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

Site Number	Location	Name	Hwy	km
NC089	HWY 63:12	Beacon Hill Backslope Slide	63:12	Km 8.7
Legal Description: 3-10-89-9 W4		**UTM Co-ordinates**		
		12U E 478503	N 6284103	

Current Monitoring:	28-May-2025	**Previous Monitoring**	11-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): SI17-2 and SI17-7	**Pneumatic Piezometers (PN):** PN17-1A, PN17 1B, PN17-2A, PN17-2B, PN17-3A, PN17-3B, PN17-4, PN17-5A, PN17-5B, PN17-6A, PN17-6B, PN17-7A, PN17-7B, and PN17-7C	**Vibration Wire Piezometers (VW):** N/A	**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 a RST Pocket PC readout	**Pneumatic Piezometers:** RST C108 pneumatic piezometer reader	**Vibration Wire Piezometers:**	**Standpipe Piezometers:**
Load Cell:	**Strain Gauges:**	**SAAs:**	**Others:**
Notes:			

Discussion	
Zones of New Movement:	None
Interpretation of Monitoring Results:	SI17-2 showed no discernible movement over 1.8 m to 3.6 m depth, no discernible moment over 4.8 m to 7.3 m depth, and a rate of movement of 0.1 mm/yr over 16.4 to 17.6 m of depth since the spring of 2024 readings. SI17-7 showed a rate of movement of less than 1 mm/yr over 1.6 m to 3.4 m depth and 22.9 m to 24.1 m depth since the spring of 2024 readings. Pneumatic piezometers PN17-1A, PN17-1B, PN17-2A, PN17-2B, PN17-3A, PN17-3B, PN17-4, PN17-5B, PN17-6A, PN17-6B, PN17-7A and PN17-7B showed decreases in groundwater levels ranging from 0.01 m in PN17-7B to 0.57 m in PN17-7A since the spring of 2024 readings. PN17-5A and PN17-7C showed increases in groundwater levels of 0.10 m and 0.04 m, respectively, since the spring of 2024 readings. The groundwater level recorded in PN17-5A was 8.77 m

	below ground surface which is the highest recorded reading in the instrument since initialization.
Future Work:	The instruments should be read again in the spring of 2026.
Instrumentation Repairs:	No instrument repairs are required at this time.
Additional Comments:	

Attachments:	• Table NC089-1 Spring 2025 – HWY 63:12 Beacon Hill Backslope Slide (Km 8.7), Slope Inclinometer Instrumentation Reading Summary • Table NC089-2 Spring 2025 – HWY 63:12 Beacon Hill Backslope Slide (Km 8.7), Pneumatic Piezometer Instrumentation Reading Summary • Statement of Limitations and Conditions • APPENDIX A – NC089-1 SPRING 2025 o Field Inspector's report o Site Plan Showing Approximate Instrument Locations (Drawing No. 32122-NC089) o SI Reading Plots o Figure NC089-1 (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

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 NC089-1: Spring 2025 – Hwy 63:12 Beacon Hill Backslope Slide (Km 8.7) Slope Inclinometer Instrumentation Reading Summary

Date Monitored: May 28, 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)
SI17-2	September 18, 2017	35.6 mm over 1.8 to 3.6 m depth in 53° direction	58.9 on September 25, 2020	Operational	June 11, 2024	No Discernible Movement	N/A	-1.2
		7.1 mm over 4.8 to 7.3 m of depth in 80° direction	5.8 on September 25, 2020			No Discernible Movement	N/A	-0.3
		2.6 mm over 16.4 to 17.6 m depth in 53° direction	3.6 on October 18, 2017			0.1	0.1	-0.2
SI17-3	*September 18, 2017*	*94.7 mm over 1.4 to 3.8 m depth in 20° direction*	*183.1 on September 25, 2020*	*Blocked at 1.2 m*	*September 25, 2020*	*N/A*	*N/A*	*N/A*
SI17-4	*September 18, 2017*	*1.0 mm over 2.0 to 3.2 m depth in 118° direction*	*2.9 on February 21, 2018*	*Blocked at 1.2 m*	*September 25, 2020*	*N/A*	*N/A*	*N/A*
		1.0 mm over 13.0 to 14.8 m depth in 78° direction	*3.5 on October 18, 2017*			*N/A*	*N/A*	*N/A*
SI17-5	*September 18, 2017*	*36.4 mm over 0.1 to 2.0 m depth in 56° direction*	*43.9 on September 17, 2018*	*Blocked at 1.2 m*	*May 28, 2020*	*N/A*	*N/A*	*N/A*
		1.2 mm over 12.3 to 14.2 m depth in 56° direction	*2.0 on September 17, 2018*			*N/A*	*N/A*	*N/A*

Figure 32122-NC089 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

Table NC089-1 – Continued: Spring 2025 – Hwy 63:12 Beacon Hill Backslope Slide (Km 8.7) Slope Inclinometer Instrumentation Reading Summary

Date Monitored: May 28, 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)
SI17-7 (Replacement for SI12-09)	September 18, 2017	24.3 mm over 1.6 to 3.4 m depth in 28° direction	60.8 in September 2020	Operational	June 11, 2024	<0.1	<0.1	-0.6
		3.1 mm over 22.9 to 24.1 m depth in 28° direction	2.3 in September 2020			<0.1	<0.1	-0.3

Figure 32122-NC089 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

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Table NC089-2: Spring 2025 – Hwy 63:12 Beacon Hill Backslope Slide (Km 8.7) Pneumatic Piezometer Instrumentation Reading Summary

Date Monitored: May 28, 2025

INSTRUMENT #	DATE INITIALIZED	TIP DEPTH (m)	CURRENT STATUS	HIGHEST MEASURED GROUNDWATER DEPTH (m)	MEASURED PORE PRESSURE (kPa)	CURRENT GROUNDWATER DEPTH (m)	PREVIOUS GROUNDWATER DEPTH (m)	CHANGE IN WATER LEVEL SINCE PREVIOUS READING (m)
PN17-1A (37677)	September 18, 2017	8.0	Operational	5.07 on June 11, 2024	28.1	5.14	5.07	-0.07
PN17-1B (37659)	September 18, 2017	15.5	Operational	10.43 on October 18, 2017	31.4	12.30	12.09	-0.21
PN17-2A (37666)	September 18, 2017	13.0	Operational	6.25 on June 3, 2022	62.1	6.67	6.54	-0.13
PN17-2B (37494)	September 18, 2017	21.6	Operational	21.20 on February 21, 2018	1.0	21.50	21.42	-0.08
PN17-3A (37665)	September 18, 2017	4.7	Operational	1.14 on May 30, 2023	33.8	1.25	1.21	-0.04
PN17-3B (37495)	September 18, 2017	14.6	Operational	9.33 on September 25, 2020	19.6	12.60	12.50	-0.10
PN17-4 (37674)	September 18, 2017	8.0	Operational	3.04 on June 11, 2024	35.7	4.36	3.04	-1.32

Figure 32122-NC089-1 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

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Table NC089-2 – Continued: Spring 2025 – Hwy 63:12 Beacon Hill Backslope Slide (Km 8.7) Pneumatic Piezometer Instrumentation Reading Summary

Date Monitored: May 28, 2025

INSTRUMENT #	DATE INITIALIZED	TIP DEPTH (m)	CURRENT STATUS	HIGHEST MEASURED GROUNDWATER DEPTH (m)	MEASURED PORE PRESSURE (kPa)	CURRENT GROUNDWATER DEPTH (m)	PREVIOUS GROUNDWATER DEPTH (m)	CHANGE IN WATER LEVEL SINCE PREVIOUS READING (m)
PN17-5A (37667)	September 18, 2017	8.9	Operational	8.77 on May 28, 2025	1.3	8.77	8.87	0.10
PN17-5B (37660)	September 18, 2017	14.8	Operational	9.95 on September 25, 2020	44.6	10.25	10.10	-0.15
PN17-6A (37664)	September 18, 2017	9.7	Operational	5.35 on October 18, 2017	27.8	6.87	6.56	-0.31
PN17-6B (37493)	September 18, 2017	18.5	Operational	18.11 on February 21, 2018	0.3	18.47	18.46	-0.01
PN17-7A (37675)	September 18, 2017	8.0	Operational	5.91 on June 3, 2022	3.3	7.66	7.09	-0.57
PN17-7B (37477)	September 18, 2017	18.0	Operational	17.59 on February 21, 2018	0.3	17.97	17.95	-0.02
PN17-7C (37661)	September 18, 2017	28.0	Operational	21.77 on May 29, 2018	60.4	21.84	21.88	0.04

Figure 32122-NC089-1 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.

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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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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.

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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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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 NC089: HWY 63:12 BEACON HILL BACKSLOPE SLIDE (km 8.7)

ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS
NORTH CENTRAL REGION - ATHABASCA AND FORT McMURRAY DISTRICTS
INSTRUMENTATION MONITORING FIELD SUMMARY (NC089)
SPRING 2025

Location:	HWY 63:12 Beacon Hill Backslope Slide	**Readout:**	RST PN C108, Unit 8
File Number:	32122	**Casing Diameter:**	2.75"
Probe:	RST SET 8R	**Temp:**	29
Cable:	RST Set 8R	**Read by:**	NKR/GE

SLOPE INCLINOMETER (SI) READINGS

SI#	GPS Location (UTM 12)		Date	Stickup (m)	Readings Depth from top of **casing** (ft)	Azimuth of A+ Groove degree	Current Bottom Depth Readings				Probe/ Reel #	Size (")	Remarks
	Northing	Easting					A+	A-	B+	B-			
SI17-2	6284103	478503	28-May-25	0.95	82 to 2	60	-521	538	-166	169	5R/5R	2.75	
SI17-7	6284102	478453	28-May-25	0.55	98 to 2	40	1705	-1700	361	-363	5R/5R	2.75	

PNEUMATIC PIEZOMETER (PN) READINGS

PN #	Serial	GPS Location (UTM 12)		Location	Date	Reading (kPa)	Comments
		Northing	Easting				
PN17-1A	37677	6284070	478515		28-May-25	28.1	
PN17-1B	37659	6284070	478515		28-May-25	31.4	
PN17-2A	37666	6284103	478503	Attached to SI17-2	28-May-25	62.1	
PN17-2B	37494	6284103	478503	Attached to SI17-2	28-May-25	1	
PN17-3A	37665	6284125	478484	Attached to SI17-3	28-May-25	33.8	
PN17-3B	37495	6284125	478484	Attached to SI17-3	28-May-25	19.6	
PN17-4	37674	6284139	478507	Attached to SI17-4	28-May-25	35.7	*
PN17-5A	37667	6284177	478476	Attached to SI17-5	28-May-25	1.3	
PN17-5B	37660	6284177	478476	Attached to SI17-5	28-May-25	44.6	
PN17-6A	37664	6284194	478502		28-May-25	27.8	
PN17-6B	37493	6284194	478502		28-May-25	0.3	
PN17-7A	37675	6284102	478453	Attached to SI17-7	28-May-25	3.3	
PN17-7B	37477	6284102	478453	Attached to SI17-7	28-May-25	0.3	
PN17-7C	37661	6284102	478453	Attached to SI12-7	28-May-25	60.4	

INSPECTOR REPORT

* Clear SI17-4, Water seepage and running down the slope.

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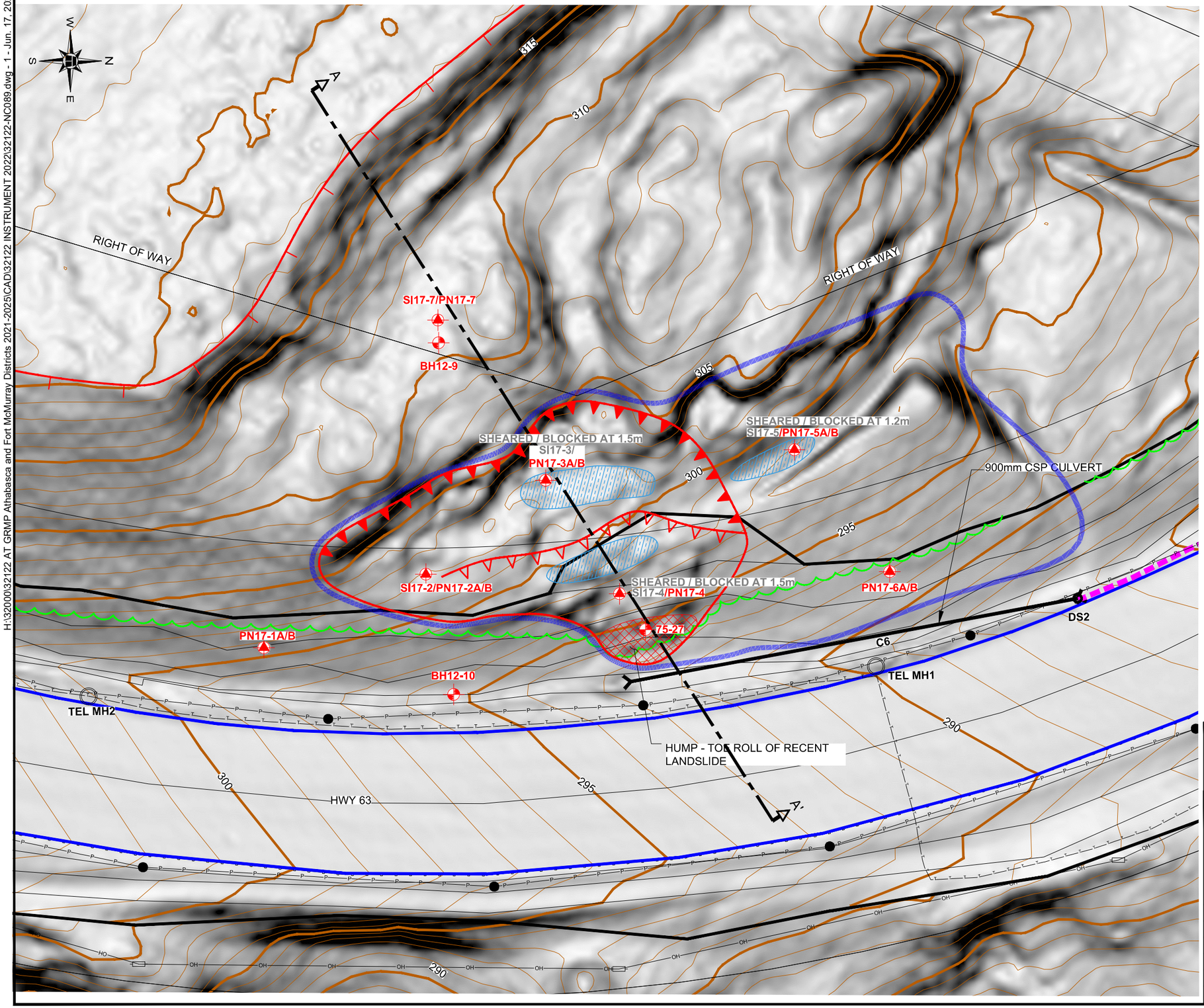


LEGEND

- APPROXIMATE LOCATION OF SLOPE INCLINOMETER (SI) / PNEUMATIC PIEZOMETER (PN)
- APPROXIMATE LOCATION OF PREVIOUS TEST HOLE
- HEADSCARP CRACK
- TENSION CRACK
- APPROXIMATE BOUNDARY OF ANCIENT LANDSLIDE BLOCK
- APPROXIMATE BOUNDARY OF RECENT ACTIVE LANDSLIDE
- APPROXIMATE VALLEY CREST
- TREE LINE
- GUARDRAIL
- OVERHEAD POWER LINE
- UNDERGROUND POWER LINE
- UNDERGROUND TELUS CABLE
- LIGHT STAND
- TELUS MANHOLE
- POWER POLE
- DROP STRUCTURE (DS#)
- STANDING WATER

NOTES:

1. LIMITED SURVEY IN THE VICINITY OF THE HIGHWAY WAS CONDUCTED ON AUGUST 30, 2017 BY WSP.
2. LIDAR, AS RECENT AS 2016, USED TO AUGMENT WSP SURVEY DATA.

0 10 20 30 40 50m

SCALE 1:800

Alberta

NORTH CENTRAL
(ATHABASCA AND FORT MCMURRAY DISTRICTS)

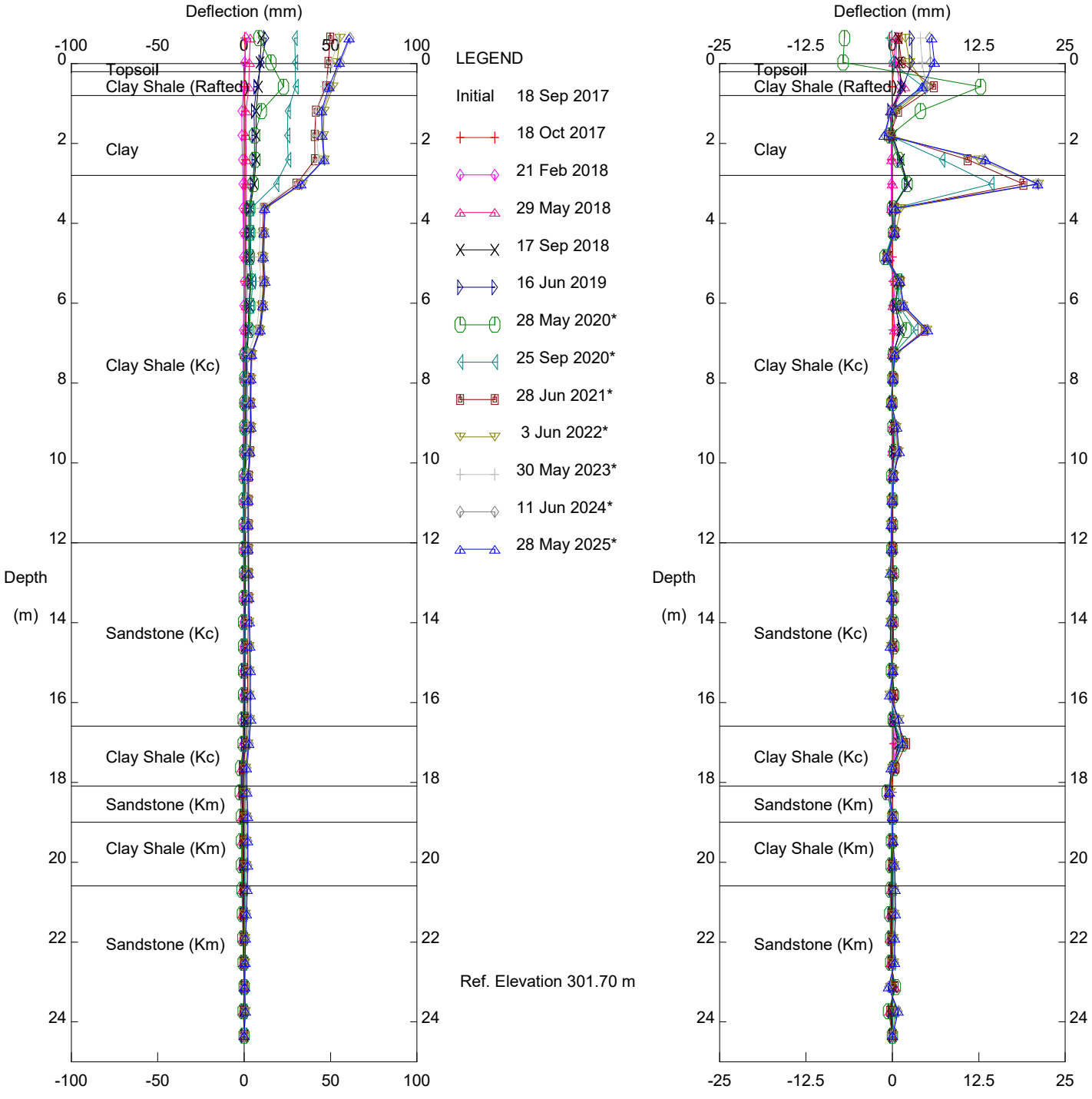
NC089: HWY 63:11 BEACON HILL
BACKSLOPE SLIDE (km 8.7)
SITE PLAN SHOWING INSTRUMENT LOCATIONS

DWG No. 32122-NC089

DRAWN BY	ML
DESIGNED BY	BWN
APPROVED BY	TSA
SCALE	1:800
DATE	JUNE 2022
FILE No.	32122

THURBER ENGINEERING LTD.

Thurber Engineering Ltd.



Cumulative Deflection

Direction A

Incremental Deflection

Direction A

NC089 - Beacon Hill Backslope Slide, Inclinometer SI17-2

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

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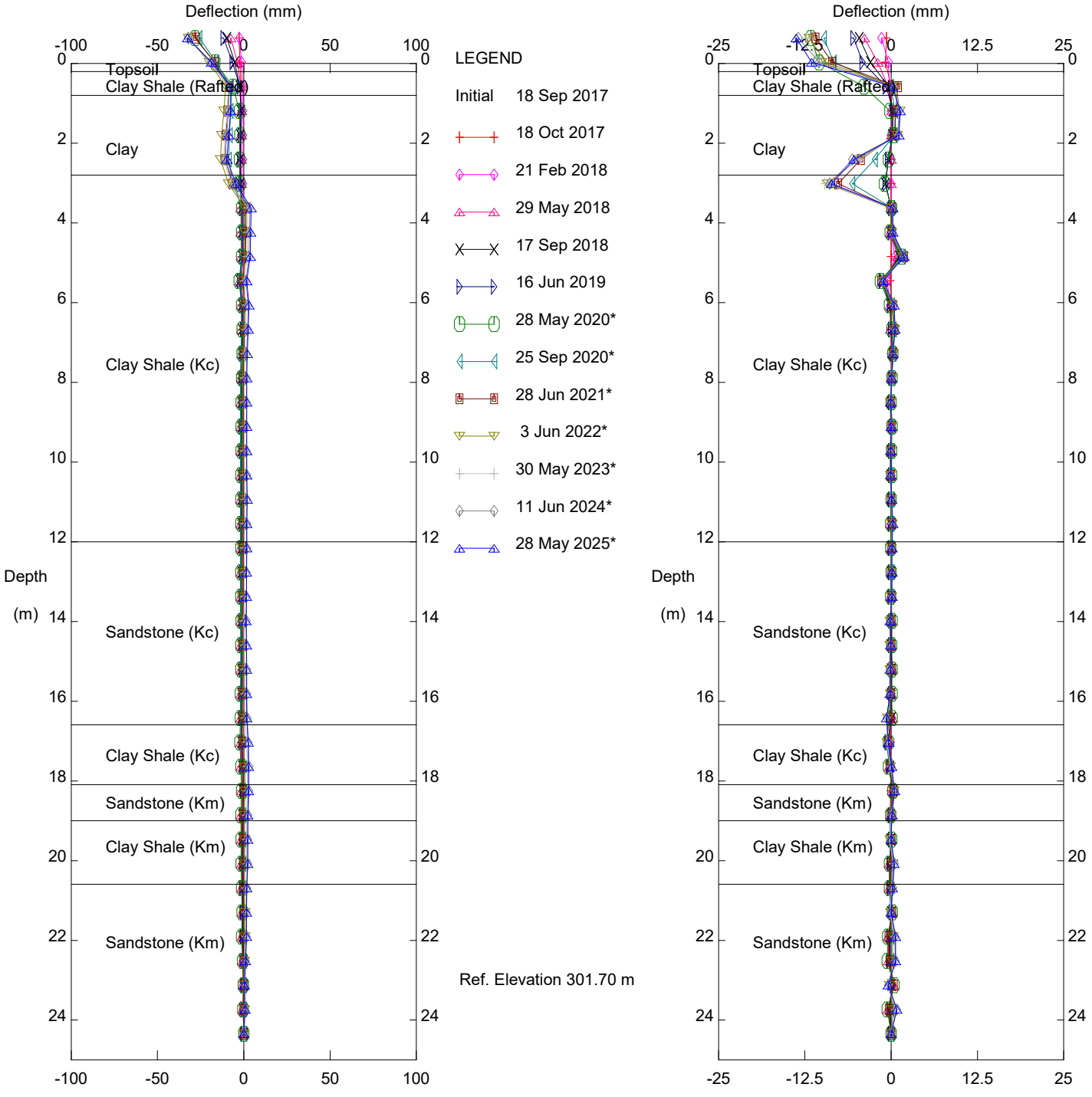

Cumulative Deflection

Direction B

Incremental Deflection

Direction B

NC089 - Beacon Hill Backslope Slide, Inclinometer SI17-2

Alberta Transportation

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

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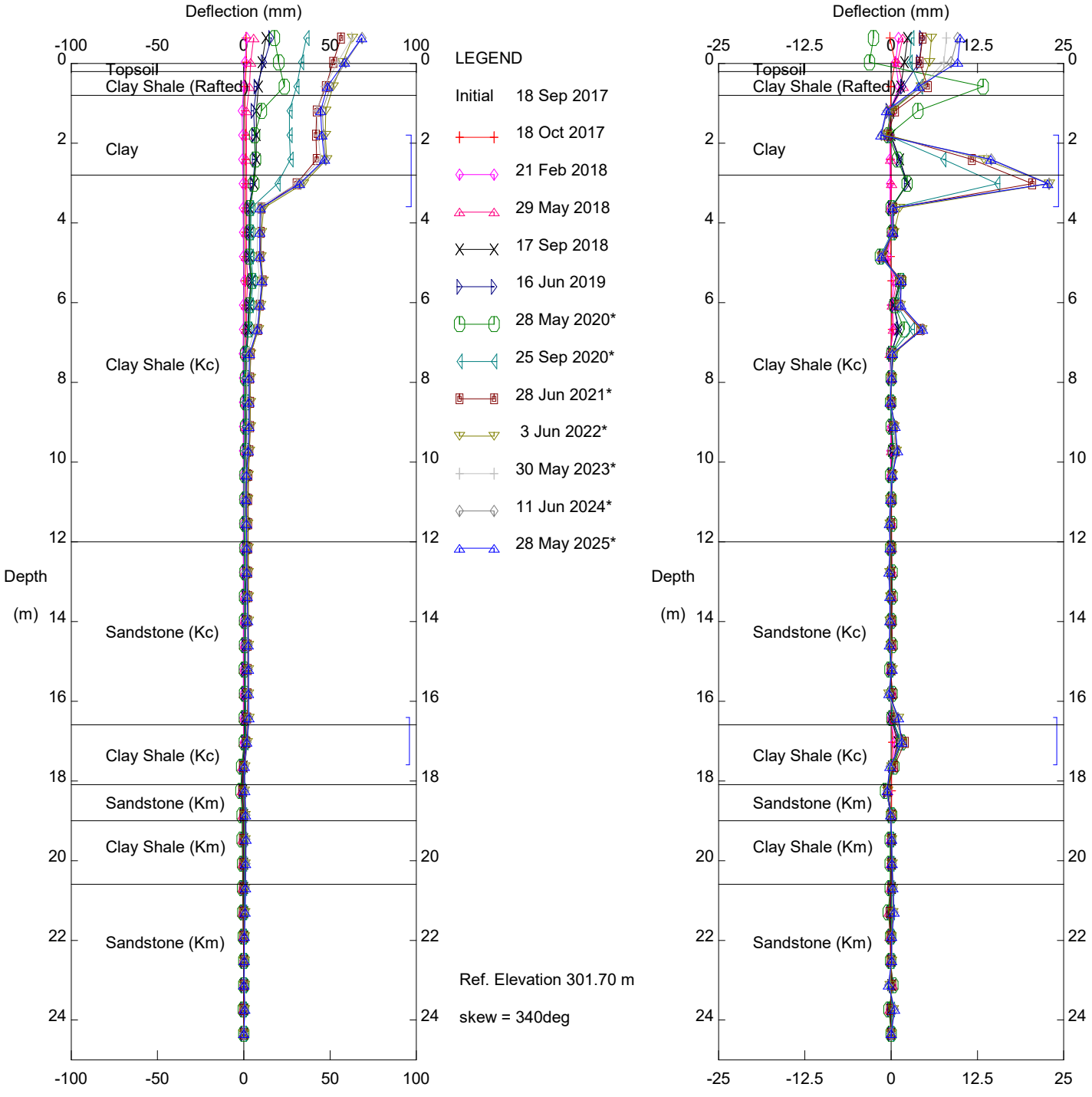

Cumulative Deflection

Direction X

Incremental Deflection

Direction X

NC089 - Beacon Hill Backslope Slide, Inclinometer SI17-2

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

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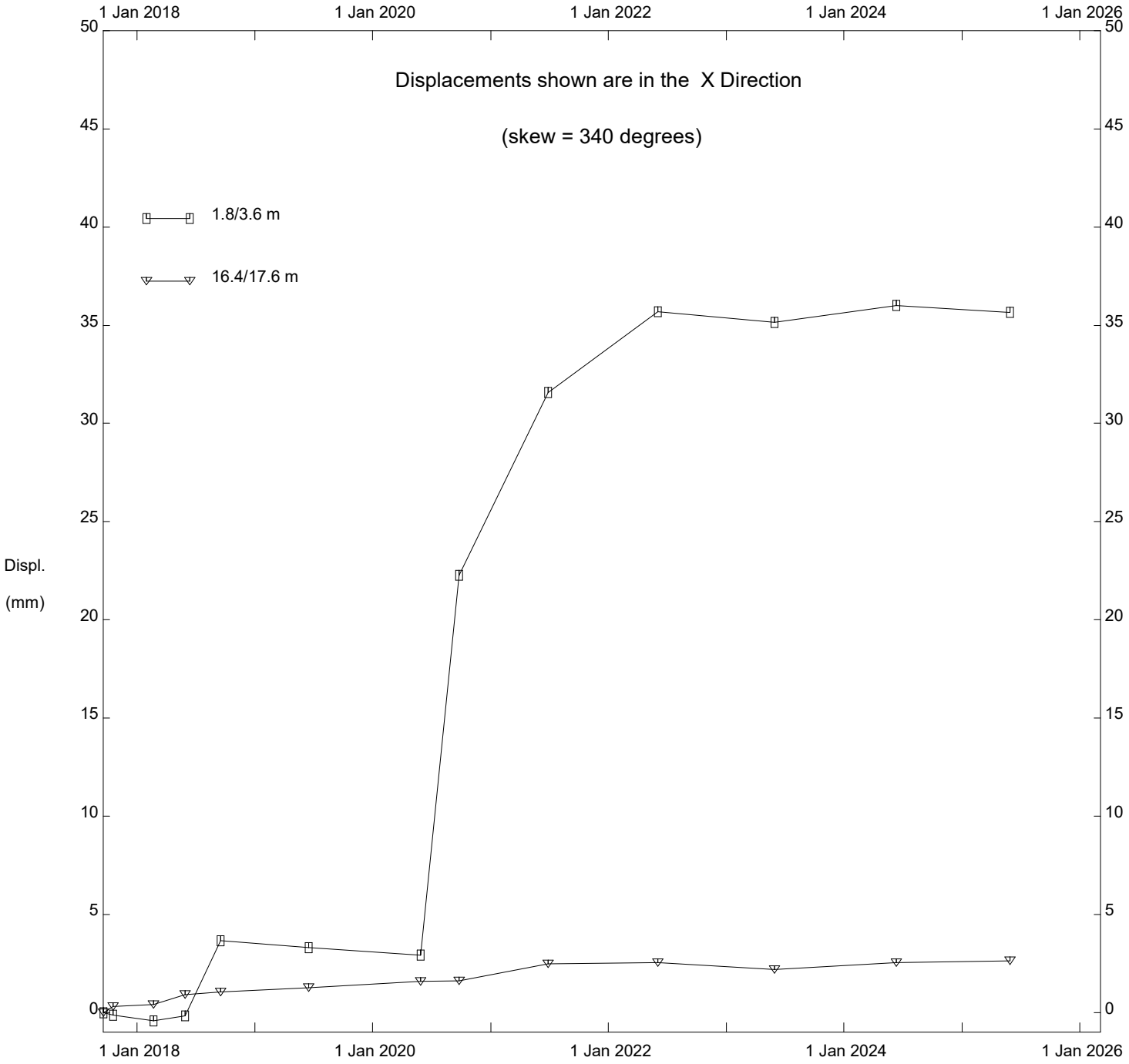

NC089 - Beacon Hill Backslope Slide, Inclinometer SI17-2

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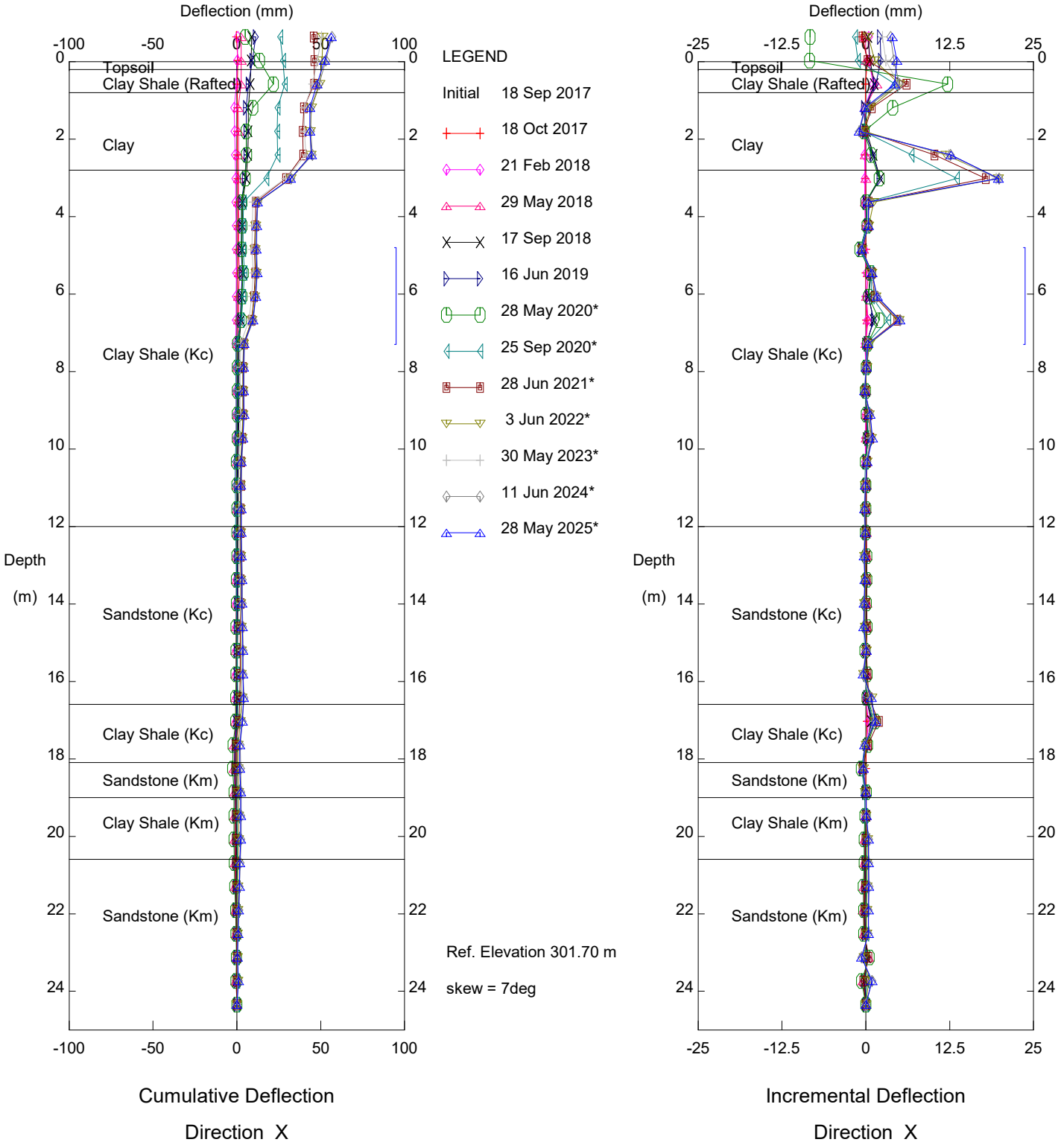

Cumulative Deflection

Direction X

Incremental Deflection

Direction X

NC089 - Beacon Hill Backslope Slide, Inclinometer SI17-2

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

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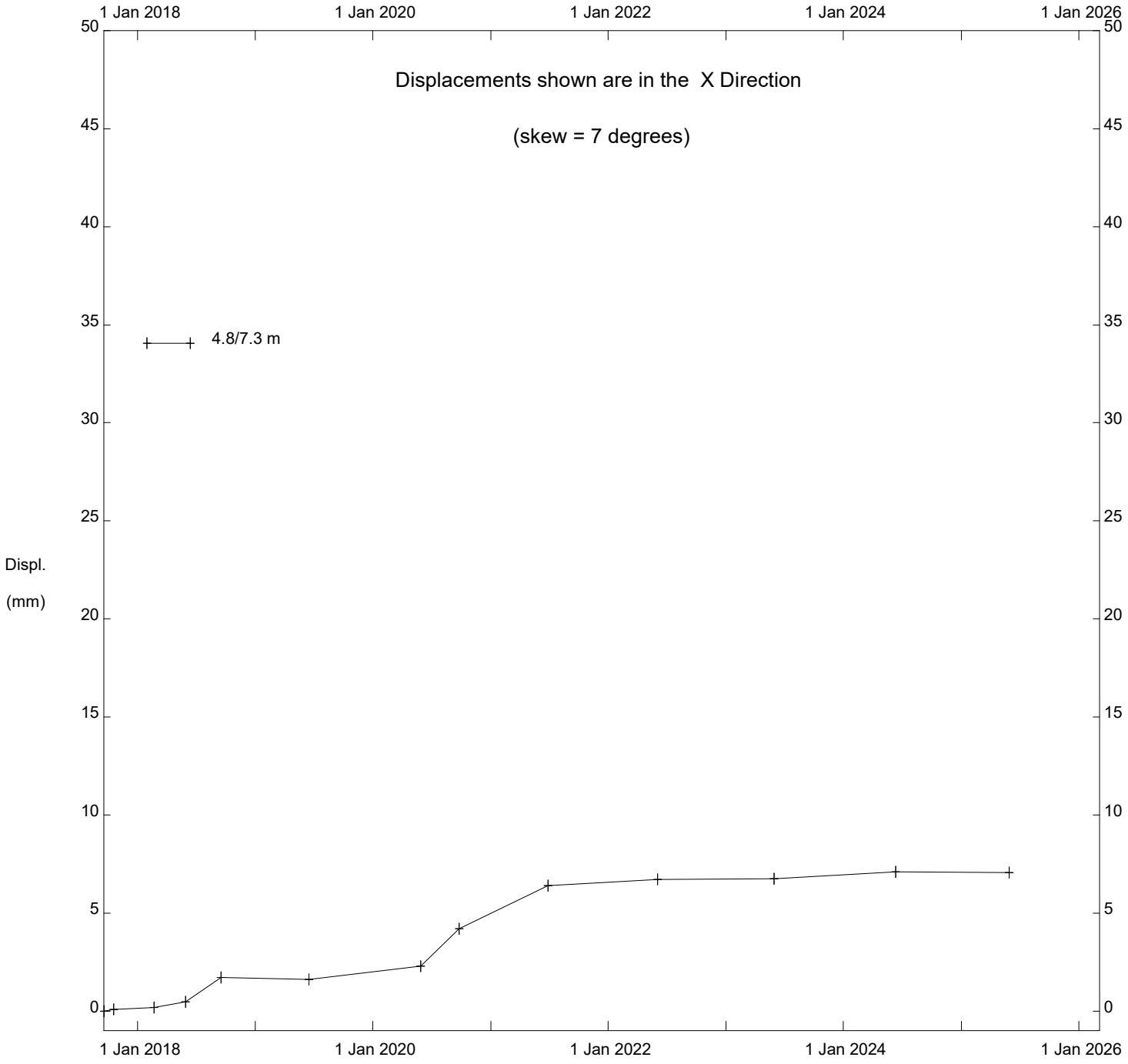

NC089 - Beacon Hill Backslope Slide, Inclinometer SI17-2

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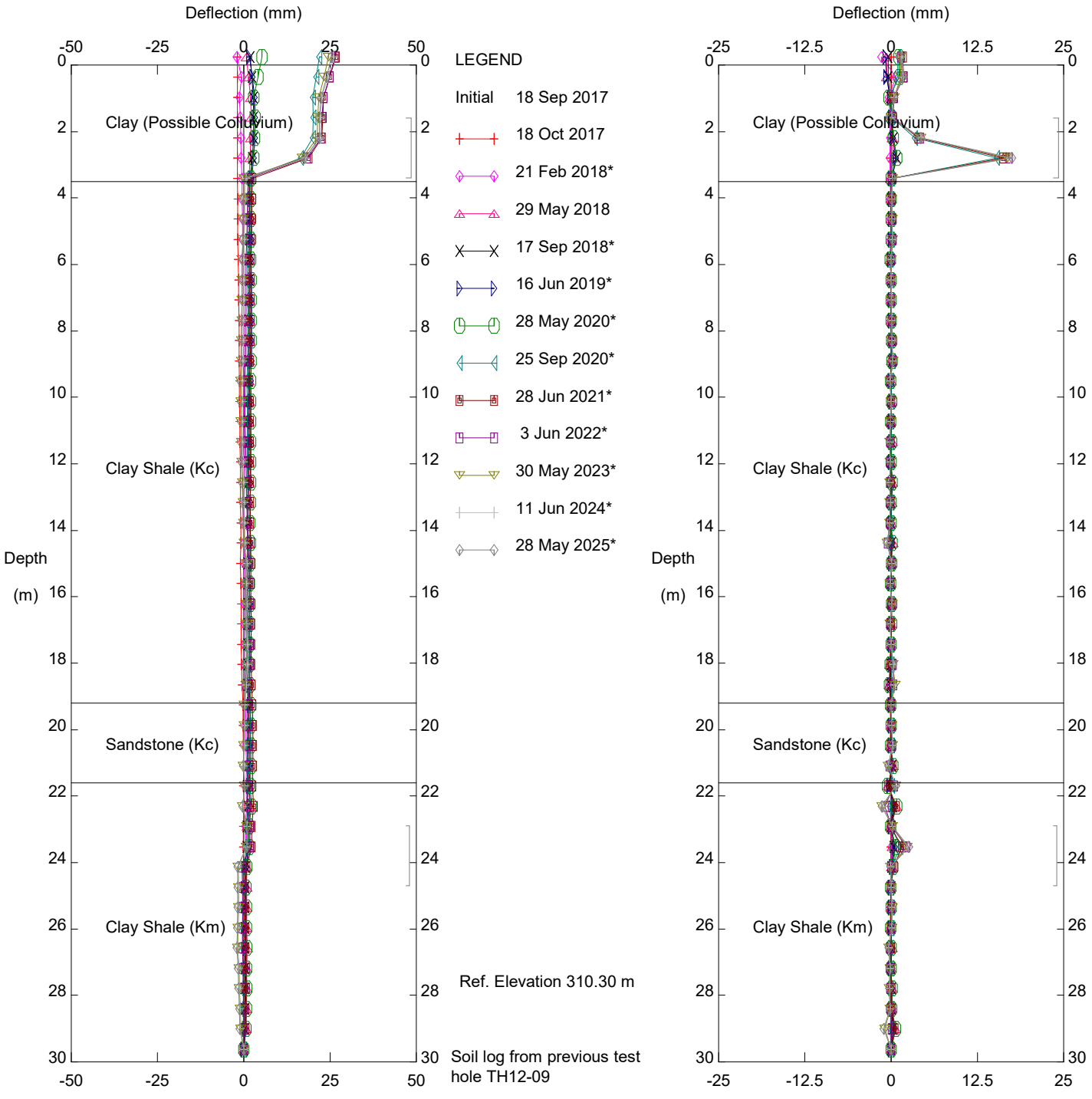

Cumulative Deflection

Direction A

Incremental Deflection

Direction A

NC089 - Beacon Hill Backslope Slide, Inclinometer SI17-7

Alberta Transportation

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

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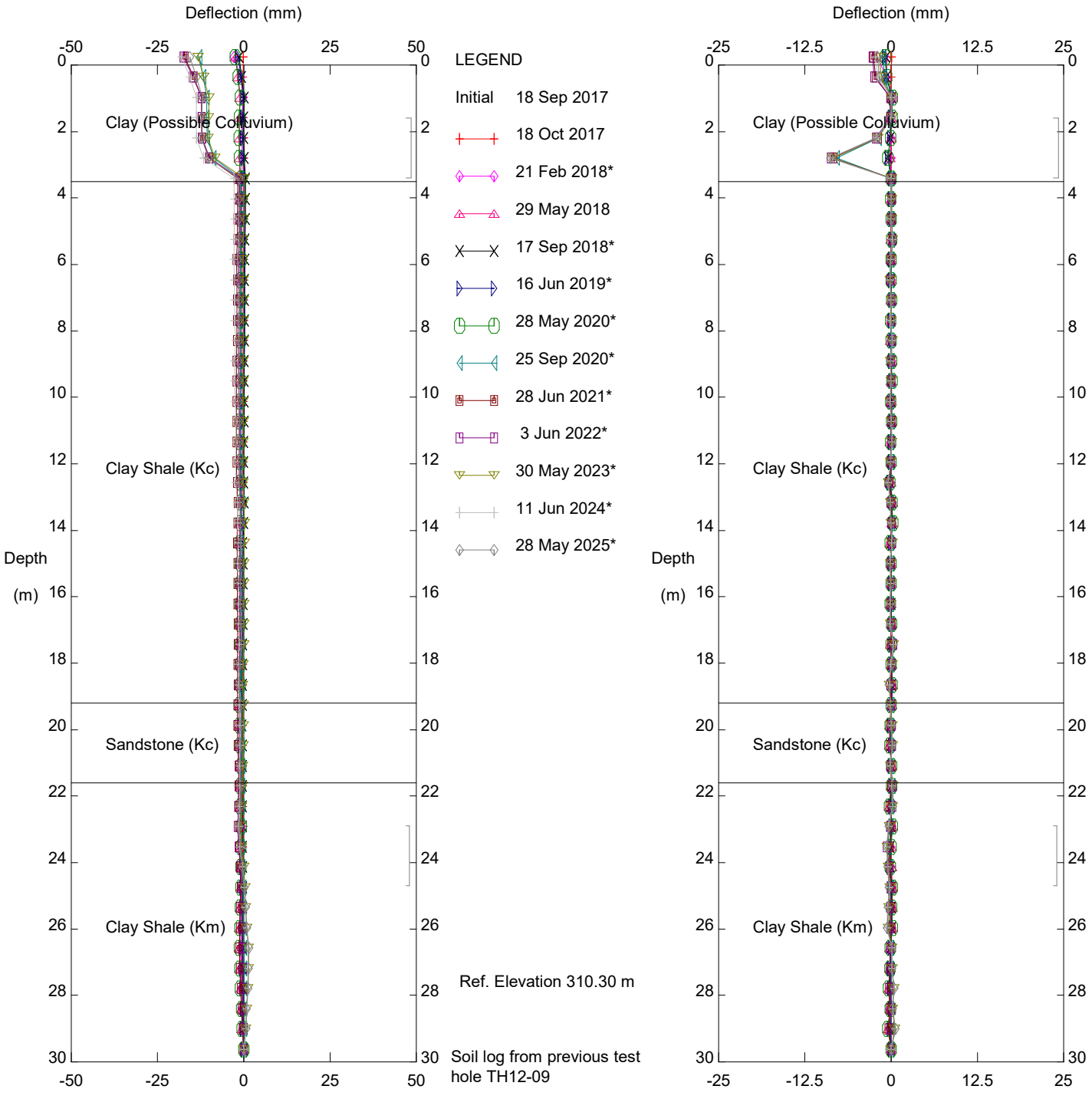

Cumulative Deflection

Direction B

Incremental Deflection

Direction B

NC089 - Beacon Hill Backslope Slide, Inclinometer SI17-7

Alberta Transportation

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

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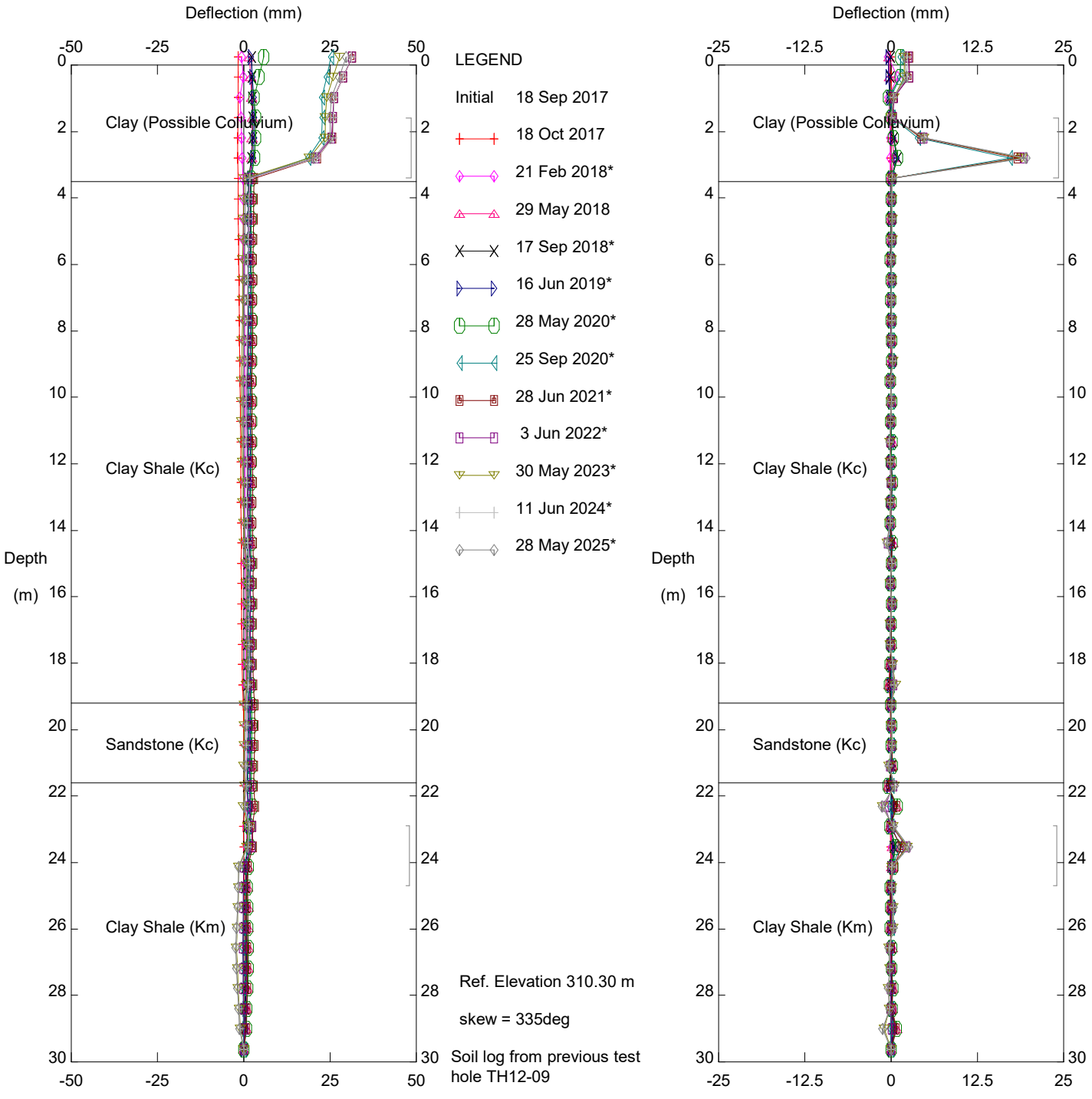

Cumulative Deflection

Direction X

Incremental Deflection

Direction X

NC089 - Beacon Hill Backslope Slide, Inclinometer SI17-7

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

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Thurber Engineering Ltd.

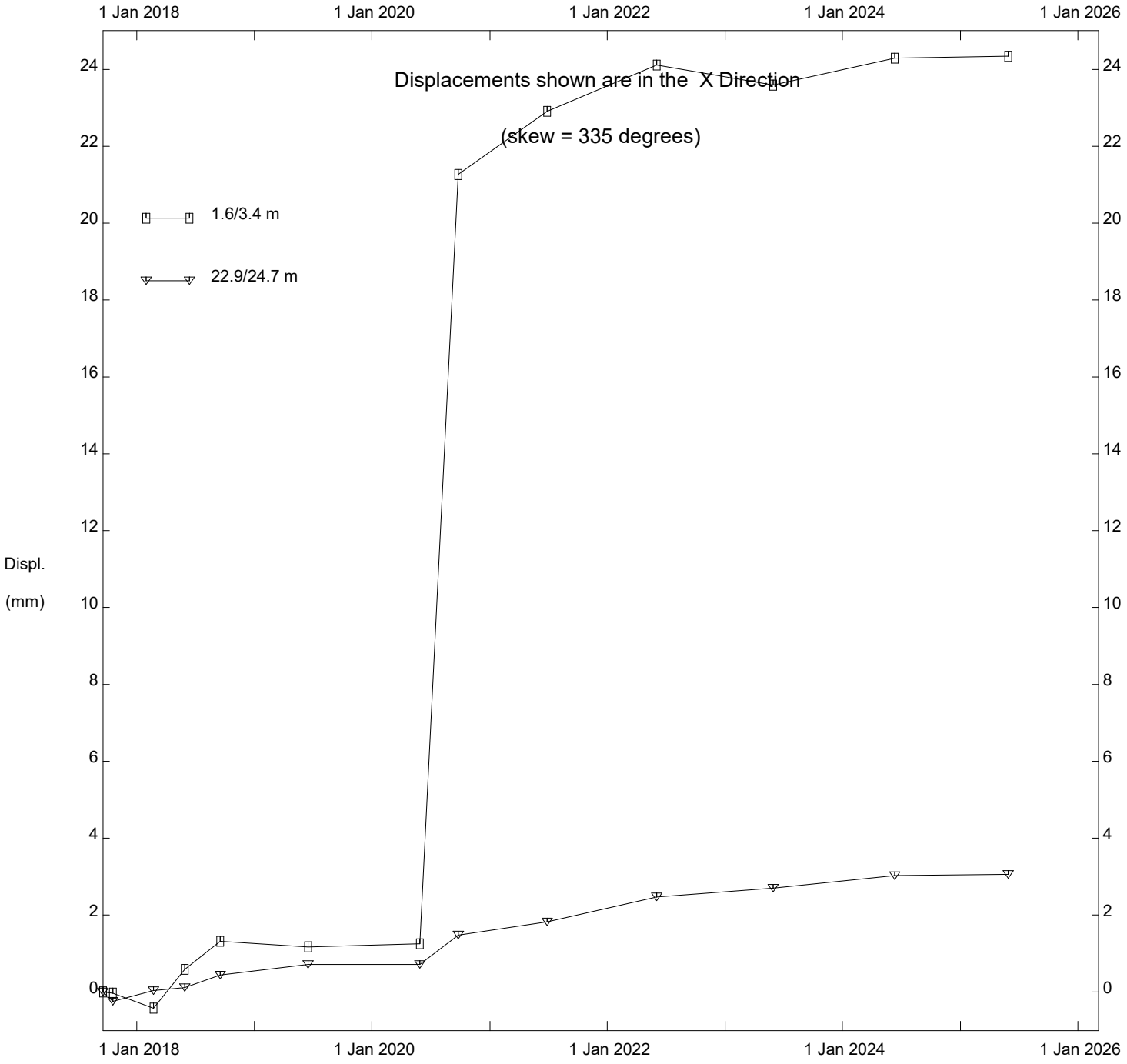

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FIGURE NC089-1
PIEZOMETER DATA FOR HWY 63:12 BEACON HILL