

APPENDIX 'A'

GEOTECHNICAL REPORT

APPENDIX 'A' - GEOTECHNICAL REPORT

GEOTECHNICAL REPORTS FOR:

- I. Alexander Avenue from Yeomans Street to McPhillips Street
- II. Downing Street and Sargent Park Place from Wellington Avenue to Dominion Street
- III. Lulu Street from Alexander Avenue to Logan Avenue
- IV. Lenore Street from Wolseley Avenue to Westminster Avenue
- V. Minto Street from Wolever Avenue to St. Matthews Avenue

The geotechnical report is provided to aid in the Contractor's evaluation of the existing pavement structure and/or soil conditions. The information presented is considered accurate at the locations shown on the Drawings and at the time of drilling. However, variations in pavement structure and/or soil conditions may exist between test holes and fluctuations in groundwater levels can be expected seasonally and may occur as a result of construction activities. The nature and extent of variations may not become evident until construction commences.



Quality Engineering | Valued Relationships

H. Manalo Consulting Ltd.

2017 Residential Street Renewal Program Sub-Surface Investigation

Prepared for:

Hermie Manalo, Manager of Field
and Laboratory Testing Services
H. Manalo Consulting Ltd.
1402 Notre Dame Avenue
Winnipeg, MB R3E 3G5
Attention: Hermie Manalo

Project Number:

0315-001-00

Date:

March 7, 2017
Final Report



Quality Engineering | Valued Relationships

March 7, 2017

Our File No. 0315-001-00

Hermie Manalo, Manager of Field and Laboratory Testing Services
H. Manalo Consulting Ltd.
1402 Notre Dame Avenue
Winnipeg, MB R3E 3G5

**RE: 2017 Residential Street Renewal Program
Sub-Surface Investigation Report**

TREK Geotechnical Inc. is pleased to submit our report for the sub-surface investigations for the 2017 Residential Street Renewal Program.

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

Sincerely,

TREK Geotechnical Inc.
Per:

A handwritten signature in blue ink, appearing to read "Nelson John Ferreira". The signature is fluid and cursive, written over a light blue circular stamp that is partially obscured.

Nelson John Ferreira, Ph.D., P. Eng.
Geotechnical Engineer, Principal
Tel: 204.975.9433 ext. 103

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

Revision History

Revision No.	Author	Issue Date	Description
0	SGBR	March 7, 2017	Final Report

Authorization Signatures

Prepared By:



Shane Broderick



Reviewed By:

Nelson John Ferreira, Ph.D., P.Eng.
Geotechnical Engineer



Table of Contents

Letter of Transmittal

Revision History and Authorization Signatures

1.0	Introduction	1
2.0	Sub-Surface Investigation and Laboratory Program	1
3.0	Closure.....	1

List of Figures

- Figure 01 Test Hole Location Plan – Alexander Avenue
- Figure 02 Test Hole Location Plan – Downing Street
- Figure 03 Test Hole Location Plan – Lulu Street
- Figure 04 Test Hole Location Plan – Lenore Street
- Figure 05 Test Hole Location Plan – Minto Street

List of Appendices

- Appendix A Test Hole Logs, Summary Table & Lab Data – Alexander Avenue
- Appendix B Test Hole Logs, Summary Table & Lab Data – Downing Street
- Appendix C Test Hole Logs, Summary Table & Lab Data – Lulu Street
- Appendix D Test Hole Logs, Summary Table & Lab Data – Lenore Street
- Appendix E Test Hole Logs, Summary Table & Lab Data – Minto Street

1.0 Introduction

This report summarizes the results of the sub-surface investigation completed for the 2017 Residential Street Renewal Program. The streets investigation included Alexander Street, Downing Street, Lulu Street, Lenore Street and Minto Street. The information collected describes the pavement structure of the existing road as well as the soil stratigraphy beneath the pavement structure.

2.0 Sub-Surface Investigation and Laboratory Program

For each street, test holes were drilled approximately every 50 m of street length with specific locations shown on Figure 01 to Figure 05. The test holes were drilled to determine sub-surface conditions for the reconstruction of the road.

The sub-surface investigation was conducted between January 11, 2017 and January 17, 2017. The test holes were drilled to a depth of 3.1 m below road surface by Paddock Drilling Ltd. using their Acker MP8 truck mounted drill rig equipped with 125 mm diameter solid stem augers. The pavement structure (asphalt or concrete) was cored by H. Manalo Consulting Ltd, using a portable coring press equipped with a hollow 150 mm diameter diamond core drill bit. The sub-surface conditions were observed during drilling and visually classified by Shane Broderick and Matt Klymochko of 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. Core samples were also retrieved and logged at TREK's material testing laboratory.

The laboratory testing program consisted of moisture content determination, Atterberg limits, and grain size analysis (mechanical sieve and hydrometer methods). Information gathered for each street is included in separate appendices (Appendix A to E). The information provided in the Appendices includes test hole logs, laboratory testing summary tables and results, and photos of the concrete cores.

Test hole locations noted on the test hole logs and shown on Figure 01 to Figure 05 are based on measured distances from the nearest address, edge of pavement or other permanent features.

3.0 Closure

The information provided in this report is in accordance with current engineering principles and practices (Standard of Practice). The findings of this report were based on information provided (field investigation, laboratory testing, geometries). Soil conditions are natural deposits that can be highly variable across a site. If sub-surface conditions are different than the conditions previously encountered on-site or those presented here, we should be notified to adjust our findings if necessary.

All information provided in this report is subject to our standard terms and conditions for engineering services, a copy of which is provided to each of our clients with the original scope of work, or a mutually executed standard engineering services agreement. If these conditions are not attached, and you are not already in possession of such terms and conditions, contact our office and you will be promptly provided with a copy.

This report has been prepared by TREK Geotechnical Inc. (the Consultant) for the exclusive use of H. Manalo Consulting Ltd. (the Client) and their agents for the work product presented in the report. Any findings or recommendations provided in this report are not to be used or relied upon by any third parties, except as agreed to in writing by the Client and Consultant prior to use.

Figures

ANSI full bleed A (8.50 x 11.00 Inches)



TH17-05

TH17-04

TH17-03

TH17-02

TH17-01



KEYPLAN
SCALE N.T.S.

LEGEND:

TEST HOLE (TREK, 2017)

NOTES:

1. AERIAL IMAGE FROM CITY OF WINNIPEG 2016.

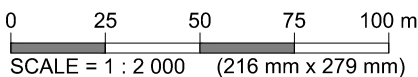


FIG 0001 2017-02-13 Test Hole Location Plan (Alexander) 0_A_DSN.dwg, 3/7/2017 10:05:25 AM

Figure 01
Alexander Ave.
Test Hole Location Plan

ANSI full bleed A (8.50 x 11.00 Inches)



FIG 0001: 2017-02-13 Test Hole Location Plan (Downing) 0_A_DSN.dwg, 3/7/2017 9:44:46 AM

LEGEND:

TEST HOLE (TREK, 2017)

NOTES:

1. AERIAL IMAGE FROM CITY OF WINNIPEG 2016.

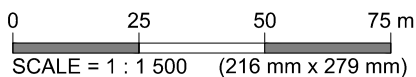
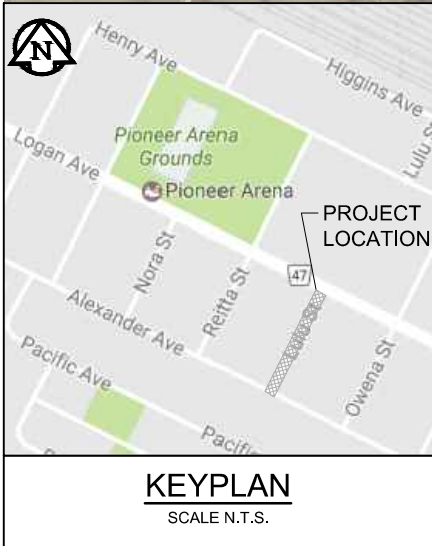
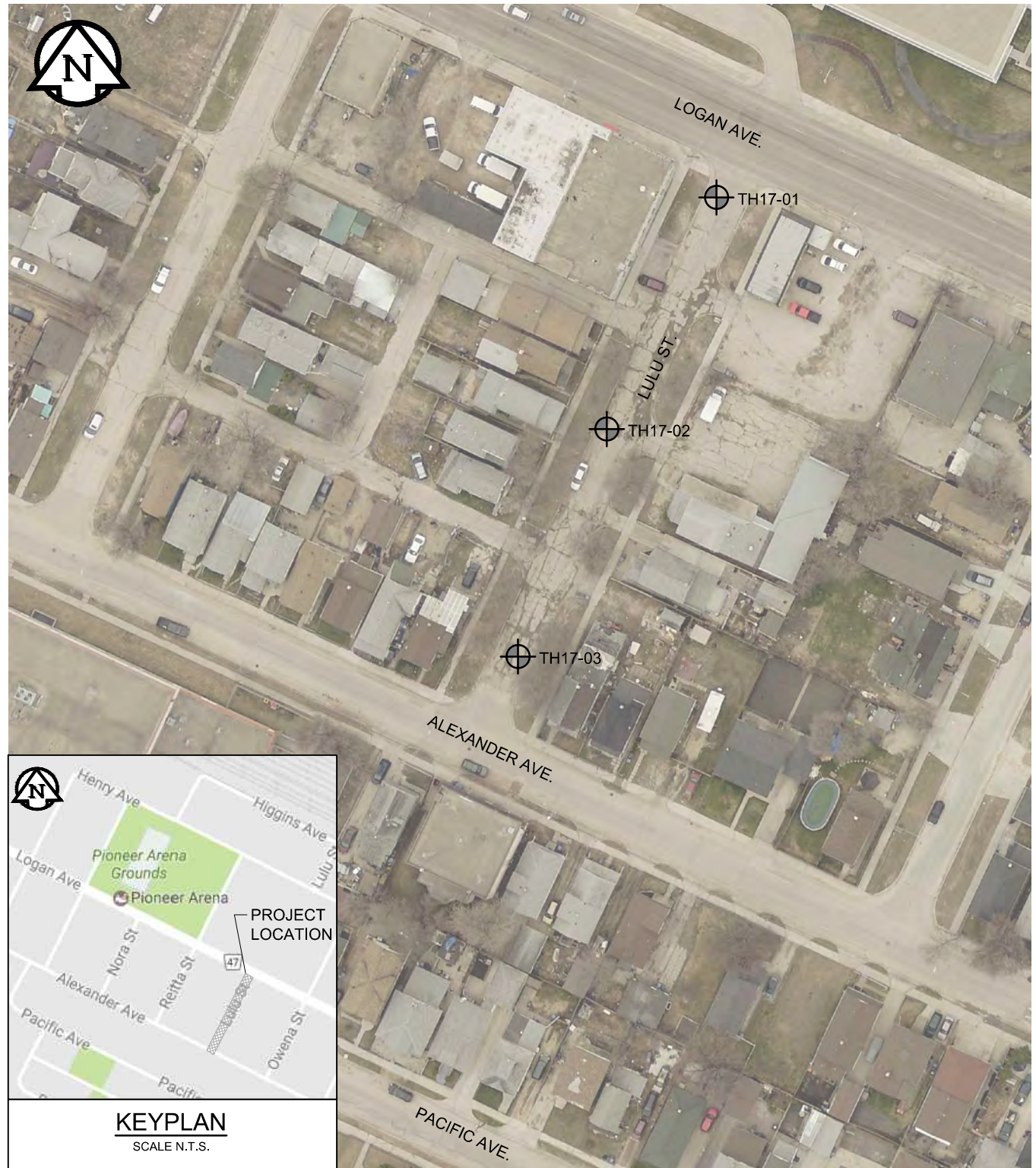


Figure 02
Downing St.
Test Hole Location Plan

ANSI full bleed A (8.50 x 11.00 Inches)



LEGEND:

⊕ TEST HOLE (TREK, 2017)

NOTES:

1. AERIAL IMAGE FROM CITY OF WINNIPEG 2016.

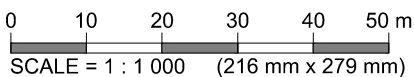


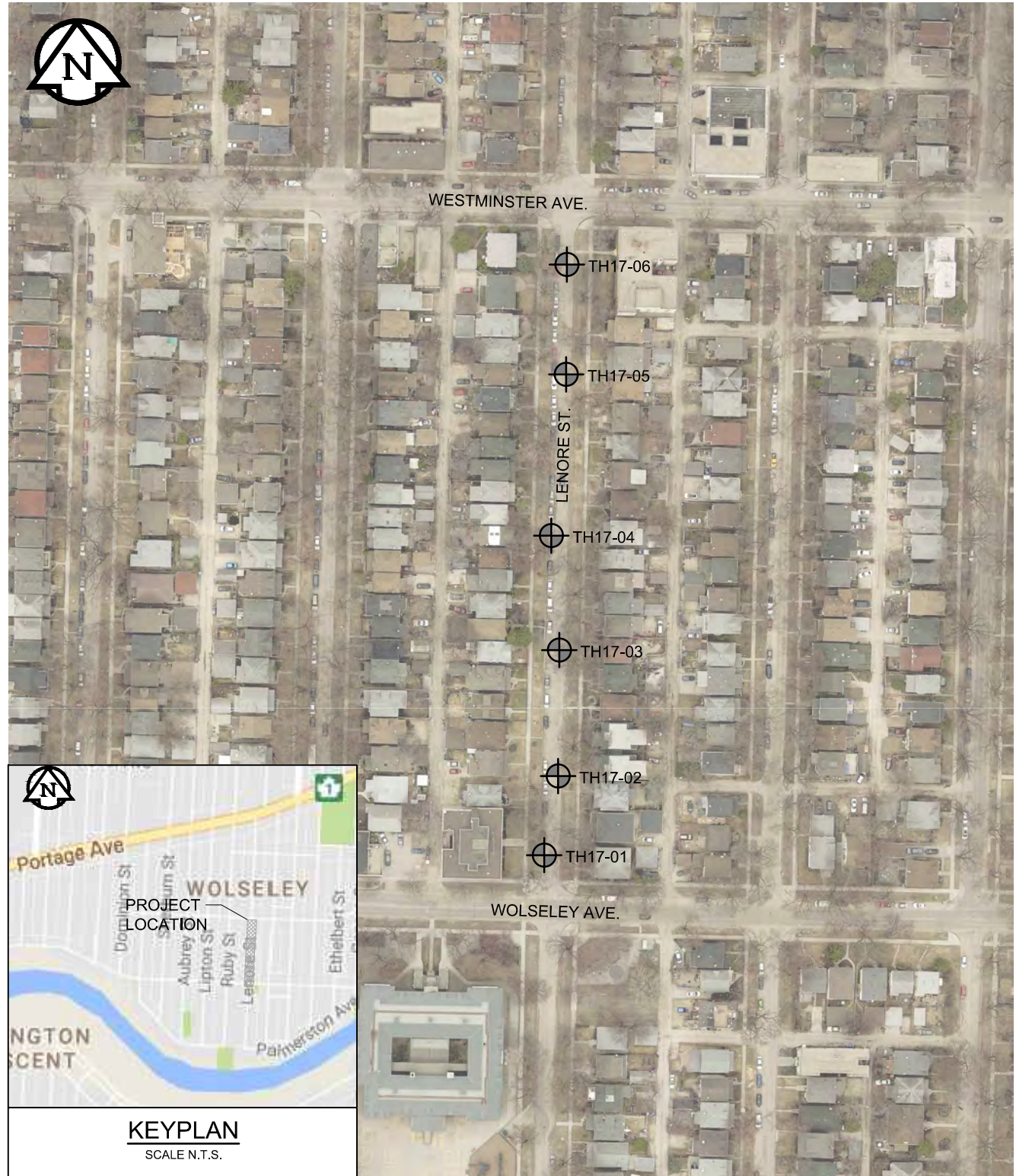
Figure 03

Lulu St.

Test Hole Location Plan

FIG 0001 2017-02-13 Test Hole Location Plan (Lulu) 0_A_DSN.dwg, 3/7/2017 9:51:16 AM

ANSI full bleed A (8.50 x 11.00 Inches)



LEGEND:

TEST HOLE (TREK, 2017)

NOTES:

1. AERIAL IMAGE FROM CITY OF WINNIPEG 2016.

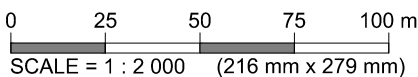
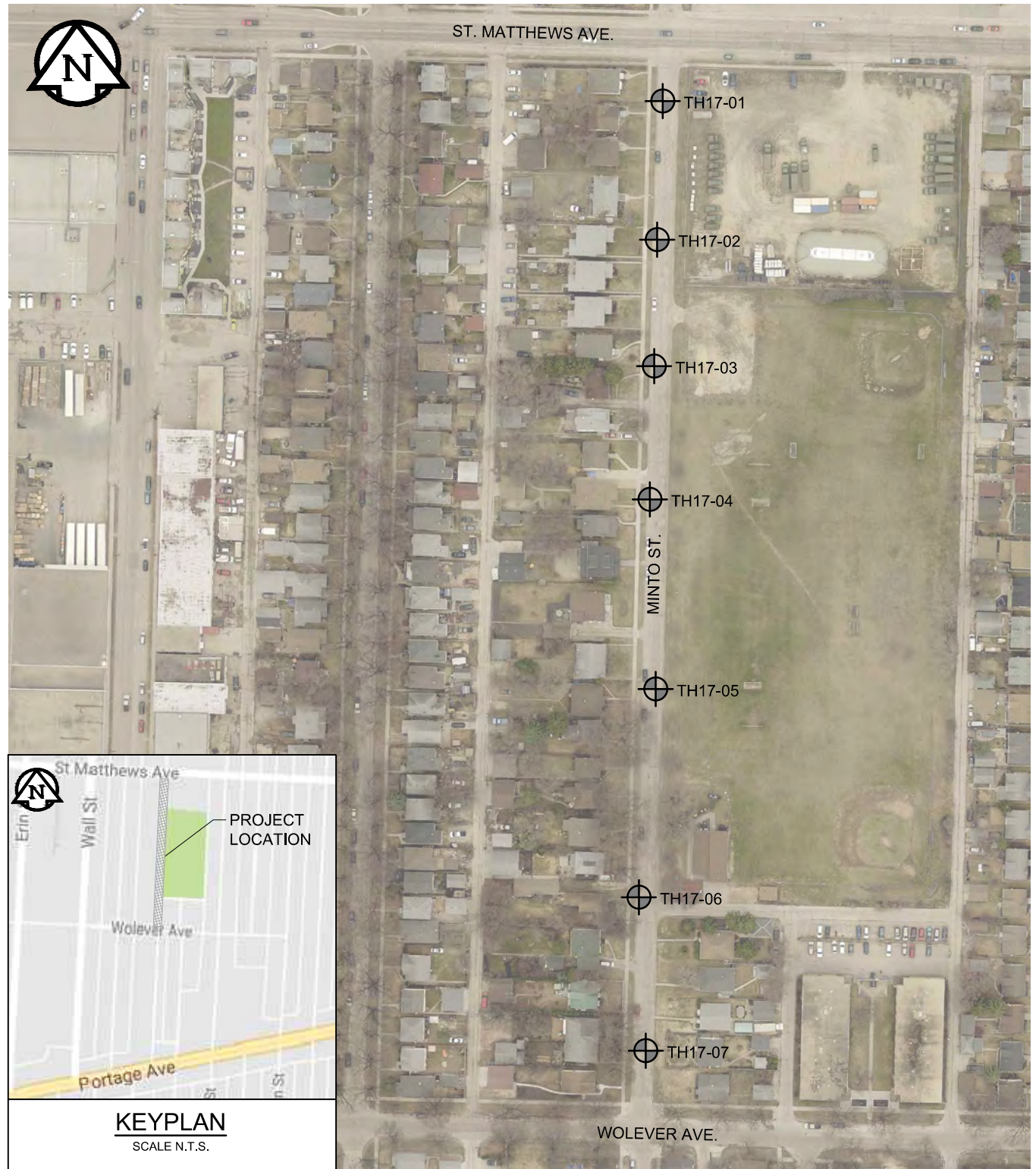


FIG 0001: 2017-02-13 Test Hole Location Plan (Lenore) 0_A_DSN.dwg, 3/7/2017 9:49:38 AM

Figure 04
Lenore St.
Test Hole Location Plan

ANSI full bleed A (8.50 x 11.00 Inches)



LEGEND:

TEST HOLE (TREK, JUNE 17, 2016)

NOTES:

1. AERIAL IMAGE FROM CITY OF WINNIPEG 2016.

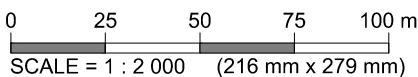


Figure 05

Minto St.

Test Hole Location Plan

FIG 0001 2017-02-13 Test Hole Location Plan (Minto) 0_A_DSN.dwg, 3/7/2017 9:53:31 AM

GENERAL NOTES

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

Major Divisions	USCS Classification	Symbols	Typical Names	Laboratory Classification Criteria		Particle Size			
Coarse-Grained soils (More than half the material is larger than No. 200 sieve size)	Gravels (More than half of coarse fraction is larger than 4.75 mm)	GW	Well-graded gravels, gravel-sand mixtures, little or no fines	Determine percentages of sand and gravel from grain size curve, depending on percentage of fines (fraction smaller than No. 200 sieve) coarse-grained soils are classified as follows: Less than 5 percent..... GW, GP, SW, SP More than 12 percent..... GM, GC, SM, SC 6 to 12 percent..... Borderline cases requiring dual symbols*	$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3	ASTM Sieve sizes #10 to #4 #40 to #10 #200 to #40 < #200			
		GP	Poorly-graded gravels, gravel-sand mixtures, little or no fines		Not meeting all gradation requirements for GW				
		GM	Silty gravels, gravel-sand-silt mixtures		Atterberg limits below "A" line or P.I. less than 4	Above "A" line with P.I. between 4 and 7 are borderline cases requiring use of dual symbols			
		GC	Clayey gravels, gravel-sand-silt mixtures		Atterberg limits above "A" line or P.I. greater than 7				
	Sands (More than half of coarse fraction is smaller than 4.75 mm)	Clean sands (Little or no fines)	SW		Well-graded sands, gravelly sands, little or no fines	$C_u = \frac{D_{60}}{D_{10}}$ greater than 6; $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$ between 1 and 3	mm 2.00 to 4.75 0.425 to 2.00 0.075 to 0.425 < 0.075		
			SP		Poorly-graded sands, gravelly sands, little or no fines	Not meeting all gradation requirements for SW			
		Sands with fines (Appreciable amount of fines)	SM		Silty sands, sand-silt mixtures	Atterberg limits below "A" line or P.I. less than 4	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

Appendix A

Summary Table, Test Hole Logs & Lab Data – Alexander Avenue



Sub-Surface Log

Test Hole TH17-01

1 of 1

Client: H. Manalo Project Number: 0315-001-00
 Project Name: Local Street Renewal Alexander Avenue Location: UTM N-5530563, E-631314
 Contractor: Paddock Drilling Ltd. Ground Elevation: 232.17 m
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: January 16, 2017

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m ³)					Undrained Shear Strength (kPa)							
						16	17	18	19	20	21	0	50	100	150	200	250	
232.1			ASPHALT (55 mm THICK)															
231.9			CONCRETE(180 mm THICK)															
231.7			GRANULAR (Fill) - some sand, some gravel, trace clay, trace silt, light to dark grey, moist when thawed, loose, frozen		G01													
	-0.5		CLAY - silty, trace sand - mottled light to dark brown, frozen - moist and very soft to soft when thawed - high plasticity		G02													
	-1.0				G03													
	-1.5		- stiff below 1.5 m		G04													
	-2.0				G05													
	-2.5		SILT - trace clay - light brown - moist to wet, very soft - low plasticity		G06													
	-3.0				G07													

END OF TEST HOLE AT 3.1 m in CLAY

Notes:

- 1) No sloughing or seepage observed.
- 2) Backfilled test hole with auger cuttings to ~ 1.0 m below top of pavement, bentonite pellets to 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 number 1096 in the westbound lane, 5.05 meters north of Alexander Avenue south curb.
- 4) UTM coordinates and elevation provided by the City of Winnipeg.

Logged By: Shane Broderick Reviewed By: Paul Bevel Project Engineer: Nelson Ferreira



Sub-Surface Log

Test Hole TH17-02

1 of 1

Client: H. Manalo Project Number: 0315-001-00
 Project Name: Local Street Renewal Alexander Avenue Location: UTM N-5530576, E-631279
 Contractor: Paddock Drilling Ltd. Ground Elevation: 231.95 m
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: January 16, 2017

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m ³)					Undrained Shear Strength (kPa)						
						16	17	18	19	20	21	0	50	100	150	200	250
231.9			ASPHALT (35 mm THICK)														
231.7			CONCRETE (195 mm THICK)														
231.5			ORGANIC CLAY - silty, black, frozen, moist and soft to firm when thawed high plasticity		G08												
231.3	-0.5		SILT - some clay, mottled green and brown, frozen, moist and very soft when thawed - low plasticity		G09												
			SILT - trace clay - light brown, frozen to 1.7 m depth - moist to wet and very soft when thawed - low plasticity		G10												
	-1.0				G11												
	-1.5				G12												
230.1	-2.0		CLAY - some silt - mottled light to dark brown - moist, firm to stiff - high plasticity		G13												
	-2.5																
	-3.0				G14												

END OF TEST HOLE AT 3.1 m in CLAY
 Notes:
 1) No sloughing or seepage observed.
 2) Backfilled test hole with auger cuttings to ~ 1.0 m below top of pavement, bentonite pellets to 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 number 1110 in the eastbound lane, 2.08 meters north of Alexander Avenue south curb.
 4) UTM coordinates and elevation provided by the City of Winnipeg.

PTH 83 TH LOGS MIT FONT LOGS 2017-01-18 STREET RENEWAL 0_C_SGBR 0315-001-00 - GPJ TREK GEOTECHNICAL.GDT 3/7/17



Sub-Surface Log

Test Hole TH17-03

1 of 1

Client: H. Manalo Project Number: 0315-001-00
 Project Name: Local Street Renewal Alexander Avenue Location: UTM N-5530603, E-631221
 Contractor: Paddock Drilling Ltd. Ground Elevation: 232.03 m
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: January 16, 2017

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m ³)					Undrained Shear Strength (kPa)						
						16	17	18	19	20	21	Test Type					
						Particle Size (%)											
						0	20	40	60	80	100						
						PL MC LL											
						0	20	40	60	80	100	0	50	100	150	200	250
232.0			ASPHALT (35 mm THICK)														
231.8			CONCRETE (170 mm THICK)														
			ORGANIC CLAY - trace silt, trace sand, trace gravel - black, frozen - moist and soft to firm when thawed - high plasticity		G15			●						△	+		
	-0.5				G16			●						△	+		
231.4			SILT - some clay, mottled green and brown, frozen - moist and very soft when thawed - intermediate plasticity		G17			●									
231.1			SILT - trace clay - light brown, frozen to 1.7 m depth - moist to wet and very soft when thawed - low plasticity		G18			●						+			
	-1.0				G19			●						△	+		
	-1.5																
230.2			CLAY - some silt - mottled light to dark brown - moist, firm to stiff - high plasticity		G20			●						+			
	-2.0																
	-2.5																
	-3.0				G21			●						+			

END OF TEST HOLE AT 3.1 m in CLAY
 Notes:
 1) No sloughing or seepage observed.
 2) Backfilled test hole with auger cuttings to ~ 1.0 m below top of pavement, bentonite pellets to 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 number 1126 in the eastbound lane, 1.84 meters north of Alexander Avenue south curb.
 4) UTM coordinates and elevation provided by the City of Winnipeg.

PTH 83 TH LOGS MIT FONT LOGS 2017-01-18 STREET RENEWAL 0_C_SGBR 0315-001-00 - GPJ TREK GEOTECHNICAL_GDT 3/7/17



Sub-Surface Log

Test Hole TH17-04

1 of 1

Client: H. Manalo Project Number: 0315-001-00
 Project Name: Local Street Renewal Alexander Avenue Location: UTM N-5530627, E-631171
 Contractor: Paddock Drilling Ltd. Ground Elevation: 231.92 m
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: January 16, 2017

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m ³)					Undrained Shear Strength (kPa)						
						16	17	18	19	20	21	Test Type					
						Particle Size (%)											
						0	20	40	60	80	100						
						PL _____ MC _____ LL _____ 0 20 40 60 80 100											
						0	20	40	60	80	100	0	50	100	150	200	250
231.9			ASPHALT (40 mm THICK)														
231.7			CONCRETE (175 mm THICK)														
	-0.5		ORGANIC CLAY - some silt - black, frozen - moist and soft to firm when thawed - high plasticity		G22												
	231.2				G23												
	231.0		SILT - trace to some clay, mottled green and brown, frozen - moist and very soft when thawed - intermediate plasticity		G24												
	-1.0		SILT - trace clay - light brown to brown, frozen - moist to wet and very soft when thawed - low plasticity		G25												
	-1.5				G26												
	230.1		CLAY - some silt - mottled light to dark brown - moist, firm to stiff - high plasticity		G27												
	-2.0				G28												
	-2.5																
	228.9																

END OF TEST HOLE AT 3.1 m in CLAY
 Notes:
 1) No sloughing or seepage observed.
 2) Backfilled test hole with auger cuttings to ~ 1.0 m below top of pavement, bentonite pellets to 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 number 1140 in the eastbound lane, 2.37 meters north of Alexander Avenue south curb.
 4) UTM coordinates and elevation provided by the City of Winnipeg.

Logged By: Shane Broderick <sbroderick@trekgeotech.com> Reviewed By: Paul Bevel Project Engineer: Nelson Ferreira

PTH 83 TH LOGS MIT FONT LOGS 2017-01-18 STREET RENEWAL 0_C_SGBR 0315-001-00 - GPJ TREK GEOTECHNICAL_GDT 3/7/17



Sub-Surface Log

Test Hole TH17-05

1 of 1

Client: H. Manalo Project Number: 0315-001-00
 Project Name: Local Street Renewal Alexander Avenue Location: UTM N-5530643, E-631134
 Contractor: Paddock Drilling Ltd. Ground Elevation: 231.99 m
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: January 16, 2017

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m ³)					Undrained Shear Strength (kPa)						
						16	17	18	19	20	21	Test Type					
						Particle Size (%)											
						0	20	40	60	80	100						
						PL ——— MC ——— LL 0 20 40 60 80 100											
						0	20	40	60	80	100	0	50	100	150	200	250
231.9			ASPHALT (50 mm THICK)														
231.8			CONCRETE (185 mm THICK)														
231.5			ORGANIC CLAY - trace silt, trace sand, black, frozen, moist and soft to firm when thawed - high plasticity		G29			●					+				△
231.3	-0.5		SILT - trace to some clay, mottled green and brown, frozen, moist and very soft when thawed. - low plasticity		G30			●									
			SILT - trace clay - light brown, frozen to 1.7 m depth - moist and very soft when thawed - low plasticity		G31			●									
	-1.0				G32			●					+				△
	-1.5				G33			●									
230.2	-2.0		CLAY - some silt, trace sand - mottled grey to brown - moist, soft - high plasticity		G34					●							+
	-2.5																
228.9	-3.0				G35					●							+

END OF TEST HOLE AT 3.1 m in CLAY

Notes:

- 1) No sloughing or seepage observed
- 2) Backfilled test hole with auger cuttings to ~ 1.0 m below top of pavement, bentonite pellets to 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 number 1154 in the eastbound lane, 1.74 meters north of Alexander Avenue south curb.
- 4) UTM coordinates and elevation provided by the City of Winnipeg.

Logged By: Shane Broderick Reviewed By: Paul Bevel Project Engineer: Nelson Ferreira



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

**Moisture Content Report
 ASTM D2216-98**

Project No. 0315-001-00
Client H. Manalo
Project Local Street Renewal - Alexander

Sample Date 16-Jan-17
Test Date 23-Jan-17
Technician SX

Test Pit	TH 17-01	TH 17-01	TH 17-01	TH 17-01	TH 17-01	TH 17-01
Depth (m)	0.0 - 0.3	0.3 - 0.6	0.6 - 0.9	0.9 - 1.2	1.2 - 1.5	1.8 - 2.1
Sample #	G01	G02	G03	G04	G05	G06
Tare ID	E130	Z27	W97	W80	Z84	N10
Mass of tare	8.6	8.5	8.5	8.5	8.6	8.5
Mass wet + tare	349.3	346.8	324.3	344.0	311.2	296.4
Mass dry + tare	294.6	284.5	261.2	276.4	243.0	232.5
Mass water	54.6	62.4	63.1	67.6	68.2	64.0
Mass dry soil	286.0	276.0	252.8	267.9	234.5	224.0
Moisture %	19.1%	22.6%	24.9%	25.2%	29.1%	28.6%

Test Pit	TH 17-01	TH 17-02	TH 17-02	TH 17-02	TH 17-02	TH 17-02
Depth (m)	2.7 - 3.0	0.2 - 0.5	0.5 - 0.7	0.7 - 0.9	0.9 - 1.2	1.2 - 1.5
Sample #	G07	G08	G09	G10	G11	G12
Tare ID	W44	Z39	D43	D1	P85	E83
Mass of tare	8.4	8.5	8.9	8.9	8.7	9.2
Mass wet + tare	342.9	296.3	315.3	305.4	359.0	319.4
Mass dry + tare	279.7	222.3	240.9	249.9	298.4	263.4
Mass water	63.2	74.0	74.4	55.5	60.6	56.0
Mass dry soil	271.2	213.7	232.0	241.0	289.7	254.2
Moisture %	23.3%	34.6%	32.1%	23.0%	20.9%	22.0%

Test Pit	TH 17-02	TH 17-02	TH 17-03	TH 17-03	TH 17-03	TH 17-03
Depth (m)	2.1 - 2.4	2.7 - 3.0	0.2 - 0.5	0.5 - 0.7	0.7 - 0.9	0.9 - 1.2
Sample #	G13	G14	G15	G16	G17	G18
Tare ID	AA08	Z95	N36	E1	D19	Z16
Mass of tare	6.6	8.5	8.4	8.4	8.5	8.5
Mass wet + tare	313.2	311.2	289.4	338.3	363.8	310.9
Mass dry + tare	232.8	221.5	218.8	258.0	286.0	258.1
Mass water	80.4	89.7	70.6	80.3	77.7	52.8
Mass dry soil	226.2	213.0	210.4	249.6	277.5	249.7
Moisture %	35.5%	42.1%	33.5%	32.2%	28.0%	21.1%



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

**Moisture Content Report
 ASTM D2216-98**

Project No. 0315-001-00
Client H. Manalo
Project Local Street Renewal - Alexander

Sample Date 16-Jan-17
Test Date 23-Jan-17
Technician SX

Test Pit	TH 17-03	TH 17-03	TH 17-03	TH 17-04	TH 17-04	TH 17-04
Depth (m)	1.2 - 1.5	2.1 - 2.4	2.7 - 3.0	0.2 - 0.5	0.5 - 0.7	0.7 - 0.9
Sample #	G19	G20	G21	G22	G23	G24
Tare ID	NH4	H62	A105	E128	F76	F154
Mass of tare	8.4	8.5	8.6	8.5	8.6	8.4
Mass wet + tare	348.9	312.3	360.5	328.5	294.7	313.6
Mass dry + tare	293.1	224.9	242.6	255.4	231.6	239.8
Mass water	55.8	87.4	117.9	73.1	63.0	73.9
Mass dry soil	284.7	216.4	234.0	247.0	223.0	231.3
Moisture %	19.6%	40.4%	50.4%	29.6%	28.3%	31.9%

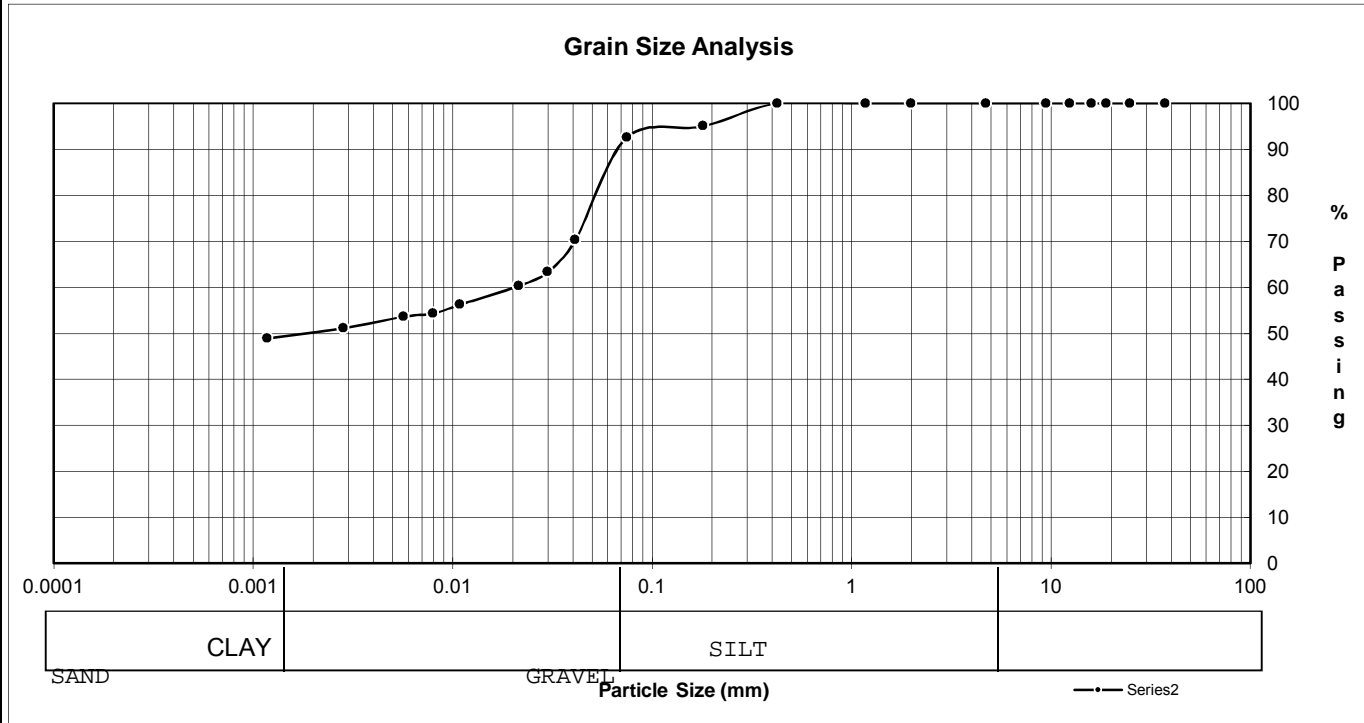
Test Pit	TH 17-04	TH 17-04	TH 17-04	TH 17-04	TH 17-05	TH 17-05
Depth (m)	0.9 - 1.2	1.2 - 1.5	2.1 - 2.4	2.7 - 3.0	0.2 - 0.5	0.5 - 0.7
Sample #	G25	G26	G27	G28	G29	G30
Tare ID	H73	E34	P30	C11	N60	W23
Mass of tare	8.4	8.4	8.4	8.3	8.3	8.4
Mass wet + tare	356.9	319.9	378.2	308.6	302.4	346.8
Mass dry + tare	296.6	261.5	272.7	204.1	224.5	263.3
Mass water	60.3	58.4	105.5	104.5	77.9	83.5
Mass dry soil	288.1	253.1	264.3	195.9	216.2	254.9
Moisture %	20.9%	23.1%	39.9%	53.3%	36.0%	32.8%

Test Pit	TH 17-05	TH 17-05	TH 17-05	TH 17-05	TH 17-05	
Depth (m)	0.7 - 0.9	0.9 - 1.2	1.2 - 1.5	2.1 - 2.4	2.7 - 3.0	
Sample #	G31	G32	G33	G34	G35	
Tare ID	D20	AC30	N100	E92	AB27	
Mass of tare	8.5	6.6	8.5	8.5	6.8	
Mass wet + tare	334.4	327.0	331.1	298.0	324.0	
Mass dry + tare	272.0	272.4	272.6	206.0	213.8	
Mass water	62.3	54.6	58.5	92.0	110.2	
Mass dry soil	263.5	265.8	264.1	197.5	207.0	
Moisture %	23.7%	20.6%	22.1%	46.6%	53.2%	

PARTICLE SIZE ANALYSIS OF SOILS TEST REPORT

CLIENT: COW - Public Works 155 Pacific Avenue W. Winnipeg, MB R3E 3P1 ATTN: Richard Weibel PROJECT: 2017 In House Local Streets Rehabilitation	PROJECT NO. 142 - 1701
---	-------------------------------

Date Sampled: Jan. 2017	Date Received: Feb. 2017	Sieve Analysis		Hydrometer Analysis	
Sampled By: SB	Date Tested: Feb. 2017	Sieve (mm)	% Passing	Diameter	% Finer
Material Identification B.H./T.H. No. TH17-04@0.8 - 1.5 Ft Sample No. G22 Sample Source Alexander Avenue Specific Gravity of Material: 2.65		50.00	100.0		
		37.50	100.0		
		25.00	100.0		
		19.00	100.0		
		16.00	100.0		
		12.50	100.0	0.0413	70.3
		9.50	100.0	0.0300	63.3
		4.75	100.0	0.0215	60.3
		2.00	100.0	0.0109	56.2
		1.18	100.0	0.0080	54.3
	0.425	100.0	0.0057	53.6	
	0.180	95.0	0.0028	51.1	
	0.075	92.6	0.0012	48.8	



SOIL DESCRIPTION	% Composition		D10
		7	Gravel
	43	Sand	D60
	50	Silt	Cu
		Clay	Cc

Remarks: Test Method: ASTM D422, D2216, D4318

Technician: ECS



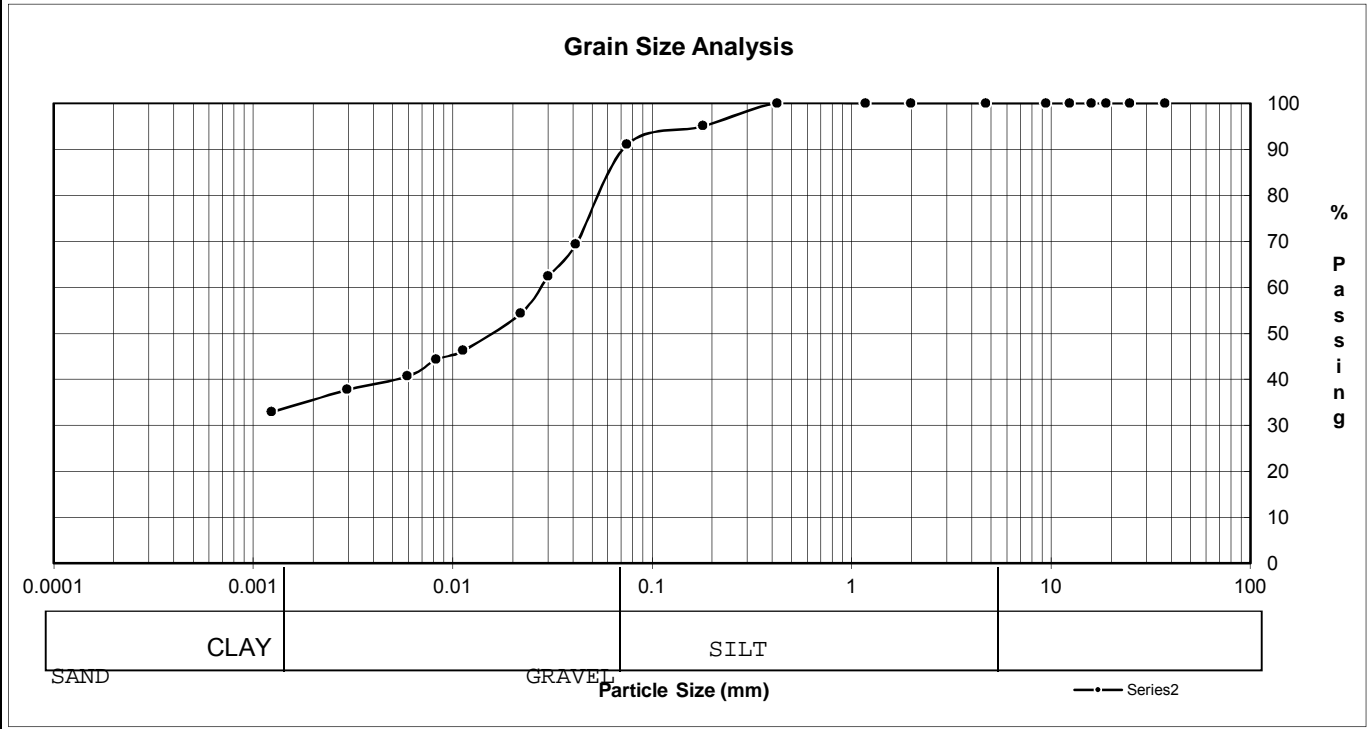
Reviewed by: Hermie Manalo

PARTICLE SIZE ANALYSIS OF SOILS TEST REPORT

CLIENT: COW - Public Works 155 Pacific Avenue W. Winnipeg, MB R3E 3P1 ATTN: Richard Weibel PROJECT: 2017 In House Local Streets Rehabilitation	PROJECT NO. 142 - 1701
---	-------------------------------

Date Sampled: Jan. 2017	Date Received: Feb. 2017	Sieve Analysis	Hydrometer Analysis
Sampled By: SB	Date Tested: Feb. 2017	Sieve (mm) % Passing	Diameter % Finer

Material Identification B.H./T.H. No. TH17-04@2.2 - 3.0 Ft Sample No. G24 Sample Source Alexander Avenue Specific Gravity of Material: 2.65	50.00 100.0 37.50 100.0 25.00 100.0 19.00 100.0 16.00 100.0 12.50 100.0 9.50 100.0 4.75 100.0 2.00 100.0 1.18 100.0 0.425 100.0 0.180 95.0 0.075 91.0	0.0415 69.3 0.0301 62.3 0.0220 54.3 0.0113 46.2 0.0083 44.3 0.0059 40.6 0.0030 37.7 0.0012 32.8
--	---	--



SOIL DESCRIPTION	% Composition	
	Gravel	D10
	9 Sand	D30
	55 Silt	D60
	36 Clay	Cu
		Cc

 Remarks: Test Method: ASTM D422, D2216, D4318
 Technician: ECS


 Reviewed by: Hermie Manalo

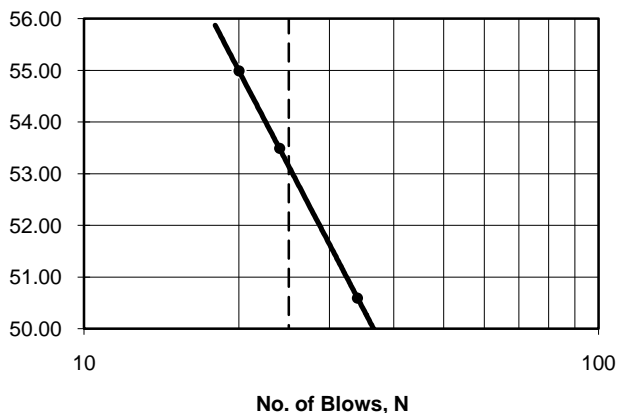
ATTERBERG LIMITS

CLIENT: COW - Public Works 155 Pacific Avenue W Winnipeg, MB R3E 3P1	PROJECT NO.: 142-1701 Test No.: 1
ATTENTION: Richard Weibel	
PROJECT: 2017 In house Local Street Rehabilitation	

Liquid Limit Determination

Dish No.:	1	2	3		Liquid Limit 25 Blows
Wet Soil + Dish:	19.54	17.75	15.52		
Dry Soil + Dish:	14.4	13	11.5		
Moisture:	5.14	4.75	4.02		
Dish:	4.24	4.12	4.19		
Dry Soil:	10.16	8.88	7.31		
% Moisture:	50.59	53.49	54.99		
No. of Blows:	34	24	20		
Liquid Limits:	52.51	53.23	53.53		

Liquid Limit



Material Identification:

Alexander Avenue
 T.H./B.H. No. **TH 17-04**

Depth: **0.8-1.5m**

Liquid Limit, %: 53
 Plastic Limit, %: 26
 Plasticity Index: 27
 (LL-PL)

Plastic Limit Determination

Dish No.:	1	2	3			
Wet Soil + Dish:	16.14	16.76	16.8			
Dry Soil + Dish:	13.71	14.12	14.22			
Moisture:	2.43	2.64	2.58			
Dish:	4.47	4.28	4.4			
Dry Soil:	9.24	9.84	9.82			
% Moisture:	26.30	26.83	26.27			
Average:						26

Test Method : ASTM: D4318, D2216

HMCL Tech: ECS

Date Tested: 17-Feb-16



Reviewed by: Hermie Manalo

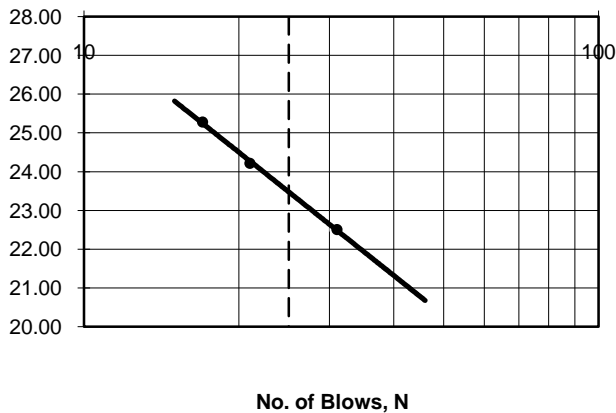
ATTERBERG LIMITS

CLIENT:	COW - Public Works 155 Pacific Avenue W Winnipeg, MB R3E 3P1	PROJECT NO.:	142-1701
ATTENTION:	Richard Weibel	Test No.:	2
PROJECT:	2017 In house Local Street Rehabilitation		

Liquid Limit Determination

Dish No.:	1	2	3		Liquid Limit 25 Blows
Wet Soil + Dish:	16.29	21.79	18.68		
Dry Soil + Dish:	14.1	18.39	15.8		
Moisture:	2.19	3.4	2.88		
Dish:	4.37	4.35	4.41		
Dry Soil:	9.73	14.04	11.39		
% Moisture:	22.51	24.22	25.29		
No. of Blows:	31	21	17		
Liquid Limits:	23.10	23.71	24.13		

Liquid Limit



Material Identification:

Alexander Avenue
 T.H./B.H. No. **TH 17-04**

Depth: **2 - 3 Ft.**

Liquid Limit, %: 24
 Plastic Limit, %: 18
 Plasticity Index: 6
 (LL-PL)

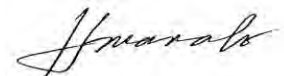
Plastic Limit Determination

Dish No.:	1	2	3			
Wet Soil + Dish:	19.51	19.54	20.04			
Dry Soil + Dish:	17.11	17.2	17.7			
Moisture:	2.4	2.34	2.34			
Dish:	4.23	4.33	4.55			
Dry Soil:	12.88	12.87	13.15			
% Moisture:	18.63	18.18	17.79			
Average:						18

Test Method : ASTM: D4318, D2216

HMCL Tech: ECS

Date Tested: 17-Feb-17



Reviewed by: Hermie Manalo

2017 In house Local Street Rehabilitation



Alexander Ave. TH17-01

2017 In house Local Street Rehabilitation



Alexander Ave. TH17-02

2017 In house Local Street Rehabilitation



Alexander Ave. TH17-03

2017 In house Local Street Rehabilitation



Alexander Ave. TH17-04

2017 In house Local Street Rehabilitation



Alexander Ave. TH17-05

Appendix B

Summary Table, Test Hole Logs & Lab Data – Downing Street



Sub-Surface Log

Test Hole TH17-01

1 of 1

Client: H. Manalo **Project Number:** 0315-001-00
Project Name: Local Street Renewal Downing Street **Location:** UTM N-5529143, E-630817
Contractor: Paddock Drilling Ltd. **Ground Elevation:** 232.33 m
Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount **Date Drilled:** January 16, 2017 - January 16, 2017

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m ³)					Undrained Shear Strength (kPa)						
						16	17	18	19	20	21	Test Type					
						Particle Size (%)											
						0	20	40	60	80	100						
						0	20	40	60	80	100	0	40	80	120	160	200
232.3			ASPHALT (25 mm THICK)														
232.2			CONCRETE (140 mm THICK)														
			ORGANIC CLAY - trace silt, trace sand, trace gravel - black, frozen - moist and soft to firm when thawed - high plasticity		G01												
					G02												
231.7			CLAY - silty, trace sand, mottled brown to dark grey, frozen, moist and soft when thawed, high plasticity		G03												
231.4			SILT - trace clay, light brown, frozen - moist and very soft when thawed - low plasticity		G04												
231.1			CLAY - trace silt - mottled grey to brown, frozen to 1.7 m depth - moist and firm to stiff - high plasticity		G05												
					G06												
					G07												

END OF TEST HOLE AT 3.1 m in CLAY

Notes:

- 1) No sloughing or seepage observed.
- 2) Backfilled test hole with auger cuttings to ~ 1.0 m below top of pavement, bentonite pellets to 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 location in the westbound lane, 9 meters west of the intersection of Downing and Dominion Street, 4.76 meters north of Downing Street south curb.
- 4) UTM coordinates and elevation provided by the City of Winnipeg.

Logged By: Shane Broderick **Reviewed By:** Paul Bevel **Project Engineer:** Nelson Ferreira

PTH 83 TH LOGS MIT FONT LOGS_2017-01-23 LOCAL STREETS RENEWAL (DOWNING) 0_A_SGBR 0315-001-00.GPJ TREK GEOTECHNICAL_GDT_3/7/17



Sub-Surface Log

Test Hole TH17-02

1 of 1

Client: H. Manalo Project Number: 0315-001-00
 Project Name: Local Street Renewal Downing Street Location: UTM N-5529119, E-630813
 Contractor: Paddock Drilling Ltd. Ground Elevation: 232.27 m
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: January 16, 2016 - January 16, 2017

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m ³)					Undrained Shear Strength (kPa)						
						16	17	18	19	20	21	Test Type					
						Particle Size (%)											
						0	20	40	60	80	100						
						PL _____ MC _____ LL _____ 0 20 40 60 80 100											
						0	20	40	60	80	100	0	40	80	120	160	200
232.2			ASPHALT (20 mm THICK)														
232.1			CONCRETE (190 mm THICK)														
231.8			ORGANIC CLAY (FILL) - some silt, black, frozen, moist and soft to firm when thawed - high plasticity		G08			●					▲				
231.6	-0.5		ORGANIC CLAY/(FILL) - trace silt, mottled light brown to black, frozen, moist and soft when thawed, high plasticity		G09			●					▲				
231.4			CLAY - trace silt, mottled light to dark brown, frozen, moist and soft when thawed - high plasticity		G10			●					▲				
230.7	-1.0		SILT - trace clay - brown, frozen - moist and very soft to soft when thawed - intermediate plasticity		G11			●					▲	+			
					G12			●					▲				
	-1.5		CLAY - trace silt, trace sand - mottled brown to black - moist, firm - high plasticity														
	-2.0																
	-2.5				G13			●					▲				
	-3.0				G14			●					▲				

END OF TEST HOLE AT 3.1 m in CLAY
 Notes:
 1) No sloughing or seepage observed.
 2) Backfilled test hole with auger cuttings to ~ 1.0 m below top of pavement, bentonite pellets to 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 location in the westbound lane, 66 meters west of the intersection of Downing and Dominion Street, 4.83 meters north of Downing Street south curb.
 4) UTM coordinates and elevation provided by the City of Winnipeg.

PTH 83 TH LOGS MIT FONT LOGS_2017-01-23 LOCAL_STREETS_RENEWAL_DOWNING)0_A_SGBR 0315-001-00.GPJ TREK GEOTECHNICAL_GDT_3/7/17



Sub-Surface Log

Test Hole TH17-03

1 of 1

Client: H. Manalo Project Number: 0315-001-00
 Project Name: Local Street Renewal Downing Street Location: UTM N-5529073, E-630812
 Contractor: Paddock Drilling Ltd. Ground Elevation: 232.47 m
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: January 17, 2017 - January 17, 2017

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m ³)					Undrained Shear Strength (kPa)						
						16	17	18	19	20	21	Test Type					
						Particle Size (%)											
						0	20	40	60	80	100						
						PL _____ MC _____ LL _____ 0 20 40 60 80 100											
						0	20	40	60	80	100	0	40	80	120	160	200
232.4			ASPHALT (30 mm THICK)														
232.2			CONCRETE (195 mm THICK)														
			ORGANIC CLAY - some silt - black, frozen - moist and soft to firm when thawed - high plasticity		G15												
	-0.5				G16												
231.8			CLAY - silty, trace sand, mottled light to dark brown, frozen - moist and soft when thawed - high plasticity		G17												
231.6					G18												
	-1.0		SILT - trace clay - brown, frozen - moist and soft to firm when thawed - intermediate plasticity		G19												
230.9	-1.5				G20												
	-2.0		CLAY - trace silt - mottled light to dark brown - moist, firm to stiff - high plasticity		G21												
	-2.5																
229.4	-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 to ~ 1.0 m below top of pavement, bentonite pellets to 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 number 1101 in the northbound lane, 4.98 meters east of Downing Street west curb.
 4) UTM coordinates and elevation provided by the City of Winnipeg.

PTH 83 TH LOGS MIT FONT LOGS_2017-01-23 LOCAL_STREETS_RENEWAL_DOWNING)0_A_SGBR 0315-001-00.GPJ TREK GEOTECHNICAL_GDT_3/7/17



Sub-Surface Log

Test Hole TH17-04

1 of 1

Client: H. Manalo **Project Number:** 0315-001-00
Project Name: Local Street Renewal Downing Street **Location:** UTM N-5529014, E-630814
Contractor: Paddock Drilling Ltd. **Ground Elevation:** 232.59 m
Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount **Date Drilled:** January 17, 2017 - January 17, 2017

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m ³)		Particle Size (%)		Undrained Shear Strength (kPa)							
						16	17	18	19	20	21	0	40	80	120	160	200
232.6			ASPHALT (40 mm THICK)														
232.4			CONCRETE (200 mm THICK)														
232.0	-0.5		ORGANIC CLAY - silty, black, frozen moist and soft to firm when thawed high plasticity		G22												
			SILT - some clay - mottled light brown to black, frozen - moist to wet and very soft when thawed - low plasticity		G23												
231.5	-1.0		SILT - trace clay - light brown, frozen - moist and very soft when thawed - intermediate plasticity		G24												
			SILT - trace clay - light brown, frozen - moist and very soft when thawed - intermediate plasticity		G25												
231.1	-1.5		CLAY - trace silt - mottled light to dark brown - moist, firm - high plasticity		G26												
			CLAY - trace silt - mottled light to dark brown - moist, firm - high plasticity		G27												
			CLAY - trace silt - mottled light to dark brown - moist, firm - high plasticity		G28												

END OF TEST HOLE AT 3.1 m in CLAY
 Notes:
 1) No sloughing or seepage observed.
 2) Backfilled test hole with auger cuttings to ~ 1.0 m below top of pavement, bentonite pellets to 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 number 1115 in the southbound lane, 1.96 meters east of Downing Street west curb.
 4) UTM coordinates and elevation provided by the City of Winnipeg.

PTH 83 TH LOGS MIT FONT LOGS_2017-01-23 LOCAL_STREETS_RENEWAL (DOWNING) 0_A_SGBR 0315-001-00.GPJ TREK GEOTECHNICAL_GDT_3/7/17



Sub-Surface Log

Test Hole TH17-05

1 of 1

Client: H. Manalo Project Number: 0315-001-00
 Project Name: Local Street Renewal Downing Street Location: UTM N-5528991, E-630829
 Contractor: Paddock Drilling Ltd. Ground Elevation: 232.77 m
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: January 17, 2017 - January 17, 2017

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m ³)					Undrained Shear Strength (kPa)						
						16	17	18	19	20	21	Test Type					
						Particle Size (%)											
						0	20	40	60	80	100						
						PL MC LL											
						0	20	40	60	80	100	0	40	80	120	160	200
232.7			ASPHALT (30 mm THICK)														
232.6			CONCRETE (180 mm THICK)														
232.1	-0.5		CLAY - trace silt - dark grey, frozen - moist and soft when thawed - high plasticity		G29												
					G30												
					G31												
	-1.0		SILT - trace clay - light brown, frozen - moist to wet and very soft when thawed - intermediate plasticity		G32												
			- soft below 1.2 m		G33												
231.2	-1.5		CLAY - trace silt - mottled light to dark brown - moist, firm to stiff - high plasticity														
	-2.0																
					G34												
	-2.5																
					G35												
	-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 to ~ 1.0 m below top of pavement, bentonite pellets to 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 number 1121 in the southbound lane, 1.45 meters east of Downing Street west curb.
 4) UTM coordinates and elevation provided by the City of Winnipeg.

Logged By: Shane Broderick Reviewed By: Paul Bevel Project Engineer: Nelson Ferreira

PTH 83 TH LOGS MIT FONT LOGS_2017-01-23 LOCAL_STREETS_RENEWAL (DOWNING) 0_A_SGBR 0315-001-00.GPJ TREK GEOTECHNICAL_GDT_3/7/17



Sub-Surface Log

Test Hole TH17-06

1 of 1

Client: H. Manalo Project Number: 0315-001-00
 Project Name: Local Street Renewal Downing Street Location: UTM N-5528989, E-630886
 Contractor: Paddock Drilling Ltd. Ground Elevation: 232.53 m
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: January 17, 2017 - January 17, 2017

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m ³)		Particle Size (%)		Undrained Shear Strength (kPa)							
						16	17	18	19	20	21	0	40	80	120	160	200
232.5			ASPHALT (30 mm THICK)														
232.3			CONCRETE (180 mm THICK)														
232.1			ORGANIC CLAY - trace silt, black, frozen, moist and soft to firm when thawed, high plasticity	G36													
231.9	-0.5		CLAY - trace silt, mottled brown to dark grey, frozen moist and soft when thawed, high plasticity	G37													
231.3	-1.0		SILT - some clay - mottled green and brown, frozen - moist and very soft when thawed - low plasticity	G38													
231.0	-1.5		SILT - trace clay, light brown, frozen - moist and very soft when thawed - intermediate plasticity	G40													
229.5	-3.0		CLAY - trace silt - mottled light to dark brown - moist, firm to stiff - high plasticity	G41													
				G42													

END OF TEST HOLE AT 3.1 m in CLAY

Notes:

- 1) No sloughing or seepage observed.
- 2) Backfilled test hole with auger cuttings to ~ 1.0 m below top of pavement, bentonite pellets to 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 number 1127 in the northbound lane, 5.31 meters east of Downing Street west curb.
- 4) UTM coordinates and elevation provided by the City of Winnipeg.

Logged By: Shane Broderick Reviewed By: Paul Bevel Project Engineer: Nelson Ferreira

PTH 83 TH LOGS MIT FONT LOGS_2017-01-23 LOCAL_STREETS_RENEWAL_DOWNING)0_A_SGBR 0315-001-00.GPJ TREK GEOTECHNICAL_GDT_3/7/17



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

**Moisture Content Report
 ASTM D2216-98**

Project No. 0315-001-00
Client H. Manalo
Project Local Street Renewal Downing Street

Sample Date 13-Jan-17
Test Date 27-Jan-17
Technician SX

Test Pit	TH 17-01	TH 17-01	TH 17-01	TH 17-01	TH 17-01	TH 17-01
Depth (m)	0.2 - 0.5	0.5 - 0.7	0.7 - 0.9	0.9 - 1.2	1.2 - 1.5	2.1 - 2.4
Sample #	G01	G02	G03	G04	G05	G06
Tare ID	E83	N10	Z84	P85	W80	D1
Mass of tare	9.2	8.5	8.5	8.7	8.5	8.9
Mass wet + tare	326.0	288.4	308.7	313.9	290.2	341.1
Mass dry + tare	238.1	209.2	226.8	253.7	229.1	237.3
Mass water	87.9	79.2	81.9	60.2	61.1	103.8
Mass dry soil	228.9	200.7	218.3	245.0	220.6	228.4
Moisture %	38.4%	39.4%	37.5%	24.5%	27.7%	45.5%

Test Pit	TH 17-01	TH 17-02	TH 17-02	TH 17-02	TH 17-02	TH 17-02
Depth (m)	2.7 - 3.0	0.2 - 0.5	0.5 - 0.7	0.7 - 0.9	0.9 - 1.2	1.2 - 1.5
Sample #	G07	G08	G09	G10	G11	G12
Tare ID	H62	N36	A105	E1	E128	E34
Mass of tare	8.6	8.4	8.7	8.4	8.5	8.9
Mass wet + tare	333.5	275.1	350.7	342.6	317.9	313.3
Mass dry + tare	223.4	193.7	259.0	258.5	257.0	254.7
Mass water	110.1	81.4	91.7	84.1	60.9	58.6
Mass dry soil	214.8	185.3	250.3	250.1	248.5	245.8
Moisture %	51.2%	43.9%	36.6%	33.6%	24.5%	23.8%

Test Pit	TH 17-02	TH 17-02	TH 17-03	TH 17-03	TH 17-03	TH 17-03
Depth (m)	2.1 - 2.4	2.7 - 3.0	0.2 - 0.5	0.5 - 0.7	0.7 - 0.9	0.9 - 1.2
Sample #	G13	G14	G15	G16	G17	G18
Tare ID	N100	AC30	W23	AB27	N60	E92
Mass of tare	8.6	6.7	8.6	6.8	8.3	8.5
Mass wet + tare	340.1	301.2	284.9	319.3	281.4	305.4
Mass dry + tare	241.5	205.2	219.6	246.9	206.6	253.9
Mass water	98.6	96.0	65.3	72.4	74.8	51.5
Mass dry soil	232.9	198.5	211.0	240.1	198.3	245.4
Moisture %	42.3%	48.4%	30.9%	30.2%	37.7%	21.0%



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

Moisture Content Report ASTM D2216-98

Project No. 0315-001-00
Client H. Manalo
Project Local Street Renewal Downing Street

Sample Date 13-Jan-17
Test Date 27-Jan-17
Technician SX

Test Pit	TH 17-03	TH 17-03	TH 17-03	TH 17-04	TH 17-04	TH 17-04
Depth (m)	1.2 - 1.5	2.1 - 2.4	2.7 - 3.0	0.2 - 0.5	0.5 - 0.7	0.7 - 0.9
Sample #	G19	G20	G21	G22	G23	G24
Tare ID	D20	W97	D43	AA08	Z27	E130
Mass of tare	8.6	8.5	9.0	6.6	8.5	8.6
Mass wet + tare	321.0	298.0	285.7	323.3	352.5	331.3
Mass dry + tare	263.1	208.5	196.4	238.2	273.9	265.0
Mass water	57.9	89.5	89.3	85.1	78.6	66.3
Mass dry soil	254.5	200.0	187.4	231.6	265.4	256.4
Moisture %	22.8%	44.8%	47.7%	36.7%	29.6%	25.9%

Test Pit	TH 17-04	TH 17-04	TH 17-04	TH 17-04	TH 17-05	TH 17-05
Depth (m)	0.9 - 1.2	1.2 - 1.5	2.1 - 2.4	2.7 - 3.0	0.2 - 0.5	0.5 - 0.7
Sample #	G25	G26	G27	G28	G29	G30
Tare ID	Z39	Z95	W44	F76	Z16	P30
Mass of tare	8.5	8.5	8.4	8.6	8.5	8.4
Mass wet + tare	333.5	330.8	307.7	289.8	296.9	328.3
Mass dry + tare	272.5	264.9	220.5	198.9	221.4	247.7
Mass water	61.0	65.9	87.2	90.9	75.5	80.6
Mass dry soil	264.0	256.4	212.1	190.3	212.9	239.3
Moisture %	23.1%	25.7%	41.1%	47.8%	35.5%	33.7%

Test Pit	TH 17-05	TH 17-05	TH 17-05	TH 17-05	TH 17-05	TH 17-06
Depth (m)	0.7 - 0.9	0.9 - 1.2	1.2 - 1.5	2.1 - 2.4	2.7 - 3.0	0.2 - 0.5
Sample #	G31	G32	G33	G34	G35	G36
Tare ID	F154	N114	H73	C11	E33	AB40
Mass of tare	8.5	8.5	8.7	8.3	8.5	6.7
Mass wet + tare	315.2	387.4	325.9	264.5	300.8	280.6
Mass dry + tare	255.1	320.6	257.3	185.4	202.8	202.1
Mass water	60.1	66.8	68.6	79.1	98.0	78.5
Mass dry soil	246.6	312.1	248.6	177.1	194.3	195.4
Moisture %	24.4%	21.4%	27.6%	44.7%	50.4%	40.2%



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

Moisture Content Report ASTM D2216-98

Project No. 0315-001-00
Client H. Manalo
Project Local Street Renewal Downing Street

Sample Date 13-Jan-17
Test Date 27-Jan-17
Technician SX

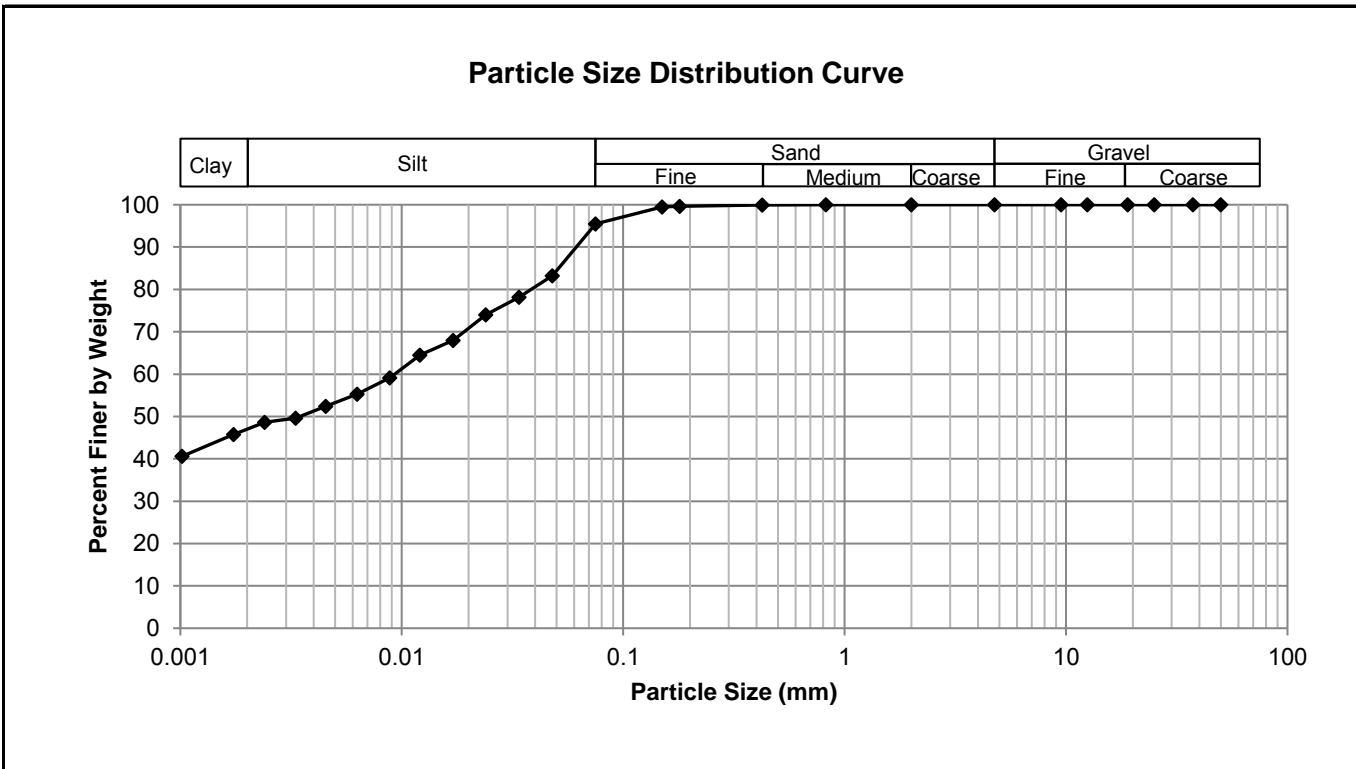
Test Pit	TH 17-06	TH 17-06	TH 17-06	TH 17-06	TH 17-06	TH 17-06
Depth (m)	0.5 - 0.7	0.7 - 0.9	0.9 - 1.2	1.2 - 1.5	2.1 - 2.4	2.7 - 3.0
Sample #	G37	G38	G39	G40	G41	G42
Tare ID	K16	AC26	Z28	AC24	AB30	Z88
Mass of tare	8.5	6.7	8.5	6.6	6.9	8.5
Mass wet + tare	298.7	331.5	345.2	329.4	333.7	308.9
Mass dry + tare	218.8	252.9	287.6	268.1	228.3	210.1
Mass water	79.9	78.6	57.6	61.3	105.4	98.8
Mass dry soil	210.3	246.2	279.1	261.5	221.4	201.6
Moisture %	38.0%	31.9%	20.6%	23.4%	47.6%	49.0%



Project No. 0315-001-00
Client H. Manalo
Project Local Street Renewal - Downing Street

Test Hole TH 17-01
Sample # G03
Depth (m) 0.6 - 0.9
Sample Date 17-Jan-17
Test Date 23-Feb-17
Technician SX

Gravel	0.0%
Sand	4.5%
Silt	48.6%
Clay	46.9%



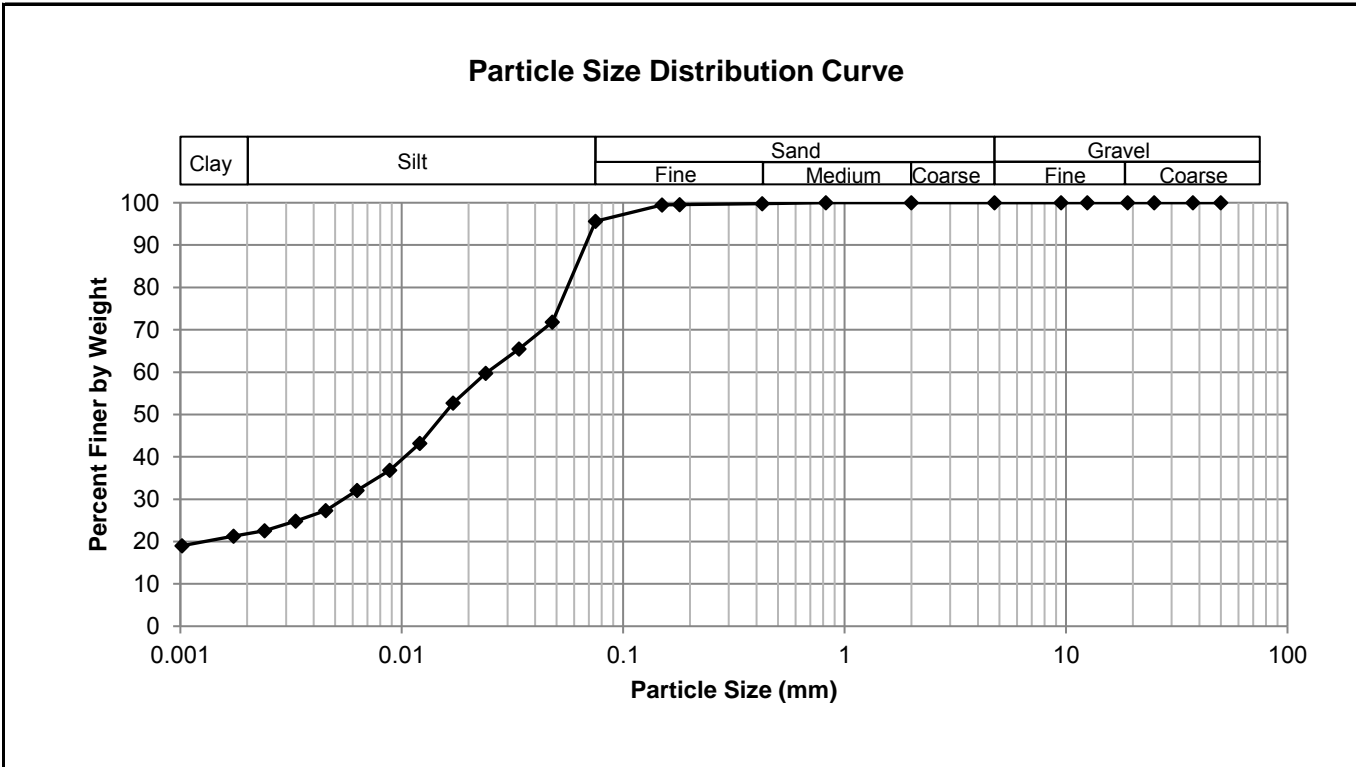
Gravel		Sand		Silt and Clay	
Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing
50.0	100.00	4.75	100.00	0.0750	95.51
37.5	100.00	2.00	100.00	0.0479	83.24
25.0	100.00	0.825	100.00	0.0338	78.16
19.0	100.00	0.425	99.94	0.0239	74.03
12.5	100.00	0.180	99.63	0.0171	68.00
9.50	100.00	0.150	99.51	0.0121	64.50
4.75	100.00	0.075	95.51	0.0088	59.10
				0.0063	55.29
				0.0045	52.44
				0.0033	49.58
				0.0024	48.62
				0.0017	45.77
				0.0010	40.62



Project No. 0315-001-00
Client H. Manalo
Project Local Streer Renewal - Downing Street

Test Hole TH 17-04
Sample # G24
Depth (m) 0.6 - 0.9
Sample Date 17-Jan-17
Test Date 24-Feb-17
Technician SX

Gravel	0.0%
Sand	4.4%
Silt	73.8%
Clay	21.8%



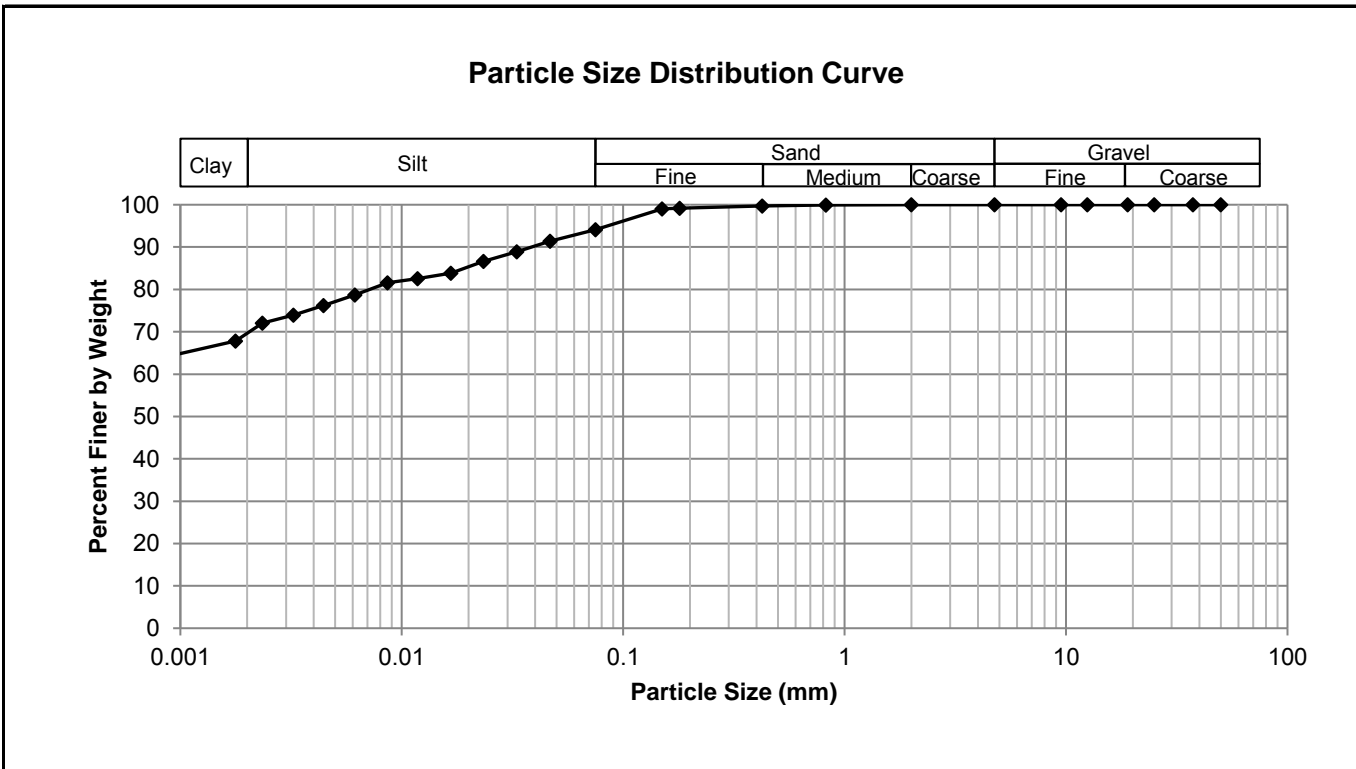
Gravel		Sand		Silt and Clay	
Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing
50.0	100.00	4.75	100.00	0.0750	95.62
37.5	100.00	2.00	99.98	0.0479	71.79
25.0	100.00	0.825	99.98	0.0338	65.44
19.0	100.00	0.425	99.80	0.0239	59.73
12.5	100.00	0.180	99.57	0.0171	52.74
9.50	100.00	0.150	99.50	0.0121	43.22
4.75	100.00	0.075	95.62	0.0088	36.87
				0.0063	32.11
				0.0045	27.34
				0.0033	24.80
				0.0024	22.58
				0.0017	21.31
				0.0010	19.02



Project No. 0315-001-00
Client H. Manalo
Project Local Street Renewal - Downing Street

Test Hole TH 17-06
Sample # G36
Depth (m) 0.2 - 0.5
Sample Date 17-Jan-17
Test Date 24-Feb-17
Technician SX

Gravel	0.0%
Sand	5.9%
Silt	24.6%
Clay	69.5%



Gravel		Sand		Silt and Clay	
Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing
50.0	100.00	4.75	100.00	0.0750	94.08
37.5	100.00	2.00	100.00	0.0468	91.43
25.0	100.00	0.825	99.91	0.0331	88.89
19.0	100.00	0.425	99.73	0.0234	86.67
12.5	100.00	0.180	99.19	0.0167	83.81
9.50	100.00	0.150	99.01	0.0118	82.54
4.75	100.00	0.075	94.08	0.0086	81.59
				0.0062	78.73
				0.0044	76.19
				0.0032	73.96
				0.0024	72.06
				0.0018	67.81
				0.0009	64.44



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

Atterberg Limits ASTM D4318-10e1

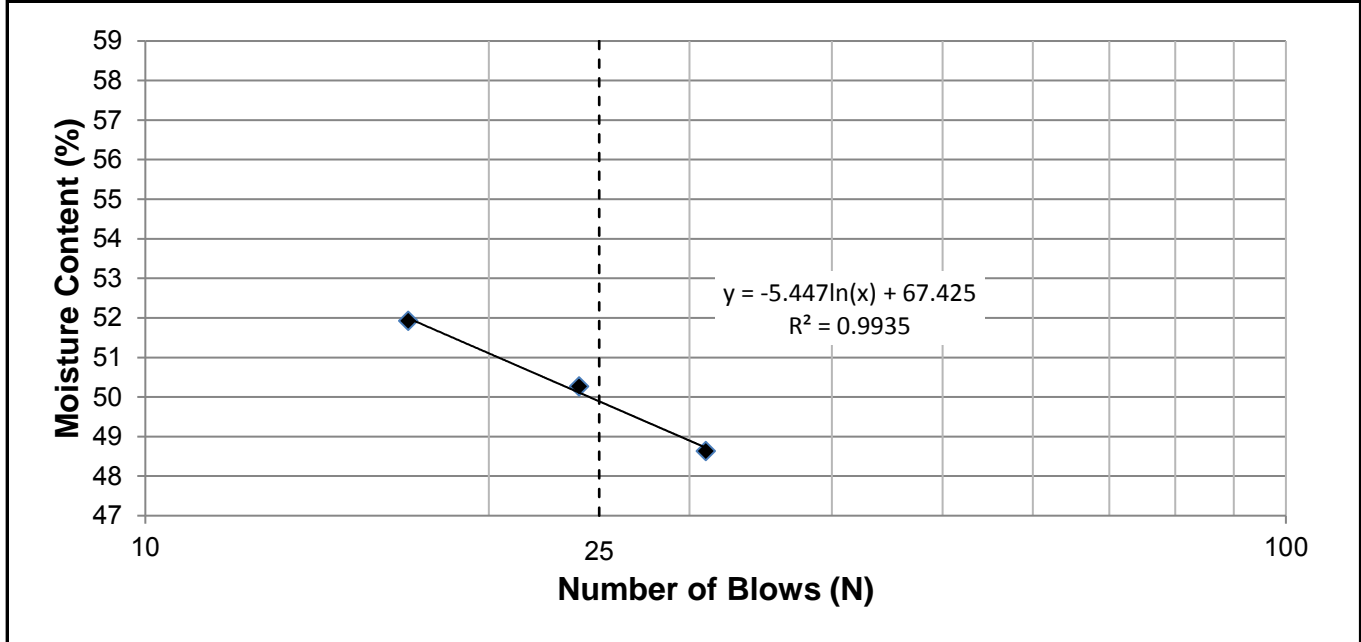
Project No. 0315-001-00
Client H. Manalo
Project Local Street Renewal - Downing Street

Test Hole TH17-01
Sample # G03
Depth (m) 0.6-0.9
Sample Date 17-Jan-17
Test Date 24-Feb-17
Technician SX

Liquid Limit	50
Plastic Limit	17
Plasticity Index	33

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	17	24	31		
Mass Wet Soil + Tare (g)	25.284	25.276	23.498		
Mass Dry Soil + Tare (g)	21.497	21.590	20.531		
Mass Tare (g)	14.204	14.257	14.430		
Mass Water (g)	3.787	3.686	2.967		
Mass Dry Soil (g)	7.293	7.333	6.101		
Moisture Content (%)	51.927	50.266	48.631		



Plastic Limit

Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	21.445	21.037			
Mass Dry Soil + Tare (g)	20.401	20.018			
Mass Tare (g)	14.273	14.075			
Mass Water (g)	1.044	1.019			
Mass Dry Soil (g)	6.128	5.943			
Moisture Content (%)	17.037	17.146			



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

Atterberg Limits ASTM D4318-10e1

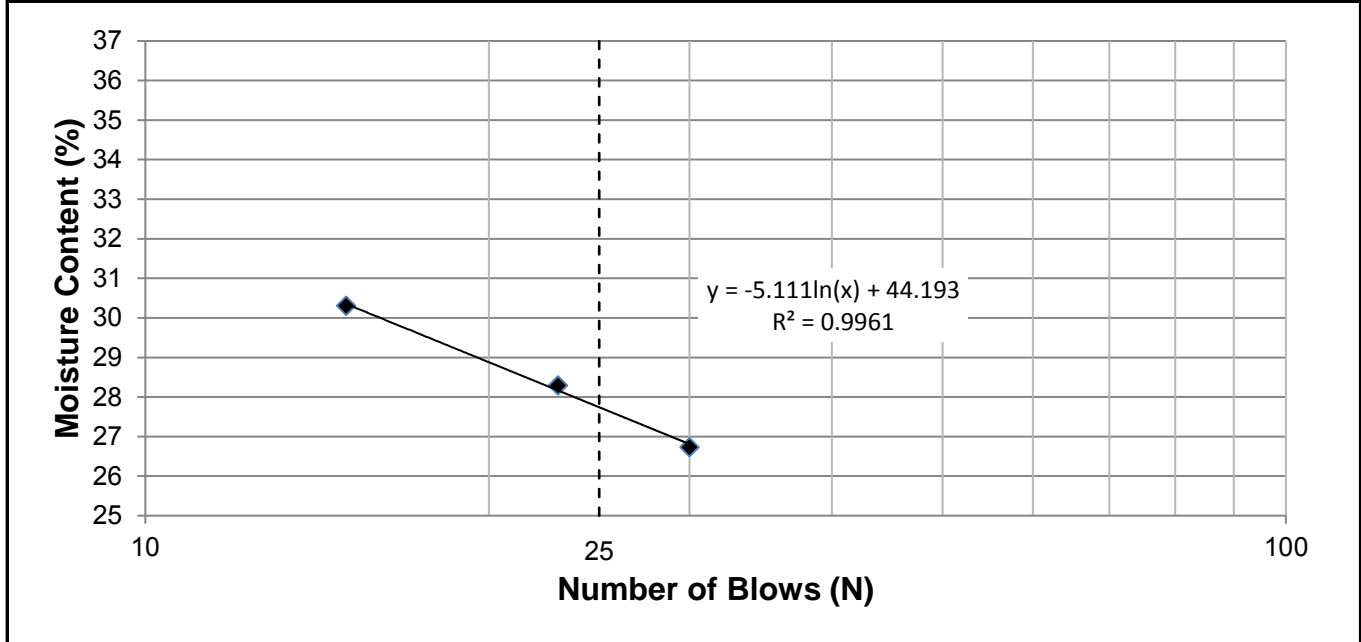
Project No. 0315-001-00
Client H. Manalo
Project Local Street Renewal - Downing Street

Test Hole TH 17-04
Sample # G24
Depth (m) 0.6-0.9
Sample Date 17-Jan-17
Test Date 23-Feb-17
Technician SX

Liquid Limit	28
Plastic Limit	15
Plasticity Index	12

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	15	23	30		
Mass Wet Soil + Tare (g)	24.512	24.155	23.021		
Mass Dry Soil + Tare (g)	22.052	21.950	21.179		
Mass Tare (g)	13.934	14.157	14.288		
Mass Water (g)	2.460	2.205	1.842		
Mass Dry Soil (g)	8.118	7.793	6.891		
Moisture Content (%)	30.303	28.295	26.731		



Plastic Limit

Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	20.238	20.044			
Mass Dry Soil + Tare (g)	19.356	19.288			
Mass Tare (g)	13.776	14.279			
Mass Water (g)	0.882	0.756			
Mass Dry Soil (g)	5.580	5.009			
Moisture Content (%)	15.806	15.093			



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

Atterberg Limits ASTM D4318-10e1

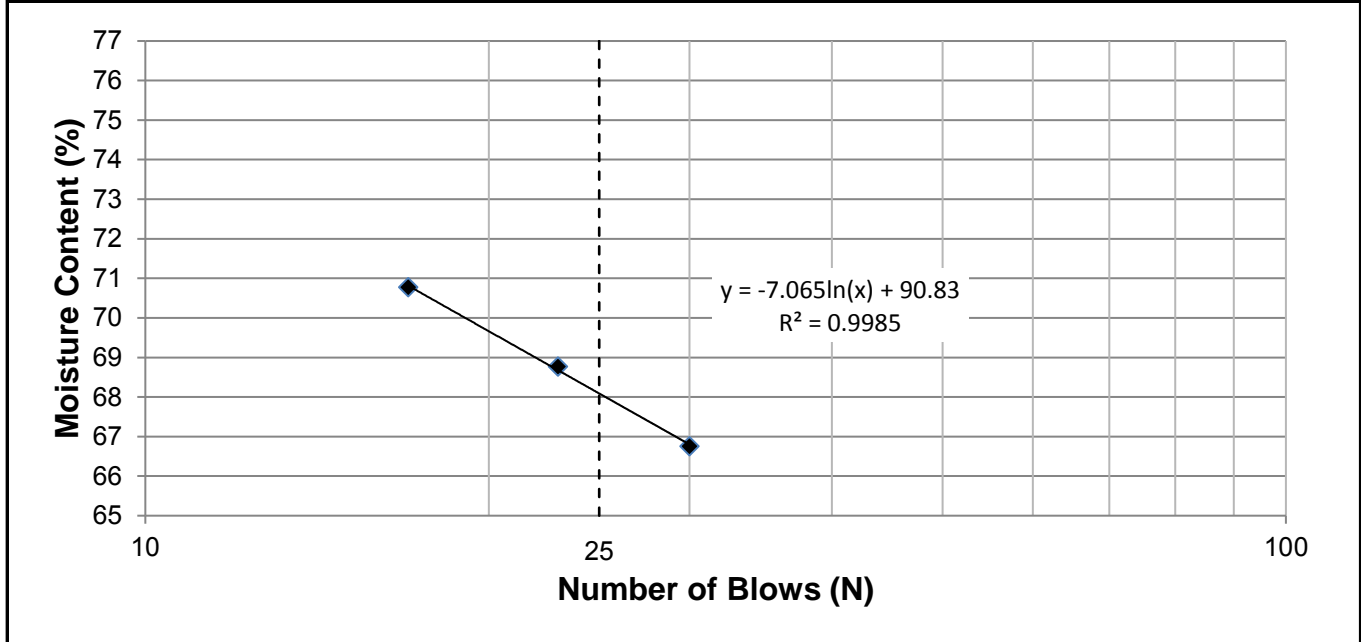
Project No. 0315-001-00
Client H. Manalo
Project Local Street Renewal - Downing Street

Test Hole TH 17-06
Sample # G36
Depth (m) 0.2-0.5
Sample Date 17-Jan-17
Test Date 24-Feb-17
Technician SX

Liquid Limit	68
Plastic Limit	23
Plasticity Index	45

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	17	23	30		
Mass Wet Soil + Tare (g)	24.156	25.253	24.453		
Mass Dry Soil + Tare (g)	19.904	20.691	20.369		
Mass Tare (g)	13.896	14.057	14.251		
Mass Water (g)	4.252	4.562	4.084		
Mass Dry Soil (g)	6.008	6.634	6.118		
Moisture Content (%)	70.772	68.767	66.754		



Plastic Limit

Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	20.126	20.931			
Mass Dry Soil + Tare (g)	19.019	19.691			
Mass Tare (g)	14.192	14.174			
Mass Water (g)	1.107	1.240			
Mass Dry Soil (g)	4.827	5.517			
Moisture Content (%)	22.933	22.476			



PHOTO 1: DOWNING STREET SPAVEMENT CORE AT TEST HOLE TH17-01



PHOTO 2: DOWNING STREET PAVEMENT CORE AT TEST HOLE TH17-02



PHOTO 3: DOWNING STREET PAVEMENT CORE AT TEST HOLE TH17-03



PHOTO 4: DOWNING STREET PAVEMENT CORE AT TEST HOLE TH17-04



PHOTO 5: DOWNING STREET PAVEMENT CORE AT TEST HOLE TH17-05



PHOTO 6: DOWNING STREET PAVEMENT CORE AT TEST HOLE TH17-06

Appendix C

Summary Table, Test Hole Logs & Lab Data – Lulu Street



Sub-Surface Log

Test Hole TH17-01

1 of 1

Client: H. Manalo Project Number: 0315-001-00
 Project Name: Local Street Renewal Lulu Street Location: UTM N-5530042, E-632388
 Contractor: Paddock Drilling Ltd. Ground Elevation: 231.87 m
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: January 11, 2017 - January 11, 2017

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m ³)					Undrained Shear Strength (kPa)						
						16	17	18	19	20	21	Test Type					
						Particle Size (%)											
						0	20	40	60	80	100						
						PL _____ MC _____ LL _____ 0 20 40 60 80 100											
						0	20	40	60	80	100	0	40	80	120	160	200
231.8			ASPHALT (40 mm THICK)														
231.6			CONCRETE (185 mm THICK)														
231.5			GRANULAR (Fill) - sand, trace clay, trace silt, light grey to grey, moist and soft when thawed		G08												
			ORGANIC CLAY - some silt - black, frozen - moist and soft to firm when thawed - high plasticity		G09												
	-0.5				G10												
	-1.0				G11												
230.7			SILT - some clay - mottled green and brown, frozen - moist and very soft when thawed - low plasticity		G12												
	-1.5				G13												
230.2			CLAY - silty, trace silt (< 10 mm dia.) - mottled light to dark brown - moist, firm - high plasticity		G14												
	-2.0																
	-2.5																
228.8	-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 to ~ 1.0 m below top of pavement, bentonite pellets to 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 number 270 in the southbound lane, 2.22 meters east of Lulu Street west curb.
 4) UTM coordinates and elevation provided by the City of Winnipeg.

PTH 83 TH LOGS MIT FONT LOGS_2017-01-23 LOCAL_STREETS_RENEWAL (LULU)_0_A_SGBR 0315-001-00.GPJ TREK GEOTECHNICAL_GDT_3/7/17



Sub-Surface Log

Test Hole TH17-02

1 of 1

Client: H. Manalo Project Number: 0315-001-00
 Project Name: Local Street Renewal Lulu Street Location: UTM N-5530082, E-632403
 Contractor: Paddock Drilling Ltd. Ground Elevation: 232.01 m
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: January 16, 2016 - January 16, 2017

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m ³)					Undrained Shear Strength (kPa)						
						16	17	18	19	20	21	Test Type					
						Particle Size (%)											
						0	20	40	60	80	100						
						PL MC LL											
						0	20	40	60	80	100	0	40	80	120	160	200
232.0			ASPHALT (25 mm THICK)														
231.8			CONCRETE (160 mm THICK)														
231.7			CLAY (Fill) - trace silt, trace sand, light to dark brown, frozen, moist and soft when thawed, high plasticity		G15												
231.4	-0.5		ORGANIC CLAY/(FILL) - silty, mottled light brown to black, frozen, moist and soft when thawed, high plasticity		G16												
231.1			ORGANIC CLAY - silty, black, frozen moist and soft to firm when thawed high plasticity		G17												
	-1.0		SILT - trace clay - light brown, frozen to 1.7 m depth - moist and very soft when thawed - low plasticity		G18												
	-1.5				G19												
229.9			CLAY - some silt, trace sand - mottled grey to brown - moist, soft - high plasticity		G20												
	-2.5				G21												
229.0	-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 to ~ 1.0 m below top of pavement, bentonite pellets to 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 number 258 in the southbound lane, 1.86 meters east of Lulu Street west curb.
- 4) UTM coordinates and elevation provided by the City of Winnipeg.

Logged By: Shane Broderick Reviewed By: Paul Bevel Project Engineer: Nelson Ferreira

PTH 83 TH LOGS MIT FONT LOGS_2017-01-23 LOCAL_STREETS_RENEWAL (LULU)_0_A_SGBR 0315-001-00.GPJ TREK GEOTECHNICAL.GDT 3/7/17



Sub-Surface Log

Test Hole TH17-03

1 of 1

Client: H. Manalo Project Number: 0315-001-00
 Project Name: Local Street Renewal Lulu Street Location: UTM N-5530122, E-632422
 Contractor: Paddock Drilling Ltd. Ground Elevation: 232.17 m
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: January 11, 2017 - January 11, 2017

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m ³)					Undrained Shear Strength (kPa)						
						16	17	18	19	20	21	Test Type					
						Particle Size (%)											
						0	20	40	60	80	100						
						PL _____ MC _____ LL _____ 0 20 40 60 80 100											
						0	20	40	60	80	100	0	40	80	120	160	200
232.1			ASPHALT (30 mm THICK)														
232.0			CONCRETE (180 mm THICK)														
231.7			ORGANIC CLAY/(FILL) - silty, mottled light brown to black, frozen, moist and soft when thawed, high plasticity		G01			●									△+
231.5	-0.5		SILT - some clay, mottled green to light brown, frozen, moist and very soft when thawed, - low plasticity		G02			●									
231.1	-1.0		SILT - clayey - light brown, frozen - moist and very soft when thawed - low plasticity		G03			●									△+
231.1	-1.0		CLAY - silty - mottled light to dark brown, frozen to 1.7 m depth - moist and firm to stiff when thawed - high plasticity		G04			●									△+
	-1.5				G05			●									△+
	-2.0				G06				●								
	-2.5				G07												△+
	-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 to ~ 1.0 m below top of pavement, bentonite pellets to 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 location is 92 meters south of the intersection of Lulu street and Logan Avenue in the northbound lane, 4.50 meters east of Lulu Street west curb.
- 4) UTM coordinates and elevation provided by the City of Winnipeg.

Logged By: Matt Klymochko Reviewed By: Paul Bevel Project Engineer: Nelson Ferreira

PTH 83 TH LOGS MIT FONT LOGS_2017-01-23 LOCAL_STREETS_RENEWAL (LULU)_0_A_SGBR 0315-001-00.GPJ TREK GEOTECHNICAL.GDT 3/7/17



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

Moisture Content Report ASTM D2216-98

Project No. 0315-001-00
Client H. Manalo
Project Local Street Renewal LuLu Street

Sample Date 12-Jan-17
Test Date 26-Jan-17
Technician SX

Test Pit	TH 17-01	TH 17-01	TH 17-01	TH 17-01	TH 17-01	TH 17-01
Depth (m)	0.2 - 0.3	0.3 - 0.5	0.6 - 0.9	0.9 - 1.2	1.2 - 1.5	1.8 - 2.1
Sample #	G08	G09	G10	G11	G12	G13
Tare ID	D14	AC03	AB43	D34	F17	H64
Mass of tare	8.6	6.5	6.6	8.9	8.5	8.5
Mass wet + tare	287.4	272.4	295.8	281.2	233.2	281.9
Mass dry + tare	247.3	216.1	224.8	211.8	194.1	203.6
Mass water	40.1	56.4	71.1	69.4	39.2	78.2
Mass dry soil	238.6	209.6	218.2	202.9	185.6	195.1
Moisture %	16.8%	26.9%	32.6%	34.2%	21.1%	40.1%

Test Pit	TH 17-01	TH 17-02	TH 17-02	TH 17-02	TH 17-02	TH 17-02
Depth (m)	2.7 - 3.0	0.2 - 0.3	0.3 - 0.5	0.6 - 0.9	0.9 - 1.2	1.2 - 1.5
Sample #	G14	G15	G16	G17	G18	G19
Tare ID	Z29	F141	F145	D35	F137	E6
Mass of tare	8.5	8.3	8.6	8.5	8.4	8.3
Mass wet + tare	273.4	266.7	301.4	301.5	310.9	292.9
Mass dry + tare	185.7	198.6	228.2	231.2	242.3	230.5
Mass water	87.7	68.1	73.2	70.3	68.5	62.4
Mass dry soil	177.2	190.3	219.6	222.7	233.9	222.2
Moisture %	49.5%	35.8%	33.3%	31.6%	29.3%	28.1%

Test Pit	TH 17-02	TH 17-02	TH 17-03	TH 17-03	TH 17-03	TH 17-03
Depth (m)	2.1 - 2.4	2.7 - 3.0	0.2 - 0.3	0.3 - 0.5	0.6 - 0.9	0.9 - 1.2
Sample #	G20	G21	G01	G02	G03	G04
Tare ID	E89	F89	D32	D40	N91	C20
Mass of tare	9.4	8.4	8.5	8.3	8.4	8.4
Mass wet + tare	283.7	303.8	287.8	328.2	283.0	279.4
Mass dry + tare	208.8	204.2	217.0	267.4	226.4	217.6
Mass water	74.9	99.5	70.7	60.8	56.6	61.8
Mass dry soil	199.4	195.8	208.6	259.1	218.0	209.2
Moisture %	37.6%	50.8%	33.9%	23.5%	25.9%	29.6%



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

Moisture Content Report ASTM D2216-98

Project No. 0315-001-00
Client H. Manalo
Project Local Street Renewal LuLu Street

Sample Date 12-Jan-17
Test Date 26-Jan-17
Technician SX

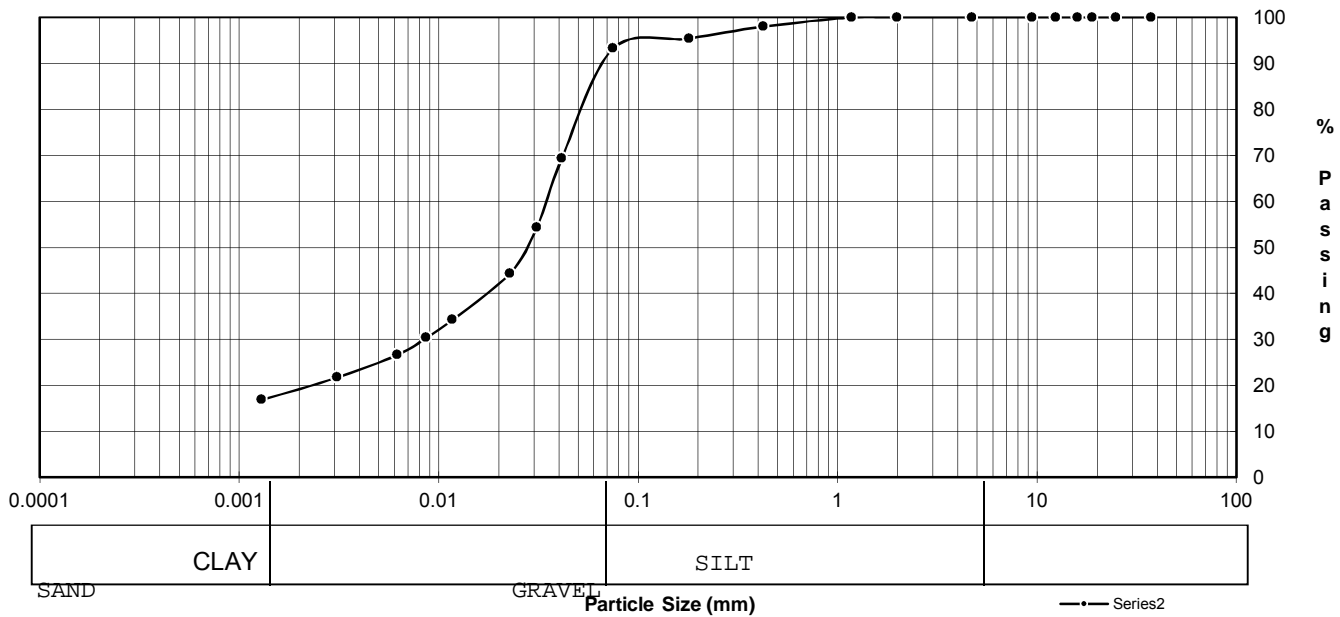
Test Pit	TH 17-03	TH 17-03	TH 17-03			
Depth (m)	1.2 - 1.5	1.8 - 2.1	2.7 - 3.0			
Sample #	G05	G06	G07			
Tare ID	C19	N93	W11			
Mass of tare	8.5	8.5	8.6			
Mass wet + tare	278.8	303.8	297.7			
Mass dry + tare	208.5	205.9	197.8			
Mass water	70.4	97.9	99.9			
Mass dry soil	200.0	197.4	189.2			
Moisture %	35.2%	49.6%	52.8%			

PARTICLE SIZE ANALYSIS OF SOILS TEST REPORT

CLIENT: COW - Public Works 155 Pacific Avenue W. Winnipeg, MB R3E 3P1 ATTN: Richard Weibel PROJECT: 2017 In House Local Streets Rehabilitation	PROJECT NO. 142 - 1701
---	-------------------------------

Date Sampled: Jan. 2017	Date Received: Feb. 2017	Sieve Analysis		Hydrometer Analysis	
Sampled By: SB	Date Tested: Feb. 2017	Sieve (mm)	% Passing	Diameter	% Finer
Material Identification B.H./T.H. No. TH17-02@3.0 - 4.0 Ft Sample No. G18 Sample Source Lulu Street Specific Gravity of Material: 2.65		50.00	100.0		
		37.50	100.0		
		25.00	100.0		
		19.00	100.0		
		16.00	100.0		
		12.50	100.0	0.0415	69.3
		9.50	100.0	0.0311	54.3
		4.75	100.0	0.0227	44.3
		2.00	100.0	0.0117	34.2
		1.18	100.0	0.0087	30.3
	0.425	98.0	0.0062	26.6	
	0.180	95.4	0.0031	21.7	
	0.075	93.2	0.0013	16.8	

Grain Size Analysis



SOIL DESCRIPTION	% Composition		D10
		7	Gravel
	76	Sand	D60
	17	Silt	Cu
		Clay	Cc

Remarks: Test Method: ASTM D422, D2216, D4318

Technician: ECS



Reviewed by: Hermie Manalo

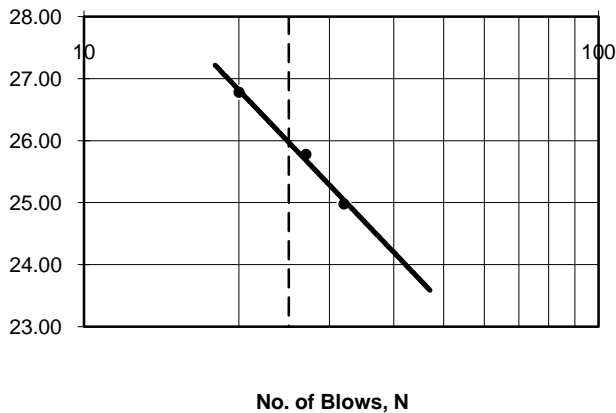
ATTERBERG LIMITS

CLIENT:	COW - Public Works 155 Pacific Avenue W Winnipeg, MB R3E 3P1	PROJECT NO.: 142-1701
ATTENTION:	Richard Weibel	Test No.: 7
PROJECT:	2017 In house Local Street Rehabilitation	

Liquid Limit Determination

Dish No.:	1	2	3		Liquid Limit 25 Blows
Wet Soil + Dish:	19.4	19.54	18.86		
Dry Soil + Dish:	16.42	16.41	15.82		
Moisture:	2.98	3.13	3.04		
Dish:	4.49	4.27	4.47		
Dry Soil:	11.93	12.14	11.35		
% Moisture:	24.98	25.78	26.78		
No. of Blows:	32	27	20		
Liquid Limits:	25.74	26.02	26.07		

Liquid Limit



Material Identification:

Lulu Street
 T.H./B.H. No. **TH 17-02**

Depth: **3 - 4 Ft.**

Liquid Limit, %: 26
 Plastic Limit, %: 17
 Plasticity Index: 9
 (LL-PL)

Plastic Limit Determination

Dish No.:	1	2	3			
Wet Soil + Dish:	18.41	18.9	19.22			
Dry Soil + Dish:	16.41	16.66	16.98			
Moisture:	2	2.24	2.24			
Dish:	4.23	4.18	4.31			
Dry Soil:	12.18	12.48	12.67			
% Moisture:	16.42	17.95	17.68			
Average:						17

Test Method : ASTM: D4318, D2216
 HMCL Tech: ECS
 Date Tested: 22-Feb-17



Reviewed by: Hermie Manalo

2017 In house Local Street Rehabilitation



Lulu St. TH17-01

2017 In house Local Street Rehabilitation



Lulu St. TH17-02

2017 In house Local Street Rehabilitation



Lulu Street TH17-03

Appendix D

Summary Table, Test Hole Logs & Lab Data – Lenore Street



Local Street Renewal (Lenore Street)
Sub-Surface Investigation
Summary Table

Test Hole No.	Test Hole Location	Pavement Surface		Pavement Structure Material		Subgrade Description	Sample Depth (m)		Moisture Content (%)	Grain Size Analysis				Atterberg Limits		
		Type	Thickness (mm)	Type	Thickness (mm)		Top (m)	Bottom (m)		Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid	Plastic	Plasticity Index
TH17-05	U14 (5526876m N, 631341m E). House number 120, northbound lane, 2.04 meters east of west curb	Asphalt	40	Concrete	170											
						SAND/GRAVEL	0.2	0.5	10.9							
						CLAY	0.5	0.6	32.2							
						SILT	0.6	0.9	23.6							
						SILT	0.9	1.2	29.0							
						SILT	1.2	1.5	26.9							
						CLAY	1.8	2.1	36.4							
TH17-06	U14 (5526849m N, 631336m E). House number 130, southbound lane, 2.72 meters east of west curb	Asphalt	45	Concrete	165											
						SAND/GRAVEL	0.2	0.3	13.1							
						CLAY	0.3	0.6	34.8	0	6	36	58	63	23	40
						SILT	0.6	0.9	27.4							
						SILT	0.9	1.2	19.9							
						SILT	1.2	1.5	20.9							
						CLAY	1.8	2.1	31.7							
				CLAY	2.4	2.7	43.1									



Sub-Surface Log

Test Hole TH17-01

1 of 1

Client: H. Manalo Project Number: 0315-001-00
 Project Name: Local Street Renewal Lenore Street Location: UTM N-5527054, E-631344
 Contractor: Paddock Drilling Ltd. Ground Elevation: 232.47 m
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: January 11, 2017 - January 11, 2017

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m ³)					Undrained Shear Strength (kPa)						
						16	17	18	19	20	21	Test Type					
						Particle Size (%)											
						0	20	40	60	80	100						
						PL _____ MC _____ LL _____ 0 20 40 60 80 100											
						0	20	40	60	80	100	0	40	80	120	160	200
											△ Torvane △ ⊕ Pocket Pen. ⊕ ⊠ Qu ⊠ ○ Field Vane ○						
232.4			ASPHALT (60 mm THICK)														
232.2			CONCRETE (170 mm THICK)														
232.1			GRANULAR (Fill) - sand, trace clay, trace silt, grey, frozen, moist and soft when thawed	▲	G01	●											
232.0	-0.5		ORGANIC CLAY - trace silt, trace sand, black, frozen, loose, moist and soft to firm when thawed, high plasticity	▲	G02		●						△	⊕			
231.7			SILT - some fine sand, trace silt, trace clay, light brown, frozen moist and very soft when thawed - low plasticity	▲	G03		●							⊕			
	-1.0		SILT - some clay - mottled green and brown, frozen - moist and very soft when thawed - low plasticity	▲	G04		●							⊕			
	-1.5			▲	G05		●							△	⊕		
230.7			CLAY - silty, trace silt inclusions (< 10 mm dia.), trace sand - mottled light to dark brown - moist - high plasticity - firm to stiff	▲	G06		●								⊕		
	-2.0			▲	G07			●							⊕		
	-2.5																
	-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 to ~ 1.0 m below top of pavement, bentonite pellets to 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 number 73 in the southbound lane, 5.73 meters east of Lenore Street west curb.
- 4) UTM coordinates and elevation provided by the City of Winnipeg.

Logged By: Matt Klymochko Reviewed By: Paul Bevel Project Engineer: Nelson Ferreira

PTH 83 TH LOGS MIT FONT LOGS_2017-01-23 LOCAL_STREETS_RENEWAL_LEN0_A_SGBR 0315-001-00.GPJ TREK GEOTECHNICAL_GDT_3/7/17



Sub-Surface Log

Test Hole TH17-02

1 of 1

Client: H. Manalo Project Number: 0315-001-00
 Project Name: Local Street Renewal Lenore Street Location: UTM N-5527016, E-631344
 Contractor: Paddock Drilling Ltd. Ground Elevation: 232.23 m
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: January 11, 2016 - January 11, 2017

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m ³)					Undrained Shear Strength (kPa)						
						16	17	18	19	20	21	Test Type					
						Particle Size (%)											
						0	20	40	60	80	100						
						PL MC LL											
						0	20	40	60	80	100	0	40	80	120	160	200
232.2			ASPHALT (55 mm THICK)														
232.0			CONCRETE (165 mm THICK)														
231.9			GANULAR (Fill) - trace clay, trace silt, trace sand, light brown, frozen, moist when thawed		G08	●											
231.6	-0.5		ORGANIC CLAY/(FILL) - some silt, mottled light grey to black, frozen, moist and soft to very soft when thawed, high plasticity		G09	●						+					
			SILT - some fine sand, trace clay - brown, frozen - moist and very soft when thawed - low plasticity		G10	●											
	-1.0				G11	●						+					
	-1.5				G12	●						+	△				
230.5			CLAY - silty, trace - mottled light to dark brown - firm, moist - high plasticity		G13	●											+
	-2.0																
	-2.5																
	-3.0				G14	●											+

END OF TEST HOLE AT 3.1 m in CLAY
 Notes:
 1) No sloughing or seepage observed.
 2) Backfilled test hole with auger cuttings to ~ 1.0 m below top of pavement, bentonite pellets to 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 number 81 in the northbound lane, 1.59 meters east of Lenore Street west curb.
 4) UTM coordinates and elevation provided by the City of Winnipeg.

PTH 83 TH LOGS MIT FONT LOGS_2017-01-23 LOCAL_STREETS_RENEWAL_LEN0_A_SGBR 0315-001-00.GPJ TREK GEOTECHNICAL_GDT_3/7/17



Sub-Surface Log

Test Hole TH17-03

1 of 1

Client: H. Manalo **Project Number:** 0315-001-00
Project Name: Local Street Renewal Lenore Street **Location:** UTM N-5526960, E-631339
Contractor: Paddock Drilling Ltd. **Ground Elevation:** 232.47 m
Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount **Date Drilled:** January 11, 2017 - January 11, 2017

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m ³)					Undrained Shear Strength (kPa)							
						16	17	18	19	20	21	Test Type						
						Particle Size (%)												
						0	20	40	60	80	100							
						PL _____ MC _____ LL _____ 0 20 40 60 80 100												
						0	20	40	60	80	100	0	40	80	120	160	200	
232.4			ASPHALT (75 mm THICK)															
232.2			CONCRETE (155 mm THICK)															
232.1			GRANULAR (Fill) - some gravel, trace clay, trace silt, brown, frozen, moist when thawed		G15	●												
231.9	-0.5		ORGANIC CLAY/(FILL) - some silt, mottled light grey to black, frozen, moist and soft to very soft when thawed, high plasticity		G16		●						△	+				
	-1.0		SILT - some sand, trace clay - brown, frozen to 1.7 m depth - moist and very soft to soft when thawed - low plasticity		G17			●										
	-1.5				G18			●						+				
	-2.0		- very soft, some clay below 1.8 meters		G19			●						+	△			
	-2.5				G20			●						△	+			
	-3.0		CLAY - silty, trace fine sand - mottled grey to brown - firm to stiff, moist - high plasticity		G21				●							△	+	

END OF TEST HOLE AT 3.1 m in CLAY
 Notes:
 1) No sloughing or seepage observed.
 2) Backfilled test hole with auger cuttings to ~ 1.0 m below top of pavement, bentonite pellets to 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 number 89 in the northbound lane, 2.21 meters east of Lenore Street west curb.
 4) UTM coordinates and elevation provided by the City of Winnipeg.

PTH 83 TH LOGS MIT FONT LOGS_2017-01-23 LOCAL_STREETS_RENEWAL (LEN)_A_SGBR 0315-001-00.GPJ TREK GEOTECHNICAL_GDT_3/7/17



Sub-Surface Log

Test Hole TH17-04

1 of 1

Client: H. Manalo Project Number: 0315-001-00
 Project Name: Local Street Renewal Lenore Street Location: UTM N-5526920, E-631342
 Contractor: Paddock Drilling Ltd. Ground Elevation: 232.31 m
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: January 11, 2017 - January 11, 2017

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m ³)		Particle Size (%)		Undrained Shear Strength (kPa)							
						16	17	18	19	20	21	0	40	80	120	160	200
232.3			ASPHALT (40 mm THICK)														
232.1			CONCRETE (165 mm THICK)														
232.0			GRANULAR (Fill) - some gravel, trace clay, frozen, moist when thawed		G22												
231.7	-0.5		ORGANIC CLAY/(FILL) - silty, trace sand, mottled light brown to black, frozen, moist and soft when thawed, high plasticity		G23												
231.4	-1.0		CLAY - silty, trace sand - mottled black to dark grey, frozen - moist and soft when thawed		G24												
	-1.5		SILT - some clay, trace sand - brown, frozen to 1.7 m depth - moist and soft when thawed - low plasticity		G25												
	-2.0				G26												
	-2.5		CLAY - silty, trace fine sand - mottle light to dark brown - firm to stiff, moist - high plasticity		G27												
229.9	-3.0				G28												

END OF TEST HOLE AT 3.1 m in CLAY

Notes:

- 1) No sloughing or seepage observed.
- 2) Backfilled test hole with auger cuttings to ~ 1.0 m below top of pavement, bentonite pellets to 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 number 100 in the southbound lane, 5.89 meters east of Lenore Street west curb.
- 4) UTM coordinates and elevation provided by the City of Winnipeg.

Logged By: Matt Klymochko Reviewed By: Paul Bevel Project Engineer: Nelson Ferreira

PTH 83 TH LOGS MIT FONT LOGS_2017-01-23 LOCAL_STREETS_RENEWAL (LEN)_0_A_SGBR 0315-001-00.GPJ TREK GEOTECHNICAL_GDT_3/7/17



Sub-Surface Log

Test Hole TH17-05

1 of 1

Client: H. Manalo Project Number: 0315-001-00
 Project Name: Local Street Renewal Lenore Street Location: UTM N-5526876, E-631341
 Contractor: Paddock Drilling Ltd. Ground Elevation: 232.38 m
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: January 11, 2017 - January 11, 2017

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m ³)					Undrained Shear Strength (kPa)						
						16	17	18	19	20	21	Test Type					
						Particle Size (%)											
						0	20	40	60	80	100						
						PL — MC — LL											
						0	20	40	60	80	100	0	40	80	120	160	200
											<input checked="" type="checkbox"/> Pocket Pen. <input checked="" type="checkbox"/> <input type="checkbox"/> Torvane <input type="checkbox"/> <input checked="" type="checkbox"/> Qu <input checked="" type="checkbox"/> <input type="checkbox"/> Field Vane <input type="checkbox"/>						
232.3			ASPHALT (40 mm THICK)														
232.2			CONCRETE (170 mm THICK)														
231.9			GRANULAR (Fill) - trace gravel, light brown, frozen, moist when thawed, loose		G29												
231.8	-0.5		CLAY - silty, trace sand, dark grey, frozen, moist and soft when thawed, high plasticity		G30												
			SILT - trace clay - light brown, frozen - moist and soft when thawed - low plasticity		G31												
	-1.0				G32												
					G33												
230.9	-1.5		CLAY - silty, trace fine sand, - mottled grey to brown - firm to stiff, moist - high plasticity		G34												
	-2.0																
	-2.5																
			-silt lenses at 2.7 m (50-75 mm thick)		G35												
229.3	-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 to ~ 1.0 m below top of pavement, bentonite pellets to 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 number 120 in the northbound lane, 2.04 meters east of Lenore Street west curb.
 4) UTM coordinates and elevation provided by the City of Winnipeg.

PTH 83 TH LOGS MIT FONT LOGS_2017-01-23 LOCAL_STREETS_RENEWAL_LEN0_A_SGBR 0315-001-00.GPJ TREK GEOTECHNICAL_GDT_3/7/17



Sub-Surface Log

Test Hole TH17-06

1 of 1

Client: H. Manalo Project Number: 0315-001-00
 Project Name: Local Street Renewal Lenore Street Location: UTM N-5526849, E-631337
 Contractor: Paddock Drilling Ltd. Ground Elevation: 232.35 m
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: January 11, 2017 - January 17, 2017

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m ³)		Particle Size (%)		Undrained Shear Strength (kPa)							
						16	17	18	19	20	21	0	40	80	120	160	200
232.3			ASPHALT (45 mm THICK)														
232.1			CONCRETE (165 mm THICK)														
232.0			GRANULAR (Fill) - some gravel, trace clay, trace silt, brown, moist when thawed, frozen		G36												
231.7	-0.5		ORGANIC CLAY/(FILL) - some silt, mottled light grey to black, frozen, moist and soft to very soft when thawed, high plasticity		G37												
	-1.0		SILT - trace clay - light brown, frozen - moist and very soft when thawed - low plasticity		G38												
	-1.5				G39												
	-2.0				G40												
230.7	-2.0		CLAY - silty, trace fine sand - mottled grey brown - firm, moist - high plasticity		G41												
	-2.5				G42												
229.3	-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 to ~ 1.0 m below top of pavement, bentonite pellets to 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 number 130 in the southbound lane, 2.72 meters east of Lenore Street west c
 4) UTM coordinates and elevation provided by the City of Winnipeg.

PTH 83 TH LOGS MIT FONT LOGS_2017-01-23 LOCAL_STREETS_RENEWAL_LEN0_A_SGBR 0315-001-00.GPJ TREK GEOTECHNICAL_GDT_3/7/17



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

**Moisture Content Report
 ASTM D2216-98**

Project No. 0315-001-00
Client H. Manalo
Project Local Street Renewal Lenore Street

Sample Date 11-Jan-17
Test Date 25-Jan-17
Technician SX

Test Pit	TH 17-01	TH 17-01	TH 17-01	TH 17-01	TH 17-01	TH 17-01
Depth (m)	0.2 - 0.3	0.3 - 0.5	0.6 - 0.8	0.9 - 1.1	1.4 - 1.5	1.8 - 2.1
Sample #	G01	G02	G03	G04	G05	G06
Tare ID	AB49	F11	AC20	N68	H57	Z69
Mass of tare	6.6	8.6	6.9	8.7	8.6	8.6
Mass wet + tare	301.2	296.9	281.0	280.5	283.9	274.4
Mass dry + tare	281.7	218.3	210.2	228.1	235.6	207.3
Mass water	19.5	78.6	70.8	52.4	48.3	67.1
Mass dry soil	275.1	209.7	203.3	219.4	227.0	198.7
Moisture %	7.1%	37.5%	34.8%	23.9%	21.3%	33.7%

Test Pit	TH 17-01	TH 17-02	TH 17-02	TH 17-02	TH 17-02	TH 17-02
Depth (m)	2.7 - 3.0	0.2 - 0.3	0.3 - 0.6	0.6 - 0.9	0.9 - 1.2	1.2 - 1.7
Sample #	G07	G08	G09	G10	G11	G12
Tare ID	Z68	H44	E56	A30	H49	K35
Mass of tare	8.5	8.4	8.7	8.2	8.4	8.3
Mass wet + tare	279.4	304.7	285.0	318.4	307.5	272.8
Mass dry + tare	196.2	268.6	227.5	257.0	247.0	223.0
Mass water	83.2	36.2	57.6	61.3	60.5	49.8
Mass dry soil	187.7	260.2	218.7	248.8	238.6	214.6
Moisture %	44.3%	13.9%	26.3%	24.7%	25.4%	23.2%

Test Pit	TH 17-02	TH 17-02	TH 17-03	TH 17-03	TH 17-03	TH 17-03
Depth (m)	1.8 - 2.1	2.7 - 3.0	0.2 - 0.3	0.3 - 0.6	0.6 - 0.9	0.9 - 1.2
Sample #	G13	G14	G15	G16	G17	G18
Tare ID	Q01	Z10	F40	AA04	F13	W09
Mass of tare	8.5	8.4	8.4	6.8	8.6	8.7
Mass wet + tare	270.6	271.9	304.6	278.0	317.7	319.8
Mass dry + tare	196.3	194.7	276.0	210.5	238.5	263.9
Mass water	74.3	77.2	28.6	67.4	79.3	55.9
Mass dry soil	187.8	186.3	267.6	203.7	229.9	255.2
Moisture %	39.6%	41.4%	10.7%	33.1%	34.5%	21.9%



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

Moisture Content Report ASTM D2216-98

Project No. 0315-001-00
Client H. Manalo
Project Local Street Renewal Lenore Street

Sample Date 11-Jan-17
Test Date 25-Jan-17
Technician SX

Test Pit	TH 17-03	TH 17-03	TH 17-03	TH 17-04	TH 17-04	TH 17-04
Depth (m)	1.2 - 1.5	1.8 - 2.1	2.4 - 2.7	0.2 - 0.3	0.3 - 0.6	0.6 - 0.9
Sample #	G19	G20	G21	G22	G23	G24
Tare ID	C27	E37	F20	E49	F73	AA14
Mass of tare	8.8	8.3	8.5	8.9	8.6	6.6
Mass wet + tare	262.6	281.4	280.1	322.8	269.1	306.9
Mass dry + tare	216.5	230.3	207.9	292.2	205.1	237.4
Mass water	46.1	51.2	72.2	30.6	64.0	69.5
Mass dry soil	207.7	222.0	199.5	283.3	196.5	230.8
Moisture %	22.2%	23.0%	36.2%	10.8%	32.6%	30.1%

Test Pit	TH 17-04	TH 17-04	TH 17-04	TH 17-04	TH 17-05	TH 17-05
Depth (m)	0.9 - 1.2	1.2 - 1.5	1.8 - 2.1	2.7 - 3.0	0.2 - 0.5	0.5 - 0.6
Sample #	G25	G26	G27	G28	G29	G30
Tare ID	N46	W58	N84	AB67	H99	A4
Mass of tare	8.5	8.3	8.6	6.8	8.4	8.7
Mass wet + tare	281.2	346.5	347.0	305.6	321.6	273.3
Mass dry + tare	232.9	287.4	280.5	215.0	290.9	208.9
Mass water	48.4	59.0	66.6	90.7	30.7	64.5
Mass dry soil	224.3	279.1	271.9	208.2	282.4	200.2
Moisture %	21.6%	21.1%	24.5%	43.6%	10.9%	32.2%

Test Pit	TH 17-05	TH 17-05	TH 17-05	TH 17-05	TH 17-05	TH 17-06
Depth (m)	0.6 - 0.9	0.9 - 1.2	1.2 - 1.5	1.8 - 2.1	2.7 - 3.0	0.2 - 0.3
Sample #	G31	G32	G33	G34	G35	G36
Tare ID	N85	E36	Z56	Z99	H52	H59
Mass of tare	8.3	8.5	8.5	8.3	8.5	8.6
Mass wet + tare	299.1	299.6	271.4	303.2	279.8	303.7
Mass dry + tare	243.6	234.2	215.7	224.5	186.4	269.4
Mass water	55.5	65.4	55.8	78.7	93.4	34.3
Mass dry soil	235.3	225.7	207.1	216.2	177.9	260.9
Moisture %	23.6%	29.0%	26.9%	36.4%	52.5%	13.1%



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

Moisture Content Report ASTM D2216-98

Project No. 0315-001-00
Client H. Manalo
Project Local Street Renewal Lenore Street

Sample Date 11-Jan-17
Test Date 25-Jan-17
Technician SX

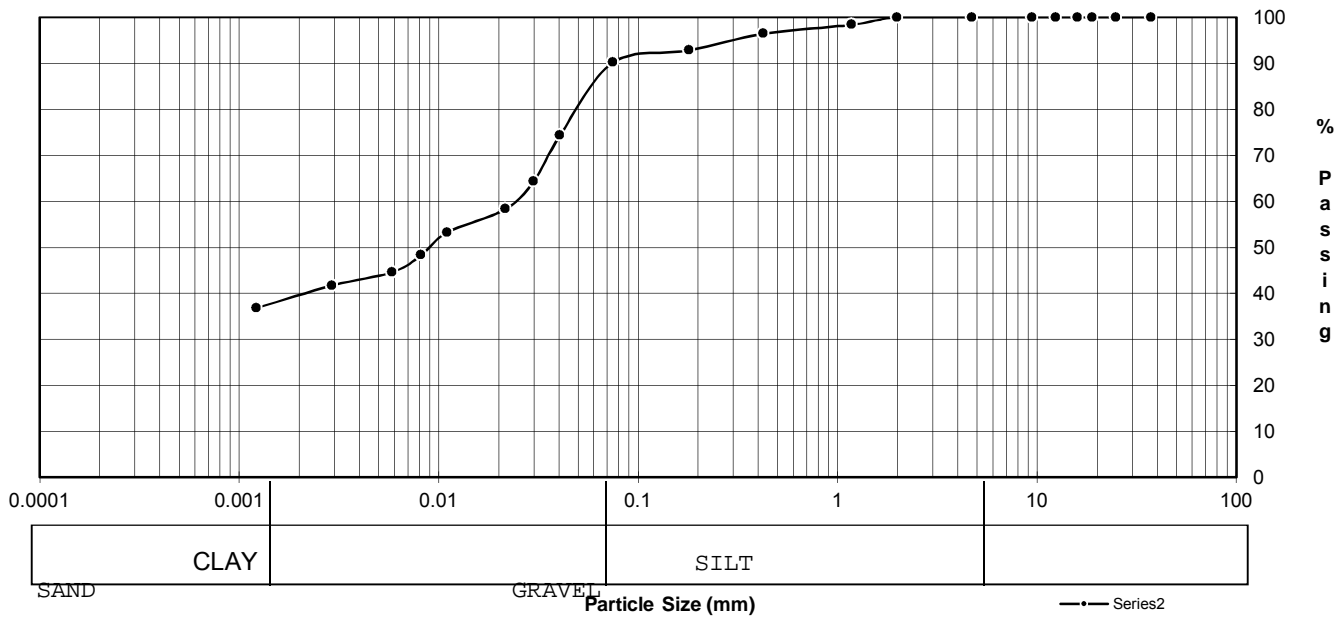
Test Pit	TH 17-06	TH 17-06	TH 17-06	TH 17-06	TH 17-06	TH 17-06
Depth (m)	0.3 - 0.6	0.6 - 0.9	0.9 - 1.2	1.2 - 1.5	1.8 - 2.1	2.4 - 2.7
Sample #	G37	G38	G39	G40	G41	G42
Tare ID	A101	F8	W78	H34	W15	E21
Mass of tare	8.6	8.6	8.4	8.6	8.4	8.6
Mass wet + tare	313.7	304.1	376.8	362.1	293.8	302.8
Mass dry + tare	234.9	240.5	315.6	301.0	225.1	214.2
Mass water	78.8	63.6	61.2	61.2	68.7	88.6
Mass dry soil	226.3	231.9	307.1	292.3	216.7	205.6
Moisture %	34.8%	27.4%	19.9%	20.9%	31.7%	43.1%

PARTICLE SIZE ANALYSIS OF SOILS TEST REPORT

CLIENT: COW - Public Works 155 Pacific Avenue W. Winnipeg, MB R3E 3P1 ATTN: Richard Weibel PROJECT: 2017 In House Local Streets Rehabilitation	PROJECT NO. 142 - 1701
---	-------------------------------

Date Sampled: Jan. 2017	Date Received: Feb. 2017	Sieve Analysis		Hydrometer Analysis	
Sampled By: SB	Date Tested: Feb. 2017	Sieve (mm)	% Passing	Diameter	% Finer
Material Identification B.H./T.H. No. TH17-04@2.0 - 3.0 Ft Sample No. G18 Sample Source Lenore Avenue Specific Gravity of Material: 2.65		50.00	100.0		
		37.50	100.0		
		25.00	100.0		
		19.00	100.0		
		16.00	100.0		
		12.50	100.0	0.0406	74.3
		9.50	100.0	0.0299	64.3
		4.75	100.0	0.0216	58.3
		2.00	100.0	0.0110	53.2
		1.18	98.4	0.0082	48.3
	0.425	96.4	0.0059	44.6	
	0.180	92.8	0.0029	41.7	
	0.075	90.2	0.0012	36.8	

Grain Size Analysis



SOIL DESCRIPTION	% Composition		D10
		10	Gravel
	50	Sand	D60
	50	Silt	Cu
	40	Clay	Cc

Remarks: Test Method: ASTM D422, D2216, D4318

Technician: ECS



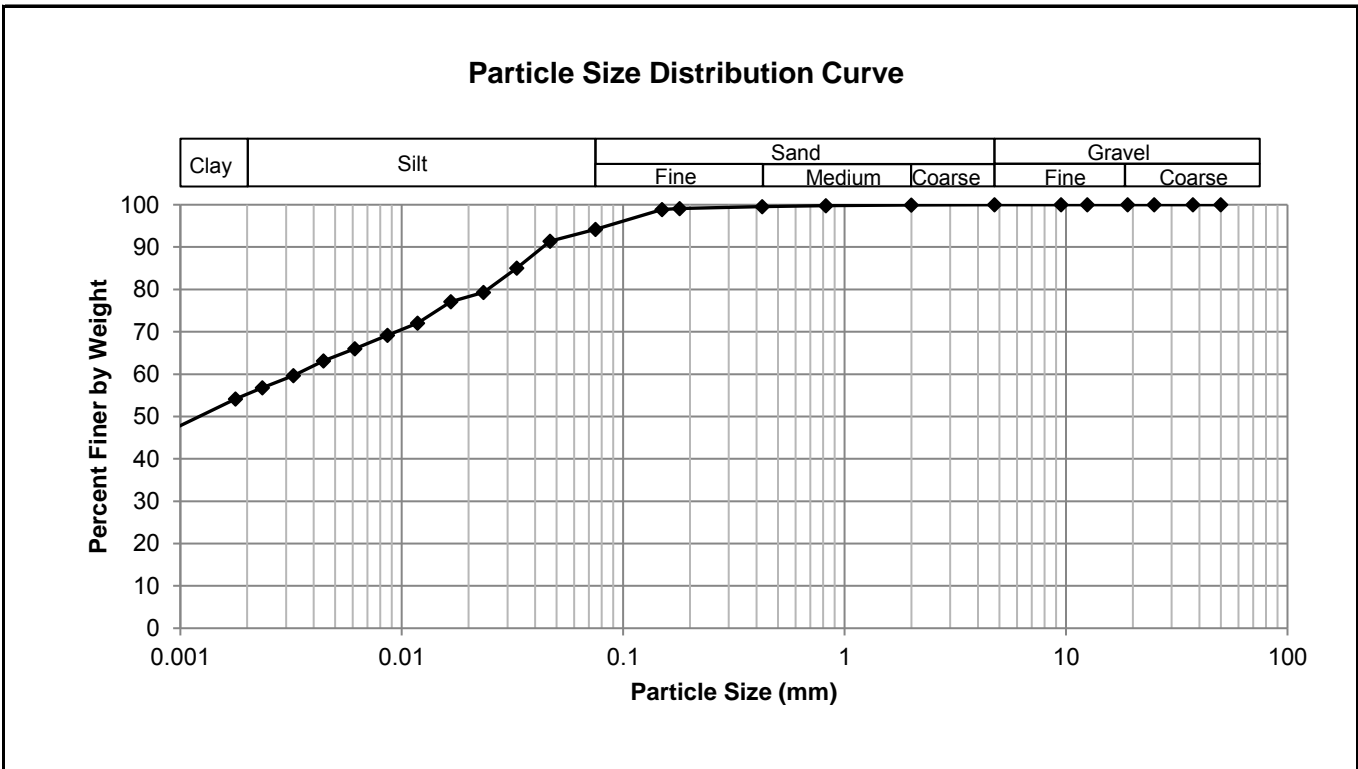
Reviewed by: Hermie Manalo



Project No. 0315-001-00
Client H. Manalo
Project Local Streer Renewal - Lenore Street

Test Hole TH 17-06
Sample # G37
Depth (m) 0.3 - 0.6
Sample Date 11-Jan-17
Test Date 24-Feb-17
Technician SX

Gravel	0.0%
Sand	5.8%
Silt	37.4%
Clay	56.8%



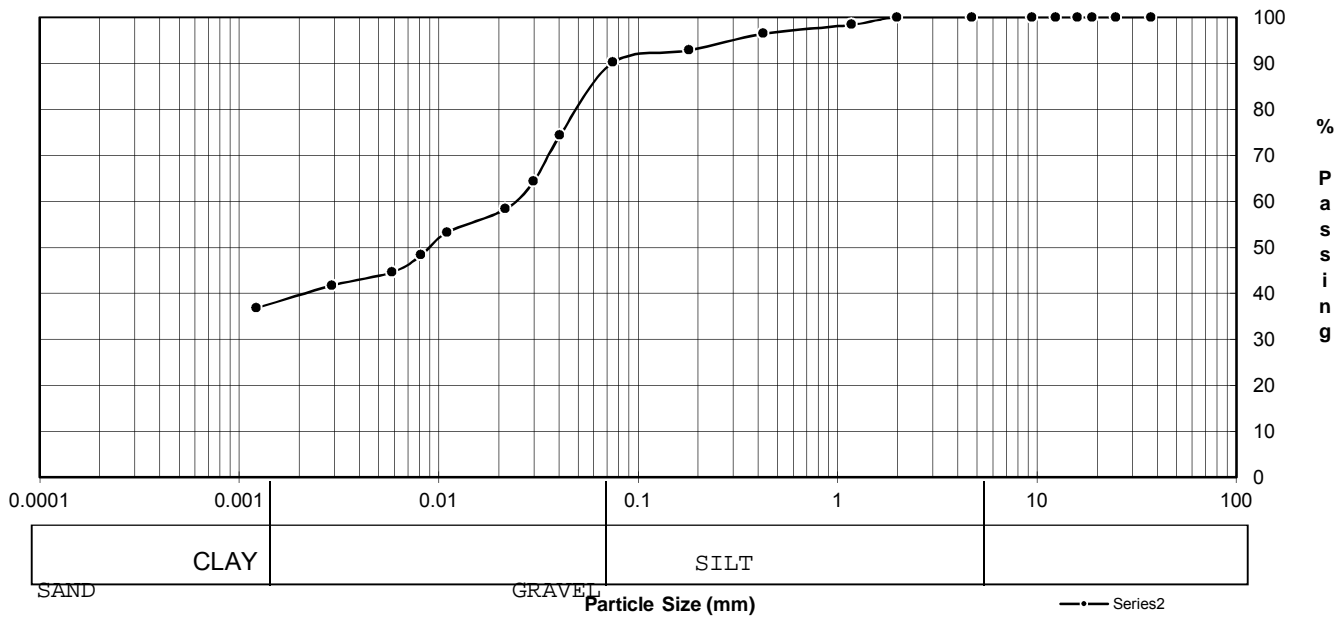
Gravel		Sand		Silt and Clay	
Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing
50.0	100.00	4.75	100.00	0.0750	94.18
37.5	100.00	2.00	99.97	0.0468	91.40
25.0	100.00	0.825	99.78	0.0331	85.05
19.0	100.00	0.425	99.59	0.0234	79.34
12.5	100.00	0.180	99.12	0.0167	77.12
9.50	100.00	0.150	98.89	0.0118	72.04
4.75	100.00	0.075	94.18	0.0086	69.18
				0.0062	66.01
				0.0044	63.15
				0.0032	59.66
				0.0024	56.80
				0.0018	54.14
				0.0009	46.96

PARTICLE SIZE ANALYSIS OF SOILS TEST REPORT

CLIENT: COW - Public Works 155 Pacific Avenue W. Winnipeg, MB R3E 3P1 ATTN: Richard Weibel PROJECT: 2017 In House Local Streets Rehabilitation	PROJECT NO. 142 - 1701
---	-------------------------------

Date Sampled: Jan. 2017	Date Received: Feb. 2017	Sieve Analysis		Hydrometer Analysis	
Sampled By: SB	Date Tested: Feb. 2017	Sieve (mm)	% Passing	Diameter	% Finer
Material Identification B.H./T.H. No. TH17-04@2.0 - 3.0 Ft Sample No. G18 Sample Source Lenore Avenue Specific Gravity of Material: 2.65		50.00	100.0		
		37.50	100.0		
		25.00	100.0		
		19.00	100.0		
		16.00	100.0		
		12.50	100.0	0.0406	74.3
		9.50	100.0	0.0299	64.3
		4.75	100.0	0.0216	58.3
		2.00	100.0	0.0110	53.2
		1.18	98.4	0.0082	48.3
0.425	96.4	0.0059	44.6		
0.180	92.8	0.0029	41.7		
0.075	90.2	0.0012	36.8		

Grain Size Analysis



SOIL DESCRIPTION	% Composition		D10
		10	Gravel
	50	Sand	D60
	50	Silt	Cu
	40	Clay	Cc

Remarks: Test Method: ASTM D422, D2216, D4318

Technician: ECS



Reviewed by: Hermie Manalo



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

Atterberg Limits ASTM D4318-10e1

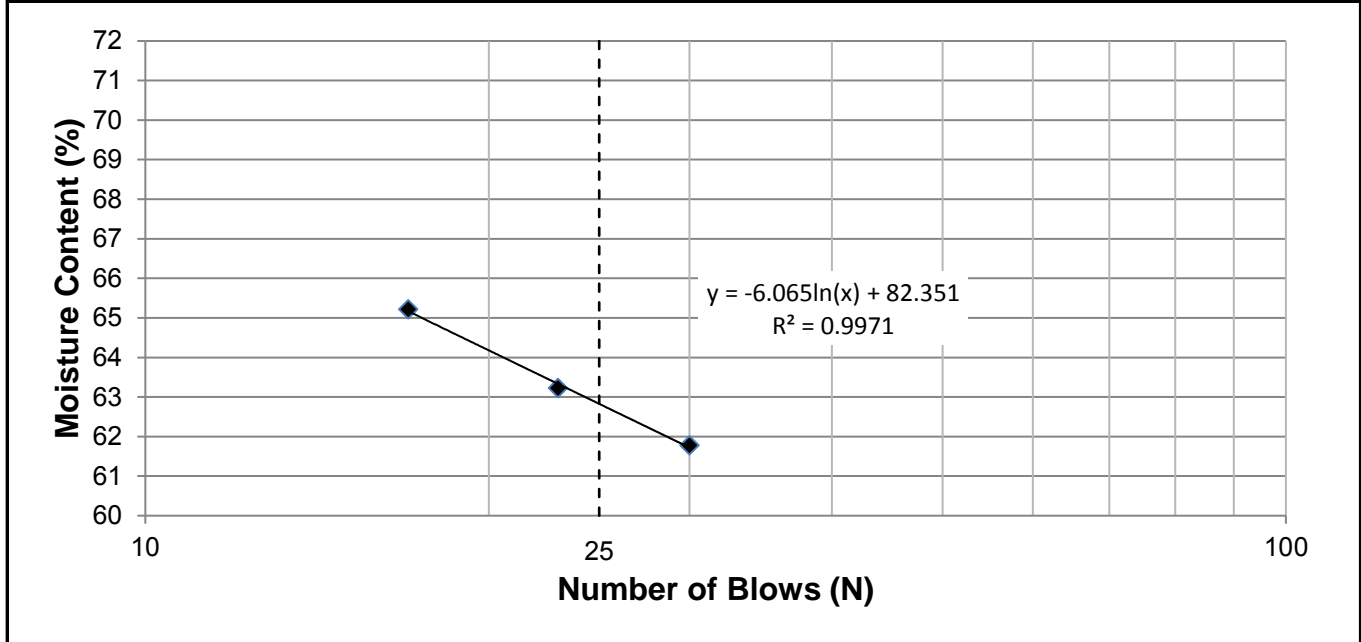
Project No. 0315-001-00
Client H. Manalo
Project Local Street Renewal - Lenore Street

Test Hole TH 17-06
Sample # G37
Depth (m) 0.3-0.6
Sample Date 11-Jan-17
Test Date 24-Feb-17
Technician SX

Liquid Limit	63
Plastic Limit	23
Plasticity Index	40

Liquid Limit

Trial #	1	2	3	4	5
Number of Blows (N)	17	23	30		
Mass Wet Soil + Tare (g)	23.832	25.355	23.753		
Mass Dry Soil + Tare (g)	19.949	20.976	20.092		
Mass Tare (g)	13.995	14.050	14.166		
Mass Water (g)	3.883	4.379	3.661		
Mass Dry Soil (g)	5.954	6.926	5.926		
Moisture Content (%)	65.217	63.226	61.779		



Plastic Limit

Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	20.313	20.212			
Mass Dry Soil + Tare (g)	19.191	19.081			
Mass Tare (g)	14.239	14.082			
Mass Water (g)	1.122	1.131			
Mass Dry Soil (g)	4.952	4.999			
Moisture Content (%)	22.658	22.625			

2017 In house Local Street Rehabilitation



Lenore St. TH17-01

2017 In house Local Street Rehabilitation



Lenore St. TH17-02

2017 In house Local Street Rehabilitation



Lenore St. TH17-03

2017 In house Local Street Rehabilitation



Lenore St. TH17-04

2017 In house Local Street Rehabilitation



Lenore St. TH17-05

2017 In house Local Street Rehabilitation



Lenore St. TH17-06

Appendix E

Summary Table, Test Hole Logs & Lab Data – Minto Street



Sub-Surface Log

Test Hole TH17-01

1 of 1

Client: H. Manalo **Project Number:** 0315-001-00
Project Name: Local Street Renewal Minto Street **Location:** UTM N-5527678, E-630727
Contractor: Paddock Drilling Ltd. **Ground Elevation:** 232.27 m
Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount **Date Drilled:** January 16, 2017 - January 16, 2017

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m ³)					Undrained Shear Strength (kPa)						
						16	17	18	19	20	21	0	40	80	120	160	200
232.2			ASPHALT (35 mm THICK)														
232.1			CONCRETE (160 mm THICK)														
			CLAY - trace silt - clay layers, silt layers - mottled brown to dark grey, frozen - moist and soft when thawed - high plasticity		G01												
					G02												
231.6			ORGANIC CLAY - silty - black, frozen - moist and soft to firm when thawed - high plasticity		G03												
					G04												
231.0			SILT - trace clay - light brown, frozen to 1.7 m depth - moist to wet and very soft when thawed - intermediate plasticity		G05												
					G06												
230.1			CLAY - silty, - mottled grey to brown - moist, firm - high plasticity		G07												
					G08												
229.2	-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 to ~ 1.0 m below top of pavement, bentonite pellets to 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 number 774 in the southbound lane, 2.44 meters east of Minto Street west curb.
 4) UTM coordinates and elevation provided by the City of Winnipeg.

Logged By: Shane Broderick **Reviewed By:** Paul Bevel **Project Engineer:** Nelson Ferreira

PTH 83 TH LOGS MIT FONT LOGS_2017-01-23 LOCAL_STREETS_RENEWAL (MINTO) O.A. SGBR 0315-001-00.GPJ_TREK GEOTECHNICAL_GDT_3/7/17



Sub-Surface Log

Test Hole TH17-02

1 of 1

Client: H. Manalo Project Number: 0315-001-00
 Project Name: Local Street Renewal Minto Street Location: UTM N-5527731, E-630724
 Contractor: Paddock Drilling Ltd. Ground Elevation: 232.50 m
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: January 16, 2016 - January 16, 2017

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m ³)					Undrained Shear Strength (kPa)						
						16	17	18	19	20	21	Test Type					
						Particle Size (%)											
						0	20	40	60	80	100						
						PL MC LL											
						0	20	40	60	80	100	0	40	80	120	160	200
232.5			ASPHALT (35 mm THICK)														
232.3			CONCRETE (175 mm THICK)														
			ORGANIC CLAY - silty - black, frozen - moist and soft to firm when thawed - high plasticity		G09												
	-0.5				G10												
					G11												
231.6			SILT - some clay - mottled black to light brown, frozen - moist and soft to firm when thawed - low plasticity		G12												
231.3			SILT - trace clay - light brown, frozen - moist to wet and very soft when thawed - intermediate plasticity		G13												
230.8			CLAY - silty - mottled grey to brown - moist, firm to stiff - high plasticity		G14												
	-2.0				G15												
	-2.5																
229.5	-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 to ~ 1.0 m below top of pavement, bentonite pellets to 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 number 758 in the southbound lane, 1.74 meters east of Minto Street west curb.
 4) UTM coordinates and elevation provided by the City of Winnipeg.

PTH 83 TH LOGS MIT FONT LOGS 2017-01-23 LOCAL STREETS RENEWAL (MINTO) O. A. SGBR 0315-001-00.GPJ TREK GEOTECHNICAL.GDT 3/7/17



Sub-Surface Log

Test Hole TH17-03

1 of 1

Client: H. Manalo Project Number: 0315-001-00
 Project Name: Local Street Renewal Minto Street Location: UTM N-5527804, E-630730
 Contractor: Paddock Drilling Ltd. Ground Elevation: 233.02 m
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: January 17, 2017 - January 17, 2017

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m ³)					Undrained Shear Strength (kPa)						
						16	17	18	19	20	21	Test Type					
						Particle Size (%)											
						0	20	40	60	80	100						
						PL _____ MC _____ LL _____ 0 20 40 60 80 100											
						0	20	40	60	80	100	0	40	80	120	160	200
233.0			ASPHALT (30 mm THICK)														
232.8			CONCRETE (165 mm THICK)														
	-0.5		ORGANIC CLAY - silty - black, frozen - moist and soft to firm when thawed - high plasticity -silt inclusions at 0.6 m (<10 mm in dia.)		G16			●					△	+			
					G17			●					△	+			
					G18			●					△	+			
232.1	-1.0		CLAY - trace silt - mottled brown to black, frozen - moist and stiff when thawed - low plasticity		G19			●					△				+
231.8	-1.5		SILT - trace clay - light brown, frozen to 1.7 depth - moist to wet and very soft when thawed - Intermediate plasticity		G20			●					△	+			
					G21			●									
231.0	-2.0		CLAY - silty - mottled grey to brown - moist, stiff - high plasticity		G22			●						△	+		
					G23			●						△	+		

END OF TEST HOLE AT 3.1 m in CLAY
 Notes:
 1) No sloughing or seepage observed
 2) Backfilled test hole with auger cuttings to ~ 1.0 m below top of pavement, bentonite pellets to 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 number 748 in the southbound lane, 1.80 meters east of Minto Street west curb.
 4) UTM coordinates and elevation provided by the City of Winnipeg.

PTH 83 TH LOGS MIT FONT LOGS 2017-01-23 LOCAL STREETS RENEWAL (MINTO) O.A. SGBR 0315-001-00.GPJ TREK GEOTECHNICAL.GDT 3/7/17



Sub-Surface Log

Test Hole TH17-04

1 of 1

Client: H. Manalo Project Number: 0315-001-00
 Project Name: Local Street Renewal Minto Street Location: UTM N-5527870, E-630728
 Contractor: Paddock Drilling Ltd. Ground Elevation: 232.91 m
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: January 17, 2017 - January 17, 2017

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m ³)					Undrained Shear Strength (kPa)						
						16	17	18	19	20	21	Test Type					
						Particle Size (%)											
						0	20	40	60	80	100						
						PL — MC — LL											
						0	20	40	60	80	100	0	40	80	120	160	200
											<input checked="" type="checkbox"/> Pocket Pen. <input checked="" type="checkbox"/> <input type="checkbox"/> Torvane <input type="checkbox"/> <input checked="" type="checkbox"/> Qu <input checked="" type="checkbox"/> <input type="checkbox"/> Field Vane <input type="checkbox"/>						
232.9			ASPHALT (50 mm THICK)														
232.7			CONCRETE (175 mm THICK)														
			ORGANIC CLAY - silty - black, frozen - moist and soft to firm when thawed - high plasticity		G24												
	-0.5				G25												
232.2			CLAY - trace silt - dark grey, frozen - moist and soft when thawed - low plasticity		G26												
	-1.0				G27												
231.7			CLAY - some silt - mottled grey to brown, frozen to 1.7 m depth - moist and firm when thawed - Intermediate plasticity		G28												
	-1.5				G29												
231.1			SILT - trace clay - light brown - moist to wet, very soft - Intermediate plasticity		G30												
	-2.0																
230.5			CLAY - silty - mottled grey to brown - moist, firm - high plasticity		G31												
	-2.5																
229.9	-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 to ~ 1.0 m below top of pavement, bentonite pellets to 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 number 732 in the southbound lane 1.51 meters east of Minto Street west curb.
 4) UTM coordinates and elevation provided by the City of Winnipeg.

Logged By: Shane Broderick Reviewed By: Paul Bevel Project Engineer: Nelson Ferreira

PTH 83 TH LOGS MIT FONT LOGS 2017-01-23 LOCAL STREETS RENEWAL (MINTO) O.A. SGBR 0315-001-00.GPJ TREK GEOTECHNICAL_GDT 3/7/17



Sub-Surface Log

Test Hole TH17-05

1 of 1

Client: H. Manalo Project Number: 0315-001-00
 Project Name: Local Street Renewal Minto Street Location: UTM N-5527917, E-630730
 Contractor: Paddock Drilling Ltd. Ground Elevation: 232.96 m
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: January 17, 2017 - January 17, 2017

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m ³)					Undrained Shear Strength (kPa)						
						16	17	18	19	20	21	Test Type					
						Particle Size (%)											
						0	20	40	60	80	100						
						PL MC LL											
						0	20	40	60	80	100	0	40	80	120	160	200
232.9			ASPHALT (25 mm THICK)														
232.8			CONCRETE (180 mm THICK)														
232.5			ORGANIC CLAY - silty, black, frozen, moist and soft to firm when thawed - high plasticity		G32												
	-0.5		CLAY - trace silt, silt pockets - mottled brown to dark grey, frozen - moist and firm to stiff when thawed - high plasticity		G33												
					G34												
	-1.0				G35												
231.7			SILT - trace clay, frozen to 1.7 m depth - light brown - moist to wet and very soft when thawed - intermediate plasticity		G36												
	-1.5																
	-2.0																
	-2.5				G37												
	-3.0				G38												

END OF TEST HOLE AT 3.1 m in CLAY

Notes:

- 1) No sloughing or seepage observed
- 2) Backfilled test hole with auger cuttings to ~ 1.0 m below top of pavement, bentonite pellets to 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 number 712 in the southbound lane, 5.20 meters east of Minto Street west curb.
- 4) UTM coordinates and elevation provided by the City of Winnipeg.

Logged By: Shane Broderick Reviewed By: Paul Bevel Project Engineer: Nelson Ferreira

PTH 83 TH LOGS MIT FONT LOGS_2017-01-23 LOCAL_STREETS_RENEWAL (MINTO) O_A_SGBR 0315-001-00.GPJ TREK GEOTECHNICAL_GDT 3/7/17



Sub-Surface Log

Client: H. Manalo Project Number: 0315-001-00
 Project Name: Local Street Renewal Minto Street Location: UTM N-5527961, E-630731
 Contractor: Paddock Drilling Ltd. Ground Elevation: 232.96 m
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: January 17, 2017 - January 17, 2017

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m ³)					Undrained Shear Strength (kPa)						
						16	17	18	19	20	21	Test Type					
						Particle Size (%)											
						0	20	40	60	80	100						
						PL		MC	LL								
						0	20	40	60	80	100	0	40	80	120	160	200
											<input checked="" type="checkbox"/> Pocket Pen. <input checked="" type="checkbox"/> <input type="checkbox"/> Torvane <input type="checkbox"/> <input checked="" type="checkbox"/> Qu <input checked="" type="checkbox"/> <input type="checkbox"/> Field Vane <input type="checkbox"/>						
232.9		[Dotted]	ASPHALT (35 mm THICK)														
232.8		[Horizontal Lines]	CONCRETE (150 mm THICK)														
	0.5	[Wavy]	ORGANIC CLAY - silty - black, frozen - moist and soft to firm when thawed - high plasticity	G39		●											
				G40		●											
				G41		●							△				
232.0	1.0	[Diagonal Lines]	CLAY - trace silt - dark grey, frozen - moist and soft when thawed - high plasticity	G42		●										△	+
231.7	1.5	[Vertical Lines]	SILT - trace clay - light brown, frozen to 1.7 m depth - moist to wet and soft when thawed - low plasticity	G43		●											+
				G44		●											
231.0	2.0	[Diagonal Lines]	CLAY - silty - mottled brown - moist, firm - high plasticity														
229.9	3.0	[Diagonal Lines]		G45		●											+

END OF TEST HOLE AT 3.1 m in CLAY
 Notes:
 1) No sloughing or seepage observed.
 2) Backfilled test hole with auger cuttings to ~ 1.0 m below top of pavement, bentonite pellets to 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 number 686 in the southbound lane, 1.18 meters east of Minto Street west curb.
 4) UTM coordinates and elevation provided by the City of Winnipeg.

PTH 83 TH LOGS MIT FONT LOGS 2017-01-23 LOCAL STREETS RENEWAL (MINTO) 0_A_SGSR 0315-001-00.GPJ TREK GEOTECHNICAL.GDT 3/7/17



Sub-Surface Log

Test Hole TH17-07

1 of 1

Client: H. Manalo Project Number: 0315-001-00
 Project Name: Local Street Renewal Minto Street Location: UTM N-5528009, E-630733
 Contractor: Paddock Drilling Ltd. Ground Elevation: 232.98 m
 Method: 125mm Solid Stem Auger, Acker MP8 Truck Mount Date Drilled: January 17, 2017 - January 17, 2017

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

Particle Size Legend: Fines Clay Silt Sand Gravel Cobbles Boulders

Elevation (m)	Depth (m)	Soil Symbol	MATERIAL DESCRIPTION	Sample Type	Sample Number	Bulk Unit Wt (kN/m ³)					Undrained Shear Strength (kPa)						
						16	17	18	19	20	21	Test Type					
						Particle Size (%)											
						0	20	40	60	80	100						
						PL _____ MC _____ LL _____ 0 20 40 60 80 100											
						0	20	40	60	80	100	0	40	80	120	160	200
233.0			ASPHALT (30 mm THICK)														
232.8			CONCRETE (175 mm THICK)														
232.5			ORGANIC CLAY - silty, black, frozen, moist and soft to firm when thawed - high plasticity		G46			●									
-0.5			CLAY - silty - mottled brown to black, frozen to 1.7m depth - moist and firm when thawed - intermediate to high plasticity		G47			●									
			- firm below 0.8 m depth		G48			●					+				
-1.0					G49			●						△	+		
			- stiff below 1.3 m depth		G50			●							△	+	
-1.5																	
-2.0																	
-2.5					G51			●						+	△		
					G52			●							+	△	
229.9	-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 to ~ 1.0 m below top of pavement, bentonite pellets to 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 number 671 in the northbound lane, 5.00 meters east of Minto Street west curb.
- 4) UTM coordinates and elevation provided by the City of Winnipeg.

Logged By: Shane Broderick Reviewed By: Paul Bevel Project Engineer: Nelson Ferreira

PTH 83 TH LOGS MIT FONT LOGS 2017-01-23 LOCAL STREETS RENEWAL (MINTO) O. A. SGBR 0315-001-00.GPJ TREK GEOTECHNICAL_GDT 3/7/17



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

**Moisture Content Report
 ASTM D2216-98**

Project No. 0315-001-00
Client H. Manalo
Project Local Street Renewal Minto Street

Sample Date 16-Jan-17
Test Date 24-Jan-17
Technician MM

Test Pit	TH17-01	TH17-01	TH17-01	TH17-01	TH17-01	TH17-01
Depth (m)	0.0 - 0.2	0.5 - 0.7	0.7 - 0.9	0.9 - 1.2	1.2 - 1.5	1.8 - 2.1
Sample #	G01	G02	G03	G04	G05	G06
Tare ID	C1	F150	C3	E42	Z53	P25
Mass of tare	8.4	8.4	8.5	8.5	8.5	8.4
Mass wet + tare	212.5	281.6	295.0	302.5	342.5	360.6
Mass dry + tare	158.2	220.1	216.8	230.6	266.8	297.7
Mass water	54.3	61.5	78.2	71.9	75.7	62.9
Mass dry soil	149.8	211.7	208.3	222.1	258.3	289.3
Moisture %	36.2%	29.1%	37.5%	32.4%	29.3%	21.7%

Test Pit	TH17-01	TH17-01	TH17-02	TH17-02	TH17-02	TH17-02
Depth (m)	2.1 - 2.4	2.7 - 3.0	0.2 - 0.5	0.5 - 0.7	0.7 - 0.9	0.9 - 1.2
Sample #	G07	G08	G09	G10	G11	G12
Tare ID	E119	E108	Z71	AB92	E104	H60
Mass of tare	8.5	8.5	8.7	6.6	8.4	8.5
Mass wet + tare	344.9	406.6	231.9	238.2	277.5	327.8
Mass dry + tare	260.9	285.1	166.9	168.6	204.2	260.4
Mass water	84.0	121.5	65.0	69.6	73.3	67.4
Mass dry soil	252.4	276.6	158.2	162.0	195.8	251.9
Moisture %	33.3%	43.9%	41.1%	43.0%	37.4%	26.8%

Test Pit	TH17-02	TH17-02	TH17-02	TH17-03	TH17-03	TH17-03
Depth (m)	1.2 - 1.5	2.1 - 2.4	2.7 - 3.0	0.2 - 0.5	0.5 - 0.7	0.7 - 0.9
Sample #	G13	G14	G15	G16	G17	G18
Tare ID	Z83	W66	N76	N29	N02	E78
Mass of tare	8.3	8.4	8.7	8.8	8.4	8.4
Mass wet + tare	310.9	404.7	270.7	257.4	340.2	360.1
Mass dry + tare	255.3	287.1	183.8	193.6	256.7	278.6
Mass water	55.6	117.6	86.9	63.8	83.5	81.5
Mass dry soil	247.0	278.7	175.1	184.8	248.3	270.2
Moisture %	22.5%	42.2%	49.6%	34.5%	33.6%	30.2%



Project No. 0315-001-00
Client H. Manalo
Project Local Street Renewal Minto Street

Sample Date 16-Jan-17
Test Date 24-Jan-17
Technician MM

Test Pit	TH17-03	TH17-03	TH17-03	TH17-03	TH17-03	TH17-04
Depth (m)	0.9 - 1.2	1.2 - 1.5	1.8 - 2.0	2.1 - 2.4	2.7 - 3.0	0.2 - 0.5
Sample #	G19	G20	G21	G22	G23	G24
Tare ID	C18	A102	AB64	P17	Z21	Z64
Mass of tare	8.7	8.5	6.7	8.5	8.3	8.4
Mass wet + tare	400.8	220.7	526.7	244.7	344.4	292.6
Mass dry + tare	316.8	179.6	421.0	174.7	232.3	214.1
Mass water	84.0	41.1	105.7	70.0	112.1	78.5
Mass dry soil	308.1	171.1	414.3	166.2	224.0	205.7
Moisture %	27.3%	24.0%	25.5%	42.1%	50.0%	38.2%

Test Pit	TH17-04	TH17-04	TH17-04	TH17-04	TH17-04	TH17-04
Depth (m)	0.5 - 0.7	0.7 - 0.9	0.9 - 1.2	1.2 - 1.5	1.5 - 1.8	2.1 - 2.4
Sample #	G25	G26	G27	G28	G29	G30
Tare ID	F128	AB47	K26	AB22	D33	C11
Mass of tare	8.5	6.8	8.4	6.6	8.2	8.4
Mass wet + tare	312.4	284.3	343.2	340.3	252.8	276.9
Mass dry + tare	240.3	243.7	278.9	264.2	203.1	224.0
Mass water	72.1	40.6	64.3	76.1	49.7	52.9
Mass dry soil	231.8	236.9	270.5	257.6	194.9	215.6
Moisture %	31.1%	17.1%	23.8%	29.5%	25.5%	24.5%

Test Pit	TH17-04	TH17-05	TH17-05	TH17-05	TH17-05	TH17-05
Depth (m)	2.7 - 3.0	0.2 - 0.5	0.5 - 0.7	0.7 - 0.9	0.9 - 1.2	1.2 - 1.5
Sample #	G31	G32	G33	G34	G35	G36
Tare ID	AB13	Z49	D6	H8	F56	Z130
Mass of tare	6.6	8.5	8.4	8.4	8.5	8.4
Mass wet + tare	295.9	275.6	258.1	263.7	300.0	254.4
Mass dry + tare	204.8	218.6	207.4	209.6	238.4	202.0
Mass water	91.1	57.0	50.7	54.1	61.6	52.4
Mass dry soil	198.2	210.1	199.0	201.2	229.9	193.6
Moisture %	46.0%	27.1%	25.5%	26.9%	26.8%	27.1%



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

**Moisture Content Report
 ASTM D2216-98**

Project No. 0315-001-00
Client H. Manalo
Project Local Street Renewal Minto Street

Sample Date 16-Jan-17
Test Date 24-Jan-17
Technician MM

Test Pit	TH17-05	TH17-05	TH17-06	TH17-06	TH17-06	TH17-06
Depth (m)	2.1 - 2.4	2.7 - 3.0	0.2 - 0.5	0.5 - 0.7	0.7 - 0.9	0.9 - 1.2
Sample #	G37	G38	G39	G40	G41	G42
Tare ID	A28	H5	C8	Z44	H79	F18
Mass of tare	8.7	8.5	8.4	8.6	8.5	8.4
Mass wet + tare	438.9	367.8	245.2	313.5	239.0	271.8
Mass dry + tare	357.3	300.6	181.7	242.6	189.1	219.5
Mass water	81.6	67.2	63.5	70.9	49.9	52.3
Mass dry soil	348.6	292.1	173.3	234.0	180.6	211.1
Moisture %	23.4%	23.0%	36.6%	30.3%	27.6%	24.8%

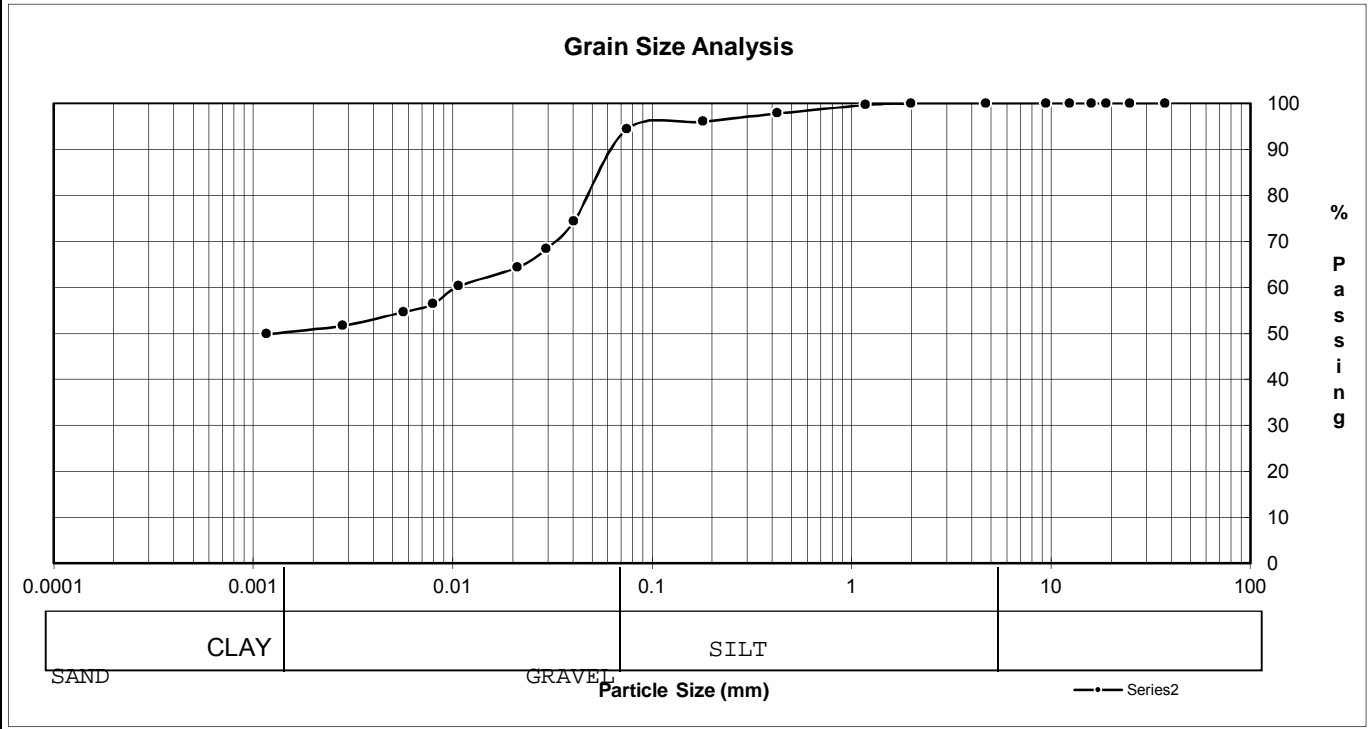
Test Pit	TH17-06	TH17-06	TH17-06	TH17-07	TH17-07	TH17-07
Depth (m)	1.2 - 1.5	1.8 - 2.0	2.7 - 3.0	0.2 - 0.5	0.5 - 0.7	0.7 - 0.9
Sample #	po	G44	G45	G46	G47	G48
Tare ID	F82	N71	N86	D19	K24	H41
Mass of tare	8.5	8.7	8.6	8.6	8.6	8.4
Mass wet + tare	323.0	360.0	394.5	232.8	293.1	294.2
Mass dry + tare	265.7	296.7	273.7	171.2	238.6	232.8
Mass water	57.3	63.3	120.8	61.6	54.5	61.4
Mass dry soil	257.2	288.0	265.1	162.6	230.0	224.4
Moisture %	22.3%	22.0%	45.6%	37.9%	23.7%	27.4%

Test Pit	TH17-07	TH17-07	TH17-07	TH17-07		
Depth (m)	0.9 - 1.2	1.2 - 1.5	2.1 - 2.4	2.7 - 3.0		
Sample #	G49	G50	G51	G52		
Tare ID	A104	N64	F131	Z11		
Mass of tare	8.4	8.5	8.6	8.3		
Mass wet + tare	316.7	319.7	222.5	399.5		
Mass dry + tare	234.6	235.0	151.6	277.5		
Mass water	82.1	84.7	70.9	122.0		
Mass dry soil	226.2	226.5	143.0	269.2		
Moisture %	36.3%	37.4%	49.6%	45.3%		

PARTICLE SIZE ANALYSIS OF SOILS TEST REPORT

CLIENT: COW - Public Works 155 Pacific Avenue W. Winnipeg, MB R3E 3P1 ATTN: Richard Weibel PROJECT: 2017 In House Local Streets Rehabilitation	PROJECT NO. 142 - 1701
---	-------------------------------

Date Sampled: Jan. 2017	Date Received: Feb. 2017	Sieve Analysis		Hydrometer Analysis	
Sampled By: SB	Date Tested: Feb. 2017	Sieve (mm)	% Passing	Diameter	% Finer
Material Identification B.H./T.H. No. TH17-01@2.0 - 3.0 Ft Sample No. G03 Sample Source Minto Street Specific Gravity of Material: 2.65		50.00	100.0		
		37.50	100.0		
		25.00	100.0		
		19.00	100.0		
		16.00	100.0		
		12.50	100.0	0.0406	74.3
		9.50	100.0	0.0294	68.3
		4.75	100.0	0.0211	64.3
		2.00	100.0	0.0107	60.2
		1.18	99.6	0.0080	56.3
	0.425	97.8	0.0057	54.6	
	0.180	96.0	0.0028	51.7	
	0.075	94.4	0.0012	49.8	



SOIL DESCRIPTION	% Composition		D10
		6	Sand
	43	Silt	D60
	51	Clay	Cu
			Cc

Remarks: Test Method: ASTM D422, D2216, D4318
 Technician: ECS



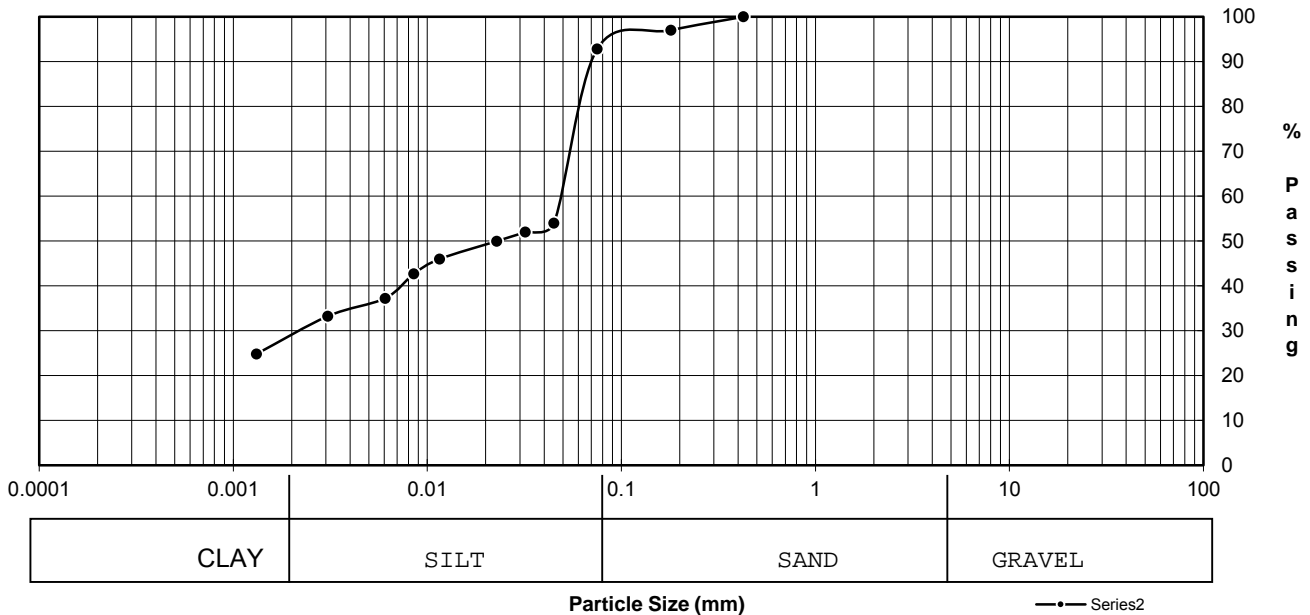
Reviewed by: Hermie Manalo

PARTICLE SIZE ANALYSIS OF SOILS TEST REPORT

CLIENT: COW - Public Works PROJECT NO. 142 -1701
155 Pacific Avenue W
Winnipeg, MB R3E 3P1
ATTN: Richard Weibel
PROJECT: 2017 In house Local Street Rehabilitation

Date Sampled: Jan. 2017	Date Received: Jan. 2017	Sieve Analysis		Hydrometer Analysis	
Sampled By: IA	Date Tested: Feb. 2017	Sieve (mm)	% Passing	Diameter	% Finer
Material Identification B.H./T.H. No. TH 17-01 @ 4 - 5 Ft Sample No. 5 Sample Source Minto St. Specific Gravity of Material: 2.65		25.00	100.0		
		19.00	100.0		
		16.00	100.0		
		12.50	100.0	0.0449	54.0
		9.50	100.0	0.0320	52.0
		4.75	100.0	0.0228	50.0
		2.00	100.0	0.0116	46.0
		1.18	100.0	0.0085	42.7
		0.425	100.0	0.0061	37.2
		0.180	97.0	0.0031	33.2
0.075	92.8	0.0013	24.8		

Grain Size Analysis



SOIL DESCRIPTION	% Composition		D10	
		7	Gravel	D30
	68	Sand	D60	0.05000
	25	Silt	Cu	
		Clay	Cc	

Remarks: Test Method: ASTM D422, D2216, D4318

Technician: ECS

REVIEWED BY: Hermie Manalo

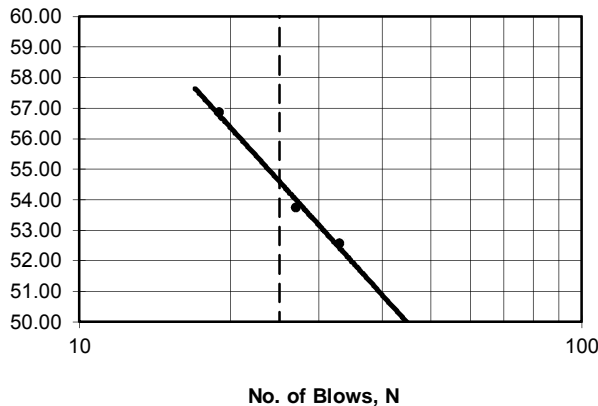
ATTERBERG LIMITS

CLIENT: COW - Public Works 155 Pacific Avenue W Winnipeg, MB R3E 3P1	PROJECT NO.: 142-1701 Test No.: G03
ATTENTION: Richard Weibel PROJECT: 2017 In house Local Street Rehabilitation	

Liquid Limit Determination

Dish No.:	1	2	3		Liquid Limit
Wet Soil + Dish:	22.01	22.35	22.6		Blows
Dry Soil + Dish:	15.97	16.08	16		
Moisture:	6.04	6.27	6.6		
Dish:	4.48	4.41	4.39		
Dry Soil:	11.49	11.67	11.61		
% Moisture:	52.57	53.73	56.85		
No. of Blows:	33	27	19		
Liquid Limits:	54.36	54.23	54.99		

Liquid Limit



Material Identification:

Minto Street
 T.H./B.H. No. **TH 17-01**
 Depth: **2.2 - 3.0 Ft.**

Liquid Limit, %: 55
 Plastic Limit, %: 21
 Plasticity Index: 34
 (LL-PL)

Plastic Limit Determination

Dish No.:	1	2	3		
Wet Soil + Dish:	18.77	18.95	19.04		
Dry Soil + Dish:	16.22	16.33	16.51		
Moisture:	2.55	2.62	2.53		
Dish:	4.33	4.39	4.46		
Dry Soil:	11.89	11.94	12.05		
% Moisture:	21.45	21.94	21.00		
Average:					21

Test Method : ASTM: D4318, D2216

HMCL Tech: **ESC**
 Date Tested: **21-Feb-17**



Reviewed by: Hermie Manalo

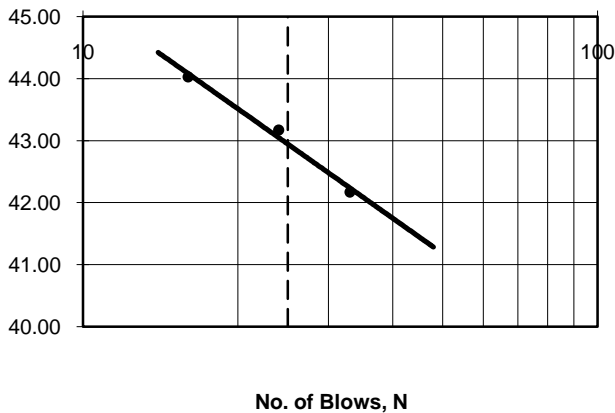
ATTERBERG LIMITS

CLIENT: COW - Public Works 155 Pacific Avenue W Winnipeg, MB R3E 3P1	PROJECT NO.: 142-1701 Test No.: 5
ATTENTION: Richard Weibel	
PROJECT: 2017 In house Local Street Rehabilitation	

Liquid Limit Determination

Dish No.:	1	2	3		Liquid Limit 25 Blows
Wet Soil + Dish:	19.93	20.95	17.48		
Dry Soil + Dish:	15.27	15.89	13.46		
Moisture:	4.66	5.06	4.02		
Dish:	4.22	4.17	4.33		
Dry Soil:	11.05	11.72	9.13		
% Moisture:	42.17	43.17	44.03		
No. of Blows:	33	24	16		
Liquid Limits:	43.61	42.96	41.72		

Liquid Limit



Material Identification:

Minto Street
 T.H./B.H. No. **TH 17-01**
 Depth: **4 - 5 Ft.**

Liquid Limit, %: 43
 Plastic Limit, %: 22
 Plasticity Index: 21
 (LL-PL)

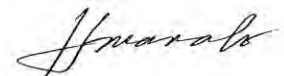
Plastic Limit Determination

Dish No.:	1	2	3			
Wet Soil + Dish:	19.97	20.51	19.66			
Dry Soil + Dish:	17.08	17.66	16.87			
Moisture:	2.89	2.85	2.79			
Dish:	4.36	4.34	4.21			
Dry Soil:	12.72	13.32	12.66			
% Moisture:	22.72	21.40	22.04			
Average:						22

Test Method : ASTM: D4318, D2216

HMCL Tech: ECS

Date Tested: 21-Feb-17



Reviewed by: Hermie Manalo

2017 In house Local Street Rehabilitation



Minto Street TH17-01

2017 In house Local Street Rehabilitation



Minto Street TH17-02

2017 In house Local Street Rehabilitation



Minto Street TH17-03



PHOTO 4: MINTO STREET PAVEMENT CORE AT TEST HOLE TH17-04



PHOTO 5: MINTO STREET PAVEMENT CORE AT TEST HOLE TH17-05



PHOTO 6: MINTO STREET PAVEMENT CORE AT TEST HOLE TH17-06



PHOTO 7: MINTO STREET PAVEMENT CORE AT TEST HOLE TH17-07