

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



| Site Number                             | Location             | Name                    | Hwy    | km      |
|-----------------------------------------|----------------------|-------------------------|--------|---------|
| NC025                                   | HWY 646:04 C1 16.082 | Lindbergh Hill          | 646:04 | Km 16.1 |
| <b>Legal Description:</b> 15-27-56-5 W4 |                      | <b>UTM Co-ordinates</b> |        |         |
|                                         |                      | 12U E 522385            | N      | 5969334 |

|                             |                                                          |                            |             |
|-----------------------------|----------------------------------------------------------|----------------------------|-------------|
| <b>Current Monitoring:</b>  | 5-June-2024                                              | <b>Previous Monitoring</b> | 24-May-2023 |
| <b>Instruments Read By:</b> | Mr. Niraj Regmi, G.I.T and Mr. Nixon Mationg, of Thurber |                            |             |

| Instruments Read During This Site Visit                        |                                           |                                                |                                                         |
|----------------------------------------------------------------|-------------------------------------------|------------------------------------------------|---------------------------------------------------------|
| <b>Slope Inclinometers (SIs):</b><br>SI02-1 and SI07-1 to 07-3 | <b>Pneumatic Piezometers (PN):</b><br>N/A | <b>Vibration Wire Piezometers (VW):</b><br>N/A | <b>Standpipe Piezometers (SP):</b><br>SP02-1 and SP02-4 |
| <b>Load Cell (LC):</b><br>VC1463 through 1468                  | <b>Strain Gauges:</b><br>N/A              | <b>SAA's:</b><br>N/A                           | <b>Others:</b>                                          |

| Readout Equipment Used                                                                                  |                               |                                    |                                                 |
|---------------------------------------------------------------------------------------------------------|-------------------------------|------------------------------------|-------------------------------------------------|
| <b>Slope Inclinometers:</b><br>RST Digital Inclinator probe with 2 ft wheelbases and RST pocket readout | <b>Pneumatic Piezometers:</b> | <b>Vibration Wire Piezometers:</b> | <b>Standpipe Piezometers:</b><br>Heron dipmeter |
| <b>Load Cell:</b><br>RST Digital readout unit                                                           | <b>Strain Gauges:</b>         | <b>SAA's:</b>                      | <b>Others:</b>                                  |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |  |  |  |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|--|
| <b>Notes:</b> <ul style="list-style-type: none"> <li>- A site plan showing instrument locations is included in Appendix A.</li> <li>- SIs plots with A and B directions are presented in Appendix A and summarized in Table NC025-1, attached. Where movement was recorded, the resultant (plot X) and the rate of movement plot are also included.</li> <li>- The Standpipe piezometer plot is included in Appendix A.</li> <li>- The Load cell plot is included in Appendix A</li> <li>- Standpipe Piezometer readings are summarized in Table NC025-2, attached.</li> <li>- Vibrating Wire Load Cell readings are summarized in Table NC025-3, attached.</li> </ul> |  |  |  |
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| Discussion                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Zones of New Movement:</b>                | None                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| <b>Interpretation of Monitoring Results:</b> | <p>SI02-1, installed in the south ditch of the highway, continued to show no discernible movement.</p> <p>The movements in the SIs installed in the piles were as follows:</p> <ul style="list-style-type: none"> <li>• SI07-1 = - 4.1 mm pile head movement over 0.4 m to 12.0 m depth</li> <li>• SI07-2 = 20.4 mm pile head movement over 0.3 m to 16.7 m depth</li> <li>• SI07-3 = 40.8 mm pile head movement over 0.2 m to 13.6 m depth.</li> </ul> <p>SI07-1, located in the western segment of the wall, showed no discernible movement over 0.4 m to 12.0 m depth and over 0.4 m to 20.0 m depth since the spring 2023 readings.</p> |

|                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                 | <p>SI07-2, located in the middle segment of the pile wall, showed no discernible movement over 0.3 m to 11.2 m depth and over 0.3 m to 16.7 m depth since the spring 2023 readings.</p> <p>SI07-3, located in the eastern segment of the wall, showed a rate of movement of 0.1 mm/yr over 0.2 m to 5.6 m depth, and a rate of movement of 0.6 mm/yr over 0.2 m to 13.6 m depth, since the spring of 2023 readings.</p> <p>Standpipe piezometers SP02-1 showed no change in groundwater level since the spring of 2023 readings. SP02-4 showed a decrease in groundwater level of 0.80 m since the spring of 2023 readings.</p> <p>Load cell VC1463 showed a decrease in measured load of 1.47 kN since the spring of 2023 readings, and a decrease of 46.47 kN since the spring of 2022 readings. The large decrease of the load in VC1463 is likely from one of the vibrating wires functioning incorrectly.</p> <p>VC1465, VC1466, VC1467 and VC1468 showed decreases in measured load of 11.82 kN, 0.76 kN, 0.39 kN, and 1.37 kN, respectively, since the spring of 2023 readings. VC1464 showed an increase in measured load of 0.16 kN, since the spring of 2023 readings. VC1463, VC1464 and VC1467 currently have three of the four vibrating wire channels functioning so the measured load is the average of the functioning channels. VC1465 currently has only one wire functioning.</p> <p>.</p> <p>In general, the instrumentation monitoring results indicate that the pile wall has performed well since construction completion.</p> |
| <b>Future Work:</b>             | The instruments should be read again in the spring of 2025.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Instrumentation Repairs:</b> | No instrument repairs are required at this time.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Additional Comments:</b>     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |

|                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Attachments:</b></p> | <ul style="list-style-type: none"> <li>• Table NC025-1 Spring 2024 – HWY 646:02 Lindbergh Hill, Slope Inclinator Instrumentation Reading Summary</li> <li>• Table NC025-2 Spring 2024 – HWY 646:02 Lindbergh Hill, Standpipe Piezometer Instrumentation Reading Summary</li> <li>• Table NC025-3 Spring 2024 – HWY 646:02 Lindbergh Hill, Load Cell Instrumentation Reading Summary</li> <li>• Statement of Limitations and Conditions</li> <li>• APPENDIX A – NC025-1 SPRING 2024 <ul style="list-style-type: none"> <li>○ Field Inspector's report</li> <li>○ Site Plan Showing Approximate Instrument Locations (Drawing No. 32122-NC025)</li> <li>○ SI Reading Plots</li> <li>○ Figure NC025-1 (Piezometric Depths)</li> <li>○ Figure NC025-2 (Load Cell Readings)</li> </ul> </li> </ul> |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

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

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

Lucas Green, P.Eng.  
Geotechnical Engineer

**Table NC025-1: Spring 2024– Hwy 646:02 Lindbergh Hill Slope Inclinator Instrumentation Reading Summary**

Date Monitored: June 5, 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) |
|--------------|------------------|------------------------------------------------------------------------|---------------------------------------------|----------------------|--------------------------|--------------------------------------------------|----------------------------------|-----------------------------------------------------------|
| SI02-1       | Sept. 9, 2002    | No discernible movement                                                | N/A                                         | Operational          | May 24, 2023             | N/A                                              | N/A                              | N/A                                                       |
| SI02-2       | Sept. 9, 2002    | N/A                                                                    | 47.6 mm/yr between Sept. 2002 and Oct. 2002 | Sheared off          | Oct. 12, 2006            | N/A                                              | N/A                              | N/A                                                       |
| SI02-3       | Sept. 9, 2002    | N/A                                                                    | 52.8 mm/yr between Sept. 2002 and Oct. 2002 | Sheared off          | Oct. 2006                | N/A                                              | N/A                              | N/A                                                       |
| SI02-4       | Sept. 9, 2002    | N/A                                                                    | 65.1 mm/yr between Sept. 2002 and Oct. 2002 | Sheared off          | Oct. 12, 2006            | N/A                                              | N/A                              | N/A                                                       |
| SI06-1       | Apr. 4, 2006     | N/A                                                                    | 207.9 mm/yr between Apr. 2006 and May 2006  | Sheared off          | Oct. 12, 2006            | N/A                                              | N/A                              | N/A                                                       |
| SI06-2       | Apr. 6, 2006     | N/A                                                                    | 430.4 mm/yr between Apr. 2006 and May 2006  | Sheared off          | Oct. 12, 2006            | N/A                                              | N/A                              | N/A                                                       |

Drawing 32122-NC025 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

**Table NC025-1 – Continued: Spring 2024 – Hwy 646:02 Lindbergh Hill Slope Inclinator Instrumentation Reading Summary**

Date Monitored: June 5, 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) |
|-------------------|------------------|------------------------------------------------------------------------|-----------------------------------------------|----------------------|--------------------------|--------------------------------------------------|----------------------------------|-----------------------------------------------------------|
| SI06-3            | Aug. 22, 2006    | N/A                                                                    | 445.6 mm/yr between Aug. 22 and 30, 2006      | Sheared Off          | Oct. 12, 2006            | N/A                                              | N/A                              | N/A                                                       |
| SI06-4            | Aug. 22, 2006    | N/A                                                                    | 194.4 mm/yr between Aug. 22 and Aug. 30, 2006 | Sheared Off          | Oct. 12, 2006            | N/A                                              | N/A                              | N/A                                                       |
| SI07-1 (Pile #14) | May 22, 2007     | -4.1 over 0.4 m to 12.0 m depth in 20° direction                       | 84.8 mm/yr between May 2007 and June 2007     | Operational          | May 24, 2023             | No discernible movement                          | N/A                              | -0.6                                                      |
|                   |                  | -2.8 over 0.4 m to 20.0 m depth in 20° direction                       | 92.2 mm/yr between May 2007 and June 2007     |                      |                          | No discernible movement                          | N/A                              | -1.2                                                      |
| SI07-2 (Pile #28) | May 22, 2007     | 20.4 over 0.3 m to 11.2 m depth in 20° direction                       | 262.7 mm/yr between May 2007 and June 2007    | Operational          | May 24, 2023             | No discernible movement                          | N/A                              | -0.8                                                      |
|                   |                  | 21.0 over 0.3 m to 16.7 m depth in 20° direction                       | 258.0 mm/yr between May 2007 and June 2007    |                      |                          | No discernible movement                          | N/A                              | -0.8                                                      |

Drawing 32122-NC025 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

**Table NC025-1 – Continued: Spring 2024 – Hwy 646:02 Lindbergh Hillslope Inclinator Instrumentation Reading Summary**

Date Monitored: June 5, 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) |
|----------------------|------------------|------------------------------------------------------------------------|---------------------------------------------|----------------------|--------------------------|--------------------------------------------------|----------------------------------|-----------------------------------------------------------|
| SI07-3<br>(Pile #38) | May 22,<br>2007  | 40.8 over 0.2 m to 5.6 m depth in 10° direction                        | 158.5 mm/yr between Jun. 2007 and July 2007 | Operational          | May 24,<br>2023          | 0.1                                              | 0.1                              | 4.1                                                       |
|                      |                  | 44.0 over 0.2 m to 13.6 m depth in 10° direction                       | 149.8 mm/yr between June 2007 and July 2007 |                      |                          | 0.6                                              | 0.6                              | 3.7                                                       |

Drawing 32122-NC025 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

**Table NC025-2: Spring 2024 – Hwy 646:02 Lindbergh Hill Standpipe Piezometer Instrumentation Reading Summary**

Date Monitored: June 5, 2024

| INSTRUMENT # | DATE INITIALIZED | TIP ELEV. (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) |
|--------------|------------------|---------------|------------------|----------------|--------------------------------------------|-----------------------------------|------------------------------------|--------------------------------------------------|
| SP02-1       | N/A              | 998.320       | 1004.50          | Operational    | 999.2 on May 7, 2007 (5.32 mBGS)           | 998.33 (6.17 mBGS)                | 998.33 (6.17 mBGS)                 | 0                                                |
| SP02-3A      | N/A              | 993.99        | 1002.71          | Destroyed      | 998.11 on Oct. 29, 2003 (4.6 mBGS)         | N/A                               | N/A                                | N/A                                              |
| SP02-3       | N/A              | 990.44        | 1002.71          | Destroyed      | 991.41 on Oct. 3, 2002 (11.3 mBGS)         | N/A                               | N/A                                | N/A                                              |
| SP02-4       | N/A              | 989.01        | 997.45           | Operational    | 996.44 on May 24, 2017 (1.01 mBGS)         | 994.39 (3.06 mBGS)                | 995.19 (2.26 mBGS)                 | -0.80                                            |
| SP06-1       | N/A              | 986.09        | 1002.20          | Destroyed      | 989.89 on May 30, 2006 (12.3 mBGS)         | N/A                               | N/A                                | N/A                                              |

Drawing 32122-NC025 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site

**Table NC025-3: Spring 2024 – Hwy 646:04 Lindbergh Hill Load Cell Instrumentation Reading Summary**

Date Monitored: June 5, 2024

| SERIAL # | ANCHOR NUMBER | DESIGN LOAD (kN) | DATE INSTALLED | MEASURED FORCE (kN) | PREVIOUS READING (kN) | CHANGE IN FORCE SINCE PREVIOUS READING (kN) |
|----------|---------------|------------------|----------------|---------------------|-----------------------|---------------------------------------------|
| VC 1463  | G37           | 240              | Jul. 6, 2007   | 163.27*             | 164.74*               | -1.47                                       |
| VC 1464  | G28U          | 240              | Jul. 6, 2007   | 219.46*             | 219.30*               | 0.16                                        |
| VC 1465  | G28L          | 240              | Jul. 6, 2007   | 148.81**            | 160.63                | -11.82                                      |
| VC 1466  | G19L          | 330              | Jul. 17, 2007  | 314.44              | 315.20                | -0.76                                       |
| VC 1467  | G9U           | 330              | Jul. 6, 2007   | 275.59*             | 275.98*               | -0.39                                       |
| VC 1468  | G19U          | 330              | Jul. 6, 2007   | 232.55              | 233.92                | -1.37                                       |

Figure 32122-NC025 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

\* The estimated loads for VC1463, VC1464, and VC1467 are based on the average readings from 3 wires instead of 4.

\*\* The estimated load for VC1465 is only based on one operating vibrating wire.

## 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.

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### 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.

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

**SPRING 2024**

**APPENDIX A  
DATA PRESENTATION AND SITE PLANS**

**SITE NC025: HWY 646:04 LINDBERGH HILL**

**ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS  
NORTH CENTRAL REGION - ATHABASCA AND FORT McMURRAY DISTRICTS  
INSTRUMENTATION MONITORING FIELD SUMMARY (NC025)  
SPRING 2024**

|                                                       |                                                  |
|-------------------------------------------------------|--------------------------------------------------|
| <b>Location:</b> Lindberg Hill (HWY 646:04 C1 16.082) | <b>Readout:</b> DGSi Dipmeter/RST VW 2106 Unit 3 |
| <b>File Number:</b> 32122                             | <b>Casing Diameter:</b> 2.75"                    |
| <b>Probe:</b> RST SI SET 8R                           | <b>Temp:</b> 13 /overcaste/drizzle               |
| <b>Cable:</b> RST SI SET 8R                           | <b>Read by:</b> NKR/NRM                          |

**SLOPE INCLINOMETER (SI) READINGS**

| SI#     | GPS Location<br>(UTM 12) |              | Date      | Stickup<br>m | Depth from top<br>of casing (ft) | Azimuth of<br>A+ Groove | Current Bottom<br>Depth Readings |      |      |      | Probe/<br>Reel<br># | Size (") | Remarks |
|---------|--------------------------|--------------|-----------|--------------|----------------------------------|-------------------------|----------------------------------|------|------|------|---------------------|----------|---------|
|         | Easting (m)              | Northing (m) |           |              |                                  |                         | A+                               | A-   | B+   | B-   |                     |          |         |
| SI02-1  | 522385.00                | 5969334.00   | 05-Jun-24 | 0.82         | 49 to 3                          | 16                      | -616                             | 587  | 727  | -728 | 8R                  | 2.75     |         |
| SI07-1* | 522428.20                | 5969328.17   | 05-Jun-24 | 0.47         | 67 to 5                          | 5                       | 190                              | -173 | -303 | 297  | 8R                  | 2.75     | ***     |
| SI07-2* | 522428.20                | 5969328.17   | 05-Jun-24 | 0.66         | 61 to 5                          | 5                       | -41                              | 59   | 339  | -339 | 8R                  | 2.75     |         |
| SI07-3* | 522428.20                | 5969328.17   | 05-Jun-24 | 0.76         | 49 to 3                          | 355                     | 497                              | -485 | 115  | -117 | 8R                  | 2.75     |         |

**STANDPIPE PIEZOMETER (SP) READINGS**

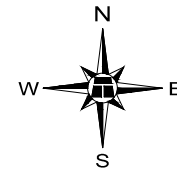
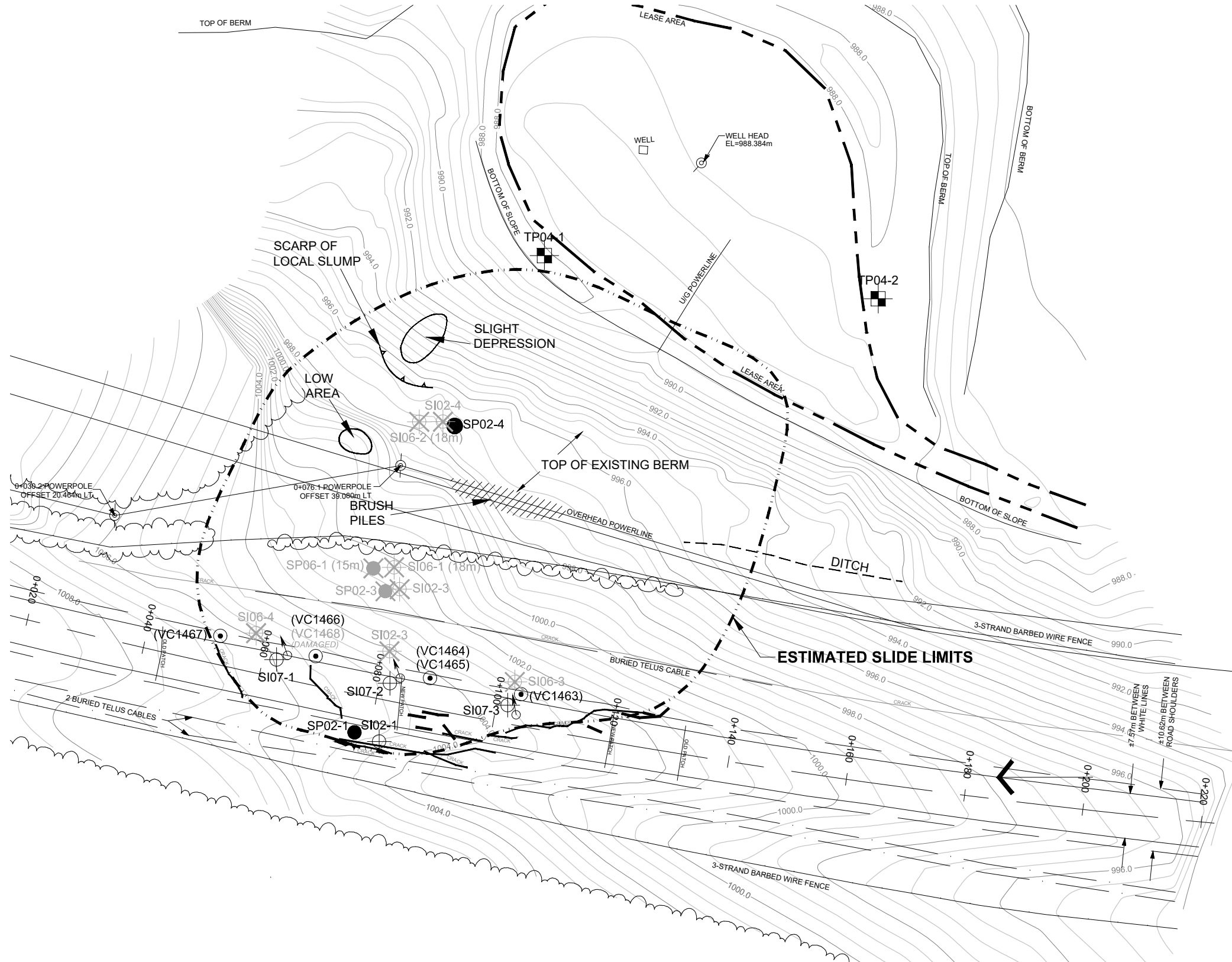
| SP#    | GPS Location (UTM 12) |              | Date      | Stick-up<br>(m) | Reading below<br>top of casing (m) | Bottom Pipe Depth<br>(below top of casing (m)) |
|--------|-----------------------|--------------|-----------|-----------------|------------------------------------|------------------------------------------------|
|        | Easting (m)           | Northing (m) |           |                 |                                    |                                                |
| SP02-1 | 522398.88             | 5969352.84   | 05-Jun-24 | 0.86            | 7.03                               | 7.06                                           |
| SP02-4 | 522393.12             | 5969402.21   | 05-Jun-24 | 0.77            | 3.83                               | 9.14                                           |

**LOAD CELL (VC) READINGS**

| Anchor# | VC#    | GPS Location |           | Date      | Reading B(units)            | Temp degree C        |
|---------|--------|--------------|-----------|-----------|-----------------------------|----------------------|
|         |        | Latitude     | Longitude |           |                             |                      |
| G9U     | VC1467 | -            | -         | 05-Jun-24 | 6335.3/6740.0/6856.0        | 10.1                 |
| G19U    | VC1468 | -            | -         | 05-Jun-24 | 6513.7/6609.7/6257.3/6670.4 | 9.7                  |
| G19L    | VC1466 | -            | -         | 05-Jun-24 | 6451.3/6068.2/6357.8/6671.7 | 7.7                  |
| G28U    | VC1464 | -            | -         | 05-Jun-24 | 6415.2/6736.0/6480.4        | 10.8                 |
| G28L    | VC1465 | -            | -         | 05-Jun-24 | 6803.9                      | <b>**Not Working</b> |
| G37     | VC1463 | -            | -         | 05-Jun-24 | 6714.0/6710.2/6704.9        | 9.7                  |

**INSPECTOR REPORT**

|                                                                  |
|------------------------------------------------------------------|
| *SI07-1,2,3 were installed in the wall.                          |
| Use RST with 1 ft extension.                                     |
| ***SI07-1 hard to pull at 6 ft                                   |
| Note: 4 SENSOR ON VW MONITOR SETTING                             |
| ** Temp. sensor not working, only one Vibrating wire functioning |
|                                                                  |



### LEGEND

- |                                                                                     |                                             |
|-------------------------------------------------------------------------------------|---------------------------------------------|
|  | TEST PIT                                    |
|  | SLOPE INCLINOMETER (OPERATIONAL)            |
|  | STANDPIPE PIEZOMETER                        |
|  | DAMAGED                                     |
|  | SLOPE INCLINOMETER (SHEARED OFF)            |
|  | LOAD CELL                                   |
|  | DIRECTION OF MOVEMENT IN SLOPE INCLINOMETER |



BASE PLAN SURVEYED BY EXH ENGINEERING SCIENCES LTD.



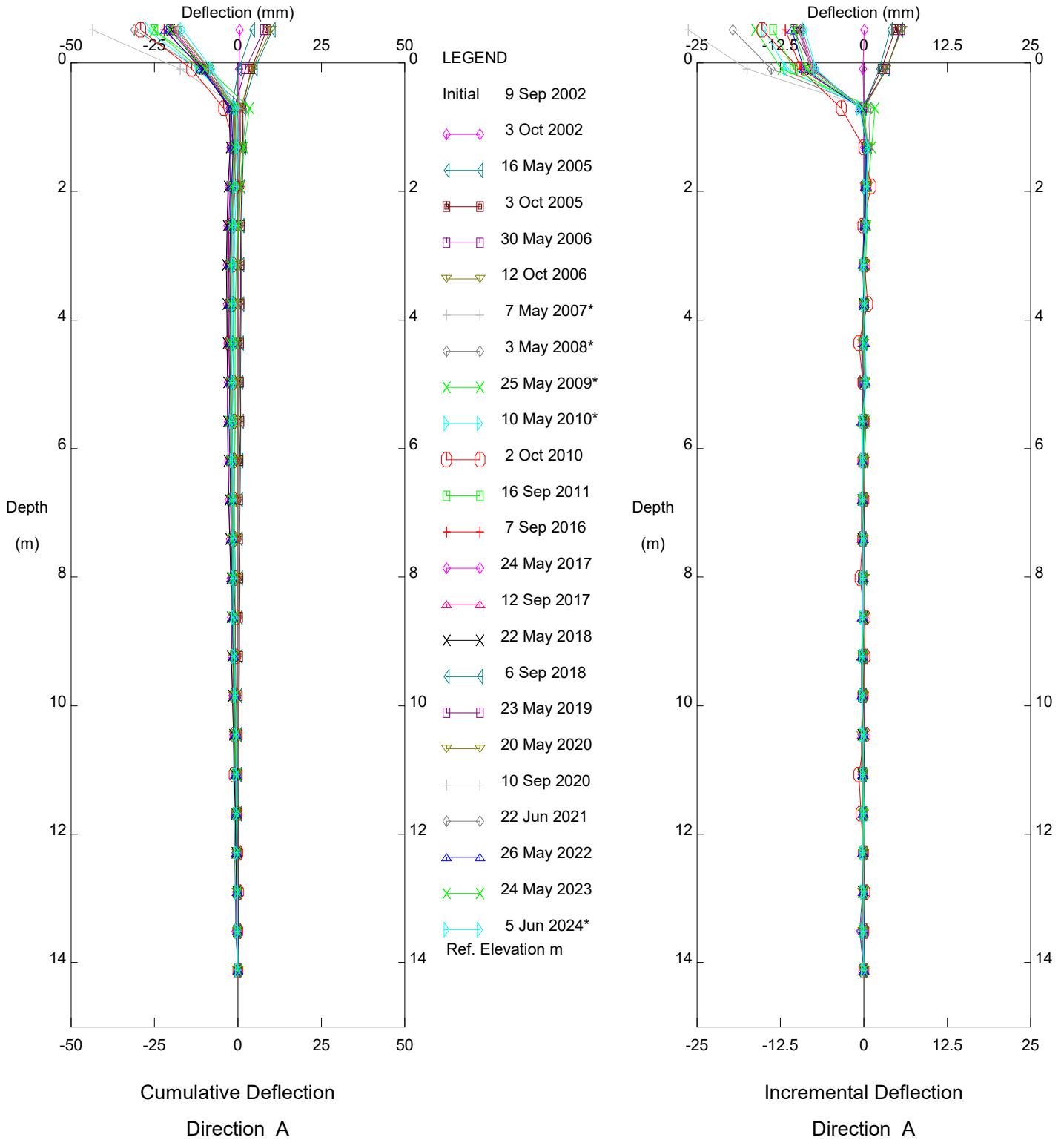
**NORTH CENTRAL  
(ATHABASCA AND FORT MCMURRAY DISTRICTS)  
NC025: HWY 646:04 (km 16)  
WEST LINDBERGH HILL SLIDE  
SITE PLAN SHOWING APPROXIMATE  
INSTRUMENT LOCATIONS  
DWG No. 32122-NC025**

|             |           |
|-------------|-----------|
| DRAWN BY    | ML        |
| DESIGNED BY | BWN       |
| APPROVED BY | TSA       |
| SCALE       | 1:750     |
| DATE        | JULY 2021 |
| FILE No.    | 3212      |



**THURBER** ENGINEERING LTD.

Thurber Engineering Ltd.

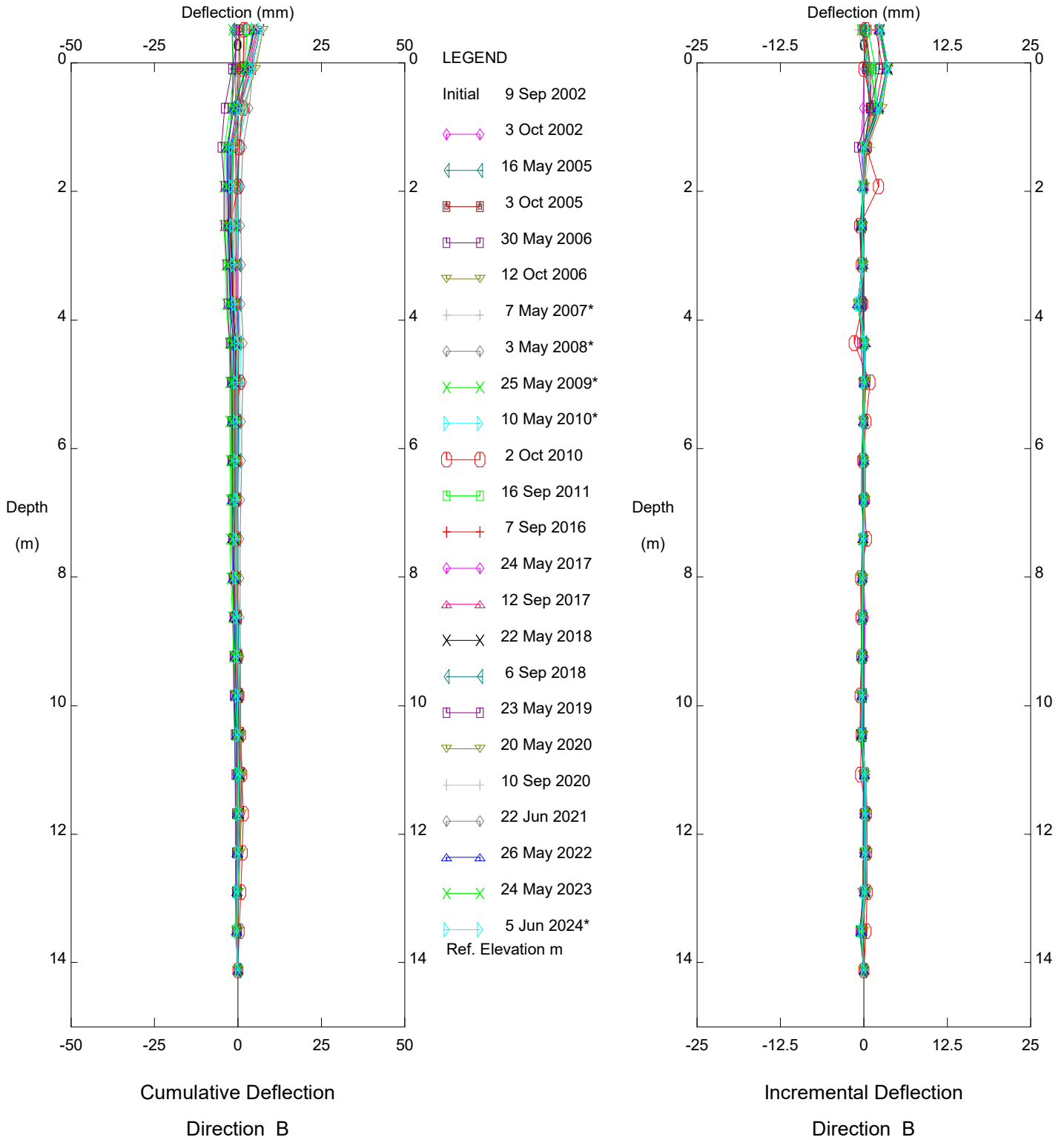


HWY 646:04 Lindbergh Hill, Inclinator SI02-1

Alberta Transportation

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

Thurber Engineering Ltd.

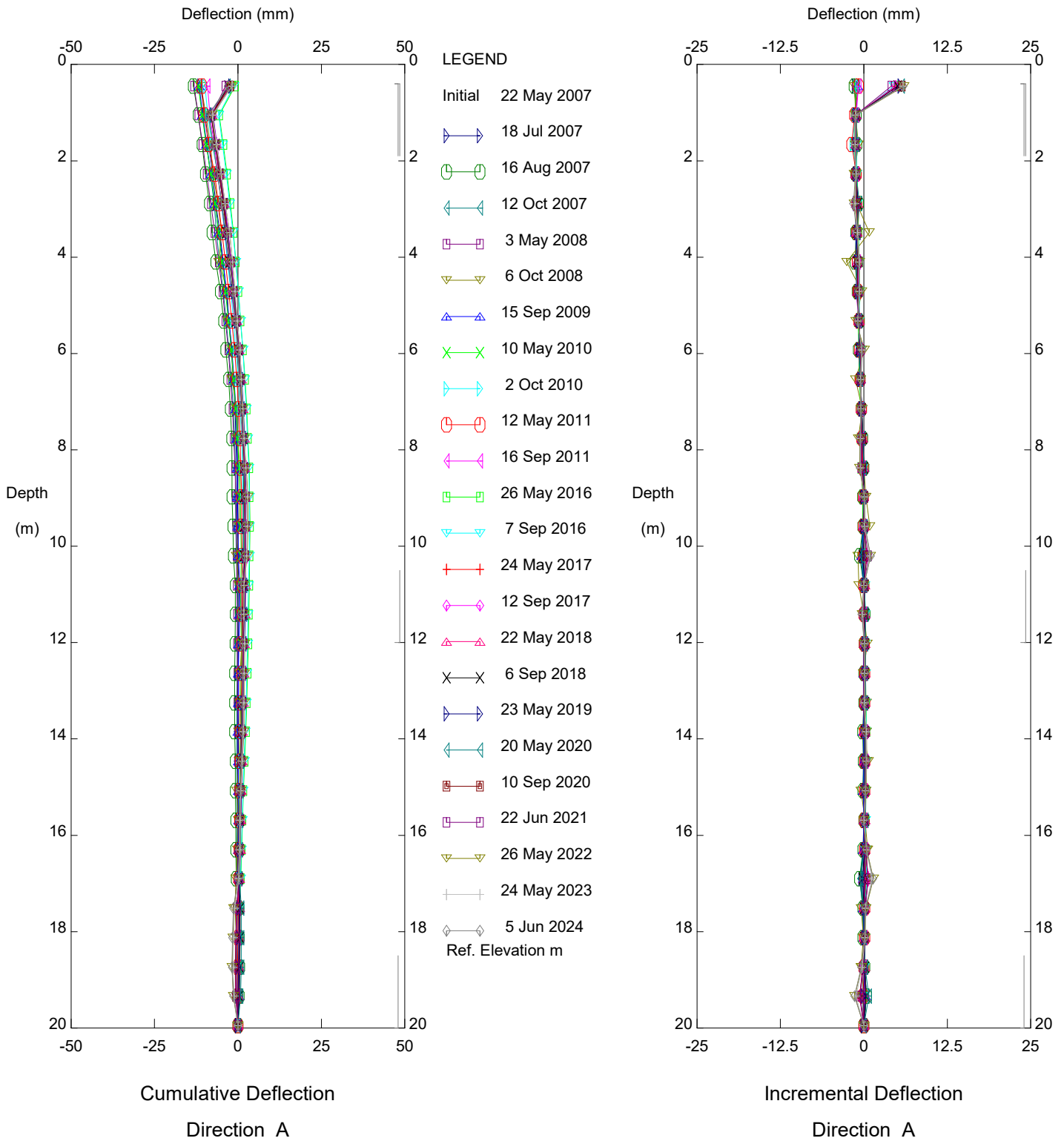


HWY 646:04 Lindbergh Hill, Inclinator SI02-1

Alberta Transportation

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

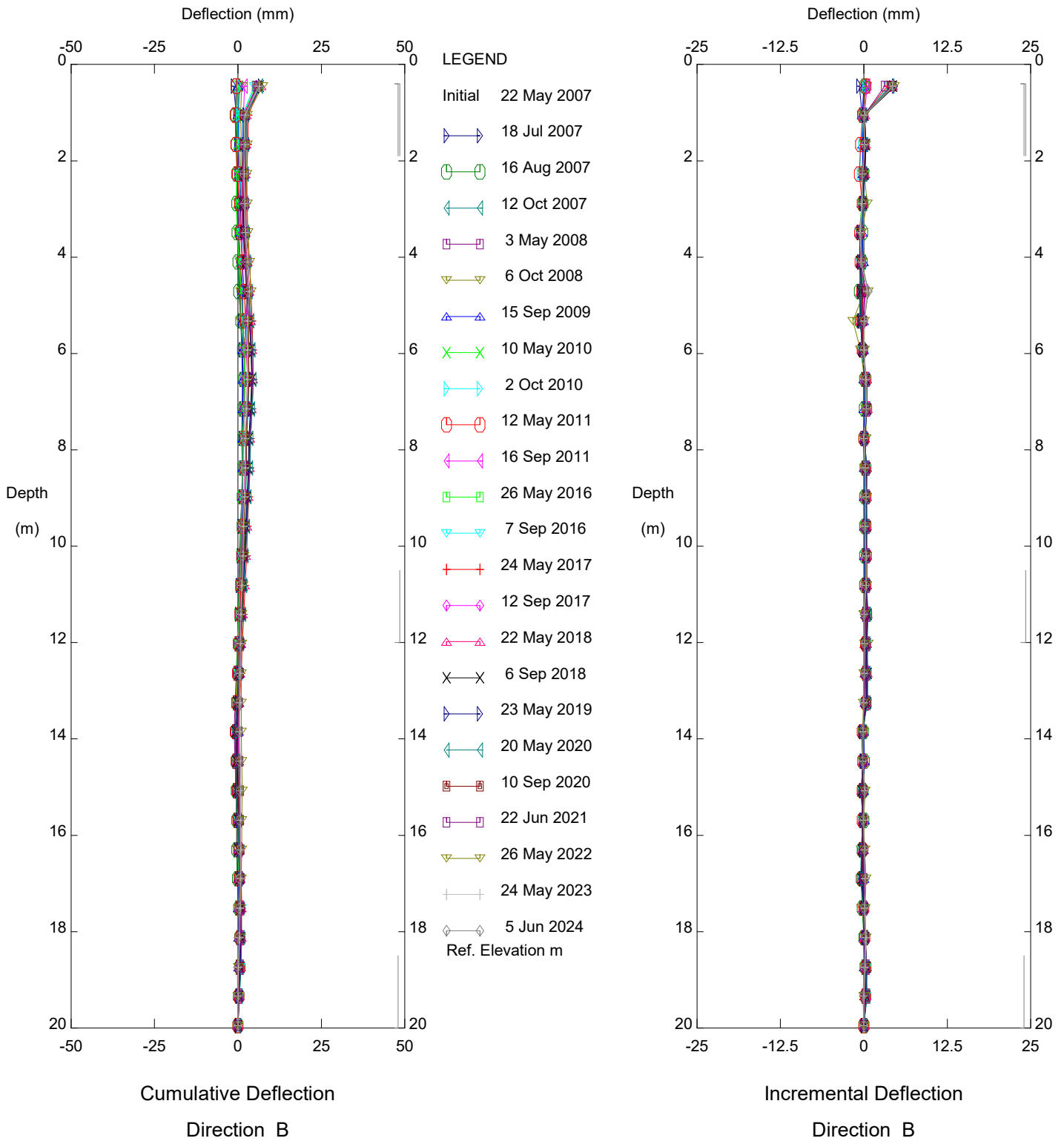
# Thurber Engineering Ltd.



HWY646:04 Lindbergh Hill, Inclinometer SI07-1

Alberta Transportation

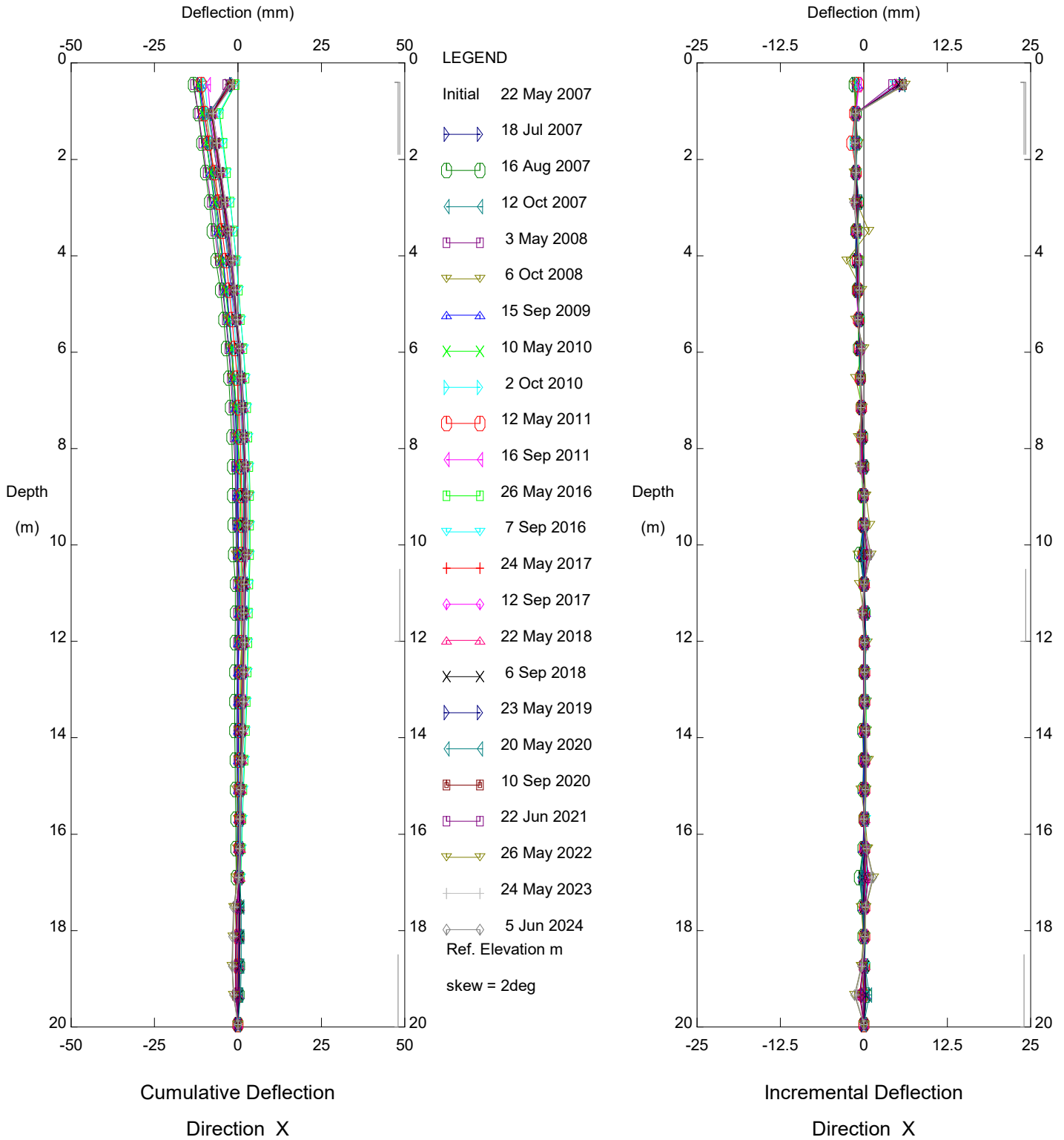
Thurber Engineering Ltd.



HWY646:04 Lindbergh Hill, Inclinometer SI07-1

Alberta Transportation

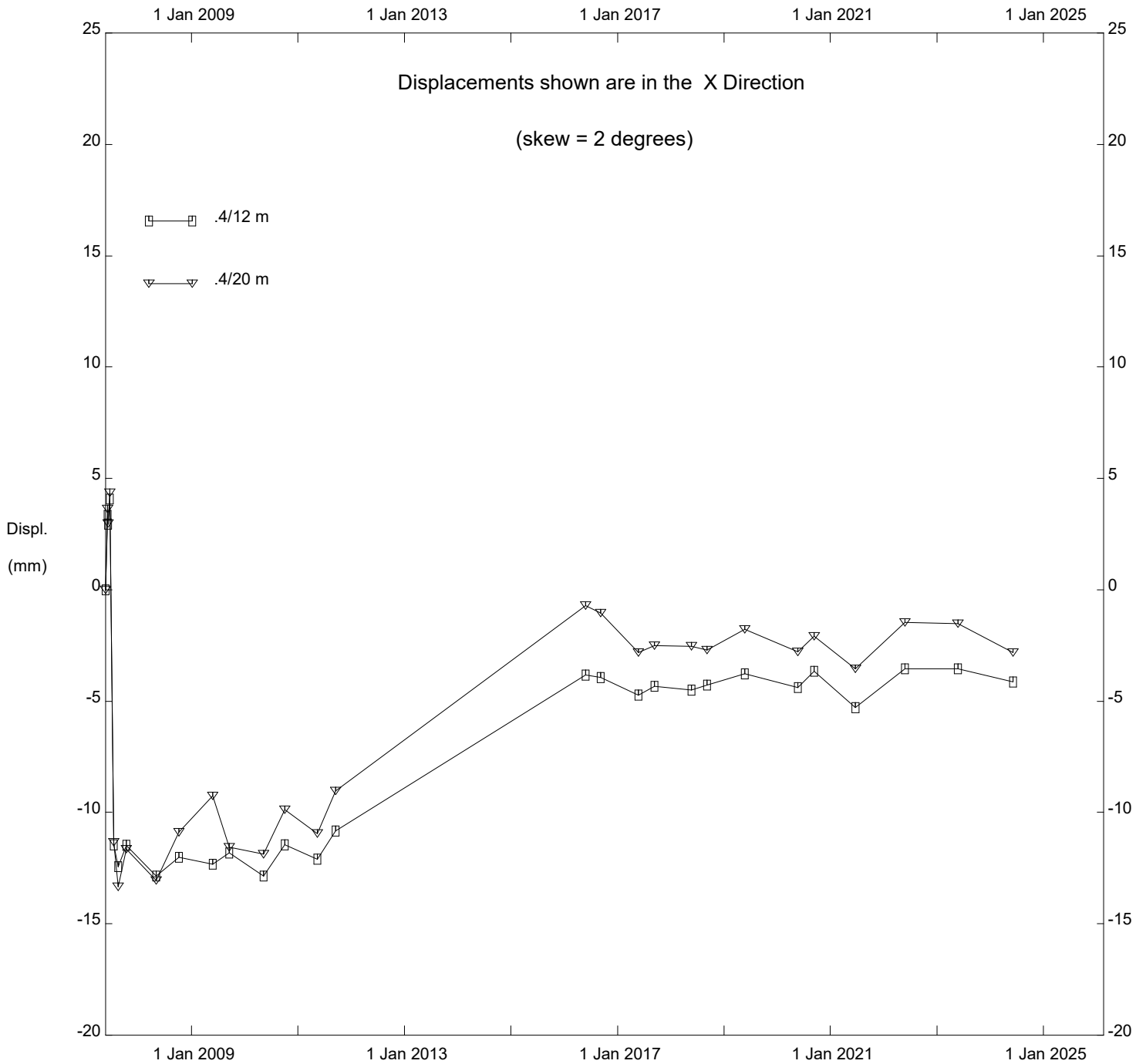
# Thurber Engineering Ltd.



HWY646:04 Lindbergh Hill, Inclinometer SI07-1

Alberta Transportation

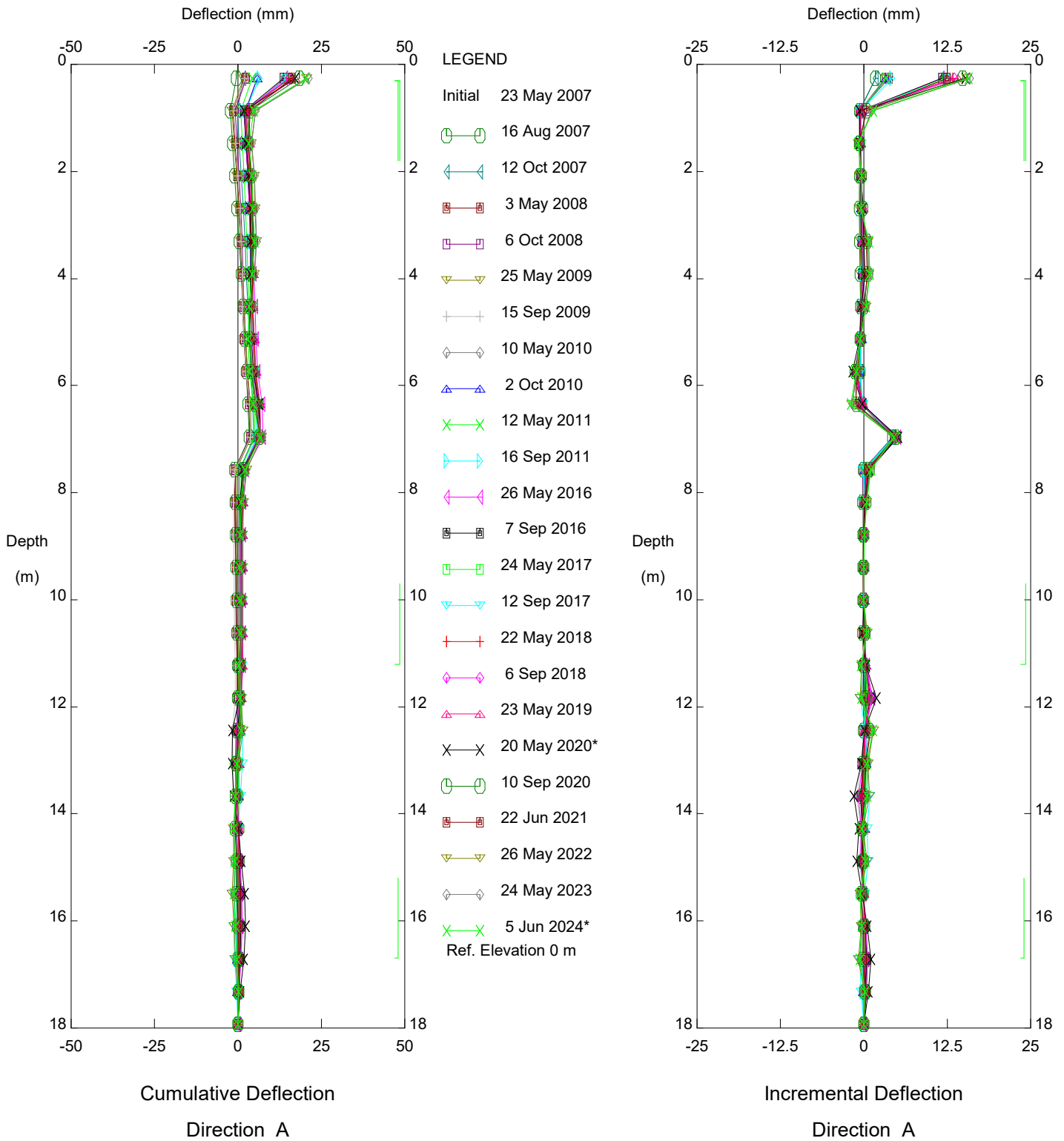
Thurber Engineering Ltd.



HWY646:04 Lindbergh Hill, Inclinator SI07-1

Alberta Transportation

# Thurber Engineering Ltd.

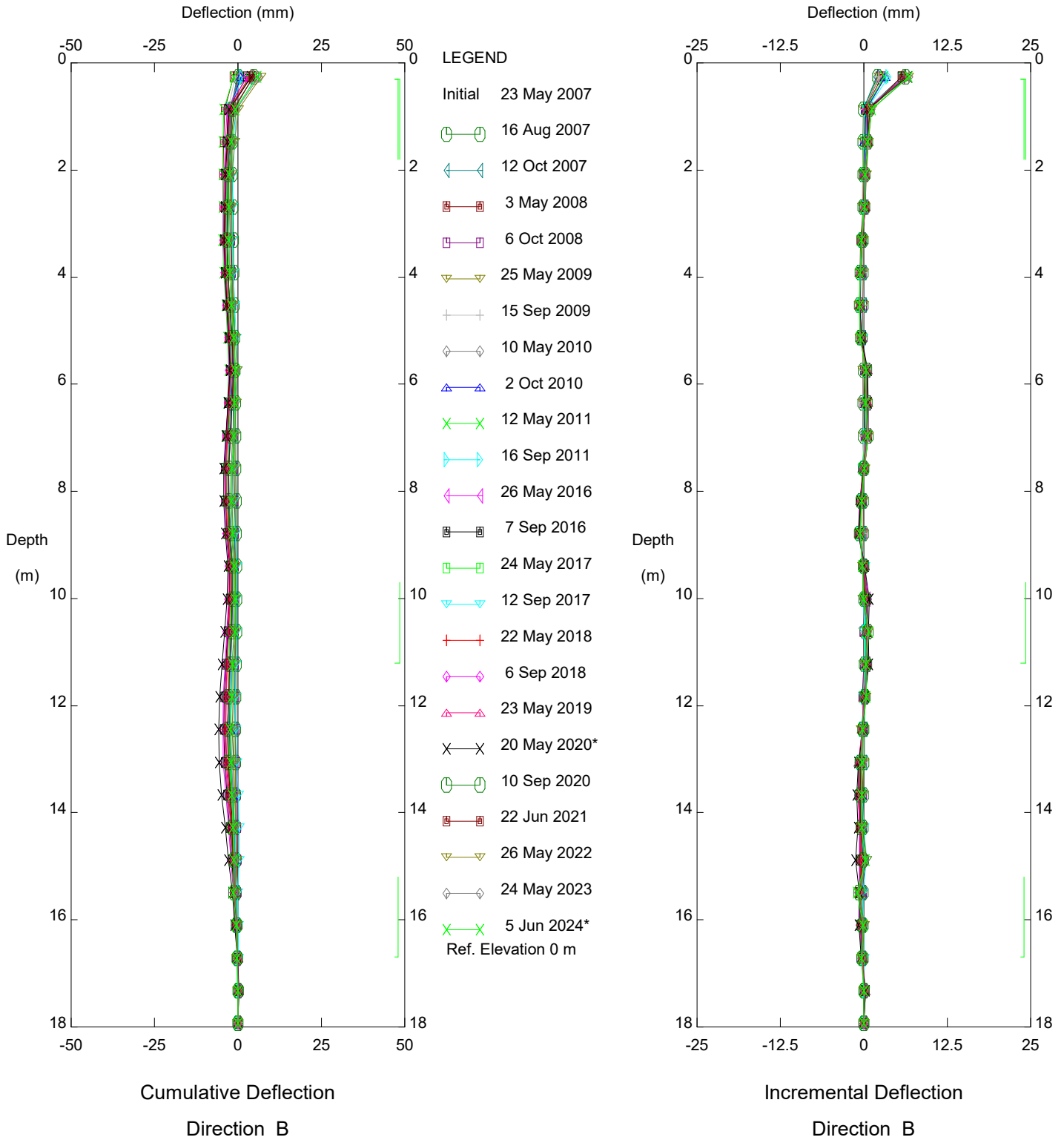


HWY646:04 Lindbergh Hill, Inclinometer SI07-2

Alberta Transportation

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

# Thurber Engineering Ltd.

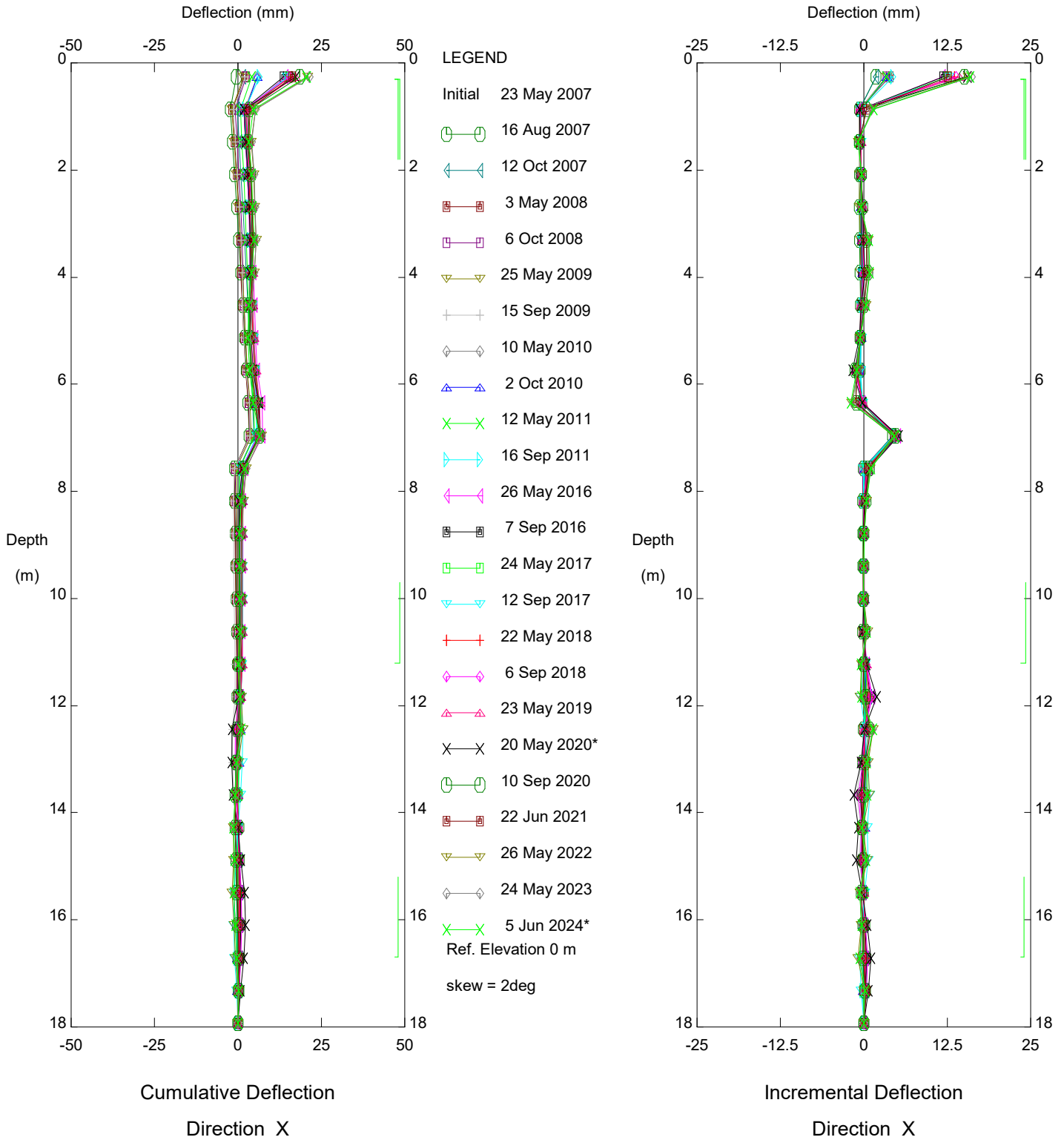


HWY646:04 Lindbergh Hill, Inclinometer SI07-2

Alberta Transportation

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

# Thurber Engineering Ltd.

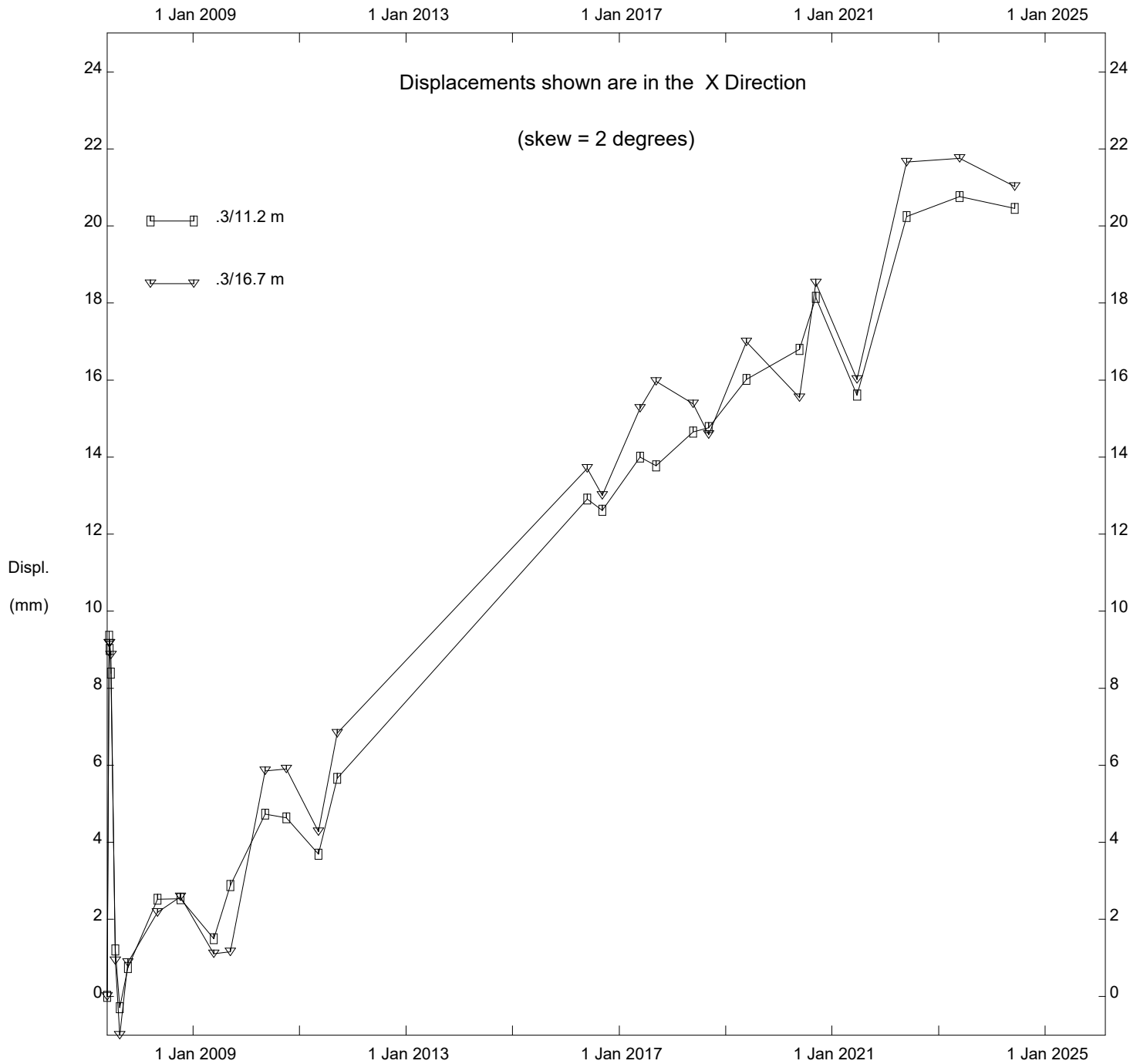


HWY646:04 Lindbergh Hill, Inclinometer SI07-2

Alberta Transportation

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

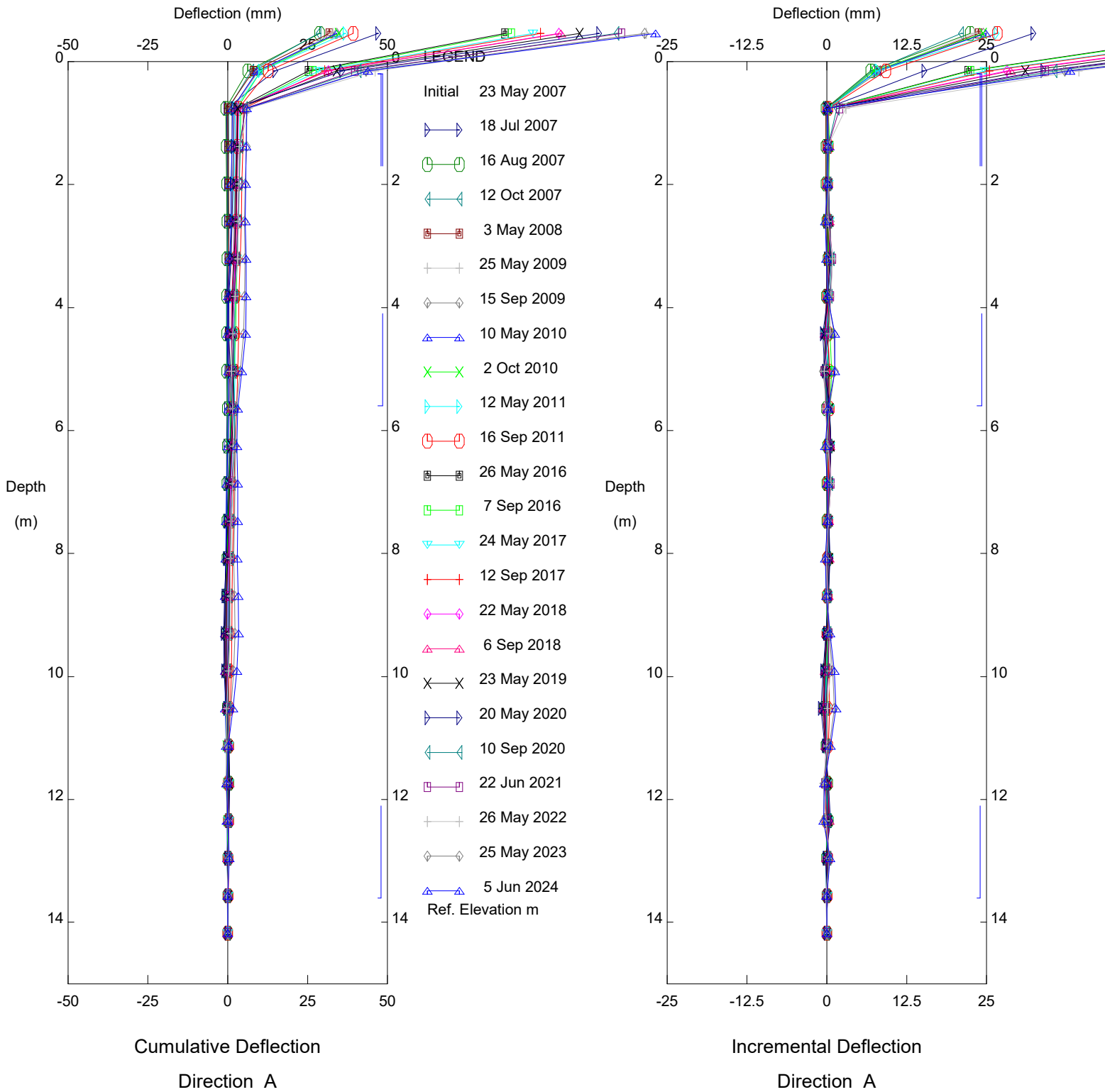
Thurber Engineering Ltd.



HWY646:04 Lindbergh Hill, Inclinator SI07-2

Alberta Transportation

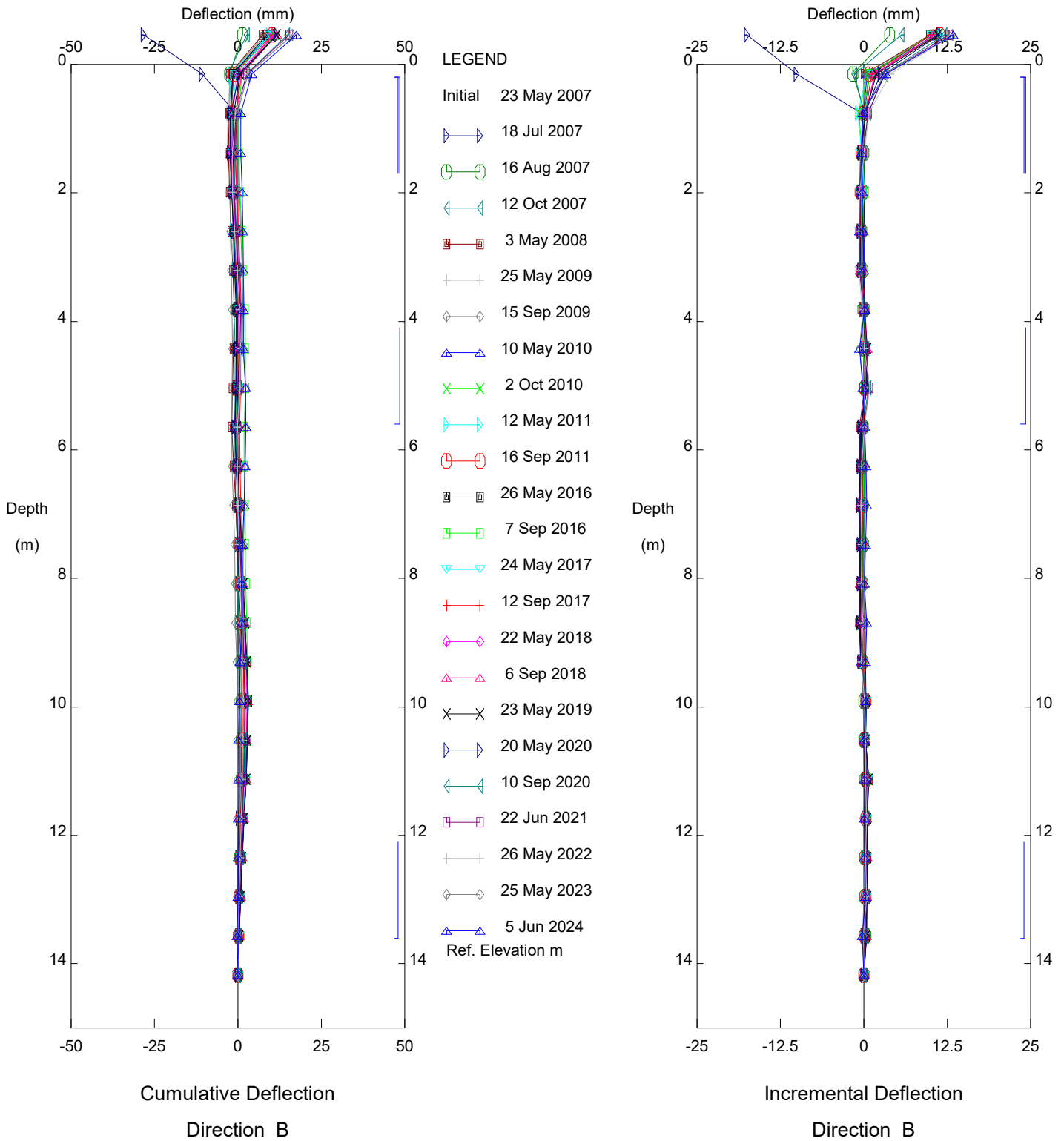
# Thurber Engineering Ltd.



HWY646:04 Lindbergh Hill, Inclinometer SI07-3

Alberta Transportation

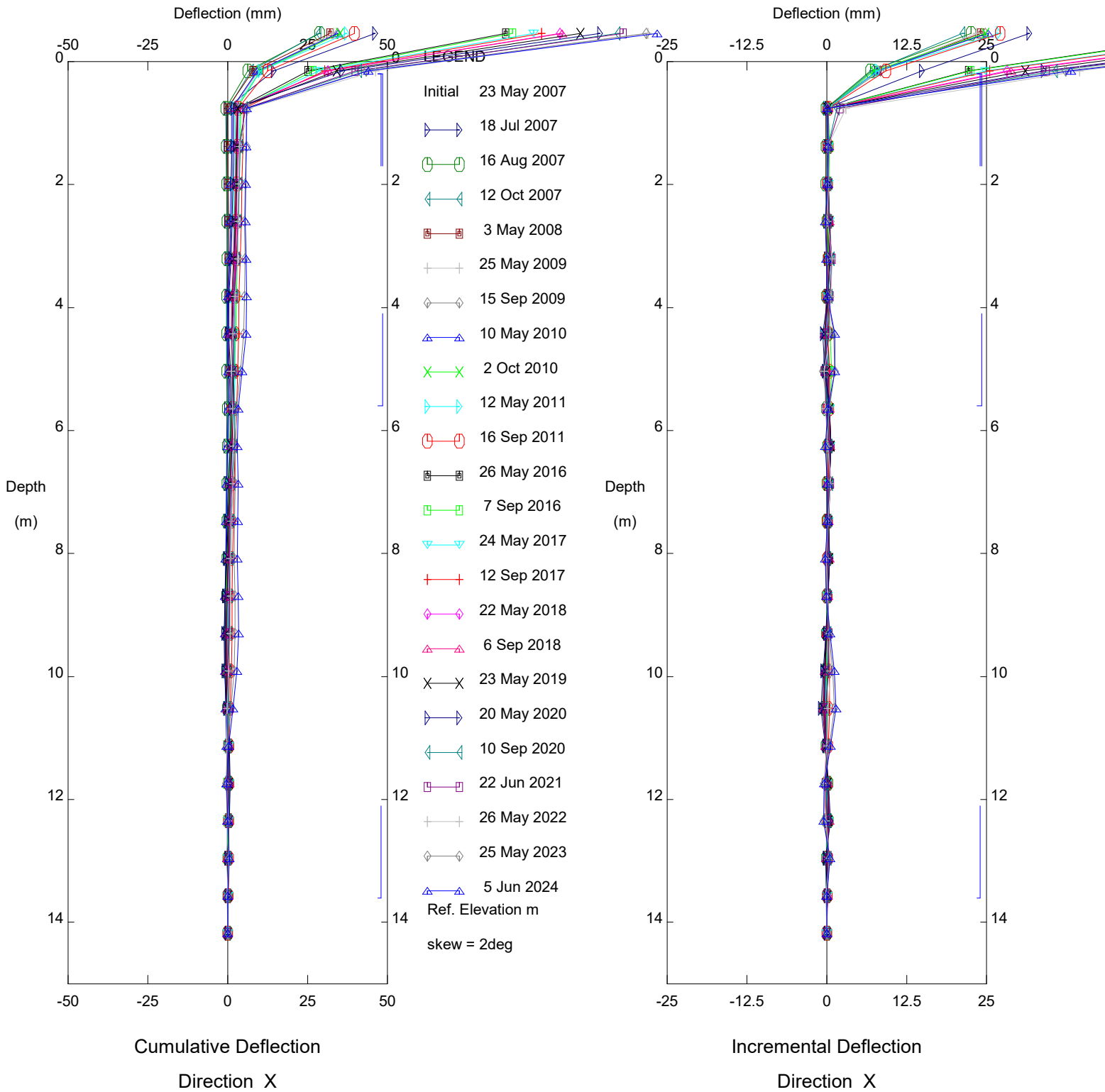
Thurber Engineering Ltd.



HWY646:04 Lindbergh Hill, Inclinometer SI07-3

Alberta Transportation

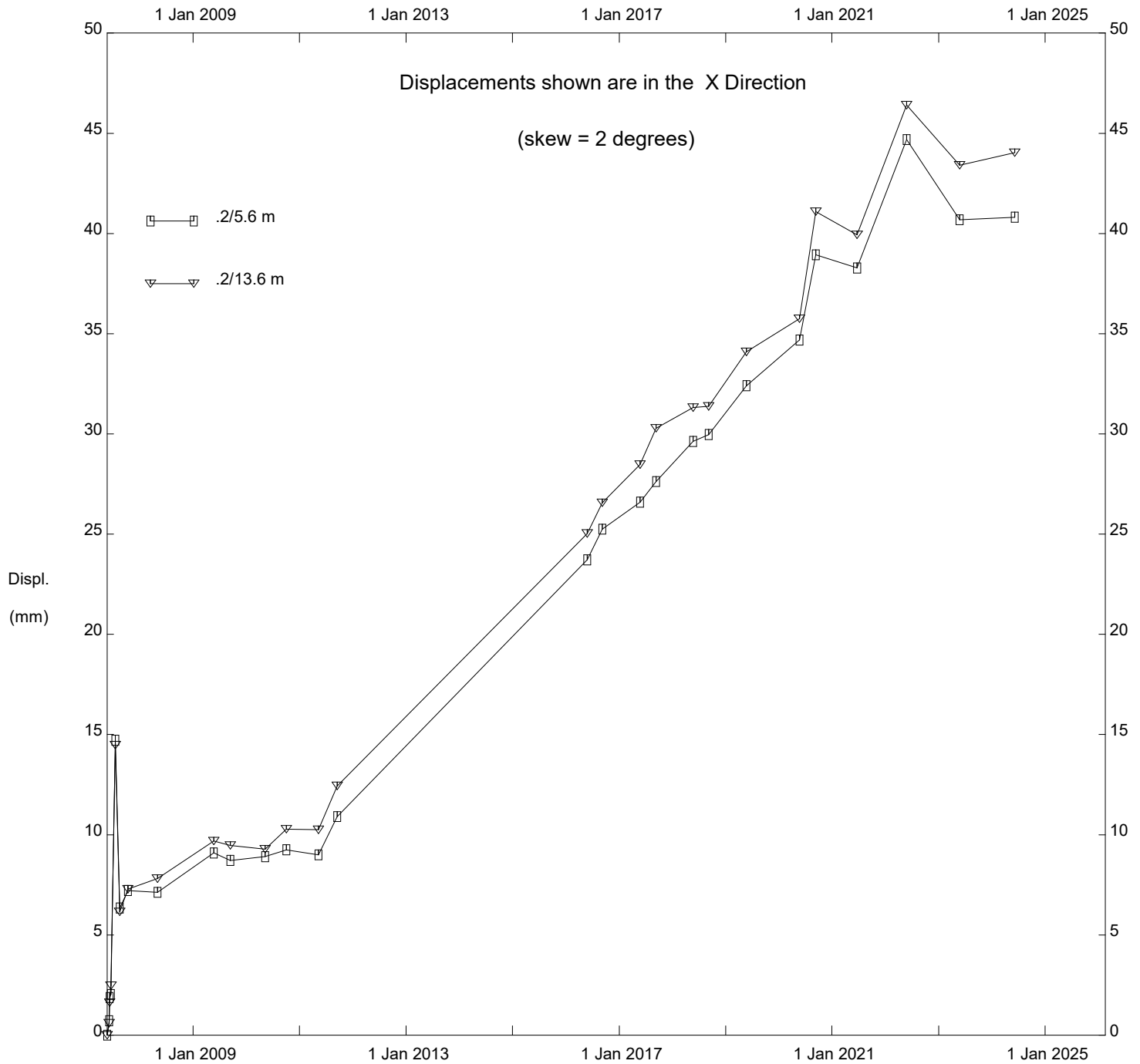
# Thurber Engineering Ltd.



HWY646:04 Lindbergh Hill, Inclinometer SI07-3

Alberta Transportation

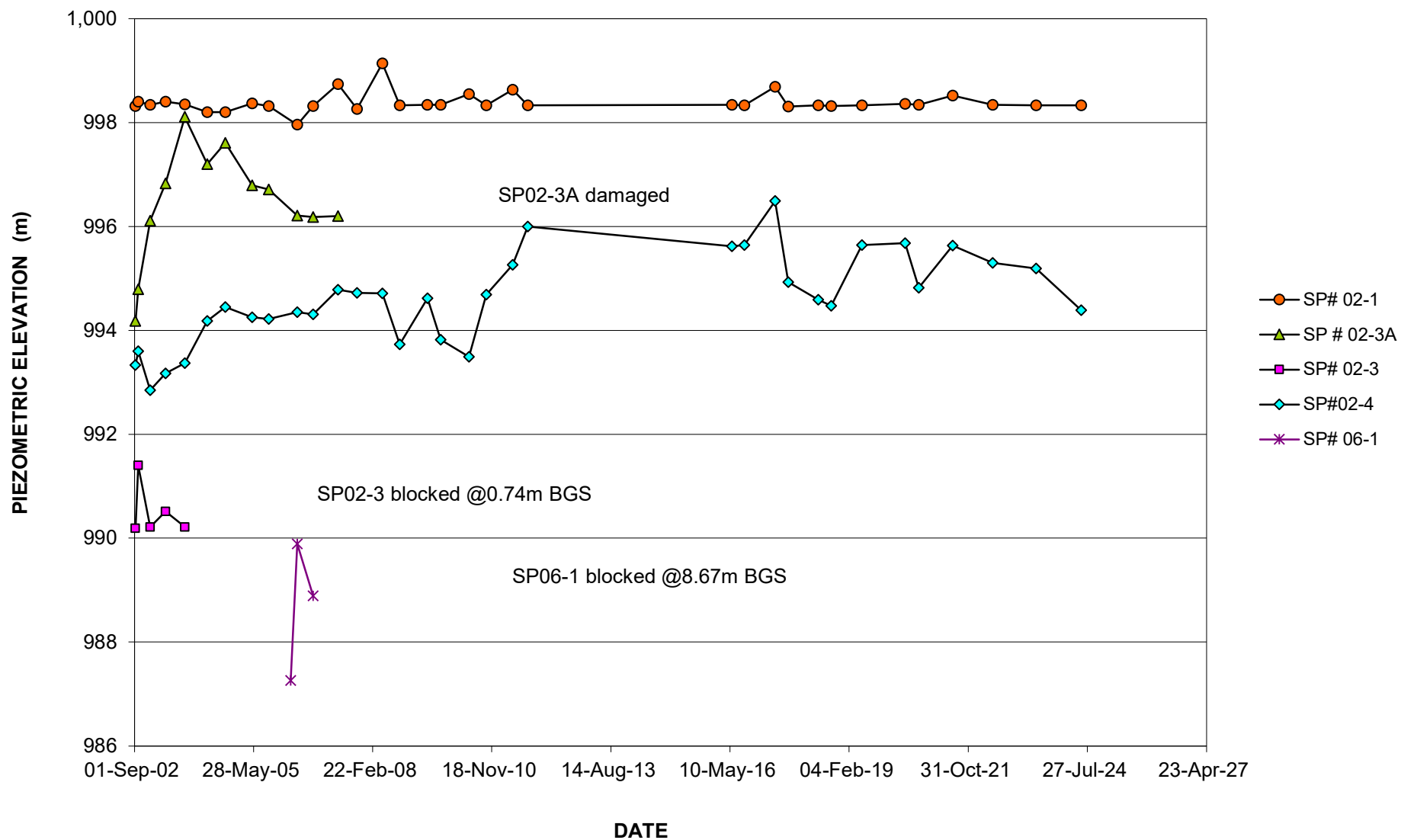
Thurber Engineering Ltd.



HWY646:04 Lindbergh Hill, Inclinator SI07-3

Alberta Transportation

**FIGURE NC025-1**  
**STANDPIPE PIEZOMETER DATA FOR HWY 646:04, LINDBERG HILL**



**FIGURE NC025-2**  
**LOAD CELL DATA FOR HWY 646:04, LINDBERG HILL**

