

**ALBERTA TRANSPORTATION AND  
ECONOMIC CORRIDORS GRMP  
PEACE REGION – (PEACE RIVER DISTRICT)  
INSTRUMENTATION MONITORING - FALL 2024**



Site Number	Location	Name	Hwy	km
PH045	Hwy 35:08 C1 26.2	Meikle Pile Wall	35:08	Km 26.2
<b>Legal Description:</b>		<b>UTM Co-ordinates</b>		
6-7-94-22 W5		11U E 467580.75	N	6333080.85

<b>Current Monitoring:</b>	23-Sep-2024	<b>Previous Monitoring</b>	24-May-2024
<b>Instruments Read By:</b>	Mr. Niraj Regmi, G.I.T., and Mr. Nixson Mationg, Thurber		

Instruments Read During This Site Visit			
<b>Slope Inclonometers (SIs):</b>  SI-49 SI-50 SI-51 SI23-100	<b>Pneumatic Piezometers (PN):</b>	<b>Vibration Wire Piezometers (VW):</b>  VW23-100A VW23-100B VW23-101 VW23-102 VW23-103	<b>Standpipe Piezometers (SP):</b>
<b>Load Cell (LC):</b>	<b>Strain Gauges:</b>	<b>SAA:</b>	<b>Others:</b>

Readout Equipment Used			
<b>Slope Inclonometers:</b>  Two RST Digital Inclonometer probes with 2 ft. wheelbases and RST Pocket PC readouts	<b>Pneumatic Piezometers:</b>	<b>Vibration Wire Piezometers:</b>  Geokon GK404	<b>Standpipe Piezometers:</b>
<b>Load Cell:</b>	<b>Strain Gauges:</b>	<b>SAA:</b>	<b>Others:</b>
<b>Note:</b>			

<b>Zones of New Movement:</b>	None
<b>Interpretation of Monitoring Results:</b>	<p>Slope inclinometers SI-49, -50, and -51 were installed inside the pile wall along the south shoulder of the highway. The movement zones for the slope inclinometers installed in the piles are defined over the length of the pile and water.</p> <p>SI-49 is installed near the east end of the wall. Since the spring of 2024 readings, slope inclinometer SI-49 showed a rate of movement of 3.6 mm/yr over 1.5 m to 14.3 m depth with a total cumulative deflection to date of 162.8 mm. The current rate of movement in SI-49 is lower than the overall rate of movement of 6.1 mm/yr measured since initialization. Overall, the movement pattern at SI-49 appears to have been unaffected by the repairs undertaken in 2016.</p> <p>SI-50 is installed in the central portion of the wall. SI-50 showed a rate of movement of 5.0 mm/yr since the spring of 2024 readings with a total</p>

	<p>cumulative movement to date of 165.4 mm. The overall movement rate in this SI since initialization is 6.2 mm/yr. SI-50 showed a marked reduction in movement rate post-construction although the rate has since increased but is lower than it was before construction.</p> <p>SI-51 is installed in near the west end of the wall and may be outside of the influence of the main slide area. SI-51 showed a rate of movement of 18.3 mm/yr since the spring of 2024 readings with a total cumulative movement to date of 80.7 mm. The overall movement rate at SI-51 since initialization is 3.0 mm/yr. The pattern at SI-51 is irregular likely due to the casing damage (at depth and near surface); however, the overall trend indicates that this inclinometer was also unaffected by the 2016 repairs.</p> <p>Slope inclinometer SI23-100 is located downslope of the pile wall and showed a rate of movement of 8.9 mm/yr over 4.8 m to 7.8 m depth, and no movement over 21.9 m to 24.3 m depth since the Fall 2023 readings. The lower zone may need more readings to confirm if this is a zone of movement but is of concern as it is below the adjacent pile wall. There is also a potential shallower zone developing at about 3 m which is the contact between the fill and native materials that will be analyzed in Spring 2025.</p> <p>The vibrating wire piezometers show current groundwater depths ranging from 2.98 m in VW23-100B to 8.92 m below existing ground surface in VW23-100A. VW23-100A, VW23-100B, VW23-101, VW23-102 and VW23-103 showed increases in groundwater level of 0.30 m, 0.28 m, 0.94 m, 0.45 m, and 0.14 m, respectively, since the spring of 2024 readings. The greatest increase, in VW23-101, corresponds to the piezometer located in the central portion of the slide mass. The current groundwater level readings in VW23-100B and VW23-101 are the highest since the instruments were initialized. The nested piezometers at VW23-100 indicate an upward trend to the groundwater flow pattern. The vibrating wire piezometer readings are summarized in Table PH045-2 below and are plotted on Figure PH045-1 in Appendix A.</p>
<b>Future Work:</b>	The instruments should be read again in the spring of 2025.
<b>Instrumentation Repairs:</b>	No instrument repairs are required at this time.
<b>Additional Comments:</b>	

<b>Attachments:</b>	<ul style="list-style-type: none"> <li>▪ Table PH045-1: Fall 2024 – Meikle River (km 26.2 Pile Wall) Slope Inclinometer Instrumentation Reading Summary</li> <li>▪ Table PH045-2: Fall 2024 – Meikle River (km 26.2 Pile Wall) Vibrating Wire Piezometer Instrumentation Reading Summary</li> <li>▪ Statement of Limitations and Conditions</li> <li>▪ APPENDIX A - PH045 FALL 2024 <ul style="list-style-type: none"> <li>□ Field Inspector’s report</li> <li>□ Site Plan Showing Approximate Instrument Locations (Drawing No. 32121 PH045)</li> <li>□ SI Reading Plots</li> <li>□ Figure PH045-1 (Vibrating Wire Piezometer Depths)</li> <li>□ Figure PH045-1 (Vibrating Wire Piezometer Elevations)</li> </ul> </li> </ul>
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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.  
Roger Skirrow, M.Sc., P. Eng.  
Senior Geotechnical Engineer

Lucas Green, P.Eng.  
Geotechnical Engineer

**Table PH045-1: Fall 2024 – Meikle River (Km 26.2 Pile Wall) Slope Inclinometer Instrumentation Reading Summary**

Date Monitored: September 23, 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)	CURRENT RATE OF MOVEMENT (mm/yr)	CHANGE IN RATE OF MOVEMENT SINCE PREVIOUS READING (mm/yr)
SI-49	Dec. 15, 1997	162.8 mm over 1.5 m to 14.3 m depth in 216° direction	15.2 mm/y In June 1999	Operational	May 24, 2024	1.2	3.6	1.0
SI-50	Dec. 15, 1997	165.4 mm over 1.7 m to 13.9 m depth in 241° direction	14.2 mm/yr in Sept. 2011	Operational	May 24, 2024	1.7	5.0	6.5
SI-51	Dec. 15, 1997	80.7 mm over 1.8 m to 12.2 m depth in 267° direction	48.8 mm/yr In May 1998	Operational	May 24, 2024	6.1	18.3	22.7
SI23-100	May 11, 2023	16.2 mm over 4.8 m to 7.8 m depth in the 160° direction	34.1 mm/yr in October 2023	Operational	May 24, 2024	3.0	8.9	10.2
		4.4 mm over 21.9 m to 24.3 m depth in the 207° direction	23.3 mm/yr in June 2023			0	0	-16.1

Drawing 32121-PH045 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

**Table PH045-2: Fall 2024 – Meikle River (Km 26.2 Pile Wall) Vibrating Wire Piezometer Instrumentation Reading Summary**

Date Monitored: September 23, 2024

INSTRUMENT	DATE INITIALIZED	GROUND ELEVATION (m)	TIP DEPTH (m)	CURRENT STATUS	MAXIMUM GROUNDWATER DEPTH (m)	CURRENT GROUNDWATER DEPTH (m)	PREVIOUS GROUNDWATER DEPTH (m)	CHANGE IN WATER LEVEL SINCE PREVIOUS READING (m)
VW23-100A	May 10, 2023	463.39	23.37	Operational	8.80 on May 10, 2023	8.92	9.22	0.30
VW23-100B	May 10, 2023	463.39	11.37	Operational	2.98 on Sep. 23, 2024	2.98	3.26	0.28
VW23-101	May 10, 2023	463.06	15.00	Operational	4.98 on Sep. 23, 2024	4.98	5.92	0.94
VW23-102	May 11, 2023	465.26	19.10	Operational	4.75 on June 15, 2023	5.60	6.05	0.45
VW23-103	May 11, 2023	468.23	15.40	Operational	6.44 on May 11, 2023	8.92	9.06	0.14

Drawing 32121-PH045 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.



## 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.

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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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### 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.

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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**

**FALL 2024**

**APPENDIX A  
DATA PRESENTATION**

**SITE PH045: HWY 35:08, MEIKLE RIVER (km 26.2 PILE WALL)**

**ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS  
PEACE REGION (PEACE RIVER DISTRICT)  
INSTRUMENTATION MONITORING FIELD SUMMARY (PH45)  
FALL 2024**

<b>Location:</b> Meikle Pile Wall (Hwy 35:08 C1 26.2)	<b>Readout:</b> GK404, S/N364
<b>File Number:</b> 32121 (read under 36776 project number)	<b>Casing Size:</b> 3.34
<b>Probe:</b> RST SET 5R and 8R	<b>Temp:</b> 14C
<b>Cable:</b> RST SET 5R and 8R	<b>Read by:</b> NNM/NRM

**SLOPE INCLINOMETER (SI) READINGS**

SI#	GPS Location (UTM 11)		Date	Stickup (m)	Depth from top of casing (ft)	Magn. North A+ Groove degree	Current Bottom Depth Readings				Probe/ Reel #	Size (")	Remarks
	Easting	Northing					A+	A-	B+	B-			
SI-49	467580.75	6333080.85	23-Sep-24	0.37	78 to 2	215°	113	-99	83	-91	8R/8R	3.34	
SI-50	467545.56	6333099.72	23-Sep-24	0.1	76 to 2	225°	79	-64	232	-239	8R/8R	3.34	**
SI-51	467545.72	6333120.09	23-Sep-24	0	70 to 2	145°	172	-161	-319	297	5R/5R	3.34	*
SI23-100	467550	6333091	23-Sep-24	1	84 to 0	181	506	-493	317	-320	10R	3.34	

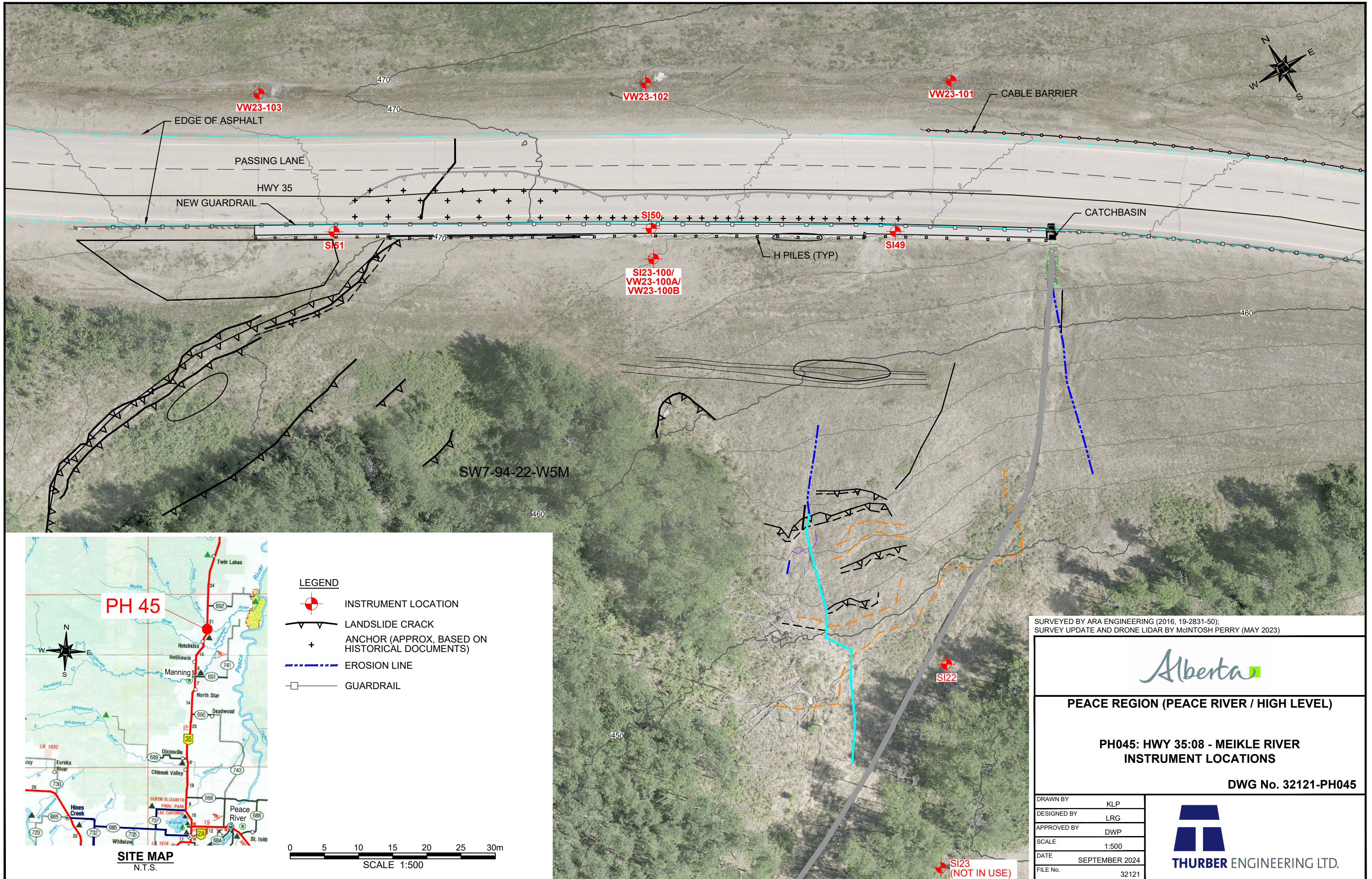
**VIBRATING WIRE PIEZOMETER (VW) READINGS**

VW#	GPS Location (UTM 11)		Date	Reading (B)	Temp (°C)	Identification Number
	Easting	Northing				
VW23-100A	467550	6333091	23-Sep-24	8316.2	5.5	158306
VW23-100B	467550	6333091	23-Sep-24	8017	6	163218
VW23-101	467601	6333093	23-Sep-24	8744.2	5.9	160947
VW23-102	467564	6333115	23-Sep-24	8471.4	5.7	160933
VW23-103	467562	6333140	23-Sep-24	8995.5	5.5	160869

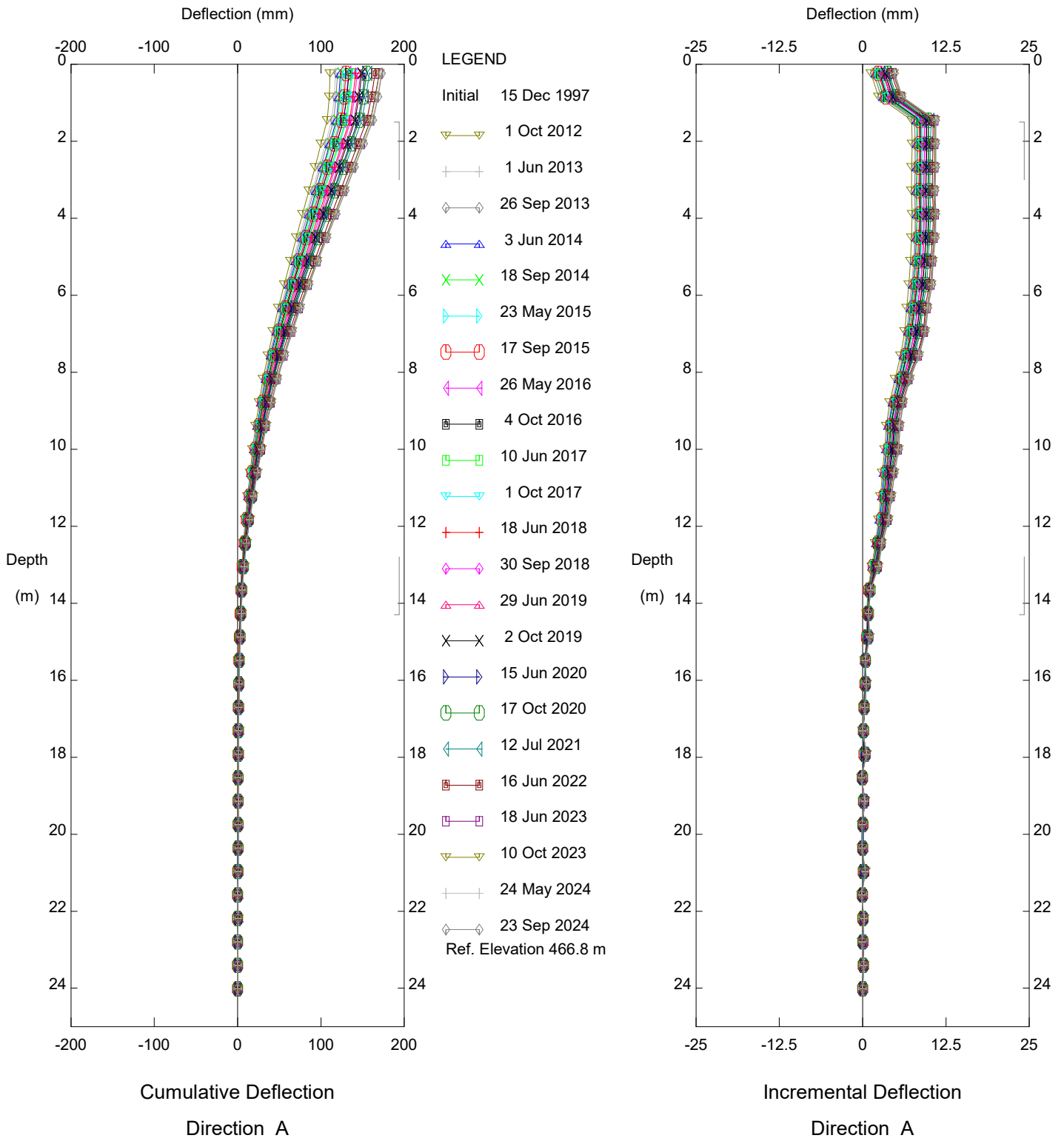
**DAILY INSPECTOR REPORT**

* SI-51 probe comes to surface not in grooves, may be damaged at 2 feet depth. Top of casing damaged
*SI-51 Probe did not go past 65 ft, SI was read from 2 ft to 64 ft
** SI-50 - top of SI slightly damaged





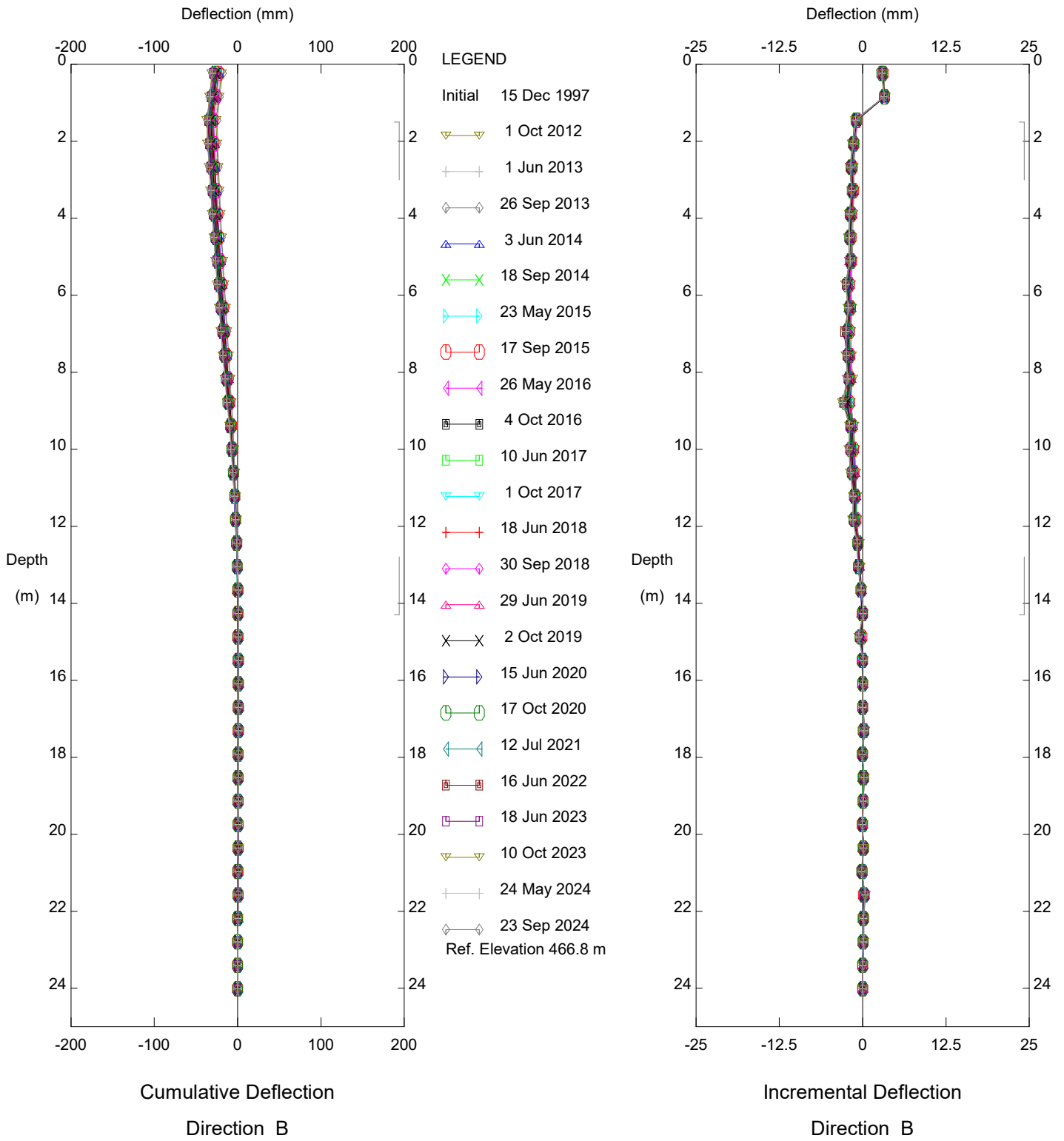
Thurber Engineering Ltd.



HWY 35:08 (PH045), Inclinometer SI-49

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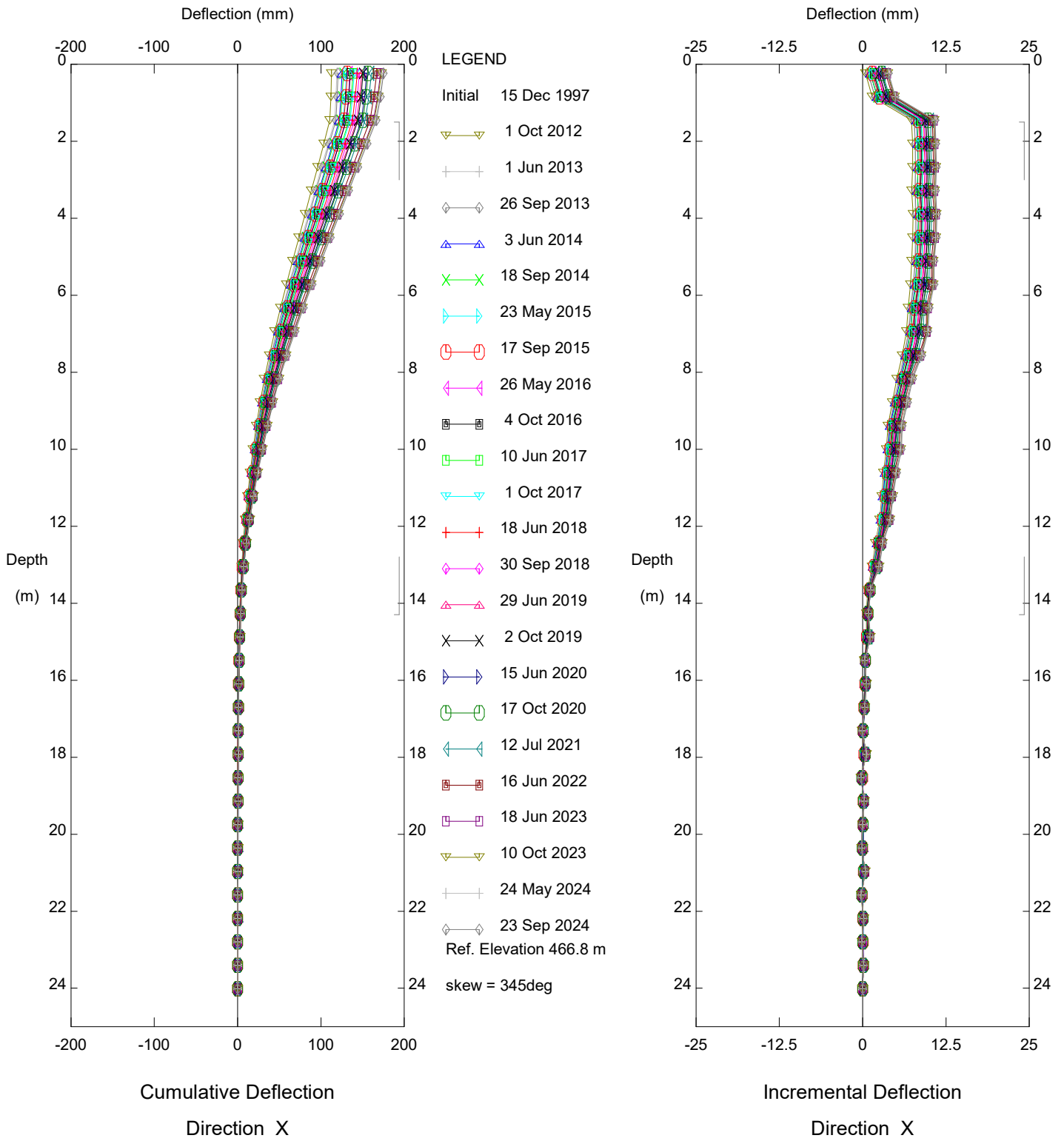
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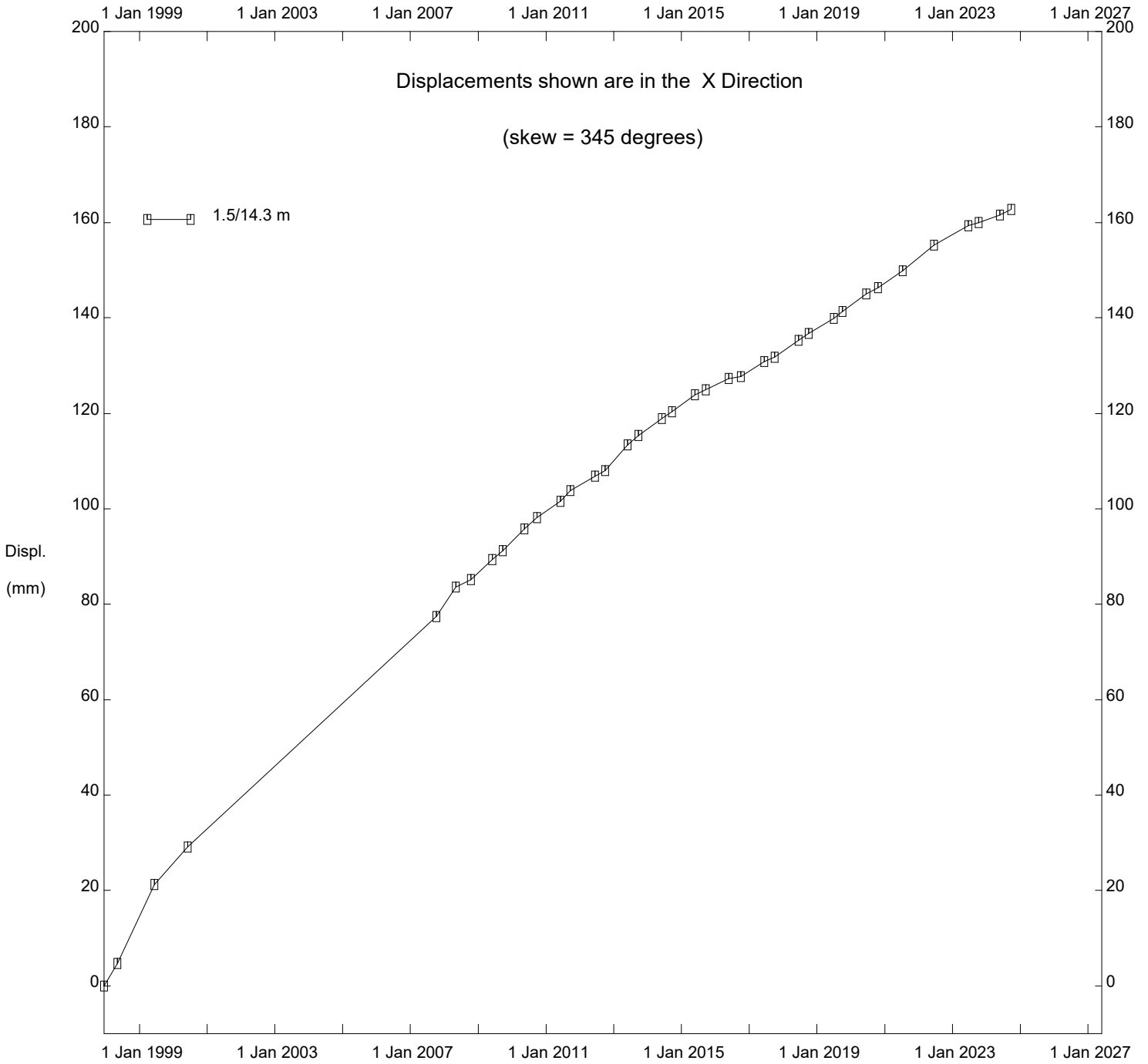
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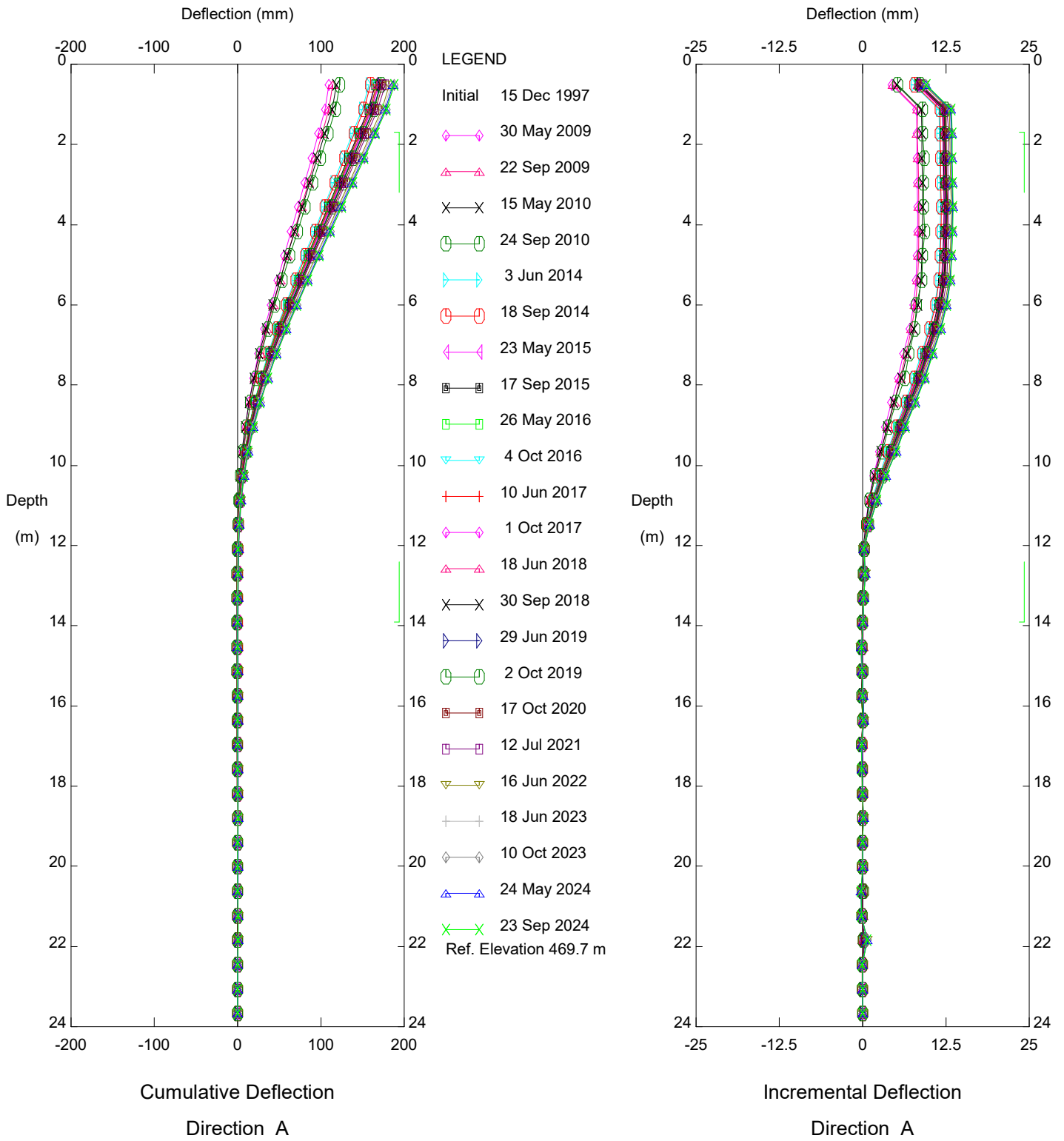
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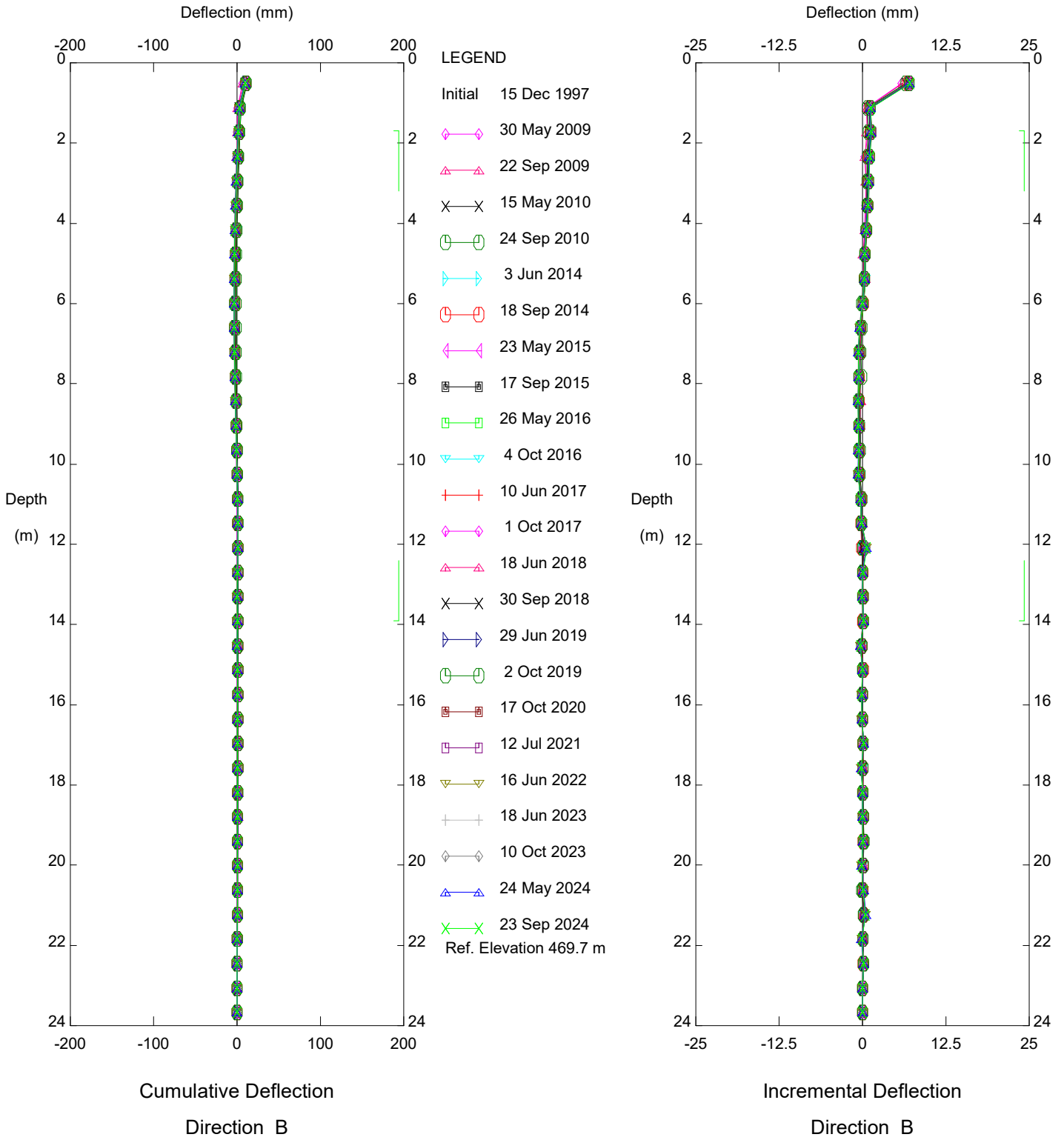
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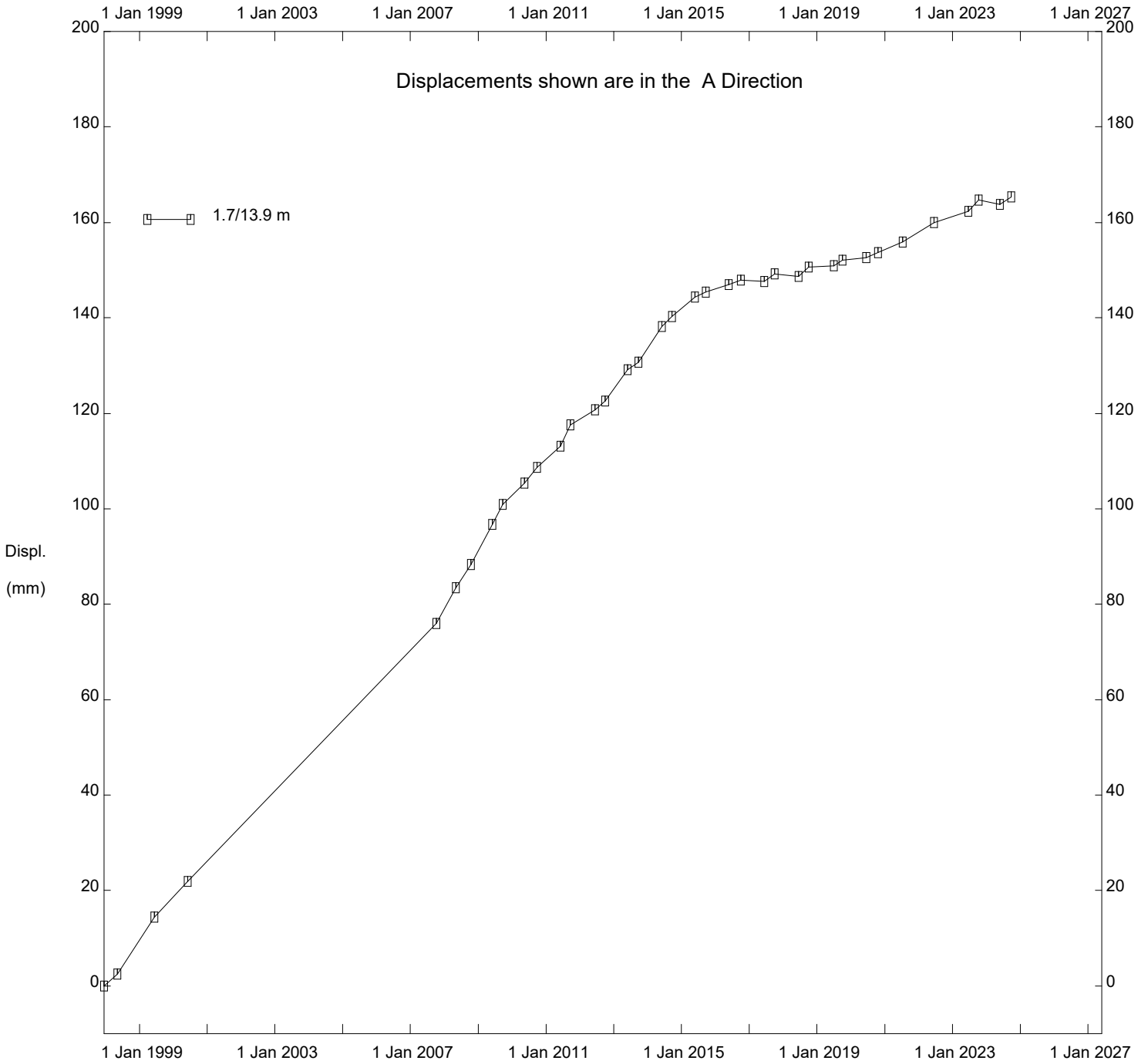
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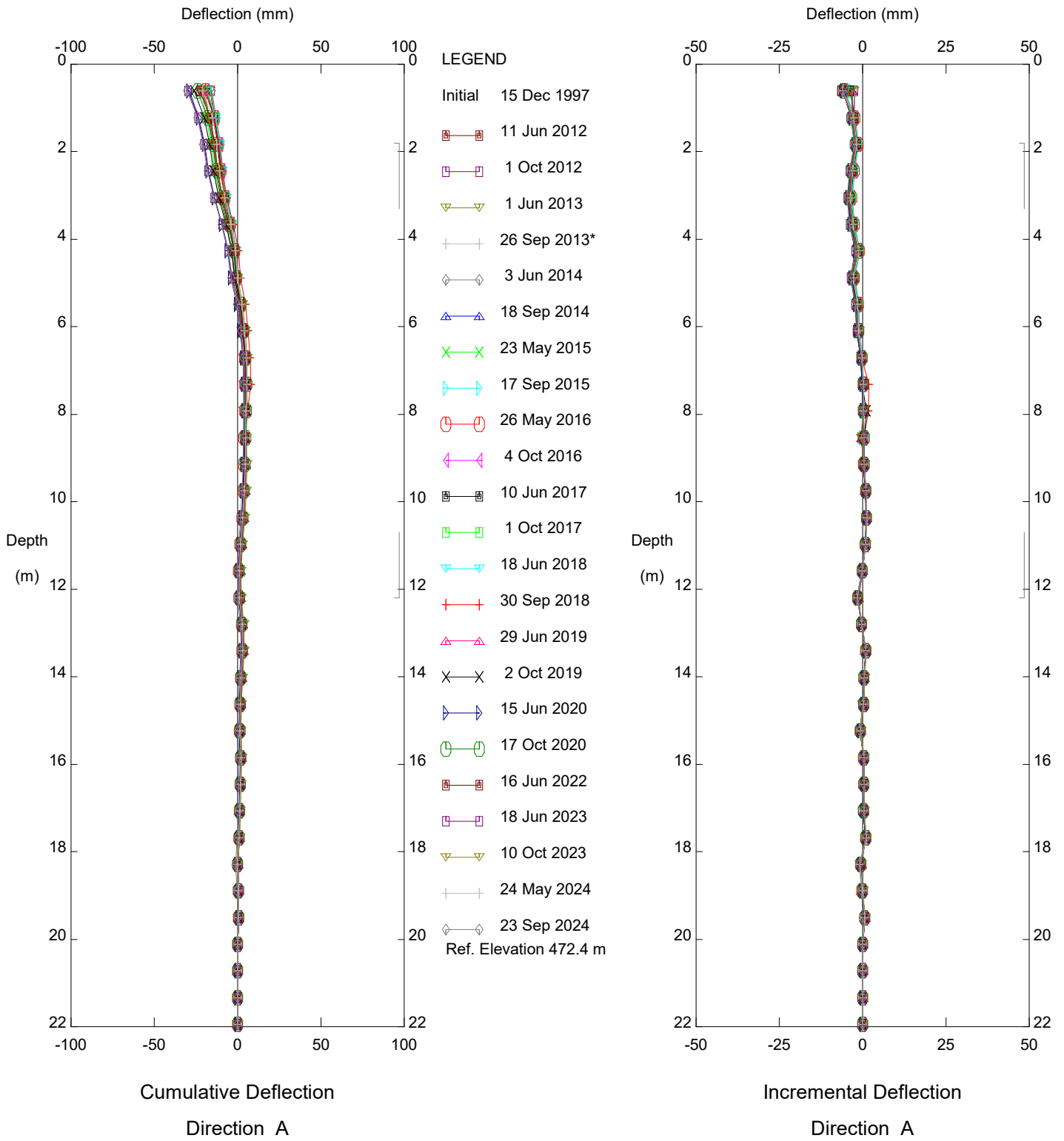


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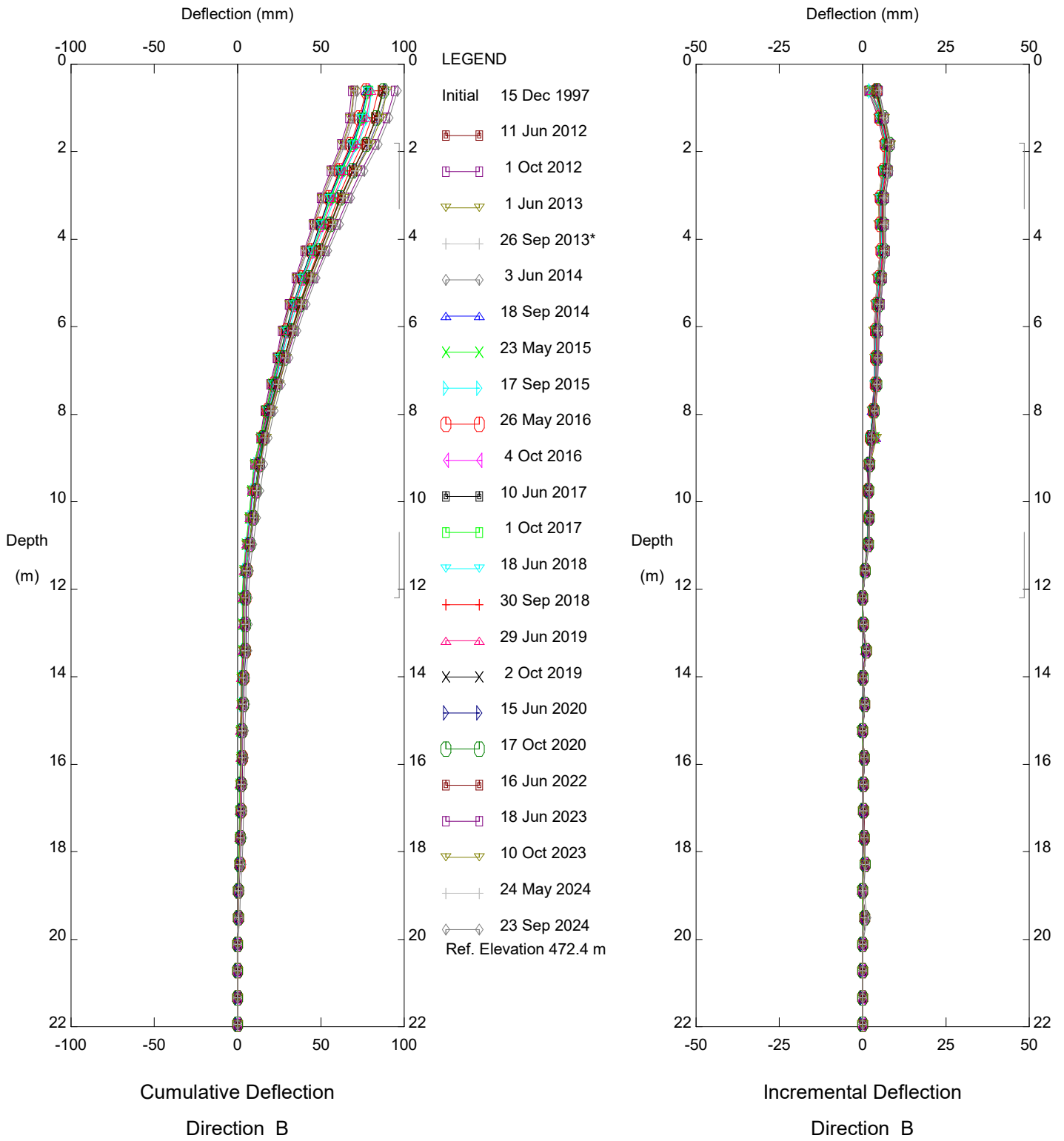


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Sets marked \* include zero shift and/or rotation corrections.

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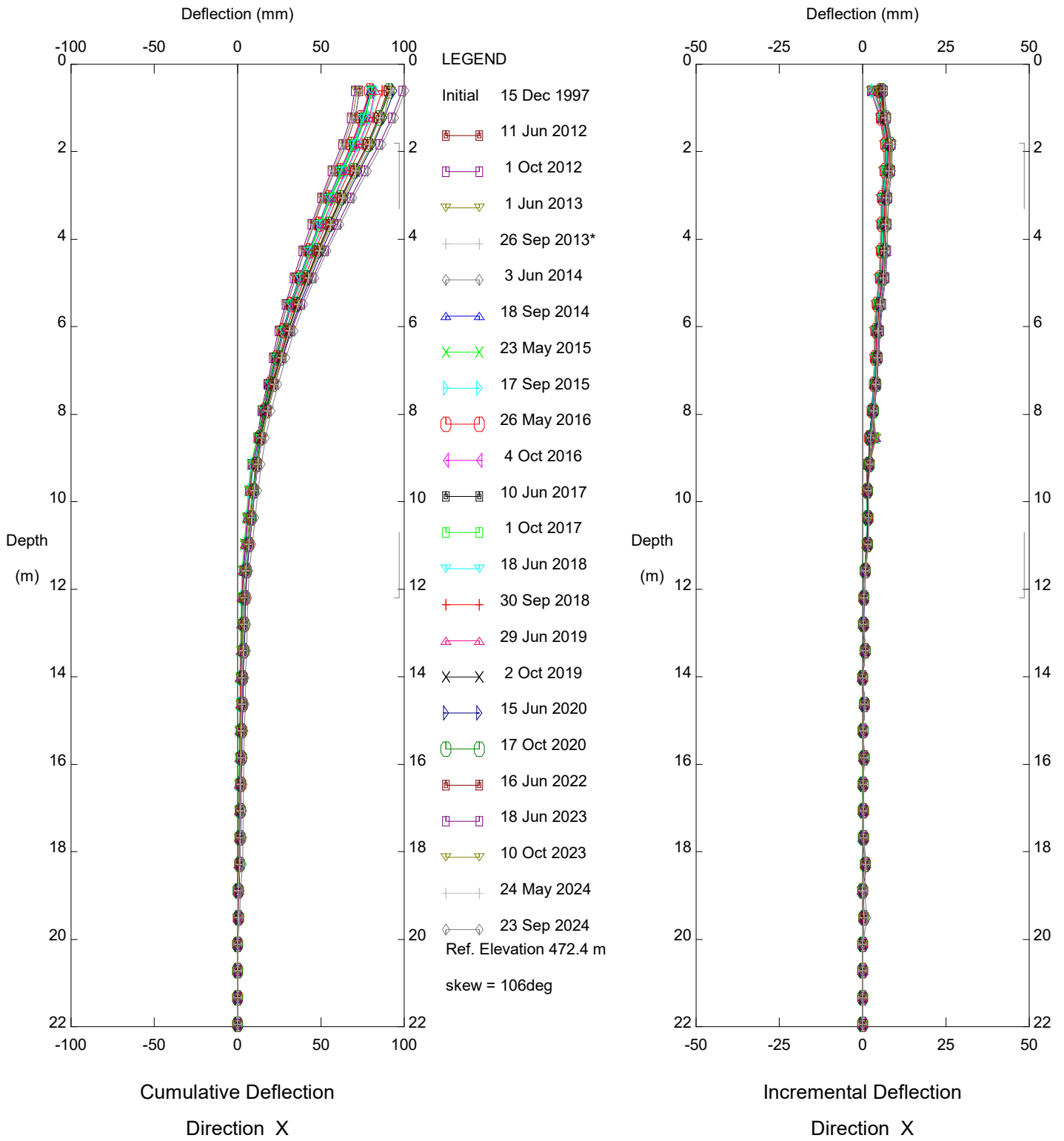


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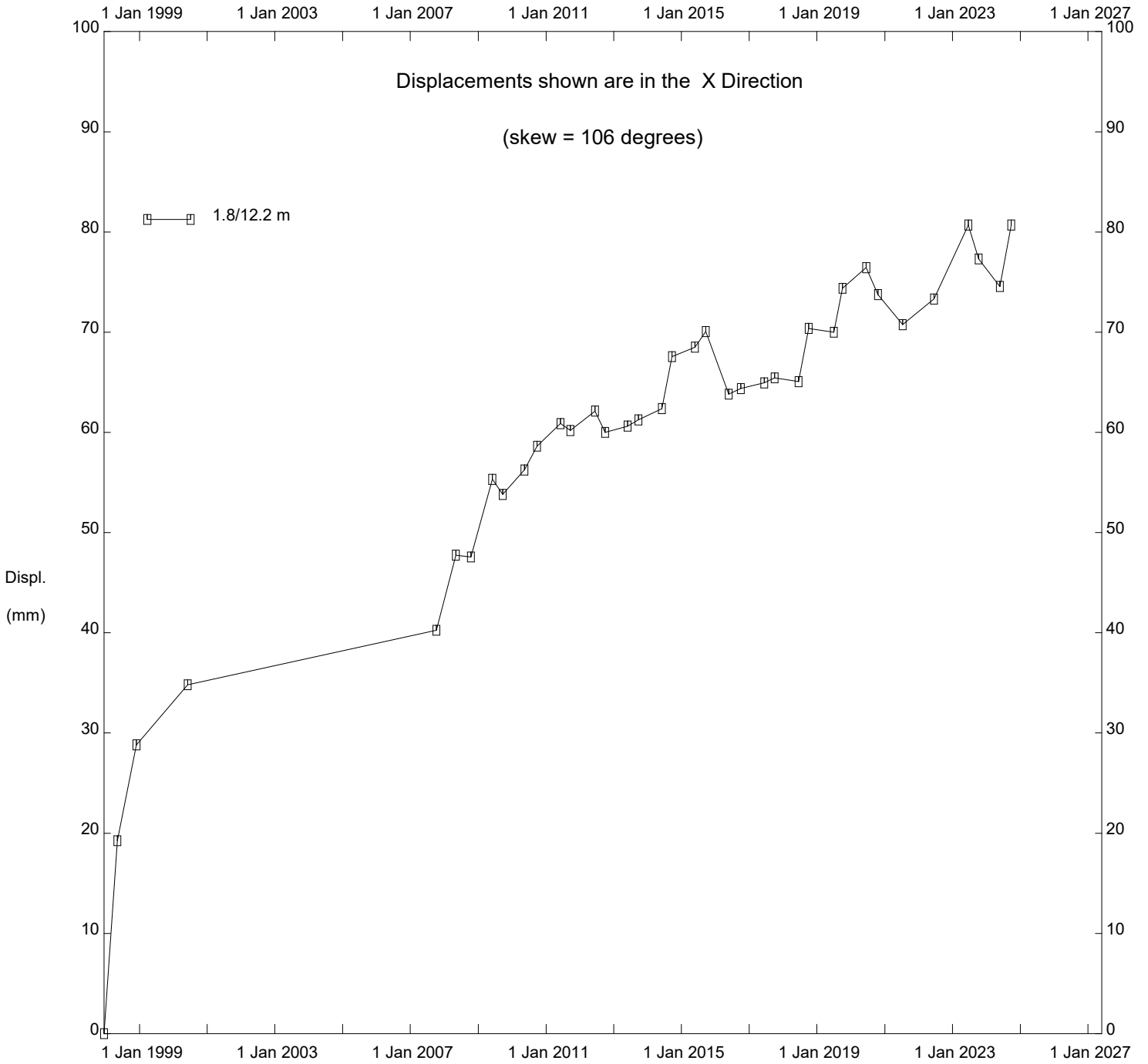


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Alberta Transportation

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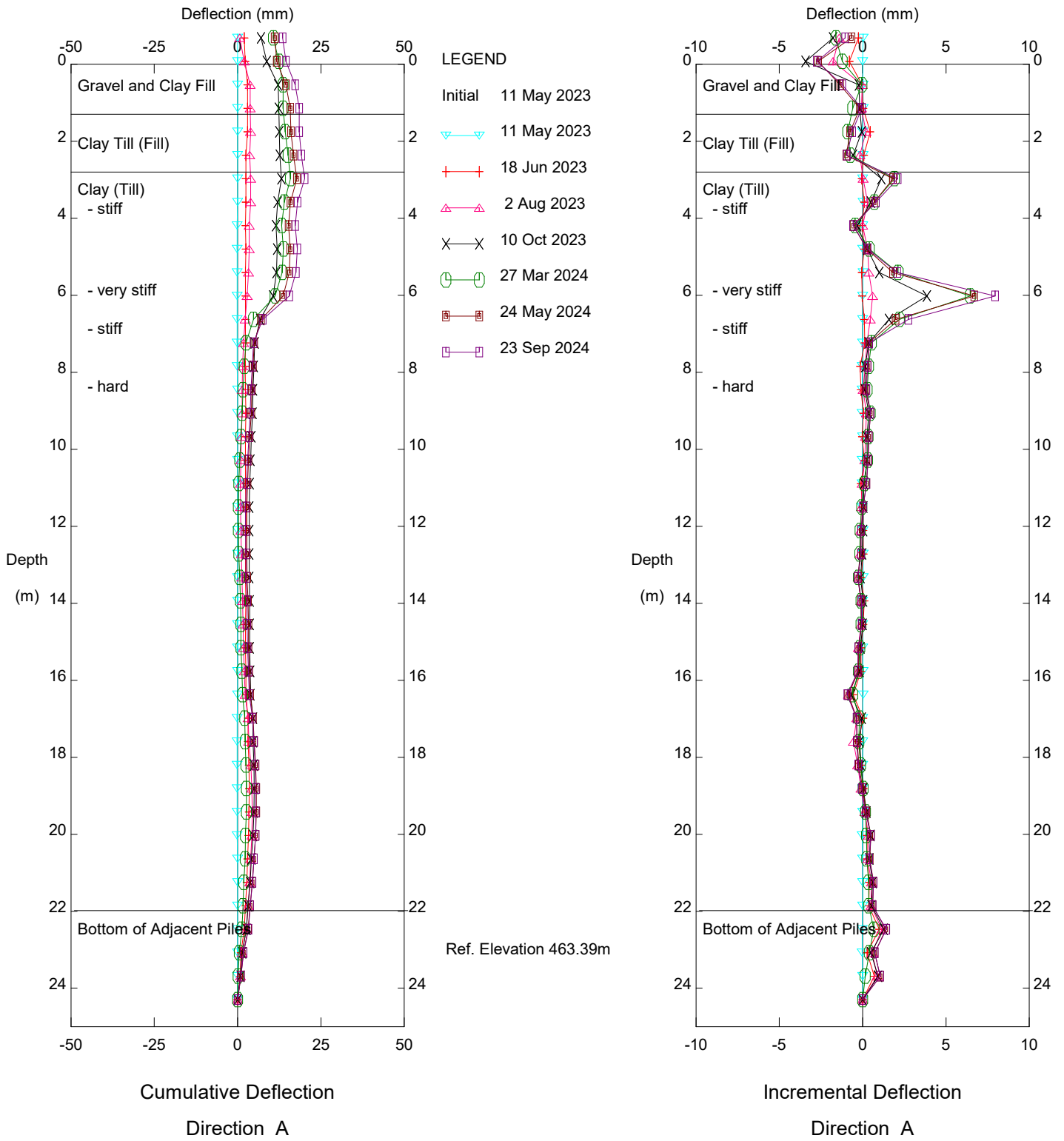
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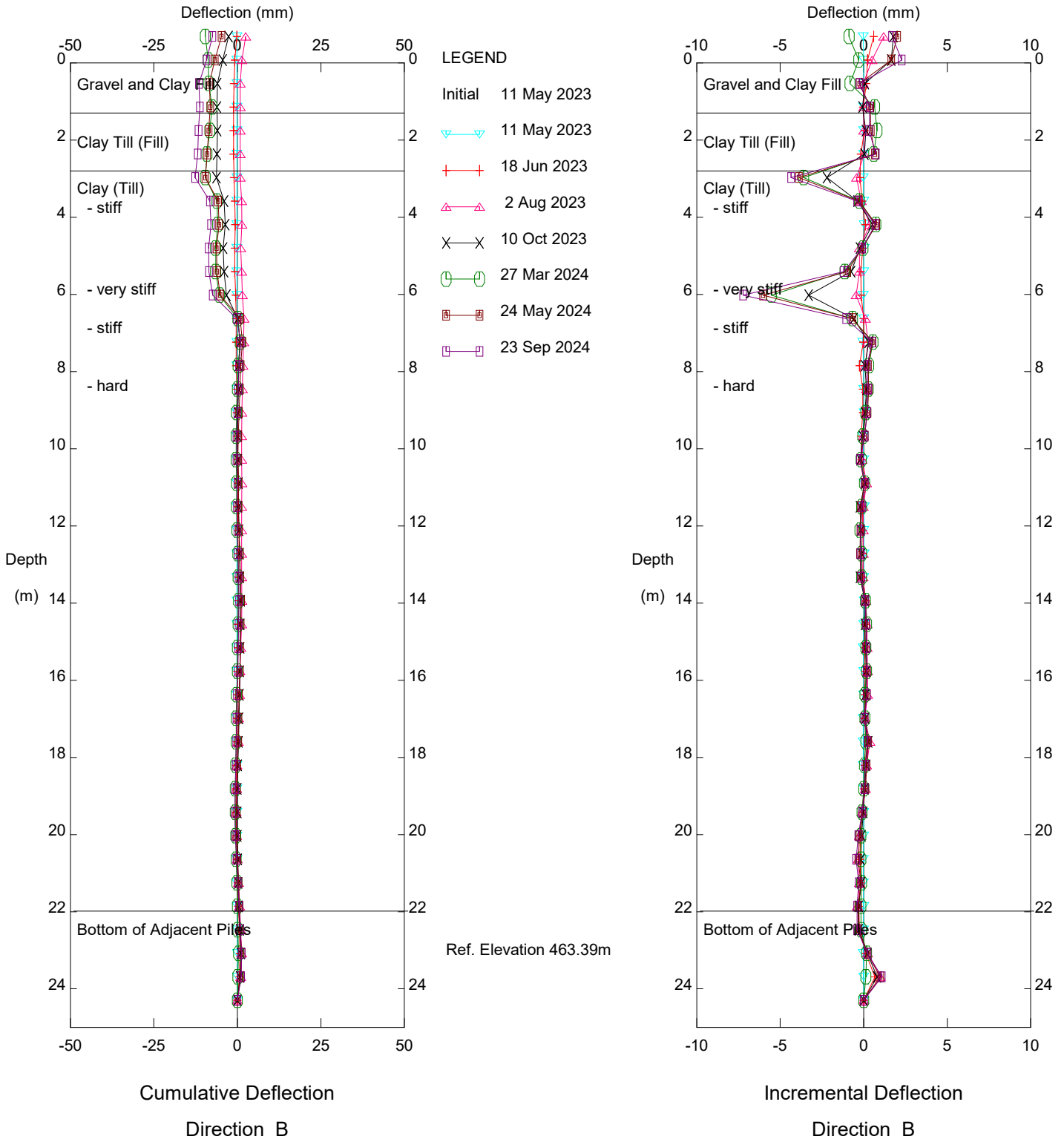
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PH045 Hwy 35:08 Meikle River Pile Wall, Inclinator SI23-100

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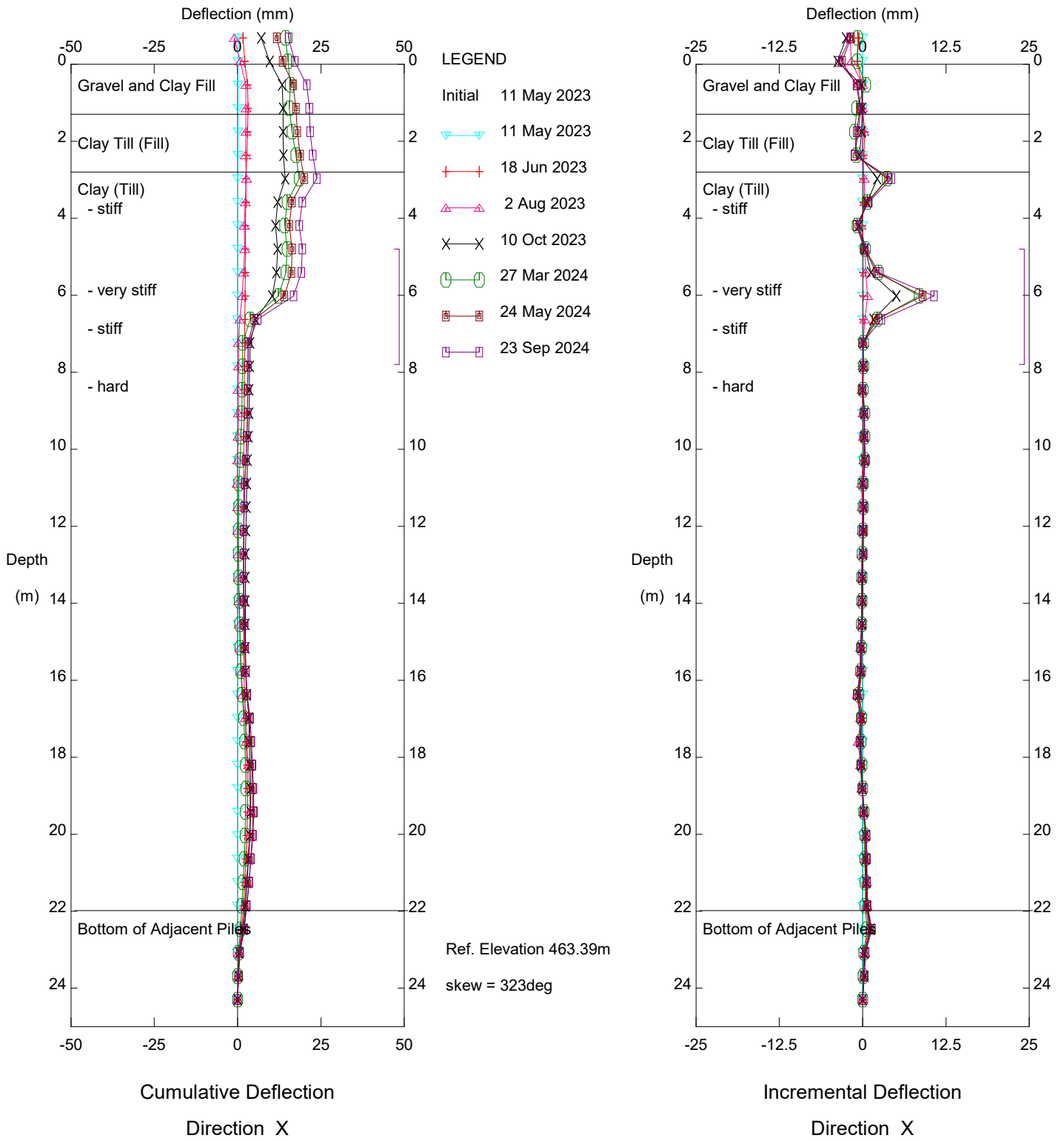
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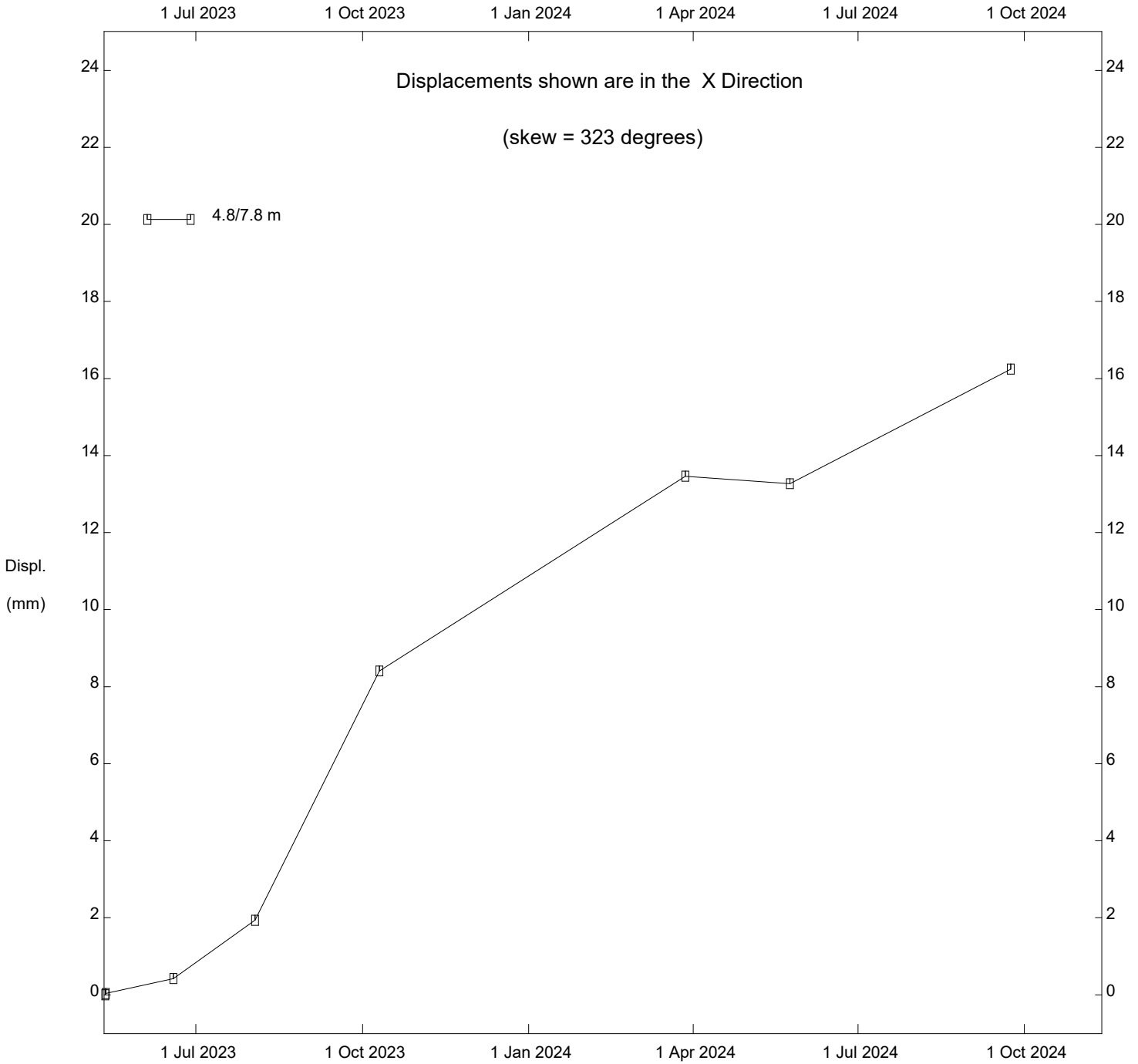
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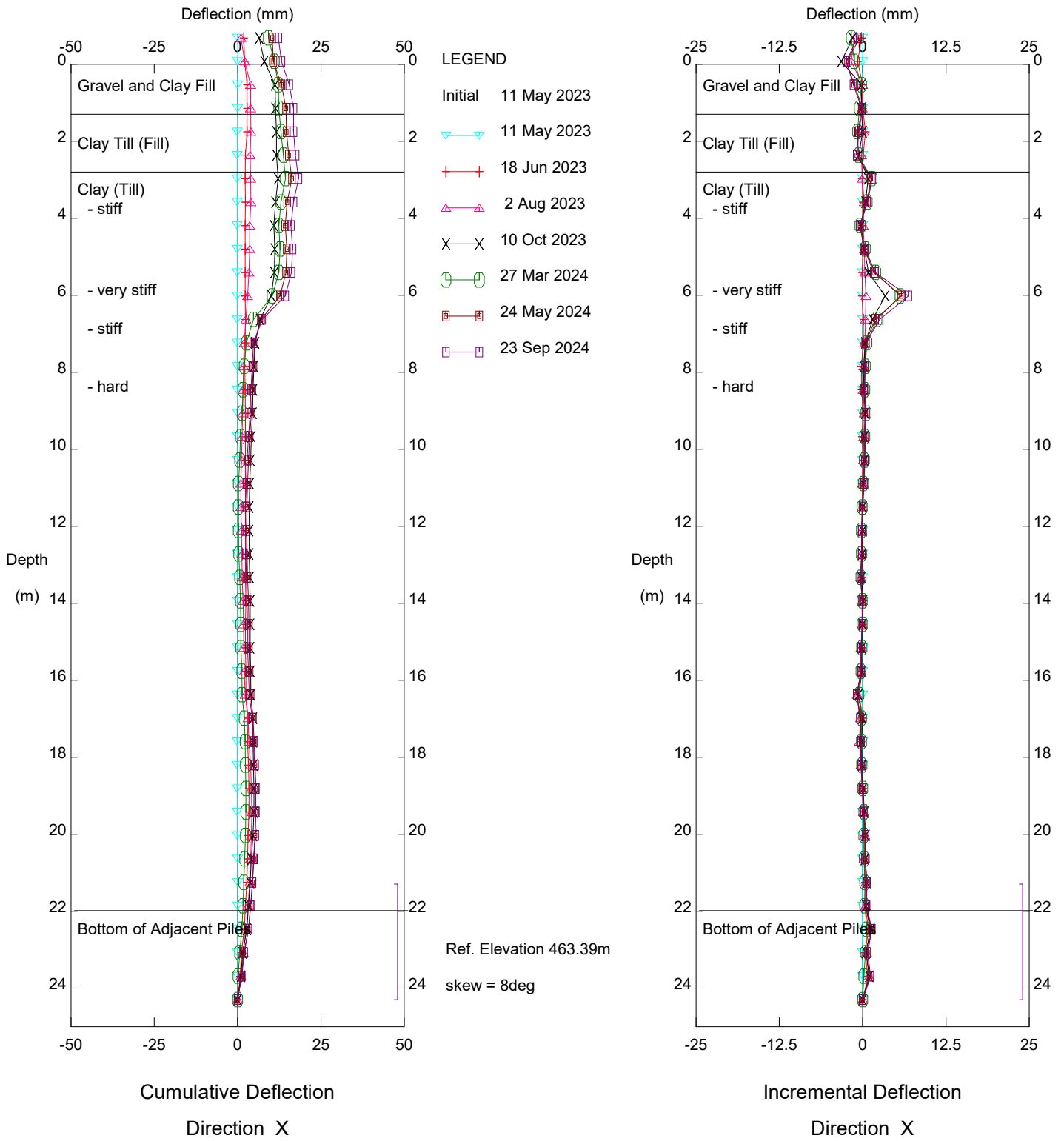


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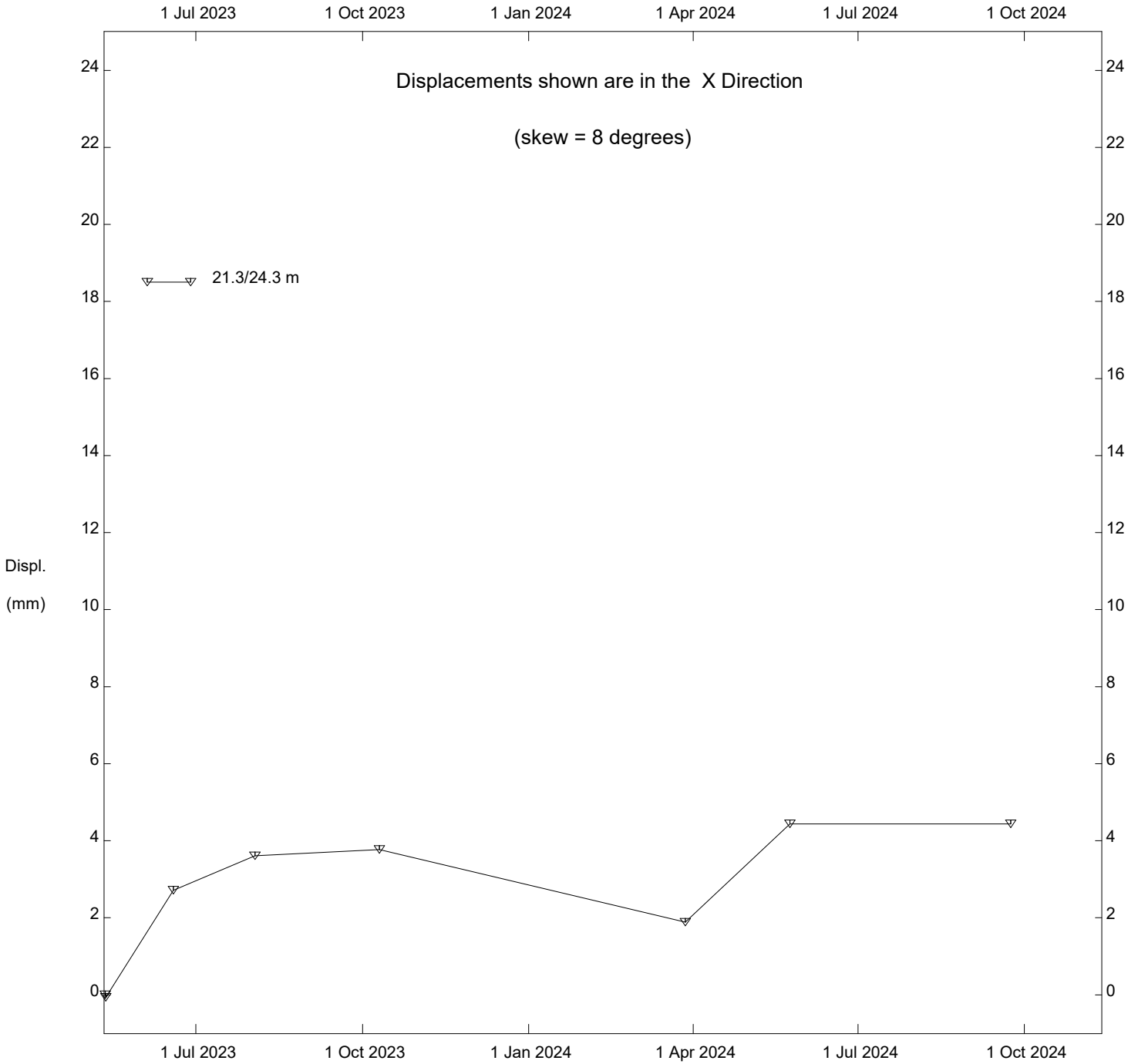
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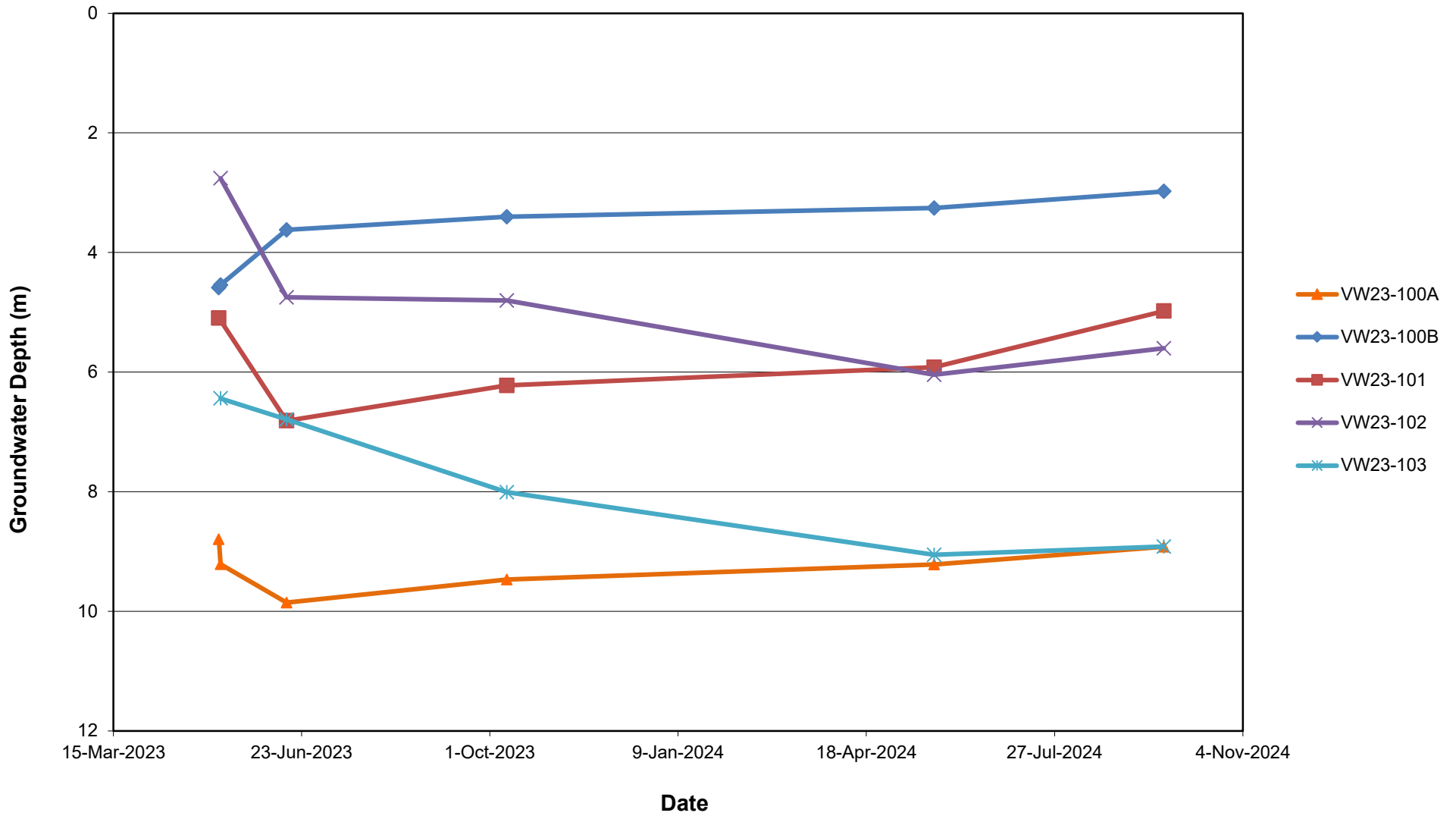
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PH045 Hwy 35:08 Meikle River Pile Wall, Inclinator SI23-100

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**FIGURE PH045-1**  
**HWY 35:08 MEIKLE RIVER PILE WALL VIBRATING WIRE PIEZOMETER DATA**



**FIGURE PH045-2**  
**HWY 35:08 MEIKLE RIVER PILE WALL VIBRATING WIRE PIEZOMETER DATA**

