

APPENDIX 'G'

GEOTECHNICAL REPORT

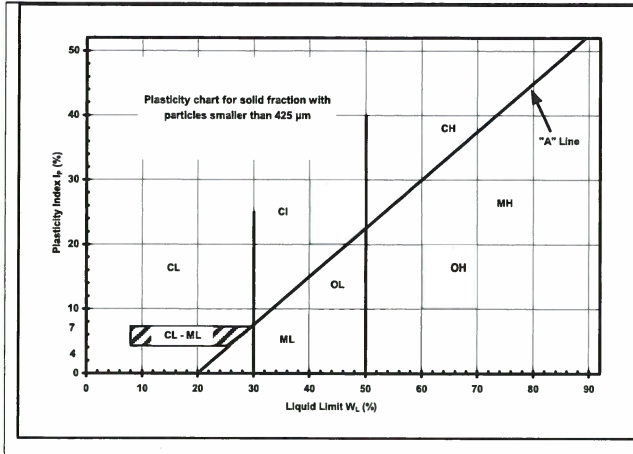
EXPLANATION OF FIELD & LABORATORY TEST DATA

Description		UMA Log Symbols	USCS Classification	Laboratory Classification Criteria					
				Fines (%)	Grading	Plasticity	Notes		
COARSE GRAINED SOILS	GRAVELS (More than 50% of coarse fraction of gravel size)	CLEAN GRAVELS (Little or no fines)	Well graded gravels, sandy gravels, with little or no fines		GW	0-5	$C_u > 4$ $1 < C_c < 3$	Dual symbols if 5-12% fines. Dual symbols if above "A" line and $4 < W_p < 7$ $C_u = \frac{D_{60}}{D_{10}}$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$	
			Poorly graded gravels, sandy gravels, with little or no fines		GP	0-5	Not satisfying GW requirements		
		DIRTY GRAVELS (With some fines)	Silty gravels, silty sandy gravels		GM	> 12			Atterberg limits below "A" line or $W_p < 4$
			Clayey gravels, clayey sandy gravels		GC	> 12			Atterberg limits above "A" line or $W_p < 7$
	SANDS (More than 50% of coarse fraction of sand size)	CLEAN SANDS (Little or no fines)	Well graded sands, gravelly sands, with little or no fines		SW	0-5	$C_u > 6$ $1 < C_c < 3$		
			Poorly graded sands, gravelly sands, with little or no fines		SP	0-5	Not satisfying SW requirements		
		DIRTY SANDS (With some fines)	Silty sands, sand-silt mixtures		SM	> 12			Atterberg limits below "A" line or $W_p < 4$
			Clayey sands, sand-clay mixtures		SC	> 12			Atterberg limits above "A" line or $W_p < 7$
FINE GRAINED SOILS	SILTS (Below 'A' line negligible organic content)	$W_L < 50$	Inorganic silts, silty or clayey fine sands, with slight plasticity		ML		Classification is Based upon Plasticity Chart		
		$W_L > 50$	Inorganic silts of high plasticity		MH				
	CLAYS (Above 'A' line negligible organic content)	$W_L < 30$	Inorganic clays, silty clays, sandy clays of low plasticity, lean clays		CL				
		$30 < W_L < 50$	Inorganic clays and silty clays of medium plasticity		CI				
		$W_L > 50$	Inorganic clays of high plasticity, fat clays		CH				
	ORGANIC SILTS & CLAYS (Below 'A' line)	$W_L < 50$	Organic silts and organic silty clays of low plasticity		OL				
		$W_L > 50$	Organic clays of high plasticity		OH				
	HIGHLY ORGANIC SOILS		Peat and other highly organic soils		Pt	Von Post Classification Limit		Strong colour or odour, and often fibrous texture	
	Asphalt		Till			AECOM			
	Concrete		Bedrock (Undifferentiated)						
	Fill		Bedrock (Limestone)						

When the above classification terms are used in this report or test hole logs, the designated fractions may be visually estimated and not measured.

NOT USED TO CLASSIFY SUBGRADE. REFER TO CITY OF WINNIPEG SPECIFICATIONS FOR GEOTECHNICAL INVESTIGATION REQUIREMENTS FOR PUBLIC WORKS PROJECTS (SEPTEMBER, 2015)

NOT USED TO CLASSIFY SUBGRADE. REFER TO CITY OF WINNIPEG SPECIFICATIONS FOR GEOTECHNICAL INVESTIGATION REQUIREMENTS FOR PUBLIC WORKS PROJECTS (SEPTEMBER, 2015)



FRACTION	SEIVE SIZE (mm)		DEFINING RANGES OF PERCENTAGE BY WEIGHT OF MINOR COMPONENTS	
	Passing	Retained	Percent	Identifier
Gravel	Coarse	76	19	35-50 and
	Fine	19	4.75	
Sand	Coarse	4.75	2.00	20-35 "y" or "ey" *
	Medium	2.00	0.425	
	Fine	0.425	0.075	
Silt (non-plastic) or Clay (plastic)	< 0.075 mm		10-20	some
			1-10	trace

* for example: gravelly, sandy clayey, silty

Definition of Oversize Material
 COBBLES: 76mm to 300mm diameter
 BOULDERS: >300mm diameter

LEGEND OF SYMBOLS

Laboratory and field tests are identified as follows:

- q_u - undrained shear strength (kPa) derived from unconfined compression testing.
- T_v - undrained shear strength (kPa) measured using a torvane
- p_p - undrained shear strength (kPa) measured using a pocket penetrometer.
- L_v - undrained shear strength (kPa) measured using a lab vane.
- F_v - undrained shear strength (kPa) measured using a field vane.
- γ - bulk unit weight (kN/m^3).
- SPT - Standard Penetration Test. Recorded as number of blows (N) from a 63.5 kg hammer dropped 0.76 m (free fall) which is required to drive a 51 mm O.D. Raymond type sampler 0.30 m into the soil.
- DPPT - Drive Point Pentrometer Test. Recorded as number of blows from a 63.5 kg hammer dropped 0.76 m (free fall) which is required to drive a 50 mm drive point 0.30 m into the soil.
- w - moisture content (W_L, W_P)

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

S_u (kPa)	CONSISTENCY
<12	very soft
12 - 25	soft
25 - 50	medium or firm
50 - 100	stiff
100 - 200	very stiff
200	hard

The resistance (N) of a non-cohesive soil can be related to compactness condition as follows

N - BLOWS/0.30 m	COMPACTNESS
0 - 4	very loose
4 - 10	loose
10 - 30	compact
30 - 50	dense
50	very dense

F2. SEWER TELEVISION GUIDELINES FOR PUBLIC WORKS PROJECTS (JANUARY 2009)

- F2.1 The Consultant is required to assess the extent of Closed Circuit Television (CCTV) inspection for all combined, wastewater, land drainage and storm relief sewers to confirm any sewer repairs required in the right-of-way within the limits of the street renewal.
- F2.2 The criteria provided are general guidelines and are not intended to replace sound municipal engineering judgement specific to the individual Project scope and/or location.
- F2.3 The available sewer televising information is contained within the City of Winnipeg's Sewer Management System (SMS) application.
- F2.4 Confirm televising requirements with Project Manager.
- F2.5 CCTV inspection general guidelines:
- (a) Confirm CCTV requirements with Water & Waste Department for sewers 1050 mm and larger in diameter;
 - (b) Televising if no previous CCTV inspections have been completed;
 - (c) Re-televising sewers in Categories A/B/C/X with a Structural Performance Grade (SPG) of 3 or higher that have not been televised in the previous 5 years;
 - (d) Sewers located more than two metres from the curb line (i.e. not located under pavement) do not need to be re-televised if previous CCTV inspection data exist. If a sewer repair or renewal requiring excavation is noted, contact the WWD;
 - (e) On all street reconstructions, regardless of location of the sewer (within the right-of-way);
 - (f) If the street exhibits obvious distress at/along the underground plant;
 - (g) Of all CB leads to be reused, as part of a street reconstruction or major rehabilitation.
- F2.6 For any uncertain situations and/or locations, contact the Project Manager.
- F2.7 The Consultant is required to coordinate the sewer-televising contract and communicate the results to the Water & Waste Department. Any repairs or other activities deemed necessary from these inspections must be coordinated with the Water & Waste Department.

F3. GEOTECHNICAL INVESTIGATION REQUIREMENTS FOR PUBLIC WORKS PROJECTS (OCTOBER 2008)

- F3.1 Fieldwork
- (a) Clear all underground services at each test-hole location.
 - (b) As this street project is greater than 500 metres, test holes may be taken every 100 m. More or fewer test-holes may be required depending upon Site conditions – confirm with the Project Manager.
 - (c) Record location of test-hole (offset from curb, distance from cross street and house number).
 - (d) Drill 150 mm-diameter cores in pavement.
 - (e) Drill 125 mm-diameter test-holes into fill materials and subgrade.
 - (f) If a service trench backfilled with granular materials is encountered, another hole shall be drilled to define the existing sub-surface conditions.
 - (g) Test-holes shall be drilled to depth of 2 m \pm 150 mm below surface of the pavement.
 - (h) Recover pavement core sample and representative samples of soil (fill materials, pavement structure materials and subgrade).
 - (i) Measure and record pavement section exposed in the test-hole (thickness of concrete or asphalt and different types of pavement structure materials).

- (j) Pavement structure materials to be identified as crushed limestone or granular fill and the maximum aggregate size of the material (20 mm, 50 mm or 150 mm).
- (k) Log soil profile for the subgrade.
- (l) Representative samples of soil must be obtained at the following depths below the bottom of the pavement structure materials – 0.1 m, 0.4 m, 0.7 m, 1.0 m, 1.3 m, 1.6 m, etc. Ensure a sample is obtained from each soil type encountered in the test-hole.
- (m) Make note of any water seepage into the test-hole.
- (n) Backfill test-hole with native materials and additional granular fill, if required. Patch pavement surface with hot mix asphalt or high strength durable concrete mix.
- (o) Return core sample from the pavement and soil samples to the laboratory.

F3.2 Lab Work

- (a) Test all soil samples for moisture content.
- (b) Photograph core samples recovered from the pavement surface.
- (c) Conduct tests for plasticity index and hydrometer analysis on selected soil samples which are between 0.5 m and 1 m below top of pavement (this is the sub-grade on which the pavement and sub-base will be built). The selection will be based upon visual classification and moisture content test results, with a minimum of one sample of each soil type per street to be tested.
- (d) Prepare test-hole logs and classify subgrade (based on hydrometer) as follows:
 - < 30% silt - classify as clay
 - 30% - 50% silt - classify as silty clay
 - 50% - 70% silt - classify as clayey silt
 - > 70% silt - classify as silt
- (e) For any uncertain situations and/or locations, or clarification of these requirements, contact the Project Manager.

PROJECT: Local Streets Package - 19-R-04	CLIENT: City of Winnipeg	TESTHOLE NO: TH19-01
LOCATION: Derek St., 1.6 m NE of SW curb, 18 m NW of Windermere Ave.		PROJECT NO.: 60596312
CONTRACTOR: Maple Leaf Drilling Ltd.	METHOD: Canterra C-250 Truck Rig, 125 mm SSA	ELEVATION (m): N/A
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE	

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	PENETRATION TESTS		UNDRAINED SHEAR STRENGTH	COMMENTS	DEPTH
						* Becker * ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) ■ Total Unit Wt (kN/m ³)	+ Torvane + × QU/2 × □ Lab Vane □ △ Pocket Pen. △ ⊕ Field Vane ⊕ (kPa)			
0		ASPHALT - 90 mm								
		SAND and GRAVEL (Fill) - 154 mm - aggregate < 25 mm diam.								
		CLAY - trace to some sand - dark grey, frozen		G1						
		CLAY - some sand to sandy - brown, frozen to 1.4 m		G2						
1		- some sand below 1.1 m		G3						1
		- firm, moist, high plasticity below 1.4 m		G4						
		SILT and SAND - light brown, moist - low plasticity		G5						
2		END OF TEST HOLE AT 2.00 m IN SILT and SAND		G6						2
		Notes: 1. No seepage observed during drilling. 2. No sloughing observed during drilling. 3. Test hole backfilled with drill cuttings and bentonite and patched with asphalt upon completion.								

LOG OF TEST HOLE TEST HOLE LOGS - LOCAL STREETS.GPJ UMA WINN.GDT 3/19/19



LOGGED BY: Ryan Harras	COMPLETION DEPTH: 2.00 m
REVIEWED BY: Faris Alobaidy	COMPLETION DATE: 1/17/19
PROJECT ENGINEER: Kevin Rae	Page 1 of 1

PROJECT: Local Streets Package - 19-R-04	CLIENT: City of Winnipeg	TESTHOLE NO: TH19-02
LOCATION: Derek St., 1.6 m SW of NE curb, 75 m NW of Windermere Ave.		PROJECT NO.: 60596312
CONTRACTOR: Maple Leaf Drilling Ltd.	METHOD: Canterra C-250 Truck Rig, 125 mm SSA	ELEVATION (m): N/A
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE	

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	PENETRATION TESTS		UNDRAINED SHEAR STRENGTH	COMMENTS	DEPTH
						* Becker * ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) ■ Total Unit Wt (kN/m ³)	+ Torvane + × QU/2 × □ Lab Vane □ △ Pocket Pen. △ ⊕ Field Vane ⊕ (kPa)			
0		ASPHALT - 40 mm								
		SAND and GRAVEL (Fill) - 260 mm - aggregate < 25 mm diam.								
		CLAY - trace to some sand - dark grey, frozen		G7	●					
		CLAY - trace sand - brown, frozen to 1.4 m - high plasticity		G8	●					
1				G9	●	—			(G9): Gravel: 0.0%, Sand: 4.6%, Silt: 25.9%, Clay: 69.5%	1
		- firm, moist below 1.4 m		G10	●					
				G11	●					
2		SILT and SAND - light brown, moist - low plasticity		G12	●					
		END OF TEST HOLE AT 2.00 m IN SILT and SAND								
		Notes: 1. No seepage observed during drilling. 2. No sloughing observed during drilling. 3. Test hole backfilled with drill cuttings and bentonite and patched with asphalt upon completion.								

LOG OF TEST HOLE TEST HOLE LOGS - LOCAL STREETS.GPJ UMA WINN.GDT 3/19/19



LOGGED BY: Ryan Harras	COMPLETION DEPTH: 2.00 m
REVIEWED BY: Faris Alobaidy	COMPLETION DATE: 1/17/19
PROJECT ENGINEER: Kevin Rae	Page 1 of 1

PROJECT: Local Streets Package - 19-R-04	CLIENT: City of Winnipeg	TESTHOLE NO: TH19-03
LOCATION: Derek St., 1.8 m NE of SW curb, 15 m NW of Byng Pl.		PROJECT NO.: 60596312
CONTRACTOR: Maple Leaf Drilling Ltd.	METHOD: Canterra C-250 Truck Rig, 125 mm SSA	ELEVATION (m): N/A
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input checked="" type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE	

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	PENETRATION TESTS		UNDRAINED SHEAR STRENGTH		COMMENTS	DEPTH
						* Becker * ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) ■ Total Unit Wt (kN/m ³)	+ Torvane + × QU/2 × □ Lab Vane □ △ Pocket Pen. △ ⊕ Field Vane ⊕ (kPa)				
0		ASPHALT - 52 mm									
		SAND and GRAVEL (Fill) - 270 mm - aggregate < 15 mm diam.									
		CLAY - trace to some sand - brown, frozen to 1.5 m		G13							
				G14							
1				G15						(Bulk) Soaked CBR: 1.2	1
				G16							
				G17							
		- firm, moist, high plasticity below 1.5 m		G18							
2		END OF TEST HOLE AT 2.00 m IN CLAY									2
		Notes: 1. No seepage observed during drilling. 2. No sloughing observed during drilling. 3. Two additional holes drilled at this location to collect bulk sample between 0.3 m and 1.5 m. 4. Test hole backfilled with drill cuttings and bentonite and patched with asphalt upon completion.									
3											

LOG OF TEST HOLE TEST HOLE LOGS - LOCAL STREETS.GPJ UMA WINN.GDT 3/19/19



LOGGED BY: Ryan Harras	COMPLETION DEPTH: 2.00 m
REVIEWED BY: Faris Alobaidy	COMPLETION DATE: 1/17/19
PROJECT ENGINEER: Kevin Rae	Page 1 of 1

PROJECT: Local Streets Package - 19-R-04	CLIENT: City of Winnipeg	TESTHOLE NO: TH19-04
LOCATION: Derek St., 1.8 m SW of NE curb, 38 m NW of Edderton Ave.		PROJECT NO.: 60596312
CONTRACTOR: Maple Leaf Drilling Ltd.	METHOD: Canterra C-250 Truck Rig, 125 mm SSA	ELEVATION (m): N/A
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input checked="" type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE	

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	PENETRATION TESTS		UNDRAINED SHEAR STRENGTH	COMMENTS	DEPTH
						* Becker * ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) ■ Total Unit Wt (kN/m ³)	+ Torvane + × QU/2 × □ Lab Vane □ △ Pocket Pen. △ ⊕ Field Vane ⊕ (kPa)			
0		ASPHALT - 22 mm SAND and GRAVEL (Fill) - 40 mm aggregate < 15 mm diam. ASPHALT - 38 mm SAND and GRAVEL (Fill) - 215 mm								
		CLAY - trace to some sand - dark grey, frozen SILT and SAND - light brown, frozen - low plasticity		G19						
				G20					(G20): Gravel: 0.3%, Sand: 38.8%, Silt: 44.4%, Clay: 16.6%	
1				G21						
		- moist below 1.2 m		G22						
				G23						
				G24						
2		END OF TEST HOLE AT 2.00 m IN SILT and SAND								
		Notes: 1. No seepage observed during drilling. 2. No sloughing observed during drilling. 3. Test hole backfilled with drill cuttings and bentonite and patched with asphalt upon completion.								

LOG OF TEST HOLE TEST HOLE LOGS - LOCAL STREETS.GPJ UMA WINN.GDT 3/19/19



LOGGED BY: Ryan Harras	COMPLETION DEPTH: 2.00 m
REVIEWED BY: Faris Alobaidy	COMPLETION DATE: 1/17/19
PROJECT ENGINEER: Kevin Rae	Page 1 of 1

PROJECT: Local Streets Package - 19-R-04		CLIENT: City of Winnipeg		TESTHOLE NO: TH19-05	
LOCATION: Derek St., 2.2 m NE of SW curb, 12 m NW of Rosemount Ave.				PROJECT NO.: 60596312	
CONTRACTOR: Maple Leaf Drilling Ltd.			METHOD: Canterra C-250 Truck Rig, 125 mm SSA		ELEVATION (m): N/A
SAMPLE TYPE		GRAB	SHELBY TUBE	SPLIT SPOON	BULK
		NO RECOVERY	CORE		

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	PENETRATION TESTS		UNDRAINED SHEAR STRENGTH		COMMENTS	DEPTH
						SPT (Standard Pen Test) (Blows/300mm)		kPa			
0		ASPHALT - 35 mm									
		SAND and GRAVEL (Fill) - 235 mm - aggregate < 15 mm diam.									
		CLAY - trace to some sand - dark grey, frozen		G25							
		CLAY - trace sand - brown, frozen		G26							
1				G27							1
		SILT and SAND - light brown, moist - low plasticity		G28							
		CLAY - trace sand - brown, firm, moist - high plasticity		G29							
2		END OF TEST HOLE AT 2.00 m IN CLAY		G30							2
		Notes: 1. No seepage observed during drilling. 2. No sloughing observed during drilling. 3. Test hole backfilled with drill cuttings and bentonite and patched with asphalt upon completion.									

LOG OF TEST HOLE TEST HOLE LOGS - LOCAL STREETS.GPJ UMA WINN.GDT 3/19/19



LOGGED BY: Ryan Harras	COMPLETION DEPTH: 2.00 m
REVIEWED BY: Faris Alobaidy	COMPLETION DATE: 1/17/19
PROJECT ENGINEER: Kevin Rae	Page 1 of 1

PROJECT: Local Streets Package - 19-R-04	CLIENT: City of Winnipeg	TESTHOLE NO: TH19-06
LOCATION: Derek St., 2.0 m SW of NE curb, 50 m NW of Rosemount Ave.		PROJECT NO.: 60596312
CONTRACTOR: Maple Leaf Drilling Ltd.	METHOD: Canterra C-250 Truck Rig, 125 mm SSA	ELEVATION (m): N/A
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE	

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	PENETRATION TESTS		UNDRAINED SHEAR STRENGTH	COMMENTS	DEPTH
						* Becker * ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) Total Unit Wt (kN/m ³) Plastic MC Liquid	+ Torvane + × QU/2 × □ Lab Vane □ △ Pocket Pen. △ ⊕ Field Vane ⊕ (kPa)			
0		ASPHALT - 50 mm								
		SAND and GRAVEL (Fill) - 200 mm - aggregate < 15 mm diam.								
		CLAY - trace to some sand - dark grey, frozen		G31	●					
		CLAY - trace sand - brown, frozen to 1.2 m		G32	●					
1		- firm to stiff, moist, high plasticity below 1.2 m		G33	●					1
				G34	●					
		SILT and SAND - light brown, moist - low plasticity		G35	●					
		CLAY - trace sand - brown, firm, moist - high plasticity		G36	●					
2		END OF TEST HOLE AT 2.00 m IN CLAY								2
		Notes: 1. No seepage observed during drilling. 2. No sloughing observed during drilling. 3. Test hole backfilled with drill cuttings and bentonite and patched with asphalt upon completion.								

LOG OF TEST HOLE TEST HOLE LOGS - LOCAL STREETS.GPJ UMA WINN.GDT 3/19/19



LOGGED BY: Ryan Harras	COMPLETION DEPTH: 2.00 m
REVIEWED BY: Faris Alobaidy	COMPLETION DATE: 1/17/19
PROJECT ENGINEER: Kevin Rae	Page 1 of 1

PROJECT: Local Streets Package - 19-R-04	CLIENT: City of Winnipeg	TESTHOLE NO: TH19-08
LOCATION: 473 Hudson St., 1.6 m E of W curb, 95 m N of Chevrier Blvd.		PROJECT NO.: 60596312
CONTRACTOR: Maple Leaf Drilling Ltd.	METHOD: Canterra C-250 Truck Rig, 125 mm SSA	ELEVATION (m): N/A
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input checked="" type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE	


DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	PENETRATION TESTS		UNDRAINED SHEAR STRENGTH	COMMENTS	DEPTH
						* Becker * ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) ■ Total Unit Wt (kN/m ³)	+ Torvane + × QU/2 × □ Lab Vane □ △ Pocket Pen. △ ⊕ Field Vane ⊕ (kPa)			
0		ASPHALT - 60 mm								
		SAND and GRAVEL (Fill) - 167 mm - aggregate < 25 mm diam.								
		CLAY - trace sand - dark grey, frozen - high plasticity		G37	●					
				G38	●	—			(G38): Gravel: 0.2%, Sand: 4.6%, Silt: 13.4%, Clay: 81.9%	
1		CLAY - trace sand - brown, frozen to 1.4 m		G39	●					
				G40	●					
		- firm to stiff, moist, high plasticity below 1.4 m		G41	●					
				G42	●					
2		END OF TEST HOLE AT 2.00 m IN CLAY								
		Notes: 1. No seepage observed during drilling. 2. No sloughing observed during drilling. 3. Test hole backfilled with drill cuttings and bentonite and patched with asphalt upon completion.								

LOG OF TEST HOLE TEST HOLE LOGS - LOCAL STREETS.GPJ UMA WINN.GDT 3/19/19



LOGGED BY: Ryan Harras	COMPLETION DEPTH: 2.00 m
REVIEWED BY: Faris Alobaidy	COMPLETION DATE: 1/18/19
PROJECT ENGINEER: Kevin Rae	Page 1 of 1

PROJECT: Local Streets Package - 19-R-04	CLIENT: City of Winnipeg	TESTHOLE NO: TH19-09
LOCATION: 457 Hudson St., 1.5 m E of W curb, 175 m N of Chevrier Blvd.		PROJECT NO.: 60596312
CONTRACTOR: Maple Leaf Drilling Ltd.	METHOD: Canterra C-250 Truck Rig, 125 mm SSA	ELEVATION (m): N/A
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input checked="" type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE	

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	PENETRATION TESTS		UNDRAINED SHEAR STRENGTH		COMMENTS	DEPTH
						* Becker * ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) ■ Total Unit Wt (kN/m³)	+ Torvane + × QU/2 × □ Lab Vane □ △ Pocket Pen. △ ⊕ Field Vane ⊕ (kPa)				
0		ASPHALT - 70 mm									
		SAND and GRAVEL (Fill) - 144 mm - aggregate < 15 mm diam.									
		END OF TEST HOLE AT 0.22 m									
		Notes: 1. Did not drill beneath fill due to nearby underground utilities in this area. 2. Test hole patched with asphalt upon completion.									
1											1
2											2
3											3

LOG OF TEST HOLE TEST HOLE LOGS - LOCAL STREETS.GPJ UMA WINN.GDT 3/19/19



LOGGED BY: Ryan Harras	COMPLETION DEPTH: 0.22 m
REVIEWED BY: Faris Alobaidy	COMPLETION DATE: 1/18/19
PROJECT ENGINEER: Kevin Rae	Page 1 of 1

PROJECT: Local Streets Package - 19-R-04	CLIENT: City of Winnipeg	TESTHOLE NO: TH19-10
LOCATION: 433 Hudson St., 1.8 m E of W curb, 53 m N of Dumas Ave.		PROJECT NO.: 60596312
CONTRACTOR: Maple Leaf Drilling Ltd.	METHOD: Canterra C-250 Truck Rig, 125 mm SSA	ELEVATION (m): N/A
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input checked="" type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE	

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	PENETRATION TESTS		UNDRAINED SHEAR STRENGTH		COMMENTS	DEPTH
						* Becker * ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) ■ Total Unit Wt (kN/m³)	+ Torvane + × QU/2 × □ Lab Vane □ △ Pocket Pen. △ ⊕ Field Vane ⊕ (kPa)				
0		ASPHALT - 55 mm									
		SAND and GRAVEL (Fill) - 160 mm - aggregate < 15 mm diam.									
		CLAY - trace to some sand - dark grey, frozen		G49	~45						
				G50	~55						
1				G51	~65						
				G52	~75						
		CLAY - trace sand - brown, firm, moist - high plasticity		G53	~85						
		SILT - clayey, some sand - light brown, soft to firm, moist - intermediate plasticity		G54	~95						
2		END OF TEST HOLE AT 2.00 m IN SILT									
		Notes: 1. No seepage observed during drilling. 2. No sloughing observed during drilling. 3. Test hole backfilled with drill cuttings and bentonite and patched with asphalt upon completion.									

LOG OF TEST HOLE TEST HOLE LOGS - LOCAL STREETS.GPJ UMA WINN.GDT 3/19/19



LOGGED BY: Ryan Harras	COMPLETION DEPTH: 2.00 m
REVIEWED BY: Faris Alobaidy	COMPLETION DATE: 1/17/19
PROJECT ENGINEER: Kevin Rae	Page 1 of 1

PROJECT: Local Streets Package - 19-R-04 CLIENT: City of Winnipeg TESTHOLE NO: TH19-11
 LOCATION: 417 Hudson St., 2.1 m E of W curb, 28 m N of Roys Ave. PROJECT NO.: 60596312
 CONTRACTOR: Maple Leaf Drilling Ltd. METHOD: Canterra C-250 Truck Rig, 125 mm SSA ELEVATION (m): N/A

SAMPLE TYPE GRAB SHELBY TUBE SPLIT SPOON BULK NO RECOVERY CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	PENETRATION TESTS		UNDRAINED SHEAR STRENGTH		COMMENTS	DEPTH
						Blows/300mm	Total Unit Wt (kN/m ³)	+	(kPa)		
0		ASPHALT - 45 mm									
		SAND and GRAVEL (Fill) - 240 mm - aggregate < 25 mm diam.									
		CLAY - trace to some sand, trace gravel - dark grey, frozen	<input checked="" type="checkbox"/>	G55	~45						
		CLAY - trace sand - brown, frozen to 1.2 m	<input checked="" type="checkbox"/>	G56	~55						
			<input checked="" type="checkbox"/>	G57	~55					(Bulk) Soaked CBR: 1.8	
			<input checked="" type="checkbox"/>	G58	~65						
			<input checked="" type="checkbox"/>	G59	~75						
			<input checked="" type="checkbox"/>	G60	~85						
2		END OF TEST HOLE AT 2.00 m IN CLAY									
		Notes: 1. No seepage observed during drilling. 2. No sloughing observed during drilling. 3. Two additional holes drilled at this location to collect bulk sample between 0.3 m and 1.5 m. 4. Test hole backfilled with drill cuttings and bentonite and patched with asphalt upon completion.									

LOG OF TEST HOLE TEST HOLE LOGS - LOCAL STREETS.GPJ UMA WINN.GDT 3/19/19



LOGGED BY: Ryan Harras COMPLETION DEPTH: 2.00 m
 REVIEWED BY: Faris Alobaidy COMPLETION DATE: 1/17/19
 PROJECT ENGINEER: Kevin Rae Page 1 of 1

PROJECT: Local Streets Package - 19-R-04	CLIENT: City of Winnipeg	TESTHOLE NO: TH19-12
LOCATION: 407 Hudson St., 2.0 m E of W curb, 85 m N of Roys Ave.		PROJECT NO.: 60596312
CONTRACTOR: Maple Leaf Drilling Ltd.	METHOD: Canterra C-250 Truck Rig, 125 mm SSA	ELEVATION (m): N/A
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input checked="" type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE	

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	PENETRATION TESTS	UNDRAINED SHEAR STRENGTH	COMMENTS	DEPTH
0		ASPHALT - 90 mm							
		SAND and GRAVEL (Fill) - 163 mm - aggregate < 20 mm diam.							
		CLAY - trace to some sand - dark grey, frozen		G61					
		CLAY - silty, some sand - brown, frozen to 1.2 m - intermediate plasticity		G62				(G62): Gravel: 0.7%, Sand: 18.5%, Silt: 48.2%, Clay: 32.6%	
1		- trace to some sand, firm, moist below 1.2 m		G63					1
				G64					
				G65					
				G66					
2		END OF TEST HOLE AT 2.00 m IN CLAY							2
		Notes: 1. No seepage observed during drilling. 2. No sloughing observed during drilling. 3. Test hole backfilled with drill cuttings and bentonite and patched with asphalt upon completion.							

LOG OF TEST HOLE TEST HOLE LOGS - LOCAL STREETS.GPJ UMA WINN.GDT 3/19/19



LOGGED BY: Ryan Harras	COMPLETION DEPTH: 2.00 m
REVIEWED BY: Faris Alobaidy	COMPLETION DATE: 1/17/19
PROJECT ENGINEER: Kevin Rae	Page 1 of 1

PROJECT: Local Streets Package - 19-R-04	CLIENT: City of Winnipeg	TESTHOLE NO: TH19-13
LOCATION: 1100 Hudson St., 2.0 m W of E curb, 64 m N of Boston Ave.		PROJECT NO.: 60596312
CONTRACTOR: Maple Leaf Drilling Ltd.	METHOD: Canterra C-250 Truck Rig, 125 mm SSA	ELEVATION (m): N/A
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input checked="" type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE	

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	PENETRATION TESTS		UNDRAINED SHEAR STRENGTH	COMMENTS	DEPTH
						* Becker * ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) ■ Total Unit Wt (kN/m ³)	+ Torvane + × QU/2 × □ Lab Vane □ △ Pocket Pen. △ ⊕ Field Vane ⊕ (kPa)			
0		ASPHALT - 68 mm								
		SAND and GRAVEL (Fill) - 150 mm - aggregate < 15 mm diam.								
		CLAY - some sand, trace gravel - dark grey, frozen		G67						
		CLAY - some sand - brown, frozen		G68						
1		CLAY - some sand - brown, frozen		G69						
		SILT - clayey, sandy - light brown, frozen to 1.5 m		G70						
		- soft to firm, moist, intermediate plasticity below 1.5 m		G71						
				G72						
2		END OF TEST HOLE AT 2.00 m IN SILT								
		Notes: 1. No seepage observed during drilling. 2. No sloughing observed during drilling. 3. Test hole backfilled with drill cuttings and bentonite and patched with asphalt upon completion.								


LOG OF TEST HOLE TEST HOLE LOGS - LOCAL STREETS.GPJ UMA WINN.GDT 3/19/19



LOGGED BY: Ryan Harras	COMPLETION DEPTH: 2.00 m
REVIEWED BY: Faris Alobaidy	COMPLETION DATE: 1/17/19
PROJECT ENGINEER: Kevin Rae	Page 1 of 1

PROJECT: Local Streets Package - 19-R-04 CLIENT: City of Winnipeg TESTHOLE NO: TH19-26
 LOCATION: Villeneuve Blvd., 1.4 m NE of SW curb, 15 m NW of Rue des Trappistes PROJECT NO.: 60596312
 CONTRACTOR: Maple Leaf Drilling Ltd. METHOD: Canterra C-250 Truck Rig, 125 mm SSA ELEVATION (m): N/A

SAMPLE TYPE GRAB SHELBY TUBE SPLIT SPOON BULK NO RECOVERY CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	PENETRATION TESTS		UNDRAINED SHEAR STRENGTH		COMMENTS	DEPTH
						* Becker * ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) ■ Total Unit Wt (kN/m ³)	+ Torvane + × QU/2 × □ Lab Vane □ △ Pocket Pen. △ ⊕ Field Vane ⊕ (kPa)				
0		ASPHALT - 90 mm									
		SAND and GRAVEL (Fill) - 190 mm - aggregate < 15 mm diam.									
		END OF TEST HOLE AT 0.28 m.									
		Notes: 1. Did not drill beneath concrete due to nearby underground utilities in this area. 2. Test hole patched with asphalt upon completion.									
1											1
2											2
3											3


LOG OF TEST HOLE TEST HOLE LOGS - LOCAL STREETS.GPJ UMA WINN.GDT 3/19/19



LOGGED BY: Ryan Harras COMPLETION DEPTH: 0.28 m
 REVIEWED BY: Faris Alobaidy COMPLETION DATE: 1/21/19
 PROJECT ENGINEER: Kevin Rae Page 1 of 1

PROJECT: Local Streets Package - 19-R-04 CLIENT: City of Winnipeg TESTHOLE NO: TH19-27
 LOCATION: 143 Villeneuve Blvd., 1.2 m SW of NE curb, 100 m NW of Rue des Trappistes PROJECT NO.: 60596312
 CONTRACTOR: Maple Leaf Drilling Ltd. METHOD: Canterra C-250 Truck Rig, 125 mm SSA ELEVATION (m): N/A

SAMPLE TYPE GRAB SHELBY TUBE SPLIT SPOON BULK NO RECOVERY CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	PENETRATION TESTS		UNDRAINED SHEAR STRENGTH		COMMENTS	DEPTH
						* Becker * ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) ■ Total Unit Wt (kN/m ³)	+ Torvane + × QU/2 × □ Lab Vane □ △ Pocket Pen. △ ⊕ Field Vane ⊕ (kPa)				
0		ASPHALT - 80 mm									
		SAND and GRAVEL (Fill) - 200 mm - aggregate < 15 mm diam.									
		END OF TEST HOLE AT 0.28 m.									
		Notes: 1. Did not drill beneath concrete due to nearby underground utilities in this area. 2. Test hole patched with asphalt upon completion.									
1											1
2											2
3											3

LOG OF TEST HOLE TEST HOLE LOGS - LOCAL STREETS.GPJ UMA WINN.GDT 3/19/19



LOGGED BY: Ryan Harras COMPLETION DEPTH: 0.28 m
 REVIEWED BY: Faris Alobaidy COMPLETION DATE: 1/21/19
 PROJECT ENGINEER: Kevin Rae Page 1 of 1

PROJECT: Local Streets Package - 19-R-04	CLIENT: City of Winnipeg	TESTHOLE NO: TH19-28
LOCATION: 104 Villeneuve Blvd., 1.5 m NE of SW curb, 16 m SE of Avenue Gendreau		PROJECT NO.: 60596312
CONTRACTOR: Maple Leaf Drilling Ltd.	METHOD: Canterra C-250 Truck Rig, 125 mm SSA	ELEVATION (m): N/A
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input checked="" type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE	

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	PENETRATION TESTS		UNDRAINED SHEAR STRENGTH	COMMENTS	DEPTH
						* Becker * ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) ■ Total Unit Wt (kN/m ³)	+ Torvane + × QU/2 × □ Lab Vane □ △ Pocket Pen. △ ⊕ Field Vane ⊕ (kPa)			
0		ASPHALT - 90 mm								
		SAND and GRAVEL (Fill) - 165 mm - aggregate < 15 mm diam.								
		CLAY - trace to some sand - dark grey, frozen to 1.4 m		G157						
				G158						
				G159					(Bulk) Soaked CBR: 2.2	
				G160						
		- firm, moist, high plasticity below 1.4 m		G161						
		SILT - clayey, some sand - light brown, firm, moist - intermediate plasticity		G162						
2		END OF TEST HOLE AT 2.00 m IN SILT								
		Notes: 1. No seepage observed during drilling. 2. No sloughing observed during drilling. 3. Two additional test holes drilled at this location to collect bulk sample between 0.3 m and 1.5 m. 4. Test hole backfilled with drill cuttings and bentonite and patched with asphalt upon completion.								

LOG OF TEST HOLE TEST HOLE LOGS - LOCAL STREETS.GPJ UMA WINN.GDT 3/19/19



LOGGED BY: Ryan Harras	COMPLETION DEPTH: 2.00 m
REVIEWED BY: Faris Alobaidy	COMPLETION DATE: 1/21/19
PROJECT ENGINEER: Kevin Rae	Page 1 of 1

PROJECT: Local Streets Package - 19-R-04 CLIENT: City of Winnipeg TESTHOLE NO: TH19-29
 LOCATION: 93 Villeneuve Blvd., 1.2 m NE of SW curb, 51 m NW of Avenue Gendreau PROJECT NO.: 60596312
 CONTRACTOR: Maple Leaf Drilling Ltd. METHOD: Canterra C-250 Truck Rig, 125 mm SSA ELEVATION (m): N/A

SAMPLE TYPE GRAB SHELBY TUBE SPLIT SPOON BULK NO RECOVERY CORE

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	PENETRATION TESTS		UNDRAINED SHEAR STRENGTH		COMMENTS	DEPTH
						* Becker * ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) ■ Total Unit Wt (kN/m ³)	+ Torvane + × QU/2 × □ Lab Vane □ △ Pocket Pen. △ ⊕ Field Vane ⊕ (kPa)				
0		ASPHALT - 90 mm									
		END OF TEST HOLE AT 0.09 m. Notes: 1. Did not drill beneath concrete due to nearby underground utilities in this area. 2. Test hole patched with asphalt upon completion.									
1											
2											
3											

LOG OF TEST HOLE TEST HOLE LOGS - LOCAL STREETS.GPJ UMA WINN.GDT 3/19/19



LOGGED BY: Ryan Harras COMPLETION DEPTH: 0.09 m
 REVIEWED BY: Faris Alobaidy COMPLETION DATE: 1/21/19
 PROJECT ENGINEER: Kevin Rae Page 1 of 1

PROJECT: Local Streets Package - 19-R-04	CLIENT: City of Winnipeg	TESTHOLE NO: TH19-30
LOCATION: 63 Villeneuve Blvd., 1.7 m SW of NE curb, 130 m NW of Avenue Gendreau		PROJECT NO.: 60596312
CONTRACTOR: Maple Leaf Drilling Ltd.	METHOD: Canterra C-250 Truck Rig, 125 mm SSA	ELEVATION (m): N/A
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input checked="" type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE	

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	PENETRATION TESTS		UNDRAINED SHEAR STRENGTH	COMMENTS	DEPTH
						* Becker * ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) ■ Total Unit Wt (kN/m ³)	+ Torvane + × QU/2 × □ Lab Vane □ △ Pocket Pen. △ ⊕ Field Vane ⊕ (kPa)			
0		ASPHALT - 105 mm								
		SAND and GRAVEL (Fill) - 150 mm - aggregate < 15 mm diam.								
		CLAY - some sand, trace gravel - dark grey, frozen - high plasticity		G169	●					
				G170	●	—			(G170): Gravel: 1.6%, Sand: 19.3%, Silt: 24.4%, Clay: 54.8%	
1				G171	●					1
				G172	●					
		CLAY - trace sand - brown, firm, moist - high plasticity		G173	●					
				G174	●					
2		END OF TEST HOLE AT 2.00 m IN CLAY								2
		Notes: 1. No seepage observed during drilling. 2. No sloughing observed during drilling. 3. Test hole backfilled with drill cuttings and bentonite and patched with asphalt upon completion.								

LOG OF TEST HOLE TEST HOLE LOGS - LOCAL STREETS.GPJ UMA WINN.GDT 3/19/19



LOGGED BY: Ryan Harras	COMPLETION DEPTH: 2.00 m
REVIEWED BY: Faris Alobaidy	COMPLETION DATE: 1/21/19
PROJECT ENGINEER: Kevin Rae	Page 1 of 1

PROJECT: Local Streets Package - 19-R-04	CLIENT: City of Winnipeg	TESTHOLE NO: TH19-31
LOCATION: 33 Villeneuve Blvd., 2.0 m SW of NE curb, 10 m SE of Ducharme Ave.		PROJECT NO.: 60596312
CONTRACTOR: Maple Leaf Drilling Ltd.	METHOD: Canterra C-250 Truck Rig, 125 mm SSA	ELEVATION (m): N/A
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input checked="" type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE	

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	PENETRATION TESTS		UNDRAINED SHEAR STRENGTH		COMMENTS	DEPTH
						* Becker * ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) ■ Total Unit Wt (kN/m ³)	+ Torvane + × QU/2 × □ Lab Vane □ △ Pocket Pen. △ ⊕ Field Vane ⊕ (kPa)				
0		ASPHALT - 80 mm									
		SAND and GRAVEL (Fill) - 157 mm - aggregate < 15 mm diam.									
		END OF TEST HOLE AT 0.24 m.									
		Notes: 1. Did not drill beneath concrete due to nearby underground utilities in this area. 2. Test hole patched with asphalt upon completion.									
1											1
2											2
3											3

LOG OF TEST HOLE TEST HOLE LOGS - LOCAL STREETS.GPJ UMA WINN.GDT 3/19/19



LOGGED BY: Ryan Harras	COMPLETION DEPTH: 0.24 m
REVIEWED BY: Faris Alobaidy	COMPLETION DATE: 1/21/19
PROJECT ENGINEER: Kevin Rae	Page 1 of 1

PROJECT: Local Streets Package - 19-R-04	CLIENT: City of Winnipeg	TESTHOLE NO: TH19-32
LOCATION: 2 Villeneuve Blvd., 1.8 m NE of SW curb, 90 m SE of Ducharme Ave.		PROJECT NO.: 60596312
CONTRACTOR: Maple Leaf Drilling Ltd.	METHOD: Canterra C-250 Truck Rig, 125 mm SSA	ELEVATION (m): N/A
SAMPLE TYPE	<input checked="" type="checkbox"/> GRAB <input type="checkbox"/> SHELBY TUBE <input checked="" type="checkbox"/> SPLIT SPOON <input type="checkbox"/> BULK <input type="checkbox"/> NO RECOVERY <input type="checkbox"/> CORE	

DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	SPT (N)	PENETRATION TESTS		UNDRAINED SHEAR STRENGTH	COMMENTS	DEPTH
						* Becker * ◇ Dynamic Cone ◇ ◆ SPT (Standard Pen Test) ◆ (Blows/300mm) Total Unit Wt (kN/m ³) Plastic MC Liquid	+ Torvane + × QU/2 × □ Lab Vane □ △ Pocket Pen. △ ⊕ Field Vane ⊕ (kPa)			
0		ASPHALT - 90 mm								
		SAND and GRAVEL (Fill) - 190 mm - aggregate < 15 mm diam.								
		CLAY - trace to some sand - dark grey, frozen		G181	●					
				G182	●					
1				G183	●					1
		SILT - clayey, some sand - light brown, soft to firm, moist - intermediate plasticity		G184	●					
		CLAY - trace to some sand - brown, firm, moist - high plasticity		G185	●					
				G186	●					
2		END OF TEST HOLE AT 2.00 m IN CLAY								2
		Notes: 1. No seepage observed during drilling. 2. No sloughing observed during drilling. 3. Test hole backfilled with drill cuttings and bentonite and patched with asphalt upon completion.								

LOG OF TEST HOLE TEST HOLE LOGS - LOCAL STREETS.GPJ UMA WINN.GDT 3/19/19



LOGGED BY: Ryan Harras	COMPLETION DEPTH: 2.00 m
REVIEWED BY: Faris Alobaidy	COMPLETION DATE: 1/21/19
PROJECT ENGINEER: Kevin Rae	Page 1 of 1

City of Winnipeg

Local Streets Pkg 19-R-04 – Contract 1 - Derek Street/ Hudson Street/ Villeneuve Boulevard/ Thatcher Drive/ Caledon Road

Geotechnical Investigation

Table 01- Summary of Laboratory Soil Test Results

Test Hole No.	Test Hole Location	Pavement Structure		Subgrade Description *	Sample Depth (m)	Moisture Content (%)	Hydrometer Analysis				Atterberg Limits		
		Type	Thickness (mm)				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit	Plastic Limit	Plasticity Index
TH19-01	Derek Street - 1.6 m NE of SW curb, 18 m NW of Windermere Ave.	Asphalt	90	CLAY	0.3	23.7							
				CLAY	0.6	23.3							
		Concrete	0	CLAY	0.9	37.0							
				CLAY	1.2	36.6							
		Sand and Gravel (Fill)	154	SILT AND SAND	1.5	43.0							
				SILT AND SAND	1.8	46.2							
TH19-02	Derek Street - 1.6 m SW of NE curb, 75 m NW of Windermere Ave.	Asphalt	40	CLAY	0.3	18.9							
				CLAY	0.6	25.7							
		Concrete	0	CLAY	0.9	31.5	0.0	4.6	25.9	69.5	66.7	20.3	46.4
				CLAY	1.2	36.2							
		Sand and Gravel (Fill)	260	CLAY	1.5	42.4							
				SILT AND SAND	1.8	33.8							
TH19-03	Derek Street - 1.8 m NE of SW curb, 15 m NW of Byng Pl.	Asphalt	52	CLAY	0.3	26.2							
				CLAY	0.6	27.9							
		Concrete	0	CLAY	0.9	30.1							
				CLAY	1.2	28.3							
		Sand and Gravel (Fill)	270	CLAY	1.5	34.8							
				CLAY	1.8	44.6							
TH19-04	Derek Street - 1.8 m SW of NE curb, 38 m NW of Edderton Ave.	Asphalt	22 + 38	CLAY	0.3	21.3							
				SILT AND SAND	0.6	24.0	0.3	38.8	44.4	16.6	28.1	14.1	14.0
		Concrete	0	SILT AND SAND	0.9	24.9							
				SILT AND SAND	1.2	24.8							
		Sand and Gravel (Fill)	40 + 215	SILT AND SAND	1.5	32.5							
				SILT AND SAND	1.8	39.9							
TH19-05	Derek Street - 2.2 m NE of SW curb, 12 m NW of Rosemount Ave.	Asphalt	35	CLAY	0.3	22.8							
				CLAY	0.6	38.7							
		Concrete	0	CLAY	0.9	38.9							
				SILT AND SAND	1.2	38.3							
		Sand and Gravel (Fill)	235	CLAY	1.5	45.5							
				CLAY	1.8	48.9							

* Note – Subgrade Description based on City of Winnipeg Specifications for Geotechnical Investigation Requirements for Public Works Projects (September 2015)

Test Hole No.	Test Hole Location	Pavement Structure		Subgrade Description *	Sample Depth (m)	Moisture Content (%)	Hydrometer Analysis				Atterberg Limits			
		Type	Thickness (mm)				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit	Plastic Limit	Plasticity Index	
TH19-06	Derek Street - 2.0 m SW of NE curb, 50 m NW of Rosemount Ave.	Asphalt	50	CLAY	0.3	22.9								
				CLAY	0.6	28.1								
		Concrete	0	CLAY	0.9	30.2								
				CLAY	1.2	31.4								
		Sand and Gravel (Fill)	200	SILT AND SAND	1.5	35.7								
CLAY	1.8			42.6										
TH19-08	473 Hudson Street - 1.6 m E of W curb, 95 m N of Chevrier Blvd.	Asphalt	60	CLAY	0.3	31.4								
				CLAY	0.6	37.0	0.2	4.6	13.4	81.9	82.6	23.8	58.8	
		Concrete	0	CLAY	0.9	35.5								
				CLAY	1.2	36.6								
		Sand and Gravel (Fill)	167	CLAY	1.5	39.8								
CLAY	1.8			44.2										
TH19-09	457 Hudson Street - 1.5 m E of W curb, 175 m N of Chevrier Blvd.	Asphalt	70											
		Concrete	0											
		Sand and Gravel (Fill)	144											
TH19-10	433 Hudson Street - 1.8 m E of W curb, 53 m N of Dumas Ave.	Asphalt	55	CLAY	0.3	27.5								
				CLAY	0.6	31.1								
		Concrete	0	CLAY	0.9	34.1								
				CLAY	1.2	33.1								
		Sand and Gravel (Fill)	160	CLAY	1.5	44.8								
CLAYEY SILT	1.8			42.1										
TH19-11	417 Hudson Street - 2.1 m E of W curb, 28 m N of Royse Ave.	Asphalt	45	CLAY	0.3	21.7								
				CLAY	0.6	29.7								
		Concrete	0	CLAY	0.9	27.8								
				CLAY	1.2	42.0								
		Sand and Gravel (Fill)	240	CLAY	1.5	47.2								
CLAY	1.8			28.6										

* Note – Subgrade Description based on City of Winnipeg Specifications for Geotechnical Investigation Requirements for Public Works Projects (September 2015)

Test Hole No.	Test Hole Location	Pavement Structure		Subgrade Description *	Sample Depth (m)	Moisture Content (%)	Hydrometer Analysis				Atterberg Limits		
		Type	Thickness (mm)				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit	Plastic Limit	Plasticity Index
TH19-12	407 Hudson Street - 2.0 m E of W curb, 85 m N of Royse Ave.	Asphalt	90	CLAY	0.3	17.3	0.7	18.5	48.2	32.6	38.3	14.7	23.6
				SILTY CLAY	0.6	35.2							
		Concrete	0	SILTY CLAY	0.9	24.6							
				SILTY CLAY	1.2	39.5							
				Sand and Gravel (Fill)	163	SILTY CLAY							
SILTY CLAY	1.8	44.2											
TH19-13	1100 Hudson Street - 2.0 m W of E curb, 64 m N of Boston Ave.	Asphalt	68	CLAY	0.3	17.8							
				CLAY	0.6	39.2							
		Concrete	0	CLAY	0.9	34.1							
				CLAYEY SILT	1.2	32.1							
				Sand and Gravel (Fill)	150	CLAYEY SILT							
CLAYEY SILT	1.8	21.9											
TH19-26	Villeneuve Boulevard - 1.4 m NE of SW curb, 15 m NW of Rue des Trappistes	Asphalt	90										
		Concrete	0										
		Sand and Gravel (Fill)	190										
TH19-27	143 Villeneuve Boulevard - 1.2 m SW of NE curb, 100 m NW of Rue des Trappistes	Asphalt	80										
		Concrete	0										
		Sand and Gravel (Fill)	200										
TH19-28	104 Villeneuve Boulevard - 1.5 m NE of SW curb, 16 m SE of Avenue Gendreau	Asphalt	90	CLAY	0.3	32.5							
				CLAY	0.6	32.2							
		Concrete	0	CLAY	0.9	32.7							
				CLAY	1.2	36.3							
				Sand and Gravel (Fill)	165	CLAYEY SILT							
CLAYEY SILT	1.8	42.1											

* Note – Subgrade Description based on City of Winnipeg Specifications for Geotechnical Investigation Requirements for Public Works Projects (September 2015)

Test Hole No.	Test Hole Location	Pavement Structure		Subgrade Description *	Sample Depth (m)	Moisture Content (%)	Hydrometer Analysis				Atterberg Limits			
		Type	Thickness (mm)				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit	Plastic Limit	Plasticity Index	
TH19-29	93 Villeneuve Boulevard - 1.2 m NE of SW curb, 51 m NW of Avenue Gendreau	Asphalt	90											
		Concrete	0											
TH19-30	63 Villeneuve Boulevard - 1.7 m SW of NE curb, 130 m NW of Avenue Gendreau	Asphalt	105	CLAY	0.3	28.5								
				CLAY	0.6	27.0	1.6	19.3	24.4	54.8	56.1	18.4	37.7	
		Concrete	0	CLAY	0.9	30.7								
				CLAY	1.2	36.2								
		Sand and Gravel (Fill)	150	CLAY	1.5	41.4								
				CLAY	1.8	41.9								
TH19-31	33 Villeneuve Boulevard - 2.0 m SW of NE curb, 10 m SE of Ducharme Ave.	Asphalt	80											
		Concrete	0											
		Sand and Gravel (Fill)	157											
TH19-32	2 Villeneuve Boulevard - 1.8 m NE of SW curb, 90 m SE of Ducharme Ave.	Asphalt	90	CLAY	0.3	31.1								
				CLAY	0.6	35.4								
		Concrete	0	CLAY	0.9	39.4								
				CLAYEY SILT	1.2	36.0								
		Sand and Gravel (Fill)	190	CLAY	1.5	37.4								
				CLAY	1.8	36.7								
CH19-36	Caledon Road - 0.8 m W of E curb, 17 m NW of Killarney Ave.	Asphalt	0											
		Concrete	122											

* Note – Subgrade Description based on City of Winnipeg Specifications for Geotechnical Investigation Requirements for Public Works Projects (September 2015)

Test Hole No.	Test Hole Location	Pavement Structure		Subgrade Description *	Sample Depth (m)	Moisture Content (%)	Hydrometer Analysis				Atterberg Limits		
		Type	Thickness (mm)				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit	Plastic Limit	Plasticity Index
CH19-37	Caledon Road - 1.3 m E of W curb, 70 m NW of Killarney Ave.	Asphalt	0										
		Concrete	133										
CH19-38	Caledon Road - 1.0 m W of E curb, 70 m SE of Mapleridge Ave.	Asphalt	0										
		Concrete	162										
CH19-39	Caledon Road - 0.9 m W of E curb, 8 m SE of Mapleridge Ave.	Asphalt	0										
		Concrete	169										
CH19-40	Thatcher Drive - 1.0 m N of S curb, 20 m NE of Pembina Hwy.	Asphalt	0										
		Concrete	140										
CH19-41	163 Thatcher Drive - 1.5 m S of N curb, 100 m NE of Pembina Hwy.	Asphalt	0										
		Concrete	142										

* Note – Subgrade Description based on City of Winnipeg Specifications for Geotechnical Investigation Requirements for Public Works Projects (September 2015)

Test Hole No.	Test Hole Location	Pavement Structure		Subgrade Description *	Sample Depth (m)	Moisture Content (%)	Hydrometer Analysis				Atterberg Limits		
		Type	Thickness (mm)				Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit	Plastic Limit	Plasticity Index
CH19-42	150 Thatcher Drive - 1.7 m N of S curb, 165 m NE of Pembina Hwy.	Asphalt	0										
		Concrete	132										
CH19-43	127 Thatcher Drive - 1.8 m S of N curb, 130 m SW of University Cre.	Asphalt	0										
		Concrete	150										
CH19-44	110 Thatcher Drive - 1.4 m N of S curb, 60 m SW of University Cre.	Asphalt	0										
		Concrete	150										

* Note – Subgrade Description based on City of Winnipeg Specifications for Geotechnical Investigation Requirements for Public Works Projects (September 2015)



Photograph 1: Test Hole TH19-01 - Derek Street



Photograph 2: Test Hole TH19-02 - Derek Street - Asphalt not recovered



Photograph 3: Test Hole TH19-03 - Derek Street



Photograph 4: Test Hole TH19-04 - Derek Street



Photograph 5: Test Hole TH19-05 - Derek Street



Photograph 6: Test Hole TH19-08 - Hudson Street



Photograph 7: Test Hole TH19-09 - Hudson Street



Photograph 8: Test Hole TH19-10 - Hudson Street



Photograph 9: Test Hole TH19-11 - Hudson Street



Photograph 10: Test Hole TH19-12 - Hudson Street



Photograph 11: Test Hole TH19-13 - Hudson Street



Photograph 12: Test Hole TH19-26 - Villeneuve Boulevard



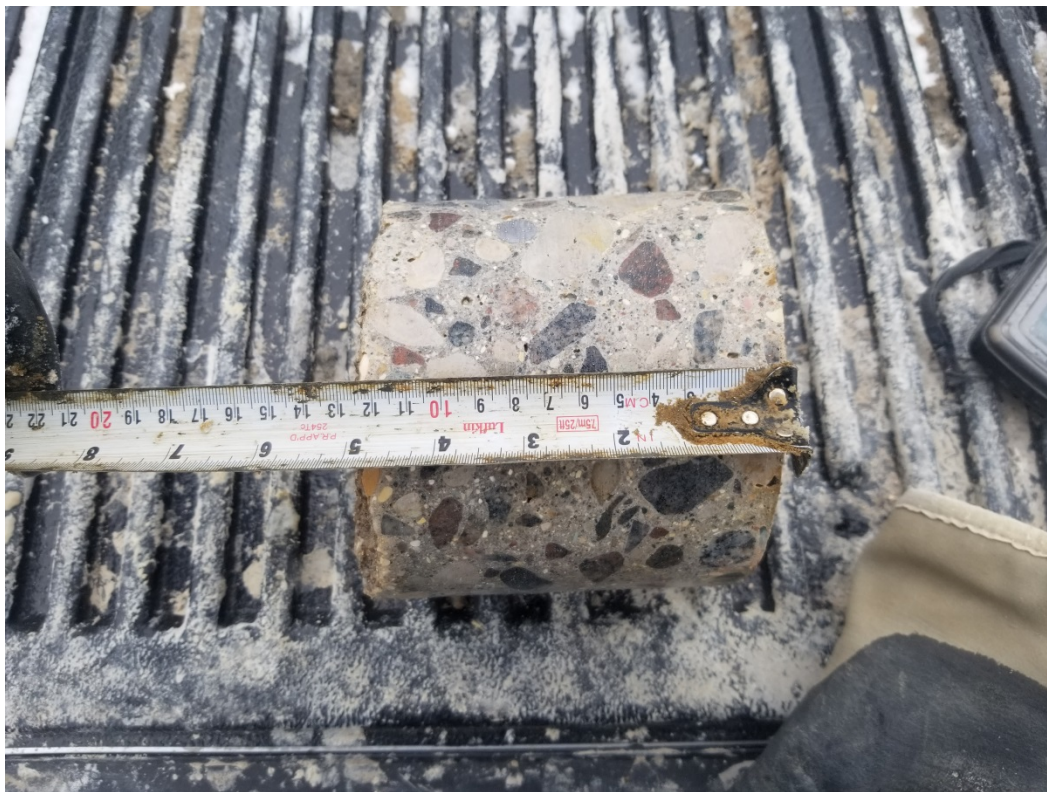
Photograph 13: Test Hole TH19-27 - Villeneuve Boulevard



Photograph 14: Test Hole TH19-31 - Villeneuve Boulevard



Photograph 15: Test Hole TH19-32 - Villeneuve Boulevard



Photograph 16: Test Hole CH19-36 - Caledon Road



Photograph 17: Test Hole CH19-37 - Caledon Road



Photograph 18: Test Hole CH19-38 - Caledon Road



Photograph 19: Test Hole CH19-39 - Caledon Road



Photograph 20: Test Hole CH19-40 - Thatcher Drive



Photograph 21: Test Hole CH19-41 - Thatcher Drive



Photograph 22: Test Hole CH19-42 - Thatcher Drive



Photograph 23: Test Hole CH19-43 - Thatcher Drive



Photograph 24: Test Hole CH19-44 - Thatcher Drive