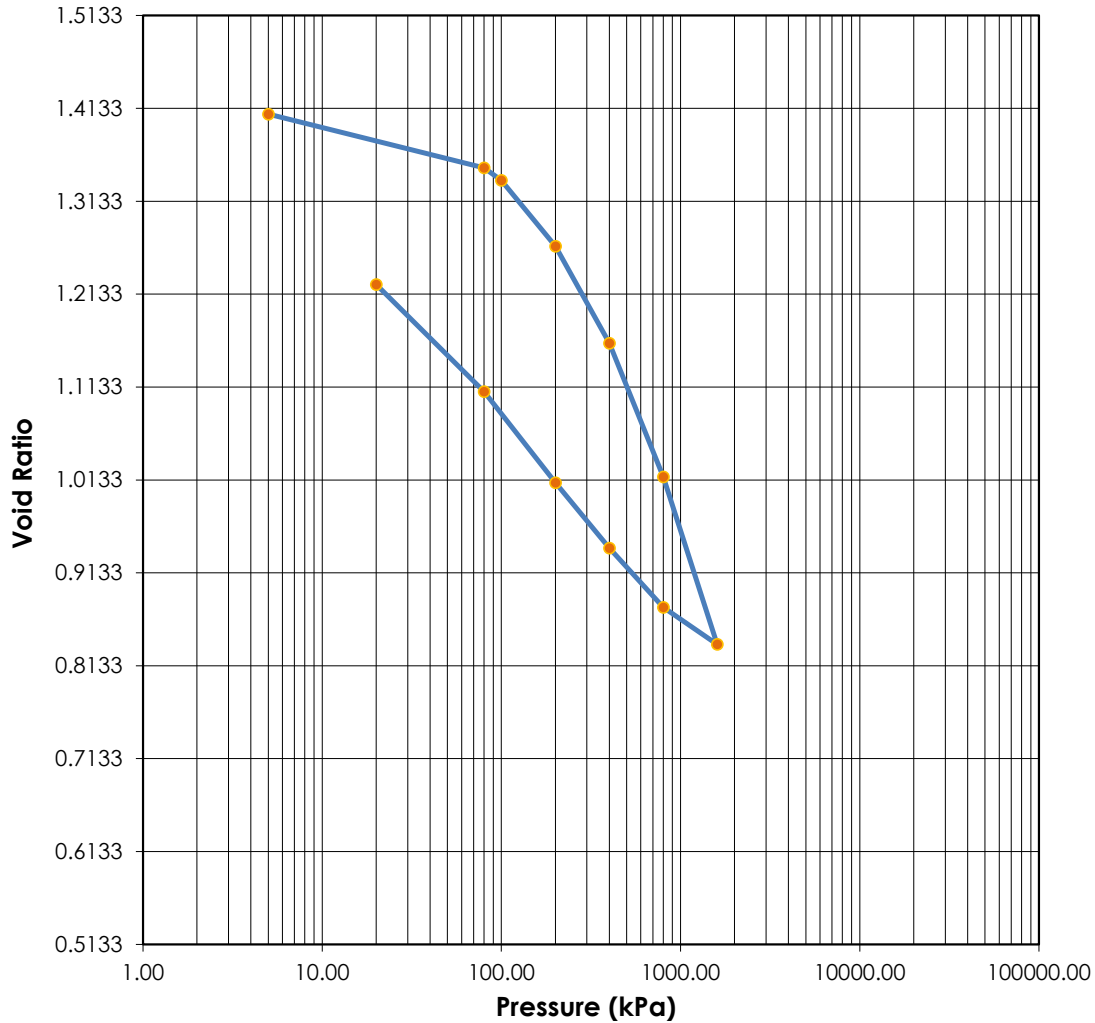
Sample Description:
 Brown Clay
Remarks:

Test Number:
Test Date: 18-Oct-16

Index	Load Sequence (kPa)	Cummulative Change in Height (mm)	Specimen Height (mm)	Height of Void (mm)	Vertical Strain (%)	Void Ratio	t90 Fitting Time (min)	t50 Fitting Time (min)	t90 Cv (mm ² /sec)	t50 Cv (mm ² /sec)
0	0.000	0.0000	25.2000	13.0144	0.00	1.0680	0.000	0.000	0.000	0.000
1	5.000	0.0000	25.2000	13.0144	0.00	1.0680	0.000	0.000	0.000	0.000
2	10.000	-0.0020	25.2020	13.0164	-0.01	1.0682	0.000	0.000	0.000	0.000
3	40.000	0.0520	25.1480	12.9624	0.21	1.0638	0.000	0.000	0.000	0.000
4	80.000	0.1160	25.0840	12.8984	0.46	1.0585	0.000	0.000	0.000	0.000
5	100.000	0.1220	25.0780	12.8924	0.48	1.0580	0.000	0.000	0.000	0.000
6	200.000	0.4580	24.7420	12.5564	1.82	1.0304	2.162	8.653	1.001	0.058
7	400.000	1.3700	23.8300	11.6444	5.44	0.9556	1.713	86.739	1.171	0.005
8	800.000	2.5380	22.6620	10.4764	10.07	0.8597	17.497	155.110	0.104	0.003
9	1600.000	4.0360	21.1640	8.9784	16.02	0.7368	59.785	206.918	0.026	0.002
10	800.000	3.5940	21.6060	9.4204	14.26	0.7731	0.000	0.000	0.000	0.000
11	400.000	2.9700	22.2300	10.0444	11.79	0.8243	0.000	0.000	0.000	0.000
12	200.000	2.2580	22.9420	10.7564	8.96	0.8827	0.000	0.000	0.000	0.000
13	80.000	1.5020	23.6980	11.5124	5.96	0.9448	0.000	0.000	0.000	0.000
14	20.000	0.8340	24.3660	12.1804	3.31	0.9996	0.000	0.000	0.000	0.000

Predicted value indicated with *

	Stantec Consulting Ltd. One-Dimensional Consolidation Test ASTM D2435 Test Results	Calgary Laboratory 10830 - 46th Street SE Calgary, Alberta T2C 1G4 Tel: (403) 253-7876
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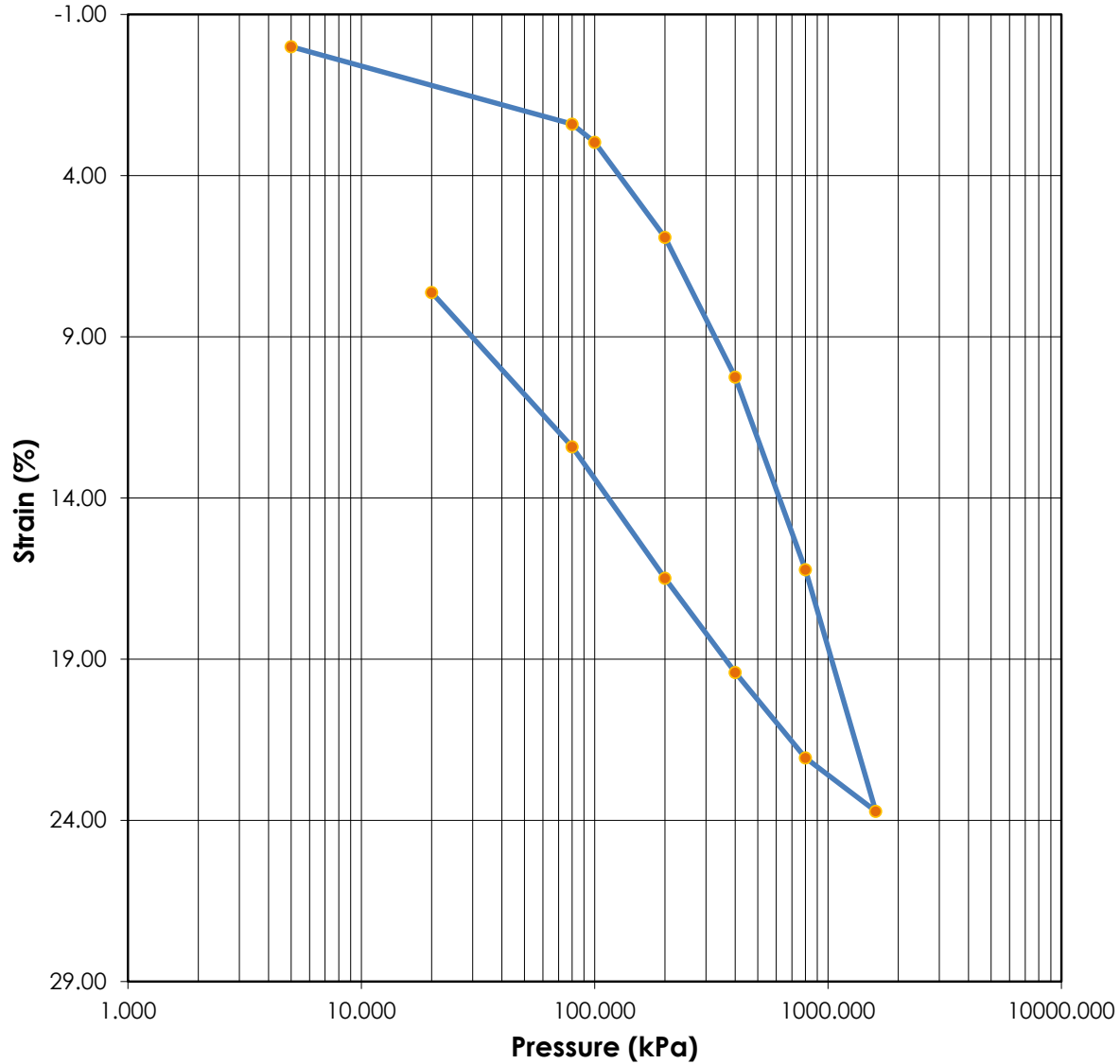
	Before	After	Liquid Limits:	-	Test Date: 18-Oct-16
Moisture (%):	49.0	50.2	Plastic Limits:	-	
Dry Density (g/cm³):	1.120	1.173	Plasticity Index (%):	-	
Saturation (%):	93.64	100.00	Specific Gravity:	2.70	Assumed
Void Ratio:	1.4054	1.2221			
Soil Description:	Brown Clay				
Project Number:	111216800		Depth:	4.5m	
Sample Number:	TH9 @ 15'		Boring Number:		
Project:	NEWPCC Upgrades			Remarks: Loads at 10kPa and 40kPa omitted due to swelling.	
Client:	AECOM Canada Ltd.				
Location:					

Tested By: C. Woods

Reviewed By:

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of the test results is provided only on written request. The data presented above is for the sole use of the client stipulated above. Stantec is not responsible, nor can be held liable, for the use of this report by any other party, with or without the knowledge of Stantec.

	Stantec Consulting Ltd. One-Dimensional Consolidation Test ASTM D2435 Test Results	Calgary Laboratory 10830 - 46th Street SE Calgary, Alberta T2C 1G4 Tel: (403) 253-7876
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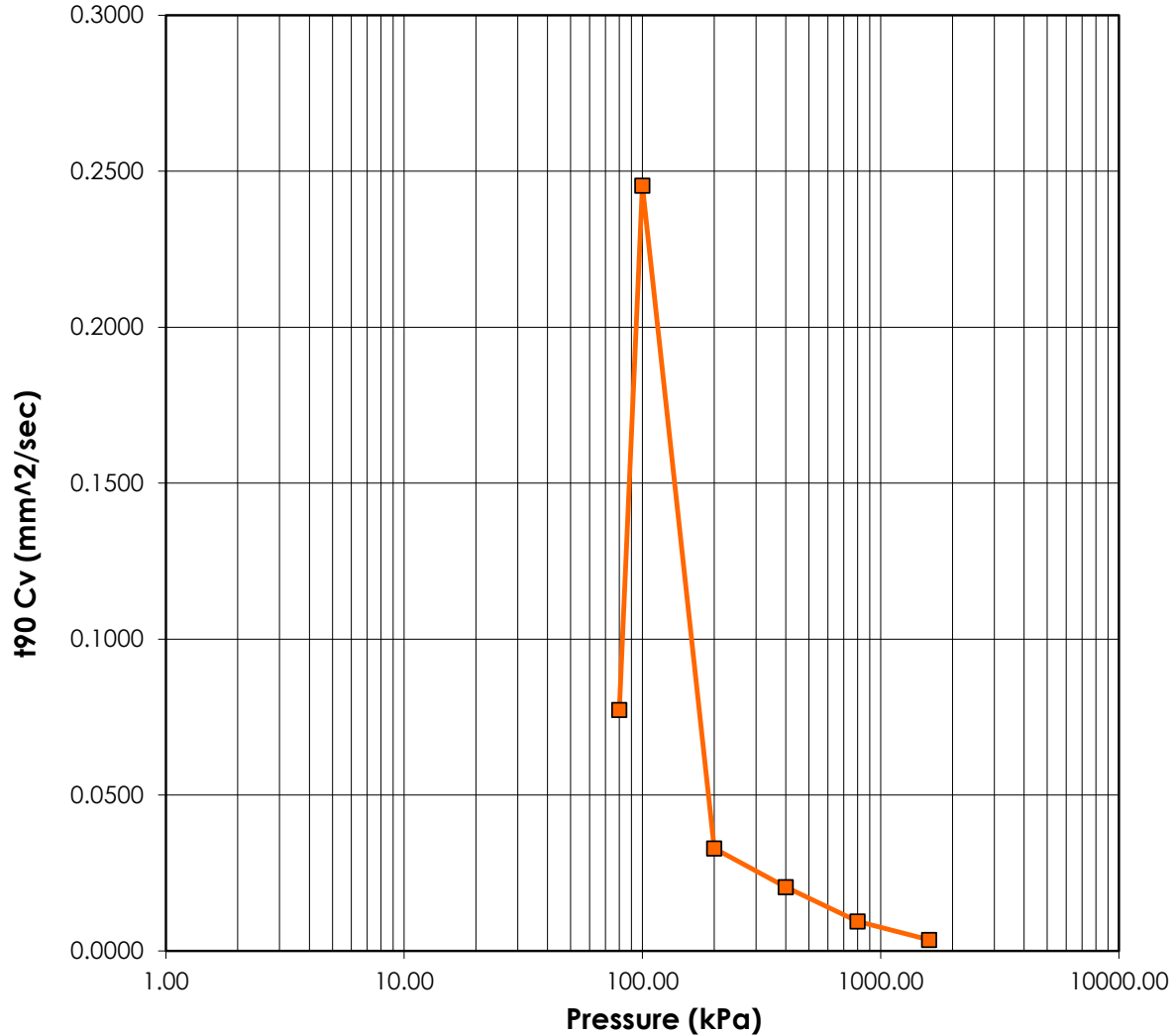


	Before	After	Liquid Limits:	-	Test Date: 18-Oct-16
Moisture (%):	49.0	50.2	Plastic Limits:	-	
Dry Density (g/cm³):	1.120	1.173	Plasticity Index (%):	-	
Saturation (%):	93.64	100.00	Specific Gravity:	2.70	Assumed
Void Ratio:	1.4054	1.2221			
Sample Description: Brown Clay					
Project Number:	111216800		Depth:	4.5m	
Sample Number:	TH9 @ 15'	Boring Number:	Remarks: Loads at 10kPa and 40kPa omitted due to swelling.		
Project:	NEWPCC Upgrades				
Client:	AECOM Canada Ltd.				
Location:					



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ASTM D2435
Test Results

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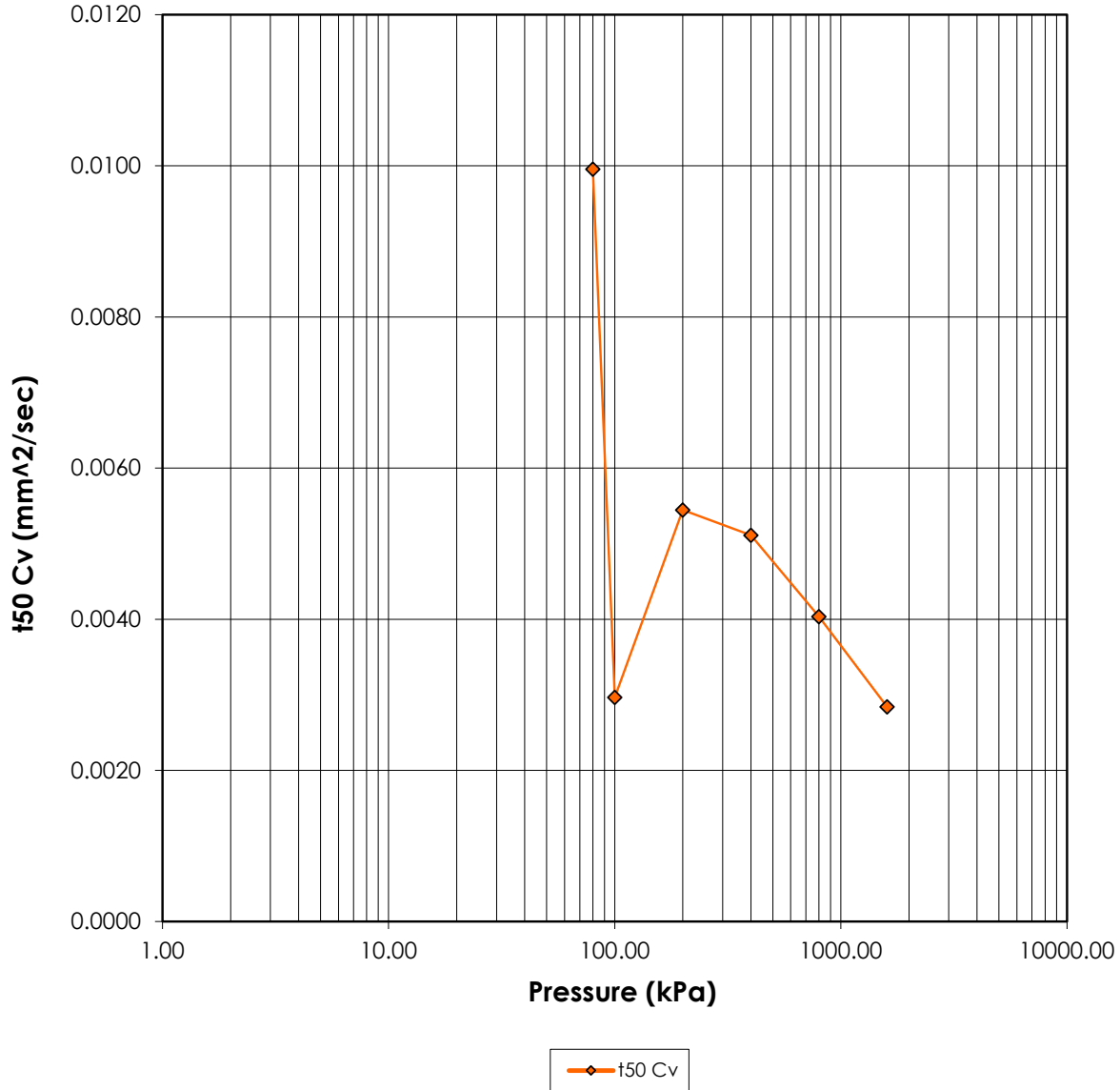
—■— $t_{90} C_v$

	Before	After	Liquid Limits:	-	Test Date:	18-Oct-16
Moisture (%):	49.0	50.2	Plastic Limits:	-		
Dry Density (g/cm ³):	1.120	1.173	Plasticity Index (%):	-		
Saturation (%):	93.64	100.00	Specific Gravity:	2.70	Assumed	
Void Ratio:	1.4054	1.2221				
Soil Description:	Brown Clay					
Project Number:	111216800	Depth:	4.5m			
Sample Number:	TH9 @ 15'	Boring Number:				
Project:	NEWPCC Upgrades		Remarks: Loads at 10kPa and 40kPa omitted due to swelling.			
Client:	AECOM Canada Ltd.					
Location:						



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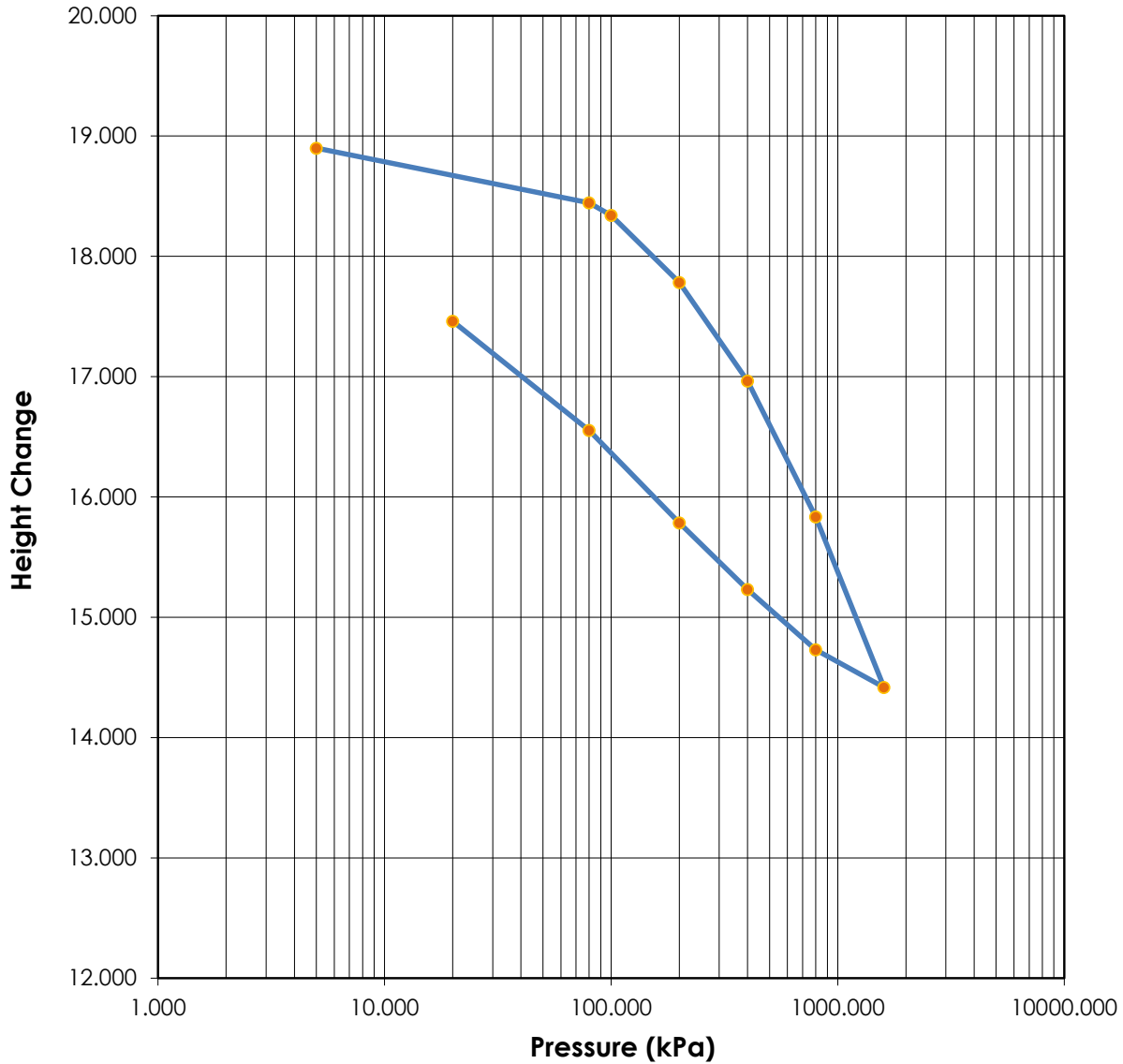


	Before	After	Liquid Limits:	-	Test Date:	18-Oct-16
Moisture (%):	49.0	50.2	Plastic Limits:	-		
Dry Density (g/cm ³):	1.120	1.173	Plasticity Index (%):	-		
Saturation (%):	93.64	100.00	Specific Gravity:	2.70	Assumed	
Void Ratio:	1.4054	1.2221				
Soil Description:	Brown Clay					
Project Number:	111216800	Depth:	4.5m	Remarks:		
Sample Number:	TH9 @ 15'	Boring Number:		Loads at 10kPa and 40kPa omitted due to swelling.		
Project:	NEWPCC Upgrades					
Client:	AECOM Canada Ltd.					
Location:						



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	Before	After	Liquid Limits:	-	Test Date:	18-Oct-16
Moisture (%):	49.0	50.2	Plastic Limits:	-		
Dry Density (g/cm ³):	1.120	1.173	Plasticity Index (%):	-		
Saturation (%):	93.64	100.00	Specific Gravity:	2.70	Assumed	
Void Ratio:	1.4054	1.2221				
Soil Description:	Brown Clay					
Project Number:	111216800	Depth:	4.5m			
Sample Number:	TH9 @ 15'	Boring Number:				
Project:	NEWPCC Upgrades		Remarks: Loads at 10kPa and 40kPa omitted due to swelling.			
Client:	AECOM Canada Ltd.					
Location:						

**Consolidation Test Results
 Summary**

Project: NEWPCC Upgrades
Location:
Job Number:

Project Number: 111216800


Sample Number: TH9 @ 15'
Boring Number:
Depth: 4.5m
Sample Type: Undisturbed

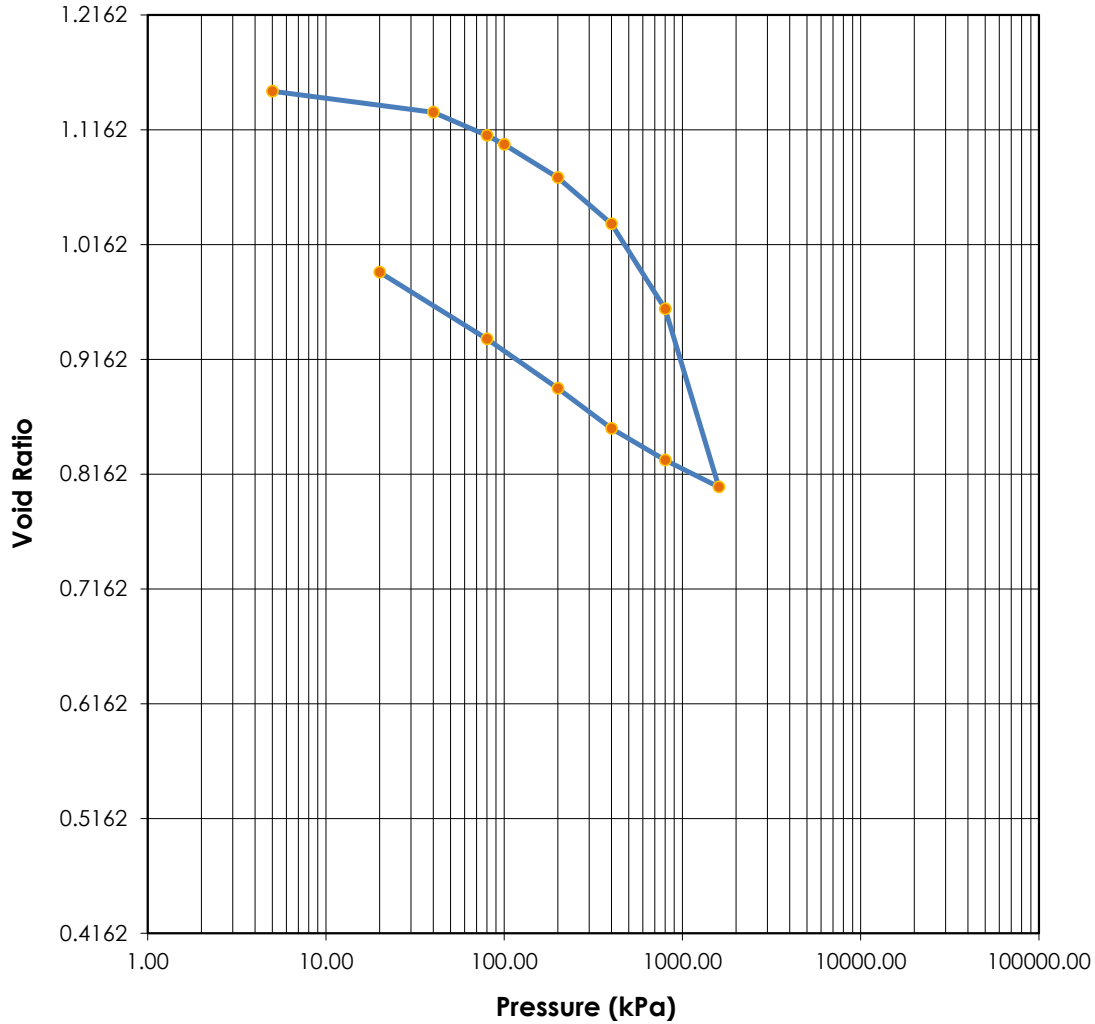
Sample Description:
 Brown Clay
Remarks:

Test Number:
Test Date: 18-Oct-16

Index	Load Sequence (kPa)	Cummulative Change in Height (mm)	Specimen Height (mm)	Height of Void (mm)	Vertical Strain (%)	Void Ratio	t90 Fitting Time (min)	t50 Fitting Time (min)	t90 Cv (mm2/sec)	t50 Cv (mm2/sec)
0	0.000	0.0000	18.9000	11.0483	0.00	1.4071	0.000	0.000	0.000	0.000
1	5.000	0.0000	18.9000	11.0483	0.00	1.4071	0.000	0.000	0.000	0.000
2	10.000	0.0180	18.8820	11.0303	0.10	1.4048	0.000	0.000	0.000	0.000
3	40.000	0.2920	18.6080	10.7563	1.54	1.3699	0.000	0.000	0.000	0.000
4	80.000	0.4540	18.4460	10.5943	2.40	1.3493	15.562	28.052	0.077	0.010
5	100.000	0.5600	18.3400	10.4883	2.96	1.3358	4.843	93.079	0.245	0.003
6	200.000	1.1180	17.7820	9.9303	5.92	1.2647	33.999	47.670	0.033	0.005
7	400.000	1.9360	16.9640	9.1123	10.24	1.1606	49.712	46.211	0.020	0.005
8	800.000	3.0660	15.8340	7.9823	16.22	1.0166	93.930	50.977	0.009	0.004
9	1600.000	4.4820	14.4180	6.5663	23.71	0.8363	207.095	60.057	0.004	0.003
10	800.000	4.1700	14.7300	6.8783	22.06	0.8760	0.000	0.000	0.000	0.000
11	400.000	3.6680	15.2320	7.3803	19.41	0.9400	0.000	0.000	0.000	0.000
12	200.000	3.1160	15.7840	7.9323	16.49	1.0103	0.000	0.000	0.000	0.000
13	80.000	2.3460	16.5540	8.7023	12.41	1.1083	0.000	0.000	0.000	0.000
14	20.000	1.4400	17.4600	9.6083	7.62	1.2237	0.000	0.000	0.000	0.000

Predicted value indicated with *

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	Before	After	Liquid Limits:	-	Test Date: 18-Oct-16
Moisture (%):	41.1	34.4	Plastic Limits:	-	
Dry Density (g/cm3):	1.254	1.385	Plasticity Index (%):	-	
Saturation (%):	96.15	97.84	Specific Gravity:	2.700	Assumed
Void Ratio:	1.1487	0.9910			
Soil Description: Brown Clay					
Project Number:	111216800		Depth: 7.6m		Remarks: Load at 10kPa omitted due to swelling.
Sample Number:	TH9 @ 25'	Boring Number:			
Project:	NEWPCC Upgrades				
Client:	AECOM Canada Ltd.				
Location:					

Tested By: C. Woods

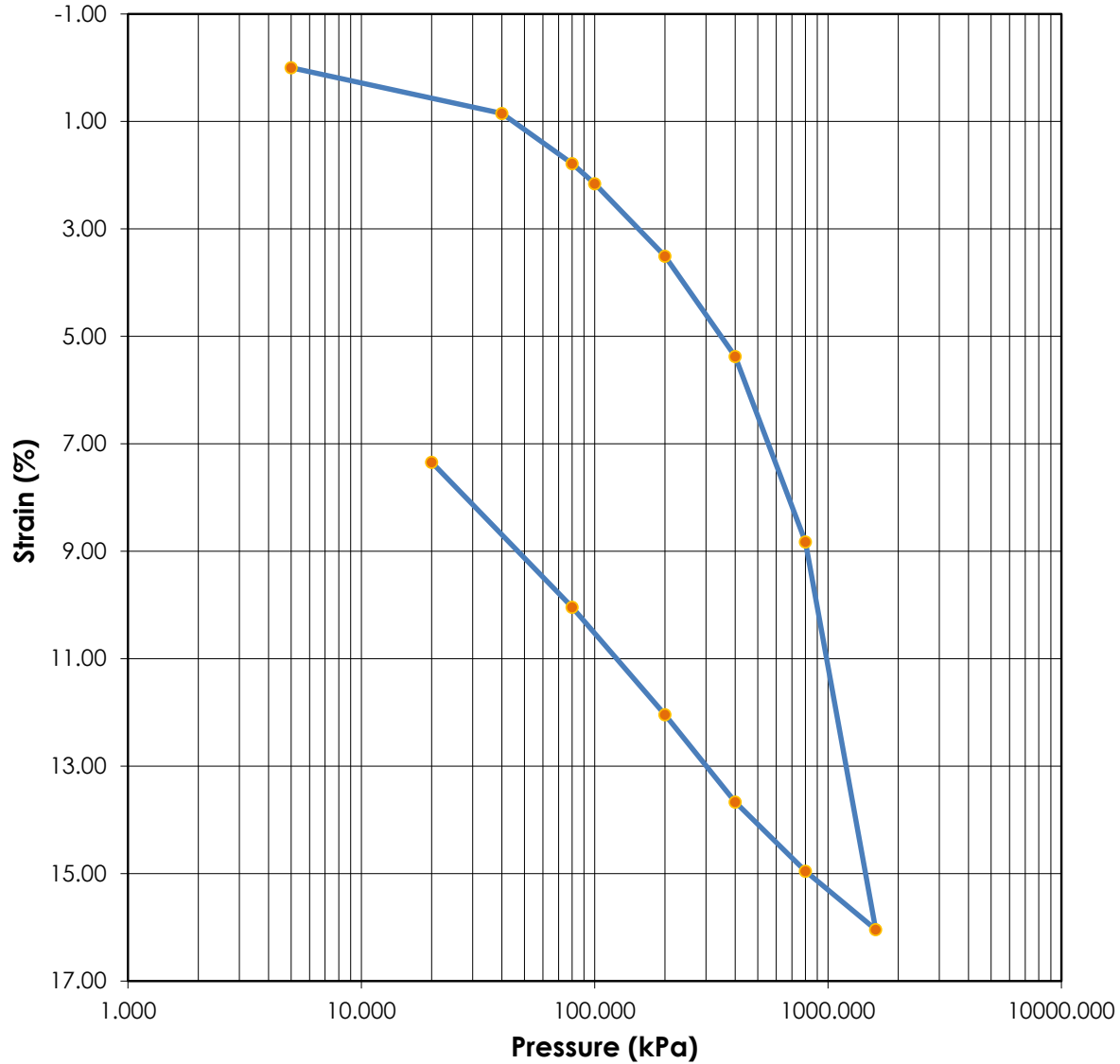
Reviewed By:

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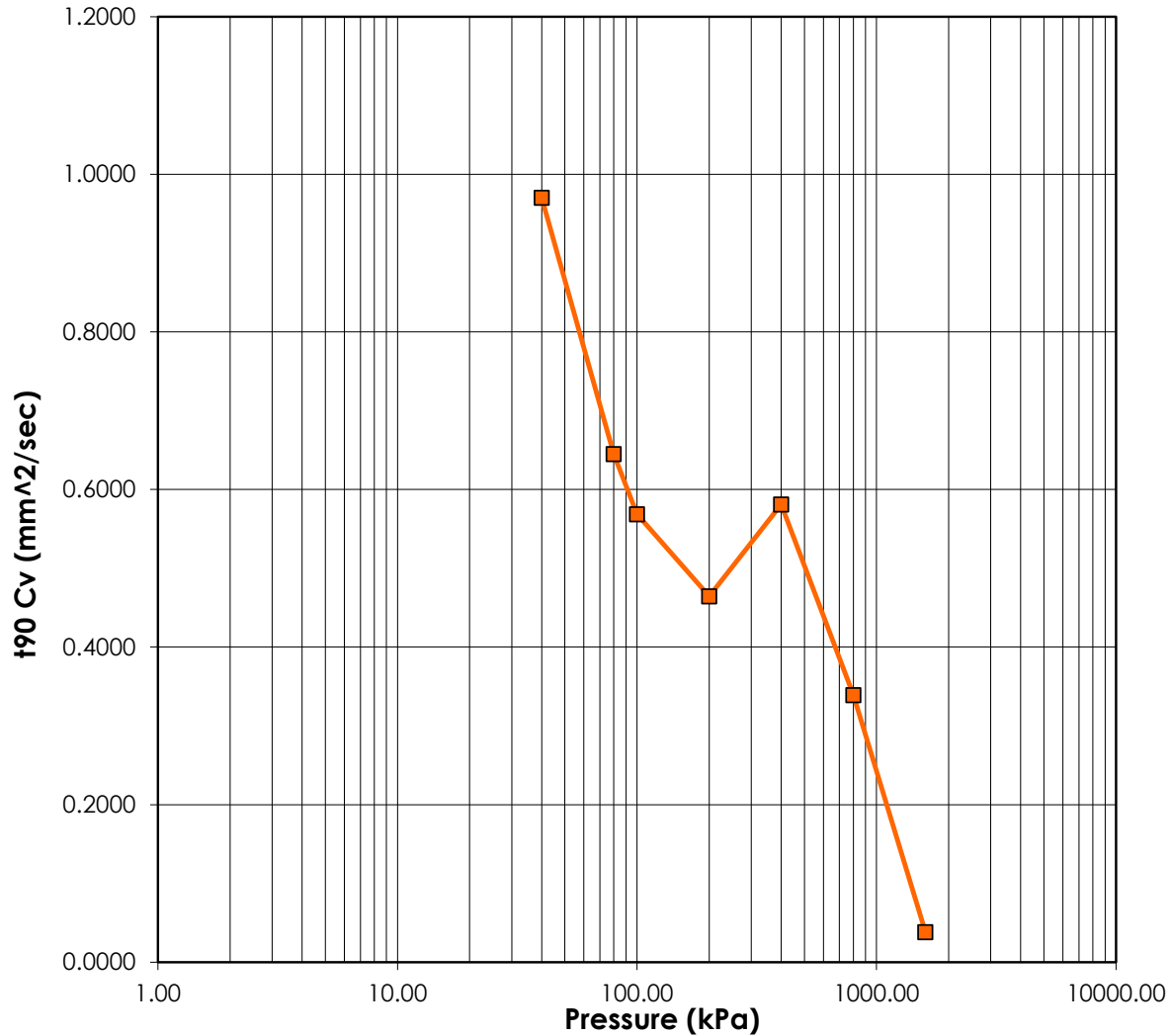


	Before	After	Liquid Limits:	-	Test Date:	18-Oct-16
Moisture (%):	41.1	34.4	Plastic Limits:	-		
Dry Density (g/cm ³):	1.254	1.385	Plasticity Index (%):	-		
Saturation (%):	96.15	97.84	Specific Gravity:	2.70	Assumed	
Void Ratio:	1.1487	0.9910				
Sample Description:	Brown Clay					
Project Number:	111216800	Depth:	7.6m			
Sample Number:	TH9 @ 25'	Boring Number:				
Project:	NEWPCC Upgrades		Remarks: Load at 10kPa omitted due to swelling.			
Client:	AECOM Canada Ltd.					
Location:						



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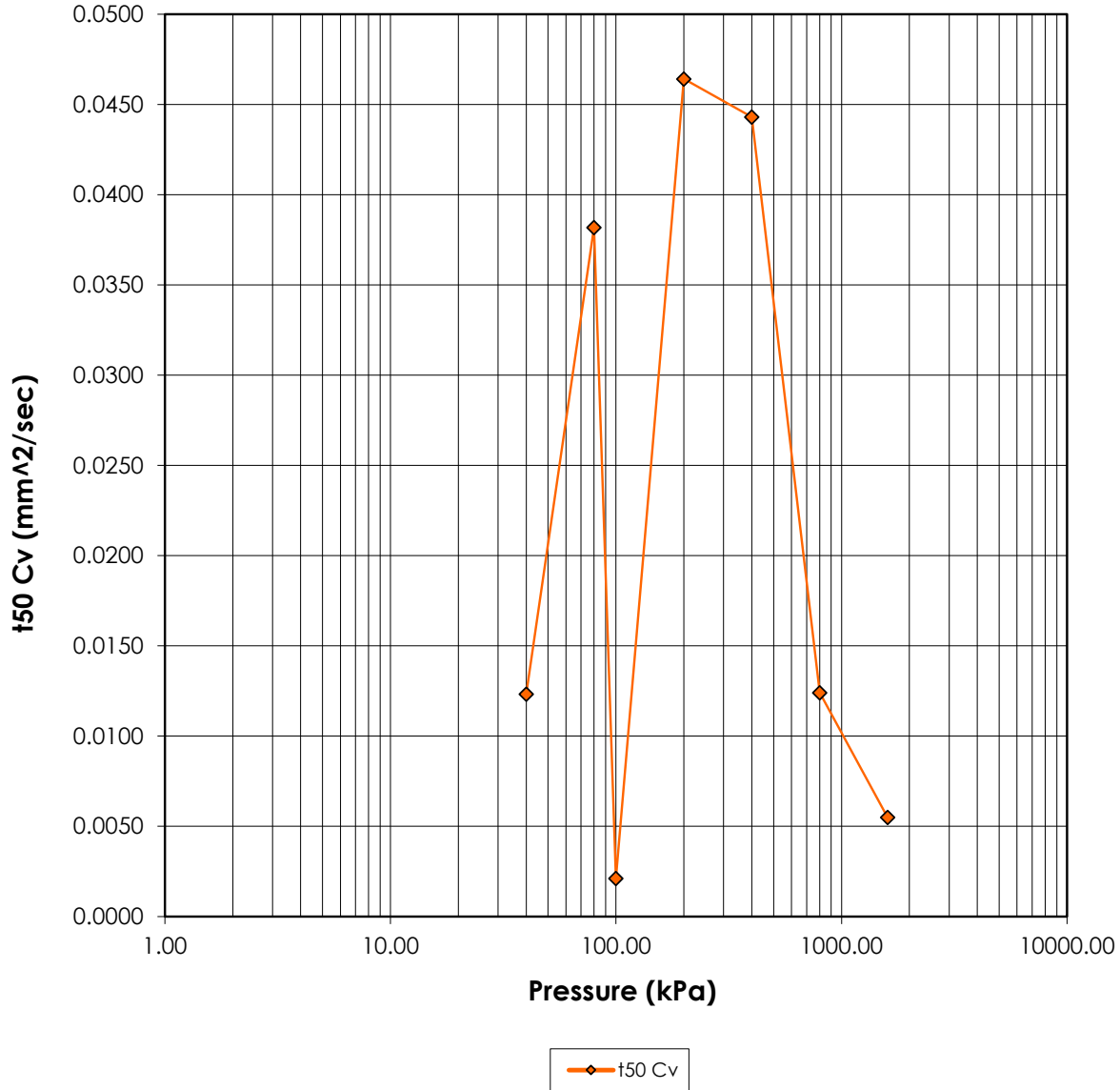
—■— t90 Cv

	Before	After	Liquid Limits:	-	Test Date:	18-Oct-16
Moisture (%):	41.1	34.4	Plastic Limits:	-		
Dry Density (g/cm ³):	1.254	1.385	Plasticity Index (%):	-		
Saturation (%):	96.15	97.84	Specific Gravity:	2.70	Assumed	
Void Ratio:	1.1487	0.9910				
Soil Description:	Brown Clay					
Project Number:	111216800	Depth:	7.6m			
Sample Number:	TH9 @ 25'	Boring Number:				
Project:	NEWPCC Upgrades					Remarks: Load at 10kPa omitted due to swelling.
Client:	AECOM Canada Ltd.					
Location:						



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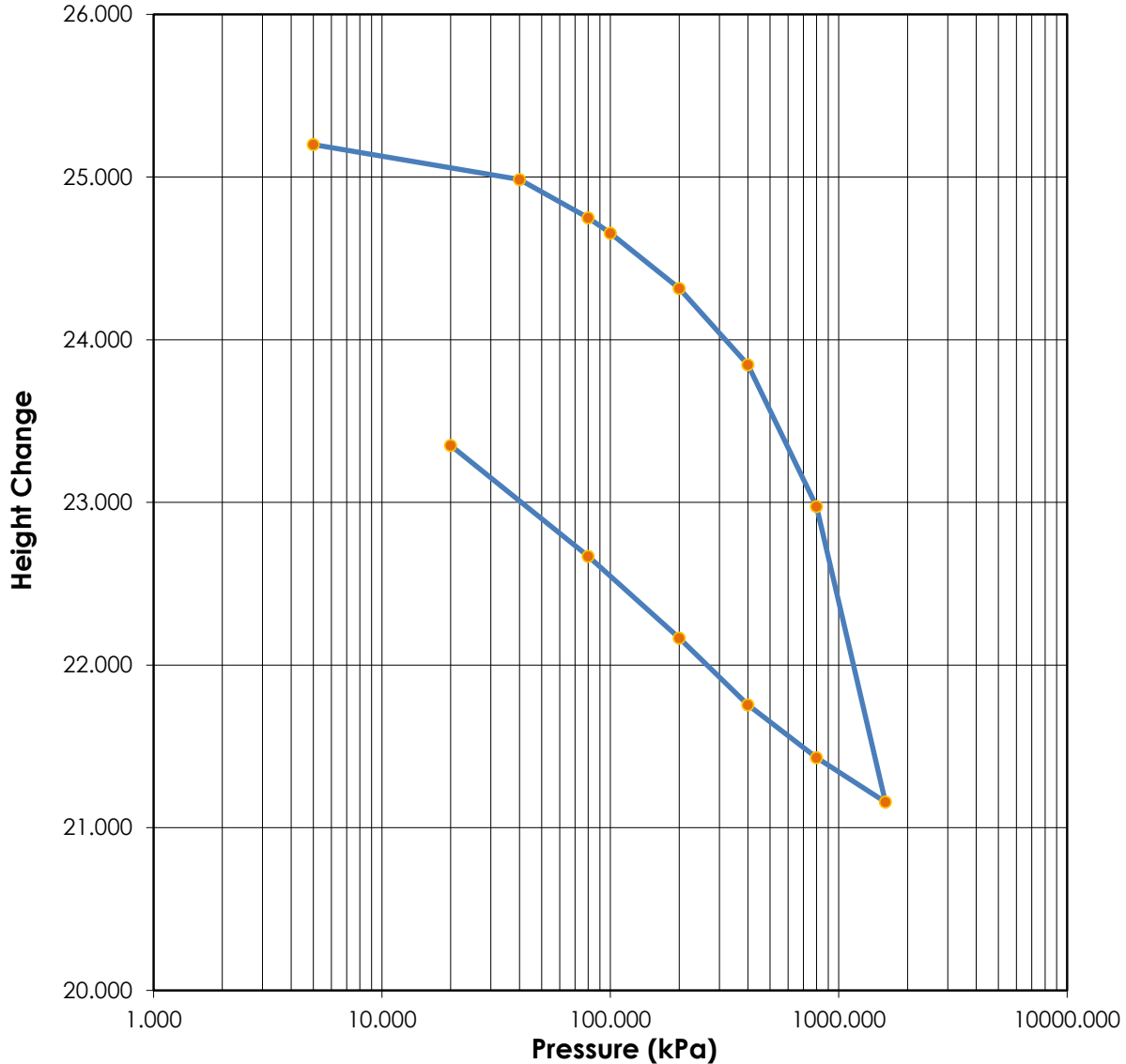


	Before	After	Liquid Limits:	-	Test Date:	18-Oct-16
Moisture (%):	41.1	34.4	Plastic Limits:	-		
Dry Density (g/cm ³):	1.254	1.385	Plasticity Index (%):	-		
Saturation (%):	96.15	97.84	Specific Gravity:	2.70	Assumed	
Void Ratio:	1.1487	0.9910				
Soil Description:	Brown Clay					
Project Number:	111216800	Depth:	7.6m			
Sample Number:	TH9 @ 25'	Boring Number:				
Project:	NEWPCC Upgrades					Remarks: Load at 10kPa omitted due to swelling.
Client:	AECOM Canada Ltd.					
Location:						



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	Before	After	Liquid Limits:	-	Test Date:	18-Oct-16
Moisture (%):	41.1	34.4	Plastic Limits:	-		
Dry Density (g/cm ³):	1.254	1.385	Plasticity Index (%):	-		
Saturation (%):	96.15	97.84	Specific Gravity:	2.70	Assumed	
Void Ratio:	1.1487	0.9910				
Soil Description:	Brown Clay					
Project Number:	111216800	Depth:	7.6m			
Sample Number:	TH9 @ 25'	Boring Number:				
Project:	NEWPCC Upgrades					Remarks: Load at 10kPa omitted due to swelling.
Client:	AECOM Canada Ltd.					
Location:						

**Consolidation Test Results
 Summary**

Project: NEWPCC Upgrades
Location:
Job Number:

Project Number: 111216800


Sample Number: TH9 @ 25'
Boring Number:
Depth: 7.6m
Sample Type: Undisturbed

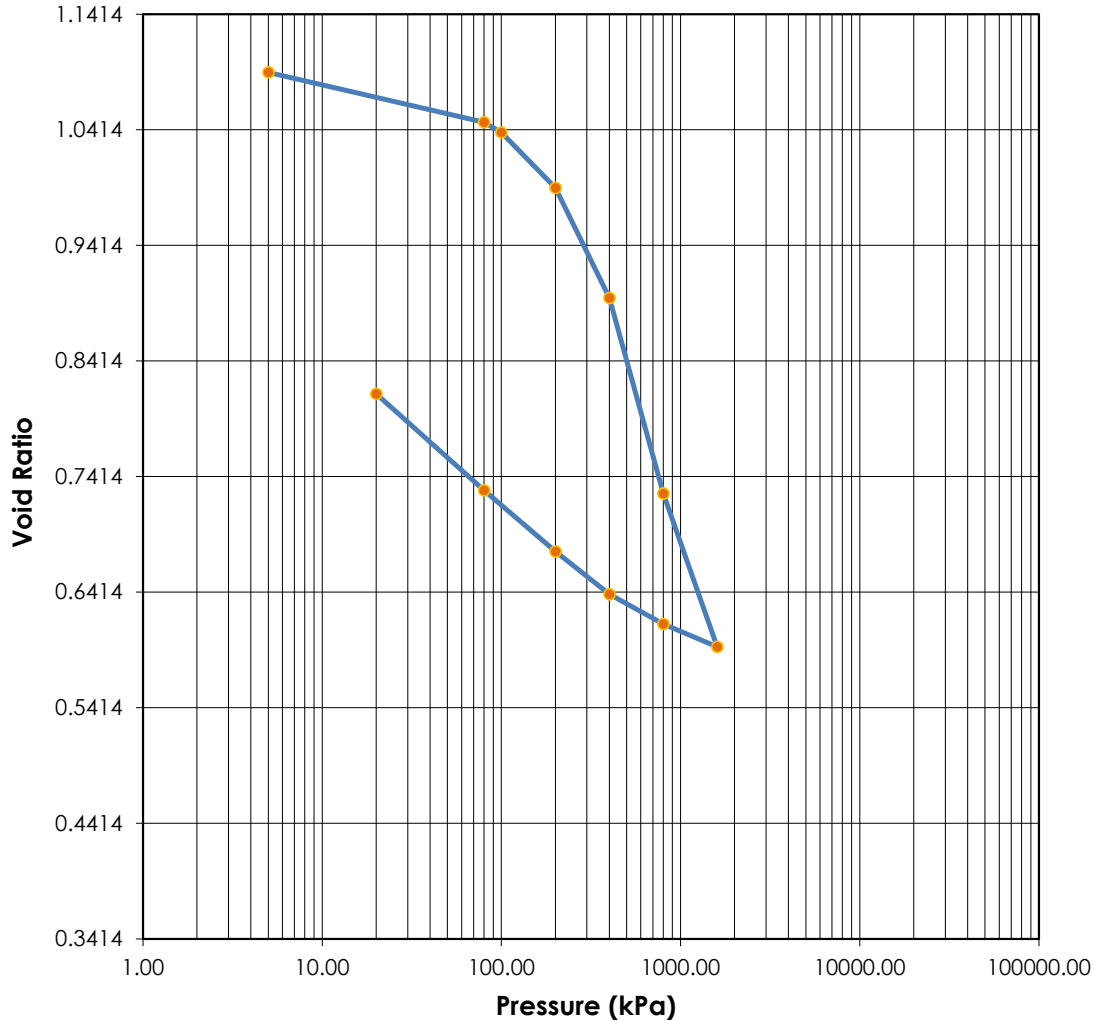
Sample Description:
 Brown Clay
Remarks:

Test Number:
Test Date: 18-Oct-16

Index	Load Sequence (kPa)	Cummulative Change in Height (mm)	Specimen Height (mm)	Height of Void (mm)	Vertical Strain (%)	Void Ratio	t90 Fitting Time (min)	t50 Fitting Time (min)	t90 Cv (mm2/sec)	t50 Cv (mm2/sec)
0	0.000	0.0000	25.2000	13.4778	0.00	1.1498	0.000	0.000	0.000	0.000
1	5.000	0.0000	25.2000	13.4778	0.00	1.1498	0.000	0.000	0.000	0.000
2	10.000	0.0160	25.1840	13.4618	0.06	1.1484	0.000	0.000	0.000	0.000
3	40.000	0.2140	24.9860	13.2638	0.85	1.1315	2.273	41.544	0.970	0.012
4	80.000	0.4500	24.7500	13.0278	1.79	1.1114	3.356	13.167	0.645	0.038
5	100.000	0.5440	24.6560	12.9338	2.16	1.1034	3.777	236.531	0.569	0.002
6	200.000	0.8840	24.3160	12.5938	3.51	1.0744	4.497	10.456	0.465	0.046
7	400.000	1.3540	23.8460	12.1238	5.37	1.0343	3.457	10.533	0.581	0.044
8	800.000	2.2240	22.9760	11.2538	8.83	0.9600	5.499	34.913	0.339	0.012
9	1600.000	4.0420	21.1580	9.4358	16.04	0.8050	41.275	66.857	0.038	0.005
10	800.000	3.7680	21.4320	9.7098	14.95	0.8283	0.000	0.000	0.000	0.000
11	400.000	3.4440	21.7560	10.0338	13.67	0.8560	0.000	0.000	0.000	0.000
12	200.000	3.0340	22.1660	10.4438	12.04	0.8909	0.000	0.000	0.000	0.000
13	80.000	2.5300	22.6700	10.9478	10.04	0.9339	0.000	0.000	0.000	0.000
14	20.000	1.8500	23.3500	11.6278	7.34	0.9919	0.000	0.000	0.000	0.000

Predicted value indicated with *

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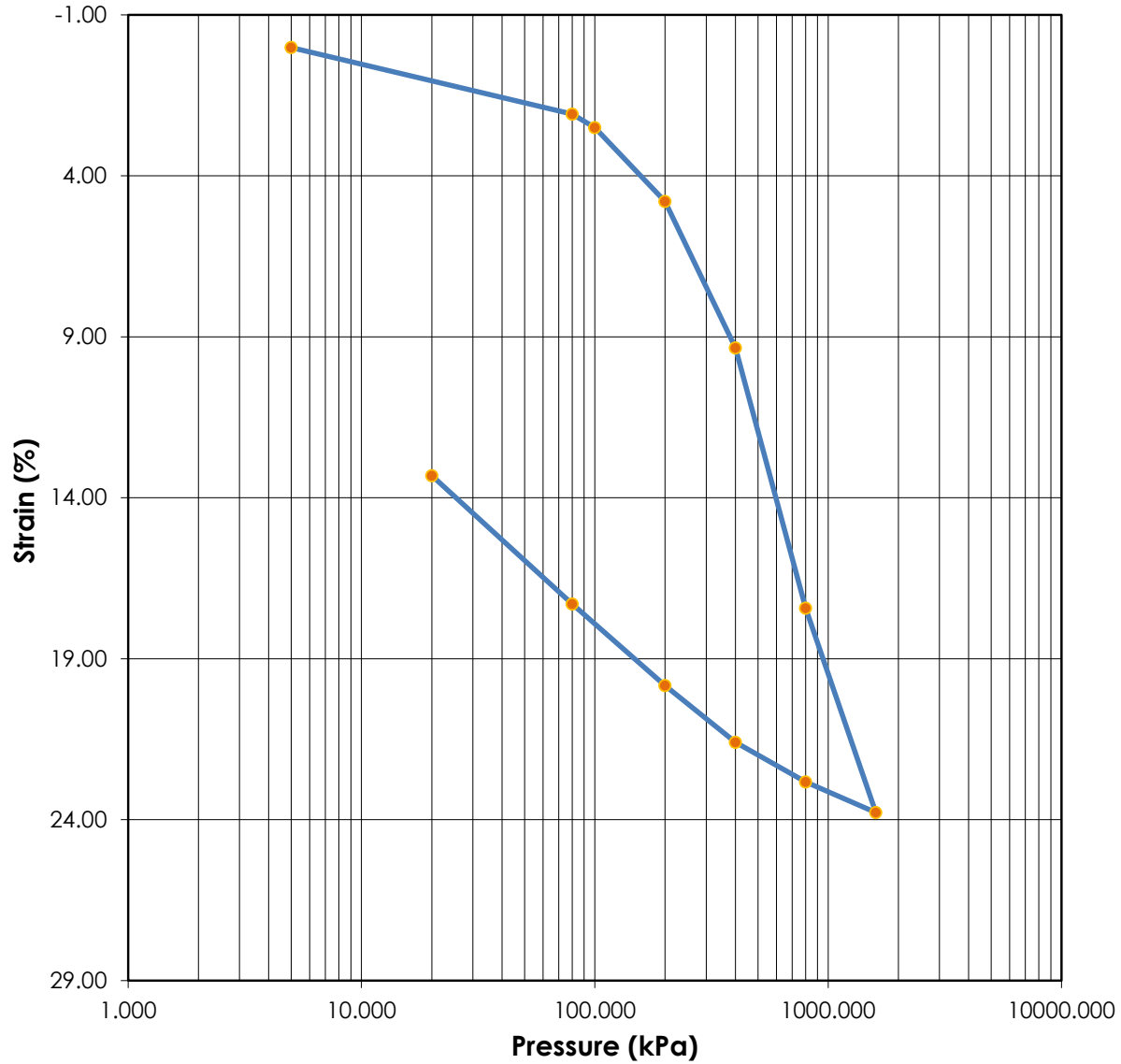
	Before	After	Liquid Limits:	-	Test Date: 18-Oct-16
Moisture (%):	38.5	33.4	Plastic Limits:	-	
Dry Density (g/cm³):	1.289	1.456	Plasticity Index (%):	-	
Saturation (%):	95.02	100.00	Specific Gravity:	2.70	Assumed
Void Ratio:	1.0912	0.8128			
Soil Description: Brown Clay					
Project Number:	111216800		Depth:	10.6m	
Sample Number:	TH9 @ 35'	Boring Number:	Remarks: Loads at 10kPa and 40kPa omitted due to swelling.		
Project:	NEWPCC Upgrades				
Client:	AECOM Canada Ltd.				
Location:					

Tested By: C. Woods


Reviewed By:

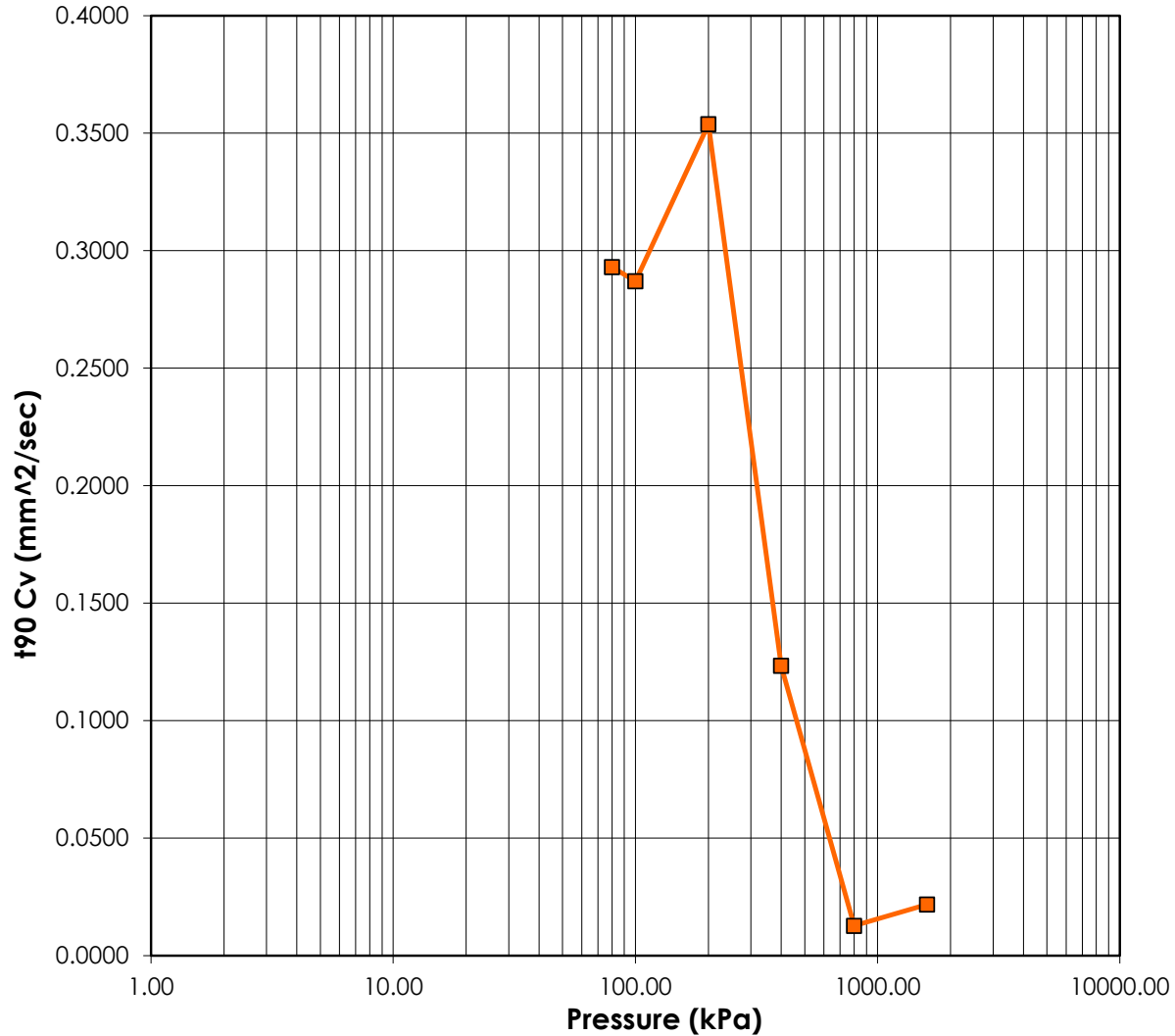
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	Before	After	Liquid Limits: -	Test Date: 18-Oct-16
Moisture (%):	38.5	33.4	Plastic Limits: -	
Dry Density (g/cm ³):	1.289	1.456	Plasticity Index (%): -	
Saturation (%):	95.02	100.00	Specific Gravity: 2.70	Assumed
Void Ratio:	1.0912	0.8128		
Sample Description: Brown Clay				
Project Number:	111216800		Depth: 10.6m	Remarks: Loads at 10kPa and 40kPa omitted due to swelling.
Sample Number:	TH9 @ 35'		Boring Number:	
Project:	NEWPCC Upgrades			
Client:	AECOM Canada Ltd.			
Location:				

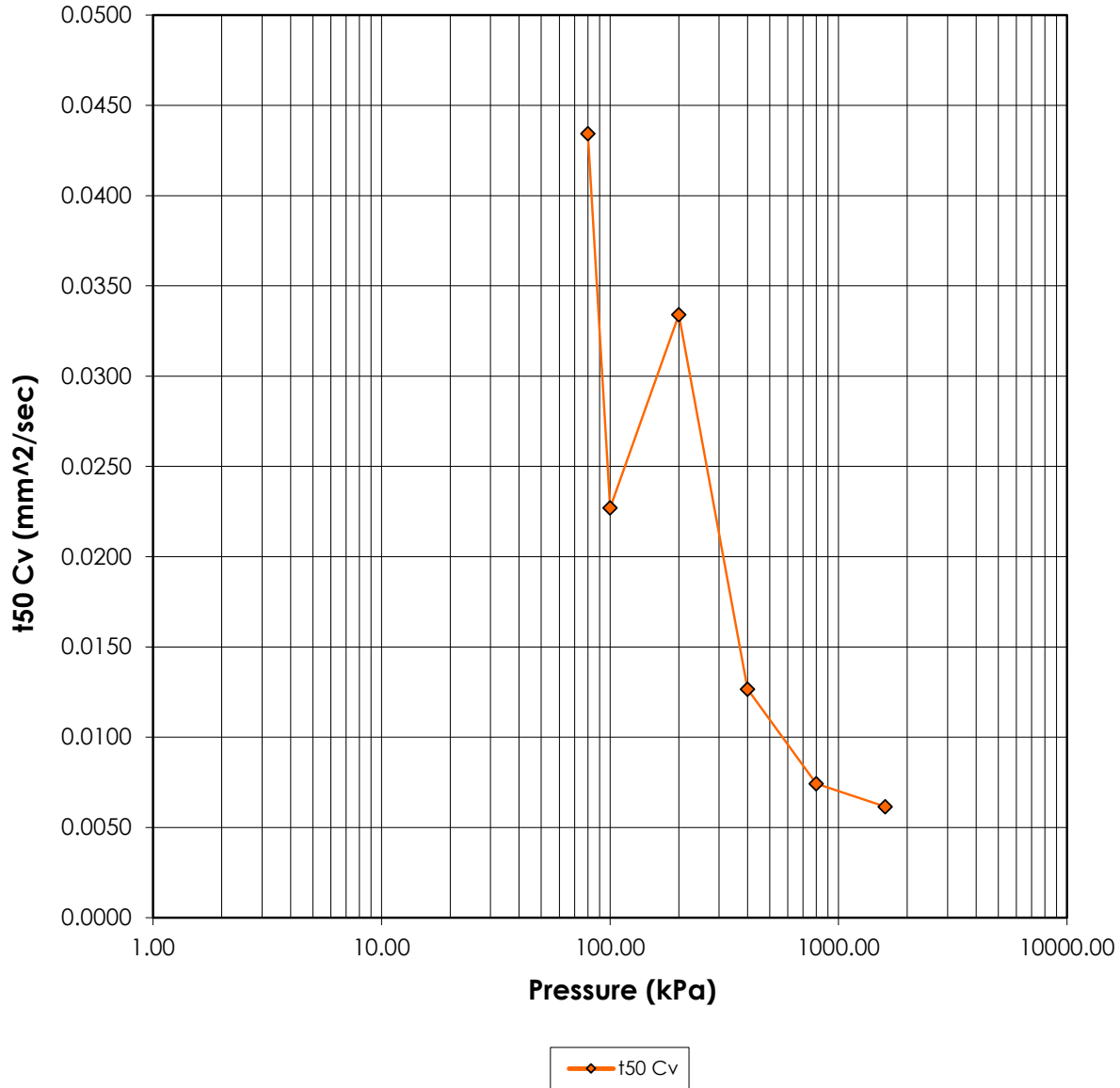
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—■— $t_{90} C_v$

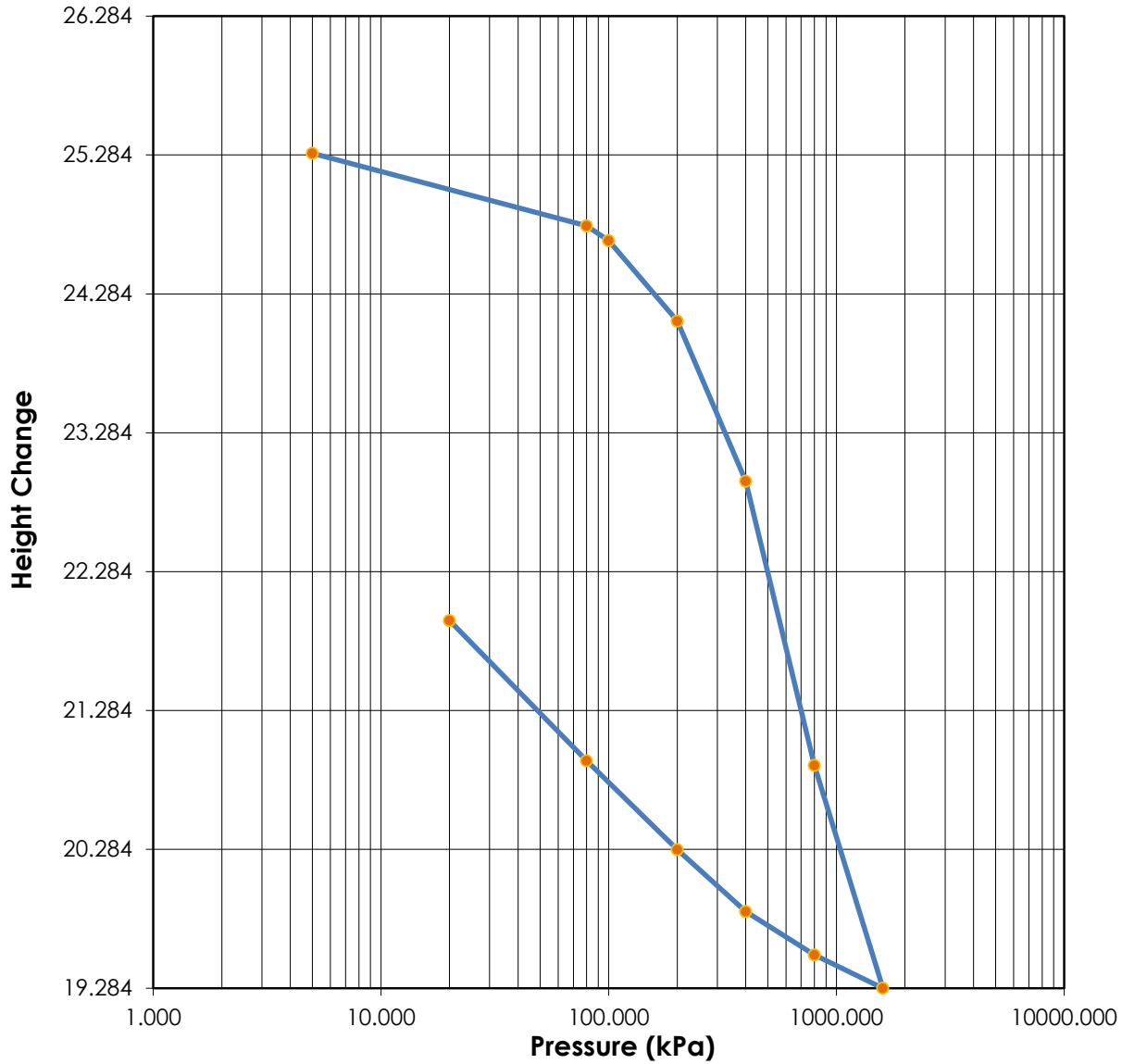
	Before	After	Liquid Limits:	-	Test Date:	18-Oct-16
Moisture (%):	38.5	33.4	Plastic Limits:	-		
Dry Density (g/cm³):	1.289	1.456	Plasticity Index (%):	-		
Saturation (%):	95.02	100.00	Specific Gravity:	2.70	Assumed	
Void Ratio:	1.0912	0.8128				
Soil Description:	Brown Clay					
Project Number:	111216800		Depth:	10.6m		
Sample Number:	TH9 @ 35'		Boring Number:			
Project:	NEWPCC Upgrades			Remarks: Loads at 10kPa and 40kPa omitted due to swelling.		
Client:	AECOM Canada Ltd.					
Location:						

	Stantec Consulting Ltd. One-Dimensional Consolidation Test ASTM D2435 Test Results	Calgary Laboratory 10830 - 46th Street SE Calgary, Alberta T2C 1G4 Tel: (403) 253-7876
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	Before	After	Liquid Limits:	-	Test Date:	18-Oct-16
Moisture (%):	38.5	33.4	Plastic Limits:	-		
Dry Density (g/cm³):	1.289	1.456	Plasticity Index (%):	-		
Saturation (%):	95.02	100.00	Specific Gravity:	2.70	Assumed	
Void Ratio:	1.0912	0.8128				
Soil Description:	Brown Clay					
Project Number:	111216800		Depth:	10.6m		
Sample Number:	TH9 @ 35'		Boring Number:			
Project:	NEWPCC Upgrades			Remarks: Loads at 10kPa and 40kPa omitted due to swelling.		
Client:	AECOM Canada Ltd.					
Location:						

	Stantec Consulting Ltd. One-Dimensional Consolidation Test ASTM D2435 Test Results	Calgary Laboratory 10830 - 46th Street SE Calgary, Alberta T2C 1G4 Tel: (403) 253-7876
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	Before	After	Liquid Limits: -	Test Date: 18-Oct-16
Moisture (%):	38.5	33.4	Plastic Limits: -	
Dry Density (g/cm ³):	1.289	1.456	Plasticity Index (%): -	
Saturation (%):	95.02	100.00	Specific Gravity: 2.70	Assumed
Void Ratio:	1.0912	0.8128		
Soil Description: Brown Clay				
Project Number:	111216800		Depth: 10.6m	Remarks: Loads at 10kPa and 40kPa omitted due to swelling.
Sample Number:	TH9 @ 35'		Boring Number:	
Project:	NEWPCC Upgrades			
Client:	AECOM Canada Ltd.			
Location:				

**Consolidation Test Results
 Summary**

Project: NEWPCC Upgrades
Location:
Job Number:

Project Number: 111216800


Sample Number: TH9 @ 35'
Boring Number:
Depth: 10.6m
Sample Type: Undisturbed

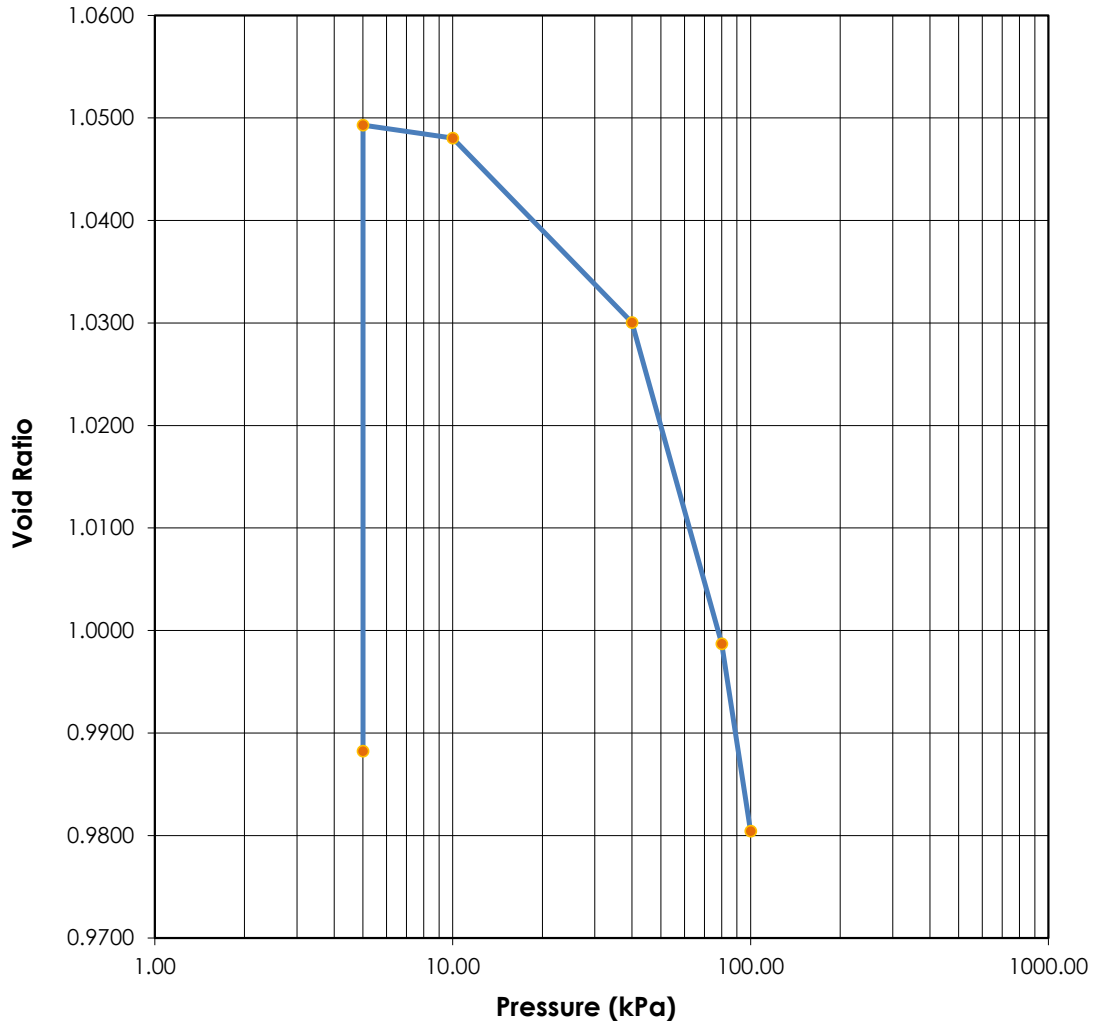
Sample Description:
 Brown Clay
Remarks:

Test Number:
Test Date: 18-Oct-16

Index	Load Sequence (kPa)	Cummulative Change in Height (mm)	Specimen Height (mm)	Height of Void (mm)	Vertical Strain (%)	Void Ratio	t90 Fitting Time (min)	t50 Fitting Time (min)	t90 Cv (mm2/sec)	t50 Cv (mm2/sec)
0	0.000	0.0000	25.3000	13.2029	0.00	1.0914	0.000	0.000	0.000	0.000
1	5.000	0.0040	25.2960	13.1989	0.02	1.0911	0.000	0.000	0.000	0.000
2	10.000	0.0040	25.2960	13.1989	0.02	1.0911	0.000	0.000	0.000	0.000
3	40.000	0.1960	25.1040	13.0069	0.77	1.0752	0.000	0.000	0.000	0.000
4	80.000	0.5260	24.7740	12.6769	2.08	1.0479	7.400	11.601	0.293	0.043
5	100.000	0.6320	24.6680	12.5709	2.50	1.0392	7.490	21.996	0.287	0.023
6	200.000	1.2120	24.0880	11.9909	4.79	0.9912	5.795	14.255	0.354	0.033
7	400.000	2.3640	22.9360	10.8389	9.34	0.8960	15.068	34.101	0.123	0.013
8	800.000	4.4100	20.8900	8.7929	17.43	0.7269	120.979	48.221	0.013	0.007
9	1600.000	6.0160	19.2840	7.1869	23.78	0.5941	60.383	49.597	0.022	0.006
10	800.000	5.7760	19.5240	7.4269	22.83	0.6139	0.000	0.000	0.000	0.000
11	400.000	5.4640	19.8360	7.7389	21.60	0.6397	0.000	0.000	0.000	0.000
12	200.000	5.0180	20.2820	8.1849	19.83	0.6766	0.000	0.000	0.000	0.000
13	80.000	4.3780	20.9220	8.8249	17.30	0.7295	0.000	0.000	0.000	0.000
14	20.000	3.3680	21.9320	9.8349	13.31	0.8130	0.000	0.000	0.000	0.000

Predicted value indicated with *

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	Before	After	Liquid Limits:	-	Test Date: 17-Oct-16
Moisture (%):	33.0	35.9	Plastic Limits:	-	
Dry Density (g/cm³):	1.356	1.444	Plasticity Index (%):	-	
Saturation (%):	89.73	100.00	Specific Gravity:	2.70	Assumed
Void Ratio:	0.9878	0.9800			
Soil Description: Brown Clay					
Project Number:	111216800		Depth:	3.0m	
Sample Number:	TH6 @ 10'	Boring Number:	Remarks:		
Project:	NEWPCC Upgrade				
Client:	AECOM Canada Ltd.				
Location:					

Tested By: C. Woods

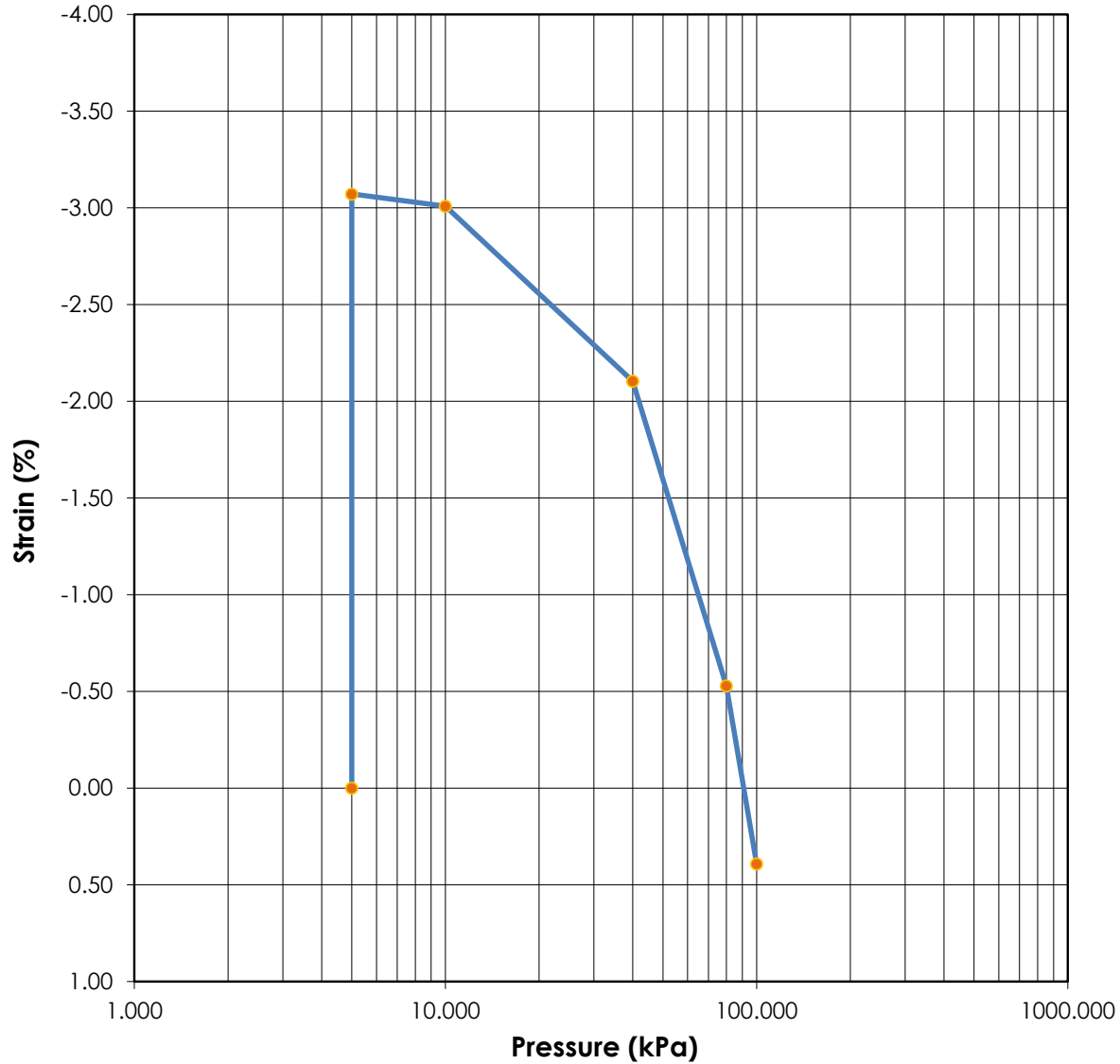
Reviewed By:

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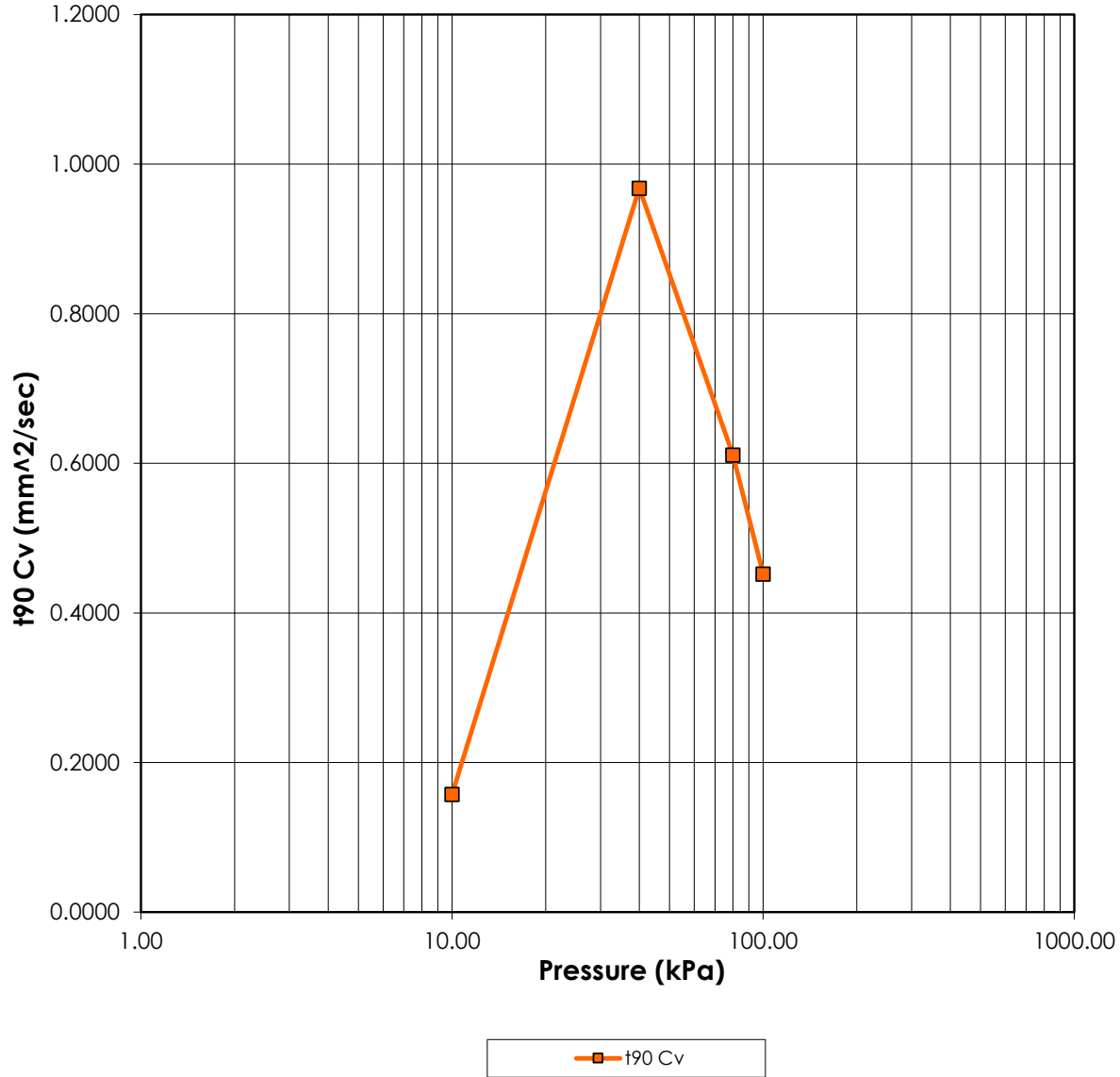
Stantec Consulting Ltd.
Swell Test
ASTM D4546 Method C
Test Results

Calgary Laboratory
 10830 - 46th Street SE
 Calgary, Alberta T2C 1G4
 Tel: (403) 253-7876




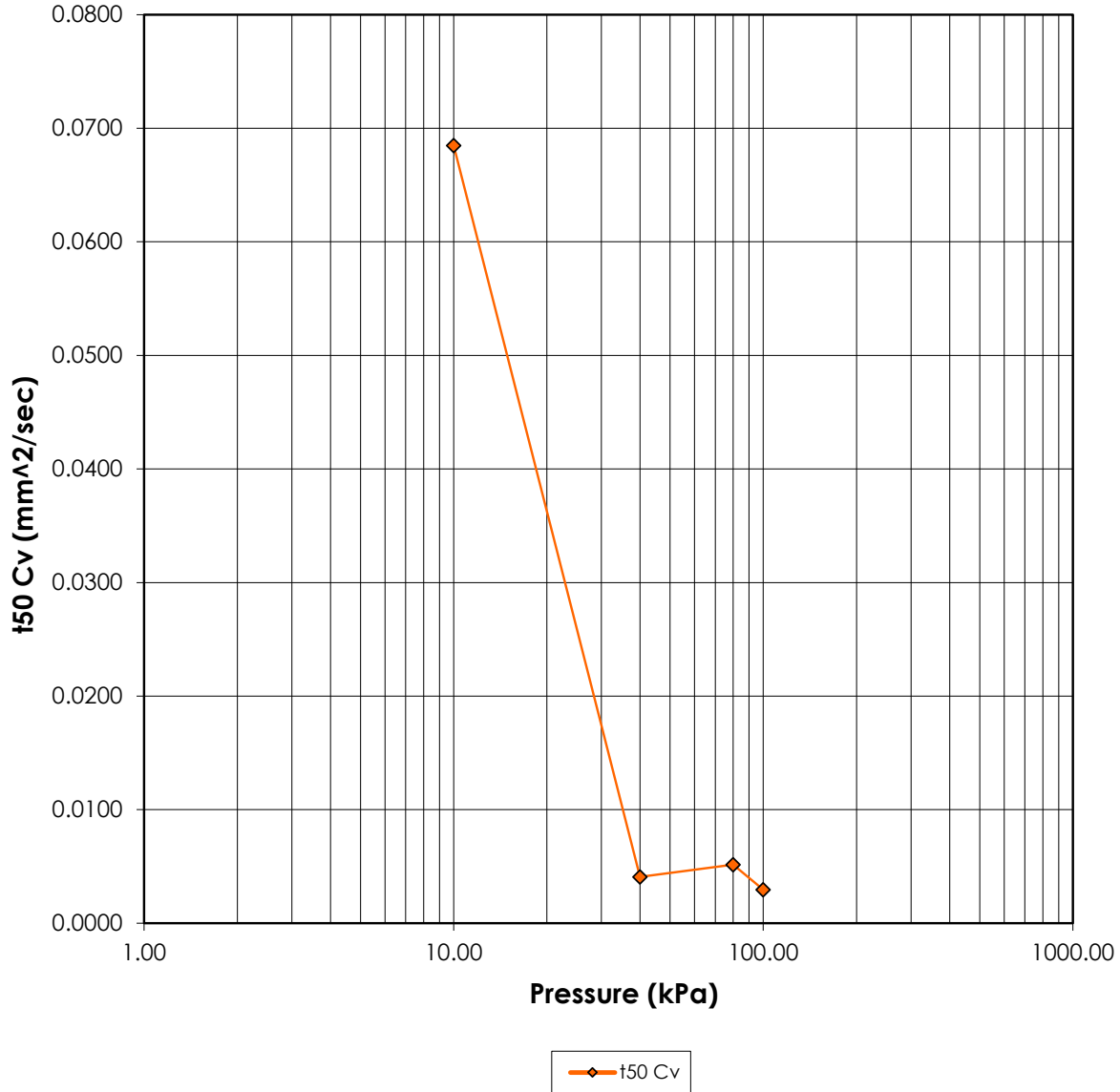
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Moisture (%):	33.0	35.9	Plastic Limits:	-		
Dry Density (g/cm ³):	1.356	1.444	Plasticity Index (%):	-		
Saturation (%):	89.73	100.00	Specific Gravity:	2.70	Assumed	
Void Ratio:	0.9878	0.9800				
Sample Description:	Brown Clay					
Project Number:	111216800	Depth:	3.0m	Remarks:		
Sample Number:	TH6 @ 10'	Boring Number:				
Project:	NEWPCC Upgrade					
Client:	AECOM Canada Ltd.					
Location:						

	Stantec Consulting Ltd. Swell Test ASTM D4546 Method C Test Results	Calgary Laboratory 10830 - 46th Street SE Calgary, Alberta T2C 1G4 Tel: (403) 253-7876
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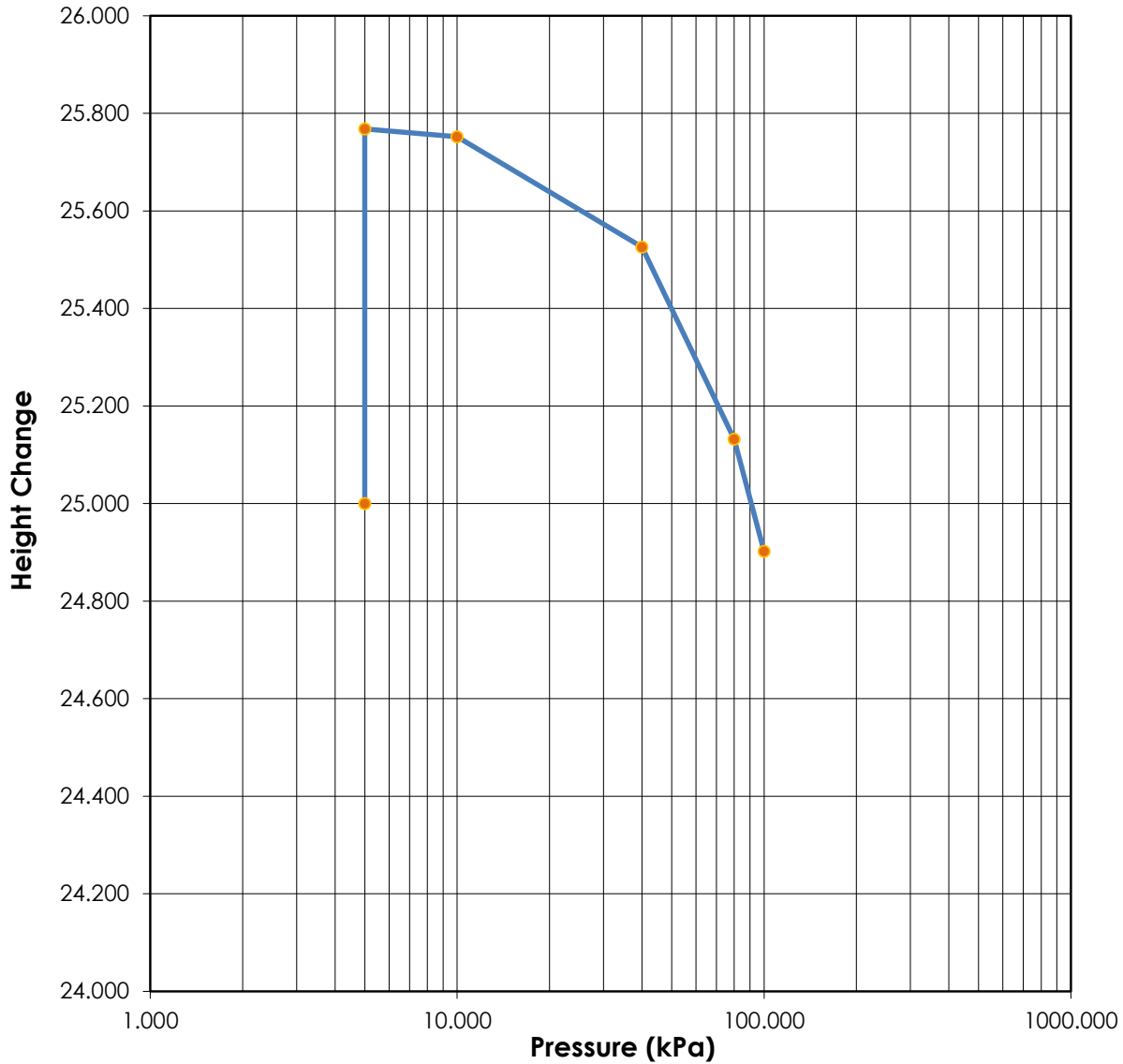
	Before	After	Liquid Limits:	-	Test Date: 17-Oct-16
Moisture (%):	33.0	35.9	Plastic Limits:	-	
Dry Density (g/cm³):	1.356	1.444	Plasticity Index (%):	-	
Saturation (%):	89.73	100.00	Specific Gravity:	2.70	Assumed
Void Ratio:	0.9878	0.9800			
Soil Description: Brown Clay					
Project Number:	111216800		Depth:	3.0m	
Sample Number:	TH6 @ 10'	Boring Number:	Remarks:		
Project:	NEWPCC Upgrade				
Client:	AECOM Canada Ltd.				
Location:					

	Stantec Consulting Ltd. Swell Test ASTM D4546 Method C Test Results	Calgary Laboratory 10830 - 46th Street SE Calgary, Alberta T2C 1G4 Tel: (403) 253-7876
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	Before	After	Liquid Limits:	-	Test Date: 17-Oct-16
Moisture (%):	33.0	35.9	Plastic Limits:	-	
Dry Density (g/cm³):	1.356	1.444	Plasticity Index (%):	-	
Saturation (%):	89.73	100.00	Specific Gravity:	2.70	Assumed
Void Ratio:	0.9878	0.9800			
Soil Description: Brown Clay					
Project Number:	111216800		Depth:	3.0m	
Sample Number:	TH6 @ 10'	Boring Number:	Remarks:		
Project:	NEWPCC Upgrade				
Client:	AECOM Canada Ltd.				
Location:					

	Stantec Consulting Ltd. Swell Test ASTM D4546 Method C Test Results	Calgary Laboratory 10830 - 46th Street SE Calgary, Alberta T2C 1G4 Tel: (403) 253-7876
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	Before	After	Liquid Limits: -	Test Date: 17-Oct-16
Moisture (%):	33.0	35.9	Plastic Limits: -	
Dry Density (g/cm³):	1.356	1.444	Plasticity Index (%): -	
Saturation (%):	89.73	100.00	Specific Gravity: 2.70	Assumed
Void Ratio:	0.9878	0.9800		
Soil Description: Brown Clay				
Project Number:	111216800		Depth: 3.0m	Remarks:
Sample Number:	TH6 @ 10'	Boring Number:		
Project:	NEWPCC Upgrade			
Client:	AECOM Canada Ltd.			
Location:				

**Consolidation Test Results
 Summary**

Project: NEWPCC Upgrade
Location:
Job Number:

Project Number: 111216800


Sample Number: TH6 @ 10'
Boring Number:
Depth: 3.0m
Sample Type: Undisturbed

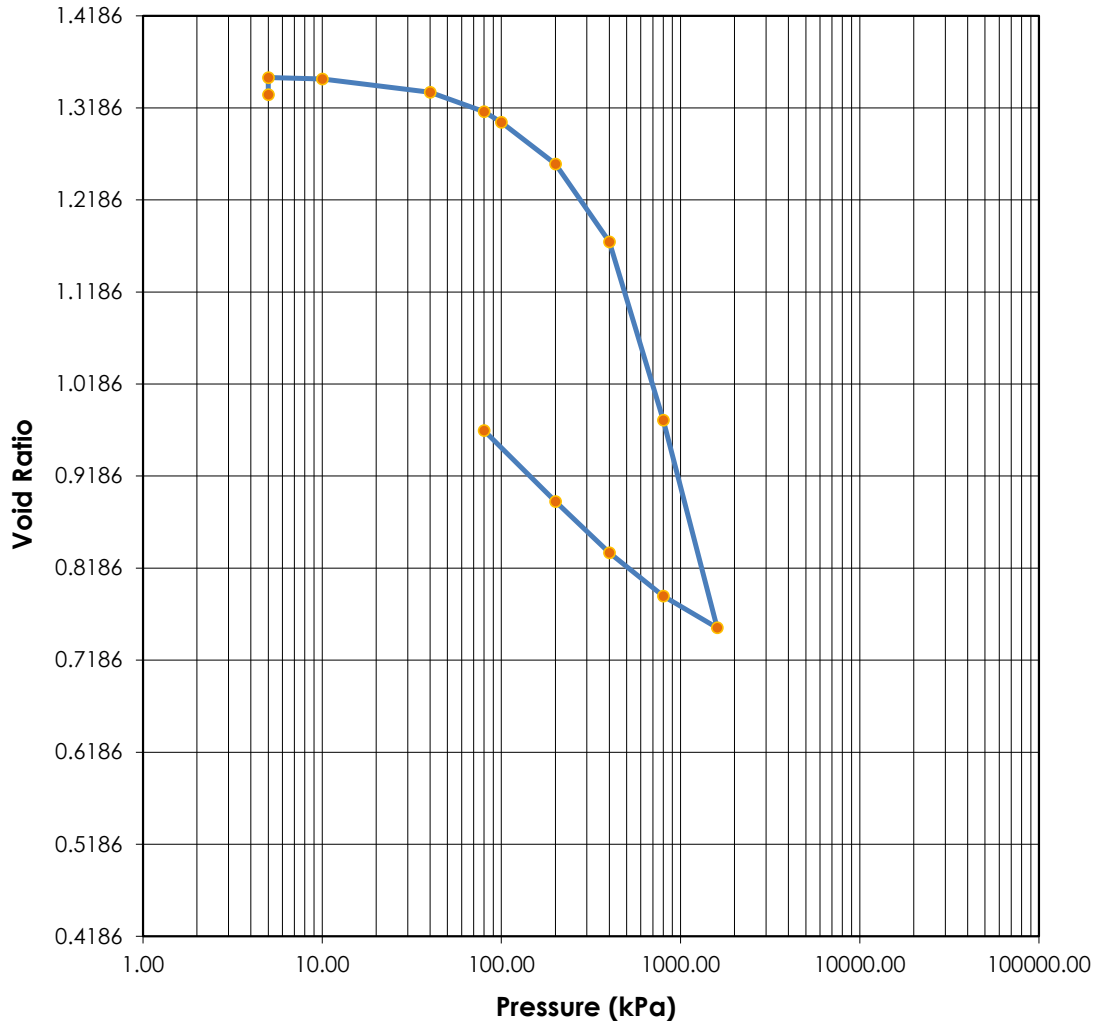
Sample Description:
 Brown Clay
Remarks:

Test Number:
Test Date: 17-Oct-16

Index	Load Sequence (kPa)	Cummulative Change in Height (mm)	Specimen Height (mm)	Height of Void (mm)	Vertical Strain (%)	Void Ratio	t90 Fitting Time (min)	t50 Fitting Time (min)	t90 Cv (mm2/sec)	t50 Cv (mm2/sec)
0	0.000	0.0000	25.0000	12.4259	0.00	0.9882	0.000	0.000	0.000	0.000
1	5.000	0.0000	25.0000	12.4260	0.00	0.9882	0.000	0.000	0.000	0.000
2	5.000	-0.7680	25.7680	13.1939	-3.07	1.0493	0.000	0.000	0.000	0.000
3	10.000	-0.7520	25.7520	13.1779	-3.01	1.0480	14.880	7.948	0.157	0.068
4	40.000	-0.5260	25.5260	12.9520	-2.10	1.0301	2.379	131.021	0.968	0.004
5	80.000	-0.1320	25.1320	12.5579	-0.53	0.9987	3.652	100.664	0.611	0.005
6	100.000	0.0980	24.9020	12.3279	0.39	0.9804	4.845	172.489	0.452	0.003
7	200.000	0.0000	0.0000	0.0000	0.00	0.0000	0.000	0.000	0.000	0.000
8	400.000	0.0000	0.0000	0.0000	0.00	0.0000	0.000	0.000	0.000	0.000
9	800.000	0.0000	0.0000	0.0000	0.00	0.0000	0.000	0.000	0.000	0.000
10	200.000	0.0000	0.0000	0.0000	0.00	0.0000	0.000	0.000	0.000	0.000
11	80.000	0.0000	0.0000	0.0000	0.00	0.0000	0.000	0.000	0.000	0.000
12	20.000	0.0000	0.0000	0.0000	0.00	0.0000	0.000	0.000	0.000	0.000

Predicted value indicated with *

	Stantec Consulting Ltd. Swell-Consolidation Test ASTM D4546 Method C & D2435 Test Results	Calgary Laboratory 10830 - 46th Street SE Calgary, Alberta T2C 1G4 Tel: (403) 253-7876
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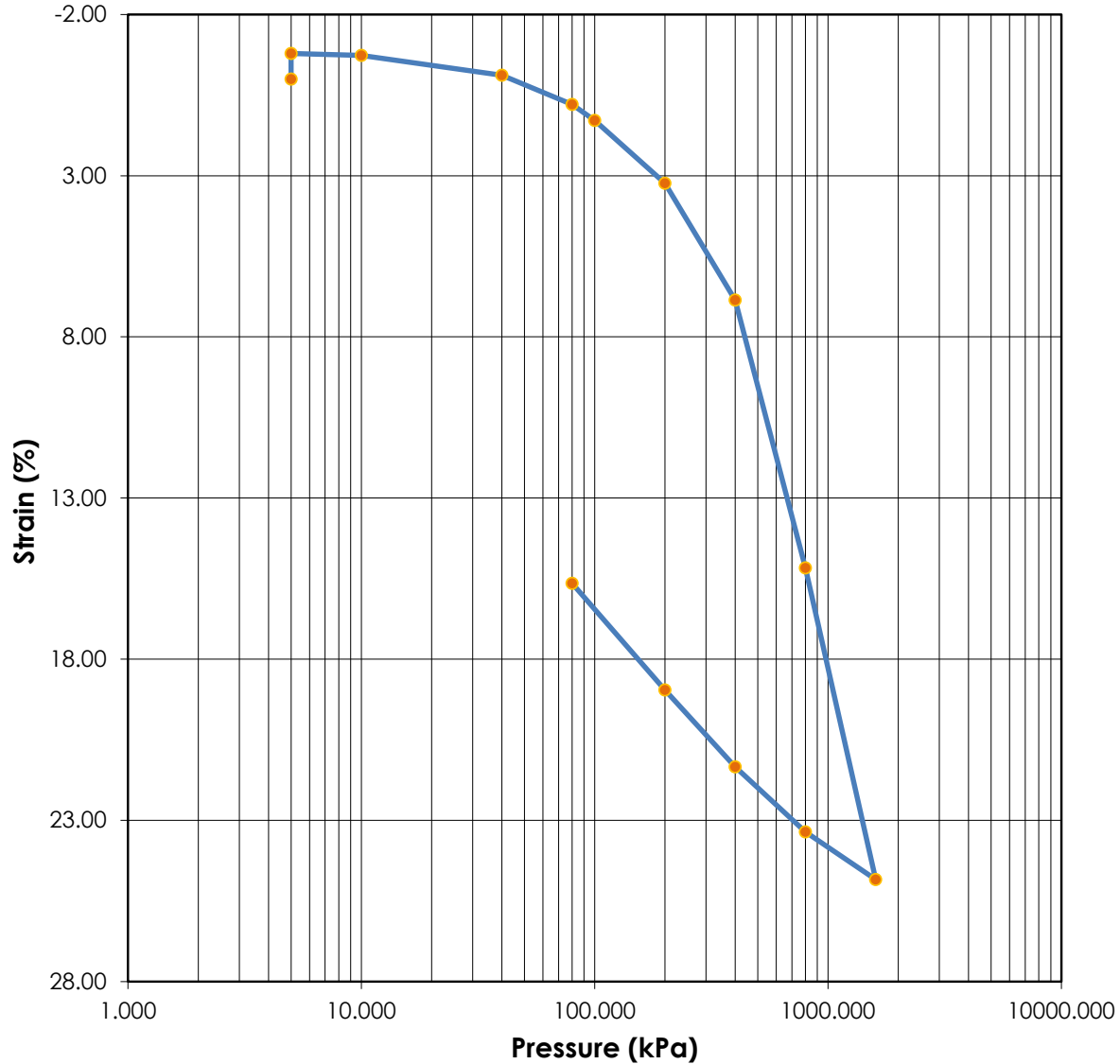
	Before	After	Liquid Limits: -	Test Date: 17-Oct-16
Moisture (%):	53.3	42.7	Plastic Limits: -	
Dry Density (g/cm³):	1.155	1.486	Plasticity Index (%): -	
Saturation (%):	107.51	100.00	Specific Gravity: 2.70	Assumed
Void Ratio:	1.3316	0.9667		
Soil Description: Brown Clay				
Project Number:	111216800		Depth: 7.6m	Remarks:
Sample Number:	TH 23 @ 25'	Boring Number:		
Project:	NEWPCC Upgrade			
Client:	AECOM Canada Ltd.			
Location:				

Tested By: C. Woods


Reviewed By:

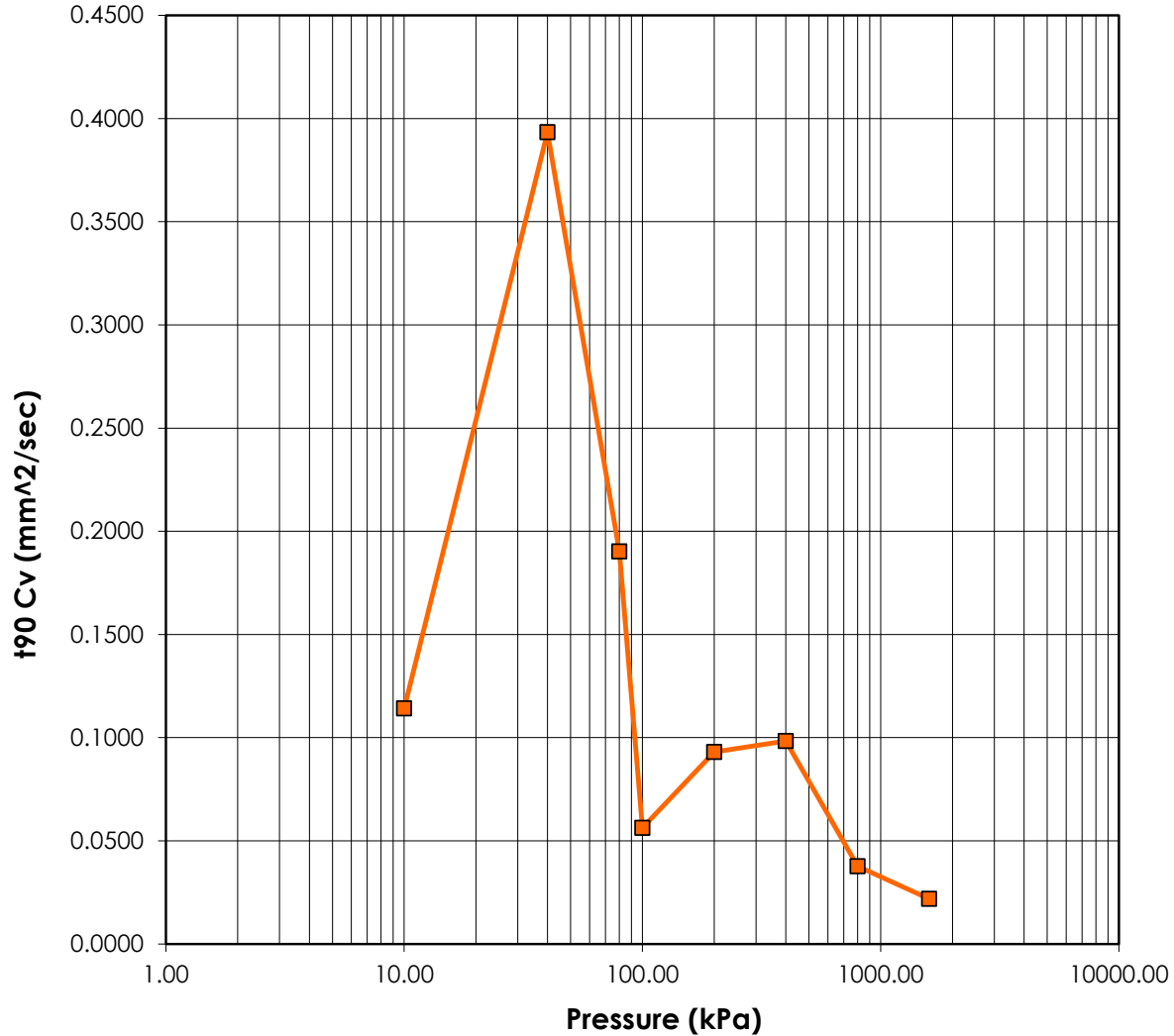
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	Before	After	Liquid Limits:	-	Test Date: 17-Oct-16
Moisture (%):	53.3	42.7	Plastic Limits:	-	
Dry Density (g/cm3):	1.155	1.486	Plasticity Index (%):	-	
Saturation (%):	107.51	100.00	Specific Gravity:	2.70	Assumed
Void Ratio:	1.3316	0.9667			
Sample Description: Brown Clay					
Project Number:	111216800		Depth:	7.6m	
Sample Number:	TH 23 @ 25'	Boring Number:	Remarks:		
Project:	NEWPCC Upgrade				
Client:	AECOM Canada Ltd.				
Location:					

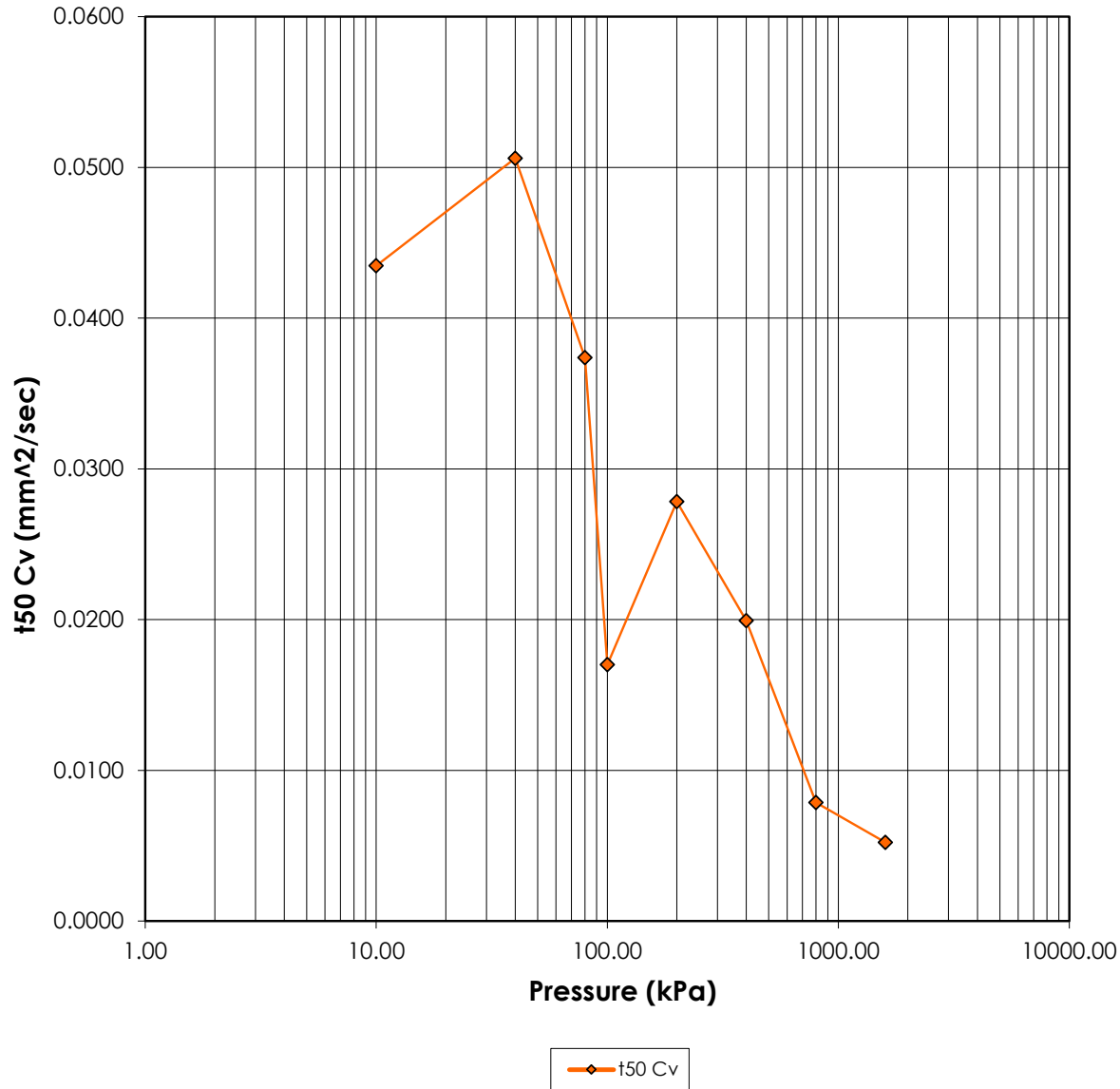
	Stantec Consulting Ltd. Swell-Consolidation Test ASTM D4546 Method C & D2435 Test Results	Calgary Laboratory 10830 - 46th Street SE Calgary, Alberta T2C 1G4 Tel: (403) 253-7876
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—■— $t_{90} C_v$

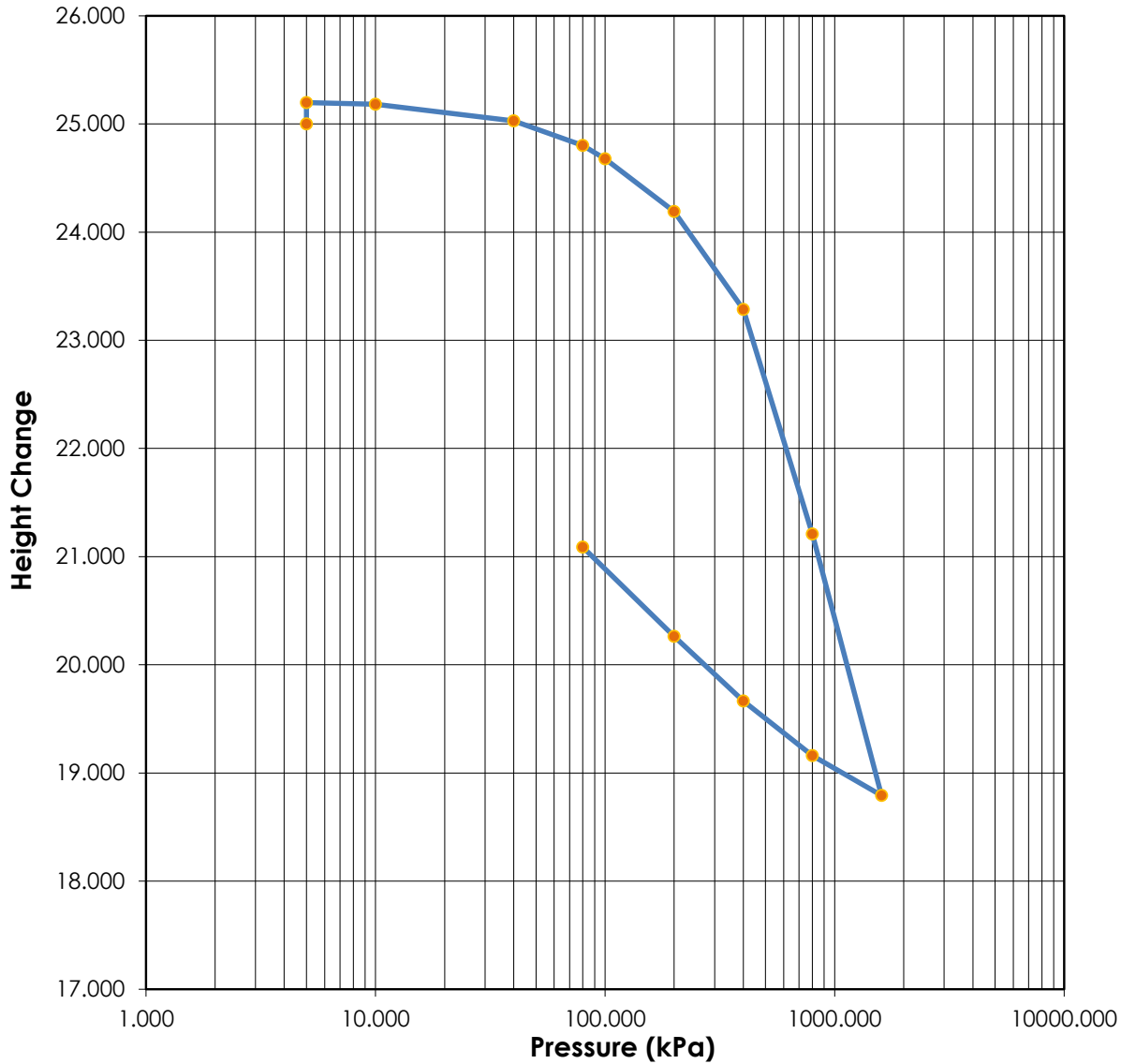
	Before	After	Liquid Limits:	-	Test Date: 17-Oct-16
Moisture (%):	53.3	42.7	Plastic Limits:	-	
Dry Density (g/cm³):	1.155	1.486	Plasticity Index (%):	-	
Saturation (%):	107.51	100.00	Specific Gravity:	2.70	Assumed
Void Ratio:	1.3316	0.9667			
Soil Description: Brown Clay					
Project Number:	111216800		Depth:	7.6m	Remarks:
Sample Number:	TH 23 @ 25'		Boring Number:		
Project:	NEWPCC Upgrade				
Client:	AECOM Canada Ltd.				
Location:					

	Stantec Consulting Ltd. Swell-Consolidation Test ASTM D4546 Method C & D2435 Test Results	Calgary Laboratory 10830 - 46th Street SE Calgary, Alberta T2C 1G4 Tel: (403) 253-7876
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	Before	After	Liquid Limits:	-	Test Date: 17-Oct-16
Moisture (%):	53.3	42.7	Plastic Limits:	-	
Dry Density (g/cm³):	1.155	1.486	Plasticity Index (%):	-	
Saturation (%):	107.51	100.00	Specific Gravity:	2.70	Assumed
Void Ratio:	1.3316	0.9667			
Soil Description: Brown Clay					
Project Number:	111216800		Depth:	7.6m	
Sample Number:	TH 23 @ 25'	Boring Number:			
Project:	NEWPCC Upgrade				
Client:	AECOM Canada Ltd.				
Location:					
			Remarks:		

	Stantec Consulting Ltd. Swell-Consolidation Test ASTM D4546 Method C & D2435 Test Results	Calgary Laboratory 10830 - 46th Street SE Calgary, Alberta T2C 1G4 Tel: (403) 253-7876
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	Before	After	Liquid Limits: -	Test Date: 17-Oct-16
Moisture (%):	53.3	42.7	Plastic Limits: -	
Dry Density (g/cm3):	1.155	1.486	Plasticity Index (%): -	
Saturation (%):	107.51	100.00	Specific Gravity: 2.70	Assumed
Void Ratio:	1.3316	0.9667		
Soil Description: Brown Clay				
Project Number:	111216800		Depth: 7.6m	Remarks:
Sample Number:	TH 23 @ 25'	Boring Number:		
Project:	NEWPCC Upgrade			
Client:	AECOM Canada Ltd.			
Location:				

**Consolidation Test Results
 Summary**

Project: NEWPCC Upgrade
Location:
Job Number:

Project Number: 111216800


Sample Number: TH 23 @ 25'
Boring Number:
Depth: 7.6m
Sample Type: Undisturbed

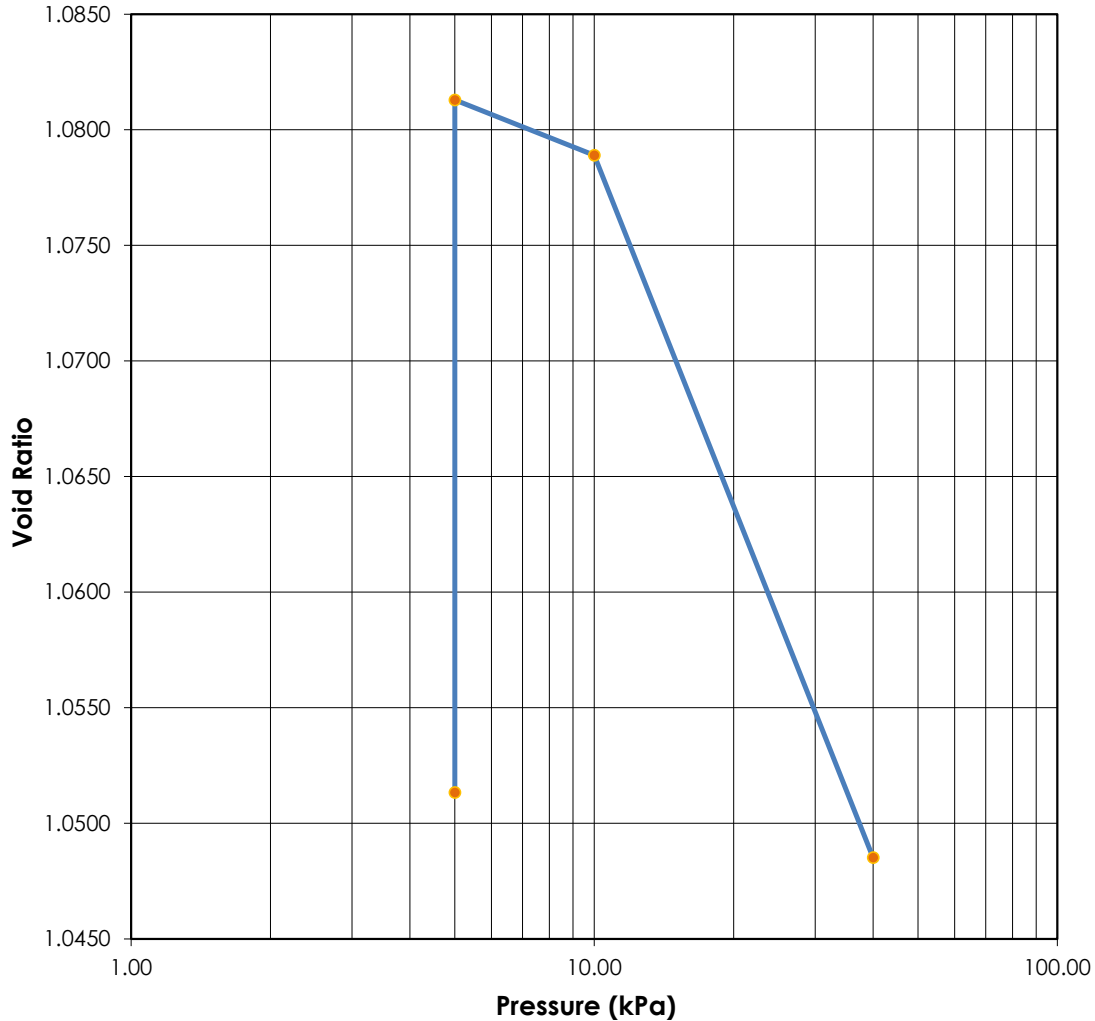
Sample Description:
 Brown Clay
Remarks:

Test Number:
Test Date: 17-Oct-16

Index	Load Sequence (kPa)	Cummulative Change in Height (mm)	Specimen Height (mm)	Height of Void (mm)	Vertical Strain (%)	Void Ratio	t90 Fitting Time (min)	t50 Fitting Time (min)	t90 Cv (mm2/sec)	t50 Cv (mm2/sec)
0	0.000	0.0000	25.0000	14.2847	0.00	1.3331	0.000	0.000	0.000	0.000
1	5.000	0.0000	25.0000	14.2847	0.00	1.3331	0.000	0.000	0.000	0.000
2	5.000	-0.1980	25.1980	14.4827	-0.79	1.3516	0.000	0.000	0.000	0.000
3	10.000	-0.1820	25.1820	14.4667	-0.73	1.3501	19.630	11.972	0.114	0.043
4	40.000	-0.0280	25.0280	14.3127	-0.11	1.3357	5.627	10.160	0.393	0.051
5	80.000	0.1980	24.8020	14.0867	0.79	1.3146	11.423	13.508	0.190	0.037
6	100.000	0.3220	24.6780	13.9627	1.29	1.3031	38.245	29.406	0.056	0.017
7	200.000	0.8080	24.1920	13.4767	3.23	1.2577	22.234	17.271	0.093	0.028
8	400.000	1.7140	23.2860	12.5707	6.86	1.1732	19.480	22.327	0.098	0.020
9	800.000	3.7920	21.2080	10.4927	15.17	0.9792	42.218	46.932	0.038	0.008
10	1600.000	6.2080	18.7920	8.0767	24.83	0.7538	57.089	55.570	0.022	0.005
11	800.000	5.8400	19.1600	8.4447	23.36	0.7881	0.000	0.000	0.000	0.000
12	400.000	5.3340	19.6660	8.9507	21.34	0.8353	0.000	0.000	0.000	0.000
13	200.000	4.7380	20.2620	9.5467	18.95	0.8909	0.000	0.000	0.000	0.000
14	80.000	3.9120	21.0880	10.3727	15.65	0.9680	0.000	0.000	0.000	0.000

Predicted value indicated with *

	Stantec Consulting Ltd. Swell Test ASTM D4546 Method C Test Results	Calgary Laboratory 10830 - 46th Street SE Calgary, Alberta T2C 1G4 Tel: (403) 253-7876
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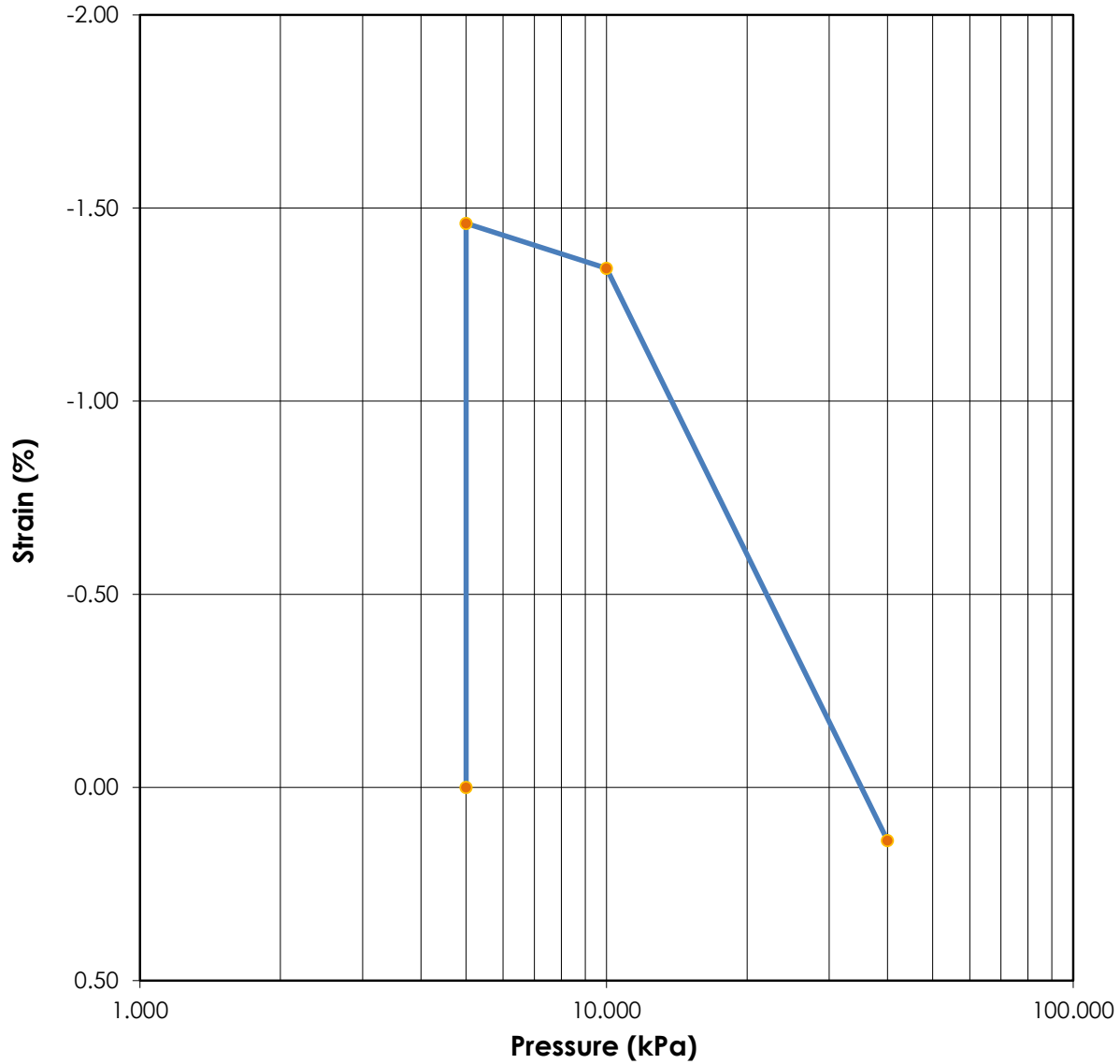
	Before	After	Liquid Limits: -	Test Date: 24-Oct-16
Moisture (%):	49.0	56.0	Plastic Limits: -	
Dry Density (g/cm³):	1.314	1.090	Plasticity Index (%): -	
Saturation (%):	125.41	100.00	Specific Gravity: 2.70	Assumed
Void Ratio:	1.0514	1.0486		
Soil Description: Brown Clay				
Project Number:	111216800		Depth: 13.6m	Remarks:
Sample Number:	TH28 @ 45'	Boring Number:		
Project:	NEWPCC Upgrade			
Client:	AECOM Canada Ltd.			
Location:				

Tested By: C. Woods


Reviewed By:

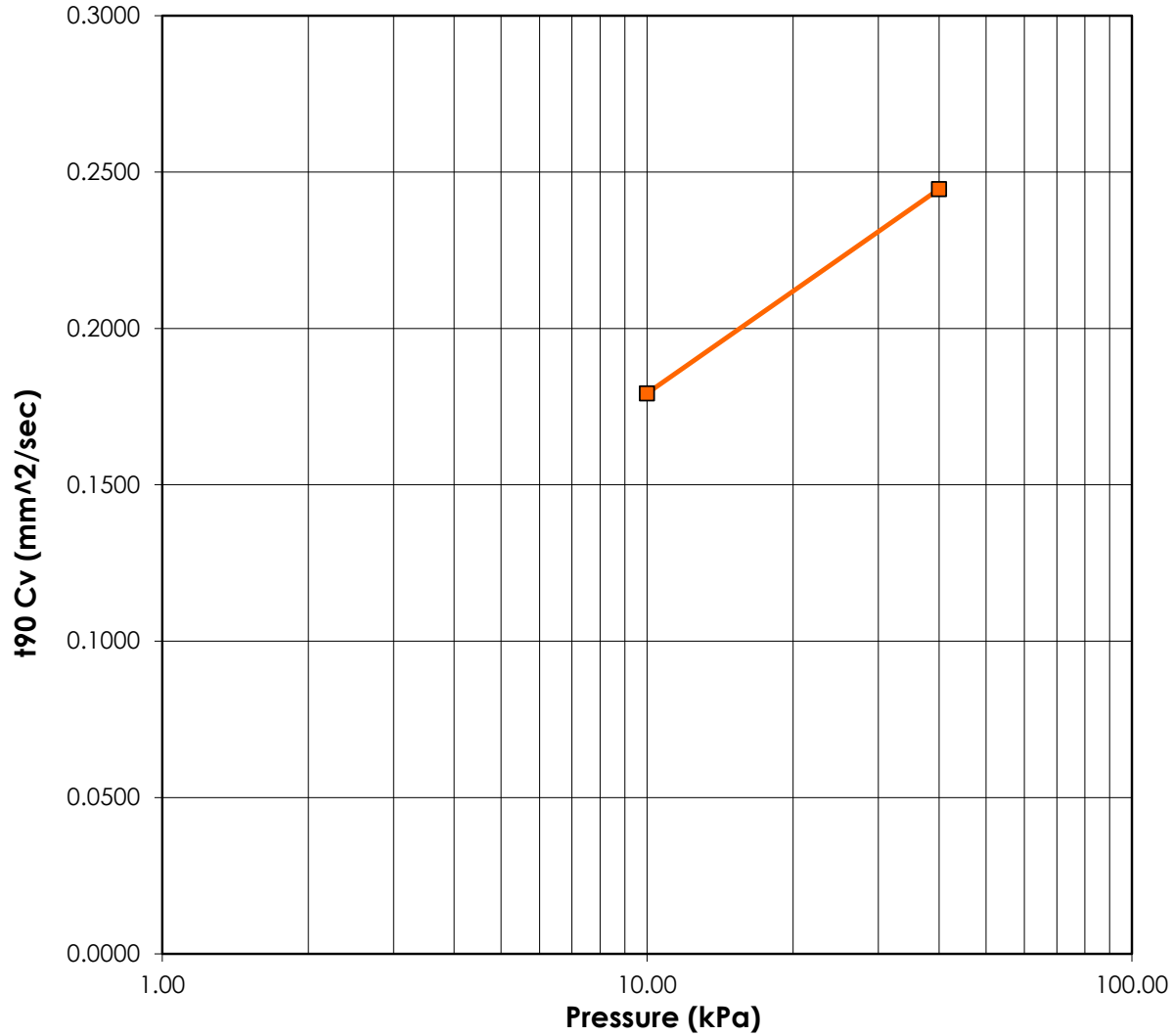
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	Before	After	Liquid Limits: -	Test Date: 24-Oct-16
Moisture (%):	49.0	56.0	Plastic Limits: -	
Dry Density (g/cm ³):	1.314	1.090	Plasticity Index (%): -	
Saturation (%):	125.41	100.00	Specific Gravity: 2.70	Assumed
Void Ratio:	1.0514	1.0486		
Sample Description: Brown Clay				
Project Number:	111216800		Depth: 13.6m	Remarks:
Sample Number:	TH28 @ 45'		Boring Number:	
Project:	NEWPCC Upgrade			
Client:	AECOM Canada Ltd.			
Location:				

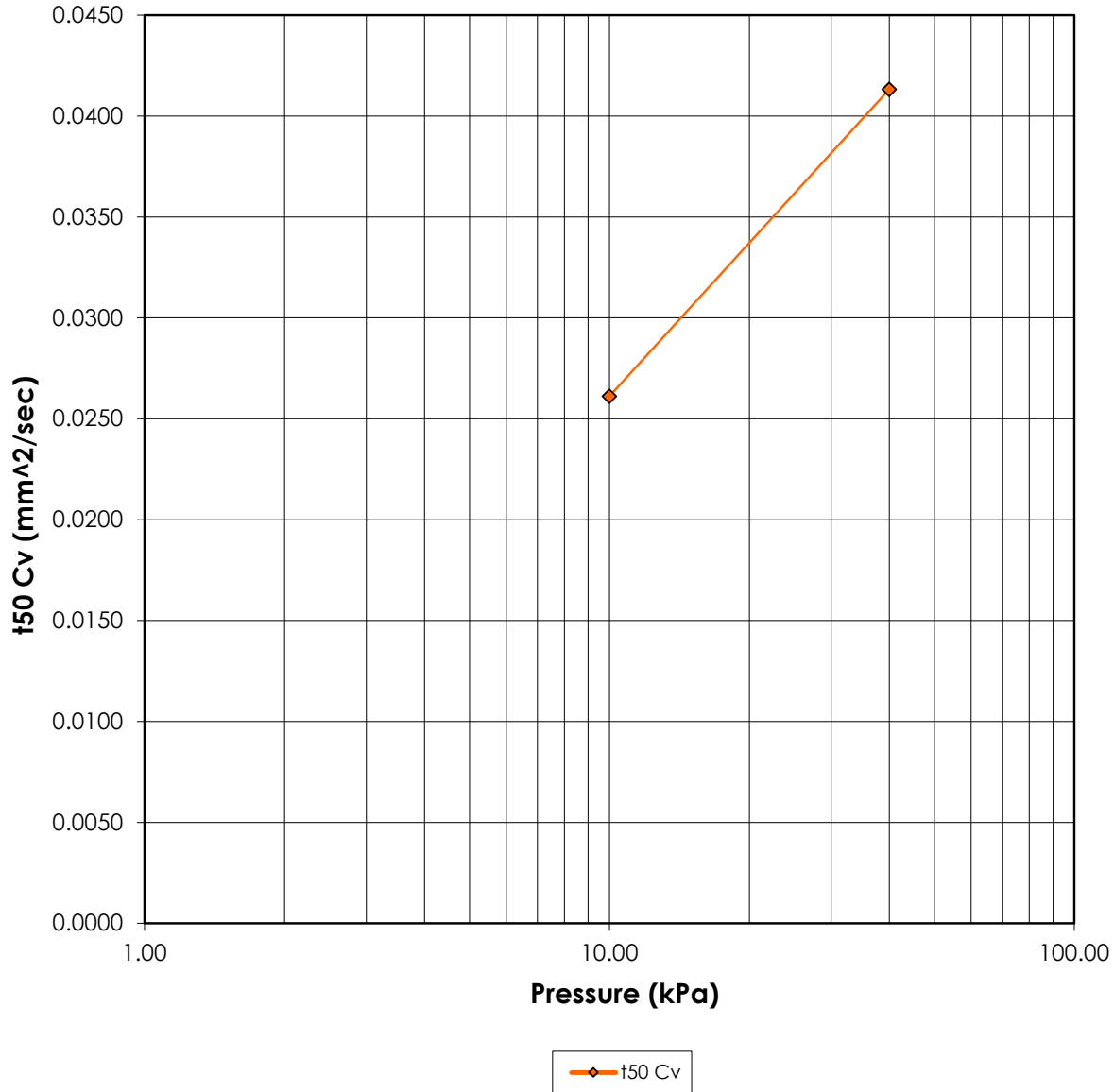
	Stantec Consulting Ltd. Swell Test ASTM D4546 Method C Test Results	Calgary Laboratory 10830 - 46th Street SE Calgary, Alberta T2C 1G4 Tel: (403) 253-7876
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—■— t90 Cv

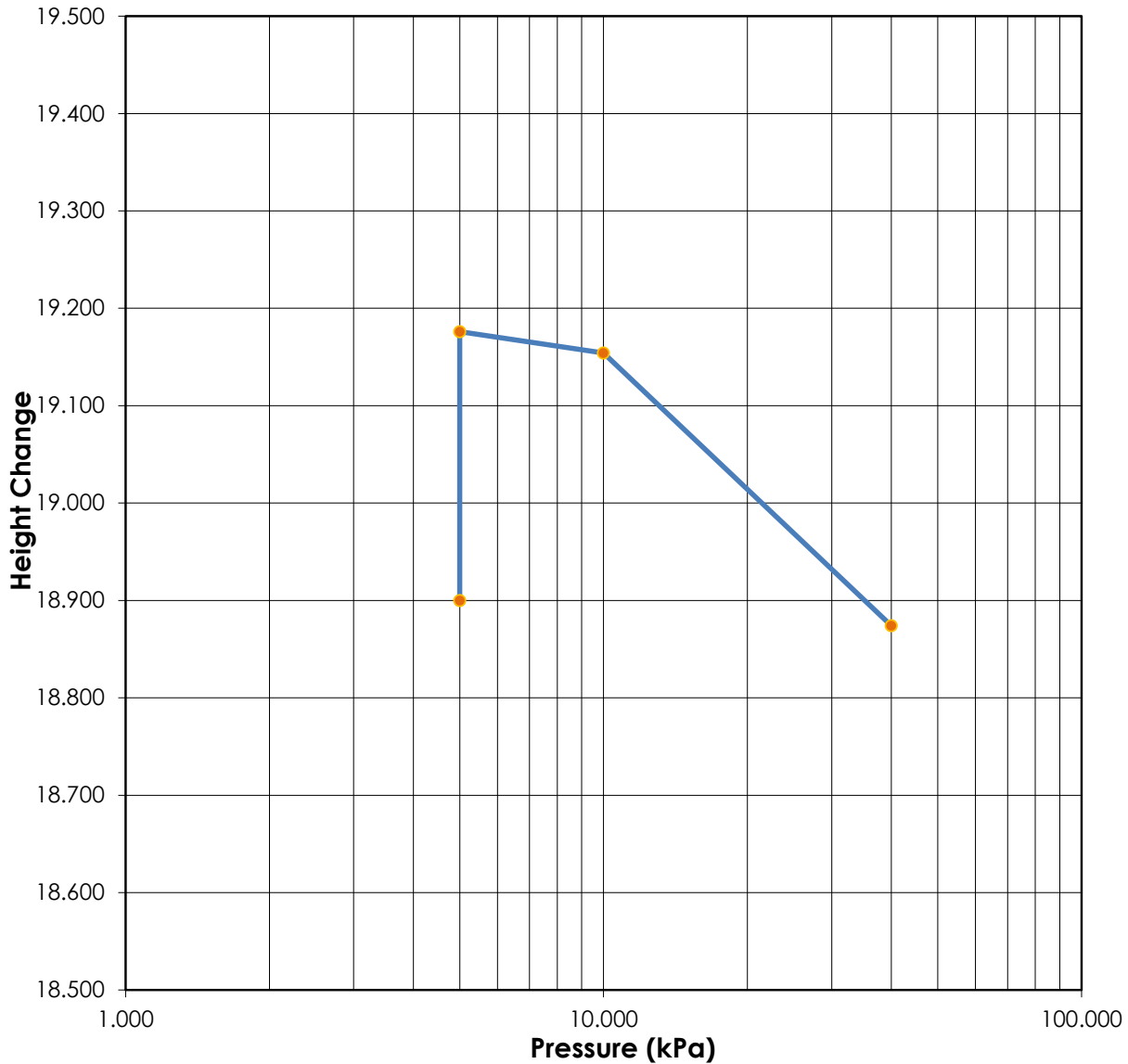
	Before	After	Liquid Limits: -	Test Date: 24-Oct-16
Moisture (%):	49.0	56.0	Plastic Limits: -	
Dry Density (g/cm³):	1.314	1.090	Plasticity Index (%): -	
Saturation (%):	125.41	100.00	Specific Gravity: 2.70	Assumed
Void Ratio:	1.0514	1.0486		
Soil Description:	Brown Clay			
Project Number:	111216800		Depth: 13.6m	Remarks:
Sample Number:	TH28 @ 45'		Boring Number:	
Project:	NEWPCC Upgrade			
Client:	AECOM Canada Ltd.			
Location:				

	Stantec Consulting Ltd. Swell Test ASTM D4546 Method C Test Results	Calgary Laboratory 10830 - 46th Street SE Calgary, Alberta T2C 1G4 Tel: (403) 253-7876
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	Before	After	Liquid Limits:	-	Test Date:	24-Oct-16	
Moisture (%):	49.0	56.0	Plastic Limits:	-			
Dry Density (g/cm³):	1.314	1.090	Plasticity Index (%):	-			
Saturation (%):	125.41	100.00	Specific Gravity:	2.70	Assumed		
Void Ratio:	1.0514	1.0486					
Soil Description:	Brown Clay						
Project Number:	111216800		Depth:	13.6m			
Sample Number:	TH28 @ 45'		Boring Number:	Remarks:			
Project:	NEWPCC Upgrade						
Client:	AECOM Canada Ltd.						
Location:							

	Stantec Consulting Ltd. Swell Test ASTM D4546 Method C Test Results	Calgary Laboratory 10830 - 46th Street SE Calgary, Alberta T2C 1G4 Tel: (403) 253-7876
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	Before	After	Liquid Limits: -	Test Date: 24-Oct-16
Moisture (%):	49.0	56.0	Plastic Limits: -	
Dry Density (g/cm³):	1.314	1.090	Plasticity Index (%): -	
Saturation (%):	125.41	100.00	Specific Gravity: 2.70	Assumed
Void Ratio:	1.0514	1.0486		
Soil Description:	Brown Clay			
Project Number:	111216800		Depth: 13.6m	Remarks:
Sample Number:	TH28 @ 45'		Boring Number:	
Project:	NEWPCC Upgrade			
Client:	AECOM Canada Ltd.			
Location:				

Consolidation Test Results Summary

Project: NEWPCC Upgrade
Location:
Job Number: 111216800

Project Number: 111216800

Sample Number: TH28 @ 45'
Boring Number:
Depth: 13.6m
Sample Type: Undisturbed

Sample Description:
 Brown Clay
Remarks:

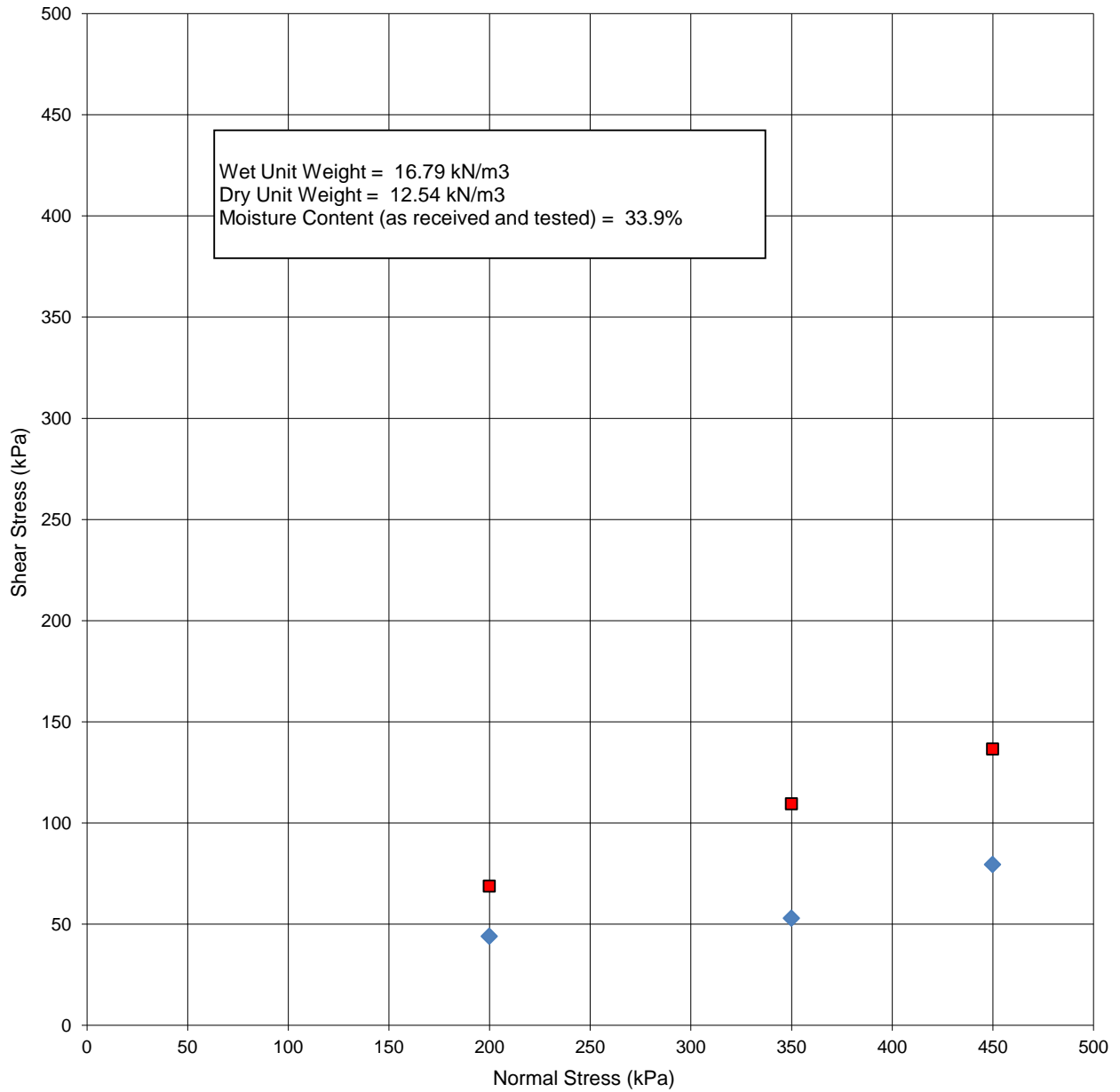
Test Number:
Test Date: 24-Oct-16

Index	Load Sequence (kPa)	Cummulative Change in Height (mm)	Specimen Height (mm)	Height of Void (mm)	Vertical Strain (%)	Void Ratio	t90 Fitting Time (min)	t50 Fitting Time (min)	t90 Cv (mm ² /sec)	t50 Cv (mm ² /sec)
0	0.000	0.0000	18.9000	9.6865	0.00	1.0513	0.000	0.000	0.000	0.000
1	5.000	0.0000	18.9000	9.6865	0.00	1.0513	0.000	0.000	0.000	0.000
2	5.000	-0.2760	19.1760	9.9625	-1.46	1.0813	0.000	0.000	0.000	0.000
3	10.000	-0.2540	19.1540	9.9405	-1.34	1.0789	7.232	11.530	0.179	0.026
4	40.000	0.0260	18.8740	9.6605	0.14	1.0485	5.148	7.076	0.245	0.041
5	80.000	0.0000	0.0000	0.0000	0.00	0.0000	0.000	0.000	0.000	0.000
6	100.000	0.0000	0.0000	0.0000	0.00	0.0000	0.000	0.000	0.000	0.000
7	200.000	0.0000	0.0000	0.0000	0.00	0.0000	0.000	0.000	0.000	0.000
8	400.000	0.0000	0.0000	0.0000	0.00	0.0000	0.000	0.000	0.000	0.000
9	800.000	0.0000	0.0000	0.0000	0.00	0.0000	0.000	0.000	0.000	0.000
10	200.000	0.0000	0.0000	0.0000	0.00	0.0000	0.000	0.000	0.000	0.000
11	80.000	0.0000	0.0000	0.0000	0.00	0.0000	0.000	0.000	0.000	0.000
12	20.000	0.0000	0.0000	0.0000	0.00	0.0000	0.000	0.000	0.000	0.000

Predicted value indicated with *

DIRECT DRAINED SHEAR TEST

EFFECTIVE STRESS FAILURE ENVELOPE

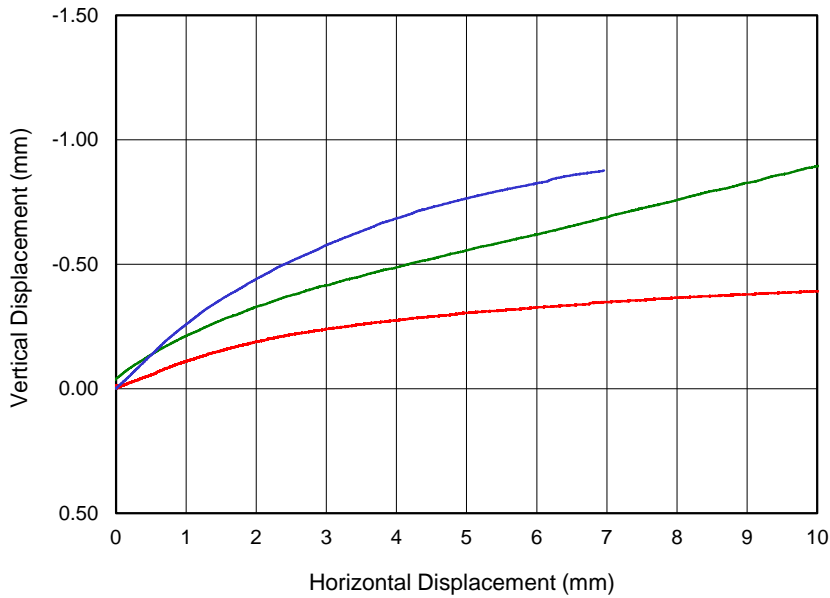
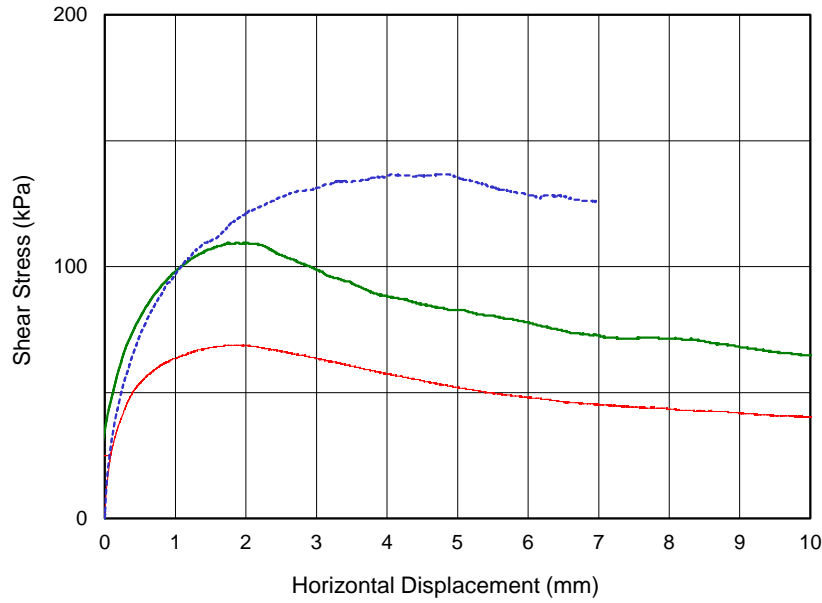


Tested By: MVG Date: Oct. 2016 Checked By: Guillaume Beauce Date: Dec 2016

**NEWPCC
TH19 5 - 7'**



DIRECT DRAINED SHEAR TEST SHEAR STRESS and VERTICAL DISPLACEMENT vs. HORIZONTAL DISPLACEMENT



— Normal Stress: 200 kPa — Normal Stress: 350 kPa — Normal Stress: 450 kPa

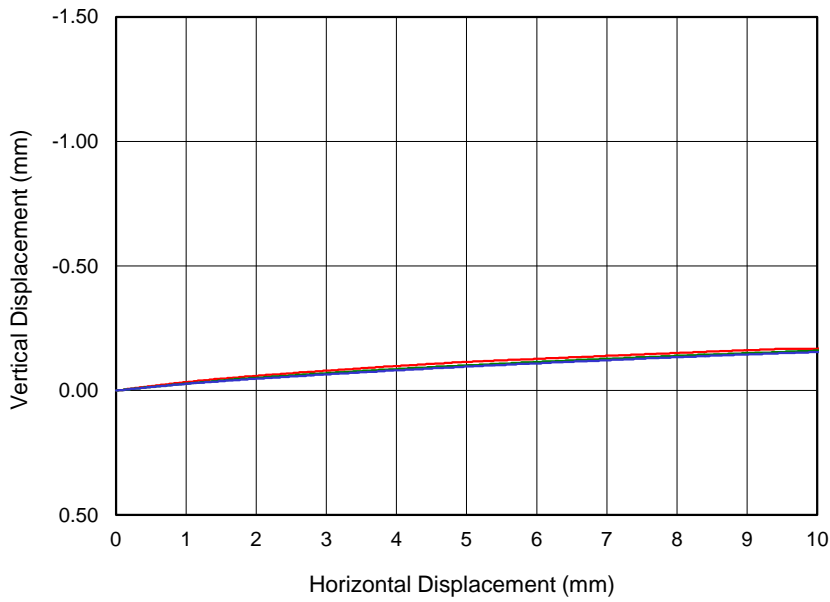
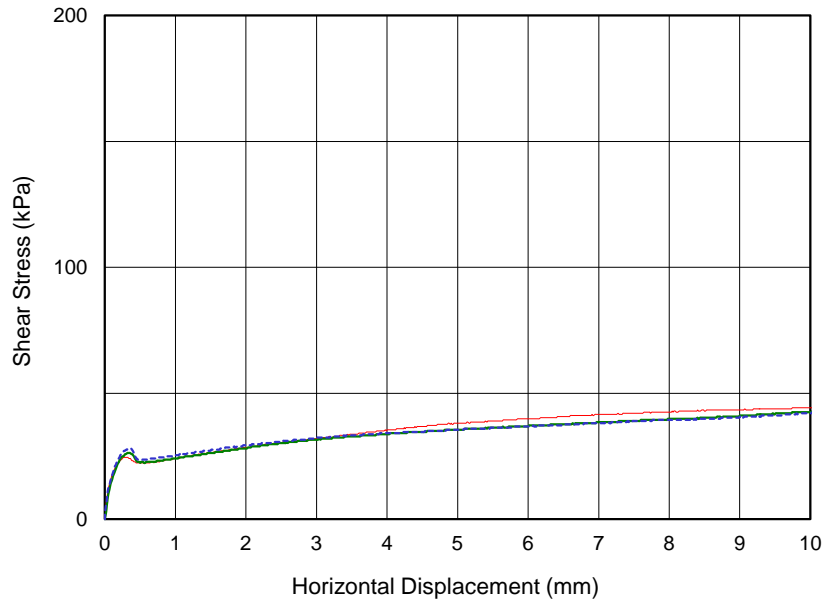
**NEWPCC
TH19 5 - 7'**



Tested By: MVG Date: Oct. 2016 Checked By: Guillaume Beauce Date: Dec 2016

DIRECT DRAINED SHEAR TEST

SHEAR STRESS and VERTICAL DISPLACEMENT
vs. HORIZONTAL DISPLACEMENT



— Normal Stress: 200kPa — Normal Stress: 200 kPa — Normal Stress: 200 kPa

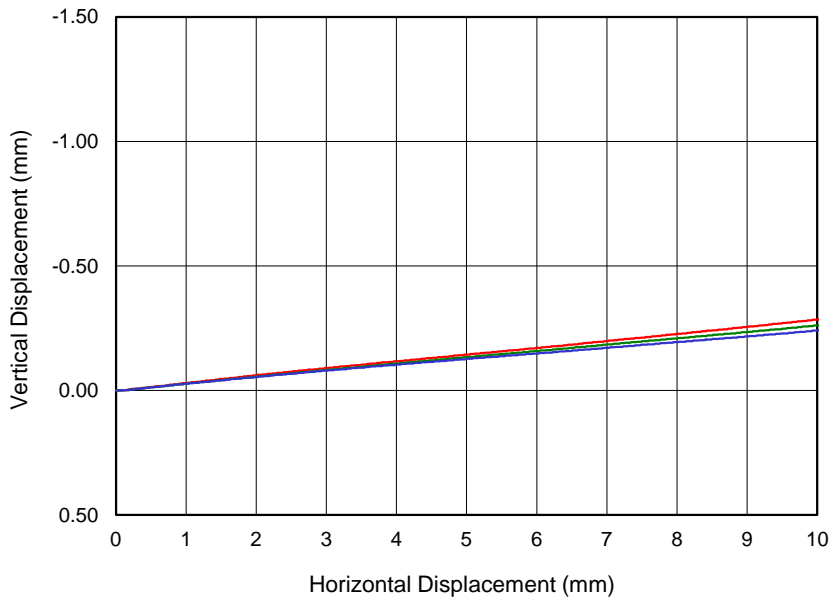
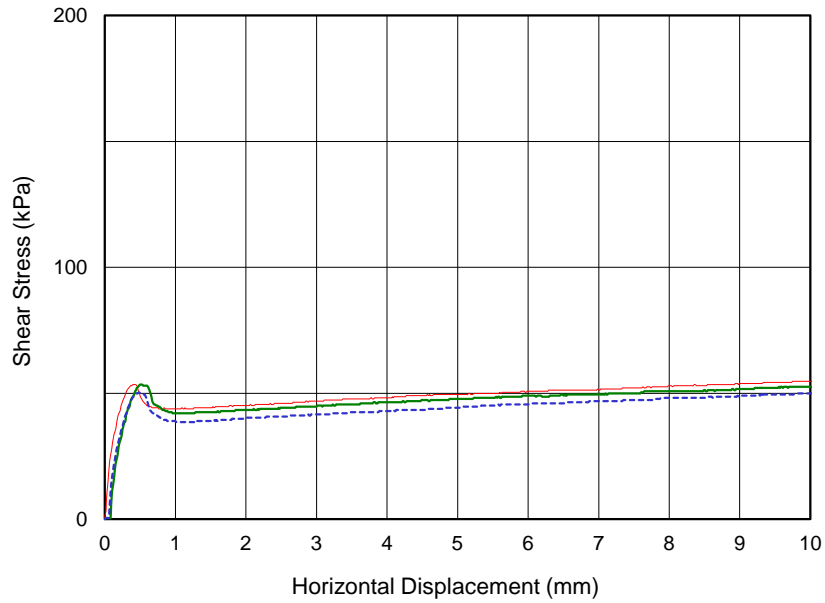
NEWPCC
TH19 5 - 7'
200 kpa Residual Trials



Checked By: Guillaume Beauce Date: Dec 2016
Tested By: MVG Date: Nov. 2016

DIRECT DRAINED SHEAR TEST

SHEAR STRESS and VERTICAL DISPLACEMENT
vs. HORIZONTAL DISPLACEMENT



— Normal Stress: 350kPa — Normal Stress: 350 kPa — Normal Stress: 350 kPa

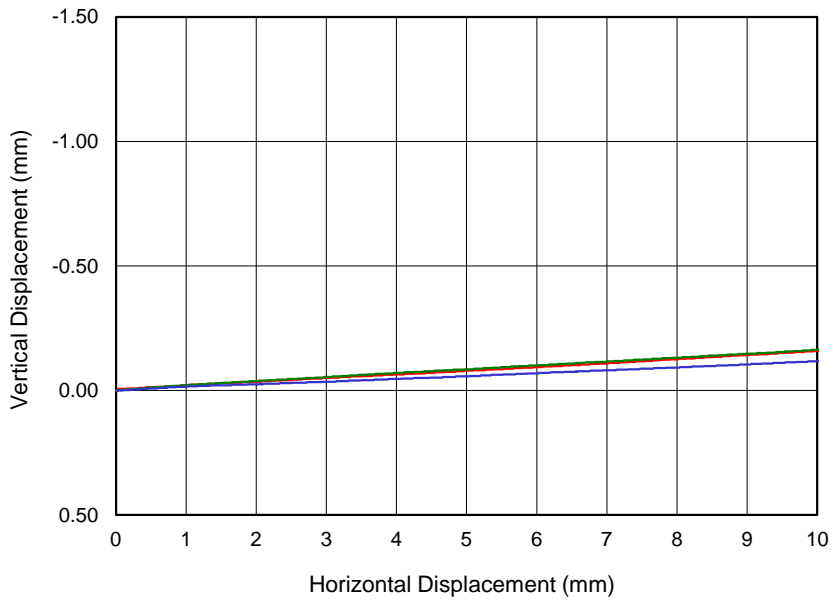
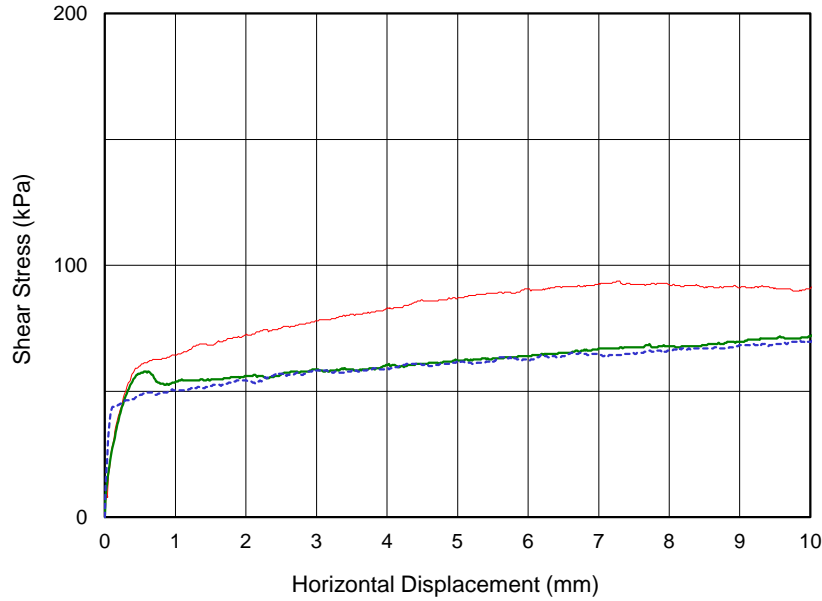
NEWPCC
TH19 5 - 7'
350 kpa Residual Trials



Tested By: MVG Date: Nov.2016 Checked By: Guillaume Beauce Date: Dec 2016

DIRECT DRAINED SHEAR TEST

SHEAR STRESS and VERTICAL DISPLACEMENT
vs. HORIZONTAL DISPLACEMENT



— Normal Stress: 450kPa — Normal Stress: 450 kPa — Normal Stress: 450 kPa

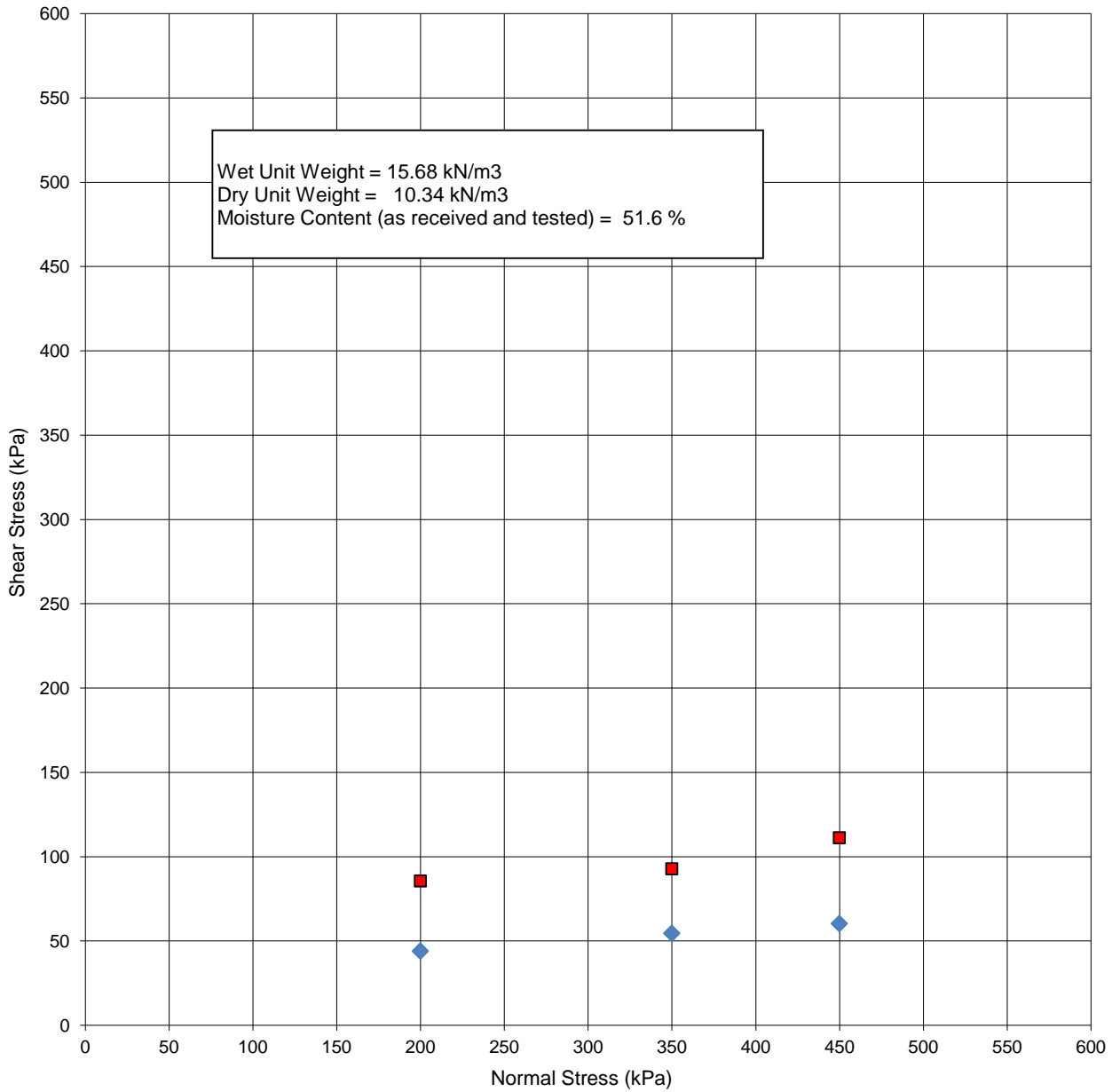
NEWPCC
TH19 5 - 7'
450 kpa Residual Trials



Tested By: MVG Date: Nov.2016 Checked By: Guillaume Beauce Date: Dec 2016

DIRECT DRAINED SHEAR TEST

EFFECTIVE STRESS FAILURE ENVELOPE



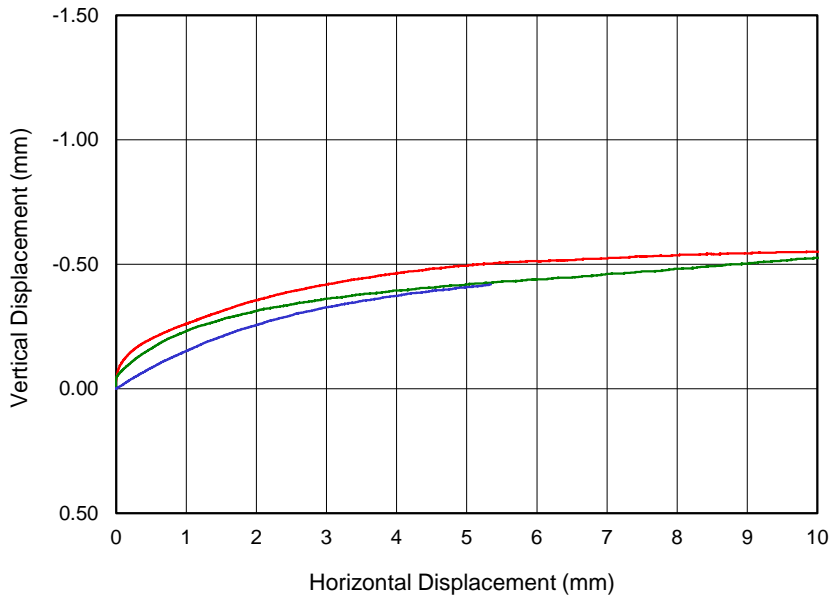
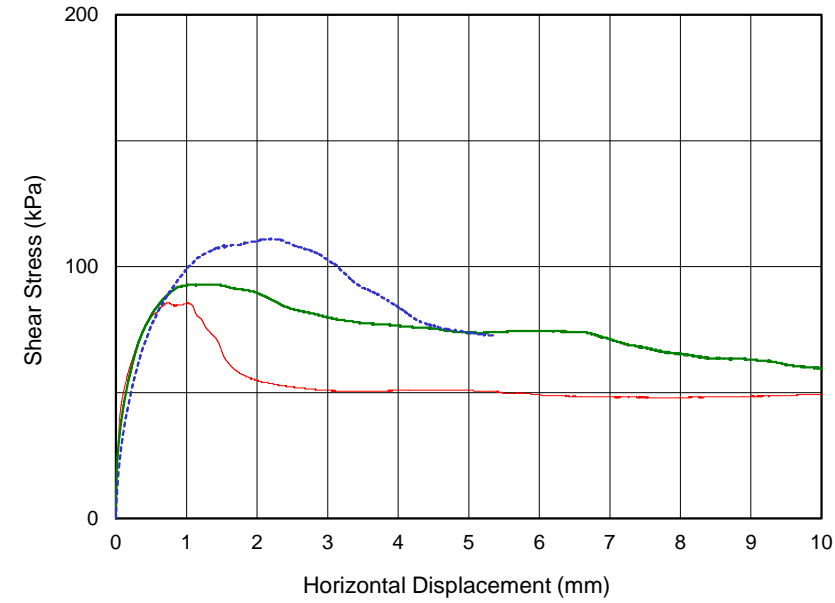
NEWPCC
TH19 15 - 17'



Tested By: M/G
Date: Nov. 2016
Checked By: Guillaume Beauce
Date: Dec 2016

DIRECT DRAINED SHEAR TEST

SHEAR STRESS and VERTICAL DISPLACEMENT
vs. HORIZONTAL DISPLACEMENT



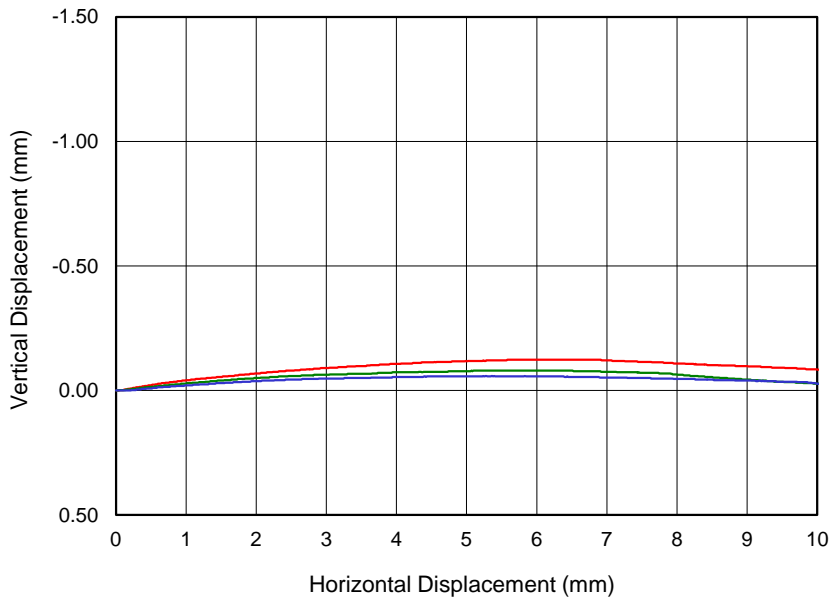
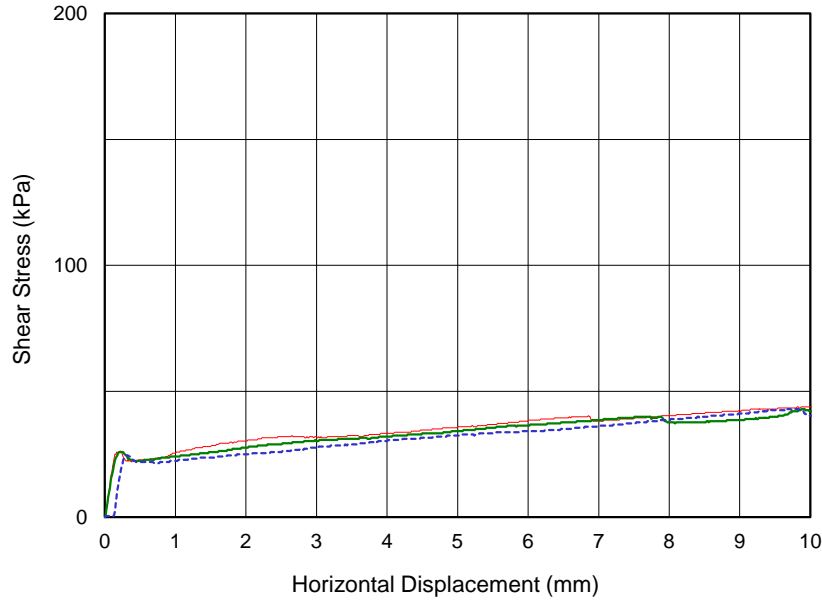
— Normal Stress: 200 kPa — Normal Stress: 350 kPa — Normal Stress: 450 kPa

**NEWPCC
TH19 15 - 17'**



DIRECT DRAINED SHEAR TEST

SHEAR STRESS and VERTICAL DISPLACEMENT
vs. HORIZONTAL DISPLACEMENT



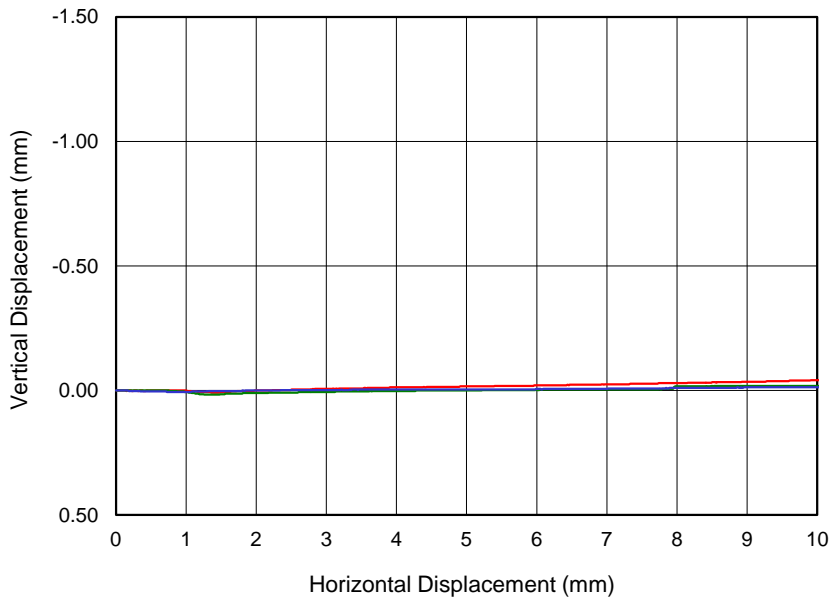
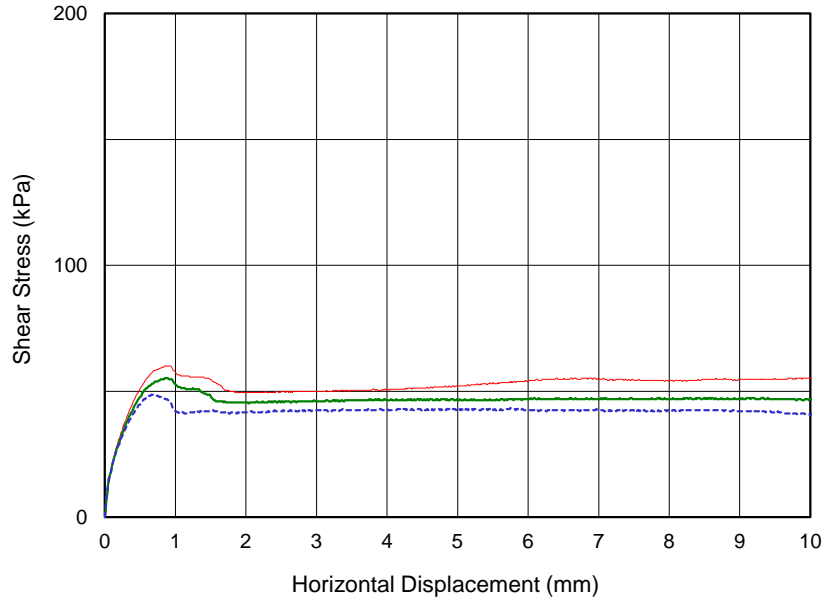
— Normal Stress: 200kPa — Normal Stress: 200 kPa — Normal Stress: 200 kPa

NEWPCC
TH19 15 - 17'
200 kpa Residual Trials



Tested By: MVG/MEL Date: Nov.2016 Checked By: Guillaume Beauce Date: Dec 2016

DIRECT DRAINED SHEAR TEST SHEAR STRESS and VERTICAL DISPLACEMENT vs. HORIZONTAL DISPLACEMENT



— Normal Stress: 350kPa — Normal Stress: 350 kPa — Normal Stress: 350 kPa

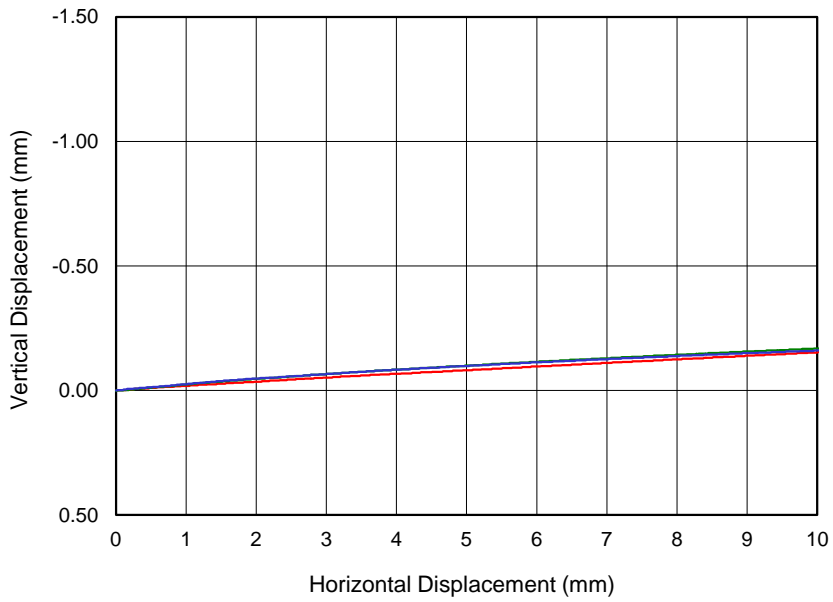
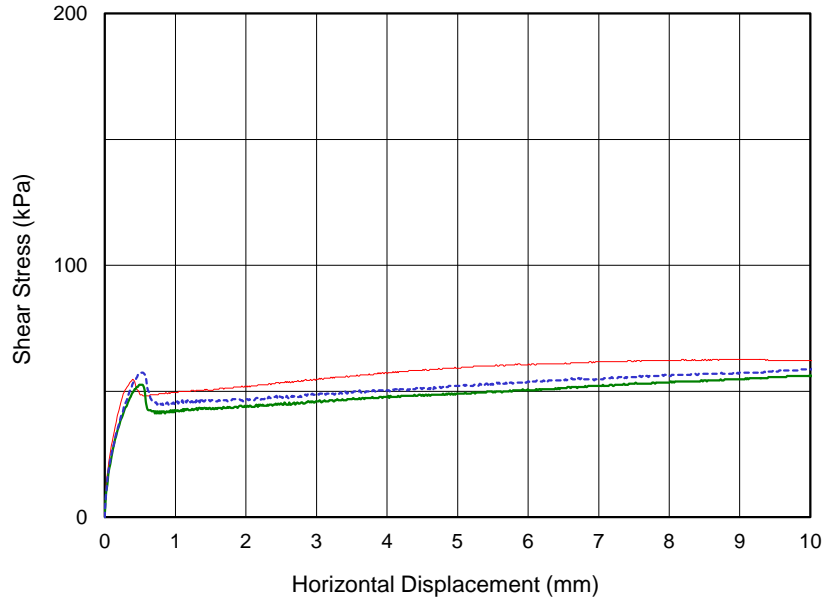
**NEWPCC
TH19 15 - 17'
350 kpa Residual Trials**



Tested By: MVG/MEL Date: Nov.2016 Checked By: Guillaume Beauce Date: Dec.2016

DIRECT DRAINED SHEAR TEST

SHEAR STRESS and VERTICAL DISPLACEMENT
vs. HORIZONTAL DISPLACEMENT



— Normal Stress: 450kPa — Normal Stress: 450 kPa — Normal Stress: 450 kPa

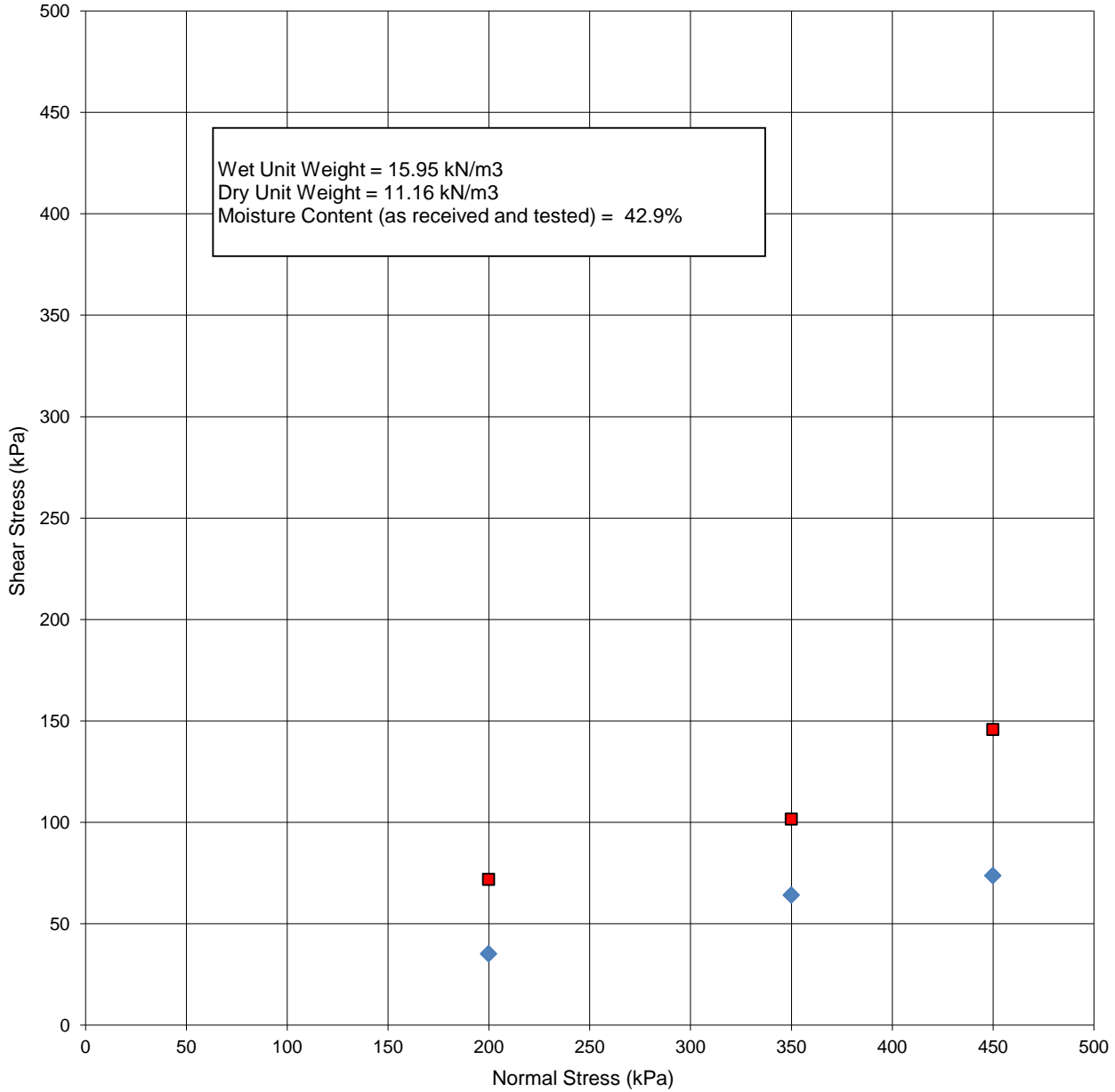
NEWPCC
TH19 15 - 17'
450 kpa Residual Trials



Tested By: MVG/MEL Date: Nov.2016 Checked By: Guillaume Beauce Date: Nov.2016

DIRECT DRAINED SHEAR TEST

EFFECTIVE STRESS FAILURE ENVELOPE

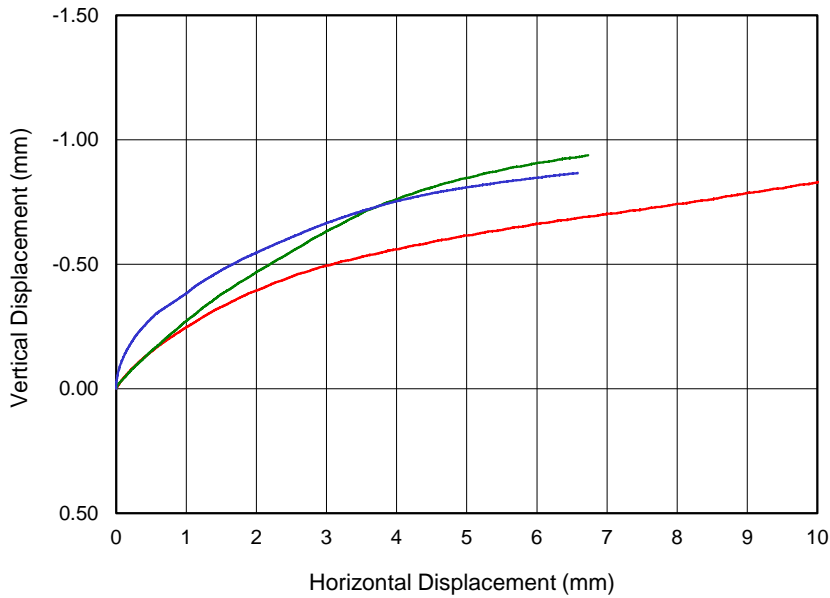
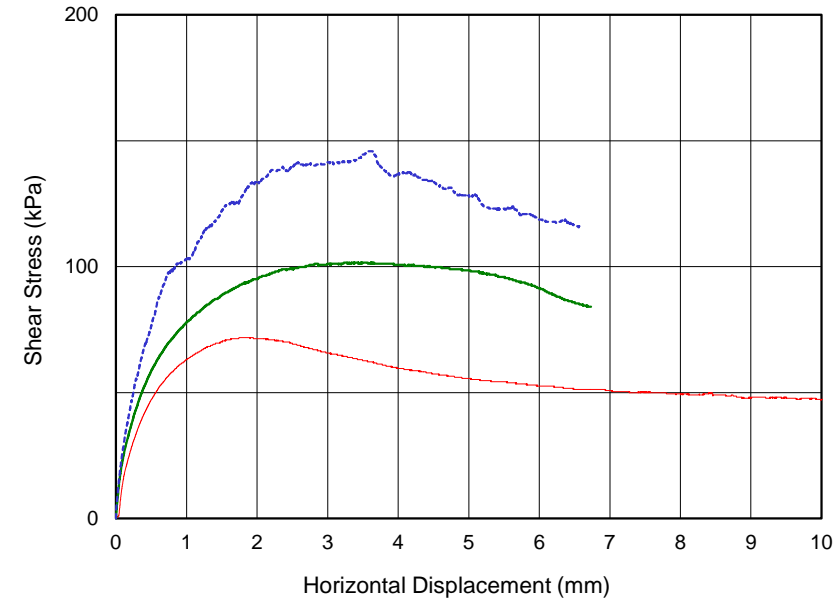


Tested By: MVG
Date: Nov.2016
Checked By: Guillaume Beauce
Date: Dec 2016

NEWPCC
TH19 35 - 37'



DIRECT DRAINED SHEAR TEST SHEAR STRESS and VERTICAL DISPLACEMENT vs. HORIZONTAL DISPLACEMENT



— Normal Stress: 200 kPa — Normal Stress: 350 kPa — Normal Stress: 450 kPa

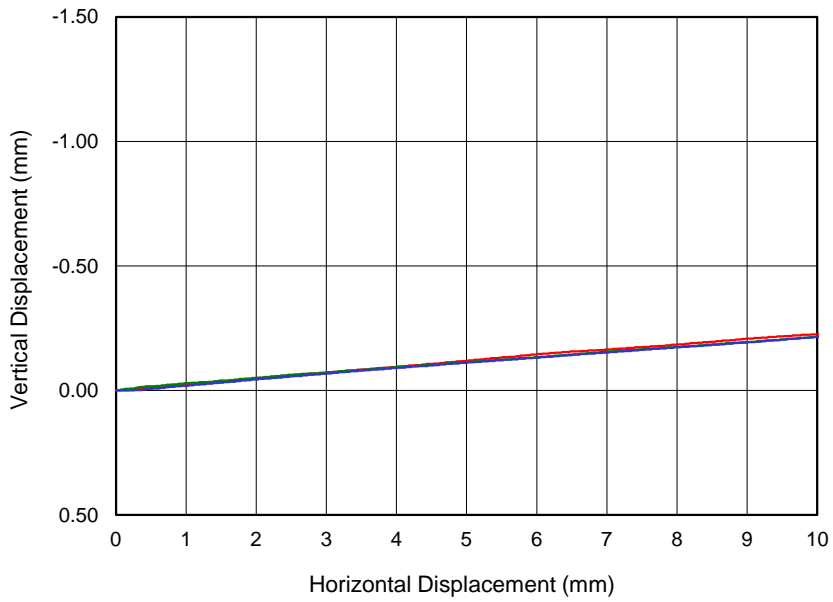
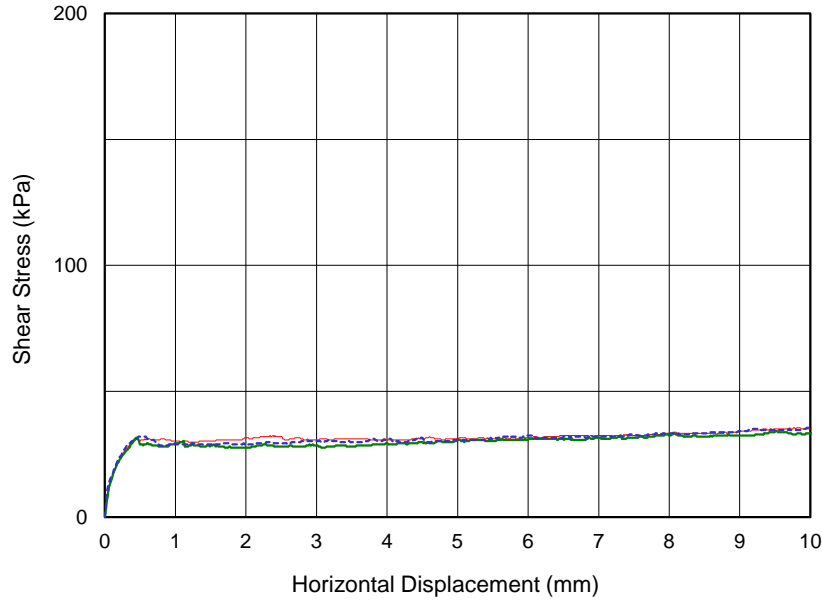
**NEWPCC
TH19 35 - 37'**



Tested By: MVG Date: Nov.2016 Checked By: Guillaume Beauce Date: Dec 2016

DIRECT DRAINED SHEAR TEST

SHEAR STRESS and VERTICAL DISPLACEMENT
vs. HORIZONTAL DISPLACEMENT



— Normal Stress: 200kPa — Normal Stress: 200 kPa — Normal Stress: 200 kPa

NEWPCC
TH19 35 - 37'
200 kpa Residual Trials

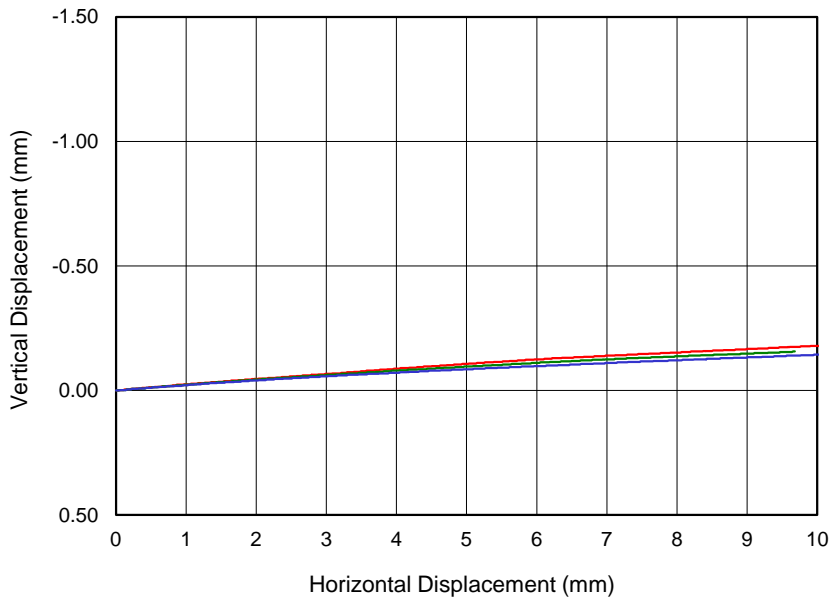
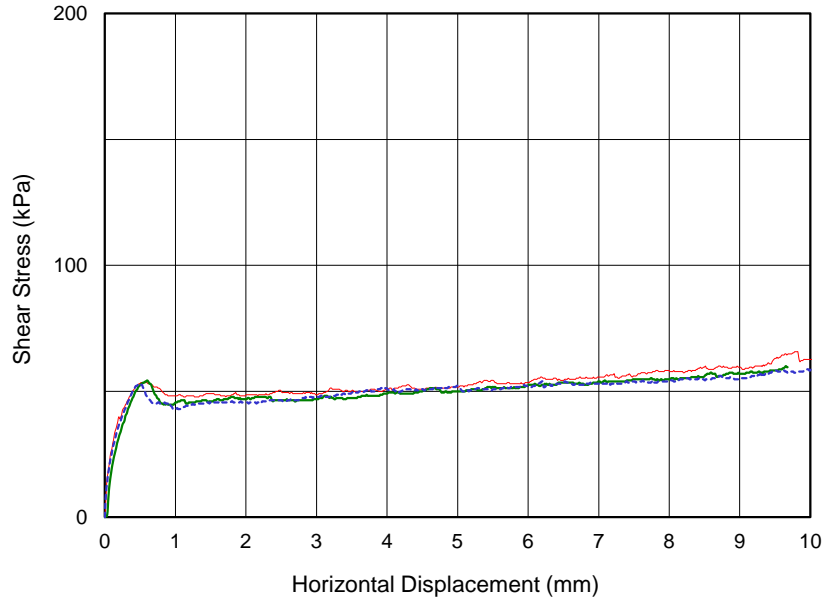


Checked By: Guillaume Beauce
Date: Dec 2016

Tested By: MVG
Date: Nov.2016

DIRECT DRAINED SHEAR TEST

SHEAR STRESS and VERTICAL DISPLACEMENT
vs. HORIZONTAL DISPLACEMENT



— Normal Stress: 350kPa — Normal Stress: 350 kPa — Normal Stress: 350 kPa

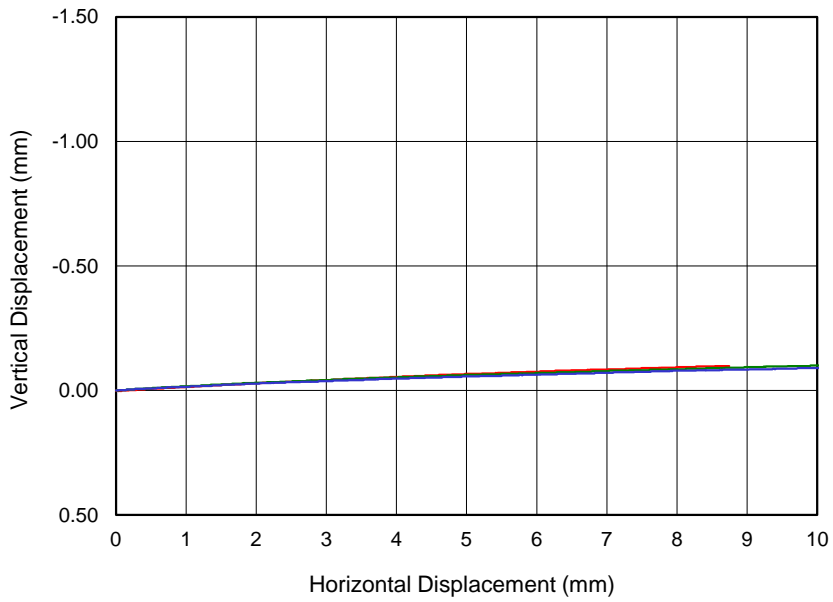
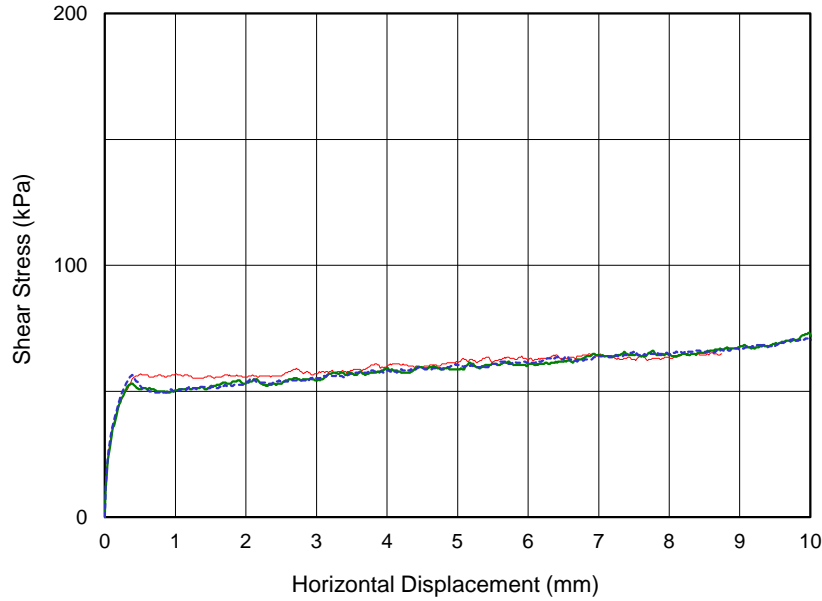
NEWPCC
TH19 35 - 37'
350 kpa Residual Trials



Tested By: MVG Date: Nov.2016 Checked By: Guillaume Beauce Date: Dec 2016

DIRECT DRAINED SHEAR TEST

SHEAR STRESS and VERTICAL DISPLACEMENT
vs. HORIZONTAL DISPLACEMENT



— Normal Stress: 450kPa — Normal Stress: 450 kPa — Normal Stress: 450 kPa

NEWPCC
TH19 35 - 37'
450 kpa Residual Trials

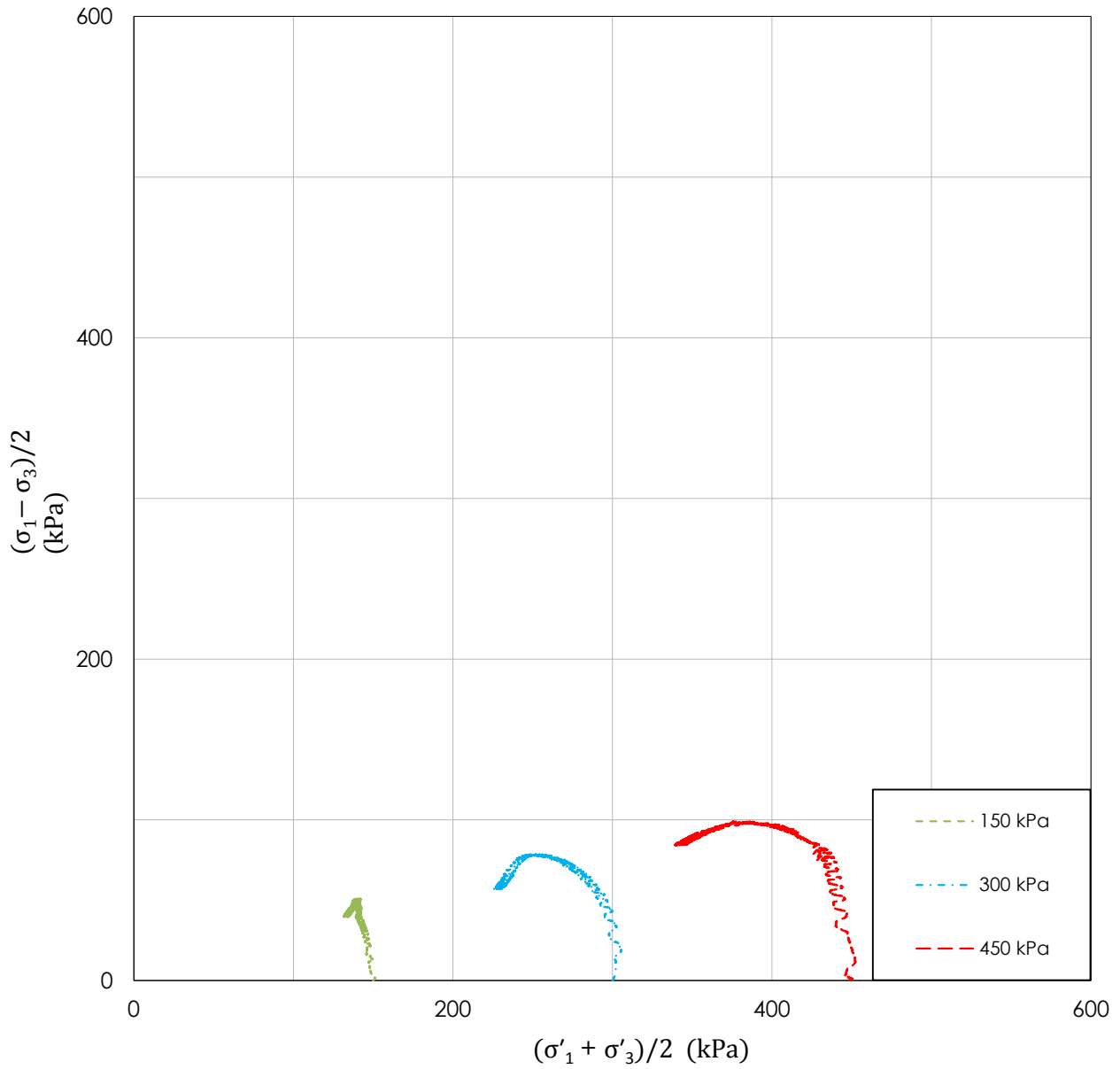


Tested By: MVG/MEL Date: Nov.2016 Checked By: Guillaume Beauce Date: Dec 2016

CONSOLIDATED UNDRAINED TRIAXIAL TEST

Checked By: Guillaume Beauce

Tested By: MVG/MEL

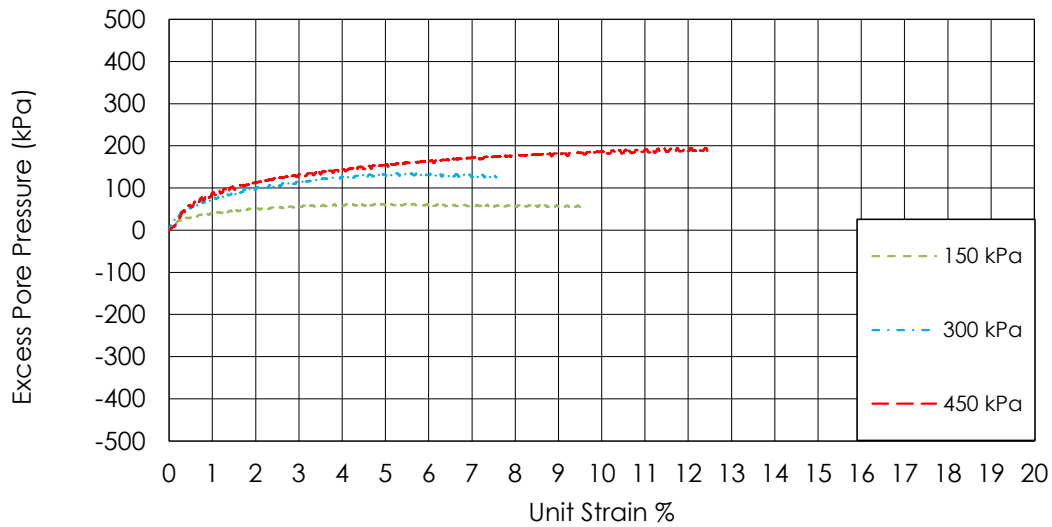
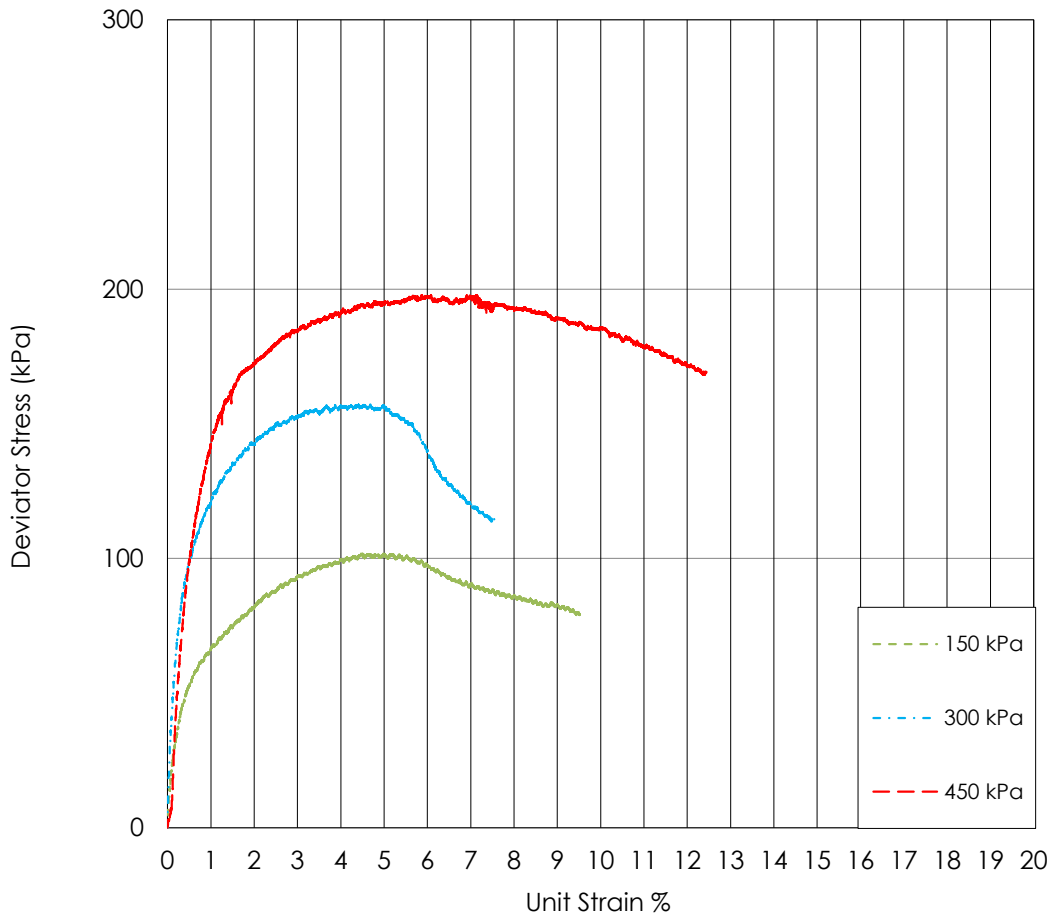


NEWPCC - TH25 25-27' CIU Testing
Project Number: 111216800

Stantec Consulting LTD.



CONSOLIDATED UNDRAINED TRIAXIAL TEST



Checked By: Guillaume Beauce

Tested By: MVG/MEL

NEWPCC - TH25 25-27' CIU Testing
Project Number: 111216800

Stantec Consulting LTD.



**ROCK CORE DIMENSIONAL and SHAPE TOLERANCES ASTM D 4543**

Project Name	NEWPCC			Project Location	Winnipeg			Project Number	111216800
Borehole	TH 01	Sample	88'3.5" - 89'2.5"	Area (mm ²)	3142	L (mm)	143.75	D (mm)	63.25
Axial Tolerance	Axial		End Surface Flatness				Perpendicularity Tolerance		
	Min	Max	D ₁	D ₂	D ₃	D ₄			
L ₁	0.000	0.007	0.000	0.000	0.000	0.000	D ₁ Δ	0.009	
L ₂	0.000	0.004	0.009	0.005	0.007	0.007	D ₂ Δ	0.005	
L ₃	0.000	0.005					D ₃ Δ	0.007	
							D ₄ Δ	0.007	
L ₁ Δ	0.007						L/D Ratio 2.3 L/D Meets Spec		
L ₂ Δ	0.004								
L ₃ Δ	0.005								
Maximum Axial Deviation (in)							Δ Max	0.009	
0.007							Δ Max / D	0.004	
Axial Deviation Meets Spec							Perpendicularity Meets Spec		
COMPRESSIVE STRENGTH of INTACT ROCK CORE ASTM D 7012									
Load, kN	500	Compressive Strength, MPa			159	Unit Weight, g/cm ³		2.589	
Tested By	MVG/SXY	Date	Nov.1.2016			Reviewed By			
Remarks									

	Stantec Ltd.								
ROCK CORE DIMENSIONAL and SHAPE TOLERANCES ASTM D 4543									
Project Name	NEWPCC			Project Location	Winnipeg			Project Number	111216800
Borehole	TH11	Sample	85' - 86'5.5"	Area (mm ²)	3142	L (mm)	145.00	D (mm)	63.25
Axial Tolerance	Axial		End Surface Flatness				Perpendicularity Tolerance		
	Min	Max	D ₁	D ₂	D ₃	D ₄			
L ₁	0.000	0.005	0.000	0.000	0.000	0.000	D ₁ Δ	0.006	
L ₂	0.000	0.004	0.006	0.003	0.007	0.003	D ₂ Δ	0.003	
L ₃	0.000	0.003					D ₃ Δ	0.007	
							D ₄ Δ	0.003	
L ₁ Δ	0.005						L/D Ratio 2.3 L/D Meets Spec		
L ₂ Δ	0.004								
L ₃ Δ	0.003								
Maximum Axial Deviation (in)							Δ Max	0.007	
0.005							Δ Max / D	0.003	
Axial Deviation Meets Spec							Perpendicularity Meets Spec		
COMPRESSIVE STRENGTH of INTACT ROCK CORE ASTM D 7012									
Load, kN	674	Compressive Strength, MPa			215	Unit Weight, g/cm ³		2.597	
Tested By	MVG/SXY	Date	Nov.1.2016			Reviewed By			
Remarks									

**ROCK CORE DIMENSIONAL and SHAPE TOLERANCES ASTM D 4543**

Project Name	NEWPCC			Project Location	Winnipeg			Project Number	111216800
Borehole	TH 17	Sample	91'5" - 92'5"	Area (mm ²)	3142	L (mm)	143.75	D (mm)	63.25
Axial Tolerance	Axial		End Surface Flatness				Perpendicularity Tolerance		
	Min	Max	D ₁	D ₂	D ₃	D ₄			
L ₁	0.000	0.003	0.000	0.000	0.000	0.000	D ₁ Δ	0.004	
L ₂	0.000	0.005	0.004	0.006	0.005	0.003	D ₂ Δ	0.006	
L ₃	0.000	0.003					D ₃ Δ	0.005	
							D ₄ Δ	0.003	
L ₁ Δ	0.003						L/D Ratio 2.3 L/D Meets Spec		
L ₂ Δ	0.005								
L ₃ Δ	0.003								
Maximum Axial Deviation (in) 0.005							Δ Max	0.006	
Axial Deviation Meets Spec							Δ Max / D	0.002	
							Perpendicularity Meets Spec		
COMPRESSIVE STRENGTH of INTACT ROCK CORE ASTM D 7012									
Load, kN	583	Compressive Strength, MPa			186	Unit Weight, g/cm ³		2.542	
Tested By	MVG/SXY	Date	Nov.1.2016			Reviewed By			
Remarks									

Stantec Ltd.									
ROCK CORE DIMENSIONAL and SHAPE TOLERANCES ASTM D 4543									
Project Name	NEWPCC			Project Location	Winnipeg			Project Number	111216800
Borehole	TH27	Sample	83'2.5" - 85'	Area (mm ²)	3142	L (mm)	143.50	D (mm)	63.25
Axial Tolerance	Axial		End Surface Flatness				Perpendicularity Tolerance		
	Min	Max	D ₁	D ₂	D ₃	D ₄			
L ₁	0.000	0.005	0.000	0.000	0.000	0.000	D ₁ Δ	0.007	
L ₂	0.000	0.006	0.007	0.006	0.004	0.008	D ₂ Δ	0.006	
L ₃	0.000	0.003					D ₃ Δ	0.004	
							D ₄ Δ	0.008	
L ₁ Δ	0.005						L/D Ratio 2.3 L/D Meets Spec		
L ₂ Δ	0.006								
L ₃ Δ	0.003								
Maximum Axial Deviation (in) 0.006							Δ Max	0.008	
Axial Deviation Meets Spec							Δ Max / D	0.003	
							Perpendicularity Meets Spec		
COMPRESSIVE STRENGTH of INTACT ROCK CORE ASTM D 7012									
Load, kN	457	Compressive Strength, MPa			145	Unit Weight, g/cm ³		2.464	
Tested By	MVG/SXY	Date	Nov.1.2016			Reviewed By			
Remarks									

**ROCK CORE DIMENSIONAL and SHAPE TOLERANCES ASTM D 4543**

Project Name	NEWPCC			Project Location	Winnipeg			Project Number	111216800
Borehole	TH 28	Sample	95'1" - 96'1"	Area (mm ²)	3142	L (mm)	149.25	D (mm)	63.25
Axial Tolerance	Axial		End Surface Flatness				Perpendicularity Tolerance		
	Min	Max	D ₁	D ₂	D ₃	D ₄			
L ₁	0.000	0.002	0.000	0.000	0.000	0.000	D ₁ Δ	0.007	
L ₂	0.000	0.004	0.007	0.004	0.004	0.007	D ₂ Δ	0.004	
L ₃	0.000	0.002					D ₃ Δ	0.004	
							D ₄ Δ	0.007	
L ₁ Δ	0.002						L/D Ratio 2.4 L/D Meets Spec		
L ₂ Δ	0.004								
L ₃ Δ	0.002								
Maximum Axial Deviation (in) 0.004							Δ Max	0.007	
Axial Deviation Meets Spec							Δ Max / D	0.003	
							Perpendicularity Meets Spec		
COMPRESSIVE STRENGTH of INTACT ROCK CORE ASTM D 7012									
Load, kN	546	Compressive Strength, MPa			174	Unit Weight, g/cm ³		2.543	
Tested By	MVG/SXY	Date	Nov.1.2016			Reviewed By			
Remarks									

Stantec Ltd.									
ROCK CORE DIMENSIONAL and SHAPE TOLERANCES ASTM D 4543									
Project Name	NEWPCC			Project Location	Winnipeg			Project Number	111216800
Borehole	TH29	Sample	76'7" - 77'8"	Area (mm ²)	3142	L (mm)	146.00	D (mm)	63.25
Axial Tolerance	Axial		End Surface Flatness				Perpendicularity Tolerance		
	Min	Max	D ₁	D ₂	D ₃	D ₄			
L ₁	0.000	0.005	0.000	0.000	0.000	0.000	D ₁ Δ	0.003	
L ₂	0.000	0.005	0.003	0.009	0.008	0.002	D ₂ Δ	0.009	
L ₃	0.000	0.007					D ₃ Δ	0.008	
							D ₄ Δ	0.002	
L ₁ Δ	0.005						L/D Ratio 2.3 L/D Meets Spec		
L ₂ Δ	0.005								
L ₃ Δ	0.007								
Maximum Axial Deviation (in) 0.007							Δ Max	0.009	
Axial Deviation Meets Spec							Δ Max / D	0.004	
							Perpendicularity Meets Spec		
COMPRESSIVE STRENGTH of INTACT ROCK CORE ASTM D 7012									
Load, kN	696	Compressive Strength, MPa			222	Unit Weight, g/cm ³		2.641	
Tested By	MVG/SXY	Date	Nov.1.2016			Reviewed By			
Remarks									



Resistivity of Soils Report

ASTM G57

*Using the M.C.Miller Soil
Box Cat.No. 37008 & Fluke
8808A Digital Multimeter

Client: AECOM Canada Ltd.

Project Name: NEWPCC Upgrade

Project No: 111216800.000

Tested By: C. Woods

Date Tested: October 31, 2016

Sample	Moisture Content %	Temperature 'C	Resistivity (Ω -cm)
TH23 @ 25'	50.1	20.8	324.5
TH06 @ 5'	11.7	21.4	2119.9
TH28 @ 45'	56.4	21	538.6

Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of the test results is provided only on written request. The data presented above is for the sole use of the client stipulated above. Stantec is not responsible, nor can be held liable, for the use of this report by any other party, with or without the knowledge of Stantec.

Reviewed by: 



**Moisture - Density
 Relationship Report**

- ASTM Designation: D698
- ASTM Designation: D1557

OFFICE

325 - 25th Street SE
 Suite 200
 Calgary, Alberta
 Canada T2A 7H8
 Tel: (403) 716-8000
 Fax: (403) 716-8099

LABORATORY

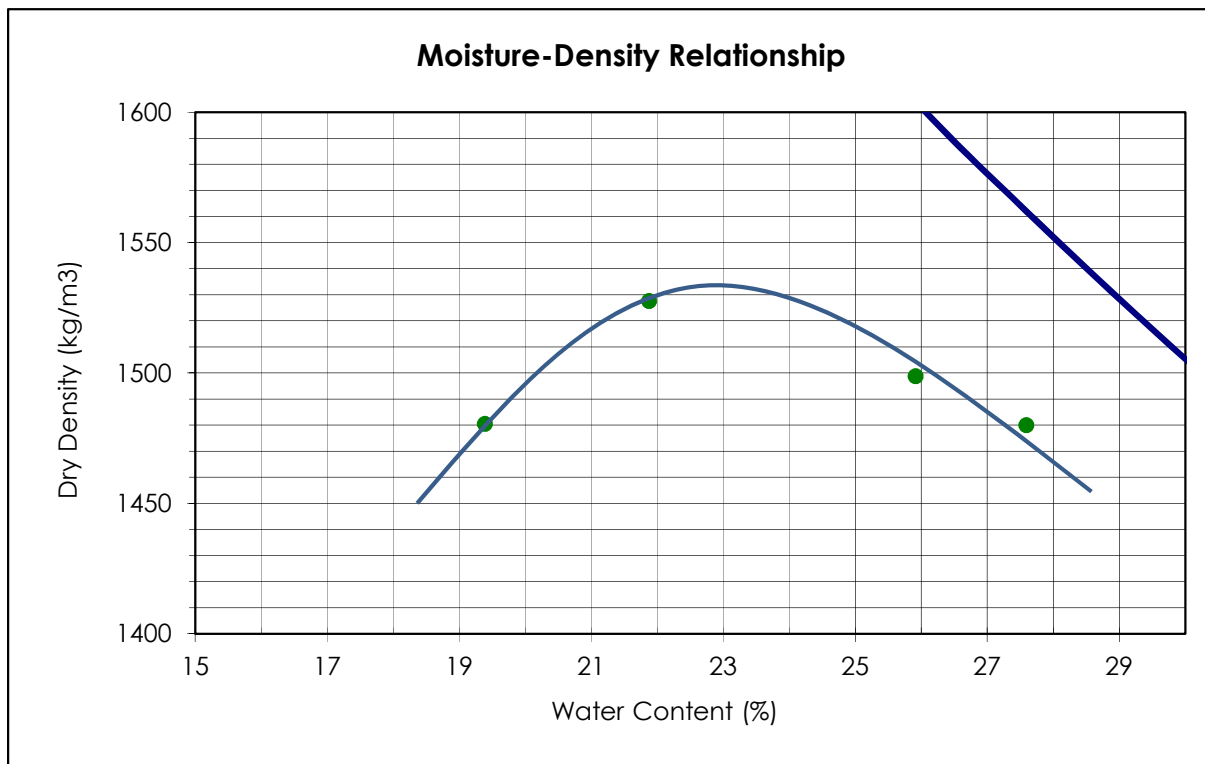
10830 - 46th Street SE
 Calgary, Alberta
 Canada T2C 1G4
 Tel: (403) 253-7876
 Fax: (403) 253-0021

Client: AECOM Canada Ltd.
 Project Name: NEWPCC Upgrade
 Project No.: 111216800

Date Sampled: December 5, 2016
 Date Tested: December 13, 2016
 Tested By: M. Pilkington

TRIAL No.	1	2	3	4
DRY DENSITY (kg/m ³)	1480	1527	1499	1480
MOISTURE CONTENT (%)	19.4	21.9	25.9	27.6

Source of Sample: TH01-12 (Parcel B)
 Visual Soil Description: Brown Clay (CH), Some Gravel
 Maximum Dry Density (kg/m³): 1535
 Optimum M.C. (%): 23.0%
 Natural M.C. (%): 33.8



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Reviewed by: 



**Moisture - Density
 Relationship Report**

- ASTM Designation: D698
- ASTM Designation: D1557

OFFICE

325 - 25th Street SE
 Suite 200
 Calgary, Alberta
 Canada T2A 7H8
 Tel: (403) 716-8000
 Fax: (403) 716-8099

LABORATORY

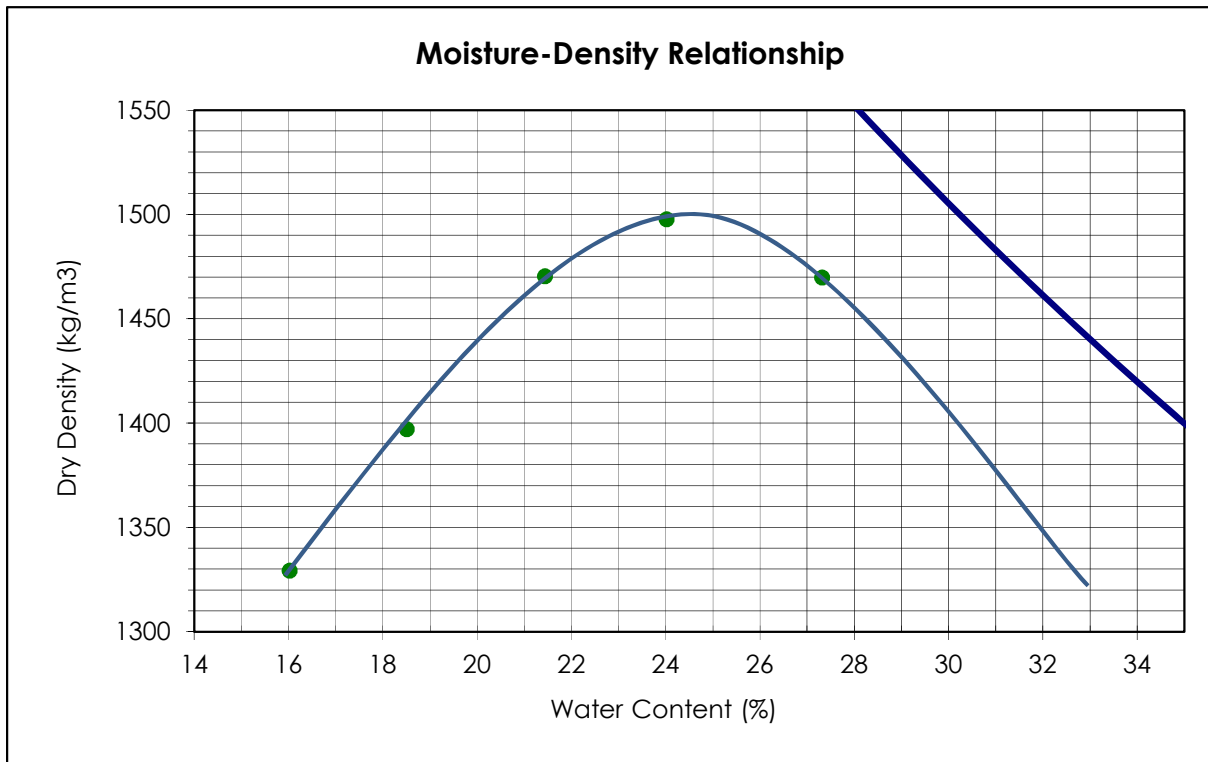
10830 - 46th Street SE
 Calgary, Alberta
 Canada T2C 1G4
 Tel: (403) 253-7876
 Fax: (403) 253-0021

Client: AECOM Canada Ltd.
 Project Name: NEWPCC Upgrade
 Project No.: 111216800

Date Sampled: N/A
 Date Tested: December 14, 2016
 Tested By: M. Pilkington

TRIAL No.	1	2	3	4	5
DRY DENSITY (kg/m ³)	1329	1397	1470	1498	1470
MOISTURE CONTENT (%)	16.0	18.5	21.4	24.0	27.3

Source of Sample: TH16-30 (Parcel A)
 Visual Soil Description: Brown Clay
 Maximum Dry Density (kg/m³): 1500
 Optimum M.C. (%): 24.5
 Natural M.C. (%): 32.7



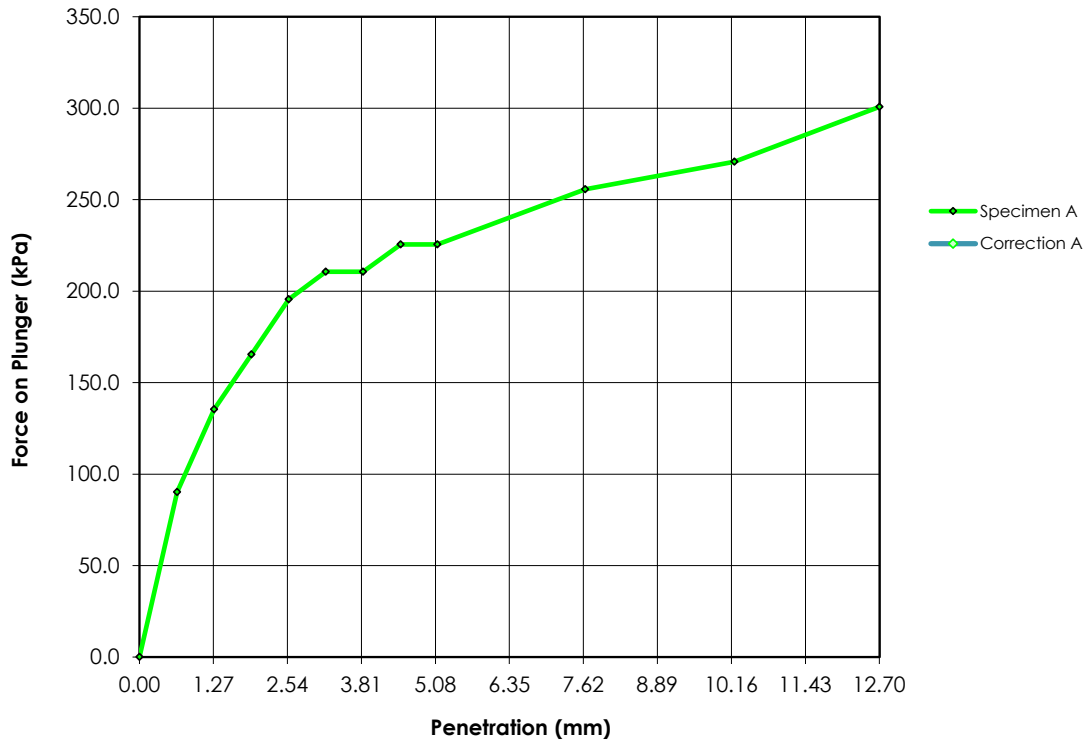
Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of the test results is provided only on written request. The data presented above is for the sole use of the client stipulated above. Stantec is not responsible, nor can be held liable, for the use of this report by any other party, with or without the knowledge of Stantec.

Reviewed by: 

Stantec Consulting Ltd.
 California Bearing Ratio Test Report



Load Penetration Curve



Reviewed By: C. Lamoureux

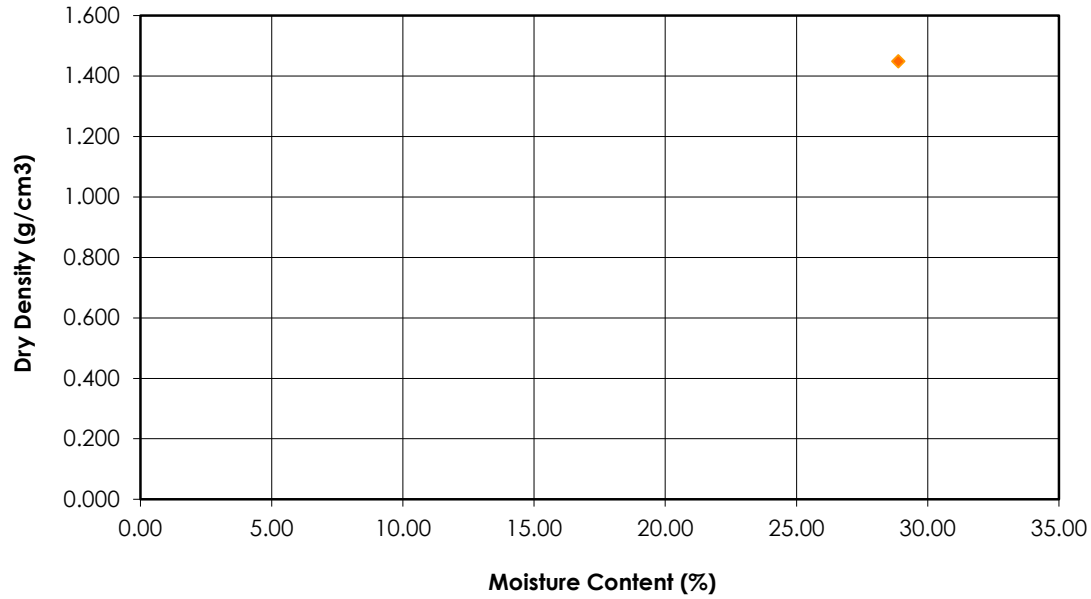
Date: 4-Jan-17

Tested By: C. Woods

CBR Results					
Results	A	B	C	D	Average
2.54 mm Pen.	2.8				2.8
5.08 mm Pen.	2.2				2.2
Moisture (%)	28.88				28.88
Density (g/cm ³)	1.448				1.448
Final Moisture (%)	30.5				30.5
Final Density (g/cm ³)	1.464				1.464
Project Information					
Project Num	111216800		Swell		
Project	NEWPCC Upgrade		Specimen A	0.470	
Date	9-Jan-17		Specimen B		
Client	AECOM Canada Ltd.		Specimen C		
			Specimen D		
Test Variables					
Job Ref.			Liquid Limit:		
Sample Num.	TH01-12		Plastic Limit:		
Remarks					

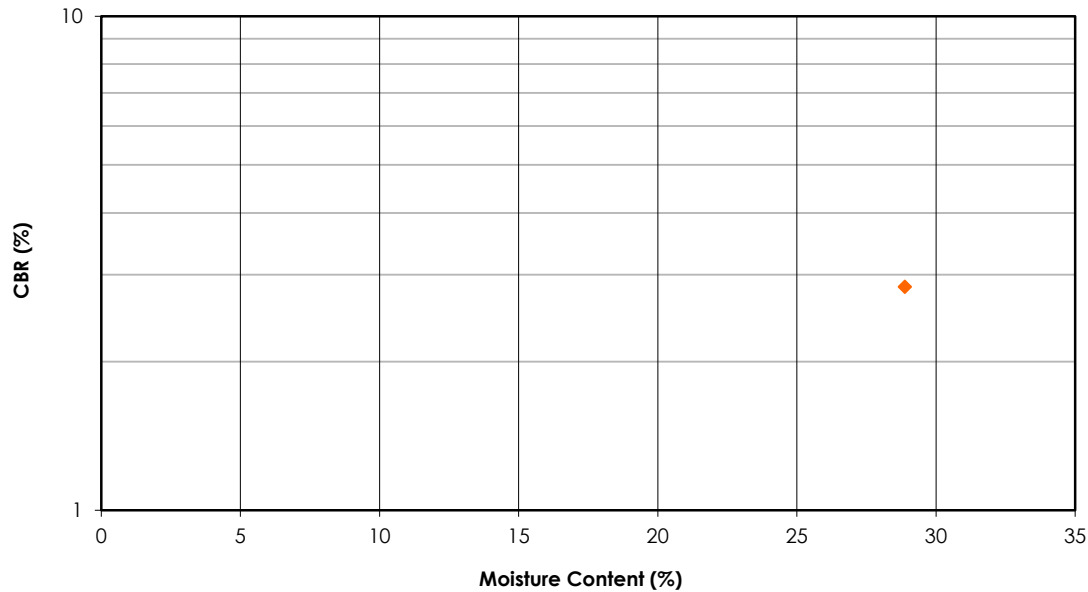
Reporting of these test results constitutes a testing service only. Engineering interpretation or evaluation of the test results is provided only on written request. The data presented above is for the sole use of the client stipulated above. Stantec is not responsible, nor can be held liable, for the use of this report by any other party, with or without the knowledge of Stantec.

Proctor Density Curve



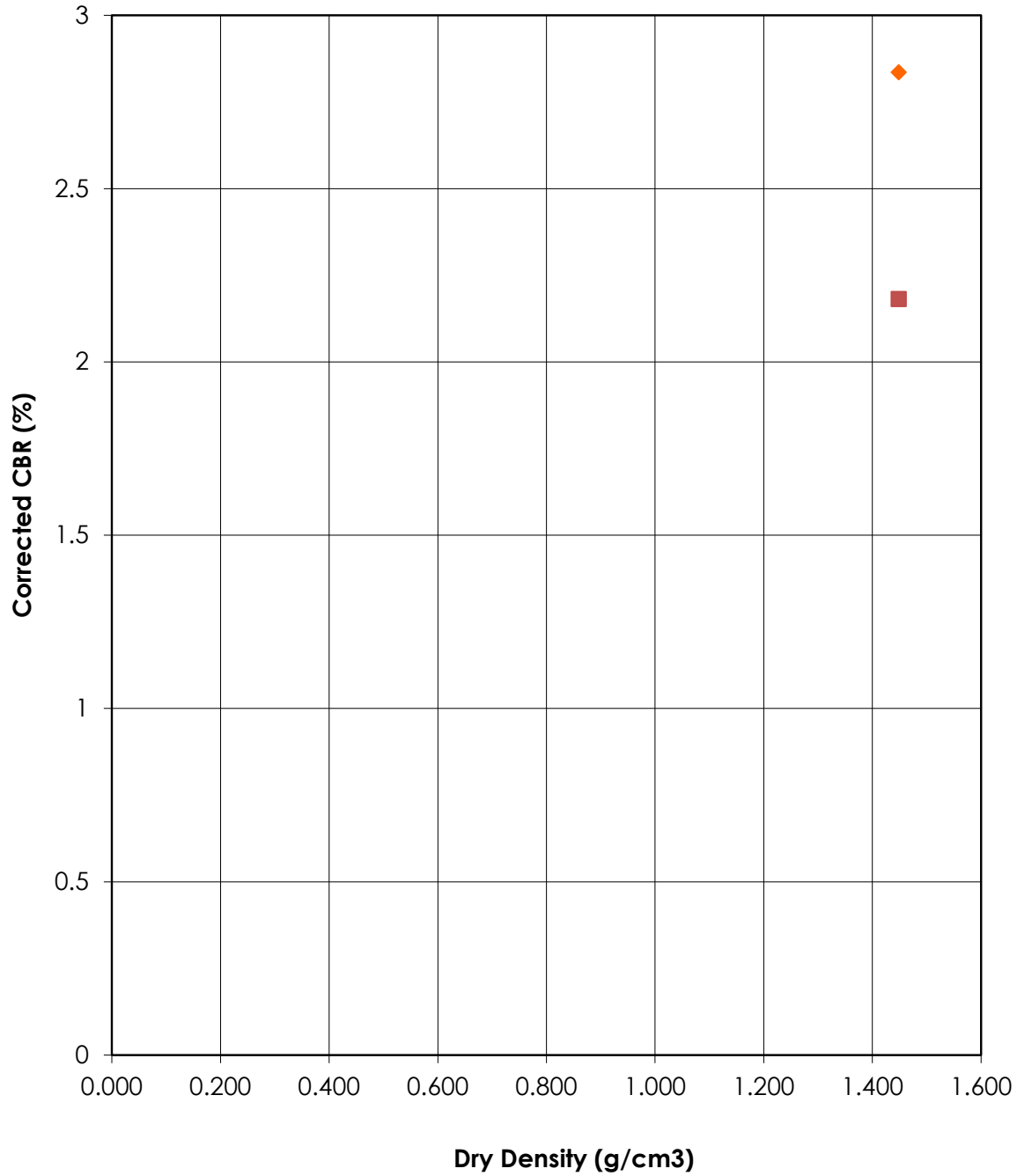
Maximum Dry Density:	1.448	g/cm ³
Optimum Moisture Content:	23.00	(%)

California Bearing Ratio (CBR)



	2.54 mm Pen.	5.08 mm Pen.	
CBR:	2.8	2.2	(%)

Density Curve



	2.54 mm Pen.	5.08 mm Pen.	
Maximum CBR:	2.8	2.2	(%)
Maximum Dry Density:	1.448		g/cm ³

Specimen A Information CBR Test	Stantec Consulting Ltd.
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File Name
 lab_111216800_cbr_th01-12.HSD

Project Information

Project No. 111216800	Date: 9-Jan-17
Project Name: NEWPCC Upgrade	
Client: AECOM Canada Ltd.	
Sample Location:	
Sample Description: Brown Clay, Some Gravel	
Remarks:	

Specimen A Data

Soaked Height (mm):	116.84	Liquid Limit:	1534.999
Swell (%):	0.470	Plastic Limit:	Opt. Moisture (%): 23

Mold Info	
Height (mm)	116.08
Weight (g)	7255.9
Soil Weight + Mold (g)	11197.30
Soil Weight (g)	3941.40
Mold Volume (m3)	2111.3
Dry Density (g/cm3)	1.448

	Moisture Percentage	
	Initial	Avg Final
Moist Soil + tare (g)	169.80	164.10
Dry Soil + tare (g)	132.60	126.53
tare (g)	3.80	4.17
Moisture (%)	28.9	30.5

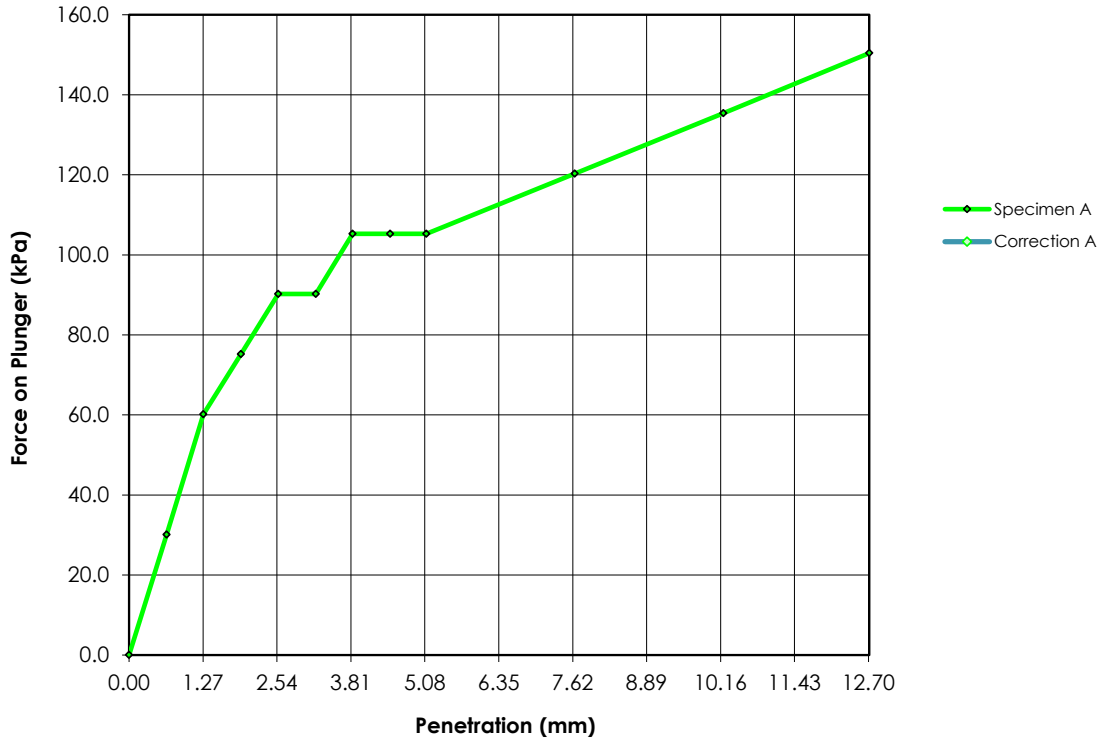
Specimen A Test Data

Read Number	Load (Kn)	Disp. (mm)	Force on Plunger (kPa)	Penetration (mm)	CBR
0	0.029	0.695	0.0	0.000	
1	0.204	1.341	90.2	0.646	
2	0.291	1.979	135.4	1.284	
3	0.349	2.618	165.4	1.923	
4	0.408	3.256	195.5	2.561	2.84
5	0.437	3.895	210.6	3.199	
6	0.437	4.533	210.6	3.838	
7	0.466	5.179	225.6	4.484	
8	0.466	5.810	225.6	5.115	2.18
9	0.524	8.350	255.7	7.655	1.95
10	0.553	10.911	270.7	10.216	1.71
11	0.611	13.401	300.8	12.706	1.68

Stantec Consulting Ltd.
 California Bearing Ratio Test Report



Load Penetration Curve



Reviewed By: C. Lamoureux

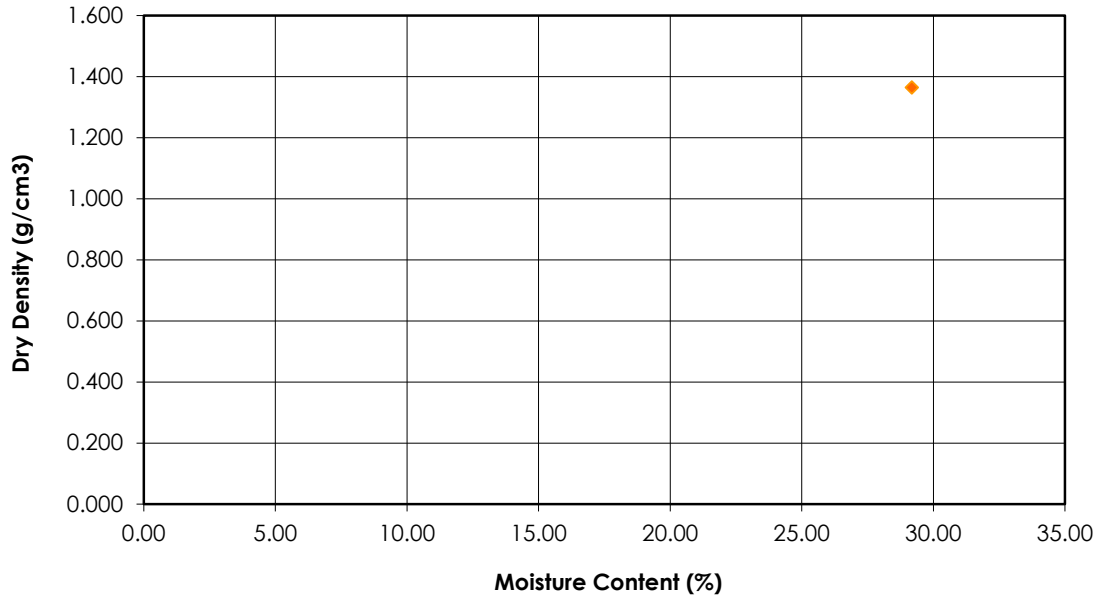
Date:

Tested By:

CBR Results					
Results	A	B	C	D	Average
2.54 mm Pen.	1.3				1.3
5.08 mm Pen.	1.0				1.0
Moisture (%)	29.18				29.18
Density (g/cm ³)	1.364				1.364
Final Moisture (%)	34.1				34.1
Final Density (g/cm ³)	1.402				1.402
Project Information					
Project Num	111216800			Swell	
Project	NEWPCC Upgrade		Specimen A	1.910	
Date	9-Jan-17		Specimen B		
Client	AECOM Canada Ltd.		Specimen C		
			Specimen D		
Test Variables					
Job Ref.			Liquid Limit:		
Sample Num.	TH16-30		Plastic Limit:		
Remarks					

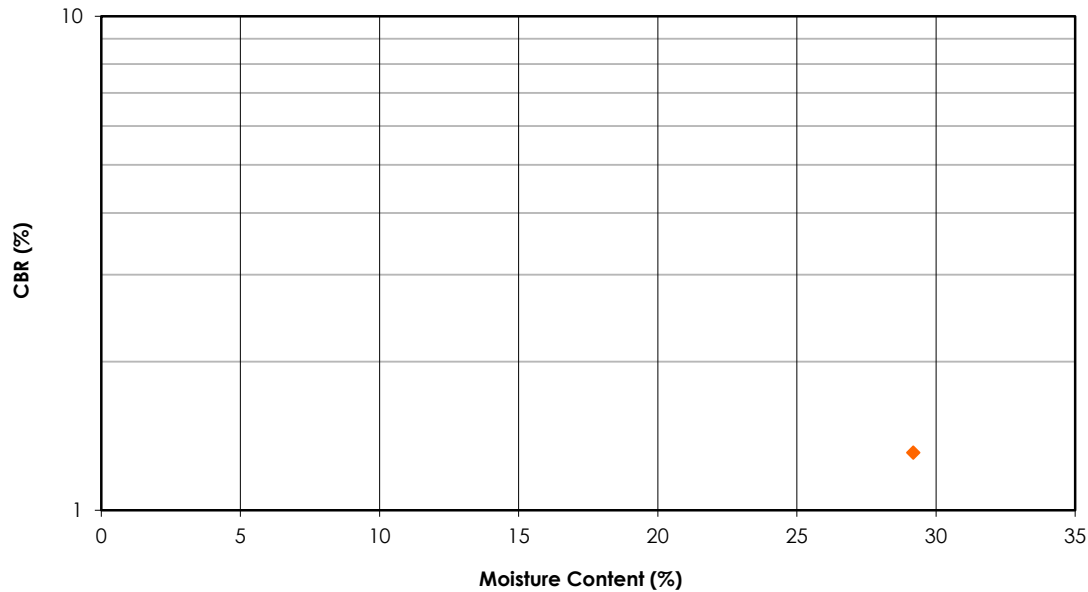
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Proctor Density Curve



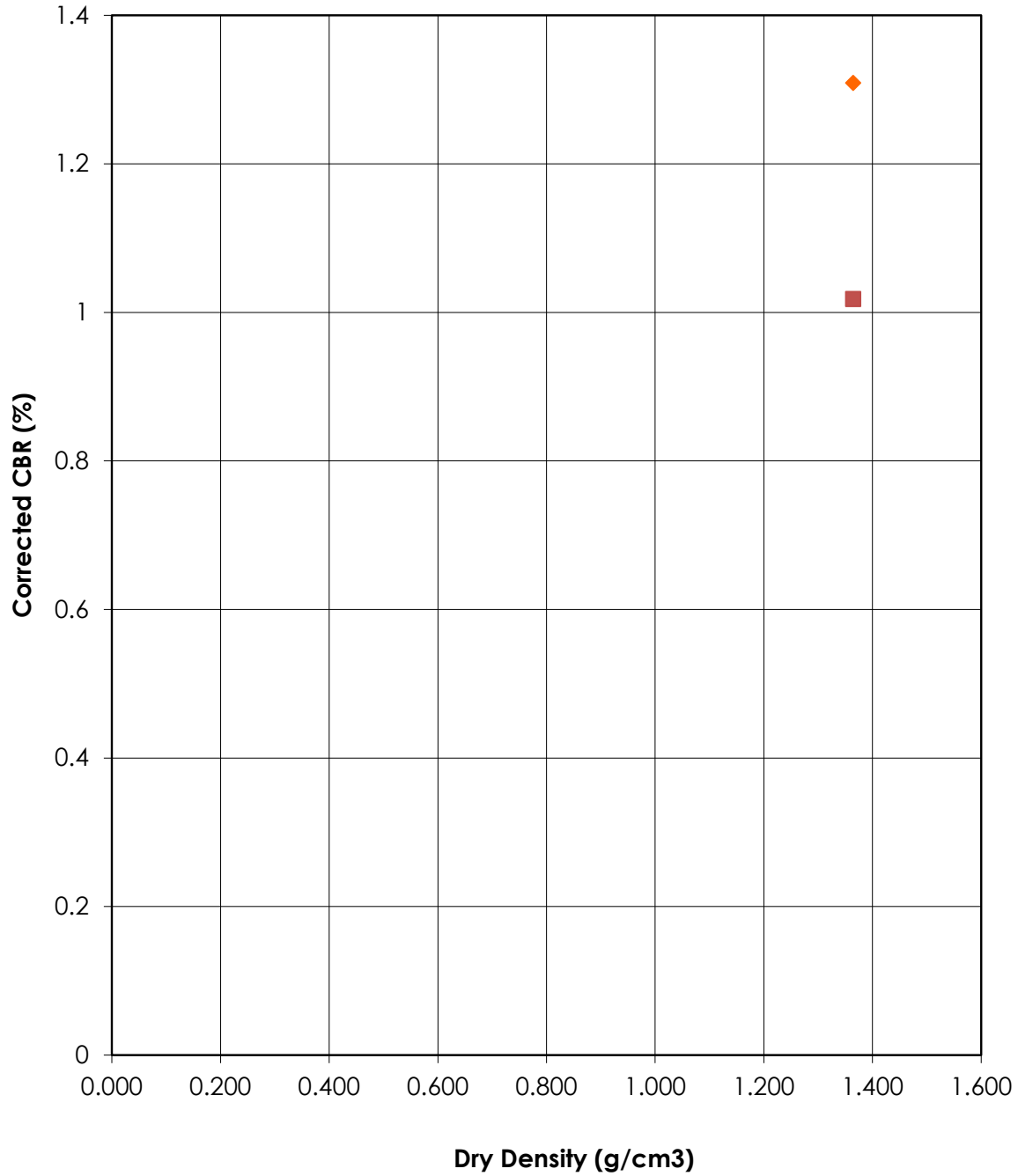
Maximum Dry Density:	1.364	g/cm3
Optimum Moisture Content:	24.50	(%)

California Bearing Ratio (CBR)



	2.54 mm Pen.	5.08 mm Pen.	
CBR:	1.3	1.0	(%)

Density Curve



	2.54 mm Pen.	5.08 mm Pen.	
Maximum CBR:	1.3	1.0	(%)
Maximum Dry Density:	1.364		g/cm ³

Specimen A Information CBR Test	Stantec Consulting Ltd.
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File Name
 lab_111216800_cbr_th16-30.HSD

Project Information

Project No. 111216800	Date: 9-Jan-17
Project Name: NEWPCC Upgrade	
Client: AECOM Canada Ltd.	
Sample Location:	
Sample Description: Brown Clay	
Remarks:	

Specimen A Data

Soaked Height (mm): 118.11	Liquid Limit:	Max Dry Dens. (g/cm ³): 1499.999	
Swell (%): 1.910	Plastic Limit:	Opt. Moisture (%): 24.5	

Mold Info	
Height (mm)	115.82
Weight (g)	8329.3
Soil Weight + Mold (g)	12047.30
Soil Weight (g)	3718.00
Mold Volume (m ³)	2109.6
Dry Density (g/cm ³)	1.364

	Moisture Percentage	
	Initial	Avg Final
Moist Soil + tare (g)	150.30	151.23
Dry Soil + tare (g)	117.30	113.73
tare (g)	4.20	3.93
Moisture (%)	29.2	34.1

Specimen A Test Data

Read Number	Load (Kn)	Disp. (mm)	Force on Plunger (kPa)	Penetration (mm)	CBR
0	0.000	2.738	0.0	0.000	
1	0.058	3.384	30.1	0.646	
2	0.116	4.015	60.2	1.277	
3	0.146	4.661	75.2	1.923	
4	0.175	5.299	90.2	2.561	1.31
5	0.175	5.945	90.2	3.207	
6	0.204	6.576	105.3	3.838	
7	0.204	7.222	105.3	4.484	
8	0.204	7.846	105.3	5.108	1.02
9	0.233	10.393	120.3	7.655	0.92
10	0.262	12.947	135.4	10.209	0.85
11	0.291	15.451	150.4	12.713	0.84

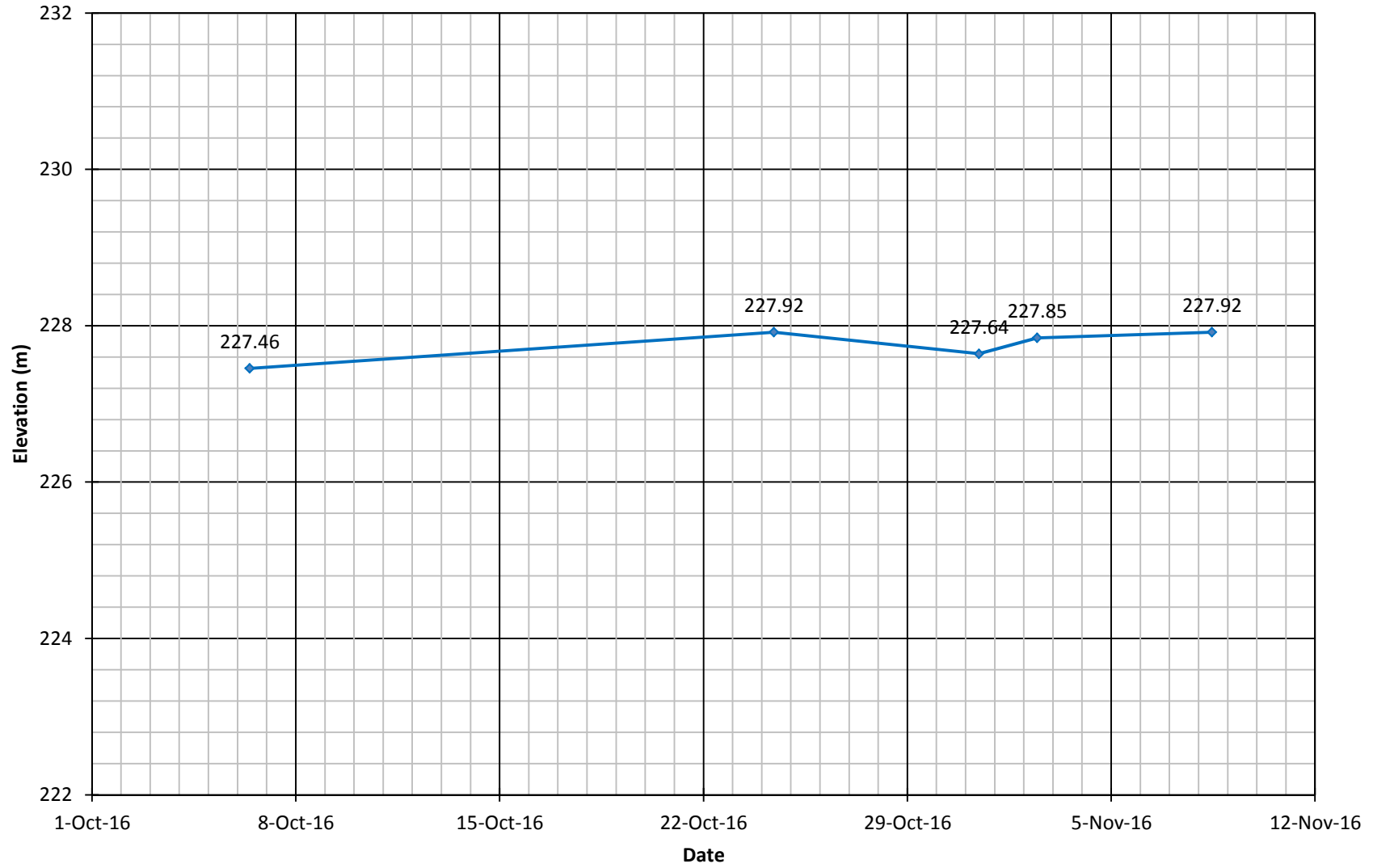
NORTH END SEWAGE TREATMENT PLANT UPGRADE

Appendix H
Instrumentation Data
June 26, 2017

Appendix H INSTRUMENTATION DATA

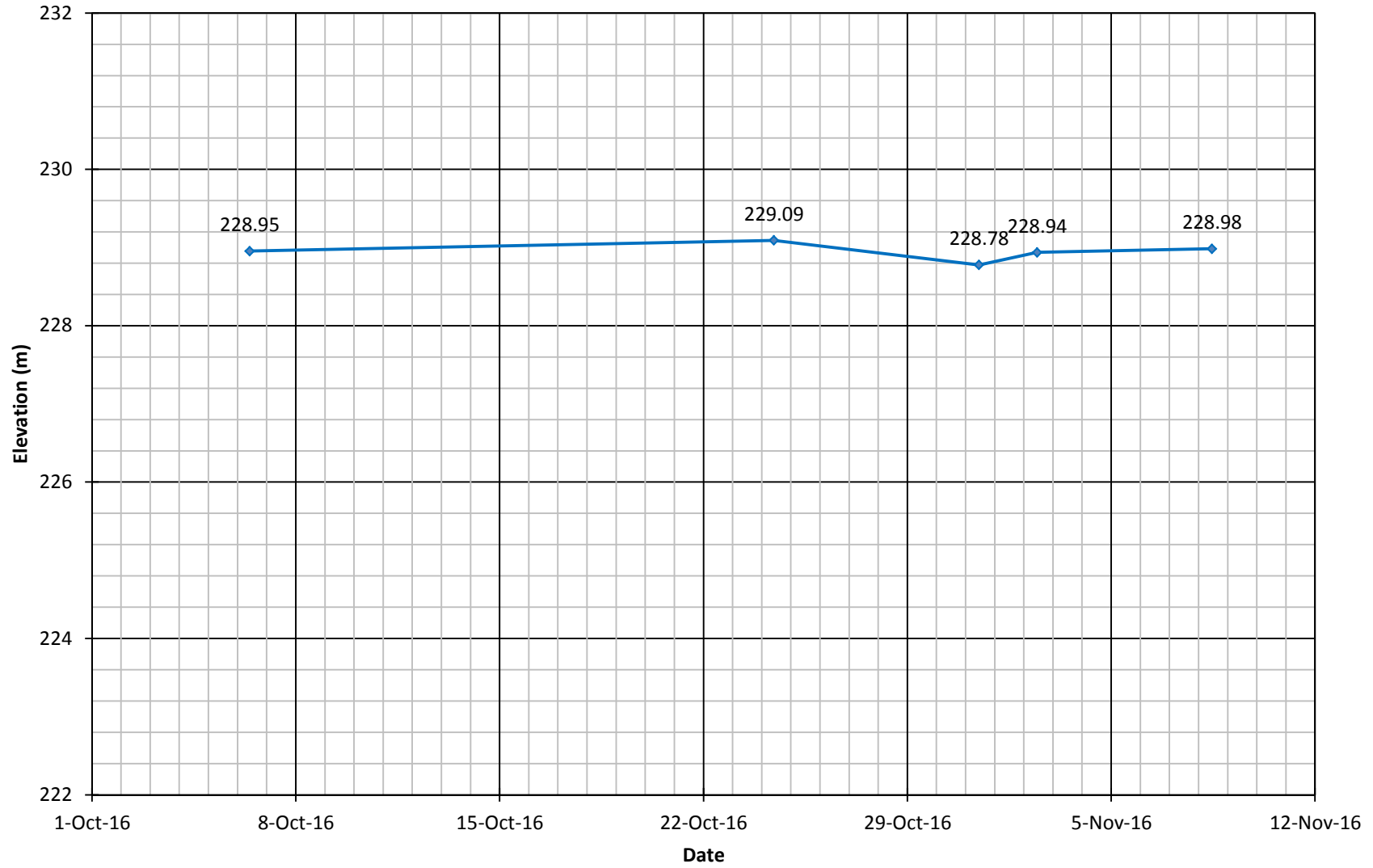
NEWPCC Upgrade Piezometer Data

—◆— VW PZ (100D161233) Elev. 218.35 m - TH16



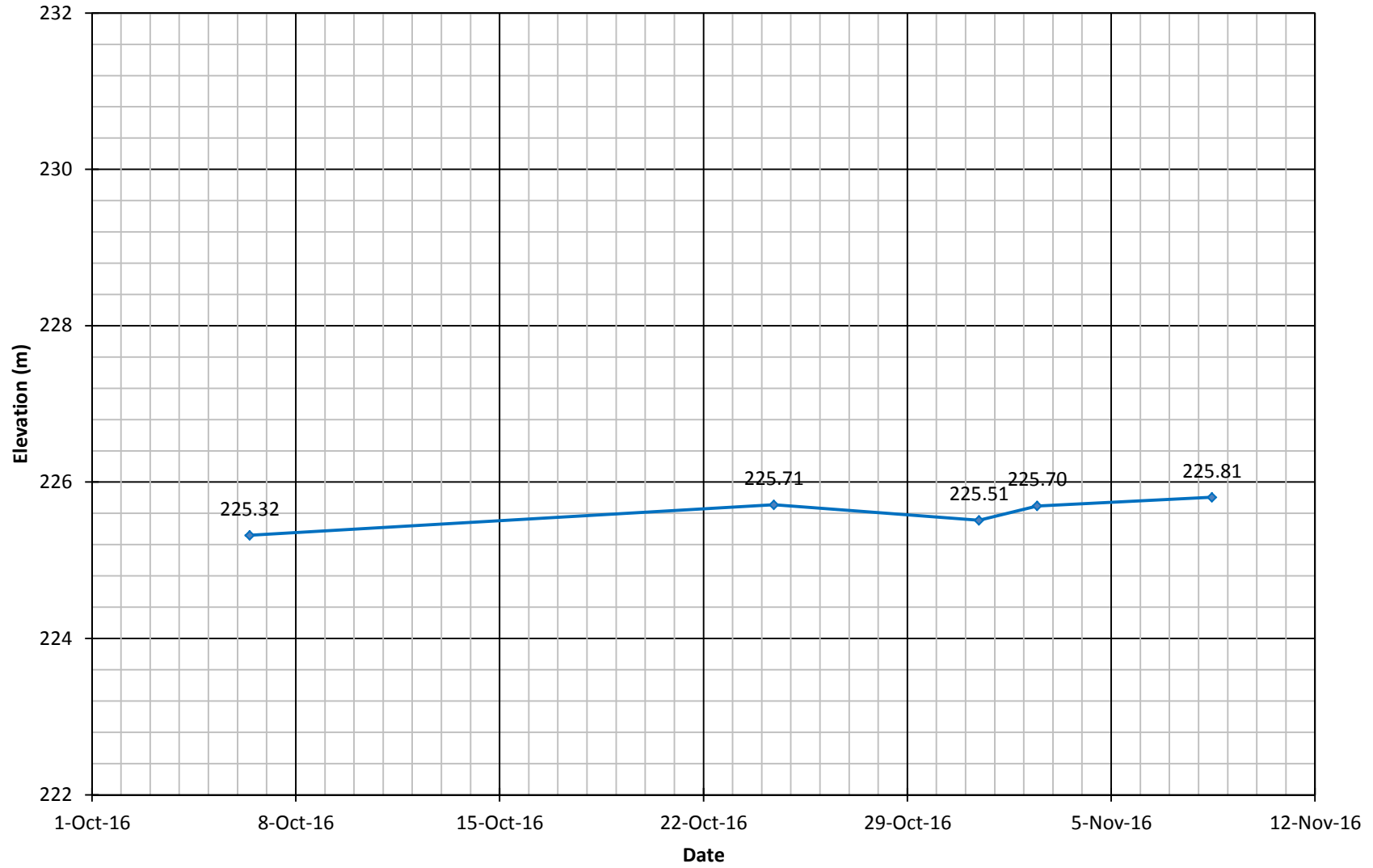
NEWPCC Upgrade Piezometer Data

—◆— VW PZ (100D161235) Elev. 224.44 - TH16



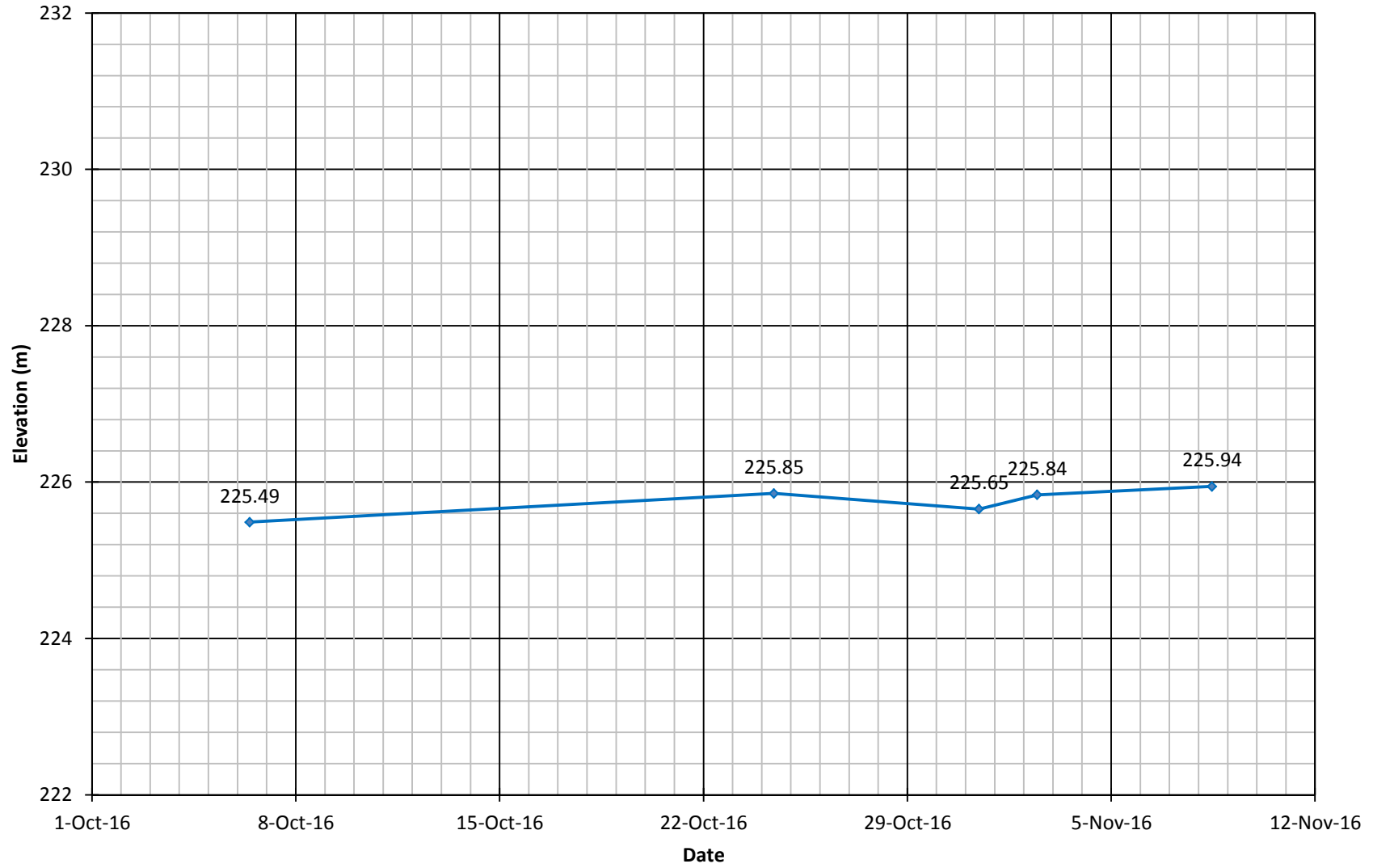
NEWPCC Upgrade Piezometer Data

—◆— VW PZ (100D161232) Elev. 217.28 m - TH24

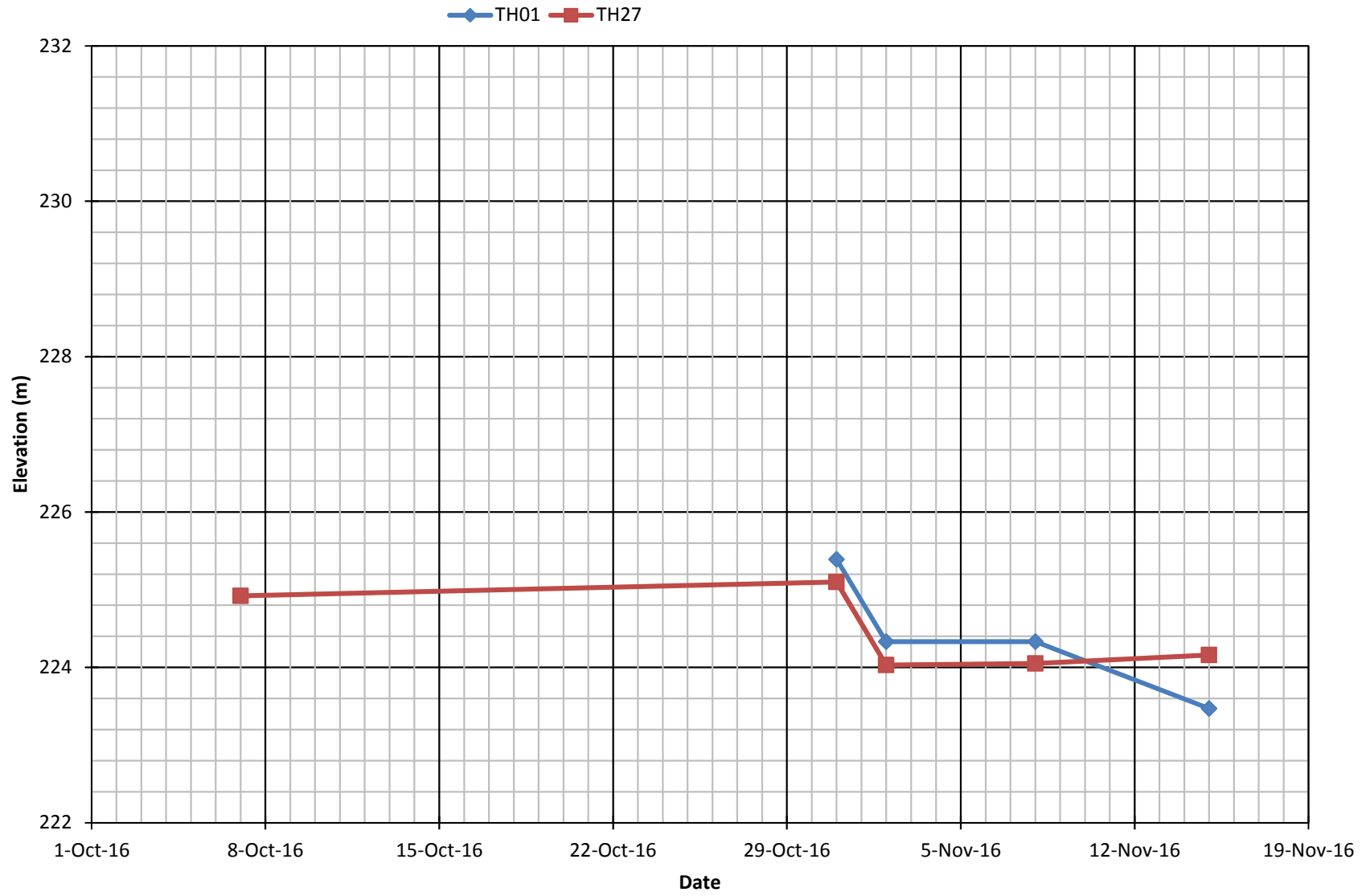


NEWPCC Upgrade Piezometer Data

—◆— VW PZ (100D161234) Elev. 223.38 m - TH24



NEWPCC Upgrade Monitoring Well Data



NEWPCC Upgrade Standpipe Data

