July 29, 2004

EBA File No: 1200108

Yukon Energy Corporation
PO Box 5920
Whitehorse, Yukon
Y1A 5L6

Attention: Mr. Albert Schwarz

Subject: **Geotechnical Evaluation for the Proposed Substation**
Concrete Pad Foundation - Near Stewart Crossing, YT.

1.0 INTRODUCTION

EBA Engineering Consultants Ltd (EBA) was retained by Mr. Albert Schwarz of Yukon Energy Corporation (YEC) to complete a Geotechnical Evaluation of the site proposed for construction of a concrete foundation pad for a new Three Phase Substation near Stewart Crossing, Yukon.

It is understood that the site development consists of the construction a 2.4 m x 2.4 m concrete pad to support a 5500 kg transformer. A containment tank will also be constructed as part of the pad to ensure and any leaks or spills from the transformer are contained. The pad will be fenced and a grounding grid buried approximately 0.65 m from final grade.

The conditions noted during the site visit and recommendations for the design and construction of the concrete pad foundation are contained in the following sections of this letter report. Mr. Niels Jacobsen, P. Eng., will provide the design specifics of the concrete pad under separate cover. This report has been prepared in accordance with generally accepted Geotechnical Evaluation practices. For additional information regarding the use of this report, please refer to the attached EBA Geotechnical Report – General Conditions.

Mr. Albert Schwarz of YEC authorized this work on July 9, 2004.

2.0 SITE INVESTIGATION

On July 21, 2004, a testpitting program was completed by Mr. James Buyck of EBA's Whitehorse office. The testpitting program included the excavation of two testpits to a depth of 4.0 m, preparing detailed testpit logs and collecting representative soil samples for natural moisture content determination and basic classification testing.

A tracked excavator, owned and operated by Ewing Transport of Mayo, Yukon, was contracted to excavate the two testpits.

Mr. Craig Ovens of the Yukon Energy Corporation from Mayo, was present during the site investigation program, and ensured that all activities on site was conducted in a safe manner and that clearances from the active transmission line set forth by YEC were adhered to.

3.0 GEOTECHNICAL EVALUATION

The description of site conditions, and corresponding geotechnical recommendations for site development are based on the information collected from the two testpits excavated during the site investigation. The subsurface conditions are presented on the detailed borehole log, along with the laboratory test results and associated test result report forms, attached. The following sections present a summary of conditions noted at the site, as well as recommendations for foundation design and construction.

3.1 Site Conditions

The subject site is located near the base of a steep mountainside (Ferry Hill) within the Right Of Way (ROW) of the recently constructed Mayo-Dawson Transmission Line. The site is accessed by a single lane dirt road located along the Klondike Highway approximately 1.2 km from the Stewart River Bridge. With the exception of the presence of the existing access road, power poles and transmission lines there are no other developments on this site.

The topography was very uneven and clear of trees and other significant vegetation. Two testpits were excavated and found to be consistent in soil stratigraphy. Testpit 1200108-TP01 was excavated approximately 50 m east of the access road passing through the site, and 13.0 m south of the transmission line centreline. Testpit 1200108-TP02 was excavated

approximately 50 m to the west of the access road and 13.0 m south of the transmission line centreline.

Testpit 1200108-TP01, excavated within the area of the primary site of the proposed concrete pad location, was found to consist of colluvial soils, originating from further up the nearby Ferry Hill mountainside. A root bearing surficial SILT with some sand to an approximate depth of 0.8 m was encountered with underlying decomposed SCHIST colluvium or talus. The SCHIST consisted mainly of small to medium sized elongated and poor quality rock fragments with sand and silt sized particles throughout. Angular cobbles and some boulders below a depth of 1.2 m was present within the schist stratum. Underlying the schist, fine-grained SILT trace of sand was found below 1.4 m to an undetermined depth below the 4.0 m deep testpit.

Testpit 1200108-TP02, excavated at the secondary site proposed for development, was found to be similar to testpit 1200108 TP-01. Root bearing surficial SILT colluvium to a depth of 0.5 m was found overlying decomposed SCHIST colluvium. The SCHIST found within this testpit contained medium to coarse rock fragments throughout. Fine grained soft SILT some sand from a depth of 1.8 m to termination depth underlies the schist stratum.

Detailed borehole logs, along with applicable laboratory and testing results, are attached to this report.

Neither groundwater nor permafrost was encountered within the testpits excavated.

3.2 Recommendations

Based on the site conditions described above, it is recommended that the proposed concrete pad be founded on an engineered gravel pad, the base of which must be below the unstable colluvium materials. The following sections present recommendations for site preparation, foundation design & construction, and inspection & testing requirements.

3.2.1 Site Preparation

All organics and near surface frost susceptible soil and colluvium must be removed from the concrete pad footprint down to the native SILT stratum. For all unheated structures, a minimum subcut thickness of 2.4 m is required, and replaced with non-frost susceptible imported pit run material.

Approximately 2.4 m of material will require removal and replacement. The subcut should also extend an additional 1.0 m out from the sides of the pad in order to properly transfer loads down through the engineered fill. The engineered fill is to be constructed of non-frost susceptible pit run gravel placed in lifts no thicker than 200 mm, moisture conditioned to assist in the compaction process, and compacted to no less than 98% of Standard Proctor maximum dry density (SPMDD) (as per ASTM D698). The imported pit run gravel should meet the 80 mm Pit Run Gravel gradation specification presented in Table 1, below. The final 100 mm below the slab should be constructed with 20 mm crushed basecourse gravel meeting the gradation specifications presented in Table 1, below.

Table No. 1
RECOMMENDED GRANULAR MATERIALS SPECIFICATIONS

80 mm PIT RUN GRAVEL		20 mm BASECOURSE GRAVEL	
SIEVE SIZE (mm)	**% PASSING BY MASS**	**SIEVE SIZE (mm)**	**% PASSING BY MASS**
80.000	100		
25.000	60 - 100	20.000	100
12.500	40 - 90	12.500	64 - 100
5.000	20 - 65	5.000	36 - 72
1.250	9 - 35	1.250	12 - 42
0.315	5 - 23	0.315	4 - 22
0.080	2 - 10	0.080	3 - 6

For stripping or general excavations that are deeper than 1.2 m the perimeter should be sloped back at an angle no steeper than 1.5:1 (horizontal:vertical). Excavations less than 1.2 m in depth can be excavated at 0.75:1 (horizontal:vertical); however, some sloughing should be anticipated. Spoil piles from excavations must be maintained at least 2.0 m from the crest of any excavation.

3.2.2 Concrete Pad Foundation Design and Construction Recommendations

Once the engineered fill has been constructed, the concrete pad foundation can be constructed according to the recommendations provided below.

- The concrete pad must be cast onto a clean, compacted gravel surface. No loose or disturbed material should be allowed to remain on the bearing surface of the pad excavation portion of the concrete slab. If an acceptable surface cannot be prepared using mechanical equipment (plate tamper, jumping jack, or walk-behind double drum roller), hand cleaning will be required. As well, care must be taken to ensure that no cobbles greater than 75 mm in size exist on the bearing surface.

- The concrete pad foundation must be protected from the inflow of surface water at all times. The pad should neither be cast directly onto or over frozen soil, nor should the soil beneath the footings be allowed to freeze subsequent to footing construction.

- A moisture barrier, such as polyethylene sheeting, should be placed immediately beneath the concrete pad to enhance curing.

- Negligible concentrations of water soluble sulphates are anticipated in the soils in the proposed area of development, therefore, Type 10 Normal Portland cement will be acceptable for use on this project. All concrete must be designed, mixed, placed and cured in accordance with the Canadian Standards Association standard CAN/CSA-A23.1-00.

- Final site grading must direct all water away from the foundation elements of the structure. Ponding adjacent to the building must be prevented, as infiltration adjacent to the foundation elements could have detrimental effects on the structural elements. To further reduce the risk of frost heave, it is also recommended that the gravel pad be constructed to at least 200 mm above existing grade to redirect runoff water and ensure adequate insulating soil cover above the frost susceptible silt at depth.

3.3 Design, Inspection & Testing Services

It is recommended that engineering field services such as excavation base inspection; compaction testing during the construction of the engineered fill; bearing surface inspection prior to pouring the concrete slab; and concrete testing of the supplied concrete be completed to ensure compliance to project specifications. EBA would be pleased to provide these services, if desired.

4.0 CLOSURE

The information and recommendations presented herein are based on the geotechnical data collected at the subject site. The conditions reported are believed to be representative of the site. However, if conditions differing from those presented in this report are encountered during subsequent phases of site development, we request that EBA be notified so that geotechnical recommendations can be re-evaluated in light of new findings.

Additional information regarding the use of this report is presented in the attached General Conditions, which form a part of this report. If additional information or clarification of any recommendation presented in this report is required, please contact the undersigned.

Yours truly,
EBA Engineering Consultants Ltd.

PROFESSIONAL ENGINEER YUKON TERRITORY J. RICHARD TRIMBLE July 29/04

James S. Buyck
Engineering Technologist
(Direct Line: 867-668-2071 Ext. 26)
(Email: jbuyck@eba.ca)

J. Richard Trimble, M.Sc. (Eng.), P.Eng.
Project Director, Yukon Region
(Direct Line: 867-668-2071 Ext. 22)
(Email: rtrimble@eba.ca

Attachments: Borehole Logs 1200108-TP01 & TP02 (2 pages)
Grain Size Analysis (2 pages)

PERMIT TO PRACTICE
Signature
Date July 29/04 EBA Engineering
PERMIT NUMBER: PP003
Association of Professional Engineers of Yukon

This report incorporates and is subject to these "General Conditions".

A.1 USE OF REPORT AND OWNERSHIP

This geotechnical report pertains to a specific site, a specific development and a specific scope of work. It is not applicable to any other sites nor should it be relied upon for types of development other than that to which it refers. Any variation from the site or development would necessitate a supplementary geotechnical assessment.

This report and the recommendations contained in it are intended for the sole use of EBA's client. EBA does not accept any responsibility for the accuracy of any of the data, the analyses or the recommendations contained or referenced in the report when the report is used or relied upon by any party other than EBA's client unless otherwise authorized in writing by EBA. Any unauthorized use of the report is at the sole risk of the user.

A.2 NATURE AND EXACTNESS OF SOIL AND ROCK DESCRIPTIONS

Classification and identification of soils and rocks are based upon commonly accepted systems and methods employed in professional geotechnical practice. This report contains descriptions of the systems and methods used. Where deviations from the system or method prevail, they are specifically mentioned.

Classification and identification of geological units are judgmental in nature as to both type and condition. EBA does not warrant conditions represented herein as exact, but infers accuracy only to the extent that is common in practice.

Where subsurface conditions encountered during development are different from those described in this report, qualified geotechnical personnel should revisit the site and review recommendations in light of the actual conditions encountered.

A.3 LOGS OF TEST HOLES

The test hole logs are a compilation of conditions and classification of soils and rocks as obtained from field observations and laboratory testing of selected samples. Soil and rock zones have been interpreted. Change from one geological zone to the other, indicated on the logs as a distinct line, can be, in fact, transitional. The extent of transition is interpretive. Any circumstance that requires precise definition of soil or rock zone transition elevations may require further investigation and review.

A.4 STRATIGRAPHIC AND GEOLOGICAL INFORMATION

The stratigraphic and geological information indicated on drawings contained in this report are inferred from logs of test holes and/or soil/rock exposures. Stratigraphy is known only at the locations of the test hole or exposure. Actual geology and stratigraphy between test holes and/or exposures may vary from that shown on these drawings. Natural variations in geological conditions are inherent and are a function of the historic environment. EBA does not represent the conditions illustrated as exact but recognizes that variations will exist. Where knowledge of more precise locations of geological units is necessary, additional investigation and review may be necessary.

A.5 SURFACE WATER AND GROUNDWATER CONDITIONS

Surface and groundwater conditions mentioned in this report are those observed at the times recorded in the report. These conditions vary with geological detail between observation sites; annual, seasonal and special meteorologic conditions; and with development activity. Interpretation of water conditions from observations and records is judgmental and constitutes an evaluation of circumstances as influenced by geology, meteorology and development activity. Deviations from these observations may occur during the course of development activities.

A.6 PROTECTION OF EXPOSED GROUND

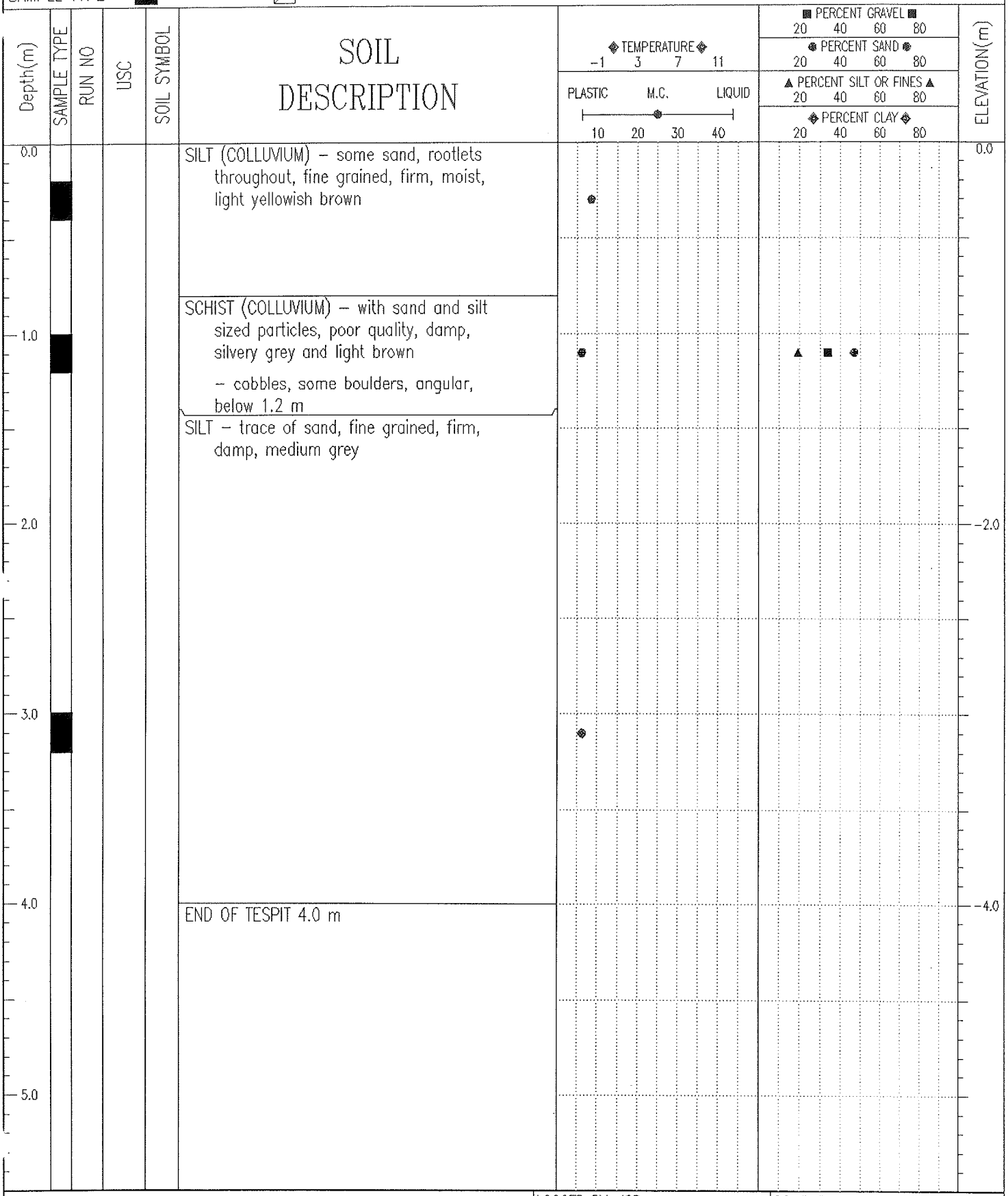
Excavation and construction operations expose geological materials to climatic elements (freeze/thaw, wet/dry) and/or mechanical disturbance that can cause severe deterioration. Unless otherwise specifically indicated in this report, the walls and floors of excavations must be protected from the elements, particularly moisture, desiccation, frost action and construction traffic.

A.7 SUPPORT OF ADJACENT GROUND AND STRUCTURES

Unless otherwise specifically advised, support of ground and structures adjacent to the anticipated construction and preservation of adjacent ground and structures from the adverse impact of construction activity is required.

Geotechnical Eval. – Substation Concrete	CLIENT: Yukon Energy Corp.	TEST PIT NO: 1200108-TP01
Pad Foundation Recommendations	EXCAVATOR: 325B Tracked Excavator	PROJECT NO: 1200108
Stewart Crossing, YT	UTM ZONE: 8 N7036000 E400600	ELEVATION:

SAMPLE TYPE ■ GRAB ⊘ NO RECOVERY



EBA Engineering Consultants Ltd. Whitehorse, Yukon	LOGGED BY: JSB	COMPLETION DEPTH: 4 m
	REVIEWED BY: JRT	COMPLETE: 04/07/21
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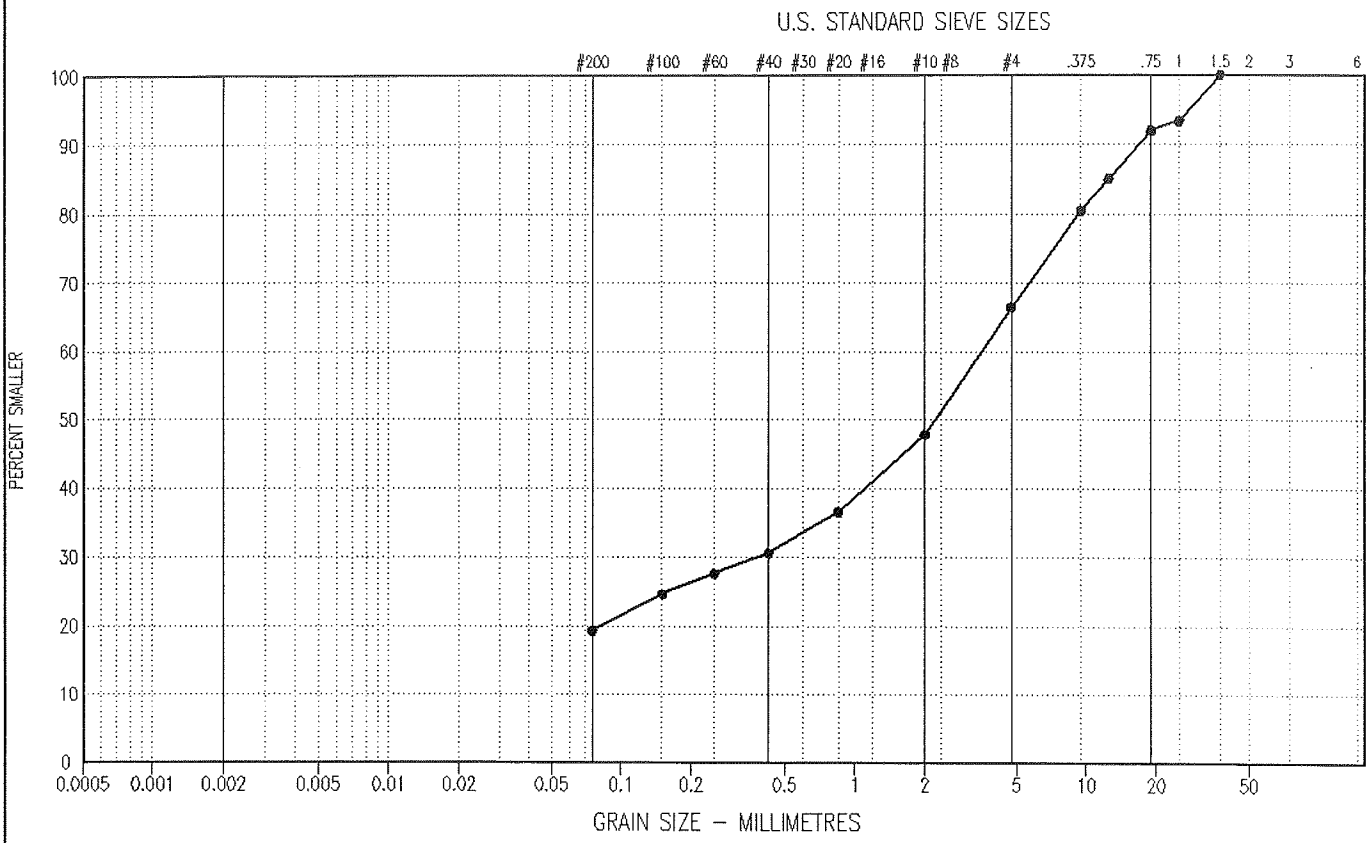
PARTICLE SIZE – ANALYSIS OF SOILS

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



SYMBOL	BOREHOLE NUMBER	DEPTH (m)	DESCRIPTION			Cu	Cc	U.S.C
			CLAY & SILT %	SAND %	GRAVEL %			
●—●	1200108-TP01	1.00 – 1.20	19	47	34	–	–	

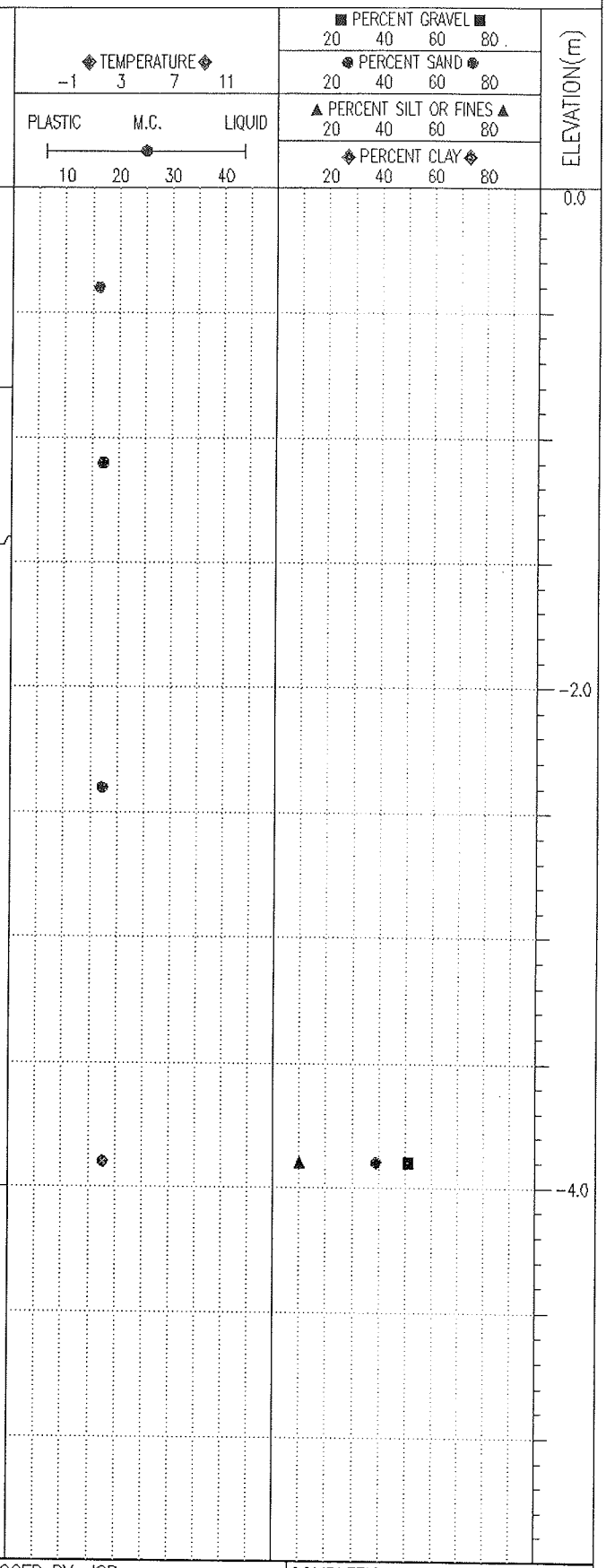
Project: 0201-1200108 Date Tested: 04/07/26 BY: MB

Tested in accordance with ASTM D422 unless otherwise noted.

Geotechnical Eval. – Substation Concrete	CLIENT: Yukon Energy Corp.	TEST PIT NO: 1200108-TP02
Pad Foundation Recommendations	EXCAVATOR: 325B Tracked Excavator	PROJECT NO: 1200108
Stewart Crossing, YT	UTM ZONE: 8 N7036000 E400650	ELEVATION:

SAMPLE TYPE ■ GRAB ⊘ NO RECOVERY

Depth(m)	SAMPLE TYPE	RUN NO	USC	SOIL SYMBOL	SOIL DESCRIPTION
0.0					SILT (COLLUVIUM) – some sand, rootlets throughout, fine grained, firm, moist, light yellowish brown
1.0					SCHIST (COLLUVIUM) – with sand and silt sized particles, poor quality, damp, silvery grey and light brown – cobbles, some boulders, angular, below 1.2 m
2.0					SILT – trace of sand, fine grained, firm, damp, medium grey
3.0					
4.0					END OF TESTPIT 4.0 m
5.0					



EBA Engineering Consultants Ltd. Whitehorse, Yukon	LOGGED BY: JSB	COMPLETION DEPTH: 4 m
	REVIEWED BY: JRT	COMPLETE: 04/07/21
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04/07/27 12:02PM (YUKON-TS)

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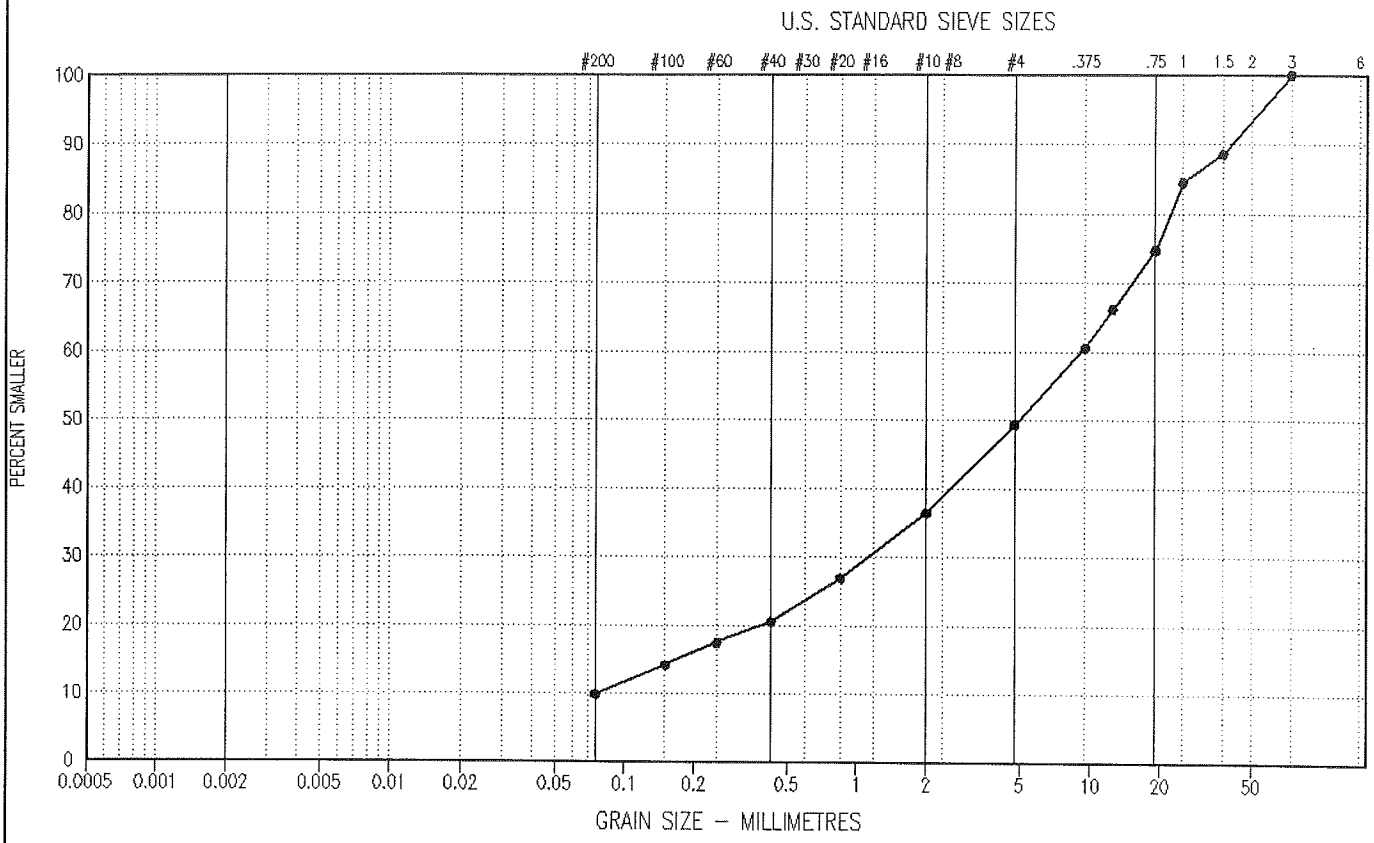
PARTICLE SIZE – ANALYSIS OF SOILS

CLAY	SILT	SAND			GRAVEL	
		FINE	MEDIUM	COARSE	FINE	COARSE



SYMBOL	BOREHOLE NUMBER	DEPTH (m)	DESCRIPTION			Cu	Cc	U.S.C
			CLAY & SILT %	SAND %	GRAVEL %			
●	1200108-TP02	3.80 – 4.00	10	39	51	120.8	2.1	GW-GM

Project: 0201-1200108 Date Tested: 04/07/26 BY: MB

Tested in accordance with ASTM D422 unless otherwise noted.