DYREGROV ROBINSON INC.
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June 14, 2013

File No. 133583

Accutech Engineering Inc.
605 – 287 Broadway Street
Winnipeg, Manitoba
R3C 0R9

Attn: Mr. Ken Drysdale, P. Eng.

Dear Sir:

RE: Sir John Franklin Community Club
Geotechnical Investigation

As requested, Dyregrov Robinson Inc. have undertaken a geotechnical investigation to determine limit states design criteria for cast-in-place concrete friction piles to be used for the support of a new structural basement floor slab at the Sir John Franklin Community Club located at 1 Sir John Franklin Road in Winnipeg, MB.

The proposed foundation system, which consists of 16-inch diameter friction piles ranging in length from 15 to 20 feet, has been designed on the basis of the working stress design method using an allowable adhesion value of 300 psf. We understand the piles are to be designed in accordance with the current National Building Code which requires limit states design of the foundations.

Field Investigation

A single test hole was drilled in the parking lot area adjacent to the Community Club at the location shown on Figure 1. On June 4th, 2013, the upper 10 feet of the test hole was soft dug by Aquajet Canada Inc. of Winnipeg, Manitoba using a hydrovac machine. The soft digging was performed to confirm that there were no buried utilities at the test hole locations (i.e. electrical and natural gas). On June 6th, 2013, the test hole was drilled into the glacial till by Subterranean Ltd. of Winnipeg, Manitoba using a truck-mounted CME 550 drill rig equipped with 125 mm solid stem augers. The subsurface conditions were visually logged during drilling by Dyregrov Robinson Inc. Disturbed (auger cuttings) and undisturbed (Shelby tube) samples were recovered at regular depth intervals. The test hole was backfilled to grade with auger cuttings.

All samples were taken to our Soils Laboratory for additional visual classification and testing. The testing consisted of the determination of moisture contents on all samples, measurement of bulk unit weights and undrained shear strengths on the Shelby tube samples. The test hole log is attached in Appendix A and illustrates the subsurface conditions encountered, results of the laboratory testing and notes of the observations made during drilling.

Subsurface Conditions

A 4 inch layer of black, moist clay topsoil covers a 4 inch thick layer of crushed limestone fill. Below the crushed limestone the soil was excavated to a depth of 10 feet using a hydro-excavator. Based on the operation of the hydro-excavator the soil was most likely clay. At a depth of 10 feet, Lake Agassiz lacustrine clay was encountered which extends to the underlying glacial silt till at a depth of 24 feet.

Lake Agassiz lacustrine silty clay is mottled brown and grey in color, stiff, moist and highly plastic. The moisture content of the clay decreases from about 55 percent to about 25 percent at a depth of 23 feet. Undrained shear strengths measured using Torvane, Pocket Penetrometer and Unconfined Compressive Strength methods ranged from about 540 to 1970 psf with an average around 1270 psf. The average bulk unit weight of the clay is 110.2 pcf.

Glacial silt till was encountered at a depth of 24 feet. The glacial till is grey in color and contains traces of sand, gravel and cobbles. The upper 4 feet of the till is loose to compact and moist with moisture contents ranging from 11 to 13 percent. Below 28 feet, it becomes dense to very dense and dry with moisture contents in the range of 7 to 8 percent.

Auger refusal was not encountered in the glacial till and no groundwater seepage or sloughing was observed in the test hole during drilling.

Recommendations For Cast-In-Place Concrete Friction Piles

Cast-in-place concrete friction piles may be designed in accordance to the current National Building Code (NBC 2010) using a service limit state (SLS) shaft adhesion value of 395 psf and for the ultimate limit state (ULS) case a factored adhesion value of 500 psf along with a factored end bearing pressure of 3000 psf can be used. A resistance factor of 0.4 was used to calculate the factored ULS shaft adhesion.

When determining effective pile lengths, the upper 5 feet of the pile shaft below the bottom of the basement floor excavation should be ignored to account for potential soil shrinkage away from the pile. The pile length should be limited to 22 feet below the current site grade to avoid penetrating into the glacial till. Piles should have a minimum spacing of 3 pile diameters on centre. Concrete should be placed as soon as possible after the pile hole is completed. Measures should be taken to protect against sloughing/caving of the pile borings and/or groundwater seepage if encountered. The piles should be inspected at the on-set of construction to confirm that the subsurface conditions encountered in the test hole are consistent with the subsurface conditions below the basement area.

Any piles that might be subjected to freezing conditions, although not expected for this project, must be protected from frost heave effects by using flat lying rigid insulation, such as Styrofoam HI, to protect against or minimize frost penetration into the soil around the piles.

Other

It is recommended that all concrete in contact with clay soil should be of high quality and manufactured with sulphate-resistant cement.

Closure

This report was prepared based on the subsurface conditions encountered in the test hole during the geotechnical investigation. Subsurface conditions are inherently variable and should be expected to vary across the site.

This report was prepared for the exclusive use of Accutech Engineering Inc. and their agents for the foundation design for the structural floor to be constructed in the basement of the Sir John Franklin Community Club located in Winnipeg, MB. The information and recommendations contained in this report shall not be used by any third parties for other projects. The findings and recommendations in this report have been prepared in accordance with generally accepted geotechnical engineering principles and practises. No other warranty, expressed or implied, is provided.

Please contact us if we can be of further assistance.

Sincerely,

DYREGROV ROBINSON INC.

Reviewed by:

for Gil Robinson

Ryan Belbas, P.Eng.
Geotechnical Engineer
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Gil Robinson

Gil Robinson, M.Sc., P.Eng.
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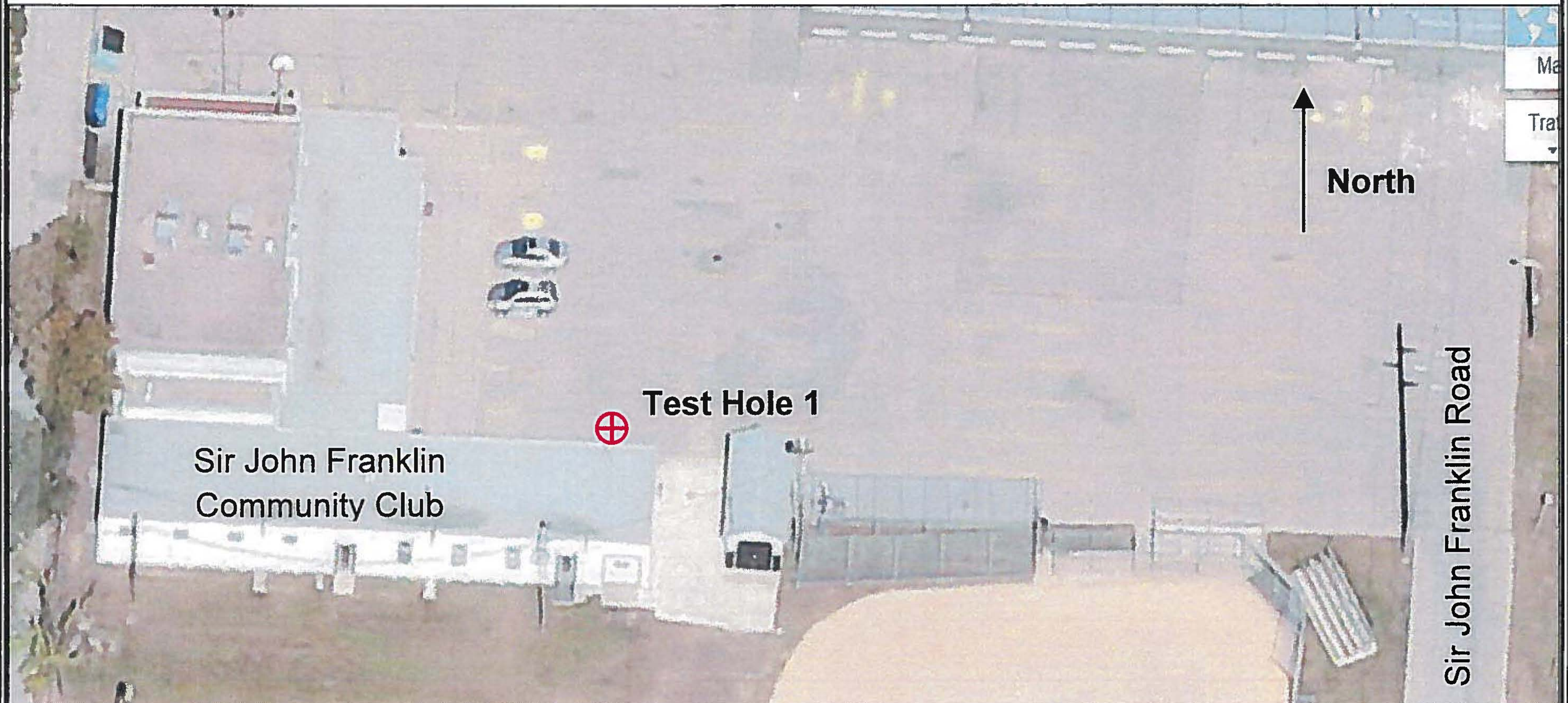
APEGM
Certificate of Authorization
Dyregrov Robinson Inc.
No. 86 **Date:** 14 June 2013

PROVINCE OF MANITOBA
GR
G.G.B.
ROBINSON
14 June 2013
REGISTERED PROFESSIONAL ENGINEER



DYREGROV ROBINSON INC. CONSULTING GEOTECHNICAL ENGINEERS			SIR JOHN FRANKLIN COMMUNITY CLUB TEST HOLE LOCATION		
SCALE: NTS	MADE BY: RB	CHKD BY: AOD	PROJECT NO. 133583	DATE: JUNE 2013	**FIGURE 1**

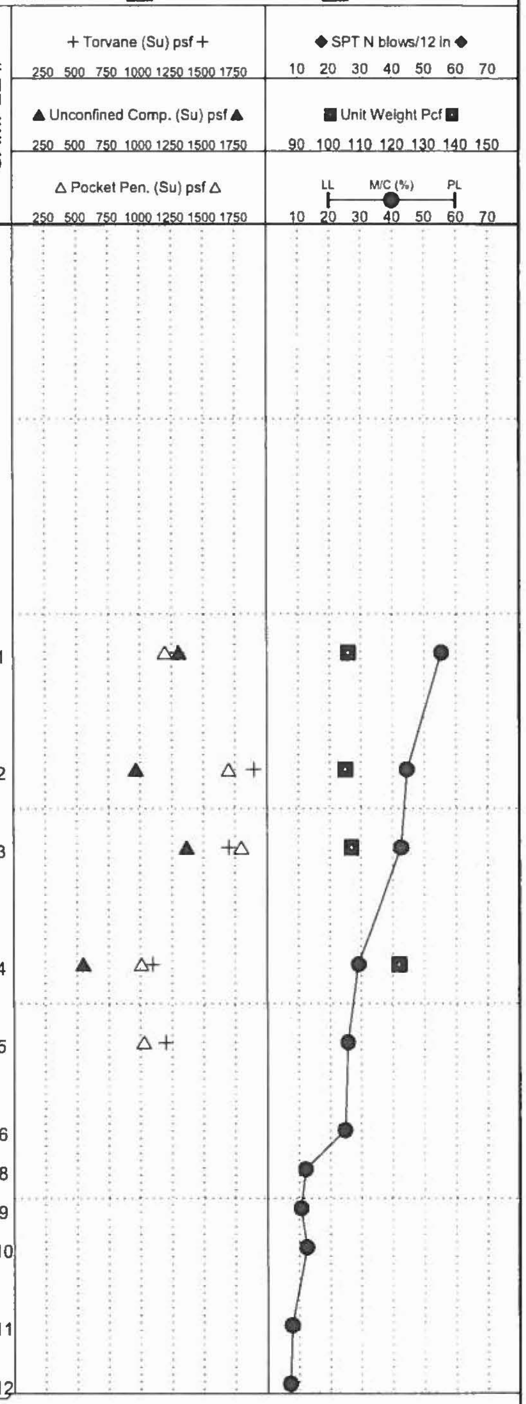
APPENDIX A

Test Hole Log

PROJECT: Sir John Franklin Community Club	CLIENT: Accutech Engineering Inc.	TESTHOLE NO: 1
LOCATION: 9 ft north and 13 ft west from northeast corner building		PROJECT NO.: 133583
CONTRACTOR: Subterranean Ltd.	METHOD: Hydrovac & CME Truck Mounted Drill Rig - 125 mm SSA	ELEVATION (ft):

SAMPLE TYPE	GRAB	SHELBY TUBE	SPLIT SPOON	BULK	NO RECOVERY	CORE
BACKFILL TYPE	BENTONITE	GRAVEL	SLOUGH	GROUT	CUTTINGS	SAND

ELEVATION (ft)	DEPTH (ft)	SOIL SYMBOL	SOIL DESCRIPTION	SAMPLE TYPE	SAMPLE #
	0		CLAY (Topsoil) - 4 inches thick, black, stiff, moist		
			CRUSHED LIMESTONE (Fill) - 4 inches thick		
			CLAY - no soil recovery during hydro-excavation to 10 ft		
	10		CLAY - silty - mottled brown and grey - stiff, moist, high plasticity - trace silt inclusions		T1
					T2
	15				T3
			- till inclusions below 18 ft		T4
	20				T5
					G6
			SILT (Till) - trace sand, trace gravel, trace cobbles - grey - loose to compact, moist		G8
	25				G9
					G10
			- dense to very dense, dry below 28 ft		G11
	30				G12



END OF TEST HOLE AT 30 ft IN SILT TILL

Notes:
1. No seepage or sloughing observed.
2. Test hole backfilled with auger cuttings and bentonite chips.

DYREGROV ROBINSON INC. Consulting Geotechnical Engineers	LOGGED BY: WG	COMPLETION DEPTH: 30.0 ft
	REVIEWED BY: GR	COMPLETION DATE: 06/06/13
	PROJECT ENGINEER: Ryan Belbas	Page 1 of 1

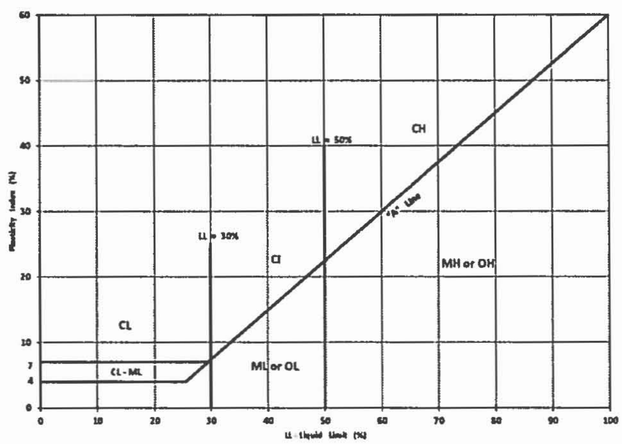
BH GEOTECH PLOTS -NEW ALT1 SIR JOHN FRANKLIN.GPJ DRI.GDT 14/06/13

EXPLANATION OF TERMS & SYMBOLS

Description				TH Log Symbols	USCS Classification	Laboratory Classification Criteria			
						Fines (%)	Grading	Plasticity	Notes
COARSE GRAINED SOILS	GRAVELS (More than 50% of coarse fraction of gravel size)	CLEAN GRAVELS (Little or no fines)	Well graded gravels, sandy gravels, with little or no fines		GW	0-5	$C_U > 4$ $1 < C_C < 3$		Dual symbols if 5-12% fines. Dual symbols if above "A" line and $4<W_P<7$ $C_U = \frac{D_{60}}{D_{10}}$ $C_C = \frac{(D_{30})^2}{D_{10} x D_{60}}$
			Poorly graded gravels, sandy gravels, with little or no fines		GP	0-5	Not satisfying GW requirements		
		DIRTY GRAVELS (With some fines)	Silty gravels, silty sandy gravels		GM	> 12		Atterberg limits below "A" line or $W_P<4$	
			Clayey gravels, clayey sandy gravels		GC	> 12		Atterberg limits above "A" line or $W_P<7$	
	SANDS (More than 50% of coarse fraction of sand size)	CLEAN SANDS (Little or no fines)	Well graded sands, gravelly sands, with little or no fines		SW	0-5	$C_U > 6$ $1 < C_C < 3$		
			Poorly graded sands, gravelly sands, with little or no fines		SP	0-5	Not satisfying SW requirements		
		DIRTY SANDS (With some fines)	Silty sands, sand-silt mixtures		SM	> 12		Atterberg limits below "A" line or $W_P<4$	
			Clayey sands, sand-clay mixtures		SC	> 12		Atterberg limits above "A" line or $W_P<7$	
FINE GRAINED SOILS	SILTS (Below 'A' line negligible organic content)	$W_L<50$	Inorganic silts, silty or clayey fine sands, with slight plasticity		ML			Classification is Based upon Plasticity Chart	
		$W_L>50$	Inorganic silts of high plasticity		MH				
	CLAYS (Above 'A' line negligible organic content)	$W_L<30$	Inorganic clays, silty clays, sandy clays of low plasticity, lean clays		CL				
		$30<W_L<50$	Inorganic clays and silty clays of medium plasticity		CI				
		$W_L>50$	Inorganic clays of high plasticity, fat clays		CH				
	ORGANIC SILTS & CLAYS (Below 'A' line)	$W_L<50$	Organic silts and organic silty clays of low plasticity		OL				
		$W_L>50$	Organic clays of high plasticity		OH				
HIGHLY ORGANIC SOILS			Peat and other highly organic soils		Pt	Von Post Classification Limit		Strong colour or odour, and often fibrous texture	

	Asphalt		Glacial Till		Bedrock (Igneous)	
	Concrete		Clay Shale		Bedrock (Limestone)	**DYREGROV ROBINSON INC.** CONSULTING GEOTECHNICAL ENGINEERS
	Fill				Bedrock (Undifferentiated)	

Plasticity Chart For Soils Passing 425 μm Sieve



FRACTION		PARTICLE SIZE (mm) Min.	Max.
Boulders		>300	
Cobbles		75	300
Gravel	Coarse	19	75
	Fine	4.75	19
Sand	Coarse	2.0	4.75
	Medium	0.425	2.0
	Fine	0.075	0.425
Silt (non-plastic) or Clay (plastic)		< 0.075 mm	

RELATIVE PROPORTIONS (by weight) Percent	Descriptor
>35%	main fraction
35 - 50	"and"
20 – 35	Adjective e.g. silty, clayey
10 – 20	"some"
1 - 10	"trace"

Soil Classification Example

Clay 50% (main fraction), Silt 25%, Sand 17%, Gravel 8%

Clay – silty, some sand, trace gravel

TERMS and SYMBOLS

Laboratory and field tests are identified as follows:

Unconfined Comp.: undrained shear strength (kPa or psf) derived from unconfined compression testing.

Torvane: undrained shear strength (kPa or psf) measured using a Torvane

Pocket Pen.: undrained shear strength (kPa or psf) measured using a pocket penetrometer.

Unit Weight bulk unit weight of soil or rock (kN/m^3 or pcf).

SPT – N Standard Penetration Test: The number of blows (N) required to drive a 51 mm O.D. split barrel sampler 300 mm into the soil using a 63.5 kg hammer with a free fall drop height of 760 mm.

DCPT Dynamic Cone Penetration Test. The number of blows (N) required to drive a 50 mm diameter cone 300 mm into the soil using a 63.5 kg hammer with a free fall drop height of 760 mm.

M/C insitu soil moisture content in percent

PL Plastic limit, moisture content in percent

LL Liquid limit, moisture content in percent

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

Su (kPa)	Su (psf)	CONSISTENCY
<12	250	very soft
12 – 25	250 – 525	soft
25 – 50	525 – 1050	firm
50 – 100	1050 – 2100	stiff
100 – 200	2100 – 4200	very stiff
200	4200	hard

The SPT - N of non-cohesive soil is related to compactness condition as follows:

N – Blows / 300 mm	COMPACTNESS
0 - 4	very loose
4 - 10	loose
10 - 30	compact
30 - 50	dense
50 +	very dense

References:

ASTM D2487 – Classification of Soils For Engineering Purposes (Unified Soil Classification System)

Canadian Foundation Engineering Manual, 4th Edition, Canadian Geotechnical Society, 2006