



# Terraprobe

Consulting Geotechnical & Environmental Engineering  
Construction Materials Inspection & Testing  
Shoring Design & Monitoring

File No.: 11-14-4066

June 28, 2016

**MMM Group Limited.**  
2655 North Sheridan Way, Suite 300  
Mississauga, Ontario  
N5K 2P8

Attention: Mr. Trevor Small, P.Eng.

**RE: FOUNDATION INVESTIGATION AND DESIGN REPORT  
UNNAMED CREEK CULVERT REPLACEMENT, SITE NO. 39E-244C  
GWP 5379-11-00, HWY. 634  
MINISTRY OF TRANSPORTATION, NORTHEASTERN REGION**

Dear Sirs:

We thank Mr. Michael Choy, P.Eng., and Mr. Ken Ahmad, P.Eng., for their thoughtful review and comments pertaining to our Foundation Investigation and Design Report. Our response to MTO's comments are provided herein and MTO's memorandum dated October 09, 2015 is attached for reference.

1. Geocres number 42H-61 is added to the title page in the Final Foundation Investigation and Design Report and Foundation Drawing.
2.
  - a. The borehole coordinates are local site coordinates and columns 2 and 3 of the Borehole Details table on Page 1 of the report is revised to "Local Site Coordinates";
  - b. Since the reported borehole coordinates are local, we have not referenced an MTO zone;
  - c. We cannot provide borehole co-ordinates in latitude and longitude values but latitude and longitude values of the site are provided in Section 2.0 of the report. As per MTO's procedures, borehole coordinates are surveyed and reported in either MTM coordinates or local site coordinates. The reported coordinate values are obtained from the survey control report accepted by MTO Geomatics. Since MTO Geomatics has accepted local site coordinates, these coordinates are reported on the borehole logs.
3. Page 6, Section 4.2.9 the verbiage is revised to state "The granodiorite schist bedrock is described as unweathered, massive brownish grey rock of very high strength (estimated by chipping rock specimens with a geological hammer)".
4.
  - a. Page 9, Section 6.3.1, the statement "Structural engineer shall select a design founding elevation based on site topography, frost depth and structural dimensions" is added below the table to provide clarification.
  - b. The recommended geotechnical resistances are minimum values selected based on a depth equivalent to 2.5 m (frost depth) envisaged in the area of the culvert inlet and outlet. There is no merit in providing higher geotechnical resistance values for larger overburden depths since the minimum overburden depth at the culvert inlet and outlet areas is the most critical.

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#### **Terraprobe Inc.**

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- c. In Section 6.3.1 of the report, text referencing "spread footings" is replaced with "strip footings".
  - d. Regulatory agencies prefer open footing culverts which promote fish passage etc. A box culvert would only be considered if the subsurface soils are weak and there is benefit in using a larger footing area. In this case a box culvert was not considered as part of the preliminary design studies because competent soils exist at relatively shallow depth to support a replacement culvert on strip footings.
5. The following statement is added to Section 6.9.1 "These soil parameters were established from predictions/empirical correlations using SPT N-values, laboratory results and back calculation of the existing slopes, tempered with engineering judgement from our experience with similar soils in this region of Ontario".
6.     a. The drawing is signed and sealed by two Professional Engineers one of whom is the Designated MTO Contact.
- b. Drawing revised to state Local Site Coordinates and the Geocres. Number is included.
- c. Units of metre (m) are reported for Site Coordinates and Geodetic Elevations.

Yours truly,

**Terraprobe Inc.**



Rehman Abdul, P.Eng.  
Principal, Senior Geotechnical Engineer



Michael Tanos, P.Eng.  
Principal, MTO Designated Contact



Att: MTO Memorandum, October 09, 2015.



# Memorandum



Phone: 416-235-3482

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9 October 2015

TO: Xin Weng  
Project Engineer, Planning and Design  
Northeastern Region

FROM: Pavements and Foundations Section  
Building 'C' – Room 223  
Downsview, Ontario

RE: **GWP 5379-11-00 : Replacement of Unnamed Creek, Hwy 634,  
2.3km South of Island Road Falls Junction, Site No. 39E-244**  
*~ Comments on Draft of Foundation Investigation & Design Report*

We have evaluated the Draft Foundation Investigation & Design Reports produced by Terraprobe Inc. (dated 20 Aug 2015), for MMM Group Limited, to determine the Consultant's performance in providing the deliverables as specified in the Terms of Reference. The report was evaluated to assess compliance with the Quality Control Plan and to ensure that recommendations are consistent with MTO protocol.

Notwithstanding the comments given below, the accuracy of the subsurface information and the adequacy of the technical details of the recommendations have not been reviewed and remain the responsibility and liability of the Consultant. The Ministry assumes no responsibility or liability for these aspects of the report.

Our comments are provided below for the Consultant's consideration and response:

**1. Geocres Number**

The Geocres number for this project is **42H-61**. Please print this number on the revised FDIR and its drawings (borehole location, soil stratigraphy drawing(s)).

**2. Borehole coordinates**

- a. The borehole co-ordinates do not match the physical location of the site. Please review the co-ordinates for correctness.
- b. Please indicate the MTM zone.
- c. In addition to MTM, please provide the boreholes co-ordinates in longitude & latitude (degrees decimal).

**3. Section 4.2.9 – Rock Strength**

Please add a note to clarify how the rock strength was determined to be "very high".

**4. Section 6.3.1 – Geotechnical resistances of Spread Footings**

- a. The table in this section shows the bearing resistance/reactions for foundations at different founding levels. Please edit or clarify this information to explain the circumstances in which this would occur.
- b. Bearing resistances for footings on the “same” soils will vary, due to the surcharging effects of the overburden soil. However, the values on the table are identical, irrespective of the amount overburden soil. Please revisit these values and revise, if necessary.
- c. The bearing resistances in section 6.3.1 are provided for “spread footings”. Please clarify if the resistances are applicable to strip footings too.
- d. Please provide resistances/subgrade reactions in the event a box culvert approach is selected.

**5. Section 6.9.1 – Slope Stability Design Parameters**

Please clarify if the design parameters were determined based on correlations with in-situ/lab test results, back-calculation of existing slopes, engineering judgment and/or other means (similar to paragraph 1 of section 6.9.2).

**6. Appendix A – Drawing No. 1:**

- a. This drawing shall be signed and stamped by two Professional Engineers licensed by the PEO, one of whom shall be the MTO Foundation Designated Contact.
- b. Comments 1 and 2 are also applicable.
- c. Please indicate the units of the elevations and co-ordinates (assumed to be in meters).

Last but not least, the Foundation Consultant shall ensure that the Final Foundation Investigation & Design Report is signed and stamped by two Professional Engineers licensed by the PEO, one of whom shall be the MTO Foundation Designated Contact. It shall also be accompanied with a letter; the letter shall list all changes/revisions that were made, including those that are in response to our comments. If there are no changes resulting from our comments, please provide an explanatory note.

If you have any questions or require further clarifications, please feel welcome to contact us.

Michael Choy, P. Eng.  
Foundation Engineer  
*for*  
Ken Ahmad, P. Eng.  
Senior Foundation Engineer