

**ALBERTA TRANSPORTATION
GEOHAZARD ASSESSMENT PROGRAM
PEACE REGION – HIGH LEVEL
2016 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:	13-May-2016	8	2	16
Current Inspection:	14-June-2016	8	2	16
Road AADT:	260		Year:	2016
Inspected By:	Rishi Adhikari, 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:	None	
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 checked="" 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.	<input type="checkbox"/>
<input checked="" type="checkbox"/> Erosion	The erosion gully on the southeast side of the embankment has extended to the bottom of the fill and a new gully has formed in the southeast ditch (NE of the culvert). Minor erosion was noted on the northwest embankment slope.	<input checked="" 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.	<input 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.

Recommendations:

Short-Term:

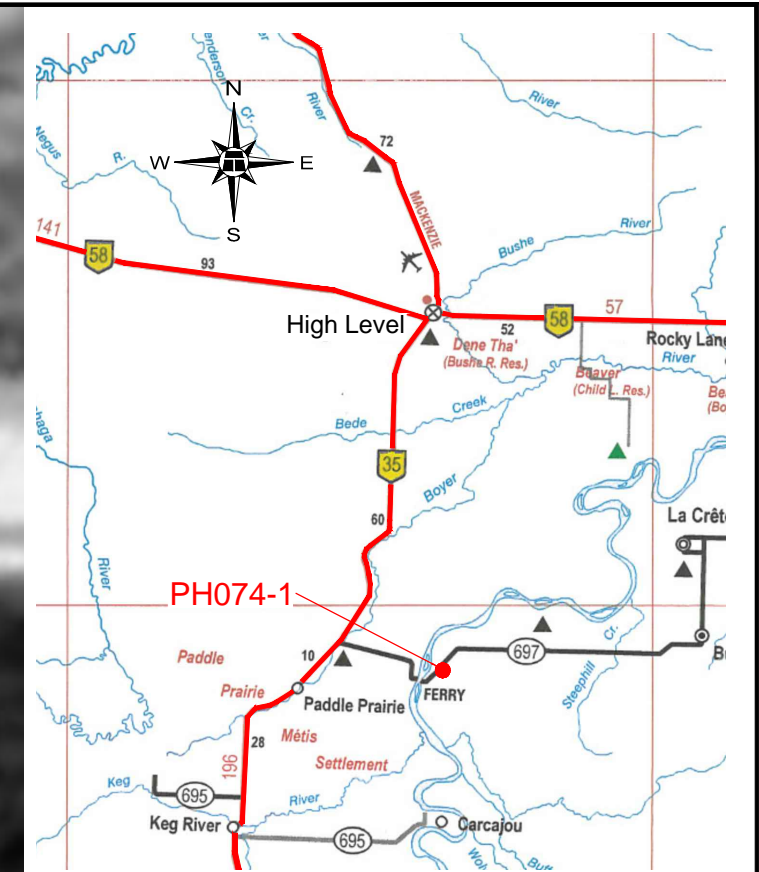
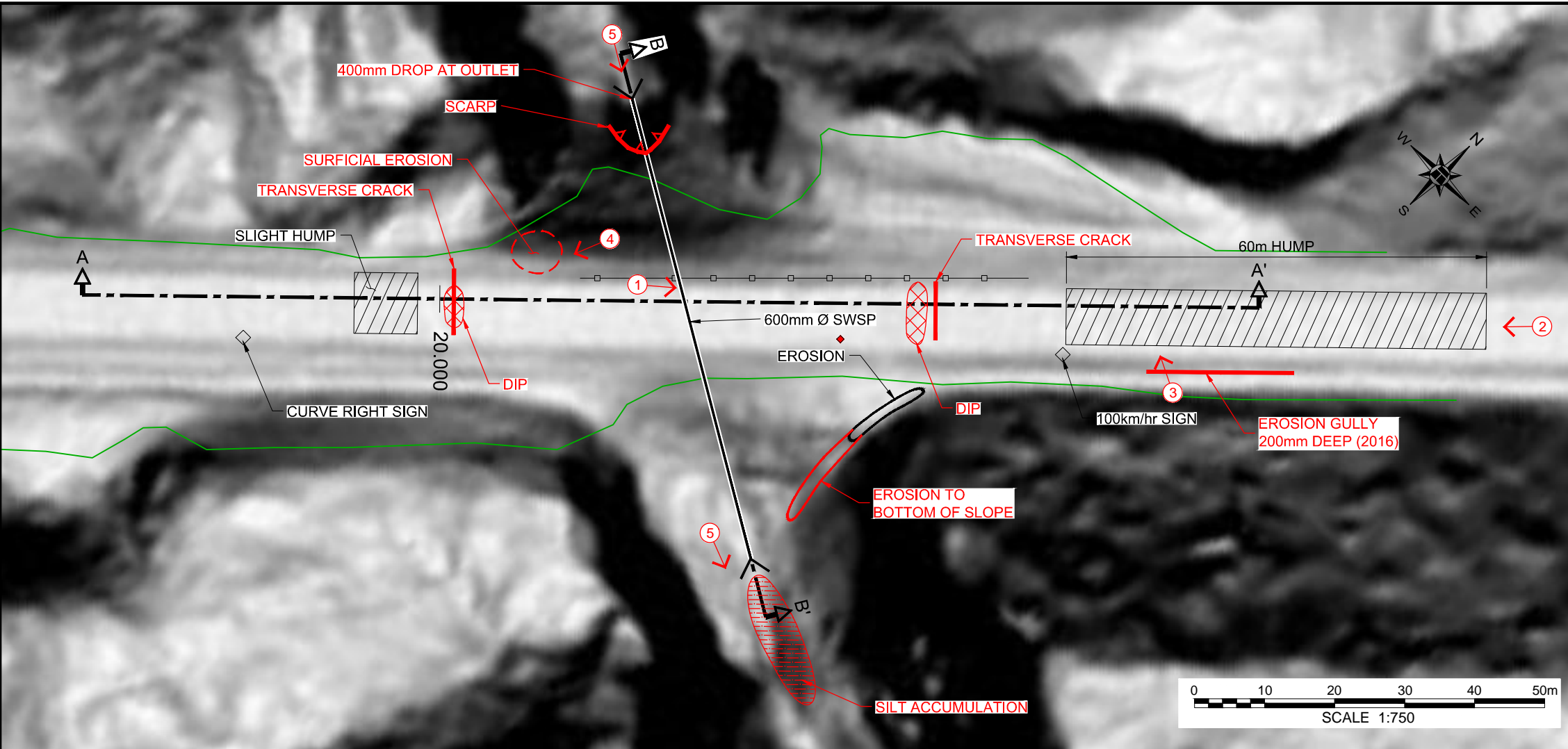
- Asphalt patching and milling, as required, to smooth the abrupt changes in the pavement profile.

Long-Term:

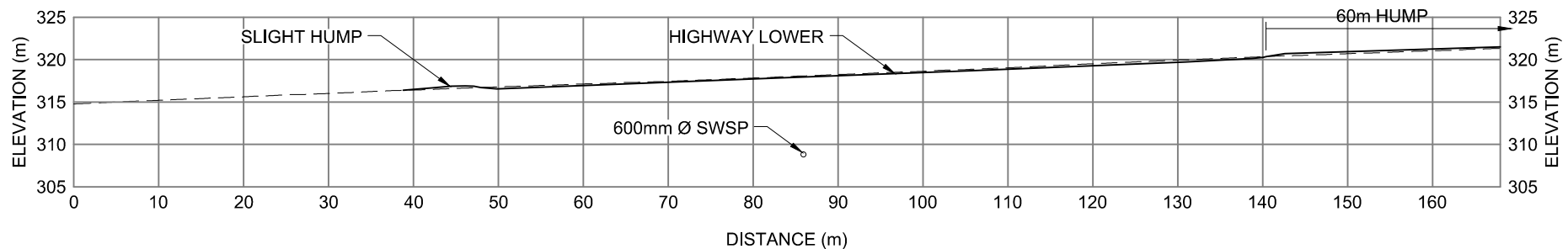
- Consideration could be given to the use of horizontal drains beneath the roadway ditches to lower the water table. Installation of insulation beneath the roadway surface may be required as an additional later measure to reduce the amount of frost heave if control of the groundwater is insufficient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

Ongoing Investigation:

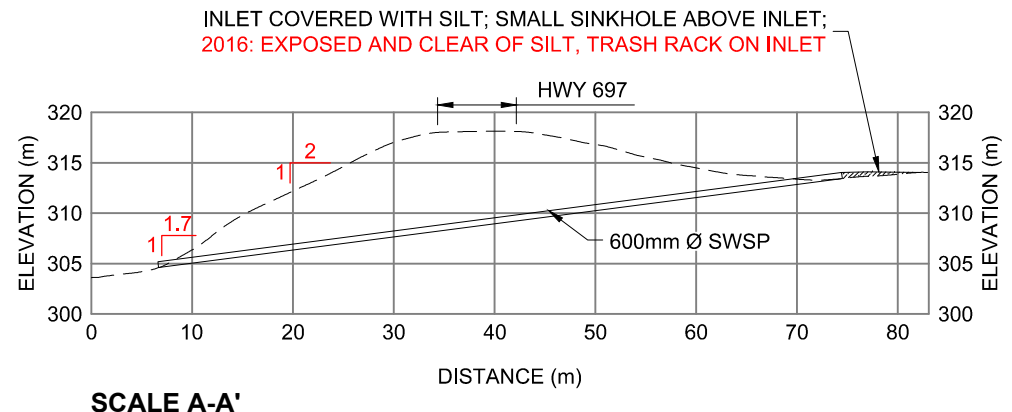
- It is suggested that the annual GeoHazard inspection frequency be reduced to alternating years unless the site significant deteriorates further.
- A geotechnical investigation should be undertaken to assess the subgrade conditions below each of the humps and to install piezometers in the ditches to 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 2016 OBSERVATIONS SHOWN IN RED.
 4. LIDAR SHADED BY SLOPE FROM WHITE AT 0° TO BLACK AT ≥ 30°



SCALE A-A'



SCALE A-A'

LIDAR PROVIDED BY ALBERTA TRANSPORTATION (ACQUISITION DATE UNKNOWN)

PEACE REGION (PEACE RIVER / HIGH LEVEL)

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

DWG No. 13351-PH074-1

DRAWN BY	KLW
DESIGNED BY	KEF
APPROVED BY	DWP
SCALE	1:750
DATE	DECEMBER 2016
FILE No.	13351

THURBER ENGINEERING LTD.



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.