APPENDIX 'G'

Geotechnical Report

Quality Engineering | Valued Relationships

Morrison Hershfield

2018 Local Streets Package (PW File #: 18-R-07)

Prepared for:

Morrison Hershfield
25 Scurfield Blvd, Unit 1
Winnipeg, MB R3Y 1G4
Attention: Ron Bruce

Project Number:
0035 056 00

Date:
February 14, 2018
Final Report

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TREK GEOTECHNICAL Quality Engineering | Valued Relationships

February 14, 2018

Our File No. 0035 056 00

Ron Bruce, P.Eng.
Morrison Hershfield
25 Scurfield Blvd, Unit 1
Winnipeg, MB R3Y 1G4

RE: Sub-Surface Investigation Report for
2018 Local Streets Package (PW File #: 18-R-07)

TREK Geotechnical Inc. is pleased to submit our report for the sub-surface investigations for the 2018 Local Streets Package (PW File #: 18-R-07).

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:

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

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

Revision History

Revision No.	Author	Issue Date	Description
0	AFK	February 14, 2018	Final Report

Authorization Signatures

Prepared By:

Angela Fidler-Kliewer C.Tech.

Reviewed By:

PROVINCE OF MANITOBA
N. J. FERREIRA
Member
22892
Feb. 14, 2018

APEGM
Certificate of Authorization
Trek Geotechnical Inc.
No. 4877 Date: Feb. 14, 2018

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

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1.0 Introduction

This report summarizes the results of the sub-surface investigation completed for the 2018 Local Streets Package 18-R-07 project. The streets included Dominion Street, Ashburn Street, Spence Street, Jones Street, Sherburn Street, Colleen Road, and Rupertsland Avenue. The information collected describes the pavement structure of the existing road as well as the soil stratigraphy beneath the pavement structure.

2.0 Sub-Surface Investigation and Laboratory Program

For each street test holes were drilled approximately every 50m of street length with specific locations shown on Figure 01 to Figure 07. The test holes were drilled in order to determine sub-surface conditions for the reconstruction of the road segment. The number of test holes per streets are as follows:

Dominion Street:	*9*
Ashburn Street:	*8*
Spence Street:	*5*
Jones Street:	*3*
Sherburn Street:	*8*
Colleen Road:	*5*
Rupertsland Avenue:	*8*

The sub-surface investigation was conducted between December 14, 2017 and December 21, 2017. The test holes were drilled to a depth of 3.0 m below road surface by Maple Leaf Drilling Ltd. using their B40 Mobile truck mounted drill rig equipped with 125 mm diameter solid stem augers. The pavement structure (asphalt or concrete) was cored by Harsimran Singh of TREK Geotechnical Inc. (TREK) using a portable coring press equipped with a hollow 150 mm diameter diamond core drill bit. The sub-surface conditions were observed during drilling and visually classified by Dawn Sellick of TREK. Other pertinent information such as groundwater and drilling conditions were also recorded during the drilling investigation. Disturbed (auger cuttings) 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.

Due to the condition of the pavement and the coring method, the concrete pavement degraded into rubble and therefore, some core samples could not be recovered or were partially recovered, in particular along Dominion and Ashburn streets.

The laboratory testing program consisted of moisture content determination, Atterberg limits, and grain size analysis (mechanical sieve and hydrometer methods) on select samples between 0.5 and 1.0 m below pavement. Information gathered for each street is included in separate appendices (Appendices A to G). The information provided in the Appendices includes test hole logs, laboratory testing

summary tables and results, and photos of the concrete cores.

Test hole locations noted on the test hole logs and shown on Figure 01 to Figure 07 are based on their location relative to the nearest address, and measured distances from the edge of pavement or other permanent features.

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.

Figures

TREK GEOTECHNICAL

0035 056 00
Morrison Hershfield
Local Streets 18-R-07 Dominion Street

ANSI full bleed A (11.00 x 8.50 Inches)

FIG.001 2018-02-06 Test Hole Plan(DOMINION ST) 0 A SL 0035 056 00.dwg, 2/7/2018 11:31:14 AM

0 50 100 150 m
SCALE = 1 : 3 500 (216 mm x 279 mm)

LEGEND: TEST HOLE (TREK, 2018)

NOTES: 1. AERIAL IMAGE FROM CITY OF WINNIPEG 2016

Figure 01
Test Hole Plan

TREK GEOTECHNICAL

0035 056 00
Morrison Hershfield
Local Streets 18-R-07 Ashburn Street

ANSI full bleed A (11.00 x 8.50 Inches)

FIG.002 2018-02-06 Test Hole Plan(ASHBURN ST) 0_A_SL 0035 056 00.dwg, 2/7/2018 11:29:48 AM

0 50 100 150 m
SCALE = 1 : 3 500 (216 mm x 279 mm)

LEGEND: TEST HOLE (TREK, 2018)

NOTES: 1. AERIAL IMAGE FROM CITY OF WINNIPEG 2016

Figure 02
Test Hole Plan

TREK GEOTECHNICAL

0035 056 00
Morrison Hershfield
Local Streets 18-R-07 Spence Street

ANSI full bleed A (11.00 x 8.50 Inches)

FIG.003 2018-02-06 Test Hole Plan(SPENCE ST) 0_A_SL 0035 056 00.dwg, 2/7/2018 11:36:06 AM

0 50 100 150 m
SCALE = 1 : 3 000 (216 mm x 279 mm)

LEGEND: TEST HOLE (TREK, 2018)

NOTES: 1. AERIAL IMAGE FROM CITY OF WINNIPEG 2016

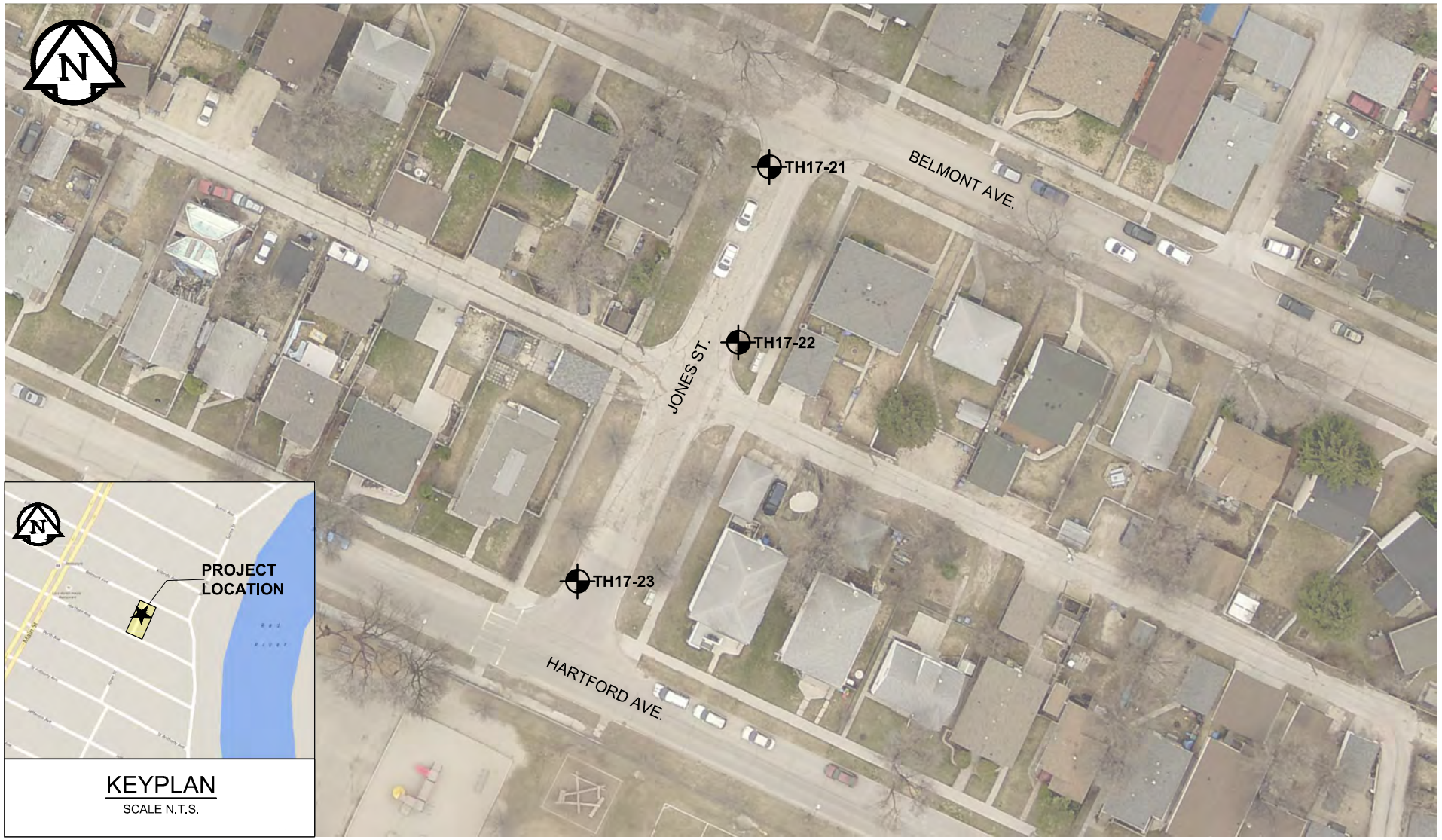
Figure 03
Test Hole Plan

TREK GEOTECHNICAL

0035 056 00
Morrison Hershfield
Local Streets 18-R-07 Jones Street

ANSI full bleed A (11.00 x 8.50 Inches)

FIG.004 2018-02-06 Test Hole Plan(JONES ST) 0_A_SL 0035 056 00.dwg, 2/7/2018 11:44:31 AM



0 10 20 30 m
SCALE = 1 : 750 (216 mm x 279 mm)

LEGEND: TEST HOLE (TREK, 2018)

NOTES: 1. AERIAL IMAGE FROM CITY OF WINNIPEG 2016

Figure 04
Test Hole Plan

TREK GEOTECHNICAL

0035 056 00
Morrison Hershfield
Local Streets 18-R-07 Sherburn Street

0 50 100 150 m
SCALE = 1 : 3 000 (216 mm x 279 mm)

LEGEND: TEST HOLE (TREK, 2018)

NOTES: 1. AERIAL IMAGE FROM CITY OF WINNIPEG 2016

Figure 05
Test Hole Plan

ANSI full bleed A (11.00 x 8.50 Inches)
FIG.005 2018-02-06 Test Hole Plan(SHERBURN ST) 0 A SL 0035 056 00.dwg, 2/7/2018 11:23:56 AM

TREK GEOTECHNICAL

0035 056 00
Morrison Hershfield
Local Streets 18-R-07 Colleen Road

ANSI full bleed A (11.00 x 8.50 Inches)

FIG.006 2018-02-06 Test Hole Plan(COLLEEN ST) 0 A SL 0035 056 00.dwg, 2/7/2018 11:53:21 AM

0 25 50 75 m
SCALE = 1 : 1 500 (216 mm x 279 mm)

LEGEND: TEST HOLE (TREK, 2018)

NOTES: 1. AERIAL IMAGE FROM CITY OF WINNIPEG 2016

Figure 06
Test Hole Plan

TREK GEOTECHNICAL

0035 056 00
Morrison Hershfield
Local Streets 18-R-07 Rupertsland Street

0 25 50 75 100 m
SCALE = 1 : 2 000 (216 mm x 279 mm)

LEGEND: TEST HOLE (TREK, 2018)

NOTES: 1. AERIAL IMAGE FROM CITY OF WINNIPEG 2016

Figure 07
Test Hole Plan

ANSI full bleed A (11.00 x 8.50 Inches)
FIG.007 2018-02-06 Test Hole Plan(RUPERTSLAND ST) 0_A_SL 0035 056 00.dwg, 2/7/2018 11:21:49 AM

Appendix A

Dominion Street, between Yarwood Ave. and Notre Dame Ave.

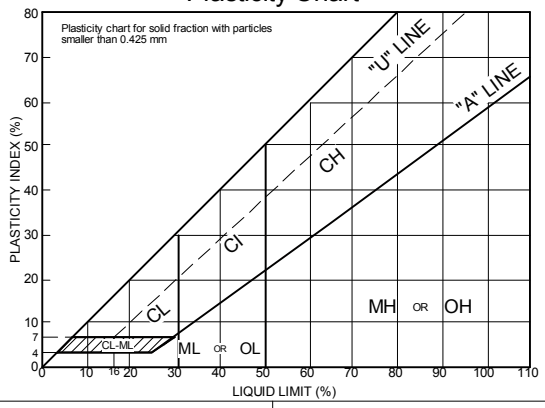
Test Hole Logs, Summary Table, Lab Data and Photographs of Pavement Core Samples

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* — $C_U = \frac{D_{60}}{D_{10}}$ greater than 4; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
			GP		Poorly-graded gravels, gravel-sand mixtures, little or no fines	Not meeting all gradation requirements for GW
		Gravel with fines (Appreciable amount of fines)	GM		Silty gravels, gravel-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
			GC		Clayey gravels, gravel-sand-silt mixtures	Atterberg limits above "A" line or P.I. greater than 7
	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 — 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
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
#40 to #10	0.425 to 2.00		Coarse
#200 to #40	0.075 to 0.425		Medium
< #200	< 0.075		Fine
			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
#4 to 3/4 in.	4.75 to 19		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

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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

Sub-Surface Log

Test Hole TH17-01
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 - Dominion Street	**Location:**	UTM N-5529441, E-630913
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 15

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	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 - 64 mm thick				
		CONCRETE - 241 mm thick				
		CLAY (Fill)- silty, trace sand, trace gravel, trace rootless - grey to brown, - frozen to 0.60 m, moist and soft when thawed - intermediate plasticity				
0.5				G02		
				G03		
1.0						
		SILT - clayey - brown - moist, stiff - low plasticity		G04		
				G05		
1.5						
		CLAY - silty, trace silt inclusions (<5 mm diam.) - brown - moist, firm to stiff - high plasticity - trace silt inclusions (<15 mm diam.), trace sand below 1.83 m		G06		
2.0				G07		
2.5						
				G08		
3.0						

END OF TEST HOLE AT 3.0 m IN CLAY
1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located at house #1208, 1.2 m East of West Curb.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2018-01-25_LOCAL STREETS 18-R-07 DOMINION STREET_0035-056-00_0_A_HS.GPJ TREK GEOTECHNICAL.GDT 18-2-14

Sub-Surface Log

Test Hole TH17-02
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 - Dominion Street	**Location:**	UTM N-5529499, E-630918
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 15

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	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
		ASPHALT - 51 mm thick				
		CONCRETE - 254 mm thick				
		CLAY - silty, trace silt inclusions (<5 mm diam.), trace sand - brown, - frozen to 0.60 m, moist and firm when thawed - high plasticity		G09		
0.5				G10		
		- trace silt inclusions (< 20 mm diameter), trace gravel (<10 mm), stiff below 0.76 m		G11		
1.0				G12		
				G13		
1.5		- firm to stiff, intermediate to high plasticity below 1.52 m		G14		
2.0				G15		
2.5						
				G16		
3.0		END OF TEST HOLE AT 3.0 m IN CLAY				

1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located at house #1237, 1 m West of East curb.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2018-01-25_LOCAL STREETS 18-R-07 DOMINION STREET_0035-056-00_0_A_HS.GPJ TREK GEOTECHNICAL.GDT 18-2-14

Sub-Surface Log

Test Hole TH17-03
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 - Dominion Street	**Location:**	UTM N-5529551, E-630919
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 15

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	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
		ASPHALT - 51 mm thick CONCRETE - 254 mm thick				
		CLAY - silty, trace sand - brown - frozen to 0.60 m, moist and firm when thawed - high plasticity		G17		
0.5				G18		
		- very stiff below 0.76 m		G19		
1.0		- light brown, firm below 1.06 m		G20		
				G21		
1.5				G22		
		- firm to stiff below 1.83 m				
2.0				G23		
2.5						
				G24		
3.0		END OF TEST HOLE AT 3.0 m IN CLAY				

1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located at house #1230, 1.1 m East of West Curb.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2018-01-25_LOCAL STREETS 18-R-07 DOMINION STREET_0035-056-00_0_A_HS.GPJ TREK GEOTECHNICAL.GDT 18-2-14

Sub-Surface Log

Test Hole TH17-04
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 - Dominion Street	**Location:**	UTM N-5529600, E-630922
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 15

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	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 - 51 mm thick				
		CONCRETE - 254 mm thick				
		CLAY - silty - grey - frozen to 0.60 m, moist and very stiff when thawed - high plasticity				
0.5				G26	●	✤ △
		SILT - clayey - light brown - moist, soft - low plasticity		G27	●	✤
				G28	●	△ ✤
1.5				G29	●	✤
		CLAY - trace silt - brown - moist and stiff - high plasticity		G30	●	△ ✤
2.0		- firm, grey below 2.13 m		G31	●	△ ✤
		- soft to firm below 2.44 m		G32	●	✤ △
3.0						

END OF TEST HOLE AT 3.0 m IN CLAY
1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located at house #1261, 1.2 m West of East curb.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2018-01-25_LOCAL STREETS 18-R-07 DOMINION STREET_0035-056-00_0_A_HS.GPJ TREK GEOTECHNICAL.GDT 18-2-14

Sub-Surface Log

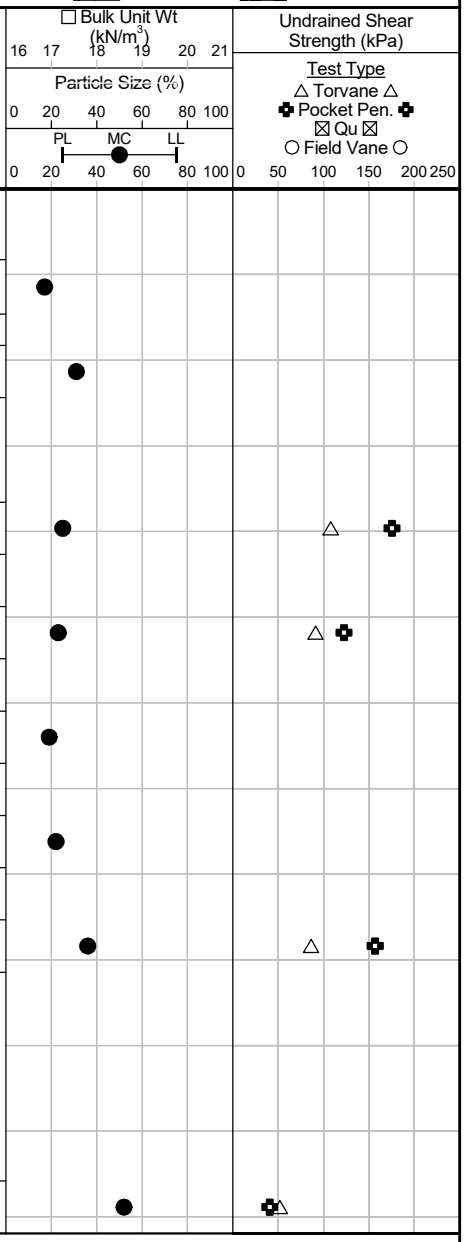
Test Hole TH17-05
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 - Dominion Street	**Location:**	UTM N-5529647, E-630919
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 15

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
		ASPHALT - 51 mm thick		
		CONCRETE - 254 mm thick		
		CLAY (Fill) - silty, trace sand, trace gravel, - light brown, - frozen to 0.60 m, moist and soft when thawed - high plasticity		G33
0.5		- trace organics, intermediate to high plasticity below 0.45 m		G34
1.0		- brown, very stiff below 0.90 m		G35
		CLAY - silty, trace sand - light brown - moist, stiff to very stiff - high plasticity		G36
		- stiff to very stiff below 1.22 m		
1.5		Silt - trace clay - light brown - moist, soft - low plasticity		G37
				G38
2.0				G39
2.5		Clay - trace silt - grey, moist, stiff - high plasticity		
3.0		- stiff to firm below 2.90 m		G40



END OF TEST HOLE AT 3.0 m IN CLAY
1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located at house #1268, 1.4 m East of West curb.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2018-01-25_LOCAL STREETS 18-R-07 DOMINION STREET_0035-056-00_0_A_HS.GPJ TREK GEOTECHNICAL.GDT 18-2-14

Sub-Surface Log

Test Hole TH17-06
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 - Dominion Street	**Location:**	UTM N-5529697, E-630922
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 15

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
		ASPHALT - 64 mm thick		
		CONCRETE - 254 mm thick		
		CLAY - trace silt, trace gravel - grey - frozen to 0.45 m, moist and stiff when thawed - high plasticity		G41
0.5				G42
		SILT - clayey - light brown - moist, soft - high plasticity		G43
1.0				
		CLAY - trace silt - grey - moist, firm to stiff - high plasticity		G44
1.5				G45
				6G
2.0				G47
2.5		- trace oxidation below 2.56 m		G48
3.0				

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 ○

END OF TEST HOLE AT 3.0 m IN CLAY
1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located at house #1281, 1.4 m West of East curb.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2018-01-25_LOCAL STREETS 18-R-07 DOMINION STREET_0035-056-00_0_A_HS.GPJ TREK GEOTECHNICAL.GDT 18-2-14

Sub-Surface Log

Test Hole TH17-07
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 - Dominion Street	**Location:**	UTM N-5529737, E-630919
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 15

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
		ASPHALT - 38 mm thick		
		CONCRETE - 102 mm thick		
		Sand (FILL) - trace silt, trace gravel - light brown - moist, loose		G49
0.5		CLAY - trace silt - grey brown - frozen to 0.60 m, moist and stiff when thawed - high plasticity		G50
1.0		SILT AND CLAY - grey brown - moist, stiff - high plasticity		G51
				G52
1.5		CLAY - silty - brown - moist, firm - high plasticity		G53
				G54
2.0				G55
2.5				
				G56
3.0		-grey below 2.90 m		

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 ○

END OF TEST HOLE AT 3.0 m IN CLAY
1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located at house #1288, 1.2 m East of West curb.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2018-01-25_LOCAL STREETS 18-R-07 DOMINION STREET_0035-056-00_0_A_HS.GPJ TREK GEOTECHNICAL.GDT 18-2-14

Sub-Surface Log

Test Hole TH17-08
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 - Dominion Street	**Location:**	UTM N-5529787, E-630925
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 15

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	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 - 76 mm thick				
		CONCRETE - 178 mm thick				
		CLAY - some silt, trace sand, trace precipitates, trace organics - grey - frozen to 0.60 m, moist and stiff when thawed - high plasticity		G57	●	
0.5				G58	●	✤
		- very stiff below 0.91 m		G59	●	✤
1.0						
		CLAY AND SILT - light brown - moist, firm - intermediate plasticity		G60	●	✤
1.5		- soft, below 1.37 m		G61	●	△✤
		CLAY - trace silt - grey - moist, stiff to very stiff - high plasticity		G62	●	△✤
2.0				G63	●	△✤
		- firm below 2.44 m		G64	●	△✤
2.5						
3.0		END OF TEST HOLE AT 3.0 m IN CLAY				

1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located at house #1301, 1.2 m West of East curb.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2018-01-25_LOCAL STREETS 18-R-07 DOMINION STREET_0035-056-00_0_A_HS.GPJ TREK GEOTECHNICAL.GDT 18-2-14

Sub-Surface Log

Test Hole TH17-09
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 - Dominion Street	**Location:**	UTM N-5529844, E-630919
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 15

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
		ASPHALT - 25 mm thick CONCRETE - 178 mm thick		
		CLAY - trace silt, trace gravel, trace organics to 0.45 m - black - frozen to 0.60 m, moist, soft when thawed - high plasticity		G65
0.5				G66
		- grey, stiff below 0.91 m		G67
1.0				G68
		SILT AND CLAY - light brown - moist, soft -intermediate plasticity		G69
1.5		- stiff between 1.82 m and 2.1 m		G70
2.0				G71
		CLAY - trace silt - grey, moist, firm - high plasticity		G72
2.5				
3.0		END OF 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
Undrained Shear Strength (kPa): 0 50 100 150 200 250
Test Type: △ Torvane △ ✤ Pocket Pen. ✤ ☒ Qu ☒ ○ Field Vane ○

1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located at east side of building #1124, 1.2 m East of West curb.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2018-01-25_LOCAL STREETS 18-R-07 DOMINION STREET_0035-056-00_0_A_HS.GPJ TREK GEOTECHNICAL.GDT 18-2-14

Local Streets Package 18-R-07
Sub-Surface Investigation
Dominion Street

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)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Plastic	Liquid	Plasticity Index
TH17-01	UTM: 5529441 N, 630913 E Located at House #1208, 1.2 m East of West curb.	Asphalt	64	Concrete	241											
						CLAY (FILL)	0.5	0.6	28							
						CLAY (FILL)	0.9	1.1	18							
						SILT	1.2	1.4	16							
						SILT	1.5	1.7	33							
						CLAY	1.8	2.0	37							
						CLAY	2.1	2.3	48							
						CLAY	2.7	2.9	40							
TH17-02	UTM: 5528917 N, 632610 E Located at House # 597, 1.0 m West of East curb.	Asphalt	64	Concrete	164											
						CLAY	0.2	0.3	N/A							
						CLAY	0.5	0.6	59							
						CLAY	0.8	0.9	28	3	10	30	58	27	71	44
						CLAY	1.1	1.2	26							
						CLAY	1.5	1.7	24							
						CLAY	1.8	2.0	32							
						CLAY	2.1	2.3	35							
						CLAY	2.4	2.6	43							
TH17-03	UTM: 5529551 N, 630919 E Located at House #1230, 1.1 m East of West curb.	Asphalt	51	Concrete	254											
						CLAY	0.2	0.3	N/A							
						CLAY	0.5	0.6	25							
						CLAY	0.8	0.9	24							
						CLAY	1.1	1.2	19							
						CLAY	1.5	1.7	23							
						CLAY	1.8	2.0	27							
						CLAY	2.1	2.3	41							
						CLAY	2.7	2.9	49							
TH17-04	UTM: 5529600 N, 630922 E Located at House #1261, 1.2 m West of East curb.	Asphalt	51	Concrete	254											
						CLAY	0.5	0.6	27							
						SILT	0.9	1.1	19	0	5	69	26	16	30	14
						SILT	1.2	1.4	18							
						SILT	1.5	1.7	28							
						CLAY	1.8	2.0	30							
						CLAY	2.1	2.3	44							
						CLAY	2.4	2.6	53							

Local Streets Package 18-R-07
Sub-Surface Investigation
Dominion Street

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)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Plastic	Liquid	Plasticity Index
TH17-05	UTM: 5529697 N, 630922 E Located at House #1281, 1.4 m West of East curb.	Asphalt	51	Concrete	254											
						CLAY (FILL)	0.2	0.3	17							
						CLAY (FILL)	0.5	0.6	31							
						CLAY (FILL)	0.9	1.1	25							
						CLAY	1.2	1.4	23							
						SILT	1.5	1.7	19							
						SILT	1.8	2.0	22							
						SILT	2.1	2.3	36							
						CLAY	2.9	3.0	52							
TH17-06	UTM: 5529697 N, 630922 E Located at House #1281, 1.4 m West of East curb.	Asphalt	64	Concrete	254											
						CLAY	0.2	0.3	N/A							
						CLAY	0.5	0.6	26							
						SILT	0.9	1.1	19							
						CLAY	1.2	1.4	28							
						CLAY	1.5	1.7	40							
						CLAY	1.8	2.0	47							
						CLAY	2.1	2.3	53							
						CLAY	2.6	2.7	45							
TH17-07	UTM: 5529737 N, 630919 E Located at House #1288, 1.2 m East of West curb.	Asphalt	38	Concrete	102											
						SAND (FILL)	0.2	0.3	17							
						CLAY	0.5	0.6	32							
						SILT AND CLAY	0.9	1.1	22							
						SILT AND CLAY	1.2	1.4	30							
						CLAY	1.5	1.7	27							
						CLAY	1.8	2.0	38							
						CLAY	2.1	2.3	49							
						CLAY	2.7	2.9	43							
TH17-08	UTM: 5529787 N, 630925 E Located at House #1301, 1.2 m West of East curb.	Asphalt	76	Concrete	178											
						CLAY	0.2	0.3	18							
						CLAY	0.5	0.6	26	0	10	24	66	26	70	44
						CLAY	0.9	1.1	27							
						SILT AND CLAY	1.2	1.4	22							
						SILT AND CLAY	1.5	1.7	23							
						CLAY	1.8	2.0	33							
						CLAY	2.1	2.3	37							
						CLAY	2.4	2.6	50							

Local Streets Package 18-R-07
Sub-Surface Investigation
Dominion Street

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)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Plastic	Liquid	Plasticity Index
TH17-09	UTM: 5529844 N, 630919 E Located at the east side of Building #1124, 1.2 m East of West curb.	Asphalt	25	Concrete	178											
						CLAY	0.2	0.3	18							
						CLAY	0.5	0.6	29							
						CLAY	0.9	1.1	26							
						CLAY	1.2	1.4	27							
						SILT AND CLAY	1.5	1.7	23							
						SILT AND CLAY	2.0	2.1	31							
						SILT AND CLAY	2.3	2.4	23							
						CLAY	2.7	2.9	48							

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Moisture Content Report
ASTM D2216-10

Project No. 0035-056-00
Client Morrison Hershfield
Project Local Streets 18-R-07 Dominion Street

Sample Date 15-Dec-07
Test Date 13-Jan-18
Technician AFK

Test Pit	TH17-01	TH17-01	TH17-01	TH17-01	TH17-01	TH17-01
Depth (m)	0.5 - 0.6	0.9 - 1.1	1.2 - 1.4	1.5 - 1.7	1.8 - 2.0	2.1 - 2.3
Sample #	G02	G03	G04	G05	G06	G07
Tare ID	ab61	k20	AB86	E143	N41	AB68
Mass of tare	6.7	8.5	6.7	8.4	8.5	6.7
Mass wet + tare	220.1	264.8	223.0	297.6	312.0	268.0
Mass dry + tare	174.1	226.0	192.8	226.5	229.9	183.2
Mass water	46.0	38.8	30.2	71.1	82.1	84.8
Mass dry soil	167.4	217.5	186.1	218.1	221.4	176.5
Moisture %	27.5%	17.8%	16.2%	32.6%	37.1%	48.0%

Test Pit	TH17-01	TH17-02	TH17-02	TH17-02	TH17-02	TH17-02
Depth (m)	2.7 - 2.9	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.5 - 1.7	1.8 - 2.0
Sample #	G08	G10	G11	G12	G13	G14
Tare ID	H58	W68	F63	F21	AB81	AB83
Mass of tare	8.5	8.5	8.4	8.5	6.7	6.6
Mass wet + tare	383.5	272.2	389.5	336.6	331.6	341.1
Mass dry + tare	277.3	174.8	305.8	270.0	269.7	260.6
Mass water	106.2	97.4	83.7	66.6	61.9	80.5
Mass dry soil	268.8	166.3	297.4	261.5	263.0	254.0
Moisture %	39.5%	58.6%	28.1%	25.5%	23.5%	31.7%

Test Pit	TH17-02	TH17-02	TH17-03	TH17-03	TH17-03	TH17-03
Depth (m)	2.1 - 2.3	2.4 - 2.6	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.5 - 1.7
Sample #	G15	G16	G18	G19	G20	G21
Tare ID	F34	F14	N45	H45	A8	F144
Mass of tare	8.4	8.6	8.5	8.5	8.0	8.6
Mass wet + tare	372.8	302.6	245.5	277.2	382.9	371.4
Mass dry + tare	279.1	214.9	198.9	225.6	322.7	303.5
Mass water	93.7	87.7	46.6	51.6	60.2	67.9
Mass dry soil	270.7	206.3	190.4	217.1	314.7	294.9
Moisture %	34.6%	42.5%	24.5%	23.8%	19.1%	23.0%

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Moisture Content Report
ASTM D2216-10

Project No. 0035-056-00
Client Morrison Hershfield
Project Local Streets 18-R-07 Dominion Street

Sample Date 15-Dec-07
Test Date 13-Jan-18
Technician AFK

Test Pit	TH17-03	TH17-03	TH17-03	TH17-04	TH17-04	TH17-04
Depth (m)	1.8 - 2.0	2.1 - 2.3	2.7 - 2.9	0.5 - 0.6	0.9 - 1.1	1.2 - 1.4
Sample #	G22	G23	G24	G26	G27	G28
Tare ID	D10	E114	F2	F85	P04	A14
Mass of tare	8.5	8.5	8.4	8.6	9.8	8.4
Mass wet + tare	306.2	278.1	338.6	285.2	252.3	377.5
Mass dry + tare	242.4	200.3	229.6	226.1	213.1	322.4
Mass water	63.8	77.8	109.0	59.1	39.2	55.1
Mass dry soil	233.9	191.8	221.2	217.5	203.3	314.0
Moisture %	27.3%	40.6%	49.3%	27.2%	19.3%	17.5%

Test Pit	TH17-04	TH17-04	TH17-04	TH17-04	TH17-05	TH17-05
Depth (m)	1.5 - 1.7	1.8 - 2.0	2.1 - 2.3	2.4 - 2.6	0.2 - 0.3	0.5 - 0.6
Sample #	G29	G30	G31	G32	G33	G34
Tare ID	F11	N07	Z44	N112	E34	W99
Mass of tare	8.8	8.6	8.6	8.4	8.5	8.5
Mass wet + tare	328.5	311.6	344.4	348.9	270.9	251.8
Mass dry + tare	259.2	241.3	241.4	230.3	232.9	193.7
Mass water	69.3	70.3	103.0	118.6	38.0	58.1
Mass dry soil	250.4	232.7	232.8	221.9	224.4	185.2
Moisture %	27.7%	30.2%	44.2%	53.4%	16.9%	31.4%

Test Pit	TH17-05	TH17-05	TH17-05	TH17-05	TH17-05	TH17-05
Depth (m)	0.9 - 1.1	1.2 - 1.4	1.5 - 1.7	1.8 - 2.0	2.1 - 2.3	2.9 - 3.0
Sample #	G35	G36	G37	G38	G39	G40
Tare ID	C10	Z06	F112	F121	D29	N57
Mass of tare	8.5	8.4	8.4	8.6	8.3	8.5
Mass wet + tare	357.6	364.3	414.7	354.9	278.9	330.4
Mass dry + tare	287.4	296.9	349.6	293.4	207.3	220.6
Mass water	70.2	67.4	65.1	61.5	71.6	109.8
Mass dry soil	278.9	288.5	341.2	284.8	199.0	212.1
Moisture %	25.2%	23.4%	19.1%	21.6%	36.0%	51.8%

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Moisture Content Report
ASTM D2216-10

Project No. 0035-056-00
Client Morrison Hershfield
Project Local Streets 18-R-07 Dominion Street

Sample Date 15-Dec-07
Test Date 13-Jan-18
Technician AFK

Test Pit	TH17-06	TH17-06	TH17-06	TH17-06	TH17-06	TH17-06
Depth (m)	0.5 - 0.6	0.9 - 1.1	1.2 - 1.4	1.5 - 1.7	1.8 - 2.0	2.1 - 2.3
Sample #	G42	G43	G44	G45	G46	G47
Tare ID	F86	AB16	F15	W34	Z96	AB47
Mass of tare	8.4	6.6	8.8	8.4	8.5	6.7
Mass wet + tare	312.9	297.2	349.2	282.9	348.3	247.1
Mass dry + tare	250.5	250.6	275.0	204.2	240.1	164.1
Mass water	62.4	46.6	74.2	78.7	108.2	83.0
Mass dry soil	242.1	244.0	266.2	195.8	231.6	157.4
Moisture %	25.8%	19.1%	27.9%	40.2%	46.7%	52.7%

Test Pit	TH17-06	TH17-07	TH17-07	TH17-07	TH17-07	TH17-07
Depth (m)	2.6 - 2.7	0.2 - 0.3	0.5 - 0.6	0.9 - 1.1	1.2 - 1.4	1.5 - 1.7
Sample #	G48	G49	G50	G51	G52	G53
Tare ID	E11	W29	F47	D5	Z66	Z105
Mass of tare	8.5	8.6	8.4	8.3	8.4	8.4
Mass wet + tare	405.6	266.5	259.9	261.8	298.9	314.8
Mass dry + tare	281.9	228.7	199.4	215.5	232.0	248.9
Mass water	123.7	37.8	60.5	46.3	66.9	65.9
Mass dry soil	273.4	220.1	191.0	207.2	223.6	240.5
Moisture %	45.2%	17.2%	31.7%	22.3%	29.9%	27.4%

Test Pit	TH17-07	TH17-07	TH17-07	TH17-08	TH17-08	TH17-08
Depth (m)	1.8 - 2.0	2.1 - 2.3	2.7 - 2.9	0.2 - 0.3	0.5 - 0.6	0.9 - 1.1
Sample #	G54	G55	G56	G57	G58	G59
Tare ID	W13	N113	N72	N68	F26	F110
Mass of tare	8.4	8.6	8.6	8.5	8.5	8.2
Mass wet + tare	270.8	204.9	279.1	198.8	309.4	337.3
Mass dry + tare	198.1	140.0	198.4	169.9	248.0	267.1
Mass water	72.7	64.9	80.7	28.9	61.4	70.2
Mass dry soil	189.7	131.4	189.8	161.4	239.5	258.9
Moisture %	38.3%	49.4%	42.5%	17.9%	25.6%	27.1%

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Moisture Content Report
ASTM D2216-10

Project No. 0035-056-00
Client Morrison Hershfield
Project Local Streets 18-R-07 Dominion Street

Sample Date 15-Dec-07
Test Date 13-Jan-18
Technician AFK

Test Pit	TH17-08	TH17-08	TH17-08	TH17-08	TH17-08	TH17-09
Depth (m)	1.2 - 1.4	1.5 - 1.7	1.8 - 2.0	2.1 - 2.3	2.4 - 2.6	0.2 - 0.3
Sample #	G60	G61	G62	G63	G64	G65
Tare ID	W83	E48	F128	E32	H50	N08
Mass of tare	8.6	8.8	8.5	8.6	8.5	8.6
Mass wet + tare	328.6	317.6	290.1	281.0	312.2	295.5
Mass dry + tare	271.9	260.9	220.8	206.9	211.6	252.1
Mass water	56.7	56.7	69.3	74.1	100.6	43.4
Mass dry soil	263.3	252.1	212.3	198.3	203.1	243.5
Moisture %	21.5%	22.5%	32.6%	37.4%	49.5%	17.8%

Test Pit	TH17-09	TH17-09	TH17-09	TH17-09	TH17-09	TH17-09
Depth (m)	0.5 - 0.6	0.9 - 1.1	1.2 - 1.4	1.5 - 1.7	2.0 - 2.1	2.3 - 2.4
Sample #	G66	G67	G68	G69	G70	G71
Tare ID	W96	E99	N22	Z130	F153	Z64
Mass of tare	8.5	8.5	8.5	8.4	8.7	8.3
Mass wet + tare	326.9	346.3	345.8	350.5	324.7	407.3
Mass dry + tare	256.0	276.0	273.9	286.1	249.5	331.6
Mass water	70.9	70.3	71.9	64.4	75.2	75.7
Mass dry soil	247.5	267.5	265.4	277.7	240.8	323.3
Moisture %	28.6%	26.3%	27.1%	23.2%	31.2%	23.4%

Test Pit	TH17-09					
Depth (m)	2.7 - 2.9					
Sample #	G72					
Tare ID	K22					
Mass of tare	8.5					
Mass wet + tare	337.4					
Mass dry + tare	230.2					
Mass water	107.2					
Mass dry soil	221.7					
Moisture %	48.4%					

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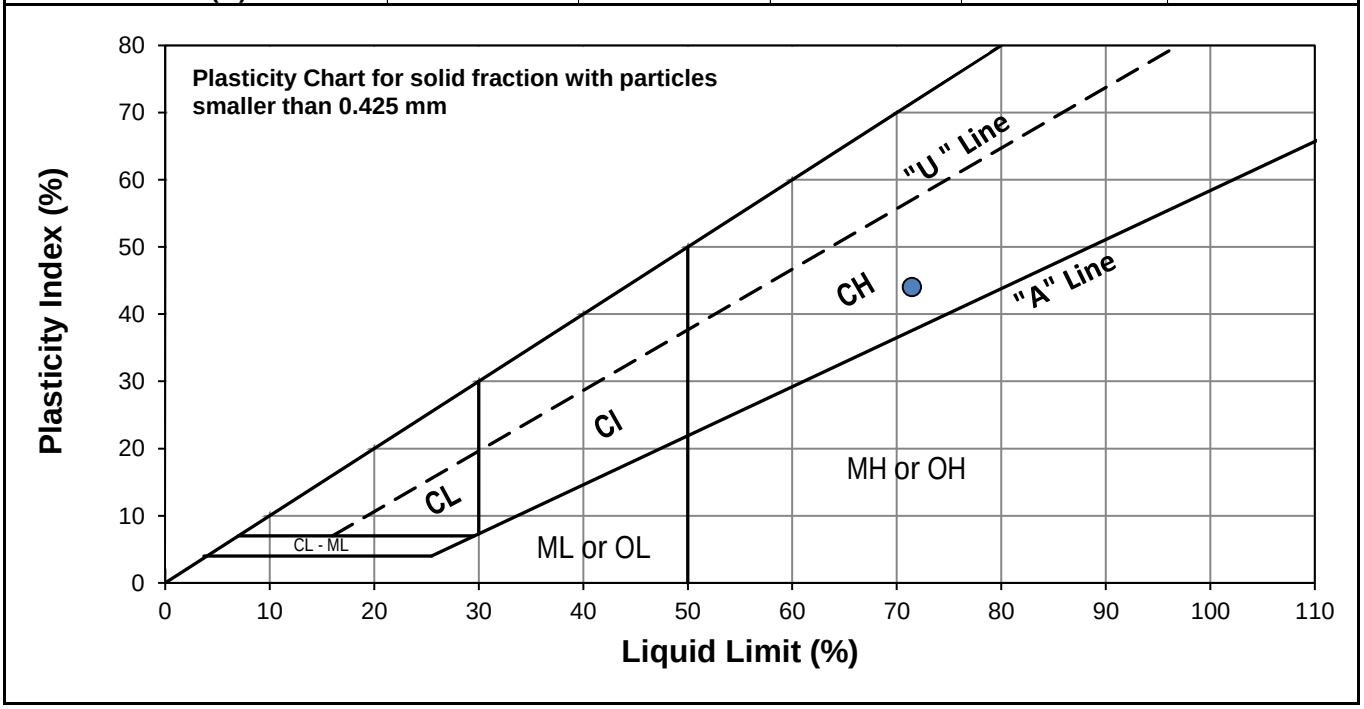
Atterberg Limits
ASTM D4318-10e1

Project No.	0035-056-00
Client	Morrision Hershfield
Project	2017 Local Streets 18-R-07 -Dominion Street
Test Hole	TH17-02
Sample #	G11
Depth (m)	0.8 - 0.9
Sample Date	15-Dec-17
Test Date	17-Jan-17
Technician	AFK

Liquid Limit	71
Plastic Limit	27
Plasticity Index	44

Liquid Limit

Trial #	1	2	3		
Number of Blows (N)	17	21	30		
Mass Wet Soil + Tare (g)	27.183	27.098	25.752		
Mass Dry Soil + Tare (g)	21.511	21.570	20.995		
Mass Tare (g)	14.112	14.023	14.128		
Mass Water (g)	5.672	5.528	4.757		
Mass Dry Soil (g)	7.399	7.547	6.867		
Moisture Content (%)	76.659	73.248	69.273		



Plastic Limit

Trial #	1	2	3	4	5
Mass Tare (g)	18.260	20.370			
Mass Wet Soil + Tare (g)	17.386	19.084			
Mass Dry Soil + Tare (g)	14.185	14.418			
Mass Water (g)	0.874	1.286			
Mass Dry Soil (g)	3.201	4.666			
Moisture Content (%)	27.304	27.561			

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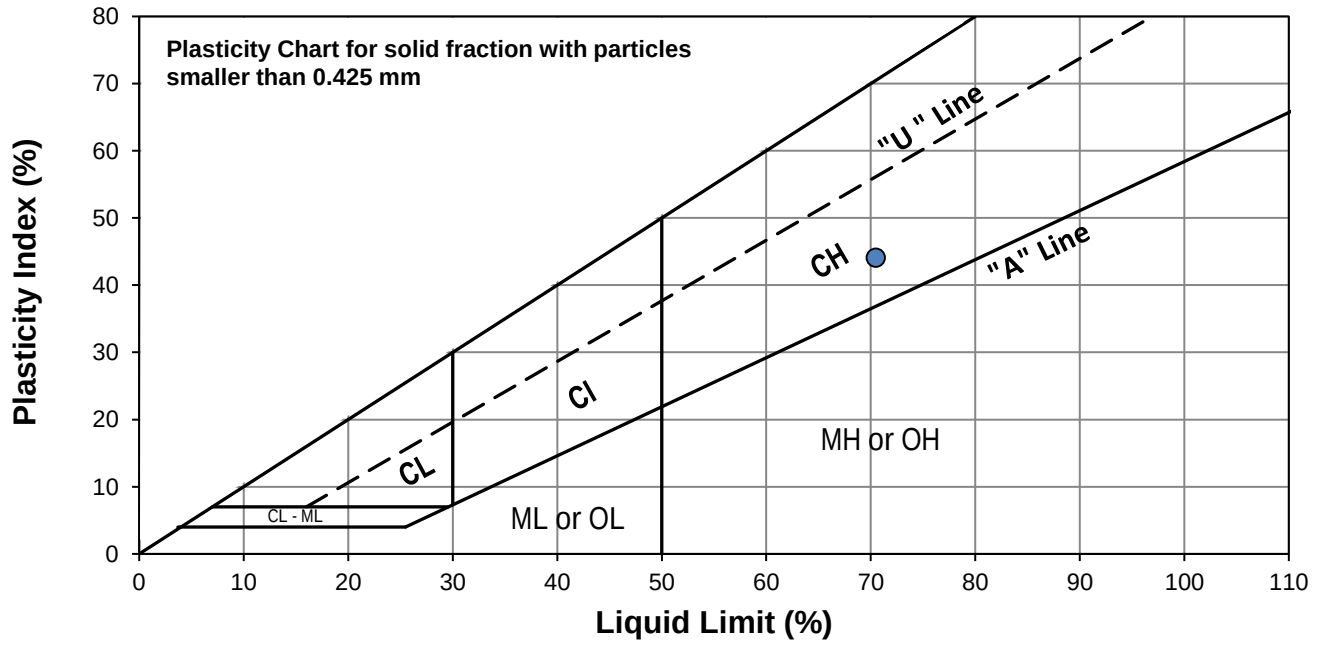
Atterberg Limits
ASTM D4318-10e1

Project No.	0035-056-00
Client	Morrision Hershfield
Project	2018 Local Street 18-R-07 Dominion Street
Test Hole	TH17-08
Sample #	G58
Depth (m)	.5 - .6
Sample Date	15-Dec-17
Test Date	22-Jan-18
Technician	AFK

Liquid Limit	70
Plastic Limit	26
Plasticity Index	44

Liquid Limit

Trial #	1	2	3		
Number of Blows (N)	16	22	32		
Mass Wet Soil + Tare (g)	28.727	27.765	28.826		
Mass Dry Soil + Tare (g)	22.535	22.130	22.994		
Mass Tare (g)	14.121	14.304	14.459		
Mass Water (g)	6.192	5.635	5.832		
Mass Dry Soil (g)	8.414	7.826	8.535		
Moisture Content (%)	73.592	72.004	68.330		



Plastic Limit

Trial #	1	2	3	4	5
Mass Tare (g)	20.064	20.877			
Mass Wet Soil + Tare (g)	18.882	19.490			
Mass Dry Soil + Tare (g)	14.347	14.300			
Mass Water (g)	1.182	1.387			
Mass Dry Soil (g)	4.535	5.190			
Moisture Content (%)	26.064	26.724			

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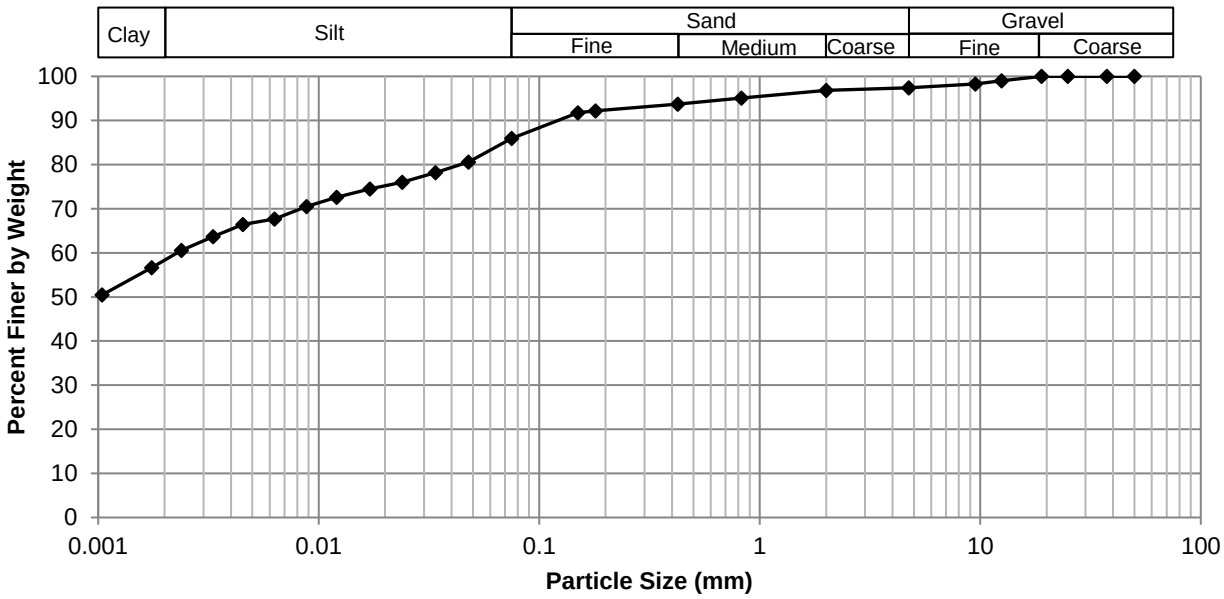
Grain Size Analysis (Hydrometer Method)
ASTM D422

Project No.	0035-056-00
Client	Morrison Hershfield
Project	Local Streets 18-R-07 Dominion Street
Test Hole	TH17-02
Sample #	G11
Depth (m)	0.8 - 0.9
Sample Date	15-Dec-17
Test Date	16-Jan-18
Technician	AFK

Gravel	2.6%
Sand	9.5%
Silt	29.7%
Clay	58.2%

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	97.40	0.0750	85.97
37.5	100.00	2.00	96.82	0.0479	80.61
25.0	100.00	0.825	95.07	0.0338	78.15
19.0	100.00	0.425	93.72	0.0239	76.00
12.5	99.03	0.180	92.17	0.0171	74.46
9.50	98.27	0.150	91.78	0.0121	72.61
4.75	97.40	0.075	85.97	0.0088	70.46
				0.0063	67.69
				0.0045	66.46
				0.0033	63.70
				0.0024	60.58
				0.0018	56.62
				0.0010	50.47

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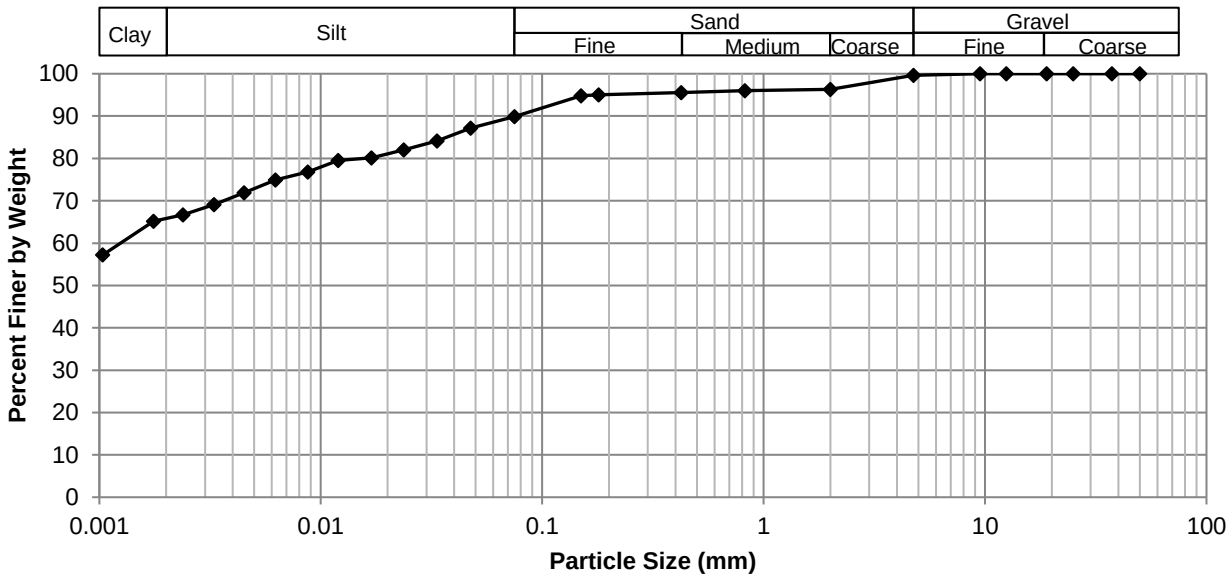
Grain Size Analysis (Hydrometer Method)
ASTM D422

Project No.	0035-056-00
Client	Morrison Hershfield
Project	Local Streets 18-R-07 Dominion Street
Test Hole	TH17 - 08
Sample #	G58
Depth (m)	0.5 - 0.6
Sample Date	15-Dec-17
Test Date	21-Jan-18
Technician	JB

Gravel	0.3%
Sand	9.8%
Silt	24.1%
Clay	65.7%

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	99.65	0.0750	89.85
37.5	100.00	2.00	96.32	0.0475	87.19
25.0	100.00	0.825	95.97	0.0336	84.13
19.0	100.00	0.425	95.56	0.0237	81.99
12.5	100.00	0.180	94.99	0.0170	80.15
9.50	100.00	0.150	94.81	0.0120	79.54
4.75	99.65	0.075	89.85	0.0088	76.79
				0.0062	74.95
				0.0045	71.89
				0.0033	69.14
				0.0024	66.69
				0.0018	65.16
				0.0010	57.21

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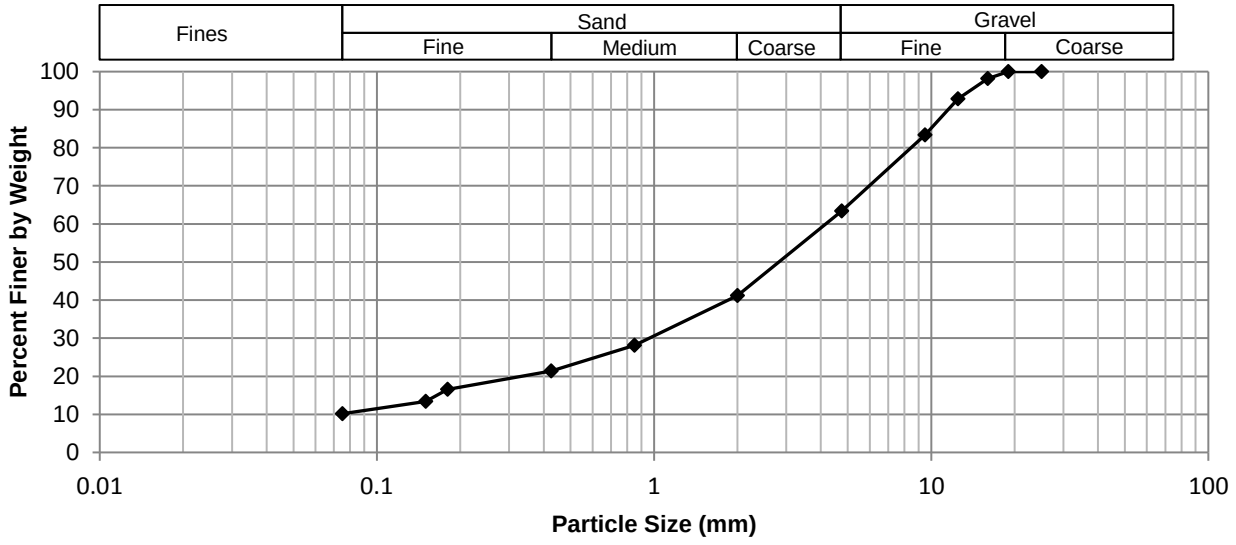
Grain Size Analysis (Sieve Method)
ASTM C136-06

Project No.	0035-056-00
Client	Morrison Hershfield
Project	Local Streets - 18-R-07 - Dominion Street
Test Hole	TH17-01
Sample #	G01
Depth (m)	0.2 - 0.3
Date Sampled	15-Dec-17
Date Tested	12-Jan-18
Technician	AFK

Total Weight (g)	456.9
Gravel %	36.6
Sand %	53.3
Fines %	10.2

Particle Size Distribution Curve



Sieve Number	Sieve Opening (mm)	Percent Passing	Specification (Min-Max)
6"	150		
5"	125		
4"	100		
3"	75.0		
2"	50.0		
1 1/2"	37.5		
1"	25.0	100	
3/4"	19.0	100	
5/8"	16.0	98	
1/2"	12.5	93	
3/8"	9.50	83	
no. 4	4.75	63	
no. 10	2.00	41	
no. 20	0.850	28	
no. 40	0.425	21	
no. 80	0.180	17	
no. 100	0.150	13	
no. 200	0.075	10	

Photo 1: Pavement Core Sample at Test Hole TH17-01

Photo 2: Pavement Core Sample at Test Hole TH17-02

Photo 3: Pavement Core Sample at Test Hole TH17-03 (no recovery of concrete)

Photo 4: Pavement Core Sample at Test Hole TH17-04

Photo 5: Pavement Core Sample at Test Hole TH17-05 (no recovery of concrete)

Photo 6: Pavement Core Sample at Test Hole TH17-06

Photo 7: Pavement Core Sample at Test Hole TH17-07 9 (no recovery of concrete

Photo 8: Pavement Core Sample at Test Hole TH17-08 (no recovery of concrete)

Photo 9: Pavement Core Sample at Test Hole TH17-09 (no recovery of concrete)

Appendix B

Ashburn Street, between Ellice Ave. to Sargent Ave.

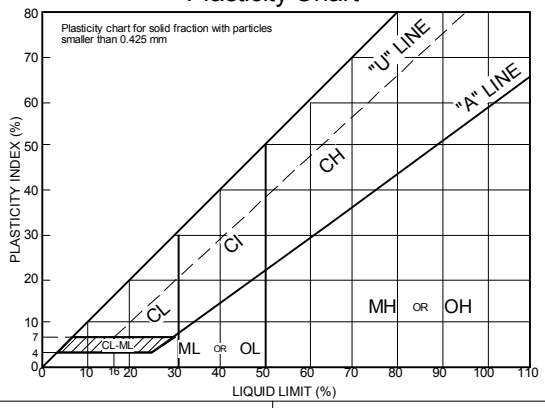
Test Hole Logs, Summary Table, Lab Data and Photographs of Pavement Core Samples

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* — $C_U = \frac{D_{60}}{D_{10}}$ greater than 4; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
			GP		Poorly-graded gravels, gravel-sand mixtures, little or no fines	Not meeting all gradation requirements for GW
		Gravel with fines (Appreciable amount of fines)	GM		Silty gravels, gravel-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
			GC		Clayey gravels, gravel-sand-silt mixtures	Atterberg limits above "A" line or P.I. greater than 7
	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 — 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
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
#40 to #10	0.425 to 2.00		Coarse
#200 to #40	0.075 to 0.425		Medium
< #200	< 0.075		Fine
			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
#4 to 3/4 in.	4.75 to 19		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

TREK GEOTECHNICAL

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

Sub-Surface Log

Test Hole TH17-10
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 - Ashburn Street	**Location:**	UTM N-5528791, E-630058
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 18

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
		ASPHALT - 76 mm thick		
		CONCRETE - 102 mm thick		
		CLAY (FILL) - silty, trace sand, trace gravel, trace organics - brown to black - frozen to 0.45 m, moist and firm to stiff when thawed - high plasticity		G73
0.5				G74
				G75
1.0		SILT - trace clay - light brown - moist, soft - low plasticity		G76
				G77
1.5		CLAY - silty - grey - moist, soft - high plasticity - stiff below 1.7 m		G78
2.0				G79
2.5				G80

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 OF TEST HOLE AT 2.9 m IN CLAY
1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located at house #1123, 1.2 m West from East curb.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2018-01-25_LOCAL STREETS 18-R-07 ASHBURN AVE_0035-056-00_0_A_NM.GPJ TREK GEOTECHNICAL.GDT 18-2-14

Sub-Surface Log

Test Hole TH17-11
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 - Ashburn Street	**Location:**	UTM N-5528735, E-630053
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 18

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
		ASPHALT - 76 mm thick		
		CONCRETE - 152 mm thick		
		SAND (Fill) - some gravel, trace silt - light brown - frozen, moist and compact when thawed		G81
0.5		CLAY (FILL) - silty, trace sand, trace gravel, some organics - grey to black - frozen to 0.45 m, moist and firm to stiff when thawed - high plasticity		G82
				G83
1.0		SILT - trace clay, trace sand - light brown - moist, soft - low plasticity		G84
		CLAY - silty - grey - moist, stiff - high plasticity		G85
1.5				G86
2.0				G87
2.5				
3.0		- firm below 2.9 m		G88

Bulk Unit Wt (kN/m^3): 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 ○

END OF TEST HOLE AT 3.0 m IN CLAY
1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located at house #1109, 1.1 m East from West curb.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2018-01-25_LOCAL STREETS 18-R-07 ASHBURN AVE_0035-056-00_0_A_NM.GPJ TREK GEOTECHNICAL.GDT 18-2-14

Sub-Surface Log

Test Hole TH17-12
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 - Ashburn Street	**Location:**	UTM N-5528686, E-630060
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 18

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)	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 - 50 mm thick				
	CONCRETE - 152 mm thick				
	SAND AND GRAVEL (FILL) - silty, some clay, grey, moist and compact when thawed, well graded, low plasticity				
	CLAY - silty, trace sand - dark grey - frozen to 0.45 m, moist and soft when thawed - high plasticity		G89	●	
0.5			G90	●	
	SILT - some clay, trace sand - light brown - moist, soft - low plasticity		G91	■	
1.0					
	CLAY - silty - grey - moist, stiff - high plasticity		G92	●	✤
			G93	●	△ ✤
1.5			G94	●	△ ✤
			G95	●	△ ✤
2.0					
	-firm below 2.5 m		G96	●	✤
2.5					

END OF TEST HOLE AT 2.7 m IN CLAY
1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located at house #1093, 1.0 m West from East curb.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2018-01-25_LOCAL STREETS 18-R-07 ASHBURN AVE_0035-056-00_0_A_NM.GPJ TREK GEOTECHNICAL.GDT 18-2-14

Sub-Surface Log

Test Hole TH17-13
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 - Ashburn Street	**Location:**	UTM N-5528631, E-630052
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 18

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
		ASPHALT - 76 mm thick		
		CONCRETE - 152 mm thick		
		CLAY (FILL) - silty, trace sand, trace gravel, some organics - dark grey - frozen to 0.45 m, moist and soft when thawed - low plasticity		
0.5				G98
		SILT - clayey, trace sand - light brown - moist, soft - intermediate plasticity		G99
1.0				G100
		CLAY - silty - grey - moist, very stiff - high plasticity		G101
1.5				G102
2.0				G103
		- stiff below 2.3 m		G104
2.5				
3.0				

Bulk Unit Wt (kN/m^3): 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 ○

END OF TEST HOLE AT 3.0 m IN CLAY
1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located between house #1072 and 1078, 1.0 m East from West curb.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2018-01-25_LOCAL STREETS 18-R-07 ASHBURN AVE_0035-056-00_0_A_NM.GPJ TREK GEOTECHNICAL.GDT 18-2-14

Sub-Surface Log

Test Hole TH17-14
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 - Ashburn Street	**Location:**	UTM N-5528573, E-630054
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 18

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	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 - 76 mm thick				
		CONCRETE - 152 mm thick				
		CLAY - silty, trace sand - light brown - frozen to 0.45 m, moist and soft when thawed - high plasticity		G105		
0.5				G106	●	
		CLAY - silty, trace sand, silt laminations (<5mm diam.) - light brown - moist and very stiff - high plasticity		G107	●	△ ✤
1.0				G108	●	△ ✤
		SILT - trace sand - light brown - moist, soft - low plasticity		G109	●	
1.5		SILT AND CLAY - trace sand - light brown - moist, soft - intermediate plasticity		G110	●	△ ✤
2.0				G111	●	△ ✤
2.5				G112	●	✤
3.0		END OF TEST HOLE AT 3.0 m IN SILT				

1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located between house #1047 and 1051, 1.0 m West from East curb.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2018-01-25_LOCAL STREETS 18-R-07 ASHBURN AVE_0035-056-00_0_A_NM.GPJ TREK GEOTECHNICAL.GDT 18-2-14

Sub-Surface Log

Test Hole TH17-15
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 - Ashburn Street	**Location:**	UTM N-5528520, E-630050
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 18

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	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 - 76 mm thick CONCRETE - 203 mm thick				
		CLAY - silty, some sand, trace organics to 1.0 m - dark brown - frozen to 0.45 m, moist and stiff when thawed - high plasticity		G113		
0.5				G114	●	
				G115	●	△ ✤
1.0				G116	●	△ ✤
				G117	●	△ ✤
1.5		SILT - clayey, trace sand - light brown - moist, soft - low plasticity		G118	●	
				G119	●	
2.0						
2.5		CLAY - silty, trace precipitates (sulphates) - grey - moist, soft - high plasticity		G120	●	△ ✤
3.0						

END OF TEST HOLE AT 3.0 m IN CLAY
1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located at house #1044, 1.0 m East from West curb.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2018-01-25_LOCAL STREETS 18-R-07 ASHBURN AVE_0035-056-00_0_A_NM.GPJ TREK GEOTECHNICAL.GDT 18-2-14

Sub-Surface Log

Test Hole TH17-16
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 - Ashburn Street	**Location:**	UTM N-5528474, E-630047
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 18

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
		ASPHALT - 50 mm thick		
		CONCRETE - 203 mm thick		
		SAND AND GRAVEL (FILL) - silty, some clay, grey to brown to 0.45 m, frozen, moist and compact when thawed, well graded, no to low plasticity		G121
0.5		CLAY - silty, trace sand, trace organics to 1.0 m - mottled grey to brown - frozen to 0.45 m, moist and soft when thawed - high plasticity		G122
1.0				G123
				G124
1.5				G125
		SILT - trace clay - light brown - moist, soft - low plasticity		G126
2.0		CLAY - silty - grey - moist, stiff - high plasticity		G127
2.5				
		- firm below 2.7 m		G128
3.0		END OF 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 ○

1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located at house #1021, 1.2 m West from East curb.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2018-01-25_LOCAL STREETS 18-R-07 ASHBURN AVE_0035-056-00_0_A_NM.GPJ TREK GEOTECHNICAL.GDT 18-2-14

Sub-Surface Log

Test Hole TH17-17
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 - Ashburn Street	**Location:**	UTM N-5528422, E-630044
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 18

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	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
		ASPHALT - 126 mm thick				
		CONCRETE - 64 mm thick				
		CLAY (FILL) - silty, trace sand, trace organics - grey to black - frozen to 0.45 m, moist and soft when thawed - high plasticity		G129		
0.5				G130		
		CLAY - silty, trace sand - moist, stiff to very stiff - high plasticity		G131		
1.0		SILT - trace sand - light brown - moist, soft - low plasticity		G132		
		CLAY - silty, trace precipitates (sulphates) - grey - moist, stiff - high plasticity		G133		
1.5				G134		
2.0				G135		
2.5		- soft below 2.7 m		G136		
3.0		END OF TEST HOLE AT 3.0 m IN CLAY				

1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located at house #1008, 1.0 m East from West curb.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2018-01-25_LOCAL STREETS 18-R-07 ASHBURN AVE_0035-056-00_0_A_NM.GPJ TREK GEOTECHNICAL.GDT 18-2-14

Local Streets Package 18-R-07
Sub-Surface Investigation
Ashburn Avenue

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)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Plastic	Liquid	Plasticity Index
TH17-10	UTM: 5528791 N, 630058 E Located at House #1123, 1.2 m West of East curb.	Asphalt	76	Concrete	102											
						CLAY (FILL)	0.2	0.3	13							
						CLAY (FILL)	0.5	0.6	21							
						CLAY (FILL)	0.8	0.9	16							
						SILT	1.1	1.2	19							
						CLAY	1.4	1.5	29							
						CLAY	1.7	1.8	29							
						CLAY	2.0	2.1	37							
						CLAY	2.7	2.9	52							
TH17-11	UTM: 5528735 N, 630053 E Located at House #1109, 1.1 m East of West curb.	Asphalt	76	Concrete	152											
						CLAY (FILL)	0.2	0.3	15							
						CLAY	0.5	0.6	19							
						CLAY	0.8	0.9	26							
						SILT	1.1	1.2	15							
						CLAY	1.4	1.5	31							
						CLAY	1.7	1.8	39							
						CLAY	2.0	2.1	48							
						CLAY	2.7	2.9	49							
TH17-12	UTM: 5528686 N, 630060 E Located at House #1093 & 1.0 m West of East curb.	Asphalt	50	Concrete	152											
						SAND AND GRAVEL (FILL)	0.2	0.3	25							
						CLAY	0.5	0.6	22							
						SILT	0.8	0.9	20	0	6	73	21	17	23	6
						CLAY	1.1	1.2	28							
						CLAY	1.4	1.5	34							
						CLAY	1.7	1.8	42							
						CLAY	2.0	2.1	48							
						CLAY	2.7	2.9	51							
TH17-13	UTM: 5528631 N, 630052 E Located between House #1072 and #1078, 1.0 m East of West curb.	Asphalt	76	Concrete	152											
						CLAY (FILL)	0.5	0.6	23							
						SILT	0.8	0.9	27							
						SILT	1.1	1.2	11							
						CLAY	1.4	1.5	36							
						CLAY	1.7	1.8	29							
						CLAY	2.0	2.1	41							
						CLAY	2.3	2.4	47							

Local Streets Package 18-R-07
Sub-Surface Investigation
Ashburn Avenue

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)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Plastic	Liquid	Plasticity Index
TH17-14	UTM: 5528573 N, 630054 E Located between House #1047 and #1051, & 1.0 m West of East curb.	Asphalt	76	Concrete	152											
						CLAY	0.1	0.2	28							
						CLAY	0.2	0.3	25							
						CLAY	0.5	0.6	20							
						CLAY	0.8	0.9	18	0	9	71	20	18	24	6
						SILT	1.2	1.4	27							
						SILT AND CLAY	1.5	1.7	36							
						SILT AND CLAY	1.8	2.0	41							
						SILT AND CLAY	2.1	2.3	44							
						SILT AND CLAY	2.4	2.6	46							
TH17-15	UTM: 5528520 N, 630050 E Located at House #1044, & 1.0 m East of West curb.	Asphalt	64	Concrete	191											
						CLAY	0.2	0.3	21							
						CLAY	0.5	0.6	24							
						CLAY	0.8	0.9	30	0	10	43	47	17	50	33
						CLAY	0.9	1.1	26							
						CLAY	1.1	1.2	18							
						SILT	1.5	1.7	38							
						SILT	2.1	2.3	42							
						CLAY	2.7	2.9	47							
TH17-16	UTM: 5528474 N, 630047 E Located between House #1021, & 1.2 m West of East curb.	Asphalt	50	Concrete	203											
						SAND AND GRAVEL (FILL)	0.2	0.3	15							
						CLAY	0.3	0.5	18							
						CLAY	0.6	0.8	30							
						CLAY	0.9	1.1	33							
						CLAY	1.2	1.4	26							
						SILT	1.5	1.7	31							
						CLAY	1.8	2.0	45							
						CLAY	2.3	2.4	47							
TH17-17	UTM: 5528422 N, 630044 E Located at House #1008 & 1.0 m East of West curb.	Asphalt	126	Concrete	64											
						CLAY (FILL)	0.2	0.3	18							
						CLAY (FILL)	0.5	0.6	17							
						CLAY	0.8	0.9	35							
						SILT	0.9	1.1	35							
						CLAY	1.2	1.4	30							
						CLAY	1.5	1.7	34							
						CLAY	1.8	2.0	34							
						CLAY	2.1	2.3	29							

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Moisture Content Report
ASTM D2216-10

Project No. 0035-056-00
Client Morrison Hershfield
Project Local Streets 18-R-07 Ashburn Street

Sample Date 18-Dec-17
Test Date 18-Jan-18
Technician DS

Test Pit	TH17-10	TH17-10	TH17-10	TH17-10	TH17-10	TH17-10
Depth (m)	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8
Sample #	G73	G74	G75	G76	G77	G79
Tare ID	AB79	Z27	N111	E1	N64	Z99
Mass of tare	6.8	8.8	9.0	8.4	8.4	8.4
Mass wet + tare	312.0	308.8	321.6	334.8	303.2	341.6
Mass dry + tare	276.2	256.4	278.4	282.4	236.8	266.5
Mass water	35.8	52.4	43.2	52.4	66.4	75.1
Mass dry soil	269.4	247.6	269.4	274.0	228.4	258.1
Moisture %	13.3%	21.2%	16.0%	19.1%	29.1%	29.1%

Test Pit	TH17-10	TH17-10	TH17-11	TH17-11	TH17-11	TH17-11
Depth (m)	2.0 - 2.1	2.7 - 2.9	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2
Sample #	G79	G80	G81	G82	G83	G84
Tare ID	W16	H11	F93	H65	E102	E105
Mass of tare	8.6	8.4	8.2	8.8	8.8	8.6
Mass wet + tare	330.8	314.2	314.4	314.2	306.6	320.8
Mass dry + tare	244.1	209.3	273.8	264.5	244.9	279.4
Mass water	86.7	104.9	40.6	49.7	61.7	41.4
Mass dry soil	235.5	200.9	265.6	255.7	236.1	270.8
Moisture %	36.8%	52.2%	15.3%	19.4%	26.1%	15.3%

Test Pit	TH17-11	TH17-11	TH17-11	TH17-11	TH17-12	TH17-12
Depth (m)	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1	2.9 - 3.0	0.2 - 0.3	0.5 - 0.6
Sample #	G85	G86	G87	G88	G89	G90
Tare ID	Z31	E135	N39	K2	AA09	F8
Mass of tare	8.4	8.4	8.4	8.6	7.0	8.6
Mass wet + tare	300.4	311.2	326.6	331.2	344.8	319.0
Mass dry + tare	230.7	226.6	223.1	225.0	278.1	262.2
Mass water	69.7	84.6	103.5	106.2	66.7	56.8
Mass dry soil	222.3	218.2	214.7	216.4	271.1	253.6
Moisture %	31.4%	38.8%	48.2%	49.1%	24.6%	22.4%

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Moisture Content Report
ASTM D2216-10

Project No. 0035-056-00
Client Morrison Hershfield
Project Local Streets 18-R-07 Ashburn Street

Sample Date 18-Dec-17
Test Date 18-Jan-18
Technician DS

Test Pit	TH17-12	TH17-12	TH17-12	TH17-12	TH17-12	TH17-12
Depth (m)	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1	2.4 - 2.6
Sample #	G91	G92	G93	G94	G95	G96
Tare ID	AB11	Z56	ab27	F68	N36	F19
Mass of tare	6.6	8.4	6.6	8.8	8.2	8.6
Mass wet + tare	444.8	313.4	309.8	325.6	315.2	316.2
Mass dry + tare	373.1	246.5	232.6	232.0	215.3	211.8
Mass water	71.7	66.9	77.2	93.6	99.9	104.4
Mass dry soil	366.5	238.1	226.0	223.2	207.1	203.2
Moisture %	19.6%	28.1%	34.2%	41.9%	48.2%	51.4%

Test Pit	TH17-13	TH17-13	TH17-13	TH17-13	TH17-13	TH17-13
Depth (m)	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1
Sample #	G98	G99	G100	G101	G102	G103
Tare ID	W81	Z52	E72	A10	N104	D4
Mass of tare	8.8	8.4	8.4	8.8	8.4	8.2
Mass wet + tare	314.4	336.0	315.4	327.8	331.0	313.6
Mass dry + tare	256.5	265.5	284.2	242.8	258.3	224.2
Mass water	57.9	70.5	31.2	85.0	72.7	89.4
Mass dry soil	247.7	257.1	275.8	234.0	249.9	216.0
Moisture %	23.4%	27.4%	11.3%	36.3%	29.1%	41.4%

Test Pit	TH17-13	TH17-14	TH17-14	TH17-14	TH17-14	TH17-14
Depth (m)	2.3 - 2.4	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8
Sample #	G104	G106	G107	G108	G109	G110
Tare ID	E4	K25	E121	Z68	W110	Z07
Mass of tare	8.4	8.4	8.4	8.4	8.2	8.6
Mass wet + tare	325.6	287.8	358.6	308.4	329.4	337.4
Mass dry + tare	224.0	237.4	284.6	246.6	275.4	283.1
Mass water	101.6	50.4	74.0	61.8	54.0	54.3
Mass dry soil	215.6	229.0	276.2	238.2	267.2	274.5
Moisture %	47.1%	22.0%	26.8%	25.9%	20.2%	19.8%

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Moisture Content Report
ASTM D2216-10

Project No. 0035-056-00
Client Morrison Hershfield
Project Local Streets 18-R-07 Ashburn Street

Sample Date 18-Dec-17
Test Date 18-Jan-18
Technician DS

Test Pit	TH17-14	TH17-14	TH17-15	TH17-15	TH17-15	TH17-15
Depth (m)	2.0 - 2.1	2.7 - 2.9	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5
Sample #	G111	G112	G114	G115	G116	G117
Tare ID	GF8	D1	H80	N92	H57	W76
Mass of tare	8.6	8.6	8.4	8.4	8.6	8.6
Mass wet + tare	302.4	323.2	301.6	312.4	307.8	311.6
Mass dry + tare	251.2	264.4	258.2	266.9	251.0	256.1
Mass water	51.2	58.8	43.4	45.5	56.8	55.5
Mass dry soil	242.6	255.8	249.8	258.5	242.4	247.5
Moisture %	21.1%	23.0%	17.4%	17.6%	23.4%	22.4%

Test Pit	TH17-15	TH17-15	TH17-15	TH17-16	TH17-16	TH17-16
Depth (m)	1.7 - 1.8	2.0 - 2.1	2.6 - 2.7	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2
Sample #	G118	G119	G120	G122	G123	G124
Tare ID	AB38	E107	W55	C4	Z87	Z73
Mass of tare	6.8	8.4	8.4	8.4	8.4	8.6
Mass wet + tare	318.0	342.8	309.0	301.2	304.6	317.2
Mass dry + tare	268.3	290.3	212.1	248.9	259.3	252.6
Mass water	49.7	52.5	96.9	52.3	45.3	64.6
Mass dry soil	261.5	281.9	203.7	240.5	250.9	244.0
Moisture %	19.0%	18.6%	47.6%	21.7%	18.1%	26.5%

Test Pit	TH17-16	TH17-16	TH17-16	TH17-16	TH17-17	TH17-17
Depth (m)	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1	2.7 - 2.9	0.5 - 0.6	0.8 - 0.9
Sample #	G125	G126	G127	G128	G130	G131
Tare ID	F124	AB32	H99	AB33	F7	W87
Mass of tare	8.4	6.6	8.4	6.6	8.4	8.4
Mass wet + tare	353.4	304.6	331.0	318.2	310.8	324.0
Mass dry + tare	299.9	259.6	234.5	218.9	244.4	249.8
Mass water	53.5	45.0	96.5	99.3	66.4	74.2
Mass dry soil	291.5	253.0	226.1	212.3	236.0	241.4
Moisture %	18.4%	17.8%	42.7%	46.8%	28.1%	30.7%

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Moisture Content Report
ASTM D2216-10

Project No. 0035-056-00
Client Morrison Hershfield
Project Local Streets 18-R-07 Ashburn Street

Sample Date 18-Dec-17
Test Date 18-Jan-18
Technician DS

Test Pit	TH17-17	TH17-17	TH17-17	TH17-17	TH17-17	
Depth (m)	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1	2.7 - 2.9	
Sample #	G132	G133	G134	G135	G136	
Tare ID	E92	AC28	AA06	N70	F145	
Mass of tare	8.4	6.6	6.8	8.4	8.6	
Mass wet + tare	302.6	305.4	309.4	330.2	361.8	
Mass dry + tare	248.7	230.2	220.4	226.5	242.0	
Mass water	53.9	75.2	89.0	103.7	119.8	
Mass dry soil	240.3	223.6	213.6	218.1	233.4	
Moisture %	22.4%	33.6%	41.7%	47.5%	51.3%	

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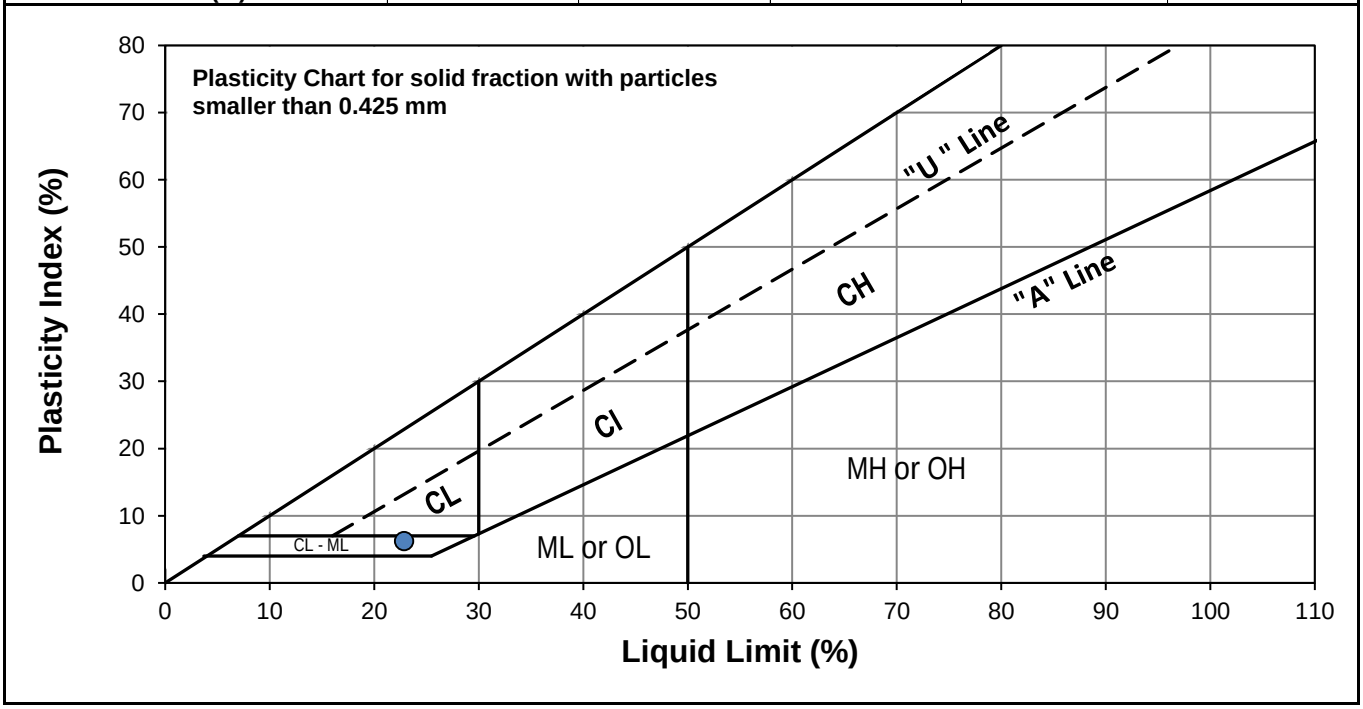
Atterberg Limits
ASTM D4318-10e1

Project No.	0035-056-00
Client	Morrision Hershfield
Project	2017 Local Streets 18-R-07 -Ashburn Street
Test Hole	TH17-12
Sample #	G91
Depth (m)	0.8 - 0.9
Sample Date	18-Dec-17
Test Date	30-Jan-18
Technician	DS

Liquid Limit	23
Plastic Limit	17
Plasticity Index	6

Liquid Limit

Trial #	1	2	3		
Number of Blows (N)	15	24	30		
Mass Wet Soil + Tare (g)	23.517	24.461	23.475		
Mass Dry Soil + Tare (g)	21.671	22.537	21.766		
Mass Tare (g)	13.876	14.091	14.216		
Mass Water (g)	1.846	1.924	1.709		
Mass Dry Soil (g)	7.795	8.446	7.550		
Moisture Content (%)	23.682	22.780	22.636		



Plastic Limit

Trial #	1	2	3	4	5
Mass Tare (g)	24.012	22.032			
Mass Wet Soil + Tare (g)	22.638	20.889			
Mass Dry Soil + Tare (g)	14.290	14.066			
Mass Water (g)	1.374	1.143			
Mass Dry Soil (g)	8.348	6.823			
Moisture Content (%)	16.459	16.752			

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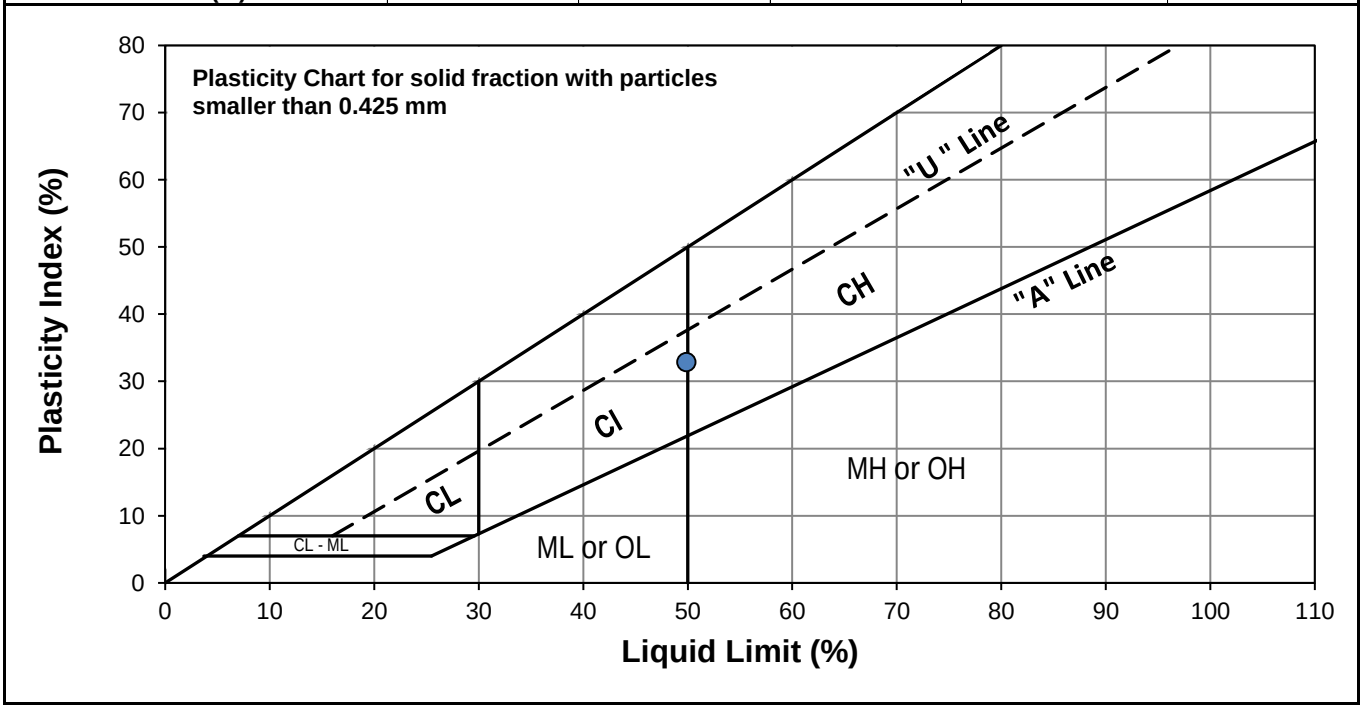
Atterberg Limits
ASTM D4318-10e1

Project No.	0035-056-00
Client	Morrision Hershfield
Project	2017 Local Streets 18-R-07 -Ashburn Street
Test Hole	TH17-15
Sample #	G115
Depth (m)	0.8 - 0.9
Sample Date	18-Dec-17
Test Date	30-Jan-18
Technician	DS

Liquid Limit	50
Plastic Limit	17
Plasticity Index	33

Liquid Limit

Trial #	1	2	3		
Number of Blows (N)	18	25	28		
Mass Wet Soil + Tare (g)	21.172	20.504	20.951		
Mass Dry Soil + Tare (g)	18.722	18.325	18.720		
Mass Tare (g)	14.209	13.896	14.157		
Mass Water (g)	2.450	2.179	2.231		
Mass Dry Soil (g)	4.513	4.429	4.563		
Moisture Content (%)	54.288	49.198	48.893		



Plastic Limit

Trial #	1	2	3	4	5
Mass Tare (g)	20.513	20.465			
Mass Wet Soil + Tare (g)	19.582	19.545			
Mass Dry Soil + Tare (g)	14.059	14.182			
Mass Water (g)	0.931	0.920			
Mass Dry Soil (g)	5.523	5.363			
Moisture Content (%)	16.857	17.155			

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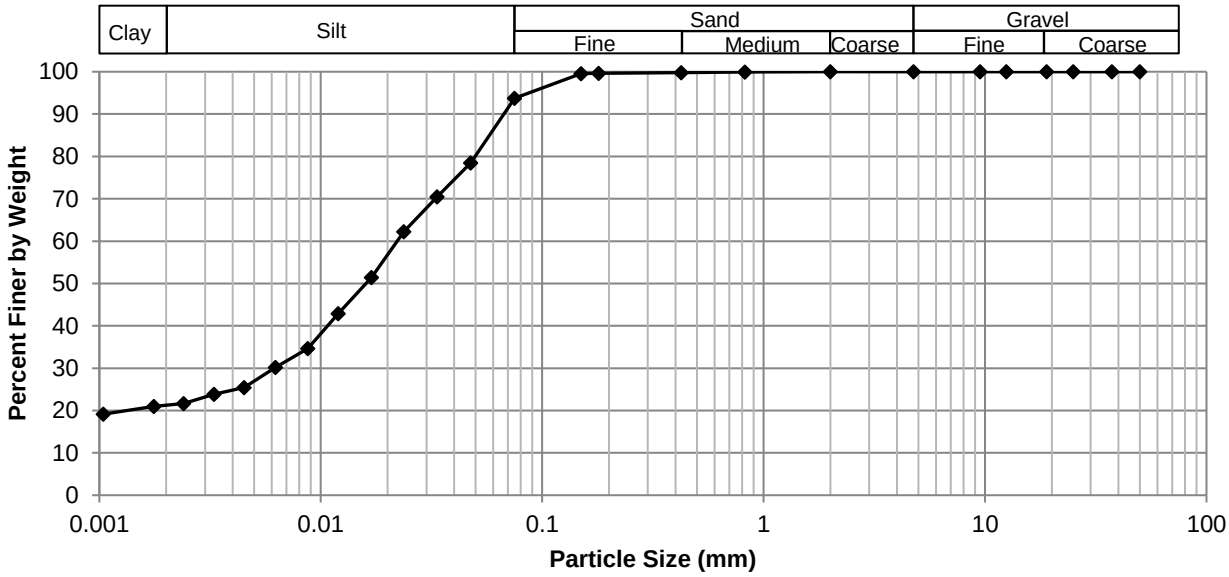
Grain Size Analysis (Hydrometer Method)
ASTM D422

Project No.	0035-056-00
Client	Morrison Hershfield
Project	Local Streets 18-R-07 Ashburn Street
Test Hole	TH17 - 12
Sample #	G91
Depth (m)	0.8 - 0.9
Sample Date	18-Dec-17
Test Date	30-Jan-18
Technician	DS

Gravel	0.0%
Sand	6.3%
Silt	72.5%
Clay	21.2%

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	93.74
37.5	100.00	2.00	99.99	0.0475	78.44
25.0	100.00	0.825	99.94	0.0336	70.50
19.0	100.00	0.425	99.81	0.0237	62.25
12.5	100.00	0.180	99.63	0.0170	51.45
9.50	100.00	0.150	99.58	0.0120	42.87
4.75	100.00	0.075	93.74	0.0088	34.61
				0.0062	30.17
				0.0045	25.40
				0.0033	23.81
				0.0024	21.63
				0.0018	20.95
				0.0010	19.15

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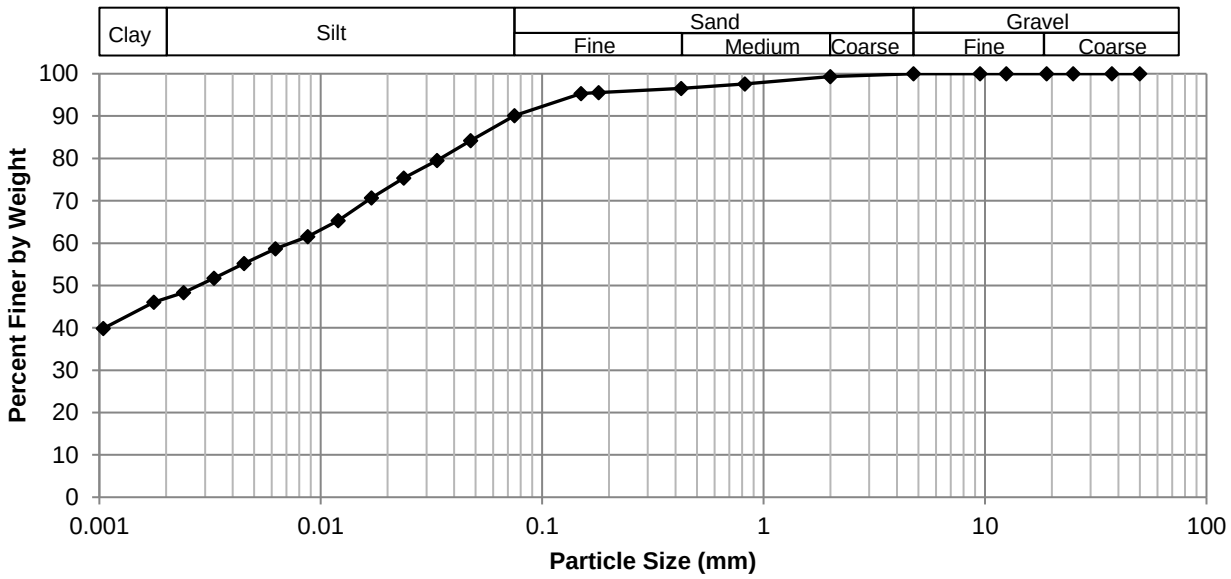
Grain Size Analysis (Hydrometer Method)
ASTM D422

Project No.	0035-056-00
Client	Morrison Hershfield
Project	Local Streets 18-R-07 Ashburn Street
Test Hole	TH17 - 15
Sample #	G115
Depth (m)	0.8 - 0.9
Sample Date	18-Dec-17
Test Date	30-Jan-18
Technician	DS

Gravel	0.0%
Sand	9.9%
Silt	43.3%
Clay	46.9%

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	90.14
37.5	100.00	2.00	99.34	0.0475	84.25
25.0	100.00	0.825	97.56	0.0336	79.52
19.0	100.00	0.425	96.54	0.0237	75.41
12.5	100.00	0.180	95.55	0.0170	70.68
9.50	100.00	0.150	95.29	0.0120	65.31
4.75	100.00	0.075	90.14	0.0088	61.53
				0.0062	58.69
				0.0045	55.22
				0.0033	51.75
				0.0024	48.32
				0.0018	46.06
				0.0010	39.85

Photo 1: Pavement Core Sample at Test Hole TH17-10

Photo 2: Pavement Core Sample at Test Hole TH17-11 (no recovery of concrete)

Photo 3: Pavement Core Sample at Test Hole TH17-12

Photo 4: Pavement Core Sample at Test Hole TH17-13

Photo 5: Pavement Core Sample at Test Hole TH17-14

Photo 6: Pavement Core Sample at Test Hole TH17-15 (no recovery of concrete)

Photo 7: Pavement Core Sample at Test Hole TH17-16 (no recovery of concrete)

Photo 8: Pavement Core Sample at Test Hole TH17-17

Appendix C

Spence Street, between Sargent Ave. to Cumberland Ave.

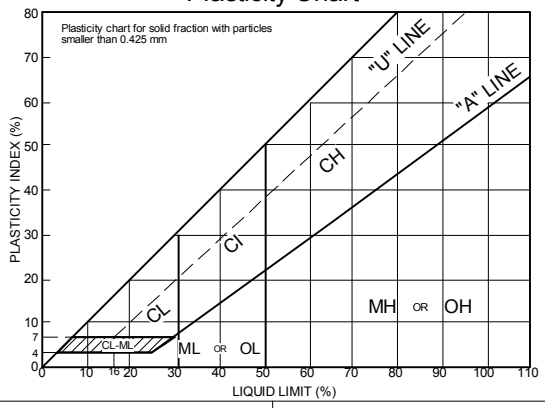
Test Hole Logs, Summary Table, Lab Data and Photographs of Pavement Core Samples

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* — $C_U = \frac{D_{60}}{D_{10}}$ greater than 4; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
			GP		Poorly-graded gravels, gravel-sand mixtures, little or no fines	Not meeting all gradation requirements for GW
		Gravel with fines (Appreciable amount of fines)	GM		Silty gravels, gravel-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
			GC		Clayey gravels, gravel-sand-silt mixtures	Atterberg limits above "A" line or P.I. greater than 7
	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 — 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
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
#40 to #10	0.425 to 2.00		Coarse
#200 to #40	0.075 to 0.425		Medium
< #200	< 0.075		Fine
			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
#4 to 3/4 in.	4.75 to 19		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

TREK GEOTECHNICAL

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

Sub-Surface Log

Test Hole TH17-18
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 - Spence Street	**Location:**	UTM N-5528970, E-632605
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 18

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	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 - 13 mm thick				
		CONCRETE - 203 mm thick				
		SAND (Fill) - silty, trace to some gravel, trace clay, brown, moist and compact when thawed	G	G137		
0.5		CLAY (Fill) - some sand, trace gravel - brown - frozen to 0.45 m, moist and soft when thawed - high plasticity	G	G138		
		SILT - clayey, trace sand - light brown - moist, soft - intermediate plasticity	G	G139		
1.0			G	G140		
		CLAY - silty - grey - moist, stiff - high plasticity	G	G141		△ ✤
1.5			G	G142		✤
			G	G143		✤
2.0						
2.5			G	G144		△ ✤
3.0		END OF TEST HOLE AT 3.0 m IN CLAY				

1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located at building #618, 1 m East of West curb.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2018-01-25_LOCAL STREETS 18-R-07 SPENCE ST_0035-056-00_0_A_HS.GPJ TREK GEOTECHNICAL.GDT 18-2-14

Sub-Surface Log

Test Hole TH17-19

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 - Spence Street	**Location:**	UTM N-5528917, E-632610
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 18

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	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 - 64 mm thick				
		CONCRETE - 164 mm thick				
		CLAY (Fill)- silty, top soil, trace sand, trace gravel to 0.33 m - grey, - frozen to 0.45 m, moist and soft when thawed - low to intermediate plasticity		G145		
0.5		- high plasticity, dark grey below 0.33 m		G146		
		CLAY - silty - grey - moist, stiff to very stiff - high plasticity		G147		
1.0				G148		
				G149		
1.5				G150		
2.0		- firm below 1.98 m		G151		
2.5						
				G152		
3.0		END OF TEST HOLE AT 3.0 m IN CLAY				

1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located at house #597, 1 m West of East curb.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

Sub-Surface Log

Test Hole TH17-20
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 - Spence Street	**Location:**	UTM N-5528863, E-632597
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 18

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	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 - 38 mm thick				
		CONCRETE - 116 mm thick				
		CLAY (Fill)- silty, some sand, trace organics - grey - frozen to 0.60 m, moist and soft when thawed - high plasticity		G153		
0.5		- dark grey below 0.45 m		G154		
		CLAY - silty - brown - moist, stiff - high plasticity		G155		
1.0		- grey below 0.76 m		G156		
				G157		
1.5		- trace silt inclusions (<10 mm diam.), trace precipitates below 1.68 m		G158		
2.0				G159		
2.5		- soft below 2.74 m		G160		
3.0		END OF TEST HOLE AT 3.0 m IN CLAY				

1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located at house #576, 1 m East of West curb.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2018-01-25_LOCAL STREETS 18-R-07 SPENCE ST_0035-056-00_0_A_HS.GPJ TREK GEOTECHNICAL.GDT 18-2-14

Sub-Surface Log

Test Hole TH17-24
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 - Spence Street	**Location:**	UTM N-5528819, E-632608
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 19

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	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 - 51 mm thick				
		CONCRETE - 102 mm thick				
		CLAY (Fill)- silty, trace sand, trace gravel - grey - frozen to 0.45 m, moist and soft when thawed - low plasticity		G185		
0.5		-dark grey, stiff, high plasticity below 0.45		G186	●	△ ✤
				G187	●	△ ✤
1.0		CLAY - silty, trace sand, trace prcipitaes - grey - moist, stiff - high plasticity		G188	●	△ ✤
		SILT AND CLAY - trace sand - light brown - moist, soft - intermediate plasticity		G189	●	△
1.5		CLAY - silty - grey - moist, stiff - high plasticity		G190	●	△ ✤
2.0				G191	●	△ ✤
2.5				G192	●	△ ✤
3.0		- firm below 2.90 m				

END OF TEST HOLE AT 3.0 m IN CLAY
1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located at house #593, 1 m West of East curb.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2018-01-25_LOCAL STREETS 18-R-07 SPENCE ST_0035-056-00_0_A_HS.GPJ TREK GEOTECHNICAL.GDT 18-2-14

Sub-Surface Log

Test Hole TH17-25
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 - Spence Street	**Location:**	UTM N-5528775, E-632599
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 19

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	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
		ASPHALT - 101mm thick				
		CONCRETE - 101 mm thick				
		CLAY (Fill)- silty, trace sand, trace gravel to 0.45 m - black - frozen to 0.60 m, moist and soft when thawed - high plasticity		G193	●	
0.5				G194	●	
		SILT - clayey, trace sand - light brown - moist, soft - low plasticity		G195	●	
1.0		CLAY - silty - grey - moist, stiff - high plasticity		G196	●	△ ✿
				G197	●	△ ✿
1.5				G198	●	△ ✿
				G199	●	△ ✿
2.0						
2.5		- a 25 mm thick silt seam at 2.43 m				
		- firm below 2.9 m		G200	●	△ ✿
3.0						

END OF TEST HOLE AT 3.0 m IN CLAY
1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located 27 m North of intersection of Sargent Ave. and Spence Street, 1 m East of West curb.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2018-01-25_LOCAL STREETS 18-R-07 SPENCE ST_0035-056-00_0_A_HS.GPJ TREK GEOTECHNICAL.GDT 18-2-14

Local Streets Package 18-R-07
Sub-Surface Investigation
Spence Street

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)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Plastic	Liquid	Plasticity Index
TH17-18	UTM: 5528970 N, 632605 E Located at Building #618, 1.0 m East of West curb.	Asphalt	13	Concrete	203							% Fines				
						SAND (FILL)	0.2	0.3	12	10	50	40				
						CLAY (FILL)	0.5	0.6	24	0	25	75				
						SILT	0.8	0.9	23							
						SILT	1.1	1.2	21							
						CLAY	1.4	1.5	36							
						CLAY	1.7	1.8	39							
						CLAY	2.0	2.1	45							
						CLAY	2.7	2.9	52							
TH17-19	UTM: 5528917 N, 632610 E Located at House # 597, 1.0 m West of East curb.	Asphalt	64	Concrete	164											
						CLAY (FILL)	0.2	0.3	16							
						CLAY (FILL)	0.5	0.6	34							
						CLAY	0.8	0.9	32							
						CLAY	1.1	1.2	34							
						CLAY	1.4	1.5	36							
						CLAY	1.7	1.8	40							
						CLAY	2.0	2.1	46							
						CLAY	2.6	2.7	52							
TH17-20	UTM: 5528863 N, 632597 E Located at House #576, 1.0 m East of West curb.	Asphalt	38	Concrete	116											
						CLAY (FILL)	0.2	0.3	18							
						CLAY (FILL)	0.5	0.6	28	0	11	28	61	16	64	47
						CLAY	0.8	0.9	27							
						CLAY	1.1	1.2	30							
						CLAY	1.4	1.5	39							
						CLAY	1.7	1.8	43							
						CLAY	2.0	2.1	49							
						CLAY	2.7	2.9	55							
TH17-24	UTM: 552819 N, 632608 E Located at House #593, 1.0 m West of East curb.	Asphalt	51	Concrete	102											
						CLAY (FILL)	0.2	0.3	N/A							
						CLAY (FILL)	0.5	0.6	34							
						CLAY (FILL)	0.8	0.9	35							
						CLAY	1.1	1.2	34							
						SILT AND CLAY	1.4	1.5	30							
						CLAY	1.7	1.8	39							
						CLAY	2.0	2.1	41							
						CLAY	2.7	2.9	50							

Local Streets Package 18-R-07
Sub-Surface Investigation
Spence Street

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)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Plastic	Liquid	Plasticity Index
TH17-25	UTM: 5528775 N, 631064 E Located 27 m North of Sargent Ave. and Spence St. intersection, 1.0 m East of West curb	Asphalt	101	Concrete	101											
						CLAY (FILL)	0.2	0.3	29							
						CLAY (FILL)	0.5	0.6	36							
						SILT	0.8	0.9	20	0	4	74	23	18	23	5
						CLAY	1.1	1.2	31							
						CLAY	1.4	1.5	32							
						CLAY	1.7	1.8	38							
						CLAY	2.0	2.1	43							
						CLAY	2.7	2.9	52							

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Moisture Content Report
ASTM D2216-10

Project No. 0035-056-00
Client Morrison Hershfield
Project Local Streets 18-R-07 Spence Street

Sample Date 18-Dec-17
Test Date 19-Jan-18
Technician DS

Test Pit	TH17-18	TH17-18	TH17-18	TH17-18	TH17-18	TH17-18
Depth (m)	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8
Sample #	G137	G138	G139	G140	G141	G142
Tare ID	AB08	K16	E120	AB67	F146	AC22
Mass of tare	6.8	8.6	8.4	7.6	8.4	6.8
Mass wet + tare	325.2	431.8	338.8	344.0	306.0	341.4
Mass dry + tare	292.2	351.4	277.0	285.4	226.8	248.0
Mass water	33.0	80.4	61.8	58.6	79.2	93.4
Mass dry soil	285.4	342.8	268.6	277.8	218.4	241.2
Moisture %	11.6%	23.5%	23.0%	21.1%	36.3%	38.7%

Test Pit	TH17-18	TH17-18	TH17-19	TH17-19	TH17-19	TH17-19
Depth (m)	2.0 - 2.1	2.7 - 2.9	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2
Sample #	G143	G144	G145	G146	G147	G148
Tare ID	Z63	E77	P85	AC19	AC40	W25
Mass of tare	8.4	8.4	8.6	6.6	6.6	8.4
Mass wet + tare	339.8	314.6	333.4	326.6	324.8	318
Mass dry + tare	236.8	209.6	288.0	245.6	248.6	239.4
Mass water	103.0	105.0	45.4	81.0	76.2	78.6
Mass dry soil	228.4	201.2	279.4	239.0	242.0	231.0
Moisture %	45.1%	52.2%	16.2%	33.9%	31.5%	34.0%

Test Pit	TH17-19	TH17-19	TH17-19	TH17-19	TH17-20	TH17-20
Depth (m)	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1	2.7 - 2.9	0.2 - 0.3	0.5 - 0.6
Sample #	G149	G150	G151	G152	G153	G154
Tare ID	N99	D34	H38	K10	F50	F46
Mass of tare	8.4	8.8	8.4	8.6	8.8	8.6
Mass wet + tare	325.2	375.2	323.8	307.0	306.6	401.2
Mass dry + tare	240.8	271.4	225.0	204.6	260.6	316.0
Mass water	84.4	103.8	98.8	102.4	46.0	85.2
Mass dry soil	232.4	262.6	216.6	196.0	251.8	307.4
Moisture %	36.3%	39.5%	45.6%	52.2%	18.3%	27.7%

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Moisture Content Report
ASTM D2216-10

Project No. 0035-056-00
Client Morrison Hershfield
Project Local Streets 18-R-07 Spence Street

Sample Date 18-Dec-17
Test Date 19-Jan-18
Technician DS

Test Pit	TH17-20	TH17-20	TH17-20	TH17-20	TH17-20	TH17-20
Depth (m)	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1	2.7 - 2.9
Sample #	G155	G156	G157	G158	G159	G160
Tare ID	K39	N61	E19	H33	Z134	N71
Mass of tare	8.4	8.6	8.4	8.6	8.6	8.8
Mass wet + tare	306.6	325.4	316.6	310.2	314.2	315.0
Mass dry + tare	244.2	252.0	230.2	219.6	214.0	206.4
Mass water	62.4	73.4	86.4	90.6	100.2	108.6
Mass dry soil	235.8	243.4	221.8	211.0	205.4	197.6
Moisture %	26.5%	30.2%	39.0%	42.9%	48.8%	55.0%

Test Pit	TH17-24	TH17-24	TH17-24	TH17-24	TH17-24	TH17-24
Depth (m)	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1
Sample #	G186	G187	G188	G189	G190	G191
Tare ID	E89	W15	A19	W86	K14	Z26
Mass of tare	8.6	8.4	8.6	8.6	8.4	8.4
Mass wet + tare	339.8	312.0	343.4	310.2	308.4	317.0
Mass dry + tare	255.0	233.3	258.8	239.8	224.0	227.0
Mass water	84.8	78.7	84.6	70.4	84.4	90.0
Mass dry soil	246.4	224.9	250.2	231.2	215.6	218.6
Moisture %	34.4%	35.0%	33.8%	30.4%	39.1%	41.2%

Test Pit	TH17-24	TH17-25	TH17-25	TH17-25	TH17-25	TH17-25
Depth (m)	2.7 - 2.9	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5
Sample #	G192	G193	G194	G195	G196	G197
Tare ID	W71	E35	A27	H23	Z21	AA12
Mass of tare	8.4	8.6	8.6	8.6	8.4	6.8
Mass wet + tare	355.2	301.6	276.6	440.2	343.2	300.4
Mass dry + tare	239.0	236.4	206.0	367.2	264.8	229.0
Mass water	116.2	65.2	70.6	73.0	78.4	71.4
Mass dry soil	230.6	227.8	197.4	358.6	256.4	222.2
Moisture %	50.4%	28.6%	35.8%	20.4%	30.6%	32.1%

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Moisture Content Report
ASTM D2216-10

Project No. 0035-056-00
Client Morrison Hershfield
Project Local Streets 18-R-07 Spence Street

Sample Date 18-Dec-17
Test Date 19-Jan-18
Technician DS

Test Pit	TH17-25	TH17-25	TH17-25			
Depth (m)	1.7 - 1.8	2.0 - 2.1	2.7 - 2.9			
Sample #	G198	G199	G200			
Tare ID	Z39	E90	Z83			
Mass of tare	8.4	8.6	8.4			
Mass wet + tare	314.6	303.6	324.0			
Mass dry + tare	231.0	214.6	216.2			
Mass water	83.6	89.0	107.8			
Mass dry soil	222.6	206.0	207.8			
Moisture %	37.6%	43.2%	51.9%			

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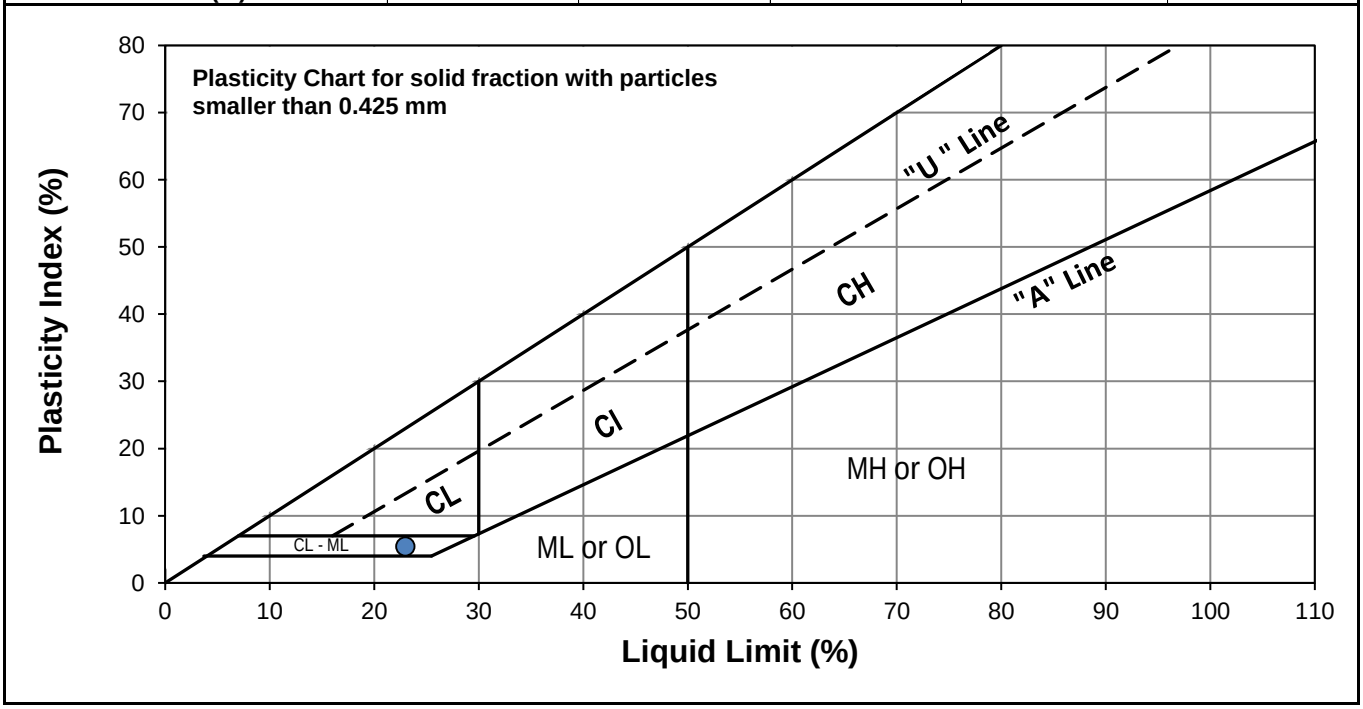
Atterberg Limits
ASTM D4318-10e1

Project No.	0035-056-00
Client	Morrision Hershfield
Project	2017 Local Streets 18-R-07 -Spence Street
Test Hole	TH17-25
Sample #	G195
Depth (m)	0.8 - 0.9
Sample Date	15-Dec-17
Test Date	26-Jan-18
Technician	DS

Liquid Limit	23
Plastic Limit	18
Plasticity Index	5

Liquid Limit

Trial #	1	2	3		
Number of Blows (N)	15	23	33		
Mass Wet Soil + Tare (g)	29.664	25.877	23.825		
Mass Dry Soil + Tare (g)	26.710	23.708	22.020		
Mass Tare (g)	14.091	14.300	14.070		
Mass Water (g)	2.954	2.169	1.805		
Mass Dry Soil (g)	12.619	9.408	7.950		
Moisture Content (%)	23.409	23.055	22.704		



Plastic Limit

Trial #	1	2	3	4	5
Mass Tare (g)	22.154	21.628			
Mass Wet Soil + Tare (g)	20.956	20.502			
Mass Dry Soil + Tare (g)	14.251	13.963			
Mass Water (g)	1.198	1.126			
Mass Dry Soil (g)	6.705	6.539			
Moisture Content (%)	17.867	17.220			

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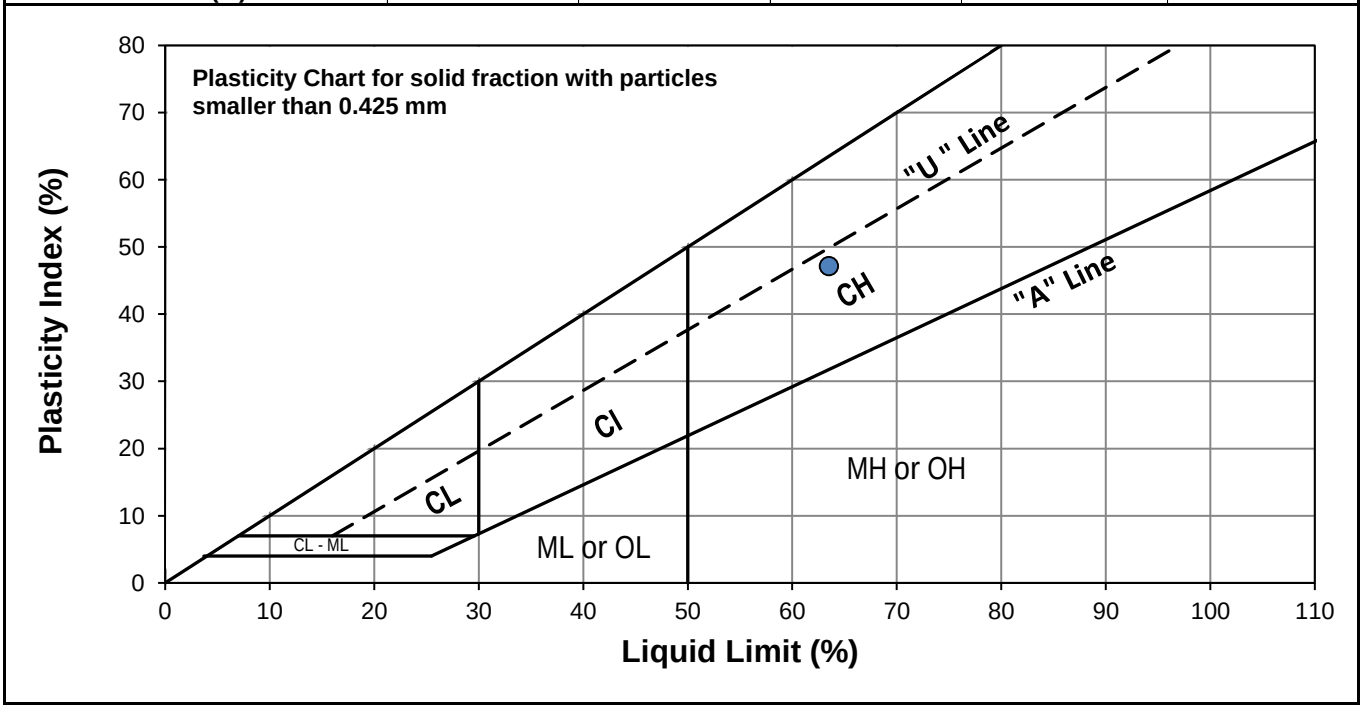
Atterberg Limits
ASTM D4318-10e1

Project No.	0035-056-00
Client	Morrision Hershfield
Project	2017 Local Streets 18-R-07 -Spence Street
Test Hole	TH17-20
Sample #	G154
Depth (m)	0.8 - 0.9
Sample Date	18-Dec-17
Test Date	23-Jan-18
Technician	DS

Liquid Limit	64
Plastic Limit	16
Plasticity Index	47

Liquid Limit

Trial #	1	2	3		
Number of Blows (N)	19	28	32		
Mass Wet Soil + Tare (g)	20.975	20.999	21.614		
Mass Dry Soil + Tare (g)	18.250	18.329	18.748		
Mass Tare (g)	14.097	14.077	14.083		
Mass Water (g)	2.725	2.670	2.866		
Mass Dry Soil (g)	4.153	4.252	4.665		
Moisture Content (%)	65.615	62.794	61.436		



Plastic Limit

Trial #	1	2	3	4	5
Mass Tare (g)	20.003	20.217			
Mass Wet Soil + Tare (g)	19.172	19.367			
Mass Dry Soil + Tare (g)	14.028	14.244			
Mass Water (g)	0.831	0.850			
Mass Dry Soil (g)	5.144	5.123			
Moisture Content (%)	16.155	16.592			

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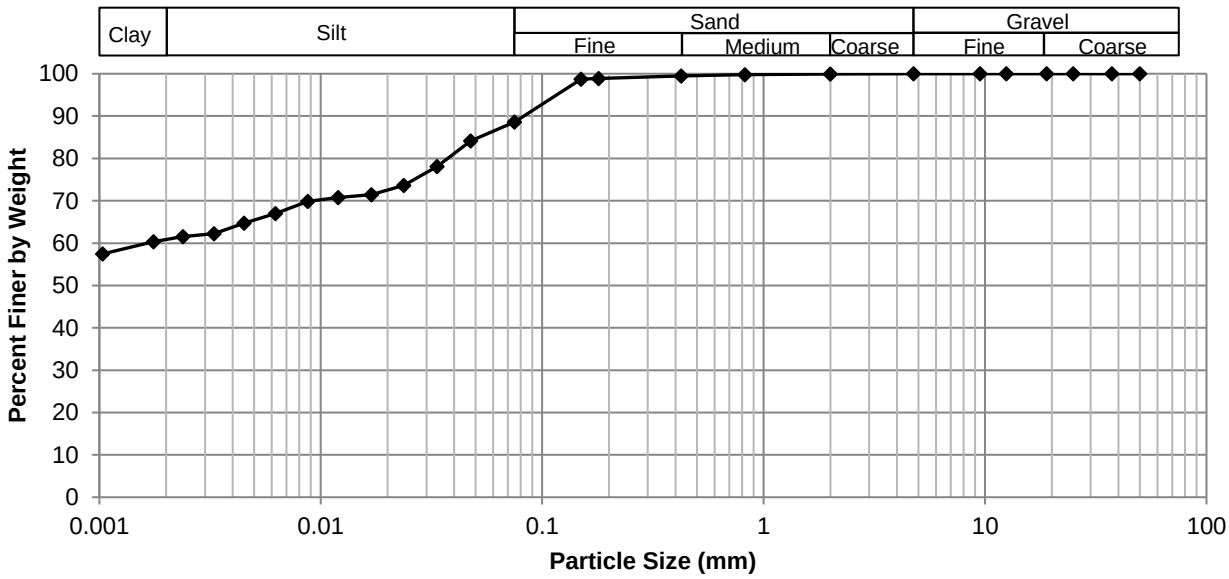
Grain Size Analysis (Hydrometer Method)
ASTM D422

Project No.	0035-056-00
Client	Morrison Hershfield
Project	Local Streets 18-R-07 Spence Street
Test Hole	TH17 - 20
Sample #	G154
Depth (m)	0.5 - 0.6
Sample Date	15-Dec-17
Test Date	21-Jan-18
Technician	JB

Gravel	0.0%
Sand	11.4%
Silt	27.8%
Clay	60.8%

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	88.61
37.5	100.00	2.00	99.93	0.0475	84.11
25.0	100.00	0.825	99.77	0.0336	78.08
19.0	100.00	0.425	99.47	0.0237	73.64
12.5	100.00	0.180	98.90	0.0170	71.42
9.50	100.00	0.150	98.73	0.0120	70.78
4.75	100.00	0.075	88.61	0.0088	69.83
				0.0062	66.97
				0.0045	64.75
				0.0033	62.21
				0.0024	61.58
				0.0018	60.31
				0.0010	57.45

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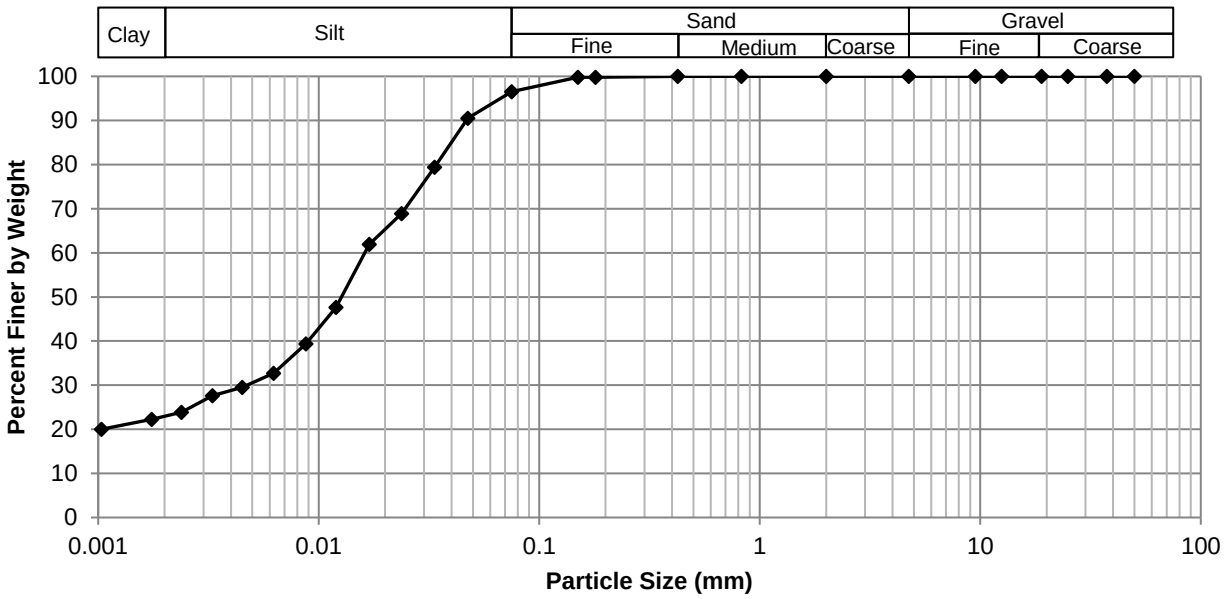
Grain Size Analysis (Hydrometer Method)
ASTM D422

Project No.	0035-056-00
Client	Morrison Hershfield
Project	Local Streets 18-R-07 Spence Street
Test Hole	TH17 - 25
Sample #	G195
Depth (m)	0.8 - 0.9
Sample Date	15-Dec-17
Test Date	21-Jan-18
Technician	JB

Gravel	0.0%
Sand	3.5%
Silt	73.6%
Clay	22.9%

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	96.50
37.5	100.00	2.00	100.00	0.0475	90.52
25.0	100.00	0.825	100.00	0.0336	79.41
19.0	100.00	0.425	100.00	0.0237	68.92
12.5	100.00	0.180	99.80	0.0170	61.94
9.50	100.00	0.150	99.80	0.0120	47.64
4.75	100.00	0.075	96.50	0.0088	39.38
				0.0062	32.71
				0.0045	29.54
				0.0033	27.63
				0.0024	23.82
				0.0017	22.23
				0.0010	20.01

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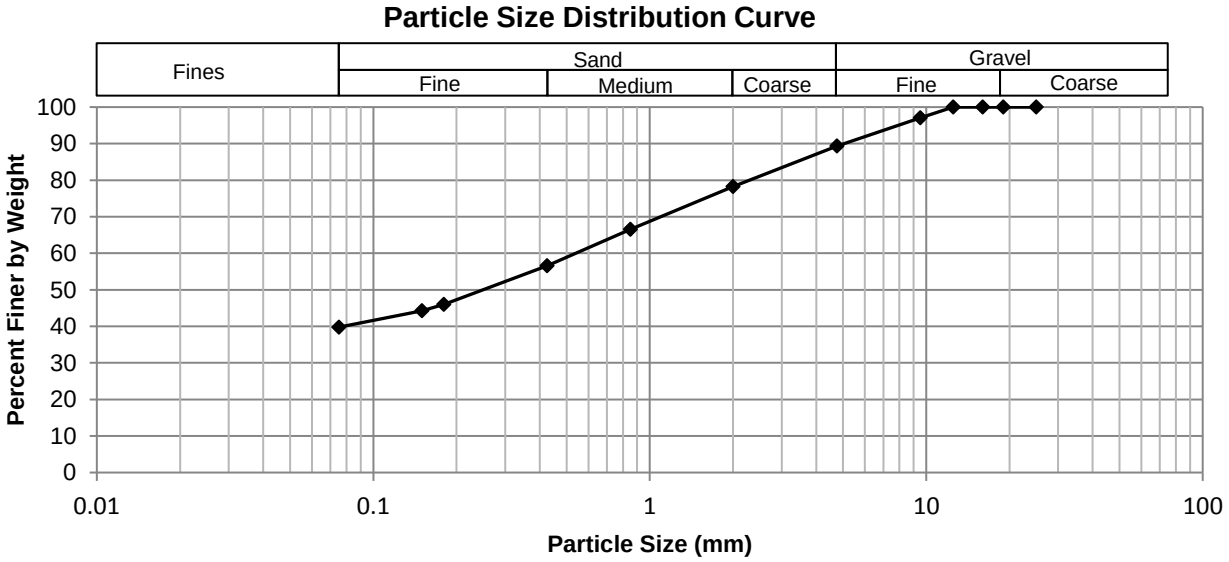
Grain Size Analysis (Sieve Method)
ASTM C136-06

Project No.	0035-056-00
Client	Morrison Hershfield
Project	Local Streets - 18-R-07 - Spence Street
Test Hole	TH17-18
Sample #	G137
Depth (m)	0.5 - 0.6
Date Sampled	18-Dec-17
Date Tested	2-Feb-18
Technician	DS

Total Weight (g)	285.2
Gravel %	10.6
Sand %	49.6
Fines %	39.8



Sieve Number	Sieve Opening (mm)	Percent Passing	Specification (Min-Max)
6"	150		
5"	125		
4"	100		
3"	75.0		
2"	50.0		
1 1/2"	37.5		
1"	25.0	100	
3/4"	19.0	100	
5/8"	16.0	100	
1/2"	12.5	100	
3/8"	9.50	97	
no. 4	4.75	89	
no. 10	2.00	78	
no. 20	0.850	67	
no. 40	0.425	57	
no. 80	0.180	46	
no. 100	0.150	44	
no. 200	0.075	40	

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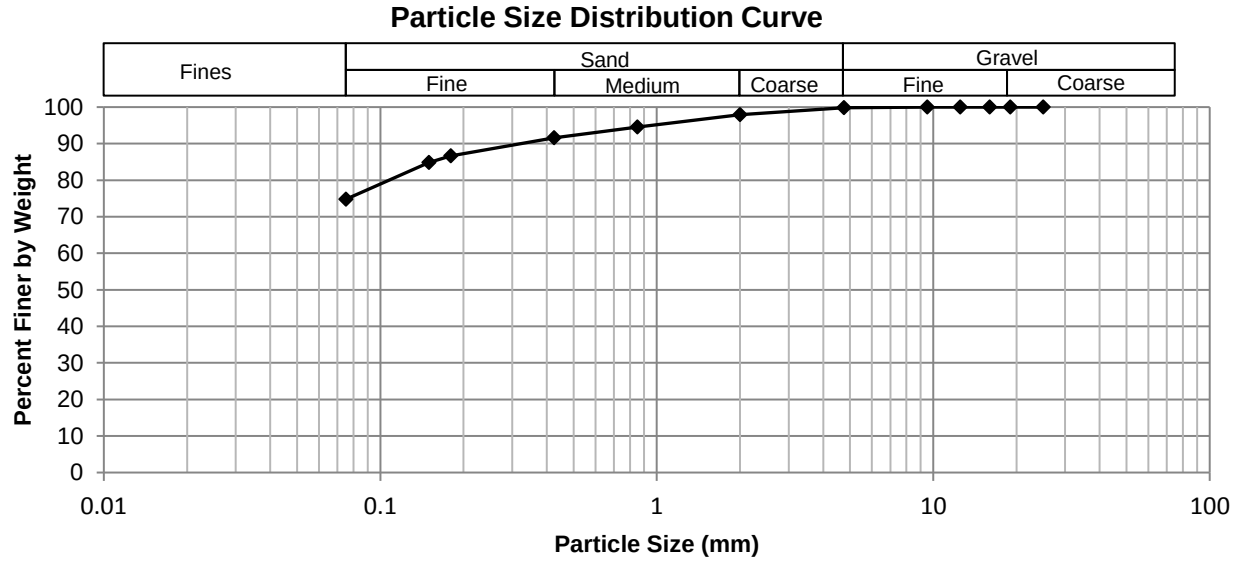
Grain Size Analysis (Sieve Method)
ASTM C136-06

Project No.	0035-056-00
Client	Morrison Hershfield
Project	Local Streets - 18-R-07 - Spence Street
Test Hole	TH17-18
Sample #	G138
Depth (m)	0.5 - 0.6
Date Sampled	18-Dec-17
Date Tested	22-Jan-18
Technician	DS

Total Weight (g)	341.8
Gravel %	0.1
Sand %	25.1
Fines %	74.8



Sieve Number	Sieve Opening (mm)	Percent Passing	Specification (Min-Max)
6"	150		
5"	125		
4"	100		
3"	75.0		
2"	50.0		
1 1/2"	37.5		
1"	25.0	100	
3/4"	19.0	100	
5/8"	16.0	100	
1/2"	12.5	100	
3/8"	9.50	100	
no. 4	4.75	100	
no. 10	2.00	98	
no. 20	0.850	94	
no. 40	0.425	92	
no. 80	0.180	87	
no. 100	0.150	85	
no. 200	0.075	75	

Photo 1: Pavement Core Sample at Test Hole TH17-18

Photo 2: Pavement Core Sample at Test Hole TH17-19

Photo 3: Pavement Core Sample at Test Hole TH17-20

Photo 4: Pavement Core Sample at Test Hole TH17-21

Photo 5: Pavement Core Sample at Test Hole TH17-22

Appendix D

Jones Street, between Belmont Ave. to Hartford Ave.

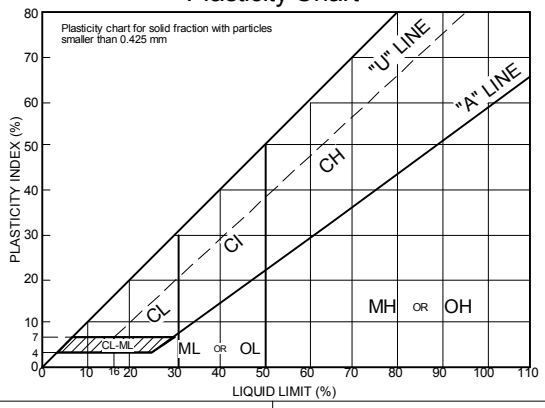
Test Hole Logs, Summary Table, Lab Data and Photographs of Pavement Core Samples

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* — $C_U = \frac{D_{60}}{D_{10}}$ greater than 4; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
			GP		Poorly-graded gravels, gravel-sand mixtures, little or no fines	Not meeting all gradation requirements for GW
		Gravel with fines (Appreciable amount of fines)	GM		Silty gravels, gravel-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
			GC		Clayey gravels, gravel-sand-silt mixtures	Atterberg limits above "A" line or P.I. greater than 7
	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 — 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
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
#40 to #10	0.425 to 2.00		Coarse
#200 to #40	0.075 to 0.425		Medium
< #200	< 0.075		Fine
			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
#4 to 3/4 in.	4.75 to 19		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

TREK GEOTECHNICAL

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

Sub-Surface Log

Test Hole TH17-21

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 - Jones St.	**Location:**	UTM N-5533210, E-635265
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 19

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	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
		CONCRETE - 178 mm thick				
		CLAY (FILL) - silty, trace sand, trace organics - grey to black - frozen to 0.60 m, moist and stiff when thawed - high plasticity		G161		
0.5				G162		
		CLAY - silty - grey - moist, very stiff - high plasticity		G163		
1.0				G164		
		-firm, grey below 1.4 m		G165		
1.5		SILT - some clay, trace sand - light brown - moist, soft - low plasticity		G166		
2.0		CLAY - silty, trace precipitates - grey - moist, stiff - high plasticity		G167		
2.5				G168		

END OF TEST HOLE AT 2.9 m IN CLAY
1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located 3 m South from intersection of Belmont Ave and Jones St, 1 m East of West Curb.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

Sub-Surface Log

Test Hole TH17-22
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 - Jones St.	**Location:**	UTM N-5533163, E-635242
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 19

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	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
		CONCRETE - 178 mm thick				
		CLAY (Fill)- silty, trace sand, trace gravel, trace organics - grey to black - frozen to 0.60 m, moist and soft when thawed - high plasticity		G169	●	
0.5				G170	●	
		-very stiff below 0.76 m		G171	●	△ ✤
1.0		CLAY - silty - grey - moist, stiff - high plasticity		G172	●	△ ✤
				G173	●	✤ △
1.5				G174	●	△ ✤
2.0				G175	●	△ ✤
2.5						
		-firm, brown below 2.7		G176	●	△ ✤
3.0		END OF TEST HOLE AT 3.0 m IN CLAY				

1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located at 37 m South from intersection of Belmont Ave and Jones Street, 1 m West of East curb.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2018-01-25_LOCAL STREETS 18-R-07 JONES ST_0035-056-00_0_A_HS.GPJ TREK GEOTECHNICAL.GDT 18-2-14

Sub-Surface Log

Test Hole TH17-23

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 - Jones St.	**Location:**	UTM N-5533155, E-635239
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 19

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	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
		CONCRETE - 152 mm thick				
		SAND (Fill) - silty, gravelly, trace clay, light brown, moist and compact when thawed, sub-angular to angular		G177		
		CLAY - silty, trace organics to 0.45 m - black - frozen to 0.45 m, moist and soft when thawed - high plasticity		G178		
0.5		-grey, stiff, trace precipitates below 0.76 m		G179		
1.0				G180		
1.5				G181		
				G182		
2.0				G183		
2.5		-firm below 2.75 m		G184		

END OF TEST HOLE AT 2.9 m IN CLAY
1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located at 5 m North from intersection of Hartford Street and Jones Street, 5 m East of West Curb.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

Local Streets Package 18-R-07
Sub-Surface Investigation
Jones Street

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)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Plastic	Liquid	Plasticity Index
TH17-21	UTM: 5533210 N, 635265 E Located 3 m South of Belmont Ave and Jones St. intersection, & 1 m East of West curb.	Asphalt	N/A	Concrete	178											
						CLAY	0.2	0.3	60							
						CLAY	0.5	0.6	39	0	2	34	65	24	78	54
						CLAY	0.8	0.9	31							
						CLAY	1.1	1.2	31							
						CLAY	1.4	1.5	29							
						SILT	1.7	1.8	25							
						CLAY	2.0	2.1	26							
						CLAY	2.7	2.9	45							
TH17-22	UTM: 5533187 N, 635261 E Located 37 m South of Belmont Ave and Jones St. intersection & 1.0 m West of East curb.	Asphalt	N/A	Concrete	178											
						CLAY (FILL)	0.2	0.3	49							
						CLAY (FILL)	0.5	0.6	41							
						CLAY (FILL)	0.8	0.9	39							
						CLAY	1.1	1.2	39							
						CLAY	1.4	1.5	38							
						CLAY	1.7	1.8	32							
						CLAY	2.0	2.1	29							
						CLAY	2.7	2.9	48							
TH17-23	UTM: 5533155 N, 635239 E Located 1 m North of Harford St. and Jones St. intersection, 1.0 m East of West curb.	Asphalt	N/A	Concrete	152							% Fines				
						SAND (FILL)	0.2	0.3	15	27	43	31				
						CLAY	0.5	0.6	43							
						CLAY	0.8	0.9	31							
						CLAY	1.1	1.2	34							
						CLAY	1.4	1.5	30							
						CLAY	1.7	1.8	40							
						CLAY	2.0	2.1	45							
						CLAY	2.7	2.9	54							

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Moisture Content Report
ASTM D2216-10

Project No. 0035-056-00
Client Morrison Hershfield
Project Local Streets 18-R-07 Jones St.

Sample Date 19-Dec-17
Test Date 19-Jan-18
Technician DS

Test Pit	TH17-21	TH17-21	TH17-21	TH17-21	TH17-21	TH17-21
Depth (m)	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8
Sample #	G161	G162	G163	G164	G165	G166
Tare ID	AB73	H22	W48	W58	AB63	F57
Mass of tare	6.6	8.6	8.4	9.2	8.2	8.4
Mass wet + tare	279.2	422.8	303.8	313.0	313.6	356.4
Mass dry + tare	177.0	306.4	234.4	242.0	244.4	287.0
Mass water	102.2	116.4	69.4	71.0	69.2	69.4
Mass dry soil	170.4	297.8	226.0	232.8	236.2	278.6
Moisture %	60.0%	39.1%	30.7%	30.5%	29.3%	24.9%

Test Pit	TH17-21	TH17-21	TH17-22	TH17-22	TH17-22	TH17-22
Depth (m)	2.0 - 2.1	2.7 - 2.9	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2
Sample #	G167	G168	G169	G170	G171	G172
Tare ID	AC10	N115	W63	K19	A28	AC31
Mass of tare	6.6	8.6	8.4	8.4	8.4	6.6
Mass wet + tare	325.4	385.2	305	348.6	331.8	363
Mass dry + tare	259.4	267.8	208.0	249.2	241.0	262.2
Mass water	66.0	117.4	97.0	99.4	90.8	100.8
Mass dry soil	252.8	259.2	199.6	240.8	232.6	255.6
Moisture %	26.1%	45.3%	48.6%	41.3%	39.0%	39.4%

Test Pit	TH17-22	TH17-22	TH17-22	TH17-22	TH17-23	TH17-23
Depth (m)	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1	2.7 - 2.9	0.2 - 0.3	0.5 - 0.6
Sample #	G173	G174	G175	G176	G177	G178
Tare ID	AB14	AC07	N05	AB95	AC06	F61
Mass of tare	6.8	7.0	8.6	6.6	6.6	8.6
Mass wet + tare	347.0	318.6	350.8	348.2	536.2	313.8
Mass dry + tare	253.8	242.4	273.6	237.4	468.8	222.8
Mass water	93.2	76.2	77.2	110.8	67.4	91.0
Mass dry soil	247.0	235.4	265.0	230.8	462.2	214.2
Moisture %	37.7%	32.4%	29.1%	48.0%	14.6%	42.5%

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Moisture Content Report
ASTM D2216-10

Project No. 0035-056-00
Client Morrison Hershfield
Project Local Streets 18-R-07 Jones St.

Sample Date 19-Dec-17
Test Date 19-Jan-18
Technician DS

Test Pit	TH17-23	TH17-23	TH17-23	TH17-23	TH17-23	TH17-23
Depth (m)	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1	2.7 - 2.9
Sample #	G179	G180	G181	G182	G183	G184
Tare ID	AB22	C28	AC37	Z110	A4	H69
Mass of tare	6.8	8.6	6.6	8.6	8.4	8.8
Mass wet + tare	305.8	335.2	308.6	346.6	312.8	340.8
Mass dry + tare	235.8	252.6	239.2	250.0	218.0	224.4
Mass water	70.0	82.6	69.4	96.6	94.8	116.4
Mass dry soil	229.0	244.0	232.6	241.4	209.6	215.6
Moisture %	30.6%	33.9%	29.8%	40.0%	45.2%	54.0%

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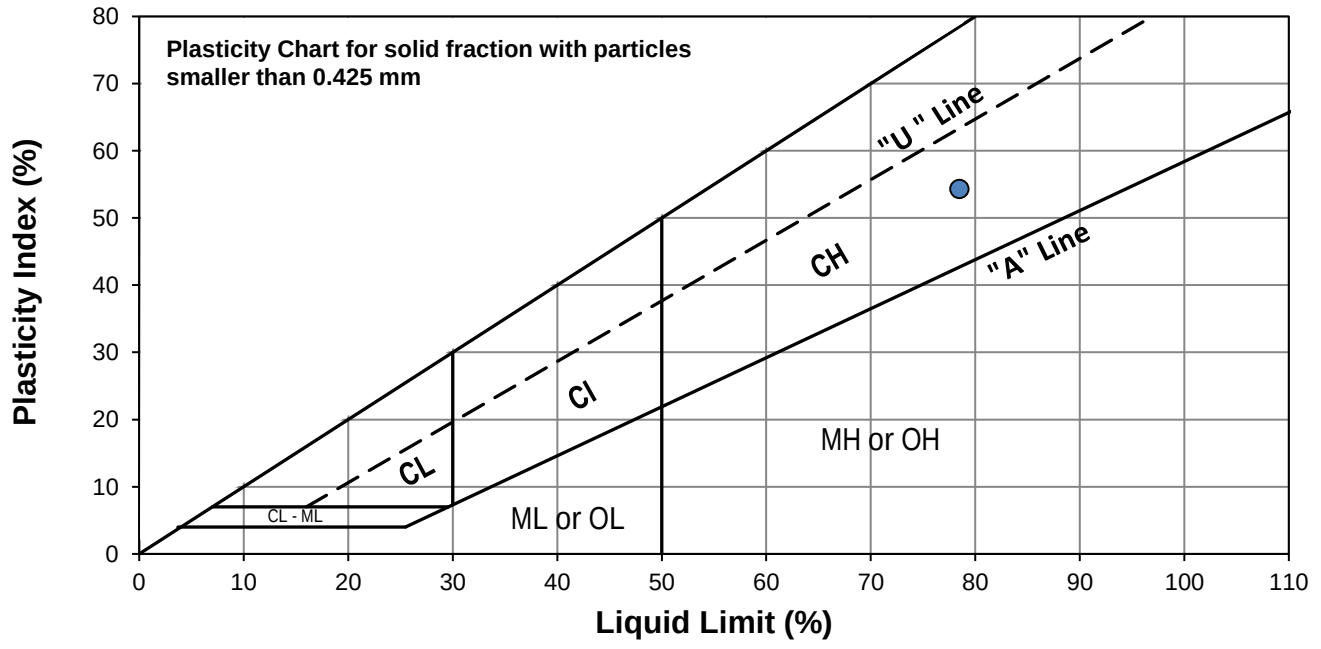
Atterberg Limits
ASTM D4318-10e1

Project No.	0035-056-00
Client	Morrision Hershfield
Project	2017 Local Streets 18-R-07 Jones Street
Test Hole	TH17-21
Sample #	G162
Depth (m)	0.8 - 0.9
Sample Date	19-Dec-17
Test Date	26-Jan-18
Technician	DS

Liquid Limit	78
Plastic Limit	24
Plasticity Index	54

Liquid Limit

Trial #	1	2	3		
Number of Blows (N)	19	27	35		
Mass Wet Soil + Tare (g)	20.730	20.509	20.366		
Mass Dry Soil + Tare (g)	17.995	17.738	17.659		
Mass Tare (g)	14.596	14.187	14.095		
Mass Water (g)	2.735	2.771	2.707		
Mass Dry Soil (g)	3.399	3.551	3.564		
Moisture Content (%)	80.465	78.034	75.954		



Plastic Limit

Trial #	1	2	3	4	5
Mass Tare (g)	20.220	20.269			
Mass Wet Soil + Tare (g)	19.020	19.079			
Mass Dry Soil + Tare (g)	14.060	14.149			
Mass Water (g)	1.200	1.190			
Mass Dry Soil (g)	4.960	4.930			
Moisture Content (%)	24.194	24.138			

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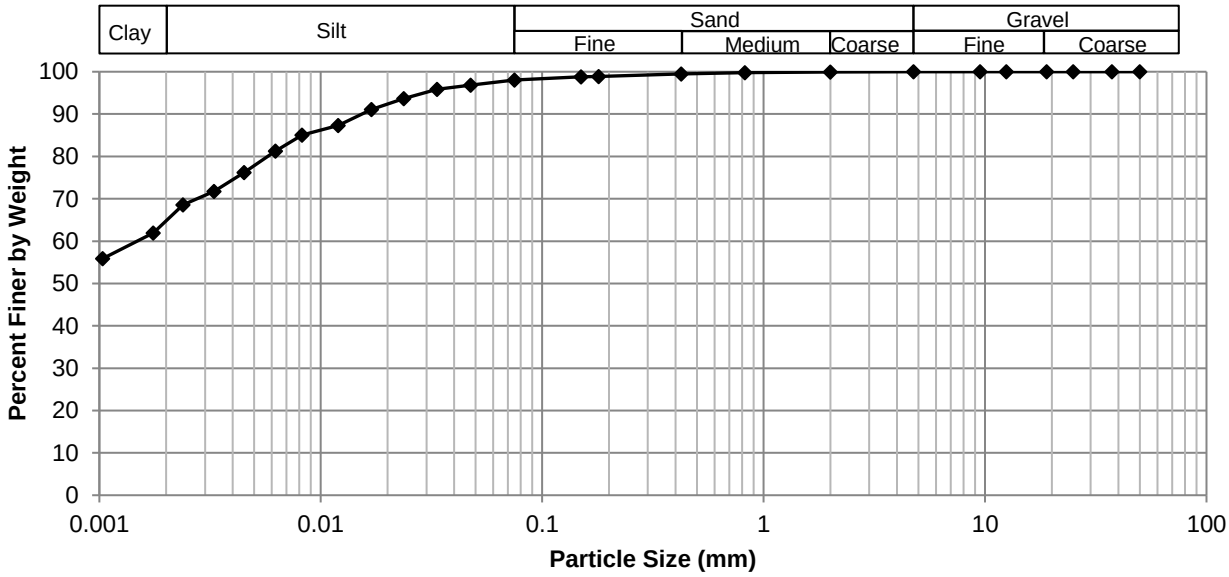
Grain Size Analysis (Hydrometer Method)
ASTM D422

Project No.	0035-056-00
Client	Morrison Hershfield
Project	Local Streets 18-R-07 Jones Street
Test Hole	TH17 - 21
Sample #	G162
Depth (m)	0.5 - 0.6
Sample Date	15-Dec-17
Test Date	21-Jan-18
Technician	JB

Gravel	0.0%
Sand	2.0%
Silt	33.5%
Clay	64.5%

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	98.02
37.5	100.00	2.00	99.96	0.0475	96.83
25.0	100.00	0.825	99.76	0.0336	95.88
19.0	100.00	0.425	99.49	0.0237	93.66
12.5	100.00	0.180	98.91	0.0170	91.12
9.50	100.00	0.150	98.78	0.0120	87.31
4.75	100.00	0.075	98.02	0.0082	85.09
				0.0062	81.28
				0.0045	76.20
				0.0033	71.75
				0.0024	68.58
				0.0018	61.91
				0.0010	55.88

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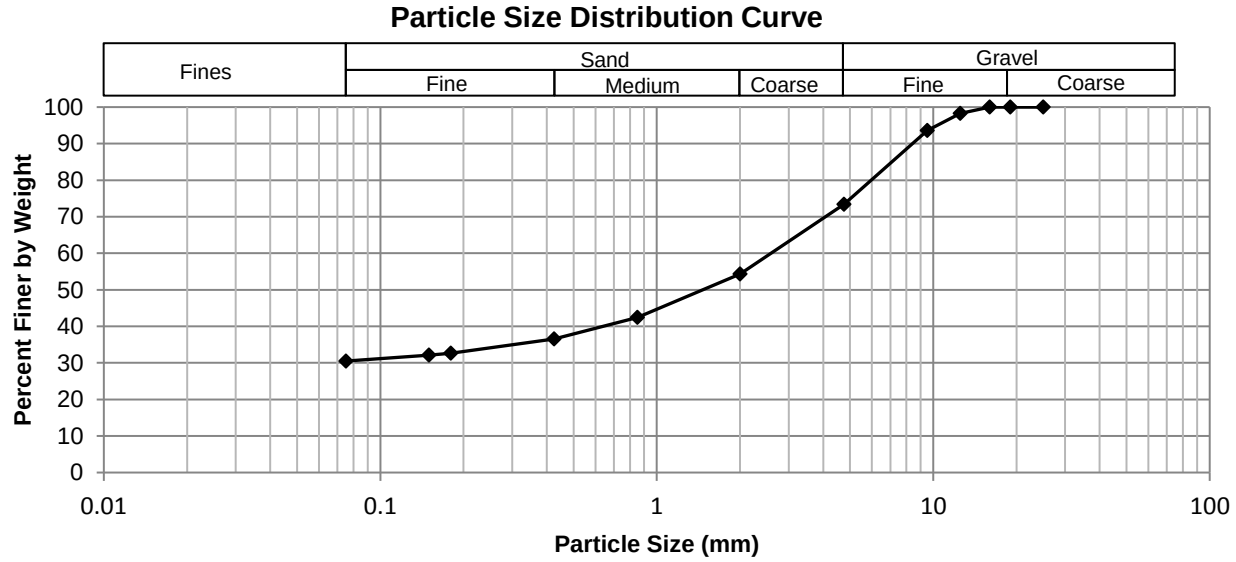
Grain Size Analysis (Sieve Method)
ASTM C136-06

Project No.	0035-056-00
Client	Morrison Hershfield
Project	Local Streets - 18-R-07 - Jones Street
Test Hole	TH17 - 23
Sample #	G177
Depth (m)	0.1 - 0.3
Date Sampled	19-Dec-17
Date Tested	23-Jan-18
Technician	JB

Total Weight (g)	462.2
Gravel %	26.6
Sand %	42.9
Fines %	30.5



Sieve Number	Sieve Opening (mm)	Percent Passing	Specification (Min-Max)
6"	150		
5"	125		
4"	100		
3"	75.0		
2"	50.0		
1 1/2"	37.5		
1"	25.0	100	
3/4"	19.0	100	
5/8"	16.0	100	
1/2"	12.5	98	
3/8"	9.50	94	
no. 4	4.75	73	
no. 10	2.00	54	
no. 20	0.850	42	
no. 40	0.425	37	
no. 80	0.180	33	
no. 100	0.150	32	
no. 200	0.075	31	

Photo 1: Pavement Core Sample at Test Hole TH17-23

Photo 2: Pavement Core Sample at Test Hole TH17-24

Photo 3: Pavement Core Sample at Test Hole TH17-25

Appendix E

Sherburn Street, between Sargent Ave. to Wellington Ave.

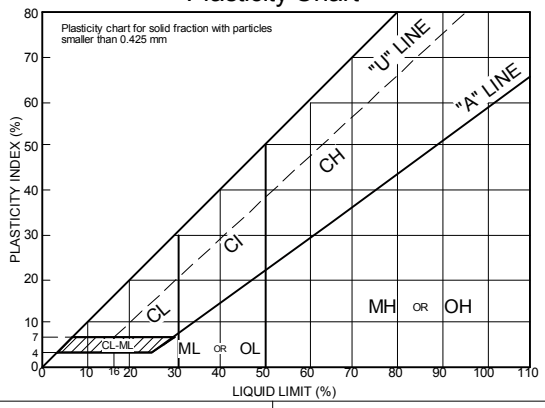
Test Hole Logs, Summary Table, Lab Data and Photographs of Pavement Core Samples

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* — $C_U = \frac{D_{60}}{D_{10}}$ greater than 4; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
			GP		Poorly-graded gravels, gravel-sand mixtures, little or no fines	Not meeting all gradation requirements for GW
		Gravel with fines (Appreciable amount of fines)	GM		Silty gravels, gravel-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
			GC		Clayey gravels, gravel-sand-silt mixtures	Atterberg limits above "A" line or P.I. greater than 7
	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 — 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
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
#40 to #10	0.425 to 2.00		Coarse
#200 to #40	0.075 to 0.425		Medium
< #200	< 0.075		Fine
			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
#4 to 3/4 in.	4.75 to 19		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

TREK GEOTECHNICAL

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

Sub-Surface Log

Test Hole TH17-26
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 - Sherburn Street	**Location:**	UTM N-5529148, E-631066
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 19

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	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
		ASPHALT - 39 mm thick				
		CONCRETE - 120 mm thick				
		CLAY - silty, trace silt inclusions (<10mm diam), trace sand, trace gravel - dark grey - fozen to 0.60 m, moist and soft when thawed - high plasticity		G201		
0.5		-firm below 0.50 m		G202		
				G203		
1.0		SILT - trace clay, trace sand - light brown - moist, soft - low plasticity		G204		
1.5				G205		
				G206		
2.0		CLAY - silty - grey - moist, firm - high plasticity		G207		
2.5		- stiff below 2.74 m		G208		
3.0		END OF TEST HOLE AT 3.0 m IN CLAY				

1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located at house #1026, 1.4 m East of West curb.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2018-01-25_LOCAL STREETS 18-R-07 SHERBURN D ST_0035-056-00_0_A_HS.GPJ TREK GEOTECHNICAL.GDT 18-2-14

Sub-Surface Log

Test Hole TH17-27
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 - Sherburn Street	**Location:**	UTM N-5529103, E-631072
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 19

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	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
		ASPHALT - 25 mm thick				
		CONCRETE - 137 mm thick				
		CLAY (Fill)- silty, trace sand - dark grey - frozen to 0.60 m, moist and soft when thawed - high plasticity		G209		
0.5		- trace gravel, trace organics and light brown below 0.45 m		G210		
				G211		
1.0		- very stiff below 1.1 m		G212		
		SILT AND CLAY - trace sand - light brown - moist, soft - intermediate plasticity		G213		
1.5				G214		
2.0		CLAY - silty - brown - moist, firm - high plasticity		G215		
2.5						
				G216		
3.0		END OF TEST HOLE AT 3.0 m IN CLAY				

1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located at house #1011, 1.9 m West of East curb.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2018-01-25_LOCAL STREETS 18-R-07 SHERBURN D ST_0035-056-00_0_A_HS.GPJ TREK GEOTECHNICAL.GDT 18-2-14

Sub-Surface Log

Test Hole TH17-28
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 - Sherburn Street	**Location:**	UTM N-5529039, E-631064
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 19

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	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
		ASPHALT - 39 mm thick				
		CONCRETE - 165 mm thick				
		CLAY - silty, trace sand - black - frozen to 0.60 m, moist and soft when thawed - high plasticity		G217	●	
0.5		- intermediate plasticity below 0.45 m -firm below 0.55 m		G218	●	
				G219	●	
1.0		SILT - trace clay, trace sand - light brown - moist, firm - no to low plasticity		G220	●	△ ✤
1.5				G221	●	
		CLAY - silty - brown - moist, stiff - high plasticity		G222	●	△ ✤
2.0				G223	●	✤
2.5						
				G224	●	△ ✤
3.0		END OF TEST HOLE AT 3.0 m IN CLAY				

1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located between house #994 and 996, 1 m East of West curb.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2018-01-25_LOCAL STREETS 18-R-07 SHERBURN D ST_0035-056-00_0_A_HS.GPJ TREK GEOTECHNICAL.GDT 18-2-14

Sub-Surface Log

Test Hole TH17-29
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 - Sherburn Street	**Location:**	UTM N-5529003, E-631068
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 19

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	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 - 25 mm thick				
		CONCRETE - 190 mm thick				
		CLAY (Fill)- silty, trace sand, trace gravel - black - frozen to 0.60 m, moist and soft when thawed - high plasticity		G225		
0.5				G226		
		SILT AND CLAY- trace sand - light brown to black - moist, soft - high plasticity		G227		
1.0				G228		
				G229		
1.5		CLAY - silty - brown - moist, stiff - high plasticity		G230		
				G231		
2.0						
2.5				G232		
3.0		END OF TEST HOLE AT 3.0 m IN CLAY				

1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located at house #986, 1.5 m West of East curb.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2018-01-25_LOCAL STREETS 18-R-07 SHERBURN D ST_0035-056-00_0_A_HS.GPJ TREK GEOTECHNICAL.GDT 18-2-14

Sub-Surface Log

Test Hole TH17-30
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 - Sherburn Street	**Location:**	UTM N-5528954, E-631064
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 20

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	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
		ASPHALT - 25 mm thick CONCRETE - 200 mm thick				
0.5		CLAY (Fill) - silty, trace sand, trace top soil - grey to black - frozen to 0.60 m, moist and soft when thawed - high plasticity		G233 G234 G235		
1.0		SILT - trace sand, trace clay - light brown - moist, soft - low plasticity		G236 G237		
1.5		CLAY - silty, trace precipitates - brown - moist, very stiff - high plasticity		G238 G239		
2.5		- firm, grey below 2.74 m		G240		
3.0		END OF TEST HOLE AT 3.0 m IN CLAY				

1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located at house #964, 1.1 m East of West curb.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2018-01-25 LOCAL STREETS 18-R-07 SHERBURN D ST 0035-056-00 0 A HS.GPJ TREK GEOTECHNICAL.GDT 18-2-14

Sub-Surface Log

Test Hole TH17-31
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 - Sherburn Street	**Location:**	UTM N-5528915, E-631071
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 20

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	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 - 50 mm thick				
		CONCRETE - 165 mm thick				
		CLAY (Fill)- silty, trace sand, trace gravel, trace top soil - black - frozen to 0.45 m, moist and firm when thawed - intermediate to high plasticity		G241		
0.5		-firm to stiff below 0.50 m		G242		
				G243		
1.0		SILT - trace sand, trace clay - light brown - moist, soft - low plasticity		G244		
1.5				G245		
				G246		
2.0		CLAY - silty - grey - moist, firm - high plasticity		G247		
2.5						
				G248		
3.0		END OF TEST HOLE AT 3.0 m IN CLAY				

1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located at house #949, 1.4 m West of East curb.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2018-01-25_LOCAL STREETS 18-R-07 SHERBURN D ST_0035-056-00_0_A_HS.GPJ TREK GEOTECHNICAL.GDT 18-2-14

Sub-Surface Log

Test Hole TH17-32
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 - Sherburn Street	**Location:**	UTM N-5528866, E-631063
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 20

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	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
		ASPHALT - 76 mm thick				
		CONCRETE - 140 mm thick				
		CLAY - silty, trace sand - black - frozen to 0.60 m, moist and soft when thawed - high plasticity		G249		
0.5		SILT - trace clay, trace sand - light brown - moist, soft - low plasticity		G250		
				G251		
1.0				G252		
		CLAY - silty - brown - moist, very stiff - high plasticity		G253		△ ✤
1.5				G254		△ ✤
		- firm below 1.98 m		G255		✤
2.0						
2.5				G256		✤ △
3.0						

END OF TEST HOLE AT 3.0 m IN CLAY
1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located at house #934, 1.1 m East of West curb.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2018-01-25_LOCAL STREETS 18-R-07 SHERBURN D ST_0035-056-00_0_A_HS.GPJ TREK GEOTECHNICAL.GDT 18-2-14

Sub-Surface Log

Test Hole TH17-33

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 - Sherburn Street	**Location:**	UTM N-5528805, E-631070
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 20

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	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 - 76 mm thick				
		CONCRETE - 102 mm thick				
		SILT AND CLAY - trace sand - black - frozen to 0.60 m, moist and soft when thawed - intermediate plasticity		G257		
0.5		- light brown below 0.45 m		G258		
		- stiff below 0.76 m		G259		
1.0		- trace silt inclusions (<5 mm diam) below 1.06 m		G260		
				G261		
1.5				G262		
2.0		SILT - trace clay, trace sand - light brown - moist, soft - low plasticity		G263		
2.5						
3.0		CLAY - silty - brown - moist, soft - high plasticity		G264		

END OF TEST HOLE AT 3.0 m IN CLAY

1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located at house #919, 1.5 m West of East curb.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

Local Streets Package 18-R-07
Sub-Surface Investigation
Sherburn Street

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)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Plastic	Liquid	Plasticity Index
TH17-26	UTM: 5529148 N, 631066 E Located in front of House #1026, 1.4 m East of West curb.	Asphalt	39	Concrete	120											
						CLAY	0.2	0.3	31							
						CLAY	0.5	0.6	34							
						CLAY	0.8	0.9	28							
						SILT	1.1	1.2	25							
						SILT	1.4	1.5	23							
						SILT	1.7	1.8	24							
						CLAY	2.0	2.1	33							
						CLAY	2.7	2.9	46							
TH17-27	UTM: 5529103 N, 631072 E Located at House # 1011, 1.9 m West of East curb.	Asphalt	25	Concrete	137											
						CLAY (FILL)	0.2	0.3	30							
						CLAY (FILL)	0.5	0.6	22							
						CLAY (FILL)	0.8	0.9	25							
						CLAY (FILL)	1.1	1.2	25							
						SILT	1.4	1.5	22							
						SILT	1.7	1.8	22							
						CLAY	2.0	2.1	39							
						CLAY	2.6	2.7	43							
TH17-28	UTM: 5529039 N, 631064 E Located between House #994 and #996, 1.0 m East of West curb.	Asphalt	39	Concrete	165											
						CLAY	0.2	0.3	29							
						CLAY	0.5	0.6	35							
						CLAY	0.8	0.9	26							
						SILT	1.1	1.2	16							
						SILT	1.4	1.5	19							
						CLAY	1.7	1.8	35							
						CLAY	2.0	2.1	44							
						CLAY	2.7	2.9	52							
TH17-29	UTM: 5529003 N, 631068 E Located at House #986, 1.5 m West of East curb.	Asphalt	25	Concrete	190											
						CLAY (FILL)	0.2	0.3	34							
						CLAY (FILL)	0.5	0.6	30							
						SILT AND CLAY	0.8	0.9	26	0	4	54	42	19	45	25
						SILT AND CLAY	1.1	1.2	17							
						SILT	1.4	1.5	20							
						CLAY	1.7	1.8	23							
						CLAY	2.0	2.1	39							
						CLAY	2.7	2.9	51							

Local Streets Package 18-R-07
Sub-Surface Investigation
Sherburn Street

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)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Plastic	Liquid	Plasticity Index
TH17-30	UTM: 5528954 N, 631064 E Located at House # 964, 1.1 m East of West curb.	Asphalt	25	Concrete	200											
						CLAY (FILL)	0.2	0.3	26							
						CLAY (FILL)	0.5	0.6	27							
						CLAY (FILL)	0.8	0.9	21							
						SILT	1.1	1.2	17							
						SILT	1.4	1.5	20							
						CLAY	1.7	1.8	31							
						CLAY	2.0	2.1	45							
						CLAY	2.7	2.9	51							
TH17-31	UTM: 5532602 N, 635001 E Located at House # 949, 1.4 m West of East curb.	Asphalt	50	Concrete	165											
						CLAY (FILL)	0.2	0.3	34							
						CLAY (FILL)	0.5	0.6	31							
						CLAY (FILL)	0.8	0.9	27							
						SILT	1.1	1.2	24							
						SILT	1.4	1.5	19							
						SILT	1.7	1.8	17							
						CLAY	2.0	2.1	39							
						CLAY	2.7	2.9	43							
TH17-32	UTM: 5528866 N, 631063 E Located at House #934, 1.1 m East of West curb.	Asphalt	76	Concrete	140											
						CLAY	0.2	0.3	47							
						SILT	0.5	0.6	28							
						SILT	0.8	0.9	21							
						SILT	1.1	1.2	20							
						CLAY	1.4	1.5	33							
						CLAY	1.7	1.8	38							
						CLAY	2.0	2.1	48							
						CLAY	2.7	2.9	50							
TH17-33	UTM: 5528805 N, 631070 E Located at House #919, 1.5 m West of East curb.	Asphalt	76	Concrete	102											
						SILT AND CLAY	0.2	0.3	35							
						SILT AND CLAY	0.5	0.6	23	0	13	43	44	20	44	24
						SILT AND CLAY	0.8	0.9	28							
						SILT AND CLAY	1.1	1.2	31							
						SILT AND CLAY	1.4	1.5	30							
						SILT AND CLAY	1.7	1.8	27							
						SILT	2.0	2.1	23							
						CLAY	2.7	2.9	39							

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Moisture Content Report
ASTM D2216-10

Project No. 0035-056-00
Client Morrison Hershfield
Project Local Streets 18-R-07 Sherburn Street

Sample Date 19-Dec-17
Test Date 22-Jan-18
Technician DS

Test Pit	TH17-26	TH17-26	TH17-26	TH17-26	TH17-26	TH17-26
Depth (m)	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8
Sample #	G201	G202	G203	G204	G205	G206
Tare ID	c25	P24	N31	AB80	N51	N34
Mass of tare	8.4	8.6	8.4	6.8	8.4	8.6
Mass wet + tare	314.4	302.8	363.0	341.0	318.8	318.8
Mass dry + tare	242.6	229.0	285.0	274.8	261.4	258.8
Mass water	71.8	73.8	78.0	66.2	57.4	60.0
Mass dry soil	234.2	220.4	276.6	268.0	253.0	250.2
Moisture %	30.7%	33.5%	28.2%	24.7%	22.7%	24.0%

Test Pit	TH17-26	TH17-26	TH17-27	TH17-27	TH17-27	TH17-27
Depth (m)	2.0 - 2.1	2.7 - 2.9	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2
Sample #	G207	G208	G209	G210	G211	G212
Tare ID	E112	A109	N37	AC04	P07	K27
Mass of tare	8.4	8.4	8.6	7.0	8.2	8.8
Mass wet + tare	304.6	326.2	315.4	341.6	312.2	305
Mass dry + tare	232.0	226.4	244.0	281.0	252.0	245.2
Mass water	72.6	99.8	71.4	60.6	60.2	59.8
Mass dry soil	223.6	218.0	235.4	274.0	243.8	236.4
Moisture %	32.5%	45.8%	30.3%	22.1%	24.7%	25.3%

Test Pit	TH17-27	TH17-27	TH17-27	TH17-27	TH17-28	TH17-28
Depth (m)	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1	2.6 - 2.7	0.2 - 0.3	0.5 - 0.6
Sample #	G213	G214	G215	G216	G217	G218
Tare ID	N67	AB20	N25	N58	F114	Z140
Mass of tare	8.4	7.4	8.6	8.6	8.6	8.4
Mass wet + tare	355.0	370.8	392.6	318.4	329.4	265.6
Mass dry + tare	292.6	304.6	284.4	225.2	257.2	198.8
Mass water	62.4	66.2	108.2	93.2	72.2	66.8
Mass dry soil	284.2	297.2	275.8	216.6	248.6	190.4
Moisture %	22.0%	22.3%	39.2%	43.0%	29.0%	35.1%

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Technician DS

Test Pit	TH17-28	TH17-28	TH17-28	TH17-28	TH17-28	TH17-28
Depth (m)	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1	2.7 - 2.9
Sample #	G219	G220	G221	G222	G223	G224
Tare ID	E125	P34	K3	Z104	W70	F77
Mass of tare	8.4	8.4	8.4	8.4	8.2	8.4
Mass wet + tare	350.8	316.6	365.0	417.4	326.2	344.6
Mass dry + tare	280.4	273.8	308.4	311.4	228.4	230.2
Mass water	70.4	42.8	56.6	106.0	97.8	114.4
Mass dry soil	272.0	265.4	300.0	303.0	220.2	221.8
Moisture %	25.9%	16.1%	18.9%	35.0%	44.4%	51.6%

Test Pit	TH17-29	TH17-29	TH17-29	TH17-29	TH17-29	TH17-29
Depth (m)	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8
Sample #	G225	G226	G227	G228	G229	G230
Tare ID	N06	W69	E62	N108	E140	D44
Mass of tare	8.4	8.6	8.4	8.4	8.6	8.4
Mass wet + tare	280.0	310.8	404.0	396.2	441.6	358.0
Mass dry + tare	211.0	241.6	323.2	339.0	369.4	293.6
Mass water	69.0	69.2	80.8	57.2	72.2	64.4
Mass dry soil	202.6	233.0	314.8	330.6	360.8	285.2
Moisture %	34.1%	29.7%	25.7%	17.3%	20.0%	22.6%

Test Pit	TH17-29	TH17-29	TH17-30	TH17-30	TH17-30	TH17-30
Depth (m)	2.0 - 2.1	2.7 - 2.9	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2
Sample #	G231	G232	G233	G234	G235	G236
Tare ID	C30	Z33	A104	F131	H21	Z69
Mass of tare	8.2	8.4	8.4	8.6	8.4	8.6
Mass wet + tare	341.0	454.8	362.0	332.2	316.6	350.2
Mass dry + tare	247.2	304.0	288.8	264.0	263.2	301.2
Mass water	93.8	150.8	73.2	68.2	53.4	49.0
Mass dry soil	239.0	295.6	280.4	255.4	254.8	292.6
Moisture %	39.2%	51.0%	26.1%	26.7%	21.0%	16.7%

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Project No. 0035-056-00
Client Morrison Hershfield
Project Local Streets 18-R-07 Sherburn Street

Sample Date 19-Dec-17
Test Date 22-Jan-18
Technician DS

Test Pit	TH17-30	TH17-30	TH17-30	TH17-30	TH17-31	TH17-31
Depth (m)	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1	2.7 - 2.9	0.2 - 0.3	0.5 - 0.6
Sample #	G237	G238	G239	G240	G241	G242
Tare ID	Z11	N76	AB15	AC20	AB49	F54
Mass of tare	8.4	8.6	6.6	6.8	6.6	8.4
Mass wet + tare	309.6	362.6	428.2	318.6	298.4	312.2
Mass dry + tare	259.6	278.2	297.0	213.8	223.8	241.2
Mass water	50.0	84.4	131.2	104.8	74.6	71.0
Mass dry soil	251.2	269.6	290.4	207.0	217.2	232.8
Moisture %	19.9%	31.3%	45.2%	50.6%	34.3%	30.5%

Test Pit	TH17-31	TH17-31	TH17-31	TH17-31	TH17-31	TH17-31
Depth (m)	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1	2.7 - 2.9
Sample #	G243	G244	G245	G246	G247	G248
Tare ID	E56	H49	K35	N64	P25	E119
Mass of tare	8.4	8.4	8.4	8.4	8.6	8.4
Mass wet + tare	274.0	368.4	298.6	294.4	309.8	302.4
Mass dry + tare	217.6	298.6	252.8	253.4	225.4	214.4
Mass water	56.4	69.8	45.8	41.0	84.4	88.0
Mass dry soil	209.2	290.2	244.4	245.0	216.8	206.0
Moisture %	27.0%	24.1%	18.7%	16.7%	38.9%	42.7%

Test Pit	TH17-32	TH17-32	TH17-32	TH17-32	TH17-32	TH17-32
Depth (m)	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8
Sample #	G249	G250	G251	G252	G253	G254
Tare ID	F150	E108	Z53	E3	P17	Z95
Mass of tare	8.2	8.4	8.4	8.4	8.4	8.6
Mass wet + tare	366.2	306.8	295.6	278.6	306.8	281.0
Mass dry + tare	252.6	242.2	246.2	232.8	232.8	205.8
Mass water	113.6	64.6	49.4	45.8	74.0	75.2
Mass dry soil	244.4	233.8	237.8	224.4	224.4	197.2
Moisture %	46.5%	27.6%	20.8%	20.4%	33.0%	38.1%

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ASTM D2216-10

Project No. 0035-056-00
Client Morrison Hershfield
Project Local Streets 18-R-07 Sherburn Street

Sample Date 19-Dec-17
Test Date 22-Jan-18
Technician DS

Test Pit	TH17-32	TH17-32	TH17-33	TH17-33	TH17-33	TH17-33
Depth (m)	2.0 - 2.1	2.7 - 2.9	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2
Sample #	G255	G256	G257	G258	G259	G260
Tare ID	C14	D20	Z71	N100	W97	D43
Mass of tare	8.4	8.4	8.6	8.6	8.4	8.6
Mass wet + tare	312.0	349.2	286.4	457.8	349.2	370.0
Mass dry + tare	213.2	235.0	214.4	374.4	274.6	284.6
Mass water	98.8	114.2	72.0	83.4	74.6	85.4
Mass dry soil	204.8	226.6	205.8	365.8	266.2	276.0
Moisture %	48.2%	50.4%	35.0%	22.8%	28.0%	30.9%

Test Pit	TH17-33	TH17-33	TH17-33	TH17-33		
Depth (m)	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1	2.9 - 3.0		
Sample #	G261	G262	G263	G264		
Tare ID	W23	N60	E104	H60		
Mass of tare	8.4	8.4	8.4	8.6		
Mass wet + tare	327.8	306.2	303.4	388.6		
Mass dry + tare	253.4	243.6	249.2	281.4		
Mass water	74.4	62.6	54.2	107.2		
Mass dry soil	245.0	235.2	240.8	272.8		
Moisture %	30.4%	26.6%	22.5%	39.3%		

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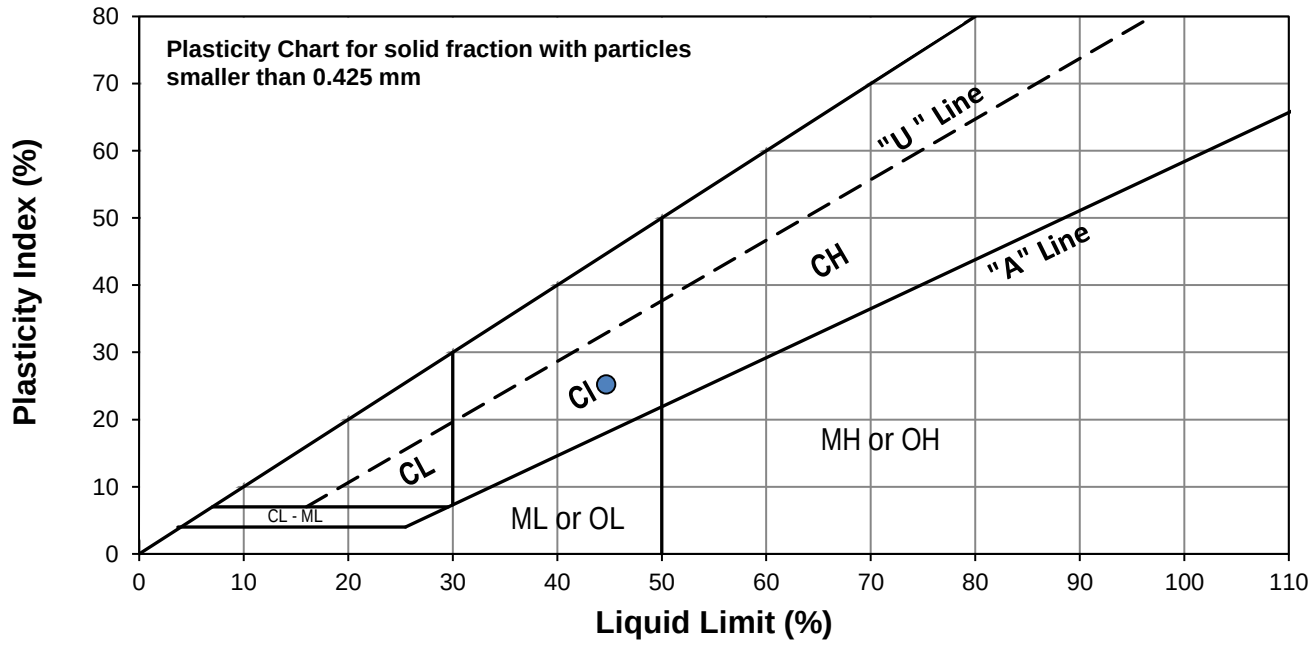
Atterberg Limits
ASTM D4318-10e1

Project No.	0035-056-00
Client	Morrision Hershfield
Project	2017 Local Streets 18-R-07 -Sherburn Street
Test Hole	TH17-29
Sample #	G227
Depth (m)	0.8 - 0.9
Sample Date	19-Dec-17
Test Date	26-Jan-18
Technician	DS

Liquid Limit	45
Plastic Limit	19
Plasticity Index	25

Liquid Limit

Trial #	1	2	3		
Number of Blows (N)	18	24	32		
Mass Wet Soil + Tare (g)	19.450	19.859	19.609		
Mass Dry Soil + Tare (g)	17.666	18.105	17.976		
Mass Tare (g)	13.796	14.227	14.202		
Mass Water (g)	1.784	1.754	1.633		
Mass Dry Soil (g)	3.870	3.878	3.774		
Moisture Content (%)	46.098	45.229	43.270		



Plastic Limit

Trial #	1	2	3	4	5
Mass Tare (g)	20.628	21.664			
Mass Wet Soil + Tare (g)	19.571	20.375			
Mass Dry Soil + Tare (g)	14.097	13.799			
Mass Water (g)	1.057	1.289			
Mass Dry Soil (g)	5.474	6.576			
Moisture Content (%)	19.309	19.602			

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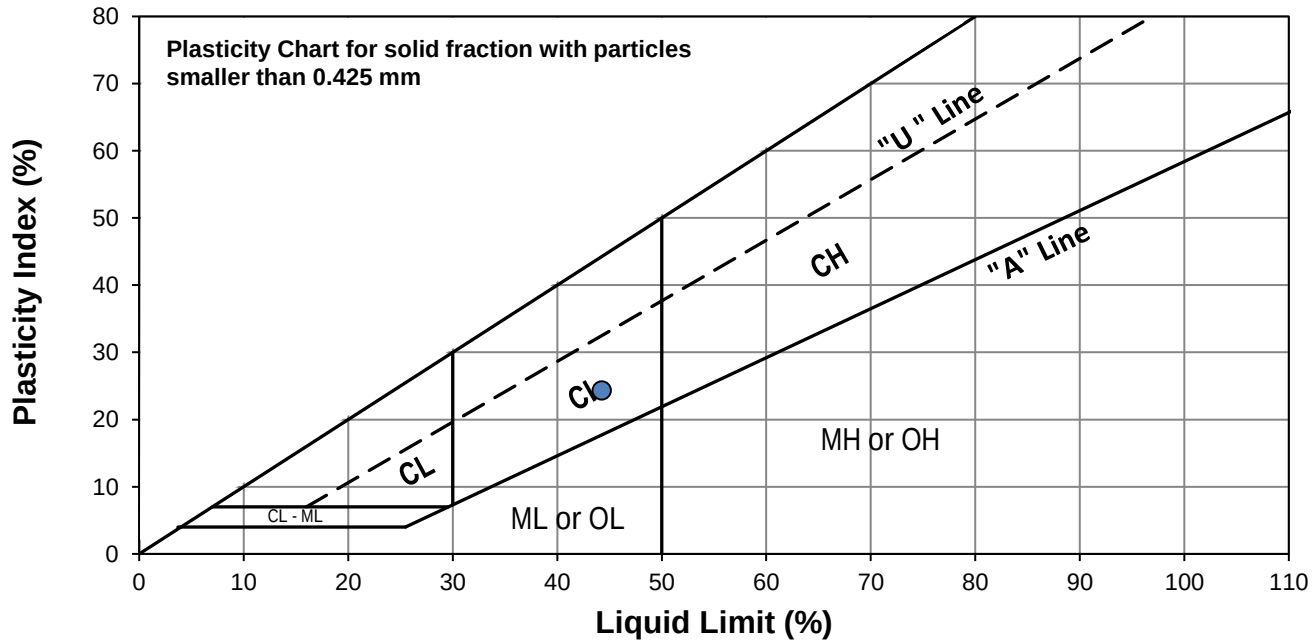
Atterberg Limits
ASTM D4318-10e1

Project No.	0035-056-00
Client	Morrision Hershfield
Project	2017 Local Streets 18-R-07 -Sherburn Street
Test Hole	TH17-33
Sample #	G258
Depth (m)	0.8 - 0.9
Sample Date	20-Dec-17
Test Date	26-Jan-18
Technician	AFK

Liquid Limit	44
Plastic Limit	20
Plasticity Index	24

Liquid Limit

Trial #	1	2	3		
Number of Blows (N)	18	22	33		
Mass Wet Soil + Tare (g)	23.111	23.041	23.818		
Mass Dry Soil + Tare (g)	20.289	20.361	20.927		
Mass Tare (g)	14.111	14.337	14.252		
Mass Water (g)	2.822	2.680	2.891		
Mass Dry Soil (g)	6.178	6.024	6.675		
Moisture Content (%)	45.678	44.489	43.311		



Plastic Limit

Trial #	1	2	3	4	5
Mass Tare (g)	21.561	20.849			
Mass Wet Soil + Tare (g)	20.352	19.730			
Mass Dry Soil + Tare (g)	14.346	14.076			
Mass Water (g)	1.209	1.119			
Mass Dry Soil (g)	6.006	5.654			
Moisture Content (%)	20.130	19.791			

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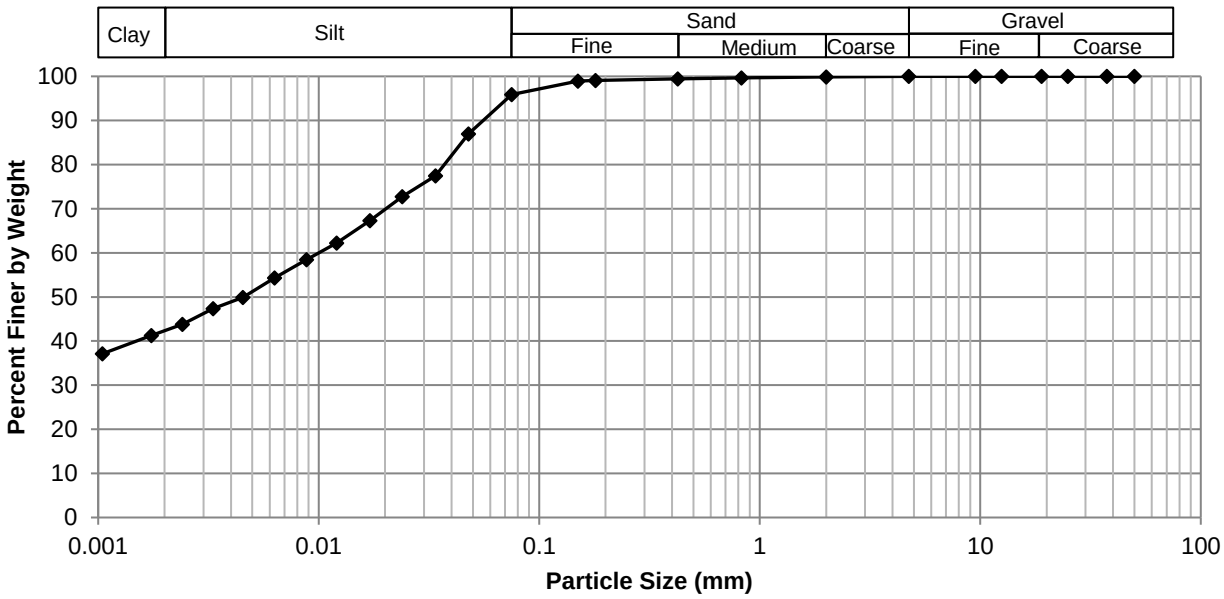
Grain Size Analysis (Hydrometer Method)
ASTM D422

Project No.	0035-056-00
Client	Morrison Hershfield
Project	Local Streets 18-R-07 Sherburn St
Test Hole	TH17 - 29
Sample #	G227
Depth (m)	0.8 - 0.9
Sample Date	19-Dec-17
Test Date	27-Jan-18
Technician	DS

Gravel	0.0%
Sand	4.1%
Silt	53.6%
Clay	42.3%

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	95.86
37.5	100.00	2.00	99.90	0.0479	86.99
25.0	100.00	0.825	99.68	0.0338	77.47
19.0	100.00	0.425	99.46	0.0239	72.71
12.5	100.00	0.180	99.09	0.0171	67.31
9.50	100.00	0.150	98.97	0.0121	62.24
4.75	100.00	0.075	95.86	0.0088	58.43
				0.0063	54.30
				0.0045	49.86
				0.0033	47.37
				0.0024	43.83
				0.0017	41.29
				0.0010	37.11

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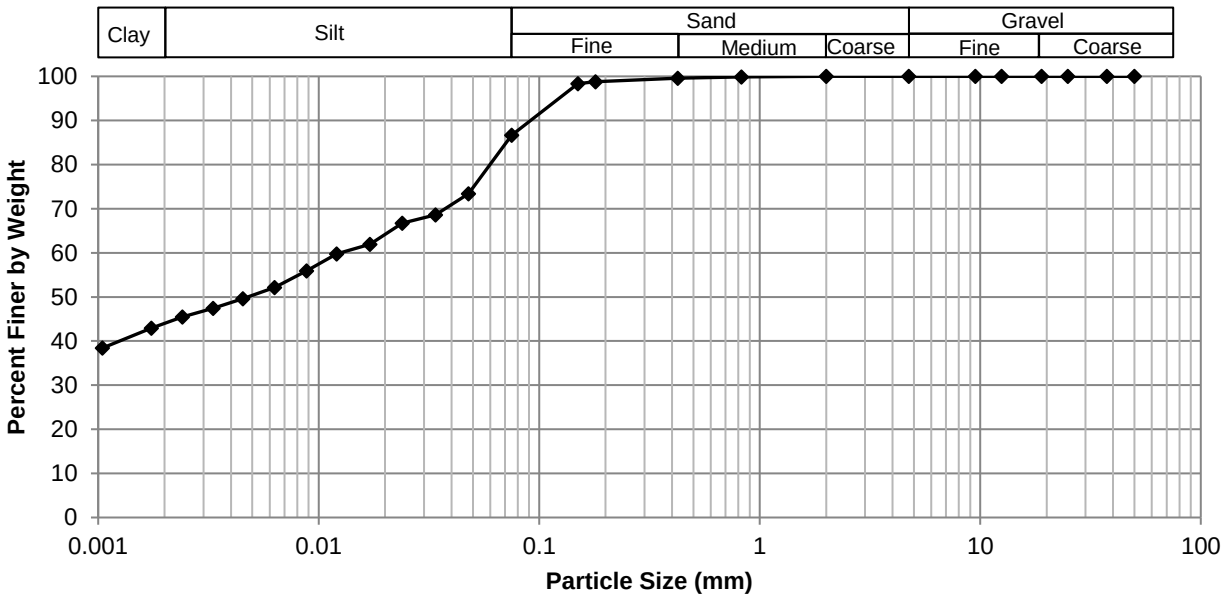
Grain Size Analysis (Hydrometer Method)
ASTM D422

Project No.	0035-056-00
Client	Morrison Hershfield
Project	Local Streets 18-R-07 Sherburn St
Test Hole	TH17 - 33
Sample #	G258
Depth (m)	0.5 - 0.6
Sample Date	20-Dec-17
Test Date	27-Jan-18
Technician	DS

Gravel	0.0%
Sand	13.3%
Silt	42.8%
Clay	43.9%

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	86.68
37.5	100.00	2.00	99.99	0.0479	73.40
25.0	100.00	0.825	99.87	0.0338	68.64
19.0	100.00	0.425	99.58	0.0239	66.73
12.5	100.00	0.180	98.78	0.0171	61.97
9.50	100.00	0.150	98.36	0.0121	59.75
4.75	100.00	0.075	86.68	0.0088	55.94
				0.0063	52.12
				0.0045	49.58
				0.0033	47.41
				0.0024	45.45
				0.0017	42.91
				0.0010	38.41

Photo 1: Pavement Core Sample at Test Hole TH17-26

Photo 2: Pavement Core Sample at Test Hole TH17-27

Photo 3: Pavement Core Sample at Test Hole TH17-28

Photo 4: Pavement Core Sample at Test Hole TH17-29

Photo 5: Pavement Core Sample at Test Hole TH17-30

Photo 6: Pavement Core Sample at Test Hole TH17-31

Photo 7: Pavement Core Sample at Test Hole TH17-32

Photo 8: Pavement Core Sample at Test Hole TH17-33

Appendix F

Colleen Road, between Jones St. to Mac St.

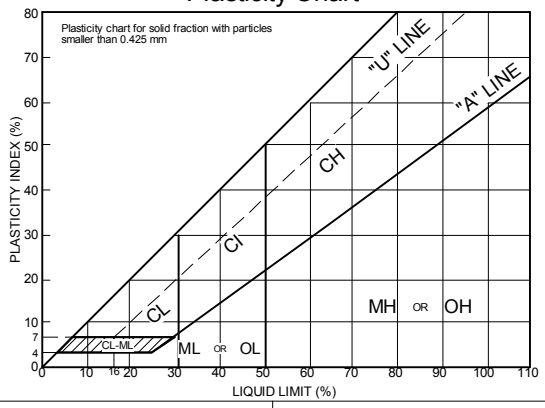
Test Hole Logs, Summary Table, Lab Data and Photographs of Pavement Core Samples

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* — $C_U = \frac{D_{60}}{D_{10}}$ greater than 4; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
			GP		Poorly-graded gravels, gravel-sand mixtures, little or no fines	Not meeting all gradation requirements for GW
		Gravel with fines (Appreciable amount of fines)	GM		Silty gravels, gravel-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
			GC		Clayey gravels, gravel-sand-silt mixtures	Atterberg limits above "A" line or P.I. greater than 7
	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 — 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
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
#40 to #10	0.425 to 2.00		Coarse
#200 to #40	0.075 to 0.425		Medium
< #200	< 0.075		Fine
			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
#4 to 3/4 in.	4.75 to 19		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

TREK GEOTECHNICAL

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

Sub-Surface Log

Test Hole TH17-34
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 - Colleen Road	**Location:**	UTM N-5532531, E-635168
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 20

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
		ASPHALT - 102 mm thick		
		CLAY - silty, trace sand, trace gravel to 0.45 m - brown - frozen to 0.60 m, moist and soft when thawed - high plasticity		G265
0.5				G266
		- stiff below 0.76 m		G267
1.0		SILT - some clay, trace sand - light brown - moist, soft - low plasticity		G268
		CLAY - silty - brown - moist, stiff - high plasticity		G269
1.5		- trace precipitates below 1.68 m		G270
2.0		- firm, grey below 1.96 m		G271
2.5				G272
3.0		END OF 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 ○

1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located at back of house #109, 1 m North from South edge of roadway.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2018-01-25_LOCAL STREETS 18-R-07 COLLENNNST_0035-056-00_0_A_HS.GPJ TREK GEOTECHNICAL.GDT 18-2-14

Sub-Surface Log

Test Hole TH17-35
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 - Colleen Road	**Location:**	UTM N-5532553, E-635129
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 20

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	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 - 229 mm thick				
		CLAY - silty, trace sand - dark grey to black - frozen to 0.46 m, moist and soft when thawed - high plasticity, hydrocarbon like smell to 0.46 m		G273		
0.5		-grey, firm below 0.50 m		G274		
		- very stiff below 0.76 m		G275		
1.0				G276		
				G277		
1.5				G278		
		-trace precipitates between 1.8 m and 2.1 m				
2.0				G279		
2.5		-stiff below 2.6 m				
		SILT - some clay, trace sand - light brown - moist, soft - low plasticity		G280		
3.0						

END OF TEST HOLE AT 3.0 m IN CLAY
1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located at back of house #115, 5 m North from South edge of roadway.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2018-01-25_LOCAL STREETS 18-R-07 COLLENNNST_0035-056-00_0_A_HS.GPJ TREK GEOTECHNICAL.GDT 18-2-14

Sub-Surface Log

Test Hole TH17-36
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 - Colleen Road	**Location:**	UTM N-5532566, E-635078
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 20

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	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 ○
		ASPHALT - 176 mm thick				
		CLAY - silty, trace sand - grey to black - frozen to 0.46 m, moist and soft when thawed - high plasticity, hydrocarbon like smell to 0.40 m		G281		
0.5		-dark grey, firm below 0.45 m		G282		
				G283		
1.0		- very stiff below 1.1 m		G284		
				G285		
1.5		SILT - some clay, trace sand - light brown -moist, soft -low plasticity		G286		
2.0		CLAY - silty - light brown - moist, very stiff - high plasticity		G287		
2.5				G288		
3.0		- grey, firm below 2.9 m				

END OF TEST HOLE AT 3.0 m IN CLAY
1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located between back of house #123 and #121, 2 m North from South edge of roadway.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2018-01-25_LOCAL STREETS 18-R-07 COLLENNNST_0035-056-00_0_A_HS.GPJ TREK GEOTECHNICAL.GDT 18-2-14

Sub-Surface Log

Test Hole TH17-37
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 - Colleen Road	**Location:**	UTM N-5532588, E-635040
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 20

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
		ASPHALT - 165 mm thick		
		CLAY - silty, trace sand - dark grey to black - frozen to 0.60 m, moist, firm to stiff when thawed - high plasticity		G289
0.5				G290
				G291
1.0		-brown below 1.1 m		G292
				G293
1.5				G294
		-trace silt inclusions (<5 mm diam) below 1.98 m		G295
2.5		SILT - some clay, trace sand - light brown - moist, soft - low plasticity		G296
3.0				

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 ○

END OF TEST HOLE AT 3.0 m IN SILT
1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located between back of house #133 and #129, 2 m South from North edge of roadway.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2018-01-25_LOCAL STREETS 18-R-07 COLLENNNST_0035-056-00_0_A_HS.GPJ TREK GEOTECHNICAL.GDT 18-2-14

Sub-Surface Log

Test Hole TH17-38

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 - Colleen Road	**Location:**	UTM N-5532602, E-635001
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 20

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	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 - 229 mm thick				
		SAND (FILL) - gravelly, some silt, trace clay - light brown - frozen to 0.60 m, moist, loose when thawed - sub-angular to angular (<20 mm diam.) - carbonate (limestone)		G297		
0.5				G298		
		CLAY (Fill) - trace silt, trace sand, trace gravel - black - moist, stiff - high plasticity		G299		
1.0				G300		
				G301		
1.5		CLAY - silty, trace sand, trace gravel (<5 mm diam.) to 2.3 m - grey - moist, stiff		G302		
2.0				G303		
2.5		-brown below 2.7 m		G304		
3.0		END OF TEST HOLE AT 3.0 m IN CLAY				

1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located at back of house #135, 1 m North from South edge of roadway.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2018-01-25_LOCAL STREETS 18-R-07 COLLENNNST_0035-056-00_0_A_HS.GPJ TREK GEOTECHNICAL.GDT 18-2-14

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Moisture Content Report
ASTM D2216-10

Project No. 0035-056-00
Client Morrison Hershfield
Project Local Streets 18-R-07 Colleen Street

Sample Date 20-Dec-17
Test Date 22-Jan-18
Technician DS

Test Pit	TH17-34	TH17-34	TH17-34	TH17-34	TH17-34	TH17-34
Depth (m)	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8
Sample #	G265	G266	G267	G268	G269	G270
Tare ID	W90	N45	AB82	E25	K28	H34
Mass of tare	8.4	8.6	6.8	9.0	8.6	8.4
Mass wet + tare	313.8	313.0	324.2	335.6	329.4	381.8
Mass dry + tare	245.8	243.8	250.8	274.4	240.8	293.4
Mass water	68.0	69.2	73.4	61.2	88.6	88.4
Mass dry soil	237.4	235.2	244.0	265.4	232.2	285.0
Moisture %	28.6%	29.4%	30.1%	23.1%	38.2%	31.0%

Test Pit	TH17-34	TH17-34	TH17-35	TH17-35	TH17-35	TH17-35
Depth (m)	2.0 - 2.1	2.7 - 2.9	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2
Sample #	G271	G272	G273	G274	G275	G276
Tare ID	F95	F10	AB02	A26	AB66	F20
Mass of tare	8.4	9.0	7.4	8.6	6.6	8.6
Mass wet + tare	327.4	371.4	319.2	311.6	428.6	310.2
Mass dry + tare	221.6	252.6	236.8	241.0	334.0	241.2
Mass water	105.8	118.8	82.4	70.6	94.6	69.0
Mass dry soil	213.2	243.6	229.4	232.4	327.4	232.6
Moisture %	49.6%	48.8%	35.9%	30.4%	28.9%	29.7%

Test Pit	TH17-35	TH17-35	TH17-35	TH17-35	TH17-36	TH17-36
Depth (m)	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1	2.6 - 2.7	0.2 - 0.3	0.5 - 0.6
Sample #	G277	G278	G279	G280	G281	G282
Tare ID	E95	F84	E49	E13	F38	AB89
Mass of tare	8.6	8.6	8.6	9.0	8.6	7.2
Mass wet + tare	318.6	314.2	358.2	350.0	316.8	321.8
Mass dry + tare	245.6	242.2	266.0	269.0	212.4	244.0
Mass water	73.0	72.0	92.2	81.0	104.4	77.8
Mass dry soil	237.0	233.6	257.4	260.0	203.8	236.8
Moisture %	30.8%	30.8%	35.8%	31.2%	51.2%	32.9%

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Moisture Content Report
ASTM D2216-10

Project No. 0035-056-00
Client Morrison Hershfield
Project Local Streets 18-R-07 Colleen Street

Sample Date 20-Dec-17
Test Date 22-Jan-18
Technician DS

Test Pit	TH17-36	TH17-36	TH17-36	TH17-36	TH17-36	TH17-36
Depth (m)	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1	2.7 - 2.9
Sample #	G283	G284	G285	G286	G287	G288
Tare ID	Z65	AA24	AC24	W09	AC12	Z42
Mass of tare	8.4	7.0	6.6	8.6	6.6	8.8
Mass wet + tare	345.0	354.8	287.6	361.0	315.6	320.2
Mass dry + tare	267.2	278.0	224.0	295.8	243.0	223.0
Mass water	77.8	76.8	63.6	65.2	72.6	97.2
Mass dry soil	258.8	271.0	217.4	287.2	236.4	214.2
Moisture %	30.1%	28.3%	29.3%	22.7%	30.7%	45.4%

Test Pit	TH17-37	TH17-37	TH17-37	TH17-37	TH17-37	TH17-37
Depth (m)	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8
Sample #	G289	G290	G291	G292	G293	G294
Tare ID	AA19	F3	N23	C13	C20	AC26
Mass of tare	6.8	8.4	8.6	8.4	8.4	6.8
Mass wet + tare	360.8	302.8	320.0	308.8	334.8	399.4
Mass dry + tare	250.0	225.8	241.8	247.0	260.6	306.6
Mass water	110.8	77.0	78.2	61.8	74.2	92.8
Mass dry soil	243.2	217.4	233.2	238.6	252.2	299.8
Moisture %	45.6%	35.4%	33.5%	25.9%	29.4%	31.0%

Test Pit	TH17-37	TH17-37	TH17-38	TH17-38	TH17-38	TH17-38
Depth (m)	2.0 - 2.1	2.7 - 2.9	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2
Sample #	G295	G296	G297	G298	G299	G300
Tare ID	K26	D28	W73	W75	911	H50
Mass of tare	8.4	8.8	8.6	8.4	8.4	8.4
Mass wet + tare	347.4	450.6	721.4	324.0	314.6	303.6
Mass dry + tare	265.2	371.0	661.4	296.6	233.4	224.4
Mass water	82.2	79.6	60.0	27.4	81.2	79.2
Mass dry soil	256.8	362.2	652.8	288.2	225.0	216.0
Moisture %	32.0%	22.0%	9.2%	9.5%	36.1%	36.7%

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Moisture Content Report
ASTM D2216-10

Project No. 0035-056-00
Client Morrison Hershfield
Project Local Streets 18-R-07 Colleen Street

Sample Date 20-Dec-17
Test Date 22-Jan-18
Technician DS

Test Pit	TH17-38	TH17-38	TH17-38	TH17-38		
Depth (m)	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1	2.7 - 2.9		
Sample #	G301	G302	G303	G304		
Tare ID	W41	K31	AB11	W27		
Mass of tare	8.6	8.2	7.0	8.2		
Mass wet + tare	391.4	410.6	411.0	337.6		
Mass dry + tare	292.6	307.0	304.4	249.0		
Mass water	98.8	103.6	106.6	88.6		
Mass dry soil	284.0	298.8	297.4	240.8		
Moisture %	34.8%	34.7%	35.8%	36.8%		

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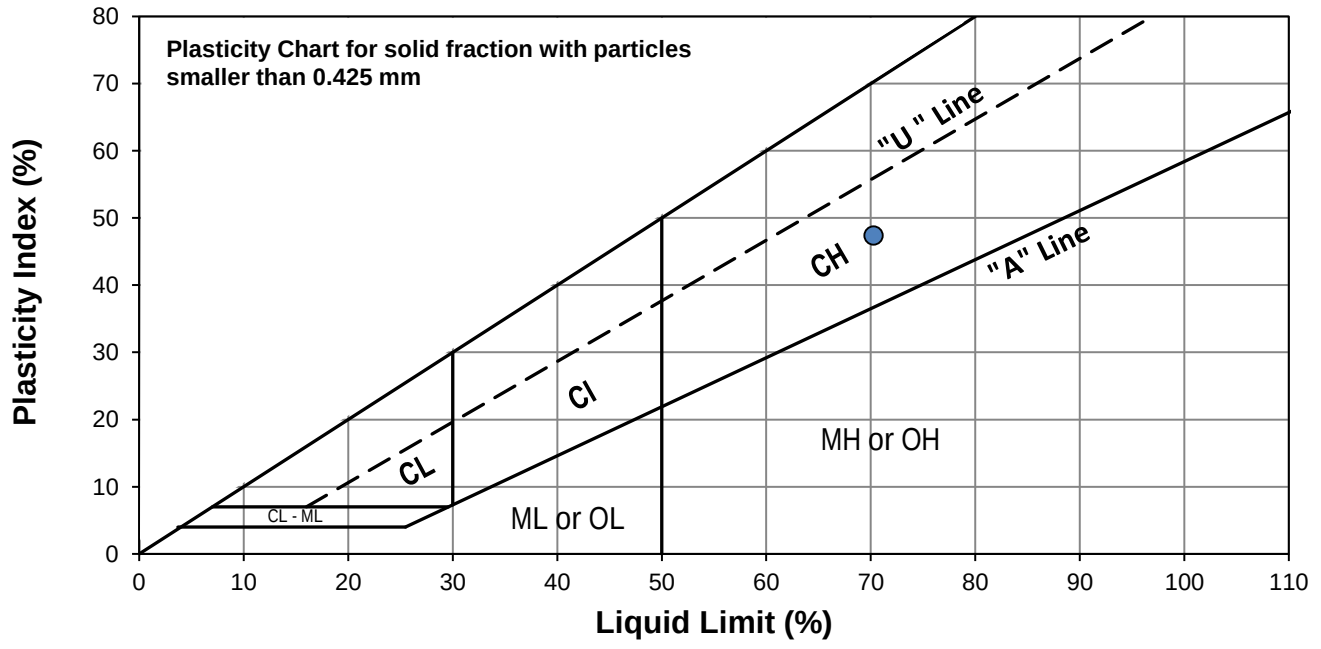
Atterberg Limits
ASTM D4318-10e1

Project No.	0035-056-00
Client	Morrision Hershfield
Project	2017 Local Streets 18-R-07 -Colleen Street
Test Hole	TH17-35
Sample #	G275
Depth (m)	0.8 - 0.9
Sample Date	20-Dec-17
Test Date	28-Jan-18
Technician	HS

Liquid Limit	70
Plastic Limit	23
Plasticity Index	47

Liquid Limit

Trial #	1	2	3		
Number of Blows (N)	18	22	27		
Mass Wet Soil + Tare (g)	26.415	29.616	26.572		
Mass Dry Soil + Tare (g)	21.349	23.275	21.482		
Mass Tare (g)	14.274	14.334	14.198		
Mass Water (g)	5.066	6.341	5.090		
Mass Dry Soil (g)	7.075	8.941	7.284		
Moisture Content (%)	71.604	70.920	69.879		



Plastic Limit

Trial #	1	2	3	4	5
Mass Tare (g)	19.144	18.948			
Mass Wet Soil + Tare (g)	18.219	18.137			
Mass Dry Soil + Tare (g)	14.258	14.517			
Mass Water (g)	0.925	0.811			
Mass Dry Soil (g)	3.961	3.620			
Moisture Content (%)	23.353	22.403			

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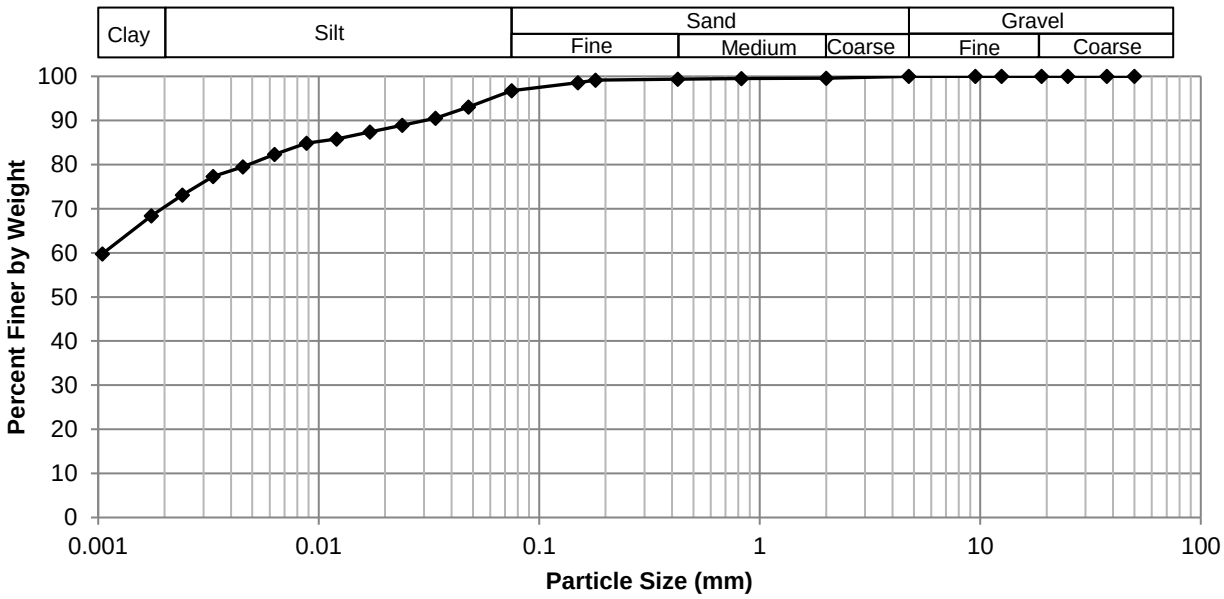
Grain Size Analysis (Hydrometer Method)
ASTM D422

Project No.	0035-056-00
Client	Morrison Hershfield
Project	Local Streets 18-R-07 Colleen St
Test Hole	TH17 - 35
Sample #	G275
Depth (m)	0.8 - 0.9
Sample Date	20-Dec-17
Test Date	27-Jan-18
Technician	DS

Gravel	0.0%
Sand	2.6%
Silt	27.2%
Clay	70.2%

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	96.79
37.5	100.00	2.00	99.62	0.0479	93.07
25.0	100.00	0.825	99.48	0.0338	90.54
19.0	100.00	0.425	99.38	0.0239	88.95
12.5	100.00	0.180	99.17	0.0171	87.37
9.50	100.00	0.150	98.57	0.0121	85.79
4.75	100.00	0.075	96.79	0.0088	84.84
				0.0063	82.31
				0.0045	79.46
				0.0033	77.30
				0.0024	73.13
				0.0017	68.39
				0.0010	59.79

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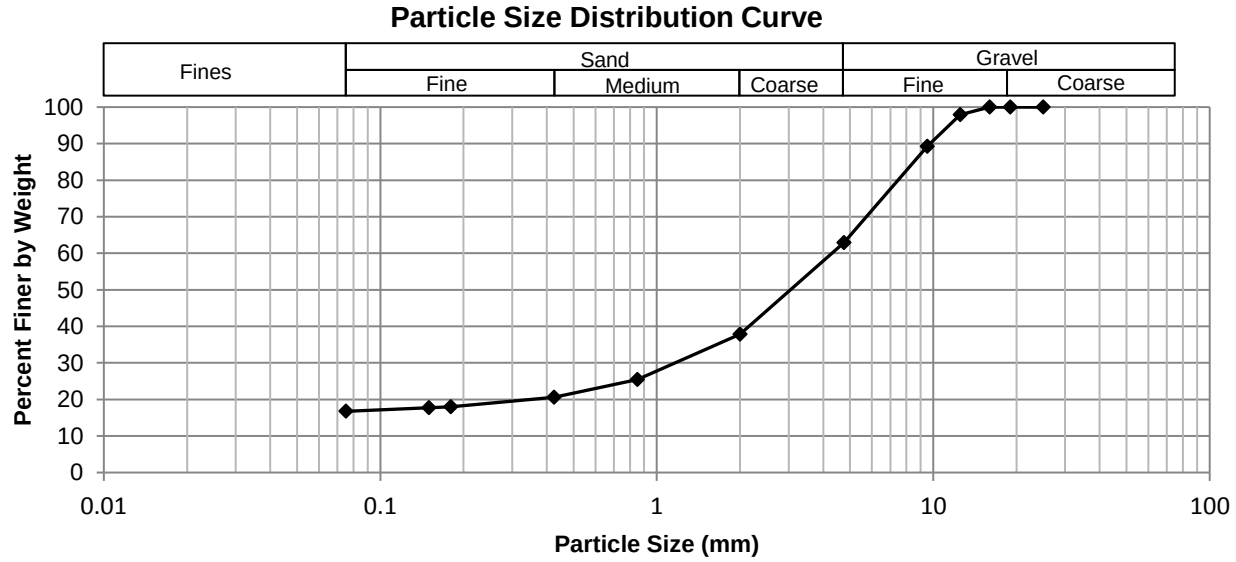
Grain Size Analysis (Sieve Method)
ASTM C136-06

Project No.	0035-056-00
Client	Morrison Hershfield
Project	Local Streets - 18-R-07 - Colleen Street
Test Hole	TH17-38
Sample #	G297
Depth (m)	0.1 - 0.3
Date Sampled	20-Dec-17
Date Tested	23-Jan-18
Technician	JB/DS

Total Weight (g)	652.8
Gravel %	37.1
Sand %	46.1
Fines %	16.8



Sieve Number	Sieve Opening (mm)	Percent Passing	Specification (Min-Max)
6"	150		
5"	125		
4"	100		
3"	75.0		
2"	50.0		
1 1/2"	37.5		
1"	25.0	100	
3/4"	19.0	100	
5/8"	16.0	100	
1/2"	12.5	98	
3/8"	9.50	89	
no. 4	4.75	63	
no. 10	2.00	38	
no. 20	0.850	25	
no. 40	0.425	21	
no. 80	0.180	18	
no. 100	0.150	18	
no. 200	0.075	17	

Photo 1: Pavement Core Sample at Test Hole TH17-34

Photo 2: Pavement Core Sample at Test Hole TH17-35

Photo 3: Pavement Core Sample at Test Hole TH17-36

Photo 4: Pavement Core Sample at Test Hole TH17-37

Photo 5: Pavement Core Sample at Test Hole TH17-38

Appendix G

Rupertsland Ave – between McGregor St. to Powers St.

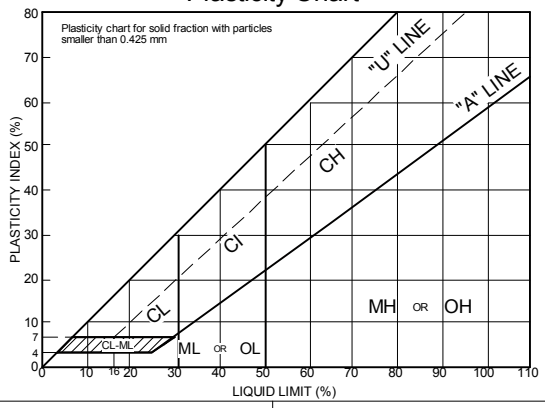
Test Hole Logs, Summary Table, Lab Data and Photographs of Pavement Core Samples

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* — $C_U = \frac{D_{60}}{D_{10}}$ greater than 4; $C_C = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3
			GP		Poorly-graded gravels, gravel-sand mixtures, little or no fines	Not meeting all gradation requirements for GW
		Gravel with fines (Appreciable amount of fines)	GM		Silty gravels, gravel-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
			GC		Clayey gravels, gravel-sand-silt mixtures	Atterberg limits above "A" line or P.I. greater than 7
	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 — 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
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
#40 to #10	0.425 to 2.00		Coarse
#200 to #40	0.075 to 0.425		Medium
< #200	< 0.075		Fine
			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
#4 to 3/4 in.	4.75 to 19		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

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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

Sub-Surface Log

Test Hole TH17-39
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 -Rupertsland Ave	**Location:**	UTM N-5532995, E-634225
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 21

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	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
		ASPHALT - 51 mm thick				
		CONCRETE - 102 mm thick				
		CLAY (Fill)- silty, trace sand, trace gravel to 0.45 m - dark grey - frozen to 0.60 m, moist and soft when thawed - high plasticity		G305	●	
0.5				G306	●	
				G307	●	
		SILT - clayey, trace sand - light brown - moist, firm - low plasticity		G308	●	
1.0				G309	●	△ ✤
1.5				G310	●	△ ✤
		CLAY - silty - grey - moist, stiff - high plasticity		G311	●	△ ✤
2.0						
2.5				G312	●	✤
3.0						

END OF TEST HOLE AT 3.0 m IN CLAY
1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located at house #352, 1.3 m North of South curb.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2018-01-25_LOCAL STREETS 18-R-07 RUPERTSLAND AVE_0035-056-00_0_A_HS.GPJ TREK GEOTECHNICAL.GDT 18-2-14

Sub-Surface Log

Test Hole TH17-40
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 -Rupertsland Ave	**Location:**	UTM N-5533028, E-634173
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 21

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	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 - 51 mm thick				
		CONCRETE - 114 mm thick				
		CLAY (Fill)- silty, trace sand, trace gravel - grey - frozen to 0.60 m, moist and firm when thawed - high plasticity		G313		
0.5				G314		
		SILT - clayey, trace sand - light brown - moist, soft - low plasticity		G315		
1.0				G316		
		CLAY - silty - brown - moist, stiff - high plasticity		G317		
1.5		- trace precipitates (sulphates) below 1.68 m		G318		
2.0		- grey, stiff below 1.98 m		G319		
2.5						
		- firm to stiff below 2.85 m m		G320		
3.0						

END OF TEST HOLE AT 3.0 m IN CLAY
1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located at house #369, 1.1 m South of North curb.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2018-01-25_LOCAL STREETS 18-R-07 RUPERTSLAND AVE_0035-056-00_0_A_HS.GPJ TREK GEOTECHNICAL.GDT 18-2-14

Sub-Surface Log

Test Hole TH17-41
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 -Rupertsland Ave	**Location:**	UTM N-5533043, E-634125
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 21

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	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
		ASPHALT - 38 mm thick				
		CONCRETE - 216 mm thick				
		CLAY - silty, trace sand - grey - frozen to 0.60 m, moist and soft when thawed - high plasticity		G321		
0.5				G322		
		SILT - clayey, trace sand - light brown - moist, soft - intermediate plasticity		G323		
1.0				G324		
		CLAY - silty - brown - moist, stiff - high plasticity		G325		
1.5		- grey, very stiff below 1.68 m		G326		
2.0		- trace silt inclusions (<10 mm diam.), stiff below 1.98 m		G327		
2.5						
				G328		
3.0		END OF TEST HOLE AT 3.0 m IN CLAY				

1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located at house #382, 1.4 m North of South curb.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2018-01-25_LOCAL STREETS 18-R-07 RUPERTSLAND AVE_0035-056-00_0_A_HS.GPJ TREK GEOTECHNICAL.GDT 18-2-14

Sub-Surface Log

Test Hole TH17-42
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 -Rupertsland Ave	**Location:**	UTM N-5533075, E-634072
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 21

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	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
		ASPHALT - 38 mm thick				
		CONCRETE - 153 mm thick				
		CLAY - silty, trace sand, trace gravel - grey - frozen to 0.60 m, moist and soft when thawed - high plasticity		G329		
0.5		- dark brown, stiff below 0.45 m		G330		
		SILT AND CLAY - trace sand, trace organics - light brown - moist, firm - intermediate plasticity		G331		
1.0				G332		
				G333		
1.5		CLAY - silty - brown - moist, very stiff - high plasticity		G334		
2.0		- stiff below 1.98 m		G335		
2.5						
				G336		
3.0		-grey, firm below 2.90 m				

END OF TEST HOLE AT 3.0 m IN CLAY
1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located at house #399, 1.5 m South of North curb.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2018-01-25_LOCAL STREETS 18-R-07 RUPERTSLAND AVE_0035-056-00_0_A_HS.GPJ TREK GEOTECHNICAL.GDT 18-2-14

Sub-Surface Log

Test Hole TH17-43
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 -Rupertsland Ave	**Location:**	UTM N-5533086, E-634021
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 21

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	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
		ASPHALT - 76 mm thick				
		CONCRETE - 229 mm thick				
		CLAY (FILL) - silty, trace gravel, trace organics - brown - frozen to 0.60 m, moist and stiff when thawed - high plastcity		G337	●	
0.5		- grey, firm, below 0.45 m		G338	●	△ ✤
		- very stiff, below 0.76 m		G339	●	△ ✤
1.0		SILT AND CLAY - trace sand - light brown - moist, soft - intermediate plasticity		G340	●	
1.5		SILT - trace clay, trace sand - light brown - moist, soft - low plasticity		G341	●	
				G342	●	△ ✤
2.0				G343	●	
2.5		CLAY - silty, trace sand - brown - moist, firm - high plasticity		G344	●	△ ✤
3.0		- grey, firm below 2.90 m				

END OF TEST HOLE AT 3.0 m IN CLAY
1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located at house #412, 1.4 m North of South curb.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2018-01-25_LOCAL STREETS 18-R-07 RUPERTSLAND AVE_0035-056-00_0_A_HS.GPJ TREK GEOTECHNICAL.GDT 18-2-14

Sub-Surface Log

Test Hole TH17-44
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 -Rupertsland Ave	**Location:**	UTM N-5533115, E-633981
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 21

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	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
		ASPHALT - 24 mm thick				
		CONCRETE - 178 mm thick				
		CLAY - silty, trace sand - grey - frozen to 0.60 m, moist and soft when thawed - high plasticity	G	G345	●	
0.5		SILT - trace clay, trace sand - light brown - moist, soft - low plasticity	G	G346	●	
			G	G347	●	
1.0			G	G348	●	
		- firm below 1.5	G	G349	●	△ ✤
1.5			G	G350	●	△ ✤
2.0		CLAY - silty - brown - moist, stiff - high plasticity	G	G351	●	✤
2.5			G	G352	●	✤ △
3.0		- trace silt inclusions (< 5 mm diam.), grey, firm below 2.9 m				

END OF TEST HOLE AT 3.0 m IN CLAY
1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located at house #429, 1.5 m South of North curb.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2018-01-25_LOCAL STREETS 18-R-07 RUPERTSLAND AVE_0035-056-00_0_A_HS.GPJ TREK GEOTECHNICAL.GDT 18-2-14

Sub-Surface Log

Test Hole TH17-45
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 -Rupertsland Ave	**Location:**	UTM N-5533162, E-633890
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 21

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	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
		ASPHALT - 38 mm thick				
		CONCRETE - 102 mm thick				
		CLAY (Fill)- silty, trace sand, trace gravel - grey - frozen to 0.60 m, moist and soft when thawed - high plasticity		G353		
0.5				G354		
		SILT AND CLAY - trace sand - light brown - moist, stiff - intermediate plasticity		G355		
1.0		SILT - clayey, trace sand - light brown - moist, soft to firm - low plasticity		G356		
				G357		
1.5				G358		
		CLAY - silty - brown - moist, stiff - high plasticity		G359		
2.0						
2.5				G360		
3.0		- grey, firm, high plasticity 2.90 m				

END OF TEST HOLE AT 3.0 m IN CLAY
1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located at house #449, 1.5 m South of North curb.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2018-01-25_LOCAL STREETS 18-R-07 RUPERTSLAND AVE_0035-056-00_0_A_HS.GPJ TREK GEOTECHNICAL.GDT 18-2-14

Sub-Surface Log

Test Hole TH17-46
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035-056-00
Project Name:	Local Streets 18-R-07 -Rupertsland Ave	**Location:**	UTM N-5533135, E-633940
Contractor:	Maple Leaf Drilling	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, B40 Mobile Truck Mount	**Date Drilled:**	2017 December 22

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
		ASPHALT - 51 mm thick		
		CONCRETE - 165 mm thick		
		CLAY - silty, trace sand, trace gravel - grey - frozen to 0.60 m, moist and soft when thawed - high plasticity		G361
0.5				G362
				G363
1.0		SILT AND CLAY - trace sand - light brown - moist, soft to firm - intermediate plasticity		G364
		SILT - trace clay, trace sand - light brown - moist, soft - low plasticity		G365
1.5				G366
		CLAY - silty - brown - moist, stiff - high plasticity		G367
2.0				
2.5				
		- grey, firm below 2.90 m		G368
3.0				

Bulk Unit Wt (kN/m^3): 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

END OF TEST HOLE AT 3.0 m IN CLAY
1) No seepage or sloughing.
2) Test hole backfilled with auger cuttings, bentonite chips, sand and cold patch asphalt.
3) Test hole located at house #461, 1.2 m South of North curb.

Logged By: Dawn Sellick **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 2018-01-25_LOCAL STREETS 18-R-07 RUPERTSLAND AVE_0035-056-00_0_A_HS.GPJ TREK GEOTECHNICAL.GDT 18-2-14

Local Streets Package 18-R-07
Sub-Surface Investigation
Rupertsland Avenue

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)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Plastic	Liquid	Plasticity Index
TH17-39	UTM: 5532995 N, 634225 E Located in front of House #352, 1.5 m North of South curb.	Asphalt	51	102	120											
						CLAY (FILL)	0.2	0.3	35							
						CLAY (FILL)	0.5	0.6	37							
						CLAY (FILL)	0.8	0.9	37							
						SILT	1.1	1.2	21							
						SILT	1.4	1.5	23							
						SILT	1.7	1.8	23							
						CLAY	2.0	2.1	32							
						CLAY	2.7	2.9	41							
TH17-40	UTM: 5533028 N, 634173 E Located at House # 369, 1.1 m South of North curb.	Asphalt	51	Concrete	114											
						CLAY (FILL)	0.2	0.3	30							
						CLAY (FILL)	0.5	0.6	22							
						SILT	0.8	0.9	25	0	4	69	27	18	25	7
						SILT	1.1	1.2	25							
						CLAY	1.4	1.5	22							
						CLAY	1.7	1.8	22							
						CLAY	2.0	2.1	39							
						CLAY	2.6	2.7	43							
TH17-41	UTM: 5533043 N, 634125 E Located at House #382, 1.4 m North of South curb.	Asphalt	38	Concrete	216											
						CLAY	0.2	0.3	27							
						CLAY	0.5	0.6	30							
						SILT	0.8	0.9	18							
						SILT	1.1	1.2	21							
						CLAY	1.4	1.5	28							
						CLAY	1.7	1.8	33							
						CLAY	2.0	2.1	40							
						CLAY	2.9	3.0	50							
TH17-42	UTM: 5533075 N, 634072 E Located at House #399, 1.5 m South of North curb.	Asphalt	38	Concrete	153											
						CLAY	0.2	0.3	31							
						CLAY	0.5	0.6	34							
						SILT AND CLAY	0.8	0.9	23							
						SILT AND CLAY	1.1	1.2	19							
						SILT AND CLAY	1.4	1.5	21							
						CLAY	1.7	1.8	31							
						CLAY	2.0	2.1	46							
						CLAY	2.9	3.0	52							

Local Streets Package 18-R-07
Sub-Surface Investigation
Rupertsland Avenue

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)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Plastic	Liquid	Plasticity Index
TH17-43	UTM: 5533086 N, 634021 E Located at House # 412, 1.4 m North of South curb.	Asphalt	25	Concrete	200											
						CLAY (FILL)	0.2	0.3	12							
						CLAY (FILL)	0.5	0.6	30	0	3	19	79	25	79	54
						CLAY (FILL)	0.8	0.9	25							
						SILT AND CLAY	1.1	1.2	28							
						SILT	1.4	1.5	49							
						SILT	1.7	1.8	21							
						SILT	2.0	2.1	22							
						CLAY	2.9	3.0	48							
TH17-44	UTM: 5533115 N, 633981 E Located at House # 429, 1.5 m South of North curb.	Asphalt	24	Concrete	178											
						CLAY	0.2	0.3	34							
						SILT	0.5	0.6	32							
						SILT	0.8	0.9	16							
						SILT	1.1	1.2	19							
						SILT	1.4	1.5	23							
						SILT	1.7	1.8	21							
						CLAY	2.0	2.1	32							
						CLAY	2.9	3.0	50							
TH17-45	UTM: 5533162 N, 633890 E Located at House #448, 1.5 m South of North curb.	Asphalt	38	Concrete	102											
						CLAY (FILL)	0.2	0.3	25							
						CLAY (FILL)	0.5	0.6	26							
						CLAY AND SILT	0.8	0.9	22							
						SILT	1.1	1.2	21							
						SILT	1.4	1.5	20							
						SILT	1.7	1.8	27							
						CLAY	2.0	2.1	41							
						CLAY	2.9	3.0	49							
TH17-46	UTM: 553135 N, 633940 E Located at House #461, 1.2 m South of North curb.	Asphalt	51	Concrete	165											
						CLAY	0.2	0.3	N/A							
						CLAY	0.5	0.6	33							
						CLAY	0.8	0.9	23							
						SILT AND CLAY	1.1	1.2	17							
						SILT	1.4	1.5	22							
						SILT	1.7	1.8	23							
						CLAY	2.0	2.1	36							
						CLAY	2.9	3.0	49							

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Moisture Content Report
ASTM D2216-10

Project No. 0035-056-00
Client Morrison Hershfield
Project Local Streets 18-R-07 Ruspertsland Avenue

Sample Date 21-Dec-17
Test Date 21-Jan-18
Technician DS/AFK

Test Pit	TH17-39	TH17-39	TH17-39	TH17-39	TH17-39	TH17-39
Depth (m)	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8
Sample #	G305	G306	G307	G308	G309	G310
Tare ID	E24	C22	Z05	E66	F99	H19
Mass of tare	8.6	8.4	8.4	9.4	8.6	8.6
Mass wet + tare	317.8	304.0	308.4	318.2	304.4	341.0
Mass dry + tare	237.4	224.0	227.8	264.2	249.6	279.5
Mass water	80.4	80.0	80.6	54.0	54.8	61.5
Mass dry soil	228.8	215.6	219.4	254.8	241.0	270.9
Moisture %	35.1%	37.1%	36.7%	21.2%	22.7%	22.7%

Test Pit	TH17-39	TH17-39	TH17-40	TH17-40	TH17-40	TH17-40
Depth (m)	2.0 - 2.1	2.7 - 2.9	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2
Sample #	G311	G312	G313	G314	G315	G316
Tare ID	H52	A1	Q01	W100	H29	P20
Mass of tare	8.4	8.0	8.4	8.4	8.4	8.8
Mass wet + tare	317	311.2	316.2	312.2	407	375
Mass dry + tare	241.8	223.8	239.9	232.0	342.4	317.4
Mass water	75.2	87.4	76.3	80.2	64.6	57.6
Mass dry soil	233.4	215.8	231.5	223.6	334.0	308.6
Moisture %	32.2%	40.5%	33.0%	35.9%	19.3%	18.7%

Test Pit	TH17-40	TH17-40	TH17-40	TH17-40	TH17-41	TH17-41
Depth (m)	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1	2.7 - 2.9	0.2 - 0.3	0.5 - 0.6
Sample #	G317	G318	G319	G320	G321	G322
Tare ID	Z135	AB94	P24	D42	E70	N02
Mass of tare	8.8	6.8	8.4	8.6	8.8	8.4
Mass wet + tare	315.2	317.0	339.8	300.4	319.4	303.0
Mass dry + tare	244.4	242.6	234.5	203.2	254.4	234.7
Mass water	70.8	74.4	105.3	97.2	65.0	68.3
Mass dry soil	235.6	235.8	226.1	194.6	245.6	226.3
Moisture %	30.1%	31.6%	46.6%	49.9%	26.5%	30.2%

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Moisture Content Report
ASTM D2216-10

Project No. 0035-056-00
Client Morrison Hershfield
Project Local Streets 18-R-07 Ruspertsland Avenue

Sample Date 21-Dec-17
Test Date 21-Jan-18
Technician DS/AFK

Test Pit	TH17-41	TH17-41	TH17-41	TH17-41	TH17-41	TH17-41
Depth (m)	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1	2.9 - 3.0
Sample #	G323	G324	G325	G326	G327	G328
Tare ID	F79	Z77	K34	Z59	N21	F151
Mass of tare	8.8	8.4	8.4	8.6	8.6	8.6
Mass wet + tare	327.4	308.2	320.8	348.6	300.6	367.8
Mass dry + tare	278.5	255.9	252.1	264.2	216.6	248.7
Mass water	48.9	52.3	68.7	84.4	84.0	119.1
Mass dry soil	269.7	247.5	243.7	255.6	208.0	240.1
Moisture %	18.1%	21.1%	28.2%	33.0%	40.4%	49.6%

Test Pit	TH17-42	TH17-42	TH17-42	TH17-42	TH17-42	TH17-42
Depth (m)	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8
Sample #	G329	G330	G331	G332	G333	G334
Tare ID	W45	D40	AC35	F9	N69	E136
Mass of tare	8.4	8.4	6.6	9.2	9.0	8.4
Mass wet + tare	318.0	304.2	312.8	351.2	300.4	327.8
Mass dry + tare	263.9	229.2	254.8	296.8	250.2	252.2
Mass water	54.1	75.0	58.0	54.4	50.2	75.6
Mass dry soil	255.5	220.8	248.2	287.6	241.2	243.8
Moisture %	21.2%	34.0%	23.4%	18.9%	20.8%	31.0%

Test Pit	TH17-42	TH17-42	TH17-43	TH17-43	TH17-43	TH17-43
Depth (m)	2.0 - 2.1	2.9 - 3.0	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2
Sample #	G335	G336	G337	G338	G339	G340
Tare ID	N91	F42	F94	Z85	W88	H17
Mass of tare	8.4	8.4	8.4	8.2	8.4	8.8
Mass wet + tare	321.4	339.6	304.8	401.0	309.4	316.8
Mass dry + tare	223.0	226.9	272.8	309.7	248.5	248.8
Mass water	98.4	112.7	32.0	91.3	60.9	68.0
Mass dry soil	214.6	218.5	264.4	301.5	240.1	240.0
Moisture %	45.9%	51.6%	12.1%	30.3%	25.4%	28.3%

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Moisture Content Report
ASTM D2216-10

Project No. 0035-056-00
Client Morrison Hershfield
Project Local Streets 18-R-07 Ruspertsland Avenue

Sample Date 21-Dec-17
Test Date 21-Jan-18
Technician DS/AFK

Test Pit	TH17-43	TH17-43	TH17-43	TH17-43	TH17-44	TH17-44
Depth (m)	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1	2.9 - 3.0	0.2 - 0.3	0.5 - 0.6
Sample #	G341	G342	G343	G344	G345	G346
Tare ID	F52	W79	P40	GH66	H46	F149
Mass of tare	8.4	8.4	8.6	8.4	8.4	8.4
Mass wet + tare	334.0	341.6	341.8	343.6	342.8	326.6
Mass dry + tare	227.7	283.9	281.8	235.0	258.1	250.1
Mass water	106.3	57.7	60.0	108.6	84.7	76.5
Mass dry soil	219.3	275.5	273.2	226.6	249.7	241.7
Moisture %	48.5%	20.9%	22.0%	47.9%	33.9%	31.7%

Test Pit	TH17-44	TH17-44	TH17-44	TH17-44	TH17-44	TH17-44
Depth (m)	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1	2.9 - 3.0
Sample #	G347	G348	G349	G350	G351	G352
Tare ID	E59	AB71	H90	F35	N26	Z43
Mass of tare	8.4	6.6	8.6	8.6	8.4	8.4
Mass wet + tare	306.2	328.8	326.4	339.0	334.2	304.2
Mass dry + tare	265.2	276.8	268.1	281.3	255.9	205.8
Mass water	41.0	52.0	58.3	57.7	78.3	98.4
Mass dry soil	256.8	270.2	259.5	272.7	247.5	197.4
Moisture %	16.0%	19.2%	22.5%	21.2%	31.6%	49.8%

Test Pit	TH17-45	TH17-45	TH17-45	TH17-45	TH17-45	TH17-45
Depth (m)	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8
Sample #	G353	G354	G355	G356	G357	G358
Tare ID	E100	P30	AC30	H13	AB87	H64
Mass of tare	8.8	8.4	6.8	8.4	6.8	8.4
Mass wet + tare	297.6	315.0	326.8	349.8	305.2	389.4
Mass dry + tare	239.4	251.2	269.9	289.8	255.5	309.4
Mass water	58.2	63.8	56.9	60.0	49.7	80.0
Mass dry soil	230.6	242.8	263.1	281.4	248.7	301.0
Moisture %	25.2%	26.3%	21.6%	21.3%	20.0%	26.6%

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Moisture Content Report
ASTM D2216-10

Project No. 0035-056-00
Client Morrison Hershfield
Project Local Streets 18-R-07 Ruspertsland Avenue

Sample Date 21-Dec-17
Test Date 21-Jan-18
Technician DS/AFK

Test Pit	TH17-45	TH17-45	TH17-46	TH17-46	TH17-46	TH17-46
Depth (m)	2.0 - 2.1	2.9 - 3.0	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5
Sample #	G359	G360	G362	G363	G364	G365
Tare ID	H27	F25	F114	W65	P09	Z85
Mass of tare	8.2	8.4	8.2	8.4	8.4	8.4
Mass wet + tare	300.6	331.2	348.4	345.8	301.0	356.8
Mass dry + tare	215.2	225.5	264.0	282.1	258.5	294.9
Mass water	85.4	105.7	84.4	63.7	42.5	61.9
Mass dry soil	207.0	217.1	255.8	273.7	250.1	286.5
Moisture %	41.3%	48.7%	33.0%	23.3%	17.0%	21.6%

Test Pit	TH17-46	TH17-46	TH17-46			
Depth (m)	1.7 - 1.8	2.0 - 2.1	2.9 - 3.0			
Sample #	G366	G367	G368			
Tare ID	F87	D37	E31			
Mass of tare	8.4	8.2	8.6			
Mass wet + tare	322.4	307.6	307.4			
Mass dry + tare	264.7	228.9	209.8			
Mass water	57.7	78.7	97.6			
Mass dry soil	256.3	220.7	201.2			
Moisture %	22.5%	35.7%	48.5%			

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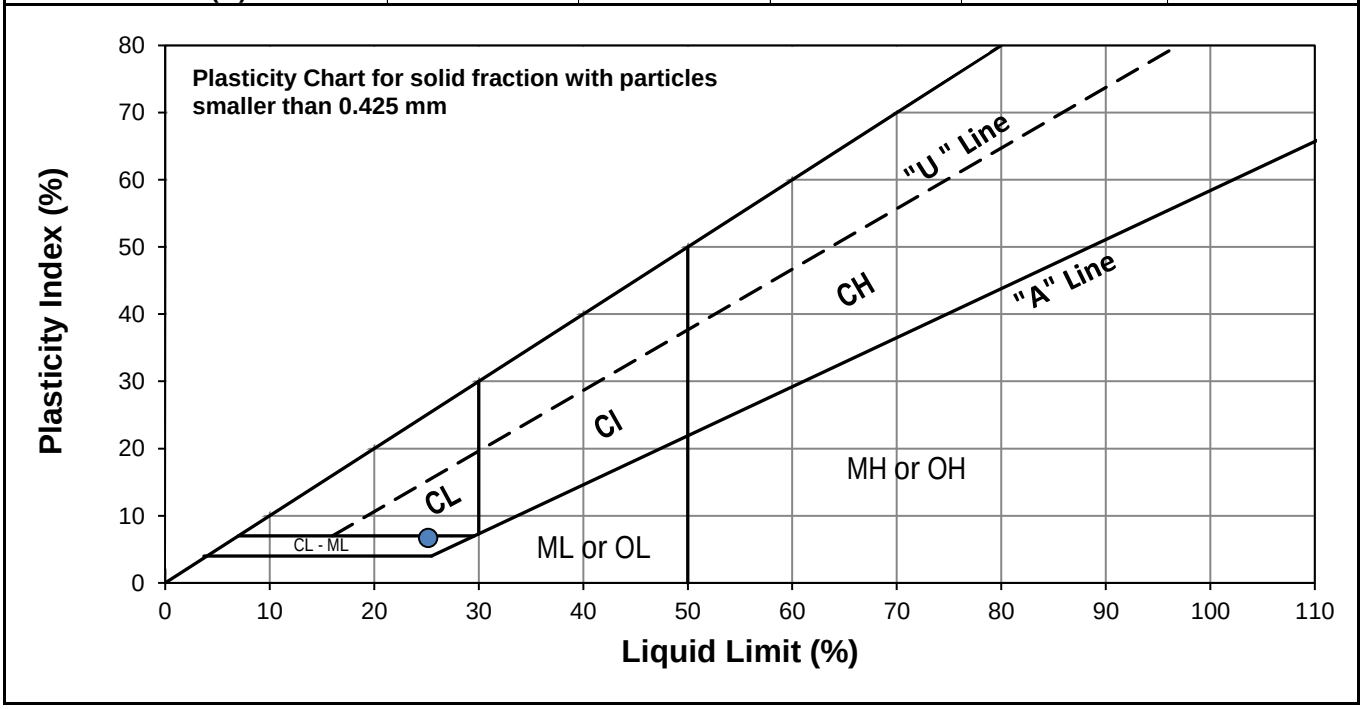
Atterberg Limits
ASTM D4318-10e1

Project No.	0035-056-00
Client	Morrision Hershfield
Project	2017 Local Streets 18-R-07 -Rupertsland Avenue
Test Hole	TH17-40
Sample #	G315
Depth (m)	0.8 - 0.9
Sample Date	21-Dec-17
Test Date	26-Jan-18
Technician	AFK

Liquid Limit	25
Plastic Limit	18
Plasticity Index	7

Liquid Limit

Trial #	1	2	3		
Number of Blows (N)	18	23	35		
Mass Wet Soil + Tare (g)	24.655	29.770	24.763		
Mass Dry Soil + Tare (g)	22.476	26.647	22.692		
Mass Tare (g)	14.138	14.300	14.163		
Mass Water (g)	2.179	3.123	2.071		
Mass Dry Soil (g)	8.338	12.347	8.529		
Moisture Content (%)	26.133	25.294	24.282		



Plastic Limit

Trial #	1	2	3	4	5
Mass Tare (g)	22.637	23.203			
Mass Wet Soil + Tare (g)	21.351	21.767			
Mass Dry Soil + Tare (g)	14.231	14.170			
Mass Water (g)	1.286	1.436			
Mass Dry Soil (g)	7.120	7.597			
Moisture Content (%)	18.062	18.902			

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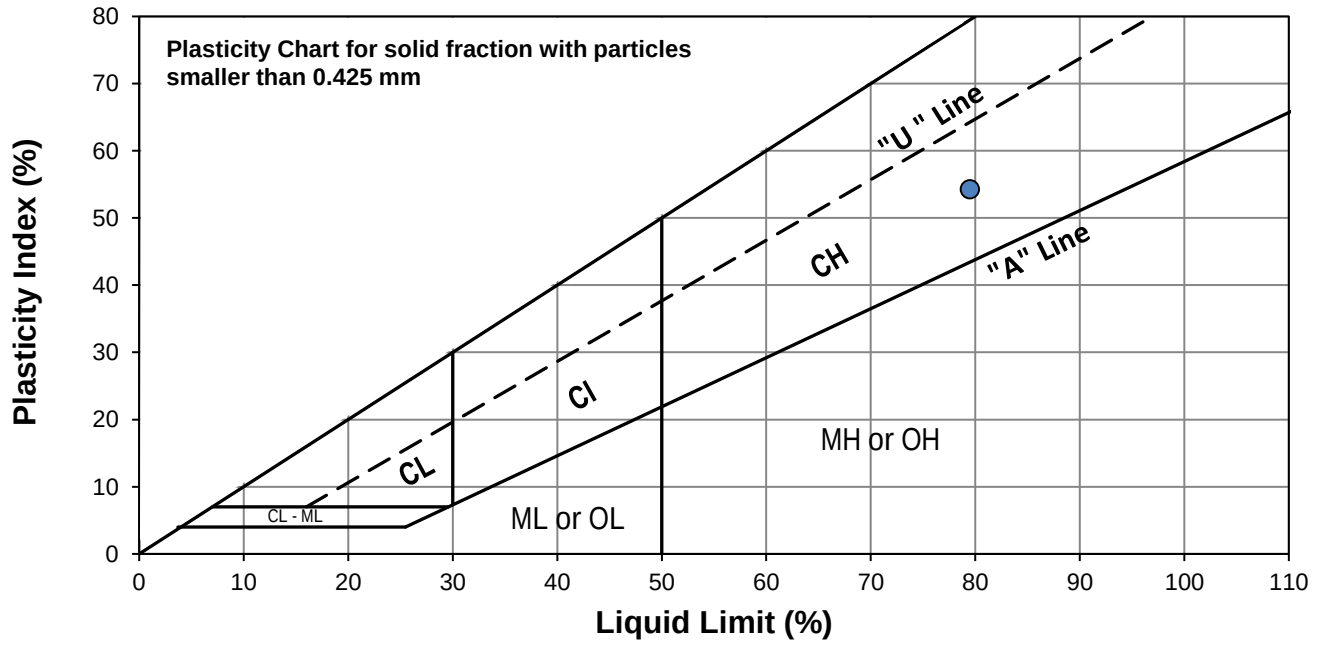
Atterberg Limits
ASTM D4318-10e1

Project No.	0035-056-00
Client	Morrision Hershfield
Project	2017 Local Streets 18-R-07 -Rupertsland Avenue
Test Hole	TH17-43
Sample #	G338
Depth (m)	0.8 - 0.9
Sample Date	21-Dec-17
Test Date	26-Jan-18
Technician	DS

Liquid Limit	79
Plastic Limit	25
Plasticity Index	54

Liquid Limit

Trial #	1	2	3		
Number of Blows (N)	19	24	34		
Mass Wet Soil + Tare (g)	20.912	19.938	19.862		
Mass Dry Soil + Tare (g)	17.890	17.403	17.278		
Mass Tare (g)	14.183	14.232	13.924		
Mass Water (g)	3.022	2.535	2.584		
Mass Dry Soil (g)	3.707	3.171	3.354		
Moisture Content (%)	81.521	79.943	77.042		



Plastic Limit

Trial #	1	2	3	4	5
Mass Tare (g)	20.493	20.376			
Mass Wet Soil + Tare (g)	19.208	19.112			
Mass Dry Soil + Tare (g)	14.073	14.147			
Mass Water (g)	1.285	1.264			
Mass Dry Soil (g)	5.135	4.965			
Moisture Content (%)	25.024	25.458			

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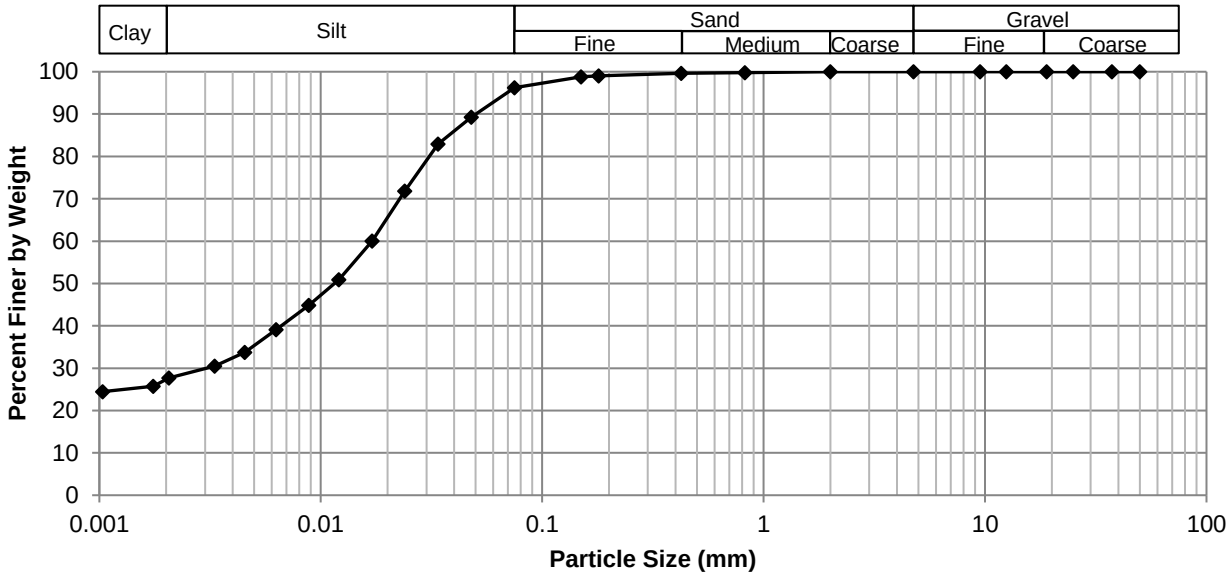
Grain Size Analysis (Hydrometer Method)
ASTM D422

Project No.	0035-056-00
Client	Morrison Hershfield
Project	Local Streets 18-R-07 Rupertsland Avenue
Test Hole	TH17-40
Sample #	G315
Depth (m)	0.8 - 0.9
Sample Date	9-Jan-18
Test Date	21-Dec-17
Technician	AFK

Gravel	0.0%
Sand	3.8%
Silt	68.9%
Clay	27.3%

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	96.20
37.5	100.00	2.00	100.00	0.0479	89.30
25.0	100.00	0.825	99.80	0.0338	82.94
19.0	100.00	0.425	99.60	0.0239	71.83
12.5	100.00	0.180	99.00	0.0171	60.07
9.50	100.00	0.150	98.80	0.0121	50.86
4.75	100.00	0.075	96.20	0.0088	44.83
				0.0063	39.11
				0.0045	33.71
				0.0033	30.53
				0.0021	27.67
				0.0018	25.77
				0.0010	24.45

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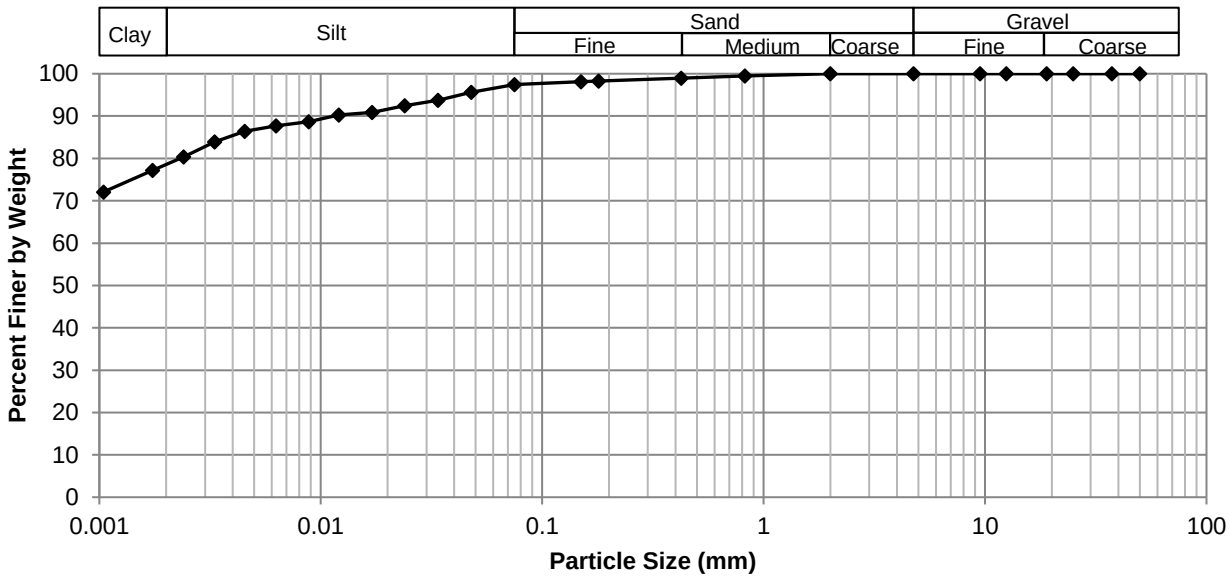
Grain Size Analysis (Hydrometer Method)
ASTM D422

Project No.	0035-056-00
Client	Morrison Hershfield
Project	Local Streets 18-R-07 Rupertsland Avenue
Test Hole	TH17 - 43
Sample #	G338
Depth (m)	0.5 - 0.6
Sample Date	21-Dec-17
Test Date	27-Jan-18
Technician	DS

Gravel	0.0%
Sand	2.5%
Silt	19.0%
Clay	78.5%

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	97.48
37.5	100.00	2.00	100.00	0.0479	95.65
25.0	100.00	0.825	99.49	0.0338	93.74
19.0	100.00	0.425	98.92	0.0239	92.47
12.5	100.00	0.180	98.25	0.0171	90.88
9.50	100.00	0.150	98.14	0.0121	90.25
4.75	100.00	0.075	97.48	0.0088	88.66
				0.0063	87.71
				0.0045	86.44
				0.0033	83.95
				0.0024	80.40
				0.0017	77.23
				0.0010	72.09

Photo 1: Pavement Core Sample at Test Hole TH17-39

Photo 2: Pavement Core Sample at Test Hole TH17-40

Photo 3: Pavement Core Sample at Test Hole TH17-41

Photo 4: Pavement Core Sample at Test Hole TH17-42

Photo 5: Pavement Core Sample at Test Hole TH17-43

Photo 6: Pavement Core Sample at Test Hole TH17-44

Photo 7: Pavement Core Sample at Test Hole TH17-45

Photo 8: Pavement Core Sample at Test Hole TH17-46