THURBER ENGINEERING LTD.

October 26, 2022 File No.: 32122

Alberta Transportation
Construction and Maintenance Division
North Central Region
Box 4596, 4513 – 62 Avenue
Barrhead, Alberta
T7N 1A5

Attention: Ms. Amy Driessen, P.Eng.

ALBERTA TRANSPORTATION GRMP (CON0022163)
NORTH CENTRAL (ATHABASCA AND FORT McMURRAY DISTRICTS)
INSTRUMENTATION MONITORING RESULTS – FALL 2022

SECTION C

SITE NC070: HWY 63:10 TRUCK STAGING AREA

Dear Ms. Driessen:

This report provides the results of the bi-annual geotechnical instrumentation monitoring for the above-mentioned site as part of Alberta Transportation's Geohazard Risk Management Program for North Central – Athabasca and Fort McMurray Districts (CON0022163).

It is a condition of this letter report that Thurber's performance of its professional services will be subject to the attached Statement of Limitations and Conditions.

1. FIELD PROGRAM AND INSTRUMENTATION STATUS

Ten slope inclinometers (SI08-7, SI10-10R, SI08-13, SI08-17, SI08-21, SI11-12R, SI17-3, SI18-5, SI18-7 and SI18-8), six pneumatic piezometers (PN08-7, PN08-10, PN08-13, PN08-17, PN08-21 and PN09-10R) and seventeen vibrating wire piezometers (VW11-12RA, VW11-12RB, VW17-3A to -3C, VW18-5A to -5C, VW18-6A to -6C, VW18-7A to -7C and VW18-8A to 18-C) were read at the Hwy 63:10 Truck Staging Area (TSA) site on September 23, 2022 by Mr. Niraj Regmi, G.I.T. and Mr. Kyle Crooymans, both of Thurber Engineering Ltd.

There are additional operational instruments at this site, but they are not read under the current scope of the GRMP.

Site plans showing approximate instrumentation locations are included in Appendix A. It should be noted that the site plan does not show the footprint of the expanded east landslide toe berm, completed between 2020 and 2021. As-built survey information of the berm was not received from Tetra Tech Inc. to update the original site plans.

The SIs were read using an RST Digital Inclinometer probe with a 2 ft wheelbase and a RST Pocket PC readout. Inclinometer reading depths were defined as per cable markings with

respect to the top of the inclinometer casing. The pneumatic piezometers were read using a RST C108 pneumatic piezometer reader. The vibrating wire piezometers were read using a RST VW2106 vibrating wire readout.

2. DATA PRESENTATION

2.1 General

SI plots for A and B directions are presented in Appendix A and are summarized below. Where movement has been recorded the resultant plot (X direction, if applicable) and rate of movement have also been provided. Pneumatic and vibrating wire piezometer reading plots are also provided in Appendix A.

2.2 Zones of Movement

No zones of new movement were observed in the SIs since the spring of 2022 readings.

Zones of movement are summarized in Table NC070-1 below. This table also provides a historical account of the total movement, the depth of movement and the maximum rate of movement that has occurred at this site since the initialization of the slope inclinometers. Table NC070-1 only includes instruments that are included under the current scope of the GRMP.

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TABLE NC070-1
FALL 2022 – HWY 63:10 TRUCK STAGING AREA SLIDE
SLOPE INCLINOMETER INSTRUMENTATION READING SUMMARY

Date Monitored: September 23, 2022

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)
SI08-7	June 29, 2008	12.8 over 7.2 m to 8.4 m depth in 28º direction	62.7 on July 22, 2008	Operational	May 31, 2022	0.2	0.5	0.5
		28.3 over 12.6 m to 14.5 m depth in 18º direction	131.6 on July 22, 2008			0.4	1.2	1.2
SI10-10R (Replacement for SI08-10)	Jan. 28, 2010	14.0 over 10.9 m to 14.0 m depth in 284º direction	8.8 on March 7, 2010	Operational	May 31, 2022	0.3	1.1	1.4
		6.7 over 22.5 m to 24.3 m depth in 350º direction	17.4 on Feb. 11, 2010			0.1	0.4	-0.5
		25.6 over 24.3 m to 26.2 m depth in 330º direction	11.5 on July 27, 2010			0.2	0.5	-2.7
SI08-13	July 13, 2008	86.4 over 5.0 m to 8.7 m depth in 5º direction	897.1 on July 22, 2008	Operational	May 31, 2022	No discernible movement	N/A	-0.2
		34.4 over 13.0 m to 14.8 m depth in 20º direction	208.7 on July 22, 2008			0.1	0.2	0.2

Drawing 32122-NC070 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

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TABLE NC070-1 – CONTINUED…
FALL 2022 – HWY 63:10 TRUCK STAGING AREA SLIDE
SLOPE INCLINOMETER INSTRUMENTATION READING SUMMARY

Date Monitored: September 23, 2022

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)
SI08-17	Dec. 15, 2008	17.3 over 14.1 m to 17.7 m depth in 349° direction	68.9 on August 19, 2015 (during east berm construction)	Operational	May 30, 2022	0.3	0.9	1.1
SI08-21	Dec. 17, 2008	133.5 over 0.3 m to 2.7 m depth in 349° direction	8447 on January 14, 2021	Operational	May 30, 2022	0.4	1.2	-0.6
		84.7 over 4.6 m to 6.4 m depth in 349° direction	10742 on August 28, 2015			No discernible movement	N/A	-4.5
		28.1 over 12.5 m to 14.9 m depth in 349° direction	687 on August 28, 2015			0.1	0.2	0.4
SI11-12R (Replacement for SI08-12)	October 21, 2011	-1.0 over 14.1 m to 15.3 m depth in 54° direction	24.9 on March 16, 2015 (during west berm construction	Operational	May 31, 2022	No discernible movement	N/A	0.1
		5.2 over 15.3 m to 20.2 m depth in 54° direction	72.9 on March 16, 2015 (during west berm construction)			<0.1	0.1	0.1

Drawing 32122-NC070 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

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TABLE NC070-1 – CONTINUED…
FALL 2022 – HWY 63:10 TRUCK STAGING AREA SLIDE
SLOPE INCLINOMETER INSTRUMENTATION READING SUMMARY

Date Monitored: September 23, 2022

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)
SI17-3	May 28, 2017	No discernible movement	N/A	Operational	May 30, 2022	N/A	N/A	N/A
SI18-5	April 30, 2018	47.5 over 4.8 m to 9.7 m depth in 60º direction	282.6 on January 18, 2021	Operational	May 30, 2022	1.1	3.6	-3.8
SI18-6	*April 30, 2018*	*62.0 over 5.0 m to 9.3 m depth in 30º direction*	*607.7 on December 7, 2020*	*Sheared off at 6.8 m below ground surface*	*June 2, 2021*	*N/A*	*N/A*	*N/A*
		32.1 over 14.1 m to 16.0 m depth in 30º direction	*477.4 on March 24, 2021*			*N/A*	*N/A*	*N/A*
SI18-7	April 30, 2021	No discernible movement	N/A	Operational	May 30, 2022	N/A	N/A	N/A
SI18-8	October 21, 2011	88.8 over 0.9 m to 2.7 m depth in 46º direction	242.6 on March 16, 2021	Operational	May 30, 2022	8.4	26.4	23.7

Drawing 32122-NC070 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

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TABLE NC070-2
FALL 2022 – HWY 63:10 TRUCK STAGING AREA SLIDE
PNEUMATIC PIEZOMETER INSTRUMENTATION READING SUMMARY

Date Monitored: September 23, 2022

INSTRUMENT #	DATE INITIALIZED	TIP ELEV. (m)	GROUND ELEV. (m)	CURRENT STATUS	HIGHEST MEASURED GROUNDWATER ELEVATION (m)	MEASURED PORE PRESSURE (kPa)	CURRENT GROUNDWATER ELEV. (m)	PREVIOUS GROUNDWATER ELEV. (m)	CHANGE IN WATER LEVEL SINCE PREVIOUS READING (m)
PN08-7 (31957)	June 27, 2008	500.31	508.11	Operational	503.20 on Nov. 25, 2008	20.8	502.43	502.10	0.33
PN08-10 (31973)	July 12, 2008	503.17	509.57	Operational	512.45* on Oct. 4, 2009	52.9	508.57	508.36	0.21
PN08-13 (31836)	July 12, 2008	501.05	508.65	Operational	507.99 on Nov. 10, 2009	58.8	507.05	506.84	0.21
PN08-17 (32329)	June 27, 2008	487.35	501.12	Operational	500.40 on June 17, 2021	123.2	499.91	499.97	-0.06
PN08-21 (32303)	December 19, 2008	479.69	500.22	Operational	496.72 On Jan. 15, 2009	132.6	493.21	491.99	1.22
PN09-10R (32611)	Dec. 12, 2009	496.46	510.66	Operational	508.55 on Sept. 22, 2020	114.4	508.12	507.80	0.32

Drawing 32122-NC070 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.
* Indicates above-ground (artesian) groundwater level

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TABLE NC070-3
FALL 2022 – HWY 63:10 TRUCK STAGING AREA SLIDE
VIBRATING WIRE PIEZOMETER INSTRUMENTATION READING SUMMARY

Date Monitored: September 23, 2022

INSTRUMENT #	DATE INITIALIZED	TIP ELEV. (m)	GROUND ELEV. (m)	CURRENT STATUS	HIGHEST MEASURED GROUNDWATER LEVEL BGS (m)	CURRENT GROUNDWATER ELEV. (m)	PREVIOUS GROUNDWATER ELEV. (m)	CHANGE IN WATER LEVEL SINCE PREVIOUS READING (m)
VW11-12RA (15893)	Oct. 20, 2011	496.64	507.86	Operational	509.43 on Oct. 20, 2011	503.99	504.02	-0.03
VW11-12RB (15907)	Oct. 19, 2011	488.05	507.86	Operational	511.37* on Oct. 19, 2011	507.99*	508.02*	-0.03
VW17-3A (42431)	March 6, 2017	492.20	499.86	Operational	506.59* on April 14, 2021	506.02*	506.31*	-0.29
VW17-3B (42429)	March 6, 2017	486.10	499.86	Operational	494.35 on May 30, 2022	494.02	494.35	-0.33
VW17-3C (42432)	March 6, 2017	476.96	499.86	Operational	491.02 on May 28, 2017	488.86	489.45	-0.59
VW18-5A (48153)	April 6, 2018	488.56	498.36	Operational	496.10 on February 23, 2021	494.16	494.43	-0.27
VW18-5B (48155)	April 6, 2018	482.47	498.36	Operational	497.31 on February 23, 2021	495.50	495.86	-0.36
VW18-5C (48159)	April 6, 2018	474.54	498.36	Operational	488.607 on March 30, 2021	487.43	487.78	-0.35

Drawing 32122-NC070 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.
* Indicates above-ground (artesian) groundwater level

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TABLE NC070-3 – CONTINUED…
FALL 2022 – HWY 63:10 TRUCK STAGING AREA SLIDE
VIBRATING WIRE PIEZOMETER INSTRUMENTATION READING SUMMARY

Date Monitored: September 23, 2022

INSTRUMENT #	DATE INITIALIZED	TIP ELEV. (m)	GROUND ELEV. (m)	CURRENT STATUS	HIGHEST MEASURED GROUNDWATER LEVEL BGS (m)	CURRENT GROUNDWATER ELEV. (m)	PREVIOUS GROUNDWATER ELEV. (m)	CHANGE IN WATER LEVEL SINCE PREVIOUS READING (m)
VW18-6A (48154)	April 6, 2018	488.82	499.36	Operational	496.87 on February 1, 2021	494.82	495.11	-0.29
VW18-6B (48156)	April 6, 2018	482.12	499.36	Operational	499.52* on March 30, 2021	497.30	497.74	-0.44
VW18-6C (48160)	April 6, 2018	475.11	499.36	Operational	499.94* on March 30, 2021	497.09	497.62	-0.53
VW18-7A (48152)	April 5, 2018	489.97	501.03	Operational	497.71 on October 8, 2021	497.31	497.61	-0.30
VW18-7B (48158)	April 5, 2018	484.17	501.03	Operational	499.50 on April 14, 2021	498.74	499.09	-0.35
VW18-7C (48161)	April 5, 2018	476.25	501.03	Operational	488.74 on April 30, 2021	486.46	486.50	-0.04
VW18-8A (48151)	April 6, 2018	491.68	501.31	Operational	497.87 on June 2, 2021	497.53	497.85	-0.32
VW18-8B (48157)	April 6, 2018	483.30	501.31	Operational	498.49 on April 14, 2021	497.67	498.00	-0.33
VW18-8C (48162)	April 6, 2018	476.74	501.31	Operational	496.27 on March 30, 2021	495.18	495.56	-0.38

Drawing 32122-NC070 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.
* Indicates above-ground (artesian) groundwater level

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3. INTERPRETATION OF MONITORING RESULTS

Overall, the SIs outside of the east landslide toe berm area continued to show no discernible movement or creep rates of movement.

SI08-7 showed rates of movement of 0.5 mm/yr and 1.2 mm/yr over 7.2 m to 8.4 m depth and 12.6 m to 14.5 m depth, respectively, since the spring of 2022 readings. SI10-10R showed a rate of movement of 1.1 mm/yr over 10.9 m to 14.0 m depth, a rate of movement of 0.4 mm/yr over 22.5 m to 24.3 m depth and a rate of movement of 0.5 mm/yr over 24.3 m to 26.2 m depth. SI08-13 showed no discernible movement over 5.0 m to 8.7 m depth and a rate of movement of 0.2 mm/yr over 13.0 m to 14.8 m depth. SI11-12R showed no discernible movement over 14.1 m to 15.3 m depth and a rate of movement of less than 0.1 mm/yr over 15.3 m to 20.2 m depth.

The remainder of the SIs fall within the footprint of the east landslide toe berm. SI17-3 and SI18-7 have both shown no discernible movement since they were initialized. SI08-17 showed a rate of movement of 0.9 mm/yr over 14.1 m to 17.7 m since the spring of 2022 readings. SI08-21 showed a rate of movement of 1.2 mm/yr over 0.3 m to 2.7 m depth, no discernible movement over 4.6 m to 6.4 m depth and a rate of movement of 0.2 mm/yr over 12.5 m to 14.9 m depth. SI18-5 showed a rate of movement of 3.6 mm/yr over 4.8 m to 9.7 m depth. SI18-5 has been showing a pattern of gradually decelerating movement rates since completion of the east toe berm expansion in 2021. SI18-8 showed a rate of movement of 26.4 mm/yr over 0.9 m to 2.7 m depth. The spring of 2022 reading for SI18-8 showed a sharp deceleration in movement, and the current reading of the instrument represents an increase in movement rate of 23.7 mm/yr compared to the spring reading. However, the current movement rate for SI18-8 is well below the high movement rates observed in the instrument during the toe berm construction.

Overall, the SIs within the east toe berm expansion area showed decreases in rates of movement since the end of the recent construction, with the exception of SI18-8. The movement rates in the SIs within the east landslide toe berm should continue to be closely monitored to determine if the movement rates continue to decelerate.

Pneumatic piezometers PN08-7, PN08-10, PN08-13, PN08-21 and PN09-10R showed increases in groundwater level of 0.33 m, 0.21 m, 0.21 m, 1.22 m, and 0.32 m, respectively, since the spring of 2022 readings. PN08-17 showed a decrease in groundwater level of 0.06 m since the spring of 2022 reading. The pneumatic piezometer readings are summarized in Table NC070-2 above.

All of the vibrating wire piezometers showed decreases in groundwater level compared to the spring of 2022 readings, ranging from a decrease of 0.03 m in VW11-12RA and VW11-12RB, to a decrease of 0.59 m in VW17-3C. VW11-12RB and VW17-3A show artesian groundwater levels of 0.13 m and 6.16 m, respectively.

Vibrating wire piezometers VW11-12RB, VW17-3C, VW18-5A, VW18-5B, VW18-5C, VW18-6A, VW18-6B, VW18-6C, VW18-7A, VW18-8B, and VW18-8C showed decreases in water levels ranging from 0.06 in VW18-8B to 0.82 m in VW18-6C since the fall of 2021 readings.

The majority of the piezometer readings appear to have remained relatively stable since completion of the toe berm extension in 2021.

The vibrating wire piezometer readings are summarized in Table NC070-3 above. The pneumatic and vibrating wire piezometer readings are also plotted on Figure NC070-1 in Appendix A.

4. RECOMMENDATIONS

4.1 Future Work

The instruments should be read again in the spring of 2023.

4.2 Instrumentation Repairs

No instrument repairs are required at this time.

5. CLOSURE

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.
Principal | Senior Geotechnical Engineer

PROFESSIONAL ENGINEER ALBERTA
BRUCE W. NESTOR
ID 161284

November 10, 2022

PERMIT TO PRACTICE
THURBER ENGINEERING LTD.
RM SIGNATURE:
RM APEGA ID #: 91085
DATE: November 10, 2022
PERMIT NUMBER: P005186
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

Bruce Nestor, P.Eng.
Geotechnical Engineer
/jf

Attachments:

- Statement of Limitations and Conditions
- Appendix A
  - Field Inspector's report
  - Site Plans Showing Approximate Instrument Locations (Drawing No. 32122-NC070-1 and 32122-NC070-2)
  - SI Reading Plots
  - Figure NC070-1 (Piezometric Elevations)

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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.

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.

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

FALL 2022

APPENDIX A
DATA PRESENTATION AND SITE PLANS

SITE NC070: HWY 63:10 TRUCK STAGING AREA

ALBERTA TRANSPORTATION
NORTH CENTRAL REGION - ATHABASCA AND FORT McMURRAY DISTRICTS
INSTRUMENTATION MONITORING FIELD SUMMARY (NC070)
FALL 2022

Location: Truck Staging Area (HWY 63:10 C1-1OR 19.407)	**Readout:**
File Number: 32122	**Casing Diameter** 2.75/2.34
Probe: RST SI SET 8R	**Temp:** 8
Cable: RST SI SET 8R	**Read by:** NKR/KTC

SLOPE INCLINOMETER (SI) READINGS

SI#	GPS Location RST		Date	Stickup (m)	Depth from top of Casing (ft)	Azimuth of A+ Groove	Current Bottom Depth Readings				Probe/ Reel #	Remarks
	Northing	Easting					A+	A-	B+	B-		
SI08-7	6253715	479380	23-Sep-22	0.47	65 to 3	4	-174	189	872	-863	8R/8R	
SI10-10R	6253651	479161	23-Sep-22	0.95	99 to 1	336	-18	38	164	-155	8R/8R	
SI08-13	6253652	479009	23-Sep-22	0.75	63 to 5	326	-736	716	94	-96	8R/8R	
SI08-17	6253786	479305	23-Sep-22	0.88	98 to 6	335	184	-165	153	-142	8R/8R	
SI08-21	6253929	479416	23-Sep-22	1.23	114 to 6	345	-116	138	20	-14	8R/8R	*
SI11-12R	6253716	479102	23-Sep-22	0.82	98 to 2	350	-183	201	-24	36	8R/8R	
SI17-3	6253813	479454	23-Sep-22	1.52	118 to 2	328	72	-52	-148	162	8R/8R	*
SI18-5	6253935	479349	23-Sep-22	1.6	92 to 2	326	190	-170	115	-101	8R/8R	*
SI18-7	6253820	479429	23-Sep-22	1.8	104 to 2	358	871	-852	-226	240	8R/8R	*
SI18-8	6253785	479474	23-Sep-22	1.28	104 to 2	297	178	-157	963	-952	8R/8R	*

INSPECTOR REPORT

SI 17-3 Casing breaking off at 9 ft.
SI8-17 Casing breaking off at 9 ft.

ALBERTA TRANSPORTATION
NORTH CENTRAL REGION - ATHABASCA AND FORT McMURRAY DISTRICTS
INSTRUMENTATION MONITORING FIELD SUMMARY (NC070)
FALL 2022

Location: Truck Staging Area (HWY 63:10 C1-1OR 19.407)
File Number: 32122
Readout: RST PN C108 Unit 1/RST VW 2106 Unit 2
Temp: 8
Read by: NKR/KTC

PNEUMATIC PIEZOMETER (PN) READINGS

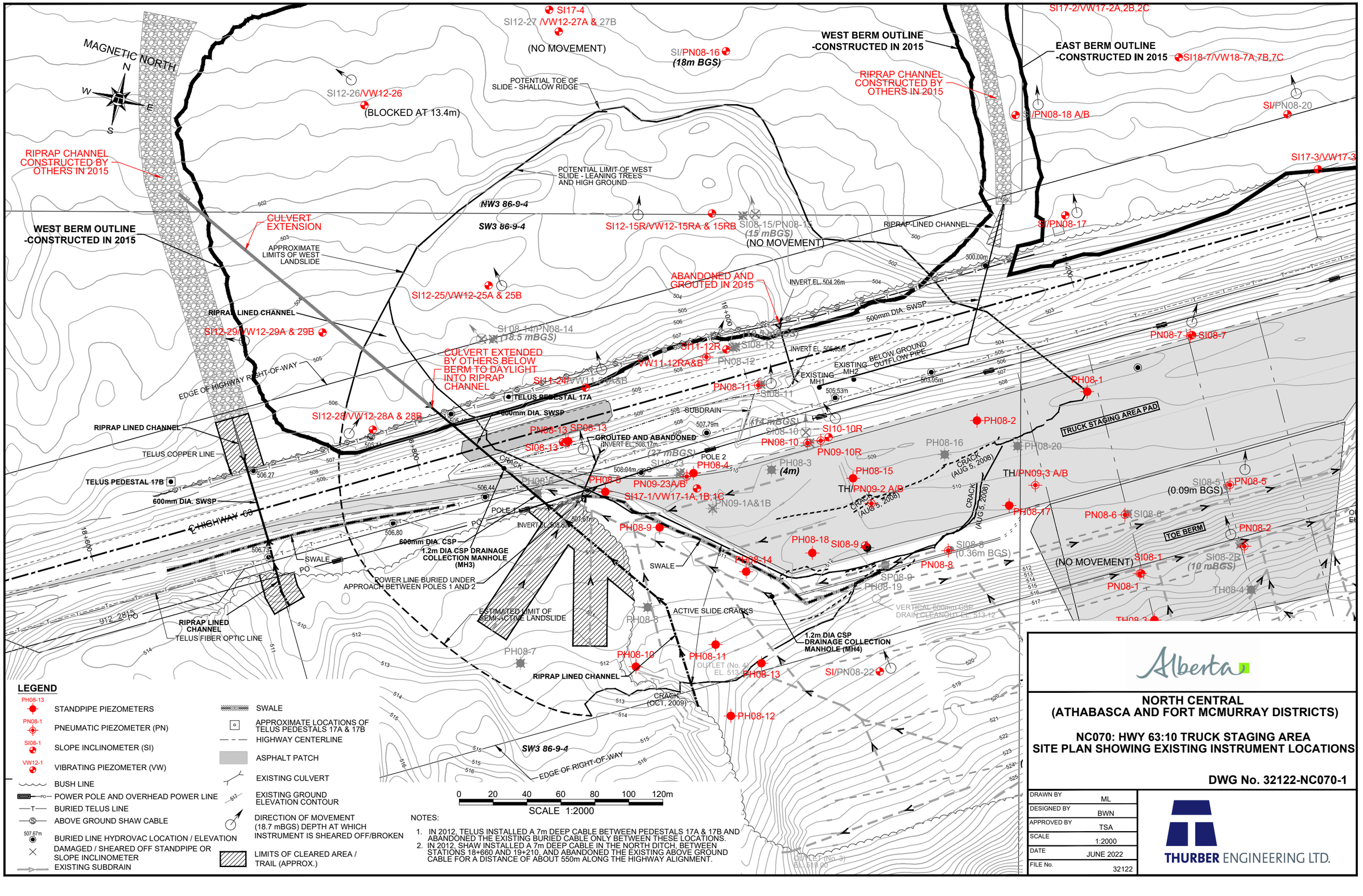
PN#	GPS Location (UTM 12)		Date	Reading	Identification	Remarks
	Northing	Easting		kPa	Number/ Tip BGS	
PN08-7	6253715	479380	23-Sep-22	20.8	(31957) tip at 7.8 m	
PN08-10	6253652	479155	23-Sep-22	52.9	(31973) tip at 6.4 m	
PN08-13	6253652	479009	23-Sep-22	58.8	(31836) tip at 7.6 m	
PN08-17	6253786	479305	23-Sep-22	123.2	(32096) tip at 12.34m	
PN08-21	6253929	479416	23-Sep-22	132.6	(32303) tip at 15.02m	
PN09-10R	6253651	479161	23-Sep-22	114.4	(32611) tip at 14.2 m	

VIBRATING WIRE PIEZOMETER (VW) READINGS

VW#	GPS (UTM 12)		Date	Identification	Reading		Remarks
	Northing	Easting		Number	B Unit	Temp (°C)	
VW11-12RA	6253716	479102	23-Sep-22	15893	8600.4	4,4	
VW11-12RB	6253716	479102	23-Sep-22	15907	7018.8	4.1	
VW17-3A	6253813	479454	23-Sep-22	42431	7554.4	3.8	
VW17-3B	6253813	479454	23-Sep-22	42429	8149.8	3.8	
VW17-3C	6253813	479454	23-Sep-22	42432	7720.7	3.6	
VW18-5A	6253935	479349	23-Sep-22	48153	8468.6	1.6	
VW18-5B	6253935	479349	23-Sep-22	48155	7577.6	1.3	
VW18-5C	6253935	479349	23-Sep-22	48159	8080.8	3	
VW18-6A	6253920	479465	23-Sep-22	48154	8219.8	1.6	
VW18-6B	6253920	479465	23-Sep-22	48156	7646.7	2.3	
VW18-6C	6253920	479465	23-Sep-22	48160	7544.8	3.1	
VW18-7A	6253820	479429	23-Sep-22	48152	8243.5	2.6	
VW18-7B	6253820	479429	23-Sep-22	48158	8012	3	
VW18-7C	6253820	479429	23-Sep-22	48161	8186	2.6	
VW18-8A	6253785	479474	23-Sep-22	48151	8144.9	0.9	
VW18-8B	6253785	479474	23-Sep-22	48157	7983.4	3.7	
VW18-8C	6253785	479474	23-Sep-22	48162	7950.4	2.4	

INSPECTOR REPORT

Note: R denotes a replacement instrument.



LEGEND

- PH08-13 — STANDPIPE PIEZOMETERS
- PN08-1 — PNEUMATIC PIEZOMETER (PN)
- SI08-1 — SLOPE INCLINOMETER (SI)
- VW12-1 — VIBRATING PIEZOMETER (VW)
- BUSH LINE
- PO — POWER POLE AND OVERHEAD POWER LINE
- T — BURIED TELUS LINE
- S — ABOVE GROUND SHAW CABLE
- 507.67m — BURIED LINE HYDROVAC LOCATION / ELEVATION
- DAMAGED / SHEARED OFF STANDPIPE OR SLOPE INCLINOMETER
- EXISTING SUBDRAIN
- SWALE
- APPROXIMATE LOCATIONS OF TELUS PEDESTALS 17A & 17B
- HIGHWAY CENTERLINE
- ASPHALT PATCH
- EXISTING CULVERT
- 507 — EXISTING GROUND ELEVATION CONTOUR
- DIRECTION OF MOVEMENT (18.7 mBGS) DEPTH AT WHICH INSTRUMENT IS SHEARED OFF/BROKEN
- LIMITS OF CLEARED AREA / TRAIL (APPROX.)

NOTES:

1. IN 2012, TELUS INSTALLED A 7m DEEP CABLE BETWEEN PEDESTALS 17A & 17B AND ABANDONED THE EXISTING BURIED CABLE ONLY BETWEEN THESE LOCATIONS.
2. IN 2012, SHAW INSTALLED A 7m DEEP CABLE IN THE NORTH DITCH, BETWEEN STATIONS 18+660 AND 19+210, AND ABANDONED THE EXISTING ABOVE GROUND CABLE FOR A DISTANCE OF ABOUT 550m ALONG THE HIGHWAY ALIGNMENT.

Alberta

NORTH CENTRAL
(ATHABASCA AND FORT MCMURRAY DISTRICTS)

NC070: HWY 63:10 TRUCK STAGING AREA
SITE PLAN SHOWING EXISTING INSTRUMENT LOCATIONS

DWG No. 32122-NC070-1

DRAWN BY	ML
DESIGNED BY	BWN
APPROVED BY	TSA
SCALE	1:2000
DATE	JUNE 2022
FILE No.	32122

THURBER ENGINEERING LTD.

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SI18-5/VW18-5A,5B,5C

SI18-6/VW18-6A,6B,6C
SHEARED

MAGNETIC NORTH
N
W
E
S

SI/PN08-19
(NO MOVEMENT)

SI/PN08-21

SI17-2/VW17-2A,2B,2C

WEST BERM OUTLINE
-CONSTRUCTED IN 2015

EAST BERM OUTLINE
-CONSTRUCTED IN 2015

SI18-7/VW18-7A,7B,7C

SI18-8/VW18-8A,8B,8C

RIPRAP CHANNEL
CONSTRUCTED BY
OTHERS IN 2015

SI/PN08-18 A/B

SI/PN08-20

SI17-3/VW17-3A,3B,3C

19+400

19+600

NE3 86-9-4

SI08-15/PN08-15
(15 mBGS)
(NO MOVEMENT)

RIPRAP-LINED CHANNEL

SI/PN08-17

1.5
7.0
1.5

PO

AND
2015

INVERT EL. 504.26m

500mm DIA. SWSP

D = 38°8'55"
R = 400m

OUTLET (No. 2)
EL. 505.23

INVERT EL. 505.06m

EXISTING BELOW GROUND OUTFLOW PIPE

EXISTING MH2

EXISTING MH1

505.53m

503.05m

PN08-7 SI08-7

PH08-1

SI08-12

SI08-11

(14 mBGS)

SI08-10

SI10-10R

PN08-10

PN09-10R

PH08-2

PH08-16

PH08-20

TRUCK STAGING AREA PAD

PH08-3
(4m)

PH08-15

TH/PN09-2 A/B

CRACK
(AUG 5, 2008)

TH/PN09-3 A/B

SI08-5
(0.09m BGS)

PN08-5

PH08-17

PN08-6 SI08-6

TOE BERM

OUTLET (No. 1)
EL. 514.23

PN08-2

PH08-18

SI08-9

SI08-8
(0.36m BGS)

PH08-14

PN08-8

SP08-9

PH08-19

(NO MOVEMENT)

SI08-1

SI08-2B
(10 mBGS)

PN08-1

TH08-4

VERTICAL 600mm CSP
DRAIN CLEANOUT EL. 513.12

TH08-3

TH08-6

1.2m DIA CSP
DRAINAGE COLLECTION
MANHOLE (MH4)

TH08-5

TH08-8

TH06-5

(JUNE 30, 2008)

PH08-13

SI/PN08-22

TH08-7

PN08-4
(14.6 mBGS)

SI08-4
(13.9 mBGS)

SI08-3

PN08-3

LEGEND

- PH08-13 — STANDPIPE PIEZOMETERS
- PN08-1 — PNEUMATIC PIEZOMETER (PN)
- SI08-1 — SLOPE INCLINOMETER (SI)
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NOTES:

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3. THE EAST AND WEST BERMS WERE CONSTRUCTED IN 2015.

0 20 40 60 80 100 120m
SCALE 1:2000

Alberta

NORTH CENTRAL
(ATHABASCA AND FORT MCMURRAY DISTRICTS)

NC070: HWY 63:10 TRUCK STAGING AREA
SITE PLAN SHOWING EXISTING INSTRUMENT LOCATIONS

DWG No. 32122-NC070-2

DRAWN BY	ML
DESIGNED BY	BWN
APPROVED BY	TSA
SCALE	1:2000
DATE	JUNE 2022
FILE No.	32122

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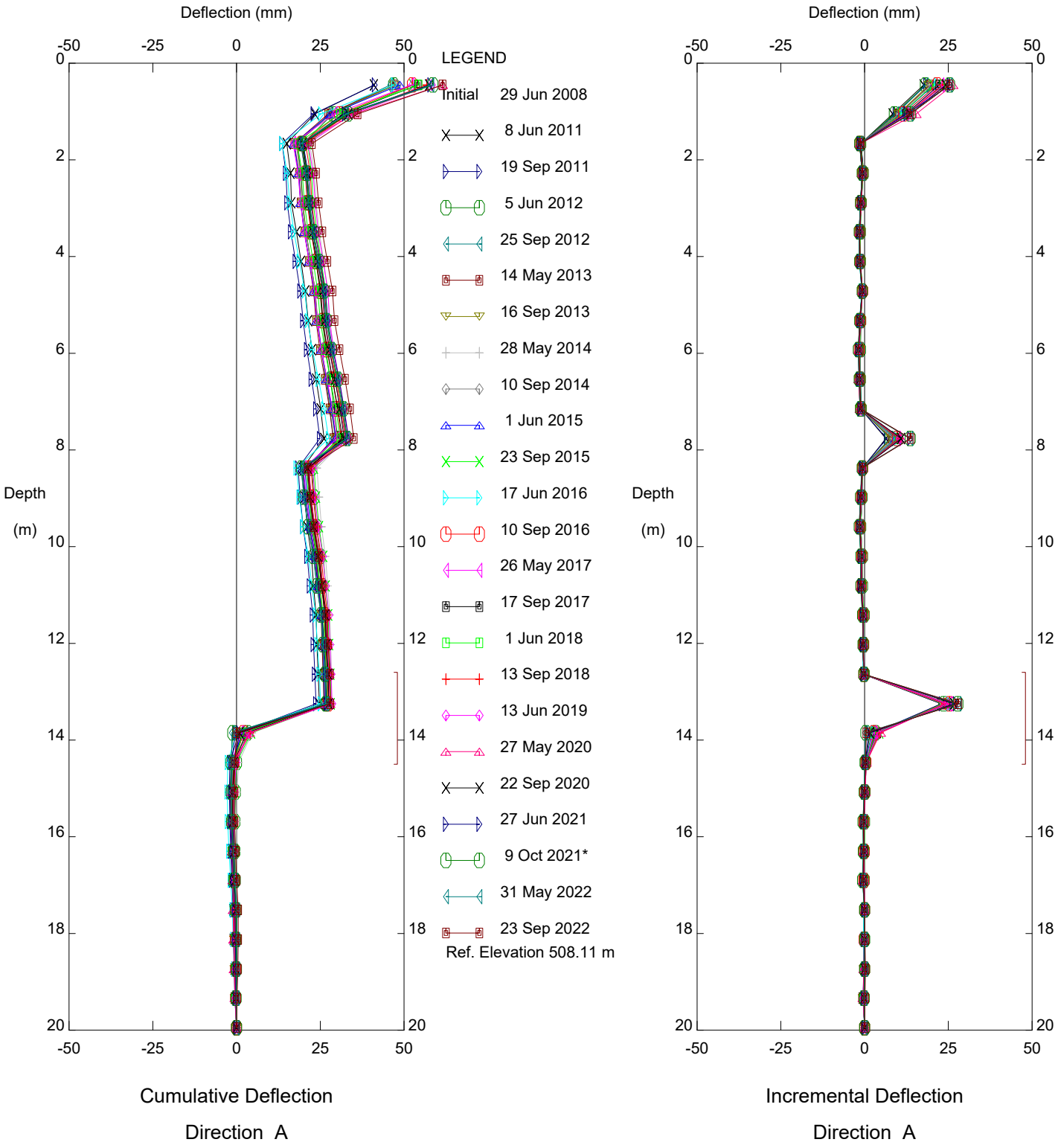
Thurber Engineering Ltd



Cumulative Deflection

Direction A

Incremental Deflection

Direction A

Hwy 63 TSA (East Slide), Inclinometer 08-7

Alberta Transportation

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

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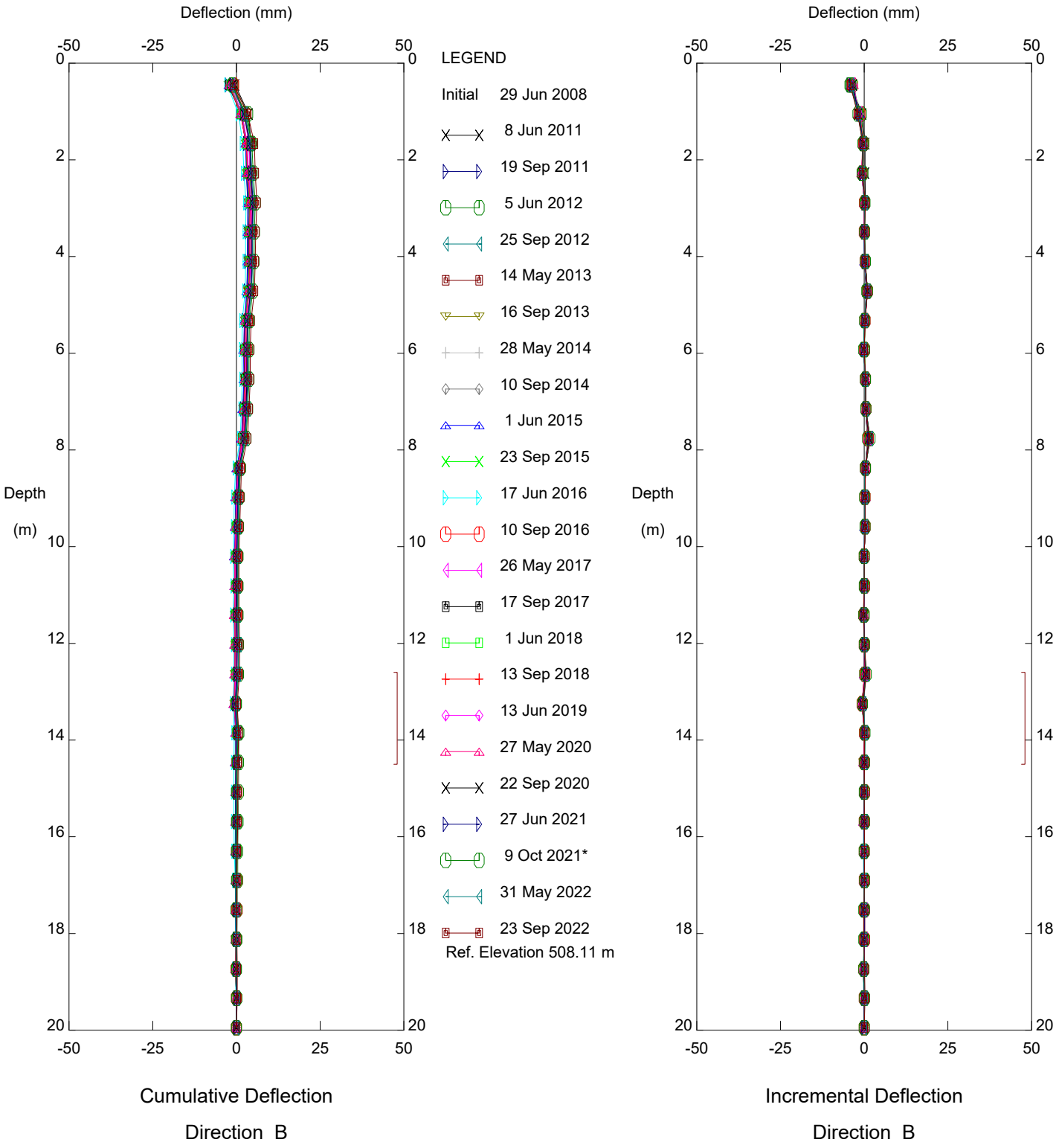
Thurber Engineering Ltd



Cumulative Deflection

Direction B

Incremental Deflection

Direction B

Hwy 63 TSA (East Slide), Inclinometer 08-7

Alberta Transportation

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

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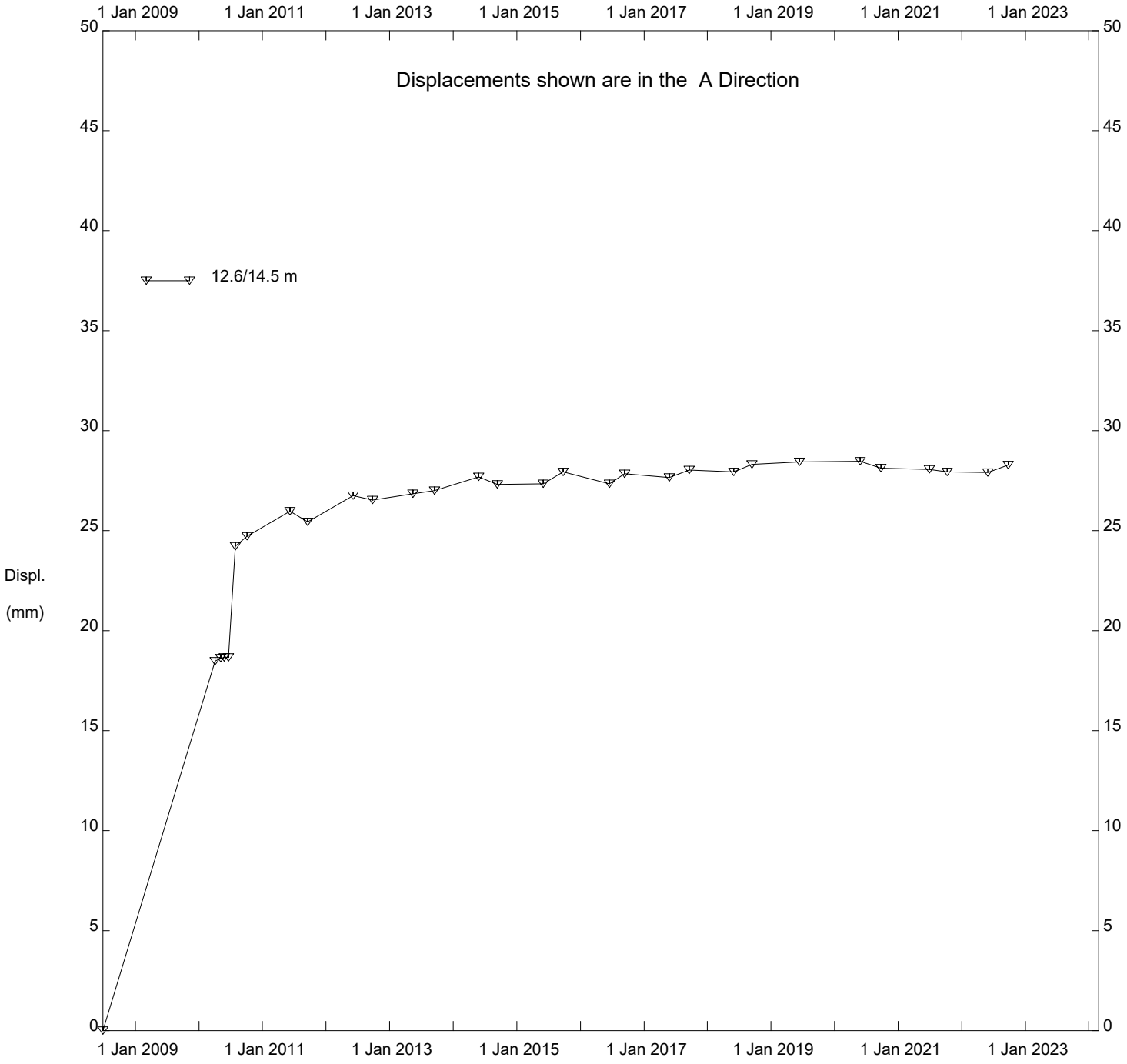
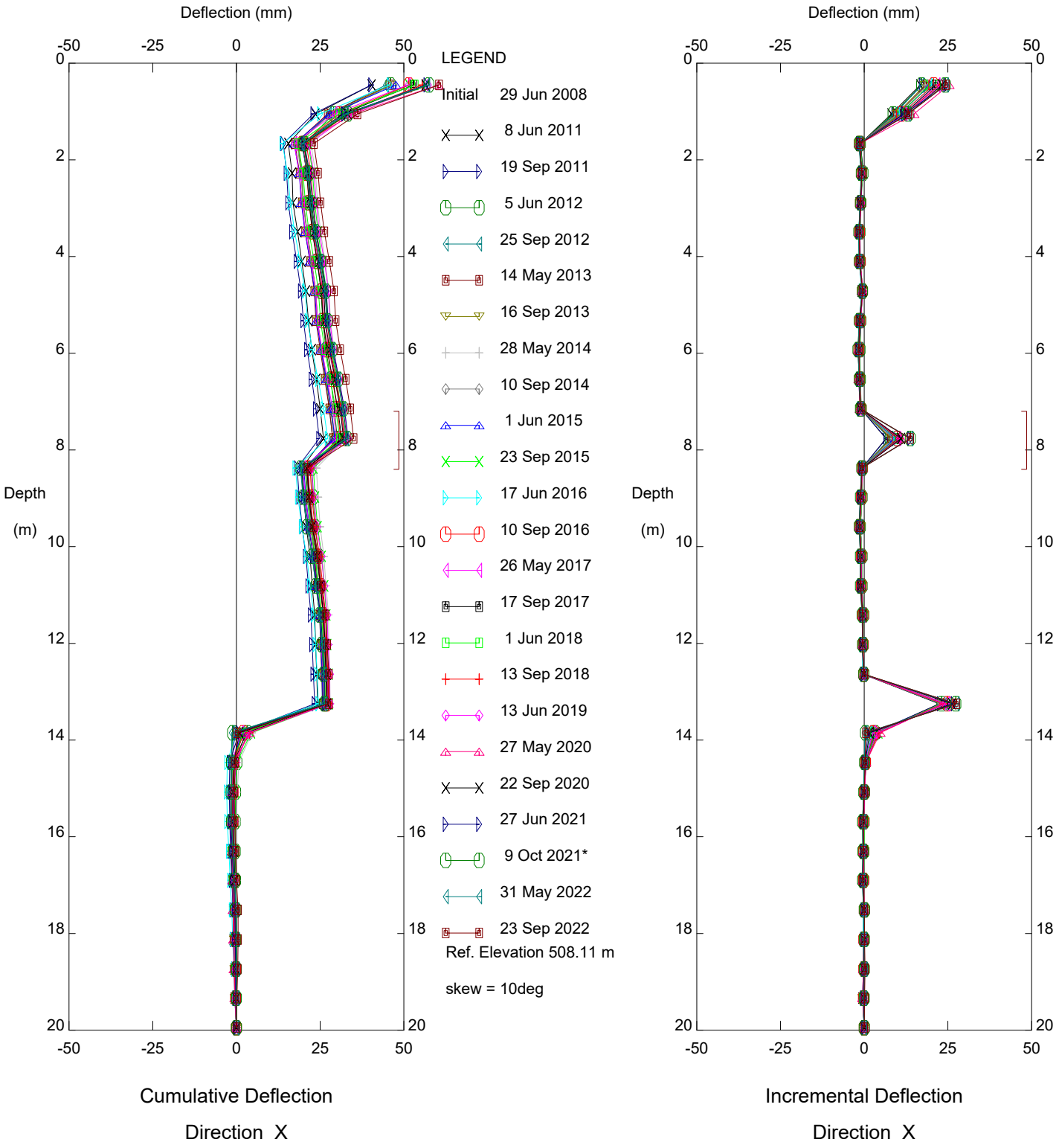


Hwy 63 TSA (East Slide), Inclinometer 08-7

Alberta Transportation

Thurber Engineering Ltd



Cumulative Deflection

Direction X

Incremental Deflection

Direction X

Hwy 63 TSA (East Slide), Inclinometer 08-7

Alberta Transportation

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

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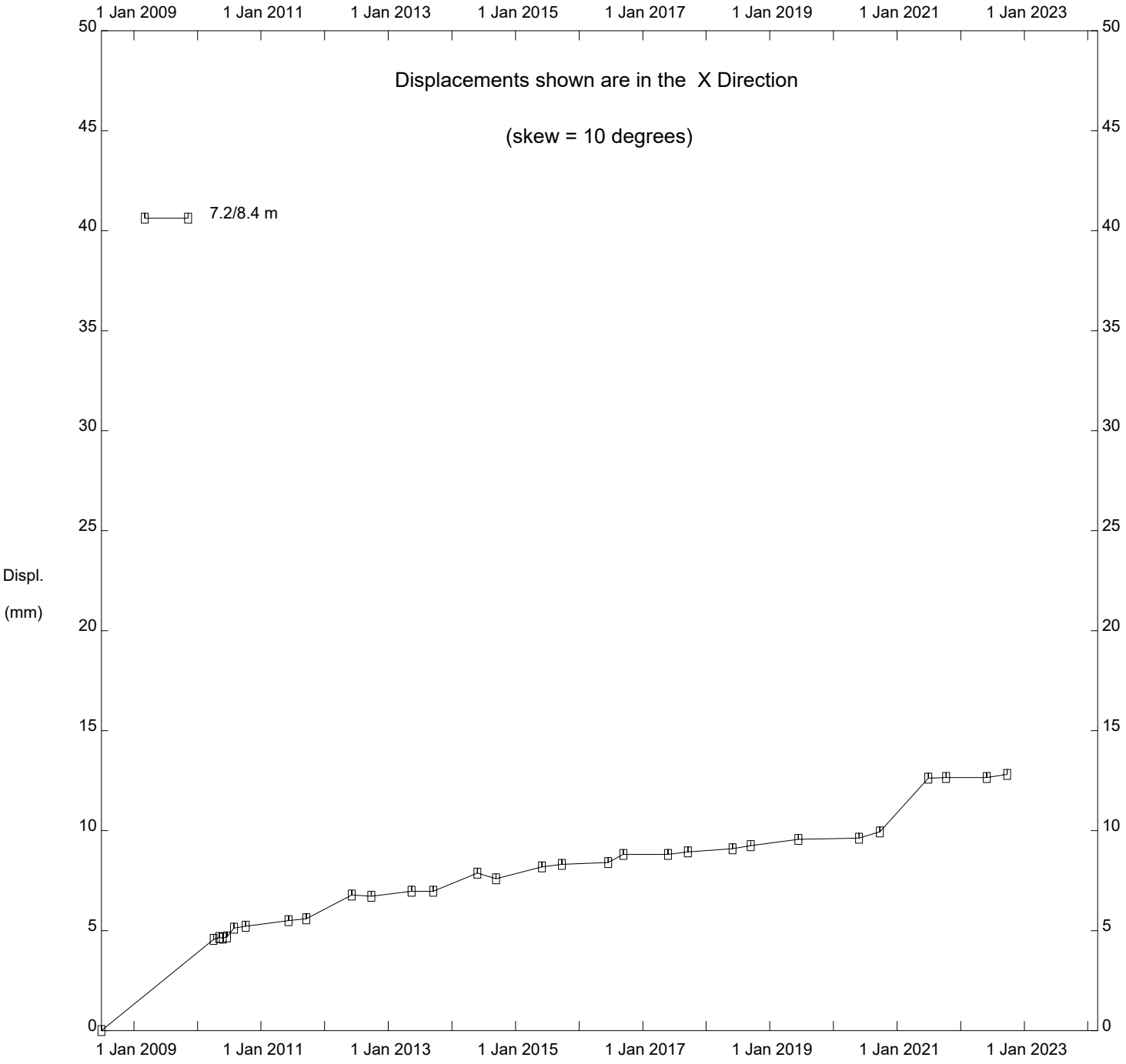
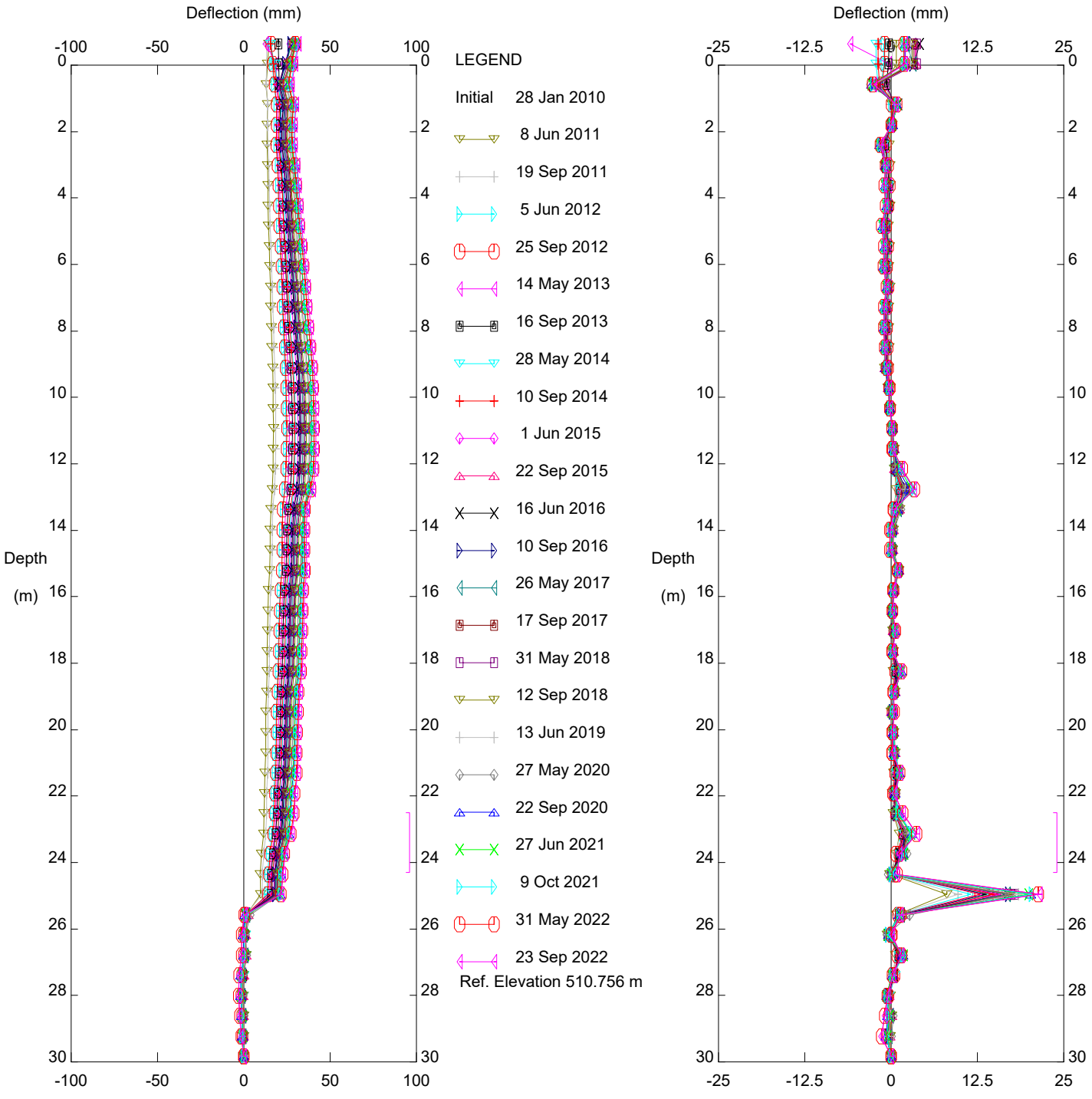
Thurber Engineering Ltd



Hwy 63 TSA (East Slide), Inclinometer 08-7

Alberta Transportation

Thurber Engineering Ltd



Cumulative Deflection

Direction A

Incremental Deflection

Direction A

HWY 63 TSA (West Slide), Inclinometer 10-10R

Alberta Transportation

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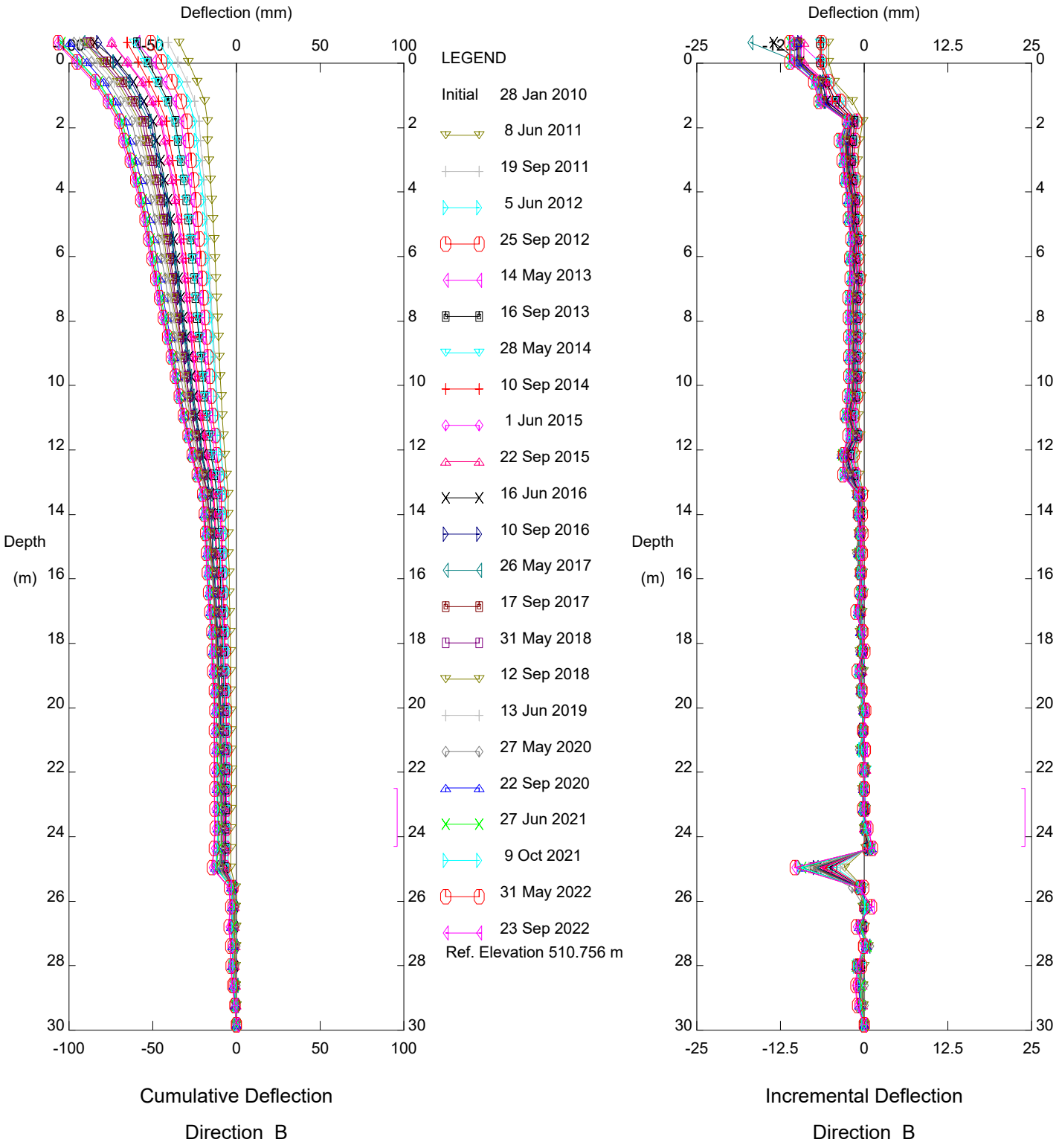

Cumulative Deflection

Direction B

Incremental Deflection

Direction B

HWY 63 TSA (West Slide), Inclinometer 10-10R

Alberta Transportation

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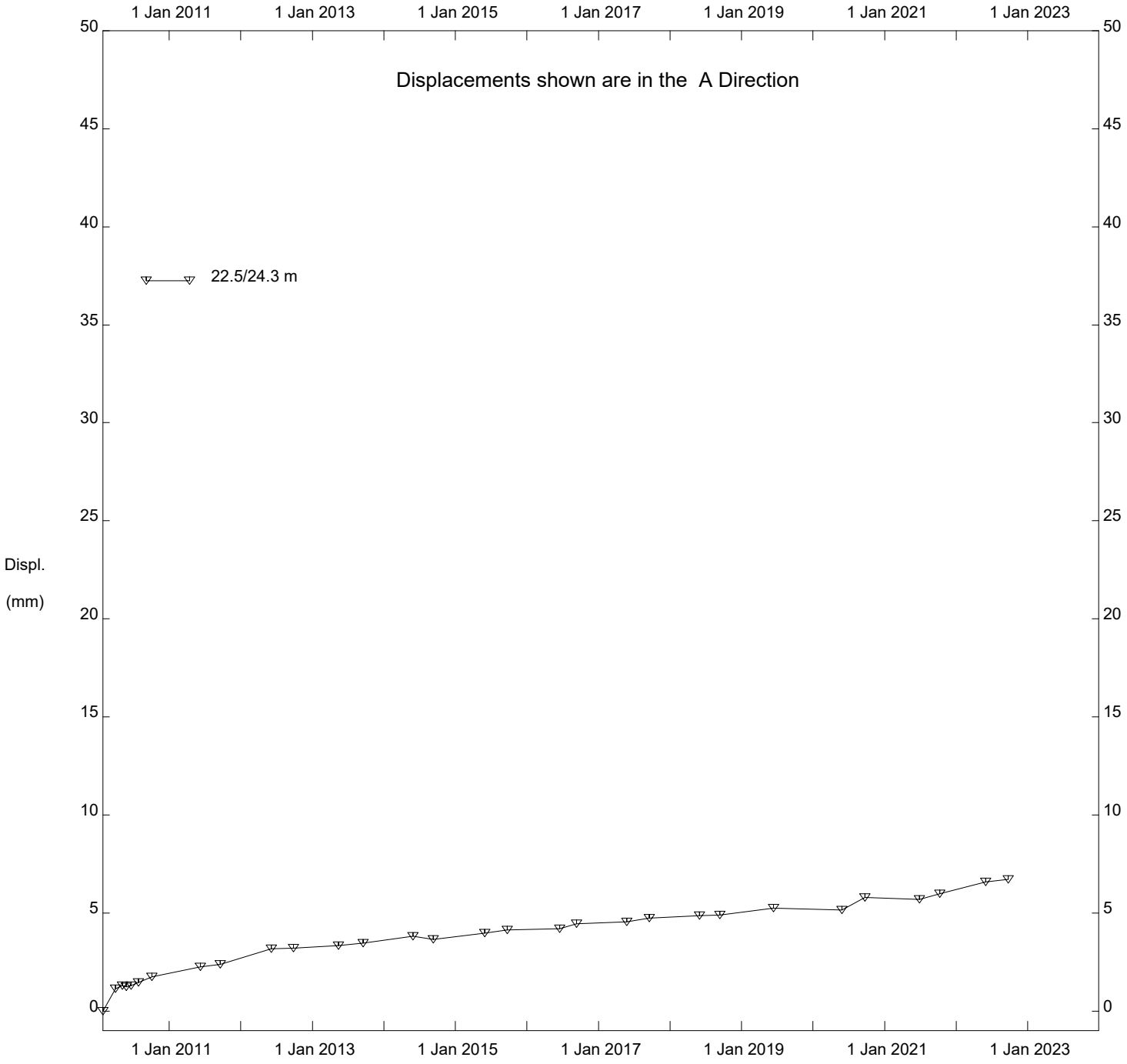
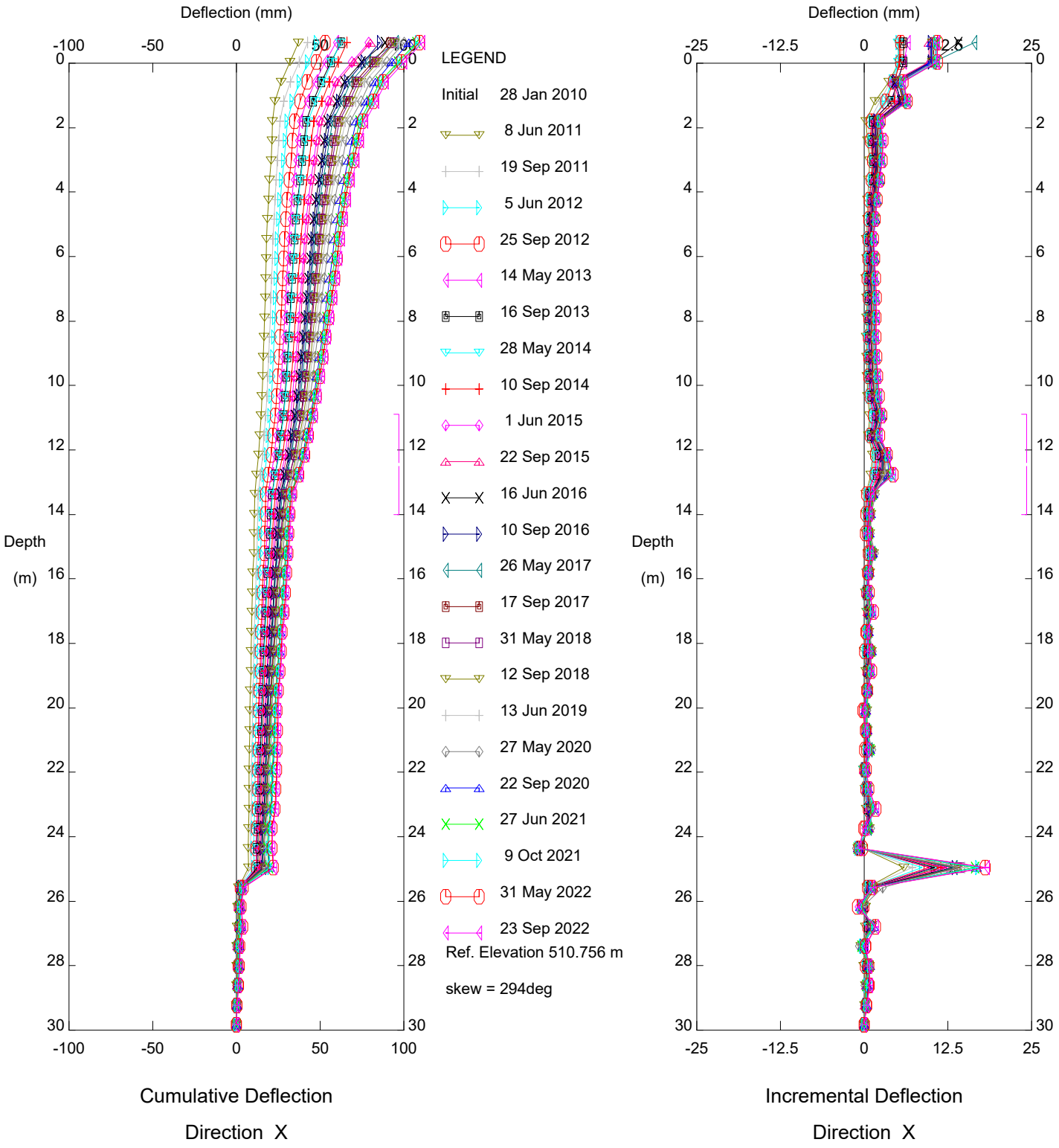
Thurber Engineering Ltd



HWY 63 TSA (West Slide), Inclinometer 10-10R

Alberta Transportation

Thurber Engineering Ltd



Cumulative Deflection

Direction X

Incremental Deflection

Direction X

HWY 63 TSA (West Slide), Inclinometer 10-10R

Alberta Transportation

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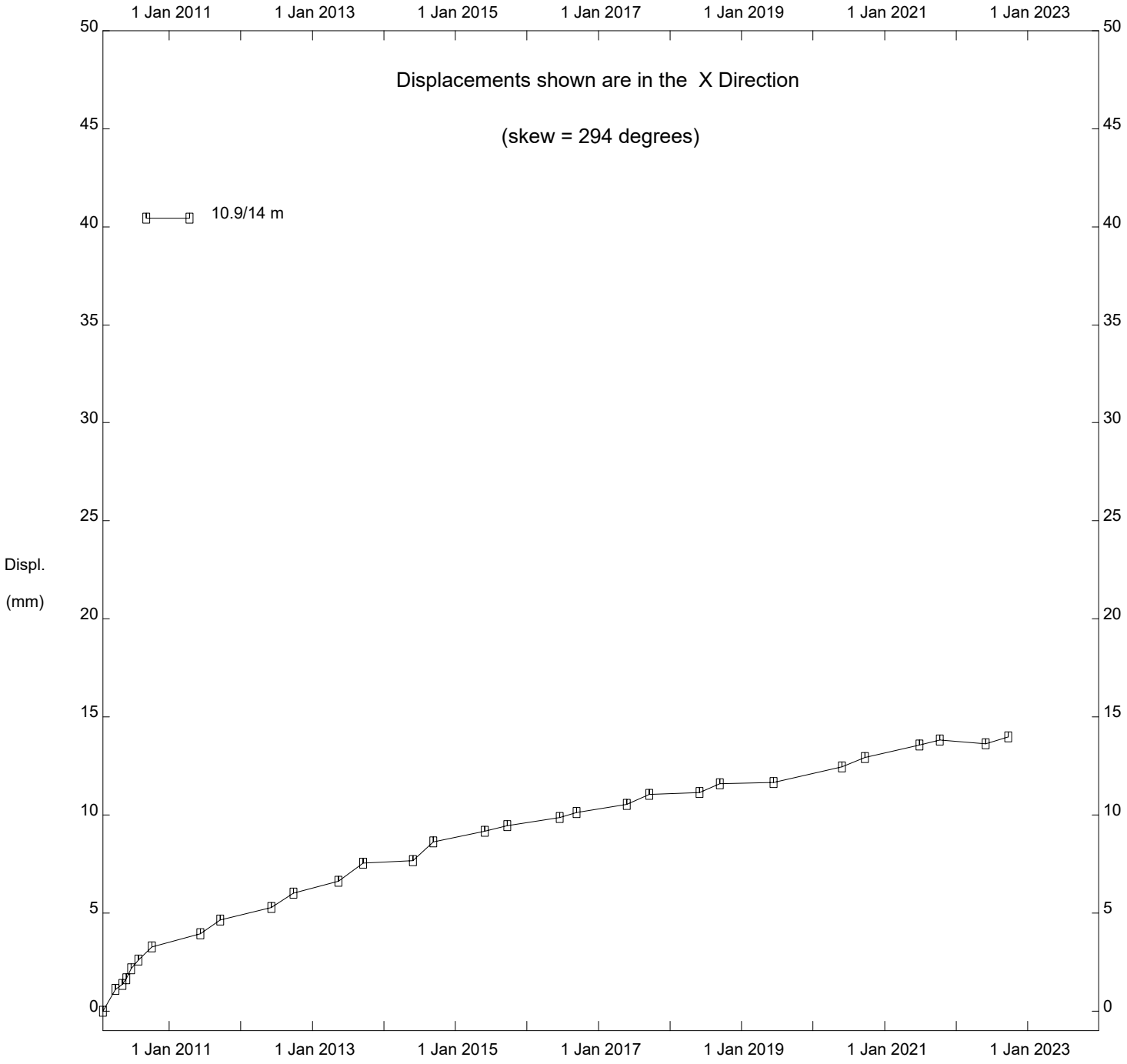
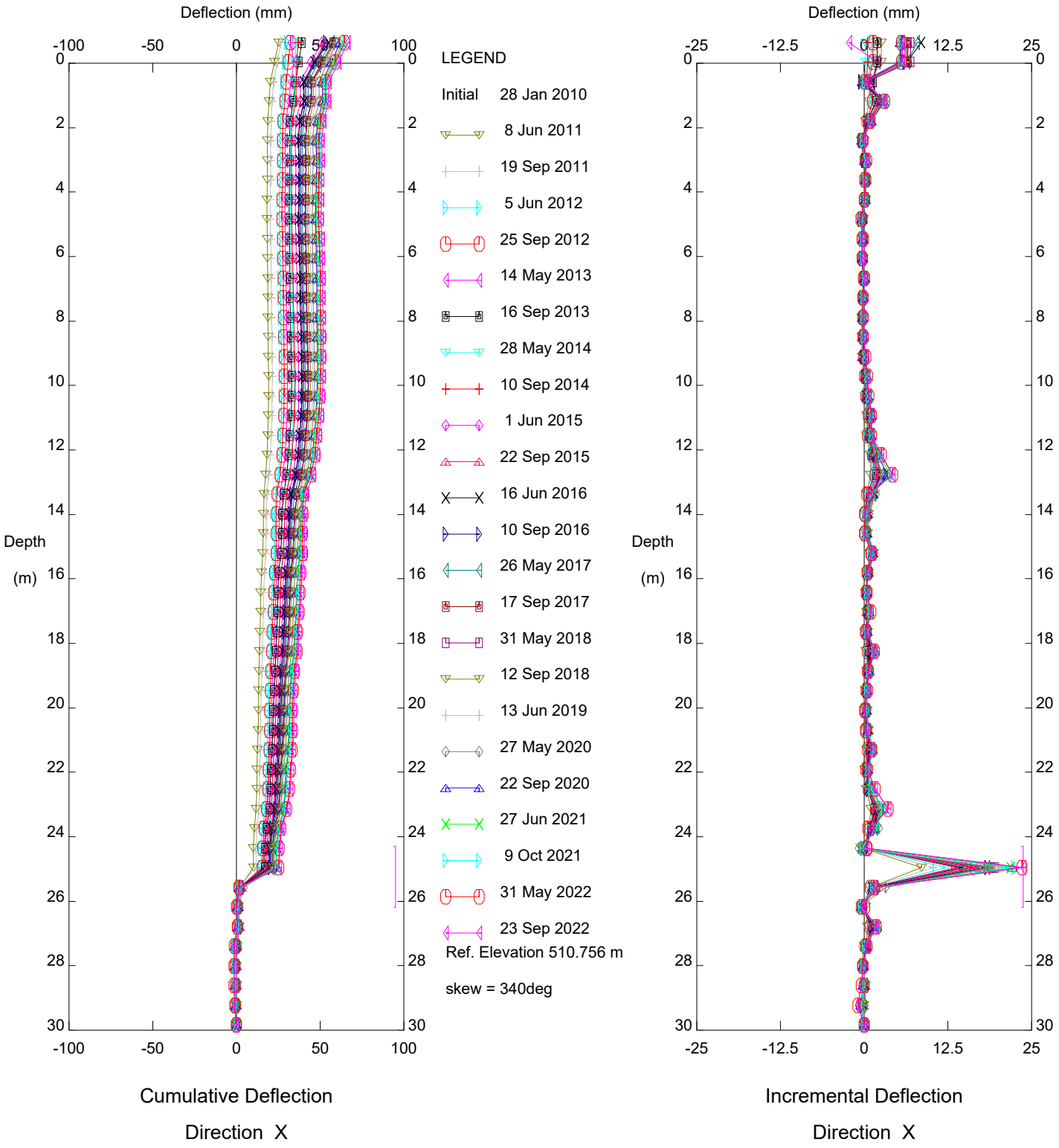
Thurber Engineering Ltd



HWY 63 TSA (West Slide), Inclinometer 10-10R

Alberta Transportation

Thurber Engineering Ltd



Cumulative Deflection

Direction X

Incremental Deflection

Direction X

HWY 63 TSA (West Slide), Inclinometer 10-10R

Alberta Transportation

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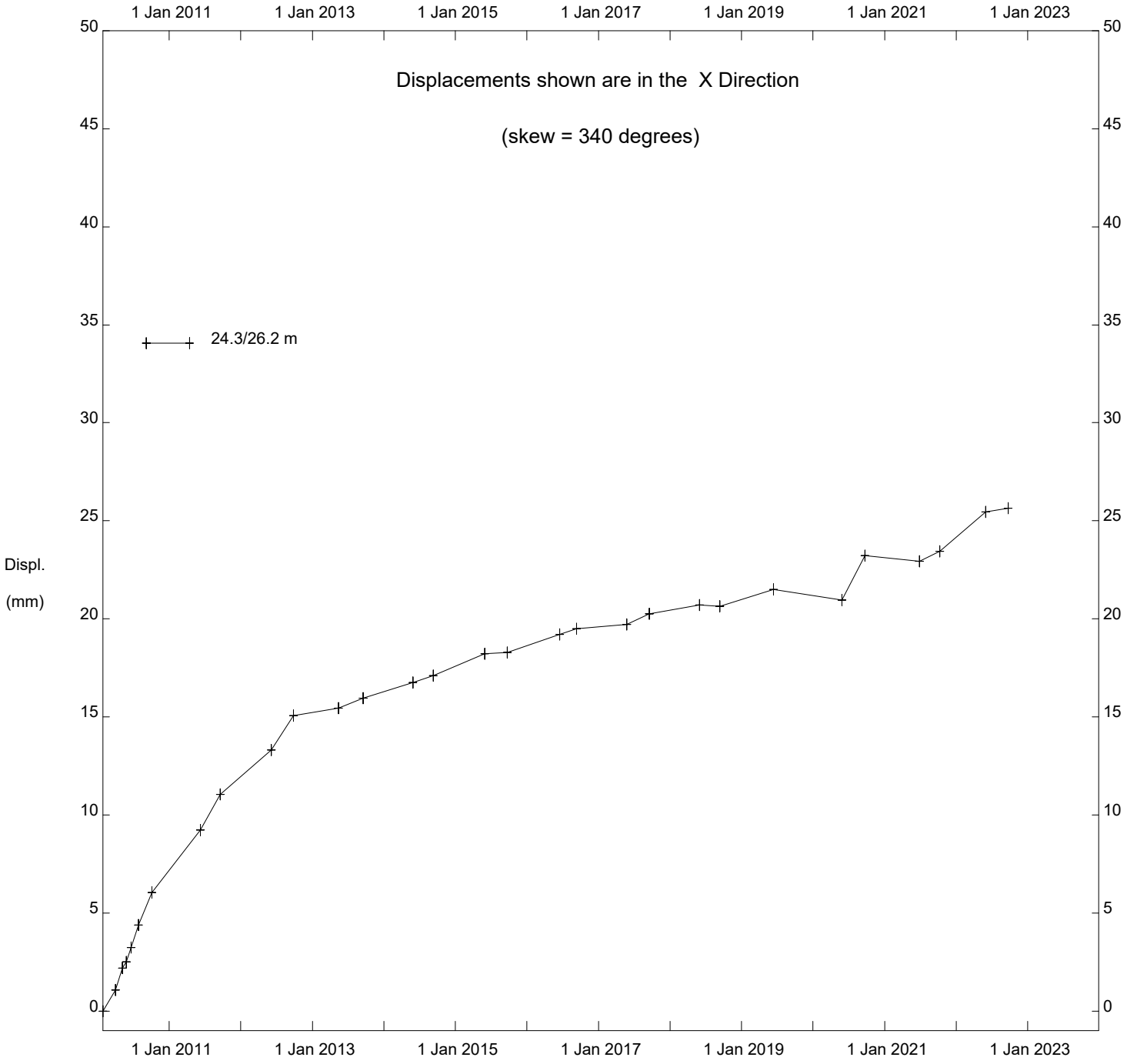
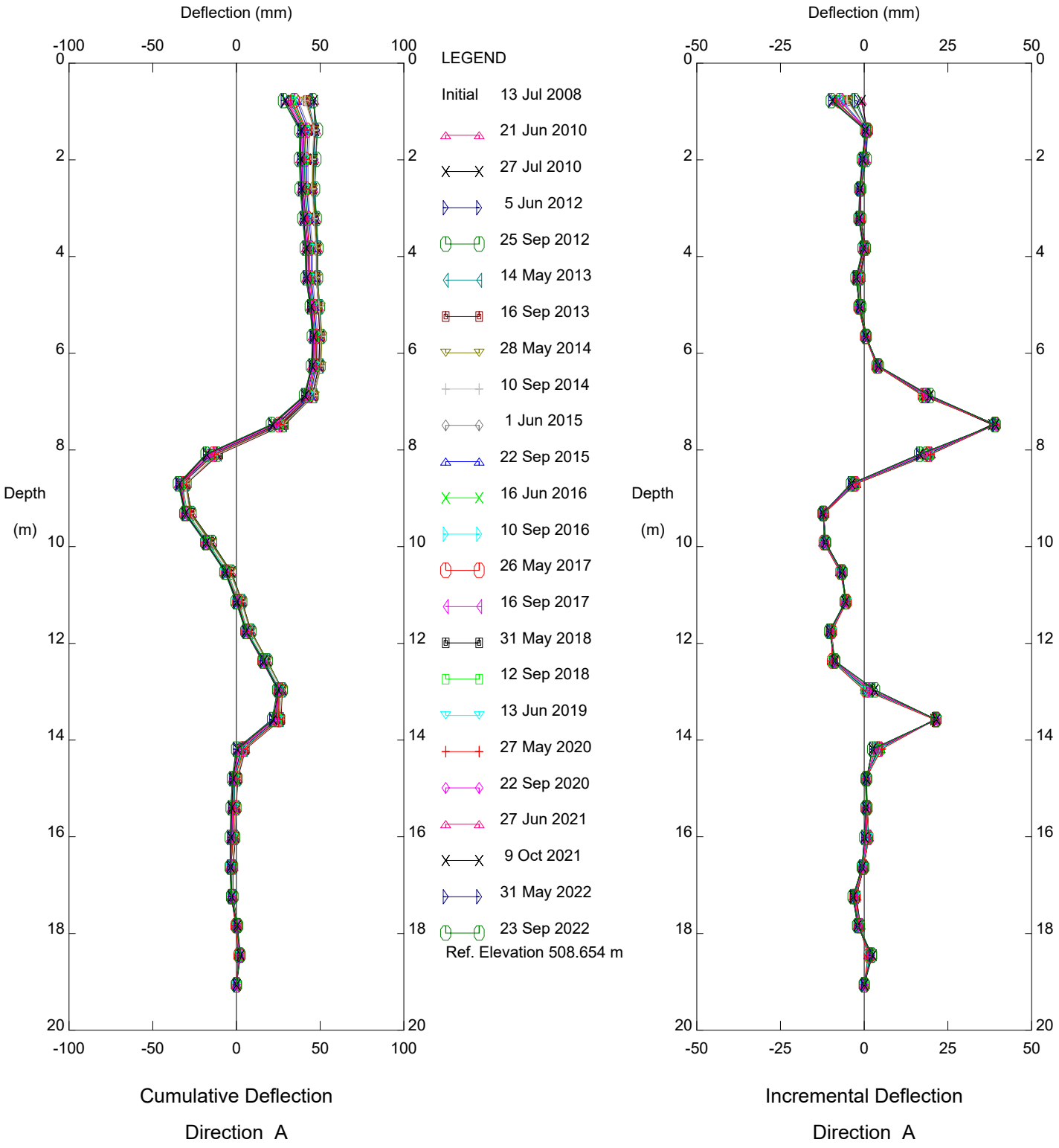
Thurber Engineering Ltd



HWY 63 TSA (West Slide), Inclinometer 10-10R

Alberta Transportation

Thurber Engineering Ltd



Cumulative Deflection

Direction A

Incremental Deflection

Direction A

Hwy 63 TSA (West Slide), Inclinometer 08-13

Alberta Transportation

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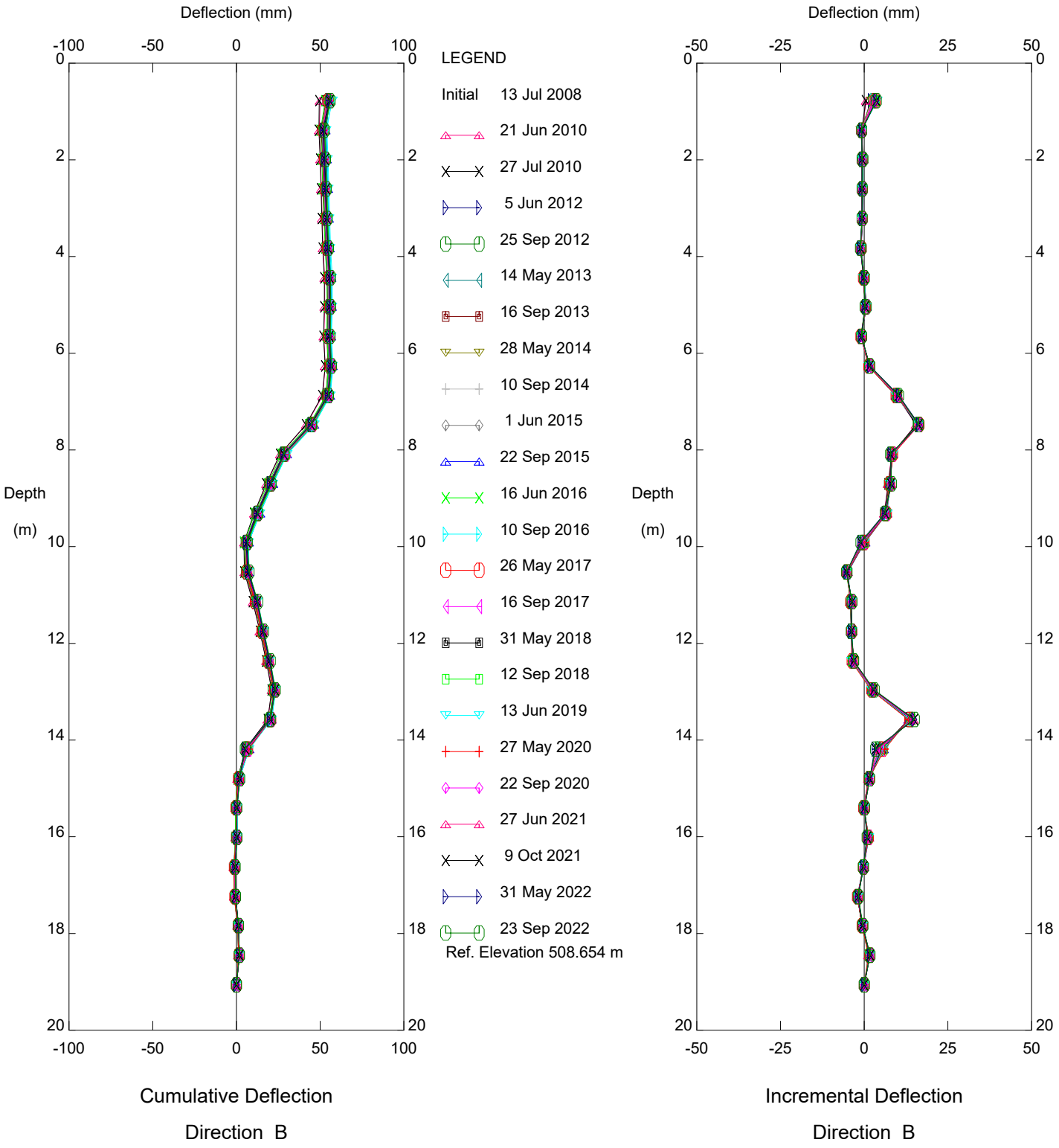

Cumulative Deflection

Direction B

Incremental Deflection

Direction B

Hwy 63 TSA (West Slide), Inclinometer 08-13

Alberta Transportation

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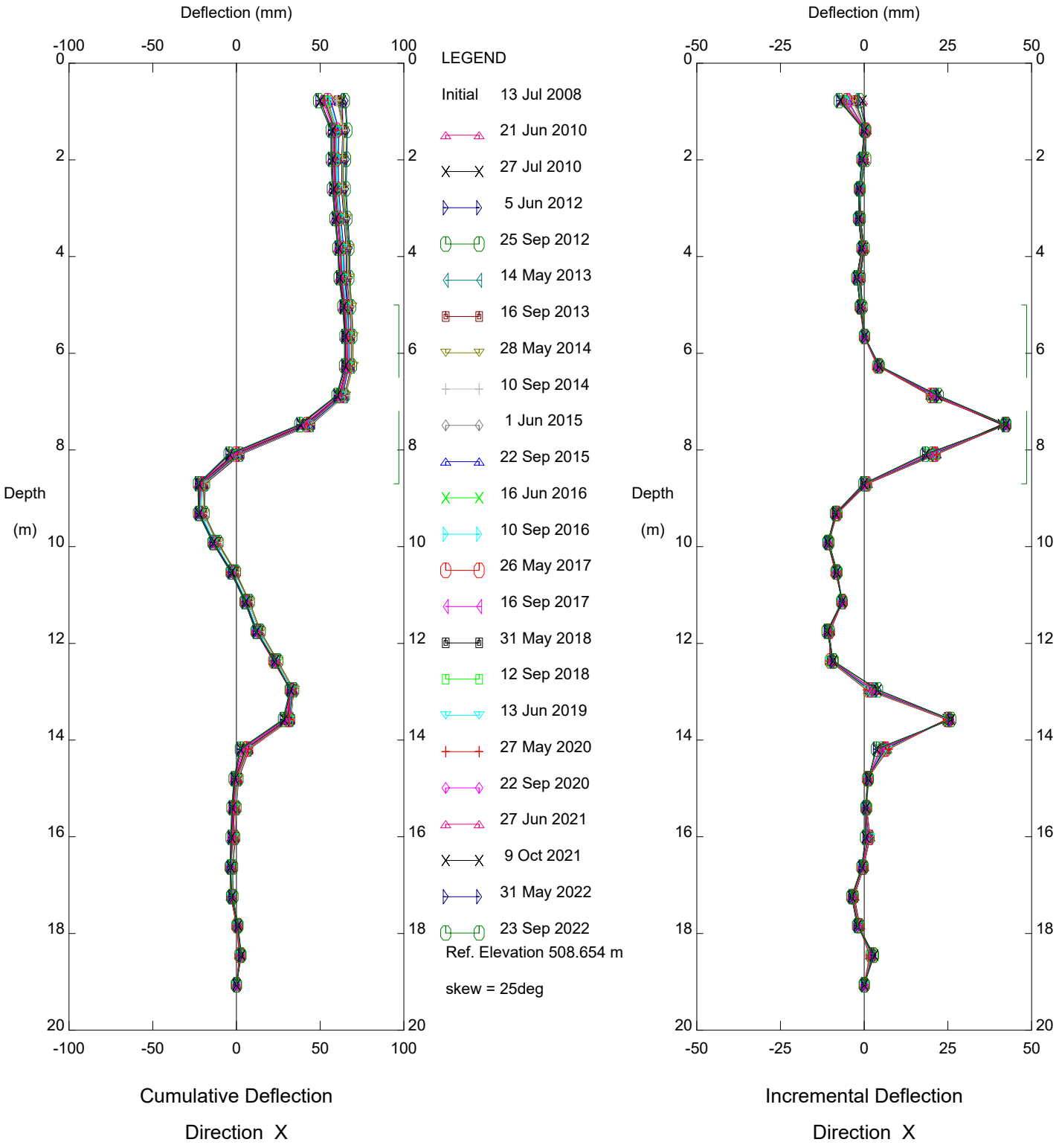

Cumulative Deflection

Direction X

Incremental Deflection

Direction X

Hwy 63 TSA (West Slide), Inclinometer 08-13

Alberta Transportation

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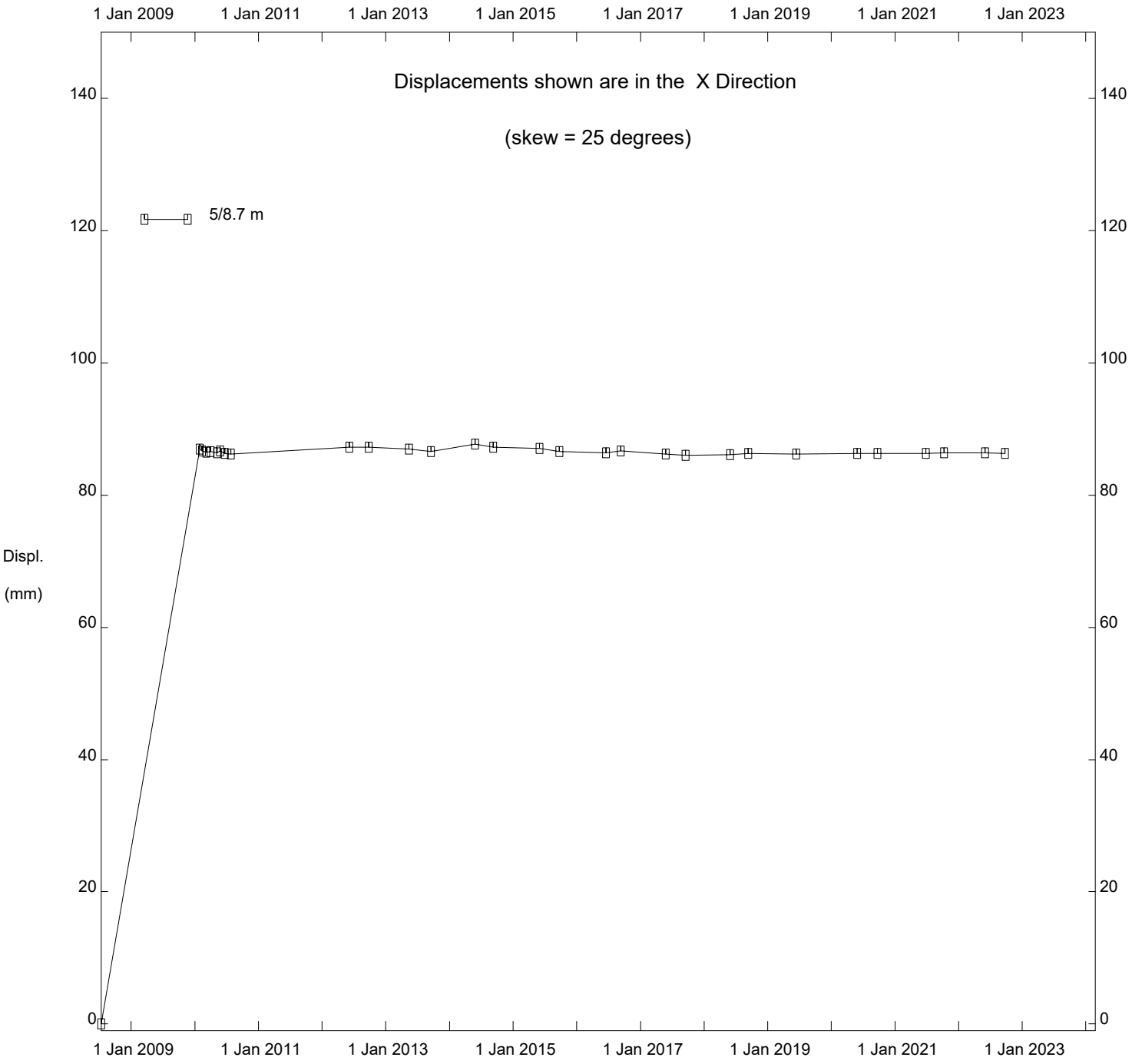
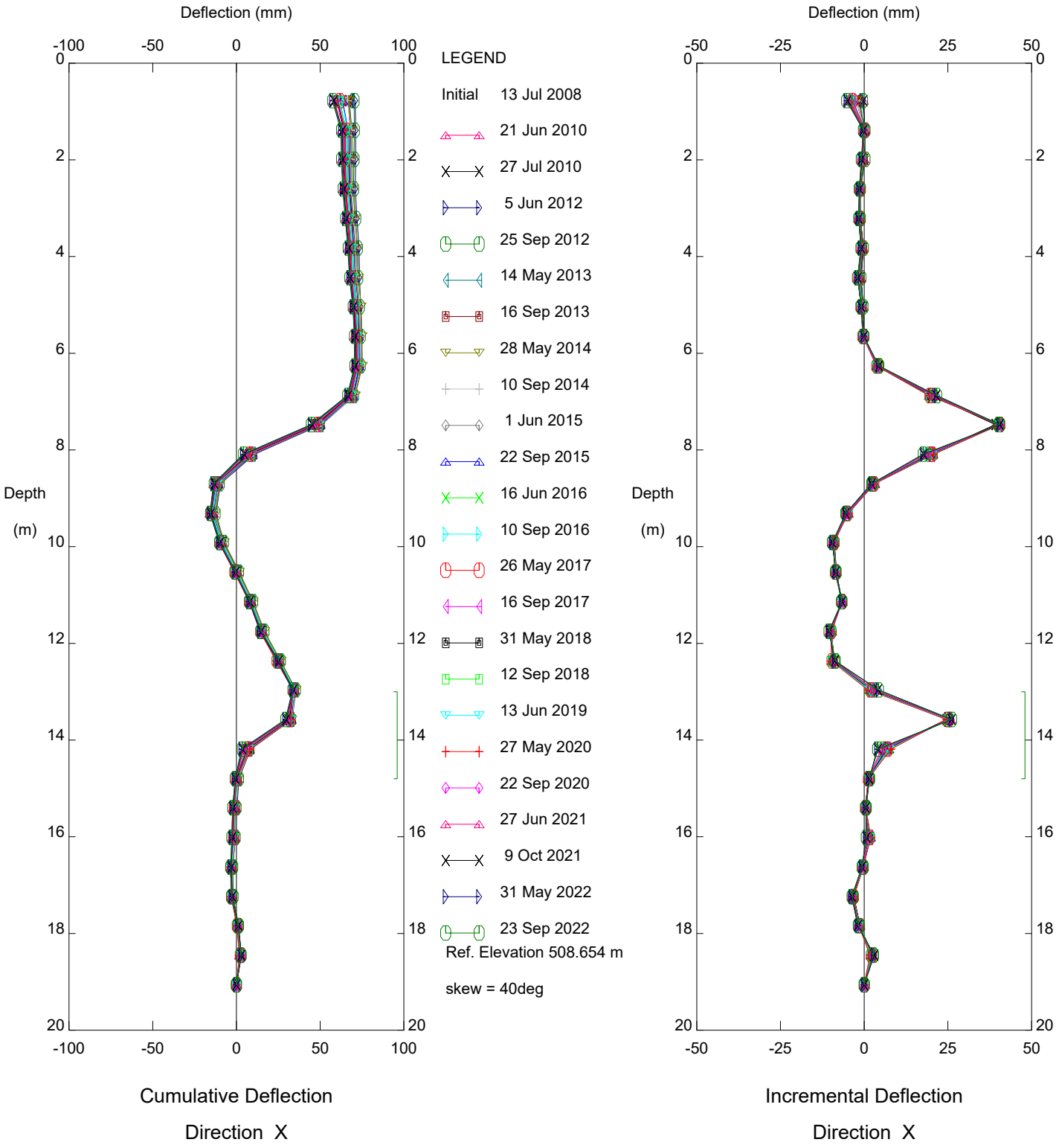
Thurber Engineering Ltd



Hwy 63 TSA (West Slide), Inclinometer 08-13

Alberta Transportation

Thurber Engineering Ltd



Cumulative Deflection

Direction X

Incremental Deflection

Direction X

Hwy 63 TSA (West Slide), Inclinometer 08-13

Alberta Transportation

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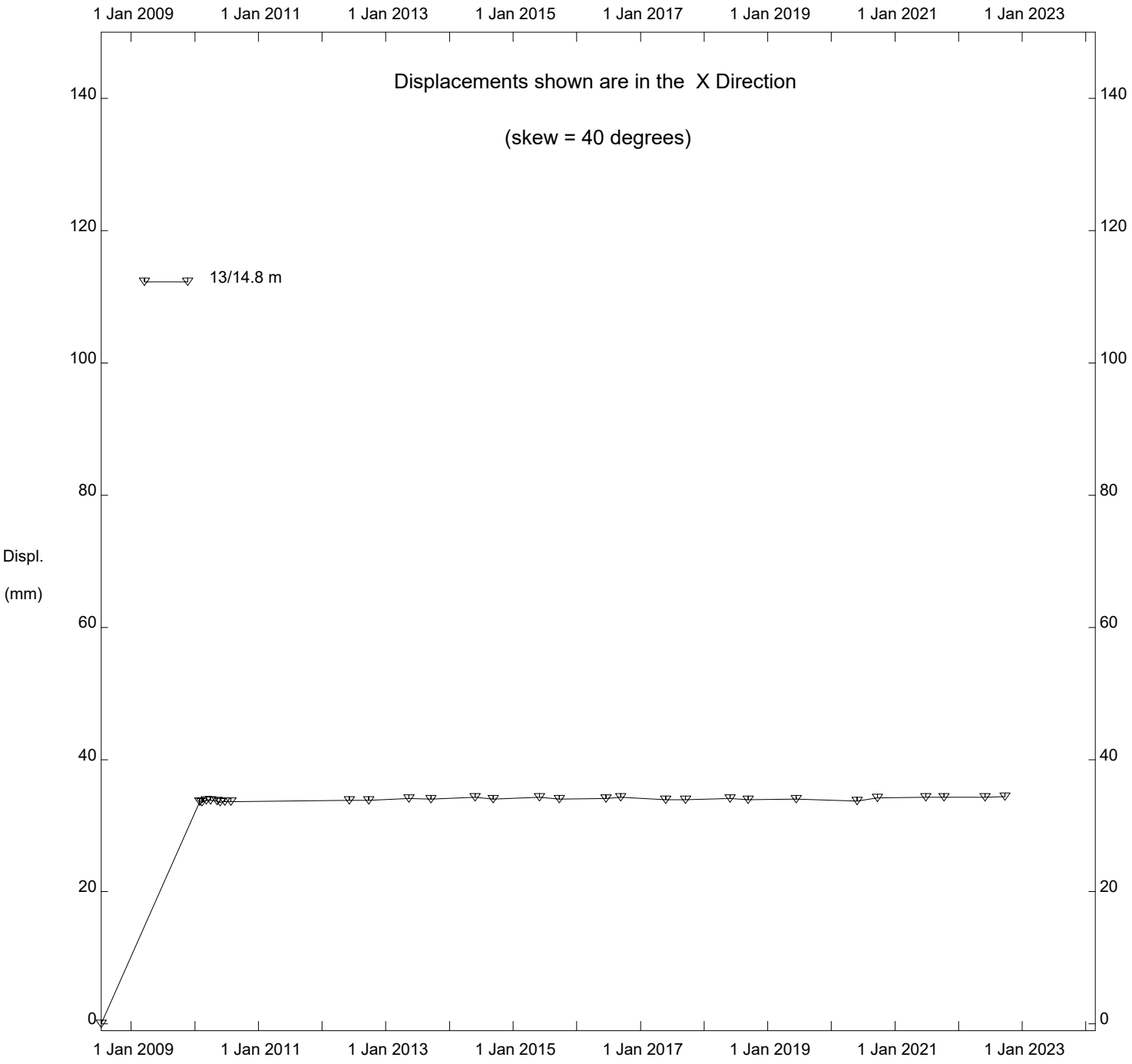
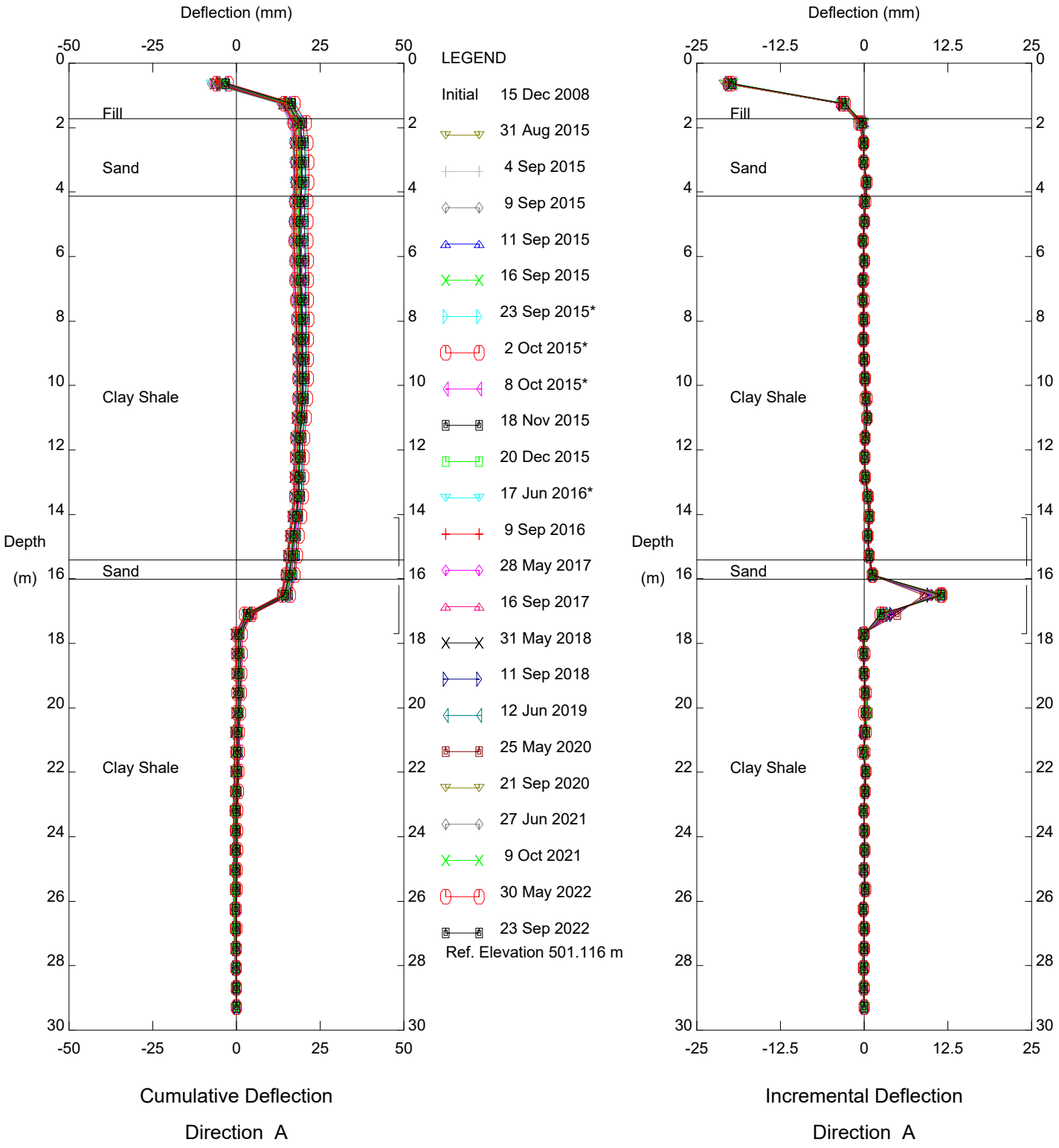


Hwy 63 TSA (West Slide), Inclinometer 08-13

Alberta Transportation

Thurber Engineering Ltd



Cumulative Deflection

Direction A

Incremental Deflection

Direction A

HWY 63 TSA (East Slide), Inclinometer SI08-17

Alberta Transportation

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

H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2022B-Fall\SI Readings\NC70\SI08-17.GTL

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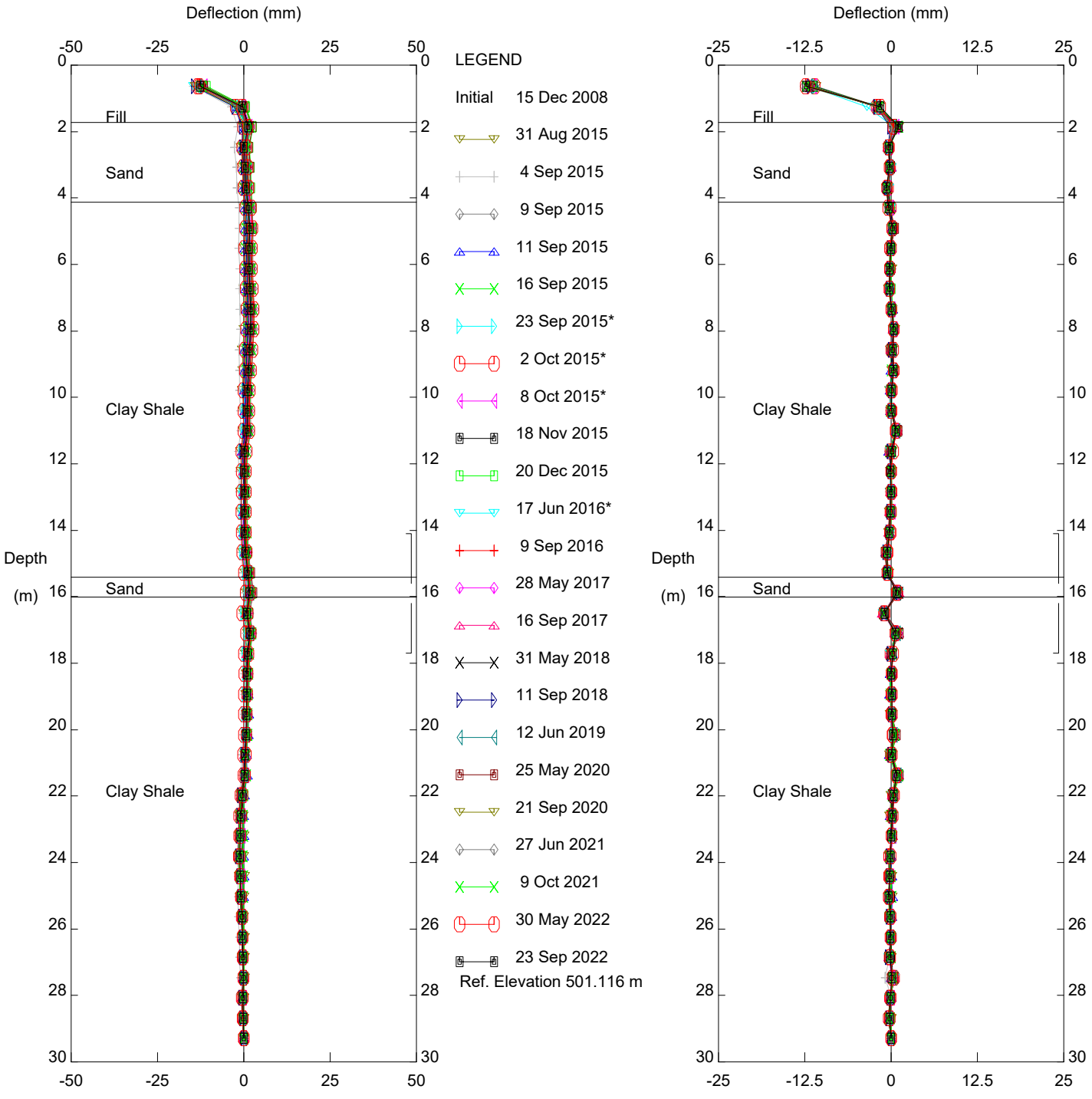


Cumulative Deflection

Direction B

Incremental Deflection

Direction B

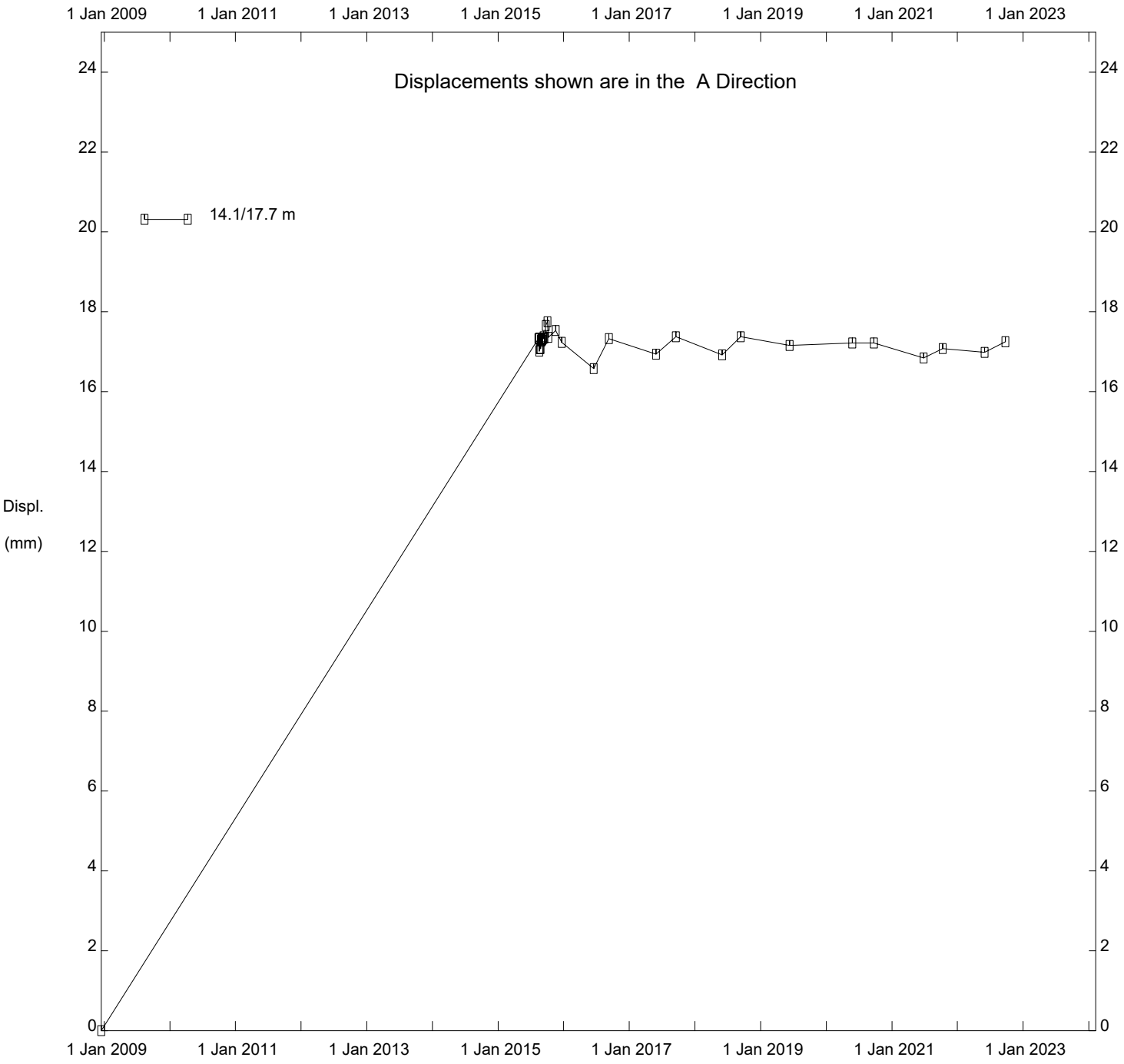
HWY 63 TSA (East Slide), Inclinometer SI08-17

Alberta Transportation

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

H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2022B-Fall\SI Readings\NC70\SI08-17.GTL

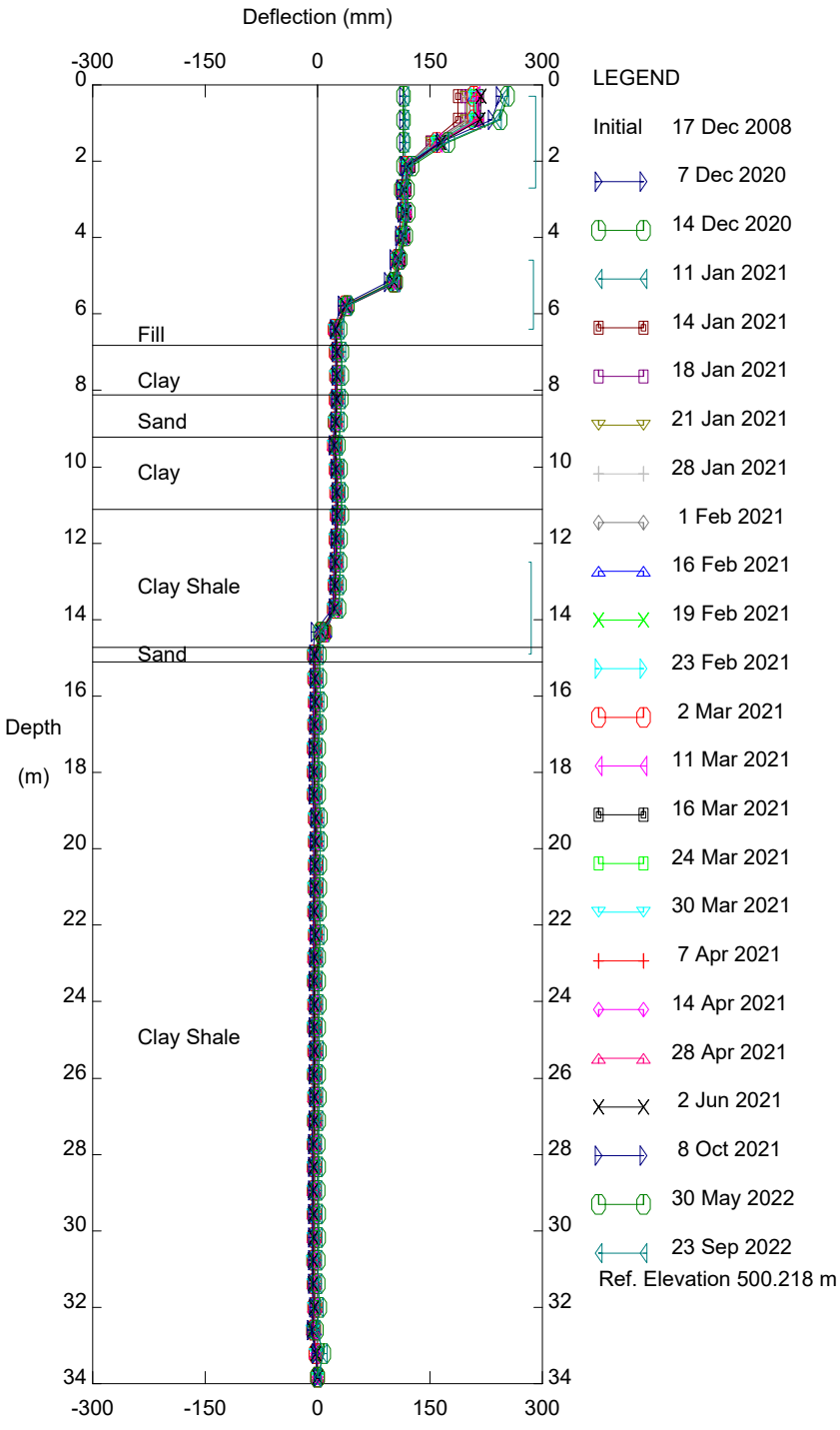
Thurber Engineering Ltd



HWY 63 TSA (East Slide), Inclinometer SI08-17

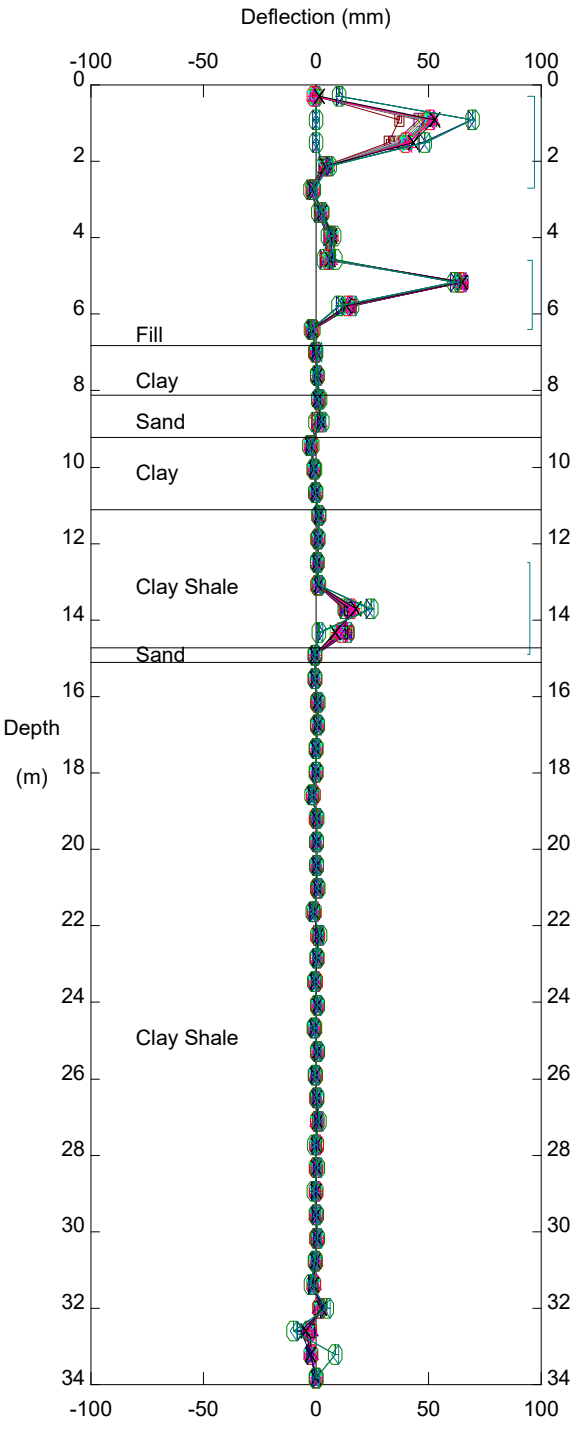
Alberta Transportation

Thurber Engineering Ltd



Cumulative Deflection

Direction A



Incremental Deflection

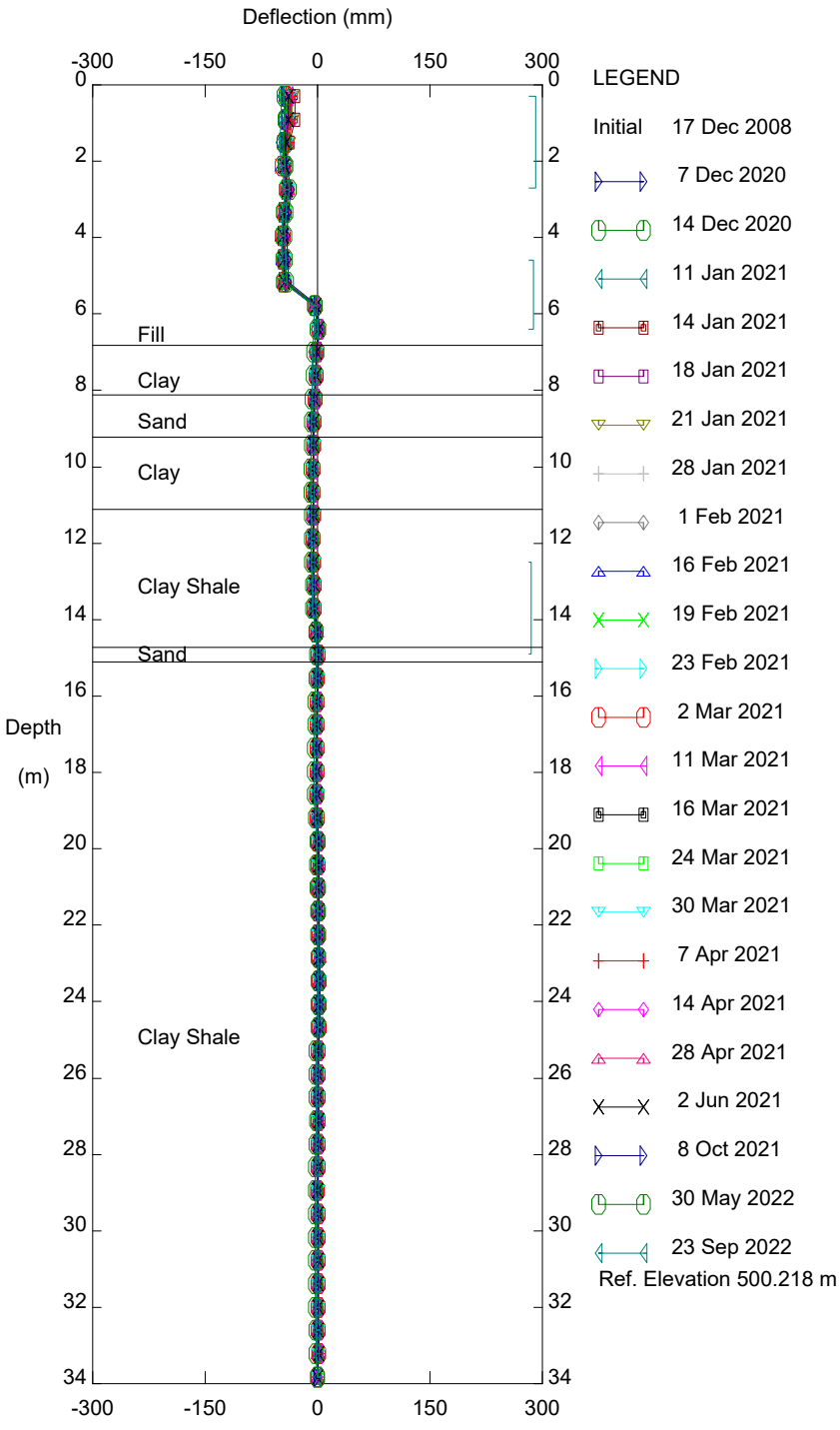
Direction A

HWY 63 TSA (East Slide), Inclinometer SI08-21

Alberta Transportation

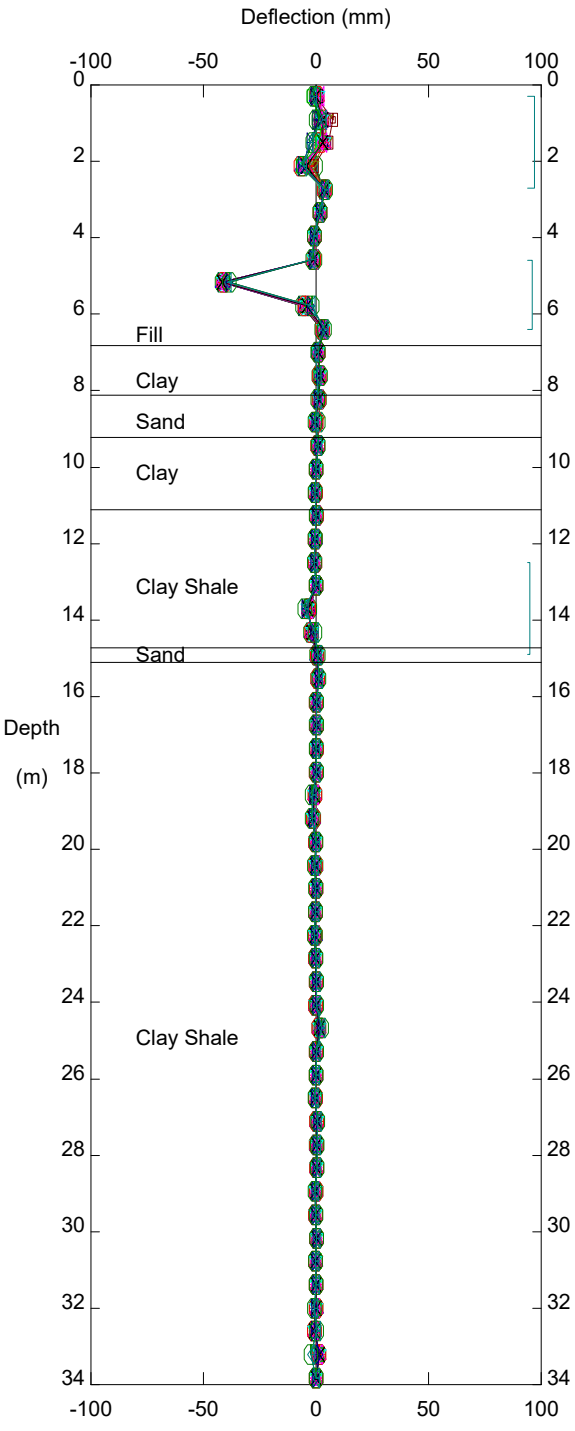
H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2022B-Fall\SI Readings\NC70\SI08-21.GTL

Thurber Engineering Ltd



Cumulative Deflection

Direction B



Incremental Deflection

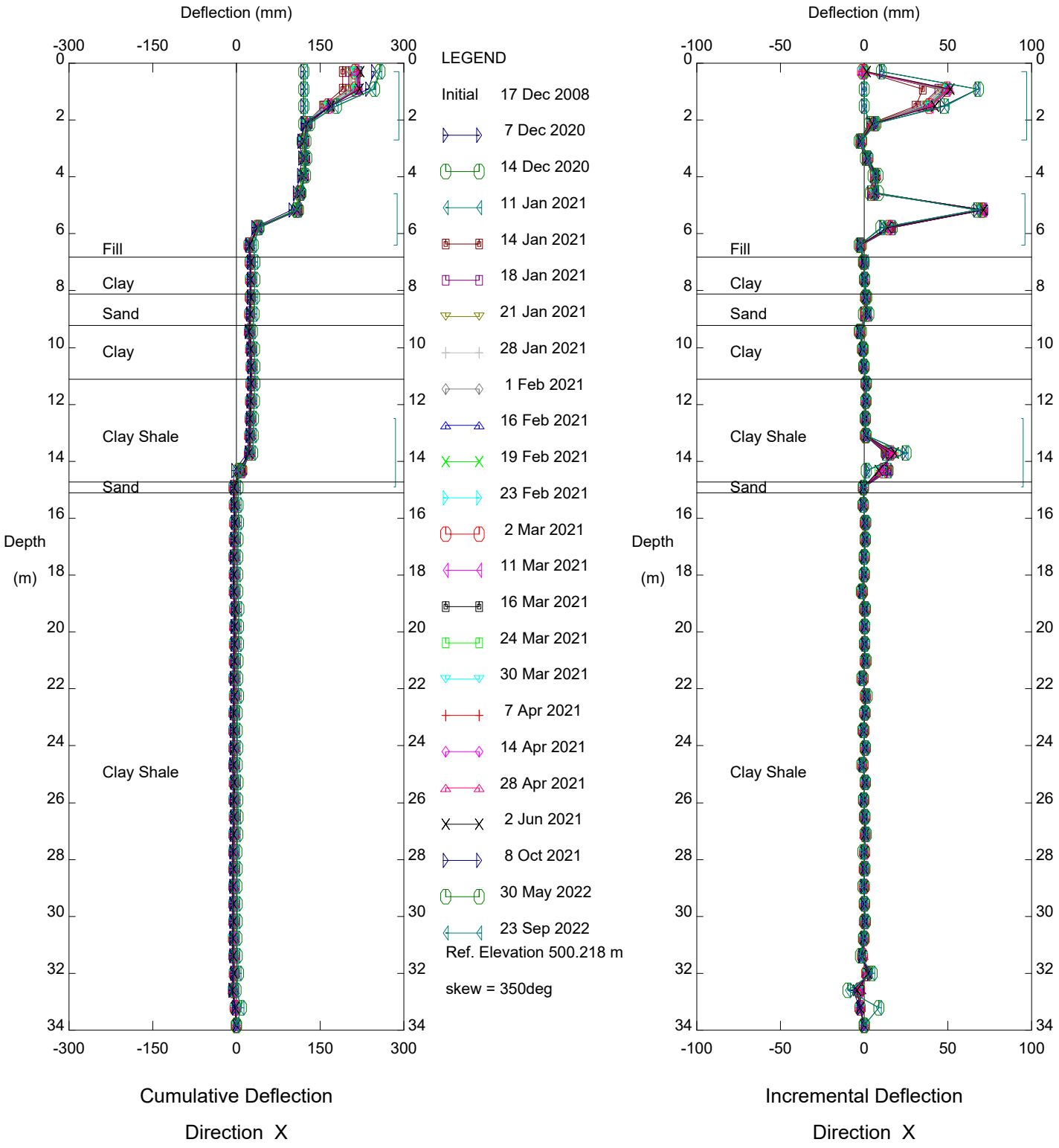
Direction B

HWY 63 TSA (East Slide), Inclinometer SI08-21

Alberta Transportation

H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2022B-Fall\SI Readings\NC70\SI08-21.GTL

Thurber Engineering Ltd



Cumulative Deflection

Direction X

Incremental Deflection

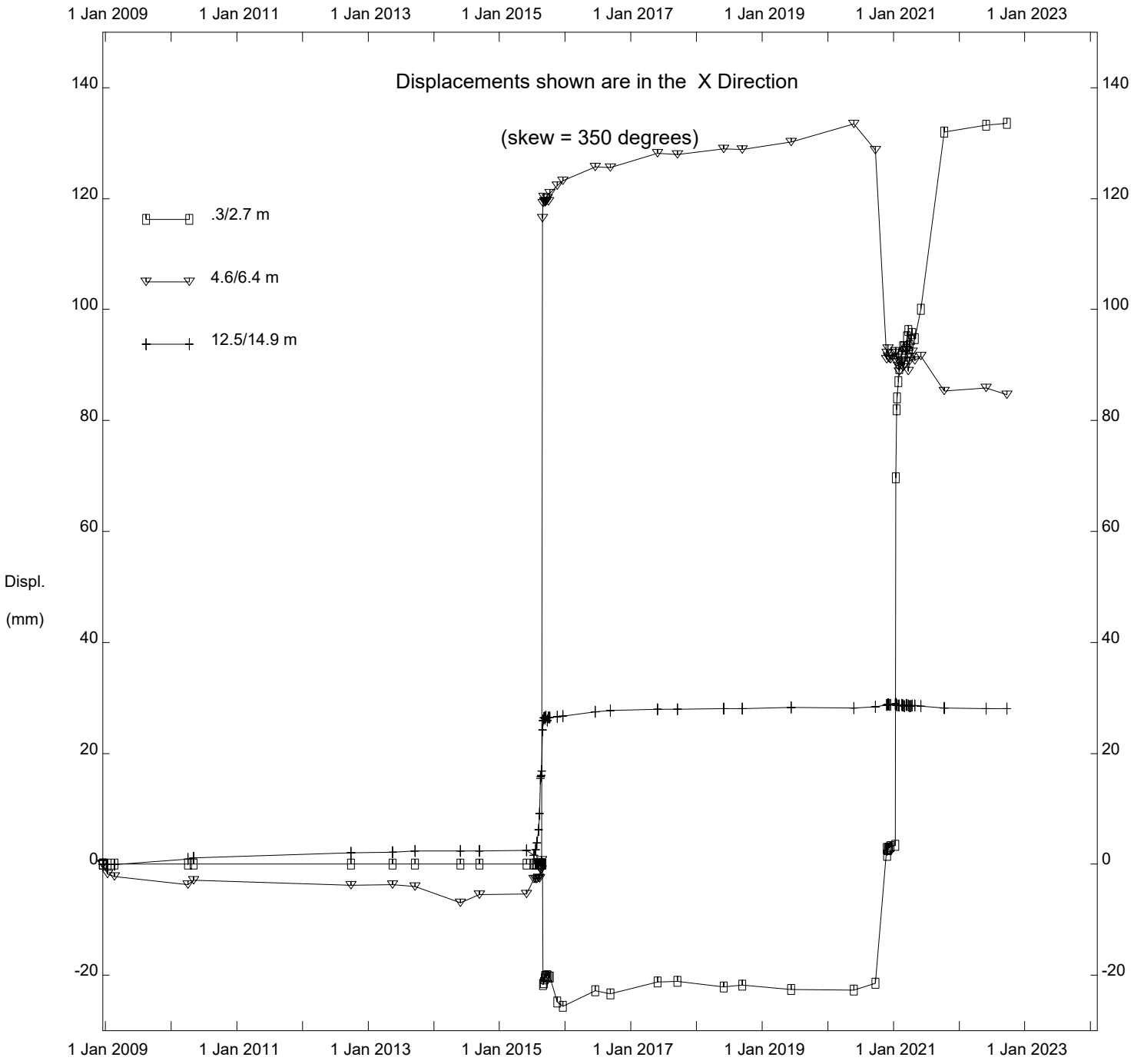
Direction X

HWY 63 TSA (East Slide), Inclinometer SI08-21

Alberta Transportation

H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2022B-Fall\SI Readings\NC70\SI08-21.GTL

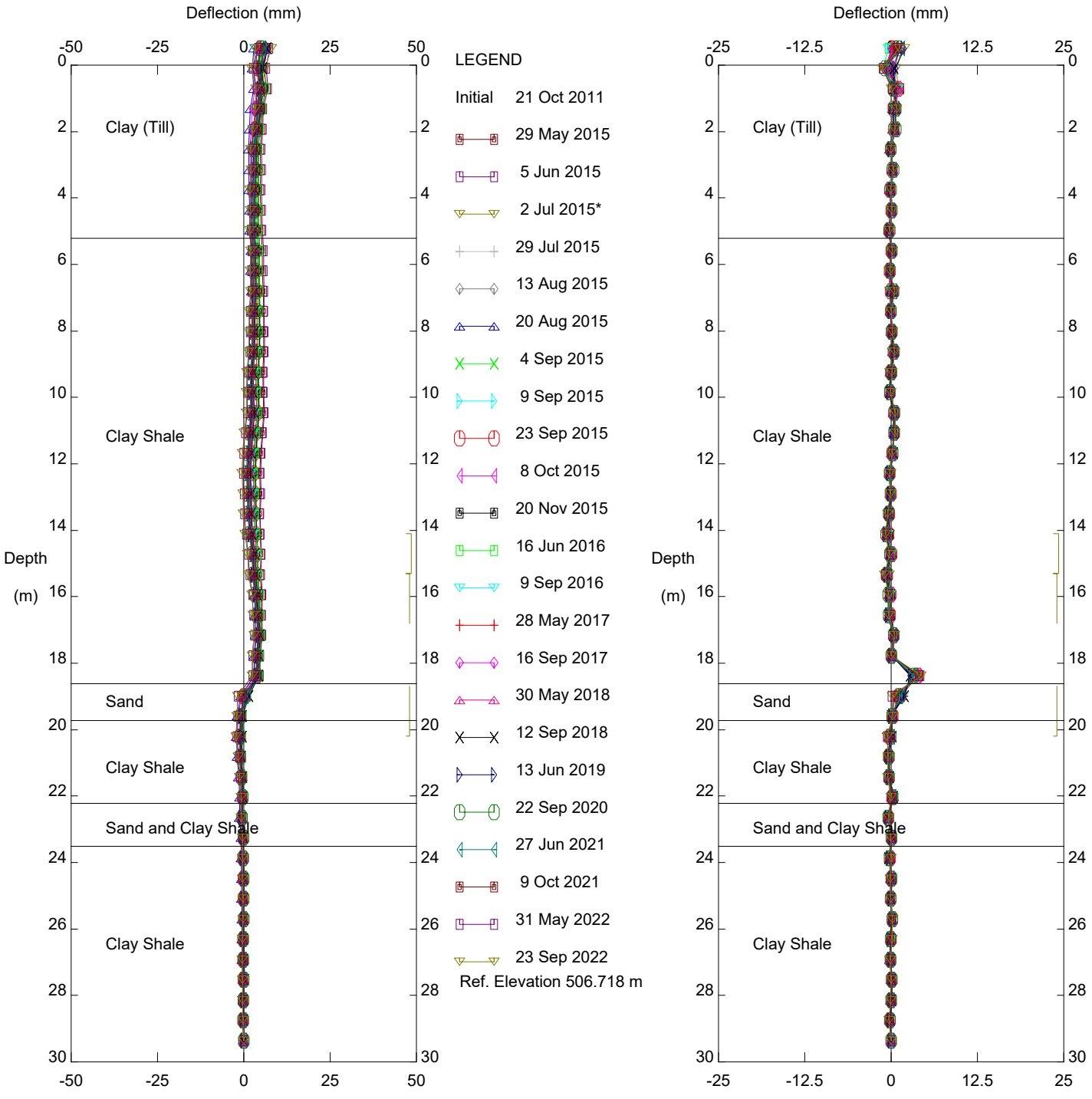
Thurber Engineering Ltd



HWY 63 TSA (East Slide), Inclinometer SI08-21

Alberta Transportation

Thurber Engineering Ltd



Cumulative Deflection

Direction A

Incremental Deflection

Direction A

HWY 63 TSA (West Slide), Inclinometer SI11-12R

Alberta Transportion

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

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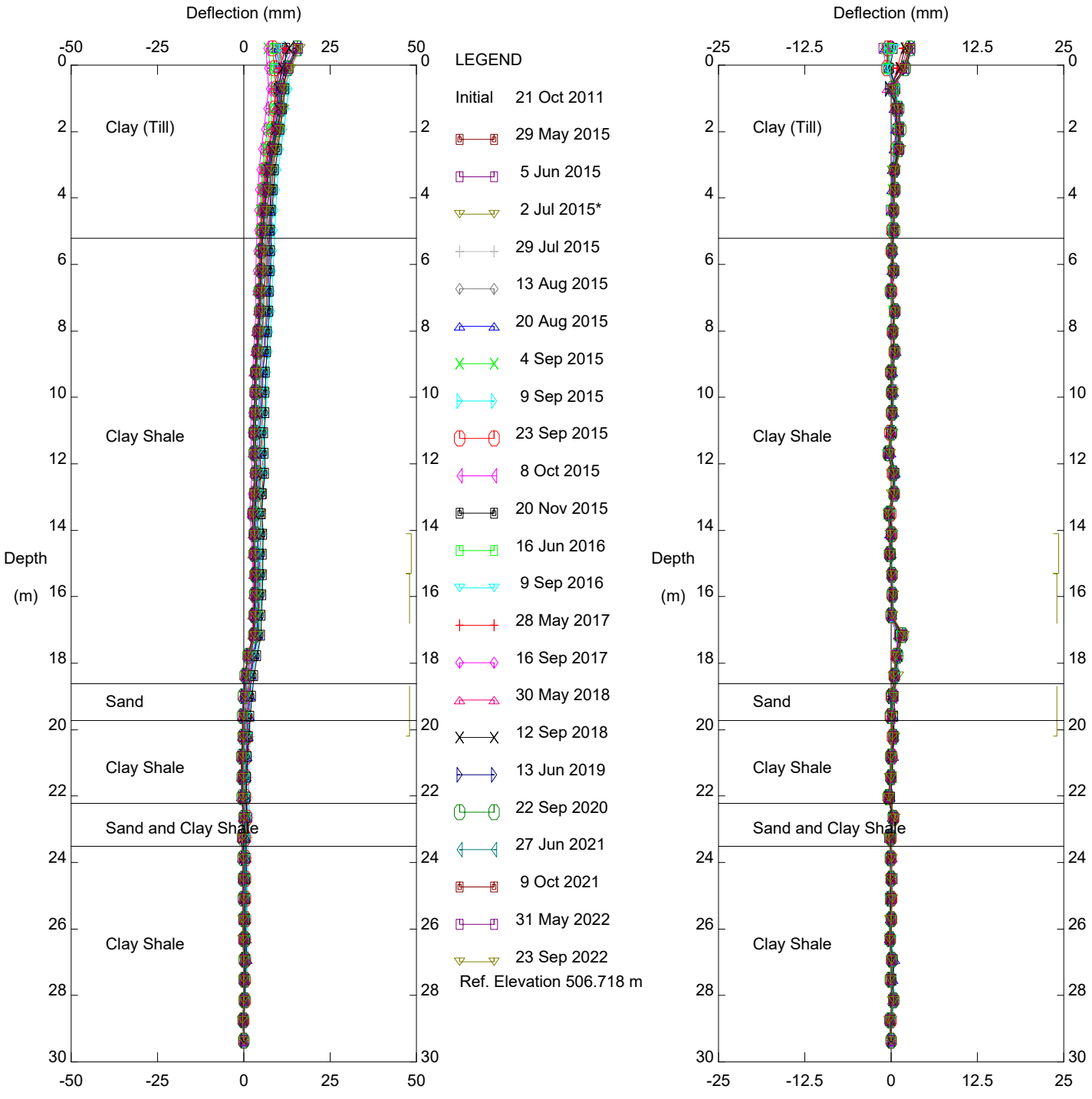
Thurber Engineering Ltd



Cumulative Deflection

Direction B

Incremental Deflection

Direction B

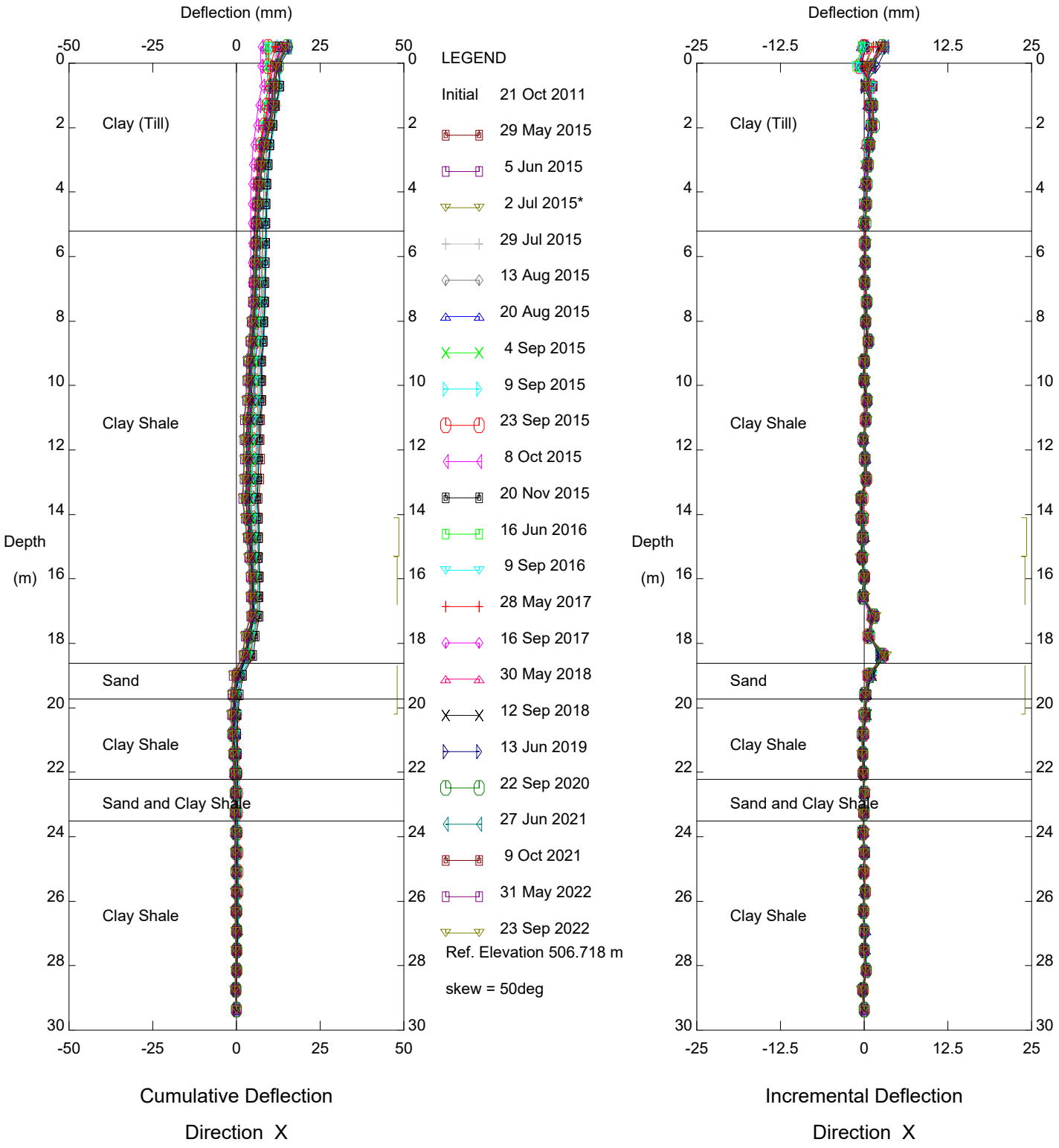
HWY 63 TSA (West Slide), Inclinometer SI11-12R

Alberta Transportion

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

H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2022B-Fall\SI Readings\NC70\SI11-12R.gtl

Thurber Engineering Ltd



Cumulative Deflection

Direction X

Incremental Deflection

Direction X

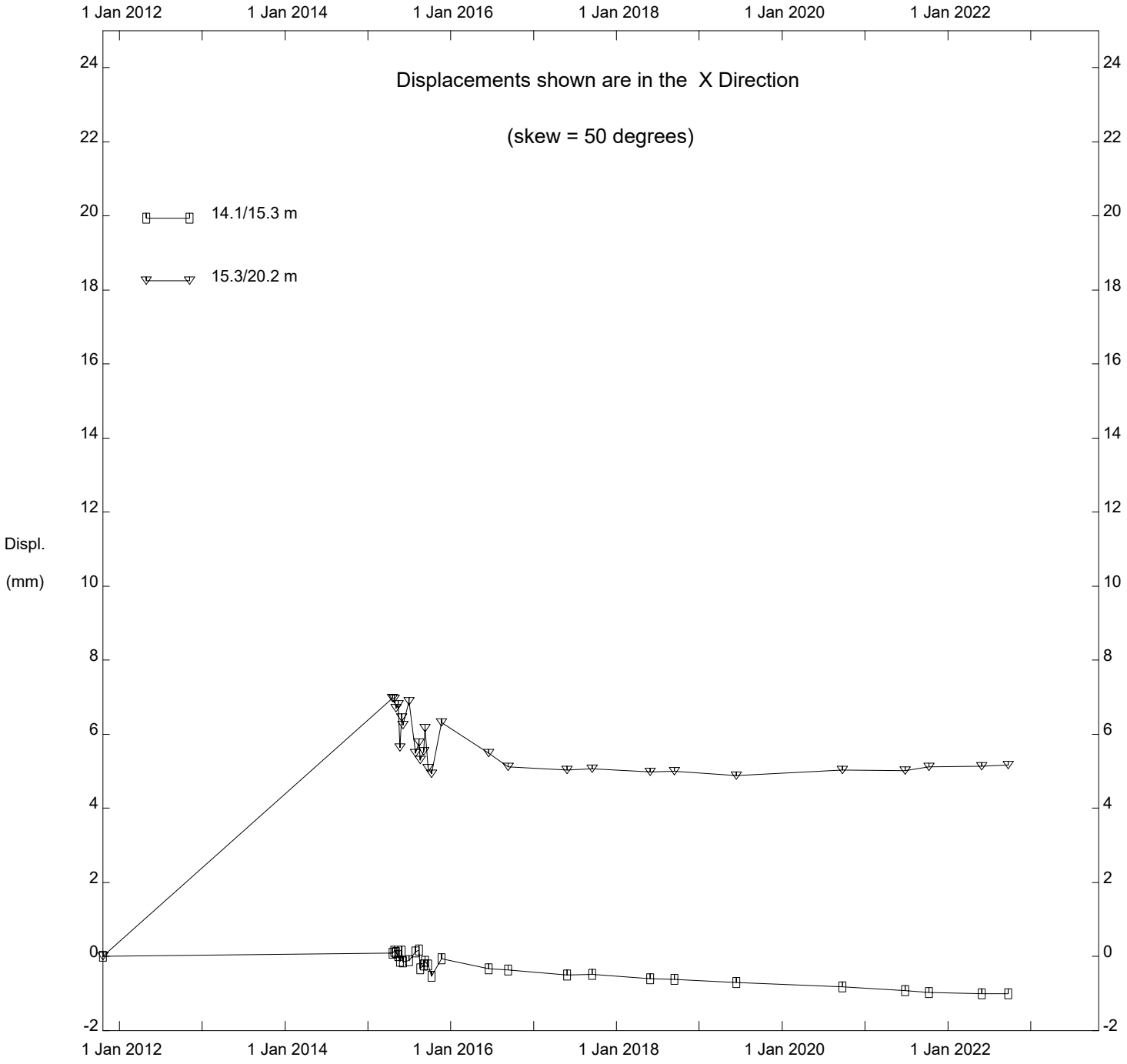
HWY 63 TSA (West Slide), Inclinometer SI11-12R

Alberta Transportion

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

H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2022B-Fall\SI Readings\NC70\SI11-12R.gtl

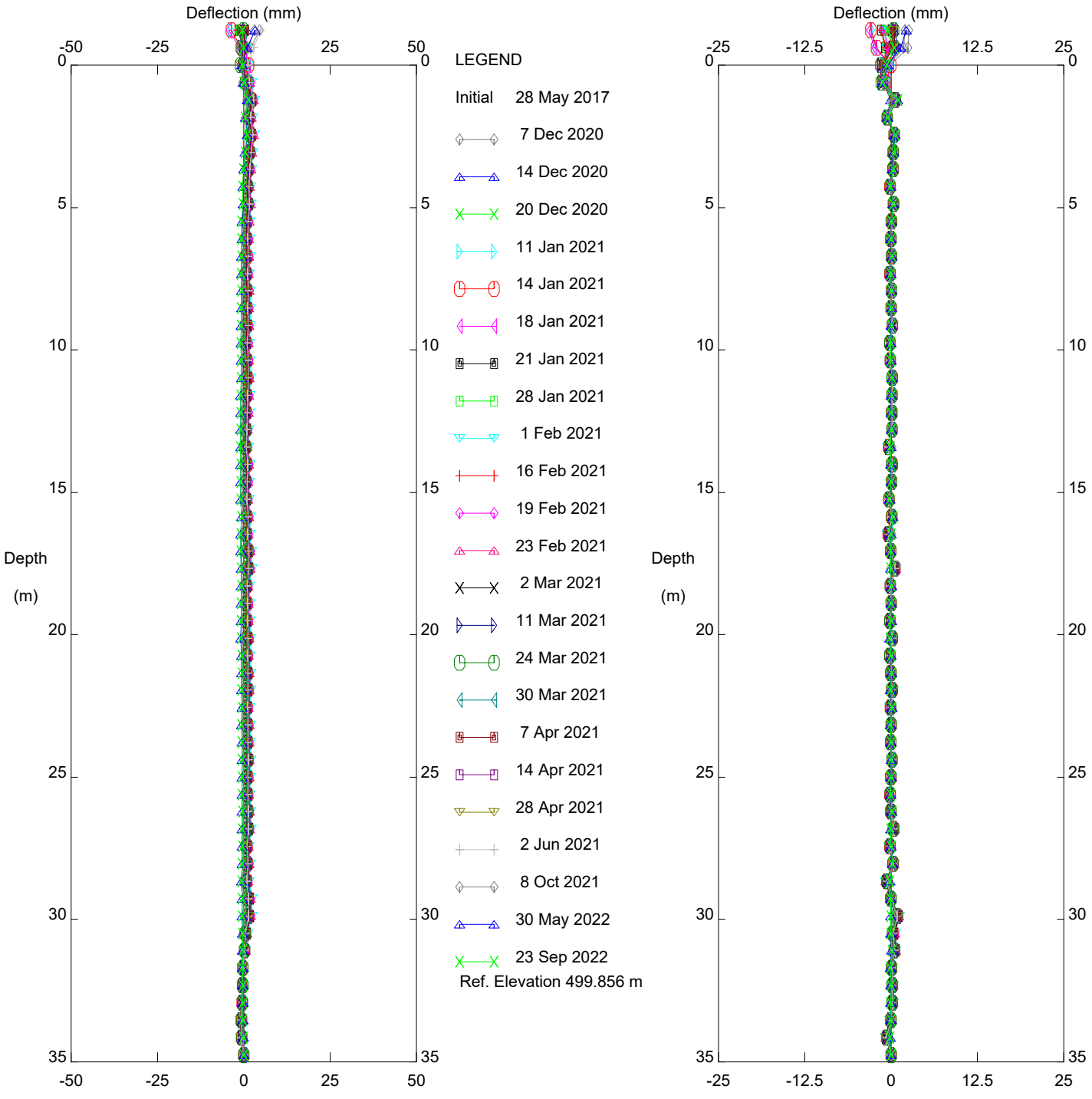
Thurber Engineering Ltd



HWY 63 TSA (West Slide), Inclinometer SI11-12R

Alberta Transportion

Thurber Engineering Ltd



Cumulative Deflection

Direction A

Incremental Deflection

Direction A

HWY 63 TSA (East Slide), Inclinometer SI17-3

Alberta Transportation

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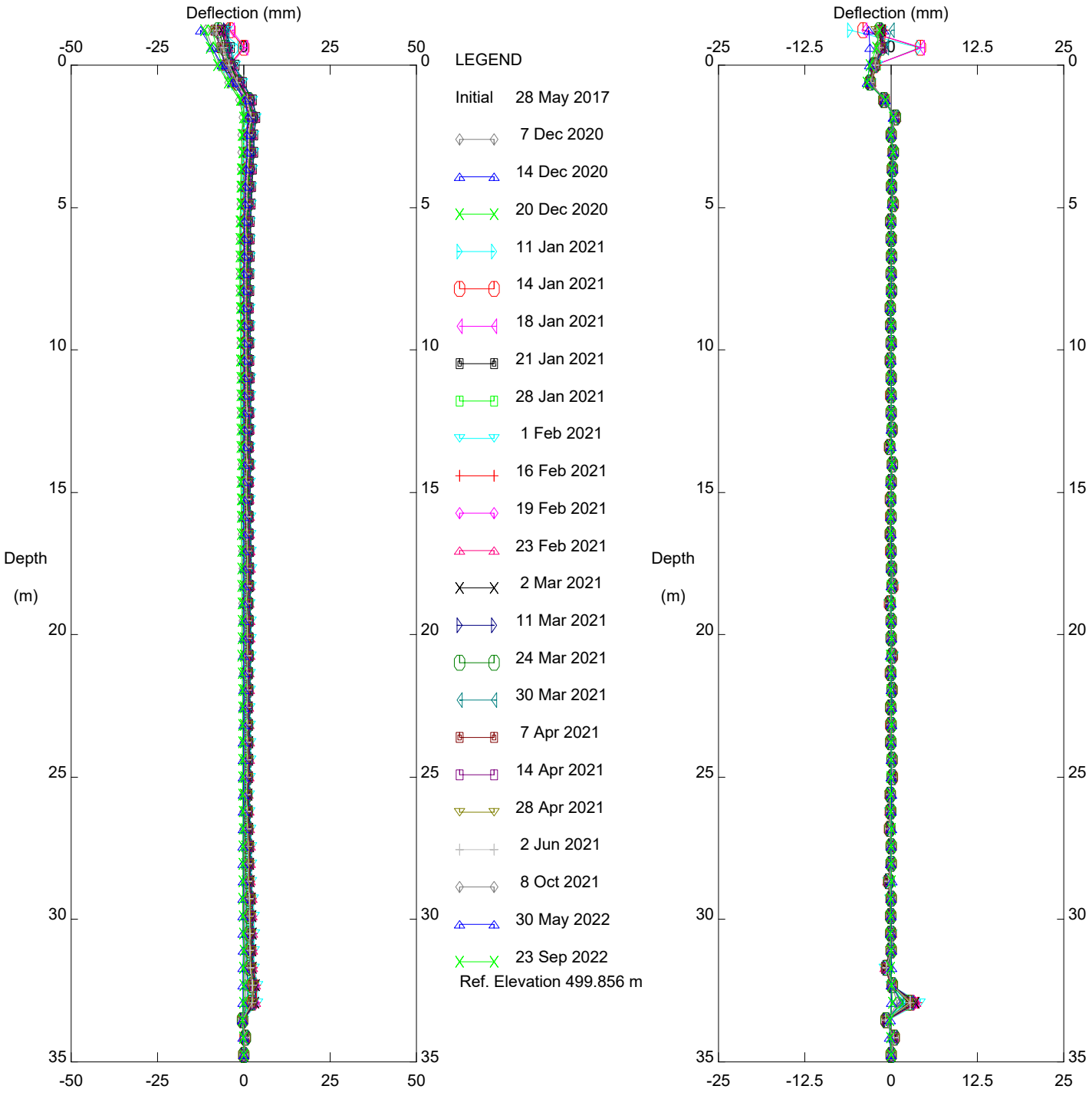
Thurber Engineering Ltd



Cumulative Deflection

Direction B

Incremental Deflection

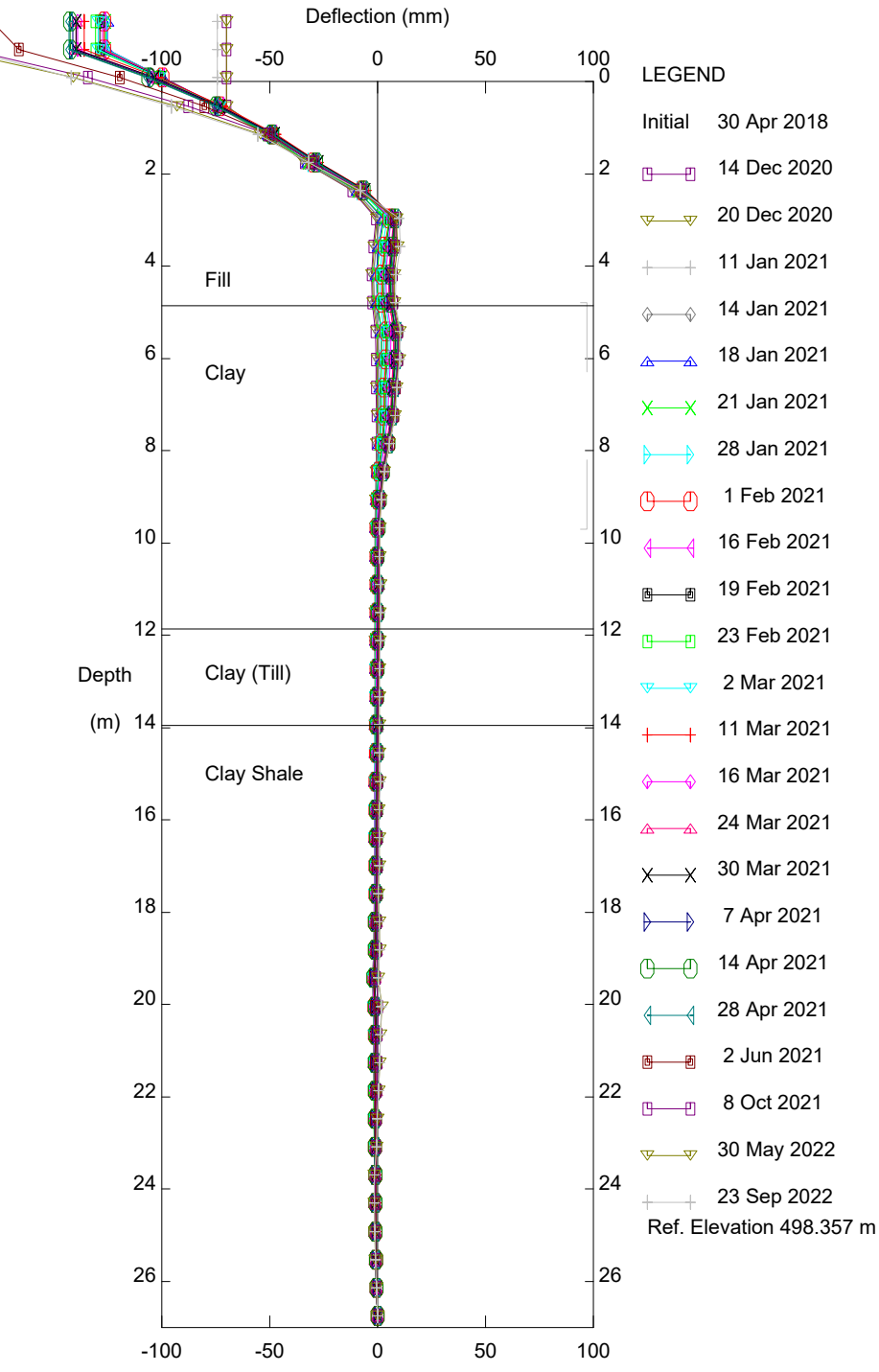
Direction B

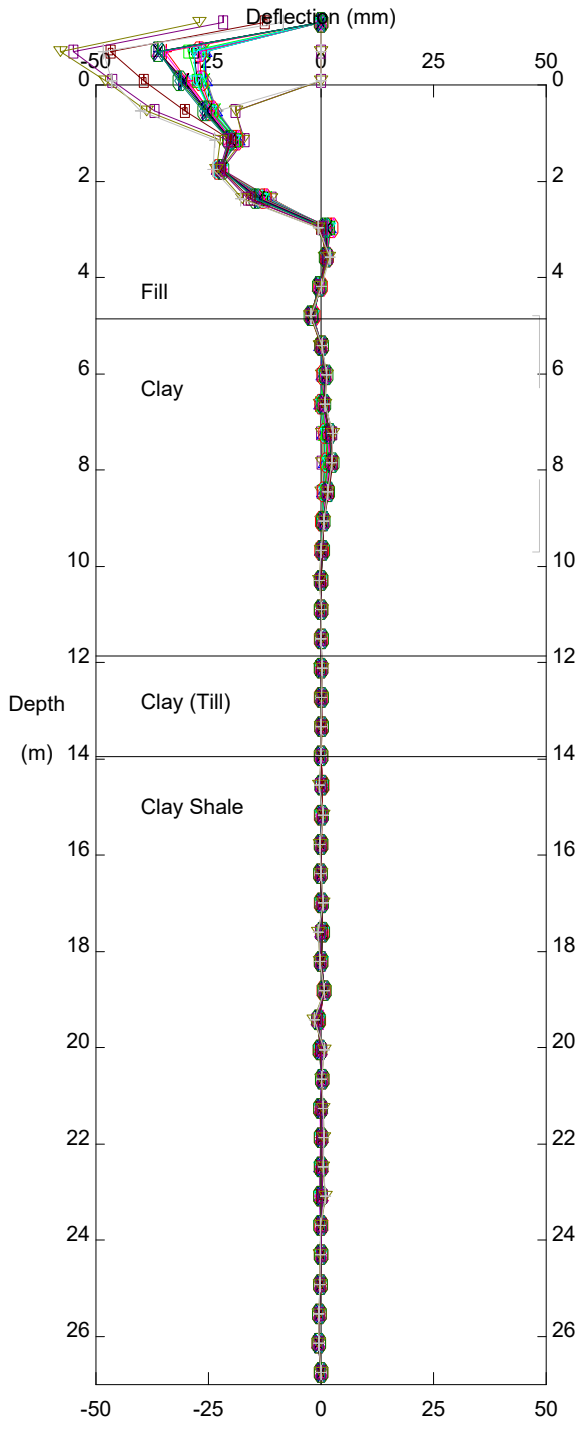
HWY 63 TSA (East Slide), Inclinometer SI17-3

Alberta Transportation

H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2022B-Fall\SI Readings\NC70\SI17-3.gtl

Thurber Engineering Ltd





Cumulative Deflection

Direction A

Incremental Deflection

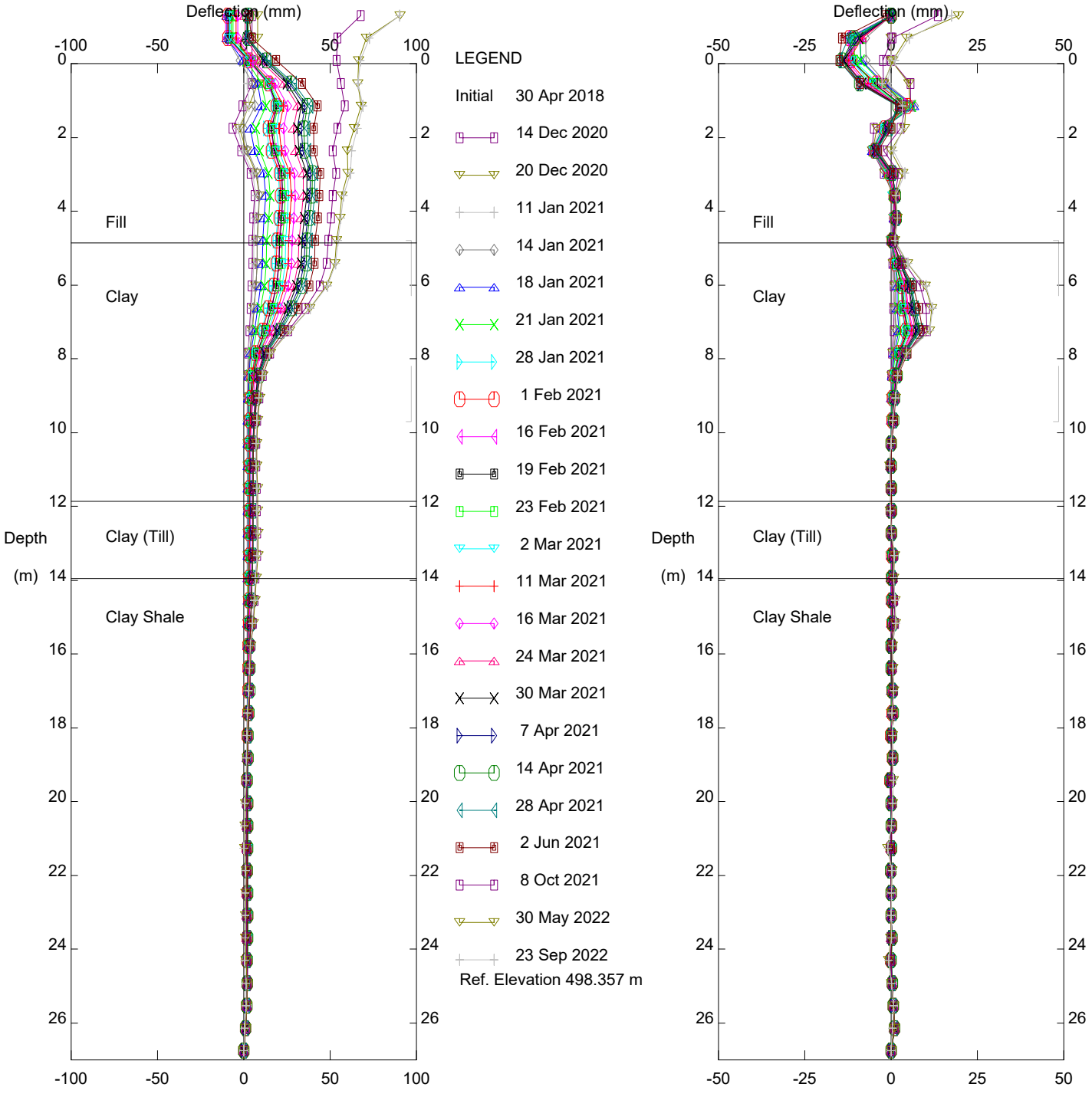
Direction A

HWY 63 TSA (East Slide), Inclinometer SI18-5

Alberta Transportation

H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2022B-Fall\SI Readings\NC70\SI18-5.gtl

Thurber Engineering Ltd



Cumulative Deflection

Direction B

Incremental Deflection

Direction B

HWY 63 TSA (East Slide), Inclinometer SI18-5

Alberta Transportation

H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2022B-Fall\SI Readings\NC70\SI18-5.gtl

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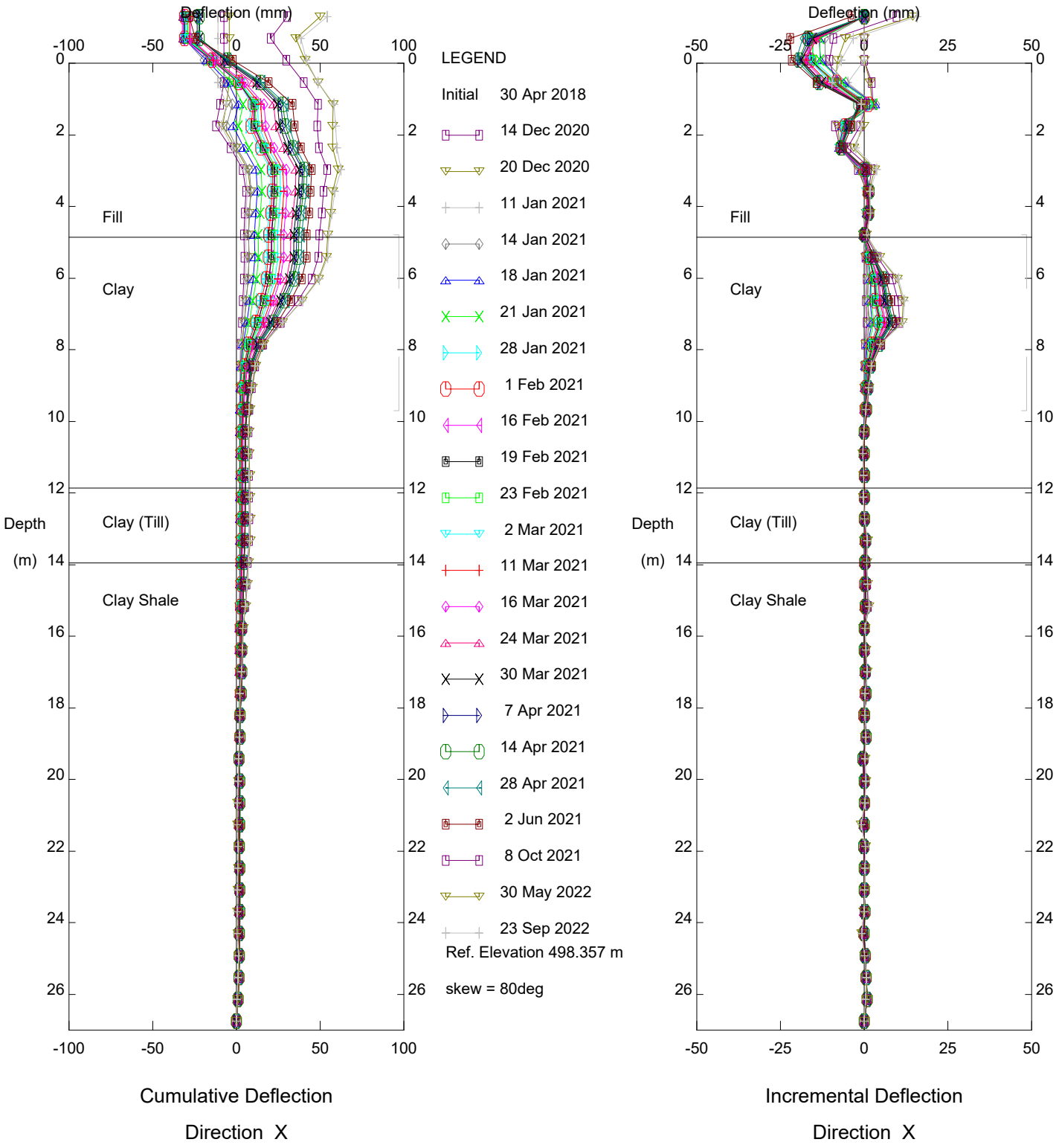

Cumulative Deflection

Direction X

Incremental Deflection

Direction X

HWY 63 TSA (East Slide), Inclinometer SI18-5

Alberta Transportation

H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2022B-Fall\SI Readings\NC70\SI18-5.gtl

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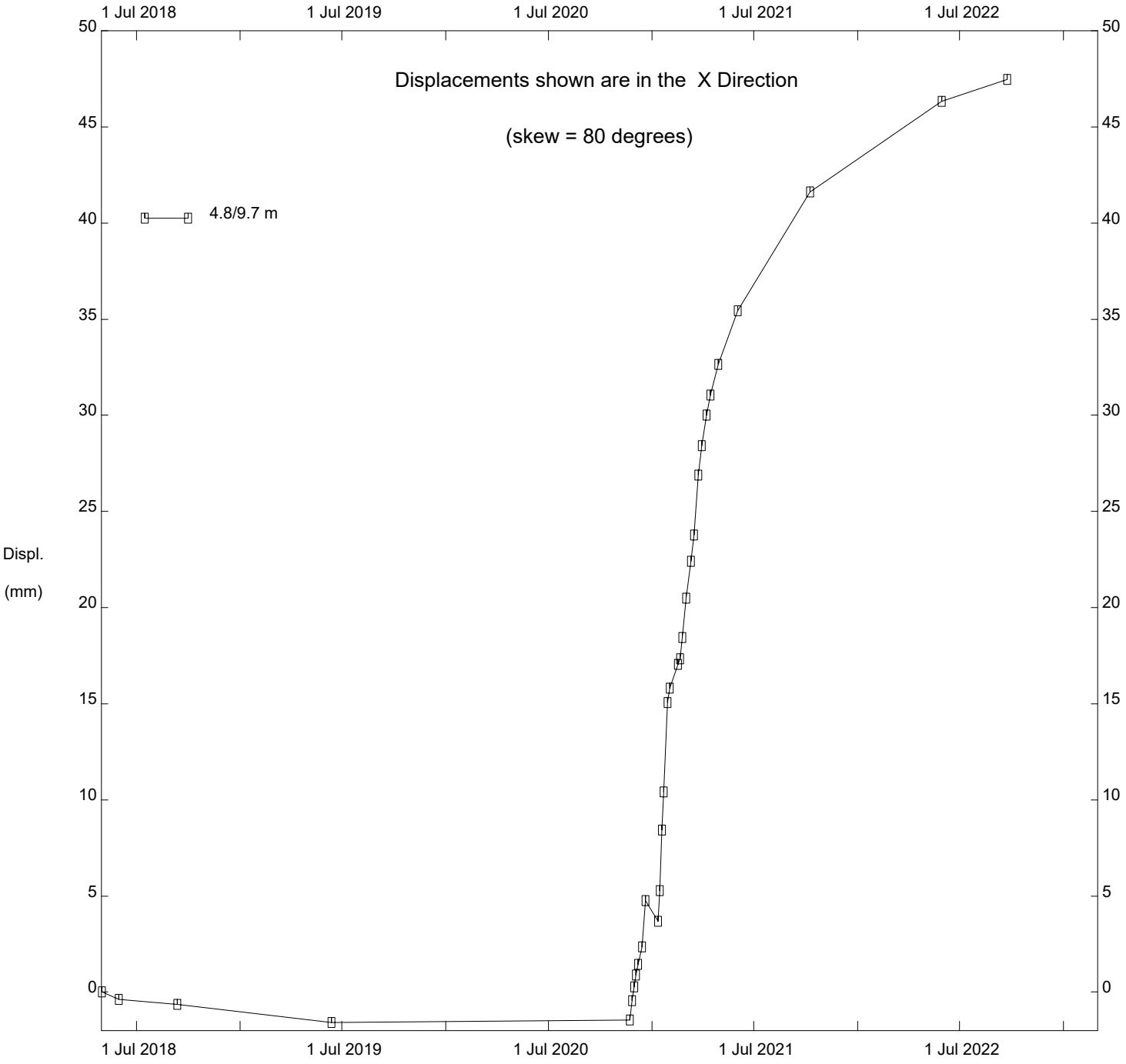
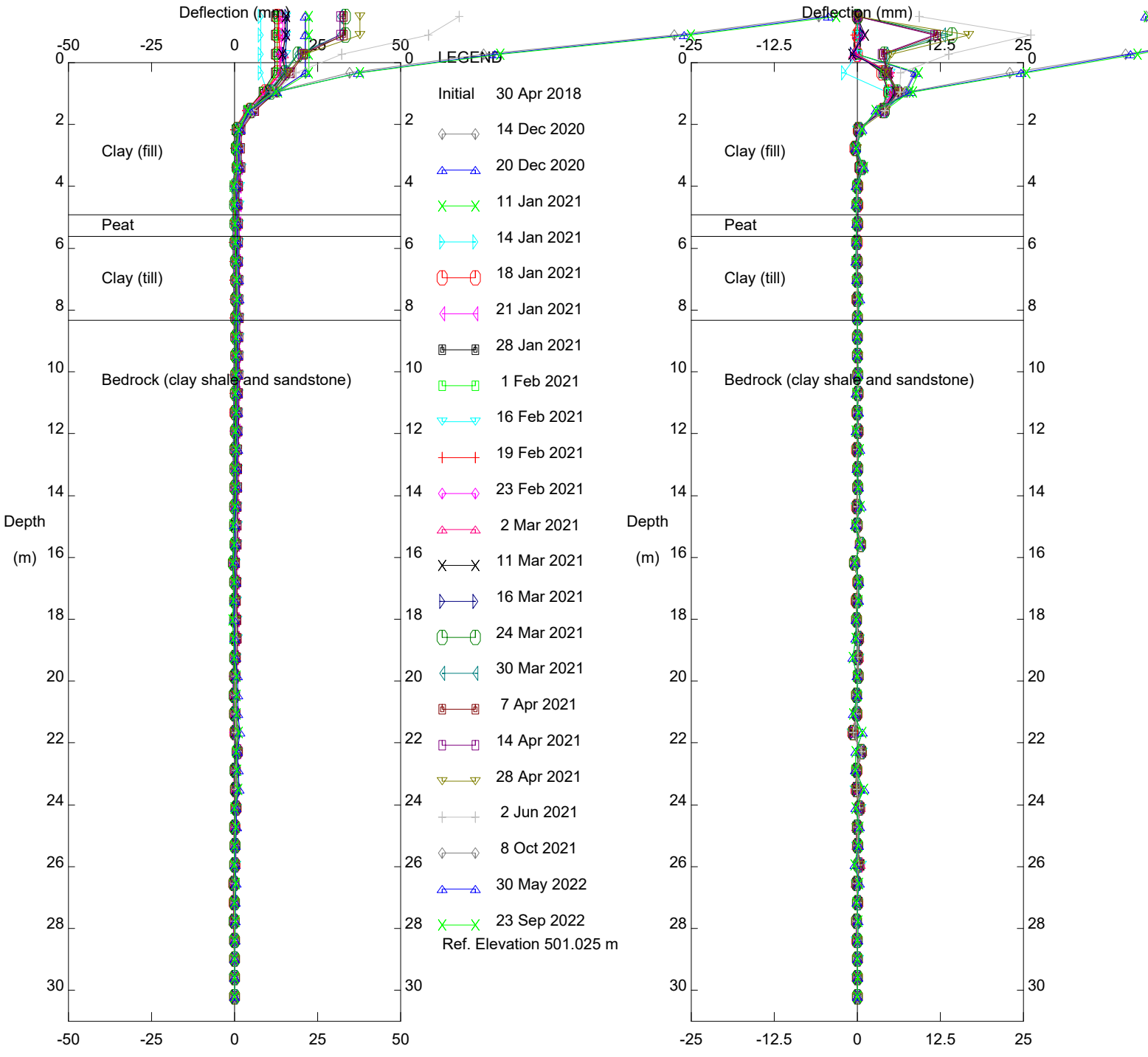


HWY 63 TSA (East Slide), Inclinometer SI18-5

Alberta Transportation

Thurber Engineering Ltd



Cumulative Deflection

Direction A

Incremental Deflection

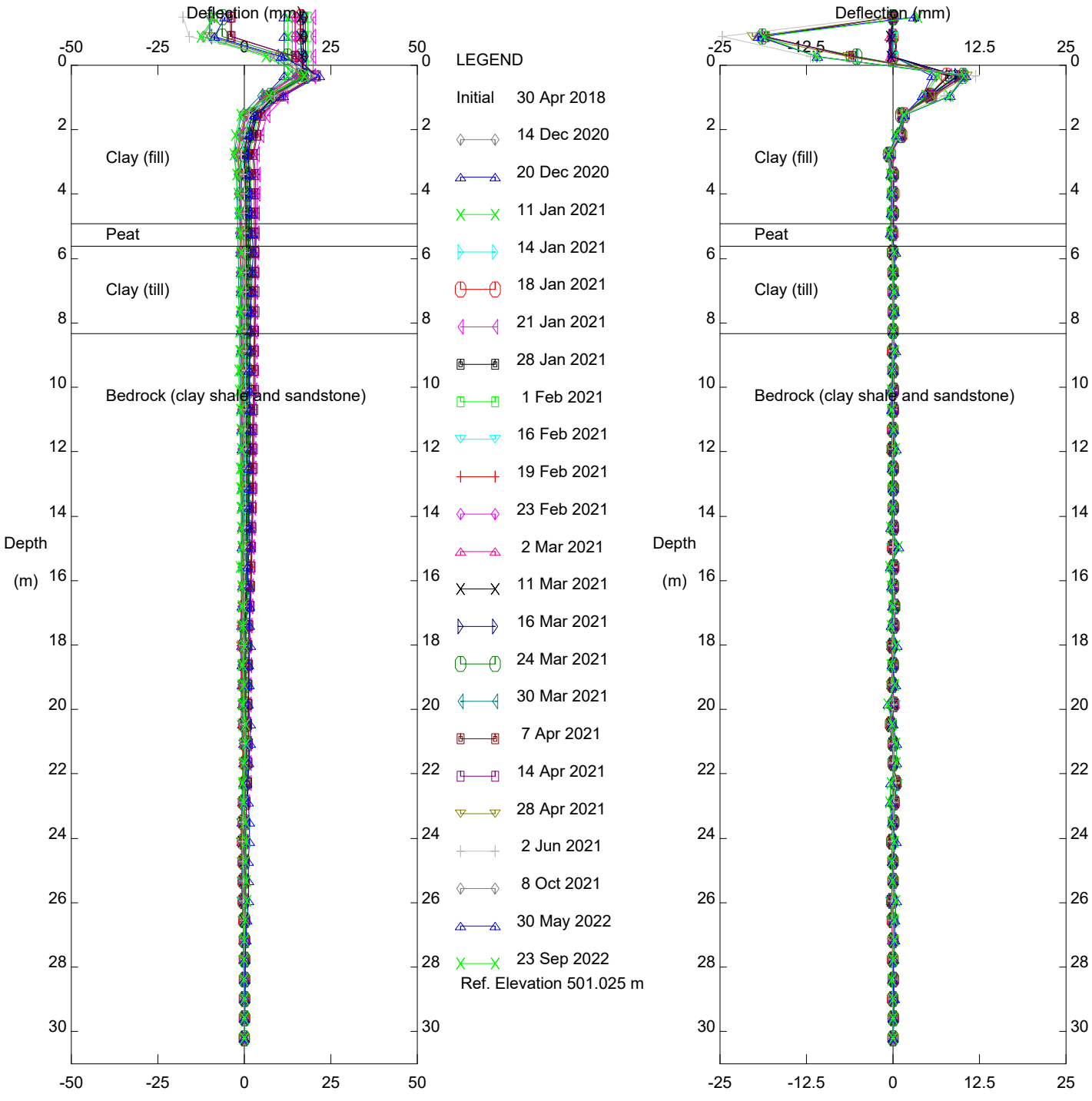
Direction A

HWY 63 TSA (East Slide), Inclinometer SI18-7

Alberta Transportation

H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2022B-Fall\SI Readings\NC70\SI18-7.gtl

Thurber Engineering Ltd



Cumulative Deflection

Direction B

Incremental Deflection

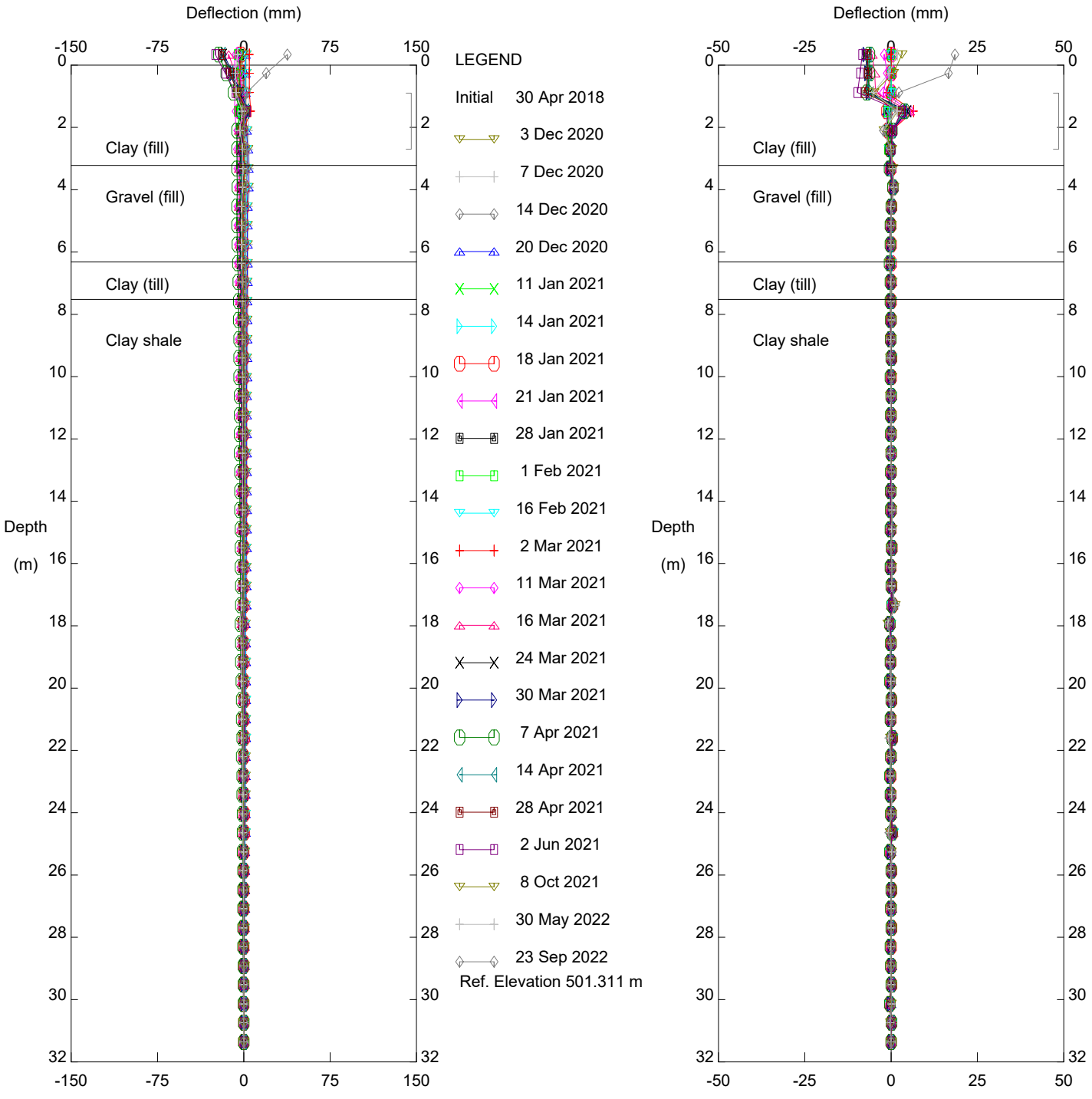
Direction B

HWY 63 TSA (East Slide), Inclinometer SI18-7

Alberta Transportation

H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2022B-Fall\SI Readings\NC70\SI18-7.gtl

Thurber Engineering Ltd



Cumulative Deflection

Direction A

Incremental Deflection

Direction A

HWY 63 TSA (East Slide), Inclinometer SI18-8

Alberta Transportation

H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2022B-Fall\SI Readings\NC70\SI18-8.gtl

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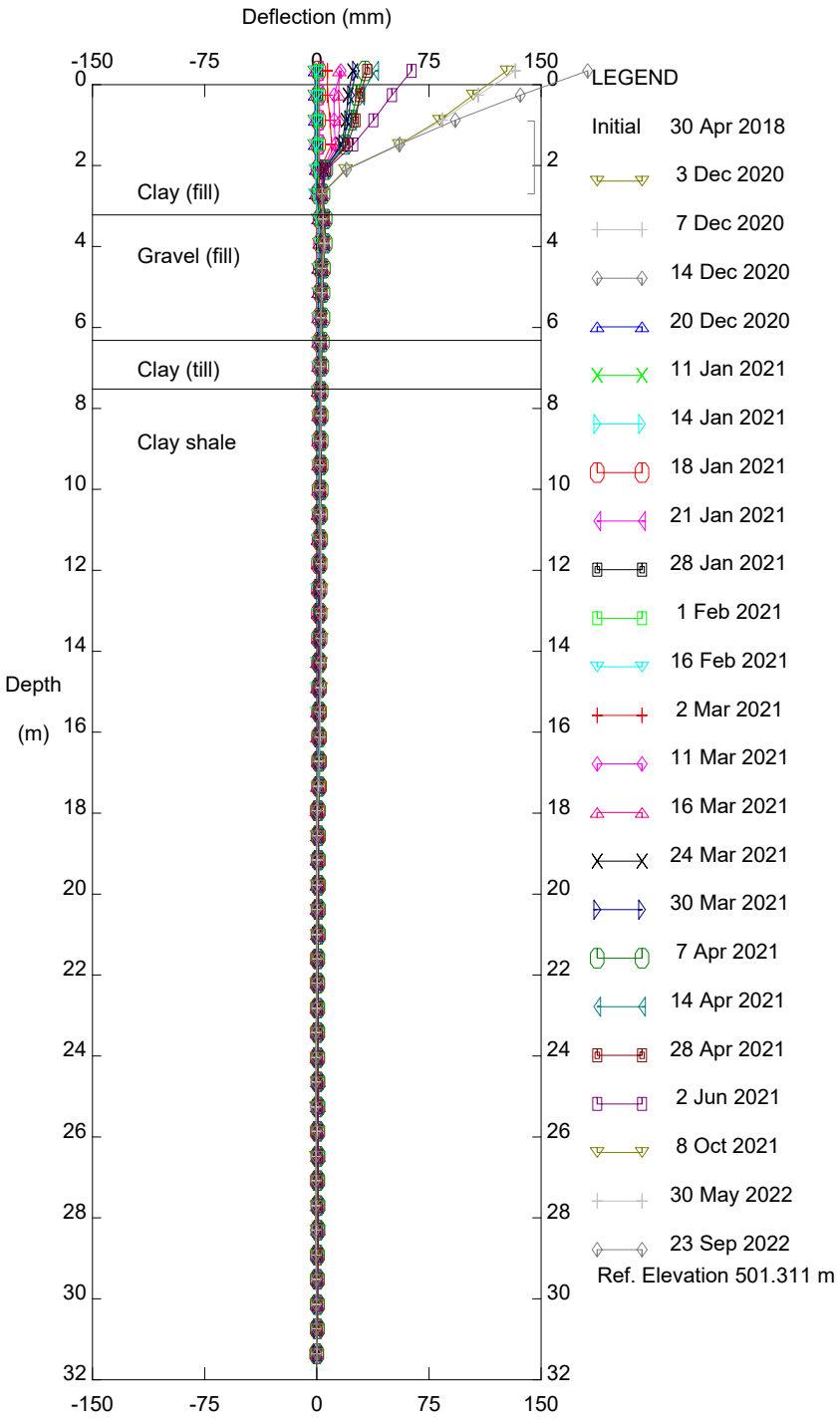
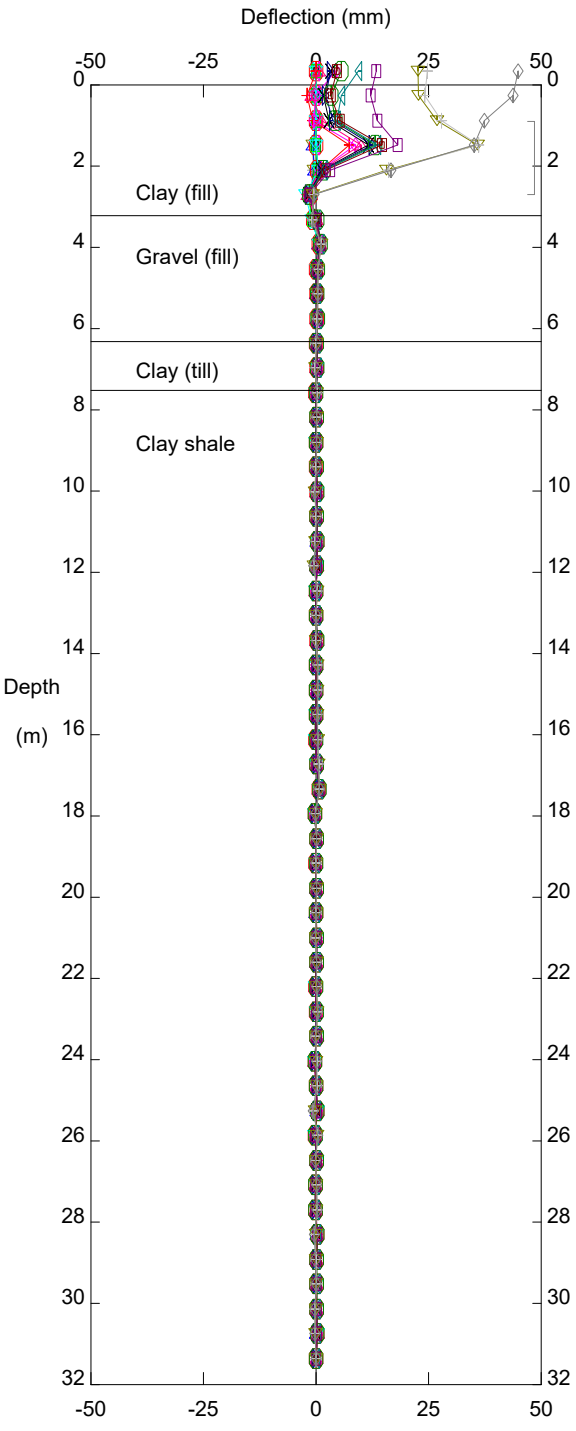


Cumulative Deflection

Direction B



Incremental Deflection

Direction B

HWY 63 TSA (East Slide), Inclinometer SI18-8

Alberta Transportation

H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2022B-Fall\SI Readings\NC70\SI18-8.gtl

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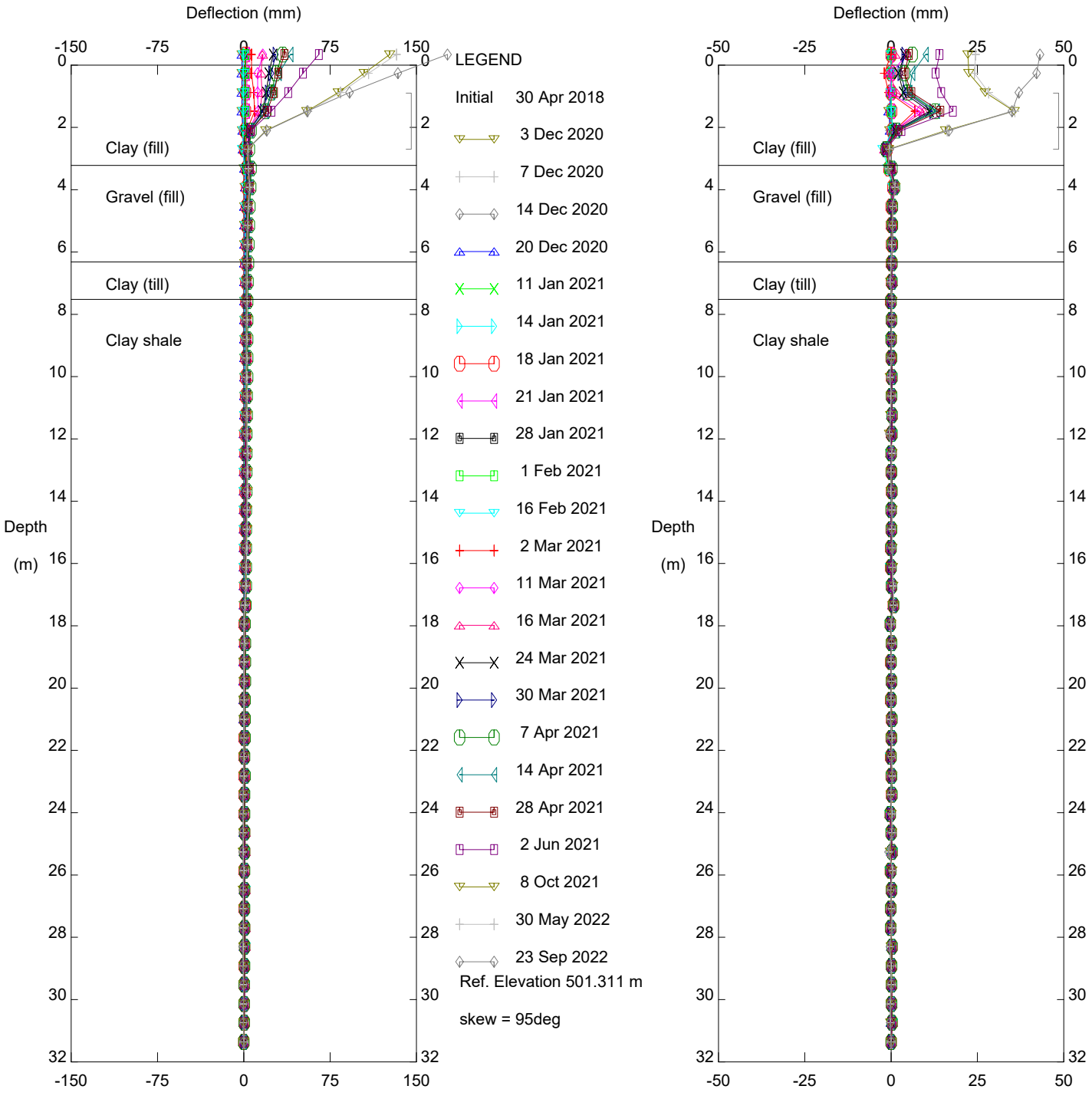

Cumulative Deflection

Direction X

Incremental Deflection

Direction X

HWY 63 TSA (East Slide), Inclinometer SI18-8

Alberta Transportation

H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2022B-Fall\SI Readings\NC70\SI18-8.gtl

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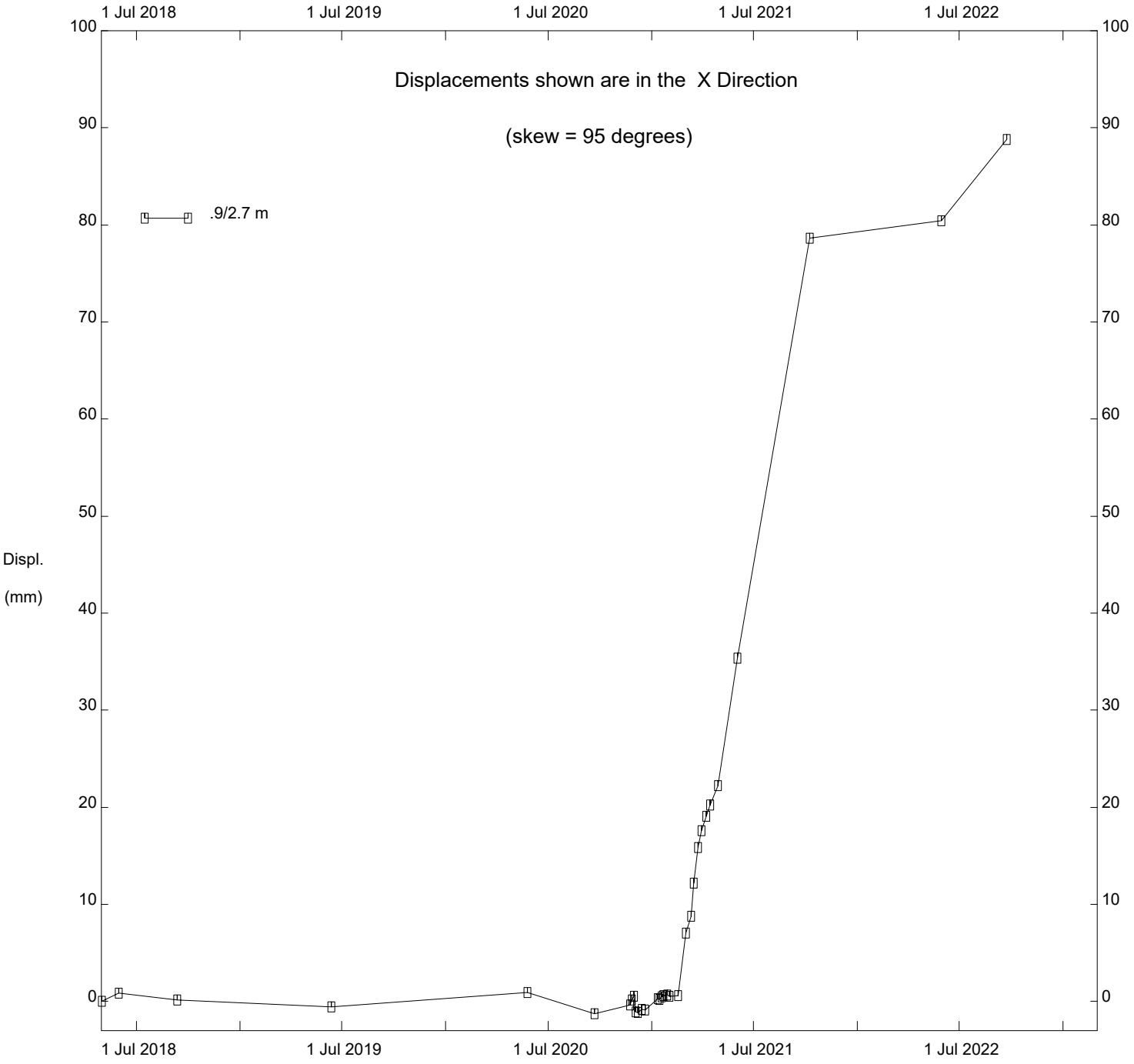

HWY 63 TSA (East Slide), Inclinometer SI18-8

Alberta Transportation

FIGURE NC070-1
PIEZOMETRIC ELEVATIONS FOR HWY 63:10 TRUCK STAGING AREA