NORTH CENTRAL REGION GRMP
EDSON / STONY PLAIN
SITE INSPECTION FORM

SITE NUMBER AND NAME:	HIGHWAY AND KM:	PREVIOUS INSPECTION:	CURRENT INSPECTION:
NC109 – Highway 734 North of BF77316	734:22, km 27.437	June 2, 2023	June 12, 2024
LEGAL DESCRIPTION:	**NAD83 COORDINATES:**		**RISK ASSESSMENT:**
NW-16-45-18-W5	UTM11U 5859050 N, 529722 E		PF: 6 CF: 3 Total: 18
AVERAGE ANNUAL DAILY TRAFFIC (AADT):		**CONTRACTOR MAINTENANCE AREA (CMA):**	
40 (2023)		508	

SUMMARY OF INSTRUMENTATION:	INSPECTED BY:
N/A	Stantec: Leslie Cho, Sonja Pharand TEC: Kristin Tappenden, Kathleen Davis

PRIMARY SITE ISSUE:

Previous washout of northbound lane (NBL), continued erosion of road and embankments.

APPROXIMATE DIMENSIONS:

15 m long by 3 m wide

DATE OF ANY REMEDIAL ACTION:

Riprap was placed in the ditch prior to 2003. In September 2011, culvert C was replaced with a 600 mm diameter culvert and 15 m^3 of pit-run was placed to replace the washed-out side slope between culverts B and C. Ice flow at the site was dug out in March 2013. The eroded shoulder was repaired using Designation 6, Class 80 material in August 2016, and the ditch drainage was reinstated.

The frozen ditch channel was dug out at two locations in January 2022. Additional ditching work, washout repair, and culvert alterations, took place in November 2022.

In August 2023, the NBL was reconstructed after a washout. As part of reconstruction, a ditch was established along the SBL. An additional culvert (Culvert G) was also installed in 2023, between culverts E and F (see attached figures).

ITEM	CONDITION EXISTS		DESCRIPTION AND LOCATION	NOTICEABLE CHANGE FROM LAST INSPECTION	
	YES	NO		YES	NO
Pavement Distress	X		Shoulder of road surface has washed above the outlet of Culvert H (See Figure 1).	X	
Slope Movement	X		Mature curved trees along upper portion of west backslope.		X
Erosion	X		Erosion gullies and rills along downslope embankment, erosion and sedimentation in ditches.		X
Seepage	X		Possible springs in backslope to the west of culverts B and C. Seepage observed in backslope to the northeast, east of culvert H.	X	
Bridge/Culvert Distress	X		2 of the 6 CSP culverts (H and E) are partially blocked with sediment/ material at the inlets.	X	

COMMENTS

- Highway 734:22 continues to be a gravel surfaced road.
- Culvert F (800 mm dia., just north of BF77316) appeared to be in good condition, similar to the previous inspection. The ditch north of the inlet has a lot of sediment, with sediment building up in the inlet as well. An erosion channel exists within the ditch north and south from the inlet with sediment gathering in this ditch (Photos 1 and 2).

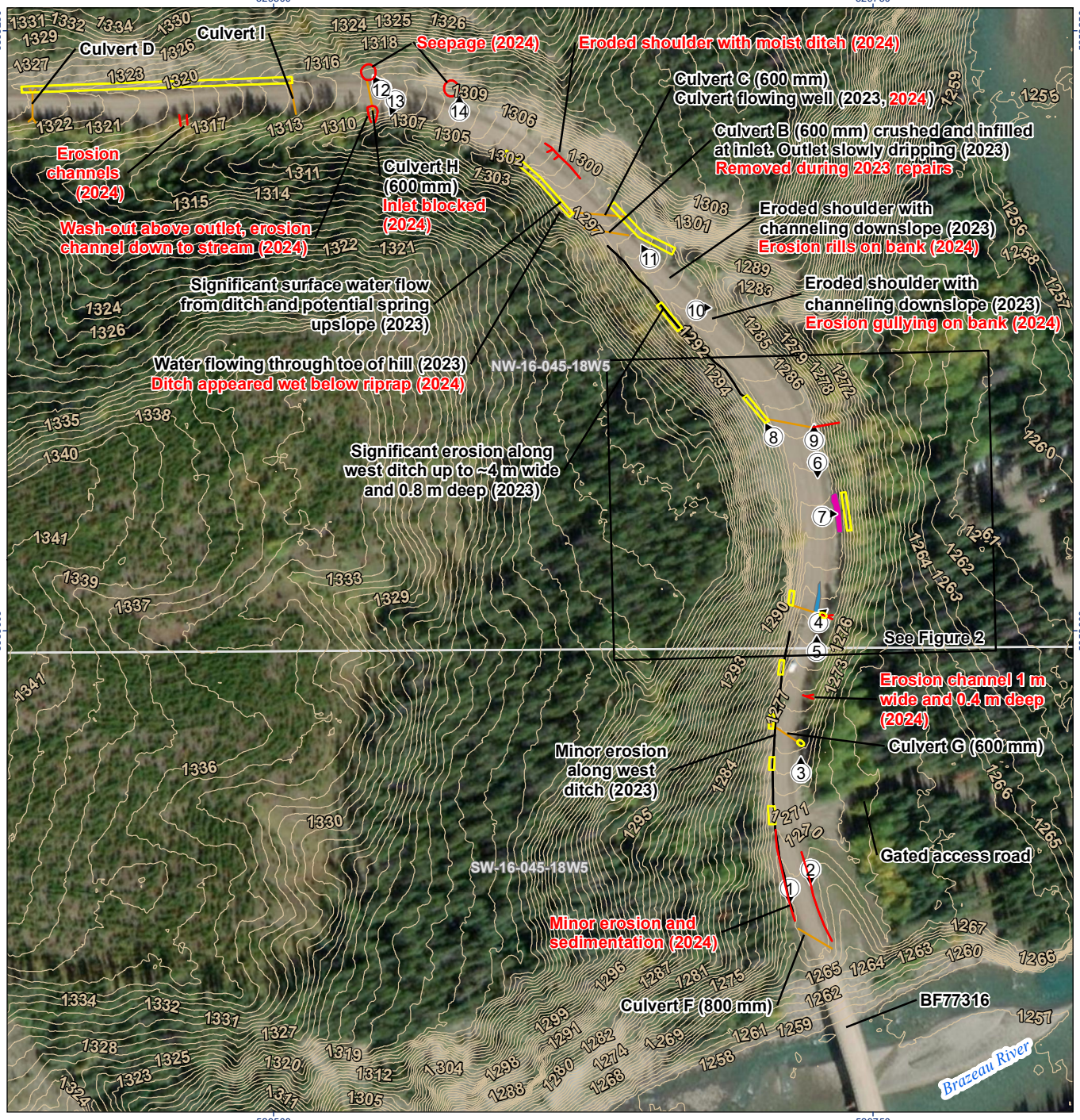
- Culvert G (600 mm dia.) has been installed north of the entrance to the gated access road between Culverts F and E. The inlet and outlet are both surrounded with riprap to protect the ditch and bank from erosion (Photo 3).
- Erosion was observed on the east bank, approximately halfway between Culverts E and G. The channel was up to 1 m wide and up to 400 mm deep.
- Culvert E was replaced and upgraded to 600 mm dia. during the reconstruction of the NBL. A rock dam has been constructed on the lower side of the inlet and riprap has been placed in the ditch leading up to the inlet. The outlet is surrounded with riprap to protect the west ditch and the east bank from erosion. The riprap is partially blocking the outlet, and two erosion channels have formed down the slope, up to 1 m wide and 0.4 m deep. Some of the riprap had been displaced downslope (Photo 4).
- A riprap buttress has been constructed at the location of the landslide observed during the 2023 call-out inspection and the NBL has been reinstated (Photos 5 and 6). The riprap is visible for approximately 10 m across the slope, at approximately 1/3 of the way down the slope (Photo 7).
- An erosion channel approximately 1 m wide and up to 0.1 m deep was observed on the east slope, south from the outlet of Culvert A.
- The inlet of Culvert A (600 mm dia.) was observed to be open and surrounded by riprap (Photo 8). Sediment off the west backslope is being deposited above the riprap but was not blocking the inlet during this inspection. The outlet was hanging over the downslope side of the highway by about 0.3 m. The erosion channel and partially washed-out mountain side observed during the 2023 call-out inspection appeared relatively unchanged. A few fallen and leaning trees were also observed near the outlet (Photo 9).
- Riprap lines the west ditch for approximately 10 m north from the inlet of Culvert A (Photos 15 and 16).
- Several erosion rills and gullies were observed between the outlets of Culvert C and Culvert A on the downslope side of the highway, to the creek (Photos 10 and 16). The erosion begins at the edge of the highway. The 4 m wide and 0.8 m deep erosion channel observed during the 2023 call-out inspection has been repaired and was not observed.
- Culvert C (600 mm dia.) was observed to have been repaired, and riprap placed along the ditch upslope of the inlet and downslope of the outlet (Photo 11). Surficial erosion and sedimentation was observed in the east ditch north from the outlet of Culvert C. Water was steadily flowing through the culvert during the inspection.
- Culvert B observed to be infilled with soil and debris during the 2023 call-out inspection was removed during recent repairs.
- Culvert H (600 mm dia.) was observed at the corner northwest from Culvert C (See Figure 1). The inlet, located in the north ditch, is blocked with wet material from the backslope (Photo 12). Partial loss of roadway was observed upslope from the outlet. The slope below the outlet of the culvert is wet, and erosion is present. Two safety cones are downslope, possibly having been placed at the edge of the highway (Photo 13).
- Erosion was observed on the shoulder of the NBL, between the outlets of Culvert H and Culvert C. The ditch appeared moist in this section.
- Seepage was observed on the backslope on the north / northeast side of the highway, above the inlet to Culvert H and approximately 50 m southeast from Culvert H. Areas of the slope appear moist, as does the ditch below this portion of this slope (Photo 14).
- Culvert I was observed through drone photos, and is approximately 50 m west from Culvert H (Photo 18). The diameter is unknown, however a berm appears to have been constructed east of the inlet, and the outlet is surrounded by riprap. The slope below the outlet appears to be moist.
- Riprap has been placed in the north ditch between Culverts I and D (Photo 18).
- Two erosion channels, both less than 1 m wide, were observed on the south embankment between Culverts I and D (Photo 18).
- A Probability Factor of 6 has been selected since the highway embankment slide is considered inactive after repairs, with a moderate probability of remobilization. Due to the presence of cuts and fills, active erosion and sedimentation, and the previous loss of a portion of the NBL, a Consequence Factor of 3 was assessed.

RECOMMENDATIONS

- Use of the area at the southeast toe should be restricted to reduce the risk to public safety.
- All culverts should be inspected regularly to maintain functionality. Damaged culverts should be replaced, and inlets/outlets should be cleaned out. Additional riprap could be placed at the outlets of the culverts to reduce further erosion of the embankment.
- Given the icing concerns noted in the history of the site, guardrails could be installed around the bend to enhance public safety.
- Erosion gullies should be repaired by backfilling with similar soils to reinstate the grade and placing riprap at eroded locations for protection against further erosion.

- The embankment above the outlet for Culvert H should be repaired before additional material is lost from the edge of the highway. This can be done by backfilling with similar soils to reinstate the grade, and riprap should be placed around the culvert outlet for erosion protection. In the near term, delineators could be placed at the edge of road to warn motorists of the loss of roadway.
- The site should continue to be inspected once per contract cycle.

PREPARED BY: Sonja Pharand, P.Eng.	**REVIEWED BY:** Xiteng Liu, M.Sc., P.Eng., PMP	**PERMIT TO PRACTICE:**
PROFESSIONAL ENGINEER ALBERTA SONJA A. PHARAND ID 286545 Oct. 15 2024		PERMIT TO PRACTICE STANTEC CONSULTING LTD. Signature Date 2024-10-15 PERMIT NUMBER: P 0258 The Association of Professional Engineers and Geoscientists of Alberta



2024 Observations
Culvert
Previous Observations
Riprap (2024)
Photos and Direction
Quarter Section
Ground Elevation Contours (m)

0 30 60 metres
(At original document size of 8.5x11)
1:2,500,000

N

Notes
1. Coordinate System: NAD 1983 10TM AEP Forest
2. Data Sources: Geogratis, ©Department of Natural Resources Canada, All rights reserved.
3. Background: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Stantec

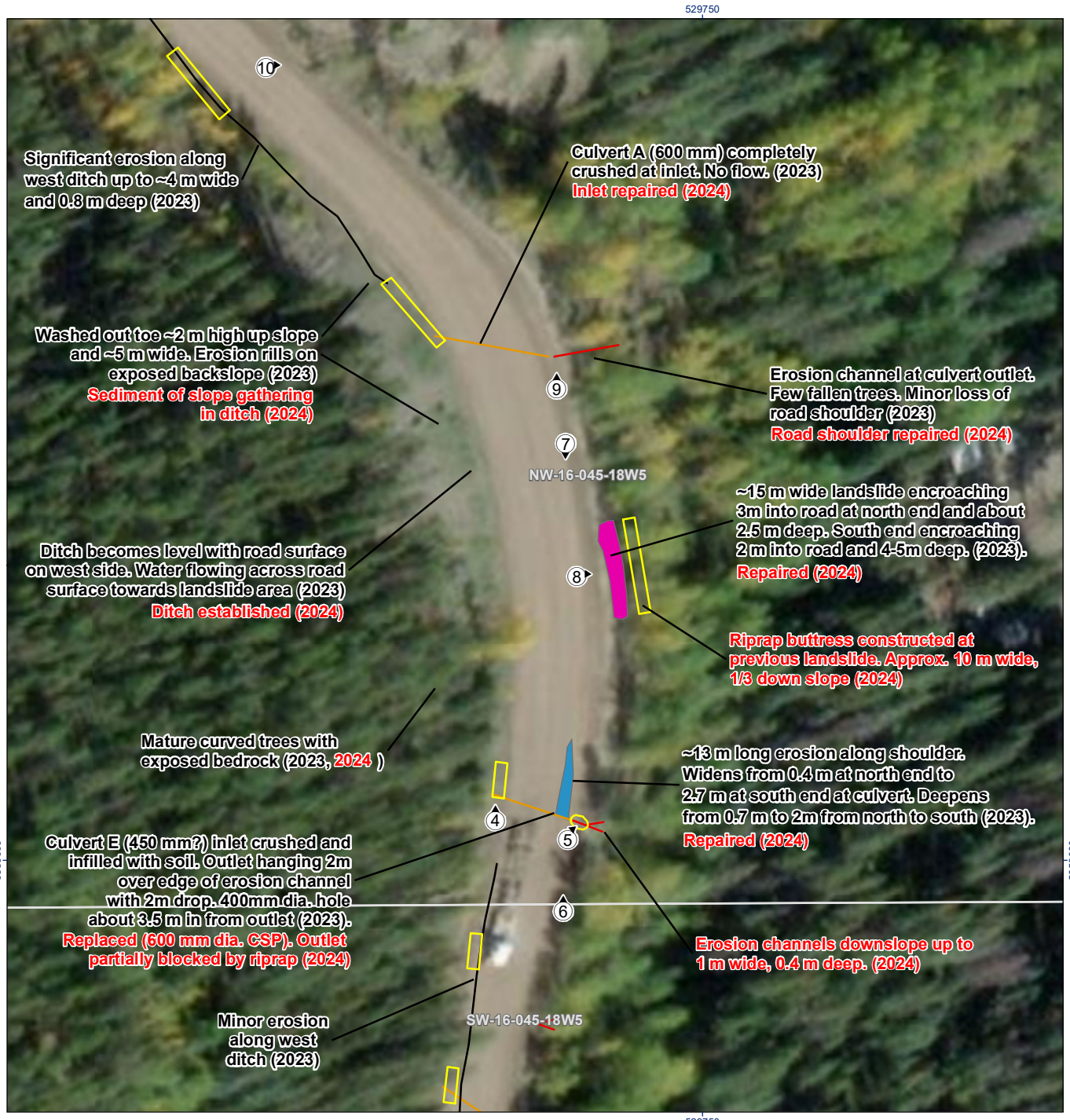
Project Location
Highway 734,
Alberta

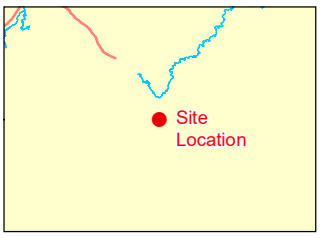
Prepared by SP on 2024-09-09
TR by LC on 2024-09-09
IR by XLiu on 2024-09-09

Client/Project 123315222
Alberta Transportation and Economic Corridors
Geohazard Monitoring Program,
NC109 Highway 734:22

Figure No.
1

Title
Site Plan





Culvert
2024 Observations
Previous Observations
Riprap (2024)
Photos / Direction
Quarter Section
Eroded Shoulder
Landslide Area

0 10 20 metres
(At original document size of 8.5x11)
1:1,000

N

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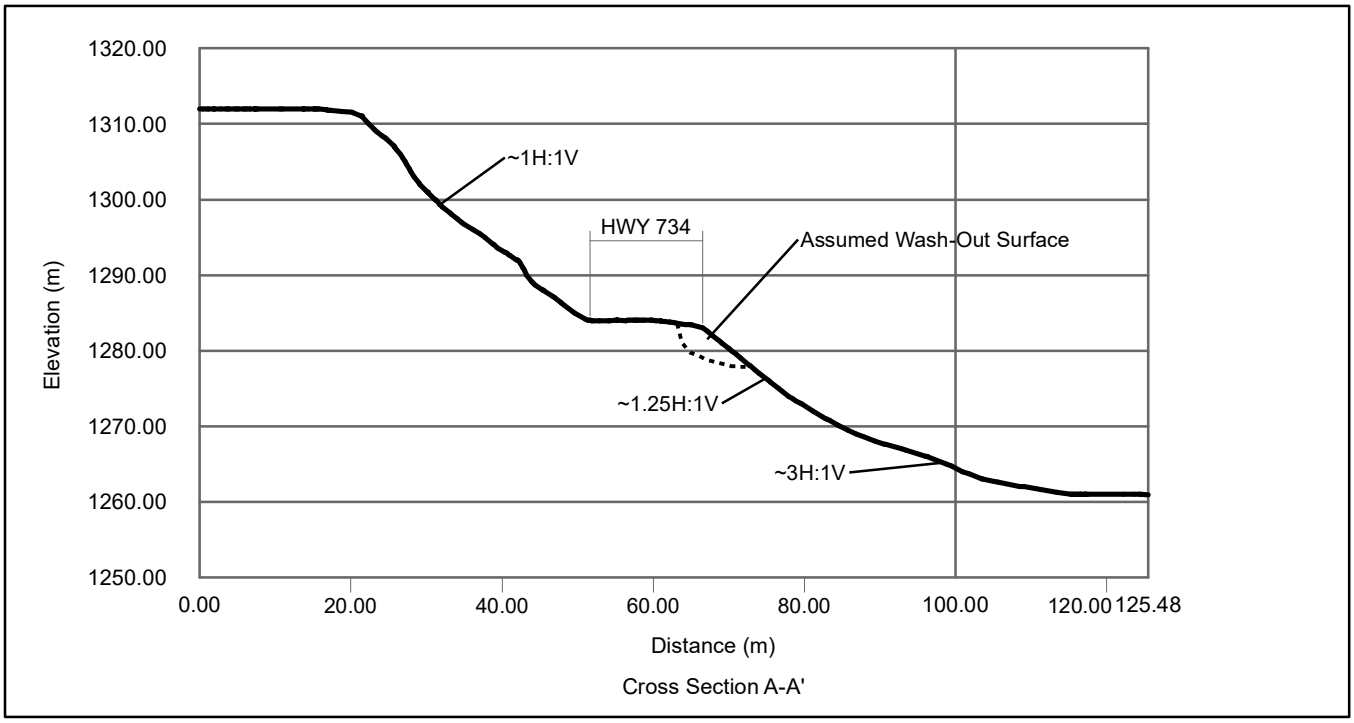
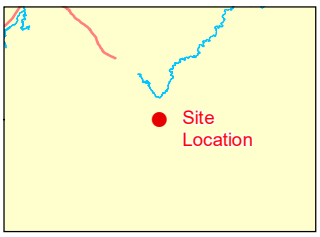
Alberta Transportation and Economic Corridor
Geohazard Monitoring Program,
NC109 Highway 734:22

Figure No.
2

Title
Landslide Area

Notes
1. Coordinate System: NAD 1983 UTM Zone 11N
2. Data Sources: Geogratis, ©Department of Natural Resources Canada, All rights reserved.
3. Background: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community





Cross Section

Ground Elevation Contours (m) (2012 LiDAR)

2023 Landslide Area

2023 Eroded Shoulder

0 10 20 metres

(At original document size of 8.5x11)
1:1,000

N

Notes

1. Coordinate System: NAD 1983 UTM Zone 11N

2. Data Sources: Geogratis, ©Department of Natural Resources Canada, All rights reserved.

3. Background: © 2024 Microsoft Corporation © 2024 Maxar ©CNES (2024) Distribution Airbus DS

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Client/Project 123315222
Alberta Transportation and Economic Corridors
Geohazard Monitoring Program,
NC109 Highway 734:22

Figure
3

Title
Ground Profile Plan

2024 Inspection Photos at NC109

Photo 1: Erosion and sedimentation in SBL ditch leading to Culvert F. Sediment built up at beveled inlet. Looking south.

Photo 2: Erosion and sedimentation in ditch next to NBL leading up to outlet of Culvert F. Looking south.

2024 Inspection Photos at NC109

Photo 3: 600 mm diameter Culvert G installed between Culverts E and F. Outlet lined with riprap. Looking north.

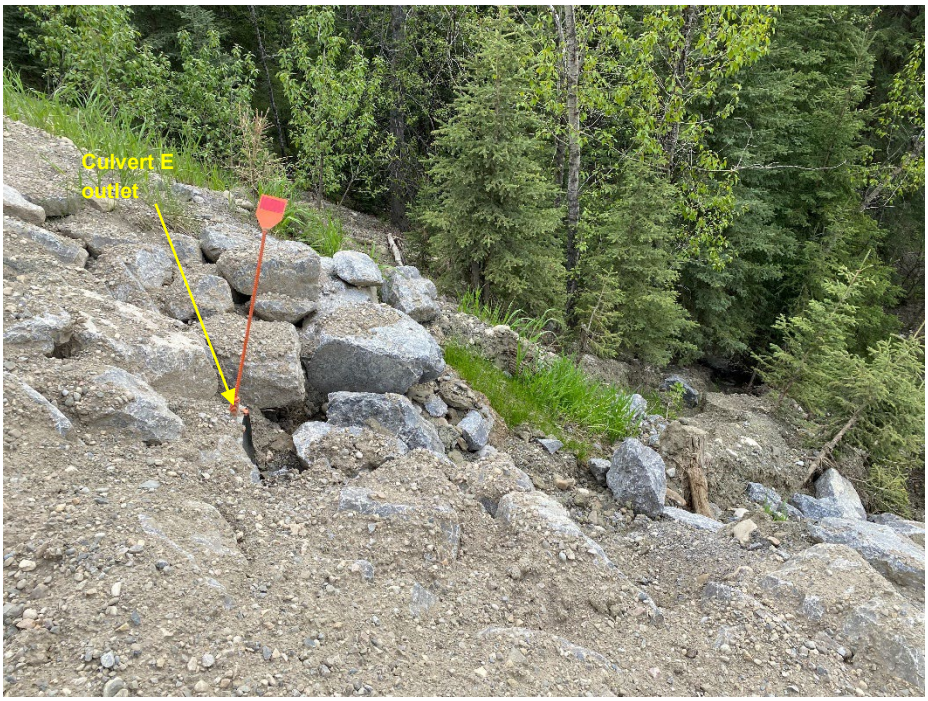

Photo 4: Bank at Culvert E lined with riprap. Erosion channel forming below. Looking northeast.

2024 Inspection Photos at NC109

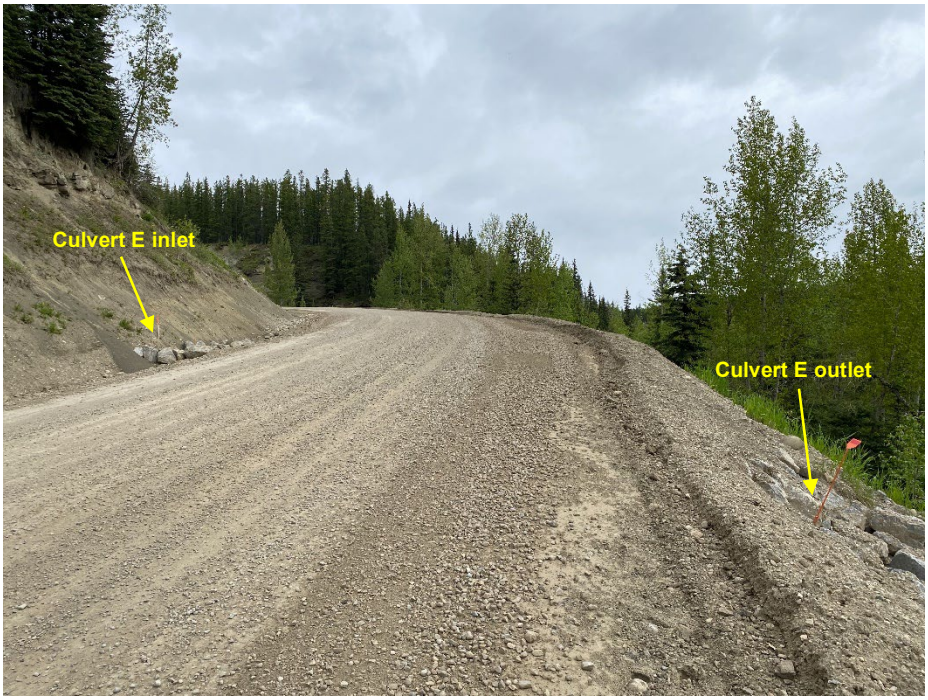

Photo 5: South end of NBL wash-out repair. Culvert E inlet and outlet lined with riprap. Looking north.

Photo 6: North end of washed-out NBL. Looking south.

2024 Inspection Photos at NC109

Photo 7: Riprap buttress constructed at location of NBL wash-out repair. Looking southeast.

Photo 8: Culvert A inlet in SBL ditch, open and dry. Riprap lining ditch north of inlet. Looking north.

2024 Inspection Photos at NC109

Photo 9: Overhang at Culvert A outlet. Washout and erosion gully below outlet. Looking north.

Photo 10: Erosion gullying on shoulder of NBL into drainage, between Culverts A and C. Looking east.

2024 Inspection Photos at NC109

Photo 11: Culvert C outlet into eroded ditch lined with riprap. Looking northwest.

Photo 12: Inlet to Culvert H is blocked with wet material off backslope. Looking northwest.

2024 Inspection Photos at NC109

Photo 13: Outlet of Culvert H positioned above stream in south ditch. Slope above outlet washed out at the edge o the highway. Looking southwest.

Photo 14: Seepage observed on backslope northeast of highway, south from Culvert H. Looking north.

2024 Inspection Photos at NC109

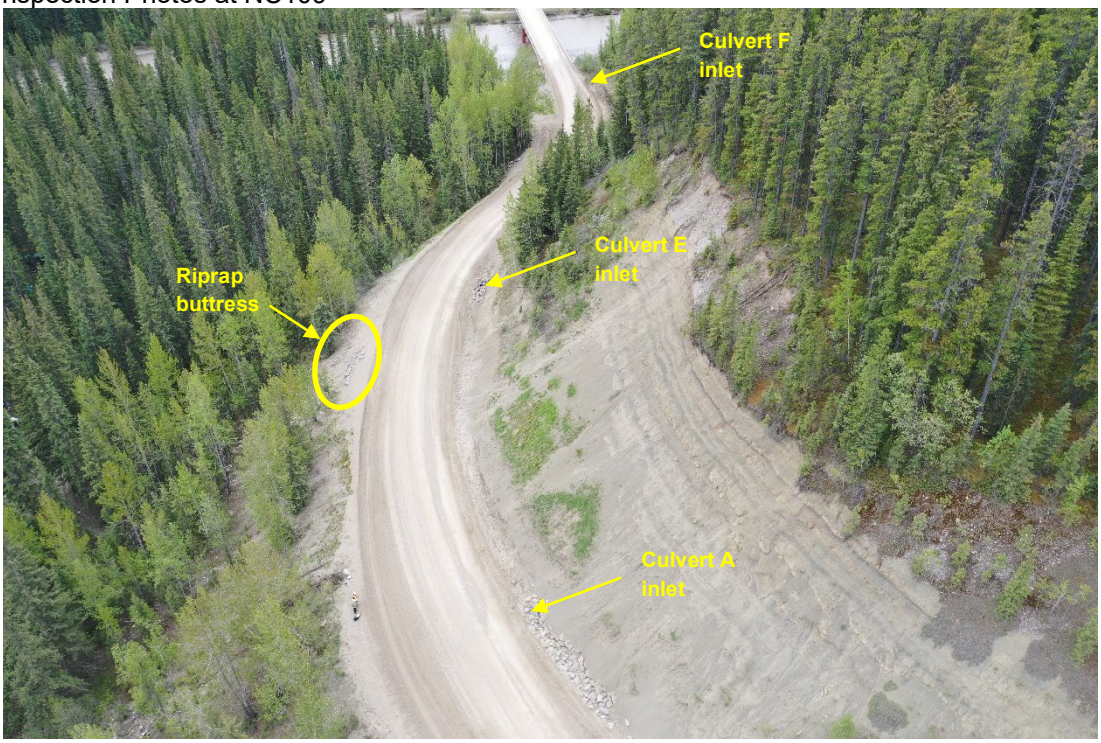

Photo 15: Overview of Highway 734 between Culvert A to the Brazeau River. Photo taken by drone, looking south.

Photo 16: Overview of Highway 734 between Culverts C and A. Photo taken by drone, looking west.

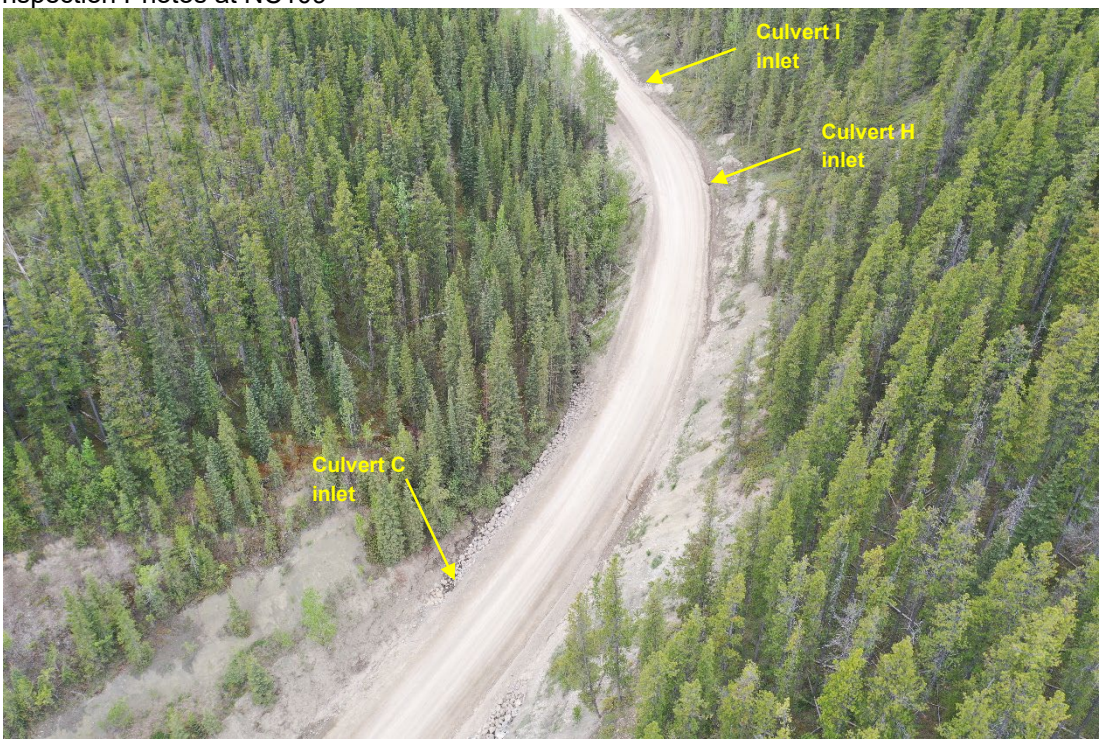

Photo 17: Overview of Highway 734 between Culverts C and I. Photo taken by drone, looking west.

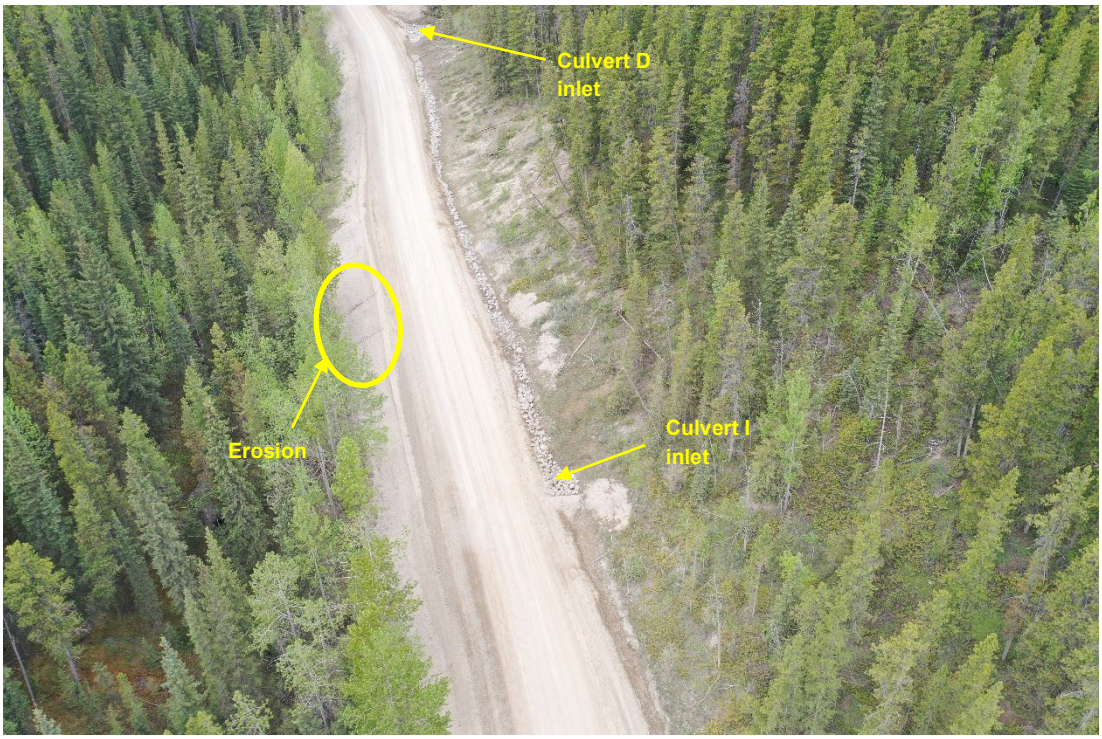

Photo 18: Overview of Highway 734 between Culverts H and I. Photo taken by drone, looking west.