

APPENDIX 'A'

GEOTECHNICAL REPORT



Quality Engineering | Valued Relationships

Morrison Hershfield

20-C-03 Portage-Sargent Pavement Renewals

Prepared for:

Morrison Hershfield
1-59 Scurfield Boulevard
Winnipeg, MB R3Y 1V2
Attention: Ron Bruce, P. Eng

Project Number:

1000 001 21

Date:

October 9, 2020
Final Report



Quality Engineering | Valued Relationships

October 9, 2020

Our File No. 1000 001 21

Mr. Ron Bruce, P. Eng
Morrison Hershfield
1-59 Scurfield Boulevard
Winnipeg, Manitoba, R3Y 1V2

**RE: Sub-Surface Investigation Report for
20-C-03 Portage-Sargent Pavement Renewals**

TREK Geotechnical Inc. is pleased to submit our report for the sub-surface investigations for the 20-C-03 Portage-Sargent Pavement Renewals project.

Please contact the undersigned if you have any questions. Thank you for the opportunity to serve you on this assignment.

Sincerely,

TREK Geotechnical Inc.

Per:

A handwritten signature in blue ink, appearing to read "N. Ferreira", written over a light blue horizontal line.

Nelson John Ferreira, Ph.D., P. Eng.
Geotechnical Engineer, Principal
Tel: 204.975.9433 ext. 103


cc: Angela Fidler-Kliwer C.Tech. (TREK Geotechnical)

Revision History

Revision No.	Author	Issue Date	Description
0	JSB	October 9, 2020	Final Report


Authorization Signatures

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1.0 Introduction

This report summarizes the results of the road investigation completed for the 20-C-03 Portage-Sargent Pavement Renewals – Sargent Ave. The test holes were located along Sargent Avenue between St. James Street and Empress Street. The 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 in accordance with the City of Winnipeg public works street project requirements.

2.0 Road Investigation and Laboratory Program

The investigation included coring of pavement and drilling test holes at 7 locations as shown on Figure 01 (attached).

The road investigation was conducted between September 10, 2020 and September 11, 2020. The pavement structure (asphalt and/or concrete) was cored by Jashandeep Singh Bhullar of TREK Geotechnical Inc. (TREK) using a portable coring press equipped with a hollow 150 mm diameter diamond core drill bit. Seven test holes were drilled to a depth of 3.0 m below road surface by Maple Leaf Drilling Ltd. using a truck mounted drill rig equipped with 125 mm diameter solid stem augers. The sub-surface conditions were observed during drilling and soils were visually classified by Jashandeep Singh Bhullar 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. Core samples were also retrieved and logged at TREK's material testing laboratory.

Test hole locations noted on the summary tables and test hole logs are based on UTM coordinates obtained using a hand-held GPS and their location relative to the nearest address, and measured distances 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 0.5 and 1.1 m below pavement as well as Standard Proctor and CBR testing. Information gathered for each street is included in separate appendix A). The information provided in the Appendices includes test hole logs, laboratory testing summary tables and results, and photos of the concrete cores.

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

Table 1 - CBR Testing Summary

Sample Description	Test Hole	Depth (m)	SPMDD (kg/m ³)	Opt. Moisture (%)	Percent Proctor (%)	Moisture Content (%)	CBR Value at 2.54 mm	CBR Value at 5.08 mm
Clay	TH20-02	0.5 to 1.5	1687	19.5	95.6	20.7	4.9	4.1
Clay	TH20-04	0.5 to 1.5	1522	26.2	94.2	30.9	4.5	3.2
Silty Clay	TH20-05	0.5 to 1.5	1596	22.4	95.6	25.7	5.9	4.5
Clay	TH20-07	0.5 to 1.5	1498	26	95.7	30.3	7.9	5.1

* Testing completed on bulk grab samples from the top 1.5 m of each test hole.

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 was 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 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.

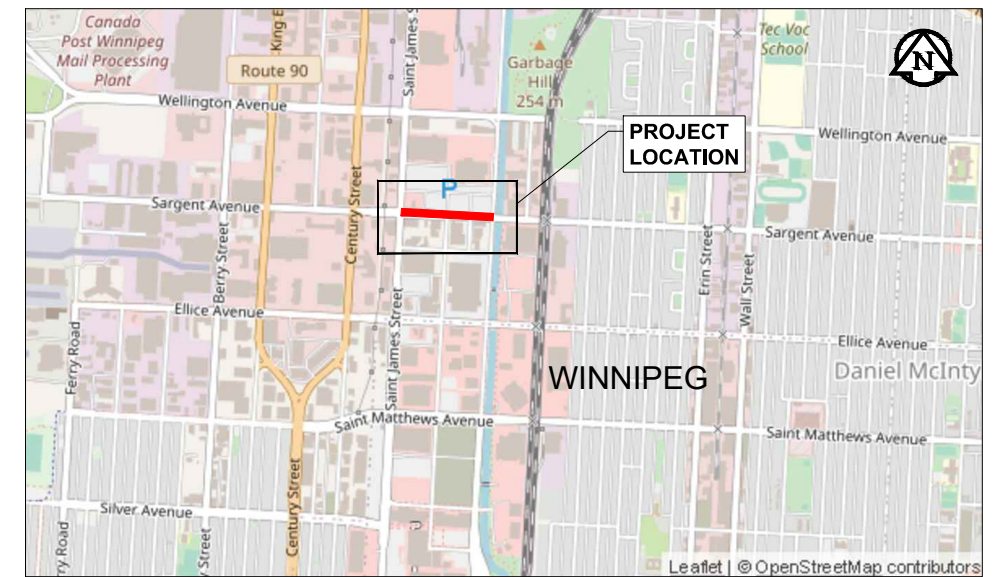
All information provided in this report is subject to our standard terms and conditions for engineering services, a copy of which is provided to each of our clients with the original scope of work, or a mutually executed standard engineering services agreement. If these conditions are not attached, and 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 Morrison Hershfield (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.

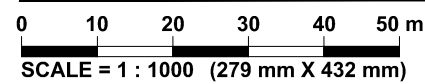
Figure

ANSI full bleed B (11.00 x 17.00 inches)

Z:\Projects\1000 Soils Lab\Lab Projects\1000-001 Morrison Hershfield\1000-001-21 20-C-03 Portage-Sargent Pavement Renewals\3 Survey and Dwg\3.4 CAD\3.4.3 Working Folder\1000-001-21_Sargent & Portage_A_Cd\1.dwg, 2020-10-09 1:16:17 PM



KEY PLAN
NTS



LEGEND:  TEST HOLE (TREK, 2020)

NOTES:

1. AERIAL IMAGE FROM GOOGLE EARTH (2020)
2. TEST HOLE LOCATIONS OBTAINED USING HAND HELD GPS UNIT AND BY MEASURING DISTANCES OFF THE NEAREST ADDRESS

Figure 01
Test Hole Location Plan

Appendix A

Sargent Avenue

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

GENERAL NOTES

- 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.
- 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.
- 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		Particle Size			
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)	GW		Well-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 Not meeting all gradation requirements for GW	ASTM Sieve sizes #10 to #4 #40 to #10 #200 to #40 < #200			
		GP		Poorly-graded gravels, gravel-sand mixtures, little or no fines					
		GM		Silty gravels, gravel-sand-silt mixtures					
		GC		Clayey gravels, gravel-sand-silt mixtures					
	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 Not meeting all gradation requirements for SW	mm 2.00 to 4.75 0.425 to 2.00 0.075 to 0.425 < 0.075		
			SP		Poorly-graded sands, gravelly sands, little or no fines				
		Sands with fines (Appreciable amount of fines)	SM		Silty sands, sand-silt mixtures			Atterberg limits below "A" line or P.I. less than 4 Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols	
			SC		Clayey sands, sand-clay mixtures				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
					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 cases requiring dual symbols*				
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 	Particle Size ASTM Sieve Sizes mm > 300 75 to 300 19 to 75 4.75 to 19 > 12 in. 3 in. to 12 in. 3/4 in. to 3 in. #4 to 3/4 in.			
		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	Material Boulders Cobbles Gravel Coarse 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

LEGEND OF ABBREVIATIONS AND SYMBOLS

LL - Liquid Limit (%)	▽ Water Level at Time of Drilling
PL - Plastic Limit (%)	▼ Water Level at End of Drilling
PI - Plasticity Index (%)	▽ Water Level After Drilling as Indicated on Test Hole Logs
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	

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:

<u>Descriptive Terms</u>	<u>SPT (N) (Blows/300 mm)</u>
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:

<u>Descriptive Terms</u>	<u>SPT (N) (Blows/300 mm)</u>
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:

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



Sub-Surface Log

Test Hole TH20-01

1 of 1

Client: Morrison Hershfield Project Number: 1000-001-21
 Project Name: 20-C-03 Portage-Sargent Pavement Renewals Location: UTM 14U 5528819 m N, 629318 m E
 Contractor: Maple Leaf Drilling Ltd. Ground Elevation: Top of Pavement
 Method: 125mm Solid Stem Auger, B40 Mobile Truck Mount Date Drilled: September 11, 2020

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	SPT (N)	Bulk Unit Wt (kN/m ³)					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 25 50 75 100 125										
		ASPHALT - 55 mm thick														
		CONCRETE - 200 mm thick														
0.5		CLAY - silty, trace silt inclusions (diam. < 20 mm) - black - moist, very stiff - high plasticity - AASHTO: A-7-6 (I) - light brown below 0.5 m.		G01				●						△		>>●
				G02				●						△		+
				G03				●						△		+
				G04				●						△		+
1.5		- grey below 1.5 m.		G05				●						△		+
				G06				●								+
2.0		SILT - clayey - light brown, moist, firm, low to intermediate plasticity, AASHTO: A-4 (I)		G06				●								
				G07				●						△		+
2.5		CLAY - silty, trace silt inclusions (<10 mm diam.) - grey - moist, soft to firm - high plasticity - AASHTO: A-7-6 (I)		G07				●								
				G08				●						△		+
3.0		END OF TEST HOLE AT 3.0 m IN CLAY														

END OF TEST HOLE AT 3.0 m IN CLAY

- 1) Seepage or sloughing not observed.
- 2) Test hole open to 3.0 m immediately after drilling.
- 3) Test hole backfilled with bentonite chips and cold patch asphalt.
- 4) (I) - AASHTO classification interpreted based on visual assessment.
- 5) Test hole located in front of east wall of 1400 Sargent Ave in Eastbound median lane, 4 m North of South curb.

Logged By: Jashandeep Singh Bhullar Reviewed By: Angela Fidler-Kliwer Project Engineer: Nelson Ferreira

SUB-SURFACE LOG LOGS 2020-10-09 PORTAGE-SARGENT PAVEMENT RENEWALS 0.E.JSB.1000-001-21.GPJ.TREK GEOTECHNICAL.GDT 10/9/20



Sub-Surface Log

Test Hole TH20-02

1 of 1

Client: Morrison Hershfield Project Number: 1000-001-21
 Project Name: 20-C-03 Portage-Sargent Pavement Renewals Location: UTM 14U 5528816 m N, 629395 m E
 Contractor: Maple Leaf Drilling Ltd. Ground Elevation: Top of Pavement
 Method: 125mm Solid Stem Auger, B40 Mobile Truck Mount Date Drilled: September 11, 2020

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	SPT (N)	Bulk Unit Wt (kN/m ³)		Particle Size (%)		Undrained Shear Strength (kPa)							
						16	17	18	19	20	21	0	25	50	75	100	125
0.0		ASPHALT - 60 mm thick															
0.0		CONCRETE - 210 mm thick															
0.0		CLAY - silty, trace silt inclusions (diam. < 20 mm), trace gravel (diam. < 25 mm) - black - moist, very stiff - high plasticity - AASHTO: A-7-6 (60) - greenish grey below 0.5 m.	<input checked="" type="checkbox"/>	G09													
0.5			<input checked="" type="checkbox"/>	G10													
1.0			<input checked="" type="checkbox"/>	G11													
1.5		- brown below 1.4 m.	<input checked="" type="checkbox"/>	G12													
2.0		- light brown below 1.8 m. - grey below 2.0 m.	<input checked="" type="checkbox"/>	G13													
2.5		- soft to firm below 2.2 m.	<input checked="" type="checkbox"/>	G14													
3.0			<input checked="" type="checkbox"/>	G15													

END OF TEST HOLE AT 3.0 m IN CLAY

- 1) Seepage not observed.
- 2) Test hole squeezed in and open to 2.7 m below ground immediately after drilling.
- 3) Test hole backfilled with bentonite chips and cold patch asphalt.
- 4) Test hole located in front of 1360 Sargent Ave in Eastbound median lane, 4 m North of South curb.

Logged By: Jashandeep Singh Bhullar Reviewed By: Angela Fidler-Kliwer Project Engineer: Nelson Ferreira

SUB-SURFACE LOG LOGS 2020-10-09 PORTAGE-SARGENT PAVEMENT RENEWALS 0_E_JSB 1000-001-21 GP.J TREK GEOTECHNICAL.GDT 10/9/20



Sub-Surface Log

Test Hole TH20-03

1 of 1

Client: Morrison Hershfield Project Number: 1000-001-21
 Project Name: 20-C-03 Portage-Sargent Pavement Renewals Location: UTM 14U 5528813 m N, 629526 m E
 Contractor: Maple Leaf Drilling Ltd. Ground Elevation: Top of Pavement
 Method: 125mm Solid Stem Auger, B40 Mobile Truck Mount Date Drilled: September 11, 2020

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	SPT (N)	Bulk Unit Wt (kN/m ³)						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 25 50 75 100 125											
		ASPHALT - 70 mm thick															
		CONCRETE - 180 mm thick															
0.5		CLAY - silty, trace silt inclusions (diam. < 30 mm) - black - moist, stiff - high plasticity - AASHTO: A-7-6 (I) - brown below 0.5 m. - some silt below 0.6 m.		G16													
1.0		- trace sand, very stiff below 1.2 m.		G17													
1.5				G18													
2.0		- firm to stiff below 1.8 m.		G19													
2.5		SILT - trace clay - light brown - moist, soft - intermediate plasticity - AASHTO: A-4 (I)		G20													
2.5		CLAY - trace silt - grey - moist, stiff - high plasticity - AASHTO: A-7-6 (I)		G21													
3.0				G22													
3.0				G23													

END OF TEST HOLE AT 3.0 m IN CLAY

- Seepage not observed.
- Test hole squeezed in and open to 2.9 m below ground immediately after drilling.
- Test hole backfilled with bentonite chips and cold patch asphalt.
- (I) - AASHTO classification interpreted based on visual assessment.
- Test hole located in front of North wall of 1040 Empress Ave in Eastbound median lane, 4 m North of South curb.

Logged By: Jashandeep Singh Bhullar Reviewed By: Angela Fidler-Kliwer Project Engineer: Nelson Ferreira

SUB-SURFACE LOG LOGS 2020-10-09 PORTAGE-SARGENT PAVEMENT RENEWALS 0_E_JSB_1000-001-21.GPJ_TREK GEOTECHNICAL.GDT 10/9/20



Sub-Surface Log

Test Hole TH20-04

1 of 1

Client: Morrison Hershfield Project Number: 1000-001-21
 Project Name: 20-C-03 Portage-Sargent Pavement Renewals Location: UTM 14U 5528816 m N, 629563 m E
 Contractor: Maple Leaf Drilling Ltd. Ground Elevation: Top of Pavement
 Method: 125mm Solid Stem Auger, B40 Mobile Truck Mount Date Drilled: September 11, 2020

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	SPT (N)	Bulk Unit Wt (kN/m ³)						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	25	50	75	100	125					
0.0 - 0.05		ASPHALT - 35 mm thick														
0.05 - 0.1		CONCRETE - 230 mm thick														
0.1 - 0.5		CLAY - silty, trace silt inclusions (diam. < 30 mm) - black - moist, very stiff - high plasticity - AASHTO: A-7-6 (I) - brown below 0.5 m.		G24												
0.5 - 1.0		SILT - some clay - light brown - moist, firm - low plasticity - AASHTO: A-4 (3)		G25												
1.0 - 1.5		CLAY - silty, trace silt inclusions (diam. < 30 mm) - brown - moist, very stiff - high plasticity - AASHTO: A-7-6 (I)		G26												
1.5 - 2.0		CLAY - silty, trace silt inclusions (diam. < 30 mm) - brown - moist, very stiff - high plasticity - AASHTO: A-7-6 (I)		G27												
2.0 - 2.5		SILT - trace clay - light brown - moist, soft to firm - low to intermediate plasticity - AASHTO: A-4 (I)		G28												
2.5 - 3.0		CLAY - trace silt - brown - moist, stiff - high plasticity - AASHTO: A-7-6 (I)		G29												
3.0 - 3.0		CLAY - trace silt - brown - moist, stiff - high plasticity - AASHTO: A-7-6 (I)		G30												

END OF TEST HOLE AT 3.0 m IN CLAY

- 1) Seepage not observed.
- 2) Sloughing observed below 2.3 m.
- 3) Test hole open to 2.3 m below ground immediately after drilling.
- 4) Test hole backfilled with bentonite chips and cold patch asphalt.
- 5) (I) - AASHTO classification interpreted based on visual assessment.
- 6) Test hole located in front of North wall of 1040 Empress Ave in Westbound median lane, 4 m South of North curb.

Logged By: Jashandeep Singh Bhullar Reviewed By: Angela Fidler-Kliewer Project Engineer: Nelson Ferreira

SUB-SURFACE LOG LOGS 2020-10-09 PORTAGE-SARGENT PAVEMENT RENEWALS 0_E_JSB 1000-001-21 GP.J_TREK GEOTECHNICAL_GDT_10/9/20



Sub-Surface Log

Test Hole TH20-05

1 of 1

Client: Morrison Hershfield Project Number: 1000-001-21
 Project Name: 20-C-03 Portage-Sargent Pavement Renewals Location: UTM 14U 5528820 m N, 629472 m E
 Contractor: Maple Leaf Drilling Ltd. Ground Elevation: Top of Pavement
 Method: 125mm Solid Stem Auger, B40 Mobile Truck Mount Date Drilled: September 11, 2020

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	SPT (N)	Bulk Unit Wt (kN/m ³)		Undrained Shear Strength (kPa)										
						16	17	18	19	20	21	0	25	50	75	100	125	
0.0 - 0.05		ASPHALT - 45 mm thick																
0.05 - 0.1		CONCRETE - 210 mm thick																
0.1 - 0.5		CLAY - silty, trace silt inclusions (diam. < 20 mm), trace gravel (diam. < 20 mm), trace organics - black - moist, very stiff - high plasticity - AASHTO: A-7-6 (54) - no organics, no gravel, some silt inclusions (diam. < 20 mm), brown below 0.5 m.	<input checked="" type="checkbox"/>	G31														
0.5 - 0.8			<input checked="" type="checkbox"/>	G32														
0.8 - 1.0			<input checked="" type="checkbox"/>	G33														
1.0 - 1.5		SILT - trace clay - light brown - moist, soft to firm - low to intermediate plasticity - AASHTO: A-4 (I)	<input checked="" type="checkbox"/>	G34														
1.5 - 2.0		- soft below 1.8 m.	<input checked="" type="checkbox"/>	G35														
2.0 - 2.5		CLAY - trace silt inclusions (<10 mm diam.) - brown - moist, firm to stiff - high plasticity - AASHTO: A-7-6 (I)	<input checked="" type="checkbox"/>	G36														
2.5 - 2.7		- greyish brown below 2.4 m.	<input checked="" type="checkbox"/>															
2.7 - 3.0		- firm below 2.7 m.	<input checked="" type="checkbox"/>	G37														

END OF TEST HOLE AT 3.0 m IN CLAY

- 1) Seepage not observed.
- 2) Test hole squeezed in and open to 2.7 m below ground immediately after drilling.
- 3) Test hole backfilled with bentonite chips and cold patch asphalt.
- 4) (I) - AASHTO classification interpreted based on visual assessment.
- 5) Test hole located in front of 1340 Sargent Ave in Westbound median lane, 5 m South of North curb.

Logged By: Jashandeep Singh Bhullar Reviewed By: Angela Fidler-Kliewer Project Engineer: Nelson Ferreira

SUB-SURFACE LOG LOGS 2020-10-09 PORTAGE-SARGENT PAVEMENT RENEWALS 0_E_JSB_1000-001-21.GPJ_TREK GEOTECHNICAL.GDT_10/9/20



Sub-Surface Log

Test Hole TH20-06

1 of 1

Client: Morrison Hershfield Project Number: 1000-001-21
 Project Name: 20-C-03 Portage-Sargent Pavement Renewals Location: UTM 14U 5528829 m N, 629363 m E
 Contractor: Maple Leaf Drilling Ltd. Ground Elevation: Top of Pavement
 Method: 125mm Solid Stem Auger, B40 Mobile Truck Mount Date Drilled: September 11, 2020

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	SPT (N)	Bulk Unit Wt (kN/m ³)		Undrained Shear Strength (kPa)	
						16	17	18	19
0.00 - 0.05		ASPHALT - 55 mm thick							
0.05 - 0.10		CONCRETE - 210 mm thick							
0.10 - 0.60		SAND AND GRAVEL - trace silt - light brown - moist, loose - angular crushed limestone (< 37.5 mm) - well graded - AASHTO: A-1-b (I)	G41						
0.60 - 1.10		CLAY - trace silt inclusions (diam. < 20 mm), trace gravel (diam. < 15 mm) - brown - moist, very stiff - high plasticity - AASHTO: A-7-6 (I)	G38						
1.10 - 1.60		- stiff below 1.1 m.	G39						
1.60 - 2.10		- grey below 1.6 m.	G40						
2.10 - 2.30		- firm to stiff below 2.1 m.	G42						
2.30 - 2.50		- firm below 2.3 m.	G43						
2.50 - 3.00			G44						

END OF TEST HOLE AT 3.0 m IN CLAY

- 1) Seepage not observed.
- 2) Test hole squeezed in and open to 2.4 m below ground immediately after drilling.
- 3) Test hole backfilled with bentonite chips and cold patch asphalt.
- 4) (I) - AASHTO classification interpreted based on visual assessment.
- 5) Test hole located in front of west wall of 1370 Sargent Ave in Westbound curb lane, 1.5 m South of North curb.

Logged By: Jashandeep Singh Bhullar Reviewed By: Angela Fidler-Kliwer Project Engineer: Nelson Ferreira

SUB-SURFACE LOG LOGS 2020-10-09 PORTAGE-SARGENT PAVEMENT RENEWALS 0_E_JSB 1000-001-21 GP.J TREK GEOTECHNICAL.GDT 10/9/20



Sub-Surface Log

Test Hole TH20-07

1 of 1

Client: Morrison Hershfield Project Number: 1000-001-21
 Project Name: 20-C-03 Portage-Sargent Pavement Renewals Location: UTM 14U 5528831 m N, 629291 m E
 Contractor: Maple Leaf Drilling Ltd. Ground Elevation: Top of Pavement
 Method: 125mm Solid Stem Auger, B40 Mobile Truck Mount Date Drilled: September 11, 2020

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	SPT (N)	Bulk Unit Wt (kN/m ³)		Particle Size (%)		Undrained Shear Strength (kPa)							
						16	17	18	19	20	21	0	25	50	75	100	125
0.0 - 0.05		ASPHALT - 40 mm thick															
0.05 - 0.1		CONCRETE - 195 mm thick															
0.1 - 0.5		SAND AND GRAVEL - trace silt - orange - moist, loose - angular crushed limestone (< 37.5 mm) - well graded - AASHTO: A-1-b (I)		G45	●												
0.5 - 1.0		CLAY - some silt, trace silt inclusions (diam. < 20 mm) - brown - moist, very stiff - high plasticity - AASHTO: A-7-6 (79)		G46	●								△	+			
1.0 - 1.2		- firm to stiff below 1.2 m.		G47	●												
1.2 - 1.5		- grey below 1.5 m.		G48	●												
1.5 - 2.0		- firm below 1.8 m.		G49	●												
2.0 - 2.5				G50	●												
2.5 - 3.0				G51	●												

END OF TEST HOLE AT 3.0 m IN CLAY

- 1) Seepage not observed.
- 2) Test hole squeezed in and open to 2.4 m below ground immediately after drilling.
- 3) Test hole backfilled with bentonite chips and cold patch asphalt.
- 4) Test hole located in front of 1400 Sargent Ave in Westbound curb lane, 1.5 m South of North curb.

Logged By: Jashandeep Singh Bhullar Reviewed By: Angela Fidler-Kliwer Project Engineer: Nelson Ferreira

SUB-SURFACE LOG LOGS 2020-10-09 PORTAGE-SARGENT PAVEMENT RENEWALS 0_E_JSB 1000-001-21 GP.J TREK GEOTECHNICAL.GDT 10/9/20



**20-C-03 Portage-Sargent Pavement Renewals - Sargent Avenue
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	
TH20-01	UTM : 14U 5528819 N, 629318 E Located in front of East wall of 1400 Sargent Ave, 4.0 m North of South curb	Asphalt	55	Concrete	200	Clay; AASHTO: A-7-6 (I)	0.3	0.5	37								
						Clay; AASHTO: A-7-6 (I)	0.8	0.9	27								
						Clay; AASHTO: A-7-6 (I)	1.1	1.2	31								
						Clay; AASHTO: A-7-6 (I)	1.4	1.5	38								
						Clay; AASHTO: A-7-6 (I)	1.5	1.7	40								
						Silt; AASHTO: A-4 (I)	1.8	2.0	45								
						Clay; AASHTO: A-7-6 (I)	2.2	2.4	49								
						Clay; AASHTO: A-7-6 (I)	1.8	2.0	55								
TH20-02	UTM : 14U 5528816 N, 629395 E Located in front of 1360 Sargent Ave, 4.0 m North of South curb	Asphalt	60	Concrete	210	Clay; AASHTO: A-7-6 (60)	0.3	0.5	29								
						Clay; AASHTO: A-7-6 (60)	0.8	0.9	30								
						Clay; AASHTO: A-7-6 (60)	1.1	1.2	32	74	23	3	0	23	77	54	
						Clay; AASHTO: A-7-6 (60)	1.4	1.5	35								
						Clay; AASHTO: A-7-6 (60)	1.8	2.0	44								
						Clay; AASHTO: A-7-6 (60)	2.2	2.4	49								
						Clay; AASHTO: A-7-6 (60)	2.7	2.9	53								
TH20-03	UTM : 14U 5528813 N, 629526 E Located in front of east wall of 1040 Empress Ave, 4.0 m North of South curb	Asphalt	70	Concrete	180	Clay; AASHTO: A-7-6 (I)	0.3	0.5	29								
						Clay; AASHTO: A-7-6 (I)	0.8	0.9	26								
						Clay; AASHTO: A-7-6 (I)	1.1	1.2	28								
						Clay; AASHTO: A-7-6 (I)	1.4	1.5	29								
						Silt; AASHTO: A-4 (I)	1.8	2.0	26								
						Clay; AASHTO: A-7-6 (I)	2.2	2.4	22								
						Clay; AASHTO: A-7-6 (I)	2.4	2.6	44								
						Clay; AASHTO: A-7-6 (I)	2.7	2.9	47								

(I) - AASHTO classification was interpreted based on visual classification.



**20-C-03 Portage-Sargent Pavement Renewals - Sargent Avenue
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	
TH20-04	UTM : 14U 5528816 N, 629563 E Located in front of 1040 Empress Ave, 4.0 m South of North curb	Asphalt	35	Concrete	230	Clay; AASHTO: A-7-6 (I)	0.3	0.5	32								
						Clay; AASHTO: A-7-6 (I)	0.8	0.9	31								
						Silt; AASHTO: A-4 (3)	1.1	1.2	23	11	82	7	0	18	23	5	
						Clay; AASHTO: A-7-6 (I)	1.4	1.5	35								
						Clay; AASHTO: A-7-6 (I)	1.8	2.0	31								
						Silt; AASHTO: A-4 (I)	2.1	2.4	23								
						Clay; AASHTO: A-7-6 (I)	2.7	2.9	50								
TH20-05	UTM : 14U 5528820 N, 629472 E Located in front of 1340 Sargent Ave, 5.0 m South of North curb	Asphalt	45	Concrete	210	Clay; AASHTO: A-7-6 (54)	0.3	0.5	25								
						Clay; AASHTO: A-7-6 (54)	0.8	0.9	27								
						Clay; AASHTO: A-7-6 (54)	1.1	1.2	29	63	33	4	0	21	70	50	
						Silt; AASHTO: A-4 (I)	1.3	1.5	24								
						Silt; AASHTO: A-4 (I)	1.8	2.0	22								
						Clay; AASHTO: A-7-6 (I)	2.2	2.4	41								
						Clay; AASHTO: A-7-6 (I)	2.7	2.9	50								
TH20-06	UTM : 14U 5528829 N, 629363 E Located in front of West wall of 1370 Sargent Ave, 1.5 m South of North curb	Asphalt	55	Concrete	210	Sand And Gravel; AASHTO: A-1-b (I)	0.3	0.6	3	14	18	68					
						Clay; AASHTO: A-7-6 (I)	0.7	0.9	34								
						Clay; AASHTO: A-7-6 (I)	1.1	1.2	40								
						Clay; AASHTO: A-7-6 (I)	1.4	1.5	41								
						Clay; AASHTO: A-7-6 (I)	1.8	2.0	49								
						Clay; AASHTO: A-7-6 (I)	2.2	2.4	51								
						Clay; AASHTO: A-7-6 (I)	2.7	2.9	57								
TH20-07	UTM : 14U 5528831 N, 629291 E Located in front of 1400 Sargent Ave, 1.5 m South of North curb	Asphalt	40	Concrete	195	Sand And Gravel; AASHTO: A-1-b (I)	0.3	0.6	4								
						Clay; AASHTO: A-7-6 (79)	0.8	0.9	34								
						Clay; AASHTO: A-7-6 (79)	1.1	1.2	40	85	14	1	0	26	93	68	
						Clay; AASHTO: A-7-6 (79)	1.4	1.5	40								
						Clay; AASHTO: A-7-6 (79)	1.8	2.0	50								
						Clay; AASHTO: A-7-6 (79)	2.2	2.4	52								
						Clay; AASHTO: A-7-6 (79)	2.7	2.9	56								

(I) - AASHTO classification was interpreted based on visual classification.



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**Moisture Content Report
 ASTM D2216-10**

Project No. 1000-001-21
Client Morrison Hershfield
Project 20-C-03 Portage-Sargent Pavement Renewals

Sample Date 11-Sep-20
Test Date 16-Sep-20
Technician NS

Test Hole	TH20-01	TH20-01	TH20-01	TH20-01	TH20-01	TH20-01
Depth (m)	0.3 - 0.5	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.5 - 1.7	1.8 - 2.0
Sample #	G01	G02	G03	G04	G05	G06
Tare ID	D21	H66	N85	Z67	Q01	AC09
Mass of tare	8.6	8.4	8.4	8.7	8.5	6.7
Mass wet + tare	210.5	261.6	227.0	213.5	238.2	229.2
Mass dry + tare	156.2	207.2	175.4	157.4	172.2	160.0
Mass water	54.3	54.4	51.6	56.1	66.0	69.2
Mass dry soil	147.6	198.8	167.0	148.7	163.7	153.3
Moisture %	36.8%	27.4%	30.9%	37.7%	40.3%	45.1%

Test Hole	TH20-01	TH20-01	TH20-02	TH20-02	TH20-02	TH20-02
Depth (m)	2.2 - 2.4	2.7 - 2.9	0.3 - 0.5	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5
Sample #	G07	G08	G09	G10	G11	G12
Tare ID	F56	W16	Z70	D10	Z14	AB61
Mass of tare	8.4	8.5	8.7	8.7	8.7	6.6
Mass wet + tare	231.0	261.2	309.8	276.0	471.1	248.0
Mass dry + tare	157.8	171.6	242.2	215.0	358.4	185.4
Mass water	73.2	89.6	67.6	61.0	112.7	62.6
Mass dry soil	149.4	163.1	233.5	206.3	349.7	178.8
Moisture %	49.0%	54.9%	29.0%	29.6%	32.2%	35.0%

Test Hole	TH20-02	TH20-02	TH20-02	TH20-03	TH20-03	TH20-03
Depth (m)	1.8 - 2.0	2.2 - 2.4	2.7 - 2.9	0.2 - 0.5	0.8 - 0.9	1.1 - 1.2
Sample #	G13	G14	G15	G16	G17	G18
Tare ID	Z93	AB06	N83	AB62	W83	E88
Mass of tare	8.6	6.8	8.6	6.6	8.4	8.8
Mass wet + tare	301.0	304.9	261.9	298.6	252.2	240.2
Mass dry + tare	211.2	206.4	174.0	233.2	202.6	189.0
Mass water	89.8	98.5	87.9	65.4	49.6	51.2
Mass dry soil	202.6	199.6	165.4	226.6	194.2	180.2
Moisture %	44.3%	49.3%	53.1%	28.9%	25.5%	28.4%



Project No. 1000-001-21
Client Morrison Hershfield
Project 20-C-03 Portage-Sargent Pavement Renewals

Sample Date 11-Sep-20
Test Date 16-Sep-20
Technician NS

Test Hole	TH20-03	TH20-03	TH20-03	TH20-03	TH20-03	TH20-04
Depth (m)	1.4 - 1.5	1.8 - 2.0	2.2 - 2.4	2.4 - 2.6	2.7 - 2.9	0.3 - 0.5
Sample #	G19	G20	G21	G22	G23	G24
Tare ID	F115	Z04	K33	P33	F88	F23
Mass of tare	8.4	8.8	8.6	8.4	8.4	8.4
Mass wet + tare	290.8	241.0	261.6	263.4	306.4	254.6
Mass dry + tare	226.8	192.6	215.4	186.0	211.6	195.6
Mass water	64.0	48.4	46.2	77.4	94.8	59.0
Mass dry soil	218.4	183.8	206.8	177.6	203.2	187.2
Moisture %	29.3%	26.3%	22.3%	43.6%	46.7%	31.5%

Test Hole	TH20-04	TH20-04	TH20-04	TH20-04	TH20-04	TH20-04
Depth (m)	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.8 - 2.0	2.1 - 2.4	2.7 - 2.9
Sample #	G25	G26	G27	G28	G29	G30
Tare ID	W26	Z140	F8	E29	Z104	D19
Mass of tare	8.4	8.6	8.6	8.6	8.6	8.6
Mass wet + tare	246.0	630.2	249.0	320.2	317.2	284.4
Mass dry + tare	190.0	515.2	187.0	247.0	259.0	192.0
Mass water	56.0	115.0	62.0	73.2	58.2	92.4
Mass dry soil	181.6	506.6	178.4	238.4	250.4	183.4
Moisture %	30.8%	22.7%	34.8%	30.7%	23.2%	50.4%

Test Hole	TH20-05	TH20-05	TH20-05	TH20-05	TH20-05	TH20-05
Depth (m)	0.3 - 0.5	0.8 - 0.9	1.1 - 1.2	1.3 - 1.5	1.8 - 2.0	2.2 - 2.4
Sample #	G31	G32	G33	G34	G35	G36
Tare ID	E5	E125	AB35	Z80	K27	K39
Mass of tare	8.7	8.3	7.1	8.7	8.7	8.6
Mass wet + tare	324.2	364.4	394.0	355.8	349.6	346.6
Mass dry + tare	260.4	289.0	307.4	289.0	289.0	248.2
Mass water	63.8	75.4	86.6	66.8	60.6	98.4
Mass dry soil	251.7	280.7	300.3	280.3	280.3	239.6
Moisture %	25.3%	26.9%	28.8%	23.8%	21.6%	41.1%



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**Moisture Content Report
 ASTM D2216-10**

Project No. 1000-001-21
Client Morrison Hershfield
Project 20-C-03 Portage-Sargent Pavement Renewals

Sample Date 11-Sep-20
Test Date 16-Sep-20
Technician NS

Test Hole	TH20-05	TH20-06	TH20-06	TH20-06	TH20-06	TH20-06
Depth (m)	2.7 - 2.9	0.7 - 0.9	1.1 - 1.2	1.4 - 1.5	0.3 - 0.6	1.8 - 2.0
Sample #	G37	G38	G39	G40	G41	G42
Tare ID	H69	H59	A14	H24	Z53	E36
Mass of tare	9.4	8.8	8.7	8.7	8.8	8.8
Mass wet + tare	301.4	282.9	315.8	283.9	432.5	349.4
Mass dry + tare	204.4	213.2	228.6	203.4	420.2	237.4
Mass water	97.0	69.7	87.2	80.5	12.3	112.0
Mass dry soil	195.0	204.4	219.9	194.7	411.4	228.6
Moisture %	49.7%	34.1%	39.7%	41.3%	3.0%	49.0%

Test Hole	TH20-06	TH20-06	TH20-07	TH20-07	TH20-07	TH20-07
Depth (m)	2.2 - 2.4	2.7 - 2.9	0.3 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5
Sample #	G43	G44	G45	G46	G47	G48
Tare ID	E67	E27	H50	E121	N110	AC27
Mass of tare	9.0	8.8	8.7	8.6	8.6	6.8
Mass wet + tare	309.2	315.3	345.3	363.0	459.3	322.0
Mass dry + tare	207.8	205.8	333.0	273.0	330.2	231.6
Mass water	101.4	109.5	12.3	90.0	129.1	90.4
Mass dry soil	198.8	197.0	324.3	264.4	321.6	224.8
Moisture %	51.0%	55.6%	3.8%	34.0%	40.1%	40.2%

Test Hole	TH20-07	TH20-07	TH20-07			
Depth (m)	1.8 - 2.0	2.2 - 2.4	2.7 - 2.9			
Sample #	G49	G50	G51			
Tare ID	D32	F109	W39			
Mass of tare	8.6	8.7	8.4			
Mass wet + tare	322.2	354.2	315.0			
Mass dry + tare	218.4	236.0	205.4			
Mass water	103.8	118.2	109.6			
Mass dry soil	209.8	227.3	197.0			
Moisture %	49.5%	52.0%	55.6%			



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Atterberg Limits
ASTM D4318-10e1

Project No. 1000-001-21
Client Morrison Hershfield
Project 20-C-03 Portage-Sargent Pavement Renewals

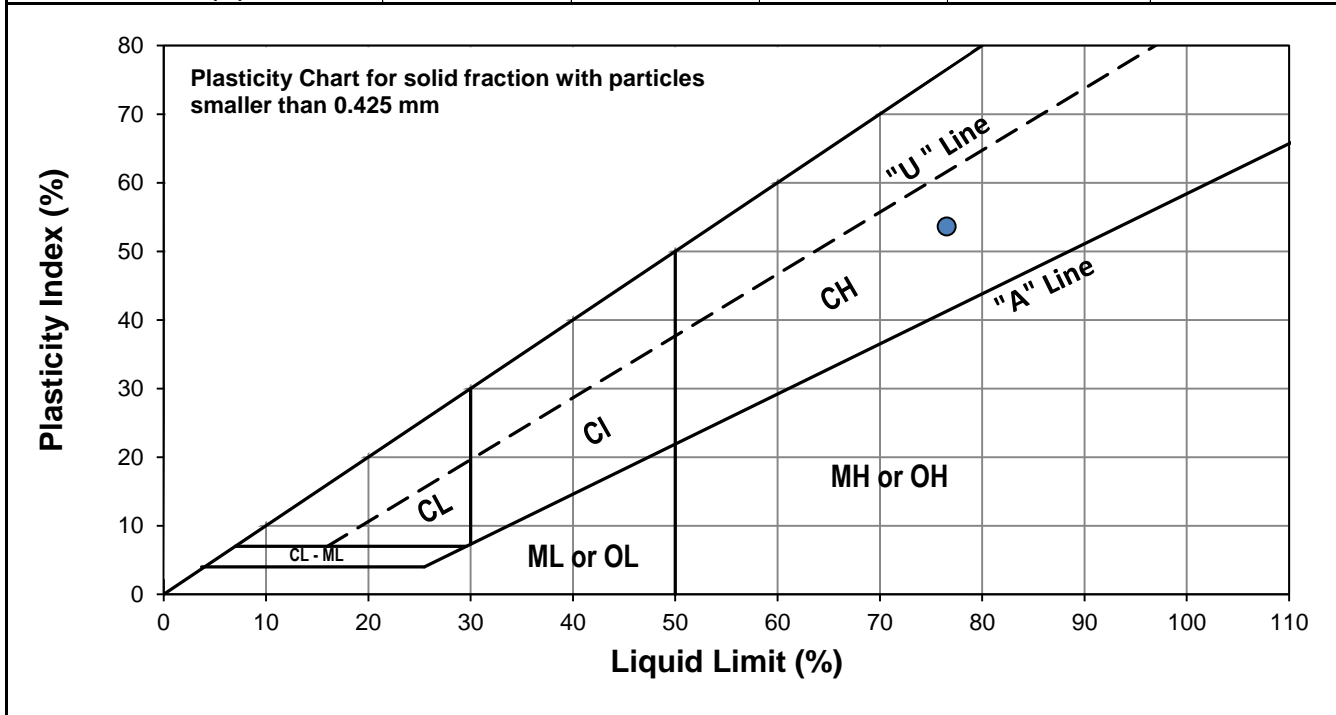


Test Hole TH20-02
Sample # G11
Depth (m) 0.8 - 0.9
Sample Date 11-Sep-20
Test Date 18-Sep-20
Technician NS

Liquid Limit	77
Plastic Limit	23
Plasticity Index	54

Liquid Limit

Trial #	1	2	3
Number of Blows (N)	23	26	30
Mass Wet Soil + Tare (g)	24.344	24.303	23.421
Mass Dry Soil + Tare (g)	19.862	19.912	19.605
Mass Tare (g)	14.090	14.149	14.433
Mass Water (g)	4.482	4.391	3.816
Mass Dry Soil (g)	5.772	5.763	5.172
Moisture Content (%)	77.651	76.193	73.782



Plastic Limit

Trial #	1	2	3	4	5
Mass Tare (g)	14.354	14.322			
Mass Wet Soil + Tare (g)	19.999	21.475			
Mass Dry Soil + Tare (g)	18.954	20.130			
Mass Water (g)	1.045	1.345			
Mass Dry Soil (g)	4.600	5.808			
Moisture Content (%)	22.717	23.158			



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Atterberg Limits
ASTM D4318-10e1

Project No. 1000-001-21
Client Morrison Hershfield
Project 20-C-03 Portage-Sargent Pavement Renewals

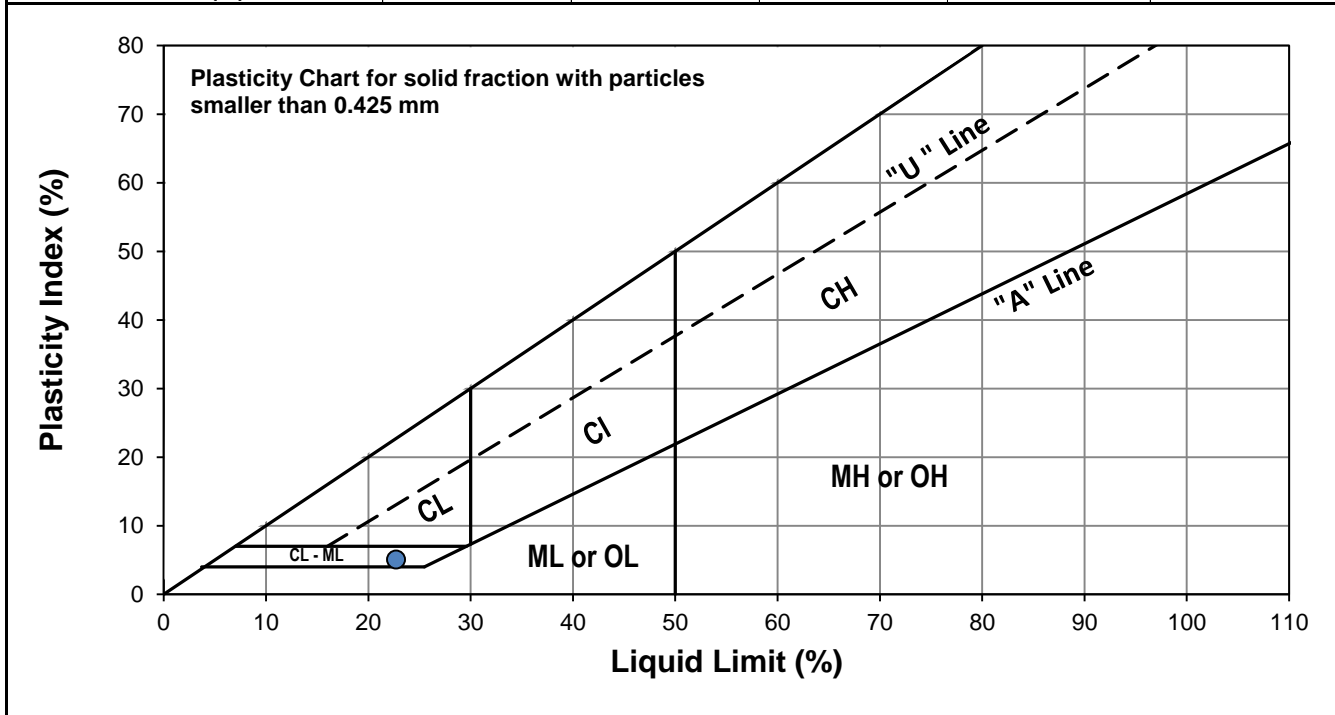


Test Hole TH20-04
Sample # G26
Depth (m) 1.1 - 1.2
Sample Date 11-Sep-20
Test Date 18-Sep-20
Technician BMH

Liquid Limit	23
Plastic Limit	18
Plasticity Index	5

Liquid Limit

Trial #	1	2	3
Number of Blows (N)	23	25	29
Mass Wet Soil + Tare (g)	25.506	26.459	28.140
Mass Dry Soil + Tare (g)	23.333	24.142	25.682
Mass Tare (g)	14.024	14.055	14.111
Mass Water (g)	2.173	2.317	2.458
Mass Dry Soil (g)	9.309	10.087	11.571
Moisture Content (%)	23.343	22.970	21.243



Plastic Limit

Trial #	1	2	3	4	5
Mass Tare (g)	14.289	13.732			
Mass Wet Soil + Tare (g)	23.229	19.943			
Mass Dry Soil + Tare (g)	21.898	19.004			
Mass Water (g)	1.331	0.939			
Mass Dry Soil (g)	7.609	5.272			
Moisture Content (%)	17.492	17.811			



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Atterberg Limits
ASTM D4318-10e1

Project No. 1000-001-21
Client Morrison Hershfield
Project 20-C-03 Portage-Sargent Pavement Renewals

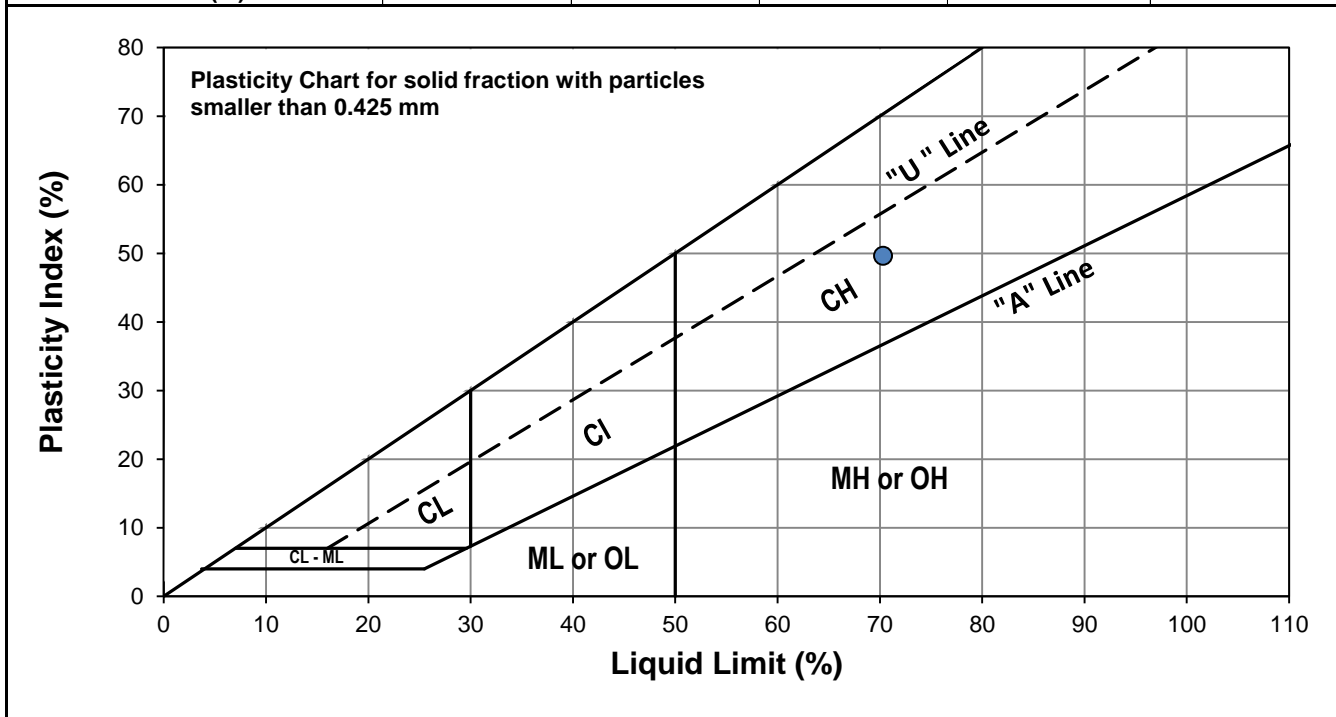


Test Hole TH20-05
Sample # G33
Depth (m) 1.1 - 1.2
Sample Date 11-Sep-20
Test Date 18-Sep-20
Technician NS

Liquid Limit	70
Plastic Limit	21
Plasticity Index	50

Liquid Limit

Trial #	1	2	3
Number of Blows (N)	20	25	28
Mass Wet Soil + Tare (g)	21.684	22.867	23.218
Mass Dry Soil + Tare (g)	18.583	19.290	19.452
Mass Tare (g)	14.163	14.205	14.101
Mass Water (g)	3.101	3.577	3.766
Mass Dry Soil (g)	4.420	5.085	5.351
Moisture Content (%)	70.158	70.344	70.379



Plastic Limit

Trial #	1	2	3	4	5
Mass Tare (g)	14.149	14.120			
Mass Wet Soil + Tare (g)	21.095	21.948			
Mass Dry Soil + Tare (g)	19.927	20.579			
Mass Water (g)	1.168	1.369			
Mass Dry Soil (g)	5.778	6.459			
Moisture Content (%)	20.215	21.195			



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Atterberg Limits
ASTM D4318-10e1

Project No. 1000-001-21
Client Morrison Hershfield
Project 20-C-03 Portage-Sargent Pavement Renewals

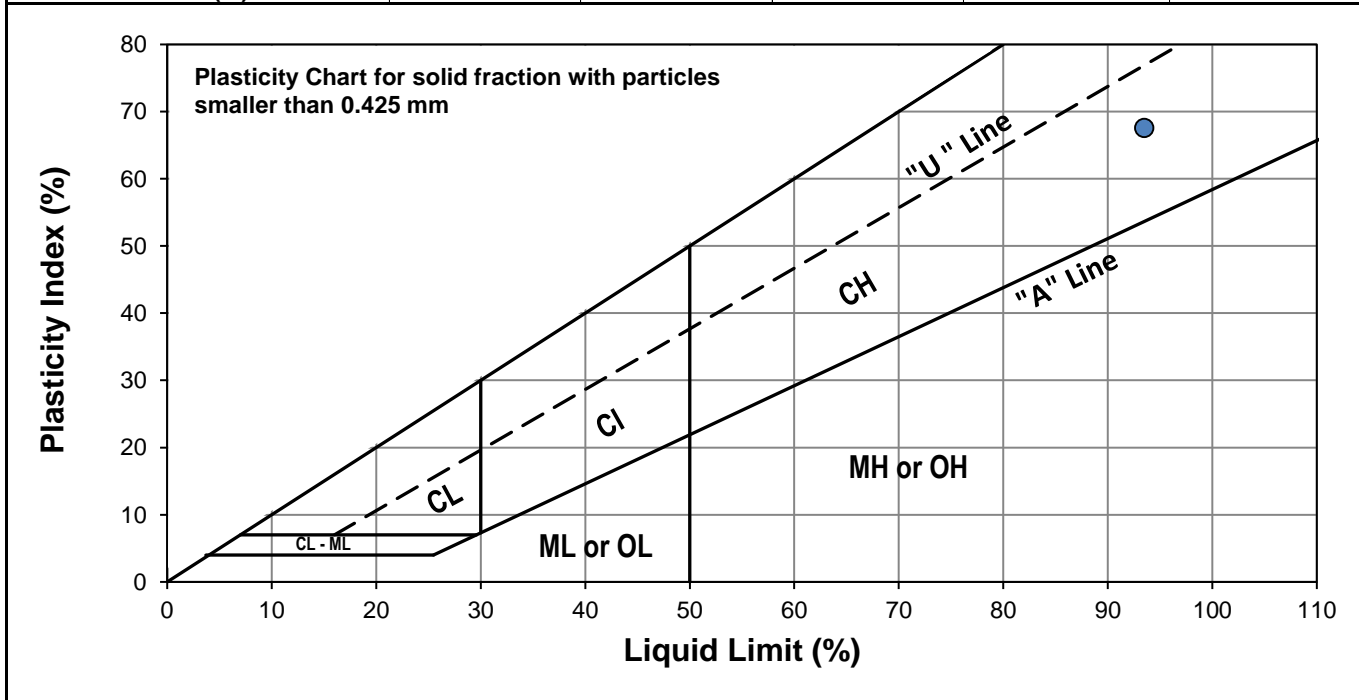


Test Hole TH20-07
Sample # G47
Depth (m) 1.1 - 1.2
Sample Date 11-Sep-20
Test Date 24-Sep-20
Technician NS

Liquid Limit 93
Plastic Limit 26
Plasticity Index 68

Liquid Limit

Trial #	1	2	3
Number of Blows (N)	16	23	35
Mass Wet Soil + Tare (g)	25.029	26.501	25.538
Mass Dry Soil + Tare (g)	19.590	20.507	20.084
Mass Tare (g)	13.969	14.143	14.087
Mass Water (g)	5.439	5.994	5.454
Mass Dry Soil (g)	5.621	6.364	5.997
Moisture Content (%)	96.762	94.186	90.945



Plastic Limit

Trial #	1	2	3	4	5
Mass Tare (g)	14.593	14.310			
Mass Wet Soil + Tare (g)	19.029	19.774			
Mass Dry Soil + Tare (g)	18.112	18.653			
Mass Water (g)	0.917	1.121			
Mass Dry Soil (g)	3.519	4.343			
Moisture Content (%)	26.059	25.812			



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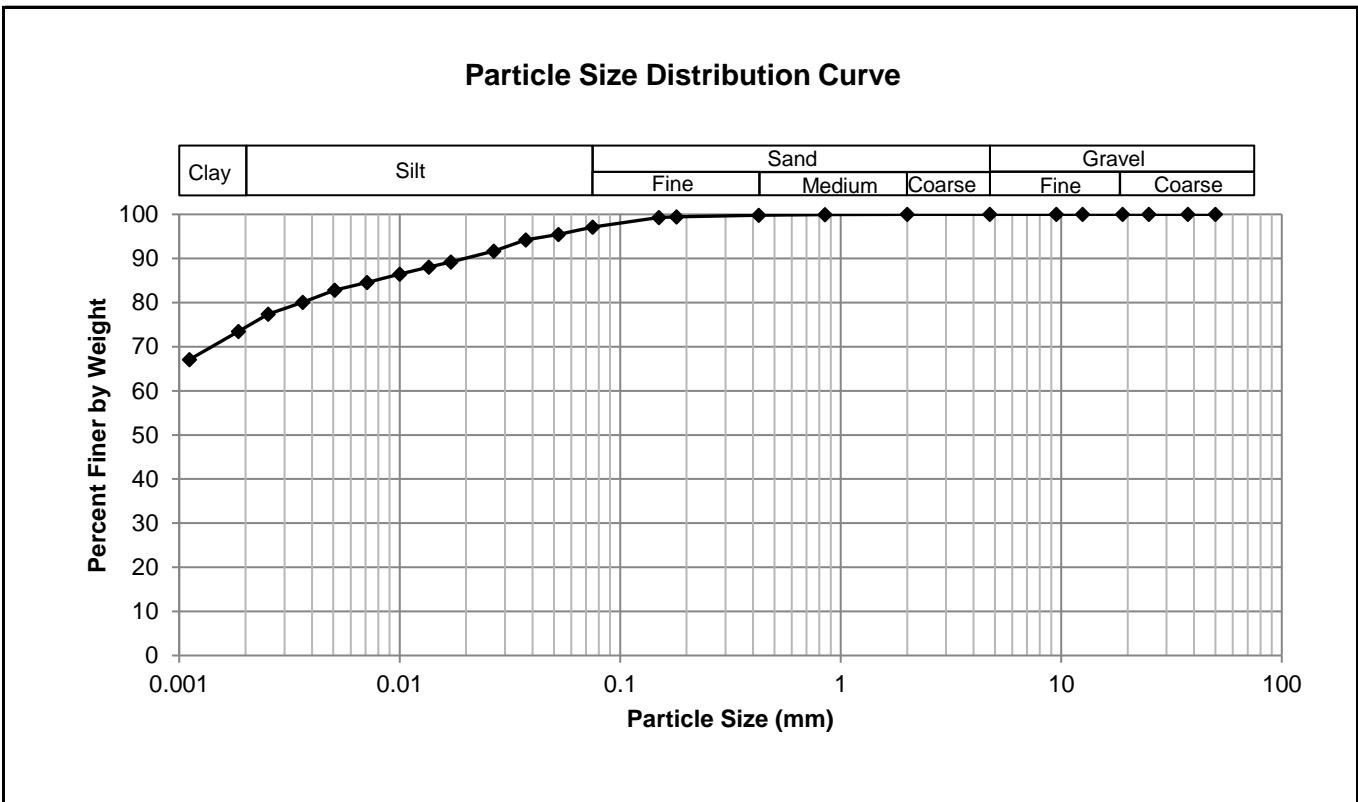
**Grain Size Analysis (Hydrometer Method)
 ASTM D7928**

Project No. 1000-001-21
Client Morrison Hershfield
Project 20-C-03 Portage-Sargent Pavement Renewals



Test Hole TH20-02
Sample # G11
Depth (m) 1.1 - 1.2
Sample Date 11-Sep-20
Test Date 21-Sep-20
Technician NS

Gravel	0.0%
Sand	2.9%
Silt	22.8%
Clay	74.3%



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	97.11
37.5	100.00	2.00	100.00	0.0524	95.46
25.0	100.00	0.850	99.94	0.0373	94.21
19.0	100.00	0.425	99.80	0.0267	91.71
12.5	100.00	0.180	99.40	0.0171	89.21
9.50	100.00	0.150	99.28	0.0136	88.03
4.75	100.00	0.075	97.11	0.0100	86.47
				0.0071	84.59
				0.0051	82.79
				0.0036	80.05
				0.0025	77.39
				0.0019	73.47
				0.0011	67.10



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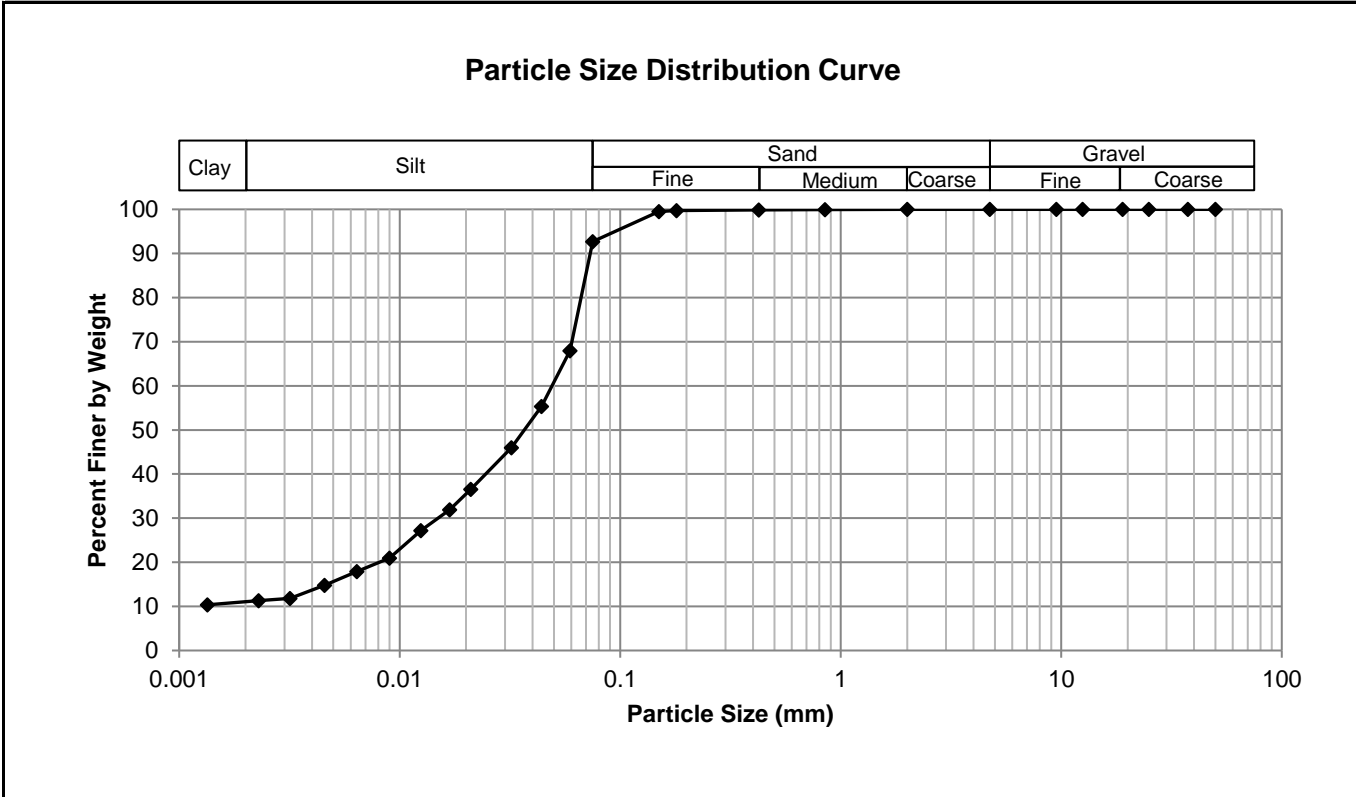
Grain Size Analysis (Hydrometer Method)
ASTM D7928

Project No. 1000-001-21
Client Morrison Hershfield
Project 20-C-03 Portage-Sargent Pavement Renewals



Test Hole TH20-04
Sample # G26
Depth (m) 1.1 - 1.2
Sample Date 11-Sep-20
Test Date 21-Sep-20
Technician NS

Gravel	0.0%
Sand	7.3%
Silt	81.7%
Clay	11.0%



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	92.72
37.5	100.00	2.00	100.00	0.0592	67.96
25.0	100.00	0.850	99.95	0.0440	55.32
19.0	100.00	0.425	99.90	0.0322	45.94
12.5	100.00	0.180	99.74	0.0210	36.56
9.50	100.00	0.150	99.51	0.0168	31.87
4.75	100.00	0.075	92.72	0.0125	27.18
				0.0090	20.93
				0.0064	17.87
				0.0046	14.81
				0.0032	11.81
				0.0023	11.31
				0.0013	10.35



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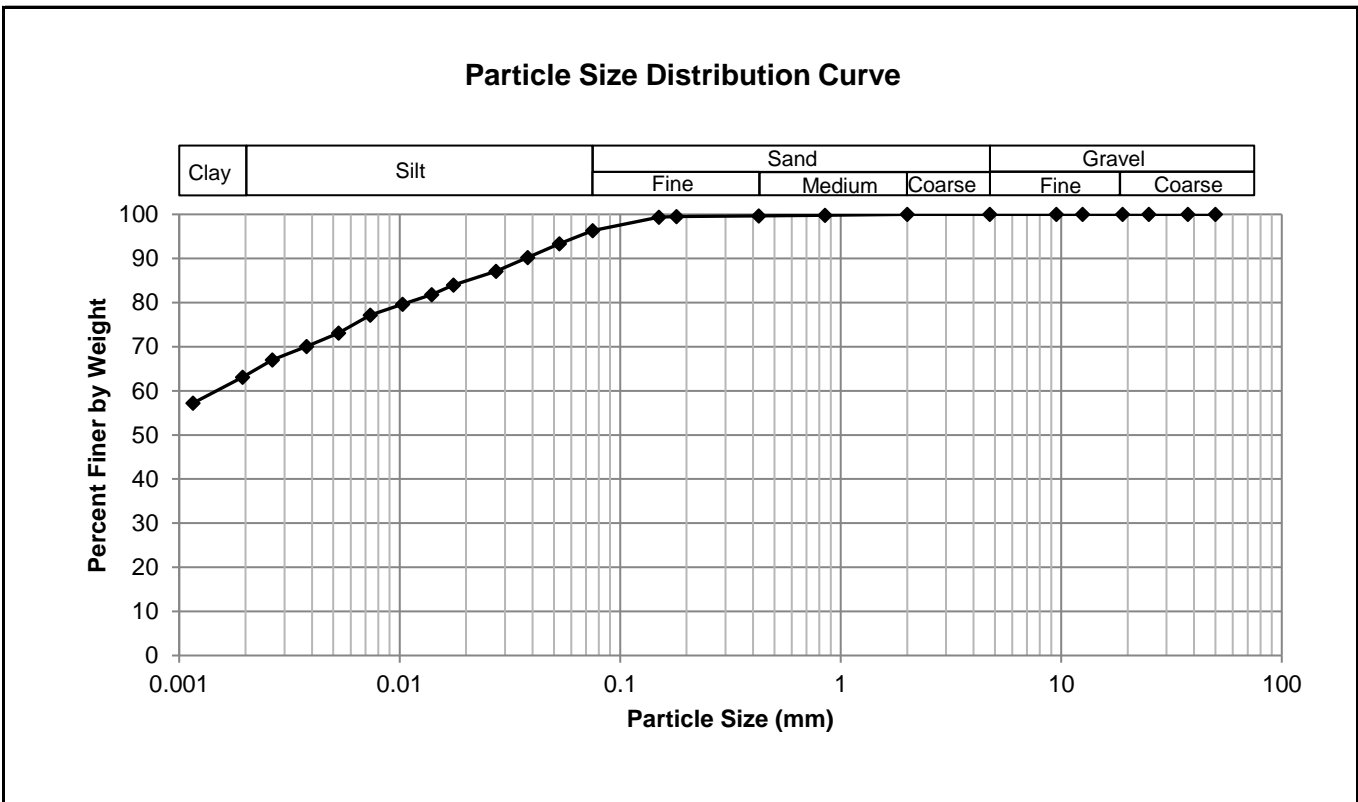
Grain Size Analysis (Hydrometer Method)
ASTM D7928

Project No. 1000-001-21
Client Morrison Hershfield
Project 20-C-03 Portage-Sargent Pavement Renewals



Test Hole TH20-05
Sample # G33
Depth (m) 1.1 - 1.2
Sample Date 11-Sep-20
Test Date 21-Sep-20
Technician NS

Gravel	0.0%
Sand	3.7%
Silt	32.8%
Clay	63.4%



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	96.29
37.5	100.00	2.00	100.00	0.0530	93.35
25.0	100.00	0.850	99.82	0.0380	90.22
19.0	100.00	0.425	99.69	0.0273	87.09
12.5	100.00	0.180	99.50	0.0175	83.97
9.50	100.00	0.150	99.40	0.0140	81.78
4.75	100.00	0.075	96.29	0.0103	79.64
				0.0074	77.14
				0.0053	73.13
				0.0038	70.06
				0.0026	67.05
				0.0019	63.09
				0.0012	57.23



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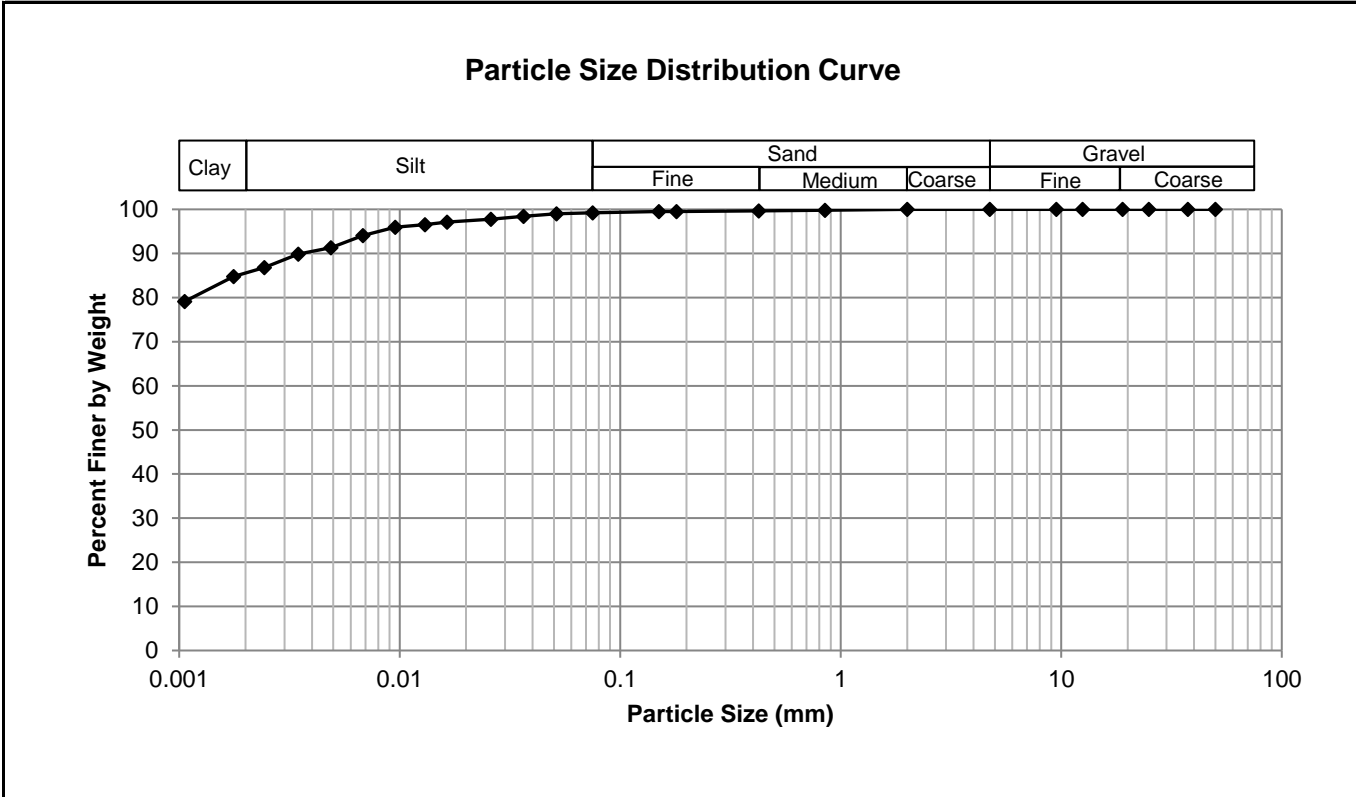
Grain Size Analysis (Hydrometer Method)
ASTM D7928

Project No. 1000-001-21
Client Morrison Hershfield
Project 20-C-03 Portage-Sargent Pavement Renewals



Test Hole TH20-07
Sample # G47
Depth (m) 1.1 - 1.2
Sample Date 11-Sep-20
Test Date 21-Sep-20
Technician NS

Gravel	0.0%
Sand	0.8%
Silt	13.7%
Clay	85.5%



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	99.19
37.5	100.00	2.00	100.00	0.0514	99.03
25.0	100.00	0.850	99.81	0.0365	98.40
19.0	100.00	0.425	99.69	0.0259	97.78
12.5	100.00	0.180	99.54	0.0164	97.15
9.50	100.00	0.150	99.48	0.0130	96.53
4.75	100.00	0.075	99.19	0.0095	95.97
				0.0068	94.09
				0.0049	91.34
				0.0035	89.84
				0.0024	86.85
				0.0018	84.79
				0.0011	79.14



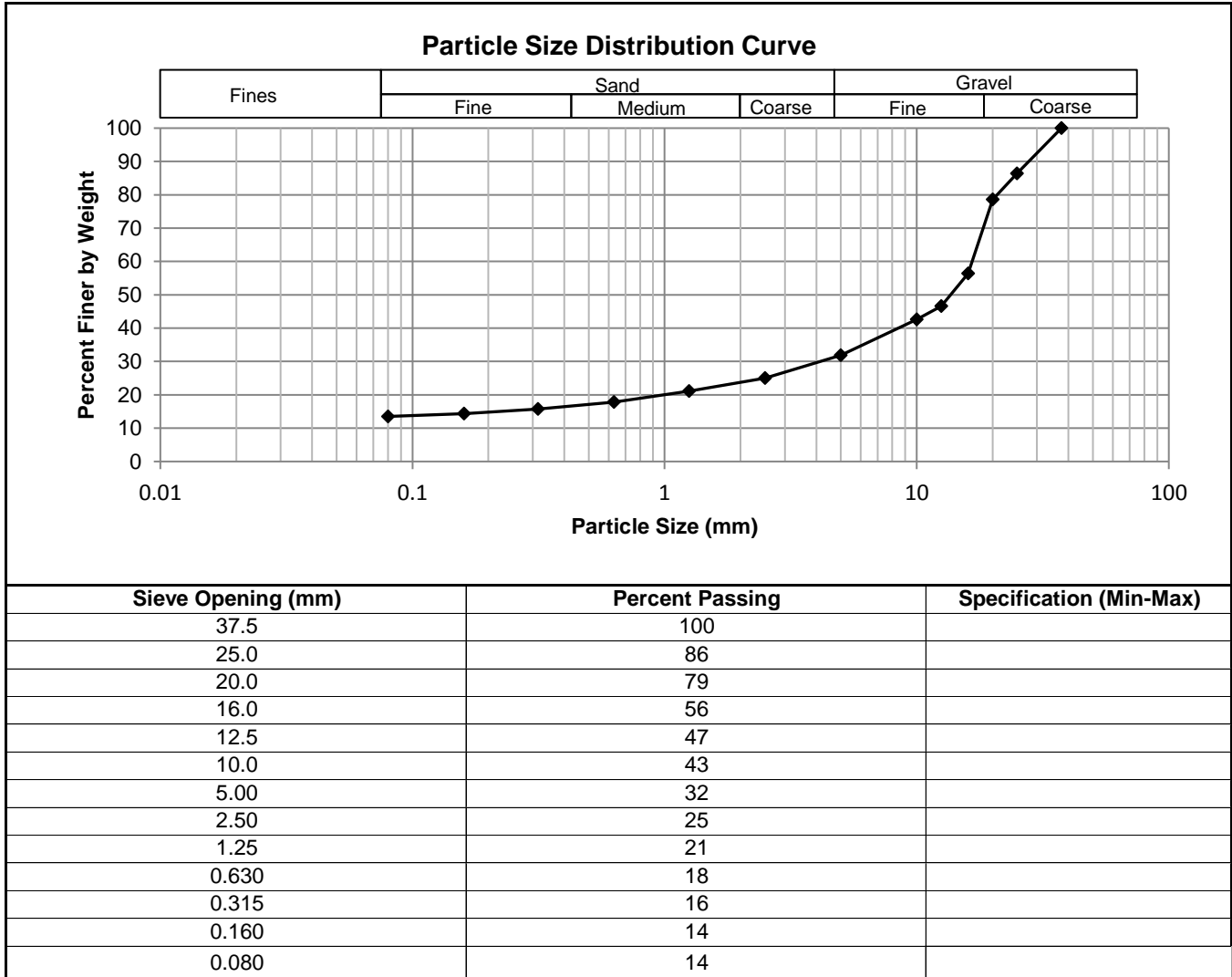
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Grain Size Analysis (Sieve Method)
ASTM C136-06

Project No. 1000-001-21
Client Morrison Hershfield
Project 20-C-03 Portage-Sargent Pavement Renewals

Test Hole TH20-06
Sample # G41
Depth (m) 0.3 - 0.6
Date Sampled 11-Sep-20
Date Tested 17-Sep-20
Technician NS

Total Weight (g)	420.2
Gravel %	68.1
Sand %	18.4
Fines %	13.5





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Standard Proctor Compaction Test

ASTM D698-12e2

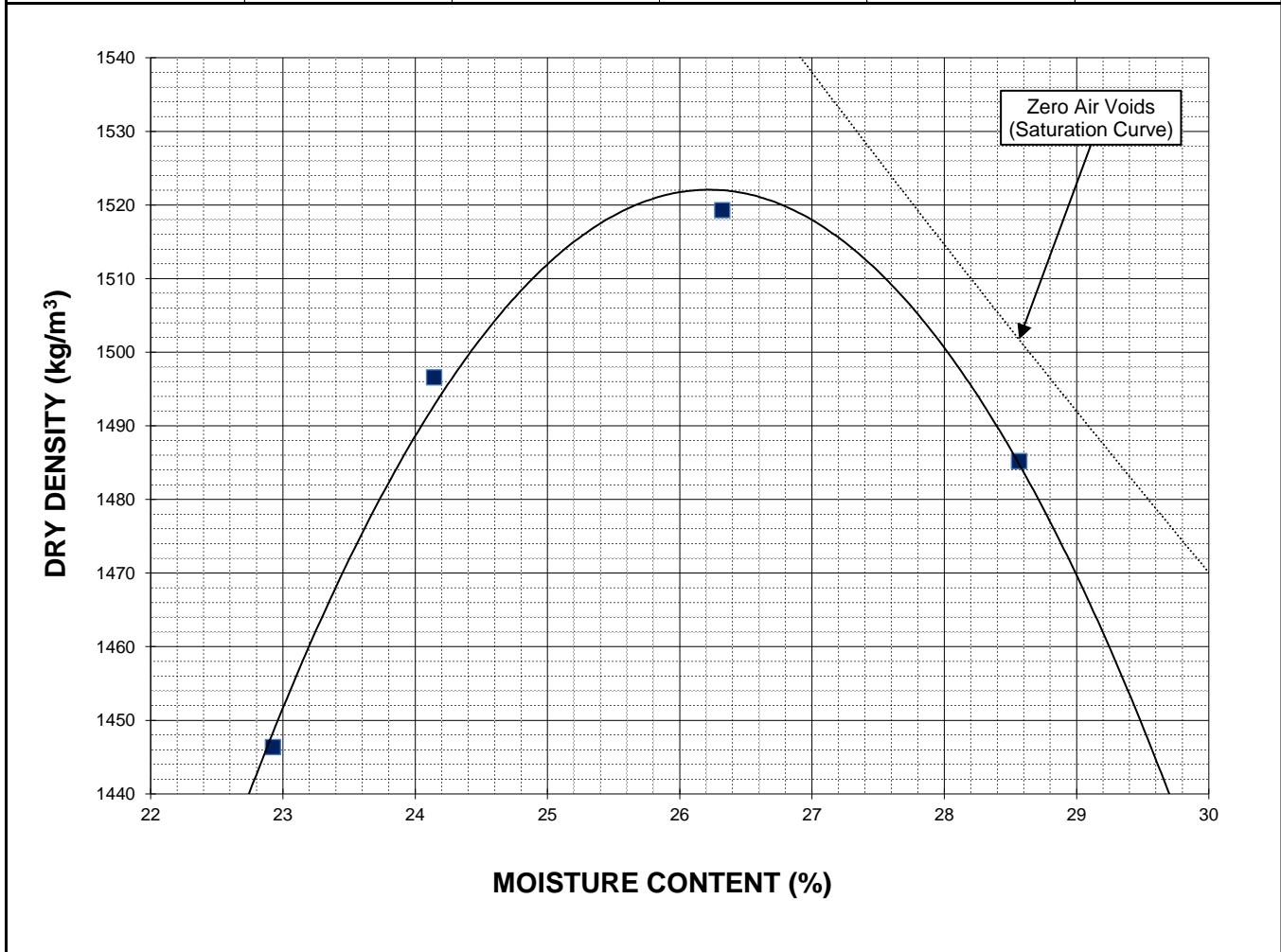
Project No. 1000-001-21
Client Morrison Hershfield
Project 20-C-03 Portage-Sargent Pavement Renewals



Sample # L20-286
Source TH20-02
Material Clay
Sample Date 11-Sep-20
Test Date 18-Sep-20
Technician NS

Maximum Dry Density (kg/m³)	1522
Optimum Moisture (%)	26.2

Trial Number	1	2	3	4	
Wet Density (kg/m ³)	1778	1858	1919	1909	
Dry Density (kg/m ³)	1446	1497	1519	1485	
Moisture Content (%)	22.9	24.1	26.3	28.6	





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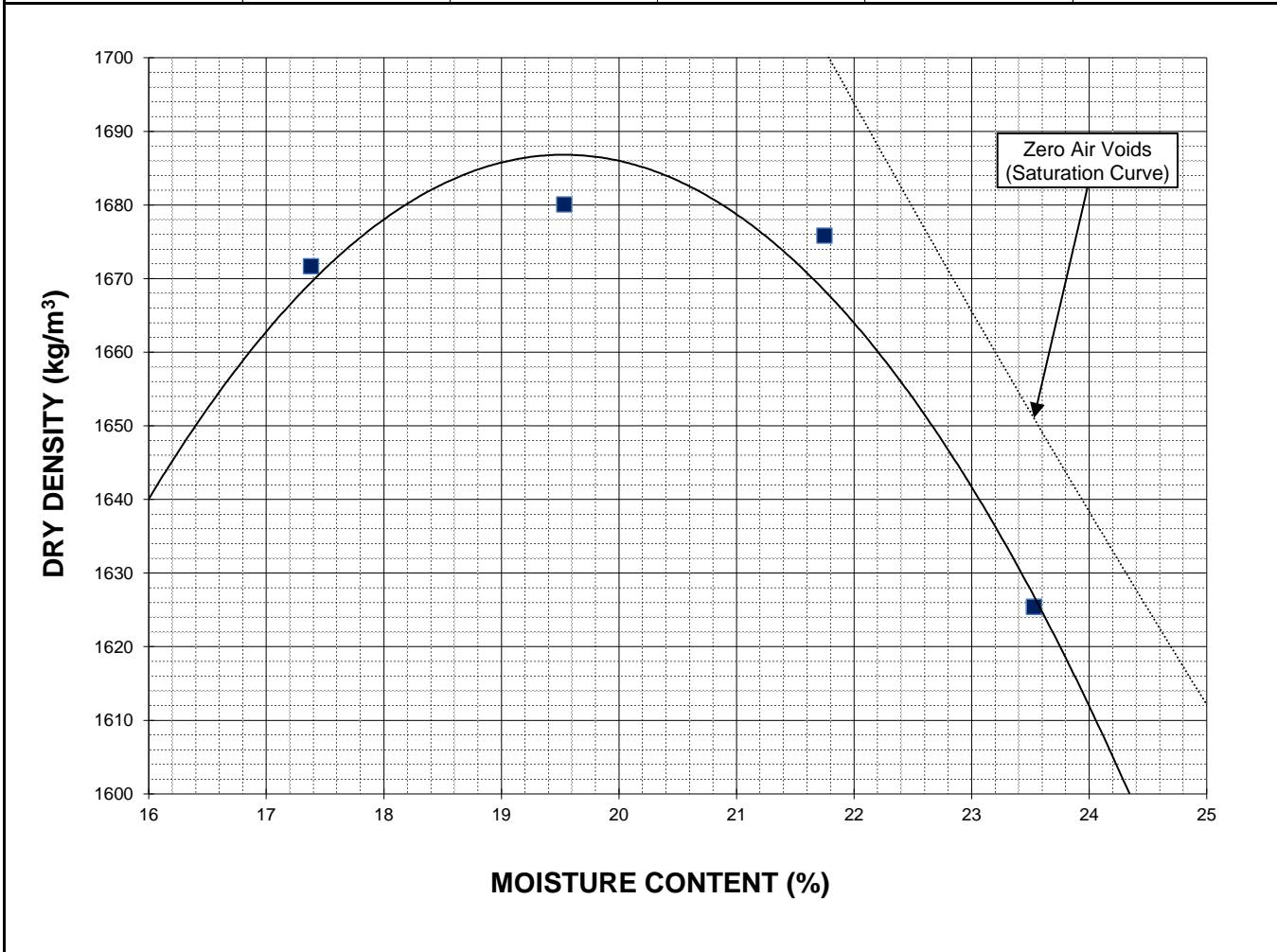
Project No. 1000-001-21
Client Morrison Hershfield
Project 20-C-03 Portage-Sargent Pavement Renewals



Sample # L20-286
Source TH20-04
Material Silty Clay
Sample Date 11-Sep-20
Test Date 17-Sep-20
Technician MT

Maximum Dry Density (kg/m³)	1687
Optimum Moisture (%)	19.5

Trial Number	1	2	3	4	
Wet Density (kg/m ³)	1962	2008	2040	2008	
Dry Density (kg/m ³)	1672	1680	1676	1625	
Moisture Content (%)	17.4	19.5	21.7	23.5	





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ASTM D698-12e2

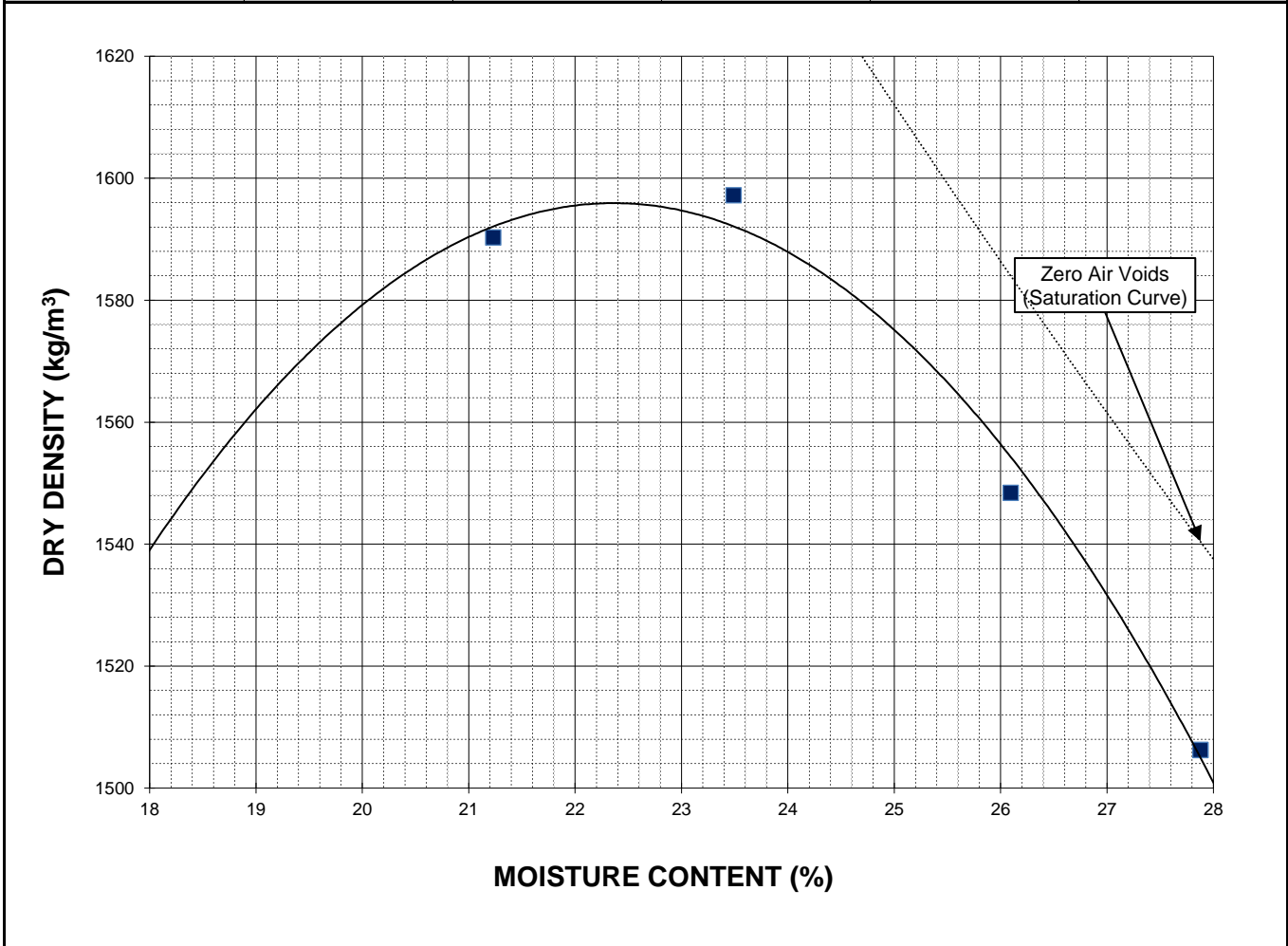
Project No. 1000-001-21
Client Morrison Hershfield
Project 20-C-03 Portage-Sargent Pavement Renewals



Sample # L20-286
Source TH20-05
Material Clay
Sample Date 11-Sep-20
Test Date 21-Sep-20
Technician NS

Maximum Dry Density (kg/m³)	1596
Optimum Moisture (%)	22.4

Trial Number	1	2	3	4	
Wet Density (kg/m ³)	1928	1972	1952	1926	
Dry Density (kg/m ³)	1590	1597	1548	1506	
Moisture Content (%)	21.2	23.5	26.1	27.9	





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Standard Proctor Compaction Test

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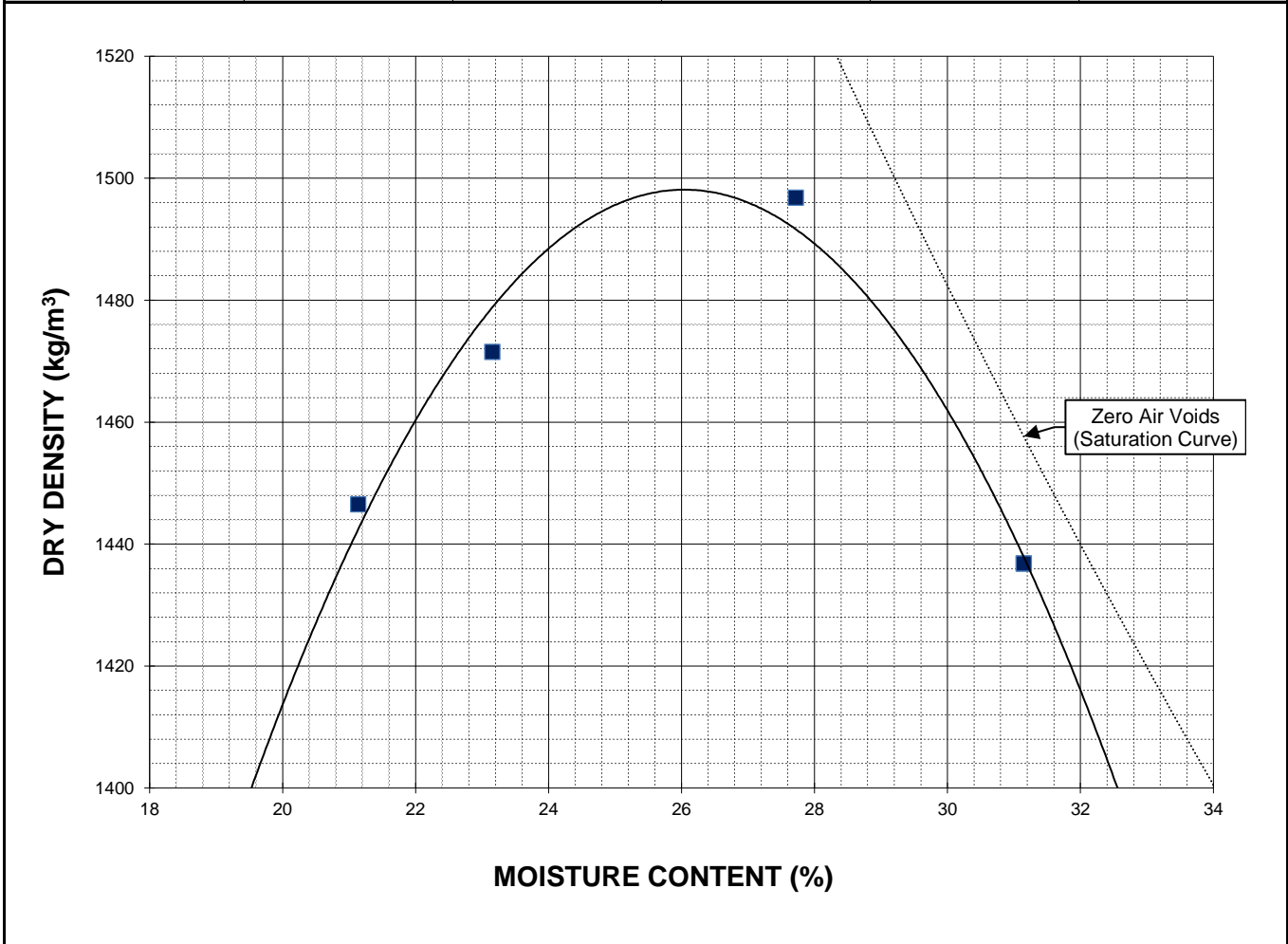
Project No. 1000-001-21
Client Morrison Hershfield
Project 20-C-03 Portage-Sargent Pavement Renewals



Sample # L20-286
Source TH20-07
Material Clay
Sample Date 11-Sep-20
Test Date 22-Sep-20
Technician AB

Maximum Dry Density (kg/m³)	1498
Optimum Moisture (%)	26.0

Trial Number	1	2	3	4	
Wet Density (kg/m ³)	1752	1812	1912	1884	
Dry Density (kg/m ³)	1447	1472	1497	1437	
Moisture Content (%)	21.1	23.2	27.7	31.1	





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California Bearing Ratio Test Data Sheet
ASTM D1883-16

Project No.	1000-001-21	Source	on-site
Client	Morrison Hershfield	Material	Clay
Project	20-C-03 Portage-Sargent	Sample Date	9/11/2020
Sample #	TH20-02	Test Date	9/22/2020
		Technician	AD

Proctor Results (ASTM D698)

Maximum Dry Density	1522 kg/m ³
Optimum Moisture Content	26.2 %
Material Retained on 19 mm Sieve	0.0 %

CBR Sample Compaction

Dry Density	1434 kg/m ³
Initial Moisture Content	30.9 %
Relative Density	94.2 % SPMD

Soaking Results

Surcharge	4.54 kg
Swell	0.6 %
Moisture Content in top 25 mm	36.7 %
Immersion Period	96 h

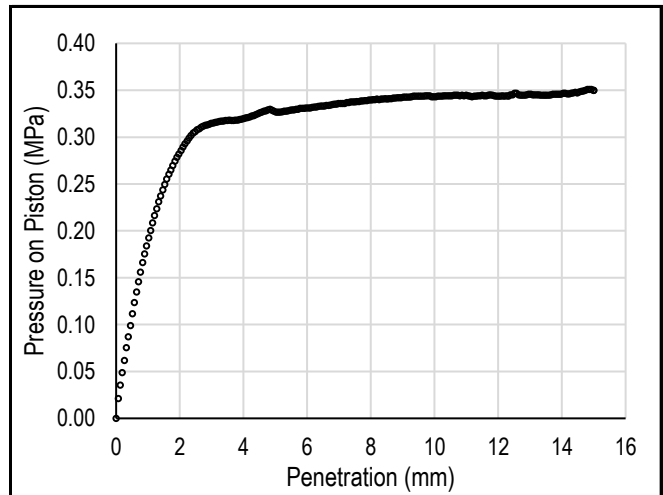
CBR Results

CBR at 2.54 mm	4.5 %
CBR at 5.08 mm	3.2 %
Zero Correction	0 mm

Test Data

Penetration (mm)	Measured Pressure (MPa)	Corrected Pressure (MPa)
0.64	0.14	0.14
1.27	0.22	0.22
1.91	0.28	0.28
2.54	0.31	0.31
3.18	0.32	0.32
3.81	0.32	0.32
4.45	0.33	0.33
5.08	0.33	0.33
7.62	0.34	0.34
10.16	0.34	0.34
12.70	0.34	0.34

Load/Penetration Curve



Comments:



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California Bearing Ratio Test Data Sheet
ASTM D1883-16

Project No.	1000-001-21	Source	on-site
Client	Morrison Hershfield	Material	Silty clay
Project	20-C-03 Portage-Sargent	Sample Date	9/11/2020
Sample #	TH20-04	Test Date	9/22/2020
		Technician	AD

Proctor Results (ASTM D698)

Maximum Dry Density	1687 kg/m ³
Optimum Moisture Content	19.5 %
Material Retained on 19 mm Sieve	0.0 %

CBR Sample Compaction

Dry Density	1613 kg/m ³
Initial Moisture Content	20.7 %
Relative Density	95.6 % SPMD

Soaking Results

Surcharge	4.54 kg
Swell	0.2 %
Moisture Content in top 25 mm	21.9 %
Immersion Period	96 h

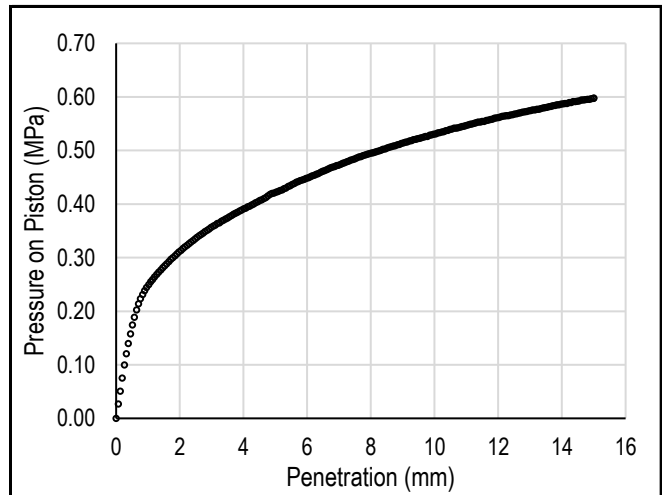
CBR Results

CBR at 2.54 mm	4.9 %
CBR at 5.08 mm	4.1 %
Zero Correction	0 mm

Test Data

Penetration (mm)	Measured Pressure (MPa)	Corrected Pressure (MPa)
0.64	0.20	0.20
1.27	0.27	0.27
1.91	0.31	0.31
2.54	0.34	0.34
3.18	0.36	0.36
3.81	0.39	0.39
4.45	0.40	0.40
5.08	0.42	0.42
7.62	0.49	0.49
10.16	0.53	0.53
12.70	0.57	0.57

Load/Penetration Curve



Comments:



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California Bearing Ratio Test Data Sheet
ASTM D1883-16

Project No.	1000-001-21	Source	on-site
Client	Morrison Hershfield	Material	Clay
Project	20-C-03 Portage-Sargent	Sample Date	9/11/2020
Sample #	TH20-05	Test Date	9/25/2020
		Technician	AD

Proctor Results (ASTM D698)

Maximum Dry Density	1596 kg/m ³
Optimum Moisture Content	22.4 %
Material Retained on 19 mm Sieve	0.0 %

CBR Sample Compaction

Dry Density	1526 kg/m ³
Initial Moisture Content	25.7 %
Relative Density	95.6 % SPMD

Soaking Results

Surcharge	4.54 kg
Swell	0.5 %
Moisture Content in top 25 mm	28.9 %
Immersion Period	96 h

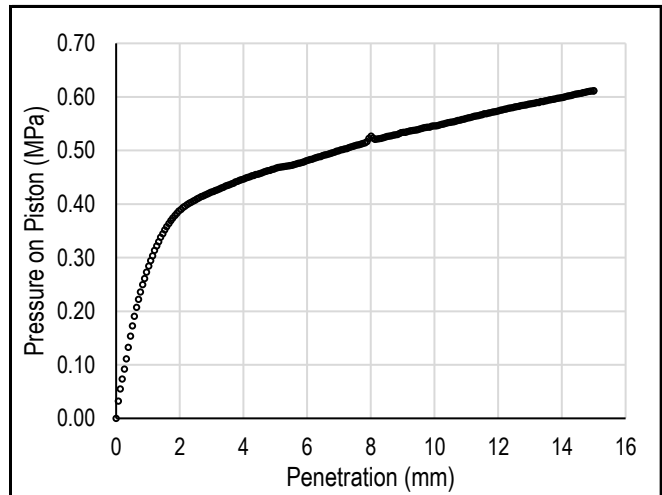
CBR Results

CBR at 2.54 mm	5.9 %
CBR at 5.08 mm	4.5 %
Zero Correction	0 mm

Test Data

Penetration (mm)	Measured Pressure (MPa)	Corrected Pressure (MPa)
0.64	0.21	0.21
1.27	0.32	0.32
1.91	0.38	0.38
2.54	0.41	0.41
3.18	0.43	0.43
3.81	0.44	0.44
4.45	0.46	0.46
5.08	0.47	0.47
7.62	0.51	0.51
10.16	0.55	0.55
12.70	0.58	0.58

Load/Penetration Curve



Comments:



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California Bearing Ratio Test Data Sheet
ASTM D1883-16

Project No.	1000-001-21	Source	on-site
Client	Morrison Hershfield	Material	Clay
Project	20-C-03 Portage-Sargent	Sample Date	9/11/2020
Sample #	TH20-07	Test Date	9/25/2020
		Technician	AB

Proctor Results (ASTM D698)

Maximum Dry Density 1498 kg/m3
 Optimum Moisture Content 26.0 %
 Material Retained on 19 mm Sieve 0.0 %

CBR Sample Compaction

Dry Density 1434 kg/m3
 Initial Moisture Content 30.3 %
 Relative Density 95.7 % SPMD

Soaking Results

Surcharge 4.54 kg
 Swell 0.4 %
 Moisture Content in top 25 mm 33.5 %
 Immersion Period 96 h

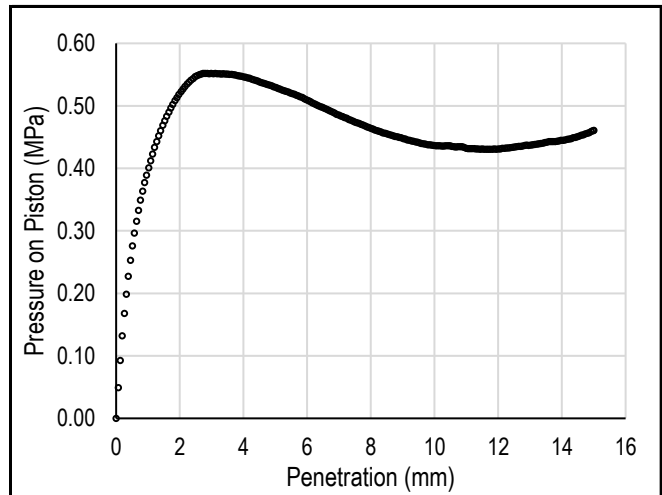
CBR Results

CBR at 2.54 mm 7.9 %
 CBR at 5.08 mm 5.1 %
 Zero Correction 0 mm

Test Data

Penetration (mm)	Measured Pressure (MPa)	Corrected Pressure (MPa)
0.64	0.32	0.32
1.27	0.44	0.44
1.91	0.51	0.51
2.54	0.55	0.55
3.18	0.55	0.55
3.81	0.55	0.55
4.45	0.54	0.54
5.08	0.53	0.53
7.62	0.47	0.47
10.16	0.44	0.44
12.70	0.44	0.44

Load/Penetration Curve



Comments:



Photo 1: Pavement Core Sample at Test Hole TH20-01



Photo 2: Pavement Core Sample at Test Hole TH20-02



Photo 3: Pavement Core Sample at Test Hole TH20-03



Photo 4: Pavement Core Sample at Test Hole TH20-04



Photo 5: Pavement Core Sample at Test Hole TH20-05



Photo 6: Pavement Core Sample at Test Hole TH20-06



Photo 7: Pavement Core Sample at Test Hole TH20-07