

**TO:** Scott Cosman, P Eng.  
**COMPANY:** BC MOTI  
**FROM:** Bob Forsyth  
**DATE:** 4 November 2022  
**CC:** Wayne Byczek, P Eng, Johnathan Tillie, Michael Carreira, P Eng.  
**PROJECT NO.:** VG07794.306  
**SUBJECT:** Silver Skagit Road, South of Hope, BC  
Road and Culvert Repair at Km 34.5  
Project Number: 14121, Site ID: SA07-150-17

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As requested, we herein provide geotechnical comment regarding proposed repairs (RF Binnie & Associates Ltd. Drawings R1-1048-000 to 301) to the creek crossing at km 34.5 of the Silver Skagit Road. During the flood event of November 2021, the culvert inlet on the upstream side of the road and culvert outlet on downstream side of the road were completely buried with sand and gravel. It is understood that flood waters flowed across the road and deposited sand and gravel on the road and in the creek channel both upstream and downstream of the road. After access had been restored at km 18.6, the road was re-established by grading the road in the vicinity of the creek crossing. The buried culvert is in place and has not yet been excavated, repaired or replaced as observed during our visits of September 14 and 21, 2022. The creek bed was observed to be dry at the time of those visits.

About 40m to the east of the main channel there are two more culverts crossing beneath the road. The inlets to the eastern culverts are buried and the outlets are exposed on the south (downstream) side of the road.



**Photo 1:** September 14, 2022. Looking upstream at the creek channel from the road.



**Photo 2:** September 14, 2022. Looking downstream at the creek channel from the road.



**Photo 3:** Looking east at culvert undercrossing of the road about 40\_m east of the main creek channel

The repair design includes:

- The culvert of the main channel will be removed and replaced with a new 1.8\_m diameter culvert. We understand that the culvert has been sized by the hydrotechnical engineer.
- The creek channel will be cleaned and deepened for a distance of about 75\_m upstream of the road and 50\_m downstream of the road. The channel bottom will have a minimum 2% downstream gradient.
- The ground adjacent to the culvert inlet and outlet will be protected with riprap.
- The road pavement structure 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. The material removed from the creek bed is expected to be suitable for this purpose.

The new culvert should be bedded and backfilled with WGB material.

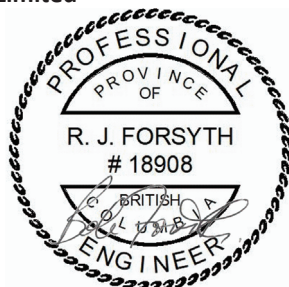
Fill materials should be compacted in lifts, of maximum 300\_mm loose thickness, using vibratory equipment. Water should be added as required so that the fill is close to optimum moisture content during compaction. We understand that compaction of fills will be witnessed by the project civil inspector.

Cleaning of the two eastern culverts should be carried out as part of the repair work. The inlet area should be cleared of vegetation and debris removed from culvert interiors.

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

Yours sincerely,

**WSP E&I Canada Limited**



07-Nov-2022 14:03 PST

Bob Forsyth, P.Eng.  
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Reviewed by:

2022-11-15

John Laxdal, P.Eng.  
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