

**ALBERTA TRANSPORTATION AND
ECONOMIC CORRIDORS GRMP
GRANDE PRAIRIE REGION –
(GRANDE PRAIRIE NORTH)
INSTRUMENTATION MONITORING - SPRING 2024**



Site Number	Location	Name	Hwy	km
GP012B	HWY 49:04 C1 2.398	Ksituan Pile Wall	49.04	Km 2.4
Legal Description: 12-10-79-8 W6		UTM Co-ordinates		
		11U E 364166.28	N	6189642.38

Current Monitoring:	29-May-2024	Previous Monitoring	24-Jun-2023
Instruments Read By:	Mr. Niraj Regmi, G.I.T and Mr. Nixon Mationg, of Thurber		

Instruments Read During This Site Visit			
Slope Inclinometers (SIs): SI-1, SI-3, SI-6, and SI-8	Pneumatic Piezometers (PN): PN-5B	Vibration Wire Piezometers (VW): N/A	Standpipe Piezometers (SP): N/A
Load Cell (LC): N/A	Strain Gauges: N/A	SAA's: 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 readout	Vibration Wire Piezometers:	Standpipe Piezometers:
Load Cell:	Strain Gauges:	SAA's:	Others:
Note:			

Discussion	
Zones of New Movement:	None
Interpretation of Monitoring Results:	<p>Slope inclinometer SI-1 showed no discernible movement over 9.2 to 12.2 m since the spring of 2023 readings.</p> <p>SI-3 showed a rate of movement of 0.3 mm/yr over 11.2 m to 14.3 m since the spring of 2023 readings.</p> <p>SI-6 showed no discernible movement over 1.1 m to 2.3 m depth since the spring of 2023 readings.</p> <p>SI-8 showed a rate of movement of 1.1 mm/yr over 0.9 m to 19.2 m depth since the spring of 2023 readings. This rate of movement has been more or less consistent since 2008. SI-8 has shown a total pile head movement of 59.8 mm to date.</p> <p>PN 5B showed a decrease in groundwater level of 0.22 m compared to the spring of 2023 readings.</p>
Future Work:	The instruments should be read again in the spring of 2025.
Instrumentation Repairs:	No instrument repairs are required at this time.
Additional Comments:	A review of the pile wall design could be undertaken to determine how the measured pile head deflection compares to the design.

<p>Attachments:</p>	<ul style="list-style-type: none"> ▪ Table GP012B-1 Spring 2024 – HWY 49:04 Ksituan Pile Wall, Slope Inclinator Reading Summary ▪ Table GP012B-2 Spring 2024 – HWY 49:04 Ksituan Pile Wall, Pneumatic Piezometer Reading Summary ▪ Statement of Limitations and General Conditions ▪ APPENDIX A – GP012B-1 SPRING 2024 <ul style="list-style-type: none"> □ Field Inspector’s report □ Site Plan Showing Approximate Instrument Locations (Drawing No. 32123-GP012B) □ SI Reading Plots □ Figure GP012B-1 (Piezometric Elevations) □ Figure GP012B-2 (Piezometric Depths)
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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 GP012B-1 Spring 2024 – Hwy 49:04, Ksituan Pile Wallslope Inclinator Instrumentation Reading Summary

Date Monitored: May 29, 2024

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)
SI-1	January 26, 2002	64.0 over 9.2 m to 12.2 m depth in 49° direction	*99.3 in February 2002	Operational	June 24, 2023	No discernible movement	N/A	-0.4
SI-2	January 26, 2002	298.7 over 1.1 m to 5.9 m depth in 52° direction	84.8 in October 2017	Damaged	October 22, 2020	N/A	N/A	N/A
		45.2 over 10.8 m to 15.7 m depth in 43° direction	45.6 in February 2002			N/A	N/A	N/A
SI-3	January 26, 2002	20.2 over 11.2 m to 14.3 m depth in 64° direction	*59.1 in November 2002	Operational	June 24, 2023	0.2	0.3	0.4
SI-4	January 26, 2002	18.0 over 3.8 m to 5.7 m depth in 41° direction	22.4 in February 2002	Damaged	October 7, 2019	N/A	N/A	N/A
SI-6	January 26, 2002	5.0 over 1.1 m to 2.3 m depth in 67° direction	*2.9 in May 2002	Operational	June 24, 2023	No discernible movement	N/A	-0.3
SI-8	November 29, 2002	59.8 over 0.9 to 19.2 m depth in 61° direction	*31.6 in March 2003	Operational	June 24, 2023	1.0	1.1	0.7

Drawing 32123-GP012B in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site

*Due to the significantly large amount of reading taken for this instrument, this date may have been removed from the SI plot to make the plot less busy.

Table GP012B-2 Spring 2024 – Hwy 49:04, Ksituan Pile Wall Pneumatic Piezometer Instrumentation Reading Summary

Date Monitored: May 29, 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 (m)	CHANGE IN WATER LEVEL SINCE PREVIOUS READING (m)
PN-4A	January 13, 1998	650.40	653.40	Destroyed	652.09 in January 1998	N/A	N/A	651.86 (June 22, 2020)	N/A
PN-4B	January 13, 1998	646.40	653.40	Damaged	651.08 in June 2020	N/A	N/A	650.58 (Oct. 22, 2020)	N/A
PN-5A	January 13, 1998	650.20	653.20	Destroyed	651.90 in May 2012	N/A	N/A	651.82 (October 2016)	N/A
PN-5B	January 13, 1998	646.20	653.20	Operational	652.10 in May 1998	34.7	649.74	649.96	-0.22

Drawing 32123-GP012B 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.

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.

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THURBER ENGINEERING LTD.

**ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS GRMP (CON0022165)
PEACE REGION (GRANDE PRAIRIE DISTRICT – NORTH)
INSTRUMENTATION MONITORING RESULTS**

SPRING 2024

**APPENDIX A
DATA PRESENTATION**

SITE GP012B: HWY 49:04, KSITUAN PILE WALL

**ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS
PEACE REGION (GRANDE PRAIRIE - NORTH DISTRICT)
INSTRUMENTATION MONITORING FIELD SUMMARY (GP012B)
SPRING 2024**

Location: Ksituan Pile Wall (HWY 49:04 C1 2.398) File Number: 32123 Probe: RST SI SET 5R and 8R Cable: RST SI SET 5R and 8R	Readout: RST PN C108 Unit 4 Extension: 2.75" except SI#8 - 3.34" Temp: 10 Read by: NKR/NRM
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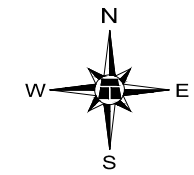
SLOPE INCLINOMETER (SI) READINGS

SI#	GPS Location (UTM 11)		Date	Stickup (m)	Depth from top of casing (ft)	Azimuth of A+ Groove degree	Current Bottom Depth Readings				Probe/ Reel #	Size (")	Remarks
	Easting (m)	Northing (m)					A+	A-	B+	B-			
SI-1	364166.28	6189642.38	29-May-24	0.86	90 to 4	58	828	-863	-513	501	8R/8R	2.75	
SI-3	364131.21	6189689.89	29-May-24	0.65	86 to 4	42	541	-531	26	-43	5R/5R	2.75	
SI-6	364197.31	6189687.82	29-May-24	0.45	48 to 4	10	-831	842	123	-122	8R/8R	2.75	
SI-8	364160.87	6189636.36	29-May-24	0.61	70 to 4	30	111	-160	697	-725	5R/5R	3.34	



PNEUMATIC PIEZOMETER (PN) READINGS

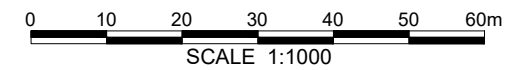
PN#	GPS Location (UTM 11)		Date	Reading (kPa)	Identification Number
	Easting (m)	Northing (m)			
PN-5B	364180.27	6189679.54	29-May-24	34.7	27765

INSPECTOR REPORT



LEGEND

-  APPROXIMATE INSTRUMENT LOCATION
- SI SLOPE INCLINOMETER
- PN PNEUMATIC PIEZOMETER
-  NON-OPERATIONAL



**PEACE REGION
(GRANDE PRAIRIE DISTRICT NORTH)**

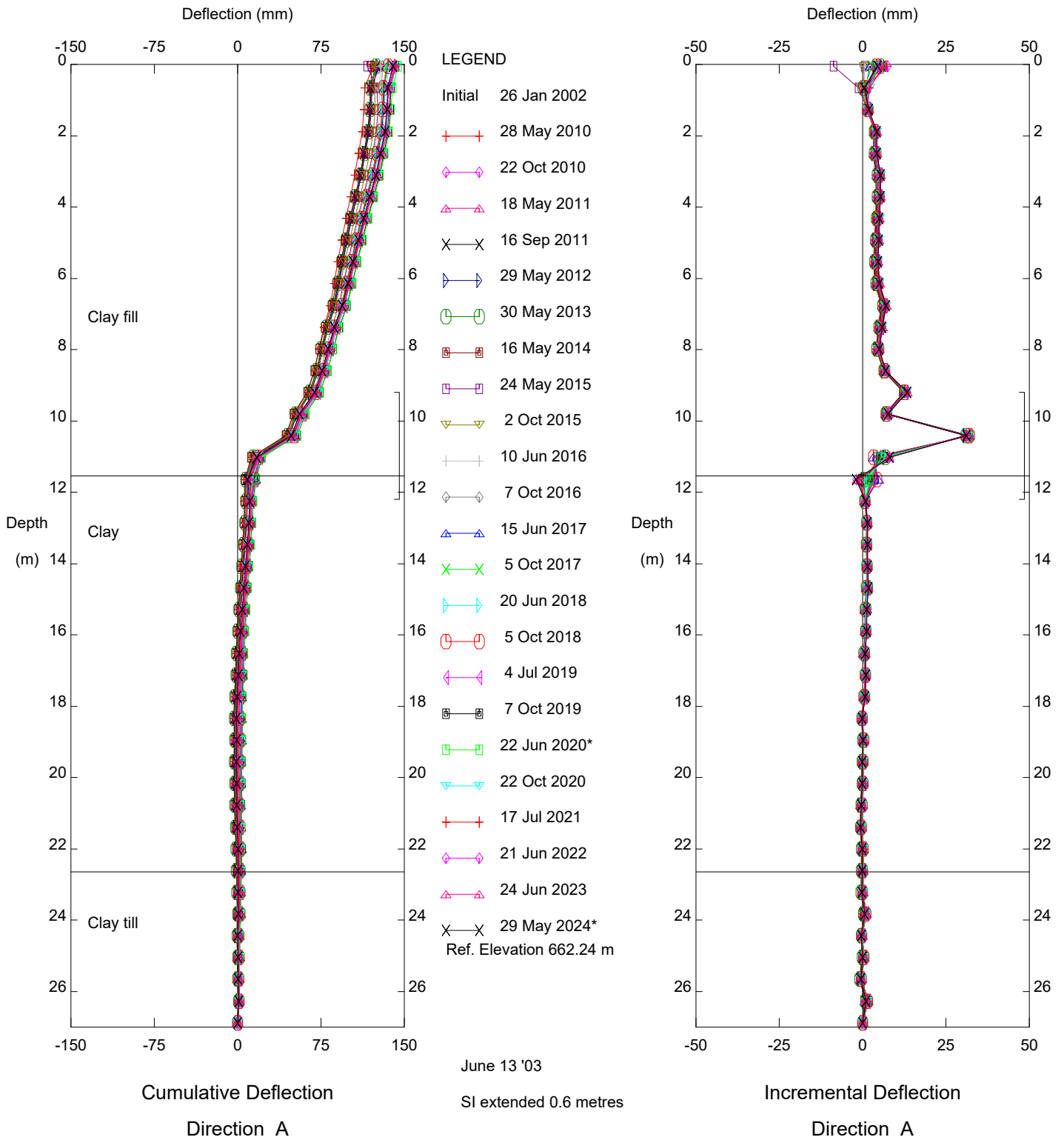
**GP012B: HWY 49:04 KSITUAN PILE WALL
INSTRUMENT LOCATIONS**

DWG No. 32123-GP012B

DRAWN BY	ML
DESIGNED BY	BWN
APPROVED BY	RVC
SCALE	1:1000
DATE	AUGUST 2021
FILE No.	32123



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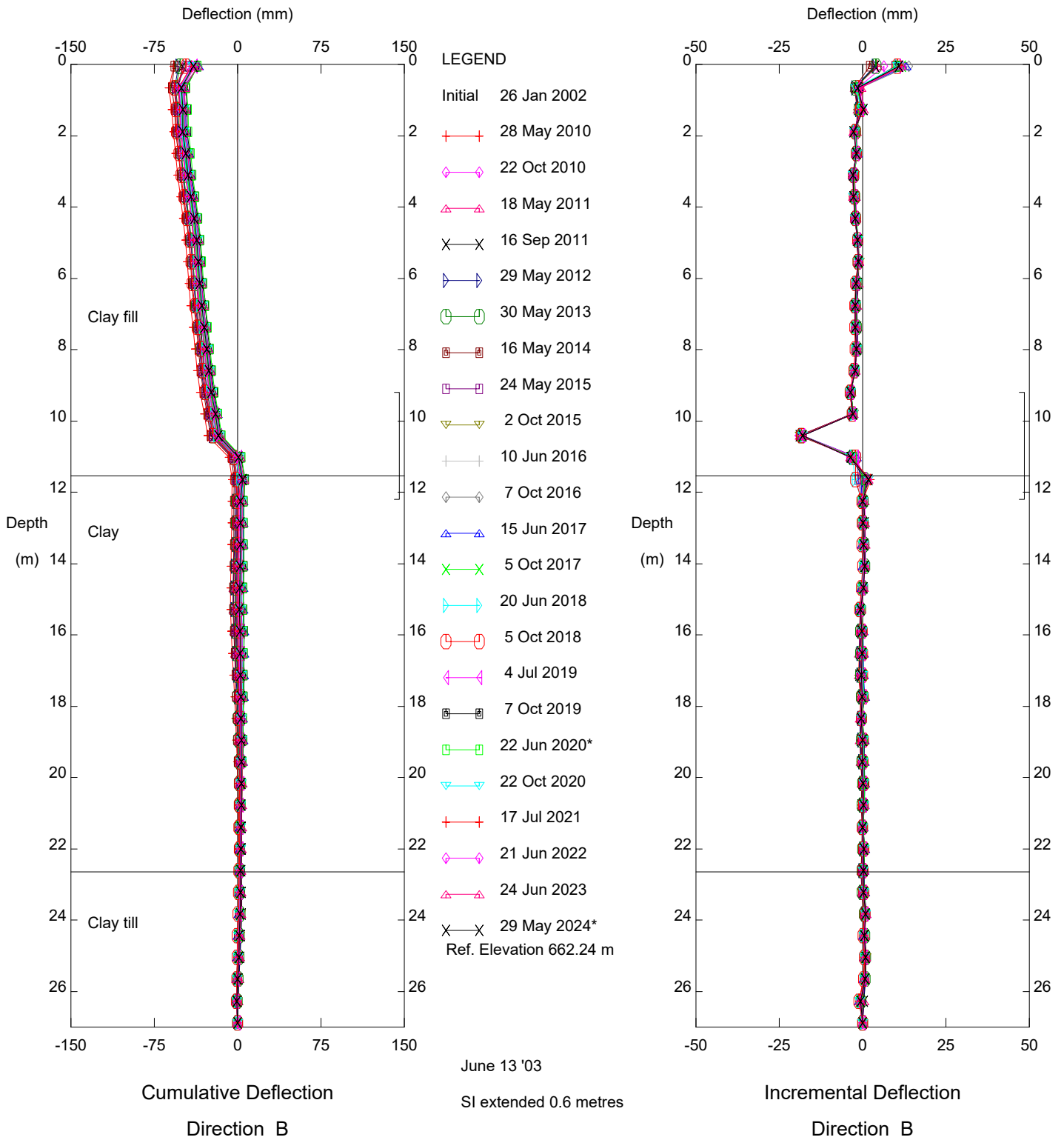


GP012B Ksituan River Crossing, Inclinometer SI-1

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

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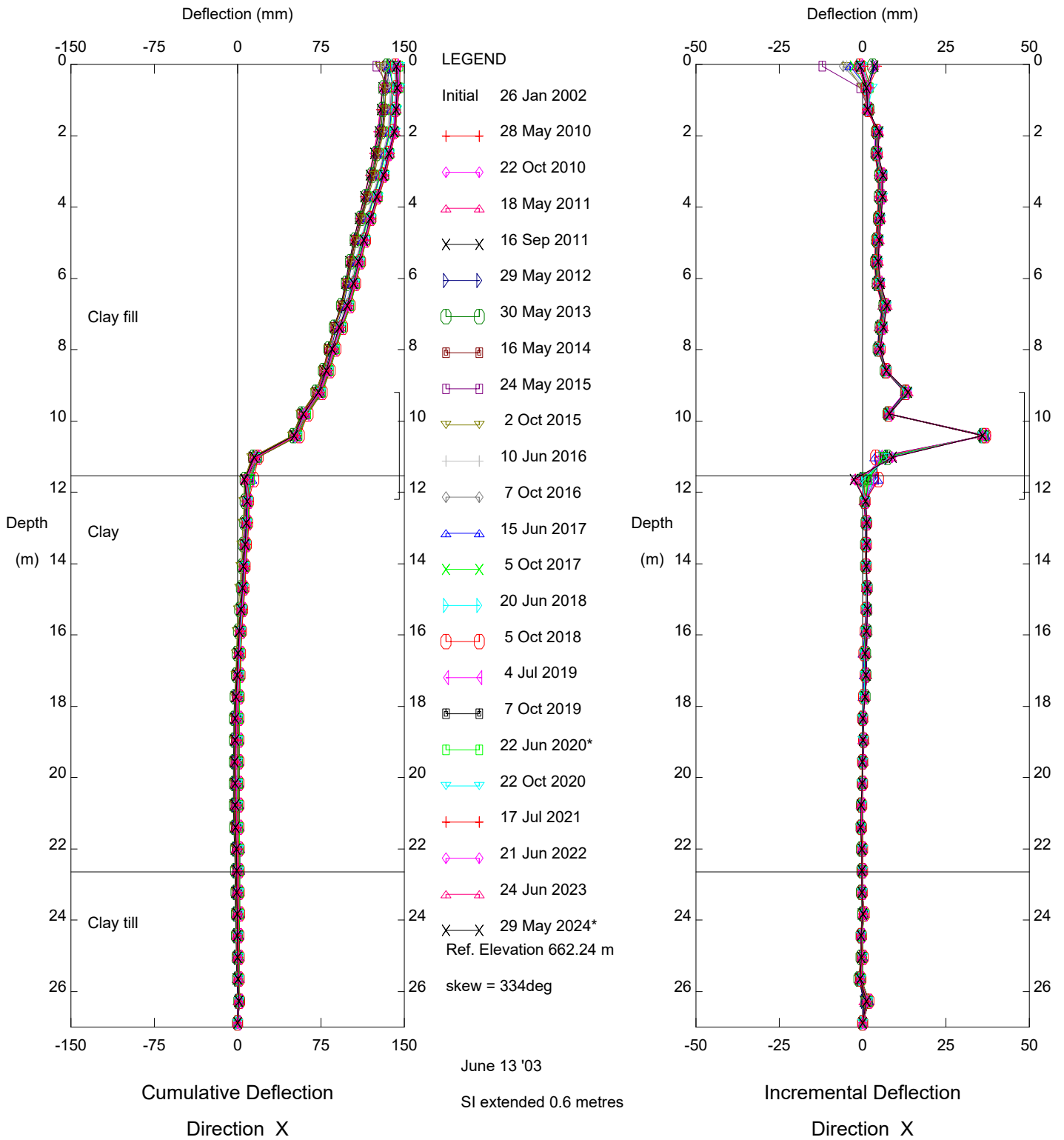


GP012B Ksituan River Crossing, Inclinometer SI-1

Alberta Transportation

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

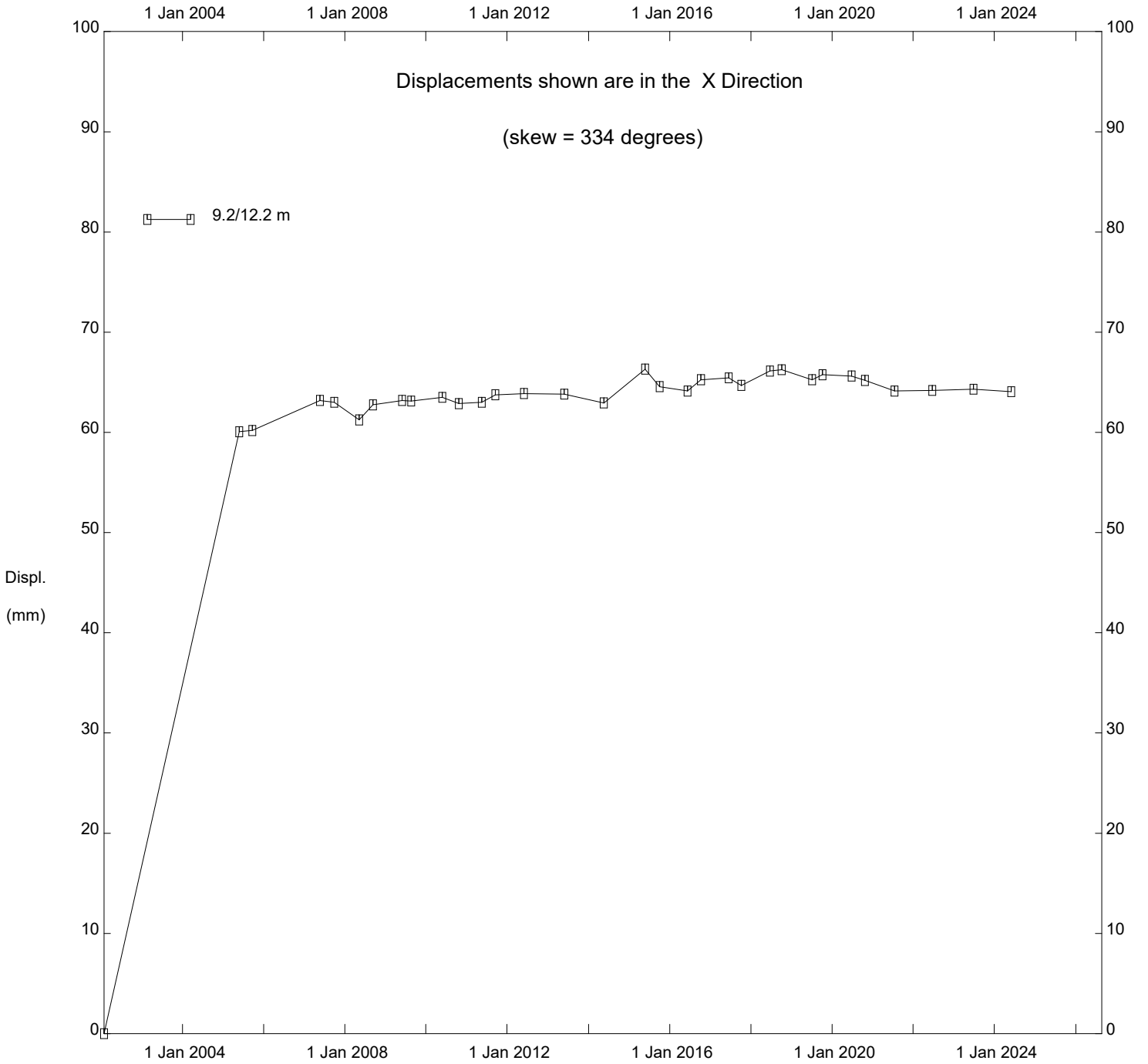
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GP012B Ksituan River Crossing, Inclinometer SI-1

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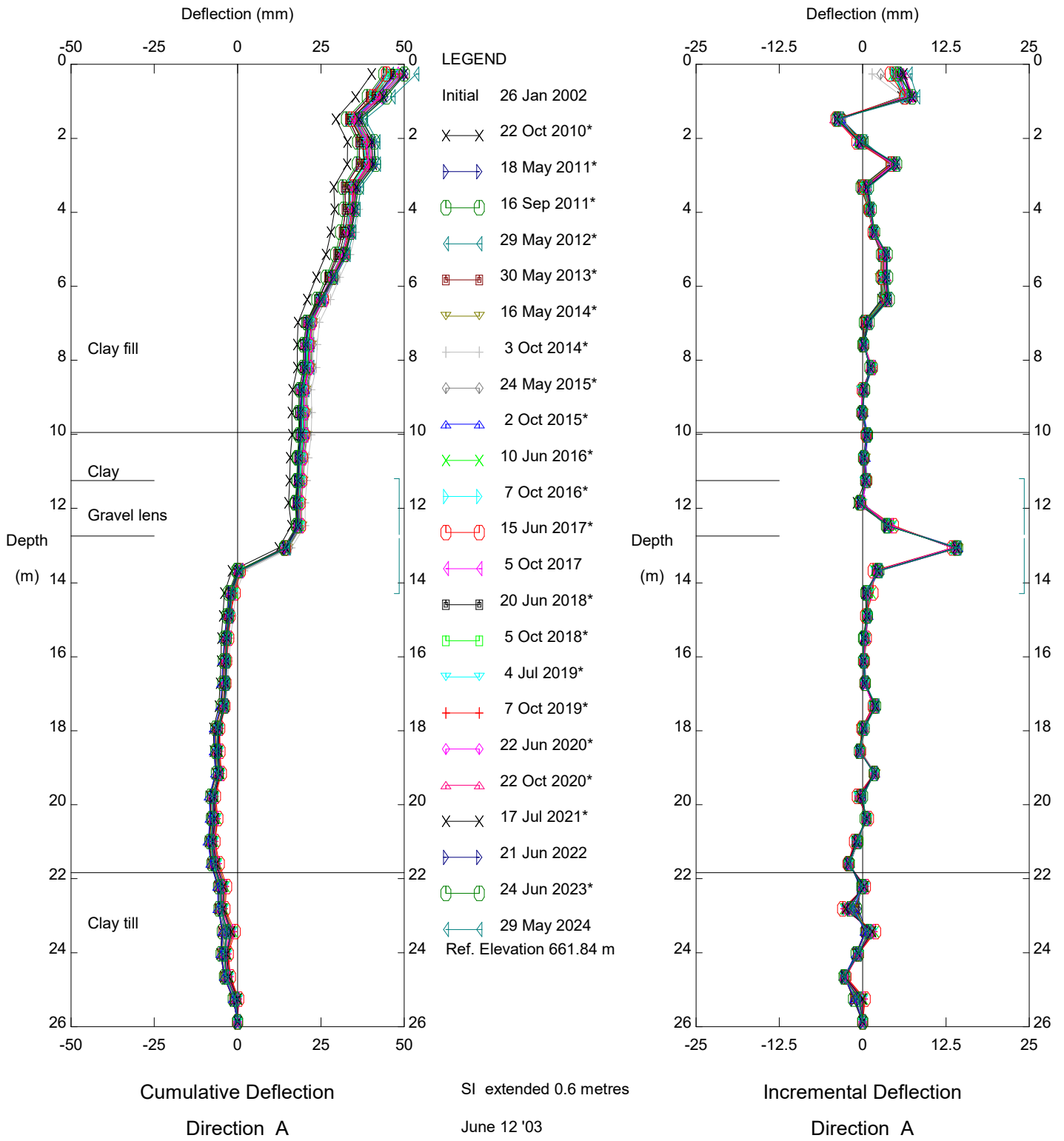
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GP012B Ksituan River Crossing, Inclinator SI-1

Alberta Transportation

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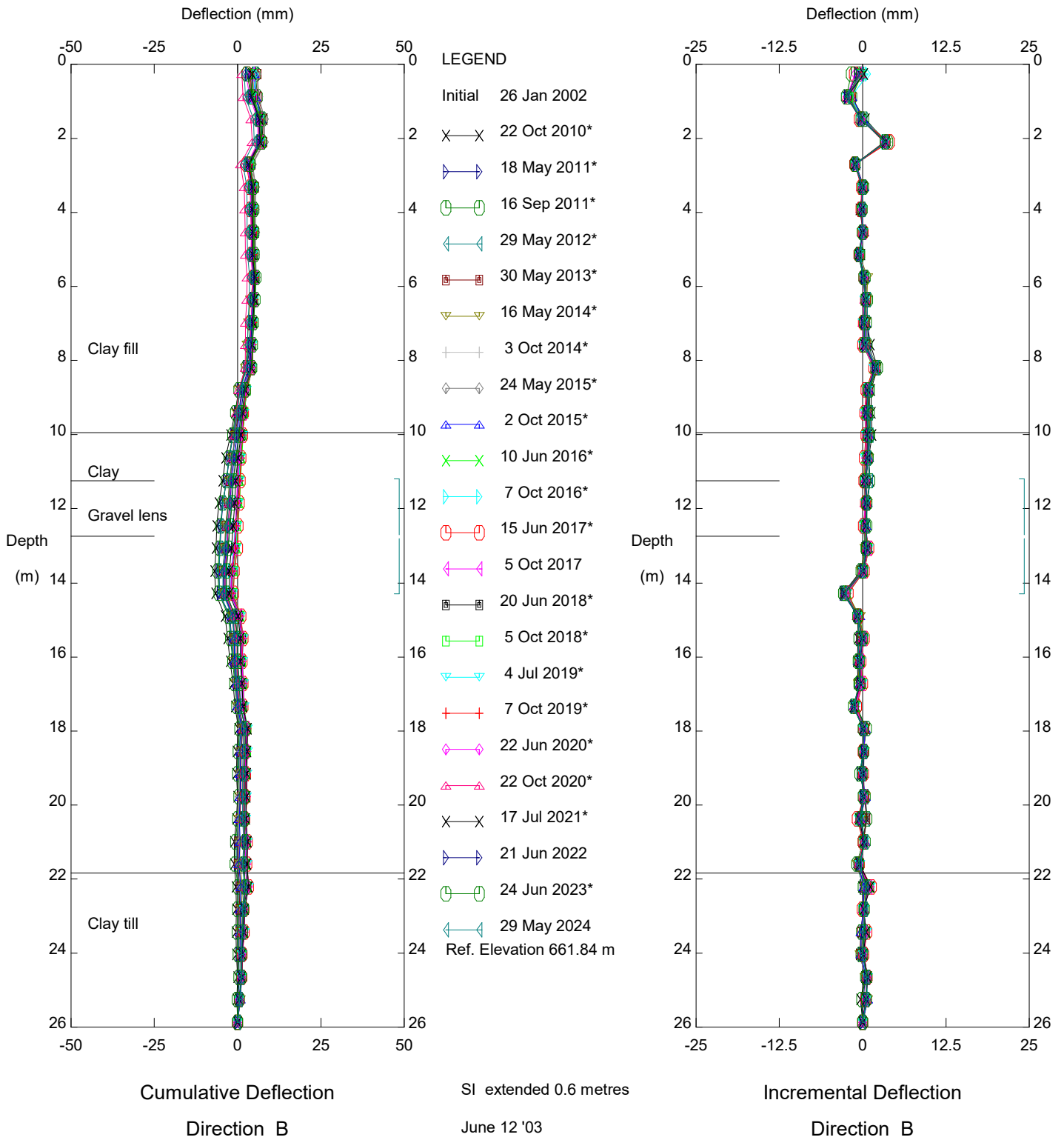


GP012B Ksituan River Crossing, Inclinometer SI-3

Alberta Transportation

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

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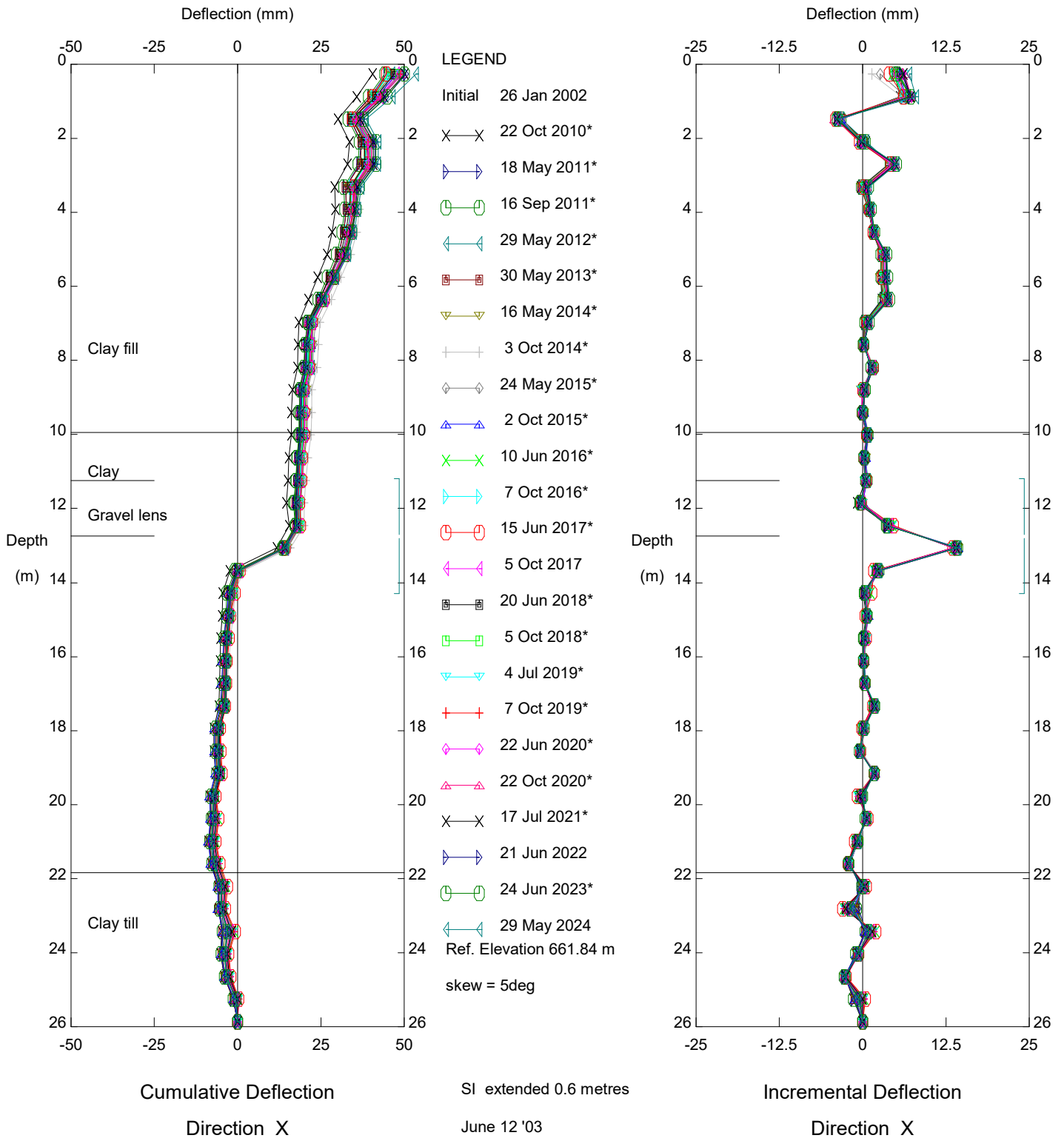


GP012B Ksituan River Crossing, Inclinometer SI-3

Alberta Transportation

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

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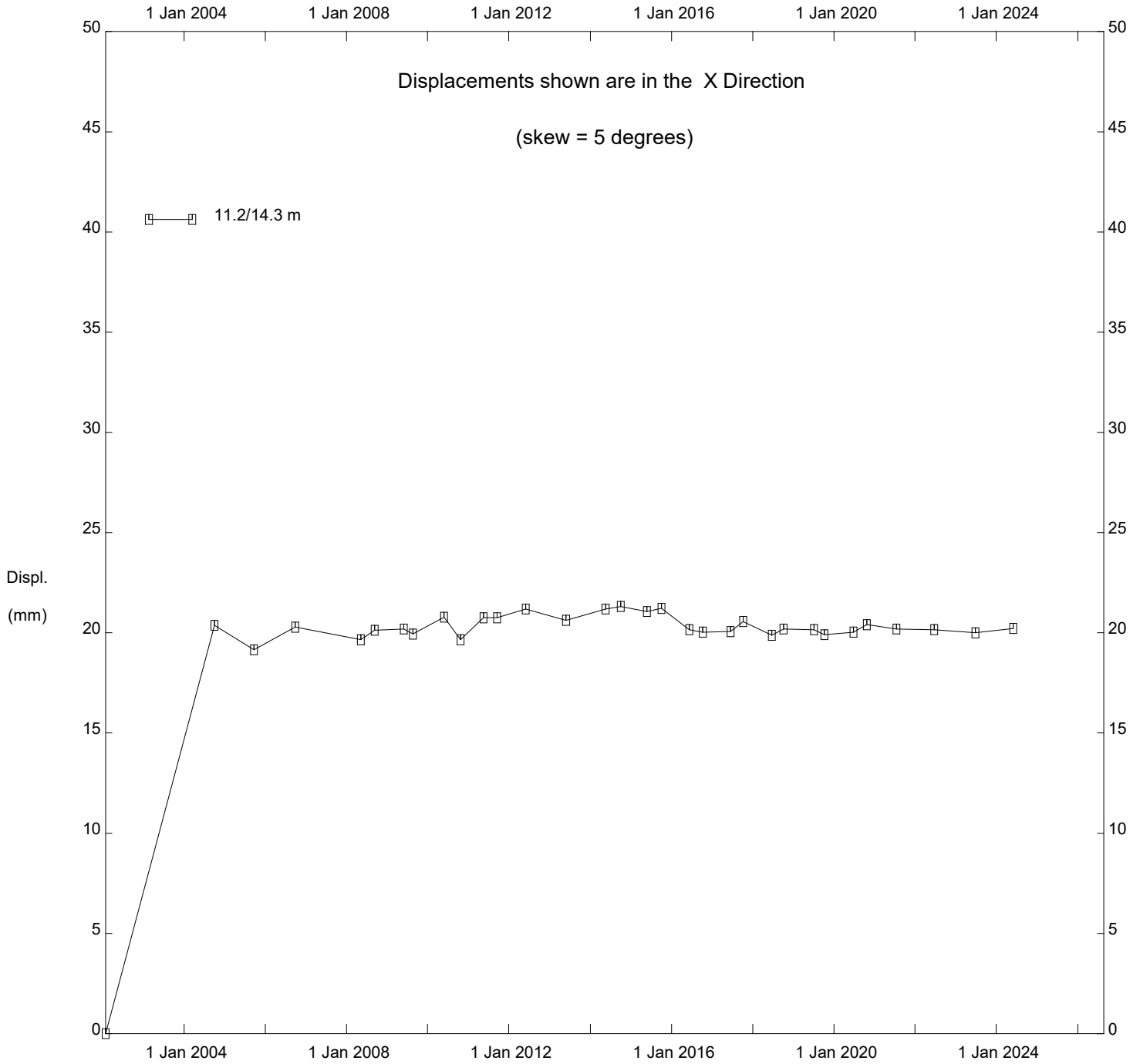


GP012B Ksituan River Crossing, Inclinometer SI-3

Alberta Transportation

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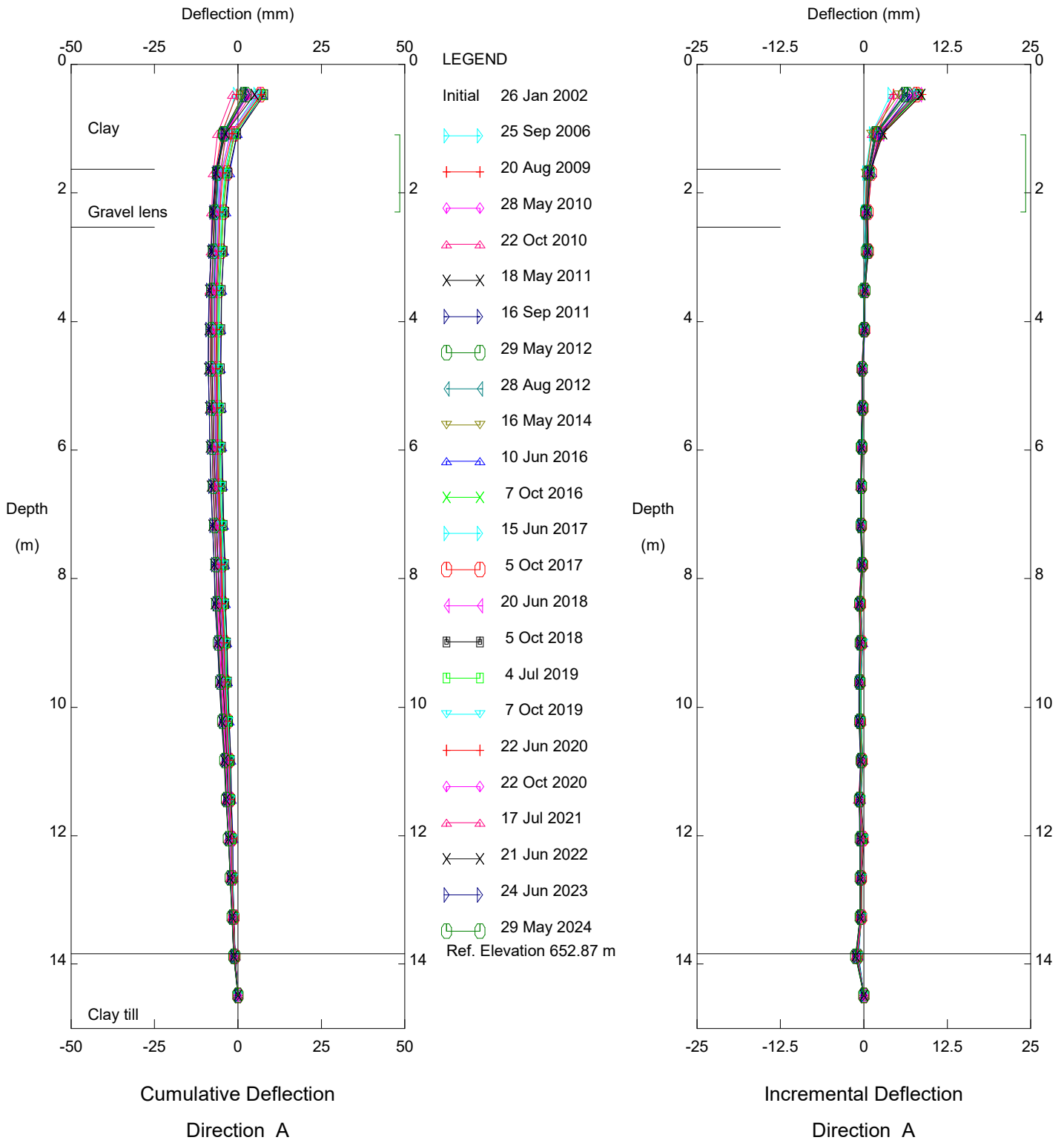
Thurber Engineering Ltd.



GP012B Ksituan River Crossing, Inclinator SI-3

Alberta Transportation

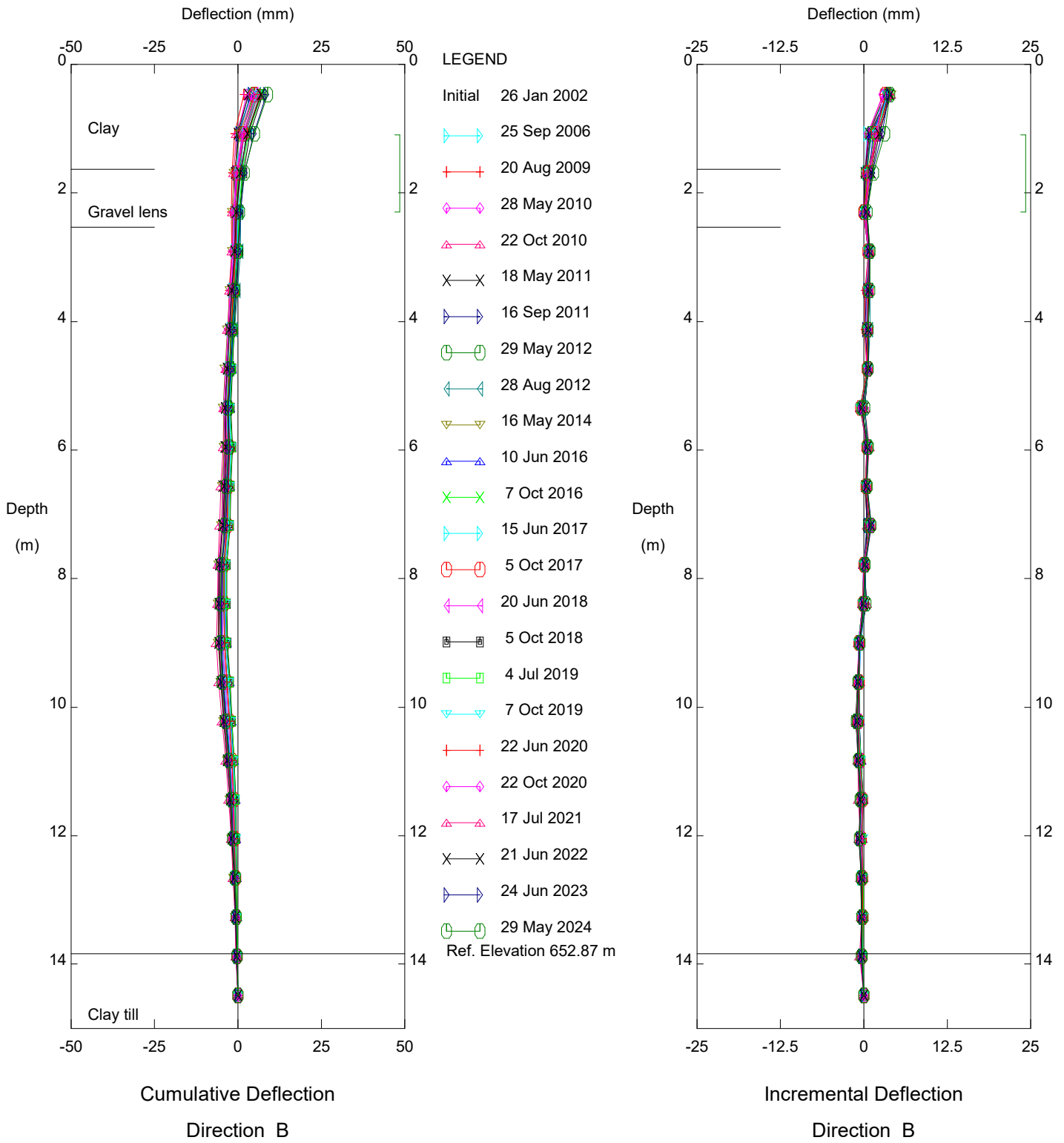
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GP012B Ksituan River Crossing, Inclinometer SI-6

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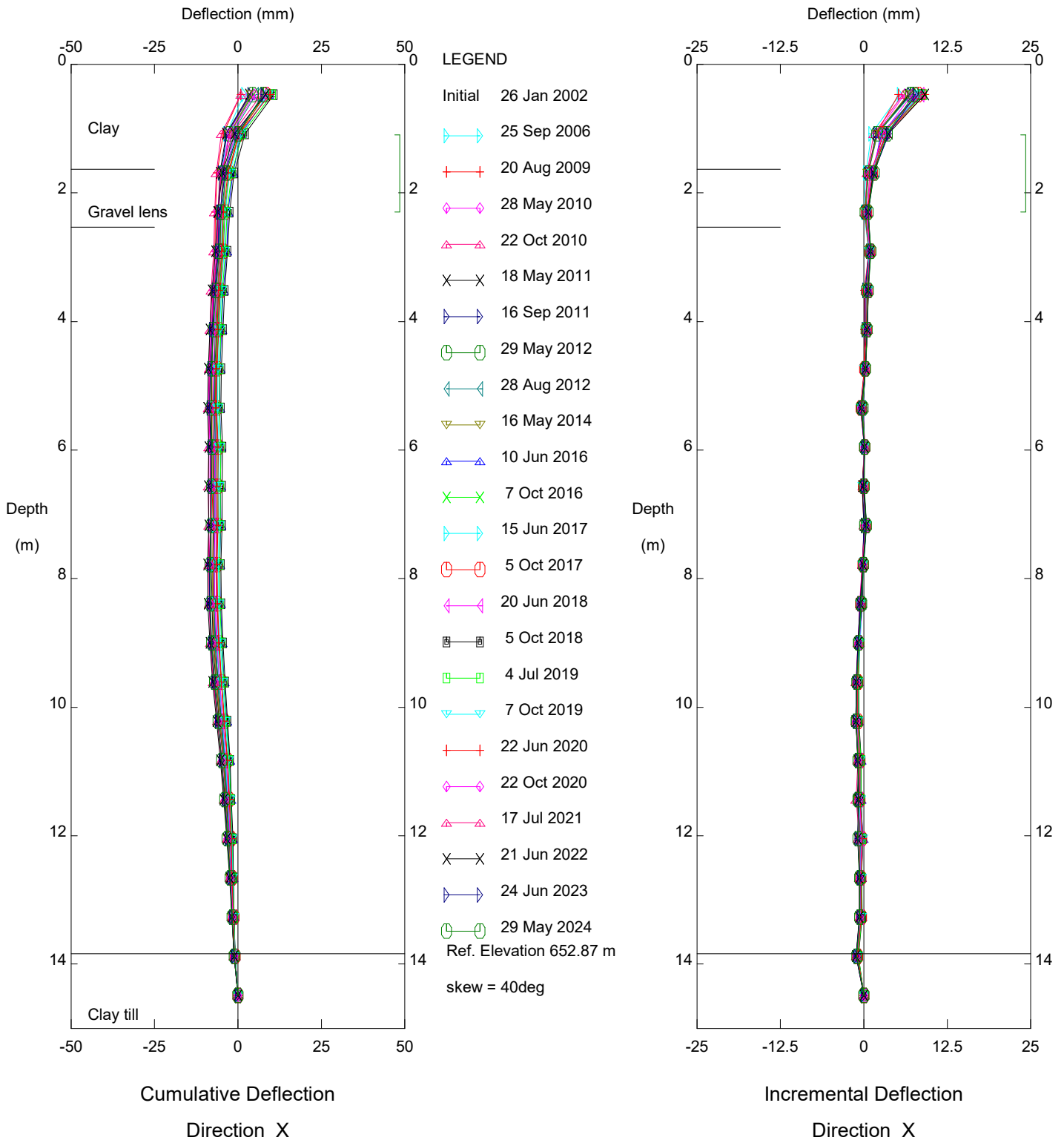
Thurber Engineering Ltd.



GP012B Ksituan River Crossing, Inclinometer SI-6

Alberta Transportation

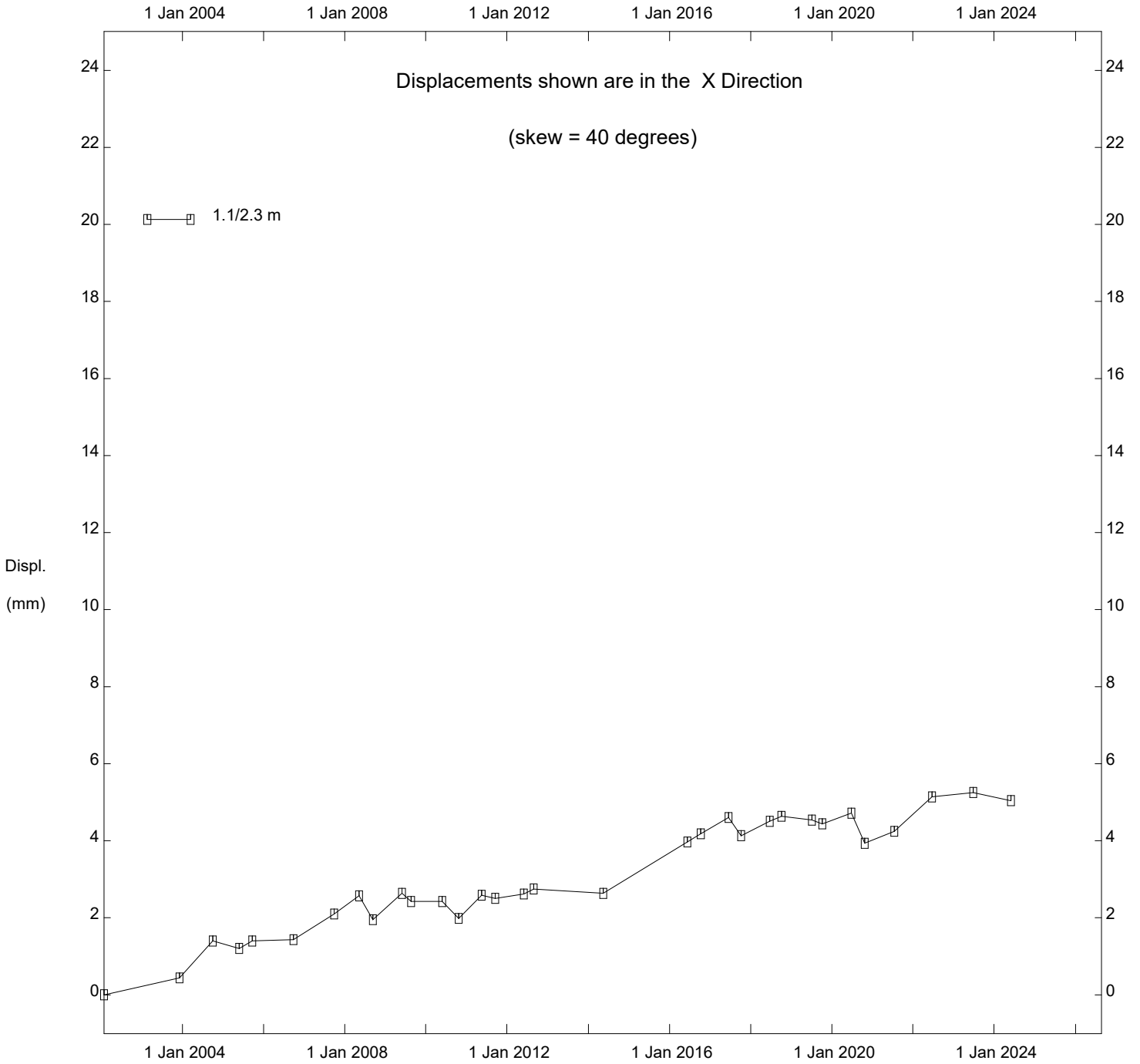
Thurber Engineering Ltd.



GP012B Ksituan River Crossing, Inclinometer SI-6

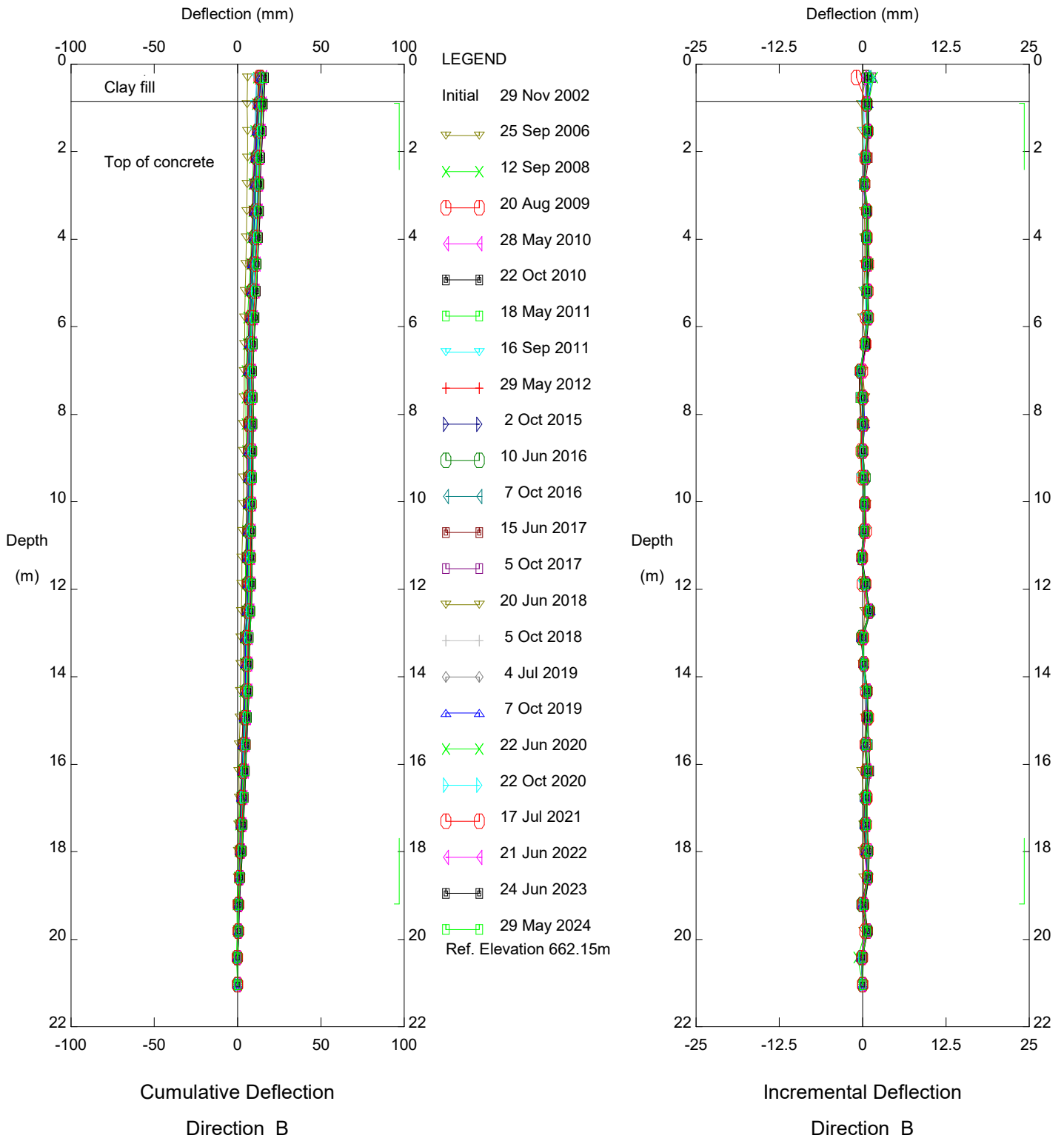
Alberta Transportation

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GP012B Ksituan River Crossing, Inclinator SI-6

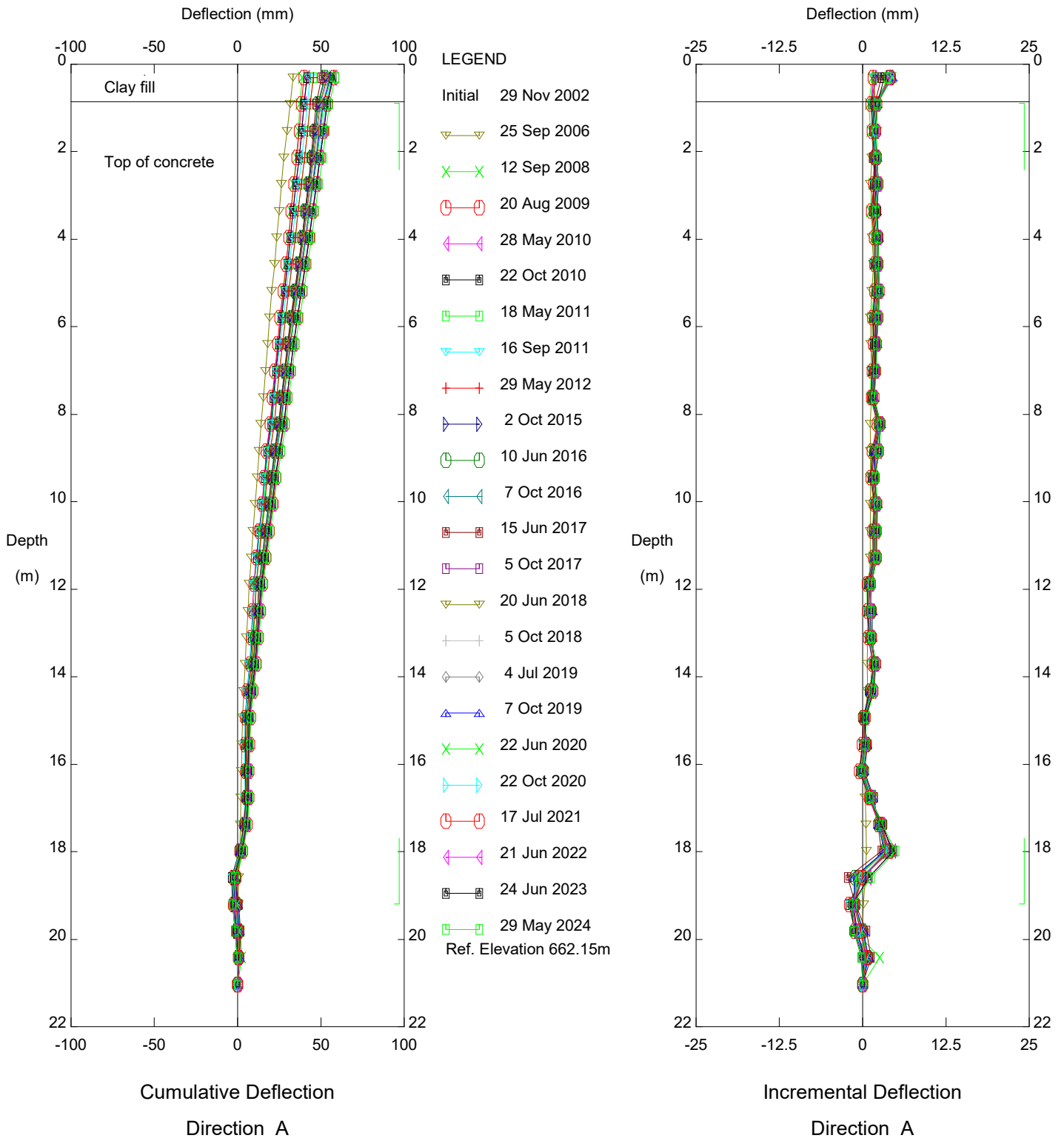
Alberta Transportation



GP012B Ksituan River Crossing, Inclinometer SI-8

Alberta Transportation

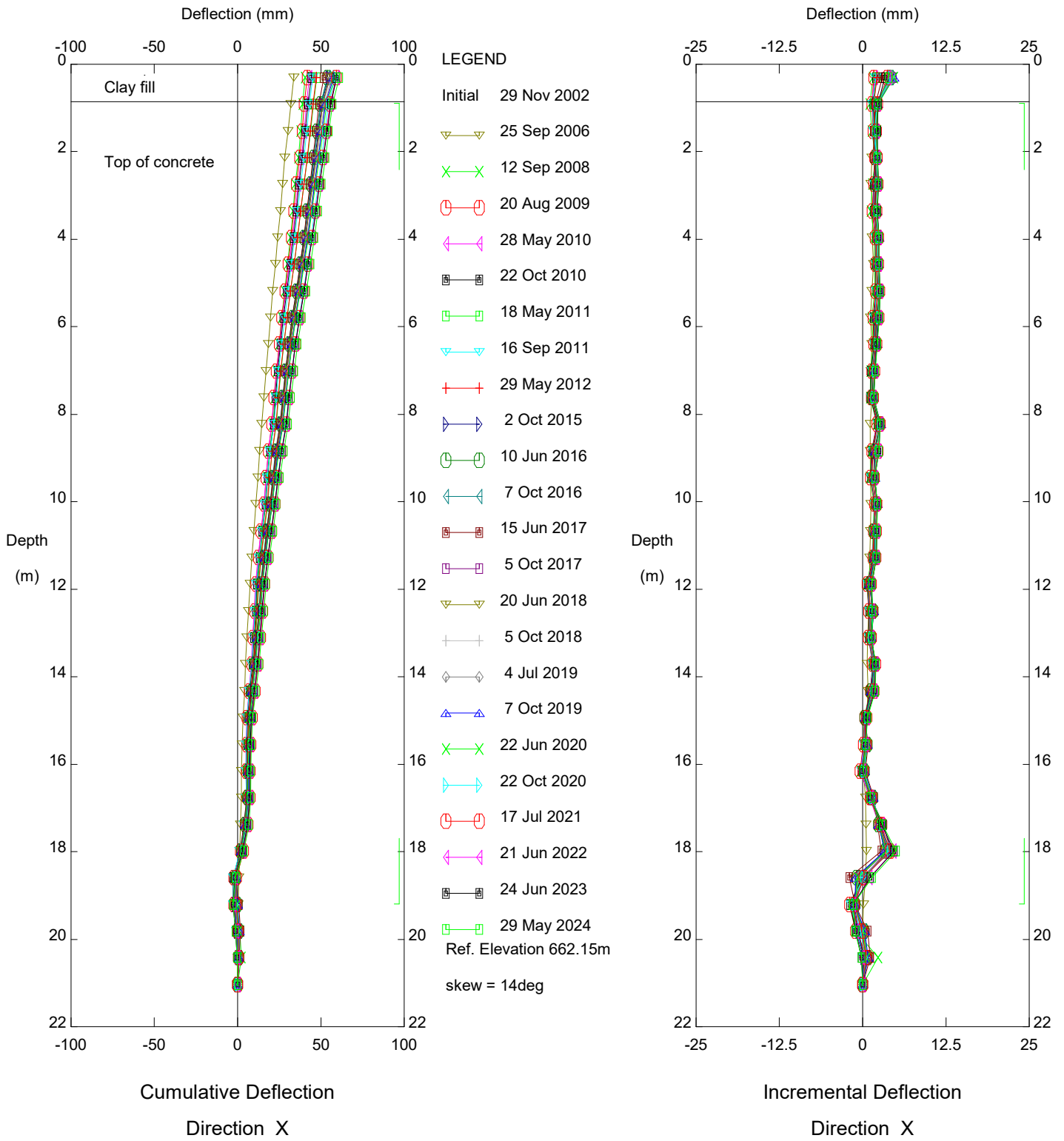
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GP012B Ksituan River Crossing, Inclinometer SI-8

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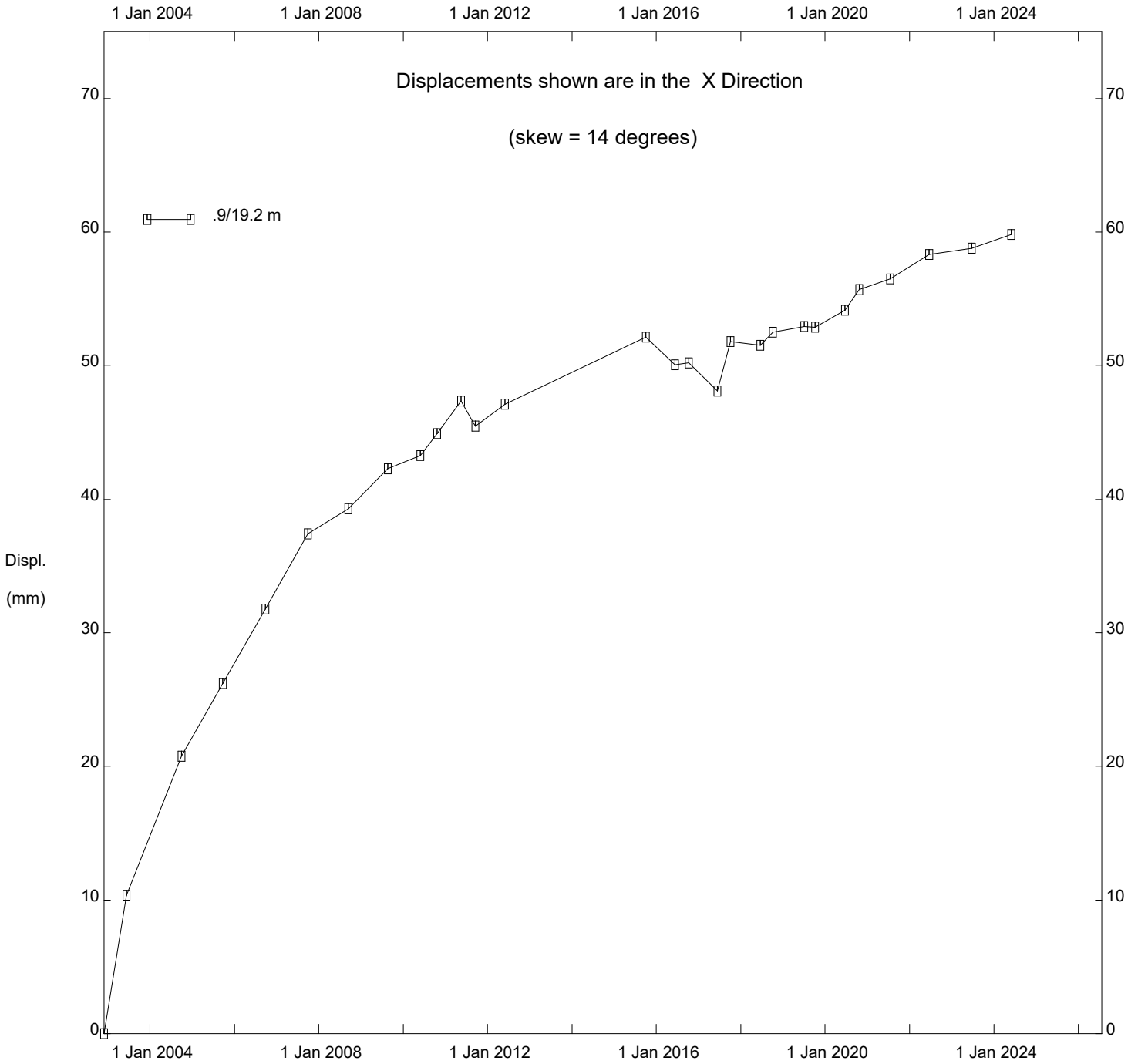
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GP012B Ksituan River Crossing, Inclinometer SI-8

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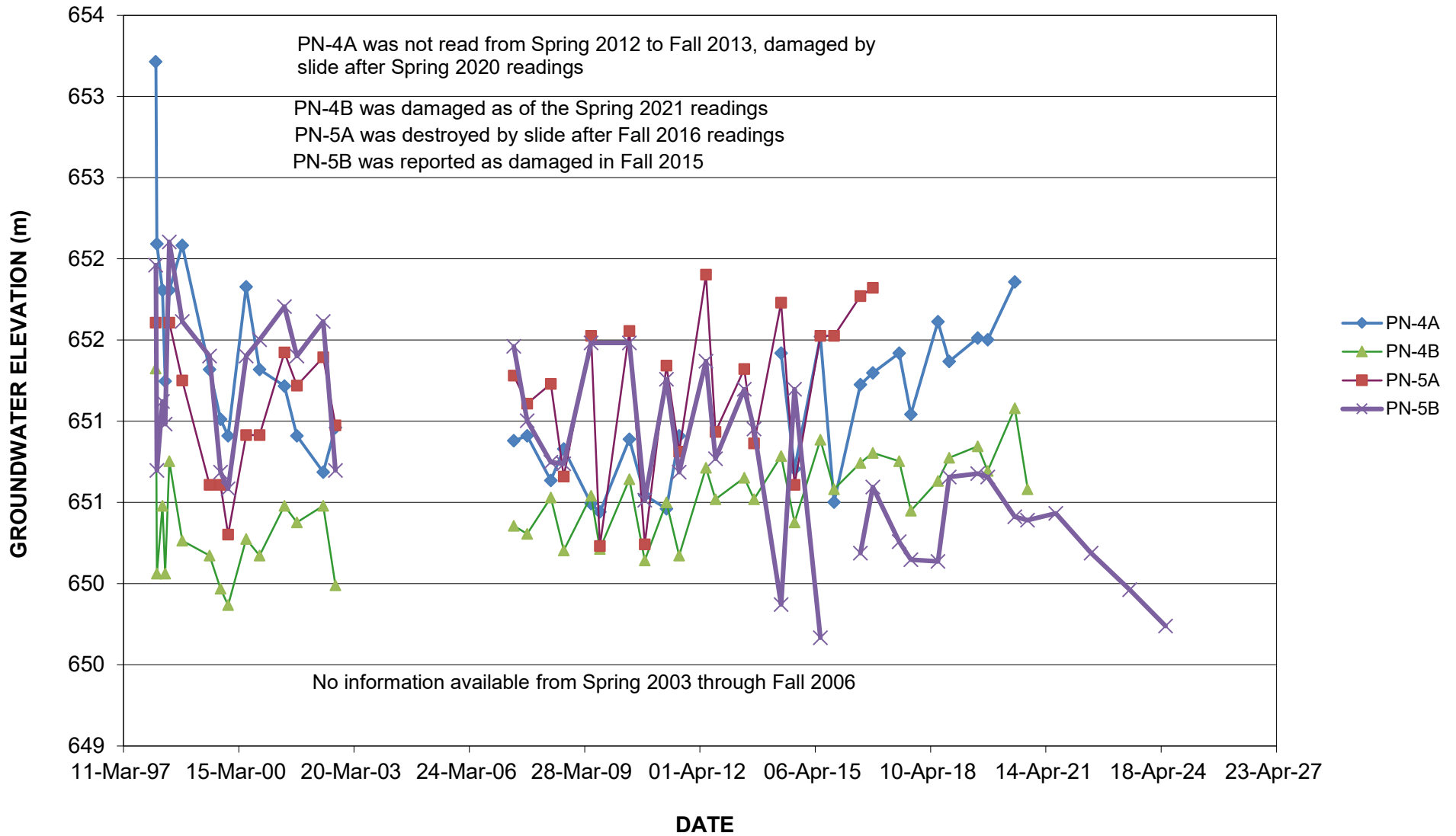
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GP012B Ksituan River Crossing, Inclinator SI-8

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FIGURE GP012B-1 PIEZOMETRIC ELEVATIONS FOR HWY 49:04, KSITUAN PILE WALL



**FIGURE GP012B-2
PIEZOMETRIC DEPTHS FOR HWY 49:04, KSITUAN PILE WALL**

