

**ALBERTA TRANSPORTATION AND
ECONOMIC CORRIDORS GRMP
NORTH CENTRAL (ATHABASCA AND FORT
McMURRAY DISTRICTS)
INSTRUMENTATION MONITORING- SPRING 2024**



Site Number	Location	Name	Hwy	km
NC008	HWY 63:02 L1 15.635	North of La Biche River	63:02	Km 15.6
Legal Description: 7-3-69-17 W4		UTM Co-ordinates		
		12U E 403478	N	6089488

Current Monitoring:	8-Jun-2024	Previous Monitoring	01-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): SI1B and SI20-2	Pneumatic Piezometers (PN): N/A	Vibration Wire Piezometers (VW): VW20-2A and VW20-2B	Standpipe Piezometers (SP): SP20-1
Load Cell (LC): N/A	Strain Gauges: N/A	SAs: N/A	Others:

Readout Equipment Used			
Slope Inclinometers: RST Digital Inclinator probe with a 2 ft. wheelbase and a RST Pocket PC readout.	Pneumatic Piezometers:	Vibration Wire Piezometers: Geokon GK404 digital readout	Standpipe Piezometers: DGS1 dipmeter
Load Cell:	Strain Gauges:	SAs:	Others:

Notes:
<ul style="list-style-type: none"> - A site plan showing instrument locations is included in Appendix A. - SIs plots with A and B directions are presented in Appendix A and summarized in Table NC008-1, attached. Where movement was recorded, the resultant (plot X) and the rate of movement plot are also included. - Pneumatic, Standpipe and vibrating wire piezometer plots are included in Appendix A. - Pneumatic Piezometer readings are summarized in Table NC008-2, attached. - Standpipe Piezometer readings are summarized in Table NC008-3, attached. - Vibrating Wire Piezometer readings are summarized in Table NC008-4, attached.

Discussion	
Zones of New Movement:	None
Interpretation of Monitoring Results:	<p>SI1B showed a rate of movement of 1.4 mm/yr over 4.8 m to 8.4 m since the fall of 2023 readings. SI20-2 showed a rate of movement of 1.4 mm/yr over 3.8 m to 7.4 m depth since the fall of 2023 readings. This corresponds to a decrease in the rate of movement by 8.8 mm/yr, and 6.9 mm/yr since the fall of 2023 readings in SI1B and SI20-2, respectively. The movement zones in both SIs are within the native high plastic clay below the highway embankment fill.</p> <p>Standpipe piezometer SP20-1 showed a decrease in groundwater level of 0.25 m compared to the fall of 2023 readings.</p> <p>Vibrating wire piezometer VW20-2A showed an increase in groundwater level of 0.02 m since the fall of 2023 readings. The groundwater level recorded in VW20-2A is the highest recorded in this instrument. VW20-2B showed a decrease in groundwater level of 0.06 m since the fall of 2023 readings.</p>
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:	
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Attachments:	<ul style="list-style-type: none"> ▪ Table NC008-1 Spring 2024 – HWY 63:02 North of La Biche River, Slope Inclinator Instrumentation Reading Summary ▪ Table NC008-2 Spring 2024 – HWY 63:02 North of La Biche River, Pneumatic Piezometer Instrumentation Reading Summary ▪ Table NC008-3 Spring 2024 – HWY 63:02 North of La Biche River, Standpipe Piezometer Instrumentation Reading Summary ▪ Table NC008-4 Spring 2024 – HWY 63:02 North of La Biche River, Vibrating Wire Piezometer Instrumentation Reading Summary ▪ Statement of Limitations and Conditions ▪ APPENDIX A – NC008-1 SPRING 2024 <ul style="list-style-type: none"> □ Field Inspector’s report □ Site Plan Showing Approximate Instrument Locations (Drawing No. 32122-NC008) □ SI Reading Plots □ Figure NC008-1 (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.
Tarek Abdelaziz, Ph.D., P. Eng.
Partner | Senior Geotechnical Engineer

Lucas Green, P.Eng.
Geotechnical Engineer



Table NC008-1: Spring 2024 – Hwy 63:02 North of La Biche River Slope Inclinometer Instrumentation Reading Summary

Date Monitored: June 8, 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)
SI1A	December 6, 1996	25.9 over 3.5 m to 5.4 m in 302° direction	13.1 in October 1997	Sheared or blocked at 3.2 m depth	May 22, 2003	N/A	N/A	N/A
		16.1 over 6.0 m to 8.4 m in 302° direction	6.3 in May 1997			N/A	N/A	N/A
SI1B	December 6, 1996	89.9 over 4.8 m to 8.4 m depth in 246° direction	16.3 in October 1997	Operational	October 1, 2023	1.0	1.4	-8.8
SI4A	October 21, 1997	54.3 over 0.5 m to 2.4 m depth in 271° direction	17.7 in May 2003	Not read*	Sep. 28, 2020	N/A	N/A	N/A
SI4B	October 21, 1997	27.8 over 1.1 m to 2.9 m depth in 308° direction	20.8 in June 1998	Presumed destroyed	May 22, 2003	N/A	N/A	N/A
		16.5 over 5.9 m to 7.8 m depth in 308° direction	10.3 in June 1998			N/A	N/A	N/A
SI20-2	December 21, 2021	12.8 over 3.8 m to 7.4 m depth in 297° direction	15.8 in March 2021	Operational	October 1, 2023	1.0	1.4	-6.9

Drawing 32122-NC008 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

* SI4A was deleted from the current GRMP.



Table NC008-2: Spring 2024 – Hwy 63:02 North of La Biche River Pneumatic Piezometer Instrumentation Reading Summary

Date Monitored: Not monitored.

INSTRUMENT #	DATE INITIALIZED	TIP DEPTH** (m)	GROUND ELEV. (m)	CURRENT STATUS	HIGHEST MEASURED GROUNDWATER LEVEL BGS (m)	MEASURED PORE PRESSURE (kPa)	CURRENT GROUNDWATER LEVEL BGS (m)	PREVIOUS GROUNDWATER LEVEL BGS (m)	CHANGE IN WATER LEVEL SINCE PREVIOUS READING (m)
<i>PN1 (34455)</i>	<i>November 20, 1996</i>	<i>17.06</i>	<i>-</i>	<i>Active</i>	<i>-0.77 m on September 28, 2020</i>	<i>N/A</i>	<i>N/A</i>	<i>-0.77*</i>	<i>N/A</i>
<i>PN2 (18199)</i>	<i>November 20, 1996</i>	<i>7.60</i>	<i>-</i>	<i>Active</i>	<i>-1.03 on September 28, 2020</i>	<i>N/A</i>	<i>N/A</i>	<i>-1.03*</i>	<i>N/A</i>

* Installed within the limits of the repaired site in 1997; negative values correspond to an above-ground (artesian) groundwater level.

** Reported tip depths, based on previous reports, may not account for fill placed during berm construction in 1997.

Note: pneumatic piezometers are not included in the current GRMP, and readings were therefore not included.



Table NC008-3: Spring 2024 – Hwy 63:02 North of La Biche River Standpipe Piezometer Instrumentation Reading Summary

Date Monitored: June 8, 2024

INSTRUMENT #	DATE INITIALIZED	TIP DEPTH (m)	GROUND ELEV. (m)	CURRENT STATUS	HIGHEST MEASURED GROUNDWATER LEVEL BGS (m)	CURRENT GROUNDWATER DEPTH BGS (m)	PREVIOUS GROUNDWATER DEPTH BGS (m)	CHANGE IN WATER LEVEL SINCE PREVIOUS READING (m)
SP20-1	Nov. 28, 2020	20.70	-	Operational	1.42 on October 1, 2023	1.67	1.42	-0.25
SP20-3	Nov. 26, 2020	20.80	-	Damaged	2.45 on December 21, 2020	N/A	2.88	N/A

Drawing 32122-NC008 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.



Table NC008-4: Spring 2024 – Hwy 63:02 North of La Biche River Vibrating Wire Piezometer Instrumentation Reading Summary

Date Monitored: June 8, 2024

INSTRUMENT #	DATE INITIALIZED	TIP DEPTH (m)	GROUND ELEV. (m)	CURRENT STATUS	HIGHEST MEASURED GROUNDWATER LEVEL BGS (m)	CURRENT GROUNDWATER DEPTH BGS (m)	PREVIOUS GROUNDWATER DEPTH BGS (m)	CHANGE IN WATER LEVEL SINCE PREVIOUS READING (m)
VW20-2A (70909)	December 21, 2020	7.32	-	Operational	2.32 on June 8, 2024	2.32	2.34	0.02
VW20-2B (70910)	December 21, 2020	15.09	-	Operational	2.43 on October 1, 2023	2.49	2.43	-0.06

Drawing 32122-NC008 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.

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

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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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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.

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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.



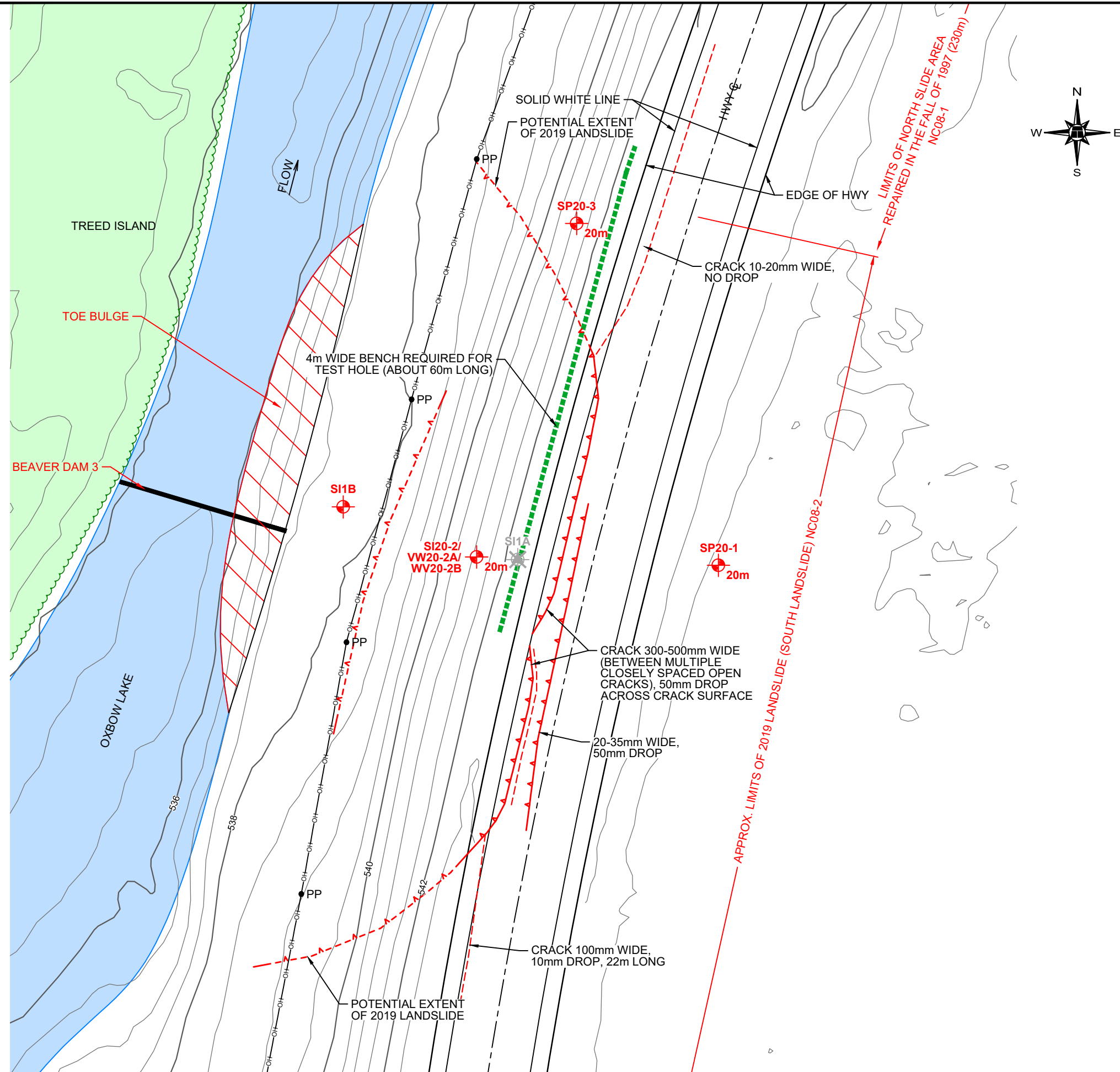
THURBER ENGINEERING LTD.

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

SPRING 2024

**APPENDIX A
DATA PRESENTATION**

SITE NC008: HWY 63:02 NORTH OF LA BICHE RIVER

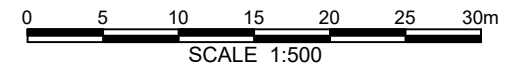



LEGEND

- APPROXIMATE TEST HOLE LOCATION (DEPTH (m))
- SI SLOPE INCLINOMETER
- VW VIBRATING WIRE PIEZOMETER
- SP STANDPIPE PIEZOMETER
- DESTROYED INSTRUMENT
- ACTIVE LANDSLIDE SCARP CRACK
- LANDSLIDE TENSION CRACKS
- CRACK
- 540 GROUND SURFACE CONTOUR
- OVERHEAD POWERLINE
- PP POWER POLE

NOTES:

1. SITE FEATURES ARE APPROXIMATE
2. TOPOGRAPHY IS BASED ON 2008 LIDAR DATA
3. JULY 3, 2019 OBSERVATIONS SHOWN IN RED
4. POTHOLES AND 10-20mm WIDE REFLECTIVE CRACKS ARE VISIBLE ON SOUTHBOUND LANES WITHIN THE LIMITS OF PREVIOUSLY REPAIRED AREA (NC08-1)
5. OVERHEAD POWERLINES WERE RELOCATED TO THE WEST SIDE OF THE OLD HIGHWAY 63 DURING HIGHWAY TWINNING PROJECT






**NORTH CENTRAL
(ATHABASCA AND FORT McMURRAY DISTRICTS)**

**NC008 HWY 63:02 LA BICHE RIVER
SITE PLAN SHOWING APPROXIMATE
INSTRUMENT LOCATIONS**

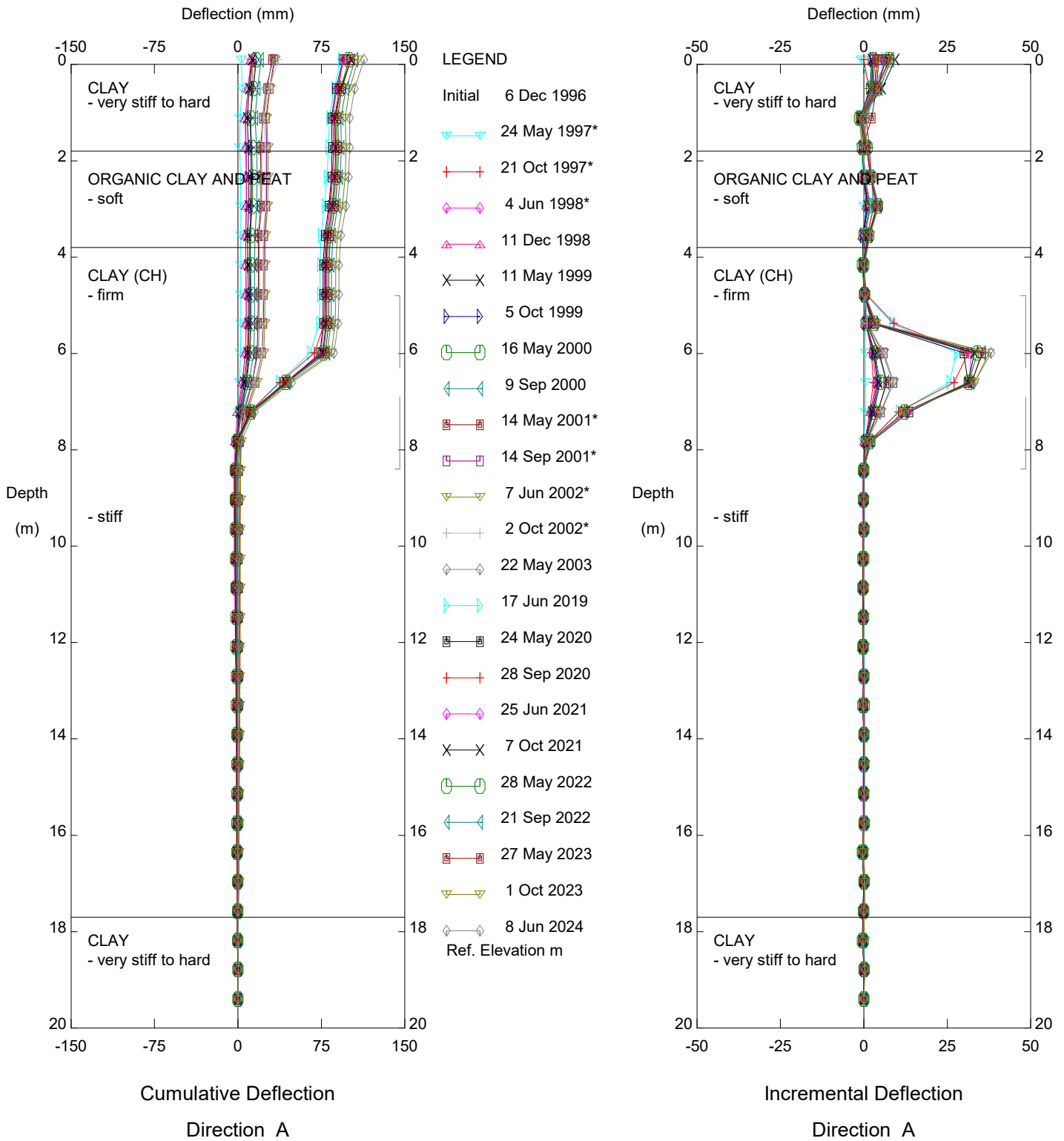
DWG No. 32122-NC008

DRAWN BY	ML
DESIGNED BY	BWN
APPROVED BY	TSA
SCALE	1:500
DATE	JULY 2021
FILE No.	32122



THURBER ENGINEERING LTD.

Thurber Engineering Ltd.

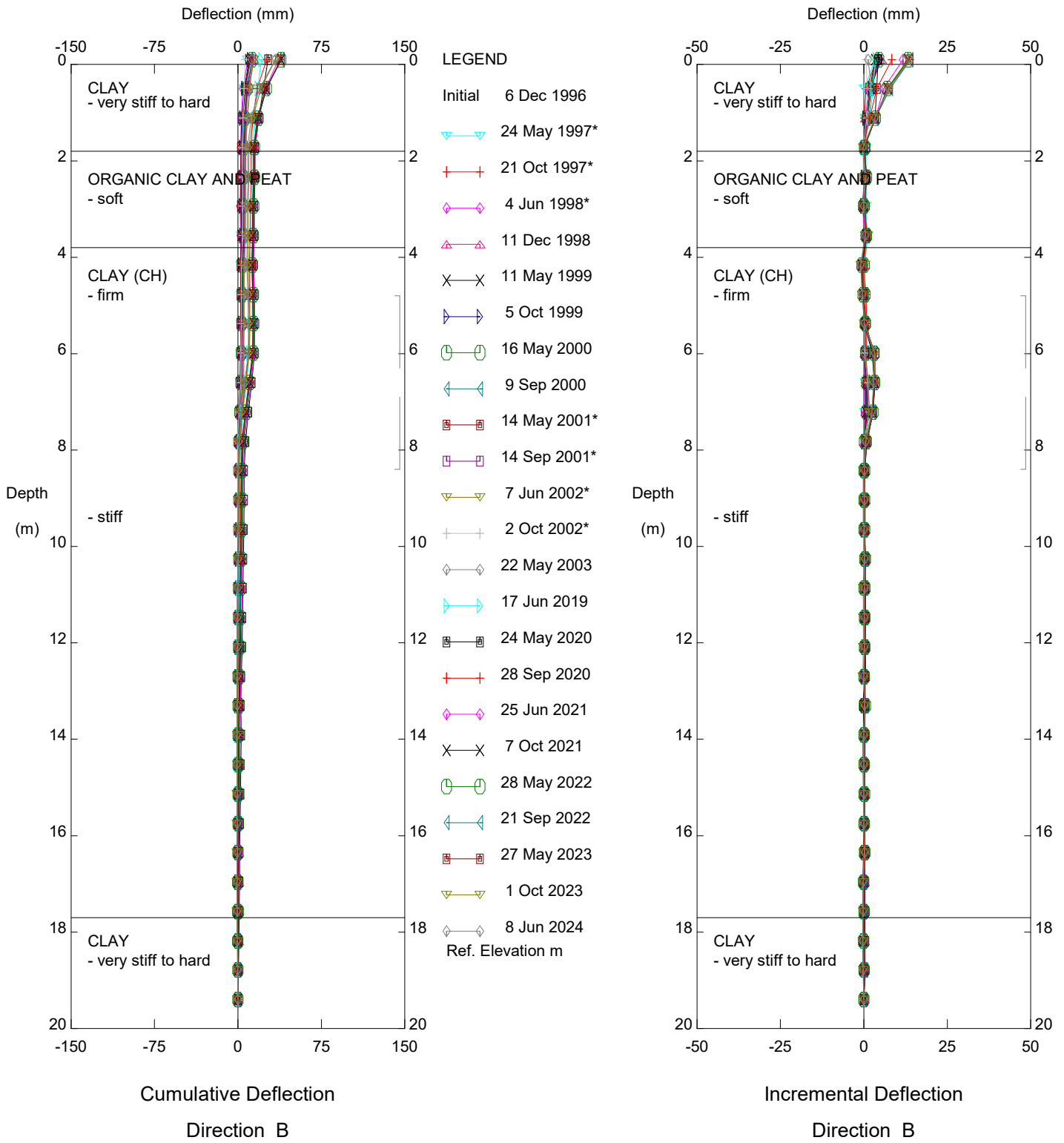


Labiche River, Inclinometer SI#1B

Alberta Transportation

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

Thurber Engineering Ltd.

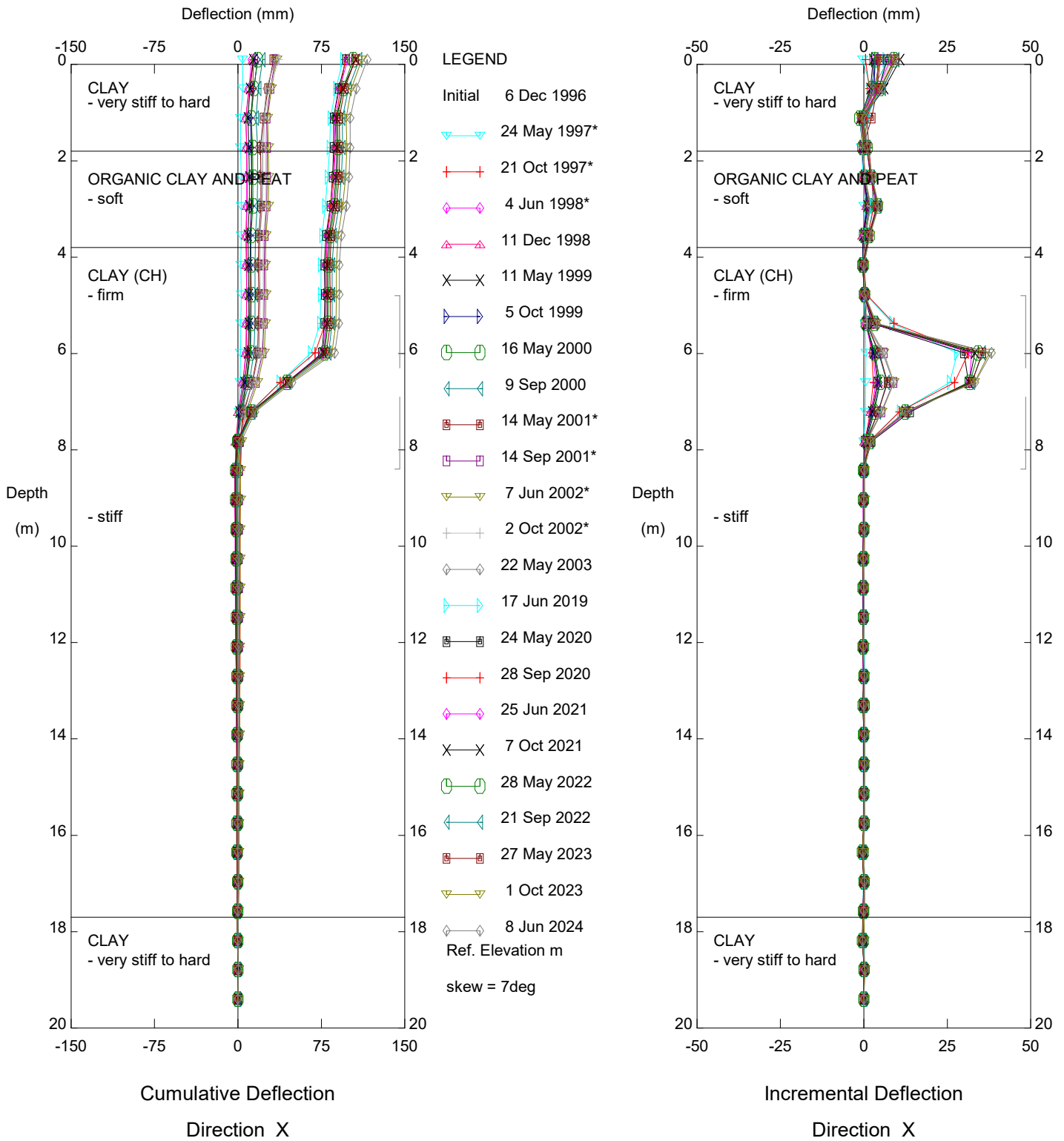


Labiche River, Inclinometer SI#1B

Alberta Transportation

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

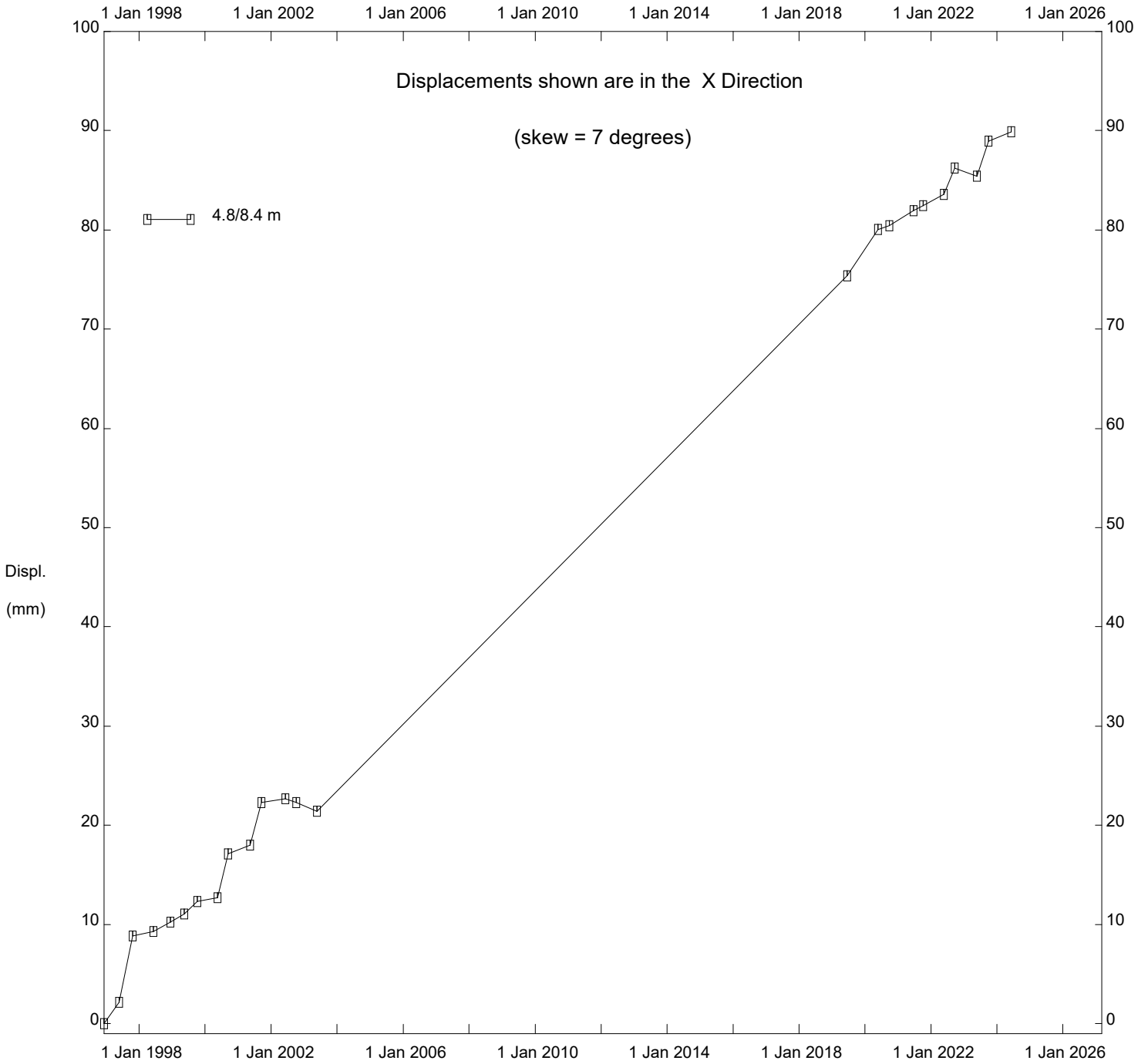
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Labiche River, Inclinometer SI#1B

Alberta Transportation

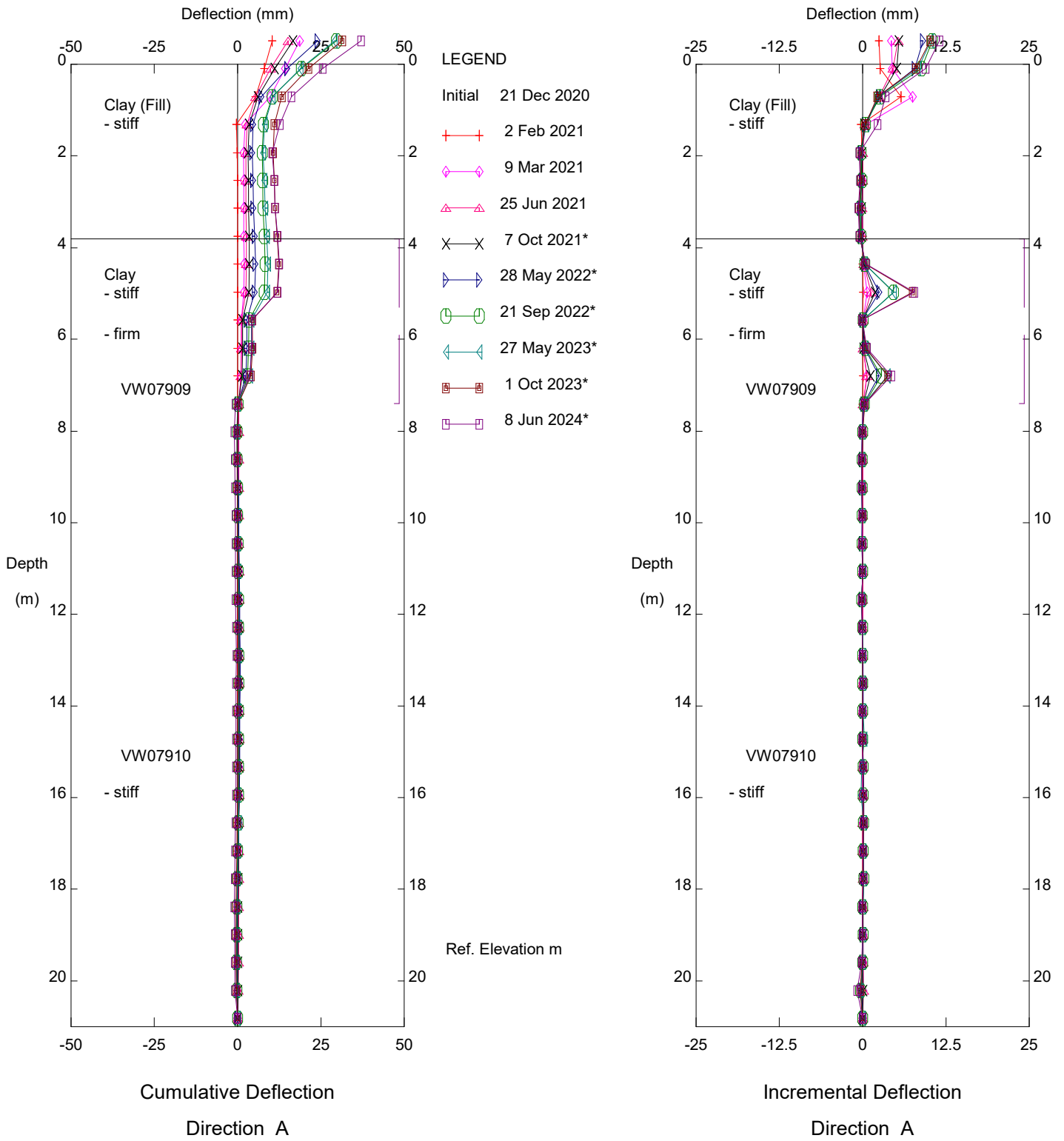
Sets marked * include zero shift and/or rotation corrections.



Labiche River, Inclinator SI#1B

Alberta Transportation

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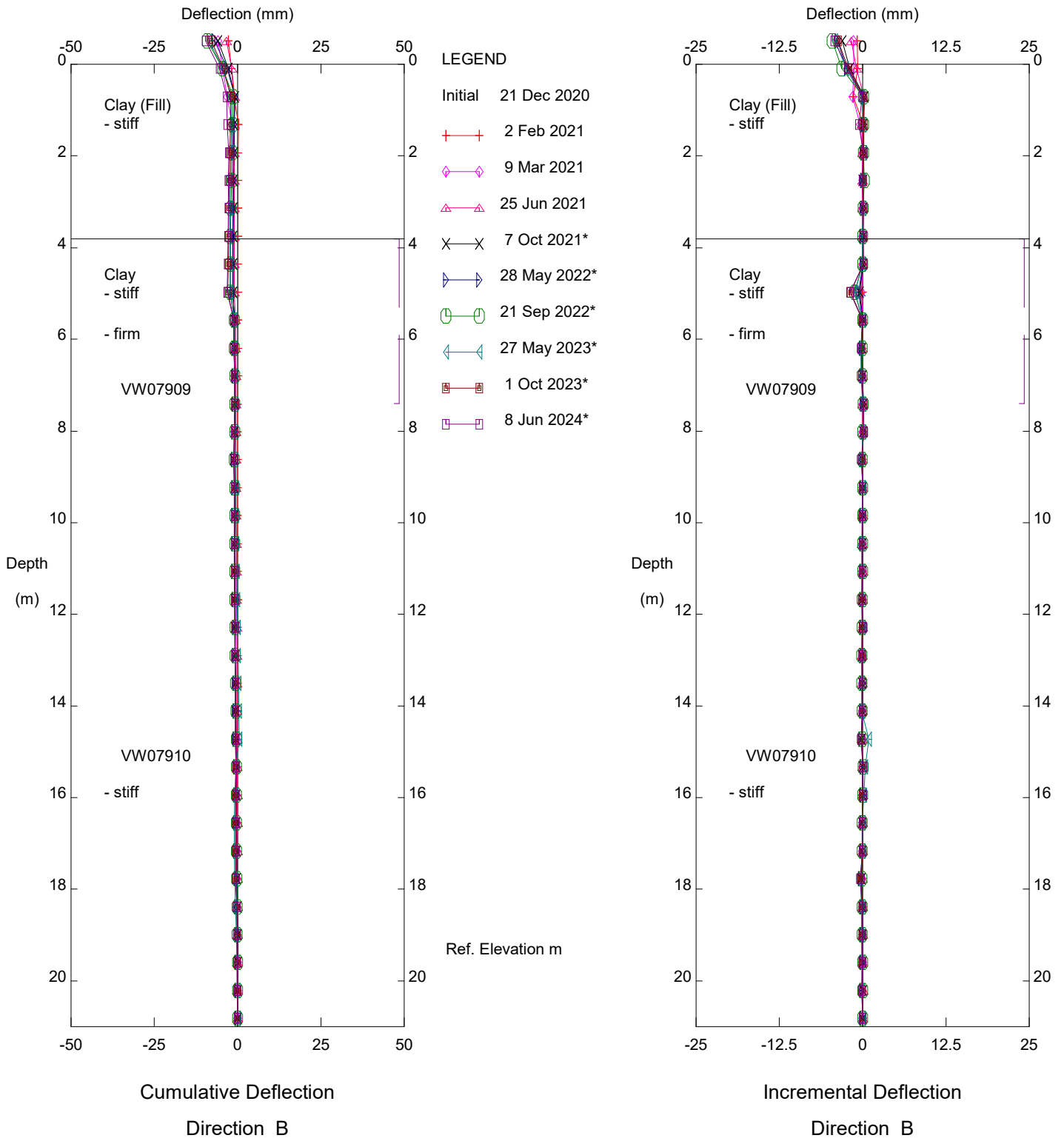


Hwy 63:02 NC08-2 La Biche River, Inclinometer SI20-2

Alberta Transportation

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

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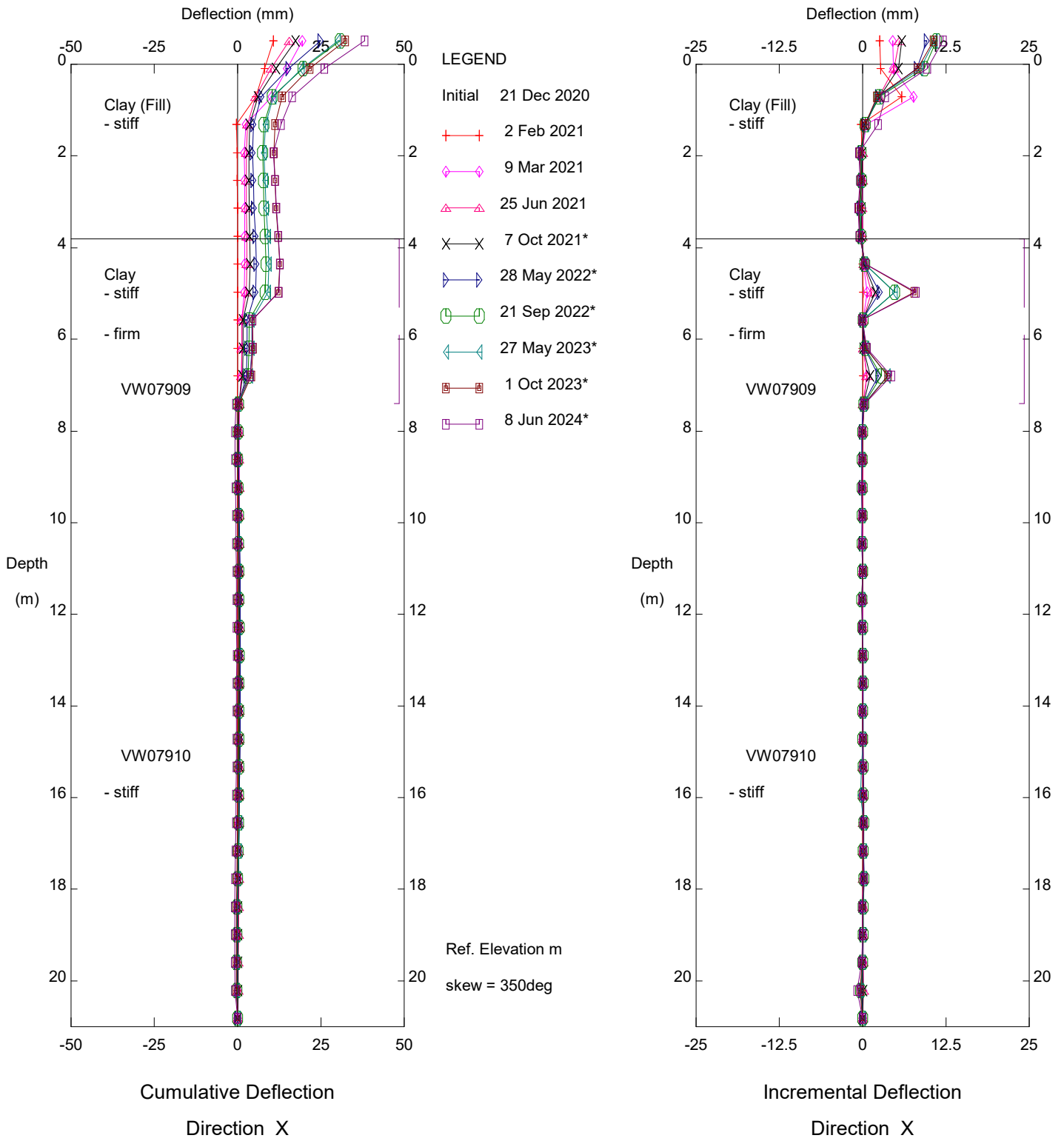


Hwy 63:02 NC08-2 La Biche River, Inclinometer SI20-2

Alberta Transportation

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

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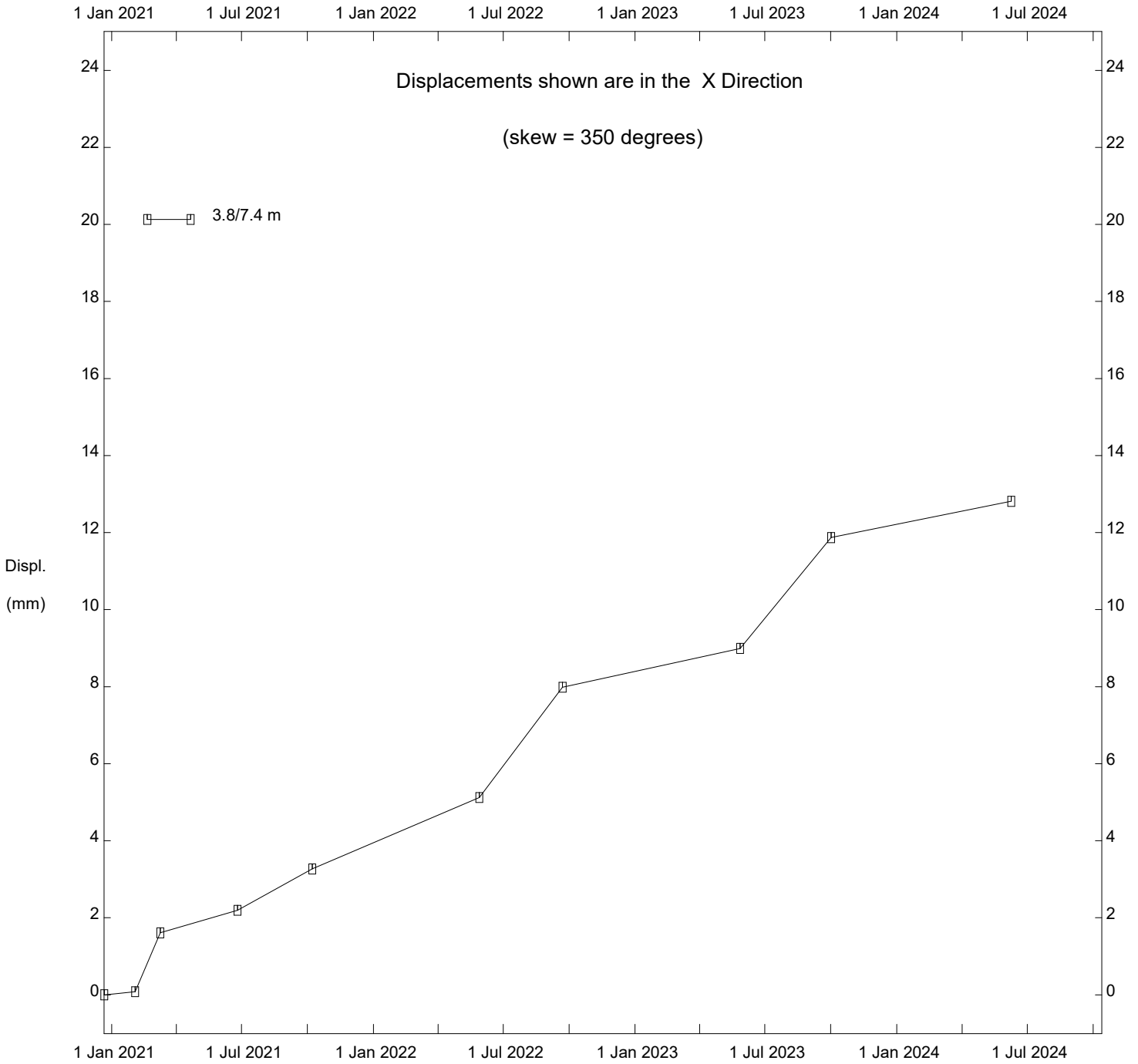


Hwy 63:02 NC08-2 La Biche River, Inclinometer SI20-2

Alberta Transportation

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

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Hwy 63:02 NC08-2 La Biche River, Inclinator SI20-2

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**FIGURE NC008-1
 HWY 63:02 NORTH OF LA BICHE RIVER BRIDGE (KM 15.6)
 VIBRATING WIRE AND STANDPIPE PIEZOMETER DATA**

