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

THURBER ENGINEERING LTD.

| Site Number | Location | Name | Hwy | km |
|---|---|---|---|---|
| NC103 (NC024-3) | HWY 41:23 C1 7.89 | Kehiwin Lake | 41:23 | km 7.8 |
| **Legal Description:** 9-25-58-7 W4 | | **UTM Co-ordinates** | | |
| | | 12U E 506737.94 | N 5988417.59 | |

| | | | |
|---|---|---|---|
| **Current Monitoring:** | 11-Sep-2024 | **Previous Monitoring** | 7-Jun-2024 |
| **Instruments Read By:** | Mr. Niraj Regmi, G.I.T and Mr. Nixson Mationg, of Thurber | | |

| **Instruments Read During This Site Visit** | | | |
|---|---|---|---|
| **Slope Inclinometers (SIs):** SI10-1, SI10-3, SI11-1 to 4 | **Pneumatic Piezometers (PN):** PN10-1 and PN10 3 | **Vibration Wire Piezometers (VW):** N/A | **Standpipe Piezometers (SP):** PB10-1, PB10-2, and PB10-4 |
| **Load Cell (LC):** VC1706 to VC1710, and VC1712 to VC1715 | **Strain Gauges:** N/A | **SAAs:** N/A | **Others:** |

| **Readout Equipment Used** | | | |
|---|---|---|---|
| **Slope Inclinometers:** Two RST Digital Inclinometer probes with 2 ft. wheelbases and RST Pocket PC readouts | **Pneumatic Piezometers:** RST C108 pneumatic piezometer reader | **Vibration Wire Piezometers:** | **Standpipe Piezometers:** DGSI dipmeter |
| **Load Cell:** VW2106 RST readout unit | **Strain Gauges:** | **SAAs:** | **Others:** |
| **Notes:** | | | |

| **Discussion** | |
|---|---|
| **Zones of New Movement:** | None |
| **Interpretation of Monitoring Results:** | SI10-1, installed in the east highway ditch, showed no discernible movement since the spring of 2024 readings. SI10-3, installed at the bottom of the slope downslope of the pile wall location, showed a rate of movement of 5.5 mm/yr since the spring of 2024 readings. SI11-1 showed a rate of movement of 1.2 mm/yr over 0.7 to 14.8 m depth. SI11-2 showed a rate of movement of 1.9 mm/yr over 0.7 m to 14.7 m depth. SI11-3 showed a rate of movement of 2.3 mm/yr over 0.5 to 14.6 m depth since the spring of 2024 readings. SI11-4 showed a rate of movement of 2.6 mm/yr over 0.8 to 14.9 m depth.<br><br>The cumulative movements in the SIs installed in the piles were as follows:<br>• SI11-1 = 3.0 mm pile head movement over 0.7 to 14.8 m depth<br>• SI11-2 = 0.9 mm pile head movement over 0.7 to 14.7 m depth<br>• SI11-3 = -6.9 mm pile head movement over 0.5 to 14.6 m depth<br>• SI11-4 = -7.7 mm pile head movement over 0.8 m to 14.9 m depth |

| | |
|---|---|
| | Pneumatic piezometer PN10-1 showed an increase in groundwater level of 0.28 m since the spring of 2024 readings. PN10-3 showed a decrease in groundwater level of 1.28 m since the spring of 2024 readings. The current groundwater level in PN10-3 is the lowest recorded in the instrument since it was initialized.<br><br>Standpipe piezometer PB10-1 and PB10-4 showed decreases in groundwater level of 0.14 m, and 0.10 m, respectively, since the spring of 2024 readings. Standpipe piezometer PB10-2 showed an increase in groundwater level of 0.49 m since the spring of 2024 readings.<br><br>Load cells VC1706, VC1708, VC1712, and VC1713 showed decreases in the measured load by 2.31 kN, 1.55 kN, 2.88 kN, and 1.20 kN, respectively since the spring of 2024 readings. Load cells VC1707, VC1709, and VC1715 showed increases in measured loads by 0.16 kN, 7.02 kN, and 16.62 kN, respectively. VC1714 showed an increase in the measured load of 90.69 since the spring of 2024 readings, however, this significant increase could be attributed to the inconsistency of the number of operating wires between the spring of 2024 and the fall of 2024.<br><br>The current measured load in VC1715 is the highest ever recorded in this load cell. Load cell VC1715 has shown a trend of gradually increasing loads for several reading cycles, indicating the load cell may be malfunctioning. The load in VC1715 is about 47.4 percent higher than the lock off load. The remaining load cells have shown decreases in measured loads, when compared to the lock off load, ranging from 10.3 percent to 39.3 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.<br><br>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. |
| **Future Work:** | The instruments should be read again in the spring of 2025. |
| **Instrumentation Repairs:** | No instrument repairs are required at this time. |
| **Additional Comments:** | |

| | |
|---|---|
| **Attachments:** | • Table NC103-1 Fall 2024 – HWY 41:23 Kehiwin Lake (7.8), Slope Inclinometer Instrumentation Reading Summary<br>• Table NC103-2 Fall 2024 – HWY 41:23 Kehiwin Lake (7.8), Pneumatic Piezometer Instrumentation Reading Summary<br>• Table NC103-3 Fall 2024 – HWY 41:23 Kehiwin Lake (7.8), Standpipe Piezometer Instrumentation Reading Summary<br>• Table NC103-4 Fall 2024 – HWY 41:23 Kehiwin Lake (7.8), Vibrating Wire Load Cells Instrumentation Reading Summary<br>• Statement of Limitations and Conditions<br>• APPENDIX A – NC103-1 Fall 2024<br>o Field Inspector's report<br>o Site Plan Showing Approximate Instrument Locations (Drawing No. 32122-NC103)<br>o SI Reading Plots<br>o Figure NC103-1 (Piezometric Depths)<br>o Figure NC103-2 (Load Cell Readings |

We trust this report meets your requirements at present. If you have any questions, please contact the undersigned at your convenience.

Yours very truly,
Thurber Engineering Ltd.
Tarek Abdelaziz, Ph.D., P. Eng.
Partner | Senior Geotechnical Engineer


2024-11-07
Lucas Green, P.Eng.
Geotechnical Engineer

**PERMIT TO PRACTICE**
**THURBER ENGINEERING LTD.**
RM SIGNATURE: _____
RM APEGA ID #: 91085
DATE: November 7, 2024
**PERMIT NUMBER: P005186**
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

***Table NC103-1: Fall 2024 – Hwy 41:23 Kehiwin Lake (Km 7.8) Slope Inclinometer Instrumentation Reading Summary***

Date Monitored: September 11, 2024

| INSTRUMENT # | DATE INITIALIZED | TOTAL CUMULATIVE RESULTANT MOVEMENT AND DEPTH OF MOVEMENT TO DATE (mm) | MAXIMUM RATE OF MOVEMENT (mm/yr) | CURRENT STATUS OF SI | DATE OF PREVIOUS READING | INCREMENTAL MOVEMENT SINCE PREVIOUS READING (mm) | CURRENT RATE OF MOVEMENT (mm/yr) | CHANGE IN RATE OF MOVEMENT SINCE PREVIOUS READING (mm/yr) |
|---|---|---|---|---|---|---|---|---|
| SI10-1 | Oct. 12, 2010 | 8.6 over 4.4 m to 7.5 m depth in 308° direction | 7.6 on Oct. 23, 2010 | Operational | June 7, 2024 | No discernible movement | N/A | -3.2 |
| SI10-3 | Oct. 12, 2010 | 25.7 over 9.9 m to 12.3 m depth in 291° direction | 26.5 on Oct. 23, 2010 | Operational | June 7, 2024 | 1.4 | 5.5 | 5.8 |
| SI11-1 (Pile 9) | May 12, 2011 | 3.0 over 0.7 m to 14.8 m depth in 308° direction | 87.6 on June 21, 2011 | Operational | June 7, 2024 | 0.3 | 1.2 | 0.2 |
| SI11-2 (Pile 27) | May 12, 2011 | 0.9 over 0.7 m to 14.7 m depth in 306° direction | 146.6 on May 25, 2011 | Operational | June 7, 2024 | 0.5 | 1.9 | 1.2 |
| SI11-3 (Pile 45) | May 25, 2011 | -6.9 over 0.5 m to 14.6 m depth in 308° direction | 14.2 on June 21, 2011 | Operational | June 7, 2024 | 0.6 | 2.3 | 3.1 |
| SI11-4 (Pile 60) | May 25, 2011 | -7.7 over 0.8 m to 14.9 m depth in 349° direction | 48.5 on June 21, 2011 | Operational | June 7, 2024 | 0.7 | 2.6 | 2.3 |

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

***Table NC103-2: Fall 2024 – Hwy 41:23 Kehiwin Lake (Km 7.8) Pneumatic Piezometer Instrumentation Reading Summary***

Date Monitored: September 11, 2024

| 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 | 48.8 | 1.58 | 1.86 | 0.28 |
| PN10-3 | October 1, 2010 | 12.27 | - | Active | 0.75 on September 8, 2014 | 91.3 | 2.97 | 1.69 | -1.28 |

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

THURBER ENGINEERING LTD.

***Table NC103-3: Fall 2024 – Hwy 41:23 Kehiwin Lake (Km 7.8) Standpipe Piezometer Instrumentation Reading Summary***

Date Monitored: September 11, 2024

| INSTRUMENT # | DATE INITIALIZED | TIP DEPTH (m) | GROUND ELEV. (m) | CURRENT STATUS | HIGHEST MEASURED GROUNDWATER LEVEL BGS (m) | CURRENT GROUNDWATER DEPTH BGS (m) | PREVIOUS GROUNDWATER DEPTH BGS (m) | CHANGE IN WATER LEVEL SINCE PREVIOUS READING (m) |
|---|---|---|---|---|---|---|---|---|
| PB10-1 | Oct. 6, 2010 | 15.0 | - | Operational | 3.59 on June 23, 2021 | 4.68 | 4.54 | -0.14 |
| PB10-2 | Oct. 6, 2010 | 15.0 | - | Operational | 2.45 on May 12, 2011 | 2.64 | 3.13 | 0.49 |
| PB10-4 | Oct. 6, 2010 | 18.6 | - | Operational | 1.03 on May 15, 2014 | 3.88 | 3.78 | -0.10 |

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

THURBER ENGINEERING LTD.

***Table NC103-4: Fall 2024 – Hwy 41:23 Kehiwin Lake (Km 7.8) Vibrating Wire Load Cells Instrumentation Reading Summary***

Date Monitored: September 11, 2024

| 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 | 208.06* | 210.37* | -2.31 |
| VC1707 | G35L | 290 | July 23, 2011 | 260.15** | 259.99** | 0.16 |
| VC1708 | G8U | 240 | July 23, 2011 | 214.13*** | 215.68*** | -1.55 |
| VC1709 | G45L | 290 | July 25, 2011 | 196.67** | 189.65** | 7.02 |
| *VC1710* | *G8L* | *240* | *July 23, 2011* | *No Reading* | *No Reading* | *N/A* |
| *VC1711* | *G45U* | *290* | *July 25, 2011* | *No Reading* | *No Reading* | *N/A* |
| VC1712 | G60U | 290 | July 27, 2011 | 247.47* | 250.35* | -2.88 |
| VC1713 | G27U | 290 | July 23, 2011 | 175.95* | 177.15* | -1.20 |
| VC1714 | G17U | 290 | July 23, 2011 | 236.83* | 146.14** | 90.69 |
| VC1715 | G27L | 290 | July 23, 2011 | 427.56** | 410.94** | 16.62 |

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.

THURBER

# 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.

THURBER ENGINEERING LTD.

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

## FALL 2024

## APPENDIX A
## DATA PRESENTATION AND SITE PLANS

## SITE NC103

**ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS**
**NORTH CENTRAL REGION - ATHABASCA AND FORT McMURRAY DISTRICTS**
**INSTRUMENTATION MONITORING FIELD SUMMARY (NC103)**
**FALL 2024**

| | |
|---|---|
| **Location:** Kehiwin Lake (HWY41:23 C1 7.894) | **Readout:** RST PN C108 Unit 4/ DGSI Dipmeter |
| **File Number:** 32122 | **Casing Diameter:** 2.75" |
| **Probe:** RST Set 5R & 8R | **Temp (deg C):** 15 |
| **Cable:** RST Set 5R & 8R | **Read by:** NRM/NKR |

**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 | 11-Sep-24 | 0.77 | 62 to 2 | 295 | 217 | -203 | 1136 | -1135 | 8R/8R | |
| SI10-3 | 506684.84 | 5988455.34 | 11-Sep-24 | 0.77 | 64 to 4 | 283 | 55 | -56 | 538 | -534 | 8R/8R | |
| SI11-1 | 506689.52 | 5988389.70 | 11-Sep-24 | 0.79 | 50 to 4 | 310 | -476 | 486 | -236 | 229 | 5R/5R | |
| SI11-2 | 506711.75 | 5988413.10 | 11-Sep-24 | 0.84 | 50 to 4 | 283 | 146 | -148 | 289 | -283 | 5R/5R | Pile Wall |
| SI11-3 | 506718.26 | 5988440.93 | 11-Sep-24 | 0.99 | 50 to 4 | 295 | -208 | 219 | 182 | -178 | 5R/5R | Pile Wall |
| SI11-4 | 506745.73 | 5988463.22 | 11-Sep-24 | 0.69 | 50 to 4 | 5572.1 | -230 | 231 | -133 | 137 | 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 | | 11-Sep-24 | 48.8 | 33672 |
| PN10-3 | Attached to SI10-3 | | 11-Sep-24 | 91.3 | 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 | 11-Sep-24 | 0.76 | 5.44 | 15.83 | - | - | - | - |
| PB10-2 | 506723.56 | 5988401.99 | 11-Sep-24 | 0.76 | 3.4 | 15.76 | - | - | - | - |
| PB10-4 | 506690.18 | 5988388.59 | 11-Sep-24 | 0.71 | 4.59 | 19.30 | - | - | - | - |

**INSPECTOR REPORT**

| |
|---|
| **Only water levels recorded in Poor boys.** |
| |
| |
| |

**ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS**
**NORTH CENTRAL REGION - ATHABASCA AND FORT McMURRAY DISTRICTS**
**VIBRATING WIRE LOAD CELL FIELD SUMMARY (NC103)**
**FALL 2024**

| | |
|---|---|
| **Location:** Kehiwin Lake (HWY41:23 C1 7.894) | **Readout:** RST PN C108 Unit 4 |
| **File Number:** 32122 | **Read by:** NKR |

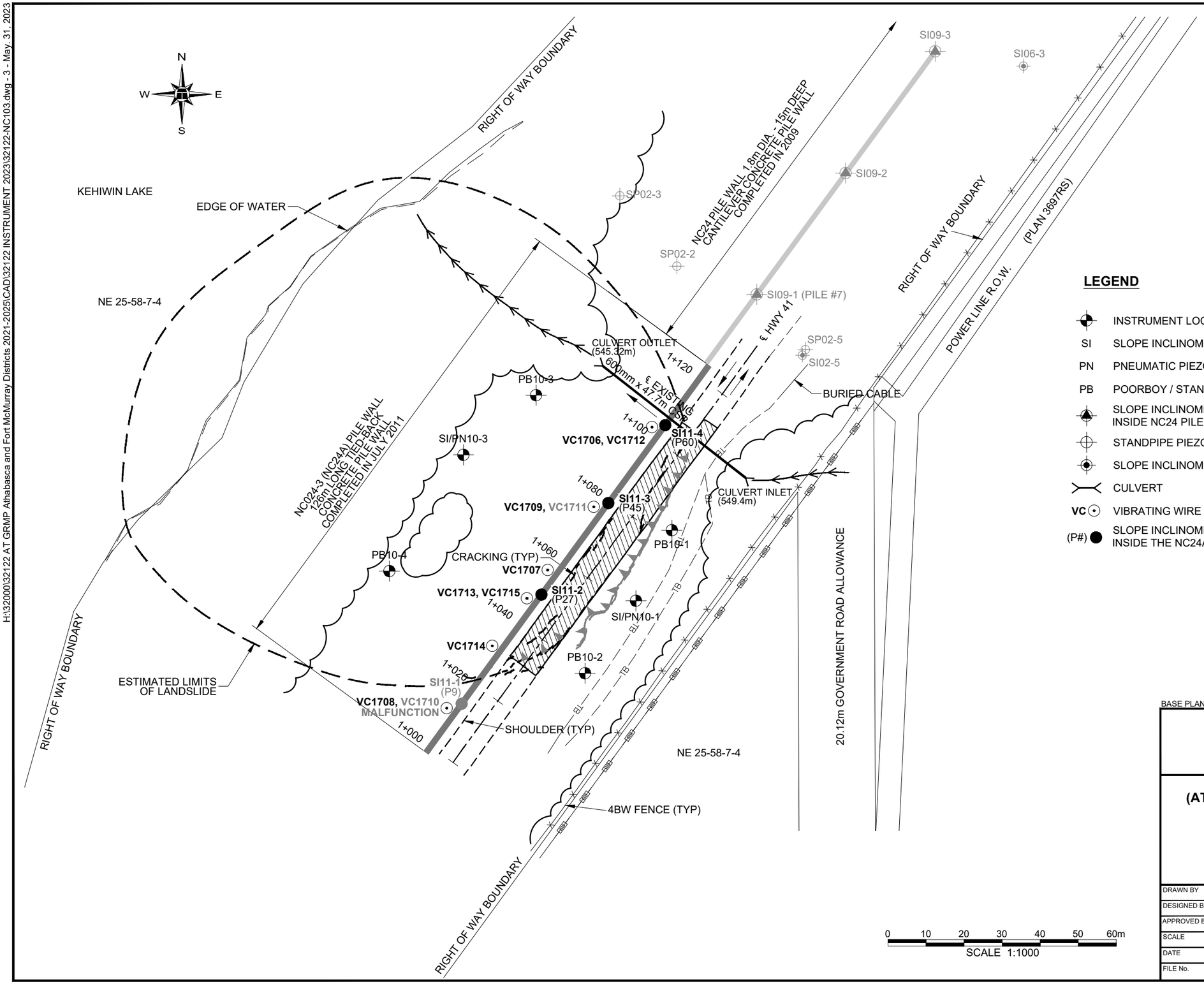
**3 WIRES VIBRATING WIRE LOAD CELL (VC) READINGS**

| VC# | GPS Location (UTM 12) | | Date | Reading (B Units) | Comments |
|---|---|---|---|---|---|
| | Easting (m) | Northing (m) | | | Temperature degree C |
| VC1706 | 506744.42 | 5988463.22 | 11-Sep-24 | 6636.1,6187.4 | 13.8 |
| VC1707 | 506720.90 | 5988428.69 | 11-Sep-24 | 6213.2 | 12.6 |
| VC1708 | 506690.18 | 5988388.59 | 11-Sep-24 | 6522.4,6828.9,6067.3 | 13.3 |
| VC1709 | 506728.08 | 5988440.94 | 11-Sep-24 | 6429 | 12.4 |
| VC1712 | 506744.42 | 5988463.22 | 11-Sep-24 | 6493.5,5934.7 | 14.5 |
| VC1713 | 506711.09 | 5988415.32 | 11-Sep-24 | 6815.5,6318.9 | 13.7 |
| VC1714 | 506700.64 | 5988401.96 | 11-Sep-24 | 6728.1,5856.8 | 13.6 |
| VC1715 | 506711.09 | 5988415.32 | 11-Sep-24 | 5572.1 | 12.3 |

**INSPECTOR REPORT**

| |
|---|
| * Only 1 VW is working |
| ** Only 2 VWs are working |
| Note: 3 SENSORS ON VW MONITOR SETTING |
| VW1714. only 1 sensor working. |
| |

H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\CAD\32122 INSTRUMENT 2023\32122-NC103.dwg - 3 - May. 31, 2023




| 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)**

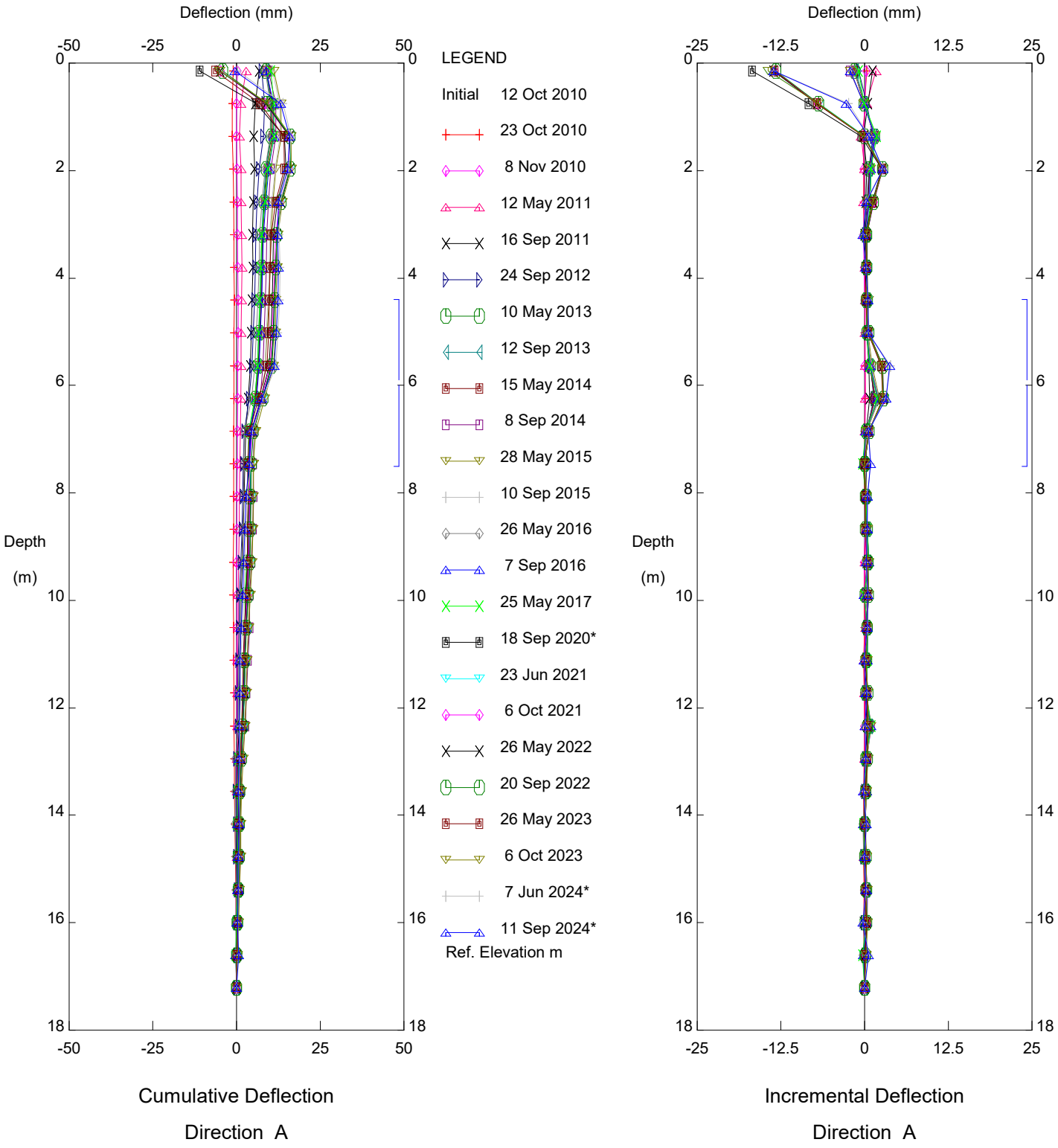
**NC103: HWY41:23 KEHIWIN LAKE (km 7.8)**
**SITE PLAN SHOWING APPROXIMATE INSTRUMENT LOCATIONS**

**DWG No. 32122-NC103**

| | |
|---|---|
| DRAWN BY | ML |
| DESIGNED BY | BWN |
| APPROVED BY | TSA |
| SCALE | 1:1000 |
| DATE | MAY 2023 |
| FILE No. | 32122 |

THURBER ENGINEERING LTD.

Thurber Engineering Ltd.




Cumulative Deflection

Direction A

Incremental Deflection

Direction A

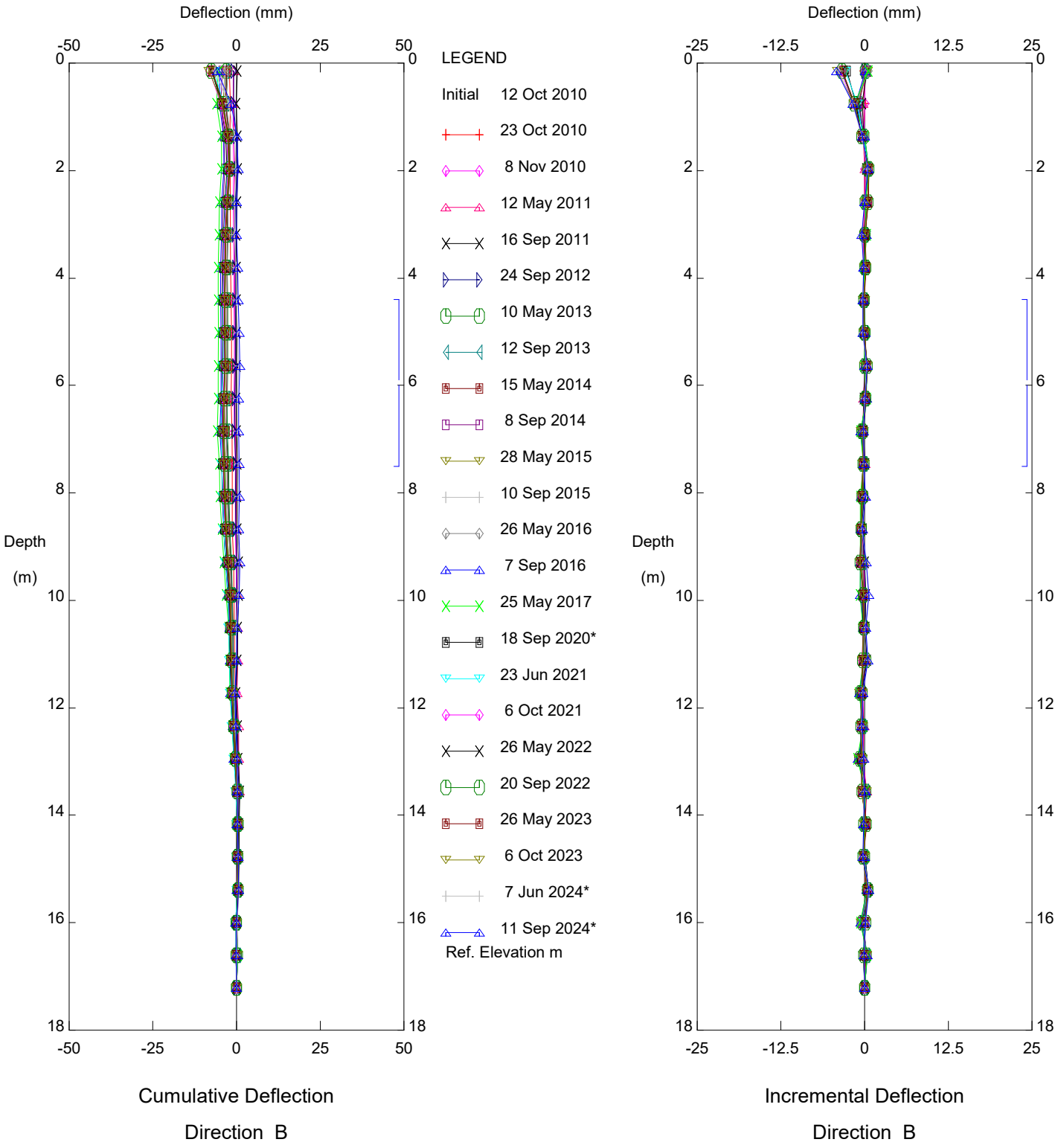
Hwy 41:23 Kehewin Lake (NC103), Inclinometer SI10-1

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\2024B-Fall\SI Readings\NC103\SI10-1 (1).gtl

Thurber Engineering Ltd.




Cumulative Deflection

Direction B

Incremental Deflection

Direction B

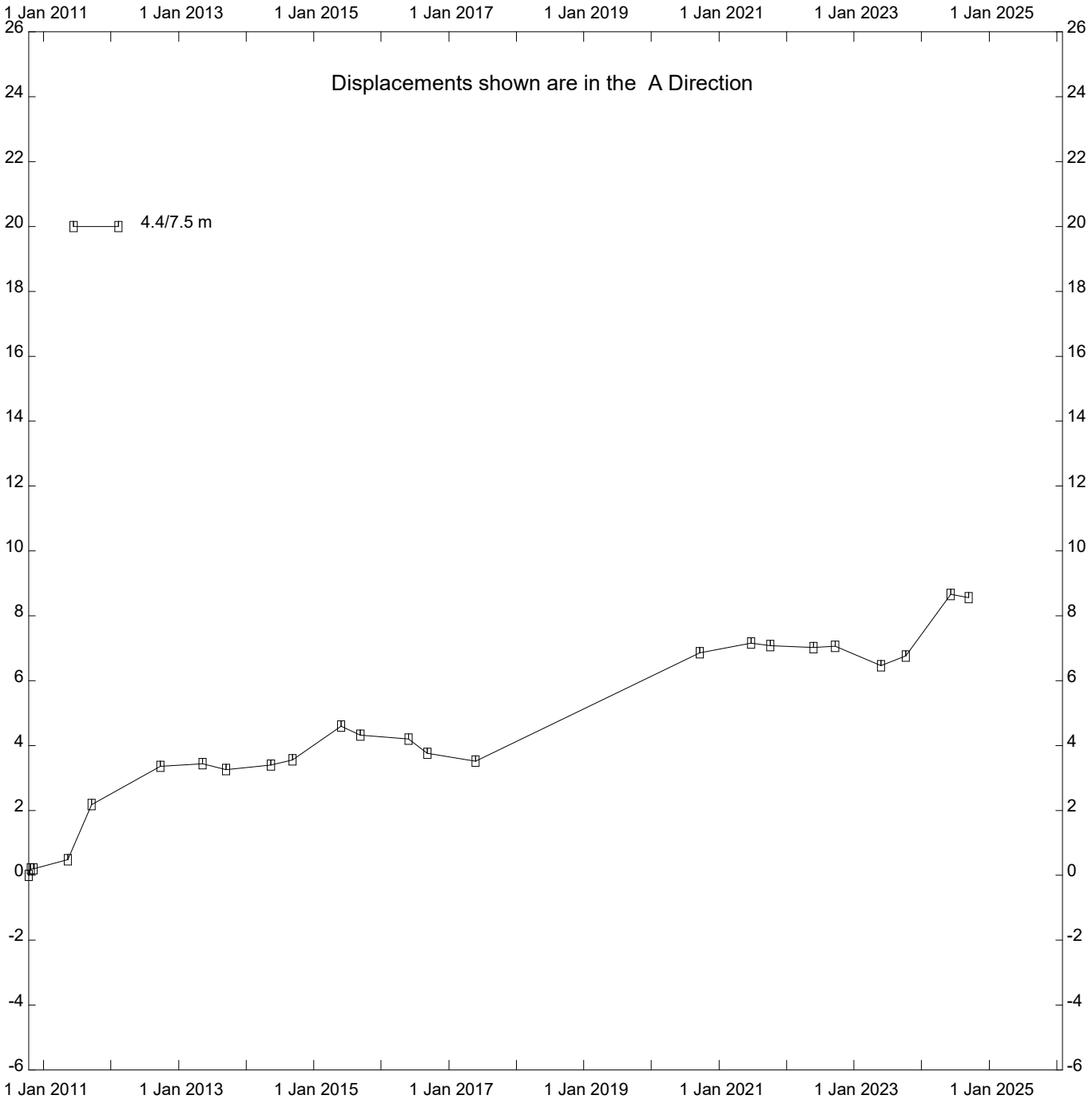
Hwy 41:23 Kehewin Lake (NC103), Inclinometer SI10-1

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\2024B-Fall\SI Readings\NC103\SI10-1 (1).gtl

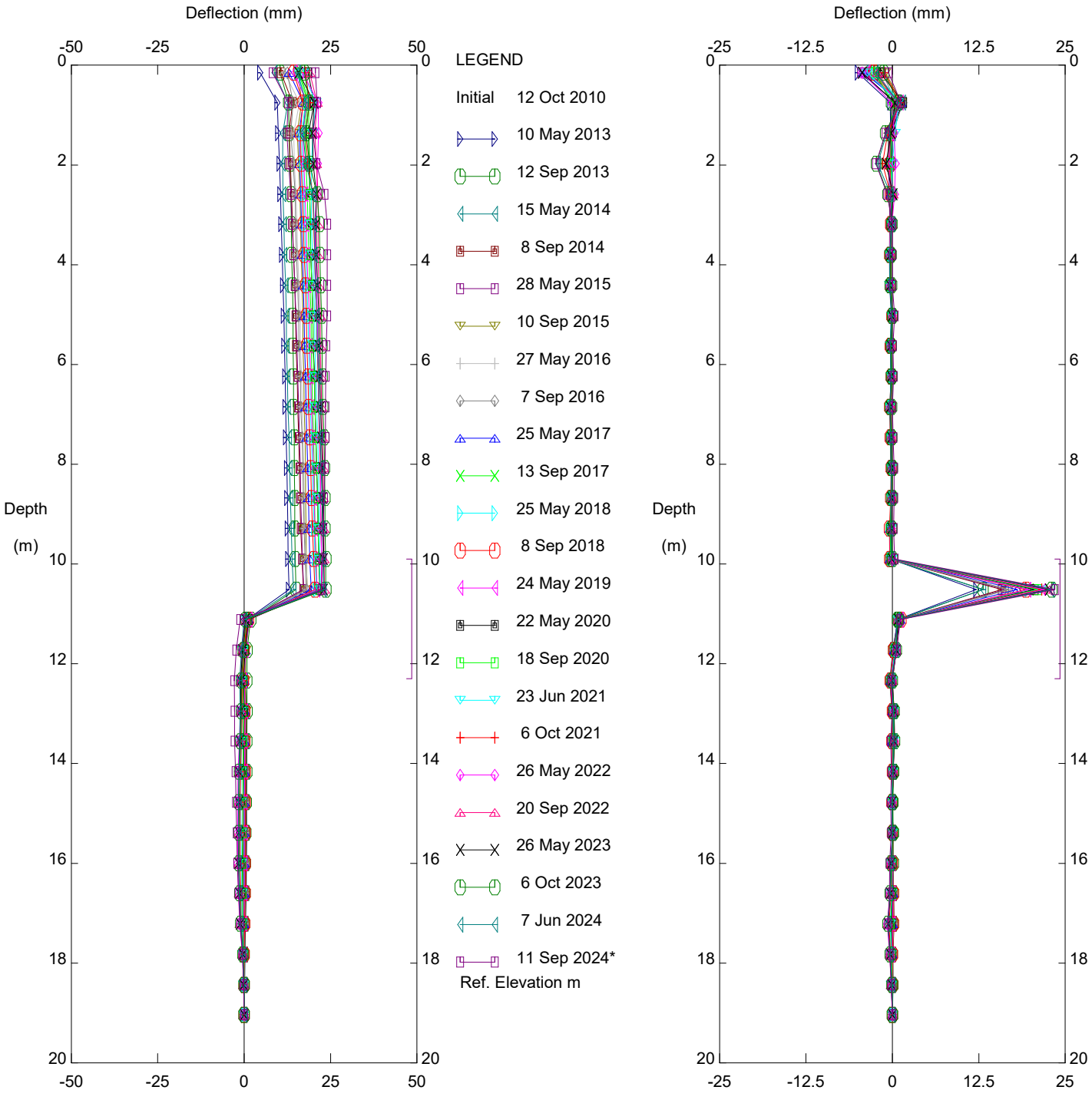
Thurber Engineering Ltd.




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

Alberta Transportation

Thurber Engineering Ltd.




Cumulative Deflection

Direction A

Incremental Deflection

Direction A

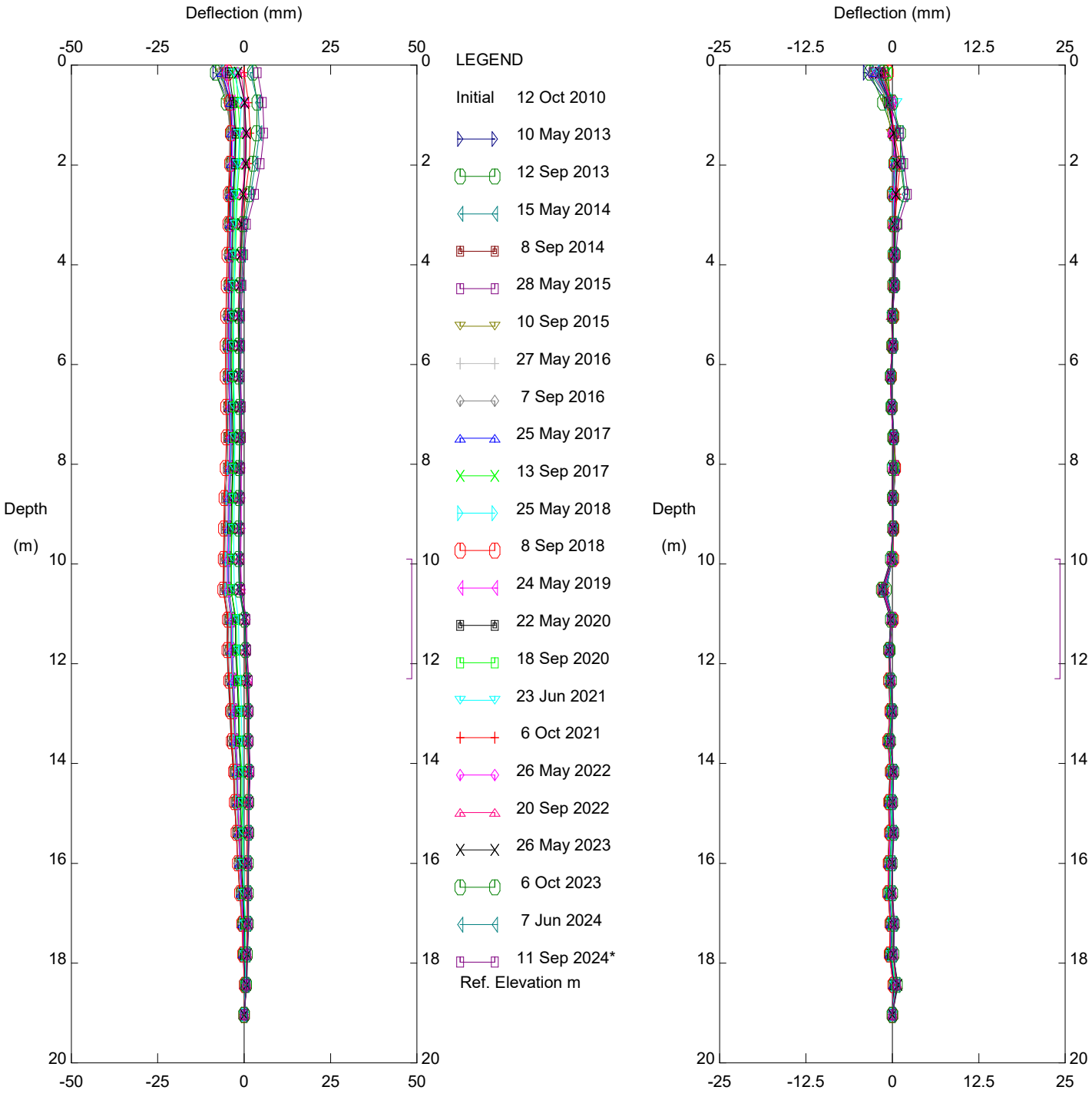
Hwy 41:23 Kehiwin Lake (NC103), Inclinometer SI10-3

Alberta Transportation

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

H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2024B-Fall\SI Readings\NC103\SI10-3 (1).gtl

Thurber Engineering Ltd.




Cumulative Deflection

Direction B

Incremental Deflection

Direction B

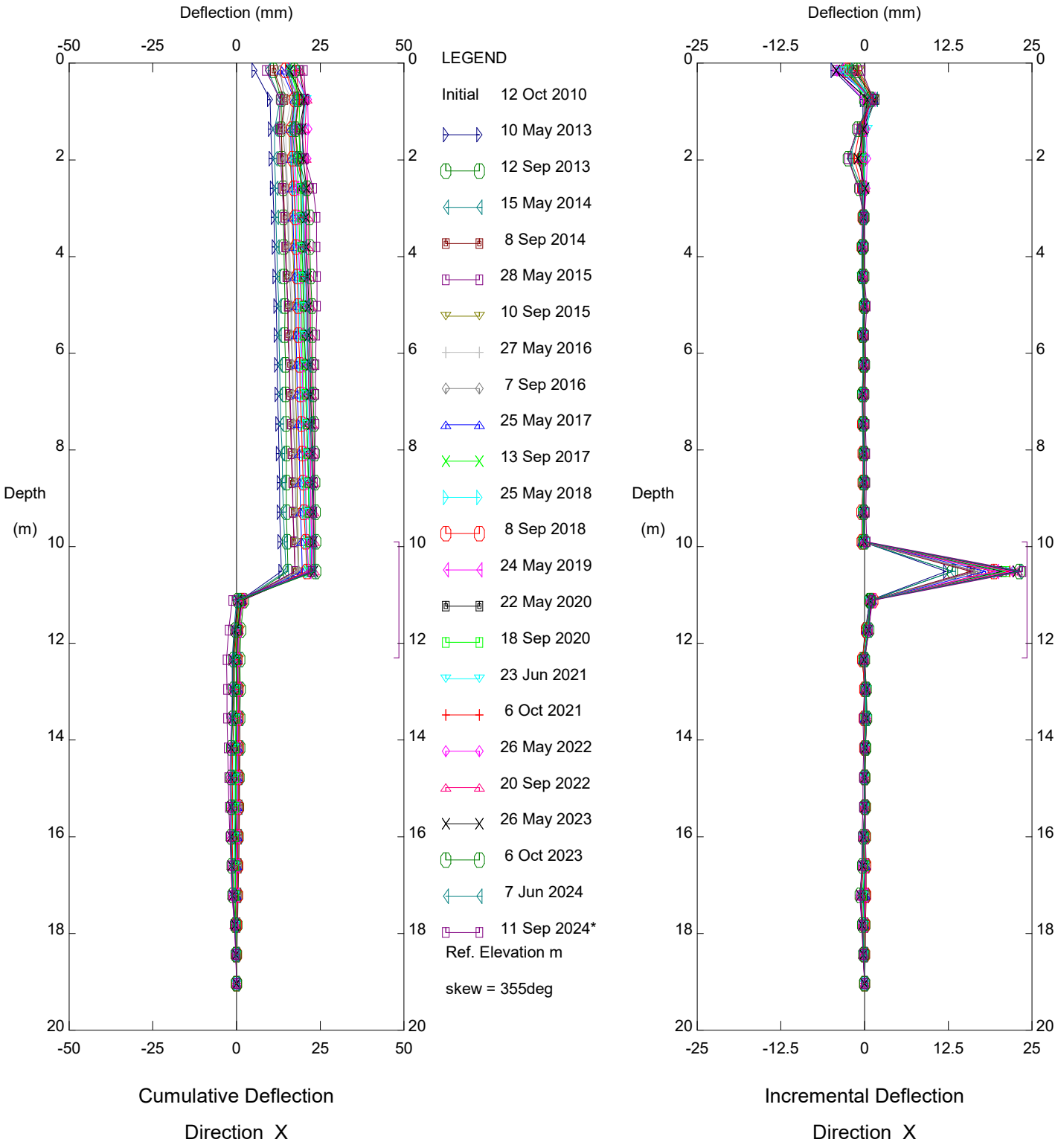
Hwy 41:23 Kehiwin Lake (NC103), Inclinometer SI10-3

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\2024B-Fall\SI Readings\NC103\SI10-3 (1).gtl

Thurber Engineering Ltd.




Cumulative Deflection

Direction X

Incremental Deflection

Direction X

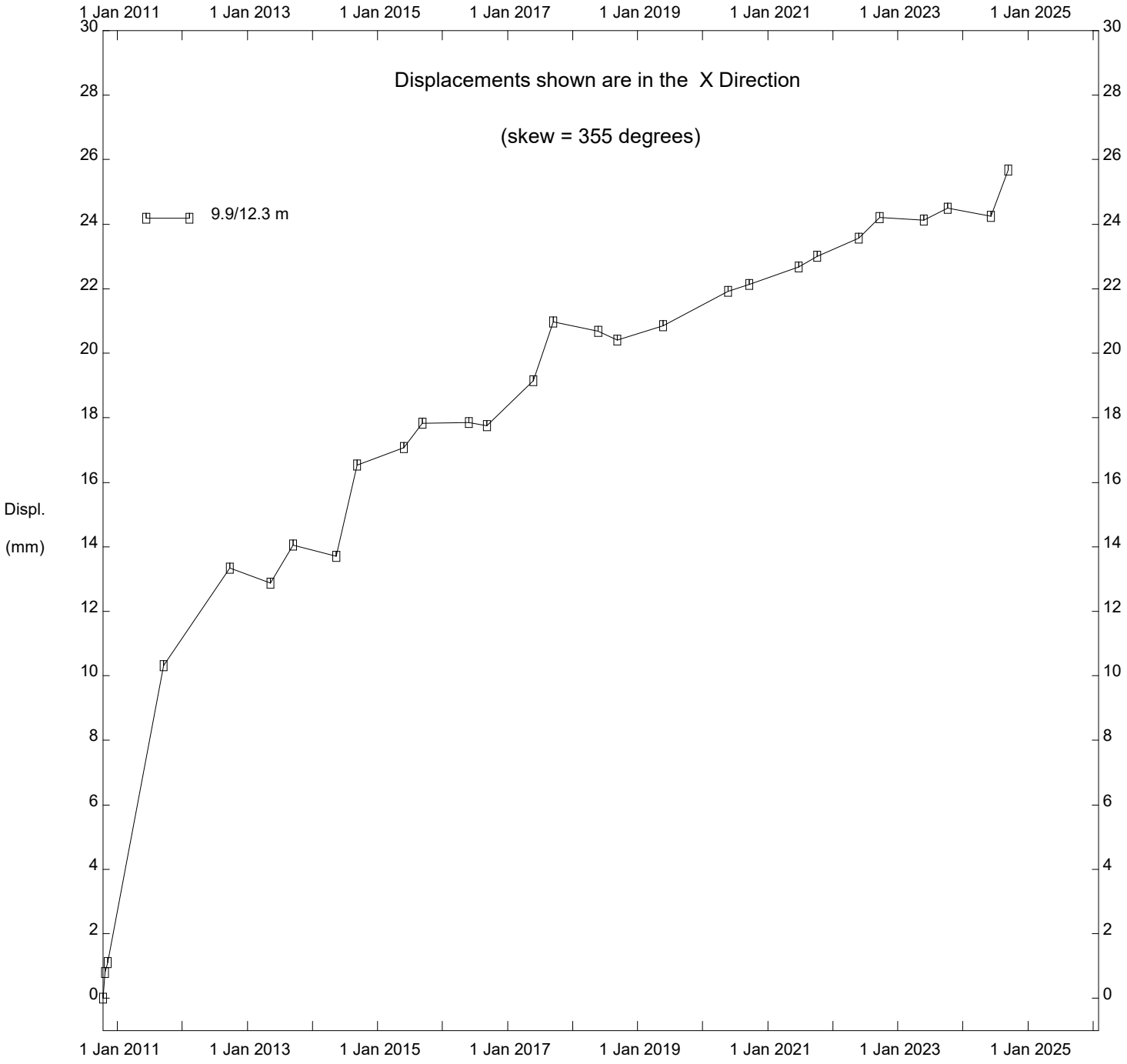
Hwy 41:23 Kehiwin Lake (NC103), Inclinometer SI10-3

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\2024B-Fall\SI Readings\NC103\SI10-3 (1).gtl

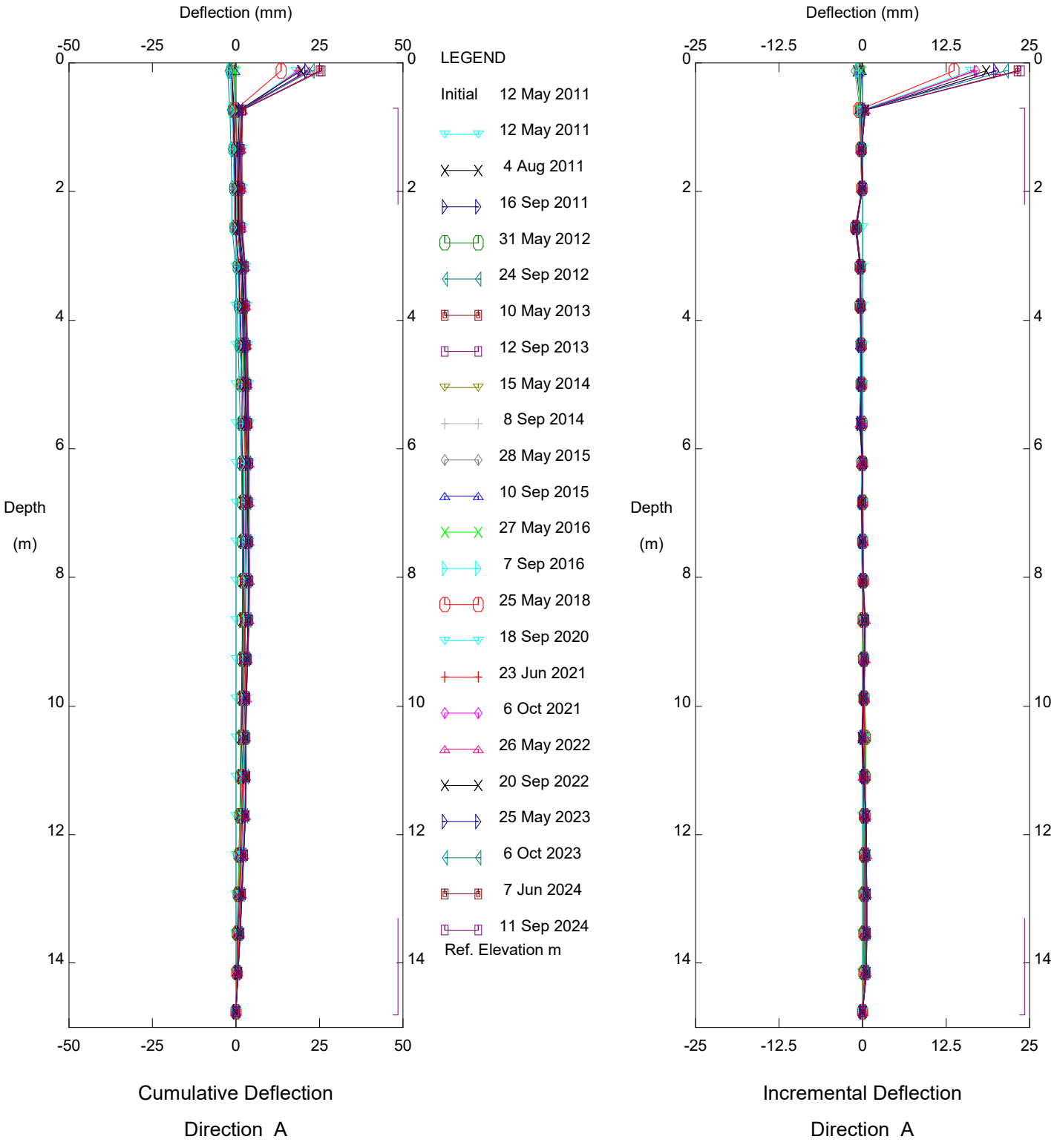
Thurber Engineering Ltd.




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

Alberta Transportation

Thurber Engineering Ltd.




Cumulative Deflection

Direction A

Incremental Deflection

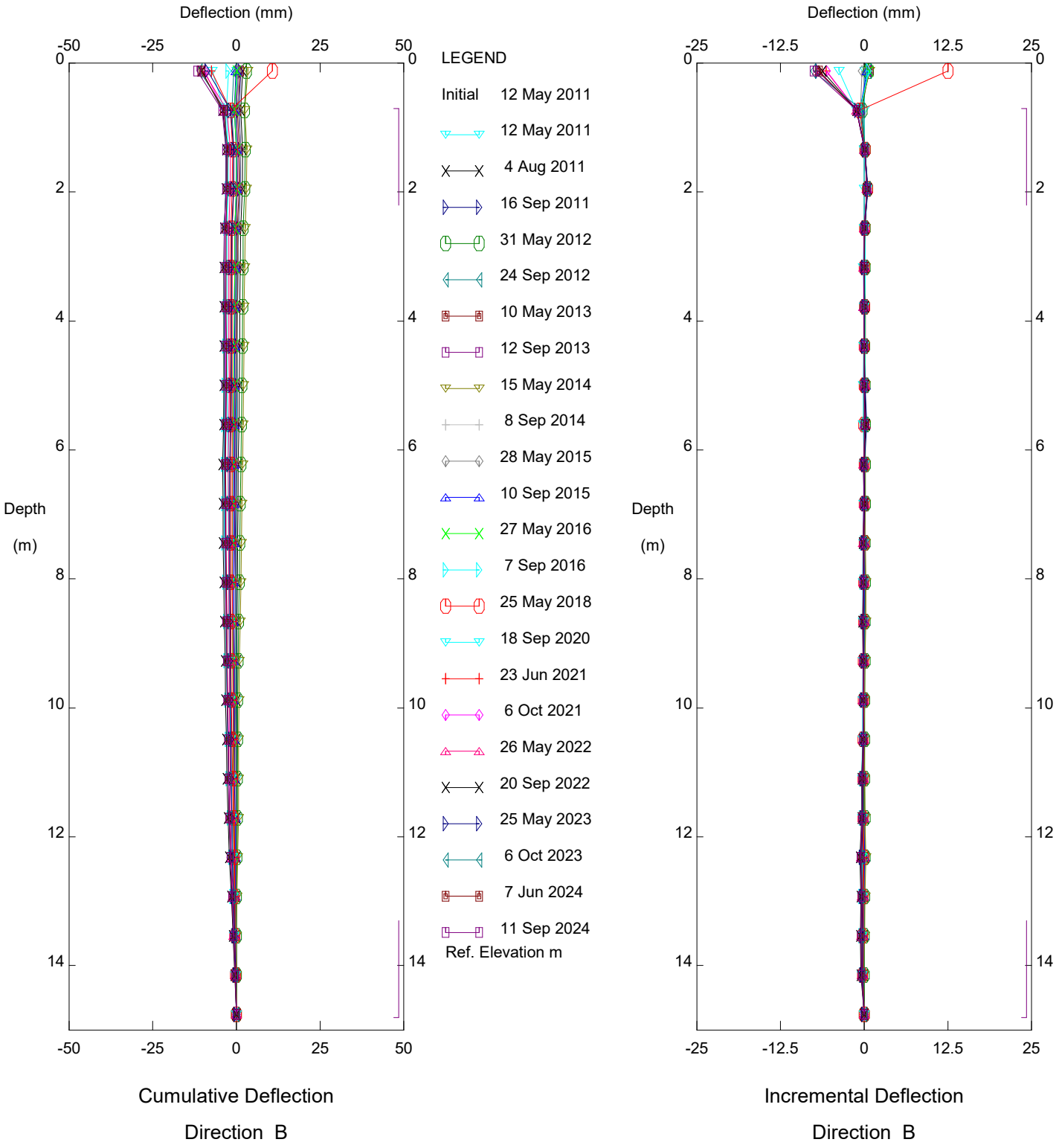
Direction A

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\2024B-Fall\SI Readings\NC103\SI11-1( km 7.8).gtl

Thurber Engineering Ltd.




Cumulative Deflection

Direction B

Incremental Deflection

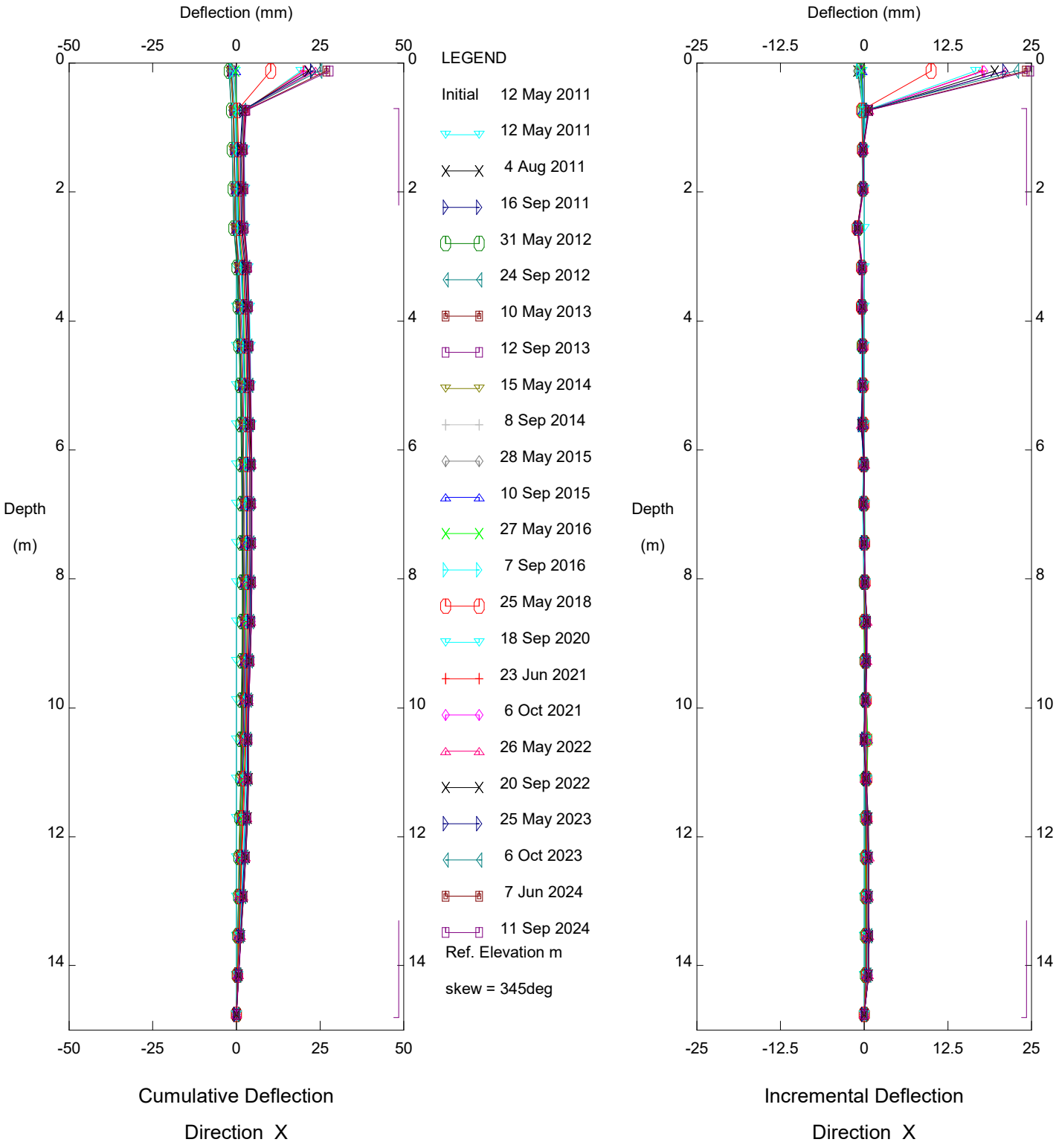
Direction B

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

Alberta Transportation

G:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2024B-Fall\SI Readings\NC103\SI11-1( km 7.8).gtl

Thurber Engineering Ltd.




Cumulative Deflection

Direction X

Incremental Deflection

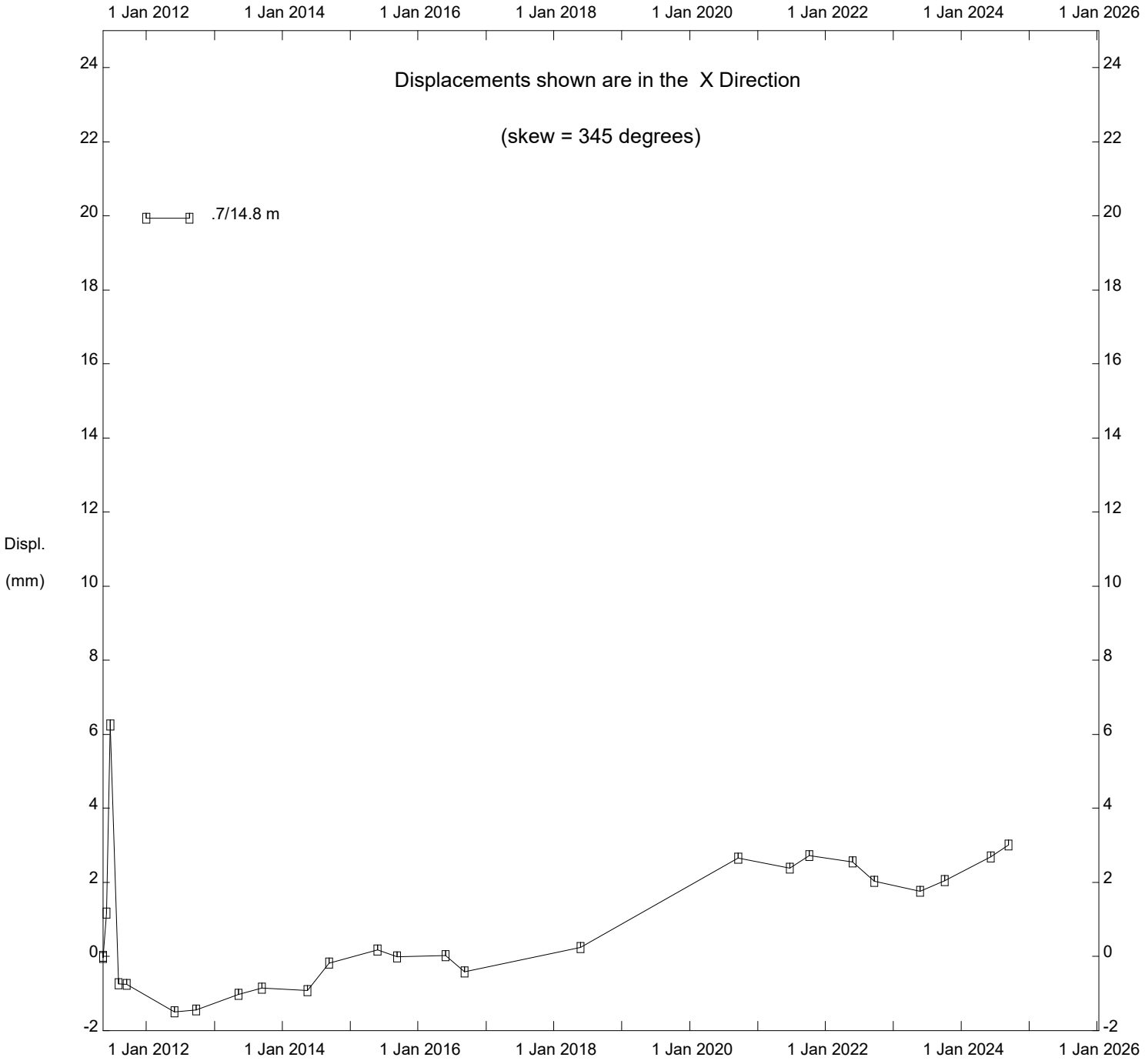
Direction X

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\2024B-Fall\SI Readings\NC103\SI11-1( km 7.8).gtl

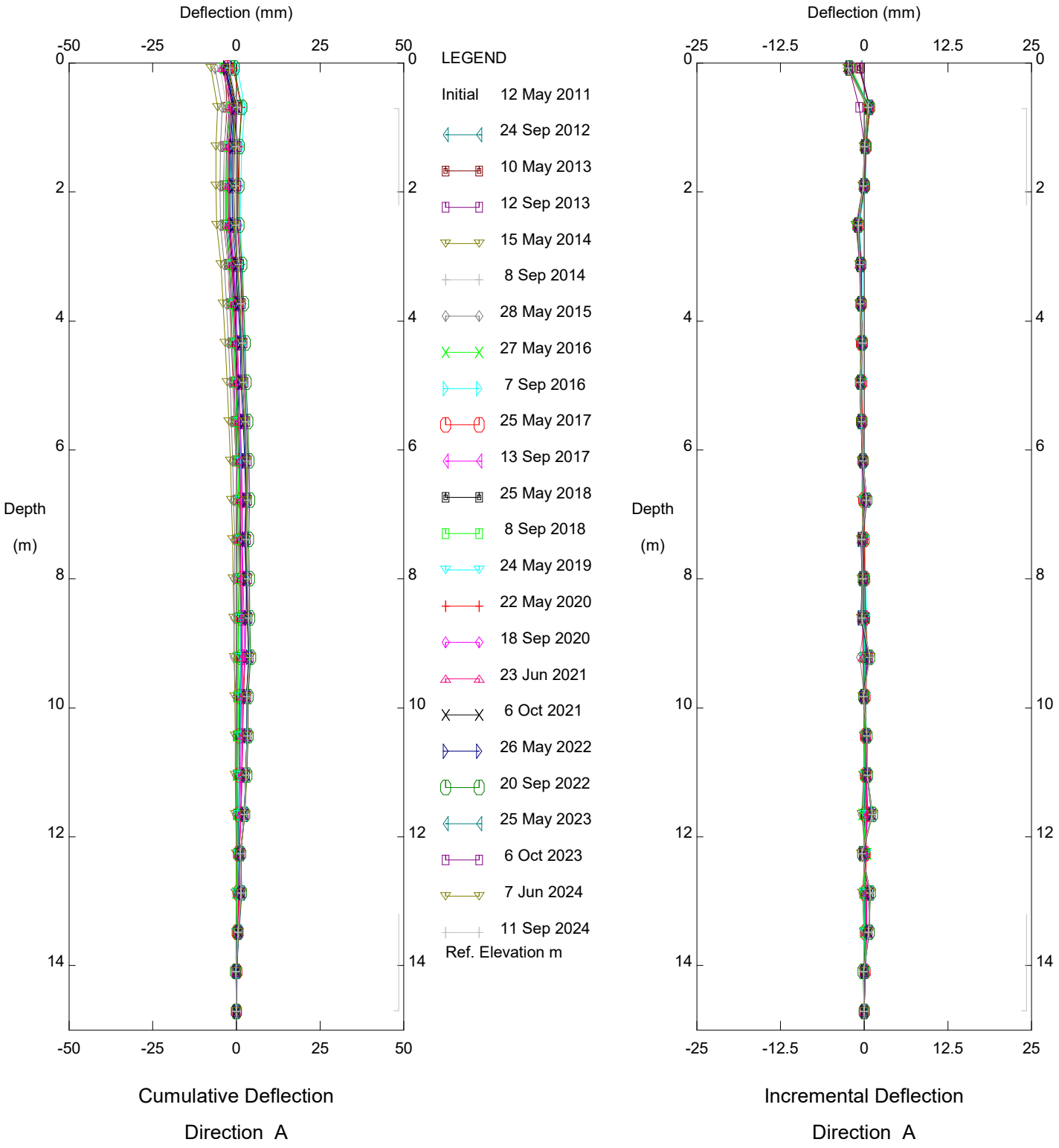
Thurber Engineering Ltd.




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

Alberta Transportation

Thurber Engineering Ltd.




Cumulative Deflection

Direction A

Incremental Deflection

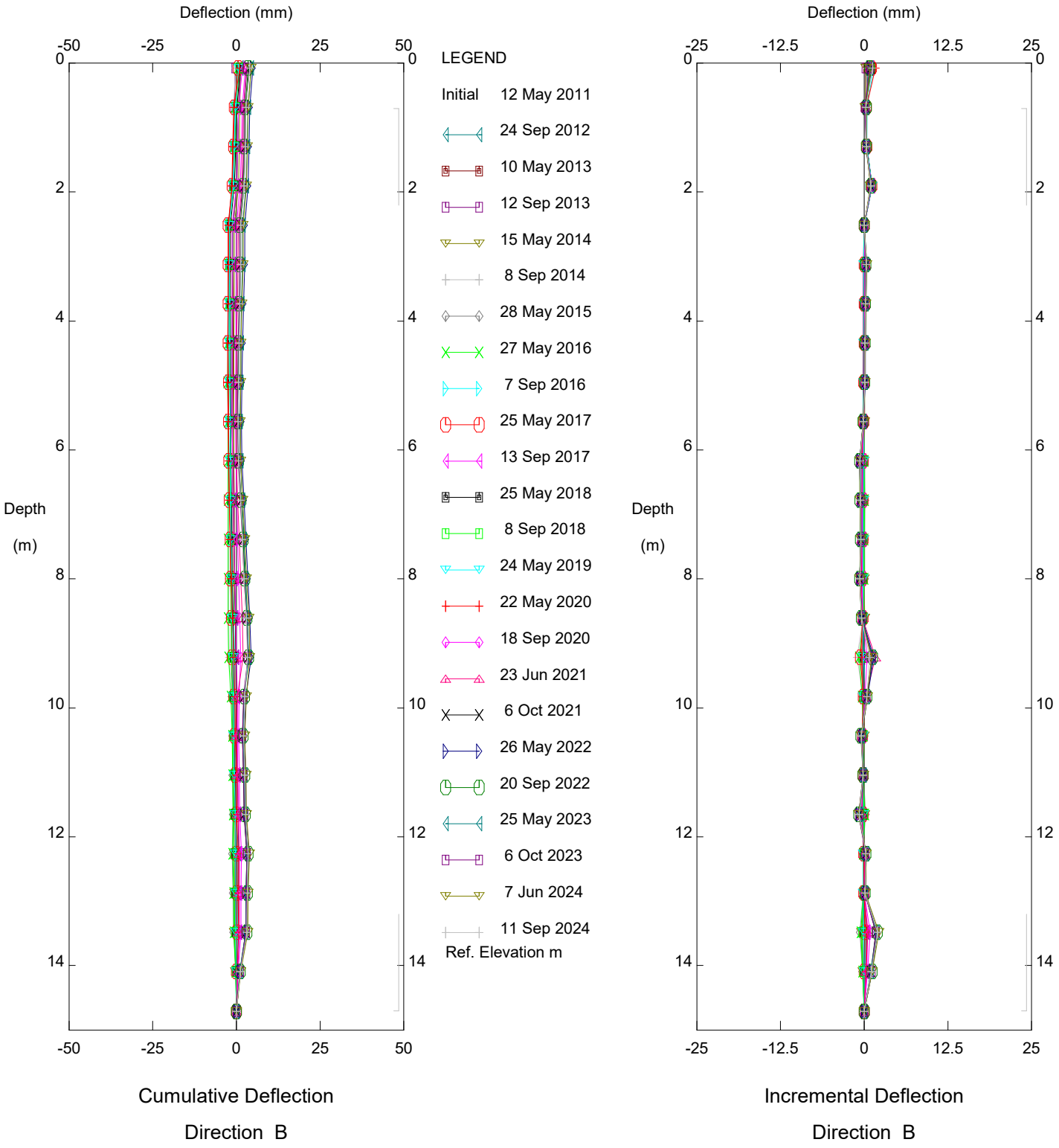
Direction A

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\2024B-Fall\SI Readings\NC103\SI11-2( km 7.8).gtl

Thurber Engineering Ltd.




Cumulative Deflection

Direction B

Incremental Deflection

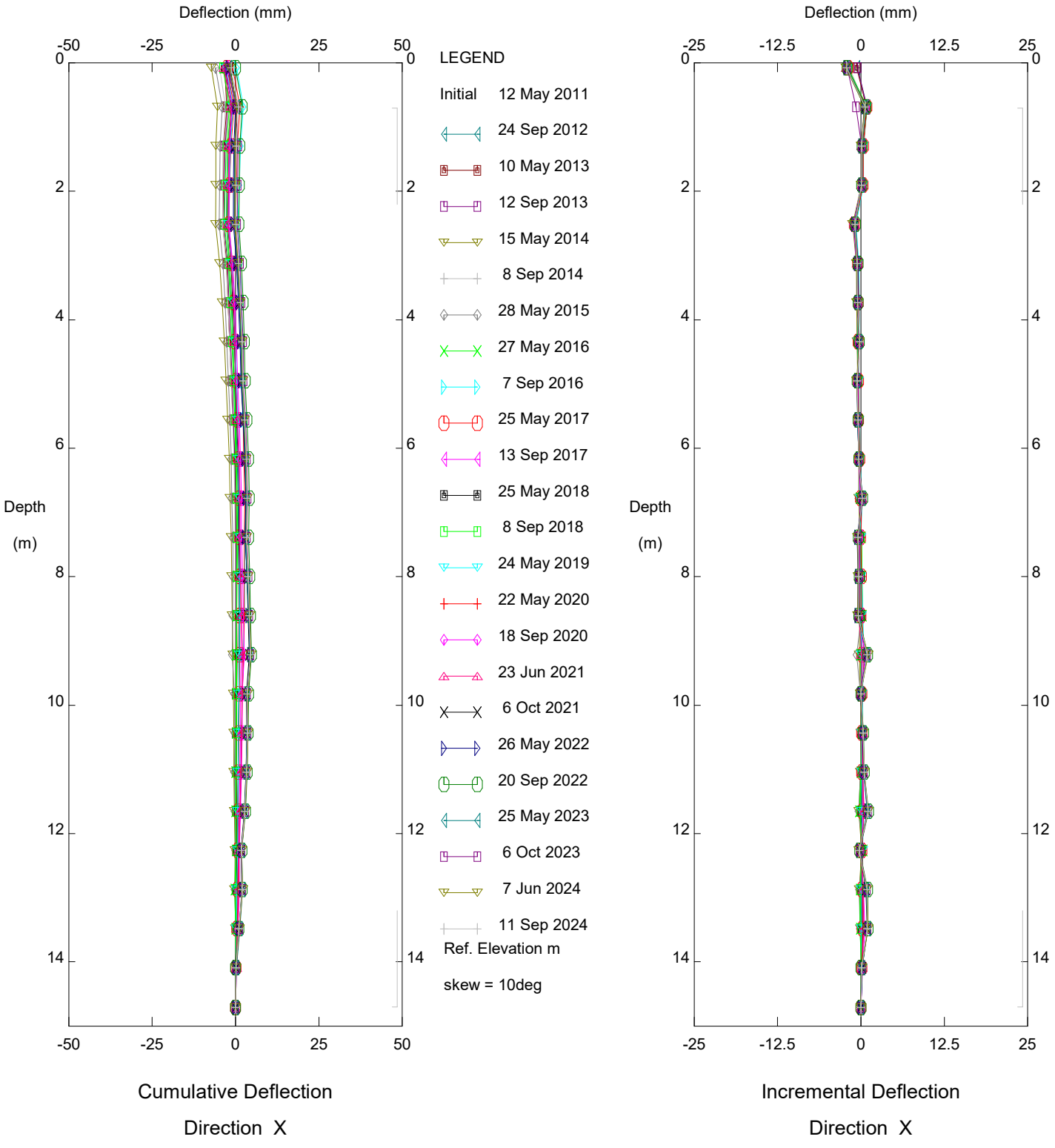
Direction B

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\2024B-Fall\SI Readings\NC103\SI11-2( km 7.8).gtl

Thurber Engineering Ltd.




Cumulative Deflection

Direction X

Incremental Deflection

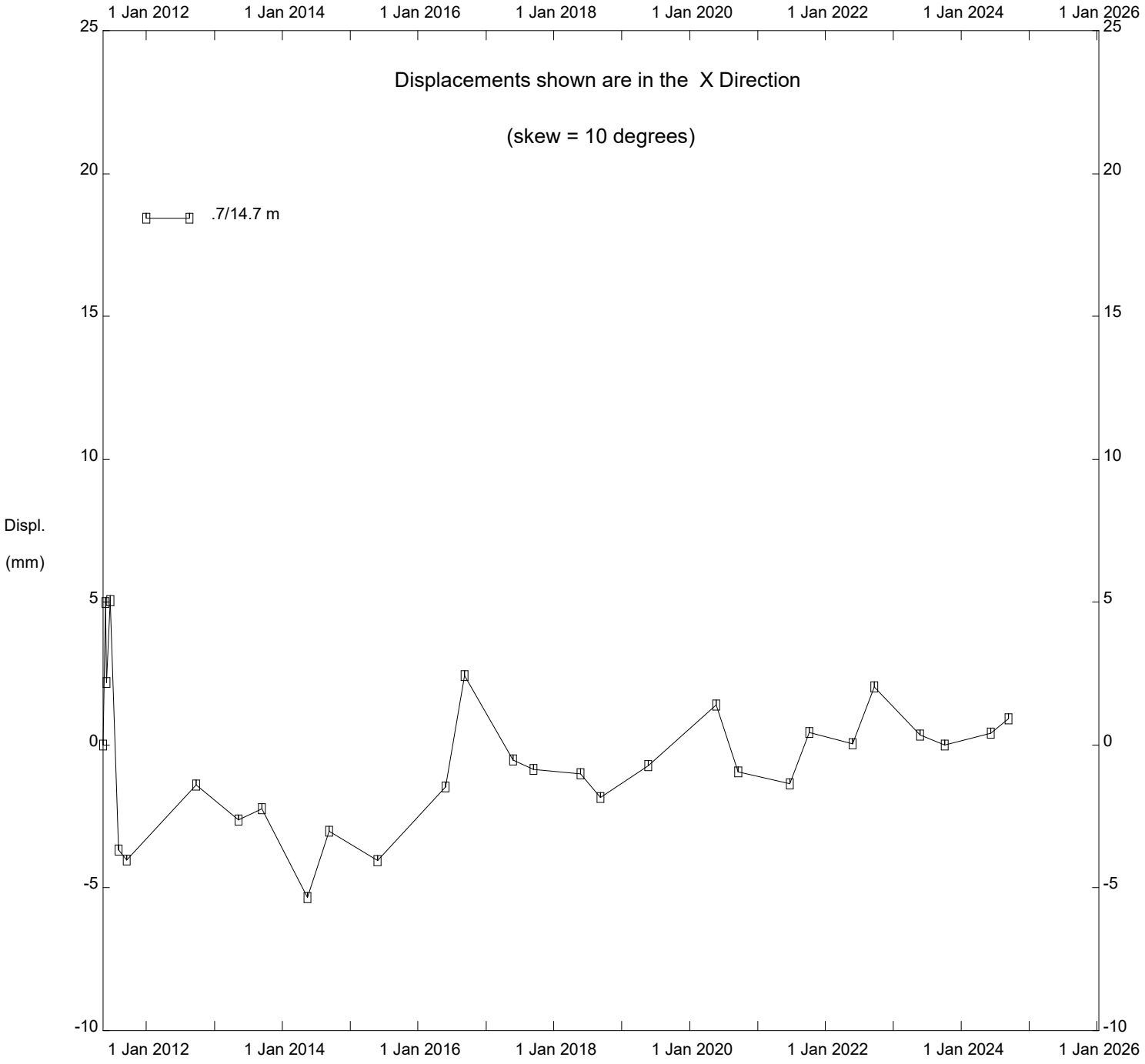
Direction X

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\2024B-Fall\SI Readings\NC103\SI11-2( km 7.8).gtl

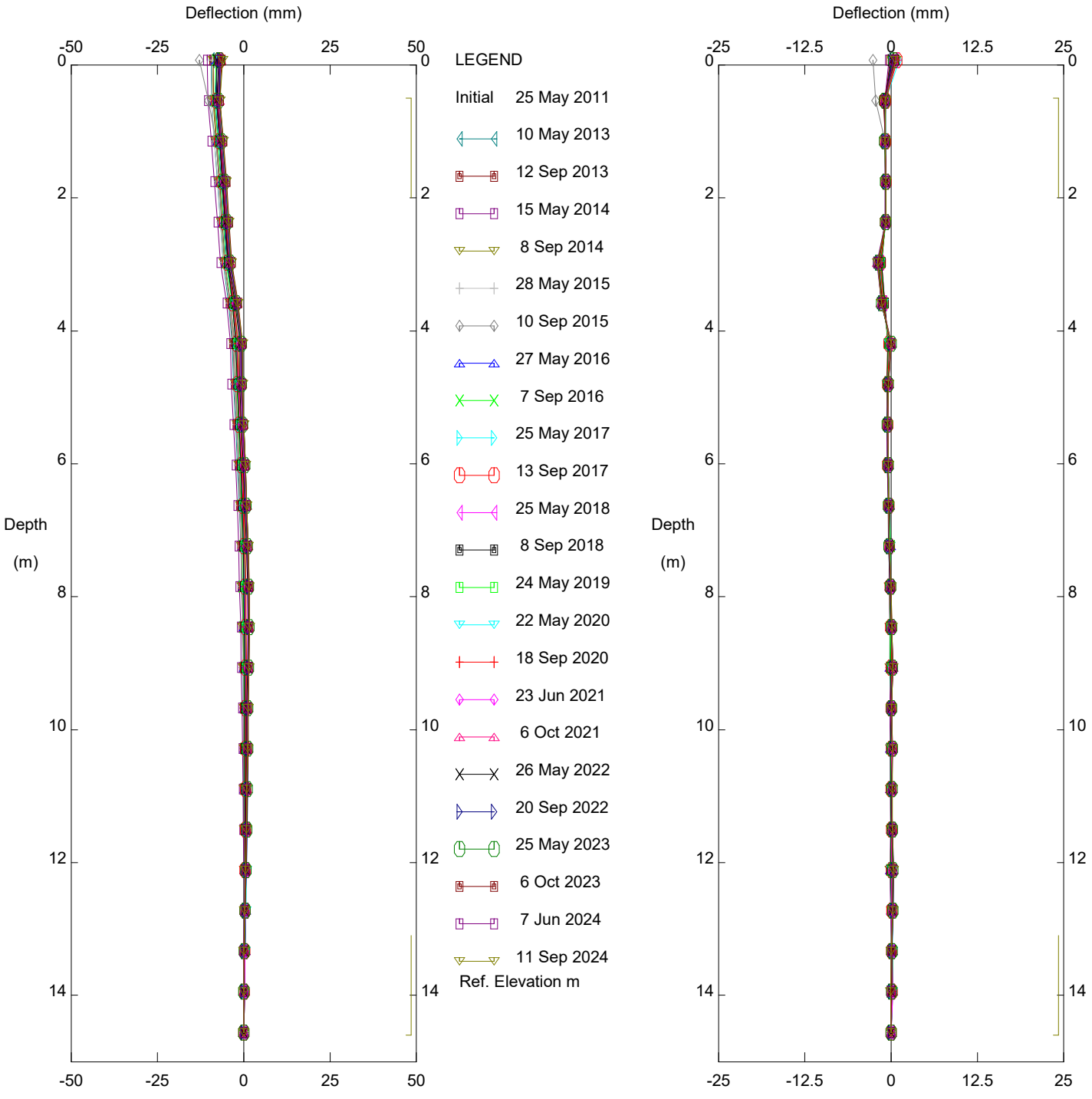
Thurber Engineering Ltd.




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

Alberta Transportation

Thurber Engineering Ltd.




Cumulative Deflection

Direction A

Incremental Deflection

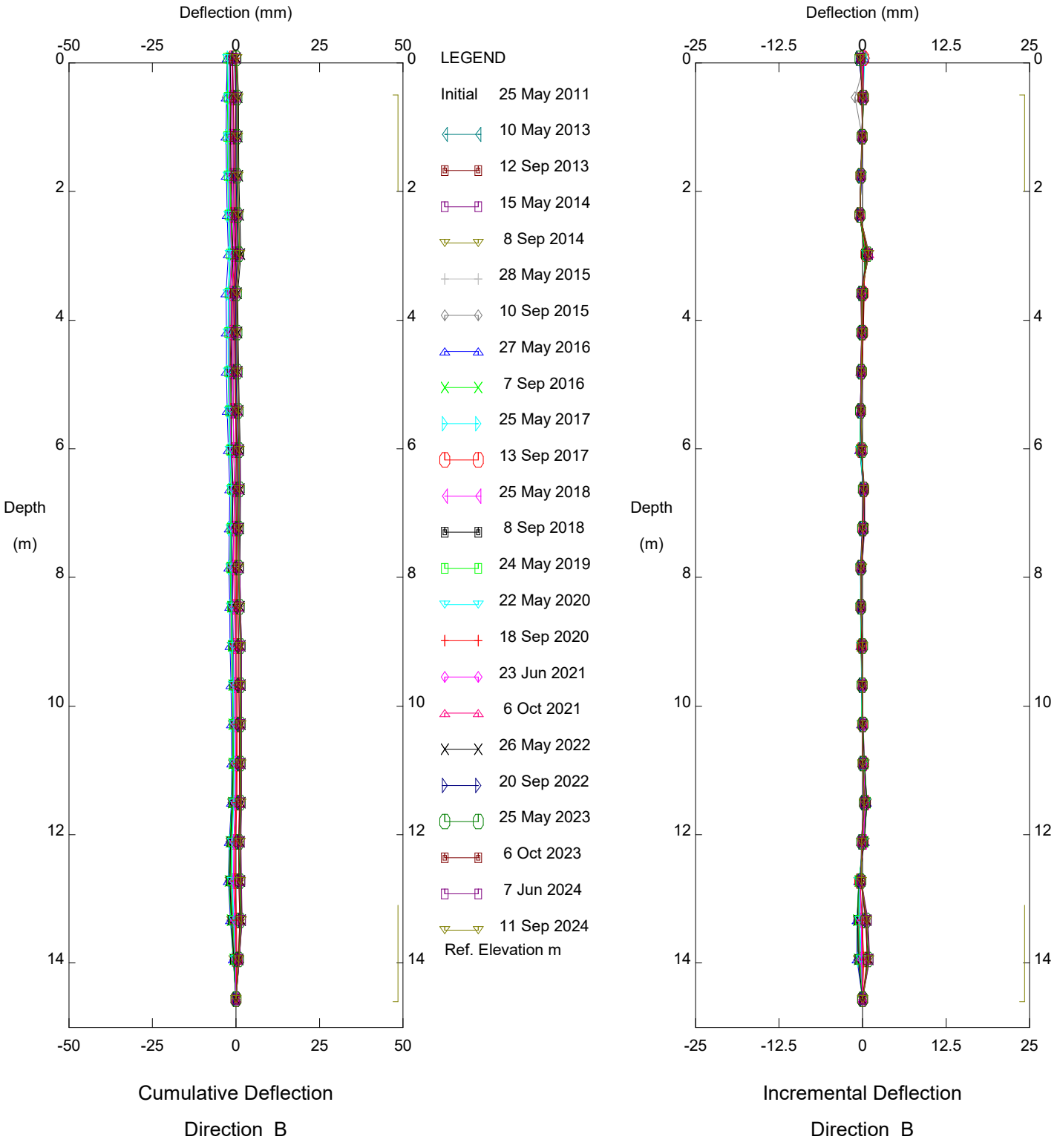
Direction A

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\2024B-Fall\SI Readings\NC103\SI11-3( km 7.8).gtl

Thurber Engineering Ltd.




Cumulative Deflection

Direction B

Incremental Deflection

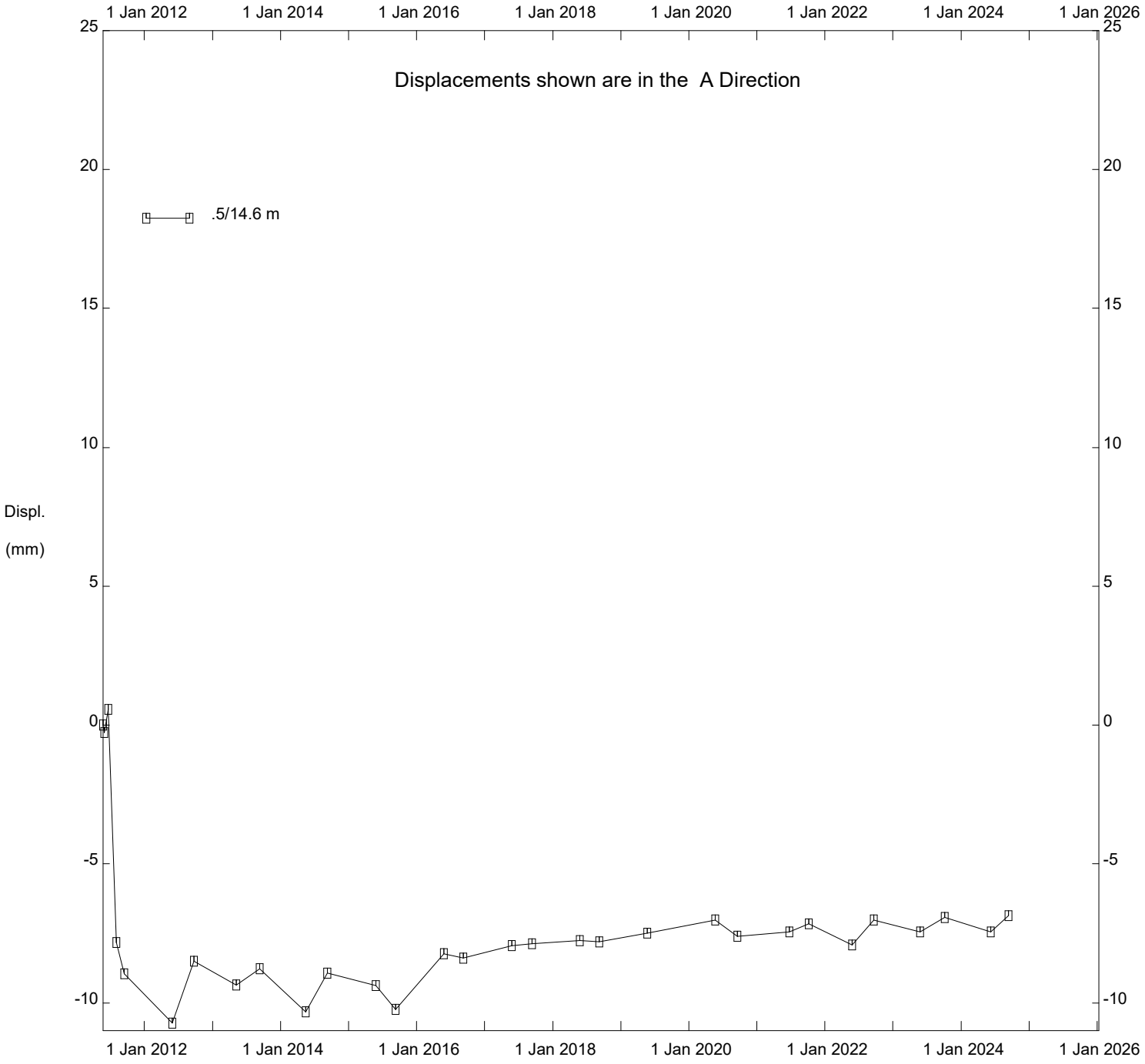
Direction B

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\2024B-Fall\SI Readings\NC103\SI11-3( km 7.8).gtl

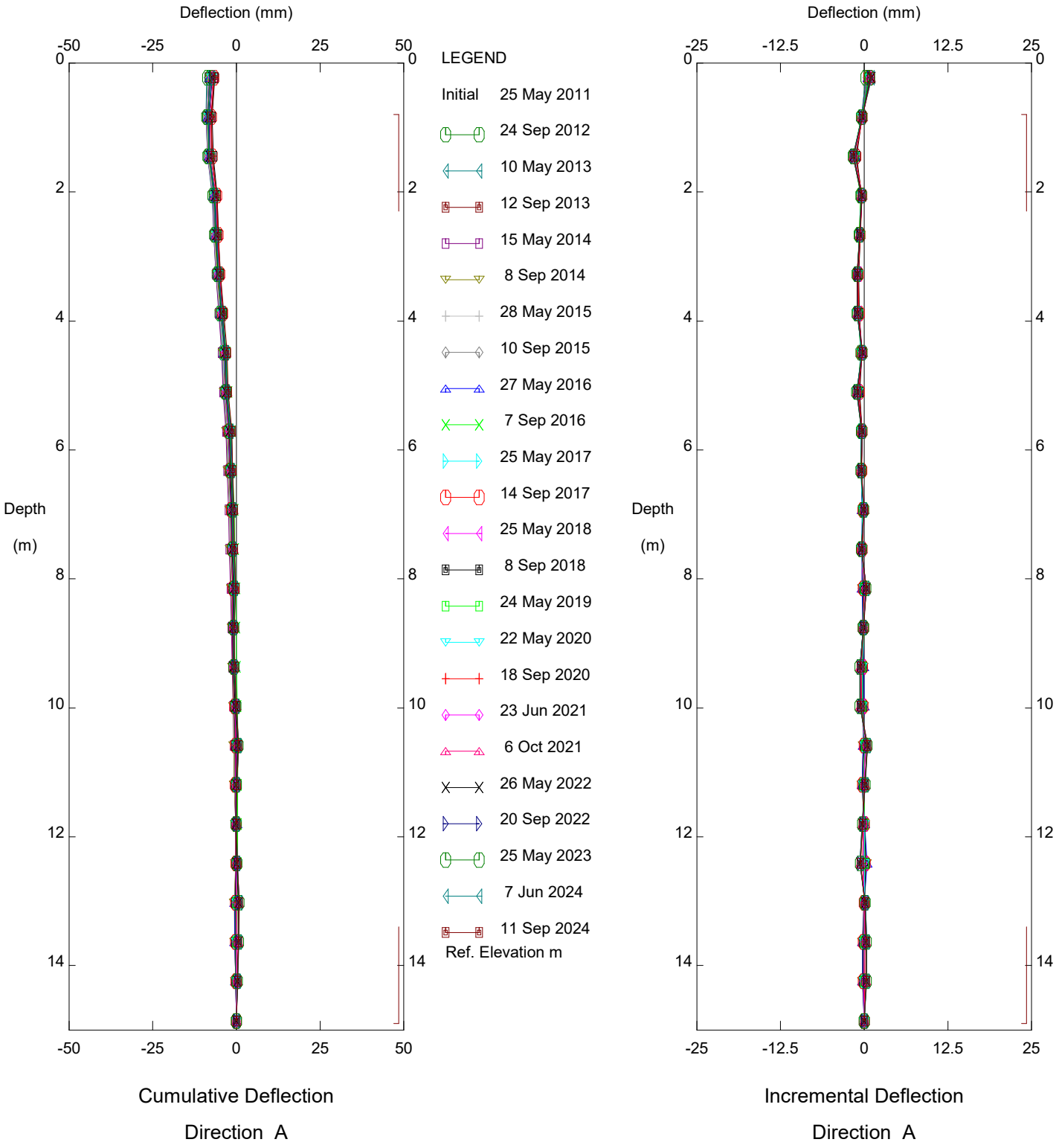
Thurber Engineering Ltd.




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

Alberta Transportation

Thurber Engineering Ltd.




Cumulative Deflection

Direction A

Incremental Deflection

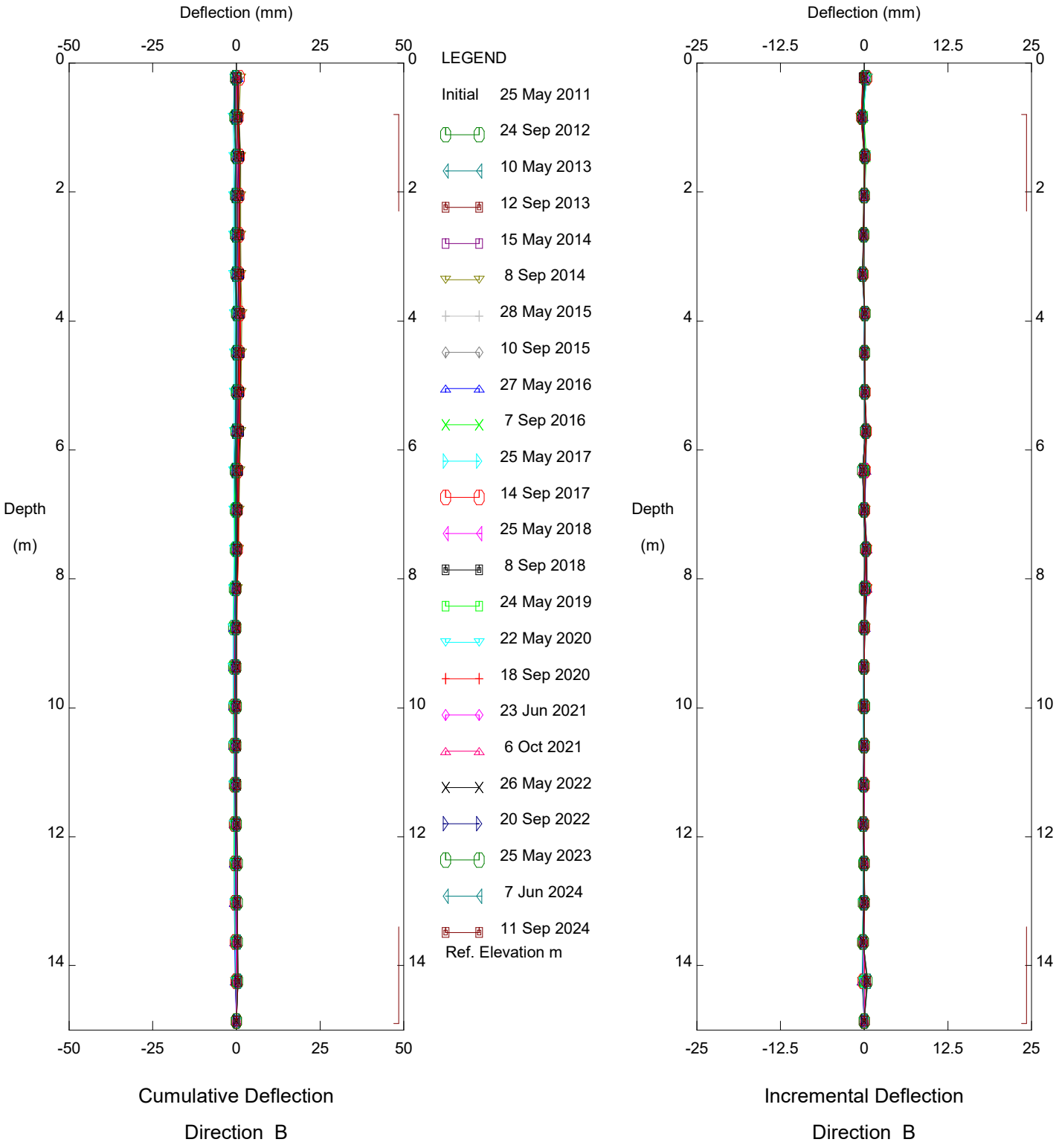
Direction A

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\2024B-Fall\SI Readings\NC103\SI11-4( km 7.8).gtl

Thurber Engineering Ltd.




Cumulative Deflection

Direction B

Incremental Deflection

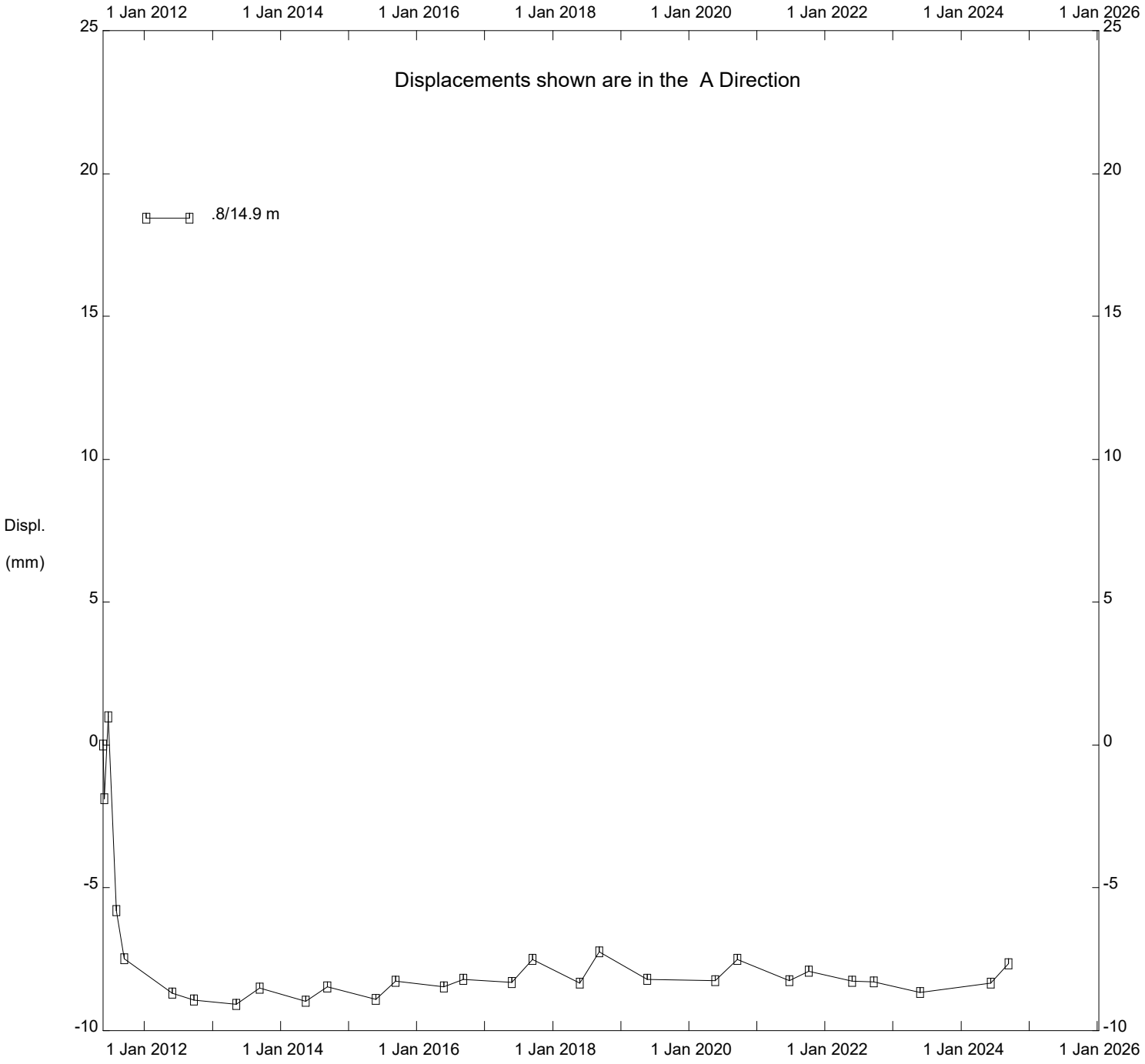
Direction B

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\2024B-Fall\SI Readings\NC103\SI11-4( km 7.8).gtl

Thurber Engineering Ltd.




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)**

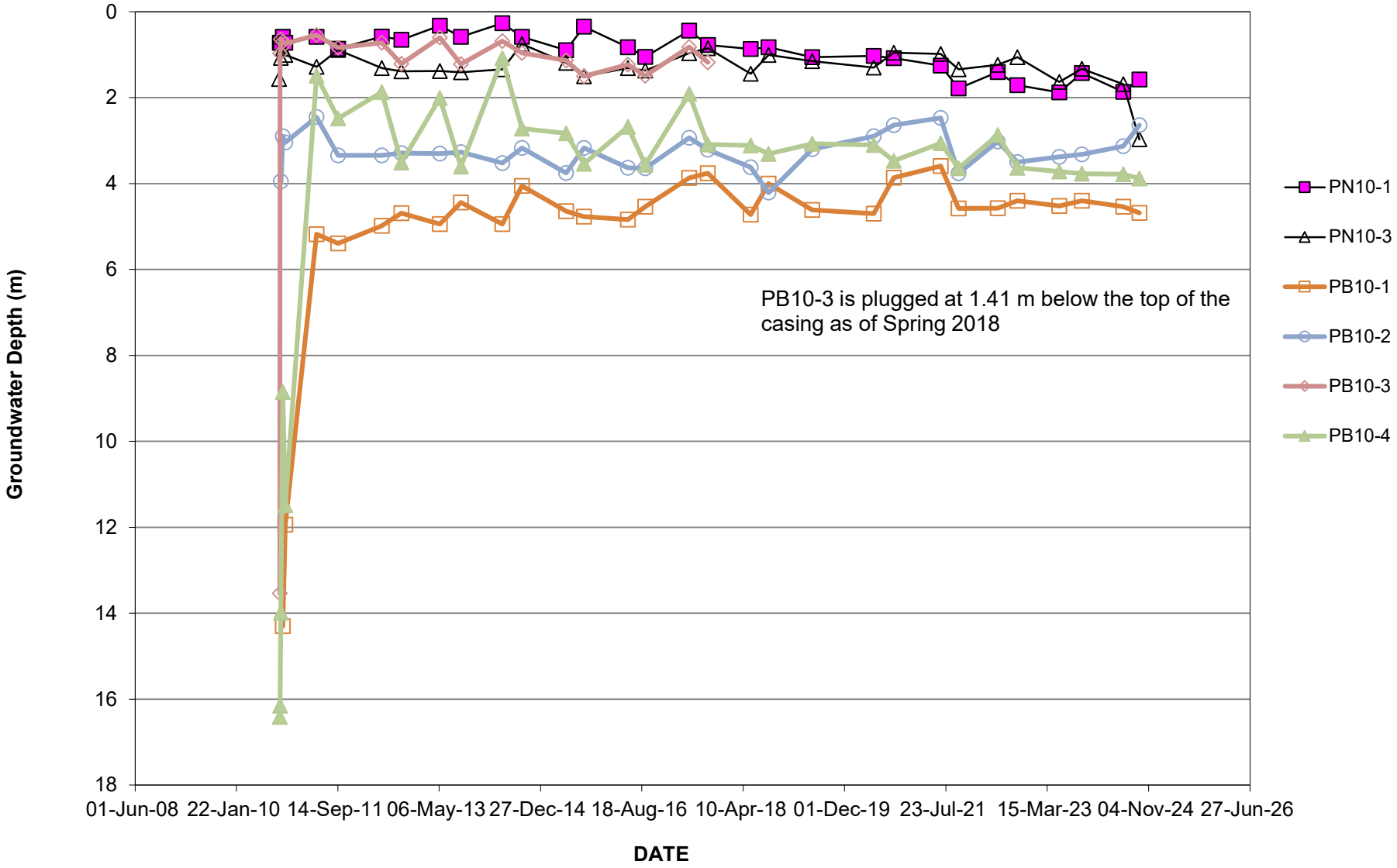


**FIGURE NC103-2**
**VIBRATING WIRE LOAD CELL DATA FOR**
**HWY 41:23, KEHIWIN LAKE (km 7.8)**