ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS GRMP
PEACE REGION – (PEACE RIVER DISTRICT)
SPRING 2024

THURBER ENGINEERING LTD.

Site Number	Location	Name	Hwy	km
SH036	HWY 679:06 C1 8.18	Prairie Echo	679:06	8.2
Legal Description: 4-26-76-16 W5		**UTM Co-ordinates**		
		11U E 539207	N 6162495	

Current Monitoring:	16-May-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): SI23-1	**Pneumatic Piezometers (PN):** **N/A**	**Vibration Wire Piezometers (VW):** VW23-1 VW23-2 VW23-3	**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 2 ft. wheelbase and RST Pocket PC readout	**Pneumatic Piezometers:**	**Vibration Wire Piezometers:** GEOKON GK-404 vibrating wire readout	**Standpipe Piezometers:**
Load Cell:	**Strain Gauges:**	**SAAs:**	**Others:**
Notes:			

Discussion	
Zones of New Movement:	None
Interpretation of Monitoring Results:	SI23-1 showed a cumulative movement of 43.7 mm over 6.1 m to 8.6 m depth with a rate of movement of 28.5 mm/yr since the previous readings on October 7, 2023. Vibrating wire piezometer VW23-1 is located near the shear zone in SI23-1. It continues to show artesian groundwater conditions of about 3.3 m above ground surface. VW23-2 also shows artesian groundwater conditions of about 2.2 m above ground surface. Vw23-1 and vw23-2 showed decreases in groundwater levels of 0.09 m and 0.07 m compared to the October 7, 2023 readings.
Future Work:	The instruments should be read again in the fall of 2024.
Instrumentation Repairs:	No instrument repairs are required at this time.
Additional Comments:	Additional readings should be taken just prior to, and during, construction of the mitigation project.

Attachments:	• Table SH036-1 Spring 2024 – HWY 679:06 Prairie Echo, Slope Inclinometer Reading Instrumentation Summary
	• Table SH036-2 Spring 2024 – HWY 679:06 Prairie Echo, Vibrating Wire Piezometer Instrumentation Reading Summary
	• Statement of Limitations sand Conditions
	• APPENDIX A – SH036 SPRING 2024
	  ○ Field Inspector's report
	  ○ Site Plan Showing Approximate Instrument Locations (Drawing No.32121 SH036-1)
	  ○ SI Reading Plots
	  ○ Figure SH036-1 (Piezometric Elevations)
	  ○ Figure SH036-2 (Piezometric Depths)

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.
Don Proudfoot, M.Eng.., P. Eng.
Partner | Senior Geotechnical Engineer

PERMIT TO PRACTICE
THURBER ENGINEERING LTD.
RM SIGNATURE: Don Proudfoot
RM APEGA ID #: 51674
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

THURBER ENGINEERING LTD.

Table SH036-1: Spring 2024 – Hwy 679:06 Prairie Echo Slope Inclinometer Instrumentation Reading Summary

Date Monitored: May 16, 2024

INSTRUMENT #	DATE INITIALIZED	TOTAL CUMULATIVE RESULTANT MOVEMENT AT NOTED DEPTH SINCE INITIAL READING (mm)	MAXIMUM RATE OF MOVEMENT (mm/yr)	CURRENT STATUS	DATE OF PREVIOUS READING	INCREMENTAL MOVEMENT SINCE PREVIOUS READING (mm)	RATE OF MOVEMENT (mm/yr)	CHANGE IN RATE OF MOVEMENT SINCE PREVIOUS READING (mm/yr)
SI23-1	January 10, 2023	43.7 mm over 6.1 m to 8.6 m depth in 172° direction	101.7 mm/yr in January 2023	Operational	October 7, 2023	17.3	28.5	-18.5

Drawing 32121-SH036-1 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

Table SH036-2: Spring 2024 – Hwy 679:06 Prairie Echo Vibrating Wire Piezometer Instrumentation Reading Summary

Date Monitored: May 16, 2024

INSTRUMENT #	DATE INITIALIZED	TIP ELEV. (m)	GROUND ELEV. (m)	CURRENT STATUS	HIGHEST MEASURED WATER ELEVATION (m)	MEASURED PORE PRESSURE (kPa)	CURRENT WATER ELEVATION (m)	PREVIOUS WATER ELEVATION (October 7, 2023) (m)	CHANGE IN WATER LEVEL SINCE PREVIOUS READING (m)
VW23-1 (158202)	January 6, 2023	606.75	615.75	Operational	619.41 on March 8, 2023	120.2	619.01	619.10	-0.09
VW23-2 (158210)	January 6, 2023	607.44	613.54	Operational	615.93 on June 11, 2023	81.7	615.77	615.84	-0.07
VW23-3 (157856)	*January 7, 2023*	*610.68*	*619.98*	*Destroyed*	*624.24 on January 13, 2023*	*N/A*	*N/A*	*622.51*	*N/A*

Drawing 32121-SH036-1 in Appendix A provides a sketch of the approximate locations of the monitoring instrumentation for this site.

Notes:
VW – vibrating wire piezometer.
BGS - below ground surface.

THURBER

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.

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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THURBER ENGINEERING LTD.

ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS GRMP (CON0022164)
PEACE REGION (PEACE RIVER DISTRICT)
INSTRUMENTATION MONITORING RESULTS

SPRING 2024

APPENDIX A
DATA PRESENTATION

SITE SH036: HWY 679:06, PRAIRIE ECHO

ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS
PEACE REGION (PEACE RIVER DISTRICT)
INSTRUMENTATION MONITORING FIELD SUMMARY (SH036)
SPRING 2024

Location:	Prairie Echo (HWY 679:06 C1 8.18)	**Readout:**	GK 404, S/N 364
File Number:	32121	**Casing Diameter:**	2.75"
Probe:	RST Set 5R	**Temp:**	4/Flurries/rain
Cable:	RST Set 5R	**Read by:**	NKR/NRM

SLOPE INCLINOMETER (SI) READINGS

SI#	GPS Location (UTM 11)		Date	Stickup (m)	Depth from top of casing (ft)	Magn. North A+ Groove	Current Bottom Depth Readings				Probe/ Reel		Remarks
	Easting	Northing				degree	A+	A-	B+	B-	#	Size (")	
SI23-1	539207	6162495	16-May-24	0.88	48 to 2	182	652	-642	90	-101	5R	2.75	

VIBRATING WIRE PIEZOMETER (VW) READINGS

VW#	GPS Location (UTM 12)		Date	Reading (B)	Temp (°C)	lentification Number
	Easting	Northing				
SI23-1	539207	6162495	16-May-24	7777.1	6.6	158202
TH23-2	539207	6162484	16-May-24	8243.1	5.7	158210
TH23-3	539318	6162492	16-May-24			157856

DAILY INSPECTOR REPORT

Damaged, Large hole where VW is supposed to be, filled with water

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SW 26-076-16-W5M

JANUARY 11, 2023 SURVEY BOUNDARY, CONTOURS OUTSIDE SURVEY BOUNDARY FROM 2008 LIDAR

HWY RIGHT OF WAY

OUTLET EL. 610.383m

CSP 600mm Ø

INLET EL. 610.744m

CRACK AT FOGLINE

MAIN CRACK ~31 m LONG

40mm WIDE

20mm WIDE, 20mm DEEP

50mm WIDE

25mm WIDE

HAIRLINE CRACK ~5m LONG

SI23-1

VW23-1

VW23-2

DIP IN ROAD

SPRING IN BACKSLOPE

CATTAILS

0.8m HIGH SCARP

WATER IN RUTS

CRACK 20-30mm WIDE IN FOGLINE, DIP TOWARD DITCH

SLIGHT DEPRESSION FORMING

VW23-3 (DESTROYED)

HWY 679

WELL

WATER ABOVE GROUND

OUTLET

WELL

TOE ROLL LOCATION FROM MAY 30, 2022 CALLOUT

POSSIBLE BULGED FENCELINE

POSSIBLE TOE ROLLS

HWY RIGHT OF WAY

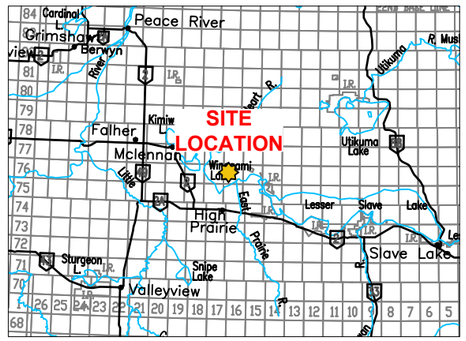
NW 23-076-16-W5M

N

W

E

S



KEY MAP

SCALE 1:3 000 000

0 10 20 30 40 50 60m

SCALE 1:1000

GROUND SURFACE CONTOURS ARE FROM MCINTOSH PERRY SURVEYED JANUARY 11, 2023
CONTOURS OUTSIDE SURVEY BOUNDARY FROM 2008 LIDAR

LEGEND

- CRACK (APPROXIMATE)
- APPROXIMATE TEST HOLE LOCATION
- (SI) SLOPE INCLINOMETER
- (VW) VIBRATING WIRE PIEZOMETER
- T TELUS LINE
- x FENCE LINE
- P OVERHEAD POWER LINE
- GL GAS LINE
- GROUND SURFACE CONTOUR (CONTOUR INTERVAL = 1m)
- TREE LINE
- POWER POLE

Alberta

PEACE REGION (PEACE RIVER DISTRICT)

SH036: HWY 679:06 km 8.18 TO km 8.24 PRAIRIE ECHO SITE PLAN SHOWING APPROXIMATE INSTRUMENT LOCATIONS

DWG NO. 32121-SH036-1

DRAWN BY	ML
DESIGNED BY	NFR
APPROVED BY	DWP
SCALE	1:1000
DATE	NOVEMBER 2023
FILE No.	32121

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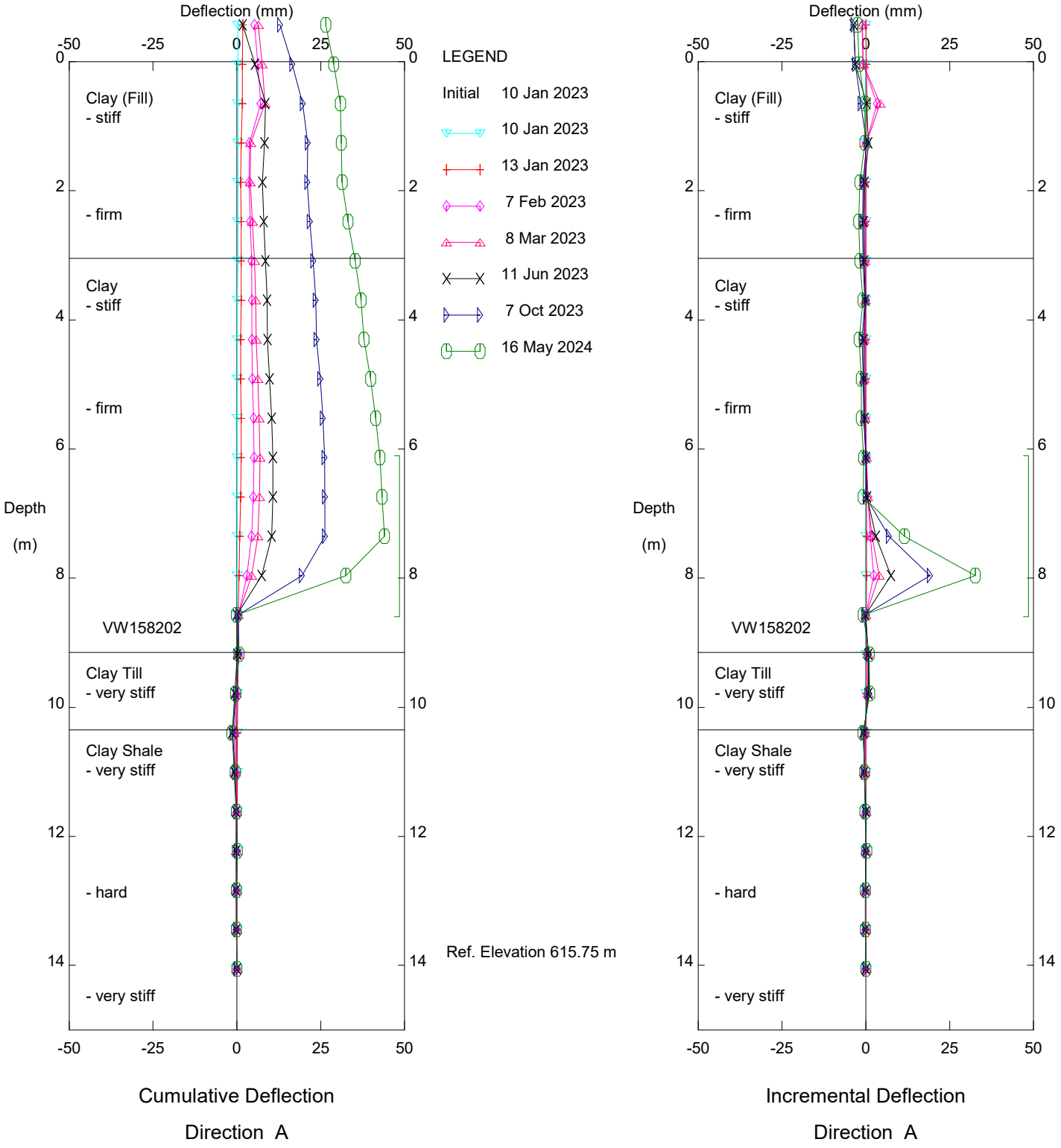

Cumulative Deflection

Direction A

Incremental Deflection

Direction A

Hwy 679:06 km 8.18 Prairie Echo, Inclinometer SI23-1

TEC

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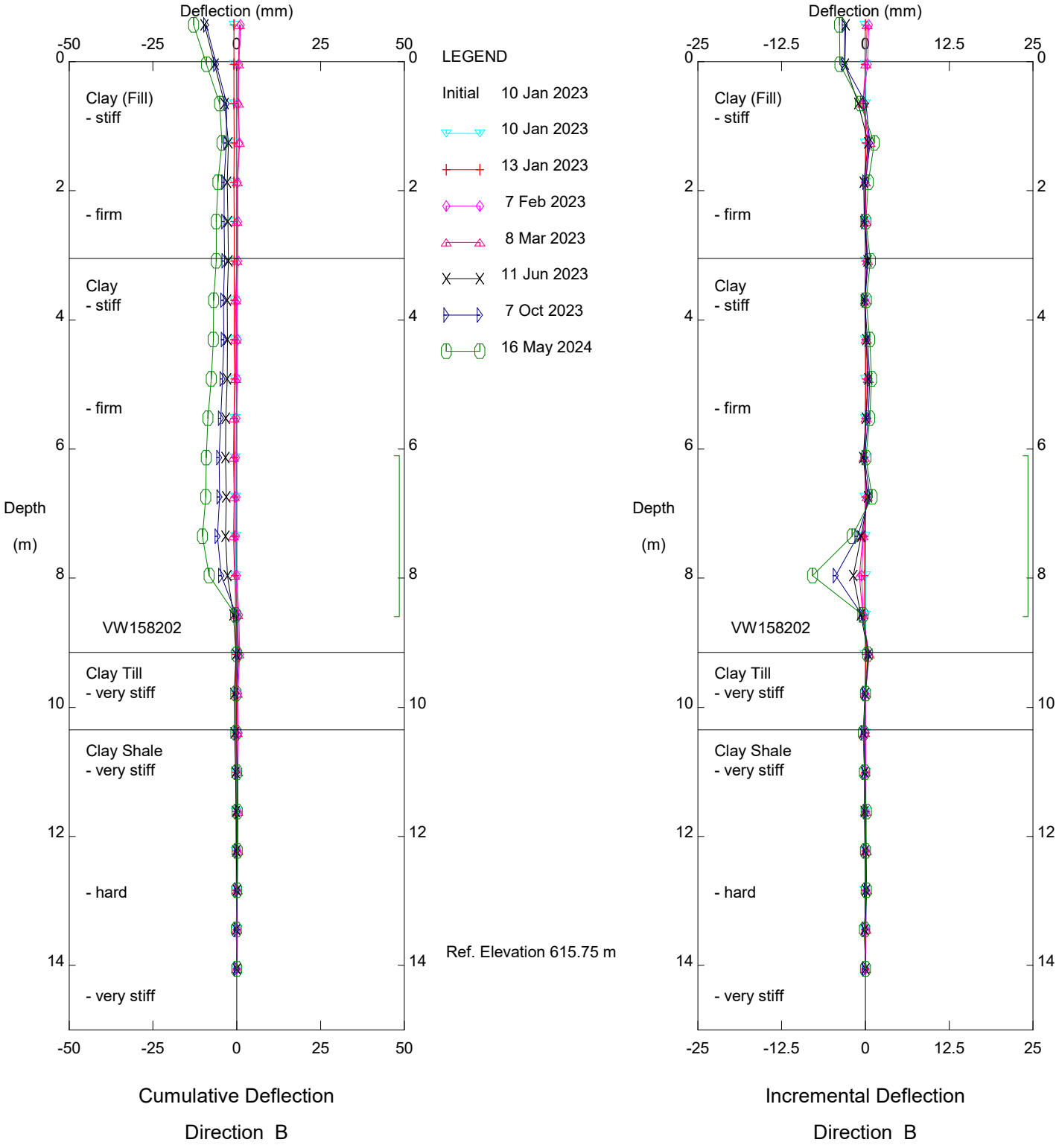

Cumulative Deflection

Direction B

Incremental Deflection

Direction B

Hwy 679:06 km 8.18 Prairie Echo, Inclinometer SI23-1

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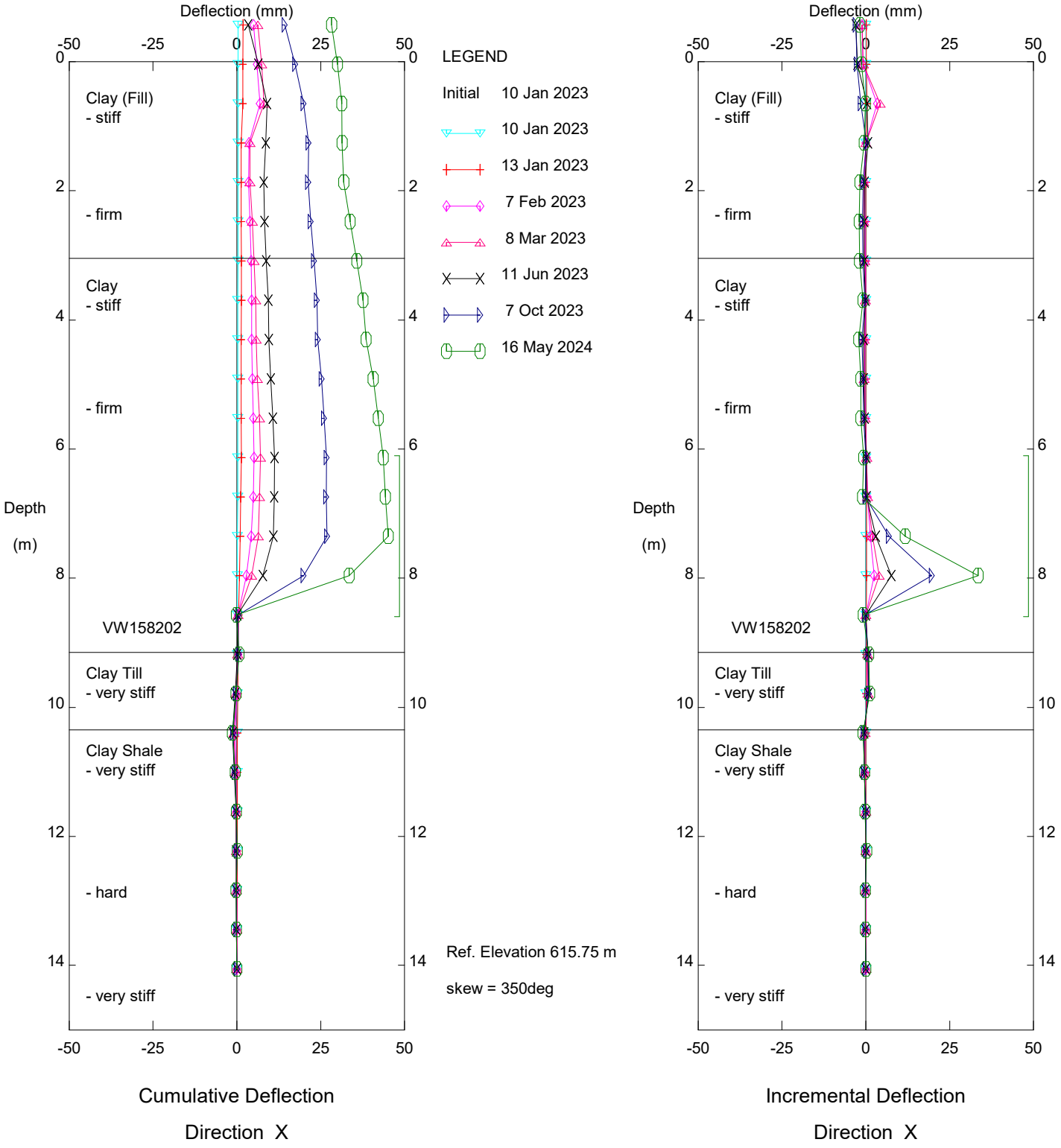

Hwy 679:06 km 8.18 Prairie Echo, Inclinometer SI23-1

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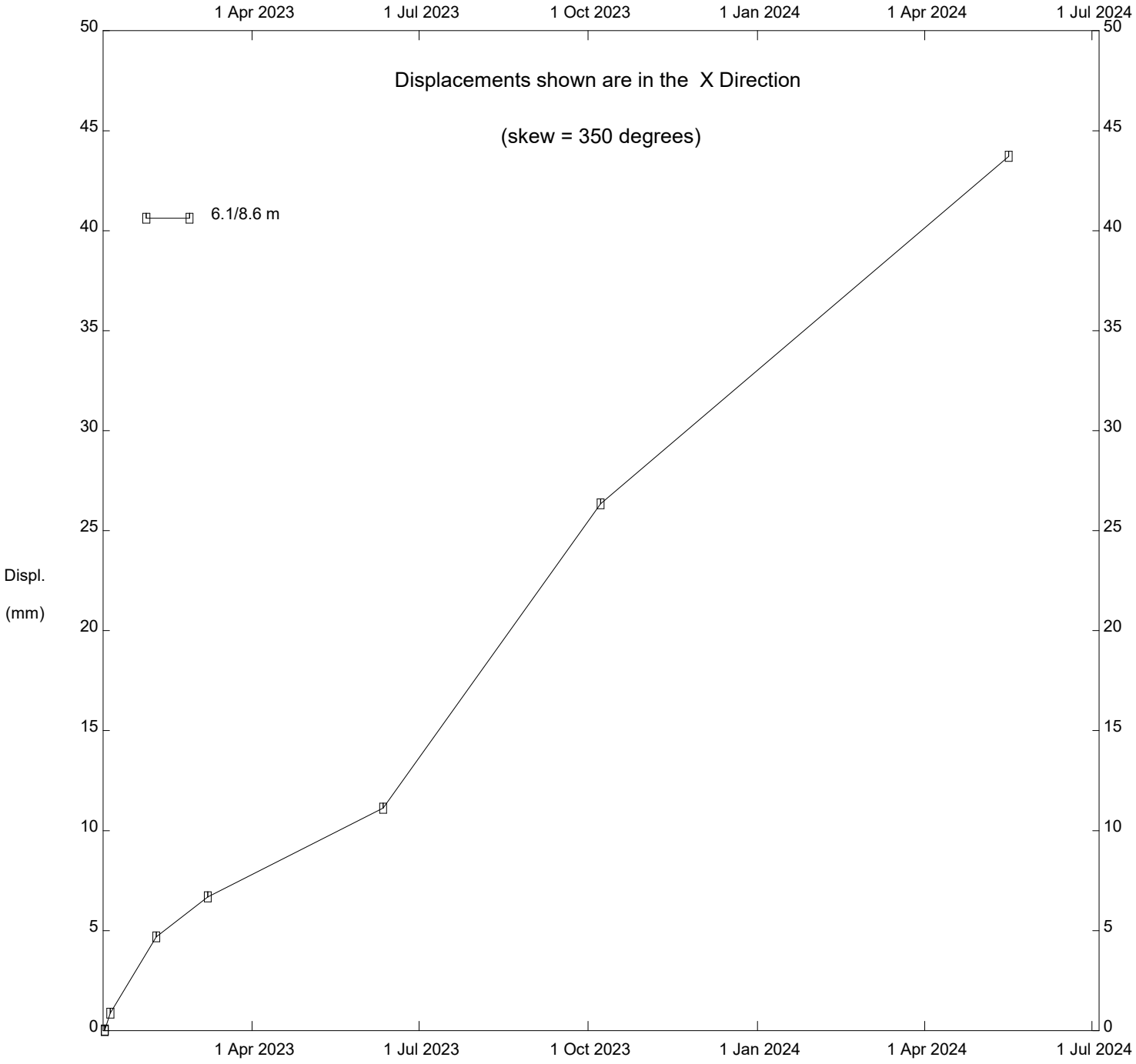

Hwy 679:06 km 8.18 Prairie Echo, Inclinometer SI23-1

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FIGURE SH036-1
PIEZOMETRIC DEPTHS FOR HWY 679:06 PRAIRIE ECHO

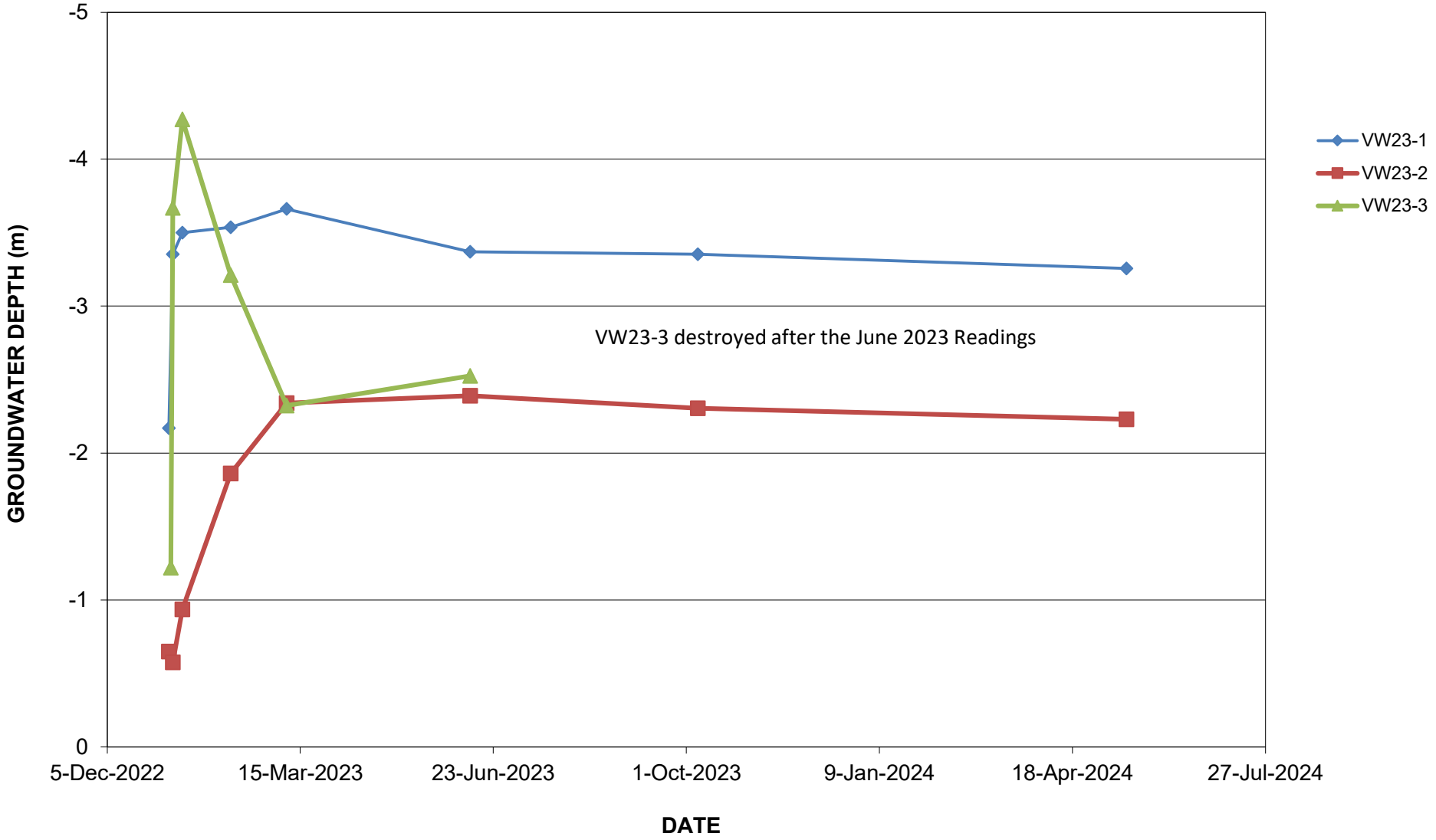

FIGURE SH036-2
PIEZOMETRIC ELEVATIONS FOR HWY 679:06 PRAIRIE ECHO