

**ALBERTA TRANSPORTATION
GEOHAZARD ASSESSMENT PROGRAM
PEACE REGION – HIGH LEVEL
2020 INSPECTION**



Site Number	Location	Name	Hwy	km
PH074-1	Northeast of La Crete Ferry Crossing	East Peace River Hill Frost Heaves	697:02	20.04
Legal Description		UTM Co-ordinates		
SW32-103-19-W5M		11U E 493,300	N	6,426,612

	Date	PF	CF	Total
Previous Inspection:	14-June-2016	8	2	16
Current Inspection:	5-June-2020	8	2	16
Road AADT:	290		Year:	2020
Inspected By:	Rocky Wang, TRANS Ed Szmata, TRANS		Ken Froese, Thurber	
Report Attachments:	<input checked="" type="checkbox"/> Photographs	<input checked="" type="checkbox"/> Plans	<input type="checkbox"/> Maintenance Items	

Primary Site Issue:	Seasonal humps on highway at each edge of embankment fill.	
Dimensions:	12.5 m high embankment	
Date of Remediation:	None	
Maintenance:	2019: Paved	
Observations:	Description	Worsened?
<input checked="" type="checkbox"/> Pavement Distress	Highway embankment is depressed over the culvert embankment fill with humps at each end: 60 m long on NE side and only slight at SW side. Transverse cracks have formed at these humps.	<input type="checkbox"/>
<input checked="" type="checkbox"/> Slope Movement	There is a scarp on the embankment slope above the culvert outlet which appears vegetated and relatively stable. Second shallow scarp has formed on north side of the embankment	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Erosion	Erosion gully down the southside of the embankment east of the culvert was unchanged; the gully in the south ditch east of the fill was roughly regraded.	<input type="checkbox"/>
<input type="checkbox"/> Seepage		<input type="checkbox"/>
<input checked="" type="checkbox"/> Bridge/Culvert Distress	Silt had been accumulated at inlet of 600 mm culvert. This appears to have been cleared by the 2016 inspection. The inlet was again covered in 2020.	<input checked="" type="checkbox"/>
<input type="checkbox"/> Other		<input type="checkbox"/>
Instrumentation:	None.	
Assessment:	Based on discussions with Alberta Transportation maintenance personnel, the humps at either end of the embankment fill are more pronounced in winter and only minor during the summer. The humps have posed a pavement smoothness issue for many years.	

As the humps occur at either end of the embankment fill, the cause is likely a combination of long-term settlement of the fill over the culvert combined with frost heaving at the cut-fill contacts in the winter. Exposed soils observed in the vicinity are sand and silt which are highly frost-susceptible when given access to water. The difference in magnitude of the frost heaving may reflect greater groundwater presence on the northeast (uphill) side which would increase the amount of frost heave. The scarp in the embankment above the outlet may have been triggered by the scour bowl that has formed at the culvert outlet. There were no signs of recent movement on this scarp; however, the slope below is steeper than the embankment fill above.

The site was inspected again in 2020 after four years without as there was a second potential site in the vicinity that the Maintenance Contractor Inspector wanted examined. That second site did not appear to be a developing slide. The conditions at PH074 appeared fairly similar to what was seen in 2016. The erosion features are relatively stable and the slump at the outlet hasn't developed further. The humps at the edges and the dip in center of the fill remain and there is a new shallow slump forming on the north embankment but deteriorating is relatively slow at this location. However, there is a concern that with the elevated water tables inducing slides at many locations elsewhere in the Peace Region and the propensity of fills in this region to lose cohesion with time means there is the potential for larger-scale movements at this location where the embankment is already quite steep.

Recommendations:

Short-Term:

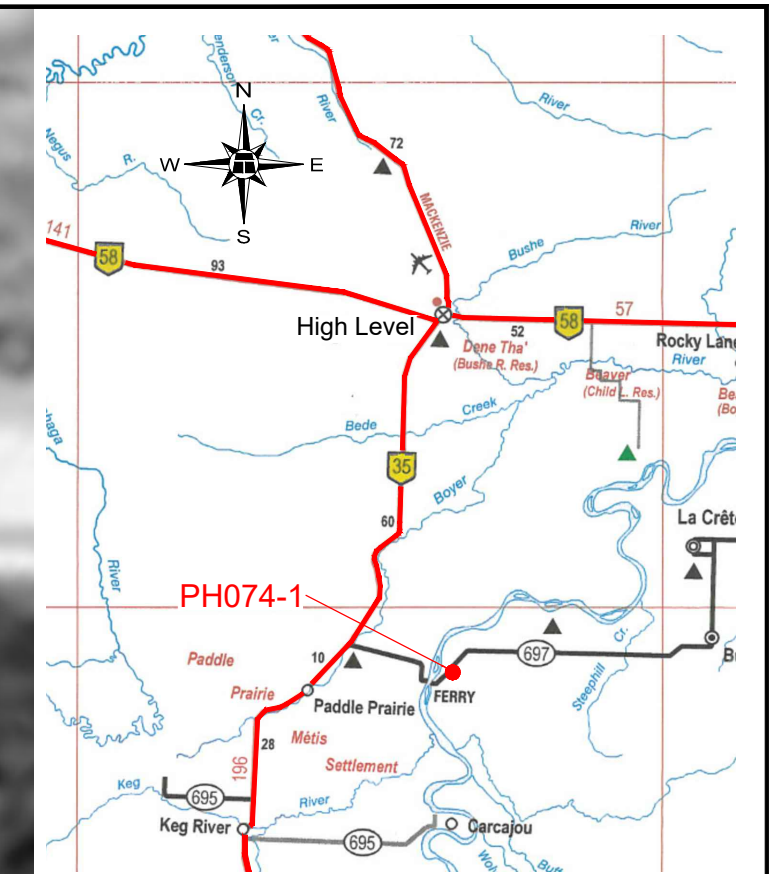
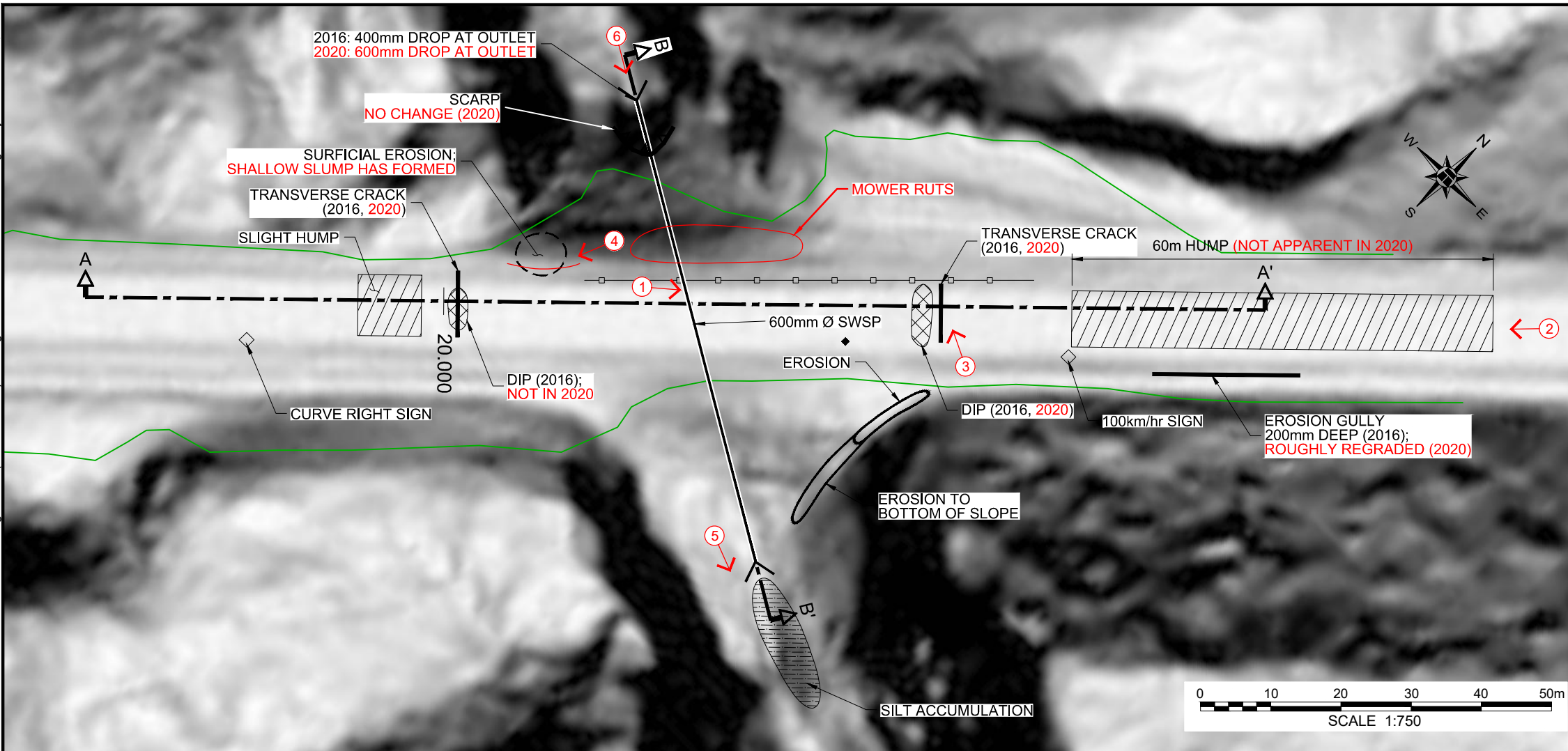
- Asphalt patching and milling, as required, to smooth the abrupt changes in the pavement profile.

Long-Term:

- Consideration could be given to the use of horizontal drains beneath the roadway ditches to lower the water table. Installation of insulation beneath the roadway surface may be required as an additional later measure to reduce the amount of frost heave if control of the groundwater is insufficient to solve the problem.

Ongoing Investigation:

- The site can be dropped again from the annual routine GeoHazard inspection unless the site significant deteriorates further.
- A geotechnical investigation should be undertaken to assess the subgrade conditions below each of the humps and to install piezometers in the ditches to determine the groundwater levels prior to design remedial measures.

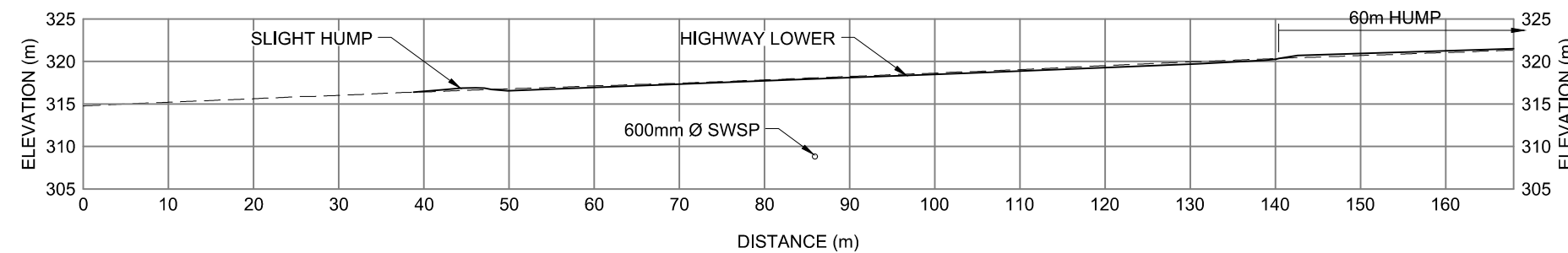


LEGEND

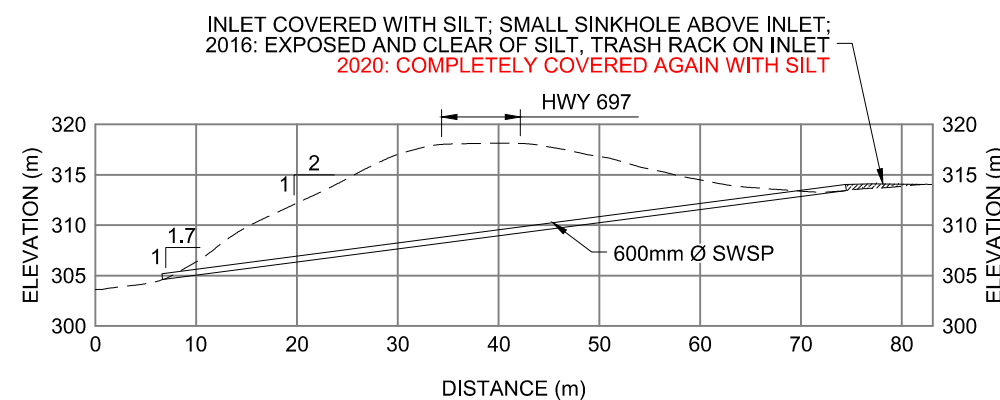
- LANDSLIDE SCARP
- GUARDRAIL
- RED TEMPORARY HAZARD SIGN
- PHOTO AND DIRECTION

NOTES

1. FEATURE LOCATIONS ARE APPROXIMATE.
2. PREVIOUS OBSERVATIONS SHOWN IN BLACK
3. JUNE 2020 OBSERVATIONS SHOWN IN RED.
4. LIDAR SHADED BY SLOPE FROM WHITE AT 0° TO BLACK AT ≥ 30°



SECTION A-A'



SECTION B-B'

LIDAR PROVIDED BY ALBERTA TRANSPORTATION (ACQUISITION DATE UNKNOWN)



PEACE REGION (PEACE RIVER / HIGH LEVEL)

**PH074-1: HWY 697:02 AT km 18.62
2020 GEOHAZARD ASSESSMENT**

DWG No. 13351-PH074-1

DRAWN BY	KLW
DESIGNED BY	KEF
APPROVED BY	DWP
SCALE	1:750
DATE	DECEMBER 2020
FILE No.	13351





Photo 1 – Looking northeast at hump in the highway.



Photo 2 – Looking southwest from northeast end at dip in highway.



Photo 3 – Looking northwest at crack at northeast end of embankment fill.



Photo 4 – Looking southwest at northwest sideslope.



Photo 5 – Silt accumulation upslope of inlet.



Photo 6 – Hanging culvert outlet.