APPENDIX 'F'

GEOTECHNICAL REPORT

TREK GEOTECHNICAL

Quality Engineering | Valued Relationships

Morrison Hershfield

2014 Local Streets Package (PW File #: 14-R-04)

Prepared for:

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

Distribution:

Ron Bruce, P.Eng.

Project Number:
0035 010 00

Date:
February 21, 2014
Final Report

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TREK GEOTECHNICAL Quality Engineering | Valued Relationships

February 21, 2014 Our File No. 0035 010 00

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

RE: Sub-Surface Investigation Report for
2014 Local Streets Package (PW File #: 14-R-04)

TREK Geotechnical Inc. is pleased to submit our Report for the sub-surface investigations for the 2014 Local Streets Package (PW File #: 14-R-04).

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

Sincerely,

TREK Geotechnical Inc.
Per:

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

cc: Beta Taryana, E.I.T. (TREK Geotechnical)

Revision History

Revision No.	Author	Issue Date	Description
0	BT	February 21, 2014	Final Report

Authorization Signatures

Prepared By:

Beta Taryana, EIT
Geotechnical Engineer-in-Training

Reviewed By:

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N. J. FERREIRA
Member
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REGISTERED PROFESSIONAL ENGINEER
Feb. 21, 2014

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

APEGM
Certificate of Authorization
Trek Geotechnical Inc.
No. 4877 Date: Feb 21, 2014

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List of Appendices

1.0 Introduction

This report summarizes the results of the sub-surface investigation completed for the 2014 Local Street Package (PW File #: 14-R-04). 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 15 test holes were drilled along Dunrobin Ave. and Harbison Ave. 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 and Figure 02.

Table 1. List of Test Holes Drilled at Each Location

Street Location	Test Hole
Dunrobin Ave. between Watt St. and Golspie St.	TH14-01, TH14-02, TH14-03, TH14-04, TH14-05, TH14-06 and TH14-07
Harbison Ave. south east of Watt St.	TH14-08, TH14-09, TH14-10, TH14-11, TH14-12, TH14-13, TH14-14 and TH14-15

The sub-surface investigation was conducted from January 14 to 15, 2014. The test holes were drilled to a depth of 3.2 m below road surface by Paddock Drilling Ltd. using their MP8 truck mounted drill rig equipped with 125 mm diameter solid stem augers. Test hole TH14-02 was terminated at a depth of 2.2 m due to suspected buried utilities. The pavement structure (asphalt and/or concrete) was cored by 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 visually classified by Martial Lemoine, EIT of TREK Geotechnical Inc. (TREK). Other pertinent information such as groundwater and drilling conditions were also recorded during the drilling investigation.

Disturbed (auger cuttings) samples retrieved during the sub-surface investigation were transported to TREK's material testing laboratory for further testing. 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 and mechanic sieve method) on select samples.

Information gathered for each street is included in separate appendices (Appendix A and B). 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 and Figure 02 are based on measured distances from the nearest house and/or edge of pavement.

Figures

TREK GEOTECHNICAL

0035 010 00
Morrison Hershfield
2014 Local Street Package (PW File #: 14-R-04)

Tabloid (279mm x 432mm)

PLOT: 18/02/2014 11:02:55 AM

FILE NAME: 0035 010 00_RB.dwg

KEY PLAN
SCALE : N.T.S.

0 12.5 25 37.5 50m
SCALE : 1:1250 (279mm x 432mm)

LEGEND :

TEST HOLE (TREK, 2014)

NOTES :

1. IMAGE FROM GOOGLE EARTH ON JUNE 22, 2012

Figure 01
Test Hole Location Plan
Dunrobin Avenue

TREK GEOTECHNICAL

0035 010 00
Morrison Hershfield
2014 Local Street Package (PW File #: 14-R-04)

Tabloid (279mm x 432mm)

PLOT: 18/02/2014 11:02:03 AM

FILE NAME: 0035 010 00_RB.dwg

WATT ST

TH14-08

TH14-09

TH14-10

TH14-11

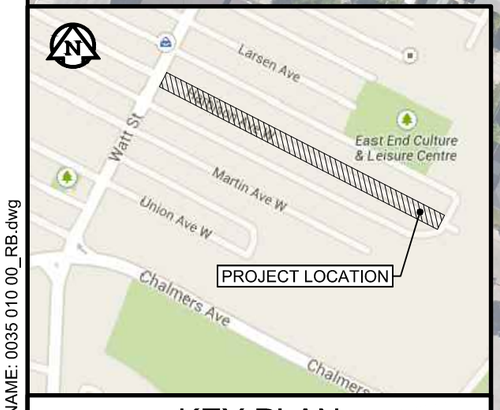
HARBISON AVE

TH14-12

TH14-13

TH14-14

TH14-15



KEY PLAN
SCALE : N.T.S.

0 12.5 25 37.5 50m
SCALE : 1:1250 (279mm x 432mm)

LEGEND :

TEST HOLE (TREK, 2014)

NOTES :

1. IMAGE FROM GOOGLE EARTH ON JUNE 22, 2012

Figure 02
Test Hole Location Plan
Harbison Avenue

Appendix A

Dunrobin Ave. between Watt St. and Golspie St.

Sub-Surface Log

Test Hole TH14-01
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035 010 00
Project Name:	2014 Local Streets Package (PW File #: 14-R-04)	**Location:**	Dunrobin Ave. - between Watt St. and Golspie St.
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, Acker MP8 Truck Mount	**Date Drilled:**	14 January 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
		ASPHALT (38 mm thick)		C01A
		CONCRETE (157 mm thick)		C01B
		CLAY - silty, trace sand, trace silt inclusions (<5 mm diam.), trace oxidation - dark grey - frozen to 0.9 m, moist and firm to stiff when thawed - high plasticity		G72
0.5				G73
				G74
1.0				G75
				G76
1.5		SILT - trace clay, trace sand, trace gravel - light brown - wet, soft - low plasticity		G77
2.0		-moist below 2.0 m		G78
		CLAY - silty, trace sand, trace silt inclusions (<5 mm diam.), trace oxidation - mottled brown and dark grey - moist, firm - high plasticity		G79
2.5				
3.0		- firm below 3.1 m		G80

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21
Particle Size (%): 0 20 40 60 80 100
PL MC LL
Undrained Shear Strength (kPa): 0 50 100 150 200 250
Test Type: △ Torvane △ ✿ Pocket Pen. ✿ ☒ Qu ☒ ○ Field Vane ○

END OF TEST HOLE AT 3.2 m in CLAY

Notes:
1. No sloughing or seepage observed.
2. Backfilled test hole with auger cuttings, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
3. Test hole located on Dunrobin Ave. between Watt St. and Golspie St., in front of south east corner of north wall of 775 Watt St., 1.7 m of south curb of Dunrobin Ave.

Logged By: Beta Taryana **Reviewed By:** Brent Hay **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG 2014 LOCAL STREET PACKAGE 14-R-04 LOGS.GPJ TREK GEOTECHNICAL.GDT 21/2/14

Sub-Surface Log

Test Hole TH14-02
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035 010 00
Project Name:	2014 Local Streets Package (PW File #: 14-R-04)	**Location:**	Dunrobin Ave. - between Watt St. and Golspie St.
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, Acker MP8 Truck Mount	**Date Drilled:**	14 January 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	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL	Undrained Shear Strength (kPa) Test Type: △ Torvane △ ✪ Pocket Pen. ✪ ☒ Qu ☒ ○ Field Vane ○ 0 50 100 150 200 250
		ASPHALT (50 mm thick)		C02A		
		CONCRETE (155 mm thick)		C02B		
		SAND (Fill) - trace clay, trace sand, trace gravel - light brown - frozen to 0.9 m, dry and loose when thawed - well graded fine sand to fine gravel		G81		
0.5				G82		
				G83		
1.0				G84		
				G85		
1.5				G86		
				G87		
2.0						

END OF TEST HOLE AT 2.2 m in SAND (Fill)

Notes:
1. No sloughing or seepage observed.
2. Backfilled test hole with auger cuttings, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
3. Test hole was not advanced into sub-grade materials below 2.2 m due to suspected buried utilities.
4. Sample G82, G83, and G84 were combined for grain size analysis (sieve method).
5. Test hole located on Dunrobin Ave. between Watt St. and Golspie St., in front of sidewalk of 520 Dunrobin Ave., 1.5 m north of south curb of Dunrobin Ave.

Logged By: Beta Taryana **Reviewed By:** Brent Hay **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG 2014 LOCAL STREET PACKAGE 14-R-04 LOGS.GPJ TREK GEOTECHNICAL.GDT 21/2/14

Sub-Surface Log

Test Hole TH14-03
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035 010 00
Project Name:	2014 Local Streets Package (PW File #: 14-R-04)	**Location:**	Dunrobin Ave. - between Watt St. and Golspie St.
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, Acker MP8 Truck Mount	**Date Drilled:**	14 January 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
		ASPHALT (30 mm thick)		C03A
		CONCRETE (155 mm thick)		C03B
		SILT - gravelly, dark brown, frozen, moist and soft when thawed, low plasticity		G143
		CLAY - silty, trace sand, trace gravel, trace organics, trace oxidation - dark brown - frozen to 0.9 m, moist and firm when thawed, high plasticity		G88
0.5		- light brown below 0.5 m		G89
		- trace silt inclusions (<25 mm diam.), mottled grey and black below 0.7 m		G90
1.0				G91
1.5				G92
				G93
2.0		SILT - trace clay - light brown - wet, soft - no to low plasticity		G94
		CLAY - silty, trace silt inclusions (<5 mm diam.), trace oxidation - brown - moist, firm - high plasticity		G95
2.5				
3.0				G96

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21

Particle Size (%): 0 20 40 60 80 100 — PL MC LL

Undrained Shear Strength (kPa): 0 50 100 150 200 250

Test Type: △ Torvane △ ✪ Pocket Pen. ✪ ☒ Qu ☒ ○ Field Vane ○

END OF TEST HOLE AT 3.2 m in CLAY

Notes:
1. No sloughing or seepage observed.
2. Backfilled test hole with auger cuttings, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
3. Test hole located on Dunrobin Ave. between Watt St. and Golspie St., 3 m east from sidewalk of 532 Dunrobin Ave., 2.3 m south of north curb of Dunrobin Ave.

Logged By: Beta Taryana **Reviewed By:** Brent Hay **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG 2014 LOCAL STREET PACKAGE 14-R-04 LOGS.GPJ TREK GEOTECHNICAL.GDT 21/2/14

Sub-Surface Log

Test Hole TH14-04
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035 010 00
Project Name:	2014 Local Streets Package (PW File #: 14-R-04)	**Location:**	Dunrobin Ave. - between Watt St. and Golspie St.
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, Acker MP8 Truck Mount	**Date Drilled:**	15 January 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	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL	Undrained Shear Strength (kPa) 0 50 100 150 200 250
		ASPHALT (45 mm thick)		C04A		
		CONCRETE (145 mm thick)		C04B		
		SILT - some sand, trace gravel, brown, frozen, dry and compact when thawed		G144		
		CLAY - silty, trace sand, trace gravel, trace organics, trace oxidation - dark brown to black - frozen, moist and stiff to very stiff when thawed - high plasticity		G106		
0.5				G107		
				G108		
1.0		- trace silt inclusions (<5 mm diam.), no longer frozen, firm below 0.9 m		G109		
		SILT - some clay, trace sand, trace oxidation - light brown - moist, firm - low plasticity		G110		
1.5				G111		
2.0				G112		
		CLAY - silty, trace sand, trace oxidation - brown - moist, firm to stiff - high plasticity		G113		
2.5						
3.0				G114		

END OF TEST HOLE AT 3.2 m in CLAY

Notes:
1. No sloughing or seepage observed.
2. Backfilled test hole with auger cuttings, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
3. Test hole located on Dunrobin Ave. between Watt St. and Golspie St., in front of sidewalk of 544 Dunrobin Ave., 1.2 m north of south curb of Dunrobin Ave.

Logged By: Beta Taryana **Reviewed By:** Brent Hay **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG 2014 LOCAL STREET PACKAGE 14-R-04 LOGS.GPJ TREK GEOTECHNICAL.GDT 21/2/14

Sub-Surface Log

Test Hole TH14-05
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035 010 00
Project Name:	2014 Local Streets Package (PW File #: 14-R-04)	**Location:**	Dunrobin Ave. - between Watt St. and Golspie St.
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, Acker MP8 Truck Mount	**Date Drilled:**	15 January 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
		ASPHALT (30 mm thick)		C05A
		CONCRETE (155 mm thick)		C05B
		SILT - gravelly, trace clay, trace sand, trace gravel, brown, frozen, moist to wet and soft when thawed, low plasticity		G145
				G97
		CLAY - silty, trace sand, trace gravel, trace silt inclusions (<10 mm diam.), trace organics, trace oxidation		
0.5		- dark grey to black, frozen, wet and soft when thawed, high plasticity - moist, firm to stiff below 0.5 m		G98
				G99
		- no longer frozen below 0.9 m		
1.0				G100
1.5		- brown, very stiff below 1.4 m		G101
		SILT - clayey, trace sand, trace oxidation - light brown - moist, soft - low plasticity		G102
2.0		CLAY - silty, trace silt inclusions (<20 mm diam.) - mottled brown and grey - moist, very stiff - high plasticity		G103
		- firm to stiff below 2.3 m		G104
2.5				
3.0		- firm below 3.1 m		G105

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21

Particle Size (%): 0 20 40 60 80 100

PL MC LL

Undrained Shear Strength (kPa): 0 50 100 150 200 250

Test Type: △ Torvane △ ✪ Pocket Pen. ✪ ☒ Qu ☒ ○ Field Vane ○

END OF TEST HOLE AT 3.2 m in CLAY

Notes:
1. No sloughing or seepage observed.
2. Backfilled test hole with auger cuttings, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
3. Test hole located on Dunrobin Ave. between Watt St. and Golspie St., in front of sidewalk of 556 Dunrobin Ave., 1.7 m north of south curb of Dunrobin Ave.

Logged By: Beta Taryana **Reviewed By:** Brent Hay **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG 2014 LOCAL STREET PACKAGE 14-R-04 LOGS.GPJ TREK GEOTECHNICAL.GDT 21/2/14

Sub-Surface Log

Test Hole TH14-06
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035 010 00
Project Name:	2014 Local Streets Package (PW File #: 14-R-04)	**Location:**	Dunrobin Ave. - between Watt St. and Golspie St.
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, Acker MP8 Truck Mount	**Date Drilled:**	15 January 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
		ASPHALT (65 mm thick)		C06A
		CONCRETE (150 mm thick)		C06B
		GRANULAR (Fill) - 19 mm down limestone, light brown, dry		G116
		CLAY - silty, trace sand, trace silt inclusions (<20 mm diam.), trace organics - dark grey to black - frozen to 0.9 m, moist and firm when thawed - high plasticity		G117
0.5				G118
1.0				G119
1.5		- trace oxidation, brown below 1.5 m		G120
				G121
2.0				G122
		SILT and CLAY - grey, moist, firm, intermediate plasticity		G123
2.5		CLAY - silty, trace sand, trace oxidation - mottled brown - moist, firm - high plasticity		
3.0				G124

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21
Particle Size (%): 0 20 40 60 80 100
PL MC LL
Undrained Shear Strength (kPa): 0 50 100 150 200 250
Test Type: △ Torvane △ ✿ Pocket Pen. ✿ ☒ Qu ☒ ○ Field Vane ○

END OF TEST HOLE AT 3.2 m in CLAY

Notes:
1. No sloughing or seepage observed.
2. Backfilled test hole with auger cuttings, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
3. Test hole located on Dunrobin Ave. between Watt St. and Golspie St., in front of sidewalk of 572 Dunrobin Ave., 1.6 m north of south curb of Dunrobin Ave.

Logged By: Beta Taryana **Reviewed By:** Brent Hay **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG 2014 LOCAL STREET PACKAGE 14-R-04 LOGS.GPJ TREK GEOTECHNICAL.GDT 21/2/14

Sub-Surface Log

Test Hole TH14-07
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035 010 00
Project Name:	2014 Local Streets Package (PW File #: 14-R-04)	**Location:**	Dunrobin Ave. - between Watt St. and Golspie St.
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, Acker MP8 Truck Mount	**Date Drilled:**	15 January 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
		ASPHALT (65 mm thick)		C07A
		CONCRETE (150 mm thick)		C07B
		SAND (Fill) - trace clay, trace sand, trace gravel - light brown - frozen, moist and loose when thawed - well graded fine sand to fine gravel		G125
0.5				G126
		CLAY - silty, some to trace sand, trace gravel, trace oxidation, trace organics - dark grey to black - frozen to 0.9 m, moist and firm when thawed - high plasticity		G127
1.0				G128
		- trace sand, trace silt inclusions (<10 mm diam.), mottled brown and grey, firm to stiff below 1.2 m		G129
1.5				G130
				G131
2.0				G132
2.5				G133
3.0				

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21
Particle Size (%): 0 20 40 60 80 100
PL MC LL
Undrained Shear Strength (kPa): 0 50 100 150 200 250
Test Type: △ Torvane △ ✪ Pocket Pen. ✪ ☒ Qu ☒ ○ Field Vane ○

END OF TEST HOLE AT 3.2 m in CLAY

Notes:
1. No sloughing or seepage observed.
2. Backfilled test hole with auger cuttings, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
3. Test hole located on Dunrobin Ave. between Watt St. and Golspie St., in front of sidewalk of 584 Dunrobin Ave., 1.8 m north of south curb of Dunrobin Ave.

Logged By: Beta Taryana **Reviewed By:** Brent Hay **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG 2014 LOCAL STREET PACKAGE 14-R-04 LOGS.GPJ TREK GEOTECHNICAL.GDT 21/2/14

2014 Local Streets Package (PW File #: 14-R-04)
Sub-Surface Investigation
Dunrobin Avenue

Test Hole No.	Test Hole Location	Pavement Surface		Pavement Structure Material		Subgrade Description	Sample Depth (m)		Moisture Content (%)	Grain Size Analysis				Atterberg Limits		
		Type	Thickness (mm)	Type	Thickness (mm)		Top (m)	Bottom (m)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Plastic	Liquid	Plasticity Index
TH14-01	Dunrobin Ave. between Watt St. and Golspie St. in front of north wall of 775 Watt St.	Asphalt	38	Concrete	157											
						Clay	0.2	0.3	34							
						Clay	0.5	0.6	32							
						Clay	0.8	0.9	33							
						Clay	1.1	1.2	35							
						Clay	1.4	1.5	32	0	2	32	66	18	64	47
						Silt	1.7	1.8	25							
						Silt	2.0	2.1	25							
						Clay	2.3	2.4	47							
						Clay	3.1	3.2	50							
TH14-02	Dunrobin Ave. between Watt St. and Golspie St. in front of 520 Dunrobin Ave.	Asphalt	50	Concrete	155											
						Sand (Fill)	0.2	0.3	4							
						Sand (Fill)	0.5	0.6	4	21	62	18 (Fines)				
						Sand (Fill)	0.8	0.9	3							
						Sand (Fill)	1.1	1.2	3							
						Sand (Fill)	1.4	1.5	3							
						Sand (Fill)	1.7	1.8	3							
						Sand (Fill)	2.0	2.1	3							
TH14-03	Dunrobin Ave. between Watt St. and Golspie St. in front of 532 Dunrobin Ave.	Asphalt	30	Concrete	155											
						Silt	0.2	0.2	22							
						Clay	0.2	0.3	23							
						Clay	0.5	0.6	23							
						Clay	0.8	0.9	27							
						Clay	1.1	1.2	32							
						Clay	1.4	1.5	30							
						Clay	1.7	1.8	38							
						Silt	2.0	2.1	27							
						Clay	2.3	2.4	27							
						Clay	3.1	3.2	49							
TH14-04	Dunrobin Ave. between Watt St. and Golspie St. in front of 544 Dunrobin Ave.	Asphalt	45	Concrete	145											
						Silt	0.2	0.2	2							
						Clay	0.2	0.3	27							
						Clay	0.5	0.6	26							
						Clay	0.8	0.9	24	0	1	37	62	16	62	46
						Clay	1.1	1.2	29							
						Silt	1.4	1.5	22							
						Silt	1.7	1.8	22							
						Silt	2.0	2.1	23							
						Clay	2.3	2.4	27							
						Clay	3.1	3.2	42							

2014 Local Streets Package (PW File #: 14-R-04)
Sub-Surface Investigation
Dunrobin Avenue

Test Hole No.	Test Hole Location	Pavement Surface		Pavement Structure Material		Subgrade Description	Sample Depth (m)		Moisture Content (%)	Grain Size Analysis				Atterberg Limits		
		Type	Thickness (mm)	Type	Thickness (mm)		Top (m)	Bottom (m)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Plastic	Liquid	Plasticity Index
TH14-05	Dunrobin Ave. between Watt St. and Golspie St. in front of 556 Dunrobin Ave.	Asphalt	30	Concrete	155											
						Silt	0.2	0.2	26							
						Clay	0.2	0.3	39							
						Clay	0.5	0.6	30							
						Clay	0.8	0.9	28							
						Clay	1.1	1.2	26							
						Clay	1.4	1.5	27							
						Silt	1.7	1.8	22							
						Clay	2.0	2.1	30							
						Clay	2.3	2.4	43							
						Clay	3.1	3.2	49							
TH14-06	Dunrobin Ave. between Watt St. and Golspie St. in front of 572 Dunrobin Ave.	Asphalt	65	Concrete	150											
						Granular (Fill)	0.2	0.3	40							
						Clay	0.5	0.6	34							
						Clay	0.8	0.9	37							
						Clay	1.1	1.2	37							
						Clay	1.4	1.5	34							
						Clay	1.7	1.8	44							
						Clay	2.0	2.1	41							
						Silt and Clay	2.3	2.4	52							
						Clay	3.1	3.2	49							
TH14-07	Dunrobin Ave. between Watt St. and Golspie St., in front of 584 Dunrobin Ave.	Asphalt	65	Concrete	150											
						Sand (Fill)	0.2	0.3	6							
						Sand (Fill)	0.5	0.6	17							
						Clay	0.8	0.9	22							
						Clay	1.1	1.2	32	0	3	12	85	20	78	57
						Clay	1.4	1.5	30							
						Clay	1.7	1.8	41							
						Clay	2.0	2.1	48							
						Clay	2.3	2.4	51							
						Clay	3.1	3.2	51							

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Moisture Content Report
ASTM D2216-98

Project No. 0035 010 00
Client Morrison Hershfield
Project Local Streets Package 14-R-04 Dunrobin Avenue

Sample Date January 15, 2014
Test Date January 27, 2014
Technician Daniel Mroz

Test Hole	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 #	G72	G73	G74	G75	G76	G77
Tare ID	K29	Z139	N40	D41	N70	F15
Mass of tare	8.2	8.4	8.4	8.4	8.3	8.4
Mass wet + tare	350.0	435.7	363.0	369.5	350.0	390.0
Mass dry + tare	263.0	330.9	276.0	275.6	267.0	313.6
Mass water	87.0	104.8	87.0	93.9	83.0	76.4
Mass dry soil	254.8	322.5	267.6	267.2	258.7	305.2
Moisture %	34.1%	32.5%	32.5%	35.1%	32.1%	25.0%

Test Hole	TH14-01	TH14-01	TH14-01	TH14-02	TH14-02	TH14-02
Depth (m)	2.0 - 2.1	2.3 - 2.4	3.1 - 3.2	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9
Sample #	G78	G79	G80	G81	G82	G83
Tare ID	F147	H63	N52	F146	P25	F154
Mass of tare	8.2	8.3	8.5	8.2	8.4	8.3
Mass wet + tare	513.0	388.3	329.3	385.0	344.6	376.7
Mass dry + tare	411.1	266.9	222.6	368.8	332.5	365.8
Mass water	101.9	121.4	106.7	16.2	12.1	10.9
Mass dry soil	402.9	258.6	214.1	360.6	324.1	357.5
Moisture %	25.3%	46.9%	49.8%	4.5%	3.7%	3.0%

Test Hole	TH14-02	TH14-02	TH14-02	TH14-02	TH14-03	TH14-03
Depth (m)	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1	0.1 - 0.1	0.2 - 0.3
Sample #	G84	G85	G86	G87	G143	G88
Tare ID	E131	N90	W17	Z58	H	N08
Mass of tare	8.6	8.3	8.3	8.4	227.6	8.5
Mass wet + tare	334.2	283.3	474.2	492.5	809.9	357.7
Mass dry + tare	325.3	275.7	461.8	479.4	704.2	291.4
Mass water	8.9	7.6	12.4	13.1	105.7	66.3
Mass dry soil	316.7	267.4	453.5	471.0	476.6	282.9
Moisture %	2.8%	2.8%	2.7%	2.8%	22.2%	23.4%

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Moisture Content Report
ASTM D2216-98

Project No. 0035 010 00
Client Morrison Hershfield
Project Local Streets Package 14-R-04 Dunrobin Avenue

Sample Date January 15, 2014
Test Date January 27, 2014
Technician Daniel Mroz

Test Hole	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	2.0 - 2.1
Sample #	G89	G90	G91	G92	G93	G94
Tare ID	H52	E16	Z110	Z16	D2	N93
Mass of tare	8.3	8.4	8.4	8.3	8.1	8.3
Mass wet + tare	407.1	437.6	323.2	362.4	445.6	461.1
Mass dry + tare	331.6	346.1	247.7	279.9	324.3	365.6
Mass water	75.5	91.5	75.5	82.5	121.3	95.5
Mass dry soil	323.3	337.7	239.3	271.6	316.2	357.3
Moisture %	23.4%	27.1%	31.6%	30.4%	38.4%	26.7%

Test Hole	TH14-03	TH14-03	TH14-04	TH14-04	TH14-04	TH14-04
Depth (m)	2.3 - 2.4	3.1 - 3.2	0.1 - 0.1	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9
Sample #	G95	G96	G144	G106	G107	G108
Tare ID	N74	H64	B	E27	F34	Z42
Mass of tare	8.4	8.4	229.6	8.4	8.3	8.2
Mass wet + tare	512.6	351.1	572.3	391.9	348.4	420.7
Mass dry + tare	406.7	238.0	567.3	309.3	278.3	340.8
Mass water	105.9	113.1	5.0	82.6	70.1	79.9
Mass dry soil	398.3	229.6	337.7	300.9	270.0	332.6
Moisture %	26.6%	49.3%	1.5%	27.5%	26.0%	24.0%

Test Hole	TH14-04	TH14-04	TH14-04	TH14-04	TH14-04	TH14-04
Depth (m)	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1	2.3 - 2.4	3.1 - 3.2
Sample #	G109	G110	G111	G112	G113	G114
Tare ID	Z123	Z80	E36	W91	W08	Z25
Mass of tare	8.2	8.3	8.3	8.4	8.3	8.2
Mass wet + tare	394.6	474.8	519.7	492.5	351.1	445.0
Mass dry + tare	307.6	390.5	427.9	403.3	277.7	316.6
Mass water	87.0	84.3	91.8	89.2	73.4	128.4
Mass dry soil	299.4	382.2	419.6	394.9	269.4	308.4
Moisture %	29.1%	22.1%	21.9%	22.6%	27.2%	41.6%

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Moisture Content Report
ASTM D2216-98

Project No. 0035 010 00
Client Morrison Hershfield
Project Local Streets Package 14-R-04 Dunrobin Avenue

Sample Date January 15, 2014
Test Date January 27, 2014
Technician Daniel Mroz

Test Hole	TH14-05	TH14-05	TH14-05	TH14-05	TH14-05	TH14-05
Depth (m)	0.1 - 0.1	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5
Sample #	G145	G97	G98	G99	G100	G101
Tare ID	HACHEM	E82	E83	N05	W67	E39
Mass of tare	218.4	8.6	8.5	8.5	8.2	8.4
Mass wet + tare	731.2	357.9	336.9	339.9	373.9	413.8
Mass dry + tare	626.7	259.7	261.2	266.6	298.5	326.6
Mass water	104.5	98.2	75.7	73.3	75.4	87.2
Mass dry soil	408.3	251.1	252.7	258.1	290.3	318.2
Moisture %	25.6%	39.1%	30.0%	28.4%	26.0%	27.4%

Test Hole	TH14-05	TH14-05	TH14-05	TH14-05	TH14-06	TH14-06
Depth (m)	1.7 - 1.8	2.0 - 2.1	2.3 - 2.4	3.1 - 3.2	0.2 - 0.3	0.5 - 0.6
Sample #	G102	G103	G104	G105	G116	G117
Tare ID	A17	A8	Z19	F155	H44	R100
Mass of tare	8.4	8	8.3	8.3	8.2	4.5
Mass wet + tare	456.6	388.7	422.0	415.2	333.3	324.5
Mass dry + tare	376.7	300.8	297.3	280.8	240.4	244.0
Mass water	79.9	87.9	124.7	134.4	92.9	80.5
Mass dry soil	368.3	292.8	289.0	272.5	232.2	239.5
Moisture %	21.7%	30.0%	43.1%	49.3%	40.0%	33.6%

Test Hole	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	1.7 - 1.8	2.0 - 2.1	2.3 - 2.4
Sample #	G118	G119	G120	G121	G122	G123
Tare ID	R101	R102	R103	R104	R105	R106
Mass of tare	4.5	4.5	4.5	4.5	4.5	4.5
Mass wet + tare	392.6	315.2	324.5	424.1	364.4	330.0
Mass dry + tare	286.9	231.5	242.8	296.6	259.0	219.3
Mass water	105.7	83.7	81.7	127.5	105.4	110.7
Mass dry soil	282.4	227.0	238.3	292.1	254.5	214.8
Moisture %	37.4%	36.9%	34.3%	43.6%	41.4%	51.5%

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Moisture Content Report
ASTM D2216-98

Project No. 0035 010 00
Client Morrison Hershfield
Project Local Streets Package 14-R-04 Dunrobin Avenue

Sample Date January 15, 2014
Test Date January 27, 2014
Technician Daniel Mroz

Test Hole	TH14-06	TH14-07	TH14-07	TH14-07	TH14-07	TH14-07
Depth (m)	3.1 - 3.2	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5
Sample #	G124	G125	G126	G127	G128	G129
Tare ID	R107	R108	R109	R110	R111	R112
Mass of tare	4.5	4.5	4.5	4.5	4.5	4.5
Mass wet + tare	378.8	373.1	327.7	314.9	327.9	378.4
Mass dry + tare	256.4	351.4	280.2	259.7	250.1	292.3
Mass water	122.4	21.7	47.5	55.2	77.8	86.1
Mass dry soil	251.9	346.9	275.7	255.2	245.6	287.8
Moisture %	48.6%	6.3%	17.2%	21.6%	31.7%	29.9%

Test Hole	TH14-07	TH14-07	TH14-07	TH14-07		
Depth (m)	1.7 - 1.8	2.0 - 2.1	2.3 - 2.4	3.1 - 3.2		
Sample #	G130	G131	G132	G133		
Tare ID	R113	R114	R115	R116		
Mass of tare	4.5	4.5	4.5	4.5		
Mass wet + tare	373.0	365.0	326.7	357.0		
Mass dry + tare	265.3	248.5	217.4	238.5		
Mass water	107.7	116.5	109.3	118.5		
Mass dry soil	260.8	244.0	212.9	234.0		
Moisture %	41.3%	47.7%	51.3%	50.6%		

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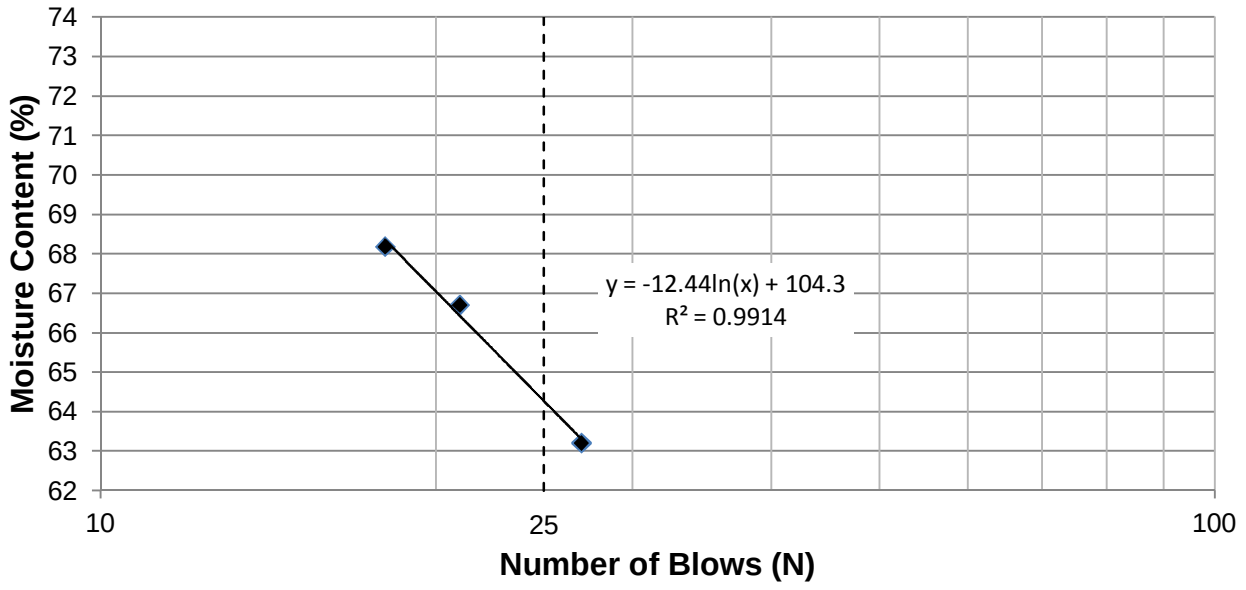
Atterberg Limits
ASTM D4318

Project No.	0035 010 00
Client	Morrison Hershfield
Project	Local Streets Package 14-R-04 Dunrobin Avenue
Test Hole	TH14-01
Sample #	G76
Depth (m)	1.4 - 1.5
Sample Date	15-Jan-14
Test Date	07-Feb-14
Technician	Hachem Ahmed

Liquid Limit	64
Plastic Limit	18
Plasticity Index	47

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	27	21	18		
Mass Wet Soil + Tare (g)	20.418	21.824	19.716		
Mass Dry Soil + Tare (g)	17.913	18.630	17.414		
Mass Tare (g)	13.950	13.842	14.038		
Mass Water (g)	2.505	3.194	2.302		
Mass Dry Soil (g)	3.963	4.788	3.376		
Moisture Content (%)	63.210	66.708	68.187		



Plastic Limit

Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	20.641	20.442			
Mass Dry Soil + Tare (g)	19.663	19.449			
Mass Tare (g)	14.011	13.882			
Mass Water (g)	0.978	0.993			
Mass Dry Soil (g)	5.652	5.567			
Moisture Content (%)	17.304	17.837			

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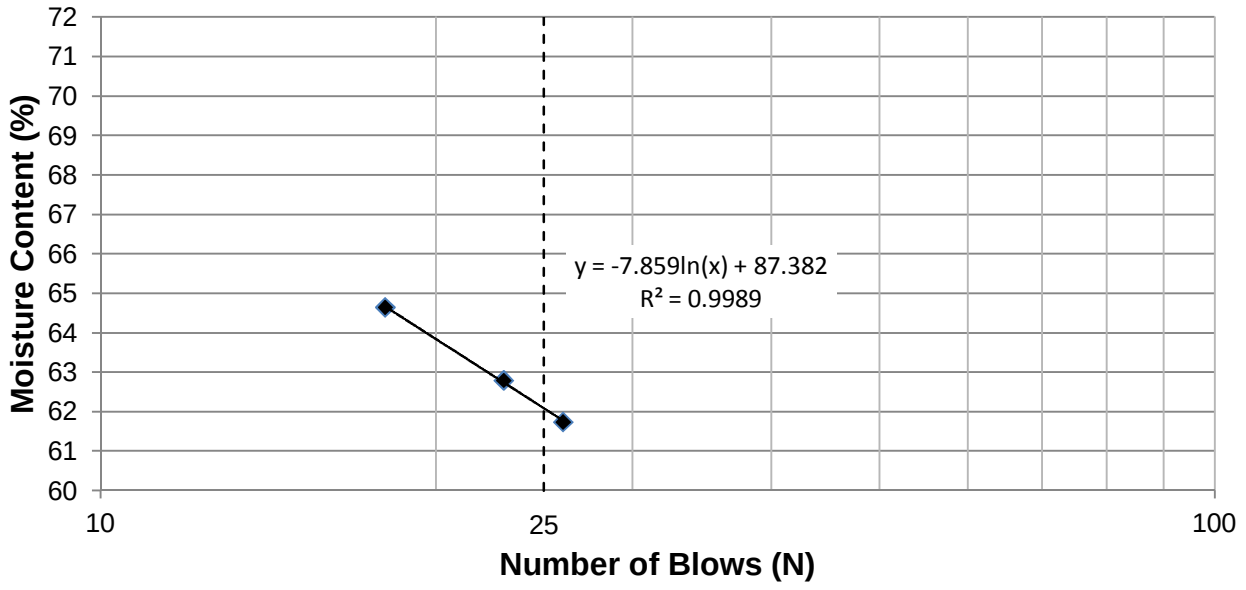
Atterberg Limits
ASTM D4318

Project No.	0035 010 00
Client	Morrison Hershfield
Project	Local Streets Package 14-R-04 Dunrobin Avenue
Test Hole	TH14-04
Sample #	G108
Depth (m)	0.8 - 0.9
Sample Date	15-Jan-14
Test Date	07-Feb-14
Technician	Hachem Ahmed

Liquid Limit	62
Plastic Limit	16
Plasticity Index	46

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	26	23	18		
Mass Wet Soil + Tare (g)	19.685	20.715	20.287		
Mass Dry Soil + Tare (g)	17.600	18.190	17.873		
Mass Tare (g)	14.223	14.169	14.139		
Mass Water (g)	2.085	2.525	2.414		
Mass Dry Soil (g)	3.377	4.021	3.734		
Moisture Content (%)	61.741	62.795	64.649		



Plastic Limit

Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	20.266	20.472			
Mass Dry Soil + Tare (g)	19.409	19.591			
Mass Tare (g)	14.081	14.264			
Mass Water (g)	0.857	0.881			
Mass Dry Soil (g)	5.328	5.327			
Moisture Content (%)	16.085	16.538			

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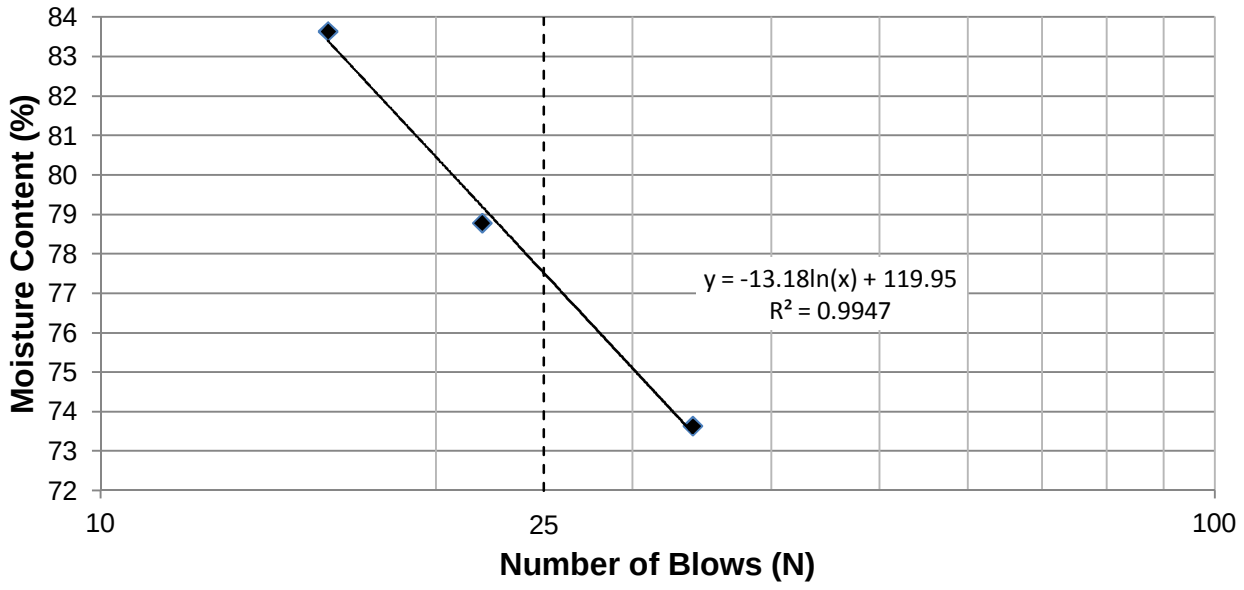
Atterberg Limits
ASTM D4318

Project No.	0035 010 00
Client	Morrison Hershfield
Project	Local Streets Package 14-R-04 Dunrobin Avenue
Test Hole	TH14-07
Sample #	G128
Depth (m)	1.1 - 1.2
Sample Date	15-Jan-14
Test Date	06-Feb-14
Technician	Daniel Mroz

Liquid Limit	78
Plastic Limit	20
Plasticity Index	57

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	34	22	16		
Mass Wet Soil + Tare (g)	23.374	22.368	21.091		
Mass Dry Soil + Tare (g)	19.427	18.640	17.916		
Mass Tare (g)	14.067	13.908	14.120		
Mass Water (g)	3.947	3.728	3.175		
Mass Dry Soil (g)	5.360	4.732	3.796		
Moisture Content (%)	73.638	78.783	83.641		



Plastic Limit

Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	19.960	20.457			
Mass Dry Soil + Tare (g)	18.938	19.363			
Mass Tare (g)	13.922	14.056			
Mass Water (g)	1.022	1.094			
Mass Dry Soil (g)	5.016	5.307			
Moisture Content (%)	20.375	20.614			

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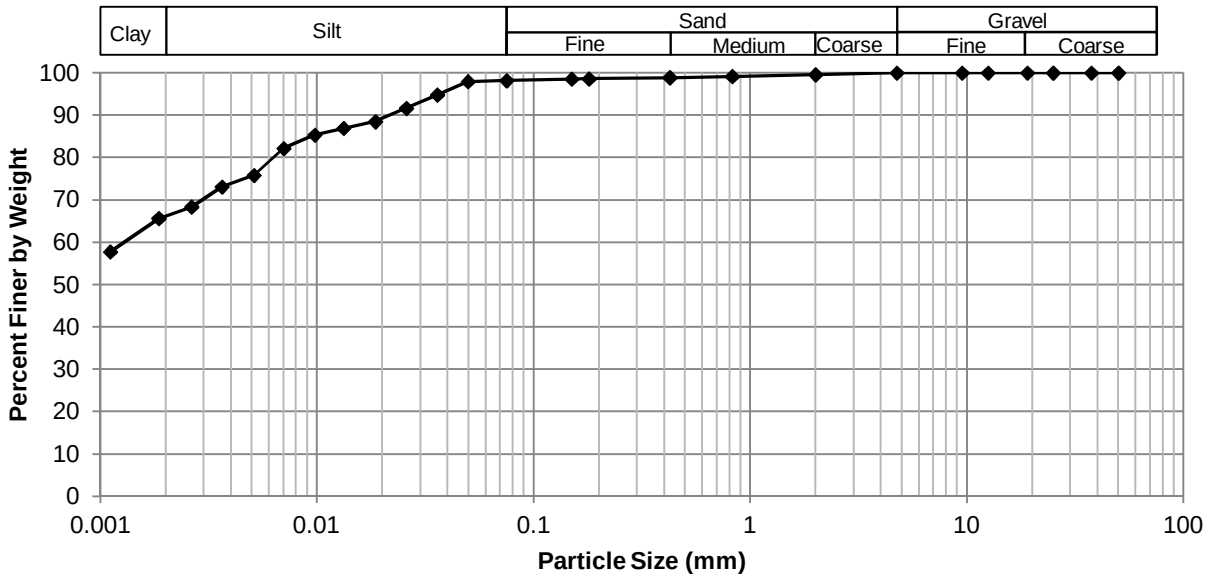
Grain Size Analysis (Hydrometer Method)
ASTM D422

Project No.	0035 010 00
Client	Morrison Hershfield
Project	Local Streets Package 14-R-04 Dunrobin Avenue
Test Hole	TH14-01
Sample #	G76
Depth (m)	1.4 - 1.5
Sample Date	15-Jan-14
Test Date	6-Feb-14
Technician	Daniel Mroz

Gravel	0.0%
Sand	1.8%
Silt	32.0%
Clay	66.1%

Particle Size Distribution Curve



Gravel		Sand		Silt and Clay	
Particle Size (mm)	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**
50.0	100.00	4.75	100.00	0.0750	98.16
37.5	100.00	2.00	99.55	0.0498	97.95
25.0	100.00	0.825	99.16	0.0359	94.79
19.0	100.00	0.425	98.86	0.0258	91.62
12.5	100.00	0.180	98.58	0.0186	88.46
9.50	100.00	0.150	98.53	0.0133	86.88
4.75	100.00	0.075	98.16	0.0098	85.30
				0.0070	82.14
				0.0051	75.81
				0.0036	73.08
				0.0026	68.33
				0.0019	65.63
				0.0011	57.72

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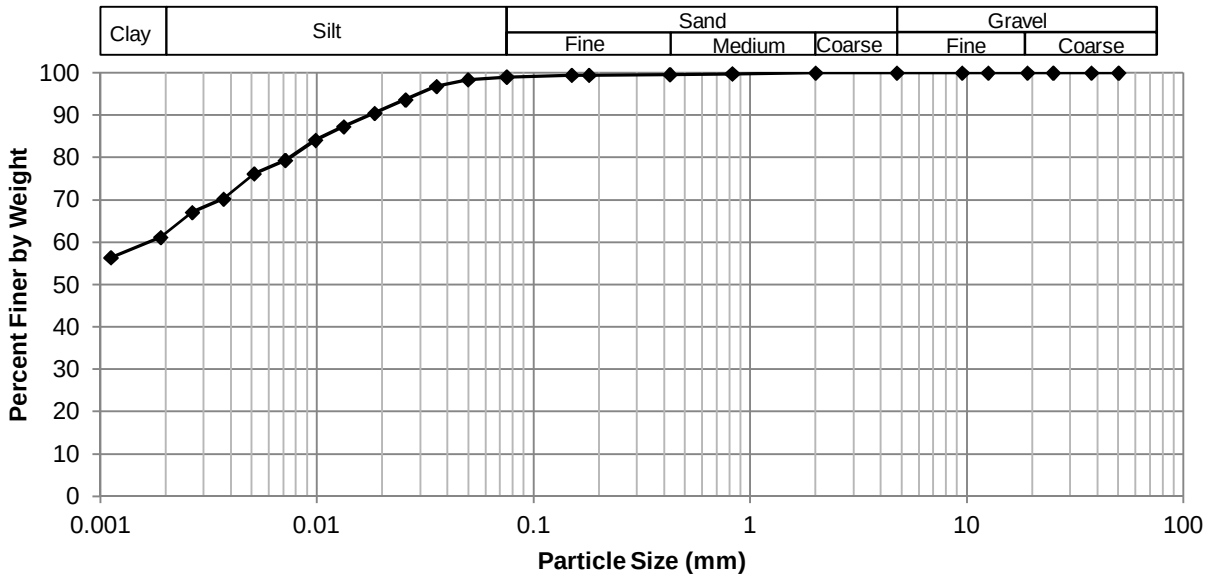
Grain Size Analysis (Hydrometer Method)
ASTM D422

Project No.	0035 010 00
Client	Morrison Hershfield
Project	Local Streets Package 14-R-04 Dunrobin Avenue
Test Hole	TH14-04
Sample #	G108
Depth (m)	0.8 - 0.9
Sample Date	15-Jan-14
Test Date	6-Feb-14
Technician	Daniel Mroz

Gravel	0.0%
Sand	1.0%
Silt	37.1%
Clay	61.9%

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	99.03
37.5	100.00	2.00	99.99	0.0498	98.37
25.0	100.00	0.825	99.77	0.0356	96.79
19.0	100.00	0.425	99.57	0.0256	93.61
12.5	100.00	0.180	99.45	0.0184	90.43
9.50	100.00	0.150	99.41	0.0133	87.26
4.75	100.00	0.075	99.03	0.0098	84.08
				0.0071	79.32
				0.0051	76.14
				0.0037	70.22
				0.0027	67.04
				0.0019	61.15
				0.0011	56.38

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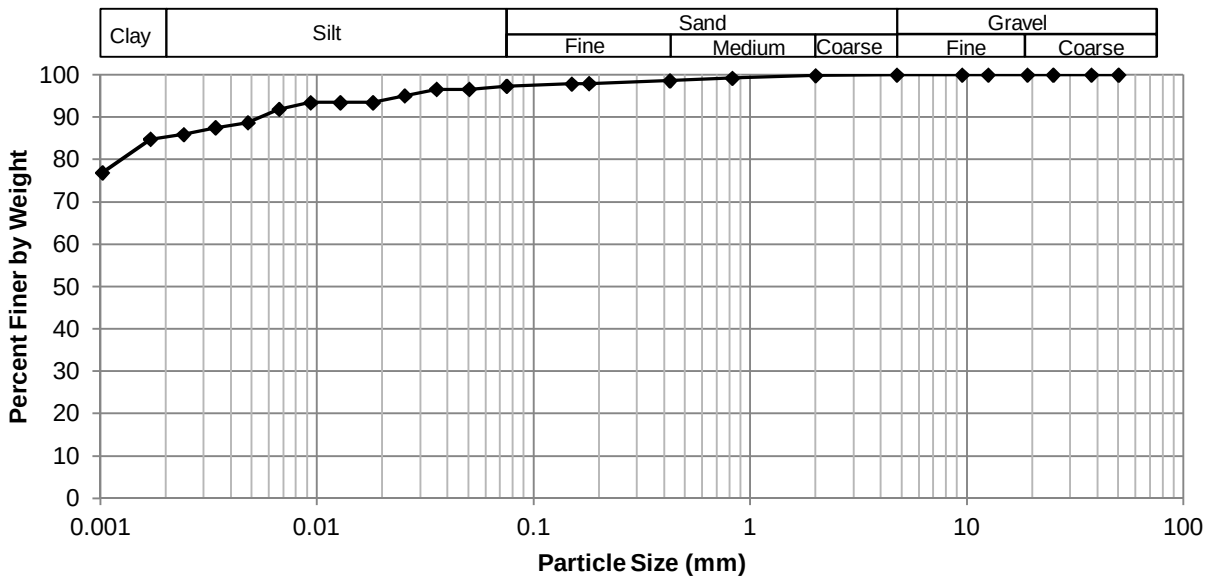
Grain Size Analysis (Hydrometer Method)
ASTM D422

Project No.	0035 010 00
Client	Morrison Hershfield
Project	Local Streets Package 14-R-04 Dunrobin Avenue
Test Hole	TH14-07
Sample #	G128
Depth (m)	1.1 - 1.2
Sample Date	15-Jan-14
Test Date	6-Feb-14
Technician	Daniel Mroz

Gravel	0.0%
Sand	2.7%
Silt	12.0%
Clay	85.3%

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	97.30
37.5	100.00	2.00	99.80	0.0503	96.61
25.0	100.00	0.825	99.21	0.0356	96.61
19.0	100.00	0.425	98.61	0.0254	95.02
12.5	100.00	0.180	97.96	0.0181	93.44
9.50	100.00	0.150	97.85	0.0128	93.44
4.75	100.00	0.075	97.30	0.0094	93.44
				0.0067	91.85
				0.0048	88.68
				0.0034	87.52
				0.0024	85.94
				0.0017	84.81
				0.0010	76.89

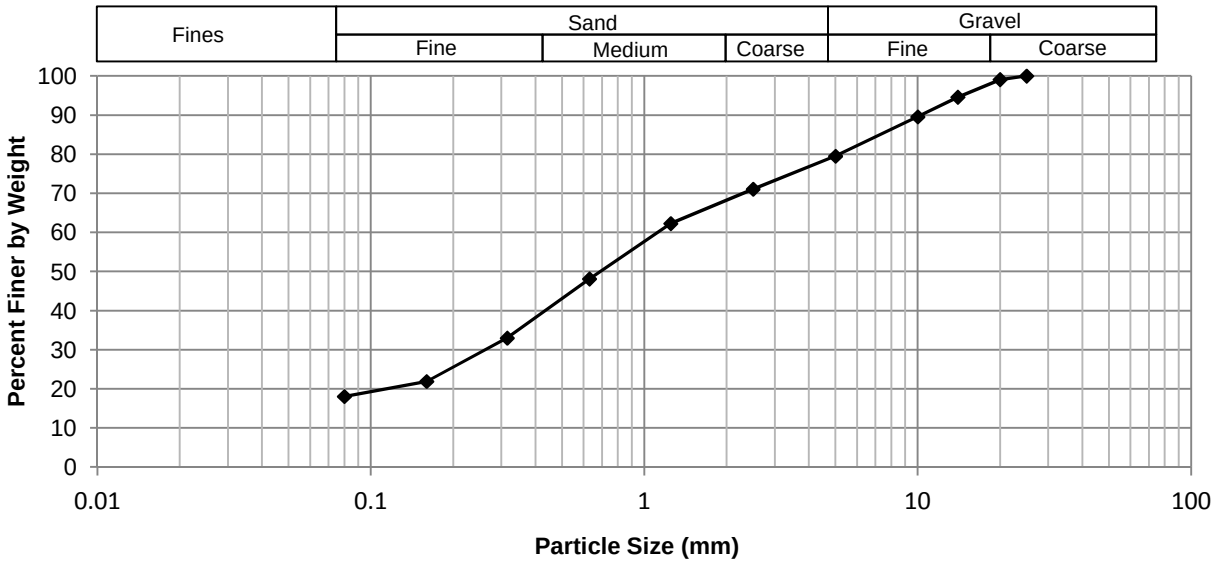
www.trekgeotechnical.ca
1712 St. James Street
Winnipeg, MB R3H 0L3
Tel: 204.975.9433 Fax: 204.975.9435

Grain Size Analysis (Sieve Method)
ASTM C136-06

Project No.	0035 010 00
Client	Morrison Hershfield
Project	Local Streets Package 14-R-04 Dunrobin Avenue
Test Hole	TH14-02
Sample #	G82,G83,G84
Depth (m)	0.2 - 1.2
Soil Desc.	Granular Fill
Date Sampled	15-Jan-14
Date Tested	10-Feb-14
Technician	Daniel Mroz

Total Weight (kg)	2.0
Cobbles %	0.0
Gravel %	20.5
Sand %	61.5
Fines %	18.0

Particle Size Distribution Curve



Sieve Opening (mm)	Percent Passing	Specification (Min - Max)
150		
125		
100		
75.0		
50.0		
37.5		
25.0	100	
20.0	99	
14.0	95	
10.0	90	
5.00	79	
2.50	71	
1.25	62	
0.630	48	
0.315	33	
0.160	22	
0.080	18	

Note: Samples G82, G83, and G84 are a similar material type and were combined in order to achieve a representative sample size.

Appendix B

Harbison Ave. south east of Watt St.

Sub-Surface Log

Test Hole TH14-08
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035 010 00
Project Name:	2014 Local Streets Package (PW File #: 14-R-04)	**Location:**	Harbison Ave. - south east of Watt St.
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, Acker MP8 Truck Mount	**Date Drilled:**	15 January 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
		ASPHALT (40 mm thick)		C08A
		CONCRETE (145 mm thick)		C08B
		CLAY - silty, trace sand, trace gravel, trace organics, trace rootlets, trace oxidation - dark grey to black - frozen to 0.9 m, moist and soft when thawed - high plasticity		G197
0.5		- firm below 0.5 m		G198
				G199
1.0				G200
		SILT - trace organics - light brown - moist to wet, soft - low plasticity		G201
1.5				
		CLAY - silty, trace sand, trace silt inclusions (<5 mm diam.) - mottled brown and grey - moist, firm to stiff - high plasticity		G202
2.0				G203
				G204
2.5				
3.0				

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21
Particle Size (%): 0 20 40 60 80 100
PL MC LL
Undrained Shear Strength (kPa): 0 50 100 150 200 250
Test Type: △ Torvane △ ✪ Pocket Pen. ✪ ☒ Qu ☒ ○ Field Vane ○

END OF TEST HOLE AT 3.2 m in CLAY

Notes:
1. No sloughing or seepage observed.
2. Backfilled test hole with auger cuttings, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
3. Test hole located on Harbison Ave., south east of Watt St., in front of 434 Harbison Ave.

Logged By: Beta Taryana **Reviewed By:** Brent Hay **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG 2014 LOCAL STREET PACKAGE 14-R-04 LOGS.GPJ TREK GEOTECHNICAL.GDT 21/2/14

Sub-Surface Log

Test Hole TH14-09
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035 010 00
Project Name:	2014 Local Streets Package (PW File #: 14-R-04)	**Location:**	Harbison Ave. - south east of Watt St.
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, Acker MP8 Truck Mount	**Date Drilled:**	15 January 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	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL	Undrained Shear Strength (kPa) 0 50 100 150 200 250
		ASPHALT (30 mm thick)		C09A		
		CONCRETE (145 mm thick)		C09B		
		CLAY - silty, trace sand, trace gravel, trace oxidation, trace organics, trace rootlets - black - frozen to 0.9 m, moist and soft when thawed - high plasticity		G188		△
0.5		- firm below 0.5 m		G189		✿△
				G190	PL MC LL	✿△
1.0		- dark grey below 1.1 m		G191		✿
		- grey, very stiff below 1.4 m		G192		✿
1.5		SILT - trace sand, trace oxidation - light brown - moist to wet, firm - low plasticity		G193		
2.0		- soft below 2.0 m		G194		
		- firm below 2.3 m		G195		
2.5		CLAY - silty, trace silt inclusions (<5 mm diam.) - mottled brown and grey - moist, stiff - high plasticity				
3.0				G196		✿△

END OF TEST HOLE AT 3.2 m in CLAY

Notes:
1. No sloughing or seepage observed.
2. Backfilled test hole with auger cuttings, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
3. Test hole located on Harbison Ave., south east of Watt St., in front of 454 Harbison Ave.

Logged By: Beta Taryana **Reviewed By:** Brent Hay **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG 2014 LOCAL STREET PACKAGE 14-R-04 LOGS.GPJ TREK GEOTECHNICAL.GDT 21/2/14

Sub-Surface Log

Test Hole TH14-10
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035 010 00
Project Name:	2014 Local Streets Package (PW File #: 14-R-04)	**Location:**	Harbison Ave. - south east of Watt St.
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, Acker MP8 Truck Mount	**Date Drilled:**	15 January 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	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL	Undrained Shear Strength (kPa) 0 50 100 150 200 250
		ASPHALT (25 mm thick)		C10A		
		CONCRETE (155 mm thick)		C10B		
		CLAY - silty, trace sand, trace gravel, trace organcis, trace oxidation - dark grey to black - frozen to 0.9 m, moist and soft when thawed - high plasticity		G179		
0.5		- firm to stiff below 0.5 m		G180		
				G181		
1.0				G182		
		SILT - trace clay, trace sand - light brown - moist to wet, soft - low plasticity		G183		
1.5				G184		
2.0				G185		
		CLAY - silty, trace silt inclusions (<10 mm diam.) - mottled brown and grey - moist, firm - intermediate plasticity		G186		
2.5						
3.0		- high plasticity below 3.1 m		G187		

END OF TEST HOLE AT 3.2 m in CLAY

Notes:
1. No sloughing or seepage observed.
2. Backfilled test hole with auger cuttings, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
3. Test hole located on Harbison Ave., south east of Watt St., in front of 470 Harbison Ave.

Logged By: Beta Taryana **Reviewed By:** Brent Hay **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG 2014 LOCAL STREET PACKAGE 14-R-04 LOGS.GPJ TREK GEOTECHNICAL.GDT 21/2/14

Sub-Surface Log

Test Hole TH14-11

Client: Morrison Hershfield
Project Number: 0035 010 00
Project Name: 2014 Local Streets Package (PW File #: 14-R-04)
Location: Harbison Ave. - south east of Watt St.
Contractor: Paddock Drilling Ltd.
Ground Elevation: Top of Pavement
Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount
Date Drilled: 15 January 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
		ASPHALT (32 mm thick)		C11A
		CONCRETE (158 mm thick)		C11B
		CLAY - silty, trace sand, trace gravel, trace silt inclusions (<20 mm diam.), trace organics, trace oxidation - dark grey to black - frozen to 0.9 m, moist and soft when thawed, high plasticity		G170
0.5		- firm below 0.5 m		G171
		- stiff to very stiff below 0.8 m		G172
1.0				G173
				G174
1.5				G175
		SILT - trace clay, trace sand - light brown - wet, soft - low plasticity		G176
2.0				G177
		CLAY - silty, trace sand, trace silt inclusions (<10 mm diam.) - mottled brown and grey - moist, firm - high plasticity		
2.5				
3.0				G178

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21
Particle Size (%): 0 20 40 60 80 100
PL MC LL
Undrained Shear Strength (kPa): 0 50 100 150 200 250
Test Type: △ Torvane △ ✪ Pocket Pen. ✪ ☒ Qu ☒ ○ Field Vane ○

END OF TEST HOLE AT 3.2 m in CLAY

Notes:
1. No sloughing or seepage observed.
2. Backfilled test hole with auger cuttings, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
3. Test hole located on Harbison Ave., south east of Watt St., in front of 482 Harbison Ave.

Logged By: Beta Taryana **Reviewed By:** Brent Hay **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG 2014 LOCAL STREET PACKAGE 14-R-04 LOGS.GPJ TREK GEOTECHNICAL.GDT 21/2/14

Sub-Surface Log

Test Hole TH14-12
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035 010 00
Project Name:	2014 Local Streets Package (PW File #: 14-R-04)	**Location:**	Harbison Ave. - south east of Watt St.
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, Acker MP8 Truck Mount	**Date Drilled:**	15 January 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	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL	Undrained Shear Strength (kPa) 0 50 100 150 200 250
		ASPHALT (22 mm thick)		C12A		
		CONCRETE (148 mm thick)		C12B		
		CLAY - silty, trace sand, trace silt inclusions (<20 mm diam.), trace organics - dark grey to black - frozen to 0.9 m, moist and firm to stiff when thawed - high plasticity		G161		
0.5				G162		
				G163		
1.0				G164		
		CLAY and SILT - trace gravel, trace organics - brown - moist, firm - intermediate plasticity		G165		
1.5		CLAY - silty, trace oxidation - brown - moist, stiff - high plasticity		G166		
2.0		SILT - trace clay, trace oxidation - light brown - moist to wet, soft - low plasticity		G167		
				G168		
2.5		CLAY - silty, trace sand - mottled brown and grey - moist, firm - high plasticity				
3.0				G169		

END OF TEST HOLE AT 3.2 m in CLAY

Notes:
1. No sloughing or seepage observed.
2. Backfilled test hole with auger cuttings, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
3. Test hole located on Harbison Ave., south east of Watt St., in front of 498 Harbison Ave.

Logged By: Beta Taryana **Reviewed By:** Brent Hay **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG 2014 LOCAL STREET PACKAGE 14-R-04 LOGS.GPJ TREK GEOTECHNICAL.GDT 21/2/14

Sub-Surface Log

Test Hole TH14-13
1 of 1

Client:	Morrison Hershfield	**Project Number:**	0035 010 00
Project Name:	2014 Local Streets Package (PW File #: 14-R-04)	**Location:**	Harbison Ave. - south east of Watt St.
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, Acker MP8 Truck Mount	**Date Drilled:**	15 January 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
		ASPHALT (43 mm thick)		C13A
		CONCRETE (172 mm thick)		C13B
		CLAY (Fill) - gravelly, silty, trace organics, trace oxidation, black, frozen, moist and soft when thawed, intermediate plasticity		G152
0.5		CLAY - silty, trace sand, trace organics, trace oxidation - dark grey to black - frozen to 0.9 m, moist and firm to stiff when thawed - high plasticity		G153
				G154
1.0				G155
1.5				G156
		SILT - trace sand, trace oxidation - light brown - wet, soft - low plasticity		G157
2.0				G158
		CLAY - silty, trace sand, trace silt inclusions (<10 mm diam.), trace oxidation - mottled brown and grey - moist, firm to stiff - high plasticity		G159
2.5				
3.0		- firm below 3.1 m		G160

Bulk Unit Wt (kN/m³): 16 17 18 19 20 21

Particle Size (%): 0 20 40 60 80 100

PL MC LL: 0 20 40 60 80 100

Undrained Shear Strength (kPa)

Test Type: △ Torvane △ ✿ Pocket Pen. ✿ ☒ Qu ☒ ○ Field Vane ○

0 50 100 150 200 250

END OF TEST HOLE AT 3.2 m in CLAY

Notes:
1. No sloughing or seepage observed.
2. Backfilled test hole with auger cuttings, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
3. Test hole located on Harbison Ave., south east of Watt St., in front of 508 Harbison Ave.

Logged By: Beta Taryana **Reviewed By:** Brent Hay **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG 2014 LOCAL STREET PACKAGE 14-R-04 LOGS.GPJ TREK GEOTECHNICAL.GDT 21/2/14

Sub-Surface Log

Test Hole TH14-14

Client:	Morrison Hershfield	**Project Number:**	0035 010 00
Project Name:	2014 Local Streets Package (PW File #: 14-R-04)	**Location:**	Harbison Ave. - south east of Watt St.
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, Acker MP8 Truck Mount	**Date Drilled:**	15 January 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	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL	Undrained Shear Strength (kPa) 0 50 100 150 200 250
		ASPHALT (23 mm thick)		C14A		
		CONCRETE (132 mm thick)		C14B		
		CLAY - silty, trace sand, trace gravel, trace silt inclusions (<20 mm diam.), trace organics - dark grey to black - frozen to 0.9 m, moist and firm to stiff when thawed - high plasticity		G143	●	
0.5				G144	●	✤
				G145	●	✤ △
1.0				G146	●	✤ △
		SILT - trace clay, trace sand - light brown - moist, soft - low plasticity		G147	●	
1.5		- wet below 1.7 m		G148	●	
2.0		- moist, firm below 2.0 m		G149	●	
		CLAY - silty, trace sand, trace silt inclusions (<10 mm diam.) - mottled brown - moist, stiff - high plasticity		G150	●	✤
2.5						
3.0		- firm to stiff below 3.1 m		G151	●	✤

END OF TEST HOLE AT 3.2 m in CLAY

Notes:
1. No sloughing or seepage observed.
2. Backfilled test hole with auger cuttings, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
3. Test hole located on Harbison Ave., south east of Watt St., in front of 520 Harbison Ave.

Logged By: Beta Taryana **Reviewed By:** Brent Hay **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG 2014 LOCAL STREET PACKAGE 14-R-04 LOGS.GPJ TREK GEOTECHNICAL.GDT 21/2/14

Sub-Surface Log

Test Hole TH14-15

Client:	Morrison Hershfield	**Project Number:**	0035 010 00
Project Name:	2014 Local Streets Package (PW File #: 14-R-04)	**Location:**	Harbison Ave. - south east of Watt St.
Contractor:	Paddock Drilling Ltd.	**Ground Elevation:**	Top of Pavement
Method:	125mm Solid Stem Auger, Acker MP8 Truck Mount	**Date Drilled:**	15 January 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	Bulk Unit Wt (kN/m³) 16 17 18 19 20 21 / Particle Size (%) 0 20 40 60 80 100 / PL MC LL	Undrained Shear Strength (kPa) 0 50 100 150 200 250
		ASPHALT (25 mm thick)		C15A		
		CONCRETE (135 mm thick)		C15B		
		CLAY (Fill) - gravelly, trace oxidation, trace organics, dark grey, frozen, moist and firm when thawed, intermediate plasticity		G134		
0.5		CLAY - some organics, trace sand, trace gravel, trace rootlets - black - frozen to 0.9 m, moist and firm when thawed - high plasticity		G135		
				G136		
1.0				G137		
				G138		
1.5						
		SILT - trace clay, trace organics to 2.0 m - ligth brown - moist, soft - low plasticity		G139		
2.0				G140		
		- wet at 2.3 m		G141		
2.5						
		CLAY - silty - mottled brown and grey - moist, firm to stiff - high plasticity				
3.0				G142		

END OF TEST HOLE AT 3.2 m in CLAY

Notes:
1. No sloughing observed
2. Slight seepage observed at 2.3 m.
3. Backfilled test hole with auger cuttings, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
4. Test hole located on Harbison Ave., south east of Watt St., in front of 532 Harbison Ave.

Logged By: Beta Taryana **Reviewed By:** Brent Hay **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG 2014 LOCAL STREET PACKAGE 14-R-04 LOGS.GPJ TREK GEOTECHNICAL.GDT 21/2/14

2014 Local Streets Package (PW File #: 14-R-04)
Sub-Surface Investigation
Harbison Avenue

Test Hole No.	Test Hole Location	Pavement Surface		Pavement Structure Material		Subgrade Description	Sample Depth (m)		Moisture Content (%)	Grain Size Analysis				Atterberg Limits		
		Type	Thickness (mm)	Type	Thickness (mm)		Top (m)	Bottom (m)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Plastic	Liquid	Plasticity Index
TH14-08	Harbison Ave. south east of Watt St. in front of 434 Harbison Ave.	Asphalt	40	Concrete	145											
						Clay	0.2	0.3	35							
						Clay	0.5	0.6	37							
						Clay	0.8	0.9	34							
						Clay	1.1	1.2	29							
						Silt	1.4	1.5	28							
						Clay	1.7	1.8	34							
						Clay	2.0	2.1	45							
						Clay	2.3	2.4	56							
TH14-09	Harbison Ave. south east of Watt St. in front of 454 Harbison Ave.	Asphalt	30	Concrete	145											
						Clay	0.2	0.3	32							
						Clay	0.5	0.6	39							
						Clay	0.8	0.9	37	0	3	19	78	22	85	64
						Clay	1.1	1.2	33							
						Clay	1.4	1.5	30							
						Silt	1.7	1.8	23							
						Silt	2.0	2.1	23							
						Silt	2.3	2.4	25							
						Clay	3.1	3.2	47							
TH14-10	Harbison Ave. south east of Watt St. in front of 470 Harbison Ave.	Asphalt	25	Concrete	155											
						Clay	0.2	0.3	43							
						Clay	0.5	0.6	33							
						Clay	0.8	0.9	30							
						Clay	1.1	1.2	31							
						Silt	1.4	1.5	29							
						Silt	1.7	1.8	21							
						Silt	2.0	2.1	24							
						Clay	2.3	2.4	26							
						Clay	3.1	3.2	51							
TH14-11	Harbison Ave. south east of Watt St. in front of 482 Harbison Ave.	Asphalt	32	Concrete	158											
						Clay	0.2	0.3	24							
						Clay	0.5	0.6	30							
						Clay	0.8	0.9	32							
						Clay	1.1	1.2	33							
						Clay	1.4	1.5	31							
						Clay	1.7	1.8	25							
						Silt	2.0	2.1	22							
						Clay	2.3	2.4	27							
						Clay	3.1	3.2	45							

2014 Local Streets Package (PW File #: 14-R-04)
Sub-Surface Investigation
Harbison Avenue

Test Hole No.	Test Hole Location	Pavement Surface		Pavement Structure Material		Subgrade Description	Sample Depth (m)		Moisture Content (%)	Grain Size Analysis				Atterberg Limits		
		Type	Thickness (mm)	Type	Thickness (mm)		Top (m)	Bottom (m)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Plastic	Liquid	Plasticity Index
TH14-12	Harbison Ave. south east of Watt St. in front of 498 Harbison Ave.	Asphalt	22	Concrete	148											
						Clay	0.2	0.3	36							
						Clay	0.5	0.6	33							
						Clay	0.8	0.9	30	0	2	20	78	20	78	58
						Clay	1.1	1.2	24							
						Clay and Silt	1.4	1.5	33							
						Clay	1.7	1.8	33							
						Silt	2.0	2.1	25							
						Silt	2.3	2.4	22							
						Clay	3.1	3.2	50							
TH14-13	Harbison Ave. south east of Watt St. in front of 508 Harbison Ave.	Asphalt	43	Concrete	172											
						Clay (Fill)	0.2	0.3	42							
						Clay	0.5	0.6	30							
						Clay	0.8	0.9	31	0	1	22	77	21	75	54
						Clay	1.1	1.2	32							
						Clay	1.4	1.5	31							
						Silt	1.7	1.8	22							
						Silt	2.0	2.1	24							
						Clay	2.3	2.4	24							
						Clay	3.1	3.2	43							
TH14-14	Harbison Ave. south east of Watt St. in front of 520 Harbison Ave.	Asphalt	23	Concrete	132											
						Clay	0.2	0.3	33							
						Clay	0.5	0.6	33							
						Clay	0.8	0.9	33							
						Clay	1.1	1.2	32							
						Silt	1.4	1.5	22	0	3	78	19	18	24	6
						Silt	1.7	1.8	23							
						Silt	2.0	2.1	25							
						Clay	2.3	2.4	41							
						Clay	3.1	3.2	50							
TH14-15	Harbison Ave. south east of Watt St. in front of 532 Harbison Ave.	Asphalt	25	Concrete	135											
						Clay (Fill)	0.2	0.3	24							
						Clay	0.5	0.6	31							
						Clay	0.8	0.9	30							
						Clay	1.1	1.2	31							
						Clay	1.4	1.5	30							
						Silt	1.7	1.8	23							
						Silt	2.0	2.1	26							
						Silt	2.3	2.4	23							
						Clay	3.1	3.2	36							

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Moisture Content Report
ASTM D2216-98

Project No. 0035 010 00
Client Morrison Hershfield
Project Local Streets Package 14-R-04 Harbison Avenue West

Sample Date January 14, 2014
Test Date January 25 to 29, 2014
Technician Jodie Neumann

Harbison	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 #	G197	G198	G199	G200	G201	G202
Tare ID	Z14	E22	N75	N102	N21	Z76
Mass of tare	8.5	8.5	8.3	8.3	8.6	8.4
Mass wet + tare	311.6	341.2	369.8	280.0	332.0	295.1
Mass dry + tare	232.6	251.4	278.4	219.6	260.8	221.7
Mass water	79.0	89.8	91.4	60.4	71.2	73.4
Mass dry soil	224.1	242.9	270.1	211.3	252.2	213.3
Moisture %	35.3%	37.0%	33.8%	28.6%	28.2%	34.4%

Harbison	TH14-08	TH14-08	TH14-09	TH14-09	TH14-09	TH14-09
Depth (m)	2.0 - 2.1	2.3 - 2.4	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2
Sample #	G203	G204	G188	G189	G190	G191
Tare ID	N86	N96	R135	R136	R137	R138
Mass of tare	8.6	8.5	4.5	4.5	4.5	4.5
Mass wet + tare	376.7	374.3	330.2	331.2	329.9	357.7
Mass dry + tare	262.1	242.9	251.2	238.8	242.5	269.8
Mass water	114.6	131.4	79.0	92.4	87.4	87.9
Mass dry soil	253.5	234.4	246.7	234.3	238.0	265.3
Moisture %	45.2%	56.1%	32.0%	39.4%	36.7%	33.1%

Harbison	TH14-09	TH14-09	TH14-09	TH14-09	TH14-09	TH14-10
Depth (m)	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1	2.3 - 2.4	3.1 - 3.2	0.2 - 0.3
Sample #	G192	G193	G194	G195	G196	G179
Tare ID	R139	R140	R141	R142	R143	R126
Mass of tare	4.5	4.5	4.5	4.5	4.5	4.5
Mass wet + tare	401.1	402.7	460.0	472.8	365.4	298.3
Mass dry + tare	309.4	328.0	373.7	380.6	250.0	209.6
Mass water	91.7	74.7	86.3	92.2	115.4	88.7
Mass dry soil	304.9	323.5	369.2	376.1	245.5	205.1
Moisture %	30.1%	23.1%	23.4%	24.5%	47.0%	43.2%

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Moisture Content Report
ASTM D2216-98

Project No. 0035 010 00
Client Morrison Hershfield
Project Local Streets Package 14-R-04 Harbison Avenue West

Sample Date January 14, 2014
Test Date January 25 to 29, 2014
Technician Jodie Neumann

Harbison	TH14-10	TH14-10	TH14-10	TH14-10	TH14-10	TH14-10
Depth (m)	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1
Sample #	G180	G181	G182	G183	G184	G185
Tare ID	R127	R128	R129	R130	R131	R132
Mass of tare	4.5	4.5	4.5	4.5	4.5	4.5
Mass wet + tare	298.9	342.9	354.9	388.7	407.1	395.1
Mass dry + tare	226.6	263.9	271.9	303.2	336.1	319.1
Mass water	72.3	79.0	83.0	85.5	71.0	76.0
Mass dry soil	222.1	259.4	267.4	298.7	331.6	314.6
Moisture %	32.6%	30.5%	31.0%	28.6%	21.4%	24.2%

Harbison	TH14-10	TH14-10	TH14-11	TH14-11	TH14-11	TH14-11
Depth (m)	2.3 - 2.4	3.1 - 3.2	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2
Sample #	G186	G187	G170	G171	G172	G173
Tare ID	R133	R134	E7	N48	A24	W10
Mass of tare	4.5	4.5	8.5	8.9	8.5	8.4
Mass wet + tare	541.0	333.1	232.5	312.8	293.4	298.1
Mass dry + tare	430.0	222.5	188.8	242.1	224.1	225.8
Mass water	111.0	110.6	43.7	70.7	69.3	72.3
Mass dry soil	425.5	218.0	180.3	233.2	215.6	217.4
Moisture %	26.1%	50.7%	24.2%	30.3%	32.1%	33.3%

Harbison	TH14-11	TH14-11	TH14-11	TH14-11	TH14-11	TH14-12
Depth (m)	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1	2.3 - 2.4	3.1 - 3.2	0.2 - 0.3
Sample #	G174	G175	G176	G177	G178	G161
Tare ID	Z61	A32	A22	N13	A106	Z104
Mass of tare	8.4	8.5	8.5	8.4	8.2	8.3
Mass wet + tare	265.3	360.6	332.5	378.7	280.9	290.3
Mass dry + tare	204.4	289.8	273.1	299.9	196.6	216.4
Mass water	60.9	70.8	59.4	78.8	84.3	73.9
Mass dry soil	196.0	281.3	264.6	291.5	188.4	208.1
Moisture %	31.1%	25.2%	22.4%	27.0%	44.7%	35.5%

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Moisture Content Report
ASTM D2216-98

Project No. 0035 010 00
Client Morrison Hershfield
Project Local Streets Package 14-R-04 Harbison Avenue West

Sample Date January 14, 2014
Test Date January 25 to 29, 2014
Technician Jodie Neumann

Harbison	TH14-12	TH14-12	TH14-12	TH14-12	TH14-12	TH14-12
Depth (m)	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1
Sample #	G162	G163	G164	G165	G166	G167
Tare ID	N51	H9	N27	F7	Z85	A100
Mass of tare	8.4	8.5	8.5	8.3	8.3	8.3
Mass wet + tare	347.2	273.1	303.1	294.3	293.1	355.4
Mass dry + tare	262.4	211.4	246.7	224.0	223.0	285.8
Mass water	84.8	61.7	56.4	70.3	70.1	69.6
Mass dry soil	254.0	202.9	238.2	215.7	214.7	277.5
Moisture %	33.4%	30.4%	23.7%	32.6%	32.7%	25.1%

Harbison	TH14-12	TH14-12	TH14-13	TH14-13	TH14-13	TH14-13
Depth (m)	2.3 - 2.4	3.1 - 3.2	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2
Sample #	G168	G169	G152	G153	G154	G155
Tare ID	F81	F39	Z102	C22	A7	W96
Mass of tare	8.3	8.4	8.4	8.4	8	8.5
Mass wet + tare	350.9	308.0	383.0	295.5	348.5	304.0
Mass dry + tare	289.4	208.2	272.8	228.9	267.5	231.9
Mass water	61.5	99.8	110.2	66.6	81.0	72.1
Mass dry soil	281.1	199.8	264.4	220.5	259.5	223.4
Moisture %	21.9%	49.9%	41.7%	30.2%	31.2%	32.3%

Harbison	TH14-13	TH14-13	TH14-13	TH14-13	TH14-13	TH14-14
Depth (m)	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1	2.3 - 2.4	3.1 - 3.2	0.2 - 0.3
Sample #	G156	G157	G158	G159	G160	G143
Tare ID	E51	H70	C18	F129	Z97	F26
Mass of tare	8.4	8.6	8.3	8.4	8.3	209.2
Mass wet + tare	320.3	396.1	346.0	396.2	342.1	346.8
Mass dry + tare	247.2	327.2	280.8	321.0	241.6	312.6
Mass water	73.1	68.9	65.2	75.2	100.5	34.2
Mass dry soil	238.8	318.6	272.5	312.6	233.3	103.4
Moisture %	30.6%	21.6%	23.9%	24.1%	43.1%	33.1%

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Moisture Content Report
ASTM D2216-98

Project No. 0035 010 00
Client Morrison Hershfield
Project Local Streets Package 14-R-04 Harbison Avenue West

Sample Date January 14, 2014
Test Date January 25 to 29, 2014
Technician Jodie Neumann

Harbison	TH14-14	TH14-14	TH14-14	TH14-14	TH14-14	TH14-14
Depth (m)	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1
Sample #	G144	G145	G146	G147	G148	G149
Tare ID	N112	H66	N84	F95	H31	D6
Mass of tare	8.3	8.3	8.4	8.2	8.3	8.2
Mass wet + tare	226.9	292.1	333.2	315.4	387.5	292.6
Mass dry + tare	172.6	221.2	255.1	260.8	316.9	236.4
Mass water	54.3	70.9	78.1	54.6	70.6	56.2
Mass dry soil	164.3	212.9	246.7	252.6	308.6	228.2
Moisture %	33.0%	33.3%	31.7%	21.6%	22.9%	24.6%

Harbison	TH14-14	TH14-14	TH14-15	TH14-15	TH14-15	TH14-15
Depth (m)	2.3 - 2.4	3.1 - 3.2	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2
Sample #	G150	G151	G134	G135	G136	G137
Tare ID	P17	C21	R117	R118	R119	R120
Mass of tare	8.3	8.3	4.5	4.5	4.5	4.5
Mass wet + tare	326.7	280.5	292.5	371.4	347.6	368.6
Mass dry + tare	234.7	189.7	237.4	285.5	268.9	282.7
Mass water	92.0	90.8	55.1	85.9	78.7	85.9
Mass dry soil	226.4	181.4	232.9	281.0	264.4	278.2
Moisture %	40.6%	50.1%	23.7%	30.6%	29.8%	30.9%

Harbison	TH14-15	TH14-15	TH14-15	TH14-15	TH14-15	
Depth (m)	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1	2.3 - 2.4	3.1 - 3.2	
Sample #	G138	G139	G140	G141	G142	
Tare ID	R121	R122	R123	R124	R125	
Mass of tare	4.5	4.5	4.5	4.5	4.5	
Mass wet + tare	422.6	380.2	449.5	395.7	389.8	
Mass dry + tare	326.9	311.0	357.7	323.2	287.1	
Mass water	95.7	69.2	91.8	72.5	102.7	
Mass dry soil	322.4	306.5	353.2	318.7	282.6	
Moisture %	29.7%	22.6%	26.0%	22.7%	36.3%	

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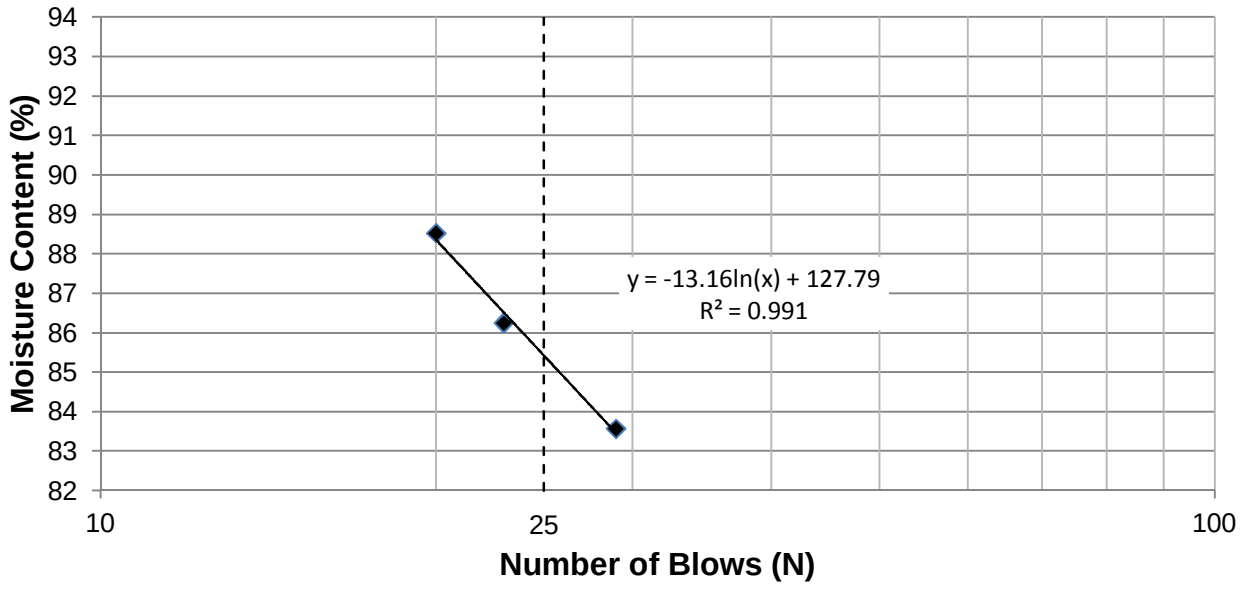
Atterberg Limits
ASTM D4318

Project No.	0035 010 00
Client	Morrison Hershfield
Project	Local Streets Package 14-R-04 Harbison Avenue West
Test Hole	TH14-09
Sample #	G190
Depth (m)	0.8 - 0.9
Sample Date	14-Jan-14
Test Date	07-Feb-14
Technician	Hachem Ahmed

Liquid Limit	85
Plastic Limit	22
Plasticity Index	64

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	29	23	20		
Mass Wet Soil + Tare (g)	20.071	19.956	20.736		
Mass Dry Soil + Tare (g)	17.294	17.265	17.588		
Mass Tare (g)	13.971	14.145	14.032		
Mass Water (g)	2.777	2.691	3.148		
Mass Dry Soil (g)	3.323	3.120	3.556		
Moisture Content (%)	83.569	86.250	88.526		



Plastic Limit

Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	20.129	20.632			
Mass Dry Soil + Tare (g)	19.040	19.466			
Mass Tare (g)	14.070	14.023			
Mass Water (g)	1.089	1.166			
Mass Dry Soil (g)	4.970	5.443			
Moisture Content (%)	21.911	21.422			

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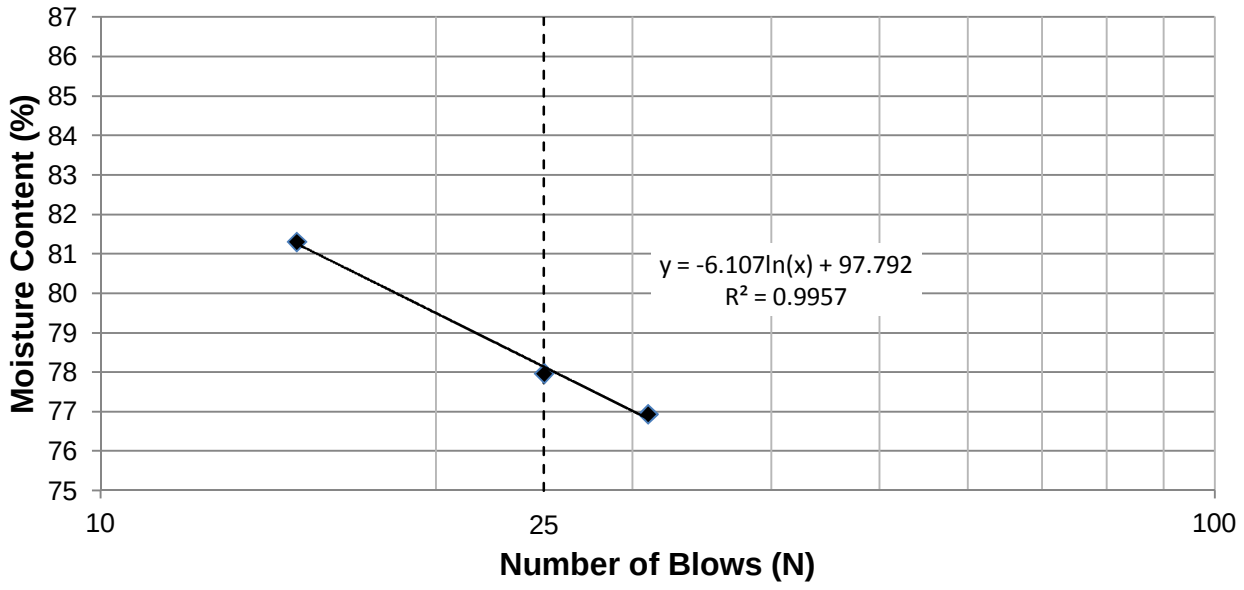
Atterberg Limits
ASTM D4318

Project No.	0035 010 00
Client	Morrison Hershfield
Project	Local Streets Package 14-R-04 Harbison Avenue West
Test Hole	TH14-12
Sample #	G163
Depth (m)	0.8 - 0.9
Sample Date	14-Jan-14
Test Date	06-Feb-14
Technician	Daniel Mroz

Liquid Limit	78
Plastic Limit	20
Plasticity Index	58

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	31	25	15		
Mass Wet Soil + Tare (g)	23.089	22.787	23.103		
Mass Dry Soil + Tare (g)	19.145	19.043	19.067		
Mass Tare (g)	14.019	14.241	14.103		
Mass Water (g)	3.944	3.744	4.036		
Mass Dry Soil (g)	5.126	4.802	4.964		
Moisture Content (%)	76.941	77.968	81.305		



Plastic Limit

Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	20.129	20.464			
Mass Dry Soil + Tare (g)	19.120	19.452			
Mass Tare (g)	14.091	14.270			
Mass Water (g)	1.009	1.012			
Mass Dry Soil (g)	5.029	5.182			
Moisture Content (%)	20.064	19.529			

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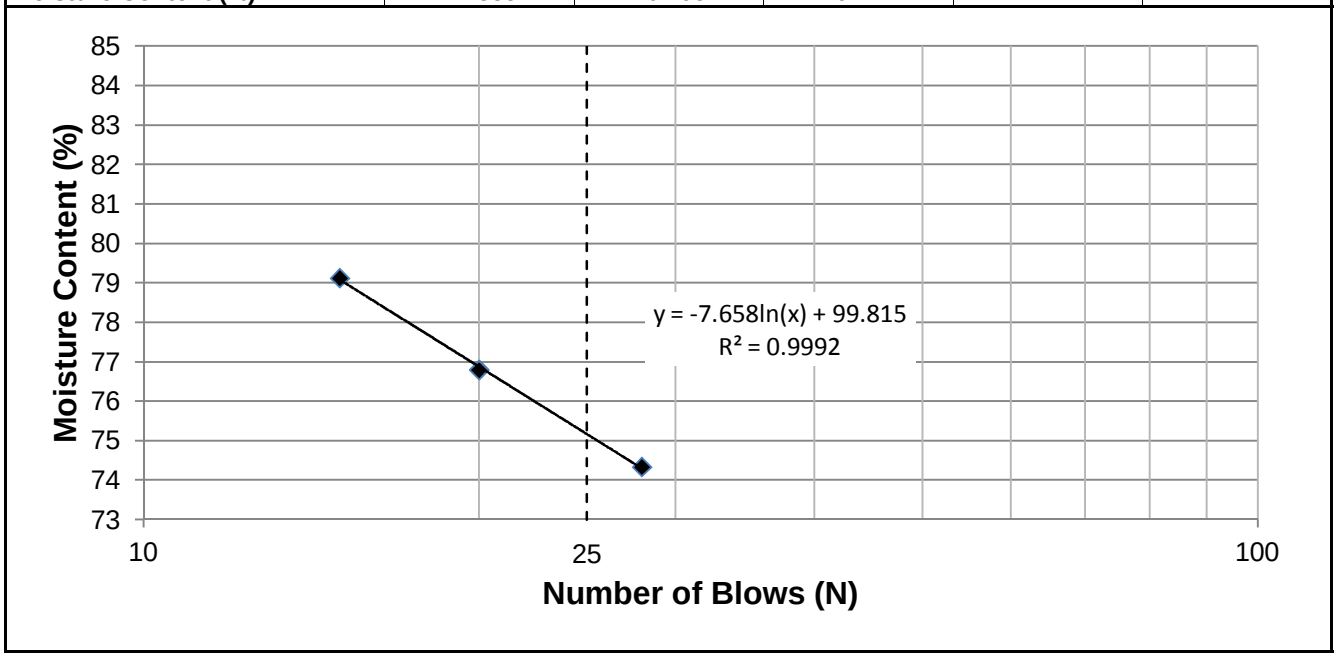
Atterberg Limits
ASTM D4318

Project No.	0035 010 00
Client	Morrison Hershfield
Project	Local Streets Package 14-R-04 Harbison Avenue West
Test Hole	TH14-13
Sample #	G154
Depth (m)	0.8 - 0.9
Sample Date	14-Jan-14
Test Date	06-Feb-14
Technician	Daniel Mroz

Liquid Limit	75
Plastic Limit	21
Plasticity Index	54

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	28	20	15		
Mass Wet Soil + Tare (g)	22.187	24.099	22.637		
Mass Dry Soil + Tare (g)	18.720	19.810	18.730		
Mass Tare (g)	14.056	14.225	13.792		
Mass Water (g)	3.467	4.289	3.907		
Mass Dry Soil (g)	4.664	5.585	4.938		
Moisture Content (%)	74.335	76.795	79.121		



Plastic Limit

Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	20.352	20.234			
Mass Dry Soil + Tare (g)	19.260	19.170			
Mass Tare (g)	14.042	14.068			
Mass Water (g)	1.092	1.064			
Mass Dry Soil (g)	5.218	5.102			
Moisture Content (%)	20.928	20.855			

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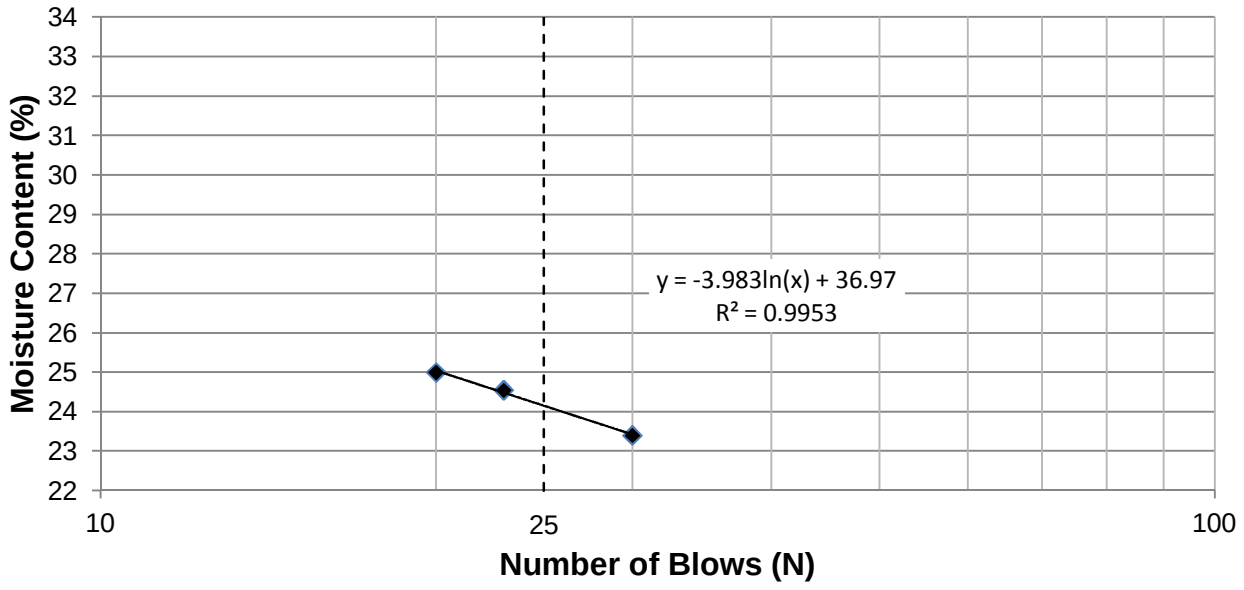
Atterberg Limits
ASTM D4318

Project No.	0035 010 00
Client	Morrison Hershfield
Project	Local Streets Package 14-R-04 Harbison Avenue West
Test Hole	TH14-14
Sample #	G147
Depth (m)	1.4 - 1.5
Sample Date	14-Jan-14
Test Date	07-Feb-14
Technician	Hachem Ahmed

Liquid Limit	24
Plastic Limit	18
Plasticity Index	6

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	30	23	20		
Mass Wet Soil + Tare (g)	22.578	22.078	22.675		
Mass Dry Soil + Tare (g)	20.953	20.509	20.931		
Mass Tare (g)	14.009	14.117	13.954		
Mass Water (g)	1.625	1.569	1.744		
Mass Dry Soil (g)	6.944	6.392	6.977		
Moisture Content (%)	23.401	24.546	24.996		



Plastic Limit

Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	20.311	22.580			
Mass Dry Soil + Tare (g)	19.345	21.272			
Mass Tare (g)	13.921	14.065			
Mass Water (g)	0.966	1.308			
Mass Dry Soil (g)	5.424	7.207			
Moisture Content (%)	17.810	18.149			

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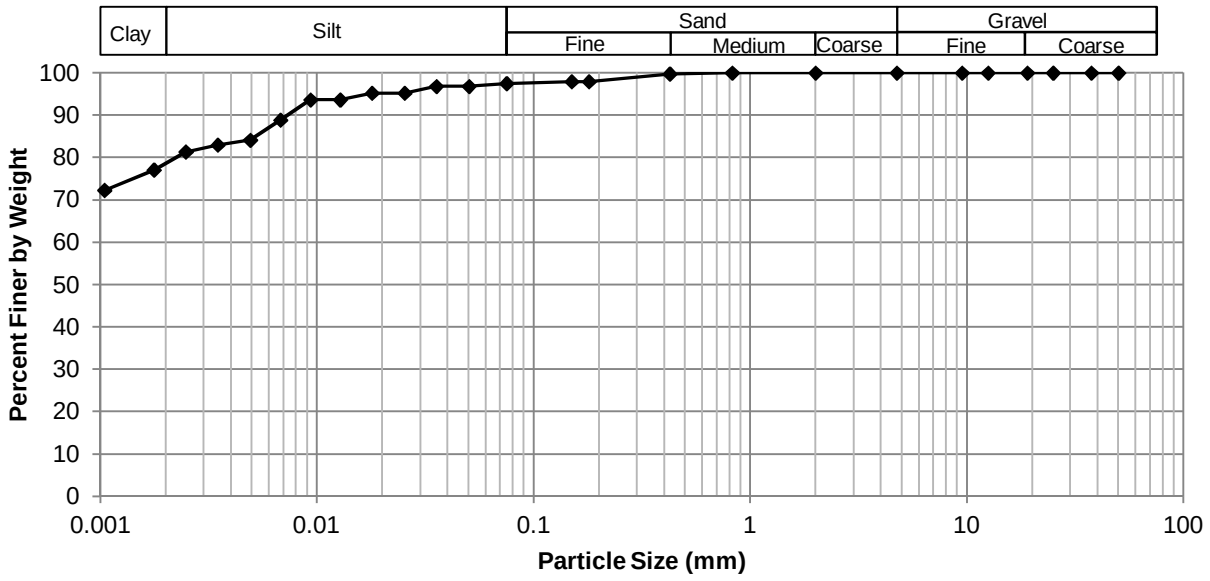
Grain Size Analysis (Hydrometer Method)
ASTM D422

Project No.	0035 010 00
Client	Morrison Hershfield
Project	Local Streets Package 14-R-04 Harbison Avenue West
Test Hole	TH14-09
Sample #	G190
Depth (m)	0.8 - 0.9
Sample Date	14-Jan-14
Test Date	6-Feb-14
Technician	Daniel Mroz

Gravel	0.0%
Sand	2.5%
Silt	19.1%
Clay	78.4%

Particle Size Distribution Curve



Gravel		Sand		Silt and Clay	
Particle Size (mm)	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**
50.0	100.00	4.75	100.00	0.0750	97.48
37.5	100.00	2.00	100.00	0.0503	96.80
25.0	100.00	0.825	99.97	0.0356	96.80
19.0	100.00	0.425	99.73	0.0254	95.21
12.5	100.00	0.180	97.93	0.0179	95.21
9.50	100.00	0.150	97.89	0.0128	93.62
4.75	100.00	0.075	97.48	0.0094	93.62
				0.0068	88.86
				0.0049	84.09
				0.0035	82.93
				0.0025	81.34
				0.0018	77.04
				0.0010	72.27

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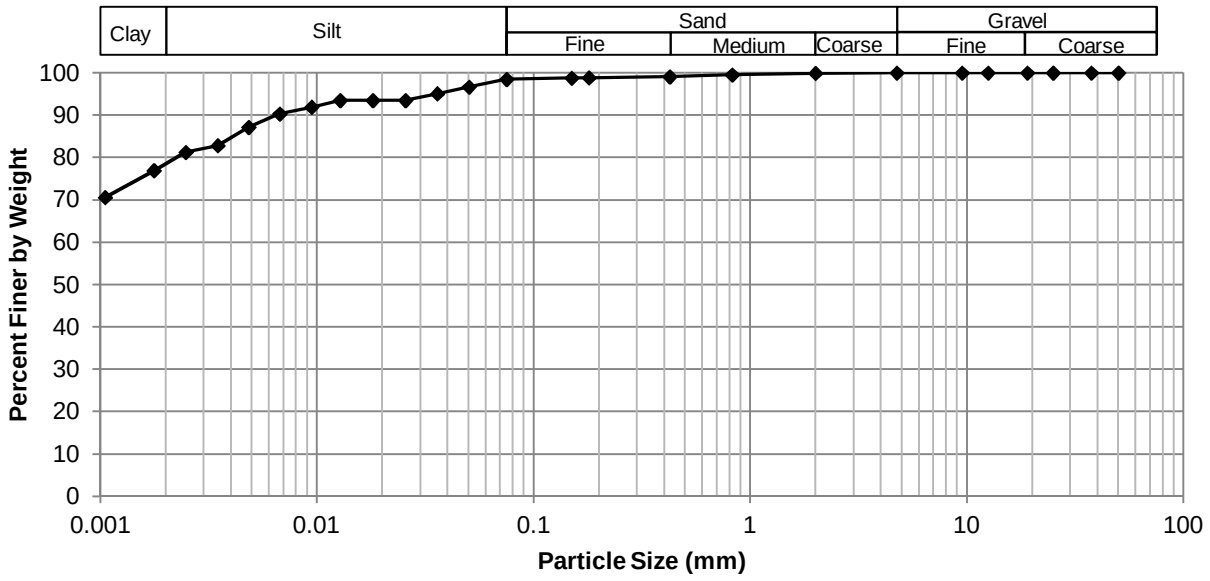
Grain Size Analysis (Hydrometer Method)
ASTM D422

Project No.	0035 010 00
Client	Morrison Hershfield
Project	Local Streets Package 14-R-04 Harbison Avenue West
Test Hole	TH14-12
Sample #	G163
Depth (m)	0.8 - 0.9
Sample Date	14-Jan-14
Test Date	6-Feb-14
Technician	Daniel Mroz

Gravel	0.0%
Sand	1.5%
Silt	20.1%
Clay	78.3%

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	98.45
37.5	100.00	2.00	99.86	0.0503	96.66
25.0	100.00	0.825	99.51	0.0359	95.08
19.0	100.00	0.425	99.05	0.0256	93.49
12.5	100.00	0.180	98.81	0.0181	93.49
9.50	100.00	0.150	98.76	0.0128	93.49
4.75	100.00	0.075	98.45	0.0094	91.90
				0.0067	90.32
				0.0048	87.15
				0.0035	82.81
				0.0025	81.23
				0.0018	76.93
				0.0011	70.59

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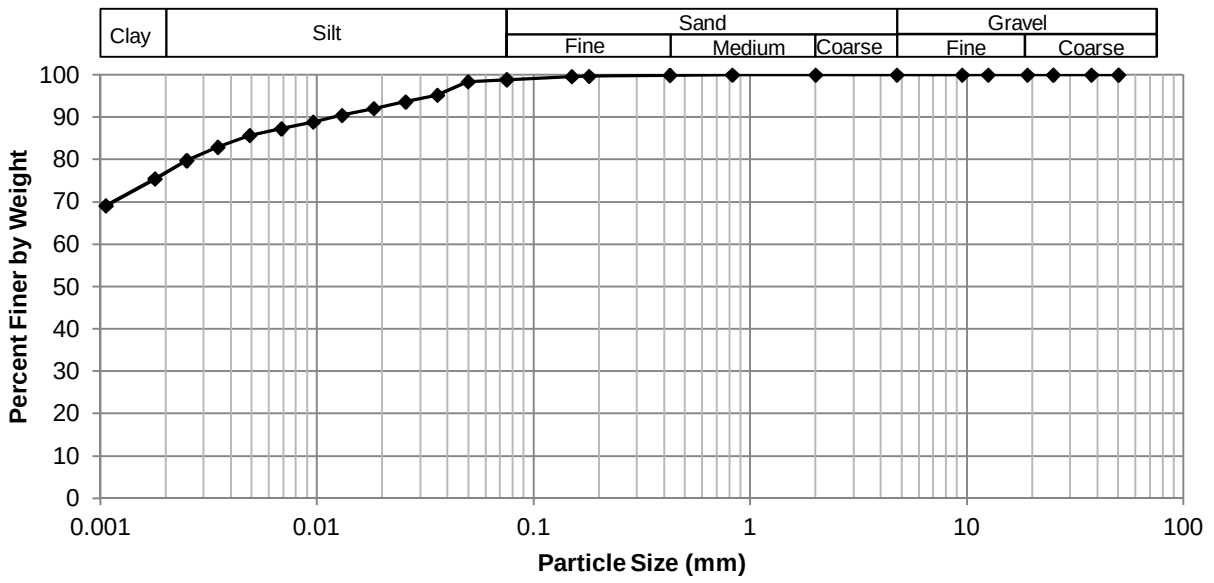
Grain Size Analysis (Hydrometer Method)
ASTM D422

Project No.	0035 010 00
Client	Morrison Hershfield
Project	Local Streets Package 14-R-04 Harbison Avenue West
Test Hole	TH14-13
Sample #	G154
Depth (m)	0.8 - 0.9
Sample Date	14-Jan-14
Test Date	6-Feb-14
Technician	Daniel Mroz

Gravel	0.0%
Sand	1.1%
Silt	22.1%
Clay	76.7%

Particle Size Distribution Curve



Gravel		Sand		Silt and Clay	
Particle Size (mm)	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**
50.0	100.00	4.75	100.00	0.0750	98.87
37.5	100.00	2.00	100.00	0.0498	98.39
25.0	100.00	0.825	99.97	0.0359	95.21
19.0	100.00	0.425	99.88	0.0256	93.62
12.5	100.00	0.180	99.68	0.0183	92.03
9.50	100.00	0.150	99.60	0.0130	90.45
4.75	100.00	0.075	98.87	0.0096	88.86
				0.0068	87.27
				0.0049	85.68
				0.0035	82.93
				0.0025	79.76
				0.0018	75.45
				0.0011	69.10

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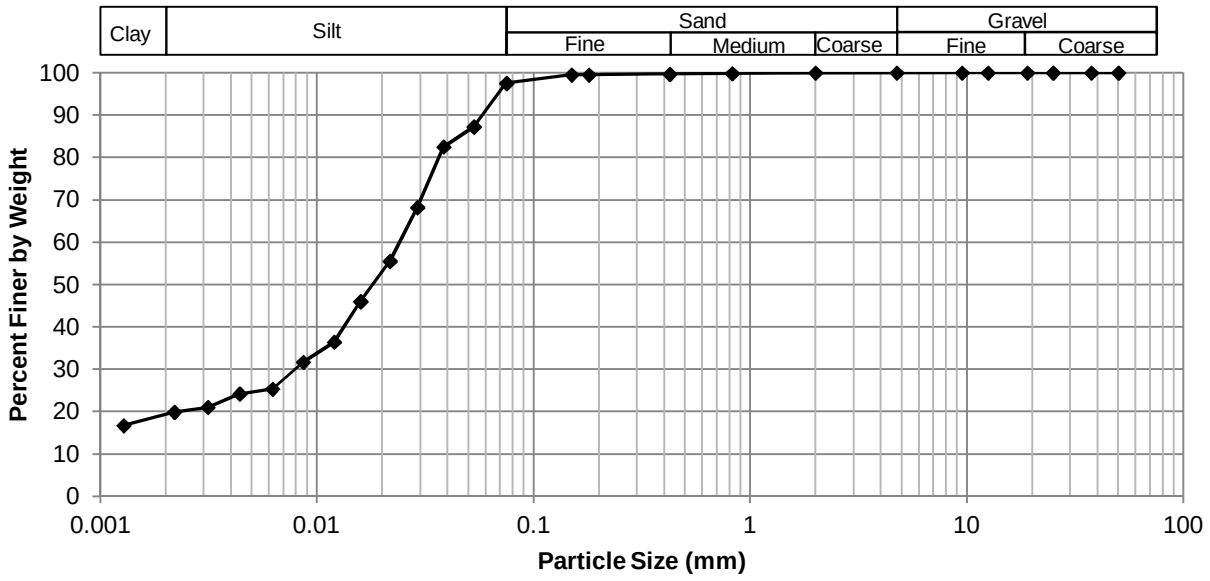
Grain Size Analysis (Hydrometer Method)
ASTM D422

Project No.	0035 010 00
Client	Morrison Hershfield
Project	Local Streets Package 14-R-04 Harbison Avenue West
Test Hole	TH14-14
Sample #	G147
Depth (m)	1.4 - 1.5
Sample Date	14-Jan-14
Test Date	6-Feb-14
Technician	Daniel Mroz

Gravel	0.0%
Sand	2.5%
Silt	78.4%
Clay	19.2%

Particle Size Distribution Curve



Gravel		Sand		Silt and Clay	
Particle Size (mm)	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**	**Particle Size (mm)**	**Percent Passing**
50.0	100.00	4.75	100.00	0.0750	97.52
37.5	100.00	2.00	99.97	0.0530	87.25
25.0	100.00	0.825	99.83	0.0384	82.48
19.0	100.00	0.425	99.68	0.0291	68.19
12.5	100.00	0.180	99.52	0.0217	55.49
9.50	100.00	0.150	99.49	0.0159	45.96
4.75	100.00	0.075	97.52	0.0120	36.44
				0.0086	31.67
				0.0062	25.32
				0.0044	24.16
				0.0031	20.99
				0.0022	19.86
				0.0013	16.68