



LETTER REPORT

DATE: March 11, 2025

FILE: 25 030

TO: **SBConsulting Inc.**
600 South Landing
Oak Bluff, Manitoba
R4G 0C3
ATTN: R. CABIGTING, P.ENG

FROM: **SILVESTRE S. URBANO, P.ENG.**
Senior Geotechnical Engineer
846 Oakenwald Avenue
Winnipeg, Manitoba R3T 1N1
Tel: (431) 373-8767

PHONE:

FAX:

RE: PAVEMENT ASSESSMENT FOR WINNIPEG TRANSIT GARAGE, 421 OSBORNE ST

It was requested that a pavement assessment based on the site subgrade conditions at 421 Osborne Street as per the new City of Winnipeg guideline for new industrial/commercial be provided. However, this guideline was strengthened based on the ESAL (Equivalent Single Axle Load) of 4.1 million which considered the anticipated weight of future electric buses and subgrade of clay over a silt subgrade. The City of Winnipeg encourages to undertake subgrade testing which consist of determining the California Bearing Ratio (CBR). The pavement structure of the new road, will be based on the determined CBR, ESAL and clay over a silt subgrade as per the listed pavement designs of City of Winnipeg.

INDUSTRIAL/COMMERCIAL ROADS

The testholes at 421 Osborne Street revealed a *general* soil profile of a fill layer underlain by a clay subgrade over a *silt* layer followed a stiff clay which extended to the depth explored. *Slight seepage and caving* conditions were observed at TH1 area and should be anticipated from the *silt layer* during road construction.

LABORATORY TEST RESULTS

A CBR of 4.9 @ 95% MDD is obtained for TH2 (2') as shown in the attached result.

PAVEMENT RECOMMENDATIONS

Based on the CBR test result and a *clay over silt* subgrade, the recommended pavement construction as per the attached City of Winnipeg Pavement Draft Design (Table 11 and Page 13) at this site should be as follows.

Pavement Structure for Commercial with CBR between 3.5 to 5

	Standard Thickness	Required Thickness	% Compaction
JRCP (Reinforced Concrete)	180mm	180mm	n/a
Base Course (Granular B)	100mm	150mm	100% Std Proctor
Subbase (50mm Granular B)	225mm	550mm	100% Std Proctor
Geogrid	applicable	applicable	n/a
Non-Woven Geotextile	applicable	applicable	n/a

ADDITIONAL RECOMMENDATIONS

As a separator, non-woven geotextile and geogrid specifications should follow the City of Winnipeg Street guideline and should be placed after static-rolling the in-situ subgrade and prior to backfilling of granular fill.

Where soft but dry spots are encountered at the subgrade level, construction traffic should be restricted. Soft but dry spots should be excavated with a large backhoe fitted with a smooth bucket and covered with non-woven geotextile, to at least 300mm below the underside of the subbase and replaced with a 300mm thick layer of 100mm crushed limestone. Note that this material should just be statically placed by a non-vibrator roller. In this regard, the total granular fill thickness would be an additional 300mm for medium to heavy duty traffic.

*Any **saturated subgrade conditions** such as in TH1 area (damp at 1.5m below grade) should be dried off quickly by excavation of sump pit or installation of permanent subdrains (600mm below the subgrade level) connected to positive outlet (catch basin) prior to placing the granular fill structure with geotextile. At these locations, the placing of granular fill should follow the geotextile specifications for soft grounds.*

The granular base course and subbase materials should include organic-free, non-frozen, aggregate conforming to the City of Winnipeg gradation limits.

Sieve analysis and compaction testing of the granular base and subgrade materials should be conducted by qualified geotechnical personnel to ensure that the materials supplied and percent compactions are in accordance with design specifications.

CLOSURE

The findings and geotechnical recommendations provided in this report were prepared by SSU Engineering Inc. (the Consultant) in accordance with generally accepted professional engineering principles and practices. The recommendations are based on the results of field and laboratory investigations and are reflective only of the actual testhole(s) and/or excavation(s) examined.

Environmental Site Assessment (ESA) is not included in our scope of work. If conditions encountered during construction appear to be different than those shown by the testhole(s) and/or excavation(s) at this site, the Consultant should be notified immediately in order that the recommendations can be reviewed and modified as necessary to address actual site conditions.

This report is limited in scope to only those items that are specifically referenced in this report. There may be existing conditions that were not recorded in this report. Such conditions were not apparent to the Consultant due to the limitations imposed by the scope of work. The Consultant, therefore, accepts no liability for any costs incurred by the Client for subsequent discovery, manifestation or rectification of such conditions.

This report is intended solely for the Client named as a general indication of the visible or reported physical condition of the items addressed in the report at the time of the geotechnical investigation. The material in this report reflects the Consultant's best judgment in light of the information available to it at the time of preparation.

This report and the information and data contained herein are to be treated as confidential and may be used only by the Client and its officers and employees in relation to the specific project that it was prepared for. Any use a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. The Consultant accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

The report has been written to be read in its entirety, do not use any part of this report as a separate entity. All files, notes, source data, test results and master files are retained by the Consultant and remain the property of the Consultant.





Legend
● Test Hole Locations

421 Osborne Street
SSU Engineering

Google Earth
Made Possible by Companies

200m



Red River

Osborne St

GTH4

GTH3

GTH2

GTH1

SW Transitway

Nassau St N

Bay St N

Bay St N

Bay St N

Jessie Ave

Mulvey Ave

Reggie Ave

Wasson Ave

Wesford Ave

Brandon Ave

62

42



Project No: 25 030

TH1

Project: Win. Transit Garage Pavement Assessment

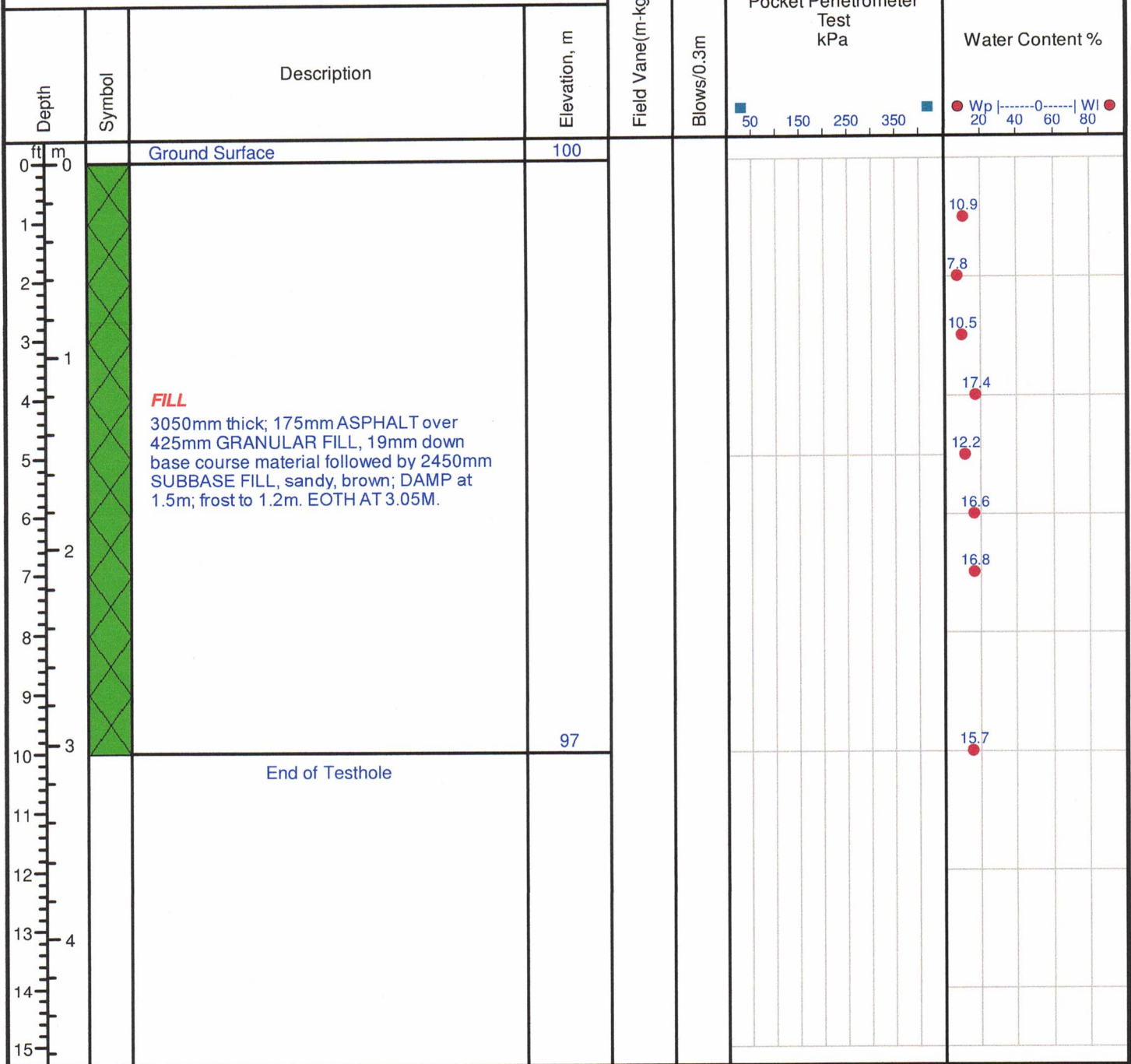
Client: SBC Inc.

Enclosure:

Location: 421 Osborne Street, Winnipeg

Engineer: SSU

SUBSURFACE PROFILE



Drill Method: Continuous Auger

Datum: Assumed 100.0m (road grade)

Drill Date: 1/22/25

Checked by: SSU

Hole Size: 150mm

Sheet: 1 of 1

Project No: 25 030

TH2

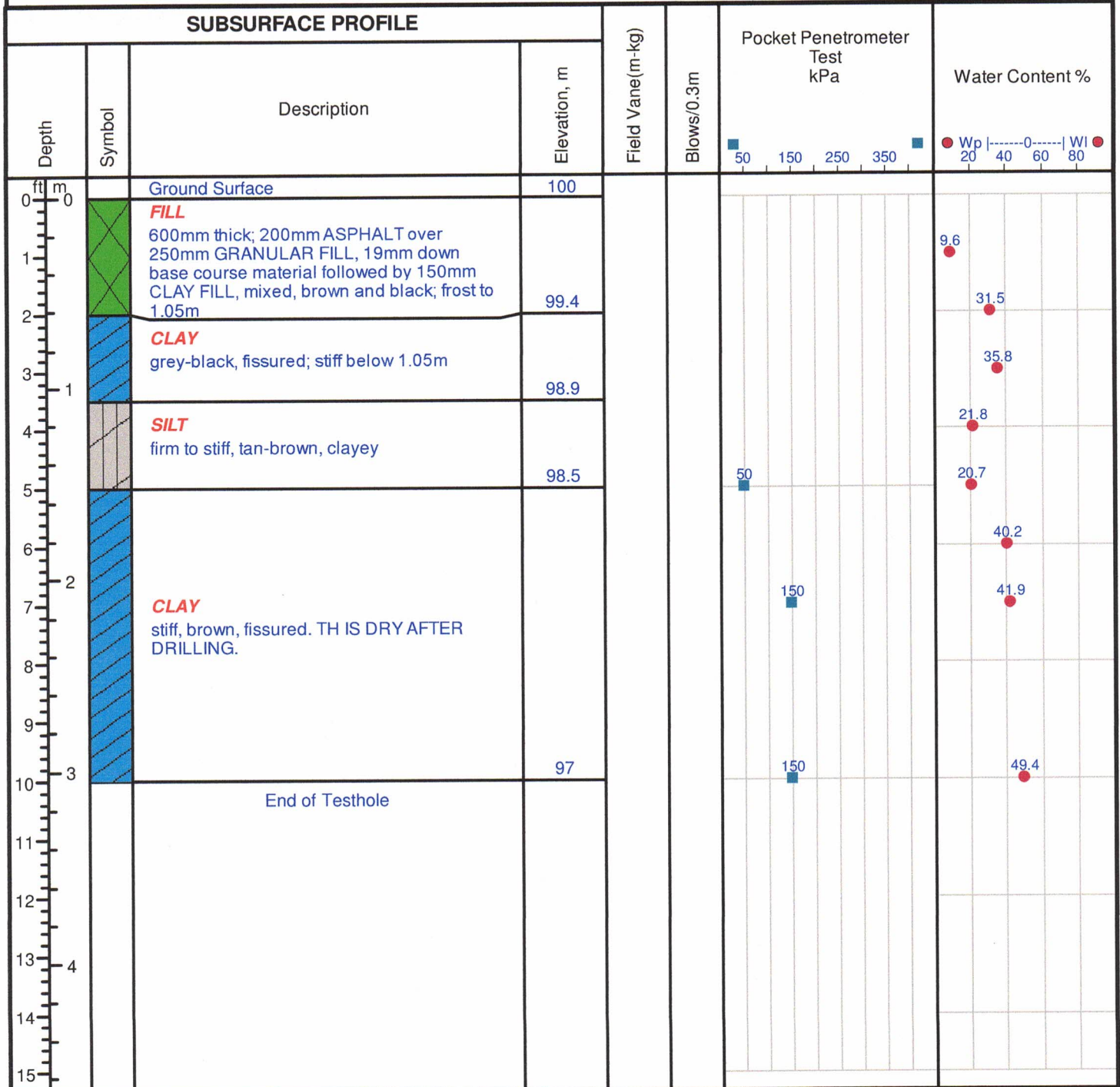
Project: Win. Transit Garage Pavement Assessment

Client: SBC Inc.

Enclosure:

Location: 421 Osborne Street, Winnipeg

Engineer: SSU



Drill Method: Continuous Auger

Datum: Assumed 100.0m (road grade)

Drill Date: 1/22/25

Checked by: SSU

Hole Size: 150mm

Sheet: 1 of 1

Project No: 25 030

TH3

Project: Win. Transit Garage Pavement Assessment

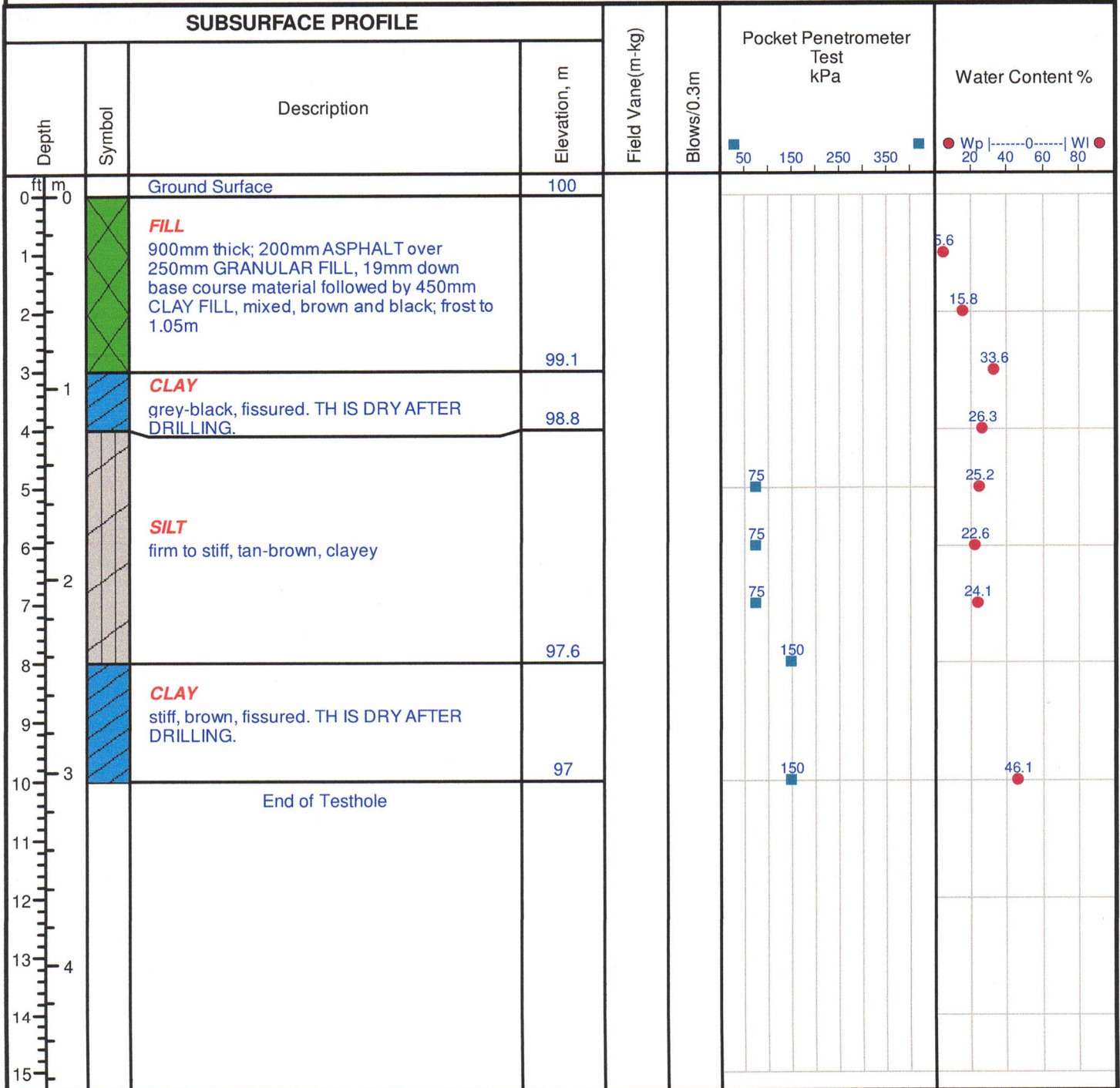
Client: SBC Inc.

Enclosure:

Location: 421 Osborne Street, Winnipeg

Engineer: SSU

SUBSURFACE PROFILE



Drill Method: Continuous Auger

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Drill Date: 1/22/25

Checked by: SSU

Hole Size: 150mm

Sheet: 1 of 1

Project No: 25 030

TH4

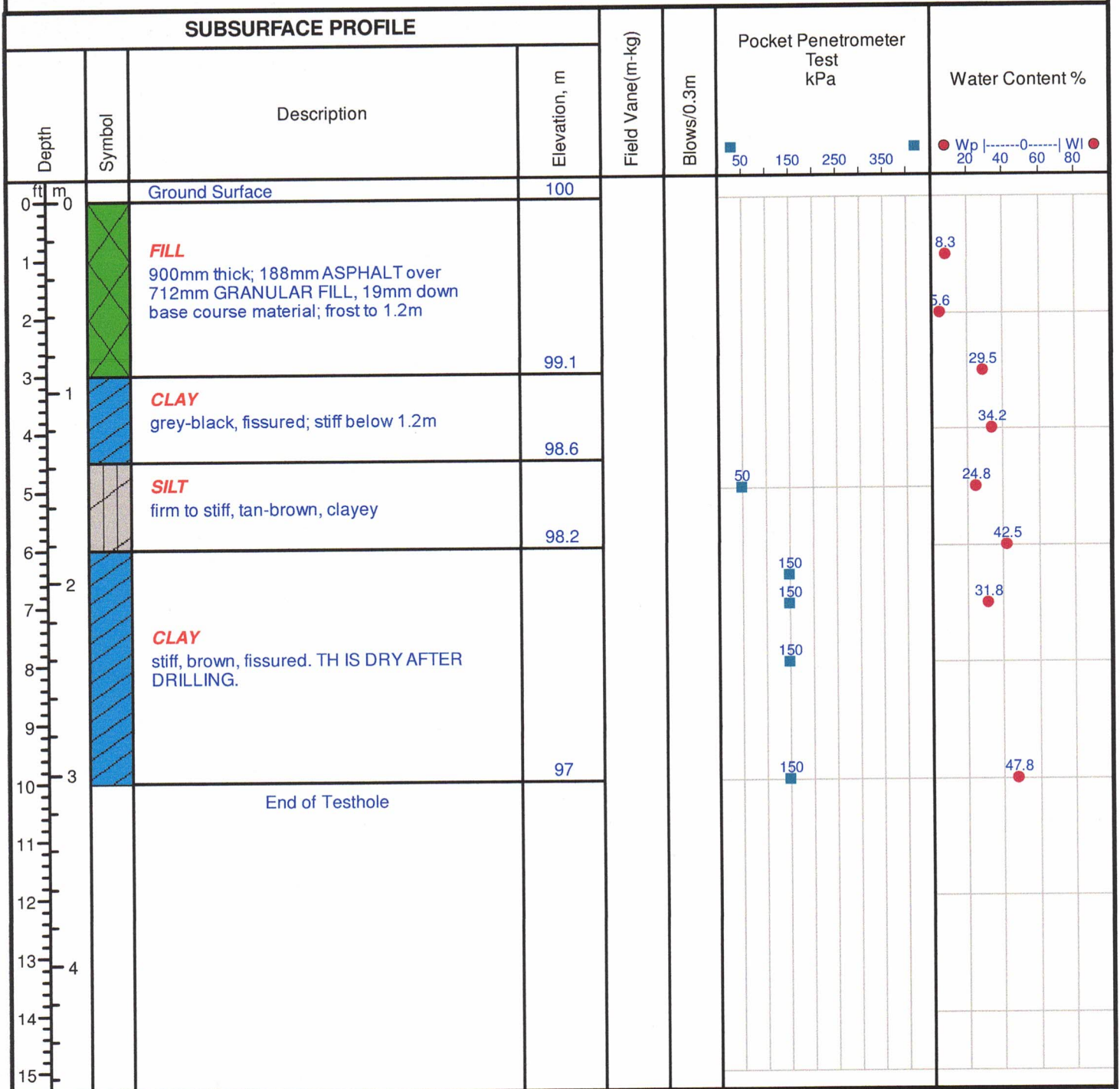
Project: Win. Transit Garage Pavement Assessment

Client: SBC Inc.

Enclosure:

Location: 421 Osborne Street, Winnipeg

Engineer: SSU



Drill Method: Continuous Auger

Datum: Assumed 100.0m (road grade)

Drill Date: 1/22/25

Checked by: SSU

Hole Size: 150mm

Sheet: 1 of 1

MOISTURE CONTENT OF SOIL (ASTM D2216)

Client:	SSU Engineering 846 Oakenwald Avenue Winnipeg, MB R3T 1N1	Project No:	104-2501
Attention:	Silvestre Urbano, P. Eng.	Test No.:	1
Project:	2025 Quality Control	Lab No.:	HM 6
		Date Sampled / By:	January 23, 202 Client
		Date Received:	January 24, 2025
		Date Tested / By:	January 27, 202 Edel Santiago

Test Hole No.	TH-1	TH-1	TH-1	TH-1	TH-1
Depth	1'	2'	3'	4'	5'
Tare No.	se4	m44	ko56	m16	m52
Wt Wet Sample + Tare	213.6	237.5	235.9	233.8	248.5
Wt Dry Sample + Tare	193	220.6	213.9	199.9	222
Wt Water	20.6	16.9	22.0	33.9	26.5
Wt Tare	4.4	4.9	4.2	5.2	4.9
Wt Dry Sample	188.6	215.7	209.7	194.7	217.1
Moisture Content (%)	10.9	7.8	10.5	17.4	12.2
Test Hole No.	TH-1	TH-1	TH-1		
Depth	6'	7'	10'		
Tare No.	tx	m50	m4		
Wt Wet Sample + Tare	213.1	239.4	243.2		
Wt Dry Sample + Tare	183.5	205.7	210.9		
Wt Water	29.6	33.7	32.3		
Wt Tare	4.9	4.8	4.6		
Wt Dry Sample	178.6	200.9	206.3		
Moisture Content (%)	16.6	16.8	15.7		
Test Hole No.	TH-2	TH-2	TH-2	TH-2	TH-2
Depth	1'	2'	3'	4'	5'
Tare No.	2-23	m49	h-m-2	09	5-23
Wt Wet Sample + Tare	230.4	208.2	211.5	225.4	227.3
Wt Dry Sample + Tare	210.6	159.4	156.8	185.9	189.1
Wt Water	19.8	48.8	54.7	39.5	38.2
Wt Tare	4.7	4.7	4.1	4.5	4.6
Wt Dry Sample	205.9	154.7	152.7	181.4	184.5
Moisture Content (%)	9.6	31.5	35.8	21.8	20.7
Test Hole No.	TH-2	TH-2	TH-2		
Depth	6'	7'	10'		
Tare No.	61	t114	m39		
Wt Wet Sample + Tare	212.7	225.1	215.5		
Wt Dry Sample + Tare	152.9	159.8	145.8		
Wt Water	59.8	65.3	69.7		
Wt Tare	4.2	4.0	4.7		
Wt Dry Sample	148.7	155.8	141.1		
Moisture Content (%)	40.2	41.9	49.4		

MOISTURE CONTENT OF SOIL (ASTM D2216)

Client:	SSU Engineering 846 Oakenwald Avenue Winnipeg, MB R3T 1N1	Project No:	104-2501
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Project:	2025 Quality Control	Lab No.:	HM 6
		Date Sampled / By:	January 23, 2025/Client
		Date Received:	January 24, 2025
		Date Tested / By:	Jan. 27, 2025/ E. Santiago

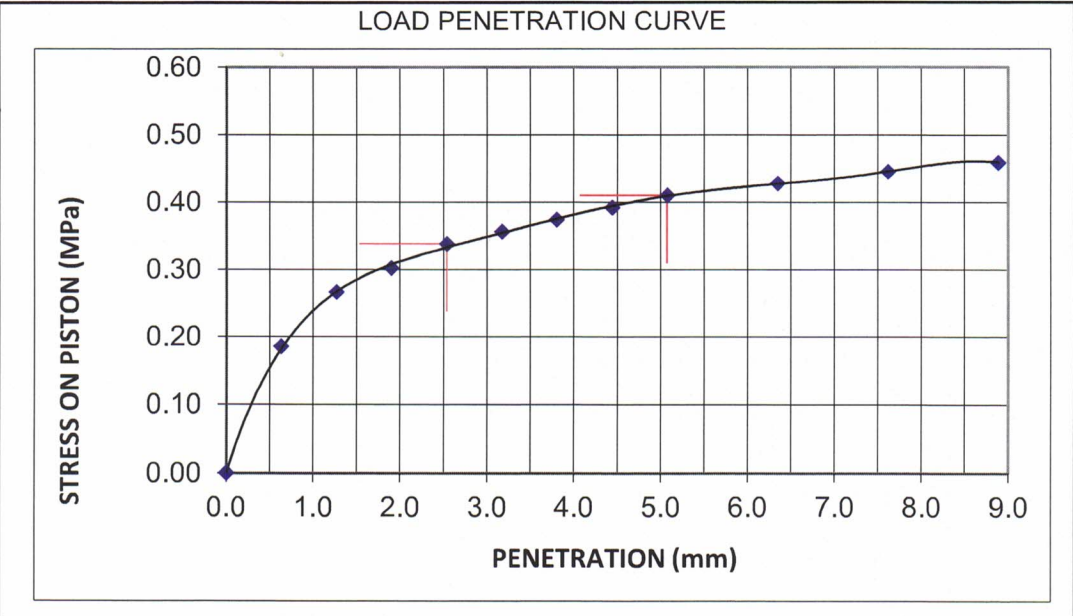
Test Hole No.	TH-3	TH-3	TH-3	TH-3	TH-3
Depth	1'	2'	3'	4'	5'
Tare No.	m42	t109	hm1	t119	m35
Wt Wet Sample + Tare	222.4	237.5	213.6	225.6	227.5
Wt Dry Sample + Tare	210.8	205.6	160.8	179.6	182.7
Wt Water	11.6	31.9	52.8	46.0	44.8
Wt Tare	4.7	3.8	3.8	4.5	4.9
Wt Dry Sample	206.1	201.8	157.0	175.1	177.8
Moisture Content (%)	5.6	15.8	33.6	26.3	25.2
Test Hole No.	TH-3	TH-3	TH-3		
Depth	6'	7'	10'		
Tare No.	m54	t106	m1		
Wt Wet Sample + Tare	256.4	222.2	236.4		
Wt Dry Sample + Tare	210	179.9	163.3		
Wt Water	46.4	42.3	73.1		
Wt Tare	4.8	4.2	4.6		
Wt Dry Sample	205.2	175.7	158.7		
Moisture Content (%)	22.6	24.1	46.1		
Test Hole No.	TH-4	TH-4	TH-4	TH-4	TH-4
Depth	1'	2'	3'	4'	5'
Tare No.	n13	1-23	m7	t122	t118
Wt Wet Sample + Tare	232.3	239.4	215.8	232.5	246
Wt Dry Sample + Tare	214.9	227	167.8	174.5	198
Wt Water	17.4	12.4	48.0	58.0	48.0
Wt Tare	4.8	4.6	4.9	4.8	4.2
Wt Dry Sample	210.1	222.4	162.9	169.7	193.8
Moisture Content (%)	8.3	5.6	29.5	34.2	24.8
Test Hole No.	TH-4	TH-4	TH-4		
Depth	6'	7'	10'		
Tare No.	m33	br17	se6		
Wt Wet Sample + Tare	244	224.5	213.9		
Wt Dry Sample + Tare	172.7	171.4	146.3		
Wt Water	71.3	53.1	67.6		
Wt Tare	5.1	4.6	4.8		
Wt Dry Sample	167.6	166.8	141.5		
Moisture Content (%)	42.5	31.8	47.8		

CALIFORNIA BEARING RATIO (CBR) TEST - ASTM D 1883

Client: SSU Engineering 846 Oakenwald Avenue Winnipeg, MB R3T 1N1	Project No: 104-2501
Attention: Silvestre Urbano, P. Eng.	Lab No: HM 6
Project 2025 Quality Control	Date sampled: January 23, 2025
Location: TH2-3	Date Received: January 24, 2025

SAMPLE DATA		SPECIMEN DATA	
Sample Type: Soil Samples		DESCRIPTION	Before Soaking After Testing
Source: N/P		Moisture Content (MC), %	24.8 25.3
Sampled by: Client		MC of top 25mm layer, %	
Optimum Moisture Content: 23.3 %		Dry Density, kg/m ³	1564
Maximum Dry Density: 1653 kg/m ³		Compaction, %	95%
Method of Compaction: Standard Proctor		CBR, %	4.9
Tested by: JJ	Date Tested: Feb 21	Swell, %	0.8

LOAD DATA	
PENETRATION mm	STRESS MPa
0	0.00
0.64	0.19
1.27	0.27
1.91	0.30
2.54	0.34
3.18	0.36
3.81	0.37
4.45	0.39
5.08	0.41
6.35	0.43
7.62	0.45
8.89	0.46



PENETRATION mm	STANDARD LOAD MPa	TEST LOAD		BEARING RATIO (soaked)	
		ACTUAL MPa	CORRECTED MPa	at 2.5 mm penetration	at 5.1 mm penetration
2.54	6.9	0.34	0.34	4.9	-
5.08	10.3	0.41	0.41	-	4.0

Remarks:

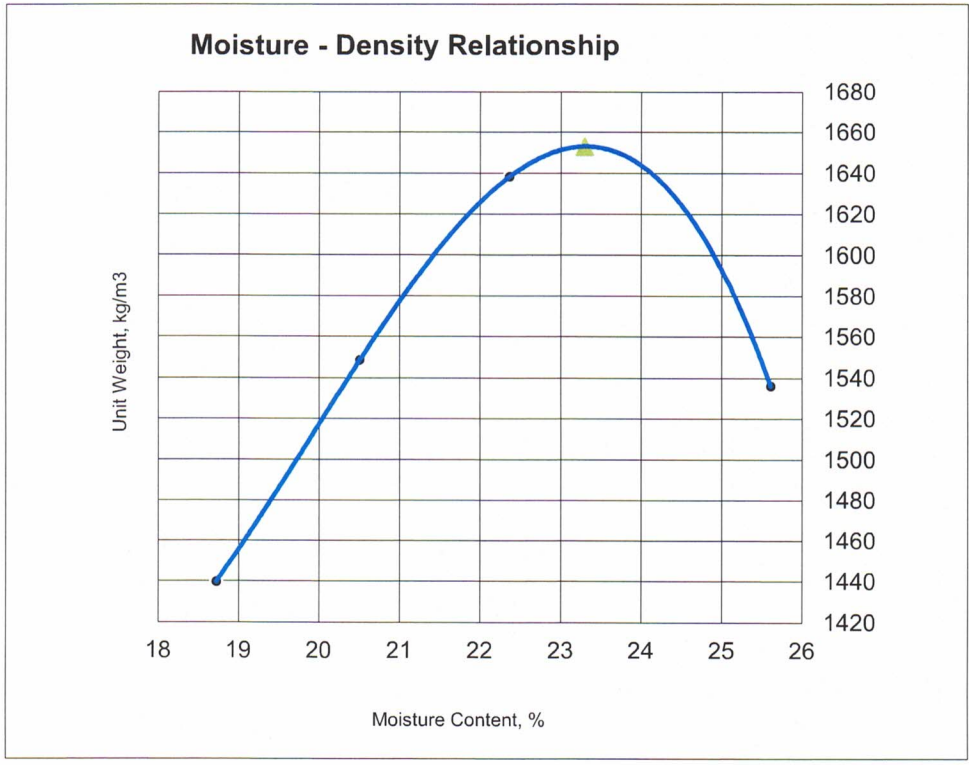
Reviewed by:

MAXIMUM DRY DENSITY AND MOISTURE CONTENT - Proctor Method (ASTM D698)

CLIENT	SSU Engineering 846 Oakenwald Avenue Winnipeg, MB R3T 1N1	Project No.:	104-2501
ATTENTION:	Silvestre Urbano, P. Eng.	Lab No.:	HM 6
PROJECT:	2025 Quality Control TH2-3'	Proctor Test No.:	1

Date Sampled:	January 23, 2025	Date Received:	January 24, 2025	PROCEDURE	A
Sampled By:	Client	Date Tested:	February 6, 2025	PREPARATION	Dry
MATERIAL INFORMATION				COMPACTION METHOD	Manual
Material Type:	Soil Samples	BLOWS PER LAYER			25
Material Use:	Subgrade	NO. OF LAYERS			3
Maximum Size:		MOLD SIZE			100
		MATERIAL SUPPLIER: N/P			935
		MATERIAL SOURCE: N/P			2.5 kg
		WEIGHT OF HAMMER			

	Test No.	1	2	3	4
Wet Density		1709	1866	2005	1930
Moisture Content		18.7	20.5	22.4	25.6
Dry Density		1440	1548	1638	1536



Maximum Dry Density (MDD):
1653 kg/m³

Optimum Moisture Content
23.3 %

STONE CORRECTION (ASTM D 4718)

Retained on 4.75mm sieve:
_____ %

Corrected Moisture:
23.3 %

Corrected Maximum Dry Density:
1653 kg/m³

Remarks:

Tested by: Dennis Aranzanso

Reviewed by: Paul Bevel

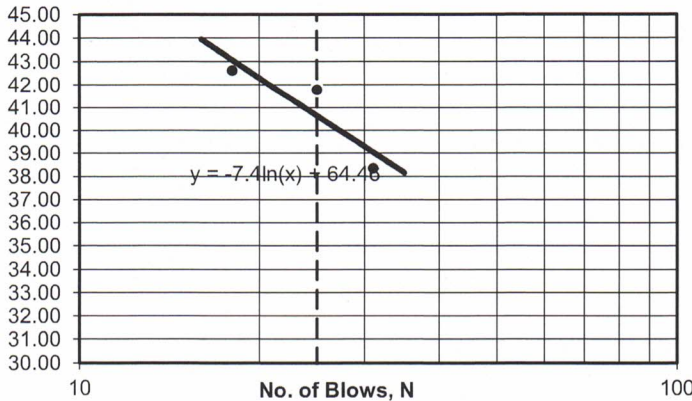
Atterberg Limits (ASTM D4318)

Client: SSU Engineering 846 Oakenwald Avenue Winnipeg, MB R3T 1N1 Attention.: Silvestre Urbano, P. Eng. Project: 2025 Quality Control TH3 - 4'	Project No.: 104-2501 PI Test No.: 1 Lab No.: HM 6 Date Sampled/By: January 23 Client Date Received: January 24, 2025 Date Tested / By: February 4, Edel Santiago
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Liquid Limit Determination

Dish No.:	1	2	3	Liquid Limit 25 Blows
Wet Soil + Dish:	56.86	58.1	46.81	
Dry Soil + Dish:	52.336	53.01	41.53	
Moisture:	4.524	5.09	5.28	
Dish:	40.54	40.83	29.14	
Dry Soil:	11.796	12.18	12.39	
% Moisture:	38.35	41.79	42.62	
No. of Blows:	31	25	18	
Liquid Limit:				41

Liquid Limit



Material Identification:

Depth:

Liquid Limit, %: **41**
 Plastic Limit, %: **18**
 Plasticity Index: **23**
 (LL-PL)

Plastic Limit Determination

Dish No.:	1	2	3	
Wet Soil + Dish:	60.57	56.74	57.44	
Dry Soil + Dish:	57.67	54.44	54.84	
Moisture:	2.9	2.30	2.6	
Dish:	41.86	40.8	40.97	
Dry Soil:	15.81	13.64	13.87	
% Moisture:	18.34	16.86	18.75	
				Average:
				18

Test Method : ASTM: D4318, D2216

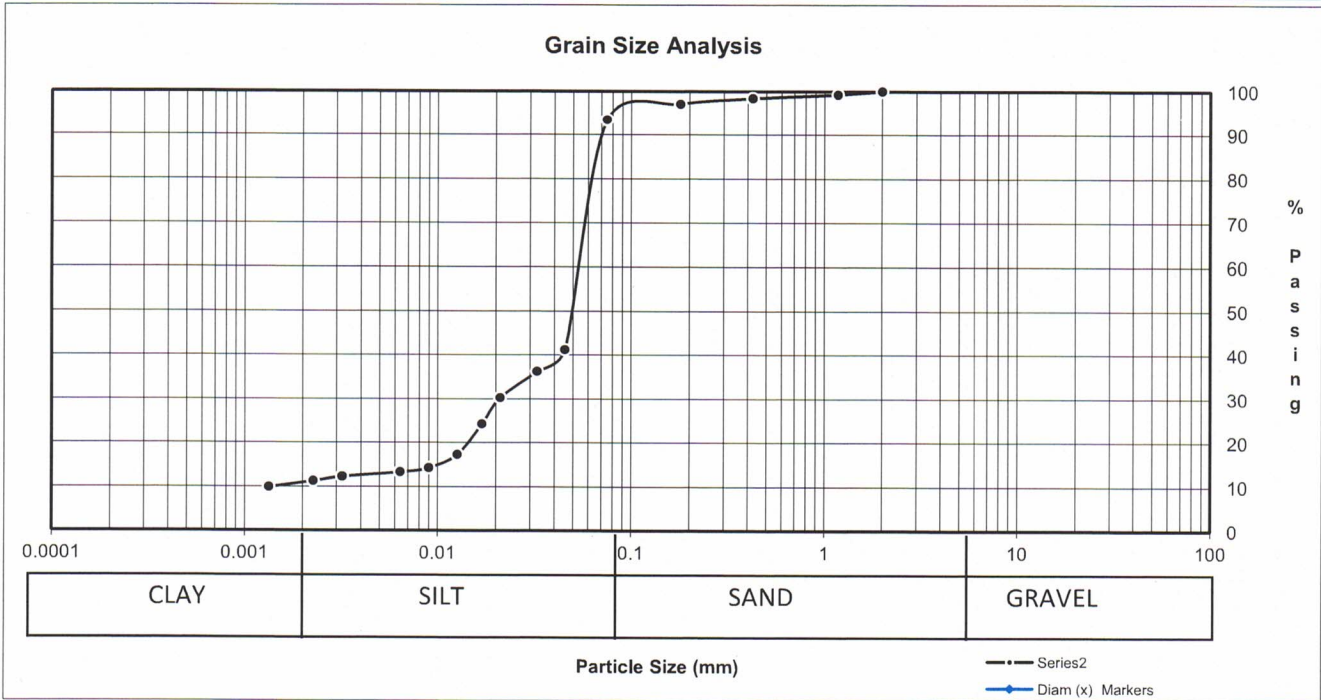
Remarks:

Reviewed by:

PARTICLE SIZE ANALYSIS OF SOILS TEST REPORT

CLIENT: SSU Engineering 846 Oakenwald Avenue Winnipeg, MB R3T 1N1 ATTENTION: Silvestre Urbano, P. Eng. PROJECT: 2025 Quality Control TH3-4'	Project No.: 104-2501 PSA Test N°: 1 Lab No.: HM 6
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Date Sampled:	January 23, 202	Date Received:	January 24, 2	Sieve Analysis	Hydrometer Analysis
Sampled By:	Client	Date Tested:	February 4, 2	Sieve (mm) % Passing	Diameter % Finer
Material Identification B.H./T.H. No. Depth Sample Source Specific Gravity of Material:				50.00 100.0	
				37.50 100.0	
				25.00 100.0	
				19.00 100.0	
				16.00 100.0	
				12.50 100.0	0.0456 41.2
				9.50 100.0	0.0327 36.2
				4.75 100.0	0.0211 30.2
				2.00 100.0	0.0170 24.2
				1.18 99.3	0.0127 17.2
			0.425 98.5	0.0090 14.2	
			0.180 97.1	0.0064 13.2	
			0.075 93.3	0.0013 9.8	



	% Composition		
	Gravel	D10	0.00220
	6.66 Sand	D30	0.04700
	82.55 Silt	D60	0.06000
	10.79 Clay	Cu	27.27
		Cc	16.73

Remarks:



LETTER REPORT

DATE: January 26, 2026

FILE: 26 010

TO: **SBConsulting Inc.**
600 South Landing
Oak Bluff, Manitoba
R4G 0C3
ATTN: R. CABIGTING, P.ENG

FROM: **SILVESTRE S. URBANO, P.ENG.**
Senior Geotechnical Engineer
846 Oakenwald Avenue
Winnipeg, Manitoba R3T 1N1
Tel: (431) 373-8767

PHONE:

FAX:

RE: ADDITIONAL PAVEMENT ASSESSMENT FOR WINNIPEG TRANSIT GARAGE, 421 OSBORNE ST

It was requested that an additional pavement assessment based on the site subgrade conditions at 421 Osborne Street as per the new City of Winnipeg guideline for new industrial/commercial be provided. However, this guideline was strengthened based on the ESAL (Equivalent Single Axle Load) of 4.1 million which considered the anticipated weight of future electric buses and subgrade of clay over a silt subgrade. The City of Winnipeg encourages to undertake subgrade testing which consist of determining the California Bearing Ratio (CBR). The pavement structure of the new road, will be based on the determined CBR, ESAL and clay over a silt subgrade as per the listed pavement designs of City of Winnipeg.

INDUSTRIAL/COMMERCIAL ROADS

The additional six testholes drilled to 3m depths at 421 Osborne Street *still* revealed a *general* soil profile of a fill layer underlain by a clay subgrade over a *silt* layer followed a stiff clay which extended to the depth explored. *Slight seepage and caving* conditions were also observed at TH1A area and should be anticipated from the *silt layer* during road construction.

LABORATORY TEST RESULTS

A CBR of 3.3 and 4.8 @ 95% MDD is obtained for TH4 (3' to 10') and TH3 (4' to 6'), respectively as shown in the attached results.

PAVEMENT RECOMMENDATIONS

Based on the CBR test result and a *clay over silt* subgrade, the recommended pavement construction as per the attached City of Winnipeg Pavement Draft Design (Table 11 and Page 13) at this site should be as follows.

Pavement Structure for Industrial/Commercial with CBR between 2.0 to 3.5

	Standard Thickness	Required Thickness	% Compaction
JRCP (Reinforced Concrete)	180mm	180mm	n/a
Base Course (Granular A)	100mm	150mm	100% Std Proctor
Subbase (50mm Granular A)	275mm	550mm	100% Std Proctor
Geogrid	applicable	applicable	n/a
Non-Woven Geotextile	applicable	applicable	n/a

ADDITIONAL RECOMMENDATIONS

As a separator, non-woven geotextile and geogrid specifications should follow the City of Winnipeg Street guideline and should be placed after static-rolling the in-situ subgrade and prior to backfilling of granular fill.

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*Any **saturated subgrade conditions** such as in TH1 and TH1A area (damp at 1.5m below grade) should be dried off quickly by excavation of sump pit or installation of permanent subdrains (600mm below the subgrade level) connected to positive outlet (catch basin) prior to placing the granular fill structure with geotextile. At these locations, the placing of granular fill should follow the geotextile specifications for soft grounds.*

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Winnipeg Transit Garage

421 Osborne St, Winnipeg, MB

Legend

- Test Hole

TH 5A

TH 4A

TH 3A

TH 2A

TH 1A

TH 6A



80 m

Google Earth

Image © 2020 Vexcel Imaging US, Inc.

Project No: 26 010

TH1A

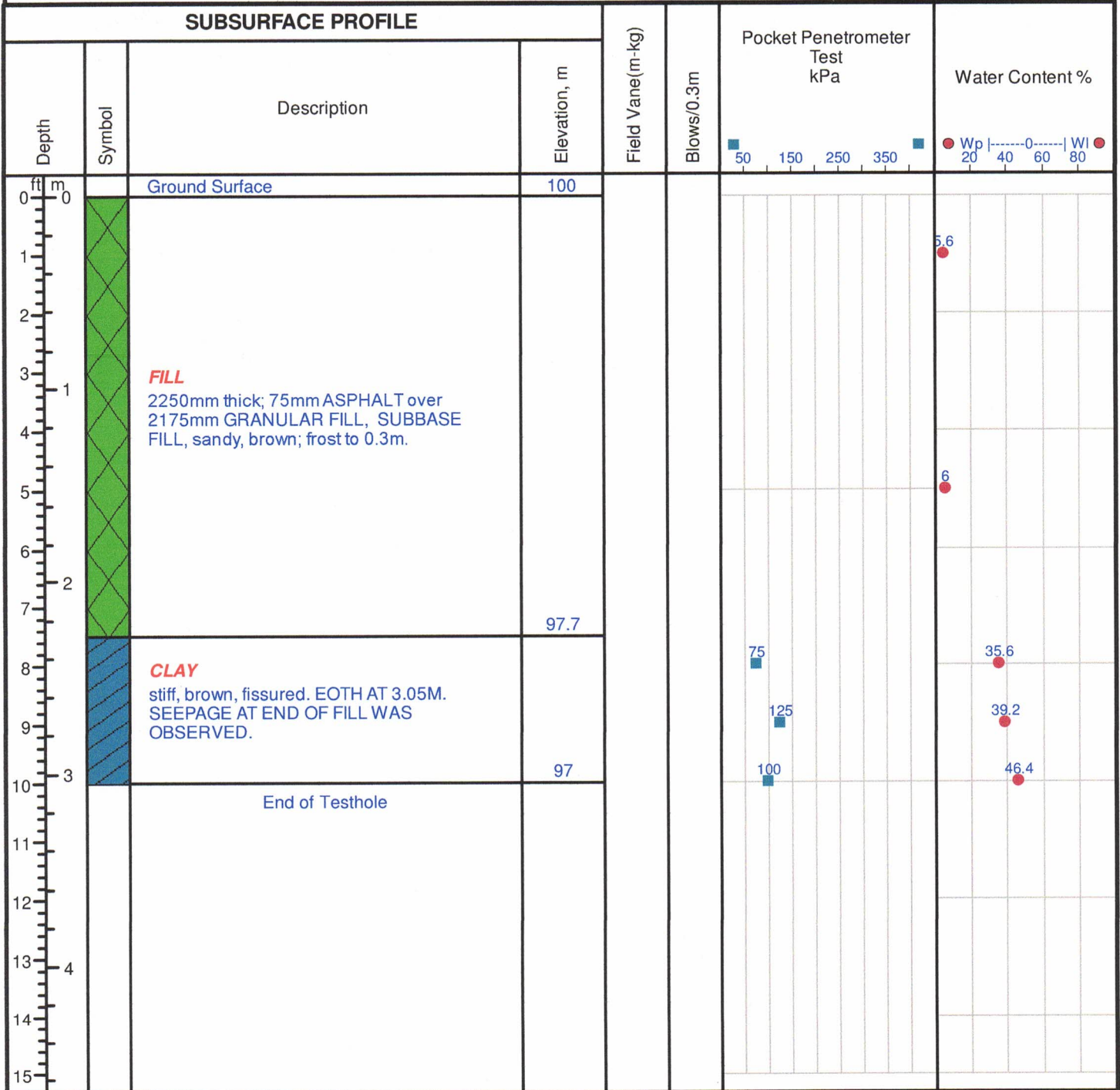
Project: Additional Pavement Assessment

Client: SBConsulting Inc.

Enclosure:

Location: 421 Osborne Street, Winnipeg

Engineer: SSU



Drill Method: Continuous Auger

Datum: Assumed 100.0m (road grade)

Drill Date: 11/26/25

Checked by: SSU

Hole Size: 150mm

Sheet: 1 of 1

Project No: 26 010

TH2A

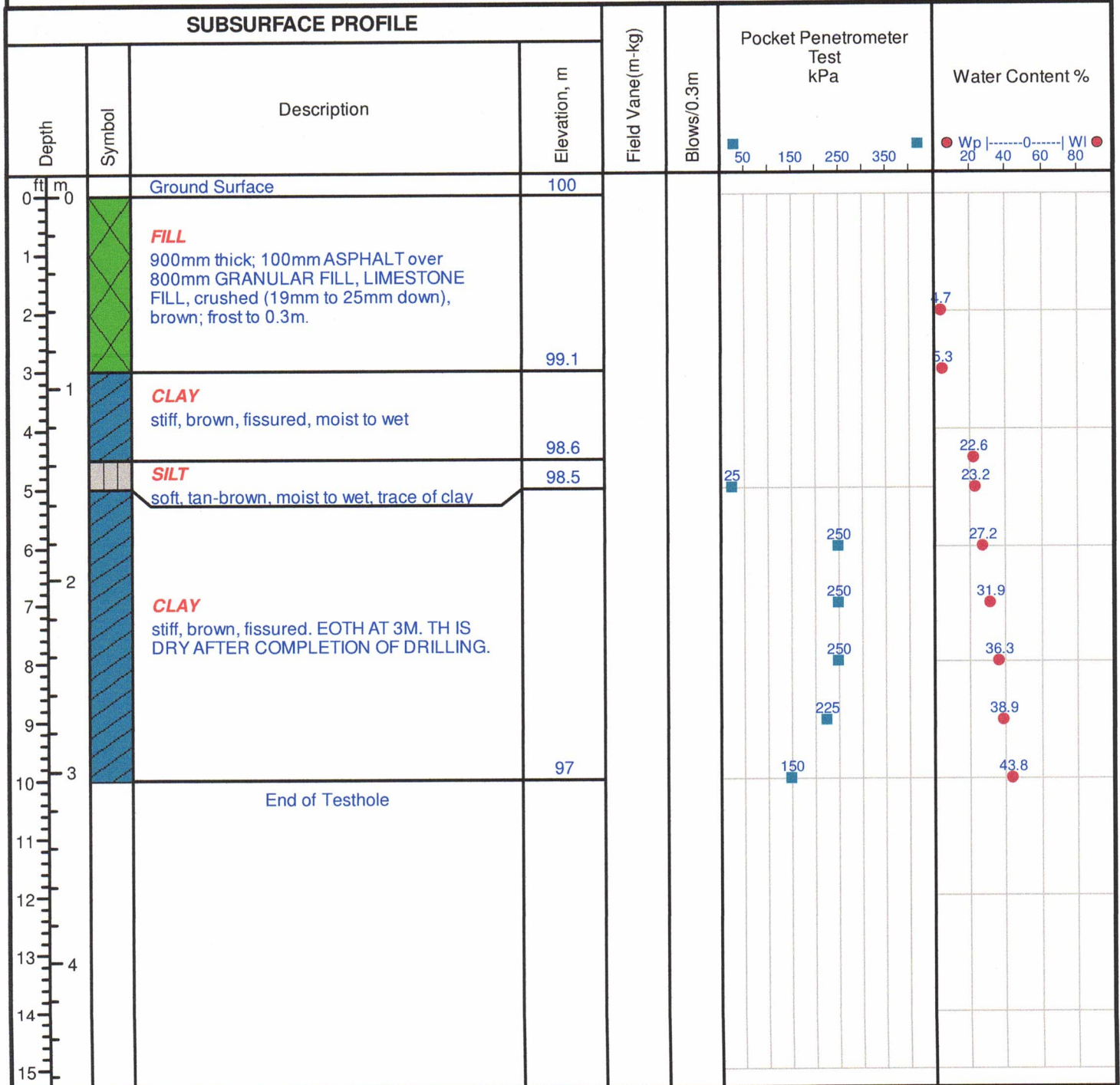
Project: Additional Pavement Assessment

Client: SBConsulting Inc.

Enclosure:

Location: 421 Osborne Street, Winnipeg

Engineer: SSU



Drill Method: Continuous Auger

Datum: Assumed 100.0m (road grade)

Drill Date: 11/26/25

Checked by: SSU

Hole Size: 150mm

Sheet: 1 of 1

Project No: 26 010

TH3A

Project: Additional Pavement Assessment

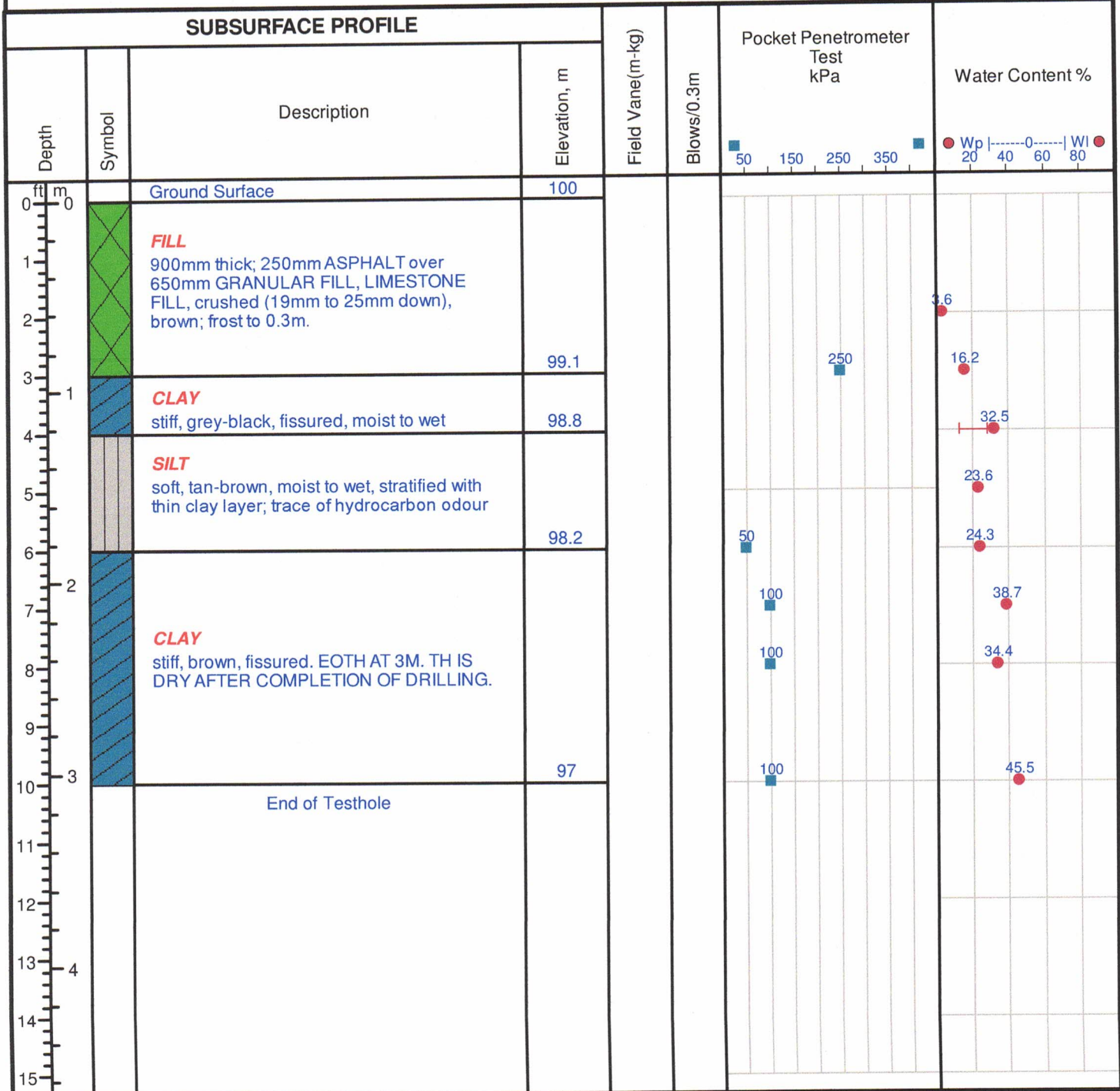
Client: SBConsulting Inc.

Location: 421 Osborne Street, Winnipeg

Enclosure:

Engineer: SSU

SUBSURFACE PROFILE



Drill Method: Continuous Auger

Drill Date: 11/26/25

Hole Size: 150mm

Datum: Assumed 100.0m (road grade)

Checked by: SSU

Sheet: 1 of 1

Project No: 26 010

TH4A

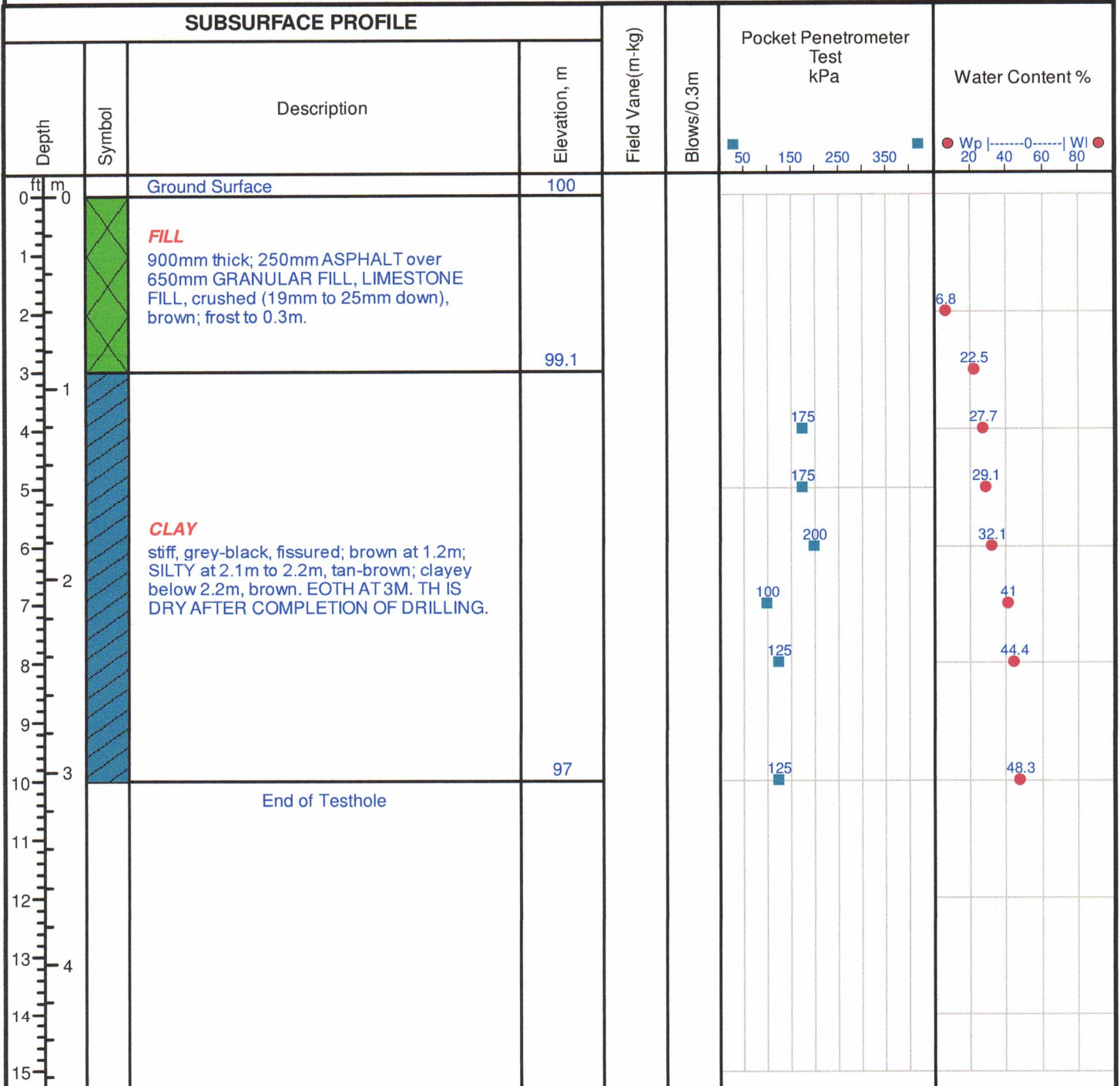
Project: Additional Pavement Assessment

Client: SBConsulting Inc.

Enclosure:

Location: 421 Osborne Street, Winnipeg

Engineer: SSU



Drill Method: Continuous Auger

Datum: Assumed 100.0m (road grade)

Drill Date: 11/26/25

Checked by: SSU

Hole Size: 150mm

Sheet: 1 of 1

Project No: 26 010

TH5A

Project: Additional Pavement Assessment

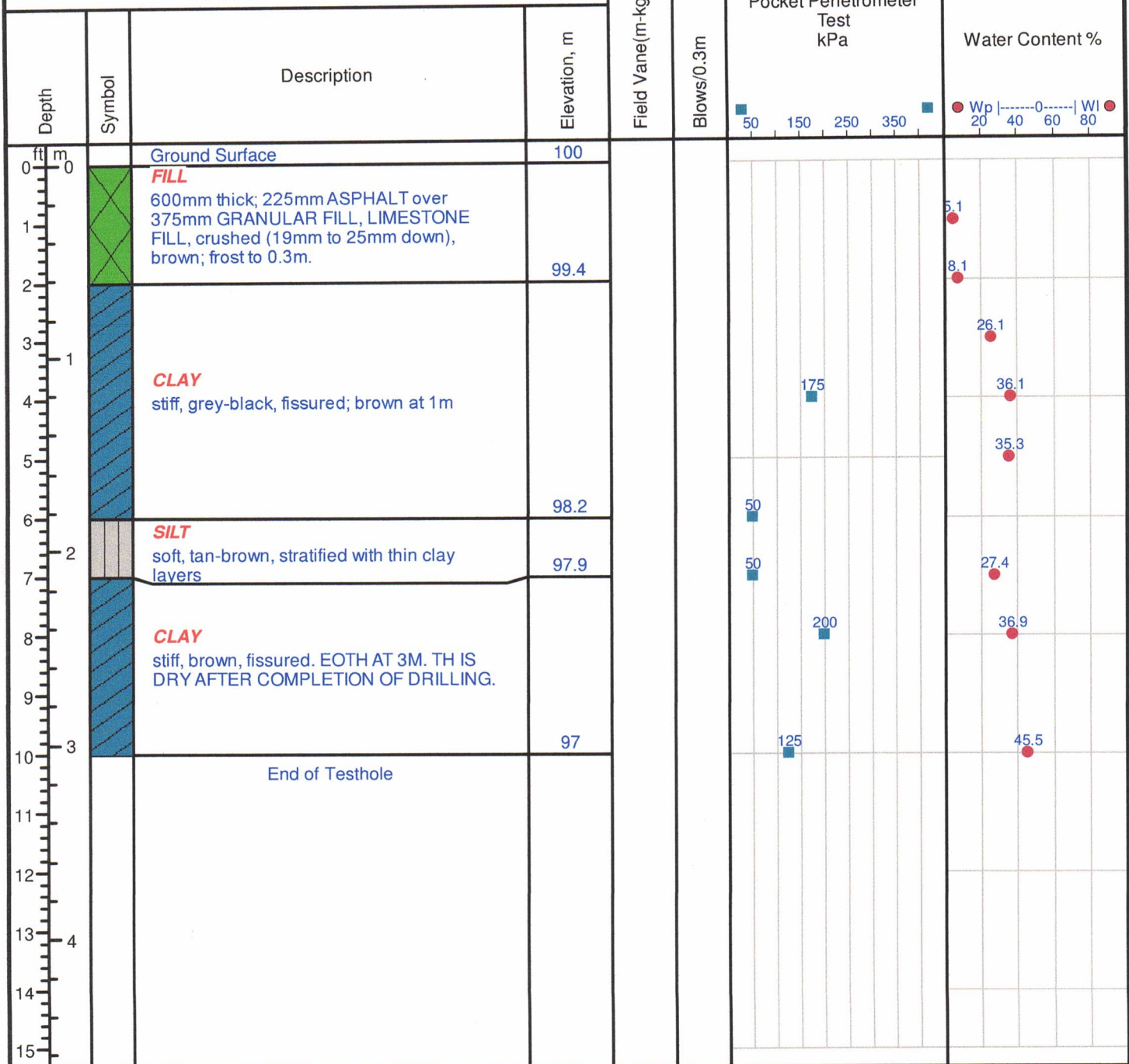
Client: SBConsulting Inc.

Enclosure:

Location: 421 Osborne Street, Winnipeg

Engineer: SSU

SUBSURFACE PROFILE



Drill Method: Continuous Auger

Datum: Assumed 100.0m (road grade)

Drill Date: 11/26/25

Checked by: SSU

Hole Size: 150mm

Sheet: 1 of 1

Project No: 26 010

TH6A

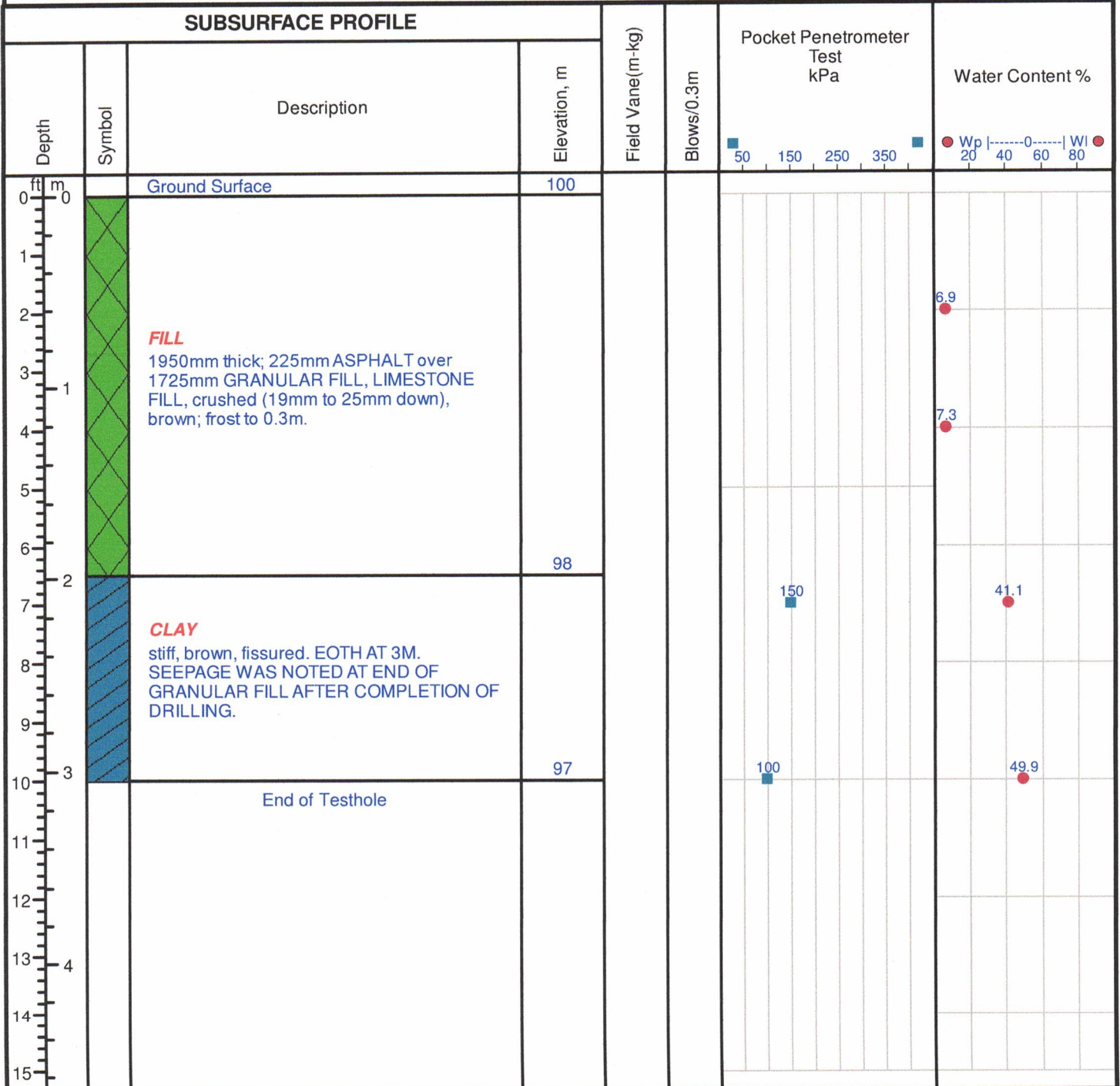
Project: Additional Pavement Assessment

Client: SBConsulting Inc.

Enclosure:

Location: 421 Osborne Street, Winnipeg

Engineer: SSU



Drill Method: Continuous Auger

Datum: Assumed 100.0m (road grade)

Drill Date: 11/26/25

Checked by: SSU

Hole Size: 150mm

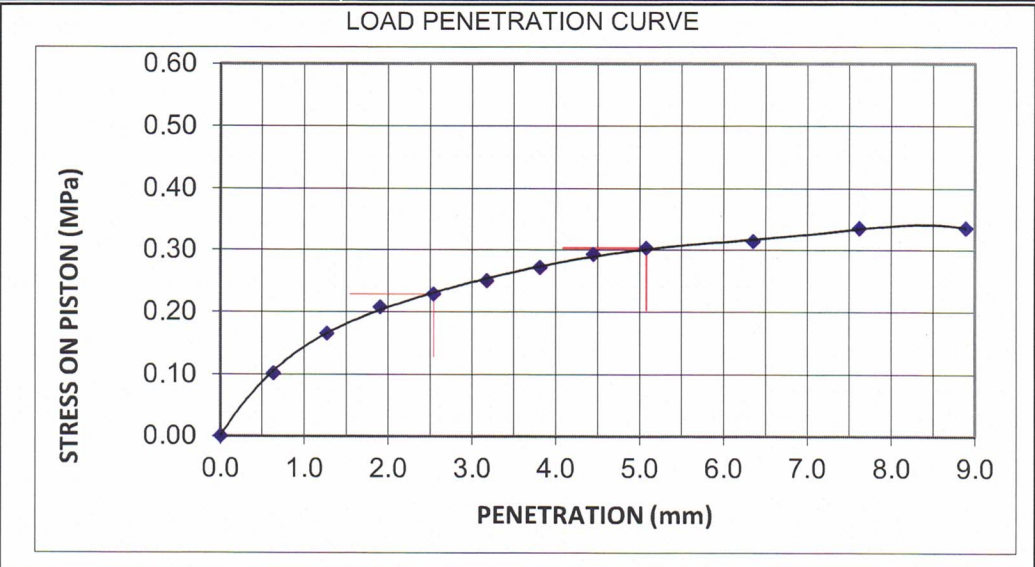
Sheet: 1 of 1

CALIFORNIA BEARING RATIO (CBR) TEST - ASTM D 1883

Client: SSU Engineering 846 Oakenwald Avenue Winnipeg, MB R3T 1N1 Attention: Silvestre Urbano, P. Eng.	Project No: 104-2505 Lab No: HM 769 - 2 Date Sampled: November 26, 2025 Date Received: November 26, 2025 Date Tested: December 2, 2025
Project: Winnipeg Transit Garage Geotechnical Investigation Location: 421 Osborne St, Winnipeg, MB R3L 0T3	


SAMPLE DATA		SPECIMEN DATA		
Sample Type: Clay - Soil Sample		DESCRIPTION	Before Soaking	After Testing
Source: TH 4 (3-ft - 10-ft)		Moisture Content (MC), %	19.5	19.9
Sampled by: MK		MC of top 25mm layer, %		
Optimum Moisture Content: 20.5 %		Dry Density, kg/m ³	1517	1511
Maximum Dry Density: 1592 kg/cm ³		Compaction, %	95%	95%
Method of Compaction: Standard Proctor		CBR at 2.5mm Penetration, %		3.3
Tested by: ECS	Date Tested: 26-Nov-25	Swell, %		2.9

LOAD DATA	
PENETRATION mm	STRESS MPa
0	0.00
0.64	0.10
1.27	0.17
1.91	0.21
2.54	0.23
3.18	0.25
3.81	0.27
4.45	0.29
5.08	0.30
6.35	0.31
7.62	0.33
8.89	0.33



PENETRATION mm	STANDARD LOAD MPa	TEST LOAD		BEARING RATIO (soaked)	
		ACTUAL MPa	CORRECTED MPa	at 2.5 mm penetration	at 5.1 mm penetration
2.54	6.9	0.23	0.23	3.3	-
5.08	10.3	0.30	0.30	-	2.9

Remarks:
HM 769-2

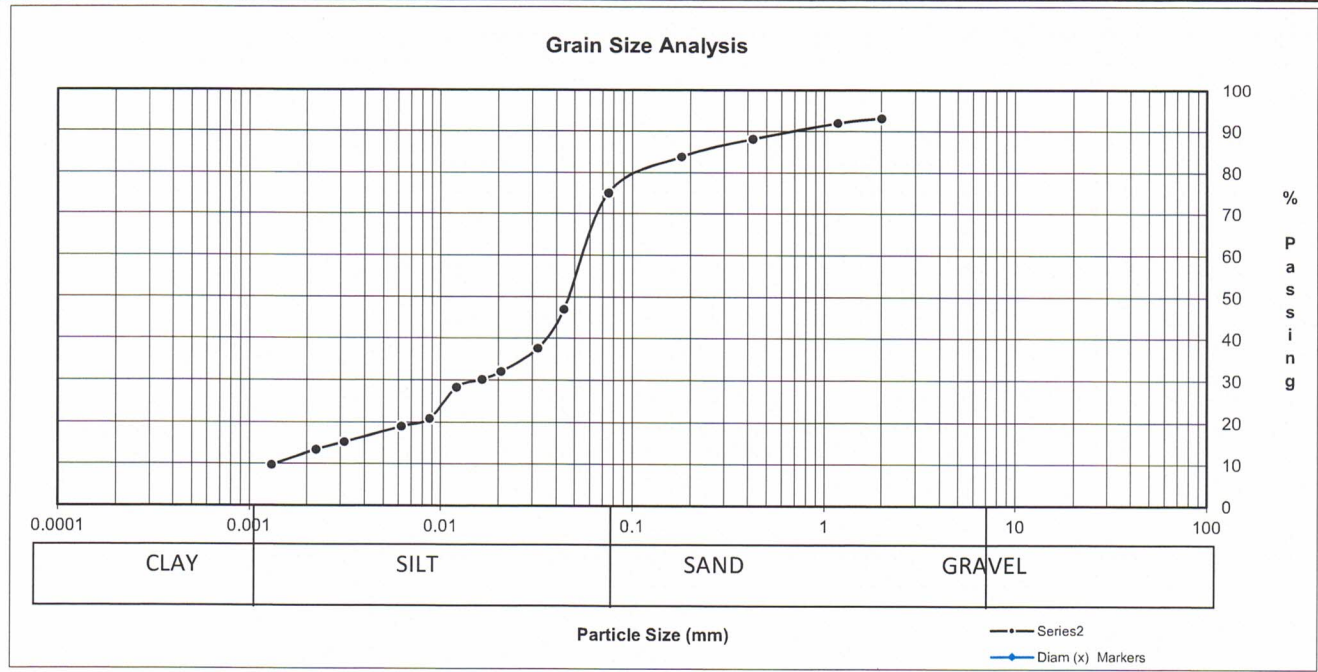

 Reviewed by: Paul Bevel

PARTICLE SIZE ANALYSIS OF SOILS TEST REPORT

CLIENT: SSU Engineering 846 Oakenwald Avenue Winnipeg, MB R3T 1N1 ATTENTION: Silvestre Urbano, P. Eng. PROJECT: Winnipeg Transit Garage Geotechnical Investigation 421 Osborne St, Winnipeg, MB R3L 0T3	Project No.: 104-2505 PSA Test No.: 1 Lab No.: HM 769-1
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Date Sampled:	Date Received:	Sieve Analysis		Hydrometer Analysis	
Sampled By:	Date Tested:	Sieve (mm)	% Passing	Diameter	% Finer
November 26, 2025	November 26, 2025	50.00	100.0		
MK	December 1, 2025	37.50	100.0		
		25.00	100.0		
		19.00	100.0		
		16.00	98.8		
		12.50	98.0	0.0439	46.9
		9.50	95.7	0.0321	37.6
		4.75	93.7	0.0207	32.0
		2.00	93.1	0.0164	30.1
		1.18	91.9	0.0121	28.3
		0.425	88.0	0.0087	20.8
		0.180	83.8	0.0062	19.0
		0.075	75.0	0.0013	9.6

Material Identification	TH 3	
B.H./T.H. No.	4ft - 6ft	
Depth	GS 23	
Sample Source	2.65	
Specific Gravity of Material:		



0	% Composition	
	6.31 Gravel	D10
	18.69 Sand	D30
	62.58 Silt	D60
	12.42 Clay	Cu
		Cc

Remarks:

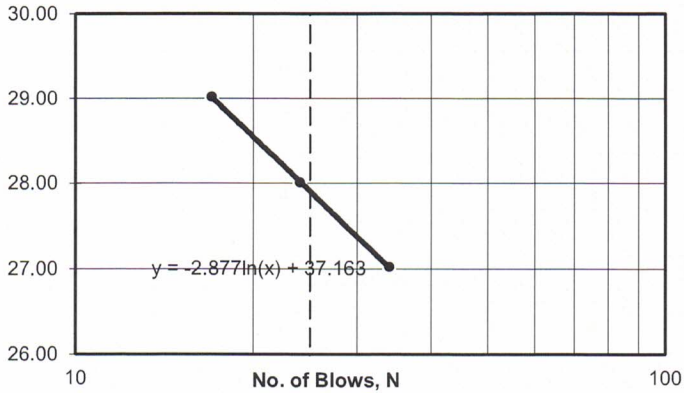
Atterberg Limits (ASTM D4318)

Client:	SSU Engineering 846 Oakenwald Avenue Winnipeg, MB R3T 1N1	Project No.:	104-2505
Attention.:	Silvestre Urbano, P. Eng.	PI Test No.:	2
Project:	Winnipeg Transit Garage Geotechnical Investigation 421 Osborne St, Winnipeg, MB R3L 0T3	Lab No.:	HM 769-2
		Date Sampled/By:	November 26, 2025 MK
		Date Received:	November 26, 2025
		Date Tested / By:	November 28, 2025 G. Manalo

Liquid Limit Determination

Dish No.:	1	2	3		Liquid Limit 25 Blows
Wet Soil + Dish:	11.84	13.15	12.66		
Dry Soil + Dish:	10.17	11.24	10.8		
Moisture:	1.67	1.91	1.86		
Dish:	3.99	4.42	4.39		
Dry Soil:	6.18	6.82	6.41		
% Moisture:	27.02	28.01	29.02		
No. of Blows:	34	24	17		
Liquid Limit:					28

Liquid Limit



Material Identification:

Test Hole: **TH 3**
Depth: **4ft - 6ft**

Liquid Limit, %: **28**
Plastic Limit, %: **13**
Plasticity Index: **14**
(LL-PL)

Plastic Limit Determination

Dish No.:	1	2	3		Average:
Wet Soil + Dish:	11.12	11.05	12.79		
Dry Soil + Dish:	10.28	10.21	11.82		
Moisture:	0.84	0.84	0.97		
Dish:	3.96	3.96	4.65		
Dry Soil:	6.32	6.25	7.17		
% Moisture:	13.29	13.44	13.53		
					13

Test Method : ASTM: D4318, D2216

Remarks:

P. Bevel

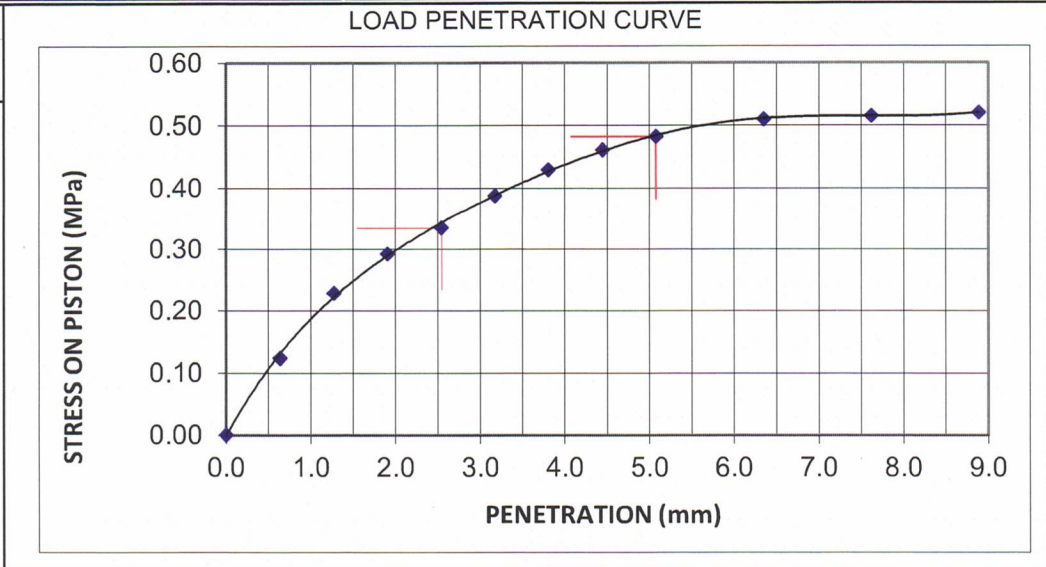
Reviewed by: Paul Bevel

CALIFORNIA BEARING RATIO (CBR) TEST - ASTM D 1883

Client: SSU Engineering 846 Oakenwald Avenue Winnipeg, MB R3T 1N1	Project No: 104-2505 Lab No: HM 769 - 1 Date Sampled: November 26, 2025 Date Received: November 26, 2025 Date Tested: December 1, 2025
Attention: Silvestre Urbano, P. Eng. Project: Winnipeg Transit Garage Geotechnical Investigation Location: 421 Osborne St, Winnipeg, MB R3L 0T3	

SAMPLE DATA		SPECIMEN DATA	
Sample Type: Silt - Soil Sample		DESCRIPTION	Before Soaking After Testing
Source: TH 3 (4-ft to 6-ft)		Moisture Content (MC), %	19.2 19.7
Sampled by: MK		MC of top 25mm layer, %	
Optimum Moisture Content: 17.5 %		Dry Density, kg/m ³	1663 1656
Maximum Dry Density: 1746 kg/cm ³		Compaction, %	95% 95%
Method of Compaction: Standard Proctor		CBR at 2.5mm penetration, %	4.8
Tested by: ECS Date Tested: 26-Nov-25		Swell, %	0.37

LOAD DATA	
PENETRATION mm	STRESS MPa
0	0.00
0.64	0.12
1.27	0.23
1.91	0.29
2.54	0.33
3.18	0.39
3.81	0.43
4.45	0.46
5.08	0.48
6.35	0.51
7.62	0.52
8.89	0.52



PENETRATION mm	STANDARD LOAD MPa	TEST LOAD		BEARING RATIO (soaked)	
		ACTUAL MPa	CORRECTED MPa	at 2.5 mm penetration	at 5.1 mm penetration
2.54	6.9	0.33	0.33	4.8	-
5.08	10.3	0.48	0.48	-	4.7

Remarks:
HM 769-1

P. Bevel

Reviewed by: Paul Bevel

MOISTURE CONTENT OF SOIL (ASTM D2216)

Client:	SSU Engineering 846 Oakenwald Avenue Winnipeg, MB R3T 1N1	Project No:	104-2505
Attention:	Silvestre Urbano, P. Eng.	Test No.:	TH 1 to TH 6
Project:	Winnipeg Transit Garage Geotechnic: 421 Osborne St, Winnipeg, MB R3L 0	Lab No.:	HM 769
		Date Sampled / By:	November 26, 2025 MK
		Date Received:	November 26, 2025
		Date Tested / By:	November 26, 2025 Mehdi Abbasi

Test Hole No.	TH 1	TH 1	TH 1	TH 1	TH 1
Depth	3-IN	5-FT	7.5-FT	8-FT	9-FT
Tare No.					
Wt Wet Sample + Tare	176.1	150.7	74.3	161.3	156.6
Wt Dry Sample + Tare	167	142.4	56.1	117.2	108.4
Wt Water	9.1	8.3	18.2	44.1	48.2
Wt Tare	4.1	4.8	5.0	4.7	4.5
Wt Dry Sample	162.9	137.6	51.1	112.5	103.9
Moisture Content (%)	5.6	6.0	35.6	39.2	46.4
Test Hole No.	TH 2	TH 2	TH 2	TH 2	TH 2
Depth	2-FT	3-FT	4-FT	5-FT	6-FT
Tare No.					
Wt Wet Sample + Tare	157.5	163.6	153.3	162.1	151.7
Wt Dry Sample + Tare	150.7	155.6	125.8	132.4	120.1
Wt Water	6.8	8.0	27.5	29.7	31.6
Wt Tare	4.5	4.7	4.0	4.6	4.1
Wt Dry Sample	146.2	150.9	121.8	127.8	116.0
Moisture Content (%)	4.7	5.3	22.6	23.2	27.2
Test Hole No.	TH 2	TH 2	TH 2	TH 2	TH 2
Depth	7-FT	8-FT	9-FT	10-FT	10.5-FT
Tare No.					
Wt Wet Sample + Tare	163	152.1	153.2	158.7	167
Wt Dry Sample + Tare	124.8	113	111.6	111.6	118.1
Wt Water	38.2	39.1	41.6	47.1	48.9
Wt Tare	4.9	5.2	4.6	4.0	4.4
Wt Dry Sample	119.9	107.8	107.0	107.6	113.7
Moisture Content (%)	31.9	36.3	38.9	43.8	43.0
Test Hole No.	TH 2				
Depth	11-FT				
Tare No.					
Wt Wet Sample + Tare	152				
Wt Dry Sample + Tare	104.4				
Wt Water	47.6				
Wt Tare	4.1				
Wt Dry Sample	100.3				
Moisture Content (%)	47.5				

MOISTURE CONTENT OF SOIL (ASTM D2216)

Client:	SSU Engineering 846 Oakenwald Avenue Winnipeg, MB R3T 1N1	Project No:	104-2505
Attention:	Silvestre Urbano, P. Eng.	Test No.:	TH 1 to TH 6
Project:	Winnipeg Transit Garage Geotechnic 421 Osborne St, Winnipeg, MB R3L C	Lab No.:	HM 769
		Date Sampled / By:	November 26, 2025 MK
		Date Received:	November 26, 2025
		Date Tested / By:	November 26, 2025 Mehdi Abbasi

Test Hole No.	TH 3	TH 3	TH 3	TH 3	TH 3
Depth	2-FT	3-FT	4-FT	5-FT	6-FT
Tare No.					
Wt Wet Sample + Tare	162.7	159.3	171.5	169.2	168.2
Wt Dry Sample + Tare	157.2	137.7	130.6	137.7	136.2
Wt Water	5.5	21.6	40.9	31.5	32.0
Wt Tare	4.0	4.7	4.9	4.0	4.7
Wt Dry Sample	153.2	133.0	125.7	133.7	131.5
Moisture Content (%)	3.6	16.2	32.5	23.6	24.3
Test Hole No.	TH 3	TH 3	TH 3		
Depth	7-FT	8-FT	10-FT		
Tare No.					
Wt Wet Sample + Tare	160.3	157.6	158.1		
Wt Dry Sample + Tare	117	118.4	110.1		
Wt Water	43.3	39.2	48.0		
Wt Tare	5.1	4.5	4.7		
Wt Dry Sample	111.9	113.9	105.4		
Moisture Content (%)	38.7	34.4	45.5		
Test Hole No.	TH 4	TH 4	TH 4	TH 4	TH 4
Depth	2-FT	3-FT	4-FT	5-FT	6-FT
Tare No.					
Wt Wet Sample + Tare	166.4	157	165	164.5	158.5
Wt Dry Sample + Tare	156.1	129	130.1	128.4	121.1
Wt Water	10.3	28.0	34.9	36.1	37.4
Wt Tare	4.7	4.7	4.1	4.2	4.7
Wt Dry Sample	151.4	124.3	126.0	124.2	116.4
Moisture Content (%)	6.8	22.5	27.7	29.1	32.1
Test Hole No.	TH 4	TH 4	TH 4		
Depth	7-FT	8-FT	10-FT		
Tare No.					
Wt Wet Sample + Tare	153.2	154.1	160.8		
Wt Dry Sample + Tare	110.1	108.3	110		
Wt Water	43.1	45.8	50.8		
Wt Tare	4.9	5.1	4.8		
Wt Dry Sample	105.2	103.2	105.2		
Moisture Content (%)	41.0	44.4	48.3		

MOISTURE CONTENT OF SOIL (ASTM D2216)

Client:	SSU Engineering 846 Oakenwald Avenue Winnipeg, MB R3T 1N1	Project No:	104-2505
Attention:	Silvestre Urbano, P. Eng.	Test No.:	TH 1 to TH 6
Project:	Winnipeg Transit Garage Geotechnical In 421 Osborne St, Winnipeg, MB R3L 0T3	Lab No.:	HM 769
		Date Sampled / By:	November 26, 2025 MK
		Date Received:	November 26, 2025
		Date Tested / By:	November 26, 2025 Mehdi Abbasi

Test Hole No.	TH 5	TH 5	TH 5	TH 5	TH 5
Depth	1-FT	2-FT	3-FT	4-FT	5-FT
Tare No.					
Wt Wet Sample + Tare	156	153.9	155.7	159.3	162.3
Wt Dry Sample + Tare	148.7	142.7	124.4	118.3	121.2
Wt Water	7.3	11.2	31.3	41.0	41.1
Wt Tare	4.6	4.8	4.5	4.7	4.8
Wt Dry Sample	144.1	137.9	119.9	113.6	116.4
Moisture Content (%)	5.1	8.1	26.1	36.1	35.3
Test Hole No.	TH 5	TH 5	TH 5		
Depth	7-FT	8-FT	10-FT		
Tare No.					
Wt Wet Sample + Tare	158.3	163.2	162		
Wt Dry Sample + Tare	125.3	120.3	112.9		
Wt Water	33.0	42.9	49.1		
Wt Tare	4.8	4.1	4.9		
Wt Dry Sample	120.5	116.2	108.0		
Moisture Content (%)	27.4	36.9	45.5		
Test Hole No.	TH 6	TH 6	TH 6	TH 6	
Depth	2-FT	4-FT	7-FT	10-FT	
Tare No.					
Wt Wet Sample + Tare	166.8	158.1	171	159.6	
Wt Dry Sample + Tare	156.3	147.6	122.6	108	
Wt Water	10.5	10.5	48.4	51.6	
Wt Tare	4.0	4.2	4.7	4.6	
Wt Dry Sample	152.3	143.4	117.9	103.4	
Moisture Content (%)	6.9	7.3	41.1	49.9	
Test Hole No.					
Depth					
Tare No.					
Wt Wet Sample + Tare					
Wt Dry Sample + Tare					
Wt Water					
Wt Tare					
Wt Dry Sample					
Moisture Content (%)					