

# **APPENDIX 'A'**

# **GEOTECHNICAL REPORT**



Quality Engineering | Valued Relationships

## **WSP Canada Group Ltd.**

### **2025 Local Street Renewal R-07**

**Prepared for:**

Scott Suderman, C.E.T., P.Eng.

WSP Canada Group Ltd.

111-93 Lombard Avenue

Winnipeg, MB

R3B 3B1

**Project Number:** 1000-043-28

**Date:** January 8, 2025



Quality Engineering | Valued Relationships

January 8, 2025

Our File No. 1000-043-28

Scott Suderman, C.E.T., P.Eng.  
WSP Canada Group Ltd.  
111-93 Lombard Avenue  
Winnipeg, MB  
R3B 3B1

**RE: 2025 Local Street Renewal R-07**

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TREK Geotechnical Inc. is pleased to submit our Final Report for the geotechnical investigation for the 2025 Local Street Renewal R-07 project.

Please contact the undersigned should you have any questions.

Sincerely,

**TREK Geotechnical Inc.**  
**Per:**

A handwritten signature in blue ink, appearing to read "N. Ferreira", is written over a light blue circular stamp.

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

Encl.

## Revision History

Revision No.	Author	Issue Date	Description
0	KF	January 8, 2025	Final Report

## Authorization Signatures

Prepared By:



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

Reviewed By:



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



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## 1.0 Introduction

This report summarizes the results of the road investigation completed for the 2025 Local Street Renewal R-07 project. The project included drilling test holes and collecting pavement cores along Gilles Street. 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. 7331-2024 (Section E3 – Site Investigation Requirements).

## 2.0 Road Investigation

The investigation included coring of pavement and drilling test holes to a depth of 3.0m at three locations on Gilles Crescent. The road investigation was conducted on December 12 and 13, 2024. The pavement structure (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 bit. 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. Appendix A includes test hole logs, laboratory testing summary tables and results, and photos of the concrete cores.

Core and test hole logs noted on the summary tables and test hole locations 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 (Hydrometer method) on select samples between 0.6 and 0.9 m below pavement as well as Standard Proctor and CBR testing.

One CBR was completed on bulk samples of the clay encountered within the prescribed sample depth for CBR testing. The results are shown in the table below.

**Table 1: CBR Testing Summary**

Soil Unit	Street	Depth (m)	SPMDD (kg/m <sup>3</sup> )	Opt. Moisture (%)	Percent Proctor (%)	Moisture Content (%)	CBR Value at 2.54 mm	CBR Value at 5.08 mm
Clay	Gilles Crescent: TH24-01, 02 & 03 Combined	0.6 – 2.1	1399	30.9	94.4	31.4	1.4%	1.0%

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.

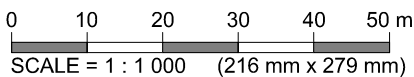
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## Figures

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Z:\Projects\1000 Soils Lab\1000-043 WSP\1000-043-28 Local R-07 and St Anne's Coring\3 Survey and Dwg\3.4 CAD\3.4.3 Working Folder\Fig 01 2025-01-03 R-07 and St Anne's Coring 0\_A 1000-043-28.dwg, 2025-01-03 10:22:30 AM



**Figure 01**  
Test Hole Location Plan

## **Appendix A**

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

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# Sub-Surface Log

Test Hole TH24-01

1 of 1

Client: WSP Project Number: 1000-043-28  
 Project Name: 2025 Local Street Renewal R-07 Location: UTM N-5528206, E-640970  
 Contractor: Maple Leaf Drilling Ground Elevation: Top of Pavement  
 Method: 125mm Solid Stem Auger, B40 Mobile Truck Mount Date Drilled: December 13, 2024

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/m <sup>3</sup> )						Undrained Shear Strength (kPa)	
					16	17	18	19	20	21		
0.0 - 0.1		CONCRETE - 165 mm thick										
0.1 - 0.2		SAND and GRAVEL - 25 mm down crushed limestone, light brown, moist, angular, frozen - AASHTO: A-1(I)										
0.2 - 0.6		CLAY (FILL) - silty, trace gravel (<20 mm diam.), trace sand - dark brown, moist, stiff - high plasticity, frozen - AASHTO: A-7-6(I)	G01									
0.6 - 1.0		CLAY - silty - brown - moist, stiff - high plasticity - AASHTO: A-7-6(83)	G02									
1.0 - 1.1			G03									
1.1 - 1.2			G04									
1.2 - 1.3			G05									
1.3 - 1.4			G06									
1.4 - 1.5			G07									

END TEST HOLE AT 3.0 m IN CLAY.

Notes:

- Seepage or sloughing not observed.
- Test hole open to 3.0 m depth immediately after drilling.
- Test hole backfilled with cuttings, granular fill and cold patch asphalt.
- Bulk samples were collected between 0.6 m and 2.1 m depth (B22).
- Test hole located in front of #47 Gillies 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 LOGS 2024-12-13 LOCAL R-07&ST ANNES O. A. KF 1000-043-28.GPJ TREK.GDT 1/8/25



# Sub-Surface Log

Test Hole TH24-02

1 of 1

Client: WSP Project Number: 1000-043-28  
 Project Name: 2025 Local Street Renewal R-07 Location: UTM N-5528220, E-640905  
 Contractor: Maple Leaf Drilling Ground Elevation: Top of Pavement  
 Method: 125mm Solid Stem Auger, B40 Mobile Truck Mount Date Drilled: December 13, 2024

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/m <sup>3</sup> )						Undrained Shear Strength (kPa)					
					16	17	18	19	20	21	Test Type					
					Particle Size (%)											
					0	20	40	60	80	100						
					PL   MC   LL 0 20 40 60 80 100											
					0	20	40	60	80	100	0	50	100	150	200	250
0.0 - 0.1		CONCRETE - 170 mm thick														
0.1 - 0.3		SAND and GRAVEL - 25 mm down crushed limestone, light brown, moist, angular, frozen - AASHTO: A-1(I)														
0.3 - 0.6		CLAY (FILL) - silty, trace gravel (<20 mm diam.), trace sand - dark brown, moist, stiff - high plasticity, frozen - AASHTO: A-7-6(I)		G08												
0.6 - 1.6		CLAY - silty - brown - moist, stiff - high plasticity - AASHTO: A-7-6(I)		G09												
				G10												
				G11												
				G12												
				G13												
				G14												
1.6 - 3.0		- firm to stiff below 1.6 m														

END TEST HOLE AT 3.0 m IN CLAY.

Notes:

- Seepage or sloughing not observed.
- Test hole open to 3.0 m depth immediately after drilling.
- Test hole backfilled with cuttings, granular fill and cold patch asphalt.
- Bulk samples were collected between 0.6 m and 2.1 m depth (B23).
- Test hole located in front of #30 Gillies 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 2024-12-13 LOCAL R-07&ST ANNES O. A. KF 1000-043-28.GPJ TREK.GDT 1/8/25



# Sub-Surface Log

Test Hole TH24-03

1 of 1

Client: WSP Project Number: 1000-043-28  
 Project Name: 2025 Local Street Renewal R-07 Location: UTM N-5528155, E-640870  
 Contractor: Maple Leaf Drilling Ground Elevation: Top of Pavement  
 Method: 125mm Solid Stem Auger, B40 Mobile Truck Mount Date Drilled: December 13, 2024

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/m <sup>3</sup> )						Undrained Shear Strength (kPa)					
					16	17	18	19	20	21	Test Type					
					Particle Size (%)											
					0	20	40	60	80	100						
					PL   MC   LL 0 20 40 60 80 100											
					0	20	40	60	80	100	0	50	100	150	200	250
0.0 - 0.1		CONCRETE - 165 mm thick														
0.1 - 0.2		SAND and GRAVEL - 25 mm down crushed limestone, light brown, moist, angular, frozen - AASHTO: A-1(I)														
0.2 - 0.4		CLAY (FILL) - silty, trace gravel (<20 mm diam.), trace sand - dark brown, moist, stiff - high plasticity, frozen - AASHTO: A-7-6(I)		G15												
0.4 - 1.6		CLAY - silty - brown - moist, stiff - high plasticity - AASHTO: A-7-6(I)		G16												
				G17												
				G18												
				G19												
				G20												
				G21												
1.6 - 2.0		- trace silt pockets (light brown, <50 mm diam.) between 1.6 and 2.0 m - firm to stiff below 1.6 m														

END TEST HOLE AT 3.0 m IN CLAY.

Notes:

- Seepage or sloughing not observed.
- Test hole open to 3.0 m depth immediately after drilling.
- Test hole backfilled with cuttings, granular fill and cold patch asphalt.
- Bulk samples were collected between 0.6 m and 2.1 m depth (B24).
- Test hole located in front of #3 Gillies 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 2024-12-13 LOCAL R-07&ST ANNES O. A. KF 1000-043-28.GPJ TREK.GDT 1/8/25





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 Tel: 204.975.9433 Fax: 204.975.9435

**Moisture Content Report  
 ASTM D2216-98**

**Project No.** 1000-043-28  
**Client** WSP  
**Project** 2025 Local Street Renewal R-07

**Sample Date** 13-Dec-24  
**Test Date** 17-Dec-24  
**Technician** K. Franklin

Test Hole	TH24-01	TH24-01	TH24-01	TH24-01	TH24-01	TH24-01
Depth (m)	0.3 - 0.5	0.7 - 0.9	1.0 - 1.2	1.3 - 1.5	1.7 - 1.8	2.1 - 2.3
Sample #	G01	G02	G03	G04	G05	G06
Tare ID	P03	E9	EE16	D49	D35	E70
Mass of tare	8.8	6.9	6.9	8.8	6.9	6.8
Mass wet + tare	214.8	239.7	416.7	235.8	233.4	254.8
Mass dry + tare	154.6	176.2	297.7	165.2	158.3	172.1
Mass water	60.2	63.5	119.0	70.6	75.1	82.7
Mass dry soil	145.8	169.3	290.8	156.4	151.4	165.3
Moisture %	41.3%	37.5%	40.9%	45.1%	49.6%	50.0%

Test Hole	TH24-01	TH24-02	TH24-02	TH24-02	TH24-02	TH24-02
Depth (m)	2.6 - 2.7	0.3 - 0.5	0.7 - 0.9	1.0 - 1.2	1.3 - 1.5	1.7 - 1.8
Sample #	G07	G08	G09	G10	G11	G12
Tare ID	M89	B5	AC12	AC25	E114	F76
Mass of tare	7.2	6.9	7.1	6.7	8.6	8.7
Mass wet + tare	253.5	228.1	219.2	226.3	218.9	226.8
Mass dry + tare	169.2	168.9	161.5	165.7	157.3	156.6
Mass water	84.3	59.2	57.7	60.6	61.6	70.2
Mass dry soil	162.0	162.0	154.4	159.0	148.7	147.9
Moisture %	52.0%	36.5%	37.4%	38.1%	41.4%	47.5%

Test Hole	TH24-02	TH24-02	TH24-03	TH24-03	TH24-03	TH24-03
Depth (m)	2.1 - 2.3	2.6 - 2.7	0.3 - 0.5	0.7 - 0.9	1.0 - 1.2	1.3 - 1.5
Sample #	G13	G14	G15	G16	G17	G18
Tare ID	H50	E96	F56	C26	AA13	Z123
Mass of tare	8.7	7.0	8.6	8.7	7.0	8.6
Mass wet + tare	235.0	240.6	226.0	223.1	224.3	219.8
Mass dry + tare	166.9	164.4	170.3	179.6	160.9	164.6
Mass water	68.1	76.2	55.7	43.5	63.4	55.2
Mass dry soil	158.2	157.4	161.7	170.9	153.9	156.0
Moisture %	43.0%	48.4%	34.4%	25.5%	41.2%	35.4%



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## Moisture Content Report ASTM D2216-98

**Project No.** 1000-043-28  
**Client** WSP  
**Project** 2025 Local Street Renewal R-07  
  
**Sample Date** 13-Dec-24  
**Test Date** 17-Dec-24  
**Technician** K. Franklin

Test Hole	TH24-03	TH24-03	TH24-03			
Depth (m)	1.7 - 1.8	2.1 - 2.3	2.6 - 2.7			
Sample #	G19	G20	G21			
Tare ID	D47	C19	W55			
Mass of tare	9.2	8.5	8.5			
Mass wet + tare	221.8	225.3	233.2			
Mass dry + tare	157.7	156.5	159.0			
Mass water	64.1	68.8	74.2			
Mass dry soil	148.5	148.0	150.5			
Moisture %	43.2%	46.5%	49.3%			





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**Atterberg Limits**  
**ASTM D4318-10e1**

**Project No.** 1000-043-28  
**Client** WSP  
**Project** 2025 Local Street Renewal R-07

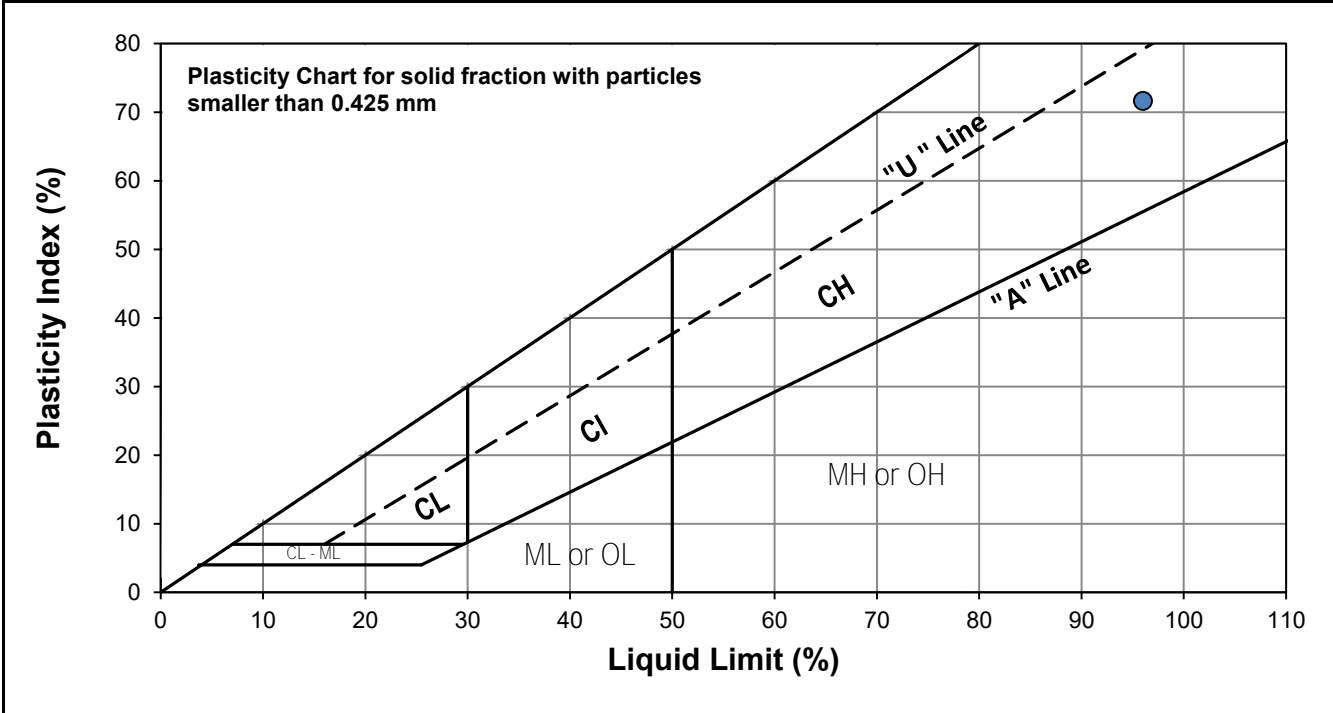


**Test Hole** TH24-01  
**Sample #** G03  
**Depth (m)** 1.0 - 1.2  
**Sample Date** 13-Dec-24  
**Test Date** 20-Dec-24  
**Technician** A. Dustmamatov

<b>Liquid Limit</b>	96
<b>Plastic Limit</b>	24
<b>Plasticity Index</b>	72

**Liquid Limit**

Trial #	1	2	3
<b>Number of Blows (N)</b>	16	23	35
<b>Mass Tare (g)</b>	14.025	14.151	13.954
<b>Mass Wet Soil + Tare (g)</b>	24.672	24.155	23.739
<b>Mass Dry Soil + Tare (g)</b>	19.369	19.242	19.007
<b>Mass Water (g)</b>	5.303	4.913	4.732
<b>Mass Dry Soil (g)</b>	5.344	5.091	5.053
<b>Moisture Content (%)</b>	99.233	96.504	93.647



**Plastic Limit**

Trial #	1	2	3	4	5
<b>Mass Tare (g)</b>	13.950	14.076			
<b>Mass Wet Soil + Tare (g)</b>	21.431	21.411			
<b>Mass Dry Soil + Tare (g)</b>	19.970	19.967			
<b>Mass Water (g)</b>	1.461	1.444			
<b>Mass Dry Soil (g)</b>	6.020	5.891			
<b>Moisture Content (%)</b>	24.269	24.512			

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



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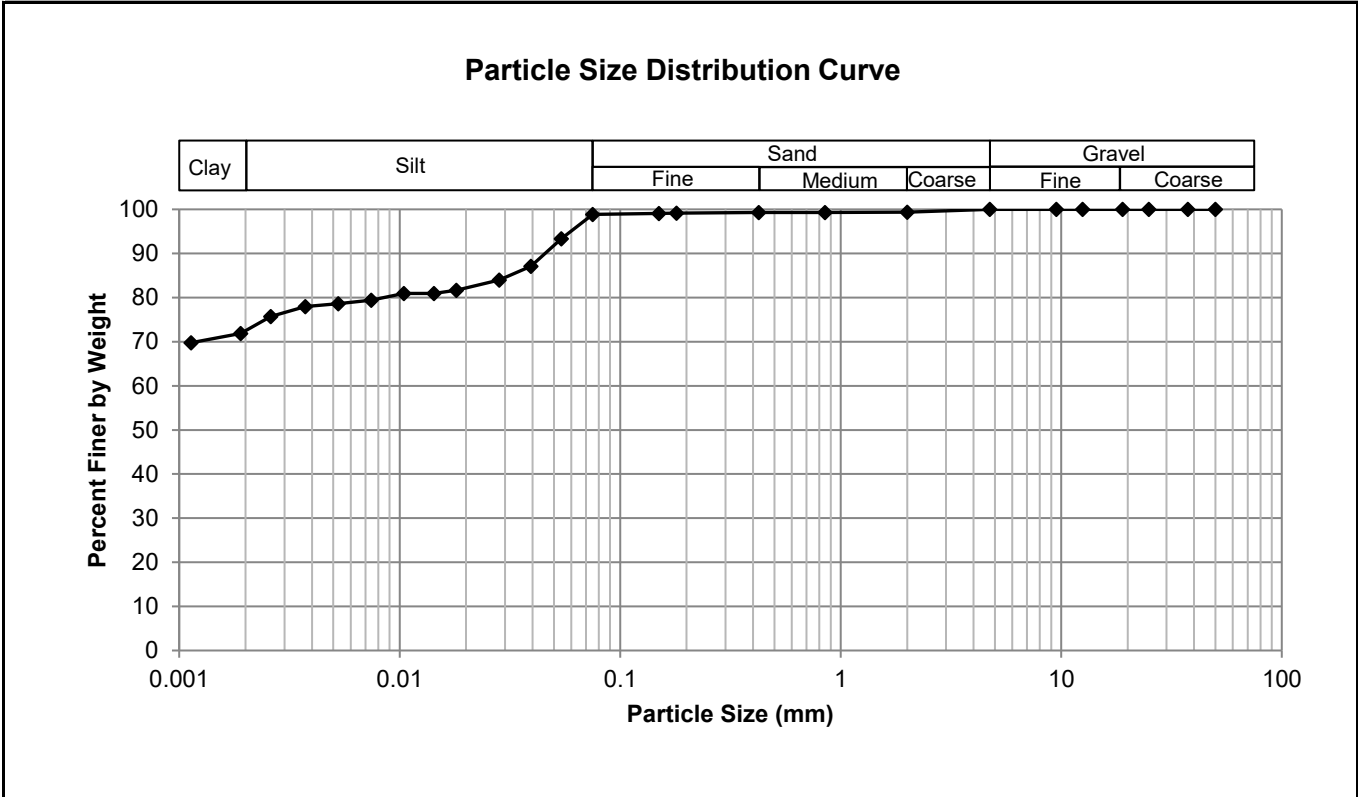
**Grain Size Analysis (Hydrometer Method)**  
**AASHTO T 88**

**Project No.** 1000-043-28  
**Client** WSP  
**Project** 2025 Local Street Renewal R-07

**Test Hole** TH24-01  
**Sample #** G03  
**Depth (m)** 1.0 - 1.2  
**Sample Date** 13-Dec-24  
**Test Date** 23-Dec-24  
**Technician** A. Dustmamatov



<b>Gravel</b>	0.0%
<b>Sand</b>	1.1%
<b>Silt</b>	26.5%
<b>Clay</b>	72.4%



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	98.89
37.5	100.00	2.00	99.39	0.0540	93.34
25.0	100.00	0.850	99.33	0.0394	87.12
19.0	100.00	0.425	99.26	0.0282	84.02
12.5	100.00	0.180	99.11	0.0181	81.69
9.50	100.00	0.150	99.07	0.0143	80.91
4.75	100.00	0.075	98.89	0.0105	80.91
				0.0074	79.39
				0.0053	78.65
				0.0037	77.94
				0.0026	75.71
				0.0019	71.89
				0.0011	69.76



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# Standard Proctor Compaction Test

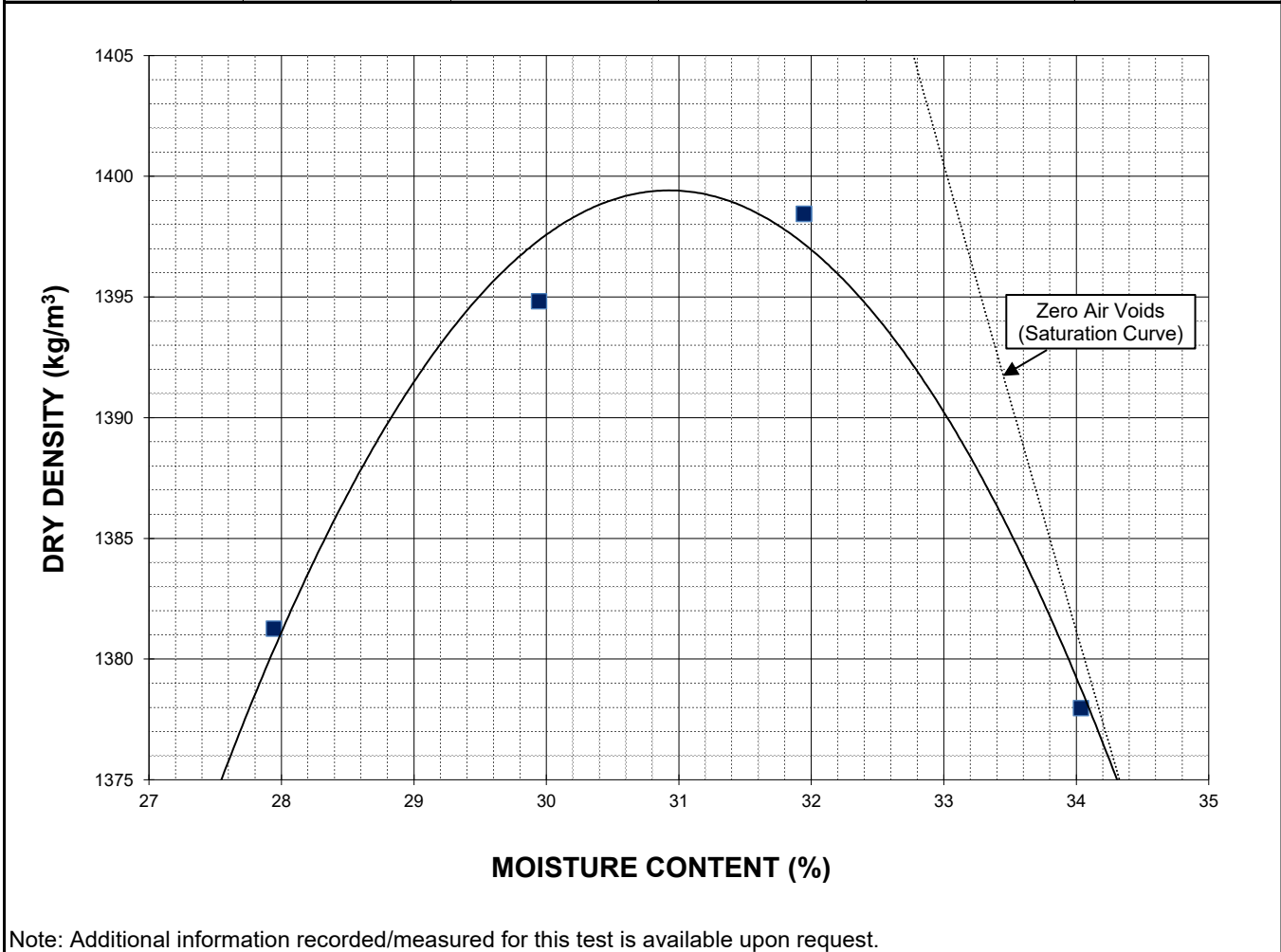
ASTM D698-12e2

**Project No.** 1000-043-28  
**Client** WSP  
**Project** 2025 Local Street Renewal R-07  
  
**Sample #** B22, B23, & B24 (combined)  
**Source** TH24-01, 02, & 03 (combined)  
**Material** Clay  
**Sample Date** 13-Dec-24  
**Test Date** 20-Dec-24  
**Technician** A. Dustmamatov



<b>Maximum Dry Density (kg/m<sup>3</sup>)</b>	1399
<b>Optimum Moisture (%)</b>	30.9

Trial Number	1	2	3	4	
<b>Wet Density (kg/m<sup>3</sup>)</b>	1847	1767	1813	1845	
<b>Dry Density (kg/m<sup>3</sup>)</b>	1378	1381	1395	1398	
<b>Moisture Content (%)</b>	34.0	27.9	29.9	31.9	





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**California Bearing Ratio Test Data Sheet**  
**ASTM D1883-16**

<b>Project No.</b>	1000-043-28	<b>Source</b>	TH24-01, 02, & 03 (combined)
<b>Client</b>	WSP	<b>Material</b>	Clay
<b>Project</b>	2025 Local Street Renewal R-07	<b>Sample Date</b>	13-Dec-24
<b>Sample #</b>	B22, B23, & B24 (combined)	<b>Test Date</b>	24-Dec-24
		<b>Technician</b>	A. Dustmamatov

**Proctor Results (ASTM D698)**

Maximum Dry Density                    1399 kg/m3  
 Optimum Moisture Content            30.9 %  
 Material Retained on 19 mm Sieve   0.0 %

**CBR Sample Compaction**

Dry Density                                    1321 kg/m3  
 Initial Moisture Content                31.4 %  
 Relative Density                            94.4 % SPMDD

**Soaking Results**

Surcharge                                    4.54 kg  
 Swell                                            2.9 %  
 Moisture Content in top 25 mm       55.0 %  
 Immersion Period                           96 h

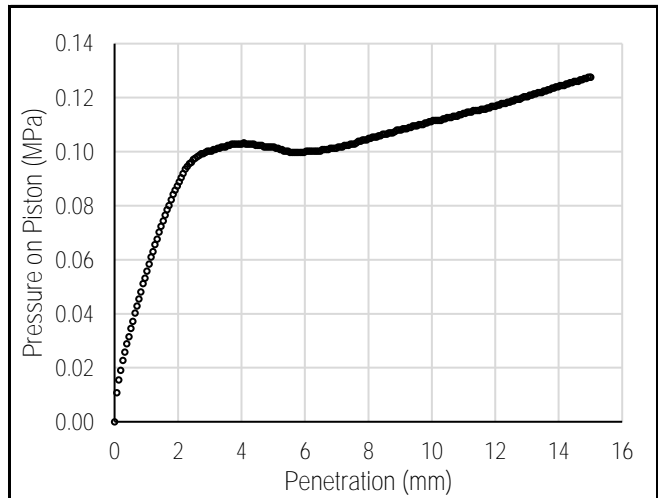
**CBR Results**

CBR at 2.54 mm                            1.4 %  
 CBR at 5.08 mm                            1.0 %  
 Zero Correction                             0 mm

**Test Data**

Penetration (mm)	Measured Pressure (MPa)	Corrected Pressure (MPa)
0.64	0.04	0.04
1.27	0.07	0.07
1.91	0.09	0.09
2.54	0.10	0.10
3.18	0.10	0.10
3.81	0.10	0.10
4.45	0.10	0.10
5.08	0.10	0.10
7.62	0.10	0.10
10.16	0.11	0.11
12.70	0.12	0.12

**Load/Penetration Curve**



**Comments:**

---



Photo 1: Pavement Core Sample at Test Hole TH24-01



Photo 2: Pavement Core Sample at Test Hole TH24-02



Photo 3: Pavement Core Sample at Test Hole TH24-03