APPENDIX 'A'

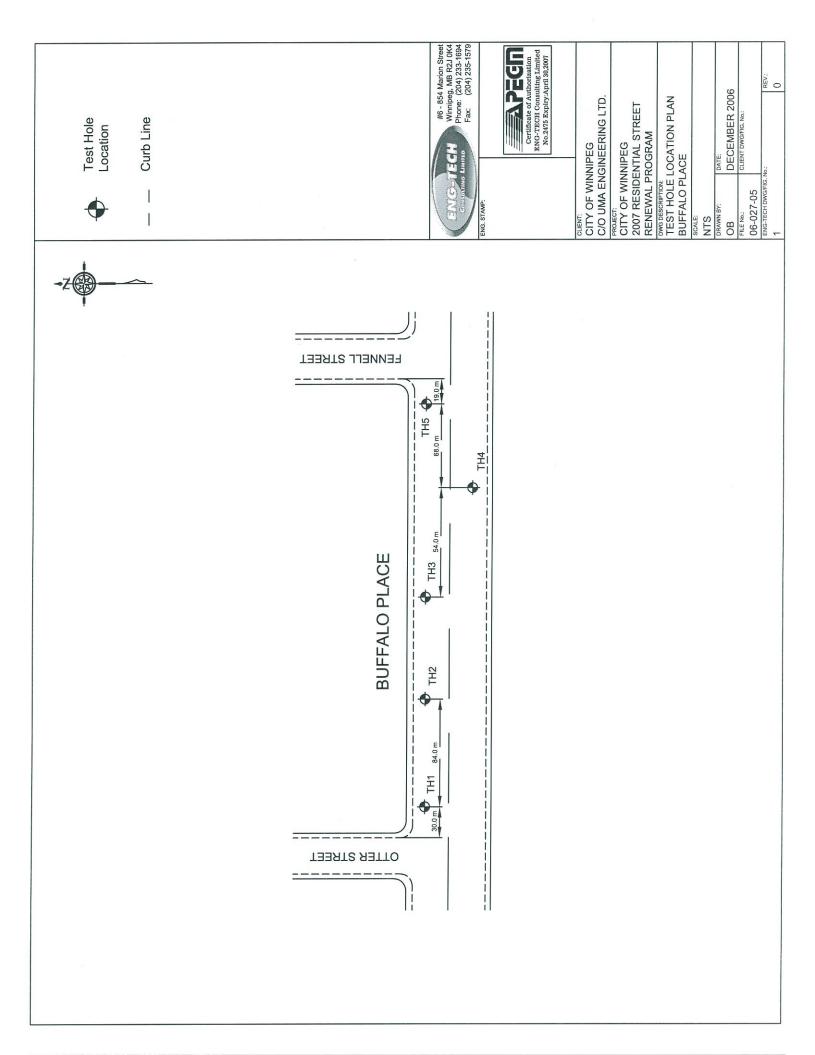
GEOTECHNICAL REPORT

APPENDIX 'A' - GEOTECHNICAL REPORT

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The geotechnical report is provided to aid in the Contractor's evaluation of the existing pavement structure and 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 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.



City of Winnipeg 2007 Residential Street Renewal Program Buffalo Place

No. Type Thickness Thickness Thickness 1 Buffalo Place Asphalt 50 50 2 Buffalo Place Asphalt 50 50 2 Buffalo Place Asphalt 50 50 3 Buffalo Place Asphalt 50 50 3 Buffalo Place Asphalt 50 50 4 Asphalt 55 50 50 3 Buffalo Place Asphalt 55 50 4 Buffalo Place Asphalt 55 50 5 Buffalo Place Asphalt 50 50 5 Buffalo Place 50	Tec	Testhole Location	Pavement Surface	t Surface	Pavement Structure Material	cture Material	Subgrade	Sample	Moisture	H	dromete	Hydrometer Analysis		4	Atterberg Limits	nits
Buffalo Place Asphalt 50 Sand Buffalo Place Concrete 180 Sand Buffalo Place Concrete 180 Sand Buffalo Place Asphalt 40 Sand Buffalo Place Asphalt 55 Sand Buffalo Place Concrete 160 Sand Buffalo Place Asphalt 55 Sand Buffalo Place Asphalt 60 - Buffalo Place Concrete 165 - Buffalo Place Asphalt 55 Sand Buffalo Place Asphalt 55 Sand Buffalo Place Asphalt 50 - Buffalo Place Asphalt 27 -	-		Type	Thickness (mm)	Type	Thickness (mm)	Description	Depth (m)	Content (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid	Plastic Limit	Plasticity Index
$ \left \begin{array}{c c c c c c c c c c c c c c c c c c c $																
$ \left \begin{array}{cccccc} & \text{Concrete} & 180 & \text{Concrete} \\ & \text{Asphalt} & 40 & \text{Sand} \\ & \text{Buffalo Place} & \text{Concrete} & 160 & \text{Sand} \\ & \text{Concrete} & 160 & \text{Sand} \\ & \text{Concrete} & 160 & \text{Sand} \\ & \text{Asphalt} & 55 & \text{Sand} \\ & \text{Concrete} & 160 & \text{Sond} \\ & \text{Concrete} & 160 & \text{Sond} \\ & \text{Concrete} & 160 & \text{Sond} \\ & \text{Asphalt} & 55 & \text{Sand} \\ & \text{Asphalt} & 60 & \text{Concrete} \\ & \text{Asphalt} & 20 & \text{Concrete} \\ & \text{Asphalt} & 27 & \text{Concrete} \\ & \text{Concrete} & 200 & \text{Concrete} \\ & \text{Asphalt} & 27 & \text{Concrete} \\ & \text{Asphalt} & 27 & \text{Concrete} \\ & \text{Asphalt} & 27 & \text{Concrete} \\ & \text{Concrete} & 200 & \text{Concrete} \\ & \text{Concrete} & 20 & Concre$	ш Ш	Inffalo Place	Asphalt	50	Puco O	C			000							
Buffalo Place Asphalt 40 Buffalo Place Concrete 160 Buffalo Place Asphalt 55 Buffalo Place Asphalt 60 Buffalo Place Asphalt 55 Buffalo Place Concrete 165 Buffalo Place Asphalt 55 Buffalo Place Asphalt 50 Buffalo Place Asphalt 27	,		Concrete	180	Qalla	00	only oldy	<u>.</u>	20.2	•			,	•		
Buffalo Place Concrete 160 Buffalo Place Concrete 160 Buffalo Place Asphalt 55 Buffalo Place Asphalt 60 Buffalo Place Asphalt 60 Buffalo Place Asphalt 27			Asphalt	40	2		Silty Clay	0.5	32.5	0.0	8.5	31.2	60.3	70.2	26.1	44.1
Buffalo Place Asphalt 55 Buffalo Place Asphalt 55 Buffalo Place Concrete 165 Buffalo Place Asphalt 60 Buffalo Place Concrete 200 Buffalo Place Asphalt 27	ш	Suffalo Place	-		Sand	50	Clayey Silt	6.0	19.3	0.0	13.8	64.7	21.5	28.3	16.7	11.6
Buffalo Place Asphalt 55 Buffalo Place Concrete 165 Buffalo Place Asphalt 60 Buffalo Place Concrete 200 Buffalo Place Asphalt 27			Concrete	160			Clay	1.2	34.5	0.0	2.1	15.5	82.4	86.9	36.0	50.9
Buffalo Place Asphalt 60	ά	uffalo Diaco	Asphalt	55	000 0	C										
Buffalo Place Asphalt 60 Concrete 200 Buffalo Place Asphalt 27	1		Concrete	165	Salia	00	Siny utay	0.4	L.92	,	1		,			
Buffalo Place 27	ď	uffalo Diaco	Asphalt	60												
Buffalo Place	L		Concrete	200			പ്പെട്ട പ്പു	c.0	34.5	1	ı	1	•	•		•
	ш Ш	Inffalo Place	Asphalt	27				L C		-						
Concrete 180			Concrete	180			only clay	0.0	Z0.4	1		ĩ	ı	ı		а. Э

P:\2006\Projects\027(U.M.A.)\05(2007 Street Renewal Program)\Pavement Summary_Buffalo.rtf

Client: UMA Engineering Ltd.

Project: City of Winnipeg 2007 Residential Street Renewal Program Site: Buffalo Place

Location: See Figure 1

Test Hole #: TH 1

		SUBSURFACE PROFILE		5	SAMPI	LE DA	ГА	N.		GRAU	N SIZE	
					0	()	E		DI		UTION	
(în	Symbol	Description	Elevation (m)		Sample Type	Recovery (%)	blows/300 mm	Water Content (%)				
Depth (m)	il Syı	Decemption	evatio	Number	mple	COVE	Ws/S	PL 0 LL	Gravel	Sand	-	ay
De	Soil		_	NZ	Sa	Ве	pla	20 40 60 80	ğ	Sa	Silt	Clay
0-		Ground Surface Asphalt (50 mm)	100	-								
	N _ A _ A _ A _ A _ A _ A _ A _ A _ A _	Concrete (180 mm)	1									
-	N 2 4 		-									
	A	<i>Sand (SP) (50 mm)</i> \ - light brown, moist, medium to	Λ	S1								
-		coarse grain sizes. . Silty Clay (CH)		S2								
_	H	- dark brown, moist, high plastic,										
		some medium sand sizes, occa. black pocket, with silt.										
_	1	- below 0.8 m, trace sand, occa. silt		23								
	Ŧ	pocket.										
1-			99-	S3				•				
	4											
-	Ŧ			S4				•				
_												
	H	- below 1.5 m, grey, some silt.	-									
-	A			S5	5							
	7										e.	
8-	H			00								
	7			S6								
2-		End of Test Hole	- 98-									
-		 end of test hole at 2.0 m below grade. 										
		 no groundwater or sloughing encountered. 								1		
-		 backfilled test hole with auger 										
		cuttings and topped with asphalt cold mix.	-									
-												
1												
3-			97-									
ENG-	TECH	Consulting Limited										
	naed		rilled By				ng Ltd		10		0	
		.1	rill Rig: uger Siz				d Stor	Completion El m Sheet: 1 of 1	evatio	n: 98	.u m	
				1			-				-	
S	amp	le Type Split Barr	el	Sh	relby	/ Tul	be 1	Auger Cuttings	S	Split	Spoo	on

GEOTECHNICAL • ENVIRONMENTAL • MATERIALS TESTING

Client: UMA Engineering Ltd.

Project: City of Winnipeg 2007 Residential Street Renewal Program **Site:** Buffalo Place

Location: See Figure 1

Test Hole #: TH 2

		SUBSURFACE PROFILE		5	SAMP	LE DA	ТА			CDAL	N SIZE	
						-	E	-	DI	ISTRIB		
(c)	Symbol		Elevation (m)		Sample Type	Recovery (%)	blows/300 mm	Water Content (%)			1	
Depth (m)	Syn	Description	atio	Number	ple	over	/s/3(PL 0 LL	le	σ		
Dep	Soil		Elev	Nun	San	Rec	blow	20 40 60 80	Gravel	Sand	Silt	Clay
0-		Ground Surface	100									
	N N N N N N N N N N N N N N N N N N N	Asphalt (40 mm)	1									
-	1 1 4	Concrete (160 mm)	_									
_	A	Sand (SP) (50 mm) - light brown, moist, medium to coarse grain sizes.										
	Ŧ	Silty Clay (CH) - dark brown to black, moist, frozen,	-	S1				· · · · · · · · · · · · · · · · · · ·	0.0	8.5	31.2	60.3
-		high plastic, trace sand, with silt.		S2								
	1	 below 0.6 m, grey, occa. silt pocket. 		52				- /				
-	H	• CONTRACTOR STATE										
1-		Clayey Silt (ML) - light grey, damp to moist, low	99-	S3				He I I I I I I I I I I I I I I I I I I I	0.0	13.8	64.7	21.5
		plastic, with clay.	- 33									
_	\square	Clay (CH)										
		- grey, moist, high plastic, some silt inclusions, some silt.		S4				• • • • • • • • • • • • • • • • • • •	0.0	2.1	15.5	82.4
_												
	\square		-									
-				S5								
	\square											
-		- below 1.9 m, medium brown, with										
		to and silt, medium to high plastic.		S6								
2-	-1	End of Test Hole	- 98-	00								
		- end of test hole at 2.0 m below										
-		grade. - test hole moved 4.0 m to north										
		side of street.										
1		 no groundwater or sloughing encountered. 										
		 backfilled test hole with auger 										
7		cuttings and topped with asphalt cold mix.										
3-			97-									
ENG-	LECH C	Consulting Limited										
		D	rilled By	: Pad	dock	Drilli	ng Ltd	. Completion De	epth: 2	2.0 m		
			rill Rig:	Acker	MP5	5-T		Completion Ele	evatio	n: 98	.0 m	
Re	viewe	d by: CAA A	uger Siz	ze: 12	5 mn	n Soli	d Sten	n Sheet: 1 of 1				
Sa	amp	le Type Split Barr	el	Sh	elby	/ Tub	e 1	Auger Cuttings	s	Split \$	Spoo	n

GEOTECHNICAL • ENVIRONMENTAL • MATERIALS TESTING

Client: UMA Engineering Ltd.

Project: City of Winnipeg 2007 Residential Street Renewal Program **Site:** Buffalo Place

Location: See Figure 1

Test Hole #: TH 3

		SUBSURFACE PROFILE		5	SAMP	LE DA	ТА			CRAI		
		2			0	(0	E		DI	STRIB		
(fill)	Symbol	Description	Elevation (m)		Sample Type	Recovery (%)	blows/300 mm	Water Content (%)	-			
Depth (m)		Description	vatic	Number	nple	cove	NS/3	PL 0 LL	Gravel	p		У
Del	Soil		Ele	Nui	Sar	Be	blo	20 40 60 80	Gra	Sand	Silt	Clay
0-		Ground Surface	100									
	× 1	Asphalt (55 mm)	-									
_	ч к к к	Concrete (165 mm)										
		Sand (SP) (50 mm)										
	H	- light brown, moist, medium to coarse grain sizes.	/	S1	5			•				
	T	Silty Clay (CH) - greyish/dark brown, moist, high	-									
-		plastic, some sand, with silt.										
	H	- below 0.5 m, trace sand, some		S2								
-		silt inclusions. - between 0.9 m to 1.1 m, black.										
	71	ando		S3								
1-	T	- below 1.1 m, grey.	99-	53								
				S4								
	H							Ň				
-	T			S5				•				
	1	- below 1.5 m dark brown.	-									
	H			S6								
_	T											
				S7	5			•				
2-	14	End of Test Hole	- 98-									
		- end of test hole at 2.0 m below										
-		grade. - no groundwater or sloughing										
		encountered.										
-		- backfilled test hole with auger										
		cuttings and topped with asphalt cold mix.	-									
-												
										×		
-												
3-			97-				ł	•••••••••••••••••				
ENG-T	ECH C	Consulting Limited	illed By	r Pad	dock	Drilli	ht I na	. Completion De	onth: (2 0 m		
Log	gged		ill Rig:				iy Liu.	Completion Ele			0 m	
Re	viewe	214	iger Siz				d Sten		o vano		U III	
		le Type Split Barr				/ Tub	-	Auger Cuttings	ļ	Split \$	Snor	n
0.000					2.23					-pine v		

Client: UMA Engineering Ltd.

Project: City of Winnipeg 2007 Residential Street Renewal Program Site: Buffalo Place

Location: See Figure 1

Test Hole #: TH 4

		SUBSURFACE PROFILE			SAMP	LE DA	ТА			CDAU		
		a		-	0	(9	E				UTION	
Ω.	Symbol	Description	Elevation (m)		Sample Type	Recovery (%)	blows/300 mm	Water Content (%)				
Depth (m)	Syr	Description	/atio	Number	Jple	ove	vs/3(PL 0 LL	Vel	σ		
Dep	Soil		Elev	Nun	San	Rec	blov	20 40 60 80	Gravel	Sand	Silt	Clay
0-		Ground Surface	100									
	× 4	Asphalt (60 mm)	1									
-	4 N N N V N N V	Concrete (200 mm)										
	71	Silty Clay (CH) - greyish black, moist, high plastic,	1	S1	1			•				
		trace sand, with silt.										
	H	- below 0.5 m grey.	-	S2				•				
	Ŧ											
-	7			S3				•				
1-	4		99-									
	H	8	00	S4				•				
-	Ħ	- below 1.2 m medium brown.										
	H		-									
	Ħ	7		S5	3							
	A	- below 1.8 m, light brown, some to										
-		with silt.		S6	5			•				
2	14	End of Test Hole	98-									
		- end of test hole at 2.0 m below grade.										
		- no groundwater or sloughing encountered.										
-		- backfilled test hole with auger					1					
		cuttings and topped with asphalt cold mix.	-									
-												
-									-			
3-			97-									
ENG-T	ECH C	onsulting Limited Dril	led By	: Pad	dock	Drillir	na I td	Completion De	nth 2	0 m		
-	-	py: ERM Dril	I Rig:				.gu.	Completion Ele	88		0 m	
Rev	viewe	d by: CA Aug	ger Siz	e: 12	5 mm	n Solia	d Sterr					
Sa	mpl	e Type Split Barre	1	Sh	elby	Tub	•	Auger Cuttings	S	plit S	spoo	n

Client: UMA Engineering Ltd.

Project: City of Winnipeg 2007 Residential Street Renewal Program Site: Buffalo Place

Location: See Figure 1

Test Hole #: TH 5

		SUBSURFACE PROFILE		5	SAMP	LE DA	ТА			CDAU	N SIZE	
					0	()	E		DI		UTION	
(C	Symbol		Elevation (m)		Sample Type	Recovery (%)	blows/300 mm	Water Content (%)				
Depth (m)	Syn	Description	atio	Number	ple	over	IS/30	PL 0 LL	le/	G		
Dep	Soil		Elev	Nun	San	Rec	hold	20 40 60 80	Gravel	Sand	Silt	Clay
0-		Ground Surface	100									
0-	2 N 21	Asphalt (27 mm)]								
_	4 A 4	Concrete (180 mm)										
	40	Silty Clay (CH)										
-		- black, moist, high plastic, with silt.		S1				•				
	H		-	S2								
-	Ŧ											
	1	- below 0.8 m, grey.		S3				•				
1-	Ŧ		99-									
		2										
	H			S4				•				
	FI											
				S5				•				
-	刊											
	A	- below 1.7 m, dark brown.										
-	1			S6				٠				-
2-	H											
27		End of Test Hole - end of test hole at 2.0 m below	98-									
_		grade.										
		 no groundwater or sloughing encountered. 										
-		- backfilled test hole with auger										
		cuttings and topped with asphalt cold mix.	-									
-												
1												
3-			97-									
ENG-T	ECH C	Consulting Limited						· · · · · · · · · · · · · · · · · · ·	l			
		Dri	lled By				ng Ltd.					
		DI	II Rig: /					Completion Ele	evation	n: 98.	0 m	
			ger Siz				-					
Sa	amp	le Type Split Barre	el	Sh	elby	Tub		Auger Cuttings	S	plit s	Spoo	'n



UMA Engineering Ltd. File No.: 06-027-05 **Reference No.:** 6-27-5-9 1479 Buffalo Place Winnipeg, Manitoba R3T 1L7 ATTENTION: Ron Bruce, P. Eng. CITY OF WINNIPEG 2007 RESIDENTIAL STREET RENEWAL PROGRAM PROJECT: TH₂ Sample No. S1 Depth: 0.5 m Test Hole No. Buffalo Pl. **ENG-TECH** Type of Sample: Bag Source: Sampled By: December 20/06 Date Tested: Date Sampled: December 13/06 Date Received: December 13/06 SAND GRAVEL CLAY SILT COARSE MEDIUM COARSE FINE FINE APPROXIMATE EQUIVALENT IMPERIAL SIEVE #200 #100 #40 #20 #10 1.0" #4 0.5" 100 PERCENT SIEVE PASSING SIZE (mm) 4.7500 100.0 2.0000 98.6 0.8500 97.5 80 0.4250 96.1 0.2500 95.2 94.5 0.1500 PERCENT PASSING 91.5 0.0750 0.0277 83.7 60 0.0178 80.8 0.0106 76.3 0.0075 74.8 71.8 0.0054 0.0028 64.7 40 0.0020 60.2 0.0012 54.7 20

10

1

SIEVE SIZE (mm)

100

Percent of: GRAVEL (0.0%), SAND (8.5%), SILT (31.2%) and CLAY (60.3%) Sample Description: Silty Clay

0.1

0.01

ENG-TECH Consulting Limited

per Clark Hryhoruk, President Ph: (204) 233-1694 / Fax: (204) 235-1579

COMMENTS:

0 0.001



PARTICLE SIZE ANALYSIS REPORT

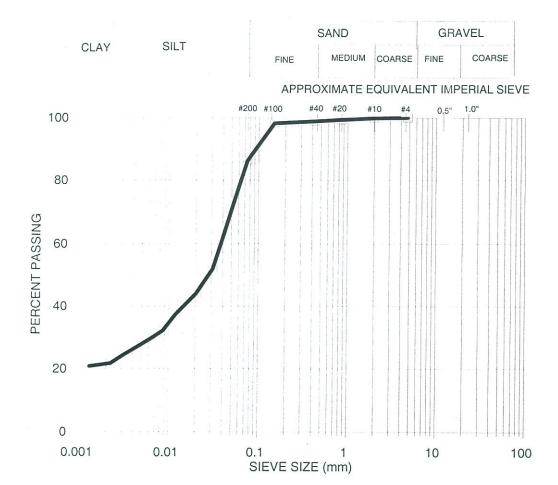
File No.: Reference No.: 06-027-05 6-27-5-10

UMA Engineering Ltd. 1479 Buffalo Place Winnipeg, Manitoba R3T 1L7

ATTENTION: Ron Bruce, P. Eng.

PROJECT: CITY OF WINNIPEG 2007 RESIDENTIAL STREET RENEWAL PROGRAM

Test Hole No.	TH2	Sample No.	S3	Depth:	0.9 m
Sampled By:	ENG-TECH	Type of Sample:	Bag	Source:	Buffalo PI.
Date Sampled:	December 13/06	Date Received:	December 13/06	Date Tested:	December 20/06



SIEVE	PERCENT
SIZE (mm)	PASSING
4.7500	100.0
2.0000	99.9
0.8500	99.4
0.4250	98.9
0.2500	98.5
0.1500	98.2
0.0750	86.2
0.0312	51.9
0.0204	44.0
0.0120	37.4
0.0087	32.1
0.0062	29.4
0.0032	24.4
0.0023	21.7
0.0013	20.8

Percent of: GRAVEL (0.0%), SAND (13.8%), SILT (64.7%) and CLAY (21.5%) Sample Description: Clayey Silt

ENG-TECH Consulting Limited

per <u>Clark Hryhoruk</u>, President Ph: (204) 233-1694 Fax: (204) 235-1579



PARTICLE SIZE ANALYSIS REPORT

UMA Engineering Ltd. File No.: 06-027-05 1479 Buffalo Place **Reference No.:** 6-27-5-11 Winnipeg, Manitoba **R3T 1L7** ATTENTION: Ron Bruce, P. Eng. PROJECT: CITY OF WINNIPEG 2007 RESIDENTIAL STREET RENEWAL PROGRAM Test Hole No. TH₂ S4 1.2 m Sample No. Depth: Sampled By: ENG-TECH Type of Sample: Bag Buffalo PI. Source: Date Sampled: December 13/06 Date Received: December 13/06 December 20/06 Date Tested: SAND GRAVEL SILT CLAY MEDIUM COARSE FINE COARSE FINE APPROXIMATE EQUIVALENT IMPERIAL SIEVE #200 #100 #40 #20 #10 #4 1.0" 0.5" 100 SIEVE PERCENT PASSING SIZE (mm) 2.0000 100.0 0.8500 99.8 99.6 0.4250 80 0.2500 99.4 0.1500 99.2 0.0750 97.9 PERCENT PASSING 0.0264 95.3 0.0167 93.8 60 0.0098 92.3 0.0069 90.8 0.0049 90.8 83.5 0.0026 0.0018 82.0 40 0.0011 81.0 20

20 0 0.001 0.01 0.1 1 10 100 SIEVE SIZE (mm)

Percent of: GRAVEL (0.0%), SAND (2.1%), SILT (15.5%) and CLAY (82.4%) Sample Description: Clay

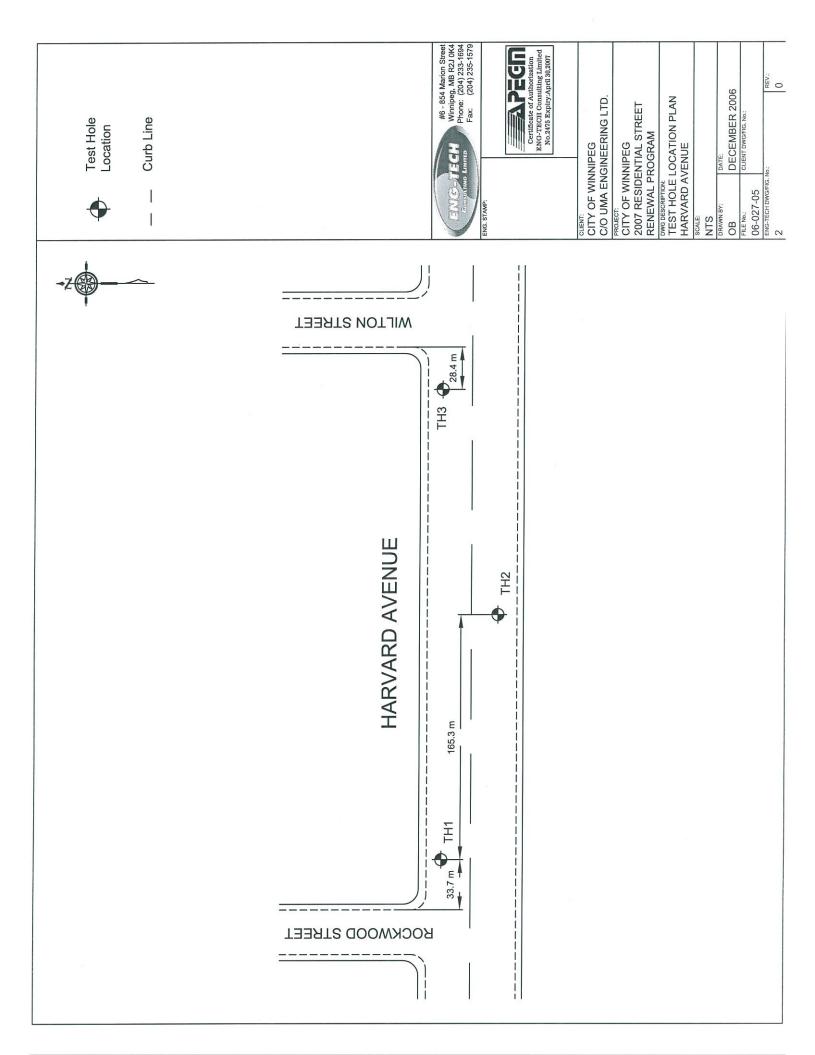
ENG-TECH Consulting Limited per Clark Hryhoruk, President Ph: (204) 233-1694 Fax: (204) 235-1579



Buffalo Place







City of Winnipeg 2007 Residential Street Renewal Program Harvard Avenue

Atterberg Limits		Limit Limit	Limit Limit	Limit Limit 59.2 22.6	Limit Limit Limit 59.2 22.6 50.1 17.4	Limit Limit Limit Limit 59.2 22.6 50.1 17.4 51.5 23.3	Liquid Plastic Limit Limit 59.2 22.6 50.1 17.4 51.5 23.3	Limit Limit 59.2 22.6 50.1 17.4 51.5 23.3 51.5	Liquid Plastic Limit Limit Limit 659.2 22.6 50.1 17.4 50.1 17.4	Liquid Plastic Limit Limit Limit	Liquid Plastic Limit Limit Limit
Hydrometer Analysis	Sand Silt Clay	(0/)		40.6	49.5	40.6	40.6 49.5 61.4	(¹⁰) 49.5 61.4 -	(¹⁰) 40.6 (1.4 (1.4 (1.4 (1.4 (1.4 (1.4 (1.4 (1.4	(¹⁰) 40.6 (1.4 (1.4 (1.4 (1.4 (1.4 (1.4 (1.4 (1.4	(¹⁰) 40.6 49.5
	Gravel (%)		-		-	-	-				
	Depth (m) Content (%)			0.5 26.9							
	Description Dep			Silty Clay	-						
Pavement Structure Material	Type Thickness (mm)		-		Sand 200						
	Type Thickness (mm)		-		Asphalt 70						
Testhole Location					Harvard Avenue						
Hole	No.				-	-	- N	- N .	- N	- N M	- N M

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1

GEOTECHNICAL • ENVIRONMENTAL • MATERIALS TESTING

Client: UMA Engineering Ltd.

Project: City of Winnipeg 2007 Residential Street Renewal Program Site: Harvard Avenue

Location: See Figure 2

Test Hole #: TH 1

		SUBSURFACE PROFILE		5	SAMPI	E DAT	ГА	_		GRAI		
Depth (m)	Soil Symbol	Description	Elevation (m)	Number	Sample Type	Recovery (%)	blows/300 mm	Water Content (%) PL 0 LL 20 40 60 80	Gravel	STRIB	AOITU Siit	Clay
0-	2015	Ground Surface Asphalt (70 mm)	100	-								
_		Sand (SP) (200 mm) - light brown, moist, medium grain sizes, trace gravel.		S1	\$			•				
	H	Silty Clay (CH) - black, moist, high plastic, trace rootlets, trace sand & gravel, and silt.	-	S2	\$				0.5	13.6	40.6	45.3
_	HH	Silty Clay (CH) - dark brown, moist, high plastic, and silt.		S3	\$			1 , 1 , 1 , 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1, 1,	0.1	13.2	49.5	37.2
1-	HH	 at 1.0 m, grey pockets. below 1.1 m, light brown, medium plastic, with silt. 	99-	S4	\$							
	HH	- below 1.4 m, some silt & gypsum inclusions.	-	S5	\$							
_	T	<i>Clayey Silt (ML)</i> - medium brown, moist, high plastic, with clay.		S6	\$			-+	0.0	1.4	61.4	37.2
2		End of Test Hole - end of test hole at 2.0 m below grade. - no groundwater or sloughing encountered. - backfilled test hole with auger cuttings and topped with asphalt cold mix.	- 98-									
3-			97-									
ENG-1 Log Re	NG-TECH Consulting Limited Drilled By: Paddock Drilling Ltd. Completion Depth: 2.0 m Logged by: ERM Drill Rig: Acker MP5-T Completion Elevation: 98.0 m Reviewed by: Auger Size: 125 mm Solid Stem Sheet: 1 of 1 Sample Type Split Barrel Shelby Tube Auger Cuttings Split Spoon											

GEOTECHNICAL • ENVIRONMENTAL • MATERIALS TESTING

Client: UMA Engineering Ltd.

Project: City of Winnipeg 2007 Residential Street Renewal Program Site: Harvard Avenue

Location: See Figure 2

Test Hole #: TH 2

	SUBSURFACE PROFILE			SAMPLE DATA					GRAIN SIZE			
					۵	(9	E				UTION	
(E	Symbol	Description	Elevation (m)		Sample Type	Recovery (%)	blows/300 mm	Water Content (%)				-
Depth (m)	il Sy	Docomption	vatic	Number	mple	cove	ws/3	PL 0 LL	Gravel	рг	000000	Y.
De	Soil			NN	Sa	Re	old	20 40 60 80	Gra	Sand	Silt	Clay
0-	205-03	Ground Surface Asphalt (75 mm)	100									
		Sand (SP) (100 mm)								-		
-	4	- light brown, moist, medium grain sizes, trace gravel.	1	S1	1			•				
_	7	Silty Clay (CH) - black, moist, high plastic, trace										
	Ŧ	rootlets, with silt.	-	S2				•				
-	1	Silty Clay (CH) - dark brown, moist, high plastic,										
_		some coarse sand sizes, and silt. - below 0.8 m medium brown.		S3	•							
1	H											
	Ħ		99-	S4								
+	T			54							-	
_		- below 1.4 m, occa. silt pocket.										
-	7	A. A. D. Desk. Instance-Science-Science and Instancement	_	S5								
-	Ħ											
+	Ħ		-	S6	3			•				
	7											
2		End of Test Hole - end of test hole at 2.0 m below	98-				ł					
-		grade.										
		 no groundwater or sloughing encountered. 										
1		 backfilled test hole with auger cuttings and topped with asphalt 										
-		cold mix.										
-												
3-			97-									
ENG-T	ECH C	Consulting Limited	lod D.	. De el	dool			0				
Logged by: ERMDrilled By: Paddock Drilling Ltd.Completion Depth: 2.0 mDrill Rig: Acker MP5-TCompletion Elevation: 98.0 m												
Rev	viewe					d Stem						
Sa	mp	le Type Split Barre		Sh	elby	Tub	e 1	Auger Cuttings	S	plit S	spoo	n

GEOTECHNICAL • ENVIRONMENTAL • MATERIALS TESTING

Client: UMA Engineering Ltd.

Project: City of Winnipeg, 2007 Residential Street Renewal Program **Site:** Harvard Avenue

Location: See Figure 2

.

Test Hole #: TH 3

		SUBSURFACE PROFILE		5	SAMPI	LE DA	ТА		GRAIN SIZE			
							E	1	DI	GRAII		
. Depth (m)	Soil Symbol	Description	Elevation (m)	Number	Sample Type	Recovery (%)	blows/300 mm	Water Content (%) PL 0 LL 20 40 60 80	Gravel	Sand	Silt	Clay
0-		Ground Surface	100									
0-		Asphalt (80 mm)		1								
	A A A A A A A A A A A A A A A A A A A	Concrete (140 mm)										
-	<u></u>	Sand (SP) (50 mm)	-	01								
		Ight brown, moist to wet, medium		S1			-					
-	1	to coarse grain sizes, trace gravel.		S2				` •				
	H	Silty Clay (CH)	-									
-	1	- black, moist, high plastic, trace / rootlets, with silt.								-		
	1	Silty Clay (CH)										
-		- dark brown, moist to damp, high		S3								
	17	plastic, with to and silt, occa. silt inclusion & pocket.		00						-		
1-			99-									
	4	Silt (ML)										
_		- light brown, damp, low plastic,										
		trace clay.		S4				•				
-								N				
	ŢĹ		_									
_	T	Silty Clay (CH) - grey, moist, high plastic, occa. silt		S5								
ŀ		inclusion, with silt.	ŀ									
-	1											
ļ		×.		S6				•				
2-	1		98-									
		End of Test Hole - end of test hole at 2.0 m below	00									
_		grade.										
		- no groundwater observed.										
		 sloughing encountered at 1.2 m below grade. 										
		- backfilled test hole with auger										
		cuttings and topped with asphalt	. 1									
7		cold mix.				-						
		-										
-												
3-			97-									
ING-T	ECH (Consulting Limited										
	hanr	COM	led By				ng Ltd.		÷			
		Bill	I Rig: A					Completion Ele	vatior	n: 98.	0 m	
Re	viewe	ed by: CAA Aug	ger Siz	e: 125	5 mm	Solid	d Stem	Sheet: 1 of 1				
Sa	mp	le Type 🛛 🗐 Split Barre	1	Sh	elby	Tub	e 1	Auger Cuttings	s	plit S	Spoo	n



PARTICLE SIZE ANALYSIS REPORT

File No.: Reference No.: 06-027-05 6-27-5-6

UMA Engineering Ltd. 1479 Buffalo Place Winnipeg, Manitoba R3T 1L7

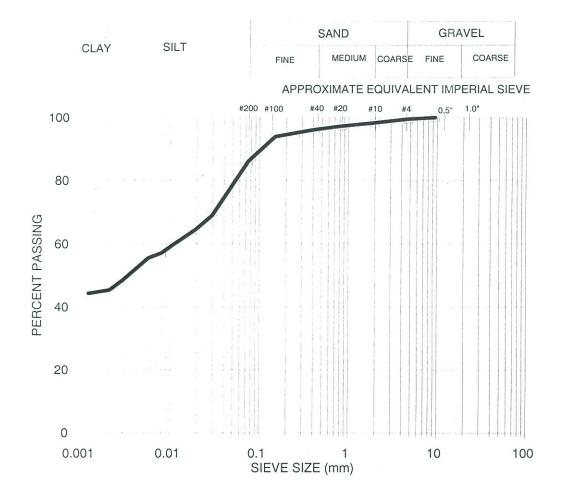
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ATTENTION: Ron Bruce, P. Eng.

PROJECT:	CITY OF W	INNIPEG 2007 RESIDER	NIAL STREET RENE	WAL PROGRAM	1
Test Hole No.	TH1	Sample	No S2	Depth:	0 !

OF MUNIPEO AND DECIDENTIAL OTDEET DENEMAL DECODAR

Test Hole No.	TH1	Sample No.	S2	Depth:	0.5 m
Sampled By:	ENG-TECH	Type of Sample:	Bag	Source:	Harvard Ave.
Date Sampled:	December 13/06	Date Received:	December 13/06	Date Tested:	December 20/06



SIEVE	PERCENT
SIZE (mm)	PASSING
9.5000	100.0
4.7500	99.5
2.0000	98.4
0.8500	97.2
0.4250	96.1
0.2500	95.0
0.1500	93.8
0.0750	86.0
0.0296	69.0
0.0192	64.5
0.0112	60.0
0.0081	57.0
0.0057	55.5
0.0029	48.4
0.0021	45.4
0.0012	44.3

Percent of: GRAVEL (0.5%), SAND (13.6%), SILT (40.6%) and CLAY (45.3%) Sample Description: Silty Clay

ENG-TECH Consulting Limited

per

Clark Hryhoruk, President Ph: (204) 233-1694 Fax: (204) 235-1579



PARTICLE SIZE ANALYSIS REPORT

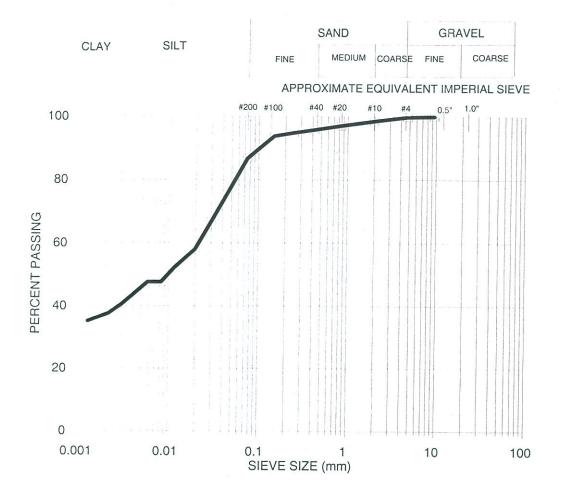
File No.: Reference No.: 06-027-05 6-27-5-7

UMA Engineering Ltd. 1479 Buffalo Place Winnipeg, Manitoba R3T 1L7

ATTENTION: Ron Bruce, P. Eng.

PROJECT: CITY OF WINNIPEG 2007 RESIDENTIAL STREET RENEWAL PROGRAM

Test Hole No.	TH1	Sample No.	S3	Depth:	0.7 m
Sampled By:	ENG-TECH	Type of Sample:	Bag	Source:	Harvard Ave.
Date Sampled:	December 13/06	Date Received:	December 13/06	Date Tested:	December 20/06



SIEVE	PERCENT						
SIZE (mm)	PASSING						
9.5000	100.0						
4.7500	99.9						
2.0000	98.6						
0.8500	97.1						
0.4250	95.8						
0.2500	94.8						
0.1500	93.7						
0.0750	86.7						
0.0301	66.9						
0.0197	58.0						
0.0116	52.1						
0.0083	47.6						
0.0059	47.6						
0.0030	40.5						
0.0022	37.6						
0.0013	35.1						

Percent of: GRAVEL (0.1%), SAND (13.2%), SILT (49.5%) and CLAY (37.2%) Sample Description: Silty Clay

ENG-TECH Consulting Limited

per d 10 18lu Clark Hryhoruk, President Ph: (204) 233-1694 Fax: (204) 235-1579



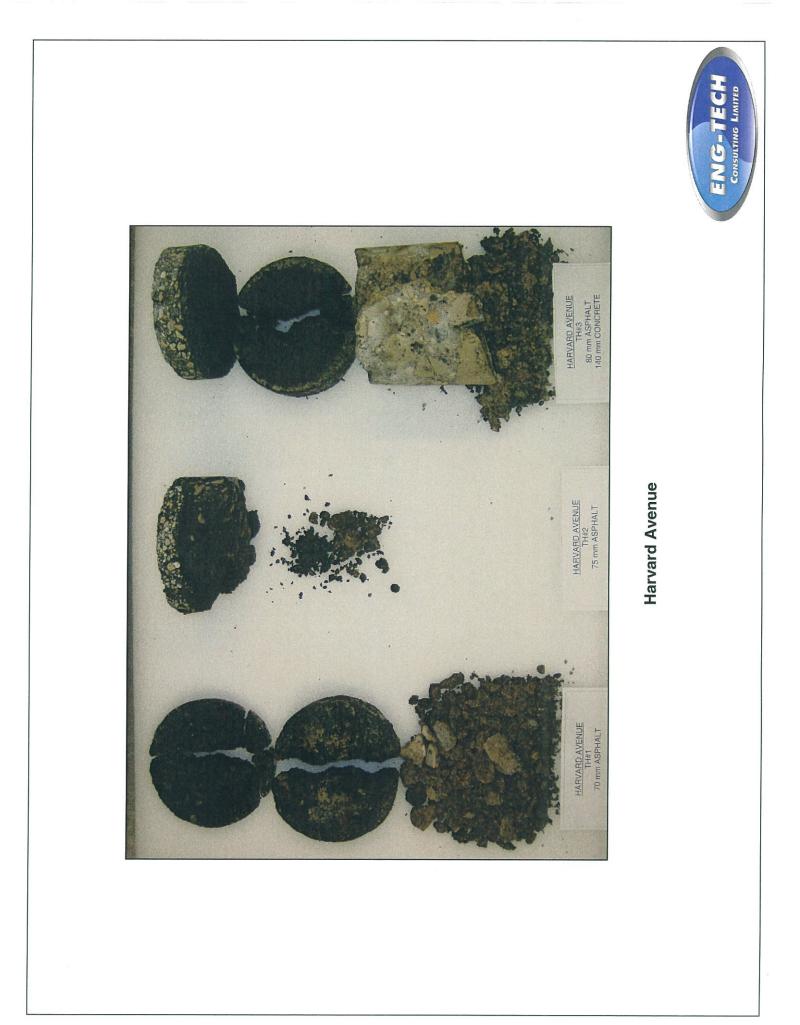
PARTICLE SIZE ANALYSIS REPORT

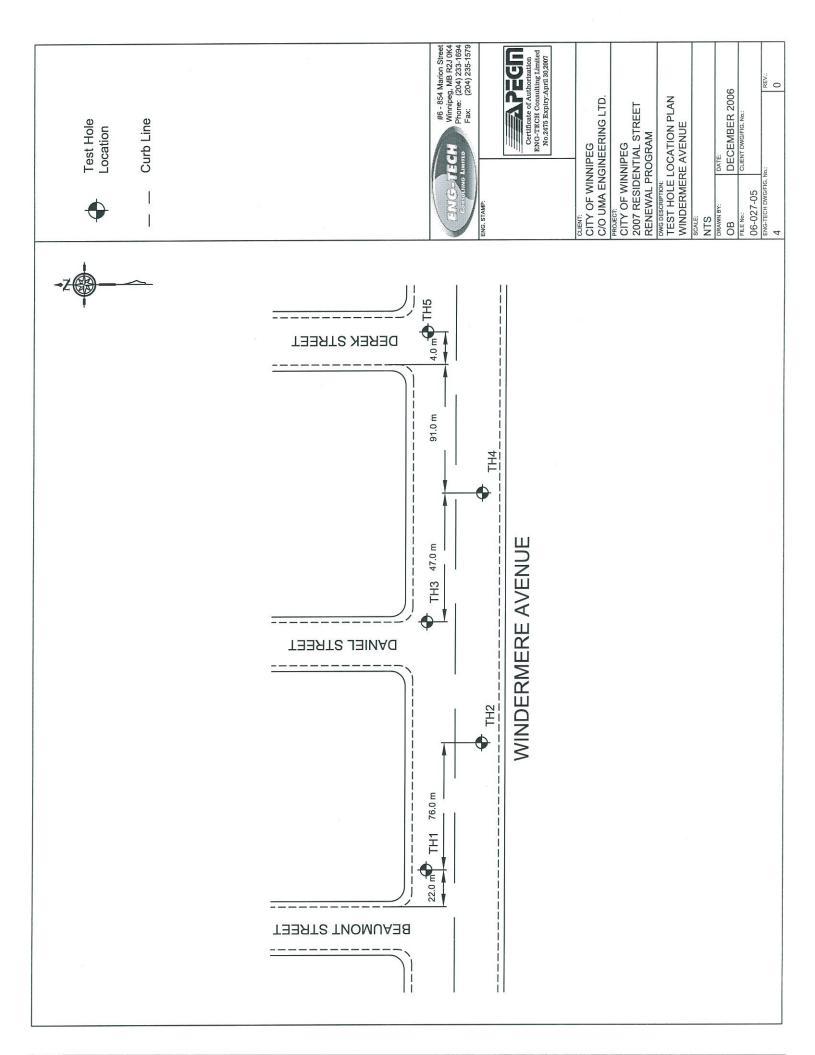
UMA Engineering Ltd. File No.: 06-027-05 1479 Buffalo Place **Reference No.:** 6-27-5-8 Winnipeg, Manitoba R3T 1L7 ATTENTION: Ron Bruce, P. Eng. PROJECT: CITY OF WINNIPEG 2007 RESIDENTIAL STREET RENEWAL PROGRAM Test Hole No. TH1 **S6** 1.7 m Sample No. Depth: Sampled By: **ENG-TECH** Harvard Ave. Type of Sample: Bag Source: Date Sampled: December 13/06 Date Received: December 13/06 Date Tested: December 20/06 SAND GRAVEL SILT CLAY MEDIUM FINE COARSE FINE COARSE APPROXIMATE EQUIVALENT IMPERIAL SIEVE #200 #100 #40 #20 #10 #4 1.0" 0.5" 100 PERCENT SIEVE SIZE (mm) PASSING 4.7500 100.0 2.0000 99.9 0.8500 99.6 80 0.4250 99.4 0.2500 99.2 0.1500 99.0 PERCENT PASSING 0.0750 98.6 0.0264 94.0 60 0.0172 88.0 0.0103 80.6 0.0077 68.7 0.0057 58.3 0.0030 43.7 40 0.0022 37.8 0.0013 33.8 20 0 0.001 0.01 0.1 10 100

Percent of: GRAVEL (0.0%), SAND (1.4%), SILT (61.4%) and CLAY (37.2%) Sample Description: Clayey Silt

SIEVE SIZE (mm)

Per Clark Hryhoruk, President Ph: (204) 233-1694 Fax: (204) 235-1579





City of Winnipeg 2007 Residential Street Renewal Program Windermere Avenue

Test	Toothoot	Pavemen	Pavement Surface	Pavement Structure Material	cture Material	Cubarado	Comple		H	Hydrometer Analysis	Analvsis			Atterberg Limits	lite
No.	l estrole Location	Type	Thickness (mm)	Type	Thickness (mm)	Description	Depth (m)	Molsture Content (%)	Gravel	Sand	Silt	Clay	Liquid	Plastic	Plasticity
									(01)	(0/)	(0/)	(0/)			Index
-	Windermere Avenue	Asphalt	142	,	1	Clay Fill	0.4	17.0	,	- 1	L		,		
						Clay	1.3	39.8	2						
					a.	Silty Clay Fill	0.6	26.1	1.2	17.8	37.5	43.5	61.1	21.2	39.9
2	Windermere Avenue	Asphalt	140	,	1	Clayey Silt	0.9	24.0	0.0	8.1	56.7	35.2	38.5	16.1	22.5
						Clay	1.2	34.9	0.1	2.6	18.9	78.4	87.5	29.5	58.0
						Silt	1.5	22.8	ï		1				
e	Windermere Avenue	Asphalt	110	,	1	Silty Clay Fill	0.2	27.3	•			×			
						Clay	1.1	37.7							
4	Windermere Avenue	Asphalt	130	,		Silty Clay Fill	0.2	24.8							
						Clay	0.7	29.1			,	e			
5	Windermere Avenue	Asphalt	137	Limestone (12 mm)	100	Silty Clay Fill	0.4	23.8	ı						

P:\2006\Projects\027(U.M.A.)\05(2007 Street Renewal Program)\Pavement Summary_Windermere.rtf

Client: UMA Engineering Ltd.

Project: City of Winnipeg 2007 Residential Street Renewal Program Site: Windermere Avenue

Location: See Figure 4

Test Hole #: TH 1

		SUBSURFACE PROFILE	SAMPLE DATA						GRAIN SIZE			
					0	()	E				UTION	
) (L	Symbol	Description	Elevation (m)		Sample Type	Recovery (%)	blows/300 mm	Water Content (%)			2.22	
Depth (m)	l Syr	Description	vatio	Number	mple	cove	ws/3	PL 0 LL	Gravel	pu		١٢
De	Soil			Nu	Sai	Re	blo	20 40 60 80	Gra	Sand	Silt	Clay
0-		Ground Surface Asphait (142 mm)	100	-								
-		Clay Fill (CH) - dark brown, moist, high plastic,	2 A.									
		some sand & gravel, with silt.		S1				•				
			-								54	
-				S2								
			-	02								
	××	Clay (CH)										
1-		- dark brown, moist, high plastic, occa. silt pocket.	99-	S3				•				
_												
				S4	3			•				
-		- below 1.4 m, medium brown.										
_				S5				•				
_				S6				•				
2-	4											
		End of Test Hole - end of test hole at 2.0 m below										
-		grade. - no groundwater or sloughing										
		encountered. - backfilled test hole with auger										
		cuttings and topped with asphalt										
-		cold mix.										
-												
3-		4	97-					I				
ENG-	FECH (Consulting Limited		" Da -	Ideal		ng 4-1	Completion De	nthe C	0		
Lo	gged	by: ERM	Drilled By Drill Rig:				ng Ltd	Completion De Completion Ele			.0 m	
Re	Reviewed by: CHA Auger S						d Ster					
Sa	amp	le Type Split Ba	arrel	Sh	elby	/ Tub	be ¶	Auger Cuttings	s	Split \$	Spoo	n

Client: UMA Engineering Ltd.

Project: City of Winnipeg 2007 Residential Street Renewal Program Site: Windermere Avenue

Location: See Figure 4

Test Hole #: TH 2

	SUBSURFACE PROFILE			SAMPLE DATA					GRAIN SIZE			
					a	()	E		D	ISTRIB		
Depth (m)	Soil Symbol	Description	Elevation (m)	Number	Sample Type	Recovery (%)	blows/300 mm	Water Content (%) PL 0 LL 20 40 60 80	Gravel	Sand	Silt	Clay
0-		Ground Surface Asphait (140 mm)	100									
-		Silty Clay Fill (CH) - dark brown, moist, high plastic, some sand & gravel, and silt.		S1	\$							
				S2					1.2	17.8	37.5	43.5
- 1-		<i>Clayey Silt (Cl)</i> - medium brown, moist, medium plastic, and clay.	99-	S3	\$				0.0	8.1	56.7	35.2
-		<i>Clay (CH)</i> - dark brown, moist, high plastic, some silt.		S4	\$				0.1	2.6	18.9	78.4
-		<i>Silt (ML)</i> - light brown, moist to damp, low plastic, some clay. - <u>Note</u> : sample S5 contaminated,		S5	\$							
2-		not able to test. <i>Clay (CH)</i> - medium brown, moist, high plastic.	98-	S6	\$			•				
		End of Test Hole - end of test hole at 2.0 m below grade. - no groundwater or sloughing encountered. - backfilled test hole with auger cuttings and topped with asphalt cold mix.	-									
-												
3-			97-									
Lo	gged	consulting Limited by: ERM d by:	Drilled By Drill Rig: Auger Siz	Acker	MP5	5-T	-	Completion El				
Sa	amp	le Type Split Ba	arrel	Sh	elby	/ Tub	be ¶	Auger Cuttings	S	Split \$	Spoc	n

GEOTECHNICAL • ENVIRONMENTAL • MATERIALS TESTING

Client: UMA Engineering Ltd.

Project: City of Winnipeg 2007 Residential Street Renewal Program **Site:** Windermere Avenue

Location: See Figure 4

Test Hole #: TH 3

		SUBSURFACE PROFILE	SAMPLE DATA					GRAIN SIZE
			(2)		Ð	(0)	E	DISTRIBUTION %
Depth (m)	Soil Symbol	Description	Elevation (m)	Number	Sample Type	Recovery (%)	blows/300 mm	Water Content (%) Water Content (%) Big U U
0-		Ground Surface	100					
		Asphalt (110 mm)						
-		Silty Clay Fill (CH) - greyish, moist, high plastic, some sand, with silt.		S1	5			
_		 below 0.4 m, some black pockets, trace silt inclusions, trace gravel. 	_	S2				
_								
	***			S3				
1-	Ħ	Clay (CH)	99-	S4				
_		 grey, moist, high plastic, occa. silt pocket, trace silt. below 1.1 m, dark brown. 						
_		- below 1.5 m, some silt, some	_	S5	\$			
_		oxide pockets.		S6				
-				30				
2-	2		98-					
		End of Test Hole - end of test hole at 2.0 m below	00					
-		grade. - no groundwater or sloughing						
-		encountered. - backfilled test hole with auger						
		cuttings and topped with asphalt cold mix.	-					
-								
_								
3-			97-					······
ENG-1	TECH C	Consulting Limited	lled By	/ Pad	dock	Drilli	na I td	d. Completion Depth: 2.0 m
Lo	gged I	FOM	ll Rig:				ng Liu	Completion Elevation: 98.0 m
Re	viewe		ger Siz				d Sten	
Sa	amp	le Type 🗧 Split Barre	1	Sh	elby	/ Tub	be ¶	Auger Cuttings Split Spoon

GEOTECHNICAL • ENVIRONMENTAL • MATERIALS TESTING

Client: UMA Engineering Ltd.

Project: City of Winnipeg 2007 Residential Street Renewal Program **Site:** Windermere Avenue

Location: See Figure 4

Test Hole #: TH 4

		SUBSURFACE PROFILE	SAMPLE DATA								GRAIN SIZE			
	_	21	(u)e	(%	mm				DI	ISTRIB		
(m)	Symbol	Description	ion (r	er	e Typ	ery (300 r	Wate	r Conte	ent (%)				
Depth (m)	Soil S		Elevation (m)	Number	Sample Type	Recovery (%)	blows/300 mm	20	40 60	LL) 80	Gravel	Sand	Silt	Clay
0-		Ground Surface	100											
0-		Asphalt (130 mm)		1										
-		Silty Clay Fill (CH) - dark brown, moist, medium to high	n	S1				•						
		plastic, occa. silt inclusions, some sand & gravel, with silt.												
		No file and the second s	-											
-	2	Clay (CH)	-	S2				•						
_		 dark brown, moist, high plastic, trace silt. 												
1			99-	S3										
			33											
ł				S4					•					
-														
Ē		- below 1.5 m, medium brown,	-	S5										
		some silt, some silt inclusions.		00										
-	2	- below 1.7, grey.		S6										s
2-	4	e.	- 98-	30										
		End of Test Hole - end of test hole at 2.0 m below												
-		grade. - no groundwater or sloughing												
-		encountered. - backfilled test hole with auger												
		cuttings and topped with asphalt cold mix.	-											
-														
3-			97-											
ENG-T	ECH C	onsulting Limited					5 5							
Log	gged l		orilled By Orill Rig: J				ng Ltd.			oletion De			0 m	
Re	viewe		uger Siz				d Sterr	ı		t: 1 of 1	- valio	1. 50.	U III	
Sa	mp	le Type Split Bar	rel	Sh	elby	/ Tub	• 1	Auge	er Cutt	tings	s	Split S	Spoo	'n

Client: UMA Engineering Ltd.

Project: City of Winnipeg 2007 Residential Street Renewal Program Site: Windermere Avenue

Location: See Figure 4

Test Hole #: TH 5

		SUBSURFACE PROFILE			SAMP	LE DA	ТА					2176	
					0	()	E			GRAIN SIZE DISTRIBUTION			
) (F	Symbol	Description	Elevation (m)		Sample Type	Recovery (%)	blows/300 mm	Water Content (%)					
Depth (m)	Syn	Description	/atio	Number	ble	over	1s/3(PL 0 LL	Vel	σ			
Dep	Soil		Elev	Nun	San	Rec	blow	20 40 60 80	Gravel	Sand	Silt	Clay	
0-		Ground Surface	100										
		Asphalt (137 mm)											
-	2	Limestone (100 mm) - tan, damp, 12 mm size max.		S1	5			•					
-		Silty Clay Fill (CH) - dark brown, moist, high plastic,		S2									
		some sand & gravel, with silt.	-	-									
				S3				•					
_													
1_	***		99-	S4									
			99-									1	
									2				
	***			S5									
0													
-<				S6	3			•					
-<													
					÷								
2-5		End of Test Hole	- 98-									Clay	
-		- end of test hole at 2.0 m below grade.											
		 no groundwater or sloughing encountered. 											
-		 backfilled test hole with auger cuttings and topped with asphalt 										~	
4		cold mix.											
									1				
5													
3-			97-										
ENG-T	ECH C	onsulting Limited											
Log	gged b		illed By ill Rig: /				ig Ltd.	Completion De Completion Ele					
Re	viewe	5 T 1	ger Siz				d Stem			00.0			
Sa	mpl	e Type Split Barro	el	Sh	elby	Tub	e 1	Auger Cuttings	Sp	lit S	poo	n	
								-	-				



PARTICLE SIZE ANALYSIS REPORT

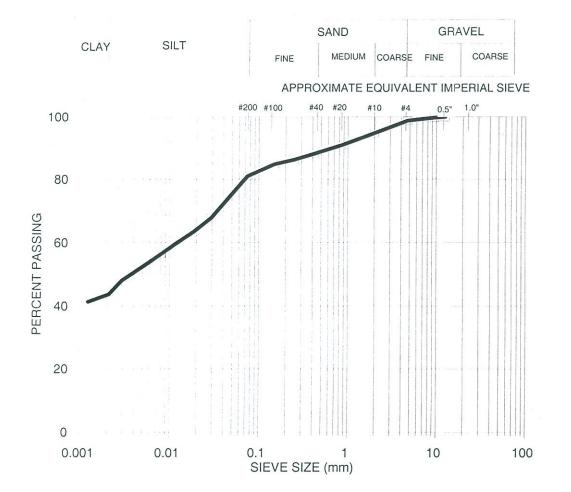
File No.: Reference No.: 06-027-05 6-27-5-1

UMA Engineering Ltd. 1479 Buffalo Place Winnipeg, Manitoba R3T 1L7

ATTENTION: Ron Bruce, P. Eng.

PROJECT: CITY OF WINNIPEG 2007 RESIDENTIAL STREET RENEWAL PROGRAM

Test Hole No.	TH2	Sample No.	S2	Depth:	0.6 m
Sampled By:	ENG-TECH	Type of Sample:	Bag	Source:	Windermere Ave.
Date Sampled:	December 14/06	Date Received:	December 14/06	Date Tested:	December 20/06



SIEVE	PERCENT		
SIZE (mm)	PASSING		
12.5000	100.0		
9.5000	99.8		
4.7500	98.8		
2.0000	94.8		
0.8500	91.0		
0.4250	88.3		
0.2500	86.3		
0.1500	84.8		
0.0750	81.0		
0.0296	67.9		
0.0190	63.5		
0.0112	59.2		
0.0081	56.4 53.5		
0.0057			
0.0029	48.0		
0.0021	43.7		
0.0012	41.3		

Percent of: GRAVEL (1.2%), SAND (17.8%), SILT (37.5%) and CLAY (43.5%) Sample Description: Silty Clay

ENG-TECH Consulting Limited

per Clark Hryhoruk, President Ph: (204) 233-1694 Fax: (204) 235-1579



UMA Engineering Ltd. 1479 Buffalo Place Winnipeg, Manitoba R3T 1L7 #6 - 854 Marion Street Winnipeg, Manitoba R2J 0K4 eng_tech@mts.net www.eng-tech.ca

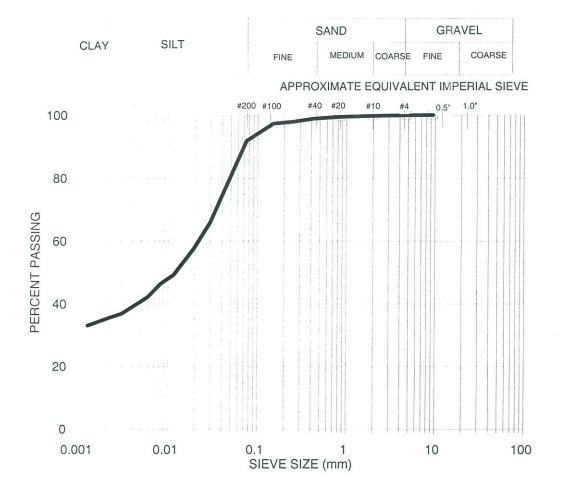
PARTICLE SIZE ANALYSIS REPORT

File No.: Reference No.: 06-027-05 6-27-5-2

ATTENTION: Ron Bruce, P. Eng.

PROJECT: CITY OF WINNIPEG 2007 RESIDENTIAL STREET RENEWAL PROGRAM

Test Hole No	. TH2	Sample No.	S3	Depth:	0.9 m
Sampled By:	ENG-TECH	Type of Sample:	Bag	Source:	Windermere Ave.
Date Sample	d: December 14/06	Date Received:	December 14/06	Date Tested:	December 20/06



PERCENT		
PASSING		
100.0		
100.0		
99.8		
99.5		
98.9		
97.9 97.4		
66.0		
57.6		
49.2		
46.4		
42.2		
36.9		
35.5		
33.1		

Percent of: GRAVEL (0.0%), SAND (8.1%), SILT (56.7%) and CLAY (35.2%) Sample Description: Clayey Silt

ENG-TECH Consulting Limited per

Clark Hryhoruk, President Ph: (204) 233-1694 Fax: (204) 235-1579



PARTICLE SIZE ANALYSIS REPORT

06-027-05

6-27-5-3

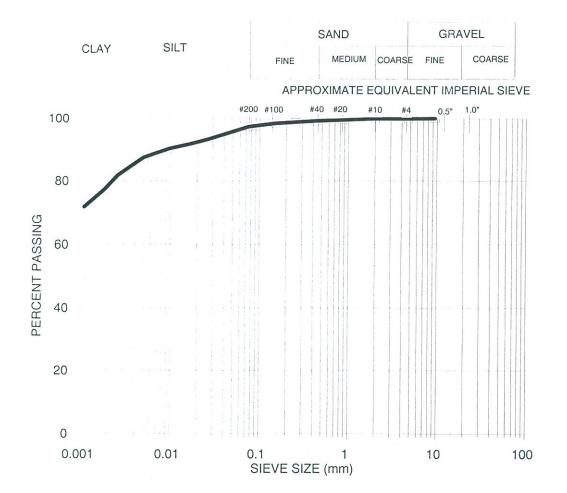
UMA Engineering Ltd. 1479 Buffalo Place Winnipeg, Manitoba R3T 1L7

ATTENTION: Ron Bruce, P. Eng.

PROJECT:	CITY OF WINNIPEG RESID	DENTIAL 2007 S	TREET RENEWAL PRO	GRAM	
Test Hole No.	TH2	Sample No.	S4	Depth:	1.2 m
Sampled By:	ENG-TECH	Type of Sample:	Bag	Source:	Windermere Ave.
Date Sampled:	December 14/06	Date Received:	December 14/06	Date Tested:	December 20/06

File No.:

Reference No.:



SIEVE	PERCENT		
SIZE (mm)	PASSING 100.0		
9.5000			
4.7500	99.9		
2.0000	99.9		
0.8500	99.6		
0.4250	99.2		
0.2500	98.8		
0.1500	98.4		
0.0750	97.3		
0.0264	93.2		
0.0167	91.8		
0.0098	90.3		
0.0069	88.8		
0.0050	87.3		
0.0026	81.7		
0.0018	77.3		
0.0011	71.8		

Percent of: GRAVEL (0.1%), SAND (2.6%), SILT (18.9%) and CLAY (78.4%) Sample Description: Clay

ENG-TECH Consulting Limited

per UN

Clark Hryhoruk, President Ph: (204) 233-1694 Fax: (204) 235-1579



Windermere Avenue





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