

<b>SITE NUMBER AND NAME:</b> NC108 – Highway 32 Slide	<b>HIGHWAY AND KM:</b> 32:10, 23.7 km	<b>PREVIOUS INSPECTION:</b> October 18, 2022	<b>CURRENT INSPECTION:</b> June 12, 2024
<b>LEGAL DESCRIPTION:</b> NE-2-59-13-W5M	<b>NAD83 COORDINATES:</b> UTM11U 5992905N, 576550E		<b>RISK ASSESSMENT:</b> PF: 5 CF: 7 Total: 35
<b>AVERAGE ANNUAL DAILY TRAFFIC (AADT):</b> 2,160 (2023)		<b>CONTRACTOR MAINTENANCE AREA (CMA):</b> 508	

<b>SUMMARY OF INSTRUMENTATION:</b> N/A	<b>INSPECTED BY:</b> Stantec: Leslie Cho, Sonja Pharand TEC: Kristen Tappenden, Tim Germyn
<b>PRIMARY SITE ISSUE:</b> Failure of east embankment causing pavement distress.	
<b>APPROXIMATE DIMENSIONS:</b> 150 m wide, location of toe unclear.	
<b>DATE OF ANY REMEDIAL ACTION:</b> Google Earth images suggest that both lanes were patched in 2020 over an approximately 480 m long section of Highway 32. Both lanes were patched again in 2023 following the call-out inspection in Fall 2022.	

ITEM	CONDITION EXISTS		DESCRIPTION AND LOCATION	NOTICEABLE CHANGE FROM LAST INSPECTION	
	YES	NO		YES	NO
Pavement Distress	X		Cracking over both lanes on Highway 32. Rutting in wheel paths along both lanes.	X	
Slope Movement	X		Semi-circular pavement cracks along highway with vertical displacement.		X
Erosion	X		Possible seepage through pavement cracks south of culvert inlet.		X
Seepage	X		Possible separation between first and second culvert segments at the inlet. Vegetation growth at beveled end of outlet.		X
Bridge/Culvert Distress		X			

<b>COMMENTS</b>
<ul style="list-style-type: none"> <li>Several pavement cracks have reflected through the 2023 patch. The cracks observed during this inspection were all under 10 mm wide within the patched area (Photos 1 to 6).</li> <li>The semi-circular pavement cracks at the north and south flanks of the slide have begun to reflect through the patch, however no vertical difference was observed (Photos 4 &amp; 5).</li> <li>Rutting along the wheel tracks was observed in both lanes, with some accompanying cracking. Significant rutting was visible in the SBL approximately 20 m north from the northern semi-circular crack. No tire marks were observed during the current inspection (Photo 6).</li> <li>The east slope is well vegetated.</li> <li>A potential toe bulge was observed along the fence line as shown on Photo 10. The fence in this area was also leaning east.</li> </ul>

- Gullying was observed east of the barbed-wire fence during the 2022 call-out inspection, with nearby wetland grasses and ground moss that could signify high groundwater. The area beyond the fence was not investigated during the 2024 inspection.
- The 900 mm diameter centerline culvert was observed to be dry, with some grass growing inside the beveled end of the outlet (Photo 7). Some riprap/cobbles was observed at the outlet; however, an erosion gully was observed below the outlet approximately 0.15 m by 0.15 m deep. The gully was vegetated and infilled with cobbles.
- At the inlet on the west side, a possible separation was noted between the first and second segments of culvert (Photos 8 & 9).
- The ditch on the west side near the culvert inlet contained ponded water (Photo 8).
- Ponded water was observed on the west paved shoulder of the highway, however the two wet spots noted within the driving lanes during the 2022 call out inspection were not observed. Historical weather data (Environment Canada) shows heavy precipitation (approx. 12 mm) in the area of the site on June 11, 2024.
- A 'bumpy road' sign was found lying on the east embankment at the south end of the site.
- A Probability Factor of 5 was assigned since there appears to be a slow rate of movement with some uncertainty. A Consequence Factor of 7 was assessed since closure of both lanes would be a direct result of a slide occurrence. In addition, potential detours would result in additional travel time of 1.5 to 2 hours on paved highways.

**RECOMMENDATIONS**

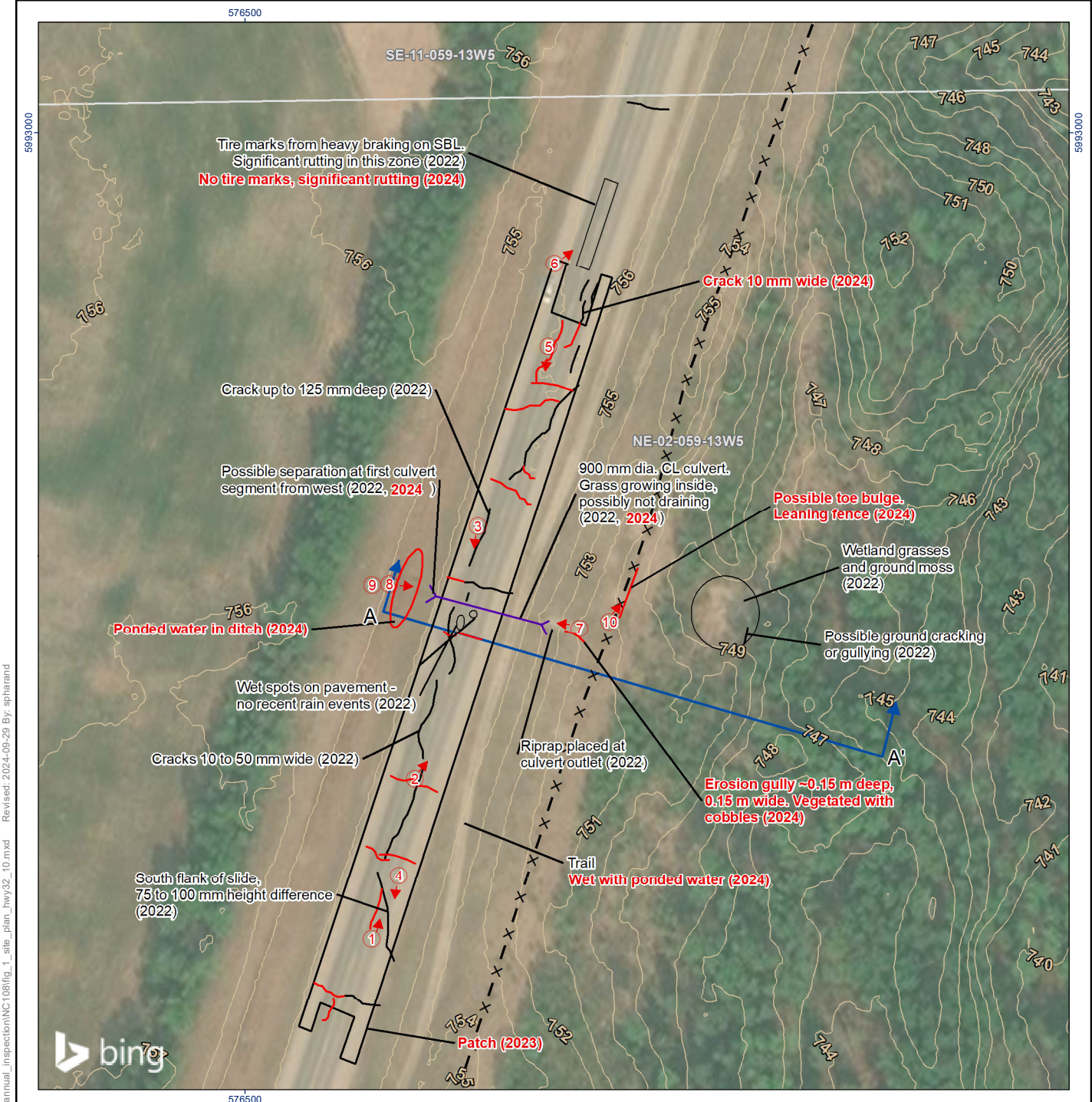
- In the short-term, Stantec recommends that all pavement cracks should be sealed to reduce surface water infiltration into the embankment and landslide. This could include milling and paving to improve rideability. Paving should be conducted such that the final highway surface should match the existing elevation or lower (i.e., no net addition of loads).
- A geotechnical investigation program should be completed, and slope inclinometers and piezometers installed to better characterize landslide movements. Any instrumentation installed should be included in the instrumentation monitoring program.
- Long-term remediation options could include:
  - Construction of a pile wall using cast-in-place concrete piles installed along the east slope near to the shoulder of the road. The high-level cost for installation of a 150 m long pile wall is \$3.0M to \$4.0M not including engineering costs.
  - Reconstruct the highway embankment using lightweight fill. This would involve replacing approximately 1m of pavement with lightweight cellular concrete to reduce the load on the slope. The high-level cost for this option is \$1,300,000 to \$1,700,000 not including engineering costs.
  - Realign the highway further west. This would require land negotiations and purchasing. Assuming a realignment length of 800 m, the high-level cost is \$1.2M to \$1.7M excluding engineering and land purchase.
  - During the site visit, it was discussed that this site may be a reasonable trial site for use of geosynthetic drainage/filtration mats. Assuming removal of the highway to a depth of about 1 m and reconstruction of the highway, the high level cost of construction is \$400,000 to \$600,000, excluding engineering.
- Potential wetlands may exist east of the right-of-way and may trigger environmental approvals should construction encroach into the wetlands.
- Historical Resources Act approval will be required since the remediation options are not included under its Land Use Bulletin.
- Site inspections should be completed every two years as part of the annual site inspection program.



NORTH CENTRAL REGION GRMP  
EDSON / STONY PLAIN  
SITE INSPECTION FORM



PREPARED BY: Sonja Pharand, P.Eng.	REVIEWED BY: Xiteng Liu, M.Sc., P.Eng., PMP	PERMIT TO PRACTICE:



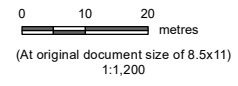
Revised: 2024-09-29 By: spharand  
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**Notes**

- Coordinate System: NAD 1983 UTM Zone 11N
- Data Sources: Geogratis, ©Department of Natural Resources Canada, All rights reserved.
- Background: © 2024 Microsoft Corporation © 2024 Maxar ©CNES (2024) Distribution Airbus DS

- ←○ Photo Number and Direction
- x Fence
- Current Observations
- Previous Observations
- Culvert
- Ground Elevation Contours (m)
- ↔ Cross Section
- Quarter Section



**Project Location** Highway 32, South of Whitecourt, Alberta

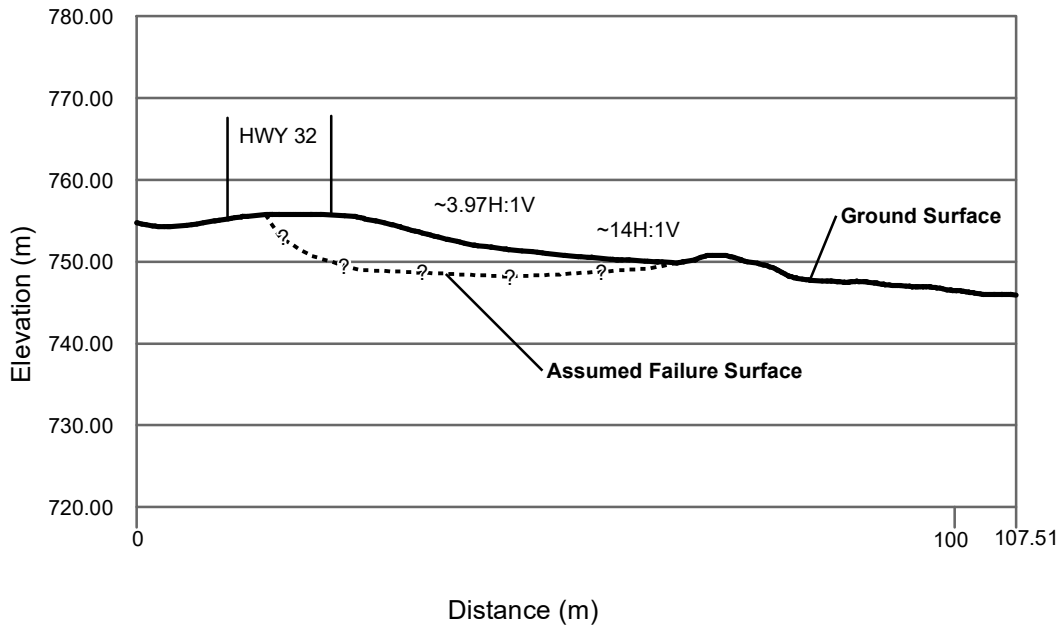
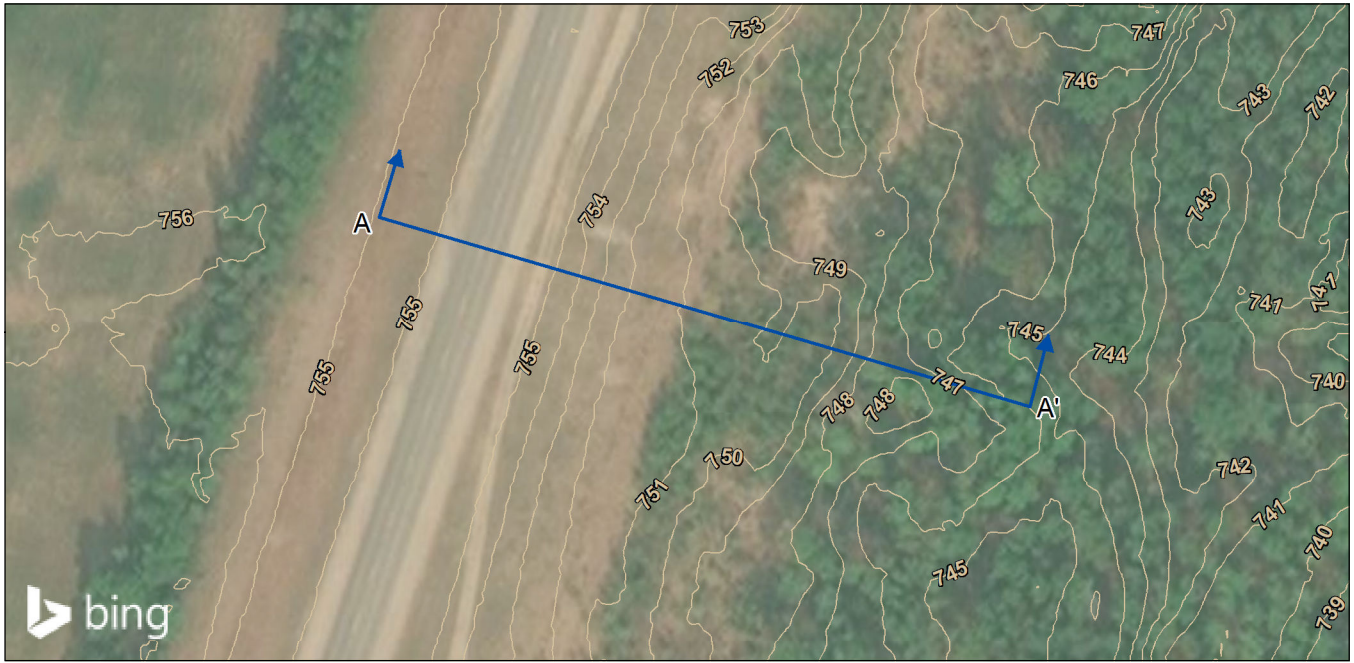
**Prepared by SP on 2024-09-30**  
**TR by LC on 2024-09-30**  
**IR by XL on 2024-09-30**



**Client/Project** Transportation and Economic Corridors  
 Geohazard Monitoring Program,  
 NC108 HWY 32:10, 23.7 km

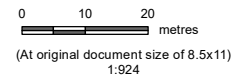
**Figure No.** 1

**Title** Site Plan

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 Cross Section  
 Ground Elevation Contours (m)



Project Location: Highway 32, South of Whitecourt, Alberta  
 Prepared by SP on 2024-09-30  
 TR by LC on 2024-09-30  
 IR by XL on 2024-09-30

Client/Project: Transportation and Economic Corridors  
 Geohazard Monitoring Program  
 NC108 HWY 32:10, 23.7 km

Figure No. 2  
 Title: Ground Profile Plan

- Notes**
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  2. Data Sources: Geogratis, ©Department of Natural Resources Canada, All rights reserved.
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2024 Inspection Photos at NC108



**Photo 1:** South extent of pavement cracking on Highway 32. Looking northeast.



**Photo 2:** Pavement condition in NBL. Looking northeast.

2024 Inspection Photos at NC108



**Photo 3:** Condition of SBL, looking southwest. Wide cracking repaired.



**Photo 4:** Thin cracks at south flank of landslide. Looking southwest.

2024 Inspection Photos at NC108



**Photo 5:** Cracking at the north flank of landslide. Looking south.



**Photo 6:** Rutting in SBL north from the pavement patch. Looking northeast.



2024 Inspection Photos at NC108

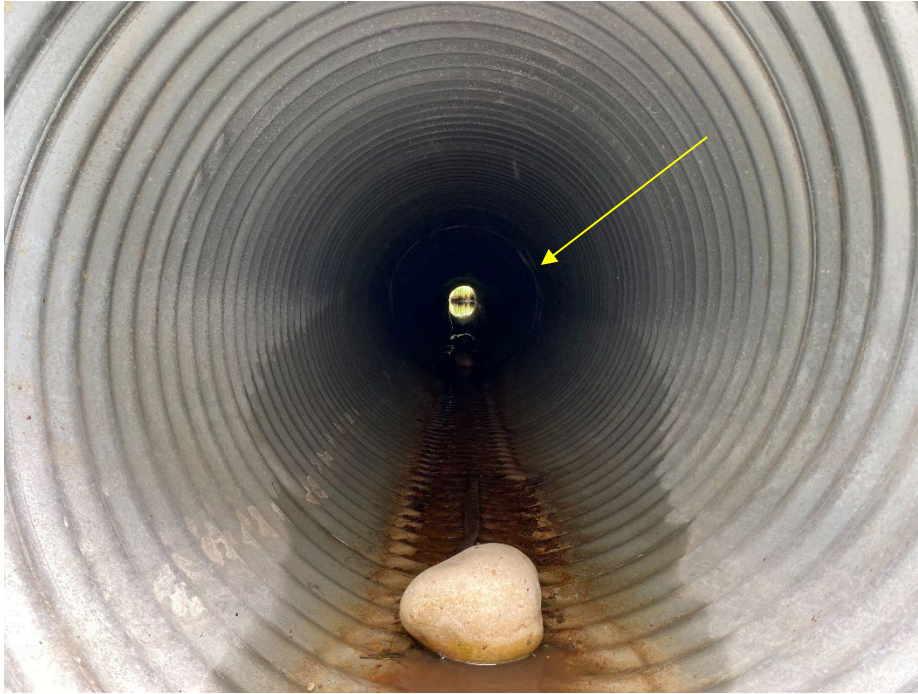


**Photo 7:** Culvert outlet becoming grown-in. Looking west.



**Photo 8:** Culvert inlet and ponded water in ditch, looking east.

2024 Inspection Photos at NC108



**Photo 9:** Possible separation between first and second segments of culvert inlet, looking east.



**Photo 10:** Possible toe bulge and leaning fence on east side of site. Looking northeast.