



THURBER ENGINEERING LTD.

To: Rob Kleine, P.Eng.
MMM Group Limited

Date: September 7, 2016

From: Alastair Gorman, P.Eng.
(Reviewed by P.K. Chatterji, P.Eng.)

File: 19-5161-251

**FOUNDATION INVESTIGATION
MISTINIKON LAKE, GWP 5014-E-0019**

This memorandum presents a summary of the foundation engineering activities completed up to the point that work at this site was suspended.

Site visits were carried out by a member of Thurber's technical staff on July 15 and October 15, 2016, to assess site access, locations for boreholes on the causeway and a location at which a barge could be placed into the lake. A number of photographs taken during this visit are attached. As these photos show, the approach roads are partially in side-hill rock cut and partially on fill.

The preliminary drawings, plan and cross sections, for the causeway were reviewed in detail to develop an understanding of the existing embankment geometry and the options being considered. It was noted that the embankment slopes on the cross-sections were steep, often approximating 1.25H:1V. These slopes were interpreted as indicative of a rock fill embankment core, which was borne out by the site inspection.

It was also noted that, in the vicinity of Stn 14+150 and 14+155, the slopes below water are locally much steeper. This was interpreted to indicate that the existing fill has been placed on top of a steep rock face. This condition would make widening to the left difficult as large quantities of fill would be required and placement techniques might need to be developed to prevent new fill from "running out" to a flat slope as it was dumped into the lake.

The existing geometry and planned realignment options were discussed with MMM Group Limited and a borehole location plan was developed – see attached. However, work at Mistinikon Lake was suspended before we had mobilized to the site.

We trust the above provides the information you require at this time. If you have any questions, do not hesitate to contact us.

Yours truly,
Thurber Engineering Ltd.

Alastair Gorman, P.Eng.
Senior Associate/Senior Geotechnical Engineer



Photograph 1 - Mistikinin Lake Causeway, Southeast Approach, Looking West



Photograph 2 - Mistikinin Lake Causeway, Northeast Approach, Looking West



Photograph 3 - Mistikinon Lake Causeway, Northeast Approach, Looking West



Photograph 4 - Mistikinon Lake Causeway, Northeast Approach, Looking North



Photograph 5 - Mistikinon Lake Causeway, Southeast Approach, Looking West



Photograph 6 - Mistikinon Lake Causeway, Southeast Approach, Looking West



Photograph 7 - Mistikinin Lake Causeway, Northeast Approach, Looking West



Photograph 8 - Mistikinin Lake Causeway, Northwest Approach, Looking West



Photograph 9 - Mistikinon Lake Causeway, Southwest Approach, Looking Southwest



Photograph 10 - Mistikinon Lake Causeway, Northwest Approach, Looking West



Photograph 11 - Mistikinon Lake Causeway, Northwest Approach, Looking West



Photograph 12 - Mistikinon Lake Causeway, Southwest Approach, Looking South



Photograph 13 - Mistikinon Lake Causeway, Southwest Approach, Looking East



Photograph 14 - Mistikinon Lake Causeway, Southwest Approach, Looking East



Photograph 15 - Mistikinon Lake Causeway, Northwest Approach, Looking East



Photograph 16 - Mistikinon Lake Causeway, Southeast Approach, Looking East



Photograph 17 - Mistikinin Lake Causeway, Southeast Approach, Looking East



Photograph 18 - Mistikinin Lake Causeway, Southeast Approach, Looking East

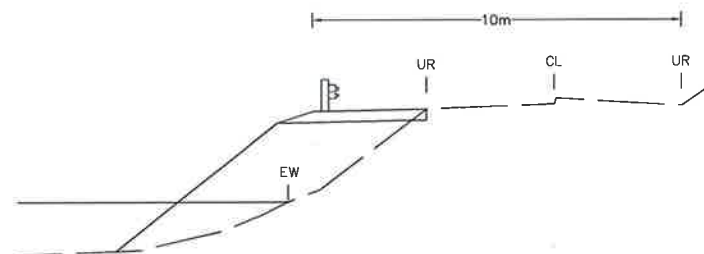
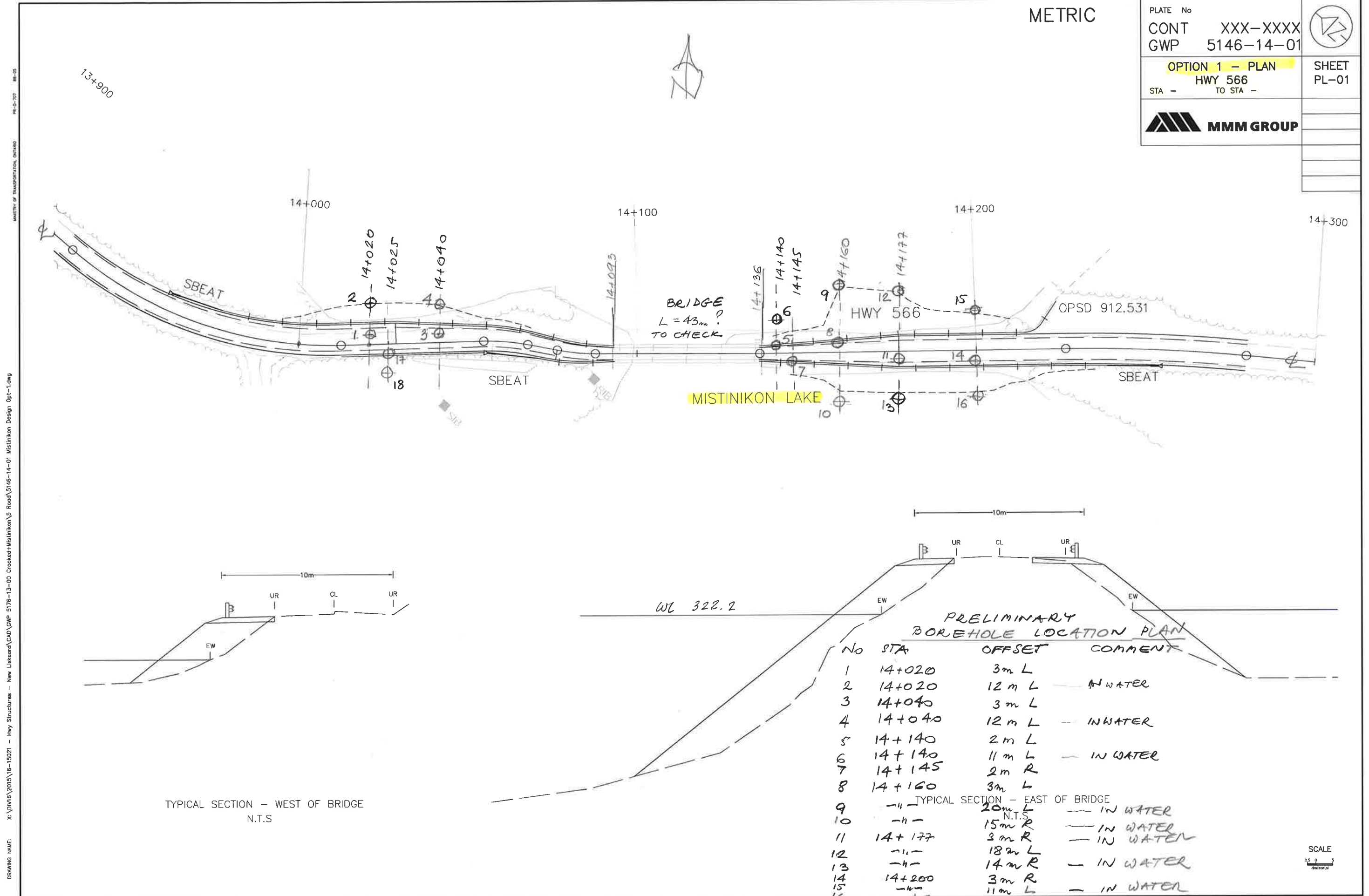
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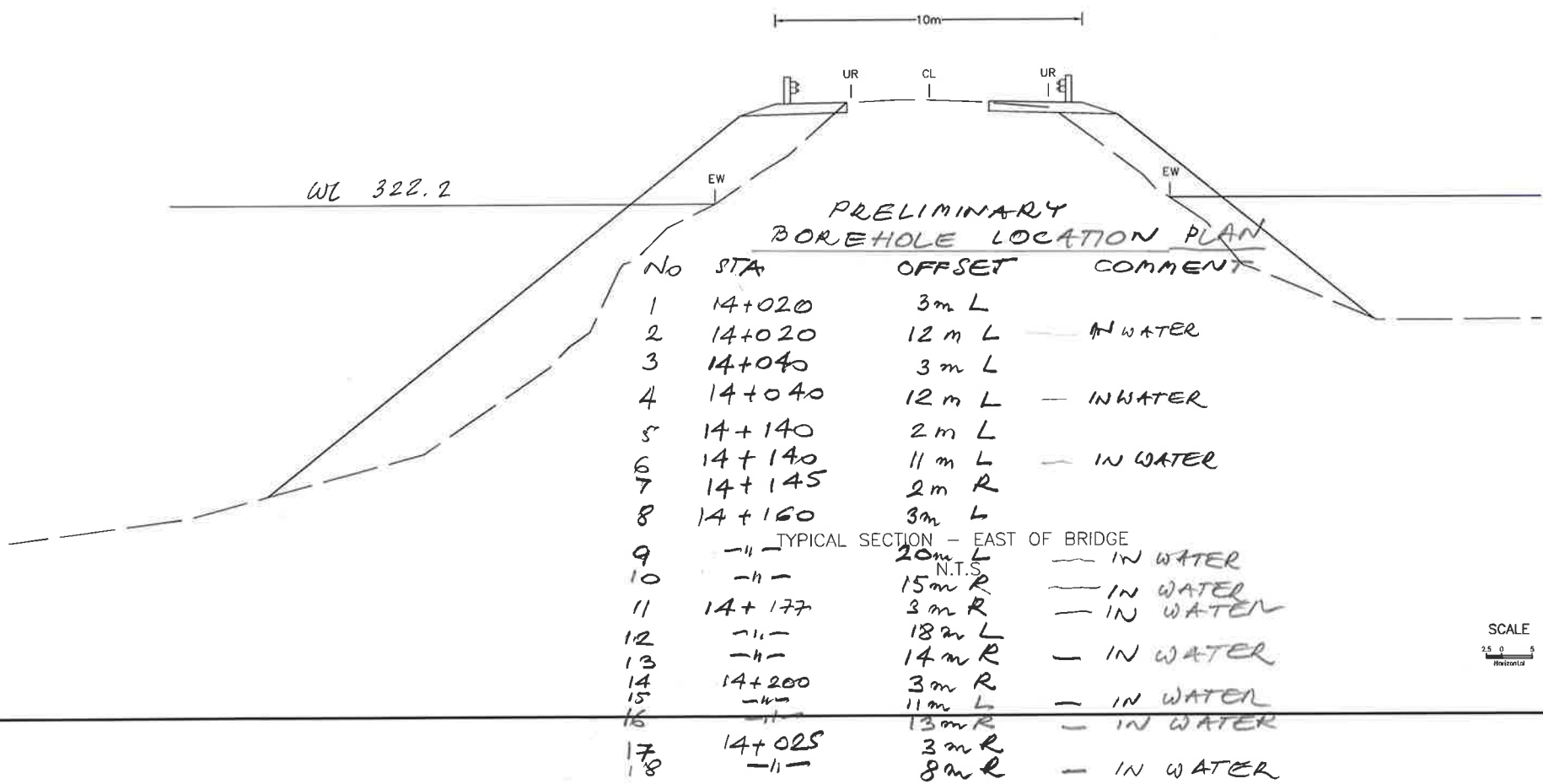
OPTION 1 - PLAN
HWY 566
STA - TO STA -

MM GROUP

SHEET
PL-01



TYPICAL SECTION - WEST OF BRIDGE
N.T.S



TYPICAL SECTION - EAST OF BRIDGE
N.T.S

SCALE
2.5 0 5
Metres

DRAWING NAME: X:\DIV16\2015\16-15021 - Hwy Structures - New Lakehead\GWP 5176-13-00 Crooked-Mistinikon\5 Road\5146-14-01 Mistinikon Design Opt-1.dwg