

MEMORANDUM

To: Marc McIntosh
McIntosh Perry Consulting Engineers

Date: March 14, 2017

From: Fred Griffiths, P.Eng.

File: 14178

GEOTECHNICAL MONITORING PROGRAM HIGHWAY 11 / FIVE MILE CREEK CULVERT REPLACEMENT DB 2016-5012

A geotechnical monitoring program is required for this project and should be completed in accordance with Section 2.4.9.11 of the Terms of Reference. Benchmarks should be established as noted in the following clause:

1. Stable benchmarks shall be established along the length of the alignment. Coordinates and elevations shall be established at least three months prior to monitoring with repeat baseline survey readings taken during this time. The number of reference benchmarks established shall be sufficient to provide adequate sight distances to permit monitoring as specified in this Chapter 2. Benchmark coordinates and elevations shall thereafter be resurveyed annually. Data shall be submitted to the Ministry for information.

Monitoring of Highway 11 should be carried out in accordance with the following:

2. Immediately following paving, monitoring points consisting of hardened steel markers treated or coated to resist corrosion, with an exposed convex head having a minimum 12 mm diameter and similar to surveyor's PK nails should be established. Each point should be rigidly affixed into the asphalt so as not to move relative to the surface to which it is attached.
3. The monitoring points are to be located at the centreline of each lane and installed at the centreline of the culvert and at distances of 20 m, 50 m, 75 m, and 100 m from the centreline of the culvert in both directions and both lanes.
4. Measurements of differential settlements between the centreline of the culvert and culvert approaches must be taken at months 3, 6, 12, 18 and 24 of the General Warranty period. Measurement data shall be provided to the Ministry.

In addition, it is recommended that monitoring be carried out at the outlet of the railway culvert located directly to the south of Highway 11 in accordance with the following:

5. In advance of construction, three monitoring points shall be established at the outlet on the railway culvert to the south of Highway 11. They should consist of survey targets

established on each of the wing walls and on the headwall on the north end of the railway culvert.

6. The following monitoring program should be followed:
 - Benchmarks should be established as described above.
 - Prior to excavation for the new Highway 11 culvert and retaining walls, monitoring should be carried out weekly for three weeks.
 - When excavation, construction, backfilling and removal of shoring for the new Highway 11 culvert is occurring on the south side of the centerline of Highway 11, monitoring should be carried out daily.
 - When excavation, construction, backfilling and removal of shoring for the new Highway 11 culvert is occurring on the north side of the centerline of Highway 11, monitoring should be carried out weekly.
 - After completion of culvert backfilling and removal of shoring, monitoring should be carried out weekly for four weeks.
7. Should the monitoring at the railway culvert indicate a change in elevation or displacement of more than 5 mm from the baseline conditions, the design team should be notified immediately.

We trust the above provides the information you require at this time. If you have any questions regarding this memorandum, please contact the undersigned.

Regards,

Thurber Engineering Ltd.



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