

23 September 2011 Project No. WX16667

Dillon Consulting Limited 895 Waverley Street, Suite 200 Winnipeg, Manitoba R3T 5P4

Attention: Mr. David Krahn, P. Eng.

Re: Geotechnical Investigation

Proposed New Transit Garage – Brandon Avenue

Winnipeg, Manitoba

1.0 INTRODUCTION

As requested, AMEC Environment & Infrastructure, a Division of AMEC Americas Limited (AMEC), completed a preliminary geotechnical investigation at the above noted site. The investigation included the supervision of test hole drilling and geotechnical lab testing. Geotechnical recommendations were not requested and therefore are not included herein. An environmental investigation program was completed concurrently with the geotechnical investigation and is presented under separate cover.

Based on the information provided by Dillon, it was understood that the proposed transit garage will be constructed using a design-build approach and as such, specific building information such as dimensions, location and foundation loads were not available at the time of drilling.

This report presents a summary of our findings during our field investigation and lab testing program.

2.0 SITE CONDITIONS

The site is located at the west end of Brandon Avenue, near Hethrington Avenue, in Winnipeg. Manitoba. The site was undeveloped at the time of the investigation, however construction of a Rapid Transit Corridor is occurring immediately adjacent to the site, and as such debris and construction equipment from the construction site were located on various parts of the site.

The site is bordered to the east by residential dwellings, and to the west by an operating rail yard and the recently constructed Rapid Transit Corridor. North and south of the site are undeveloped areas that will become part of the Rapid Transit Corridor. The site is generally flat lying and is partially covered by short grass.

P:\Jobs\16600's\16660's\16667 - Dillon Rapid Transit Garage\WX16667 Transit Garage Geo Report.doc AMEC Environment & Infrastructure A Division of AMEC Americas Limited 440 Dovercourt Drive Winnipeg, Manitoba Canada R3Y 1N4 Tel +1 (204) 488-2997 Fax +1 (204) 489-8261



3.0 GEOTECHNCIAL FIELD INVESTIGATION

A total of twelve test holes were drilled across the site area using a SoilMec SR-30 track-mounted piling rig owned and operated by Subterranean Ltd. of West St. Paul, Manitoba. Four of the test holes were advanced to auger refusal, four test holes were drilled to a depth of 5 m, while the remaining four holes were completed at a depth of 3 m.

It should be noted that during drilling of test hole TH07, an abandoned water line was struck at approximately 0.9 m below existing ground surface. Dillon Consulting was informed. Drilling of the test hole continued until the seepage from the water line caused the test hole to fill with water. Drilling of the hole was subsequently ceased at a depth of 13.7 m. The test hole was moved to avoid the water line and drilling continued as normal. The original test hole was backfilled using 19mm down crushed gravel.

During drilling, soil stratigraphy was classified according to the Modified Unified Soil Classification System (MUSCS) by AMEC's field technician, Mr. Anthony Lospe. Disturbed grab samples were collected from the auger at regular intervals, while relatively undisturbed Shelby Tube samples were collected at select depths. Pocket penetrometers readings were taken to assess the relative consistency of cohesive samples. All samples were sealed in plastic bags to limit moisture loss and transported to AMEC's Winnipeg laboratory.

A laboratory testing program was undertaken and consisted of natural moisture content determination, unconfined compression and laboratory vane testing.

4.0 SUBSURFACE CONDITIONS

Based on the twelve test holes drilled on 8 September 2011, the soil stratigraphy at the test hole locations was as follows:

- Fill
- Organic Clay
- Silt
- Clay
- Silt Till

Fill

Clay fill materials were found at the ground surface at all test hole locations, with the exception of test hole TH11 (where no fill was observed) and at test hole TH12 (where it was found beneath a layer of surface granular fill). The clay fill was generally described as silty, low plastic, moist, stiff, brown to dark grey, and contained trace to some sand and gravel. Rubble, bricks and other debris was also found within the clay fill in several test holes. The clay fill extended to depths ranging between 0.6 m and 1.6 m.

Granular fill was found at the surface in test holes TH11 and TH12 and was described as being gravelly, sandy, poorly graded, medium to coarse grained, loose to compact, moist, brown and contained some gravel. The granular fill extended to 1.1 and 0.4 m from grade at the two



locations, respectively. A thin layer of sand fill was also noted beneath the clay fill in test holes TH08 and TH09. The sand fill at these locations was generally described as being poorly graded, medium to coarse grained, loose to compact, moist, brown and ranged between trace silt and silty. The sand extended to depths ranging between 0.9 m and 1.3 m.

Organic Clay

A layer of organic clay was found beneath the fill material in test hole TH01. The organic clay was described as being low to medium plastic, moist, firm, black and contained traces of silt, sand, and rootlets. The organic clay extended to 0.9 m.

Silt

A thin layer of silt was found in the majority of the test holes, either directly beneath the fill materials (TH02 to TH08 and TH12) or within the underlying native clay (test holes TH01, TH03, TH10 and TH11). Silt was not observed in test hole TH09.

Generally the silt was low plastic, moist to very moist, soft and light brown to tan. The silt layer was encountered at depths ranging between 0.9 m and 2.2 m, and extended to depths ranging between 1.4 m and 2.6 m.

Clay

Native clay was observed below the fill, silt and organic layers in all the test holess. The clay was silty, high plastic, moist, stiff to very stiff and brown. Generally, the clay became stiff and then firm and grey with increasing depth in the deep test holes. Sulphate inclusions were found within the clay below depths of approximately 3.1 m or greater. Traces of gravel and silt till inclusions were also noted within the clay below depths of approximately 12.2 m. The clay extended to depths ranging between 14.3 m and 15.4 m (although TH07 was terminated while still in clay at 13.7 m).

Silt Till

Glacial silt till was present below the clay in each of the deep test holes (TH01, TH06, TH07 and TH12) except test hole TH01, where refusal was met prior to reaching the till layer. The silt till was low plastic, moist, soft, grey and contained traces of sand and gravel. With depth, the till becamse damp dense and the till extended to the maximum depths explored in each test hole where it was found (16.0 to 16.5 m).

4.1 Sloughing and Seepage Conditions

Each test hole was left open for approximately 10 minutes after completion of drilling in order to measure short term sloughing and seepage conditions. The table below provides a summary of the sloughing and seepage conditions observed at the test holes.



Table 1: Sloughing and Seepage Conditions

Test Hole #	Drilled Depth (m)	Sloughing Below (m)	Test Hole Open To (m)	Seepage Below (m)	Water Level Prior to Backfili (m)
TH01	14.6		14.6	1.7 (very slight)	
TH02	3.0		3.0		
TH03	3.0		3.0	1.7 (very slight)	
TH04	5.0		4.9	1.4 (slight)	4.7
TH05	5.0	1.5 (moderate)	1.7	1.5 (moderate)	1.5
TH06	16.5		16.5	0.9 (very slight)	
TH07	13.7		13.7	0.9 (significant; from water line)	3.7
TH07-A	16.3	15.2 (slight)	16.2	15.2 (slight)	15.2
TH08	5.0		5.0		
TH09	5.0		5.0	3.1 (heavy)	3.1
TH10	3.0		3.0		
TH11	3.0		3.0		
TH12	16.0	**	15.8	15.3 (slight) 15.8 (moderate to heavy)	13.7

[&]quot;--" indicates not encountered

5.0 LABORATORY TESTING

A laboratory testing program was conducted on selected samples and consisted of natural moisture content determination, unconfined compression and laboratory vane testing. Results of all laboratory testing can be found on the test hole logs, however a summary of the unconfined compression and laboratory vane testing is presented below.



Table 2: Laboratory Testing Results

Test Hole and Sample Number	Sample Depth (m)	Unconfined Compressive Strength (kPa)	Laboratory Vane Shear Strength (kPa)	Bulk Unit Weight (kg/m³)	Moisture Content (%)
TH06 Sample 6	3.1 – 3.7	19.9*	77.4	1701	55.0
TH06 Sample 9	6.1 – 6.7	116.2	74.0	1708	51.9
TH06 Sample 12	9.1 – 9.7	103.5	59.0	1772	47.9
TH07 Sample 7	4.6 – 5.2	80.1	82.9	1706	57.1
TH07 Sample 10	7.6 – 8.2	124.4	62.8	1734	45.0
TH07-A Sample 2	13.7 – 14.3	76.6	53.2	1770	46.6

^{*}Low unconfined compressive strength confirmed due to presence of slickenside in sample



6.0 CLOSURE

Soil conditions, by their nature, can be highly variable across a construction site. The placement of fill during and prior to construction activities on a site can contribute to variable soil conditions. A contingency amount should be included in the construction budget to allow for the possibility of unexpected variations in soil conditions, which may result in modification of the design, and/or changes in construction procedures.

This memorandum has been prepared for the exclusive use of Dillon Consulting Limited and the City of Winnipeg for inclusion in the Rapid Transit Garage Design Build request for proposals. The information contained herein should be used for informational purposes only and should be verified by the successful design build team. Any use that a third party makes of this memo, or any reliance or decisions based on this memo are the sole responsibility of those parties. It has been prepared in accordance with generally accepted soil and foundation engineering practices. No other warranty is made, either expressed or implied.

AMEC trusts the above information satisfies your requirements at this time. We would be pleased to provide any further information that may be needed during design. If you require additional information, please do not hesitate to contact one of the undersigned.

Sincerely,

AMEC EARTH & ENVIRONMENTAL

Jorden Wiwcharyk, EIT Geotechnical Engineer-In-Training

Reviewed By:

Harley Pankratz, P. Eng.

Vice President: Eastern Prairies/Northern Alberta

Attachments: Figure 1: Test Hole Location Plan

Figure 2-14: Test Hole Logs

Senior Geotechnical Engineer

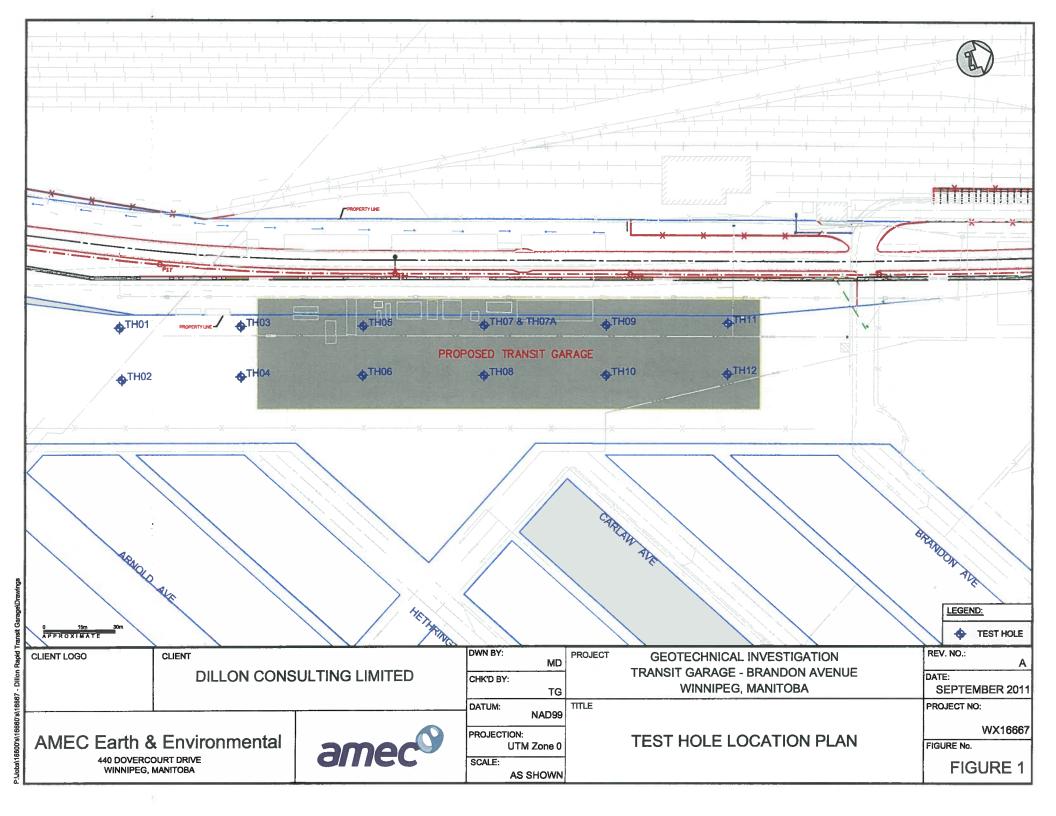
Trevor Gluck, P. Ena

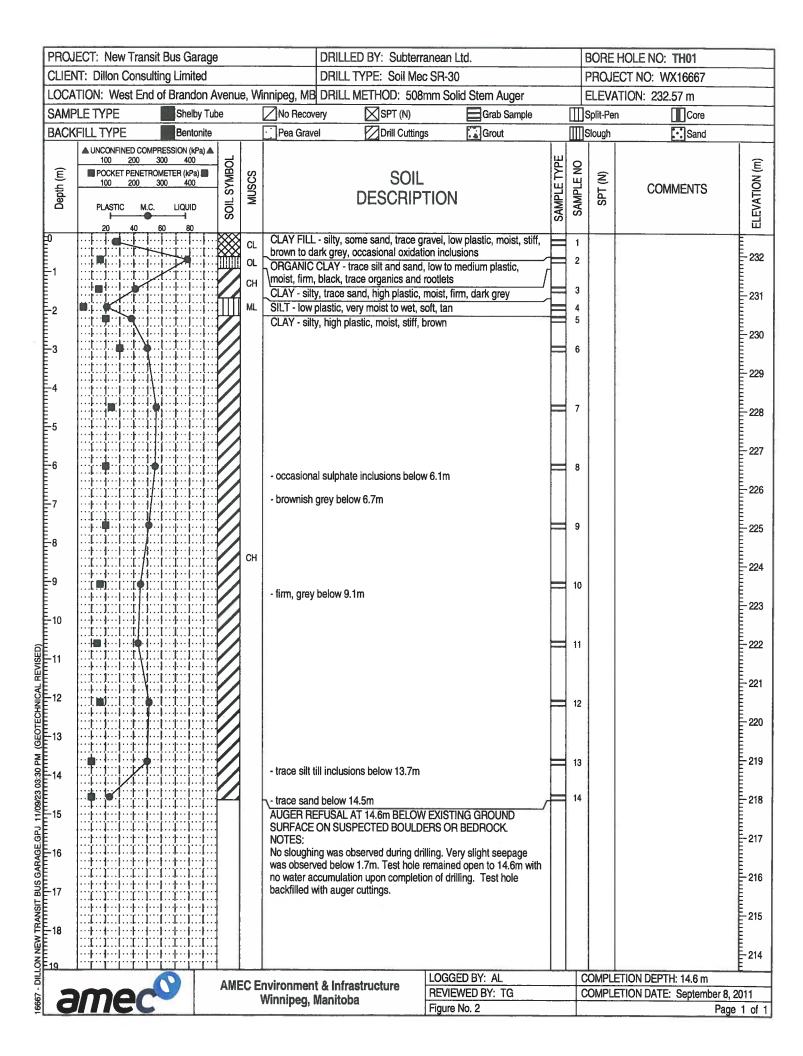
Certificate of Authorization

AMEC Environment & Infrastructure, a

Division of AMEC Americas Limited

No. 555 Date: Sept=3/11



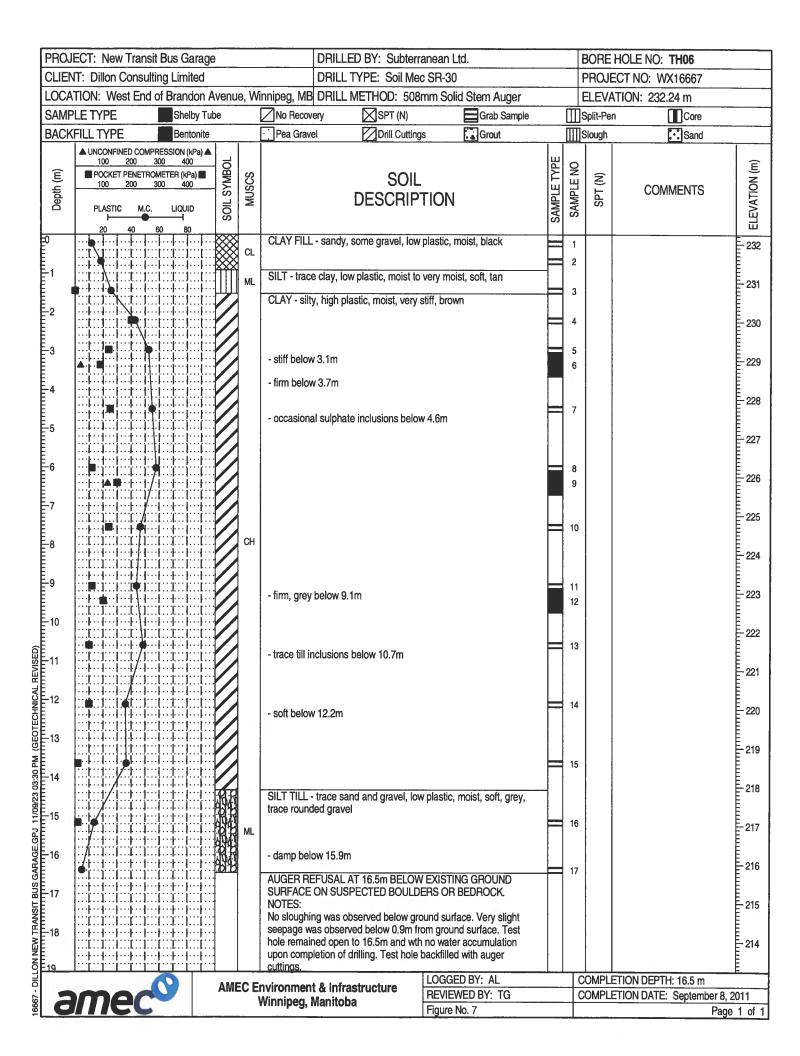


PROJ	JECT: New Transit Bus Ga	arage	DRILLED BY: Subter	ranean Ltd.	BOR	BORE HOLE NO: TH02		
CLIEN	NT: Dillon Consulting Limi	ted	DRILL TYPE: Soil Me	ec SR-30		JECT NO: WX16667		
LOCA	ATION: West End of Branc	don Avenue, W	innipeg, MB DRILL METHOD: 508	Bmm Solid Stem Auger	ELE	/ATION: 232,21 m		
SAMF	PLE TYPE Shel	by Tube	☑ No Recovery ☑ SPT (N)	Grab Sample	Split-F	Pen Core		
BACK	KFILL TYPE Bent	onite	Pea Gravel Drill Cuttin	gs Grout	Slougl	h Sand		
Depth (m)	■ UNCONFINED COMPRESSION (# 100 200 300 40(■ POCKET PENETROMETER (KP) 100 200 300 40(PLASTIC M.C. LIQUII 20 40 60 80	SOIL SYMBOL MUSCS	SOIL DESCRIP	TION	SAMPLE NO SPT (N)	STRIBMMOD (m)		
Button New Hansi Bus Garage, 67 1708/23 03:0 PM (GEO) ECHNICAL HEVISED) 1		CL ML CH	CLAY FILL - silty, trace sand and gracrumbly - trace rubble, bricks and wood piece SILT - trace clay, low plastic, moist to CLAY - silty, high plastic, moist, stiff, - firm to stiff below 2.3m TEST HOLE TERMINATED AT 3.0m GROUND SURFACE. NOTES: No sloughing or seepage was obsen Test hole remained open to 3.0m and drilling. Test hole backfilled with aug	be below 0.8m Divery moist, soft, tan brown BELOW EXISTING Wed below ground surface. It was dry upon completion of	1 2 3 4 5 5	= 232 = 231 = 230 = 229 = 227 = 226 = 225 = 224 = 223 = 221 =		
16 17 17 18 18 18 18 18 18 18 18 18 18 18 18 18			18			216 2215 214		
<u>-19</u>				LOGGED BY: AL	COMP	L E PLETION DEPTH: 3 m		
	mec®		nvironment & Infrastructure	REVIEWED BY: TG		PLETION DATE: September 8, 2011		
	リリにし	\	Winnipeg, Manitoba	Figure No. 3	1	Page 1 of 1		

PROJ	ECT: New Transit Bus G	arage	DRILLED BY: Subterr	anean Ltd.	Е	BORE HO	OLE NO: TH03
	IT: Dillon Consulting Limi		DRILL TYPE: Soil Me				T NO: WX16667
_			Vinnipeg, MB DRILL METHOD: 508 ✓ No Recovery SPT (N)	mm Solid Stem Auger Grab Sample			ON: 232.8 m
_		by Tube tonite	No Recovery SPT (N) ☐ Pea Gravel Drill Cutting			Split-Pen Slough	Core Sand
DACK	▲ UNCONFINED COMPRESSION (kPa) ▲				Slough	5- Sariu
Depth (m)	100 200 300 40 POCKET PENETROMETER (kF 100 200 300 40 PLASTIC M.C. LIQUI 20 40 60 80	SOIL SYMBC		TION	SAMPLE NO	SPT (N)	COMMENTS STREAMMOD
10 11 12 2 3 3 4 4 5 6 6		CL	CLAY FILL - some sand, trace gravel crumbly - trace brick and rootlets below 0.8m	, low plastic, moist, black,	1 2		- 232
£,		СН		o stiff, greyish brown	3		Ē
2	t t	ML	SILT - trace clay, low plastic, moist to	very moist, soft, tan	4		231
Ē.		CH	CLAY - silty, high plastic, moist, stiff,	brown			230
F 3			TEST HOLE TERMINATED AT 3.0m GROUND SURFACE.	BELOW EXISTING	5		
E-4			NOTES: No sloughing was observed below gro	ound surface. Very slight			E- 229
5			seepage was observed below 1.7m fr hole remained open to 3.0m with no v completion of drilling. Test hole backf	vater accumulation upon			228
6							- 227
7							226
8							- 225
E							- 224
10							- 223
F							- 222
2 - 11							E E
12							F-221
13							E- 220
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11 11 12 13 14 15 16 17 17 18 18 18 18 18 18 18 18 18 18 18 18 18							216
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<u> </u>				LOGGED BY: AL	닊	OMDUCTU	E- 214 ON DEPTH: 3 m
	mec	AMEC	Environment & Infrastructure	REVIEWED BY: TG			ON DATE: September 8, 2011
			Winnipeg, Manitoba	Figure No. 4		<u></u> 11	Page 1 of 1

	JECT: New Transit Bu			DRILL	ED BY: Subterra	nean Ltd.		I	BORE	HOLE NO: TH04	
	NT: Dillon Consulting L				TYPE: Soil Mec						
	ATION: West End of B							<u>l</u>		ATION: 232,21 m	
		Shelby Tube	No F		SPT (N)	Grab Sampl	e		Split-Pe	n	
BACK	FILL TYPE A UNCONFINED COMPRESSI	Bentonite	· Pea	Gravel	Drill Cuttings	Grout		Ш	Slough	Sand	
Depth (m)	100 200 300 ■ POCKET PENETROMETE 100 200 300	400	MUSCS		SOIL DESCRIPT		SAMPLE TYPE	SAMPLE NO	SPT (N)	COMMENTS	ELEVATION (m)
Đ.			moist	FILL - silty, s crumbly, bla	some to trace sand a	nd gravel, low plastic,		1			232
Ē1			GL I	•	stiff, dark grey belo	w 0.8m		2			231
Ծառաժուսակու 2			ML SILT -	trace clay, ic	ow plastic, moist to v	ery moist, soft, tan		3			231
E 2			CLAY	- silty, high p	plastic, moist, stiff, br	own		4			230
3							-	5			229
E			СН								E 223
4 -4 -5								6			228
5					sulphate inclusions t			7			1
Ē			GROU	IND SURFAC	MINATED AT 5.0m B CE.	ELOW EXISTING					227
6			NOTE No slo	ughing was	observed below ground	and surface. Slight seeps	age				226
7			remair	ed open to 4	w 1.4m from ground 4.9m and water level f drilling. Test hole b	was measured at 4.7m					Ē
			cutting		utiling. restricte o	ackinied with auger					225
E-8											224
9		 									Ē
		 									223
E-10											222
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11 12 13 14 15 16 17 18 19 19 19 19 19 19 19 19 19 19 19 19 19											221
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1 13	~	AME	C Environ	nont 2 Info	'aetriictiira -	LOGGED BY: AL	1			ETION DEPTH: 5 m	
	mec	AWE			ha	REVIEWED BY: TG		C	OMPL	ETION DATE: September 8,	
el 🖳		Nec Winnipeg, Manito				Figure No. 5		- 1		Page	e 1 of 1

PROJ	ECT: New Transit Bus Ga	arage	DRILLED BY: Subter	ranean Ltd.		BORE	HOLE NO: TH05	
	NT: Dillon Consulting Limit		DRILL TYPE: Soil Mo				ECT NO: WX16667	
		ion Avenue, V by Tube	Vinnipeg, MB DRILL METHOD: 50 ✓ No Recovery ✓ SPT (N)	8mm Solid Stem Auger Grab Sample			ATION: 232.75 m	
-	FILL TYPE Bent		Pea Gravel Drill Cuttin			Split-Pe	Core	
DAOIN	▲ UNCONFINED COMPRESSION (kg	(Pa) ▲				Dolough	s o Sanu	Ī
Depth (m)	100 200 300 400 POCKET PENETROMETER (KPI 100 200 300 400 PLASTIC M.C. LIQUID 20 40 60 80	SOIL SYMBC			SAMPLE TYPE	SPT (N)	COMMENTS	ELEVATION (m)
B			CLAY FILL - trace silt, sand and graderumbly, black, trace rootlets	vel, low plastic, moist,	1 2			
8 1 1 		CL	- trace organics below 0.8m					232
-			- gravelly, trace bricks, wet below 1.] 3			231
E-2		ML	1		≓ 4			Ē
3			CLAY - silty, high plastic, moist, stiff	greyish brown	– 5			230
4		СН		:				229
E *					- 6			Ē
5			TEST HOLE TERMINATED AT 5.0n	BELOW EXISTING	7			E-228
Ē.			GROUND SURFACE. NOTES:					227
E-6			Moderate sloughing and seepage was ground surface. Test hole remained	as observed below 1.5m from open to 1.7m and water level				Ē
7 2 2 2 3 4 7 2 2 3 3 4 3 4 3 4 3 4 3 4 4 4 4 4 4 4 4	.		was measured at 1.5m upon comple backfilled with auger cuttings.	tion of drilling. Test hole				226
8								225
Ē								E 004
E-9								E- 224
10								223
, E	l l l l l l l l l l							222
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19				LOCCED BY: AL	Ц,	COLIDI	TION DEPTH #	214
	mec	= AMEC I	Environment & Infrastructure	LOGGED BY: AL REVIEWED BY: TG			ETION DEPTH: 5 m ETION DATE: September 8, 2	011
			Winnipeg, Manitoba	Figure No. 6		3 TH No.		1 of 1



PROJ	ECT: New Transit Bus Gar	age	DRILLED BY: Subteri	ranean Ltd.		BORE	BORE HOLE NO: TH07		
_	NT: Dillon Consulting Limite		DRILL TYPE: Soil Me				ECT NO: WX16667		
			Vinnipeg, MB DRILL METHOD: 508				ATION: 232.7 m		
		/ Tube	No Recovery SPT (N)	Grab Sample		∭Split-Pe			
BACK	FILL TYPE Benton A UNCONFINED COMPRESSION (KP)		Pea Gravel Drill Cutting	gs Grout		∭Slough I	Sand		
Depth (m)	100 200 300 400 POCKET PENETROMETER (kPa) 100 200 300 400 PLASTIC M.C. LIQUID 20 40 60 80	링ㅣ		TION	SAMPLE TYPE	SAMPLE NO SPT (N)	STRIBMMOD STRENATION (m)		
8			CLAY FILL - silty, trace sand, organic moist, crumbly, black	s and rootlets, low plastic,	H	1			
Ю шене 1 шене 1		:i∷∰ cr	- trace gravel, stiff, occasional grey si	It pockets below 0.8m	Ħ	2	232		
Ē		ML ML	SILT - clayey, low to medium plastic,	moist, stiff, grey	Ħ	3	231		
E-2			CLAY - silty, high plastic, damp to mo	pist, stiff, brown		4	= 201		
3						5	230		
E-4 			- moist below 4.6m			6 7	229-		
6						8	E-227		
7							- 226		
8		CH	- occasional sulphate inclusions below	w 7.6m		9 10	225		
Ē			- greyish brown below 8.2m		П		E 004		
9			- firm to stiff below 9.1m			11	E-224 E-223		
10			- trace silt till pockets, firm below 10.7	'm		12	- 222		
11 12							E-221		
13			- trace gravel below 12.2m			13	220		
žĘ.			TEST HOLE TERMINATED AT 13.7n GROUND SURFACE DUE TO EXCE				219		
14 15 15 15			NOTES: No sloughing was observed during dr was observed at 0.9m below ground an abandonded water line. Test hole	surface due to contact with			218		
16			water level at 3.7m upon completion with 19mm down crushed gravel. Tes water line and re-drilled (see TH07-A)	of drilling. Test hole backfilled to the transfer of the trans			E-217		
17 18		 					E-216		
E		[F-215		
F19				LOGGED BY: AL		COMPL	ETION DEPTH: 13.7 m		
2	mec	AWEC	Environment & Infrastructure Winnipeg, Manitoba	REVIEWED BY: TG			ETION DATE: September 8, 2011		
			Transpos, maintona	Figure No. 8			Page 1 of 1		

PROJ	ECT: New Transit Bus G	arage		DRILLED BY: Subter	DRILLED BY: Subterranean Ltd.			BORE HOLE NO: TH07-A	
	NT: Dillon Consulting Limi			DRILL TYPE: Soil Me		**	PROJ	ECT NO: WX16667	
LOCA	TION: West End of Brand	don Avenu	ıe, W	innipeg, MB DRILL METHOD: 508	mm Solid Stem Auger		ELEV	ATION: 232.7 m	
		by Tube		No Recovery SPT (N)	Grab Sample		∏Split-Pe		
BACK		tonite		Pea Gravel Drill Cutting	gs Grout		Slough	Sand	
Depth (m)	■ UNCONFINED COMPRESSION (100 200 300 40 ■ POCKET PENETROMETER (kf. 100 200 300 40 PLASTIC M.C. LIQUI 20 40 60 8	L SYMBOL	MUSCS	SOIL DESCRIP	TION	SAMPLE TYPE	SPT (N)	COMMENTS	ELEVATION (m)
- DILLON NEW TRANSIT BUS GARAGE. GP. 11/09/22 03:30 PM (GEOTECHNICAL REVISED) - THE CONTRACT OF THE CONTRACT			CH	TEST HOLE NOT LOGGED. SEE THOESCRIPTION CLAY - silty, trace silt till inclusions, inclusions, including the silty of the	d gravel, low plastic, moist to		1 2 3 4		□□ 232 231 230 229 228 227 226 225 224 221 221 221 221 218 □□ 218
DI NEW TRANSIT				NOTES: Slight sloughing and seepage was ob- existin ground surface. Test hole rem water level was measured at 15.2m b of drilling. Test hole backfilled with au	served below 15.2m below ained open to 16.2m and selow grade upon completion				215
	0	AMI	EC F	nvironment & Infrastructure	LOGGED BY: AL			ETION DEPTH: 16.3 m	
6667	mec			Winnipeg, Manitoba	REVIEWED BY: TG Figure No. 9		COMPL	ETION DATE: September 9, 2	
9 1	HIIEC Winnipo				LEIGHTE NO 9		I	Page	1 of 1

PROJ	ECT: New Transit Bus Ga	rage		DRILLED BY: Subteri	ranean Ltd.		ВО	RE HOLE NO: TH08	
	NT: Dillon Consulting Limite			DRILL TYPE: Soil Me				OJECT NO: WX16667	
				innipeg, MB DRILL METHOD: 508	<u></u>			EVATION: 232.23 m	
		y Tube		No Recovery SPT (N)	Grab Sample		∭Spli		
BACK	FILL TYPE Bento			Pea Gravel Drill Cutting	gs Grout	- 1 1	∭Slou I	igh Sand	T
Depth (m)	■ UNCONFINED COMPRESSION (kF 100 200 300 400 100 200 300 400 100 200 300 400 100 200 300 400 100 200 300 400 100 200 300 400 100 200 300 400 100 100 100 100 100 100 100 100 1	L SYMBOL	MUSCS	SOIL DESCRIP		SAMPLE TYPE	SAMPLE NO	COMMENTS	ELEVATION (m)
E0		1 💥	CI	CLAY FILL - some sand, trace gravel	l, medium plastic, moist,	Ħ	1		E-232
9 1 2 2			SM ML	black, trace wood pieces SAND (FILL) - trace silt and gravel, p loose to compact (inferred), moist, da SILT - trace clay, low plastic, moist to CLAY - silty, high plastic, moist, stiff,	ork brown o very moist, soft, tan		3 4		231
3 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1			СН	- occasional sulphate inclusions below	w 3.1m		5		229
15 10 10 10 10 10 10 10 10 10 10 10 10 10				TEST HOLE TERMINATED AT 5.0m	BELOW EXISTING		7		227
6				GROUND SURFACE. NOTES: No sloughing or seepage was observ Test hole remained open to 5.0m and	red below ground surface. d was dry upon completion o	of			226
7				drilling. Test hole backfilled with aug	er cuttings.				225
8 1 1 9									224
E-9									223
10									- 222
11									- 221
12									220
13 13									219
11 12 13 14 15 16 17 17 18 19 19 19 19 19 19 19 19 19 19 19 19 19				=					218
15 25 25 25 25 25 25 25 25 25 25 25 25 25				=					217
16									216
									215
10									214
3		AME	CE	nvironment & Infrastructure	LOGGED BY: AL			APLETION DEPTH: 5 m	
8	amec			Winnipeg, Manitoba	REVIEWED BY: TG		COV	MPLETION DATE: September 8, 2	2011 1 of 1

PROJ	JECT: New Transit Bus Ga	arage	DRILLED BY: Subterranea	n Ltd.	BORE	HOLE NO: TH09
	NT: Dillon Consulting Limite		DRILL TYPE: Soil Mec SR-		PROJ	ECT NO: WX16667
			B DRILL METHOD: 508mm S			ATION: 232.34 m
		by Tube No Reco			∭Split-Pe	
BACK	(FILL TYPE Bento		vel Drill Cuttings	Grout	∭Slough I	Sand
Depth (m)	■ UNCONFINED COMPRESSION (M 100 200 300 400 ■ POCKET PENETROMETER (kPa 100 200 300 400 PLASTIC M.C. LIQUID 20 40 60 80	L SYMB(SOIL DESCRIPTIO	SAMPLE TYPE	SAMPLE NO SPT (N)	STRAMMOD (m)
P		CLAY FIL	L - some sand, trace gravel, low p	plastic, moist, black	1	- 232
80 1 1 1		∴t ∴∴ SM loose to c	LL) - silty, poorly graded, medium ompact (inferred), moist, tan to br	own	2	E E E- 231
2		grey	ty, trace sand, medium to high pla	astic, moist, stiff, dark	3 4	
		- high pla	stic, very stiff, brown below 2.3m			E 230
-3 ₹		СН			5	- 229
4					6	E- 228
5 E		∷fi∷i GROUND	LE TERMINATED AT 5.0m BELC SURFACE.	W EXISTING	7	227
E-6		Test hole	ning or seepage was observed be remained open to 5.0m and was	dry upon completion of		226
<u>-</u> 7		drilling. To	est hole backfilled with auger cutt	ings.		225
8						E-224
9						E 223
10						
11						F-222
12						F-221
13						220
2E 2E 14						E-219
14						218
15 15 15 15 15 15						217
16		::(:::1 ::} ::(:::1				216
17						E-215
11 12 13 14 15 16 17 18 19 19 19 19 19 19 19 19 19 19 19 19 19						214
19			lio.	GGED BY: AL	COMP	ETION DEDTH: 5 m
	mec®	AMEC Environmen	nt & Intrastructure	/IEWED BY: TG		ETION DEPTH: 5 m ETION DATE: September 8, 2011
		Winnipeg,	Manifola —	re No. 11		Page 1 of 1

PRO	JECT: New Transi	it Bus Garage		DRILLED BY: Subt	erranean Ltd.		BORE	HOLE NO: TH10
	NT: Dillon Consult	_ 		DRILL TYPE: Soil I			PROJ	ECT NO: WX16667
_					08mm Solid Stem Aug			ATION: 232.11 m
	PLE TYPE	Shelby Tube	☑No Rec			nple	Split-Pe	
BAC	(FILL TYPE	Bentonite	Pea Gra	avel Drill Cu	tings Grout	1 1	Slough	Sand
Depth (m)	POCKET PENETRO	300 400 DMETER (kPa) 300 400	MUSCS	SC DESCR	PTION	SAMPLE TYPE	SAMPLE NO SPT (N)	COMMENTS STREAMMOD STREAMM
Burnelland 1 2 3 4 5 6 6 7 8 9 10 11 12 13 14 15 16 17 18 19 10 11 12 13 14 15 16 17 18 19 10 10 11 12 13 14 15 16 17 18 19 10 10 10 10 10 10 10 10 10 10 10 10 10			CLAY - s TEST HO GROUNI NOTES: No sloug Test hole	ark brown to black, trace villy, trace sand, medium platity, trace sand, high plastic, trace clay, low plastic, very litty, high plastic, moist, stop SURFACE. Thing or seepage was obs	plastic, moist, stiff, dark greatic, moist, stiff, brown moist to wet, soft, light brown mom BELOW EXISTING erved below ground surface	own , ee.	1 2 3 4 5 6	231 230 229 228 227 228 227 226 226 225 224 224 224 224 224 224 224
14 15 16 16								218
17 17 18 18 19 19								215 E 215 E 214
		AMI	EC Environme	ent & Infrastructure	LOGGED BY: AL			ETION DEPTH: 3 m
	AMEC Environme Winnipeg		, Manitoba	REVIEWED BY: TG Figure No. 12		COMPL	ETION DATE: September 8, 2011 Page 1 of 1	

PROJ	ECT: New Transit Bus Ga	arage	DRILLED BY: Subter	ranean Ltd.		BORE	HOLE NO: TH11	
	NT: Dillon Consulting Limit		DRILL TYPE: Soil Me	c SR-30			ECT NO: WX16667	
LOCA	TION: West End of Brand	don Avenue, Winn	nipeg, MB DRILL METHOD: 508	Imm Solid Stem Auger		ELEV	ATION: 232.43 m	
		by Tube	No Recovery SPT (N)	Grab Sample]Split-Pe		
BACK		onite	Pea Gravel Drill Cuttin	gs Grout		Slough	Sand	
Depth (m)	UNCONFINED COMPRESSION (k 100 200 300 400 POCKET PENETROMETER (kP 100 200 300 400 PLASTIC M.C. LIQUIE 20 40 60 80	L SYMBOL MUSCS	SOIL DESCRIP		SAMPLE TYPE	SPT (N)	COMMENTS	ELEVATION (m)
8667 - DILLON NEW TRANSIT BUS GARAGE GPJ 11/08/23 03:30 PM (GEOTECHNICAL REVISED) Burning and a second state of the second st		GP (GRANULAR FILL - sandy, gravelly, to medium to coarse grained, damp to a (inferrred), light brown CLAY - silty, trace, sand, high plastic SILT - trace sand and clay, low plastic CLAY - silty, high plastic, moist, very TEST HOLE TERMINATED AT 3.0m GROUND SURFACE. NOTES: No sloughing or seepage was obsent Test hole remained open to 3.0m and drilling. Test hole backfilled with aug	noist, loose to compact moist, stiff, greyish brown c, moist, soft, light brown stiff, brown BELOW EXISTING red below ground surface.	34 5 6			- 232 - 231 - 230 - 229 - 228 - 227 - 226 - 225 - 224 - 223 - 222 - 221 - 220 - 219 - 218 - 217 - 216
18 8 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1							<u> </u>	-215 -214
DI	mec	AMEC Env	vironment & Infrastructure	LOGGED BY: AL			ETION DEPTH: 3 m	
2999	mec		innipeg, Manitoba	REVIEWED BY: TG Figure No. 13		COMPL	ETION DATE: September 9, 20 Page 1	
ωլ 🝆		1		i Figure No. 13	- 1		Pane 1	nt 1

