

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.

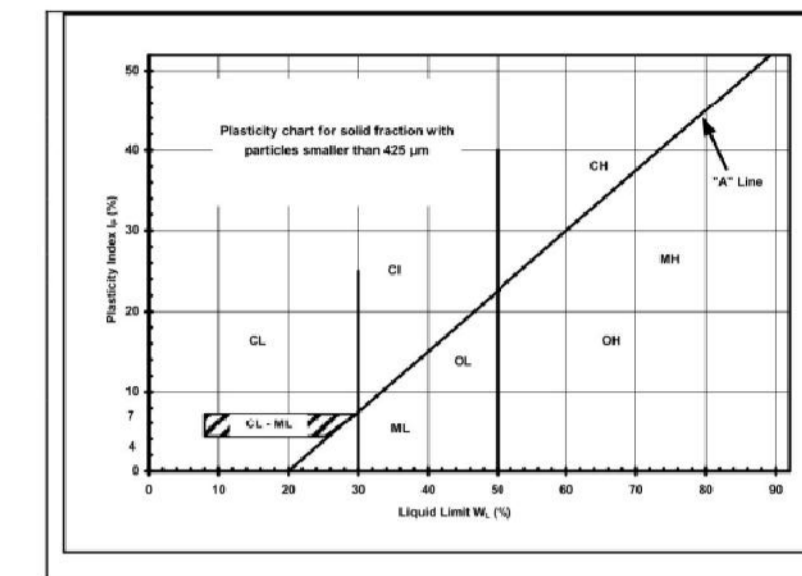
Since it is possible for conditions to vary from those assumed in the analysis and upon which our conclusions and recommendations are based, a contingency fund should be included in the construction budget to allow for the possibility of variations which may result in modification of the design and construction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

Description	UMA Log Symbols	USCS Classification	Laboratory Classification Criteria			Notes
			Fines (%)	Grading	Plasticity	
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 $4 < W_p < 7$
	DIRTY GRAVELS (With some fines)	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 $W_p < 4$	
SANDS (More than 50% of coarse fraction of sand size)	CLEAN SANDS (Little or no fines)	Well graded sands, gravely sands, with little or no fines	SW	0-5	$C_u > 6$ $1 < C_c < 3$	$C_u = \frac{D_{60}}{D_{10}}$ $C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
	DIRTY SANDS (With some fines)	Poorly graded sands, gravely 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 $W_p < 4$	
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	Till					
Concrete	Bedrock (Undifferentiated)					
Fill	Bedrock (Limestone)					

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



FRACTION	SEIVE SIZE (mm)		DEFINING RANGES OF PERCENTAGE BY WEIGHT OF MINOR COMPONENTS		
	Passing	Retained	Percent	Identifier	
Gravel	Coarse	76	1g	35-50	and
	Fine	19	4.75		
Sand	Coarse	4.75	2.00	20-35	'y' or 'ey'
	Medium	2.00	0.425		
	Fine	0.425	0.075	10-20	some
Silt (non-plastic) or Clay (plastic)		< 0.075 mm		1-10	trace

* for example: gravelly, sandy 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:

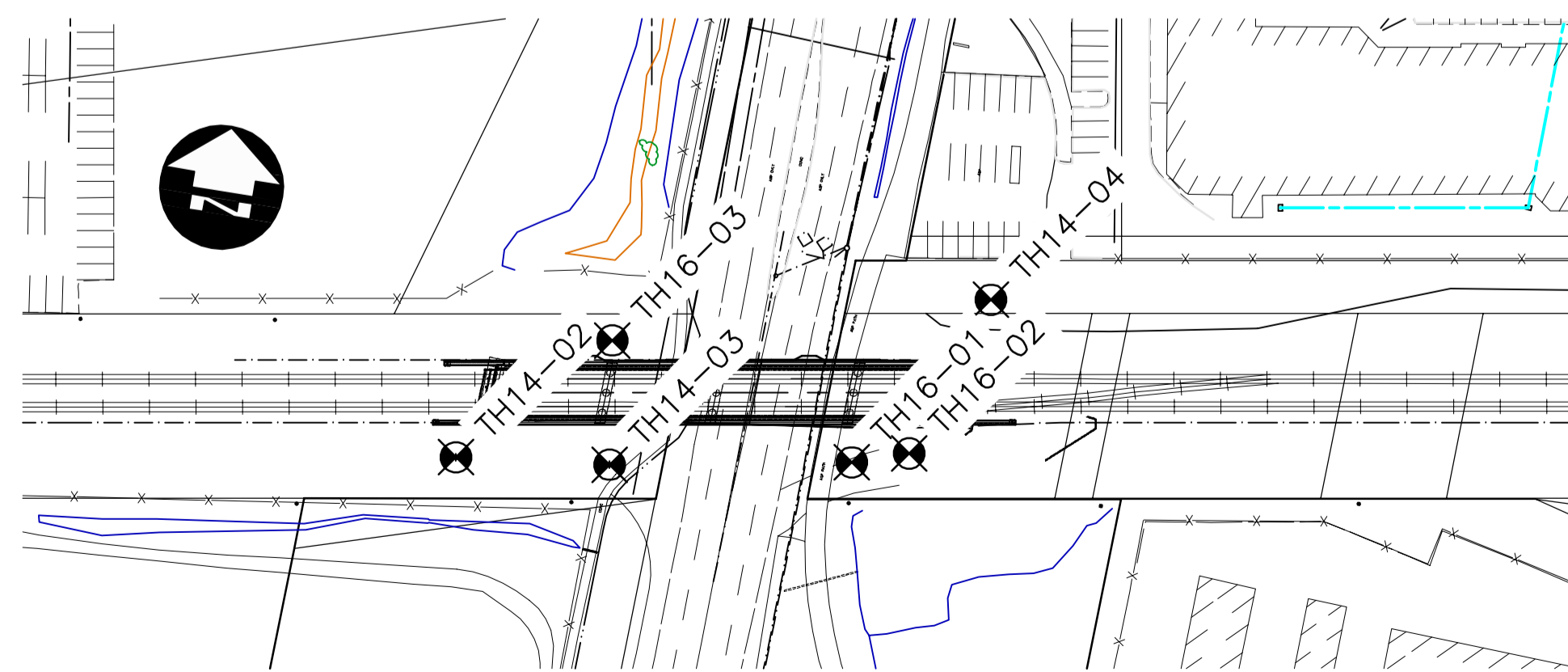
- q_u - undrained shear strength (kPa) derived from unconfined compression testing.
- T_v - undrained shear strength (kPa) measured using a torvane
- pp - undrained shear strength (kPa) measured using a pocket penetrometer.
- L_v - undrained shear strength (kPa) measured using a lab vane.
- F_v - undrained shear strength (kPa) measured using a field vane.
- γ - bulk unit weight (kN/m^3).
- 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 Penetrometer 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 (S_u) of a cohesive soil can be related to its consistency as follows:

S_u (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



KEY PLAN
SCALE 1:1000



NO.	REVISIONS	DATE	BY	DATE
0	ISSUED FOR TENDER	17/01/09	RE	

DESIGNED BY	RE	CHECKED BY	SSR
DRAWN BY	CGC	APPROVED BY	DBW
HOR. SCALE	AS SHOWN	RELEASED FOR CONSTRUCTION	
VERTICAL	AS SHOWN		

ENGINEER'S SEAL
PROVINCE OF MANITOBA
R.B. ERIC
Member 22665
REGISTERED PROFESSIONAL ENGINEER
CONSULTANT PROJECT NUMBER
16-3353

THE CITY OF WINNIPEG
PUBLIC WORKS DEPARTMENT
Waverley Street Underpass at CN Mile 3.89 Rivers Sub
CONTRACT 2: UNDERPASS STRUCTURE, RAILWORKS,
ROADWORKS, LAND DRAINAGE SEWER, PUMPING STATION
AND LANDSCAPING WORKS
CITY DRAWING NUMBER
U-239-2016-C2-CS-007
SHEET 007 OF 085
CONSULTANT DRAWING NUMBER
C2-CS-007
BORING LOGS - SHEET 1

NOTE:
THE INFORMATION ON THIS DRAWING HAS BEEN EXTRACTED FROM THE PRELIMINARY DESIGN GEOTECHNICAL REPORT PREPARED BY AECOM CANADA LTD. DATED JANUARY 2015 AND THE MEMORANDUM TITLED SUMMARY OF BEDROCK INVESTIGATION IN THE VICINITY OF THE PROPOSED CN BRIDGE-WAVERLEY STREET UNDERPASS PROJECT, PREPARED BY AECOM CANADA LTD. DATED NOVEMBER 23, 2016. IN THE EVENT OF A DISCREPANCY BETWEEN THESE GEOTECHNICAL REPORTS AND THE INFORMATION PROVIDED ON THIS DRAWING, THE ORIGINAL GEOTECHNICAL REPORTS SHALL GOVERN. THE CONTRACTOR IS STRONGLY URGED TO REVIEW ALL AVAILABLE GEOTECHNICAL DATA.