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

THURBER ENGINEERING LTD.

Site Number	Location	Name	Hwy	km
PH090	HWY 744:04 C1 59.0	Judah Hill Trunk Slide	744:04	Km 59.0
Legal Description: 2-29-83-21 W5		**UTM Co-ordinates**		
		11U E 482825.09	N 6230757.65	

Current Monitoring:	23-May-2024	**Previous Monitoring**	11-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): SI98-6i, SI98-7i, SI10-10 and SI10-11	**Pneumatic Piezometers (PN):** PN98-6, PN98-7a, PN10-10, and PN10-11	**Vibrating Wire Piezometers (VW):** N/A	**Standpipe Piezometers (SP):** N/A
Load Cell (LC): N/A	**Strain Gauges:** N/A	**SAAs:** N/A	**Others:** N/A

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 readout	**Vibrating Wire Piezometers:** N/A	**Standpipe Piezometers:** N/A
Load Cell: N/A	**Strain Gauges:** N/A	**SAAs:** N/A	**Others:** N/A

Zones of New Movement:	None
Interpretation of Monitoring Results:	SI98-6i showed a rate of movement of 1.0 mm/yr over 0.4 m to 3.4 m depth, a rate of movement of less than 0.1 mm/yr over 6.5 m to 8.9 m depth, and a rate of movement of 1.7 mm/yr over 0.4 m to 9.5 m depth since the fall of 2023 readings. SI98-7i showed no discernible movement over 3.3 m to 4.5 m depth since the fall of 2023 readings. SI10-10 showed a rate of movement of 6.5 mm/yr over 1.0 m to 8.3 m depth and a rate of movement of 0.1 mm/yr over 5.2 m to 8.3 m depth since the fall of 2023 readings. SI10-11 showed a rate of movement of 0.6 mm/yr over 2.0 m to 5.0 m depth since the fall of 2023 readings. Pneumatic piezometers PN98-6, PN98-7a and PN10-11 showed decreases in groundwater level of 0.36 m, 0.59 m and 1.10 m, respectively, since the fall of 2023 readings. The current groundwater level in PN10-11 is in line with historic readings in the instrument, following a spike in the fall of 2023 readings. Pneumatic piezometer PN10-10 showed an increase in groundwater level of 0.02 m since the fall of 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:	

Attachments:	• Table PH090-1: Spring 2024 – HWY 744:04 Judah Hill Trunk Slide Slope Inclinometer Instrumentation Reading Summar
	• Table PH090-2: Spring 2024 – HWY 744:04 Judah Hill Trunk Slide Pneumatic Piezometer Instrumentation Reading Summary
	• Statement of Limitations and Conditions
	• APPENDIX A - PH090 SPRING 2024
	  ○ Field Inspector's report
	  ○ Site Plan Showing Approximate Instrument Locations (Drawing No. 32121- PH090
	  ○ SI Reading Plots
	  ○ Figure PH090-1 (Judah Hill Trunk Slide Pneumatic Piezometer Readings)

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

PROFESSIONAL ENGINEER ALBERTA
BRUCE W. NESTOR
ID 161284
2024-07-15

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)

Bruce Nestor, P.Eng.
Geotechnical Engineer

THURBER ENGINEERING LTD.

Table PH090-1: Spring 2024 – HWY 744:04 Judah Hill Trunk Slide Slope Inclinometer Instrumentation Reading Summary

Date Monitored: May 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)	RATE OF MOVEMENT (mm/yr)	CHANGE IN RATE OF MOVEMENT SINCE PREVIOUS READING (mm/yr)
SI98-1i	*Oct. 26, 2000*	*Not Known*	*Not Known*	*Destroyed*	*May 18, 2004*	*N/A*	*N/A*	*N/A*
SI98-6i	Oct. 26, 2000	24.8 mm over 0.4 m to 3.4 m depth in 316° direction	17.0 mm/yr in May 2007	Operational	October 11, 2023	0.6	1.0	10.8
		16.6 mm over 6.5 m to 8.9 m depth in 316° direction	9.3 mm/yr in September 2013			<0.1	<0.1	-0.2
		57.9 mm over 0.4 m to 9.5 m depth in 316° direction	22.6 mm/yr In May 2013			1.0	1.7	11.9
SI98-7i	May 10, 2001	7.9 mm over 3.3 m to 4.5 m depth in 241° direction	8.1 mm/yr in September 2013	Operational	October 11, 2023	No discernible movement	N/A	1.2
SI10-10	March 27, 2010	52.3 mm over 1.0 m to 8.3 m depth in 326° direction	7.6 mm/yr in June 2023	Operational	October 11, 2023	4.0	6.5	3.1
		8.8 mm over 5.2 m to 8.3 m depth in 326° direction	5.3 mm/yr in June 2011			<0.1	0.1	1.8
SI10-11	March 2010	73.3 mm over 2.0 m to 5.0 m depth in 241° direction	11.9 mm/yr in October 2020	Operational	October 11, 2023	0.4	0.6	-4.0

Drawing 32121-PH090 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

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Table PH090-2: Spring 2024 – HWY 744:04 Judah Hill Trunk Slide Pneumatic Piezometer Instrumentation Reading Summary

Date Monitored: May 23, 2024

INSTRUMENT #	DATE INITIALIZED	TIP DEPTH (m)	GROUND ELEV. (m)	CURRENT STATUS	HIGHEST MEASURED WATER LEVEL BGS (m)	MEASURED PORE PRESSURE (kPa)	CURRENT WATER LEVEL BGS (m)	PREVIOUS WATER LEVEL BGS (m)	CHANGE IN WATER LEVEL SINCE PREVIOUS READING (m)
PN98-6 (22830)	Oct. 26, 2000	9.8	N/A	Active	8.54 on October 11, 2023	8.8	8.90	8.54	-0.36
PN98-6a (22833)	*Oct. 26, 2000*	*16.2*	*N/A*	*Not Operational*	*14.86 on October 4, 2016*	*N/A*	*N/A*	*N/A*	*N/A*
PN98-7 (22838)	*May 10, 2001*	*7.8*	*N/A*	*Not Operational*	*6.74 on October 4, 2002*	*N/A*	*N/A*	*N/A*	*N/A*
PN98-7a (22831)	May 10, 2001	16.2	N/A	Active	9.77 on May 22, 2015	45.0	11.61	11.02	-0.59
PN10-10 (33088)	March 13, 2010	18.0	N/A	Active	17.67 on September 23, 2010	2.4	17.74	17.76	0.02
PN10-11 (33077)	March 26, 2010	18.3	N/A	Active	17.04 on October 11, 2023	1.5	18.14	17.04	-1.10

Drawing 32121-PH090 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

Notes:
PN - pneumatic 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.

IN ORDER TO PROPERLY UNDERSTAND THE SUGGESTIONS, RECOMMENDATIONS AND OPINIONS EXPRESSED HEREIN, REFERENCE MUST BE MADE TO THE WHOLE OF THE REPORT. THURBER IS NOT RESPONSIBLE FOR USE BY ANY PARTY OF PORTIONS OF THE REPORT WITHOUT REFERENCE TO THE WHOLE REPORT.

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.

4. USE OF THE REPORT

The information and opinions expressed in the Report, or any document forming part of the Report, are for the sole benefit of the Client. NO OTHER PARTY MAY USE OR RELY UPON THE REPORT OR ANY PORTION THEREOF WITHOUT THURBER'S WRITTEN CONSENT AND SUCH USE SHALL BE ON SUCH TERMS AND CONDITIONS AS THURBER MAY EXPRESSLY APPROVE. Ownership in and copyright for the contents of the Report belong to Thurber. Any use which a third party makes of the Report, is the sole responsibility of such third party. Thurber accepts no responsibility whatsoever for damages suffered by any third party resulting from use of the Report without Thurber's express written permission.

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.

6. RELEASE OF POLLUTANTS OR HAZARDOUS SUBSTANCES

Geotechnical engineering and environmental consulting projects often have the potential to encounter pollutants or hazardous substances and the potential to cause the escape, release or dispersal of those substances. Thurber shall have no liability to the Client under any circumstances, for the escape, release or dispersal of pollutants or hazardous substances, unless such pollutants or hazardous substances have been specifically and accurately identified to Thurber by the Client prior to the commencement of Thurber's professional services.

7. INDEPENDENT JUDGEMENTS OF CLIENT

The information, interpretations and conclusions in the Report are based on Thurber's interpretation of conditions revealed through limited investigation conducted within a defined scope of services. Thurber does not accept responsibility for independent conclusions, interpretations, interpolations and/or decisions of the Client, or others who may come into possession of the Report, or any part thereof, which may be based on information contained in the Report. This restriction of liability includes but is not limited to decisions made to develop, purchase or sell land.

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 PH090-1: HWY 744:04, JUDAH HILL (TRUNK SLIDE)

ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS
PEACE REGION (PEACE RIVER DISTRICT)
INSTRUMENTATION MONITORING FIELD SUMMARY (PH090)
SPRING 2024

Location:	Trunk - Judah Hill (HWY 744:04 C1 59.451)	**Readout:**	RST PN C108 Unit 4
File Number:	32121	**Casing:**	2.75
Probe:	RST SI SET 5R and 8R	**Temp:**	17
Cable:	RST SI SET 5R and 8R	**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 #	Size (")	Remarks
	Easting (m)	Northing (m)					A+	A-	B+	B-			
SI98-6i	482825.09	6230757.65	23-May-24	0.85	84 to 2	245	313	-315	-44	59	8R/8R	2.75	*See notes
SI98-7i	482795.09	6230746.64	23-May-24	0.4	66 to 2	225	492	-486	69	-79	8R/8R	2.75	*See notes
SI10-10	482874.96	6230715.49	23-May-24	1.17	106 to 4	300	292	-289	790	-800	5R/5R	2.75	
SI10-11	482851.63	6230772.35	23-May-24	0.75	102 to 4	255	-360	356	1073	-1098	5R/5R	2.75	

PNEUMATIC PIEZOMETER READINGS

PN#	GPS Location (UTM 11)		Date	Reading (kPa)	Identification Number
	Easting (m)	Northing (m)			
PN98-6	482825.09	6230757.65	23-May-24	8.8	22830
PN98-7a	482795.09	6230746.64	23-May-24	45	22831
PN10-10	482874.96	6230715.49	23-May-24	2.4	33088

INSPECTOR REPORT

* For SI98-6i & SI98-7i multiply readings by 2 to get the plot in Gtilt.

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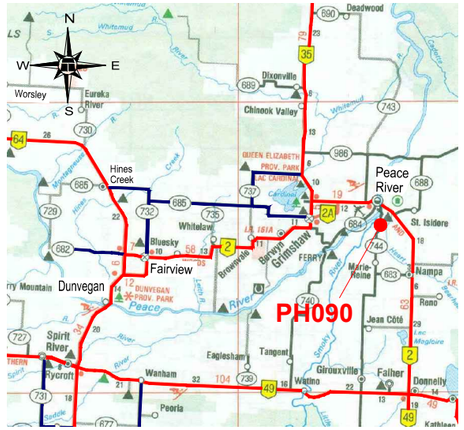
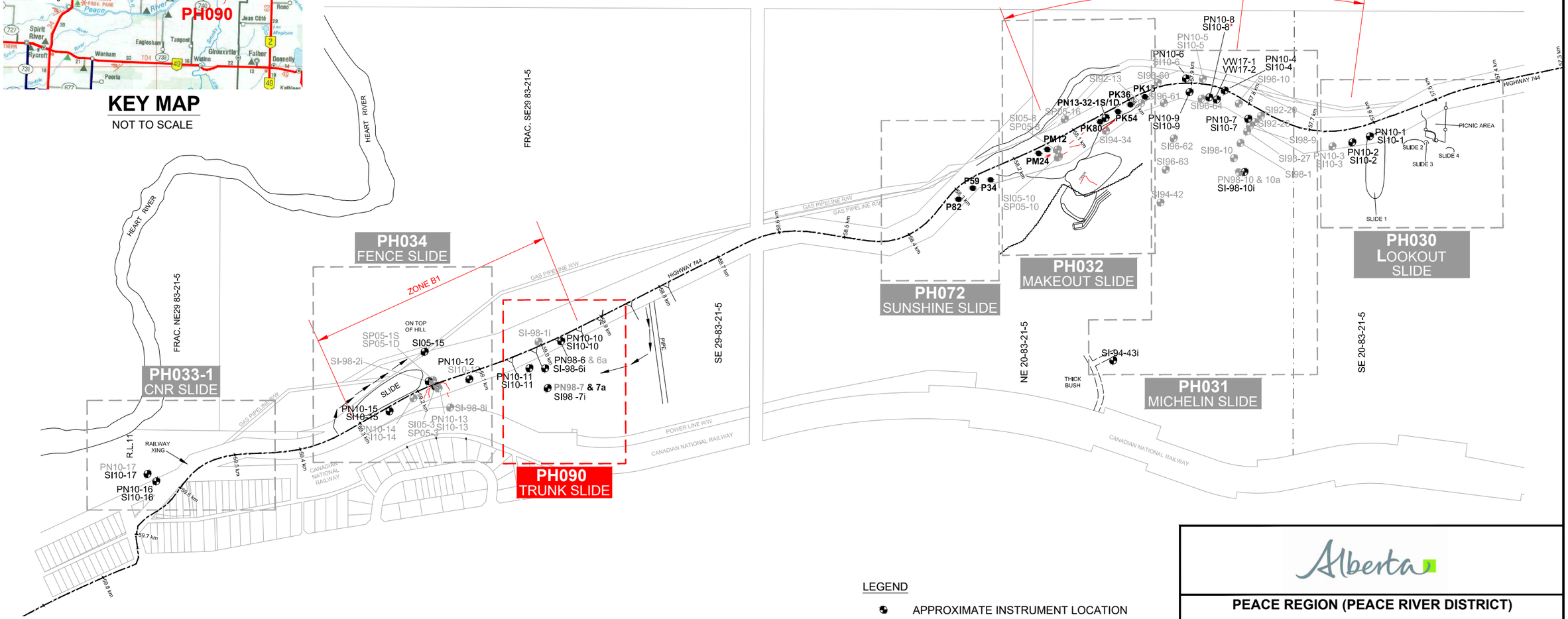


KEY MAP

NOT TO SCALE



LEGEND

- APPROXIMATE INSTRUMENT LOCATION
- INSTRUMENT NOT IN USE
- PN PNEUMATIC PIEZOMETER
- SP STANDPIPE PIEZOMETER
- SI SLOPE INCLINOMETER
- VW VIBRATING WIRE PIEZOMETER
- APPROXIMATE PILE LOCATION

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PEACE REGION (PEACE RIVER DISTRICT)

PH090: HWY 744:02 - JUDAH HILL (TRUNK SLIDE) INSTRUMENT LOCATIONS

DWG No. 32121-PH090

DRAWN BY	ML
DESIGNED BY	BWN
APPROVED BY	DWP
SCALE	APPROX. 1:6000
DATE	SEPTEMBER 2021
FILE No.	32121

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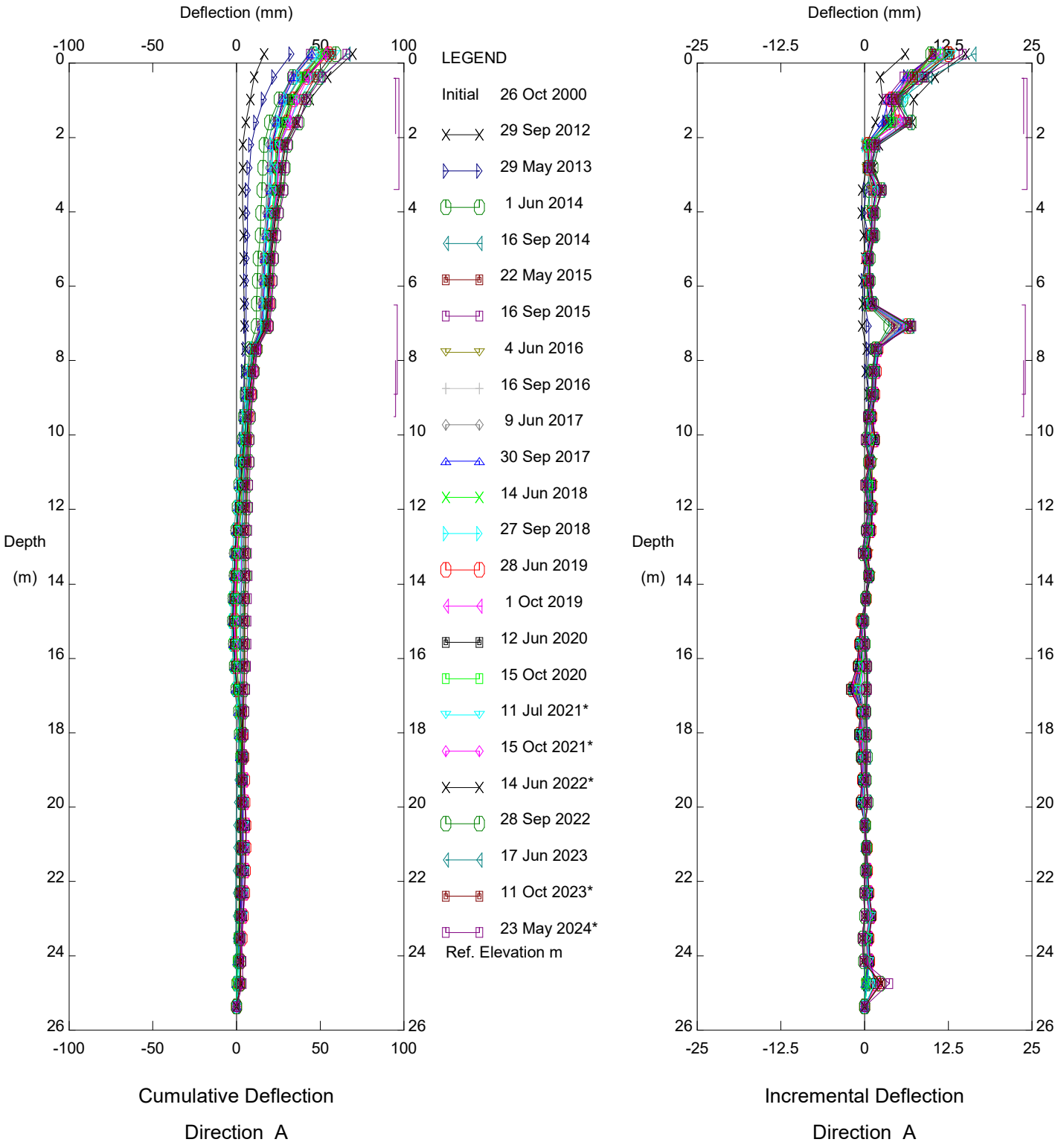
Thurber Engineering Ltd.



Cumulative Deflection

Direction A

Incremental Deflection

Direction A

PH090 Judah Hill Trunk Slide, Inclinometer SI98-6i

Alberta Transportation

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

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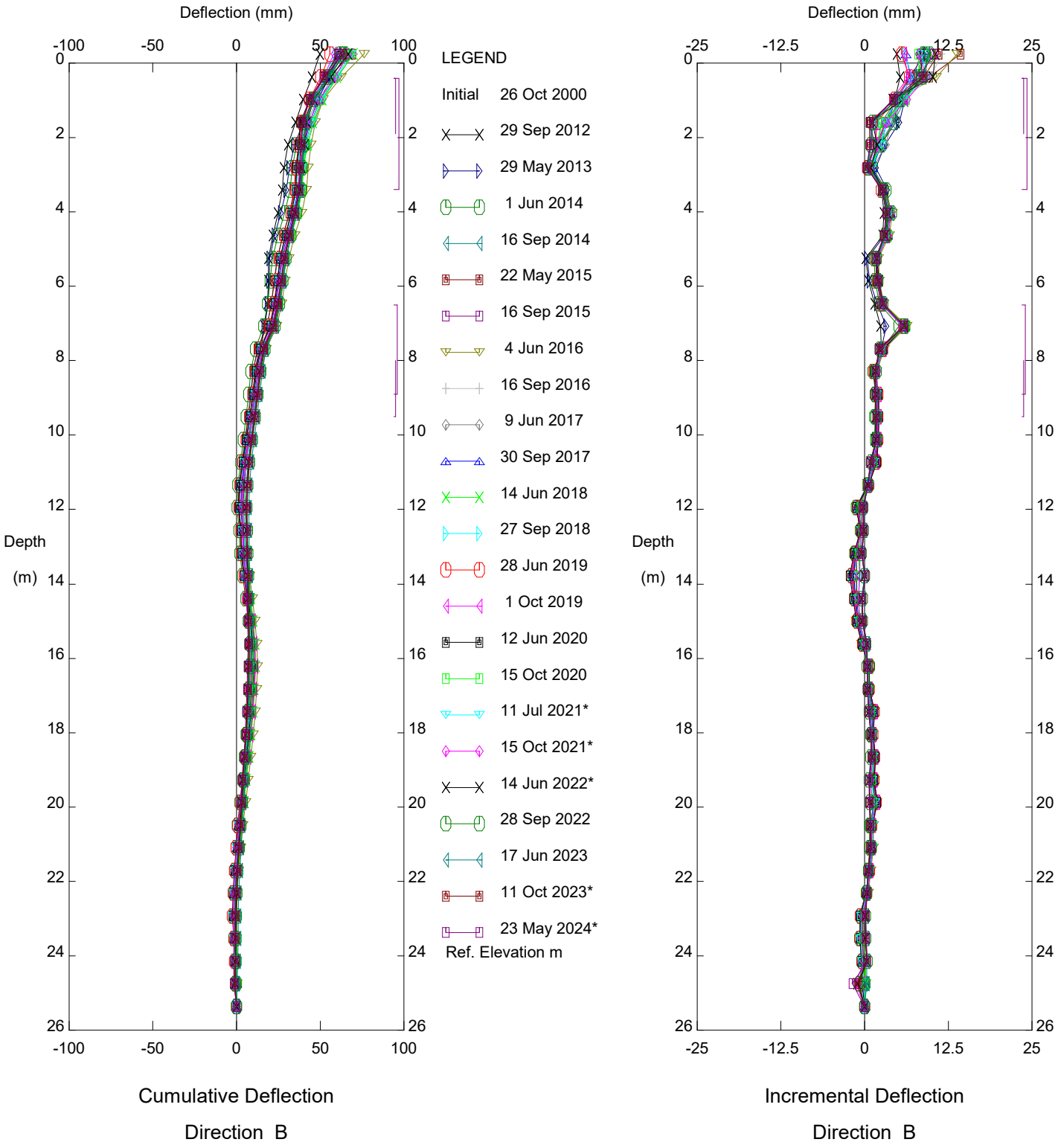

Cumulative Deflection

Direction B

Incremental Deflection

Direction B

PH090 Judah Hill Trunk Slide, Inclinometer SI98-6i

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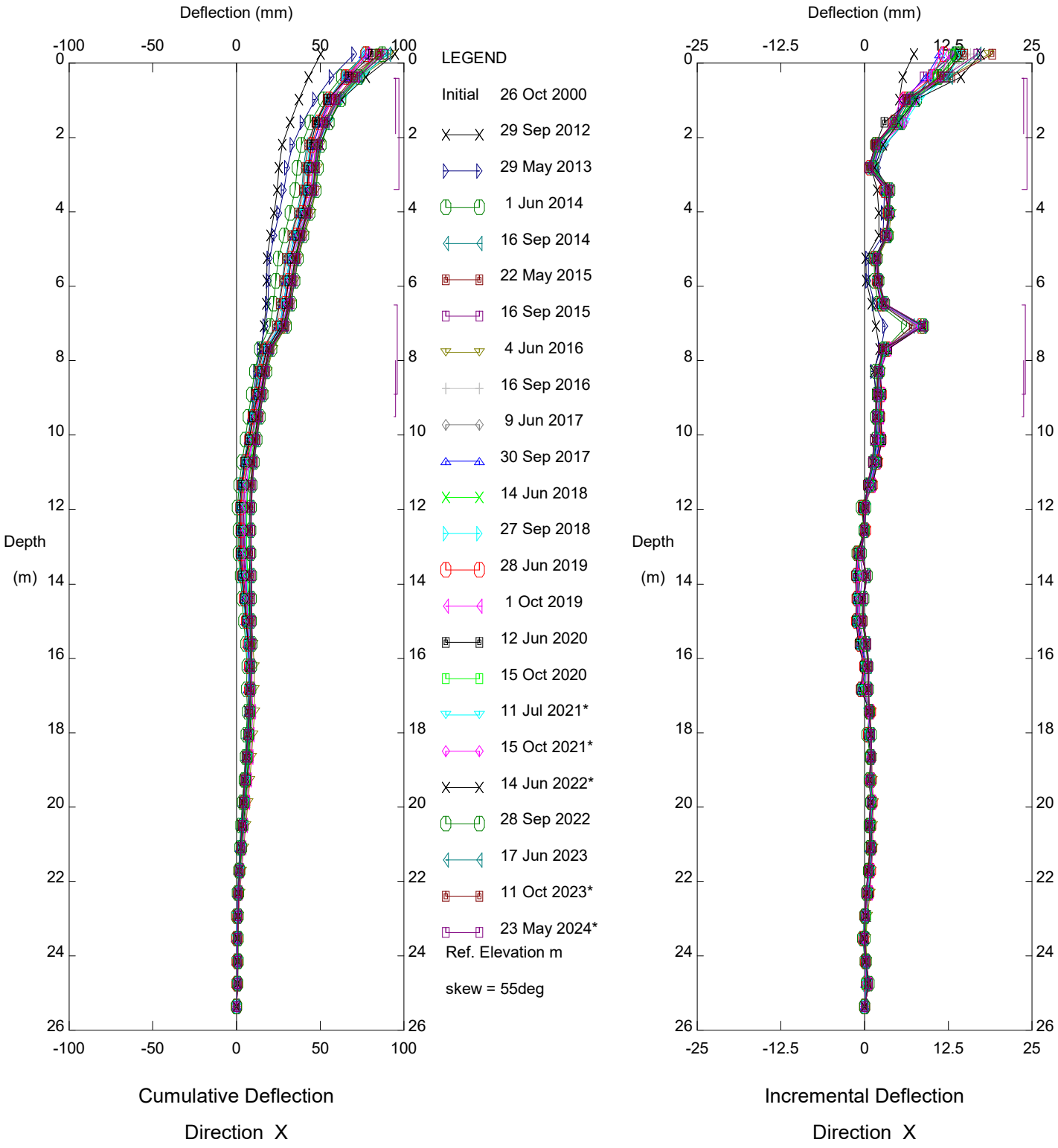

Cumulative Deflection

Direction X

Incremental Deflection

Direction X

PH090 Judah Hill Trunk Slide, Inclinometer SI98-6i

Alberta Transportation

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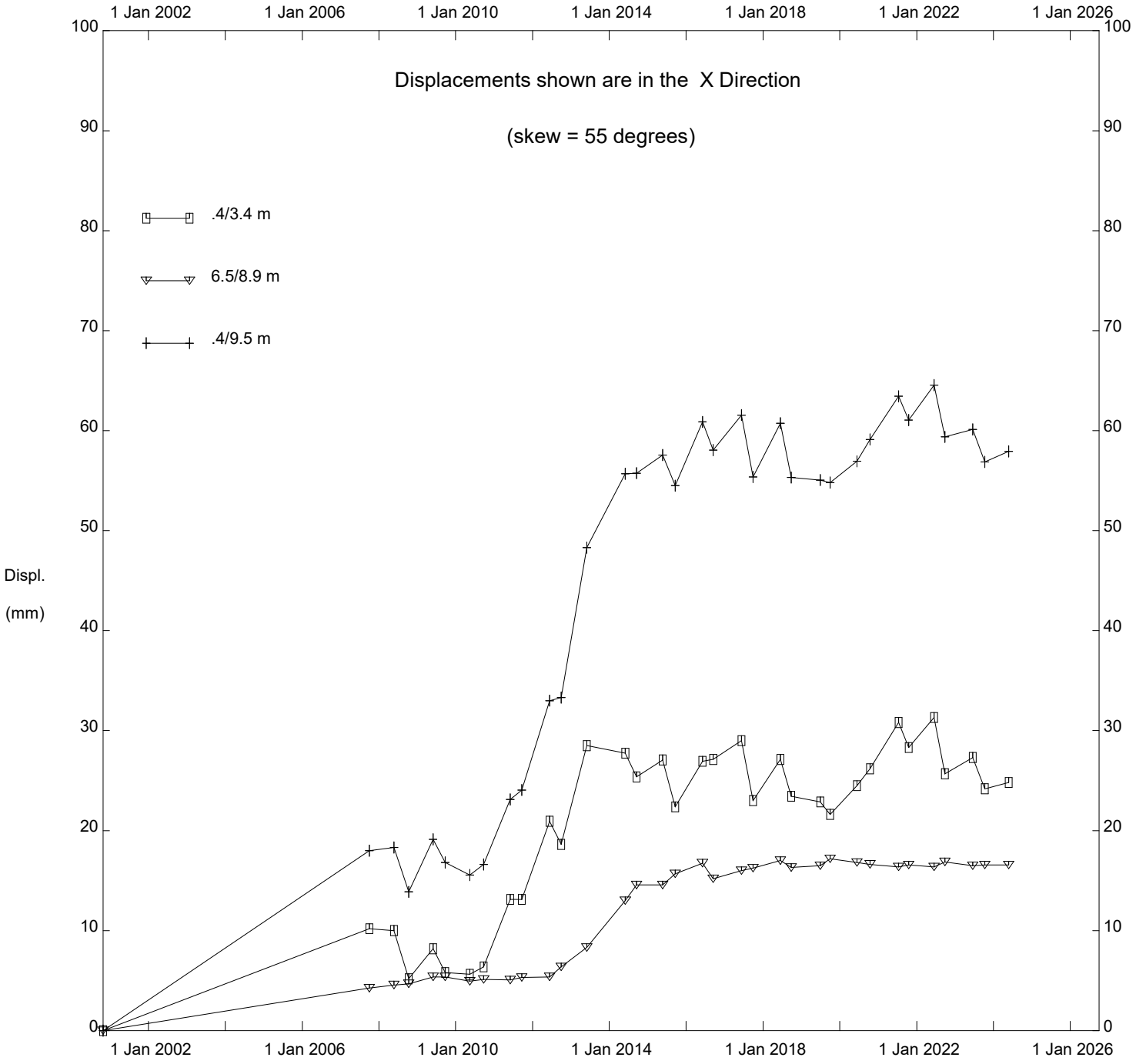

PH090 Judah Hill Trunk Slide, Inclinometer SI98-6i

Alberta Transportation

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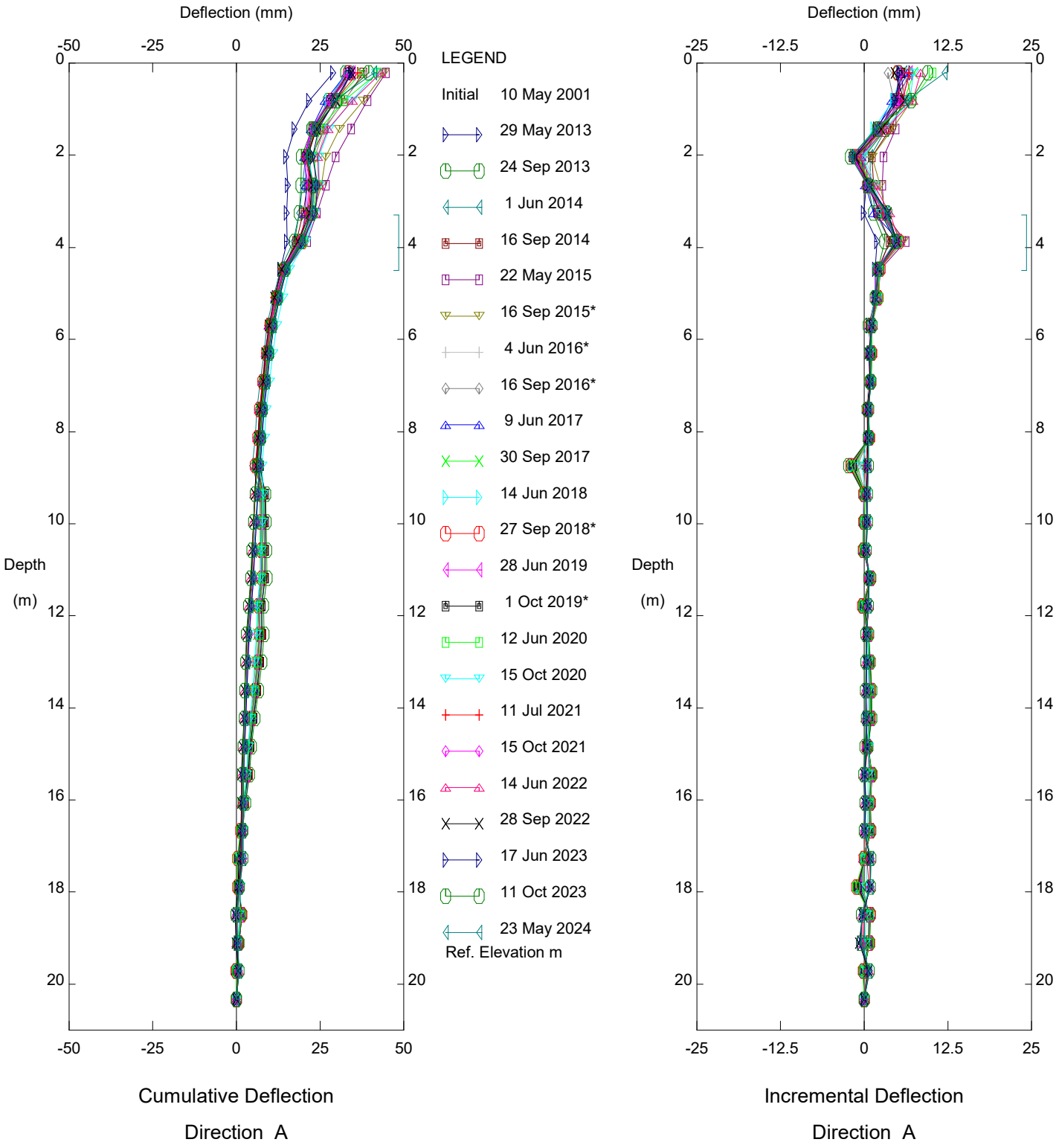

Cumulative Deflection

Direction A

Incremental Deflection

Direction A

PH090 Judah Hill Trunk Slide, Inclinometer SI98-7i

Alberta Transportation

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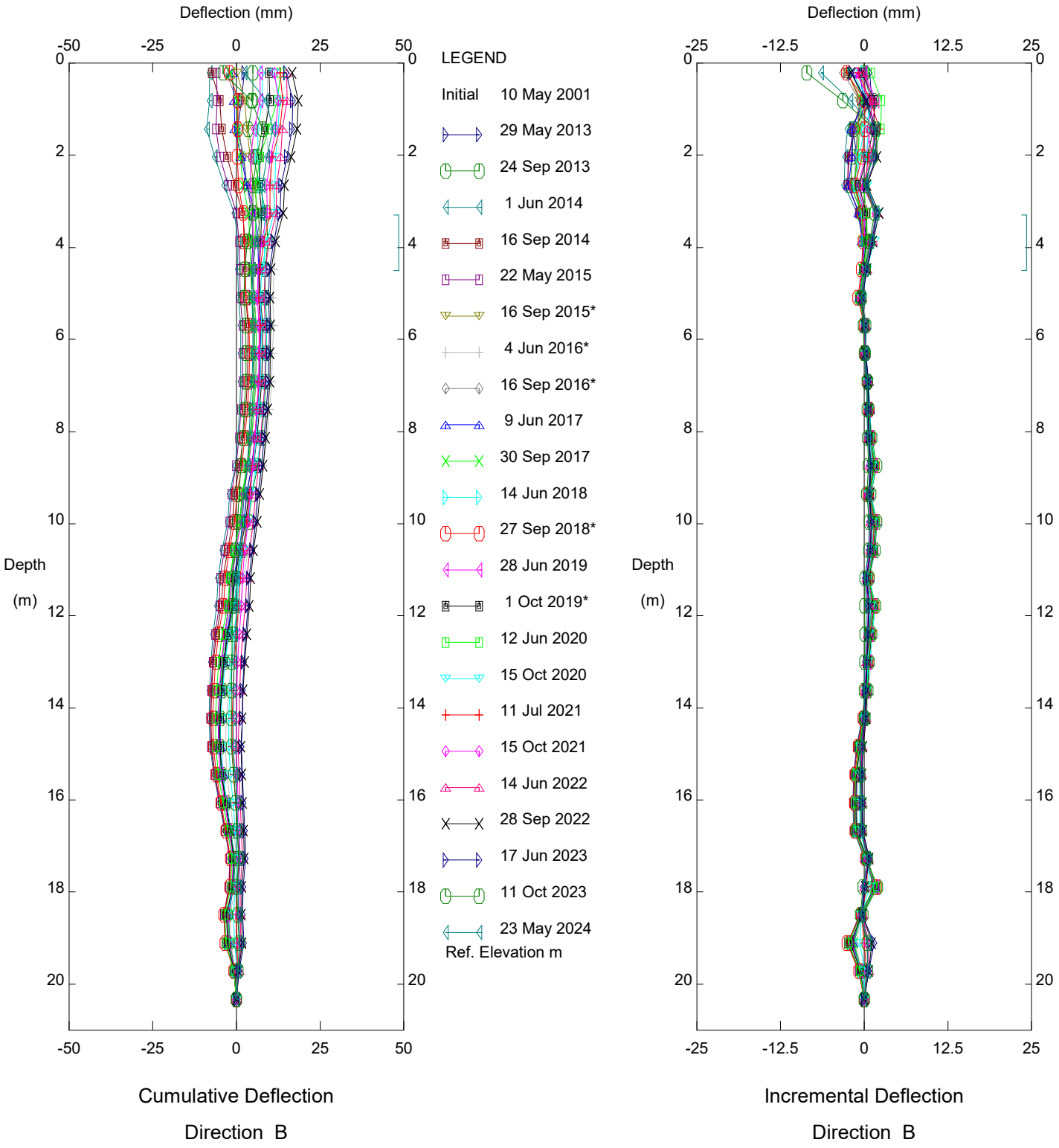

Cumulative Deflection

Direction B

Incremental Deflection

Direction B

PH090 Judah Hill Trunk Slide, Inclinometer SI98-7i

Alberta Transportation

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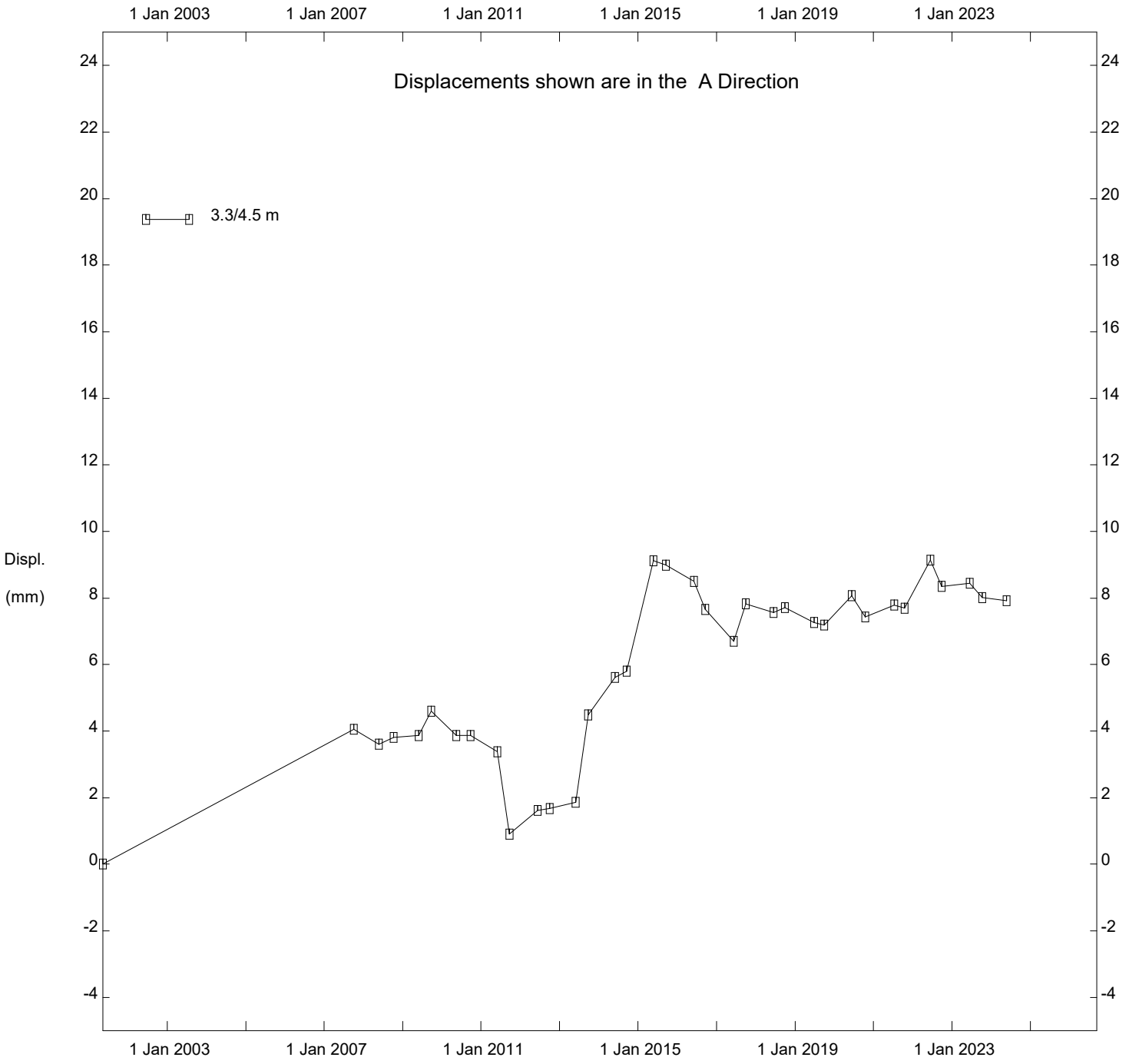

PH090 Judah Hill Trunk Slide, Inclinometer SI98-7i

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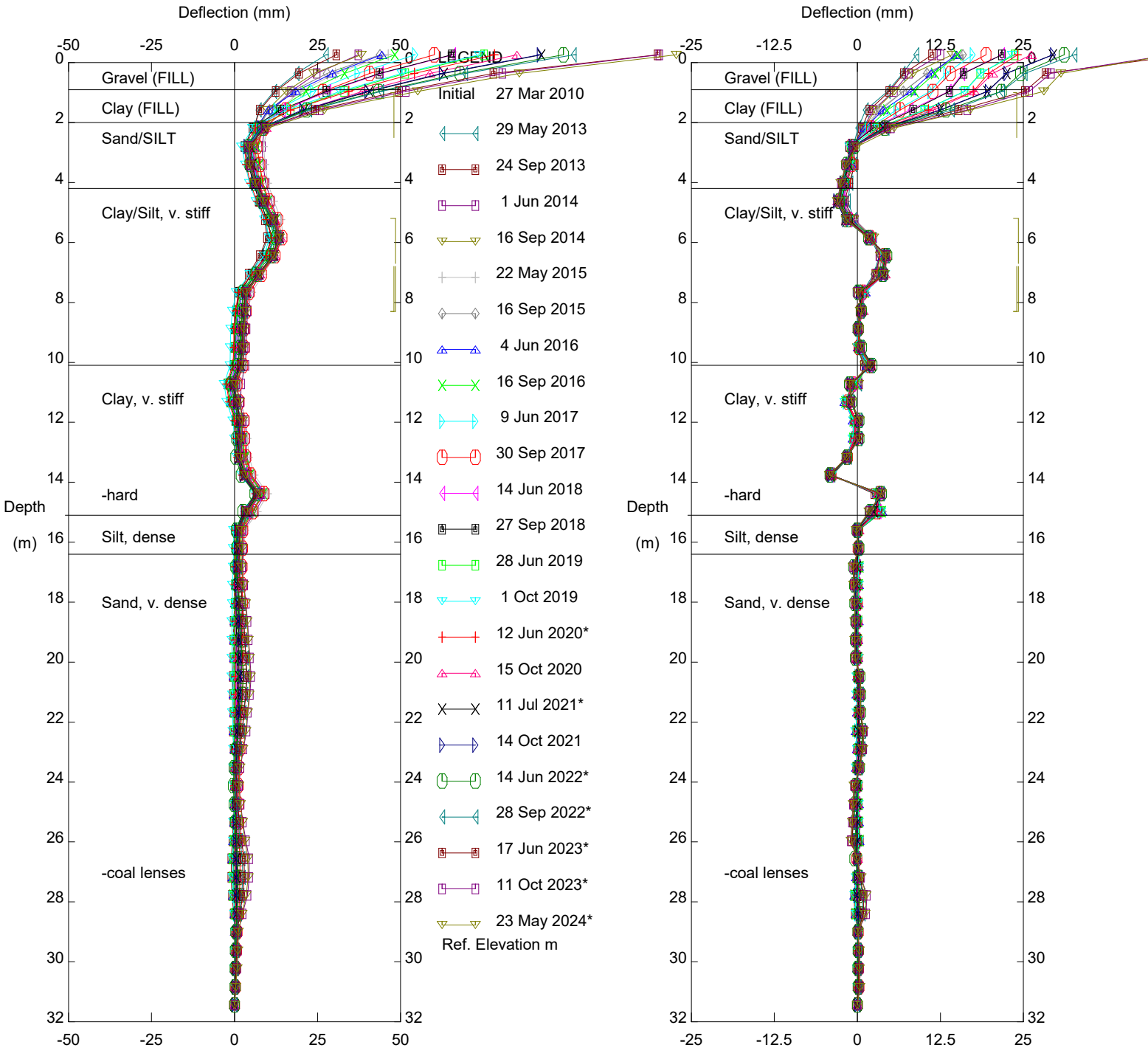

Cumulative Deflection

Direction A

Incremental Deflection

Direction A

PH090 Judah Hill Trunk Slide, Inclinometer SI10-10

Alberta Transportation

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

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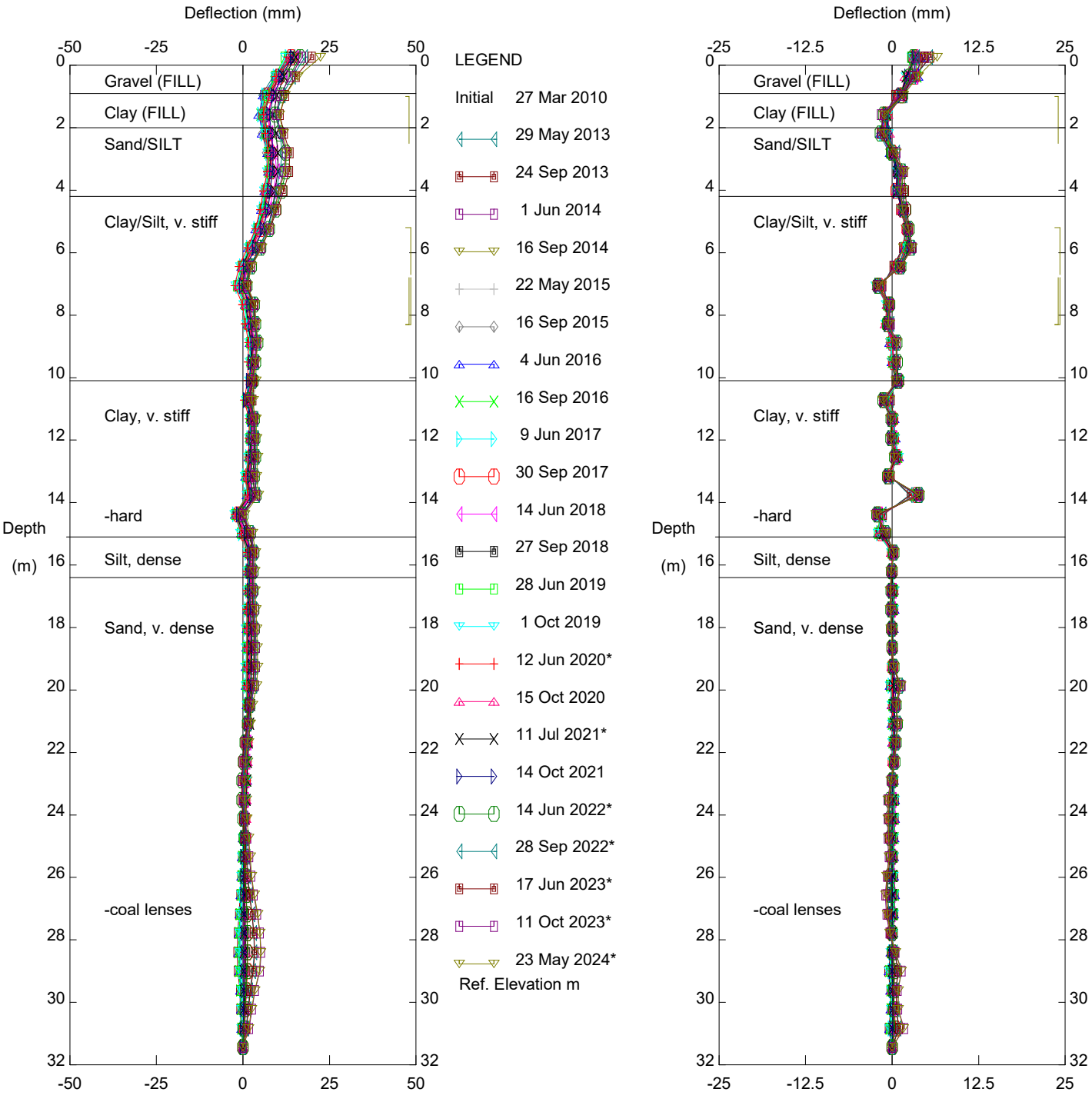

Cumulative Deflection

Direction B

Incremental Deflection

Direction B

PH090 Judah Hill Trunk Slide, Inclinometer SI10-10

Alberta Transportation

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

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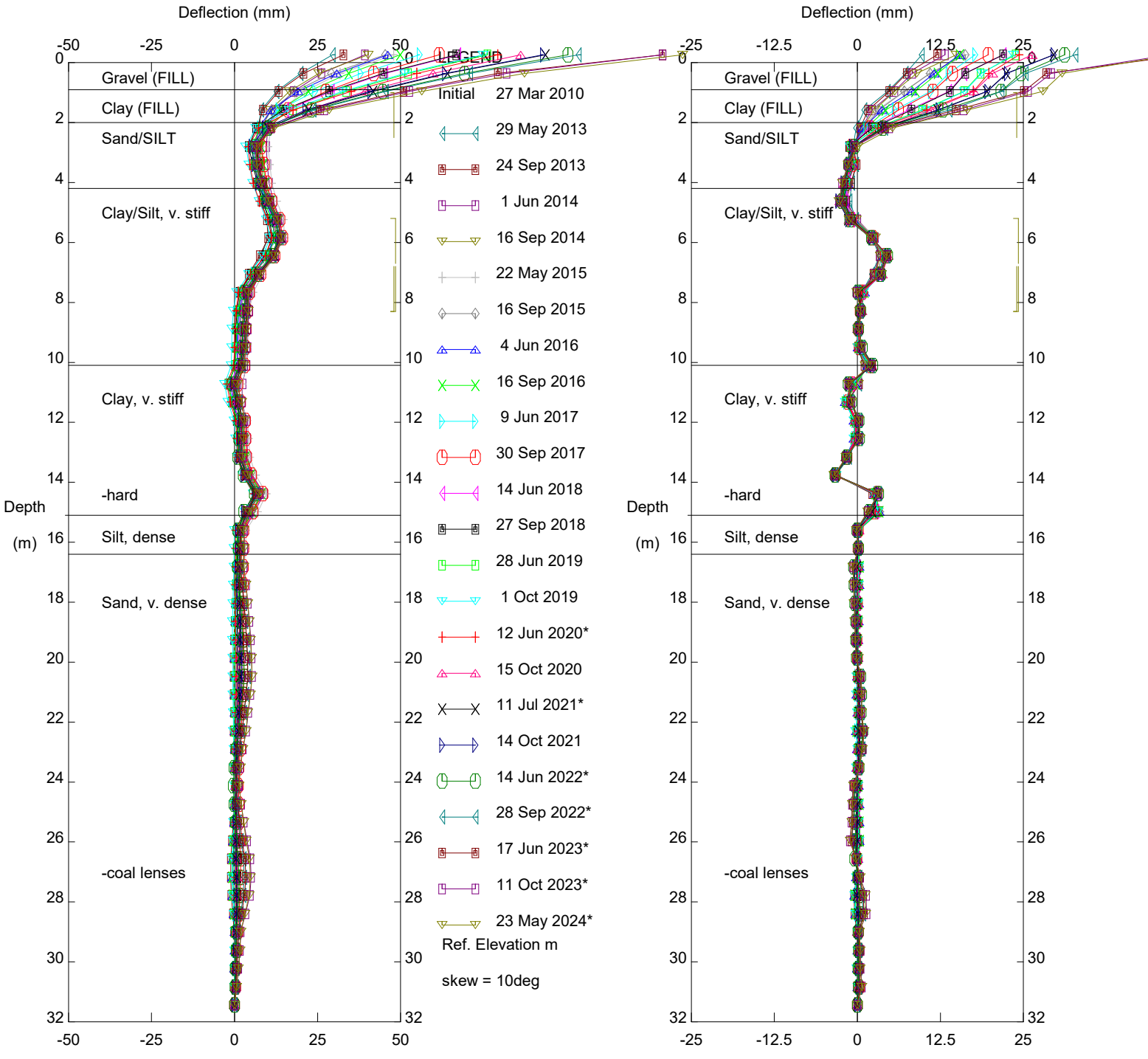

Cumulative Deflection

Direction X

Incremental Deflection

Direction X

PH090 Judah Hill Trunk Slide, Inclinometer SI10-10

Alberta Transportation

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

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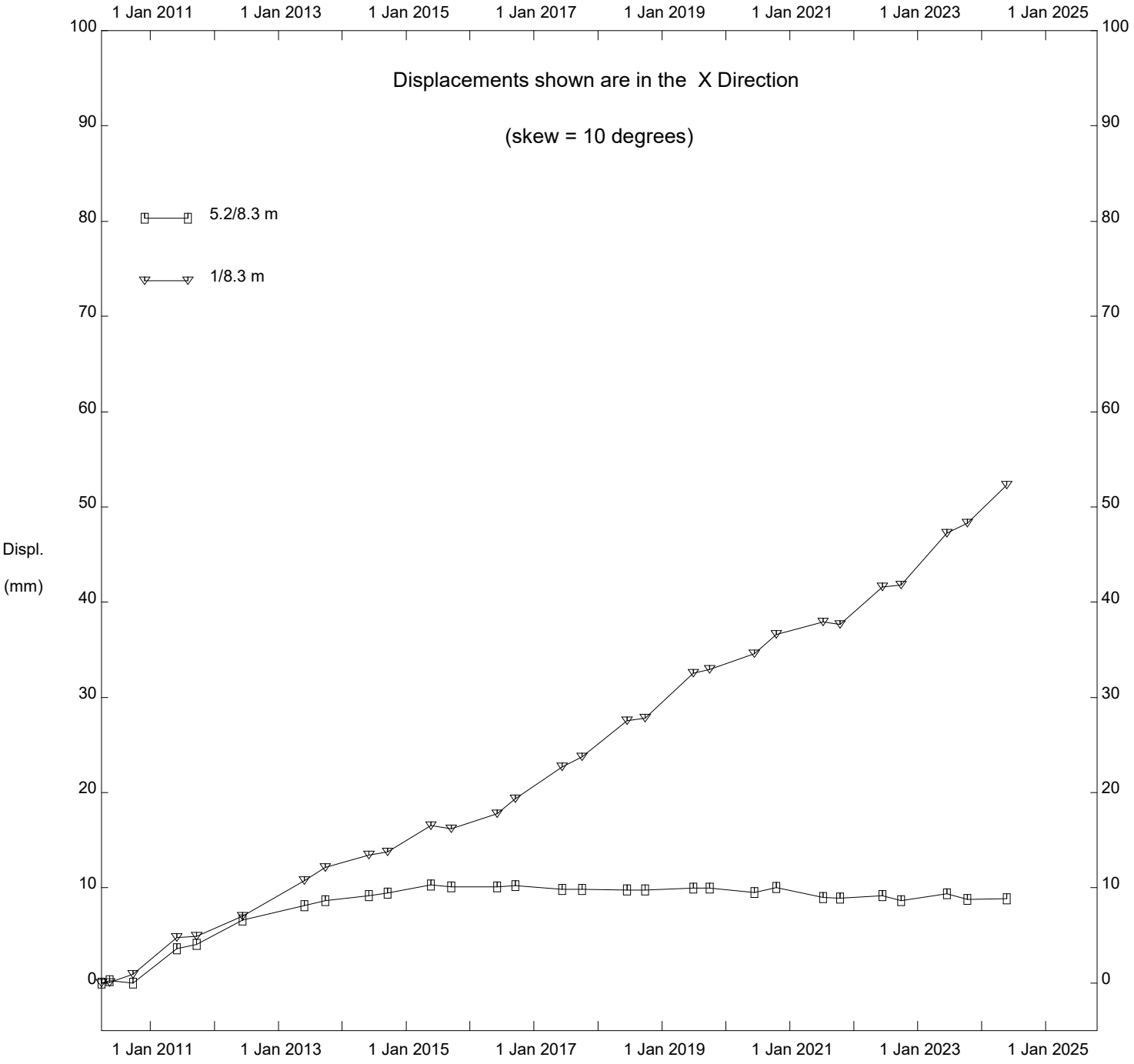

PH090 Judah Hill Trunk Slide, Inclinometer SI10-10

Alberta Transportation

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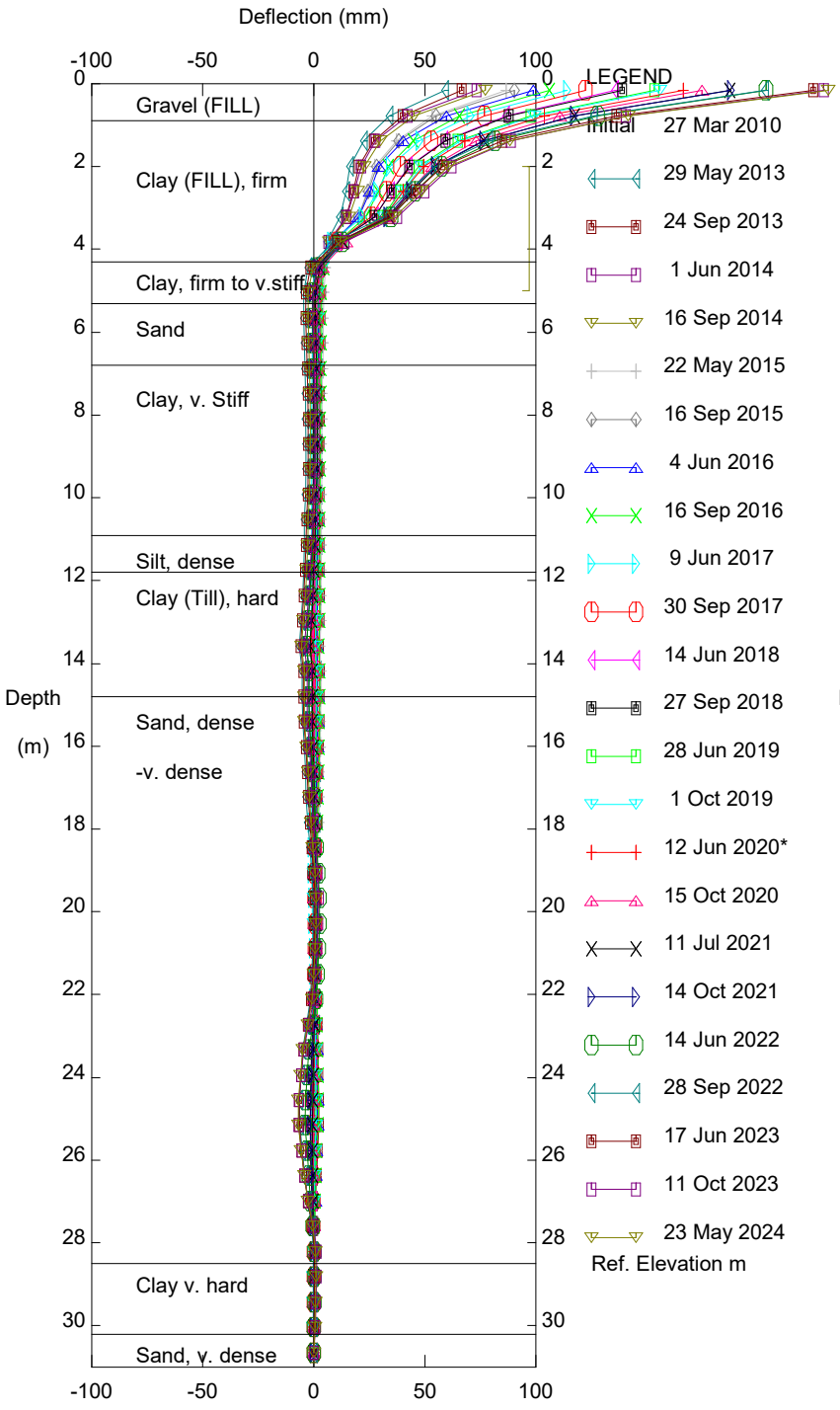
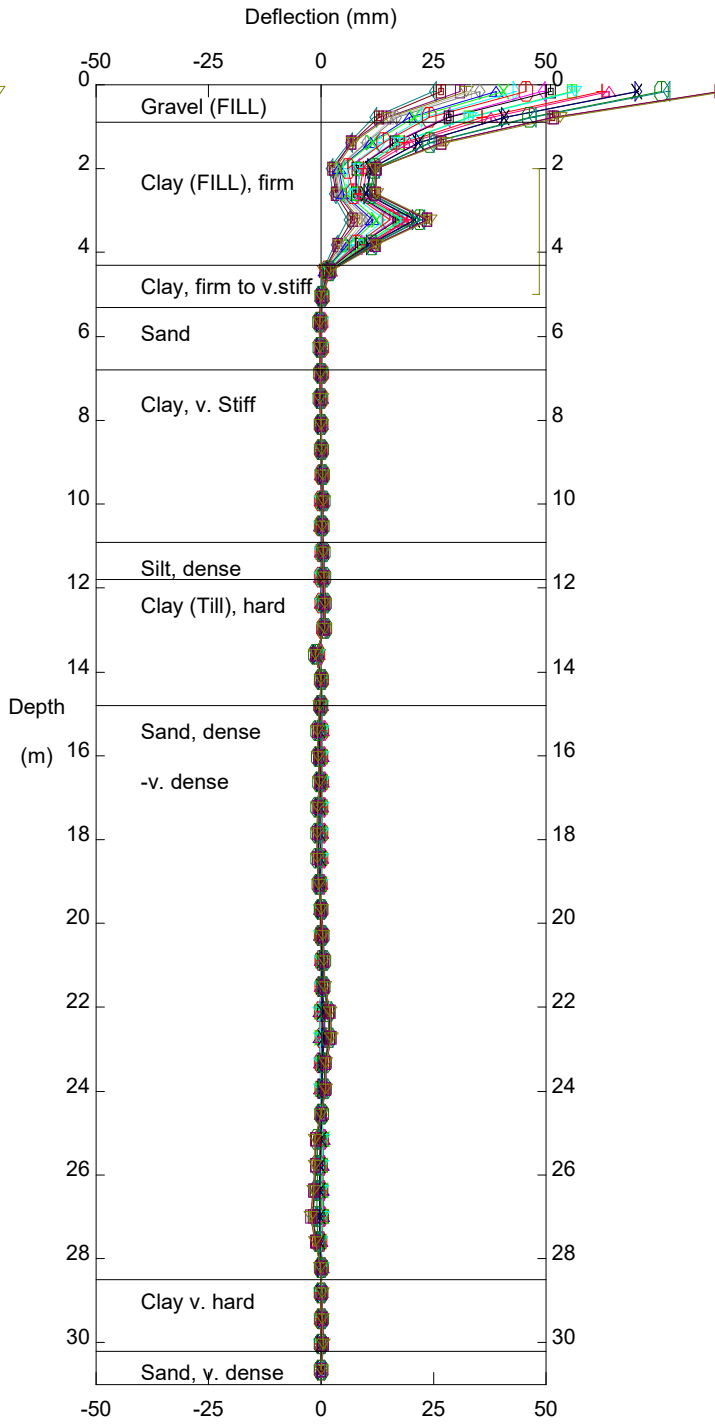


Cumulative Deflection

Direction A



Incremental Deflection

Direction A

PH090 Judah Hill Trunk Slide, Inclinometer SI10-11

Alberta Transportation

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

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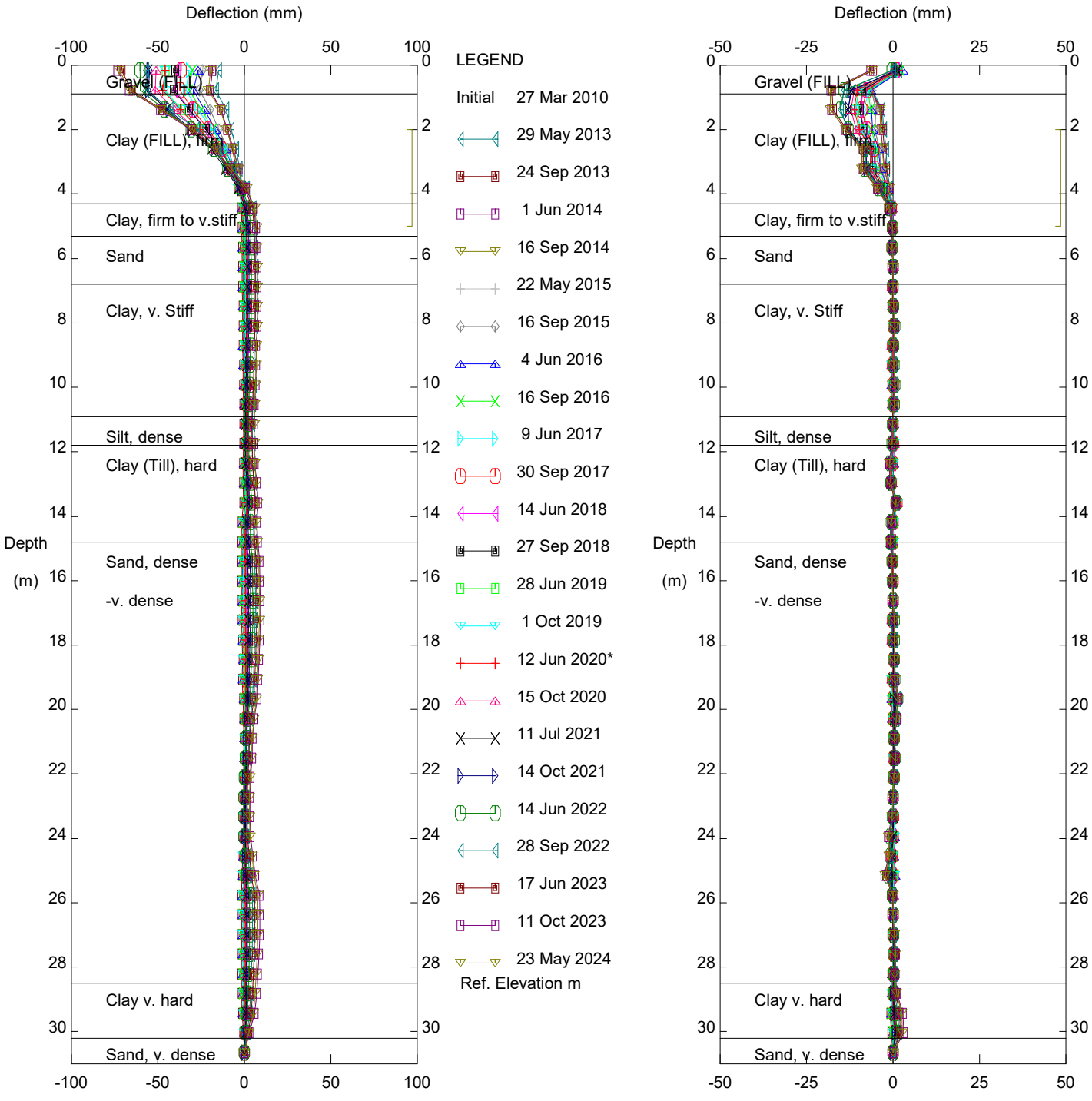

Cumulative Deflection

Direction B

Incremental Deflection

Direction B

PH090 Judah Hill Trunk Slide, Inclinometer SI10-11

Alberta Transportation

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

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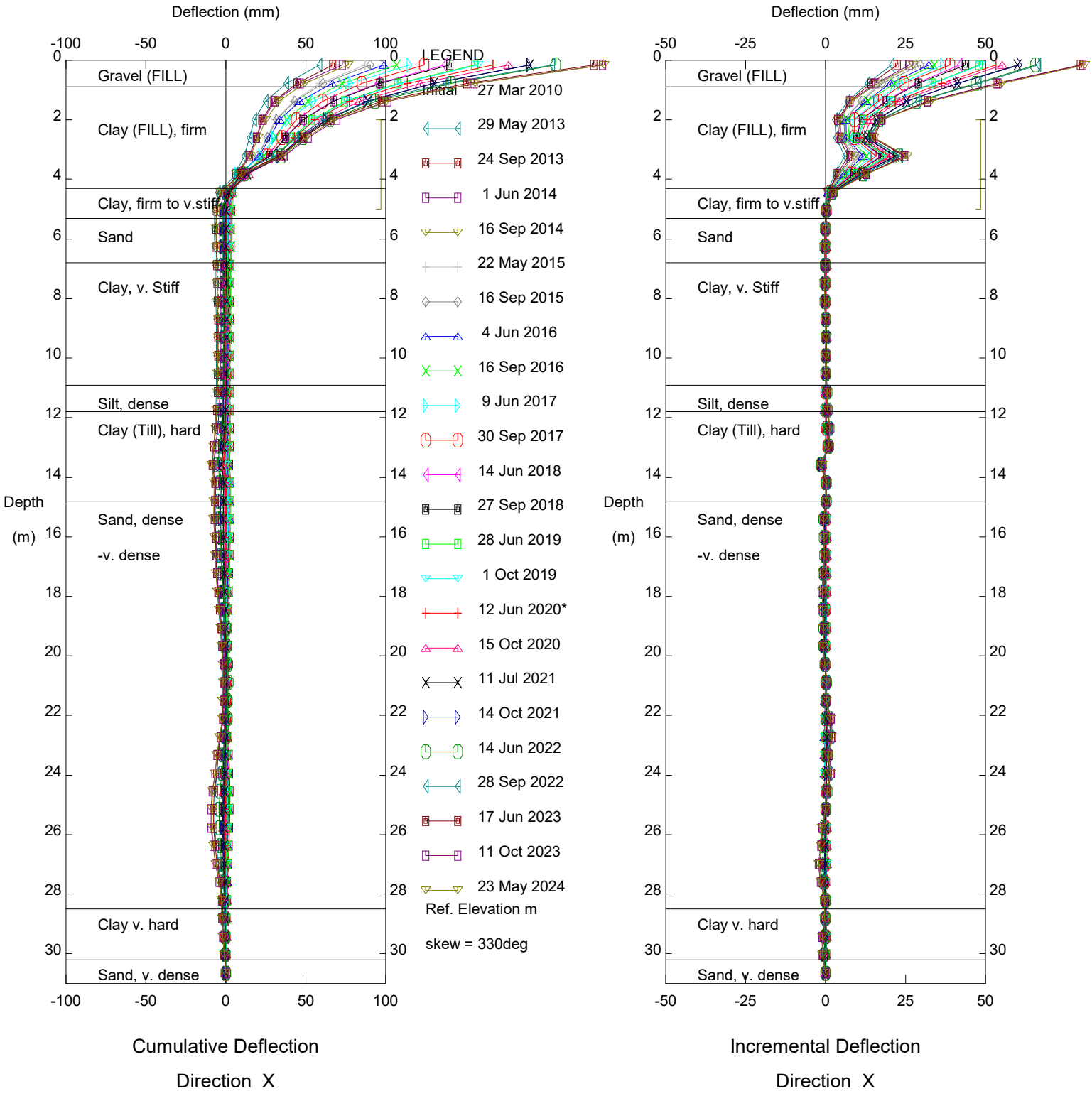
Thurber Engineering Ltd.



Cumulative Deflection

Direction X

Incremental Deflection

Direction X

PH090 Judah Hill Trunk Slide, Inclinometer SI10-11

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

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Thurber Engineering Ltd.

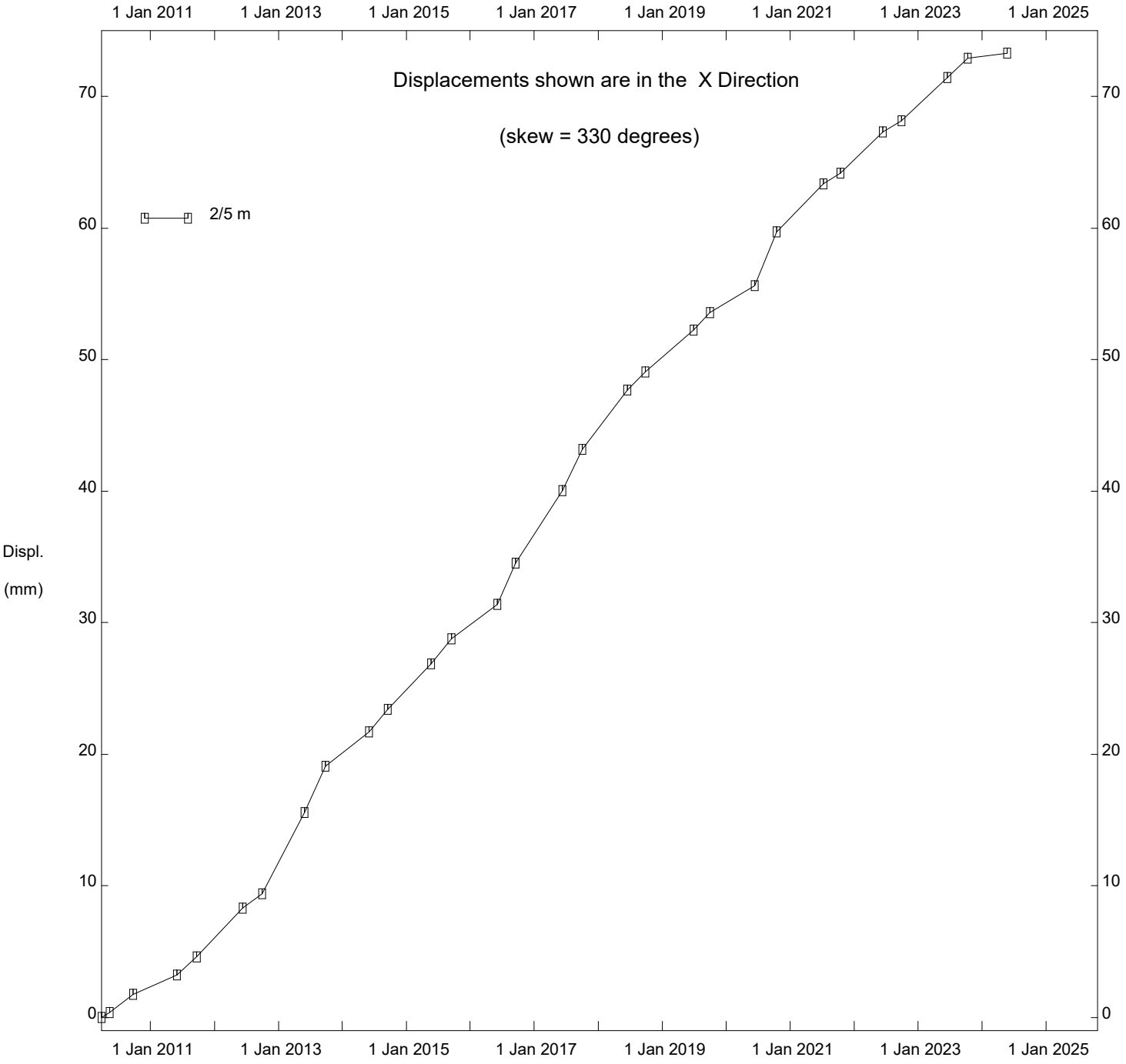

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FIGURE PH090-1
PIEZOMETER DATA FOR HWY 744:04: JUDAH HILL TRUNK SLIDE