APPENDIX ‘A’

GEOTECHNICAL REPORT

Quality Engineering | Valued Relationships

WSP Canada Group Ltd.

25-R-04 Local Street Renewal Program

Prepared for:
Kelly Groff, P.Eng.
WSP Canada Group Ltd.
1600 Buffalo Place
Winnipeg, MB
R3T 6B8

Project Number: 1000-043-29

Date: February 20, 2025

www.trekgeotechnical.ca
1712 St. James Street | Winnipeg, Manitoba R3H 0L3 | Tel 1.204.975.9433 | Fax 1.204.975.9435

TREK GEOTECHNICAL Quality Engineering | Valued Relationships

February 20, 2025 Our File No. 1000-043-29

Kelly Groff, P.Eng.
WSP Canada Group Ltd.
1600 Buffalo Place
Winnipeg, MB
R3T 6B8

RE: 25-R-04 Local Street Renewal Program

TREK Geotechnical Inc. is pleased to submit our Final Report for the geotechnical investigation for 25-R-04 Local Street Renewal Program.

Please contact the undersigned should you have any questions.

Sincerely,

TREK Geotechnical Inc.
Per:

Nelson John Ferreira, Ph.D., P.Eng.
Senior Geotechnical Engineer

Encl.

Revision History

Revision No.	Author	Issue Date	Description
0	KF	February 20, 2025	Final Report

Authorization Signatures

Prepared By: _____ for

Kate Franklin M.Sc. (Geotechnical Engineering)
Technical Support Specialist

PROVINCE OF MANITOBA
N.J. FERREIRA
Member
22892
REGISTERED PROFESSIONAL ENGINEER

Reviewed By: _____

Nelson John Ferreira, Ph.D., P.Eng.
Senior Geotechnical Engineer

ENGINEERS GEOSCIENTISTS MANITOBA
Certificate of Authorization
TREK GEOTECHNICAL INC.
No. 4877

Table of Contents

List of Tables

List of Figures

List of Appendices

1.0 Introduction

This report summarizes the results of the road investigation completed for the 25-R-04 Local Streets Renewal Program. The project included drilling test holes and collecting pavement cores along several streets. The test hole information collected describes the pavement structure of the existing road as well as the soil stratigraphy beneath the pavement structure. The investigation was carried out following the City of Winnipeg RFQ No. 331-2024 (Section E3 – Site Investigation Requirements).

2.0 Road Investigation

The investigation included coring of pavement at 25 locations on 12 different Local streets with drilling of test holes occurring at 17 of the cored locations along 6 streets/alleys. Drilling of test holes also occurred at 4 locations along 2 alleys where there was no pavement.. The investigation locations are shown on Figures 01 to 14 (attached) and the table below summarizes the investigation program per street.

Table 1: Road Investigation Program

25-R-04 Local Street Renewals	# of Locations	Investigation
Alumni Pl – Chancellor Dr to Chancellor Dr	2	2 Test Holes to 3.0m
Chancellor Dr – Markham Rd to 435m E of Markham Rd	4	4 Test holes to 3.0m
Marshall Cr – Clarence Ave to Waller Ave	5	5 Test holes to 3.0m
Clarence/Boston Alley – Hudson St. to Pembina Hwy	2	2 Test holes to 3.0m
Clarence/Howard Alley- Hudson St to Pembina Hwy	2	2 Test holes to 3.0m
Walker/Kylemore Alley – Nassau St to Osborne St	3	3 Test holes to 3.0m
Walker/Rathgar Alley – Nassau St to Osbourne St	2	2 Test holes to 3.0m
Killarney/Magdalene Alley – Baylor Ave to Greyfriars Rd	1	2 Test holes to 3.0m (one Test hole for bulk sample)
Dartmouth Dr – Pembina Hwy to Snow St	1	1 Core
Hector Ave – Wentworth St to Lilac St	1	1 Core
Hector Ave – Stafford St to Wentworth St	1	1 Core

Waller – Vincent St to Pembina Hwy	3	3 Cores
Morningside Dr – Rochester Ave to Valence Ave	1	1 Core
Snow St – Markham Rd to End	1	1 Core
Killarney/Magdalene Alley – Baylor Ave to Greyfriars Road	1	1 Core

The road investigation was conducted between January 15 through January 23, 2025. The pavement structure (asphalt/concrete) was cored by Tyler Green of TREK Geotechnical Inc. (TREK) using a portable coring press equipped with a hollow 150 mm diameter diamond core drill bits. The test holes were drilled by Maple Leaf Drilling Ltd to a depth of approximately 3.0 m below road surface using a truck mounted drill rig equipped with 125 mm diameter solid stem augers. The sub-surface conditions were observed during drilling and visually classified by Kate Franklin of TREK. Other pertinent information such as groundwater and drilling conditions were also recorded during the drilling investigation. Disturbed (auger cuttings) samples and bulk samples retrieved during the sub-surface investigation were transported to TREK's material testing laboratory for further testing. Pavement core samples were also retrieved and logged at TREK's material testing laboratory.

A test hole along Walker/Rathgar alley behind 669 Osborne (as listed in the proposal) was abandoned due to the proximity to underground utilities. In this regard, a test hole was added to the proposed drilling program in Killarney/Magdalene Alley (adjacent to TH25-21) to collect sufficient material for a bulk sample, only TH25-21 was logged.

Core and test hole logs noted on the summary tables and test hole location plans are based on UTM coordinates obtained using a hand-held GPS, and their location relative to the nearest address or intersection, measured distance from the edge of pavement, or other permanent features.

The laboratory testing program consisted of moisture content determination on all samples, as well as Atterberg Limits, and grain size analysis (mechanical sieve and hydrometer methods) on select samples between 0.6 and 0.9 m below pavement as well as Standard Proctor and CBR testing. Information gathered for each street package is included in separate appendices (Appendices A to O). The information provided in the Appendices includes test hole logs, summary tables, laboratory testing results, and photos of the concrete cores.

Seven CBR's were completed on bulk samples of the soil units present below the pavement. Tests were performed on clay layers encountered within the prescribed sample depth for CBR testing and the results are shown in the table below.

Table 2: CBR Testing Summary

Soil Unit	Street	Depth (m)	SPMDD (kg/m³)	Opt. Moisture (%)	Percent Proctor (%)	Moisture Content (%)	CBR Value at 2.54 mm	CBR Value at 5.08 mm
Clay	Alumni Pl: TH25-02 & TH25-03 Combined	0.6 – 2.1	1411	28.7	94.9	29.1	2.0%	1.4%
Clay	Chancellor Dr: TH25-01 & TH25-05 Combined	0.6 – 2.1	1449	28.2	94.9	28.5	2.0%	1.3%
Clay	Marshall Cres: TH25-08 & TH25-11 Combined	0.6 – 2.1	1395	31.2	95.3	31.3	2.2%	1.4%
Clay	Clarence/Boston Alley: TH25-12 & TH25-13 Combined	0.8 – 2.1	1422	28.6	95.0	28.8	2.6%	1.6%
Clay	Clarence/Howard Alley: TH25-14 & TH25-15 Combined	0.8 – 2.1	1436	28.8	94.8	29.3	2.4%	1.6%
Clay	Walker/Kylemore Alley: TH25-16, TH25-19 & TH25-20 Combined	1.2 – 2.1 1.4 - 2.1 0.9 – 2.1	1507	25.8	95.2	25.6	1.9%	1.3%
Clay	Walker/Rathgar Alley: TH25-17 & TH25-18 Combined	1.5 - 2.0 0.9 – 2.0	1458	28.4	94.9	28.4	2.8%	1.8%

The test hole logs include a description of the soil units encountered during drilling and other pertinent information such as groundwater conditions and a summary of the laboratory testing results. The soils were classified in general accordance with the Unified Soil Classification System (USCS) and the AASHTO soil classification system (American Association of state highway and transportation officials). The AASHTO system classifies soils based on laboratory testing results from Atterberg Limits and grain size testing methods (hydrometer and mechanical sieve method). Where laboratory testing was not conducted, the AASHTO classification of the soils were interpreted based on a visual assessment as indicated with a (I) on the test hole logs and attached tables. For cohesive soils, the AASHTO system uses a combination of testing results to determine the Group Index of the soils and thus, were only determined where sufficient laboratory test data was available.

3.0 Closure

The information provided in this report is in accordance with current engineering principles and practices (Standard of Practice). The findings of this report were based on information provided (field investigation, laboratory testing, geometries). Soil conditions are natural deposits that can be highly variable across a site. If sub-surface conditions are different than the conditions previously encountered on-site or those presented here, we should be notified to adjust our findings if necessary.

All information provided in this report is subject to our standard terms and conditions for engineering services, a copy of which is provided to each of our clients with the original scope of work, or a mutually executed standard engineering services agreement. If these conditions are not attached, and you are not already in possession of such terms and conditions, contact our office and you will be promptly provided with a copy.

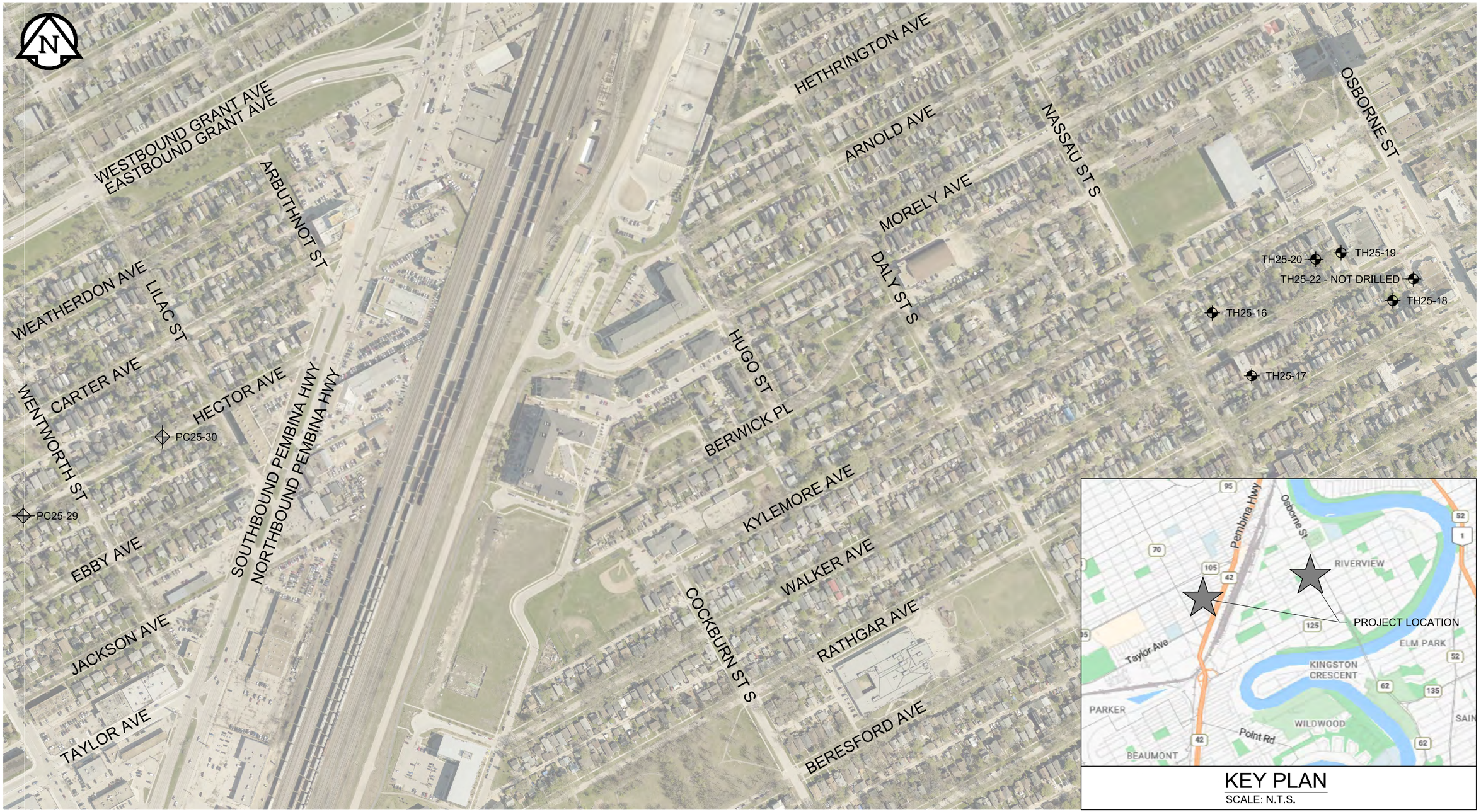
This report has been prepared by TREK Geotechnical Inc. (the Consultant) for the exclusive use of WSP Canada Group Ltd. (the Client) and their agents for the work product presented in the report. Any findings or recommendations provided in this report are not to be used or relied upon by any third parties, except as agreed to in writing by the Client and Consultant prior to use.

Figures

Appendix A

Test Hole Logs, Summary Table, Lab Testing Results and Pavement Core Photos

Alumni Pl – Chancellor Dr to Chancellor Dr



KEY PLAN
SCALE: N.T.S.

0 50 100 150 200 m
SCALE = 1 : 4 000 (279 mm x 432 mm)

LEGEND:
- TEST HOLE (TREK, 2025)
- PAVEMENT CORE (TREK, 2025)

NOTES:
1. AERIAL IMAGERY FROM CITY OF WINNIPEG (2024).

Figure 01
Test Hole and Pavement Core Location Plan

TREK GEOTECHNICAL

1000 043 29
WSP Canada Group Ltd.
Local Street Renewal Package 25-R-04

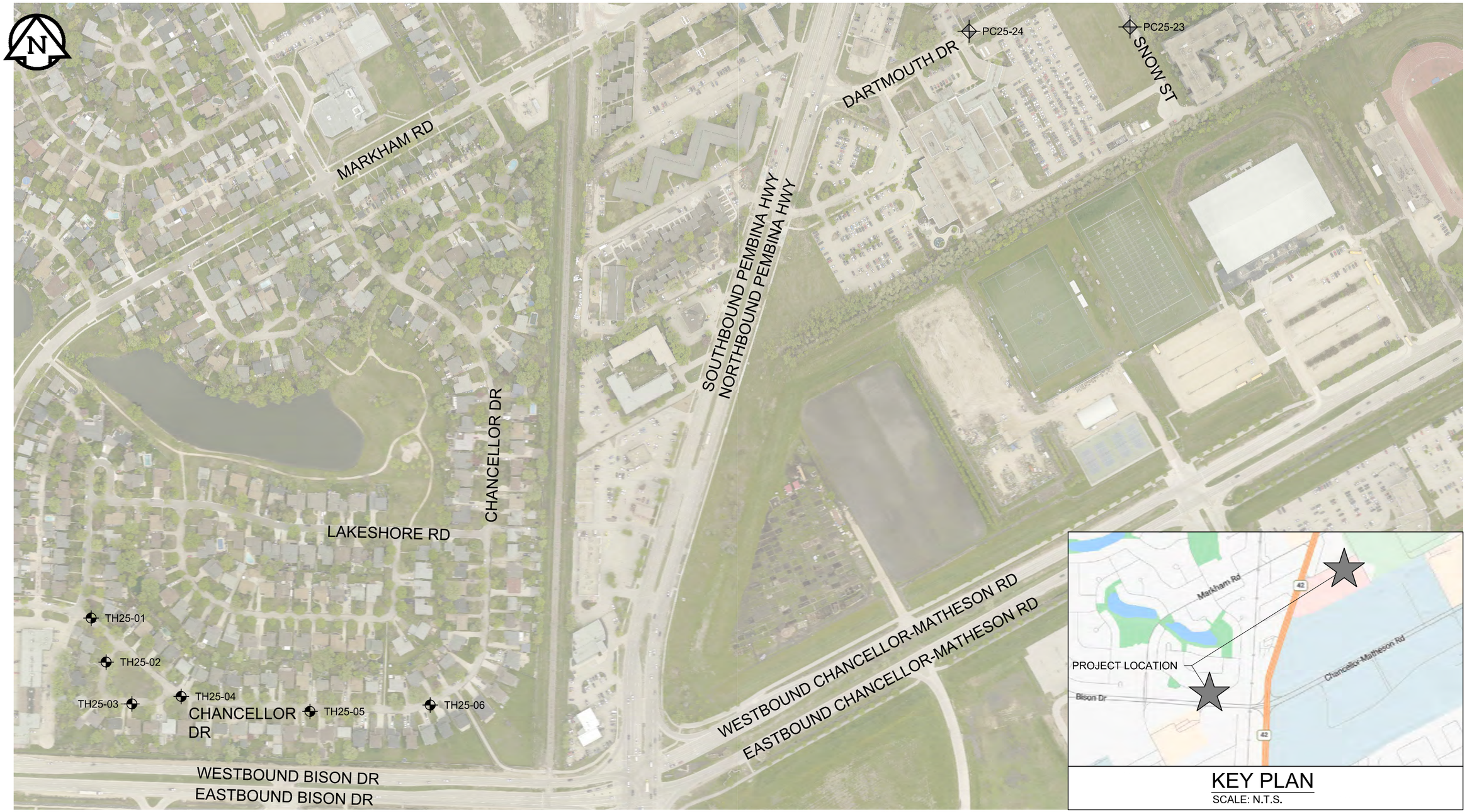
KEY PLAN
SCALE: N.T.S.

0 50 100 150 m
SCALE = 1 : 3 000 (279 mm x 432 mm)

LEGEND:
- TEST HOLE (TREK, 2025)
- PAVEMENT CORE (TREK, 2025)

NOTES:
1. AERIAL IMAGERY FROM CITY OF WINNIPEG (2024).

Figure 02
Test Hole and Pavement Core Location Plan



KEY PLAN
SCALE: N.T.S.

0 50 100 150 m
SCALE = 1 : 3 500 (279 mm x 432 mm)

LEGEND:
- TEST HOLE (TREK, 2025)
- PAVEMENT CORE (TREK, 2025)

NOTES:
1. AERIAL IMAGERY FROM CITY OF WINNIPEG (2024).

Figure 03
Test Hole and Pavement Core Location Plan

KEY PLAN
SCALE: N.T.S.

0 50 100 150 200 250 m
SCALE = 1 : 5 000 (279 mm x 432 mm)

LEGEND:
- TEST HOLE (TREK, 2025)
- PAVEMENT CORE (TREK, 2025)

NOTES:
1. AERIAL IMAGERY FROM CITY OF WINNIPEG (2024).

Figure 04
Test Hole and Pavement Core Location Plan

Sub-Surface Log

Test Hole TH25-02
1 of 1

Client:	WSP	**Project Number:**	1000-043-29
Project Name:	25-R-04 Local Street Renewal (Alumni Place)	**Location:**	UTM N-5518306, E-632120
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement m (local datum)
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	January 15, 2025

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

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL 0 20 40 60 80 100	Undrained Shear Strength (kPa) Test Type: Torvane, Pocket Pen., Qu, Field Vane 0 50 100 150 200 250
		ASPHALT				
		SAND and GRAVEL (FILL) - trace silt, light brown, frozen, moist and compact when thawed, poorly graded fine grained sand to gravel (<25 mm diam.), angular crushed limestone. AASHTO: A-1(I)		G08		
0.5		CLAY (FILL) - silty, trace sand - dark grey brown - frozen, moist and firm to stiff when thawed - high plasticity - AASHTO: A-7-6(I)		G09		
1.0		CLAY - silty - brown - frozen to 1.0 m, moist and stiff to very stiff when thawed - high plasticity - AASHTO: A-7-6(49) - trace silt pockets <50 mm diam. between 0.9 and 1.5 m		G10		
				G11		
1.5				G12		
2.0		- mottled brown and grey, stiff below 1.8 m		G13		
2.5				G14		
3.0						

END TEST HOLE AT 3.0 m IN CLAY.
Notes:
1. Seepage or sloughing not observed.
2. Test hole open to 3.0 m depth immediately after drilling.
3. Test hole backfilled with cuttings, granular fill and cold patch asphalt.
4. Bulk samples were collected between 0.6 m and 2.1 m depth (B145).
5. Test hole located in front of #3 Alumni Place, Southbound lane, 2.0 m East of West curb.

Logged By: Kate Franklin **Reviewed By:** Angela Fidler-Kliewer **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2025-01-23 25-R-04 LOCAL STREETS - ALUMNI 0_A_KF 1000-043-29.GPJ TREK.GDT 2/18/25

Sub-Surface Log

Test Hole TH25-03
1 of 1

Client:	WSP	**Project Number:**	1000-043-29
Project Name:	25-R-04 Local Street Renewal (Alumni Place)	**Location:**	UTM N-5518267, E-632144
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement m (local datum)
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	January 15, 2025

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

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number
0		ASPHALT		
		SAND and GRAVEL (FILL) - trace silt, light brown, frozen, moist and compact when thawed, poorly graded fine grained sand to gravel (<25 mm diam.), angular crushed limestone. AASHTO: A-1(I)	G	G15
		CLAY (FILL) - silty, trace sand - dark grey brown - frozen, moist and firm when thawed - high plasticity - AASHTO: A-7-6(I)	G	G16
0.5				
		CLAY - silty - brown - frozen to 1.2 m, moist and stiff to very stiff when thawed - high plasticity - AASHTO: A-7-6(I)	G	G17
1.0			G	G18
1.5		- stiff below 1.5 m	G	G19
2.0			G	G20
2.5			G	G21
3.0		END TEST HOLE AT 3.0 m IN CLAY.		

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21

Particle Size (%): 0 20 40 60 80 100

PL MC LL: 0 20 40 60 80 100

Undrained Shear Strength (kPa): 0 50 100 150 200 250

Test Type: △ Torvane △ | ✤ Pocket Pen. ✤ | ☒ Qu ☒ | ○ Field Vane ○

Notes:
1. Seepage or sloughing not observed.
2. Test hole open to 3.0 m depth immediately after drilling.
3. Test hole backfilled with cuttings, granular fill and cold patch asphalt.
4. Bulk samples were collected between 0.6 m and 2.1 m depth (B145).
5. Test hole located in front of #17 Alumni Place, Eastbound lane, 2.0 m North of South curb.

Logged By: Kate Franklin **Reviewed By:** Angela Fidler-Kliewer **Project Engineer:** Nelson Ferreira

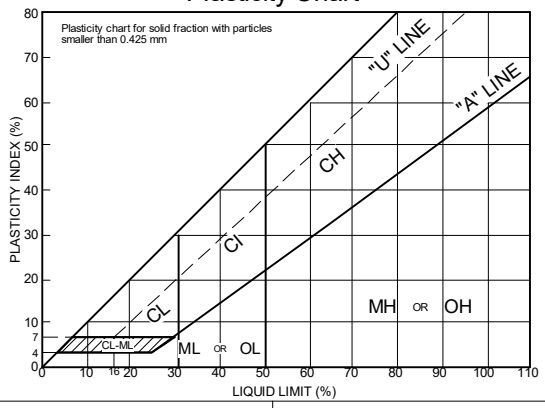
SUB-SURFACE LOG LOGS 2025-01-23 25-R-04 LOCAL STREETS - ALUMNI 0_A_KF 1000-043-29.GPJ TREK.GDT 2/18/25

EXPLANATION OF FIELD AND LABORATORY TESTING

GENERAL NOTES

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

Major Divisions			USCS Classification	Symbols	Typical Names	Laboratory Classification Criteria
Coarse-Grained soils (More than half the material is larger than No. 200 sieve size)	Gravels (More than half of coarse fraction is larger than 4.75 mm)	Clean gravel (Little or no fines)	GW		Well-graded gravels, gravel-sand mixtures, little or no fines	Determine percentages of sand and gravel from grain size curve, depending on percentage of fines (fraction smaller than No. 200 sieve) coarse-grained soils are classified as follows: Less than 5 percent..... GW, GP, SW, SP; More than 12 percent..... GM, GC, SM, SC; 6 to 12 percent..... Borderline case4s requiring dual symbols*
			GP		Poorly-graded gravels, gravel-sand mixtures, little or no fines	$C_U = \frac{D_{60}}{D_{10}}$ greater than 4; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
		Gravel with fines (Appreciable amount of fines)	GM		Silty gravels, gravel-sand-silt mixtures	Not meeting all gradation requirements for GW
			GC		Clayey gravels, gravel-sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4; Atterberg limits above "A" line or P.I. greater than 7; Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
	Sands (More than half of coarse fraction is smaller than 4.75 mm)	Clean sands (Little or no fines)	SW		Well-graded sands, gravelly sands, little or no fines	$C_U = \frac{D_{60}}{D_{10}}$ greater than 6; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
			SP		Poorly-graded sands, gravelly sands, little or no fines	Not meeting all gradation requirements for SW
		Sands with fines (Appreciable amount of fines)	SM		Silty sands, sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4; Atterberg limits above "A" line or P.I. greater than 7; Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
			SC		Clayey sands, sand-clay mixtures	
Fine-Grained soils (More than half the material is smaller than No. 200 sieve size)	Silts and Clays (Liquid limit less than 50)		ML		Inorganic silts and very fine sands, rock floor, silty or clayey fine sands or clayey silts with slight plasticity	Plasticity Chart
			CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	
			OL		Organic silts and organic silty clays of low plasticity	
	Silts and Clays (Liquid limit greater than 50)		MH		Inorganic silts, micaceous or distomaceous fine sandy or silty soils, organic silts	
			CH		Inorganic clays of high plasticity, fat clays	
			OH		Organic clays of medium to high plasticity, organic silts	
	Highly Organic Soils		Pt		Peat and other highly organic soils	Von Post Classification Limit: Strong colour or odour, and often fibrous texture



Particle Size		Material
ASTM Sieve sizes	mm	
#10 to #4	2.00 to 4.75	Sand: Coarse
#40 to #10	0.425 to 2.00	Medium
#200 to #40	0.075 to 0.425	Fine
< #200	< 0.075	Silt or Clay

Particle Size		Material
ASTM Sieve Sizes	mm	
> 12 in.	> 300	Boulders
3 in. to 12 in.	75 to 300	Cobbles
3/4 in. to 3 in.	19 to 75	Gravel: Coarse
#4 to 3/4 in.	4.75 to 19	Fine

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

Other Symbol Types

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

EXPLANATION OF FIELD AND LABORATORY TESTING

LEGEND OF ABBREVIATIONS AND SYMBOLS

LL - Liquid Limit (%)
PL - Plastic Limit (%)
PI - Plasticity Index (%)
MC - Moisture Content (%)
SPT - Standard Penetration Test
RQD - Rock Quality Designation
Qu - Unconfined Compression
Su - Undrained Shear Strength
VW - Vibrating Wire Piezometer
SI - Slope Inclinometer

▽ Water Level at Time of Drilling

▼ Water Level at End of Drilling

▼ Water Level After Drilling as Indicated on Test Hole Logs

FRACTION OF SECONDARY SOIL CONSTITUENTS ARE BASED ON THE FOLLOWING TERMINOLOGY

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

TERMS DESCRIBING CONSISTENCY OR COMPACTION CONDITION

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

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

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

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

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

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

25-R-04 Local Street Renewal
Alumni Place - Chancellor Dr to Chancellor Dr
Summary Table - Sub-Surface Investigation

Test Hole No.	Test Hole Location	Pavement Surface		Pavement Structure Material		Subgrade Description	Sample Depth (m)		Moisture Content (%)	Grain Size Analysis				Atterberg Limits		
		Type	Thickness (mm)	Type	Thickness (mm)		Top (m)	Bottom (m)		Clay (%)	Silt (%)	Sand (%)	Gravel (%)	Plastic	Liquid	Plasticity Index
TH25-02	UTM : 5518306 N, 632120 E Located in front of #3 Alumni Place, Southbound lane, 2.0 m East of West curb	Asphalt	60	Concrete	-	Sand and Gravel (Fill), AASHTO: A-1 (I)	0.2	0.3	7							
						Clay (Fill), AASHTO: A-7-6 (I)	0.6	0.8	37							
						Clay, AASHTO: A-7-6 (49)	0.9	1.1	28	60	36	4	0	17	64	47
						Clay, AASHTO: A-7-6 (49)	1.2	1.4	33							
						Clay, AASHTO: A-7-6 (49)	1.6	1.8	43							
						Clay, AASHTO: A-7-6 (49)	2.0	2.1	47							
						Clay, AASHTO: A-7-6 (49)	2.5	2.7	49							
TH25-03	UTM : 5518267 N, 632144 E Located in front of #17 Alumni Place, Eastbound lane, 2.0 m North of South curb	Asphalt	70	Concrete	-	Sand and Gravel (Fill), AASHTO: A-1 (I)	0.2	0.3	28							
						Clay (Fill), AASHTO: A-7-6 (I)	0.6	0.8	24							
						Clay, AASHTO: A-7-6 (I)	0.9	1.1	23							
						Clay, AASHTO: A-7-6 (I)	1.2	1.4	22							
						Clay, AASHTO: A-7-6 (I)	1.6	1.8	44							
						Clay, AASHTO: A-7-6 (I)	2.0	2.1	51							
						Clay, AASHTO: A-7-6 (I)	2.5	2.7	53							

www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

Moisture Content Report
ASTM D2216-98

Project No. 1000-043-29
Client WSP
Project 25-R-04 Local Street Renewal (Alumni Place)

Sample Date 15-Jan-25
Test Date 29-Jan-25
Technician K Franklin

Test Hole	TH25-02	TH25-02	TH25-02	TH25-02	TH25-02	TH25-02
Depth (m)	0.2 - 0.3	0.6 - 0.8	0.9 - 1.1	1.2 - 1.4	1.6 - 1.8	2.0 - 2.1
Sample #	G08	G09	G10	G11	G12	G13
Tare ID	QT49	QT50	QT51	QT52	QT53	QT54
Mass of tare	8.2	8.2	8.3	8.3	8.3	8.3
Mass wet + tare	224.7	252.1	460.1	222.1	256.5	225.9
Mass dry + tare	210.3	185.6	361.8	168.8	181.9	156.0
Mass water	14.4	66.5	98.3	53.3	74.6	69.9
Mass dry soil	202.1	177.4	353.5	160.5	173.6	147.7
Moisture %	7.1%	37.5%	27.8%	33.2%	43.0%	47.3%

Test Hole	TH25-02	TH25-03	TH25-03	TH25-03	TH25-03	TH25-03
Depth (m)	2.5 - 2.7	0.1 - 0.2	0.6 - 0.8	0.9 - 1.1	1.2 - 1.4	1.6 - 1.8
Sample #	G14	G15	G16	G17	G18	G19
Tare ID	QT55	QT56	QT57	QT58	QT59	QT60
Mass of tare	8.0	8.0	8.0	8.0	8.1	8.3
Mass wet + tare	236.5	217.3	219.1	235.1	241.2	231.3
Mass dry + tare	161.8	186.4	156.6	171.2	172.2	159.3
Mass water	74.7	30.9	62.5	63.9	69.0	72.0
Mass dry soil	153.8	178.4	148.6	163.2	164.1	151.0
Moisture %	48.6%	17.3%	42.1%	39.2%	42.0%	47.7%

Test Hole	TH25-03	TH25-03				
Depth (m)	2.0 - 2.1	2.5 - 2.7				
Sample #	G20	G21				
Tare ID	QT61	QT62				
Mass of tare	8.2	8.2				
Mass wet + tare	222.8	233.9				
Mass dry + tare	150.4	155.8				
Mass water	72.4	78.1				
Mass dry soil	142.2	147.6				
Moisture %	50.9%	52.9%				

www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

Atterberg Limits
ASTM D4318-10e1

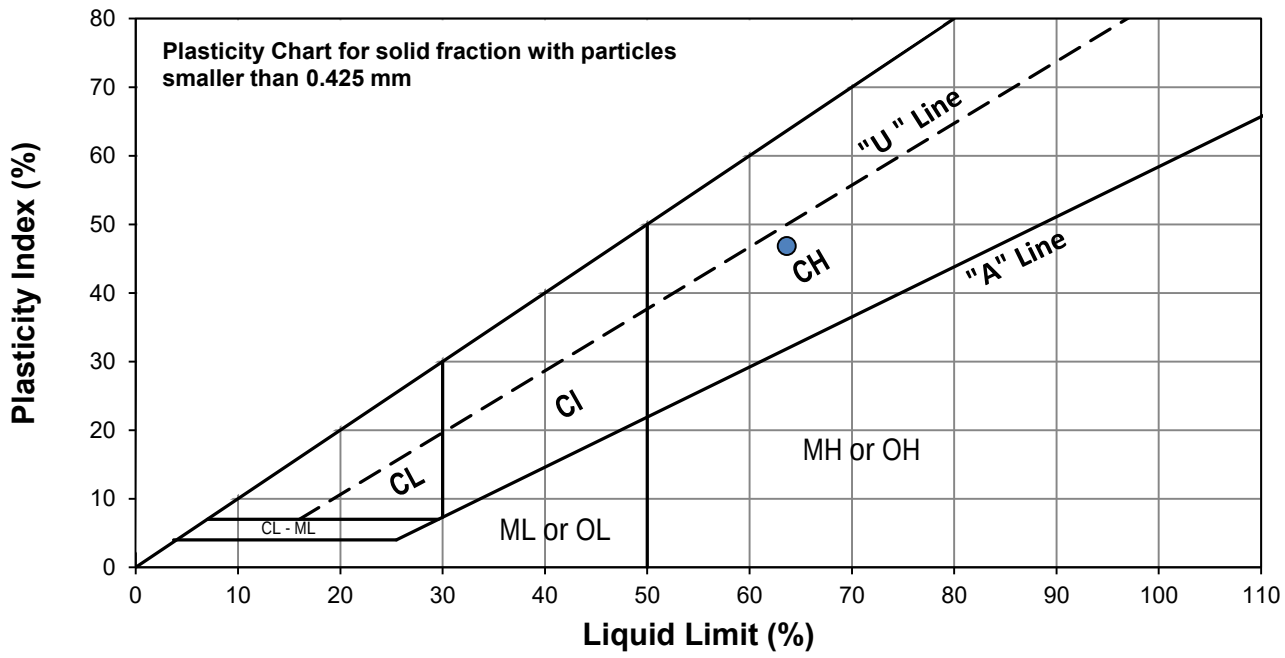
CERTIFIED BY CCIL Canadian Council of Independent Laboratories For specific tests as listed on www.ccil.com

Project No.	1000-043-29
Client	WSP
Project	25-R-04 Local Street Renewal (Alumni Place)
Test Hole	TH25-02
Sample #	G10
Depth (m)	0.9 - 1.1
Sample Date	15-Jan-25
Test Date	04-Feb-25
Technician	A. Dustmamatov

Liquid Limit	64
Plastic Limit	17
Plasticity Index	47

Liquid Limit

Trial #	1	2	3		
Number of Blows (N)	15	21	29		
Mass Tare (g)	14.023	13.934	14.069		
Mass Wet Soil + Tare (g)	25.450	25.433	25.410		
Mass Dry Soil + Tare (g)	20.827	20.922	21.040		
Mass Water (g)	4.623	4.511	4.370		
Mass Dry Soil (g)	6.804	6.988	6.971		
Moisture Content (%)	67.945	64.554	62.688		



Plastic Limit

Trial #	1	2	3	4	5
Mass Tare (g)	13.952	14.067			
Mass Wet Soil + Tare (g)	21.214	22.103			
Mass Dry Soil + Tare (g)	20.169	20.947			
Mass Water (g)	1.045	1.156			
Mass Dry Soil (g)	6.217	6.880			
Moisture Content (%)	16.809	16.802			

Note: Additional information recorded/measured for this test is available upon request.

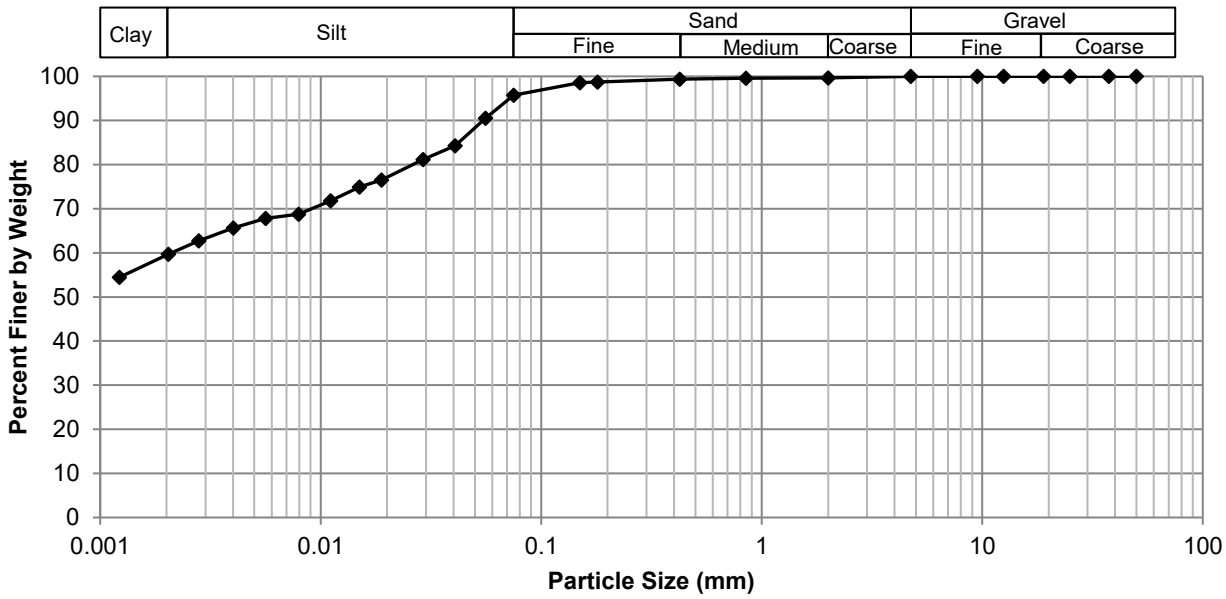
www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

Grain Size Analysis (Hydrometer Method)
AASHTO T 88

Project No.	1000-043-29
Client	WSP
Project	25-R-04 Local Street Renewal (Alumni Place)
Test Hole	TH25-02
Sample #	G10
Depth (m)	0.9 - 1.1
Sample Date	15-Jan-25
Test Date	03-Feb-25
Technician	A. Fidler-Kliewer

Gravel	0.0%
Sand	4.2%
Silt	36.3%
Clay	59.5%

Particle Size Distribution Curve



Gravel		Sand		Silt and Clay	
Particle Size (mm)	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**
50.0	100.00	4.75	100.00	0.0750	95.76
37.5	100.00	2.00	99.69	0.0559	90.53
25.0	100.00	0.850	99.59	0.0407	84.30
19.0	100.00	0.425	99.40	0.0292	81.18
12.5	100.00	0.180	98.75	0.0188	76.51
9.50	100.00	0.150	98.59	0.0150	74.95
4.75	100.00	0.075	95.76	0.0111	71.84
				0.0079	68.72
				0.0056	67.83
				0.0040	65.65
				0.0028	62.70
				0.0020	59.71
				0.0012	54.44

www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

Standard Proctor Compaction Test

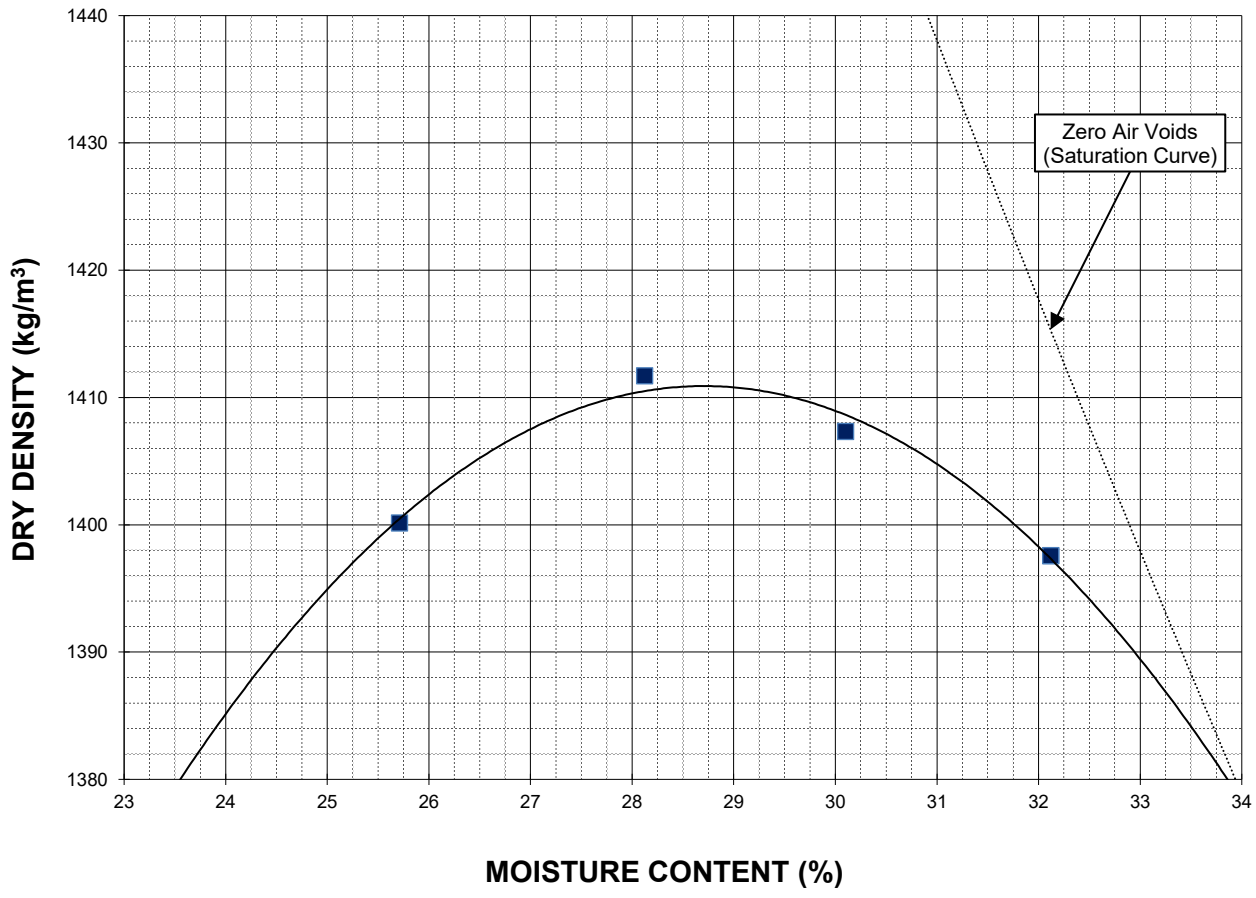
ASTM D698-12e2

CERTIFIED BY CCIL Canadian Council of Independent Laboratories For specific tests as listed on www.ccil.com

Project No.	1000-043-29
Client	WSP
Project	25-R-04 Local Street Renewal (Alumni Place)
Sample #	B145
Source	TH25-03 & TH25-02 (0.6m to 2.1m)
Material	Clay
Sample Date	16-Jan-25
Test Date	21-Jan-25
Technician	A. Dustmamatov

Maximum Dry Density (kg/m3)	1411
Optimum Moisture (%)	28.7

Trial Number	1	2	3	4	
Wet Density (kg/m^3)	1760	1809	1831	1846	
Dry Density (kg/m^3)	1400	1412	1407	1398	
Moisture Content (%)	25.7	28.1	30.1	32.1	



Note: Additional information recorded/measured for this test is available upon request.

www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

California Bearing Ratio Test Data Sheet

ASTM D1883-16

Project No.	1000-043-29	**Source**	TH25-03 & TH25-02 (0.6m to 2.1m)
Client	WSP	**Material**	Clay
Project	25-R-04 Local Street Renewal (Alumni Place)	**Sample Date**	15-Jan-25
		Test Date	23-Jan-25
Sample #	B145	**Technician**	A. Dustmamatov

Proctor Results (ASTM D698)

Maximum Dry Density	1411	kg/m3
Optimum Moisture Content	28.7	%
Material Retained on 19 mm Sieve	0.0	%

CBR Sample Compaction

Dry Density	1340	kg/m3
Initial Moisture Content	29.1	%
Relative Density	94.9	% SPMDD

Soaking Results

Surcharge	4.54	kg
Swell	2.6	%
Moisture Content in top 25 mm	47.1	%
Immersion Period	96	h

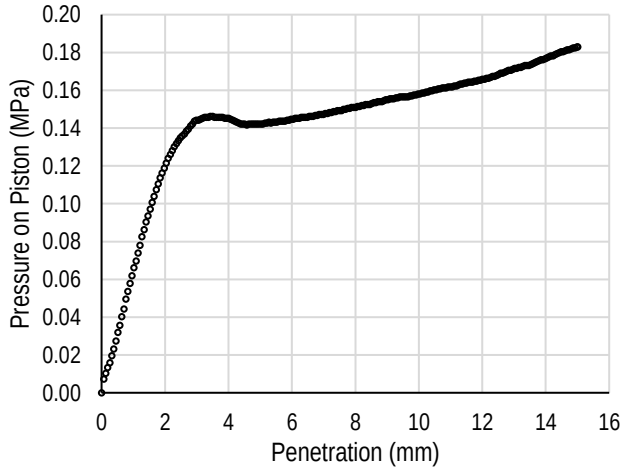
CBR Results

CBR at 2.54 mm	2.0	%
CBR at 5.08 mm	1.4	%
Zero Correction	0	mm

Test Data

Penetration (mm)	Measured Pressure (MPa)	Corrected Pressure (MPa)
0.64	0.04	0.04
1.27	0.08	0.08
1.91	0.12	0.12
2.54	0.14	0.14
3.18	0.15	0.15
3.81	0.15	0.15
4.45	0.14	0.14
5.08	0.14	0.14
7.62	0.15	0.15
10.16	0.16	0.16
12.70	0.17	0.17

Load/Penetration Curve



Comments:

Photo 1: Pavement Core Sample at TH25-02

Photo 2: Pavement Core Sample at TH25-03

Appendix B

Test Hole Logs, Summary Table, Lab Testing Results and Pavement Core Photos

Chancellor Dr – Markham Rd to 435m E of Markham Rd Ave

Sub-Surface Log

Test Hole TH25-01
1 of 1

Client:	WSP	**Project Number:**	1000-043-29
Project Name:	25-R-04 Local Street Renewal (Chancellor Drive)	**Location:**	UTM N-5518347, E-632106
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement m (local datum)
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	January 15, 2025

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

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number
0.0		ASPHALT		
		SAND and GRAVEL (FILL) - trace silt, light brown, frozen, moist and compact when thawed, poorly graded fine grained sand to gravel (<25 mm diam.), angular crushed limestone. AASHTO: A-1(I)		G01
		CLAY (FILL) - silty, trace sand - dark grey brown - frozen to 0.9 m, moist and firm when thawed - high plasticity - AASHTO: A-7-6(I)		G02
1.0		CLAY - trace silt - brown - moist, stiff - high plasticity - AASHTO: A-7-6(87)		G03
				G04
1.5		- silt pocket 50 mm diam. at 1.5 m - silty, firm to stiff below 1.5 m		G05
		- mottled grey and brown below 1.8 m		
2.0				G06
2.5				G07
3.0		END TEST HOLE AT 3.0 m IN CLAY.		

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21

Particle Size (%): 0 20 40 60 80 100

PL MC LL: 0 20 40 60 80 100

Undrained Shear Strength (kPa): 0 50 100 150 200 250

Test Type: △ Torvane △ | ✤ Pocket Pen. ✤ | ☒ Qu ☒ | ○ Field Vane ○

Notes:
1. Seepage or sloughing not observed.
2. Test hole open to 3.0 m depth immediately after drilling.
3. Test hole backfilled with cuttings, granular fill and cold patch asphalt.
4. Bulk samples were collected between 0.6 m and 2.1 m depth (B146).
5. Test hole located on Chancellor Drive, North of #3 Alumni Place, Westbound lane, 2.0 m South of North curb.

Logged By: Kate Franklin **Reviewed By:** Angela Fidler-Kliewer **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2025-01-23 25-R-04 LOCAL STREETS - CHANCELLOR 0_A_KF 1000-043-29.GPJ TREK.GDT 2/18/25

Sub-Surface Log

Test Hole TH25-04
1 of 1

Client:	WSP	**Project Number:**	1000-043-29
Project Name:	25-R-04 Local Street Renewal (Chancellor Drive)	**Location:**	UTM N-5518274, E-632190
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement m (local datum)
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	January 15, 2025

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

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number
0		ASPHALT		
		SAND and GRAVEL (FILL) - trace silt, light brown, frozen, moist and compact when thawed, poorly graded fine grained sand to gravel (<25 mm diam.), angular crushed limestone. AASHTO: A-1(I)	G	G22
0.5		CLAY (FILL) - silty, trace sand - dark grey brown - frozen to 1.2 m, moist and stiff when thawed - high plasticity - AASHTO: A-7-6(I)	G	G23
1.0			G	G24
1.5		CLAY - silty - brown - moist, stiff to very stiff - high plasticity - AASHTO: A-7-6(I) - silt pockets <50 mm diam. between 1.2 and 1.8 m	G	G25
			G	G26
2.0		-grey, stiff below 2.0 m	G	G27
2.5			G	G28
3.0		END TEST HOLE AT 3.0 m IN CLAY.		

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21

Particle Size (%): 0 20 40 60 80 100

PL MC LL: 0 20 40 60 80 100

Undrained Shear Strength (kPa): 0 50 100 150 200 250

Test Type: △ Torvane △ | ✤ Pocket Pen. ✤ | ☒ Qu ☒ | ○ Field Vane ○

Notes:
1. Seepage or sloughing not observed.
2. Test hole open to 3.0 m depth immediately after drilling.
3. Test hole backfilled with cuttings, granular fill and cold patch asphalt.
4. Test hole located in front of #1595 Chancellor Drive, Eastbound lane, 2.0 m North of South curb.

Logged By: Kate Franklin **Reviewed By:** Angela Fidler-Kliewer **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2025-01-23 25-R-04 LOCAL STREETS - CHANCELLOR 0_A_KF 1000-043-29.GPJ TREK.GDT 2/18/25

Sub-Surface Log

Test Hole TH25-05
1 of 1

Client:	WSP	**Project Number:**	1000-043-29
Project Name:	25-R-04 Local Street Renewal (Chancellor Drive)	**Location:**	UTM N-5518260, E-632310
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement m (local datum)
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	January 15, 2025

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

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL 0 20 40 60 80 100	Undrained Shear Strength (kPa) Test Type: △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○ 0 50 100 150 200 250
		ASPHALT				
		SAND and GRAVEL (FILL) - trace silt, light brown, frozen, moist and compact when thawed, poorly graded fine grained sand to gravel (<25 mm diam.), angular crushed limestone. AASHTO: A-1(I)		G29	●	
0.5		CLAY (FILL) - silty, trace sand - dark grey - frozen to 1.5 m, moist and firm when thawed - high plasticity - AASHTO: A-7-6(55)		G30	●	△ ✤
1.0		- very stiff below 0.9 m		G31	●	✤ △
				G32	●	△ ✤
1.5		CLAY - silty - brown grey - moist, stiff to very stiff - high plasticity - AASHTO: A-7-6(I)		G33	●	△ ✤
2.0				G34	●	△ ✤
2.5		- silt pocket <40 mm diam. at 2.4 m - brown below 2.4 m		G35	●	△ ✤
3.0						

END TEST HOLE AT 3.0 m IN CLAY.

Notes:
1. Seepage or sloughing not observed.
2. Test hole open to 3.0 m depth immediately after drilling.
3. Test hole backfilled with cuttings, granular fill and cold patch asphalt.
4. Bulk samples were collected between 0.6 m and 2.1 m depth (B146).
5. Test hole located in front of #1623 Chancellor Drive, Eastbound lane, 2.0 m North of South curb.

Logged By: Kate Franklin **Reviewed By:** Angela Fidler-Kliewer **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2025-01-23 25-R-04 LOCAL STREETS - CHANCELLOR 0_A_KF 1000-043-29.GPJ TREK.GDT 2/18/25

Sub-Surface Log

Test Hole TH25-06
1 of 1

Client:	WSP	**Project Number:**	1000-043-29
Project Name:	25-R-04 Local Street Renewal (Chancellor Drive)	**Location:**	UTM N-5518266, E-632422
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement m (local datum)
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	January 15, 2025

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

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL 0 20 40 60 80 100	Undrained Shear Strength (kPa) Test Type: Torvane, Pocket Pen., Qu, Field Vane 0 50 100 150 200 250
		ASPHALT				
		SAND and GRAVEL (FILL) - trace silt, light brown, frozen, moist and compact when thawed, poorly graded fine grained sand to gravel (<25 mm diam.), angular crushed limestone. AASHTO: A-1(I)		G36		
0.5		CLAY (FILL) - silty, trace sand - dark grey brown - frozen, moist and stiff to very stiff with depth when thawed - high plasticity - AASHTO: A-7-6(I)		G37		
1.0				G38		
		CLAY - silty - brown - moist, very stiff - high plasticity - AASHTO: A-7-6(I) - silt seam, light grey <100 mm thick at 1.1 m		G39		
1.5				G40		
2.0		- stiff to very stiff below 2.0 m		G41		
2.5				G42		
3.0		END TEST HOLE AT 3.0 m IN CLAY.				

Notes:
1. Seepage or sloughing not observed.
2. Test hole open to 3.0 m depth immediately after drilling.
3. Test hole backfilled with cuttings, granular fill and cold patch asphalt.
4. Test hole located in front of #1655 Chancellor Drive, Eastbound lane, 2.0 m North of South curb.

Logged By: Kate Franklin **Reviewed By:** Angela Fidler-Kliewer **Project Engineer:** Nelson Ferreira

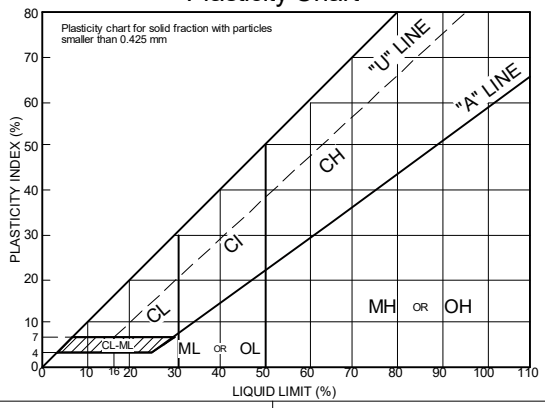
SUB-SURFACE LOG LOGS 2025-01-23 25-R-04 LOCAL STREETS - CHANCELLOR 0_A_KF 1000-043-29.GPJ TREK.GDT 2/18/25

EXPLANATION OF FIELD AND LABORATORY TESTING

GENERAL NOTES

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

Major Divisions			USCS Classification	Symbols	Typical Names	Laboratory Classification Criteria
Coarse-Grained soils (More than half the material is larger than No. 200 sieve size)	Gravels (More than half of coarse fraction is larger than 4.75 mm)	Clean gravel (Little or no fines)	GW		Well-graded gravels, gravel-sand mixtures, little or no fines	Determine percentages of sand and gravel from grain size curve, depending on percentage of fines (fraction smaller than No. 200 sieve) coarse-grained soils are classified as follows: Less than 5 percent..... GW, GP, SW, SP; More than 12 percent..... GM, GC, SM, SC; 6 to 12 percent..... Borderline case4s requiring dual symbols*
			GP		Poorly-graded gravels, gravel-sand mixtures, little or no fines	$C_U = \frac{D_{60}}{D_{10}}$ greater than 4; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
		Gravel with fines (Appreciable amount of fines)	GM		Silty gravels, gravel-sand-silt mixtures	Not meeting all gradation requirements for GW
			GC		Clayey gravels, gravel-sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4; Atterberg limits above "A" line or P.I. greater than 7; Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
	Sands (More than half of coarse fraction is smaller than 4.75 mm)	Clean sands (Little or no fines)	SW		Well-graded sands, gravelly sands, little or no fines	$C_U = \frac{D_{60}}{D_{10}}$ greater than 6; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
			SP		Poorly-graded sands, gravelly sands, little or no fines	Not meeting all gradation requirements for SW
		Sands with fines (Appreciable amount of fines)	SM		Silty sands, sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4; Atterberg limits above "A" line or P.I. greater than 7; Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
			SC		Clayey sands, sand-clay mixtures	
Fine-Grained soils (More than half the material is smaller than No. 200 sieve size)	Silts and Clays (Liquid limit less than 50)		ML		Inorganic silts and very fine sands, rock floor, silty or clayey fine sands or clayey silts with slight plasticity	Plasticity Chart
			CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	
			OL		Organic silts and organic silty clays of low plasticity	
	Silts and Clays (Liquid limit greater than 50)		MH		Inorganic silts, micaceous or distomaceous fine sandy or silty soils, organic silts	
			CH		Inorganic clays of high plasticity, fat clays	
			OH		Organic clays of medium to high plasticity, organic silts	
	Highly Organic Soils		Pt		Peat and other highly organic soils	Von Post Classification Limit: Strong colour or odour, and often fibrous texture



Particle Size		Material
ASTM Sieve sizes	mm	
#10 to #4	2.00 to 4.75	Sand: Coarse
#40 to #10	0.425 to 2.00	Medium
#200 to #40	0.075 to 0.425	Fine
< #200	< 0.075	Silt or Clay

Particle Size		Material
ASTM Sieve Sizes	mm	
> 12 in.	> 300	Boulders
3 in. to 12 in.	75 to 300	Cobbles
3/4 in. to 3 in.	19 to 75	Gravel: Coarse
#4 to 3/4 in.	4.75 to 19	Fine

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

Other Symbol Types

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

EXPLANATION OF FIELD AND LABORATORY TESTING

LEGEND OF ABBREVIATIONS AND SYMBOLS

LL - Liquid Limit (%)
PL - Plastic Limit (%)
PI - Plasticity Index (%)
MC - Moisture Content (%)
SPT - Standard Penetration Test
RQD - Rock Quality Designation
Qu - Unconfined Compression
Su - Undrained Shear Strength
VW - Vibrating Wire Piezometer
SI - Slope Inclinometer

▽ Water Level at Time of Drilling

▼ Water Level at End of Drilling

▼ Water Level After Drilling as Indicated on Test Hole Logs

FRACTION OF SECONDARY SOIL CONSTITUENTS ARE BASED ON THE FOLLOWING TERMINOLOGY

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

TERMS DESCRIBING CONSISTENCY OR COMPACTION CONDITION

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

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

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

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

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

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

25-R-04 Local Street Renewal
Chancellor Drive - Markham Rd to 435 m East of Markham Rd
Summary Table - Sub-Surface Investigation

Test Hole No.	Test Hole Location	Pavement Surface		Pavement Structure Material		Subgrade Description	Sample Depth (m)		Moisture Content (%)	Grain Size Analysis				Atterberg Limits		
		Type	Thickness (mm)	Type	Thickness (mm)		Top (m)	Bottom (m)		Clay (%)	Silt (%)	Sand (%)	Gravel (%)	Plastic	Liquid	Plasticity Index
TH25-01	UTM : 5518347 N, 632106 E Located on Chancellor Drive, North of #3 Alumni Place, Westbound lane, 2.0 m South of North curb	Asphalt	65	Concrete	-	Sand and Gravel (Fill), AASHTO: A-1 (I)	0.2	0.3	14							
						Clay (Fill), AASHTO: A-7-6 (I)	0.6	0.8	42							
						Clay, AASHTO: A-7-6 (87)	0.9	1.1	40	90	9	1	0	26	100	75
						Clay, AASHTO: A-7-6 (87)	1.2	1.4	43							
						Clay, AASHTO: A-7-6 (87)	1.6	1.8	50							
						Clay, AASHTO: A-7-6 (87)	2.0	2.1	51							
						Clay, AASHTO: A-7-6 (87)	2.5	2.7	54							
TH25-04	UTM : 5518274 N, 632190 E Located in front of #1595 Chancellor Drive, Eastbound lane, 2.0 m North of South curb	Asphalt	110	Concrete	-	Sand and Gravel (Fill), AASHTO: A-1 (I)	0.1	0.2	6							
						Clay (Fill), AASHTO: A-7-6 (I)	0.6	0.8	32							
						Clay (Fill), AASHTO: A-7-6 (I)	0.9	1.1	34							
						Clay, AASHTO: A-7-6 (I)	1.2	1.4	37							
						Clay, AASHTO: A-7-6 (I)	1.6	1.8	42							
						Clay, AASHTO: A-7-6 (I)	2.0	2.1	46							
						Clay, AASHTO: A-7-6 (I)	2.5	2.7	49							
TH25-05	UTM : 5518260 N, 632310 E Located in front of #1623 Chancellor Drive, Eastbound lane, 2.0 m North of South curb	Asphalt	95	Concrete	-	Sand and Gravel (Fill), AASHTO: A-1 (I)	0.1	0.2	6							
						Clay (Fill), AASHTO: A-7-6 (55)	0.6	0.8	30							
						Clay (Fill), AASHTO: A-7-6 (55)	0.9	1.1	29	67	31	2	0	19	69	50
						Clay (Fill), AASHTO: A-7-6 (55)	1.2	1.4	29							
						Clay, AASHTO: A-7-6 (I)	1.6	1.8	41							
						Clay, AASHTO: A-7-6 (I)	2.0	2.1	44							
						Clay, AASHTO: A-7-6 (I)	2.5	2.7	47							
TH25-06	UTM : 5518266 N, 632422 E Located in front of #1655 Chancellor Drive, Eastbound lane, 2.0 m North of South curb	Asphalt	75	Concrete	-	Sand and Gravel (Fill), AASHTO: A-1 (I)	0.1	0.2	11							
						Clay (Fill), AASHTO: A-7-6 (I)	0.6	0.8	38							
						Clay (Fill), AASHTO: A-7-6 (I)	0.9	1.1	26							
						Clay, AASHTO: A-7-6 (I)	1.2	1.4	28							
						Clay, AASHTO: A-7-6 (I)	1.6	1.8	35							
						Clay, AASHTO: A-7-6 (I)	2.0	2.1	43							
						Clay, AASHTO: A-7-6 (I)	2.5	2.7	43							

www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

Moisture Content Report
ASTM D2216-98

Project No. 1000-043-29
Client WSP
Project 25-R-04 Local Street Renewal (Chancellor Drive)

Sample Date 15-Jan-25
Test Date 29-Jan-25
Technician K Franklin

Test Hole	TH25-01	TH25-01	TH25-01	TH25-01	TH25-01	TH25-01
Depth (m)	0.2 - 0.3	0.6 - 0.8	0.9 - 1.1	1.2 - 1.4	1.6 - 1.8	2.0 - 2.1
Sample #	G01	G02	G03	G04	G05	G06
Tare ID	QT17	QT18	QT19	QT20	QT21	QT22
Mass of tare	8.1	8.2	8.1	8.1	8.1	8.1
Mass wet + tare	176.6	218.2	442.5	240.1	236.3	224.3
Mass dry + tare	156.5	155.6	317.7	170.5	160.6	151.1
Mass water	20.1	62.6	124.8	69.6	75.7	73.2
Mass dry soil	148.4	147.4	309.6	162.4	152.5	143.0
Moisture %	13.5%	42.5%	40.3%	42.9%	49.6%	51.2%

Test Hole	TH25-01	TH25-04	TH25-04	TH25-04	TH25-04	TH25-04
Depth (m)	2.5 - 2.7	0.1 - 0.2	0.6 - 0.8	0.9 - 1.1	1.2 - 1.4	1.6 - 1.8
Sample #	G07	G22	G23	G24	G25	G26
Tare ID	QT23	QT24	QT25	QT26	QT27	QT28
Mass of tare	8.1	8.1	8.3	8.2	8.2	8.3
Mass wet + tare	228.2	229.6	228.2	236.8	233.9	225.0
Mass dry + tare	151.2	217.2	174.9	178.3	172.4	160.7
Mass water	77.0	12.4	53.3	58.5	61.5	64.3
Mass dry soil	143.1	209.1	166.6	170.1	164.2	152.4
Moisture %	53.8%	5.9%	32.0%	34.4%	37.5%	42.2%

Test Hole	TH25-04	TH25-04	TH25-05	TH25-05	TH25-05	TH25-05
Depth (m)	2.0 - 2.1	2.5 - 2.7	0.1 - 0.2	0.6 - 0.8	0.9 - 1.1	1.2 - 1.4
Sample #	G27	G28	G29	G30	G31	G32
Tare ID	QT29	QT30	QT31	QT32	QT33	QT34
Mass of tare	8.2	8.2	8.1	8.1	8.1	8.2
Mass wet + tare	224.7	232.5	229.3	215.4	435.4	222.8
Mass dry + tare	156.0	158.4	216.2	167.1	338.6	174.9
Mass water	68.7	74.1	13.1	48.3	96.8	47.9
Mass dry soil	147.8	150.2	208.1	159.0	330.5	166.7
Moisture %	46.5%	49.3%	6.3%	30.4%	29.3%	28.7%

www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

Moisture Content Report
ASTM D2216-98

Project No. 1000-043-29
Client WSP
Project 25-R-04 Local Street Renewal (Chancellor Drive)

Sample Date 15-Jan-25
Test Date 29-Jan-25
Technician K Franklin

Test Hole	TH25-05	TH25-05	TH25-05	TH25-06	TH25-06	TH25-06
Depth (m)	1.6 - 1.8	2.0 - 2.1	2.5 - 2.7	0.1 - 0.2	0.6 - 0.8	0.9 - 1.1
Sample #	G33	G34	G35	G36	G37	G38
Tare ID	QT35	QT36	QT37	QT38	QT39	QT40
Mass of tare	8.1	8.1	8.0	8.1	8.1	8.5
Mass wet + tare	235.8	239.5	262.9	316.7	243.0	220.4
Mass dry + tare	169.1	169.0	181.6	286.8	178.7	177.0
Mass water	66.7	70.5	81.3	29.9	64.3	43.4
Mass dry soil	161.0	160.9	173.6	278.7	170.6	168.5
Moisture %	41.4%	43.8%	46.8%	10.7%	37.7%	25.8%

Test Hole	TH25-06	TH25-06	TH25-06	TH25-06		
Depth (m)	1.2 - 1.4	1.6 - 1.8	2.0 - 2.1	2.5 - 2.7		
Sample #	G39	G40	G41	G42		
Tare ID	QT41	QT43	QT45	QT46		
Mass of tare	8.1	8.2	8.1	8.2		
Mass wet + tare	238.8	266.3	254.1	231.1		
Mass dry + tare	188.7	200.0	180.1	164.4		
Mass water	50.1	66.3	74.0	66.7		
Mass dry soil	180.6	191.8	172.0	156.2		
Moisture %	27.7%	34.6%	43.0%	42.7%		

Test Hole						
Depth (m)						
Sample #						
Tare ID						
Mass of tare						
Mass wet + tare						
Mass dry + tare						
Mass water						
Mass dry soil						
Moisture %						

www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

Atterberg Limits
ASTM D4318-10e1

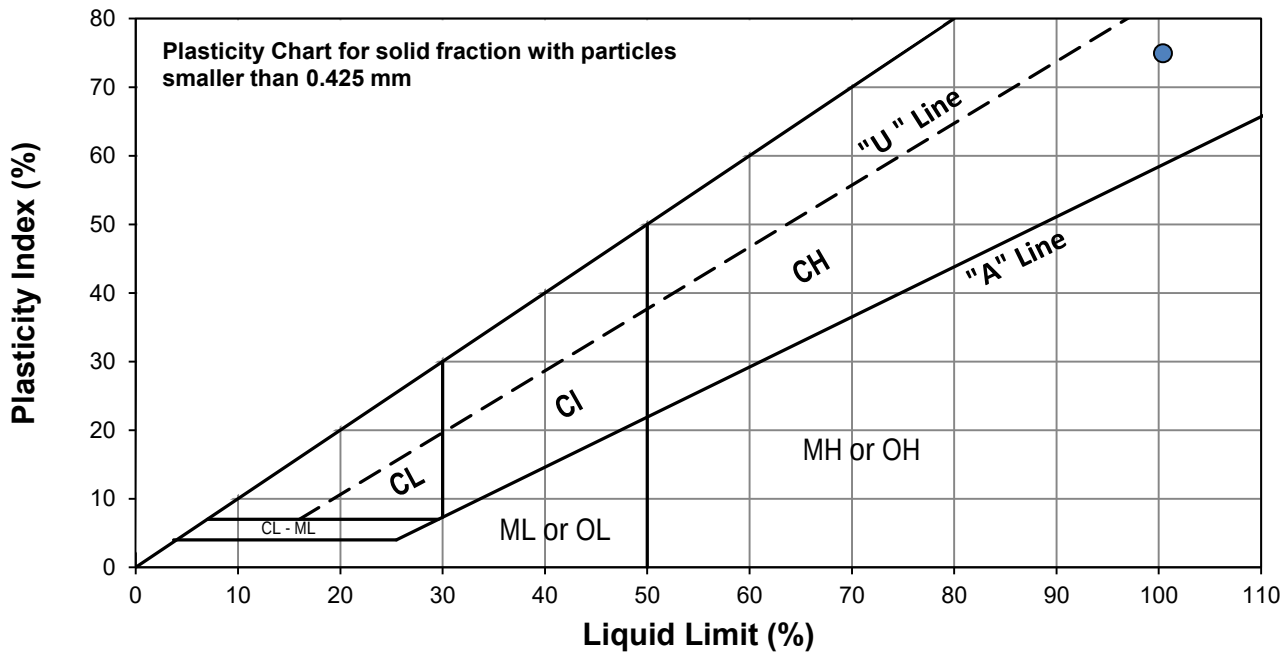
CERTIFIED BY CCIL Canadian Council of Independent Laboratories For specific tests as listed on www.ccil.com

Project No.	1000-043-29
Client	WSP
Project	25-R-04 Local Street Renewal (Chancellor Drive)
Test Hole	TH25-01
Sample #	G03
Depth (m)	0.9 - 1.1
Sample Date	15-Jan-25
Test Date	31-Jan-25
Technician	A. Dustmamatov

Liquid Limit	100
Plastic Limit	26
Plasticity Index	75

Liquid Limit

Trial #	1	2	3		
Number of Blows (N)	18	27	31		
Mass Tare (g)	14.229	13.787	14.001		
Mass Wet Soil + Tare (g)	24.686	23.287	25.348		
Mass Dry Soil + Tare (g)	19.376	18.542	19.714		
Mass Water (g)	5.310	4.745	5.634		
Mass Dry Soil (g)	5.147	4.755	5.713		
Moisture Content (%)	103.167	99.790	98.617		



Plastic Limit

Trial #	1	2	3	4	5
Mass Tare (g)	13.735	14.004			
Mass Wet Soil + Tare (g)	21.314	22.397			
Mass Dry Soil + Tare (g)	19.759	20.706			
Mass Water (g)	1.555	1.691			
Mass Dry Soil (g)	6.024	6.702			
Moisture Content (%)	25.813	25.231			

Note: Additional information recorded/measured for this test is available upon request.

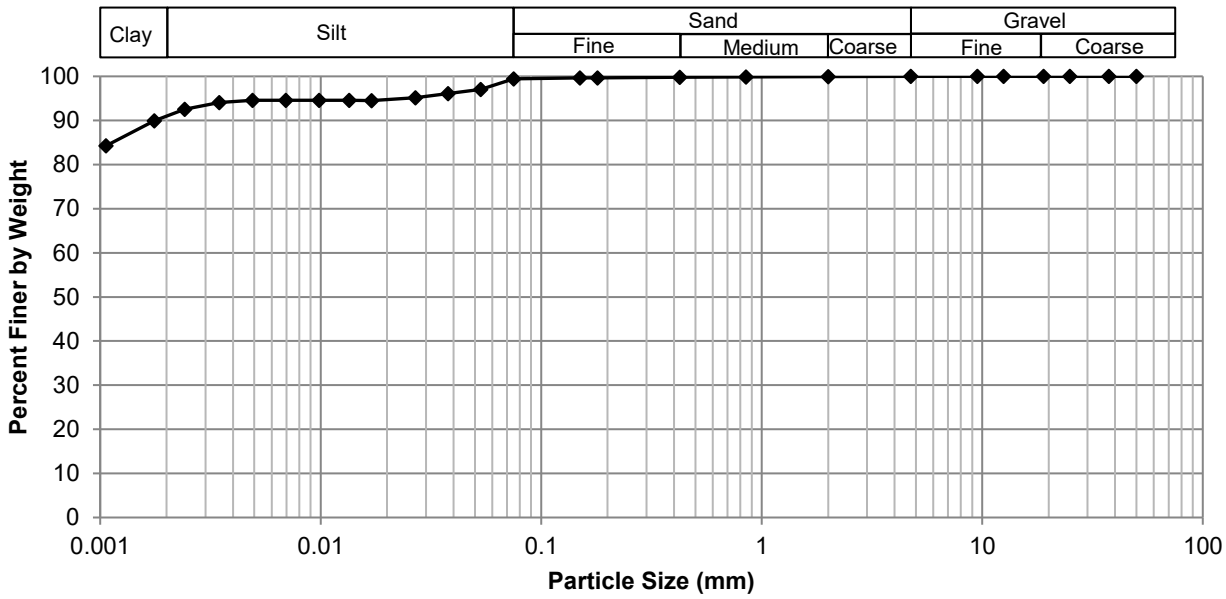
www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

Grain Size Analysis (Hydrometer Method)
AASHTO T 88

Project No.	1000-043-29
Client	WSP
Project	25-R-04 Local Street Renewal (Chancellor Drive)
Test Hole	TH25-01
Sample #	G03
Depth (m)	0.9 - 1.1
Sample Date	15-Jan-25
Test Date	30-Jan-25
Technician	A. Fidler-Kliewer

Gravel	0.0%
Sand	0.5%
Silt	8.6%
Clay	90.9%

Particle Size Distribution Curve



Gravel		Sand		Silt and Clay	
Particle Size (mm)	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**
50.0	100.00	4.75	100.00	0.0750	99.47
37.5	100.00	2.00	99.96	0.0532	97.02
25.0	100.00	0.850	99.86	0.0378	96.08
19.0	100.00	0.425	99.77	0.0269	95.15
12.5	100.00	0.180	99.67	0.0170	94.52
9.50	100.00	0.150	99.63	0.0135	94.56
4.75	100.00	0.075	99.47	0.0098	94.56
				0.0069	94.56
				0.0049	94.61
				0.0035	94.07
				0.0024	92.55
				0.0018	89.90
				0.0011	84.26

www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

Atterberg Limits
ASTM D4318-10e1

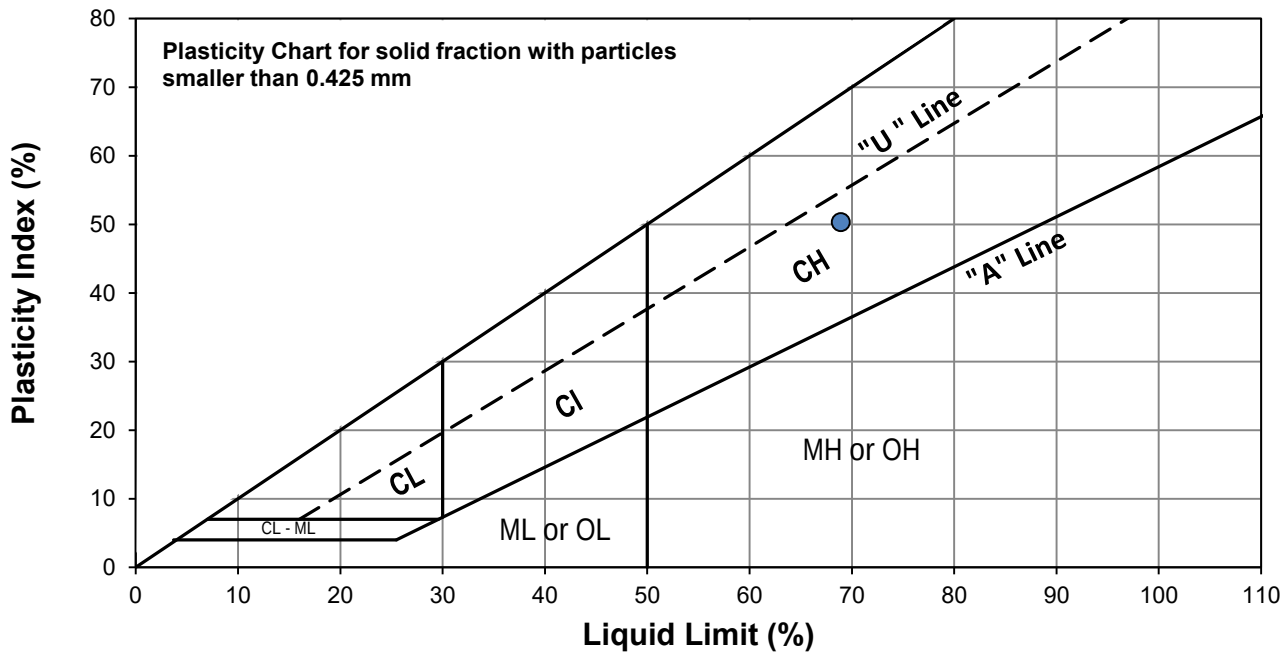
CERTIFIED BY CCIL Canadian Council of Independent Laboratories For specific tests as listed on www.ccil.com

Project No.	1000-043-29
Client	WSP
Project	25-R-04 Local Street Renewal (Chancellor Drive)
Test Hole	TH25-05
Sample #	G31
Depth (m)	0.9 - 1.1
Sample Date	15-Jan-25
Test Date	31-Jan-25
Technician	A. Dustmamatov

Liquid Limit	69
Plastic Limit	19
Plasticity Index	50

Liquid Limit

Trial #	1	2	3		
Number of Blows (N)	17	23	33		
Mass Tare (g)	14.045	13.828	13.965		
Mass Wet Soil + Tare (g)	27.116	26.451	25.597		
Mass Dry Soil + Tare (g)	21.667	21.284	20.921		
Mass Water (g)	5.449	5.167	4.676		
Mass Dry Soil (g)	7.622	7.456	6.956		
Moisture Content (%)	71.490	69.300	67.223		



Plastic Limit

Trial #	1	2	3	4	5
Mass Tare (g)	14.110	13.950			
Mass Wet Soil + Tare (g)	24.200	21.748			
Mass Dry Soil + Tare (g)	22.617	20.521			
Mass Water (g)	1.583	1.227			
Mass Dry Soil (g)	8.507	6.571			
Moisture Content (%)	18.608	18.673			

Note: Additional information recorded/measured for this test is available upon request.

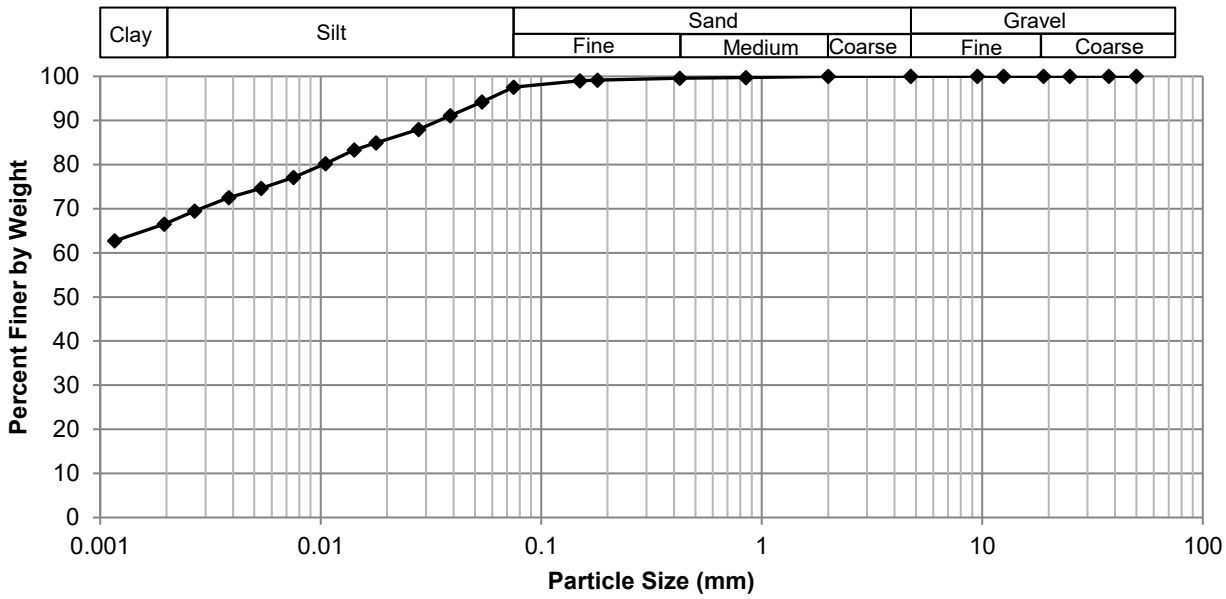
www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

Grain Size Analysis (Hydrometer Method)
AASHTO T 88

Project No.	1000-043-29
Client	WSP
Project	25-R-04 Local Street Renewal (Chancellor Drive)
Test Hole	TH25-05
Sample #	G31
Depth (m)	0.9 - 1.1
Sample Date	15-Jan-25
Test Date	30-Jan-25
Technician	A. Fidler-Kliewer

Gravel	0.0%
Sand	2.5%
Silt	30.8%
Clay	66.7%

Particle Size Distribution Curve



Gravel		Sand		Silt and Clay	
Particle Size (mm)	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**
50.0	100.00	4.75	100.00	0.0750	97.53
37.5	100.00	2.00	100.00	0.0540	94.24
25.0	100.00	0.850	99.74	0.0388	91.12
19.0	100.00	0.425	99.58	0.0278	87.99
12.5	100.00	0.180	99.15	0.0178	84.91
9.50	100.00	0.150	99.00	0.0142	83.34
4.75	100.00	0.075	97.53	0.0105	80.22
				0.0075	77.09
				0.0054	74.64
				0.0038	72.54
				0.0027	69.46
				0.0020	66.51
				0.0012	62.70

www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

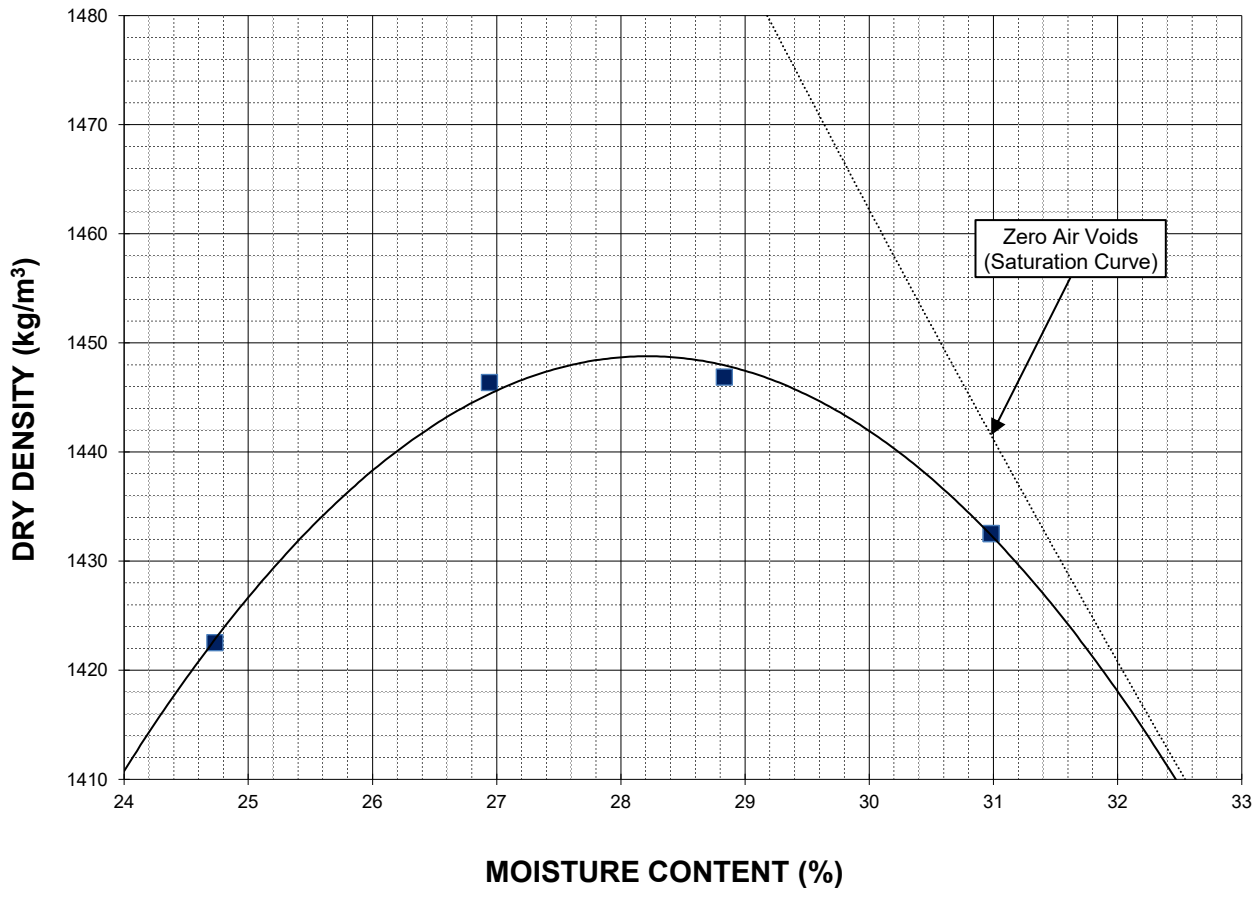
Standard Proctor Compaction Test

ASTM D698-12e2

Project No.	1000-043-29
Client	WSP
Project	25-R-04 Local Street Renewal (Chancellor Drive)
Sample #	B146
Source	TH25-01 & TH25-05 (0.6m to 2.1m)
Material	Clay
Sample Date	16-Jan-25
Test Date	21-Jan-25
Technician	A. Dustmamatov

Maximum Dry Density (kg/m3)	1449
Optimum Moisture (%)	28.2

Trial Number	1	2	3	4	
Wet Density (kg/m^3)	1774	1836	1864	1876	
Dry Density (kg/m^3)	1423	1446	1447	1433	
Moisture Content (%)	24.7	26.9	28.8	31.0	



Note: Additional information recorded/measured for this test is available upon request.

www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

California Bearing Ratio Test Data Sheet

ASTM D1883-16

Project No.	1000-043-29	**Source**	TH25-01 & TH25-05 (0.6m to 2.1m)
Client	WSP	**Material**	Clay
Project	25-R-04 Local Street Renewal (Chancellor Drive)	**Sample Date**	15-Jan-25
		Test Date	23-Jan-25
Sample #	B146	**Technician**	A. Dustmamatov

Proctor Results (ASTM D698)

Maximum Dry Density	1449	kg/m3
Optimum Moisture Content	28.2	%
Material Retained on 19 mm Sieve	0.0	%

CBR Sample Compaction

Dry Density	1375	kg/m3
Initial Moisture Content	28.5	%
Relative Density	94.9	% SPMDD

Soaking Results

Surcharge	4.54	kg
Swell	2.6	%
Moisture Content in top 25 mm	44.2	%
Immersion Period	96	h

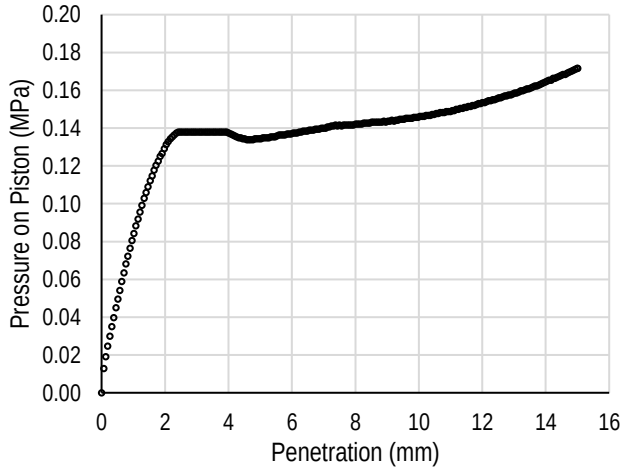
CBR Results

CBR at 2.54 mm	2.0	%
CBR at 5.08 mm	1.3	%
Zero Correction	0	mm

Test Data

Penetration (mm)	Measured Pressure (MPa)	Corrected Pressure (MPa)
0.64	0.06	0.06
1.27	0.10	0.10
1.91	0.13	0.13
2.54	0.14	0.14
3.18	0.14	0.14
3.81	0.14	0.14
4.45	0.13	0.13
5.08	0.13	0.13
7.62	0.14	0.14
10.16	0.15	0.15
12.70	0.16	0.16

Load/Penetration Curve



Comments:

Photo 1: Pavement Core Sample at TH25-01

Photo 2: Pavement Core Sample at TH25-04

Photo 3: Pavement Core Sample at TH25-05

Photo 4: Pavement Core Sample at TH25-06

Appendix C

Test Hole Logs, Summary Table, Lab Testing Results and Pavement Core Photos

Marshall Cr – Clarence Ave to Waller Ave

Sub-Surface Log

Test Hole TH25-07
1 of 1

Client:	WSP	**Project Number:**	1000-043-29
Project Name:	25-R-04 Local Street Renewal (Marshall Crescent)	**Location:**	UTM N-5521776, E-632283
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement m (local datum)
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	January 16, 2025

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

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL 0 20 40 60 80 100	Undrained Shear Strength (kPa) Test Type △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○ 0 50 100 150 200 250
		ASPHALT				
		CONCRETE				
		SAND and GRAVEL (FILL) - trace silt, light brown, frozen, moist and compact when thawed, poorly graded fine grained sand to gravel (<25 mm diam.), angular crushed limeston. AASHTO: A-1(I)				
0.5		CLAY (FILL) - silty, trace sand, trace organics - dark grey - frozen to 1.2 m, moist and firm when thawed - high plasticity - AASHTO: A-7-6(I)		G43		
1.0				G44		
		CLAY - silty - dark grey brown - moist, very stiff - high plasticity - AASHTO: A-7-6(I) - silt pockets <50 mm diam. between 1.5 and 1.8 m - brown, firm to stiff below 1.5 m		G45		
1.5				G46		
2.0				G47		
2.5				G48		
3.0						

END TEST HOLE AT 3.0 m IN CLAY.
Notes:
1. Seepage or sloughing not observed.
2. Test hole open to 3.0 m depth immediately after drilling.
3. Test hole backfilled with cuttings, granular fill and cold patch asphalt.
4. Test hole located in front of #177 Marshall Crescent, Northbound lane, 2.0 m West of East curb.

Logged By: Kate Franklin **Reviewed By:** Angela Fidler-Kliewer **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2025-01-23 25-R-04 LOCAL STREETS - MARSHALL 0_A_KF 1000-043-29.GPJ TREK.GDT 2/18/25

Sub-Surface Log

Test Hole TH25-08
1 of 1

Client:	WSP	**Project Number:**	1000-043-29
Project Name:	25-R-04 Local Street Renewal (Marshall Crescent)	**Location:**	UTM N-5521861, E-632353
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement m (local datum)
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	January 16, 2025

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

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL 0 20 40 60 80 100	Undrained Shear Strength (kPa) Test Type: Torvane, Pocket Pen., Qu, Field Vane 0 50 100 150 200 250
		ASPHALT				
		CONCRETE				
		SAND and GRAVEL (FILL) - trace silt, light brown, frozen, moist and compact when thawed, poorly graded fine grained sand to gravel (<25 mm diam.), angular crushed limestone. AASHTO: A-1(I)				
0.5		CLAY (FILL) - silty, trace sand - dark grey brown - frozen, moist and very stiff when thawed - high plasticity - AASHTO: A-7-6(61)		G49		
		CLAY - silty - grey - frozen to 1.2 m, moist, very stiff when thawed - high plasticity - AASHTO: A-7-6(I)		G50		
1.0		- trace silt pockets <50 mm diam. between 0.9 and 1.6 m		G51		
1.5		- brown below 1.5 m - trace silt inclusions <5 mm diam. below 1.7 m		G52		
2.0				G53		
2.5				G54		
3.0		END TEST HOLE AT 3.0 m IN CLAY.				

Notes:
1. Seepage or sloughing not observed.
2. Test hole open to 3.0 m depth immediately after drilling.
3. Test hole backfilled with cuttings, granular fill and cold patch asphalt.
4. Bulk samples were collected between 0.6 m and 2.1 m depth (B147).
5. Test hole located in front of #137 Marshall Crescent, Eastbound lane, 2.0 m North of South curb.

Logged By: Kate Franklin **Reviewed By:** Angela Fidler-Kliewer **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2025-01-23 25-R-04 LOCAL STREETS - MARSHALL 0_A_KF 1000-043-29.GPJ TREK.GDT 2/18/25

Sub-Surface Log

Test Hole TH25-09

Client:	WSP	**Project Number:**	1000-043-29
Project Name:	25-R-04 Local Street Renewal (Marshall Crescent)	**Location:**	UTM N-5521961, E-632527
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement m (local datum)
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	January 16, 2025

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

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL 0 20 40 60 80 100	Undrained Shear Strength (kPa) Test Type: Torvane, Pocket Pen., Qu, Field Vane 0 50 100 150 200 250
		ASPHALT				
		CONCRETE				
		SAND and GRAVEL (FILL) - trace silt, light brown, frozen, moist and compact when thawed, poorly graded fine grained sand to gravel (<25 mm diam.), angular crushed limestone. AASHTO: A-1(I)				
0.5		CLAY (FILL) - silty, trace sand - dark grey brown - frozen to 0.9 m, moist and firm when thawed - high plasticity - AASHTO: A-7-6(I)		G55		
1.0		SILT - some clay, trace sand - light brown - moist, firm - low plasticity - AASHTO: A-6(9)		G56		
1.5				G57		
		CLAY - silty, trace silt incl. <5 mm diam. - brown - moist, stiff - high plasticity - AASHTO: A-7-6(I)		G58		
2.0				G59		
2.5				G60		
3.0						

END TEST HOLE AT 3.0 m IN CLAY.

Notes:
1. Seepage or sloughing not observed.
2. Test hole open to 3.0 m depth immediately after drilling.
3. Test hole backfilled with cuttings, granular fill and cold patch asphalt.
4. Test hole located in front of #83 Marshall Crescent, Westbound lane, 2.0 m South of North curb.

Logged By: Kate Franklin **Reviewed By:** Angela Fidler-Kliewer **Project Engineer:** Nelson Ferreira

Sub-Surface Log

Test Hole TH25-10

Client:	WSP	**Project Number:**	1000-043-29
Project Name:	25-R-04 Local Street Renewal (Marshall Crescent)	**Location:**	UTM N-5522047, E-632599
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement m (local datum)
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	January 16, 2025

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

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL 0 20 40 60 80 100	Undrained Shear Strength (kPa) Test Type △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○ 0 50 100 150 200 250
		ASPHALT				
		CONCRETE				
		SAND and GRAVEL (FILL) - trace silt, light brown, frozen, moist and compact when thawed, poorly graded fine grained sand to gravel (<25 mm diam.), angular crushed limestone. AASHTO: A-1(I)				
0.5		CLAY (FILL) - silty, trace sand - dark grey brown - frozen, moist and firm when thawed - high plasticity - AASHTO: A-7-6(I)		G61		
1.0		CLAY - silty - dark grey brown - frozen to 1.2 m, moist and stiff to very stiff when thawed - high plasticity - AASHTO: A-7-6(I)		G62		
		- silt pockets <30 mm diam. between 0.9 and 2.4 m		G63		
1.5		- brown, firm to stiff below 1.7 m		G64		
2.0				G65		
2.5				G66		
3.0						

END TEST HOLE AT 3.0 m IN CLAY.

Notes:
1. Seepage or sloughing not observed.
2. Test hole open to 3.0 m depth immediately after drilling.
3. Test hole backfilled with cuttings, granular fill and cold patch asphalt.
4. Test hole located in front of #48 Marshall Crescent, Northbound lane, 2.0 m West of East curb.

Logged By: Kate Franklin **Reviewed By:** Angela Fidler-Kliewer **Project Engineer:** Nelson Ferreira

Sub-Surface Log

Test Hole TH25-11
1 of 1

Client:	WSP	**Project Number:**	1000-043-29
Project Name:	25-R-04 Local Street Renewal (Marshall Crescent)	**Location:**	UTM N-5522193, E-632593
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement m (local datum)
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	January 16, 2025

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

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL 0 20 40 60 80 100	Undrained Shear Strength (kPa) Test Type: Torvane, Pocket Pen., Qu, Field Vane 0 50 100 150 200 250
		ASPHALT				
		CONCRETE				
		SAND and GRAVEL (FILL) - trace silt, light brown, frozen, moist and compact when thawed, poorly graded fine grained sand to gravel (<25 mm diam.), angular crushed limestone. AASHTO: A-1(I)				
0.5		CLAY (FILL) - some silt, trace sand - dark grey brown - frozen to 1.2 m, moist and stiff when thawed - high plasticity - AASHTO: A-7-6(69)		G67		
1.0				G68		
		CLAY - silty - grey brown - moist, very stiff - high plasticity - AASHTO: A-7-6(I)		G69		
1.5		- brown, firm to stiff below 1.6 m		G70		
2.0				G71		
2.5				G72		
		- silt pocket <30 mm diam. at 2.7 m				
3.0						

END TEST HOLE AT 3.0 m IN CLAY.
Notes:
1. Seepage or sloughing not observed.
2. Test hole open to 3.0 m depth immediately after drilling.
3. Test hole backfilled with cuttings, granular fill and cold patch asphalt.
4. Bulk samples were collected between 0.6 m and 2.1 m depth (B147).
5. Test hole located in front of #12 Marshall Crescent, Southbound lane, 2.0 m East of West curb.

Logged By: Kate Franklin **Reviewed By:** Angela Fidler-Kliewer **Project Engineer:** Nelson Ferreira

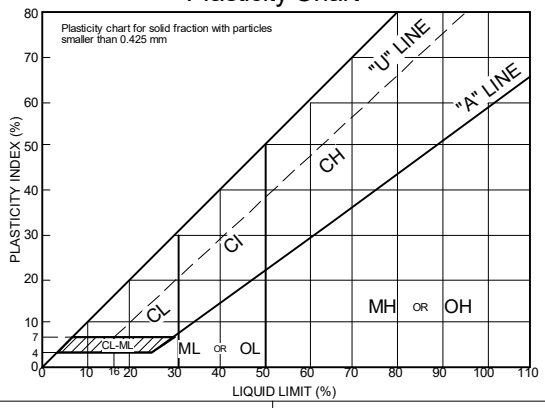
SUB-SURFACE LOG LOGS 2025-01-23 25-R-04 LOCAL STREETS - MARSHALL 0_A_KF 1000-043-29.GPJ TREK.GDT 2/18/25

EXPLANATION OF FIELD AND LABORATORY TESTING

GENERAL NOTES

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

Major Divisions			USCS Classification	Symbols	Typical Names	Laboratory Classification Criteria
Coarse-Grained soils (More than half the material is larger than No. 200 sieve size)	Gravels (More than half of coarse fraction is larger than 4.75 mm)	Clean gravel (Little or no fines)	GW		Well-graded gravels, gravel-sand mixtures, little or no fines	Determine percentages of sand and gravel from grain size curve, depending on percentage of fines (fraction smaller than No. 200 sieve) coarse-grained soils are classified as follows: Less than 5 percent..... GW, GP, SW, SP; More than 12 percent..... GM, GC, SM, SC; 6 to 12 percent..... Borderline case4s requiring dual symbols*
			GP		Poorly-graded gravels, gravel-sand mixtures, little or no fines	$C_U = \frac{D_{60}}{D_{10}}$ greater than 4; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
		Gravel with fines (Appreciable amount of fines)	GM		Silty gravels, gravel-sand-silt mixtures	Not meeting all gradation requirements for GW
			GC		Clayey gravels, gravel-sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4; Atterberg limits above "A" line or P.I. greater than 7; Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
	Sands (More than half of coarse fraction is smaller than 4.75 mm)	Clean sands (Little or no fines)	SW		Well-graded sands, gravelly sands, little or no fines	$C_U = \frac{D_{60}}{D_{10}}$ greater than 6; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
			SP		Poorly-graded sands, gravelly sands, little or no fines	Not meeting all gradation requirements for SW
		Sands with fines (Appreciable amount of fines)	SM		Silty sands, sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4; Atterberg limits above "A" line or P.I. greater than 7; Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
			SC		Clayey sands, sand-clay mixtures	
Fine-Grained soils (More than half the material is smaller than No. 200 sieve size)	Silts and Clays (Liquid limit less than 50)		ML		Inorganic silts and very fine sands, rock floor, silty or clayey fine sands or clayey silts with slight plasticity	Plasticity Chart
			CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	
			OL		Organic silts and organic silty clays of low plasticity	
	Silts and Clays (Liquid limit greater than 50)		MH		Inorganic silts, micaceous or distomaceous fine sandy or silty soils, organic silts	
			CH		Inorganic clays of high plasticity, fat clays	
			OH		Organic clays of medium to high plasticity, organic silts	
	Highly Organic Soils		Pt		Peat and other highly organic soils	Von Post Classification Limit: Strong colour or odour, and often fibrous texture



Particle Size		Material
ASTM Sieve sizes	mm	
#10 to #4	2.00 to 4.75	Sand: Coarse
#40 to #10	0.425 to 2.00	Medium
#200 to #40	0.075 to 0.425	Fine
< #200	< 0.075	Silt or Clay

Particle Size		Material
ASTM Sieve Sizes	mm	
> 12 in.	> 300	Boulders
3 in. to 12 in.	75 to 300	Cobbles
3/4 in. to 3 in.	19 to 75	Gravel: Coarse
#4 to 3/4 in.	4.75 to 19	Fine

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

Other Symbol Types

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

EXPLANATION OF FIELD AND LABORATORY TESTING

LEGEND OF ABBREVIATIONS AND SYMBOLS

LL - Liquid Limit (%)
PL - Plastic Limit (%)
PI - Plasticity Index (%)
MC - Moisture Content (%)
SPT - Standard Penetration Test
RQD - Rock Quality Designation
Qu - Unconfined Compression
Su - Undrained Shear Strength
VW - Vibrating Wire Piezometer
SI - Slope Inclinometer

▽ Water Level at Time of Drilling

▼ Water Level at End of Drilling

▼ Water Level After Drilling as Indicated on Test Hole Logs

FRACTION OF SECONDARY SOIL CONSTITUENTS ARE BASED ON THE FOLLOWING TERMINOLOGY

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

TERMS DESCRIBING CONSISTENCY OR COMPACTION CONDITION

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

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

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

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

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

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

25-R-04 Local Street Renewal
Marshall Crescent - Clarence Ave to Waller Ave
Summary Table - Sub-Surface Investigation

Test Hole No.	Test Hole Location	Pavement Surface		Pavement Structure Material		Subgrade Description	Sample Depth (m)		Moisture Content (%)	Grain Size Analysis				Atterberg Limits		
		Type	Thickness (mm)	Type	Thickness (mm)		Top (m)	Bottom (m)		Clay (%)	Silt (%)	Sand (%)	Gravel (%)	Plastic	Liquid	Plasticity Index
TH25-07	UTM : 5521776 N, 632283 E Located in front of #177 Marshall Crescent, Northbound lane, 2.0 m West of East curb	Asphalt	30	Concrete	160	Clay (Fill), AASHTO: A-7-6 (I)	0.7	0.9	32							
						Clay (Fill), AASHTO: A-7-6 (I)	1.0	1.2	37							
						Clay, AASHTO: A-7-6 (I)	1.3	1.5	34							
						Clay, AASHTO: A-7-6 (I)	1.7	1.8	47							
						Clay, AASHTO: A-7-6 (I)	2.1	2.3	52							
						Clay, AASHTO: A-7-6 (I)	2.6	2.7	53							
TH25-08	UTM : 5521861 N, 632353 E Located in front of #137 Marshall Crescent, Eastbound lane, 2.0 m North of South curb	Asphalt	30	Concrete	180	Clay (Fill), AASHTO: A-7-6 (61)	0.7	0.9	30	77	21	2	0	25	79	54
						Clay, AASHTO: A-7-6 (I)	1.0	1.2	29							
						Clay, AASHTO: A-7-6 (I)	1.3	1.5	34							
						Clay, AASHTO: A-7-6 (I)	1.7	1.8	45							
						Clay, AASHTO: A-7-6 (I)	2.1	2.3	46							
						Clay, AASHTO: A-7-6 (I)	2.6	2.7	52							
TH25-09	UTM : 5521961 N, 632527 E Located in front of #83 Marshall Crescent, Westbound lane, 2.0 m South of North curb	Asphalt	30	Concrete	160	Clay (Fill), AASHTO: A-7-6 (I)	0.7	0.9	33							
						Silt, AASHTO: A-6 (9)	1.0	1.2	22	21	74	5	0	16	27	11
						Silt, AASHTO: A-6 (9)	1.3	1.5	19							
						Clay, AASHTO: A-7-6 (I)	1.7	1.8	42							
						Clay, AASHTO: A-7-6 (I)	2.1	2.3	46							
						Clay, AASHTO: A-7-6 (I)	2.6	2.7	50							
TH25-10	UTM : 5522047 N, 632599 E Located in front of #48 Marshall Crescent, Northbound lane, 2.0 m West of East curb	Asphalt	30	Concrete	200	Clay (Fill), AASHTO: A-7-6 (I)	0.7	0.9	33							
						Clay, AASHTO: A-7-6 (I)	1.0	1.2	30							
						Clay, AASHTO: A-7-6 (I)	1.3	1.5	26							
						Clay, AASHTO: A-7-6 (I)	1.7	1.8	34							
						Clay, AASHTO: A-7-6 (I)	2.1	2.3	43							
						Clay, AASHTO: A-7-6 (I)	2.6	2.7	55							
TH25-11	UTM : 5522193 N, 632593 E Located in front of #12 Marshall Crescent, Southbound lane, 2.0 m East of West curb	Asphalt	35	Concrete	185	Clay (Fill), AASHTO: A-7-6 (69)	0.7	0.9	35							
						Clay (Fill), AASHTO: A-7-6 (69)	1.0	1.2	33	82	17	1	0	23	83	60
						Clay, AASHTO: A-7-6 (I)	1.3	1.5	38							
						Clay, AASHTO: A-7-6 (I)	1.7	1.8	49							
						Clay, AASHTO: A-7-6 (I)	2.1	2.3	52							
						Clay, AASHTO: A-7-6 (I)	2.6	2.7	52							

www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

Moisture Content Report
ASTM D2216-98

Project No. 1000-043-29
Client WSP
Project 25-R-04 Local Street Renewal (Marshall Crescent)

Sample Date 16-Jan-25
Test Date 29-Jan-25
Technician K Franklin

Test Hole	TH25-07	TH25-07	TH25-07	TH25-07	TH25-07	TH25-07
Depth (m)	0.7 - 0.9	1.0 - 1.2	1.3 - 1.5	1.7 - 1.8	2.1 - 2.3	2.6 - 2.7
Sample #	G43	G44	G45	G46	G47	G48
Tare ID	QT63	QT64	QT65	QT66	QT67	QT68
Mass of tare	8.2	8.2	8.2	8.2	8.2	8.2
Mass wet + tare	228.4	224.9	229.7	256.0	239.0	230.9
Mass dry + tare	175.1	166.0	173.3	176.8	160.3	154.2
Mass water	53.3	58.9	56.4	79.2	78.7	76.7
Mass dry soil	166.9	157.8	165.1	168.6	152.1	146.0
Moisture %	31.9%	37.3%	34.2%	47.0%	51.7%	52.5%

Test Hole	TH25-08	TH25-08	TH25-08	TH25-08	TH25-08	TH25-08
Depth (m)	0.7 - 0.9	1.0 - 1.2	1.3 - 1.5	1.7 - 1.8	2.1 - 2.3	2.6 - 2.7
Sample #	G49	G50	G51	G52	G53	G54
Tare ID	QT69	QT70	QT71	QT72	QT73	QT74
Mass of tare	8.2	8.2	8.3	8.2	8.2	8.1
Mass wet + tare	448.3	240.3	229.6	229.9	239.5	254.5
Mass dry + tare	348.0	187.7	173.8	160.9	167.0	169.8
Mass water	100.3	52.6	55.8	69.0	72.5	84.7
Mass dry soil	339.8	179.5	165.5	152.7	158.8	161.7
Moisture %	29.5%	29.3%	33.7%	45.2%	45.7%	52.4%

Test Hole	TH25-09	TH25-09	TH25-09	TH25-09	TH25-09	TH25-09
Depth (m)	0.7 - 0.9	1.0 - 1.2	1.3 - 1.5	1.7 - 1.8	2.1 - 2.3	2.6 - 2.7
Sample #	G55	G56	G57	G58	G59	G60
Tare ID	QT75	QT76	QT77	QT78	QT79	QT80
Mass of tare	8.1	8.3	8.2	8.1	8.1	8.2
Mass wet + tare	223.6	482.5	247.7	235.8	222.8	234.3
Mass dry + tare	170.2	397.0	209.0	168.8	155.6	158.6
Mass water	53.4	85.5	38.7	67.0	67.2	75.7
Mass dry soil	162.1	388.7	200.8	160.7	147.5	150.4
Moisture %	32.9%	22.0%	19.3%	41.7%	45.6%	50.3%

www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

Moisture Content Report
ASTM D2216-98

Project No. 1000-043-29
Client WSP
Project 25-R-04 Local Street Renewal (Marshall Crescent)

Sample Date 16-Jan-25
Test Date 29-Jan-25
Technician K Franklin

Test Hole	TH25-10	TH25-10	TH25-10	TH25-10	TH25-10	TH25-10
Depth (m)	0.7 - 0.9	1.0 - 1.2	1.3 - 1.5	1.7 - 1.8	2.1 - 2.3	2.6 - 2.7
Sample #	G61	G62	G63	G64	G65	G66
Tare ID	QT81	QT82	QT83	QT84	QT85	QT86
Mass of tare	8.3	8.3	8.5	8.1	8.2	8.4
Mass wet + tare	234.3	247.3	236.8	239.9	222.6	223.9
Mass dry + tare	177.8	192.4	189.0	180.6	158.4	147.0
Mass water	56.5	54.9	47.8	59.3	64.2	76.9
Mass dry soil	169.5	184.1	180.5	172.5	150.2	138.6
Moisture %	33.3%	29.8%	26.5%	34.4%	42.7%	55.5%

Test Hole	TH25-11	TH25-11	TH25-11	TH25-11	TH25-11	TH25-11
Depth (m)	0.7 - 0.9	1.0 - 1.2	1.3 - 1.5	1.7 - 1.8	2.1 - 2.3	2.6 - 2.7
Sample #	G67	G68	G69	G70	G71	G72
Tare ID	QT87	QT88	QT89	QT100	QT38	QT17
Mass of tare	8.4	8.3	8.4	8.1	8.1	8.1
Mass wet + tare	227.7	449.7	225.8	235.2	223.7	225.7
Mass dry + tare	171.2	339.6	165.6	160.2	149.8	151.0
Mass water	56.5	110.1	60.2	75.0	73.9	74.7
Mass dry soil	162.8	331.3	157.2	152.1	141.7	142.9
Moisture %	34.7%	33.2%	38.3%	49.3%	52.2%	52.3%

Test Hole						
Depth (m)						
Sample #						
Tare ID						
Mass of tare						
Mass wet + tare						
Mass dry + tare						
Mass water						
Mass dry soil						
Moisture %						

TREK GEOTECHNICAL
www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

Atterberg Limits
ASTM D4318-10e1

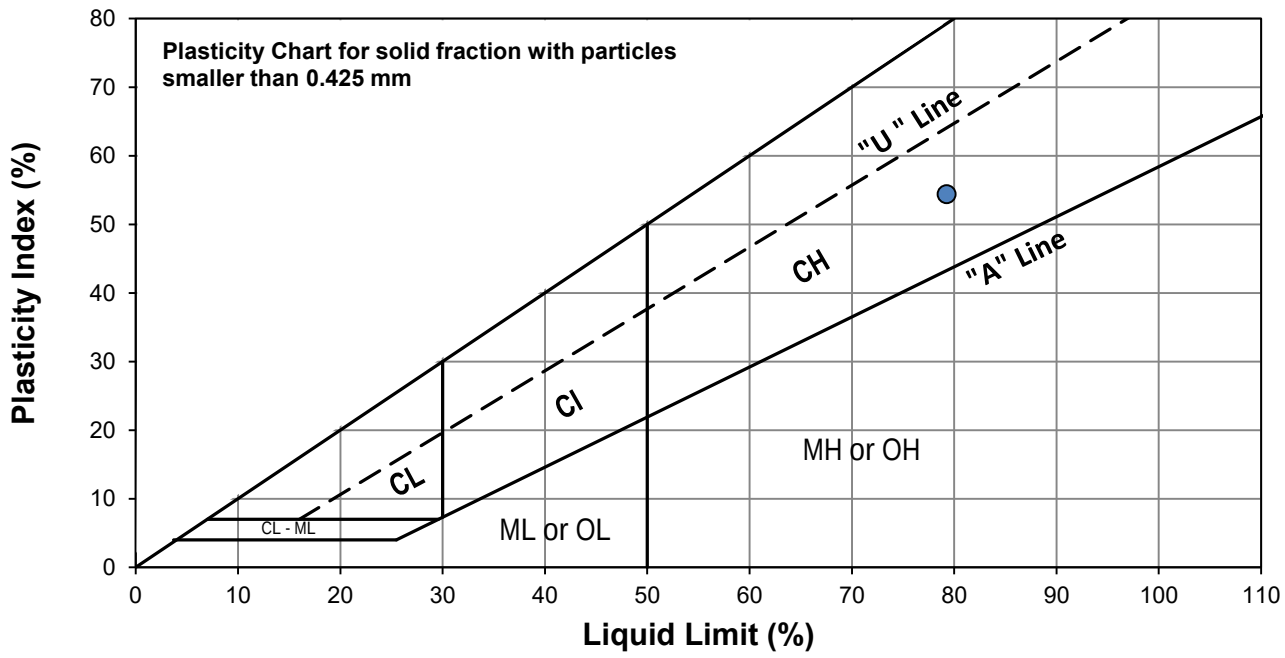
CERTIFIED BY CCIL Canadian Council of Independent Laboratories For specific tests as listed on www.ccil.com

Project No.	1000-043-29
Client	WSP
Project	25-R-04 Local Street Renewal (Marshall Crescent)
Test Hole	TH25-08
Sample #	G49
Depth (m)	0.7 - 0.9
Sample Date	16-Jan-25
Test Date	04-Feb-25
Technician	K. Franklin

Liquid Limit	79
Plastic Limit	25
Plasticity Index	54

Liquid Limit

Trial #	1	2	3		
Number of Blows (N)	16	24	34		
Mass Tare (g)	14.180	14.066	14.074		
Mass Wet Soil + Tare (g)	23.200	21.266	21.143		
Mass Dry Soil + Tare (g)	19.101	18.075	18.079		
Mass Water (g)	4.099	3.191	3.064		
Mass Dry Soil (g)	4.921	4.009	4.005		
Moisture Content (%)	83.296	79.596	76.504		



Plastic Limit

Trial #	1	2	3	4	5
Mass Tare (g)	13.848	13.946			
Mass Wet Soil + Tare (g)	22.991	22.954			
Mass Dry Soil + Tare (g)	21.160	21.168			
Mass Water (g)	1.831	1.786			
Mass Dry Soil (g)	7.312	7.222			
Moisture Content (%)	25.041	24.730			

Note: Additional information recorded/measured for this test is available upon request.

www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

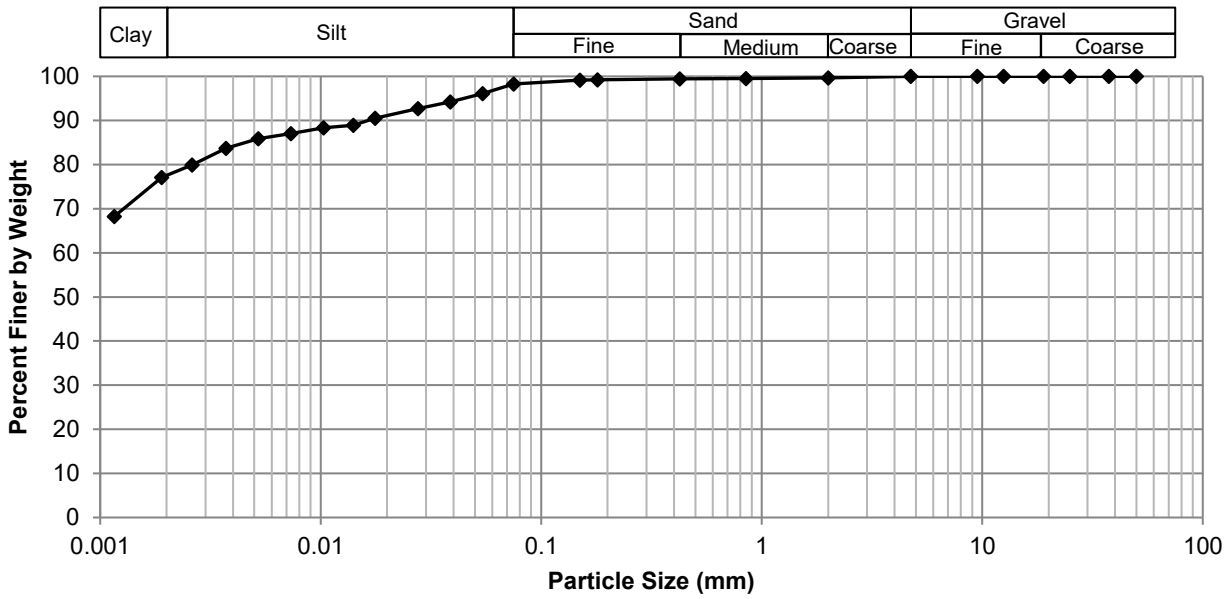
Grain Size Analysis (Hydrometer Method)
AASHTO T 88

Project No.	1000-043-29
Client	WSP
Project	25-R-04 Local Street Renewal (Marshall Crescent)
Test Hole	TH25-08
Sample #	G49
Depth (m)	0.7 - 0.9
Sample Date	16-Jan-25
Test Date	03-Feb-25
Technician	A. Fidler-Kliewer

CERTIFIED BY CCIL Canadian Council of Independent Laboratories For specific tests as listed on www.ccil.com

Gravel	0.0%
Sand	1.7%
Silt	20.8%
Clay	77.5%

Particle Size Distribution Curve



Gravel		Sand		Silt and Clay	
Particle Size (mm)	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**
50.0	100.00	4.75	100.00	0.0750	98.25
37.5	100.00	2.00	99.64	0.0543	96.10
25.0	100.00	0.850	99.51	0.0388	94.23
19.0	100.00	0.425	99.40	0.0276	92.67
12.5	100.00	0.180	99.22	0.0177	90.49
9.50	100.00	0.150	99.17	0.0141	88.93
4.75	100.00	0.075	98.25	0.0103	88.31
				0.0073	87.07
				0.0052	85.89
				0.0037	83.71
				0.0026	79.96
				0.0019	77.07
				0.0012	68.24

www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

Atterberg Limits
ASTM D4318-10e1

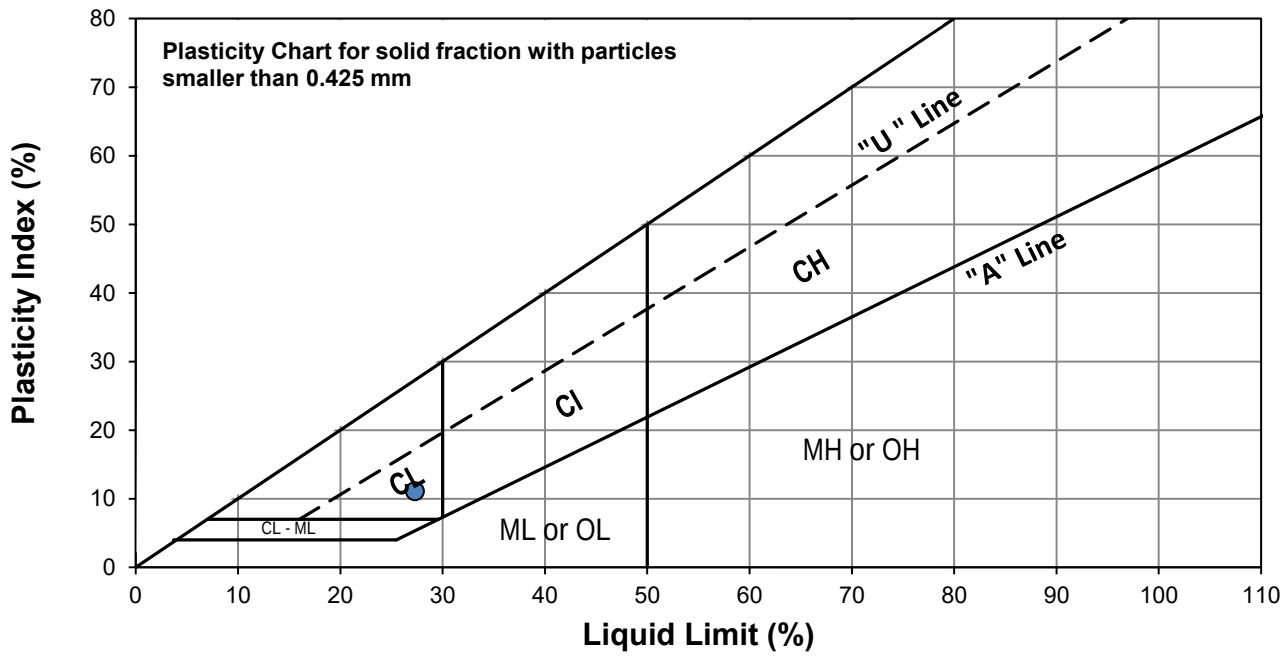
CERTIFIED BY CCIL Canadian Council of Independent Laboratories For specific tests as listed on www.ccil.com

Project No.	1000-043-29
Client	WSP
Project	25-R-04 Local Street Renewal (Marshall Crescent)
Test Hole	TH25-09
Sample #	G56
Depth (m)	1.0 - 1.2
Sample Date	16-Jan-25
Test Date	05-Feb-25
Technician	A. Dustmamatov

Liquid Limit	27
Plastic Limit	16
Plasticity Index	11

Liquid Limit

Trial #	1	2	3		
Number of Blows (N)	17	19	35		
Mass Tare (g)	14.221	14.075	14.118		
Mass Wet Soil + Tare (g)	28.622	26.488	29.374		
Mass Dry Soil + Tare (g)	25.428	23.761	26.200		
Mass Water (g)	3.194	2.727	3.174		
Mass Dry Soil (g)	11.207	9.686	12.082		
Moisture Content (%)	28.500	28.154	26.270		



Plastic Limit

Trial #	1	2	3	4	5
Mass Tare (g)	13.736	14.120			
Mass Wet Soil + Tare (g)	24.751	23.760			
Mass Dry Soil + Tare (g)	23.215	22.409			
Mass Water (g)	1.536	1.351			
Mass Dry Soil (g)	9.479	8.289			
Moisture Content (%)	16.204	16.299			

Note: Additional information recorded/measured for this test is available upon request.

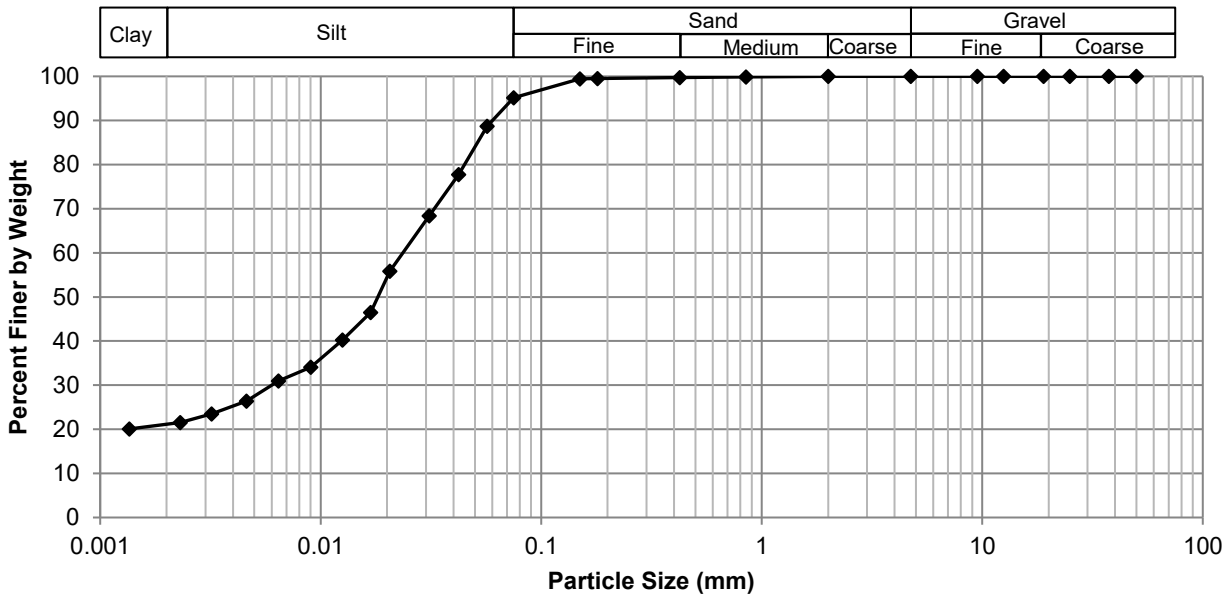
www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

Grain Size Analysis (Hydrometer Method)
AASHTO T 88

Project No.	1000-043-29
Client	WSP
Project	25-R-04 Local Street Renewal (Marshall Crescent)
Test Hole	TH25-09
Sample #	G56
Depth (m)	1.0 - 1.2
Sample Date	16-Jan-25
Test Date	05-Feb-25
Technician	A. Fidler-Kliewer

Gravel	0.0%
Sand	4.8%
Silt	74.1%
Clay	21.1%

Particle Size Distribution Curve



Gravel		Sand		Silt and Clay	
Particle Size (mm)	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**
50.0	100.00	4.75	100.00	0.0750	95.18
37.5	100.00	2.00	100.00	0.0568	88.69
25.0	100.00	0.850	99.85	0.0422	77.74
19.0	100.00	0.425	99.75	0.0310	68.36
12.5	100.00	0.180	99.53	0.0206	55.86
9.50	100.00	0.150	99.46	0.0168	46.48
4.75	100.00	0.075	95.18	0.0126	40.22
				0.0090	34.06
				0.0064	30.98
				0.0046	26.38
				0.0032	23.48
				0.0023	21.52
				0.0014	20.08

www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

Atterberg Limits
ASTM D4318-10e1

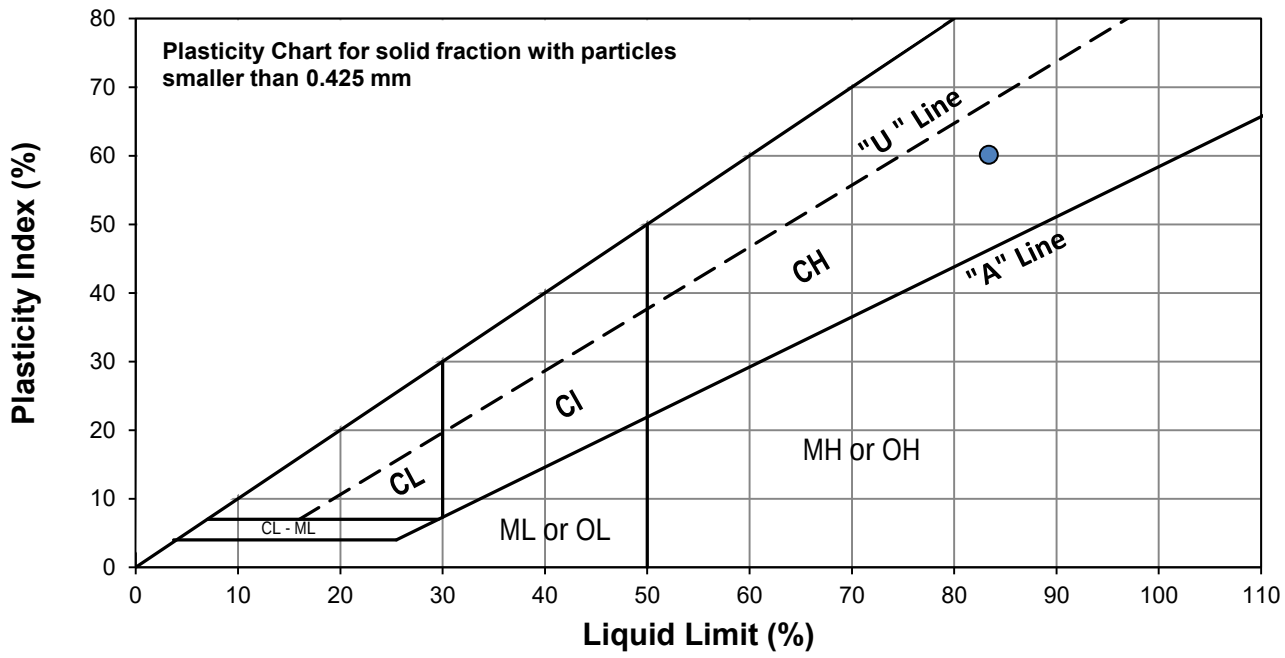
CERTIFIED BY CCIL Canadian Council of Independent Laboratories For specific tests as listed on www.ccil.com

Project No.	1000-043-29
Client	WSP
Project	25-R-04 Local Street Renewal (Marshall Crescent)
Test Hole	TH25-11
Sample #	G68
Depth (m)	1.0 - 1.2
Sample Date	16-Jan-25
Test Date	03-Feb-25
Technician	K. Franklin

Liquid Limit	83
Plastic Limit	23
Plasticity Index	60

Liquid Limit

Trial #	1	2	3		
Number of Blows (N)	15	24	32		
Mass Tare (g)	13.893	14.072	13.979		
Mass Wet Soil + Tare (g)	24.216	23.906	22.052		
Mass Dry Soil + Tare (g)	19.396	19.438	18.421		
Mass Water (g)	4.820	4.468	3.631		
Mass Dry Soil (g)	5.503	5.366	4.442		
Moisture Content (%)	87.589	83.265	81.742		



Plastic Limit

Trial #	1	2	3	4	5
Mass Tare (g)	13.938	14.190			
Mass Wet Soil + Tare (g)	23.603	23.457			
Mass Dry Soil + Tare (g)	21.774	21.711			
Mass Water (g)	1.829	1.746			
Mass Dry Soil (g)	7.836	7.521			
Moisture Content (%)	23.341	23.215			

Note: Additional information recorded/measured for this test is available upon request.

www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

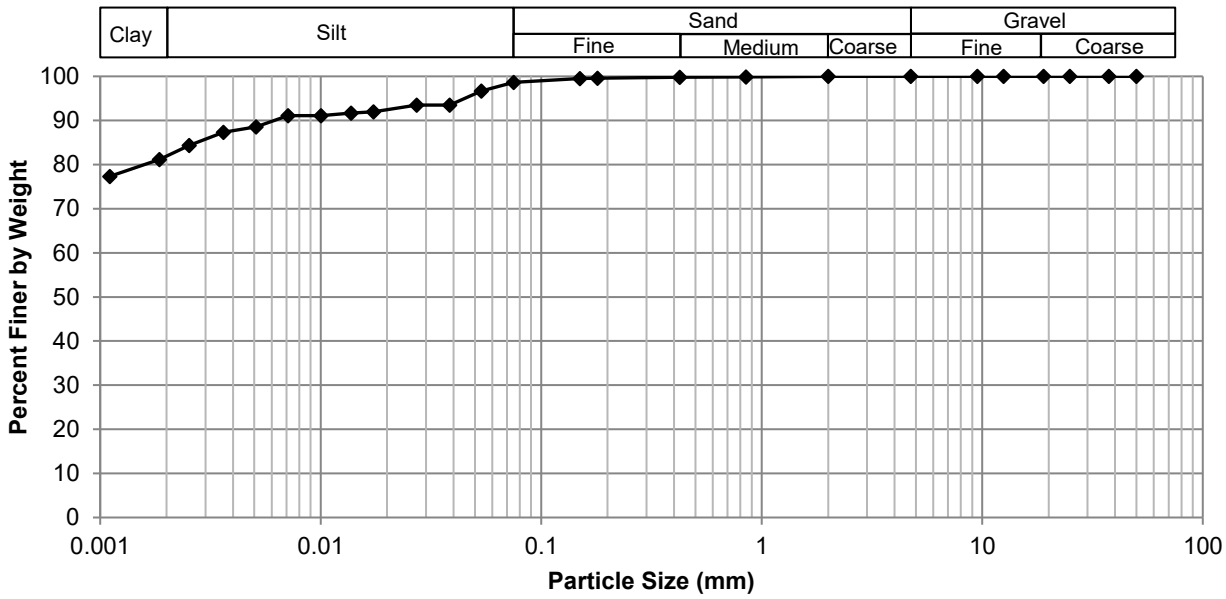
Grain Size Analysis (Hydrometer Method)
AASHTO T 88

Project No.	1000-043-29
Client	WSP
Project	25-R-04 Local Street Renewal (Marshall Crescent)
Test Hole	TH25-11
Sample #	G68
Depth (m)	1.0 - 1.2
Sample Date	16-Jan-25
Test Date	31-Jan-25
Technician	D. Sellick

CERTIFIED BY CCIL Canadian Council of Independent Laboratories For specific tests as listed on www.ccil.com

Gravel	0.0%
Sand	1.4%
Silt	16.8%
Clay	81.8%

Particle Size Distribution Curve



Gravel		Sand		Silt and Clay	
Particle Size (mm)	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**
50.0	100.00	4.75	100.00	0.0750	98.62
37.5	100.00	2.00	100.00	0.0536	96.65
25.0	100.00	0.850	99.89	0.0385	93.53
19.0	100.00	0.425	99.79	0.0272	93.53
12.5	100.00	0.180	99.60	0.0173	91.96
9.50	100.00	0.150	99.53	0.0137	91.65
4.75	100.00	0.075	98.62	0.0100	91.09
				0.0071	91.09
				0.0051	88.52
				0.0036	87.33
				0.0025	84.33
				0.0019	81.14
				0.0011	77.34

www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

Standard Proctor Compaction Test

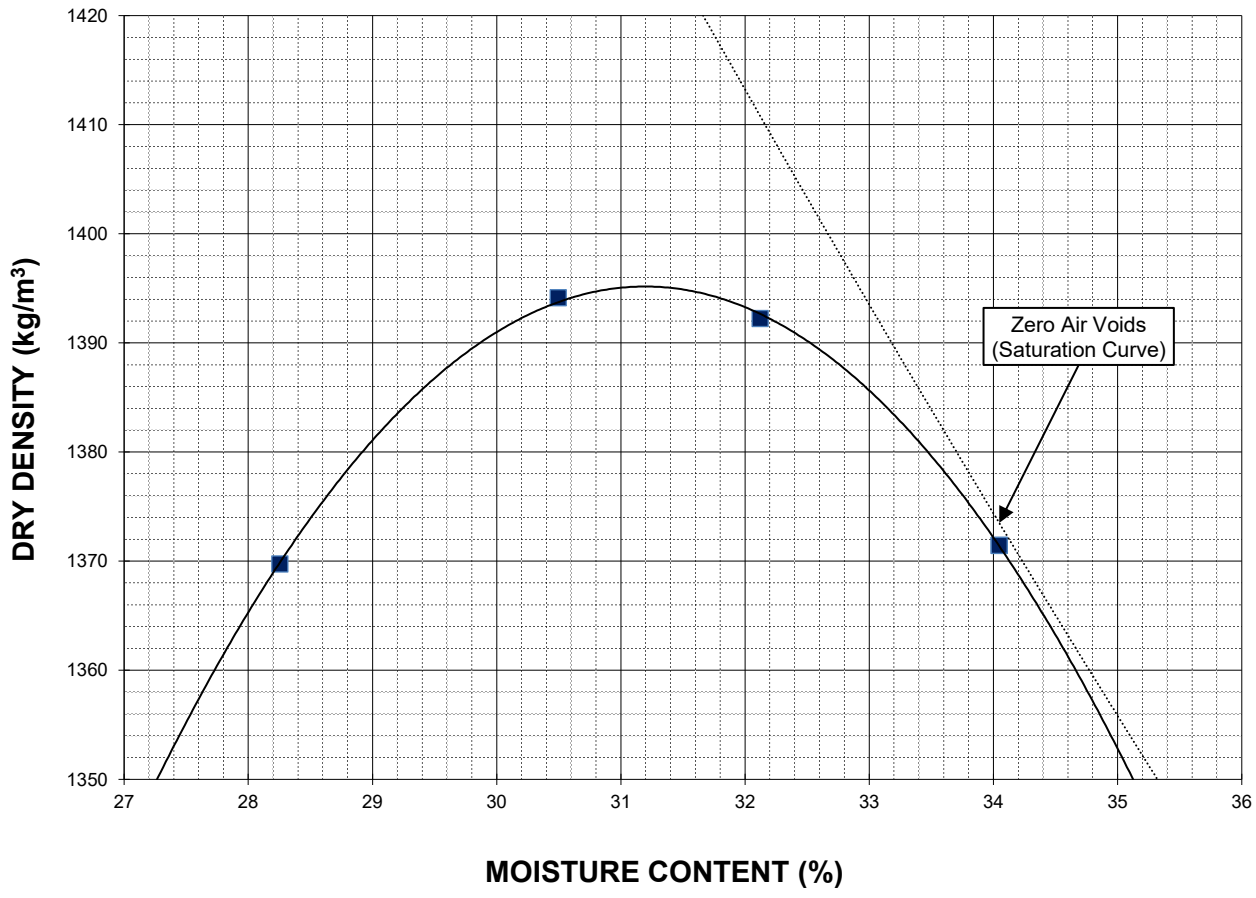
ASTM D698-12e2

CERTIFIED BY CCIL Canadian Council of Independent Laboratories For specific tests as listed on www.ccil.com

Project No.	1000-043-29
Client	WSP
Project	25-R-04 Local Street Renewal (Marshall Crescent)
Sample #	B147
Source	TH25-08 & TH25-11 (0.6m to 2.1m)
Material	Clay
Sample Date	16-Jan-25
Test Date	21-Jan-25
Technician	A. Dustmamatov

Maximum Dry Density (kg/m3)	1395
Optimum Moisture (%)	31.2

Trial Number	1	2	3	4	
Wet Density (kg/m^3)	1757	1819	1839	1838	
Dry Density (kg/m^3)	1370	1394	1392	1371	
Moisture Content (%)	28.3	30.5	32.1	34.0	



Note: Additional information recorded/measured for this test is available upon request.

www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

California Bearing Ratio Test Data Sheet

ASTM D1883-16

Project No.	1000-043-29	**Source**	TH25-08 & TH25-11 (0.6m to 2.1m)
Client	WSP	**Material**	Clay
Project	25-R-04 Local Street Renewal (Marshall Crescent)	**Sample Date**	16-Jan-25
		Test Date	23-Jan-25
Sample #	B147	**Technician**	A. Dustmamatov

Proctor Results (ASTM D698)

Maximum Dry Density	1395	kg/m3
Optimum Moisture Content	31.2	%
Material Retained on 19 mm Sieve	0.0	%

CBR Sample Compaction

Dry Density	1329	kg/m3
Initial Moisture Content	31.3	%
Relative Density	95.3	% SPMDD

Soaking Results

Surcharge	4.54	kg
Swell	1.7	%
Moisture Content in top 25 mm	47.0	%
Immersion Period	44	h

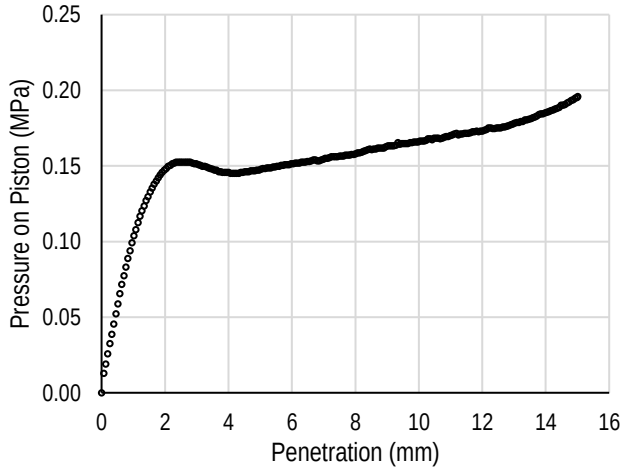
CBR Results

CBR at 2.54 mm	2.2	%
CBR at 5.08 mm	1.4	%
Zero Correction	0	mm

Test Data

Penetration (mm)	Measured Pressure (MPa)	Corrected Pressure (MPa)
0.64	0.07	0.07
1.27	0.12	0.12
1.91	0.15	0.15
2.54	0.15	0.15
3.18	0.15	0.15
3.81	0.15	0.15
4.45	0.15	0.15
5.08	0.15	0.15
7.62	0.16	0.16
10.16	0.17	0.17
12.70	0.18	0.18

Load/Penetration Curve



Comments:

Photo 1: Pavement Core Sample at TH25-07

Photo 2: Pavement Core Sample at TH25-08

Photo 3: Pavement Core Sample at TH25-09

Photo 4: Pavement Core Sample at TH25-10

Photo 5: Pavement Core Sample at TH25-11

Appendix D

Test Hole Logs, Summary Table, and Lab Testing Results

Clarence/Boston Alley – Hudson St. to Pembina Hwy

Sub-Surface Log

Test Hole TH25-12

Client:	WSP	**Project Number:**	1000-043-29
Project Name:	25-R-04 Local Street Renewal (Clarence/Boston Alley)	**Location:**	UTM N-5521932, E-632762
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement m (local datum)
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	January 16, 2025

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

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL	Undrained Shear Strength (kPa) Test Type: Torvane, Pocket Pen., Qu, Field Vane 0 50 100 150 200 250
		SAND and GRAVEL (FILL) - trace silt, light brown, frozen, moist and compact when thawed, poorly graded fine grained sand to gravel (<25 mm diam.), angular crushed limeston. AASHTO: A-1(I)		G73		
0.5		CLAY (FILL) - silty, trace organics, trace sand - black, frozen to 1.1, moist and stiff when thawed - intermediate plasticity, - AASHTO: A-7-6(65)		G74		
				G75		
1.0		CLAY - silty - brown - moist, stiff to very stiff - high plasticity - AASHTO: A-7-6(I)		G76		
1.5		- stiff below 1.5 m		G77		
2.0				G78		
2.5				G79		
		- silt layer <100 mm thick at 2.7 m				
3.0						

END TEST HOLE AT 3.0 m IN CLAY.

Notes:
1. Seepage or sloughing not observed.
2. Test hole open to 3.0 m depth immediately after drilling.
3. Test hole backfilled with cuttings, granular fill and cold patch asphalt.
4. Bulk samples were collected between 1.1 m and 2.1 m depth (B148).
5. Test hole located behind #1045 Boston Avenue, centreline of alley between Clarence Avenue and Boston Avenue.

Logged By: Kate Franklin **Reviewed By:** Angela Fidler-Kliewer **Project Engineer:** Nelson Ferreira

Sub-Surface Log

Test Hole TH25-13

Client:	WSP	**Project Number:**	1000-043-29
Project Name:	25-R-04 Local Street Renewal (Clarence/Boston Alley)	**Location:**	UTM N-5522012, E-632909
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement m (local datum)
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	January 16, 2025

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

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL	Undrained Shear Strength (kPa) 0 50 100 150 200 250 / Test Type: △ Torvane △, ✿ Pocket Pen. ✿, ☒ Qu ☒, ○ Field Vane ○
		SAND and GRAVEL (FILL) - trace silt, light brown, frozen, moist and compact when thawed, poorly graded fine grained sand to gravel (<25 mm diam.), angular crushed limestone. AASHTO: A-1(I)		G80		
0.5		CLAY (FILL) - silty, trace organics, trace sand - mottled dark grey and black - frozen, moist and firm when thawed - intermediate plasticity - AASHTO: A-7-6(I)		G81		
1.0				G82		
		CLAY - silty - dark grey - frozen to 1.1 m, moist and stiff to very stiff when thawed - high plasticity - AASHTO: A-7-6(I)		G83		
1.5		- brown below 1.4 m - stiff below 1.5 m		G84		
2.0				G85		
		SILT - some clay - light brown - moist, firm - low to intermediate plasticity - AASHTO: A-6 (I)		G86		
2.5		CLAY - silty - brown, moist, stiff to very stiff - high plasticity - AASHTO: A-7-6(I)		G87		
3.0						

END TEST HOLE AT 3.0 m IN CLAY.

Notes:
1. Seepage or sloughing not observed.
2. Test hole open to 3.0 m depth immediately after drilling.
3. Test hole backfilled with cuttings, granular fill and cold patch asphalt.
4. Bulk samples were collected between 0.8 m and 2.1 m depth (B148).
5. Test hole located behind #1003 Boston Avenue, centreline of alley between Clarence Avenue and Boston Avenue.

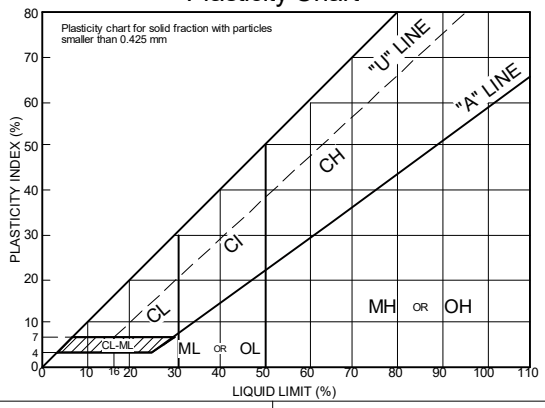
Logged By: Kate Franklin **Reviewed By:** Angela Fidler-Kliewer **Project Engineer:** Nelson Ferreira

EXPLANATION OF FIELD AND LABORATORY TESTING

GENERAL NOTES

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

Major Divisions			USCS Classification	Symbols	Typical Names	Laboratory Classification Criteria
Coarse-Grained soils (More than half the material is larger than No. 200 sieve size)	Gravels (More than half of coarse fraction is larger than 4.75 mm)	Clean gravel (Little or no fines)	GW		Well-graded gravels, gravel-sand mixtures, little or no fines	Determine percentages of sand and gravel from grain size curve, depending on percentage of fines (fraction smaller than No. 200 sieve) coarse-grained soils are classified as follows: Less than 5 percent..... GW, GP, SW, SP; More than 12 percent..... GM, GC, SM, SC; 6 to 12 percent..... Borderline case4s requiring dual symbols*
			GP		Poorly-graded gravels, gravel-sand mixtures, little or no fines	$C_U = \frac{D_{60}}{D_{10}}$ greater than 4; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
		Gravel with fines (Appreciable amount of fines)	GM		Silty gravels, gravel-sand-silt mixtures	Not meeting all gradation requirements for GW
			GC		Clayey gravels, gravel-sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4; Atterberg limits above "A" line or P.I. greater than 7; Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
	Sands (More than half of coarse fraction is smaller than 4.75 mm)	Clean sands (Little or no fines)	SW		Well-graded sands, gravelly sands, little or no fines	$C_U = \frac{D_{60}}{D_{10}}$ greater than 6; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
			SP		Poorly-graded sands, gravelly sands, little or no fines	Not meeting all gradation requirements for SW
		Sands with fines (Appreciable amount of fines)	SM		Silty sands, sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4; Atterberg limits above "A" line or P.I. greater than 7; Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
			SC		Clayey sands, sand-clay mixtures	
Fine-Grained soils (More than half the material is smaller than No. 200 sieve size)	Silts and Clays (Liquid limit less than 50)		ML		Inorganic silts and very fine sands, rock floor, silty or clayey fine sands or clayey silts with slight plasticity	Plasticity Chart
			CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	
			OL		Organic silts and organic silty clays of low plasticity	
	Silts and Clays (Liquid limit greater than 50)		MH		Inorganic silts, micaceous or distomaceous fine sandy or silty soils, organic silts	
			CH		Inorganic clays of high plasticity, fat clays	
			OH		Organic clays of medium to high plasticity, organic silts	
	Highly Organic Soils		Pt		Peat and other highly organic soils	Von Post Classification Limit: Strong colour or odour, and often fibrous texture



Particle Size		Material
ASTM Sieve sizes	mm	
#10 to #4	2.00 to 4.75	Sand: Coarse
#40 to #10	0.425 to 2.00	Medium
#200 to #40	0.075 to 0.425	Fine
< #200	< 0.075	Silt or Clay

Particle Size		Material
ASTM Sieve Sizes	mm	
> 12 in.	> 300	Boulders
3 in. to 12 in.	75 to 300	Cobbles
3/4 in. to 3 in.	19 to 75	Gravel: Coarse
#4 to 3/4 in.	4.75 to 19	Fine

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

Other Symbol Types

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

EXPLANATION OF FIELD AND LABORATORY TESTING

LEGEND OF ABBREVIATIONS AND SYMBOLS

LL - Liquid Limit (%)
PL - Plastic Limit (%)
PI - Plasticity Index (%)
MC - Moisture Content (%)
SPT - Standard Penetration Test
RQD - Rock Quality Designation
Qu - Unconfined Compression
Su - Undrained Shear Strength
VW - Vibrating Wire Piezometer
SI - Slope Inclinometer

▽ Water Level at Time of Drilling

▼ Water Level at End of Drilling

▼ Water Level After Drilling as Indicated on Test Hole Logs

FRACTION OF SECONDARY SOIL CONSTITUENTS ARE BASED ON THE FOLLOWING TERMINOLOGY

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

TERMS DESCRIBING CONSISTENCY OR COMPACTION CONDITION

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

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

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

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

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

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

25-R-04 Local Street Renewal
Clarence/Boston Alley - Hudson St to Pembina Hwy
Summary Table - Sub-Surface Investigation

Test Hole No.	Test Hole Location	Pavement Surface		Pavement Structure Material		Subgrade Description	Sample Depth (m)		Moisture Content (%)	Grain Size Analysis				Atterberg Limits		
		Type	Thickness (mm)	Type	Thickness (mm)		Top (m)	Bottom (m)		Clay (%)	Silt (%)	Sand (%)	Gravel (%)	Plastic	Liquid	Plasticity Index
TH25-12	UTM : 5521932 N, 632762 E Located behind #1045 Boston Avenue, centreline of alley between Clarence Avenue and Boston Avenue	Asphalt	-	Concrete	-	Sand and Gravel (Fill), AASHTO: A-1 (I)	0.2	0.3	18							
						Clay (Fill), AASHTO: A-7-6 (65)	0.5	0.7	34							
						Clay (Fill), AASHTO: A-7-6 (65)	0.9	1.0	37	69	28	3	0	25	83	58
						Clay, AASHTO: A-7-6 (I)	1.2	1.3	33							
						Clay, AASHTO: A-7-6 (I)	1.5	1.7	40							
						Clay, AASHTO: A-7-6 (I)	1.9	2.1	44							
						Clay, AASHTO: A-7-6 (I)	2.4	2.6	44							
TH25-13	UTM : 5522012 N, 632909 E Located behind #1003 Boston Avenue, centreline of alley between Clarence Avenue and Boston Avenue	Asphalt	-	Concrete	-	Sand and Gravel (Fill), AASHTO: A-1 (I)	0.2	0.3	13							
						Clay (Fill), AASHTO: A-7-6 (I)	0.5	0.7	39							
						Clay (Fill), AASHTO: A-7-6 (I)	0.9	1.0	34							
						Clay, AASHTO: A-7-6 (I)	1.2	1.3	34							
						Clay, AASHTO: A-7-6 (I)	1.5	1.7	41							
						Clay, AASHTO: A-7-6 (I)	1.9	2.1	42							
						Silt, AASHTO: A-6 (I)	2.1	2.3	37							
						Clay, AASHTO: A-7-6 (I)	2.4	2.6	42							

www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

Moisture Content Report
ASTM D2216-98

Project No. 1000-043-29
Client WSP
Project 25-R-04 Local Street Renewal (Clarence/Boston Alley)

Sample Date 16-Jan-25
Test Date 29-Jan-25
Technician K Franklin

Test Hole	TH25-12	TH25-12	TH25-12	TH25-12	TH25-12	TH25-12
Depth (m)	0.2 - 0.3	0.5 - 0.7	0.9 - 1.0	1.2 - 1.3	1.5 - 1.7	1.9 - 2.1
Sample #	G73	G74	G75	G76	G77	G78
Tare ID	QT20	A	QT9	ZD07	ZD30	ZD31
Mass of tare	8.1	6.7	8.4	8.1	8.2	8.2
Mass wet + tare	252.3	230.5	451.0	241.3	217.2	249.8
Mass dry + tare	214.2	173.2	330.4	183.4	157.4	176.4
Mass water	38.1	57.3	120.6	57.9	59.8	73.4
Mass dry soil	206.1	166.5	322.0	175.3	149.2	168.2
Moisture %	18.5%	34.4%	37.5%	33.0%	40.1%	43.6%

Test Hole	TH25-12	TH25-13	TH25-13	TH25-13	TH25-13	TH25-13
Depth (m)	2.4 - 2.6	0.2 - 0.3	0.5 - 0.7	0.9 - 1.0	1.2 - 1.3	1.5 - 1.7
Sample #	G79	G80	G81	G82	G83	G84
Tare ID	QT14	N21	W34	QT42	QT5	B
Mass of tare	8.2	8.8	8.4	8.2	8.6	6.8
Mass wet + tare	227.4	222.2	201.8	219.0	434.2	233.6
Mass dry + tare	160.4	198.0	147.2	165.2	325.6	167.8
Mass water	67.0	24.2	54.6	53.8	108.6	65.8
Mass dry soil	152.2	189.2	138.8	157.0	317.0	161.0
Moisture %	44.0%	12.8%	39.3%	34.3%	34.3%	40.9%

Test Hole	TH25-13	TH25-13	TH25-13			
Depth (m)	1.9 - 2.1	2.1 - 2.3	2.4 - 2.6			
Sample #	G85	G86	G87			
Tare ID	Z23	H67	Z15			
Mass of tare	6.8	8.6	8.4			
Mass wet + tare	228.6	232.4	221.0			
Mass dry + tare	162.8	172.0	158.6			
Mass water	65.8	60.4	62.4			
Mass dry soil	156.0	163.4	150.2			
Moisture %	42.2%	37.0%	41.5%			

www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

Atterberg Limits
ASTM D4318-10e1

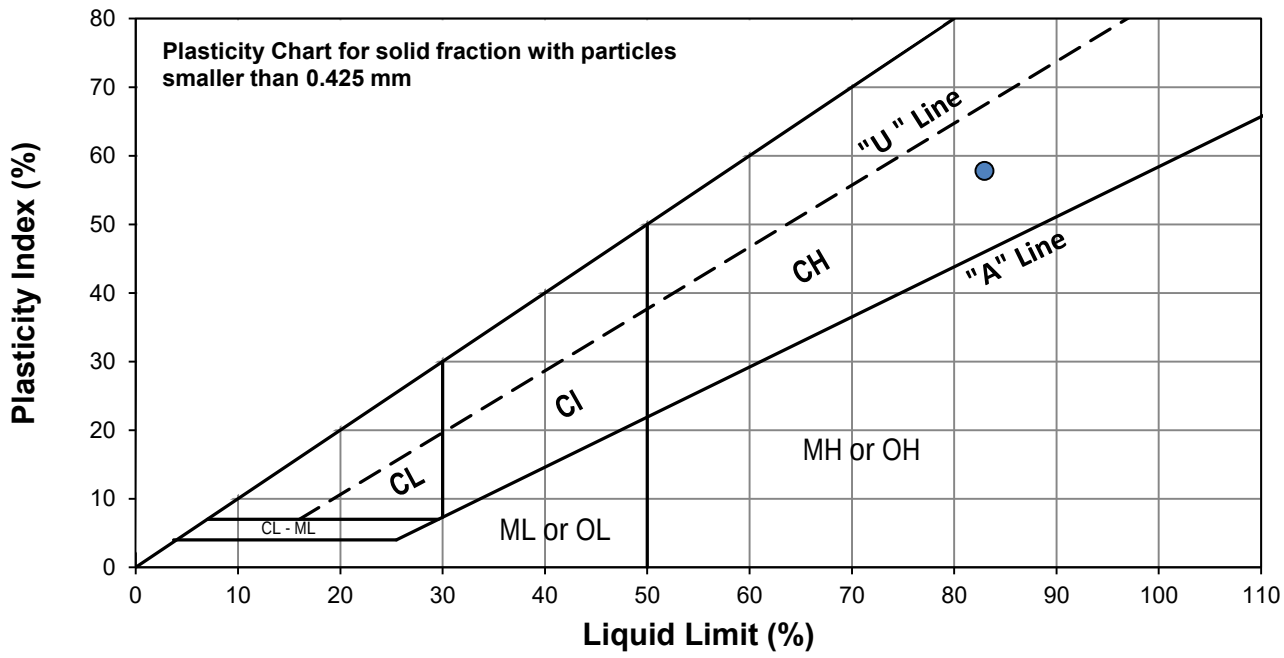
CERTIFIED BY CCIL Canadian Council of Independent Laboratories For specific tests as listed on www.ccil.com

Project No.	1000-043-29
Client	WSP
Project	25-R-04 Local Street Renewal (Clarence/Boston Alley)
Test Hole	
Sample #	TH25-12
Depth (m)	G75
Sample Date	0.9 - 1.0
Test Date	16-Jan-25
Technician	06-Feb-25
	A. Dustmamatov

Liquid Limit	83
Plastic Limit	25
Plasticity Index	58

Liquid Limit

Trial #	1	2	3		
Number of Blows (N)	18	24	35		
Mass Tare (g)	13.883	14.091	14.146		
Mass Wet Soil + Tare (g)	26.410	26.770	24.231		
Mass Dry Soil + Tare (g)	20.649	21.000	19.735		
Mass Water (g)	5.761	5.770	4.496		
Mass Dry Soil (g)	6.766	6.909	5.589		
Moisture Content (%)	85.146	83.514	80.444		



Plastic Limit

Trial #	1	2	3	4	5
Mass Tare (g)	13.982	13.917			
Mass Wet Soil + Tare (g)	21.318	21.767			
Mass Dry Soil + Tare (g)	19.845	20.182			
Mass Water (g)	1.473	1.585			
Mass Dry Soil (g)	5.863	6.265			
Moisture Content (%)	25.124	25.299			

Note: Additional information recorded/measured for this test is available upon request.

www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

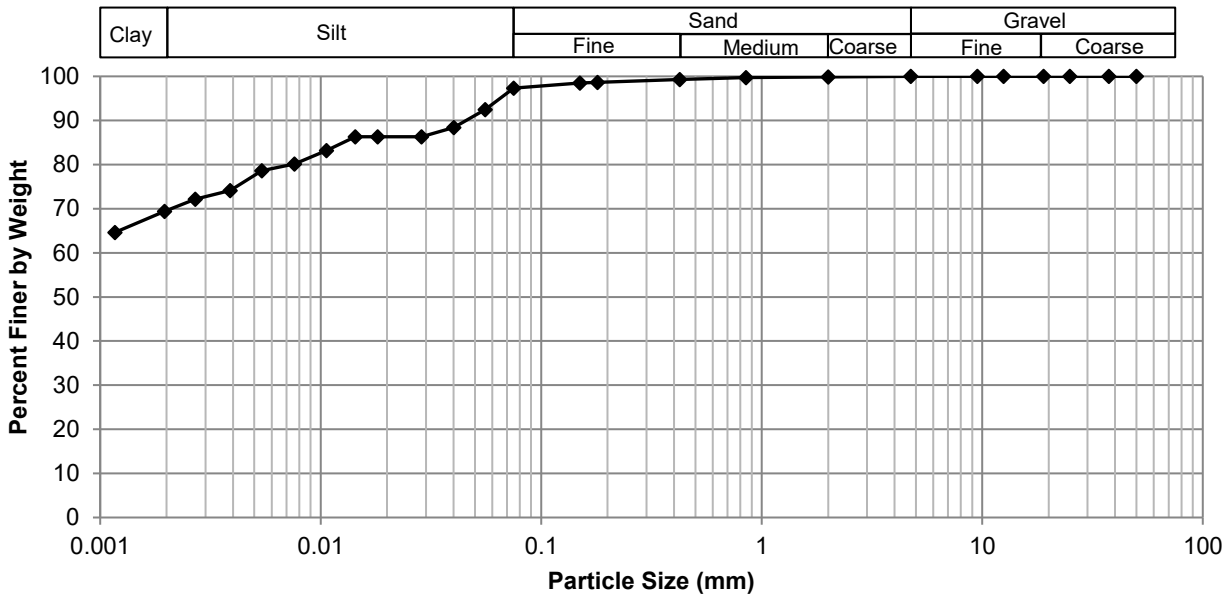
Grain Size Analysis (Hydrometer Method)
AASHTO T 88

Project No.	1000-043-29
Client	WSP
Project	25-R-04 Local Street Renewal (Clarence/Boston Alley)
Test Hole	TH25-12
Sample #	G75
Depth (m)	0.9 - 1.0
Sample Date	16-Jan-25
Test Date	05-Feb-25
Technician	A. Fidler-Kliewer

CERTIFIED BY CCIL Canadian Council of Independent Laboratories For specific tests as listed on www.ccil.com

Gravel	0.0%
Sand	2.7%
Silt	27.7%
Clay	69.6%

Particle Size Distribution Curve



Gravel		Sand		Silt and Clay	
Particle Size (mm)	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**
50.0	100.00	4.75	100.00	0.0750	97.33
37.5	100.00	2.00	99.87	0.0557	92.50
25.0	100.00	0.850	99.70	0.0402	88.44
19.0	100.00	0.425	99.29	0.0287	86.31
12.5	100.00	0.180	98.66	0.0181	86.31
9.50	100.00	0.150	98.49	0.0143	86.31
4.75	100.00	0.075	97.33	0.0106	83.19
				0.0076	80.13
				0.0054	78.63
				0.0039	74.13
				0.0027	72.19
				0.0020	69.44
				0.0012	64.64

www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

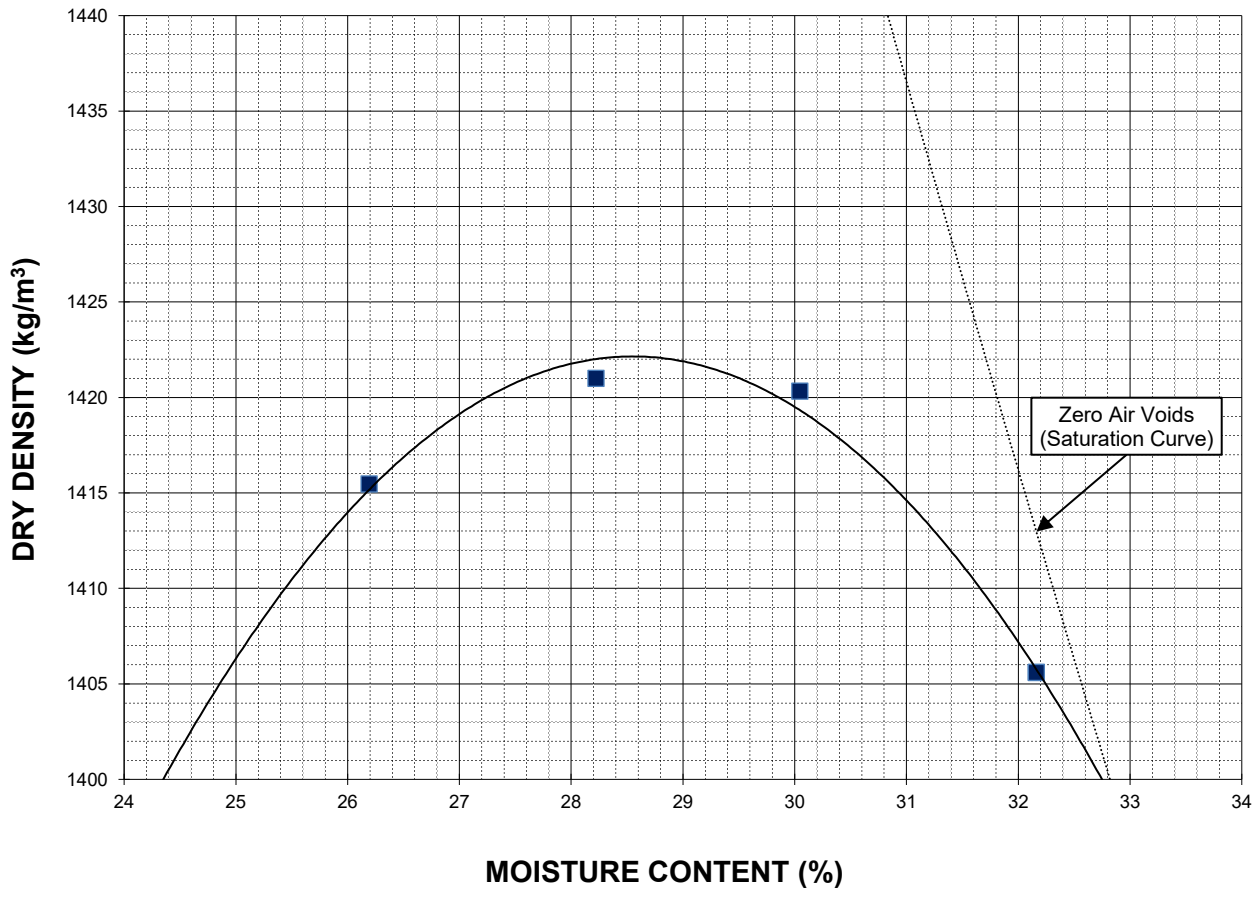
Standard Proctor Compaction Test

ASTM D698-12e2

Project No.	1000-043-29
Client	WSP
Project	25-R-04 Local Street Renewal (Clarence/Boston Alley)
Sample #	B148
Source	TH25-12 & TH25-13 (0.8m to 2.1m)
Material	Clay
Sample Date	16-Jan-25
Test Date	21-Jan-25
Technician	A. Dustmamatov

Maximum Dry Density (kg/m3)	1422
Optimum Moisture (%)	28.6

Trial Number	1	2	3	4	
Wet Density (kg/m^3)	1786	1822	1847	1858	
Dry Density (kg/m^3)	1415	1421	1420	1406	
Moisture Content (%)	26.2	28.2	30.0	32.2	



Note: Additional information recorded/measured for this test is available upon request.

www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

California Bearing Ratio Test Data Sheet

ASTM D1883-16

Project No.	1000-043-29	**Source**	TH25-12 & TH25-13 (0.8m to 2.1m)
Client	WSP	**Material**	Clay
Project	25-R-04 Local Street Renewal (Clarence/Boston Alley)	**Sample Date**	16-Jan-25
		Test Date	23-Jan-25
Sample #	B148	**Technician**	A. Dustmamatov

Proctor Results (ASTM D698)

Maximum Dry Density	1422	kg/m3
Optimum Moisture Content	28.6	%
Material Retained on 19 mm Sieve	0.0	%

CBR Sample Compaction

Dry Density	1352	kg/m3
Initial Moisture Content	28.8	%
Relative Density	95.0	% SPMDD

Soaking Results

Surcharge	4.54	kg
Swell	2.3	%
Moisture Content in top 25 mm	44.8	%
Immersion Period	96	h

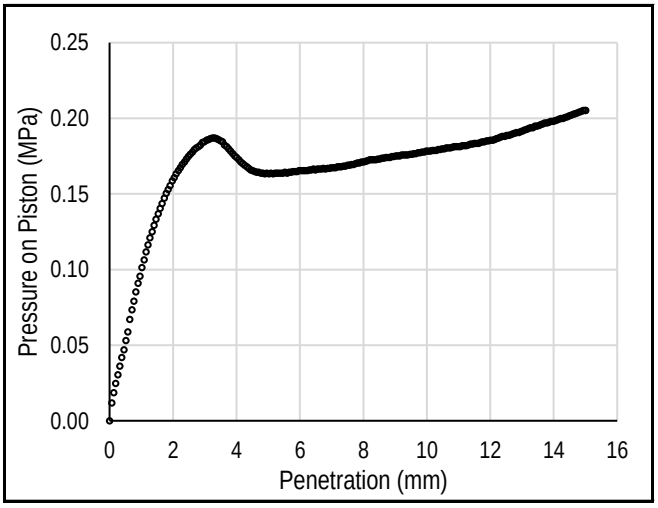
CBR Results

CBR at 2.54 mm	2.6	%
CBR at 5.08 mm	1.6	%
Zero Correction	0	mm

Test Data

Penetration (mm)	Measured Pressure (MPa)	Corrected Pressure (MPa)
0.64	0.07	0.07
1.27	0.12	0.12
1.91	0.16	0.16
2.54	0.18	0.18
3.18	0.19	0.19
3.81	0.18	0.18
4.45	0.17	0.17
5.08	0.16	0.16
7.62	0.17	0.17
10.16	0.18	0.18
12.70	0.19	0.19

Load/Penetration Curve



Comments:

Appendix E

Test Hole Logs, Summary Table, and Lab Testing Results

Clarence/Howard Alley – Hudson St. to Pembina Hwy

Sub-Surface Log

Test Hole TH25-14
1 of 1

Client:	WSP	**Project Number:**	1000-043-29
Project Name:	25-R-04 Local Street Renewal (Clarence/Howard Alley)	**Location:**	UTM N-5522096, E-632876
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement m (local datum)
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	January 16, 2025

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

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number
		SAND and GRAVEL (FILL) - trace silt - light brown - frozen, moist and compact when thawed - poorly graded fine grained sand to gravel (<25 mm diam.), angular crushed limestone - AASHTO: A-1(I)		G88
0.5		CLAY (TOPSOIL) - silty, some organics, trace sand - black, frozen, moist and firm when thawed - intermediate plasticity - AASHTO: A-7-5(I)		G89
		CLAY - silty - dark grey - frozen to 1.1 m, moist and firm when thawed - high plasticity - AASHTO: A-7-5(I)		G90
1.0		- dark brown, stiff to very stiff below 1.1 m		G91
1.5				G92
2.0				G93
2.5		SILT - clayey - brown, moist, firm to stiff, low to intermediate plasticity - AASHTO: A-6(I)		G94
		CLAY - silty - brown - moist, stiff - high plasticity - AASHTO: A-7-5(I)		
3.0		END TEST HOLE AT 3.0 m IN CLAY.		

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21

Particle Size (%): 0 20 40 60 80 100

PL MC LL: 0 20 40 60 80 100

Undrained Shear Strength (kPa): 0 50 100 150 200 250

Test Type: △ Torvane △ | ✤ Pocket Pen. ✤ | ☒ Qu ☒ | ○ Field Vane ○

Notes:
1. Seepage or sloughing not observed.
2. Test hole open to 3.0 m depth immediately after drilling.
3. Test hole backfilled with cuttings, granular fill and cold patch asphalt.
4. Bulk samples were collected between 0.8 m and 2.1 m depth (B149).
5. Test hole located behind #1030 Howard Avenue, centreline of alley between Clarence Avenue and Howard Avenue.

Logged By: Kate Franklin **Reviewed By:** Angela Fidler-Kliewer **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2025-01-23 25-R-04 LOCAL STREETS - HOWARD 0_A_KF 1000-043-29.GPJ TREK.GDT 2/18/25

Sub-Surface Log

Test Hole TH25-15

Client:	WSP	**Project Number:**	1000-043-29
Project Name:	25-R-04 Local Street Renewal (Clarence/Howard Alley)	**Location:**	UTM N-5522046, E-632785
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement m (local datum)
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	January 16, 2025

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

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL	Undrained Shear Strength (kPa) 0 50 100 150 200 250
		SAND and GRAVEL (FILL) - trace silt - light brown - frozen, moist and compact when thawed - poorly graded fine grained sand to gravel (<25 mm diam.), angular crushed limestone - AASHTO: A-1(I)		G95		
0.5		CLAY (TOPSOIL) - silty, some organics, trace sand - black, frozen, moist and firm when thawed - intermediate plasticity - AASHTO: A-7-5(I)		G96		
1.0		CLAY - silty - dark grey - frozen to 1.1 m, moist and firm when thawed - high plasticity - AASHTO: A-7-5(72)		G97		
		- very stiff below 1.2 m		G98		
1.5		- stiff below 1.5 m		G99		
2.0		- brown below 1.8 m		G100		
		- silt layer 50 mm thick at 2.1 m				
2.5				G101		
3.0		END TEST HOLE AT 3.0 m IN CLAY.				

Notes:
1. Seepage or sloughing not observed.
2. Test hole open to 3.0 m depth immediately after drilling.
3. Test hole backfilled with cuttings, granular fill and cold patch asphalt.
4. Bulk samples were collected between 0.9 m and 2.1 m depth (B149).
5. Test hole located behind #1066 Howard Avenue, centreline of alley between Clarence Avenue and Howard Avenue.

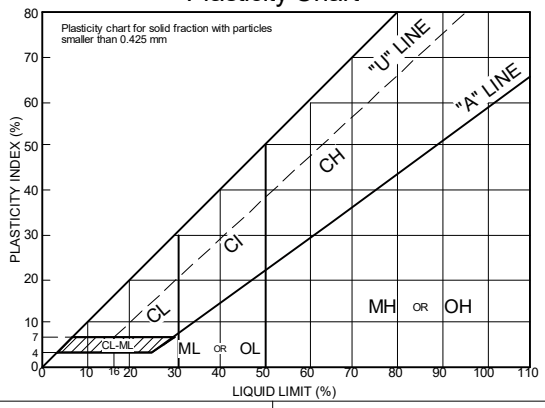
Logged By: Kate Franklin **Reviewed By:** Angela Fidler-Kliewer **Project Engineer:** Nelson Ferreira

EXPLANATION OF FIELD AND LABORATORY TESTING

GENERAL NOTES

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

Major Divisions			USCS Classification	Symbols	Typical Names	Laboratory Classification Criteria
Coarse-Grained soils (More than half the material is larger than No. 200 sieve size)	Gravels (More than half of coarse fraction is larger than 4.75 mm)	Clean gravel (Little or no fines)	GW		Well-graded gravels, gravel-sand mixtures, little or no fines	Determine percentages of sand and gravel from grain size curve, depending on percentage of fines (fraction smaller than No. 200 sieve) coarse-grained soils are classified as follows: Less than 5 percent..... GW, GP, SW, SP; More than 12 percent..... GM, GC, SM, SC; 6 to 12 percent..... Borderline case4s requiring dual symbols*
			GP		Poorly-graded gravels, gravel-sand mixtures, little or no fines	$C_U = \frac{D_{60}}{D_{10}}$ greater than 4; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
		Gravel with fines (Appreciable amount of fines)	GM		Silty gravels, gravel-sand-silt mixtures	Not meeting all gradation requirements for GW
			GC		Clayey gravels, gravel-sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4; Atterberg limits above "A" line or P.I. greater than 7; Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
	Sands (More than half of coarse fraction is smaller than 4.75 mm)	Clean sands (Little or no fines)	SW		Well-graded sands, gravelly sands, little or no fines	$C_U = \frac{D_{60}}{D_{10}}$ greater than 6; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
			SP		Poorly-graded sands, gravelly sands, little or no fines	Not meeting all gradation requirements for SW
		Sands with fines (Appreciable amount of fines)	SM		Silty sands, sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4; Atterberg limits above "A" line or P.I. greater than 7; Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
			SC		Clayey sands, sand-clay mixtures	
Fine-Grained soils (More than half the material is smaller than No. 200 sieve size)	Silts and Clays (Liquid limit less than 50)		ML		Inorganic silts and very fine sands, rock floor, silty or clayey fine sands or clayey silts with slight plasticity	Plasticity Chart
			CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	
			OL		Organic silts and organic silty clays of low plasticity	
	Silts and Clays (Liquid limit greater than 50)		MH		Inorganic silts, micaceous or distomaceous fine sandy or silty soils, organic silts	
			CH		Inorganic clays of high plasticity, fat clays	
			OH		Organic clays of medium to high plasticity, organic silts	
	Highly Organic Soils		Pt		Peat and other highly organic soils	Von Post Classification Limit: Strong colour or odour, and often fibrous texture



Particle Size		Material
ASTM Sieve sizes	mm	
#10 to #4	2.00 to 4.75	Sand: Coarse
#40 to #10	0.425 to 2.00	Medium
#200 to #40	0.075 to 0.425	Fine
< #200	< 0.075	Silt or Clay

Particle Size		Material
ASTM Sieve Sizes	mm	
> 12 in.	> 300	Boulders
3 in. to 12 in.	75 to 300	Cobbles
3/4 in. to 3 in.	19 to 75	Gravel: Coarse
#4 to 3/4 in.	4.75 to 19	Fine

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

Other Symbol Types

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

EXPLANATION OF FIELD AND LABORATORY TESTING

LEGEND OF ABBREVIATIONS AND SYMBOLS

LL - Liquid Limit (%)
PL - Plastic Limit (%)
PI - Plasticity Index (%)
MC - Moisture Content (%)
SPT - Standard Penetration Test
RQD - Rock Quality Designation
Qu - Unconfined Compression
Su - Undrained Shear Strength
VW - Vibrating Wire Piezometer
SI - Slope Inclinometer

▽ Water Level at Time of Drilling

▼ Water Level at End of Drilling

▼ Water Level After Drilling as Indicated on Test Hole Logs

FRACTION OF SECONDARY SOIL CONSTITUENTS ARE BASED ON THE FOLLOWING TERMINOLOGY

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

TERMS DESCRIBING CONSISTENCY OR COMPACTION CONDITION

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

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

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

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

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

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

25-R-04 Local Street Renewal
Clarence/Howard Alley - Hudson St to Pembina Hwy
Summary Table - Sub-Surface Investigation

Test Hole No.	Test Hole Location	Pavement Surface		Pavement Structure Material		Subgrade Description	Sample Depth (m)		Moisture Content (%)	Grain Size Analysis				Atterberg Limits		
		Type	Thickness (mm)	Type	Thickness (mm)		Top (m)	Bottom (m)		Clay (%)	Silt (%)	Sand (%)	Gravel (%)	Plastic	Liquid	Plasticity Index
TH25-14	UTM : 5522096 N, 632876 E Located behind #1030 Howard Avenue, centreline of alley between Clarence Avenue and Howard Avenue	Asphalt	-	Concrete	-	Sand and Gravel (Fill), AASHTO: A-1 (I)	0.2	0.3	21							
						Clay (Topsoil), AASHTO: A-7-5 (I)	0.5	0.7	40							
						Clay, AASHTO: A-7-5 (I)	0.9	1.0	37							
						Clay, AASHTO: A-7-5 (I)	1.2	1.3	31							
						Clay, AASHTO: A-7-5 (I)	1.5	1.7	42							
						Clay, AASHTO: A-7-5 (I)	1.9	2.1	43							
						Silt, AASHTO: A-6 (I)	2.4	2.6	41							
TH25-15	UTM : 5522046 N, 632785 E Located behind #1066 Howard Avenue, centreline of alley between Clarence Avenue and Howard Avenue	Asphalt	-	Concrete	-	Sand and Gravel (Fill), AASHTO: A-1 (I)	0.2	0.3	10							
						Clay (Topsoil), AASHTO: A-7-5 (72)	0.6	0.8	37							
						Clay, AASHTO: A-7-5 (72)	0.9	1.0	38	78	19	2	0	30	93	63
						Clay, AASHTO: A-7-5 (72)	1.2	1.3	36							
						Clay, AASHTO: A-7-5 (72)	1.5	1.7	40							
						Clay, AASHTO: A-7-5 (72)	1.9	2.1	44							
						Clay, AASHTO: A-7-5 (72)	2.4	2.6	45							

www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

Moisture Content Report
ASTM D2216-98

Project No. 1000-043-29
Client WSP
Project 25-R-04 Local Street Renewal (Clarence/Howard Alley)

Sample Date 16-Jan-25
Test Date 30-Jan-25
Technician K Franklin

Test Hole	TH25-14	TH25-14	TH25-14	TH25-14	TH25-14	TH25-14
Depth (m)	0.2 - 0.3	0.5 - 0.7	0.9 - 1.0	1.2 - 1.3	1.5 - 1.7	1.9 - 2.1
Sample #	G88	G89	G90	G91	G92	G93
Tare ID	I67	ZD24	ZD29	QT56	QT49	D230
Mass of tare	6.8	8.4	8.2	8.0	8.2	6.8
Mass wet + tare	212.8	212.8	228.8	243.4	203.8	230.2
Mass dry + tare	177.0	154.2	169.8	187.6	146.4	162.8
Mass water	35.8	58.6	59.0	55.8	57.4	67.4
Mass dry soil	170.2	145.8	161.6	179.6	138.2	156.0
Moisture %	21.0%	40.2%	36.5%	31.1%	41.5%	43.2%

Test Hole	TH25-14	TH25-15	TH25-15	TH25-15	TH25-15	TH25-15
Depth (m)	2.4 - 2.6	0.2 - 0.3	0.6 - 0.8	0.9 - 1.0	1.2 - 1.3	1.5 - 1.7
Sample #	G94	G95	G96	G97	G98	G99
Tare ID	H46	QW4	E92	B25	MD	E93
Mass of tare	6.8	6.6	6.6	6.8	7.4	7.0
Mass wet + tare	219.8	202.0	204.0	458.6	219.2	214.2
Mass dry + tare	158.0	184.0	151.0	334.0	163.4	155.2
Mass water	61.8	18.0	53.0	124.6	55.8	59.0
Mass dry soil	151.2	177.4	144.4	327.2	156.0	148.2
Moisture %	40.9%	10.1%	36.7%	38.1%	35.8%	39.8%

Test Hole	TH25-15	TH25-15				
Depth (m)	1.9 - 2.1	2.4 - 2.6				
Sample #	G100	G101				
Tare ID	ZD	ZD01				
Mass of tare	6.8	6.8				
Mass wet + tare	239.6	214.2				
Mass dry + tare	168.0	150.2				
Mass water	71.6	64.0				
Mass dry soil	161.2	143.4				
Moisture %	44.4%	44.6%				

www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

Atterberg Limits
ASTM D4318-10e1

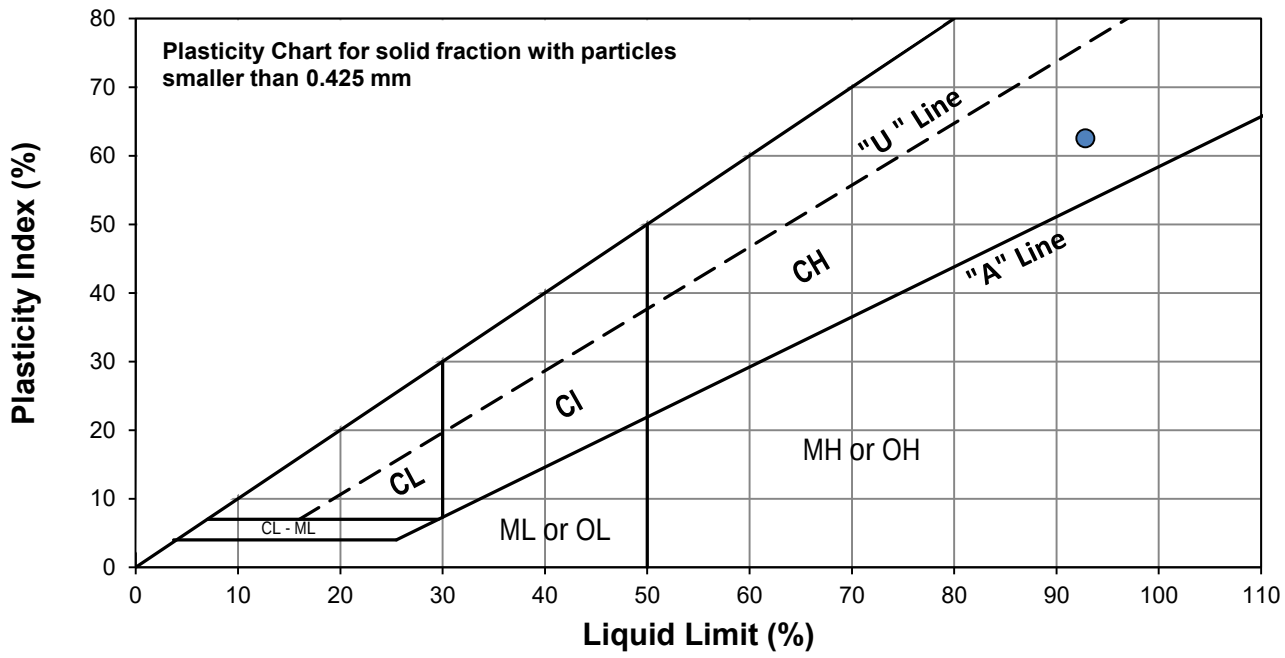
CERTIFIED BY CCIL Canadian Council of Independent Laboratories For specific tests as listed on www.ccil.com

Project No.	1000-043-29
Client	WSP
Project	25-R-04 Local Street Renewal (Clarence/Howard Alley)
Test Hole	TH25-15
Sample #	G97
Depth (m)	0.9 - 1.1
Sample Date	16-Jan-25
Test Date	05-Feb-25
Technician	K. Franklin

Liquid Limit	93
Plastic Limit	30
Plasticity Index	63

Liquid Limit

Trial #	1	2	3		
Number of Blows (N)	17	26	32		
Mass Tare (g)	13.841	13.822	14.116		
Mass Wet Soil + Tare (g)	22.461	22.883	22.603		
Mass Dry Soil + Tare (g)	18.256	18.527	18.553		
Mass Water (g)	4.205	4.356	4.050		
Mass Dry Soil (g)	4.415	4.705	4.437		
Moisture Content (%)	95.243	92.582	91.278		



Plastic Limit

Trial #	1	2	3	4	5
Mass Tare (g)	14.140	13.937			
Mass Wet Soil + Tare (g)	25.540	21.125			
Mass Dry Soil + Tare (g)	22.904	19.443			
Mass Water (g)	2.636	1.682			
Mass Dry Soil (g)	8.764	5.506			
Moisture Content (%)	30.078	30.548			

Note: Additional information recorded/measured for this test is available upon request.

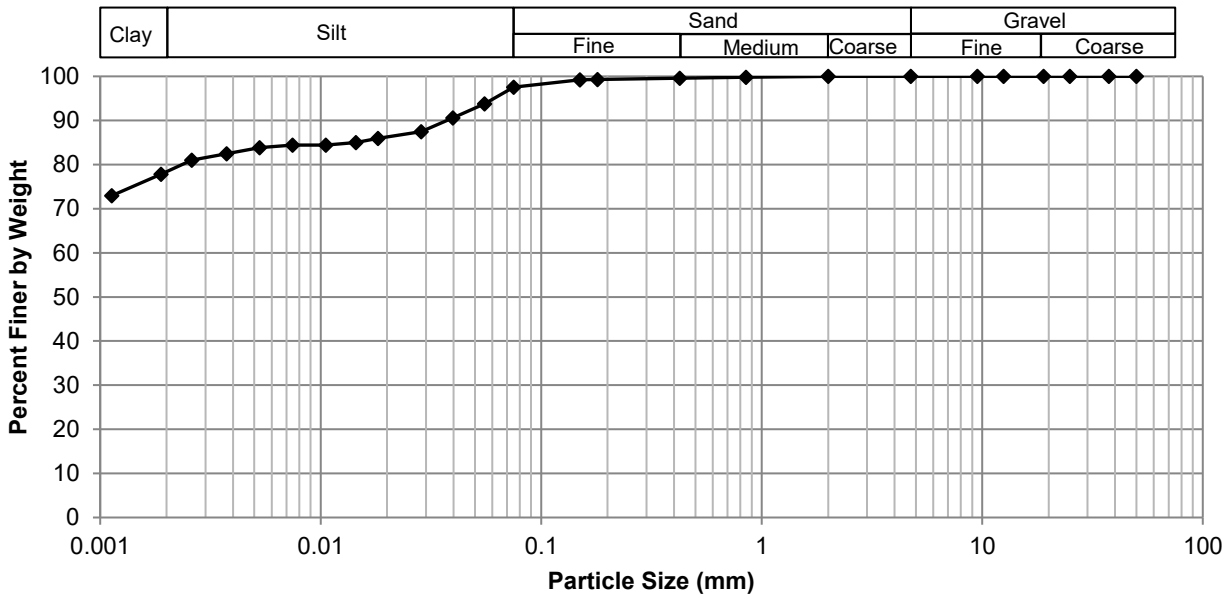
www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

Grain Size Analysis (Hydrometer Method)
AASHTO T 88

Project No.	1000-043-29
Client	WSP
Project	25-R-04 Local Street Renewal (Clarence/Howard Alley)
Test Hole	TH25-15
Sample #	G97
Depth (m)	0.9 - 1.1
Sample Date	16-Jan-25
Test Date	05-Feb-25
Technician	A. Fidler-Kliewer

Gravel	0.0%
Sand	2.4%
Silt	19.2%
Clay	78.4%

Particle Size Distribution Curve



Gravel		Sand		Silt and Clay	
Particle Size (mm)	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**
50.0	100.00	4.75	100.00	0.0750	97.55
37.5	100.00	2.00	100.00	0.0554	93.75
25.0	100.00	0.850	99.81	0.0398	90.62
19.0	100.00	0.425	99.62	0.0286	87.49
12.5	100.00	0.180	99.30	0.0182	85.93
9.50	100.00	0.150	99.20	0.0144	85.03
4.75	100.00	0.075	97.55	0.0106	84.41
				0.0075	84.45
				0.0053	83.87
				0.0037	82.43
				0.0026	81.04
				0.0019	77.86
				0.0011	72.97

www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

Standard Proctor Compaction Test

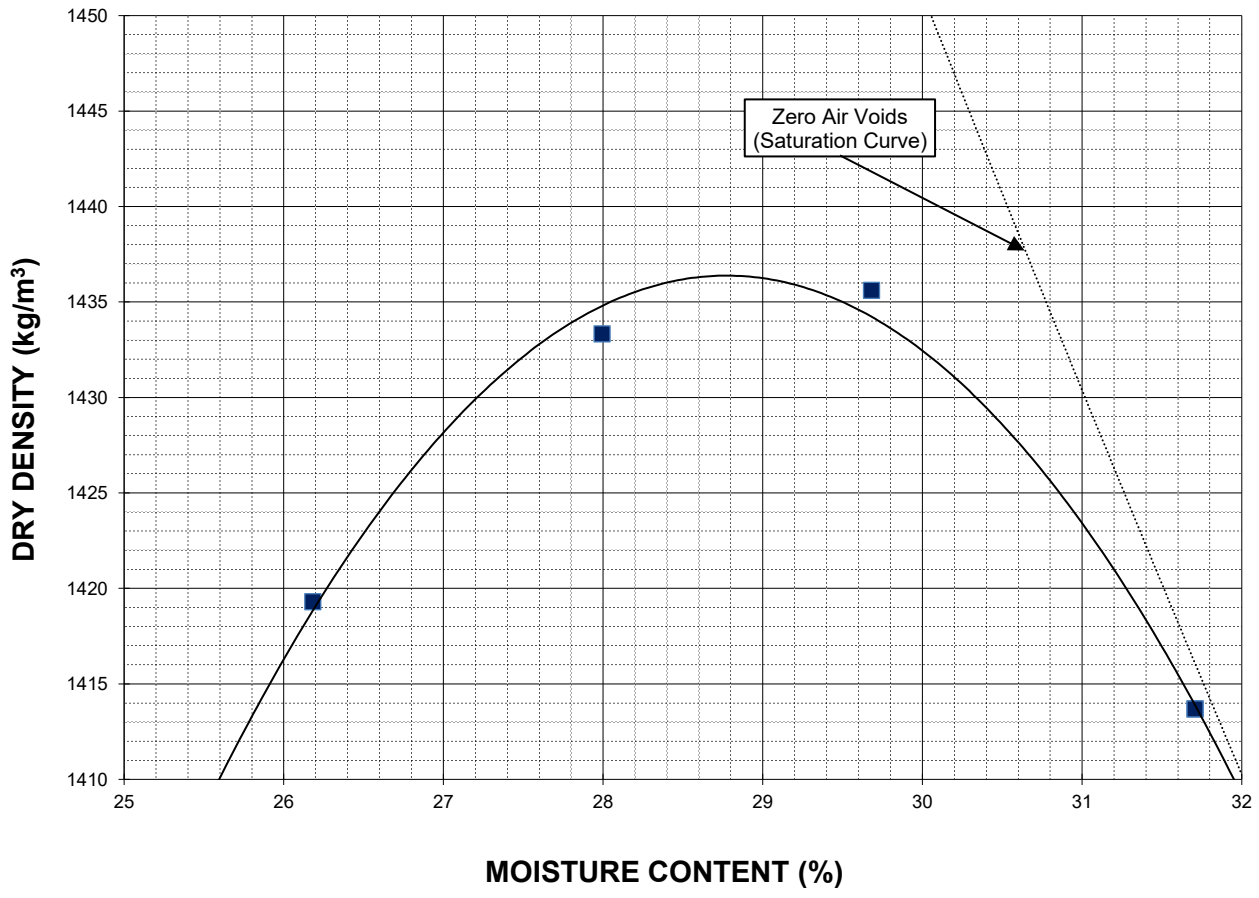
ASTM D698-12e2

CERTIFIED BY CCIL Canadian Council of Independent Laboratories For specific tests as listed on www.ccil.com

Project No.	1000-043-29
Client	WSP
Project	25-R-04 Local Street Renewal (Clarence/Howard Alley)
Sample #	B149
Source	TH25-14 & TH25-15 (0.8m to 2.1m)
Material	Clay
Sample Date	16-Jan-25
Test Date	21-Jan-25
Technician	A. Dustmamatov

Maximum Dry Density (kg/m3)	1436
Optimum Moisture (%)	28.8

Trial Number	1	2	3	4	
Wet Density (kg/m^3)	1791	1835	1862	1862	
Dry Density (kg/m^3)	1419	1433	1436	1414	
Moisture Content (%)	26.2	28.0	29.7	31.7	



Note: Additional information recorded/measured for this test is available upon request.

www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

California Bearing Ratio Test Data Sheet

ASTM D1883-16

Project No.	1000-043-29	**Source**	TH25-14 & TH25-15 (0.8m to 2.1m)
Client	WSP	**Material**	Clay
Project	25-R-04 Local Street Renewal (Clarence/Howard Alley)	**Sample Date**	16-Jan-25
		Test Date	23-Jan-25
Sample #	B149	**Technician**	A. Dustmamatov

Proctor Results (ASTM D698)

Maximum Dry Density	1436	kg/m3
Optimum Moisture Content	28.8	%
Material Retained on 19 mm Sieve	0.0	%

CBR Sample Compaction

Dry Density	1361	kg/m3
Initial Moisture Content	29.3	%
Relative Density	94.8	% SPMDD

Soaking Results

Surcharge	4.54	kg
Swell	2.1	%
Moisture Content in top 25 mm	42.2	%
Immersion Period	96	h

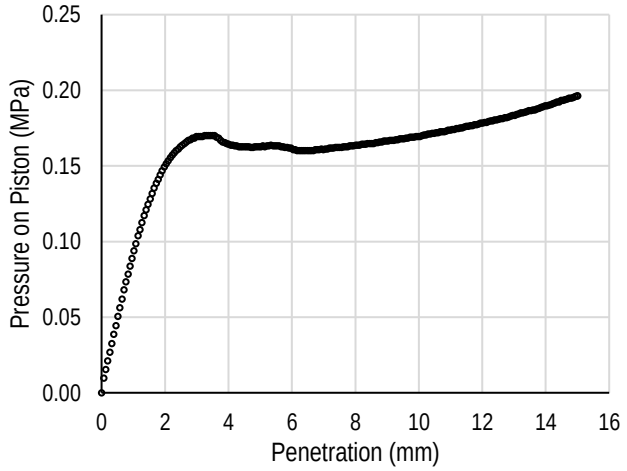
CBR Results

CBR at 2.54 mm	2.4	%
CBR at 5.08 mm	1.6	%
Zero Correction	0	mm

Test Data

Penetration (mm)	Measured Pressure (MPa)	Corrected Pressure (MPa)
0.64	0.06	0.06
1.27	0.11	0.11
1.91	0.15	0.15
2.54	0.16	0.16
3.18	0.17	0.17
3.81	0.17	0.17
4.45	0.16	0.16
5.08	0.16	0.16
7.62	0.16	0.16
10.16	0.17	0.17
12.70	0.18	0.18

Load/Penetration Curve



Comments:

Appendix F

Test Hole Logs, Summary Table, Lab Testing Results and Pavement Core Photos

Walker/Kylemore Alley – Nassau St to Osborne St

Sub-Surface Log

Test Hole TH25-16
1 of 1

Client:	WSP	**Project Number:**	1000-043-29
Project Name:	25-R-04 Local Street Renewal (Walker/Kylemore Alley)	**Location:**	UTM N-5524967, E-633973
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement m (local datum)
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	January 23, 2025

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

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number
		CONCRETE		
		SAND and GRAVEL (FILL) - trace silt, light brown, frozen, moist and compact when thawed, poorly graded fine grained sand to gravel (<25 mm diam.), angular crushed limestone. AASHTO: A-1(I)		G102
0.5		CLAY (FILL) - silty, trace sand - dark grey - frozen, moist and firm when thawed - high plasticity - AASHTO: A-7-6(I)		G103
1.0		CLAY - silty, brown - frozen, moist and firm when thawed, high plasticity - AASHTO: A-7-6(I)		G104
		SILT - some clay, light brown, frozen to 1.1 m, moist and firm when thawed - low to intermediate plasticity - AASHTO: A-6(I)		G105
1.5		CLAY - silty - brown - moist, stiff to very stiff - high plasticity - AASHTO: A-7-6(I) - trace silt pockets <50 mm diam. between 1.4 and 1.5 m		G106 G107
2.0		- firm to stiff below 2.1 m		G108
2.5				G109
3.0		END TEST HOLE AT 3.0 m IN CLAY.		

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21
Particle Size (%): 0 20 40 60 80 100
PL MC LL: 0 20 40 60 80 100
Undrained Shear Strength (kPa): 0 50 100 150 200 250
Test Type: △ Torvane △ | ✿ Pocket Pen. ✿ | ☒ Qu ☒ | ○ Field Vane ○

Notes:
1. Seepage or sloughing not observed.
2. Test hole open to 3.0 m depth immediately after drilling.
3. Test hole backfilled with cuttings, granular fill and cold patch asphalt.
4. Bulk samples were collected between 1.2 m and 2.1 m depth (B150).
5. Test hole located behind #514 Kylemore Avenue, centreline of alley between Kylemore Avenue and Walker Avenue.

Logged By: Kate Franklin **Reviewed By:** Angela Fidler-Kliewer **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2025-01-23 25-R-04 LOCAL STREETS - KYLEMORE 0_A_KF 1000-043-29.GPJ TREK.GDT 2/19/25

Sub-Surface Log

Test Hole TH25-19

Client: WSP
Project Number: 1000-043-29
Project Name: 25-R-04 Local Street Renewal (Walker/Kylemore Alley)
Location: UTM N-5525031, E-634110
Contractor: Maple Leaf Drilling
Ground Elevation: Top of Pavement m (local datum)
Method: 125mm Solid Stem Auger, B40 Mobile Truck Mount
Date Drilled: January 23, 2025

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

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number
		CONCRETE		
		SAND and GRAVEL (FILL) - trace silt, light brown, frozen, moist and compact when thawed, poorly graded fine grained sand to gravel (<25 mm diam.), angular crushed limestone. AASHTO: A-1(I)		G124
0.5		CLAY (TOPSOIL) - silty, some organics, trace sand - black - frozen, moist and stiff when thawed - intermediate to high plasticity - AASHTO: A-7-6(I)		G125
1.0		CLAY - silty - grey - frozen to 1.2 m, moist and firm when thawed - high plasticity - AASHTO: A-7-6(I) - very stiff below 1.2		G126
				G127
1.5		SILT - some clay - light brown - moist, firm to stiff - low to intermediate plasticity - AASHTO: A-6(I)		G128
2.0		CLAY - silty - brown - moist, stiff - high plasticity - AASHTO: A-7-6(I)		G129
2.5		SILT - some clay - light brown - moist, firm - low to intermediate plasticity - AASHTO: A-6(I)		G130
3.0		END TEST HOLE AT 3.0 m IN SILT		

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21
Particle Size (%): 0 20 40 60 80 100
PL MC LL: 0 20 40 60 80 100
Undrained Shear Strength (kPa): 0 50 100 150 200 250
Test Type: △ Torvane △ | ✤ Pocket Pen. ✤ | ☒ Qu ☒ | ○ Field Vane ○

Notes:
1. Seepage or sloughing not observed.
2. Test hole open to 3.0 m depth immediately after drilling.
3. Test hole backfilled with cuttings, granular fill and cold patch asphalt.
4. Bulk samples were collected between 0.8m and 1.4 m and between 1.9 m and 2.1 m depth (B150).
5. Test hole located beside garage #479 Kylemore Avenue, centreline of alley behind #655 Osborne Street.

Logged By: Kate Franklin **Reviewed By:** Angela Fidler-Kliewer **Project Engineer:** Nelson Ferreira

Sub-Surface Log

Test Hole TH25-20

Client:	WSP	**Project Number:**	1000-043-29
Project Name:	25-R-04 Local Street Renewal (Walker/Kylemore Alley)	**Location:**	UTM N-5525024, E-634083
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement m (local datum)
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	January 23, 2025

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

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL	Undrained Shear Strength (kPa) 0 50 100 150 200 250
		CONCRETE				
		SAND and GRAVEL (FILL) - trace silt, light brown, frozen, moist and compact when thawed, poorly graded fine grained sand to gravel (<25 mm diam.), angular crushed limestone. AASHTO: A-1(I)		G131		
0.5		CLAY (TOPSOIL) - silty, some organics, trace sand - black - frozen, moist and firm when thawed - intermediate to high plasticity - AASHTO: A-7-6(I)		G132		
1.0		CLAY - silty - dark grey - frozen to 1.1 m, moist and firm when thawed - high plasticity - AASHTO: A-7-6(49)		G133		
		- very stiff below 1.2 m		G134		
1.5		- brown, stiff below 1.5 m		G135		
2.0				G136		
2.5				G137		
3.0						

END TEST HOLE AT 3.0 m IN CLAY.

Notes:
1. Seepage or sloughing not observed.
2. Test hole open to 3.0 m depth immediately after drilling.
3. Test hole backfilled with cuttings, granular fill and cold patch asphalt.
4. Bulk samples were collected between 0.9 m and 2.1 m depth (B150).
5. Test hole located behind #484 Kylemore Avenue, centreline of alley between Walker Avenue and Kylemore Avenue.

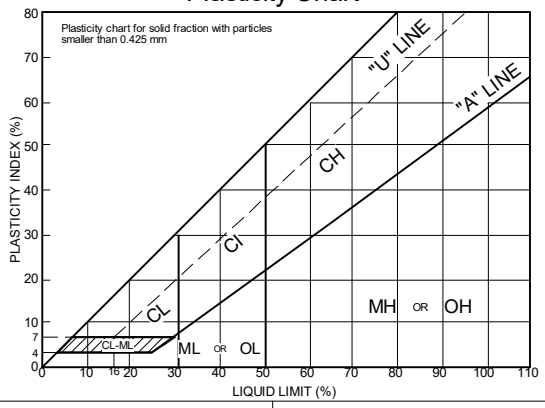
Logged By: Kate Franklin **Reviewed By:** Angela Fidler-Kliewer **Project Engineer:** Nelson Ferreira

EXPLANATION OF FIELD AND LABORATORY TESTING

GENERAL NOTES

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

Major Divisions			USCS Classification	Symbols	Typical Names	Laboratory Classification Criteria
Coarse-Grained soils (More than half the material is larger than No. 200 sieve size)	Gravels (More than half of coarse fraction is larger than 4.75 mm)	Clean gravel (Little or no fines)	GW		Well-graded gravels, gravel-sand mixtures, little or no fines	Determine percentages of sand and gravel from grain size curve, depending on percentage of fines (fraction smaller than No. 200 sieve) coarse-grained soils are classified as follows: Less than 5 percent..... GW, GP, SW, SP; More than 12 percent..... GM, GC, SM, SC; 6 to 12 percent..... Borderline case4s requiring dual symbols*
			GP		Poorly-graded gravels, gravel-sand mixtures, little or no fines	$C_U = \frac{D_{60}}{D_{10}}$ greater than 4; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
		Gravel with fines (Appreciable amount of fines)	GM		Silty gravels, gravel-sand-silt mixtures	Not meeting all gradation requirements for GW
			GC		Clayey gravels, gravel-sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4; Atterberg limits above "A" line or P.I. greater than 7; Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
	Sands (More than half of coarse fraction is smaller than 4.75 mm)	Clean sands (Little or no fines)	SW		Well-graded sands, gravelly sands, little or no fines	$C_U = \frac{D_{60}}{D_{10}}$ greater than 6; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
			SP		Poorly-graded sands, gravelly sands, little or no fines	Not meeting all gradation requirements for SW
		Sands with fines (Appreciable amount of fines)	SM		Silty sands, sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4; Atterberg limits above "A" line or P.I. greater than 7; Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
			SC		Clayey sands, sand-clay mixtures	
Fine-Grained soils (More than half the material is smaller than No. 200 sieve size)	Silts and Clays (Liquid limit less than 50)		ML		Inorganic silts and very fine sands, rock floor, silty or clayey fine sands or clayey silts with slight plasticity	Plasticity Chart
			CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	
			OL		Organic silts and organic silty clays of low plasticity	
	Silts and Clays (Liquid limit greater than 50)		MH		Inorganic silts, micaceous or distomaceous fine sandy or silty soils, organic silts	
			CH		Inorganic clays of high plasticity, fat clays	
			OH		Organic clays of medium to high plasticity, organic silts	
	Highly Organic Soils		Pt		Peat and other highly organic soils	Von Post Classification Limit: Strong colour or odour, and often fibrous texture



Particle Size		Material
ASTM Sieve sizes	mm	
#10 to #4	2.00 to 4.75	Sand: Coarse
#40 to #10	0.425 to 2.00	Medium
#200 to #40	0.075 to 0.425	Fine
< #200	< 0.075	Silt or Clay

Particle Size		Material
ASTM Sieve Sizes	mm	
> 12 in.	> 300	Boulders
3 in. to 12 in.	75 to 300	Cobbles
3/4 in. to 3 in.	19 to 75	Gravel: Coarse
#4 to 3/4 in.	4.75 to 19	Fine

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

Other Symbol Types

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

EXPLANATION OF FIELD AND LABORATORY TESTING

LEGEND OF ABBREVIATIONS AND SYMBOLS

LL - Liquid Limit (%)
PL - Plastic Limit (%)
PI - Plasticity Index (%)
MC - Moisture Content (%)
SPT - Standard Penetration Test
RQD - Rock Quality Designation
Qu - Unconfined Compression
Su - Undrained Shear Strength
VW - Vibrating Wire Piezometer
SI - Slope Inclinometer

▽ Water Level at Time of Drilling

▼ Water Level at End of Drilling

▼ Water Level After Drilling as Indicated on Test Hole Logs

FRACTION OF SECONDARY SOIL CONSTITUENTS ARE BASED ON THE FOLLOWING TERMINOLOGY

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

TERMS DESCRIBING CONSISTENCY OR COMPACTION CONDITION

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

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

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

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

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

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

25-R-04 Local Street Renewal
Walker/Kylemore Alley - Nassau St to Osborne St
Summary Table - Sub-Surface Investigation

Test Hole No.	Test Hole Location	Pavement Surface		Pavement Structure Material		Subgrade Description	Sample Depth (m)		Moisture Content (%)	Grain Size Analysis				Atterberg Limits		
		Type	Thickness (mm)	Type	Thickness (mm)		Top (m)	Bottom (m)		Clay (%)	Silt (%)	Sand (%)	Gravel (%)	Plastic	Liquid	Plasticity Index
TH25-16	UTM : 5524967 N, 633973 E Located behind #514 Kylemore Avenue, centreline of alley between Kylemore Avenue and Walker Avenue	Asphalt	-	Concrete	150	Sand and Gravel (Fill), AASHTO: A-1 (I)	0.2	0.3	15							
						Clay, AASHTO: A-7-6 (I)	0.8	0.9	36							
						Silt, AASHTO: A-6 (I)	1.1	1.2	25							
						Silt, AASHTO: A-6 (I)	1.2	1.4	24							
						Clay, AASHTO: A-7-6 (I)	1.4	1.5	34							
						Clay, AASHTO: A-7-6 (I)	1.7	1.8	41							
						Clay, AASHTO: A-7-6 (I)	2.1	2.3	39							
						Clay, AASHTO: A-7-6 (I)	2.6	2.7	54							
TH25-19	UTM : 5525031 N, 634110 E Located beside garage #479 Kylemore Avenue, centreline of alley behind #655 Osborne Street	Asphalt	-	Concrete	130	Sand and Gravel (Fill), AASHTO: A-1 (I)	0.2	0.3	17							
						Clay (Topsoil), AASHTO: A-7-6 (I)	0.6	0.8	35							
						Clay, AASHTO: A-7-6 (I)	0.9	1.1	32							
						Clay, AASHTO: A-7-6 (I)	1.2	1.4	32							
						Silt, AASHTO: A-6 (I)	1.6	1.8	23							
						Clay, AASHTO: A-7-6 (I)	2.0	2.1	43							
						Silt, AASHTO: A-6 (I)	2.5	2.7	24							
TH25-20	UTM : 5525024 N, 634083 E Located behind #484 Kylemore Avenue, centreline of alley between Walker Avenue and Kylemore Avenue	Asphalt	-	Concrete	100	Sand and Gravel (Fill), AASHTO: A-1 (I)	0.2	0.3	9							
						Clay (Topsoil), AASHTO: A-7-6 (I)	0.6	0.8	39							
						Clay, AASHTO: A-7-6 (49)	0.9	1.1	34	60	37	3	0	18	64	46
						Clay, AASHTO: A-7-6 (49)	1.2	1.4	30							
						Clay, AASHTO: A-7-6 (49)	1.6	1.8	47							
						Clay, AASHTO: A-7-6 (49)	2.0	2.1	49							
						Clay, AASHTO: A-7-6 (49)	2.5	2.7	53							

www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

Moisture Content Report
ASTM D2216-98

Project No. 1000-043-29
Client WSP
Project 25-R-04 Local Street Renewal (Walker/Kylemore Alley)

Sample Date 23-Jan-25
Test Date 31-Jan-25
Technician K Franklin

Test Hole	TH25-16	TH25-16	TH25-16	TH25-16	TH25-16	TH25-16
Depth (m)	0.2 - 0.3	0.8 - 0.9	1.1 - 1.2	1.2 - 1.4	1.4 - 1.5	1.7 - 1.8
Sample #	G102	G103	G104	G105	G106	G107
Tare ID	F51	F128	Z66	E88	N15	E67
Mass of tare	8.4	8.5	8.5	7.4	8.6	8.7
Mass wet + tare	181.5	210.1	219.9	220.9	204.7	206.9
Mass dry + tare	158.7	156.9	177.7	180.2	155.1	149.4
Mass water	22.8	53.2	42.2	40.7	49.6	57.5
Mass dry soil	150.3	148.4	169.2	172.8	146.5	140.7
Moisture %	15.2%	35.8%	24.9%	23.6%	33.9%	40.9%

Test Hole	TH25-16	TH25-16	TH25-19	TH25-19	TH25-19	TH25-19
Depth (m)	2.1 - 2.3	2.6 - 2.7	0.2 - 0.3	0.6 - 0.8	0.9 - 1.1	1.2 - 1.4
Sample #	G108	G109	G124	G125	G126	G127
Tare ID	P31	F66	E115	N39	H20	B6
Mass of tare	8.9	8.7	9.0	8.4	7.3	6.8
Mass wet + tare	231.5	216.5	122.3	216.3	221.6	235.5
Mass dry + tare	169.4	143.4	106.1	162.2	170.2	180.1
Mass water	62.1	73.1	16.2	54.1	51.4	55.4
Mass dry soil	160.5	134.7	97.1	153.8	162.9	173.3
Moisture %	38.7%	54.3%	16.7%	35.2%	31.6%	32.0%

Test Hole	TH25-19	TH25-19	TH25-19	TH25-20	TH25-20	TH25-20
Depth (m)	1.6 - 1.8	2.0 - 2.1	2.5 - 2.7	0.2 - 0.3	0.6 - 0.8	0.9 - 1.1
Sample #	G128	G129	G130	G131	G132	G133
Tare ID	A1	E98	M58	M99	N43	M78
Mass of tare	7.1	7.1	7.1	6.9	8.6	7.1
Mass wet + tare	208.9	218.3	245.6	221.3	216.9	454.5
Mass dry + tare	170.6	154.6	198.9	203.0	158.6	341.5
Mass water	38.3	63.7	46.7	18.3	58.3	113.0
Mass dry soil	163.5	147.5	191.8	196.1	150.0	334.4
Moisture %	23.4%	43.2%	24.3%	9.3%	38.9%	33.8%

www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

Moisture Content Report
ASTM D2216-98

Project No. 1000-043-29
Client WSP
Project 25-R-04 Local Street Renewal (Walker/Kylemore Alley)

Sample Date 23-Jan-25
Test Date 31-Jan-25
Technician K Franklin

Test Hole	TH25-20	TH25-20	TH25-20	TH25-20		
Depth (m)	1.2 - 1.4	1.6 - 1.8	2.0 - 2.1	2.5 - 2.7		
Sample #	G134	G135	G136	G137		
Tare ID	Q68	H19	B2	E09		
Mass of tare	7.0	8.3	6.8	7.1		
Mass wet + tare	236.6	234.6	244.8	225.5		
Mass dry + tare	183.1	162.2	167.0	150.3		
Mass water	53.5	72.4	77.8	75.2		
Mass dry soil	176.1	153.9	160.2	143.2		
Moisture %	30.4%	47.0%	48.6%	52.5%		

Test Hole						
Depth (m)						
Sample #						
Tare ID						
Mass of tare						
Mass wet + tare						
Mass dry + tare						
Mass water						
Mass dry soil						
Moisture %						

Test Hole						
Depth (m)						
Sample #						
Tare ID						
Mass of tare						
Mass wet + tare						
Mass dry + tare						
Mass water						
Mass dry soil						
Moisture %						

www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

Atterberg Limits
ASTM D4318-10e1

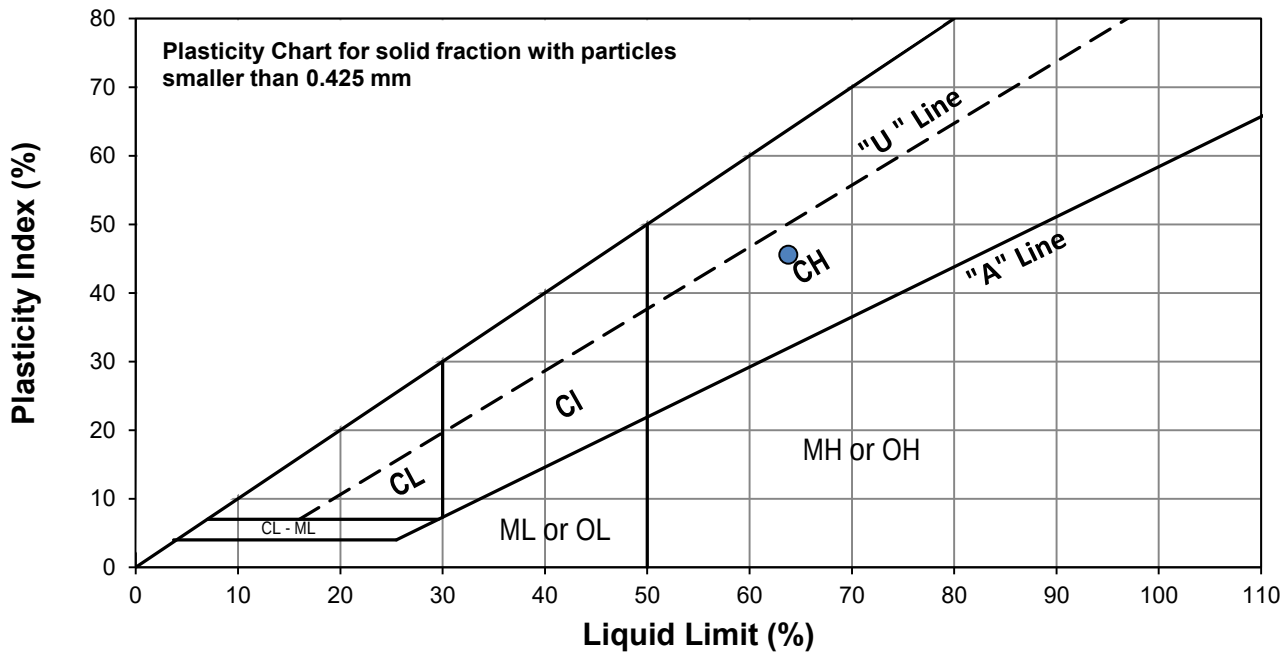
CERTIFIED BY CCIL Canadian Council of Independent Laboratories For specific tests as listed on www.ccil.com

Project No.	1000-043-29
Client	WSP
Project	25-R-04 Local Street Renewal (Walker/Kylemore Alley)
Test Hole	TH25-20
Sample #	G133
Depth (m)	0.9 - 1.1
Sample Date	23-Jan-25
Test Date	06-Feb-25
Technician	A. Dustmamatov

Liquid Limit	64
Plastic Limit	18
Plasticity Index	46

Liquid Limit

Trial #	1	2	3		
Number of Blows (N)	16	25	29		
Mass Tare (g)	13.904	14.224	13.895		
Mass Wet Soil + Tare (g)	27.398	26.526	26.096		
Mass Dry Soil + Tare (g)	22.009	21.737	21.384		
Mass Water (g)	5.389	4.789	4.712		
Mass Dry Soil (g)	8.105	7.513	7.489		
Moisture Content (%)	66.490	63.743	62.919		



Plastic Limit

Trial #	1	2	3	4	5
Mass Tare (g)	13.972	13.988			
Mass Wet Soil + Tare (g)	22.628	23.245			
Mass Dry Soil + Tare (g)	21.298	21.810			
Mass Water (g)	1.330	1.435			
Mass Dry Soil (g)	7.326	7.822			
Moisture Content (%)	18.155	18.346			

Note: Additional information recorded/measured for this test is available upon request.

www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

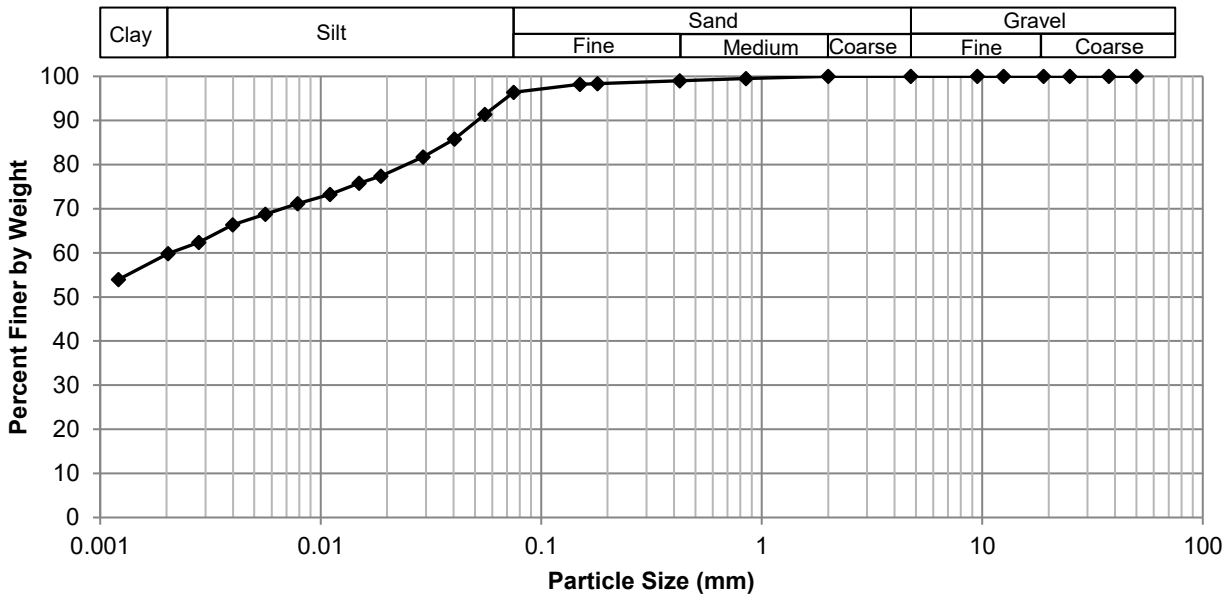
Grain Size Analysis (Hydrometer Method)
AASHTO T 88

Project No.	1000-043-29
Client	WSP
Project	25-R-04 Local Street Renewal (Walker/Kylemore Alley)
Test Hole	TH25-20
Sample #	G133
Depth (m)	0.9 - 1.1
Sample Date	23-Jan-25
Test Date	06-Feb-25
Technician	D. Sellick

CERTIFIED BY CCIL Canadian Council of Independent Laboratories For specific tests as listed on www.ccil.com

Gravel	0.0%
Sand	3.6%
Silt	36.8%
Clay	59.6%

Particle Size Distribution Curve



Gravel		Sand		Silt and Clay	
Particle Size (mm)	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**
50.0	100.00	4.75	100.00	0.0750	96.36
37.5	100.00	2.00	100.00	0.0556	91.42
25.0	100.00	0.850	99.54	0.0404	85.79
19.0	100.00	0.425	98.99	0.0291	81.73
12.5	100.00	0.180	98.36	0.0188	77.35
9.50	100.00	0.150	98.22	0.0149	75.79
4.75	100.00	0.075	96.36	0.0110	73.29
				0.0079	71.16
				0.0056	68.72
				0.0040	66.34
				0.0028	62.40
				0.0020	59.83
				0.0012	53.96

www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

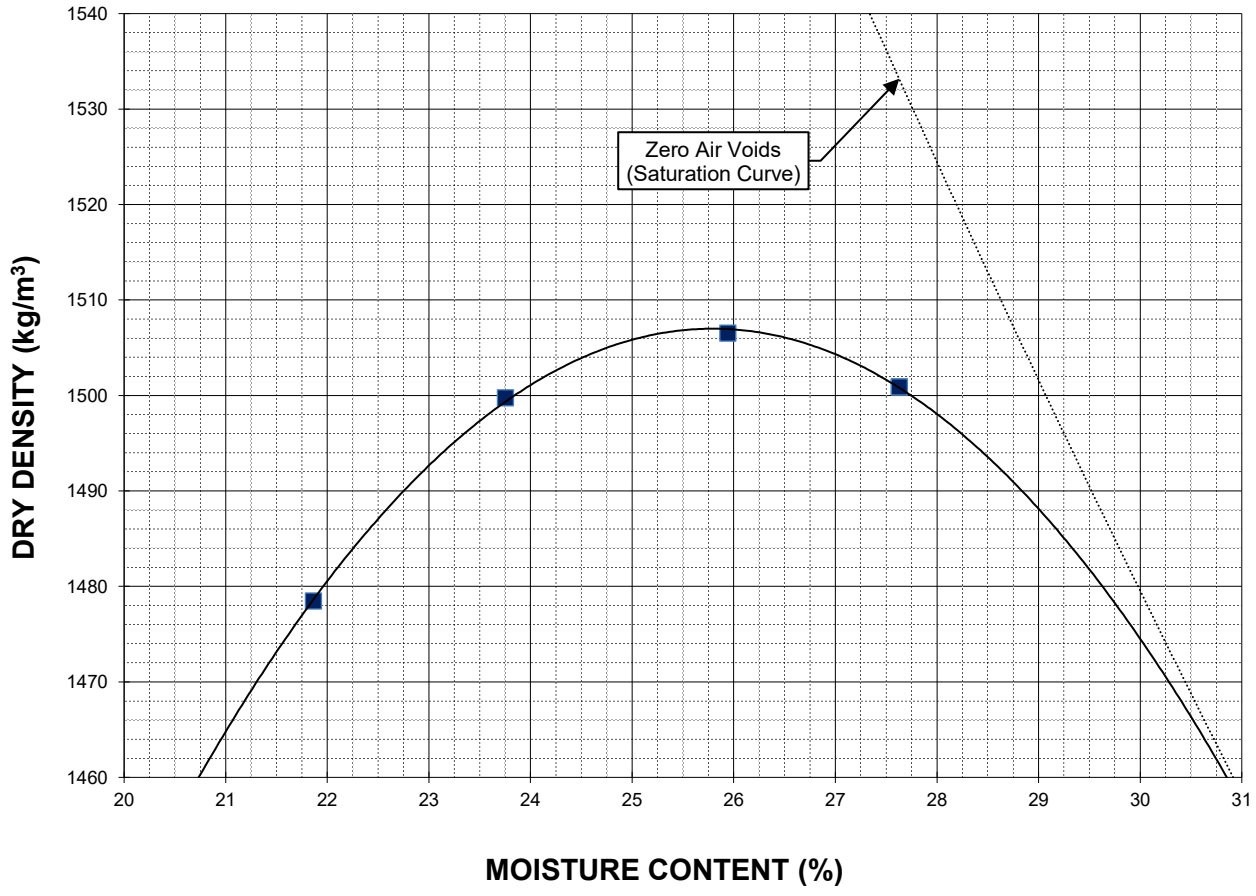
Standard Proctor Compaction Test

ASTM D698-12e2

Project No.	1000-043-29
Client	WSP
Project	25-R-04 Local Street Renewal (Walker/Kylemore Alley)
Sample #	B150
Source	TH25-16 (1.2m to 2.1m), TH25-19 (1.4m to 2.1m) & TH25-20 (0.9m to 2.1m)
Material	Clay
Sample Date	16-Jan-25
Test Date	28-Jan-25
Technician	A. Dustmamatov

Maximum Dry Density (kg/m3)	1507
Optimum Moisture (%)	25.8

Trial Number	1	2	3	4	
Wet Density (kg/m^3)	1802	1856	1897	1916	
Dry Density (kg/m^3)	1478	1500	1507	1501	
Moisture Content (%)	21.9	23.8	25.9	27.6	



Note: Additional information recorded/measured for this test is available upon request.

www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

California Bearing Ratio Test Data Sheet

ASTM D1883-16

Project No.	1000-043-29	**Source**	TH25-16 (1.2m to 2.1m), TH25-19 (1.4m to 2.1m) & TH25-20 (0.9m to 2.1m)
Client	WSP	**Material**	Clay
Project	25-R-04 Local Street Renewal (Walker/Kylemore Alley)	**Sample Date**	23-Jan-25
		Test Date	30-Jan-25
Sample #	B150	**Technician**	A. Dustmamatov

Proctor Results (ASTM D698)

Maximum Dry Density	1507	kg/m3
Optimum Moisture Content	25.8	%
Material Retained on 19 mm Sieve	0.0	%

CBR Sample Compaction

Dry Density	1435	kg/m3
Initial Moisture Content	25.6	%
Relative Density	95.2	% SPMDD

Soaking Results

Surcharge	4.54	kg
Swell	2.4	%
Moisture Content in top 25 mm	41.4	%
Immersion Period	96	h

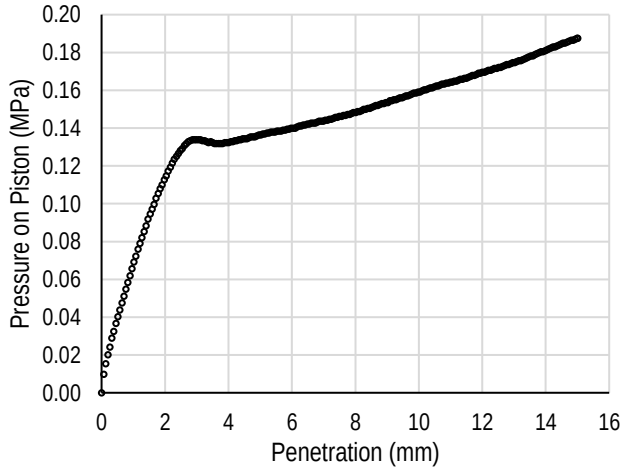
CBR Results

CBR at 2.54 mm	1.9	%
CBR at 5.08 mm	1.3	%
Zero Correction	0	mm

Test Data

Penetration (mm)	Measured Pressure (MPa)	Corrected Pressure (MPa)
0.64	0.05	0.05
1.27	0.08	0.08
1.91	0.11	0.11
2.54	0.13	0.13
3.18	0.13	0.13
3.81	0.13	0.13
4.45	0.13	0.13
5.08	0.14	0.14
7.62	0.15	0.15
10.16	0.16	0.16
12.70	0.17	0.17

Load/Penetration Curve



Comments:

Photo 1: Pavement Core Sample at TH25-16

Photo 2: Pavement Core Sample at TH25-19

Photo 3: Pavement Core Sample at TH25-20

Appendix G

Test Hole Logs, Summary Table, Lab Testing Results and Pavement Core Photos

Walker/Rathgar Alley – Nassau St to Osborne St

Sub-Surface Log

Test Hole TH25-17
1 of 1

Client:	WSP	**Project Number:**	1000-043-29
Project Name:	25-R-04 Local Street Renewal (Walker/Rathgar Alley)	**Location:**	UTM N-5524900, E-634015
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement m (local datum)
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	January 23, 2025

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

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL	Undrained Shear Strength (kPa) Test Type: △ Torvane △ ✿ Pocket Pen. ✿ ☒ Qu ☒ ○ Field Vane ○ 0 50 100 150 200 250
		ASPHALT				
		SAND and GRAVEL (FILL) - trace silt, light brown, frozen, moist and compact when thawed, poorly graded fine grained sand to gravel (<25 mm diam.), angular crushed limestone. AASHTO: A-1(I)		G110	●	
0.5		CLAY (TOPSOIL) - silty, some organics, trace sand - black, frozen, moist and firm when thawed - intermediate plasticity - AASHTO: A-7-6(I)				
		CLAY - silty, trace sand, trace organics - grey, frozen to 0.9 m, moist and firm when thawed - high plasticity - AASHTO: A-7-6(I)		G111	●	✿
1.0		SILT - clayey, trace sand - light brown - moist, soft to firm with depth - low to intermediate plasticity - AASHTO: A-6(18)		G112	●	✿
				G113	●	✿
1.5		CLAY - silty, trace sand - mottled brown and grey - moist, stiff to very stiff - high plasticity - AASHTO: A-7-6(I) - trace silt pockets <30 mm diam. between 1.8 m and 2.3 m - firm to stiff below 1.9 m		G114	●	✿ △
2.0				G115	●	✿
2.5				G116	●	✿
3.0						

END TEST HOLE AT 3.0 m IN CLAY.

Notes:
1. Seepage or sloughing not observed.
2. Test hole open to 3.0 m depth immediately after drilling.
3. Test hole backfilled with cuttings, granular fill and cold patch asphalt.
4. Bulk samples were collected between 1.6 m and 2.1 m depth (B151).
5. Test hole located behind #526 Walker Avenue, centreline of alley between Walker Avenue and Rathgar Avenue.

Logged By: Kate Franklin **Reviewed By:** Angela Fidler-Kliewer **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2025-01-23 25-R-04 LOCAL STREETS - RATHCAR 0_A_KF 1000-043-29.GPJ TREK.GDT 2/19/25

Sub-Surface Log

Test Hole TH25-18
1 of 1

Client:	WSP	**Project Number:**	1000-043-29
Project Name:	25-R-04 Local Street Renewal (Walker/Rathgar Alley)	**Location:**	UTM N-5524980, E-634165
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement m (local datum)
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	January 23, 2025

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

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number
		ASPHALT		
		SAND and GRAVEL (FILL) - trace silt, light brown, frozen, moist and compact when thawed, poorly graded fine grained sand to gravel (<25 mm diam.), angular crushed limestone. AASHTO: A-1(I)	G	G117
0.5		SILT - some clay - light brown, frozen, moist and soft when thawed - low to intermediate plasticity - AASHTO: A-6(I)	G	G118
		CLAY - silty - brown - frozen to 1.1 m, moist and firm when thawed - high plasticity - AASHTO: A-7-6(46)	G	G119
1.0		- very stiff below 1.2 m	G	G120
1.5		- silt pocket approximately 50 mm diam. at 1.6 m - stiff below 1.6 m	G	G121
2.0		- firm to stiff below 1.8 m	G	G122
2.5			G	G123
3.0				

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21
Particle Size (%): 0 20 40 60 80 100
PL MC LL
Undrained Shear Strength (kPa): 0 50 100 150 200 250
Test Type: △ Torvane △ ✿ Pocket Pen. ✿ ☒ Qu ☒ ○ Field Vane ○

END TEST HOLE AT 3.0 m IN CLAY.

Notes:
1. Seepage or sloughing not observed.
2. Test hole open to 3.0 m depth immediately after drilling.
3. Test hole backfilled with cuttings, granular fill and cold patch asphalt.
4. Bulk samples were collected between 0.8 m and 2.1 m depth (B151).
5. Test hole located behind #472 Walker Avenue, centreline of alley between Walker Avenue and Rathgar Avenue.

Logged By: Kate Franklin **Reviewed By:** Angela Fidler-Kliewer **Project Engineer:** Nelson Ferreira

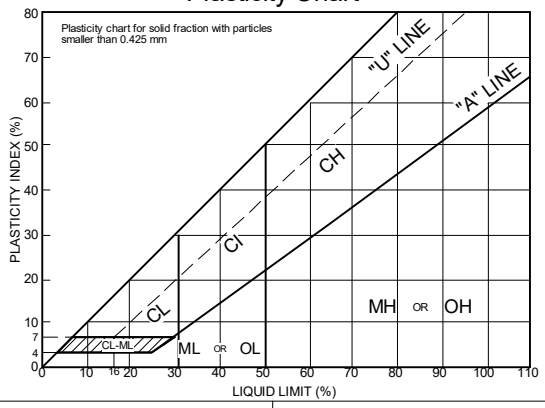
SUB-SURFACE LOG LOGS 2025-01-23 25-R-04 LOCAL STREETS - RATHCAR 0_A_KF 1000-043-29.GPJ TREK.GDT 2/19/25

EXPLANATION OF FIELD AND LABORATORY TESTING

GENERAL NOTES

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

Major Divisions			USCS Classification	Symbols	Typical Names	Laboratory Classification Criteria
Coarse-Grained soils (More than half the material is larger than No. 200 sieve size)	Gravels (More than half of coarse fraction is larger than 4.75 mm)	Clean gravel (Little or no fines)	GW		Well-graded gravels, gravel-sand mixtures, little or no fines	Determine percentages of sand and gravel from grain size curve, depending on percentage of fines (fraction smaller than No. 200 sieve) coarse-grained soils are classified as follows: Less than 5 percent..... GW, GP, SW, SP; More than 12 percent..... GM, GC, SM, SC; 6 to 12 percent..... Borderline case4s requiring dual symbols*
			GP		Poorly-graded gravels, gravel-sand mixtures, little or no fines	$C_U = \frac{D_{60}}{D_{10}}$ greater than 4; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
		Gravel with fines (Appreciable amount of fines)	GM		Silty gravels, gravel-sand-silt mixtures	Not meeting all gradation requirements for GW
			GC		Clayey gravels, gravel-sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4; Atterberg limits above "A" line or P.I. greater than 7; Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
	Sands (More than half of coarse fraction is smaller than 4.75 mm)	Clean sands (Little or no fines)	SW		Well-graded sands, gravelly sands, little or no fines	$C_U = \frac{D_{60}}{D_{10}}$ greater than 6; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
			SP		Poorly-graded sands, gravelly sands, little or no fines	Not meeting all gradation requirements for SW
		Sands with fines (Appreciable amount of fines)	SM		Silty sands, sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4; Atterberg limits above "A" line or P.I. greater than 7; Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
			SC		Clayey sands, sand-clay mixtures	
Fine-Grained soils (More than half the material is smaller than No. 200 sieve size)	Silts and Clays (Liquid limit less than 50)		ML		Inorganic silts and very fine sands, rock floor, silty or clayey fine sands or clayey silts with slight plasticity	Plasticity Chart
			CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	
			OL		Organic silts and organic silty clays of low plasticity	
	Silts and Clays (Liquid limit greater than 50)		MH		Inorganic silts, micaceous or distomaceous fine sandy or silty soils, organic silts	
			CH		Inorganic clays of high plasticity, fat clays	
			OH		Organic clays of medium to high plasticity, organic silts	
	Highly Organic Soils		Pt		Peat and other highly organic soils	Von Post Classification Limit: Strong colour or odour, and often fibrous texture



Particle Size		Material
ASTM Sieve sizes	mm	
#10 to #4	2.00 to 4.75	Sand: Coarse
#40 to #10	0.425 to 2.00	Medium
#200 to #40	0.075 to 0.425	Fine
< #200	< 0.075	Silt or Clay

Particle Size		Material
ASTM Sieve Sizes	mm	
> 12 in.	> 300	Boulders
3 in. to 12 in.	75 to 300	Cobbles
3/4 in. to 3 in.	19 to 75	Gravel: Coarse
#4 to 3/4 in.	4.75 to 19	Fine

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

Other Symbol Types

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

EXPLANATION OF FIELD AND LABORATORY TESTING

LEGEND OF ABBREVIATIONS AND SYMBOLS

LL - Liquid Limit (%)
PL - Plastic Limit (%)
PI - Plasticity Index (%)
MC - Moisture Content (%)
SPT - Standard Penetration Test
RQD - Rock Quality Designation
Qu - Unconfined Compression
Su - Undrained Shear Strength
VW - Vibrating Wire Piezometer
SI - Slope Inclinometer

▽ Water Level at Time of Drilling

▼ Water Level at End of Drilling

▼ Water Level After Drilling as Indicated on Test Hole Logs

FRACTION OF SECONDARY SOIL CONSTITUENTS ARE BASED ON THE FOLLOWING TERMINOLOGY

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

TERMS DESCRIBING CONSISTENCY OR COMPACTION CONDITION

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

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

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

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

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

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

25-R-04 Local Street Renewal
Walker/Rathgar Alley - Nassau St to Osborne St
Summary Table - Sub-Surface Investigation

Test Hole No.	Test Hole Location	Pavement Surface		Pavement Structure Material		Subgrade Description	Sample Depth (m)		Moisture Content (%)	Grain Size Analysis				Atterberg Limits		
		Type	Thickness (mm)	Type	Thickness (mm)		Top (m)	Bottom (m)		Clay (%)	Silt (%)	Sand (%)	Gravel (%)	Plastic	Liquid	Plasticity Index
TH25-17	UTM : 5524900 N, 634015 E Located behind #526 Walker Avenue, centreline of alley between Walker Avenue and Rathgar Avenue	Asphalt	70	Concrete	-	Sand and Gravel (Fill), AASHTO: A-1 (I)	0.2	0.3	8							
						Clay, AASHTO: A-7-6 (I)	0.6	0.8	41							
						Silt, AASHTO: A-6 (18)	0.9	1.1	33	27	69	4	0	16	35	19
						Silt, AASHTO: A-6 (18)	1.2	1.4	26							
						Clay, AASHTO: A-7-6 (I)	1.5	1.7	42							
						Clay, AASHTO: A-7-6 (I)	2.0	2.1	37							
						Clay, AASHTO: A-7-6 (I)	2.4	2.6	52							
TH25-18	UTM : 5524980 N, 634165 E Located behind #472 Walker Avenue, centreline of alley between Walker Avenue and Rathgar Avenue	Asphalt	70	Concrete	-	Sand and Gravel (Fill), AASHTO: A-1 (I)	0.2	0.3	11							
						Silt, AASHTO: A-6 (I)	0.6	0.8	28							
						Clay, AASHTO: A-7-6 (46)	0.9	1.1	35	68	28	3	0	21	63	43
						Clay, AASHTO: A-7-6 (46)	1.2	1.4	31							
						Clay, AASHTO: A-7-6 (46)	1.6	1.8	46							
						Clay, AASHTO: A-7-6 (46)	2.0	2.1	51							
						Clay, AASHTO: A-7-6 (46)	2.5	2.7	47							

www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

Moisture Content Report
ASTM D2216-98

Project No. 1000-043-29
Client WSP
Project 25-R-04 Local Street Renewal (Walker/Rathgar Alley)

Sample Date 23-Jan-25
Test Date 31-Jan-25
Technician K Franklin

Test Hole	TH25-17	TH25-17	TH25-17	TH25-17	TH25-17	TH25-17
Depth (m)	0.2 - 0.3	0.6 - 0.8	0.9 - 1.1	1.2 - 1.4	1.5 - 1.7	2.0 - 2.1
Sample #	G110	G111	G112	G113	G114	G115
Tare ID	D31	W45	QW6	W27	Z117	W101
Mass of tare	8.4	8.4	6.8	8.4	8.5	8.7
Mass wet + tare	206.4	215.4	530.9	235.7	246.5	219.8
Mass dry + tare	192.0	155.5	399.5	189.3	176.3	162.7
Mass water	14.4	59.9	131.4	46.4	70.2	57.1
Mass dry soil	183.6	147.1	392.7	180.9	167.8	154.0
Moisture %	7.8%	40.7%	33.5%	25.6%	41.8%	37.1%

Test Hole	TH25-17	TH25-18	TH25-18	TH25-18	TH25-18	TH25-18
Depth (m)	2.4 - 2.6	0.2 - 0.3	0.6 - 0.8	0.9 - 1.1	1.2 - 1.4	1.6 - 1.8
Sample #	G116	G117	G118	G119	G120	G121
Tare ID	W92	M43	F131	E01	M25	E28
Mass of tare	8.6	7.0	8.6	6.9	6.8	6.8
Mass wet + tare	214.5	221.4	257.3	466.7	233.5	249.6
Mass dry + tare	144.2	200.9	202.5	347.7	179.7	173.4
Mass water	70.3	20.5	54.8	119.0	53.8	76.2
Mass dry soil	135.6	193.9	193.9	340.8	172.9	166.6
Moisture %	51.8%	10.6%	28.3%	34.9%	31.1%	45.7%

Test Hole	TH25-18	TH25-18				
Depth (m)	2.0 - 2.1	2.5 - 2.7				
Sample #	G122	G123				
Tare ID	M03	M55				
Mass of tare	6.8	6.8				
Mass wet + tare	229.6	253.4				
Mass dry + tare	154.8	174.3				
Mass water	74.8	79.1				
Mass dry soil	148.0	167.5				
Moisture %	50.5%	47.2%				

www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

Atterberg Limits
ASTM D4318-10e1

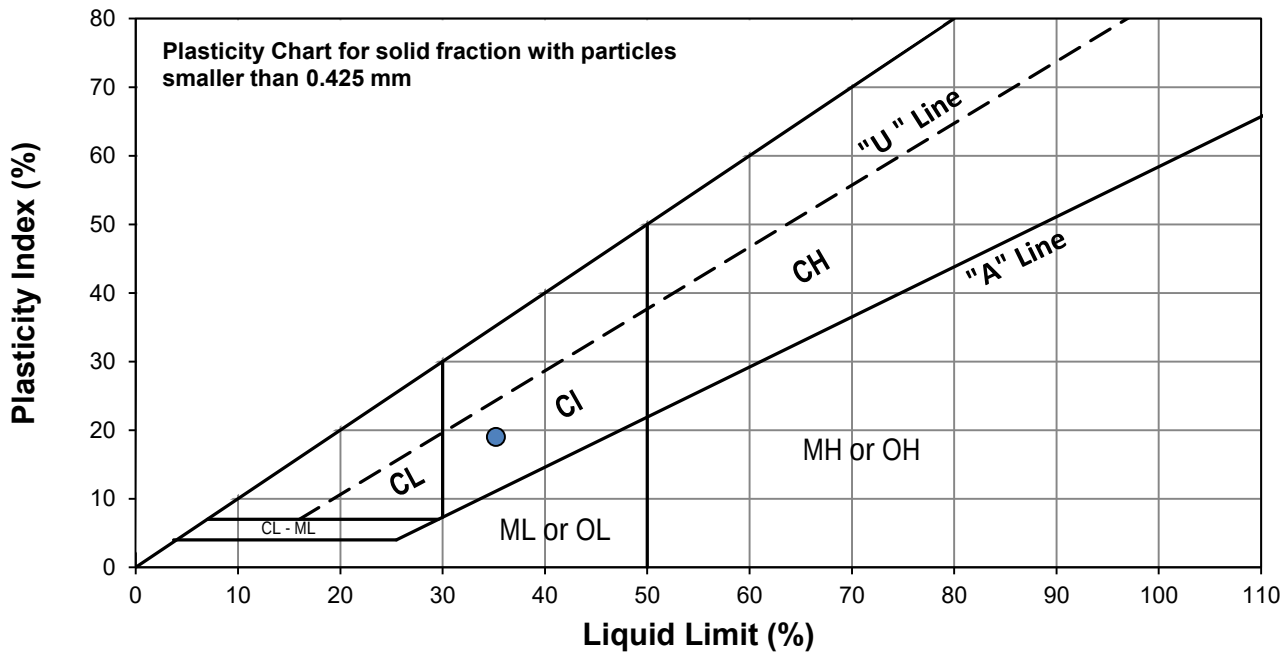
CERTIFIED BY CCIL Canadian Council of Independent Laboratories For specific tests as listed on www.ccil.com

Project No.	1000-043-29
Client	WSP
Project	25-R-04 Local Street Renewal (Walker/Rathgar Alley)
Test Hole	TH25-17
Sample #	G112
Depth (m)	0.9 - 1.1
Sample Date	23-Jan-25
Test Date	05-Feb-25
Technician	K. Franklin

Liquid Limit	35
Plastic Limit	16
Plasticity Index	19

Liquid Limit

Trial #	1	2	3		
Number of Blows (N)	16	29	31		
Mass Tare (g)	14.268	13.903	13.996		
Mass Wet Soil + Tare (g)	22.732	21.340	22.400		
Mass Dry Soil + Tare (g)	20.473	19.419	20.237		
Mass Water (g)	2.259	1.921	2.163		
Mass Dry Soil (g)	6.205	5.516	6.241		
Moisture Content (%)	36.406	34.826	34.658		



Plastic Limit

Trial #	1	2	3	4	5
Mass Tare (g)	13.916	13.910			
Mass Wet Soil + Tare (g)	25.482	22.608			
Mass Dry Soil + Tare (g)	23.876	21.388			
Mass Water (g)	1.606	1.220			
Mass Dry Soil (g)	9.960	7.478			
Moisture Content (%)	16.124	16.315			

Note: Additional information recorded/measured for this test is available upon request.

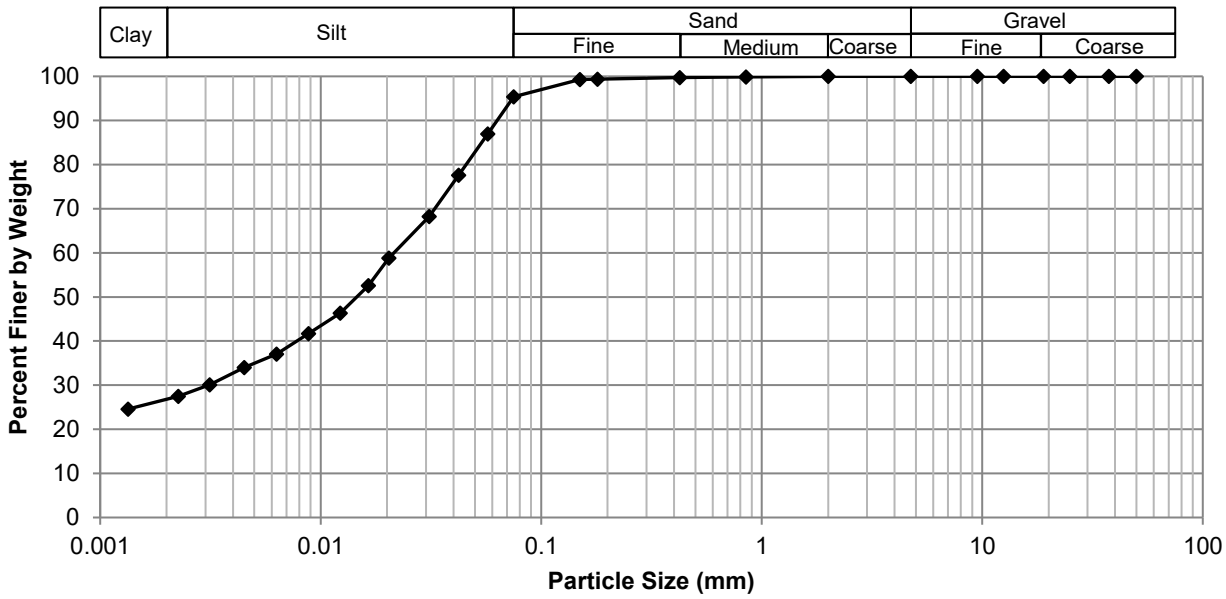
www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

Grain Size Analysis (Hydrometer Method)
AASHTO T 88

Project No.	1000-043-29
Client	WSP
Project	25-R-04 Local Street Renewal (Walker/Rathgar Alley)
Test Hole	TH25-17
Sample #	G112
Depth (m)	0.9 - 1.1
Sample Date	23-Jan-25
Test Date	05-Feb-25
Technician	A. Fidler-Kliewer

Gravel	0.0%
Sand	4.7%
Silt	68.7%
Clay	26.7%

Particle Size Distribution Curve



Gravel		Sand		Silt and Clay	
Particle Size (mm)	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**
50.0	100.00	4.75	100.00	0.0750	95.34
37.5	100.00	2.00	100.00	0.0573	86.98
25.0	100.00	0.850	99.86	0.0422	77.60
19.0	100.00	0.425	99.74	0.0311	68.22
12.5	100.00	0.180	99.39	0.0204	58.84
9.50	100.00	0.150	99.27	0.0165	52.59
4.75	100.00	0.075	95.34	0.0123	46.37
				0.0088	41.71
				0.0063	37.06
				0.0045	34.00
				0.0031	30.10
				0.0023	27.49
				0.0013	24.59

www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

Atterberg Limits
ASTM D4318-10e1

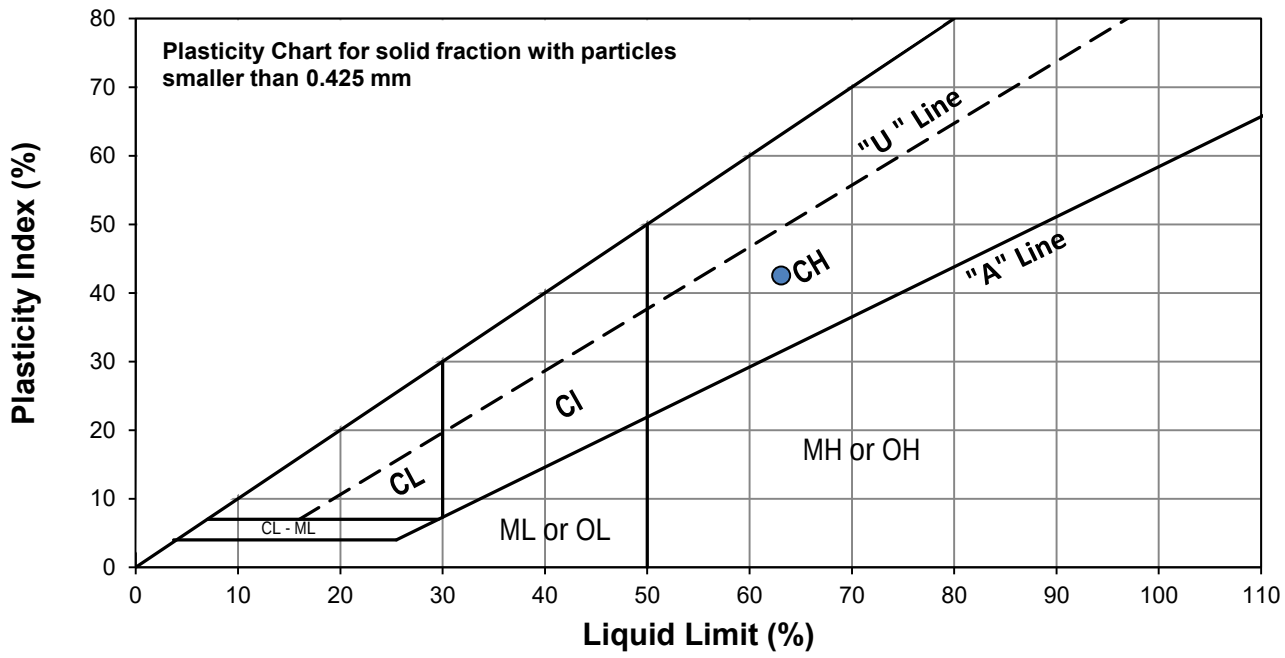
CERTIFIED BY CCIL Canadian Council of Independent Laboratories For specific tests as listed on www.ccil.com

Project No.	1000-043-29
Client	WSP
Project	25-R-04 Local Street Renewal (Walker/Rathgar Alley)
Test Hole	TH25-18
Sample #	G119
Depth (m)	0.9 - 1.1
Sample Date	15-Jan-25
Test Date	05-Feb-25
Technician	A. Dustmamatov

Liquid Limit	63
Plastic Limit	21
Plasticity Index	43

Liquid Limit

Trial #	1	2	3		
Number of Blows (N)	18	23	28		
Mass Tare (g)	13.984	14.094	13.896		
Mass Wet Soil + Tare (g)	25.833	25.798	28.439		
Mass Dry Soil + Tare (g)	21.119	21.243	22.866		
Mass Water (g)	4.714	4.555	5.573		
Mass Dry Soil (g)	7.135	7.149	8.970		
Moisture Content (%)	66.069	63.715	62.129		



Plastic Limit

Trial #	1	2	3	4	5
Mass Tare (g)	13.924	13.950			
Mass Wet Soil + Tare (g)	22.197	22.235			
Mass Dry Soil + Tare (g)	20.778	20.828			
Mass Water (g)	1.419	1.407			
Mass Dry Soil (g)	6.854	6.878			
Moisture Content (%)	20.703	20.457			

Note: Additional information recorded/measured for this test is available upon request.

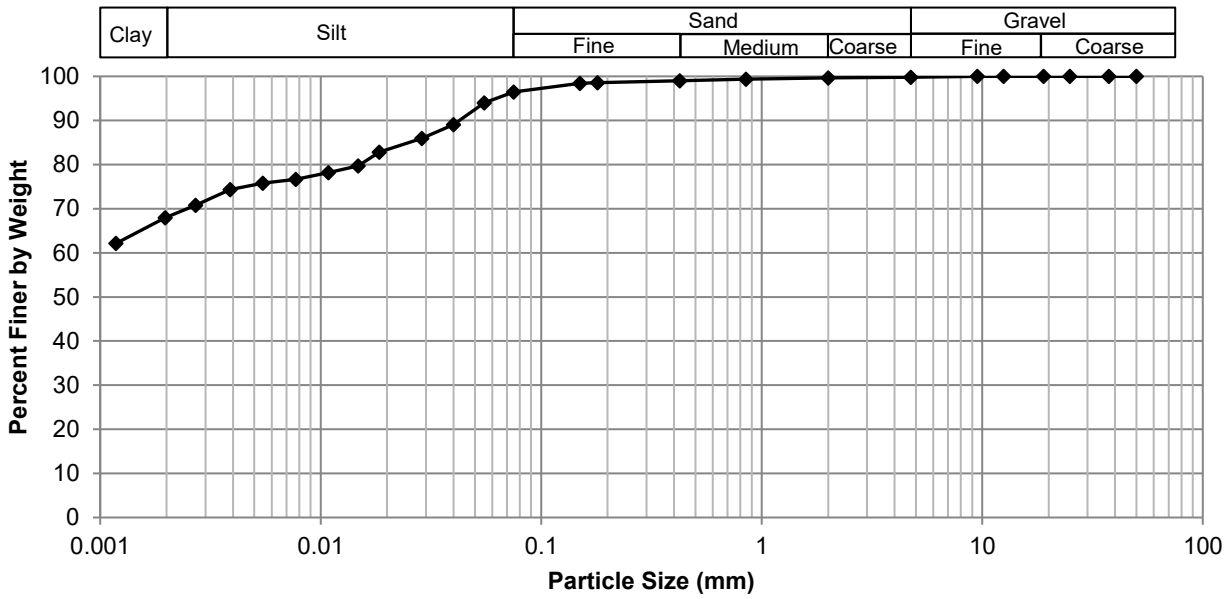
www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

Grain Size Analysis (Hydrometer Method)
AASHTO T 88

Project No.	1000-043-29
Client	WSP
Project	25-R-04 Local Street Renewal (Walker/Rathgar Alley)
Test Hole	TH25-18
Sample #	G119
Depth (m)	0.9 - 1.1
Sample Date	23-Jan-25
Test Date	05-Feb-25
Technician	A. Fidler-Kliewer

Gravel	0.2%
Sand	3.3%
Silt	28.4%
Clay	68.1%

Particle Size Distribution Curve



Gravel		Sand		Silt and Clay	
Particle Size (mm)	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**
50.0	100.00	4.75	99.82	0.0750	96.50
37.5	100.00	2.00	99.66	0.0552	94.03
25.0	100.00	0.850	99.36	0.0400	89.04
19.0	100.00	0.425	98.99	0.0287	85.93
12.5	100.00	0.180	98.55	0.0184	82.81
9.50	100.00	0.150	98.44	0.0148	79.69
4.75	99.82	0.075	96.50	0.0109	78.18
				0.0077	76.67
				0.0055	75.78
				0.0039	74.32
				0.0027	70.81
				0.0020	67.93
				0.0012	62.12

www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

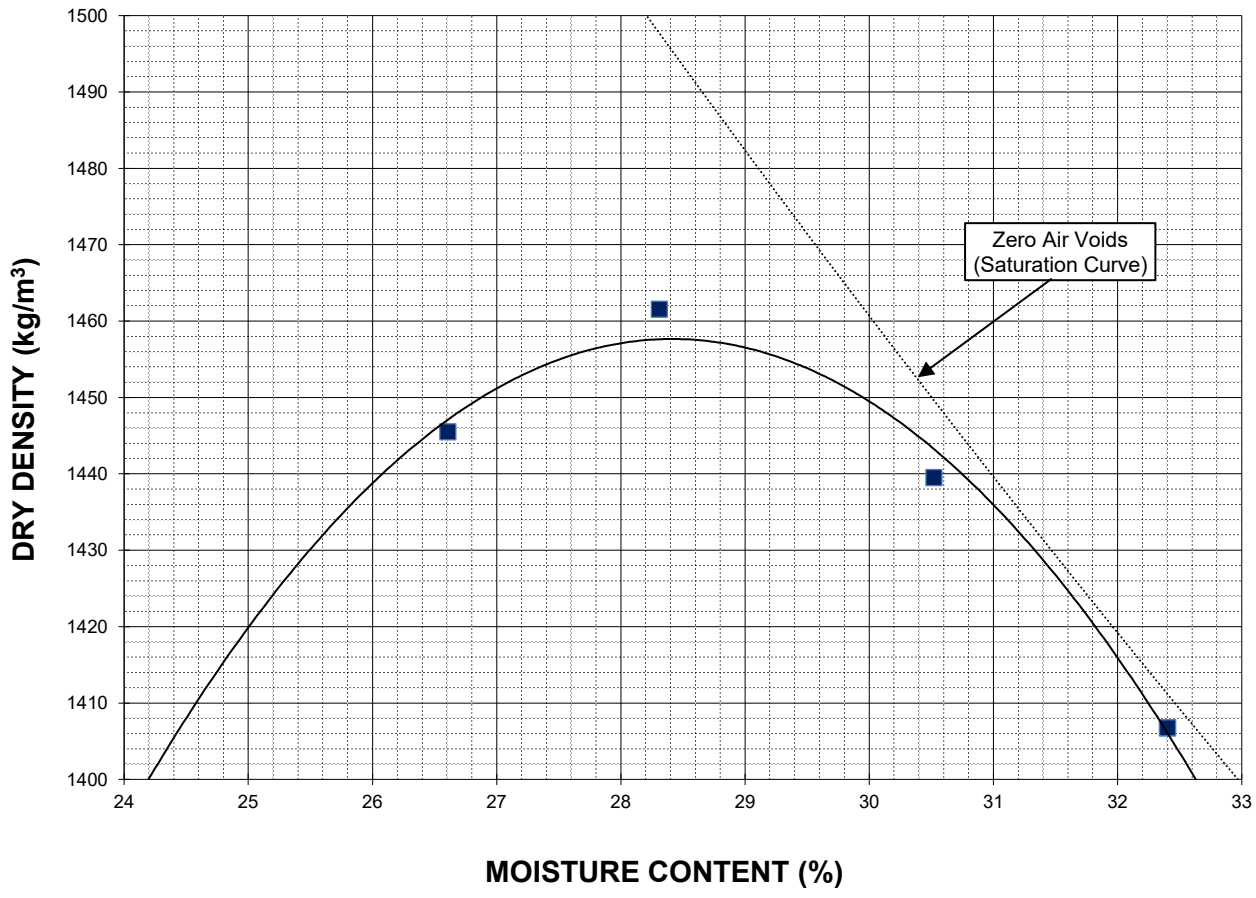
Standard Proctor Compaction Test

ASTM D698-12e2

Project No.	1000-043-29
Client	WSP
Project	25-R-04 Local Street Renewal (Walker/Rathgar Alley)
Sample #	B151
Source	TH25-17 (1.6m to 2.1m) & TH25-18 (0.8m to 2.1m)
Material	Clay
Sample Date	16-Jan-25
Test Date	28-Jan-25
Technician	A. Dustmamatov

Maximum Dry Density (kg/m3)	1458
Optimum Moisture (%)	28.4

Trial Number	1	2	3	4	
Wet Density (kg/m^3)	1830	1875	1879	1863	
Dry Density (kg/m^3)	1446	1462	1440	1407	
Moisture Content (%)	26.6	28.3	30.5	32.4	



Note: Additional information recorded/measured for this test is available upon request.

www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

California Bearing Ratio Test Data Sheet

ASTM D1883-16

Project No.	1000-043-29	**Source**	TH25-17 (1.6m to 2.1m) & TH25-18 (0.8m to 2.1m)
Client	WSP	**Material**	Clay
Project	25-R-04 Local Street Renewal (Walker/Rathgar Alley)	**Sample Date**	23-Jan-25
		Test Date	30-Jan-25
Sample #	B151	**Technician**	A. Dustmamatov

Proctor Results (ASTM D698)

Maximum Dry Density	1458	kg/m3
Optimum Moisture Content	28.4	%
Material Retained on 19 mm Sieve	0.0	%

CBR Sample Compaction

Dry Density	1384	kg/m3
Initial Moisture Content	29.8	%
Relative Density	94.9	% SPMDD

Soaking Results

Surcharge	4.54	kg
Swell	1.8	%
Moisture Content in top 25 mm	42.9	%
Immersion Period	96	h

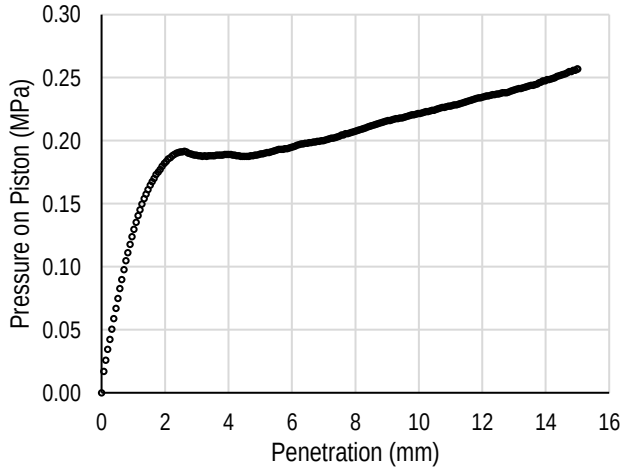
CBR Results

CBR at 2.54 mm	2.8	%
CBR at 5.08 mm	1.8	%
Zero Correction	0	mm

Test Data

Penetration (mm)	Measured Pressure (MPa)	Corrected Pressure (MPa)
0.64	0.09	0.09
1.27	0.15	0.15
1.91	0.18	0.18
2.54	0.19	0.19
3.18	0.19	0.19
3.81	0.19	0.19
4.45	0.19	0.19
5.08	0.19	0.19
7.62	0.20	0.20
10.16	0.22	0.22
12.70	0.24	0.24

Load/Penetration Curve



Comments:

Photo 1: Pavement Core Sample at TH25-17

Photo 2: Pavement Core Sample at TH25-18

Appendix H

Test Hole Logs, Summary Table, Lab Testing Results and Pavement Core Photos

Killarney/Magdalene Alley – Baylor Ave to Greyfriars Rd

Sub-Surface Log

Test Hole TH25-21
1 of 1

Client:	WSP	**Project Number:**	1000-043-29
Project Name:	25-R-04 Local Street Renewal (Killarney/Magdalene Alley)	**Location:**	UTM N-5516917, E-632924
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement m (local datum)
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	January 23, 2025

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

Particle Size Legend: Fines | Clay | Silt | Sand | Gravel | Cobbles | Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL 0 20 40 60 80 100	Undrained Shear Strength (kPa) Test Type: Torvane, Pocket Pen., Qu, Field Vane 0 50 100 150 200 250
		ASPHALT				
		CONCRETE				
		SAND and GRAVEL (FILL) - trace silt, trace clay, brown - frozen, moist and compact when thawed - poorly graded fine grained sand to gravel (<25 mm diam.), rounded "pit run". - AASHTO: A-1(I)		G138		
0.5		SILT - clayey - light grey - frozen to 1.2 m, moist and soft when thawed - low to intermediate plasticity - AASHTO: A-6(16)		G139		
1.0		- brown below 1.1 m		G140		
		CLAY - silty - brown, moist, stiff - high plasticity - AASHTO: A-7-6(I)		G141		
1.5		SILT - some clay - light brown - moist, firm to stiff - low to intermediate plasticity - AASHTO: A-6(I)		G142		
2.0		CLAY - silty - brown - moist, very stiff - high plasticity - AASHTO: A-7-6(I)		G143		
2.5		- firm to stiff below 2.5 m		G144		
3.0		END TEST HOLE AT 3.0 m IN CLAY				

Notes:
1. Seepage or sloughing not observed.
2. Test hole open to 3.0 m depth immediately after drilling.
3. Test hole backfilled with cuttings, granular fill and cold patch asphalt.
4. Bulk samples were collected between 0.8 and 2.1 m depth (B152A(silt) and B152B(clay)).
5. A second test hole was drilled adjacent (0.5 m West) for the collection of bulk samples.
6. Test hole located behind #19 Magdalene Bay, centreline of alley between Killarney Avenue and Magdalene Bay.

Logged By: Kate Franklin **Reviewed By:** Angela Fidler-Kliewer **Project Engineer:** Nelson Ferreira

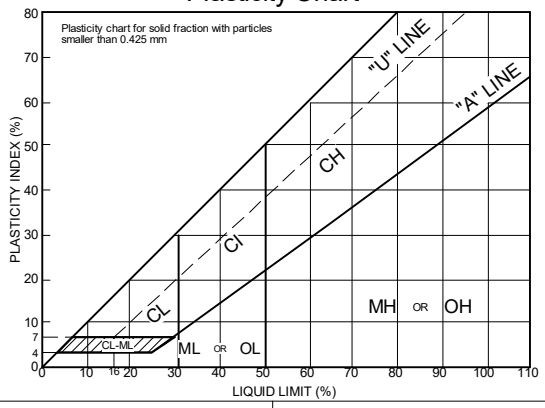
SUB-SURFACE LOG LOGS 2025-01-23 25-R-04 LOCAL STREETS - KILLARNEY 0_A_KF 1000-043-29.GPJ TREK.GDT 2/18/25

EXPLANATION OF FIELD AND LABORATORY TESTING

GENERAL NOTES

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

Major Divisions			USCS Classification	Symbols	Typical Names	Laboratory Classification Criteria
Coarse-Grained soils (More than half the material is larger than No. 200 sieve size)	Gravels (More than half of coarse fraction is larger than 4.75 mm)	Clean gravel (Little or no fines)	GW		Well-graded gravels, gravel-sand mixtures, little or no fines	Determine percentages of sand and gravel from grain size curve, depending on percentage of fines (fraction smaller than No. 200 sieve) coarse-grained soils are classified as follows: Less than 5 percent..... GW, GP, SW, SP; More than 12 percent..... GM, GC, SM, SC; 6 to 12 percent..... Borderline case4s requiring dual symbols*
			GP		Poorly-graded gravels, gravel-sand mixtures, little or no fines	$C_U = \frac{D_{60}}{D_{10}}$ greater than 4; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
		Gravel with fines (Appreciable amount of fines)	GM		Silty gravels, gravel-sand-silt mixtures	Not meeting all gradation requirements for GW
			GC		Clayey gravels, gravel-sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4; Atterberg limits above "A" line or P.I. greater than 7; Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
	Sands (More than half of coarse fraction is smaller than 4.75 mm)	Clean sands (Little or no fines)	SW		Well-graded sands, gravelly sands, little or no fines	$C_U = \frac{D_{60}}{D_{10}}$ greater than 6; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
			SP		Poorly-graded sands, gravelly sands, little or no fines	Not meeting all gradation requirements for SW
		Sands with fines (Appreciable amount of fines)	SM		Silty sands, sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4; Atterberg limits above "A" line or P.I. greater than 7; Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols
			SC		Clayey sands, sand-clay mixtures	
Fine-Grained soils (More than half the material is smaller than No. 200 sieve size)	Silts and Clays (Liquid limit less than 50)		ML		Inorganic silts and very fine sands, rock floor, silty or clayey fine sands or clayey silts with slight plasticity	Plasticity Chart
			CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays	
			OL		Organic silts and organic silty clays of low plasticity	
	Silts and Clays (Liquid limit greater than 50)		MH		Inorganic silts, micaceous or distomaceous fine sandy or silty soils, organic silts	
			CH		Inorganic clays of high plasticity, fat clays	
			OH		Organic clays of medium to high plasticity, organic silts	
	Highly Organic Soils		Pt		Peat and other highly organic soils	Von Post Classification Limit: Strong colour or odour, and often fibrous texture



Particle Size		Material
ASTM Sieve sizes	mm	
#10 to #4	2.00 to 4.75	Sand: Coarse
#40 to #10	0.425 to 2.00	Medium
#200 to #40	0.075 to 0.425	Fine
< #200	< 0.075	Silt or Clay

Particle Size		Material
ASTM Sieve Sizes	mm	
> 12 in.	> 300	Boulders
3 in. to 12 in.	75 to 300	Cobbles
3/4 in. to 3 in.	19 to 75	Gravel: Coarse
#4 to 3/4 in.	4.75 to 19	Fine

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

Other Symbol Types

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

EXPLANATION OF FIELD AND LABORATORY TESTING

LEGEND OF ABBREVIATIONS AND SYMBOLS

LL - Liquid Limit (%)
PL - Plastic Limit (%)
PI - Plasticity Index (%)
MC - Moisture Content (%)
SPT - Standard Penetration Test
RQD - Rock Quality Designation
Qu - Unconfined Compression
Su - Undrained Shear Strength
VW - Vibrating Wire Piezometer
SI - Slope Inclinometer

▽ Water Level at Time of Drilling

▼ Water Level at End of Drilling

▼ Water Level After Drilling as Indicated on Test Hole Logs

FRACTION OF SECONDARY SOIL CONSTITUENTS ARE BASED ON THE FOLLOWING TERMINOLOGY

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

TERMS DESCRIBING CONSISTENCY OR COMPACTION CONDITION

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

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

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

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

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

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

25-R-04 Local Street Renewal
Killarney/Magdalene Alley - Baylor Ave to Greyfriars Rd
Summary Table - Sub-Surface Investigation

Test Hole No.	Test Hole Location	Pavement Surface		Pavement Structure Material		Subgrade Description	Sample Depth (m)		Moisture Content (%)	Grain Size Analysis				Atterberg Limits		
		Type	Thickness (mm)	Type	Thickness (mm)		Top (m)	Bottom (m)		Clay (%)	Silt (%)	Sand (%)	Gravel (%)	Plastic	Liquid	Plasticity Index
TH25-21	UTM : 551691720 N, 632924 E Located behind #19 Magdalene Bay, centreline of alley between Killarney Avenue and Magdalene Bay	Asphalt	50	Concrete	105	Sand and Gravel (Fill), AASHTO: A-1 (I)	0.2	0.3	10							
						Silt, AASHTO: A-6 (16)	0.8	0.9	35							
						Silt, AASHTO: A-6 (16)	1.1	1.2	25	26	69	5	0	14	32	18
						Clay, AASHTO: A-7-6 (I)	1.4	1.5	38							
						Silt, AASHTO: A-6 (I)	1.7	1.8	22							
						Clay, AASHTO: A-7-6 (I)	2.1	2.3	35							
						Clay, AASHTO: A-7-6 (I)	2.6	2.7	50							

www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

Moisture Content Report
ASTM D2216-98

Project No. 1000-043-29
Client WSP
Project 25-R-04 Local Street Renewal (Killarney/Magdalene Alley)

Sample Date 23-Jan-25
Test Date 31-Jan-25
Technician K Franklin

Test Hole	TH25-21	TH25-21	TH25-21	TH25-21	TH25-21	TH25-21
Depth (m)	0.2 - 0.3	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8	2.1 - 2.3
Sample #	G138	G139	G140	G141	G142	G143
Tare ID	Z43	W74	L2	AB68	A106	W111
Mass of tare	8.6	8.5	6.7	7.1	8.4	8.7
Mass wet + tare	233.9	234.8	424.4	216.5	239.4	234.5
Mass dry + tare	213.6	175.8	340.9	158.9	198.2	175.7
Mass water	20.3	59.0	83.5	57.6	41.2	58.8
Mass dry soil	205.0	167.3	334.2	151.8	189.8	167.0
Moisture %	9.9%	35.3%	25.0%	37.9%	21.7%	35.2%

Test Hole	TH25-21					
Depth (m)	2.6 - 2.7					
Sample #	G144					
Tare ID	E45					
Mass of tare	6.8					
Mass wet + tare	227.6					
Mass dry + tare	154.2					
Mass water	73.4					
Mass dry soil	147.4					
Moisture %	49.8%					

Test Hole						
Depth (m)						
Sample #						
Tare ID						
Mass of tare						
Mass wet + tare						
Mass dry + tare						
Mass water						
Mass dry soil						
Moisture %						

www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

Atterberg Limits
ASTM D4318-10e1

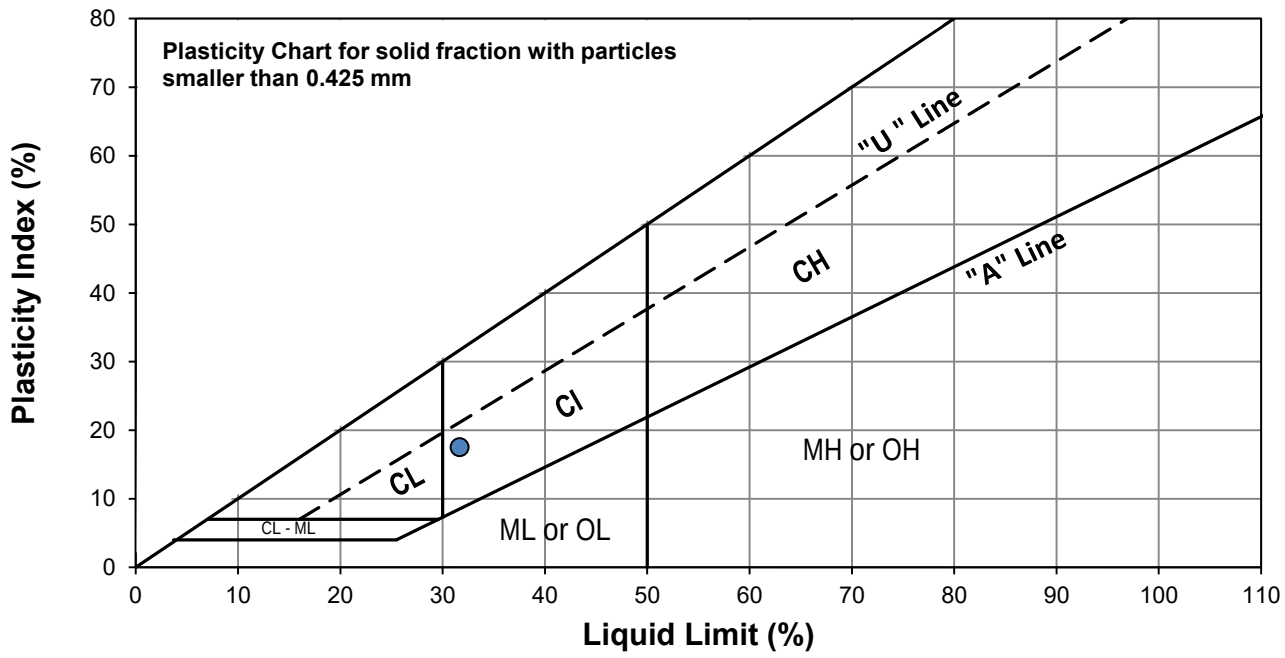
CERTIFIED BY CCIL Canadian Council of Independent Laboratories For specific tests as listed on www.ccil.com

Project No.	1000-043-29
Client	WSP
Project	25-R-04 Local Street Renewal (Killarney/Magdalene Alley)
Test Hole	TH25-21
Sample #	G140
Depth (m)	1.1 - 1.2
Sample Date	23-Jan-25
Test Date	06-Feb-25
Technician	K. Franklin

Liquid Limit	32
Plastic Limit	14
Plasticity Index	18

Liquid Limit

Trial #	1	2	3		
Number of Blows (N)	19	26	33		
Mass Tare (g)	13.831	13.975	13.774		
Mass Wet Soil + Tare (g)	23.299	22.421	23.122		
Mass Dry Soil + Tare (g)	20.981	20.394	20.916		
Mass Water (g)	2.318	2.027	2.206		
Mass Dry Soil (g)	7.150	6.419	7.142		
Moisture Content (%)	32.420	31.578	30.888		



Plastic Limit

Trial #	1	2	3	4	5
Mass Tare (g)	14.171	13.929			
Mass Wet Soil + Tare (g)	26.496	22.332			
Mass Dry Soil + Tare (g)	24.981	21.281			
Mass Water (g)	1.515	1.051			
Mass Dry Soil (g)	10.810	7.352			
Moisture Content (%)	14.015	14.295			

Note: Additional information recorded/measured for this test is available upon request.

www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

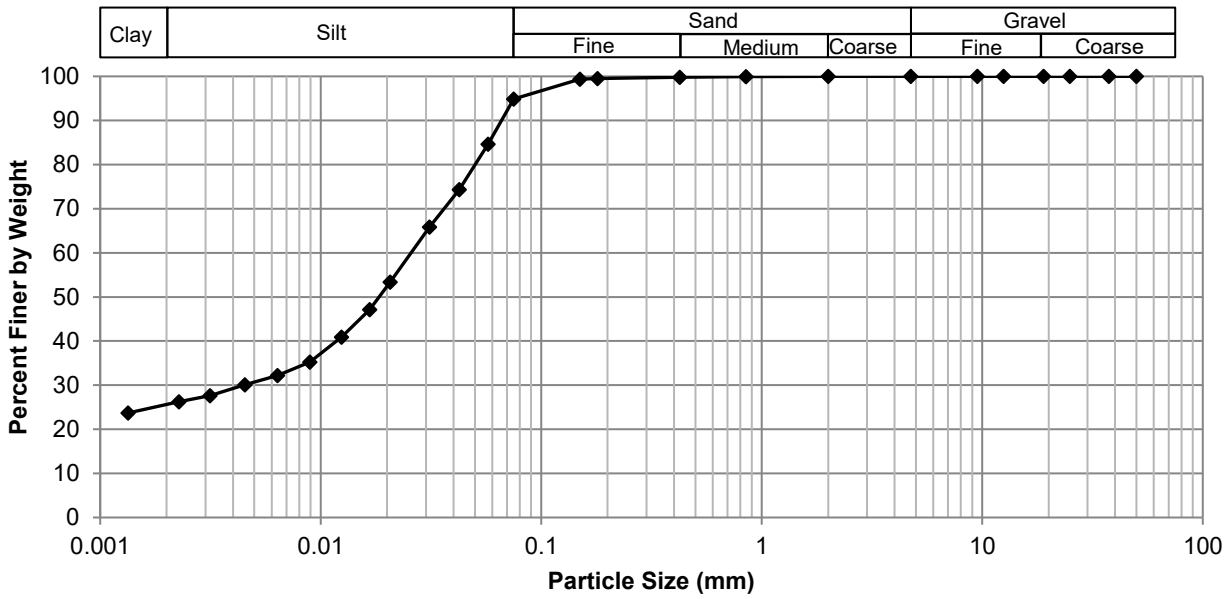
Grain Size Analysis (Hydrometer Method)
AASHTO T 88

CERTIFIED BY CCIL Canadian Council of Independent Laboratories For specific tests as listed on www.ccil.com

Project No.	1000-043-29
Client	WSP
Project	25-R-04 Local Street Renewal (Killarney/Magdalene Alley)
Test Hole	TH25-21
Sample #	G140
Depth (m)	1.1 - 1.2
Sample Date	23-Jan-25
Test Date	06-Feb-25
Technician	D. Sellick

Gravel	0.0%
Sand	5.1%
Silt	69.4%
Clay	25.5%

Particle Size Distribution Curve



Gravel		Sand		Silt and Clay	
Particle Size (mm)	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**
50.0	100.00	4.75	100.00	0.0750	94.89
37.5	100.00	2.00	100.00	0.0575	84.62
25.0	100.00	0.850	99.91	0.0425	74.30
19.0	100.00	0.425	99.78	0.0311	65.86
12.5	100.00	0.180	99.50	0.0206	53.35
9.50	100.00	0.150	99.39	0.0167	47.10
4.75	100.00	0.075	94.89	0.0124	40.89
				0.0089	35.26
				0.0064	32.18
				0.0045	30.08
				0.0032	27.66
				0.0023	26.27
				0.0013	23.69

Photo 1: Pavement Core Sample at TH25-21

Appendix I

Summary Table and Pavement Core Photos

Dartmouth Dr – Pembina Hwy to Snow St

Dartmouth Drive

25-R-04 Local Street Renewal

Pavement Core No.	Pavement Core Location	Pavement Surface		Pavement Structure Material	
		Type	Thickness (mm)	Type	Thickness (mm)
PC25-24	UTM : 5518894 m N, 632924 m E; Located on Dartmouth Dr, Westbound Lane 13 m East of ambulance ramp, 2.0 m South of North curb	Asphalt	0	Concrete	210

Photo 1: Pavement Core Sample at TH25-24

Appendix J

Summary Table and Pavement Core Photos

Hector Ave – Wentworth St to Lilac St

Hector Avenue - Wentworth Street to Lilac Street

25-R-04 Local Street Renewal

Pavement Core No.	Pavement Core Location	Pavement Surface		Pavement Structure Material	
		Type	Thickness (mm)	Type	Thickness (mm)
PC25-30	UTM : 5524835 m N, 632856 m E; Located at #797 Hector Ave, Westbound lane, 2.0 m South of North curb	Asphalt	80	Concrete	190

Photo 1: Pavement Core Sample at PC25-30

Appendix K

Summary Table and Pavement Core Photos

Hector Ave – Stafford St to Wentworth St

Hector Avenue - Stafford Street to Wentworth Street

25-R-04 Local Street Renewal

Pavement Core No.	Pavement Core Location	Pavement Surface		Pavement Structure Material	
		Type	Thickness (mm)	Type	Thickness (mm)
PC25-29	UTM : 5524751 m N, 632708 m E; Located at #840 Hector Ave, Eastbound lane, 2.0 m North of South curb	Asphalt	45	Concrete	275

Photo 1: Pavement Core Sample at PC25-29

Appendix L

Summary Table and Pavement Core Photos

Waller – Vincent St to Pembina Hwy

Waller Avenue - Vincent Street to Pembina Highway

25-R-04 Local Street Renewal

Pavement Core No.	Pavement Core Location	Pavement Surface		Pavement Structure Material	
		Type	Thickness (mm)	Type	Thickness (mm)
PC25-26	UTM : 5522183 m N, 632389 m E; Located at #1300 Waller Ave, Eastbound Lane, 1.8 m North of South curb	Asphalt	100	Concrete	0
PC25-27	UTM : 5522286 m N, 632581 m E; Located at #1141 Waller Ave, Westbound Lane, 2.6 m South of North curb	Asphalt	110	Concrete	0
PC25-28	UTM : 5522393 m N, 632768 m E; Located at #1011 Waller Ave, Westbound Lane, 2.3 m South of North curb	Asphalt	85	Concrete	0

Photo 1: Pavement Core Sample at PC25-26

Photo 2: Pavement Core Sample at PC25-27

Photo 3: Pavement Core Sample at PC25-28

Appendix M

Summary Table and Pavement Core Photos

Morningside Dr – Rochester Ave to Valence Ave

Morning Side Drive - Rochester Ave to Valence Ave

25-R-04 Local Street Renewal

Pavement Core No.	Pavement Core Location	Pavement Surface		Pavement Structure Material	
		Type	Thickness (mm)	Type	Thickness (mm)
PC25-25	UTM : 5515928 m N, 633273 m E; Located at #2 Morningside Drive, Westbound Lane, 2.1 m South of North curb	Asphalt	0	Concrete	160

Photo 1: Pavement Core Sample at PC25-25

Appendix N

Summary Table and Pavement Core Photos

Snow St – Markham Rd to End

Snow Street - Markham Road to End

25-R-04 Local Street Renewal

Pavement Core No.	Pavement Core Location	Pavement Surface		Pavement Structure Material	
		Type	Thickness (mm)	Type	Thickness (mm)
PC25-23	UTM : 5518898 m N, 633074 m E; Located on Snow St, Southbound Lane 100m South of Darthmouth Dr, 2.0 m East of West curb	Asphalt	100	Concrete	220

Photo 1: Pavement Core Sample at PC25-23

Appendix O

Summary Table and Pavement Core Photos

Killarney/Magdalene Alley – Baylor Ave to Greyfriars Rd

Killarney/Magdalene Alley – Baylor Ave to Greyfriars Rd

25-R-04 Local Street Renewal

Pavement Core No.	Pavement Core Location	Pavement Surface		Pavement Structure Material	
		Type	Thickness (mm)	Type	Thickness (mm)
PC25-31	UTM : 5516917 m N, 632924 m E; Located at #11 Magdalene Bay garage, Westbound lane, 3.0 m North of South curb	Asphalt	50	Concrete	105

Photo 1: Pavement Core Sample at PC25-31