

**ALBERTA TRANSPORTATION  
GEOHAZARD ASSESSMENT PROGRAM  
PEACE REGION – GRANDE PRAIRIE  
2023 INSPECTION**



Site Number	Location	Name	Hwy	km
GP040	4.7 km's N. of Rycroft	Spirit River Bridge (BF75106)	2:68	4.7
Legal Description		UTM Co-ordinates		
SE¼ 34-078-5 W6M		11U E 394291	N 6184727	

	Date	PF	CF	Total
<b>Previous Inspection:</b>	28-May-2020	13	6	78
<b>Current Inspection:</b>	29-May-2023	12	2	24
<b>Road AADT:</b>	2,860		<b>Year:</b>	2022
<b>Inspected By:</b>	Max Shannon, TEC Rishi Adhikari, TEC		Nicole Wilder, Thurber Don Proudfoot, 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 Items			

<b>Primary Site Issue:</b>	<p>In 2013, a landslide developed in the west side of the south abutment headslope and sideslope of the Spirit River Bridge (BF75106). It appeared that there was also a second localized slide below the bridge south abutment which extended towards the east where a previous tension crack existed and had developed into a 1 m high scarp.</p> <p>Erosion was also observed at the toe of the south abutment headslope beneath the bridge.</p>	
<b>Dimensions:</b>	<p>The upper portion of the old landslide located close to the south abutment was about 20 m in width across the backscarp and extended down to the river bank. The lower portion of the landslide located on the river terrace was about 35 m in width across the backscarp. The second slide to the east was approximately 30 m in width.</p>	
<b>Date of any Remediation:</b>	<p>The highway was stabilized with the construction of two concrete tangent pile walls and soil nails under the south headslope between July 2020 and August 2021.</p>	
<b>Maintenance:</b>		
<b>Observations:</b>	<b>Description</b>	<b>Worsened?</b>
<input type="checkbox"/> Pavement Distress	No new pavement cracks were observed since the repair.	<input type="checkbox"/>
<input checked="" type="checkbox"/> Slope Movement	The slope downslope of both pile walls appeared to have settled between 0.51 m on the west wall and about 2.1 m on the east wall.	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Erosion	Erosion was observed within the area that was previously repaired east of the bridge. The erosion gully was about 750 mm wide and 580 mm deep.	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Seepage	The erosion gully was slightly wet.	<input checked="" type="checkbox"/>
<input type="checkbox"/> Bridge/Culvert Distress		<input type="checkbox"/>
<input type="checkbox"/> Other		<input type="checkbox"/>

**Instrumentation April 29, 2021: Inclometers SI20-1** = Installed in the west pile wall showed a possible movement zone between 1.5 m and 4 m depth with about 13 mm of displacement and a rate of 24.6 mm/yr since it was initialized **SI17-1** = Sheared off at 4.6 m depth prior to the October 5, 2017 readings; **SI17-2** = Sheared off at 4.3 m depth prior to the October 5, 2017 readings; **SI17-3** = This SI was last read June 22, 2020 and showed movement between 0.2 m to 3.9 m depth and a rate of 19.4 mm/yr. **Piezometers** were last read June 22, 2020 **PN17-1A** = not functioning; **PN17-1B** = 3.6 m BGS; **PN17-2** = 7.3 m BGS; **PN17-3** = not functioning.

**Assessment:**

In 2013, as a result of heavy rains, the water level in the Spirit River rose and shifted toward the south. The raised river level caused erosion at the toe of the south bridge abutment headslope and sideslope, resulting in the occurrence of the landslide in the south abutment fill. The slip surface appeared to be based in high plastic clay and clay till, toeing out at the river.

The site was repaired between 2020 and 2021 by constructing two concrete tangent pile walls and soil nails below the south headslope. However, during the 2023 inspection the slope below the pile walls had settled and dropped between 0.51 m and 2.1 m below the top of the pile walls. The magnitude of the drop was reviewed with the design team and it is understood that the wall can accommodate this amount of loss of passive support. However, this may become a concern if the slide mass settles even further in front of the wall. This should be monitored going forward. There was an erosion gully that formed on the east side of the bridge which should be filled in by the maintenance contractor before it enlarges and poses a risk to the bridge.

**Recommendations:**

**Cost**

Regularly monitor the site for activity, settlement and erosion.

Maintenance

It is recommended to keep this site on the annual geohazard monitoring program at least for a few more years to confirm that there is no further settlement of the soil downslope of the walls.

**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.

Don Proudfoot, P.Eng.  
Principal | Senior Geotechnical Engineer

Nicole Wilder, P.Eng.  
Geotechnical Engineer



## STATEMENT OF LIMITATIONS AND CONDITIONS

### 1. STANDARD OF CARE

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.

### 2. COMPLETE REPORT

All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment are a part of the Report, which is of a summary nature and is not intended to stand alone without reference to the instructions given to Thurber by the Client, communications between Thurber and the Client, and any other reports, proposals or documents prepared by Thurber for the Client relative to the specific site described herein, all of which together constitute the Report.

IN ORDER TO PROPERLY UNDERSTAND THE SUGGESTIONS, RECOMMENDATIONS AND OPINIONS EXPRESSED HEREIN, REFERENCE MUST BE MADE TO THE WHOLE OF THE REPORT. THURBER IS NOT RESPONSIBLE FOR USE BY ANY PARTY OF PORTIONS OF THE REPORT WITHOUT REFERENCE TO THE WHOLE REPORT.

### 3. BASIS OF REPORT

The Report has been prepared for the specific site, development, design objectives and purposes that were described to Thurber by the Client. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed in the Report, subject to the limitations provided herein, are only valid to the extent that the Report expressly addresses proposed development, design objectives and purposes, and then only to the extent that there has been no material alteration to or variation from any of the said descriptions provided to Thurber, unless Thurber is specifically requested by the Client to review and revise the Report in light of such alteration or variation.

### 4. USE OF THE REPORT

The information and opinions expressed in the Report, or any document forming part of the Report, are for the sole benefit of the Client. NO OTHER PARTY MAY USE OR RELY UPON THE REPORT OR ANY PORTION THEREOF WITHOUT THURBER'S WRITTEN CONSENT AND SUCH USE SHALL BE ON SUCH TERMS AND CONDITIONS AS THURBER MAY EXPRESSLY APPROVE. Ownership in and copyright for the contents of the Report belong to Thurber. Any use which a third party makes of the Report, is the sole responsibility of such third party. Thurber accepts no responsibility whatsoever for damages suffered by any third party resulting from use of the Report without Thurber's express written permission.

### 5. INTERPRETATION OF THE REPORT

- a) Nature and Exactness of Soil and Contaminant Description: Classification and identification of soils, rocks, geological units, contaminant materials and quantities have been based on investigations performed in accordance with the standards set out in Paragraph 1. Classification and identification of these factors are judgmental in nature. Comprehensive sampling and testing programs implemented with the appropriate equipment by experienced personnel may fail to locate some conditions. All investigations utilizing the standards of Paragraph 1 will involve an inherent risk that some conditions will not be detected and all documents or records summarizing such investigations will be based on assumptions of what exists between the actual points sampled. Actual conditions may vary significantly between the points investigated and the Client and all other persons making use of such documents or records with our express written consent should be aware of this risk and the Report is delivered subject to the express condition that such risk is accepted by the Client and such other persons. Some conditions are subject to change over time and those making use of the Report should be aware of this possibility and understand that the Report only presents the conditions at the sampled points at the time of sampling. If special concerns exist, or the Client has special considerations or requirements, the Client should disclose them so that additional or special investigations may be undertaken which would not otherwise be within the scope of investigations made for the purposes of the Report.
- 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.

### 6. RELEASE OF POLLUTANTS OR HAZARDOUS SUBSTANCES

Geotechnical engineering and environmental consulting projects often have the potential to encounter pollutants or hazardous substances and the potential to cause the escape, release or dispersal of those substances. Thurber shall have no liability to the Client under any circumstances, for the escape, release or dispersal of pollutants or hazardous substances, unless such pollutants or hazardous substances have been specifically and accurately identified to Thurber by the Client prior to the commencement of Thurber's professional services.

### 7. INDEPENDENT JUDGEMENTS OF CLIENT

The information, interpretations and conclusions in the Report are based on Thurber's interpretation of conditions revealed through limited investigation conducted within a defined scope of services. Thurber does not accept responsibility for independent conclusions, interpretations, interpolations and/or decisions of the Client, or others who may come into possession of the Report, or any part thereof, which may be based on information contained in the Report. This restriction of liability includes but is not limited to decisions made to develop, purchase or sell land.



**Photo 1. Looking north along the west shoulder of the highway. Photo credit: Don Proudfoot.**



**Photo 2. Looking northeast at the concrete drain trough above the west pile wall.  
Photo credit: Nicole Wilder.**





**Photo 3. Looking northeast at riprap that appeared to have settled on the downslope side of the pile wall.  
Photo credit: Nicole Wilder.**



**Photo 4. Looking east at the corner of the pile wall and settled riprap. Photo credit: Nicole Wilder.**





**Photo 5. Looking south at the south abutment and head slope. Photo Credit: Don Proudfoot.**



**Photo 6. Looking south at erosion gully that has formed east of the south side of the bridge. Photo Credit: Nicole Wilder.**





**Photo 7. Looking east at riprap that settled below the east pile wall. Photo Credit: Don Proudfoot.**



**Photo 8. Looking south towards the east pile wall and riprap. Photo Credit: Don Proudfoot.**





Photo 9. Looking southeast at the pier and riprap. Photo Credit: Nicole Wilder.



Photo 10. Looking south at debris that has accumulated in the pile weirs. Photo Credit: Don Proudfoot.





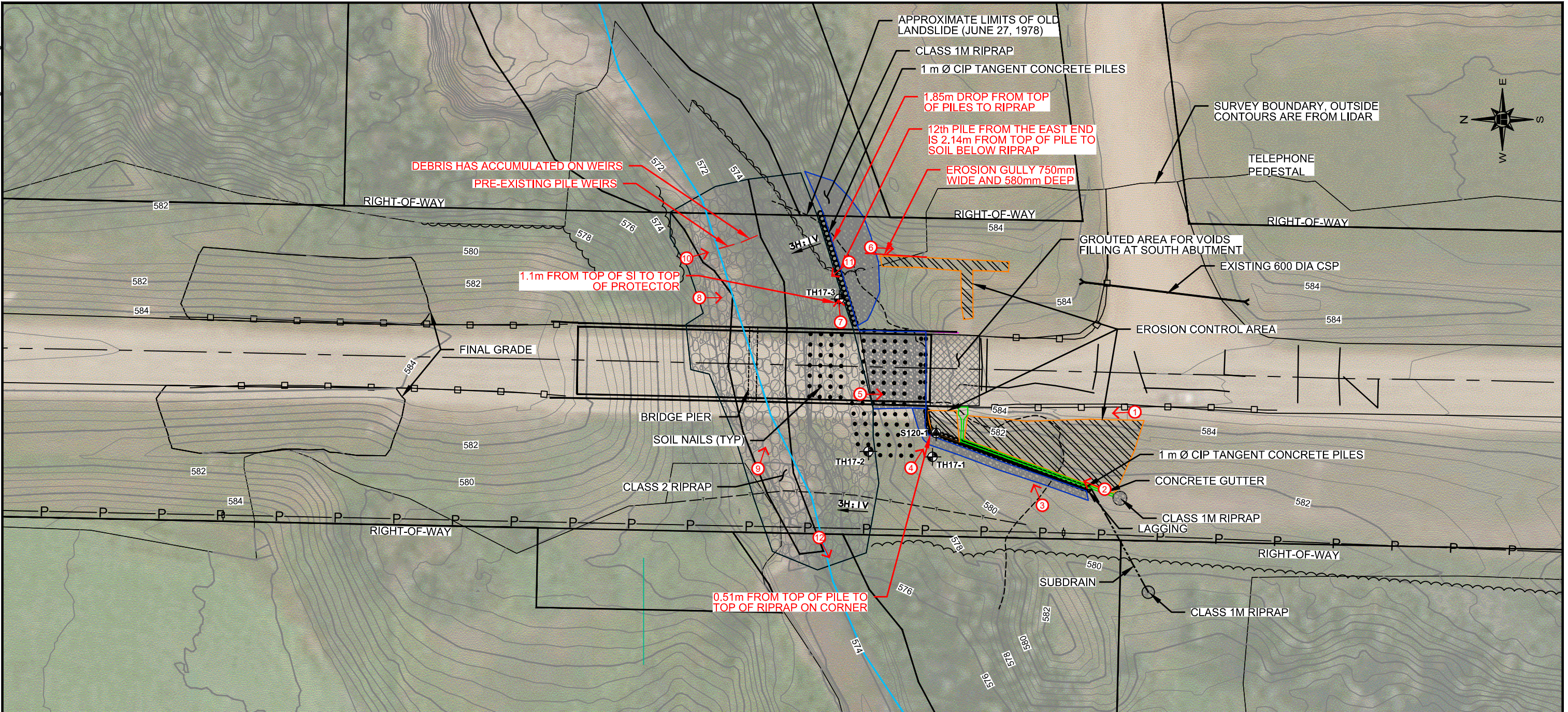
**Photo 11. Looking northwest at the north head slope. Photo Credit: Nicole Wilder.**



**Photo 12. Looking west at the river upstream of the placed riprap. Photo Credit: Don Proudfoot.**



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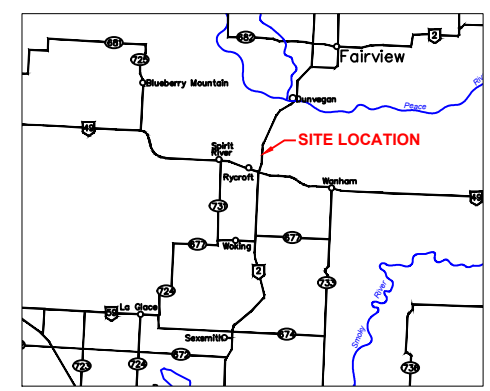
**LEGEND**

- APPROXIMATE TEST HOLE LOCATION(2017)
- APPROXIMATE SLOPE INCLINOMETER LOCATION (2020)
- TELUS CABLE
- OVERHEAD POWER LINE
- GUARD RAIL
- TREE LINE
- SOIL NAIL
- SUBDRAIN
- CONTROL POINT
- DIRECTION AND NUMBER OF PHOTO

- NOTES:**
1. MAY 29, 2023 FEATURES SHOWN IN RED
  2. BASE PLAN PROVIDED BY WSP, SITE SURVEYED ON SEPTEMBER 5, 2017.
  3. CONTOURS OUTSIDE SURVEY LIMIT ARE FROM 2015 LIDAR DATA.
  4. NAD83 UTM 11 COORDINATE SYSTEM.
  5. CONTOUR INTERVALS 0.5m.



AIR PHOTO FROM ESRI WORLD IMAGERY EXPORTED ON AUGUST 23, 2023



**KEY PLAN**  
SCALE: 1:2 000 000



**PEACE REGION (GRANDE PRAIRIE)**

**GP040-1: HWY 2:68 - SPIRIT RIVER BRIDGE (BF75106)  
2023 INSPECTION PLAN**

DWG No. 32123-GP040-1

DRAWN BY	ML
DESIGNED BY	NPW
APPROVED BY	DWP
SCALE	1:750
DATE	AUGUST 2023
FILE No.	32123

