

# **APPENDIX 'A'**

# **GEOTECHNICAL REPORT**

## APPENDIX 'A' - GEOTECHNICAL REPORT

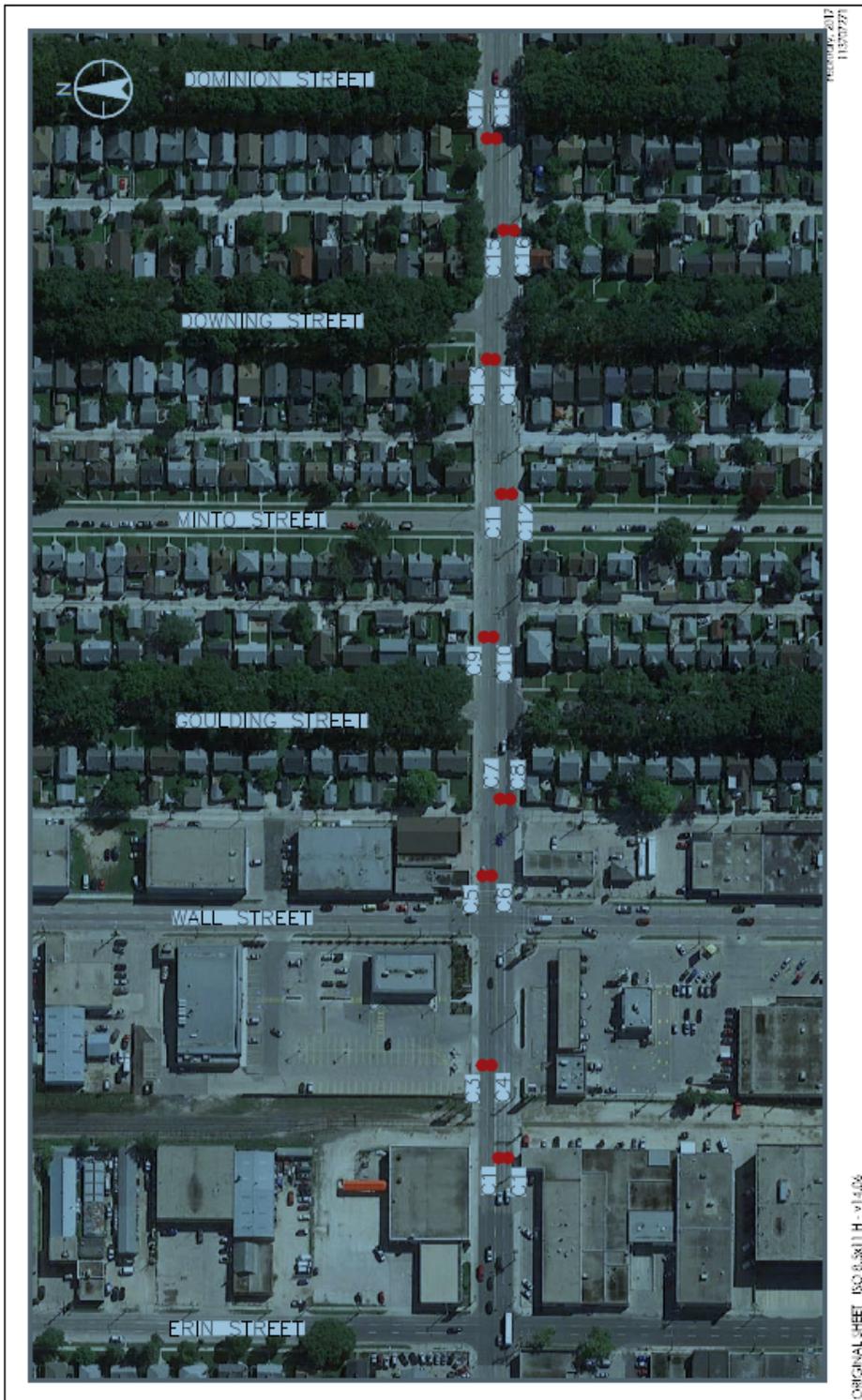
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The geotechnical report is provided to aid in the Contractor's evaluation of the existing pavement structure and/or soil conditions. The information presented is considered accurate at the locations shown on the Drawings and at the time of drilling. 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.

## Geotechnical Report for Ellice Avenue Reconstruction

### Pavement Core Locations



11/27/2010  
11:57:27

Client/Project  
STANTEC CONSULTING LTD.  
ELLICE AVENUE STREET RENEWAL  
WINNIPEG, MB

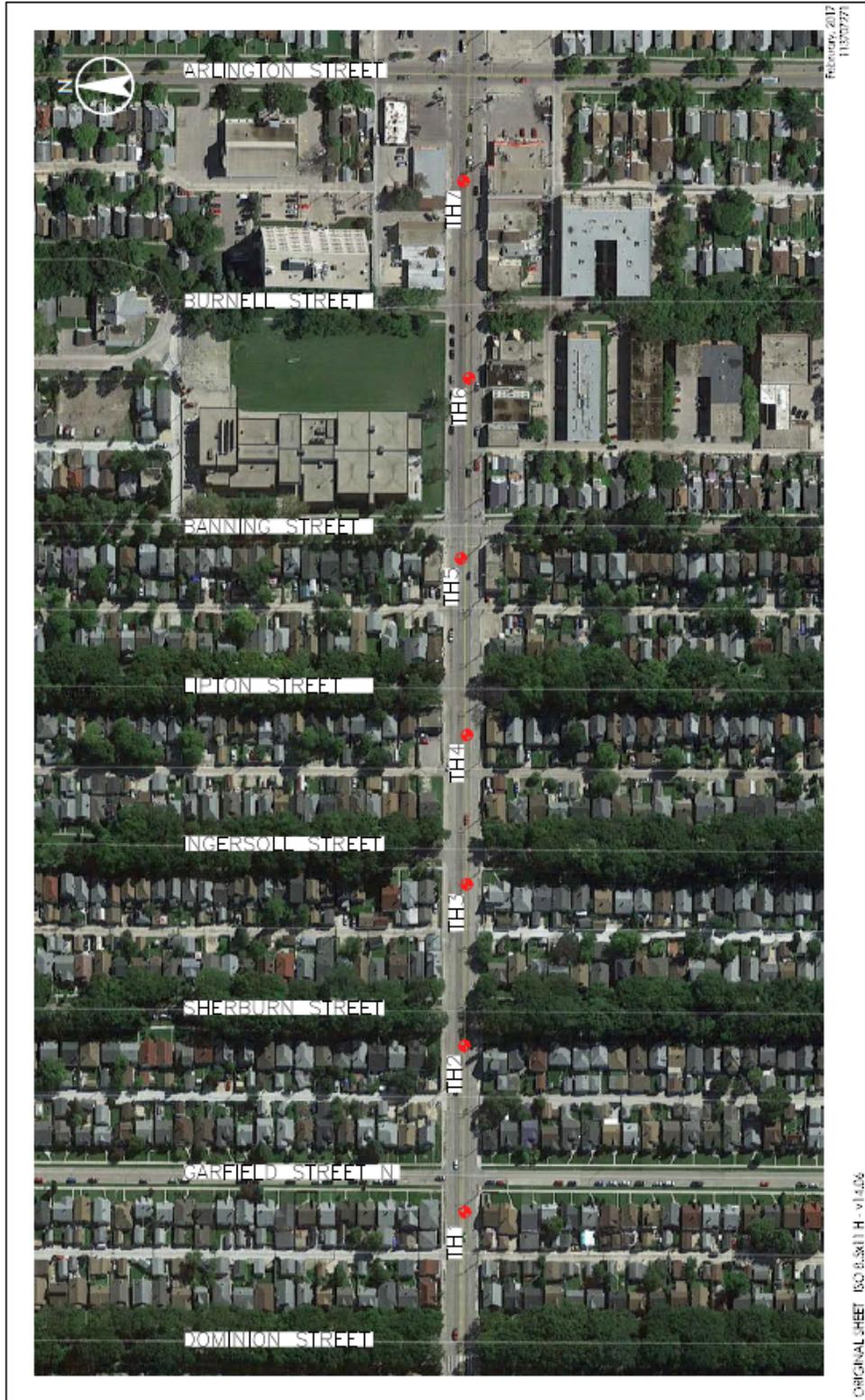
Figure No. 1  
Title  
CORE LOCATION PLAN

Legend  
● PAVEMENT CORE

Notes

**Stantec**  
Stantec Consulting Ltd.  
Suite 500, 311 Portage Avenue  
Winnipeg MB Canada R2B 2B9  
Tel. 204.489.5900 Fax. 204.453.9012  
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**Test Hole Locations**



ORIGINAL SHEET ISO 8.5x11 H - v1-4.06

February 2017  
 11357271

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 www.stantec.com

**Legend**  
 TESTHOLE

**Notes**

**Client/Project**  
 STANTEC CONSULTING LTD.  
 ELLICE AVENUE STREET RENEWAL  
 WINNIPEG, MB

**Figure No.** 2  
**Title** TESTHOLE LOCATION PLAN





**TABLE 1  
 PAVEMENT CORING AND GEOTECHNICAL INVESTIGATION SUMMARY  
 ELLICE AVENUE FROM ERIN STREET TO ARLINGTON STREET  
 WINNIPEG, MANITOBA**

Testhole ID	Testhole Location	Pavement Surface		Sample Description	Sample Depth (m)	Moisture Content (%)	Particle Size Analysis				Atterberg Limits		
		Type	Thickness (mm)				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit	Plastic Limit	Plasticity Index
C14	Ellice Avenue 12.0 m West of Northwest corner of Ellice Avenue and Downing Street 5.0 m South of North curb	Asphalt	110	-	-	-	-	-	-	-	-	-	-
		Concrete	220										
C15	Ellice Avenue 26.5 m East of Southeast corner of Ellice Avenue and Downing Street 5.0 m North of South curb	Asphalt	195	-	-	-	-	-	-	-	-	-	-
C16	Ellice Avenue 26.5 m East of Southeast corner of Ellice Avenue and Downing Street 1.0 m North of South curb	Asphalt	150	-	-	-	-	-	-	-	-	-	-
C17	Ellice Avenue 12.5 m West of Northwest corner of Ellice Avenue and Dominion Street 1.0 m South of North curb	Asphalt	150	-	-	-	-	-	-	-	-	-	-
C18	Ellice Avenue 12.5 m West of Northwest corner of Ellice Avenue and Dominion Street 5.0 m South of North curb	Asphalt	145	-	-	-	-	-	-	-	-	-	-
		Concrete	190										
TH1	Ellice Avenue 14.0 m West of Southwest corner of Ellice Avenue and Garfield Street North 5.5 m North of South curb	Asphalt	220	-	-	-	-	-	-	-	-	-	-
		Concrete	120										
TH2	Ellice Avenue 9.0 m West of Southwest corner of Ellice Avenue and Sherburn Street 5.5 m North of South curb	Asphalt	180	Clay Fill	0.6	29	1.3	17.6	39.4	41.7	60	23	37
		Concrete	140										
TH3	Ellice Avenue 11.5 m West of Southwest corner of Ellice Avenue and Ingersoll Street 5.5 m North of South curb	Asphalt	145	-	-	-	-	-	-	-	-	-	-
		Concrete	155										
TH4	Ellice Avenue 17.5 m West of Southwest corner of Ellice Avenue and Lipton Street 5.5 m North of South curb	Asphalt	170	-	-	-	-	-	-	-	-	-	-
		Concrete	135										
TH5	Ellice Avenue 11.0 m West of Northwest corner of Ellice Avenue and Banning Street 5.5 m South of North curb	Asphalt	185	-	-	-	-	-	-	-	-	-	-
		Concrete	140										
TH6	Ellice Avenue 34.5 m West of Southwest corner of Ellice Avenue and Burnell Street 5.5 m North of South curb	Asphalt	120	Clay	0.9	32	0.0	3.6	18.7	77.7	74	21	53
		Concrete	155										
TH7	Ellice Avenue 46.0 m West of Northwest corner of Ellice Avenue and Arlington Street 5.5 m South of North curb	Asphalt	135	Silty Clay	0.9	24	0.0	5.1	67.0	23.9	28	16	12
		Concrete	175										

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**Test Hole Log for TH1**

<b>TH1 TESTHOLE RECORD</b>											
CLIENT <u>City of Winnipeg</u>		PROJECT No. <u>113707271</u>									
PROJECT <u>Ellice Ave from Erin St to Arlington St</u>		DATUM _____		NORTHING _____							
LOCATION <u>Winnipeg, Manitoba</u>		ELEVATION _____		EASTING _____							
DRILLING DATE <u>March 29, 2017</u>		DRILLING CO. <u>Maple Leaf Drilling Ltd.</u>		DRILLING METHOD <u>125 mm SSA</u>							
DEPTH (m)	SOIL TYPE	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input type="checkbox"/> Torvane on Grab Samples (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa)				DEPTH (ft)
				TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa	
0	AS		ASPHALT								0
	CO		CONCRETE								
	FL		FILL: black clay with some fine sand - trace gravel - silty	GS	32						2
	CL ML		Soft tan SILTY CLAY (CL-ML)	GS	27						4
				GS	26						4
				GS	23						6
				GS	21						6
2	CH		Stiff brown fat CLAY (CH)	GS	28						8
			TESTHOLE LOCATION: 14.0 m West of Southwest corner of Ellice Avenue and Garfield Street North, 5.5 m North of South curb.  • The soil was frozen to a depth of 1.5 m. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole terminated at a depth of 2.1 m.								10
Sample Type: GS - Grab Sample    SS - Split Spoon    RC - Rock Core ST - Shelby Tube    PT - Piston Tube    VT - Shear Vane Test Piezometer Backfill Type: <input type="checkbox"/> Bentonite <input type="checkbox"/> Drill Cuttings <input type="checkbox"/> Sand <input type="checkbox"/> Slough				Logged by: Sothea Bun Reviewed by: German Leal		<b>Stantec</b>					

**Test Hole Log for TH2**

<b>TH2 TESTHOLE RECORD</b>											
CLIENT <u>City of Winnipeg</u>		PROJECT <u>Ellice Ave from Erin St to Arlington St</u>			DATUM _____		PROJECT No. <u>113707271</u>				
LOCATION <u>Winnipeg, Manitoba</u>		ELEVATION _____			NORTHING _____		EASTING _____				
DRILLING DATE <u>March 29, 2017</u>		DRILLING CO. <u>Maple Leaf Drilling Ltd.</u>			DRILLING METHOD <u>125 mm SSA</u>						
DEPTH (m)	SOIL TYPE	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input type="checkbox"/> Torvane on Grab Samples (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa)				DEPTH (ft)
				TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa	
0	AS		ASPHALT								0
	CO		CONCRETE								
	FL		FILL: black clay with some fine sand - trace gravel - silty  Particle Size Analysis at 0.6 m: 1.3% Gravel, 17.6% Sand, 39.4% Silt, 41.7% Clay	GS	29						2
	FL			GS	26						
1	CL ML		Soft tan SILTY CLAY (CL-ML)	GS	25						4
	CL ML			GS	25						
	CL ML			GS	22						6
2	CH		Stiff brown fat CLAY (CH)	GS	27						6
			TESTHOLE LOCATION: 9.0 m West of Southwest corner of Ellice Avenue and Sherburn Street, 5.5 m North of South curb.  • The soil was frozen to a depth of 1.5 m. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole terminated to a depth of 2.1 m.								8
3											10

Sample Type: GS - Grab Sample    SS - Split Spoon    RC - Rock Core  
 ST - Shelby Tube    PT - Piston Tube    VT - Shear Vane Test  
 Piezometer Backfill Type:  Bentonite     Drill Cuttings     Sand     Slough

Logged by: Sothea Bun  
 Reviewed by: German Leal

**Stantec**

Template Version: C420170317 - RW

**Test Hole Log for TH3**

<b>TH3 TESTHOLE RECORD</b>										
CLIENT <u>City of Winnipeg</u>			PROJECT No. <u>113707271</u>							
PROJECT <u>Ellice Ave from Erin St to Arlington St</u>			DATUM _____			NORTHING _____				
LOCATION <u>Winnipeg, Manitoba</u>			ELEVATION _____			EASTING _____				
DRILLING DATE <u>March 29, 2017</u>			DRILLING CO. <u>Maple Leaf Drilling Ltd.</u>			DRILLING METHOD <u>125 mm SSA</u>				
DEPTH (m)	SOIL TYPE SOIL SYMBOL	SOIL DESCRIPTION	SAMPLES			<input type="checkbox"/> In situ Shear Vane (kPa) <input type="checkbox"/> Torvane on Grab Samples (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa)				DEPTH (ft)
			TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa	
						W <sub>p</sub> W    W <sub>L</sub> Moisture Content & Atterberg Limits ● Standard Penetration Test, N Value				
0	AS	ASPHALT								0
	CO	CONCRETE								
	FL	FILL: black clay with some fine sand - trace gravel - silty	GS	32						2
			GS	31						
1	CL ML	Firm brown SILTY CLAY (CL-ML) - trace fine to medium sand	GS	24						4
			GS	26						
	CH	Stiff brown fat CLAY (CH)	GS	35						6
2			GS	38						
		TESTHOLE LOCATION: 11.5 m West of Southwest corner of Ellice Avenue and Ingersoll Street, 5.5 m North of South curb.  • The soil was frozen to a depth of 1.5 m. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole terminated at a depth of 2.1 m.								8
3										10

Sample Type: GS - Grab Sample    SS - Split Spoon    RC - Rock Core  
 ST - Shelby Tube    PT - Piston Tube    VT - Shear Vane Test

Piezometer Backfill Type:  Bentonite     Drill Cuttings     Sand     Slough

Logged by: Sothea Bun  
 Reviewed by: German Leal

Template Version: C420170317 - RW

**Test Hole Log for TH4**

<b>TH4 TESTHOLE RECORD</b>											
CLIENT <u>City of Winnipeg</u>			PROJECT No. <u>113707271</u>								
PROJECT <u>Ellice Ave from Erin St to Arlington St</u>			DATUM _____			NORTHING _____					
LOCATION <u>Winnipeg, Manitoba</u>			ELEVATION _____			EASTING _____					
DRILLING DATE <u>March 29, 2017</u>			DRILLING CO. <u>Maple Leaf Drilling Ltd.</u>			DRILLING METHOD <u>125 mm SSA</u>					
DEPTH (m)	SOIL TYPE	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input checked="" type="checkbox"/> Torvane on Grab Samples (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa)				DEPTH (ft)
				TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa	
0	AS		ASPHALT								0
	CO		CONCRETE								
	FL		FILL: black clay with some fine sand - trace gravel - silty	GS	41						2
	CL ML		Soft tan SILTY CLAY (CL-ML) - trace fine to medium sand	GS	28						4
	CH		Stiff brown fat CLAY (CH)	GS	33						6
				GS	38						8
				GS	39						10
			TESTHOLE LOCATION: 17.5 m West of Southwest corner of Ellice Avenue and Lipton Street, 5.5 m North of South curb.								
			<ul style="list-style-type: none"> <li>The soil was frozen to a depth of 1.5 m.</li> <li>No groundwater seepage or soil sloughing was observed during or upon completion of drilling.</li> <li>Testhole terminated at a depth of 2.1 m.</li> </ul>								
Sample Type: GS - Grab Sample    SS - Split Spoon    RC - Rock Core ST - Shelby Tube    PT - Piston Tube    VT - Shear Vane Test				Logged by: Sothea Bun							
Piezometer Backfill Type:  Bentonite     Drill Cuttings     Sand     Slough				Reviewed by: German Leal							

**Test Hole Log for TH5**

<b>TH5 TESTHOLE RECORD</b>											
CLIENT <u>City of Winnipeg</u>		PROJECT <u>Ellice Ave from Erin St to Arlington St</u>			DATUM _____		PROJECT No. <u>113707271</u>				
LOCATION <u>Winnipeg, Manitoba</u>		ELEVATION _____			NORTHING _____		EASTING _____				
DRILLING DATE <u>March 29, 2017</u>		DRILLING CO. <u>Maple Leaf Drilling Ltd.</u>			DRILLING METHOD <u>125 mm SSA</u>						
DEPTH (m)	SOIL TYPE	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input type="checkbox"/> Torvane on Grab Samples (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa)				DEPTH (ft)
				TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa	
0	AS		ASPHALT								0
	CO		CONCRETE								
	FL		FILL: black clay with some fine sand - trace gravel - silty	GS	32						2
	CL ML		Soft tan SILTY CLAY (CL-ML) - trace fine to medium sand	GS	25						4
	CH		Stiff brown fat CLAY (CH)	GS	30						6
				GS	36						8
				GS	43						10
			TESTHOLE LOCATION: 11.0 m West of Northwest corner of Ellice Avenue and Banning Street, 5.5 m South of North curb.								
			<ul style="list-style-type: none"> <li>The soil was frozen to a depth of 1.5m.</li> <li>No groundwater seepage or soil sloughing was observed during or upon completion of drilling.</li> <li>Testhole terminated at a depth of 2.1 m.</li> </ul>								
Sample Type: GS - Grab Sample    SS - Split Spoon    RC - Rock Core ST - Shelby Tube    PT - Piston Tube    VT - Shear Vane Test Piezometer Backfill Type:  Bentonite     Drill Cuttings     Sand     Slough				Logged by: Sothea Bun Reviewed by: German Leal							

**Test Hole Log for TH6**

<b>TH6 TESTHOLE RECORD</b>														
CLIENT <u>City of Winnipeg</u>			PROJECT No. <u>113707271</u>											
PROJECT <u>Ellice Ave from Erin St to Arlington St</u>			DATUM _____			NORTHING _____								
LOCATION <u>Winnipeg, Manitoba</u>			ELEVATION _____			EASTING _____								
DRILLING DATE <u>March 29, 2017</u>			DRILLING CO. <u>Maple Leaf Drilling Ltd.</u>			DRILLING METHOD <u>125 mm SSA</u>								
DEPTH (m)	SOIL TYPE	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input checked="" type="checkbox"/> Torvane on Grab Samples (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa)				DEPTH (ft)			
				TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa				
0	AS		ASPHALT								0			
	CO		CONCRETE											
	CH		Firm black fat CLAY (CH) - trace fine to coarse sand - some silt  Particle Size Analysis at 0.9 m: 0.0% Gravel, 3.6% Sand, 18.7% Silt, 77.7% Clay	GS	33							2		
				GS	32									4
1				GS	32									4
				GS	33									6
				GS	36									6
			- stiff brown below 1.5 m - trace silt	GS	43							6		
2												8		
			TESTHOLE LOCATION: 34.5 m West of Southwest corner of Ellice Avenue and Burnell Street, 5.5 m North of South curb.  • The soil was frozen to a depth of 1.5 m. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole terminated at a depth of 2.1 m.									8		
3												10		

Sample Type: GS - Grab Sample    SS - Split Spoon    RC - Rock Core  
 ST - Shelby Tube    PT - Piston Tube    VT - Shear Vane Test

Piezometer Backfill Type:  Bentonite     Drill Cuttings     Sand     Slough

Logged by: Sothea Bun  
 Reviewed by: German Leal

**Test Hole Log for TH7**

<b>TH7 TESTHOLE RECORD</b>											
CLIENT <u>City of Winnipeg</u>		PROJECT No. <u>113707271</u>			PROJECT <u>Ellice Ave from Erin St to Arlington St</u>		DATUM _____			NORTHING _____	
LOCATION <u>Winnipeg, Manitoba</u>		ELEVATION _____			EASTING _____						
DRILLING DATE <u>March 29, 2017</u>		DRILLING CO. <u>Maple Leaf Drilling Ltd.</u>			DRILLING METHOD <u>125 mm SSA</u>						
DEPTH (m)	SOIL TYPE	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLES			<input type="checkbox"/> Insitu Shear Vane (kPa) <input type="checkbox"/> Torvane on Grab Samples (kPa) <input type="checkbox"/> Pocket Penetrometer (kPa)				DEPTH (ft)
				TYPE	NUMBER	MOISTURE CONTENT (%)	50kPa	100kPa	150kPa	200kPa	
0	AS		ASPHALT								0
	CO		CONCRETE								
	FL		FILL: black clay with some fine sand - trace gravel - silty	GS	36						2
	CL ML		Soft tan SILTY CLAY (CL-ML) - trace fine to medium sand Particle Size Analysis at 0.9 m: 0.0% Gravel, 5.1% Sand, 67.0% Silt, 27.9% Clay	GS	24						4
	CH		Stiff brown fat CLAY (CH)	GS	32						4
				GS	35						5
				GS	40						6
				GS	45						7
3	TESTHOLE LOCATION: 46.0 m West of Northwest corner of Ellice Avenue and Arlington Street, 5.5 m South of North curb.  • The soil was frozen to a depth of 1.4 m. • No groundwater seepage or soil sloughing was observed during or upon completion of drilling. • Testhole terminated at a depth of 2.1 m.										8
											10

Sample Type: GS - Grab Sample    SS - Split Spoon    RC - Rock Core  
 ST - Shelby Tube    PT - Piston Tube    VT - Shear Vane Test

Piezometer Backfill Type: Bentonite    Drill Cuttings    Sand    Slough

Logged by: Sothea Bun  
 Reviewed by: German Leal

### Pavement Core Photos



Photo 1 - Core 1



Photo 2 - Core 2



Photo 3 - Core 3



Photo 4 - Core 4



Photo 5 - Core 5



Photo 6 - Core 6



Photo 7 - Core 7



Photo 8 - Core 8



Photo 9 - Core 9



Photo 10 - Core 10



Photo 11 - Core 11



Photo 12 - Core 12



Photo 13 - Core 13



Photo 14 - Core 14



Photo 15 - Core 15



Photo 16 - Core 16



Photo 17 - Core 17



Photo 18 - Core 18



Photo 19 - Testhole 1



Photo 20 - Testhole 2



Photo 21 - Testhole 3



Photo 22 - Testhole 4



Photo 23 - Testhole 5



Photo 24 - Testhole 6



Photo 25 - Testhole 7