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 NC071: HWY 663:04 LITTLE PINE CREEK

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

Five slope inclinometers (SI12-1 to SI12-4, and SI12-9), eight pneumatic piezometers (PN12-1B, 12-2A, 12-2B, 12-3B, 12-4A, 12-4B, 12-6, and 12-8) and four standpipe piezometers (SP1, SP2, SP12-10, and SP12-11) were read at the Hwy 663:03 Little Pine Creek site on September 24, 2021, by Mr. Niraj Regmi, G.I.T. and Mr. Kyle Crooymans, both of Thurber Engineering Ltd.

A site plan showing approximate instrumentation locations is included in Appendix A.

The SIs were read using a 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 casings. The pneumatic and standpipe piezometers were read using a RST C108 pneumatic piezometer reader and a DGSI dipmeter, respectively.

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. The standpipe and pneumatic piezometer plots are also provided in Appendix A. The slope inclinometer and piezometer reading summary tables are provided below. These tables also include instruments that were deleted from the GRMP or not read during this monitoring event for future reference.

2.2 Zones of Movement

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

Zones of movement are summarized in Table NC071-1 at the end of this report. Table NC071-1 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.

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TABLE NC071-1
FALL 2022 – HWY 663:04 LITTLE PINE CREEK
SLOPE INCLINOMETER INSTRUMENTATION READING SUMMARY

Date Monitored: September 24, 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)
SI12-1	December 8, 2012	48.6 over 1.8 m to 5.5 m depth in 230° direction	26.0 in September 2015	Operational	June 4, 2022	<0.1	0.1	-6.6
SI12-2	December 8, 2012	102.9 over 9.8 m to 12.3 m depth in 203° direction	31.0 in October 10, 2021	Operational	June 4, 2022	6.1	19.8	5.6
SI12-3	December 12, 2012	38.1 over 11.3 m to 13.1 m depth in 179° direction	14.1 in September 2020	Operational	June 4, 2022	1.2	3.8	-3.8
SI12-4	December 12, 2012	No discernible movement	N/A	Operational	June 4, 2022	N/A	N/A	N/A
SI12-9	December 9, 2012	49.0 over 6.8 m to 8.6 m depth in 202° direction	23.9 in September 2015	Operational	June 4, 2022	3.3	10.7	6.3
		5.9 over 17.2 m to 19.6 m depth in 202° direction	1.6 in May 2016			0.1	0.3	-1.3

Drawing 32122-NC071 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

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TABLE NC071-2
FALL 2022 – HWY 663:04 LITTLE PINE CREEK
PNEUMATIC PIEZOMETER INSTRUMENTATION READING SUMMARY

Date Monitored: September 24, 2022

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)
PN12-1A	*December 12, 2012*	*15.0*	*589.4*	*Non-Operational*	4.12 in February 2013	*N/A*	*N/A*	*4.12 (February 2013)*	*N/A*
PN12-1B	December 12, 2012	25.0	589.4	Active	14.42 in September 2018	102.3	14.54	14.58	0.04
PN12-2A	December 7, 2012	15.9	583.3	Active	6.81 in June 2022	88.8	6.87	6.81	-0.06
PN12-2B	December 7, 2012	19.9	583.3	Active	10.48 in June 2022	91.8	10.57	10.48	-0.09
PN12-3A	*December 12, 2012*	*11.0*	*573.9*	*Malfunctioning*	*2.06 in February 2013*	*N/A*	*N/A*	*3.19 (May 2017)*	*N/A*
PN12-3B	December 12, 2012	15.3	573.9	Active	0.92 in June 2022	138.9	1.09	0.92	-0.17

Drawing 32122-NC071 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

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TABLE NC071-2 – CONTINUED…
FALL 2022 – HWY 663:04 LITTLE PINE CREEK
PNEUMATIC PIEZOMETER INSTRUMENTATION READING SUMMARY

Date Monitored: September 24, 2022

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)
PN12-4A	December 12, 2012	9.4	565.1	Active	2.84 in May 2013	51.4	4.14	3.98	-0.16
PN12-4B	December 12, 2012	20.6	565.1	Active	4.76 in June 2020	149.3	5.36	5.10	-0.26
PN12-5	*December 5, 2012*	*20.0*	*590.5*	*Malfunctioning*	*13.32 in December 2012*	*N/A*	*N/A*	*19.93 (September 2018)*	*N/A*
PN12-6	December 5, 2012	12.0	585.6	Active	7.50 in May 2016	32.2	8.72	8.60	-0.12
PN12-8	December 2, 2012	5.3	588.9	Active	-0.36 in May 2017	41.5	1.10	0.49	-0.61
PN12-9	*December 7, 2012*	*18.3*	*582.3*	*Malfunctioning*	*1.58 in February 2013*	*N/A*	*N/A*	*3.05 (September 2018)*	*N/A*

Drawing 32122-NC071 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

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TABLE NC071-3
FALL 2022 – HWY 663:04 LITTLE PINE CREEK
STANDPIPE PIEZOMETER INSTRUMENTATION READING SUMMARY

Date Monitored: September 24, 2022

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)
SP1	December 1979	12.3	587.0	Operational	6.49 on June 29, 2021	6.74	7.08	0.34
SP2	December 1979	11.3	576.5	Operational	1.98 on June 4, 2022	2.23	1.98	-0.25
SP12-7	*December 8, 2012*	*19.8*	*578.3*	*Blocked at 1 m depth*	*4.95 on September 28, 2020*	*N/A*	*4.95*	*N/A*
SP12-10	December 12, 2012	19.8	571.6	Operational	0.78 on June 4, 2022	1.08	0.78	-0.3
SP12-11	December 12, 2012	15.2	556.2	Operational	7.58 on June 4, 2022	8.50	7.58	-0.92

Drawing 32122-NC071 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

3. INTERPRETATION OF MONITORING RESULTS

Slope inclinometer SI12-4 has continued to show no discernible movement since initialization.

SI12-1 showed a rate of movement of 0.1 mm/yr since the spring of 2022 readings. SI12-2 showed a rate of movement of 19.8 mm/yr over 9.8 m to 12.3 m depth since the spring of 2022 readings. SI12-3 showed a rate of movement of 3.8 mm/yr over 11.3 m to 13.1 m depth since the spring of 2022 readings. SI12-9 showed a rate of movement of 10.7 mm/yr over 6.8 m to 8.6 m depth since the spring of 2022 readings. SI12-9 showed a rate of movement of 0.3 mm/yr over 17.2 m to 19.6 m depth.

It was noted that the SI probe was hard to pull near the shear zones in SI12-2, SI12-3 and SI12-9 during the current readings, which likely indicates that the SIs are close to shearing off.

Pneumatic piezometers PN12-2A, PN12-2B, PN12-3B, PN12-4A, PN12-4B, PN12-6, and PN12-8, and PN12-6 showed decreases in groundwater level of 0.06 m, 0.09 m, 0.17 m, 0.16 m, 0.26 m, 0.12 m, and 0.61 m, respectively, since the spring of 2022 readings. PN12-1B showed an increase in groundwater level of 0.04 m since the spring of 2022 readings.

Standpipe piezometer SP1 showed an increase in groundwater level of 0.34 m since the spring of 2022 readings. Standpipe piezometers SP2, SP12-10 and SP12-11 showed decreases in groundwater level of 0.25 m, 0.30 m, and 0.92 m, respectively, since the spring of 2022 readings.

Overall, the groundwater levels measured in the pneumatic and standpipe piezometers are in line with historic groundwater readings at the site. The piezometer readings are summarized in Tables NC071-2 and NC071-3, and are plotted on Figure NC071-1 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.

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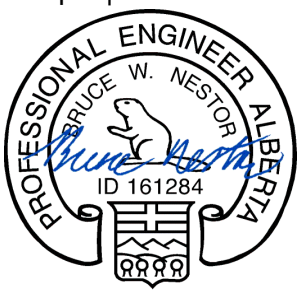
5. CLOSURE

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



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 Plan Showing Approximate Instrument Locations (Drawing No. 32122-NC071)
  - SI Reading Plots
  - Figure NC071-1 (Piezometric Depths)

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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 NC071: HWY 663:04 LITTLE PINE CREEK

ALBERTA TRANSPORTATION
NORTH CENTRAL REGION - ATHABASCA AND FORT McMURRAY DISTRICTS
INSTRUMENTATION MONITORING FIELD SUMMARY (NC071)
FALL 2022

Location:	Little Pine Creek Slide (HWY 663:04 C1 6.987)	**Readout:**	RST PN C108 Unit 1/DGSI Dipmeter
File Number:	32122	**Casing Diameter:**	2.75"
Probe:	RST SI Set 8R	**Temp:**	16
Cable:	RST SI Set 8R	**Read by:**	KTC/NKR

SLOPE INCLINOMETER (SI) READINGS

SI#	GPS Location (UTM 12)		Date	Stickup (m)	Readings Depth from top of **casing** (ft)	Azimuth of A+ Groove degree	Current Bottom Depth Readings				Probe/ Reel #	Remarks
	Northing	Easting					A+	A-	B+	B-		
SI12-1	6054601	355844	24-Sep-22	0.91	94 to 2	183	-335	348	539	-528	8R/8R	
SI12-2	6054552	355828	24-Sep-22	0.85	84 to 2	175	6	-17	79	-77	8R/8R	About to shear at 33ft, use dummy probe
SI12-3	6054465	355789	24-Sep-22	0.63	68 to 2	180	60	-46	-309	326	8R/8R	About to shear at 35ft, use dummy probe
SI12-4	6054381	355753	24-Sep-22	0.75	80 to 2	187	172	-156	38	-26	8R/8R	
SI12-9	6054576	355750	24-Sep-22	0.8	84 to 2	180	-6	-16	-97	113	8R/8R	About to shear at 24ft, use dummy probe

PNEUMATIC PIEZOMETER (PN) READINGS

PN #	Serial	GPS Location (UTM 12)		Location	Date	Reading (kPa)	Comments
		Northing	Easting				
PN12-1B	35011	6054601	355844	Attached to SI12-1	24-Sep-22	102.3	Water Return, reading was fluctuated
PN12-2A	35015	6054552	355828	Attached to SI12-2	24-Sep-22	88.8	
PN12-2B	35008	6054552	355828	Attached to SI12-2	24-Sep-22	91.8	
PN12-3B	35007	6054465	355789	Attached to SI12-3	24-Sep-22	138.9	
PN12-4A	35014	6054381	355753	Attached to SI12-4	24-Sep-22	51.4	
PN12-4B	35009	6054381	355753	Attached to SI12-4	24-Sep-22	149.3	Water return
PN12-6	35018	6054544	355889	PN12-6	24-Sep-22	32.2	
PN12-8	35017	6054628	355765	PN12-8	24-Sep-22	41.5	

STANDPIPE PIEZOMETER (SP) READINGS

SP#	GPS Location (UTM 12)		Date	Stick-up (m)	Water level below top of pipe (m)	Comments
	Northing	Easting				
SP1	6054544	355892	24-Sep-22	0.81	7.55	
SP2	6054476	355820	24-Sep-22	1.02	3.25	TD = 11.3m
SP12-10	6054454	355673	24-Sep-22	0.57	1.65	
SP12-11	6054310	355747	24-Sep-22	0.77	9.27	

INSPECTOR REPORT

Rita /Allyn do not live on the property anymore, they have rented the place. Have to find the number to contact the renter for access (Contact - Rita/Allyn Nelson: 780-675-9295)

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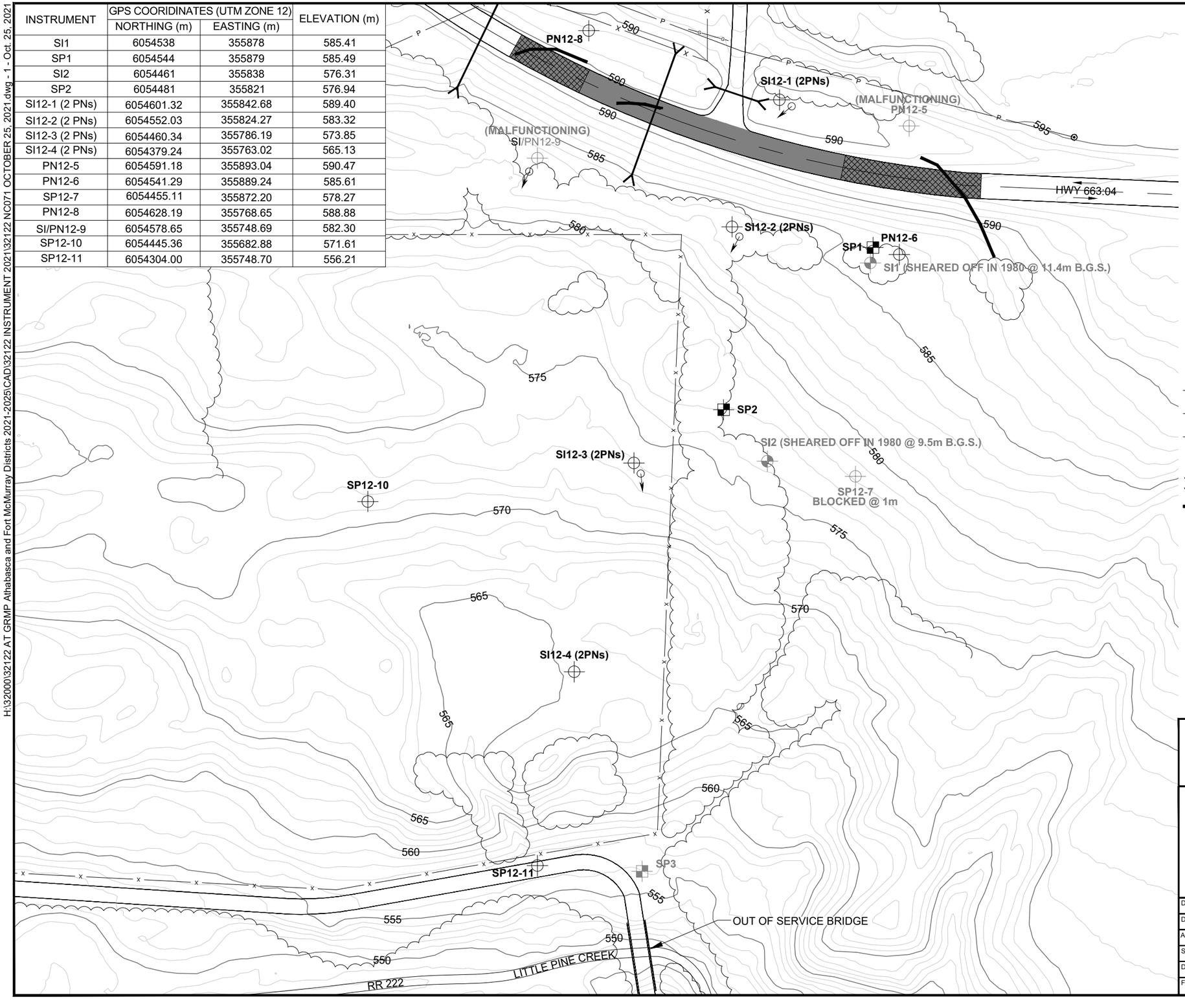
INSTRUMENT	GPS COORIDINATES (UTM ZONE 12)		ELEVATION (m)
	NORTHING (m)	EASTING (m)	
SI1	6054538	355878	585.41
SP1	6054544	355879	585.49
SI2	6054461	355838	576.31
SP2	6054481	355821	576.94
SI12-1 (2 PNs)	6054601.32	355842.68	589.40
SI12-2 (2 PNs)	6054552.03	355824.27	583.32
SI12-3 (2 PNs)	6054460.34	355786.19	573.85
SI12-4 (2 PNs)	6054379.24	355763.02	565.13
PN12-5	6054591.18	355893.04	590.47
PN12-6	6054541.29	355889.24	585.61
SP12-7	6054455.11	355872.20	578.27
PN12-8	6054628.19	355768.65	588.88
SI/PN12-9	6054578.65	355748.69	582.30
SP12-10	6054445.36	355682.88	571.61
SP12-11	6054304.00	355748.70	556.21



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LEGEND

- INSTRUMENTS INSTALLED IN 2012
- SI — SLOPE INCLINOMETER
- PN — PNEUMATIC PIEZOMETER
- SP — STANDPIPE PIEZOMETER
- SP — PREVIOUSLY INSTALLED STANDPIPE PIEZOMETER
- SI — PREVIOUSLY INSTALLED SLOPE INCLINOMETER
- ACP PATCH
- DISTRESSED AREA
- POWER POLE (APPROX.)
- P — OVERHEAD POWER LINE (APPROX.)
- G — GAS LINE (APPROX.)
- X — FENCE LINE (APPROX.)
- BUSH LINE (APPROX.)
- CULVERT (APPROX.)
- CRACKS
- DIRECTION OF MOVEMENT IN SLOPE INCLINOMETER

NOTES

1. CONTOUR INTERVAL = 1 m
2. SITE CONTOURS ARE BASED ON LIDAR DATA.
3. THIS SITE WAS NOT SURVEYED AND LANDSLIDE FEATURES WERE PICKED UP USING A HAND HELD GPS UNIT.

0 20 40 60 80 m
SCALE 1:1500

Alberta

NORTH CENTRAL
(ATHABASCA AND FORT MCMURRAY DISTRICTS)

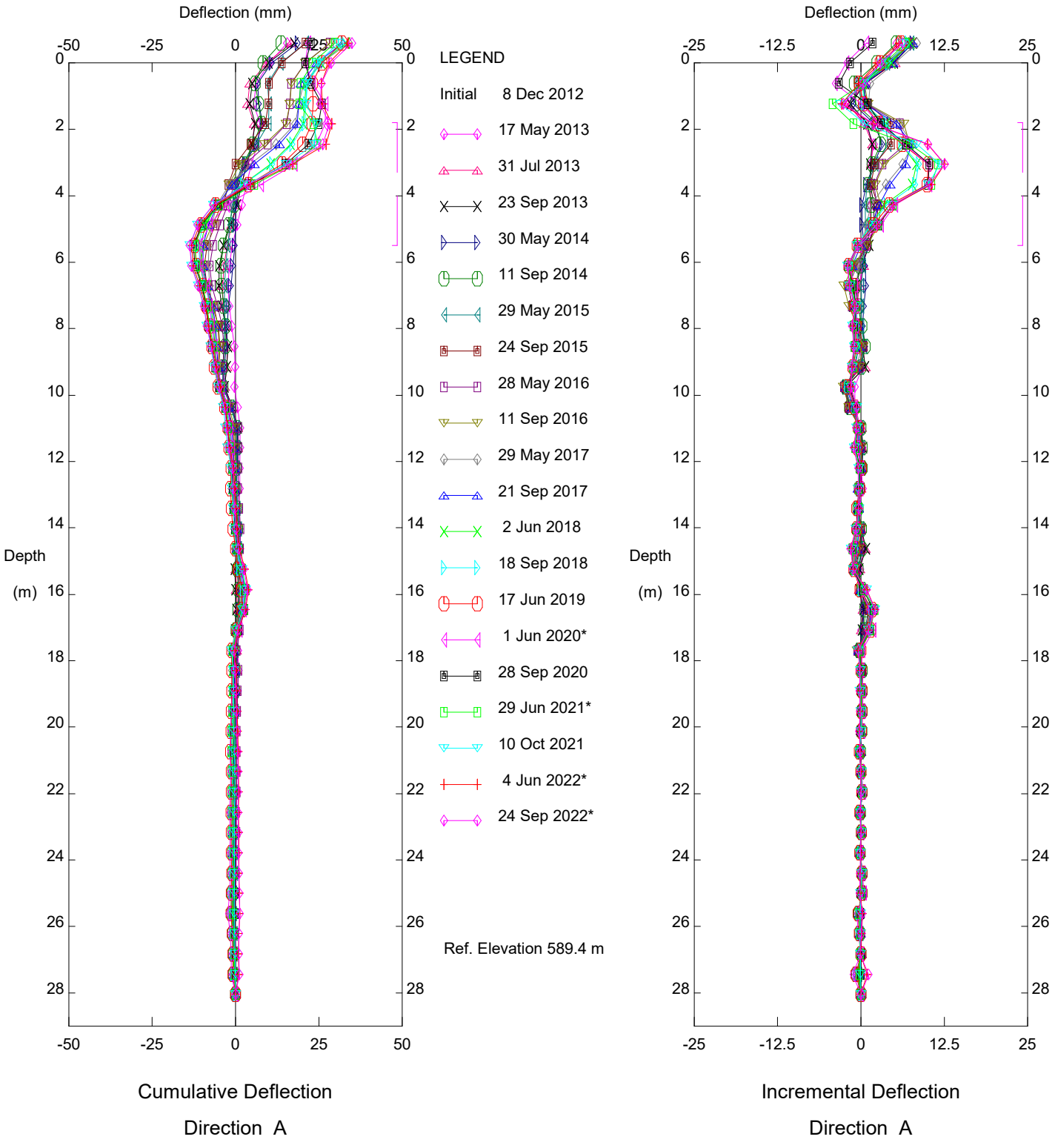
NC071: HWY 663:04 LITTLE PINE CREEK
SITE PLAN SHOWING APPROXIMATE INSTRUMENT LOCATIONS

DWG No. 32122-NC071

DRAWN BY	ML
DESIGNED BY	BWN
APPROVED BY	TSA
SCALE	1:1500
DATE	OCTOBER 2021
FILE No.	32122

THURBER ENGINEERING LTD.

Thurber Engineering Ltd.



Cumulative Deflection

Direction A

Incremental Deflection

Direction A

Hwy 663 04 Little Pine Creek [Colinton], Inclinometer SI12-1

Alberta Transportation

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

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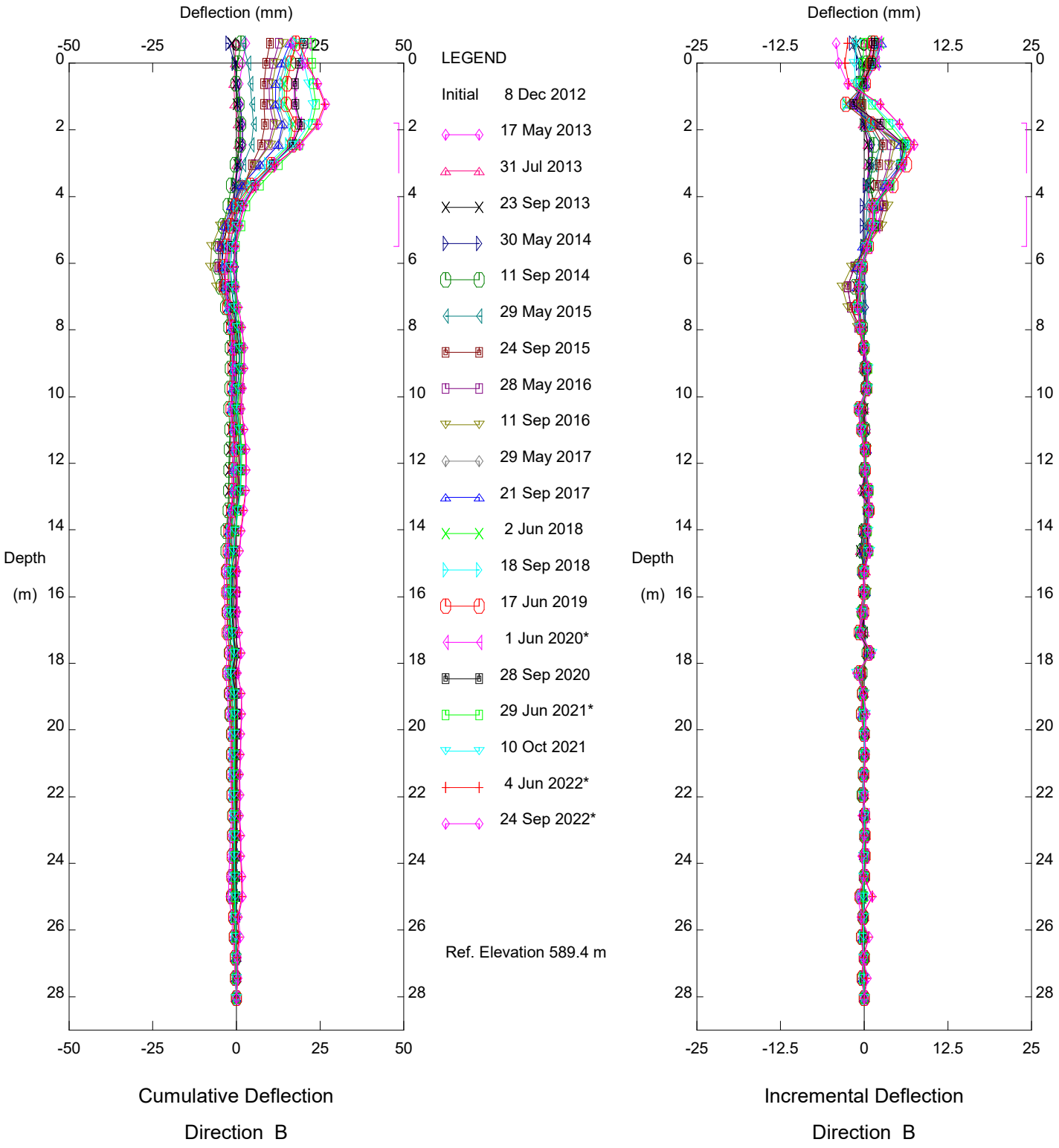
Thurber Engineering Ltd.



Cumulative Deflection

Direction B

Incremental Deflection

Direction B

Hwy 663 04 Little Pine Creek [Colinton], Inclinometer SI12-1

Alberta Transportation

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

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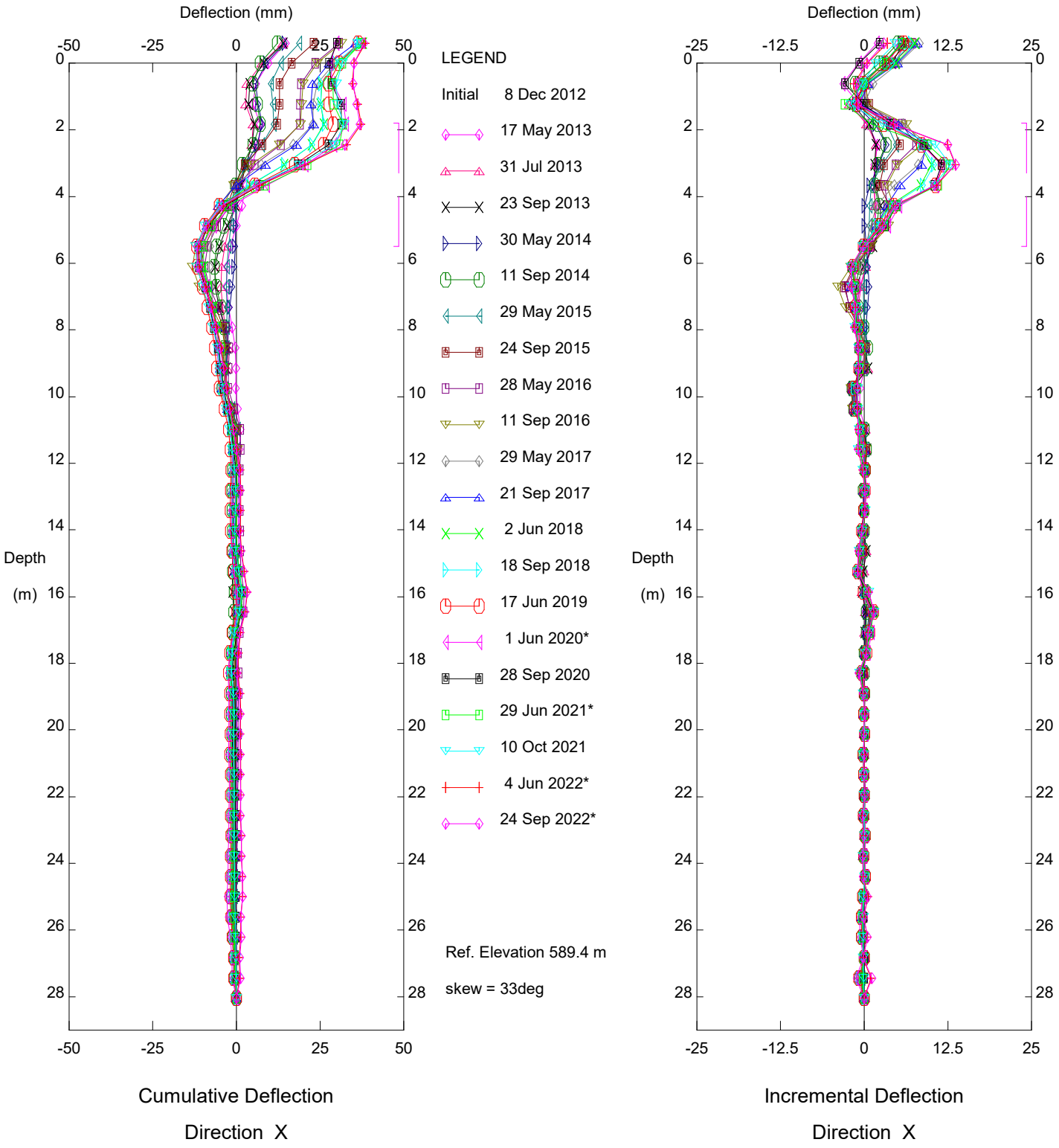
Thurber Engineering Ltd.



Cumulative Deflection

Direction X

Incremental Deflection

Direction X

Hwy 663 04 Little Pine Creek [Colinton], Inclinometer SI12-1

Alberta Transportation

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

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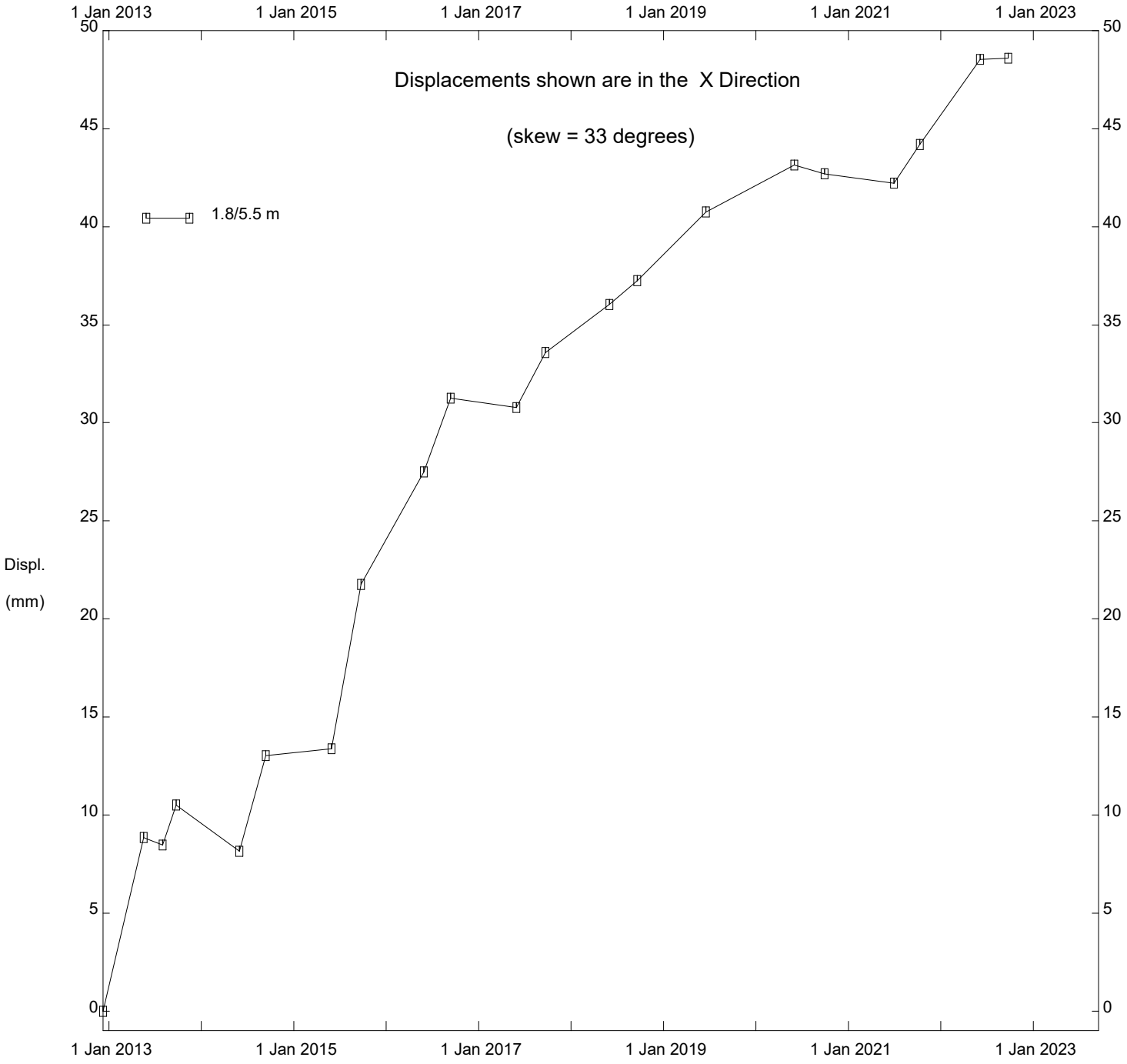
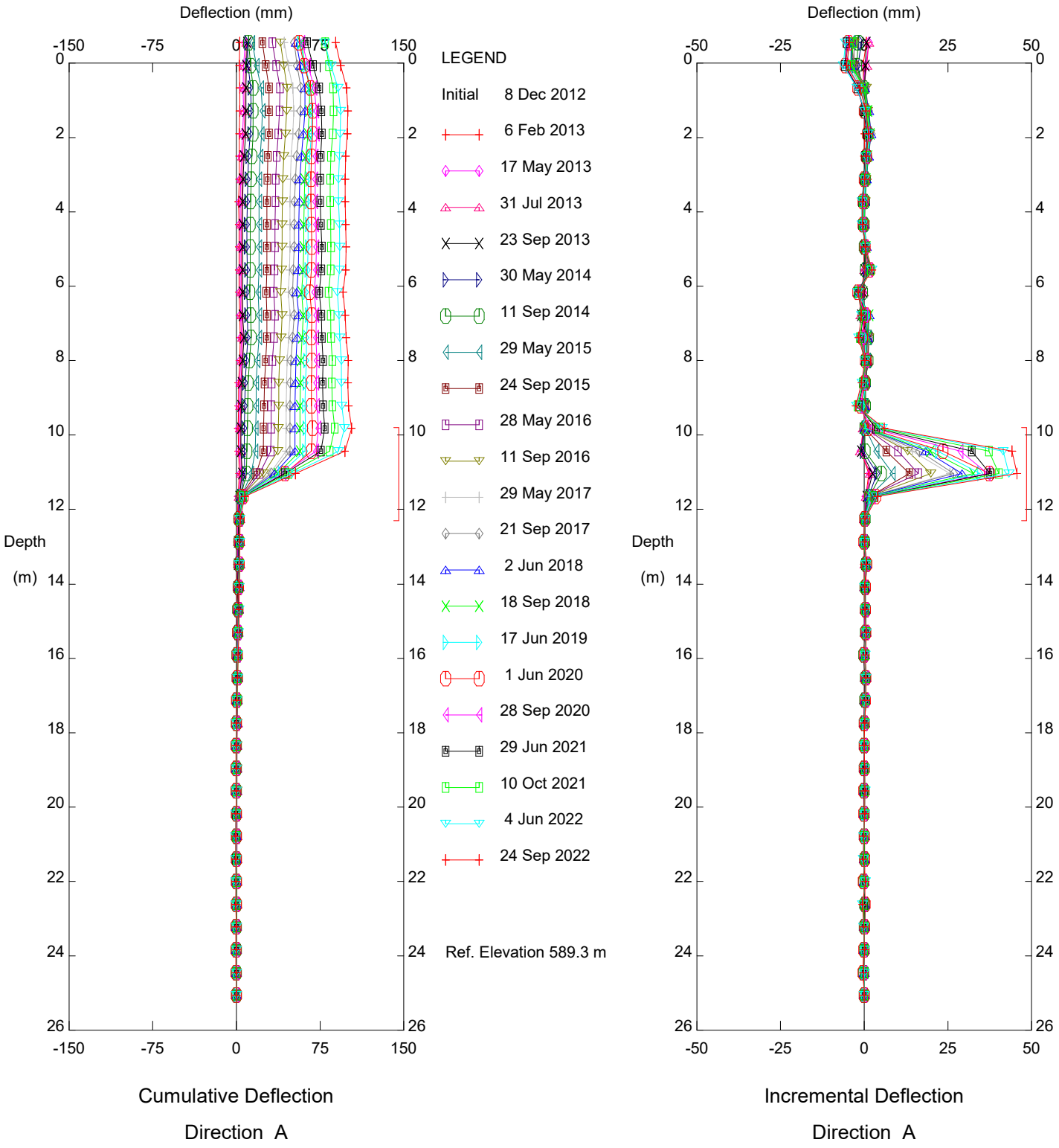
Thurber Engineering Ltd.



Hwy 663 04 Little Pine Creek [Colinton], Inclinometer SI12-1

Alberta Transportation

Thurber Engineering Ltd.



Cumulative Deflection

Direction A

Incremental Deflection

Direction A

Hwy 663 04 Little Pine Creek, Inclinometer SI12-2

Alberta Transportation

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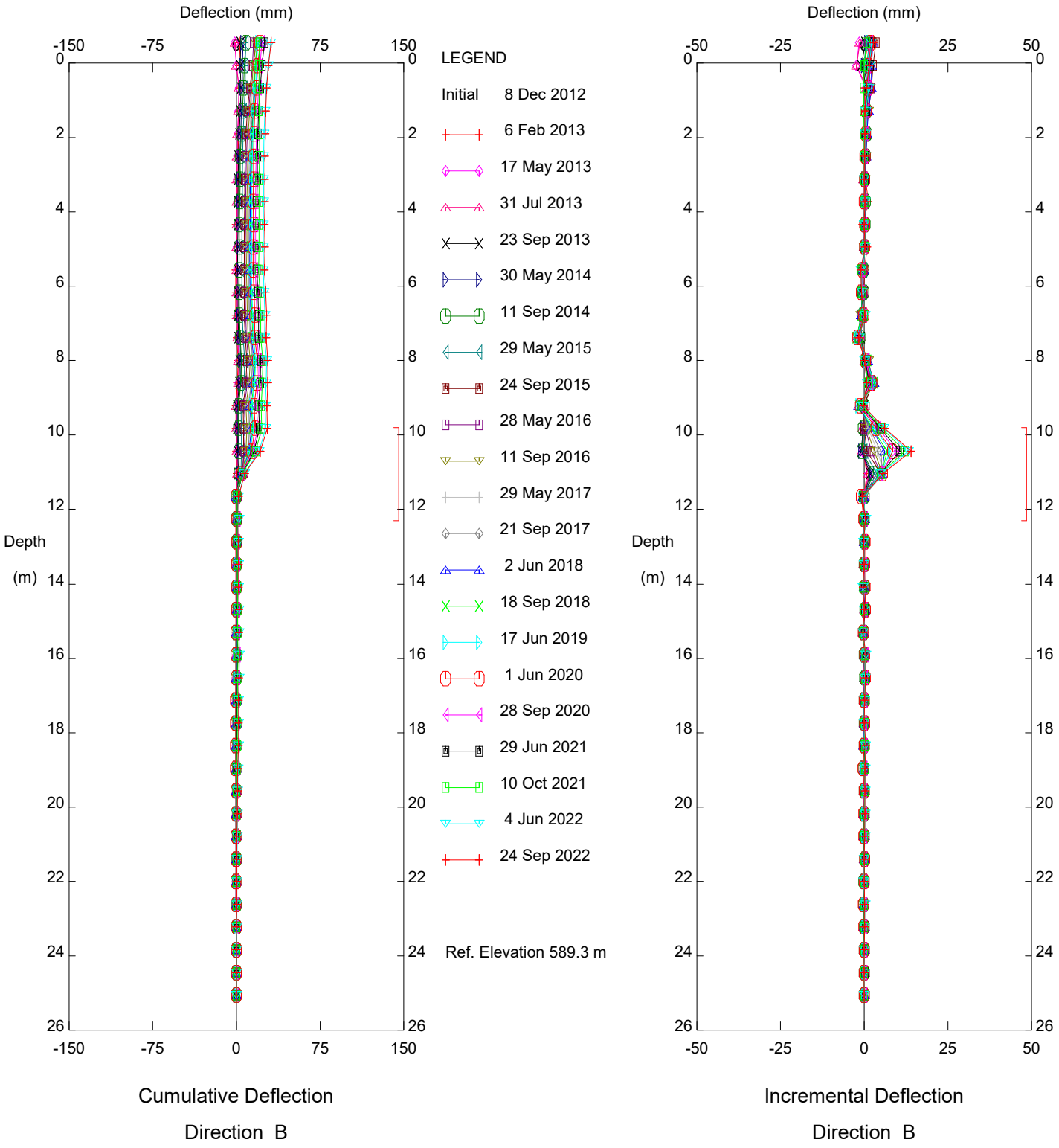
Thurber Engineering Ltd.



Cumulative Deflection

Direction B

Incremental Deflection

Direction B

Hwy 663 04 Little Pine Creek, Inclinometer SI12-2

Alberta Transportation

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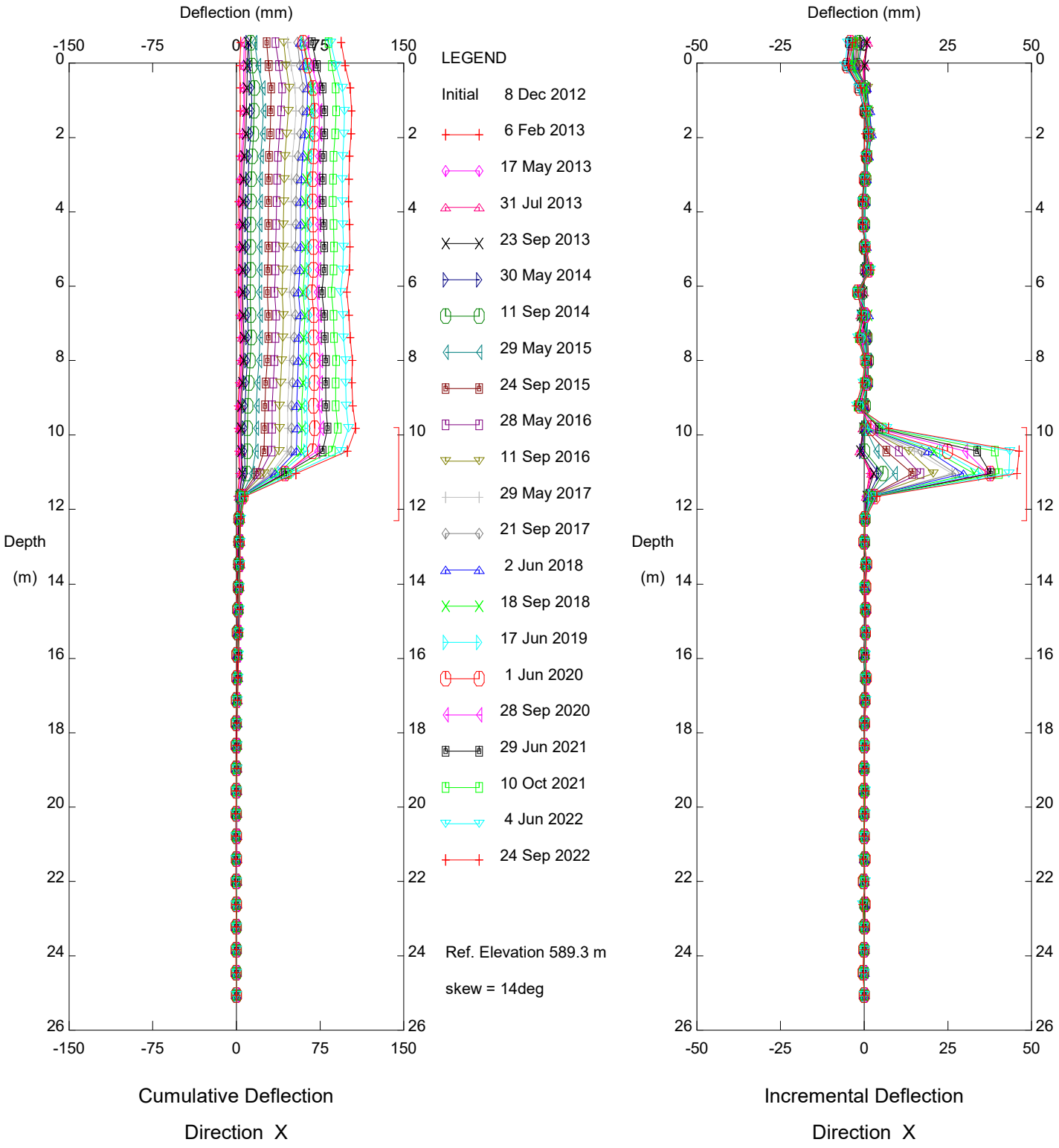

Cumulative Deflection

Direction X

Incremental Deflection

Direction X

Hwy 663 04 Little Pine Creek, Inclinometer SI12-2

Alberta Transportation

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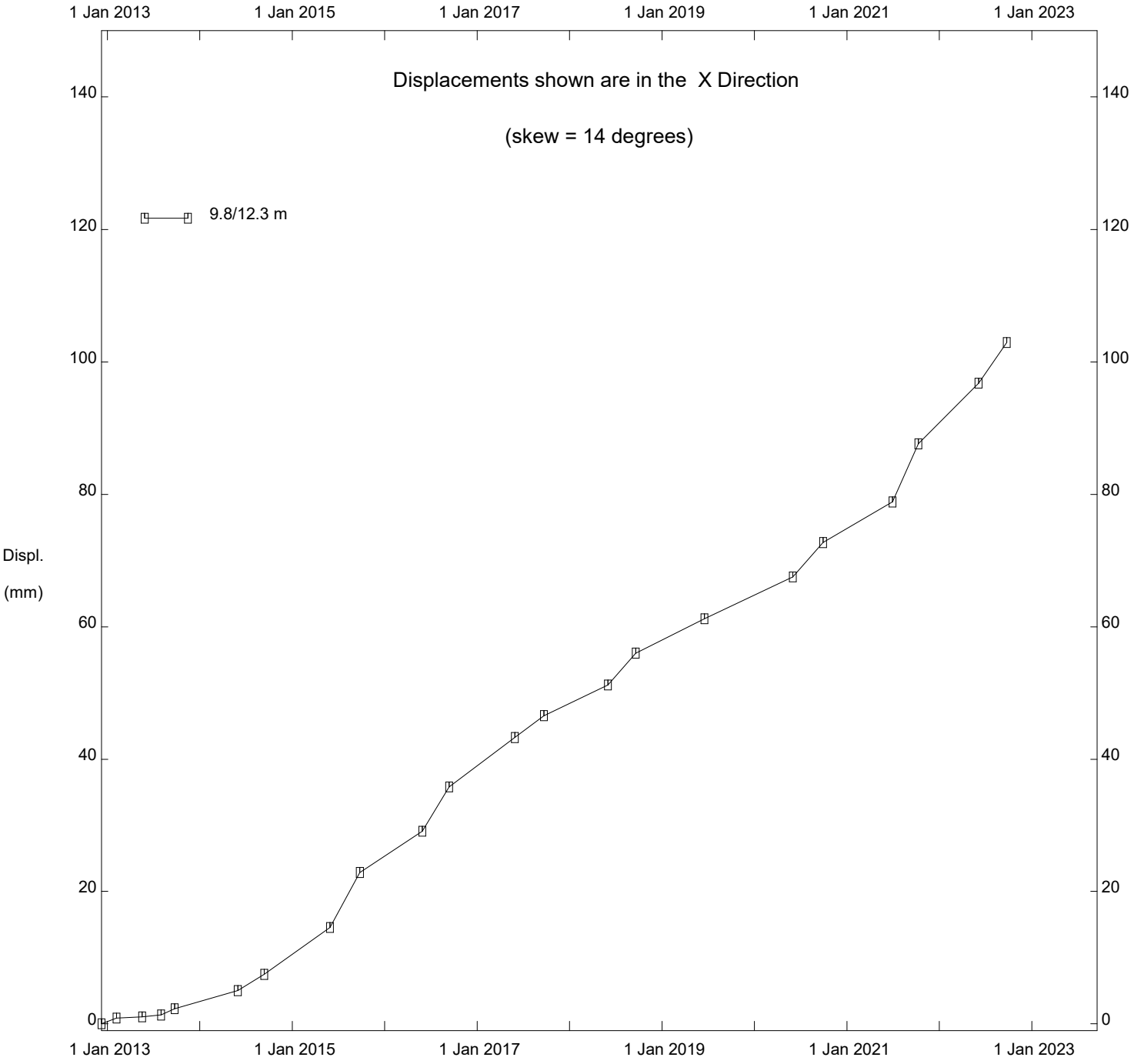
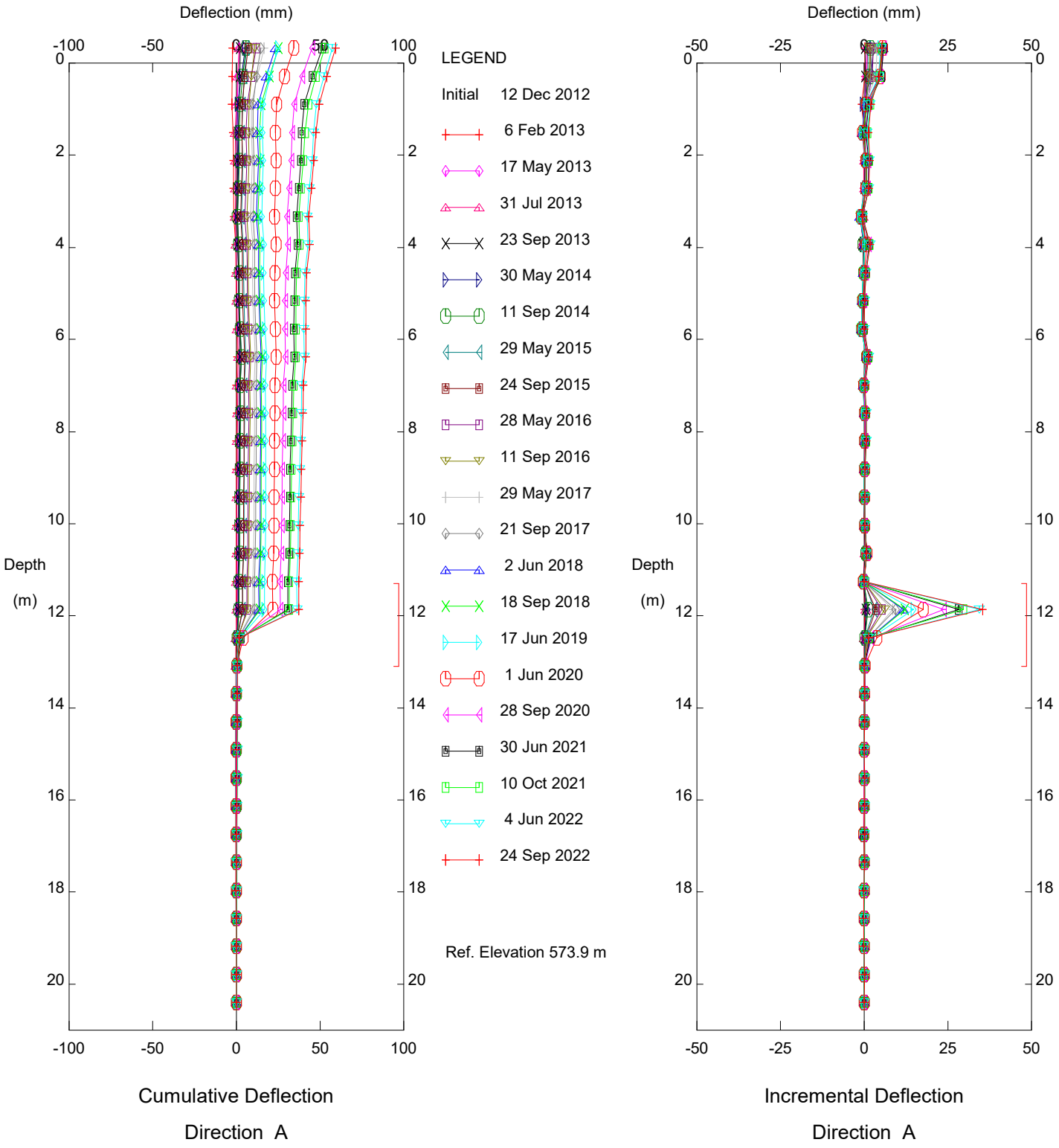


Hwy 663 04 Little Pine Creek, Inclinometer SI12-2

Alberta Transportation

Thurber Engineering Ltd.



Cumulative Deflection

Direction A

Incremental Deflection

Direction A

Hwy 663 04 Little Pine Creek [Colinton], Inclinometer SI12-3

Alberta Transportation

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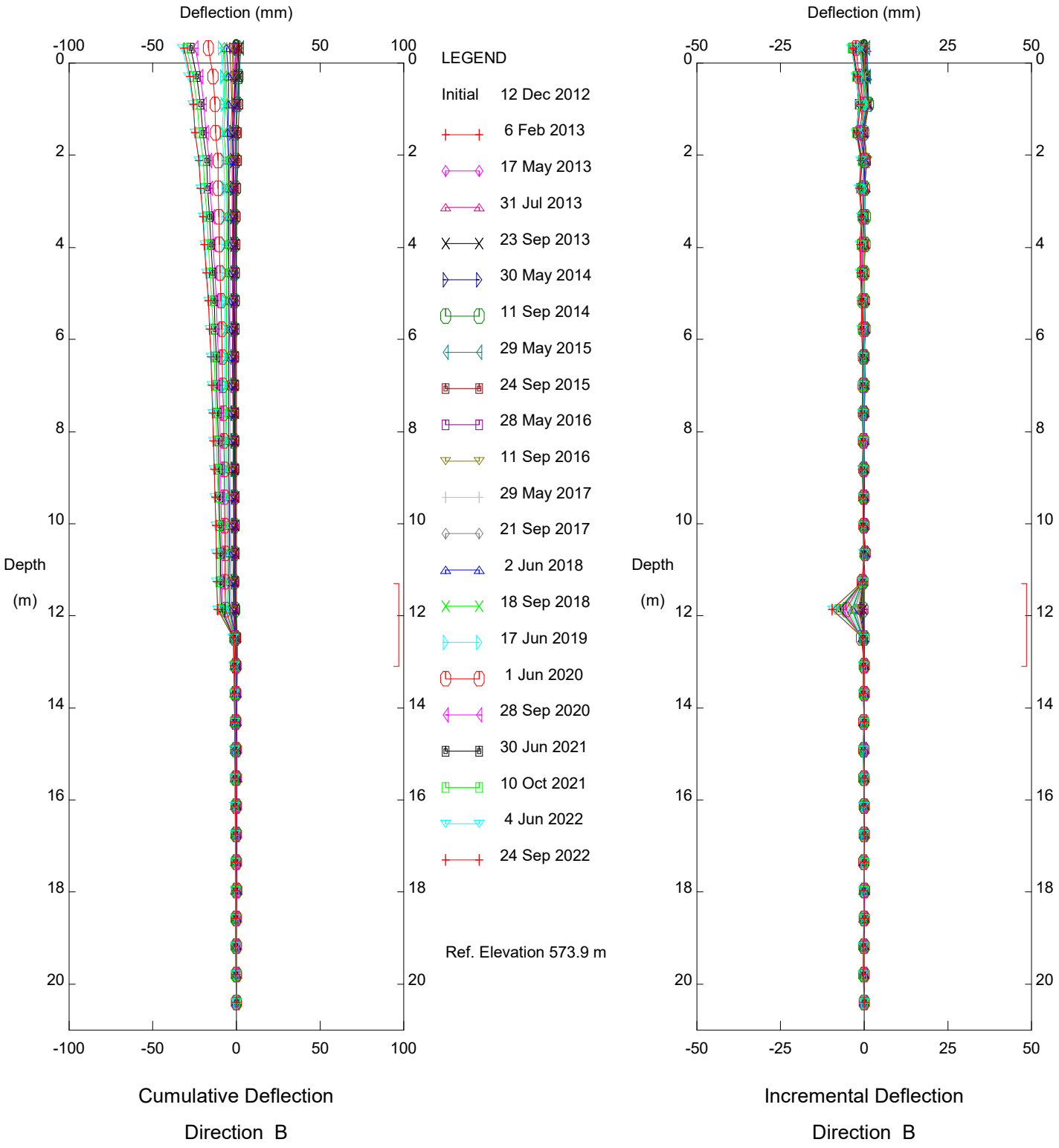
Thurber Engineering Ltd.



Cumulative Deflection

Direction B

Incremental Deflection

Direction B

Hwy 663 04 Little Pine Creek [Colinton], Inclinometer SI12-3

Alberta Transportation

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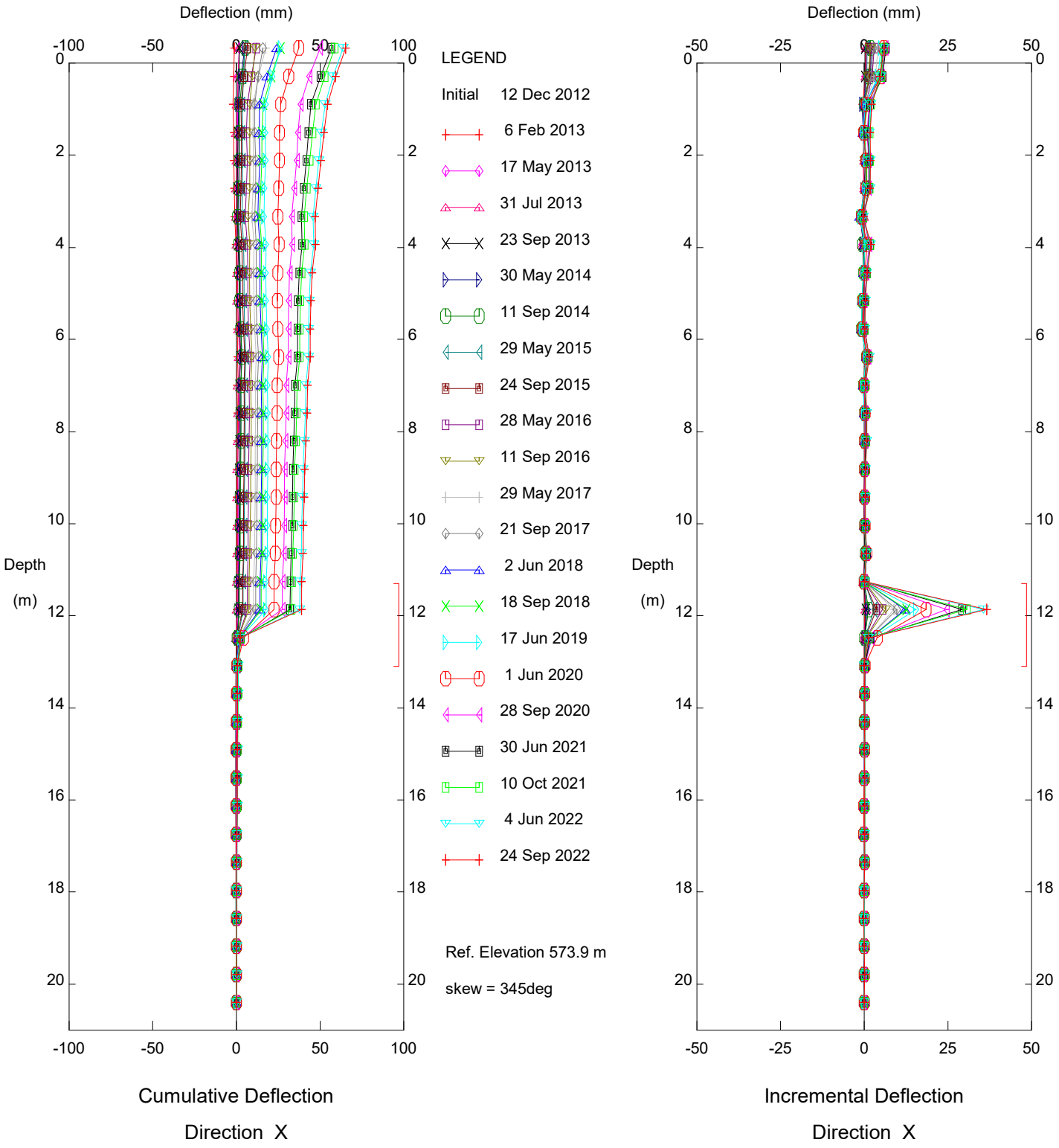

Cumulative Deflection

Direction X

Incremental Deflection

Direction X

Hwy 663 04 Little Pine Creek [Colinton], Inclinometer SI12-3

Alberta Transportation

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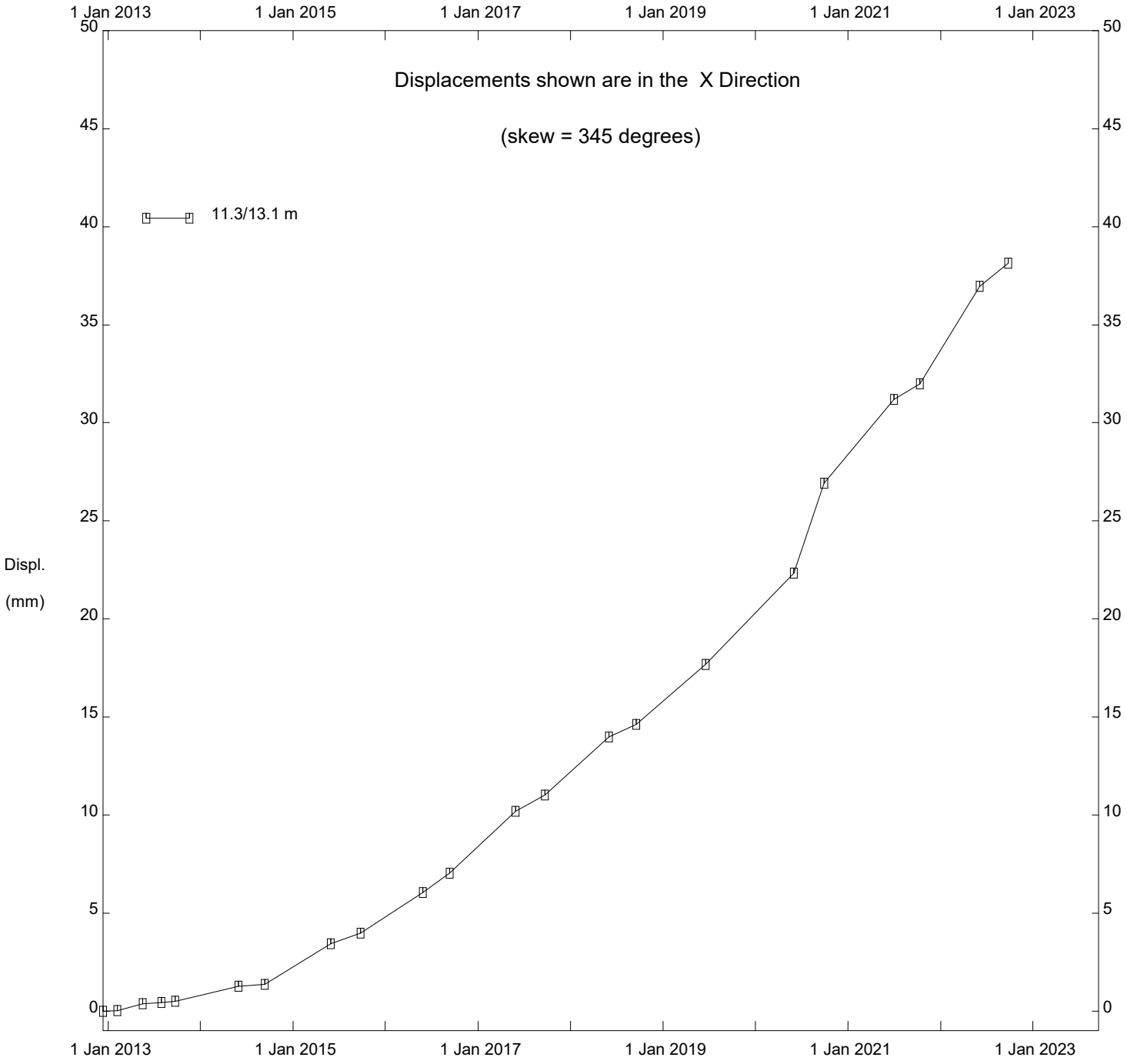
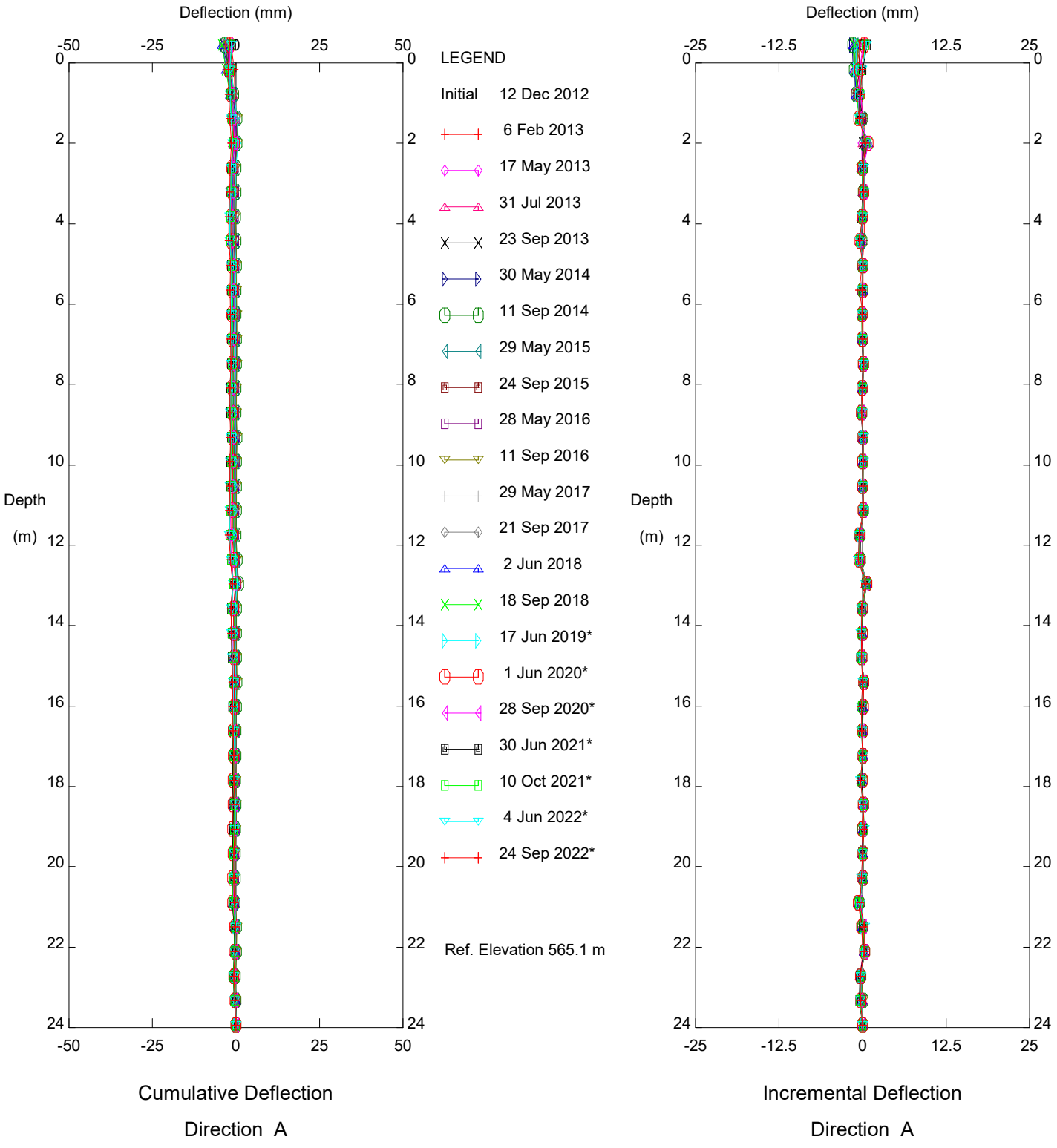


Hwy 663 04 Little Pine Creek [Colinton], Inclinometer SI12-3

Alberta Transportation

Thurber Engineering Ltd.



Cumulative Deflection

Direction A

Incremental Deflection

Direction A

Hwy 663 04 Little Pine Creek [Colinton], Inclinometer SI12-4

Alberta Transportation

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

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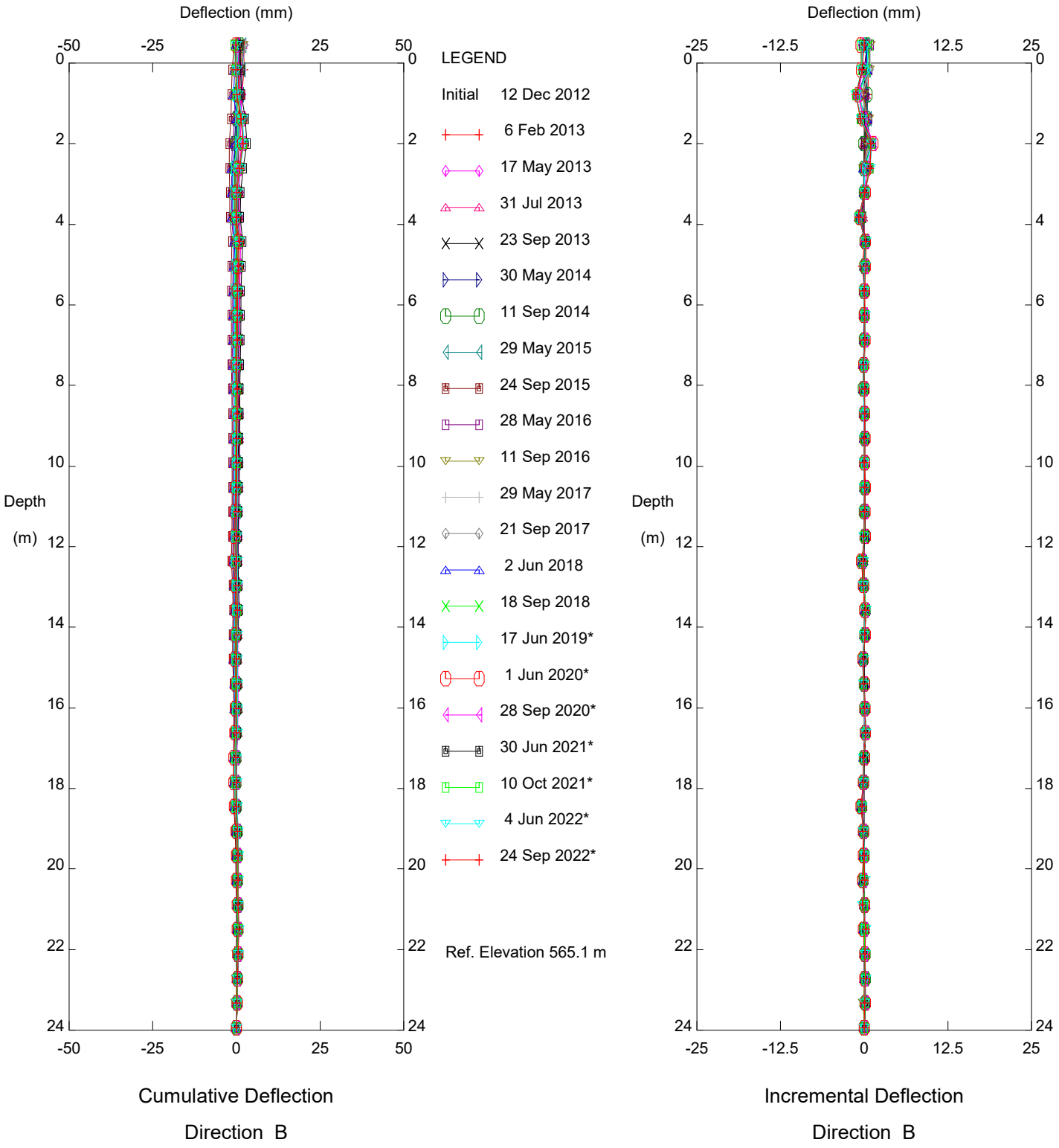
Thurber Engineering Ltd.



Cumulative Deflection

Direction B

Incremental Deflection

Direction B

Hwy 663 04 Little Pine Creek [Colinton], Inclinometer SI12-4

Alberta Transportation

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

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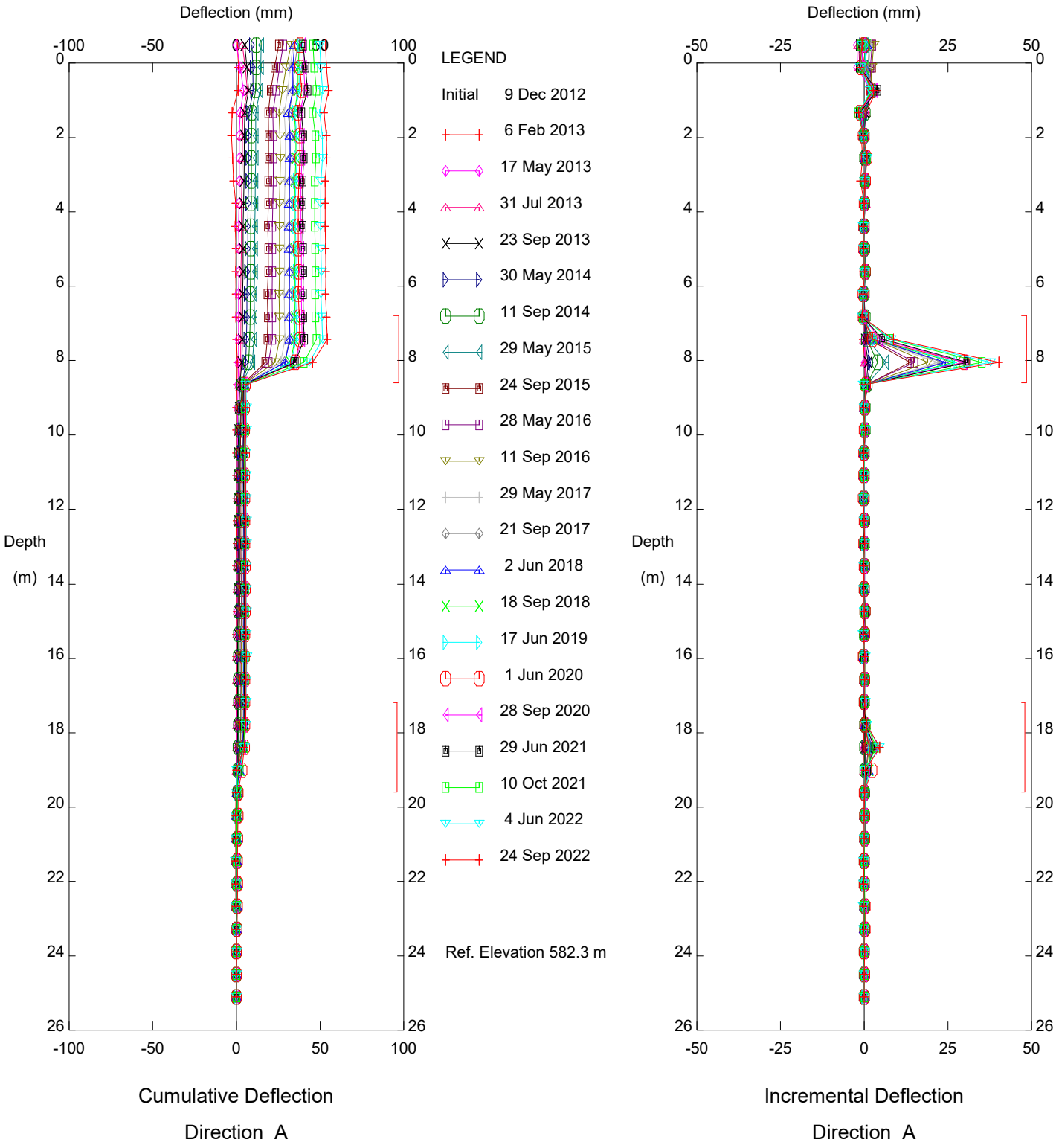
Thurber Engineering Ltd.



Cumulative Deflection

Direction A

Incremental Deflection

Direction A

Hwy 663 04 Little Pine Creek [Colinton], Inclinometer SI12-9

Alberta Transportation

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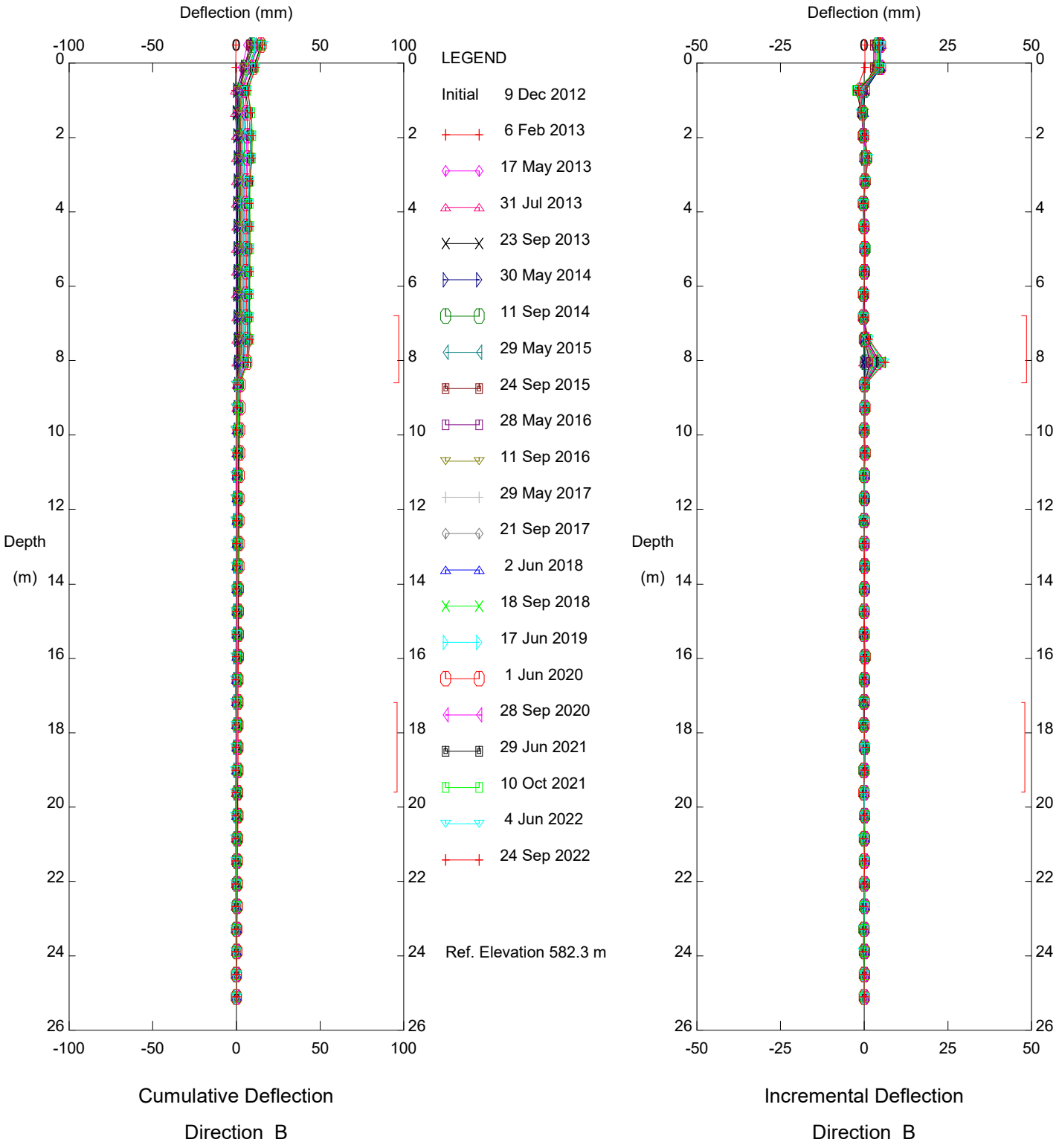

Cumulative Deflection

Direction B

Incremental Deflection

Direction B

Hwy 663 04 Little Pine Creek [Colinton], Inclinometer SI12-9

Alberta Transportation

H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2022B-Fall\SI Readings\NC71\SI12-9.gtl

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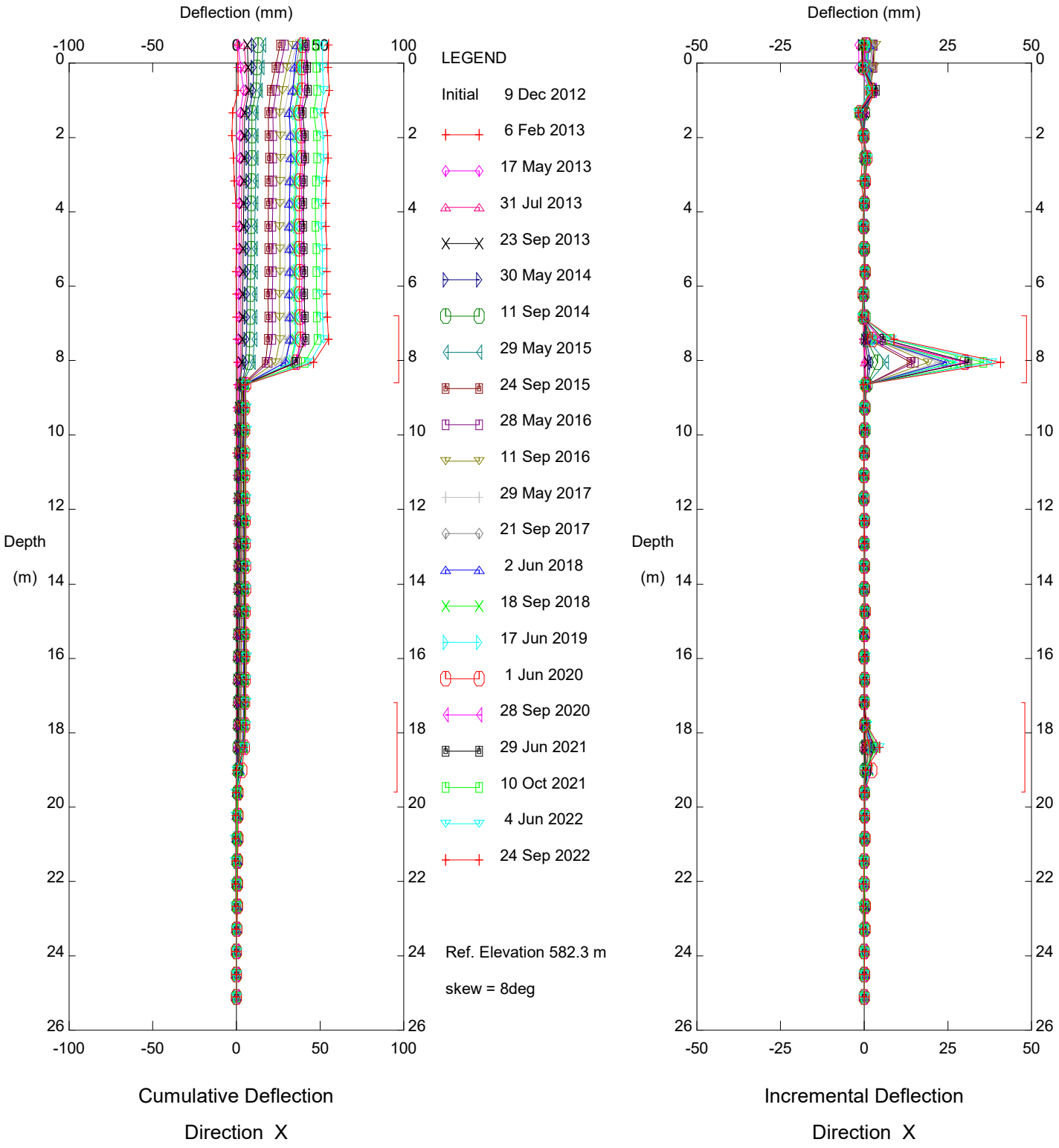

Cumulative Deflection

Direction X

Incremental Deflection

Direction X

Hwy 663 04 Little Pine Creek [Colinton], Inclinometer SI12-9

Alberta Transportation

H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2022B-Fall\SI Readings\NC71\SI12-9.gtl

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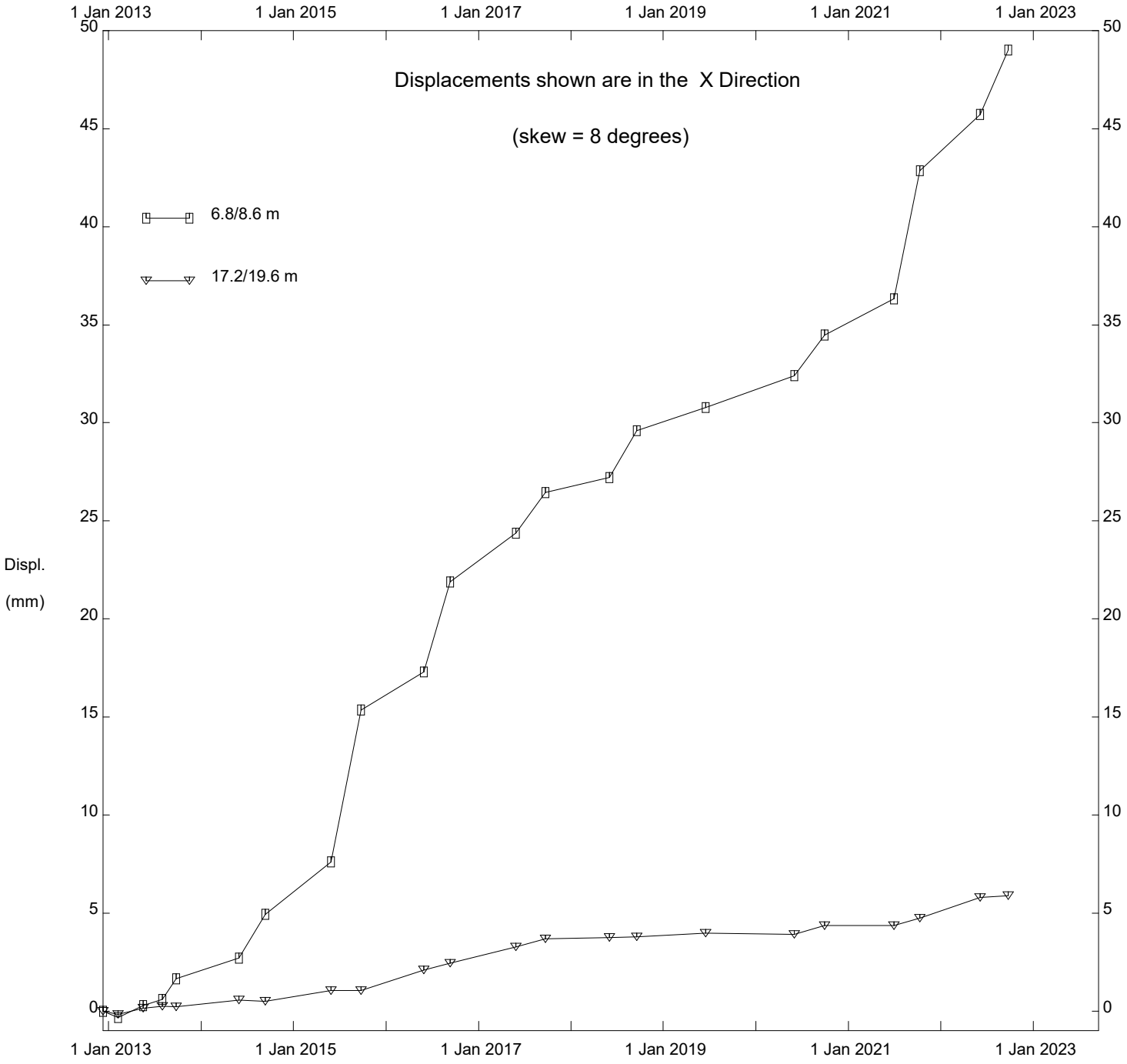

Hwy 663 04 Little Pine Creek [Colinton], Inclinometer SI12-9

Alberta Transportation

FIGURE NC071-1
PIEZOMETER DATA FOR HWY 663:04, LITTLE PINE CREEK