AGENCY OF TRANSPORTATION **OFFICE MEMORANDUM**

To: Paul Libby, Highway Safety & Design Project Manager
MLM

From: Marcy Meyers, Geotechnical Engineer, via Callie Ewald, P.E., Senior Geotechnical Engineer
CEE

Date: July 23rd, 2014

Subject: Mt. Holly STP 0133(8) – Slope Recommendations Addendum

1.0 INTRODUCTION

As requested, we have performed a geotechnical evaluation for the proposed vegetated slope and stone fill slope recommendations put forth by Fitzgerald Environmental, Green International Affiliates (Green), and Milone & MacBroom for the Mt. Holly STP 0133(8) project. This is an addendum report to the revised stationing geotechnical report dated March 10th, 2014, which includes mitigation recommendations for the slope instability along the eastern slope adjacent to the Mill River in Mt. Holly, VT. After an initial construction cost estimate performed by Green, the vegetated slope alternative came in approximately $215,000 cheaper than the stone fill alternative. As a result, a geotechnical analysis was performed to determine whether or not the alternative with the vegetated slope would satisfy requirements for design. Provided herein are the results of our slope stability modeling and our revised recommendations for the Mt. Holly STP 0133(8) slope repair.

2.0 ANALYSIS

After review of the proposed vegetated slope for Sta. 609+55 (the critical section as determined in the first geotechnical report), the 1V:1.5H vegetated slope below the bench and above the stone fill raised concern of the potential for surficial slope failure. A computer model was generated using the software program, Slide, version 6.0, developed by Rocscience for Sta. 609+55 using the Bishop Simplified Method, and our initial concerns were confirmed. Results from this model indicated a failure surface occurring in the 1V:1.5H slope below the bench and above the stone fill as seen in Figure 1.

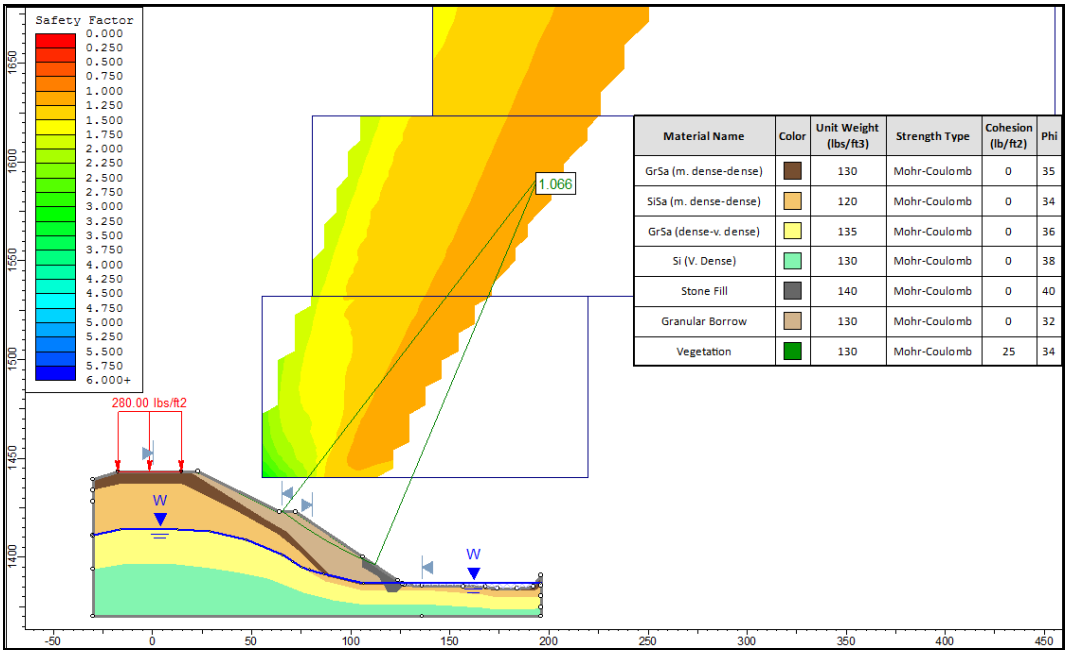

Figure 1: Proposed Vegetated Slope at Sta. 609+55 with Failure below Bench

In order to address the instability while still maintaining the vegetated slope alternative, removing the bench and regrading the slope to a 1V:2H was evaluated. The stone fill remained in place at the same offset as specified in the sections provided by Green. A 1 foot thick layer of vegetation was input in Slide to model the surficial stability that the actual in place vegetation will provide for the surficial soils on the slope. A Slide model using the Bishop Simplified Method was evaluated and results can be found in Figure 2.

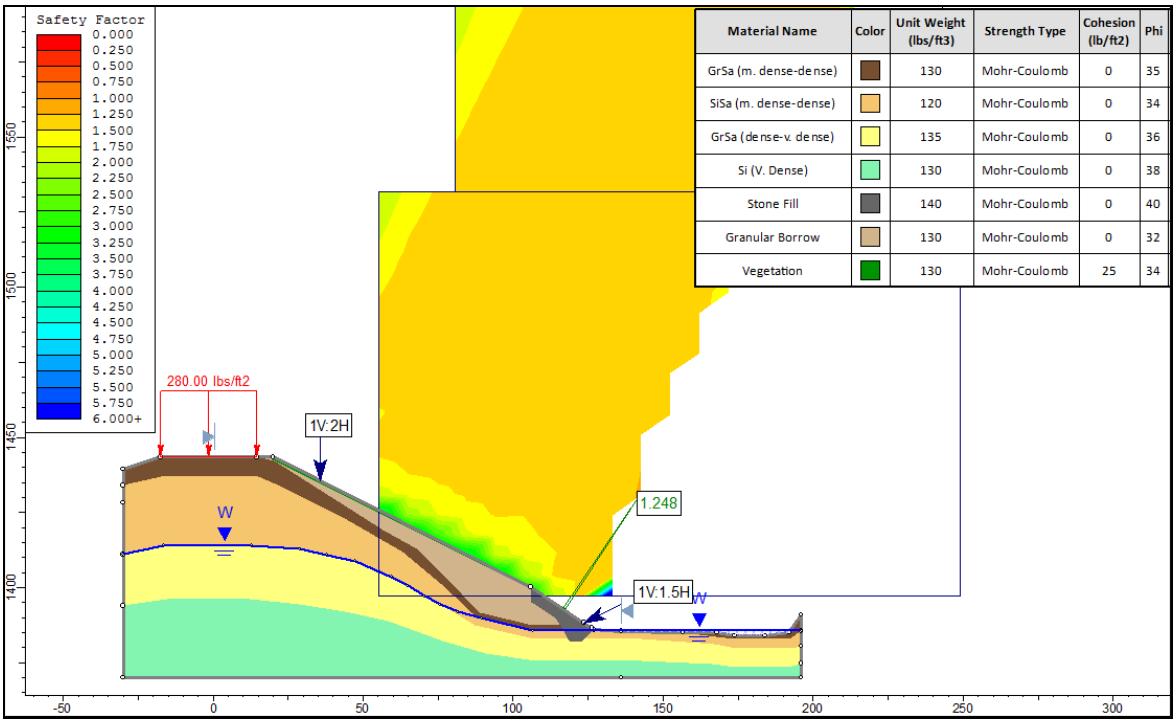

Figure 2: Revised Vegetated Slope at Sta. 609+55 with Failure in Stone

Although this minimum factor of safety of 1.25 is below AASHTO's recommended value of 1.3, we are comfortable with this value as the failure surface is occurring in the stable Type IV stone fill section.

3.0 RECOMMENDATIONS

We recommend using a revised grade for the slope being vegetated as seen in Figure 2 (and also attached) for the unstable slope present at this site. The toe armoring of Type IV stone fill should be kept the same as detailed in the sections provided by Green, however we recommend beginning the 1V:2H grade from the top of stone and continuing it to the shoulder of the roadway. This does narrow the bench at the top of the slope, but still leaves approximately 5.5 feet of a bench from the guard rail to the top of slope. As mentioned in Section 2.0 above, a 1 foot thick layer of vegetation was used in the Slide models. It is our understanding that the vegetation for the slope will be designed by others and that surficial stability will be taken into account when developing details for the proposed 1V:2H vegetated slope.

4.0 CONCLUSION

Please feel free to contact us at (802) 828-2561 if you have any questions, or you would like to further discuss this report.

Enclosures: Revised Vegetated Slope Alternative (1 Page)

cc: Read File/DJH
Project File/CEE
MLM

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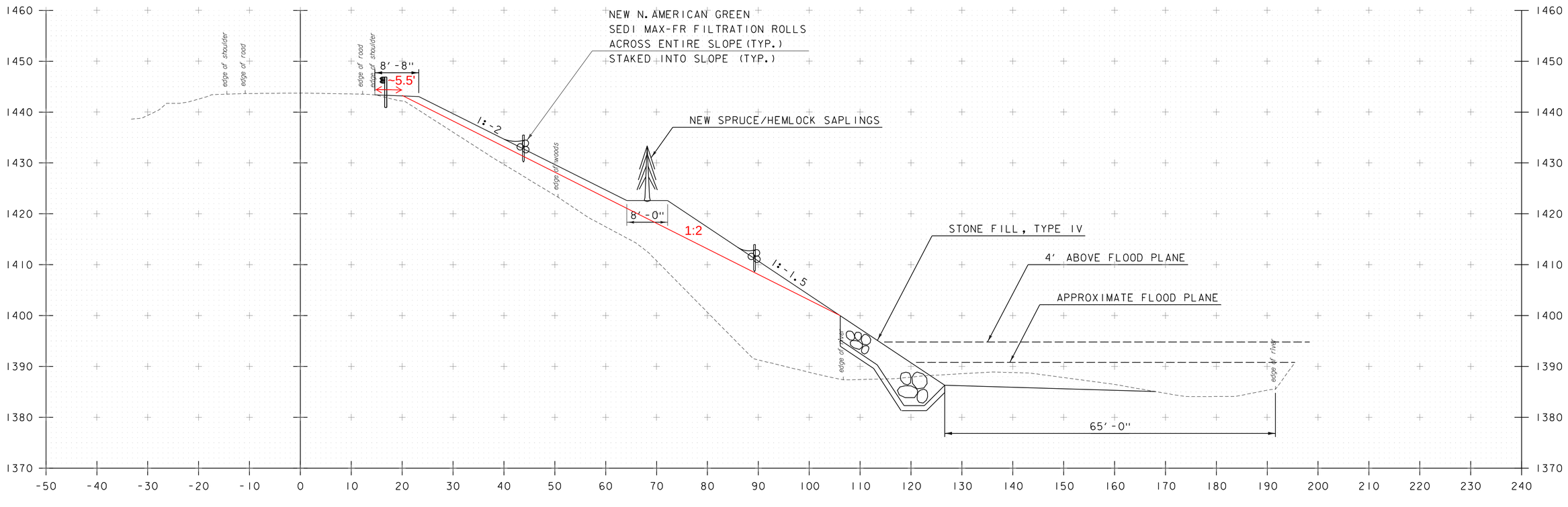

609+55

VEGETATED SLOPE

STA. 609+55 TO STA. 609+55

PROJECT NAME:	MOUNT HOLLY
PROJECT NUMBER:	STP 0133 (8)
FILE NAME: ppms#/Section/------.dgn	PLOT DATE: 6/20/2014
PROJECT LEADER: ------	DRAWN BY: ------
DESIGNED BY: ------	CHECKED BY: ------
------ ------	SHEET $S#$ OF $T#$