

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



Site Number	Location	Name	Hwy	km
PH038-1	North of Town of Peace River	Whitemud River (km 45.5) (Was Station 45+350)	743:02	45.3
Legal Description		UTM Co-ordinates		
S11-88-21-5		11V N 6,274,373	E 485,755	

	Date	PF	CF	Total
Previous Inspection:	15-May-2019	9	3	27 (erosion scale)
Current Inspection:	4-Jun-2020	9	3	27 (erosion scale)
Road AADT:	110	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:	Site repaired in 2009. Original issue was erosion and sliding affecting the highway sideslope and culvert outlet. Current issue is ongoing erosion of riprap swale.		
Dimensions:	85 m of erosion along rip-rap drainage swale.		
Date of any remediation:	2009: The culvert was replaced with a larger, longer culvert, the embankment sideslopes were flattened, and slide areas around the culvert outlet were removed or unloaded. 2011: The swale was re-lined with larger riprap.		
Maintenance:	N/A	Worsened?	
Observations:	Description	Yes	No
<input type="checkbox"/> Pavement Distress	Highway is gravel surfaced.	<input type="checkbox"/>	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Slope Movement	No noticeable signs of movement of embankment. Slumping occurring along northern swale and at culvert outlet.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> Erosion	Erosion has occurred along the north swale causing slumping along the entire length. Voids forming below concrete headwalls at inlet and outlet.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> Seepage	Minor seepage was noted in the riprap apron at the culvert outlet and along the road to the west which was quite pronounced in 2020.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input checked="" type="checkbox"/> Culvert Distress	The 2.43 m dia. culvert (BF77273-2) was installed in 2009 and is in good condition. There is a 900 mm dia. culvert at the west side of the site: the inlet is sunken well below ditch level and an erosion bowl has formed at the outlet.	<input checked="" type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/> Other		<input type="checkbox"/>	<input type="checkbox"/>

Instrumentation:

2 pneumatic piezometers and 2 settlement plates were installed for the design and construction of the remedial measures. These were removed/destroyed during construction.

Assessment:

There were two call-out inspections undertaken along the Whitemud River valley later in June after the GeoHazard inspection and again in August due to significant landslide movements on both sides of the valley which closed the highway in July 2020. This site is located on a relatively flatter section of the roadway and was unaffected by these other movements.

The embankment fill slopes appeared to be in good condition with no signs of global instability and is well vegetated.

The main drainage swale was relined with larger Class 2-3 sized riprap in 2011. However, significant erosion and settlement has developed especially in the upper, steeper, 30 m of the swale where tension cracks and slumping have formed on both sides of the swale and have worsened yearly since 2016. Possible tension cracks were noted in 2017 south partway up the highway embankment which could be related to the movement local to the drainage channel but were not changed in 2018. Erosion, settlement, and cracking was also present at several other locations along the swale and have continued to worsen each year. Erosion and settlement along the drainage swale also extends closer to the toe of the bank (near the culvert outlet). The deterioration of this rock swale is likely a result of poor compaction, poor fill quality, and possible gaps in geotextile. Water flow is getting outside of the channel upslope so can erode behind the riprap for the remainder. Pins to monitor regression of this feature were installed in 2019 at 2 m from the main scarps and the distance had dropped to 1 m or less in 2020

Some erosion and shallow slump cracks are present in the fill at the culvert outlet but have not worsened noticeably since the previous inspection with the exception of an erosion void noted in 2019 forming at the culvert outlet. In 2020, voids were also documented below the concrete headwall at the inlet as well. Based on the height of deposited sediment at the inlet, the flows in the spring of 2020 were significant.

Recommendations:**Short-Term:**

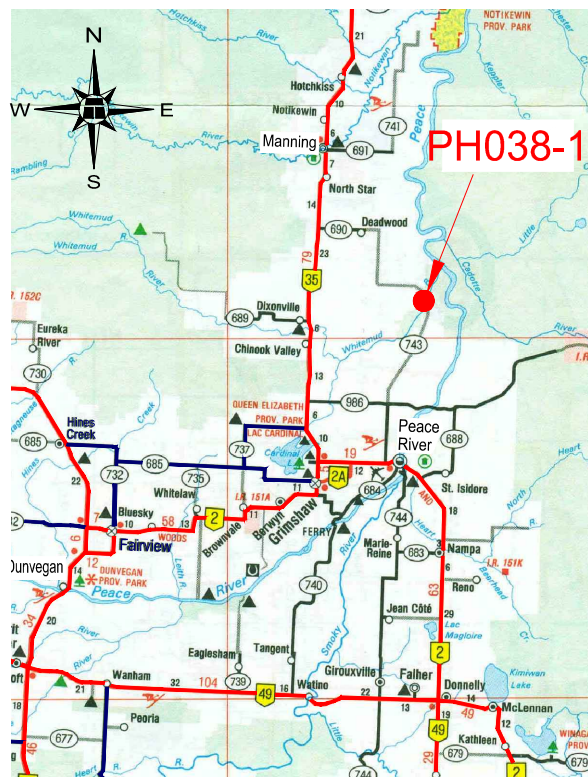
- Periodic visits by the AT Maintenance Contractor are recommended to ensure that the erosion at the west end of the swale is not adversely affecting the highway.
- The silt fences installed on both sides of the embankment are no longer required and should be removed to minimize the potential for channelized flow.

Long-Term:

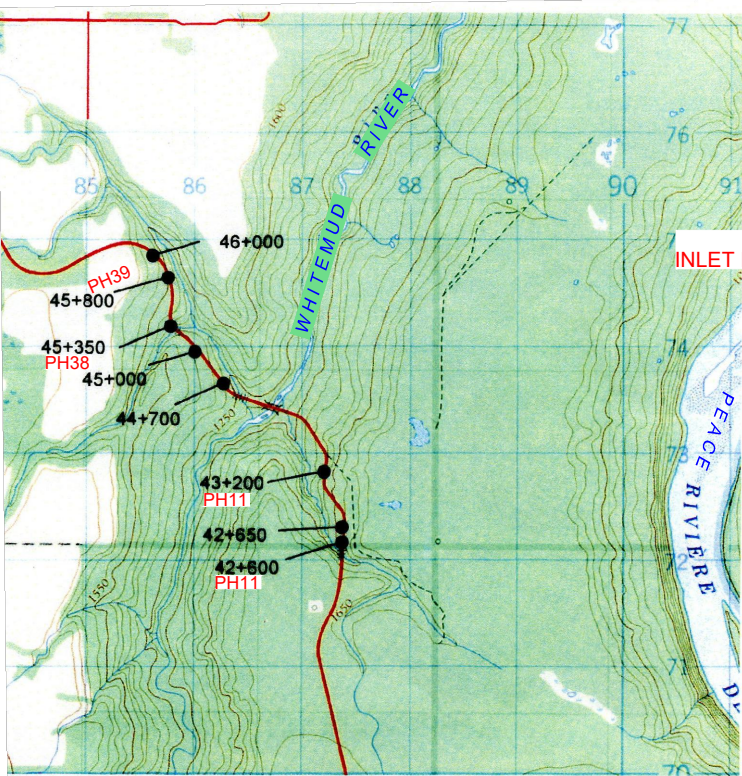
- The rock swale should be completely reconstructed: remove and salvage the existing riprap, excavate the wet or soft subgrade at the base of the channel to a depth of 1 m over a 10 m width, place and compact borrow material, flatten the sideslopes, install new non-woven geotextile, and replace the rock riprap. The subgrade should be compacted with a sheepsfoot compactor. Borrow material could be taken from the knoll located northeast of the channel.
- The voids forming below the concrete headwalls should be grouted if other repairs be undertaken.

Ongoing Investigation:

- It is recommended that the annual GeoHazard inspection should continue as scheduled until at least one year after the drainage swale has been rebuilt to ensure the embankment slopes are adequately stabilized.



SITE MAP
NOT TO SCALE

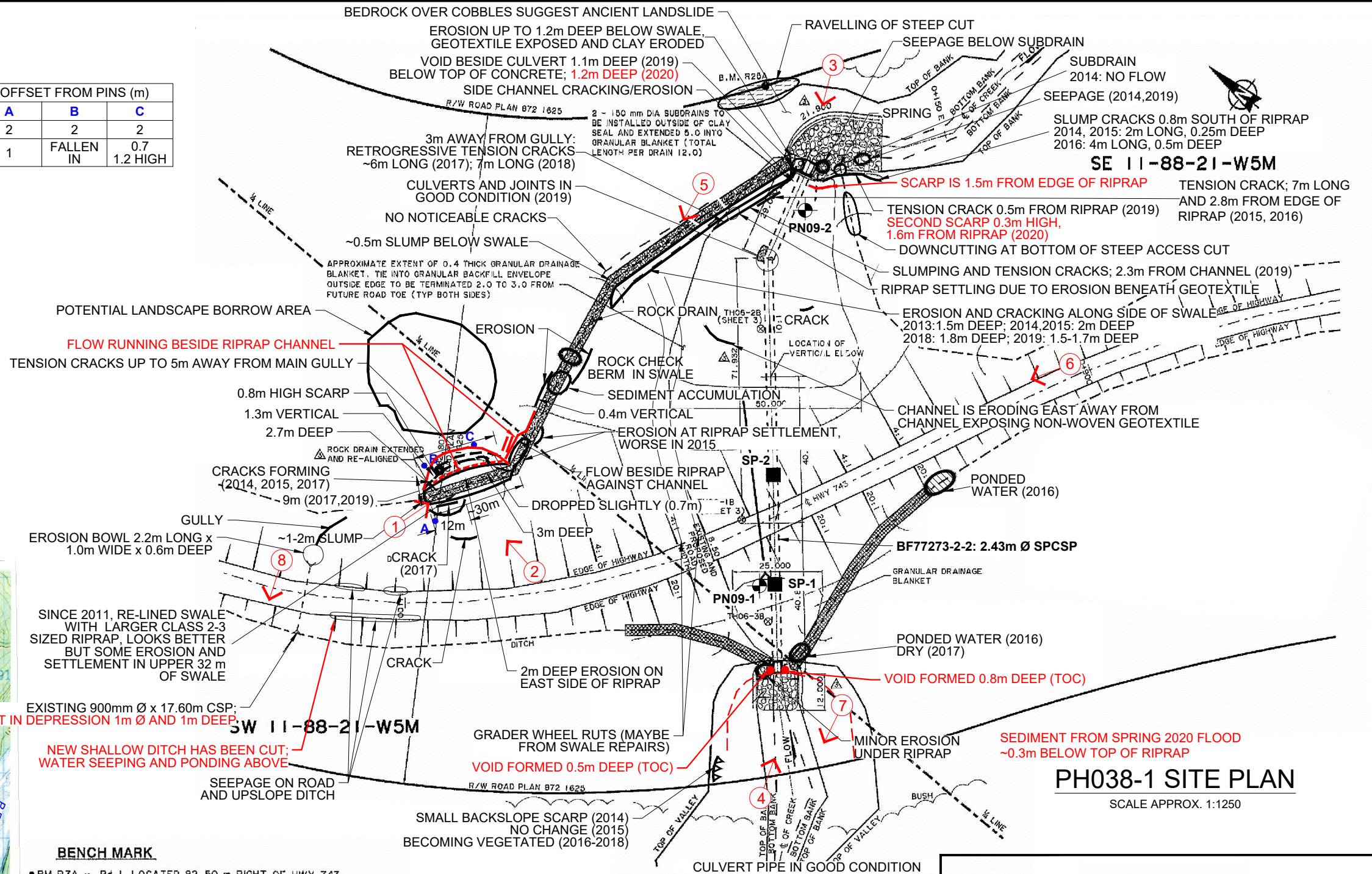


SITE LOCATION MAP
NOT TO SCALE

NOTES

1. FEATURE LOCATIONS ARE APPROXIMATE.
2. JUNE 2020 OBSERVATIONS SHOWN IN RED.

	OFFSET FROM PINS (m)		
	A	B	C
2019	2	2	2
2020	1	FALLEN IN	0.7 1.2 HIGH



BENCH MARK

- BM R7A - Pd.1 LOCATED 82.50 m RIGHT OF HWY 743
☐ AT STATION I+295.600 ELEVATION 455.00
- BM R25A - Pd.1 LOCATED 106.80 m RIGHT OF HWY 743
☐ AT STATION 0+945.800 ELEVATION 445.00

SURVEY BY

- STEWART WEIR & COMPANY Ltd, APRIL, 2006

HYDROTECHNICAL SUMMARY

- DRAINAGE AREA = 33.0 km²
- DESIGN DISCHARGE = 9.0 m³/s
- MEAN OUTLET VELOCITY AT PROPOSED CULVERT FOR DESIGN DISCHARGE = 1.94 m/s
- AVERAGE SLOPE OF STREAMBED = 0.042 m/m

LEGEND

- PN09-1 APPROXIMATE PNEUMATIC PIEZOMETER LOCATION
- SP-1 APPROXIMATE STANDPIPE PIEZOMETER LOCATION
- PHOTO AND DIRECTION

PROPOSED STRUCTURE

- INSTALL 1 - 2430 mm ϕ SPCSP x 112.77 INVERT LENGTH ON 24° LHF SKEW TO HWY 743 ☐ AT STATION 0+993.000 EXTENDED WITH 1 - 2700 mm ϕ CSP x 29.00 INVERT LENGTH ON 25° LHF SKEW TO SPCSP CULVERT ☐
- PIPE TO INCLUDE 1 - 6.75° VERTICAL ELBOW DEFLECTION
- SPCSP PLATE THICKNESS IS 4.0 mm (915 gm/m² GALVANIZED COATING)
- SPCSP CORRUGATION PROFILE 152 x 51 mm
- CSP PLATE THICKNESS IS 2.8 mm GALVANIZED TYPE II COATING
- CSP CORRUGATION PROFILE 125 x 25 mm

GENERAL NOTES

- ALL DIMENSIONS ARE IN METRES UNLESS NOTED OTHERWISE
- ROADWAY DESIGN STANDARD FOR CULVERT: RCU-2110-110
- SPCSP CULVERT ASSEMBLY AND INSTALLATION TO BE IN ACCORDANCE WITH STANDARD DRAWING S-1418-03 WHERE APPLICABLE
- STRUCTURAL DESIGN IN ACCORDANCE WITH CAN/CSA S6-00 AND CL-600-AB DESIGN LIVE LOAD

PEACE REGION (PEACE RIVER / HIGH LEVEL)

**PH038-1: HWY 743:02 WHITEMUD RIVER, km 45.3
(WAS STA 45+350)**

2020 GEOHAZARD ASSESSMENT

DWG No. 13351-PH038-1-1

DRAWN BY	KLW
DESIGNED BY	KEF
APPROVED BY	DWP
SCALE	AS SHOWN
DATE	DECEMBER 2020
FILE No.	13351

THURBER ENGINEERING LTD.



Photo 1 – Looking at west end of drainage swale.



Photo 2 – Looking north at erosion on north side of drainage swale.



Photo 3 – Looking west at culvert outlet.



Photo 4 – Looking northeast at culvert inlet.



Photo 5 – Looking west at swale near the culvert outlet.



Photo 6 – Looking northwest at road and north side slope.



Photo 7 – Looking west at shallow slumps on backslope at culvert inlet.



Photo 8 – Looking at seepage along west side of road near the north end of the site.



UAV 2020 Orthoimage



UAV 2020 Orthoimage – Slumping at start of riprap channel