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Morrison Hershfield

## **2013 City of Winnipeg Regional and Local Street Renewals – Local Streets Package (I3-R-04)**

**Prepared for:**

Ron Bruce  
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Attention: Ron Bruce

**Distribution:**

**Project Number:**

0035 006 00

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April 2013  
Final Report



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April 15, 2013

Our File No. 0035 006 00

Ron Bruce  
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25 Scurfield Blvd, Unit 1  
Winnipeg, MB R3Y 1G4

**RE: Sub-Surface Investigation Report for  
2013 City of Winnipeg Regional and Local Street Renewals – Local Streets Package**

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TREK Geotechnical Inc. is pleased to submit our Report for the sub-surface investigations at three residential streets within Winnipeg.

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: Stephen Renner, C.E.T. (TREK Geotechnical)

## Revision History

Revision No.	Author	Issue Date	Description
0	SLR	April 15, 2013	Final Report

## Authorization Signatures

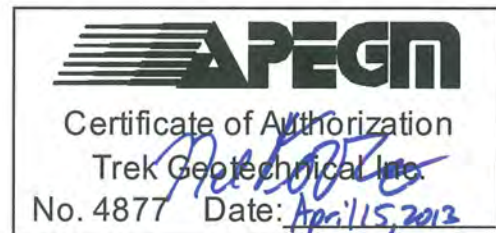
Prepared By:

  
 Stephen Renner, C.E.T  
 Geotechnical Technologist,

Reviewed By:



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



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Appendix C Laidlaw Boulevard from Mountbatten Avenue to Corydon Avenue

## 1.0 Introduction

This report summarizes the results of the sub-surface investigation completed for the proposed 2013 City of Winnipeg Regional and Local Street Renewal Program (PW File #: 13-R-04). The project consists of reconstruction of three residential streets in Winnipeg. 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 25 test holes were drilled at three (3) residential streets within the City of Winnipeg as part of the sub-surface investigation. The test holes drilled at each street are listed in Table 1 and the test hole locations are shown on Figures 01 to 03.

**Table 1. List of Test Holes Drilled at Each Alley**

Street Location	Test Hole
Wavell Avenue from Casey Street to Osborne Service Road	WAV13-01 to WAV13-07
Garwood Avenue from Stafford Street to House #974	GAR13-01 to GAR13-06
Laidlaw Boulevard from Mountbatten Avenue to Corydon Avenue	LAI13-01 to LAI13-12

The sub-surface investigation was conducted on March 21 and 22, 2013. The test holes were drilled to a depth of 3.1 m below road surface by Paddock Drilling Ltd. using their MP8 truck mounted drill rig equipped with 125 mm diameter solid stem augers. The pavement structure (asphalt and/or concrete) was cored by Quality Coring 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 Stephen Renner 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 to 03 are based on measured distances from the nearest curb and monument (i.e. light post, fire hydrant, catch basin, etc.)

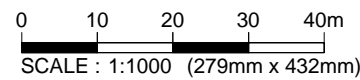
## Figures

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Tabloid (279mm x 432mm)

PLOT: 15/04/2013 9:19:42 AM

FILE NAME: 0035 006 00\_RA.dwg



**LEGEND :**

⊕ TEST HOLE (TREK, 2013)

**NOTES :**

1. TEST HOLE LOCATIONS SHOWN ARE BASED ON MEASURED DISTANCES FROM THE NEAREST CURB AND MONUMENT (i.e. LIGHT POST, FIRE HYDRANT, CATCH BASIN, ETC.)

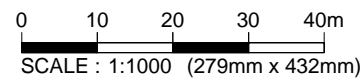
**Figure 01**

Test Hole Location Plan - Wavell Avenue  
Wavell Avenue - Between Casey Street and Osborne Service Road

Tabloid (279mm x 432mm)

PLOT: 15/04/2013 9:21:38 AM

FILE NAME: 0035 006 00\_RA.dwg



**LEGEND :**

⊕ TEST HOLE (TREK, 2013)

**NOTES :**

1. TEST HOLE LOCATIONS SHOWN ARE BASED ON MEASURED DISTANCES FROM THE NEAREST CURB AND MONUMENT (i.e. LIGHT POST, FIRE HYDRANT, CATCH BASIN, ETC.)

**Figure 02**

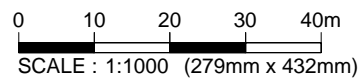
Test Hole Location Plan - Garwood Avenue  
Garwood Avenue - Between Stafford Street and House #974



Tabloid (279mm x 432mm)

PLOT: 15/04/2013 9:25:51 AM

FILE NAME: 0035 006 00\_RA.dwg



**LEGEND :**

⊕ TEST HOLE (TREK, 2013)

**NOTES :**

1. TEST HOLE LOCATIONS SHOWN ARE BASED ON MEASURED DISTANCES FROM THE NEAREST CURB AND MONUMENT (i.e. LIGHT POST, FIRE HYDRANT, CATCH BASIN, ETC.)

**Figure 03**

Test Hole Location Plan - Laidlaw Boulevard  
Laidlaw Boulevard - Between Corydon Avenue and Mountbatten Avenue

## **Appendix A**

### **Wavell Avenue from Casey Street to Osborne Service Road**

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### GENERAL NOTES

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

Major Divisions	USCS Classification	Symbols	Typical Names	Laboratory Classification Criteria		Particle Size					
Coarse-Grained soils (More than half the material is larger than No. 200 sieve size)	Gravels (More than half of coarse fraction is larger than 4.75 mm)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3  Not meeting all gradation requirements for GW  Atterberg limits below "A" line or P.I. less than 4  Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols  Atterberg limits above "A" line or P.I. greater than 7  $C_u = \frac{D_{60}}{D_{10}}$ greater than 6; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3  Not meeting all gradation requirements for SW  Atterberg limits below "A" line or P.I. less than 4  Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols  Atterberg limits above "A" line or P.I. greater than 7	Determine percentages of sand and gravel from grain size curve, depending on percentage of fines (fraction smaller than No. 200 sieve) coarse-grained soils are classified as follows:  Less than 5 percent..... GW, GP, SW, SP More than 12 percent..... GM, GC, SM, SC 6 to 12 percent..... Borderline cases requiring dual symbols*	ASTM Sieve sizes  #10 to #4 #40 to #10 #200 to #40 < #200					
		GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines								
		GM	Silty gravels, gravel-sand-silt mixtures								
		GC	Clayey gravels, gravel-sand-silt mixtures								
	Sands (More than half of coarse fraction is smaller than 4.75 mm)	Clean sands (Little or no fines)	SW				Well-graded sands, gravelly sands, little or no fines				
			SP				Poorly-graded sands, gravelly sands, little or no fines				
		Sands with fines (Appreciable amount of fines)	SM				Silty sands, sand-silt mixtures				
			SC				Clayey sands, sand-clay mixtures				
			Fine-Grained soils (More than half the material is smaller than No. 200 sieve size)				Silt and Clays (Liquid limit less than 50)	ML	Inorganic silts and very fine sands, rock floor, silty or clayey fine sands or clayey silts with slight plasticity		Particle Size mm > 300 75 to 300 19 to 75 4.75 to 19
								CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays		
OL	Organic silts and organic silty clays of low plasticity										
Silt and Clays (Liquid limit greater than 50)	MH	Inorganic silts, micaceous or distomaceous fine sandy or silty soils, organic silts									
	CH	Inorganic clays of high plasticity, fat clays									
	OH	Organic clays of medium to high plasticity, organic silts									
Highly Organic Soils	Pt	Peat and other highly organic soils	Von Post Classification Limit	Strong colour or odour, and often fibrous texture	Material Boulders Cobbles Gravel Coarse Fine						

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

### Other Symbol Types

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

### LEGEND OF ABBREVIATIONS AND SYMBOLS

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

### FRACTION OF SECONDARY SOIL CONSTITUENTS ARE BASED ON THE FOLLOWING TERMINOLOGY

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

### TERMS DESCRIBING CONSISTENCY OR COMPACTION CONDITION

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

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

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

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

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

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



# Sub-Surface Log

Test Hole WAV13-01

1 of 1

Client: Morrison Hershfield Project Number: 0035 006 00  
 Project Name: 2013 Local Streets Package - PW File #: 13-R-04 Location: Wavell Ave. - from Casey St. to Osborne Service Rd.  
 Contractor: Paddock Drilling Ltd. Ground Elevation: Not Surveyed  
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: March 21, 2013

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 <sup>3</sup> )		Particle Size (%)		Undrained Shear Strength (kPa)									
					16	17	18	19	20	21	0	50	100	150	200	250		
		ASPHALT (25 mm thick)		C36														
		CONCRETE (178 mm thick) - rubble		G62														
		CLAY - silty - brown - frozen to 1.5 m, moist and very stiff when thawed - high plasticity  - trace silt lenses (<20 mm diam.)		G63														
-0.5				G64														
-1.0				G65														
-1.5				G66														
-2.0				G67														
-2.5				G68														
-3.0				G69														
				G70														

END OF TEST HOLE AT 3.1 m IN CLAY

Notes:

1. No sloughing or seepage observed.
2. Backfilled test hole with auger cuttings and bentonite pellets 0.2 m below top of pavement, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
3. Test hole located at House #243, 1.7 m south of north curb, 2.3 m west of light standard #2-006-716.

Logged By: Stephen Renner Reviewed By: Nelson Ferreira Project Engineer: Nelson Ferreira

SUB-SURFACE LOG 2013 LOCAL STREET RENEWALS WAVELL TESTHOLE LOGS.GPJ TREK GEOTECHNICAL GDT 4/15/13



# Sub-Surface Log

Test Hole WAV13-02

1 of 1

**Client:** Morrison Hershfield **Project Number:** 0035 006 00  
**Project Name:** 2013 Local Streets Package - PW File #: 13-R-04 **Location:** Wavell Ave. - from Casey St. to Osborne Service Rd.  
**Contractor:** Paddock Drilling Ltd. **Ground Elevation:** Not Surveyed  
**Method:** 125mm Solid Stem Auger, Acker MP8 Truck Mount **Date Drilled:** March 21, 2013

**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 <sup>3</sup> )		Particle Size (%)		Undrained Shear Strength (kPa)									
					16	17	18	19	20	21	50	100	150	200	250			
0.0		ASPHALT (50 mm thick)		C19														
0.0		CONCRETE (100 mm thick) - rubble		G1														
0.0		CLAY - silty - brown - frozen, moist and soft to firm when thawed, high plasticity		G2														
0.5		SILT - clayey, trace sand (fine grained) - brown - frozen, wet and very soft when thawed - intermediate plasticity		G3														
0.5		CLAY - silty - brown - frozen to 1.7 m, moist and stiff when thawed - high plasticity		G4														
1.0		CLAY - silty - brown - frozen to 1.7 m, moist and stiff when thawed - high plasticity		G5														
1.5		CLAY - silty - brown - frozen to 1.7 m, moist and stiff when thawed - high plasticity		G6														
2.0		CLAY - silty - brown - frozen to 1.7 m, moist and stiff when thawed - high plasticity		G7														
2.0		CLAY - silty - brown - frozen to 1.7 m, moist and stiff when thawed - high plasticity		G8														
2.5		- trace oxidation and firm below 2.1 m  - stiff below 2.3 m																
3.0		CLAY - silty - brown - frozen to 1.7 m, moist and stiff when thawed - high plasticity		G9														

END OF TEST HOLE AT 3.1 m IN CLAY

Notes:

1. No sloughing or seepage observed.
2. Backfilled test hole with auger cuttings and bentonite pellets 0.2 m below top of pavement, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
3. Test hole located at House #260, 2.0 m north of south curb, 12.2 m west of light standard #2-029-713.

**Logged By:** Stephen Renner **Reviewed By:** Nelson Ferreira **Project Engineer:** Nelson Ferreira



# Sub-Surface Log

Test Hole WAV13-03

1 of 1

Client: Morrison Hershfield Project Number: 0035 006 00  
 Project Name: 2013 Local Streets Package - PW File #: 13-R-04 Location: Wavell Ave. - from Casey St. to Osborne Service Rd.  
 Contractor: Paddock Drilling Ltd. Ground Elevation: Not Surveyed  
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: March 21, 2013

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 <sup>3</sup> )		Particle Size (%)		Undrained Shear Strength (kPa)								
					16	17	18	19	20	21	0	50	100	150	200	250	
0.00 - 0.05		ASPHALT (50 mm thick)		C37													
0.05 - 0.10		CONCRETE (150 mm thick) - rubble		G10													
0.10 - 1.10		CLAY - silty - dark brown - frozen, moist and soft when thawed - high plasticity - firm to stiff below 0.5 m		G11													
0.10 - 1.10				G12													
0.10 - 1.10				G13													
0.10 - 1.10		- brown below 1.1 m		G14													
0.10 - 1.10				G15													
1.10 - 2.30		SILT - trace to some sand (fine grained), trace clay - light brown - moist, firm - low plasticity		G16													
2.30 - 3.10		CLAY - silty - brown - frozen to 2.3 m, moist and stiff when thawed - high plasticity - stiff below 2.3 m		G17													
3.10 - 3.10				G18													

END OF TEST HOLE AT 3.1 m IN CLAY

Notes:

- No sloughing or seepage observed.
- Backfilled test hole with auger cuttings and bentonite pellets 0.2 m below top of pavement, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
- Test hole located at House #272, 1.1 m north of south curb, 10.2 m west of light standard #2-029-712.

Logged By: Stephen Renner Reviewed By: Nelson Ferreira Project Engineer: Nelson Ferreira

SUB-SURFACE LOG 2013 LOCAL STREET RENEWALS WAVELL TESTHOLE LOGS.GPJ TREK GEOTECHNICAL GDT 4/15/13



# Sub-Surface Log

Test Hole WAV13-04

1 of 1

Client: Morrison Hershfield Project Number: 0035 006 00  
 Project Name: 2013 Local Streets Package - PW File #: 13-R-04 Location: Wavell Ave. - from Casey St. to Osborne Service Rd.  
 Contractor: Paddock Drilling Ltd. Ground Elevation: Not Surveyed  
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: March 21, 2013

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 <sup>3</sup> )		Particle Size (%)		Undrained Shear Strength (kPa)								
					16	17	18	19	20	21	0	50	100	150	200	250	
0.0		ASPHALT (13 mm thick)		C61													
0.0		CONCRETE (140 mm thick) - rubble		G20													
0.0		CLAY - silty - brown - frozen, moist and firm when thawed, high plasticity		G21													
0.5		SILT - clayey, trace sand (fine grained) - light brown - frozen, wet and very soft when thawed - low to intermediate plasticity - moist, soft below 0.8 m		G22													
0.8				G23													
1.5		CLAY - silty - brown - moist, stiff - high plasticity		G26													
2.0				G27													
2.5		- light brown, firm, trace to some silt inclusions (<20 mm diam.), trace to some oxidation below 2.3 m - stiff, trace silt inclusions (<2 mm diam.), trace oxidation below 2.4 m		G28													
3.0				G29													

END OF TEST HOLE AT 3.1 m IN CLAY

Notes:

1. No sloughing or seepage observed.
2. Backfilled test hole with auger cuttings and bentonite pellets 0.2 m below top of pavement, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
3. Test hole located at House #284, 1.6 m north of south curb, 1.0 m west of light standard #2-029-711.

Logged By: Stephen Renner Reviewed By: Nelson Ferreira Project Engineer: Nelson Ferreira

SUB-SURFACE LOG 2013 LOCAL STREET RENEWALS WAVELL TESTHOLE LOGS.GPJ TREK GEOTECHNICAL GDT 4/15/13





# Sub-Surface Log

Test Hole WAV13-05

1 of 1

Client: Morrison Hershfield Project Number: 0035 006 00  
 Project Name: 2013 Local Streets Package - PW File #: 13-R-04 Location: Wavell Ave. - from Casey St. to Osborne Service Rd.  
 Contractor: Paddock Drilling Ltd. Ground Elevation: Not Surveyed  
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: March 21, 2013

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 <sup>3</sup> )		Particle Size (%)		Undrained Shear Strength (kPa)								
					16	17	18	19	20	21	50	100	150	200	250		
0.0		ASPHALT (32 mm thick)		C133													
0.0		CONCRETE (172 mm thick) - rubble		G30													
0.0		CLAY - some silt, some organics, trace sand (medium grained), dark brown to black, frozen, dry to moist and friable when thawed, low plasticity		G31													
0.5		CLAY - silty - dark brown - frozen to 1.5 m, moist and stiff when thawed - high plasticity		G32													
0.5				G33													
1.0				G34													
1.5		- brown below 1.5 m		G35													
2.0		- stiff to very stiff below 2.0 m		G38													
2.0				G39													
3.0				G40													

END OF TEST HOLE AT 3.1 m IN CLAY

Notes:

- No sloughing or seepage observed.
- Backfilled test hole with auger cuttings and bentonite pellets 0.2 m below top of pavement, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
- Test hole located between House #295 and #299, 1.6 m south of north curb, 14.9 m west of light standard #2-054-584.

Logged By: Stephen Renner Reviewed By: Nelson Ferreira Project Engineer: Nelson Ferreira

SUB-SURFACE LOG 2013 LOCAL STREET RENEWALS WAVELL TESTHOLE LOGS.GPJ TREK GEOTECHNICAL GDT 4/15/13



# Sub-Surface Log

Test Hole WAV13-06

1 of 1

Client: Morrison Hershfield Project Number: 0035 006 00  
 Project Name: 2013 Local Streets Package - PW File #: 13-R-04 Location: Wavell Ave. - from Casey St. to Osborne Service Rd.  
 Contractor: Paddock Drilling Ltd. Ground Elevation: Not Surveyed  
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: March 21, 2013

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 <sup>3</sup> )		Particle Size (%)		Undrained Shear Strength (kPa)	
					16	17	18	19	20	21
		ASPHALT (38 mm thick)		C41						
		CONCRETE (165 mm thick) - rubble		G42						
		CLAY - silty - dark brown - frozen, moist and firm when thawed, high plasticity		G43						
-0.5		SILT - clayey, trace sand (fine grained) - light brown - frozen, wet and very soft when thawed - intermediate plasticity - some clay, moist to wet and soft below 0.8 m		G44						
				G45						
		CLAY - silty - brown - frozen to 1.5 m, moist and stiff when thawed - high plasticity		G46						
-1.5				G47						
				G48						
-2.0		- firm below 2.0 m		G49						
		- light brown, firm, trace to some silt inclusions (<20 mm diam.), trace to some oxidation below 2.3 m - trace silt inclusions (<2 mm diam.), trace precipitates (<10 mm diam.) below 2.4 m		G50						
-2.5										
				G51						
-3.0										

END OF TEST HOLE AT 3.1 m IN CLAY

Notes:

1. No sloughing or seepage observed.
2. Backfilled test hole with auger cuttings and bentonite pellets 0.2 m below top of pavement, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
3. Test hole located at House #312, 1.6 m north of south curb, 8.2 m east of light standard #2-029-722.

Logged By: Stephen Renner Reviewed By: Nelson Ferreira Project Engineer: Nelson Ferreira

SUB-SURFACE LOG 2013 LOCAL STREET RENEWALS WAVELL TESTHOLE LOGS.GPJ TREK GEOTECHNICAL GDT 4/15/13



# Sub-Surface Log

Test Hole WAV13-07

1 of 1

Client: Morrison Hershfield Project Number: 0035 006 00  
 Project Name: 2013 Local Streets Package - PW File #: 13-R-04 Location: Wavell Ave. - from Casey St. to Osborne Service Rd.  
 Contractor: Paddock Drilling Ltd. Ground Elevation: Not Surveyed  
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: March 21, 2013

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 <sup>3</sup> )		Particle Size (%)		Undrained Shear Strength (kPa)									
					16	17	18	19	20	21	0	50	100	150	200	250		
0.0		ASPHALT (50 mm thick)		C52														
0.0		CONCRETE (127 mm thick) - rubble		G53														
0.0		CLAY - silty - dark brown - frozen, moist and firm when thawed - high plasticity - stiff below 0.5 m		G54														
0.5				G55														
0.8				G56														
1.0				G57														
1.5			SILT - some sand (fine grained), trace clay - light brown - frozen, dry to moist and friable when thawed - low plasticity		G58													
1.8				G59														
2.0		CLAY - silty - dark brown - moist, very stiff - high plasticity - stiff, brown below 2.3 m		G60														
2.5																		
3.0				G61														

END OF TEST HOLE AT 3.1 m IN CLAY

Notes:

1. No sloughing or seepage observed.
2. Backfilled test hole with auger cuttings and bentonite pellets 0.2 m below top of pavement, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
3. Test hole located at House #319, 2.1 m south of north curb, 22.2 m east of light standard #2-029-723.

Logged By: Stephen Renner Reviewed By: Nelson Ferreira Project Engineer: Nelson Ferreira

SUB-SURFACE LOG 2013 LOCAL STREET RENEWALS WAVELL TESTHOLE LOGS.GPJ TREK GEOTECHNICAL GDT 4/15/13







**Project No.** 0035 006 00  
**Client** Morrison Hershfield  
**Project** 2013 Regional and Local Streets Program - Local Streets Pkg. (13-R-04) - Wavell Avenue

**Sample Date** March 21, 2013  
**Test Date** April 4, 2013  
**Technician** Beta Taryana

Test Hole	WAV13-01	WAV13-01	WAV13-01	WAV13-01	WAV13-01	WAV13-01
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 #	G63	G64	G65	G66	G67	G68
Tare ID	Z94	Z05	F34	Z29	F113	Z110
Mass of tare	8.2	8.3	8.3	8.3	8.1	8.4
Mass wet + tare	311.4	298.4	299.5	331.4	347.8	353.2
Mass dry + tare	244.2	231.5	229.7	259.1	265.6	276.2
Mass water	67.2	66.9	69.8	72.3	82.2	77.0
Mass dry soil	236.0	223.2	221.4	250.8	257.5	267.8
Moisture %	28.5%	30.0%	31.5%	28.8%	31.9%	28.8%

Test Hole	WAV13-01	WAV13-01	WAV13-02	WAV13-02	WAV13-02	WAV13-02
Depth (m)	2.0 - 2.1	2.9 - 3.0	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2
Sample #	G69	G70	G2	G3	G4	G5
Tare ID	Z34	H72	D4	E8	A39	E52
Mass of tare	8.3	8.3	8.2	8.4	8.1	8.4
Mass wet + tare	337.1	335.5	388.1	327.8	362.7	348.4
Mass dry + tare	261.2	259.5	305.5	248.3	292.6	256.9
Mass water	75.9	76.0	82.6	79.5	70.1	91.5
Mass dry soil	252.9	251.2	297.3	239.9	284.5	248.5
Moisture %	30.0%	30.3%	27.8%	33.1%	24.6%	36.8%

Test Hole	WAV13-02	WAV13-02	WAV13-02	WAV13-02	WAV13-03	WAV13-03
Depth (m)	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1	2.9 - 3.0	0.2 - 0.3	0.5 - 0.6
Sample #	G6	G7	G8	G9	G11	G12
Tare ID	E74	E115	E20	H60	F114	K34
Mass of tare	8.5	8.3	8.3	8.4	8.3	8.3
Mass wet + tare	320.4	389.7	376	296.1	295.4	305.3
Mass dry + tare	231.5	276.6	264.3	201.1	215.3	228.4
Mass water	88.9	113.1	111.7	95.0	80.1	76.9
Mass dry soil	223.0	268.3	256.0	192.7	207.0	220.1
Moisture %	39.9%	42.2%	43.6%	49.3%	38.7%	34.9%



**Project No.** 0035 006 00  
**Client** Morrison Hershfield  
**Project** 2013 Regional and Local Streets Program - Local Streets Pkg. (13-R-04) - Wavell Avenue

**Sample Date** March 21, 2013  
**Test Date** April 4, 2013  
**Technician** Beta Taryana

Test Hole	WAV13-03	WAV13-03	WAV13-03	WAV13-03	WAV13-03	WAV13-03
Depth (m)	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8	2.1 - 2.3	2.9 - 3.0
Sample #	G13	G14	G15	G16	G17	G18
Tare ID	F30	W96	W65	K4	F51	P23
Mass of tare	8.2	8.4	8.2	8.4	8.3	8.2
Mass wet + tare	294.8	283.9	447.1	375.7	392.3	350.3
Mass dry + tare	223.3	216.7	348	316.7	300.2	249.4
Mass water	71.5	67.2	99.1	59.0	92.1	100.9
Mass dry soil	215.1	208.3	339.8	308.3	291.9	241.2
Moisture %	33.2%	32.3%	29.2%	19.1%	31.6%	41.8%

Test Hole	WAV13-04	WAV13-04	WAV13-04	WAV13-04	WAV13-04	WAV13-04
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 #	G21	G22	G23	G24	G25	G26
Tare ID	E67	P16	D28	H47	A104	E70
Mass of tare	8.2	8.4	8.2	8.4	8.3	8.5
Mass wet + tare	303.9	424.4	415.5	402.8	381.1	310.9
Mass dry + tare	237	301.2	340.7	334.3	315.8	226.2
Mass water	66.9	123.2	74.8	68.5	65.3	84.7
Mass dry soil	228.8	292.8	332.5	325.9	307.5	217.7
Moisture %	29.2%	42.1%	22.5%	21.0%	21.2%	38.9%

Test Hole	WAV13-04	WAV13-04	WAV13-04	WAV13-05	WAV13-05	WAV13-05
Depth (m)	2.0 - 2.1	2.3 - 2.4	2.9 - 3.0	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9
Sample #	G27	G28	G29	G31	G32	G33
Tare ID	Z102	N71	K3	E132	H53	Z111
Mass of tare	8.4	8.3	8.4	8.3	8.4	8.3
Mass wet + tare	296.7	316	347.2	306.2	365.6	372.8
Mass dry + tare	207	230.2	241.1	231.8	278.7	284.6
Mass water	89.7	85.8	106.1	74.4	86.9	88.2
Mass dry soil	198.6	221.9	232.7	223.5	270.3	276.3
Moisture %	45.2%	38.7%	45.6%	33.3%	32.1%	31.9%



**Project No.** 0035 006 00  
**Client** Morrison Hershfield  
**Project** 2013 Regional and Local Streets Program - Local Streets Pkg. (13-R-04) - Wavell Avenue

**Sample Date** March 21, 2013  
**Test Date** April 4, 2013  
**Technician** Beta Taryana

<b>Test Hole</b>	WAV13-05	WAV13-05	WAV13-05	WAV13-05	WAV13-05	WAV13-06
<b>Depth (m)</b>	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1	2.9 - 3.0	0.2 - 0.3
<b>Sample #</b>	G34	G35	G38	G39	G40	G43
<b>Tare ID</b>	W38	W88	Z16	Z10	W68	E97
<b>Mass of tare</b>	8.2	8.4	8.3	8.3	8.3	8.5
<b>Mass wet + tare</b>	386	360.8	369.3	384.1	419.7	357.7
<b>Mass dry + tare</b>	299.1	279.7	282.1	296.4	327.9	276.5
<b>Mass water</b>	86.9	81.1	87.2	87.7	91.8	81.2
<b>Mass dry soil</b>	290.9	271.3	273.8	288.1	319.6	268.0
<b>Moisture %</b>	29.9%	29.9%	31.8%	30.4%	28.7%	30.3%

<b>Test Hole</b>	WAV13-06	WAV13-06	WAV13-06	WAV13-06	WAV13-06	WAV13-06
<b>Depth (m)</b>	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1
<b>Sample #</b>	G44	G45	G46	G47	G48	G49
<b>Tare ID</b>	F24	H7	F21	W13	Z131	D36
<b>Mass of tare</b>	8.3	8.2	8.3	8.3	8.3	8.5
<b>Mass wet + tare</b>	613.7	486.9	423.9	365.1	341.6	444.2
<b>Mass dry + tare</b>	431.2	383.1	336.7	282.3	253.7	330.9
<b>Mass water</b>	182.5	103.8	87.2	82.8	87.9	113.3
<b>Mass dry soil</b>	422.9	374.9	328.4	274.0	245.4	322.4
<b>Moisture %</b>	43.2%	27.7%	26.6%	30.2%	35.8%	35.1%

<b>Test Hole</b>	WAV13-06	WAV13-06	WAV13-07	WAV13-07	WAV13-07	WAV13-07
<b>Depth (m)</b>	2.3 - 2.4	2.9 - 3.0	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2
<b>Sample #</b>	G50	G51	G54	G55	G56	G57
<b>Tare ID</b>	N107	N113	Z95	N79	E29	C10
<b>Mass of tare</b>	8.3	8.5	8.3	8.3	8.3	8.3
<b>Mass wet + tare</b>	422	420.8	336.8	397.9	366.2	356
<b>Mass dry + tare</b>	311.6	291.6	245.8	301.7	284.4	285.3
<b>Mass water</b>	110.4	129.2	91.0	96.2	81.8	70.7
<b>Mass dry soil</b>	303.3	283.1	237.5	293.4	276.1	277.0
<b>Moisture %</b>	36.4%	45.6%	38.3%	32.8%	29.6%	25.5%





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## Moisture Content Report ASTM D2216-98

**Project No.** 0035 006 00  
**Client** Morrison Hershfield  
**Project** 2013 Regional and Local Streets Program - Local Streets Pkg. (13-R-04) - Wavell Avenue

**Sample Date** March 21, 2013  
**Test Date** April 4, 2013  
**Technician** Beta Taryana

Test Hole	WAV13-07	WAV13-07	WAV13-07	WAV13-07		
Depth (m)	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1	2.9 - 3.0		
Sample #	G58	G59	G60	G61		
Tare ID	F87	F121	A31	H45		
Mass of tare	8.2	8.3	8.5	8.3		
Mass wet + tare	353.7	414	390	374.5		
Mass dry + tare	299.7	355.8	288.5	263.3		
Mass water	54.0	58.2	101.5	111.2		
Mass dry soil	291.5	347.5	280.0	255.0		
Moisture %	18.5%	16.7%	36.3%	43.6%		



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**Atterberg Limits  
 ASTM D4318**

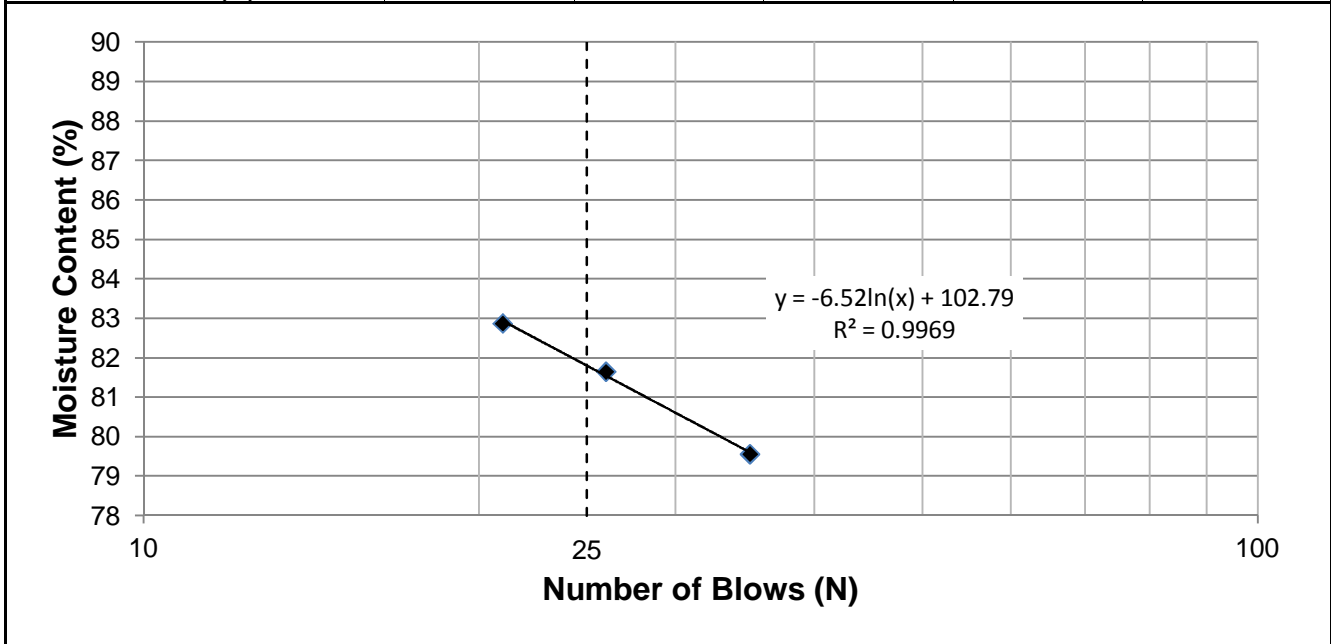
**Project No.** 0035 006 00  
**Client** Morrison Hershfield  
**Project** 2013 City of Winnipeg Regional and Local Streets Program - Local Streets Pkg. (13-R-04)

**Test Hole** WAV13-03  
**Sample #** G13  
**Depth (m)** 0.8 - 0.9  
**Sample Date** 21-Mar-13  
**Test Date** 11-Apr-13  
**Technician** Beta Taryana

<b>Liquid Limit</b>	82
<b>Plastic Limit</b>	27
<b>Plasticity Index</b>	55

**Liquid Limit**

Trial #	1	2	3	4	5
<b>Number of Blows (N)</b>	35	26	21		
<b>Mass Wet Soil + Tare (g)</b>	25.283	25.551	25.303		
<b>Mass Dry Soil + Tare (g)</b>	20.293	20.376	20.232		
<b>Mass Tare (g)</b>	14.021	14.038	14.113		
<b>Mass Water (g)</b>	4.990	5.175	5.071		
<b>Mass Dry Soil (g)</b>	6.272	6.338	6.119		
<b>Moisture Content (%)</b>	79.560	81.650	82.873		



**Plastic Limit**

Trial #	1	2	3	4	5
<b>Mass Wet Soil + Tare (g)</b>	20.767	20.346			
<b>Mass Dry Soil + Tare (g)</b>	19.381	18.990			
<b>Mass Tare (g)</b>	14.173	14.050			
<b>Mass Water (g)</b>	1.386	1.356			
<b>Mass Dry Soil (g)</b>	5.208	4.940			
<b>Moisture Content (%)</b>	26.613	27.449			



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**Atterberg Limits  
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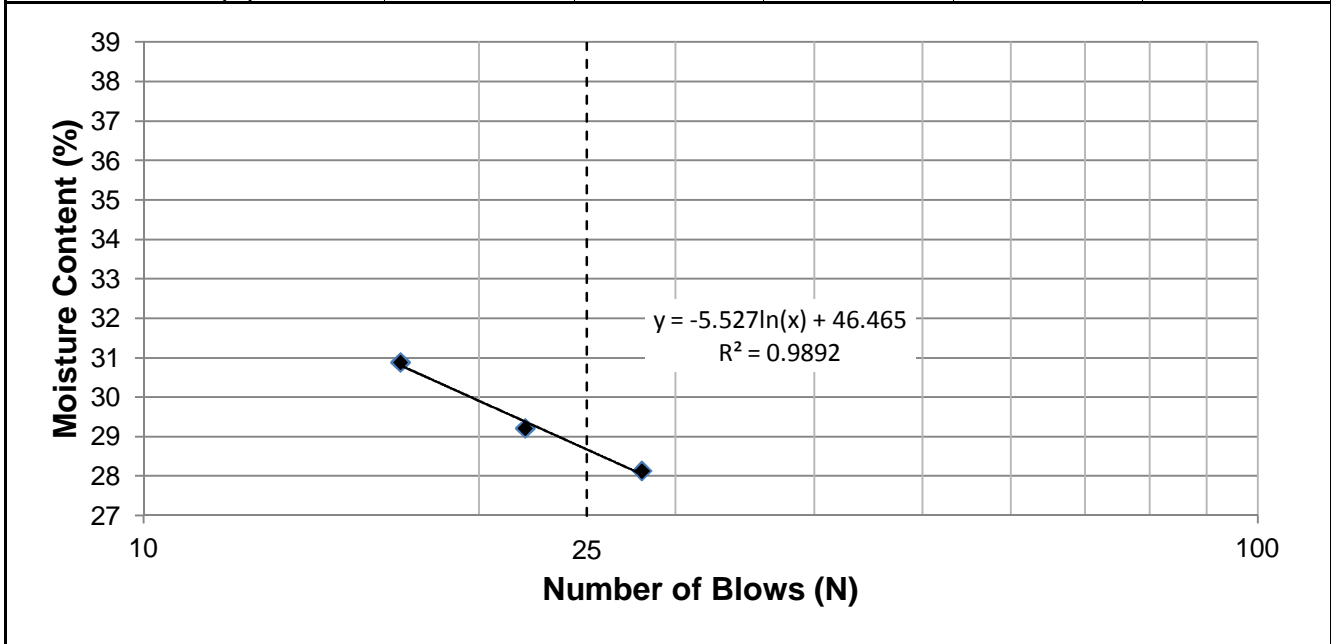
**Project No.** 0035 006 00  
**Client** Morrison Hershfield  
**Project** 2013 City of Winnipeg Regional and Local Streets Program - Local Streets Pkg. (13-R-04)

**Test Hole** WAV13-04  
**Sample #** G23  
**Depth (m)** 0.8 - 0.9  
**Sample Date** 21-Mar-13  
**Test Date** 11-Apr-13  
**Technician** Beta Taryana

<b>Liquid Limit</b>	29
<b>Plastic Limit</b>	15
<b>Plasticity Index</b>	14

**Liquid Limit**

Trial #	1	2	3	4	5
<b>Number of Blows (N)</b>	28	22	17		
<b>Mass Wet Soil + Tare (g)</b>	27.807	27.310	27.572		
<b>Mass Dry Soil + Tare (g)</b>	24.773	24.352	24.353		
<b>Mass Tare (g)</b>	13.989	14.227	13.931		
<b>Mass Water (g)</b>	3.034	2.958	3.219		
<b>Mass Dry Soil (g)</b>	10.784	10.125	10.422		
<b>Moisture Content (%)</b>	28.134	29.215	30.887		



**Plastic Limit**

Trial #	1	2	3	4	5
<b>Mass Wet Soil + Tare (g)</b>	20.417	20.339			
<b>Mass Dry Soil + Tare (g)</b>	19.616	19.513			
<b>Mass Tare (g)</b>	14.217	14.136			
<b>Mass Water (g)</b>	0.801	0.826			
<b>Mass Dry Soil (g)</b>	5.399	5.377			
<b>Moisture Content (%)</b>	14.836	15.362			



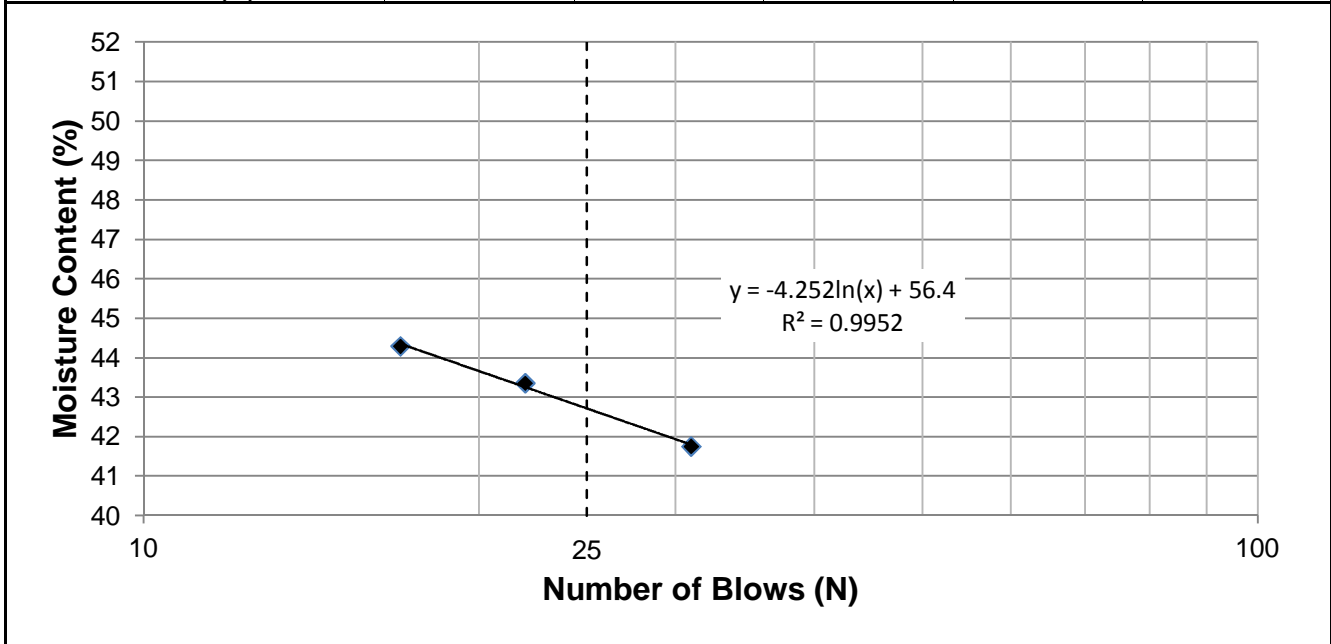
**Project No.** 0035 006 00  
**Client** Morrison Hershfield  
**Project** 2013 City of Winnipeg Regional and Local Streets Program - Local Streets Pkg. (13-R-04)

**Test Hole** WAV13-06  
**Sample #** G44  
**Depth (m)** 0.5 - 0.6  
**Sample Date** 21-Mar-13  
**Test Date** 11-Apr-13  
**Technician** Beta Taryana

<b>Liquid Limit</b>	43
<b>Plastic Limit</b>	16
<b>Plasticity Index</b>	26

**Liquid Limit**

Trial #	1	2	3	4	5
<b>Number of Blows (N)</b>	31	22	17		
<b>Mass Wet Soil + Tare (g)</b>	26.026	26.394	26.609		
<b>Mass Dry Soil + Tare (g)</b>	22.408	22.682	22.677		
<b>Mass Tare (g)</b>	13.743	14.121	13.800		
<b>Mass Water (g)</b>	3.618	3.712	3.932		
<b>Mass Dry Soil (g)</b>	8.665	8.561	8.877		
<b>Moisture Content (%)</b>	41.754	43.359	44.294		



**Plastic Limit**

Trial #	1	2	3	4	5
<b>Mass Wet Soil + Tare (g)</b>	20.683	20.982			
<b>Mass Dry Soil + Tare (g)</b>	19.739	19.997			
<b>Mass Tare (g)</b>	14.037	13.968			
<b>Mass Water (g)</b>	0.944	0.985			
<b>Mass Dry Soil (g)</b>	5.702	6.029			
<b>Moisture Content (%)</b>	16.556	16.338			

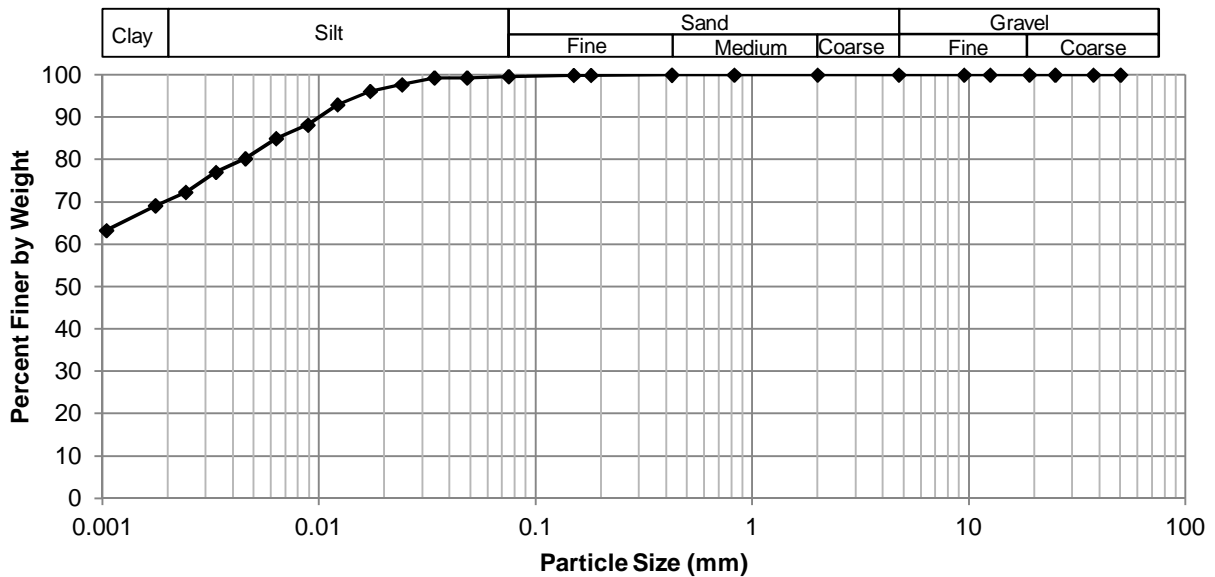


**Project No.** 0035 006 00  
**Client** Morrison Hershfield  
**Project** 2013 City of Winnipeg Regional and Local Streets Program - Local Streets Pkg. (13-R-04)

**Test Hole** WAV13-03  
**Sample #** G13  
**Depth (m)** 0.8 - 0.9  
**Sample Date** 21-Mar-13  
**Test Date** 10-Apr-13  
**Technician** Beta Taryana

<b>Gravel</b>	0.0%
<b>Sand</b>	0.4%
<b>Silt</b>	29.5%
<b>Clay</b>	70.1%

**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	99.58
37.5	100.00	2.00	100.00	0.0482	99.26
25.0	100.00	0.825	100.00	0.0341	99.26
19.0	100.00	0.425	99.95	0.0241	97.68
12.5	100.00	0.180	99.89	0.0172	96.09
9.50	100.00	0.150	99.86	0.0122	92.91
4.75	100.00	0.075	99.58	0.0089	88.15
				0.0063	84.97
				0.0046	80.21
				0.0033	77.03
				0.0024	72.27
				0.0018	69.09
				0.0010	63.24



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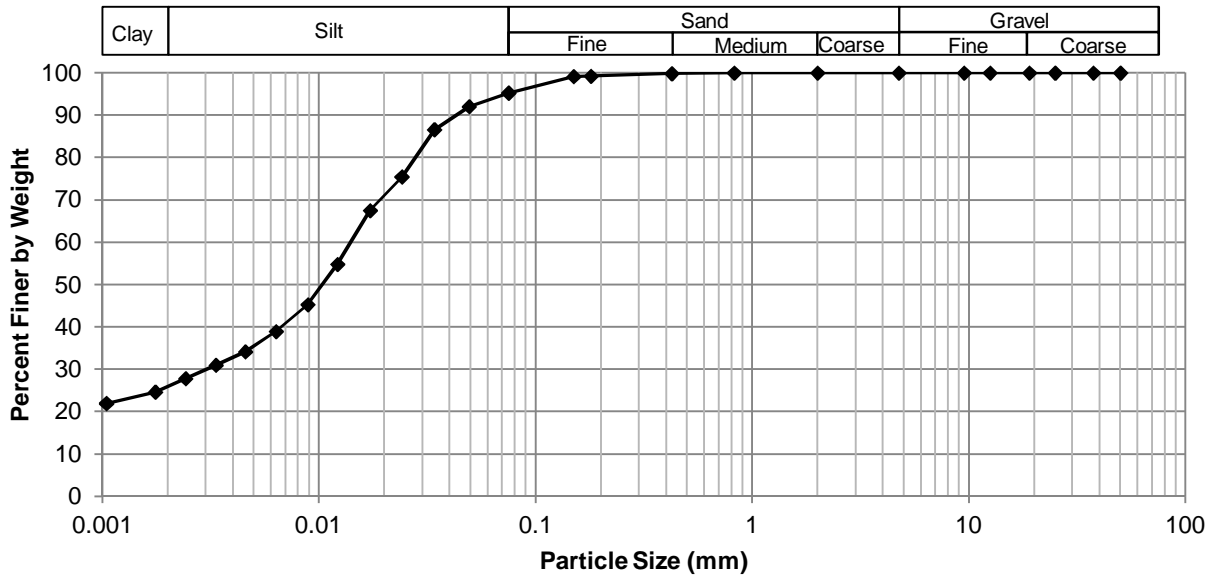
**Grain Size Analysis (Hydrometer Method)**  
**ASTM D422**

**Project No.** 0035 006 00  
**Client** Morrison Hershfield  
**Project** 2013 City of Winnipeg Regional and Local Streets Program - Local Streets Pkg. (13-R-04)

**Test Hole** WAV13-04  
**Sample #** G23  
**Depth (m)** 0.8 - 0.9  
**Sample Date** 21-Mar-13  
**Test Date** 10-Apr-13  
**Technician** Beta Taryana

<b>Gravel</b>	0.0%
<b>Sand</b>	4.8%
<b>Silt</b>	68.9%
<b>Clay</b>	26.3%

**Particle Size Distribution Curve**



Gravel		Sand		Silt and Clay	
Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing
50.0	100.00	4.75	100.00	0.0750	95.25
37.5	100.00	2.00	100.00	0.0493	92.03
25.0	100.00	0.825	99.99	0.0341	86.56
19.0	100.00	0.425	99.81	0.0241	75.44
12.5	100.00	0.180	99.24	0.0172	67.50
9.50	100.00	0.150	99.12	0.0122	54.80
4.75	100.00	0.075	95.25	0.0089	45.27
				0.0063	38.92
				0.0046	34.15
				0.0033	30.98
				0.0024	27.80
				0.0018	24.62
				0.0010	21.95



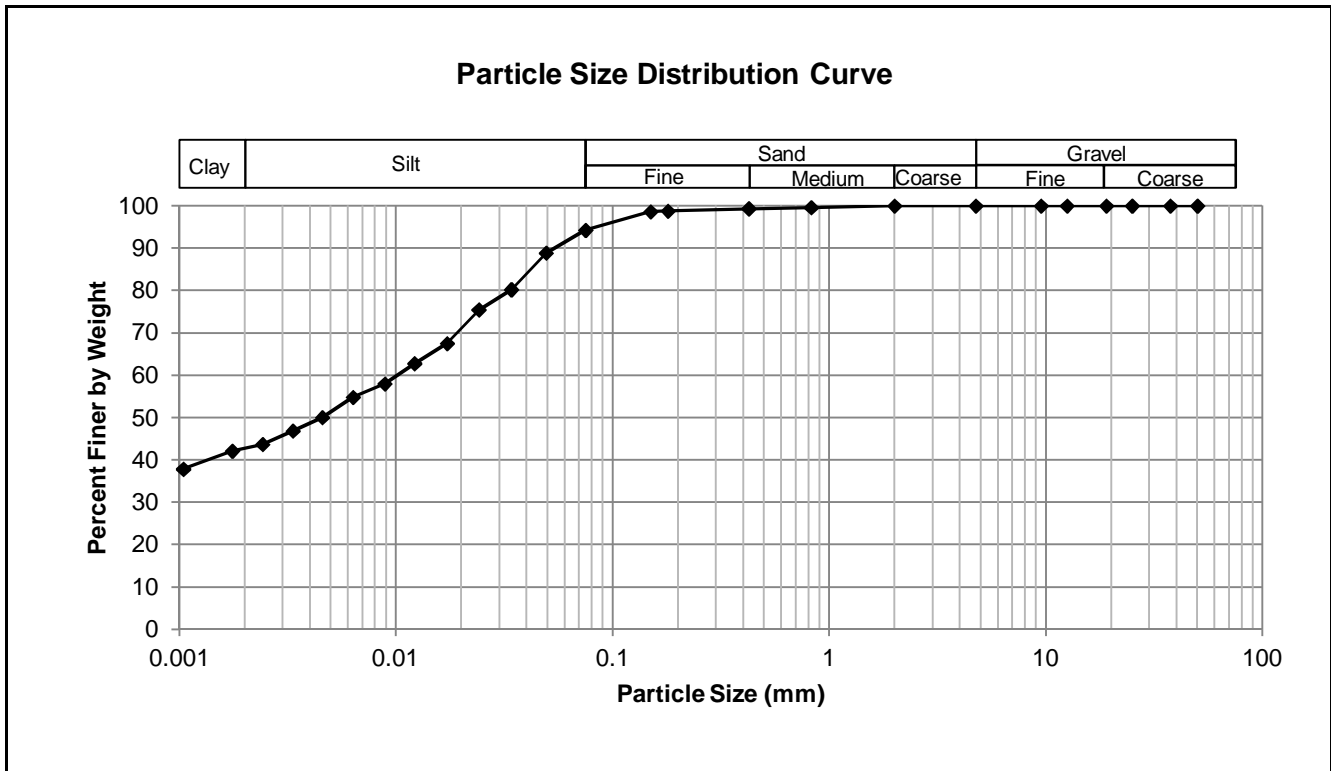
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**Grain Size Analysis (Hydrometer Method)**  
**ASTM D422**

**Project No.** 0035 006 00  
**Client** Morrison Hershfield  
**Project** 2013 City of Winnipeg Regional and Local Streets Program - Local Streets Pkg. (13-R-04)

**Test Hole** WAV13-06  
**Sample #** G44  
**Depth (m)** 0.5 - 0.6  
**Sample Date** 21-Mar-13  
**Test Date** 10-Apr-13  
**Technician** Beta Taryana

<b>Gravel</b>	0.0%
<b>Sand</b>	0.0%
<b>Silt</b>	57.8%
<b>Clay</b>	42.2%



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	94.23
37.5	100.00	2.00	100.00	0.0493	88.85
25.0	100.00	0.825	99.58	0.0341	80.21
19.0	100.00	0.425	99.32	0.0241	75.44
12.5	100.00	0.180	98.77	0.0172	67.50
9.50	100.00	0.150	98.63	0.0122	62.74
4.75	100.00	0.075	94.23	0.0089	57.97
				0.0063	54.80
				0.0046	50.03
				0.0033	46.86
				0.0024	43.68
				0.0018	42.09
				0.0010	37.83



Photo 1: Asphalt Core Sample from Test Hole WAV13-01



Photo 2: Asphalt Core Sample from Test Hole WAV13-02





Photo 3: Asphalt Core sample from Test Hole WAV13-03



Photo 4: Asphalt Core sample from Test Hole WAV13-04



Photo 5: Asphalt and Concrete Core sample from Test Hole WAV13-05



Photo 6: Asphalt Core sample from Test Hole WAV13-06



Photo 7: Asphalt and Concrete core sample from Test Hole WAV13-07

## **Appendix B**

### **Garwood Avenue from Stafford Street to House #974**

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### GENERAL NOTES

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

Major Divisions	USCS Classification	Symbols	Typical Names	Laboratory Classification Criteria		Particle Size			
Coarse-Grained soils (More than half the material is larger than No. 200 sieve size)	Gravels (More than half of coarse fraction is larger than 4.75 mm)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines	Determine percentages of sand and gravel from grain size curve, depending on percentage of fines (fraction smaller than No. 200 sieve) coarse-grained soils are classified as follows:  Less than 5 percent..... GW, GP, SW, SP More than 12 percent..... GM, GC, SM, SC 6 to 12 percent..... Borderline cases requiring dual symbols*	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3	ASTM Sieve sizes #10 to #4 #40 to #10 #200 to #40 < #200			
		GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines		Not meeting all gradation requirements for GW				
		GM	Silty gravels, gravel-sand-silt mixtures		Atterberg limits below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols			
		GC	Clayey gravels, gravel-sand-silt mixtures		Atterberg limits above "A" line or P.I. greater than 7				
	Sands (More than half of coarse fraction is smaller than 4.75 mm)	Clean sands (Little or no fines)	SW		Well-graded sands, gravelly sands, little or no fines	$C_u = \frac{D_{60}}{D_{10}}$ greater than 6; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3	mm 2.00 to 4.75 0.425 to 2.00 0.075 to 0.425 < 0.075		
			SP		Poorly-graded sands, gravelly sands, little or no fines	Not meeting all gradation requirements for SW			
		Sands with fines (Appreciable amount of fines)	SM		Silty sands, sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols		
			SC		Clayey sands, sand-clay mixtures	Atterberg limits above "A" line or P.I. greater than 7			
			Fine-Grained soils (More than half the material is smaller than No. 200 sieve size)		Sils and Clays (Liquid limit less than 50)	ML	Inorganic silts and very fine sands, rock floor, silty or clayey fine sands or clayey silts with slight plasticity		Material Sand Coarse Medium Fine Silt or Clay
						CL	Inorganic clays of low to medium plasticity, gravelly clays, silty clays, lean clays		
OL	Organic silts and organic silty clays of low plasticity								
Sils and Clays (Liquid limit greater than 50)	MH	Inorganic silts, micaceous or distomaceous fine sandy or silty soils, organic silts							
	CH	Inorganic clays of high plasticity, fat clays							
	OH	Organic clays of medium to high plasticity, organic silts							
	Pt	Peat and other highly organic soils		Von Post Classification Limit	Strong colour or odour, and often fibrous texture				

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

### Other Symbol Types

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

## LEGEND OF ABBREVIATIONS AND SYMBOLS

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

## FRACTION OF SECONDARY SOIL CONSTITUENTS ARE BASED ON THE FOLLOWING TERMINOLOGY

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

## TERMS DESCRIBING CONSISTENCY OR COMPACTION CONDITION

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

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

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

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

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

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



# Sub-Surface Log

Test Hole GAR13-01

1 of 1

Client: Morrison Hershfield Project Number: 0035 006 00  
 Project Name: 2013 Local Streets Package - PW File #: 13-R-04 Location: Garwood Ave. - from Stafford St. to House #974  
 Contractor: Paddock Drilling Ltd. Ground Elevation: Not Surveyed  
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: March 21, 2013

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 <sup>3</sup> )		Particle Size (%)		Undrained Shear Strength (kPa)									
					16	17	18	19	20	21	0	50	100	150	200	250		
0.0		CONCRETE (200 mm thick) - rubble below 150 mm		C71														
0.0		CLAY - some silt, trace sand (medium and coarse grained), trace organics - dark brown - frozen, moist and firm when thawed - high plasticity - firm to stiff below 0.5 m		G72														
0.5				G73														
0.5				G74														
1.0		SILT - clayey, trace sand (fine grained) - light brown - frozen, dry to moist and firm when thawed - low plasticity  - trace clay below 1.4 m		G75														
1.0				G76														
1.5				G77														
2.0		CLAY - silty, trace silt inclusions (<10 mm diam.) - brown - moist, stiff - high plasticity  - firm below 2.4 m		G78														
2.0				G79														
2.5																		
3.0				G80														

END OF TEST HOLE AT 3.1 m IN CLAY

Notes:

- No sloughing or seepage observed.
- Backfilled test hole with auger cuttings and bentonite pellets 0.2 m below top of pavement, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
- Test hole located at House #974, 1.7 m north of south curb, 4.9 m east of light standard #2-026-372.

Logged By: Stephen Renner Reviewed By: Nelson Ferreira Project Engineer: Nelson Ferreira

SUB-SURFACE LOG 2013 LOCAL STREET RENEWALS GARWOOD TESTHOLE LOGS.GPJ TREK GEOTECHNICAL.GDT 4/15/13



# Sub-Surface Log

Test Hole GAR13-02

1 of 1

Client: Morrison Hershfield Project Number: 0035 006 00  
 Project Name: 2013 Local Streets Package - PW File #: 13-R-04 Location: Garwood Ave. - from Stafford St. to House #974  
 Contractor: Paddock Drilling Ltd. Ground Elevation: Not Surveyed  
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: March 21, 2013

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 <sup>3</sup> )		Particle Size (%)		Undrained Shear Strength (kPa)								
					16	17	18	19	20	21	0	50	100	150	200	250	
0.0 - 0.1		CONCRETE (150 mm thick) - rubble below 100 mm		C81													
0.1 - 0.4		CLAY - some silt, trace sand (medium and coarse grained), trace organics, trace oxidation - dark brown - frozen, moist and firm to stiff when thawed - high plasticity		G82													
0.4 - 0.5				G83													
0.5 - 0.8				G84													
0.8 - 1.0				G85													
1.0 - 1.5		SILT - clayey, trace sand (fine grained) - light brown - frozen, dry to moist and stiff when thawed - low plasticity		G86													
1.5 - 2.0		CLAY - silty - dark brown - frozen to 2.0 m, moist and stiff when thawed - high plasticity		G87													
2.0 - 2.3		- brown, trace silt inclusions (<10 mm diam.) below 2.0 m		G88													
2.3 - 2.4		- firm, trace to some silt inclusions (<20 mm diam.), trace to some oxidation below 2.3 m		G89													
2.4 - 3.0		- trace silt inclusions (<5 mm diam.) below 2.4 m		G90													

END OF TEST HOLE AT 3.1 m IN CLAY

Notes:

- No sloughing or seepage observed.
- Backfilled test hole with auger cuttings and bentonite pellets 0.2 m below top of pavement, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
- Test hole located at House #962, 2.4 m south of north curb, 15.9 m west of light standard #2-026-301.

Logged By: Stephen Renner Reviewed By: Nelson Ferreira Project Engineer: Nelson Ferreira

SUB-SURFACE LOG 2013 LOCAL STREET RENEWALS GARWOOD TESTHOLE LOGS.GPJ TREK GEOTECHNICAL.GDT 4/15/13





# Sub-Surface Log

Test Hole GAR13-03

1 of 1

Client: Morrison Hershfield Project Number: 0035 006 00  
 Project Name: 2013 Local Streets Package - PW File #: 13-R-04 Location: Garwood Ave. - from Stafford St. to House #974  
 Contractor: Paddock Drilling Ltd. Ground Elevation: Not Surveyed  
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: March 21, 2013

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 <sup>3</sup> )		Particle Size (%)		Undrained Shear Strength (kPa)								
					16	17	18	19	20	21	0	50	100	150	200	250	
0.0 - 0.1		CONCRETE (177 mm thick) - rubble below 100 mm		C91													
0.1 - 1.5		CLAY - some silt, trace sand (medium and coarse grained), trace organics - dark brown - frozen, moist and firm to stiff when thawed - high plasticity  - very stiff below 0.8 m		G92													
0.5 - 0.6				G93													
0.6 - 0.7				G94													
0.7 - 0.8				G95													
0.8 - 1.4				G96													
1.4 - 1.5		SILT - clayey, trace sand (fine grained), light brown, frozen, dry to moist and firm when thawed, low to intermediate plasticity		G97													
1.5 - 2.0		CLAY - silty, trace silt inclusions (<10 mm diam.) - brown - moist, stiff to very stiff - high plasticity		G98													
2.0 - 2.1				G99													
2.1 - 3.0				G100													
3.0 - 3.1																	

END OF TEST HOLE AT 3.1 m IN CLAY

Notes:

- No sloughing or seepage observed.
- Backfilled test hole with auger cuttings and bentonite pellets 0.2 m below top of pavement, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
- Test hole located at House #946, 1.6 m north of south curb, 1.1 m east of man hole #12-6-92.

Logged By: Stephen Renner Reviewed By: Nelson Ferreira Project Engineer: Nelson Ferreira

SUB-SURFACE LOG 2013 LOCAL STREET RENEWALS GARWOOD TESTHOLE LOGS.GPJ TREK GEOTECHNICAL.GDT 4/15/13



# Sub-Surface Log

Test Hole GAR13-04

1 of 1

Client: Morrison Hershfield Project Number: 0035 006 00  
 Project Name: 2013 Local Streets Package - PW File #: 13-R-04 Location: Garwood Ave. - from Stafford St. to House #974  
 Contractor: Paddock Drilling Ltd. Ground Elevation: Not Surveyed  
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: March 21, 2013

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 <sup>3</sup> )		Particle Size (%)		Undrained Shear Strength (kPa)	
					16	17	18	19	20	21
0.0		ASPHALT (25 mm thick)		C101						
0.0		CONCRETE (190 mm thick)		C102						
0.0		CLAY - some silt, trace sand (medium grained), trace organics - dark brown - frozen, moist and firm to stiff when thawed - high plasticity		G104						
0.5				G105						
0.5				G106						
1.0		SILT - clayey, trace sand (fine grained) - light brown - frozen, moist and stiff when thawed - low to intermediate plasticity		G107						
1.5		CLAY - some silt - dark brown - frozen to 1.8 m, moist and stiff when thawed - high plasticity		G108						+
1.5		SILT - clayey, brown, moist, stiff, intermediate plasticity		G109						+
2.0		CLAY - silty, trace silt inclusions (<10 mm diam.) - brown - moist, stiff - high plasticity		G110						+
2.5										
3.0		- firm to stiff below 2.7 m		G111						+

END OF TEST HOLE AT 3.1 m IN CLAY

Notes:

1. No sloughing or seepage observed.
2. Backfilled test hole with auger cuttings and bentonite pellets 0.2 m below top of pavement, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
3. Test hole located at House #935, 2.1 m south of north curb, 14.1 m east of light standard #2-029-947.

Logged By: Stephen Renner Reviewed By: Nelson Ferreira Project Engineer: Nelson Ferreira

SUB-SURFACE LOG 2013 LOCAL STREET RENEWALS GARWOOD TESTHOLE LOGS.GPJ TREK GEOTECHNICAL.GDT 4/15/13



# Sub-Surface Log

Test Hole GAR13-05

1 of 1

Client: Morrison Hershfield Project Number: 0035 006 00  
 Project Name: 2013 Local Streets Package - PW File #: 13-R-04 Location: Garwood Ave. - from Stafford St. to House #974  
 Contractor: Paddock Drilling Ltd. Ground Elevation: Not Surveyed  
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: March 21, 2013

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 <sup>3</sup> )		Particle Size (%)		Undrained Shear Strength (kPa)					
					16	17	18	19	20	21	Test Type			
					0 20 40 60 80 100 PL MC LL 0 20 40 60 80 100				0 50 100 150 200 250 △ Torvane △ ⊕ Pocket Pen. ⊕ ⊠ Qu ⊠ ○ Field Vane ○					
		ASPHALT (13 mm thick)		C112										
		CONCRETE (165 mm thick) - rubble below 50 mm		C113										
		CLAY - silty, trace organics, dark brown, frozen, moist and firm when thawed, high plasticity		G114										
				G115										
-0.5		SILT - clayey, trace sand (fine grained), light brown, frozen, moist and stiff when thawed, low to intermediate plasticity		G116										
				G117										
		CLAY - silty - dark brown - frozen to 1.7 m, moist and stiff when thawed - high plasticity		G118										
-1.0				G119										
				G120										
-1.5				G121										
-2.0				G122										
		- trace silt inclusions below 2.2 m - firm to stiff, trace to some silt inclusions (<20 mm diam.), trace to some oxidation below 2.3 m - stiff, trace silt inclusions (<10 mm diam.) below 2.3 m		G123										
-2.5														
-3.0		- firm to stiff below 2.7 m												

END OF TEST HOLE AT 3.1 m IN CLAY

Notes:

- No sloughing or seepage observed.
- Backfilled test hole with auger cuttings and bentonite pellets 0.2 m below top of pavement, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
- Test hole located at House #923, 1.6 m north of south curb, 14.4 m east of light standard #2-029-948.

Logged By: Stephen Renner Reviewed By: Nelson Ferreira Project Engineer: Nelson Ferreira

SUB-SURFACE LOG 2013 LOCAL STREET RENEWALS GARWOOD TESTHOLE LOGS.GPJ TREK GEOTECHNICAL.GDT 4/15/13



# Sub-Surface Log

Test Hole GAR13-06

1 of 1

Client: Morrison Hershfield Project Number: 0035 006 00  
 Project Name: 2013 Local Streets Package - PW File #: 13-R-04 Location: Garwood Ave. - from Stafford St. to House #974  
 Contractor: Paddock Drilling Ltd. Ground Elevation: Not Surveyed  
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: March 21, 2013

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 <sup>3</sup> )		Particle Size (%)		Undrained Shear Strength (kPa)	
					16	17	18	19	20	21
0.0		ASPHALT (40 mm thick)		C123						
0.0		CONCRETE (140 mm thick) - rubble		G124						
0.0		CLAY - silty, trace organics - dark brown - frozen, moist and stiff when thawed - high plasticity		G125						
0.5				G126						
1.0				G127						△
1.0				G128						△
1.5		SILT - clayey, trace sand (fine grained), light brown, moist, firm, intermediate plasticity		G129						
2.0		CLAY - silty - dark brown - frozen, moist and stiff when thawed - high plasticity - trace to some organics at 2.0 m		G130						
2.5				G131						
3.0		CLAY - silty - brown - moist, stiff - high plasticity		G132						△

END OF TEST HOLE AT 3.1 m IN CLAY

Notes:

- No sloughing or seepage observed.
- Backfilled test hole with auger cuttings and bentonite pellets 0.2 m below top of pavement, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
- Test hole located at House #911, 1.8 m south of north curb, 7.0 m east of light standard #2-029-935.

Logged By: Stephen Renner Reviewed By: Nelson Ferreira Project Engineer: Nelson Ferreira

SUB-SURFACE LOG 2013 LOCAL STREET RENEWALS GARWOOD TESTHOLE LOGS.GPJ TREK GEOTECHNICAL.GDT 4/15/13







**Project No.** 0035 006 00  
**Client** Morrison Hershfield  
**Project** 2013 Regional and Local Streets Program - Local Streets Pkg. (13-R-04) - Garwood Avenue

**Sample Date** March 21, 2013  
**Test Date** April 4, 2013  
**Technician** Beta Taryana

Test Hole	GAR13-01	GAR13-01	GAR13-01	GAR13-01	GAR13-01	GAR13-01
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 #	G73	G74	G75	G76	G77	G78
Tare ID	D29	E134	Z117	D34	K16	Z107
Mass of tare	8.1	8.2	8.3	8.3	8.3	8.4
Mass wet + tare	263.1	316.2	383.2	359.8	392.1	297
Mass dry + tare	217.8	263	315.6	306.1	344.5	221
Mass water	45.3	53.2	67.6	53.7	47.6	76.0
Mass dry soil	209.7	254.8	307.3	297.8	336.2	212.6
Moisture %	21.6%	20.9%	22.0%	18.0%	14.2%	35.7%

Test Hole	GAR13-01	GAR13-01	GAR13-02	GAR13-02	GAR13-02	GAR13-02
Depth (m)	2.0 - 2.1	2.9 - 3.0	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2
Sample #	G79	G80	G83	G84	G85	G86
Tare ID	H73	H78	H30	H70	E55	Z96
Mass of tare	8.4	8.3	8.2	8.5	8.4	8.2
Mass wet + tare	255.4	293.6	400.8	304.3	353	312.7
Mass dry + tare	182.8	193.3	339.9	229	274.5	276.9
Mass water	72.6	100.3	60.9	75.3	78.5	35.8
Mass dry soil	174.4	185.0	331.7	220.5	266.1	268.7
Moisture %	41.6%	54.2%	18.4%	34.1%	29.5%	13.3%

Test Hole	GAR13-02	GAR13-02	GAR13-02	GAR13-02	GAR13-03	GAR13-03
Depth (m)	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1	2.9 - 3.0	0.2 - 0.3	0.5 - 0.6
Sample #	G87	G88	G89	G90	G93	G94
Tare ID	H76	W11	W71	F5	Z125	Z58
Mass of tare	8.3	8.1	8.2	8.3	8.4	8.4
Mass wet + tare	385.6	337.8	353.6	309.4	243.1	299.7
Mass dry + tare	342.4	255.7	275.3	220	188.1	239.3
Mass water	43.2	82.1	78.3	89.4	55.0	60.4
Mass dry soil	334.1	247.6	267.1	211.7	179.7	230.9
Moisture %	12.9%	33.2%	29.3%	42.2%	30.6%	26.2%



**Project No.** 0035 006 00  
**Client** Morrison Hershfield  
**Project** 2013 Regional and Local Streets Program - Local Streets Pkg. (13-R-04) - Garwood Avenue

**Sample Date** March 21, 2013  
**Test Date** April 4, 2013  
**Technician** Beta Taryana

Test Hole	GAR13-03	GAR13-03	GAR13-03	GAR13-03	GAR13-03	GAR13-03
Depth (m)	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1	2.9 - 3.0
Sample #	G95	G96	G97	G98	G99	G100
Tare ID	Z129	A101	F148	F46	F140	A38
Mass of tare	8.3	8.3	87.1	8.4	8.3	8.2
Mass wet + tare	291.8	332	407.2	270.3	344.7	340.1
Mass dry + tare	232.7	263.2	341.8	203.1	251.3	235.7
Mass water	59.1	68.8	65.4	67.2	93.4	104.4
Mass dry soil	224.4	254.9	254.7	194.7	243.0	227.5
Moisture %	26.3%	27.0%	25.7%	34.5%	38.4%	45.9%

Test Hole	GAR13-04	GAR13-04	GAR13-04	GAR13-04	GAR13-04	GAR13-04
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 #	G104	G105	G106	G107	G108	G109
Tare ID	E87	D23	F129	E6	H68	E105
Mass of tare	8.4	8.4	8.3	8.5	8.3	8.4
Mass wet + tare	290.3	295.1	424.8	378.4	273.2	311.7
Mass dry + tare	222.6	227.2	329.1	331.2	208.9	227.2
Mass water	67.7	67.9	95.7	47.2	64.3	84.5
Mass dry soil	214.2	218.8	320.8	322.7	200.6	218.8
Moisture %	31.6%	31.0%	29.8%	14.6%	32.1%	38.6%

Test Hole	GAR13-04	GAR13-04	GAR13-05	GAR13-05	GAR13-05	GAR13-05
Depth (m)	2.0 - 2.1	2.9 - 3.0	0.2 - 0.3	0.3 - 0.5	0.5 - 0.6	0.8 - 0.9
Sample #	G110	G111	G115	G116	G117	G118
Tare ID	F11	C24	P35	Z76	P15	Z86
Mass of tare	8.3	8.4	8.4	8.3	8.4	8.1
Mass wet + tare	362	331.1	297.9	369.5	439.3	451.3
Mass dry + tare	258.5	229.1	237.3	295.7	363.7	354.8
Mass water	103.5	102.0	60.6	73.8	75.6	96.5
Mass dry soil	250.2	220.7	228.9	287.4	355.3	346.7
Moisture %	41.4%	46.2%	26.5%	25.7%	21.3%	27.8%





**Project No.** 0035 006 00  
**Client** Morrison Hershfield  
**Project** 2013 Regional and Local Streets Program - Local Streets Pkg. (13-R-04) - Garwood Avenue

**Sample Date** March 21, 2013  
**Test Date** April 4, 2013  
**Technician** Beta Taryana

<b>Test Hole</b>	GAR13-05	GAR13-05	GAR13-05	GAR13-05	GAR13-05	GAR13-06
<b>Depth (m)</b>	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8	2.3 - 2.4	2.7 - 2.9	0.2 - 0.3
<b>Sample #</b>	G119	G120	G121	G122	G123	G125
<b>Tare ID</b>	W44	P22	E88	F136	F76	F128
<b>Mass of tare</b>	8.3	8.4	8.5	8.2	8.5	8.3
<b>Mass wet + tare</b>	435.6	384.5	406.2	405	423.4	326.2
<b>Mass dry + tare</b>	333.5	284.6	291.1	293.3	285.4	254.5
<b>Mass water</b>	102.1	99.9	115.1	111.7	138.0	71.7
<b>Mass dry soil</b>	325.2	276.2	282.6	285.1	276.9	246.2
<b>Moisture %</b>	31.4%	36.2%	40.7%	39.2%	49.8%	29.1%

<b>Test Hole</b>	GAR13-06	GAR13-06	GAR13-06	GAR13-06	GAR13-06	GAR13-06
<b>Depth (m)</b>	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8	2.1 - 2.3
<b>Sample #</b>	G126	G127	G128	G129	G130	G131
<b>Tare ID</b>	F109	E123	E18	F147	H31	N70
<b>Mass of tare</b>	8.2	8.3	8.3	8.1	8.4	8.4
<b>Mass wet + tare</b>	417.5	395.5	410.3	373.8	397.5	575.3
<b>Mass dry + tare</b>	333.4	315.7	326.6	304.6	318.1	467
<b>Mass water</b>	84.1	79.8	83.7	69.2	79.4	108.3
<b>Mass dry soil</b>	325.2	307.4	318.3	296.5	309.7	458.6
<b>Moisture %</b>	25.9%	26.0%	26.3%	23.3%	25.6%	23.6%

<b>Test Hole</b>	GAR13-06					
<b>Depth (m)</b>	2.9 - 3.0					
<b>Sample #</b>	G132					
<b>Tare ID</b>	K9					
<b>Mass of tare</b>	8.3					
<b>Mass wet + tare</b>	410.4					
<b>Mass dry + tare</b>	293.4					
<b>Mass water</b>	117.0					
<b>Mass dry soil</b>	285.1					
<b>Moisture %</b>	41.0%					



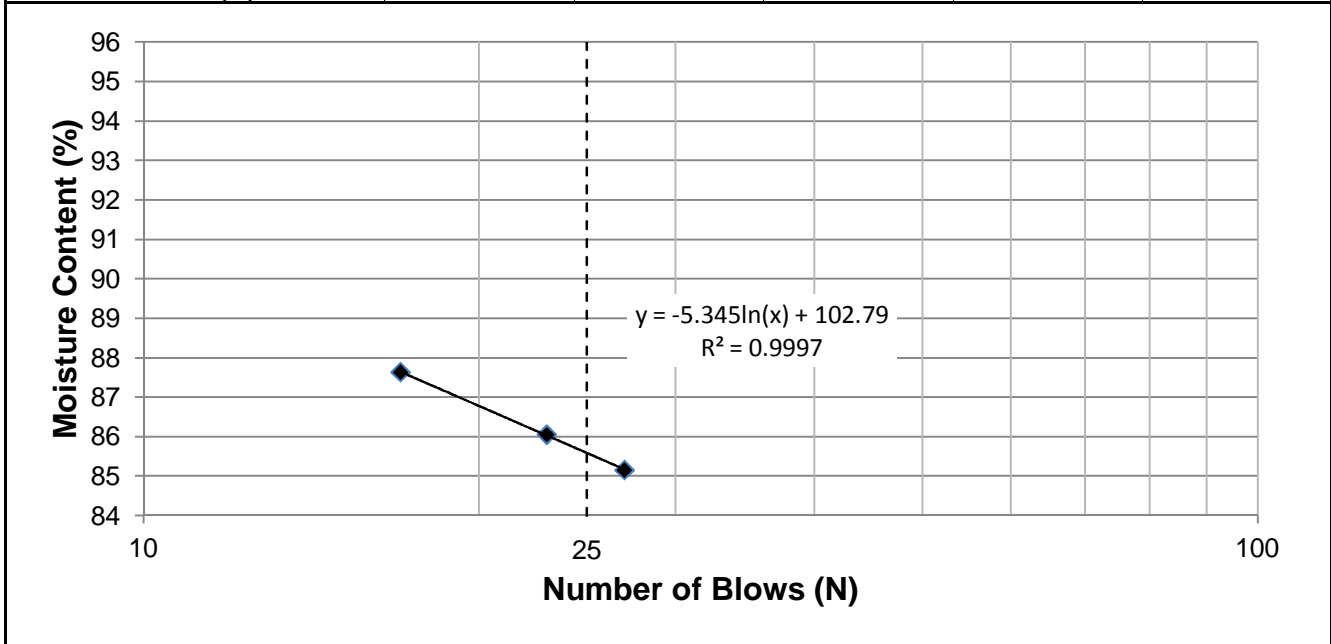
**Project No.** 0035 006 00  
**Client** Morrison Hershfield  
**Project** 2013 City of Winnipeg Regional and Local Streets Program - Local Streets Pkg. (13-R-04)

**Test Hole** GAR13-02  
**Sample #** G84  
**Depth (m)** 0.5 - 0.6  
**Sample Date** 21-Mar-13  
**Test Date** 11-Apr-13  
**Technician** Beta Taryana

<b>Liquid Limit</b>	86
<b>Plastic Limit</b>	27
<b>Plasticity Index</b>	59

**Liquid Limit**

Trial #	1	2	3	4	5
<b>Number of Blows (N)</b>	27	23	17		
<b>Mass Wet Soil + Tare (g)</b>	25.454	24.529	26.107		
<b>Mass Dry Soil + Tare (g)</b>	20.187	19.678	20.400		
<b>Mass Tare (g)</b>	14.002	14.041	13.888		
<b>Mass Water (g)</b>	5.267	4.851	5.707		
<b>Mass Dry Soil (g)</b>	6.185	5.637	6.512		
<b>Moisture Content (%)</b>	85.158	86.056	87.638		



**Plastic Limit**

Trial #	1	2	3	4	5
<b>Mass Wet Soil + Tare (g)</b>	20.434	19.823			
<b>Mass Dry Soil + Tare (g)</b>	19.035	18.569			
<b>Mass Tare (g)</b>	13.785	13.813			
<b>Mass Water (g)</b>	1.399	1.254			
<b>Mass Dry Soil (g)</b>	5.250	4.756			
<b>Moisture Content (%)</b>	26.648	26.367			



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**Atterberg Limits  
 ASTM D4318**

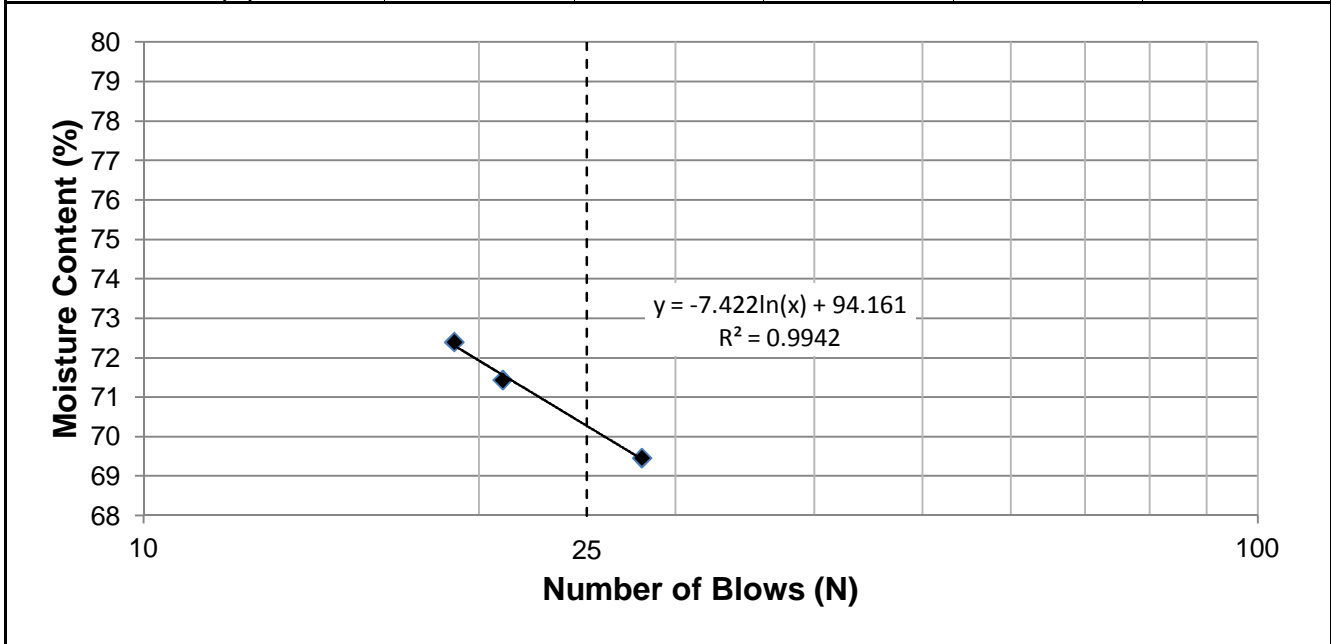
**Project No.** 0035 006 00  
**Client** Morrison Hershfield  
**Project** 2013 City of Winnipeg Regional and Local Streets Program - Local Streets Pkg. (13-R-04)

**Test Hole** GAR13-05  
**Sample #** G116  
**Depth (m)** 0.3 - 0.5  
**Sample Date** 21-Mar-13  
**Test Date** 11-Apr-13  
**Technician** Beta Taryana

<b>Liquid Limit</b>	70
<b>Plastic Limit</b>	22
<b>Plasticity Index</b>	48

**Liquid Limit**

Trial #	1	2	3	4	5
<b>Number of Blows (N)</b>	28	21	19		
<b>Mass Wet Soil + Tare (g)</b>	25.257	26.003	25.808		
<b>Mass Dry Soil + Tare (g)</b>	20.646	21.028	20.713		
<b>Mass Tare (g)</b>	14.008	14.064	13.676		
<b>Mass Water (g)</b>	4.611	4.975	5.095		
<b>Mass Dry Soil (g)</b>	6.638	6.964	7.037		
<b>Moisture Content (%)</b>	69.464	71.439	72.403		



**Plastic Limit**

Trial #	1	2	3	4	5
<b>Mass Wet Soil + Tare (g)</b>	21.385	20.659			
<b>Mass Dry Soil + Tare (g)</b>	20.065	19.451			
<b>Mass Tare (g)</b>	14.188	13.935			
<b>Mass Water (g)</b>	1.320	1.208			
<b>Mass Dry Soil (g)</b>	5.877	5.516			
<b>Moisture Content (%)</b>	22.460	21.900			



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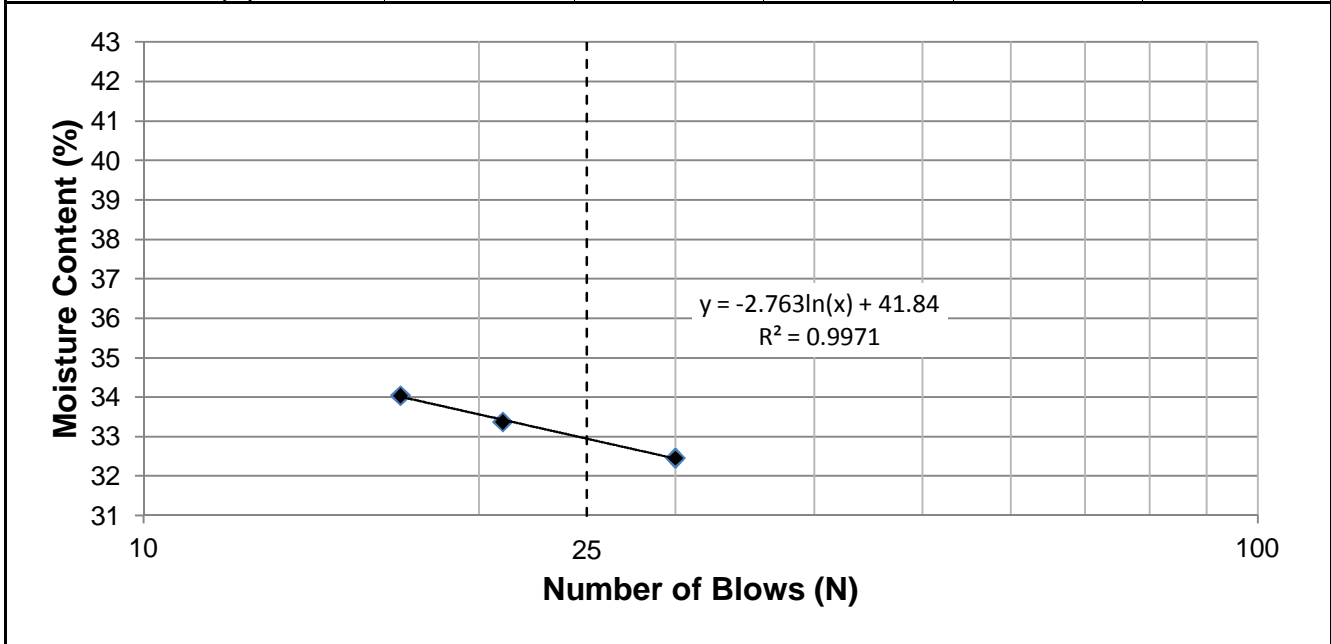
**Project No.** 0035 006 00  
**Client** Morrison Hershfield  
**Project** 2013 City of Winnipeg Regional and Local Streets Program - Local Streets Pkg. (13-R-04)

**Test Hole** GAR13-05  
**Sample #** G117  
**Depth (m)** 0.5-0.6  
**Sample Date** 21-Mar-13  
**Test Date** 11-Apr-13  
**Technician** Beta Taryana

<b>Liquid Limit</b>	33
<b>Plastic Limit</b>	14
<b>Plasticity Index</b>	19

**Liquid Limit**

Trial #	1	2	3	4	5
<b>Number of Blows (N)</b>	30	21	17		
<b>Mass Wet Soil + Tare (g)</b>	26.024	27.568	25.299		
<b>Mass Dry Soil + Tare (g)</b>	23.094	24.204	22.423		
<b>Mass Tare (g)</b>	14.068	14.126	13.975		
<b>Mass Water (g)</b>	2.930	3.364	2.876		
<b>Mass Dry Soil (g)</b>	9.026	10.078	8.448		
<b>Moisture Content (%)</b>	32.462	33.380	34.044		



**Plastic Limit**

Trial #	1	2	3	4	5
<b>Mass Wet Soil + Tare (g)</b>	20.419	20.354			
<b>Mass Dry Soil + Tare (g)</b>	19.622	19.573			
<b>Mass Tare (g)</b>	13.906	13.932			
<b>Mass Water (g)</b>	0.797	0.781			
<b>Mass Dry Soil (g)</b>	5.716	5.641			
<b>Moisture Content (%)</b>	13.943	13.845			

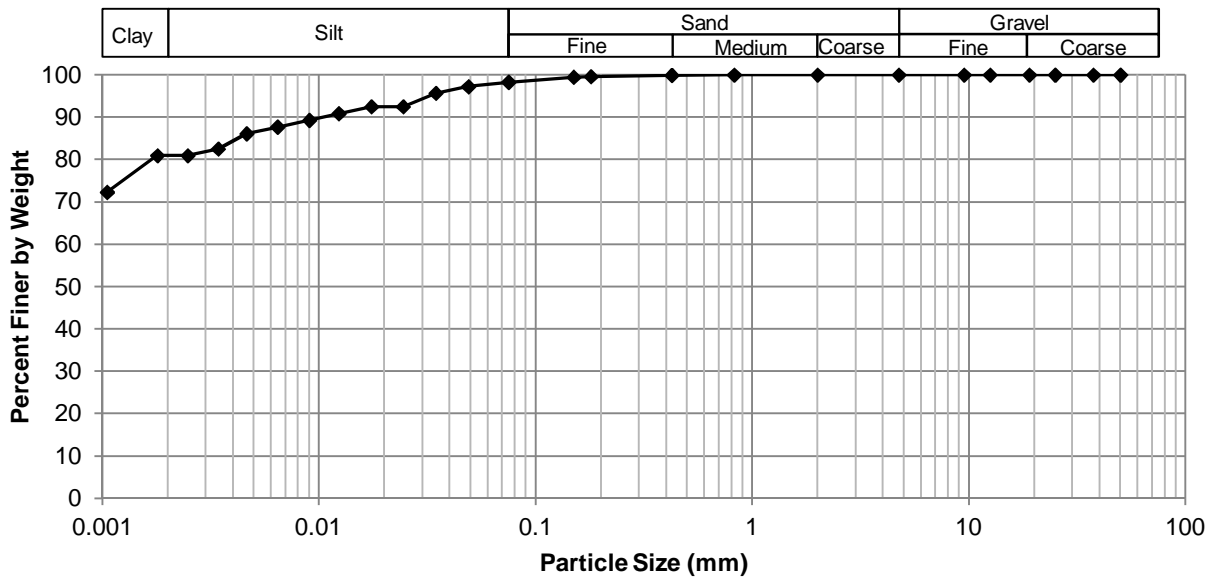


**Project No.** 0035 006 00  
**Client** Morrison Hershfield  
**Project** 2013 City of Winnipeg Regional and Local Streets Program - Local Streets Pkg. (13-R-04)

**Test Hole** GAR13-02  
**Sample #** G84  
**Depth (m)** 0.5 - 0.6  
**Sample Date** 21-Mar-13  
**Test Date** 10-Apr-13  
**Technician** Beta Taryana

<b>Gravel</b>	0.0%
<b>Sand</b>	1.7%
<b>Silt</b>	18.2%
<b>Clay</b>	80.1%

**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	98.26
37.5	100.00	2.00	100.00	0.0490	97.22
25.0	100.00	0.825	100.00	0.0346	95.63
19.0	100.00	0.425	99.86	0.0245	92.45
12.5	100.00	0.180	99.56	0.0175	92.45
9.50	100.00	0.150	99.46	0.0124	90.86
4.75	100.00	0.075	98.26	0.0090	89.28
				0.0064	87.69
				0.0046	86.10
				0.0034	82.50
				0.0025	80.91
				0.0018	80.91
				0.0011	72.27

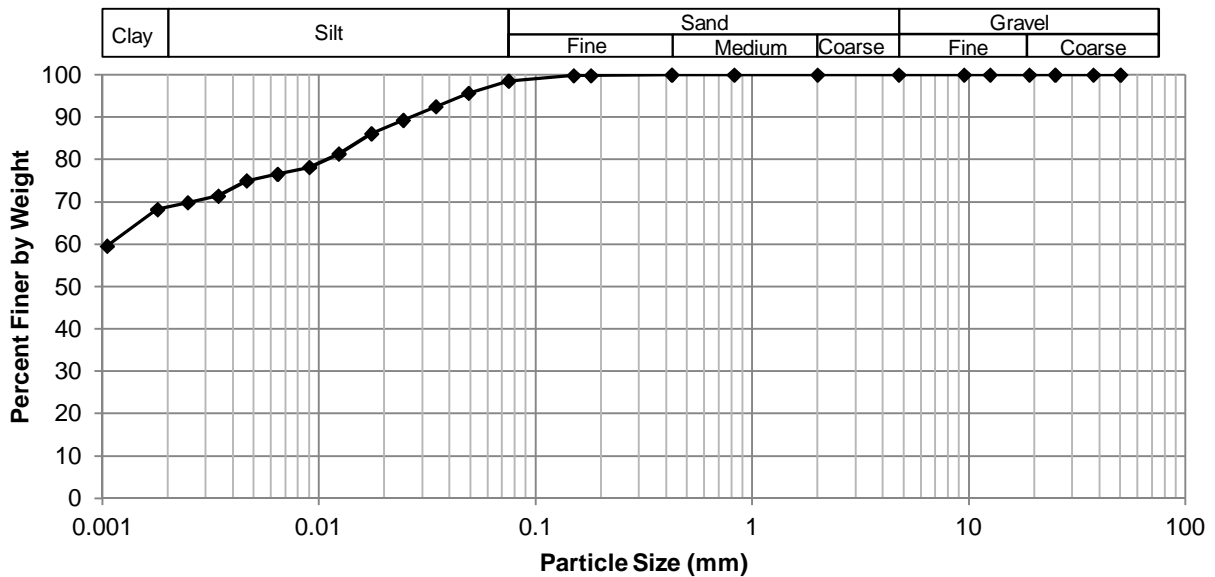


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**Client** Morrison Hershfield  
**Project** 2013 City of Winnipeg Regional and Local Streets Program - Local Streets Pkg. (13-R-04)

**Test Hole** GAR13-05  
**Sample #** G116  
**Depth (m)** 0.3 - 0.5  
**Sample Date** 21-Mar-13  
**Test Date** 10-Apr-13  
**Technician** Beta Taryana

<b>Gravel</b>	0.0%
<b>Sand</b>	1.5%
<b>Silt</b>	29.5%
<b>Clay</b>	69.0%

**Particle Size Distribution Curve**



Gravel		Sand		Silt and Clay	
Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing
50.0	100.00	4.75	100.00	0.0750	98.53
37.5	100.00	2.00	100.00	0.0490	95.63
25.0	100.00	0.825	100.00	0.0346	92.45
19.0	100.00	0.425	100.00	0.0245	89.28
12.5	100.00	0.180	99.84	0.0175	86.10
9.50	100.00	0.150	99.84	0.0124	81.34
4.75	100.00	0.075	98.53	0.0090	78.16
				0.0064	76.57
				0.0046	74.98
				0.0034	71.38
				0.0025	69.79
				0.0018	68.20
				0.0011	59.56

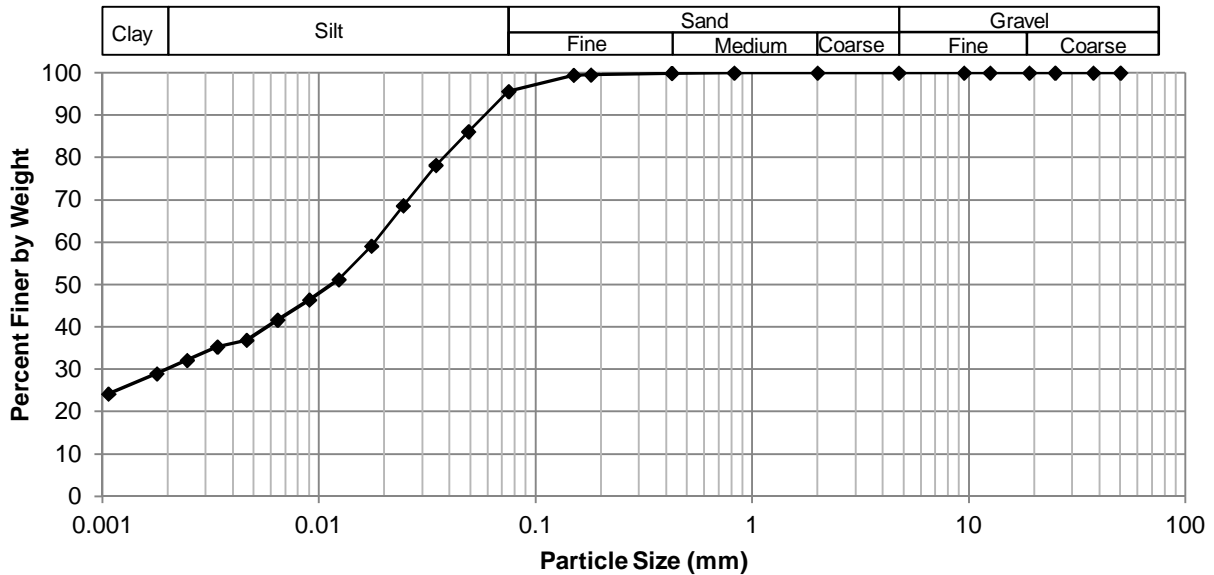


**Project No.** 0035 006 00  
**Client** Morrison Hershfield  
**Project** 2013 City of Winnipeg Regional and Local Streets Program - Local Streets Pkg. (13-R-04)

**Test Hole** GAR13-05  
**Sample #** G117  
**Depth (m)** 0.5 - 0.6  
**Sample Date** 21-Mar-13  
**Test Date** 10-Apr-13  
**Technician** Beta Taryana

<b>Gravel</b>	0.0%
<b>Sand</b>	4.4%
<b>Silt</b>	65.0%
<b>Clay</b>	30.5%

**Particle Size Distribution Curve**



Gravel		Sand		Silt and Clay	
Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing
50.0	100.00	4.75	100.00	0.0750	95.58
37.5	100.00	2.00	100.00	0.0490	86.10
25.0	100.00	0.825	99.98	0.0346	78.16
19.0	100.00	0.425	99.88	0.0245	68.63
12.5	100.00	0.180	99.51	0.0175	59.10
9.50	100.00	0.150	99.42	0.0124	51.16
4.75	100.00	0.075	95.58	0.0090	46.40
				0.0064	41.63
				0.0046	36.87
				0.0034	35.28
				0.0025	32.11
				0.0018	28.93
				0.0011	24.17



Photo 1: Concrete Core Sample from Test Hole GAR13-01



Photo 2: Concrete Core Sample from Test Hole GAR13-02





Photo 3: Concrete Core Sample from Test Hole GAR13-03



Photo 4: Asphalt Core Sample from Test Hole GAR13-04



Photo 5: Concrete Core Sample from Test Hole GAR13-04



Photo 6: Asphalt Core Sample from Test Hole GAR13-05



Photo 7: Concrete Core Sample from Test Hole GAR13-05



Photo 8: Asphalt Core Sample from Test Hole GAR13-06

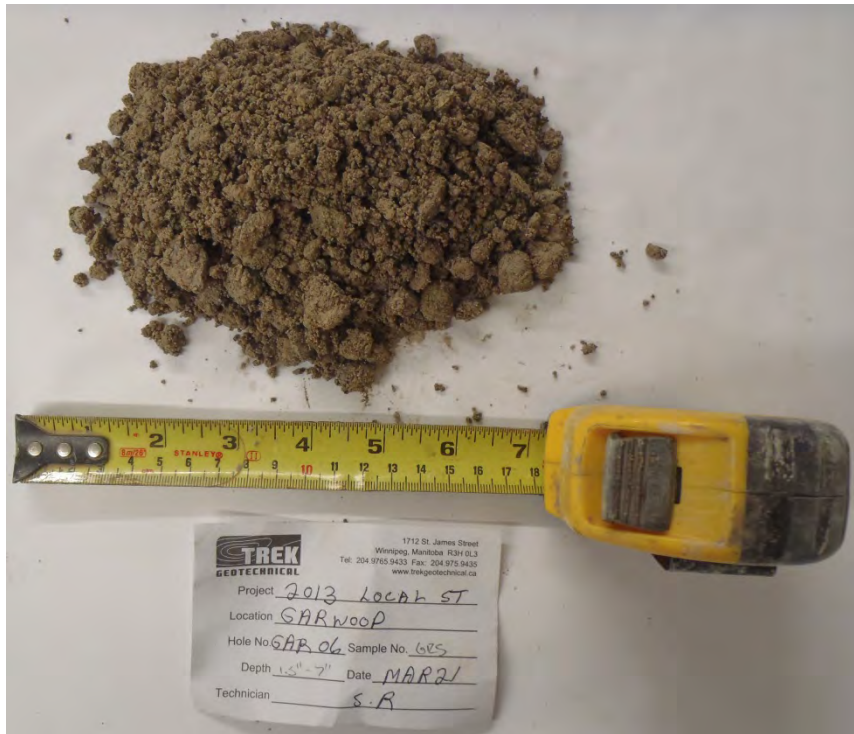


Photo 9: Concrete Core Sample from Test Hole GAR13-06

## **Appendix C**

### **Laidlaw Boulevard from Mountbatten Avenue to Corydon Avenue**

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### GENERAL NOTES

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

Major Divisions	USCS Classification	Symbols	Typical Names	Laboratory Classification Criteria		Particle Size						
Coarse-Grained soils (More than half the material is larger than No. 200 sieve size)	Gravels (More than half of coarse fraction is larger than 4.75 mm)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3  Not meeting all gradation requirements for GW  Atterberg limits below "A" line or P.I. less than 4  Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols  Atterberg limits above "A" line or P.I. greater than 7	$C_u = \frac{D_{60}}{D_{10}}$ greater than 6; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3  Not meeting all gradation requirements for SW  Atterberg limits below "A" line or P.I. less than 4  Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols  Atterberg limits above "A" line or P.I. greater than 7	Determine percentages of sand and gravel from grain size curve, depending on percentage of fines (fraction smaller than No. 200 sieve) coarse-grained soils are classified as follows:  Less than 5 percent..... GW, GP, SW, SP More than 12 percent..... GM, GC, SM, SC 6 to 12 percent..... Borderline cases requiring dual symbols*	ASTM Sieve sizes #10 to #4 #40 to #10 #200 to #40 < #200					
		GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines									
		GM	Silty gravels, gravel-sand-silt mixtures									
		GC	Clayey gravels, gravel-sand-silt mixtures									
	Sands (More than half of coarse fraction is smaller than 4.75 mm)	Clean sands (Little or no fines)	SW					Well-graded sands, gravelly sands, little or no fines				
			SP					Poorly-graded sands, gravelly sands, little or no fines				
		Sands with fines (Appreciable amount of fines)	SM					Silty sands, sand-silt mixtures				
			SC					Clayey sands, sand-clay mixtures				
			Fine-Grained soils (More than half the material is smaller than No. 200 sieve size)					Silt and Clays (Liquid limit less than 50)	ML	Inorganic silts and very fine sands, rock floor, silty or clayey fine sands or clayey silts with slight plasticity		Particle Size mm > 300 75 to 300 19 to 75 4.75 to 19
									CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays		
OL	Organic silts and organic silty clays of low plasticity											
Silt and Clays (Liquid limit greater than 50)	MH	Inorganic silts, micaceous or distomaceous fine sandy or silty soils, organic silts										
	CH	Inorganic clays of high plasticity, fat clays										
	OH	Organic clays of medium to high plasticity, organic silts										
Highly Organic Soils	Pt	Peat and other highly organic soils	Von Post Classification Limit	Strong colour or odour, and often fibrous texture	Material Boulders Cobbles Gravel Coarse Fine							

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

### Other Symbol Types

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

## LEGEND OF ABBREVIATIONS AND SYMBOLS

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

## FRACTION OF SECONDARY SOIL CONSTITUENTS ARE BASED ON THE FOLLOWING TERMINOLOGY

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

## TERMS DESCRIBING CONSISTENCY OR COMPACTION CONDITION

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

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

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

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

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

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



# Sub-Surface Log

Test Hole LAID13-01

1 of 1

Client: Morrison Hershfield Project Number: 0035 006 00  
 Project Name: 2013 Local Streets Package - PW File #: 13-R-04 Location: Laidlaw Blvd - from Corydon Ave to Mountbatten Ave  
 Contractor: Paddock Drilling Ltd. Ground Elevation: Not Surveyed  
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: March 22, 2013

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 <sup>3</sup> )						Undrained Shear Strength (kPa)					
					16	17	18	19	20	21	Test Type					
					Particle Size (%)											
					0	20	40	60	80	100						
					PL   MC   LL 0 20 40 60 80 100											
					0	20	40	60	80	100	0	50	100	150	200	250
		ASPHALT (70 mm thick)		C136												
		CONCRETE (133 mm thick)		C137												
		CLAY - silty - dark brown - frozen to 1.7 m, moist and firm when thawed - high plasticity		G138												
-0.5				G139												
				G140												
-1.0				G141												
				G142												
-1.5				G143												
				G144												
-2.0		- trace silt inclusions (<15 mm diam.) below 2.0 m														
-2.5		- firm below 2.3 m														
-3.0		- trace sulphate precipitates (<5 mm diam.) below 2.4 m														
				G145												

END OF TEST HOLE AT 3.1 m IN CLAY

Notes:

- No sloughing or seepage observed.
- Backfilled test hole with auger cuttings and bentonite pellets 0.2 m below top of pavement, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
- Test hole located at House #429, 1.8 m west of east curb, 10.9 m north of light standard at intersection of Laidlaw Ave and Mountbatten Ave.

Logged By: Tom Hildahl Reviewed By: Nelson Ferreira Project Engineer: Nelson Ferreira





# Sub-Surface Log

Test Hole LAID13-02

1 of 1

Client: Morrison Hershfield Project Number: 0035 006 00  
 Project Name: 2013 Local Streets Package - PW File #: 13-R-04 Location: Laidlaw Blvd - from Corydon Ave to Mountbatten Ave  
 Contractor: Paddock Drilling Ltd. Ground Elevation: Not Surveyed  
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: March 22, 2013

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 <sup>3</sup> )						Undrained Shear Strength (kPa)					
					16	17	18	19	20	21	Test Type					
					Particle Size (%)											
					0	20	40	60	80	100						
					PL   MC   LL 0 20 40 60 80 100											
					0	20	40	60	80	100	0	50	100	150	200	250
		ASPHALT (83 mm thick)		C146												
		CONCRETE (120 mm thick)		C147												
		SAND (Fill) - silty, trace gravel (<5 mm diam.) - light brown - frozen, moist and compact when thawed - poorly graded fine and medium grained sand - limestone		G148												
		CLAY - silty - dark brown - frozen to 2.0 m, moist and firm when thawed - high plasticity - trace sulphate precipitates (<5 mm diam.) below 0.9 m		G149												
				G150												
				G151												
		- stiff below 1.5 m		G152												
				G153												
				G154												
		- trace oxidation below 2.4 m														
				G155												

END OF TEST HOLE AT 3.1 m IN CLAY

Notes:

1. No sloughing or seepage observed.
2. Backfilled test hole with auger cuttings and bentonite pellets 0.2 m below top of pavement, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
3. Test hole located at House #420, 1.6 m east of west curb, 13.3 m south of light standard #2-042-043.

Logged By: Tom Hildahl Reviewed By: Nelson Ferreira Project Engineer: Nelson Ferreira

SUB-SURFACE LOG 2013 LOCAL STREET RENEWALS LAIDLAW TESTHOLE LOGS.GPJ\_TREK GEOTECHNICAL.GDT 4/15/13



# Sub-Surface Log

Test Hole LAID13-03

1 of 1

Client: Morrison Hershfield Project Number: 0035 006 00  
 Project Name: 2013 Local Streets Package - PW File #: 13-R-04 Location: Laidlaw Blvd - from Corydon Ave to Mountbatten Ave  
 Contractor: Paddock Drilling Ltd. Ground Elevation: Not Surveyed  
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: March 22, 2013

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 <sup>3</sup> )						Undrained Shear Strength (kPa)					
					16	17	18	19	20	21	Test Type					
					Particle Size (%)											
					0	20	40	60	80	100						
					PL   MC   LL 0 20 40 60 80 100											
					0	20	40	60	80	100	0	50	100	150	200	250
		ASPHALT (108 mm thick)		C156												
		CONCRETE (95 mm thick)		C157												
		CLAY - some silt - black - frozen, moist and firm when thawed - high plasticity - dark brown below 0.5 m		G158			●									
-0.5				G159			●									
				G160			●						▲			
-1.0		SILT - clayey, trace sand (fine grained), light brown, frozen, moist and firm when thawed, intermediate plasticity		G161			●						▲			
		CLAY - silty, trace silt inclusions (<5 mm diam.) - dark brown - frozen to 1.5 m, moist and soft when thawed - high plasticity - firm below 1.4 m		G162			●						▲			
-1.5				G163			●						▲	◆		
-2.0				G164			●						▲	◆		
-2.5																
-3.0				G165			●						▲	◆		

END OF TEST HOLE AT 3.1 m IN CLAY

Notes:

- No sloughing or seepage observed.
- Backfilled test hole with auger cuttings and bentonite pellets 0.2 m below top of pavement, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
- Test hole located between House #419 and #421, 1.9 m west of east curb, 13.8 m north of light standard #2-042-043.

Logged By: Tom Hildahl Reviewed By: Nelson Ferreira Project Engineer: Nelson Ferreira

SUB-SURFACE LOG 2013 LOCAL STREET RENEWALS LAIDLAW TESTHOLE LOGS.GPJ TREK GEOTECHNICAL.GDT 4/15/13



# Sub-Surface Log

Test Hole LAID13-04

1 of 1

Client: Morrison Hershfield Project Number: 0035 006 00  
 Project Name: 2013 Local Streets Package - PW File #: 13-R-04 Location: Laidlaw Blvd - from Corydon Ave to Mountbatten Ave  
 Contractor: Paddock Drilling Ltd. Ground Elevation: Not Surveyed  
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: March 22, 2013

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 <sup>3</sup> )		Particle Size (%)		Undrained Shear Strength (kPa)	
					16	17	18	19	20	21
0.0		ASPHALT (64 mm thick)		C166						
0.0		CONCRETE (146 mm thick)		C167						
0.0		CLAY - some silt, trace organics (rootlets), trace oxidation, black, frozen, moist and firm when thawed, high plasticity		G168						
0.5		SILT - clayey, trace sand (fine grained) light brown, frozen, moist and firm when thawed, intermediate plasticity		G169						
0.5		CLAY - silty, trace silt inclusions (<10 mm diam.), trace precipitates (<15 mm diam.) - dark brown - frozen to 2.0 m, moist and firm to stiff when thawed - high plasticity		G170						△ ⊕
1.0				G171						△ ⊕
1.5				G172						△ ⊕
2.0				G173						⊕ △
2.0		- stiff, trace to some silt inclusions (<20 mm diam.), trace to some oxidation between 2.0 m and 2.1 m - trace gravel (<10 mm diam.) at 2.1 m		G174						△ ⊕
2.5										
3.0		- firm below 2.9 m		G175						⊕ △

END OF TEST HOLE AT 3.1 m IN CLAY

Notes:

1. No sloughing or seepage observed.
2. Backfilled test hole with auger cuttings and bentonite pellets 0.2 m below top of pavement, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
3. Test hole located at House #414, 1.8 m east of west curb, 10.1 m north of light standard #2-094-061.

Logged By: Tom Hildahl Reviewed By: Nelson Ferreira Project Engineer: Nelson Ferreira

SUB-SURFACE LOG 2013 LOCAL STREET RENEWALS LAIDLAW TESTHOLE LOGS GPJ TREK GEOTECHNICAL GDT 4/15/13



# Sub-Surface Log

Test Hole LAID13-05

1 of 1

Client: Morrison Hershfield Project Number: 0035 006 00  
 Project Name: 2013 Local Streets Package - PW File #: 13-R-04 Location: Laidlaw Blvd - from Corydon Ave to Mountbatten Ave  
 Contractor: Paddock Drilling Ltd. Ground Elevation: Not Surveyed  
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: March 22, 2013

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 <sup>3</sup> )						Undrained Shear Strength (kPa)								
					16	17	18	19	20	21	Test Type								
					Particle Size (%)														
					0	20	40	60	80	100									
					PL   MC   LL 0 20 40 60 80 100														
					0 20 40 60 80 100						0 50 100 150 200 250								
					<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"/>														
		ASPHALT (57 mm thick)		C176															
		CONCRETE (100 mm thick)		C177															
		CLAY - some silt - dark brown - frozen to 1.7 m, moist and stiff when thawed - high plasticity		G178			●												
-0.5				G179			●												
		- firm to stiff below 0.8 m		G180			●												
-1.0				G181			●												
		- firm below 1.4 m		G182			●												
-1.5				G183			●												
		- stiff below 1.7 m		G184			●												
-2.0				G185			●												
		- trace silt inclusions (<5 mm diam.) below 1.8 m																	
-2.5																			
-3.0																			
		- firm to stiff below 2.9 m																	

END OF TEST HOLE AT 3.1 m IN CLAY

Notes:

1. No sloughing or seepage observed.
2. Backfilled test hole with auger cuttings and bentonite pellets 0.2 m below top of pavement, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
3. Test hole located at House #411, 1.8 m west of east curb, 14.9 m north of light standard #2-042-034.

Logged By: Tom Hildahl Reviewed By: Nelson Ferreira Project Engineer: Nelson Ferreira

SUB-SURFACE LOG 2013 LOCAL STREET RENEWALS LAIDLAW TESTHOLE LOGS.GPJ\_TREK GEOTECHNICAL.GDT 4/15/13



# Sub-Surface Log

Test Hole LAID13-06

1 of 1

Client: Morrison Hershfield Project Number: 0035 006 00  
 Project Name: 2013 Local Streets Package - PW File #: 13-R-04 Location: Laidlaw Blvd - from Corydon Ave to Mountbatten Ave  
 Contractor: Paddock Drilling Ltd. Ground Elevation: Not Surveyed  
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: March 22, 2013

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 <sup>3</sup> )		Particle Size (%)		Undrained Shear Strength (kPa)								
					16	17	18	19	20	21	0	50	100	150	200	250	
		ASPHALT (73 mm thick)		C186													
		CONCRETE (137 mm thick)		C187													
		CLAY - some silt, trace silt inclusions (<2 mm diam.), dark brown, frozen, moist and soft to firm when thawed, high plasticity		G188													
-0.5		SILT - clayey, trace sand (fine grained), light brown, frozen, moist and firm when thawed, intermediate plasticity		G189													
				G190													
-1.0		CLAY - silty, trace silt inclusions (<5 mm diam.) - dark brown - frozen to 1.7 m, moist and stiff when thawed - high plasticity		G191													
				G192													
		- silt seam (<75 mm thick) at 1.7 m - stiff to very stiff below 1.7 m		G193													
-2.0		- trace sulphate precipitates (<5 mm diam.) below 2.0 m		G194													
				G195													

END OF TEST HOLE AT 3.1 m IN CLAY

Notes:

1. No sloughing or seepage observed.
2. Backfilled test hole with auger cuttings and bentonite pellets 0.2 m below top of pavement, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
3. Test hole located at House #404, 2.0 m west of east curb, 10.0 m north of light standard #2-042-035.

Logged By: Tom Hildahl Reviewed By: Nelson Ferreira Project Engineer: Nelson Ferreira

SUB-SURFACE LOG 2013 LOCAL STREET RENEWALS LAIDLAW TESTHOLE LOGS GPJ TREK GEOTECHNICAL GDT 4/15/13



# Sub-Surface Log

Test Hole LAID13-07

1 of 1

**Client:** Morrison Hershfield **Project Number:** 0035 006 00  
**Project Name:** 2013 Local Streets Package - PW File #: 13-R-04 **Location:** Laidlaw Blvd - from Corydon Ave to Mountbatten Ave  
**Contractor:** Paddock Drilling Ltd. **Ground Elevation:** Not Surveyed  
**Method:** 125mm Solid Stem Auger, Acker MP8 Truck Mount **Date Drilled:** March 22, 2013

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 <sup>3</sup> )						Undrained Shear Strength (kPa)					
					16	17	18	19	20	21	Test Type					
					Particle Size (%)											
					0	20	40	60	80	100						
					0	20	40	60	80	100	0	50	100	150	200	250
		ASPHALT (48 mm thick)		C196												
		CONCRETE (162 mm thick)		C197												
		CLAY - some silt, trace silt inclusions (<2 mm diam.), dark brown, frozen, moist and stiff when thawed, high plasticity	G	G198												
-0.5		SILT - some clay, trace sand (fine grained), light brown, frozen, moist and firm when thawed, low plasticity	G	G199												
			G	G200												
-1.0		CLAY - silty - dark brown - frozen to 2.0 m, moist and stiff when thawed - high plasticity	G	G201												
			G	G202												
-1.5			G	G203												
			G	G204												
-2.0		- trace silt inclusions (<5 mm diam.), trace precipitates (<5 mm diam.) below 2.1 m														
-2.5																
-3.0		- firm to stiff below 2.9 m	G	G205												

END OF TEST HOLE AT 3.1 m IN CLAY

Notes:

- No sloughing or seepage observed.
- Backfilled test hole with auger cuttings and bentonite pellets 0.2 m below top of pavement, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
- Test hole located at House #403, 2.0 m west of east curb, 3.3 m north of light standard #2-042-033.

**Logged By:** Tom Hildahl **Reviewed By:** Nelson Ferreira **Project Engineer:** Nelson Ferreira

SUB-SURFACE LOG 2013 LOCAL STREET RENEWALS LAIDLAW TESTHOLE LOGS GPJ TREK GEOTECHNICAL GDT 4/15/13



# Sub-Surface Log

Test Hole LAID13-08

1 of 1

Client: Morrison Hershfield Project Number: 0035 006 00  
 Project Name: 2013 Local Streets Package - PW File #: 13-R-04 Location: Laidlaw Blvd - from Corydon Ave to Mountbatten Ave  
 Contractor: Paddock Drilling Ltd. Ground Elevation: Not Surveyed  
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: March 22, 2013

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 <sup>3</sup> )		Particle Size (%)		Undrained Shear Strength (kPa)								
					16	17	18	19	20	21	0	50	100	150	200	250	
0.0		ASPHALT (73 mm thick)		C206													
0.0		CONCRETE (41 mm thick)		C207													
0.0		SAND and GRAVEL (Fill) - some clay, dark brown, moist, compact, well graded		G208													
0.0		CLAY - some silt, trace silt inclusions (<2 mm diam.) - dark brown - frozen, moist and stiff when thawed - high plasticity		G209													
0.5		SILT - clayey, light brown, frozen, moist and firm when thawed, intermediate plasticity		G210													
1.0		CLAY - silty - dark brown - frozen to 1.8 m, moist and stiff when thawed - high plasticity		G211													
1.5		- trace silt inclusions (<5 mm diam.) below 1.7 m		G212													
1.5		- trace sulphate precipitates (<5 mm diam.) below 1.8 m		G213													
2.0		- stiff to very stiff below 2.0 m		G214													
2.5		- stiff below 2.4 m															
3.0				G215													

END OF TEST HOLE AT 3.1 m IN CLAY

Notes:

1. No sloughing or seepage observed.
2. Backfilled test hole with auger cuttings and bentonite pellets 0.2 m below top of pavement, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
3. Test hole located at House #316, 2.1 m east of west curb, 13.0 m north of light standard #2-097-423.

Logged By: Tom Hildahl Reviewed By: Nelson Ferreira Project Engineer: Nelson Ferreira

SUB-SURFACE LOG 2013 LOCAL STREET RENEWALS LAIDLAW TESTHOLE LOGS GPJ TREK GEOTECHNICAL GDT 4/15/13



# Sub-Surface Log

Test Hole LAID13-09

1 of 1

Client: Morrison Hershfield Project Number: 0035 006 00  
 Project Name: 2013 Local Streets Package - PW File #: 13-R-04 Location: Laidlaw Blvd - from Corydon Ave to Mountbatten Ave  
 Contractor: Paddock Drilling Ltd. Ground Elevation: Not Surveyed  
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: March 22, 2013

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 <sup>3</sup> )		Particle Size (%)		Undrained Shear Strength (kPa)								
					16	17	18	19	20	21	0	50	100	150	200	250	
		ASPHALT (40 mm thick)		C226													
		CONCRETE (150 mm thick)		C216													
		SAND and GRAVEL (Fill) - clayey, dark brown, wet, compact, well graded		G217													
		CLAY - some silt, trace silt inclusions (<2 mm diam.), dark brown, frozen, moist and soft when thawed, high plasticity		G218													
-0.5		SILT - clayey, trace sand (fine grained) - light brown - frozen, moist and firm when thawed - low plasticity		G219													
-1.0		CLAY - silty, trace silt inclusions (<5 mm diam.) - dark brown - frozen to 1.5 m, moist and stiff when thawed - high plasticity		G220													
-1.5		- trace sand inclusions (<5 mm diam.) below 1.7 m		G221													
-2.0		- trace organics (rootlets) below 2.1 m		G222													
-2.5		SILT - clayey, trace sand (fine grained), trace oxidation, brown, moist, firm, low plasticity		G223													
-3.0		CLAY - silty, trace silt inclusions (<5 mm diam.) - brown - moist, firm - high plasticity		G224													
		CLAY - silty, trace silt inclusions (<5 mm diam.) - brown - moist, firm - high plasticity		G225													

END OF TEST HOLE AT 3.1 m IN CLAY

Notes:

1. No sloughing or seepage observed.
2. Backfilled test hole with auger cuttings and bentonite pellets 0.2 m below top of pavement, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
3. Test hole located at House #315, 1.5 m west of east curb, 14.9 m north of light standard #2-094-878.

Logged By: Tom Hildahl Reviewed By: Nelson Ferreira Project Engineer: Nelson Ferreira

SUB-SURFACE LOG 2013 LOCAL STREET RENEWALS LAIDLAW TESTHOLE LOGS.GPJ\_TREK GEOTECHNICAL.GDT 4/15/13





# Sub-Surface Log

Test Hole LAID13-10

1 of 1

Client: Morrison Hershfield Project Number: 0035 006 00  
 Project Name: 2013 Local Streets Package - PW File #: 13-R-04 Location: Laidlaw Blvd - from Corydon Ave to Mountbatten Ave  
 Contractor: Paddock Drilling Ltd. Ground Elevation: Not Surveyed  
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: March 22, 2013

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 <sup>3</sup> )		Particle Size (%)		Undrained Shear Strength (kPa)							
					16	17	18	19	20	21	50	100	150	200	250	
0.00 - 0.05		ASPHALT (60 mm thick)		C227												
0.05 - 0.10		CONCRETE (146 mm thick)		C228												
0.10 - 0.15		SAND and GRAVEL (Fill) - some clay, dark brown, wet, compact, well graded		G229												
0.15 - 0.45		CLAY - some silt, trace silt inclusions (<2 mm diam.), trace organics (rootlets), trace oxidation, dark brown, frozen, moist and stiff when thawed, high plasticity		G230												
0.45 - 1.00		SILT - clayey, trace sand (fine grained) - light brown - frozen, moist and firm when thawed - low plasticity		G231												
1.00 - 1.50		CLAY - silty, trace silt inclusions (<5 mm diam.) - dark brown - frozen to 2.0 m, moist and stiff when thawed - high plasticity		G232												
1.50 - 2.00				G233												
2.00 - 2.10		- stiff to very stiff, trace precipitates (<5 mm diam.) below 2.0 m		G234												
2.10 - 2.90		- trace to some oxidation, trace to some silt inclusions (<20 mm diam.) at 2.1 m		G235												
2.90 - 3.10		- firm to stiff below 2.9 m		G236												

END OF TEST HOLE AT 3.1 m IN CLAY

Notes:

1. No sloughing or seepage observed.
2. Backfilled test hole with auger cuttings and bentonite pellets 0.2 m below top of pavement, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
3. Test hole located at House #308, 1.7 m east of west curb, 18.7 m south of light standard #2-018-726.

Logged By: Tom Hildahl Reviewed By: Nelson Ferreira Project Engineer: Nelson Ferreira

SUB-SURFACE LOG 2013 LOCAL STREET RENEWALS LAIDLAW TESTHOLE LOGS GPJ TREK GEOTECHNICAL GDT 4/15/13



# Sub-Surface Log

Test Hole LAID13-11

1 of 1

Client: Morrison Hershfield Project Number: 0035 006 00  
 Project Name: 2013 Local Streets Package - PW File #: 13-R-04 Location: Laidlaw Blvd - from Corydon Ave to Mountbatten Ave  
 Contractor: Paddock Drilling Ltd. Ground Elevation: Not Surveyed  
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: March 22, 2013

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 <sup>3</sup> )		Particle Size (%)		Undrained Shear Strength (kPa)								
					16	17	18	19	20	21	0	50	100	150	200	250	
		ASPHALT (41 mm thick)		C227B													
		CONCRETE (165 mm thick)		C228B													
		SAND and GRAVEL (Fill) - some clay, dark brown, moist, compact, well graded		G229B	●												
-0.5		SILT - clayey, trace sand (fine grained) - light brown - frozen, moist and firm when thawed - low plasticity		G230B	●												
-1.0		CLAY - silty, trace silt inclusions (<5 mm diam.), trace precipitates - dark brown - frozen to 1.8 m, moist and stiff when thawed - high plasticity		G231B	●												
-1.5				G232B	●												
-2.0				G233B	●												
-2.5				G234B	●												
-3.0				G235B	●												
-3.0				G236B	●												

END OF TEST HOLE AT 3.1 m IN CLAY

Notes:

1. No sloughing or seepage observed.
2. Backfilled test hole with auger cuttings and bentonite pellets 0.2 m below top of pavement, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
3. Test hole located at House #305, 2.0 m west of east curb, 12.5 m south of light standard #2-042-095.

Logged By: Tom Hildahl Reviewed By: Nelson Ferreira Project Engineer: Nelson Ferreira

SUB-SURFACE LOG 2013 LOCAL STREET RENEWALS LAIDLAW TESTHOLE LOGS GPJ TREK GEOTECHNICAL GDT 4/15/13



# Sub-Surface Log

Test Hole LAID13-12

1 of 1

Client: Morrison Hershfield Project Number: 0035 006 00  
 Project Name: 2013 Local Streets Package - PW File #: 13-R-04 Location: Laidlaw Blvd - from Corydon Ave to Mountbatten Ave  
 Contractor: Paddock Drilling Ltd. Ground Elevation: Not Surveyed  
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: March 22, 2013

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 <sup>3</sup> )		Particle Size (%)		Undrained Shear Strength (kPa)	
					16	17	18	19	20	21
0.0		ASPHALT (70 mm thick)		C237						
0.0		CONCRETE (137 mm thick)		C238						
0.0		CLAY - some sand (coarse grained), some gravel (<20 mm diam.), dark brown, frozen, moist and soft when thawed, high plasticity		G239						
0.5		SILT - clayey, trace sand (fine grained) - light brown - frozen, moist and firm when thawed - low plasticity		G240						
0.8		- dry firm below 0.8 m		G241						
1.0				G242						
1.5		CLAY - silty, trace silt inclusions (<5 mm diam.) - dark brown - frozen to 2.0 m, moist and stiff when thawed - high plasticity		G243						
2.0		- stiff to very stiff below 2.0 m		G244						
2.3		- trace precipitates below 2.3 m		G245						
2.1		- trace to some oxidation, trace to some silt inclusions (<20 mm diam.) at 2.1 m								
2.9		- firm to stiff below 2.9 m		G246						

END OF TEST HOLE AT 3.1 m IN CLAY

Notes:

1. No sloughing or seepage observed.
2. Backfilled test hole with auger cuttings and bentonite pellets 0.2 m below top of pavement, sand to 0.1 m below top of pavement and asphalt cold patch to top of pavement.
3. Test hole located at House #300, 2.2 m east of west curb, 6.8 m south of light standard #2-042-098.

Logged By: Tom Hildahl Reviewed By: Nelson Ferreira Project Engineer: Nelson Ferreira

SUB-SURFACE LOG 2013 LOCAL STREET RENEWALS LAIDLAW TESTHOLE LOGS GPJ\_TREK GEOTECHNICAL.GDT 4/15/13









**Project No.** 0035 006 00  
**Client** Morrison Hershfield  
**Project** 2013 Regional and Local Streets Program - Local Streets Pkg. (13-R-04) - Laidlaw Boulevard

**Sample Date** March 21, 2013  
**Test Date** April 4, 2013  
**Technician** Beta Taryana

Test Hole	LAI13-01	LAI13-01	LAI13-01	LAI13-01	LAI13-01	LAI13-01
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 #	G138	G139	G140	G141	G142	G143
Tare ID	F22	F13	W80	Z48	N17	Z93
Mass of tare	8.3	8.3	8.4	8.3	8.5	8.3
Mass wet + tare	314.7	315.3	346.4	267.3	309.2	350.6
Mass dry + tare	236.6	241.5	257.5	196.1	220.8	251.1
Mass water	78.1	73.8	88.9	71.2	88.4	99.5
Mass dry soil	228.3	233.2	249.1	187.8	212.3	242.8
Moisture %	34.2%	31.6%	35.7%	37.9%	41.6%	41.0%

Test Hole	LAI13-01	LAI13-01	LAI13-02	LAI13-02	LAI13-02	LAI13-02
Depth (m)	2.0 - 2.1	2.9 - 3.0	0.3 - 0.5	0.6 - 0.8	0.9 - 1.1	1.2 - 1.4
Sample #	G144	G145	G148	G149	G150	G151
Tare ID	Z118	E93	E131	K15	Z45	F88
Mass of tare	8.3	8.3	8.4	8.3	8.2	8.2
Mass wet + tare	347.6	366	342.1	259.6	338.4	348.1
Mass dry + tare	242.3	249.9	316.1	211.8	257.2	268.9
Mass water	105.3	116.1	26.0	47.8	81.2	79.2
Mass dry soil	234.0	241.6	307.7	203.5	249.0	260.7
Moisture %	45.0%	48.1%	8.4%	23.5%	32.6%	30.4%

Test Hole	LAI13-02	LAI13-02	LAI13-02	LAI13-02	LAI13-03	LAI13-03
Depth (m)	1.5 - 1.7	1.8 - 2.0	2.1 - 2.3	2.9 - 3.0	0.2 - 0.3	0.5 - 0.6
Sample #	G152	G153	G154	G155	G158	G159
Tare ID	P27	Z04	N20	W67	N13	F74
Mass of tare	8.3	8.3	8.3	8.2	8.4	8.2
Mass wet + tare	320.2	325	289.1	283.7	127.5	279.6
Mass dry + tare	247.8	238.5	213	199.6	92.3	208.3
Mass water	72.4	86.5	76.1	84.1	35.2	71.3
Mass dry soil	239.5	230.2	204.7	191.4	83.9	200.1
Moisture %	30.2%	37.6%	37.2%	43.9%	42.0%	35.6%



**Project No.** 0035 006 00  
**Client** Morrison Hershfield  
**Project** 2013 Regional and Local Streets Program - Local Streets Pkg. (13-R-04) - Laidlaw Boulevard

**Sample Date** March 21, 2013  
**Test Date** April 4, 2013  
**Technician** Beta Taryana

Test Hole	LAI13-03	LAI13-03	LAI13-03	LAI13-03	LAI13-03	LAI13-03
Depth (m)	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1	2.9 - 3.0
Sample #	G160	G161	G162	G163	G164	G165
Tare ID	E27	N103	W40	W34	N114	Z87
Mass of tare	8.4	8.2	8.2	8.2	8.3	8.3
Mass wet + tare	299.1	356.6	282.3	337.7	471.5	307.1
Mass dry + tare	231	258.5	209.6	250.1	360.2	210.8
Mass water	68.1	98.1	72.7	87.6	111.3	96.3
Mass dry soil	222.6	250.3	201.4	241.9	351.9	202.5
Moisture %	30.6%	39.2%	36.1%	36.2%	31.6%	47.6%

Test Hole	LAI13-04	LAI13-04	LAI13-04	LAI13-04	LAI13-04	LAI13-04
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 #	G168	G169	G170	G171	G172	G173
Tare ID	N88	N30	F8	H29	W104	H4
Mass of tare	8.2	8.3	8.5	8.3	8.3	8.4
Mass wet + tare	289	296	273	364.1	300.1	332.7
Mass dry + tare	216.8	235.4	206.8	270.1	218.2	243.9
Mass water	72.2	60.6	66.2	94.0	81.9	88.8
Mass dry soil	208.6	227.1	198.3	261.8	209.9	235.5
Moisture %	34.6%	26.7%	33.4%	35.9%	39.0%	37.7%

Test Hole	LAI13-04	LAI13-04	LAI13-05	LAI13-05	LAI13-05	LAI13-05
Depth (m)	2.0 - 2.1	2.9 - 3.0	0.2 - 0.3	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2
Sample #	G174	G175	G178	G179	G180	G181
Tare ID	E48	C17	W62	F58	Z37	E60
Mass of tare	8.4	8.3	8.3	8.5	8.2	8.4
Mass wet + tare	359.7	363.9	326.8	337.2	312	316.5
Mass dry + tare	260.2	251.2	250.2	257.7	233.8	233.8
Mass water	99.5	112.7	76.6	79.5	78.2	82.7
Mass dry soil	251.8	242.9	241.9	249.2	225.6	225.4
Moisture %	39.5%	46.4%	31.7%	31.9%	34.7%	36.7%





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Test Hole	LAI13-05	LAI13-05	LAI13-05	LAI13-05	LAI13-06	LAI13-06
Depth (m)	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1	2.9 - 3.0	0.2 - 0.3	0.5 - 0.6
Sample #	G182	G183	G184	G185	G188	G189
Tare ID	Z71	F67	Z42	F137	Z70	H39
Mass of tare	8.3	8.4	8.2	8.2	8.4	8.4
Mass wet + tare	247.3	331.9	330.6	324.1	304.9	315
Mass dry + tare	180	239.5	240.1	224.1	229.3	258.6
Mass water	67.3	92.4	90.5	100.0	75.6	56.4
Mass dry soil	171.7	231.1	231.9	215.9	220.9	250.2
Moisture %	39.2%	40.0%	39.0%	46.3%	34.2%	22.5%

Test Hole	LAI13-06	LAI13-06	LAI13-06	LAI13-06	LAI13-06	LAI13-06
Depth (m)	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1	2.9 - 3.0
Sample #	G190	G191	G192	G193	G194	G195
Tare ID	Z11	W73	W20	W49	F130	Z112
Mass of tare	8.4	8.4	8.3	8.3	8.4	8.4
Mass wet + tare	377.4	290.9	302.2	378.2	374.7	391.6
Mass dry + tare	312.9	217.1	223.5	278.5	266.8	269.9
Mass water	64.5	73.8	78.7	99.7	107.9	121.7
Mass dry soil	304.5	208.7	215.2	270.2	258.4	261.5
Moisture %	21.2%	35.4%	36.6%	36.9%	41.8%	46.5%

Test Hole	LAI13-07	LAI13-07	LAI13-07	LAI13-07	LAI13-07	LAI13-07
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 #	G198	G199	G200	G201	G202	G203
Tare ID	H33	E66	H42	F33	Z07	A103
Mass of tare	8.4	8.3	8.3	8.4	8.4	8.4
Mass wet + tare	329.9	462.1	438.2	324.3	298.3	378.4
Mass dry + tare	257.4	390.1	372.4	251.2	222.2	272.9
Mass water	72.5	72.0	65.8	73.1	76.1	105.5
Mass dry soil	249.0	381.8	364.1	242.8	213.8	264.5
Moisture %	29.1%	18.9%	18.1%	30.1%	35.6%	39.9%



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Test Hole	LAI13-07	LAI13-07	LAI13-08	LAI13-08	LAI13-08	LAI13-08
Depth (m)	2.0 - 2.1	2.9 - 3.0	0.1 - 0.2	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2
Sample #	G204	G205	G208	G209	G210	G211
Tare ID	E95	N06	H57	F75	E19	F56
Mass of tare	8.4	8.4	8.4	8.4	8.3	8.3
Mass wet + tare	369.1	396.8	386.2	368.7	453.9	278.6
Mass dry + tare	257.5	267.7	349.3	299.9	388.3	210.8
Mass water	111.6	129.1	36.9	68.8	65.6	67.8
Mass dry soil	249.1	259.3	340.9	291.5	380.0	202.5
Moisture %	44.8%	49.8%	10.8%	23.6%	17.3%	33.5%

Test Hole	LAI13-08	LAI13-08	LAI13-08	LAI13-08	LAI13-09	LAI13-09
Depth (m)	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1	2.9 - 3.0	0.2 - 0.2	0.3 - 0.5
Sample #	G212	G213	G214	G215	G217	G218
Tare ID	W39	D46	K36	F28	F61	H35
Mass of tare	8.2	8.3	8.3	8.4	8.4	8.4
Mass wet + tare	352.1	312.3	373.8	326.2	425.4	468.4
Mass dry + tare	266.6	232.1	270.1	228.7	327.1	362.6
Mass water	85.5	80.2	103.7	97.5	98.3	105.8
Mass dry soil	258.4	223.8	261.8	220.3	318.7	354.2
Moisture %	33.1%	35.8%	39.6%	44.3%	30.8%	29.9%

Test Hole	LAI13-09	LAI13-09	LAI13-09	LAI13-09	LAI13-09	LAI13-09
Depth (m)	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1	2.4 - 2.6
Sample #	G219	G220	G221	G222	G223	G224
Tare ID	E82	C29	E80	F132	F17	F143
Mass of tare	8.5	8.3	8.5	8.5	8.4	8.4
Mass wet + tare	393.3	330.2	288.9	363.2	377.4	367.1
Mass dry + tare	321.8	247.5	212.2	282.3	275.7	294.8
Mass water	71.5	82.7	76.7	80.9	101.7	72.3
Mass dry soil	313.3	239.2	203.7	273.8	267.3	286.4
Moisture %	22.8%	34.6%	37.7%	29.5%	38.0%	25.2%



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<b>Test Hole</b>	LAI13-09	LAI13-10	LAI13-10	LAI13-10	LAI13-10	LAI13-10
<b>Depth (m)</b>	2.9 - 3.0	0.2 - 0.2	0.2 - 0.4	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5
<b>Sample #</b>	G225	G229	G230	G231	G232	G233
<b>Tare ID</b>	P10	d19	H34	F145	K25	E91
<b>Mass of tare</b>	8.3	8.3	8.3	8.4	8.4	8.3
<b>Mass wet + tare</b>	399	564.3	332	387.8	363.9	299.6
<b>Mass dry + tare</b>	285	464.8	261.5	348.5	340.3	238
<b>Mass water</b>	114.0	99.5	70.5	39.3	23.6	61.6
<b>Mass dry soil</b>	276.7	456.5	253.2	340.1	331.9	229.7
<b>Moisture %</b>	41.2%	21.8%	27.8%	11.6%	7.1%	26.8%

<b>Test Hole</b>	LAI13-10	LAI13-10	LAI13-10	LAI13-11	LAI13-11	LAI13-11
<b>Depth (m)</b>	1.7 - 1.8	2.0 - 2.1	2.9 - 3.0	0.2 - 0.2	0.3 - 0.5	0.8 - 0.9
<b>Sample #</b>	G234	G235	G236	G229B	G230B	G231B
<b>Tare ID</b>	W78	W82	Z18	W21	W69	K30
<b>Mass of tare</b>	8.3	8.4	8.5	8.4	8.5	8.6
<b>Mass wet + tare</b>	345.4	321.3	404	257.1	313.6	262.5
<b>Mass dry + tare</b>	262.6	237	291.4	228.2	276.8	212.1
<b>Mass water</b>	82.8	84.3	112.6	28.9	36.8	50.4
<b>Mass dry soil</b>	254.3	228.6	282.9	219.8	268.3	203.5
<b>Moisture %</b>	32.6%	36.9%	39.8%	13.1%	13.7%	24.8%

<b>Test Hole</b>	LAI13-11	LAI13-11	LAI13-11	LAI13-11	LAI13-11	LAI13-12
<b>Depth (m)</b>	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1	2.9 - 3.0	0.2 - 0.3
<b>Sample #</b>	G232B	G233B	G234	G235B	G236B	G239
<b>Tare ID</b>	F126	W05	K13	A06	W89	H5
<b>Mass of tare</b>	8.3	8.3	8.3	8.2	8.1	8.6
<b>Mass wet + tare</b>	313.1	269.1	396.5	324.5	396.5	222.7
<b>Mass dry + tare</b>	246.4	202.6	295.2	235.4	285.6	186.2
<b>Mass water</b>	66.7	66.5	101.3	89.1	110.9	36.5
<b>Mass dry soil</b>	238.1	194.3	286.9	227.2	277.5	177.6
<b>Moisture %</b>	28.0%	34.2%	35.3%	39.2%	40.0%	20.6%



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**Moisture Content Report  
 ASTM D2216-98**

**Project No.** 0035 006 00  
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**Project** 2013 Regional and Local Streets Program - Local Streets Pkg. (13-R-04) - Laidlaw Boulevard

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<b>Test Hole</b>	LAI13-12	LAI13-12	LAI13-12	LAI13-12	LAI13-12	LAI13-12
<b>Depth (m)</b>	0.5 - 0.6	0.8 - 0.9	1.1 - 1.2	1.4 - 1.5	1.7 - 1.8	2.0 - 2.1
<b>Sample #</b>	G240	G241	G242	G243	G244	G245
<b>Tare ID</b>	F19	P12	F10	Z39	K31	N63
<b>Mass of tare</b>	8.5	8.4	8.4	8.4	8.2	8.2
<b>Mass wet + tare</b>	321.8	283.3	254.7	292.3	281.2	359
<b>Mass dry + tare</b>	243.7	244.4	227.1	230.2	211.2	253.8
<b>Mass water</b>	78.1	38.9	27.6	62.1	70.0	105.2
<b>Mass dry soil</b>	235.2	236.0	218.7	221.8	203.0	245.6
<b>Moisture %</b>	33.2%	16.5%	12.6%	28.0%	34.5%	42.8%

<b>Test Hole</b>	LAI13-12					
<b>Depth (m)</b>	2.9 - 3.0					
<b>Sample #</b>	G246					
<b>Tare ID</b>	W85					
<b>Mass of tare</b>	8.4					
<b>Mass wet + tare</b>	414.7					
<b>Mass dry + tare</b>	296.6					
<b>Mass water</b>	118.1					
<b>Mass dry soil</b>	288.2					
<b>Moisture %</b>	41.0%					



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**Atterberg Limits  
 ASTM D4318**

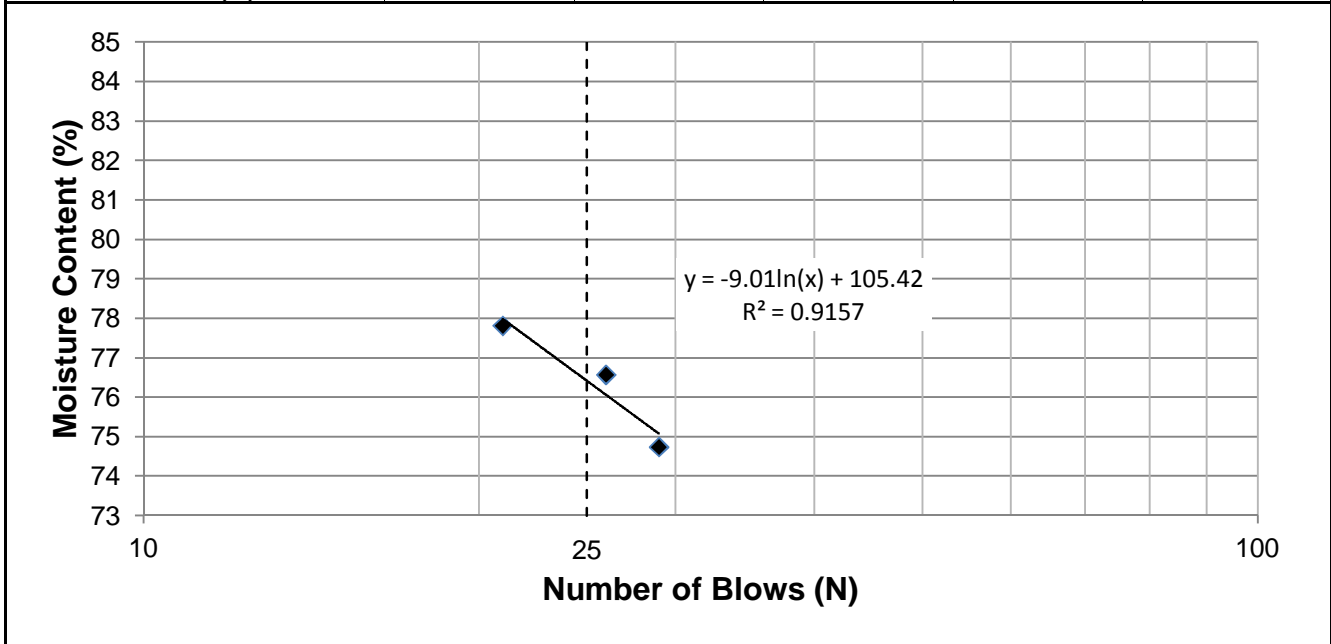
**Project No.** 0035 006 00  
**Client** Morrison Hershfield  
**Project** 2013 City of Winnipeg Regional and Local Streets Program - Local Streets Pkg. (13-R-04)

**Test Hole** LAID13-01  
**Sample #** G139  
**Depth (m)** 0.5 - 0.6  
**Sample Date** 22-Mar-13  
**Test Date** 11-Apr-13  
**Technician** Beta Taryana

<b>Liquid Limit</b>	76
<b>Plastic Limit</b>	23
<b>Plasticity Index</b>	54

**Liquid Limit**

Trial #	1	2	3	4	5
<b>Number of Blows (N)</b>	29	26	21		
<b>Mass Wet Soil + Tare (g)</b>	24.820	24.783	24.490		
<b>Mass Dry Soil + Tare (g)</b>	20.207	20.080	19.913		
<b>Mass Tare (g)</b>	14.035	13.938	14.031		
<b>Mass Water (g)</b>	4.613	4.703	4.577		
<b>Mass Dry Soil (g)</b>	6.172	6.142	5.882		
<b>Moisture Content (%)</b>	74.741	76.571	77.814		



**Plastic Limit**

Trial #	1	2	3	4	5
<b>Mass Wet Soil + Tare (g)</b>	21.047	20.274			
<b>Mass Dry Soil + Tare (g)</b>	19.747	19.127			
<b>Mass Tare (g)</b>	14.045	14.014			
<b>Mass Water (g)</b>	1.300	1.147			
<b>Mass Dry Soil (g)</b>	5.702	5.113			
<b>Moisture Content (%)</b>	22.799	22.433			



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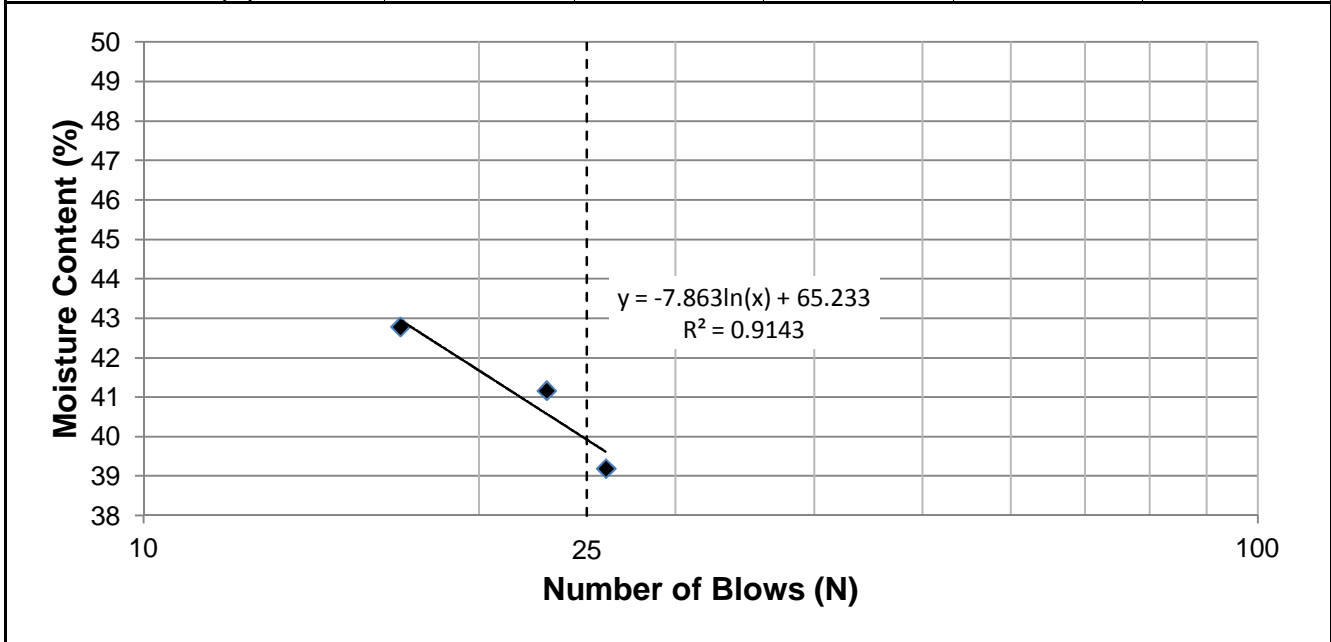
**Project No.** 0035 006 00  
**Client** Morrison Hershfield  
**Project** 2013 City of Winnipeg Regional and Local Streets Program - Local Streets Pkg. (13-R-04)

**Test Hole** LAID13-04  
**Sample #** G169  
**Depth (m)** 0.5 - 0.6  
**Sample Date** 22-Mar-13  
**Test Date** 11-Apr-13  
**Technician** Beta Taryana

<b>Liquid Limit</b>	40
<b>Plastic Limit</b>	15
<b>Plasticity Index</b>	25

**Liquid Limit**

Trial #	1	2	3	4	5
<b>Number of Blows (N)</b>	26	23	17		
<b>Mass Wet Soil + Tare (g)</b>	21.833	23.321	23.700		
<b>Mass Dry Soil + Tare (g)</b>	19.555	20.638	20.806		
<b>Mass Tare (g)</b>	13.743	14.121	14.042		
<b>Mass Water (g)</b>	2.278	2.683	2.894		
<b>Mass Dry Soil (g)</b>	5.812	6.517	6.764		
<b>Moisture Content (%)</b>	39.195	41.169	42.785		



**Plastic Limit**

Trial #	1	2	3	4	5
<b>Mass Wet Soil + Tare (g)</b>	21.932	20.761			
<b>Mass Dry Soil + Tare (g)</b>	20.932	19.859			
<b>Mass Tare (g)</b>	14.240	14.074			
<b>Mass Water (g)</b>	1.000	0.902			
<b>Mass Dry Soil (g)</b>	6.692	5.785			
<b>Moisture Content (%)</b>	14.943	15.592			



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**Atterberg Limits  
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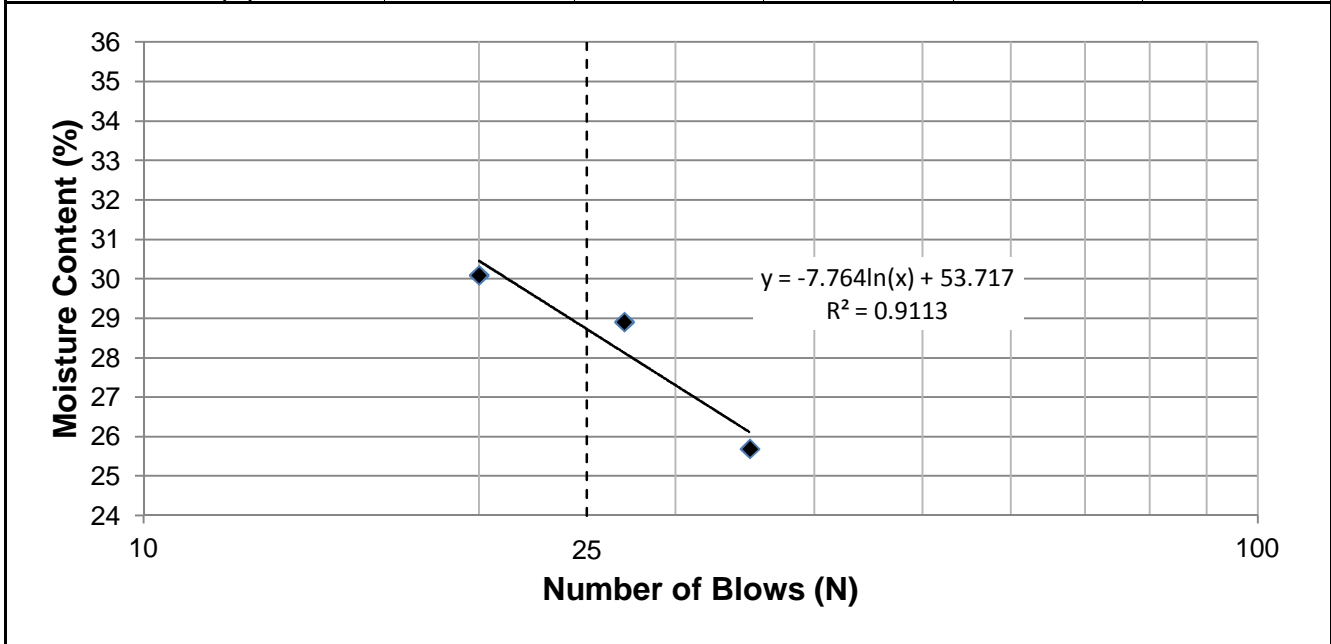
**Project No.** 0035 006 00  
**Client** Morrison Hershfield  
**Project** 2013 City of Winnipeg Regional and Local Streets Program - Local Streets Pkg. (13-R-04)

**Test Hole** LAID13-10  
**Sample #** G231  
**Depth (m)** 0.8 - 0.9  
**Sample Date** 22-Mar-13  
**Test Date** 11-Apr-13  
**Technician** Beta Taryana

<b>Liquid Limit</b>	29
<b>Plastic Limit</b>	14
<b>Plasticity Index</b>	15

**Liquid Limit**

Trial #	1	2	3	4	5
<b>Number of Blows (N)</b>	35	27	20		
<b>Mass Wet Soil + Tare (g)</b>	28.767	27.418	26.479		
<b>Mass Dry Soil + Tare (g)</b>	25.696	24.436	23.602		
<b>Mass Tare (g)</b>	13.743	14.121	14.042		
<b>Mass Water (g)</b>	3.071	2.982	2.877		
<b>Mass Dry Soil (g)</b>	11.953	10.315	9.560		
<b>Moisture Content (%)</b>	25.692	28.909	30.094		



**Plastic Limit**

Trial #	1	2	3	4	5
<b>Mass Wet Soil + Tare (g)</b>	21.122	20.889			
<b>Mass Dry Soil + Tare (g)</b>	20.256	20.059			
<b>Mass Tare (g)</b>	14.001	14.139			
<b>Mass Water (g)</b>	0.866	0.830			
<b>Mass Dry Soil (g)</b>	6.255	5.920			
<b>Moisture Content (%)</b>	13.845	14.020			



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 Tel: 204.975.9433 Fax: 204.975.9435

**Atterberg Limits  
 ASTM D4318**

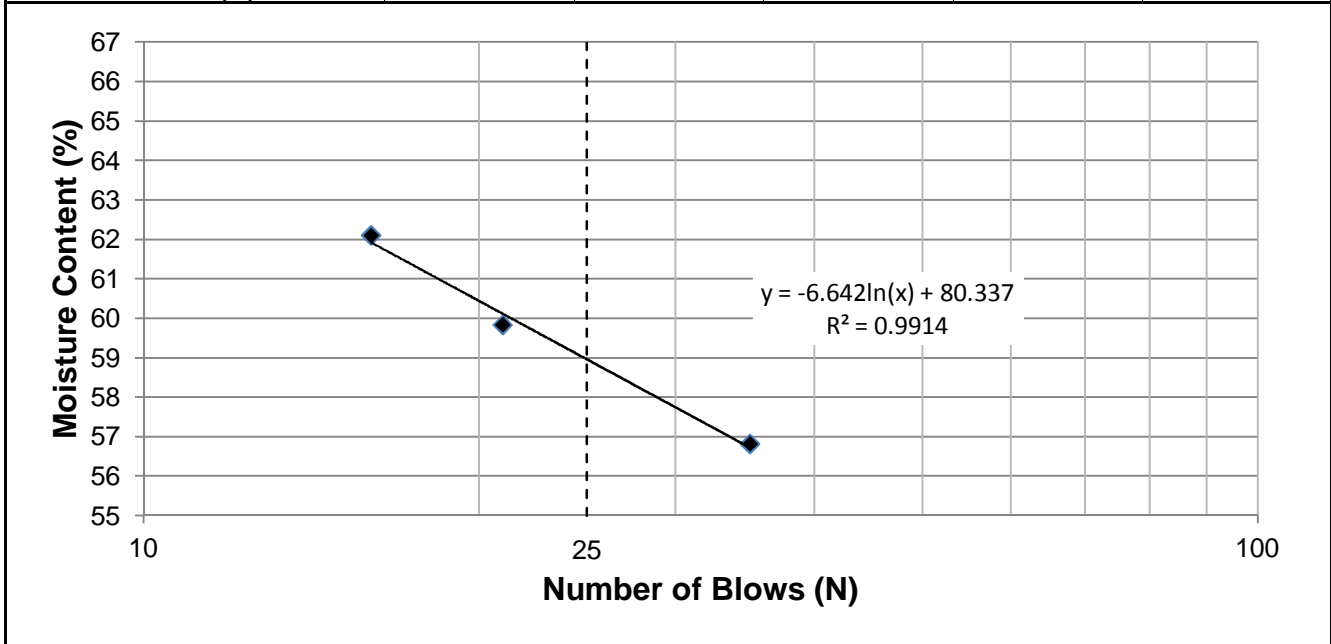
**Project No.** 0035 006 00  
**Client** Morrison Hershfield  
**Project** 2013 City of Winnipeg Regional and Local Streets Program - Local Streets Pkg. (13-R-04)

**Test Hole** LAID13-11  
**Sample #** G231B  
**Depth (m)** 0.8 - 0.9  
**Sample Date** 22-Mar-13  
**Test Date** 11-Apr-13  
**Technician** Beta Taryana

<b>Liquid Limit</b>	59
<b>Plastic Limit</b>	19
<b>Plasticity Index</b>	40

**Liquid Limit**

Trial #	1	2	3	4	5
<b>Number of Blows (N)</b>	35	21	16		
<b>Mass Wet Soil + Tare (g)</b>	22.697	22.992	20.941		
<b>Mass Dry Soil + Tare (g)</b>	19.515	19.610	18.304		
<b>Mass Tare (g)</b>	13.915	13.958	14.058		
<b>Mass Water (g)</b>	3.182	3.382	2.637		
<b>Mass Dry Soil (g)</b>	5.600	5.652	4.246		
<b>Moisture Content (%)</b>	56.821	59.837	62.106		



**Plastic Limit**

Trial #	1	2	3	4	5
<b>Mass Wet Soil + Tare (g)</b>	20.442	20.374			
<b>Mass Dry Soil + Tare (g)</b>	19.444	19.370			
<b>Mass Tare (g)</b>	14.049	13.961			
<b>Mass Water (g)</b>	0.998	1.004			
<b>Mass Dry Soil (g)</b>	5.395	5.409			
<b>Moisture Content (%)</b>	18.499	18.562			



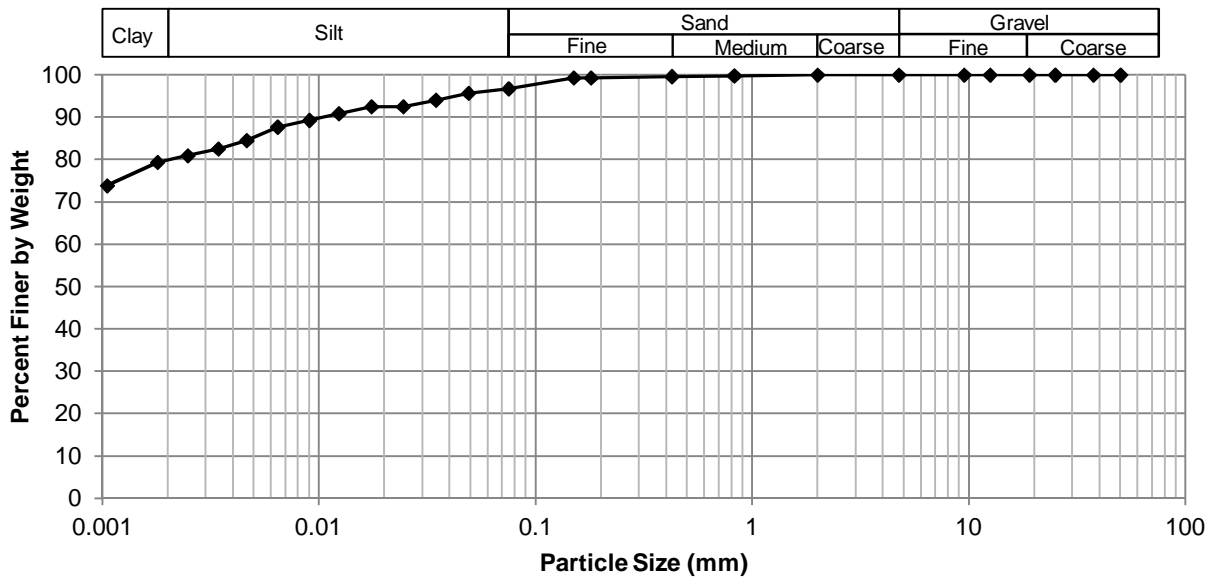


**Project No.** 0035 006 00  
**Client** Morrison Hershfield  
**Project** 2013 City of Winnipeg Regional and Local Streets Program - Local Streets Pkg. (13-R-04)

**Test Hole** LAID13-01  
**Sample #** G139  
**Depth (m)** 0.5 - 0.6  
**Sample Date** 21-Mar-13  
**Test Date** 10-Apr-13  
**Technician** Beta Taryana

<b>Gravel</b>	0.0%
<b>Sand</b>	3.3%
<b>Silt</b>	16.6%
<b>Clay</b>	80.1%

**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	96.71
37.5	100.00	2.00	100.00	0.0490	95.63
25.0	100.00	0.825	99.78	0.0346	94.04
19.0	100.00	0.425	99.61	0.0245	92.45
12.5	100.00	0.180	99.30	0.0175	92.45
9.50	100.00	0.150	99.26	0.0124	90.86
4.75	100.00	0.075	96.71	0.0090	89.28
				0.0064	87.69
				0.0046	84.51
				0.0034	82.50
				0.0025	80.91
				0.0018	79.32
				0.0011	73.85



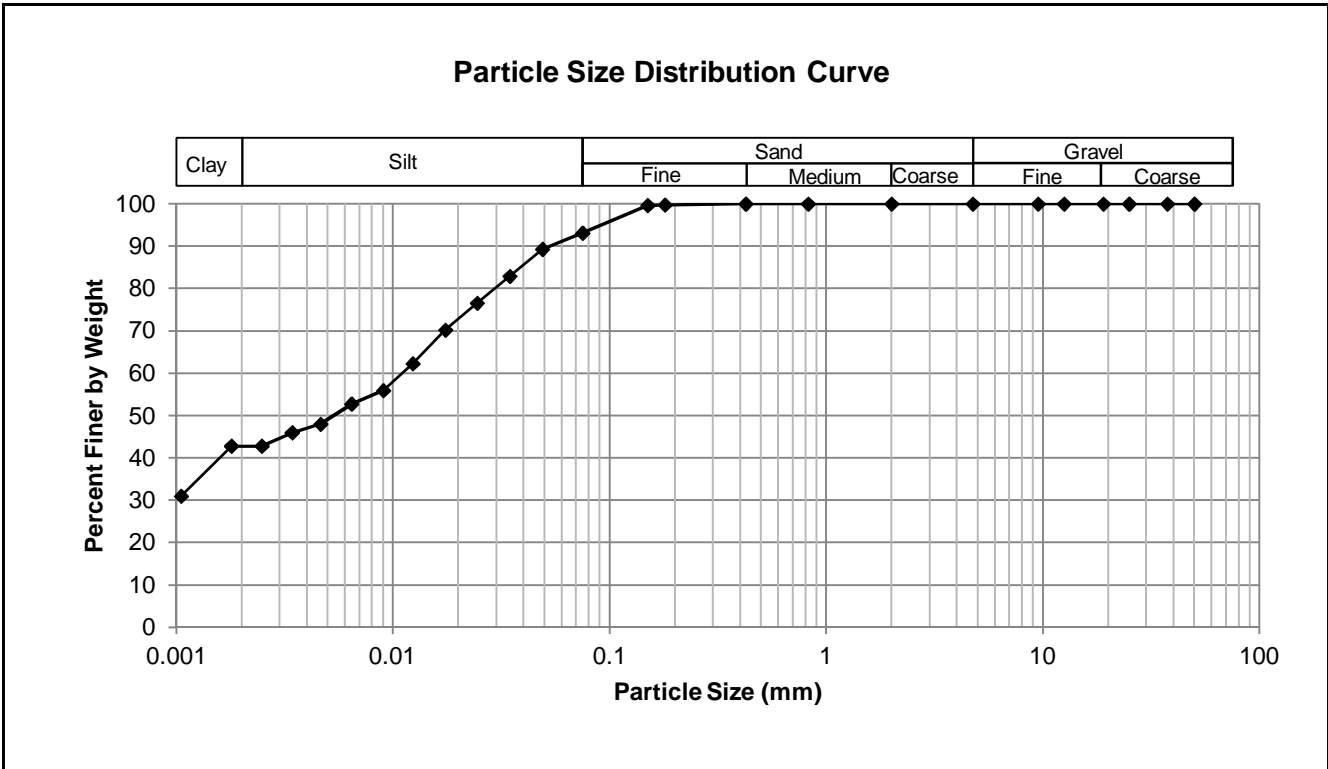
www.trekgeotechnical.ca  
 1712 St. James Street  
 Winnipeg, MB R3H 0L3  
 Tel: 204.975.9433 Fax: 204.975.9435

**Grain Size Analysis (Hydrometer Method)**  
**ASTM D422**

**Project No.** 0035 006 00  
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**Test Hole** LAID13-04  
**Sample #** G169  
**Depth (m)** 0.5 - 0.6  
**Sample Date** 21-Mar-13  
**Test Date** 10-Apr-13  
**Technician** Beta Taryana

<b>Gravel</b>	0.0%
<b>Sand</b>	6.9%
<b>Silt</b>	51.9%
<b>Clay</b>	41.2%



Gravel		Sand		Silt and Clay	
Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing
50.0	100.00	4.75	100.00	0.0750	93.09
37.5	100.00	2.00	100.00	0.0490	89.28
25.0	100.00	0.825	100.00	0.0346	82.92
19.0	100.00	0.425	99.96	0.0245	76.57
12.5	100.00	0.180	99.71	0.0175	70.22
9.50	100.00	0.150	99.63	0.0124	62.28
4.75	100.00	0.075	93.09	0.0090	55.93
				0.0064	52.75
				0.0046	47.99
				0.0034	45.97
				0.0025	42.80
				0.0018	42.80
				0.0011	30.98

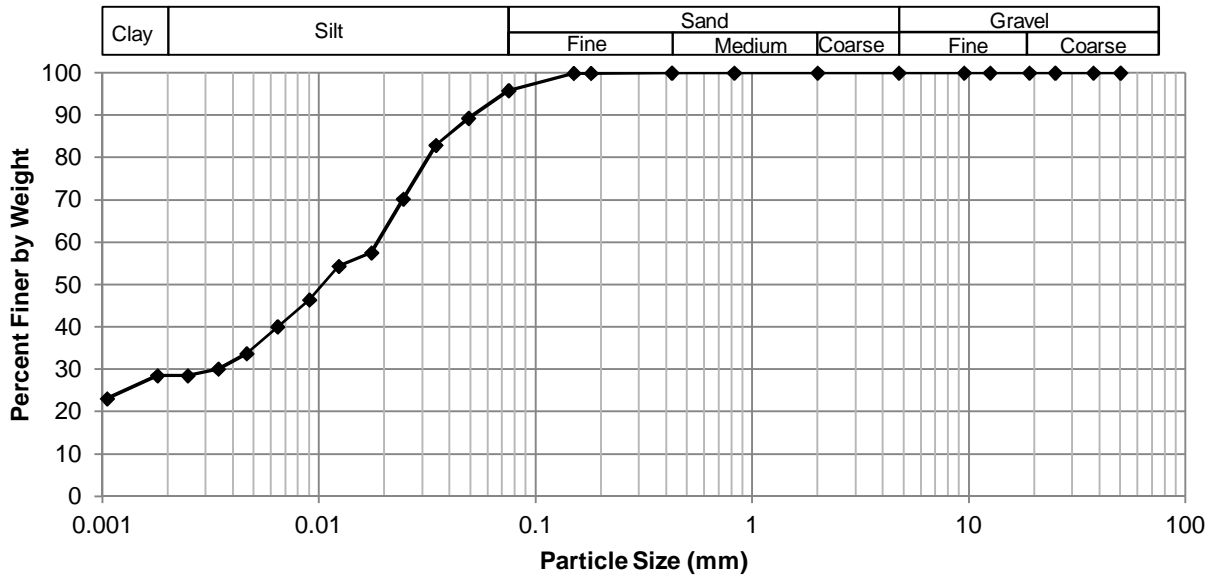


**Project No.** 0035 006 00  
**Client** Morrison Hershfield  
**Project** 2013 City of Winnipeg Regional and Local Streets Program - Local Streets Pkg. (13-R-04)

**Test Hole** LAID13-10  
**Sample #** G231  
**Depth (m)** 0.8 - 0.9  
**Sample Date** 21-Mar-13  
**Test Date** 10-Apr-13  
**Technician** Beta Taryana

<b>Gravel</b>	0.0%
<b>Sand</b>	4.2%
<b>Silt</b>	68.1%
<b>Clay</b>	27.7%

**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	95.83
37.5	100.00	2.00	100.00	0.0490	89.28
25.0	100.00	0.825	100.00	0.0346	82.92
19.0	100.00	0.425	100.00	0.0245	70.22
12.5	100.00	0.180	99.89	0.0175	57.52
9.50	100.00	0.150	99.89	0.0124	54.34
4.75	100.00	0.075	95.83	0.0090	46.40
				0.0064	40.05
				0.0046	33.69
				0.0034	30.09
				0.0025	28.50
				0.0018	28.50
				0.0011	23.04

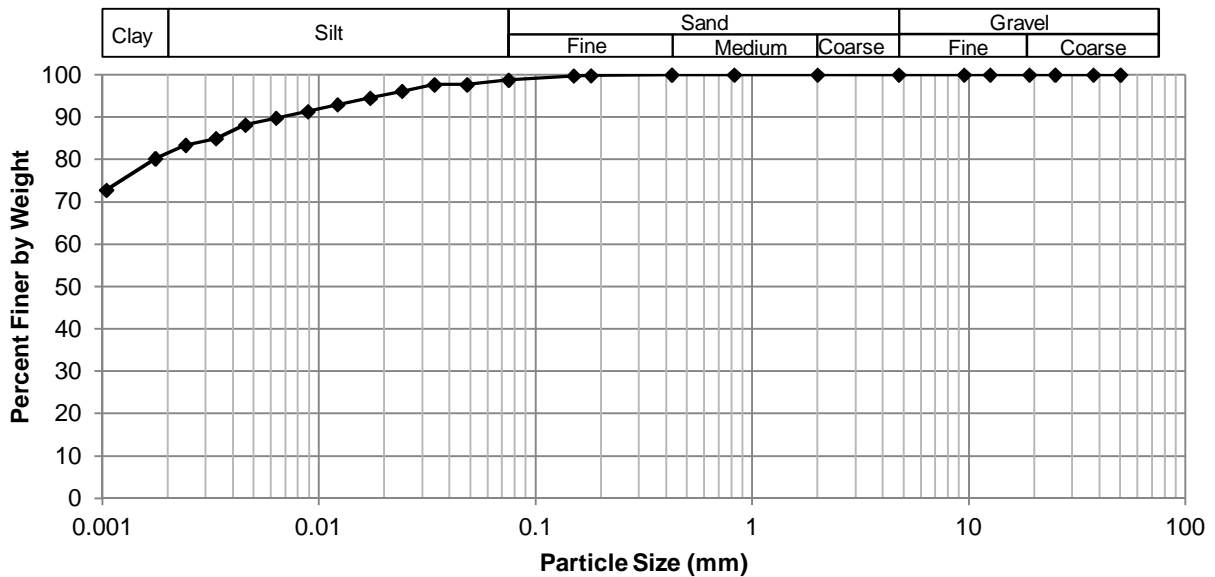


**Project No.** 0035 006 00  
**Client** Morrison Hershfield  
**Project** 2013 City of Winnipeg Regional and Local Streets Program - Local Streets Pkg. (13-R-04)

**Test Hole** LAID13-11  
**Sample #** G231B  
**Depth (m)** 0.8 - 0.9  
**Sample Date** 21-Mar-13  
**Test Date** 10-Apr-13  
**Technician** Beta Taryana

<b>Gravel</b>	0.0%
<b>Sand</b>	1.2%
<b>Silt</b>	16.1%
<b>Clay</b>	82.6%

**Particle Size Distribution Curve**



Gravel		Sand		Silt and Clay	
Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing
50.0	100.00	4.75	100.00	0.0750	98.76
37.5	100.00	2.00	100.00	0.0482	97.68
25.0	100.00	0.825	100.00	0.0341	97.68
19.0	100.00	0.425	100.00	0.0241	96.09
12.5	100.00	0.180	99.80	0.0172	94.50
9.50	100.00	0.150	99.75	0.0122	92.91
4.75	100.00	0.075	98.76	0.0089	91.32
				0.0063	89.74
				0.0046	88.15
				0.0033	84.97
				0.0024	83.38
				0.0018	80.21
				0.0010	72.77



Photo 1: Asphalt Core Sample from Test Hole LAID13-01



Photo 2: Concrete Core Sample from Test Hole LAID13-01



Photo 3: Asphalt and Concrete Core Sample from Test Hole LAID13-02



Photo 4: Concrete Core Sample from Test Hole LAID13-02



Photo 5: Asphalt Core Sample from Test Hole LAID13-03



Photo 6: Concrete Core Sample from Test Hole LAID13-03



Photo 7: Asphalt Core Sample from Test Hole LAID13-04



Photo 8: Concrete Core Sample from Test Hole LAID13-04





Photo 9: Asphalt Core Sample from Test Hole LAID13-05



Photo 10: Concrete Core Sample from Test Hole LAID13-05



Photo 11: Asphalt Core Sample from Test Hole LAID13-06



Photo 12: Concrete Core Sample from Test Hole LAID13-06



Photo 13: Asphalt Core Sample from Test Hole LAID13-07



Photo 14: Concrete Core Sample from Test Hole LAID13-07



Photo 15: Asphalt Core Sample from Test Hole LAID13-08



Photo 16: Concrete Core Sample from Test Hole LAID13-08



Photo 17: Asphalt Core Sample from Test Hole LAID13-09



Photo 18: Concrete Core Sample from Test Hole LAID13-09

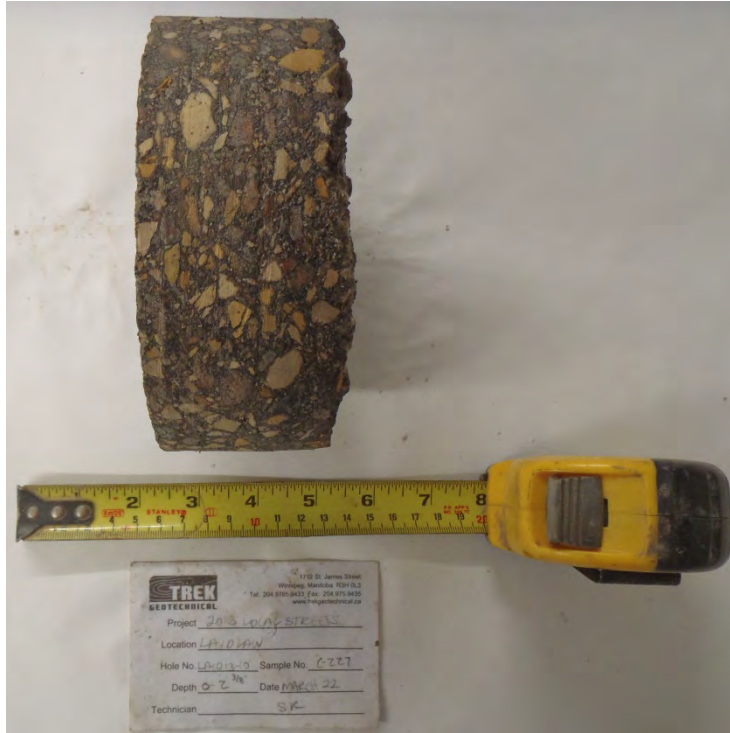


Photo 19: Asphalt Core Sample from Test Hole LAID13-10



Photo 20: Concrete Core Sample from Test Hole LAID13-10



Photo 21: Asphalt Core Sample from Test Hole LAID13-11



Photo 22: Concrete Core Sample from Test Hole LAID13-11



Photo 23: Asphalt Core Sample from Test Hole LAID13-12



Photo 24: Concrete Core Sample from Test Hole LAID13-12