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 NC103 (NC024-3): HWY 41:23 KEHIWIN LAKE (km 7.8)

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

Six slope inclinometers (SI10-1, SI10-3, SI11-1 to 4), two pneumatic piezometers (PN10-1 and PN10-3), three standpipe piezometers (PB10-1, PB10-2, and PB10-4) and ten vibrating wire load cells (VC1706 to VC1715) were read at the Hwy 41:23 Kehiwin Lake site (NC103, previously known as NC24-3 from 2016 to 2020 and NC24A prior to 2016) on September 20, 2022, by Mr. Niraj Regmi, G.I.T. and Mr. Kyle Crooymans, both of Thurber Engineering Ltd. An attempt was made to read vibrating wire load cell VC1711, but none of the vibrating wires were functioning during this monitoring event.

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

The SIs were read using two RST Digital Inclinometer probes with 2 ft. wheelbases and RST Pocket PC readouts. 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 an RST C108 pneumatic piezometer reader and a Heron dipmeter, respectively. The vibrating wire load cells were read using a VW2106 RST readout unit.

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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. Standpipe and pneumatic piezometer results, as well as the vibrating wire load cell readings, are also provided in Appendix A. The slope inclinometer and piezometer reading summary tables are provided below. These tables also include instruments deleted from the GRMP program 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 previous readings in the spring of 2022.

Zones of movement are summarized in Table NC103-1 below. Table NC103-1 also provides a historical account of the total movement, the depth of movement and the maximum rate of movement that has occurred in the SIs since initialization.

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TABLE NC103-1
FALL 2022 – HWY 41:23 KEHIWIN LAKE (km 7.8)
SLOPE INCLINOMETER INSTRUMENTATION READING SUMMARY

Date Monitored: September 20, 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)
SI10-1	Oct. 12, 2010	7.1 over 4.4 m to 7.5 m depth in 308° direction	7.6 on Oct. 23, 2010	Operational	May 26, 2022	<0.1	0.1	0.2
SI10-3	Oct. 12, 2010	24.2 over 9.9 m to 12.3 m depth in 291° direction	26.5 on Oct. 23, 2010	Operational	May 26, 2022	0.6	2.0	1.1
SI11-1 (Pile 9)	May 12, 2011	2.0 over 0.7 m to 14.8 m depth in 308° direction	87.6 on June 21, 2011	Operational	May 26, 2022	No discernible movement	N/A	-1.4
SI11-2 (Pile 27)	May 12, 2011	2.0 over 0.7 m to 14.7 m depth in 306° direction	146.6 on May 25, 2011	Operational	May 26, 2022	2.0	6.2	6.8
SI11-3 (Pile 45)	May 25, 2011	-7.0 over 0.5 m to 14.6 m depth in 308° direction	14.2 on June 21, 2011	Operational	May 26, 2022	0.9	2.8	4.1
SI11-4 (Pile 60)	May 25, 2011	-8.3 over 0.8 m to 14.9 m depth in 349° direction	48.5 on June 21, 2011	Operational	May 26, 2022	No discernible movement	N/A	0.5

Drawing 32122-NC103 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

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TABLE NC103-2
FALL 2022 – HWY 41:23 KEHIWIN LAKE (km 7.8)
PNEUMATIC PIEZOMETER INSTRUMENTATION READING SUMMARY

Date Monitored: September 20, 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)
PN10-1	October 5, 2010	6.55	-	Active	0.26 on May 15, 2014	47.5	1.71	1.41	-0.30
PN10-3	October 1, 2010	12.27	-	Active	0.75 on September 8, 2014	110.10	1.05	1.24	0.19

Drawing 32122-NC103 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

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TABLE NC103-3
FALL 2022 – HWY 41:23 KEHIWIN LAKE (km 7.8)
STANDPIPE PIEZOMETER INSTRUMENTATION READING SUMMARY

Date Monitored: September 20, 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)
PB10-1	Oct. 6, 2010	15.0	-	Operational	3.59 on June 23, 2021	4.40	4.57	0.17
PB10-2	Oct. 6, 2010	15.0	-	Operational	2.45 on May 12, 2011	3.50	3.02	-0.48
PB10-3	*Oct. 6, 2010*	*18.6*	-	*Blocked at 0.65 m BGS*	*0.54 on May 12, 2011*	*N/A*	*N/A*	-
PB10-4	Oct. 6, 2010	18.6	-	Operational	1.03 on May 15, 2014	3.63	2.87	-0.76

Drawing 32122-NC103 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

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TABLE NC103-4
FALL 2022 – HWY 41:23 KEHIWIN LAKE (km 7.8)
VIBRATING WIRE LOAD CELLS INSTRUMENTATION READING SUMMARY

Date Monitored: September 20, 2022

SERIAL #	ANCHOR NUMBER	DESIGN LOCK OFF LOAD (kN)	DATE INSTALLED	MEASURED LOAD (kN)	PREVIOUS READING (kN)	CHANGE IN LOAD SINCE PREVIOUS READING (kN)
VC1706	G60L	290	July 27, 2011	204.46*	208.76*	-4.30
VC1707	G35L	290	July 23, 2011	240.56**	254.47**	-13.91
VC1708	G8U	240	July 23, 2011	211.10***	213.30***	-2.20
VC1709	G45L	290	July 25, 2011	191.92**	188.75**	3.17
VC1710	G8L	240	July 23, 2011	165.51	155.19 (October 6, 2021)	10.32
VC1711	*G45U*	*290*	*July 25, 2011*	*No Reading*	*No Reading*	*N/A*
VC1712	G60U	290	July 27, 2011	245.05*	248.79*	-3.74
VC1713	G27U	290	July 23, 2011	168.23*	167.54*	0.69
VC1714	G17U	290	July 23, 2011	238.29*	148.79**	89.50
VC1715	G27L	290	July 23, 2011	377.97**	369.14**	8.83

Drawing 32122-NC103 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

Note: * This reading is an average of two readings as only two of the vibrating wires are operational.
** This reading is based on one vibrating wire channel as only one of the vibrating wires is operational.
*** This reading is based on the average of three vibrating wires as three of the vibrating wires are operational.

3. INTERPRETATION OF MONITORING RESULTS

SI10-1, installed in the east highway ditch, showed a rate of movement of 0.1 mm/yr over 4.4 to 7.5 m depth since the spring of 2022 readings. SI10-3, installed at the bottom of the slope downslope of the pile wall location, showed a rate of movement of 2 mm/yr over 9.9 m to 12.3 m depth since the spring of 2022 readings. SI11-1 and SI11-4 showed no discernible movement since the spring of 2022 readings. SI11-2 showed a rate of movement of 6.2 mm/yr since the spring of 2022 readings. SI11-3 showed a rate of movement of 2.8 mm/yr since the spring of 2022 readings.

The cumulative movements in the SIs installed in the piles were as follows:

- SI11-1 = 2.0 mm pile head movement over 0.7 to 14.8 m depth
- SI11-2 = 2.0 mm pile head movement over 0.7 to 14.7 m depth
- SI11-3 = -7.0 mm pile head movement over 0.5 to 14.6 m depth
- SI11-4 = -8.3 mm pile head movement over 0.8 m to 14.9 m depth

Pneumatic piezometer PN10-1 showed a decrease in groundwater level of 0.30 m since the spring of 2022 readings. PN10-3 showed an increase in groundwater level of 0.19 m since the spring of 2022 readings. The pneumatic piezometer readings are summarized in Table NC103-2.

Standpipe piezometer PB10-1 showed an increase in groundwater level of 0.17 m since the spring of 2022 reading. Standpipe piezometers PB10-2 and PB10-4 showed decreases in groundwater level of 0.48 m, and 0.76 m, respectively, since the spring of 2022 readings. The standpipe piezometer readings are summarized in Table NC103-3. The pneumatic and standpipe piezometer readings are plotted on Figure NC103-1 in Appendix A.

Load cells VC1706, VC1707, VC1708, and VC1712 showed decreases in the measured load of 4.30 kN, 13.91 kN, 2.20 kN, and 3.74 kN, respectively, since the spring of 2022 readings. VC1709, VC1713, VC1714, and VC1715 showed increases in measured load of 3.17 kN, 0.69 kN, 89.50 and 8.83 kN, respectively, since the spring of 2022 readings. The current measured load in VC1715 is the highest ever recorded in this load cell, and this load cell has shown a trend of gradually increasing loads for several reading cycles. VC1714 showed an apparent increase in the measured load by 88.5 kN since the spring of 2022 readings. Between the fall of 2021 and the spring of 2022, this load cell showed a reduction in the measured load by 88.58 kN . Hence, the seasonal variation in the measured load in VC1714 is only a reflection of the inconsistency in the number of operational vibrating wire channels during the reading events. VC1710 showed an increase in the measured load by 11.32 kN, when compared to the last reading recorded in the fall of 2021.

The current load in VC1715 is about 30.0 percent higher than the lock off load. The remaining load cells have shown decreases in measured load, when compared to the lock off load, ranging from 12.0 percent to 48.7 percent. However, the load cells with the largest variations in load values have lost one or more vibrating wire channels over several reading cycles. In addition, the

reductions in the loads have not been consistent with the observed movement patterns of the walls, based on the slope inclinometer readings.

If significant reductions in anchor loads occur in the future in response to the wall deflection towards west, the anchors will need to be restressed to maintain the wall's lateral deflection within the design limit.

The load cell readings are summarized in Table NC103-3, and are plotted on Figure NC103-2 in Appendix A.

4. RECOMMENDATIONS

4.1 Future Work

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

4.2 Instrumentation Repairs

VC1711 has not functioned for two reading cycles in a row, and it will therefore be deleted from future reading cycles.

No instrument repairs are required at this time.

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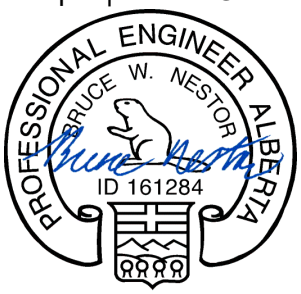
5. CLOSURE

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-NC103)
  - SI Reading Plots
  - Figure NC103-1 (Piezometric Depths)
  - Figure NC103-2 (Load Cell Readings)

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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.

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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.

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.

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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 NC103 (NC024-3): HWY 41:23 KEHIWIN LAKE (km 7.8)

ALBERTA TRANSPORTATION
NORTH CENTRAL REGION - ATHABASCA AND FORT McMURRAY DISTRICTS
INSTRUMENTATION MONITORING FIELD SUMMARY (NC103)
FALL 2022

Location: Kehiwin Lake (HWY41:23 C1 7.894)	**Readout:** RST PN C108 Unit 1/DGSI Dipmeter
File Number: 32122	**Casing Diameter:** 2.75"
Probe: RST Set 8R/5R	**Temp (deg C):** 15
Cable: RST Set 8R/5R	**Read by:** NKR/KTC

SLOPE INCLINOMETER (SI) READINGS

SI#	GPS Location (UTM 12)		Date	Stickup m	Depth from top of **CASING** (ft)	Azimuth of A+ Groove	Current Bottom Depth Readings				Probe/ Reel #	Remarks
	Easting (m)	Northing (m)					A+	A-	B+	B-		
SI10-1	506737.94	5988417.59	20-Sep-22	0.77	62 to 2	295	214	-208	1141	-1131	8R/8R	
SI10-3	506684.84	5988455.34	20-Sep-22	0.77	64 to 4	283	70	-52	545	-530	8R/8R	
SI11-1	506689.52	5988389.70	20-Sep-22	0.79	50 to 4	310	-476	488	-244	227	5R/5R	
SI11-2	506711.75	5988413.10	20-Sep-22	0.84	50 to 4	283	147	-132	285	-293	5R/5R	Pile Wall
SI11-3	506718.26	5988440.93	20-Sep-22	0.99	50 to 4	295	-207	219	176	-186	5R/5R	Pile Wall
SI11-4	506745.73	5988463.22	20-Sep-22	0.69	50 to 4	336	-227	234	-142	130	5R/5R	Pile Wall

PNEUMATIC PIEZOMETER (PN) READINGS

PN #	GPS Location		Date	Reading (kPa)	Identification Number
	Easting (m)	Northing (m)			
PN10-1	Attached to SI10-1		20-Sep-22	47.5	33672
PN10-3	Attached to SI10-3		20-Sep-22	110.1	33668

STANDPIPE PIEZOMETER (SP) READINGS

PB#	GPS Location (UTM 12)		Date	Stick-up (m)	Water level below top of pipe (m)	Total length of pipe (m)	Poor Boy Probe Depth below top of pipe to bottom of probe (m)			
	Easting (m)	Northing (m)					4'	3'	2'	1'
PB10-1	506746.42	5988436.52	20-Sep-22	0.76	5.16	15.83	-	-	-	-
PB10-2	506723.56	5988401.99	20-Sep-22	0.76	4.26	15.76	-	-	-	-
PB10-4	506690.18	5988388.59	20-Sep-22	0.71	4.34	19.30	-	-	-	-

INSPECTOR REPORT

Only water levels recorded in Poor boys.

ALBERTA TRANSPORTATION
NORTH CENTRAL REGION - ATHABASCA AND FORT McMURRAY DISTRICTS
VIBRATING WIRE LOAD CELL FIELD SUMMARY (NC103)
FALL 2022

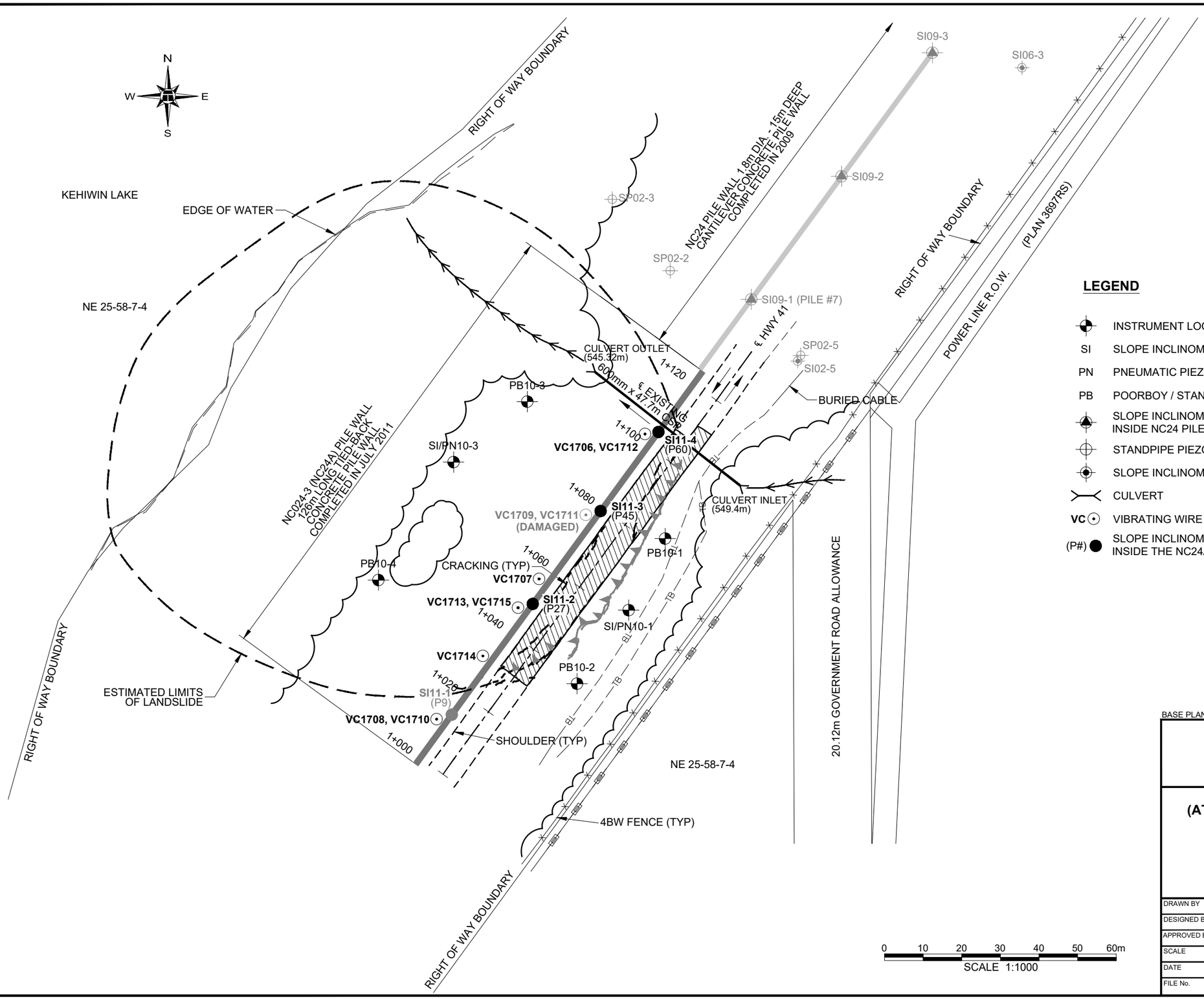
Location: Kehiwin Lake (HWY41:23 C1 7.894)	**Readout:** RST VW2106 Unit 2
File Number: 32122	**Read by:** NKR/KTC

3 WIRES VIBRATING WIRE LOAD CELL (VC) READINGS

VC#	GPS Location (UTM 12)		Date	Reading (B Units)	Comments
	Easting (m)	Northing (m)			Temperature degree C
VC1706	506744.42	5988463.22	20-Sep-22	**6651.9/6203.7	11.4
VC1707	506720.90	5988428.69	20-Sep-22	*6299.1	12.5
VC1708	506690.18	5988388.59	20-Sep-22	6657.1/6017.1/6784.5	12.7
VC1709	506728.08	5988440.94	20-Sep-22	*6450	12.6
VC1710	506690.00	5988388.00	20-Sep-22	*6519.4	12.7
VC1711	506728.08	5988440.94	20-Sep-22	No Reading	12.5
VC1712	506744.42	5988463.22	20-Sep-22	**6484.0/5965.7/1201.4	11.6
VC1713	506711.09	5988415.32	20-Sep-22	**6924.7/6277.1	12.8
VC1714	506700.64	5988401.96	20-Sep-22	**6841.1/5731.1	13
VC1715	506711.09	5988415.32	20-Sep-22	*5791/1193.3	12.5

INSPECTOR REPORT

* Only 1 VW is working
** Only 2 VWs are working
***Attempt to read VC1710 and VC1711 again in Fall 2022
Note: 3 SENSORS ON VW MONITOR SETTING
VW1714. only 1 sensor working.



ANCHOR	VIBRATING WIRE LOAD CELL
G8U	VC1708
G8L	VC1710
G17U	VC1714
G27U	VC1713
G27L	VC1715
GL35	VC1707
G45U	VC1711
G45L	VC1709
G60U	VC1712
G60L	VC1706

LEGEND

- INSTRUMENT LOCATION
- SI — SLOPE INCLINOMETER
- PN — PNEUMATIC PIEZOMETER
- PB — POORBOY / STANDPIPE
- SLOPE INCLINOMETER INSTALLED INSIDE NC24 PILE WALL
- STANDPIPE PIEZOMETER (EXISTING)
- SLOPE INCLINOMETER (EXISTING)
- CULVERT
- VC — VIBRATING WIRE LOAD CELL
- (P#) — SLOPE INCLINOMETER INSTALLED INSIDE THE NC24A PILE WALL (PILE #)
- ACP PATCH
- FENCE LINE
- TB — TELUS LINE
- BUSH LINE
- CRACK
- POWER POLE
- GULLY
- LANDSLIDE REFLECTIVE CRACK

BASE PLAN PROVIDED BY WSP

Alberta

NORTH CENTRAL
(ATHABASCA AND FORT MCMURRAY DISTRICTS)

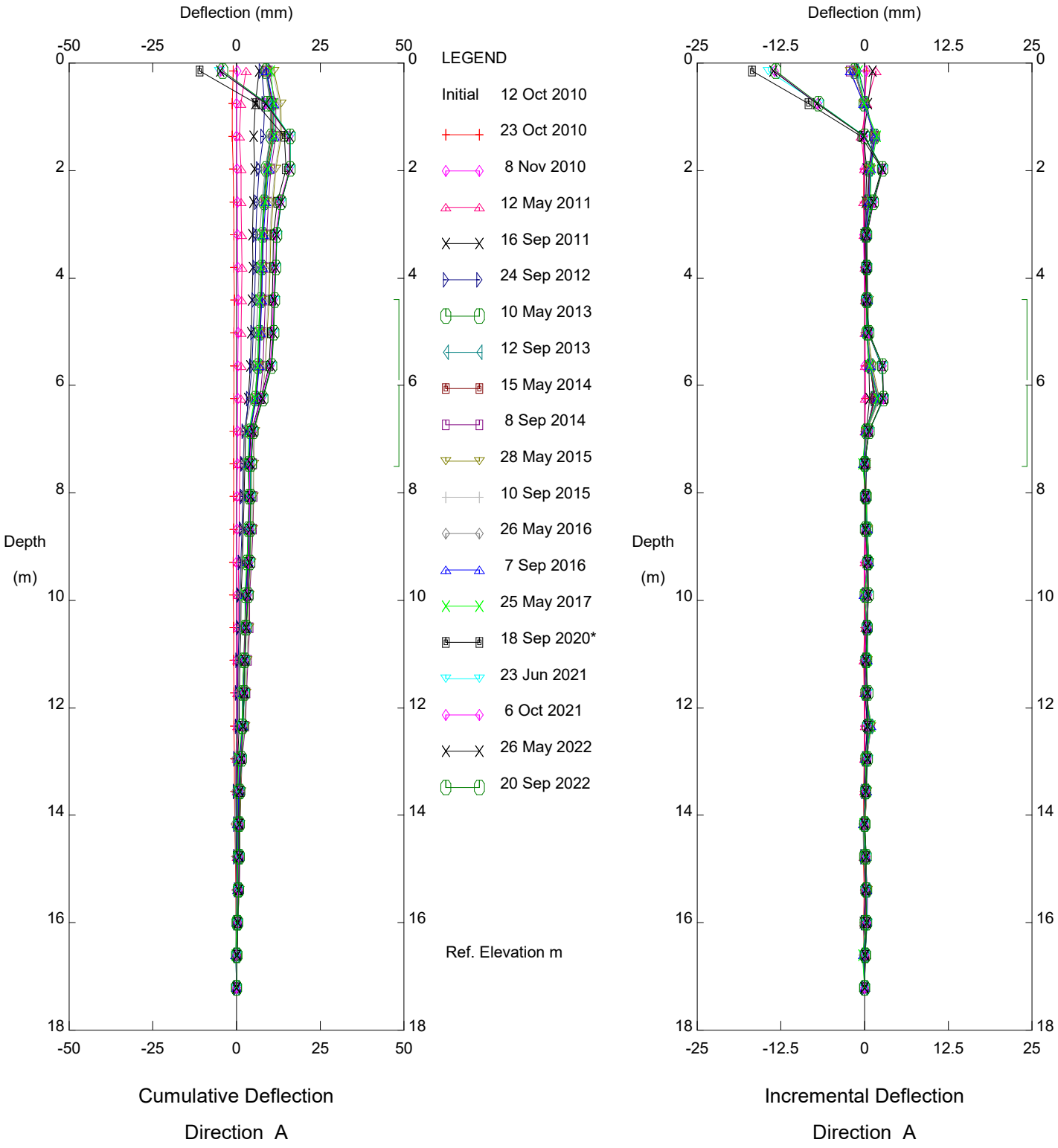
NC103: HWY41:23 KEHIWIN LAKE (km 7.8)
SITE PLAN SHOWING APPROXIMATE INSTRUMENT LOCATIONS

DWG No. 32122-NC103

DRAWN BY	ML
DESIGNED BY	BWN
APPROVED BY	TSA
SCALE	1:1000
DATE	OCTOBER 2022
FILE No.	32122

THURBER ENGINEERING LTD.

Thurber Engineering Ltd.



Cumulative Deflection

Direction A

Incremental Deflection

Direction A

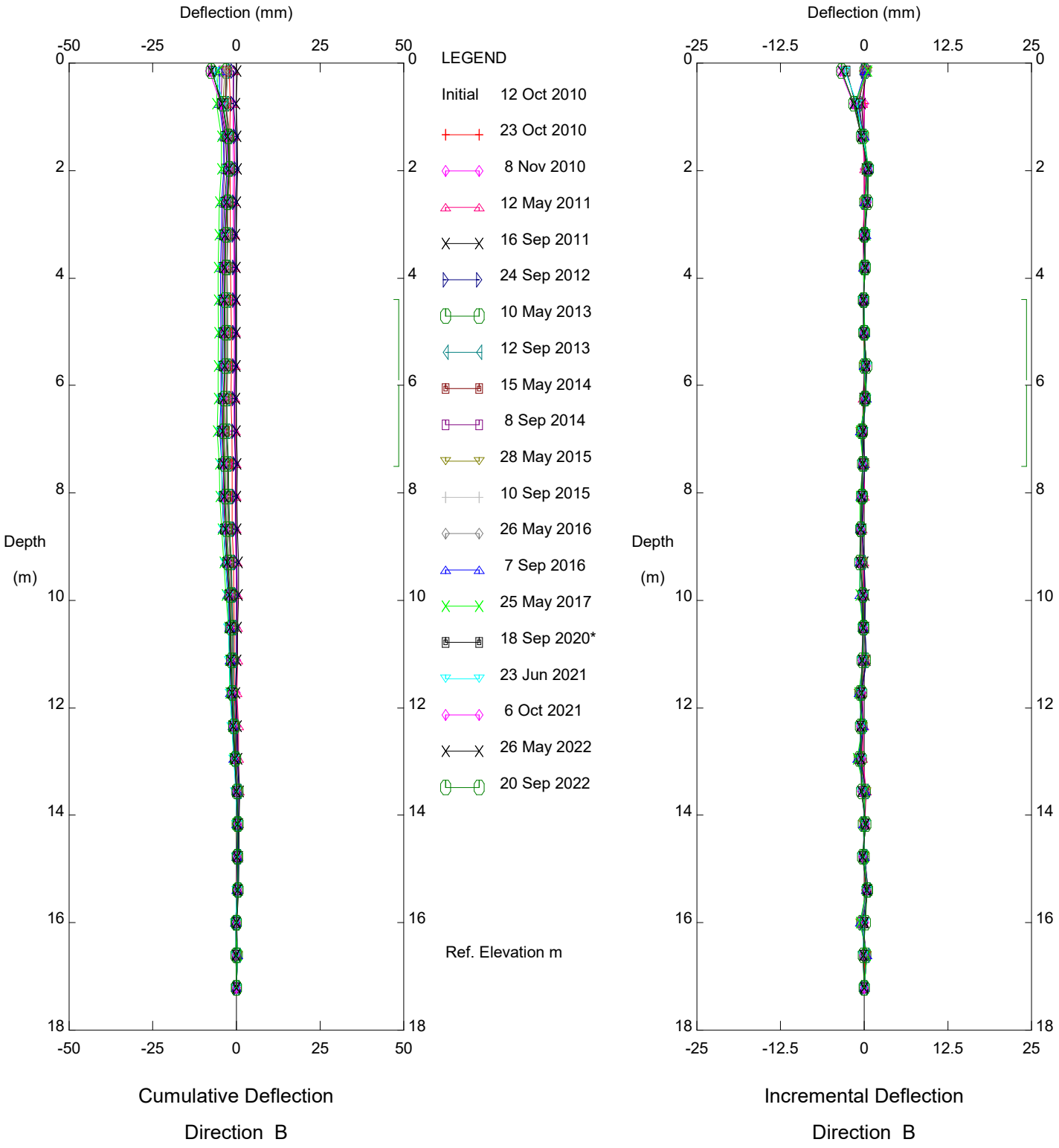
Hwy 41:23 Kehewin Lake (NC103), Inclinometer SI10-1

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\NC103 (NC024-3)\SI10-1.gtl

Thurber Engineering Ltd.



Cumulative Deflection

Direction B

Incremental Deflection

Direction B

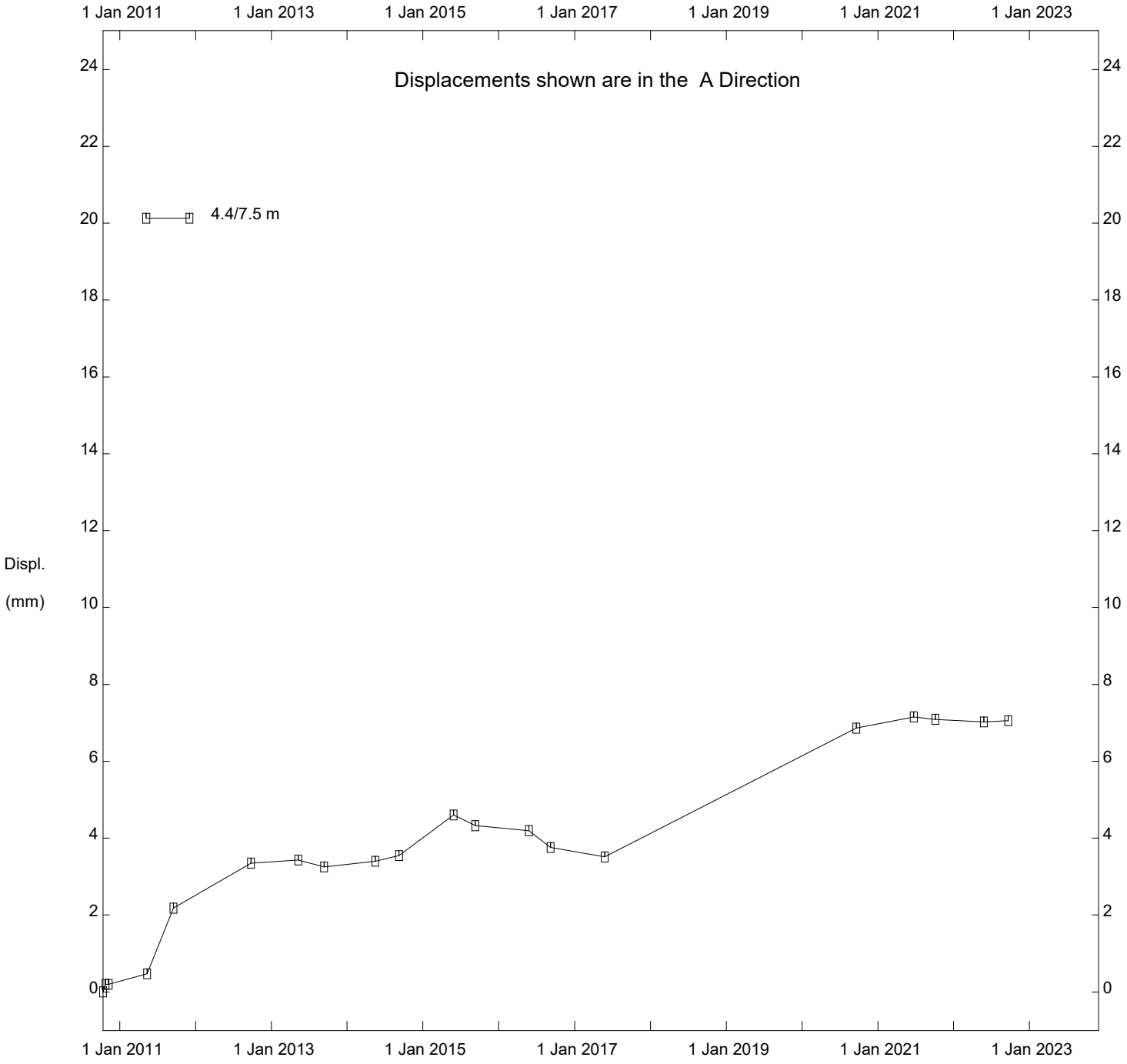
Hwy 41:23 Kehewin Lake (NC103), Inclinometer SI10-1

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\NC103 (NC024-3)\SI10-1.gtl

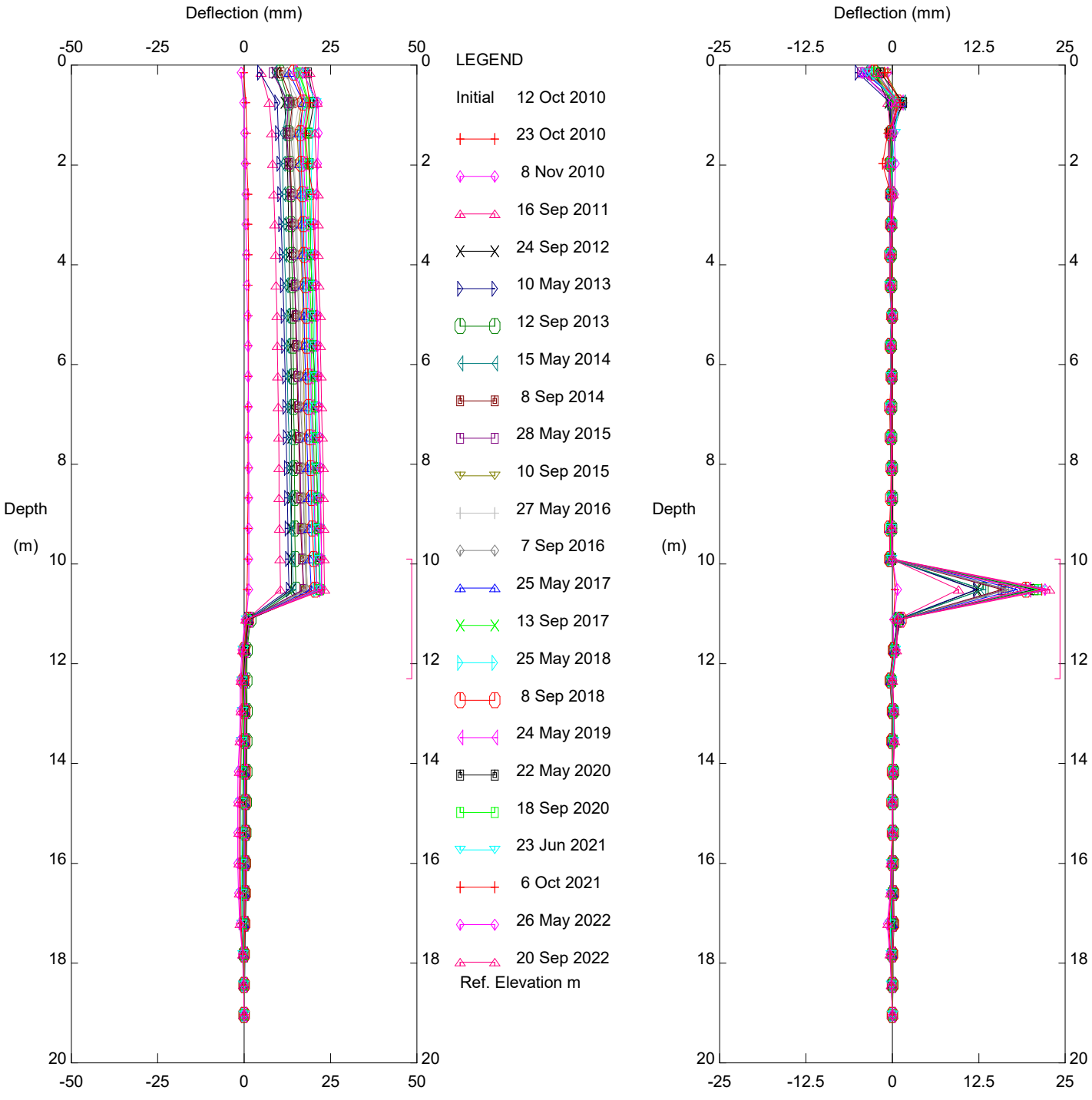
Thurber Engineering Ltd.



Hwy 41:23 Kehewin Lake (NC103), Inclinometer SI10-1

Alberta Transportation

Thurber Engineering Ltd.



Cumulative Deflection

Direction A

Incremental Deflection

Direction A

Hwy 41:23 Kehiwin Lake (NC103), Inclinometer SI10-3

Alberta Transportation

H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2022B-Fall\SI Readings\NC103 (NC024-3)\SI10-3.gtl

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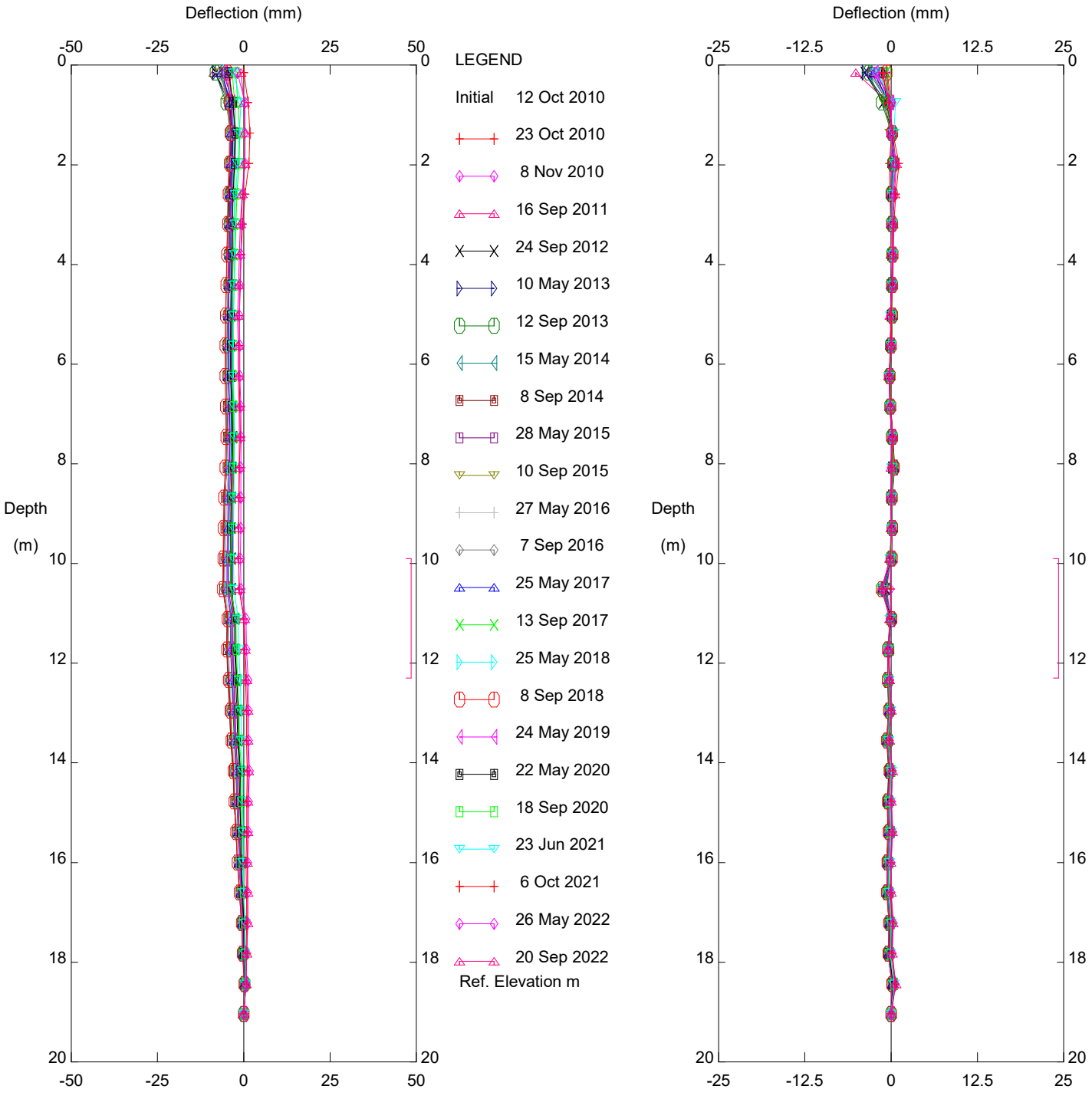


Cumulative Deflection

Direction B

Incremental Deflection

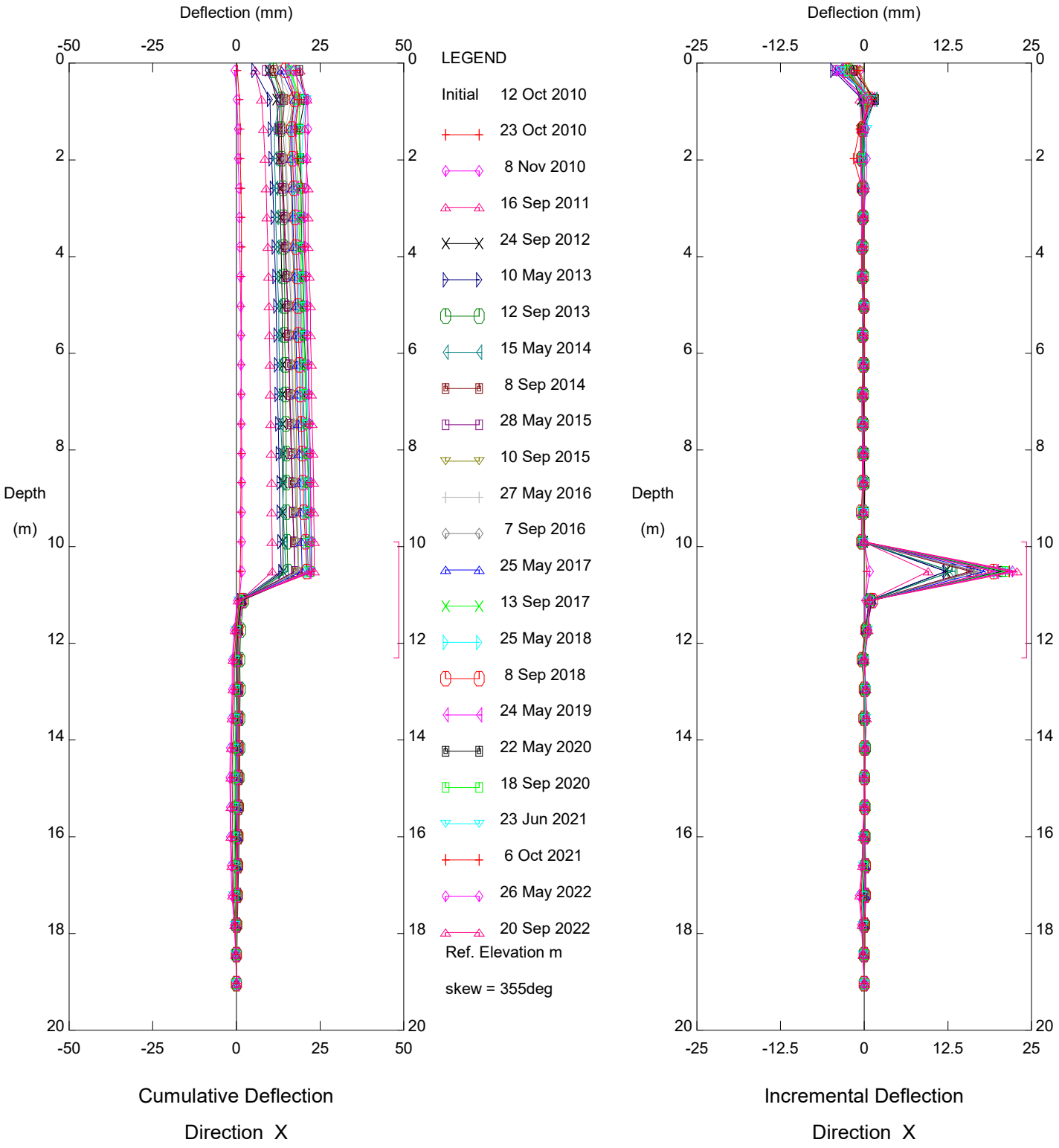
Direction B

Hwy 41:23 Kehiwin Lake (NC103), Inclinometer SI10-3

Alberta Transportation

H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2022B-Fall\SI Readings\NC103 (NC024-3)\SI10-3.gtl

Thurber Engineering Ltd.



Cumulative Deflection

Direction X

Incremental Deflection

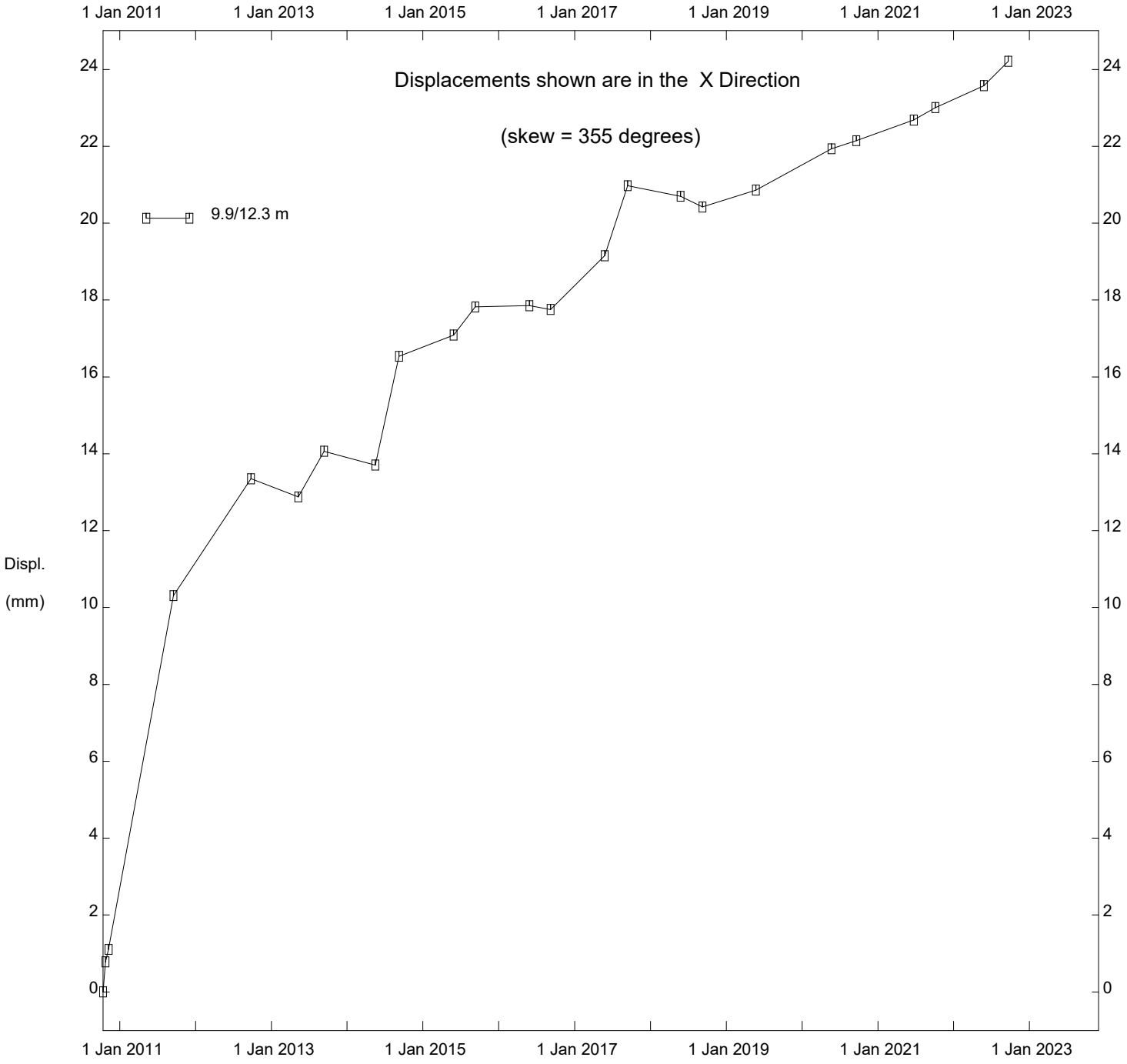
Direction X

Hwy 41:23 Kehiwin Lake (NC103), Inclinometer SI10-3

Alberta Transportation

H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2022B-Fall\SI Readings\NC103 (NC024-3)\SI10-3.gtl

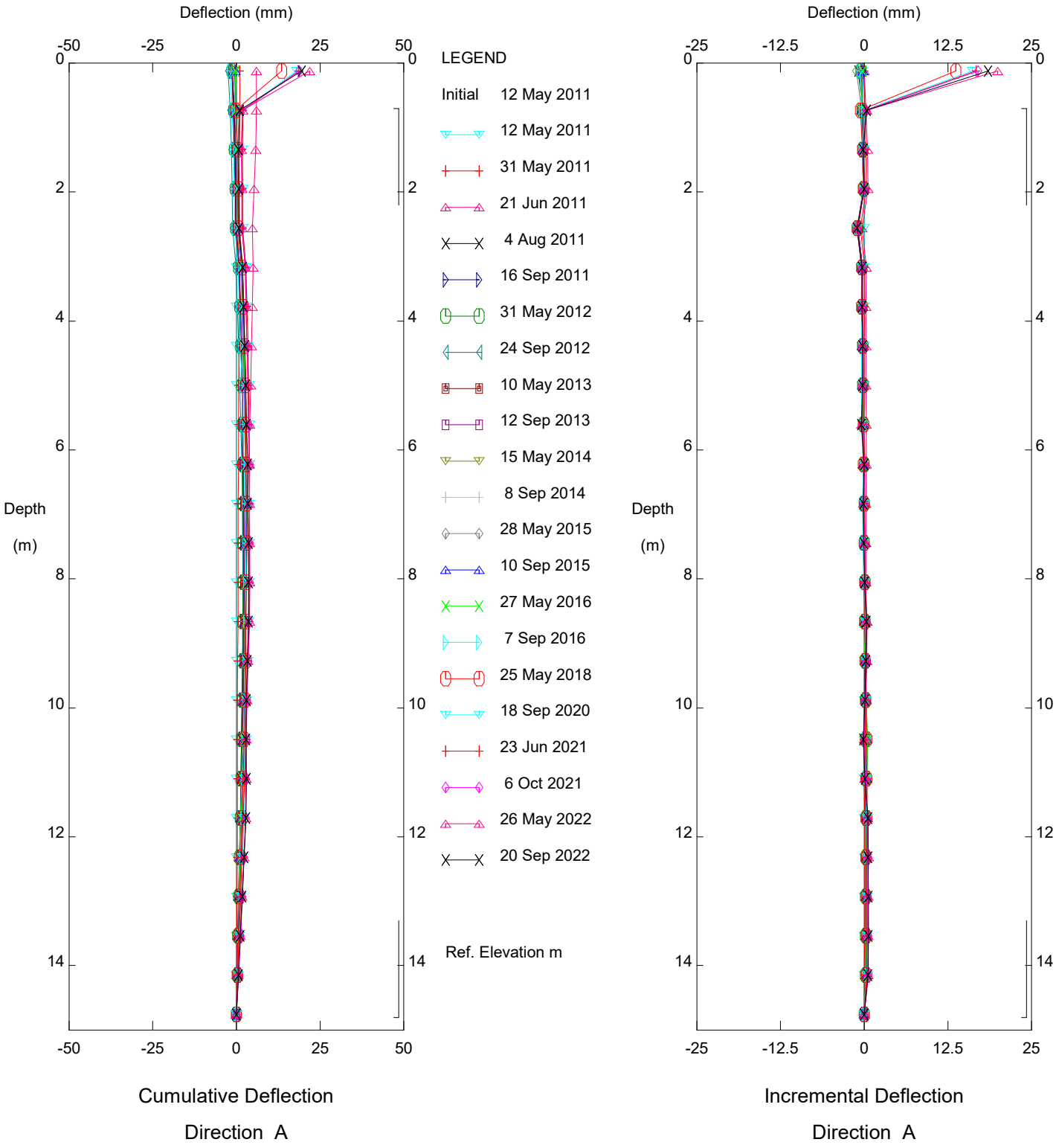
Thurber Engineering Ltd.



Hwy 41:23 Kehiwin Lake (NC103), Inclinometer SI10-3

Alberta Transportation

Thurber Engineering Ltd.



Cumulative Deflection

Direction A

Incremental Deflection

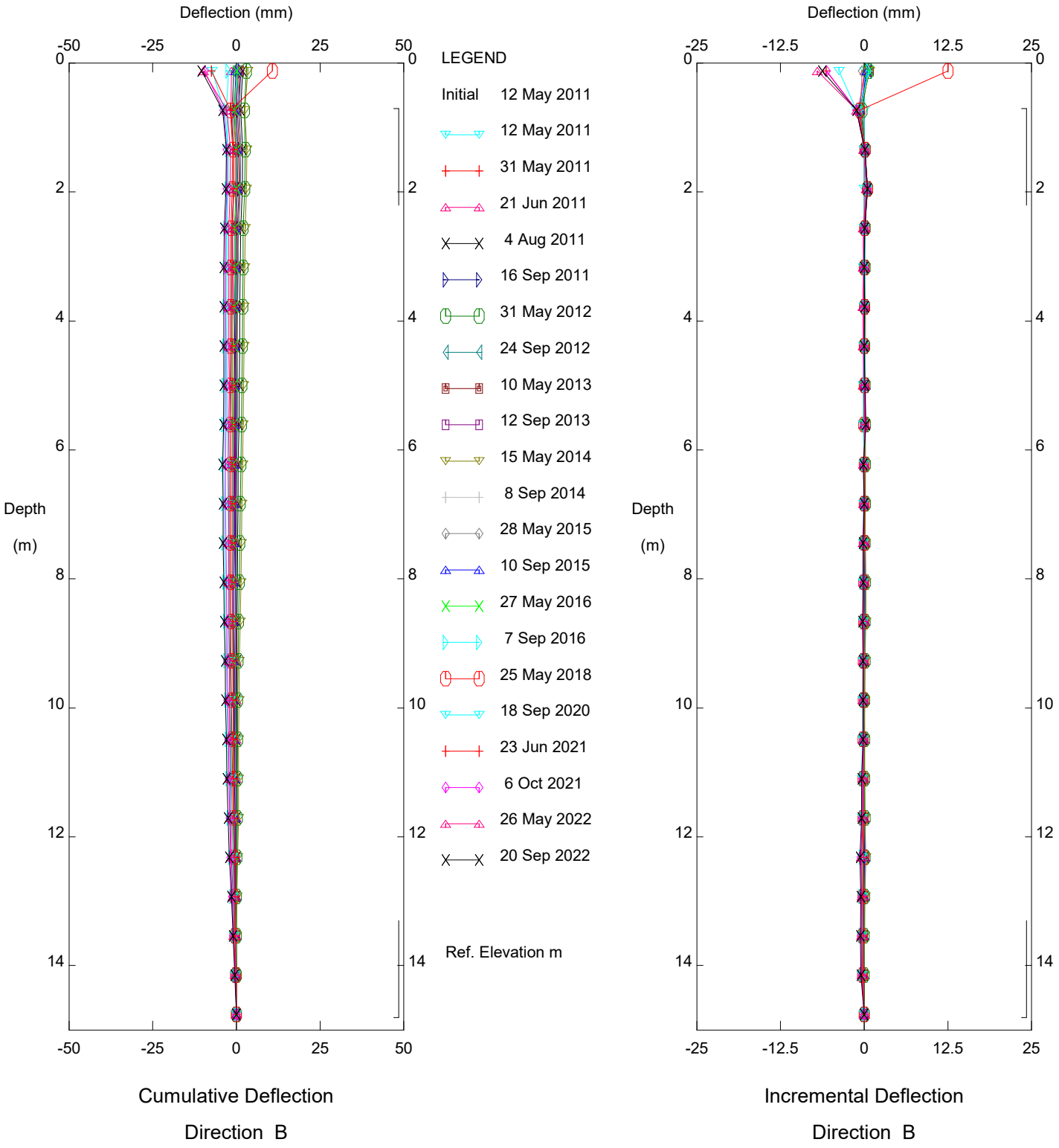
Direction A

Hwy 41:23 Kehewin Lake (NC103), Inclinometer SI11-1(P9)

Alberta Transportation

H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2022B-Fall\SI Readings\NC103 (NC024-3)\SI11-1(km 7.8).gtl

Thurber Engineering Ltd.



Cumulative Deflection

Direction B

Incremental Deflection

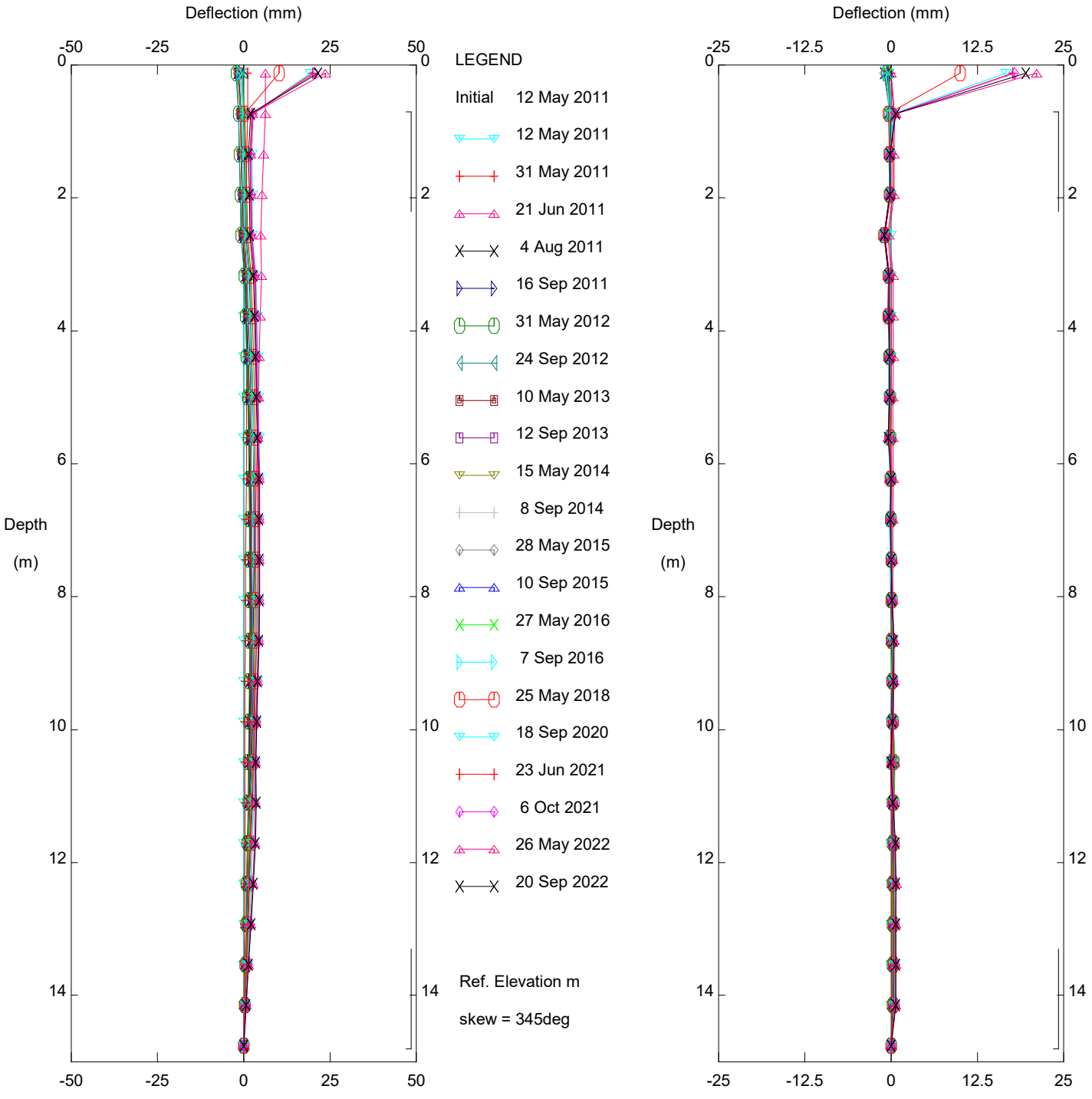
Direction B

Hwy 41:23 Kehewin Lake (NC103), Inclinometer SI11-1(P9)

Alberta Transportation

H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2022B-Fall\SI Readings\NC103 (NC024-3)\SI11-1(km 7.8).gtl

Thurber Engineering Ltd.



Cumulative Deflection

Direction X

Incremental Deflection

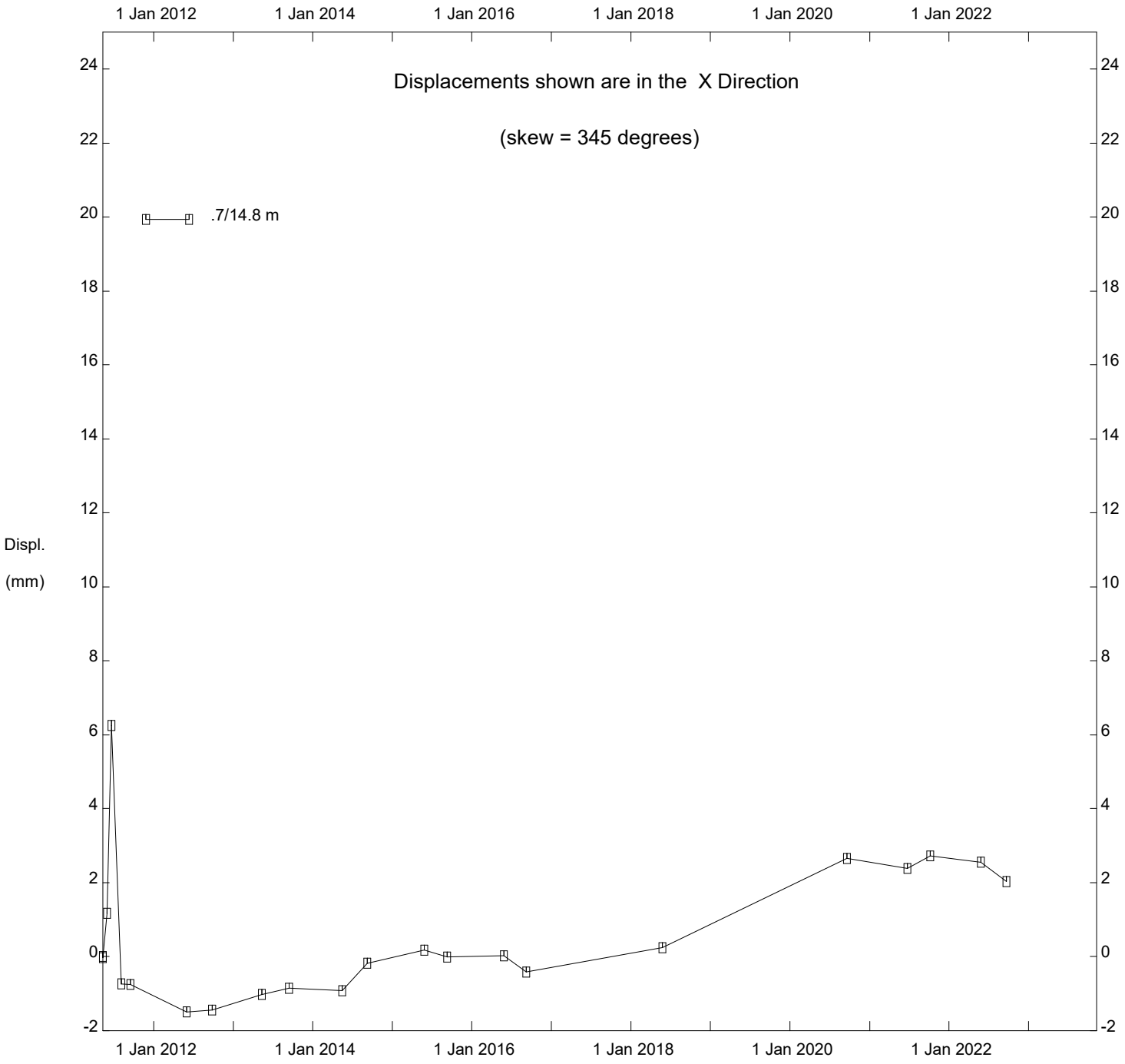
Direction X

Hwy 41:23 Kehewin Lake (NC103), Inclinometer SI11-1(P9)

Alberta Transportation

H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2022B-Fall\SI Readings\NC103 (NC024-3)\SI11-1(km 7.8).gtl

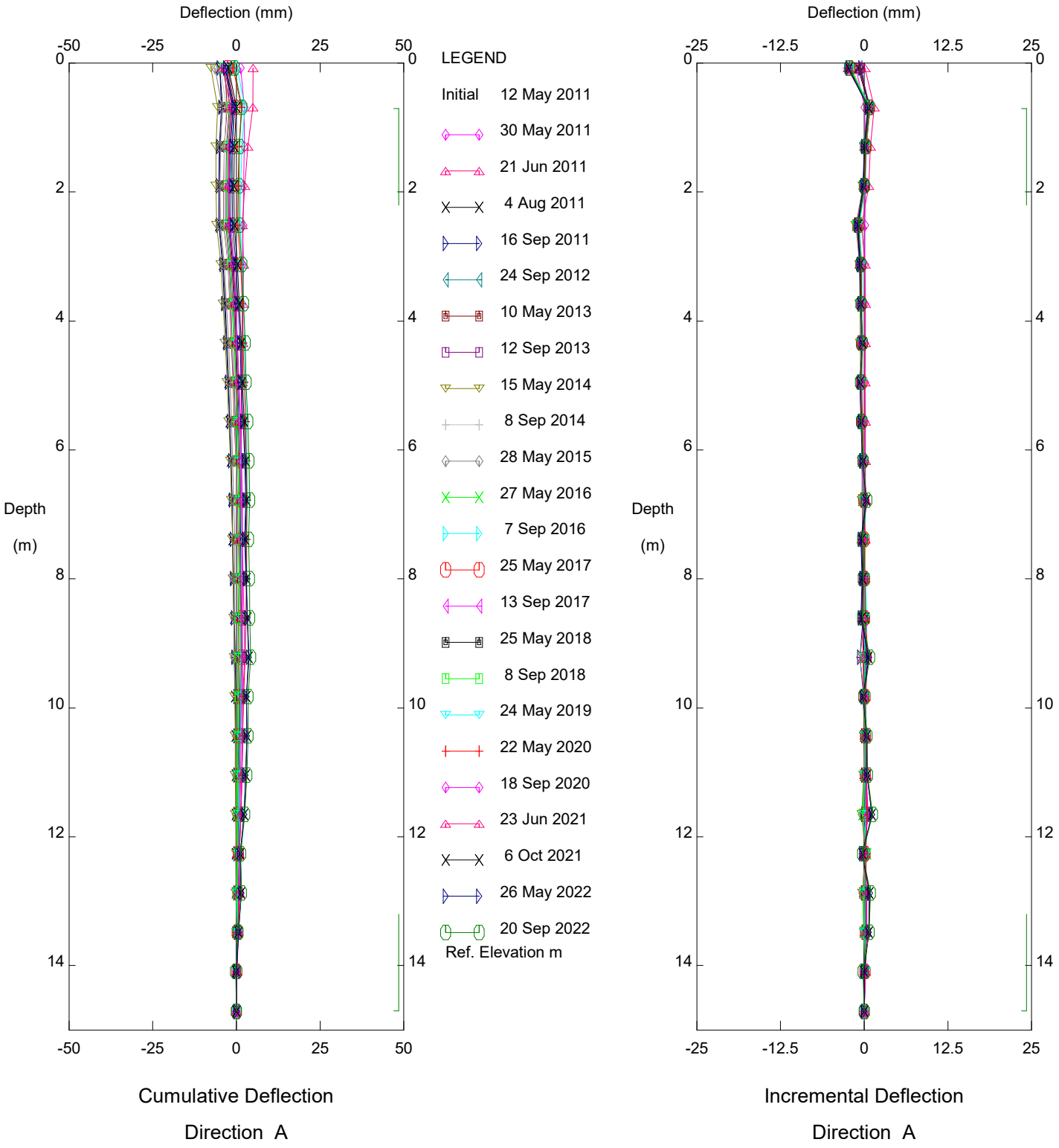
Thurber Engineering Ltd.



Hwy 41:23 Kehewin Lake (NC103), Inclinometer SI11-1(P9)

Alberta Transportation

Thurber Engineering Ltd.



Cumulative Deflection

Direction A

Incremental Deflection

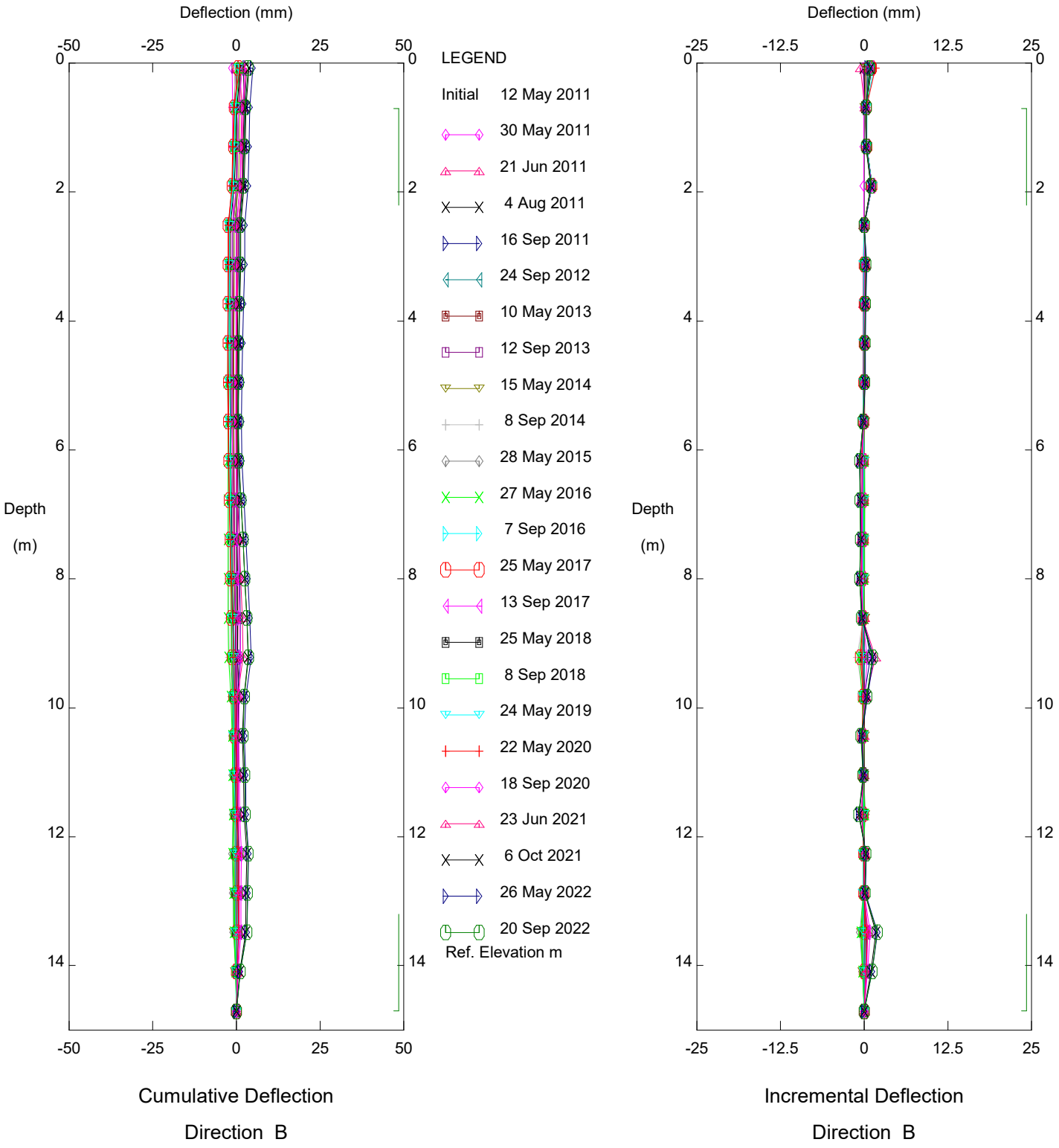
Direction A

Hwy 41:23 Kehiwin Lake (NC103), Inclinometer SI11-2 (P27)

Alberta Transportation

H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2022B-Fall\SI Readings\NC103 (NC024-3)\SI11-2(km 7.8).gtl

Thurber Engineering Ltd.



Cumulative Deflection

Direction B

Incremental Deflection

Direction B

Hwy 41:23 Kehiwin Lake (NC103), Inclinometer SI11-2 (P27)

Alberta Transportation

H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2022B-Fall\SI Readings\NC103 (NC024-3)\SI11-2(km 7.8).gtl

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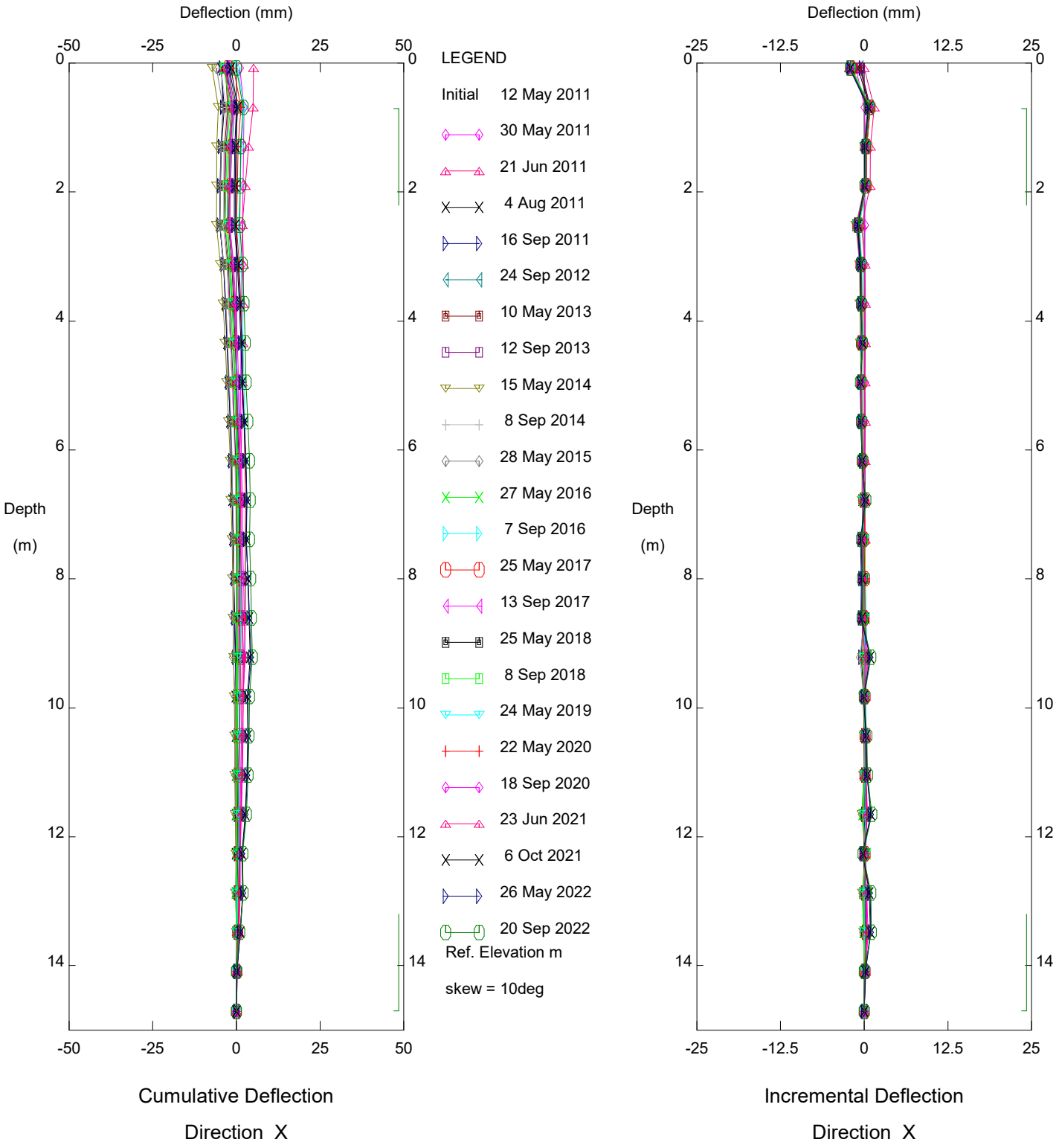

Cumulative Deflection

Direction X

Incremental Deflection

Direction X

Hwy 41:23 Kehiwin Lake (NC103), Inclinometer SI11-2 (P27)

Alberta Transportation

H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2022B-Fall\SI Readings\NC103 (NC024-3)\SI11-2(km 7.8).gtl

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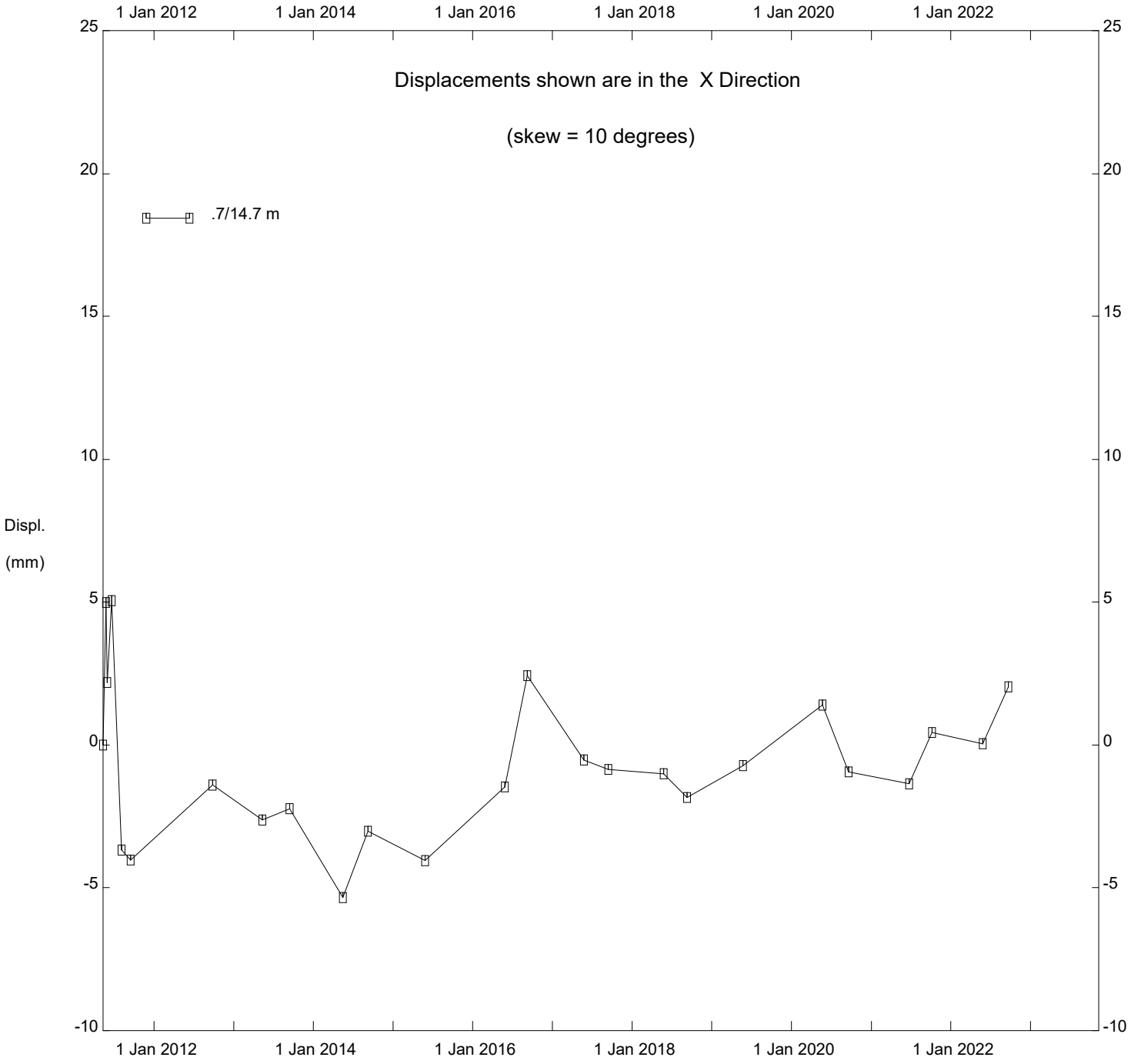
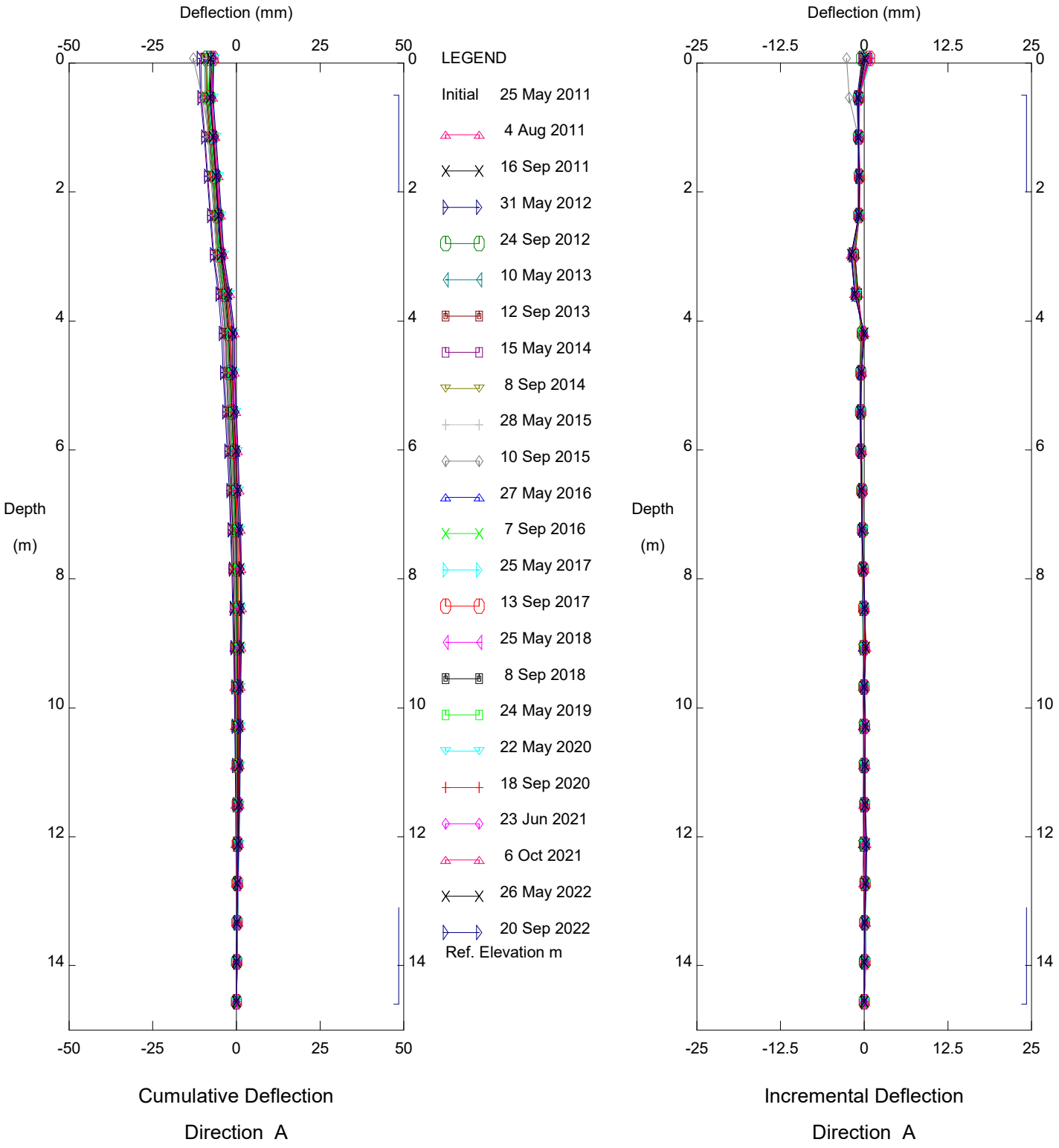


Hwy 41:23 Kehiwin Lake (NC103), Inclinometer SI11-2 (P27)

Alberta Transportation

Thurber Engineering Ltd.



Cumulative Deflection

Direction A

Incremental Deflection

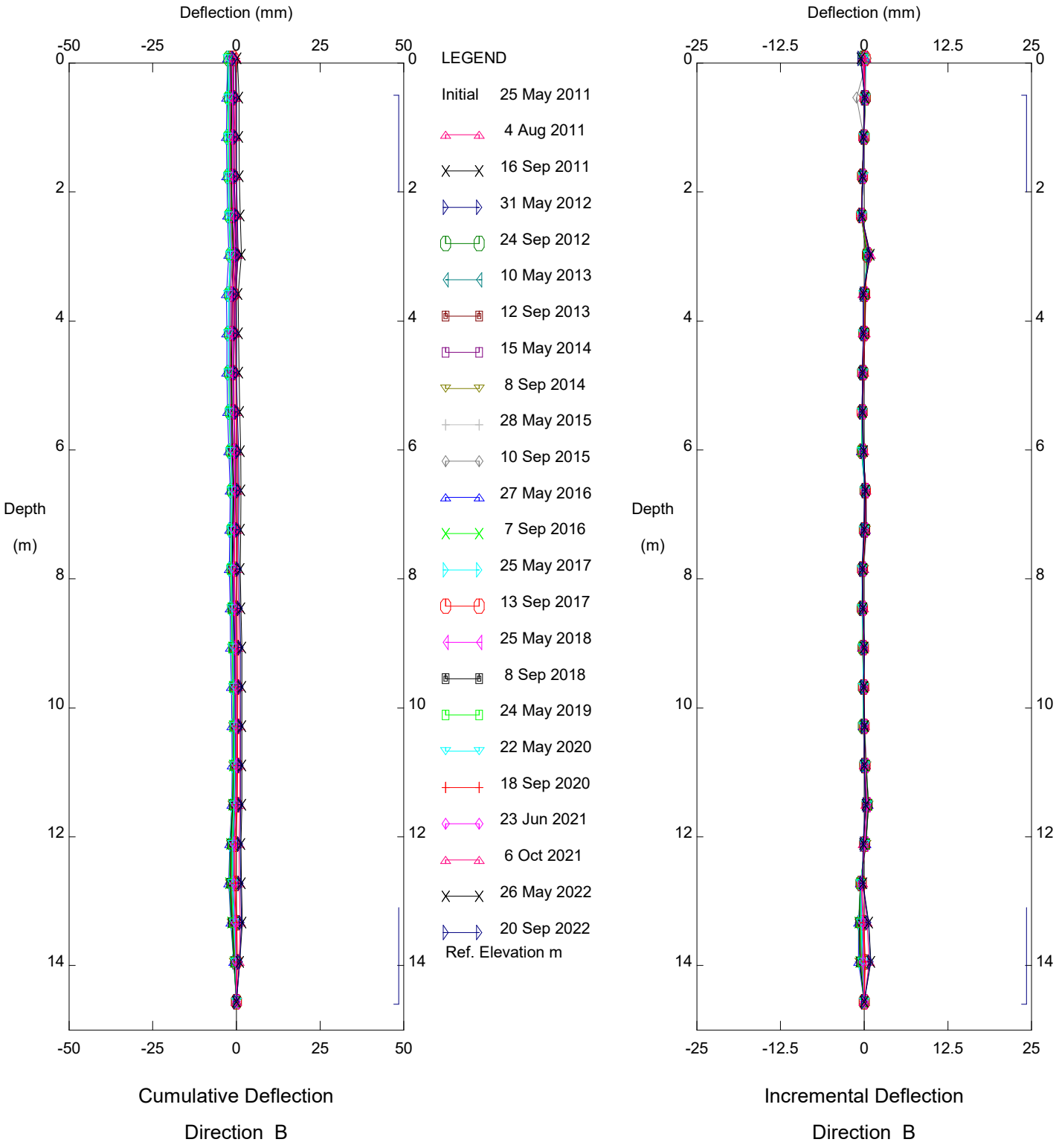
Direction A

Hwy 41:23 Kehiwin Lake (NC103), Inclinometer SI11-3(P45)

Alberta Transportation

H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2022B-Fall\SI Readings\NC103 (NC024-3)\SI11-3(km 7.8).gtl

Thurber Engineering Ltd.



Cumulative Deflection

Direction B

Incremental Deflection

Direction B

Hwy 41:23 Kehiwin Lake (NC103), Inclinometer SI11-3(P45)

Alberta Transportation

H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2022B-Fall\SI Readings\NC103 (NC024-3)\SI11-3(km 7.8).gtl

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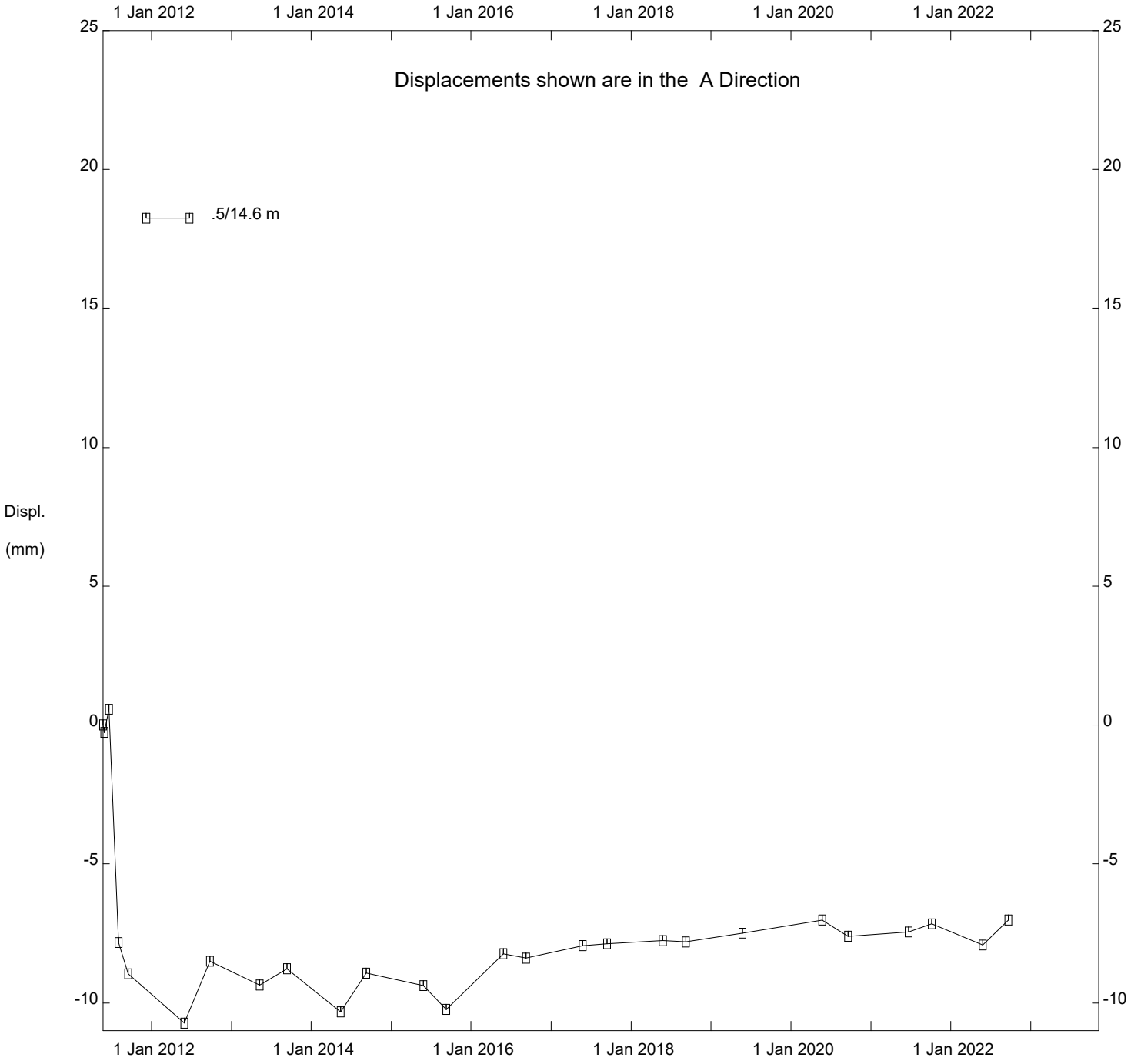
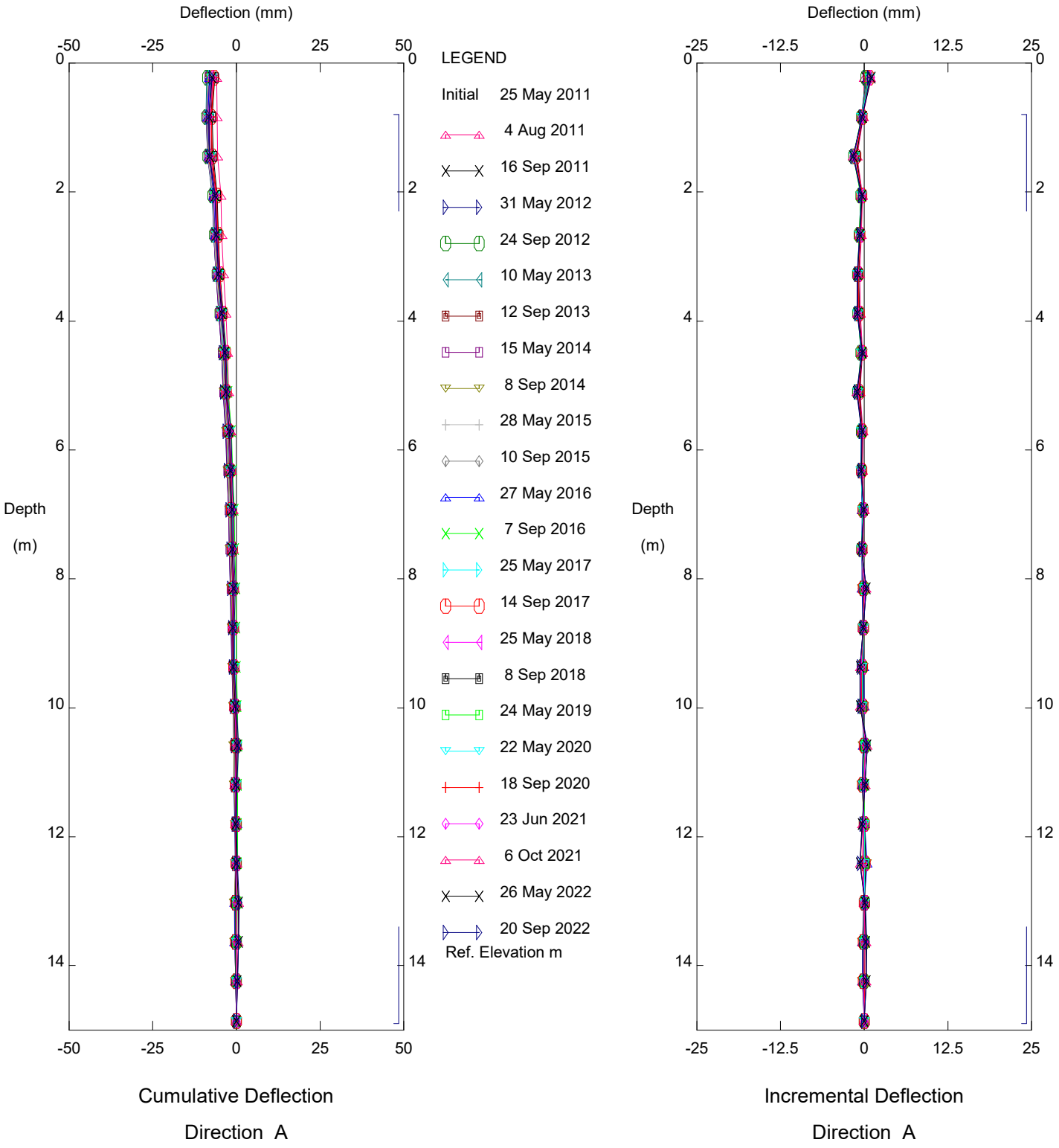


Hwy 41:23 Kehiwin Lake (NC103), Inclinometer SI11-3(P45)

Alberta Transportation

Thurber Engineering Ltd.



Cumulative Deflection

Direction A

Incremental Deflection

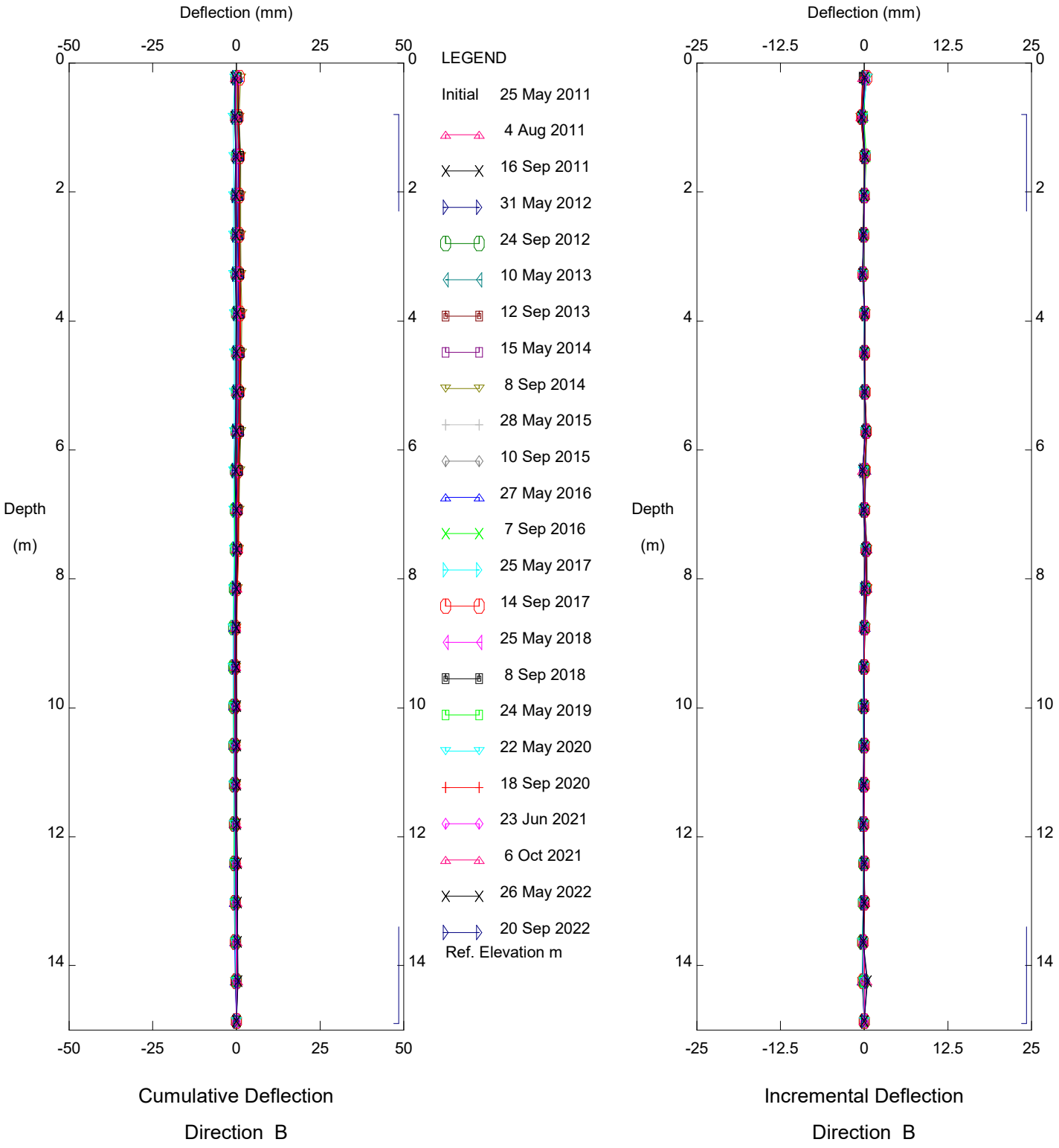
Direction A

Hwy 41:23 Kehiwin Lake (NC103), Inclinometer SI11-4 (P60)

Alberta Transportation

H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2022B-Fall\SI Readings\NC103 (NC024-3)\SI11-4(km 7.8).gtl

Thurber Engineering Ltd.



Cumulative Deflection

Direction B

Incremental Deflection

Direction B

Hwy 41:23 Kehiwin Lake (NC103), Inclinometer SI11-4 (P60)

Alberta Transportation

H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2022B-Fall\SI Readings\NC103 (NC024-3)\SI11-4(km 7.8).gtl

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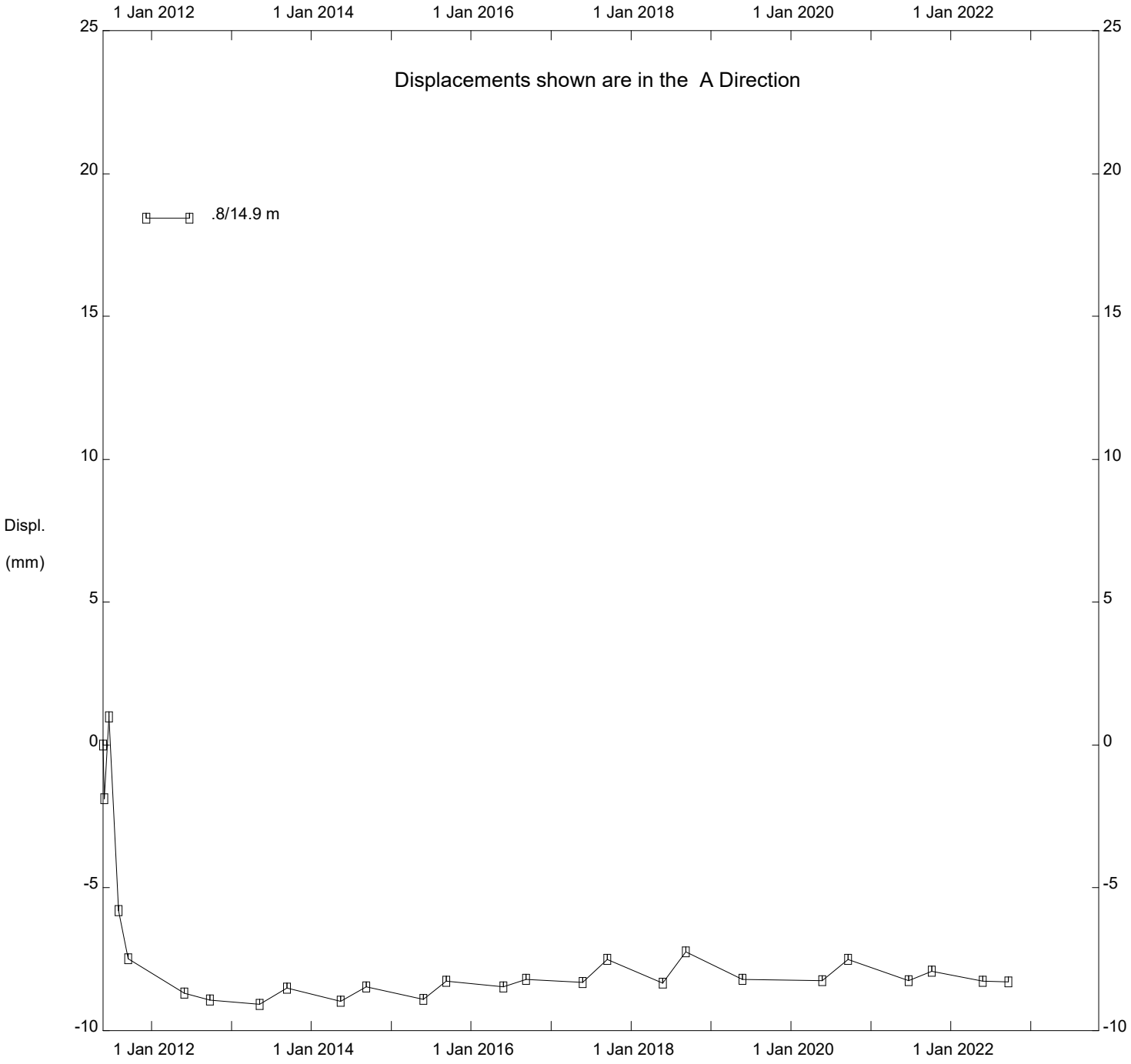

Hwy 41:23 Kehiwin Lake (NC103), Inclinometer SI11-4 (P60)

Alberta Transportation

FIGURE NC103-1
PIEZOMETER DATA FOR HWY 41:23, KEHIWIN LAKE (KM 7.8)

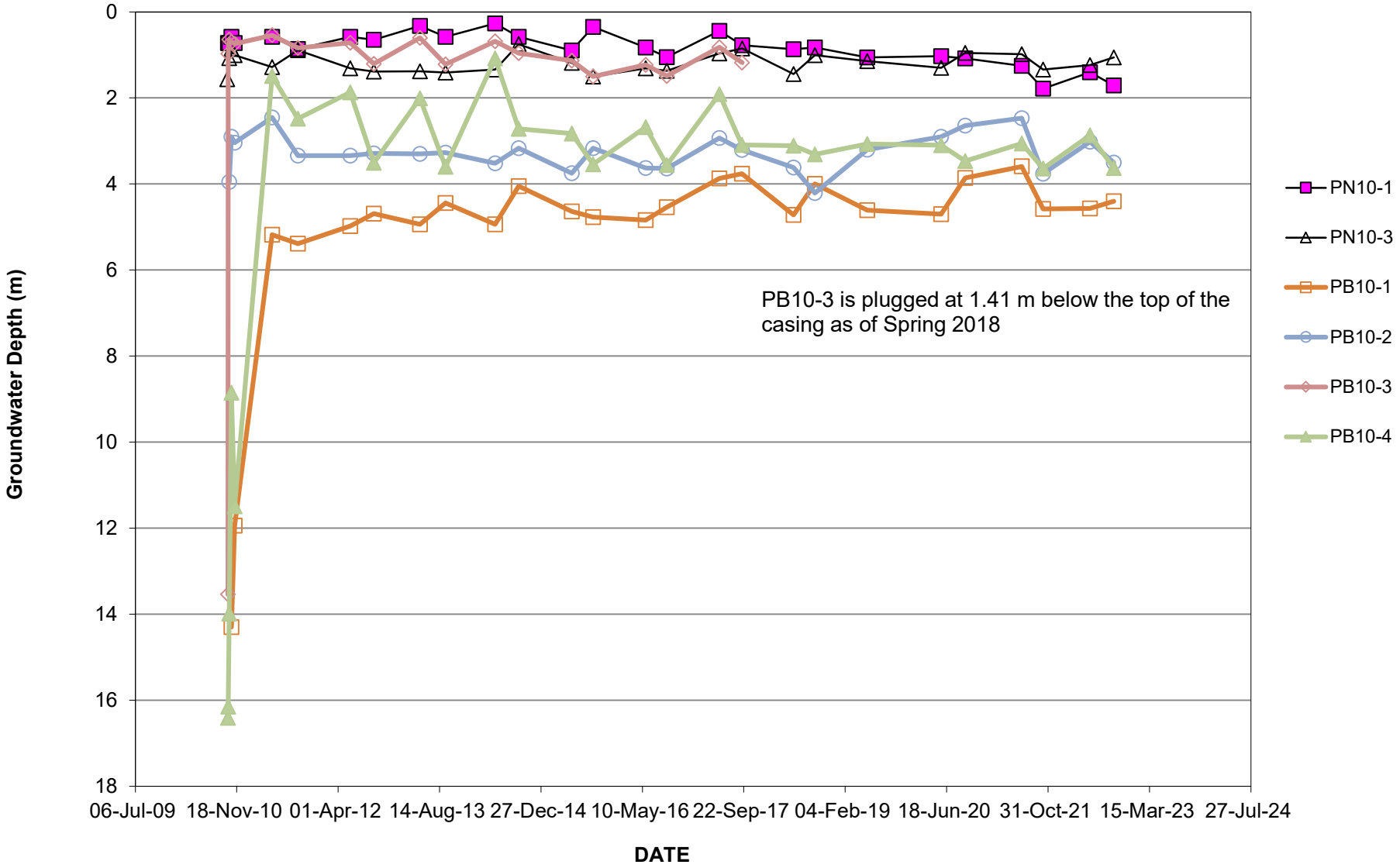

FIGURE NC103-2
VIBRATING WIRE LOAD CELL DATA FOR
HWY 41:23, KEHIWIN LAKE (km 7.8)