

APPENDIX 'G'

GEOTECHNICAL REPORTS



Quality Engineering | Valued Relationships

Morrison Hershfield
2014 Local Streets Package (PW File #: 14-R-01)

Prepared for:

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

Distribution:

Ron Bruce, P.Eng.

Project Number:

0035 011 00

Date:

February 21, 2014
Final Report



Quality Engineering | Valued Relationships

February 21, 2014

Our File No. 0035 011 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-01)**

TREK Geotechnical Inc. is pleased to submit our report for the sub-surface investigations for the 2014 Local Streets Package (PW File #: 14-R-01).

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 "Nelson John Ferreira".

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

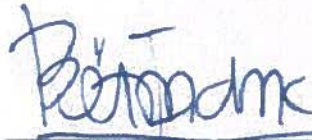
cc: Beta Taryana, E.I.T. (TREK Geotechnical)

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:



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



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- Appendix B Furby St. between Ellice Ave. and Furby Place
- Appendix C Heritage Blvd. between Valley View Dr. and Fieldstone Bay

1.0 Introduction

This report summarizes the results of the sub-surface investigation completed for the 2014 Local Street Package (PW File #: 14-R-01). 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 16 test holes were drilled along Victor St., Furby St., and Heritage Blvd. 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, Figure 02 and Figure 03.

Table 1. List of Test Holes Drilled at Each Location

Street Location	Test Hole
Victor St., between Sargent Ave. and Ellice Ave.	TH14-01, TH14-02, TH14-03, TH14-04, TH14-05, TH14-06, TH14-07 and TH14-08
Furby St., between Ellice Ave. and Furby Place	TH14-09, TH14-10, TH14-11, TH14-12 and TH14-13
Heritage Blvd., between Valey View Dr. and Fieldstone Bay	TH14-14, TH14-15 and TH14-16

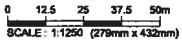
The sub-surface investigation was conducted from January 13 to 14, 2014. The test holes were drilled to a depth of 3.2 m to 3.4 m below road surface. Test holes were drilled by Paddock Drilling Ltd. with an MP8 truck mounted drill rig equipped with 125 mm diameter solid stem augers. The pavement structure (asphalt and/or concrete) was cored by 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 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, Figure 02 and Figure 03 are based on measured distances from the nearest house and/or edge of pavement.

Figures



LEGEND:

◆ TEST HOLE (TREK, 2014)

NOTES:

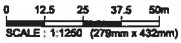
1. IMAGE FROM GOOGLE EARTH ON JUNE 22, 2012 AND MAY 2, 2013


Figure 01
Test Hole Location Plan
Victor Street



FILE NAME: 0035 011 00_RC.dwg
 PLOT: 18022014 5:05:03 PM
 Tabloid (279mm x 432mm)

Image © 2014 DigitalGlobe



LEGEND:
 TEST HOLE (TREK, 2014)

NOTES:
 1. IMAGE FROM GOOGLE EARTH ON JUNE 22, 2012 AND MAY 2, 2013

Figure 02
Test Hole Location Plan
Furby Street



FILE NAME: 0035 011 00_RC.dwg
 PLOT: 19/02/2014 8:09:42 PM
 Tabloid (279mm x 432mm)



0 25 50 75 100m
SCALE: 1:2500 (279mm x 432mm)

LEGEND:
◆ TEST HOLE (TREK, 2014)

NOTES:
1. IMAGE FROM GOOGLE EARTH ON MAY 2, 2013

Figure 03
Test Hole Location Plan
Heritage Boulevard

Appendix A

Victor St. between Sargent Ave. and Ellice Ave.

Client: Morrison Hershfield **Project Number:** 0035 011 00
Project Name: 2014 Local Streets Package (PW File #: 14-R-01) **Location:** Victor St. - between Sargent Ave. and Ellice Ave.
Contractor: Paddock Drilling Ltd. **Ground Elevation:** Top of Pavement
Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount **Date Drilled:** 13 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/m ³)					Undrained Shear Strength (kPa)						
					16	17	18	19	20	21	Test Type					
					Particle Size (%)					△ Torvane △ ⊕ Pocket Pen. ⊕ ⊠ Qu ⊠ ○ Field Vane ○						
					PL MC LL					0 50 100 150 200 250						
		ASPHALT (105 mm thick)		C01												
		CONCRETE (115 mm thick)		C02												
0.5		CLAY - silty, trace sand, trace gravel, trace organics - dark brown to black - frozen to 0.4 m, moist and firm to stiff when thawed - high plasticity - trace silt inclusions (<10 mm diam.) below 0.5 m - dark brown below 0.6 m		G01												⊕△
				G02												⊕△
				G03												⊕△
1.0		SILT - some clay, trace sand, trace organics, trace oxidation - brown - moist, soft - low plasticity - trace clay below 1.4 m - firm below 1.7 m		G04												
				G05												
				G06												
				G07												
2.0		CLAY - silty, trace fine sand - grey - moist, stiff - high plasticity		G08												⊕△
2.5																
3.0																
				G09												△

END OF TEST HOLE AT 3.2 m IN CLAY

Notes:

- No sloughing or seepage observed.
- Backfilled test hole with auger cuttings, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
- Test hole located on southbound Victor St. between Sargent Ave. and Ellice Ave., east side of 690 Sargent Ave.



Sub-Surface Log

Test Hole TH14-02

1 of 1

Client: Morrison Hershfield **Project Number:** 0035 011 00
Project Name: 2014 Local Streets Package (PW File #: 14-R-01) **Location:** Victor St. - between Sargent Ave. and Ellice Ave.
Contractor: Paddock Drilling Ltd. **Ground Elevation:** Top of Pavement
Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount **Date Drilled:** 13 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/m ³)					Undrained Shear Strength (kPa)						
					16	17	18	19	20	21	Test Type					
					Particle Size (%)											
					0	20	40	60	80	100						
					PL MC LL											
					0	20	40	60	80	100	0	50	100	150	200	250
		ASPHALT (100 mm thick)		C03												
		CONCRETE (170 mm thick)		C04												
0.5		CLAY - silty, trace gravel, trace organics, trace oxidation - dark grey - frozen to 0.4 m, moist and firm when thawed - high plasticity	▲	G01												
			▲	G02												
1.0		- brown, soft below 0.9 m	▲	G03												
1.5		SILT - trace clay, trace sand, trace oxidation to 1.5 m - light brown - moist, soft - low plasticity	▲	G04												
			▲	G05												
			▲	G06												
			▲	G07												
2.5		CLAY - silty, trace silt inclusions (<10 mm diam.) - grey - moist, stiff to very stiff - high plasticity	▲	G08												⊕ △
3.0			▲	G09												

END OF TEST HOLE AT 3.3 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 southbound Victor St. between Sargent Ave. and Ellice Ave., in front of 579 Victor St.

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

SUB-SURFACE LOG 2014 LOCAL STREET RENEWALS VICTOR ST. TESTHOLE LOGS.GPJ TREK GEOTECHNICAL.GDT 21/2/14



Sub-Surface Log

Test Hole TH14-03

1 of 1

Client: Morrison Hershfield Project Number: 0035 011 00
 Project Name: 2014 Local Streets Package (PW File #: 14-R-01) Location: Victor St. - between Sargent Ave. and Ellice Ave.
 Contractor: Paddock Drilling Ltd. Ground Elevation: Top of Pavement
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: 13 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/m ³)		Undrained Shear Strength (kPa)
					18	19	
					Particle Size (%)		Test Type
					0	100	△ Torvane △
					PL	MC	⊕ Pocket Pen. ⊕
					0	100	⊠ Qu ⊠
					0	100	○ Field Vane ○
					0	200250	
		ASPHALT (70 mm thick)		C05			
		CONCRETE (150 mm thick)		C06			
0.5		CLAY - silty, trace sand, trace gravel, trace organics - mottled black and brown - frozen to 0.4 m, moist and firm when thawed - high plasticity		G01			
				G02			⊕
1.0		SILT - clayey, trace sand - light brown - moist, soft - low plasticity		G03			
				G04			
				G05			
				G06			
				G07			
2.5		CLAY - silty, trace gravel, trace silt inclusions (<10 mm diam.) - dark grey - moist, stiff - high plasticity		G08			⊕
				G09			

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 northbound Victor St. between Sargent Ave. and Ellice Ave., in front of 563 Victor St.

SUB-SURFACE LOG 2014 LOCAL STREET RENEWALS VICTOR ST. TESTHOLE LOGS.GPJ TREK GEOTECHNICAL.GDT 21/2/14

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



Sub-Surface Log

Test Hole TH14-04

1 of 1

Client: Morrison Hershfield Project Number: 0035 011 00
 Project Name: 2014 Local Streets Package (PW File #: 14-R-01) Location: Victor St. - between Sargent Ave. and Ellice Ave.
 Contractor: Paddock Drilling Ltd. Ground Elevation: Top of Pavement
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: 13 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/m ³)					Undrained Shear Strength (kPa)						
					16	17	18	19	20	21	Test Type					
					Particle Size (%)											
					0	20	40	60	80	100						
					PL MC LL											
					0	20	40	60	80	100	0	50	100	150	200	250
		ASPHALT (55 mm thick)		C07												
		CONCRETE (125 mm thick)		C08												
		CLAY - silty, trace silt inclusions (<5 mm diam.), trace organics - dark grey - frozen, moist and firm when thawed, high plasticity		G01												
0.5		SILT - clayey, trace sand, trace oxidation - light brown - moist, firm - low plasticity		G02												
				G03												
1.0		- trace clay below 1.1 m		G04												
		CLAY - silty, trace silt inclusions (<5 mm diam.) - grey - moist, stiff - high plasticity		G05												
		SILT - trace clay - light brown - moist, soft - low plasticity		G06												
2.0				G07												
		CLAY - silty, trace silt inclusions (<5 mm diam.) - brown - moist, very stiff - high plasticity		G08												
2.5				G09												
3.0																

END OF TEST HOLE AT 3.2 m IN CLAY

Notes:

- No sloughing or seepage observed.
- Backfilled test hole with auger cuttings, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
- Test hole located on northbound Victor St. between Sargent Ave. and Ellice Ave., in front of 547 Victor St.

Logged By: Beta Taryana

Reviewed By: Brent Hay

Project Engineer: Nelson Ferreira

SUB-SURFACE LOG 2014 LOCAL STREET RENEWALS VICTOR ST. TESTHOLE LOGS.GPJ TREK GEOTECHNICAL.GDT 21/2/14

Sub-Surface Log

Test Hole TH14-05

1 of 1

Client: Morrison Hershfield **Project Number:** 0035 011 00
Project Name: 2014 Local Streets Package (PW File #: 14-R-01) **Location:** Victor St. - between Sargent Ave. and Ellice Ave.
Contractor: Paddock Drilling Ltd. **Ground Elevation:** Top of Pavement
Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount **Date Drilled:** 13 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/m ³)		Undrained Shear Strength (kPa)
					16 17 18 19 20 21	Test Type	
					Particle Size (%)		△ Torvane △
					PL MC LL		⊕ Pocket Pen. ⊕
					0 20 40 60 80 100 0		⊠ Qu ⊠
					0 50 100 150 200 250		○ Field Vane ○
0.0 - 0.1	ASPHALT	ASPHALT (108 mm thick)		C09			
0.1 - 0.2	CONCRETE	CONCRETE (118 mm thick)		C10			
0.2 - 0.5	CLAY	CLAY - silty, trace sand, trace rootlets, trace organics - black - frozen to 0.4 m, moist and stiff to very stiff when thawed - high plasticity		G01	●		⊕ △
0.5 - 0.6	CLAY	- brown below 0.6 m		G02	●		
0.6 - 1.1	CLAY	- trace gravel below 1.1 m		G03	●	⊠	
1.1 - 1.7	CLAY	- firm below 1.7 m		G04	●		⊕ △
1.7 - 1.9	CLAY	- light brown below 1.9 m		G05	●		
1.9 - 2.5	SILT	SILT - trace sand - light brown - moist, firm - low plasticity		G06	●		
2.5 - 3.2	CLAY	CLAY - silty, trace sand, trace gravel, trace silt inclusions (<5 mm diam.) - brown - moist, firm - high plasticity		G07	●		
3.2 - 3.2	CLAY	END OF TEST HOLE AT 3.2 m IN CLAY		G08	●		
3.2 - 3.2	CLAY			G09	●		

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 northbound Victor St. between Sargent Ave. and Ellice Ave., in front of 535 Victor St.

SUB-SURFACE LOG - 2014 LOCAL STREET RENEWALS VICTOR ST. TESTHOLE LOGS.GPJ - TREK GEOTECHNICAL.GDT 2/12/14

Client: Morrison Hershfield **Project Number:** 0035 011 00
Project Name: 2014 Local Streets Package (PW File #: 14-R-01) **Location:** Victor St. - between Sargent Ave. and Ellice Ave.
Contractor: Paddock Drilling Ltd. **Ground Elevation:** Top of Pavement
Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount **Date Drilled:** 13 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/m ³)					Undrained Shear Strength (kPa)						
					16	17	18	19	20	21	Test Type					
					Particle Size (%)											
					0	20	40	60	80	100						
					PL MC LL											
					0	20	40	60	80	100	0	50	100	150	200	250
		ASPHALT (50 mm thick)		C11												
		CONCRETE (220 mm thick)		C12												
0.5		CLAY (Fill) - silty, trace sand, trace gravel, trace silt inclusions (<5 mm diam.), trace rootlets - black - frozen to 0.4 m, moist and firm to stiff when thawed - high plasticity	Grab (G)	G01												
		- mottled grey and brown below 0.9 m	Grab (G)	G02												
1.0			Grab (G)	G03												
1.5		- brown below 1.5 m	Grab (G)	G04												
		- some sand, some gravel, mottled brown and grey below 1.8 m	Grab (G)	G05												
			Grab (G)	G06												
			Grab (G)	G07												
2.5		CLAY - silty, trace sand, trace gravel, trace silt inclusions (<5 mm diam.) - brown - moist, firm to stiff - high plasticity	Grab (G)	G08												
3.0			Grab (G)	G09												

END OF TEST HOLE AT 3.3 m IN CLAY

Notes:

- No sloughing or seepage observed.
- Backfilled test hole with auger cuttings, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
- Test hole located on northbound Victor St. between Sargent Ave. and Ellice Ave., in front of 521 Victor St.



Sub-Surface Log

Test Hole TH14-07

1 of 1

Client: Morrison Hershfield **Project Number:** 0035 011 00
Project Name: 2014 Local Streets Package (PW File #: 14-R-01) **Location:** Victor St. - between Sargent Ave. and Ellice Ave.
Contractor: Paddock Drilling Ltd. **Ground Elevation:** Top of Pavement
Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount **Date Drilled:** 13 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/m ³)					Undrained Shear Strength (kPa)				
					16	17	18	19	20	21	Test Type			
					Particle Size (%)					△ Torvane △ ⊕ Pocket Pen. ⊕ ⊠ Qu ⊠ ○ Field Vane ○				
					PL MC LL 0 20 40 60 80 100 0					50 100 150 200 250				
0.0 - 0.05		ASPHALT (45 mm thick)		C13										
0.05 - 0.1		CONCRETE (130 mm thick)		C14										
0.1 - 0.8		CLAY - silty, trace sand, trace gravel, trace silt inclusions (<5 mm diam.), trace organics to 0.8 m - black - frozen to 0.4 m, moist and stiff to very stiff when thawed - high plasticity	▲	G01		●								
0.5			▲	G02		●						⊕	△	
0.8			▲	G03		●								
1.0			▲	G04		●								
1.5			▲	G05		●						⊕	△	
2.0		- trace silt inclusions (<10 mm diam.) below 1.7 m	▲	G06		●								
2.5			▲	G07		●								
3.0			▲	G08		●						⊕	△	
3.2			▲	G09		●								

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 Victor St. between Sargent Ave. and Ellice Ave., center line of road in between 499 and 497 Victor St.

SUB-SURFACE LOG 2014 LOCAL STREET RENEWALS VICTOR ST. TESTHOLE LOGS.GPJ TREK GEOTECHNICAL.GDT 21/2/14

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



Sub-Surface Log

Test Hole TH14-08

1 of 1

Client: Morrison Hershfield **Project Number:** 0035 011 00
Project Name: 2014 Local Streets Package (PW File #: 14-R-01) **Location:** Victor St. - between Sargent Ave. and Ellice Ave.
Contractor: Paddock Drilling Ltd. **Ground Elevation:** Top of Pavement
Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount **Date Drilled:** 13 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/m ³)		Undrained Shear Strength (kPa)
					18	19	
					Particle Size (%)		Test Type
					0	20	<input type="checkbox"/> Torvane <input type="checkbox"/> <input checked="" type="checkbox"/> Pocket Pen. <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Qu <input checked="" type="checkbox"/> <input type="checkbox"/> Field Vane <input type="checkbox"/>
					0	20	50
					PL	MC	LL
					0	20	40
					0	20	40
		ASPHALT (115 mm thick)		C15			
		CONCRETE (95 mm thick)		C16			
		CLAY - silty, trace gravel - mottled black and dark brown - frozen to 0.4 m, moist and firm to stiff when thawed - high plasticity - dark grey below 0.5 m		G01	●		
-0.5				G02	●		⊕△
-1.0				G03	●		
-1.5				G04	●		
-2.0				G05	●		
-2.5				G06	●		⊕△
-3.0				G07	●		
		- brown below 2.3 m		G08	●		⊕△
				G09	●		

END OF TEST HOLE AT 3.2 m IN CLAY

- Notes:
- No sloughing or seepage observed.
 - Backfilled test hole with auger cuttings, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
 - Test hole located on Victor St. between Sargent Ave. and Ellice Ave., center line of road in front of 483 Victor St.

SUB-SURFACE LOG 2014 LOCAL STREET RENEWALS VICTOR ST. TESTHOLE LOGS.GPJ TREK GEOTECHNICAL.GDT 21/2/14

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



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**Moisture Content Report
 ASTM D2216-98**

Project No. 0035 011 00
Client Morrison Hershfield
Project Local Streets Package 14-R-01 Victor Street

Sample Date 12-Jan-14
Test Date 20-Jan-14
Technician Hachem Ahmed

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 #	G1	G2	G3	G4	G5	G6
Tare ID	C8	E4	E89	F56	P29	W107
Mass of tare	8.2	8.4	8.5	8.3	8.3	8.4
Mass wet + tare	138.6	180.6	249.0	273.9	185.8	168.8
Mass dry + tare	104.3	147.3	195.9	214.0	156.2	143.2
Mass water	34.3	33.3	53.1	59.9	29.6	25.6
Mass dry soil	96.1	138.9	187.4	205.7	147.9	134.8
Moisture %	35.7%	24.0%	28.3%	29.1%	20.0%	19.0%

Test Pit	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	0.3 - 0.4	0.6 - 0.7	0.9 - 1.0
Sample #	G7	G8	G9	G1	G2	G3
Tare ID	E143	E52	Z-87	C2	E125	F90
Mass of tare	8.4	8.4	8.3	8.3	8.3	8.3
Mass wet + tare	202.2	270.1	256.1	223.2	215.7	229.2
Mass dry + tare	167.3	208.2	196.6	176.9	171.6	178.5
Mass water	34.9	61.9	59.5	46.3	44.1	50.7
Mass dry soil	158.9	199.8	188.3	168.6	163.3	170.2
Moisture %	22.0%	31.0%	31.6%	27.5%	27.0%	29.8%

Test Pit	TH14-02	TH14-02	TH14-02	TH14-02	TH14-02	TH14-02
Depth (m)	1.2 - 1.3	1.5 - 1.6	1.8 - 1.9	2.1 - 2.2	2.4 - 2.5	3.2 - 3.3
Sample #	G4	G5	G6	G7	G8	G9
Tare ID	D21	H5	P36	W05	Z96	K36
Mass of tare	8.4	8.3	8.5	8.3	8.3	8.3
Mass wet + tare	300.8	247.8	286.7	265.2	267.5	251.3
Mass dry + tare	249.7	209.1	246.3	219.4	199.9	195.5
Mass water	51.1	38.7	40.4	45.8	67.6	55.8
Mass dry soil	241.3	200.8	237.8	211.1	191.6	187.2
Moisture %	21.2%	19.3%	17.0%	21.7%	35.3%	29.8%



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**Moisture Content Report
 ASTM D2216-98**

Project No. 0035 011 00
Client Morrison Hershfield
Project Local Streets Package 14-R-01 Victor Street

Sample Date 12-Jan-14
Test Date 20-Jan-14
Technician Hachem Ahmed

Test Pit	TH14-03	TH14-03	TH14-03	TH14-03	TH14-03	TH14-03
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 #	G1	G2	G3	G4	G5	G6
Tare ID	F4	E88	E98	D17	A14	H37
Mass of tare	8.5	8.5	8.5	8.4	8.3	8.3
Mass wet + tare	235.7	255.0	252.5	247.4	352.7	274.9
Mass dry + tare	184.4	200.2	198.7	205.7	294.1	225.5
Mass water	51.3	54.8	53.8	41.7	58.6	49.4
Mass dry soil	175.9	191.7	190.2	197.3	285.8	217.2
Moisture %	29.2%	28.6%	28.3%	21.1%	20.5%	22.7%

Test Pit	TH14-03	TH14-03	TH14-03	TH14-04	TH14-04	TH14-04
Depth (m)	2.0 - 2.1	2.3 - 2.4	3.1 - 3.2	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2
Sample #	G7	G8	G9	G2	G3	G4
Tare ID	W70	Z04	E128	W29	D32	K24
Mass of tare	8.4	8.4	8.3	8.3	8.4	8.4
Mass wet + tare	250.2	265.6	265.1	253.9	221.4	198.7
Mass dry + tare	207.1	190.7	199.1	194.1	178.1	167.1
Mass water	43.1	74.9	66.0	59.8	43.3	31.6
Mass dry soil	198.7	182.3	190.8	185.8	169.7	158.7
Moisture %	21.7%	41.1%	34.6%	32.2%	25.5%	19.9%

Test Pit	TH14-04	TH14-04	TH14-04	TH14-04	TH14-05	TH14-05
Depth (m)	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1	2.3 - 2.4	0.2 - 0.3	0.5 - 0.6
Sample #	G5	G6	G7	G8	G1	G2
Tare ID	H60	H79	Z12	C3	A30	P06
Mass of tare	8.4	8.4	8.5	8.5	8.3	8.4
Mass wet + tare	245.1	246.8	277.5	217.9	166.9	209.4
Mass dry + tare	179.5	200.4	228.0	167.1	133.1	171.4
Mass water	65.6	46.4	49.5	50.8	33.8	38.0
Mass dry soil	171.1	192.0	219.5	158.6	124.8	163.0
Moisture %	38.3%	24.2%	22.6%	32.0%	27.1%	23.3%



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Moisture Content Report ASTM D2216-98

Project No. 0035 011 00
Client Morrison Hershfield
Project Local Streets Package 14-R-01 Victor Street

Sample Date 12-Jan-14
Test Date 20-Jan-14
Technician Hachem Ahmed

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	2.3 - 2.4
Sample #	G3	G4	G5	G6	G7	G8
Tare ID	F20	H17	P33	Z79	H90	Z125
Mass of tare	8.3	8.4	8.4	8.7	8.4	8.3
Mass wet + tare	229.4	161.3	200.1	313.2	240.4	284.3
Mass dry + tare	186.6	131.2	158.8	249.0	193.7	240.0
Mass water	42.8	30.1	41.3	64.2	46.7	44.3
Mass dry soil	178.3	122.8	150.4	240.3	185.3	231.7
Moisture %	24.0%	24.5%	27.5%	26.7%	25.2%	19.1%

Test Pit	TH14-05	TH14-06	TH14-06	TH14-06	TH14-06	TH14-06
Depth (m)	3.1 - 3.2	0.3 - 0.4	0.6 - 0.7	0.9 - 1.0	1.2 - 1.3	1.5 - 1.6
Sample #	G9	G1	G2	G3	G4	G5
Tare ID	W75	W35	E107	W21	E45	P11
Mass of tare	8.3	8.4	8.5	8.4	8.5	8.3
Mass wet + tare	235.1	228.8	197.9	263.8	260.9	174.4
Mass dry + tare	190.3	175.9	160.0	221.9	212.1	143.8
Mass water	44.8	52.9	37.9	41.9	48.8	30.6
Mass dry soil	182.0	167.5	151.5	213.5	203.6	135.5
Moisture %	24.6%	31.6%	25.0%	19.6%	24.0%	22.6%

Test Pit	TH14-06	TH14-06	TH14-06	TH14-06	TH14-07	TH14-07
Depth (m)	1.8 - 1.9	2.1 - 2.2	2.4 - 2.5	3.2 - 3.3	0.2 - 0.3	0.5 - 0.6
Sample #	G6	G7	G8	G9	G1	G2
Tare ID	E92	R150	W69	E59	A21	C19
Mass of tare	8.4	4.5	8.3	8.4	8.5	8.3
Mass wet + tare	248.2	288.5	175.4	241.8	197.8	218.9
Mass dry + tare	212.1	242.2	151.2	176.2	151.7	172.1
Mass water	36.1	46.3	24.2	65.6	46.1	46.8
Mass dry soil	203.7	237.7	142.9	167.8	143.2	163.8
Moisture %	17.7%	19.5%	16.9%	39.1%	32.2%	28.6%



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**Moisture Content Report
 ASTM D2216-98**

Project No. 0035 011 00
Client Morrison Hershfield
Project Local Streets Package 14-R-01 Victor Street

Sample Date 12-Jan-14
Test Date 20-Jan-14
Technician Hachem Ahmed

Test Pit	TH14-07	TH14-07	TH14-07	TH14-07	TH14-07	TH14-07
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 #	G3	G4	G5	G6	G7	G8
Tare ID	Z13	Z86	F1	A108	K6	K26
Mass of tare	8.5	8.3	8.5	8.6	8.5	8.7
Mass wet + tare	302.5	266.5	265.6	238.9	247.4	243.1
Mass dry + tare	241.1	212.0	210.2	189.6	198.1	177.4
Mass water	61.4	54.5	55.4	49.3	49.3	65.7
Mass dry soil	232.6	203.7	201.7	181.0	189.6	168.7
Moisture %	26.4%	26.8%	27.5%	27.2%	26.0%	38.9%

Test Pit	TH14-07	TH14-08	TH14-08	TH14-08	TH14-08	TH14-08
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 #	G9	G1	G2	G3	G4	G5
Tare ID	E32	HA	F120	E41	A38	N49
Mass of tare	8.4	376.7	8.2	8.4	8.2	8.3
Mass wet + tare	249.1	1099.6	343.8	295.0	234.6	429.5
Mass dry + tare	180.6	996.8	275.3	239.5	186.2	337.8
Mass water	68.5	102.8	68.5	55.5	48.4	91.7
Mass dry soil	172.2	620.1	267.1	231.1	178.0	329.5
Moisture %	39.8%	16.6%	25.6%	24.0%	27.2%	27.8%

Test Pit	TH14-08	TH14-08	TH14-08	TH14-08		
Depth (m)	1.7 - 1.8	2.0 - 2.1	2.3 - 2.4	3.1 - 3.2		
Sample #	G6	G7	G8	G9		
Tare ID	E28	Z10	Z70	P18		
Mass of tare	8.4	8.2	8.4	8.4		
Mass wet + tare	282.3	394.7	258.2	249.2		
Mass dry + tare	224.9	309.2	210.8	196.3		
Mass water	57.4	85.5	47.4	52.9		
Mass dry soil	216.5	301.0	202.4	187.9		
Moisture %	26.5%	28.4%	23.4%	28.2%		



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 ASTM D4318**

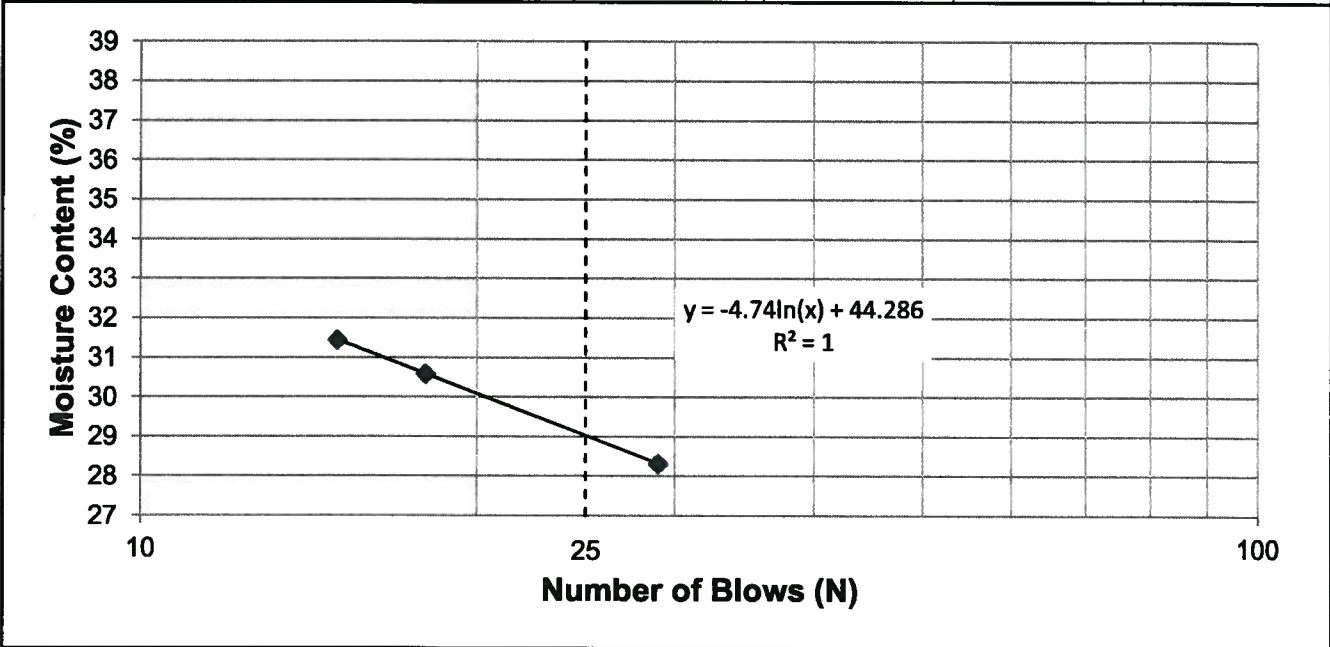
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Client Morrison Hershfield
Project Local Streets Package 14-R-01 Victor Street

Test Hole TH14-03
Sample # G3
Depth (m) 0.8 - 0.9
Sample Date 12-Jan-14
Test Date 11-Feb-14
Technician Daniel Mroz

Liquid Limit	29
Plastic Limit	16
Plasticity Index	13

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	29	18	15		
Mass Wet Soil + Tare (g)	24.553	23.042	22.752		
Mass Dry Soil + Tare (g)	22.282	20.938	20.622		
Mass Tare (g)	14.264	14.059	13.849		
Mass Water (g)	2.271	2.104	2.130		
Mass Dry Soil (g)	8.018	6.879	6.773		
Moisture Content (%)	28.324	30.586	31.448		



Plastic Limit

Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	20.151	20.004			
Mass Dry Soil + Tare (g)	19.326	19.185			
Mass Tare (g)	14.066	13.924			
Mass Water (g)	0.825	0.819			
Mass Dry Soil (g)	5.260	5.261			
Moisture Content (%)	15.684	15.567			



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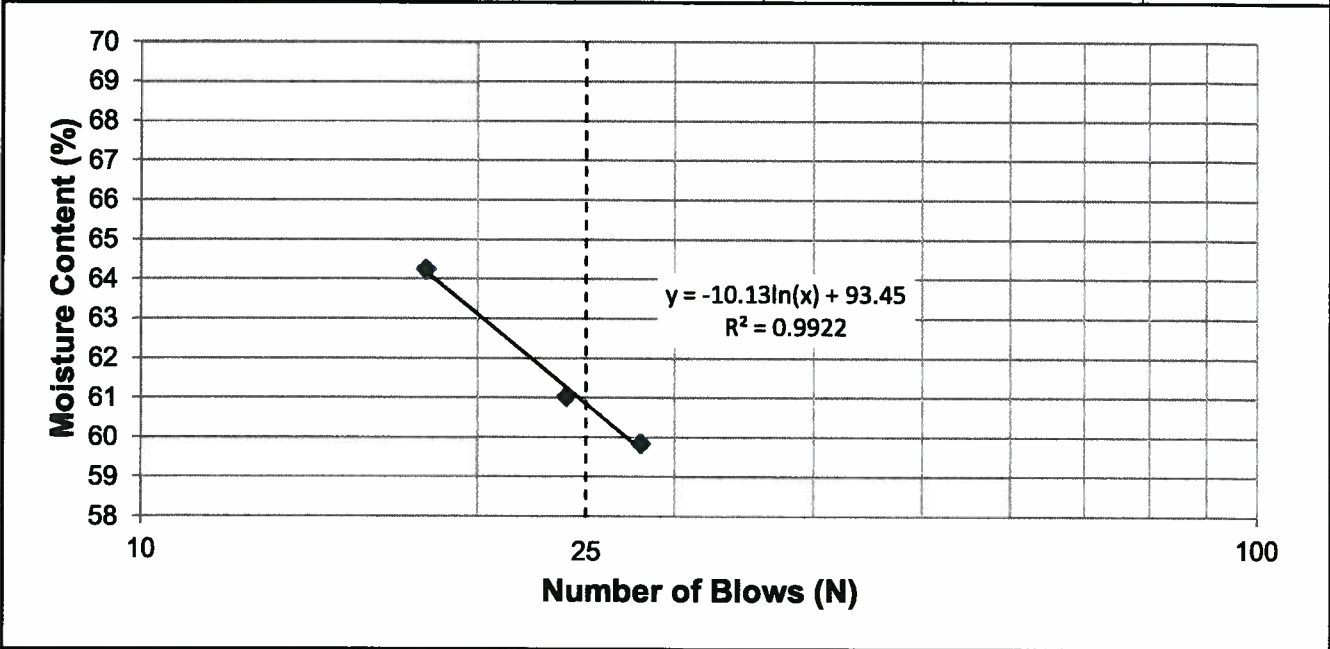
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Project Local Streets Package 14-R-01 Victor Street

Test Hole TH14-05
Sample # G3
Depth (m) 0.8 - 0.9
Sample Date 12-Jan-14
Test Date 30-Jan-14
Technician Hachem Ahmed

Liquid Limit	61
Plastic Limit	18
Plasticity Index	43

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	28	24	18		
Mass Wet Soil + Tare (g)	20.745	21.035	20.803		
Mass Dry Soil + Tare (g)	18.299	18.421	18.166		
Mass Tare (g)	14.212	14.138	14.062		
Mass Water (g)	2.446	2.614	2.637		
Mass Dry Soil (g)	4.087	4.283	4.104		
Moisture Content (%)	59.848	61.032	64.254		



Plastic Limit

Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	20.644	20.555			
Mass Dry Soil + Tare (g)	19.653	19.608			
Mass Tare (g)	14.108	14.123			
Mass Water (g)	0.991	0.947			
Mass Dry Soil (g)	5.545	5.485			
Moisture Content (%)	17.872	17.265			



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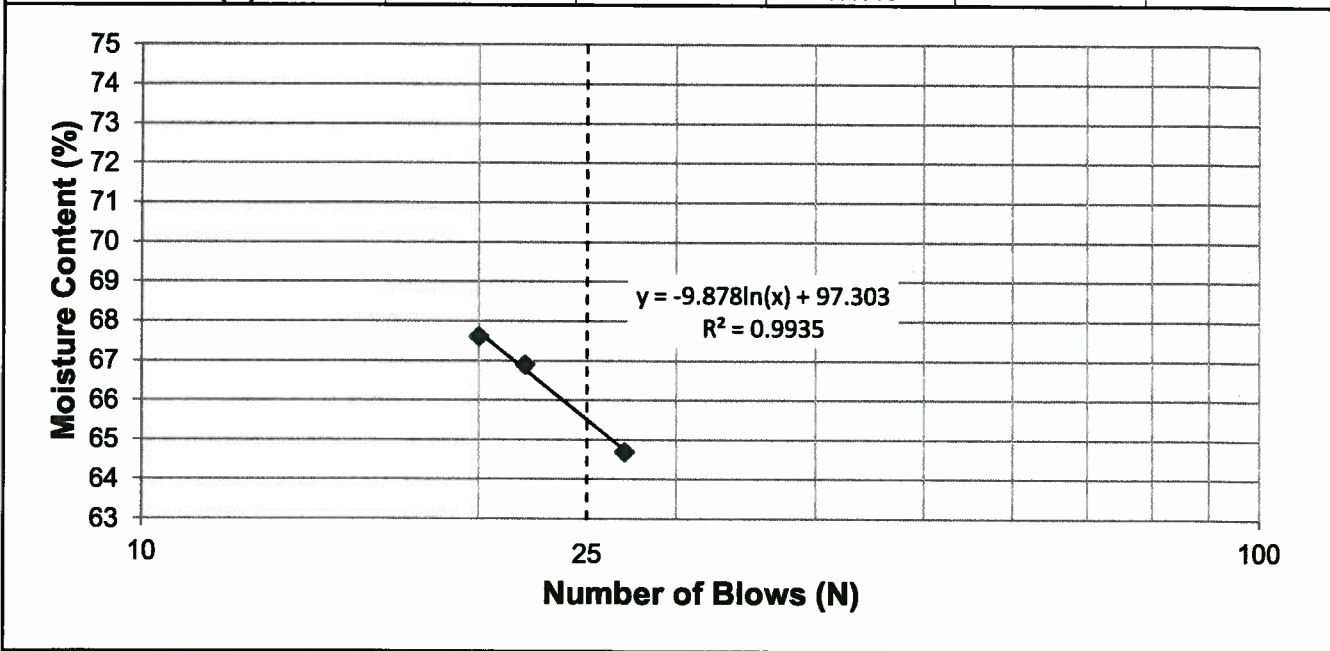
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Client Morrison Hershfield
Project Local Streets Package 14-R-01 Victor Street

Test Hole TH14-06
Sample # G2
Depth (m) 0.6 - 0.7
Sample Date 12-Jan-14
Test Date 11-Feb-14
Technician Daniel Mroz

Liquid Limit	66
Plastic Limit	17
Plasticity Index	48

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	27	22	20		
Mass Wet Soil + Tare (g)	23.266	22.792	22.747		
Mass Dry Soil + Tare (g)	19.655	19.276	19.160		
Mass Tare (g)	14.074	14.021	13.855		
Mass Water (g)	3.611	3.516	3.587		
Mass Dry Soil (g)	5.581	5.255	5.305		
Moisture Content (%)	64.702	66.908	67.615		



Plastic Limit

Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	20.018	20.355			
Mass Dry Soil + Tare (g)	19.131	19.434			
Mass Tare (g)	14.000	14.125			
Mass Water (g)	0.887	0.921			
Mass Dry Soil (g)	5.131	5.309			
Moisture Content (%)	17.287	17.348			



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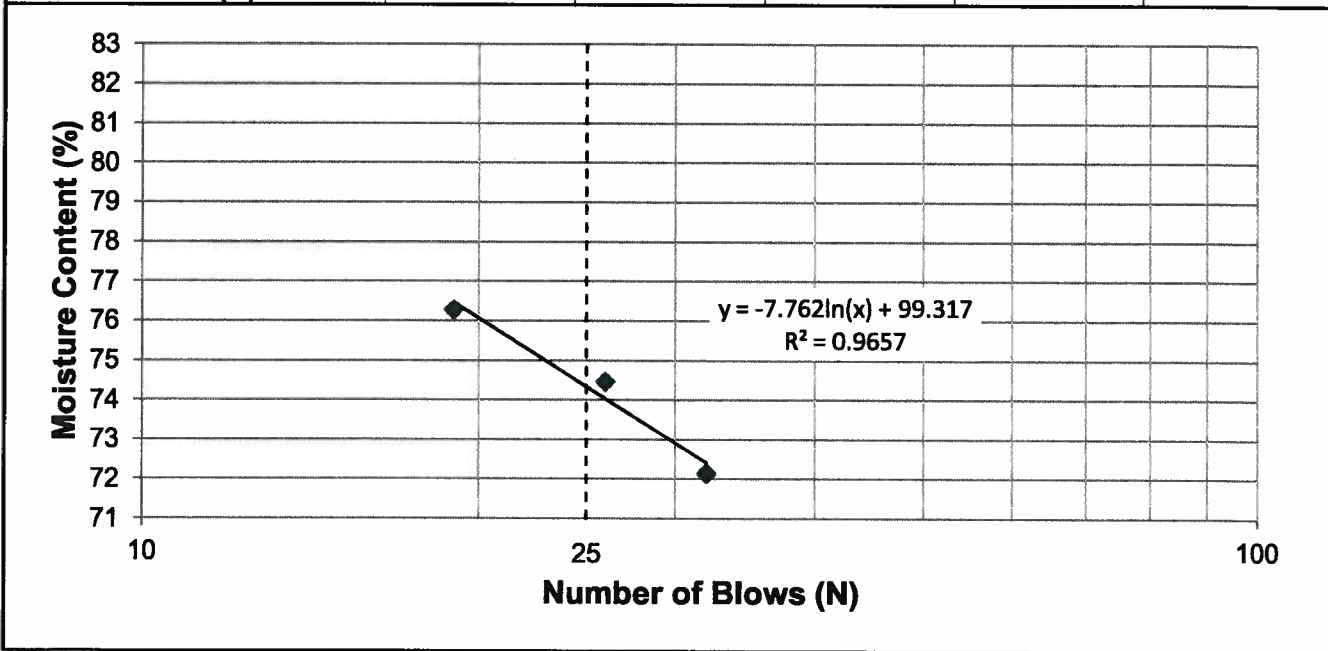
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Test Hole TH14-07
Sample # G4
Depth (m) 1.1 - 1.2
Sample Date 12-Jan-14
Test Date 30-Jan-14
Technician Hachem Ahmed

Liquid Limit	74
Plastic Limit	19
Plasticity Index	55

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	32	26	19		
Mass Wet Soil + Tare (g)	19.443	19.755	19.289		
Mass Dry Soil + Tare (g)	17.145	17.305	17.021		
Mass Tare (g)	13.960	14.015	14.048		
Mass Water (g)	2.298	2.450	2.268		
Mass Dry Soil (g)	3.185	3.290	2.973		
Moisture Content (%)	72.151	74.468	76.287		



Plastic Limit

Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	20.149	20.686			
Mass Dry Soil + Tare (g)	19.140	19.650			
Mass Tare (g)	14.066	14.225			
Mass Water (g)	1.009	1.036			
Mass Dry Soil (g)	5.074	5.425			
Moisture Content (%)	19.886	19.097			



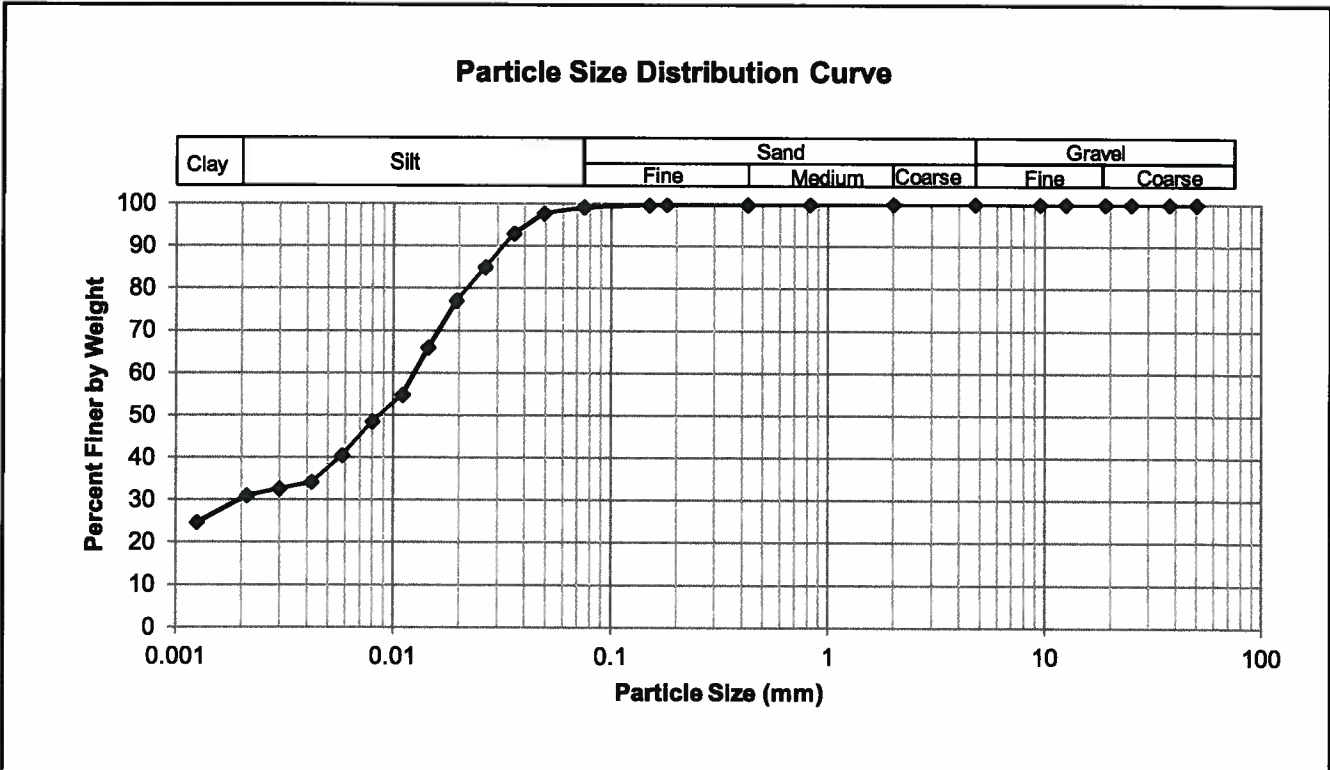
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Grain Size Analysis (Hydrometer Method)
ASTM D422

Project No. 0035 011 00
Client Morrison Hershfield
Project Local Streets Package 14-R-01 Victor Street

Test Hole TH14-03
Sample # G3
Depth (m) 0.8 - 0.9
Sample Date 12-Jan-14
Test Date 11-Feb-14
Technician Daniel Mroz

Gravel	0.0%
Sand	0.8%
Silt	69.1%
Clay	30.1%



Gravel		Sand		Silt and Clay	
Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing
50.0	100.00	4.75	100.00	0.0750	99.16
37.5	100.00	2.00	99.99	0.0492	97.68
25.0	100.00	0.825	99.88	0.0357	92.92
19.0	100.00	0.425	99.79	0.0264	84.98
12.5	100.00	0.180	99.71	0.0194	77.03
9.50	100.00	0.150	99.70	0.0144	65.92
4.75	100.00	0.075	99.16	0.0110	54.80
				0.0080	48.45
				0.0058	40.51
				0.0042	34.15
				0.0030	32.57
				0.0021	30.98
				0.0013	24.63



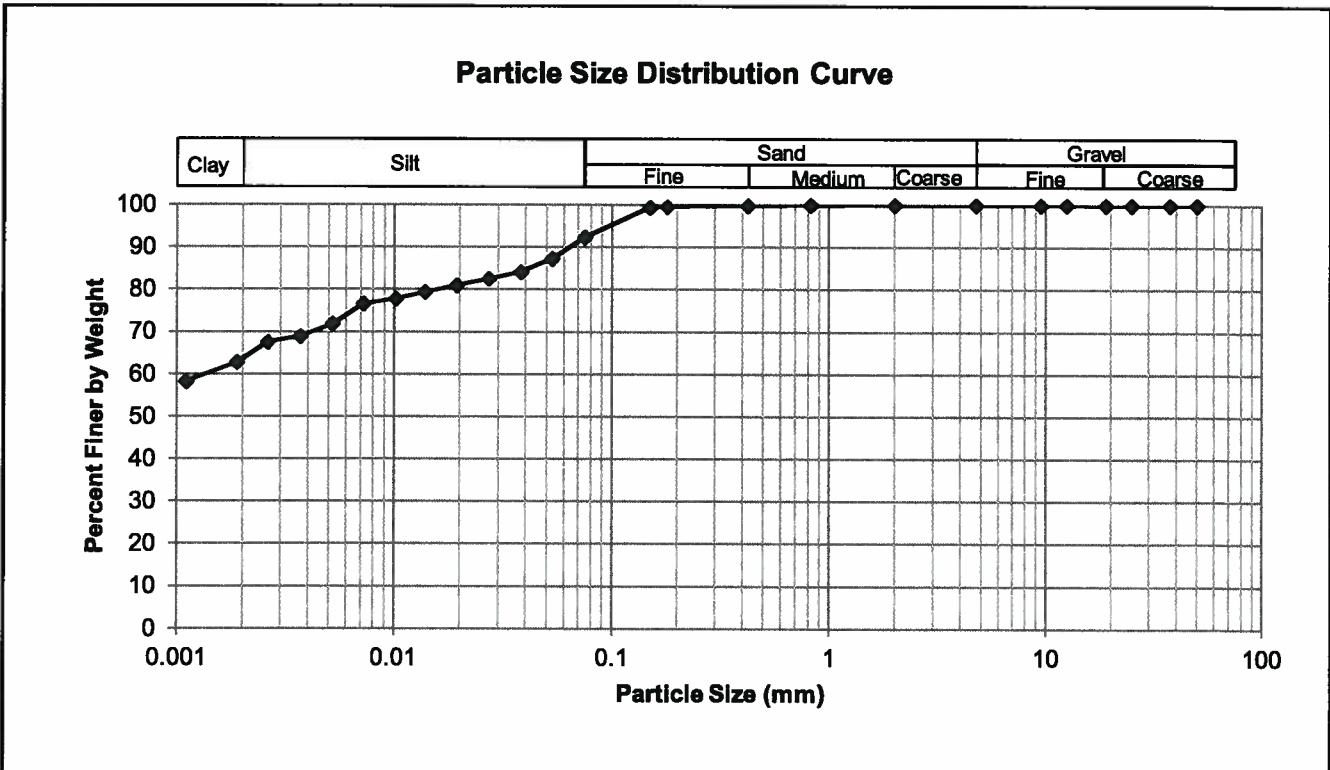
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Grain Size Analysis (Hydrometer Method)
ASTM D422

Project No. 0035 011 00
Client Morrison Hershfield
Project Local Streets Package 14-R-01 Victor Street

Test Hole TH14-05
Sample # G3
Depth (m) 0.8 - 0.9
Sample Date 12-Jan-14
Test Date 27-Jan-14
Technician Hachem Ahmed

Gravel	0.0%
Sand	7.7%
Silt	28.8%
Clay	63.5%



Gravel		Sand		Silt and Clay	
Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing
50.0	100.00	4.75	100.00	0.0750	92.33
37.5	100.00	2.00	100.00	0.0530	87.27
25.0	100.00	0.825	99.92	0.0381	84.09
19.0	100.00	0.425	99.81	0.0272	82.51
12.5	100.00	0.180	99.50	0.0194	80.92
9.50	100.00	0.150	99.33	0.0138	79.33
4.75	100.00	0.075	92.33	0.0102	77.74
				0.0072	76.58
				0.0052	71.81
				0.0037	68.86
				0.0026	67.51
				0.0019	62.74
				0.0011	58.23



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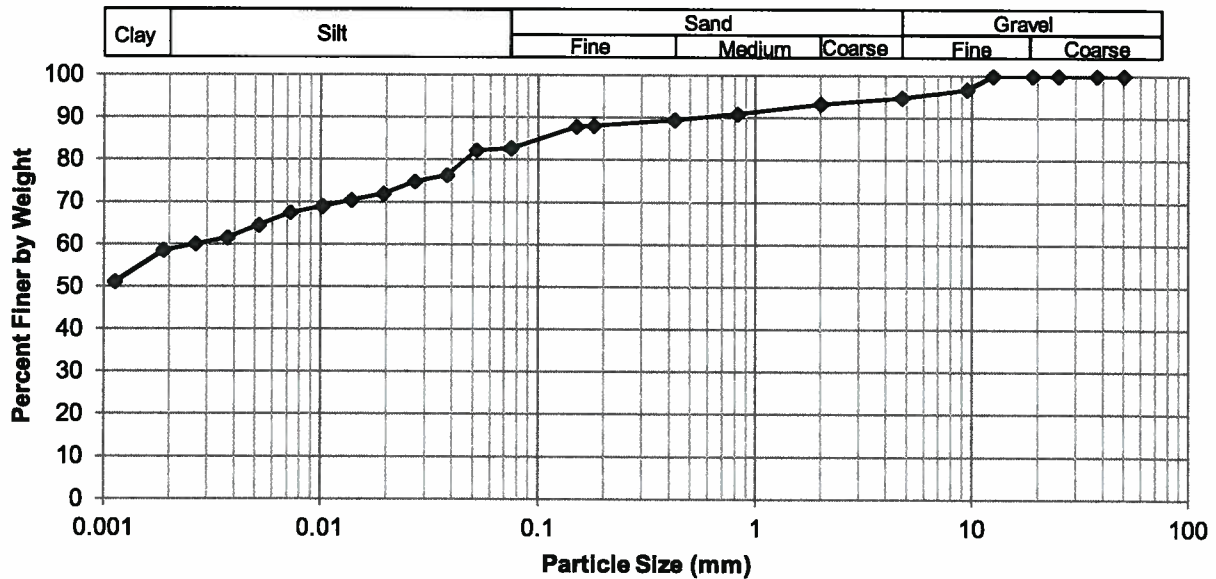
Grain Size Analysis (Hydrometer Method)
ASTM D422

Project No. 0035 011 00
Client Morrison Hershfield
Project Local Streets Package 14-R-01 Victor Street

Test Hole TH14-06
Sample # G2
Depth (m) 0.6 - 0.7
Sample Date 12-Jan-14
Test Date 11-Feb-14
Technician Daniel Mroz

Gravel	5.2%
Sand	12.1%
Silt	24.0%
Clay	58.7%

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	94.78	0.0750	82.70
37.5	100.00	2.00	93.28	0.0519	82.22
25.0	100.00	0.825	90.92	0.0379	76.30
19.0	100.00	0.425	89.43	0.0270	74.81
12.5	100.00	0.180	88.03	0.0194	71.85
9.50	96.74	0.150	87.81	0.0138	70.37
4.75	94.78	0.075	82.70	0.0102	68.89
				0.0072	67.41
				0.0052	64.45
				0.0037	61.48
				0.0026	60.00
				0.0019	58.52
				0.0011	51.11



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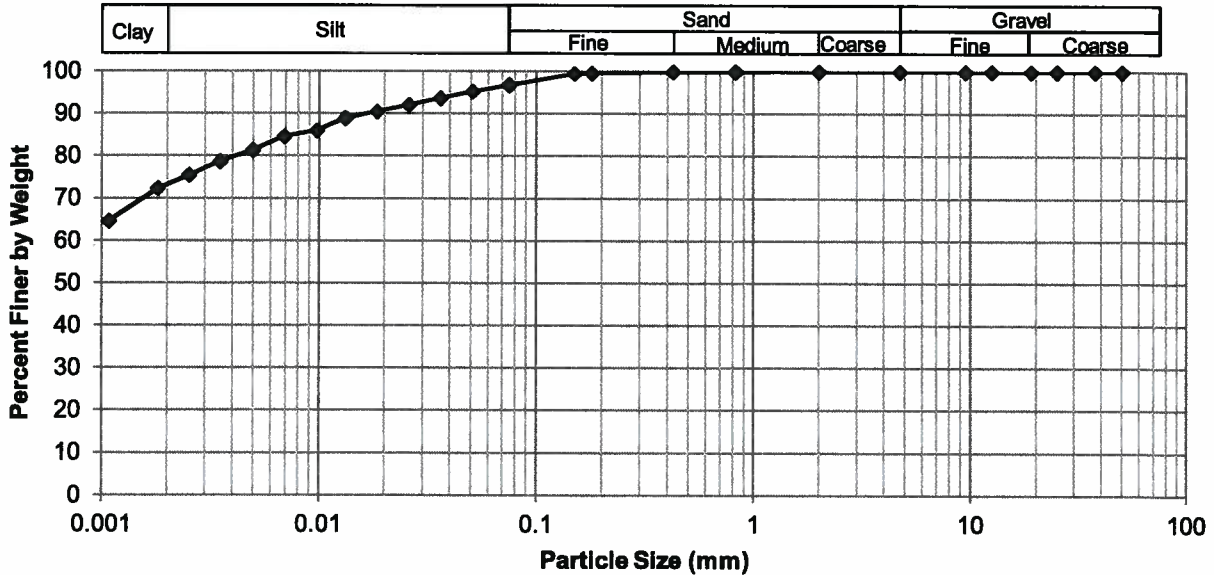
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ASTM D422

Project No. 0035 011 00
Client Morrison Hershfield
Project Local Streets Package 14-R-01 Victor Street

Test Hole TH14-07
Sample # G4
Depth (m) 1.1 - 1.2
Sample Date 12-Jan-14
Test Date 27-Jan-14
Technician Hachem Ahmed

Gravel	0.0%
Sand	3.2%
Silt	23.6%
Clay	73.1%

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	96.76
37.5	100.00	2.00	100.00	0.0508	95.21
25.0	100.00	0.825	99.93	0.0362	93.62
19.0	100.00	0.425	99.86	0.0258	92.04
12.5	100.00	0.180	99.54	0.0184	90.45
9.50	100.00	0.150	99.41	0.0131	88.86
4.75	100.00	0.075	96.76	0.0097	85.89
				0.0069	84.52
				0.0050	81.34
				0.0035	78.63
				0.0025	75.45
				0.0018	72.27
				0.0011	64.58

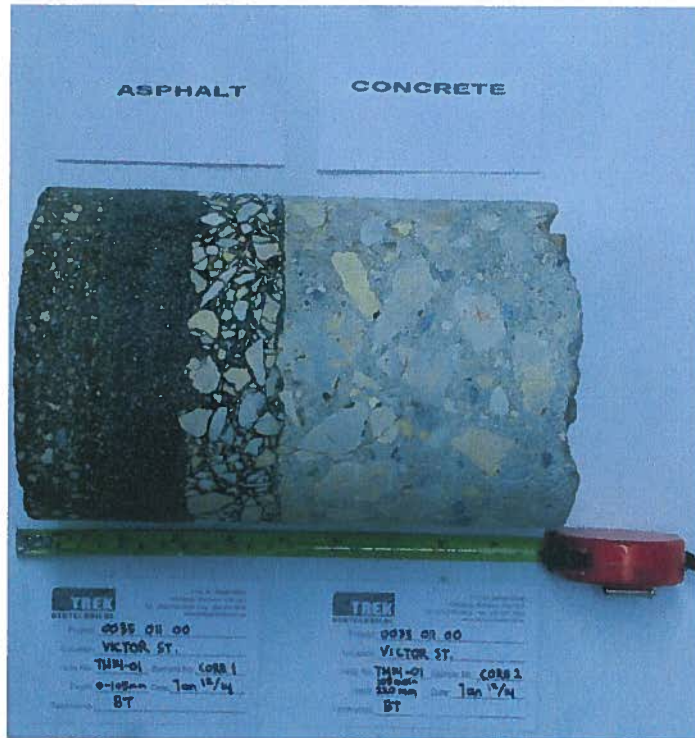


Photo 1: Asphalt and Concrete Core Sample from Test Hole TH14-01

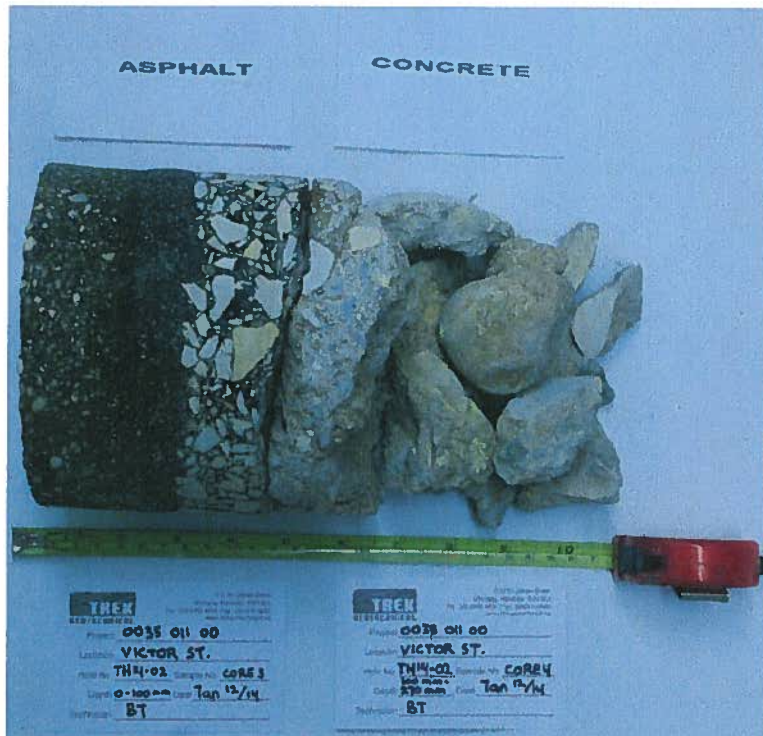


Photo 2: Asphalt and Concrete Core Sample from Test Hole TH14-02

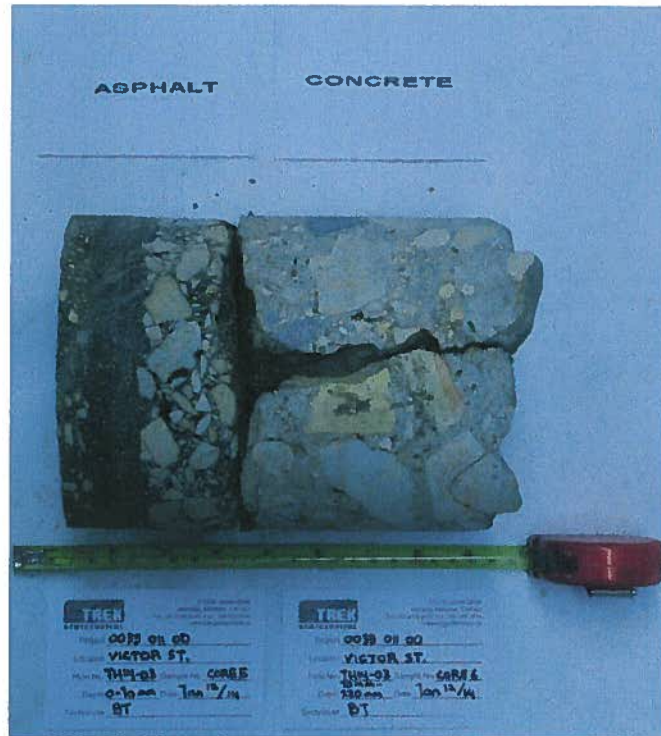


Photo 3: Asphalt and Concrete Core Sample from Test Hole TH14-03

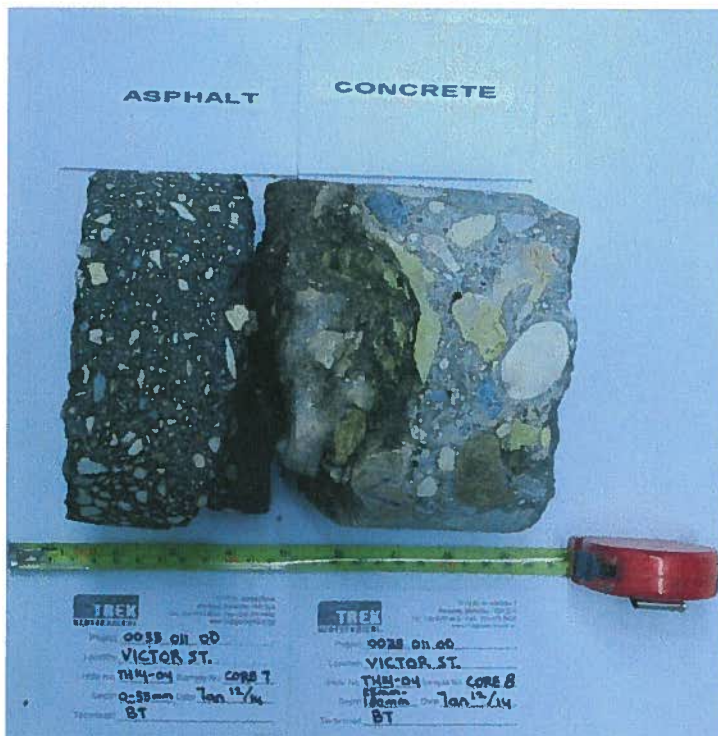


Photo 4: Asphalt and Concrete Core Sample from Test Hole TH14-04

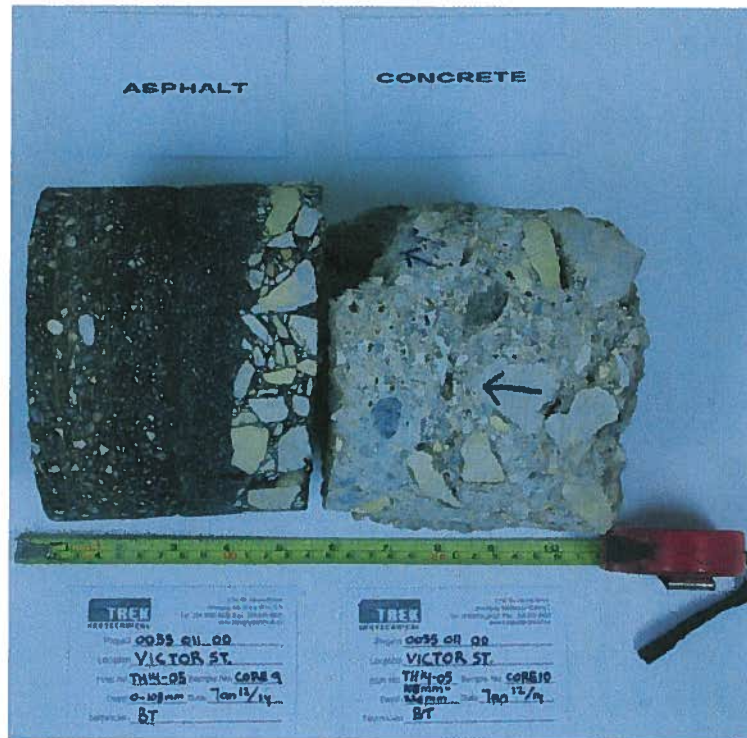


Photo 5: Asphalt and Concrete Core Sample from Test Hole TH14-05

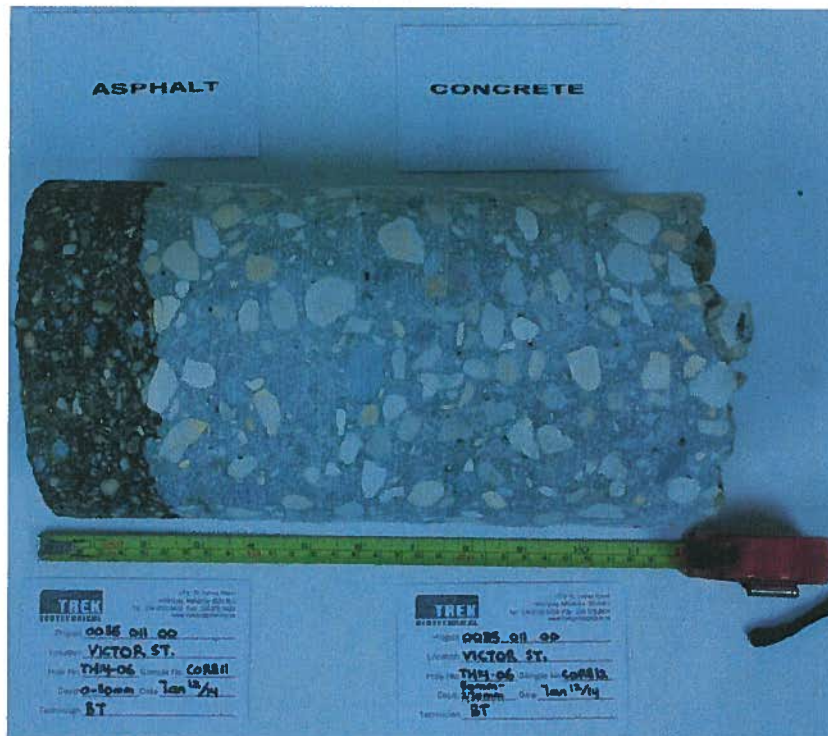


Photo 6: Asphalt and Concrete Core Sample from Test Hole TH14-06



Photo 7: Asphalt and Concrete Core Sample from Test Hole TH14-07

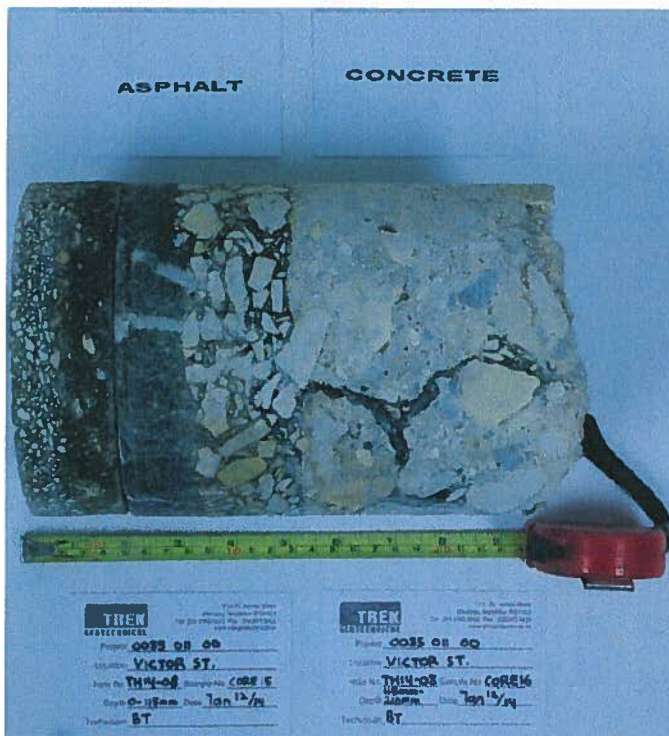


Photo 8: Asphalt and Concrete Core Sample from Test Hole TH14-08

Appendix B

Furby St. between Ellice Ave. and Furby Place



Sub-Surface Log

Test Hole TH14-09

1 of 1

Client: Morrison Hershfield Project Number: 0035 011 00
 Project Name: 2014 Local Streets Package - PW File #: 14-R-01 Location: Furby St.- between Ellice Ave and Furby Place
 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/m ³)					Undrained Shear Strength (kPa)						
					16	17	18	19	20	21	Test Type					
					Particle Size (%)											
					0	20	40	60	80	100	0	50	100	150	200	250
					PL MC LL											
					0	20	40	60	80	100	0	50	100	150	200	250
		ASPHALT (100 mm thick)		C09A												
		CONCRETE (160 mm thick)		C09B												
0.5		CLAY - silty, trace sand, trace gravel to 0.6 m, trace organics - black - frozen to 0.4 m, wet and soft when thawed - high plasticity		G01												
				G02												
1.0		SILT - trace clay - light brown - moist, soft - low plasticity		G03												
1.5		CLAY - silty, trace silt inclusions (<10 mm diam.), trace organics, trace oxidation - dark grey to black - moist, firm to stiff - high plasticity		G04												
				G05												
2.0				G06												
				G07												
2.5				G08												

END OF TEST HOLE AT 3.3 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 northbound Furby St. between Ellice Ave and Furby Place, in front of 463 Furby St., 2.1 m west of east curb.

SUB-SURFACE LOG 2014 LOCAL STREET RENEWALS FURBY ST. TESTHOLE LOGS.GPJ, TREK GEOTECHNICAL.GDT, 21/2/14

Sub-Surface Log

Test Hole TH14-10

1 of 1

Client: Morrison Hershfield **Project Number:** 0035 011 00
Project Name: 2014 Local Streets Package - PW File #: 14-R-01 **Location:** Furby St.- between Ellice Ave and Furby Place
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/m ³)		Particle Size (%)		Undrained Shear Strength (kPa)							
					16	17	18	19	20	21	0	50	100	150	200	250
0.0 - 0.05		ASPHALT (60 mm thick)		C10A												
0.05 - 0.1		CONCRETE (205 mm thick)		C10B												
0.1 - 0.5		CLAY - silty, trace gravel, trace silt inclusions (<20 mm diam.), trace organics - black - frozen to 0.4 m, moist and soft to firm when thawed - high plasticity	▲	G09												
0.5 - 1.0		SILT - clayey, trace sand, trace oxidation - light brown - moist, firm - low plasticity	▲	G10												
1.0 - 1.5		SILT - clayey, trace sand, trace oxidation - light brown - moist, firm - low plasticity	▲	G11												
1.5 - 2.0		CLAY - silty, trace sand, trace silt inclusions (<10 mm diam.), trace organics, trace oxidation - dark grey to black - moist, very stiff - high plasticity	▲	G12												
2.0 - 2.5		- stiff to very stiff below 1.8 m	▲	G13												
2.5 - 3.0		- mottled brown and grey, firm below 2.1 m	▲	G14												
3.0 - 3.3			▲	G15												
3.3 - 3.5			▲	G16												
3.5 - 3.7			▲	G17												

END OF TEST HOLE AT 3.3 m IN CLAY

Notes:

- No sloughing or seepage observed.
- Backfilled test hole with auger cuttings, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
- Test hole located on northbound Furby St. between Ellice Ave and Furby Place, in front of 451 Furby St.



Sub-Surface Log

Test Hole TH14-11

1 of 1

Client: Morrison Hershfield **Project Number:** 0035 011 00
Project Name: 2014 Local Streets Package - PW File #: 14-R-01 **Location:** Furby St.- between Ellice Ave and Furby Place
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/m ³)		Particle Size (%)		Undrained Shear Strength (kPa)		Test Type
					16	17	18	19	20	21	
		ASPHALT (110 mm thick)		C11A							
		CONCRETE (135 mm thick)		C11B							
0.5		CLAY - silty, trace sand, trace gravel, trace silt inclusions (<20 mm diam.), trace organics, trace oxidation - black - frozen to 0.4 m, moist and soft when thawed - high plasticity		G18							
				G19							
1.0		SILT - clayey, trace sand, trace oxidation - light brown - moist, soft - low plasticity		G20							
				G21							
1.5		CLAY - silty, trace sand, trace silt inclusions (<10 mm diam.), trace oxidation - dark grey - moist, stiff to very stiff - high plasticity		G22							
				G23							
2.0				G24							
				G25							
2.5											
3.0											
		- firm to stiff below 3.1 m		G26							

END OF TEST HOLE AT 3.3 m IN CLAY

Notes:

- No sloughing or seepage observed.
- Backfilled test hole with auger cuttings, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
- Test hole located on northbound Furby St. between Ellice Ave and Furby Place, in front of 433 Furby St., 1.8 m west of east curb.

Logged By: Martial Lemoine

Reviewed By: Brent Hay

Project Engineer: Nelson Ferreira

SUB-SURFACE LOG 2014 LOCAL STREET RENEWALS FURBY ST. TESTHOLE LOGS.GPJ TREK GEOTECHNICAL.GDT 21/2/14



Sub-Surface Log

Test Hole TH14-12

1 of 1

Client: Morrison Hershfield **Project Number:** 0035 011 00
Project Name: 2014 Local Streets Package - PW File #: 14-R-01 **Location:** Furby St.- between Ellice Ave and Furby Place
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/m ³)		Undrained Shear Strength (kPa)									
					16	17										
					Particle Size (%)		Test Type Δ Torvane Δ ⊕ Pocket Pen. ⊕ ⊠ Qu ⊠ ○ Field Vane ○									
					0	20										
					PL	MC	LL									
					0	20	40	60	80	100	0	50	100	150	200	250
		ASPHALT (245 mm thick)		C12A												
		CONCRETE (110 mm thick)		C12B												
0.5		CLAY (Fill) - silty, trace sand, trace gravel, trace oxidation - black - frozen to 0.4 m, moist and soft to firm when thawed - high plasticity - no longer trace gravel, dark grey below 0.7 m		G27		●	⊕ Δ									
				G28		●	⊕ Δ									
1.0		- grey, stiff below 1.0 m		G29		●	⊕ Δ									
		- firm below 1.3 m		G30		●	⊕									
1.5		SILT - some clay, trace sand, trace oxidation - light brown - moist, soft - low plasticity,		G31		●										
2.0		CLAY - silty, trace sand, trace silt inclusions (<20 mm diam.), trace oxidation - brown - moist, very stiff - high plasticity - stiff below 2.2 m		G32		●	⊕ Δ									
				G33		●	⊕ Δ									
2.5		- firm to stiff below 2.5 m		G34		●	⊕ Δ									
				G35		●	⊕ Δ									

END OF TEST HOLE AT 3.4 m IN CLAY

Notes:

- No sloughing or seepage observed.
- Backfilled test hole with auger cuttings, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
- Test hole located on northbound Furby St., between Ellice Ave and Furby Place, in front of 419 Furby St., 2.0 m west of east curb.

Logged By: Martial Lemoine

Reviewed By: Brent Hay

Project Engineer: Nelson Ferreira

SUB-SURFACE LOG 2014 LOCAL STREET RENEWALS FURBY ST. TESTHOLE LOGS.GPJ TREK GEOTECHNICAL.GDT 21/2/14



Sub-Surface Log

Test Hole TH14-13

1 of 1

Client: Morrison Hershfield Project Number: 0035 011 00
 Project Name: 2014 Local Streets Package - PW File #: 14-R-01 Location: Furby St.- between Ellice Ave and Furby Place
 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/m ³)					Undrained Shear Strength (kPa)						
					16	17	18	19	20		21					
					Particle Size (%)					Test Type <input type="checkbox"/> Torvane <input type="checkbox"/> <input checked="" type="checkbox"/> Pocket Pen. <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> Qu <input checked="" type="checkbox"/> <input type="checkbox"/> Field Vane <input type="checkbox"/>						
					0	20	40	60	80		100					
					PL MC LL											
					0	20	40	60	80	100	0	50	100	150	200	250
		ASPHALT (90 mm thick)		C13A												
		CONCRETE (105 mm thick)		C13B												
		SILT - clayey, trace sand, trace gravel, trace oxidation - light grey and dark brown - frozen to 0.4 m, moist and soft when thawed - low plasticity		G36												
0.5				G37												
		CLAY - silty, trace sand, trace gravel, trace silt inclusions (<20 mm diam.), trace oxidation, trace organics - mottled brown and dark grey - moist, firm to stiff - high plasticity		G38												
				G39												
				G40												
		- very stiff below 1.7 m		G41												
		- firm to stiff below 2.0 m		G42												
				G43												
				G44												

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 northbound Furby St. between Ellice Ave and Furby Place, in front of 405 Furby St., 1.6 m west of east curb.

SUB-SURFACE LOG 2014 LOCAL STREET RENEWALS FURBY ST. TESTHOLE LOGS.GPJ TREK GEOTECHNICAL.GDT 21/2/14

Logged By: Martial Lemoine Reviewed By: Brent Hay Project Engineer: Nelson Ferreira



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**Moisture Content Report
 ASTM D2216-98**

Project No. 0035 011 00
Client Morrison Hershfield
Project Local Streets Package 14-R-01 Furby Street

Sample Date 14-Jan-14
Test Date 27-Jan-14
Technician Jodie Neumann

Furby St	TH14-09	TH14-09	TH14-09	TH14-09	TH14-09	TH14-09
Depth (m)	0.3 - 0.4	0.6 - 0.7	0.9 - 1.0	1.2 - 1.3	1.5 - 1.6	1.8 - 1.9
Sample #	G1	G2	G3	G4	G5	G6
Tare ID	W41	N92	W24	Z47	Z51	W111
Mass of tare	8.4	8.3	8.4	8.6	8.4	8.3
Mass wet + tare	188.3	286.0	245.2	251.2	247.4	245.8
Mass dry + tare	146.6	211.7	194.4	182.4	177.8	173.4
Mass water	41.7	74.3	50.8	68.8	69.6	72.4
Mass dry soil	138.2	203.4	186.0	173.8	169.4	165.1
Moisture %	30.2%	36.5%	27.3%	39.6%	41.1%	43.9%

Furby St	TH14-09	TH14-09	TH14-10	TH14-10	TH14-10	TH14-10
Depth (m)	2.1 - 2.2	2.4 - 2.5	0.3 - 0.4	0.6 - 0.7	0.9 - 1.0	1.2 - 1.3
Sample #	G7	G8	G9	G10	G11	G12
Tare ID	Z137	W02	W63	Z73	N02	K10
Mass of tare	8.2	8.3	8.4	8.4	8.3	8.3
Mass wet + tare	277.9	243	224.5	241.8	243.1	241.3
Mass dry + tare	190.0	157.3	165.1	206.1	199.7	190.5
Mass water	87.9	85.7	59.4	35.7	43.4	50.8
Mass dry soil	181.8	149.0	156.7	197.7	191.4	182.2
Moisture %	48.3%	57.5%	37.9%	18.1%	22.7%	27.9%

Furby St	TH14-10	TH14-10	TH14-10	TH14-10	TH14-10	TH14-11
Depth (m)	1.5 - 1.6	1.8 - 1.9	2.1 - 2.2	2.4 - 2.5	3.2 - 3.3	0.2 - 0.3
Sample #	G13	G14	G15	G16	G17	G18
Tare ID	Z123	F77	D37	W43	N109	Z22
Mass of tare	8.3	8.4	8.3	8.5	8.3	8.2
Mass wet + tare	249.3	233.7	242.2	231.2	240.3	223.7
Mass dry + tare	186.1	167.5	172.6	159.2	160.2	175.5
Mass water	63.2	66.2	69.6	72.0	80.1	48.2
Mass dry soil	177.8	159.1	164.3	150.7	151.9	167.3
Moisture %	35.5%	41.6%	42.4%	47.8%	52.7%	28.8%



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**Moisture Content Report
 ASTM D2216-98**

Project No. 0035 011 00
Client Morrison Hershfield
Project Local Streets Package 14-R-01 Furby Street

Sample Date 14-Jan-14
Test Date 27-Jan-14
Technician Jodie Neumann

Furby St	TH14-11	TH14-11	TH14-11	TH14-11	TH14-11	TH14-11
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 #	G19	G20	G21	G22	G23	G24
Tare ID	F114	N46	Z126	K14	E95	Z07
Mass of tare	8.2	8.2	8.3	8.4	8.4	8.4
Mass wet + tare	240.6	257.2	232.8	283.0	231.6	283.4
Mass dry + tare	189.4	209.7	199.8	223.7	171.4	201.0
Mass water	51.2	47.5	33.0	59.3	60.2	82.4
Mass dry soil	181.2	201.5	191.5	215.3	163.0	192.6
Moisture %	28.3%	23.6%	17.2%	27.5%	36.9%	42.8%

Furby St	TH14-11	TH14-11	TH14-12	TH14-12	TH14-12	TH14-12
Depth (m)	2.3 - 2.4	3.1 - 3.2	0.4 - 0.5	0.7 - 0.8	1.0 - 1.1	1.3 - 1.4
Sample #	G25	G26	G27	G28	G29	G30
Tare ID	D46	E19	W74	F113	E90	F141
Mass of tare	8.4	8.3	8.2	8.2	8.4	8.3
Mass wet + tare	290.7	289.7	229.9	361.1	231.6	267.1
Mass dry + tare	200.6	197.7	162.7	267.3	181.4	204.8
Mass water	90.1	92.0	67.2	93.8	50.2	62.3
Mass dry soil	192.2	189.4	154.5	259.1	173.0	196.5
Moisture %	46.9%	48.6%	43.5%	36.2%	29.0%	31.7%

Furby St	TH14-12	TH14-12	TH14-12	TH14-12	TH14-12	TH14-13
Depth (m)	1.6 - 1.7	1.9 - 2.0	2.2 - 2.3	2.5 - 2.6	3.3 - 3.4	0.2 - 0.3
Sample #	G31	G32	G33	G34	G35	G36
Tare ID	W18	N42	F83	N70	Z35	W102
Mass of tare	8.3	8.3	8.3	8.3	8.4	8.3
Mass wet + tare	238.7	238.3	269.5	290.2	259.4	317.7
Mass dry + tare	200.6	179.3	190.3	201.8	174.3	247.6
Mass water	38.1	59.0	79.2	88.4	85.1	70.1
Mass dry soil	192.3	171.0	182.0	193.5	165.9	239.3
Moisture %	19.8%	34.5%	43.5%	45.7%	51.3%	29.3%



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**Moisture Content Report
 ASTM D2216-98**

Project No. 0035 011 00
Client Morrison Hershfield
Project Local Streets Package 14-R-01 Furby Street

Sample Date 14-Jan-14
Test Date 27-Jan-14
Technician Jodie Neumann

Furby St	TH14-13	TH14-13	TH14-13	TH14-13	TH14-13	TH14-13
Depth (m)	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1
Sample #	G37	G38	G39	G40	G41	G42
Tare ID	K25	K17	F11	D45	P19	W66
Mass of tare	8.4	8.3	8.4	8.3	8.5	8.3
Mass wet + tare	385.9	354.0	357.3	350.4	400.7	356.8
Mass dry + tare	311.4	284.5	277.1	271.0	299.7	246.2
Mass water	74.5	69.5	80.2	79.4	101.0	110.6
Mass dry soil	303.0	276.2	268.7	262.7	291.2	237.9
Moisture %	24.6%	25.2%	29.8%	30.2%	34.7%	46.5%

Furby St	TH14-13	TH14-13			
Depth (m)	2.3 - 2.4	3.1 - 3.2			
Sample #	G43	G44			
Tare ID	E46	W71			
Mass of tare	8.4	8.3			
Mass wet + tare	385.7	300.2			
Mass dry + tare	254.3	198.2			
Mass water	131.4	102.0			
Mass dry soil	245.9	189.9			
Moisture %	53.4%	53.7%			



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**Atterberg Limits
 ASTM D4318**

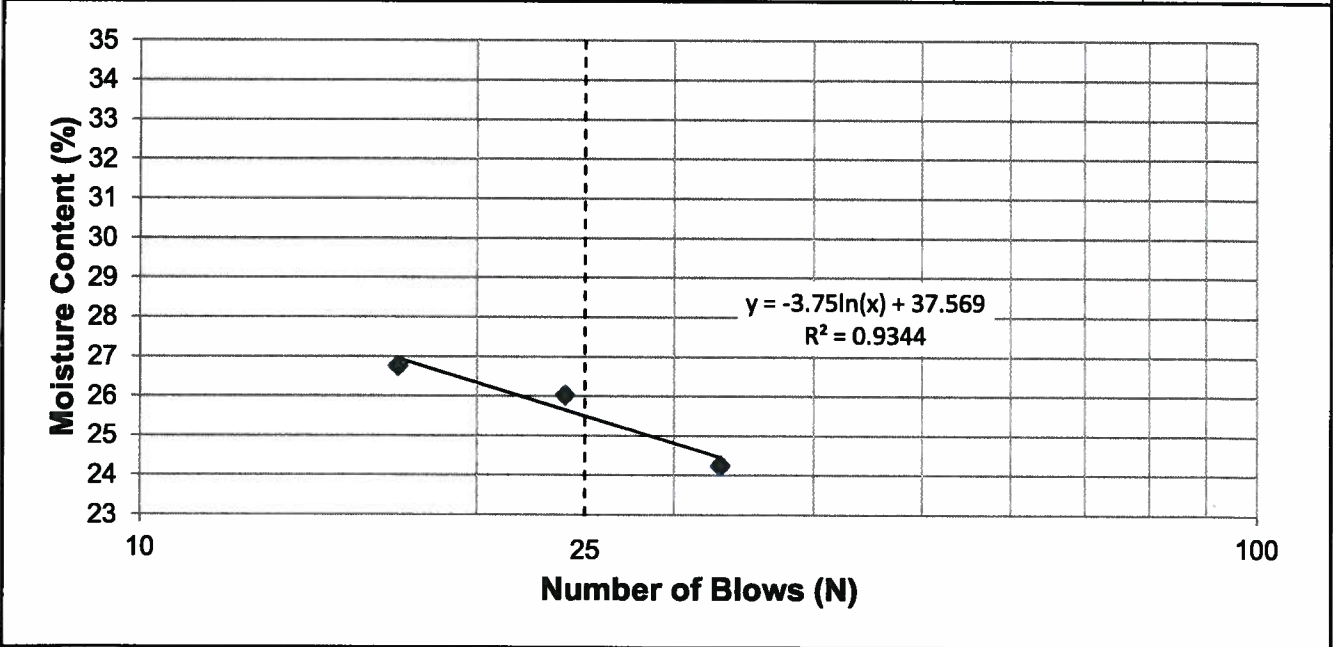
Project No. 0035 011 00
Client Morrison Hershfield
Project Local Streets Package 14-R-01 Furby Street

Test Hole TH14-11
Sample # G20
Depth (m) 0.8 - 0.9
Sample Date 14-Jan-14
Test Date 11-Feb-14
Technician Daniel Mroz

Liquid Limit	25
Plastic Limit	17
Plasticity Index	9

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	33	24	17		
Mass Wet Soil + Tare (g)	23.058	22.554	23.800		
Mass Dry Soil + Tare (g)	21.287	20.789	21.716		
Mass Tare (g)	13.987	14.009	13.929		
Mass Water (g)	1.771	1.765	2.084		
Mass Dry Soil (g)	7.300	6.780	7.787		
Moisture Content (%)	24.260	26.032	26.763		



Plastic Limit

Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	20.565	20.406			
Mass Dry Soil + Tare (g)	19.611	19.489			
Mass Tare (g)	14.041	14.011			
Mass Water (g)	0.954	0.917			
Mass Dry Soil (g)	5.570	5.478			
Moisture Content (%)	17.127	16.740			



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**Atterberg Limits
 ASTM D4318**

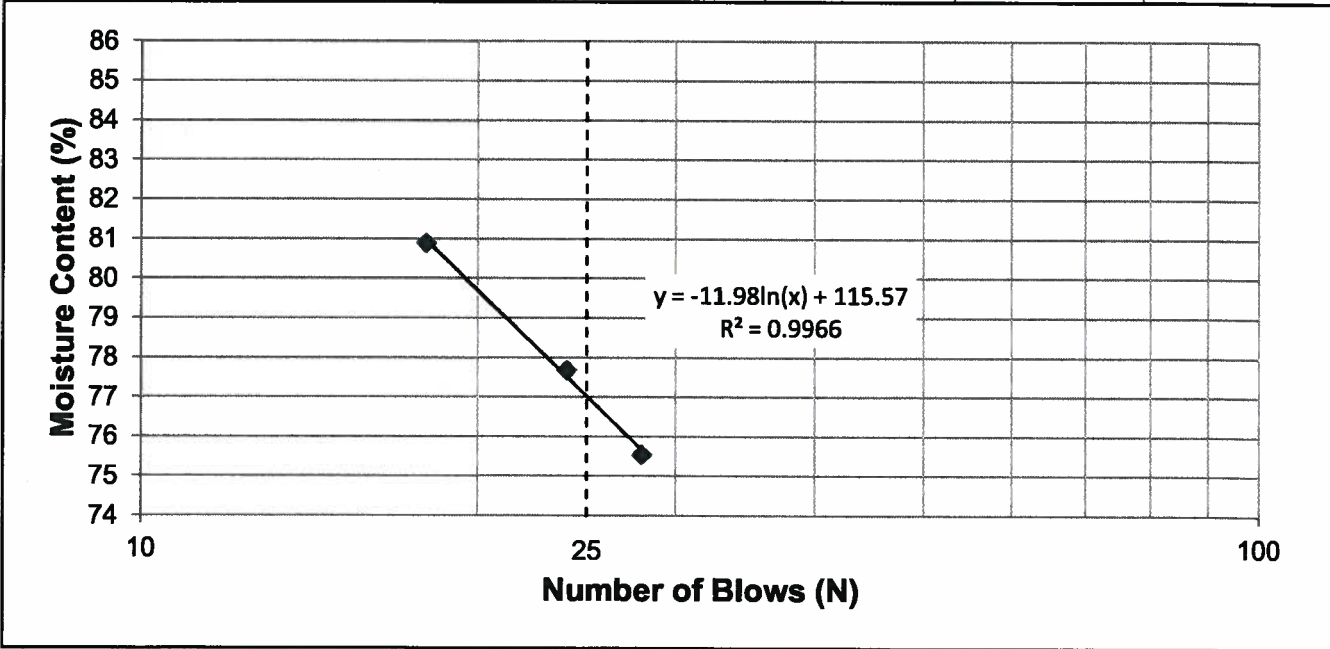
Project No. 0035 011 00
Client Morrison Hershfield
Project Local Streets Package 14-R-01 Furby Street

Test Hole TH14-12
Sample # G28
Depth (m) 0.7 - 0.8
Sample Date 14-Jan-14
Test Date 12-Feb-14
Technician Hachem Ahmed

Liquid Limit	77
Plastic Limit	21
Plasticity Index	56

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	28	24	18		
Mass Wet Soil + Tare (g)	19.988	20.567	19.347		
Mass Dry Soil + Tare (g)	17.430	17.733	16.845		
Mass Tare (g)	14.044	14.085	13.752		
Mass Water (g)	2.558	2.834	2.502		
Mass Dry Soil (g)	3.386	3.648	3.093		
Moisture Content (%)	75.546	77.686	80.892		



Plastic Limit

Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	20.140	19.863			
Mass Dry Soil + Tare (g)	19.046	18.768			
Mass Tare (g)	13.949	13.643			
Mass Water (g)	1.094	1.095			
Mass Dry Soil (g)	5.097	5.125			
Moisture Content (%)	21.464	21.366			



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**Atterberg Limits
 ASTM D4318**

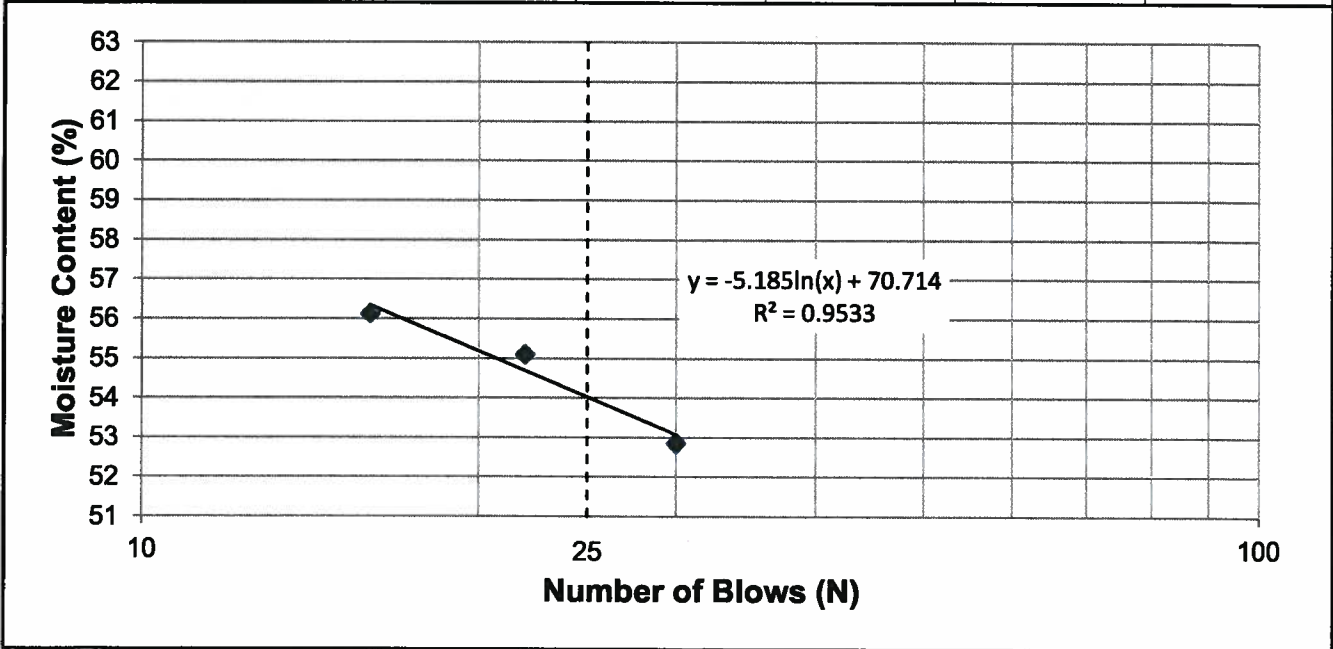
Project No. 0035 011 00
Client Morrison Hershfield
Project Local Streets Package 14-R-01 Furby Street

Test Hole TH14-13
Sample # G38
Depth (m) 0.8 - 0.9
Sample Date 14-Jan-14
Test Date 12-Feb-14
Technician Daniel Mroz

Liquid Limit	54
Plastic Limit	16
Plasticity Index	38

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	30	22	16		
Mass Wet Soil + Tare (g)	24.012	23.968	23.704		
Mass Dry Soil + Tare (g)	20.555	20.448	20.189		
Mass Tare (g)	14.016	14.060	13.927		
Mass Water (g)	3.457	3.520	3.515		
Mass Dry Soil (g)	6.539	6.388	6.262		
Moisture Content (%)	52.867	55.103	56.132		



Plastic Limit

Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	20.430	20.400			
Mass Dry Soil + Tare (g)	19.528	19.545			
Mass Tare (g)	14.073	14.177			
Mass Water (g)	0.902	0.855			
Mass Dry Soil (g)	5.455	5.368			
Moisture Content (%)	16.535	15.928			



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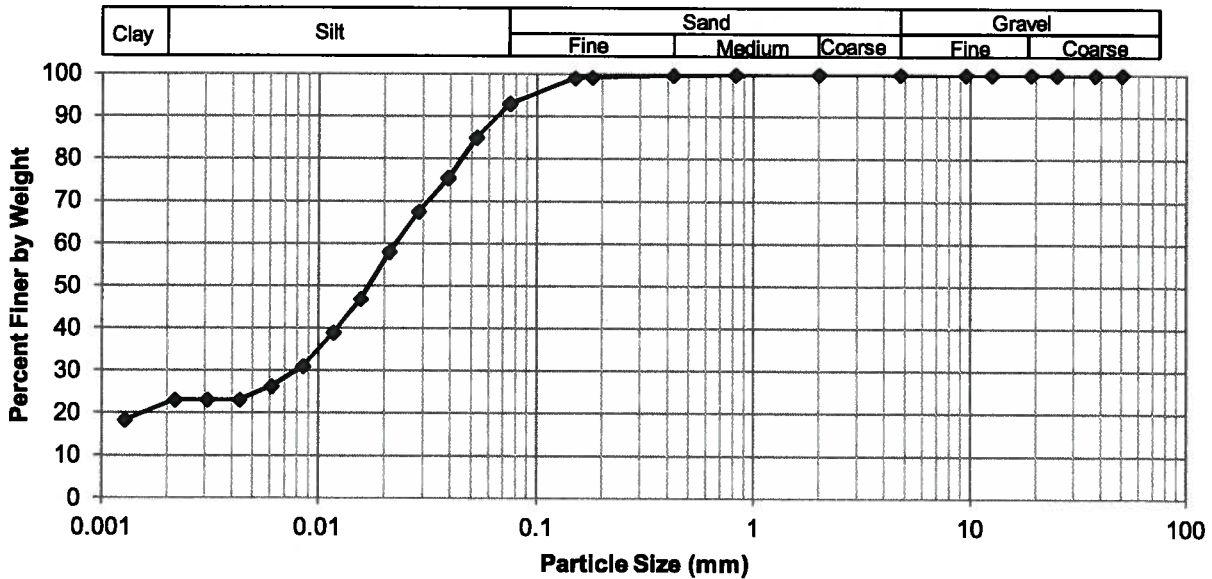
Grain Size Analysis (Hydrometer Method)
ASTM D422

Project No. 0035 011 00
Client Morrison Hershfield
Project Local Streets Package 14-R-01 Furby Street

Test Hole TH14-11
Sample # G20
Depth (m) 0.8 - 0.9
Sample Date 14-Jan-14
Test Date 11-Feb-14
Technician Daniel Mroz

Gravel	0.0%
Sand	7.0%
Silt	70.9%
Clay	22.1%

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	92.98
37.5	100.00	2.00	100.00	0.0527	84.98
25.0	100.00	0.825	99.90	0.0391	75.45
19.0	100.00	0.425	99.72	0.0286	67.51
12.5	100.00	0.180	99.24	0.0211	57.98
9.50	100.00	0.150	99.09	0.0156	46.86
4.75	100.00	0.075	92.98	0.0117	38.92
				0.0085	30.98
				0.0061	26.21
				0.0044	23.04
				0.0031	23.04
				0.0022	23.04
				0.0013	18.27



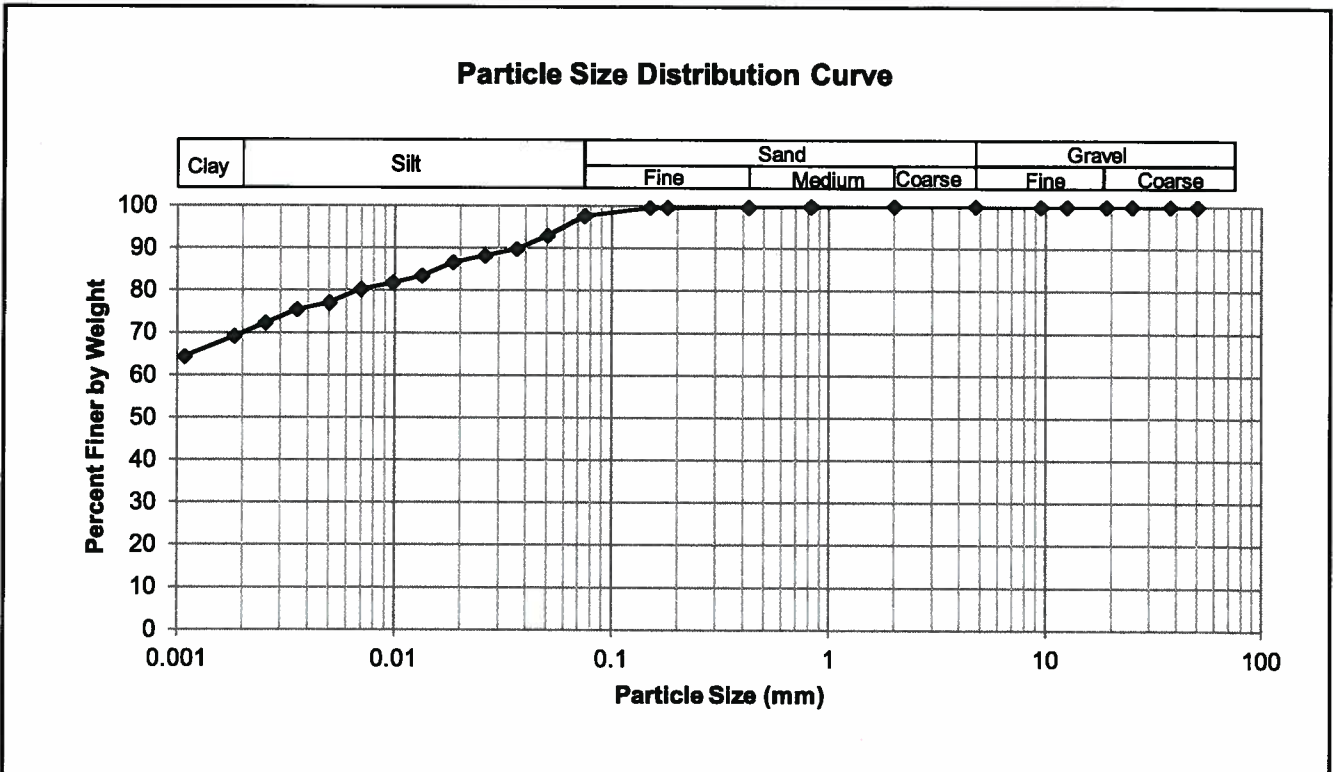
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Grain Size Analysis (Hydrometer Method)
ASTM D422

Project No. 0035 011 00
Client Morrison Hershfield
Project Local Streets Package 14-R-01 Furby Street

Test Hole TH14-12
Sample # G28
Depth (m) 0.3 - 0.4
Sample Date 14-Jan-14
Test Date 11-Feb-14
Technician Daniel Mroz

Gravel	0.0%
Sand	2.4%
Silt	27.8%
Clay	69.8%



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	97.60
37.5	100.00	2.00	99.99	0.0505	92.92
25.0	100.00	0.825	99.93	0.0364	89.74
19.0	100.00	0.425	99.79	0.0259	88.15
12.5	100.00	0.180	99.62	0.0185	86.56
9.50	100.00	0.150	99.58	0.0133	83.39
4.75	100.00	0.075	97.60	0.0098	81.80
				0.0070	80.21
				0.0050	77.03
				0.0036	75.45
				0.0026	72.27
				0.0018	69.09
				0.0011	64.33



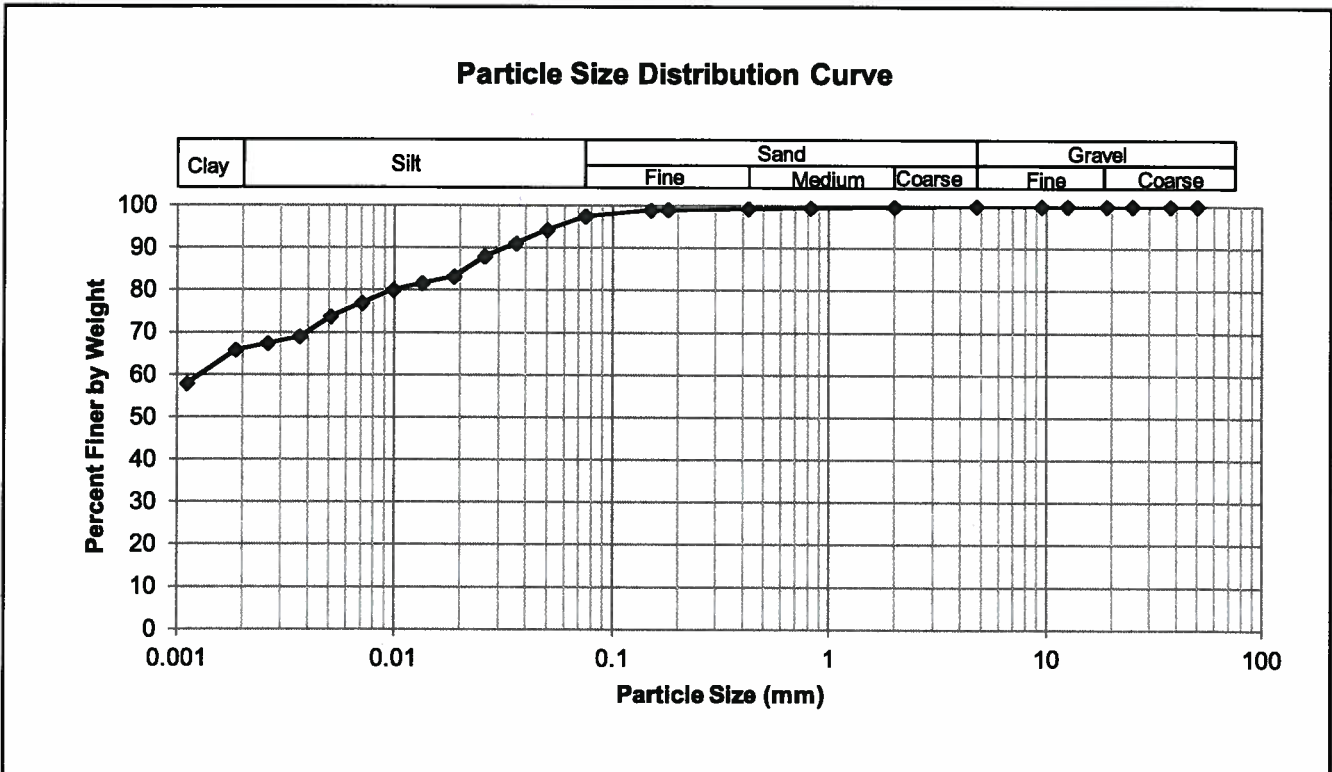
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Grain Size Analysis (Hydrometer Method)
ASTM D422

Project No. 0035 011 00
Client Morrison Hershfield
Project Local Streets Package 14-R-01 Furby Street

Test Hole TH14-13
Sample # G38
Depth (m) 0.8 - 0.9
Sample Date 14-Jan-14
Test Date 11-Feb-14
Technician Daniel Mroz

Gravel	0.0%
Sand	2.5%
Silt	31.4%
Clay	66.0%



Gravel		Sand		Silt and Clay	
Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing
50.0	100.00	4.75	100.00	0.0750	97.46
37.5	100.00	2.00	99.73	0.0501	94.25
25.0	100.00	0.825	99.51	0.0360	91.08
19.0	100.00	0.425	99.30	0.0259	87.92
12.5	100.00	0.180	99.02	0.0188	83.16
9.50	100.00	0.150	98.94	0.0134	81.58
4.75	100.00	0.075	97.46	0.0099	80.00
				0.0071	76.83
				0.0051	73.66
				0.0037	68.91
				0.0026	67.33
				0.0019	65.74
				0.0011	57.82

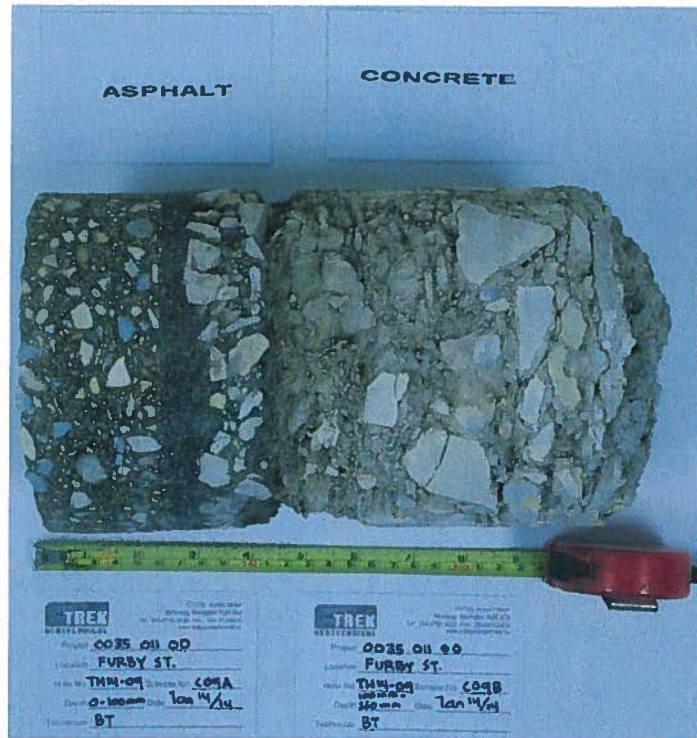


Photo 1: Asphalt and Concrete Core Sample from Test Hole TH14-09

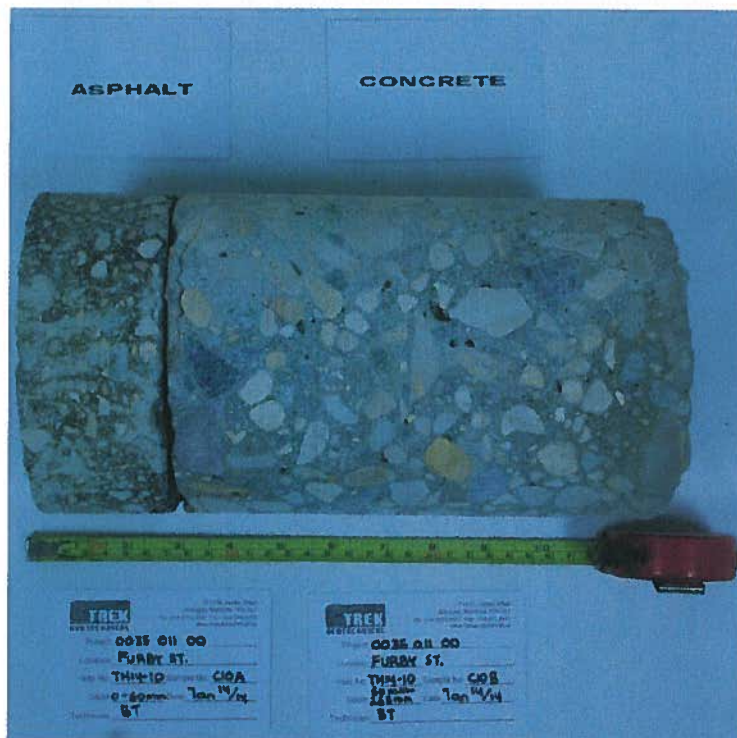


Photo 2: Asphalt and Concrete Core Sample from Test Hole TH14-10

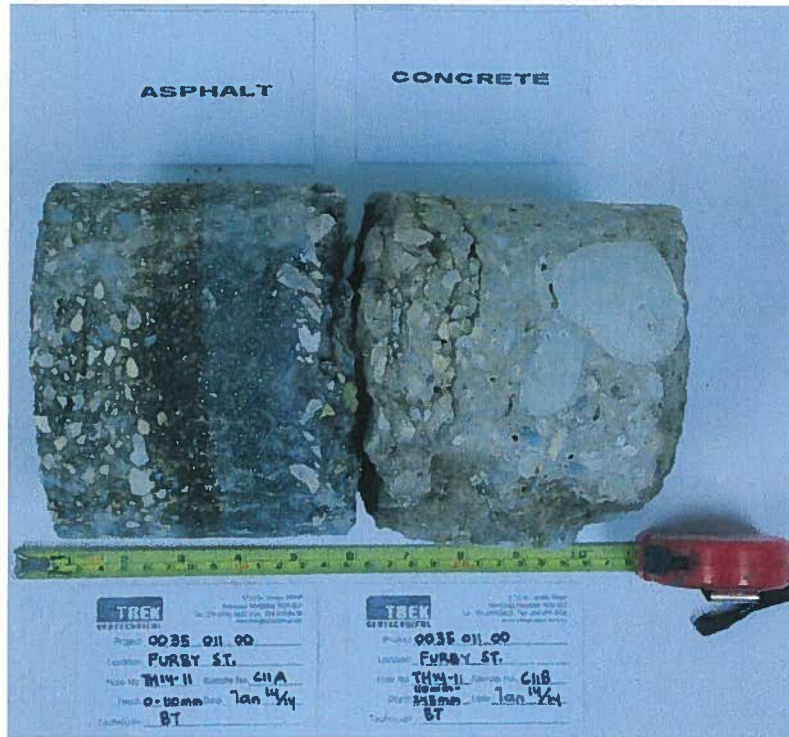


Photo 3: Asphalt and Concrete Core Sample from Test Hole TH14-11



Photo 4: Asphalt and Concrete Core Sample from Test Hole TH14-12

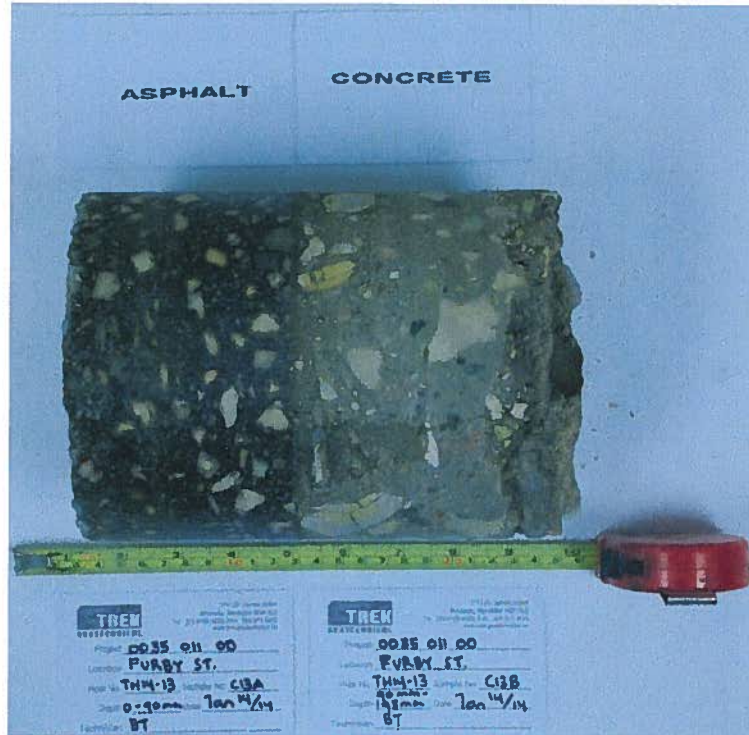


Photo 5: Asphalt and Concrete Core Sample from Test Hole TH14-13

Appendix C

Heritage Blvd. between Valley View Dr. and Fieldstone Bay



Sub-Surface Log

Test Hole TH14-14

1 of 1

Client: Morrison Hershfield **Project Number:** 0035 011 00
Project Name: 2014 Local Streets Package - PW File #: 14-R-01 **Location:** Heritage Blvd. - between Valey View Dr. and Fieldstone Bay
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/m ³)					Undrained Shear Strength (kPa)					
					16	17	18	19	20	21	Test Type				
					Particle Size (%)										
					0	20	40	60	80	100					
					PL MC LL										
					0	20	40	60	80	100	0	50	100	150	200/250
0.0 - 0.1		CONCRETE (150 mm thick)		C14											
0.1 - 0.2		CLAY (Fill) - silty, gravelly, trace sand, trace gravel, moist, firm, intermediate plasticity		G63											
0.2 - 0.5		CLAY - silty, trace sand, trace oxidation, trace organics - dark grey - frozen to 0.9 m, moist and firm to stiff when thawed - high plasticity		G64											
0.5 - 1.0				G65											
1.0 - 1.5		- very stiff below 1.1 m - trace silt inclusions (<15 mm diam.), brown below 1.2m		G66											
1.5 - 2.0		- firm to stiff below 1.4 m		G67											
2.0 - 2.5				G68											
2.5 - 3.0				G69											
3.0 - 3.2				G70											
3.2 - 3.3				G71											

END OF TEST HOLE AT 3.2m IN CLAY

Notes:

- No sloughing or seepage observed.
- Backfilled test hole with auger cuttings, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
- Test hole located on northbound Heritage Blvd. between Valey View Dr. and Fieldstone Bay, in front of 90 Heritage Blvd., 2.5 m west of east curb.

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

SUB-SURFACE LOG 2014 LOCAL STREET RENEWALS HERITAGE ST. TESTHOLE LOGS.GPJ TREK GEOTECHNICAL.GDT 21/2/14



Sub-Surface Log

Test Hole TH14-15

1 of 1

Client: Morrison Hershfield **Project Number:** 0035 011 00
Project Name: 2014 Local Streets Package - PW File #: 14-R-01 **Location:** Heritage Blvd. - between Valey View Dr. and Fieldstone Bay
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/m ³)					Undrained Shear Strength (kPa)						
					16	17	18	19	20	21	Test Type					
					Particle Size (%)											
					0 20 40 60 80 100					Δ Torvane Δ ⊕ Pocket Pen. ⊕ ⊠ Qu ⊠ ○ Field Vane ○						
					PL MC LL					0 50 100 150 200 250						
					0 20 40 60 80 100											
0.0 - 0.1		CONCRETE (153 mm thick)		C15												
0.1 - 0.2		GRANULAR (FILL) - 19 mm down limestone		G54												
0.2 - 0.5		SILT - trace sand, trace oxidation - light brown, frozen, moist and soft when thawed, low plasticity, compact to dense		G55												
0.5 - 1.0		CLAY - silty, sandy, trace oxidation - light brown to brown - frozen, moist and soft when thawed - intermediate plasticity - stiff, high plasticity below 0.8 m		G56												
1.0 - 1.5		SILT - trace clay, trace sand - light brown - moist, soft - low plasticity		G57												
1.5 - 2.0		CLAY - silty, trace sand, trace gravel, trace silt inclusions (<20 mm diam.), trace precipitates (<5 mm diam.), trace organics, trace oxidation - mottled brown and dark grey - moist, stiff to very stiff - high plasticity		G58												
2.0 - 2.5				G59												
2.5 - 3.0				G60												
3.0 - 3.2				G61												
3.2 - 3.3				G62												

END OF TEST HOLE AT 3.2m IN CLAY

Notes:

- No sloughing or seepage observed.
- Backfilled test hole with auger cuttings, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
- Test hole located on northbound Heritage Blvd. between Valey View Dr. and Fieldstone Bay, in front of 80 Heritage Blvd., 2.0 m west of east curb.

Logged By: Beta Taryana

Reviewed By: Brent Hay

Project Engineer: Nelson Ferreira

SUB-SURFACE LOG 2014 LOCAL STREET RENEWALS HERITAGE ST. TESTHOLE LOGS.GPJ TREK GEOTECHNICAL.GDT 21/2/14



Sub-Surface Log

Test Hole TH14-16

1 of 1

Client: Morrison Hershfield **Project Number:** 0035 011 00
Project Name: 2014 Local Streets Package - PW File #: 14-R-01 **Location:** Heritage Blvd. - between Valey View Dr. and Fieldstone Bay
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/m ³)					Undrained Shear Strength (kPa)	
					16	17	18	19	20		21
					Particle Size (%)						
					0	20	40	60	80	100	Test Type + Torvane Δ ⊕ Pocket Pen. ⊕ ⊗ Qu ⊗ ○ Field Vane ○
					0	20	40	60	80	100	
		CONCRETE (168 mm thick)		C16							
		SILT - gravelly, some clay, trace sand, trace oxidation - light brown - frozen, moist and soft when thawed, low plasticity		G45							
0.5		CLAY - silty, trace sand, trace silt inclusions (<5 mm diam.), trace precipitates (<5 mm diam.), trace oxidation - mottled dark grey and brown - frozen to 0.9 m, moist and firm to stiff when thawed - high plasticity		G46							⊕ Δ
				G47							⊕ Δ
				G48							⊕ Δ
				G49							⊕ Δ
				G50							⊕ Δ
				G51							⊕ Δ
				G52							⊕ Δ
				G53							⊕ Δ

END OF TEST HOLE AT 3.2m IN CLAY

Notes:

- No sloughing or seepage observed.
- Backfilled test hole with auger cuttings, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
- Test hole located on southbound Heritage Blvd. between Valey View Dr. and Fieldstone Bay, in front of fence between 73 and 75 Heritage Blvd., 1.2 m east of west curb.

SUB-SURFACE LOG 2014 LOCAL STREET RENEWALS HERITAGE ST. TESTHOLE LOGS.GPJ TREK GEOTECHNICAL.GDT 21/2/14

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



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**Moisture Content Report
 ASTM D2216-98**

Project No. 0035 011 00
Client Morrison Hershfield
Project Local Streets Package 14-R-01 Heritage Blvd

Sample Date 14-Jan-14
Test Date 23-Jan-14
Technician Hachem Ahmed

Heritage Blvd	TH14-14	TH14-14	TH14-14	TH14-14	TH14-14	TH14-14
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 #	G63	G64	G65	G66	G67	G68
Tare ID	F58	F130	A28	P24	H35	E53
Mass of tare	8.5	8.5	8.2	8.5	8.4	8.4
Mass wet + tare	240.2	235.0	227.4	239.3	204.7	223.8
Mass dry + tare	198.8	193.7	182.4	189.3	154.4	161.8
Mass water	41.4	41.3	45.0	50.0	50.3	62.0
Mass dry soil	190.3	185.2	174.2	180.8	146.0	153.4
Moisture %	21.8%	22.3%	25.8%	27.7%	34.5%	40.4%

Heritage Blvd	TH14-14	TH14-14	TH14-14	TH14-15	TH14-15	TH14-15
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 #	G69	G70	G71	G54	G55	G56
Tare ID	W45	N60	N28	D30	F99	Z115
Mass of tare	8.3	8.2	8.2	8.3	8.5	8.1
Mass wet + tare	225.4	423	263.5	259.4	251.4	259.6
Mass dry + tare	158.3	291.9	184.4	225.0	215.3	203.1
Mass water	67.1	131.1	79.1	34.4	36.1	56.5
Mass dry soil	150.0	283.7	176.2	216.7	206.8	195.0
Moisture %	44.7%	46.2%	44.9%	15.9%	17.5%	29.0%

Heritage Blvd	TH14-15	TH14-15	TH14-15	TH14-15	TH14-15	TH14-15
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 #	G57	G58	G59	G60	G61	G62
Tare ID	W79	Z32	Z116	E99	Z67	Z33
Mass of tare	8.4	8.5	8.3	4.3	8.4	8.3
Mass wet + tare	289.7	239.6	286.8	278.1	236.1	275.6
Mass dry + tare	243.6	207.6	207.3	197.5	165.8	190.6
Mass water	46.1	32.0	79.5	80.6	70.3	85.0
Mass dry soil	235.2	199.1	199.0	193.2	157.4	182.3
Moisture %	19.6%	16.1%	39.9%	41.7%	44.7%	46.6%



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**Moisture Content Report
 ASTM D2216-98**

Project No. 0035 011 00
Client Morrison Hershfield
Project Local Streets Package 14-R-01 Heritage Blvd

Sample Date 14-Jan-14
Test Date 23-Jan-14
Technician Hachem Ahmed

Heritage Blvd	TH14-16	TH14-16	TH14-16	TH14-16	TH14-16	TH14-16
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 #	G45	G46	G47	G48	G49	G50
Tare ID	W95	W34	N36	P03	E104	H48
Mass of tare	8.3	8.2	8.2	8.5	8.3	8.3
Mass wet + tare	315.6	242.1	224.3	238.2	219.6	258.9
Mass dry + tare	269.1	186.1	165.1	172.3	157.8	177.1
Mass water	46.5	56.0	59.2	65.9	61.8	81.8
Mass dry soil	260.8	177.9	156.9	163.8	149.5	168.8
Moisture %	17.8%	31.5%	37.7%	40.2%	41.3%	48.5%

Heritage Blvd	TH14-16	TH14-16	TH14-16			
Depth (m)	2.0 - 2.1	2.3 - 2.4	3.1 - 3.2			
Sample #	G51	G52	G53			
Tare ID	E47	N62	E69			
Mass of tare	8.4	8.4	8.4			
Mass wet + tare	245.4	240.5	287.9			
Mass dry + tare	171.2	167.0	203.1			
Mass water	74.2	73.5	84.8			
Mass dry soil	162.8	158.6	194.7			
Moisture %	45.6%	46.3%	43.6%			



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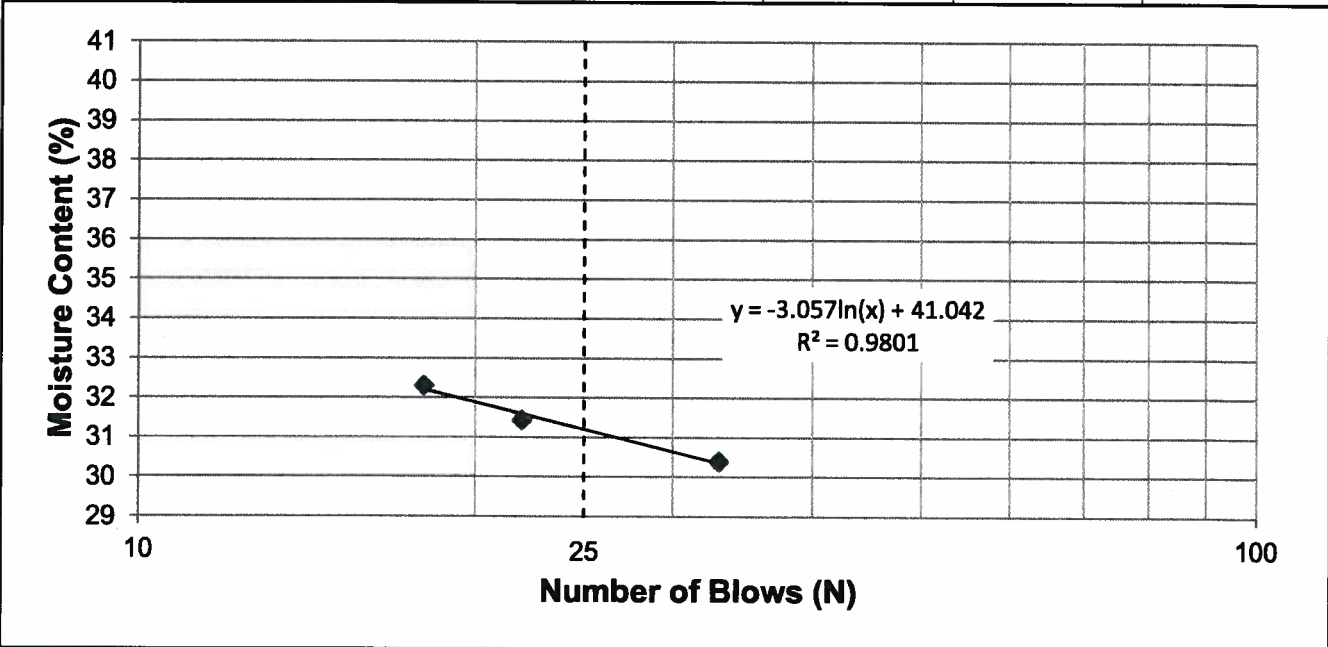
Project No. 0035 011 00
Client Morrison Hershfield
Project Local Streets Package 14-R-01 Heritage Blvd

Test Hole TH14-15
Sample # G55
Depth (m) 0.5 - 0.6
Sample Date 14-Jan-14
Test Date 30-Jan-14
Technician Hachem Ahmed

Liquid Limit	31
Plastic Limit	12
Plasticity Index	19

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	33	22	18		
Mass Wet Soil + Tare (g)	22.024	21.907	20.876		
Mass Dry Soil + Tare (g)	20.166	20.019	19.184		
Mass Tare (g)	14.055	14.014	13.947		
Mass Water (g)	1.858	1.888	1.692		
Mass Dry Soil (g)	6.111	6.005	5.237		
Moisture Content (%)	30.404	31.440	32.309		



Plastic Limit

Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	20.290	20.775			
Mass Dry Soil + Tare (g)	19.595	20.076			
Mass Tare (g)	13.906	14.065			
Mass Water (g)	0.695	0.699			
Mass Dry Soil (g)	5.689	6.011			
Moisture Content (%)	12.217	11.629			



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**Atterberg Limits
 ASTM D4318**

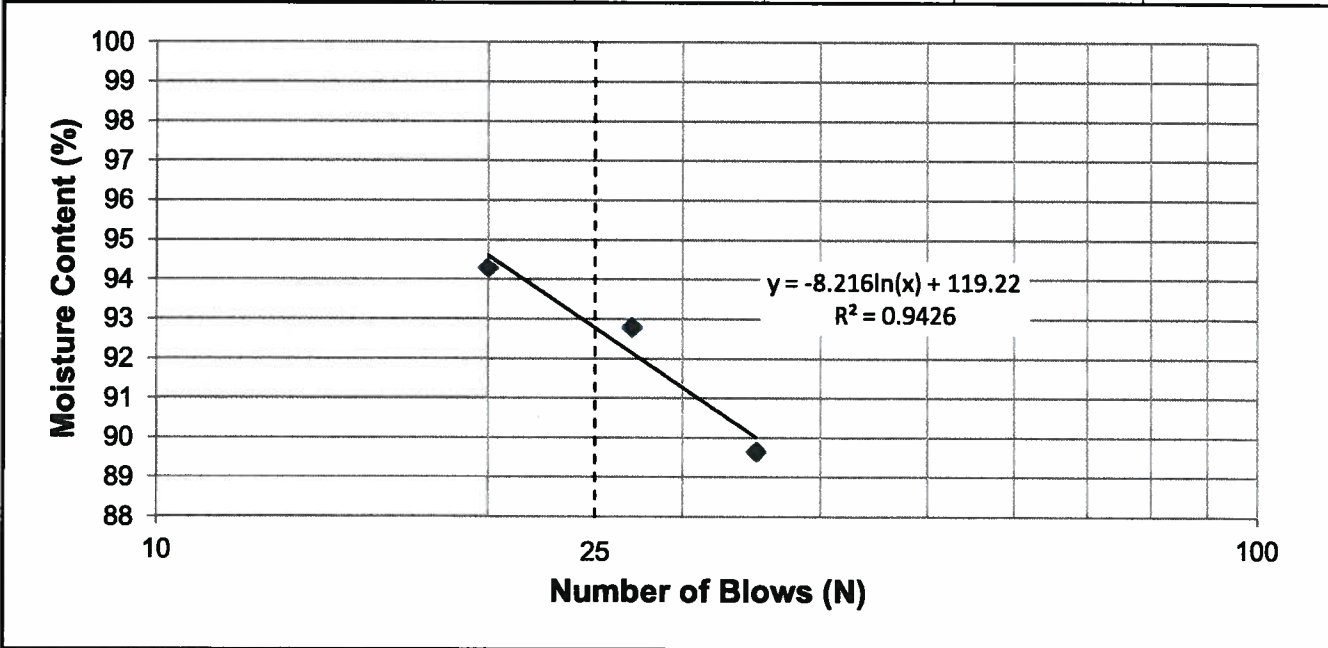
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Client Morrison Hershfield
Project Local Streets Package 14-R-01 Heritage Blvd

Test Hole TH14-16
Sample # G47
Depth (m) 0.8 -0.9
Sample Date 14-Jan-14
Test Date 12-Feb-14
Technician Daniel Mroz

Liquid Limit	93
Plastic Limit	23
Plasticity Index	70

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	35	27	20		
Mass Wet Soil + Tare (g)	23.176	22.494	22.035		
Mass Dry Soil + Tare (g)	18.782	18.425	18.180		
Mass Tare (g)	13.881	14.040	14.092		
Mass Water (g)	4.394	4.069	3.855		
Mass Dry Soil (g)	4.901	4.385	4.088		
Moisture Content (%)	89.655	92.794	94.300		



Plastic Limit

Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	20.064	20.750			
Mass Dry Soil + Tare (g)	18.965	19.493			
Mass Tare (g)	14.059	13.964			
Mass Water (g)	1.099	1.257			
Mass Dry Soil (g)	4.906	5.529			
Moisture Content (%)	22.401	22.735			



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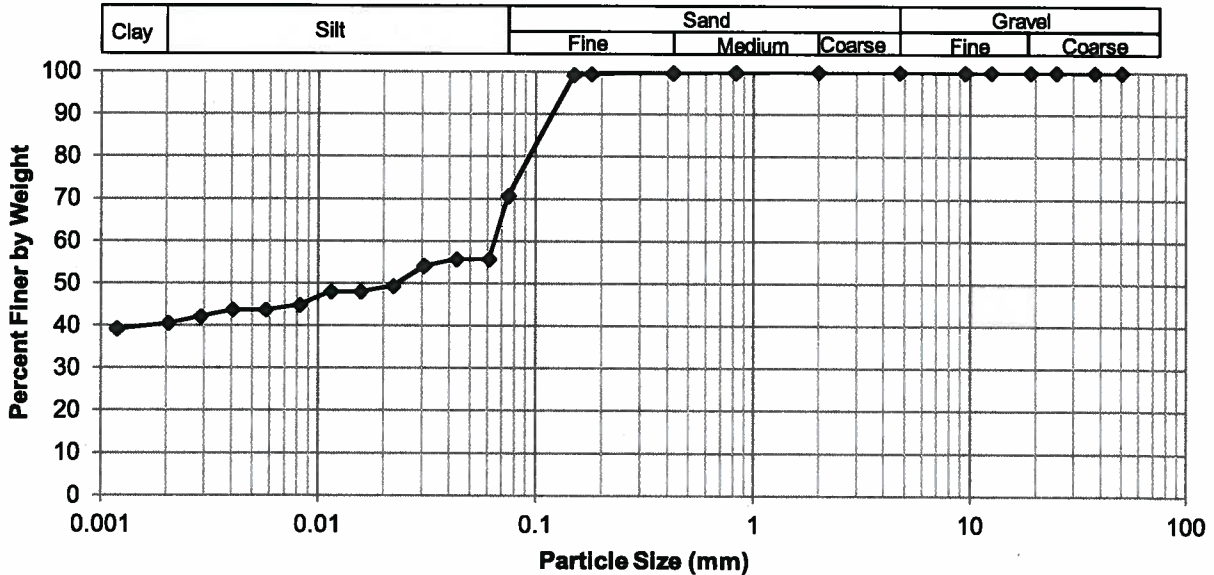
Grain Size Analysis (Hydrometer Method)
ASTM D422

Project No. 0035 011 00
Client Morrison Hershfield
Project Local Streets Package 14-R-01 Heritage Blvd

Test Hole TH14-15
Sample # G55
Depth (m) 0.5 - 0.6
Sample Date 14-Jan-14
Test Date 27-Jan-14
Technician Hachem Ahmed

Gravel	0.0%
Sand	29.3%
Silt	30.2%
Clay	40.4%

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	70.67
37.5	100.00	2.00	100.00	0.0611	55.72
25.0	100.00	0.825	99.92	0.0432	55.72
19.0	100.00	0.425	99.81	0.0308	54.13
12.5	100.00	0.180	99.48	0.0221	49.36
9.50	100.00	0.150	99.26	0.0157	47.99
4.75	100.00	0.075	70.67	0.0115	47.99
				0.0082	44.81
				0.0057	43.69
				0.0041	43.69
				0.0029	42.10
				0.0021	40.51
				0.0012	39.17



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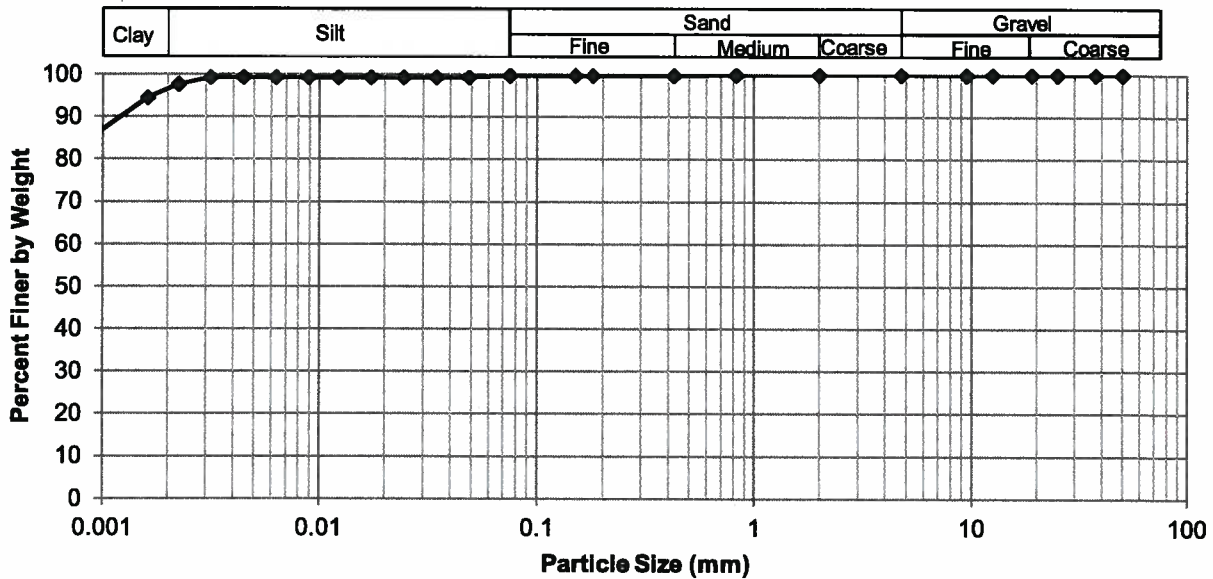
Grain Size Analysis (Hydrometer Method)
ASTM D422

Project No. 0035 011 00
Client Morrison Hershfield
Project Local Streets Package 14-R-01 Heritage Blvd

Test Hole TH14-16
Sample # G47
Depth (m) 0.8 - 0.9
Sample Date 14-Jan-14
Test Date 11-Feb-14
Technician Daniel Mroz

Gravel	0.0%
Sand	0.3%
Silt	3.3%
Clay	96.4%

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	99.72
37.5	100.00	2.00	99.98	0.0487	99.25
25.0	100.00	0.825	99.90	0.0344	99.25
19.0	100.00	0.425	99.78	0.0243	99.25
12.5	100.00	0.180	99.76	0.0172	99.25
9.50	100.00	0.150	99.76	0.0122	99.25
4.75	100.00	0.075	99.72	0.0089	99.25
				0.0063	99.25
				0.0044	99.25
				0.0031	99.25
				0.0022	97.67
				0.0016	94.49
				0.0010	86.55



Photo 1: Asphalt and Concrete Core Sample from Test Hole TH14-14



Photo 2: Asphalt and Concrete Core Sample from Test Hole TH14-15



Photo 3: Asphalt and Concrete Core Sample from Test Hole TH14-16



Quality Engineering | Valued Relationships

Morrison Hershfield

Coring for Wellington Crescent Pathway

Prepared for:

Morrison Hershfield
25 Scurfield Blvd, Unit 1
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Attention: Ron Bruce

Distribution:

Ron Bruce, P.Eng.

Project Number:

0035 012 00

Date:

February 21, 2014
Final Report



Quality Engineering | Valued Relationships

February 21, 2014

Our File No. 0035 012 00

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

**RE: Pavement Structure Investigation Report for
Wellington Crescent Pathway**

TREK Geotechnical Inc. is pleased to submit our report for the pavement structure investigation on Wellington Crescent Pathway

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 "Nelson John Ferreira".

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

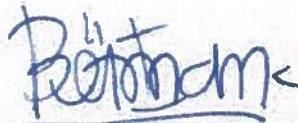
cc: Beta Taryana, E.I.T. (TREK Geotechnical)

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:



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



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Appendix B Photographs of Pavement Core Samples

1.0 Introduction

This report summarizes the results of the pavement structure investigation completed for Wellington Crescent multi-use pathway between Academy Rd. and Park Blvd. N. Information regarding the asphalt and granular base is provided.

2.0 Pavement Structure Investigation and Laboratory Program

A total of 12 test holes were drilled on Wellington Crescent multi-use pathway between Academy Rd. and Park Blvd. N. at the locations shown on Figure 01. The test holes were drilled in order to determine the pavement conditions for rehabilitation of the pathway along this stretch.

The pavement structure investigation was conducted January 24 to January 25, 2014. The pavement structure (asphalt and granular base) were cored by TREK using a portable coring drill press equipped with a hollow 150 mm diameter diamond core drill bit. Core samples were retrieved and the thickness was logged at TREK's materials testing laboratory. Below the core sample a 100 to 240 mm thick granular layer was encountered (19 mm down limestone and/or sand and gravel A-Base). The test hole locations are noted accordingly in the pavement structure summary table included in Appendix A. Photos of the asphalt core and granular base are included in Appendix B.

Test hole locations shown on the figure are based on handheld GPS coordinates. Approximate street address are also provided.

Figure



FILE NAME: 0035 012 00_03B.dwg
 PLOT: 19/02/2014 11:17:17 PM
 Tabset (279mm x 432mm)

0 25 50 75 100m
SCALE: 1:2500 (279mm x 432mm)

LEGEND:
◆ TEST HOLE (TREK, JANUARY, 2014)

NOTES:
1. IMAGE FROM GOOGLE EARTH ON MAY 2, 2013



KEY PLAN
SCALE: N.T.S.

Figure 01
Test Hole Location Plan
Wellington Crescent Pathway

Appendix A

Pavement Structure Summary Table



**Coring for Wellington Crescent Pathway
Pavement Structure Investigation**

Test Hole No.	Test Hole Location Approximate Street Address (UTM Coordinates)	Pavement		Granular Base Material	
		Type	Thickness (mm)	Type	Thickness (mm)
TH14-01	West side of 696 Academy Rd. (628796.84E, 5526224.71N)	Asphalt	58	19 mm Down Limestone	202
TH14-02	West side of 1674 Wellington Crescent (628785.16E, 5526130.66N)	Asphalt	65	19 mm Down Limestone	195
TH14-03	North east of 123 Duncaster St. (628708.38E, 5526081.44N)	Asphalt	105	Sand and Gravel (A-Base)	145
TH14-04	North west of 123 Duncaster St. (628613.99E, 5526071.13N)	Asphalt	140	Sand and Gravel (A-Base)	100
TH14-05	North east of 101 Chataway Blvd. (628520.7E, 5526087N)	Asphalt	68	19 mm Down Limestone	232
TH14-05B	North of 1800 Wellington Crescent (628520.7E, 5526087N)	Asphalt	60	19 mm Down Limestone	240
TH14-06	North of 102 Chataway Blvd. (628430.84E, 5526118.66N)	Asphalt	68	19 mm down Limestone over sand and gravel (A-Base)	237
TH14-07	North of 102 Girton Blvd. (628337.55E, 5526113.27N)	Asphalt	62	19 mm Down Limestone	238
TH14-08	North west of 101 Grenfell Blvd. (628337.55E, 5526113.27N)	Asphalt	128	19 mm Down Limestone	187
TH14-09	North of 101 Handsart Blvd. (628161.93E, 5526089.25N)	Asphalt	150	19 mm Down Limestone	150
TH14-10	North east of 103 Lamont Blvd. (628074E, 5526059.62N)	Asphalt	120	19 mm Down Limestone over Sand and Gravel with some Silt and some Clay	180
TH14-11	North of 100 Lamont Blvd. (628008.81E, 5526004.6N)	Asphalt	88	Sand and Gravel (A-Base)	175
TH14-12	North west of 101 Park Blvd. N. (627927.6E, 5525968.95N)	Asphalt	76	Sand and Gravel (A-Base) over Sand and Gravel (A-Base) with some Silt and some Clay	154

Appendix B

Photographs of Pavements Core Samples



Photo 1: Asphalt Core Sample from Test Hole TH14-01

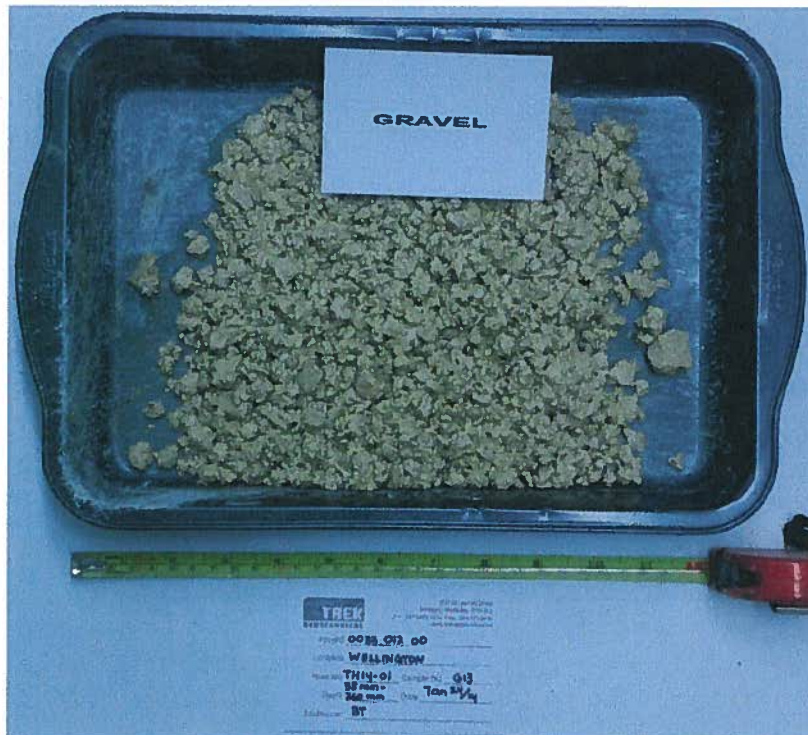


Photo 2: 19 mm Down Limestone Sample from Test Hole TH14-01



Photo 3: Asphalt Core Sample from Test Hole TH14-02

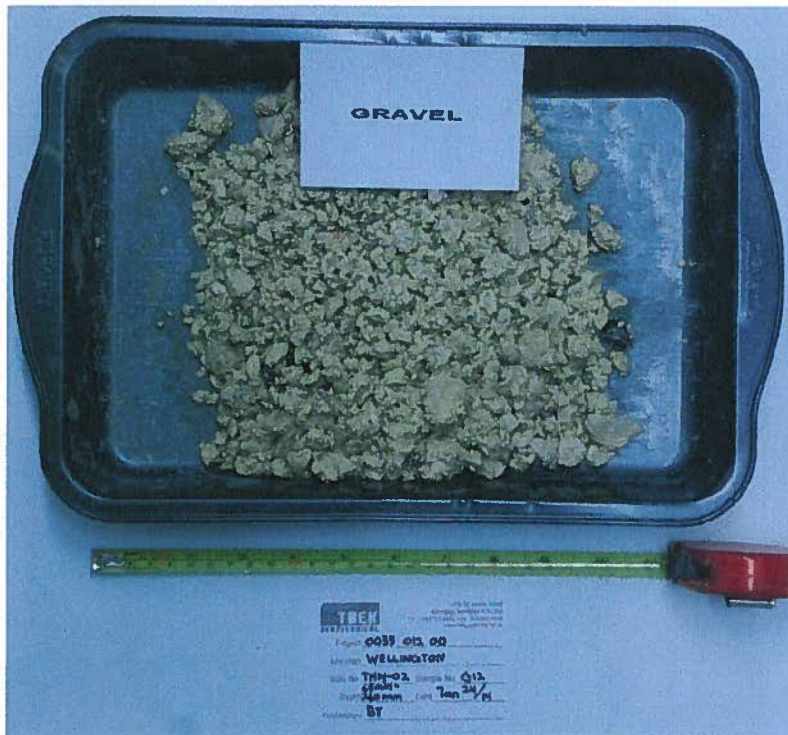


Photo 4: 19 mm Down Limestone Sample from Test Hole TH14-02



Photo 5: Asphalt Core Sample from Test Hole TH14-03



Photo 6: Sand and Gravel (A-Base) Sample from Test Hole TH14-03

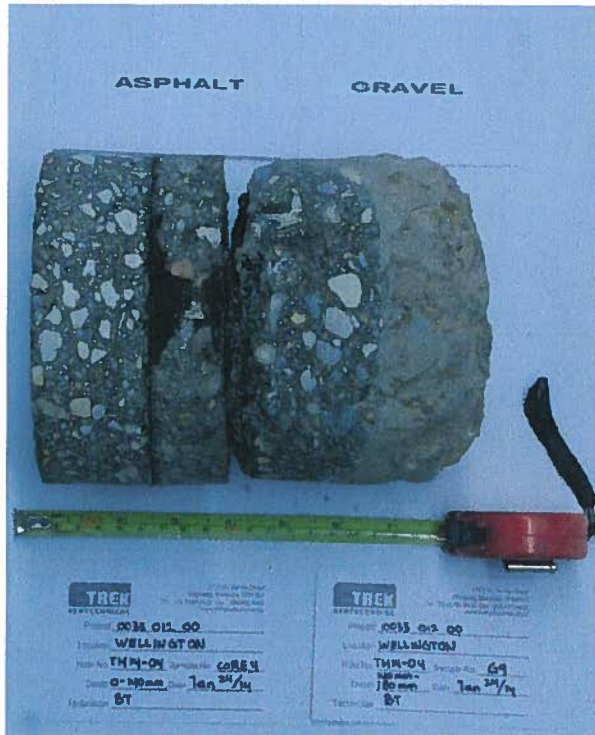


Photo 7: Asphalt Core and 19 mm Down Limestone Sample from Test Hole TH14-04



Photo 8: Sand and Gravel (A-Base) Sample from Test Hole TH14-04



Photo 9: Asphalt Core Sample from Test Hole TH14-05



Photo 10: 19 mm Down Limestone Sample from Test Hole TH14-05



Photo 11: Asphalt Core Sample from Test Hole TH14-05B

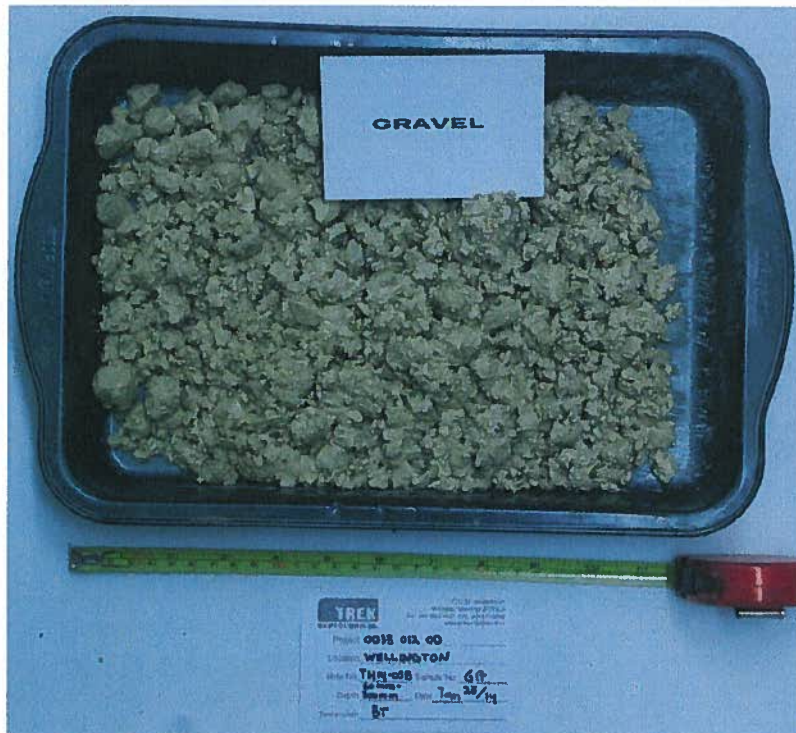


Photo 12: 19 mm Down Limestone Sample from Test Hole TH14-05B



Photo 13: Asphalt Core Sample from Test Hole TH14-06



Photo 14: 19 mm Down Limestone over Sand and Gravel (A-Base) Sample from Test Hole TH14-06



Photo 15: Asphalt Core Sample from Test Hole TH14-07

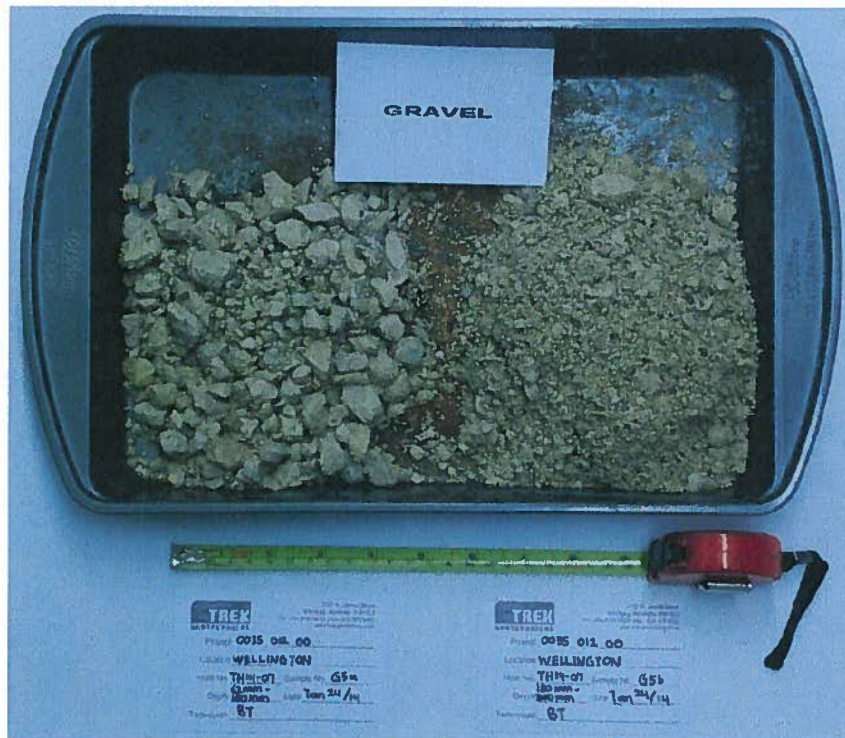


Photo 16: 19 mm Down Limestone Sample from Test Hole TH14-07



Photo 17: Asphalt Core Sample from Test Hole TH14-08



Photo 18: 19 mm Down Limestone Sample from Test Hole TH14-08

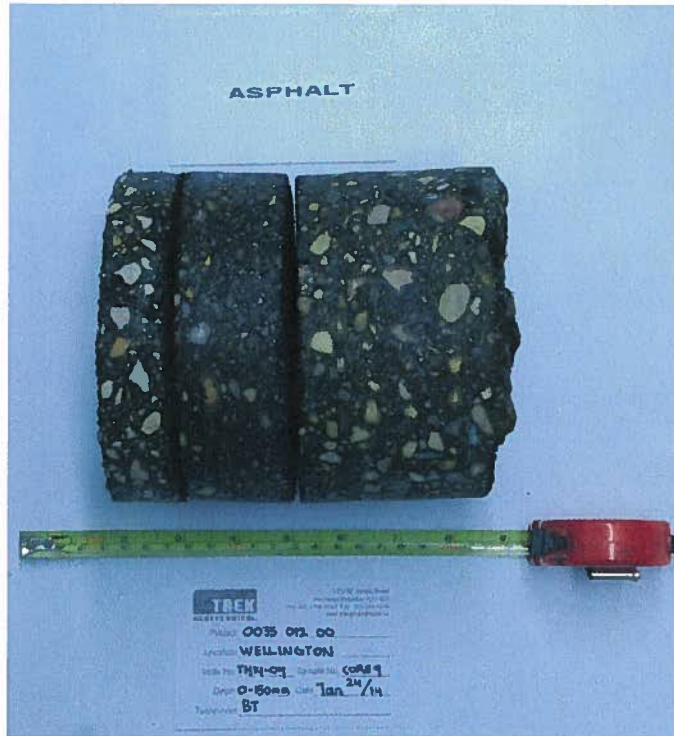


Photo 19: Asphalt Core Sample from Test Hole TH14-09



Photo 20: 19 mm Down Limestone Sample from Test Hole TH14-09

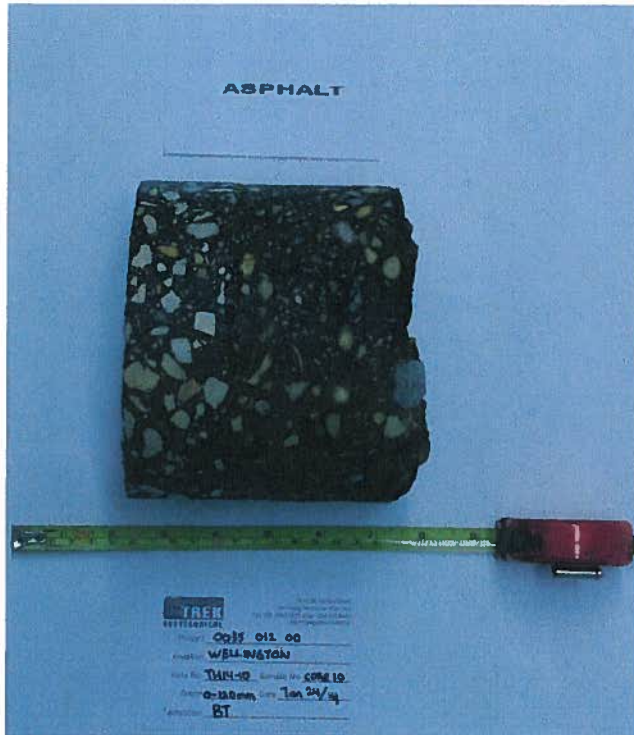


Photo 21: Asphalt Core Sample from Test Hole TH14-10

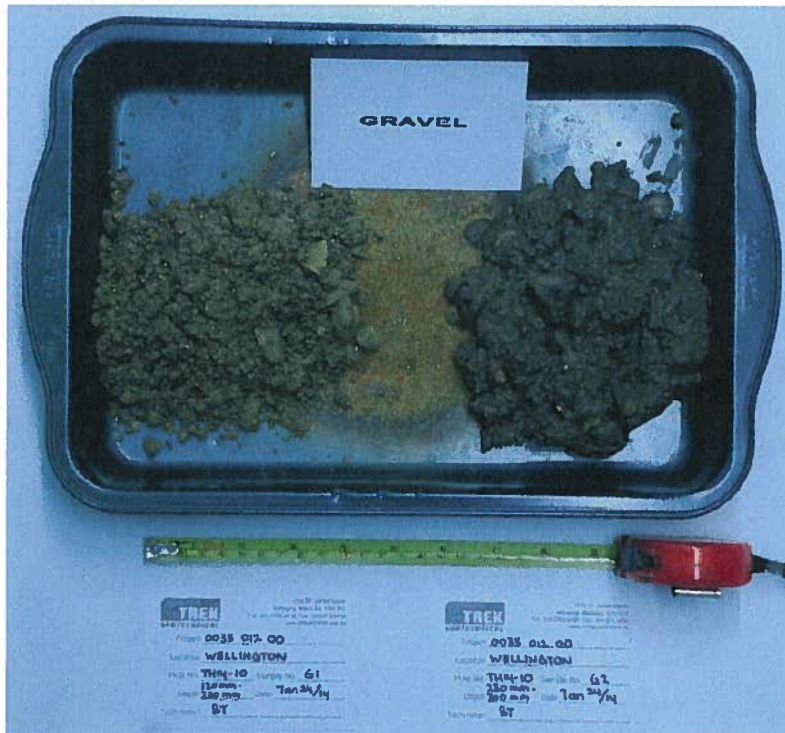


Photo 22: 19 mm Down Limestone over Sand and Gravel with some Silt and some Clay Sample from Test Hole TH14-10



Photo 23: Asphalt Core Sample from Test Hole TH14-11



Photo 24: Sand and Gravel (A-Base) Sample from Test Hole TH14-11



Photo 25: Asphalt Core Sample from Test Hole TH14-12



Photo 26: Sand and Gravel (A-Base) over Sand and Gravel (A-Base) with some Silt and some Clay Sample from Test Hole TH14-12