

---

To:	Amy Driessen Alberta Transportation	From:	Leslie Cho and Carrie Murray Stantec Consulting Ltd.
File:	123315222	Date:	June 12, 2022

---

**Reference: North Central Region, Edson, Site NC013 - Highway 633:02 Cattlepass West, Spring 2022 Instrumentation Monitoring Report**

## **1.0 OBSERVATIONS**

### **1.1 FIELD PROGRAM AND INSTRUMENTATION STATUS**

The Spring 2022 reading cycle consisted of instrument readings of three slope inclinometers (SI05-1, SI17-01, and SI17-02) and three vibrating wire piezometers (VW05-6, VW17-01, and VW17-02). The site plan is shown on **Figure 1** attached. The instrument readings were taken by Akintola Fakinlede, MSc., Engineering Technologist and, Mahendran Senthooan, M.Eng., EIT on May 6, 2022.

The slope inclinometers (SI) were measured using an RST MEMS digital inclinometer probe with 0.5 m increments and handheld PC. Readings were taken based on cable marks in relation to the top of SI casing. The vibrating wire piezometers (VW) were read with an RST VW2106 readout box.

GPS coordinates of all instruments were obtained using a Garmin eTrex 22x handheld GPS unit.

## **2.0 INSTRUMENTATION READINGS**

### **2.1 GENERAL**

The SI plots are provided in the attachments and summarized in the following sections. Displacement-time plots in the resultant x-direction (i.e., slope movement direction) along with movement rates, total cumulative movement, maximum movement rates, and incremental movements since initializing each SI are provided in **Table NC013-1** and the attachments.

The groundwater levels from VW readings are plotted in the attachments and summarized in **Table NC013-2**.

### **2.2 ZONES OF MOVEMENT**

No new zones of movement were observed in the three operational SIs during the Spring 2022 reading cycle.

### **2.3 MONITORING RESULTS**

#### **2.3.1 SLOPE INCLINOMETERS**

**SI05-1** has two movement zones being monitored. An increase in movement of 1 mm or less was observed in both movement zones since the Fall 2021 readings.

No discernable zone of movement has been recorded in **SI17-01** to date.

June 12, 2022

Amy Driessen

Page 2 of 5

**Reference:** North Central Region, Edson, Site NC013 - Highway 633:02 Cattlepass West, Spring 2022 Instrumentation Monitoring Report

**SI17-02** has two movement zones being monitored, the upper movement zone from 8.9 m to 10.4 m appears to be creeping at a rate of less than 1 mm/yr since initialization in 2017. The current rate of movement for the lower movement zone from 12.9 m to 14.9 m depth was also observed to be less than 1 mm/yr. The upper movement zone has a total cumulative movement of about 3 mm. The lower movement zone has a total cumulative movement of about 1 mm.

### **2.3.2 PIEZOMETERS**

Little to no change in groundwater levels was observed in VW17-01 and VW17-02 with water levels at 1.2 m below ground surface (bgs) and 1.5 m bgs, respectively. VW05-6 decreased by 0.7 m compared to the Fall 2021 readings. The groundwater level readings show a general trend of increasing water levels since installation in 2017.

**VW05-6** showed artesian groundwater levels prior to construction in 2011 and is currently about 0.9 m below ground surface (bgs).

**VW17-01** and **VW17-02** show a current piezometric level of 1.2 m and 1.5 m bgs, respectively.

## **3.0 RECOMMENDATIONS**

### **3.1 FUTURE WORK**

It is recommended that all instruments be read in the Fall 2022 reading cycle.

### **3.1 INSTRUMENTATION REPAIRS**

Although SI05-1 and SI17-01 can still be monitored, the SI casing should be extended to approximately 1 m above ground and protected with a steel casing to protect against further damage rendering this repair unfeasible.

June 12, 2022

Amy Driessen

Page 3 of 5

Reference: North Central Region, Edson, Site NC013 - Highway 633:02 Cattlepass West, Spring 2022 Instrumentation Monitoring Report

**Table NC013-1: Fall 2021 Slope Inclinometer Reading Summary**

Instrument Name	Date Initialized	Coordinates <sup>(1)</sup> (UTM 11U, NAD1983) (m)		Total Cumulative Resultant Movement and Depth of Movement to Date (mm)	Maximum Rate of Movement (mm/yr)	Current Status	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)
		Northing	Easting							
SI05-1	April 25, 2005	5942628	642203	110 over 2.1m to 8.1m depth in 345° direction	46 between Sept. 2011 and June 2012	Operational	September 08, 2021	1	2	1
				130 over 8.1m to 11.6m depth in 345° direction	48 between Sept. 2011 and June 2012			<1	1	-15
SI17-01	November 24, 2017	5942640	642248	-	-	Operational	September 08, 2021	No Discernable Zone of Movement		
SI17-02	November 24, 2017	5942598	642214	3 over 8.9m to 10.4m depth in 35° direction	2.4 between May 2019 and Sep 2019	Operational	September 08, 2021	< 1	<1	<1
				1 over 12.9 m to 14.9 m depth in 35° direction	1.6 between Jul 2021 and Sep 2021			< 1	< 1	< 1
Note: (1) Updated May 06, 2022, with approximate accuracy of ± 3 m.										

June 12, 2022

Amy Driessen

Page 4 of 5

Reference: North Central Region, Edson, Site NC013 - Highway 633:02 Cattlepass West, Spring 2022 Instrumentation Monitoring Report

**Table NC013-2: Fall 2021 Vibrating Wire Piezometer Reading Summary**

Instrument Name	Date Initialized	Coordinates <sup>(1)</sup> (UTM 11U, NAD1983) (m)		Tip Elevation (m) (aMSL) <sup>(2)</sup>	Ground Elevation <sup>(1)</sup> (m) (aMSL)	Current Status	Maximum Piezometric Elevation (m)	Measured Piezometric Elevation (Spring 2022) (m)	Previous Piezometric Elevation (Fall 2021) (m)	Change in Water Level Since Previous Reading (m bgs)
		Northing	Easting							
VW05-6 (79657)	May 6, 2005	5942601	642259	726.4	740.1	Operational	740.8 on May 2013	739.2 (0.9 m bgs)	739.9 (0.2 m bgs)	-0.7
VW17-01 (100D1700263)	Nov. 24, 2017	5942621	642252	730.3	739.8	Operational	738.8 on July 2021	738.6 (1.2 m bgs)	738.6 (1.2 m bgs)	<0.1
VW17-02 (100D1701604)	Nov. 24, 2017	5942598	642214	727.4	741.1	Operational	739.7 on July 2021	739.6 (1.5 m bgs)	739.6 (1.5 m bgs)	< 0.1
Note: (1) Updated May 06, 2022, with approximate accuracy of $\pm 3$ m. (2) aMSL = Above Mean Sea Level										

June 12, 2022

Amy Driessen

Page 5 of 5

**Reference:** North Central Region, Edson, Site NC013 - Highway 633:02 Cattlepass West, Spring 2022 Instrumentation Monitoring Report

## CLOSING

We trust this instrumentation report meets your requirements. If you have any questions, please do not hesitate to contact the undersigned.

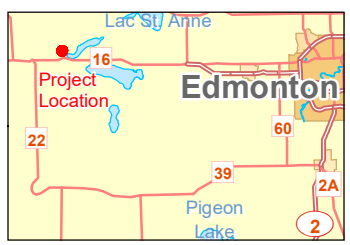
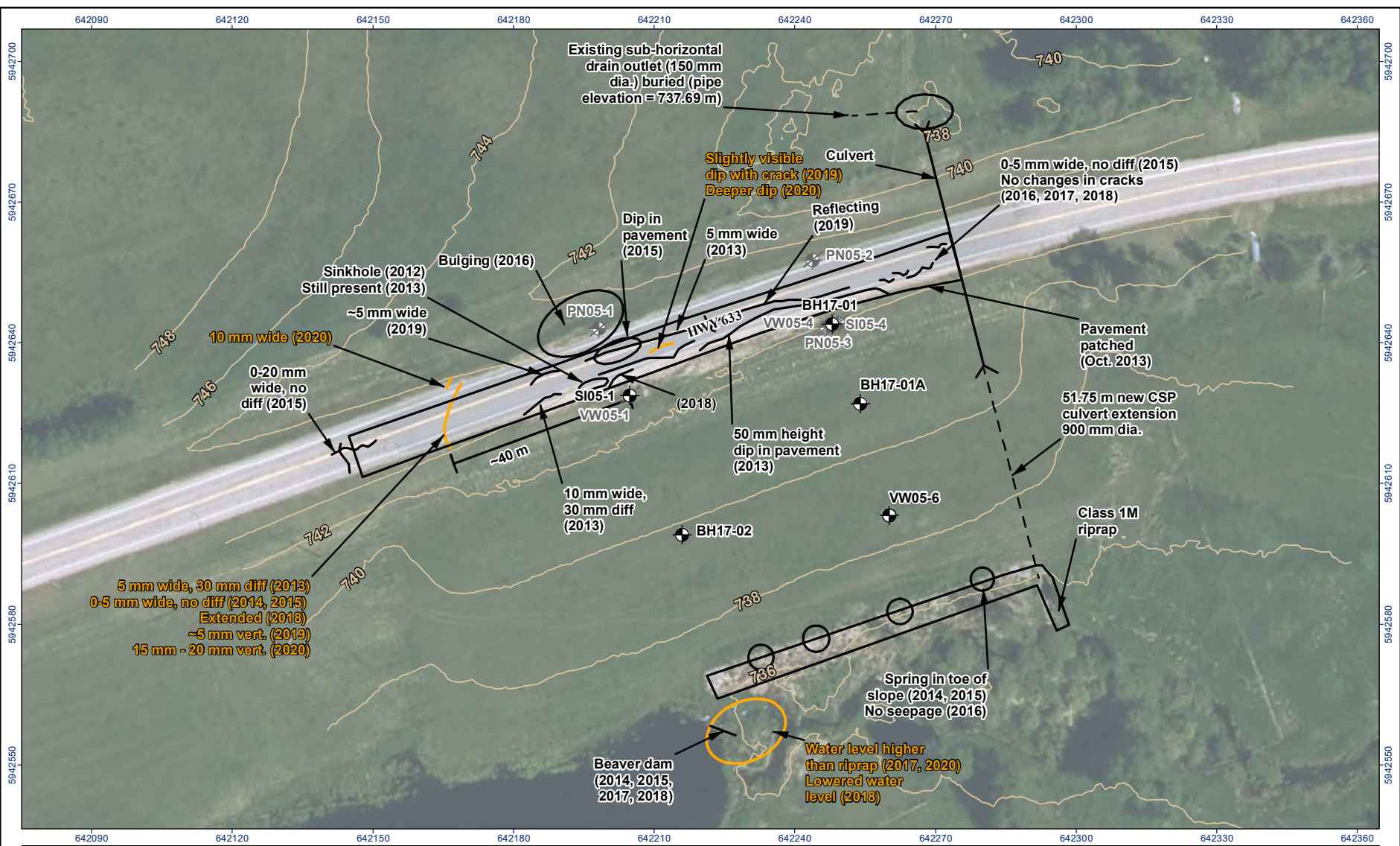
**Stantec Consulting Ltd.**

**Leslie Cho** M.Eng., P.Eng.  
Associate, Geotechnical Engineer  
Phone: 780-917-7403  
[leslie.cho@stantec.com](mailto:leslie.cho@stantec.com)

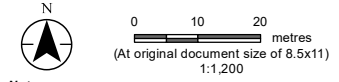
**Carrie Murray** M.Eng., P.Eng.  
Principal, Senior Geotechnical Engineer  
Phone: 780-917-7403  
[carrie.murray@stantec.com](mailto:carrie.murray@stantec.com)

Attachment: Figure 1 – Site Plan  
SI05-1 Slope Inclinator Plots  
SI17-01 Slope Inclinator Plots  
SI17-02 Slope Inclinator Plots  
Vibrating Wire Piezometer Depth vs Time Plot  
Vibrating Wire Piezometer Elevation vs. Time Plot

\\Cd1001-c200\workgroup\123312435\NC Sites\Edson\_NC13\Task B Annual Inspection\DWG\_c\GIS\2020\Fig\_1\_Site\_Plan\_NC13.mxd Revised: 2020-06-24 By: MK\khl



- Borehole Location
- Non-Operational Instrument
- Previous Observation
- 2020 Observation
- Ground Elevation Contours (m AMSL, LiDAR Nov. 2014)



- Notes**
1. Coordinate System: NAD 1983 UTM Zone 11N
  2. Data Sources: Geogratis, ©Department of Natural Resources Canada, All rights reserved.
  3. Background: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

**Project Location**  
 Hwy 633  
 Parkland County, Alberta

Prepared by MK on 2020-06-11  
 Quality Review by LC on 2020-06-19  
 Independent Review by XL on 2020-06-19

**Client/Project**  
 Alberta Transportation  
 Geohazard Monitoring Program  
 NC13 Cattle Pass West

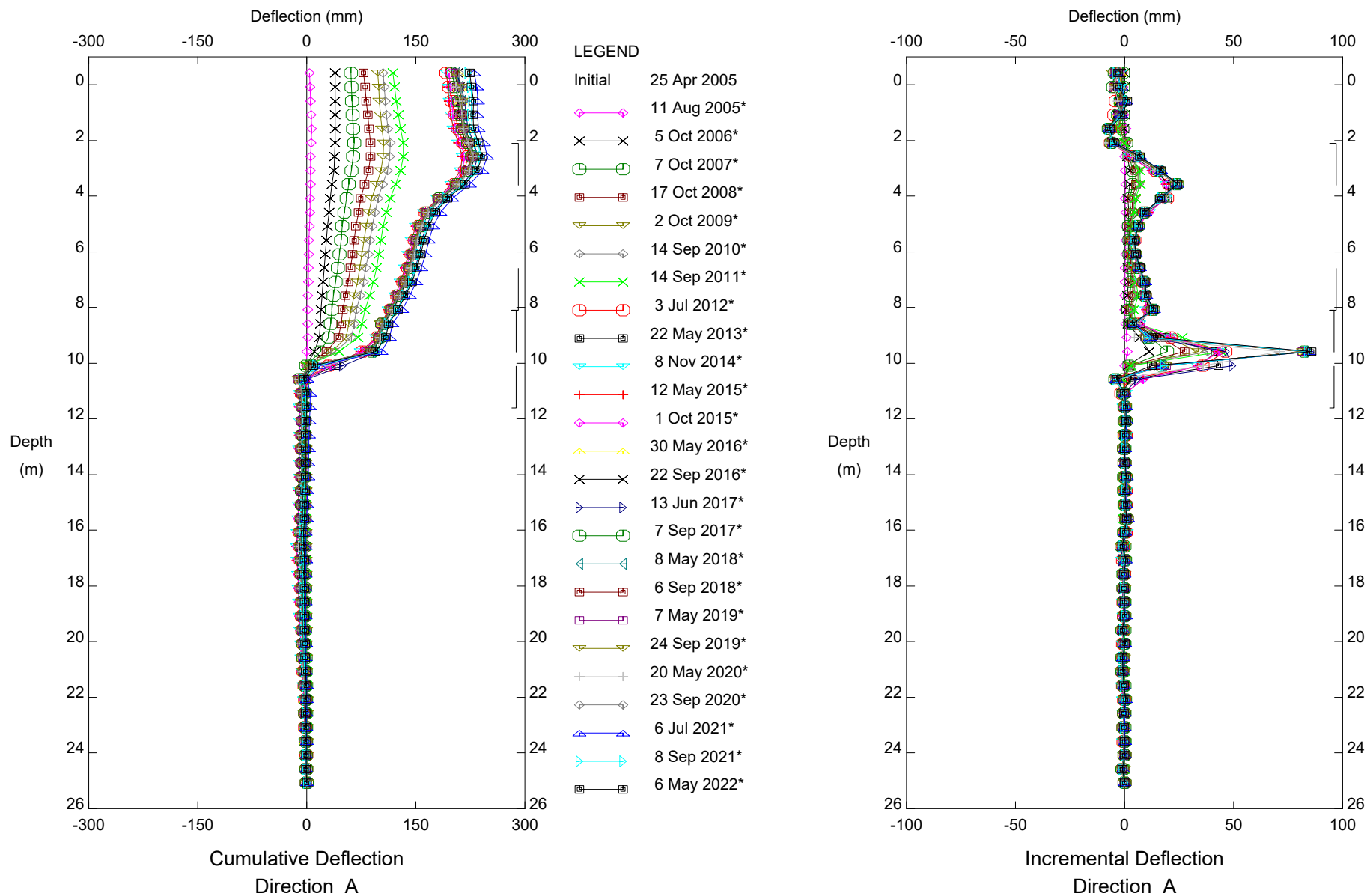
123315222

**Figure No.**  
**1**

**Title**  
**Site Plan**

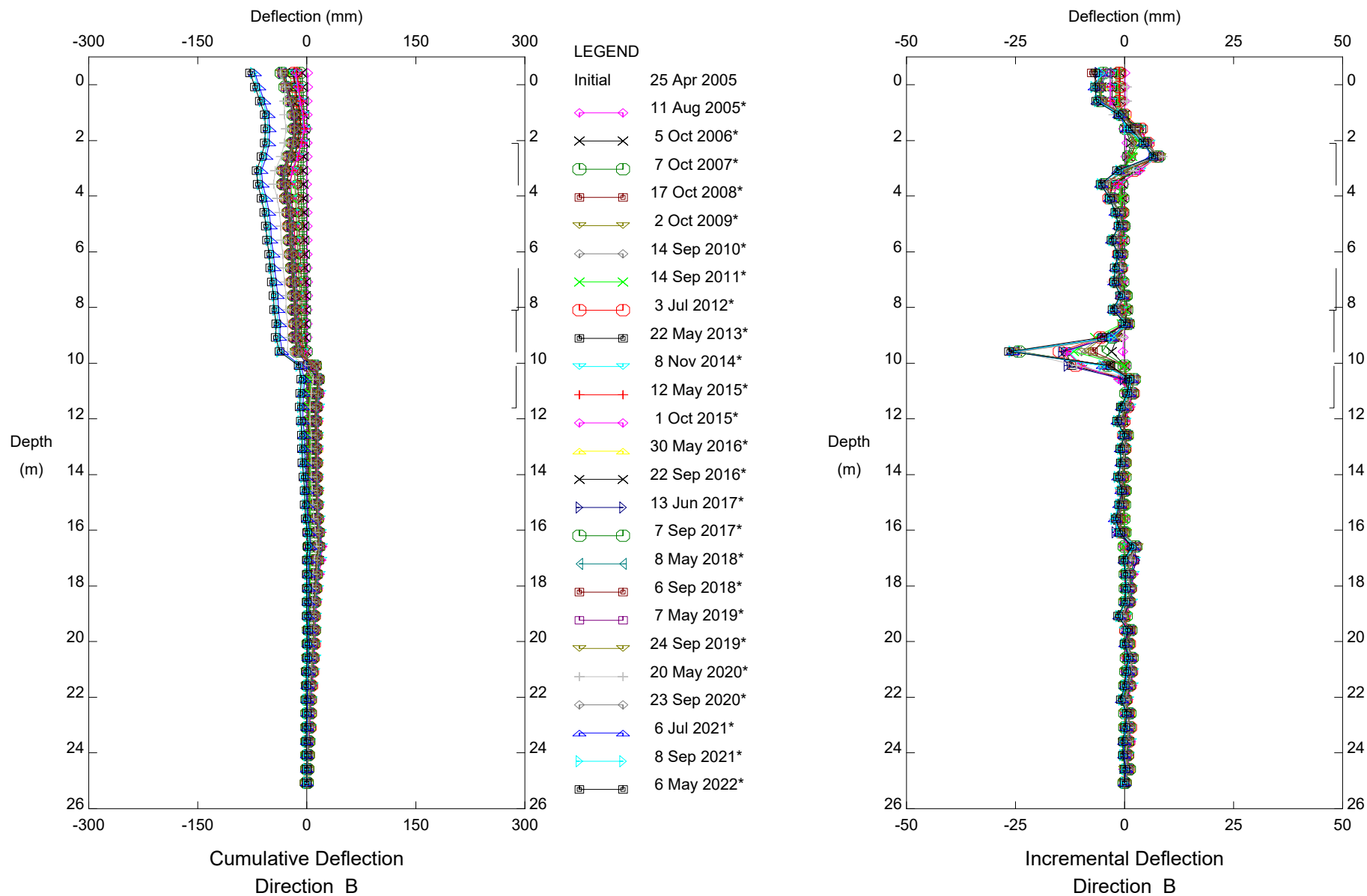


Disclaimer: This document has been prepared based on information provided by others as cited in the Notes section. Stantec has not verified the accuracy and/or completeness of this information and shall not be responsible for any errors or omissions which may be incorporated herein as a result. Stantec assumes no responsibility for data supplied in electronic format, and the recipient accepts full responsibility for verifying the accuracy and completeness of the data.



HWY 633:02 Cattlepass West (NC13), Inclinometer SI05-1  
 Alberta Transportation

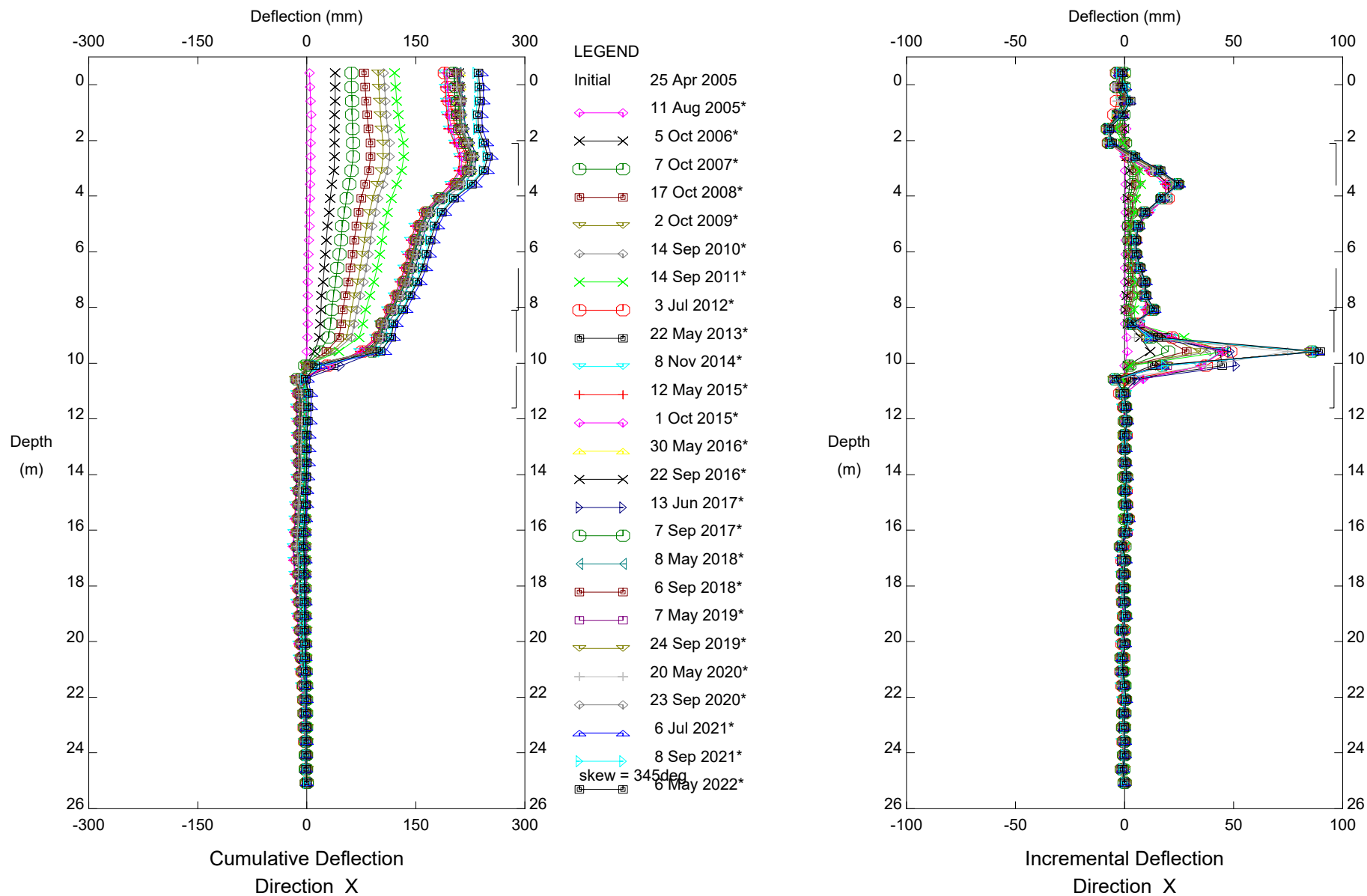
Sets marked \* include zero shift and/or rotation corrections.



HWY 633:02 Cattlepass West (NC13), Inclinator SI05-1  
 Alberta Transportation

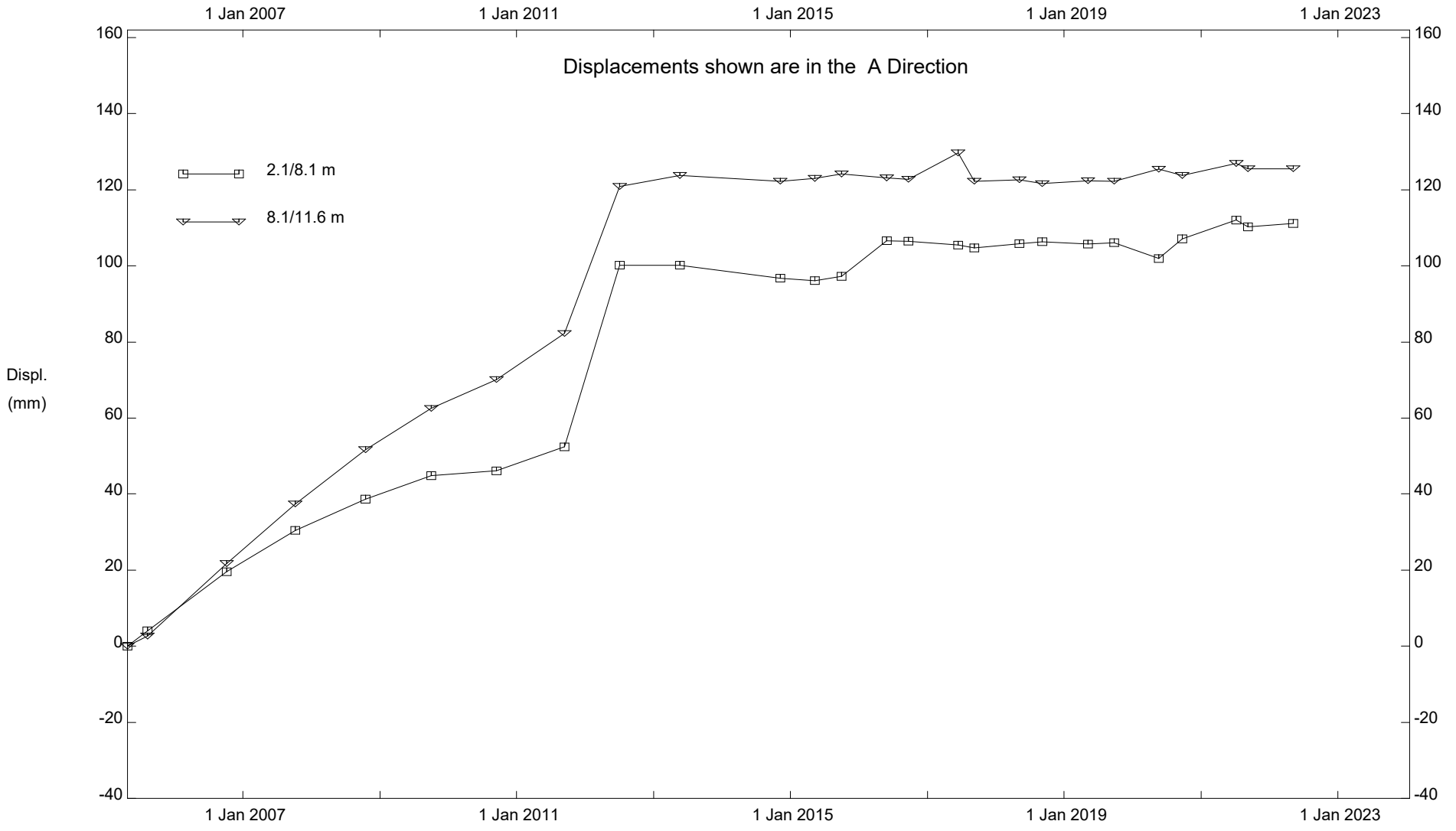
Sets marked \* include zero shift and/or rotation corrections.





HWY 633:02 Cattlepass West (NC13), Inclinator SI05-1  
Alberta Transportation

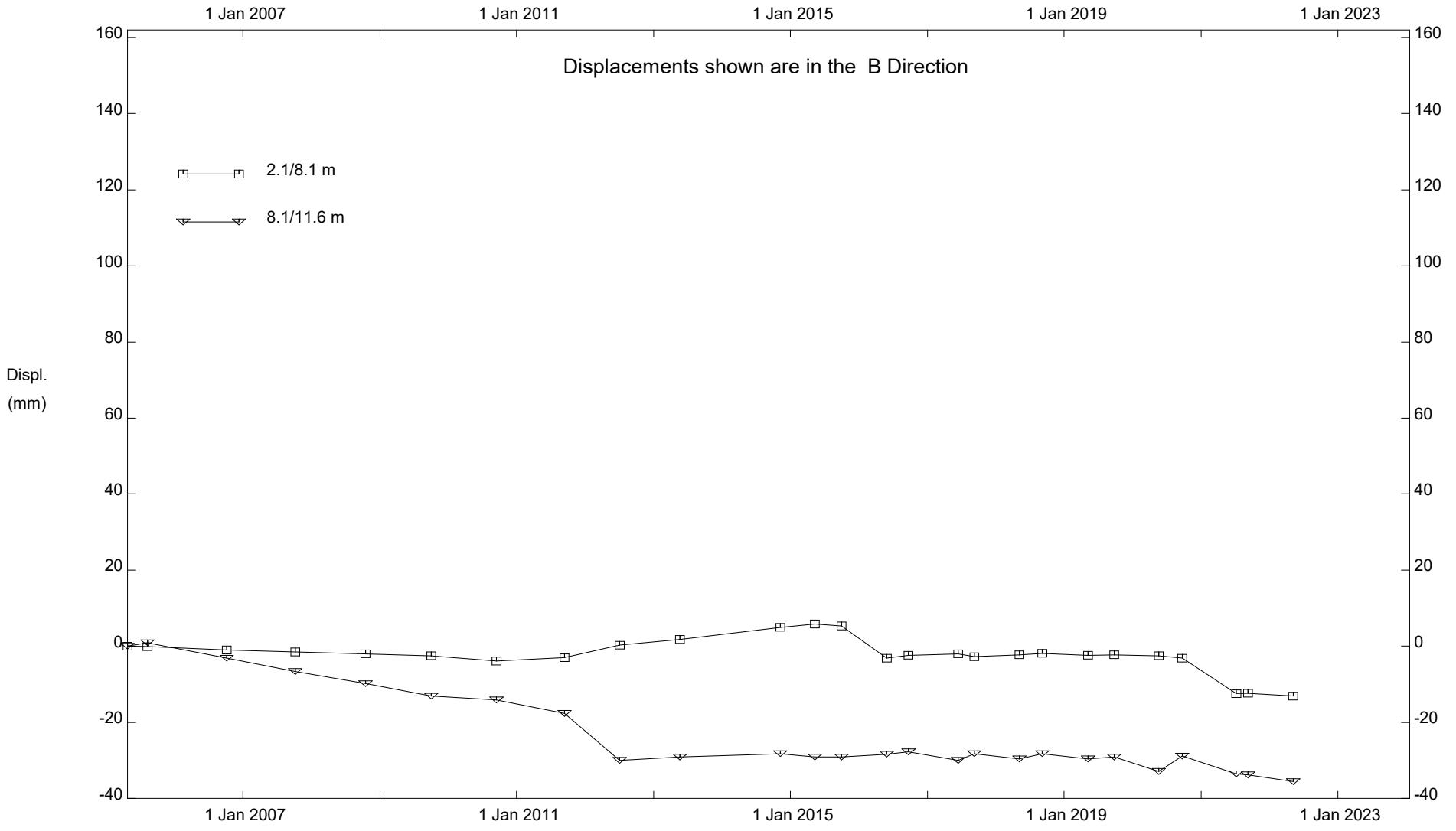
Sets marked \* include zero shift and/or rotation corrections.



HWY 633:02 Cattlepass West (NC13), Inclinometer SI05-1

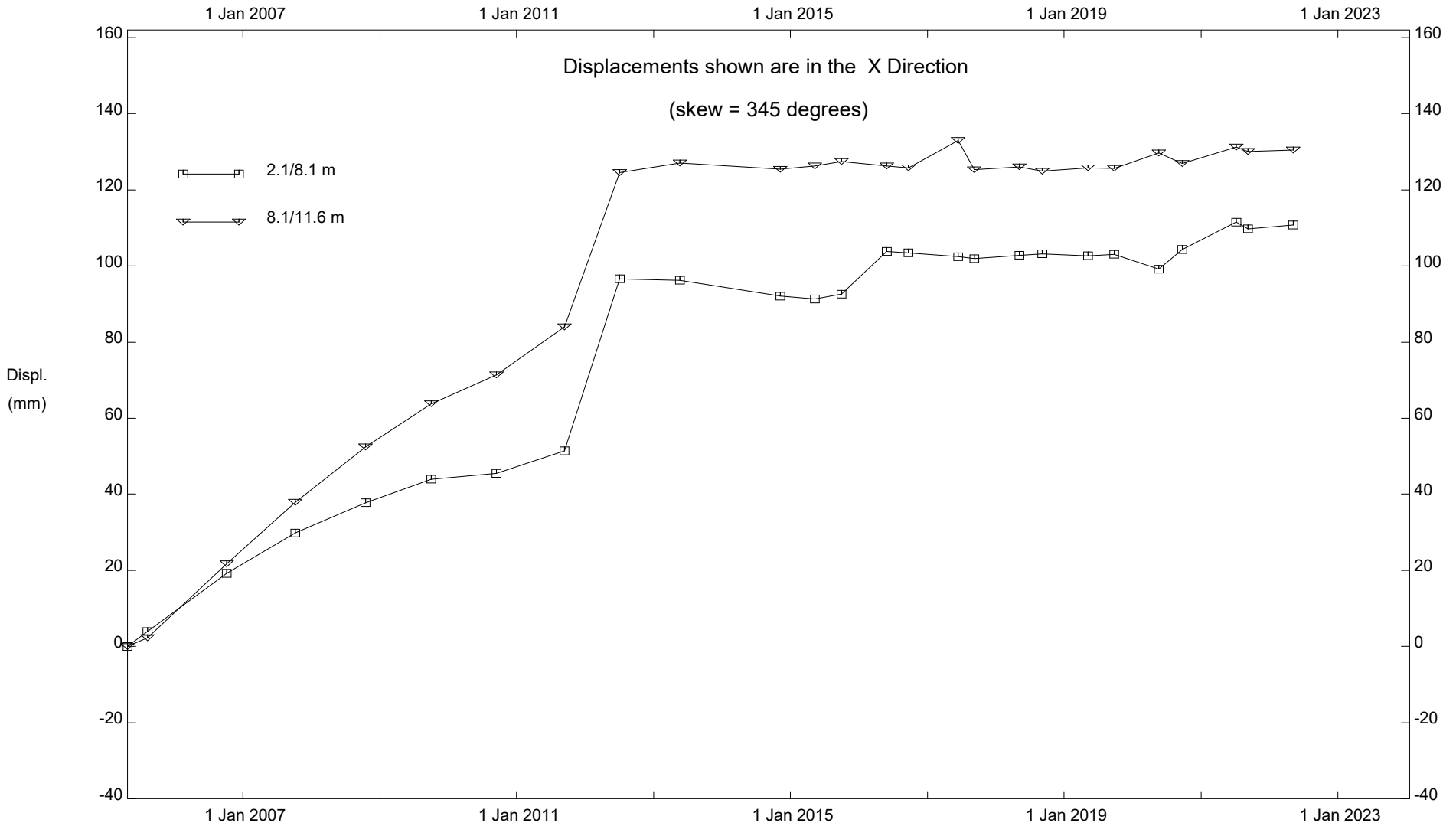
Alberta Transportation

Stantec Consulting Ltd - Edmonton



HWY 633:02 Cattlepass West (NC13), Inclinator SI05-1

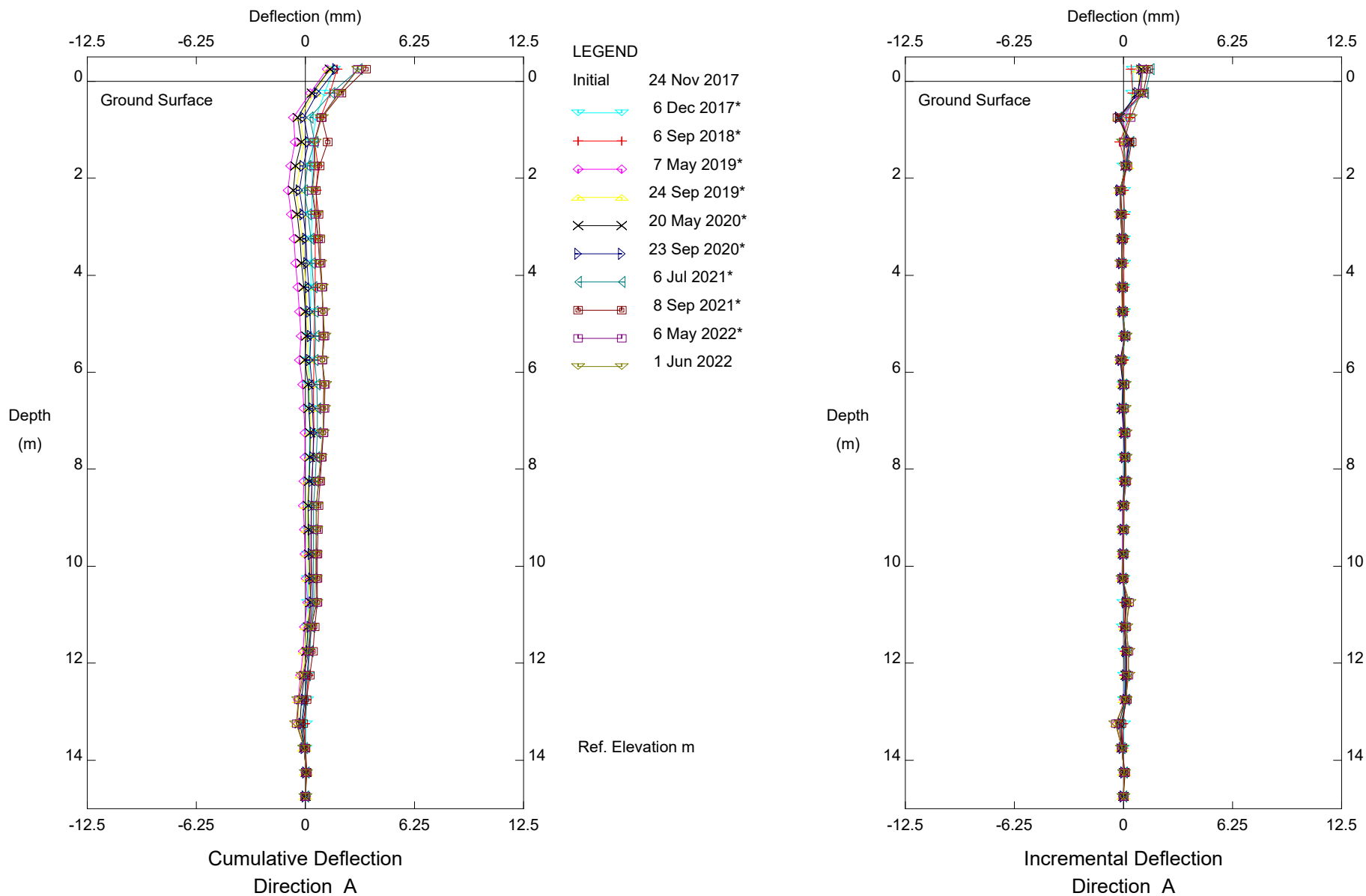
Alberta Transportation



HWY 633:02 Cattlepass West (NC13), Inclinometer SI05-1

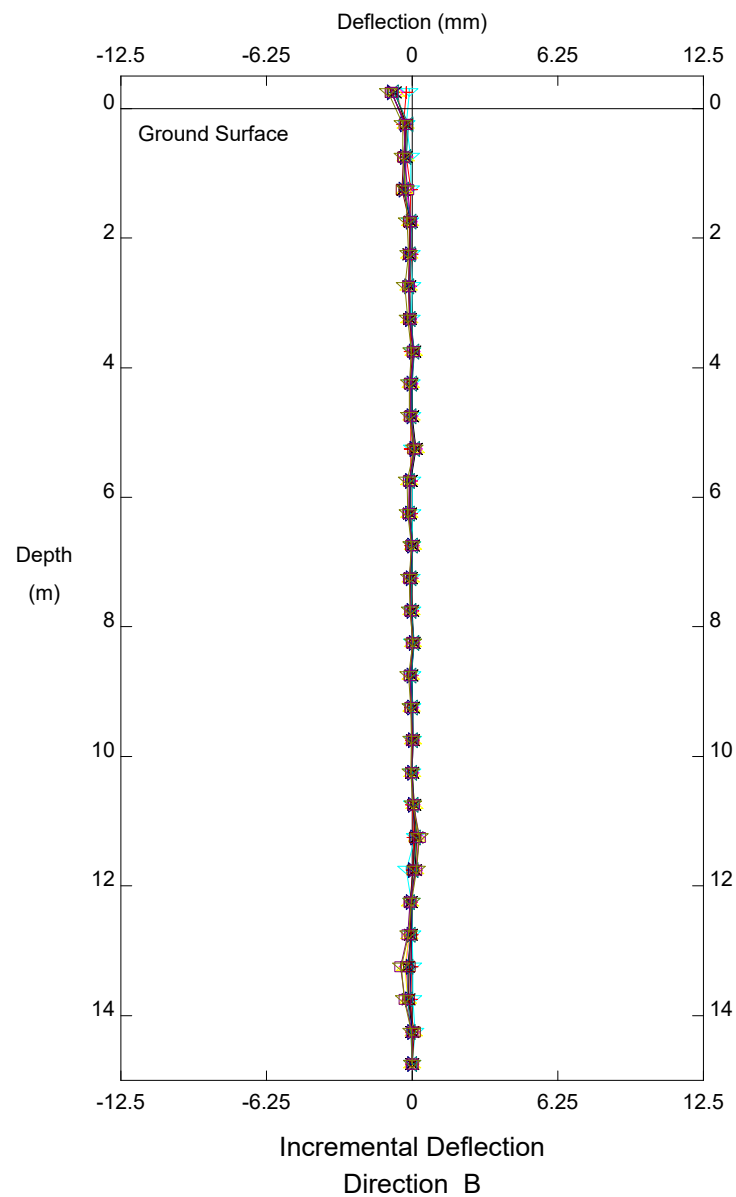
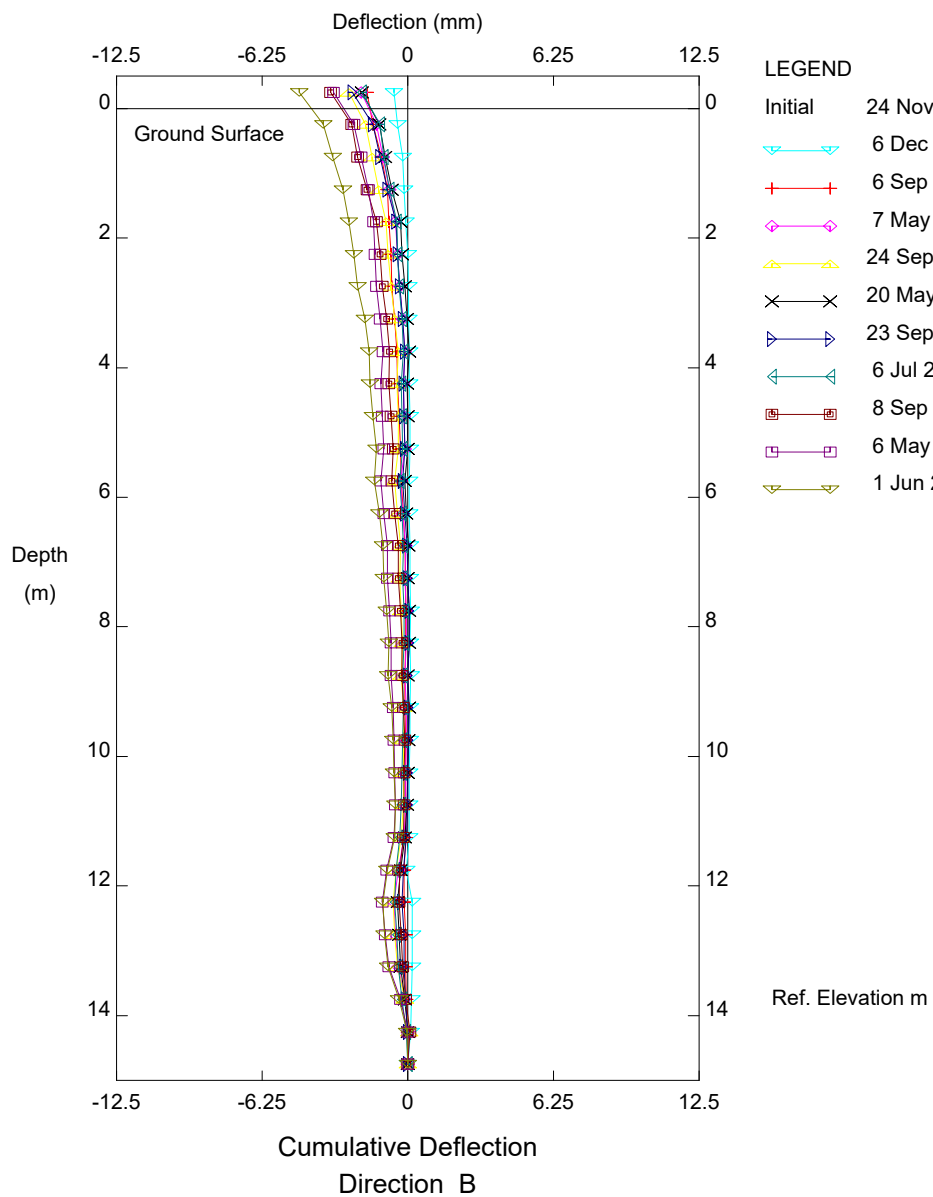
Alberta Transportation

Stantec Consulting Ltd - Edmonton



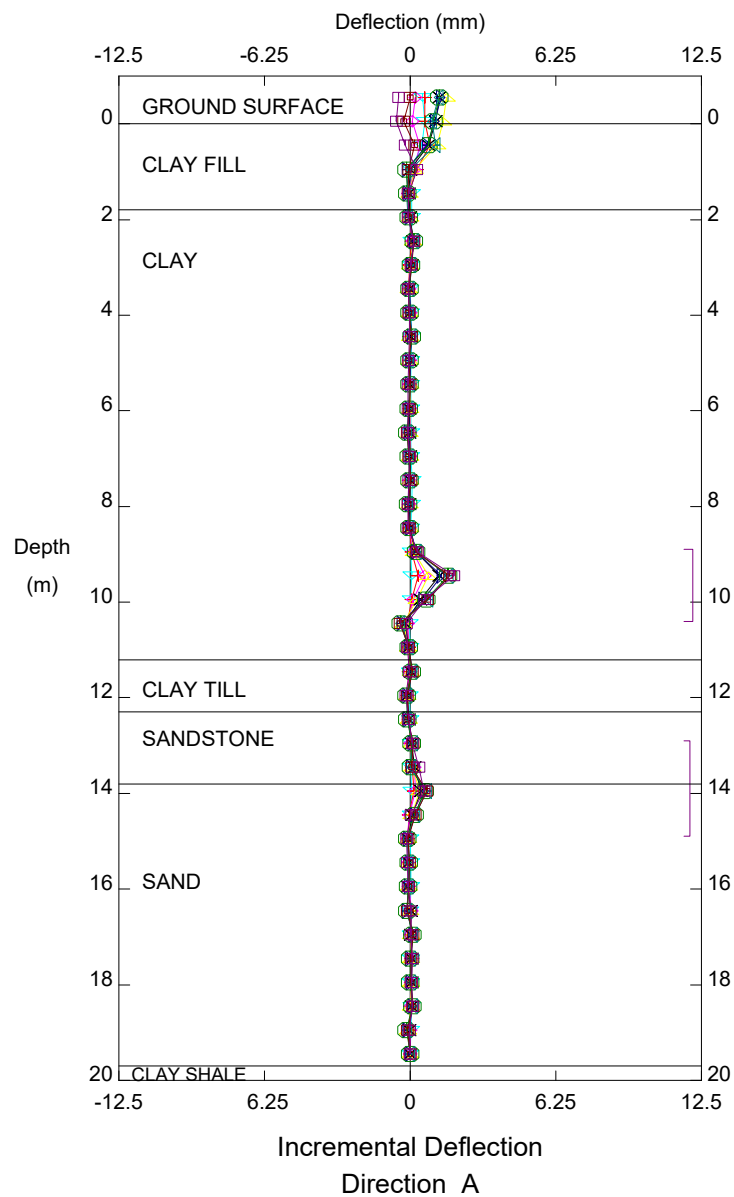
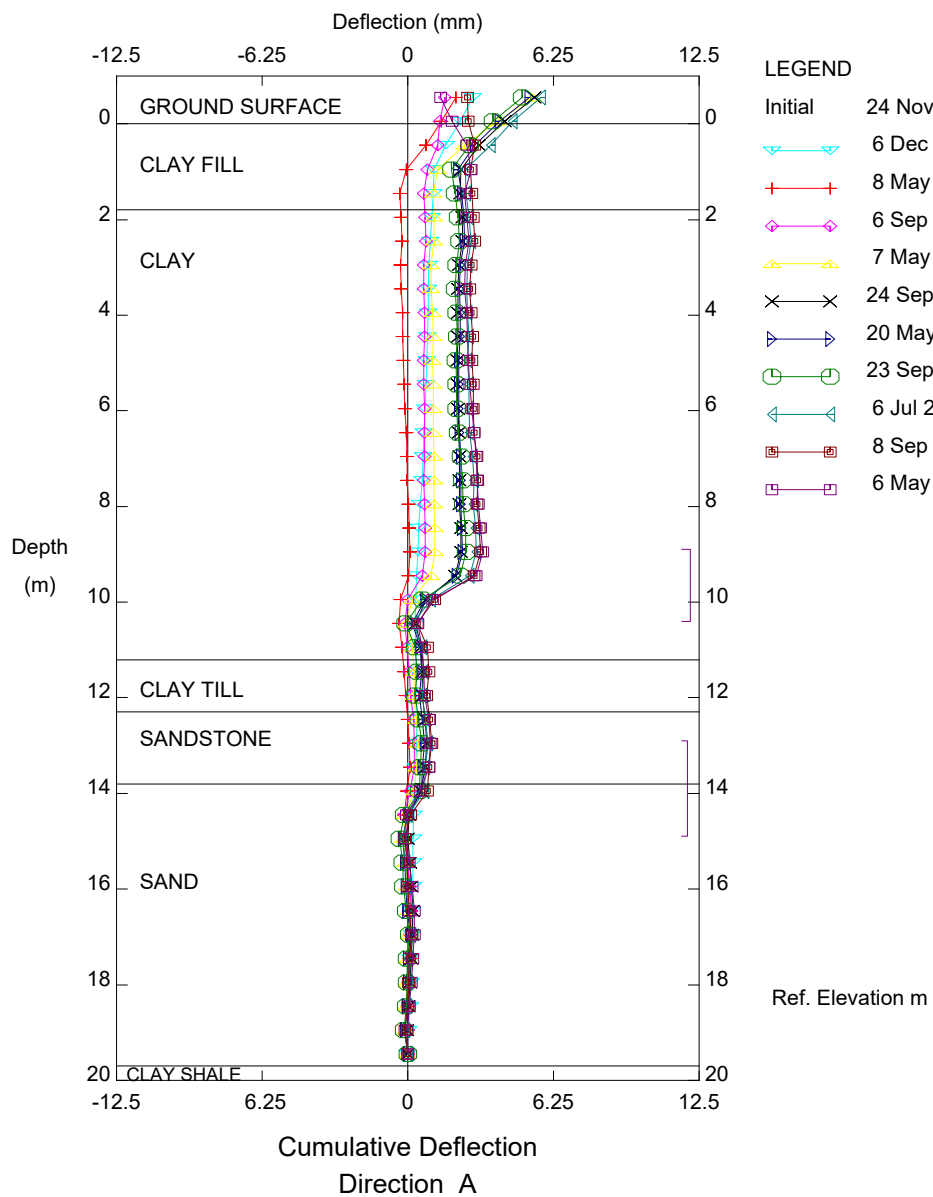
NC13, Inclinometer SI17-01

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



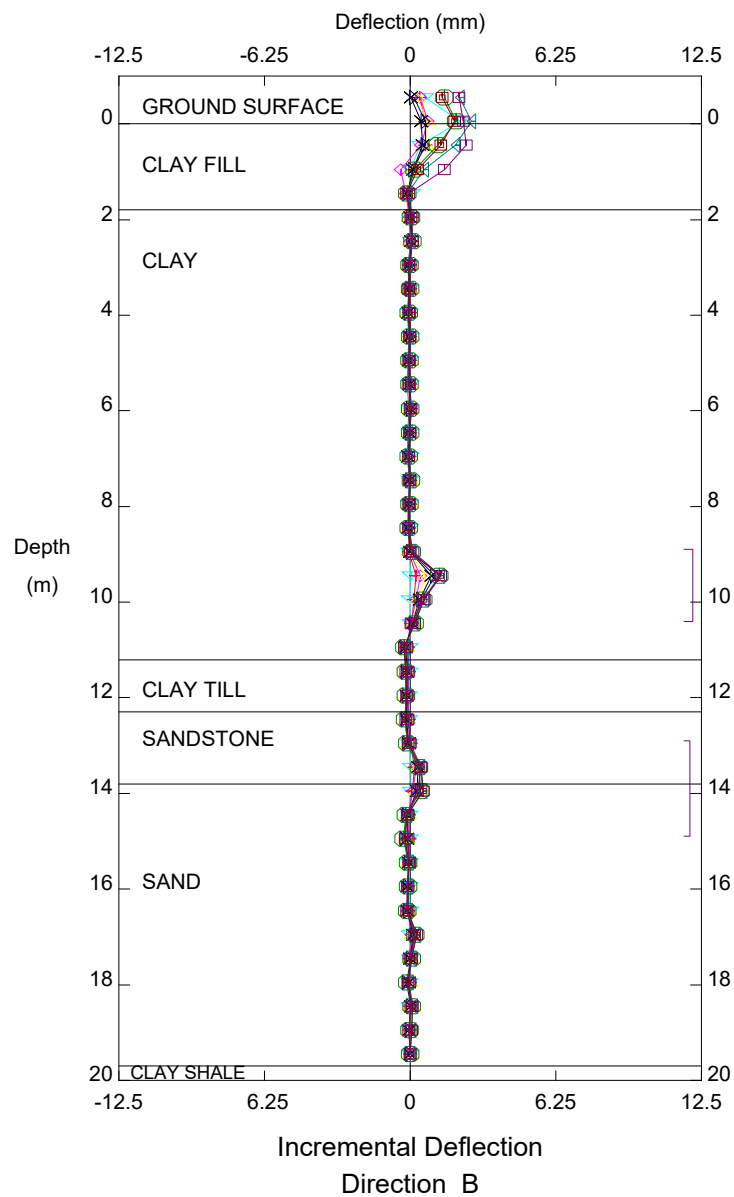
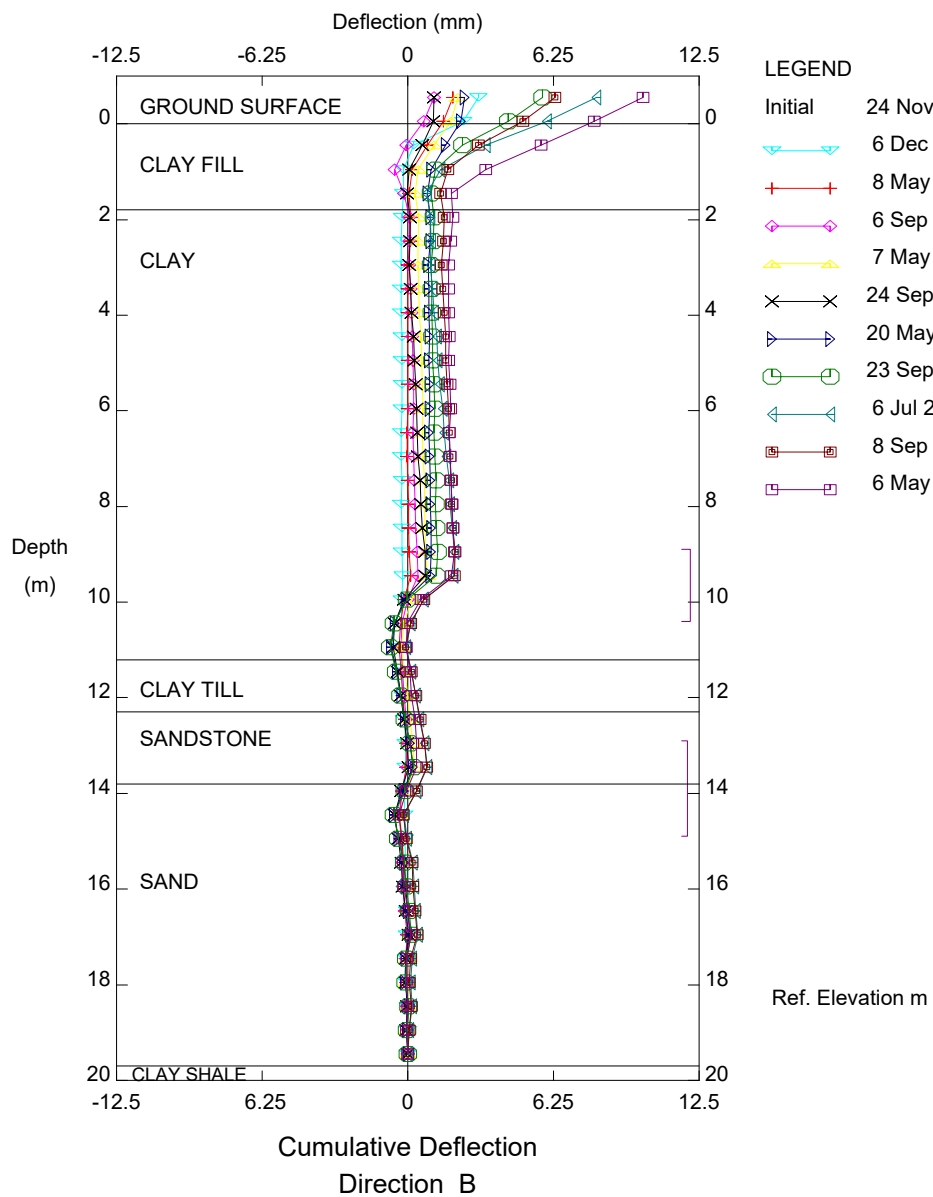
NC13, Inclinator SI17-01

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



NC13, Inclinometer SI17-02

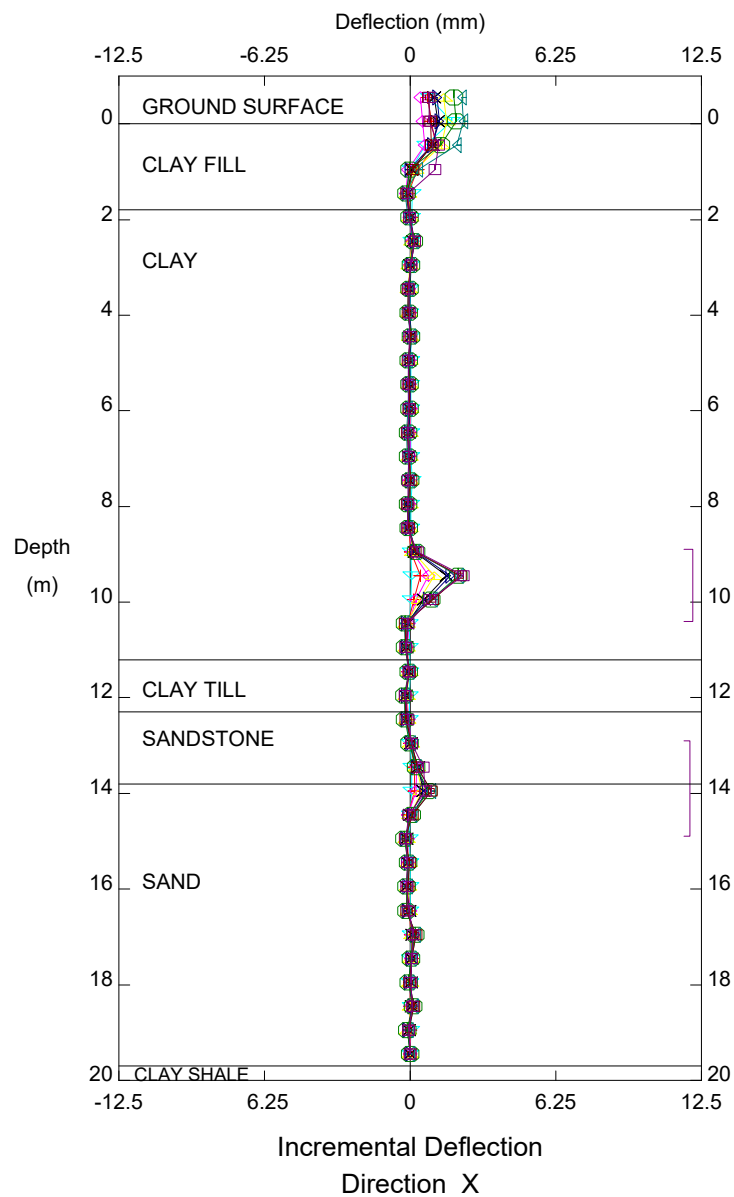
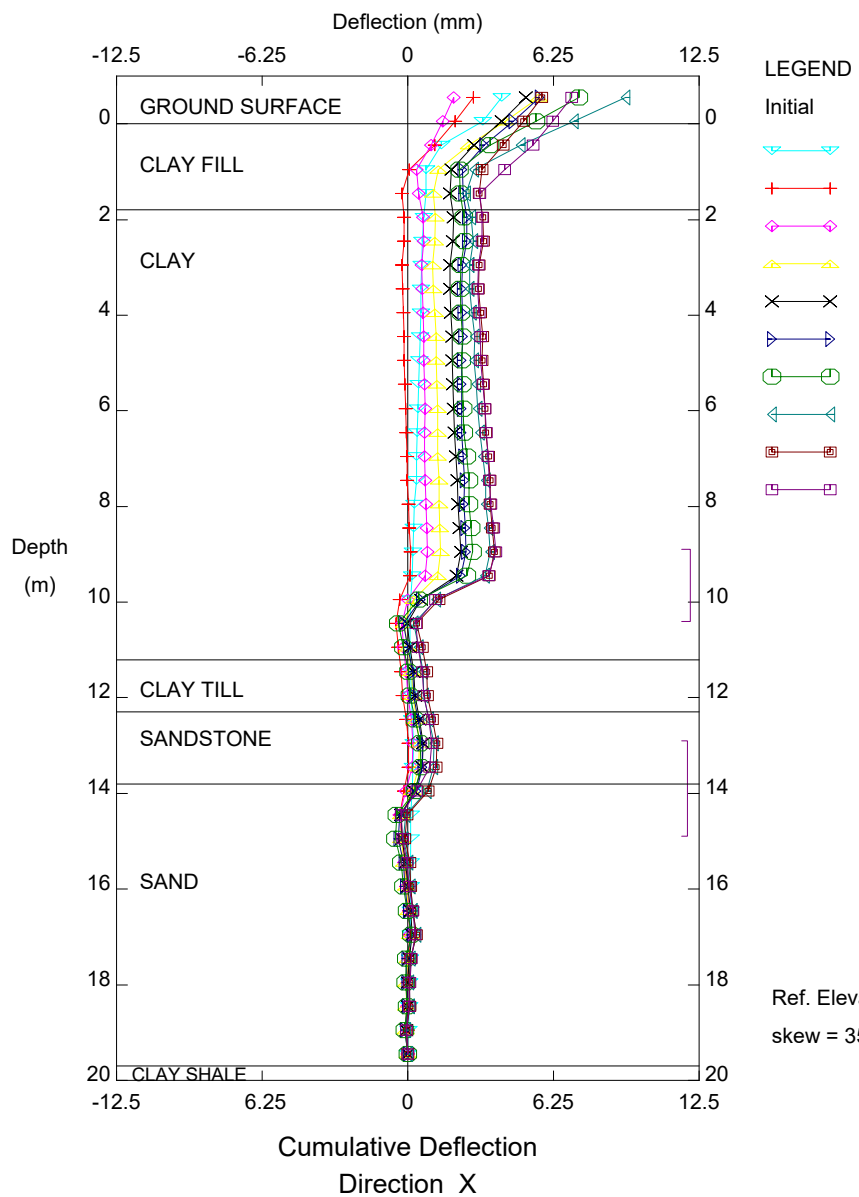
Sets marked \* include zero shift and/or rotation corrections.



NC13, Inclinator SI17-02

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

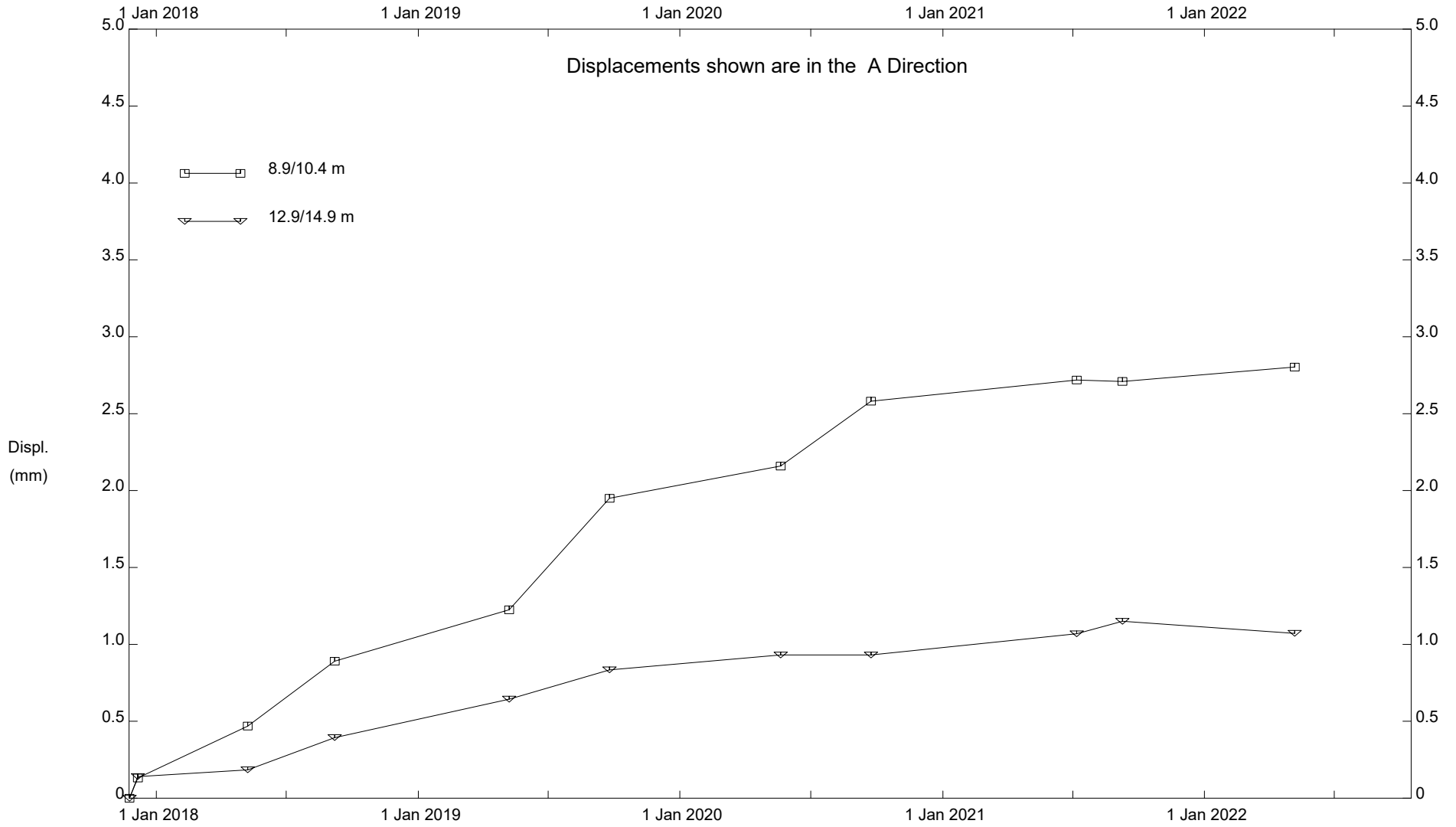




NC13, Inclinator SI17-02

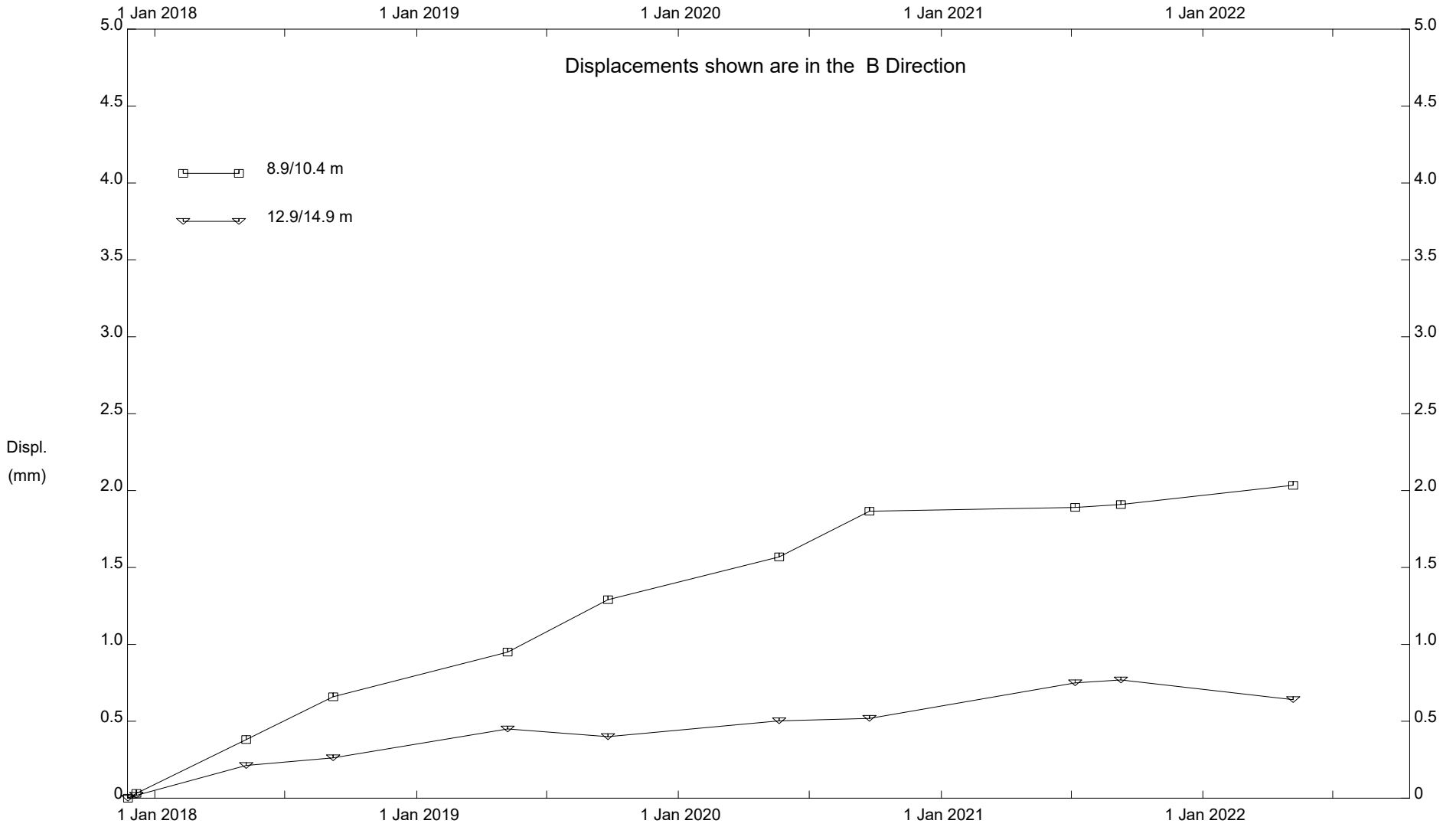
Sets marked \* include zero shift and/or rotation corrections.

Stantec Consulting Ltd - Edmonton



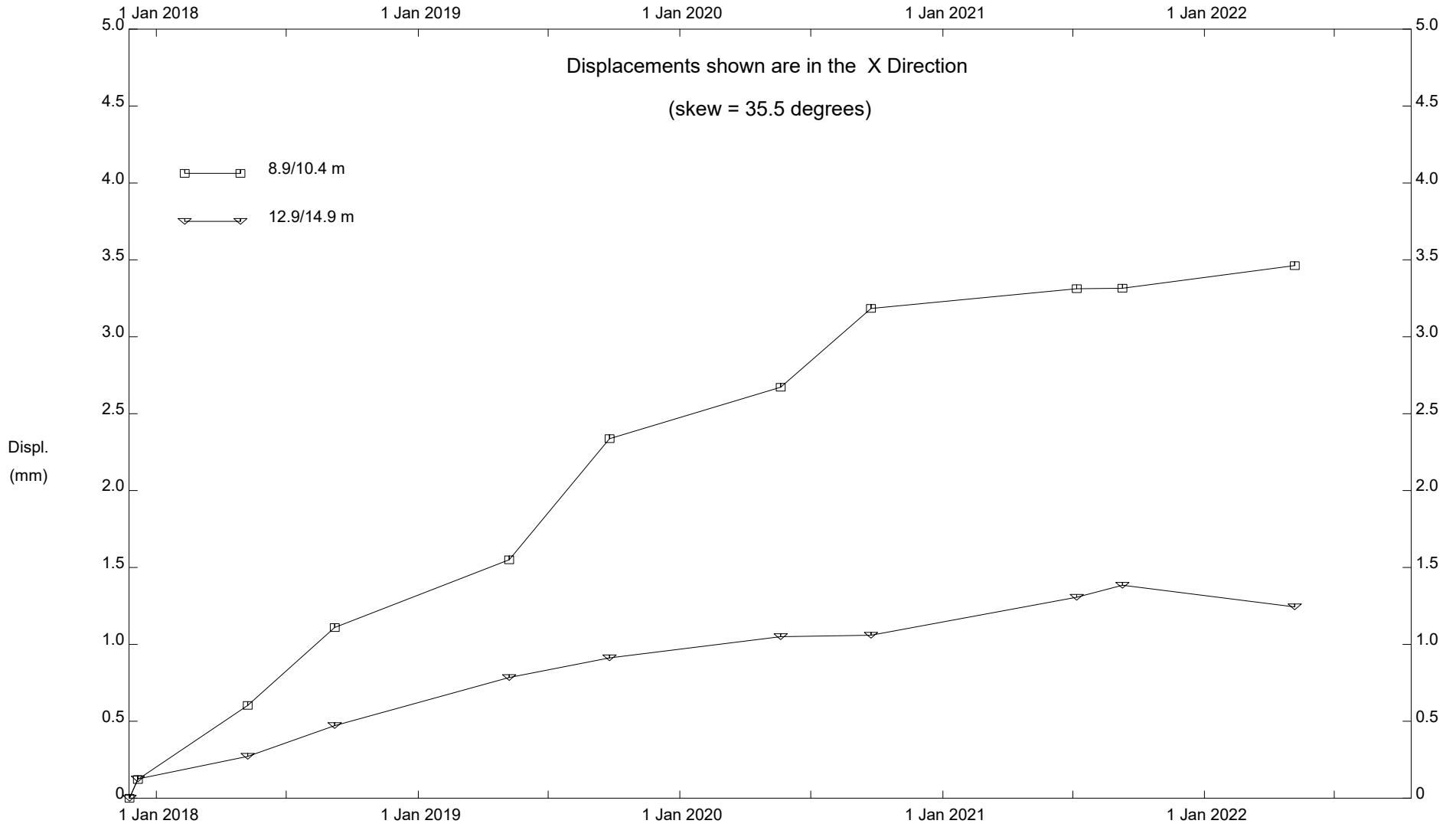
NC13, Inclinometer SI17-02

Stantec Consulting Ltd - Edmonton



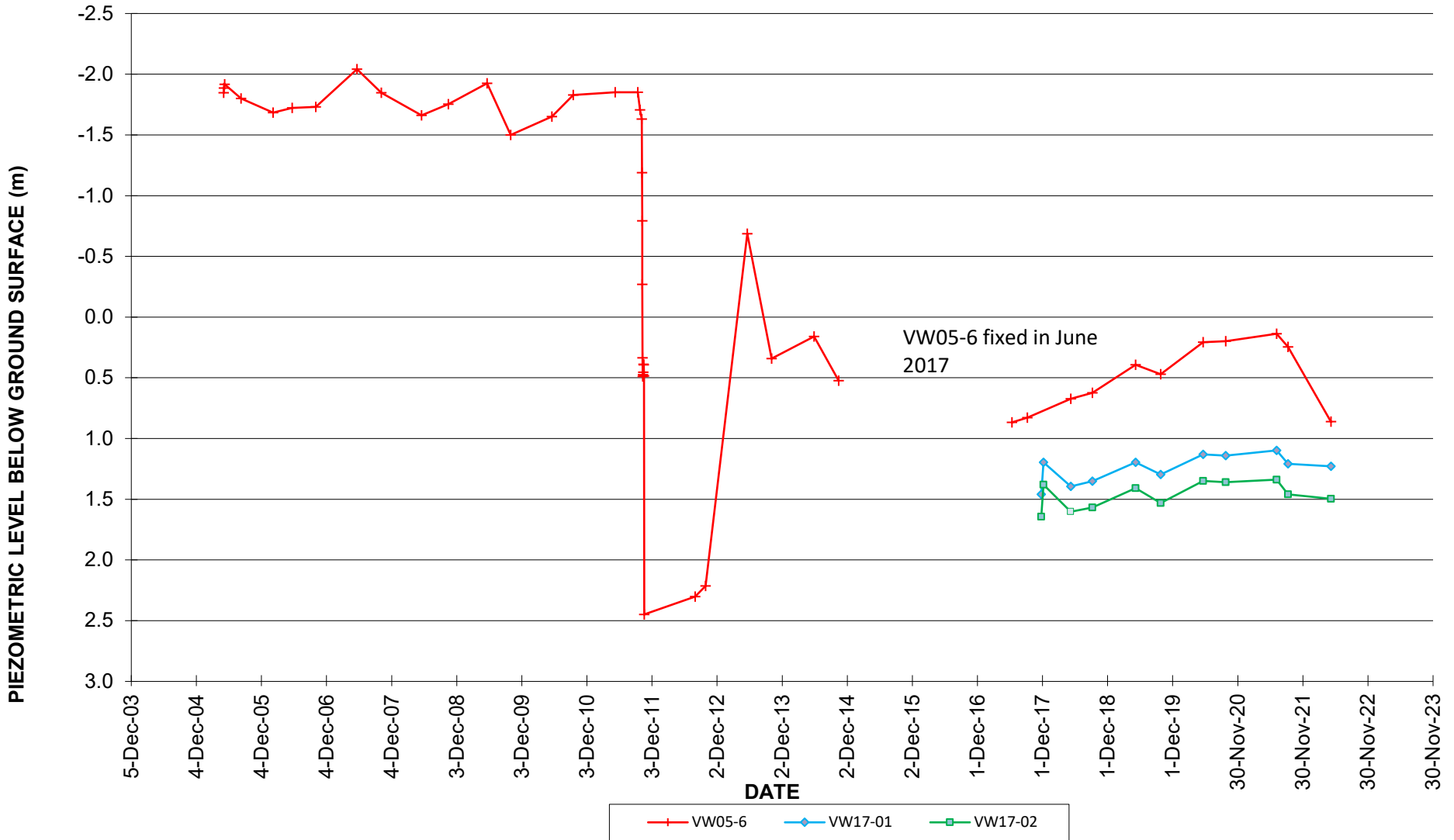
NC13, Inclinometer SI17-02

Stantec Consulting Ltd - Edmonton



NC13, Inclinator SI17-02

### PIEZOMETER DATA NC13: HWY633:02, Cattlepass West



### PIEZOMETER DATA NC13: HWY633:02, Cattlepass West

