APPENDIX 'A'

GEOTECHNICAL REPORT

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APPENDIX 'A' - GEOTECHNICAL REPORT

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GEOTECHNICAL REPORT FOR SOUTHWEST RAPID TRANSIT CORRIDOR – STAGE 1: TRANSIT WAY CONSTRUCTION, DONALD/HARKNESS RECONSTRUCTION AND ASSOCIATED WORKS 1

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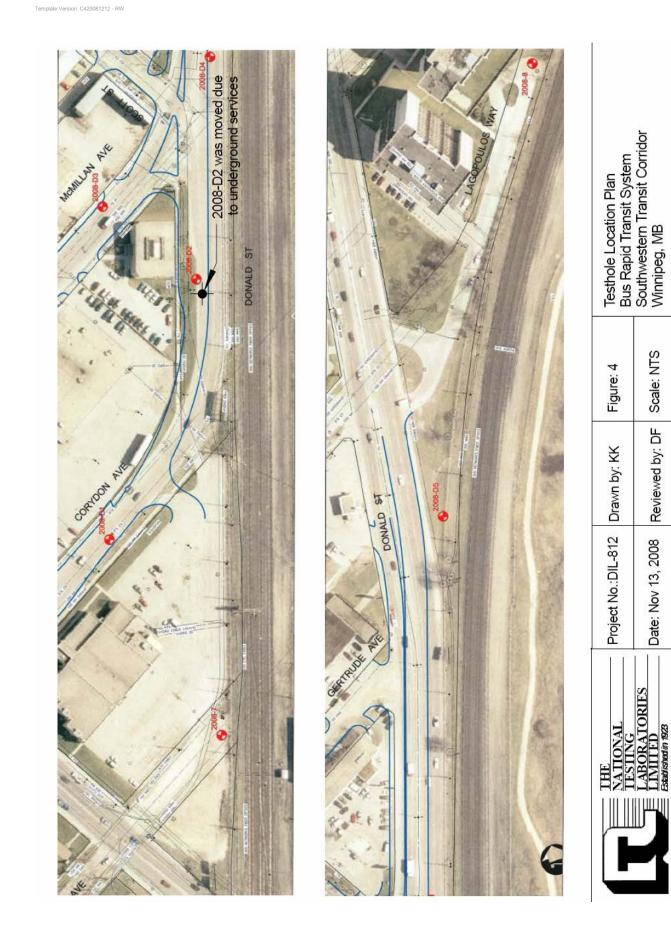
The geotechnical report is provided to aid in the Contractor's evaluation of the existing pavement structure and/or soil conditions. The information presented is considered accurate at the locations shown on the Drawings and at the time of drilling. However, variations in pavement structure and/or soil 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 Southwest Rapid Transit Corridor – Stage 1: Transit way Construction, Donald/Harkness Reconstruction and Associated Works

Test Hole Locations



Testhole Location Plan Bus Rapid Transit System	Southwestern Transit Corridor Winnipeg, MB
Figure: 1	Scale: NTS
Drawn by: KK	Reviewed by: DF Scale: NTS
Project No.:DIL-812 Drawn by: KK	Date: Nov 13, 2008
THE NATIONAL	LABORATORIES LIMITED Estatishedin 923



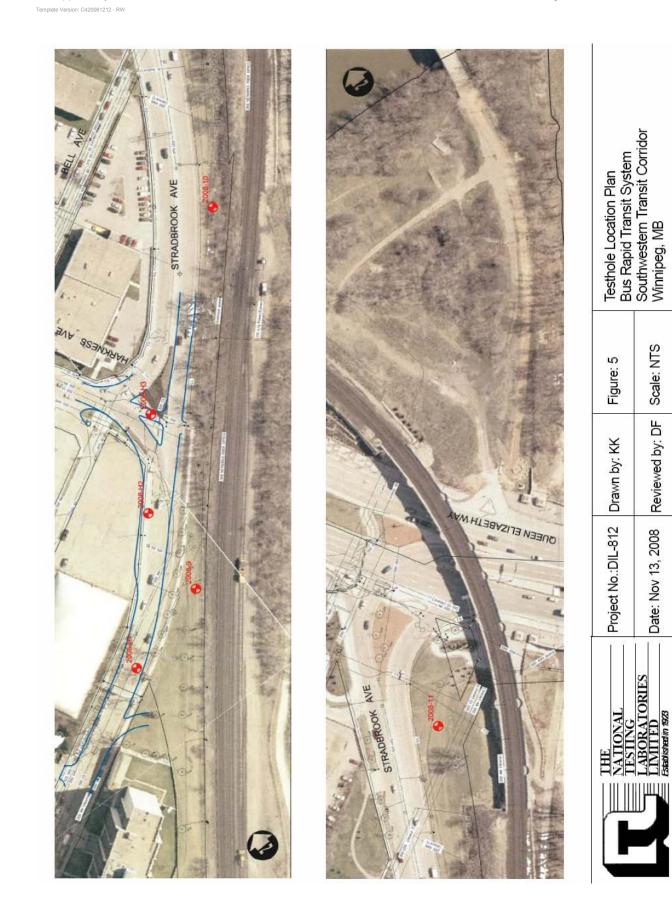


TABLE 1 TESTHOLE LOCATIONS BUS RAPID TRANSIT SYSTEM SOUTHWESTERN TRANSIT CORRIDOR

Testhole ID	UTM Co-ordinate	General Description
2008-7	633600 E / 5526274 N	Jessie Avenue
2008-8	633883 E / 5526945 N	Lagopoulus Way
2008-9	633974 E / 5527056 N	Between Stradbrook and CNR Rivers
2008-10	634096 E / 5527211 N	Between Stradbrook and CNR Rivers
2008-11	634169 E / 5527322 N	Between Stradbrook and CNR Rivers
2008-D1	633585 E / 5526390 N	Corydon Avenue
2008-D2	633669 E / 5526486 N	Donald Street
2008-D3	633641 E / 5526544 N	McMillan Avenue
2008-D4	633710 E / 5526587 N	Donald Street
2008-D5	633768 E / 5526749 N	Between Donald Street and CNR Rivers
2008-H1	633925 E / 5527037 N	Stradbrook Avenue
2008-H2	633981 E / 5527097 N	Stradbrook Avenue
2008-H3	634015 E / 5527134 N	Harkness Avenue

Summary of Core Samples

TABLE 2 PAVEMENT SECTIONS BUS RAPID TRANSIT SYSTEM SOUTHWESTERN TRANSIT CORRIDOR

Tartal	Paveme	nt Surface	Pavement Structure Mater	
Testhole ID	Туре	Thickness (mm)	Туре	Thickness (mm)
2008-8	Asphalt / Concrete	40 / 240	Fill/ Granular Fill	100/250
2008-D1	Asphalt / Concrete	32 / 203	Granular Base	50
2008-D2	Asphalt / Concrete	70 / 245	Granular Base	595
2008-D3	Asphalt / Concrete	65 / 235	Granular Base	25
2008-D4	Asphalt / Concrete	115 / 225	Granular Base	25
2008-H1	Concrete	245	Limestone Base	665
2008-H2	Concrete	125	Limestone Base	175
2008-H3	Concrete	120	Limestone Base	180

			Moisture	Par	Particle Size Analysis	e Analys	is	At	Atterberg Limits	mits
ID Depth (m	затріе Depth (m)	sample Description	Content (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit	Plastic Limit	Plasticity Index
2008-D3	6.0	Clayey Silt (CL)	23	0.4	6.5	62.7	30.4	33	19	14
2008-D4	1.2	Clay (CH)	32	0	1.3	14.3	84.4	84	26	58
2008-5	6.0	Granular Fill (SM)	18	0	88.0	8.5	3.5	I	I	
2008-6	1.5	Silt (CL-ML)	16	1				26	19	7

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Test Hole Logs for SWRTC

		TESTHOLE 2008-7	THE WALL DESIDE		
Clien Site:	Project Name: Bus Rapid Transit System Date Drilled: October 22, 2008 Client: Dillon Consulting Ltd. Depth of Testhole: 2.1 m Site: Southwestern Transit Corridor Logged by: Kurtis Kulchyski Testhole Location: 633600 E / 5526274N - Jessie Avenue Date Drilled: October 22, 2008				
		Subsurface Profile	Laboratory Testing		
Depth (m)	Symbol	Description	Water Content (%) 0 20 40 60 80 100		
0.0-		Ground Surface Limestone Base (GW)			
0.5-		 20 mm maximum aggregate size Clay Fill (CH) brown, stiff, moist, high plasticity, some fine gravel black, firm, with fiberous organics between 0.3 to 0.6 m brown below 0.6 m 	22 40		
- 1.0- - -			27		
1.5-		Silt (CL-ML) - light grey/tan, firm/soft, moist, low plasticity, some clay - saturated below 1.7 m	25		
- 2.0-		Clay (CH) - brown, stiff, moist, high plasticity, with trace layers of silt	33		
2.5-		 Testhole was terminated 2.1 m Minor water seepage was observed within the saturated silt I during drilling No sloughing was observed during or upon completion of the testhole 			
3.0-					

NATEUNAL TESTING LABORATORIES LIMITED TESTHOLE 2008-8 Project Name: Bus Rapid Transit System Date Drilled: October 30, 2008 Client: Dillon Consulting Ltd. Depth of Testhole: 2.1 m Site: Southwestern Transit Corridor Logged by: Kurtis Kulchyski Testhole Location: 633883 E / 5526945 N - Lagopoulus Way Subsurface Profile Laboratory Testing Water Content Depth Symbol Description (%) 40 60 (m) 80 100 0 20 Ground Surface 0.0 1000 E. 100 Asphalt Concrete Concrete 94 Fill black mixture of granular base and clay ß 9, 0.5 Granular Fill (SW) - tan, compact, moist, fine to coarse sand, with fine gravel stained grey, with hydrocarbon smell below 0.5 m Clay (CH) - black, stiff, moist, high plasticity, trace fine gravel to 0.7 m grey below 0.8 m 1.0 Silt (CL-ML) - grey, soft, moist, low plasticity, with clay - saturated below 1.4 m - with layers of clay below 1.7 m 1.5 Clay (CH) - brown, stiff, moist, high plasticity 2.0 Testhole was terminated 2.1 m · No water seepage or sloughing were observed during or upon completion of drilling 2.5 3.0

NATEONAL TESTING LABORATORIES LIMITED **TESTHOLE 2008-9** Project Name: Bus Rapid Transit System Date Drilled: October 22, 2008 Client: Dillon Consulting Ltd. Depth of Testhole: 2.1 m Site: Southwestern Transit Corridor Logged by: Kurtis Kulchyski Testhole Location: 633974 E / 5527056N - Between Stradbrook and CNR Rivers Subsurface Profile Laboratory Testing Water Content Depth Symbol Description (%) 40 60 (m) 80 100 0 20 Ground Surface 0.0 Topsoil Clay Fill (CH) - brown, stiff, moist, high plasticity, some fine gravel 25 0.5 24 • Granular Fill (SW) 0,0 Ð 6 10 - tan, compact, moist, fine to coarse sand, with fine gravel, some . 1 clay 1.0 Ð. Ð 6 6 q 1.5Silt (CL-ML) - tan, soft, moist, low plasticity, with layers of clay Clay (CH) - brown, stiff, moist, high plasticity 2.0 Testhole was terminated 2.1 m · No water seepage or sloughing were observed during or upon completion of drilling 2.5 3.0

NATEUNAL TESTING LABORATORIES LIMITED **TESTHOLE 2008-10** Project Name: Bus Rapid Transit System Date Drilled: October 22, 2008 Client: Dillon Consulting Ltd. Depth of Testhole: 0.9 m Site: Southwestern Transit Corridor Logged by: Kurtis Kulchyski Testhole Location: 634096 E / 5527211N - Between Stradbrook and CNR Rivers Subsurface Profile Laboratory Testing Water Content Depth Symbol Description (%) 40 € (m) 60 80 100 0 20 Ground Surface 0.0 Clay Fill (CH) - brown, stiff, moist, high plasticity, some fine gravel, trace vegetation at the surface 7 Limestone Base (GW) 0.5 20 mm nominal maximum aggregate size 2 0 ° 0 6 Granular Fill (SW) - brown, compact, moist, fine to medium sand, trace fine gravel 0°6 1 · Auger refusal occured at 0.9 m on a suspected concrete slab 1.0 Testhole was relocated approx. 1.5 m from the original location. Auger refusal was observed between 0.9 to 1.0 m on a suspected concrete slab in each of the three attempts. 1.5 2.0 2.5 3.0

TESTHOLE 2008-11 LABORATORIES Project Name: Bus Rapid Transit System Date Drilled: October 22, 2008 Client: Dillon Consulting Ltd. Depth of Testhole: 2.1 m Site: Southwestern Transit Corridor Logged by: Kurtis Kulchyski Testhole Location: 634169 E / 5527322 N - Between Stradbrook and CNR Rivers Subsurface Profile Laboratory Testing Water Content Depth Symbol Description (%) 40 60 (m) 80 100 0 20 Ground Surface 0.0 Clay Fill (CH) - brown, stiff, moist, high plasticity, trace fine gravel, vegetation at the surface 5 Limestone Base (GW) 0.5 - 20 mm nominal maximum aggregate size Clay (CH) - brown, stiff, moist, high plasticity 1.0 2Ø 2|8 1.5 30 2.0 Testhole was terminated at 2.1 m · Sloughing within the limestone layer was observed during drilling · No water seepage was observed during or upon completion of drilling 2.5 3.0

		TESTHOLE 2008-D1	ĺ	
Client Site:	t: Dillon C Southwes	Consulting Ltd. Dept	h of Testh	october 30, 2008 nole: 2.1 m ırtis Kulchyski
		Subsurface Profile		Laboratory Testing
Depth (m)	Symbol	Description	ç	Water Content (%) 20 40 60 80 100
		Ground Surface		
0.0-		Asphalt Concrete		
-	57-157-	Concrete		
-		Granular Base - black mixture of granular base and clay		20
0.5- -		Clay (CH) - black, stiff, moist, high plasticity, with layers of grey silty clay b 0.5 m	elow	28
- - 1.0- - -	•	Silt (CL-ML) - tan, firm/soft, moist, low plasticity, some clay		24 23
- 1.5- - - 2.0-		Clav (CH) - brown, stiff, moist, high plasticity, trace layers of silt		33 31 39
		 Testhole was terminated 2.1 m No water seepage or sloughing were observed during or upon completion of drilling 	1	
- - - 3.0-				
-				

NATEUNAL TESTING LABORATORIES LIMITED TESTHOLE 2008-D2 Project Name: Bus Rapid Transit System Date Drilled: October 30, 2008 Client: Dillon Consulting Ltd. Depth of Testhole: 2.1 m Site: Southwestern Transit Corridor Logged by: Kurtis Kulchyski Testhole Location: 633669 E / 5526486 N - Donald Street Subsurface Profile Laboratory Testing Water Content Depth Symbol Description (%) 40 6 (m) 0 20 60 80 100 Ground Surface 0.0 Asphalt Concrete Concrete 21 Granular Fill (SP) - black, compact, moist, fine to coarse sand, some fine gravel and 0.5 clay n c C(fragments of slag and black carbon/coal observed within the fill) 20 202Sand Fill (SM) 1.0 - tan, compact, saturated, fine to medium grained 15 Clay (CH) - grey, stiff, moist, high plasticity, - trace layers of silt below 1.8 m 1.5 35 2.0 Testhole was terminated 2.1 m · Minor water seepage observed from the saturated sand layer during drilling. · Water level and sloughing observed below 1.4 m upon completion 2.5 of drilling. 3.0

NATEUNAL TESTING LABORATORIES LIMITED TESTHOLE 2008-D3 Project Name: Bus Rapid Transit System Date Drilled: October 30, 2008 Client: Dillon Consulting Ltd. Depth of Testhole: 2.1 m Site: Southwestern Transit Corridor Logged by: Kurtis Kulchyski Testhole Location: 633641 E / 5526544 N - McMillan Avenue Subsurface Profile Laboratory Testing % Sand (%) Clay (%) Depth Water Content (%) Gravel (Silt (%) Symbol Description (m) ΡI 11 25 50 0 75 100 Ground Surface 0.0 Asphalt Concrete Concrete 32 Granular Base (SW) 20 mm maximum aggregate size 0.5 Clay (CH) - black, firm, moist, high plasticity, with layers of grey clayey silt Clayey Silt (CL) 23 - tan, firm, moist, low to intermediate plasticity, some clay 0.4 6.5 62.7 30.4 1.0 25 Clay (CH) - brown, stiff, moist, high plasticity 1.5 2.0 Testhole was terminated 2.1 m No water seepage or sloughing was observed during or upon completion of drilling 2.5 3.0

TER NATEONAL TESTING LABORATORIES LIMITED TESTHOLE 2008-D4 Project Name: Bus Rapid Transit System Date Drilled: October 30, 2008 Client: Dillon Consulting Ltd. Depth of Testhole: 2.1 m Site: Southwestern Transit Corridor Logged by: Kurtis Kulchyski Testhole Location: 633710 E / 5526587 N - Donald Street Subsurface Profile Laboratory Testing 8 Clay (%) Sand (%) Depth Water Content (%) Symbol Grave Silt (%) Description (m) 25 50 75 100 0 Ground Surface 0.0 Asphalt Concrete Concrete 29 Granular Base (SW) 20 mm maximum aggregate size 0.5 Clay (CH) - black/grey, stiff, moist, high plasticity brown below 0.8 m - trace layers of saturated silt and fine 30 sand below 1.5 m 1.0 32 0 1.3 14.3 84.4 333 1.5 33 2.0 · Testhole was terminated 2.1 m Minor/moderate water seepage was observed from the saturated layers of silt/fine sand below 1.5 m during drilling 2.5 · Water level observed at 2.0 m upon completion of drilling • No sloughing was observed during or upon completion of drilling 3.0

TESTHOLE 2008-D5 LABORATORIES Project Name: Bus Rapid Transit System Date Drilled: October 22, 2008 Client: Dillon Consulting Ltd. Depth of Testhole: 2.1 m Site: Southwestern Transit Corridor Logged by: Kurtis Kulchyski Testhole Location: 633768 E / 5526749N - Between Donald Street and CNR Rivers Subsurface Profile Laboratory Testing Water Content Depth Symbol Description (%) 40 60 (m) 80 100 0 20 Ground Surface 0.0 Topsoil Clay Fill (CH) brown, stiff, moist, high plasticity, some fine gravel
 trace silt inclusions below 0.6 m 17 0.5 30 1.0 29 Fill - mixture of clay, sand, and fine gravel - saturated below 1.2 m 219 1.5 2.0 Clay (CH) 48 - black, stiff, moist, high plasticity Testhole was terminated 2.1 m
 Moderate water seepage was observed within the saturated fill layer during drilling 2.5 Water level at 0.9 m upon completion of drilling Sloughing below 1.5 m upon completion of drilling 3.0

NATEUNAL TESTING LABORATORIES LIMITED TESTHOLE 2008-H1 Project Name: Bus Rapid Transit System Date Drilled: October 30, 2008 Client: Dillon Consulting Ltd. Depth of Testhole: 2.1 m Site: Southwestern Transit Corridor Logged by: Kurtis Kulchyski Testhole Location: 633925 E / 5527037 N - Stradbrook Avenue Subsurface Profile Laboratory Testing Water Content Depth Symbol Description (%) 40 60 (m) 80 100 0 20 Ground Surface 0.0 Concrete 4 Limestone Base (GW) - 20 mm maximum aggregate size 0.5 Recycled Concrete Fill 1.0 - dark grey, dense, with sand and fine gravel Silt (CL-ML) - tan, firm, moist, low plasticity, with clay 24 1.5 Clay (CH) - brown, stiff, moist, high plasticity, with layers of silt 2.0 31 Testhole was terminated 2.1 m · No water seepage was observed during or upon completion of drilling · Sloughing at 1.4 m from the limestone base was observed upon 2.5 completion of drilling. · Black polyethylene fibers were observed between the recycled concrete and silt layer. 3.0

THE NATEINAL TESTING LABORATORIES LIMITED TESTHOLE 2008-H2 Project Name: Bus Rapid Transit System Date Drilled: October 30, 2008 Client: Dillon Consulting Ltd. Depth of Testhole: 2.1 m Site: Southwestern Transit Corridor Logged by: Kurtis Kulchyski Testhole Location: 633981 E / 5527097 N - Stradbrook Avenue Subsurface Profile Laboratory Testing Water Content (%) 40 Depth Symbol Description (m) 80 100 20 60 0 Ground Surface 0.0 - 100 Concrete Limestone Base (GW) 7 - 20 mm maximum aggregate size Clay Fill (CH) - brown, stiff, moist, high plasticity, trace fine gravel 0.5 Silt (CL-ML) - light grey/tan, firm/soft, moist, low plasticity, with layers of clay 28 1.0 Clay (CH) - brown, stiff, moist, high plasticity 1.5 2.0 48 · Testhole was terminated 2.1 m · No water seepage or sloughing was observed during or upon completion of drilling 2.5 3.0

		TESTHOLE 2008-H3	INCOMPACTOR
Client Site: \$	t: Dillon C Southwes	Consulting Ltd. Depth	rilled: October 30, 2008 of Testhole: 2.1 m d by: Kurtis Kulchyski
		Subsurface Profile	Laboratory Testing
Depth (m)	Symbol	Description	Water Content (%) 0 20 40 60 80 100
0.0-	54740877963674047	Ground Surface	
-		Concrete Limestone Base (GW) - 20 mm maximum aggregate size Clay Fill (CH)	25
0.5- - -		- brown, stiff, moist, high plasticity, with silt and fine gravel	32 26
1.0- - - -			33 30
1.5- - - -		Clay (CH) - brown, stiff, moist, high plasticity	31
2.0		 Testhole was terminated 2.1 m No water seepage or sloughing was observed during or upon 	3p
- 2.5- - -		completion of drilling	
3.0- - -			

Pavement Core Photos



Pavement core from Testhole TH 2008-8



Pavement core from Testhole TH 2008-D1



Pavement core from Testhole TH 2008-D2



Pavement core from Testhole TH 2008-D3



Pavement core from Testhole TH 2008-D4



Pavement core from Testhole TH 2008-H1



Pavement core from Testhole TH 2008-H2



Pavement core from Testhole TH 2008-H3