ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS GRMP NORTH CENTRAL (ATHABASCA AND FORT McMURRAY DISTRICTS) INSTRUMENTATION MONITORING- SPRING 2024

THURBER ENGINEERING LTD.

Site Number	Location	Name	Hwy	km
NC093	HWY 813:06, C1 4.631	Rock Island Bridge	813:06	Km 4.6
Legal Description: 9-5-74-22 W4		**UTM Co-ordinates**		
		12U E 351689	N 6139948	

Current Monitoring:	13-June-2024	**Previous Monitoring**	07-Oct-2023
Instruments Read By:	Mr. Niraj Regmi, G.I.T and Mr. Nixson Mationg, of Thurber		

Instruments Read During This Site Visit			
Slope Inclinometers (SIs): SI20-1	**Pneumatic Piezometers (PN):** N/A	**Vibration Wire Piezometers (VW):** VW20-1A and VW20-1B	**Standpipe Piezometers (SP):** N/A
Load Cell (LC): N/A	**Strain Gauges:** N/A	**SAAs:** N/A	**Others:**

Readout Equipment Used			
Slope Inclinometers: RST Digital Inclinometer probe with a 2 ft. wheelbase and an RST Pocket PC readout	**Pneumatic Piezometers:**	**Vibration Wire Piezometers:** GEOKON GK 404 vibrating wire readout	**Standpipe Piezometers:**
Load Cell:	**Strain Gauges:**	**SAAs:**	**Others:**

Notes:

- A site plan showing instrument locations is included in Appendix A.
- The vibrating wire piezometer plot is included in Appendix A.
- Historical slope inclinometer readings are summarized in Table NC096-1, attached.
- Vibrating wire piezometer readings are summarized in Table NC096-2, attached.

Discussion	
Zones of New Movement:	None
Interpretation of Monitoring Results:	SI20-1 was found to have been sheared or blocked at 0.91 m below ground surface since the fall of 2023 readings. Vibrating wire piezometers VW20-1A and VW20-1B showed increases in groundwater level of 0.37 m and 0.32 m, respectively, since the fall of 2023 readings. The current groundwater levels are within the historical levels.
Future Work:	The instruments should be read again in the fall of 2024.
Instrumentation Repairs:	VW20-2A and VW20-2B will not be repaired as requested by TEC, and hence they will be removed from the program. Consideration should be given to repairing SI20-1 to continue monitoring the landslide movement rate at this site. A mechanical or hydrovac excavation will be required to repair the SI.
Additional Comments:	

Attachments:	• Table NC0931-1 Spring 2024 – HWY 813 Rock Island River Bridge NW Approach Fill Landslide (Bf79692), Slope Inclinometer Instrumentation Reading Summary
	• Table NC0931-2 Spring 2024 – HWY 813 Rock Island River Bridge NW Approach Fill Landslide (Bf79692), Vibrating Wire Piezometer Instrumentation Reading Summary
	• Statement of Limitations and Conditions
	• APPENDIX A – NC093-1 SPRING 2024
	  ○ Field Inspector's report
	  ○ Site Plan Showing Approximate Instrument Locations (Drawing No. 32122-NC093)
	  ○ SI Reading Plots
	  ○ Figure NC093-1 (Piezometric Data Plot)

We trust this report meets your requirements at present. If you have any questions, please contact the undersigned at your convenience.

Yours very truly,
Thurber Engineering Ltd.
Tarek Abdelaziz, Ph.D., P. Eng.
Partner | Senior Geotechnical Engineer

PROFESSIONAL ENGINEER ALBERTA
LUCAS R.M. GREEN
ID 206714

PERMIT TO PRACTICE
THURBER ENGINEERING LTD.
RM SIGNATURE:
RM APEGA ID #: 91085
DATE: July 15, 2024
PERMIT NUMBER: P005186
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

2024-07-15
Lucas Green, P.Eng.
Geotechnical Engineer

Table NC093-1: Spring 2024 – Hwy 813 Rock Island River Bridge NW Approach Fill Landslide (Bf79692) Slope Inclinometer Instrumentation Reading Summary

Date Monitored: June 13, 2024

INSTRUMENT #	DATE INITIALIZED	TOTAL CUMULATIVE RESULTANT MOVEMENT AND DEPTH OF MOVEMENT TO DATE (mm)	MAXIMUM RATE OF MOVEMENT (mm/yr)	CURRENT STATUS OF SI	DATE OF PREVIOUS READING	INCREMENTAL MOVEMENT SINCE PREVIOUS READING (mm)	CURRENT RATE OF MOVEMENT (mm/yr)	CHANGE IN RATE OF MOVEMENT SINCE PREVIOUS READING (mm/yr)
SI20-1	*December 21, 2020*	*37.6 over 1.9 m to 3.8 m depth in 192° direction*	*76.9 in June 2021*	*Sheared / Blocked*	*June 2, 2023*	*N/A*	*N/A*	*N/A*

Drawing 32122-NC093 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

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Table NC093-2: Spring 2024 – Hwy 813 Rock Island River Bridge NW Approach Fill Landslide (Bf79692) Vibrating Wire Piezometer Instrumentation Reading Summary

Date Monitored: June 13, 2024

INSTRUMENT #	DATE INITIALIZED	TIP DEPTH (m)	GROUND ELEV. (m)	CURRENT STATUS	HIGHEST MEASURED GROUNDWATER LEVEL BGS (m)	CURRENT GROUNDWATER DEPTH BGS (m)	PREVIOUS GROUNDWATER DEPTH BGS (m)	CHANGE IN WATER LEVEL SINCE PREVIOUS READING (m)
VW20-1A (70928)	December 21, 2020	5.80	-	Operational	2.45 on June 29, 2021	2.57	2.94	0.37
VW20-1B (70929)	December 21, 2020	11.89	-	Operational	2.28 on June 29, 2021	2.41	2.73	0.32
VW20-2A (70927)	*December 21, 2020*	*7.62*	-	*Damaged*	*4.91 on December 21, 2021*	*N/A*	*5.12 (June 4, 2022)*	*N/A*
VW20-2B (70930)	*December 21, 2020*	*11.89*	-	*Damaged*	*5.71 on June 29, 2021*	*N/A*	*5.92 (June 4, 2022)*	*N/A*

Drawing 32122-NC093 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

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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.

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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.

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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.

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ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS GRMP (CON0022163)
NORTH CENTRAL (ATHABASCA AND FORT McMURRAY DISTRICTS)
INSTRUMENTATION MONITORING RESULTS

SPRING 2024

APPENDIX A
DATA PRESENTATION AND SITE PLANS

SITE NC093: HWY 813 ROCK ISLAND RIVER BRIDGE NW APPROACH FILL LANDSLIDE (BF79692)

ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS
NORTH CENTRAL REGION - ATHABASCA AND FORT McMURRAY DISTRICTS
INSTRUMENTATION MONITORING FIELD SUMMARY (NC093)
SPRING 2024

Location:	Rock Island Bridge (Hwy 813:06, C1 4.631)	**Readout:**	GK 404 SN 364
File Number:	32122	**Casing Diameter:**	2.75"
Probe:	RST Set 8R	**Temp:**	16
Cable:	RST Set 8R	**Read by:**	NKR/NRM

SLOPE INCLINOMETER (SI) READINGS

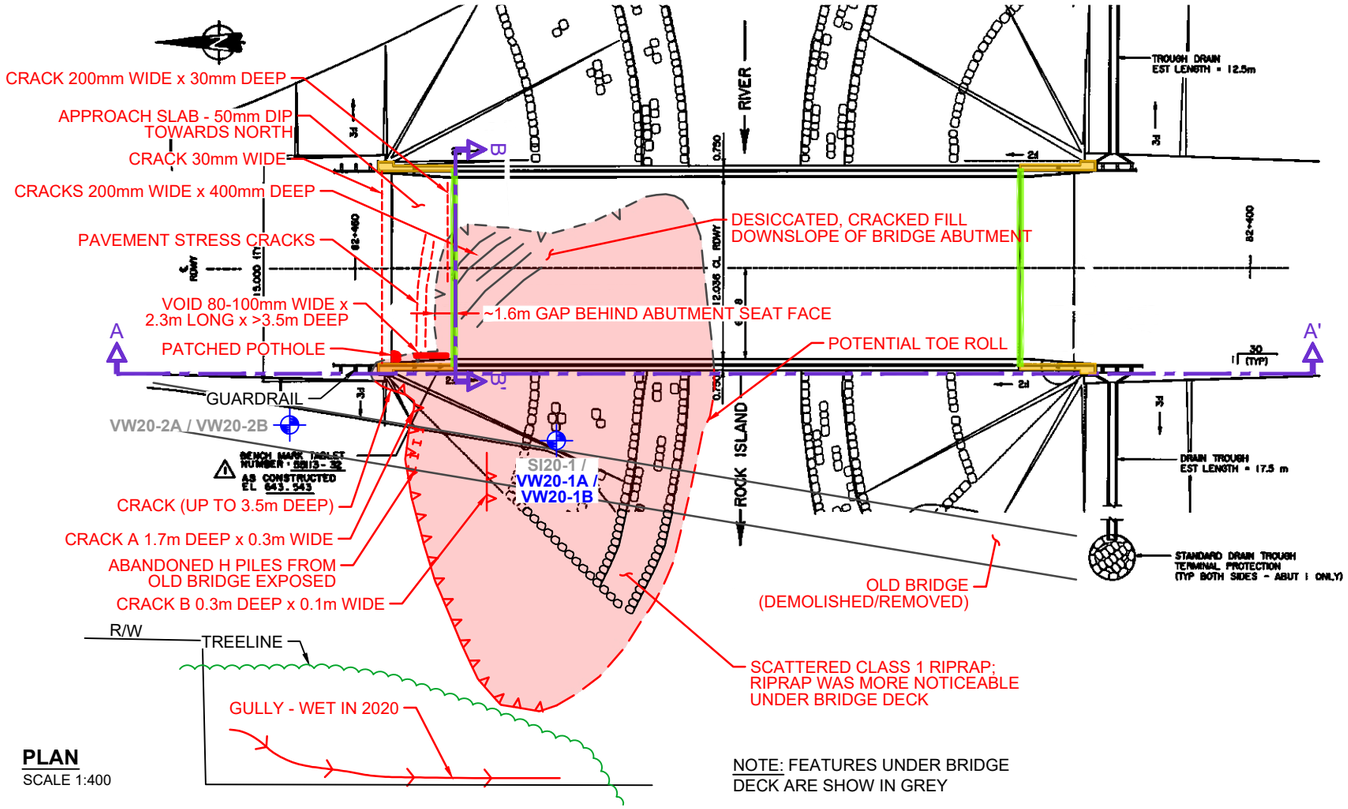
SI#	GPS Location (UTM 12)		Date	Stickup m	Depth from top of casing (ft)	Azimuth of A+ Groove	Current Bottom Depth Readings				Probe/ Reel #	Size (")	Remarks
	Easting (m)	Northing (m)					A+	A-	B+	B-			
SI20-1	351689	6139948	13-Jun-24	0.81	52 to 2	138	-468	476	498	-515	8R	2.75	Sheared or blocked at 3 '

VIBRATING WIRE READINGS

VW	Serial	GPS Location		Date	Reading B(units)	Temp degree C
		Latitude	Longitude			
VW20-1A	70928	351689	6139948	13-Jun-24	8921.1	3.3
VW20-1B	70929	351689	6139948	13-Jun-24	8044.8	4.5
VW20-2A	70927	351691	6139963	Not Read		
VW20-2B	70930	351691	6139963	Not Read		

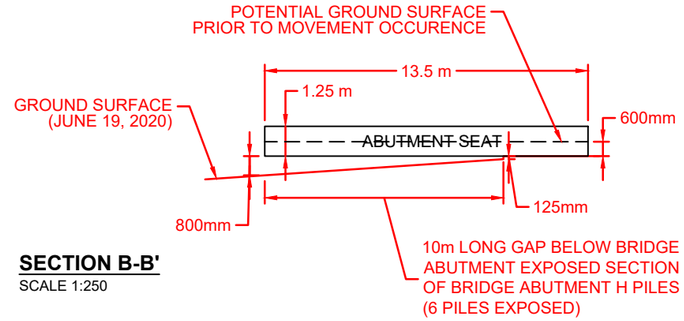
INSPECTOR REPORT

Site is KM marker 70 on Hwy 813
VW20-2A & VW20-2B attempted to repair need mechanical excavator if repair needed, skip reading for Spring 2024.

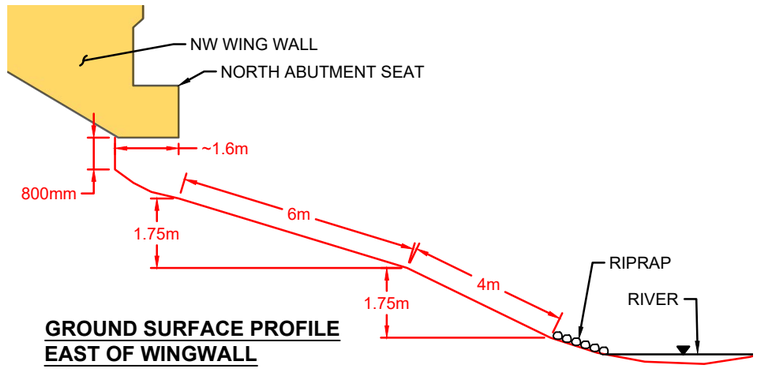


PLAN
SCALE 1:400

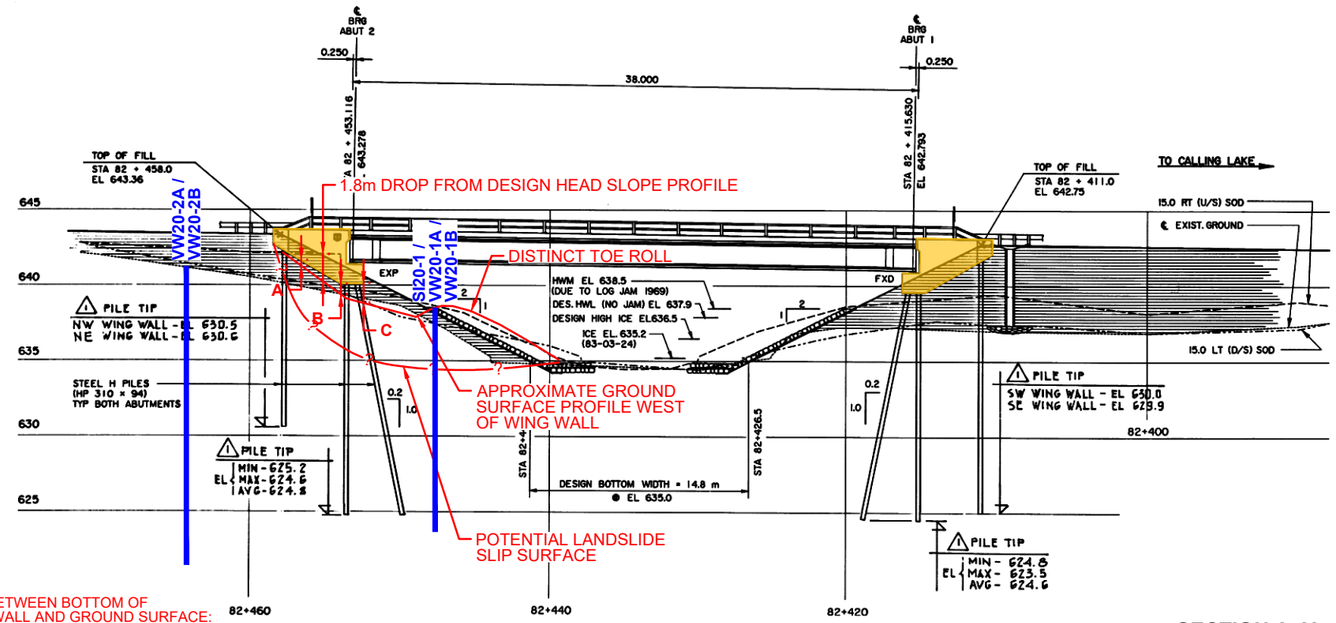
NOTE: FEATURES UNDER BRIDGE DECK ARE SHOW IN GREY



SECTION B-B'
SCALE 1:250



GROUND SURFACE PROFILE EAST OF WINGWALL
NTS



GAP BETWEEN BOTTOM OF WINGWALL AND GROUND SURFACE:
A: 300mm
B: 200mm
C: 800mm

SECTION A-A'
SCALE 1:400

LEGEND

- APPROXIMATE INSTRUMENT LOCATION
- HEADSCARP CRACK
- WING WALL
- GULLY/DITCH
- EXISTING RIPRAP
- BRIDGE EXPANSION JOINT
- POTENTIAL EXTENT OF LANDSLIDE
- SI — SLOPE INCLINOMETER
- VW — VIBRATING WIRE PIEZOMETER
- 5m — DEPTH (m) OF VIBRATING WIRE PIEZOMETER OR SLOPE INCLINOMETER

0 5 10 15 20 25m
SCALE APPROX. 1:400

Alberta

NORTH CENTRAL (ATHABASCA AND FORT MCMURRAY DISTRICTS)
NC093 HWY 813 ROCK ISLAND RIVER BRIDGE NW APPROACH FILL SITE PLAN SHOWING APPROXIMATE INSTRUMENT LOCATIONS
DWG NO. 32122-NC093

DRAWN BY	ML
DESIGNED BY	BWN
APPROVED BY	TSA
SCALE	AS SHOWN
DATE	JULY 2021
FILE No.	32122

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FIGURE NC093-1
HWY 813 ROCK ISLAND RIVER BRIDGE (BF79692)
VIBRATING WIRE PIEZOMETER DATA