

APPENDIX 'I'

GEOTECHNICAL REPORT



Quality Engineering | Valued Relationships

Morrison Hershfield
2015 Local Streets Package (PW File #: 15-R-03)

Prepared for:

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

Distribution:

Ron Bruce, P.Eng.

Project Number:

0035 016 00

Date:

February 24, 2015
Final Report



Quality Engineering | Valued Relationships

February 24, 2015

Our File No. 0035 016 00

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

**RE: Sub-Surface Investigation Report for
2015 Local Streets Package (PW File #: 15-R-03)**

TREK Geotechnical Inc. is pleased to submit our report for the sub-surface investigations for the 2015 Local Streets Package (PW File #: 15-R-03).

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

Sincerely,

TREK Geotechnical Inc.
Per:

A handwritten signature in blue ink, appearing to read "N. Ferreira".

Nelson John Ferreira, M. Sc., P. Eng.
Geotechnical Engineer, Principal
Tel: 204.975.9433 ext. 103

cc: Sylvio Precourt C.E.T. (TREK Geotechnical)

Revision History

Revision No.	Author	Issue Date	Description
0	SP	February 24, 2015	Final Report

Authorization Signatures

Prepared By:



Sylvio L. Precourt, C.E.T.
Senior Engineering Technologist



Reviewed By:

Nelson John Ferreira, M. Sc., P.Eng.
Geotechnical Engineer

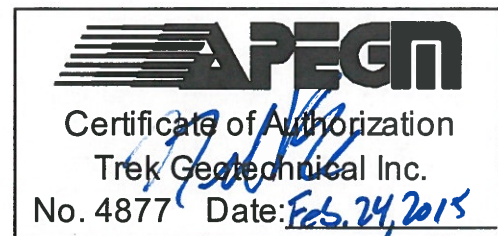


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Appendix C Swan Lake Bay

1.0 Introduction

This report summarizes the results of the sub-surface investigation completed for the 2015 Local Street Package (PW File #: 15-R-03). Information regarding the asphalt, concrete, road base for the existing road and the soil stratigraphy beneath the pavement structure is provided.

2.0 Sub-Surface Investigation and Laboratory Program

A total of 24 test holes were drilled along Clarence Ave., McDowell Dr. and Swan Lake Bay as part of the sub-surface investigation. The test holes drilled at each location are listed in Table 1 and are shown on Figures 01 to Figure 03.

Table 1. List of Test Holes Drilled at Each Location

Street Location	Test Hole
Clarence Ave., between Marshall Cres. and Hudson St.	TH14-01 to TH14-9
McDowell Dr., between Westlund Way and Oakdale Dr.	TH14-01 to TH14-07
Swan Lake Bay	TH14-01 to TH14-08

The sub-surface investigation was conducted between December 3rd to the 9th, 2014. The test holes were drilled to a depth of 3 m below top of road surface. Test holes were drilled by Paddock Drilling Ltd. with an MP8 truck mounted drill rig equipped with 125 mm diameter solid stem augers. The pavement structure (asphalt and/or concrete) was cored by Paul Bevel, B.Sc. of TREK Geotechnical Inc. (TREK) using a portable coring drill press equipped with a hollow 150 mm diameter diamond core drill bit. The sub-surface conditions were observed during drilling and were visually classified by Sylvio Precourt, C.E.T. of TREK Geotechnical Inc. (TREK). Other pertinent information such as groundwater and drilling conditions were also recorded during the sub-surface investigation.

Disturbed (auger cuttings) samples retrieved during the sub-surface investigation were transported to TREK's material testing laboratory for further testing. Pavement core samples were also retrieved and logged at TREK's material testing laboratory. The laboratory testing program consisted of moisture content determination on all samples, and Atterberg limits and grain size analysis (hydrometer method) on select samples.

Information gathered for each street is included in separate appendices (Appendix A to C). The information provided in the Appendices includes test hole logs, laboratory testing summary tables and results, and photos of the asphalt and concrete cores.

Test hole locations shown on Figures 01 to Figure 03 are based on measured distances from the nearest address and edge of pavement.

Figures

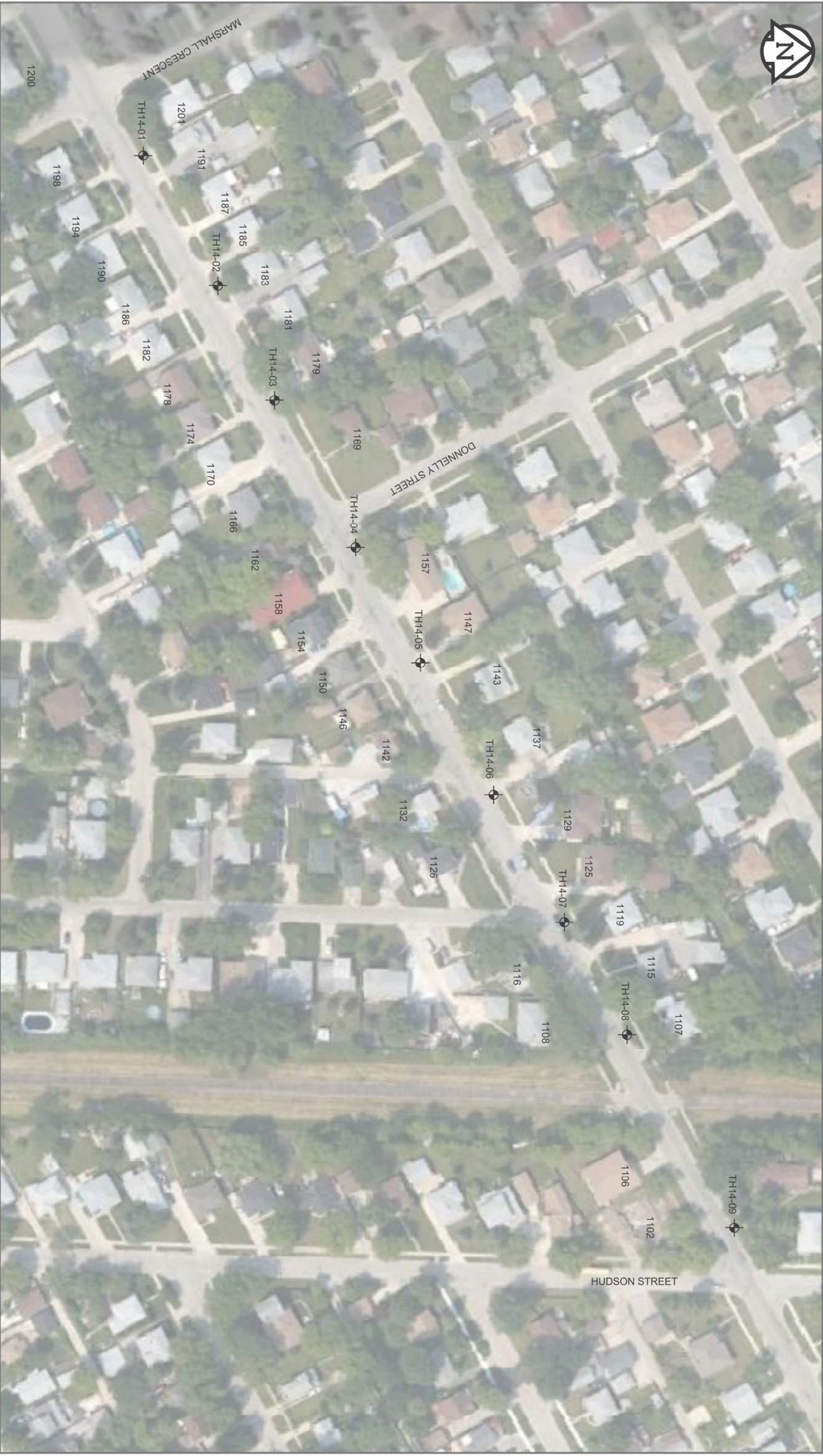
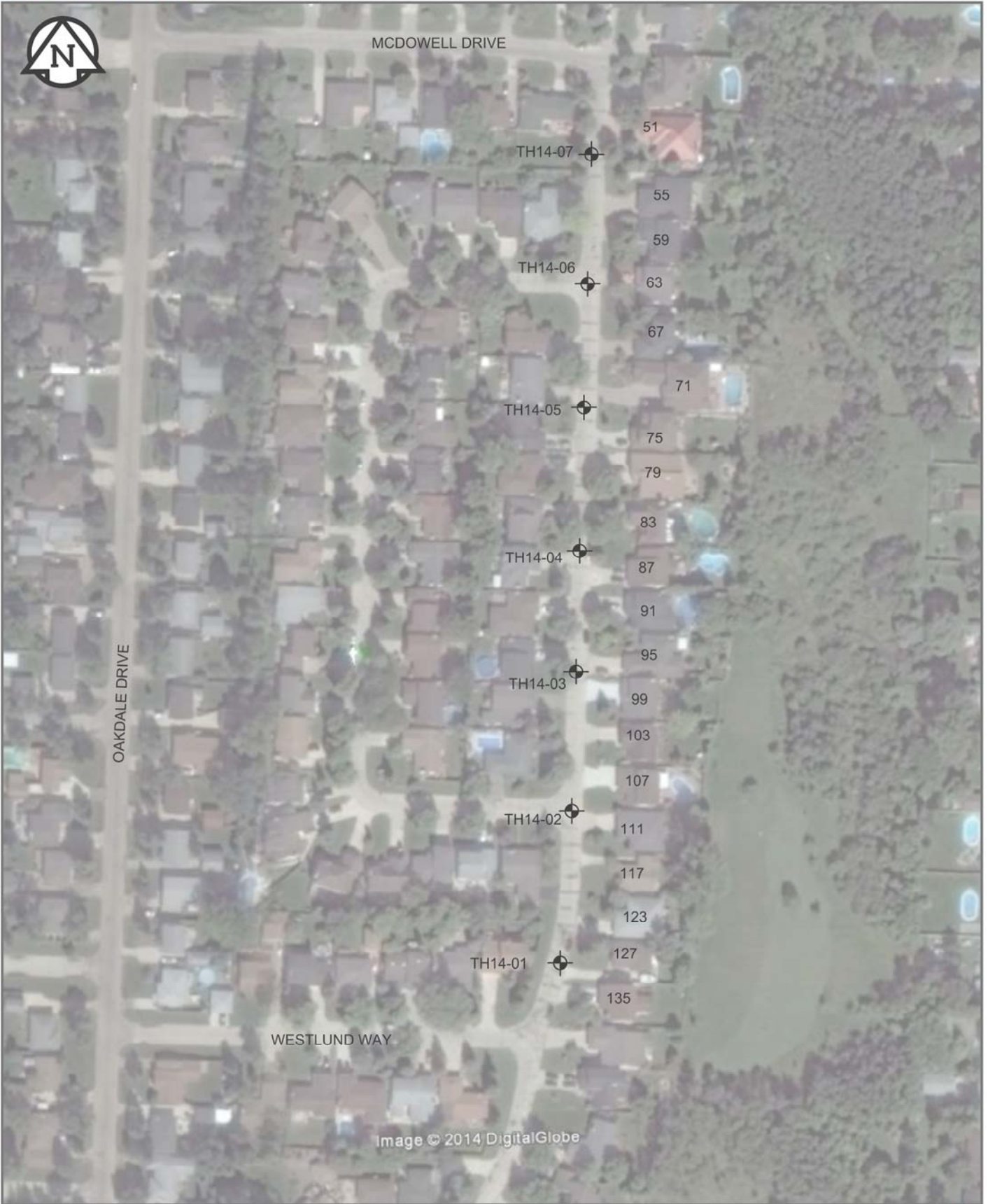


FIGURE 01
TEST HOLE LOCATIONS
CLARENCE AVENUE

8 1/2" x 11"

FILE NAME: FIG 0002 2015-02-10 Site Plan_F_SP 0035 016 00 McDowell.dwg PLOT: 10/02/2015 1:29:09 PM

OAKDALE DRIVE



MCDOWELL DRIVE

51

TH14-07

55

TH14-06

59

63

67

TH14-05

71

75

79

TH14-04

83

87

TH14-03

91

95

99

103

TH14-02

107

111

117

123

TH14-01

127

135

WESTLUND WAY

Image © 2014 DigitalGlobe

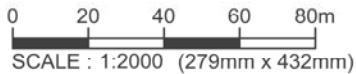
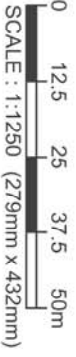


Figure 02
TEST HOLE LOCATIONS
McDowell Drive



LEGEND
 TEST HOLE

FIGURE 03
TEST HOLE LOCATIONS
SWAN LAKE BAY

Appendix A

Clarence Ave., between Marshall Cres. and Hudson St.



Sub-Surface Log

Test Hole TH14-01

1 of 1

Client: Morrison Hershfield Project Number: 0035 016 00
 Project Name: City of Winnipeg Local Streets Package 15-R-03 Location: Clarence Ave. - between Marshall Cres. and Hudson St.
 Contractor: Paddock Drilling Ltd. Ground Elevation: Top of Pavement
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: 4 December 2014

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	SPT (N)	Bulk Unit Wt (kN/m ³)		Particle Size (%)		Undrained Shear Strength (kPa)							
						16	17	18	19	20	21	0	50	100	150	200	250
0.00 - 0.05	ASPHALT	ASPHALT - (83 mm thick)		C01													
0.05 - 0.45	CLAY (FILL)	CLAY (FILL) - silty, sandy - dark grey - frozen to 0.9 m, moist and soft when thawed, moist below - intermediate to high plasticity	G	G1	1												
0.45 - 0.80	CLAY (FILL)	CLAY (FILL) - silty, sandy - dark grey - frozen to 0.9 m, moist and soft when thawed, moist below - intermediate to high plasticity	G	G2	1												
0.80 - 1.00	CLAY (FILL)	CLAY (FILL) - silty, sandy - dark grey - frozen to 0.9 m, moist and soft when thawed, moist below - intermediate to high plasticity	G	G3	1												
1.00 - 1.50	CLAY (FILL)	CLAY (FILL) - silty, sandy - dark grey - frozen to 0.9 m, moist and soft when thawed, moist below - intermediate to high plasticity	G	G4	1												
1.50 - 2.00	CLAY	CLAY - silty, trace gravel (<10 mm diam.) - mottled brown and grey - moist, stiff - high plasticity	G	G5	1												
2.00 - 2.10	CLAY	CLAY - silty, trace gravel (<10 mm diam.) - mottled brown and grey - moist, stiff - high plasticity	G	G6	1												
2.10 - 2.50	CLAY	CLAY - silty, trace gravel (<10 mm diam.) - mottled brown and grey - moist, stiff - high plasticity	G	G7	1												
2.50 - 3.00	CLAY	CLAY - silty, trace gravel (<10 mm diam.) - mottled brown and grey - moist, stiff - high plasticity	G	G8	1												

END OF TEST HOLE AT 3.05 m IN CLAY

Notes:

- 1) No seepage or sloughing observed.
- 2) Test hole was backfilled with auger cuttings up to 0.45 m depth, 150 mm bentonite, 150 mm sand, 150 mm cold patch asphalt to surface.
- 3) Test hole located on between House #1191 & #1201, 2.0m north from south curb.

Logged By: Syl Precourt Reviewed By: N.J Ferreira Project Engineer: Nelson Ferreira

SUB-SURFACE LOG LOGS 0001 2015-02-25 CLARENCE AVE. D. SP. 0035 016 00.GPJ TREK GEOTECHNICAL.GDT 25/2/15



Sub-Surface Log

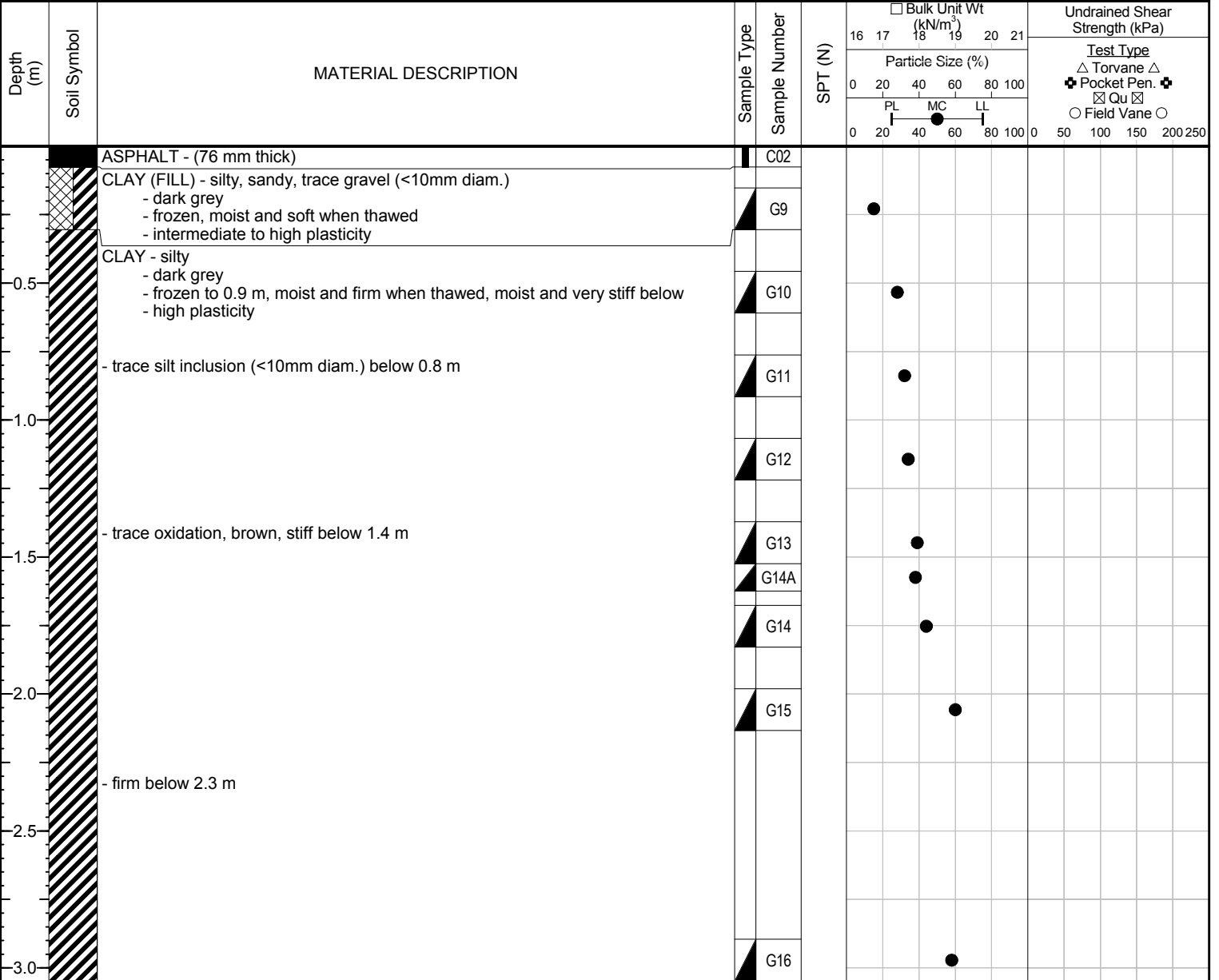
Test Hole TH14-02

1 of 1

Client: Morrison Hershfield Project Number: 0035 016 00
 Project Name: City of Winnipeg Local Streets Package 15-R-03 Location: Clarence Ave. - between Marshall Cres. and Hudson St.
 Contractor: Paddock Drilling Ltd. Ground Elevation: Top of Pavement
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: 4 December 2014

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



END OF TEST HOLE AT 3.05 m IN CLAY

Notes:

- 1) No seepage or sloughing observed.
- 2) Test hole was backfilled with auger cuttings up to 0.45 m depth, 150 mm bentonite, 150 mm sand, 150 mm cold patch asphalt to surface.
- 3) Test hole located at House #1183, 2.0m south from north curb.

Logged By: Syl Precourt Reviewed By: N.J Ferreira Project Engineer: Nelson Ferreira

SUB-SURFACE LOG LOGS 0001 2015-02-25 CLARENCE AVE. D. SP. 0035 016 00.GPJ TREK GEOTECHNICAL.GDT. 25/2/15



Sub-Surface Log

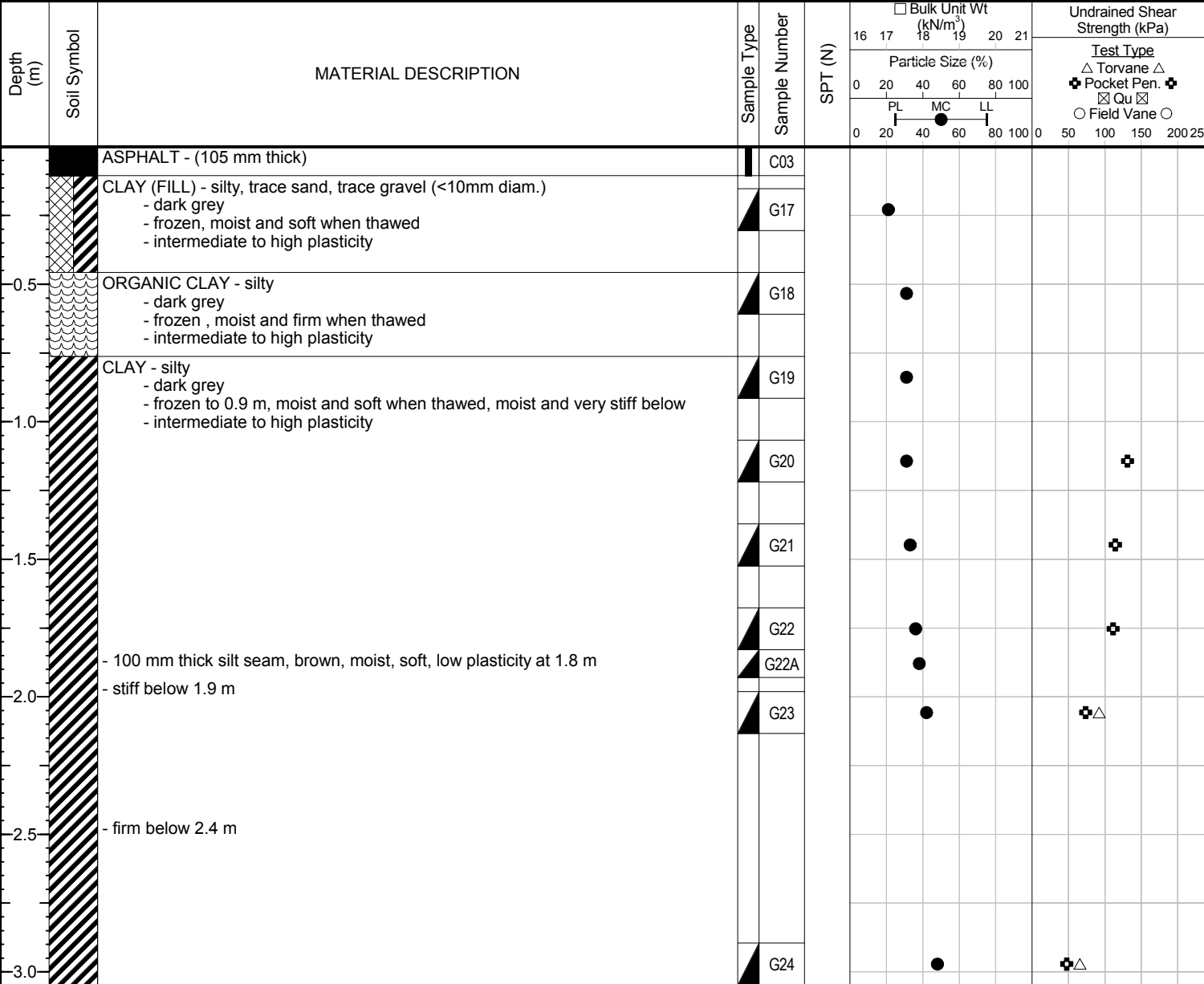
Test Hole TH14-03

1 of 1

Client: Morrison Hershfield Project Number: 0035 016 00
 Project Name: City of Winnipeg Local Streets Package 15-R-03 Location: Clarence Ave. - between Marshall Cres. and Hudson St.
 Contractor: Paddock Drilling Ltd. Ground Elevation: Top of Pavement
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: 4 December 2014

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



END OF TEST HOLE AT 3.05 m IN CLAY

Notes:

- 1) No seepage or sloughing observed.
- 2) Test hole was backfilled with auger cuttings up to 0.45 m depth, 150 mm bentonite, 150 mm sand, 150 mm cold patch asphalt to surface.
- 3) Test hole located at House #1179, 2.0m north from south curb.

Logged By: Syl Precourt Reviewed By: N.J Ferreira Project Engineer: Nelson Ferreira

SUB-SURFACE LOG LOGS 0001 2015-02-25 CLARENCE AVE. D. SP. 0035 016 00 GPJ TREK GEOTECHNICAL GDT. 25/2/15



Sub-Surface Log

Test Hole TH14-04

1 of 1

Client: Morrison Hershfield **Project Number:** 0035 016 00
Project Name: City of Winnipeg Local Streets Package 15-R-03 **Location:** Clarence Ave. - between Marshall Cres. and Hudson St.
Contractor: Paddock Drilling Ltd. **Ground Elevation:** Top of Pavement
Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount **Date Drilled:** 4 December 2014

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	SPT (N)	Bulk Unit Wt (kN/m ³)		Particle Size (%)		Undrained Shear Strength (kPa)	
						16	17	18	19	20	21
0.0		ASPHALT - (90 mm thick)		C04							
0.05		CLAY (FILL) - silty, trace sand - grey - frozen, moist and soft when thawed - intermediate to high plasticity		G33							
0.45		CLAY - silty, trace silt inclusion (<10mm diam.), trace sand - dark grey - frozen to 0.9 m, moist and soft when thawed, moist and very stiff below - intermediate to high plasticity		G34							
0.85				G35							
1.15		SILT - trace clay - brown - moist, soft - low plasticity		G36							
1.55				G37							
1.95		CLAY - silty - brown - moist, very stiff - high plasticity		G38							
2.05		- firm below 2.0 m		G39							
2.15		- 50 mm thick silt seam, brown, moist, soft, low plasticity at 2.1 m									
2.45		- trace gravel (<30mm diam.) below 2.4 m									
2.95		- soft below 2.9 m		G40							

END OF TEST HOLE AT 3.05 m IN CLAY

Notes:

- 1) No seepage or sloughing observed.
- 2) Test hole was backfilled with auger cuttings up to 0.45 m depth, 150 mm bentonite, 150 mm sand, 150 mm cold patch asphalt to surface.
- 3) Test hole located at House #1157, 2.0m south from north curb.

Logged By: Syl Precourt **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 0001 2015-02-25 CLARENCE AVE. D. SP. 0035 016 00 GPJ TREK GEOTECHNICAL GDT. 25/2/15



Sub-Surface Log

Test Hole TH14-05

1 of 1

Client: Morrison Hershfield Project Number: 0035 016 00
 Project Name: City of Winnipeg Local Streets Package 15-R-03 Location: Clarence Ave. - between Marshall Cres. and Hudson St.
 Contractor: Paddock Drilling Ltd. Ground Elevation: Top of Pavement
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: 4 December 2014

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	SPT (N)	Bulk Unit Wt (kN/m ³)		Particle Size (%)		Undrained Shear Strength (kPa)								
						16	17	18	19	20	21	0	50	100	150	200	250	
0.0		ASPHALT - (127 mm thick)		C05														
0.0		SAND (FILL) - some clay, trace silt, brown, frozen, moist when thawed		G25														
0.0		ORGANIC CLAY - silty, trace sand - black - frozen, moist and soft when thawed - intermediate to high plasticity		G26														
0.5		CLAY - silty, trace sand - brown - frozen to 0.9 m, moist and soft when thawed, moist and very stiff below - high plasticity		G27														
1.0				G28														
1.5		- 25 mm thick silt seam, brown, moist, soft, low plasticity at 1.5 m		G29														
1.5				G30A														
1.8		- mottled grey and brown, stiff below 1.6 m		G30														
2.0				G31														
2.5																		
2.8		- trace silt inclusion (<5mm diam.) below 2.7 m																
3.0		- firm below 2.9 m		G32														

END OF TEST HOLE AT 3.05 m IN CLAY

Notes:

- 1) No seepage or sloughing observed.
- 2) Test hole was backfilled with auger cuttings up to 0.45 m depth, 150 mm bentonite, 150 mm sand, 150 mm cold patch asphalt to surface.
- 3) Test hole located at House #1147, 2.0m south from north curb.

Logged By: Syl Precourt Reviewed By: N.J Ferreira Project Engineer: Nelson Ferreira

SUB-SURFACE LOG LOGS 0001 2015-02-25 CLARENCE AVE. D. SP. 0035 016 00 GPJ TREK GEOTECHNICAL GDT. 25/2/15



Sub-Surface Log

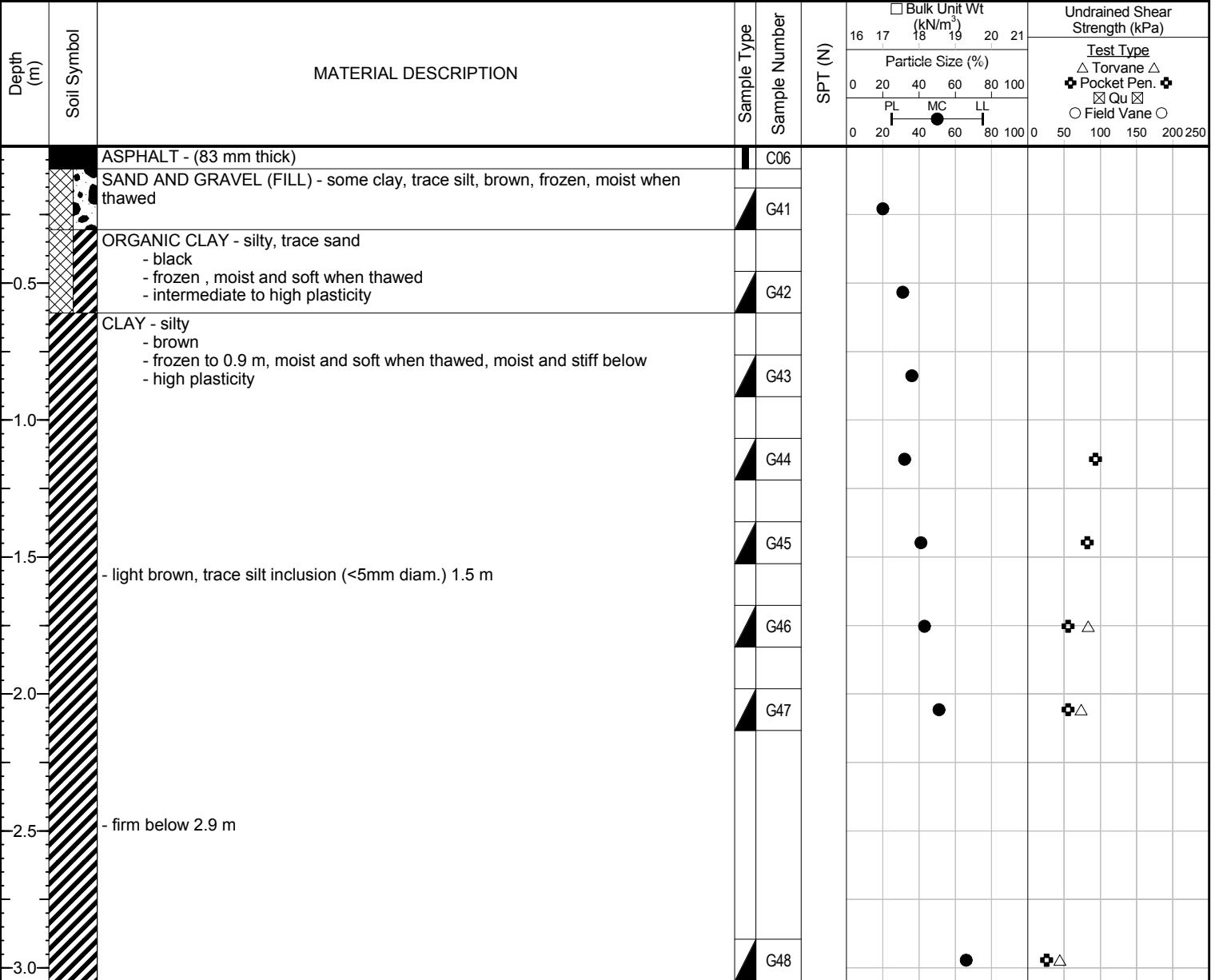
Test Hole TH14-06

1 of 1

Client: Morrison Hershfield Project Number: 0035 016 00
 Project Name: City of Winnipeg Local Streets Package 15-R-03 Location: Clarence Ave. - between Marshall Cres. and Hudson St.
 Contractor: Paddock Drilling Ltd. Ground Elevation: Top of Pavement
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: 4 December 2014

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



END OF TEST HOLE AT 3.05 m IN CLAY

Notes:

- 1) No seepage or sloughing observed.
- 2) Test hole was backfilled with auger cuttings up to 0.45 m depth, 150 mm bentonite, 150 mm sand, 150 mm cold patch asphalt to surface.
- 3) Test hole located at House #1125, 2.0m south from north curb.

Logged By: Syl Precourt Reviewed By: N.J Ferreira Project Engineer: Nelson Ferreira

SUB-SURFACE LOG LOGS 0001 2015-02-25 CLARENCE AVE. D. SP. 0035 016 00 GPJ TREK GEOTECHNICAL GDT 25/2/15



Sub-Surface Log

Test Hole TH14-07

1 of 1

Client: Morrison Hershfield Project Number: 0035 016 00
 Project Name: City of Winnipeg Local Streets Package 15-R-03 Location: Clarence Ave. - between Marshall Cres. and Hudson St.
 Contractor: Paddock Drilling Ltd. Ground Elevation: Top of Pavement
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: 4 December 2014

Sample Type: Grab (G) Shelby Tube (T) Split Spoon (SS) Split Barrel (SB) Core (C)
 Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	SPT (N)	Bulk Unit Wt (kN/m ³)		Particle Size (%)		Undrained Shear Strength (kPa)	
						16	17	18	19	20	21
0.0		ASPHALT - (95 mm thick)		C07							
0.0		CLAY AND SILT (FILL) - sandy, trace gravel (<20mm diam.), trace silt inclusions (<5mm diam.) - brown - frozen, moist to wet and soft when thawed - intermediate to high plasticity		G49							
0.5		CLAY - silty, some sand, trace gravel (<10mm diam.), trace silt inclusion (<5mm diam.) - mottled brown and dark grey - frozen to 0.9 m, moist and soft when thawed, moist and stiff below - intermediate to high plasticity		G50							
0.9				G51							
1.0				G52							
1.5		- 100 mm thick silt seam, brown, soft, moist, low plasticity		G53							
1.6				G53A							
1.7		- brown below 1.7 m		G54							
2.0				G55							
3.0				G56							

END OF TEST HOLE AT 3.05 m IN CLAY

Notes:

- 1) No seepage or sloughing observed.
- 2) Test hole was backfilled with auger cuttings up to 0.45 m depth, 150 mm bentonite, 150 mm sand, 150 mm cold patch asphalt to surface.
- 3) Test hole located at House #1115, 2.0m south from north curb.

Logged By: Syl Precourt Reviewed By: N.J Ferreira Project Engineer: Nelson Ferreira

SUB-SURFACE LOG LOGS 0001 2015-02-25 CLARENCE AVE. D. SP. 0035 016 00.GPJ TREK GEOTECHNICAL.GDT. 25/2/15



Sub-Surface Log

Test Hole TH14-08

1 of 1

Client: Morrison Hershfield Project Number: 0035 016 00
 Project Name: City of Winnipeg Local Streets Package 15-R-03 Location: Clarence Ave. - between Marshall Cres. and Hudson St.
 Contractor: Paddock Drilling Ltd. Ground Elevation: Top of Pavement
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: 4 December 2014

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	SPT (N)	Bulk Unit Wt (kN/m ³)		Undrained Shear Strength (kPa)
						16	17	
						Particle Size (%)		Test Type △ Torvane △ ⊕ Pocket Pen. ⊕ ⊗ Qu ⊗ ○ Field Vane ○
						0	20	
						0	20	
0.0		ASPHALT - (35 mm thick)		C08				
0.0		CONCRETE - (125 mm thick)						
0.0		SAND (FILL) - trace to some silt, trace clay, trace gravel (<10mm diam.) - brown - frozen to 0.9 m, moist when thawed, moist and compact below		G57	●			
0.5				G58	●			
1.0		SILT - clayey, some sand - light brown - moist, soft - low plasticity		G59	●			
1.5				G60	●			
1.5				G61	●			
2.0		CLAY - silty - brown - moist, very stiff - intermediate to high plasticity		G62	●			
2.0				G63	●			
2.5								
3.0		- stiff below 2.9 m		G64	●			

END OF TEST HOLE AT 3.05 m IN CLAY

Notes:

- 1) No seepage or sloughing observed.
- 2) Test hole was backfilled with auger cuttings up to 0.45 m depth, 150 mm bentonite, 150 mm sand, 150 mm cold patch asphalt to surface.
- 3) Test hole located at House #1107, 2.0m north from south curb.

Logged By: Syl Precourt Reviewed By: N.J Ferreira Project Engineer: Nelson Ferreira

SUB-SURFACE LOG LOGS 0001 2015-02-25 CLARENCE AVE. D. SP. 0035 016 00.GPJ TREK GEOTECHNICAL.GDT. 25/2/15



Sub-Surface Log

Test Hole TH14-09

1 of 1

Client: Morrison Hershfield **Project Number:** 0035 016 00
Project Name: City of Winnipeg Local Streets Package 15-R-03 **Location:** Clarence Ave. - between Marshall Cres. and Hudson St.
Contractor: Paddock Drilling Ltd. **Ground Elevation:** Top of Pavement
Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount **Date Drilled:** 4 December 2014

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	SPT (N)	Bulk Unit Wt (kN/m ³)		Particle Size (%)		Undrained Shear Strength (kPa)	
						16	17	18	19	20	21
0.0		ASPHALT - (90 mm thick)		C09							
0.0		SAND (FILL) - trace clay, trace silt - brown - frozen, moist when thawed, compact		G65							
0.5		CLAY (FILL) - silty - dark grey - frozen to 0.9 m, moist and soft when thawed, moist below - intermediate to high plasticity		G66							
0.5				G67							
1.0		SILT - some clay, some sand - light brown - moist, soft - low plasticity		G68							
1.5				G69							
1.8		CLAY - silty - brown - moist, very stiff - intermediate to high plasticity - 50 mm thick silt seam, light brown, moist, soft, low plasticity at 1.8 m		G70							
1.8				G71							
2.0											
2.5											
3.0		- firm below 2.9 m		G72							

END OF TEST HOLE AT 3.05 m IN CLAY

Notes:

- 1) No seepage or sloughing observed.
- 2) Test hole was backfilled with auger cuttings up to 0.45 m depth, 150 mm bentonite, 150 mm sand, 150 mm cold patch asphalt to surface.
- 3) Test hole located at House #1067, 2.0m south from north curb.

Logged By: Syl Precourt **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 0001 2015-02-25 CLARENCE AVE. D. SP. 0035 016 00.GPJ TREK GEOTECHNICAL.GDT. 25/2/15



Project No. 0035 016 00
Client Morrison Hershfield
Project Local Streets Package 15-R-03, Clarence Avenue

Sample Date 04-Dec-14
Test Date 12-Jan-15
Technician Xin Xiong

Test Pit	TH14-01	TH14-01	TH14-01	TH14-01	TH14-01	TH14-01
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 #	G01	G02	G03	G04	G05	G06
Tare ID	W74	W60	Z115	W89	Z22	H23
Mass of tare	8.7	8.8	8.6	8.5	8.3	8.4
Mass wet + tare	385.7	372.8	461.2	417.2	409.1	480.6
Mass dry + tare	339.4	314.2	383.5	372.3	300.2	345.4
Mass water	46.3	58.6	77.7	44.9	108.9	135.2
Mass dry soil	330.7	305.4	374.9	363.8	291.9	337.0
Moisture %	14.0%	19.2%	20.7%	12.3%	37.3%	40.1%

Test Pit	TH14-01	TH14-01	TH14-02	TH14-02	TH14-02	TH14-02
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 #	G07	G08	G09	G10	G11	G12
Tare ID	F107	K23	W04	H99	F78	H53
Mass of tare	8	8.5	8.4	8.5	8.5	8.9
Mass wet + tare	457.4	415	437.6	403.5	411.7	396.7
Mass dry + tare	333.3	279.6	382.6	316.8	314	298.5
Mass water	124.1	135.4	55.0	86.7	97.7	98.2
Mass dry soil	325.3	271.1	374.2	308.3	305.5	289.6
Moisture %	38.1%	49.9%	14.7%	28.1%	32.0%	33.9%

Test Pit	TH14-02	TH14-02	TH14-02	TH14-02	TH14-02	TH14-03
Depth (m)	1.4 - 1.5	1.5 - 1.6	1.7 - 1.8	2.0 - 2.1	2.9 - 3.0	0.2 - 0.3
Sample #	G13	G14A	G14	G15	G16	G17
Tare ID	F96	F51	F19	E1	W33	N101
Mass of tare	8.5	8.4	8.7	85.0	8.3	8.4
Mass wet + tare	403.2	461.4	390.2	427.9	387.0	407.8
Mass dry + tare	293.5	336.5	274.0	299.7	248.7	338.8
Mass water	109.7	124.9	116.2	128.2	138.3	69.0
Mass dry soil	285.0	328.1	265.3	214.7	240.4	330.4
Moisture %	38.5%	38.1%	43.8%	59.7%	57.5%	20.9%



Project No. 0035 016 00
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Test Pit	TH14-03	TH14-03	TH14-03	TH14-03	TH14-03	TH14-03
Depth (m)	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8	1.8 - 1.9
Sample #	G18	G19	G20	G21	G22	G22A
Tare ID	H36	C13	H63	H13	H86	Z136
Mass of tare	8.3	8.7	8.5	8.6	8.4	8.3
Mass wet + tare	395.1	429.2	381.1	493.3	416.9	450.5
Mass dry + tare	304.6	329.4	292.8	371.9	308.3	329.2
Mass water	90.5	99.8	88.3	121.4	108.6	121.3
Mass dry soil	296.3	320.7	284.3	363.3	299.9	320.9
Moisture %	30.5%	31.1%	31.1%	33.4%	36.2%	37.8%

Test Pit	TH14-03	TH14-03	TH14-05	TH14-05	TH14-05	TH14-05
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 #	G23	G24	G25	G26	G27	G28
Tare ID	H43	D37	D18	H45	E138	H8
Mass of tare	8.8	8.5	8.5	8.3	8.5	8.4
Mass wet + tare	389.2	423.1	415.8	380	423.7	389.4
Mass dry + tare	276.4	289.4	369.7	290.7	319.6	291.4
Mass water	112.8	133.7	46.1	89.3	104.1	98.0
Mass dry soil	267.6	280.9	361.2	282.4	311.1	283.0
Moisture %	42.2%	47.6%	12.8%	31.6%	33.5%	34.6%

Test Pit	TH14-05	TH14-05	TH14-05	TH14-05	TH14-05	TH14-04
Depth (m)	1.4 - 1.5	1.5 - 1.5	1.7 - 1.8	2.0 - 2.1	2.9 - 3.0	0.2 - 0.3
Sample #	G29	G30A	G30	G31	G32	G33
Tare ID	W39	Z05	F69	P36	F94	Z04
Mass of tare	8.3	8.4	8.6	8.5	8.3	8.4
Mass wet + tare	451.1	473.3	430.2	451.1	365	372.3
Mass dry + tare	328.6	335.3	314	313.8	240.5	293.9
Mass water	122.5	138.0	116.2	137.3	124.5	78.4
Mass dry soil	320.3	326.9	305.4	305.3	232.2	285.5
Moisture %	38.2%	42.2%	38.0%	45.0%	53.6%	27.5%



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Technician Xin Xiong

Test Pit	TH14-04	TH14-04	TH14-04	TH14-04	TH14-04	TH14-04
Depth (m)	0.5 - 0.6	0.6 - 0.8	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1
Sample #	G34	G35	G36	G37	G38	G39
Tare ID	W03	Z58	Z101	E32	W86	W46
Mass of tare	8.3	8.4	8.3	8.4	8.4	8.3
Mass wet + tare	358.9	391.6	371	442.2	412.9	400.4
Mass dry + tare	276.5	314	297.2	357.9	313.8	305.5
Mass water	82.4	77.6	73.8	84.3	99.1	94.9
Mass dry soil	268.2	305.6	288.9	349.5	305.4	297.2
Moisture %	30.7%	25.4%	25.5%	24.1%	32.4%	31.9%

Test Pit	TH14-04	TH14-06	TH14-06	TH14-06	TH14-06	TH14-06
Depth (m)	2.9 - 3.0	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5
Sample #	G40	G41	G42	G43	G44	G45
Tare ID	F146	H6	E130	Z107	Z98	W27
Mass of tare	8.2	8.5	8.2	8.4	8.4	8.3
Mass wet + tare	449.7	418.2	381.6	356.4	425.6	358.5
Mass dry + tare	296.9	351.3	294.2	264.3	323.5	256.1
Mass water	152.8	66.9	87.4	92.1	102.1	102.4
Mass dry soil	288.7	342.8	286.0	255.9	315.1	247.8
Moisture %	52.9%	19.5%	30.6%	36.0%	32.4%	41.3%

Test Pit	TH14-06	TH14-06	TH14-06	TH14-07	TH14-07	TH14-07
Depth (m)	1.7 - 1.8	19.8 - 2.1	2.9 - 3.0	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9
Sample #	G46	G47	G48	G49	G50	G51
Tare ID	Z76	Z01	Z23	E45	F155	F150
Mass of tare	8.4	8.4	8.4	8.5	8.4	8.2
Mass wet + tare	449.2	369.3	378.4	424.9	391.9	480.7
Mass dry + tare	316.1	247.8	231.4	320.9	309.6	371.5
Mass water	133.1	121.5	147.0	104.0	82.3	109.2
Mass dry soil	307.7	239.4	223.0	312.4	301.2	363.3
Moisture %	43.3%	50.8%	65.9%	33.3%	27.3%	30.1%



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Test Pit	TH14-07	TH14-07	TH14-07	TH14-07	TH14-07	TH14-07
Depth (m)	1.1 - 1.2	1.4 - 1.5	1.5 - 1.6	1.7 - 1.8	2.0 - 2.1	2.9 - 3.0
Sample #	G52	G53	G53A	G54	G55	G56
Tare ID	W76	E51	F23	E113	P31	D14
Mass of tare	8.3	8.4	8.5	8.4	8.3	8.5
Mass wet + tare	434.8	365.2	455.0	444.3	436.4	490.7
Mass dry + tare	350.8	291.6	352.3	317.7	302.3	323.2
Mass water	84.0	73.6	102.7	126.6	134.1	167.5
Mass dry soil	342.5	283.2	343.8	309.3	294.0	314.7
Moisture %	24.5%	26.0%	29.9%	40.9%	45.6%	53.2%

Test Pit	TH14-08	TH14-08	TH14-08	TH14-08	TH14-08	TH14-08
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 #	G57	G58	G59	G60	G61	G62
Tare ID	N69	E92	F86	C12	Z38	Z91
Mass of tare	8.5	8.2	8.6	8.6	8.6	8.3
Mass wet + tare	428.0	373.5	400.7	419.1	470.6	435.1
Mass dry + tare	394.5	344.4	380.5	347.0	354.5	349.6
Mass water	33.5	29.1	20.2	72.1	116.1	85.5
Mass dry soil	386.0	336.2	371.9	338.4	345.9	341.3
Moisture %	8.7%	8.7%	5.4%	21.3%	33.6%	25.1%

Test Pit	TH14-08	TH14-08	TH14-09	TH14-09	TH14-09	TH14-09
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 #	G63	G64	G65	G66	G67	G68
Tare ID	F59	H47	F145	C15	F54	F66
Mass of tare	8.5	8.5	8.5	8.5	8.4	8.4
Mass wet + tare	456.0	418.2	385.0	447.7	368.7	478.1
Mass dry + tare	322.5	291.9	336.2	344.4	277.8	369.2
Mass water	133.5	126.3	48.8	103.3	90.9	108.9
Mass dry soil	314.0	283.4	327.7	335.9	269.4	360.8
Moisture %	42.5%	44.6%	14.9%	30.8%	33.7%	30.2%



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**Moisture Content Report
 ASTM D2216-98**

Project No. 0035 016 00
Client Morrison Hershfield
Project Local Streets Package 15-R-03, Clarence Avenue

Sample Date 04-Dec-14
Test Date 12-Jan-15
Technician Xin Xiong

Test Pit	TH14-09	TH14-09	TH14-09	TH14-09		
Depth (m)	1.4 - 1.5	1.7 - 1.8	1.8 - 1.9	2.9 - 3.0		
Sample #	G69	G70	G71	G72		
Tare ID	Z122	D30	F132	A51		
Mass of tare	8.5	8.5	8.7	8.5		
Mass wet + tare	375.7	431.7	410.7	351.4		
Mass dry + tare	308.6	314.3	299.0	236.8		
Mass water	67.1	117.4	111.7	114.6		
Mass dry soil	300.1	305.8	290.3	228.3		
Moisture %	22.4%	38.4%	38.5%	50.2%		

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

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



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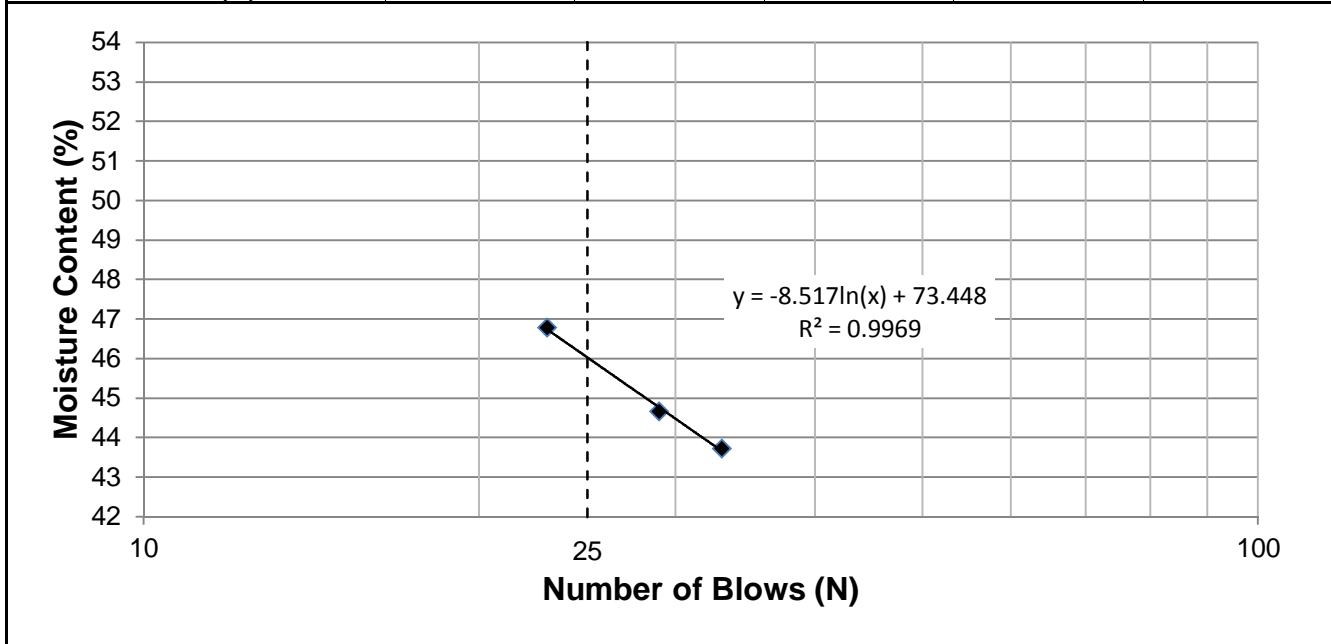
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Client Morrision Hershfield
Project Local Streets Package 15-R-03, Clarence Avenue

Test Hole TH14-01
Sample # G2
Depth (m) 0.5 - 0.6
Sample Date 04-Dec-14
Test Date 21-Jan-15
Technician Xin Xiong

Liquid Limit	46
Plastic Limit	14
Plasticity Index	32

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	33	29	23		
Mass Wet Soil + Tare (g)	24.239	25.736	26.430		
Mass Dry Soil + Tare (g)	21.145	22.124	22.430		
Mass Tare (g)	14.070	14.038	13.879		
Mass Water (g)	3.094	3.612	4.000		
Mass Dry Soil (g)	7.075	8.086	8.551		
Moisture Content (%)	43.731	44.670	46.778		



Plastic Limit

Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	20.476	20.337			
Mass Dry Soil + Tare (g)	19.684	19.533			
Mass Tare (g)	14.030	14.090			
Mass Water (g)	0.792	0.804			
Mass Dry Soil (g)	5.654	5.443			
Moisture Content (%)	14.008	14.771			



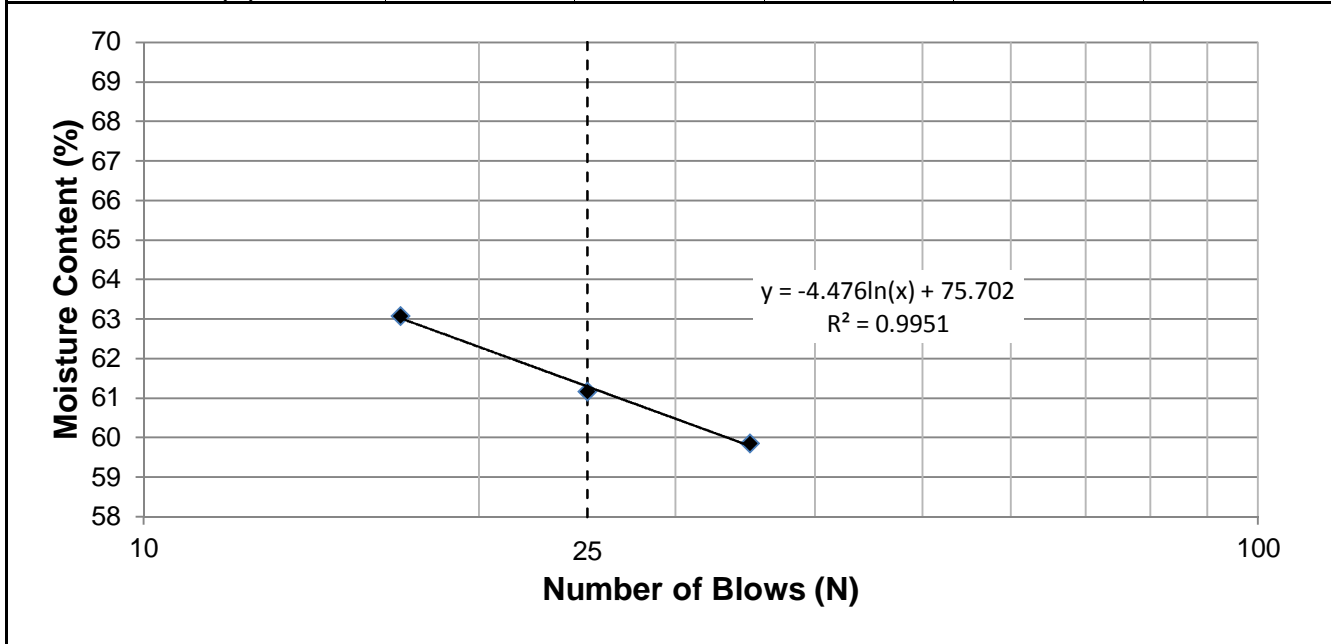
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Project Local Streets Package 15-R-03, Clarence Avenue

Test Hole TH14-04
Sample # G35
Depth (m) 0.6-0.8
Sample Date 04-Dec-14
Test Date 21-Jan-15
Technician Xin Xiong

Liquid Limit	61
Plastic Limit	20
Plasticity Index	41

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	35	25	17		
Mass Wet Soil + Tare (g)	24.615	26.832	24.464		
Mass Dry Soil + Tare (g)	20.608	22.156	20.363		
Mass Tare (g)	13.914	14.511	13.862		
Mass Water (g)	4.007	4.676	4.101		
Mass Dry Soil (g)	6.694	7.645	6.501		
Moisture Content (%)	59.860	61.164	63.083		



Plastic Limit

Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	21.218	20.698			
Mass Dry Soil + Tare (g)	20.053	19.590			
Mass Tare (g)	14.106	14.122			
Mass Water (g)	1.165	1.108			
Mass Dry Soil (g)	5.947	5.468			
Moisture Content (%)	19.590	20.263			



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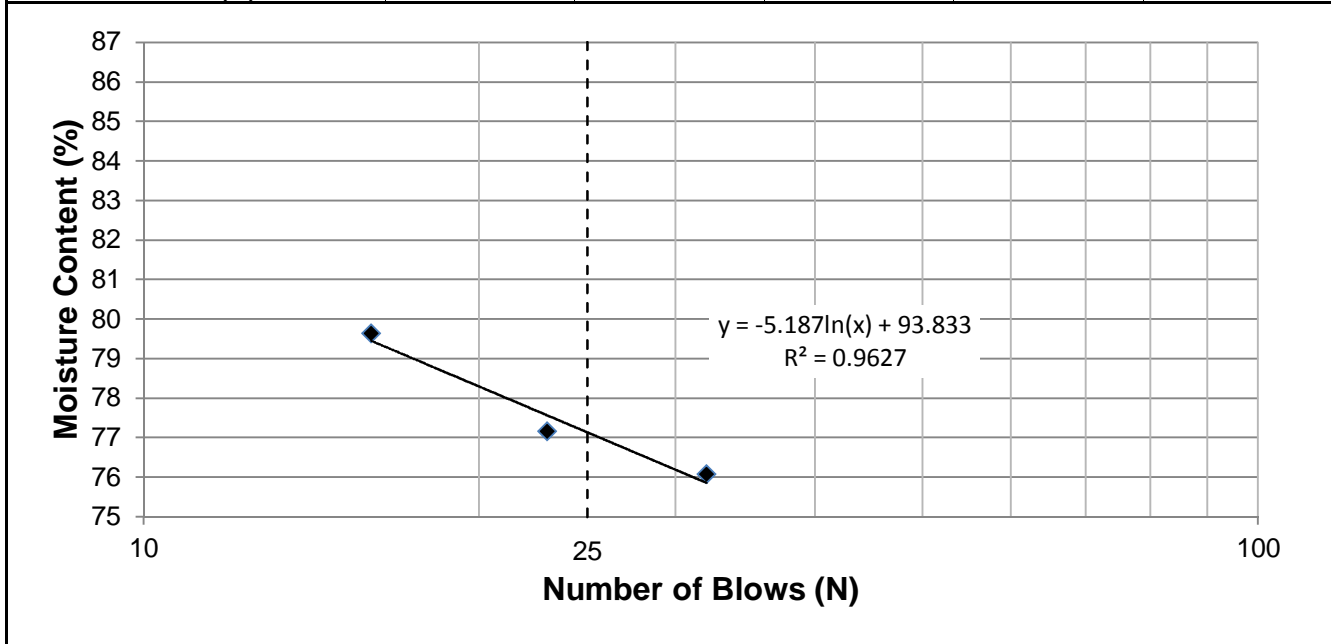
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Project Local Streets Package 15-R-03, Clarence Avenue

Test Hole TH14-05
Sample # G27
Depth (m) 0.8-0.9
Sample Date 04-Dec-14
Test Date 21-Jan-15
Technician Xin Xiong

Liquid Limit	77
Plastic Limit	30
Plasticity Index	48

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	32	23	16		
Mass Wet Soil + Tare (g)	25.334	25.445	24.206		
Mass Dry Soil + Tare (g)	20.477	20.496	19.671		
Mass Tare (g)	14.092	14.082	13.977		
Mass Water (g)	4.857	4.949	4.535		
Mass Dry Soil (g)	6.385	6.414	5.694		
Moisture Content (%)	76.069	77.159	79.645		



Plastic Limit

Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	21.200	20.739			
Mass Dry Soil + Tare (g)	19.593	19.242			
Mass Tare (g)	14.064	14.257			
Mass Water (g)	1.607	1.497			
Mass Dry Soil (g)	5.529	4.985			
Moisture Content (%)	29.065	30.030			



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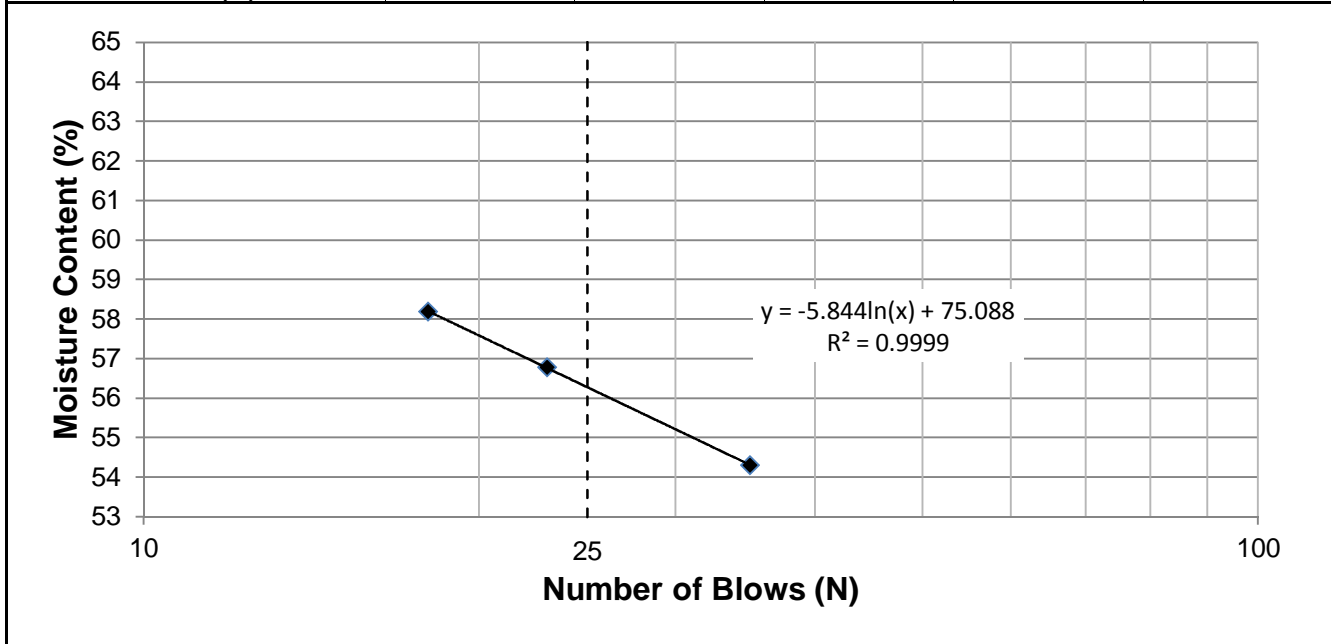
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Test Hole TH14-07
Sample # G51
Depth (m) 0.8-0.9
Sample Date 04-Dec-14
Test Date 21-Jan-15
Technician Xin Xiong

Liquid Limit	56
Plastic Limit	22
Plasticity Index	35

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	35	23	18		
Mass Wet Soil + Tare (g)	29.477	23.095	24.824		
Mass Dry Soil + Tare (g)	24.052	19.877	20.868		
Mass Tare (g)	14.062	14.210	14.069		
Mass Water (g)	5.425	3.218	3.956		
Mass Dry Soil (g)	9.990	5.667	6.799		
Moisture Content (%)	54.304	56.785	58.185		



Plastic Limit

Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	20.515	20.648			
Mass Dry Soil + Tare (g)	19.346	19.469			
Mass Tare (g)	14.005	13.924			
Mass Water (g)	1.169	1.179			
Mass Dry Soil (g)	5.341	5.545			
Moisture Content (%)	21.887	21.262			



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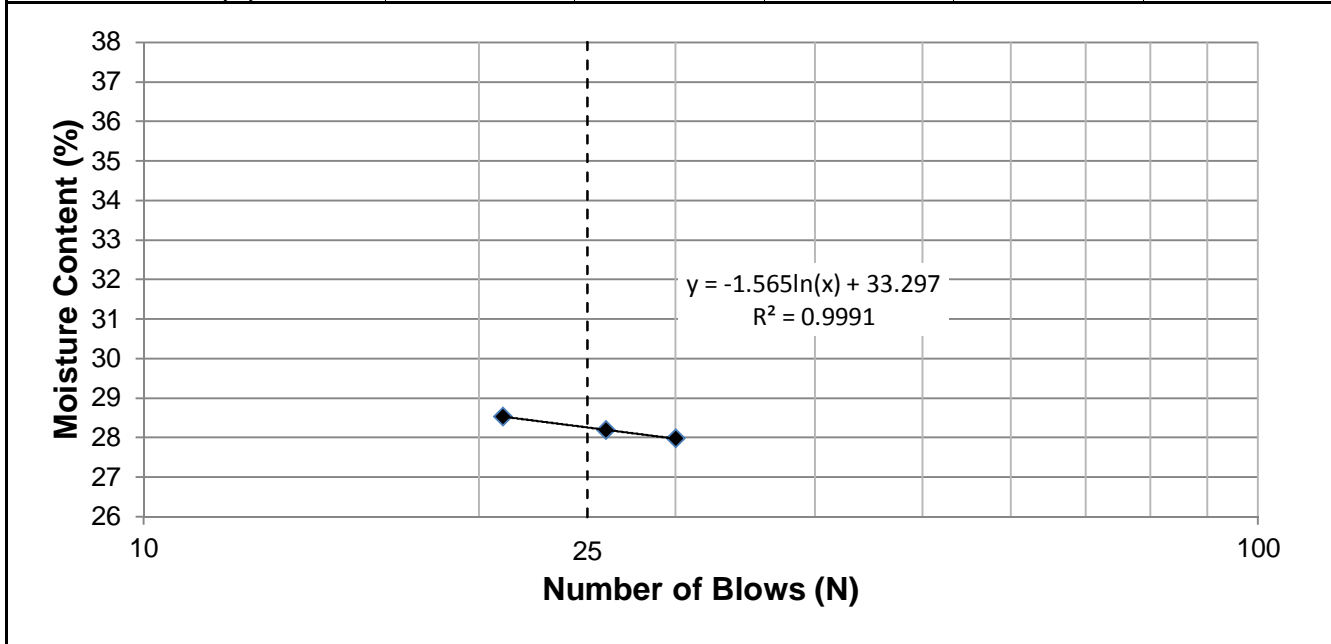
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Test Hole TH14-08
Sample # G60
Depth (m) 1.1-1.2
Sample Date 04-Dec-14
Test Date 21-Jan-15
Technician Xin Xiong

Liquid Limit	28
Plastic Limit	17
Plasticity Index	11

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	30	21	26		
Mass Wet Soil + Tare (g)	23.642	21.793	22.330		
Mass Dry Soil + Tare (g)	21.618	20.096	20.619		
Mass Tare (g)	14.384	14.149	14.549		
Mass Water (g)	2.024	1.697	1.711		
Mass Dry Soil (g)	7.234	5.947	6.070		
Moisture Content (%)	27.979	28.535	28.188		



Plastic Limit

Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	22.980	21.025			
Mass Dry Soil + Tare (g)	21.680	20.009			
Mass Tare (g)	14.082	14.175			
Mass Water (g)	1.300	1.016			
Mass Dry Soil (g)	7.598	5.834			
Moisture Content (%)	17.110	17.415			

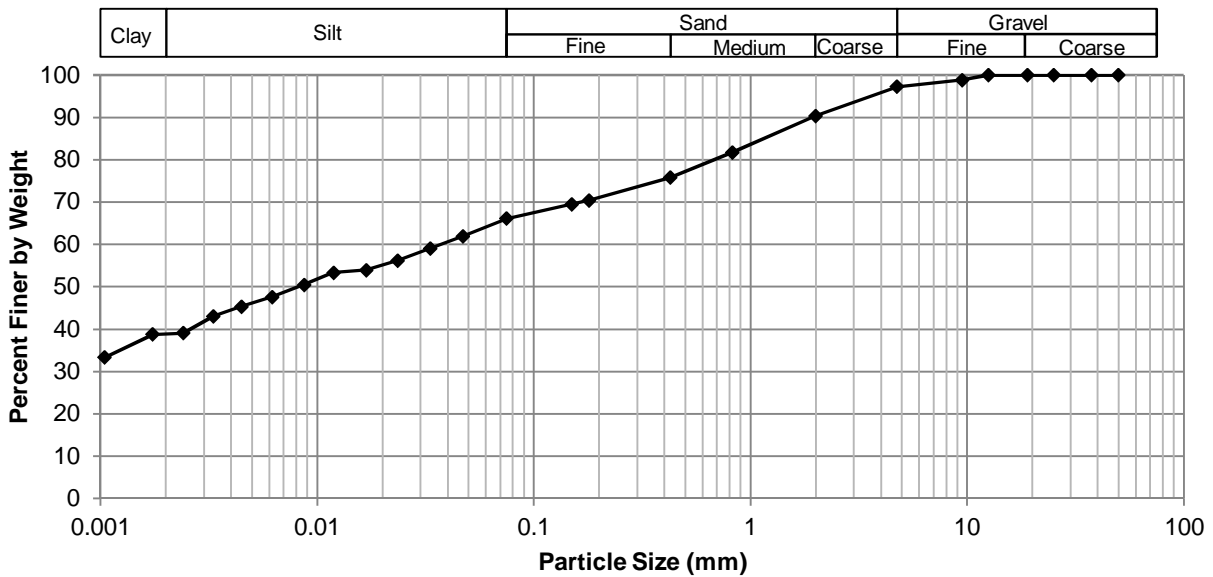


Project No. 0035 016 00
Client Morrison Hershfield
Project Clarence

Test Hole TH14-01
Sample # G02
Depth (m) 0.5 - 0.6
Sample Date 4-Dec-14
Test Date 21-Jan-15
Technician Xin Xiong/Junhui Wu

Gravel	2.7%
Sand	31.2%
Silt	27.2%
Clay	38.9%

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	97.25	0.0750	66.08
37.5	100.00	2.00	90.39	0.0471	61.97
25.0	100.00	0.825	81.75	0.0333	59.10
19.0	100.00	0.425	75.82	0.0236	56.23
12.5	100.00	0.180	70.39	0.0168	53.93
9.50	98.83	0.150	69.53	0.0119	53.36
4.75	97.25	0.075	66.08	0.0087	50.49
				0.0062	47.62
				0.0045	45.32
				0.0033	43.09
				0.0024	39.07
				0.0017	38.78
				0.0010	33.33

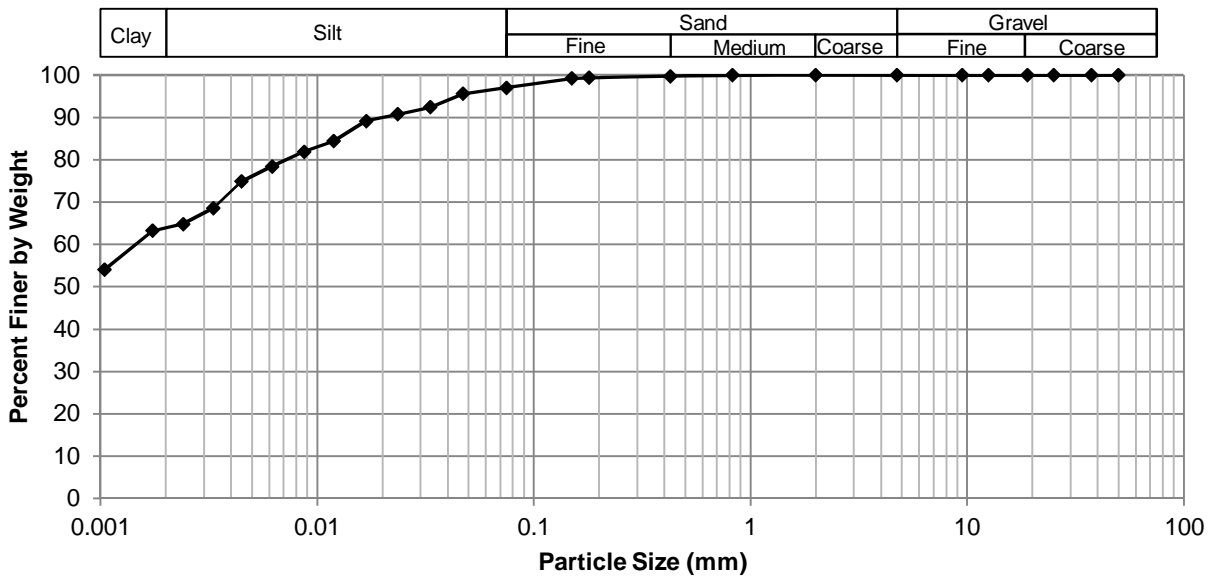


Project No. 0035 016 00
Client Morrison Hershfield
Project Clarence

Test Hole TH14-04
Sample # G35
Depth (m) 0.6 - 0.8
Sample Date 4-Dec-14
Test Date 21-Jan-15
Technician Xin Xiong/Junhui Wu

Gravel	0.0%
Sand	3.0%
Silt	33.2%
Clay	63.8%

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	97.01
37.5	100.00	2.00	100.00	0.0471	95.55
25.0	100.00	0.825	100.00	0.0333	92.38
19.0	100.00	0.425	99.78	0.0236	90.79
12.5	100.00	0.180	99.39	0.0168	89.20
9.50	100.00	0.150	99.24	0.0119	84.44
4.75	100.00	0.075	97.01	0.0087	81.90
				0.0062	78.41
				0.0045	74.91
				0.0033	68.63
				0.0024	64.82
				0.0017	63.23
				0.0010	54.02

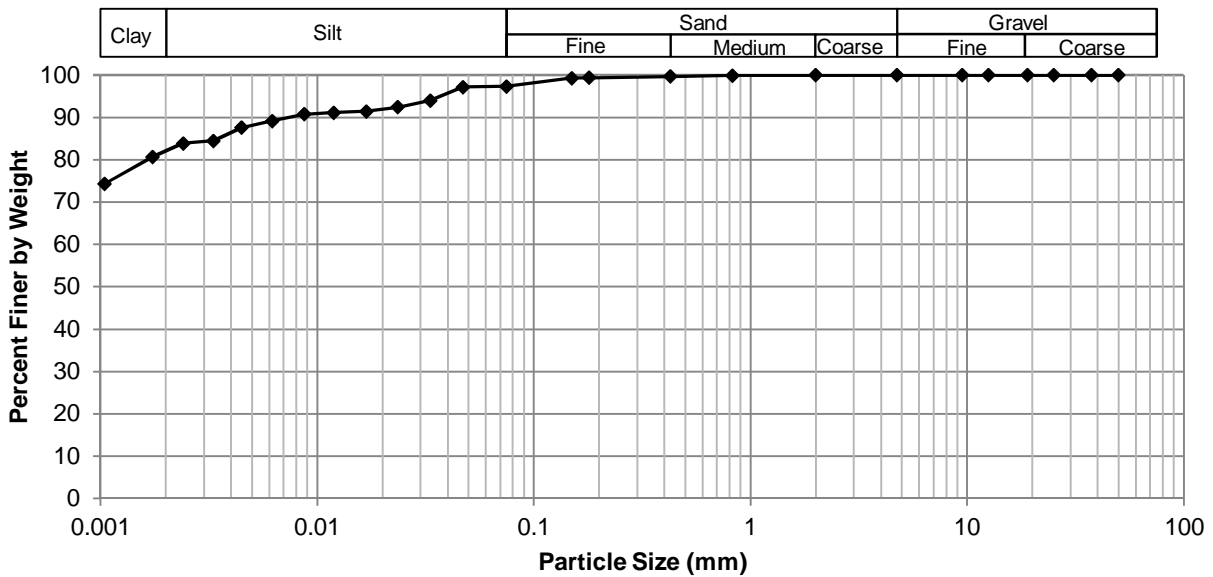


Project No. 0035 016 00
Client Morrison Hershfield
Project Clarence

Test Hole TH14-05
Sample # G27
Depth (m) 0.8 - 0.9
Sample Date 4-Dec-14
Test Date 21-Jan-15
Technician Xin Xiong/Junhui Wu

Gravel	0.0%
Sand	2.7%
Silt	15.4%
Clay	81.9%

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	97.34
37.5	100.00	2.00	100.00	0.0471	97.14
25.0	100.00	0.825	99.88	0.0333	93.97
19.0	100.00	0.425	99.68	0.0236	92.38
12.5	100.00	0.180	99.39	0.0168	91.43
9.50	100.00	0.150	99.30	0.0119	91.11
4.75	100.00	0.075	97.34	0.0087	90.79
				0.0062	89.20
				0.0045	87.62
				0.0033	84.51
				0.0024	83.87
				0.0017	80.70
				0.0010	74.35

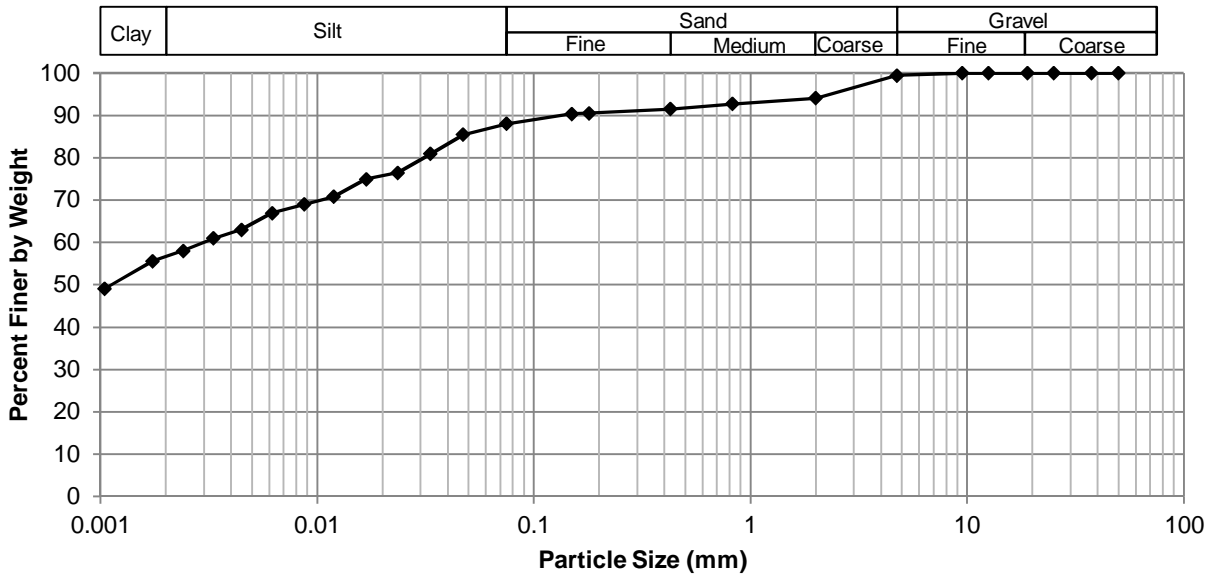


Project No. 0035 016 00
Client Morrison Hershfield
Project Clarence

Test Hole TH14-07
Sample # G51
Depth (m) 0.8 - 0.9
Sample Date 4-Dec-14
Test Date 21-Jan-15
Technician Xin Xiong/Junhui Wu

Gravel	0.6%
Sand	11.4%
Silt	31.5%
Clay	56.6%

Particle Size Distribution Curve



Gravel		Sand		Silt and Clay	
Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing
50.0	100.00	4.75	99.43	0.0750	88.05
37.5	100.00	2.00	94.11	0.0471	85.45
25.0	100.00	0.825	92.73	0.0333	80.96
19.0	100.00	0.425	91.50	0.0236	76.48
12.5	100.00	0.180	90.53	0.0168	74.99
9.50	100.00	0.150	90.39	0.0119	70.80
4.75	99.43	0.075	88.05	0.0087	69.01
				0.0062	66.92
				0.0045	63.03
				0.0033	61.01
				0.0024	58.02
				0.0017	55.63
				0.0010	49.05

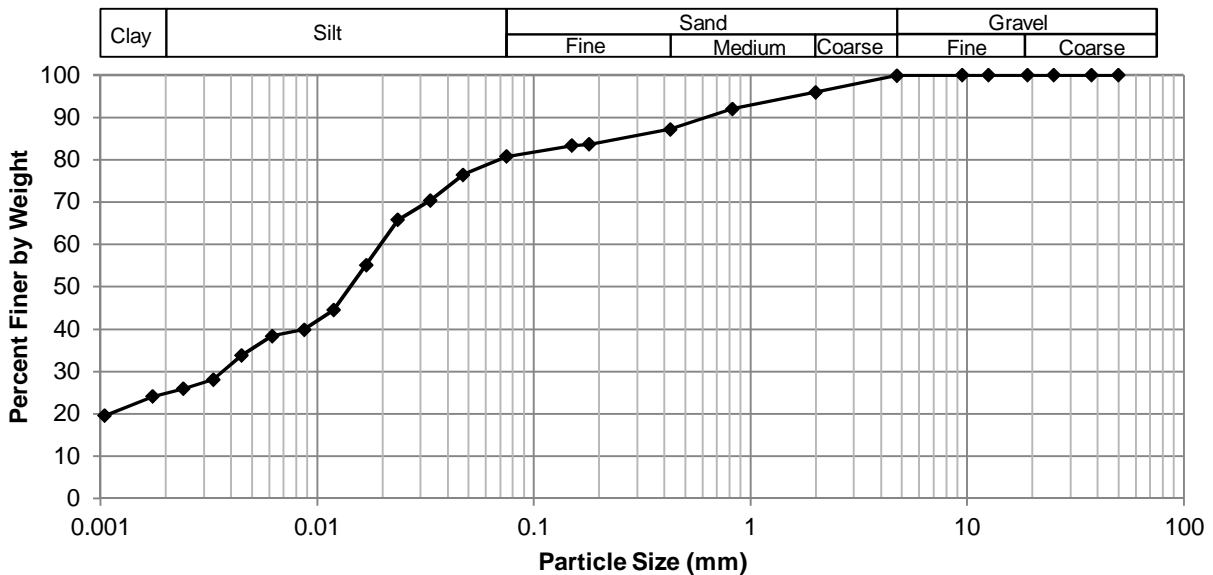


Project No. 0035 016 00
Client Morrison Hershfield
Project Clarence

Test Hole TH14-08
Sample # G60
Depth (m) 1.1 - 1.2
Sample Date 4-Dec-14
Test Date 21-Jan-15
Technician Xin Xiong/Junhui Wu

Gravel	0.1%
Sand	19.1%
Silt	55.1%
Clay	25.8%

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	99.88	0.0750	80.81
37.5	100.00	2.00	96.00	0.0471	76.49
25.0	100.00	0.825	92.06	0.0333	70.40
19.0	100.00	0.425	87.18	0.0236	65.82
12.5	100.00	0.180	83.64	0.0168	55.15
9.50	100.00	0.150	83.33	0.0119	44.48
4.75	99.88	0.075	80.81	0.0087	39.91
				0.0062	38.38
				0.0045	33.81
				0.0033	28.08
				0.0024	25.95
				0.0017	24.12
				0.0010	19.55



Photo 1: Concrete Core Sample From Test Hole TH14-01



Photo 2: Concrete Core Sample From Test Hole TH14-02



Photo 3: Concrete Core Sample From Test Hole TH14-03



Photo 4: Concrete Core Sample From Test Hole TH14-04



Photo 5: Concrete Core Sample From Test Hole TH14-05

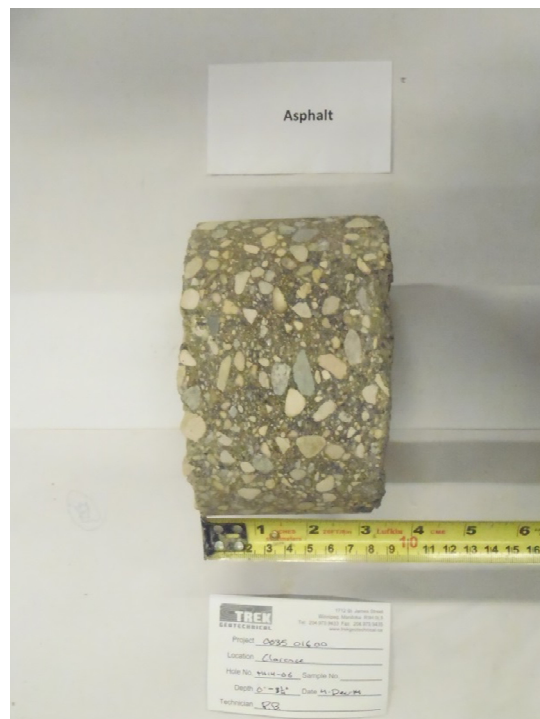


Photo 6: Concrete Core Sample From Test Hole TH14-06



Photo 7: Concrete Core Sample From Test Hole TH14-07



Photo 8: Concrete Core Sample From Test Hole TH14-08

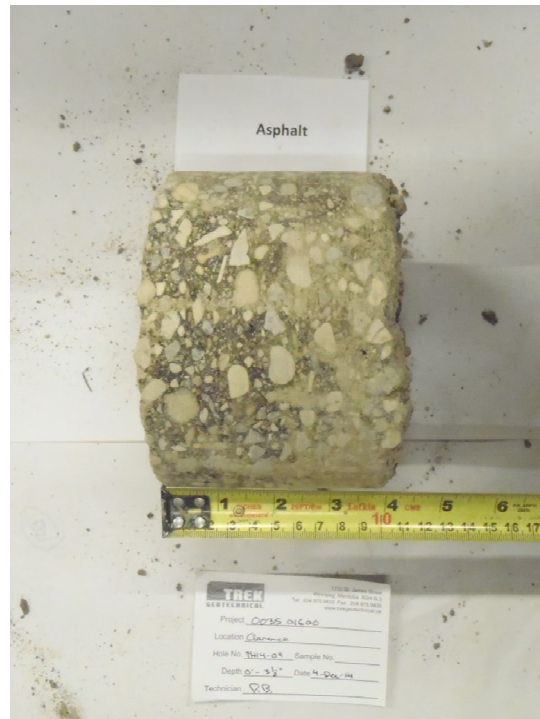


Photo 9: Concrete Core Sample From Test Hole TH14-09

Appendix B

McDowell Dr., between Westlund Way and Oakdale Dr.



Sub-Surface Log

Test Hole TH14-01

1 of 1

Client: Morrison Hershfield Project Number: 0035 016 00
 Project Name: City of Winnipeg Local Streets Package 15-R-03 Location: McDowell Dr.
 Contractor: Paddock Drilling Ltd. Ground Elevation: Top of Pavement
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: 9 December 2014

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	SPT (N)	Bulk Unit Wt (kN/m ³)		Particle Size (%)		Undrained Shear Strength (kPa)	
						16	17	18	19	20	21
0.0 - 0.15		CONCRETE - (165 mm thick)		C01							
0.15 - 0.45		SAND (FILL) - some clay, trace silt, trace gravel (<10mm diam.), brown, frozen, moist when thawed		G1							
0.45 - 0.9		ORGANIC CLAY - silty, trace organics - black - frozen, moist and soft when thawed - high plasticity		G2							
0.9 - 1.8		CLAY - silty - brown - moist, stiff - high plasticity		G3							
1.8 - 3.05		- mottled brown and grey and firm below 1.8 m		G4							
				G5							
				G6							
				G7							
				G8							

END OF TEST HOLE AT 3.05 m IN CLAY

Notes:

- 1) No seepage or sloughing observed.
- 2) Test hole was backfilled with auger cuttings up to 0.45 m depth, 150 mm bentonite, 150 mm sand, 150 mm cold patch asphalt to surface.
- 3) Test hole located at House #127, 2.5m west from east curb.

Logged By: Syl Precourt Reviewed By: N.J Ferreira Project Engineer: Nelson Ferreira

SUB-SURFACE LOG LOGS 0002 2015-02-25 MCDOWELL.D.SP.0035.016.00.GPJ TREK GEOTECHNICAL.GDT.25/2/15



Sub-Surface Log

Test Hole TH14-02

1 of 1

Client: Morrison Hershfield Project Number: 0035 016 00
 Project Name: City of Winnipeg Local Streets Package 15-R-03 Location: McDowell Dr.
 Contractor: Paddock Drilling Ltd. Ground Elevation: Top of Pavement
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: 9 December 2014

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	SPT (N)	Bulk Unit Wt (kN/m ³)		Particle Size (%)		Undrained Shear Strength (kPa)	
						16	17	18	19	20	21
0.0		CONCRETE - (145 mm thick)		C02							
0.0		SAND (FILL) - some clay, trace silt, trace gravel (<10mm diam.), brown, frozen, moist when thawed,		G9							
0.5		ORGANIC CLAY - silty, trace organics, trace silt inclusion (<5mm diam.) - black - frozen, moist and soft when thawed - intermediate to high plasticity		G10							
1.0		CLAY - silty - brown - frozen to 0.9 m, moist and soft when thawed, moist below - intermediate to high plasticity		G11							
1.1		- very stiff below 1.1 m		G12							
1.4		- stiff below 1.4 m		G13							
1.9		- 15mm thick silt seam, brown, moist, soft, low plasticity		G14							
2.0		- firm and mottled brown and grey below 2.0 m		G15							
3.0				G16							

END OF TEST HOLE AT 3.05 m IN CLAY

Notes:

- 1) No seepage or sloughing observed.
- 2) Test hole was backfilled with auger cuttings up to 0.45 m depth, 150 mm bentonite, 150 mm sand, 150 mm cold patch asphalt to surface.
- 3) Test hole located between House #107 & #111, 2.0m east from west curb.

Logged By: Syl Precourt Reviewed By: N.J Ferreira Project Engineer: Nelson Ferreira

SUB-SURFACE LOG LOGS 0002 2015-02-25 MCDOWELL.D.SP.0035.016.00.GPJ TREK GEOTECHNICAL.GDT.25/2/15



Sub-Surface Log

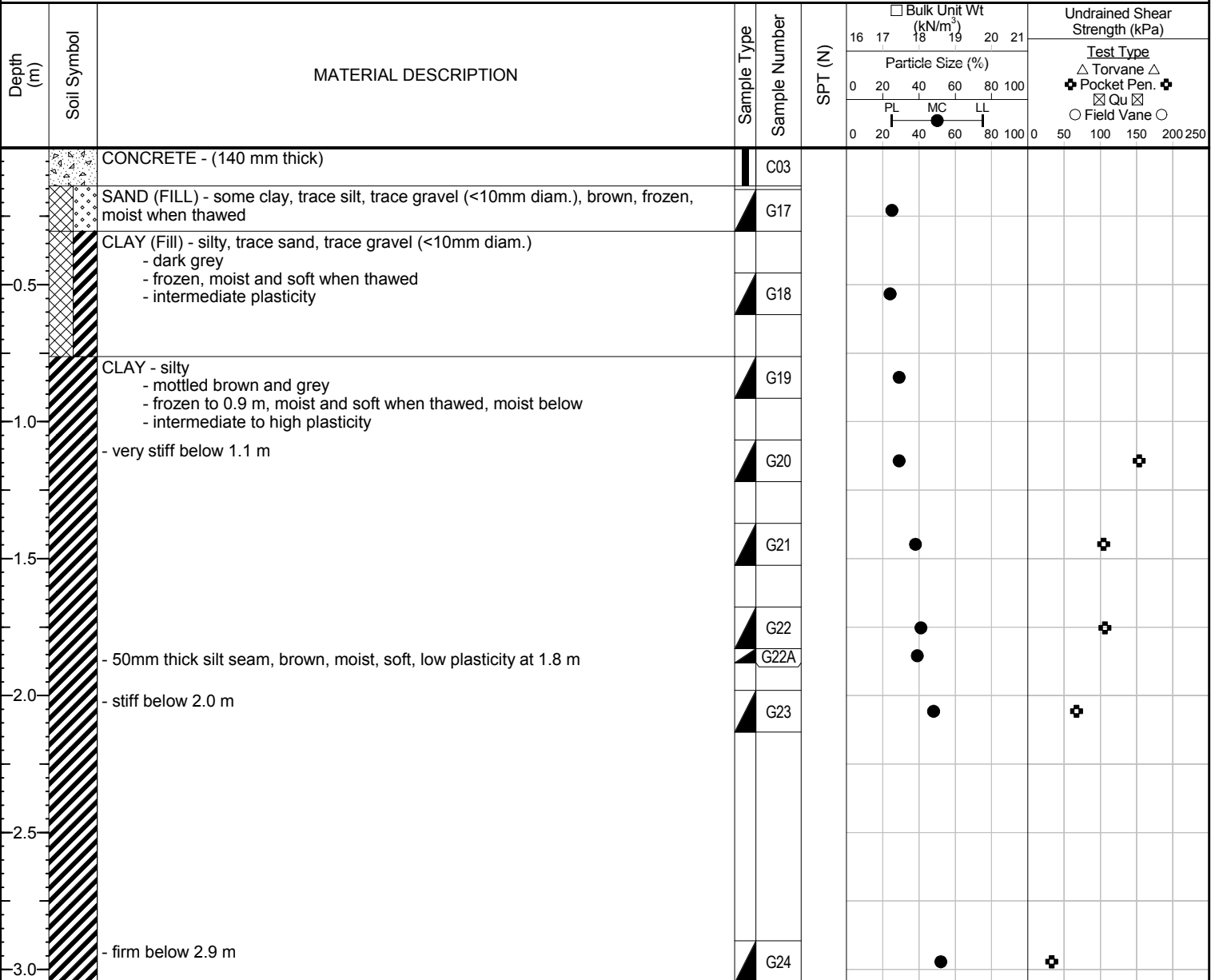
Test Hole TH14-03

1 of 1

Client: Morrison Hershfield Project Number: 0035 016 00
 Project Name: City of Winnipeg Local Streets Package 15-R-03 Location: McDowell Dr.
 Contractor: Paddock Drilling Ltd. Ground Elevation: Top of Pavement
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: 9 December 2014

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



END OF TEST HOLE AT 3.05 m IN CLAY

Notes:

- 1) No seepage or sloughing observed.
- 2) Test hole was backfilled with auger cuttings up to 0.45 m depth, 150 mm bentonite, 150 mm sand, 150 mm cold patch asphalt to surface.
- 3) Test hole located between House #95 & #99, 2.0m west from east curb.

Logged By: Syl Precourt Reviewed By: N.J Ferreira Project Engineer: Nelson Ferreira

SUB-SURFACE LOG LOGS 0002 2015-02-25 MCDOWELL.D.SP_0035 016 00.GPJ TREK GEOTECHNICAL.GDT 25/2/15



Sub-Surface Log

Test Hole TH14-04

1 of 1

Client: Morrison Hershfield Project Number: 0035 016 00
 Project Name: City of Winnipeg Local Streets Package 15-R-03 Location: McDowell Dr.
 Contractor: Paddock Drilling Ltd. Ground Elevation: Top of Pavement
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: 9 December 2014

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	SPT (N)	Bulk Unit Wt (kN/m ³)		Particle Size (%)		Undrained Shear Strength (kPa)							
						16	17	18	19	20	21	0	50	100	150	200	250
0.0		CONCRETE - (160 mm thick)		C04													
0.0		SAND (FILL) - trace clay, trace gravel (<10mm diam.), brown, frozen, moist when thawed		G25													
0.5		SILT- some clay, trace to some sand - grey - frozen to 0.5 m, moist and hard when thawed, soft below - low plasticity		G26													
0.5		CLAY - silty - mottled brown and grey - moist, very stiff - intermediate to high plasticity		G27													
1.0				G28													
1.5				G29													
2.0		- stiff below 1.7 m		G30													
2.0				G31A													
2.0				G31													
2.5																	
3.0		- firm below 2.9 m		G32													

END OF TEST HOLE AT 3.05 m IN CLAY

Notes:

- 1) No seepage or sloughing observed.
- 2) Test hole was backfilled with auger cuttings up to 0.45 m depth, 150 mm bentonite, 150 mm sand, 150 mm cold patch asphalt to surface.
- 3) Test hole located between House #83 & #87, 2.0m east from west curb.

Logged By: Syl Precourt Reviewed By: N.J Ferreira Project Engineer: Nelson Ferreira

SUB-SURFACE LOG LOGS 0002 2015-02-25 MCDOWELL.D.SP.0035.016.00.GPJ TREK GEOTECHNICAL.GDT.25/2/15



Sub-Surface Log

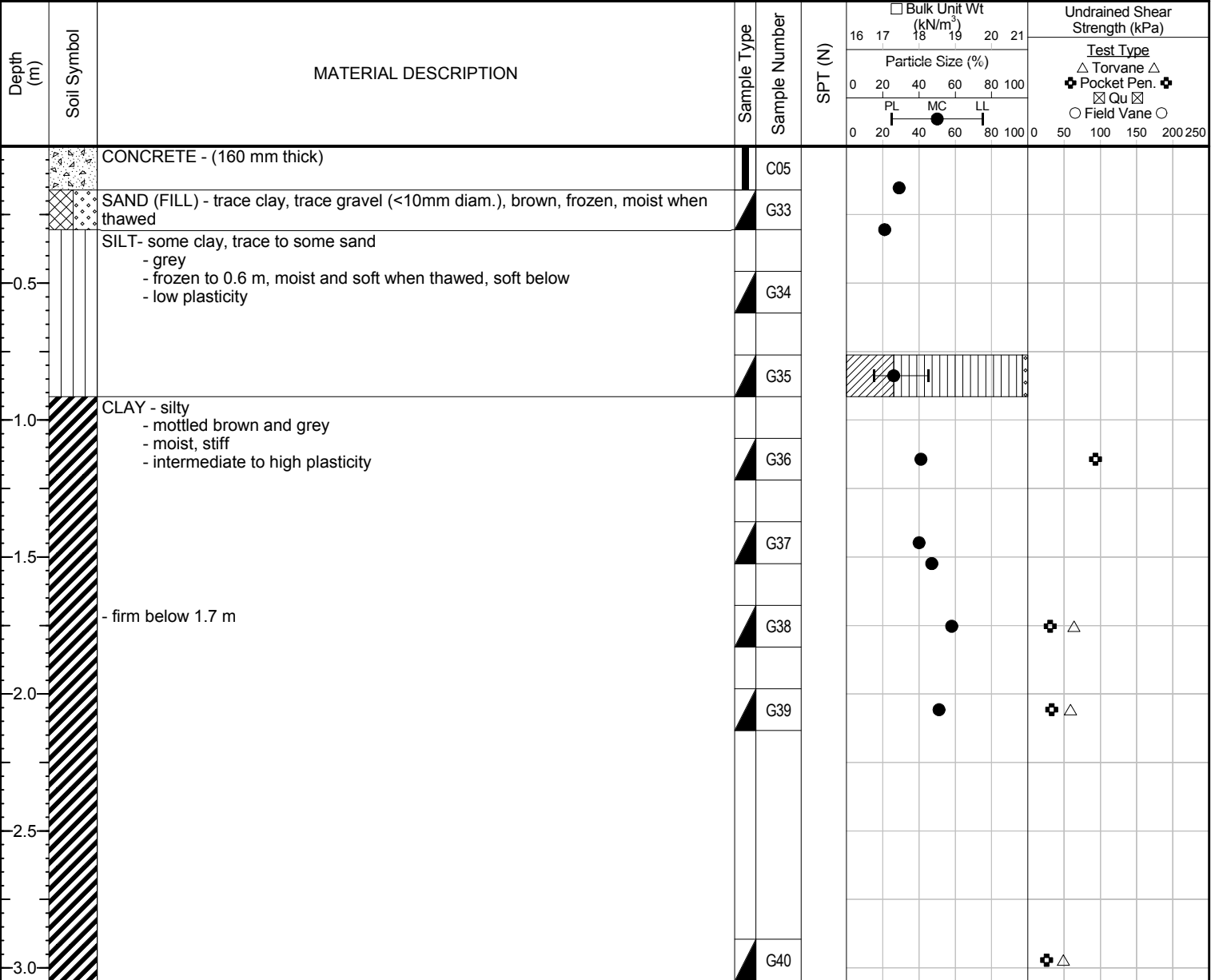
Test Hole TH14-05

1 of 1

Client: Morrison Hershfield **Project Number:** 0035 016 00
Project Name: City of Winnipeg Local Streets Package 15-R-03 **Location:** McDowell Dr.
Contractor: Paddock Drilling Ltd. **Ground Elevation:** Top of Pavement
Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount **Date Drilled:** 9 December 2014

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



END OF TEST HOLE AT 3.05 m IN CLAY

Notes:

- 1) No seepage or sloughing observed.
- 2) Test hole was backfilled with auger cuttings up to 0.45 m depth, 150 mm bentonite, 150 mm sand, 150 mm cold patch asphalt to surface.
- 3) Test hole located between House #71 & #75, 2.0m west from east curb.

Logged By: Syl Precourt **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 0002 2015-02-25 MCDOWELL.D.SP.0035.016.00.GPJ TREK GEOTECHNICAL.GDT.25/2/15



Sub-Surface Log

Test Hole TH14-06

1 of 1

Client: Morrison Hershfield Project Number: 0035 016 00
 Project Name: City of Winnipeg Local Streets Package 15-R-03 Location: McDowell Dr.
 Contractor: Paddock Drilling Ltd. Ground Elevation: Top of Pavement
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: 9 December 2014

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	SPT (N)	Bulk Unit Wt (kN/m ³)		Particle Size (%)		Undrained Shear Strength (kPa)							
						16	17	18	19	20	21	0	50	100	150	200	250
0.0		CONCRETE - (165 mm thick)		C06													
0.0		SAND (FILL) - trace clay, trace gravel (<10mm diam.), brown, frozen, moist when thawed		G41													
0.0		CLAY - silty - mottled brown and grey - frozen to 0.6 m, moist and soft when thawed, stiff below - intermediate to high plasticity		G42													
0.5		- 150 mm thick silt seam, grey, moist, soft, low plasticity at 0.6 m		G43													
1.0				G44													
1.5				G45													
2.0		- firm below 1.7 m		G46													
2.5				G47													
3.0				G48													

END OF TEST HOLE AT 3.05 m IN CLAY

Notes:

- 1) No seepage or sloughing observed.
- 2) Test hole was backfilled with auger cuttings up to 0.45 m depth, 150 mm bentonite, 150 mm sand, 150 mm cold patch asphalt to surface.
- 3) Test hole located at House #63, 2.0m east from west curb.

Logged By: Syl Precourt Reviewed By: N.J Ferreira Project Engineer: Nelson Ferreira

SUB-SURFACE LOG LOGS 0002 2015-02-25 MCDOWELL.D.SP.0035.016.00.GPJ TREK GEOTECHNICAL.GDT.25/2/15



Sub-Surface Log

Test Hole TH14-07

1 of 1

Client: Morrison Hershfield Project Number: 0035 016 00
 Project Name: City of Winnipeg Local Streets Package 15-R-03 Location: McDowell Dr.
 Contractor: Paddock Drilling Ltd. Ground Elevation: Top of Pavement
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: 9 December 2014

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	SPT (N)	Bulk Unit Wt (kN/m ³)		Undrained Shear Strength (kPa)	
						16	17	18	19
0.0		CONCRETE - (165 mm thick)		C07					
0.05		SAND (FILL) - trace clay, trace gravel (<10mm diam.), brown, frozen, moist when thawed		G49					
0.1		CLAY - silty - mottled brown and grey - frozen to 0.6 m, moist and soft when thawed, stiff below - intermediate to high plasticity - 50 mm thick silt seam, grey, moist, soft, low plasticity at 0.6 m		G49A					
0.2				G50					
0.5				G51					
0.8				G52					
1.1				G53					
1.4				G54					
1.7				G55					
2.0		- firm below 1.8 m		G56					
2.3									
2.6									
2.9									
3.2									
3.5									

END OF TEST HOLE AT 3.05 m IN CLAY

Notes:

- 1) No seepage or sloughing observed.
- 2) Test hole was backfilled with auger cuttings up to 0.45 m depth, 150 mm bentonite, 150 mm sand, 150 mm cold patch asphalt to surface.
- 3) Test hole located at House #51, 2.0m west from east curb.

Logged By: Syl Precourt Reviewed By: N.J Ferreira Project Engineer: Nelson Ferreira

SUB-SURFACE LOG LOGS 0002 2015-02-25 MCDOWELL.D.SP.0035.016.00.GPJ TREK GEOTECHNICAL.GDT.25/2/15



Project No. 0035 016 00
Client Morrison Hershfield
Project Local Streets Package 15-R-03, McDowell Dr.

Sample Date 09-Dec-14
Test Date 16-Jan-15
Technician Daniel Wiebe

Test Pit	TH14-01	TH14-01	TH14-01	TH14-01	TH14-01	TH14-01
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 #	G01	G02	G03	G04	G05	G06
Tare ID	Z25	H9	E103	Z55	D50	E29
Mass of tare	8.3	8.5	8.6	8.6	8.4	8.6
Mass wet + tare	528.1	372.2	485.9	516.9	384.6	449.4
Mass dry + tare	444.7	309.0	394.7	379.8	277.8	304.7
Mass water	83.4	63.2	91.2	137.1	106.8	144.7
Mass dry soil	436.4	300.5	386.1	371.2	269.4	296.1
Moisture %	19.1%	21.0%	23.6%	36.9%	39.6%	48.9%

Test Pit	TH14-01	TH14-01	TH14-02	TH14-02	TH14-02	TH14-02
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 #	G07	G08	G09	G10	G11	G12
Tare ID	A21	W08	D40	A1111	W38	N59
Mass of tare	8.5	8.5	8.2	8.3	8.5	8.3
Mass wet + tare	483.2	401.3	502.6	361.9	448.5	414.7
Mass dry + tare	318.1	261.7	414.3	266.9	336.3	317.6
Mass water	165.1	139.6	88.3	95.0	112.2	97.1
Mass dry soil	309.6	253.2	406.1	258.6	327.8	309.3
Moisture %	53.3%	55.1%	21.7%	36.7%	34.2%	31.4%

Test Pit	TH14-02	TH14-02	TH14-02	TH14-02	TH14-03	TH14-03
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 #	G13	G14	G15	G16	G17	G18
Tare ID	E49	C6	E128	W10	F27	Z32
Mass of tare	8.5	8.3	8.3	8.4	8.3	8.4
Mass wet + tare	450.7	507.2	404.1	467.9	408.2	462.2
Mass dry + tare	325.4	350.4	274.2	315.0	327.2	374.1
Mass water	125.3	156.8	129.9	152.9	81.0	88.1
Mass dry soil	316.9	342.1	265.9	306.6	318.9	365.7
Moisture %	39.5%	45.8%	48.9%	49.9%	25.4%	24.1%



Project No. 0035 016 00
Client Morrison Hershfield
Project Local Streets Package 15-R-03, McDowell Dr.

Sample Date 09-Dec-14
Test Date 16-Jan-15
Technician Daniel Wiebe

Test Pit	TH14-03	TH14-03	TH14-03	TH14-03	TH14-03	TH14-03
Depth (m)	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8	1.8 - 1.9	2.0 - 2.1
Sample #	G19	G20	G21	G22	G22A	G23
Tare ID	C27	P05	F3	Z11	F116	Z40
Mass of tare	8.3	8.5	8.4	8.5	8.4	8.4
Mass wet + tare	451.1	390.8	392.8	484.8	346	376.5
Mass dry + tare	352.8	304.1	286.8	345.9	251.9	256.5
Mass water	98.3	86.7	106.0	138.9	94.1	120.0
Mass dry soil	344.5	295.6	278.4	337.4	243.5	248.1
Moisture %	28.5%	29.3%	38.1%	41.2%	38.6%	48.4%

Test Pit	TH14-03	TH14-04	TH14-04	TH14-04	TH14-04	TH14-04
Depth (m)	2.9 - 3.0	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5
Sample #	G24	G25	G26	G27	G28	G29
Tare ID	N63	E35	P36	Z132	Z08	P33
Mass of tare	8.4	8.4	8.3	8.4	8.3	8.3
Mass wet + tare	385.4	456.1	402.8	443.2	380.7	380.7
Mass dry + tare	256.7	363.3	326.1	379.8	285.1	272
Mass water	128.7	92.8	76.7	63.4	95.6	108.7
Mass dry soil	248.3	354.9	317.8	371.4	276.8	263.7
Moisture %	51.8%	26.1%	24.1%	17.1%	34.5%	41.2%

Test Pit	TH14-04	TH14-04	TH14-04	TH14-04	TH14-05	TH14-05
Depth (m)	1.7 - 1.8	1.9 - 2.0	2.0 - 2.1	2.9 - 3.0	0.2 - 0.3	0.5 - 0.6
Sample #	G30	G30A	G31	G32	G33	G34
Tare ID	W57	Z63	Z62	C10	F40	F124
Mass of tare	8.6	8.4	8.4	8.3	8.2	8.4
Mass wet + tare	400.9	393	380.9	474.4	485.4	424.9
Mass dry + tare	276.5	282.5	262.4	315.5	377.1	352.8
Mass water	124.4	110.5	118.5	158.9	108.3	72.1
Mass dry soil	267.9	274.1	254.0	307.2	368.9	344.4
Moisture %	46.4%	40.3%	46.7%	51.7%	29.4%	20.9%



Project No. 0035 016 00
Client Morrison Hershfield
Project Local Streets Package 15-R-03, McDowell Dr.

Sample Date 09-Dec-14
Test Date 16-Jan-15
Technician Daniel Wiebe

Test Pit	TH14-05	TH14-05	TH14-05	TH14-05	TH14-05	TH14-05
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 #	G35	G36	G37	G38	G39	G40
Tare ID	Z125	E125	E34	E105	A7	W71
Mass of tare	8.4	8.2	8.5	8.3	8.2	8.6
Mass wet + tare	436.9	377.6	480.4	449.2	418.3	389.3
Mass dry + tare	347.6	270.6	345.9	309.3	267.3	260.2
Mass water	89.3	107.0	134.5	139.9	151.0	129.1
Mass dry soil	339.2	262.4	337.4	301.0	259.1	251.6
Moisture %	26.3%	40.8%	39.9%	46.5%	58.3%	51.3%

Test Pit	TH14-06	TH14-06	TH14-06	TH14-06	TH14-06	TH14-06
Depth (m)	0.2 - 0.3	0.5 - 0.6	0.6 - 0.8	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8
Sample #	G41	G42	G43	G44	G45	G46
Tare ID	F117	E18	Z33	F77	D24	N38
Mass of tare	8.3	8.3	8.4	8.3	8.3	8.4
Mass wet + tare	352.6	373.3	429.1	363.7	460.5	425.7
Mass dry + tare	271.5	272.0	312.0	261.5	321.5	279.0
Mass water	81.1	101.3	117.1	102.2	139.0	146.7
Mass dry soil	263.2	263.7	303.6	253.2	313.2	270.6
Moisture %	30.8%	38.4%	38.6%	40.4%	44.4%	54.2%

Test Pit	TH14-06	TH14-06	TH14-07	TH14-07	TH14-07	TH14-07
Depth (m)	2.0 - 2.1	2.9 - 3.0	0.2 - 0.3	0.5 - 0.5	0.5 - 0.6	0.8 - 0.9
Sample #	G47	G48	G49	G49A	G50	G51
Tare ID	W26	F65	E15	H10	W52	P13
Mass of tare	8.3	8.5	8.6	8.5	8.4	8.6
Mass wet + tare	419.6	440.3	439.9	339.8	387.5	365.4
Mass dry + tare	270.2	284.7	336.0	260.1	302.5	277.7
Mass water	149.4	155.6	103.9	79.7	85.0	87.7
Mass dry soil	261.9	276.2	327.4	251.6	294.1	269.1
Moisture %	57.0%	56.3%	31.7%	31.7%	28.9%	32.6%



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**Moisture Content Report
 ASTM D2216-98**

Project No. 0035 016 00
Client Morrison Hershfield
Project Local Streets Package 15-R-03, McDowell Dr.

Sample Date 09-Dec-14
Test Date 16-Jan-15
Technician Daniel Wiebe

Test Pit	TH14-07	TH14-07	TH14-07	TH14-07	TH14-07
Depth (m)	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1	2.9 - 3.0
Sample #	G52	G53	G54	G55	G56
Tare ID	N22	E102	N104	E56	W19
Mass of tare	8.5	8.5	8.4	8.4	8.6
Mass wet + tare	431.6	365.0	517.0	378.2	468.3
Mass dry + tare	314.0	261.1	353.0	260.3	313.4
Mass water	117.6	103.9	164.0	117.9	154.9
Mass dry soil	305.5	252.6	344.6	251.9	304.8
Moisture %	38.5%	41.1%	47.6%	46.8%	50.8%

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

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



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**Atterberg Limits
 ASTM D4318**

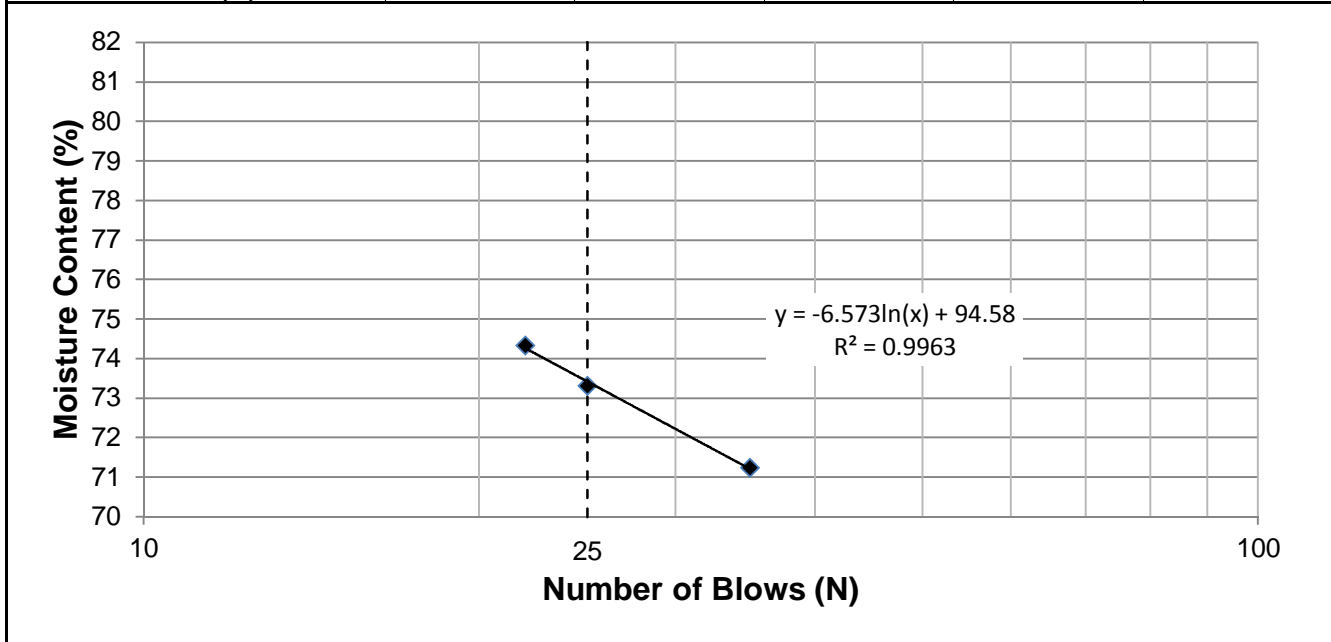
Project No. 0035 016 00
Client Morrision Hershfield
Project Local Streets Package 15-R-03, McDowell Dr.

Test Hole TH14-01
Sample # G4
Depth (m) 1.1-1.2
Sample Date 12-Dec-14
Test Date 26-Jan-15
Technician Xin Xiong

Liquid Limit	73
Plastic Limit	21
Plasticity Index	53

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	35	25	22		
Mass Wet Soil + Tare (g)	23.614	23.756	26.437		
Mass Dry Soil + Tare (g)	19.703	19.701	21.182		
Mass Tare (g)	14.213	14.170	14.113		
Mass Water (g)	3.911	4.055	5.255		
Mass Dry Soil (g)	5.490	5.531	7.069		
Moisture Content (%)	71.239	73.314	74.339		



Plastic Limit

Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	20.129	20.873			
Mass Dry Soil + Tare (g)	19.055	19.667			
Mass Tare (g)	13.880	13.921			
Mass Water (g)	1.074	1.206			
Mass Dry Soil (g)	5.175	5.746			
Moisture Content (%)	20.754	20.989			



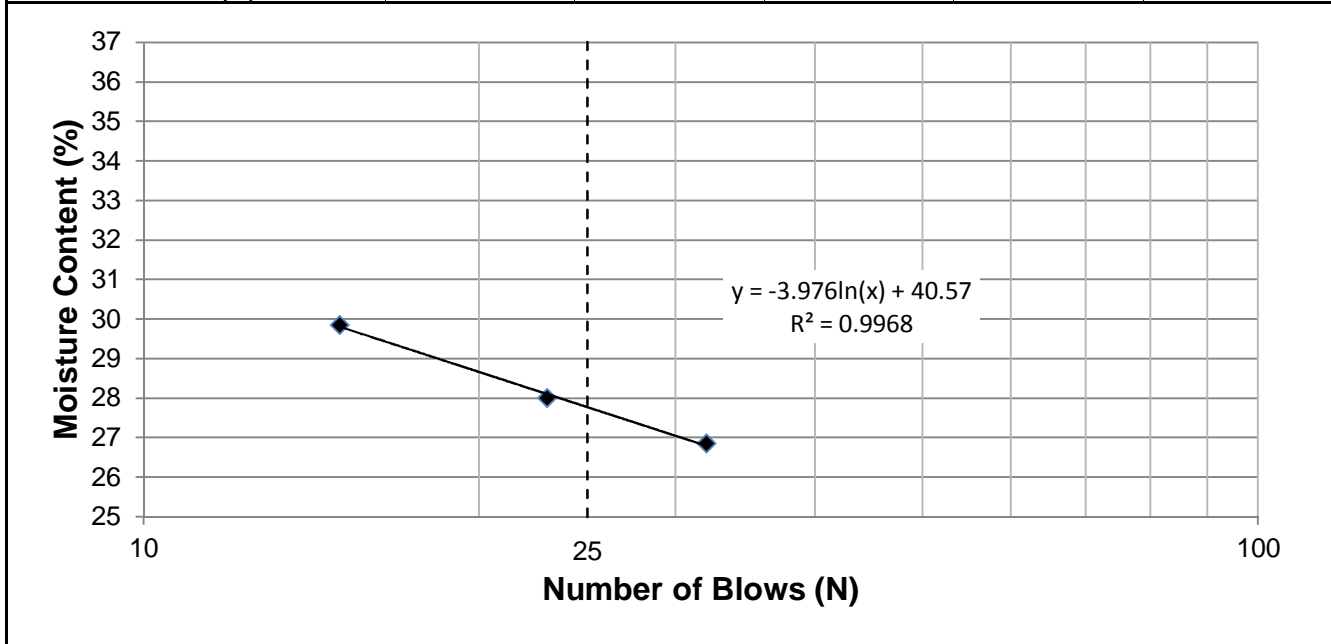
Project No. 0035 016 00
Client Morrision Hershfield
Project Local Streets Package 15-R-03, McDowell Dr.

Test Hole TH14-04
Sample # G26
Depth (m) 0.5-0.6
Sample Date 12-Dec-14
Test Date 26-Jan-15
Technician Xin Xiong

Liquid Limit	28
Plastic Limit	15
Plasticity Index	12

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	15	23	32		
Mass Wet Soil + Tare (g)	25.146	27.819	24.590		
Mass Dry Soil + Tare (g)	22.598	24.817	22.355		
Mass Tare (g)	14.061	14.098	14.030		
Mass Water (g)	2.548	3.002	2.235		
Mass Dry Soil (g)	8.537	10.719	8.325		
Moisture Content (%)	29.847	28.006	26.847		



Plastic Limit

Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	20.918	21.636			
Mass Dry Soil + Tare (g)	20.026	20.624			
Mass Tare (g)	14.124	14.105			
Mass Water (g)	0.892	1.012			
Mass Dry Soil (g)	5.902	6.519			
Moisture Content (%)	15.114	15.524			



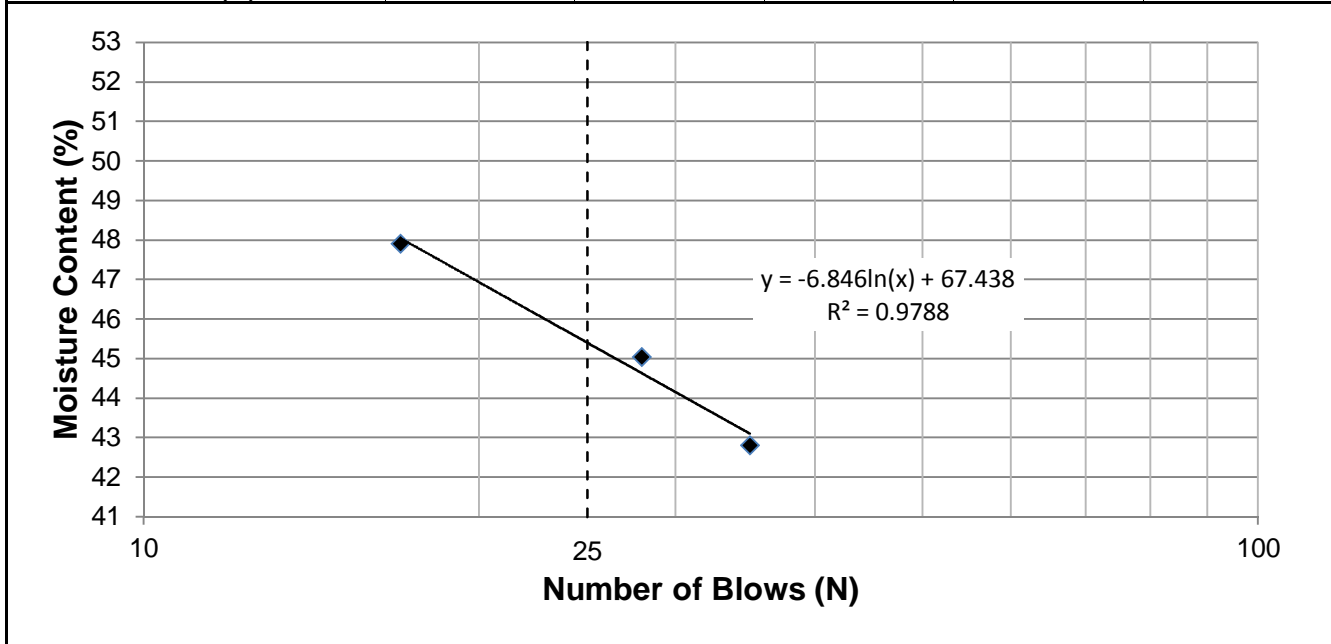
Project No. 0035 016 00
Client Morrision Hershfield
Project Local Streets Package 15-R-03, McDowell Dr.

Test Hole TH14-05
Sample # G35
Depth (m) 0.8-0.9
Sample Date 12-Dec-14
Test Date 26-Jan-15
Technician Xin Xiong

Liquid Limit	45
Plastic Limit	15
Plasticity Index	30

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	35	17	28		
Mass Wet Soil + Tare (g)	26.793	24.717	24.690		
Mass Dry Soil + Tare (g)	22.986	21.262	21.398		
Mass Tare (g)	14.093	14.051	14.090		
Mass Water (g)	3.807	3.455	3.292		
Mass Dry Soil (g)	8.893	7.211	7.308		
Moisture Content (%)	42.809	47.913	45.047		



Plastic Limit

Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	20.705	21.233			
Mass Dry Soil + Tare (g)	19.790	20.324			
Mass Tare (g)	13.990	14.260			
Mass Water (g)	0.915	0.909			
Mass Dry Soil (g)	5.800	6.064			
Moisture Content (%)	15.776	14.990			

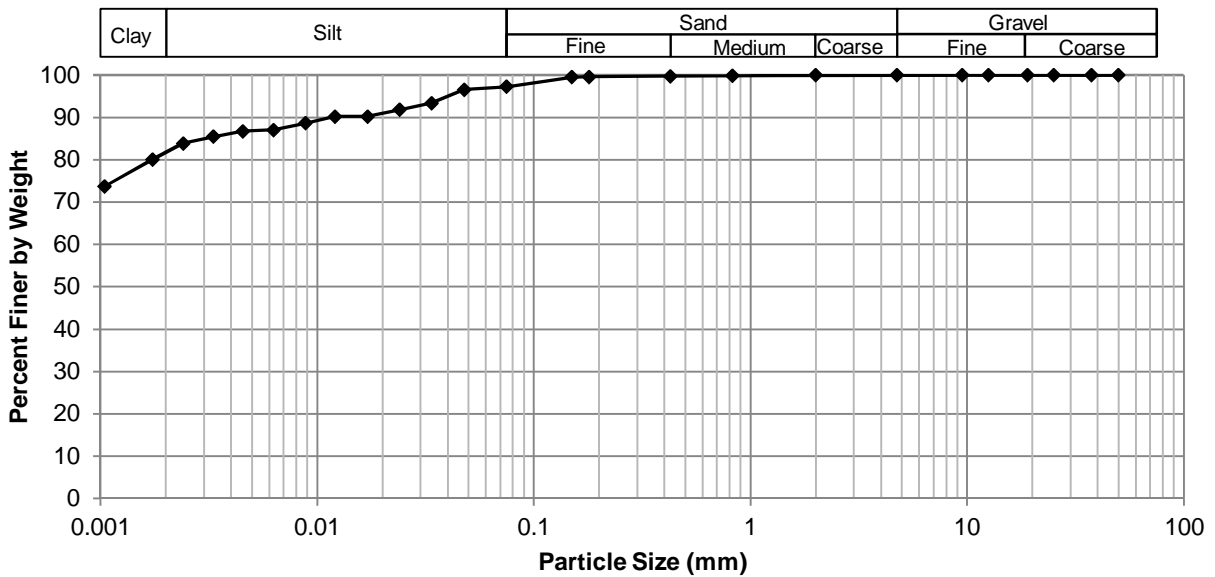


Project No. 0035 016 00
Client Morrison Hershfield
Project Local Streets Package 15-R-03, McDowell Dr.

Test Hole TH14-01
Sample # G04
Depth (m) 0.3 - 0.4
Sample Date 12-Dec-14
Test Date 28-Jan-15
Technician Xin Xiong/Junhui Wu

Gravel	0.0%
Sand	2.7%
Silt	15.7%
Clay	81.5%

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	97.26
37.5	100.00	2.00	100.00	0.0479	96.58
25.0	100.00	0.825	99.85	0.0338	93.40
19.0	100.00	0.425	99.74	0.0239	91.81
12.5	100.00	0.180	99.57	0.0171	90.23
9.50	100.00	0.150	99.51	0.0121	90.23
4.75	100.00	0.075	97.26	0.0088	88.64
				0.0063	87.05
				0.0045	86.73
				0.0033	85.46
				0.0024	83.87
				0.0017	80.06
				0.0010	73.71

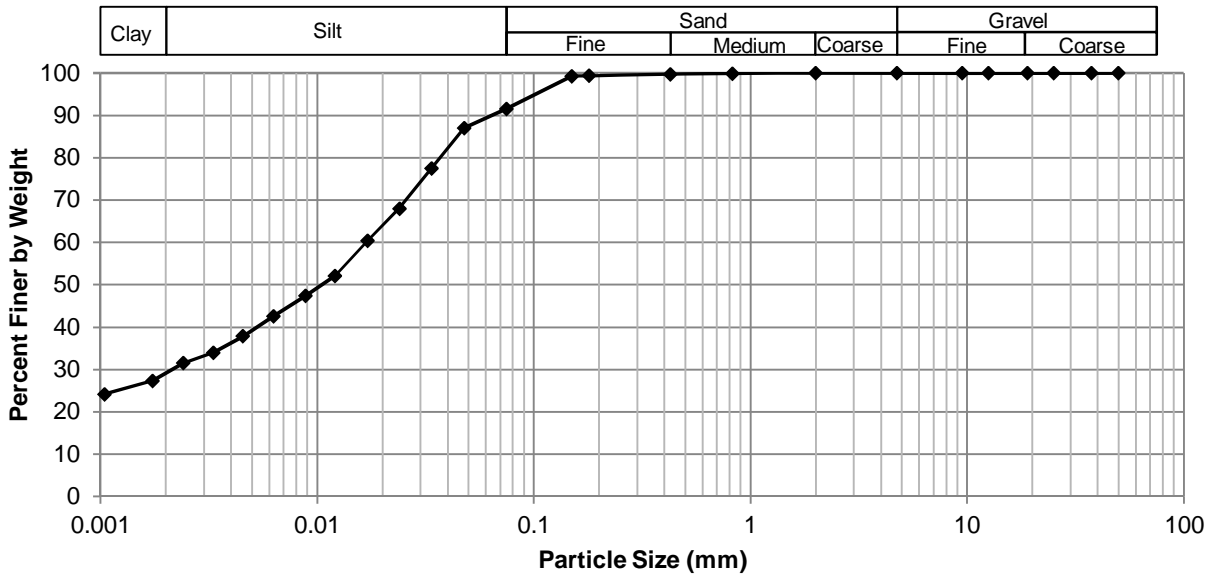


Project No. 0035 016 00
Client Morrison Hershfield
Project Local Streets Package 15-R-03, McDowell Dr.

Test Hole TH14-04
Sample # G26
Depth (m) 0.2 - 0.2
Sample Date 12-Dec-14
Test Date 28-Jan-15
Technician Xin Xiong/Junhui Wu

Gravel	0.0%
Sand	8.4%
Silt	62.6%
Clay	28.9%

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	91.55
37.5	100.00	2.00	100.00	0.0479	87.05
25.0	100.00	0.825	99.92	0.0338	77.52
19.0	100.00	0.425	99.77	0.0239	68.00
12.5	100.00	0.180	99.38	0.0171	60.37
9.50	100.00	0.150	99.27	0.0121	52.12
4.75	100.00	0.075	91.55	0.0088	47.35
				0.0063	42.59
				0.0045	37.83
				0.0033	34.02
				0.0024	31.48
				0.0017	27.35
				0.0010	24.17

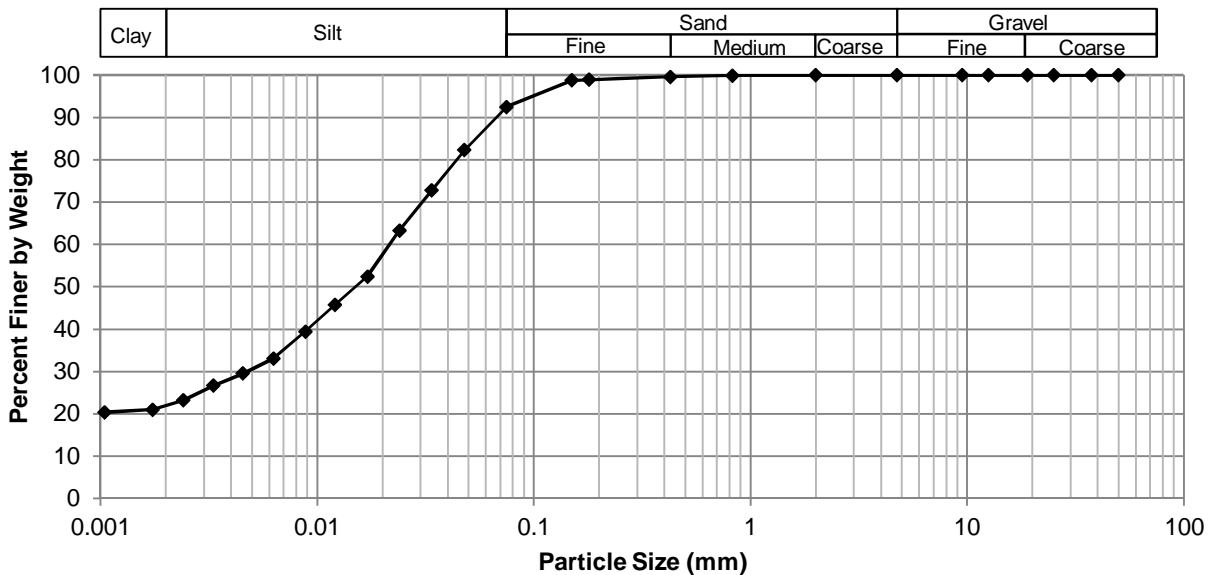


Project No. 0035 016 00
Client Morrison Hershfield
Project Local Streets Package 15-R-03, McDowell Dr.

Test Hole TH14-05
Sample # G35
Depth (m) 0.2 - 0.3
Sample Date 12-Dec-14
Test Date 28-Jan-15
Technician Xin Xiong/Junhui Wu

Gravel	0.0%
Sand	7.5%
Silt	70.6%
Clay	21.9%

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	92.50
37.5	100.00	2.00	100.00	0.0479	82.29
25.0	100.00	0.825	99.87	0.0338	72.76
19.0	100.00	0.425	99.63	0.0239	63.23
12.5	100.00	0.180	98.94	0.0171	52.44
9.50	100.00	0.150	98.75	0.0121	45.77
4.75	100.00	0.075	92.50	0.0088	39.42
				0.0063	33.06
				0.0045	29.57
				0.0033	26.71
				0.0024	23.22
				0.0017	21.00
				0.0010	20.36



Photo 1: Concrete Core Sample From Test Hole TH14-01



Photo 2: Concrete Core Sample From Test Hole TH14-02



Photo 3: Concrete Core Sample From Test Hole TH14-03



Photo 4: Concrete Core Sample From Test Hole TH14-04



Photo 5: Concrete Core Sample From Test Hole TH14-05



Photo 6: Concrete Core Sample From Test Hole TH14-06



Photo 7: Concrete Core Sample From Test Hole TH14-07

Appendix C
Swan Lake Bay



Sub-Surface Log

Test Hole TH14-01

1 of 1

Client: Morrison Hershfield **Project Number:** 0035 016 00
Project Name: City of Winnipeg Local Streets Package 15-R-03 **Location:** Swan Lake Bay
Contractor: Paddock Drilling Ltd. **Ground Elevation:** Top of Pavement
Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount **Date Drilled:** 3 December 2014

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	SPT (N)	Bulk Unit Wt (kN/m ³)		Particle Size (%)		Undrained Shear Strength (kPa)							
						16	17	18	19	20	21	0	50	100	150	200	250
0.00 - 0.05		CONCRETE - (152 mm thick)		C01													
0.05 - 0.45		SAND (FILL) - trace clay, trace gravel (<10 mm diam.) - brown - frozen, moist when thawed		G1													
0.45 - 0.90		SILT - some clay, trace to some sand - brown - frozen, moist to wet and soft when thawed - low plasticity		G2													
0.90 - 1.10		CLAY - silty, trace sand - brown - frozen to 1.1 m, moist and soft when thawed, stiff below - intermediate to high plasticity		G3													
1.10 - 1.30				G4													
1.30 - 1.50				G5													
1.50 - 1.70				G6													
1.70 - 1.90				G7													
1.90 - 2.05		- 50 mm thick silt seam, brown, soft, moist, low plasticity															
2.05 - 2.20																	
2.20 - 2.40																	
2.40 - 2.60																	
2.60 - 2.80																	
2.80 - 3.00				G8													

END OF TEST HOLE AT 3.05 m IN CLAY

Notes:

- 1) No seepage or sloughing observed.
- 2) Test hole was backfilled with auger cuttings up to 0.45 m depth, 150 mm bentonite, 150 mm sand, 150 mm cold patch asphalt to surface.
- 3) Test hole located at House #134, 2.2m west of east curb.

Logged By: Syl Precourt **Reviewed By:** N.J Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG LOGS 0003 2015-02-24 SWAN LAKE BAY C.SP.0035 016 00.GPJ TREK GEOTECHNICAL.GDT 25/2/15



Sub-Surface Log

Test Hole TH14-02

1 of 1

Client: Morrison Hershfield Project Number: 0035 016 00
 Project Name: City of Winnipeg Local Streets Package 15-R-03 Location: Swan Lake Bay
 Contractor: Paddock Drilling Ltd. Ground Elevation: Top of Pavement
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: 3 December 2014

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	SPT (N)	Bulk Unit Wt (kN/m ³)		Particle Size (%)		Undrained Shear Strength (kPa)								
						16	17	18	19	20	21	0	50	100	150	200	250	
0.0		CONCRETE - (145 mm thick)		C02														
0.0		SAND (FILL) - trace clay, trace gravel (<10mm diam.) - brown, frozen, moist when thawed		G9		●												
0.5		CLAY - silty, trace sand, trace silt inclusion (<5mm diam.) - dark brown - frozen to 0.9 m, moist and soft when thawed, stiff below - intermediate to high plasticity		G10		●												
0.8				G11		●												
1.0				G12														
1.2				G13														
1.5		- 150 mm thick silt seam, brown, soft, moist, low plasticity at 1.5 m		G14		●												
1.8				G15														
2.0		- firm below 2.0 m																
2.5																		
3.0		- soft below 2.9 m		G16														

END OF TEST HOLE AT 3.05 m IN CLAY

Notes:

- 1) No seepage or sloughing observed.
- 2) Test hole was backfilled with auger cuttings up to 0.45 m depth, 150 mm bentonite, 150 mm sand, 150 mm cold patch asphalt to surface.
- 3) Test hole located at House #115, 2.0m east of west curb.

Logged By: Syl Precourt Reviewed By: N.J Ferreira Project Engineer: Nelson Ferreira

SUB-SURFACE LOG LOGS 0003 2015-02-24 SWAN LAKE BAY C.SP.0035 016 00.GPJ TREK GEOTECHNICAL.GDT 25/2/15



Sub-Surface Log

Test Hole TH14-03

1 of 1

Client: Morrison Hershfield Project Number: 0035 016 00
 Project Name: City of Winnipeg Local Streets Package 15-R-03 Location: Swan Lake Bay
 Contractor: Paddock Drilling Ltd. Ground Elevation: Top of Pavement
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: 3 December 2014

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	SPT (N)	Bulk Unit Wt (kN/m ³)		Undrained Shear Strength (kPa)	
						16	17	18	19
0.0 - 0.05		CONCRETE - (145 mm thick)		C03					
0.05 - 0.45		SAND (FILL) - trace gravel (<10mm diam.) - brown - frozen, moist when thawed		G17					
0.45 - 1.4		CLAY - silty, trace sand, trace silt inclusions (<5mm diam.) - brown - frozen to 1.1 m, moist and soft when thawed - intermediate to high plasticity		G18					
1.4 - 1.5		- 150 mm thick silt seam, brown, soft, moist, low plasticity		G19					
1.5 - 1.6		- soft below 1.4 m		G20					
1.6 - 1.7				G21					
1.7 - 1.8				G22					
1.8 - 1.9				G23					
1.9 - 2.0				G24					
2.0 - 2.1									
2.1 - 2.2									
2.2 - 2.3									
2.3 - 2.4									
2.4 - 2.5									
2.5 - 2.6									
2.6 - 2.7									
2.7 - 2.8									
2.8 - 2.9									
2.9 - 3.0									

END OF TEST HOLE AT 3.05 m IN CLAY
 Notes:
 1) No seepage or sloughing observed.
 2) Test hole was backfilled with auger cuttings up to 0.45 m depth, 150 mm bentonite, 150 mm sand, 150 mm cold patch asphalt to surface.
 3) Test hole located at House #103, 2.3m west from east curb.

Logged By: Syl Precourt Reviewed By: N.J Ferreira Project Engineer: Nelson Ferreira

SUB-SURFACE LOG LOGS 0003 2015-02-24 SWAN LAKE BAY C.SP.0035 016 00.GPJ TREK GEOTECHNICAL.GDT 25/2/15



Sub-Surface Log

Test Hole TH14-04

1 of 1

Client: Morrison Hershfield Project Number: 0035 016 00
 Project Name: City of Winnipeg Local Streets Package 15-R-03 Location: Swan Lake Bay
 Contractor: Paddock Drilling Ltd. Ground Elevation: Top of Pavement
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: 3 December 2014

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	SPT (N)	Bulk Unit Wt (kN/m ³)		Particle Size (%)		Undrained Shear Strength (kPa)	
						16	17	18	19	20	21
0.0		CONCRETE - (140 mm thick)		C04							
0.0		SAND (FILL) - trace gravel (<10mm diam.) - brown, frozen, moist when thawed		G25							
0.5		CLAY - silty, trace sand - brown - frozen to 1.1 m, moist and soft when thawed, firm below - high plasticity		G26							
0.9		- 100 mm thick silt seam, brown, soft, moist, low plasticity at 0.9 m		G27							
0.9				G28							
1.5		- trace oxidation and soft below 1.5 m		G29							
2.0		- gypsum inclusions (1-3 mm diam.) below 1.8 m		G30							
2.0				G31							
3.0				G32							

END OF TEST HOLE AT 3.05 m IN CLAY

Notes:

- 1) No seepage or sloughing observed.
- 2) Test hole was backfilled with auger cuttings up to 0.45 m depth, 150 mm bentonite, 150 mm sand, 150 mm cold patch asphalt to surface.
- 3) Test hole located between House #77 & #81, 1.5m north of south curb.

Logged By: Syl Precourt Reviewed By: N.J Ferreira Project Engineer: Nelson Ferreira

SUB-SURFACE LOG LOGS 0003 2015-02-24 SWAN LAKE BAY C.SP.0035 016 00.GPJ TREK GEOTECHNICAL.GDT 25/2/15



Sub-Surface Log

Test Hole TH14-05

1 of 1

Client: Morrison Hershfield Project Number: 0035 016 00
 Project Name: City of Winnipeg Local Streets Package 15-R-03 Location: Swan Lake Bay
 Contractor: Paddock Drilling Ltd. Ground Elevation: Top of Pavement
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: 3 December 2014

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	SPT (N)	Bulk Unit Wt (kN/m ³)		Particle Size (%)		Undrained Shear Strength (kPa)								
						16	17	18	19	20	21	0	50	100	150	200	250	
0.0		CONCRETE - (140 mm thick)		C05														
0.0		SAND (FILL) - trace gravel (<10mm diam.) - brown, frozen, moist when thawed		G33														
0.5		SILT - trace to some clay, trace sand - brown - frozen, moist to wet and soft when thawed - low to intermediate plasticity		G34														
0.5				G35														
1.0		CLAY - silty, trace sand - brown - frozen to 0.9 m, moist and soft when thawed, very stiff below - intermediate to high plasticity		G36														
1.5				G37														
2.0		- stiff below 1.7 m		G38														
2.5				G39														
3.0		- firm below 2.9 m		G40														

END OF TEST HOLE AT 3.05 m IN CLAY

Notes:

- 1) No seepage or sloughing observed.
- 2) Test hole was backfilled with auger cuttings up to 0.45 m depth, 150 mm bentonite, 150 mm sand, 150 mm cold patch asphalt to surface.
- 3) Test hole located at House # 62, 2.5m south of north curb.

Logged By: Syl Precourt Reviewed By: N.J Ferreira Project Engineer: Nelson Ferreira



Sub-Surface Log

Test Hole TH14-06

1 of 1

Client: Morrison Hershfield Project Number: 0035 016 00
 Project Name: City of Winnipeg Local Streets Package 15-R-03 Location: Swan Lake Bay
 Contractor: Paddock Drilling Ltd. Ground Elevation: Top of Pavement
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: 3 December 2014

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	SPT (N)	Bulk Unit Wt (kN/m ³)		Particle Size (%)		Undrained Shear Strength (kPa)	
						16	17	18	19	20	21
0.0		CONCRETE - (137 mm thick)		C06							
0.0		SAND (FILL) - trace clay, trace gravel (<10mm diam.) - brown, frozen, moist when thawed		G41							
0.5		CLAY - silty, trace sand, trace silt inclusion (<5mm diam.) - mottled brown and grey - frozen to 0.9 m, moist and soft when thawed, stiff below - intermediate to high plasticity		G42							
				G43							
				G44							
				G45							
		- 200 mm thick silt seam, brown, soft, moist, low plasticity		G46							
		- firm below 1.7 m		G47							
				G48							

END OF TEST HOLE AT 3.05 m IN CLAY

Notes:

- 1) No seepage or sloughing observed.
- 2) Test hole was backfilled with auger cuttings up to 0.45 m depth, 150 mm bentonite, 150 mm sand, 150 mm cold patch asphalt to surface.
- 3) Test hole located at House # 41, 1.5m north of south curb.

Logged By: Syl Precourt Reviewed By: N.J Ferreira Project Engineer: Nelson Ferreira

SUB-SURFACE LOG LOGS 0003 2015-02-24 SWAN LAKE BAY C.SP.0035 016 00.GPJ TREK GEOTECHNICAL.GDT 25/2/15



Sub-Surface Log

Test Hole TH14-07

1 of 1

Client: Morrison Hershfield Project Number: 0035 016 00
 Project Name: City of Winnipeg Local Streets Package 15-R-03 Location: Swan Lake Bay
 Contractor: Paddock Drilling Ltd. Ground Elevation: Top of Pavement
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: 3 December 2014

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	SPT (N)	Bulk Unit Wt (kN/m ³)		Undrained Shear Strength (kPa)	
						16	17	18	19
0.0		CONCRETE - (170 mm thick)		C07					
0.0		SAND (FILL) - trace clay, trace gravel (<10mm diam.) - brown, frozen, moist when thawed		G49					
0.5		CLAY (FILL) - silty, trace gravel (<10mm diam.) - brown - frozen, moist and soft when thawed - intermediate to high plasticity		G50					
0.9		CLAY - silty, trace sand, trace silt inclusion (<5mm diam.) - mottled brown and grey - frozen to 0.9 m, moist and soft when thawed, firm below - intermediate to high plasticity		G51					
1.7		- 100 mm thick silt seam, brown, soft, moist, low plasticity at 1.7 m		G52					
1.7				G53					
2.0				G54					
2.0				G55					
3.0		- soft below 2.9 m		G56					

END OF TEST HOLE AT 3.05 m IN CLAY

Notes:

- 1) No seepage or sloughing observed.
- 2) Test hole was backfilled with auger cuttings up to 0.45 m depth, 150 mm bentonite, 150 mm sand, 150 mm cold patch asphalt to surface.
- 3) Test hole located at House #26, 2.0m west from east curb.

Logged By: Syl Precourt Reviewed By: N.J Ferreira Project Engineer: Nelson Ferreira

SUB-SURFACE LOG LOGS 0003 2015-02-24 SWAN LAKE BAY C.SP.0035 016 00.GPJ TREK GEOTECHNICAL.GDT 25/2/15



Sub-Surface Log

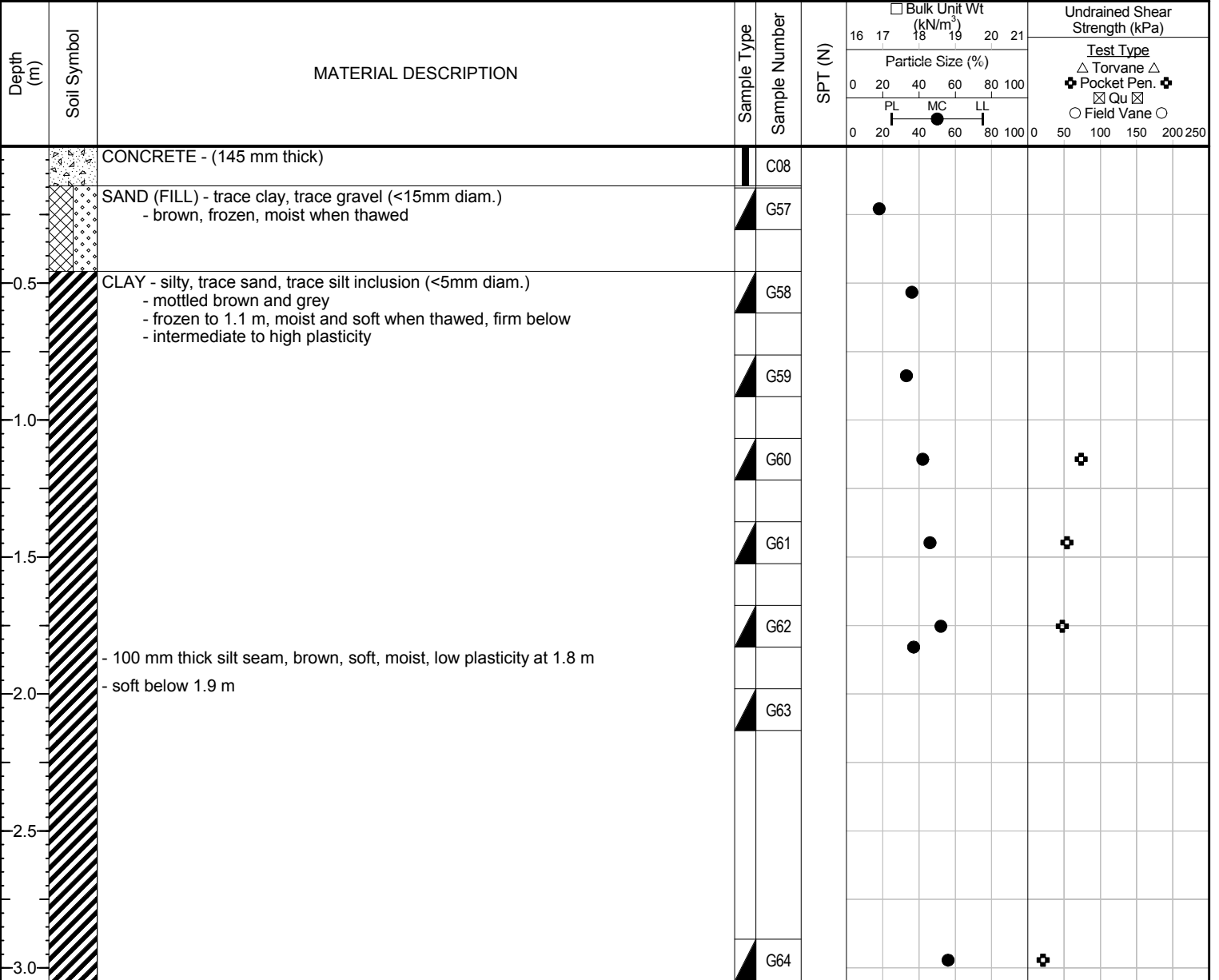
Test Hole TH14-08

1 of 1

Client: Morrison Hershfield Project Number: 0035 016 00
 Project Name: City of Winnipeg Local Streets Package 15-R-03 Location: Swan Lake Bay
 Contractor: Paddock Drilling Ltd. Ground Elevation: Top of Pavement
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: 3 December 2014

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



END OF TEST HOLE AT 3.05 m IN CLAY

Notes:

- 1) No seepage or sloughing observed.
- 2) Test hole was backfilled with auger cuttings up to 0.45 m depth, 150 mm bentonite, 150 mm sand, 150 mm cold patch asphalt to surface.
- 3) Test hole located at House #10, 2.0m east of west curb.

Logged By: Syl Precourt Reviewed By: N.J Ferreira Project Engineer: Nelson Ferreira

SUB-SURFACE LOG LOGS 0003 2015-02-24 SWAN LAKE BAY C.SP.0035 016 00.GPJ TREK GEOTECHNICAL.GDT 25/2/15



Project No. 0035 016 00
Client Morrison Hershfield
Project Local Streets Package 15-R-03, Swan Lake Bay

Sample Date 03-Dec-14
Test Date 05-Jan-15
Technician Daniel Wiebe

Test Pit	TH14-01	TH14-01	TH14-01	TH14-01	TH14-01	TH14-01
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 #	G01	G02	G03	G04	G05	G06
Tare ID	F53	E84	F32	Z30	E77	N99
Mass of tare	8.3	8.4	8.4	8.4	8.4	8.4
Mass wet + tare	412.5	376.7	384.4	403.6	408.2	361.3
Mass dry + tare	377.0	308.3	317.6	294.3	315.0	257.5
Mass water	35.5	68.4	66.8	109.3	93.2	103.8
Mass dry soil	368.7	299.9	309.2	285.9	306.6	249.1
Moisture %	9.6%	22.8%	21.6%	38.2%	30.4%	41.7%

Test Pit	TH14-01	TH14-01	TH14-02	TH14-02	TH14-02	TH14-02
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 #	G07	G08	G09	G10	G11	G12
Tare ID	W35	N103	D47	F102	Z31	Z80
Mass of tare	8.3	8.3	8.6	8.3	8.4	8.5
Mass wet + tare	381.2	378.2	372.5	360.6	381.9	411.5
Mass dry + tare	265	255.9	349.1	301.2	305.4	301.4
Mass water	116.2	122.3	23.4	59.4	76.5	110.1
Mass dry soil	256.7	247.6	340.5	292.9	297.0	292.9
Moisture %	45.3%	49.4%	6.9%	20.3%	25.8%	37.6%

Test Pit	TH14-02	TH14-02	TH14-02	TH14-02	TH14-03	TH14-03
Depth (m)	1.4 - 1.5	1.5 - 1.7	2.0 - 2.1	2.9 - 3.0	0.2 - 0.3	0.5 - 0.6
Sample #	G13	G14	G15	G16	G17	G18
Tare ID	F128	F39	F89	W47	E23	D29
Mass of tare	8.4	8.3	8.4	8.5	8.5	8.4
Mass wet + tare	399.6	425.4	436.4	431.2	412.0	408.7
Mass dry + tare	283.8	323.8	306.2	279.7	363.5	307.8
Mass water	115.8	101.6	130.2	151.5	48.5	100.9
Mass dry soil	275.4	315.5	297.8	271.2	355.0	299.4
Moisture %	42.0%	32.2%	43.7%	55.9%	13.7%	33.7%



Project No. 0035 016 00
Client Morrison Hershfield
Project Local Streets Package 15-R-03, Swan Lake Bay

Sample Date 03-Dec-14
Test Date 05-Jan-15
Technician Daniel Wiebe

Test Pit	TH14-03	TH14-03	TH14-03	TH14-03	TH14-03	TH14-03
Depth (m)	0.8 - 0.9	1.1 - 1.2	1.2 - 1.4	1.7 - 1.8	2.0 - 2.1	2.9 - 3.0
Sample #	G19	G20	G21	G22	G23	G24
Tare ID	D6	N06	P11	N34	H42	W94
Mass of tare	8.3	8.4	8.3	8.4	8.4	8.4
Mass wet + tare	407.2	418.8	561.9	420.4	469.9	458.9
Mass dry + tare	305.5	299.7	410.3	291.8	315.2	310.7
Mass water	101.7	119.1	151.6	128.6	154.7	148.2
Mass dry soil	297.2	291.3	402.0	283.4	306.8	302.3
Moisture %	34.2%	40.9%	37.7%	45.4%	50.4%	49.0%

Test Pit	TH14-04	TH14-04	TH14-04	TH14-04	TH14-04	TH14-04
Depth (m)	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9	0.9 - 1.0	1.4 - 1.5	1.7 - 1.8
Sample #	G25	G26	G27	G28	G29	G30
Tare ID	A32	W51	D19	C18	Z50	Z52
Mass of tare	8.5	8.3	8.5	9	8.3	8.4
Mass wet + tare	422.4	413.3	370.3	494.3	399.6	418.2
Mass dry + tare	334.4	310.1	265.1	357.8	280.5	272.6
Mass water	88.0	103.2	105.2	136.5	119.1	145.6
Mass dry soil	325.9	301.8	256.6	348.8	272.2	264.2
Moisture %	27.0%	34.2%	41.0%	39.1%	43.8%	55.1%

Test Pit	TH14-04	TH14-04	TH14-05	TH14-05	TH14-05	TH14-05
Depth (m)	2.0 - 2.1	2.9 - 3.0	0.2 - 0.3	0.5 - 0.6	0.6 - 0.8	1.1 - 1.2
Sample #	G31	G32	G33	G34	G35	G36
Tare ID	N112	E38	A14	F114	A101	E39
Mass of tare	8.3	8.4	8.4	8.5	8.5	8.5
Mass wet + tare	481.8	520.7	434.7	416.6	409	356.8
Mass dry + tare	310.5	334.7	396.7	345.2	324.2	268.1
Mass water	171.3	186.0	38.0	71.4	84.8	88.7
Mass dry soil	302.2	326.3	388.3	336.7	315.7	259.6
Moisture %	56.7%	57.0%	9.8%	21.2%	26.9%	34.2%



Project No. 0035 016 00
Client Morrison Hershfield
Project Local Streets Package 15-R-03, Swan Lake Bay

Sample Date 03-Dec-14
Test Date 05-Jan-15
Technician Daniel Wiebe

Test Pit	TH14-05	TH14-05	TH14-05	TH14-05	TH14-06	TH14-06
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 #	G37	G38	G39	G40	G41	G42
Tare ID	Z44	W105	C7	H52	F133	Z134
Mass of tare	8.6	8.4	8.3	8.3	8.3	8.4
Mass wet + tare	472.1	453.4	463.6	428.5	414.8	323.8
Mass dry + tare	351.7	355.7	328.2	282.4	369.2	238.7
Mass water	120.4	97.7	135.4	146.1	45.6	85.1
Mass dry soil	343.1	347.3	319.9	274.1	360.9	230.3
Moisture %	35.1%	28.1%	42.3%	53.3%	12.6%	37.0%

Test Pit	TH14-06	TH14-06	TH14-06	TH14-06	TH14-06	TH14-06
Depth (m)	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.5 - 1.7	2.0 - 2.1	2.9 - 3.0
Sample #	G43	G44	G45	G46	G47	G48
Tare ID	D13	E69	P25	H39	H24	Z140
Mass of tare	8.6	8.4	8.5	8.5	8.5	8.4
Mass wet + tare	388.8	354.0	367.8	454.8	380.5	403.9
Mass dry + tare	281.6	247.5	253.5	327.8	252.7	262.8
Mass water	107.2	106.5	114.3	127.0	127.8	141.1
Mass dry soil	273.0	239.1	245.0	319.3	244.2	254.4
Moisture %	39.3%	44.5%	46.7%	39.8%	52.3%	55.5%

Test Pit	TH14-07	TH14-07	TH14-07	TH14-07	TH14-07	TH14-07
Depth (m)	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9	0.9 - 1.2	1.4 - 1.5	1.7 - 1.8
Sample #	G49	G50	G51	G52	G53	G54
Tare ID	Z121	Z106	F31	N60	P20	F43
Mass of tare	8.4	8.5	8.4	8.3	8.5	8.6
Mass wet + tare	360.2	373.7	339.0	458.9	426.6	395.5
Mass dry + tare	286.4	280.6	240.1	315.8	276.6	281.9
Mass water	73.8	93.1	98.9	143.1	150.0	113.6
Mass dry soil	278.0	272.1	231.7	307.5	268.1	273.3
Moisture %	26.5%	34.2%	42.7%	46.5%	55.9%	41.6%



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**Moisture Content Report
 ASTM D2216-98**

Project No. 0035 016 00
Client Morrison Hershfield
Project Local Streets Package 15-R-03, Swan Lake Bay

Sample Date 03-Dec-14
Test Date 05-Jan-15
Technician Daniel Wiebe

Test Pit	TH14-07	TH14-07	TH14-08	TH14-08	TH14-08	TH14-08
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 #	G55	G56	G57	G58	G59	G60
Tare ID	F144	C3	A39	D3	K15	F153
Mass of tare	8.4	8.4	8.2	8.3	8.4	8.5
Mass wet + tare	359.6	362.5	370.8	358.9	443.1	401.8
Mass dry + tare	230.7	230.0	314.8	265.5	335.5	284.8
Mass water	128.9	132.5	56.0	93.4	107.6	117.0
Mass dry soil	222.3	221.6	306.6	257.2	327.1	276.3
Moisture %	58.0%	59.8%	18.3%	36.3%	32.9%	42.3%

Test Pit	TH14-08	TH14-08	TH14-08	TH14-08		
Depth (m)	1.4 - 1.5	1.7 - 1.8	1.8 - 1.9	2.9 - 3.0		
Sample #	G61	G62	G63	G64		
Tare ID	E99	E50	H80	W58		
Mass of tare	8.6	8.5	8.6	8.2		
Mass wet + tare	399.9	406.1	400.3	388.2		
Mass dry + tare	276.4	270.2	293.8	252.4		
Mass water	123.5	135.9	106.5	135.8		
Mass dry soil	267.8	261.7	285.2	244.2		
Moisture %	46.1%	51.9%	37.3%	55.6%		



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**Atterberg Limits
 ASTM D4318**

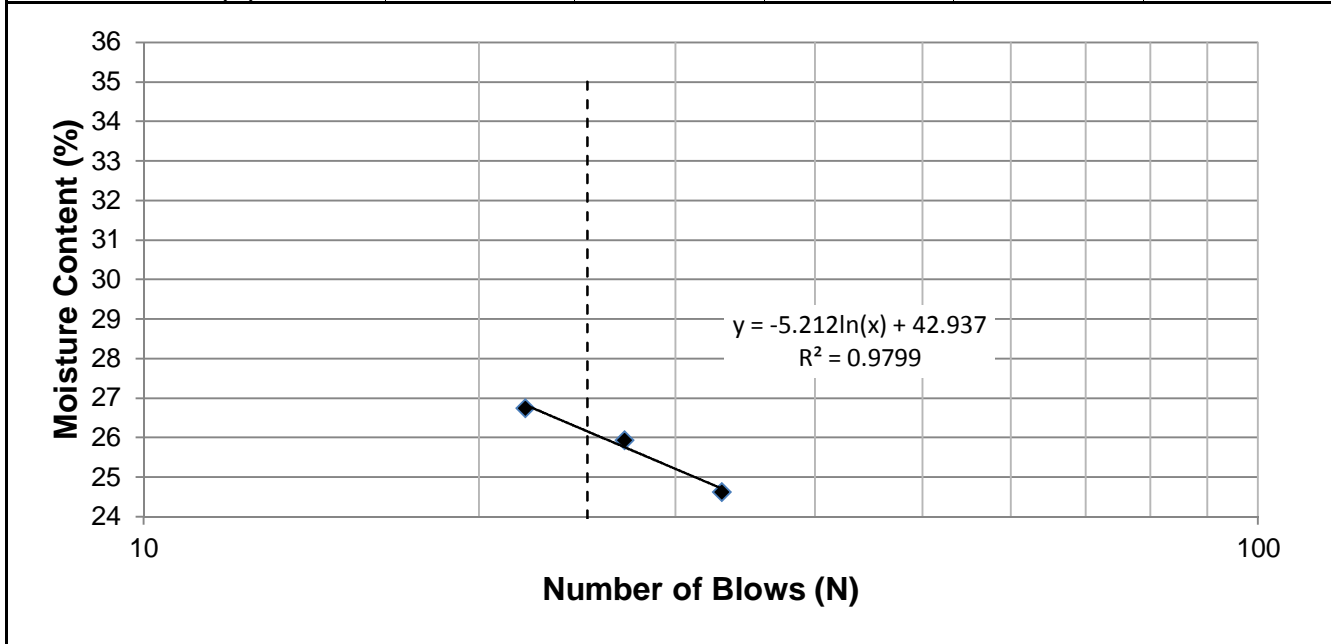
Project No. 0035 016 00
Client Morrison Hershfield
Project Local Streets Package 15-R-03, Swan Lake Bay

Test Hole TH14-01
Sample # G02
Depth (m) 0.5 - 0.6
Sample Date 03-Dec-14
Test Date 05-Jan-15
Technician Daniel Wiebe

Liquid Limit	26
Plastic Limit	17
Plasticity Index	9

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	33	27	22		
Mass Wet Soil + Tare (g)	24.451	25.285	24.085		
Mass Dry Soil + Tare (g)	22.392	23.017	21.931		
Mass Tare (g)	14.031	14.272	13.876		
Mass Water (g)	2.059	2.268	2.154		
Mass Dry Soil (g)	8.361	8.745	8.055		
Moisture Content (%)	24.626	25.935	26.741		



Plastic Limit

Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	20.078	20.703			
Mass Dry Soil + Tare (g)	19.166	19.758			
Mass Tare (g)	13.831	14.152			
Mass Water (g)	0.912	0.945			
Mass Dry Soil (g)	5.335	5.606			
Moisture Content (%)	17.095	16.857			



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**Atterberg Limits
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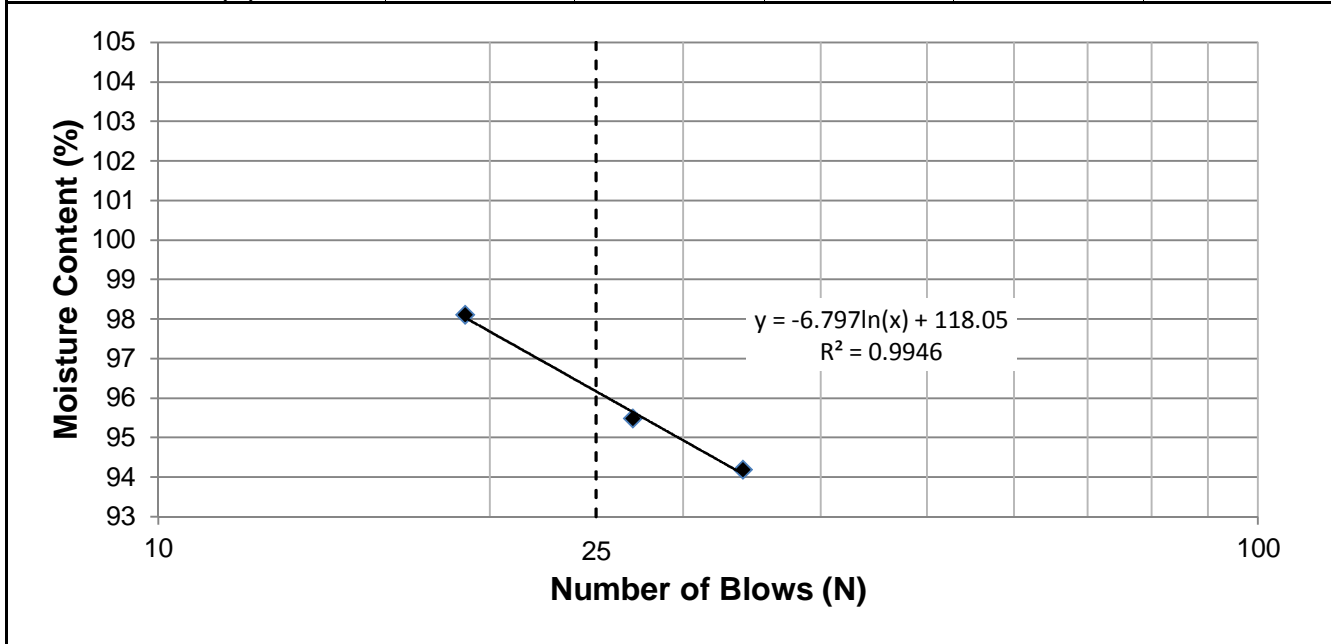
Project No. 0035 016 00
Client Morrison Hershfield
Project Local Streets Package 15-R-03, Swan Lake Bay

Test Hole TH14-04
Sample # G27
Depth (m) 2.5 - 3.0
Sample Date 03-Dec-14
Test Date 05-Jan-15
Technician Daniel Wiebe

Liquid Limit	96
Plastic Limit	26
Plasticity Index	70

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	34	19	27		
Mass Wet Soil + Tare (g)	23.158	25.204	24.507		
Mass Dry Soil + Tare (g)	18.738	19.721	19.290		
Mass Tare (g)	14.045	14.132	13.826		
Mass Water (g)	4.420	5.483	5.217		
Mass Dry Soil (g)	4.693	5.589	5.464		
Moisture Content (%)	94.183	98.103	95.480		



Plastic Limit

Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	20.700	20.671			
Mass Dry Soil + Tare (g)	19.300	19.287			
Mass Tare (g)	14.078	13.992			
Mass Water (g)	1.400	1.384			
Mass Dry Soil (g)	5.222	5.295			
Moisture Content (%)	26.810	26.138			



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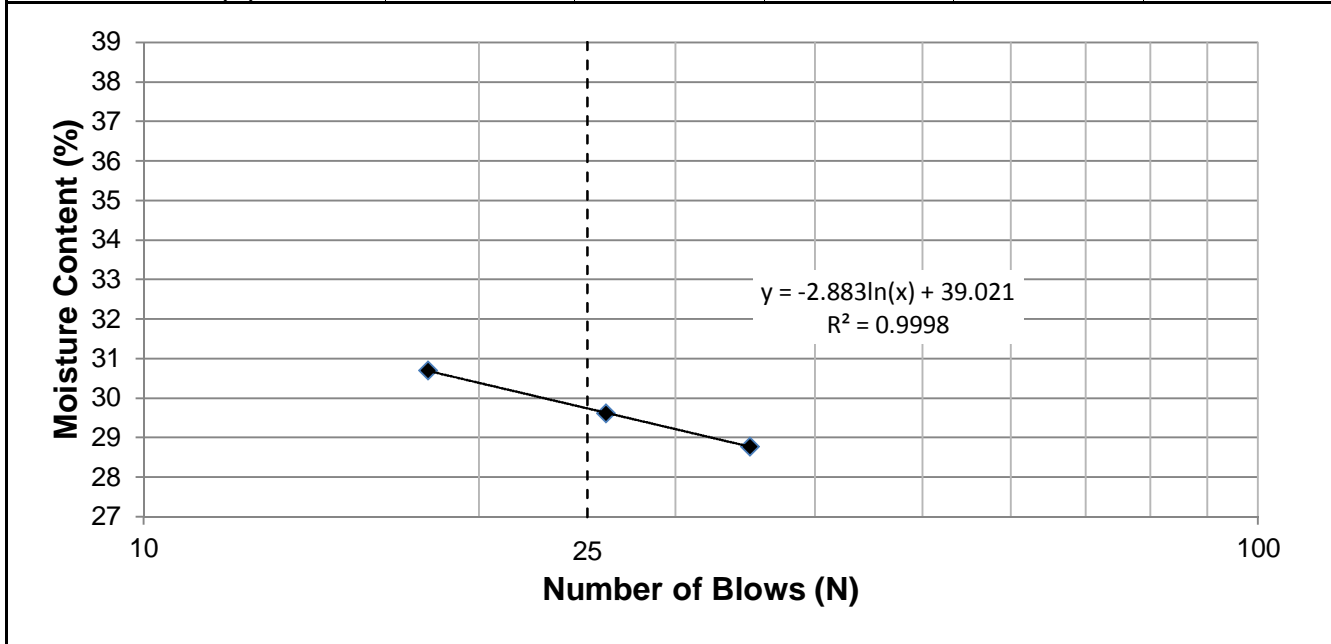
Project No. 0035 016 00
Client Morrison Hershfield
Project Local Streets Package 15-R-03, Swan Lake Bay

Test Hole TH14-05
Sample # G34
Depth (m) 0.5 - 0.6
Sample Date 03-Dec-14
Test Date 05-Jan-15
Technician Daniel Wiebe

Liquid Limit	30
Plastic Limit	16
Plasticity Index	13

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	26	35	18		
Mass Wet Soil + Tare (g)	25.507	26.218	25.378		
Mass Dry Soil + Tare (g)	22.860	23.538	22.721		
Mass Tare (g)	13.921	14.226	14.065		
Mass Water (g)	2.647	2.680	2.657		
Mass Dry Soil (g)	8.939	9.312	8.656		
Moisture Content (%)	29.612	28.780	30.695		



Plastic Limit

Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	20.667	20.780			
Mass Dry Soil + Tare (g)	19.782	19.849			
Mass Tare (g)	14.471	14.080			
Mass Water (g)	0.885	0.931			
Mass Dry Soil (g)	5.311	5.769			
Moisture Content (%)	16.664	16.138			

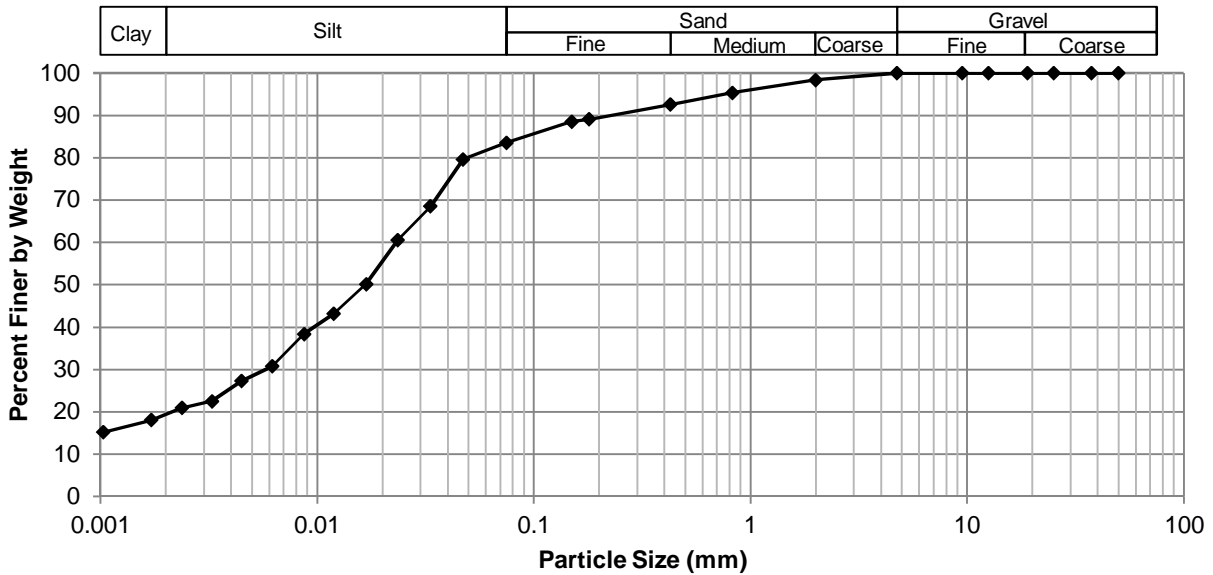


Project No. 0035 016 00
Client Morrison Hershfield
Project Local Streets Package 15-R-03, Swan Lake Bay

Test Hole TH14-01
Sample # G02
Depth (m) 0.5 - 0.6
Sample Date 3-Dec-14
Test Date 1-Feb-15
Technician Xin Xiong/Junhui Wu

Gravel	0.0%
Sand	16.5%
Silt	64.2%
Clay	19.3%

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	83.54
37.5	100.00	2.00	98.41	0.0471	79.68
25.0	100.00	0.825	95.34	0.0333	68.56
19.0	100.00	0.425	92.56	0.0236	60.62
12.5	100.00	0.180	89.12	0.0168	50.14
9.50	100.00	0.150	88.55	0.0119	43.16
4.75	100.00	0.075	83.54	0.0087	38.39
				0.0062	30.77
				0.0045	27.28
				0.0033	22.51
				0.0024	20.93
				0.0017	18.07
				0.0010	15.21

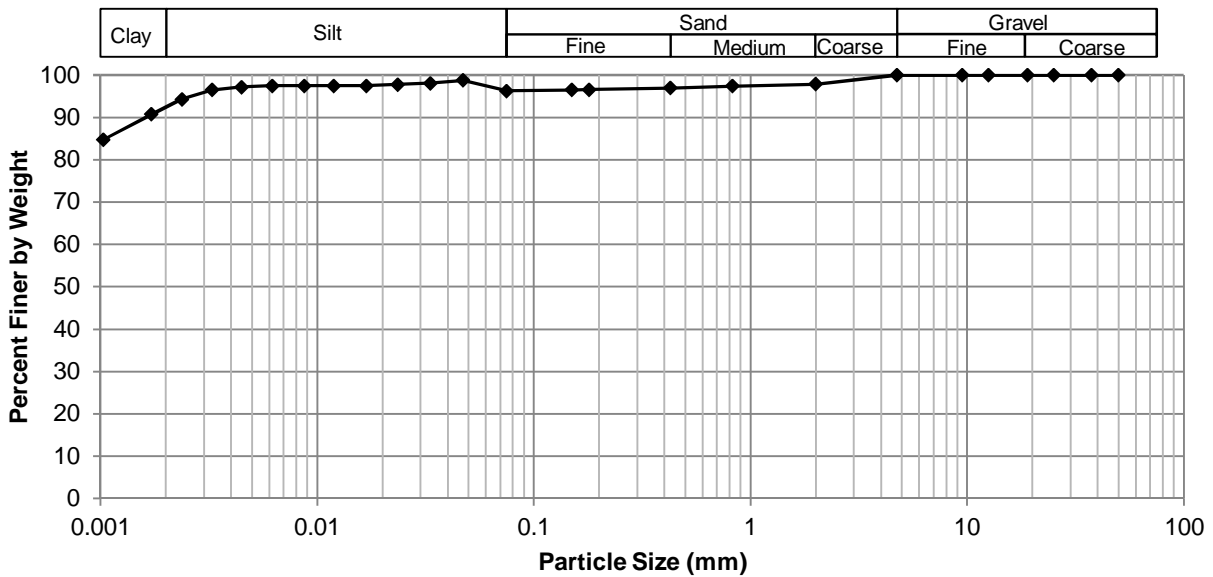


Project No. 0035 016 00
Client Morrison Hershfield
Project Local Streets Package 15-R-03, Swan Lake Bay

Test Hole TH14-04
Sample # G27
Depth (m) 0.8 - 0.9
Sample Date 3-Dec-14
Test Date 1-Feb-15
Technician Xin Xiong/Junhui Wu

Gravel	0.0%
Sand	3.7%
Silt	4.0%
Clay	92.3%

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	96.29
37.5	100.00	2.00	97.83	0.0471	98.73
25.0	100.00	0.825	97.39	0.0333	98.09
19.0	100.00	0.425	96.98	0.0236	97.78
12.5	100.00	0.180	96.58	0.0168	97.46
9.50	100.00	0.150	96.50	0.0119	97.46
4.75	100.00	0.075	96.29	0.0087	97.46
				0.0062	97.46
				0.0045	97.14
				0.0033	96.51
				0.0024	94.28
				0.0017	90.79
				0.0010	84.76

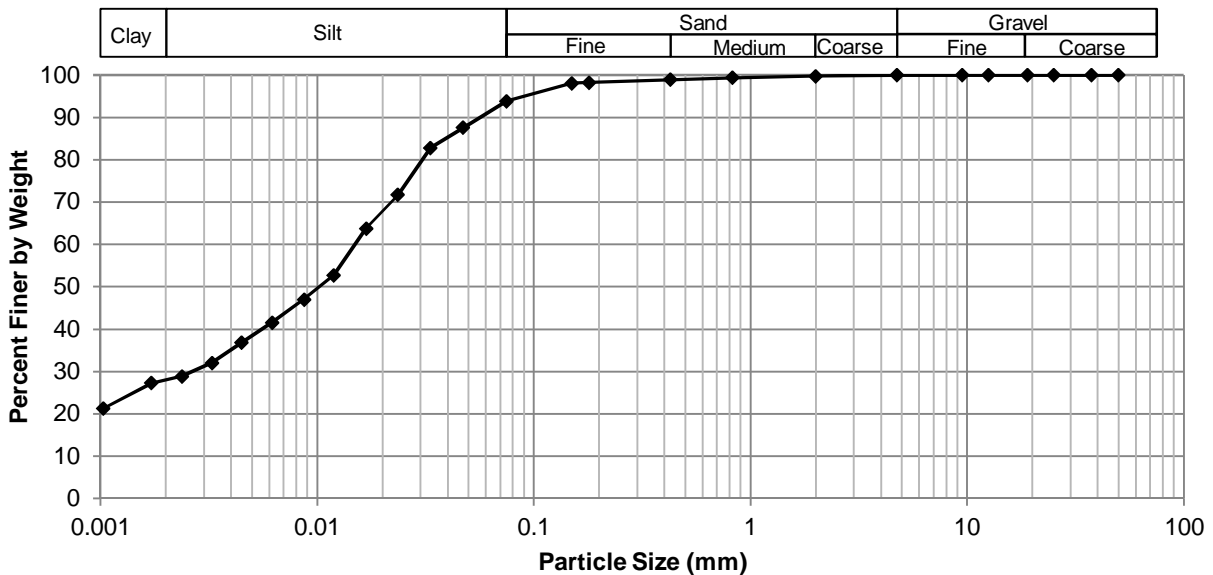


Project No. 0035 016 00
Client Morrison Hershfield
Project Local Streets Package 15-R-03, Swan Lake Bay

Test Hole TH14-04
Sample # G34
Depth (m) 0.5 - 0.6
Sample Date 3-Dec-14
Test Date 1-Feb-15
Technician Xin Xiong/Junhui Wu

Gravel	0.0%
Sand	6.1%
Silt	65.9%
Clay	28.0%

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	93.88
37.5	100.00	2.00	99.78	0.0471	87.62
25.0	100.00	0.825	99.38	0.0333	82.85
19.0	100.00	0.425	98.91	0.0236	71.74
12.5	100.00	0.180	98.23	0.0168	63.80
9.50	100.00	0.150	98.09	0.0119	52.68
4.75	100.00	0.075	93.88	0.0087	46.97
				0.0062	41.57
				0.0045	36.80
				0.0033	32.04
				0.0024	28.87
				0.0017	27.28
				0.0010	21.24



Photo 1: Concrete Core Sample From Test Hole TH14-01



Photo 2: Concrete Core Sample From Test Hole TH14-02



Photo 3: Concrete Core Sample From Test Hole TH14-03



Photo 4: Concrete Core Sample From Test Hole TH14-04



Photo 5: Concrete Core Sample From Test Hole TH14-05



Photo 6: Concrete Core Sample From Test Hole TH14-06

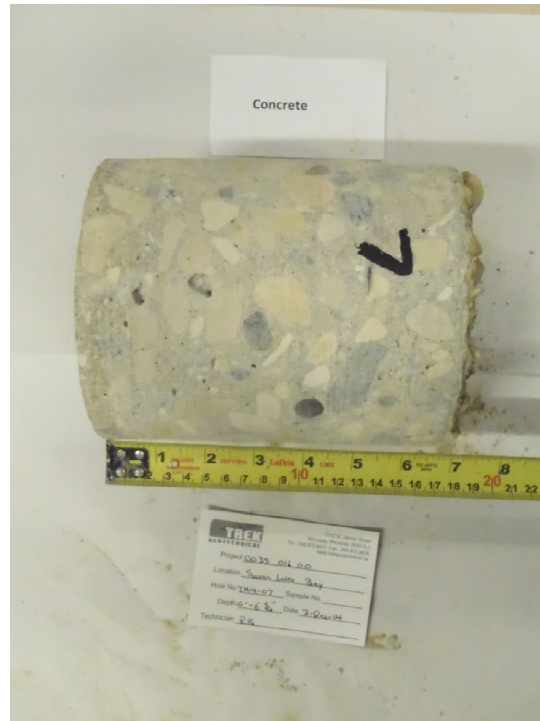


Photo 7: Concrete Core Sample From Test Hole TH14-07



Photo 8: Concrete Core Sample From Test Hole TH14-08