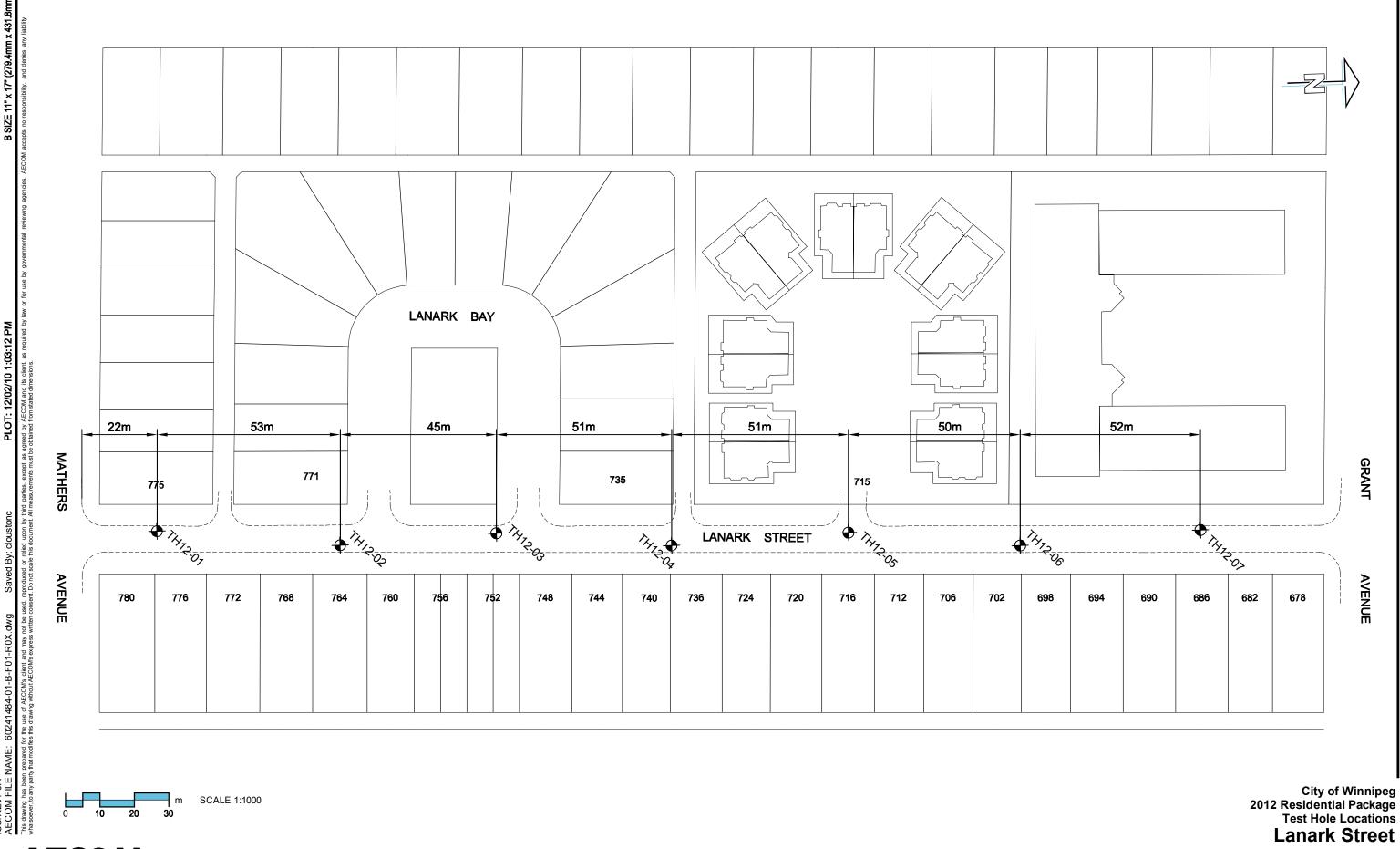
A=COM

Lanark Street



AECOM



PUBLIC WORKS DEPARTMENT • SERVICE DES TRAVAUX PUBLICS

Engineering Division • Division de l'ingénierie

GEOTECHNICAL INVESTIGATION

STREET RECONSTRUCTION

Revised October 28th, 2008

<u>Fieldwork</u>

- 1. Clear all underground services at each testhole location.
- 2. Test holes required every 50 m with a minimum of 3 test holes per street.
- 3. Record location of testhole (offset from curb, distance from cross street and house number).
- 4. Drill 150 mm-diameter core in pavement.
- 5. Drill 125 mm-diameter testhole into fill materials and subgrade
- 6. If a service trench backfilled with granular materials is encountered, another hole shall be drilled to define the existing sub-surface conditions.
- 7. Testhole to be drilled to depth of 2 m \pm 150 mm below surface of the pavement.
- 8. Recover pavement core sample and representative samples of soil (fill materials, pavement structure materials and subgrade).
- 9. Measure and record pavement section exposed in the testhole (thickness of concrete or asphalt and different types of pavement structure materials).
- 10. Pavement structure materials to be identified as crushed limestone or granular fill and the maximum aggregate size of the material (20 mm, 50 mm or 150 mm).
- 11. Log soil profile for the subgrade.
- 12. Representative samples of soil must be obtained at the following depths below the bottom of the pavement structure materials 0.1 m, 0.4 m, 0.7 m, 1.0 m, 1.3 m, 1.6 m, etc. Ensure a sample is obtained from each soil type encountered in the testhole.
- 13. Make note of any water seepage into the testhole.
- 14. Backfill testhole with native materials and additional granular fill, if required. Patch pavement surface with hot mix asphalt or high strength durable concrete mix.
- 15. Return core sample from the pavement and soil samples to the laboratory.

Lab Work

- 1. Test all soil samples for moisture content.
- 2. Photograph core samples recovered from the pavement surface.
- 3. Conduct tests for plasticity index and hydrometer analysis on selected soil samples which are between 0.5 m and 1 m below top of pavement (this is the sub-grade on which the pavement and sub-base will be built). The selection will be based upon visual classification and moisture content test results, with a minimum of one sample of each soil type per street to be tested.
- 4. Prepare testhole logs and classify subgrade (based on hydrometer) as follows;

< 30% silt - classify as clay 30% - 50% silt - classify as silty clay 50% - 70% silt - classify as clayey silt > 70% silt - classify as silt

Prepared by: The National Testing Laboratories Limited and Eng-Tech Consulting

Embrace the Spirit · Vivez l'esprit

AECOM Canada Ltd.

GENERAL STATEMENT

NORMAL VARIABILITY OF SUBSURFACE CONDITIONS

The scope of the investigation presented herein is limited to an investigation of the subsurface conditions as to suitability for the proposed project. This report has been prepared to aid in the evaluation of the site and to assist the engineer in the design of the facilities. Our description of the project represents our understanding of the significant aspects of the project relevant to the design and construction of earth work, foundations and similar. In the event of any changes in the basic design or location of the structures as outlined in this report or plan, we should be given the opportunity to review the changes and to modify or reaffirm in writing the conclusions and recommendations of this report.

The analysis and recommendations presented in this report are based on the data obtained from the borings and test pit excavations made at the locations indicated on the site plans and from other information discussed herein. This report is based on the assumption that the subsurface conditions everywhere are not significantly different from those disclosed by the borings and excavations. However, variations in soil conditions may exist between the excavations and, also, general groundwater levels and conditions may fluctuate from time to time. The nature and extent of the variations may not become evident until construction. If subsurface conditions differ from those encountered in the exploratory borings and excavations, are observed or encountered during construction, or appear to be present beneath or beyond excavations, we should be advised at once so that we can observe and review these conditions and reconsider our recommendations where necessary.

Since it is possible for conditions to vary from those assumed in the analysis and upon which our conclusions and recommendations are based, a contingency fund should be included in the construction budget to allow for the possibility of variations which may result in modification of the design and construction procedures.

In order to observe compliance with the design concepts, specifications or recommendations and to allow design changes in the event that subsurface conditions differ from those anticipated, we recommend that all construction operations dealing with earth work and the foundations be observed by an experienced soils engineer. We can be retained to provide these services for you during construction. In addition, we can be retained to review the plans and specifications that have been prepared to check for substantial conformance with the conclusions and recommendations contained in our report.

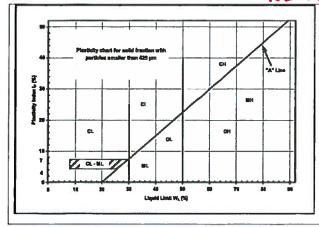
EXPLANATION OF FIELD & LABORATORY TEST DATA

					UMA	uscs		Laborator	y Classification Crite	eria
		Descripti	ion		Log Symbols	Classification	Fines (%)	Grading	Plasticity	Notes
		CLEAN GRAVELS	Well graded sandy gravel or no f	s, with little	2721	GW	0-5	C _U > 4 1 < C _C < 3		
	GRAVELS (More than 50% of	(Little or no fines)	Poorly grade sandy gravel or no f	s, with little		GP	0-5	Not satisfying GW requirements		Dual symbols if 5-
SILS	coarse fraction of gravel size)	DIRTY GRAVELS	Silty gravels, grave			GM	> 12		Atterberg limits below "A" line or W _P <4	12% fines. Dual symbols if above "A" line and
AINED SC		(With some fines)	Clayey grave sandy g			GC	> 12		Atterberg limits above "A" line or W _P <7	4 <w<sub>P<7</w<sub>
COARSE GRAINED SOILS		CLEAN SANDS	Well grade gravelly sand or no f	s, with little	\$5.84 \$5.64	sw	0-5	C _U > 6 1 < C _C < 3		$C_U = \frac{D_{60}}{D_{10}}$
CO	SANDS (More than 50% of	(Little or no fines)	Poorly grad gravelly sand or no f	s, with little	2000	SP	0-5	Not satisfying SW requirements		$C_U = \frac{D_{60}}{D_{10}}$ $C_C = \frac{(D_{30})^2}{D_{10} x D_{60}}$
	coarse fraction of sand size)	DIRTY SANDS	Silty sa sand-silt r			SM	> 12		Atterberg limits below "A" line or W _P <4	
		(With some fines)	Clayey s sand-clay			sc	> 12		Atterberg limits above "A" line or W _P <7	
	SILTS (Below 'A' line	W _L <50	Inorganic sil clayey fine s slight pla	ands, with		ML				
	negligible organic content)	W _L >50	Inorganic si plasti			МН				
SOILS	CLAYS	W _L <30	Inorganic c clays, sand low plasticity,	y clays of		CL				
FINE GRAINED SOILS	(Above 'A' line negligible organic	30 <w<sub>L<50</w<sub>	Inorganic cla clays of n plasti	nedium		CI			Classification is Based upon Plasticity Chart	
FINE	content)	W _L >50	Inorganic cla plasticity,			СН				
	ORGANIC SILTS &	W _L <50	Organic s organic silty o plasti	clays of low		OL				
	CLAYS (Below 'A' line)	W _L >50	Organic cla plasti		7/2	ОН				
Н	IIGHLY ORGA	INIC SOILS	Peat and ot organic		****	Pt		on Post ification Limit		r odour, and often s texture
		Asphalt			Till					
		Concrete			Bedrock fferentiated)				AE	COM
×		Fill		(Li	Bedrock mestone)				ignated fraction	

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

NOT USED TO CLASSIFY SUBGRADE, REFER TO CITY OF WINN IPER SPECS FOR GEOTECHNICAL INVESTIGATION STREET

RECONSTRUCTION (OCT. 2008)



FRAC	CTION	SEIVE	SIZE (mm)	DEFINING F PERCENTAGE OF MINOR CO	E BY WEIGHT
		Passing	Retained	Percent	Identifier
Gravel	Coarse	76	19	35-50	and
Gravei	Fine	19	4.75	33-30	and
	Coarse	4.75	2.00	20-35	"y" or "ey" "
Sand	Medium	2.00	0.425	20-35	y or ay
	Fine	0.425	0.075	10.20	same
	n-plastic) (plastic)	< 0.0)75 mm	1-10	trace
	*1	or example:	gravelly, san	dy clayey, silty	

Definition of Oversize Material

COBBLES: 76mm to 300mm diameter BOULDERS: >300mm diameter

LEGEND OF SYMBOLS

Laboratory and field tests are identified as follows:

qu - undrained shear strength (kPa) derived from unconfined compression testing.

T_v - undrained shear strength (kPa) measured using a torvane

pp - undrained shear strength (kPa) measured using a pocket penetrometer.

L_v - undrained shear strength (kPa) measured using a lab vane.

F_v - undrained shear strength (kPa) measured using a field vane.

γ - bulk unit weight (kN/m³).

SPT - Standard Penetration Test. Recorded as number of blows (N) from a 63.5 kg hammer dropped 0.76 m (free fall) which is required to drive a 51 mm O.D. Raymond type sampler 0.30 m into the soil.

DPPT - Drive Point Pentrometer Test. Recorded as number of blows from a 63.5 kg hammer dropped 0.76 m (free fall) which is required to drive a 50 mm drive point 0.30 m into the soil.

w - moisture content (W_L, W_P)

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

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

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

N - BL.OWS/0.30 m	COMPACTNESS
0 - 4	very loose
4 - 10	loose
10 - 30	compact
30 - 50	dense
50	very dense

		Local Streets Package 12-R-02 I: Lanark Street; In Front of House						Winr Curb	nipeg							STHOLE NO: TH12- DJECT NO.: 602414	
		TOR: Maple Leaf Drilling Ltd									50 m	nm Co	oring			VATION (m):	
SAN	/IPLE T	YPE GRAB	SHELBY TUBE	SF	PLIT :	SP0	NC		Bl	JLK				NO REC		Y CORE	
DEPTH (m)	SOIL SYMBOL	SOIL DESC	CRIPTION		SAMPLE TYPE	SAMPLE #	◆ SP 0 2 16 17	X E Dyna T (Star (Blov 0 40 Tota Tota 18 lastic	Becker amic C ndard F vs/300i 0 60 al Unit kN/m ³) 19	one ◇ Pen Tes mm) 0 80 Wt ■ 20	it) ◆ 100 21	2	+ Torva X QU Lab V Pocket Field \ (kP	J × ′ane □ : Pen. △ ⁄ane ❤ a)		COMMENTS	DEPTH
0		ASPHALT (thickness = 50 mm)					2	0 41	0 60	0 80	100	50	10	0 150	200		
-		CONCRETE (thickness = 200 mm) CLAY (FILL) - trace silt, trace sand															
- - -		- dark brown - frozen to 1.2 m, moist when th - intermediate plasticity	awed			G1											
-						G2	•)									
- - 1						G3) · · · · · ·									1 -
-		- below 1.2 m, compact to loose				G4	•										
- - -		- suspected hydroc ['] arbon odour				G5	•										
13/12		SILTY CLAY - brown - moist, firm - intermediate plasticity															
A WINN.GDT 2/						G6		•									2 -
LOGS.GPJ UM		END OF TEST HOLE AT 2.1 m in silty NOTES:	r clay.			G7)								
NE & WAVELL		No sloughing observed. No seepage observed. Test hole backfilled with auger cutti to surface. Drilled with 150 mm diamond core to 1.1 mm.		h													
LOG OF TEST HOLE LANARK, MULVEY, KANE & WAVELL LOGS.GPJ. UMA WINN.GDT 2/13/12		2.1 m.															
ST HOLE LANA															* * * * * *		
비		A=C044										etsche				TION DEPTH: 2.10 m	
0000		AECOM								: Far		alli Iair Co	ckrell	100	JIVIPLE	TION DATE: 1/24/12 Page	e 1 of 1

		Local Streets Package 12-R-02 : Lanark Street; In Front of House #764, Northbound Lan	CLIE ne, 2.0]						STHOLE NO: TH12-0 DJECT NO.: 602414	
CON	TRAC	TOR: Maple Leaf Drilling Ltd	MET	ГНО	D:	125	nm S	SSA	with	150 r	nm C	oring			EVATION (m):	
SAME	PLE T	YPE GRAB SHELBY TUBE	SF	PLIT	SP0	ON		В	ULK				NO RE	COVER	RY CORE	
DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION		SAMPLE TYPE	SAMPLE #	◆ SF 0 2 16 1	X Dyn T (Sta (Blov 0 4 Tot Tot Plastic	Becker amic C ndard I ws/300 0 6 al Unit (kN/m ³) 3 19	Cone <> Pen Te Imm) 0 8 Wt 0 Liquid	st) • 0 100 0 21		+ Tor	HEAR STF vane + QU × Vane □ et Pen. ∠ I Vane • Pa)	7	COMMENTS	ОЕРТН
0		ASPHALT (thickness = 40 mm)				2	0 4	0 6	0 8	0 100	5	0 1	00 1	50 200 :		
-	X	CONCRETE (thickness = 200 mm) CLAY (FILL) - some silt, trace sand														
-		- dark brown - frozen, moist when thawed - high plasticity			G8		•									
-					G9		•									
-		GRANULAR (FILL) - possible concrete pipe (abandoned) - dry, loose upon recovery			G10	•										
-		CLAY - trace silt - brown			G11											1-
-		- moist firm - high plasticity			011								2			
13/12					G12		•									
MINN.GDI 2/					G13		•									2 -
OGS.GPJ UMF		- silt pocket at 1.9 m END OF TEST HOLE AT 2.1 m in clay. NOTES:			G14			•			*****					2
IE & WAVELL L		 No sloughing observed. No seepage observed. Test hole backfilled with auger cuttings, bentonite and asphalt colopatch to surface. Drilled with 150 mm diamond core to 0.24 m, solid stem augers to 														
MULVEY, KAN		2.1 m.									* * * * * *					
LOG OF TEST HOLE LANARK, MULVEY, KANE & WAVELL LOGS,GPJ UMA WINN,GDT 2/13/12																
3						LOC	GFD	BY:	Stenl	hen P	etsch	: e	: C	: OMPLF	ETION DEPTH: 2.10 m	<u> </u>
5		A ECOM				RE۱	/IEWI	ED B	Y: Fa	ris Kh	alil		С		TION DATE: 1/25/12	
ğ						PRO)JEC.	T ENG	GINE	ER: E	Blair Co	ockrell			Page	1 of 1

		Local Streets Package 12-R-02 Lanark Street; Opposite House #752, Southbound L					Winr urb	ipeg						STHOLE NO: TH12-0	
		TOR: Maple Leaf Drilling Ltd						<u>S</u> A 1	with 15	<u>50</u> mr	n Cor	ing		EVATION (m):	
SAMI	PLE T	YPE GRAB SHELBY TUBE	⊠s					ВІ					RECOVE		
DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION		SAMPLE TYPE	SAMPLE #	◆ SF 0 2 16 1;	X E ◇ Dyna PT (Star (Blow 0 40 ■ Tota (I) 7 18	Becker amic Condard F vs/300i 0 60 al Unit kN/m ³) 19 MC	one <>Pen Test) mm) 0 80 Wt 1 Liquid	100	+ □ △ F	Torvane XQU X Lab Vane Pocket Per Field Vane (kPa)	□ n. △ • æ	COMMENTS	рертн
0		ASPHALT (thickness = 60 mm)				2	0 40	60	0 80	100	50	100	150 200		
-	***	CONCRETE (thickness = 180 mm) CLAY (FILL) - some silt, trace sand													
-		 dark brown frozen, moist when thawed high plasticity 			G15	(
-		CLAY - some silt, trace sand - brown - frozen to 1.2 m, moist when thawed - high plasticity			G16		•		1					Gradation: Sand = 3.0%, Silt = 18.7%, Clay = 78.2%	
- - -1					G17		•								1 -
-		- below 1.2 m, firm			G18		•								
-					G19		•								
13/12		at 1.75 are all the collect						:					:		
2 TO		- at 1.75 m, silt pocket - below 1.8 m, trace silt			000		<u>.</u> خ								
10.NNIW AMIN - - - - - - 2		- DETOW 1.0 III, II ALE SIII			G20)							2 -
LOGS.GPJ (END OF TEST HOLE AT 2.1 m in clay. NOTES: 1. No sloughing observed.			G21										
S WAVELL		No seepage observed. No seepage observed. Test hole backfilled with auger cuttings, sand and asphalt cold to surface. Drilled with 150 mm diamond core to 0.24 m, solid stem auger	-												
MULVEY, KANI		2.1 m.								,,,,,					
LOG OF TEST HOLE LANARK, MULVEY, KANE & WAVELL LOGS.GPJ. UMA WINN.GDT 2/13/12															
3 3						LOC	GED	BY:	Stephe	n Pet	sche	:	COMPI	 ETION DEPTH: 2.10 m	
SOF		A ECOM				RE۱	/IEWE	D BY	: Faris	Khali	l			ETION DATE: 1/24/12	
ĕΙ						PRO	JECT	ENC	GINEEF	R: Bla	ir Cocl	rell		Page	1 of 1

PROJ	IECT:	Local Streets Package 12-R-02	CLIE	ENT: C	ity o	f Wir	nipe	<u> </u>					TE:	STHOLE NO: TH12-0	4
LOCA	TION	: Lanark Street; Along Property Line of House #740 and 73							Vest	of Cu	rb			OJECT NO.: 6024148	
-				HOD:		mm	SSA	with	150 ו	mm C				EVATION (m):	
SAME	PLE T	YPE GRAB SHELBY TUBE	SF	PLIT SPO	OON			BULK				NO RE	COVE	RY TCORE	
DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION		SAMPLE TYPE SAMPLE #		⇒ Dy SPT (St (Bl 20 ■ To 17	ows/30 40 otal Uni (kN/m 18 1	er ₩ Cone < Pen Te Omm) 60 { t Wt ■) 9 2	est) • 30 100		+ Tor	vane + QU X Vane □ et Pen. ∠ Vane • Pa)	<u>۸</u>	COMMENTS	DEРТН
0		ASPHALT (thickness = 55 mm)				20	40	50 8	30 100	5	0 1	00 1 :	50 200		
- - - -		CONCRETE (thickness = 190 mm) CLAY (FILL) - trace silt, trace sand		G222											- - - -
-		CLAY - some silt, trace sand		323											-
-1		 dark brown frozen to 1.2 m, moist when thawed high plasticity 		G24		I			:					Gradation: Sand = 1.5%, Silt = 12.1%, Clay = 86.4%	- 1 <i>-</i> -
-				G25		•)								-
2		- below 1.4 m, firm - below 1.5 m, silt inclusions		G26											-
N.GDT 2/13/1				G27			•								-
LOG OF TEST HOLE LANARK, MULVEY, KANE & WAVELL LOGS.GPJ. UMA WINN, GDT. 2/13/1 C		CLAYEY SILT - trace sand - brown - moist, soft to firm - intermediate plasticity END OF TEST HOLE AT 2.1 m in clayey silt. NOTES: 1. No sloughing observed.	_	G28											2 - -
ULVEY, KANE & WAVE		2. No seepage observed. 3. Test hole backfilled with auger cuttings, sand and asphalt cold patch to surface. 4. Drilled with 150 mm diamond core to 0.245 m, solid stem augers to 2.1 m.													- - -
ST HOLE LANARK, MI															- - -
SH		1 = 60.14		1						etsche	9			ETION DEPTH: 2.10 m	
000		A ECOM							ris Kr		1	C	COMPLE	ETION DATE: 1/24/12	1 (1
9					PR	OJEC	JI EN	GINE	ER: [Blair Co	ockrell			Page	1 of 1

		Local Streets Package 12-R-02 : Lanark Street; Opposite House #716, Southbound Lane		ENT: m Ea				nipeg]						STHOLE NO: TH12-0 DJECT NO.: 6024148	
CON	TRAC	TOR: Maple Leaf Drilling Ltd	MET	HOD	: 1:	25 r	nm S			150 ı	nm C			ELE	EVATION (m):	
SAMI	PLE T			PLIT SF				В				Ž	NO RE	COVER	Y CORE	
DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION		SAMPLE TYPE	SAIVIPLE	◆ SP 20 6 17 P	Dyna T (Star (Blov D 4) ■ Tota (18	Becker amic C ndard F vs/300 0 6 al Unit kN/m ³)	r ₩ Cone ≎ Pen Te Imm) 0 8 Wt ■)	est) ◆ 0 100 0 21		+ Toi X 0 □ Lab △ Pock ♣ Field (k	HEAR STI rvane + QU × Vane □ set Pen. ∠ d Vane €	7	COMMENTS	DEPTH
0		ASPHALT (thickness = 65 mm)			-	20	0 41	6	0 E	0 100	5	0 1	100 1	50 200 :		
-	*	CONCRETE (thickness = 150 mm)														
-		CLAY (FILL) - trace silt, trace sand - dark brown - frozen to 1.2 m, moist when thawed - intermediate plasticity		G	29											
-				G	30	•										
-																
- 1 -				G	31											1 -
-		- below 1.2 m, compacted to loose - suspected hydrocarbon odour		G	32											
-		CLAY - trace silt - moist, firm - high plasticity		G	33											
N.GDT 2/13/1				G:	34			.								
-2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2		SILT - some clay - light brown - moist, soft \ - low to intermediate plasticity		G	35			•								2 -
WAVELL LOGS		END OF TEST HOLE AT 2.1 m in silt. NOTES: 1. No sloughing observed. 2. No seepage observed. 3. Test hole backfilled with auger cuttings, sand and asphalt cold pate	ch													
VEY, KANE &		to surface. 4. Drilled with 150 mm diamond core to 0.215 m, solid stem augers to 2.1 m.														
LOG OF TEST HOLE LANARK, MULVEY, KANE & WAVELL LOGS.GPJ. UMA WINN.GDT 2/13/12																
3 3 3 4 4 0 L					1	LOG	GED	BY:	Sten	hen F	etsch	e	<u> </u>	OMPI F	TION DEPTH: 2.10 m	
GOF		A ECOM				REV	IEWE	D B\	Y: Fa	ris Kh	alil		С		TION DATE: 1/24/12	
9						PRC	JEC1	ENG	GINE	ER: E	Blair C	ockrell			Page	1 of 1

PROJ	JECT:	Local Streets Package 12-R-02	CLIE	ENT: C	itv o	f Win	nipe						TE:	STHOLE NO: TH12-0	16
		: Lanark Street; Along Property Line of House #702 and 69							Vest o	of Cur	b			OJECT NO.: 6024148	
CON	TRAC	TOR: Maple Leaf Drilling Ltd	ИΕΊ	THOD:	125	mm :	SSA	with	150	mm C	oring		ELI	EVATION (m):	
SAME	PLE T			PLIT SPC			B	ULK				NO RE	COVE		
DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION		SAMPLE TYPE SAMPLE #		♦ Dyr PT (Sta (Blo 20 4 To 17 1 Plastic	Becke namic (andard ws/300 40 6 tal Unit (kN/m) 8 1	Pen To Dmm) 50 t Wt 10 9 2	> est) ◆ 80 100		+ Tor	vane + QU X Vane □ et Pen. ∠ I Vane & Pa)	△	COMMENTS	DEPTH
0		ASPHALT (thickness = 60 mm)			 	20 4	40 E		:		1	00 1	50 200		
-		CONCRETE (thickness = 270 mm)													-
-		CLAY (FILL) - some silt to silty, trace sand - dark brown - frozen, moist when thawed - high plasticity		G36											-
-				U30								· · · · · · · · · · · · · · · · · · ·		Gradation:	-
-1 -1		CLAY - some silt, trace sand		G37		I ⊕		: -1···						Sand = 5.8%, Silt = 22.0%, Clay = 72.1%	1 -
-		- brown - frozen to 1.2 m, moist when thawed - high plasticity - below 1.2 m, firm		G38				<u> </u>						Gradation: Sand = 2.6%, Silt = 14.3%, Clay = 83.1%	
713/12				G39											
MA WINN.GDI - 2				G40											2 —
ELL LOGS.GPJ (END OF TEST HOLE AT 2.1 m in clay. NOTES: 1. No sloughing observed. 2. No seepage observed.		G41											-
/EY, KANE & WAV		Test hole backfilled with auger cuttings, sand and asphalt cold patch to surface. Drilled with 150 mm diamond core to 0.330 m, solid stem augers to 2.1 m.	ı												- -
LOG OF TEST HOLE LANARK, MULVEY, KANE & WAVELL LOGS.GPJ UMA WINN.GDT 2/13/1															·
3							:	:	:			:	:		
# #		A=CO44								Petsche	9			ETION DEPTH: 2.10 m	
) G L		AECOM				VIEW				nalıl Blair Co	nckrall		JUIVIPLI	ETION DATE: 1/24/12	1 of 1
ات					111	OJ L C	- LIV	UNIVE	i\. I	ט ווטוכ	ういい てご			raye	ı UI I

		Local Streets Package 12-R-02 : Lanark Street; Opposite House	#686, Southbound Lane					Winni Curb	ipeg							STHOLE NO: TH12- DJECT NO.: 602414	
CON	TRAC	TOR: Maple Leaf Drilling Ltd		ME	THO	D:	125 r	nm S	SA v	vith 1	50 m	m Co	oring			EVATION (m):	
SAMI	PLE T	YPE GRAB	SHELBY TUBE	$\sum S$	PLIT	SP0	ON		Bl	JLK			Ž	NO RE	COVER	RY CORE	
DEPTH (m)	SOIL SYMBOL	SOIL DESC	RIPTION		SAMPLE TYPE	SAMPLE #	◆ SF 0 2 16 1;	Dynai T (Stand (Blows 0 40 ■ Tota (k 7 18	ecker mic Co dard P s/300r 60 I Unit \ :N/m³)	Pen Test mm) 80 Wt ■ 20 Liquid		2	+ Torv X QI □ Lab \ \(\) Pocke Prield \(\) (kP	J X /ane □ t Pen. △ /ane • /a)		COMMENTS	ОЕРТН
0		ASPHALT (thickness = 45 mm)			\vdash		2	0 40	60	80	100	50) 10	0 15	0 200		
-		CONCRETE (thickness = 205 mm) CLAY (FILL) - trace silt, trace sand - dark brown															
-		- frozen, moist when thawed - high plasticity				G42											
												3					
-1 -		CLAY - trace to some silt			_	G43											1-
- - -		- brown - frozen to 1.2 m, moist when tha - high plasticity - below 1.2 m, firm	wed			G44 G45											
5DT 2/13/12		CLAYEY SILT - trace sand				G46											
- 2 - 2 - 2		 light brown moist, soft intermediate plasticity 				G40											2 -
WAVELL LOGS.C		END OF TEST HOLE AT 2.1 m in clays NOTES: 1. No sloughing observed. 2. No seepage observed. 3. Test hole backfilled with auger cutting to surface.		tch													
LOG OF TEST HOLE LANARK, MULVEY, KANE & WAVELL LOGS.GPJ UMA WINN.GDT 2/13/12 C C C C C C C C C C C C		4. Drilled with 150 mm diamond core to 2.1 m.	0 0.25 m, solid stem augers to	•													
ST HOLE LANARK,																	
H F		A = CO 14						GED I								TION DEPTH: 2.10 m	
) 9C		A=COM					_	JEWE JECT					ckroll	100	JIVIPLE	ETION DATE: 1/24/12	e 1 of 1
ـــــاد							1111	いしつし	LING	MALE	11. DIG	un UU	ON CII			raye	, i Ul I



City of Winnipeg Local Streets Package 12-R-02 Geotechnical Investigation

Test		Pavement Si	urface	Pavement Struct	ture Material	Subgrade	Sample	Moisture		Hydromet	er Analysis		At	terberg Lin	nits
Hole No.	Test Hole Location	Туре	Thickness (mm)	Туре	Thickness (mm)	Description	Depth (m)	Content (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit	Plastic Limit	Plasticity Index
						Clay Fill	0.3	20.9	, ,						
		Asphalt	50			Clay Fill	0.6	17.6							
	Lanark Street; In Front of					Clay Fill	0.9	17.0							
TH12-01	House #775, Southbound			None	n/a	Clay Fill	1.2	5.7							
	Lane, 1.5 m East of Curb	Concrete	200			Clay Fill	1.5	6.7							
		Concrete	200			Silty Clay	1.8	35.0							
						Silty Clay	2.1	38.1							
						Clay Fill	0.3	26.9							
		Asphalt	40			Clay Fill	0.6	29.6							
	Lanark Street, In Front of					Granular Fill	0.9	10.5							
TH12-02	House #764, Northbound			None	n/a	Clay	1.2	32.0							
	Lane, 2.0 m West of Curb	Concrete	200			Clay	1.5	37.3							
		Concrete	200			Clay	1.8	37.9							
						Clay	2.1	42.9							
						Clay Fill	0.3	22.2							
		Asphalt	60			Clay	0.6	27.1	0.0	3.0	18.7	78.2	69.6	22.9	46.7
	Lanark Street, Opposite					Clay	0.9	29.2							
TH12-03	House #752, Southbound			None	n/a	Clay	1.2	32.1							
	Lane, 2.0 m East of Curb	Concrete	180			Clay	1.5	37.1							
		Concrete	100			Clay	1.8	41.7							
						Clay	2.1	43.4							
						Clay Fill	0.3	37.1							
	Lanark Street; Along Property	Asphalt	55			Clay Fill	0.6	33.3							
	Line of House #740 and 736,					Clay	0.9	30.4	0.0	1.5	12.1	86.4	81.9	24.3	57.6
TH12-04	Northbound Lane, 2.0 m			None	n/a	Clay	1.2	31.9							
	West of Curb	Concrete	190			Clay	1.5	36.2							
	West of Carb	COLLECTO	170			Clay	1.8	42.0							
						Clayey Silt	2.1	42.5							
						Clay Fill	0.3	15.7							
		Asphalt	65			Clay Fill	0.6	15.1							
	Lanark Street; Opposite					Clay Fill	0.9	16.4							
TH12-05	House #716, Southbound			None	n/a	Clay Fill	1.2	16.6							
	Lane, 2.0 m East of Curb	Concrete	150			Clay Fill	1.5	19.5							
		OUTLICE	130			Clay	1.8	42.9							
						Silt	2.1	46.4							



City of Winnipeg Local Streets Package 12-R-02 Geotechnical Investigation

Test		Pavement S	urface	Pavement Struc	cture Material	Subgrade	Sample	Moisture		Hydromete	er Analysis		At	Atterberg Limits		
Hole No.	Test Hole Location	Туре	Thickness (mm)	Туре	Thickness (mm)	Description	Depth (m)	Content (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit	Plastic Limit	Plasticity Index	
		Asphalt	60			Clay Fill	0.6	27.8				.0 72.1 65.6 23.4				
	Lanark Street; Along Property	Азрпан	00			Clay Fill	0.9	31.3	0.0	5.8	22.0	72.1	65.6	23.4	42.2	
TH12-06	Line of House #702 and 698,			None	n/a	Clay	1.2	28.7	0.0	2.6	14.3	83.1	74.2	23.1	51.2	
11112-00	Northbound Lane, 2.0 m	Concrete	270	None	11/ a	Clay	1.5	30.7								
	West of Curb	Concrete	270			Clay	1.8	41.8								
						Clay	2.1	40.0								
		Asphalt	45			Clay Fill	0.6	38.3								
	Lanark Stroot: Opposito	Азрпан	45			Clay Fill	0.9	34.5								
TH12-07	Lanark Street; Opposite House #686, Southbound			None	n/a	Clay	1.2	33.3								
11112-07	Lane, 1.25 m East of Curb	Concrete	205	None	II/a	Clay	1.5	37.4								
	Lane, 1.25 III Last Of Guib	COLICIETE	203			Clayey Silt	1.8	41.3	·		·					
						Clayey Silt	2.1	41.0								



Photograph 1. Lanark Street – TH12-01



Photograph 2. Lanark Street - TH12-02



Photograph 3. Lanark Street – TH12-03



Photograph 4. Lanark Street – TH12-04



Photograph 5. Lanark Street – TH12-05



Photograph 6. Lanark Street – TH12-06



Photograph 7. Lanark Street - TH12-07

A=COM

Mulvey Avenue

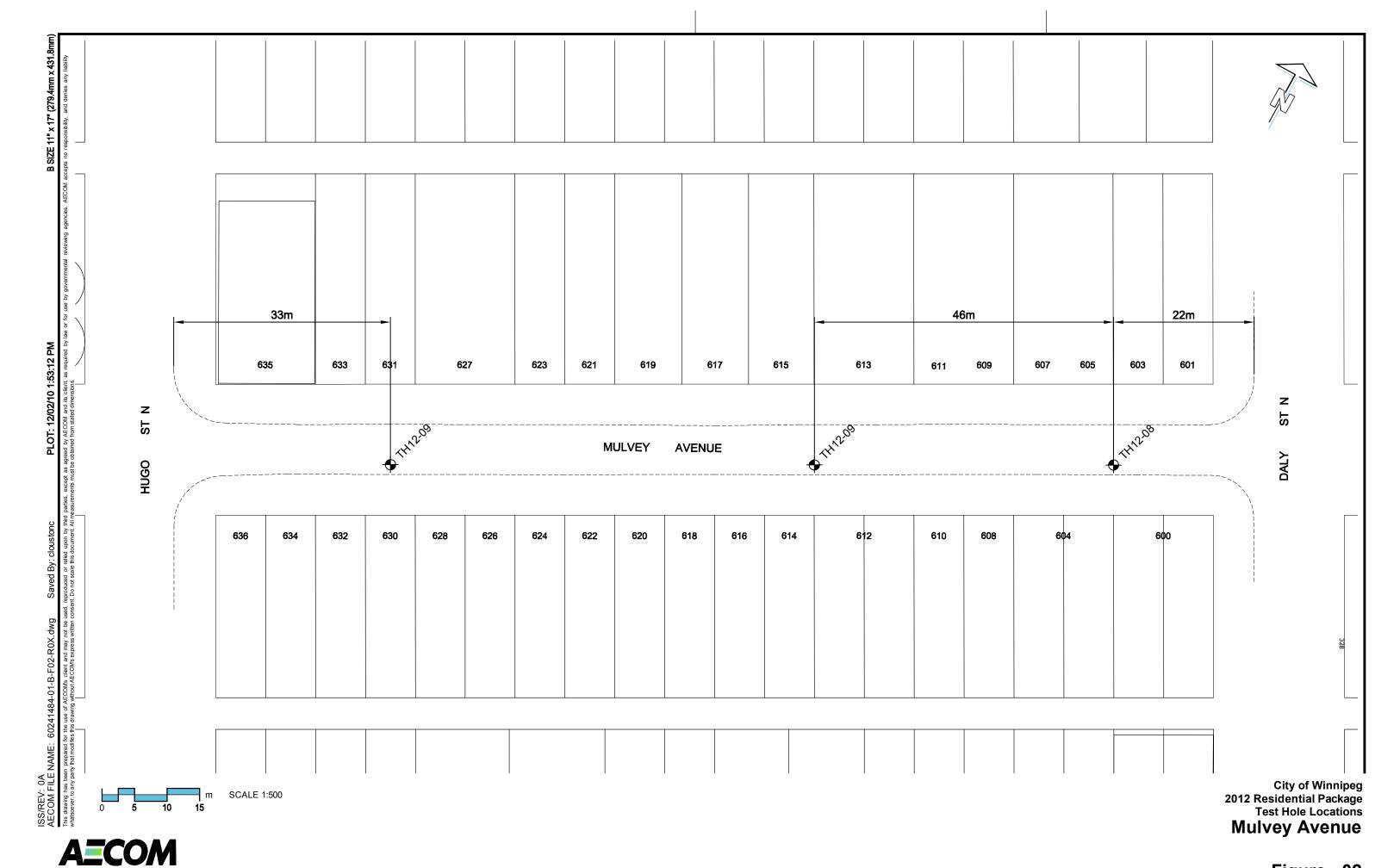


Figure - 02



PUBLIC WORKS DEPARTMENT • SERVICE DES TRAVAUX PUBLICS

Engineering Division • Division de l'ingénierie

GEOTECHNICAL INVESTIGATION

STREET RECONSTRUCTION

Revised October 28th, 2008

<u>Fieldwork</u>

- 1. Clear all underground services at each testhole location.
- 2. Test holes required every 50 m with a minimum of 3 test holes per street.
- 3. Record location of testhole (offset from curb, distance from cross street and house number).
- 4. Drill 150 mm-diameter core in pavement.
- 5. Drill 125 mm-diameter testhole into fill materials and subgrade
- 6. If a service trench backfilled with granular materials is encountered, another hole shall be drilled to define the existing sub-surface conditions.
- 7. Testhole to be drilled to depth of 2 m \pm 150 mm below surface of the pavement.
- 8. Recover pavement core sample and representative samples of soil (fill materials, pavement structure materials and subgrade).
- 9. Measure and record pavement section exposed in the testhole (thickness of concrete or asphalt and different types of pavement structure materials).
- 10. Pavement structure materials to be identified as crushed limestone or granular fill and the maximum aggregate size of the material (20 mm, 50 mm or 150 mm).
- 11. Log soil profile for the subgrade.
- 12. Representative samples of soil must be obtained at the following depths below the bottom of the pavement structure materials 0.1 m, 0.4 m, 0.7 m, 1.0 m, 1.3 m, 1.6 m, etc. Ensure a sample is obtained from each soil type encountered in the testhole.
- 13. Make note of any water seepage into the testhole.
- 14. Backfill testhole with native materials and additional granular fill, if required. Patch pavement surface with hot mix asphalt or high strength durable concrete mix.
- 15. Return core sample from the pavement and soil samples to the laboratory.

Lab Work

- 1. Test all soil samples for moisture content.
- 2. Photograph core samples recovered from the pavement surface.
- 3. Conduct tests for plasticity index and hydrometer analysis on selected soil samples which are between 0.5 m and 1 m below top of pavement (this is the sub-grade on which the pavement and sub-base will be built). The selection will be based upon visual classification and moisture content test results, with a minimum of one sample of each soil type per street to be tested.
- 4. Prepare testhole logs and classify subgrade (based on hydrometer) as follows;

< 30% silt - classify as clay 30% - 50% silt - classify as silty clay 50% - 70% silt - classify as clayey silt > 70% silt - classify as silt

Prepared by: The National Testing Laboratories Limited and Eng-Tech Consulting

Embrace the Spirit · Vivez l'esprit

AECOM Canada Ltd.

GENERAL STATEMENT

NORMAL VARIABILITY OF SUBSURFACE CONDITIONS

The scope of the investigation presented herein is limited to an investigation of the subsurface conditions as to suitability for the proposed project. This report has been prepared to aid in the evaluation of the site and to assist the engineer in the design of the facilities. Our description of the project represents our understanding of the significant aspects of the project relevant to the design and construction of earth work, foundations and similar. In the event of any changes in the basic design or location of the structures as outlined in this report or plan, we should be given the opportunity to review the changes and to modify or reaffirm in writing the conclusions and recommendations of this report.

The analysis and recommendations presented in this report are based on the data obtained from the borings and test pit excavations made at the locations indicated on the site plans and from other information discussed herein. This report is based on the assumption that the subsurface conditions everywhere are not significantly different from those disclosed by the borings and excavations. However, variations in soil conditions may exist between the excavations and, also, general groundwater levels and conditions may fluctuate from time to time. The nature and extent of the variations may not become evident until construction. If subsurface conditions differ from those encountered in the exploratory borings and excavations, are observed or encountered during construction, or appear to be present beneath or beyond excavations, we should be advised at once so that we can observe and review these conditions and reconsider our recommendations where necessary.

Since it is possible for conditions to vary from those assumed in the analysis and upon which our conclusions and recommendations are based, a contingency fund should be included in the construction budget to allow for the possibility of variations which may result in modification of the design and construction procedures.

In order to observe compliance with the design concepts, specifications or recommendations and to allow design changes in the event that subsurface conditions differ from those anticipated, we recommend that all construction operations dealing with earth work and the foundations be observed by an experienced soils engineer. We can be retained to provide these services for you during construction. In addition, we can be retained to review the plans and specifications that have been prepared to check for substantial conformance with the conclusions and recommendations contained in our report.

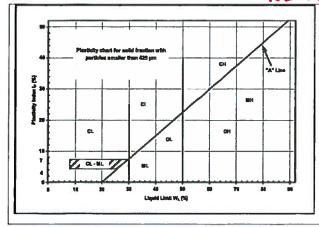
EXPLANATION OF FIELD & LABORATORY TEST DATA

					UMA	uscs		Laborator	y Classification Crite	eria
		Descripti	on		Log Symbols	Classification	Fines (%) Grading		Plasticity	Notes
		CLEAN GRAVELS	Well graded sandy gravel or no f	s, with little	200	GW	0-5	C _U > 4 1 < C _C < 3		
	GRAVELS (More than 50% of	(Little or no fines)	Poorly grade sandy gravel or no f	s, with little		GP	0-5	Not satisfying GW requirements		Dual symbols if 5-
SILS	coarse fraction of gravel size)	DIRTY GRAVELS	Silty gravels, silty sa gravels	Silty gravels, silty sandy gravels		GM	> 12		Atterberg limits below "A" line or W _P <4	12% fines. Dual symbols if above "A" line and
AINED SC		(With some fines)	Clayey gravels, clayey sandy gravels			GC	> 12		Atterberg limits above "A" line or W _P <7	4 <w<sub>P<7</w<sub>
COARSE GRAINED SOILS		CLEAN SANDS	Well grade gravelly sand or no f	s, with little	60 A	sw	0-5	C _U > 6 1 < C _C < 3		$C_U = \frac{D_{60}}{D_{10}}$
CO	SANDS (More than 50% of	(Little or no fines)	Poorly grad gravelly sand or no f	s, with little	7.00	SP	0-5	Not satisfying SW requirements		$C_U = \frac{D_{60}}{D_{10}}$ $C_C = \frac{(D_{30})^2}{D_{10} x D_{60}}$
	coarse fraction of sand size)	DIRTY SANDS	Silty sa sand-silt r			SM	> 12		Atterberg limits below "A" line or W _P <4	
		(With some fines)	Clayey s sand-clay			sc	> 12		Atterberg limits above "A" line or W _P <7	
	SILTS (Below 'A' line	W _L <50	Inorganic silts, silty or clayey fine sands, with slight plasticity			ML				
	negligible organic content)	W _L >50	Inorganic silts of high plasticity			МН				
SOILS	CLAYS	W _L <30	Inorganic c clays, sand low plasticity,	y clays of		CL				
FINE GRAINED SOILS	(Above 'A' line negligible organic	30 <w<sub>L<50</w<sub>	Inorganic clays and silty clays of medium plasticity			CI			Classification is Based upon Plasticity Chart	
FINE	content)	W _L ≥50	Inorganic clays of high plasticity, fat clays			СН				
	ORGANIC SILTS & CLAYS	W _L <50	Organic s organic silty o plasti	clays of low		OL				
	(Below 'A' line)	W _L >50	Organic cla plasti		7/i	ОН				
Н	HIGHLY ORGAINIC SOILS Peat and other high organic soils		Peat and other highly organic soils		***	Pt		on Post ification Limit		r odour, and often s texture
		Asphalt								
					Bedrock fferentiated)				AE	COM
8	\boxtimes	Fill		(Li	Bedrock mestone)				ignated fraction	

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

NOT USED TO CLASSIFY SUBGRADE, REFER TO CITY OF WINN IPER SPECS FOR GEOTECHNICAL INVESTIGATION STREET

RECONSTRUCTION (OCT. 2008)



FRAC	CTION	SEIVE	SIZE (mm)	DEFINING F PERCENTAGE OF MINOR CO	BY WEIGHT
		Passing	Retained	Percent	Identifier
Gravel	Coarse	76	19	35-50	and
Gravei	Fine	19	4.75	35-50	and
	Coarse	4.75	2.00	20-35	"y" or "ey" "
Sand	Medium	2.00	0.425	20-35	y or ay
	Fine	0.425	0.075	10-20	same
	n-plastic) (plastic)	< 0.0	75 mm	1-10	trace
	*1	or example:	gravelly, san	dy clayey, silty	

Definition of Oversize Material

COBBLES: 76mm to 300mm diameter BOULDERS: >300mm diameter

LEGEND OF SYMBOLS

Laboratory and field tests are identified as follows:

qu - undrained shear strength (kPa) derived from unconfined compression testing.

T_v - undrained shear strength (kPa) measured using a torvane

pp - undrained shear strength (kPa) measured using a pocket penetrometer.

L_v - undrained shear strength (kPa) measured using a lab vane.

F_v - undrained shear strength (kPa) measured using a field vane.

γ - bulk unit weight (kN/m³).

SPT - Standard Penetration Test. Recorded as number of blows (N) from a 63.5 kg hammer dropped 0.76 m (free fall) which is required to drive a 51 mm O.D. Raymond type sampler 0.30 m into the soil.

DPPT - Drive Point Pentrometer Test. Recorded as number of blows from a 63.5 kg hammer dropped 0.76 m (free fall) which is required to drive a 50 mm drive point 0.30 m into the soil.

w - moisture content (W_L, W_P)

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

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

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

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

		Local Streets Package 12-R-02 : Mulvey Avenue; Along Property Line of House #602 and	ENT: 1. Eas						orth (of Cui	·b			STHOLE NO: TH12-0 OJECT NO.: 6024148	
		TOR: Maple Leaf Drilling Ltd	THOD											EVATION (m):	<i>,</i> 1
SAMP			PLIT S				BI		00 11	1111 00		NO RE			
DEРТН (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #	◆ SP 0 2 16 17	XED Dyna T (Star (Blov 0 40 Tota (18 T	Becker amic C ndard F vs/300 0 60 al Unit kN/m ³)	one <> Pen Tes mm) 0 80 Wt 1 Liquid	100 21	2	+ Torv X QI □ Lab \ \(\) Pocke Prield \(\) (kP	U X /ane □ t Pen. △ Vane • Pa)		COMMENTS	DEPTH
0		ASPHALT (thickness = 95 mm)			2	0 40	60	0 80	100	50) 10	00 15	0 200		
	4 . 4	CONCRETE (thickness = 155 mm)													
-		CLAY (FILL) - trace silt, trace sand - dark brown - frozen, moist when thawed - high plasticity	G	48		•									-
-		SILTY CLAY - trace sand - brown - frozen, moist when thawed - intermediate plasticity	G	i49 -		•									
- - -			G	i50 -			-							Gradation: Sand = 9.5%, Silt = 38.1%, Clay = 52.4%	
- -		SILT - some sand - light brown - frozen to 1.2 m, moist when thawed - low to intermediate plasticity - below 1.2 m, soft	G	551		•									
3/12			G	552	•										
NN.GDT 2/1		- below 1.8 m, some clay, soft to firm	G	53		•									
		CLAY - trace silt - brown - moist, firm - high plasticity END OF TEST HOLE AT 2.1 m in clay.	G	554		•									2 -
LOG OF TEST HOLE LANARK, MULVEY, KANE & WAVELL LOGS.GPJ. UMA WINN.GDT 2/13/12		NOTES: 1. No sloughing observed. 2. No seepage observed. 3. Test hole backfilled with auger cuttings, sand and asphalt cold pat to surface. 4. Drilled with 150 mm diamond core to 0.25 m, solid stem augers to 2.1 m.													
ANARK, MULVEY,		2.1 111.													
3 3							D' (<u> </u>					01.45	TION DESTINATION	
아 프		A ECOM						Steph /: Fari						ETION DEPTH: 2.10 m ETION DATE: 1/24/12	
90		A_CO//I						GINEE			ckrell		OIVII EL		1 of 1

		Local Streets Package 12-R-02 I: Mulvey Avenue; Along Property Line	CLI e of House #612 and 614	IEN 4, E	IT: C Eastb	ity of ound	Winr Lane	nipeg e, 1.5	j i m N	lorth	of Cu	rb			STHOLE NO: TH12-0 DJECT NO.: 602414			
CON	TRAC	TOR: Maple Leaf Drilling Ltd	ME	TH	OD:	125 r	nm S	SSA	with 1		nm Co	oring		ELEVATION (m):				
SAMI	PLE T	YPE GRAB	SHELBY TUBE S	SPLI	T SPC	ON		В	ULK				NO RE		CORE			
DEPTH (m)	SOIL SYMBOL	SOIL DESCRIF	PTION	SAMPI F TYPF	SAMPLE #	◆ SF 0 2 16 1;	X I Dyna T (Star (Blow 0 4 Tot (7 18 Plastic	Becker amic C ndard F ws/300 0 6 al Unit (kN/m ³) 3 19 MC	cone <> Pen Tes mm) 0 80 Wt 1 20 Liquid	st) ♦ 0 100	2	+ Tor\ XQ □ Lab \ △ Pocke ♣ Field (kF	U X √ane □ et Pen. △ Vane ❤ Pa)		COMMENTS	ОЕРТН		
0		ASPHALT (thickness = 55 mm)				2	0 4	0 6	0 80	0 100	5	0 10	00 15	0 200				
-	7	CONCRETE (thickness = 175 mm)																
-		CLAY (FILL) - trace silt, trace sand - dark brown - frozen, moist when thawed - high plasticity			G55		•											
-					G56		•											
-1	ŤŤ	SILT - trace clay, trace sand - light brown - frozen to 1.1 m, moist when thawed - low to intermediate plasticity			G57	•										1-		
-		- below 1.1 m, soft			G58											,		
-					G59													
GDT 2/13/12		- below 1.75 m, some clay			G60		•											
SS.GPJ UMA WINN.		CLAY - some silt - brown - moist, firm - high plasticity			G61		•									2-		
LOG OF TEST HOLE LANARK, MULVEY, KANE & WAVELL LOGS.GPJ. UMA WINN.GDT 2/13/12		END OF TEST HOLE AT 2.3 m in clay. NOTES: 1. No sloughing observed. 2. No seepage observed.																
ARK, MULVEY, KA		Test hole backfilled with auger cuttings, sate surface. Drilled with 150 mm diamond core to 0.23 2.3 m.																
ST HOLE LANA								D. (C						TION DESTINATION			
		AECOM							Stept 7: Fai		etsche	;			ETION DEPTH: 2.30 m			
000		AECUM								aiii Iair Cc	ckrell		COMPLETION DATE: 1/24/12 Page 1 of 1					

		Local Streets Package 12-R-02 (: Mulvey Avenue; In Front of House #630, Eastbound Lane		<u>ENT: (</u> 5 m No]					STHOLE NO: TH12-1 OJECT NO.: 6024148	
								with 15	60 mn	n Corin	 Э		EVATION (m):	JT
SAMI				PLIT SP			В				NO RE			
DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION		SAMPLE TYPE SAMPLE #	♦ \$ 0	⇒ Dyo SPT (Sta (Blo 20 To 17 Plastic	Becke namic C andard ows/300 40 6 otal Unit (kN/m ³ 8 1	Cone ♦ Pen Test) Omm) 60 80 Wt ■) 9 20 Liquid	◆ 100 21	× □ La ∆ Poo ⊕ Fie	orvane + QU X b Vane □ cket Pen. 2 eld Vane 4 (kPa)	<u>^</u>	COMMENTS	ОЕРТН
0		ASPHALT (thickness = 125 mm)			-	20	40 • 6	80	100	50	100 1	50 200 :		
-	4.4	CONCRETE (thickness = 125 mm)												
-		CLAY (FILL) - trace silt, trace sand - dark brown - frozen, moist when thawed - high plasticity		G6:	2	•								
-		SILTY CLAY - trace sand - dark brown - frozen, moist when thawed - high plasticity		G6:	3	H							Gradation: Sand = 7.3%, Silt = 37.1%, Clay = 55.6%	
- 1 -		- at 0.9 m, brown, some silt SILT - trace clay - light brown		G6-	4	•								1-
-		- frozen to 1.2 m, moist when thawed - low plasticity - below 1.2 m, soft		G6:										
DT 2/13/12		- below 1.8 m, some clay		G66										
ONNW WINN CAS		CLAY - some silt - brown - moist, firm		G66	3	•								2 -
NE & WAVELL LOGS.(- high plasticity END OF TEST HOLE AT 2.1 m in clay. NOTES: 1. No sloughing observed. 2. No seepage observed. 3. Test hole backfilled with auger cuttings, sand and asphalt cold patch to surface.	/											
LOG OF TEST HOLE LANARK, MULVEY, KANE & WAVELL LOGS.GPJ. UMA WINN.GDT 2/13/12		4. Drilled with 150 mm diamond core to 0.25 m, solid stem augers to 2.1 m.												
EST HOLE LA					1	CCEI) RV·	Stephe	n Pate	sche		.UMDI I	ETION DEPTH: 2.10 m	
1G OF 1		AECOM			RE	VIEW	ED B'	Y: Faris	Khali		C		ETION DATE: 1/24/12	1 -6 6
2					PR	CULEC	, I EN	GINEER	t: Blai	r Cockre	ell		Page	1 of 1



City of Winnipeg Local Streets Package 12-R-02 Geotechnical Investigation

Test		Pavement Su	urface	Pavement Struc	cture Material	Subgrade	Sample	Moisture		Hydromete	er Analysis		At	terberg Lin	nits
Hole No.	Test Hole Location	Туре	Thickness (mm)	Туре	Thickness (mm)	Description	Depth (m)	Content (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit	Plastic Limit	Plasticity Index
						Clay Fill	0.3	29.6							
	Mulvey Avenue; Along	Asphalt	95			Silty Clay	0.6	31.9					45.4 19.6		
	Property Line of House #602					Silty Clay	0.9	36.6	0.0	9.5	38.1	52.4	45.4	19.6	25.7
TH12-08	and 604, Eastbound Lane,			None	n/a	Silt	1.2	23.3							
	1.5 m North of Curb	Concrete	155			Silt	1.5	14.6							
	1.0 million or odib	Concrete	100			Silt	1.8	20.1							
						Clay	2.1	28.2							
						Clay Fill	0.3	33.4							
	Mulvey Avenue; Along	Asphalt	55			Clay Fill	0.6	27.9							
	Property Line of House #612					Silt	0.9	14.1							
TH12-09	and 614, Eastbound Lane,			None	n/a	Silt	1.2	15.9							
	1.5 m North of Curb	Concrete	175			Silt	1.5	16.1							
	The minds are such	CONCICTO	173			Silt	1.8	27.5							
						Clay	2.1	29.6							
						Clay Fill	0.3	28.8							
		Asphalt	125			Clay	0.6	36.5	0.0	7.3	37.1	55.6	76.8	27.3	49.4
	Mulvey Avenue; In Front of					Clay	0.9	31.9							
TH12-10	House #630, Eastbound Lane,			None	n/a	Silt	1.2	20.7							
	1.5 m North of Curb	Concrete	125			Silt	1.5	21.4							
		CONCIETE	123			Silt	1.8	26.9							
						Clay	2.1	30.6							



Photograph 1. Mulvey Avenue - TH12-08



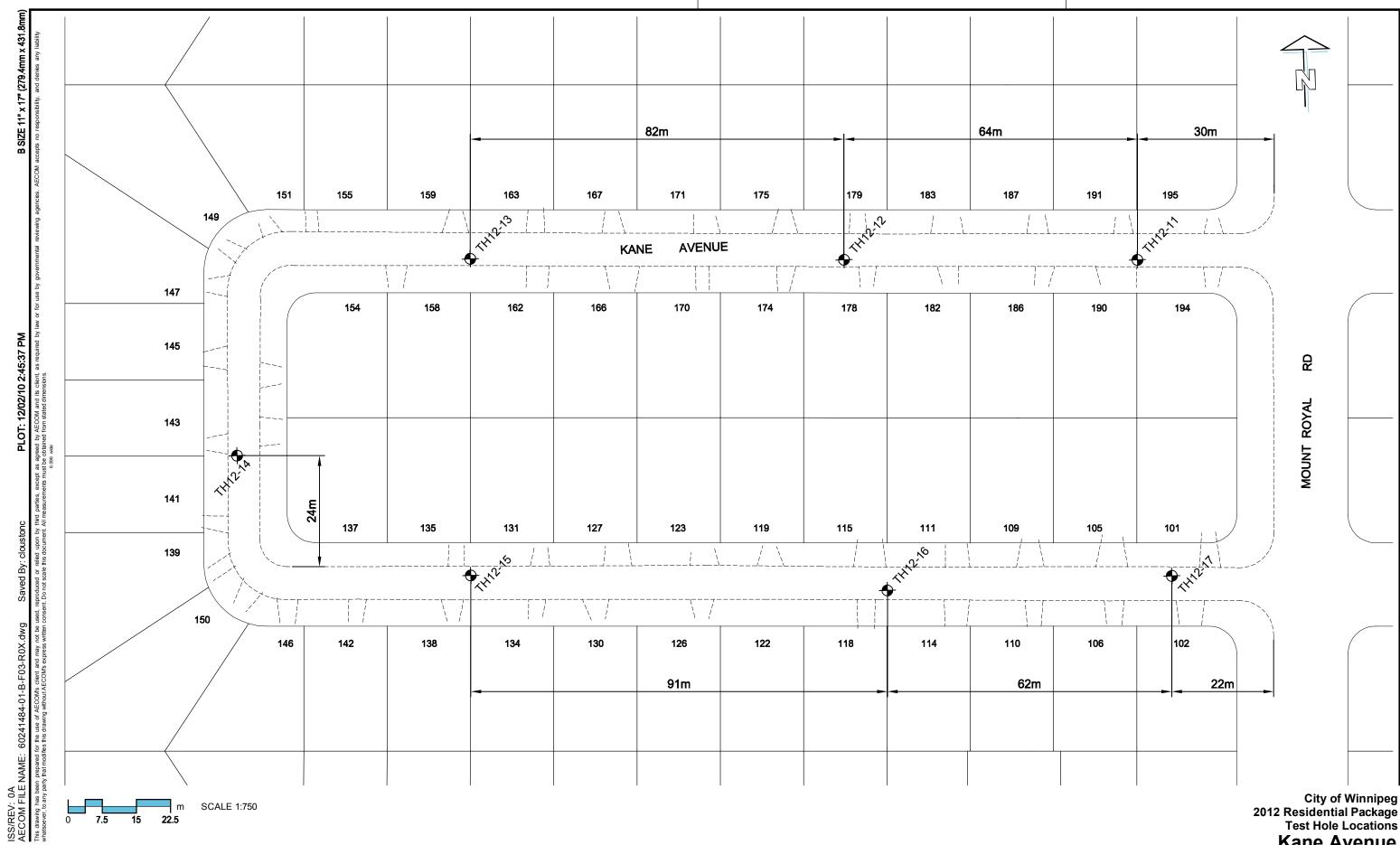
Photograph 2. Mulvey Avenue - TH12-09



Photograph 3. Mulvey Avenue - TH12-10

A=CON

Kane Avenue



City of Winnipeg 2012 Residential Package Test Hole Locations **Kane Avenue**



7.5

22.5



PUBLIC WORKS DEPARTMENT • SERVICE DES TRAVAUX PUBLICS

Engineering Division • Division de l'ingénierie

GEOTECHNICAL INVESTIGATION

STREET RECONSTRUCTION

Revised October 28th, 2008

<u>Fieldwork</u>

- 1. Clear all underground services at each testhole location.
- 2. Test holes required every 50 m with a minimum of 3 test holes per street.
- 3. Record location of testhole (offset from curb, distance from cross street and house number).
- 4. Drill 150 mm-diameter core in pavement.
- 5. Drill 125 mm-diameter testhole into fill materials and subgrade
- 6. If a service trench backfilled with granular materials is encountered, another hole shall be drilled to define the existing sub-surface conditions.
- 7. Testhole to be drilled to depth of 2 m \pm 150 mm below surface of the pavement.
- 8. Recover pavement core sample and representative samples of soil (fill materials, pavement structure materials and subgrade).
- 9. Measure and record pavement section exposed in the testhole (thickness of concrete or asphalt and different types of pavement structure materials).
- 10. Pavement structure materials to be identified as crushed limestone or granular fill and the maximum aggregate size of the material (20 mm, 50 mm or 150 mm).
- 11. Log soil profile for the subgrade.
- 12. Representative samples of soil must be obtained at the following depths below the bottom of the pavement structure materials 0.1 m, 0.4 m, 0.7 m, 1.0 m, 1.3 m, 1.6 m, etc. Ensure a sample is obtained from each soil type encountered in the testhole.
- 13. Make note of any water seepage into the testhole.
- 14. Backfill testhole with native materials and additional granular fill, if required. Patch pavement surface with hot mix asphalt or high strength durable concrete mix.
- 15. Return core sample from the pavement and soil samples to the laboratory.

Lab Work

- 1. Test all soil samples for moisture content.
- 2. Photograph core samples recovered from the pavement surface.
- 3. Conduct tests for plasticity index and hydrometer analysis on selected soil samples which are between 0.5 m and 1 m below top of pavement (this is the sub-grade on which the pavement and sub-base will be built). The selection will be based upon visual classification and moisture content test results, with a minimum of one sample of each soil type per street to be tested.
- 4. Prepare testhole logs and classify subgrade (based on hydrometer) as follows;

< 30% silt - classify as clay 30% - 50% silt - classify as silty clay 50% - 70% silt - classify as clayey silt > 70% silt - classify as silt

Prepared by: The National Testing Laboratories Limited and Eng-Tech Consulting

Embrace the Spirit · Vivez l'esprit

AECOM Canada Ltd.

GENERAL STATEMENT

NORMAL VARIABILITY OF SUBSURFACE CONDITIONS

The scope of the investigation presented herein is limited to an investigation of the subsurface conditions as to suitability for the proposed project. This report has been prepared to aid in the evaluation of the site and to assist the engineer in the design of the facilities. Our description of the project represents our understanding of the significant aspects of the project relevant to the design and construction of earth work, foundations and similar. In the event of any changes in the basic design or location of the structures as outlined in this report or plan, we should be given the opportunity to review the changes and to modify or reaffirm in writing the conclusions and recommendations of this report.

The analysis and recommendations presented in this report are based on the data obtained from the borings and test pit excavations made at the locations indicated on the site plans and from other information discussed herein. This report is based on the assumption that the subsurface conditions everywhere are not significantly different from those disclosed by the borings and excavations. However, variations in soil conditions may exist between the excavations and, also, general groundwater levels and conditions may fluctuate from time to time. The nature and extent of the variations may not become evident until construction. If subsurface conditions differ from those encountered in the exploratory borings and excavations, are observed or encountered during construction, or appear to be present beneath or beyond excavations, we should be advised at once so that we can observe and review these conditions and reconsider our recommendations where necessary.

Since it is possible for conditions to vary from those assumed in the analysis and upon which our conclusions and recommendations are based, a contingency fund should be included in the construction budget to allow for the possibility of variations which may result in modification of the design and construction procedures.

In order to observe compliance with the design concepts, specifications or recommendations and to allow design changes in the event that subsurface conditions differ from those anticipated, we recommend that all construction operations dealing with earth work and the foundations be observed by an experienced soils engineer. We can be retained to provide these services for you during construction. In addition, we can be retained to review the plans and specifications that have been prepared to check for substantial conformance with the conclusions and recommendations contained in our report.

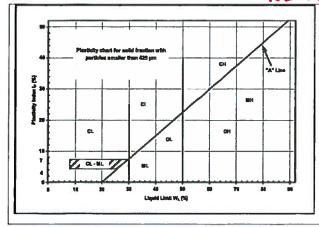
EXPLANATION OF FIELD & LABORATORY TEST DATA

					UMA	USCS		Laborator	y Classification Crite	lassification Criteria			
		Descripti	on		Log Symbols	Classification	Fines (%)	Grading	Plasticity	Notes			
	_	CLEAN GRAVELS	Well graded sandy gravels or no f	s, with little	2721	GW	0-5	C _U > 4 1 < C _C < 3					
	GRAVELS (More than 50% of coarse	(Little or no fines)	Poorly grade sandy gravel or no f	s, with little		GP	0-5	Not satisfying GW requirements		Dual symbols if 5-			
SOILS	fraction of gravel size)	DIRTY GRAVELS	Silty gravels, grave		NI	GM	> 12		Atterberg limits below "A" line or W _P <4	12% fines. Dual symbols if above "A" line and			
AINED SC		(With some fines)	Clayey grave sandy g			GC	> 12		Atterberg limits above "A" line or W _P <7	4 <w<sub>P<7</w<sub>			
COARSE GRAINED		CLEAN SANDS	Well grade gravelly sand or no f	s, with little	60 Q	sw	0-5	C _U > 6 1 < C _C < 3		$C_U = \frac{D_{60}}{D_{10}}$			
CO/	SANDS (More than 50% of	(Little or no fines)	Poorly grade gravelly sand or no f	s, with little	000	SP	0-5	Not satisfying SW requirements		$C_U = \frac{D_{60}}{D_{10}}$ $C_C = \frac{(D_{30})^2}{D_{10} x D_{60}}$			
	coarse fraction of sand size)	DIRTY SANDS	Silty sa sand-silt n			SM	> 12		Atterberg limits below "A" line or W _P <4				
		(With some fines)	Clayey s sand-clay i			sc	> 12		Atterberg limits above "A" line or W _P <7				
	SILTS (Below 'A' line	W _L <50	Inorganic sil clayey fine s slight pla	ands, with		ML							
	negligible organic content)	W _L >50	Inorganic silts of high plasticity			MH							
SOILS	CLAYS	W _L <30	Inorganic c clays, sand low plasticity,	y clays of		CL							
FINE GRAINED SOILS	(Above 'A' line negligible organic	30 <w<sub>L<50</w<sub>	Inorganic clay clays of n plasti	nedium		СІ			Classification is Based upon Plasticity Chart				
FINE	content)	W _L >50	Inorganic cla plasticity, f			СН							
	ORGANIC SILTS & CLAYS	W _L <50	Organic s organic silty o plasti	lays of low		OL							
	(Below 'A' line)	W _L >50	Organic cla plasti		7/iz	ОН							
Н	HIGHLY ORGAINIC SOILS Peat and other highly organic soils			***	Pt		on Post ification Limit		r odour, and often s texture				
		Asphalt			Till								
		Concrete			Bedrock fferentiated)				AE	COM			
	Fill			(Li	Bedrock mestone)				ignated fraction				

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

NOT USED TO CLASSIFY SUBGRADE, REFER TO CITY OF WINN IPER SPECS FOR GEOTECHNICAL INVESTIGATION STREET

RECONSTRUCTION (OCT. 2008)



FRAC	CTION	SEIVE	SIZE (mm)	DEFINING F PERCENTAGE OF MINOR CO	E BY WEIGHT
		Passing	Retained	Percent	Identifier
Gravel	Coarse	76	19	35-50	and
Gravei	Fine	19	4.75	33-30	and
	Coarse	4.75	2.00	20-35	"y" or "ey" "
Sand	Medium	2.00	0.425	20-35	y or ay
	Fine	0.425	0.075	10.20	same
	n-plastic) (plastic)	< 0.0)75 mm	1-10	trace
	*1	or example:	gravelly, san	dy clayey, silty	

Definition of Oversize Material

COBBLES: 76mm to 300mm diameter BOULDERS: >300mm diameter

LEGEND OF SYMBOLS

Laboratory and field tests are identified as follows:

qu - undrained shear strength (kPa) derived from unconfined compression testing.

T_v - undrained shear strength (kPa) measured using a torvane

pp - undrained shear strength (kPa) measured using a pocket penetrometer.

L_v - undrained shear strength (kPa) measured using a lab vane.

F_v - undrained shear strength (kPa) measured using a field vane.

γ - bulk unit weight (kN/m³).

SPT - Standard Penetration Test. Recorded as number of blows (N) from a 63.5 kg hammer dropped 0.76 m (free fall) which is required to drive a 51 mm O.D. Raymond type sampler 0.30 m into the soil.

DPPT - Drive Point Pentrometer Test. Recorded as number of blows from a 63.5 kg hammer dropped 0.76 m (free fall) which is required to drive a 50 mm drive point 0.30 m into the soil.

w - moisture content (W_L, W_P)

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

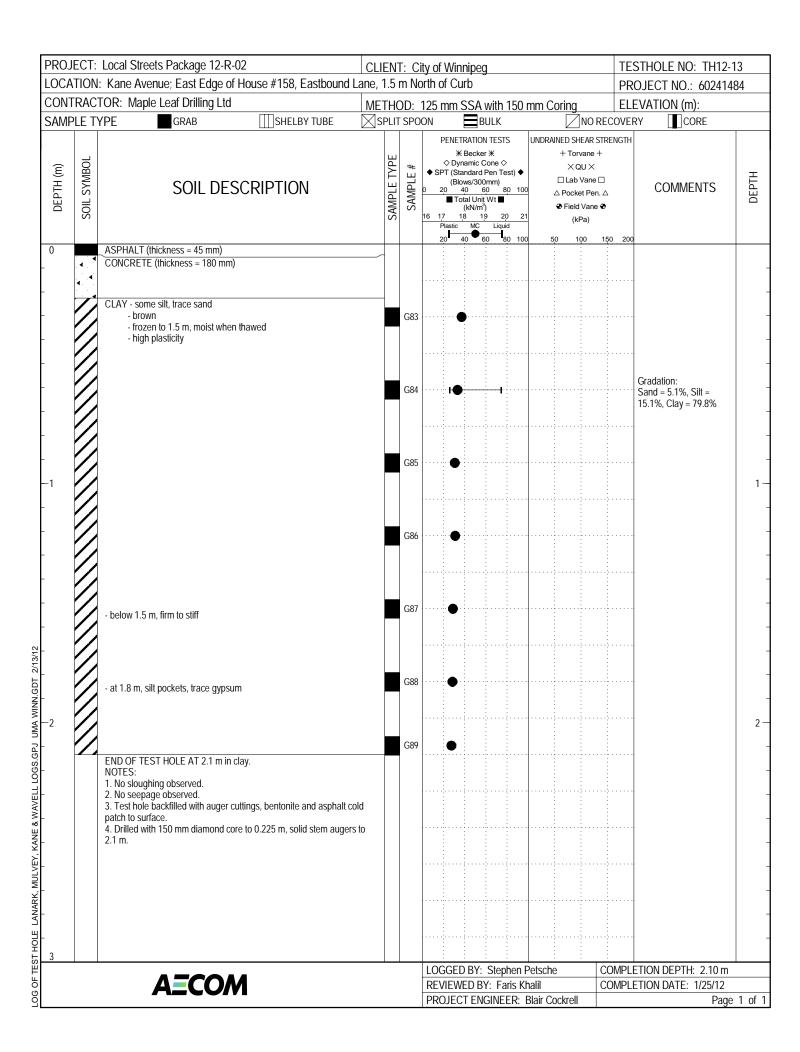
Su (kPa)	CONSISTENCY
<12	very soft
12 – 25	soft
25 – 50	medium or firm
50 – 100	stiff
100 – 200	very stiff
200	hard

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

N - BL.OWS/0.30 m	COMPACTNESS
0 - 4	very loose
4 - 10	loose
10 - 30	compact
30 - 50	dense
50	very dense

		Local Streets Package 12-R-02 : Kane Avenue; West Edge of House #19					Winni of Cur						STHOLE NO: TH12-1	
		TOR: Maple Leaf Drilling Ltd							ith 150	mm Co	ring		EVATION (m):	<u> </u>
SAME	PLE T	YPE GRAB SHE	ELBY TUBE S					BUI				RECOVE	RY CORE	
DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	ON	SAMPLE TYPE	SAMPLE #	◆ SF 0 2 16 17	Dynai T (Stand (Blows 0 40 ■ Tota (k 7 18	ecker ** mic Cordard Pe s/300m 60 I Unit W N/m³) 19	(c) (ne ♦) (n Test) ♦ (m) (80 100) (t ■ (20 21) (Liquid	<u> </u>	+ Torvane X QU X Lab Vane Pocket Pe Field Van (kPa)	: ⊕ □ en. △ e ⊕	COMMENTS	DEPTH
0		ASPHALT (thickness = 55 mm)				2	0 40	- 60	80 100	50	100	150 200)	
-	***	CONCRETE (thickness = 170 mm) CLAY (FILL) - trace silt, trace sand												
-		- dark brown - frozen, moist when thawed - high plasticity			G69		•							
-		CLAY - some silt, trace sand			G70		•							
- 1		- dark brown - frozen to 1.2 m, moist when thawed - high plasticity			G71		+●-						Gradation: Sand = 8.7%, Silt = 15.4%, Clay = 75.9%	1-
-		- below 1.2 m, firm			G72		•							
-					G73		•							
INN.GDI 2/13/13		- below 1.8 m, brown			G74		•							
38.GPJ UMA W		END OF TEST HOLE AT 2.1 m in clay. NOTES:			G75		•							2 -
& WAVELL LO		1. No sloughing observed. 2. No seepage observed. 3. Test hole backfilled with auger cuttings, benton patch to surface. 4. Drilled with 150 mm diamond core to 0.225 m,	•											
LOG OF TEST HOLE LANARK, MULVEY, KANE & WAVELL LOGS,GPJ UMA WINN,GDT 2/13/12		2.1 m.	Sould Stoff dugists to											
ST HOLE LANAR														
#		A=CO44							tephen F				ETION DEPTH: 2.10 m	
<u> </u>		AECOM							Faris Kl NEER: I		ckroll	COMPL	ETION DATE: 1/25/12	1 of 1
اد						LLKC	いこしし	LING	INLEK. I	uali VV	CVICII	1	Page	ı Ul

		Local Streets Package 12-R-02 : Kane Avenue; In Front of House #178, Eastbound Lane		ENT:				nipeg]						STHOLE NO: TH12-1 DJECT NO.: 6024148	
CON	TRAC	TOR: Maple Leaf Drilling Ltd	ME	THOE	D:	125 ı	nm S	SSA	with	150 r	mm C	oring		ELE	EVATION (m):	
SAMI	PLE T	YPE GRAB ∭SHELBY TUBE	\boxtimes s	PLIT S	SPO	ON		В	ULK			Z	•	COVER	CORE	
DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION		SAMPLE TYPE	SAMPLE #	◆ SF 0 2 16 1	♦ Dyna PT (Star (Blov 0 4 Tot (7 18	Becker amic C ndard I ws/300 0 6 al Unit (kN/m ³) MC	r ₩ Cone ◇ Pen Te Imm) 0 8 Wt ■)	est) ◆ 0 100 0 21		+ Tor X 0 □ Lab △ Pock ♣ Field	HEAR STI vane + QU × Vane □ et Pen. ∠ I Vane ❤ Pa)	7	COMMENTS	DEPTH
0		_ASPHALT (thickness = 30 mm)				2	0 4	0 6	0 8	0 100	5	0 1	00 1	50 200 :		
		CONCRETE (thickness = 155 mm) CLAY - trace to some silt, trace sand														
		- brown					_									
-		- frozen to 1.1 m, moist when thawed - high plasticity			G76											
					G77		•						:	:		
													; ; ;	<u>.</u>		
-																
-					G78		•									
-1																1-
-		- below 1.1 m, firm										} · · · · · · · · · · · · · · · · · · ·				
-					G79)					:			
-																
_													· }	:		
													:			
					G80		•)								
13/12																
72 TO					G81)								
5 - -							_							,		
<u>₹</u> -2									: : :			: } · · · · · · ·	: ;			2 -
5					G82		•									
SS.GF		END OF TEST HOLE AT 2.1 m in clay.														
7		NOTES: 1. No sloughing observed.														
AVEL		 No seepage observed. Test hole backfilled with auger cuttings, bentonite and asphalt col 	d													
≽_ ⊗ ш		patch to surface. 4. Drilled with 150 mm diamond core to 0.185 m, solid stem augers														
A -		2.1 m.														
LVEY,													:	: :		
, MUI													:			
NAR																
5 Ψ						,								<u>:</u>		
LOG OF TEST HOLE LANARK, MULVEY, KANE & WAVELL LOGS.GPJ UMA WINN.GDT 2/13/12																
SEL SEL	ı	A =6014									etsch	Э			TION DEPTH: 2.10 m	1
0000		A ECOM					/IEWE					ockrell		OMPLE	ETION DATE: 1/25/12	1 of 1
 _						LK	いこし	ı EIV	JIIVE	LK. E	nall U	JUN EII			Page	1 of 1



		Local Streets Package 12-R-02 : Kane Avenue; South Edge of House #143, Southbound	CLIE Lane	ENT: e, 2.0	Ci m	ty of East	Wini of C	nipeç Curb]						STHOLE NO: TH12-1 OJECT NO.: 6024148	
		TOR: Maple Leaf Drilling Ltd							with	150 r	nm C	oring			EVATION (m):	
SAMF	PLE T	YPE GRAB SHELBY TUBE	SI	PLIT S	PO	ON		В	ULK			Z	NO RE	COVE	RY CORE	
DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION		SAMPLE TYPE	SAMPLE #	◆ SF 0 2 16 1;	⇒ Dyn T (Sta (Blog 0 4 Tot Tot Plastic	Becke amic C ndard ws/300 0 6 tal Unit (kN/m ³ 8 1	Cone © Pen Te Omm) 60 8 Wt 9 20 Liqui	est) • 60 100 0 21		+ Tor	vane + QU × Vane □ et Pen. ∠ I Vane & Pa)	<u>,</u>	COMMENTS	DEPTH
0		ASPHALT (thickness = 60 mm)				2	0 4	0 6	0 8	0 100	5	0 1	00 1 :	50 200 :		
-	4 4 7 7 7 7 7 7 9	CONCRETE (thickness = 190 mm) SILTY CLAY - dark brown														
-		- frozen, moist when thawed - intermediate plasticity		G	690 ·		•									
-				G	691 ·		•									
- -1				G	692 ·	· · · · ·	•								Gradation: Silt = 40.7%, Clay = 59.3%	1 -
-		CLAYEY SILT - trace sand - brown - frozen to 1.4 m, moist when thawed - intermediate plasticity		G	693		•									
-		- below 1.4 m, firm		G	694		•									
2/13/12 				G	695		•									
2088.GPJ UMA W		SILT - trace clay - light brown - moist, soft - low plasticity END OF TEST HOLE AT 2.1 m in silt.		G	696		•									2 -
LOG OF TEST HOLE LANARK, MULVEY, KANE & WAVELL LOGS,GPJ UMA WINN,GDT 2/13/12		NOTES: 1. No sloughing observed. 2. No seepage observed. 3. Test hole backfilled with auger cuttings, bentonite and asphalt cold patch to surface. 4. Drilled with 150 mm diamond core to 0.25 m, solid stem augers to														
AKK, MULVET, N.		2.1 m.														
T HOLE LANA									<u> </u>				: : : : : :	0.15	ETION DESTINATION	
= -		AECOM								hen F iris Kh	etsche				ETION DEPTH: 2.10 m ETION DATE: 1/25/12	
500		AECOM										ockrell		OIVIT LI	Page	1 of 1

		Local Streets Package 12-R-02 : Kane Avenue; Along Property Line of House #135 and	CLII 131,	ENT: Westl	Cit	ty of Ind L	Winr ane,	nipeg 2.0	j m So	outh (of Cu	rb			STHOLE NO: TH12-1 DJECT NO.: 6024148	
		TOR: Maple Leaf Drilling Ltd		THOE						150 ı	mm C				EVATION (m):	
SAM	PLE T	YPE GRAB SHELBY TUBE	\boxtimes sı	PLIT S	PO	NC		В	ULK				NO RE	COVER	CORE CORE	
DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION		SAMPLE TYPE	SAMPLE #	◆ SF 0 2 16 1	♦ Dyna T (Star (Blov 0 4 Tot (7 18	Becker amic C ndard F ws/300 0 6 al Unit (kN/m ³)	r ₩ Cone ◇ Pen Te Imm) 0 8 Wt ■)	est) • 60 100		+ Tor	HEAR STF rvane + QU × Vane □ set Pen. △ d Vane ⊕	7	COMMENTS	DEPTH
0		_ ASPHALT (thickness = 37 mm)				2	0 4	0 6	0 8	0 100		50 <u>′</u>	100 1	50 200		
-	•	CONCRETE (thickness = 188 mm)														
-		CLAY FILL - trace silt, trace sand, trace organics - dark brown - frozen, moist when thawed - high plasticity		G	697			••								
-				G	698			•								
-		CLAY - trace silt		G	699		•									
- 1		 dark brown frozen to 1.2 m, moist when thawed high plasticity 			100											1 -
-		- below 1.2 m, firm		G	100											
2/13/12		- below 1.5 m, brown		G	101		•									
MINN.GDT				G	102		•	• • • • • • • • • • • • • • • • • • • •								2 -
LL LOGS:GFJ		END OF TEST HOLE AT 2.1 m in clay. NOTES: 1. No sloughing observed. 2. No seepage observed.		G	103											
, KANE & WAVI		Test hole backfilled with auger cuttings, bentonite and asphalt colopatch to surface. Drilled with 150 mm diamond core to 0.225 m, solid stem augers to 2.1 m.														
LOG OF TEST HOLE LANARK, MULYEY, KANE & WAVELL LOGS.GPJ. UMA WINN.GDT 2/13/12																
TEST HOLE						LOC	GED	BY:	Sten	hen F	etsch	• · · · · · · · · · · · · · · · · · · ·	<u> </u>	OMPI F	TION DEPTH: 2.10 m	
<u> </u>		AECOM					/IEWE					_			TION DATE: 1/25/12	
ဒို												ockrel				1 of 1

		Local Streets Package 12-R-02		CLII	ENT: C	ity of	Winn	ipeg					TESTHOLE NO: T	
		: Kane Avenue; Along Property	Line of House #118 and										PROJECT NO.: 60)241484
SAME		TOR: Maple Leaf Drilling Ltd YPE ■ GRAB	SHELBY TUBE		<mark>THOD:</mark> PLIT SPO			SA wi		mm C		NO RECO	ELEVATION (m): VERY Tocre	
DEPTH (m)	SOIL SYMBOL	SOIL DESC		SI	SAMPLE TYPE SAMPLE #	◆ SI 0 :	PENETR # B Openation Openation Description PENETR # B Openation Openation Penetration Penetration	ATION T Becker # Imic Cor Idard Pe Is/300mr 0 60 al Unit W kN/m³)	ESTS (ine ♦ n Test) ♦ m) 80 10 t ■	0		EAR STRENC vane + U × √ane □ tt Pen. △ Vane • Pa)		
0		ASPHALT (thickness = 35 mm)				 	20 40	. 60	80 10	1	10	0 150	200	
-		CONCRETE (thickness = 165 mm) CLAY - some silt, trace sand	awed		G104	1								
-					G10!	5	H						Gradation: Sand = 2.6%, Silt = 14.7%, Clay = 82.7	= '%
-1 -1		- below 1.1 m, firm			G100		•							
- - -		 below 1.2 m, brown below 1.5 m, silt inclusions (< 10 mm 	o)		G10 ³		•							
			,		G104)								
—2 —2		END OF TEST HOLE AT 2.1 m in cla	V.		G110)	•							:
		NOTES: 1. No sloughing observed. 2. No seepage observed. 3. Test hole backfilled with auger cutti patch to surface. 4. Drilled with 150 mm diamond core 2.1 m.	ngs, bentonite and asphalt co											
י י י י י י י י י י י י י י י י י י י														
3	1	AECOM				RE\	/IEWE	D BY:	tephen Faris K NEER:	halil			PLETION DEPTH: 2. PLETION DATE: 1/2	

		Local Streets Package 12-R-02 : Kane Avenue; In Front of House #101, Westbound Lane,	NT: C m Sou									STHOLE NO: TH12-1 DJECT NO.: 6024148	
							vith 150	mm (Coring			EVATION (m):	
SAME	PLE T		LIT SPO			Bl	JLK		Ž	NO REG	COVER	Y CORE	
DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE SAMPLE #	◆ SI 0 :	♦ Dyna PT (Star (Blow 20 4) ■ Tota (7 18	Becker amic Condard F vs/300r 0 60 al Unit 1 kN/m ³)	X one ♦ en Test) • mm) 0 80 10 Wt ■ 20 2	21	+ To X l □ Lab △ Pock ♣ Field (K	HEAR STRI rvane + QU × Vane □ set Pen. △ d Vane ♣ kPa)		COMMENTS	ОЕРТН
0	4	CONCRETE (thickness = 190 mm)			20 4	0 60	80 10	00	50	100 15	0 200		
-		GRANULAR BASE - well graded (<19 mm diameter) CLAY - trace silt - brown - frozen, moist when thawed - high plasticity	G111		•								-
-			G112										-
- 1		SILT - trace clay - light brown	G113										1-
-		- moist, soft - low plasticity CLAY - some silt, some silt inclusions (<10 mm) - brown - moist, firm - high plasticity	G114										-
NA WINN.GDT 2/13/12			G116										
& WAVELL LOGS.GPJ UM		END OF TEST HOLE AT 2.1 m in clay. NOTES: 1. No sloughing observed. 2. No seepage observed. 3. Test hole backfilled with auger cuttings, bentonite and asphalt cold patch to surface.	G117		•								- -
LOG OF TEST HOLE LANARK, MULVEY, KANE & WAVELL LOGS.GFJ. UMA WINN.GDT 2/13/12 C C C C C C C C C C C C		4. Drilled with 150 mm diamond core to 0.19 m, solid stem augers to 2.1 m.											-
3				1.0	CCC	DV-	Ctonbar	Dotor	:	100	אוטי ב	TION DEDTIL 2.10 **	
G OF T.		AECOM		RE\	/IEWE	D BY	Stephen ': Faris k	Chalil		CC		TION DEPTH: 2.10 m TION DATE: 1/25/12	
9				PR(JJEC1	ENG	SINEER:	Blair (Cockrel			Page	1 of 1



City of Winnipeg Local Streets Package 12-R-02 Geotechnical Investigation

Test		Pavement S	Surface	Pavement Struc	ture Material	Subgrade	Sample	Moisture		Hydromet	er Analysis		At	terberg Lin	nits
Hole No.	Test Hole Location	Туре	Thickness (mm)	Туре	Thickness (mm)	Description	Depth (m)	Content (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit	Plastic Limit	Plasticity Index
						Clay Fill	0.3	27.5							
		Asphalt	55			Clay Fill	0.6	38.9							
	Kane Avenue; West Edge of					Clay	0.9	35.1	0.0	8.7	15.4	75.9	83.3	26.6	56.7
TH12-11	House #194, Eastbound Lane,			None	n/a	Clay	1.2	32.8							
	1.5 m North of Curb	Concrete	170			Clay	1.5	35.2							
		Concrete	170			Clay	1.8	34.8							
						Clay	2.1	38.4							
						Clay	0.3	35.6							
		Asphalt	30			Clay	0.6	35.7							
	Kane Avenue; In Front of					Clay	0.9	36.0							
TH12-12	House #178, Eastbound Lane,			None	n/a	Clay	1.2	37.9							
	1.5 m North of Curb	Concrete	155			Clay	1.5	36.9							
		Concrete	133			Clay	1.8	37.6							
						Clay	2.1	35.5							
						Clay	0.3	37.0							
		Asphalt	45			Clay	0.6	33.2	0.0	5.1	15.1	79.8	74.4	25.9	48.5
	Kane Avenue; East Edge of					Clay	0.9	30.6							
TH12-13	House #158, Eastbound Lane,			None	n/a	Clay	1.2	31.0							
	1.5 m North of Curb	Concrete	180			Clay	1.5	28.8							
		Concrete	100			Clay	1.8	28.4							
						Clay	2.1	27.4							
						Silty Clay	0.3	29.2							
		Asphalt	60			Silty Clay	0.6	31.7							
	Kane Avenue; South Edge of					Silty Clay	0.9	22.3	0.0	0.0	40.7	59.3	44.6	18.3	26.3
TH12-14	House #143, Southbound			None	n/a	Clayey Silt	1.2	26.5							
	Lane, 2.0 m East of Curb	Concrete	190			Clayey Silt	1.5	25.9							
		Concrete	170			Clayey Silt	1.8	28.8							
						Silt	2.1	26.9							
						Clay Fill	0.3	54.5							
	Kara Avanua, Alana Dranartu	Asphalt	37			Clay Fill	0.6	50.0							
	Kane Avenue; Along Property Line of House #135 and 131,					Clay	0.9	35.3							
TH12-15	Westbound Lane, 2.0 m			None	n/a	Clay	1.2	32.8							
	South of Curb	Concrete	188			Clay	1.5	35.8							
	Journal Curb	Concrete	100			Clay	1.8	36.6							
						Clay	2.1	39.1							



City of Winnipeg Local Streets Package 12-R-02 Geotechnical Investigation

Test		Pavement S	urface	Pavement Structu	re Material	Subgrade	Sample	Moisture		Hydromete	er Analysis		At	terberg Lin	nits
Hole No.	Test Hole Location	Туре	Thickness (mm)	Туре	Thickness (mm)	Description	Depth (m)	Content (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit	Plastic Limit	Plasticity Index
						Clay	0.3	28.4							
	Kana Ayanya, Alang Pranarty	Asphalt	35			Clay	0.6	33.5	0.0	2.6	14.7	82.7	82.3	24.4	57.9
	Kane Avenue; Along Property Line of House #118 and 114,					Clay	0.9	33.1							
TH12-16	Eastbound Lane, 2.0 m North			None	n/a	Clay	1.2	37.4							
	of Curb	Concrete	165			Clay	1.5	36.2							
	or carb	Concrete	105			Clay	1.8	39.2							
						Clay	2.1	37.8							
						Clay	0.3	26.6							
						Clay	0.6	24.1							
	Kane Avenue; In Front of			Granular Base		Clay	0.9	25.9							
TH12-17	House #101, Westbound	Concrete	190	(<19mm	62	Silt	1.2	19.3							
	Lane, 2.0 m South of Curb			diameter)		Clay	1.5	32.8							
						Clay	1.8	36.5							
						Clay	2.1	35.0							



Photograph 1. Kane Avenue - TH12-11



Photograph 2. Kane Avenue – TH12-12



Photograph 3. Kane Avenue – TH12-13



Photograph 4. Kane Avenue – TH12-14



Photograph 5. Kane Avenue – TH12-15



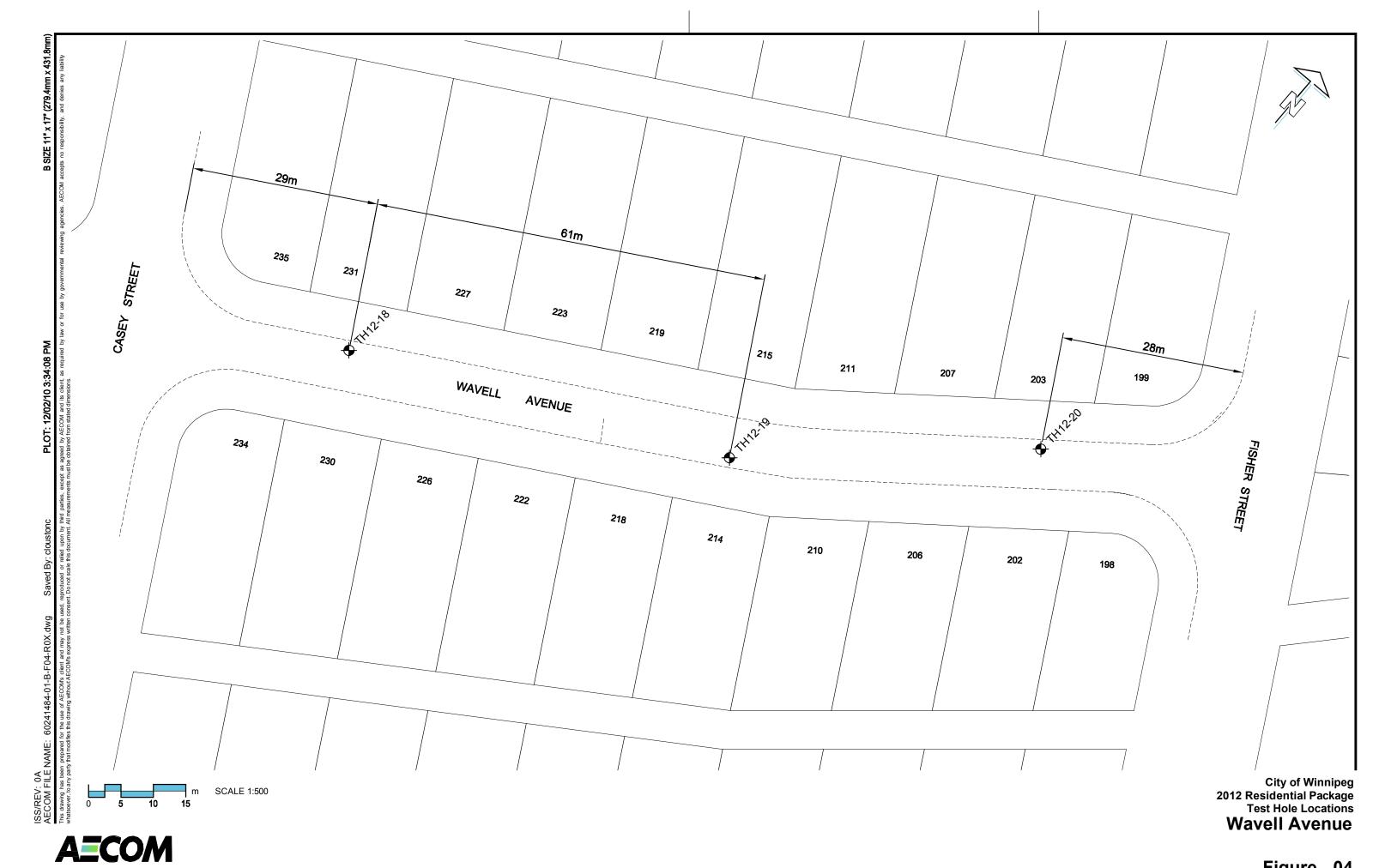
Photograph 6. Kane Avenue – TH12-16



Photograph 7. Kane Avenue – TH12-17

A=COM

Wavell Avenue





PUBLIC WORKS DEPARTMENT • SERVICE DES TRAVAUX PUBLICS

Engineering Division • Division de l'ingénierie

GEOTECHNICAL INVESTIGATION

STREET RECONSTRUCTION

Revised October 28th, 2008

<u>Fieldwork</u>

- 1. Clear all underground services at each testhole location.
- 2. Test holes required every 50 m with a minimum of 3 test holes per street.
- 3. Record location of testhole (offset from curb, distance from cross street and house number).
- 4. Drill 150 mm-diameter core in pavement.
- 5. Drill 125 mm-diameter testhole into fill materials and subgrade
- 6. If a service trench backfilled with granular materials is encountered, another hole shall be drilled to define the existing sub-surface conditions.
- 7. Testhole to be drilled to depth of 2 m \pm 150 mm below surface of the pavement.
- 8. Recover pavement core sample and representative samples of soil (fill materials, pavement structure materials and subgrade).
- 9. Measure and record pavement section exposed in the testhole (thickness of concrete or asphalt and different types of pavement structure materials).
- 10. Pavement structure materials to be identified as crushed limestone or granular fill and the maximum aggregate size of the material (20 mm, 50 mm or 150 mm).
- 11. Log soil profile for the subgrade.
- 12. Representative samples of soil must be obtained at the following depths below the bottom of the pavement structure materials 0.1 m, 0.4 m, 0.7 m, 1.0 m, 1.3 m, 1.6 m, etc. Ensure a sample is obtained from each soil type encountered in the testhole.
- 13. Make note of any water seepage into the testhole.
- 14. Backfill testhole with native materials and additional granular fill, if required. Patch pavement surface with hot mix asphalt or high strength durable concrete mix.
- 15. Return core sample from the pavement and soil samples to the laboratory.

Lab Work

- 1. Test all soil samples for moisture content.
- 2. Photograph core samples recovered from the pavement surface.
- 3. Conduct tests for plasticity index and hydrometer analysis on selected soil samples which are between 0.5 m and 1 m below top of pavement (this is the sub-grade on which the pavement and sub-base will be built). The selection will be based upon visual classification and moisture content test results, with a minimum of one sample of each soil type per street to be tested.
- 4. Prepare testhole logs and classify subgrade (based on hydrometer) as follows;

< 30% silt - classify as clay 30% - 50% silt - classify as silty clay 50% - 70% silt - classify as clayey silt > 70% silt - classify as silt

Prepared by: The National Testing Laboratories Limited and Eng-Tech Consulting

Embrace the Spirit · Vivez l'esprit

AECOM Canada Ltd.

GENERAL STATEMENT

NORMAL VARIABILITY OF SUBSURFACE CONDITIONS

The scope of the investigation presented herein is limited to an investigation of the subsurface conditions as to suitability for the proposed project. This report has been prepared to aid in the evaluation of the site and to assist the engineer in the design of the facilities. Our description of the project represents our understanding of the significant aspects of the project relevant to the design and construction of earth work, foundations and similar. In the event of any changes in the basic design or location of the structures as outlined in this report or plan, we should be given the opportunity to review the changes and to modify or reaffirm in writing the conclusions and recommendations of this report.

The analysis and recommendations presented in this report are based on the data obtained from the borings and test pit excavations made at the locations indicated on the site plans and from other information discussed herein. This report is based on the assumption that the subsurface conditions everywhere are not significantly different from those disclosed by the borings and excavations. However, variations in soil conditions may exist between the excavations and, also, general groundwater levels and conditions may fluctuate from time to time. The nature and extent of the variations may not become evident until construction. If subsurface conditions differ from those encountered in the exploratory borings and excavations, are observed or encountered during construction, or appear to be present beneath or beyond excavations, we should be advised at once so that we can observe and review these conditions and reconsider our recommendations where necessary.

Since it is possible for conditions to vary from those assumed in the analysis and upon which our conclusions and recommendations are based, a contingency fund should be included in the construction budget to allow for the possibility of variations which may result in modification of the design and construction procedures.

In order to observe compliance with the design concepts, specifications or recommendations and to allow design changes in the event that subsurface conditions differ from those anticipated, we recommend that all construction operations dealing with earth work and the foundations be observed by an experienced soils engineer. We can be retained to provide these services for you during construction. In addition, we can be retained to review the plans and specifications that have been prepared to check for substantial conformance with the conclusions and recommendations contained in our report.

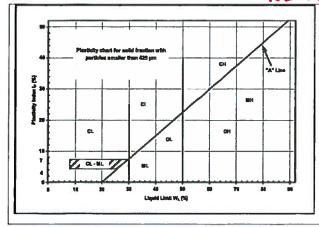
EXPLANATION OF FIELD & LABORATORY TEST DATA

					UMA	uscs		Laborator	y Classification Crite	eria
		Descripti	ion		Log Symbols	Classification	Fines (%)	Grading	Plasticity	Notes
		CLEAN GRAVELS	Well graded sandy gravel or no f	s, with little	2721	GW	0-5	C _U > 4 1 < C _C < 3		
	GRAVELS (More than 50% of	(Little or no fines)	Poorly grade sandy gravel or no f	s, with little		GP	0-5	Not satisfying GW requirements		Dual symbols if 5-
SILS	coarse fraction of gravel size)	DIRTY GRAVELS	Silty gravels, grave			GM	> 12		Atterberg limits below "A" line or W _P <4	12% fines. Dual symbols if above "A" line and
AINED SC		(With some fines)	Clayey grave sandy g			GC	> 12		Atterberg limits above "A" line or W _P <7	4 <w<sub>P<7</w<sub>
COARSE GRAINED SOILS		CLEAN SANDS	Well grade gravelly sand or no f	s, with little	\$5.44 \$5.61	sw	0-5	C _U > 6 1 < C _C < 3		$C_U = \frac{D_{60}}{D_{10}}$
CO	SANDS (More than 50% of	(Little or no fines)	Poorly grad gravelly sand or no f	s, with little	2000	SP	0-5	Not satisfying SW requirements		$C_U = \frac{D_{60}}{D_{10}}$ $C_C = \frac{(D_{30})^2}{D_{10} x D_{60}}$
	coarse fraction of sand size)	DIRTY SANDS	Silty sa sand-silt r			SM	> 12		Atterberg limits below "A" line or W _P <4	
		(With some fines)	Clayey s sand-clay			sc	> 12		Atterberg limits above "A" line or W _P <7	
	SILTS (Below 'A' line	W _L <50	Inorganic sil clayey fine s slight pla	ands, with		ML				
	negligible organic content)	W _L >50	Inorganic si plasti			МН				
SOILS	CLAYS	W _L <30	Inorganic c clays, sand low plasticity,	y clays of		CL				
FINE GRAINED SOILS	(Above 'A' line negligible organic	30 <w<sub>L<50</w<sub>	Inorganic cla clays of n plasti	nedium		CI			Classification is Based upon Plasticity Chart	
FINE	content)	W _L >50	Inorganic cla plasticity,			СН				
	ORGANIC SILTS &	W _L <50	Organic s organic silty o plasti	clays of low		OL				
	CLAYS (Below 'A' line)	W _L >50	Organic cla plasti		7/2	ОН				
Н	IIGHLY ORGA	INIC SOILS	Peat and ot organic		****	Pt		on Post ification Limit		r odour, and often s texture
		Asphalt			Till					
		Concrete			Bedrock fferentiated)				AE	COM
×		Fill		(Li	Bedrock mestone)				ignated fraction	

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

NOT USED TO CLASSIFY SUBGRADE, REFER TO CITY OF WINN IPER SPECS FOR GEOTECHNICAL INVESTIGATION STREET

RECONSTRUCTION (OCT. 2008)



FRAC	CTION	SEIVE	SIZE (mm)	DEFINING RANGES OF PERCENTAGE BY WEIGHT OF MINOR COMPONENTS						
		Passing	Retained	Percent	Identifier					
Gravel	Coarse	76	19	35-50	and					
Gravei	Fine	19	4.75	35-50	and					
	Coarse	4.75	2.00	20-35	"y" or "ey" "					
Sand	Medium	2.00	0.425	20-35	y or ay					
	Fine	0.425	0.075	10-20	same					
	n-plastic) (plastic)	< 0.0	75 mm	1-10	trace					
	*1	or example:	gravelly, san	dy clayey, silty						

Definition of Oversize Material

COBBLES: 76mm to 300mm diameter BOULDERS: >300mm diameter

LEGEND OF SYMBOLS

Laboratory and field tests are identified as follows:

qu - undrained shear strength (kPa) derived from unconfined compression testing.

T_v - undrained shear strength (kPa) measured using a torvane

pp - undrained shear strength (kPa) measured using a pocket penetrometer.

L_v - undrained shear strength (kPa) measured using a lab vane.

F_v - undrained shear strength (kPa) measured using a field vane.

γ - bulk unit weight (kN/m³).

SPT - Standard Penetration Test. Recorded as number of blows (N) from a 63.5 kg hammer dropped 0.76 m (free fall) which is required to drive a 51 mm O.D. Raymond type sampler 0.30 m into the soil.

DPPT - Drive Point Pentrometer Test. Recorded as number of blows from a 63.5 kg hammer dropped 0.76 m (free fall) which is required to drive a 50 mm drive point 0.30 m into the soil.

w - moisture content (W_L, W_P)

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

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

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

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

		Local Streets Package 12-R-02 : Wavell Avenue; In Front of House #231, Westbound Lan		<u>ENT:</u> .5 m											STHOLE NO: TH12-1 OJECT NO.: 6024148	
									vith 15	50 mr	n Co	ring			EVATION (m):	
SAMI	PLE T	YPE GRAB SHELBY TUBE	\leq SI	PLIT S	POC	<u>125 mm SSA with 150 mm Co</u> OON ■BULK						N	O RECC	OVER	RY TCORE	
DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION		SAMPLE TYPE	SAMPLE #	◆ SP 3 20 16 17	Plastic MC Liquid			◆ 100 21	□ Lab Vane □ □ Δ Pocket Pen. Δ ♣ Field Vane ♣ (kPa)				COMMENTS	DEPTH
0		ASPHALT (thickness = 25 mm)				20	40	60	80	100	50	100	150	200		
-	* * * * * * * * * * * * * * * * * * *	CONCRETE (thickness = 175 mm)														
-		SILTY CLAY - trace sand - brown - frozen to 1.1 m, moist when thawed - high plasticity		G	118											
-				G	119		I-•		⊣ ····						Gradation: Sand = 4.9%, Silt = 42.7%, Clay = 52.4%	
- 1 -		- below 1.1 m, firm		G	120		•									1-
-				G	121		•									
2/13/12				G	122		•									
MMA WINN.GDT					123		•									2-
AVELL LOGS.GPJ		END OF TEST HOLE AT 2.1 m in silty clay. NOTES: 1. No sloughing observed. 2. No seepage observed. 3. Test hole backfilled with auger cuttings, bentonite and asphalt cold		G	124											
LVEY, KANE & W,		patch to surface. 4. Drilled with 150 mm diamond core to 0.20 m, solid stem augers to 2.1 m.														
LOG OF TEST HOLE LANARK, MULVEY, KANE & WAVELL LOGS.GFJ. UMA WINN.GDT 2/13/12																
SEL.	1	48644							Stephe						ETION DEPTH: 2.10 m	
0000		AECOM							: Faris INEEF			krell	COV	/IPLE	ETION DATE: 1/25/12 Page	1 of 1

		Local Streets Package 12-R-02			ENT: C									THOLE NO: TI				
		: Wavell Avenue; In Front of Hou												PROJECT NO.: 60241484				
		FOR: Maple Leaf Drilling Ltd ✓PF ■ GRAB			THOD:) mm (140 550		VATION (m):				
DEPTH (m)	SOIL SYMBOL	GRAB SOIL DESC			SAMPLE TYPE SAMPLE #	◆ SI 0 :	PENETRATION TE # Becker # Dynamic Cone SPT (Standard Pen (Blows/300mm) 20 40 60 Total Unit Wt (kN/m) 16 17 18 19 Plastic MC L) 000 21	UNDRAINED SHEAR S' + Torvane +		NGTH	Y Toore COMMENT	S	DEPTH		
0		ASPHALT (thickness = 35 mm)					20 4	60	80 1	50	50 1	150	200					
-		CONCRETE (thickness = 160 mm) CLAY - silty, trace sand - brown - frozen to 1.1 m, moist when that - high plasticity	wed		G125	5												
-					G126) · · · ·	•											
- 1 -		- below 1.1 m, firm			G127		•									1		
- - -					G128													
-					G130)												
		END OF TEST HOLE AT 2.1 m in clay			G13 ⁻¹		•									2		
		NOTES: 1. No sloughing observed. 2. No seepage observed. 3. Test hole backfilled with auger cuttir patch to surface. 4. Drilled with 150 mm diamond core to 2.1 m.	gs, bentonite and asphalt cold															
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2																		
3		AECOM				RE	/IEWE	D BY:	Faris I	Petsch Chalil Blair C		CO		TION DEPTH: 2.7 TION DATE: 1/25		1 of		

		Local Streets Package 12-R-02 : Wavell Avenue; In Front of House #203, Westbound Lan		ENT: .5 m S				g						STHOLE NO: TH12-2 OJECT NO.: 6024148	
				THOD				with	150 r	nm Co	orina			EVATION (m):	J-T
SAM	PLE T			PLIT SF								NO RE	COVE		
DEPTH (m)	SOIL SYMBOL	SOIL DESCRIPTION	PE		0	PENETRATION TESTS			est) ◆ 30 100	♣ Field Vane			,	COMMENTS	DEPTH
0		ASPHALT (thickness = 25 mm)			+-	20	40	. 00	30 100	5) 10	00 15	0 200		
-		CONCRETE (thickness = 160 mm)													
-		CLAY (FILL) - trace silt, trace sand - dark brown - frozen, moist when thawed - high plasticity		G1	32		•								
-		SILTY CLAY - trace sand, trace rootlets - brown - frozen to 1.2 m, moist when thawed		G1	33)								
-		- high plasticity													
- 1				G1	34	•								Gradation: Sand = 1.2%, Silt = 44.8%, Clay = 54.0%	1 -
-		- below 1.2 m, firm		G1	35	•									
-				G136	36	•									
INN.GDT 2/13/1					37	•									
-2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2 - 2		END OF TEST HOLE AT 2.1 m in silty clay.		G1	38	•									2 -
WAVELL LOG		NOTES: 1. No sloughing observed. 2. No seepage observed. 3. Test hole backfilled with auger cuttings, bentonite and asphalt cold patch to surface.													
LVEY, KANE &		4. Drilled with 150 mm diamond core to 0.185 m, solid stem augers to 2.1 m.													
LOG OF TEST HOLE LANARK, MULVEY, KANE & WAVELL LOGS.GPJ. UMA WINN.GDT 2/13/12															
3					1.	:		<u>:</u>		alc -!			ON ADI	TION DEDTIL 2.42	
06 OF TE		AECOM			R	EVIE	VED B	Y: Fa	aris Kh	etsche alil Blair Co				ETION DEPTH: 2.10 m ETION DATE: 1/25/12	1 of 1



City of Winnipeg Local Streets Package 12-R-02 Geotechnical Investigation

Test		Pavement Su	ırface	Pavement Struc	cture Material	Subgrade	Sample	Moisture		Hydromete	er Analysis		Atterberg Limits			
Hole No.	Test Hole Location	Type Thickness (mm) Type Thickness (mm) Description	Depth (m)	Content (%)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	Liquid Limit	Plastic Limit	Plasticity Index					
						Silty Clay	0.3	36.7								
		Asphalt	25			Silty Clay	0.6	33.6	0.0	4.9	42.7	52.4	65.8	22.1	43.6	
	Wavell Avenue; In Front of					Silty Clay	0.9	28.6								
TH12-18	House #231, Westbound			None	n/a	Silty Clay	1.2	30.0								
	Lane, 1.5 m South of Curb	Concrete	175			Silty Clay	1.5	30.1								
		Concrete	175			Silty Clay	1.8	27.9								
						Silty Clay	2.1	27.4								
	Wavell Avenue; In Front of House #214, Eastbound Lane, 1.5 m North of Curb		35			Clay	0.3	32.1								
		Asphalt		None	n/a	Clay	0.6	32.6								
						Clay	0.9	27.2								
TH12-19		e, Concrete	160			Clay	1.2	27.5								
						Clay	1.5	27.5								
						Clay	1.8	26.4								
						Clay	2.1	27.7								
						Clay Fill	0.3	37.9								
		Asphalt	25			Silty Clay	0.6	30.3								
	Wavell Avenue; In Front of					Silty Clay	0.9	26.6	0	1.2	44.8	54.0	68.1	23.8	44.4	
TH12-20	House #203, Westbound		160	None	n/a	Silty Clay	1.2	24.4								
	Lane, 1.5 m South of Curb	Concrete				Silty Clay	1.5	25.0								
			100			Silty Clay	1.8	27.6								
						Silty Clay	2.1	26.4								



Photograph 1. Wavell Avenue – TH12-18



Photograph 2. Wavell Avenue – TH12-19



Photograph 3. Wavell Avenue - TH12-20