MEMO

TO:	Scott Cosman. P ENG.
COMPANY:	BC MOTI
FROM:	Bob Forsyth
DATE:	21 November 2022
CC:	Wayne Byczek, P Eng, Johnathan Tillie, Michael Carreira, P Eng.
PROJECT NO.:	VG07794.309
SUBJECT:	Silver Skagit Road, South of Hope, BC Road and Culvert Repair at km 25.3 Project Number: 14142, Site ID: SA07 150-30

As requested, we herein provide geotechnical comment regarding proposed repairs (RF Binnie & Associates Ltd. Drawings R1-1056-000 to 201) to the road embankment at km 25.3 of the Silver Skagit Road. During the flood event of November 2021, a tributary channel of Silverhope Creek encroached into the embankment of the Silver Skagit Road such that for a 50 m long section of the road, the west road edge has been eroded in places by the creek channel. The creek channel is still present at the west edge of the road and carried a substantial flow of water during our site visit of November 9, 2022.

As a temporary measure to protect the existing roadway from erosion, the embankment was protected with riprap in the more greatly eroded parts of the section.

Photo 1: Looking south at the embankment on the west side of the road. Note the culvert outlet in the foreground.

The repair design includes:

- The creek channel will be temporarily diverted during the work so that repairs can be done in the dry.
- The channel bottom will be excavated at least 0.8 m below the existing creek bed. Disturbed and/or organic material will be removed from the excavation bottom and sides.
- Where it has been eroded, the embankment will be reconstructed with Type D embankment fill.
- Non-woven geotextile (filter fabric) will be placed on top of the excavation bottom and /or embankment slope.
- A 1.60 m width of 100 kg class riprap will be placed atop the filter fabric so the creek bottom and west road edge are armoured with riprap.
- The pavement structure at the west road edge will be reconstructed so that it will consist of High Fines Surfacing Aggregate (HFSA), underlain by Well Graded Base Course (WGB) then Select Granular Subbase (SGSB). BC MOTI specifications for the pavement structure materials are shown below.

Course	In Cut	In Fill
HFSA	100	100
25 mm WGB	225	225
SGSB	300*	150**

Notes: * assumes fine grained subgrade ML/CL/OL/MH/CH/OH. Can be reduced if it is coarse grained.
** assumes coarse grained subgrade GW/GP/GM/GC/SW/SP/SM/SC

The subbase can be omitted where the underlying subgrade material meets SGSB requirements. We expect that Type D compacted subgrade material, where required by site grades, will consist of locally sourced granular fill.

Permanent fill materials should be unfrozen, compacted in lifts, of maximum 300 mm loose thickness, using vibratory equipment. They should be placed on unfrozen surfaces. Water should be added as required so that the fill is close to optimum moisture content during compaction. We understand that compaction of fills will be witnessed by the project civil inspector.

A culvert crosses beneath the road near the mid-portion of the affected road section. The culvert inlet, in a broad, shallow ditch on the east (upslope) side of the road, is buried. From the local topography we expect that the area of the culvert inlet would contain water during spring runoff and wet weather. Accordingly, it is recommended that the culvert inlet be exposed and the culvert interior be cleaned of soil/debris.

Considering the above, it is our opinion that the repair plan is reasonable from a geotechnical perspective.

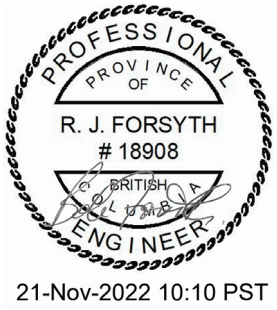
Comments and recommendations presented herein are based on a geotechnical evaluation of the available information as noted. If conditions other than those reported are noted in subsequent phases of the project, WSP E&I Canada Limited should be notified and be given the opportunity to review and revise the current comments and recommendations if necessary. Recommendations presented herein may not be valid if an adequate level of review or inspection is not provided during construction.

This memo has been prepared for the exclusive use of BC MOTI and their appointed agents for specific application to the area covered within this memo. Any use which a third party makes of this memo or any reliance on or decisions made based on it are the responsibility of such third parties. WSP accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken based on this memo. It has been prepared in accordance with generally accepted soil and foundation engineering practices. No other warranty, expressed or implied, is made.

Effective September 21, 2022, Wood Environment & Infrastructure Solutions Canada Limited is now operating as WSP E&I Canada Limited. No other aspects of our legal entity, contractual terms or capabilities have changed in relation to this memo submission.

Yours sincerely,

WSP E&I Canada Limited



21-Nov-2022 10:10 PST

Bob Forsyth, P.Eng.
Associate Geotechnical Engineer

Reviewed by:

2022-11-21

John Laxdal, P.Eng.
Principal Geotechnical Engineer

PERMIT TO PRACTICE
Wood Canada Limited
RR (Delegate) Name JOHN LAXDAL
Signature
Date 2022-11-21
PERMIT NUMBER: 1000679
Engineers and Geoscientists
British Columbia

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