

**ALBERTA TRANSPORTATION AND  
ECONOMIC CORRIDORS  
GEOHAZARD ASSESSMENT PROGRAM  
PEACE REGION – GRANDE PRAIRIE DISTRICT - NORTH  
2024 INSPECTION**



Site Number	Location	Name	Hwy	km
PH029	Grimms Creek	Old Site #4	682:02	13.54
Legal Description		UTM Co-ordinates (NAD83)		
NW36-81-5-W6		11	N	6214740
			E	397620

	Date	PF	CF	Total
<b>Previous Inspection:</b>	May 30, 2023	12	5	60
<b>Current Inspection:</b>	May 7, 2024	12	5	60
<b>Road AADT:</b>	330		<b>Year:</b>	2023
<b>Inspected By:</b>	Robert Senior, TEC Rocky Wang, TEC Ken Szmata, TEC		Don Proudfoot, Thurber Nicole Wilder, Thurber	
<b>Report Prepared By:</b>	Nicole Wilder, Don Proudfoot (Review)			
<b>Report Attachments:</b>	<input checked="" type="checkbox"/> Photographs		<input checked="" type="checkbox"/> Plans	<input type="checkbox"/> Maintenance

<b>Primary Site Issue:</b>	On-going movement of the downstream embankment overtop of the old (former) culvert location. Subsidence of the road requires continual patching, milling and paving.	
<b>Dimensions:</b>	Slide was about 60 m long by 100 m wide.	
<b>Date of any remediation:</b>	Culvert was rerouted in 2009 by jack and drill. The old culvert was abandoned with partial grouting.	
<b>Maintenance:</b>	Semi-continuous milling, patching and crack sealing. Patched last in 2022 and milled on either end of patch and then placed a thin ACP overlay in 2023 and a new guardrail but left the old wooden posts in place.	
<b>Observations:</b>	<b>Description</b>	<b>Worse?</b>
<input checked="" type="checkbox"/> Pavement Distress	The old crack delineating the east edge of the slide scarp crossing the highway was not yet reflecting through the 2023 overlay but subsidence and dips are still noticeable in new guardrail as well . A large scarp crack previously appeared to be developing north of the highway (crossing the highway in two areas), and possibly joining the active slide area. There were no signs of this crack in the 2024 overlay but the road surface appeared to be undulating.	<input type="checkbox"/>
<input checked="" type="checkbox"/> Slope Movement	The downstream embankment over the old culvert continues to move slowly and more local slumping/retrogression appeared to be coalescing with the larger slide, which has retrogressed towards the highway. On the upstream side of the highway, the west hill is actively squeezing into the creek upstream of the culvert inlet.	<input type="checkbox"/>
<input checked="" type="checkbox"/> Erosion	NE ditch crotch erosion – detailed in PH067. SE ditch crotch - ~18m long x 0.5m deep x 0.5m wide There were 3 sinkholes observed south of the landslides south flank which were mostly unchanged in 2024.	<input type="checkbox"/>
<input checked="" type="checkbox"/> Seepage	The soil appeared to be slightly moist but mostly dry in the backscarp.	<input type="checkbox"/>
<input checked="" type="checkbox"/> Bridge/Culvert	Culvert outlet is still 2/3 full of sediment	<input type="checkbox"/>

Other

**Instrumentation:**

Last Read on May 25, 2024

**Slope Inclinometers:** SI-1: Sheared off at 14m depth in 2009 (Prev. movement zones at 11.5 to 16m). SI-2: 1.6 mm/yr over 2m to 14m; SI-3: No discernible movement; and SI-4: 8.1 mm/yr over 2 to 8m and 1.7 mm/yr @ 14m [between the old and new culvert alignments].

**Piezometers:** Water levels in PN-1 at 9.81 m BGS; PN-1A not operational; PN-2 at 9.22 m BGS; PN-2A at 4.88 m BGS; PN-3 at 0.85 m BGS; and PN-4 at 4.98 m BGS.

**Assessment:**

Movements were previously observed in the downstream embankment slope along the old culvert alignment. In 2024 they mainly appeared in similar condition as in 2023, and the rate of movement appears to have slightly decreased at SI-2 this year. Of the three remaining inclinometers, SI-2 near the west end of the site nearer to the highway is showing a decreased rate of movement, SI-3 in the flat area past the sideslope has never measured movement, and SI-4 between the new and old culverts near the highway is currently showing a very slight increase in movement rate.

The cracking and settlements previously observed have not yet reflected through the 2023 overlay. Three dips exist on or near the pavement at this site which appeared to be the same or slightly worse, giving the road its undulating appearance. One dip is over top of the new culvert and is anticipated to be due to settlement of the soil since it's installation in 2009. Two other dips exist about 70 m apart on the highway. The east dip previously contained a diagonal crack across the highway which has not reflected through the 2023 overlay but could be coincident with each end of a large scarp that is developing north of the highway, directly above the subsidence and connected to active sliding observed further downslope on the south embankment.

Upstream of the culvert inlet, a large active hillside slide is squeezing into the creek channel from the west side, which contained a shallower active block that has slid into the creek.

**Recommendations:**

**Maintenance:**

Continue to monitor, and seal/patch/mill the pavement crack and dips as required.

Clean the silt out of the new culvert outlet bowl to retain culvert capacity and to enhance water energy dissipation.

**Long Term:**

In order to curtail the increasing movements on the downstream embankment, it was proposed to flatten the slope further downslope into the old channel and construct a toe berm across it. Common fill for this repair could possibly be obtained from the ridge on the west side of the old channel.

**Estimated Cost \$300,000.**

During the 2023 geohazards year end meeting, it was emphasized that buttressing the valley should be the focus, while avoiding digging out/replacing the slumps. Perhaps a wall could be considered down in the narrow part of the gully that allows drainage to pass through.

**Closure**

It is a condition of this letter report that Thurber's performance of its professional services will be subject to the attached Statement of Limitations and Conditions.

Yours very truly,  
Thurber Engineering Ltd.  
Don Proudfoot, P.Eng.  
Principal | Senior Geotechnical Engineer

Nicole Wilder, M.Eng., P.Eng.  
Geotechnical Engineer



## STATEMENT OF LIMITATIONS AND CONDITIONS

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This Report has been prepared in accordance with generally accepted engineering or environmental consulting practices in the applicable jurisdiction. No other warranty, expressed or implied, is intended or made.

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- b) Reliance on Provided Information: The evaluation and conclusions contained in the Report have been prepared on the basis of conditions in evidence at the time of site inspections and on the basis of information provided to Thurber. Thurber has relied in good faith upon representations, information and instructions provided by the Client and others concerning the site. Accordingly, Thurber does not accept responsibility for any deficiency, misstatement or inaccuracy contained in the Report as a result of misstatements, omissions, misrepresentations, or fraudulent acts of the Client or other persons providing information relied on by Thurber. Thurber is entitled to rely on such representations, information and instructions and is not required to carry out investigations to determine the truth or accuracy of such representations, information and instructions.
- c) Design Services: The Report may form part of design and construction documents for information purposes even though it may have been issued prior to final design being completed. Thurber should be retained to review final design, project plans and related documents prior to construction to confirm that they are consistent with the intent of the Report. Any differences that may exist between the Report's recommendations and the final design detailed in the contract documents should be reported to Thurber immediately so that Thurber can address potential conflicts.
- d) Construction Services: During construction Thurber should be retained to provide field reviews. Field reviews consist of performing sufficient and timely observations of encountered conditions in order to confirm and document that the site conditions do not materially differ from those interpreted conditions considered in the preparation of the report. Adequate field reviews are necessary for Thurber to provide letters of assurance, in accordance with the requirements of many regulatory authorities.

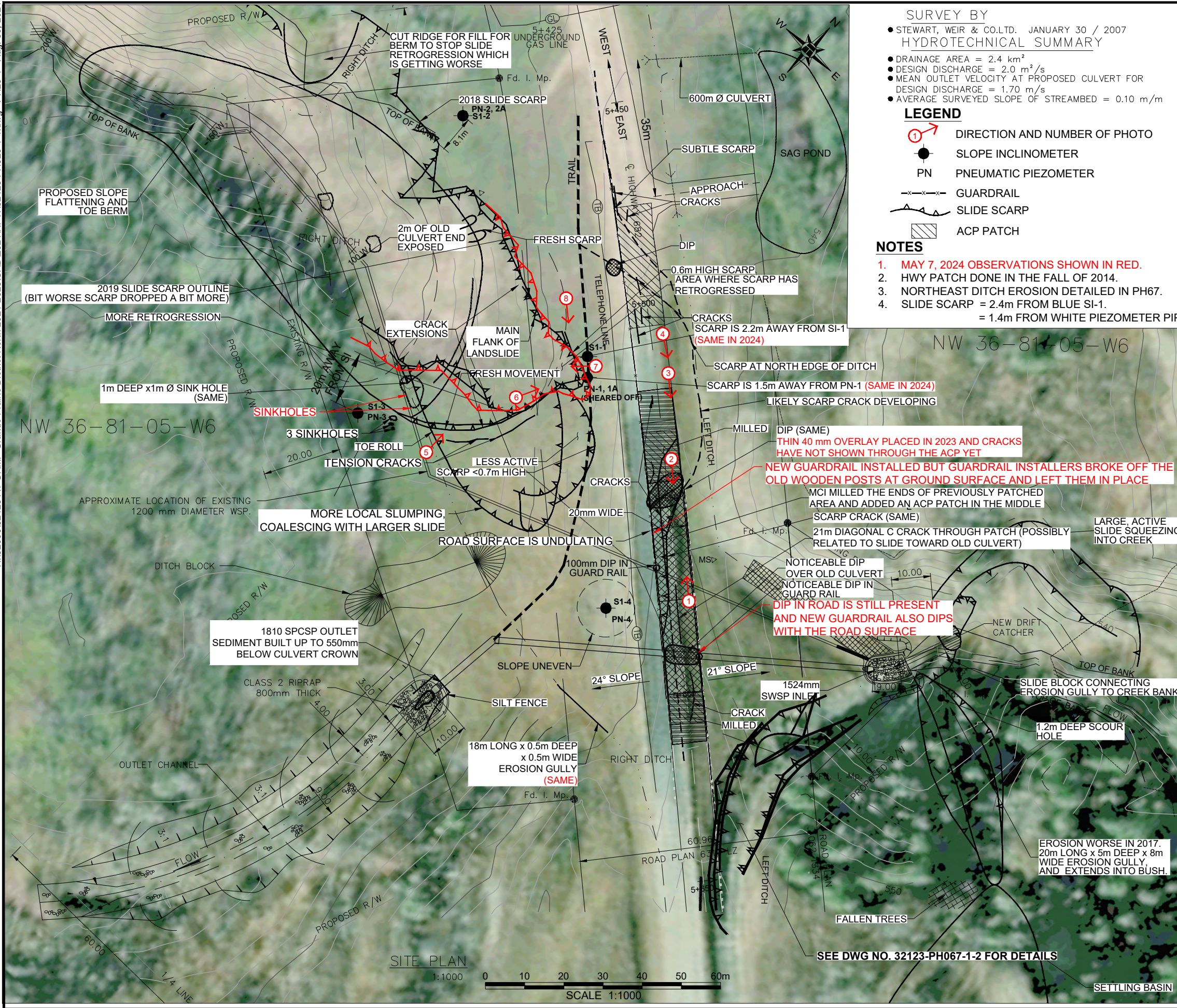
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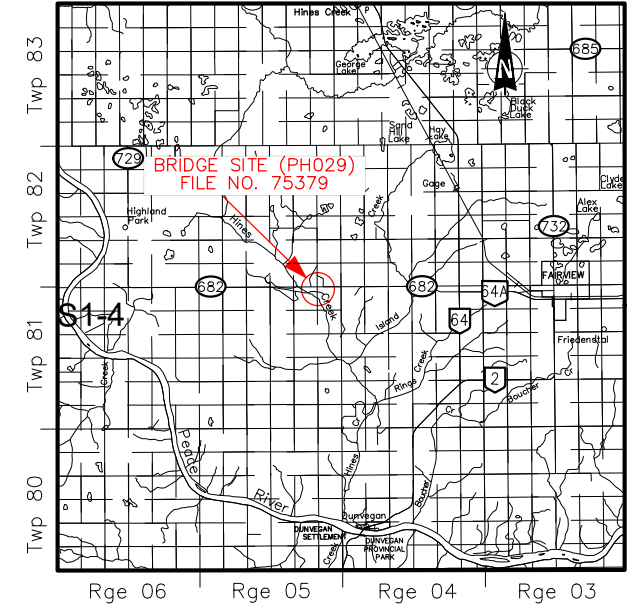
H:\32000\32123 AT GRMP Grande Prairie District North 2021-2025\CAD\2024\NPMW\32123 PH029-1-1.dwg - PH29-1 - Aug. 30, 2024



**SURVEY BY**  
 ● STEWART, WEIR & CO.LTD. JANUARY 30 / 2007  
**HYDROTECHNICAL SUMMARY**  
 ● DRAINAGE AREA = 2.4 km<sup>2</sup>  
 ● DESIGN DISCHARGE = 2.0 m<sup>3</sup>/s  
 ● MEAN OUTLET VELOCITY AT PROPOSED CULVERT FOR DESIGN DISCHARGE = 1.70 m/s  
 ● AVERAGE SURVEYED SLOPE OF STREAMBED = 0.10 m/m

**LEGEND**  
 ① DIRECTION AND NUMBER OF PHOTO  
 ● SLOPE INCLINOMETER  
 PN PNEUMATIC PIEZOMETER  
 -x-x- GUARDRAIL  
 ▲ SLIDE SCARP  
 ▨ ACP PATCH

**NOTES**  
 1. MAY 7, 2024 OBSERVATIONS SHOWN IN RED.  
 2. HWY PATCH DONE IN THE FALL OF 2014.  
 3. NORTHEAST DITCH EROSION DETAILED IN PH67.  
 4. SLIDE SCARP = 2.4m FROM BLUE SI-1 = 1.4m FROM WHITE PIEZOMETER PIPE 1A



**SITE MAP**  
 1 : 1 000 000

**LEGEND**  
 ② HIGHWAY 1-216  
 ⑥14 HIGHWAY 500-986  
 LOCAL ROAD

**BENCH MARK**

- SPIKE IN GROUND LOCATED 10.51 m LT OF C<sub>L</sub> ROAD ALIGNMENT AT STATION 5+568.60, ELEVATION 538.64
  - Fd.1.MP. LOCATED 29.90 m LT OF C<sub>L</sub> ROAD ALIGNMENT AT STATION 5+625.98, ELEVATION 541.90
  - Fd.1.MP. LOCATED 54.86 m LT OF C<sub>L</sub> ROAD ALIGNMENT AT STATION 5+606.12, ELEVATION 532.61
  - Fd.1.MP. LOCATED 31.03 m RT OF C<sub>L</sub> ROAD ALIGNMENT AT STATION 5+626.16, ELEVATION 545.47
  - Fd.1.MP. LOCATED 29.71 m LT OF C<sub>L</sub> ROAD ALIGNMENT AT STATION 5+561.05, ELEVATION 545.45
  - SPIKE IN GROUND LOCATED 37.61 m RT OF C<sub>L</sub> ROAD ALIGNMENT AT STATION 5+467.26, ELEVATION 526.04
  - Fd.1.MP. LOCATED 28.33 m RT OF C<sub>L</sub> ROAD ALIGNMENT AT STATION 5+437.72, ELEVATION 528.28
- EXISTING STRUCTURE**
- 1-1524 mm SPCSP CULVERT LINED WITH 1200 mm WSP. INVERT LENGTH 225 m +/-.
  - 1524 mm DIA x 97.00 m INVERT LENGTH WSP BY JACKING AND DRILLING ON 10° LHF SKEW TO ROAD AT C<sub>L</sub> STA 5+592
  - 1810 mm DIA x 20.000 m LONG SPCSP OUTLET EXTENSION
  - SPCSP WALL THICKNESS IS 3.0 mm (910 gm/m<sup>2</sup>) CORRUGATION IS 152 X 51 mm
  - WSP WALL THICKNESS IS 12.7 mm (PLAIN STEEL)

BASE PLAN PROVIDED BY CH2MHILL



PEACE REGION (GRAND PRAIRIE DISTRICT - NORTH)

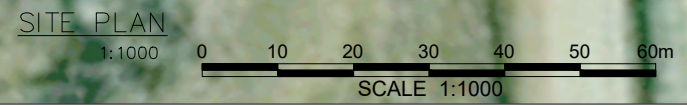
**PH029: GRIMM'S CREEK - HWY 682:02, BF 75379**  
**INSPECTION PLAN**

DWG No. 32123-PH029-1

DRAWN BY	ML
DESIGNED BY	NPW
APPROVED BY	DWP
SCALE	1:1000
DATE	AUGUST 2024
FILE No.	32123



SEE DWG NO. 32123-PH067-1-2 FOR DETAILS





**Photo 1. Looking west along the highway at where the highway was overlaid, note the dip in the guardrail. Photo credit: Don Proudfoot.**



**Photo 2. View of where the slide scarp crack was located looking east along the highway from near the west end of the north guardrail. Photo credit: Nicole Wilder.**



**Photo 3. Looking east along the highway at the west end of where the scarp crack was located but was overlayed. Photo credit: Nicole Wilder.**



**Photo 4. Looking east along the highway at where it was paved but you can see the dip in the guardrail. Photo credit: Don Proudfoot.**



**Photo 5. Looking northwest towards the landslide and backscarp. Photo Credit: Don Proudfoot.**



**Photo 6. Looking north at slumping above the old culvert alignment on the south highway embankment. Photo Credit: Don Proudfoot.**





**Photo 7. Looking southwest down at landslide mass. Photo Credit: Don Proudfoot.**



**Photo 8. Looking southeast up at the backscarp and flank of the landslide. Photo Credit: Don Proudfoot.**