

APPENDIX 'A'

GEOTECHNICAL REPORT



Quality Engineering | Valued Relationships

Morrison Hershfield
Salter Street Rehabilitation
Sub-Surface Investigation

Prepared for:

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

Distribution:

Brad Sacher, P.Eng.

Project Number:

0035-045-00

Date:

April 6, 2017
Final Report



Quality Engineering | Valued Relationships

April 6, 2017

Our File No. 0035-045-00

Brad Sacher, P.Eng.
Morrison Hershfield
59 Scurfield Blvd, Unit 1
Winnipeg, MB R3Y 1V2

**RE: Salter Street Rehabilitation
Sub-Surface Investigation Report**

TREK Geotechnical Inc. is pleased to submit our report for the sub-surface investigations for the Salter Street Rehabilitation project.

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

Sincerely,

TREK Geotechnical Inc.
Per:

A handwritten signature in blue ink, appearing to read "Brent Hay", with a horizontal line drawn through it.

Brent Hay, P. Eng.
Geotechnical Engineer
Tel: 204.975.9433 ext. 105

cc: Paul Bevel, B.Sc., (TREK Geotechnical)

Revision History

Revision No.	Author	Issue Date	Description
0	SGBR	April 6, 2017	Final Report

Authorization Signatures

Prepared By:

Shane Broderick, Assistant Lab and Field Services Manager.



Reviewed By:

Brent Hay, P.Eng.
Geotechnical Engineer

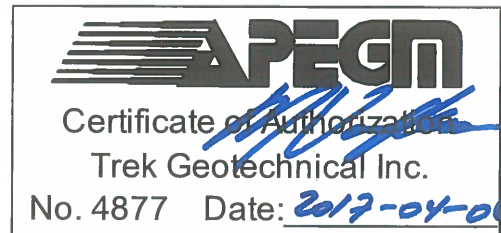


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1.0 Introduction

This report summarizes the results of the sub-surface investigation completed for the 2017 Residential Street Renewal Program. The streets investigation includes Salter Street. 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 50 m of street length with specific locations shown in Figure 01. The test holes were drilled to determine sub-surface conditions for the reconstruction of the road.

The sub-surface investigation was conducted on March 13th, 2017. The test holes were drilled to a depth of 3.1 m below road surface by Paddock Drilling Ltd. using an Acker MP8 truck mounted drill rig equipped with 125 mm diameter solid stem augers. The pavement structure (asphalt or concrete) was cored by Paul Bevel of Trek Geotechnical, 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 Shane Broderick of TREK. Other pertinent information such as groundwater and drilling conditions were also recorded during drilling. 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.

The laboratory testing program consisted of moisture content determination, Atterberg limits, and grain size analysis (mechanical sieve and hydrometer methods). Information gathered for each street is included in separate appendices (Appendix A). 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 are based on measured distances from the nearest address, edge of pavement or other permanent features.

3.0 Closure

The geotechnical 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 and laboratory testing). Soil conditions are natural deposits that can be highly variable across a site. If subsurface conditions are different than the conditions previously encountered on-site or those presented here, we should be notified to adjust our findings if necessary.

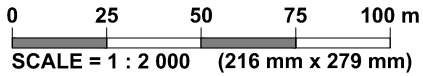
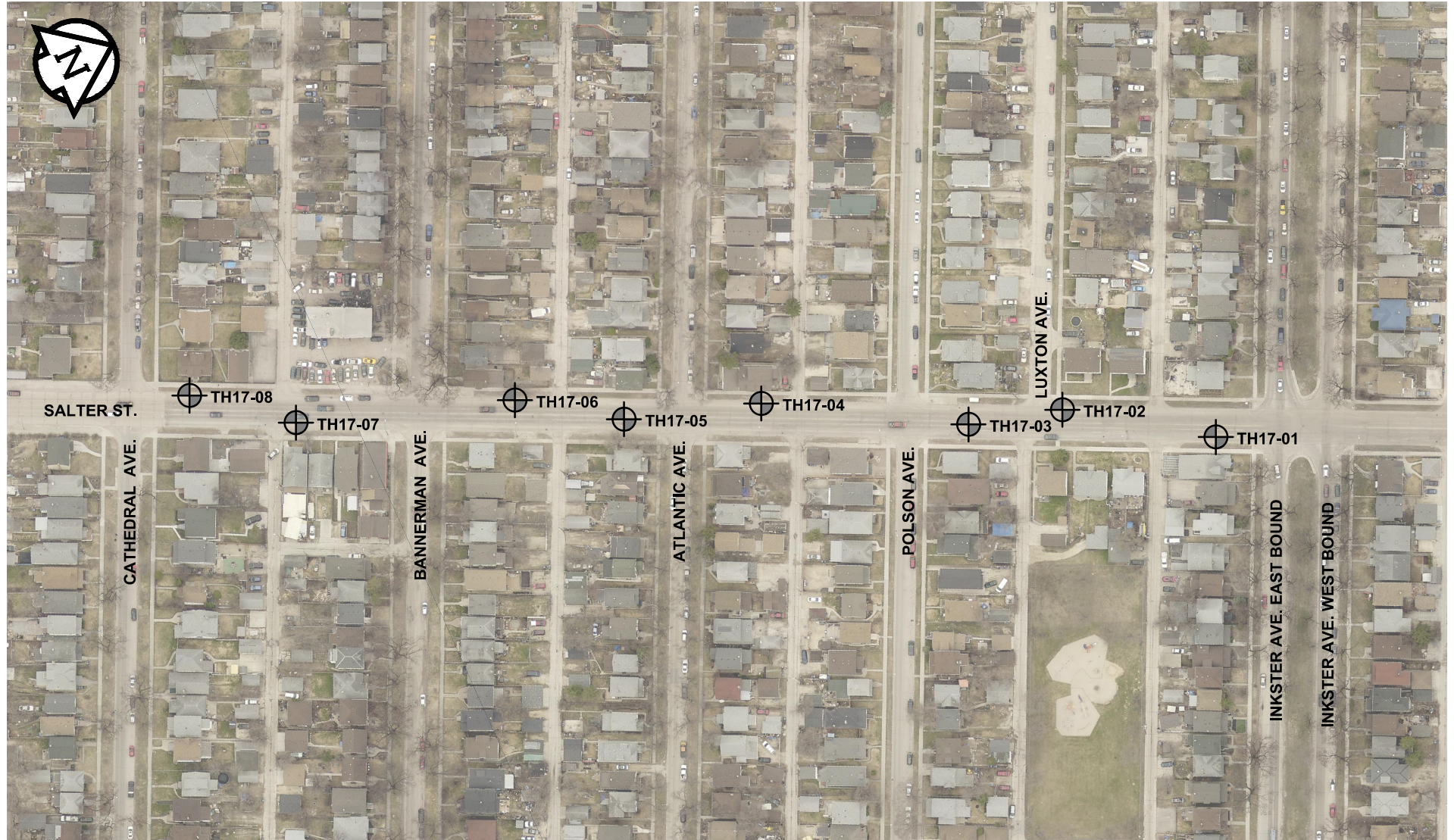
All information provided in this report is subject to our standard terms and conditions for engineering services, a copy of which is provided to each of our clients with the original scope of work, or a mutually executed standard engineering services agreement. If these conditions are not attached, and 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 Ltd. (the Client) and their agents for the work product presented in the report. Any findings or recommendations provided in this report are not to be relied upon by any third parties, except as agreed to in writing by the Client and Consultant prior to use.

Figures

ANSI full bleed A (11.00" x 8.50 inches)

FIG 0001 2017-02-28 Test Hole Location Plan 0_A.DSN.dwg_4/6/2017 10:10:01 AM



LEGEND:  TEST HOLE (TREK, 2017)

NOTES: 1. IMAGE FROM CITY OF WINNIPEG 2016.

Figure 01
Test Hole Location Plan

GENERAL NOTES

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

Major Divisions	USCS Classification	Symbols	Typical Names	Laboratory Classification Criteria		Particle Size					
Coarse-Grained soils (More than half the material is larger than No. 200 sieve size)	Gravels (More than half of coarse fraction is larger than 4.75 mm)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines	Determine percentages of sand and gravel from grain size curve, depending on percentage of fines (fraction smaller than No. 200 sieve) coarse-grained soils are classified as follows: Less than 5 percent..... GW, GP, SW, SP More than 12 percent..... GM, GC, SM, SC 6 to 12 percent..... Borderline cases requiring dual symbols*	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3	ASTM Sieve sizes #10 to #4 #40 to #10 #200 to #40 < #200					
		GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines		Not meeting all gradation requirements for GW						
		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	mm 2.00 to 4.75 0.425 to 2.00 0.075 to 0.425 < 0.075				
			SP		Poorly-graded sands, gravelly sands, little or no fines	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		Material Sand Coarse Medium Fine Silt or Clay			
			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)		Sils 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		Particle Size ASTM Sieve Sizes mm > 300 75 to 300 19 to 75 4.75 to 19 3 in. to 12 in. 3/4 in. to 3 in. #4 to 3/4 in.
						CL			Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays		
OL	Organic silts and organic silty clays of low plasticity										
Sils and Clays (Liquid limit greater than 50)	MH	Inorganic silts, micaceous or distomaceous fine sandy or silty soils, organic silts		Material Boulders Cobbles Gravel Coarse Fine							
	CH	Inorganic clays of high plasticity, fat clays									
	OH	Organic clays of medium to high plasticity, organic silts									
	Pt	Peat and other highly organic soils									
Highly Organic Soils				Von Post Classification Limit	Strong colour or odour, and often fibrous texture						

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

Other Symbol Types

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

LEGEND OF ABBREVIATIONS AND SYMBOLS

LL - Liquid Limit (%)	▽ Water Level at Time of Drilling
PL - Plastic Limit (%)	▼ Water Level at End of Drilling
PI - Plasticity Index (%)	▽ Water Level After Drilling as Indicated on Test Hole Logs
MC - Moisture Content (%)	
SPT - Standard Penetration Test	
RQD- Rock Quality Designation	
Qu - Unconfined Compression	
Su - Undrained Shear Strength	
VW - Vibrating Wire Piezometer	
SI - Slope Inclinometer	

FRACTION OF SECONDARY SOIL CONSTITUENTS ARE BASED ON THE FOLLOWING TERMINOLOGY

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

TERMS DESCRIBING CONSISTENCY OR COMPACTION CONDITION

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

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

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

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

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

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

Appendix A
Test Hole Logs



Sub-Surface Log

Test Hole TH17-01

1 of 1

Client: Morrison Hershfield Project Number: 0035-045-00
 Project Name: Salter Street Rehabilitation Sub-Surface Investigation Location: UTM N-5532422, E-634162.1
 Contractor: Paddock Drilling Ltd. Ground Elevation: 231.36 m
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: 13 March 2017

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

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m ³)					Undrained Shear Strength (kPa)							
						16	17	18	19	20	21	Test Type						
						Particle Size (%)												
						0	20	40	60	80	100							
						PL _____ MC _____ LL _____ 0 20 40 60 80 100												
						0	20	40	60	80	100	0	50	100	150	200	250	
231.3			ASPHALT (90 mm THICK)															
			CONCRETE (215 mm THICK)															
231.1																		
231.0			CLAY (FILL) - some silt, trace sand, trace gravel (<15 mm dia), light to dark brown, frozen, moist and soft when thawed, high plasticity		G01													
	-0.5		CLAY - silty - dark green - frozen, moist and firm to stiff when thawed - high plasticity		G02													
	-1.0				G03													
	-1.5				G04													
	-2.0				G05													
	-2.5		-trace fine sand, trace silt inclusions (<50 mm), light to dark brown below 1.52 m		G06													
228.6																		
	-3.0		SILT - some clay, low plasticity - mottled light brown to brown - frozen, moist and very soft when thawed - low plasticity		G07													

END OF TEST HOLE AT 3.1 m IN SILT

Notes:

- 1) No sloughing or seepage observed.
- 2) Test hole backfilled with auger cuttings, bentonite, sand, and cold patch asphalt to surface.
- 3) Test hole location in the northbound lane, 30.4 m south of the intersection of Inkster Blvd and Salter Street, 1.8 m west of Salter Street east curb.
- 4) UTM coordinates and elevation surveyed by Morrison Hershfield.

Logged By: Shane Broderick Reviewed By: Brent Hay Project Engineer: Nelson Ferreira



Sub-Surface Log

Test Hole TH17-02

1 of 1

Client: Morrison Hershfield Project Number: 0035-045-00
 Project Name: Salter Street Rehabilitation Sub-Surface Investigation Location: UTM N-5532377, E-634170.8
 Contractor: Paddock Drilling Ltd. Ground Elevation: 231.06 m
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: 13 March 2017

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

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m ³)					Undrained Shear Strength (kPa)								
						16	17	18	19	20	21	Test Type							
						Particle Size (%)													
						0	20	40	60	80	100								
						PL MC LL													
						0	20	40	60	80	100	0	50	100	150	200	250		
230.9			ASPHALT (115 mm THICK)																
230.8			CONCRETE (135 mm THICK)																
230.7			SAND AND GRAVEL (<20 mm dia) - some clay, trace silt, light brown, frozen, moist and soft when thawed		G08	●													
	-0.5		CLAY - silty, trace organics to 0.67 m - dark green to black - frozen, moist and firm when thawed - high plasticity		G09		●												
			- silt inclusions (<25 mm dia.) below 0.91 m		G10			●											
	-1.0				G11				●										
229.8			SILT - some clay, light brown - frozen, moist and very soft when thawed - low plasticity		G12		●												
229.5	-1.5		CLAY - some silt - light brown - frozen, moist and stiff when thawed - high plasticity		G13				●										
229.2			SILT - some clay - light brown - frozen, moist to wet and very soft when thawed - low plasticity		G14					●									
228.6	-2.0				G15						●								
228.0	-2.5		CLAY - some silt - light brown - frozen, moist and firm to stiff when thawed - high plasticity																
	-3.0																		

END OF TEST HOLE AT 3.1 m IN CLAY
 Notes:
 1) No sloughing or seepage observed.
 2) Test hole backfilled with auger cuttings, bentonite, sand, and cold patch asphalt to surface.
 3) Test hole location in the southbound lane, 84.1 m south of the intersection of Inkster Blvd and Salter Street, 10.6 m west of Salter Street east curb.
 4) UTM coordinates and elevation surveyed by Morrison Hershfield.

SUB-SURFACE LOG LOGS 20170314.SALTER STREET REHABILITATION 0_A_SGBR 0035-045-00.GPJ TREK GEOTECHNICAL GDT 6/4/17



Sub-Surface Log

Test Hole TH17-03

1 of 1

Client: Morrison Hershfield Project Number: 0035-045-00
 Project Name: Salter Street Rehabilitation Sub-Surface Investigation Location: UTM N-5532345, E-634162.1
 Contractor: Paddock Drilling Ltd. Ground Elevation: 230.94 m
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: 13 March 2017

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

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m ³)					Undrained Shear Strength (kPa)						
						16	17	18	19	20	21	Test Type					
						Particle Size (%)											
						0	20	40	60	80	100						
						PL — MC — LL											
						0	20	40	60	80	100	0	50	100	150	200	250
											<input checked="" type="checkbox"/> Pocket Pen. <input checked="" type="checkbox"/> <input type="checkbox"/> Torvane <input type="checkbox"/> <input type="checkbox"/> Qu <input type="checkbox"/> <input type="checkbox"/> Field Vane <input type="checkbox"/>						
230.8			ASPHALT (95 mm THICK)														
230.7			CONCRETE (180 mm THICK)														
230.6			CLAY (FILL) - some silt, trace sand, trace gravel (<20 mm dia), light to dark brown, frozen, moist and soft when thawed, high plasticity		G51												
230.3	-0.5		CLAY - silty, trace gravel, trace organics, silt inclusions (<20 mm dia.), black - frozen, moist and firm when thawed - high plasticity		G52												
			SILT - clayey, trace sand - light brown to dark black - frozen, moist and very soft when thawed - low plasticity		G53												
	-1.0				G54												
					G55												
	-1.5																
	-2.0				G56												
228.8			CLAY - silty - light to dark brown - frozen, moist and firm to stiff when thawed - high plasticity		G57												
	-2.5		- some silt below 2.13 m														
			- trace silt below 2.59 m														
227.9	-3.0				G58												

END OF TEST HOLE AT 3.1 m IN CLAY
 Notes:
 1) No sloughing or seepage observed.
 2) Test hole backfilled with auger cuttings, bentonite, sand, and cold patch asphalt to surface.
 3) Test hole location in the northbound lane, 116.8 m south of the intersection of Inkster Blvd and Salter Street, 4.9 m west of Salter Street east curb.
 4) UTM coordinates and elevation surveyed by Morrison Hershfield.

SUB-SURFACE LOG LOGS 20170314_SALTER STREET REHABILITATION 0_A_SGBR 0035-045-00.GPJ TREK GEOTECHNICAL.GDT 6/4/17



Sub-Surface Log

Test Hole TH17-04

1 of 1

Client: Morrison Hershfield Project Number: 0035-045-00
 Project Name: Salter Street Rehabilitation Sub-Surface Investigation Location: UTM N-5532282, E-634125.8
 Contractor: Paddock Drilling Ltd. Ground Elevation: 230.78 m
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: 13 March 2017

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

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m ³)					Undrained Shear Strength (kPa)						
						16	17	18	19	20	21	Test Type					
						Particle Size (%)											
						0	20	40	60	80	100						
						PL _____ MC _____ LL _____ 0 20 40 60 80 100											
						0	20	40	60	80	100	0	50	100	150	200	250
230.6			ASPHALT (140 mm THICK)														
230.5			CONCRETE (110 mm THICK)														
230.4			SAND AND GRAVEL - some clay, trace silt, light brown, frozen, moist and soft when thawed		G16		●										
	-0.5		CLAY - silty - dark green - frozen, moist and firm to stiff when thawed - high plasticity		G17			●									●
					G18			●									●
	-1.0				G19			●									●
	-1.5				G20			●									
229.0			SILT - some clay - brown - frozen, moist to wet and very soft when thawed - low plasticity		G21			●									
228.0			CLAY - some silt - light to dark brown - frozen, moist and stiff when thawed - high plasticity		G22			●									●

END OF TEST HOLE AT 3.1 m IN CLAY

Notes:

- 1) No sloughing or seepage observed.
- 2) Test hole backfilled with auger cuttings, bentonite, sand, and cold patch asphalt to surface.
- 3) Test hole location in the southbound lane, 189.2 m south of the intersection of Inkster Blvd and Salter Street, 11.1 m west of Salter Street east curb.
- 4) UTM coordinates and elevation surveyed by Morrison Hershfield.

Logged By: Shane Broderick Reviewed By: Brent Hay Project Engineer: Nelson Ferreira

SUB-SURFACE LOG LOGS 20170314.SALTER STREET REHABILITATION 0_A_SGBR 0035-045-00.GPJ TREK GEOTECHNICAL.GDT 6/4/17



Sub-Surface Log

Test Hole TH17-05

1 of 1

Client: Morrison Hershfield Project Number: 0035-045-00
 Project Name: Salter Street Rehabilitation Sub-Surface Investigation Location: UTM N-5532236, E-634111.2
 Contractor: Paddock Drilling Ltd. Ground Elevation: 230.89 m
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: 13 March 2017

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

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m ³)		Particle Size (%)		Undrained Shear Strength (kPa)							
						16	17	18	19	20	21	0	50	100	150	200	250
230.8			ASPHALT (75 mm THICK)														
230.7			CONCRETE (155 mm THICK)														
	-0.5		CLAY - silty, trace organics - mottled dark green to black - frozen, moist and stiff when thawed - high plasticity		G44												
					G45												
	-1.0				G46												
	-1.5				G47												
					G48												
229.1	-2.0		SILT - some clay - light brown - frozen, moist to wet and very soft when thawed - low plasticity		G49												
	-2.5																
	-3.0				G50												

END OF TEST HOLE AT 3.1 m IN SILT

Notes:

- 1) No sloughing or seepage observed.
- 2) Test hole backfilled with auger cuttings, bentonite, sand, and cold patch asphalt to surface.
- 3) Test hole location in the northbound lane, 237.1 m south of the intersection of Inkster Blvd and Salter Street, 4.8 m west of Salter Street east curb.
- 4) UTM coordinates and elevation surveyed by Morrison Hershfield.

Logged By: Shane Broderick Reviewed By: Brent Hay Project Engineer: Nelson Ferreira



Sub-Surface Log

Test Hole TH17-06

1 of 1

Client: Morrison Hershfield Project Number: 0035-045-00
 Project Name: Salter Street Rehabilitation Sub-Surface Investigation Location: UTM N-5532204, E-634089.2
 Contractor: Paddock Drilling Ltd. Ground Elevation: 230.81 m
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: 13 March 2017

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

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m ³)					Undrained Shear Strength (kPa)						
						16	17	18	19	20	21	Test Type					
						Particle Size (%)											
						0	20	40	60	80	100						
						PL _____ MC _____ LL _____ 0 20 40 60 80 100											
						0	20	40	60	80	100	0	50	100	150	200	250
230.7			ASPHALT (75 mm THICK)														
230.6			CONCRETE (150 mm THICK)														
230.5			CLAY (FILL) - trace silt, trace sand, light to dark brown, moist and soft when thawed, high plasticity	<input checked="" type="checkbox"/>	G23			●									
	-0.5		CLAY - silty - dark green - frozen, moist and firm to stiff when thawed - high plasticity	<input checked="" type="checkbox"/>	G24			●						■			
				<input checked="" type="checkbox"/>	G25			●						■			
	-1.0			<input checked="" type="checkbox"/>	G26			●						■			
				<input checked="" type="checkbox"/>	G27			●						■			
	-1.5			<input checked="" type="checkbox"/>													
	-2.0			<input checked="" type="checkbox"/>													
228.7			SILT - some clay - brown - frozen, moist to wet and very soft when thawed - low plasticity	<input checked="" type="checkbox"/>	G28			●									
	-2.5			<input checked="" type="checkbox"/>													
228.1			CLAY - some silt, light brown - frozen, moist and stiff when thawed - high plasticity	<input checked="" type="checkbox"/>	G29			●						▲			
	-3.0			<input checked="" type="checkbox"/>													

END OF TEST HOLE AT 3.1 m IN CLAY
 Notes:
 1) No sloughing or seepage observed.
 2) Test hole backfilled with auger cuttings, bentonite, sand, and cold patch asphalt to surface.
 3) Test hole location in the southbound lane, 275.2 m south of the intersection of Inkster Blvd and Salter Street, 10.9 m west of Salter Street east curb.
 4) UTM coordinates and elevation surveyed by Morrison Hershfield.

Logged By: Shane Broderick Reviewed By: Brent Hay Project Engineer: Nelson Ferreira

SUB-SURFACE LOG LOGS 20170314_SALTER STREET REHABILITATION 0_A_SGBR 0035-045-00.GPJ TREK GEOTECHNICAL.GDT 6/4/17



Sub-Surface Log

Test Hole TH17-07

1 of 1

Client: Morrison Hershfield Project Number: 0035-045-00
 Project Name: Salter Street Rehabilitation Sub-Surface Investigation Location: UTM N-5532131, E-634065.5
 Contractor: Paddock Drilling Ltd. Ground Elevation: 230.87 m
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: 13 March 2017

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

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m ³)		Particle Size (%)		Undrained Shear Strength (kPa)	
						16	17	18	19	20	21
230.8			ASPHALT (110 mm THICK)								
230.6			CONCRETE (170 mm THICK)								
	-0.5		CLAY - silty, trace sand, trace organics to 0.46 m - light brown to black - frozen, moist and firm when thawed - high plasticity		G37						
					G38						
					G39						
229.7	-1.0				G40						
	-1.5		SILT - some clay - light brown - frozen, moist to wet and very soft when thawed - low plasticity		G41						
	-2.0										
	-2.5		CLAY - some silt - brown to light brown - frozen, moist and stiff when thawed - high plasticity		G42						
	-3.0				G43						

END OF TEST HOLE AT 3.1 m IN CLAY
 Notes:
 1) No sloughing or seepage observed.
 2) Test hole backfilled with auger cuttings, bentonite, sand, and cold patch asphalt to surface.
 3) Test hole location in the northbound lane, 351.6 m south of the intersection of Inkster Blvd and Salter Street, 1.9 m west of Salter Street east curb.
 4) UTM coordinates and elevation surveyed by Morrison Hershfield.

Logged By: Shane Broderick Reviewed By: Brent Hay Project Engineer: Nelson Ferreira

SUB-SURFACE LOG LOGS 20170314_SALTER STREET REHABILITATION 0_A_SGBR 0035-045-00.GPJ TREK GEOTECHNICAL GDT 6/4/17



Sub-Surface Log

Test Hole TH17-08

1 of 1

Client: Morrison Hershfield	Project Number: 0035-045-00
Project Name: Salter Street Rehabilitation Sub-Surface Investigation	Location: UTM N-5532101, E-634041.6
Contractor: Paddock Drilling Ltd.	Ground Elevation: 230.90 m
Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount	Date Drilled: 13 March 2017

Sample Type:	<input checked="" type="checkbox"/> Grab (G)	<input type="checkbox"/> Shelby Tube (T)	<input type="checkbox"/> Split Spoon (SS)	<input type="checkbox"/> Split Barrel (SB)	<input type="checkbox"/> Core (C)
--------------	--	--	---	--	-----------------------------------

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

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m ³)					Undrained Shear Strength (kPa)							
						16	17	18	19	20	21	Test Type						
						Particle Size (%)												
						0	20	40	60	80	100							
						PL — MC — LL												
						0	20	40	60	80	100	0	50	100	150	200	250	
230.8			ASPHALT (90 mm THICK)															
230.7			CONCRETE (215 mm THICK)															
230.6			CLAY (FILL) - some clay, some silt, trace sand, trace gravel, light to dark brown, frozen, moist and soft when thawed, high plasticity		G30			●										
	-0.5		CLAY - silty, trace sand, trace organics to 0.67 m - dark green to black - frozen, moist and firm to stiff when thawed - high plasticity		G31			●						+				
					G32			●						+				
	-1.0				G33			●						+				
					G34			●						+				
	-1.5																	
	-2.0																	
228.8			SILT - some clay - brown - frozen, moist to wet and very soft when thawed - low plasticity		G35			●										
	-2.5		CLAY - some silt - light to dark brown - frozen, moist and stiff when thawed - high plasticity		G36			●						+				
	-3.0																	

END OF TEST HOLE AT 3.1 m IN CLAY
 Notes:
 1) No sloughing or seepage observed.
 2) Test hole backfilled with auger cuttings, bentonite, sand, and cold patch asphalt to surface.
 3) Test hole location in the southbound lane, 388.9 m south of the intersection of Inkster Blvd and Salter Street, 10.7 m west of Salter Street east curb.
 4) UTM coordinates and elevation surveyed by Morrison Hershfield.

SUB-SURFACE LOG LOGS 20170314_SALTER STREET REHABILITATION 0_A_SGBR 0035-045-00.GPJ TREK GEOTECHNICAL.GDT 6/4/17

Appendix B

Lab Testing Summary and Lab Testing Results – Salter Street



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

**Atterberg Limits
 ASTM D4318-10e1**

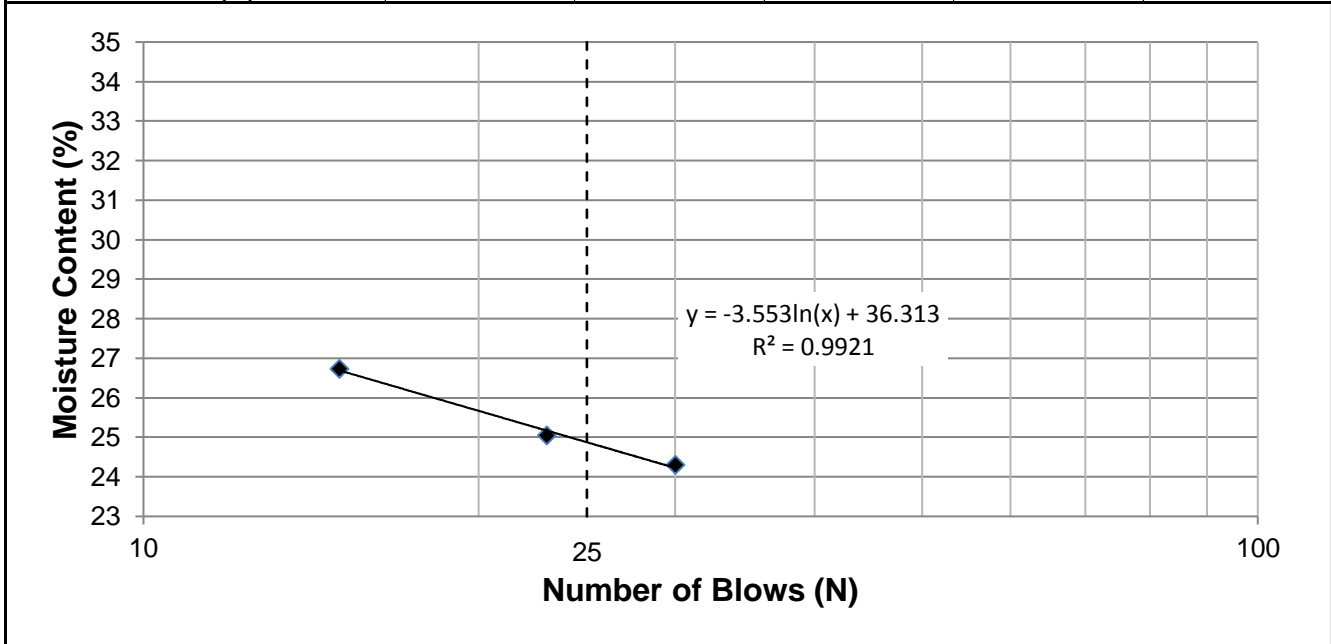
Project No. 0035-045-00
Client Morrison Hershfield
Project Salter Street Rehabilitation

Test Hole TH17-03
Sample # G54
Depth (m) 0.9 - 1.2
Sample Date 13-Mar-17
Test Date 22-Mar-17
Technician SX

Liquid Limit	25
Plastic Limit	15
Plasticity Index	10

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	15	23	30		
Mass Wet Soil + Tare (g)	27.984	28.329	27.798		
Mass Dry Soil + Tare (g)	25.101	25.496	25.129		
Mass Tare (g)	14.319	14.184	14.148		
Mass Water (g)	2.883	2.833	2.669		
Mass Dry Soil (g)	10.782	11.312	10.981		
Moisture Content (%)	26.739	25.044	24.306		



Plastic Limit

Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	20.572	21.068			
Mass Dry Soil + Tare (g)	19.744	20.165			
Mass Tare (g)	14.321	14.075			
Mass Water (g)	0.828	0.903			
Mass Dry Soil (g)	5.423	6.090			
Moisture Content (%)	15.268	14.828			



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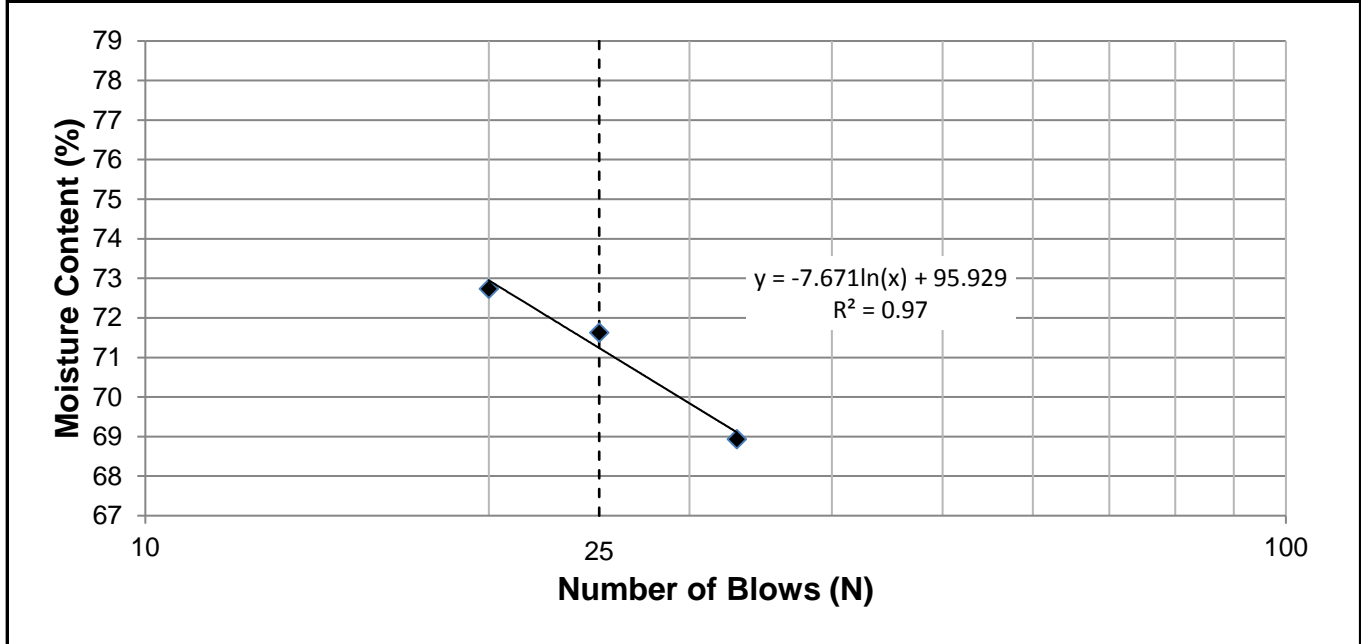
Project No. 0035-045-00
Client Morrison Hershfield
Project Slater Street Rehabilitation

Test Hole TH17-05
Sample # G44
Depth (m) 0.2 - 0.3
Sample Date 13-Mar-17
Test Date 22-Mar-17
Technician SX

Liquid Limit	71
Plastic Limit	28
Plasticity Index	43

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	20	25	33		
Mass Wet Soil + Tare (g)	23.495	24.402	25.304		
Mass Dry Soil + Tare (g)	19.571	20.153	20.604		
Mass Tare (g)	14.176	14.221	13.786		
Mass Water (g)	3.924	4.249	4.700		
Mass Dry Soil (g)	5.395	5.932	6.818		
Moisture Content (%)	72.734	71.628	68.935		



Plastic Limit

Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	20.178	19.801			
Mass Dry Soil + Tare (g)	18.910	18.590			
Mass Tare (g)	14.433	14.281			
Mass Water (g)	1.268	1.211			
Mass Dry Soil (g)	4.477	4.309			
Moisture Content (%)	28.323	28.104			



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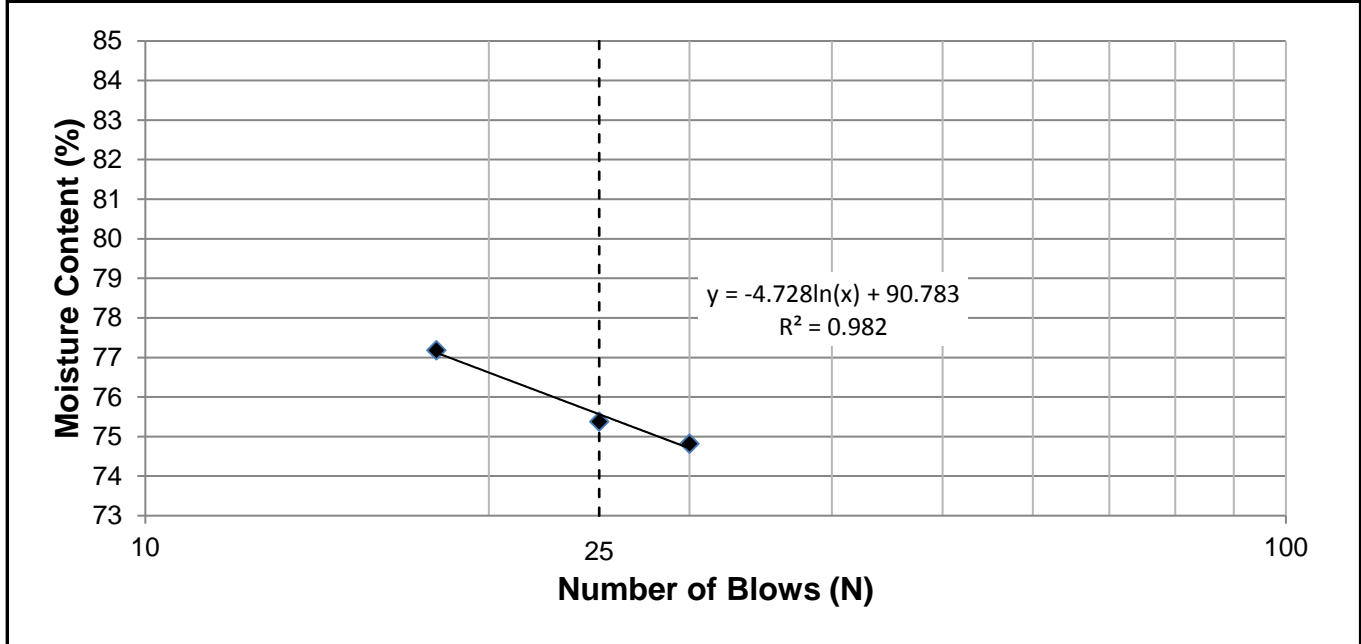
Project No. 0035-045-00
Client Morrison Hershfield
Project Salter Street Rehabilitation

Test Hole TH17-05
Sample # G46
Depth (m) 0.7 - 0.9
Sample Date 13-Mar-17
Test Date 22-Mar-17
Technician SX

Liquid Limit	76
Plastic Limit	25
Plasticity Index	51

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	18	25	30		
Mass Wet Soil + Tare (g)	23.964	25.590	24.698		
Mass Dry Soil + Tare (g)	19.593	20.680	20.231		
Mass Tare (g)	13.930	14.166	14.261		
Mass Water (g)	4.371	4.910	4.467		
Mass Dry Soil (g)	5.663	6.514	5.970		
Moisture Content (%)	77.185	75.376	74.824		



Plastic Limit

Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	20.180	19.890			
Mass Dry Soil + Tare (g)	18.979	18.743			
Mass Tare (g)	14.106	14.056			
Mass Water (g)	1.201	1.147			
Mass Dry Soil (g)	4.873	4.687			
Moisture Content (%)	24.646	24.472			



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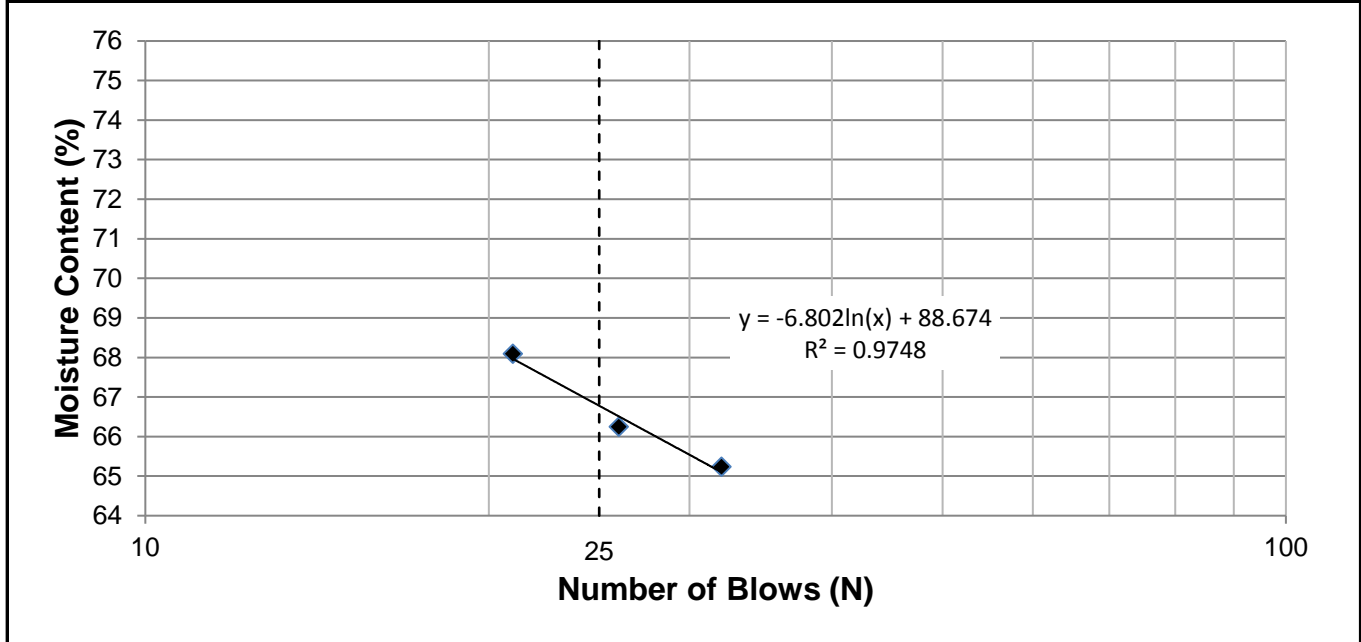
Project No. 0035-045-00
Client Morrison Hershfield
Project Salter Street Rehabilitation

Test Hole TH17-07
Sample # G40
Depth (m) 0.9 - 1.2
Sample Date 13-Mar-17
Test Date 22-Mar-17
Technician SX

Liquid Limit	67
Plastic Limit	21
Plasticity Index	45

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	21	26	32		
Mass Wet Soil + Tare (g)	26.058	26.253	24.836		
Mass Dry Soil + Tare (g)	21.247	21.521	20.629		
Mass Tare (g)	14.182	14.378	14.180		
Mass Water (g)	4.811	4.732	4.207		
Mass Dry Soil (g)	7.065	7.143	6.449		
Moisture Content (%)	68.096	66.247	65.235		



Plastic Limit

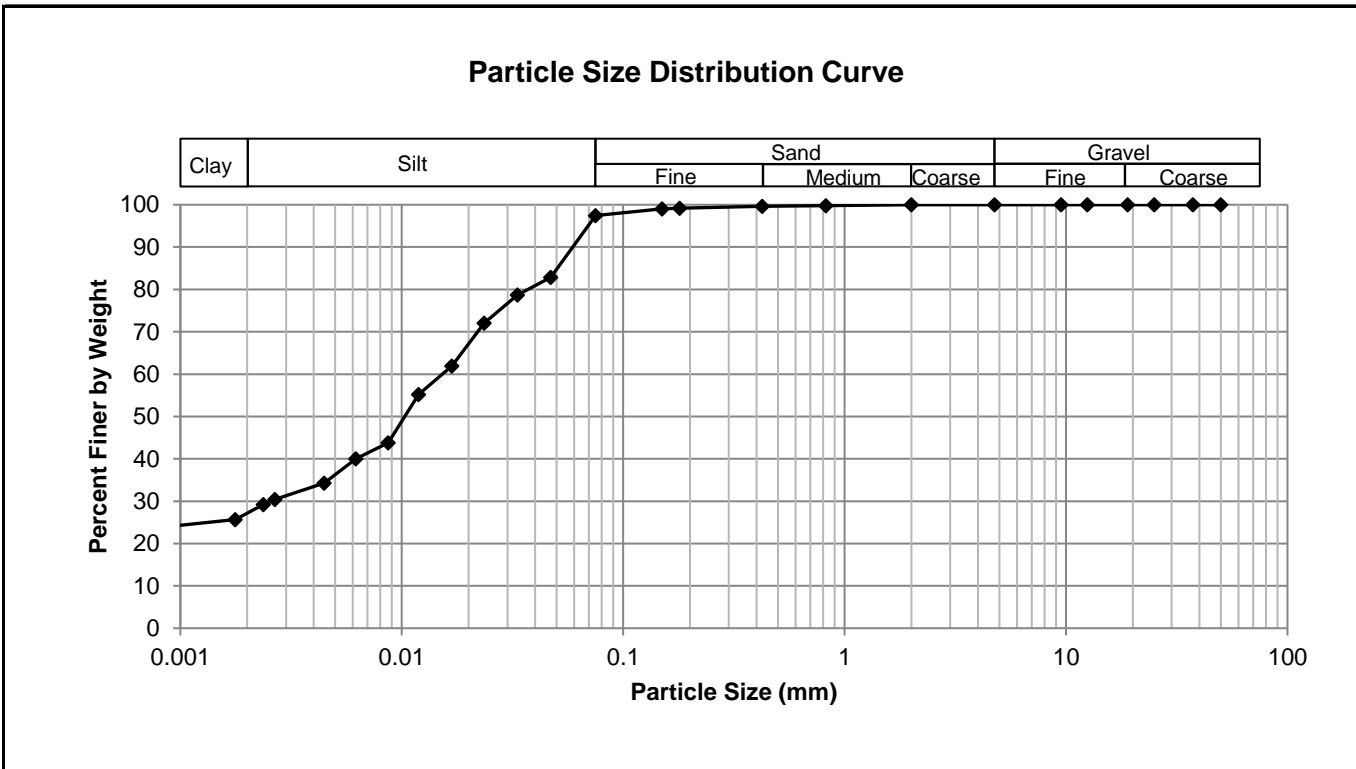
Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	21.052	20.149			
Mass Dry Soil + Tare (g)	19.835	19.122			
Mass Tare (g)	14.211	14.293			
Mass Water (g)	1.217	1.027			
Mass Dry Soil (g)	5.624	4.829			
Moisture Content (%)	21.639	21.267			



Project No. 0035-045-00
Client Morrison Hershfield
Project Slater Street Rehabilitation

Test Hole TH17-03
Sample # G54
Depth (m) 0.9 - 1.2
Sample Date 13-Mar-17
Test Date 20-Mar-17
Technician SX

Gravel	0.0%
Sand	2.6%
Silt	70.4%
Clay	27.0%



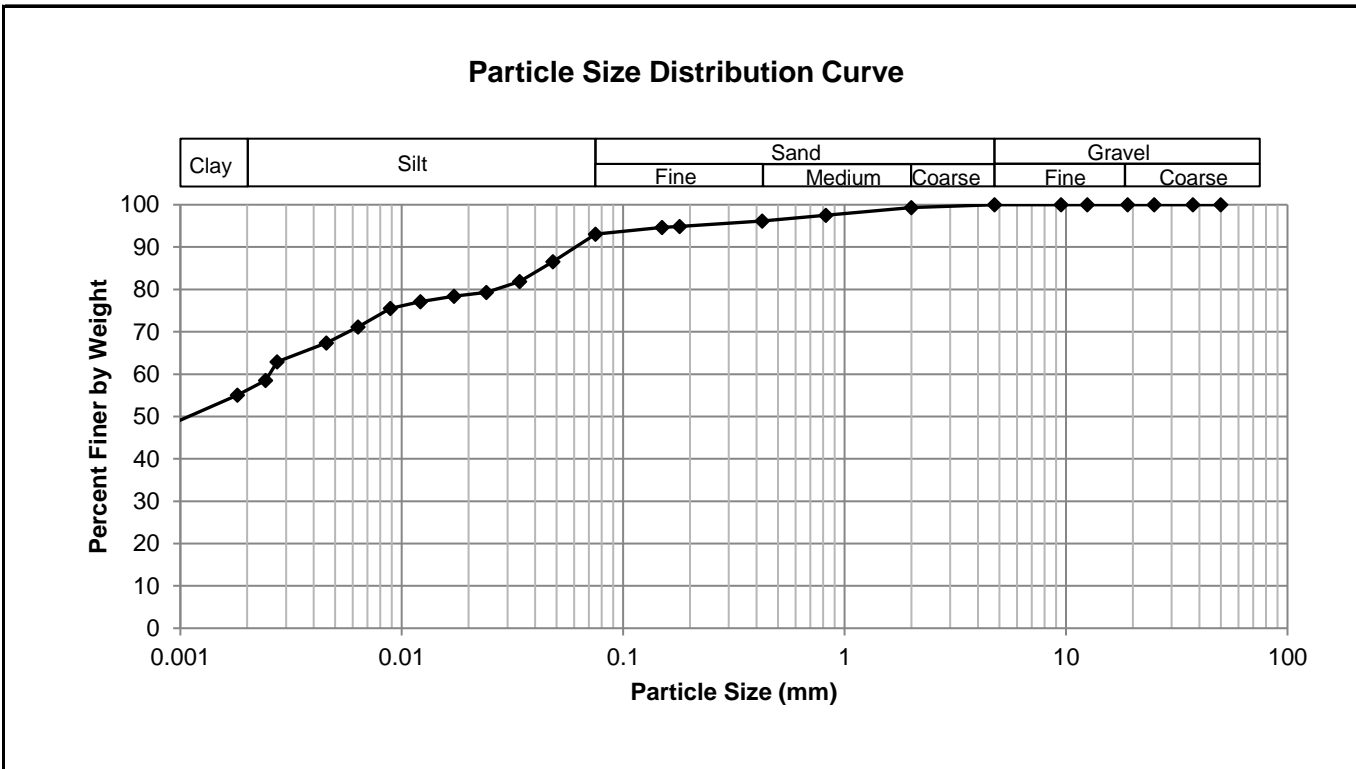
Gravel		Sand		Silt and Clay	
Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing
50.0	100.00	4.75	100.00	0.0750	97.41
37.5	100.00	2.00	100.00	0.0471	82.85
25.0	100.00	0.825	99.82	0.0333	78.72
19.0	100.00	0.425	99.60	0.0236	72.05
12.5	100.00	0.180	99.15	0.0168	61.89
9.50	100.00	0.150	99.03	0.0119	55.22
4.75	100.00	0.075	97.41	0.0087	43.79
				0.0062	39.98
				0.0045	34.26
				0.0027	30.45
				0.0024	29.18
				0.0018	25.69
				0.0008	23.78



Project No. 0035-045-00
Client Morrison Hershfield
Project Slater Street Rehabilitation

Test Hole TH17-05
Sample # G44
Depth (m) 0.2 - 0.3
Sample Date 13-Mar-17
Test Date 21-Mar-17
Technician SX

Gravel	0.0%
Sand	7.0%
Silt	36.9%
Clay	56.1%



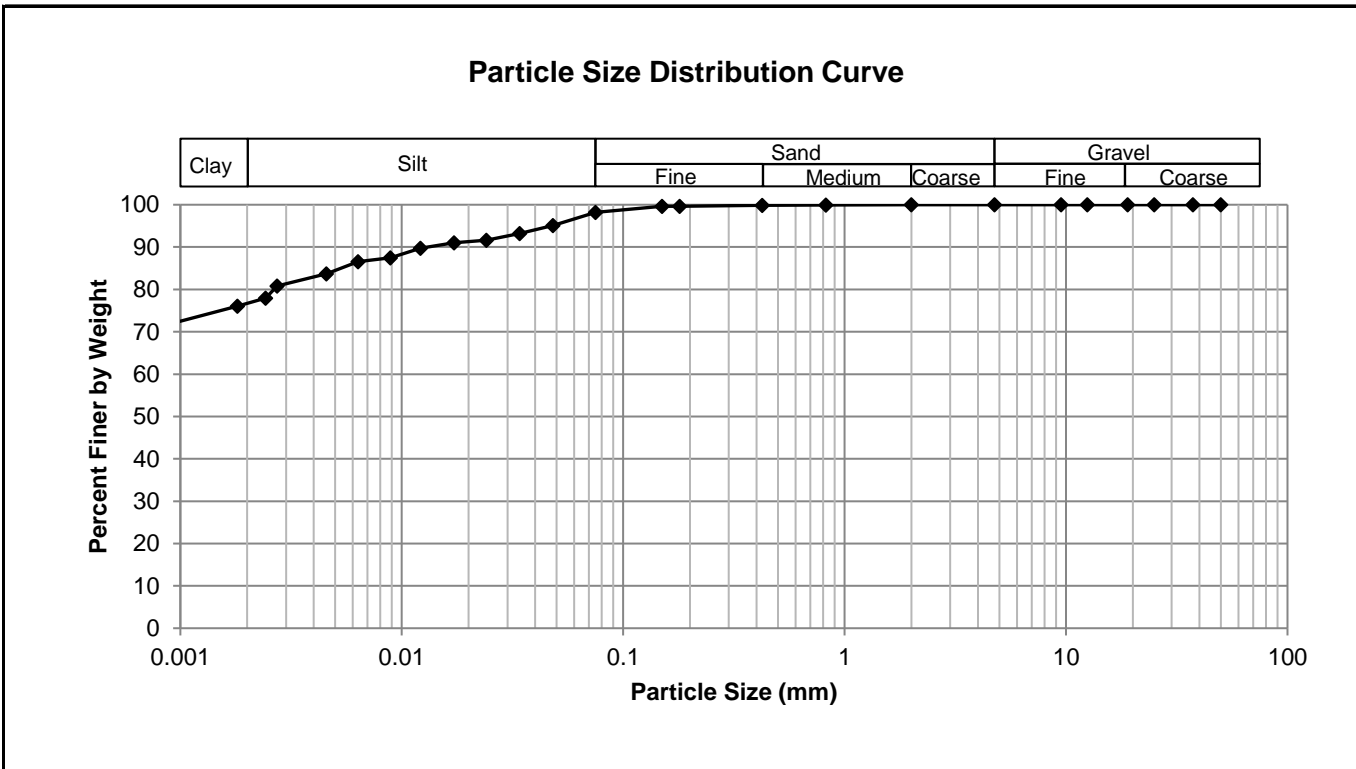
Gravel		Sand		Silt and Clay	
Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing
50.0	100.00	4.75	100.00	0.0750	93.03
37.5	100.00	2.00	99.30	0.0482	86.57
25.0	100.00	0.825	97.55	0.0341	81.84
19.0	100.00	0.425	96.16	0.0241	79.32
12.5	100.00	0.180	94.85	0.0172	78.37
9.50	100.00	0.150	94.63	0.0122	77.11
4.75	100.00	0.075	93.03	0.0089	75.53
				0.0063	71.12
				0.0046	67.33
				0.0027	62.92
				0.0024	58.51
				0.0018	55.04
				0.0008	47.15



Project No. 0035-045-00
Client Morrison Hershfield
Project Slater Street Rehabilitation

Test Hole TH17-05
Sample # G46
Depth (m) 0.7 - 0.9
Sample Date 13-Mar-17
Test Date 21-Mar-17
Technician SX

Gravel	0.0%
Sand	1.8%
Silt	21.5%
Clay	76.6%



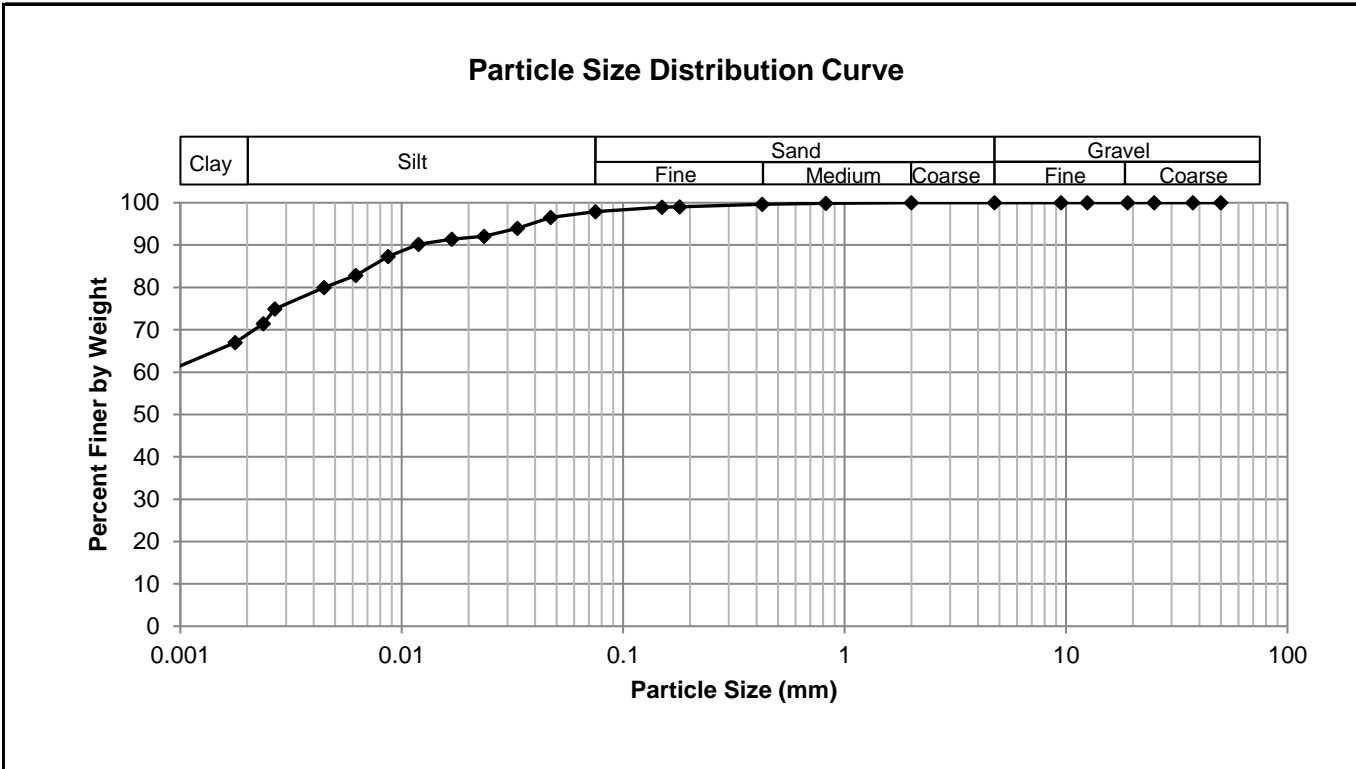
Gravel		Sand		Silt and Clay	
Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing
50.0	100.00	4.75	100.00	0.0750	98.16
37.5	100.00	2.00	100.00	0.0482	95.12
25.0	100.00	0.825	99.96	0.0341	93.21
19.0	100.00	0.425	99.85	0.0241	91.63
12.5	100.00	0.180	99.64	0.0172	90.99
9.50	100.00	0.150	99.63	0.0122	89.72
4.75	100.00	0.075	98.16	0.0089	87.50
				0.0063	86.55
				0.0046	83.69
				0.0027	80.83
				0.0024	77.97
				0.0018	76.07
				0.0008	71.30



Project No. 0035-045-00
Client Morrison Hershfield
Project Slater Street Rehabilitation

Test Hole TH17-07
Sample # G40
Depth (m) 0.9 - 1.2
Sample Date 13-Mar-17
Test Date 20-Mar-17
Technician SX

Gravel	0.0%
Sand	2.1%
Silt	29.2%
Clay	68.7%



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	97.90
37.5	100.00	2.00	100.00	0.0471	96.51
25.0	100.00	0.825	99.89	0.0333	93.97
19.0	100.00	0.425	99.64	0.0236	92.06
12.5	100.00	0.180	99.04	0.0168	91.43
9.50	100.00	0.150	98.93	0.0119	90.16
4.75	100.00	0.075	97.90	0.0087	87.30
				0.0062	82.85
				0.0045	79.99
				0.0027	74.91
				0.0024	71.42
				0.0018	66.97
				0.0008	59.35

Appendix C

Photographs of Pavement Core Samples



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



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



Photo 5: Pavement Core Sample at Test Hole TH17-05



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



Photo 7: Pavement Core Sample at Test Hole TH17-07



Photo 8: Pavement Core Sample at Test Hole TH17-08