



Environmental

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September 23, 2014

Public Works & Government Services Canada
Sir Charles Tupper Building
2720 Riverside Drive, Tower A, Floor 0,
Ottawa, ON K1A 0S5

Attn: Mr. Daniel Segura, P.Eng., Deputy Project Manager

**Re: Test Pit Investigation – Proposed Staging Area
Thompson Bay Dam, Peterborough, Ontario
Cambium Reference: 3420-001**

Dear Mr. Segura,

We are pleased to submit this letter-report outlining the methodology, results, and recommendations of our test pit investigation, conducted at the above-noted Site on September 10, 2014. The purpose of the investigation was to determine the subsurface conditions at the Site in order to provide geotechnical design recommendations for the design and construction of a proposed staging area to be used during the reconstruction of the Thompson Bay Dam.

FIELD INVESTIGATION

A test pit investigation was completed at the site on September 10, 2014. As requested, two (2) test pits, designated TP101-14 and TP102-14, were advanced at accessible locations within the proposed staging area. The test pits were excavated to refusal on limestone bedrock at depths of 1.6 m and 0.55 m below the existing ground surface in test pits TP101-14 and TP102-14 respectively. A Cambium technician logged and sampled the soils from test pits, placing the samples in labelled plastic bags for transport, future reference, storage, and review. The location of the test pits is shown on Figure 1.

Dynamic probe penetration tests (DPT), consisting of driving a 19 mm diameter steel rod into the soil with an 8 kg hammer falling 750 mm, were completed at each of the test pit locations in order to determine the in-situ density of the subgrade soils.

SUBSURFACE CONDITIONS

Test pit logs showing the subsurface soil profile and the results of the DPT testing are attached as Table 1.

TEST PIT TP101-14

The test pit logs indicate that subsurface conditions at the location of TP101-14 consist of a 0.2 m thick layer of surficial, organic topsoil underlain by a 0.6 m thick layer of fine to medium sand fill which also contained some gravel and occasional cobbles. The fill was moist to wet at the time of the investigation. The fill was underlain by a 0.7 m thick, moist to wet layer of dark



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brown to green clayey silt with some sand and occasional pockets of organic material. The clayey silt was about the plastic limit (APL) at the time of the investigation and is classified as firm to stiff based on DPT penetration resistances ranging from 4 to 6 blows per 150 mm. The test pit was terminated at a depth of 1.6 m on limestone bedrock. No significant groundwater seepage was encountered in TP101-14.

TEST PIT TP101-14

Test pit TP102-14 encountered 0.3 m of organic topsoil at the ground surface. A thin layer of large flat stones was encountered immediately below the topsoil. The stones were underlain by greenish grey clay and silt with some fine sand. The clay and silt was wetter than the plastic limit and was found to be soft to stiff based on DPT penetration resistances. Test pit TP102-14 was terminated on refusal on limestone bedrock at a depth of 0.55 m.

Groundwater seepage was observed in TP102-14 at a depth of 0.4 m.

It should be noted that groundwater levels will vary depending upon seasonal conditions and rainfall events.

GEOTECHNICAL CONSIDERATIONS

The following recommendations are based on the test pit information and are intended to assist designers. Recommendations should not be construed as providing instructions to contractors, who should form their own opinions about site conditions, particularly when it comes to organic material thickness and groundwater. It is possible that subsurface conditions beyond the test pit locations may vary from those observed. If significant variations are found before or during construction, Cambium should be contacted so that we can reassess our findings, if necessary.

STAGING AREA PREPARATION

All surficial organic soils should be removed from below the proposed staging area, to expose either sand fill with some gravel or native clayey silty to silt and clay soils. Upon removal of the surficial topsoil it is recommended that a medium strength non-woven geotextile such as a Terrafix 270R or equivalent be placed on the subgrade. The staging area can then be backfilled to the proposed grades with 2 inch minus and/or 4 inch minus crushed limestone, depending upon the depth of the fill. The crushed limestone should be placed in maximum 300 mm thick lifts and compacted with a heavy, self-propelled vibratory compactor.

A minimum thickness of 300 mm of compacted crushed limestone overlying the geotextile is recommended. Based on the 1.2 m difference in the existing grades at TP101-14 and TP102-14, additional crushed limestone will be required if the staging area is to be made level or close to level. Consideration could also be given to taking the area around TP101-14 down to



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bedrock prior to placing some crushed limestone in order to reduce the overall volume of crushed limestone that would be required to create a reasonably level staging area.

CLOSING

We trust that the information and recommendations in this letter-report meet your current needs. If you have questions or comments regarding this report please do not hesitate to contact the undersigned at (705) 742-7900 ext. 332.

Respectfully submitted,

CAMBIUM INC.

Stuart Baird, P.Eng.
Senior Project Manager

SEB/seb

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GEOTECHNICAL INVESTIGATION
 PUBLIC WORKS AND GOVERNMENT SERVICES CANADA
 Thompson Bay Dam, Peterborough, Ontario

LEGEND

- Core Hole Location
- Test Pit Location
- River Bottom Elevation
- Benchmark

Notes:
 - 2011 imagery acquired September, 2014 from ESRI. Source: Esri, DigitalGlobe, GeoEye, i-cubed, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community
 - Base mapping features are © Queen's Printer of Ontario, 2010 (this does not constitute an endorsement by the Ministry of Natural Resources or the Ontario Government).
 - Distances on this plan are in metres and can be converted to feet by dividing by 0.3048.
 - Cambium Inc. makes every effort to ensure this map is free from errors but cannot be held responsible for any damages due to error or omissions. This map should not be used for navigation or legal purposes. It is intended for general reference use only.
Benchmarks:
 1 - City of Peterborough Control Point
 Elevation set at an assumed 100.00 m



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SITE PLAN

Project No.:	3420-001	Date:	September 2014
Scale:	1:400	Rev.:	
Created by:	NLB	Projection:	NAD 1983 UTM Zone 17N
Checked by:	JAB	Figure:	1



TABLE 1: TEST PIT LOGS

Thompson Bay Dam, Peterborough, Ontario

Cambium Reference No. 3420-001

Test Pit ID Elev. (m)	Depth (mbgl ¹)	Material Description	Depth (m)	DPT ² (Blows/150mm)
TP101-14 98.21	0.00 - 0.2	Dark brown organic topsoil	0.75 - 0.90	2
	0.2 - 0.8	Brown fine to medium sand, some gravel, occasional cobbles, moist	0.90 - 1.05	4
	0.8 - 1.5	Dark brown to green clayey silt, some sand, occasional organics, moist to wet	1.05 - 1.20	4
	1.5 - 1.6	Greenish grey clay and silt, APL, soft	1.20 - 1.35	6
	1.6	Limestone bedrock, end of test pit	1.35 - 1.50	1
		Test pit open and stable on completion, no significant groundwater seepage	1.50 - 1.60	20/refusal
TP102-14 97.01	0.00 - 0.3	Dark brown organic topsoil	0.40 - 0.55	7
	0.3 - 0.4	Large flat stones	0.55	Refusal
	0.4 - 0.55	Greenish grey clay and silt, some fine sand, WTPL, soft		
	0.55	Limestone bedrock, end of test pit		
	Test pit open and stable on completion, groundwater seepage at 0.4 m			

Notes:

1. mbgl = metres below ground level
2. Dynamic probe penetration test, consisting of driving a 19 mm diameter steel rod into the soil with an 8 kg hammer falling 750 mm.