APPENDIX 'A' GEOTECHNICAL REPORT



Morrison Hershfield

Kenaston Blvd Southbound Widening Project Sub-Surface Investigation

Prepared for:

Distribution:

Morrison Hershfield 25 Scurfield Blvd, Unit 1 Winnipeg, MB R3Y 1G4 Attention: Ron Bruce Ron Bruce, P.Eng.

Project Number: 0035-048-00

Date:

April 13, 2017

Quality Engineering | Valued Relationships

April 13, 2017

Our File No. 0035-048-00

Ron Bruce, P.Eng. Morrison Hershfield 59 Scurfield Blvd, Unit 1 Winnipeg, MB R3Y 1V2

RE:

Kenaston Blvd Southbound Widening

Sub-Surface Investigation Report

TREK Geotechnical Inc. is pleased to submit our report for the sub-surface investigations for the Kenaston Blvd Southbound Widening Project.

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

Sincerely,

TREK Geotechnical Inc.

Per:

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

Tel: 204.975.9433 ext. 103

cc: Shane Broderick, Assistant Lab and Field Services Manager., (TREK Geotechnical)

Revision History

Revision No.	Author	Issue Date	Description
0	SGB	April 13, 2017	Final Report

Authorization Signatures

Prepared By:

Shane Broderick, Assistant Lab and Field Services Manager.



Reviewed By:

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

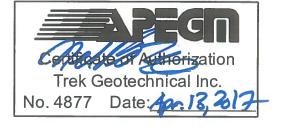


Table of Contents

Letter of Transmittal

Revision History and Authorization Signatures

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

List of Figures

Figure 01 Test Hole Location Plan – Kenaston Street

List of Appendices

Appendix A Test Hole Logs

Appendix B Lab Testing Summary and Lab Testing Results

Appendix C Photographs of Pavement Core Samples



1.0 Introduction

This report summarizes the results of the sub-surface investigation completed for the Kenaston Street Rehabilitation Project The information collected describes the pavement structure of the existing road as well as the soil stratigraphy beneath the pavement structure.

2.0 Sub-Surface Investigation and Laboratory Program

A total of eight (8) test holes were drilled along Kenaston street between Scurfield boulevard and Kleyson drive. The test holes were drilled at a 50 to 125 m spacing at the locations shown in Figure 01 to a depth of 3.1 m. The test holes were drilled to determine sub-surface conditions for the road upgrades.

The sub-surface investigation was conducted on March 23, 2017. The test holes were drilled by Paddock Drilling Ltd. using their Acker MP8 truck mounted drill rig equipped with 125 mm diameter solid stem augers. The pavement structure (asphalt or concrete) was cored by Paul Bevel of Trek Geotechnical, using a portable coring press equipped with a hollow 150 mm diameter diamond core drill bit. The sub-surface conditions were observed during drilling and visually classified by Shane Broderick of TREK. Other pertinent information such as groundwater and drilling conditions were also recorded during the drilling. Disturbed (auger cuttings) samples retrieved during the sub-surface investigation were transported to TREK's material testing laboratory for further testing. Core samples were also retrieved and logged at TREK's material testing laboratory.

The laboratory testing program consisted of moisture content determination, Atterberg limits, and grain size analysis (mechanical sieve and hydrometer methods) on selected samples. Information gathered is included in a separate appendix (Appendix A). The information provided in the Appendix includes test hole logs, laboratory testing summary tables and results, and photos of the concrete cores.

Test hole locations noted on the test hole logs and shown on Figure 01 are based on a GPS survey conducted by Morrison Hershfield and measured distances from the nearest address, edge of pavement or other permanent features.

3.0 Closure

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

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



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



Figures





ANSI full bleed A (11.00 x 8.50 Inches)





Appendix A

Test Hole Logs

1 of 1



Clien	ıt:	_M	orrison He	rshfield				Project Number:	0035	5-048-	00								_
Proje	ect Nan	ne: <u>K</u> e	enaston Bl	vd Soutl	hbound W	/idening		Location:	UTM	N-55	52008	33, E-6	32949	7					_
Conti	ractor:	_Pa	addock Dri	lling Ltd				Ground Elevation	: <u>234.</u>	12 m									_
Meth	od:	_12	5mm Solid S	tem Augei	r, Acker MP8	3 Truck Mount		Date Drilled:	23 N	larch :	2017								_
	Sampl	е Туре	ə:		Grab (G)		Shelby Tube (T)	Split Spoon ((SS)	S	plit B	arrel (SB)	Co	ore (C	<u></u>			
	Particl	e Size	Legend:		Fines	Clay	Silt	Sand	<u> </u>	Gra	avel	50/	<u>习 c</u>	bbles		Вс	ulder	rs	
			Ī	VVVV		77773		L		<u></u>		□Bu	ılk Unit			Undra	ained S	Shear	
۾		<u>8</u>							Sample Type	Number	16	17 18	kN/m³) 8 19	20 21			ngth (k est Typ		
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		0,							S	Sa	0 :	20 40	60	80 100	0 5		eld Vai		00 250
234.0			ASPHAL [*]	T (110 n	nm THICK	()													
	<u> </u>	\bowtie	SAND (F	ILL) - gra	avelly (<2	0 mm dia.), tra	ace clay, trace silt			224									
	-	\bowtie	- poo	orly grad	led, fine s	and to fine gr				G01									
				bonate gular, co	(limestone impact)					1								
	-0.5-	\bowtie								G02		•							
233.4	<u>.</u>	>>>				0.70					1								
	-		- dar	k green			silt inclusions (<15	mm dia.)		G03									
/4/17	ļ :			zen, moi h plastic		n to stiff wher	n thawed		4										
<u>+</u>	1.0		ing	ii piaotic	oncy					004									
L.GD	:									G04					•				
N C	-										_								
힏										G05		•				٥			
GEO.	1.5-																		
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Ö 231.1			SILT OF	mo olov	light brow	un vonvooft	moiat law placticity	,											
IAST	,					1.1 m IN SILT	moist, low plasticity	<u>'</u>											
# E			Notes:	uahina d	or seenad	e observed.													
7032			2) Test he	ole back	filled with	auger cutting	s, bentonite, sand,	and cold patch asph	nalt										
\$ 201			to surface 3) Test he		tion in the	southbound I	ane, 78.5 m north o	of the intersection of											
FOG			Kenaston	Blvd ar	nd Kleysor	n Drive, 14.3 i	m west of Kenastor yed by Morrison He	n east curb.											
90]			+) UTIVI C	oordina	ico anu en	cvalion surve	you by Monison He	nameu.											
ACE																			
SURF.																			
SUB-SURFACE LOG LOGS 20170324 KENASTON SOUTHBOUND WIDENING 0_A_SGBR 0035-048-00.GPJ TREK GEOTECHNICAL.GDT 134/17 C	ed By:	Sha	ne Broderi	ck		Review	ved By: Paul Bev	el		Proje	ct En	ginee	r: Ne	elson Fe	rreira	ı			
·-																			



1 of 1

GENTECHNICOL

Client: Mo	rrison Hershfield			Project Number:	0035	-048-	00							
Project Name: Ker	naston Blvd Southbound V	/idening		Location:	UTM	N-5	5199	94, E-6	329548	3				
Contractor: Pac	ddock Drilling Ltd.			Ground Elevation:	233.6	33 m								
Method: <u>125</u> 1	mm Solid Stem Auger, Acker MP	8 Truck Mount		Date Drilled:	23 M	arch	2017	•						
Sample Type:	Grab (G) []	Shelby Tube (T)	Split Spoon (S	SS)	S	plit B	Barrel (SB)	Co	re (C)			
Particle Size I	_egend: Fines	Clay	Silt	Sand		Gra	avel	50	<u>∃</u> c₀	bbles	H	Bould	lers	
Elevation (m) Depth (m) Soil Symbol		MATERIAL DE	ESCRIPTION		Sample Type	Sample Number		17 18 Partic	k(N/m³) 3 19 le Size (0 60 MC	20 21	•	trength Test 1 Torva Torva Pocket Qu Field \	ane ∆ t Pen. 1	• •
	SAND (FILL) - gravelly (<2 dark brown, frozen, moist v carbonate (limestone), ano	when thawed, po	e clay, trace silt, r porly graded fine s	nottled reddish ligh to and to fine gravel,		G08	•							
	CLAY (FILL) - silty, trace s dia.), trace oxidation - light grey to black - frozen, moist and sti		l (<20 mm dia.), s	ilt inclusion (<25 mm		G09		•						
	- high plasticity	wildir diduod				G10		•						
-1.0-						G11		•						
-1.5-						G12		•						
231.5						G13		•				^ o		
	SILT - some clay - light brown - frozen, moist and ve - low plasticity	ry soft when tha	wed			G14		•						
231.0	CLAY - some silt, trace silt	inclusions (<20	mm dja.), trace n	recipitates (<10 mm									+	
230.6 -3.0-	dia.) - light brown to brown - frozen, moist and sti - high plasticity	ff when thawed	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	,		G15 <i>A</i>	Λ		•			•		
	END OF TEST HOLE AT 3 Notes: 1) No sloughing or seepag 2) Test hole backfilled with to surface. 3) Test hole location in the Kenaston Blvd and Kleyso 4) UTM coordinates and e	e observed. auger cuttings, southbound lan n Drive, 10.8 m	e, 23.6 m south o	of the intersection of east curb.	alt									
Logged By: Shan	e Broderick	Reviewed	d By: Paul Beve	I	_	Proje	ct Er	nginee	r: <u>Ne</u>	lson Fer	reira			



1 of 1

GENTECHNICOL

Clien	nt:	_Mc	orrison Her	shfield				Project Number:	0035	-048-0	00					
Proje	ect Nan	ne: <u>K</u> e	enaston Blv	d Sout	hbound W	/idening		Location:	UTM	N-55	19938, E	-6295	77			
Cont	ractor:	Pa	ddock Dril	ling Ltd	l			Ground Elevation:	233.3	39 m						
Meth	od:	_12	5mm Solid St	em Auge	r, Acker MP8	3 Truck Mount		Date Drilled:	23 M	arch 2	2017					
	Sampl	е Туре):		Grab (G)		Shelby Tube (T)	Split Spoon (S	SS)	S	olit Barre	l (SB)	Co	ore (C)		
	Particl	e Size	Legend:		Fines	Clay	Silt	Sand		Gra			obbles		Boulde	rs
Elevation (m)	Depth (m)	Soil Symbol				MATERIAL D	DESCRIPTION		Sample Type	Sample Number	16 17	Bulk Uni (kN/m ³ , 18 19 ticle Size 40 60 MC 40 60	20 21 (%) 0 80 100	S1	drained strength (I Test Type Torvan Pocket P 図 Qu E Field Va	kPa) <u>oe</u> e ∆ en. Φ
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	-0.5		- mot - froz	tled da	rk green to ist and firr	and, trace silt in black on to stiff when	nclusions (<20 mn	n dia.)		G16	•					
4/1/										G17	1.		•	•		
232.2	1.0									G18	•					
K GEOTECHNIC	-1.5-		- froz	t brown en, mo	to grey	ry soft when th y	awed			G19		1	4 c			
G 0_A_SGBK 0035-048-00.GPU REK GEOTECHNICAL.GDT 1347/7 CC	-2.0									G20					5	
231.3 231.3	· ·			t to dar	k brown ist and firr	m to stiff when	thawed			G21		•		©		
	-2.5		- high	n plastio	city											
N SCUITECUN 330 3	3-3.0-									G22		•				
SUB-SURFACE LOG LOGS 20170324 KENASION SOUI HBOUND WIDENIN SO S SURFACE LOG LOGS 20170324 KENASION SOUI HBOUND WIDENIN SO S SURFACE LOG LOGS 20170324 KENASION SOUI HBOUND WIDENIN SO S S S S S S S S S S S S S S S S S S	<u>ы</u>		Notes: 1) No slou 2) Test ho to surface 3) Test ho Kenaston roadway s	ighing of the back the loca Blvd ar solid wh	or seepag dilled with tion in the nd Kleyson ite.	southbound la n Drive, 10.6 m	ine, 87.1 m south	and cold patch aspha of the intersection of Blvd east edge of ershfield.	alt							
၌ Log g	ged By:	Sha	ne Broderi	ck		Review	ed By: Paul Beve	el	_	Proje	t Engine	er: N	lelson Fe	rreira		

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Client			rrison Her							Project	Number:	0035	-048-	-00									-
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	actor:		ddock Dril	_							Elevation:												-
Metho	od:	_125	imm Solid Ste	em Auge						Date Dri		23 M											
	Sample	Туре	:		Grab (G	i)		Shelby T	ube (T)	Spl	it Spoon (S	SS)	S	plit E	Barrel	(SB)		Co	re (C	;)			
	Particle	Size	Legend:		Fines		Clay		Silt	•••••	Sand		Gra	avel			Cobbl	les	*	Во	ulder	s	
Elevation (m)	Depth (m)	Soil Symbol				MATE	ERIAL DE	ESCRIPT	TION			Sample Type	Sample Number	0	Part PL	Sulk Un (kN/m) 18 1 icle Siz 40 6 MC	9 2 e (%) 60 8 LL	0 21 0 100 0 100 (•	Strer Te Te Tre Proces Fields	ined S ngth (k est Typ orvane ket Pe l Qu ⊠ eld Var	<u>Pa)</u> e e ∆ en. Ф	25
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231.1			SILT - clay	yey, tra	ce oxidat	ion, ligh	t brown t	o brown,	frozen,	moist and	very soft		G28			•							
230.2	-2.5		CLAY - so dia.) - ligh - froz - high	me silt t to dar en, mo n plastic	, trace sil k brown ist and fir city	t inclusion	f when th), trace p	orecipitates	s (<10 mm		G29			•			•	.			
			to surface 3) Test ho	ighing of le back le loca Blvd au solid wh	or seepace of seepace of the seepace	ge obser n auger e southb on Drive,	rved. cuttings, ound lan , 9.9 m w	e, 169.6 est of Ke	m north enaston	and cold p of the inte Blvd east e ershfield.	rsection of												
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Client	τ:	_IVIC	orrison Her	sntiela						Pro	ject Number:	_00	35-04	8-00)							—
Proje	ct Nam	e: <u>K</u> e	enaston Bly	d Sout	hbound W	idening				Loc	ation:	UT	M N-	551	9811, E	-6296	648					
Contr	ractor:	Pa	ddock Dril	ling Ltd						Gro	und Elevatio	n: <u>23</u>	2.94 r	n								
Metho	od:	_125	5mm Solid Ste	em Auge	r, Acker MP8	Truck Mo	ount			Dat	e Drilled:	_23	Marc	h 20	17							
	Sample	е Туре	: :		Grab (G)			Shelby T	ube (T)	\boxtimes	Split Spoon	(SS)	X	Spl	it Barrel	(SB)		Co	re (C)		
	Particle	e Size	Legend:		Fines		Clay		Silt	[Sand	•		Grav	el 5	7	Cobbl	es	1	Boul	ders	
Elevation (m)	Depth (m)	Soil Symbol				MATE	RIAL DE	SCRIPT	ΓΙΟΝ				Sample Type	Sample Number	Part PL	3ulk Un (kN/m 18 1 icle Siz 40 6 MC	3) 19 20 2e (%) 60 80 LL	0 21 -	4	Indraine Strengt Test △ Torv Pocke ☑ Q ⊃ Field 100	h (kPa Type ane ∆ t Pen. u ⊠ Vane	a)
232.7	- ;	\bigotimes	SAND (FI	LL) - gr	avelly (<20	0 mm di	a.), silty,	trace cl	ay, light	brown	, frozen, mois imestone),	st	G	31	•							
232.5	-0.5		angular, c CLAY (FIL - blac - froz	ompac L) - sili ck en, mo	t ty, trace sa ist and stif	and, trac	e precip			`	race organics	;	4	32	•	7777						
			- high	n plastio	city								G:				1	• • • •				
													G:		•							
200.0	-1.5-											•	G	35								
230.8			dia.) - ligh - moi		k brown	ilt inclus	sions (<2	0 mm d	ia.), trac	e prec	ipitates (<10	mm	G	36		•			A	þ		
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229.9	-3.0-												G:	37		•			•			
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Logge	ed By:	Shai	ne Broderio	ck		R	eviewed	I B y: _P	aul Beve	el			Pro	ject	Engine	er: _l	Nelso	n Fer	reira			

1 of 1



Clien	t:	_Mc	orrison Hersh	nfield						Project N	umber:	0035	-048-	00								
Proje	ct Name:	<u>Ke</u>	naston Blvd	South	nbound \	Videning]			Location:		UTM	N-55	5197	42, E-	62968	36					
Conti	actor:	<u>Pa</u>	ddock Drillin	g Ltd.						Ground E	levation:	232.6	88 m									
Meth	od:	125	imm Solid Stem	n Auger	, Acker MF	8 Truck M	ount			Date Drill	ed:	23 M	arch :	2017	•							
	Sample ¹	уре	: [Grab (G	i)		Shelby Tub	e (T)	Split	Spoon (S	S)	S	plit E	Barrel ((SB)		Core	e (C)			
	Particle 9	Size	Legend:		Fines		Clay		Silt	*****	Sand		Gra	avel	5	_	obble	s ·		Bould	lers	
ltion	otto (1	Symbol										Type	Number	16	17 {	ulk Unit kN/m³) 8 19 ble Size	20	21	5	ndraine Strength <u>Test T</u> ∆ Torva	n (kPa) <u>Type</u>)
Elevation (m)	Depth (m)	SOS	20110055	- (0.40	-		RIAL DE	SCRIPTIO	DN			Sample Type	Sample I		20 4 PL	0 60 MC		100 0	۰	Pocket ⊠Qu Field \	t Pen. ■ u ⊠ Vane C	•
232.4		4 4	CONCRETE	Ì		ŕ																
232.2	1 . KX	\boxtimes	SAND (FILL moist when angular, cor	thawe npact	ed, poorl	y graded	fine san	d to fine gr	avel, ca	iht brown, arbonate (li	frozen, mestone)	,	G38	•								
	-0.5	\bigotimes	CLAY (FILL - black - frozer - high p	n, moi	st and fir		ce grave f when th	_	anics				G39		•							
		\bigotimes	- trace silt in	clusic	ons (<20	mm dia.) below ().7 m					G40		•							
	-1.0-												G41		•							
		\bigotimes											G42		•				4			
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		\bigotimes																				
	2.0																					
230.5 230.5			SILT - claye and very so	ft whe	n thawe	d, low pla	asticity	` .					G43	-								
	-2.5		- frozer	rown n, moi:	to browr st and fir	1	ons (<20 f when th	,	race pre	ecipitates (<5 mm di	a.)	G44			•			٥	_		
			- high բ	nastic	ııy															_		
229.6	-3.0-				<u> </u>								G45			•			•			
			END OF TE Notes: 1) No sloug 2) Test hole to surface. 3) Test hole Kenaston B 4) UTM coo	hing o back locat	or seepagifilled with	ge obser n auger o e southb on Drive,	ved. cuttings, ound lan 17.1 m	e, 311.3 m west of Ker	south o	of the interseast curb.												
Logg	ed By: _	Shar	ne Broderick			F	Reviewed	l By : Pau	l Bevel			_	Proje	ct Er	nginee	r: <u>N</u>	elson	Ferre	eira			

1 of 1



Clier	ıt:	Mo	orrison Her	shfield					_ F	Project Numbe	er: <u>0</u>	035-	-048-	00									
Proje	ect Nam	ne: <u>K</u> e	enaston Blv	d Sout	hbound V	Videning			_ L	ocation:	_U	ТМ	N-55	196	31, E	-6297	746						_
Cont	ractor:	Pa	addock Drill	ing Ltd					_ (Fround Elevat	ion: <u>2</u>	32.6	64 m										_
Meth	od:	_12	5mm Solid Ste	em Auge	r, Acker MP	8 Truck Mount	t		_ [Date Drilled:	_2	3 Ma	arch 2	2017									_
	Sampl	e Type			Grab (G)	SI	nelby Tube (T) >	Split Spoo	n (SS)	7	s	plit B	Barrel	(SB)		Псс	re (C	;)			
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-	artici	e oize	Legena.		1 11163	<u> </u>	iay	ШШ		P.P. Janu	L			T T	□B	Bulk Ur	nit Wt			_	ined S		
_ ا		0										ğ	Sample Number	16	17	(kN/m	1 ³) 19	20 21		Strer	ngth (k	(Pa)	
atio (Depth (m)	Symbol				MATERIA	VI DES	SCRIPTION				e T	Nur		Parti	icle Siz	ze (%)		ΔΤ	st Typor	_ e ∆	
Elevation (m)	De	Soil S				WATER	TE DEC	JOINI HON				Sample Type	əldı	0	20 ·	40 6 MC		80 100	'	Pod B	ket Po	en. 春	
		Ś										S	San	0	-	_		80 100	0 5		eld Vai	ne () i0 200	0 250
	-	D 4 4	CONCRE	ΓΕ (21	5 mm THI	CK)																	
232.4	[]	4 4 7																					
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	<u> </u>																						
230.7	,[]																						
230.5	7-2.0-		SILT - clay			ion, light br	own, fr	ozen, moist	to wet	and very soft	when		G51			•							
]		CLAY - so	me silt			(<20 m	nm dia.), trad	e pred	cipitates (<5 m	m dia.)												
j	1 :		- froz	en, mo	ist and fin	m to stiff wh	nen tha	wed					G52			•	'			•			
	2.5		- nign	plastic	city																		
	2.5																						
	<u> </u>																						
	<u> </u>											14											
000 (3 0												G53			_			42	1			
229.6	3.0-			EST H	OLE AT	3.1 m IN CL	.AY							1			1						
			Notes: 1) No slou	ghing (or seepad	e observed	i.																
				le back				entonite, sa	nd, and	d cold patch as	sphalt												
			3) Test ho	le locat						the intersectio													
			roadway s	olid wh	ite.					vd east edge o	7 1												
			4) UIM co	ordina	tes and e	evation sur	veyed	by Morrison	Hersh	itiela.													

1 of 1



Client: Morrison Hershfield	Project Number:	0035-048-00
Project Name: Kenaston Blvd Southbound Widening	Location:	UTM N-5519582, E-629770
Contractor: Paddock Drilling Ltd.	Ground Elevation:	: 232.90 m
Method:125mm Solid Stem Auger, Acker MP8 Truck Mount	Date Drilled:	23 March 2017
Sample Type: Grab (G) Shelby Tube (T)	Split Spoon (S	SS) Split Barrel (SB) Core (C)
Particle Size Legend: Fines Clay Silt	Sand Sand	Gravel Cobbles Boulders Bulk Unit Wt Undrained Shear
		0 2 16 17 18 19 20 21 Strength (kPa)
Control (m)		16 17 18 19 20 21 Strength (kPa)
MATERIAL DESCRIPTION		0 20 40 60 80 100
Soil D D Sill		
ASPHALT (120 mm THICK)		0 20 40 60 80 100 0 50 100 150 200 250
SAND (FILL) - gravelly (<20 mm dia.), trace clay, trace silt		 _
- light brown		G54 •
- frozen, moist when thawed - poorly graded, fine sand to fine gravel		
- carbonate (limestone) - 0.5 - angular, compact		G55 •
I i i i i i i i i i i i i i i i i i i i		
		4 G56 ●
232.0		
CLAY (FILL) - silty, some sand, trace gravel		
- light to dark brown - frozen, moist and firm when thawed		G57 •
- high plasticity		
- mottled dark brown to dark green below 1.2 m		050
		G58 •
2.0		
230.8 230.7 SILT - clayey, trace silt inclusions (<10 mm dia.), trace oxid	dation brown frozen	G59
moist to wet and very soft when thawed, low plasticity		
CLAY - some silt, precipitates (<10 mm dia.) - light to dark brown		1 G60
-2.5— frozen, moist and firm to stiff when thawed - high plasticity		G00
mg/r plasticity		
		G61 • • • • • •
229.9 - 3.0-		
END OF TEST HOLE AT 3.1 m IN CLAY		
Notes: 1) No sloughing or seepage observed.		
 Test hole backfilled with auger cuttings, bentonite, sand to surface. 	, and cold patch asph	alt
Test hole location in the southbound lane, 492.0 m nort Kenaston Blvd and Kleyson Drive, 14.1 m west of Kenasto		f
roadway solid white.	•	
UTM coordinates and elevation surveyed by Morrison H	ershfield.	
Logged By: Shane Broderick Reviewed By: Paul Bev	rel	Project Engineer: Nelson Ferreira



Ap	pen	dix	В
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Lab Testing Summary and Lab Testing Results – Kenaston Street



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

Test Hole		Paveme	ent Surface	Pavement Str	ucture Material		Sample	Depth (m)	Moisture		Grain Siz	e Analysis	6	A:	tterberg L	imits
No.	Test Hole Location	Туре	Thickness (mm)	Туре	Thickness (mm)	Subgrade Description	Top (m)	Bottom (m)	Content (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid	Plastic	Plasticity Index
		Asphalt	110						-							
	U14 (5520083m N, 629497m E)					SAND FILL (limestone)	0.1	0.4	6.2							
	78.5 m north of the					SAND FILL (limestone)	0.4	0.7	22.1							
TH17-01	intersection of Kleyson					CLAY FILL	0.7	0.9	35.4							
1117-01	Drive and Kenaston					CLAY FILL	0.9	1.2	34.9							
	Blvd, southbound lane,					CLAY FILL	1.2	1.5	32.5							
	14.3 m west of east curb					CLAY FILL	2.1	2.4	30.5							
	Cuib					CLAY	2.7	3.0	41.5							
i	U14 (5519994m N, 629548m E)					SAND FILL (limestone)	0.0	0.3	6.8							
	23.6 m south of the					CLAY FILL	0.3	0.6	25.5							
	intersection of Kleyson					CLAY FILL	0.6	0.9	26.9							
TH17-02	Drive and Kenaston					CLAY FILL	0.9	1.2	29.0							
	Blvd, southbound lane,					CLAY FILL	1.2	1.5	28.5							
	10.9 m west of east curb					CLAY FILL	1.8	2.1	29.1							
	Cuib					SILT	2.1	2.4	20.8							
						CLAY	2.7	3.0	44.3							
	U14 (5519938m N, 629577m E)					SAND FILL (limestone)	0.0	0.3	8.9							
	87.1 m south of the					CLAY FILL	0.3	0.6	24.8							
	intersection of Kleyson					CLAY FILL	0.6	0.9	26.5	0	6	47	47	52	20	32
TH17-03	Drive and Kenaston					CLAY FILL	0.9	1.2	29.2							
	Blvd, southbound lane,					CLAY FILL	1.2	1.5	23.3	0	3	65	32	36	16	20
	10.6 m west of the east edge of roadway whitle					SILT	1.8	2.1	23.5							
	solid line					CLAY	2.1	2.4	42.9							
						CLAY	2.7	3.0	48.0							
	U14 (5519866m N,	Asphalt	100													
	629618m					SAND FILL (limestone)	0.1	0.3	5.0							
	169.6 m south of the					CLAY FILL	0.3	0.6	26.9							<u> </u>
	intersection of Kleyson			ļ		CLAY FILL	0.6	0.9	26.1							
TH17-04	Drive and Kenaston					CLAY FILL	0.9	1.2	23.1							
	Blvd, southbound lane, 9.9 m west of the east					CLAY FILL	1.2	1.5	38.5							
	edge of roadway whitle			ļ		SILT	2.1	2.2	38.7							
	solid line			ļ		CLAY	2.2	2.4	44.6							
						CLAY	2.7	3.0	53.5							



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

Test Hole		Paveme	ent Surface	Pavement Str	ucture Material		Sample Depth (m)		Moisture	Grain Size Analysis			Atterberg Limits			
No.	Test Hole Location	Туре	Thickness (mm)	Туре	Thickness (mm)	Subgrade Description	Top (m)	Bottom (m)	Content (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid	Plastic	Plasticity Index
	U14 (5519811m N, 629649m E) 234.7 m south of the	Concrete	235													
						SAND FILL (limestone)	0.2	0.4	7.1							
						CLAY FILL	0.4	0.7	25.3							
T1147.05	intersection of Kleyson					CLAY FILL	0.7	0.9	24.9	1	13	30	55	63	22	41
TH17-05	Drive and Kenaston					CLAY FILL	0.9	1.2	25.1							
	Blvd, southbound lane,					CLAY FILL	1.2	1.5	24.2							
	14.4 m west of east					CLAY FILL	2.1	2.4	47.5							
	curb					CLAY FILL	2.7	3.0	50.6							
		Concrete	240													
	U14 (5519742m N,					SAND FILL (limestone)	0.2	0.4	8.3							
	629686m E)					CLAY FILL	0.4	0.7	25.7							
	311.3 m south of the					CLAY FILL	0.7	0.9	26.7							
TH17-06	intersection of Kleyson Drive and Kenaston Blvd, southbound lane, 17.1 m west of east curb					CLAY FILL	0.9	1.2	30.7							
						CLAY FILL	1.2	1.5	33.0							
						SILT	2.2	2.3	37.9							
						CLAY	2.3	2.6	50.9							
						CLAY	2.7	3.0	56.6							
	U14 (5519631m N, 629745m E)	Concrete	215													
						SAND FILL (limestone)	0.2	0.4	5.4							
	437.2 m south of the					SAND FILL (limestone)	0.4	0.7	3.6							
	intersection of Kleyson					SAND FILL (limestone)	0.7	0.9	3.8							
TH17-07	Drive and Kenaston					CLAY	0.9	1.2	22.6	2	15	46	37	43	15	28
	Blvd, southbound lane,					CLAY/SILT	1.2	1.5	22.9							
	11.9 m west of the east					SILT	2.0	2.1	38.6							
	edge of roadway whitle solid line					CLAY	2.1	2.4	52.7							
	Soliu lille					CLAY	2.7	3.0	50.9							
	U14 (5519582m N,	Asphalt	120													
	629770m E)					SAND FILL (limestone)	0.1	0.3	7.3							
	492.0 m south of the					SAND FILL (limestone)	0.3	0.6	6.4							
	intersection of Kleyson					SAND FILL (limestone)	0.6	0.9	6.9							
TH17-08	Drive and Kenaston					CLAY	0.9	1.2	19.7							
	Blvd, southbound lane,					CLAY	1.2	1.5	34.8							
	14.1 m west of the east edge of roadway whitle					SILT	2.1	2.2	37.4							
	solid line					CLAY	2.3	2.6	50.4							
	30114 11110					CLAY	2.7	3.0	51.3							



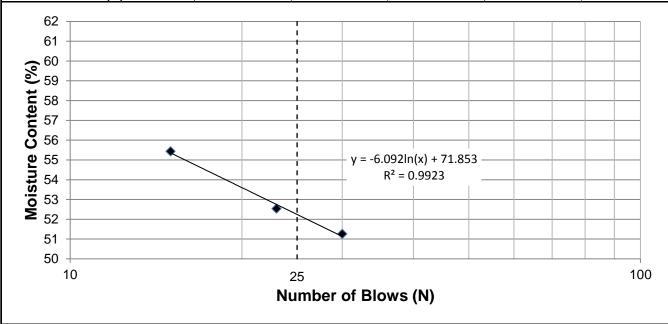
Project Kenaston Street Rehabilitation

Test Hole TH17-03 G17 Sample # Depth (m) 0.6 - 0.9 Sample Date 23-Mar-17 **Test Date** 31-Mar-17 **Technician** SX

Liquid Limit	52
Plastic Limit	20
Plasticity Index	32

Liquid Limit

Liquid Littit					
Trial #	1	2	3	4	5
Number of Blows (N)	15	23	30		
Mass Wet Soil + Tare (g)	24.545	26.283	24.656		
Mass Dry Soil + Tare (g)	20.722	22.182	21.071		
Mass Tare (g)	13.826	14.376	14.078		
Mass Water (g)	3.823	4.101	3.585		
Mass Dry Soil (g)	6.896	7.806	6.993		
Moisture Content (%)	55.438	52.537	51.266		



Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	21.274	20.962			
Mass Dry Soil + Tare (g)	20.132	19.823			
Mass Tare (g)	14.437	13.980			
Mass Water (g)	1.142	1.139			
Mass Dry Soil (g)	5.695	5.843			
Moisture Content (%)	20.053	19.493			



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Project No. 0035-048-00
Client Morrison Hershfield

Project Kenaston Street Rehabilitation

 Test Hole
 TH17-03

 Sample #
 G19

 Depth (m)
 1.2 - 1.5

 Sample Date
 23-Mar-17

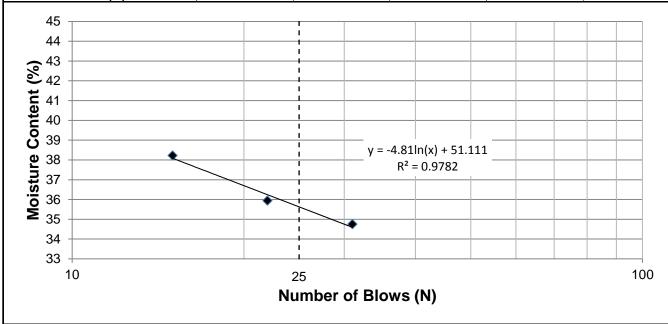
 Test Date
 31-Mar-17

 Technician
 SX

Liquid Limit	36
Plastic Limit	16
Plasticity Index	20

Liquid Limit

Liquid Littit					
Trial #	1	2	3	4	5
Number of Blows (N)	15	22	31		
Mass Wet Soil + Tare (g)	27.059	28.850	30.055		
Mass Dry Soil + Tare (g)	23.505	25.034	25.981		
Mass Tare (g)	14.208	14.417	14.258		
Mass Water (g)	3.554	3.816	4.074		
Mass Dry Soil (g)	9.297	10.617	11.723		
Moisture Content (%)	38.227	35.942	34.752		



Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	19.575	19.913			
Mass Dry Soil + Tare (g)	18.859	19.137			
Mass Tare (g)	14.177	14.290			
Mass Water (g)	0.716	0.776			
Mass Dry Soil (g)	4.682	4.847			
Moisture Content (%)	15.293	16.010			



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Project No. 0035-048-00 Client Morrison Hershfield

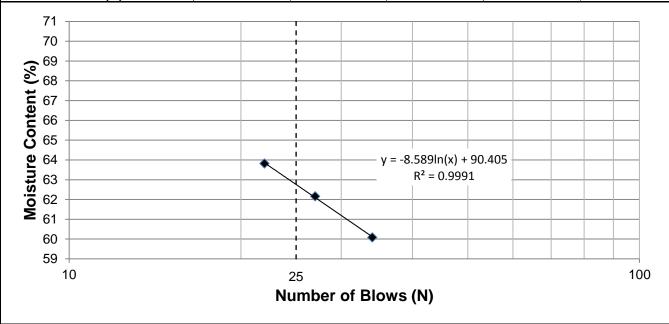
Project Kenaston Street Rehabilitation

Test Hole TH17-05 G33 Sample # Depth (m) 0.7 - 0.9 Sample Date 23-Mar-17 **Test Date** 31-Mar-17 **Technician** SX

Liquid Limit	63
Plastic Limit	22
Plasticity Index	41

Liquid Limit

Liquid Littit					
Trial #	1	2	3	4	5
Number of Blows (N)	22	27	34		
Mass Wet Soil + Tare (g)	26.517	26.401	25.970		
Mass Dry Soil + Tare (g)	21.632	21.737	21.449		
Mass Tare (g)	13.978	14.234	13.925		
Mass Water (g)	4.885	4.664	4.521		
Mass Dry Soil (g)	7.654	7.503	7.524		
Moisture Content (%)	63.823	62.162	60.088		



Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	19.957	20.881			
Mass Dry Soil + Tare (g)	18.866	19.694			
Mass Tare (g)	13.932	14.078			
Mass Water (g)	1.091	1.187			
Mass Dry Soil (g)	4.934	5.616			
Moisture Content (%)	22.112	21.136			



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Project No. 0035-048-00
Client Morrison Hershfield

Project Kenaston Street Rehabilitation

 Test Hole
 TH17-07

 Sample #
 G49

 Depth (m)
 0.9 - 1.2

 Sample Date
 23-Mar-17

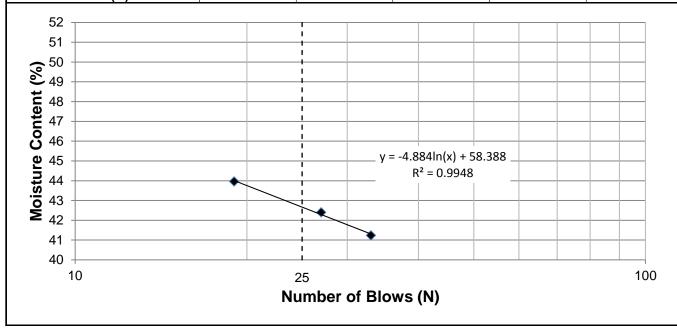
 Test Date
 31-Mar-17

 Technician
 SX

Liquid Limit	43
Plastic Limit	15
Plasticity Index	28

Liquid Limit

Liquia Liitiit					
Trial #	1	2	3	4	5
Number of Blows (N)	19	27	33		
Mass Wet Soil + Tare (g)	25.679	27.473	25.689		
Mass Dry Soil + Tare (g)	22.142	23.547	22.338		
Mass Tare (g)	14.097	14.288	14.212		
Mass Water (g)	3.537	3.926	3.351		
Mass Dry Soil (g)	8.045	9.259	8.126		
Moisture Content (%)	43.965	42.402	41.238		



Trial #	1	2	3	4	5
Mass Wet Soil + Tare (g)	20.983	19.388			
Mass Dry Soil + Tare (g)	20.126	18.731			
Mass Tare (g)	14.289	14.246			
Mass Water (g)	0.857	0.657			
Mass Dry Soil (g)	5.837	4.485			
Moisture Content (%)	14.682	14.649			



Project Kenaston Street Rehabilitation

 Test Hole
 TH17-03

 Sample #
 G17

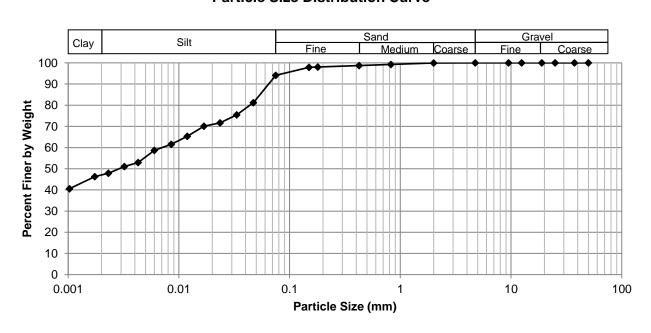
 Depth (m)
 0.6 - 0.9

 Sample Date
 23-Mar-17

 Test Date
 31-Mar-17

 Technician
 SX

Gravel	0.0%
Sand	5.8%
Silt	47.1%
Clay	47.0%



Gra	avel	Sand		Silt ar	Silt and Clay	
Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing	
50.0	100.00	4.75	100.00	0.0750	94.15	
37.5	100.00	2.00	99.91	0.0471	81.19	
25.0	100.00	0.825	99.28	0.0333	75.48	
19.0	100.00	0.425	98.71	0.0236	71.67	
12.5	100.00	0.180	98.03	0.0168	70.09	
9.50	100.00	0.150	97.89	0.0119	65.33	
4.75	100.00	0.075	94.15	0.0085	61.52	
				0.0060	58.67	
				0.0043	52.95	
				0.0032	51.05	
				0.0023	47.88	
				0.0017	46.29	
				0.0010	40.58	



Project Kenaston Street Rehabilitation

 Test Hole
 TH17-03

 Sample #
 G19

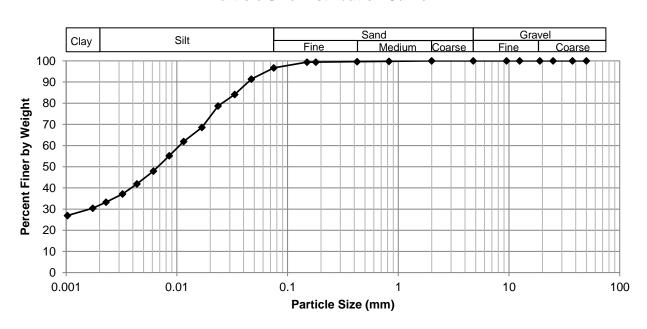
 Depth (m)
 1.2 - 1.5

 Sample Date
 23-Mar-17

 Test Date
 31-Mar-17

 Technician
 SX

Gravel	0.0%
Sand	3.4%
Silt	64.9%
Clay	31.8%



Gra	avel	Sand		Silt and Clay	
Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing
50.0	100.00	4.75	100.00	0.0750	96.65
37.5	100.00	2.00	100.00	0.0471	91.43
25.0	100.00	0.825	99.76	0.0333	84.12
19.0	100.00	0.425	99.64	0.0236	78.72
12.5	100.00	0.180	99.43	0.0168	68.56
9.50	100.00	0.150	99.42	0.0115	61.89
4.75	100.00	0.075	96.65	0.0085	55.22
				0.0061	47.92
				0.0044	41.89
				0.0032	37.12
				0.0023	33.31
				0.0017	30.45
				0.0010	26.96



Project Kenaston Street Rehabilitation

 Test Hole
 TH17-05

 Sample #
 G33

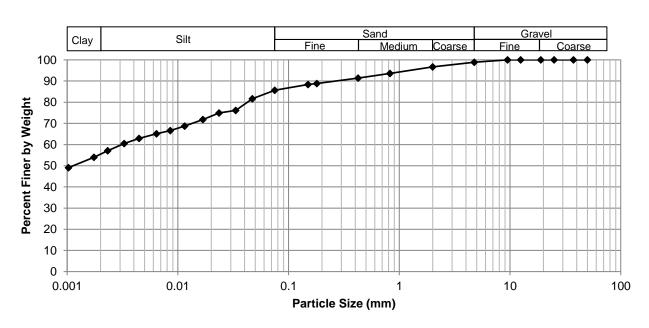
 Depth (m)
 0.7 - 0.9

 Sample Date
 23-Mar-17

 Test Date
 31-Mar-17

 Technician
 SX

Gravel	1.1%
Sand	13.2%
Silt	30.3%
Clay	55.4%



Gra	avel	Sand Silt a		nd Clay	
Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing
50.0	100.00	4.75	98.90	0.0750	85.69
37.5	100.00	2.00	96.70	0.0471	81.66
25.0	100.00	0.825	93.61	0.0333	76.13
19.0	100.00	0.425	91.36	0.0236	74.90
12.5	100.00	0.180	88.80	0.0168	71.83
9.50	100.00	0.150	88.41	0.0115	68.76
4.75	98.90	0.075	85.69	0.0085	66.61
				0.0064	65.07
				0.0045	62.92
				0.0033	60.47
				0.0023	57.09
				0.0017	54.02
				0.0010	49.10



Project Kenaston Street Rehabilitation

 Test Hole
 TH17-07

 Sample #
 G49

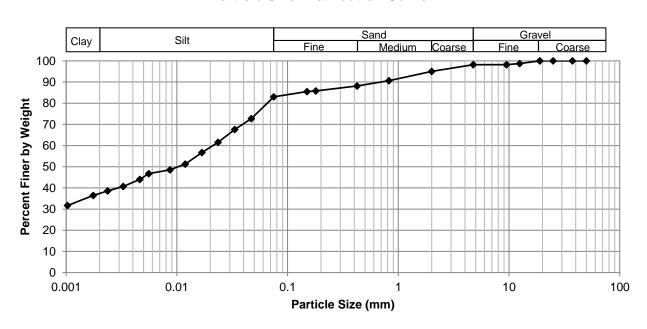
 Depth (m)
 0.9 - 1.2

 Sample Date
 23-Mar-17

 Test Date
 31-Mar-17

 Technician
 SX

Gravel	1.8%
Sand	15.2%
Silt	45.7%
Clay	37.3%



Gra	avel	Sand		Silt and Clay	
Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing	Particle Size (mm)	Percent Passing
50.0	100.00	4.75	98.18	0.0750	83.00
37.5	100.00	2.00	95.06	0.0471	72.72
25.0	100.00	0.825	90.65	0.0333	67.59
19.0	100.00	0.425	88.12	0.0236	61.55
12.5	98.76	0.180	85.81	0.0168	56.72
9.50	98.18	0.150	85.49	0.0119	51.29
4.75	98.18	0.075	83.00	0.0087	48.57
				0.0056	46.76
				0.0046	44.04
				0.0033	40.72
				0.0024	38.61
				0.0018	36.50
				0.0010	31.67



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Photographs of Pavement Core Samples





Photo 1: Pavement Core Sample at Test Hole TH17-01



Photo 2: Pavement Core Sample at Test Hole TH17-04





Photo 3: Pavement Core Sample at Test Hole TH17-05



Photo 4: Pavement Core Sample at Test Hole TH17-06





Photo 5: Pavement Core Sample at Test Hole TH17-07



Photo 6: Pavement Core Sample at Test Hole TH17-08