ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS GRMP NORTH CENTRAL (ATHABASCA AND FORT McMURRAY DISTRICTS) INSTRUMENTATION MONITORING - SPRING 2025

Site Number	Location	Name	Hwy	km
NC069	HWY 63:02 L1 32.020	South of Wandering River	63:02	Km 32
Legal Description: 3-27-70-17 W4		**UTM Co-ordinates**		
		12U E 403599	N 6105301	

Current Monitoring:	30-May-2025	**Previous Monitoring**	13-June-2024
Instruments Read By:	Mr. Niraj Regmi, G.I.T and Mr. Godfred Etiendem, of Thurber		

Instruments Read During This Site Visit			
Slope Inclinometers (SIs): SI09-4, SI10-1 and SI13-14	**Pneumatic Piezometers (PN):** PN09-3 and PN10-1	**Vibration Wire Piezometers (VW):** VW13-11 and VW13-12	**Standpipe Piezometers (SP):** N/A
Load Cell (LC): N/A	**Strain Gauges:** N/A	**SAAs:** N/A	**Others:**

Readout Equipment Used			
Slope Inclinometers: Two RST Digital Inclinometer probes with 2 ft wheelbases and RST Pocket PC readouts	**Pneumatic Piezometers:** RST C108 pneumatic piezometer reader	**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:	SI09-4, installed in the vicinity of the crest of the west landslide area, showed a rate of movement of 0.4 mm/yr since the spring of 2024 readings. SI10-1, installed near the northern limit of the east landslide on the highway surface, showed no discernible movement since the spring of 2024 readings. SI13-14, installed within the footprint of the toe berm constructed in 2013 to stabilize the west landslide area, showed a rate of movement of 0.3 mm/yr since the spring of 2024 readings. Overall, the SIs have shown creep rates of movement over their respective movement zones over the past several years. The groundwater level decreased in PN09-3 by 0.02 m since the spring of 2024 readings. Vibrating wire piezometers VW13-11 and VW13-12 showed decreases in groundwater level of 0.12 m and 0.19 m, respectively, since the spring of 2024 readings.
Future Work:	The instruments should be read again in the spring of 2026.
Instrumentation Repairs:	Pneumatic piezometer PN10-1 could be repaired during the spring of 2026 readings. However, this instrument will require mechanical or

	hydrovac excavation to repair, as it is placed inside a steel flush mount protector. Additionally, traffic accommodation would be required to complete this instrument repair.
Additional Comments:	

Attachments:	• Table NC069-1 Spring 2025 – HWY 63:02 Slope Repair South of Wandering River, Slope Inclinometer Instrumentation Reading Summary • Table NC069-2 Spring 2025 – HWY 63:02 Slope Repair South of Wandering River, Pneumatic Piezometer Instrumentation Reading Summary • Table NC069-3 Spring 2025 – HWY 63:02 Slope Repair South of Wandering River, Vibrating Wire Piezometer Instrumentation Reading Summary • Statement of Limitations and Conditions • APPENDIX A – NC069-1 SPRING 2025 o Field Inspector's report o Site Plan Showing Approximate Instrument Locations (Drawing No. 32122-NC069) o SI Reading Plots o Figure NC069-1 (Piezometric Elevations) o Figure NC069-2 (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.
Tarek Abdelaziz, Ph.D., P. Eng.
Partner | Senior Geotechnical Engineer

PROFESSIONAL ENGINEER ALBERTA
LUCAS R.M. GREEN
ID 206714
June 20, 2025

PERMIT TO PRACTICE
THURBER ENGINEERING LTD.
RM SIGNATURE:
RM APEGA ID #: 91085
DATE: June 20, 2025
PERMIT NUMBER: P005186
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

Lucas Green, P.Eng.
Geotechnical Engineer

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Table NC069-1 Spring 2025 – Hwy 63:02 Slope Repair South of Wandering River Slope Inclinometer Instrumentation Reading Summary

Date Monitored: May 30, 2025

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)
SI09-1	*October 4, 2009*	*9.0 over 10.2 m to 12.6 m depth in 88º direction*	*25.1 on May 24, 2013*	*Sheared at 3.0 m*	*June 29, 2021*	*N/A*	*N/A*	*N/A*
SI09-4	November 19, 2009	58.1 over 10.3 m to 12.1 m depth in 331º direction	1505.1 on November 21, 2009	Operational	June 13, 2024	0.4	0.4	-0.9
SI10-1	April 12, 2010	10.6 over 3.3 m to 6.4 m depth in 91º direction	7.3 on April 4, 2011	Operational	June 13, 2024	No discernible movement	N/A	0
SI13-14	September 3, 2013	16.9 over 7.5 m to 10.5 m depth in 333º direction	284.3 on September 10, 2013	Operational	June 13, 2024	0.3	0.3	-0.2

Drawing 32122-NC069 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

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Table NC069-2 Spring 2025 – Hwy 63:02 Slope Repair South of Wandering River Pneumatic Piezometer Instrumentation Reading Summary

Date Monitored: May 30, 2025

INSTRUMENT #	DATE INITIALIZED	TIP ELEV. (m)	GROUND ELEV. (m)	CURRENT STATUS	HIGHEST MEASURED GROUNDWATER ELEVATION (m)	MEASURED PORE PRESSURE (kPa)	CURRENT GROUNDWATER ELEVATION (m)	PREVIOUS GROUNDWATER ELAVATION (m)	CHANGE IN WATER LEVEL SINCE PREVIOUS READING (m)
PN09-1	*October 4, 2009*	*536.80*	*548.80*	*Malfunctioning*	*545.40 on September 10, 2018*	*No reading*	*No reading*	*544.56 (June 4, 2022)*	*N/A*
PN09-3	October 4, 2009	538.07	546.07	Active	543.27 on September 3, 2009	44.7	542.63	542.65	-0.02
PN10-1	*April 12, 2010*	*538.90*	*548.65*	*Damaged*	*544.37 on September 20, 2020*	*No reading*	*No reading*	*543.88 (June 4, 2022)*	*N/A*

Drawing 32122-NC069 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

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Table NC069-3 Spring 2025 – Hwy 63:02 Slope Repair South of Wandering River Vibrating Wire Piezometer Instrumentation Reading Summary

Date Monitored: May 30, 2025

INSTRUMENT #	DATE INITIALIZED	TIP ELEV. (m)	GROUND ELEV. (m)	CURRENT STATUS	MAXIMUM GROUNDWATER ELEV. (m)	CURRENT GROUNDWATER ELEV. (m)	PREVIOUS GROUNDWATER ELEV. (m)	CHANGE IN WATER LEVEL SINCE PREVIOUS READING (m)
VW13-11 (25325)	May 6, 2013	539.51	547.74	Operational	540.66 on September 4, 2013	540.29	540.41	-0.12
VW13-12 (25323)	May 6, 2013	539.04	547.69	Operational	542.89 on September 4, 2013	541.54	541.73	-0.19
VW13-13 (25324)	*May 6, 2013*	*539.59*	*544.88*	*Damaged*	*541.01 on August 28, 2013*	*No reading*	*538.74 (May 24, 2020)*	*N/A*

Drawing 32122-NC069 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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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

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

SPRING 2025

APPENDIX A
DATA PRESENTATION AND SITE PLANS

SITE NC069: HWY 63:02 SLOPE REPAIR SOUTH OF WANDERING RIVER

ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS
NORTH CENTRAL REGION - ATHABASCA AND FORT McMURRAY DISTRICTS
INSTRUMENTATION MONITORING FIELD SUMMARY (NC069)
SPRING 2025

Location:	South of Wandering River (HWY 63:02 L1 32.020)	**Readout:**	RST VW 2106, Unit 1/RST PN C108 Unit 8
File Number:	32122	**Casing Diameter:**	2.75/3.34
Probe:	RST Set 5R and 8R	**Temp (deg C):**	25
Cable:	RST Set 5R and 8R	**Read by:**	NKR/GE

SLOPE INCLINOMETER (SI) READINGS

SI#	GPS Location (UTM 12)		Date	Stickup (m)	Depth from top of **casing** (ft)	Azimuth of A+ Groove degree	Current Bottom Depth Readings				Probe/ Reel #	Size (")	Remarks
	Easting	Northing					A+	A-	B+	B-			
SI09-4	403599	6105301	30-May-25	1.00	55 to 3	322	218	-213	-524	508	5R/5R	-	
SI10-1	403626	6105316	30-May-25	0.04	60 to 2	122	-103	81	59	-57	8R/8R	-	
SI13-14	403566	6105294	30-May-25	0.76	38 to 2	329	-259	269	58	-81	5R/5R	-	

PNEUMATIC PIEZOMETER (PN) READINGS

PN#	GPS Location (UTM 12)		Date	Reading kPa	Depth Below Ground Surface (m)	Identification Number
	Easting	Northing				
PN09-3	403602	6105296	30-May-25	44.7	8	032440

VIBRATING WIRE PIEZOMETER (VW) READINGS

VW#	GPS (UTM 12)		Date	Identification Number	Reading		Remarks
	Easting	Northing			B Unit	Temp (°C)	
VW13-11	6105263	403669	30-May-25	25325	8805.8	5	
VW13-12	6105279	403669	30-May-25	25323	8644.3	5.2	

INSPECTOR REPORT

SI09-4 was installed on November 17, 2009 to replace SI09-3. It has a red stick-up protector in the west ditch.
SI10-1 casing breaking apart @ 10 ft. use dummy probe/ camera for next reading.
PN10-1 cut off damaged since the Spring 2023 readings, requires mechanical excavation

32+425.5
32+381.70
32+400
32+397.05
32+350
32+342.05
32+332.12
32+302.91
32+300
32+292.13
32+250
132+400
132+350
132+300
232+400
232+350
R/W
TYPE C RECP ON SLOPES (TYP)
10mm WIDE CRACK
10mm WIDE, 5mm DROP
(DAMAGED)
SI10-1/PN10-1
GS=548.63
10-40mm WIDE, 10-20mm DROP
15-20mm WIDE, 10-15mm DROP ACROSS REFLECTIVE CRACK
MONITORING STATION (VW13-13)
(NOT FUNCTIONING)
VW13-13
SI09-4
GS=546.85
SI13-14
PN09-3
SI09-1/PN09-1
(SHEARED)
GS=548.80
(NOT FUNCTIONING)
HAIRLINE CRACK
NEW MEDIAN
VW13-12
VW13-11
NEW 3630mm Ø SWSP CULVERT (BF76427)
DRAINAGE
NEW R/W
MONITORING STATION (VW13-11 & VW13-12)
TOP OF BERM EL. 542.0 (TYP)
CLASS 1 ROCK RIPRAP PLACED 0.45m THICK (TYP BOTH ENDS)
TOP OF BANK (TYP)
BOTTOM OF BANK (TYP)
SLOPE LIMITS (APPROX)
NEW HWY 63 SOUTHBOUND LANES (OLD HWY 63)
NEW HWY 63 NORTHBOUND LANES
20:1
7:1
5:1
6:1
4:1
PP
P
PR

N
W
E
S

LEGEND

- INSTRUMENT LOCATION
- MONITORING STATION
- ACP PATCH
- SI — SLOPE INCLINOMETER
- PN — PNEUMATIC PIEZOMETER
- VW — VIBRATING WIRE PIEZOMETER
- P — OVERHEAD POWERLINE
- FENCE LINE
- PP — POWER POLE

NOTE:
1. OLD CULVERTS WERE GROUTED IN 2013.
2. FUTURE HIGHWAY NORTHBOUND LANES AND THE NEW CULVERT WERE CONSTRUCTED IN 2013.

0 10 20 30 40 50m
SCALE 1:750

Alberta

NORTH CENTRAL
(ATHABASCA AND FORT MCMURRAY DISTRICTS)

NC069: HWY 63:02 (km 13) SOUTH OF WANDERING RIVER SLIDE REPAIR

DWG No. 32122-NC069

DRAWN BY	ML
DESIGNED BY	BWN
APPROVED BY	TSA
SCALE	1:750
DATE	JUNE 2023
FILE No.	32122

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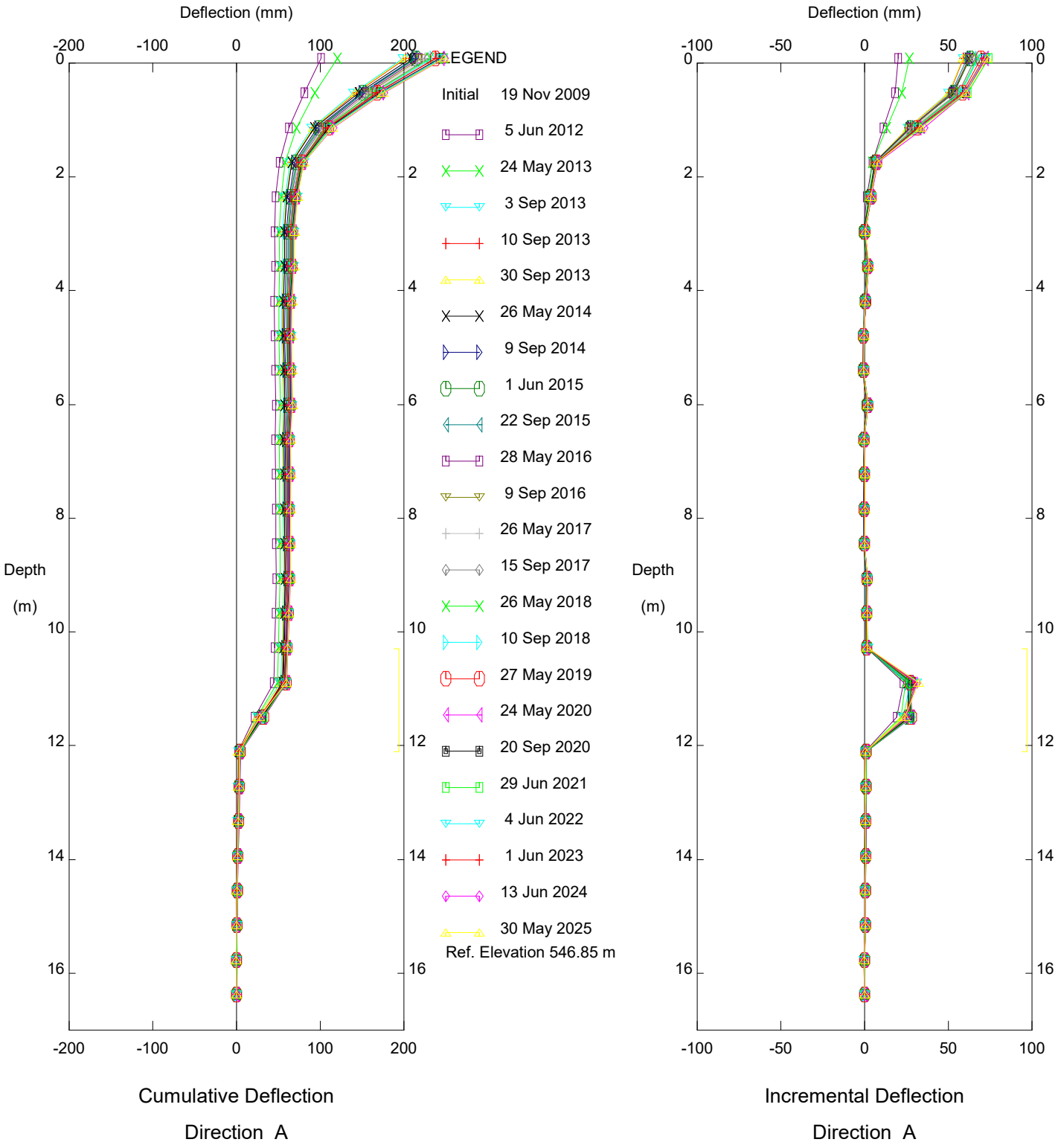

Cumulative Deflection

Direction A

Incremental Deflection

Direction A

HWY 63:02 South of Wandering River, Inclinometer SI09-4

Alberta Transportation

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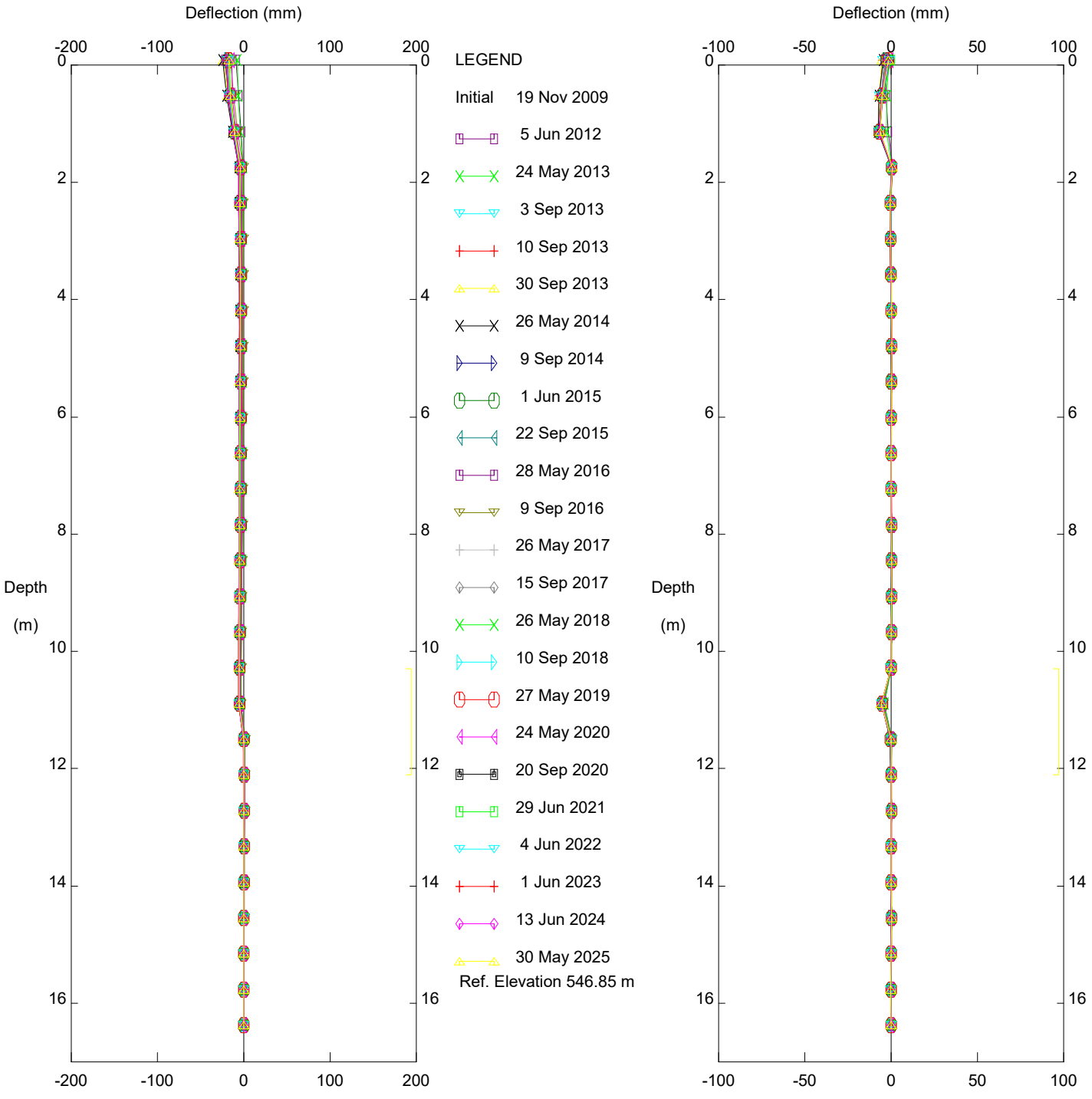

Cumulative Deflection

Direction B

Incremental Deflection

Direction B

HWY 63:02 South of Wandering River, Inclinometer SI09-4

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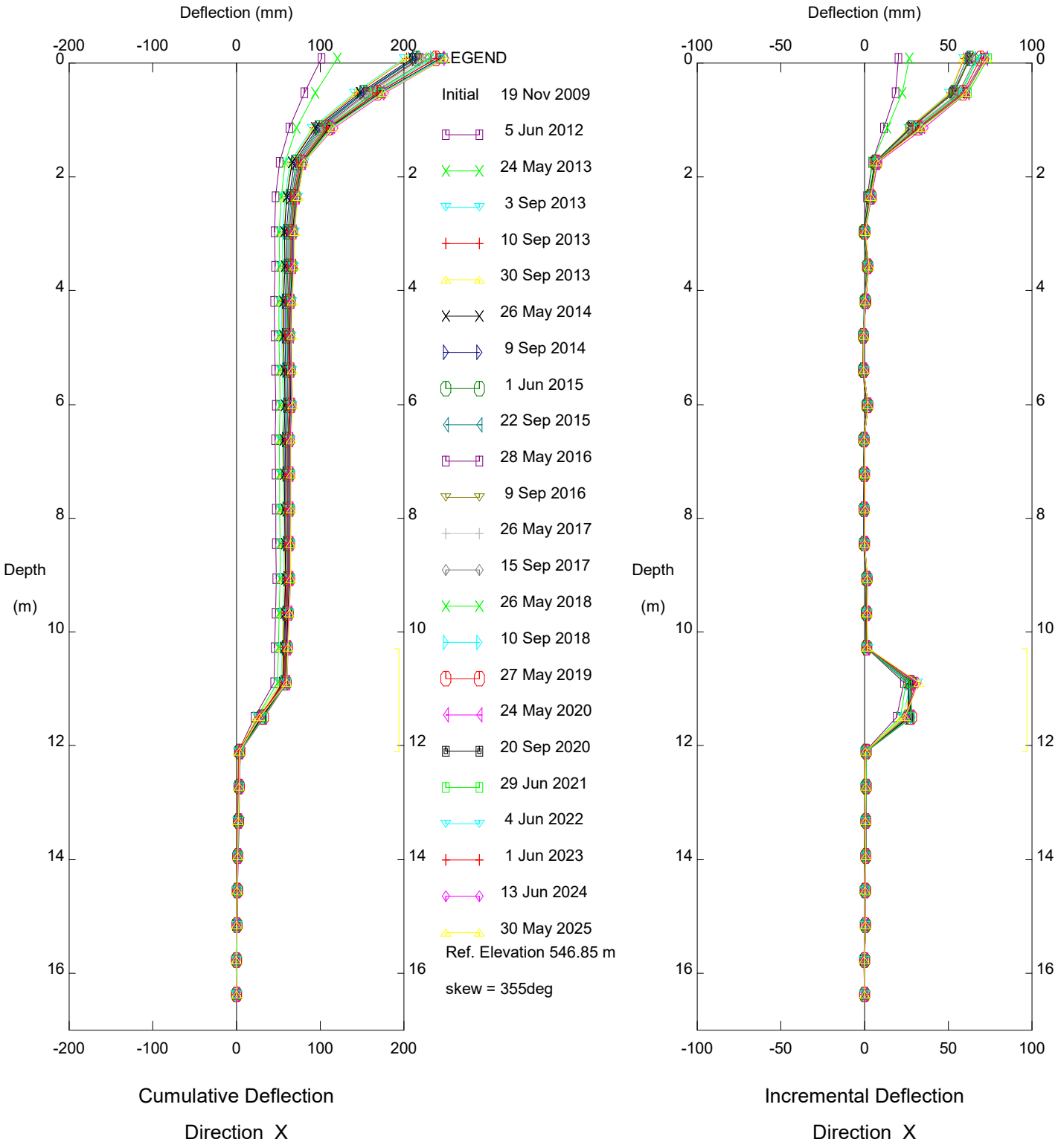

Cumulative Deflection

Direction X

Incremental Deflection

Direction X

HWY 63:02 South of Wandering River, Inclinometer SI09-4

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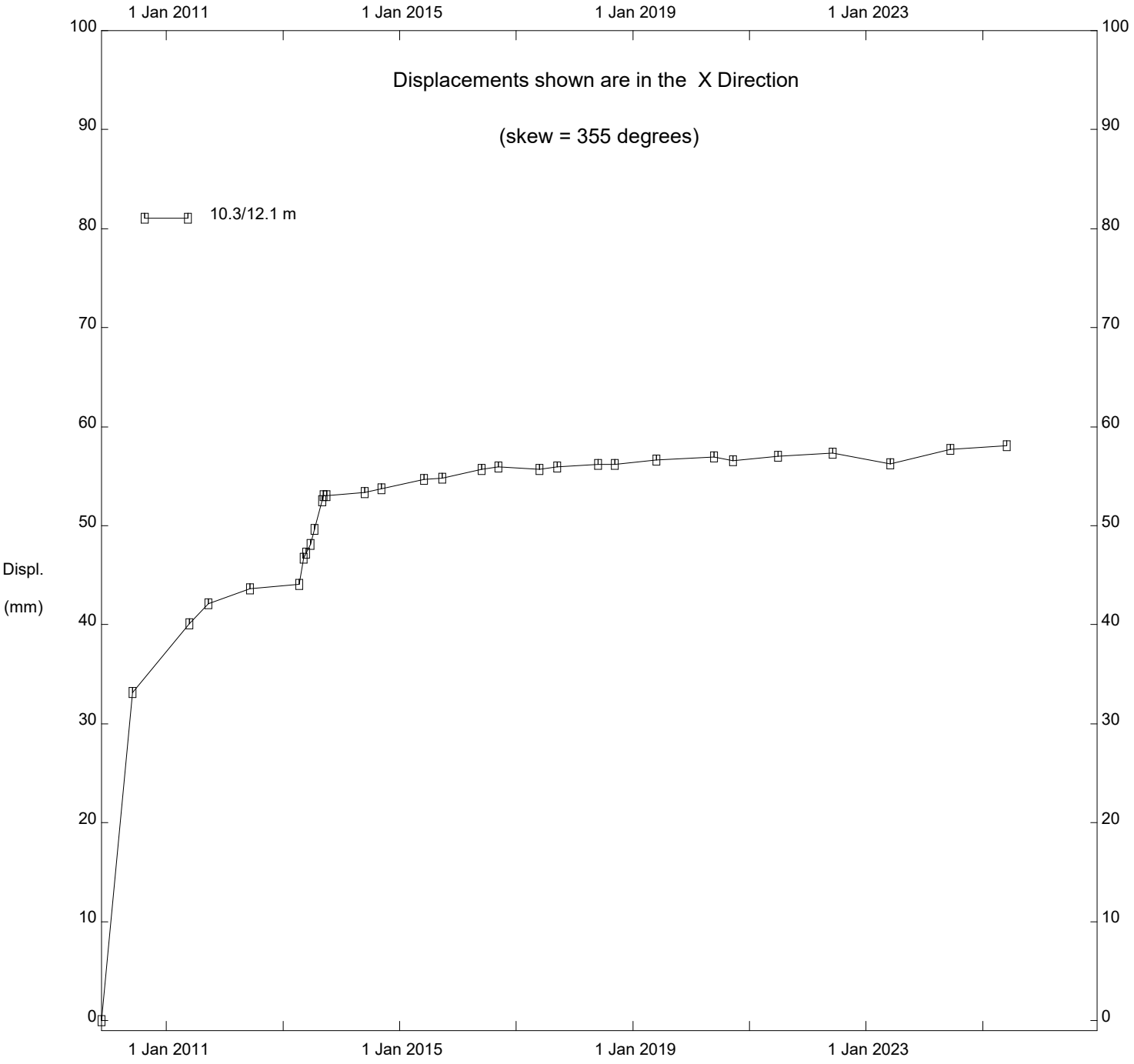

HWY 63:02 South of Wandering River, Inclinometer SI09-4

Alberta Transportation

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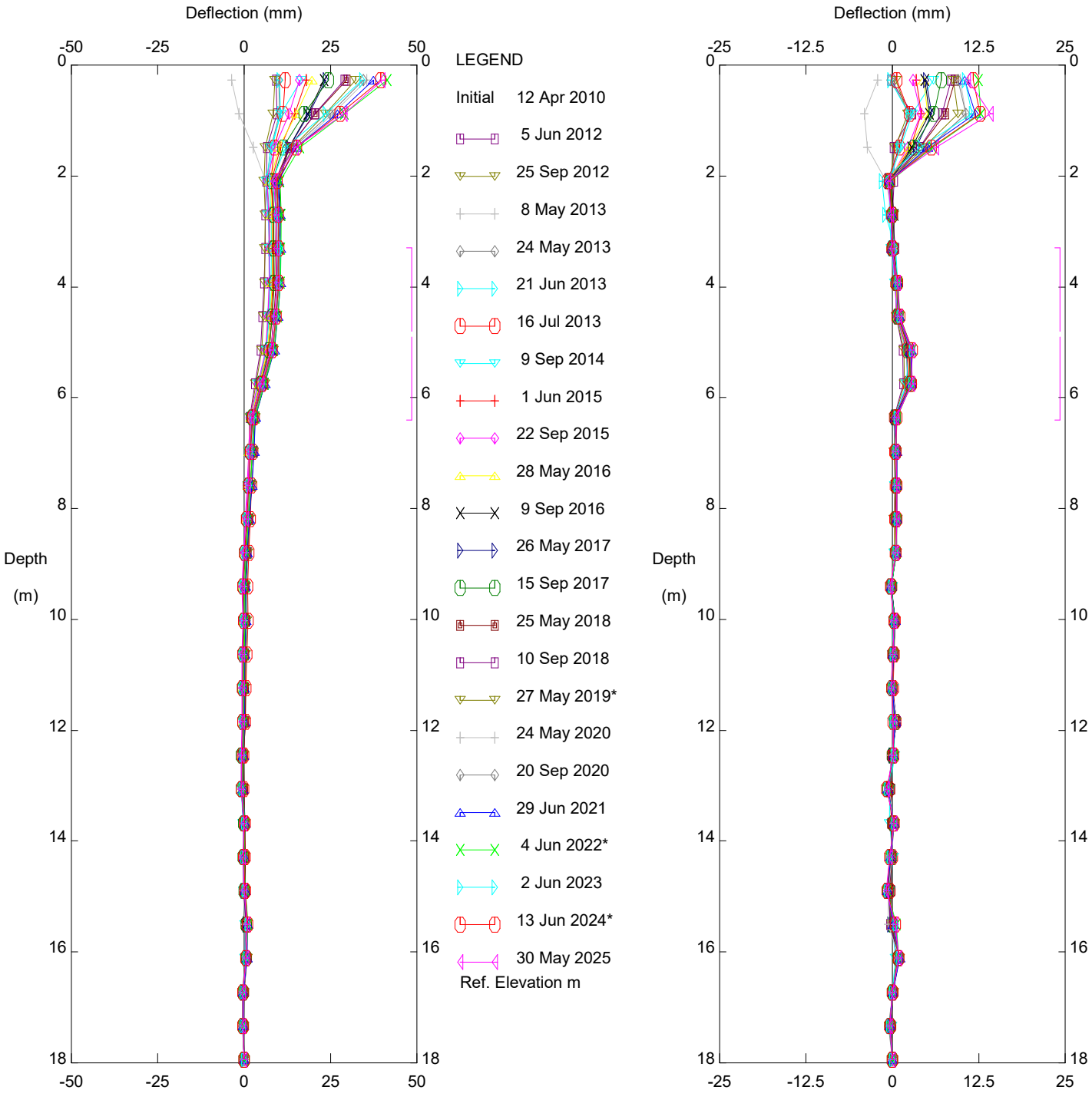

Cumulative Deflection

Direction A

Incremental Deflection

Direction A

HWY 63:02 South of Wandering River, Inclinometer SI10-1

Alberta Transportation

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

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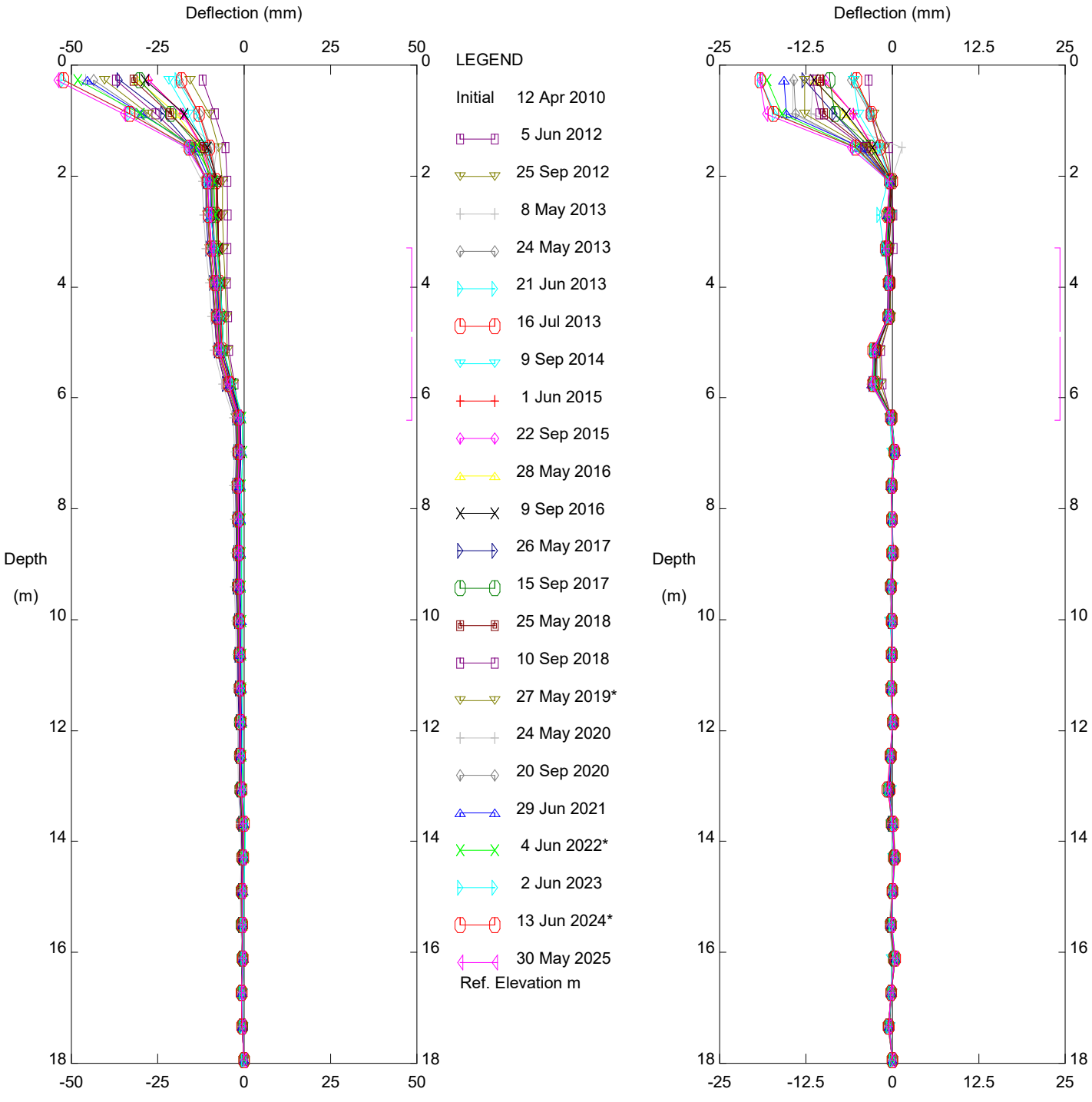

Cumulative Deflection

Direction B

Incremental Deflection

Direction B

HWY 63:02 South of Wandering River, Inclinometer SI10-1

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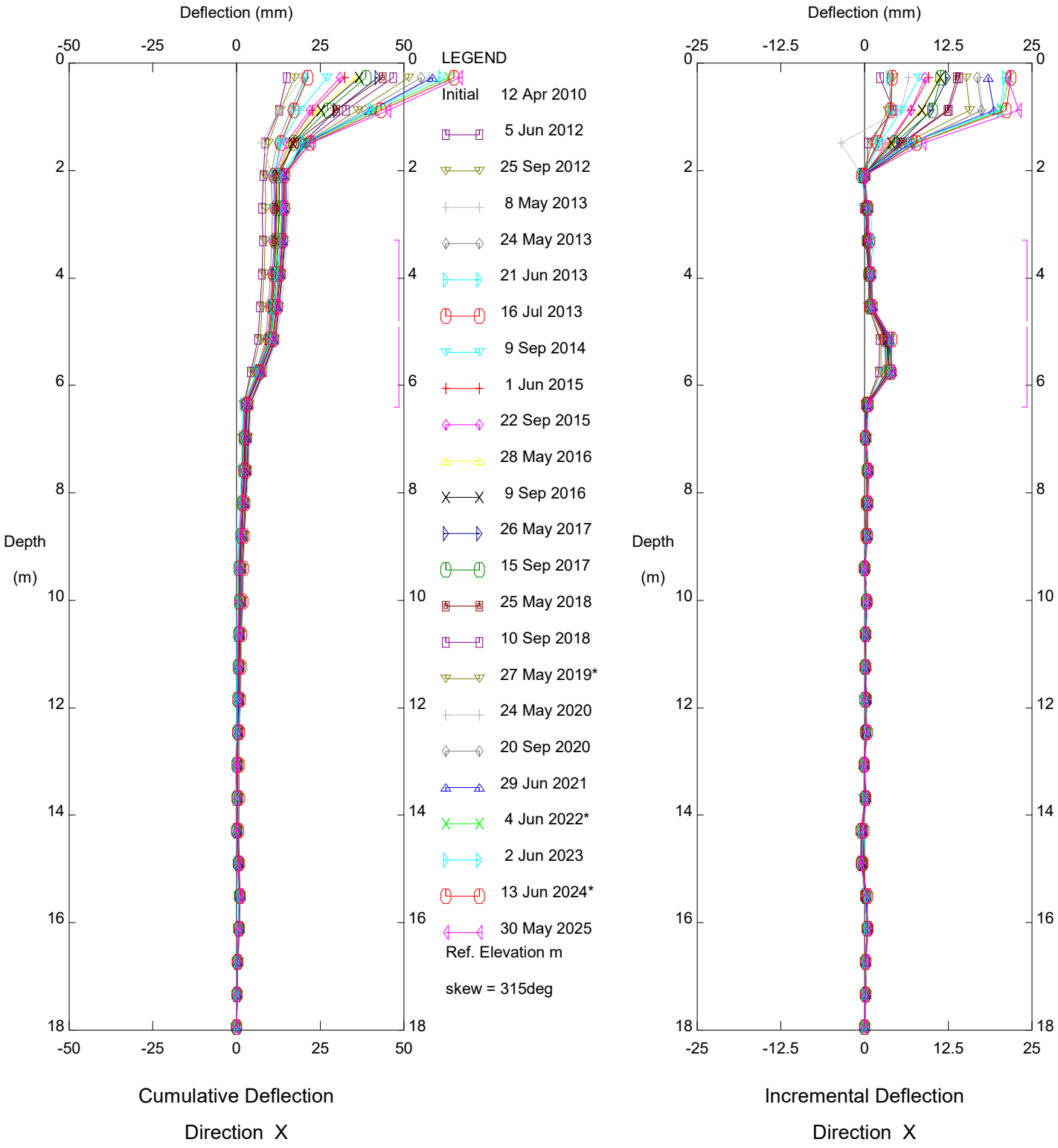

Cumulative Deflection

Direction X

Incremental Deflection

Direction X

HWY 63:02 South of Wandering River, Inclinometer SI10-1

Alberta Transportation

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

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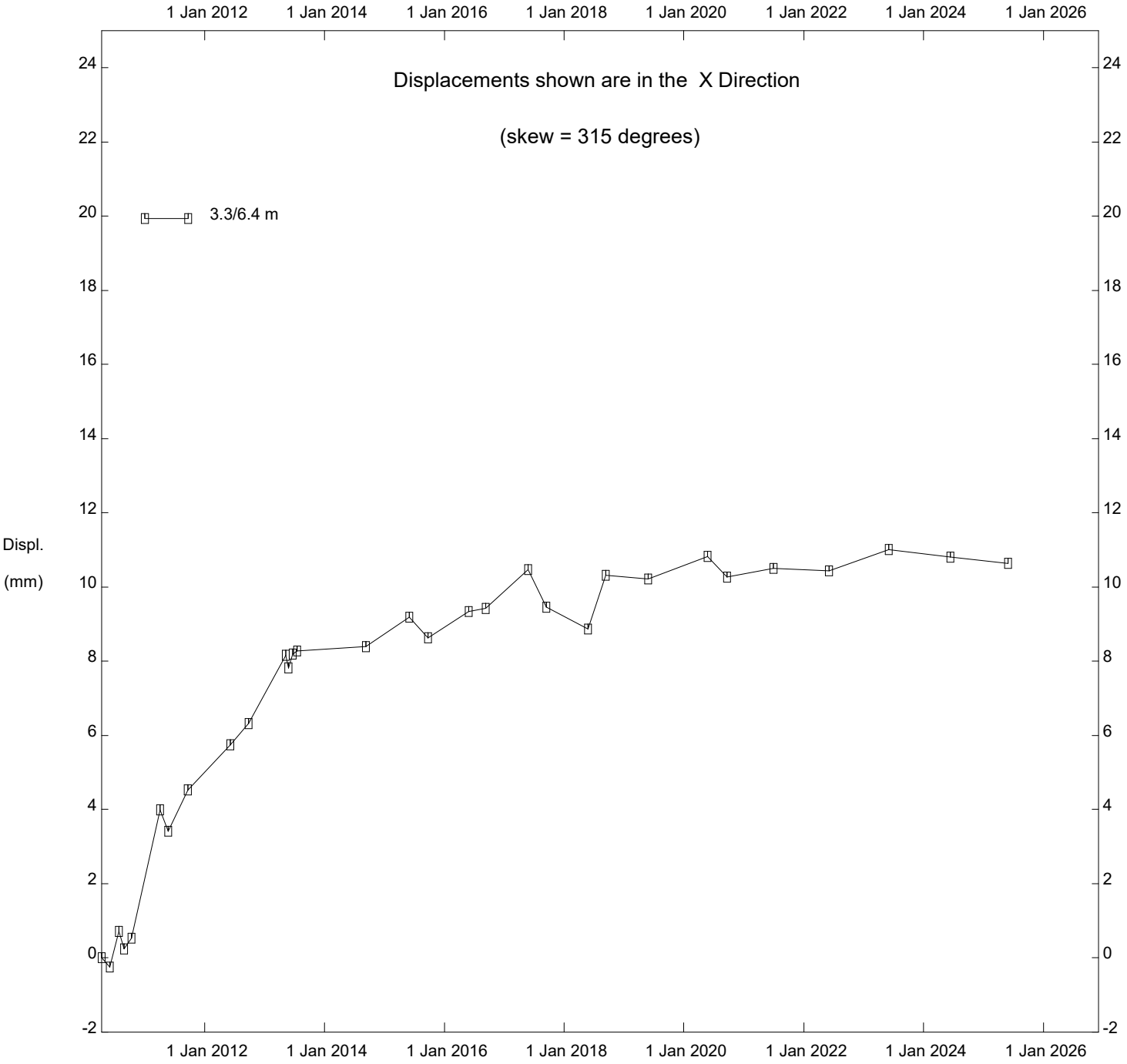

HWY 63:02 South of Wandering River, Inclinometer SI10-1

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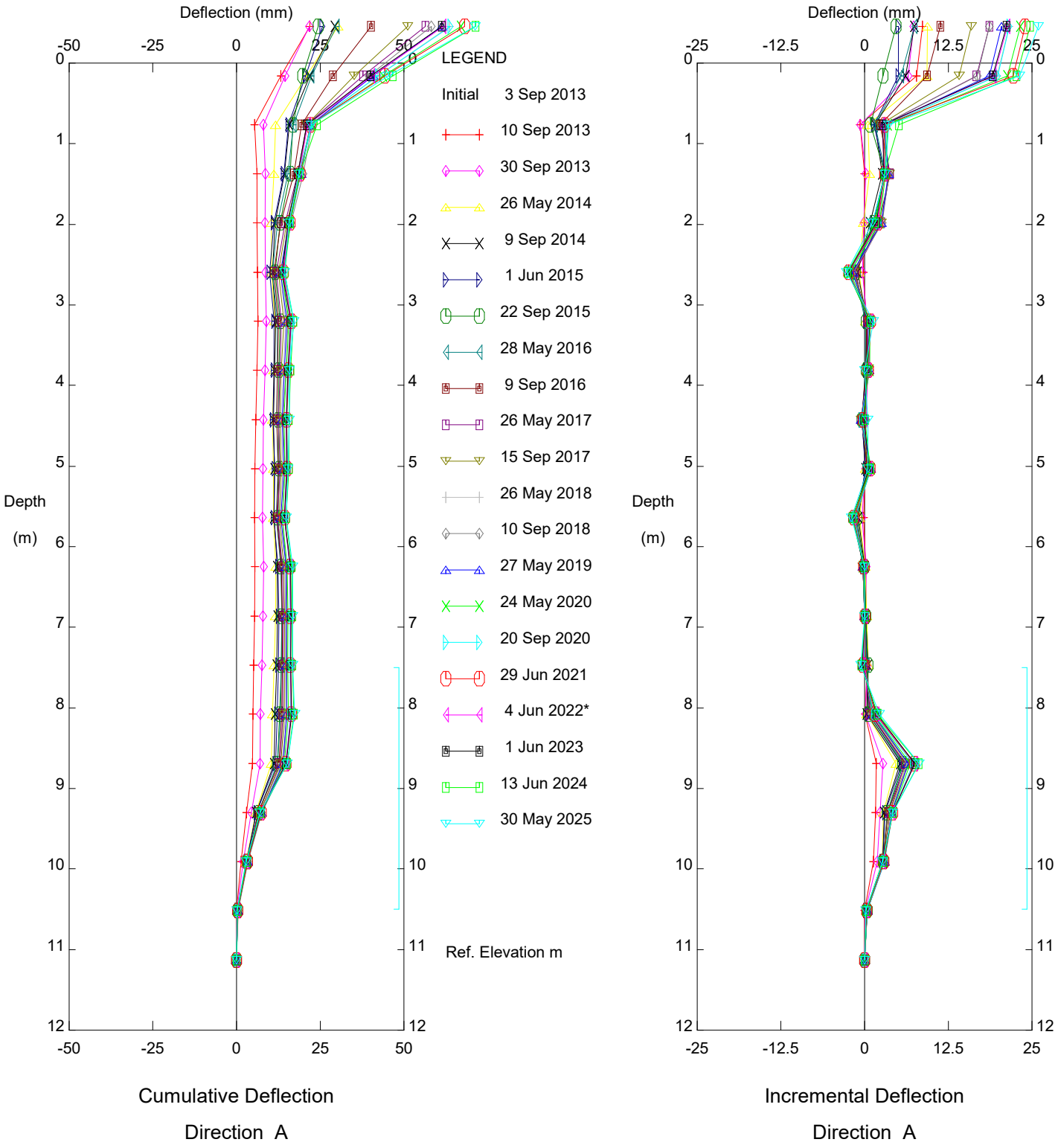

Cumulative Deflection

Direction A

Incremental Deflection

Direction A

HWY 63:02 South of Wandering River, Inclinometer SI13-14

Alberta Transportation

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

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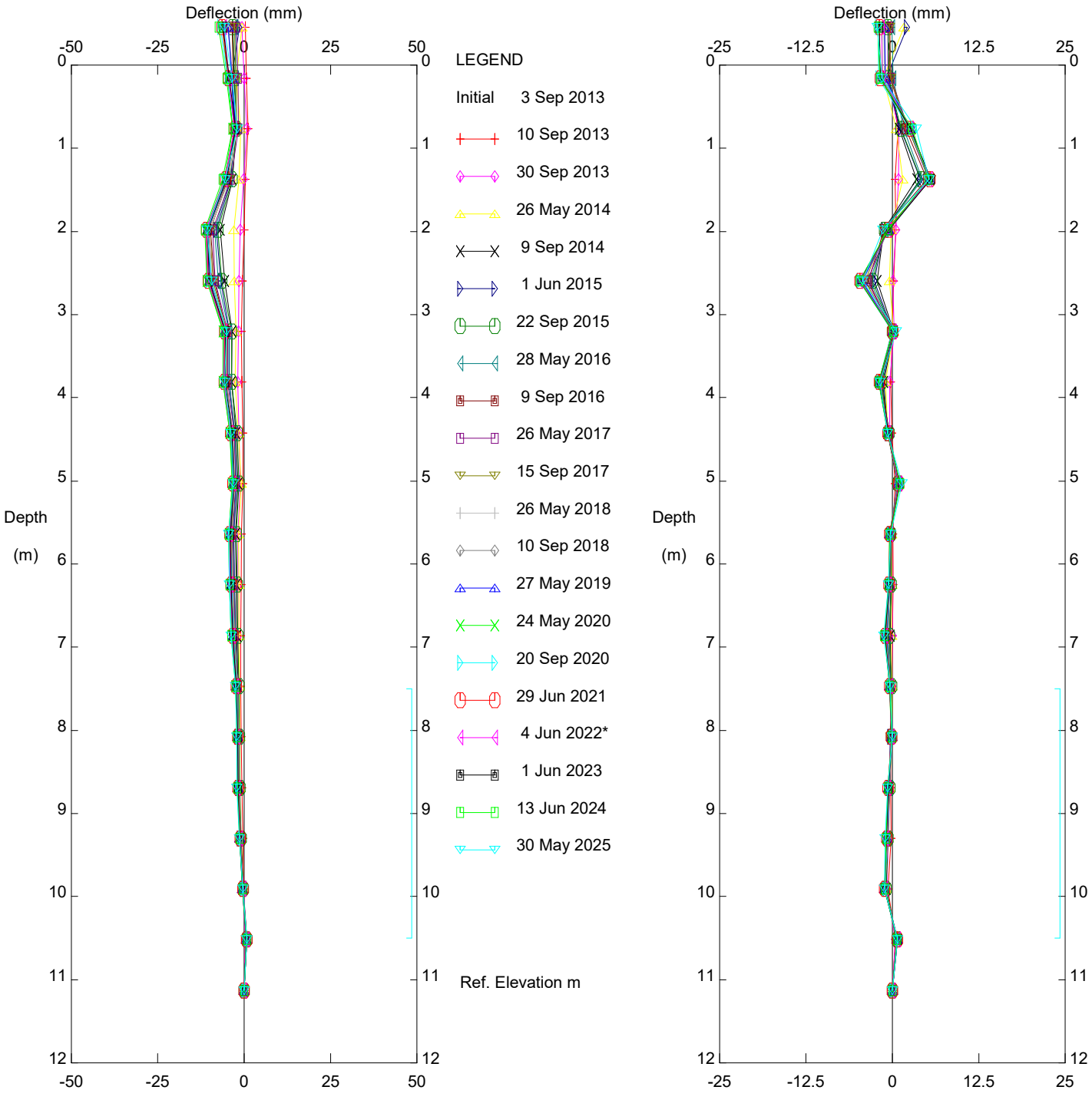

Cumulative Deflection

Direction B

Incremental Deflection

Direction B

HWY 63:02 South of Wandering River, Inclinometer SI13-14

Alberta Transportation

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

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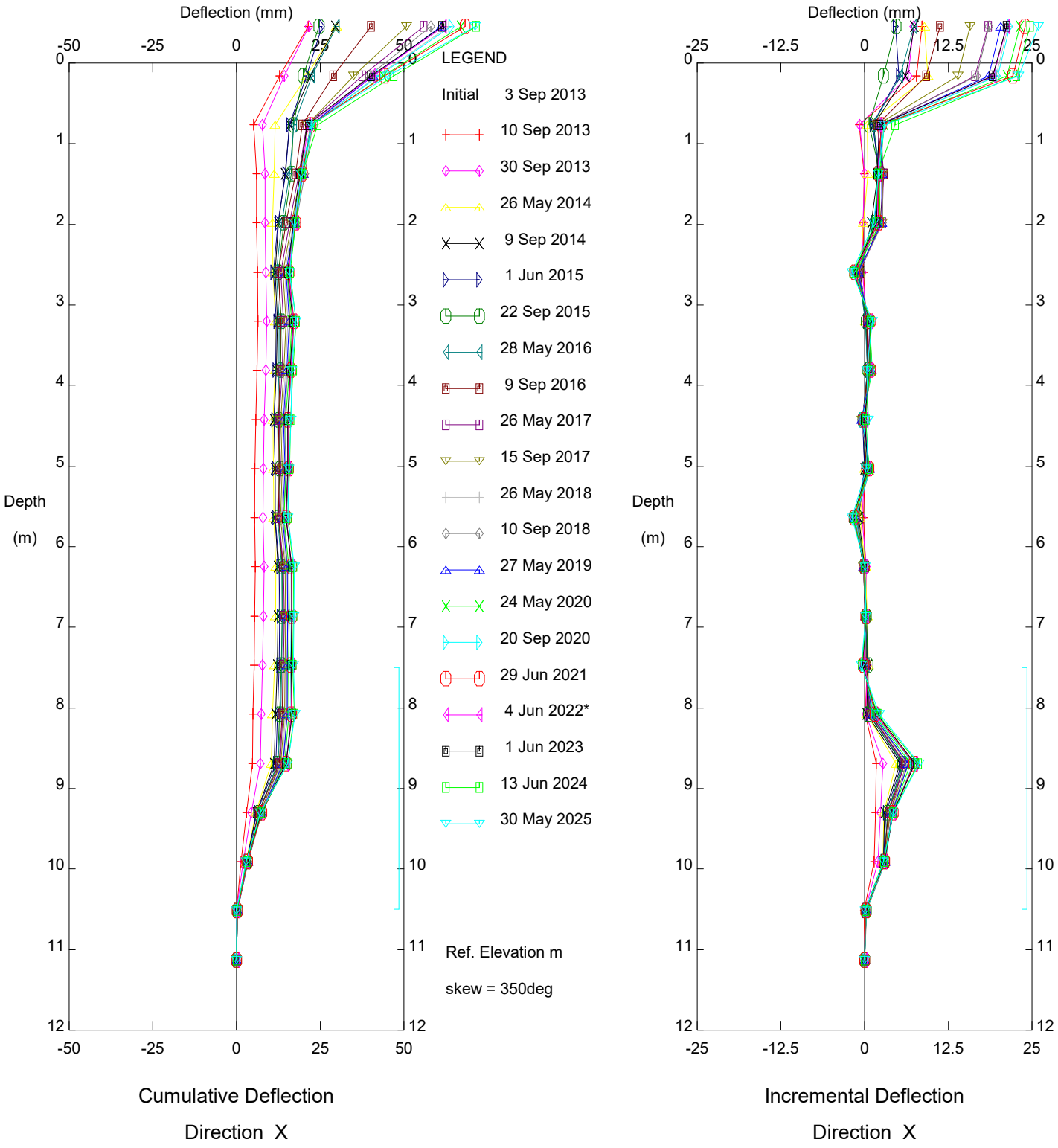

Cumulative Deflection

Direction X

Incremental Deflection

Direction X

HWY 63:02 South of Wandering River, Inclinometer SI13-14

Alberta Transportation

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

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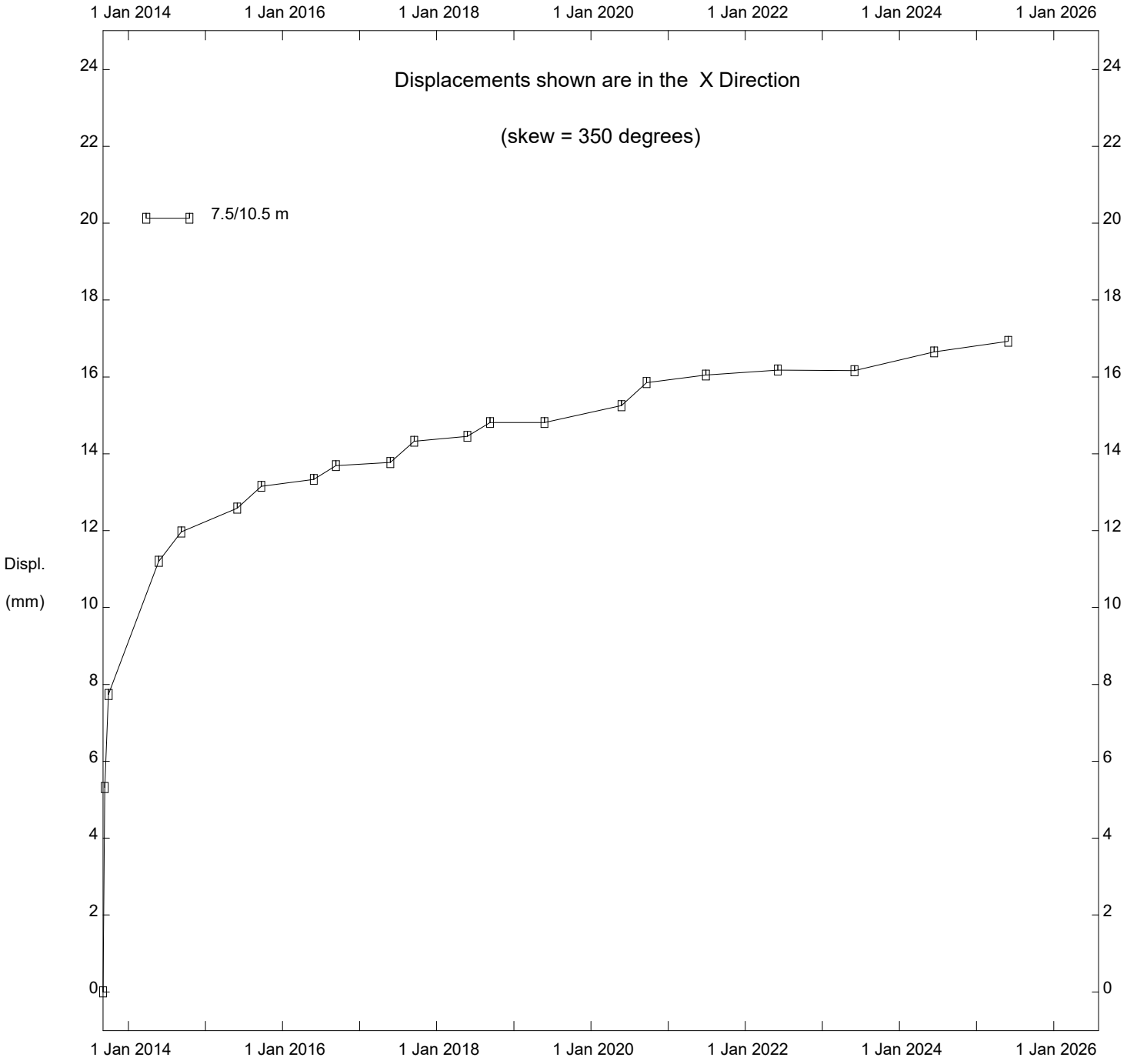

HWY 63:02 South of Wandering River, Inclinometer SI13-14

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FIGURE NC069-1
PIEZOMETRIC ELEVATIONS FOR HWY 63:02 SLOPE REPAIR

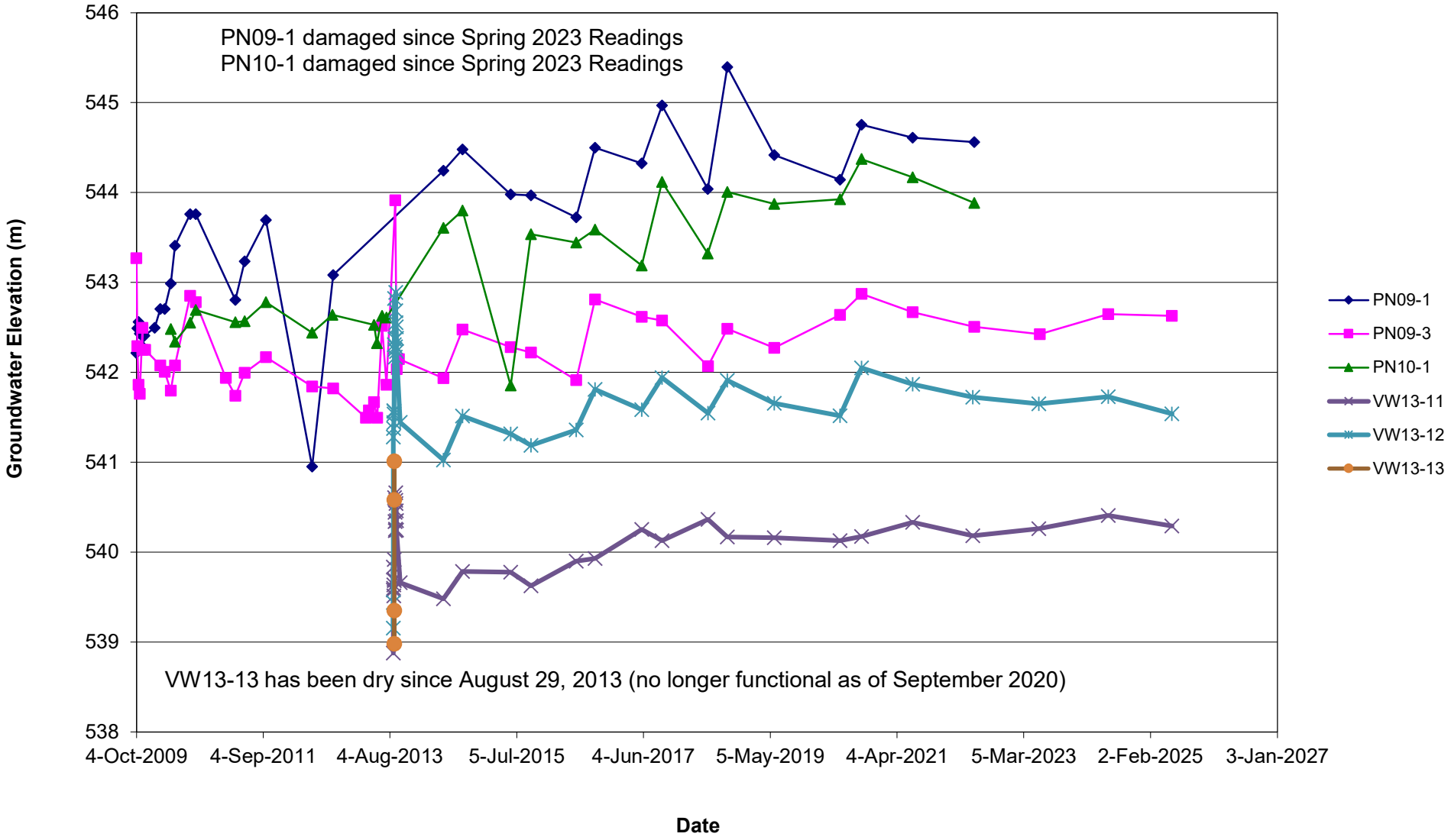

FIGURE NC069-2
PIEZOMETRIC DEPTHS FOR HWY 63:02 SLOPE REPAIR