The City of Winnipeg Bid Opportunity No. 262-2011

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Appendix 'A' Page 1 of 1

APPENDIX 'A'

GEOTECHNICAL REPORT



2011 Residential Street Renewal Garrioch Avenue, Camden Place, and Ridley Street Sub-Surface Investigation

Sub-Surface Investigation Report May 2011



2011 Residential Street Renewal Garrioch Avenue, Camden Place, and Ridley Street Sub-Surface Investigation

Sub-Surface Investigation Report May 2011

Prepared for:

Morrison Hershfield Suite I, 25 Scurfield Blvd Winnipeg, Manitoba R3Y IG4



TREK Geotechnical Inc. Per:

Prepared by:

Styten leanon

Stephen Renner Geotechnical Technician





Table of Contents

1.0	Introduction	2
2.0	Sub-Surface Investigation and Laboratory Program	2

List of Figures

Figure 01	Test Hole Location Plan – Garrioch Avenue
Figure 02	Test Hole Location Plan – Camden Place
Figure 03	Test Hole Location Plan – Ridley Streeet

List of Appendices

Appendix A	Laboratory Testing Results Summary and Test Hole Logs
Appendix B	Photos of Core Samples



I.0 Introduction

This report summarizes the results of the sub-surface investigation complete for the propsed 2011 Residential Street Renewals of Garrioch Avenue, Camden Place, and Ridley Street in Winnipeg. The project consists of reconstruction of the existing streets. Information regarding the concrete, asphalt, road base for the existing road, and the soil stratigraphy beneath the existing road is provided.

2.0 Sub-Surface Investigation and Laboratory Program

A total of 20 test holes were drilled on Garrioch Avenue (TH11-01 to 10), Camden Place (TH11-11 to 16), and Ridley Street (TH11-17 to 20) at the locations shown on Figures 01 to 03. The test holes were drilled in order to determine sub-surface conditions at the three sites for reconstruction of the existing streets.

The sub-surface investigation was conducted on March 28 and 29, 2011. The test holes were drilled to a depth of 3.1 m below road surface by Paddock Drilling Ltd. using their Brat 22 truck mounted drill rig equipped with 125 mm diameter solid stem augers. The pavement structure (asphalt or concrete) was cored by Quality Coring 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 Stephen Renner of TREK. Other pertinent information such as ground water 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 hydrometer tests. The laboratory information has been included on the test hole logs and a summary table of the laboratory testing results has been included in Appendix A. Photos of the concrete and asphalt cores are included in Appendix B.

Test hole locations noted on the test hole logs and shown on Figure 01 to 03 are based on measured distances from the nearest curb and associated house number.



Figures

Test Hole Location Plans



∐40 m



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Test Hole Location Plan Garrioch Avenue Figure 01



City of Winnipeg 2011 Residential Streets 0035-001-00







Figure 02 Test Hole Location Plan Camden Place

City of Winnipeg 2011 Residential Streets 0035-001-00

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City of Winnipeg 2011 Residential Streets 0035-001-00



Appendix A

Laboratory Testing Results Summary and Test Hole Logs

Testilals	Test Hale Leastion	Linuar	Paveme	nt Surface	Pavement Stre	ucture Material		Comula	Moisture		Hydrometer	Analysis		At	tterberg Lin	nits
No.	(Street Name)	No.	Туре	Thickness (mm)	Туре	Thickness (mm)	Subgrade Description	Depth (m)	Content (%)	Gravel (%)	Sand (%)`	Silt (%)	Clay (%)	Plastic	Liquid	Plasticity Index
	Garrioch Avenue	105	Asphalt	38	Concrete	165										
							Clay	0.2	45							
							Clay	0.5	38							
							Clay	0.8	24							
TH11-01							Clay	1.1	34							
							Clay	1.4	34							
							Clay	1.7	41							
							Clay	2.0	38							
							Clay	2.3	38							
							Clay	2.9	53							
	Garrioch Avenue	115	Asphalt	38	Concrete	165										
							Clay	0.2	36							
							Clay	0.5	32							
							Clay	0.8	28	0	19	24	57	17	62	45
TH11-02							Clay	1.1	33							
11111 02							Clay	1.4	31							
							Clay	1.7	36							
							Clay	2.0	41							
							Clay	2.3	45							
							Clay	2.9	35							
	Garrioch Avenue	127	Asphalt	64	Concrete	165										
							Clay	0.2	55							
							Clay	0.5	66							
							Clay	0.8	38							
TH11-03							Clay	1.1	35							
							Clay	1.4	35							
							Clay	1.7	38							
							Clay	2.3	43							
							Clay	2.9	37							
	Garrioch Avenue	135	Asphalt	25	Concrete	165										
							Clay	0.2	43							
		ļ					Clay	0.5	38				ļ		ļ	l
		ļ					Clay	0.8	32	-	<u> </u>					L
TH11-04		ļ					Silt	1.1	25	0	0	62	31	12	29	17
		-	1				Silt	1.4	24		<u> </u>	<u> </u>	-		1	
							Clay	1./	34							
			-				Clay	2.3	36		-					4
							Clay	2.9	32							
	Garrioch Avenue	143	Asphalt	32	Concrete	171	<u> </u>									<u> </u>
							Clay	0.2	48							
							Clay	0.5	29							
T 1144 0-		-	1				Clay	0.8	30		<u> </u>	<u> </u>	-		1	
1H11-05							Clay	1.1	31							
		<u> </u>	<u> </u>				Clay	1.4	36		<u> </u>		<u>├</u> ───		<u> </u>	<u> </u>
		<u> </u>	<u> </u>				Clay	1./	39		<u> </u>		<u>├</u> ───		<u> </u>	<u> </u>
			ļ				Clay	2.3	39		l		ļ		ļ	
				1			Clay	2.9	36	1		1				1

Test	Test Hale Leastion	Linua	Paveme	nt Surface	Pavement Str	ucture Material		Comula	Moisture		Hydrometer	Analysis		A	tterberg Lin	iits
No.	(Street Name)	No.	Туре	Thickness (mm)	Туре	Thickness (mm)	Subgrade Description	Depth (m)	Content (%)	Gravel (%)	Sand (%)`	Silt (%)	Clay (%)	Plastic	Liquid	Plasticity Index
	Garrioch Avenue	145	Asphalt	57	Concrete	146										
							Clay	0.2	30							
							Clay	0.5	21							
							Clay	0.8	31	0	14	38	49	14	47	33
TH11-06							Clay	1.1	40							
							Clay	1.4	37							
							Clay	1.7	37							
							Clay	2.3	41							
							Clay	2.9	44							
	Garrioch Avenue	163	Asphalt	57	Concrete	146										
							Clay	0.2	37							
							Clay	0.5	32							
							Clay	0.8	37							
TH11-07							Clay	1.1	35							
							Clay	1.4	30							
							Clay	1.7	33							
							Clay	2.3	34							
							Clay	2.9	42							
	Garrioch Avenue	171	Asphalt	38	Concrete	165										
							Clay	0.2	39							
							Clay	0.5	40							
							Clay	0.8	42							
TH11-08							Clay	1.1	27							
							Clay	1.4	27							
							Clay	1.7	40							
							Clay	2.3	37							
							Clay	2.9	45							
	Garrioch Avenue	183	Asphalt	38	Concrete	152										
							Clay	0.2	47							
							Clay	0.5	46							
							Clay	0.8	40	0	2	12	86	22	85	63
TH11-09							Clay	1.1	38							
					ļ		Clay	1.4	40	ļ						
					ļ		Clay	1.7	40	ļ						
					ļ		Clay	2.3	47	ļ						
							Clay	2.9	52							
	Garrioch Avenue	Church	Asphalt	51	Concrete	152										
		ļ					Clay	0.2	55	ļ					ļ	
		ļ					Clay	0.5	39	ļ					ļ	
		ļ					Clay	0.8	34	ļ					ļ	
TH11-10		ļ					Clay	1.1	30							
		L					Clay	1.4	36			L				
		ļ					Clay	1.7	36	ļ					ļ	
		ļ					Clay	2.3	43	ļ					ļ	
							Clay	2.9	50							

Test Hole No.	Test Hole Location	Llavaa	Paveme	nt Surface	Pavement Str	ucture Material		Comula	Moisture		Hydrometer	Analysis		At	terberg Lim	iits
No.	(Street Name)	No.	Туре	Thickness (mm)	Туре	Thickness (mm)	Subgrade Description	Depth (m)	Content (%)	Gravel (%)	Sand (%)`	Silt (%)	Clay (%)	Plastic	Liquid	Plasticity Index
	Camden Place	542	Asphalt	64	-	-										
							Sand (Fill)	0.1	7							
							Clay (Fill)	0.2	29							
							Clay (Fill)	0.5	36							
							Silt	0.8	28							
TH11-11							Clay	1.1	30							
							Clay	1.4	29							
							Clay	1.7	33							
							Clay	2.1	35							
							Clay	2.6	44							
	On the Direct	500	Assels	00			Clay	2.9	51							
	Camden Place	528	Asphalt	89	-	-	Cond (Fill)	0.4	44							
							Sand (FIII)	0.1	11							
				-				0.2	23							
				-			Silt	0.5	40 30	0	7	66	26	1/	33	10
TH11-12				1			Clay	0.0	30	0	'	00	20	14	- 55	13
11111-12							Silt	1.1	22							
							Silt	1.4	22			1				
				1			Clay	21	35							
				1			Clay	2.6	46							
							Clay	2.9	48							
	Camden Place	520	Asphalt	76	-	-	onaj	2.0								
							Sand (Fill)	0.1	19							
							Clay (Fill)	0.2	41							
							Clay (Fill)	0.5	38	0	8	37	55	20	67	47
							Silt	0.8	35							
TH11-13							Clay	1.1	38							
							Clay	1.4	36							
							Clay	1.7	39							
							Clay	2.1	44							
							Clay	2.6	48							
							Clay	2.9	48							
	Camden Place	512	Asphalt	76	-	-	_									
							Sand (Fill)	0.1	15							
							Clay	0.2	25							
				l			Clay	0.5	28							
TU44 44							Clay	0.8	29		<u> </u>	l				
IH11-14		+		<u> </u>			Clay	1.1	29		<u> </u>	<u>├</u> ──				
		+		<u> </u>			SIIT	1.4	28		<u> </u>	<u>├</u> ──				
		+					Silt	1./	21							
							Clay	2.1	30							
							Clay	2.0	44							
							Clay	2.9	45							

Testilit	To at the last of the state		Paveme	nt Surface	Pavement Structure Material TypeMoisture Content $Content(%)Hydrometer AnalysisAtterberg LimTypeThickness(mm)Subgrade DescriptionSampleDepth (m)MoistureContent(%)Sand (%)Salt (%)Clay (%)PlasticLiquidSand (Fill)0.118Clay0.235$	Sample		iits								
No.	(Street Name)	No.	Туре	Thickness (mm)	Туре	Thickness (mm)	Subgrade Description	Depth (m)	Content (%)	Gravel (%)	Sand (%)`	Silt (%)	Clay (%)	Plastic	Liquid	Plasticity Index
	Camden Place	498	Asphalt	57	-	-							Î			
							Sand (Fill)	0.1	18							
							Clay	0.2	35							
							Clay	0.5	35							
							Silt	0.8	21							
TH11-15							Silt	1.1	24							
							Clay	1.4	35							
							Clay	1.7	38							
							Clay	2.1	44							
							Clay	2.6	45							
							Clay	2.9	48							
	Camden Place	School	Asphalt	57	-	-	0									
							Sand (Fill)	0.1	21							
							Clay	0.2	36							
							Sand	0.5	22	0	16	42	44	20	55	25
TU11 16							Clay	0.0	31	0	10	43	41	20	55	35
1011-10							Clay	1.1	30							
							Clay	1.4	20	1						
					1		Silt	2.1	20	1						
							Silt	2.1	24							
							Silt	2.0	29							
	Ridley Street	176		-	Concrete	165	Oilt	2.5	25							
	Ridiely Officer	170			Oblicicie	105	Sand and Gravel (Fill)	0.1	13							
							Clay	0.2	29							
							Clay	0.5	38	1						
							Clav	0.8	37							
TH11-17							Clay	1.1	48							
							Clay	1.4	35							
							Clay	1.7	41							
							Clay	2.1	45							
							Clay	2.6	45							
							Clay	2.9	44							
	Ridley Street	178	-	-	Concrete	152										
							Sand and Gravel (Fill)	0.1	10							
							Clay	0.2	24							
[Clay	0.5	36							
							Clay	0.8	36	1	3	23	73	19	74	55
TH11-18							Clay	1.1	34	ļ						
							Clay	1.4	37	ļ						
							Clay	1.7	40							
			ļ				Clay	2.1	43				ļ			
			ļ				Clay	2.6	45				ļ			
		1		1	1		Clay	2.9	49		1	1	1		1	1

Test Hole No.	Test Hole Location	Llaura	Paveme	ent Surface	Pavement Str	ucture Material		Comula	Moisture		Hydrometer	Analysis		At	terberg Lin	nits
No.	(Street Name)	No.	Туре	Thickness (mm)	Туре	Thickness (mm)	Subgrade Description	Depth (m)	Content (%)	Gravel (%)	Sand (%)`	Silt (%)	Clay (%)	Plastic	Liquid	Plasticity Index
	Ridley Street	182 / 184	-	-	Concrete	152										
							Sand and Gravel (Fill)	0.1	10							
							Clay	0.2	35							
							Clay	0.5	39							
							Clay	0.8	34							
TH11-19							Clay	1.1	36							
							Clay	1.4	38							
							Clay	1.7	38							
							Clay	2.1	40							
							Clay	2.6	36							
							Clay	2.9	43							
	Ridley Street	191	-	-	Concrete	152										
							Sand and Gravel (Fill)	0.1	16							
							Clay	0.2	36							
							Clay	0.5	35							
							Clay	0.8	28							
TH11-20							Clay	1.1	34							
							Clay	1.4	30							
							Clay	1.7	30							
							Clay	2.1	37							
							Clay	2.6	33							
							Clay	2.9	36							

	-17
GEOTECHD	

Client:	Morrison Hersh	nfield			Project Nu	mber:	0035	001 0	0			
Project Name	: 2011 Residenti	al Street Renewal	8		Location:		105 G	Garrioo	ch Ave (14 U	626041 E	, 5527182 1	N)
Contractor:	Paddock Drilling	g Ltd.			Ground El	evation:	Existi	ng Gi	round			
Method:	125mm Solid S	Stem Auger, Brat 2	2 Truck Mount		Date Drille	d:	28 Ma	arch 2	011			
Sam	ple Type:	Grab	Shell	oy Tube	Split	Spoon			Split Barrel		Core	
Parti	cle Size Legend:	Clay	Silt	*****	Sand		Gravel		For Cobl	oles	Bould	lers
Depth (m)	ASPHALT (38 mm CONCRETE (165 CLAY - silty, trace - dark brown t - frozen, mois - intermediate	MA thick) mm thick) organics to black t and soft to firm v plasticity	TERIAL DESCRIPTI	ON			Sample Type	C C C C C C C C C C C C C C C C C C C	Bulk 16 17 18 Particle 0 20 40 PL 0 0 20 40	Unit Wt /m ³) 19 20 Size (%) 60 80 1 AC LL 60 80 1	21 21 000 00 0 0 0 0 0 0 0 0 0 0	rained Shear ength (kPa) Torvane △ ocket Pen. ● ⊠ Qu ⊠ field Vane ○ 100 150 2003
-0.5-								G4 G5	•			
	CLAY - silty - brown - frozen to 1.5 - high plasticit	5 m, moist and sof	t to firm when thawed	1				G6 G7	•			
-1.5	moist below 1.5 n	n										
	firm to stiff below	1.7 m						G8	•		•	
-2.0-	trace silt inclustio	ns (<15 mm diam	.), firm below 1.8 m									
	trace precipitates	(<10 mm diam.)						G9 G10				
	soft below 2.7 m							G11		•	• • • •	
	END OF TEST HO Notes: 1. No sloughing. 2. No seepage. 3. Backfilled test ho below top of pavem 4. UTM coordinate:	DLE AT 3.0 m IN C ole with auger cutt nent, and asphalt o s from hand held (LAY ings to 0.3 m below t cold patch to top of pa GPS.	op of paven avement.	nent, sand to	0.2 m						
l ogged By:	Stephen Renner		Reviewed Bv:	Nelson Fe	rreira		F	Proie	ct Engineer:	Nelson	Ferreira	

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GE	UT	ECHNIC	RL													
Client	t:	Morrison Hersh	nfield			Project I	Number:	0035	001 0	0						
Proje	ct Nam	e: 2011 Residenti	ial Street Renewal	S		Locatior	n:	115 0	Garrioo	ch Ave	(14 U 62	25984 E	E, 5527	183 N)	
Contr	actor:	Paddock Drillin	g Ltd.			Ground	Elevation	: Exist	ing Gr	round						
Metho	od:	125mm Solid S	Stem Auger, Brat 2	2 Truck Mount		Date Dri	lled:	28 Ma	arch 2	2011						
	Sam	iple Type:	Grab	S	Shelby Tube	Sr	olit Spoon			Split Ba	arrel		Core	Э		
	Part	icle Size Legend:				Sand	•••	Gravel		[53	Cobble			Boulde	are	
	i ait	icie Olze Legena.			<u>°°°°</u>	Sanu		Oraver	L		Bulk U	nit Wt		Undra	ained S	hear
	ō							/be	nbei	16 17	(kN/m 18	r) 19 20	21	Stre	ngth (k	Pa)
n)	ymt		MA	TERIAL DESCR				e T)	Nur	F	Particle Si	ze (%)		∆ T o Por	orvane	:∆ •n ota
۳. ۳	oil S							Idmi	Jple	0 20	40 I	60 80	100	٦	🛛 Qu 🖂]
	Š							S	San	0 20		60 80	100 0	O Fie	eld Var	ie ⊖ 0 20025
	- 6 d	ASPHALT (38 mm	n thick)						C12							
	A A A	CONCRETE (165	mm thick)						C13							
F -		CLAY - silty, trace	organics						G14		•					
È -		- dark brown t - frozen mois	to black st and soft to firm v	when thawed												
F -		- intermediate	e plasticity													
-0.5-									G15		•					
F -													• •			
									G16			-				
F												•	• •			
-1.0-																
									G17		•					
E -		CLAY - silty												_		
E 3		- brown - frozen to 1.7	7 m, moist and sof	t to firm when the	awed											
		- high plastici	ty						G18		•					
		- trace silt inclusion	ns (<10 mm diam.) below 1.5 m												
		maint stiff balow	17m													
		- moist, stin below	1.7 111						G19		•			_∕₽		
-2.0-																
									G22		•			¢ A		
<u>i</u> – –																
									G20		•			4		
-2.5-		- trace silt inclusion	ns (<20 mm diam.), trace oxidation	, trace precipitat	es (<5 mm	diam.),									
				- 7 111												
									<u> </u>							
-3.0-									G21		•		4			
		END OF TEST HC Notes:	DLE AT 3.0 m IN C	CLAY												
		1. No sloughing.														
		3. Backfilled test h	ole with auger cut	tings to 0.3 m bel	low top of paver	nent, sand f	to 0.2 m									
		below top of paven 4. UTM coordinate	nent, and asphalt on s from hand held (cold patch to top GPS.	ot pavement.											
Loaa	ed Bv:	Stephen Renner		Reviewed I	By: Nelson Fe	erreira			Projec	ct Enai	neer:	Nelson	Ferrei	ra		
		•			-					5						

TREK
GEOTECHNICAL

UCUI	CLHIIL	HC												
Client:	Morrison Hersh	nfield			Project Number:	0035 001 00								
Project Nam	e: 2011 Residenti	al Street Renewal	S		Location:	127 Ga	rrioch Ave (14	U 6259	922 E, 55	27184 N)				
Contractor:	Paddock Drillin	g Ltd.			Ground Elevation	n: Existin	g Ground							
Method:	125mm Solid S	stem Auger, Brat 2	2 Truck Mount		Date Drilled:	28 Mar	ch 2011							
Sam	nple Type:	Grab	Shel	by Tube	Split Spoon		Split Barre	9	Co	ore				
Part	ticle Size Legend:	Clay	Silt	****	Sand	Gravel	67 C	obbles		Boulder	S			
Depth (m) Soil Symbol	ASPHALT (64 mm CONCRETE (165	MA thick) mm thick)	TERIAL DESCRIPTI	ON		Sample Type	Instruction Instruction	Bulk Unit V (kN/m ³) 18 19 icle Size (40 60 MC 40 60	Wt 20 21 (%) 80 100 LL -1 80 100 0	Undrai Stren △ To ● Poc ⊠ ○ Fie 50 10	ned Shear gth (kPa) orvane ∆ ket Pen. ∳ Qu ⊠ Id Vane ⊖ 0 150 20025			
	- dark brown t - frozen, wet a - intermediate - trace organics (ro	o black and very soft wher plasticity potlets) below 0.5 r	n thawed n				526 527 528							
2.0	CLAY - silty - brown - moist, firm - high plasticit - stiff below 1.5 m - trace silt inclusior	ty ns (<20 mm diam.), trace oxidation, mc	ttled brown	and grey below 1.8 r	m	329 • 330 •			4				
-2.5-	- trace gravel (<5 n - trace organics (ar END OF TEST HC Notes: 1. No sloughing. 2. No seepage.	nm diam.), soft to morphous) below : DLE AT 3.0 m IN C	firm below 2.7 m 2.9 m CLAY				G31			•				
Longe d Der	3. Backfilled test he below top of paven 4. UTM coordinate	ole with auger cut nent, and asphalt o s from hand held	ings to 0.3 m below to cold patch to top of pa GPS.	top of paven avement.	nent, sand to 0.2 m			ow. N1-		oiro				
Logged By:	Stephen Kenner		Reviewed By:	INEISON FE	rielfa	Pr	oject Engine	er: <u>N</u> e	eison Ferr	eira				

SEKEK	
GEOTECHNICAL	

GEOT	ECHNIC												
Client:	Morrison Hersh	field			Project N	umber:	0035	001 0	0				
Project Nam	e: 2011 Residentia	al Street Renewals	8		Location:	:	_135 G	arrioc	ch Ave (14 U 6	25891 E, 5	527184 N)	
Contractor:	Paddock Drilling	g Ltd.			Ground E	levation	: Existi	ng Gr	round				
Method:	125mm Solid S	tem Auger, Brat 2	2 Truck Mount		Date Drill	led:	28 Ma	arch 2	011				
San	nple Type:	Grab	Shelb	y Tube	Spl	it Spoon		X :	Split Barrel		Core		
Par	ticle Size Legend:	Clay	Silt	••••••	Sand		Gravel		Cobble	es 💽	Boulde	ers	
Depth (m) Soil Symbol		MA	TERIAL DESCRIPTIC	N			Sample Type	Sample Number	Bulk U (kV/m) Particle S 0 20 40 PL MC 0 20 40	njit Wt 19 20 21 ize (%) 60 80 100 LL 60 80 100	Undra Stre	ained Shea ngth (kPa) Forvane △ cket Pen. • ☑ Qu ☑ eld Vane ○ 00 150	ar • • • •
	ASPHALT (25 mm CONCRETE (165 - dark brown t - frozen, mois - intermediate SILT - clayey - light brown - frozen, mois - low to interm	thick) mm thick) organics o black t and soft when th plasticity	awed					C33 C34 G35 G36 G37 G38					
	CLAY - silty, trace - brown - moist, stiff - high plasticit	silt inclusions (<20 y) mm diam.)					G39 G40	•			•	
								G41				• • •	
-3.0-	END OF TEST HO Notes: 1. No sloughing. 2. No seepage. 3. Backfilled test ho below top of paverr 4. UTM coordinates	LE AT 3.0 m IN C ble with auger cutt lent, and asphalt c s from hand held 0	LAY ings to 0.3 m below to old patch to top of pa GPS.	op of pavem vement.	nent, sand to	o 0.2 m		G42			<u> </u>		
Logged By:	Stephen Renner		Reviewed By:	Nelson Fer	rreira		_ F	Projec	ct Engineer:	Nelson Fe	rreira		,

	-17
GEOTECHD	

GE		ECHNIC	HL													
Client	:	Morrison Herst	hfield			Projec	t Number:	0035	001 0	0						
Projec	ct Name	e: 2011 Resident	ial Street Renewal	s		Locati	on:	141 (Garrio	ch Ave	e (14 U 6	25853 E	E, 5527	7209 N)	
Contra	actor:	Paddock Drillin	ng Ltd.			Ground	d Elevation	: Exist	ting G	round						
Metho	od:	125mm Solid S	Stem Auger, Brat 2	2 Truck Mount		Date D	rilled:	28 M	arch 2	2011						
	Sam	ple Type:	Grab	She	by Tube		Split Spoon			Split B	arrel		Cor	е		
	Parti	cle Size Legend	Clay		- [*****	Sand		Gravel		[0]	Cobble	es		Boulde	ers	
	- 4.1	olo elzo Logolia.			<u>```````</u>	Garia			<u>۔</u>		Bulk U	Jnit Wt		Undra	ained S	hear
	0							ype	mbe	16 17	(kN/n 7 18	n ^v) 19 20	21	Stre	ngth (k	Pa)
n) bth	ym		МА	TERIAL DESCRIPT	ION			e T	NU		Particle S	ize (%)		∆ I ∳ Po	orvane cket Pe	e.∆ en. Φ
ă –	oil							dma	nple	0 20) 40	60 80	100	Σ	🛛 Qu 🖂	1
	S							s	Sar	0 20		60 80	100 0	O Fi	eld Var 00 15	ne⊖ 0 20025
	0 4 A V	ASPHALT (32 mm	n thick)					<u>i</u>	C43							
	° (CONCRETE (171	mm thick)						C44							
╞╶╡	1////	CLAY - silty, trace	organics						G45							
╞╶┤		 dark brown frozen, mois 	to black st and firm when th	nawed										_		
╞╶╡		- low to intern	nediate plasticity													
-0.5-									G46		•					
╞╶╡																
		SILT - clayey, light	t brown, frozen, low	v to intermediate pla	sticity											
⊧ ≠		CLAY - silty							G47		•					
1		- frozen to 1.7	7 m, moist and firm	n to stiff when thawe	d									_		
-1.0-		- high plastici	ity													
-									G48		•					
⊧ -1																
╞ ┤																
F _ 7									G49		•					
-1.5-														_		
F 7																
F -7		trace silt inclustic	ons (<20 mm diam	.) moist, stiff below 1	.7 m				G50		•			۵		
$F - \frac{1}{2}$																
E_{a}														_		
$\begin{bmatrix} 2.0 \end{bmatrix}$																
E ∃																
E-B																
E 3									G51		•			•∆		
-25-		trace gravel (<20) mm diam.), firm to	o stiff below 2.4 m										_		
														_		
<u>t</u>																
╞╶╛														_		
t 1		fine h l 0.0														
-3.0-		TIRM DEIOW 2.9 M							G52		•			•		
<u> </u>	[END OF TEST HO	DLE AT 3.0 m IN C	CLAY							I			-		1
	1	votes: 1. No sloughing.														
	4	2. No seepage.	ole with auger out	tings to 0.3 m below	ton of navor	nent car	1 to 0.2 m									
	Ì	below top of paven	nent, and asphalt of	cold patch to top of p	avement.	nont, sail	a to 0.2 III									
		4. UTM coordinate	es from hand held (GPS.												
Logge	ed By:	Stephen Renner		_ Reviewed By:	Nelson Fe	erreira			Proje	ct Eng	ineer:	Nelson	Ferrei	ra		

	-17
GEOTECHD	

GEOT	ECHNIC	AL												
Client:	Morrison Hersh		Project N	umber:	0035 001 00									
Project Nar	ne: 2011 Residenti	ial Street Renewal	s		Location	:	147 G	527239 N)					
Contractor	Paddock Drillin	ig Ltd.			Ground E	levation:	Existi	ng Gr	ound		_			
Method:	125mm Solid S	Stem Auger, Brat 2	22 Truck Mount		Date Dril	led:	28 Ma	arch 2	011		_			
Sa	mple Type [.]	Grab	Shel	by Tube		it Spoon			Solit Ba	rrel		Core		
				<u> </u>										
Pa	nicle Size Legena:			<u>*.*.</u> *.	Sand		Gravei		62	Bulk Uni	t Wt	Boulde	IS	
							g	lber	16 17	(kN/m ³)	9 20 21	Stre	ngth (kPa)	
jup ()							Ty	Zun	F	article Size	∋ (%)		orvane ∆	
il Sy Der		MA	TERIAL DESCRIPT	ION			nple	ple I	0 20	40 60	0 80 100	Por Por	cket Pen. 🗣 Ngu 🕅	
S							Sai	Sam	P			O Fi	eld Vane O	
		thick)						C53	0 20	40 60	0 80 100	0 50 10	00 150 20)025
	CONCRETE (146	mm thick)						C54						
F Int								0.04						
F ¥////	- dark brown	to black						G55		•				<u> </u>
F ¥////	 frozen, mois low to intern 	st and firm when the nediate plasticity	nawed											
-0.5-	CLAY - silty,	providing						G56						
E = <i>1111</i>	- brown - frozen to 1 7	7 m. moist and firr	n when thawed					000						
F - <i>V//</i>	- intermediate	to high plasticity												
F <i>-1///</i>	- trace coarse grai	ned sand (<5 mm	diam.)					C57						
F - <i>111</i>								657						
-1.0-														
F - <i>111</i>								CE0						
F <i>-1///</i>								G20		-				
F <i>-1///</i>														
F - <i>111</i>								050						
1.5								G59		•				
F <i>1///</i>														
F <i>1///</i>	- trace silt inclusio	ns (<15 mm diam), moist, stiff below 1	.7 m						-				
F - <i>1///</i>			,,					G60		•		•		
F - <i>1111</i>														
-2.0-														
F <i>- 1111</i>														
F - <i>111</i>														
F = <i>1///</i>	- firm below 2 3 m													
F <i>-{///</i>								G61		•		o A		
-2.5-														
F - 1///														
F <i>-1///</i>														
F -///														
E - <i>1111</i>	- firm to stiff below	/29 m												_
-3.0-								G62		•		•		
	END OF TEST HC)LE AT 3.0 m IN (CLAY											
	1. No sloughing.													
	 No seepage. Backfilled test h 	ole with auger cut	tings to 0.3 m below	top of naven	nent, sand to	0.2 m								
	below top of paven	nent, and asphalt	cold patch to top of p	avement.										
	4. UTIVI coordinate	s from hand held	GPS.	N			_							
Logged By:	Stephen Renner		Reviewed By:	Nelson Fe	rreira		_ P	rojec	t Engi	neer: _N	velson ⊢er	reira		

FREK
GEOTECHNICAL

Client:	Morrison Herst	nfield			Proiect N	umber:	0035	001 0	0							
Project Nam	e: 2011 Resident	ial Street Renewa	ls		Location		163 Garrioch Ave (14 LL 625899 F 5527264 NI)									
Contractor	Paddock Drillin	altd			Ground F	Ievation	• Exist	ina Gr	ound	(1100	<u></u>		.,			
Method:	125mm Solid S	Stem Auger Brat 2	22 Truck Mount		Date Dril	led:	28 M	arch 2	011							
				been Trade a					0.14 D			0				
San	nple Type:	Grab	Shel	by Tube	Spi Spi	it Spoon				arrel		Core				
Par	ticle Size Legend:	Clay	Silt	***** *****	Sand		Gravel		60	Cobble	s 🎴	Bou	Iders			
_							Q	ber	16 17	Bulk Ur (kN/m	$\frac{1}{2}$	Ur S	ndraineo Strength	d Shear (kPa)		
mbo (th							Typ	Iml		Particle Si	7e (%)	- 4	∆ Torva	ane \triangle		
S (mg		MA	ATERIAL DESCRIPTI	ION			ple	le N	0 20	40	50 80 100) •	Pocket	Pen. 🗣		
Soi							San	amp	F	PL MC		1 с	Field V	/ane 〇		
								ى م	0 20	40 0	50 8 0 100	0 50	100	150 2002		
	ASPHALT (57 mm	thick)					/+ -	<u>C63</u>								
	CONCRETE (140							C64								
	CLAY - silty, trace	organics to black						G65		•						
	- frozen, mois	st and firm when t	hawed													
-0.5-	- intermediate	e plasticity														
								G66		•						
								G67		•						
-1 0-																
								G68		•						
1 5-								G69		•						
	CLAY - silty															
	- brown - frozen to 1.7	7 m, moist and firr	n when thawed													
	- high plastici	ty 17 m						G70		•			40			
	- moist, still below	1.7 111														
		(1 0 "														
	- trace silt inclustic	ons (<10 mm diam	n.) below 2.3 m					G71		•			•			
-25-																
///																
-20-	- trace oxidation, fi	rm to stiff below 2	9 m					G72		•		Q	2			
0.0	END OF TEST HO	OLE AT 3.0 m IN (CLAY													
	Notes:															
	2. No seepage.															
	3. Backfilled test h	ole with auger cut	tings to 0.3 m below t	top of paver	nent, sand to	o 0.2 m										
	4. UTM coordinate	es from hand held	GPS.													

GEOTECHNICAL

Client: Morison Harshfield Project Number: 2003 000 00 Project Name: 2011 Residential Street Renevals 171 Gardoch Ave (14 U 625929 E, 5527259 Contractor: Paddock Dilling Lid. Ground Elevation: Existing Ground Method: 125mm Sold Stem Auger, Brat 22 Truck Mount Date Drilled: 28 March 2011 Sample Type: Grab Shelby Tube Split Spoon Split Barrel Core Particle Size Legend: Clay Silt Silt Core Core Particle Size Legend: Clay Split Barrel Core Split B	
Project Name: 2011 Residential Street Renewals Location: 171 Garrisch Ave (14 U 625929 E, 5527259 Contractor: Paddock Drilling Ltd. Ground Elevation: Existing Ground Method: 125mm Solid Steen Auger, Brat 22 Truck Mount Date Drilled: 28 March 2011 Sample Type: Grab Shelby Tube Split Spoon Split Barrel Core Particle Size Legend: Clay Sitt Stelby Tube Split Spoon Split Barrel Core Sample Type: MatTeRIAL DESCRIPTION Split Spoon Split Barrel Core Split Split Barrel Core Sample Type: ASPHALT (38 mm thick) CCAY Split Split Barrel Core Split Split Barrel Core COLAY = Sity Troce organics G77 G77 G74 G77 G74 CLAY = Sity - intermediate plasticity G77 G77 G74 G77 G74 CLAY = Sity - intermediate plasticity G77 G77 G74 G77 G77 G77 G77 CLAY = Sity - intermediate plasticity - intermediate plasticity G76 G77 G77 <td< th=""><th></th></td<>	
Contractor: Paddock Drilling Ltd. Ground Elevation: Existing Ground Method: 126mm Sold Stem Auger, Brat 22 Truck Mount Date Drilled: 28 March 2011 Sample Type: Grab Shelby Tube Split Spoon Split Barrel Core Particle Size Legend: Clay IIII Site Split Spoon Split Barrel Core Barrel Clay IIIII Site Split Spoon Split Barrel Core Barrel Clay IIIII Site Split Spoon Split Barrel Core Barrel Clay IIIII Site Split Spoon Split Spoon Barrel Core Barrel Clay IIIIII Site Spoon Split Spoon Split Spoon Barrel Ungetter Barrel Clay IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	N)
Method: 125mm Solid Stem Auger, Brat 22 Truck Mount Date Drilled: 28 March 2011 Sample Type: Grab Shelby Tube Split Spoon Split Barrel Core Particle Size Legend: Clay Sitt Sitt Gravel Core Balk Unit Split Spoon Split Barrel Core g g g g g g Gravel Core Balk Unit Split Spoon Split Barrel Core Split Barrel Core Split Spoon Split Spl	
Sample Type: Grab Shelby Tube Split Spoon Split Barrel Core Particle Size Legend: Clay Sitt Sitt Gravet Cobbles Bod Image: Split Barrel MATERIAL DESCRIPTION Image: Split Barrel Image: Split Barrel<	
Particle Size Legend: Clay Sitt Cold Gravel Coldeis Bould Bould is 17 16 </th <th></th>	
Big E Big E Back Upt WI Unit The Back Upt WI Unit Big E	ders
CLAY - silty G75 - 0.5 G76 - 0.5 G77 - 0.5 G78 - 0.5 G79 -	Irained Shear rength (kPa) Torvane △ Pocket Pen. ● ⊠ Qu ⊠ Field Vane ○ 100 150 20025
1.0 G78 G78 G78 G78 1.5 CLAY - silty G78 G79 G79 - dark brown - frozen to 1.5 m, moist and firm when thawed G79 G79 - high plasticity G80 G80 G80 - trace coarse grained sand, stiff below 1.7 m G80 G80 G80 - trace silt inclustions (<10 mm diam.) below 2.3 m	
- dark brown - frozen to 1.5 m, moist and firm when thawed - high plasticity - moist, firm below 1.5 m - trace coarse grained sand, stiff below 1.7 m - trace silt inclustions (<10 mm diam.) below 2.3 m - trace silt inclustions (<10 mm diam.) below 2.3 m	
2.0 - trace silt inclustions (<10 mm diam.) below 2.3 m	
- trace silt inclustions (<10 mm diam.) below 2.3 m	
	.0
- trace silt inclusions (<20 mm diam.), trace oxidation, mottled brown and grey, firm below 2.9	
 END OF TEST HOLE AT 3.0 m IN CLAY Notes: 1. No sloughing. 2. No seepage. 3. Backfilled test hole with auger cuttings to 0.3 m below top of pavement, sand to 0.2 m below top of pavement, and asphalt cold patch to top of pavement. 4. UTM coordinates from hand held GPS. 	
Cogged By: Stephen Renner Reviewed By: Nelson Ferreira Project Engineer: Nelson Ferreira	

REK	
GEOTECHNICAL	

GEOT		AL																
Client:	Morrison Hersh	nfield			Project Nu	mber:	0035	001 0	0									
Project Name	2011 Residenti	ial Street Renewal	8		Location:		183 Garrioch Ave (14 U 625985 E, 5527262 N)											
Contractor:	Paddock Drillin	g Ltd.			Ground El	evation	: Existing Ground											
Method:	125mm Solid S	Stem Auger, Brat 2	2 Truck Mount		Date Drille	ed:	28 Ma	arch 2	011									
Sam	ple Type:	Grab	Shelt	by Tube	Split	Spoon			Split Ba	rrel	(Core						
Part	cle Size Legend:	Clay	Silt	•••••	Sand		Gravel		62	Cobbles		Bou	lders					
Depth (m) Soil Symbol		MA	TERIAL DESCRIPTIO	ON			Sample Type	Sample Number	16 17 Pa 0 20 PL 0 20	article Size 40 60 40 60 40 60	20 21 ≥ (%) > 80 100 LL > 80 100	Ur S • • • • • • • • • •	Idrained Itrength ☐ Torval Pocket I ☑ Qu Field V 100	Shear (kPa) ne △ Pen. Ф ⊠ ane ○ 150 2002				
	ASPHALT (38 mm CONCRETE (152 CLAY - some silt, † plasticity	n thick) mm thick) trace organics, dar	k grey, frozen, moist	and firm wh	nen thawed, ir	ntermed	iate	C83 C84 G85		•								
	- brown - frozen to 1.4 - high plastici	4 m, moist and firn ty	n when thawed					G86		•								
	moist, stiff below	1.4 m						G87 G88 G89		•			•					
2.0-	trace silt inclusion n	ns (<10 mm diam.), trace precipitates (<	<1 mm diam	n.), firm to stif	f below	1.7	G90		•		0^	<u> </u>					
2.5-	soft below 2.3 m							G91		•		• •						
-3.0	trace oxidation be END OF TEST HC Notes:	elow 2.9 m DLE AT 3.0 m IN C	LAY					G92		•		•						
Logged By:	2. Seepage observ 3. Backfilled test h below top of paven 4. UTM coordinate Stephen Renner	ed at 0.2 m. ole with auger cutt nent, and asphalt o s from hand held (ings to 0.3 m below to cold patch to top of pa GPS. _ Reviewed By: _	op of pavem avement. Nelson Fe	nent, sand to rreira	0.2 m	F	Projec	ct Engi	neer: _N	lelson Fe	rreira						

GEOTECHNICAL

Client [.]	Morrison Herst	nfield			Proie	ct Number	0035	001.0	0					
Project Nam	2011 Resident	ial Street Renewal	8		Locat	tion:	Garri	$och \Delta$	ve - In	Front of	Church (1	411626	136 E	5527262
Contractor	Paddock Drillin	nal ta	5		Grou	nd Elovation						40020	JJU L,	5521202
Mothedu		iy Liu. Diana Ausan Daat (Ground Elevation:			ung Gi						
wethod:		Stem Auger, Brat 2			Date	Drillea:	28 11	arch 2	011					
Sar	nple Type:	Grab	S	helby Tube	\bowtie	Split Spoon			Split B	arrel		Core		
Par	ticle Size Legend:	Clay	Silt	*****	Sand		Gravel		62	Cobble	s 🎴	Boul	ders	
							0	er		Bulk Un (kN/m	it Wt	Un	drained	Shear
L Lodr							Zype	qur	16 17	18 1	9 20 2 ⁻		Torva	(ĸ⊧a) ne ∆
(m) Syn		MA	TERIAL DESCRI	PTION			le l	e N		-'article Siz	£ (%) Ω 80.100	•	Pocket	Pen. 🗣
Soil							am	du	F				Qu	
							N	Sa	0 20	40 e	0 80 100	0 50	100	ane () 150 20025
	ASPHALT (51 mm	n thick)					/	C93						
	CONCRETE (152	mm thick)						C94						
	CLAY - some silt,	trace organics						G95		•				
	 dark grey frozen mois 	st and firm when th	awed											
	- intermediate	e plasticity												
-0.5-	CLAY - silty							G96		•				
	- frozen to 1.4	4 m, moist and firn	n when thawed											
	- high plastici	ty												
								G97		•				
							F						_	
-1.0-														
								G98		•				
///								000		•			_	
////	- moist, stiff below	1.4 m						<u></u>					~	
-1.5-								G99		•			×	
	- trace silt inclusion	ns (<20 mm diam.), trace organics (fine fibrous), fi	rm to sti	ff below 1.7 n	n 🗖	0400		•			- 0	
////								G100		-		•		
////	- mottled brown an	nd grey, firm below	1.8 m											
-2.0-													_	
////														
								G101		•				
-2.5-	- soft below 2.4 m													
‡ <i>≦////</i>														
-3.0-								G102		•				
	END OF TEST HO	DLE AT 3.0 m IN C	LAY						<u> </u>					
	Notes:													
	2. No seepage.													
	Backfilled test h below top of paver	ole with auger cut	ings to 0.3 m belo	w top of paver f pavement.	nent, sa	nd to 0.2 m								
	4. UTM coordinate	es from hand held	GPS.											
Logged By:	Stephen Renner		Reviewed B	v: Nelson Fe	erreira			Proje	t Eng	ineer:	Nelson Fe	erreira		

TREK
GEOTECHNICAL

Client:	Morrison Herst	nfield			Project	Number:	0035 0	01 0	0									
Project Nam	e: 2011 Residenti	ial Street Renewa	S		Locatio	n:	542 Ca	amde	en Place (14	4 U 63	30410 F	552718	0 N)					
Contractor:	Paddock Drillin	altd	0		Ground	Flevation	on: _Existing Ground											
Method:	125mm Solid S	Stem Auger Brat 2	2 Truck Mount		Date Dr	illed:	29 March 2011											
0				United Trade a			20 110				-							
Sar	npie Type:	Grab	Sne			plit Spoon						Jore						
Par	ticle Size Legend:	Clay	Silt	• • • • • • • • • • • • • • • • • • •	Sand		Gravel		62 Co	bbles		Bou	ders					
_							e	ber	■ BU (20 21	Un S	draine trength	d Shear i (kPa)				
mbo							Typ	lum	Partic	le Size	(%)	Z	\ Torva	ane $ riangle$				
Dep (m		MA	ION			ple	ole N	0 20 40	0 60	80 100	Pocket Pen.							
Soi							San	amp	PL	MC		0	Field \	/ane 〇				
								0 100	0 20 40	0 60	80 100	0 50	100	150 2002				
 ⁰ 000000	ASPHALT (64 mm	thick)	frozen dry to moist	and compac	t when tha	wed well		5103 5104	•									
:	graded	, nght brown,						3105										
	CLAY (Fill) - silty, t	trace organics, tra	ce fine grained sand	1					-									
₣ =¥>>>>	- frozen, mois	st and soft to firm	when thawed															
-0.5-	- nign plastici	ty						106										
₣ ¥▓▓								5100					_					
E -1000																		
E <u>fiii</u>	SILT - clayey, trace	e organics						3107										
	 light brown frozen, mois 	st and soft to firm	when thawed					5107	-									
-1.0-	- low plasticity	y																
	CLAY - silty, trace	fine grained sand						2108										
	- brown - frozen to 1.7	7 m. moist and firr	n when thawed					5100	-									
	- high plasticit	ty																
	- trace gravel (<25	mm diam.) at 1.4	m					2100	•									
-1.5-									•									
	- moist, firm below	1.7 m						110										
									•									
-2.0-								3111				•						
									•									
-2.5-																		
								3112		•								
		hrown clay light	nown silt moist sof	t low to into	mediate n	lasticity bio	nh	- • • •		-			_					
	plasticity clay	Sown Gay, light l	5. Switt Silt, 11015t, 501		πουίαιο μ	asticity, my	יי											
30-	CLAY - silty, brown	n, moist, soft, high	plasticity				G	G113		•		ΦA						
////	END OF TEST HO	OLE AT 3.0 m IN (CLAY									1						
	Notes: 1. No slouahina																	
	2. No seepage.	olo with ourses and	tinge to 0.2 m hole	top of power	nont and	to 0.1												
	below top of paven	nent, and asphalt	cold patch to top of p	avement.	neni, sand	ιο υ. I m												
	4. UTM coordinate	es from hand held	GPS.															
Logged By:	Stephen Renner		Reviewed By:	Nelson Fe	rreira		Pr	rojec	ct Enginee	r: <u>N</u>	elson Fe	reira						

TREK
GEOTECHNICAL

G	OT	ECHNIC	AL													
Clien	t:	Morrison Herst	nfield			Project	Number:	0035	5 001 C	00						
Proje	ct Nam	e: 2011 Resident	ial Street Renewals	8		Locatio	n:	528	Camde	en Plac	æ (14 U	63040	08 E, 58	527126	5 N)	
Contr	ractor:	Paddock Drillin	g Ltd.			Ground	Elevation	n: <u>Exis</u>	ting G	round						
Metho	od:	125mm Solid S	Stem Auger, Brat 2	2 Truck Mount		Date Dr	illed:	29 N	larch 2	2011						
	San	nple Type:	Grab	Shell	by Tube	\boxtimes s	plit Spoon			Split B	arrel		Co	re		
	Parl	ticle Size Legend:	Clay	Silt	****	Sand		Grave		62	Cobbl	es		Bould	lers	
Depth (m)	Soil Symbol	ASPHALT (89 mm	MA		ON			Sample Type	C114	16 17 I 0 20 F 0 20	Particle S 40 PL MC 40 40	Size (%) 60 8 C LL 60 8	0 21 0 100 0 100 0	0 nd Str • P • P 50	rained S rength (k Torvane ocket Pe ⊠ Qu ⊠ Field Var 100 15	near Pa) en. ● I I 0 20025
 		SAND (Fill) - trace graded CLAY (Fill) - silty, SILT - source clay	black, frozen, mois	frozen, dry to moist a	nd compact	t when tha	wed, well e plasticity		G115 G116	5 6 1	•					
-0.5		- light brown - frozen, mois - low to intern	st and soft when th nediate plasticity	awed					G117		•					
									G118				• • • •			
		CLAY - silty - brown - frozen, mois - high plastici	st and firm when th ty	awed					G119)	•					
 1.5		SILT - clayey - light brown - frozen up to - low to intern	1.7 m, moist and s nediate plasticity	soft when thawed					G120							
 		- moist, soft below	1.7 m						G121		•					
-2.0-		CLAY - silty, trace - brown - moist, stiff - high plastici	gravel (<20 mm di ty	iam.)					G122		•				20	
		- trace silt inclusion	ns (<10 mm diam.)), trace oxidation, sof	t to firm belo	ow 2.6 m			G123	<u>}</u>	•			•		
-3.0-		END OF TEST HC Notes: 1. No sloughing. 2. No seepage. 3. Backfilled test h below top of paven 4. UTM coordinate	DLE AT 3.0 m IN C ole with auger cutt nent, and asphalt c s from hand held (LAY ings to 0.2 m below t old patch to top of pa GPS.	op of paven avement.	nent, sand	to 0.1 m		0124	r				•		
Logg	ed By:	Stephen Renner		Reviewed By:	Nelson Fe	rreira			Proje	ct Eng	ineer:	Nelsc	n Ferre	eira		

GEOTECHNICAL

E	UT	ECHNIC	RL											
Client	:	Morrison Hersh	nfield			Project	Number:	0035 00	1 00					
Projec	t Nam	e: 2011 Residenti	al Street Renewal	S		Locatio	n:	520 Car	nden Pla	ace (14 U 6	30406 E, s	5527094	N)	
Contra	actor:	Paddock Drillin	g Ltd.			Ground	Elevatior	n: <u>Existing</u>	Ground		_			
Metho	d:	125mm Solid S	Stem Auger, Brat 2	22 Truck Mount		Date Dr	illed:	29 Marc	:h 2011		_			
	Sam	nple Type:	Grab	Shel	by Tube	S S	plit Spoon		Split	Barrel	C	ore		
	Part	ticle Size Legend:	Clay	Silt	**** ****	Sand		Gravel	67			Boulde	ers	
	_							e .		■ Bulk Uni (kN/m ³) 17 18 19	t Wt 20 21	Undr Stre	ained She ength (kPa	ear 'a)
÷	mbd							Typ		Particle Size	e (%)	\triangle	Torvane 2	Δ
де Се	ll Sy		MA	TERIAL DESCRIPT	ION			, nple		20 40 60	80 100	Po 🕈	icket Pen ⊠ Ou ⊠	•
	Soi							San	am	PL MC	LL	OFi	eld Vane	0
									ທ ₀ 2	20 40 60	80 100	0 50 1	00 150	2002
	°°°°°	ASPHALT (76 mm	thick)	frozon wat and com	nact whon	thawad wa	laradod	C'	125					
		CLAY - silty. trace	organics	iiozeii, wet and com	pact when	unaweu, wei	i graueu	G	120					
		- black						G	127	•				
		 frozen, mois intermediate 	e plasticity	soft when thawed										
╒╶╶┦														
-0.5-								G	128		-			
									///					
		SILT - some clay, I	ight brown, frozer	n, moist and soft whe	n thawed			G	129	•				
		CLAY - silty trace	aravel (<25 mm d	liam)										
-1.0-		- brown	graver (+20 mm e	iidiii.)										
		 frozen up to biob plasticit 	1.7 m, moist and	firm when thawed					120					
		- night plastich	ly .						130					
								G	131	•				
			4 7											
		- moist, stiff delow	1.7 M					G	132	•		C		
-2.0-								G	133	•			5	
										-				
-2.5-														
		- trace oxidation tr	ace organics (amo	orphous), firm below	2.6 m									
								G	134			4		
⊨ ≭		Among all to the t		and the firme 1 1 a	0									
-3.0-		- trace slit inclusion	is (<5 mm diam.)	, soft to firm below 2.	эm			G	135			•		
- /		END OF TEST HC	DLE AT 3.0 m IN C	CLAY										
		Notes:												
		2. No seepage.												
		3. Backfilled test h	ole with auger cut	tings to 0.2 m below	top of pave	ment, sand	to 0.1 m							
		4. UTM coordinate	s from hand held	GPS.										
Logae	d Bv:	Stephen Renner		Reviewed Bv:	Nelson F	erreira		Pro	oject En	gineer: N	lelson Fer	reira		
33*	,								-					-

TREK
GEOTECHNICAL

UC	UI	CLAIIIL	HL													
Client	:	Morrison Hersh	nfield			Projec	Number:	_003	5 001 (00						
Projec	ct Nam	e: 2011 Residenti	al Street Renewals	6		Locati	on:	_512	Camd	en Plac	ce (14 U	630406 E,	552706	65 N)		
Contr	actor:	Paddock Drillin	g Ltd.			Ground	d Elevation	n: Xi	sting G	round						
Metho	od:	125mm Solid S	Stem Auger, Brat 2	2 Truck Mount		Date D	rilled:	29	March 2	2011						
	San	nple Type:	Grab	She	elby Tube		Split Spoon	1		Split B	arrel		Core			
	Par	ticle Size Legend:	Clay	Silt	****	Sand		Grave	el	62	Cobble	es 🎦	Bou	lders		
Depth (m)	Soil Symbol	ASPHALT (76 mm SAND (Fill) - trace compact when tha CLAY - silty, trace - dark brown - frozen up to - low to intern	MA clay, trace gravel wed, well graded gravel (<12.5 mm to black 1.4 m, moist and in- rediate plasticity	TERIAL DESCRIP (<12.5 mm diam.), diam.), trace organ	ΓΙΟΝ light brown, τ ics (roots/an awed	frozen, dry norphous)	to moist a	Ind	C136 G133 G138	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	<pre></pre>	19 20 21 12e (%) 60 80 100 LL 60 80 100		La Torva Pocket ⊠ Qu Field V 100	(kPa) ine △ Pen. • ⊠ ⁄ane ⊂ 150	•
-0.5		- trace to some silt	inclusions (<25 m	m diam.)					G139	> > > 1	•					
		SILT - some clay - light brown - moist, soft - low plasticity	/						G142 G143	3	•					
-2.0		CLAY - silty - brown - moist, stiff - high plastici	ty						G144	1	•			△ �		
-2.5		- trace silt inclusion	ns (10 mm diam.),	firm to stiff below 2	2.6 m				G145	5	•		4	k		
3.0-		- trac silt inclusions	s (<20 mm diam.),	trace oxidation, tra	ce precipitate	e, firm belo	w 2.9 m		G146	6	•		•			
		END OF TEST HC Notes: 1. No sloughing. 2. No seepage. 3. Backfilled test h below top of paven 4. UTM coordinate	DLE AT 3.0 m IN C ole with auger cutt nent, and asphalt c s from hand held (LAY ings to 0.2 m below old patch to top of GPS.	/ top of paver pavement.	ment, sano	d to 0.1 m									
Logge	ed By:	Stephen Renner		_ Reviewed By	: Nelson Fe	erreira			Proje	ct Eng	jineer:	Nelson Fe	rreira			

TREK
GEOTECHNICAL

Client:	Morrison Hersh	nfield			Project N	umber:	0035 001	00					
Project Na	me: 2011 Residenti	ial Street Renewal	s		Location:		498 Cam	den Place (14	4 U 630	0407 E, 5	527009 N	I)	
Contractor	: Paddock Drillin	g Ltd.			Ground E	levation	: Existing (Ground					
Method:	125mm Solid S	stem Auger, Brat 2	22 Truck Mount		Date Drill	ed:	29 March	2011					
Sa	ample Type:	Grab	Shelt	y Tube	Spl	it Spoon		Split Barrel		Co	ore		
Pa	article Size Legend:	Clay	Silt	***** *****	Sand		Gravel	Co	bbles		Boulder	s	
Depth (m) Soil Symbol		MA	TERIAL DESCRIPTI	NC			Sample Type Sample Number	■ Bu (16 16 17 12 Partic 0 20 40 PL 0 20 40	Ik Unit V (N/m ³) 3 19 Ie Size (0 60 MC 0 60	Vt 20 21 %) 80 100 LL 80 100 0	Undrai Stren A To Pocl Strent O Fiel 50 100	ned Shear gth (kPa) orvane △ ket Pen. Φ Qu ⊠ Id Vane ○ 0 150 20	20025
	ASPHALT (57 mm SAND (Fill) - some compact when that CLAY - silty, trace - black - frozen, mois - low to intern - brown, high plast	a thick) e gravel (<20 mm wed, well graded gravel (<20 mm c st and soft when the nediate plasticity icity below 0.5 m	diam.), trace clay, ligh liam.) nawed	t brown, fro	ozen, dry to r	noist and	G12 G12 G12 G12 G12 G12	17 18 19 50					
	SILT - some clay - light brown - frozen, mois - low to intern	st and soft when the and soft when the and soft when the s	nawed				G18	52 •					
	CLAY - some silt - brown - frozen up to - high plasticit	1.2 m, moist and ty	stiff when thawed				G15	53				\ •	
	- trace silt inclusior	ns (<5 mm diam.)	, stiff below 2.0 m				G15 G15	55 0	•				
	- trace silt inclusior trace precipitates (- firm below 2.9 m	ns (<20 mm diam. <2mm diam.), firn	.), trace silt lamniation n to stiff below 2.6 m	s (<2 mm t	hick), trace (oxidation,	G15	i6	•				
-3.0-	END OF TEST HC Notes: 1. No sloughing. 2. No seepage. 3. Backfilled test h below top of paven 4. UTM coordinate	DLE AT 3.0 m IN 0 ole with auger cut nent, and asphalt is from hand held	CLAY tings to 0.2 m below t cold patch to top of pa GPS. Reviewed By:	op of paven wement.	nent, sand to	o 0.1 m	Proj	ect Enginee	r: Ne		eira		

GEOTECHNICAL

••	•			Projec	Number:	0035 001 00												
Projec	ct Name	: 2011 Residenti	al Street Renewals	S		Locati	on:	Camden Place - In Front of School (14 U 630406 E, 552696 : Existing Ground										
Contra	actor:	Paddock Drillin	g Ltd.			Groun	d Elevation:											
Vletho	d:	125mm Solid S	stem Auger, Brat 2	Auger, Brat 22 Truck Mount		Date D	rilled:	29 March 2011										
	Sam	ple Type:	Grab	Shelb	y Tube		Split Spoon		X	Split I	Barrel			С	ore			
	Parti	cle Size Legend:	Clay	Silt		Sand	•••	Gravel		67		bble	5		Bc	bulder	s	
		0							Ľ		 ■ Bi	ulk Un	it Wt		1	Undrai	ned S	hear
_	lodr							Vpe	g m	16 1	17 Ì	8 1	92	0 21		Stren ∧ To	igtn (k prvane	<u>Pa)</u> •∧
(L) ebu	Syn		MA	TERIAL DESCRIPTION	NC			ole	e Nr	0 3	Partic	cle Siz ດີ ຄ	:e(%) ∷∩ 8	0 100	•	Poc	ket Pe	en. 🕈
ב	Soil							Sami	mp		PL	MC		0 100			Qu 🛛	1
								0)	Sa	0 2	20 4	0 6	0 8	0 100 0	50	0 10	0 150	0 200
_		ASPHALT (57 mm	thick)	tion) trace day ligh	thrown from	Top day	a maist and		C158 G159		•							
		compact when that	wed, well graded	diam.), trace clay, ligh	t brown, no.	zen, ary	o moist and		C160									
		CLAY - silty, trace	gravel (<20 mm di	iam.), black, frozen, n	noist and fire	m to stiff	when thawe	ed,	GIUC									
		SAND - trace grave	el (10 mm diam.),	dark brown to black, f	rozen, dry te	o moist a	nd loose wh	en										
0.5-	,	hawed, well grade	d						C161									
		CLAX silty some	and (fine graines	4/					0101		–							
		- brown		1) 														
		 frozen up to low to interm 	1.2 m, moist and a nediate plasticity	stiff when thawed					G162									
		dark brown, high	plastic below 0.9 r	n				_							_			
1.0-		aa																
_									G163	3	•							
_																		
-																		
1 5 J									G164	ł	•					\bigtriangleup	•	
1.5								ſ										
-									G165	5	•							
2.0-		SILT - clavey													_		_	
]		- brown							G166	6	•						0	
_		- low to interm	nediate plasticity															
_																		
-																		
2.5-																		
4		trace sand (fine g	rained)						G167		•				¢			
]																		
]																		
3.0-									G168	8	•							
		END OF TEST HC	DLE AT 3.0 m IN C	LAY				V		1				[
	l ·	Notes: I. No slouahina.																
	-	2. No seepage.	ole with suger out	ings to 0.2 m below to	on of navem	ent con	1 to 0 1 m											
	ì	below top of paven	nent, and asphalt of	cold patch to top of pa	vement.	on, sali												
			/ امام مرجع ما مصحف م															

TREK
GEOTECHNICAL

GE	OT	ECHNIC	AL														
Client	t:	Morrison Hersh	nfield			Project Nu	mber:	0035 0	01 00	0							
Projec	ct Nam	e: 2011 Residenti	al Street Renewal	S		Location:		<u>176 Ridley Street (14 U 621891 E, 5527329 N)</u> n: <u>Existing Ground</u>									
Contr	actor:	Paddock Drillin	g Ltd.			Ground El	evation:										
Metho	od:	125mm Solid S	otem Auger, Brat 2	2 Truck Mount		Date Drille	ed:	29 Mar	rch 20	011							
	San	nple Type:	Grab	Shelb	y Tube	Split	Spoon		(5	Split Barrel		Core					
	Part	ticle Size Legend:	Clay	Silt	**** ****	Sand		Gravel		Cobb	les	Bould	ers				
Depth (m)	Soil Symbol		MA	TERIAL DESCRIPTIC	N			Sample Type	Sample Number	■ Bulk (kN 16 17 18 Particle 0 20 40 PL M 0 20 40	Unit Wt (m ³) 19 20 2 Size (%) 60 80 10 C LL 60 80 10	Undi Stra 0 0 0 0 0 0 0 0 0 50 1	ained Sh ength (kF Torvane ⊃ocket Per ⊠ Qu ⊠ ield Vane 100 150	ear 'a) △ ١. Φ 2002			
	A N A	CONCRETE (165	mm thick)						2169								
		SAND AND GRAV well graded CLAY - silty, trace thawed, intermedia	EL (Fill) - trace cla gravel (<20 mm d te to high plasticit	ay, light brown, frozen ia.), dark brown, froze y	, wet and c n, moist ar	compact when nd firm to stiff	thawed, when	, , , , , , , , , , , , , , , , , , , ,	G170 G171	•							
-0.5 		CLAY - silty - brown - frozen to 1.7 - high plasticit	7 m, moist and firn ty	n to stiff when thawed					G172	•							
									G173 G174 G175								
		- moist, firm below	1.7 m						G176	•		•	<u> </u>				
-2.0		- trace silt inclusior	ns (<5 mm diam.),	trace oxidation below	2.0 m				6177								
		- trace silt inclusion	ns (<20 mm diam.), trace precipitates be	elow 2.9 m				G179			•					
		END OF TEST HC Notes: 1. No sloughing. 2. No seepage. 3. Backfilled test he below top of paven 4. UTM coordinate	DLE AT 3.0 m IN C ole with auger cut nent, and asphalt o s from hand held	CLAY ings to 0.3 m below to cold patch to top of pa GPS.	op of paven vement.	nent, sand to	0.2 m										
Logge	ed By:	Stephen Renner		Reviewed By:	Nelson Fe	rreira		_ P	rojec	t Engineer:	Nelson F	erreira					

TREK
GEOTECHNICAL

	CCNIIIC															
Client:	Morrison Hersh	nfield			Project N	Number:	0035	001 C	0							
Project Nam	e: 2011 Residenti	al Street Renewal	3		Location	1: 	<u>178 Ridley Street (14 U 621888 E, 5527292 N)</u>									
Contractor:	Paddock Drillin	g Ltd.			Ground I	Elevation	1: <u>Exis</u>	ting Gi	round							
wethou:		Stern Auger, Brat 2				nea:	29 10					1_				
San	nple Type:	Grab	Shelb	y Tube	Sp Sp	olit Spoon			Split B	arrel		Core	•			
Parl	ticle Size Legend:	Clay	Silt	*****	Sand		Gravel		62	Cobbl	es i		Boulde	ers		
Depth (m) Soil Symbol	CONCRETE (152	MA mm thick)	TERIAL DESCRIPTIO	N			Sample Type	Sample Number	16 17 0 20 F 0 20	Particle S Particle S PL MC 40 PL MC 40	n3) 19 20 19 20 60 80 1 C LL 60 80 1	21 100 100 0	Ondr Stre △ - ● Po 0 Fi 50 1	ained s ength (k Forvane cket Pe ⊠ Qu ⊵ eld Var 00 15	near Pa) e △ en. Φ 1 ne ○ 0 20025	
	SAND AND GRAV well graded CLAY - silty, dark t plasticity	/EL (Fill) - trace cla prown, frozen, moi	ay, light brown, frozen st and firm to stiff who	, wet and o	compact who	en thawed	d,	G181 G182	•	•						
	CLAY - silty - brown - frozen to 1.7 - high plasticit	7 m, moist and firm ty	n to stiff when thawed					G183		•						
								G184 G185 G186		•						
-2.0-	- trace silt inclusior	ns (<10 mm diam.), moist, firm below 1.	7 m				G187 G188	• • • • • • • • • • • • • • • • • • •	•			• • •			
2.5	- soft to firm below	2.4 m) mottled brown and		26 m											
3.0	- u ace sil inclusion	is (∼∠u min uiam.	, moued brown and (yıty delow	2.0 111			G189 G190		•			♪ 0.			
	END OF TEST HC Notes: 1. No sloughing. 2. No seepage. 3. Backfilled test hi below top of paven 4. UTM coordinate	DLE AT 3.0 m IN C ole with auger cutt nent, and asphalt o s from hand held (LAY ings to 0.3 m below to old patch to top of pa GPS.	op of paver vement.	ment, sand t	to 0.2 m				1	x					
Logged By:	Stephen Renner		Reviewed By:	Nelson Fe	erreira			Proje	ct Eng	ineer:	Nelson	Ferreir	а			

GEOTECHNICAL

Client	:	Morrison Hersh	field			Project Number:	0035	001 0	0								
Projec	t Nam	e: 2011 Residenti	al Street Renewals	3		Location:	Between 182 and 184 Ridley Street (14 U 621887 E, 55272										
Contra	actor:	Paddock Drilling	g Ltd.			Ground Elevation:	Existi	ng Gi	ound								
Metho	d:	125mm Solid S	item Auger, Brat 2	2 Truck Mount		Date Drilled:	29 March 2011										
	Sam	ple Type:	Grab	Shelb	by Tube	Split Spoon		Split Barr				Core					
	Part	icle Size Legend:	Clay	Silt	****	Sand	Gravel		67	Cobbl	es	E	Boulders	S			
Depth (m)	Soil Symbol		MA	TERIAL DESCRIPTION	ON		ample Type	mple Number	16 1 0 20	■ Bulk U (kN/r 7 18 Particle S 0 40 PL MC	Jnit Wt m ³) 19 20 Size (%) 60 80 1 C LL	21	Undrair Streng △ To ● Pock	ned Shear gth (kPa) rvane ∆ ket Pen. Φ Qu ⊠			
							S	Sa	0 2	0 40	60 80 1	00 0	50 100	0 Vane () 150 2002			
		CONCRETE (152 SAND AND GRAV well graded CLAY - silty	mm thick) EL (Fill) - trace cla	y, light brown, frozen	n, wet and co	ompact when thawed,		C191 G192 G193		•							
-0.5-		- frozen, mois - intermediate	t and firm when th to high plasticity	awed				G194		•							
- - - - - 1.0-		- dark brown - frozen to 1.7 - high plasticit	′ m, moist and firm y	when thawed				G195		•							
								G196 G197		•							
		- trace silt inclusior precipitate, brown,	ns (<10 mm diam.) moist, firm to stiff	, trace coarse graine below 1.7 m	d sand(<5 r	nm diam.), trace		G198		•			•				
-2.0-		- trace silt inclusior m	ns (<20 mm diam.)	, trace oxidation, mot	ttled brown a	and grey, firm below 2	2.0	G199		•		•	•				
- - - - - - - - - - - - - - - - - - -																	
								G200		•		4					
-3.0-		- soft to firm below	2.9 m					G201		•		•					
		END OF TEST HO Notes: 1. No sloughing. 2. No seepage. 3. Backfilled test ho below top of pavem	DLE AT 3.0 m IN C ole with auger cutti nent, and asphalt c s from band bald (LAY ngs to 0.3 m below to old patch to top of pa	op of pavem avement.	ent, sand to 0.2 m											
					=												

GEOTECHNICAL

5	O T	ECHNIC	AL															
Clien	ıt:	Morrison Hersh	nfield			Project	Number:	0035 001	00									
Proje	ct Nam	e: 2011 Residenti	ial Street Renewals	8		Locatio	on:	<u>176 Ridley Street (14 U 621889 E, 5527190 N)</u>										
Conti	ractor:	Paddock Drillin	g Ltd.			Ground	l Elevatior											
Meth	od:	125mm Solid S	Stem Auger, Brat 2	2 Truck Mount		Date D	rilled:	29 March	2011									
	Sam	iple Type:	Grab	Shell	oy Tube	\ge	Split Spoon		Split E	Barrel		Core						
	Part	icle Size Legend:	Clay	Silt	****	Sand		Gravel	62	Cobbl	es		Boulde	ers				
Depth (m)	Soil Symbol		MA	TERIAL DESCRIPTI	ON			Sample Type	16 1 0 2 0 2	■ Bulk U (kN/r 7 18 Particle S 0 40 PL M0 0 40	Jnit Wt m ³) 19 20 60 80 C LL 60 80	21 100 100 0	Undra Stre	ained Sł ngth (kł ſorvane cket Per ⊠ Qu ⊠ eld Van 00 150	near ² a) △ n. Ф e ○ 20025			
		CONCRETE (152	mm thick)					C20)2									
		SAND AND GRAV well graded CLAY - silty - brown	/EL (Fill) - trace cla	ay, light brown, frozer	n, wet and o	compact w	hen thawe	d, <u>G20</u> G20) <u>3</u> •)4	•								
-0.5-		- frozen up to - intermediate	to high plasticity	nim when thawed				G20)5	•								
-1.0								G20	06	•								
								G20)7	•								
 - 1.5- 								G20	8	•								
		- moist, firm to stift	f below 1.7 m					G20	09	•			•2					
		- soft to firm below	/ 1.8 M															
-2.0-		- trace oxidation, tr	ace precipitates be	elow 2.0 m				G2'	10									
		- mottled brown an	nd grey below 2.6 n	n				G2 ⁻	11	•		•	2					
-3.0-		- firm below 2.9 m						G2 ²	12	•		•	2					
		END OF TEST HC Notes: 1. No sloughing. 2. No seepage. 3. Backfilled test h below top of paven 4. UTM coordinate	DLE AT 3.0 m IN C ole with auger cutt nent, and asphalt c is from hand held (LAY ings to 0.3 m below t cold patch to top of pa GPS.	op of paver avement.	ment, sand	l to 0.2 m		_, _					· 1				
Logg	ed By:	Stephen Renner		Reviewed By:	Nelson Fe	erreira		Proj	ect Eng	gineer:	Nelson	Ferreira	a					



Appendix B

Photos of Core Samples





Photo 1: Asphalt core sample from TH11-01



Photo 2: Concrete core sample from TH11-01





Photo 3: Asphalt core sample from TH11-02



Photo 4: Concrete core sample from TH11-02





Photo 5: Asphalt core sample from TH11-03



Photo 6: Concrete core sample from TH11-03





Photo 7: Asphalt core sample from TH11-04



Photo 8: Concrete core sample from TH11-04





Photo 9: Asphalt core sample from TH11-05



Photo 10: Concrete core sample from TH11-05





Photo 11: Asphalt core sample from TH11-06



Photo 12: Concrete core sample from TH11-06





Photo 13: Asphalt core sample from TH11-07



Photo 14: Concrete core sample from TH11-07





Photo 15: Asphalt core sample from TH11-08



Photo 16: Concrete core sample from TH11-08





Photo 17: Asphalt core sample from TH11-09



Photo 18: Concrete core sample from TH11-09





Photo 19: Asphalt core sample from TH11-10



Photo 20: Concrete core sample from TH11-10





Photo 21: Asphalt core sample from TH11-11



Photo 22: Asphalt core sample from TH11-12





Photo 23: Asphalt core sample from TH11-13



Photo 24: Asphalt core sample from TH11-14





Photo 25: Asphalt core sample from TH11-15



Photo 26: Asphalt core sample from TH11-16





Photo 27: Concrete core sample from TH11-17



Photo 28: Concrete core sample from TH11-18





Photo 29: Concrete core sample from TH11-19



Photo 30: Concrete core sample from TH11-20



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