



**THURBER** ENGINEERING LTD.

October 26, 2022

File No.: 32122

Alberta Transportation  
Construction and Maintenance Division  
North Central Region  
Box 4596, 4513 – 62 Avenue  
Barrhead, Alberta  
T7N 1A5

Attention: Ms. Amy Driessen, P.Eng.

**ALBERTA TRANSPORTATION GRMP (CON0022163)  
NORTH CENTRAL (ATHABASCA AND FORT McMURRAY DISTRICTS)  
INSTRUMENTATION MONITORING RESULTS – FALL 2022**

**SECTION C**

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

Dear Ms. Driessen:

This report provides the results of the bi-annual geotechnical instrumentation monitoring for the above-mentioned site as part of Alberta Transportation's Geohazard Risk Management Program for North Central – Athabasca and Fort McMurray Districts (CON0022163).

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.

**1. FIELD PROGRAM AND INSTRUMENTATION STATUS**

One slope inclinometer (SI20-1) and four vibrating wire piezometers (VW20-1A, VW20-1B, VW20-2A and VW20-2B) were read at the Hwy 813 Rock Island River Bridge NW Approach Fill Landslide (BF79692) site on September 24, 2022, by Mr. Niraj Regmi, G.I.T. and Mr. Kyle Croymans, both of Thurber Engineering Ltd.

Vibrating wire piezometers VW20-2A and VW20-2B are damaged and could not be read or repaired during this reading event.

A site plan showing approximate instrumentation locations is included in Appendix A.

The SI was read using a RST Digital Inclinometer probe with a 2 ft. wheelbase and a RST Pocket PC readout. Inclinometer reading depths were defined as per cable markings with respect to the top of the inclinometer casings. The vibrating wire piezometers were read using a GEOKON GK-404 vibrating wire readout.



## **2. DATA PRESENTATION**

### **2.1 General**

SI plots for A and B directions are presented in Appendix A and are summarized below. Where movement has been recorded the resultant plot (X direction, if applicable) and rate of movement have also been provided. Vibrating wire piezometer results are also provided in Appendix A.

### **2.2 Zones of Movement**

No zones of new movement were identified in SI20-1 since the previous readings in the spring of 2022.

Zones of movement are summarized in Table NC093-1 below. Table NC093-1 also provides a historical account of the total movement, the depth of movement and the maximum rate of movement that has occurred in the SIs since initialization.



**TABLE NC093-1  
FALL 2022 – HWY 813 ROCK ISLAND RIVER BRIDGE NW APPROACH FILL LANDSLIDE (BF79692)  
SLOPE INCLINOMETER INSTRUMENTATION READING SUMMARY**

Date Monitored: September 24, 2022

<b>INSTRUMENT #</b>	<b>DATE INITIALIZED</b>	<b>TOTAL CUMULATIVE RESULTANT MOVEMENT AND DEPTH OF MOVEMENT TO DATE (mm)</b>	<b>MAXIMUM RATE OF MOVEMENT (mm/yr)</b>	<b>CURRENT STATUS OF SI</b>	<b>DATE OF PREVIOUS READING</b>	<b>INCREMENTAL MOVEMENT SINCE PREVIOUS READING (mm)</b>	<b>CURRENT RATE OF MOVEMENT (mm/yr)</b>	<b>CHANGE IN RATE OF MOVEMENT SINCE PREVIOUS READING (mm/yr)</b>
SI20-1	December 21, 2020	29.7 over 1.9 m to 3.8 m depth in 192° direction	76.9 in June 2021	Operational	June 4, 2022	No discernible movement	N/A	-11.4

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



**TABLE NC093-2  
FALL 2022 – HWY 813 ROCK ISLAND RIVER BRIDGE NW APPROACH FILL LANDSLIDE (BF79692)  
VIBRATING WIRE PIEZOMETER INSTRUMENTATION READING SUMMARY**

Date Monitored: September 24, 2022

<b>INSTRUMENT #</b>	<b>DATE INITIALIZED</b>	<b>TIP DEPTH (m)</b>	<b>GROUND ELEV. (m)</b>	<b>CURRENT STATUS</b>	<b>HIGHEST MEASURED GROUNDWATER LEVEL BGS (m)</b>	<b>CURRENT GROUNDWATER DEPTH BGS (m)</b>	<b>PREVIOUS GROUNDWATER DEPTH BGS (m)</b>	<b>CHANGE IN WATER LEVEL SINCE PREVIOUS READING (m)</b>
VW20-1A (70928)	December 21, 2020	5.80	-	Operational	2.45 on June 29, 2021	3.27	2.67	-0.60
VW20-1B (70929)	December 21, 2020	11.89	-	Operational	2.28 on June 29, 2021	3.06	2.47	-0.59
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.



### **3. INTERPRETATION OF MONITORING RESULTS**

SI20-1 showed no discernible movement over 1.9 m to 3.8 m depth since the spring of 2022 readings. The rate of movement has decreased by 11.4 mm/yr since the spring of 2022 readings.

Vibrating wire piezometers VW20-1A and VW20-1B showed decreases in groundwater level of 0.60 m and 0.59 m, respectively, since the spring of 2022 readings. The vibrating wire piezometer readings are summarized in Table NC093-2 above, and are plotted on Figure NC093-1 in Appendix A.

### **4. RECOMMENDATIONS**

#### **4.1 Future Work**

The instruments should be read again in the spring of 2023.

#### **4.2 Instrumentation Repairs**

It is recommended to repair VW20-2A and VW20-2B. A small backhoe or a hydrovac excavation unit will be needed to repair these instruments.



## 5. CLOSURE

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.  
Principal | Senior Geotechnical Engineer

Bruce Nestor, P.Eng.  
Geotechnical Engineer  
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### Attachments:

- Statement of Limitations and Conditions
- Appendix A
  - Field Inspector's report
  - Site Plan Showing Approximate Instrument Locations (Drawing No. 32122-NC093)
  - SI Reading Plots
  - Figure NC093-1 (Piezometric Data Plot)



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

**FALL 2022**

**APPENDIX A  
DATA PRESENTATION AND SITE PLANS**

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

ALBERTA TRANSPORTATION  
 NORTH CENTRAL REGION - ATHABASCA AND FORT McMURRAY DISTRICTS  
 INSTRUMENTATION MONITORING FIELD SUMMARY (NC093)  
 FALL 2022

<b>Location:</b> Rock Island Bridge (Hwy 813:06, C1 4.631) <b>File Number:</b> 32122 <b>Probe:</b> RST SISet 8R <b>Cable:</b> RST SISet 8R	<b>Readout:</b> GK 404 S/N 364 <b>Casing Diameter:</b> 2.75" <b>Temp:</b> 15 <b>Read by:</b> KTC/NKR
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**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 #	Remarks
	Easting (m)	Northing (m)					A+	A-	B+	B-		
SI20-1	351689	6139948	24-Sep-22	0.81	52 to 2	138	-466	479	511	-497	8R	

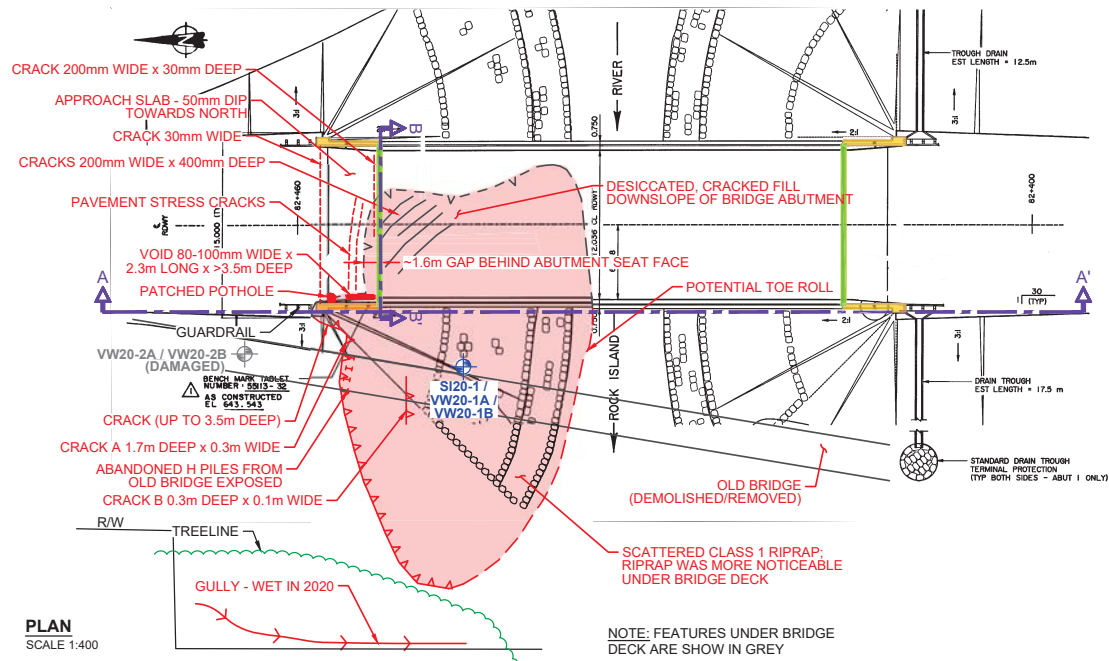
**VIBRATING WIRE READINGS**

VW	Serial	GPS Location		Date	Reading B(units)	Temp degree C
		Latitude	Longitude			
VW20-1A	70928	351689	6139948	24-Sep-22	8976.1	4.5
VW20-1B	70929	351689	6139948	24-Sep-22	8115.8	4.2
VW20-2A	70927	351691	6139963	24-Sep-22	8415.7	4.3
VW20-2B	70930	351691	6139963	24-Sep-22	8358.9	4.5

**INSPECTOR REPORT**

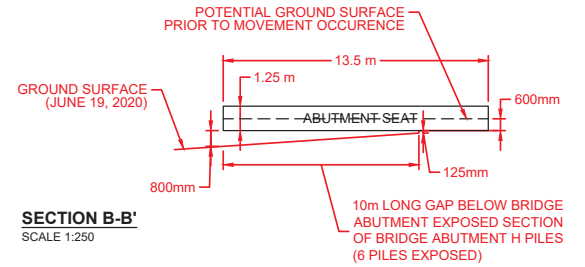
Site is KM marker 70 on Hwy 813
VW20-2A and VW20-2B damaged by lawn mower. If repair needed, have to dig down where the wire is cut off, make splice and restore stickup protector.



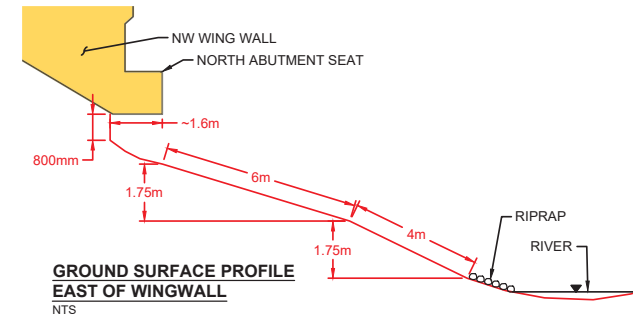


**PLAN**  
SCALE 1:400

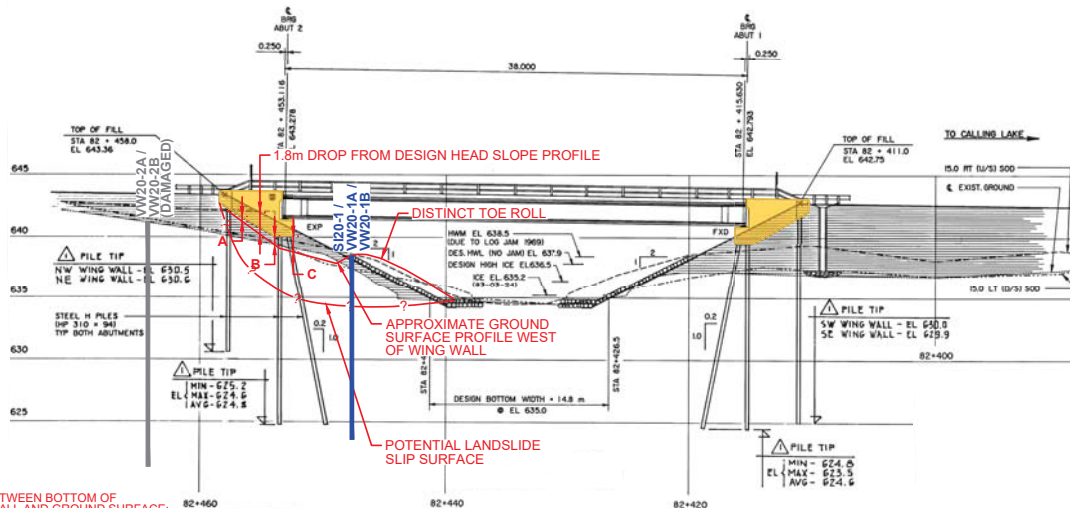
NOTE: FEATURES UNDER BRIDGE DECK ARE SHOW IN GREY



**SECTION B-B'**  
SCALE 1:250



**GROUND SURFACE PROFILE EAST OF WINGWALL**  
NTS



**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
- SLOPE INCLINOMETER
- VIBRATING WIRE PIEZOMETER
- DEPTH (m) OF VIBRATING WIRE PIEZOMETER OR SLOPE INCLINOMETER

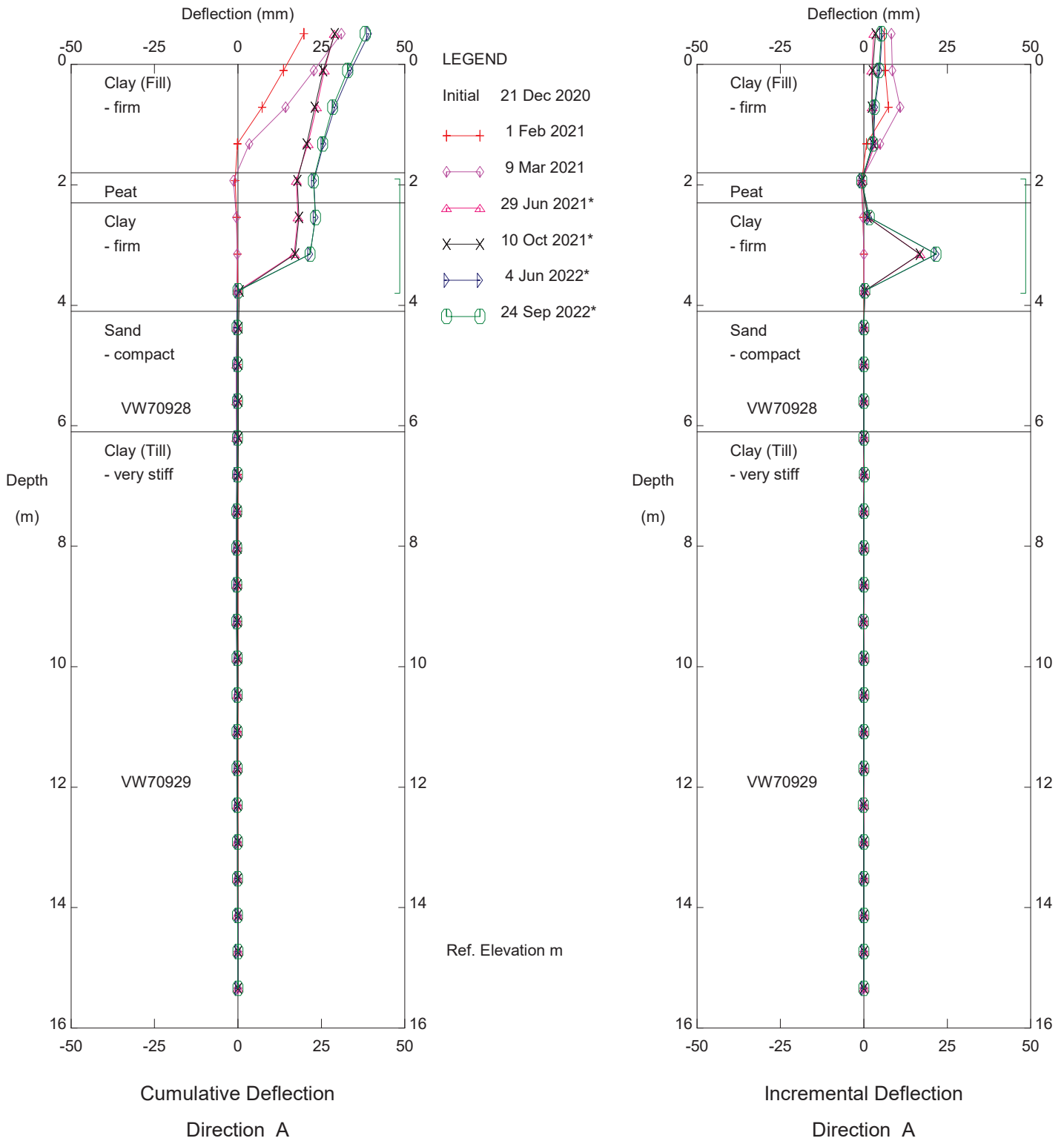


GAP BETWEEN BOTTOM OF WINGWALL AND GROUND SURFACE:  
A: 300mm  
B: 200mm  
C: 800mm

**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	OCTOBER 2022
FILE NO.	32122

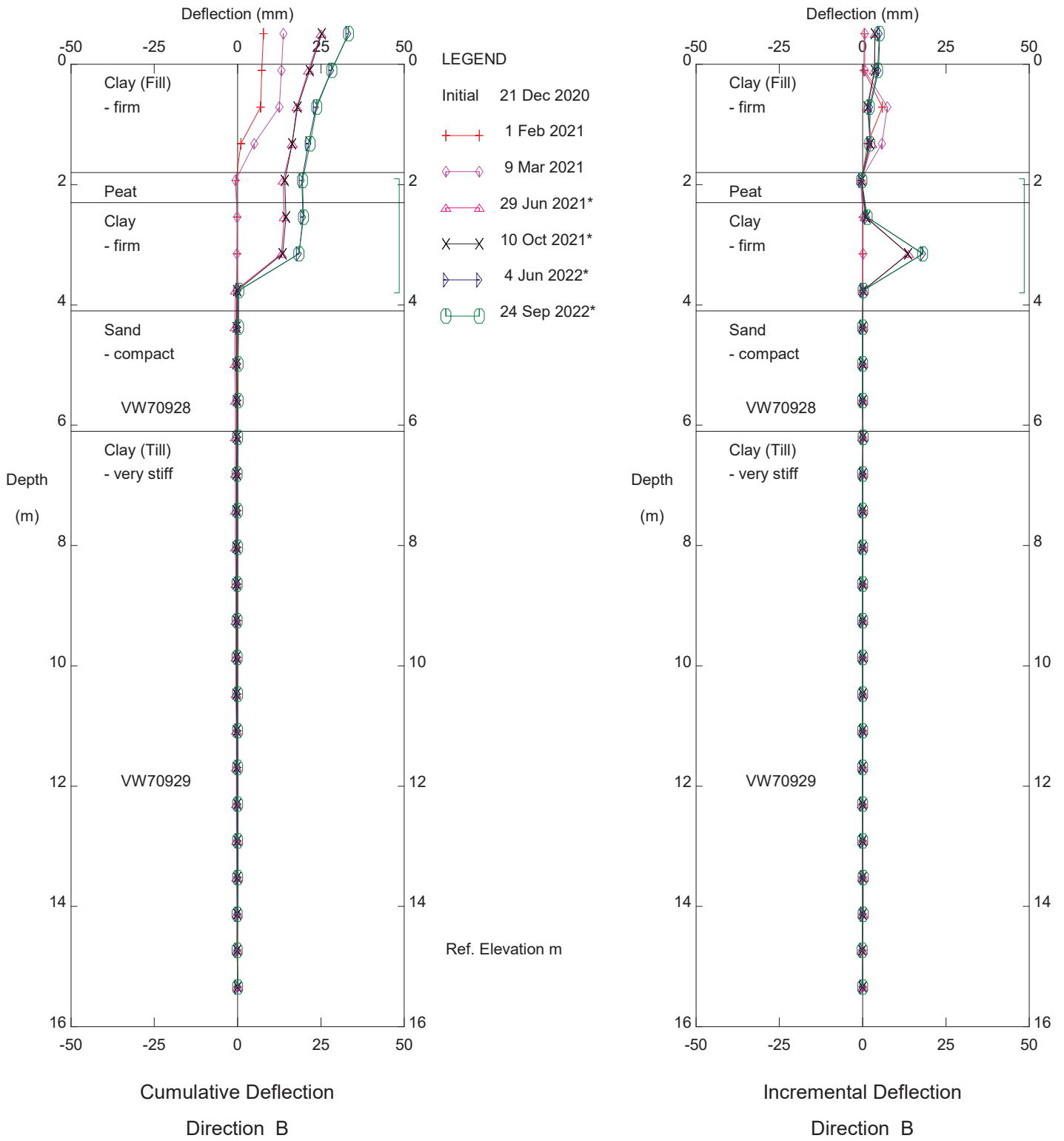
**THURBER ENGINEERING LTD.**



Hwy 813 NC93 Rock Island River Bridge, Inclinometer SI20-1

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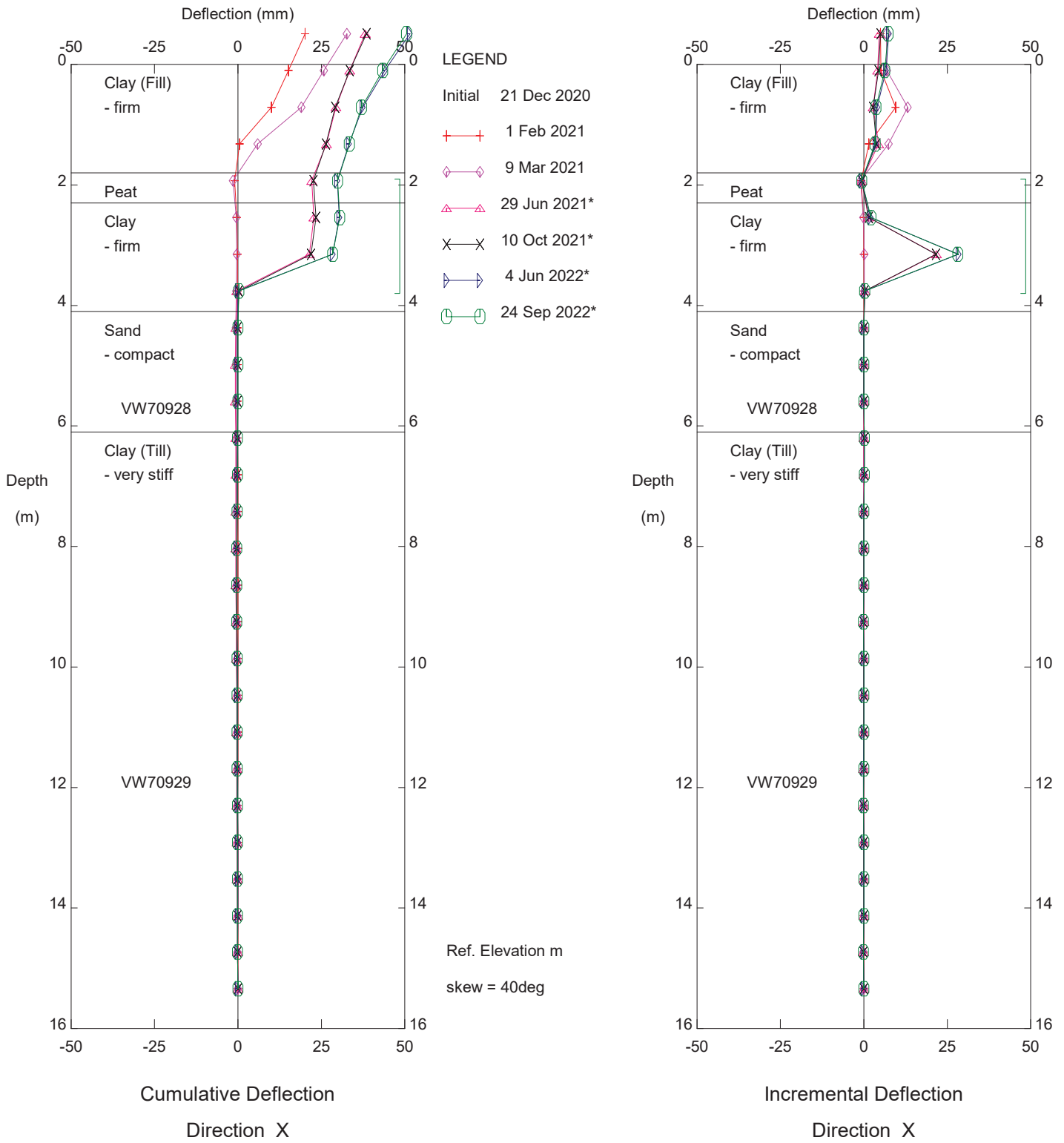
Sets marked \* include zero shift and/or rotation corrections.



Hwy 813 NC93 Rock Island River Bridge, Inclinometer SI20-1

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Sets marked \* include zero shift and/or rotation corrections.

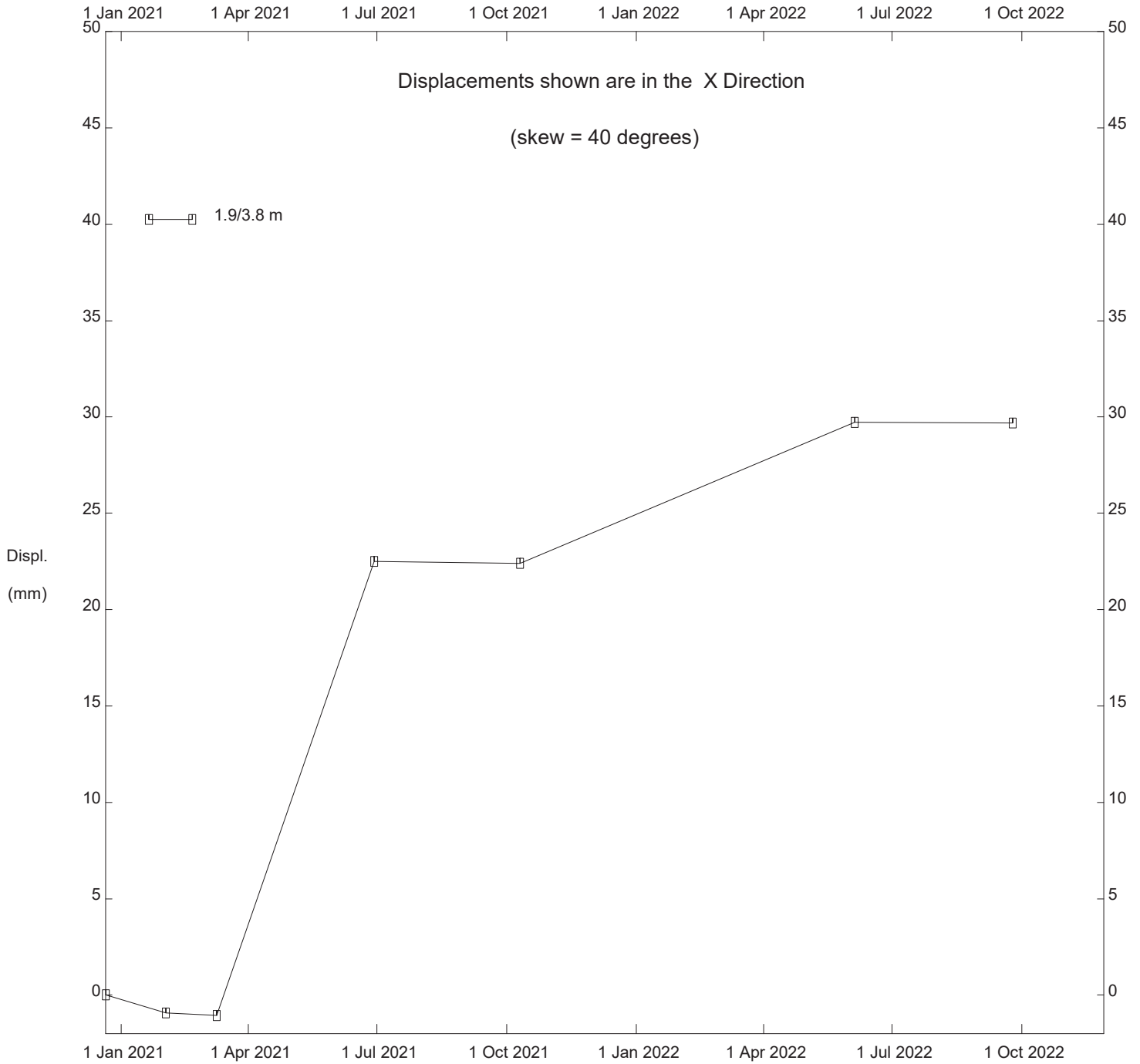


Hwy 813 NC93 Rock Island River Bridge, Inclinometer SI20-1

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Sets marked \* include zero shift and/or rotation corrections.

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Hwy 813 NC93 Rock Island River Bridge, Inclinometer SI20-1

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

