
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 NC044 - Highway 633:02 Cattlepass East, 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 two slope inclinometers (SI17-01 and SI17-02), one pneumatic piezometer (PN05-8), and two vibrating wire piezometers (VW17-01 and VW17-02). **Figure 1** attached provides a schematic of the site. The instruments were read by Mahendran Senthoran, M.Eng., EIT and Akintola Fakinlede, M.Sc., Engineering Technologist on May 6, 2022.

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 markings in relation to the top of SI casing. The pneumatic piezometers (PN) were read with an RST Instruments C-109 Pneumatic Readout. The vibrating wire piezometers (VW) were read with an RST VW2106 readout box.

GPS coordinates of all instruments were obtained using a Garmin eTrex 10 handheld GPS unit.

2.0 INTERPRETATION

2.1 GENERAL

The SI plots are provided in the attachments and summarized in the following sections. The movement rates, total cumulative movement, maximum movement rates, and incremental movements since initializing each SI are provided in **Table NC044-1** and the attachments.

Plots for the piezometric levels are provided in the attachments with summaries provided in **Table NC044-2** and **Table NC044-3**.

2.2 MONITORING RESULTS

2.2.1 Slope Inclinometer

SI17-01 has a movement zone at approximately 6.7 m to 10.6 m below ground surface (bgs). During the Spring 2022 reading cycle, 2 mm of incremental movement was recorded corresponding to a current movement rate of 2 mm/yr. The overall movement rate is about 2 mm/yr since Spring 2018.

SI17-02 has a zone of movement at approximately 11 to 12 m below ground surface (bgs). The current reading shows less than 1 mm movement since the last reading in Spring 2021. There appears to be creep movement at a rate of less than 1 mm/yr since Spring 2018.

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2.2.2 Piezometers

Pneumatic piezometer **PN05-8** showed an increase of 0.1 m in the piezometric level since the Spring 2021 reading cycle. An overall trend of increasing pore pressure has been developing since about 2010.

The piezometric level in **VW17-01** showed an increase of 0.1 m while **VW17-02** showed a decrease of 0.2 m, compared to the Spring 2021 reading cycle.

3.0 FUTURE WORK

It is recommended that all instruments be monitored again during the Spring 2023 reading cycle.

3.1 INSTRUMENTATION REPAIRS

PN05-4, PN05-5, and PN05-9 are damaged and are considered unrepairable.

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Table NC044-1: Spring 2022 Slope Inclinometer Reading Summary

Instrument Name	Date Initialized	Coordinates ⁽¹⁾ (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							
SI17-01	November 24, 2017	5942550	642823	14 over 6.7m to 10.6m depth in 352° direction	10 in May 2018	Operational	July 6, 2021	2	2	<1
SI17-02	November 24, 2017	5942513	642807	4 over 9.9 m to 13.9 m depth in 0° direction	5 in May 2018	Operational	July 6, 2021	< 1	< 1	< 1

Note:
(1) Updated May 6, 2022, with approximate accuracy of ± 3 m.

Table NC044-2: Spring 2022 Pneumatic Piezometer Reading Summary

Instrument Name	Date Initialized	Coordinates ⁽¹⁾ (UTM 11U, NAD1983) (m)		Tip Elevation (m aMSL) ⁽²⁾	Ground Elevation (m aMSL)	Current Status	Maximum Piezometric Elevation (m aMSL)	Measured Piezometric Elevation (m aMSL) (Groundwater Level)	Previous Piezometric Elevation (Spring 2021) (m aMSL) (Groundwater Level)	Change in Water Level Since Previous Reading (m bgs)
		Northing	Easting							
PN05-4	May 3, 2005	-	-	733.7	744.6	Non-Operational	741.8 Oct. 2011	Damaged	Damaged	Damaged
PN05-5	May 3, 2005	-	-	729.4	739.2	Non-Operational	738.7 June 2017	Damaged	Damaged	Damaged
PN05-8	May 3, 2005	5942531	642813	729.4	739.4	Operational	739.5 Sept. 2019	739.1 (0.3 m bgs)	739.0 (0.4 m bgs)	0.1
PN05-9	May 3, 2005	-	-	984.9	737.0	Non-Operational	737.9 May 2015	Damaged	Damaged	Damaged

ote:
(1) Updated May 6, 2022, with approximate accuracy of ± 3 m.
(2) aMSL = Above Mean Sea Level

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Table NC044-3: Spring 2022 Vibrating Wire Piezometer Reading Summary

Instrument Number	Date Initialized	Coordinates ⁽¹⁾ (UTM 11U, NAD1983) (m)		Tip Elevation (m aMSL) ⁽²⁾	Ground Elevation (m aMSL)	Current Status	Maximum Piezometric Elevation (m aMSL)	Measured Piezometric Elevation (m aMSL) (Groundwater Level)	Previous Piezometric Elevation (Spring 2021) (m aMSL) (Groundwater Level)	Change in Water Level Since Previous Reading (m bgs)
		Northing	Easting							
VW17-01 (100D1700257)	Nov. 24, 2017	5942550	642823	729.0	741	Operational	738.9 May 8, 2018	738.0 (3.0 m bgs)	737.9 (3.1 m bgs)	0.1
VW17-02 (100D1701604)	Nov. 24, 2017	5942513	642807	727.7	737	Operational	736.6 Sept. 24, 2019	736.0 (1.0 m bgs)	736.2 (0.8 m bgs)	-0.2
Note: (1) Updated May 6, 2022, with approximate accuracy of ± 3 m. (2) aMSL = Above Mean Sea Level										

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4.0 CLOSING

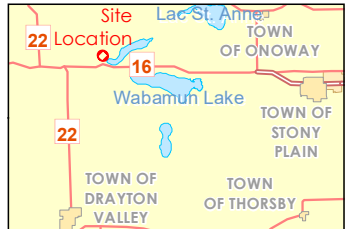
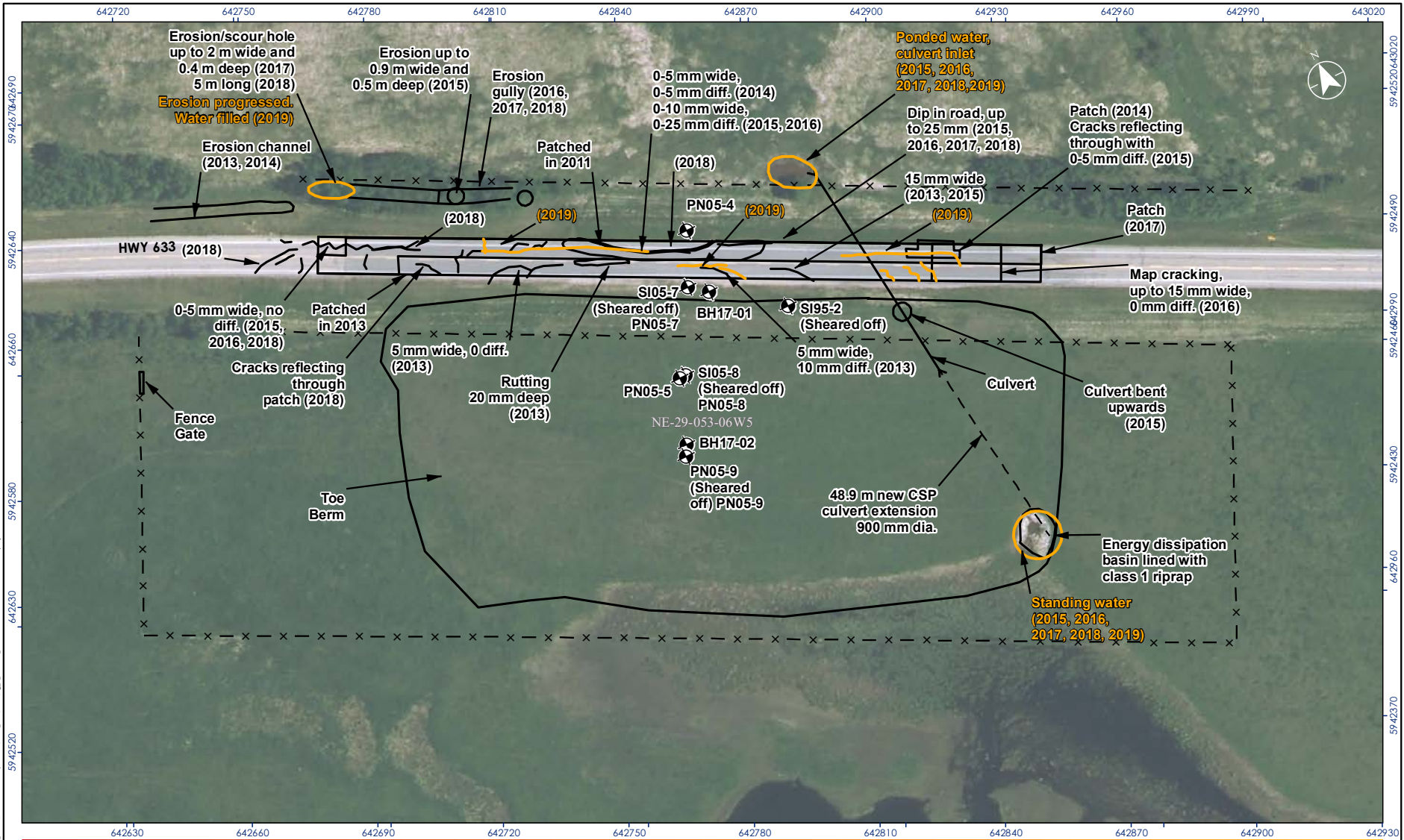
We trust this instrumentation report meets your requirements. If you have any questions, please do not hesitate to contact the undersigned.






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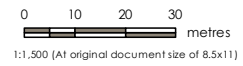
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Attachment: Figure 1 – Site Plan
S117-01 Slope Inclinometer Plots
S117-02 Slope Inclinometer Plots
Piezometer Depth vs Time Plot
Piezometer Elevation vs. Time Plot



-  Borehole Location
-  Previous Observation
-  2019 Observation
-  Fence
-  Quarter Section



- Notes**
1. Coordinate System: NAD 1983 UTM Zone 11 N
 2. Base features: Geogratis, ©Department of Natural Resources Canada. All rights reserved.
 3. Imagery: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community (2017).

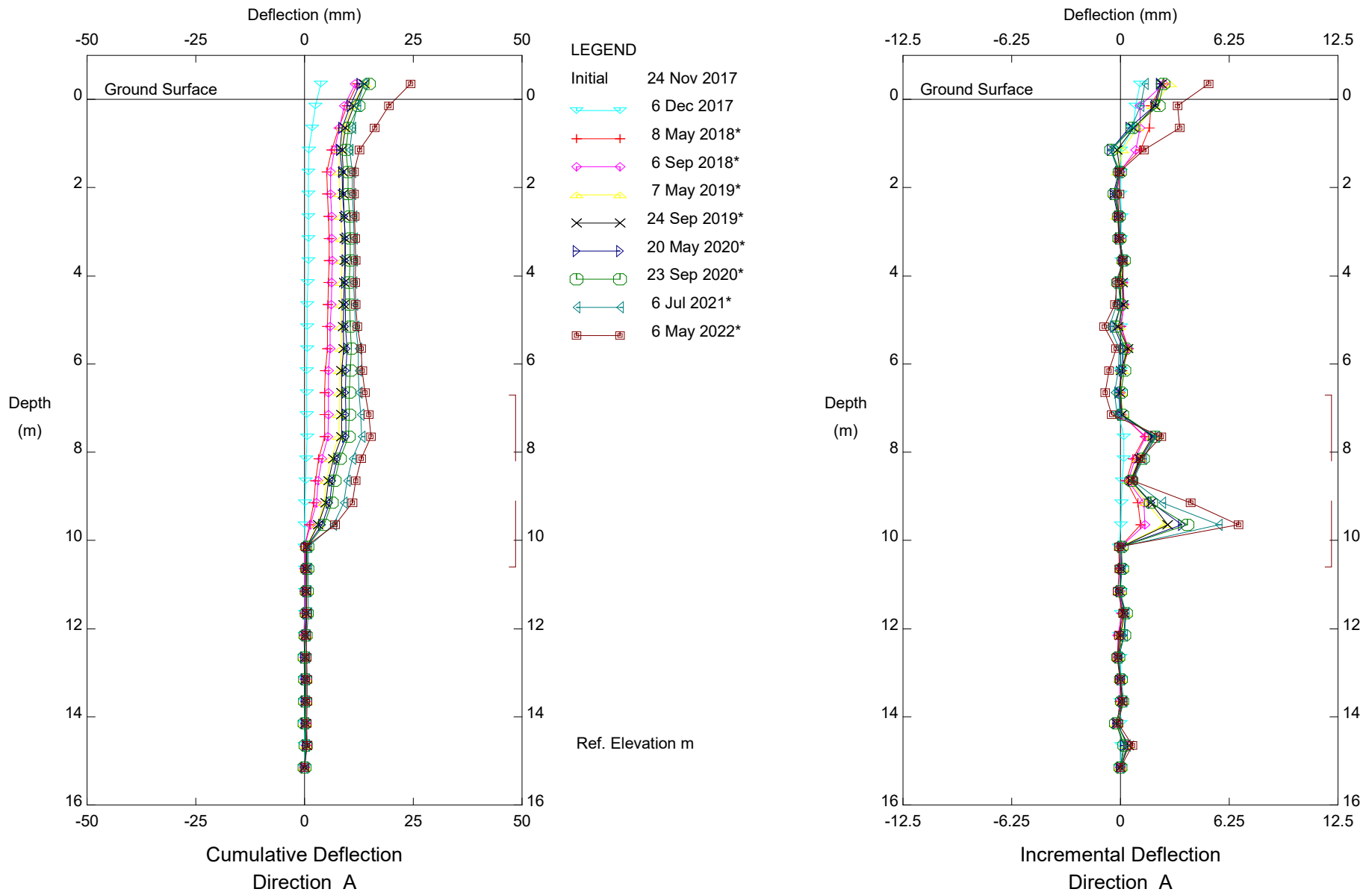
Project Location
 Hwy 633
 Parkland County, Alberta
 Prepared by MK on 2019-07-30
 Quality Review by XL on 2019-07-30
 Approved by LC on 2019-07-30

Client/Project
 Alberta Transportation
 Geohazard Monitoring Program
 NC44 Cattle Pass East
 Figure No.
 1

Title
Site Plan



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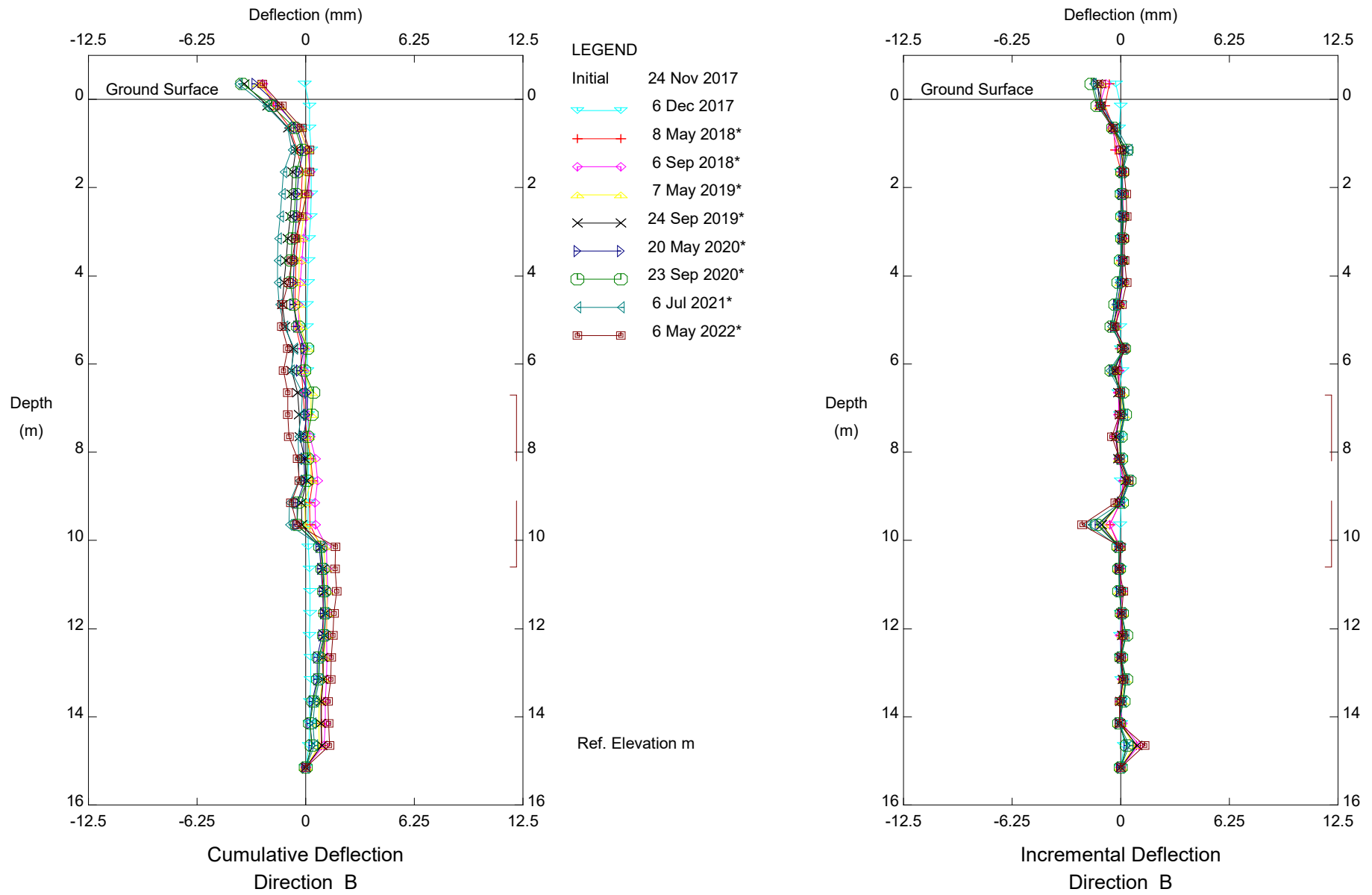


HWY 633:02 Cattlepass East (NC044), Inclinometer SI17-01

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

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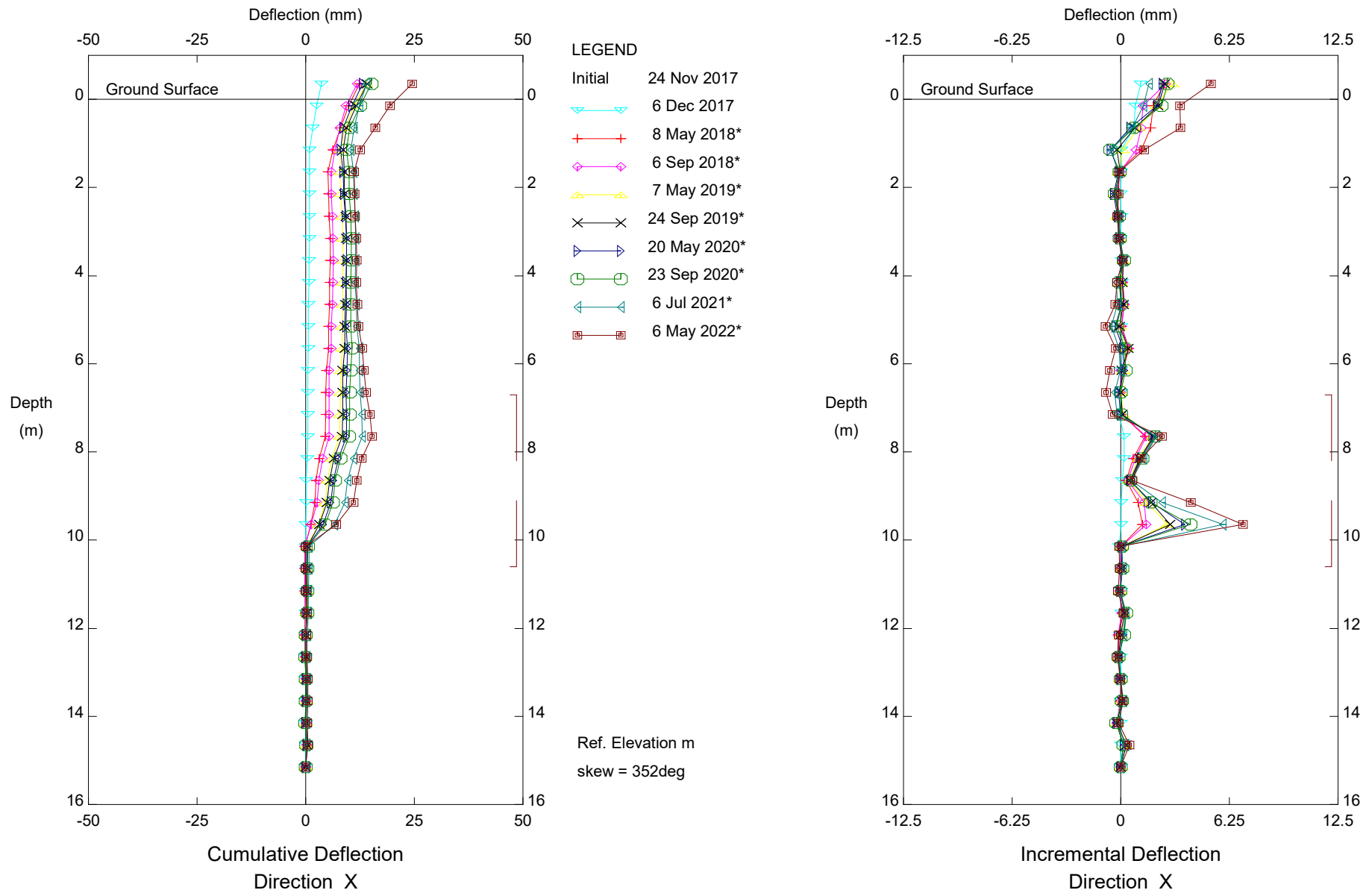


HWY 633:02 Cattlepass East (NC044), Inclinometer SI17-01

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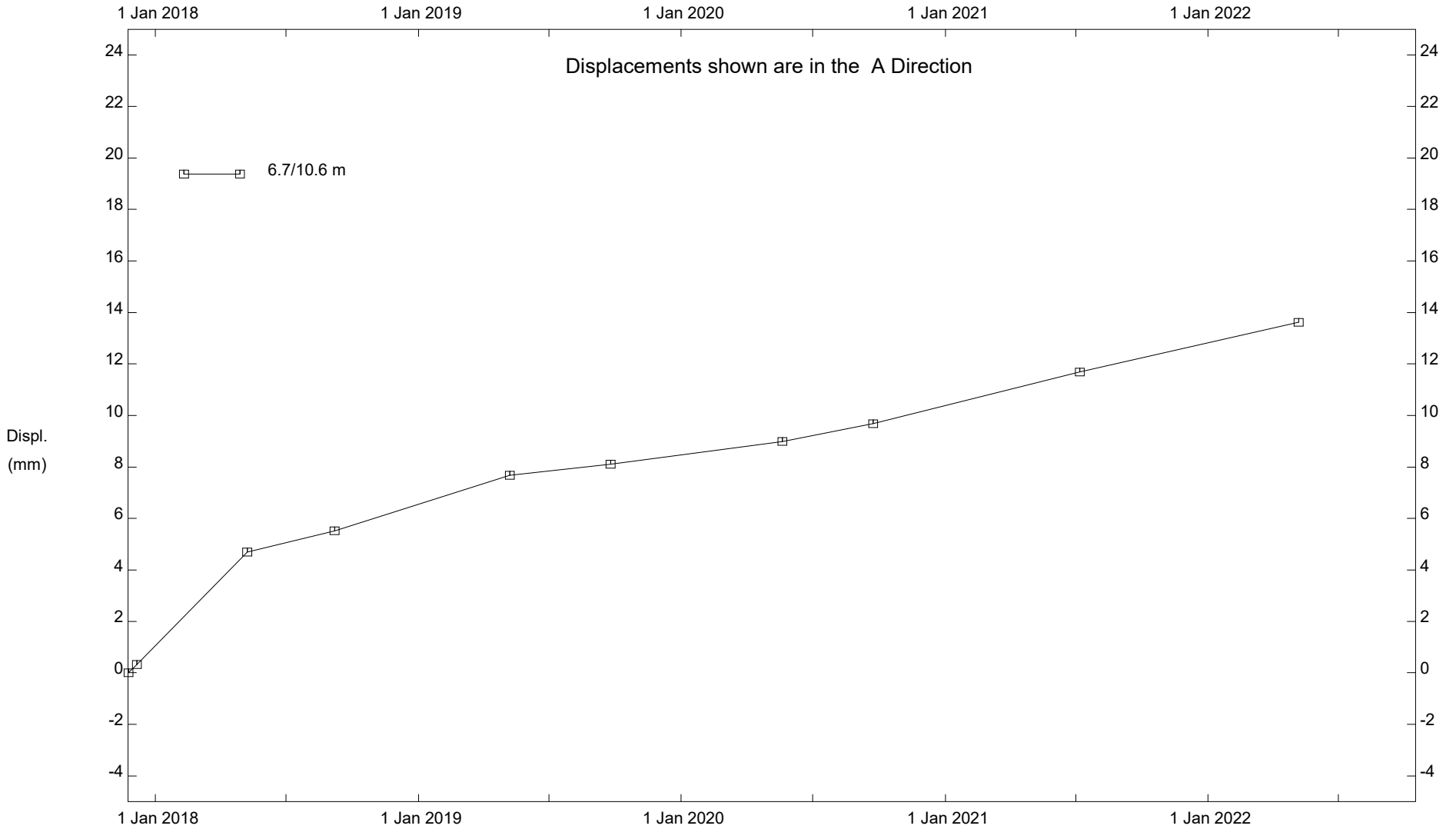


HWY 633:02 Cattlepass East (NC044), Inclinometer SI17-01

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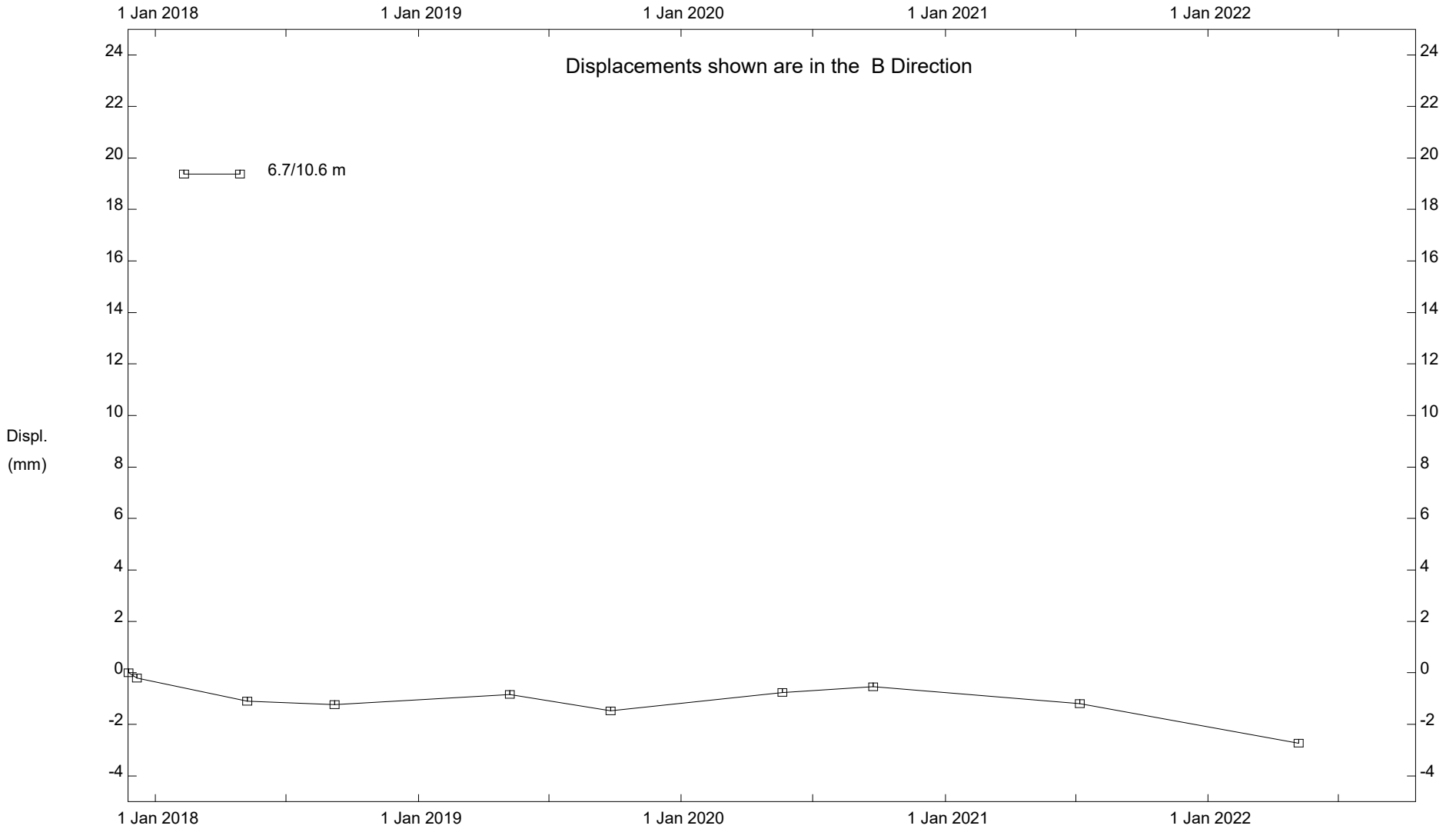
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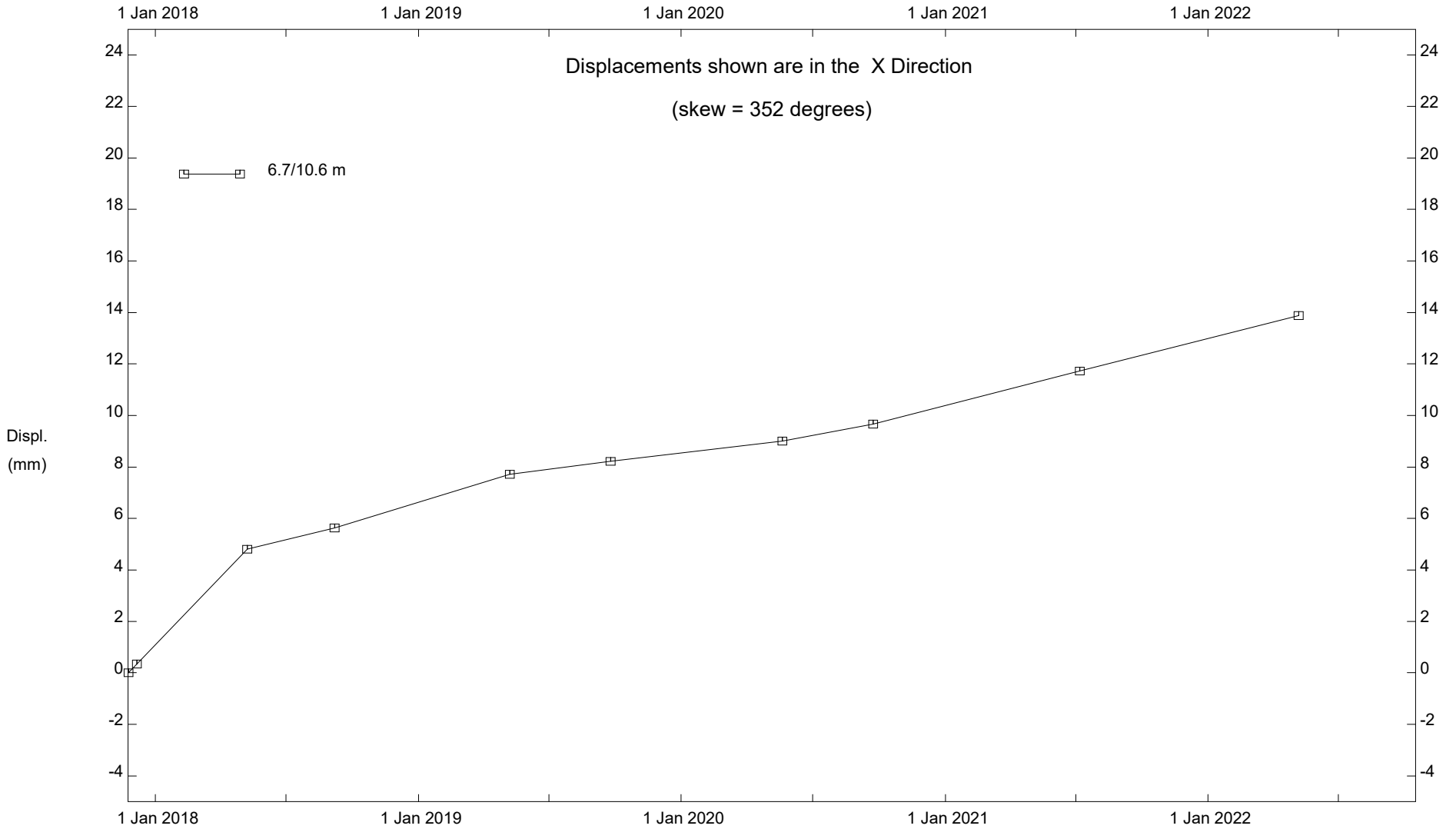
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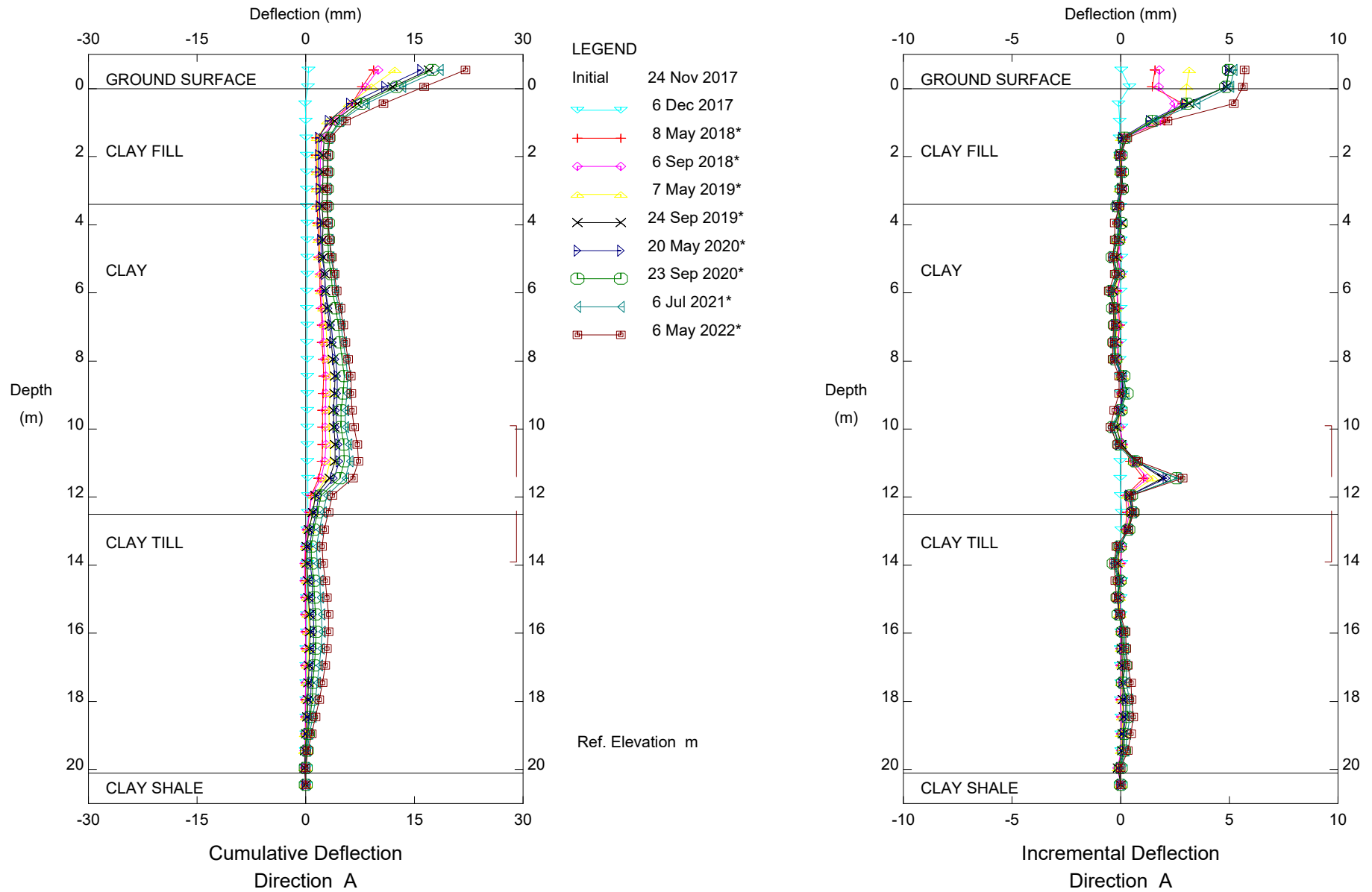
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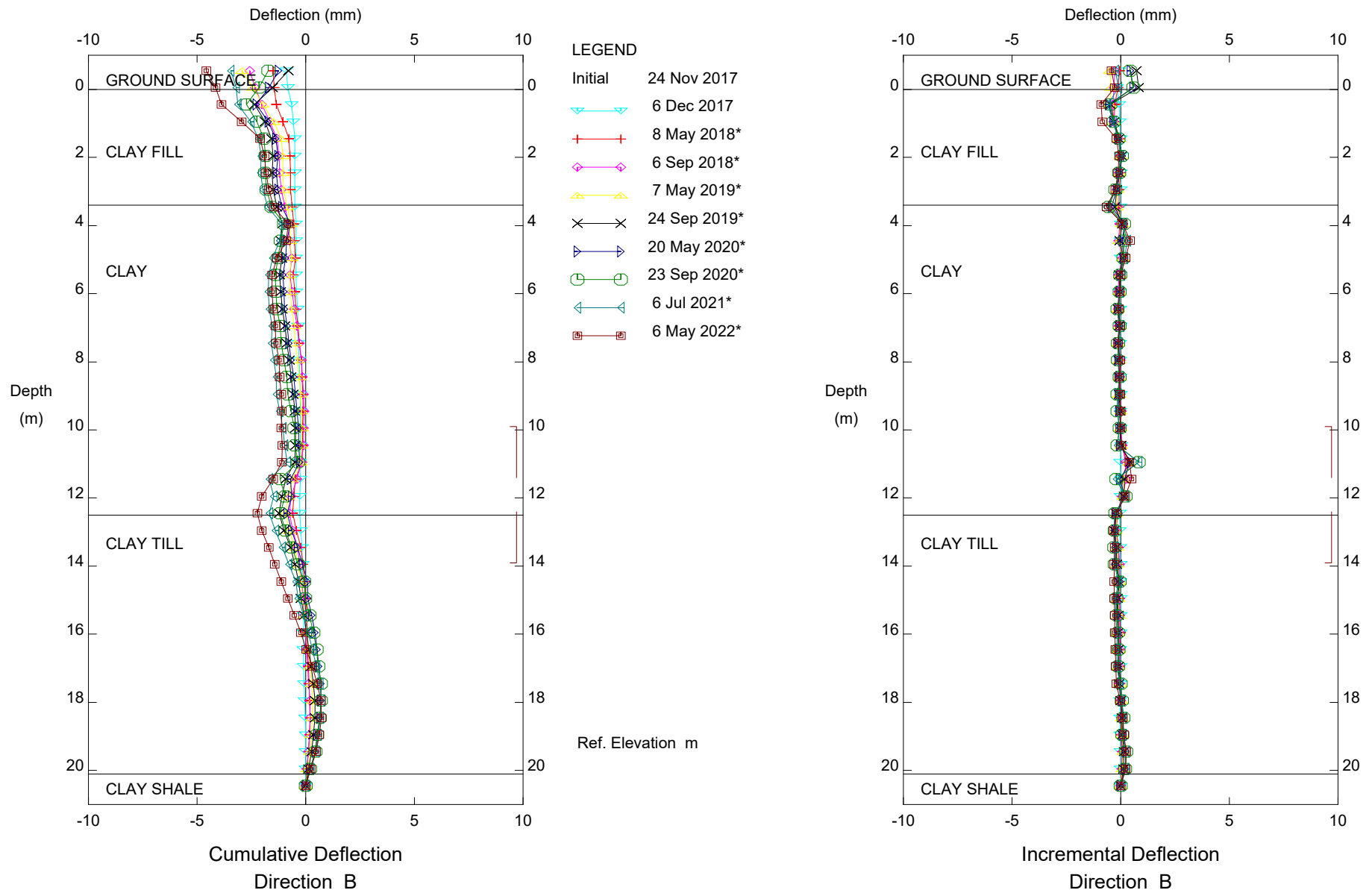
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HWY 633:02 Cattlepass East (NC044), Inclinometer SI17-02

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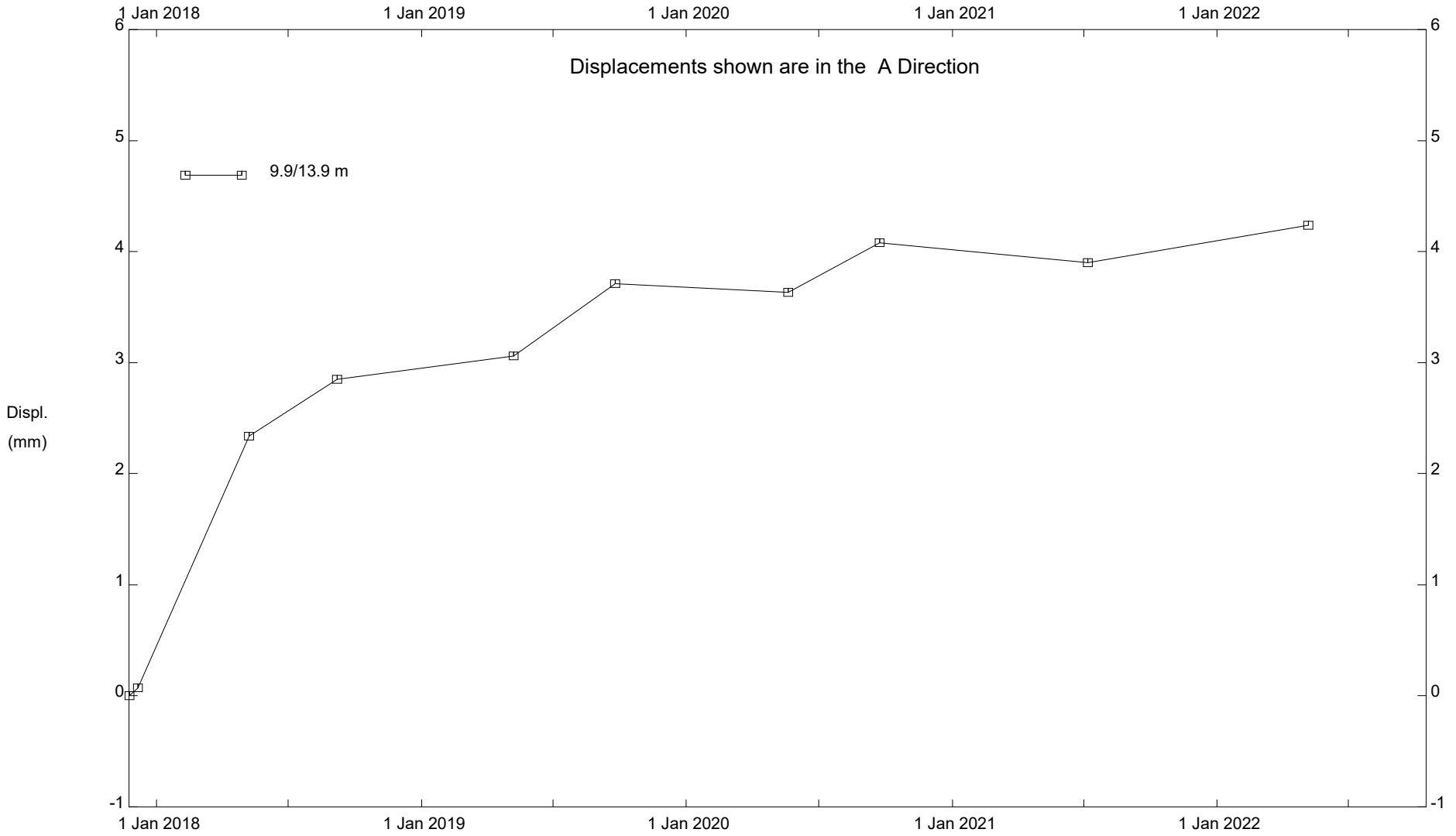


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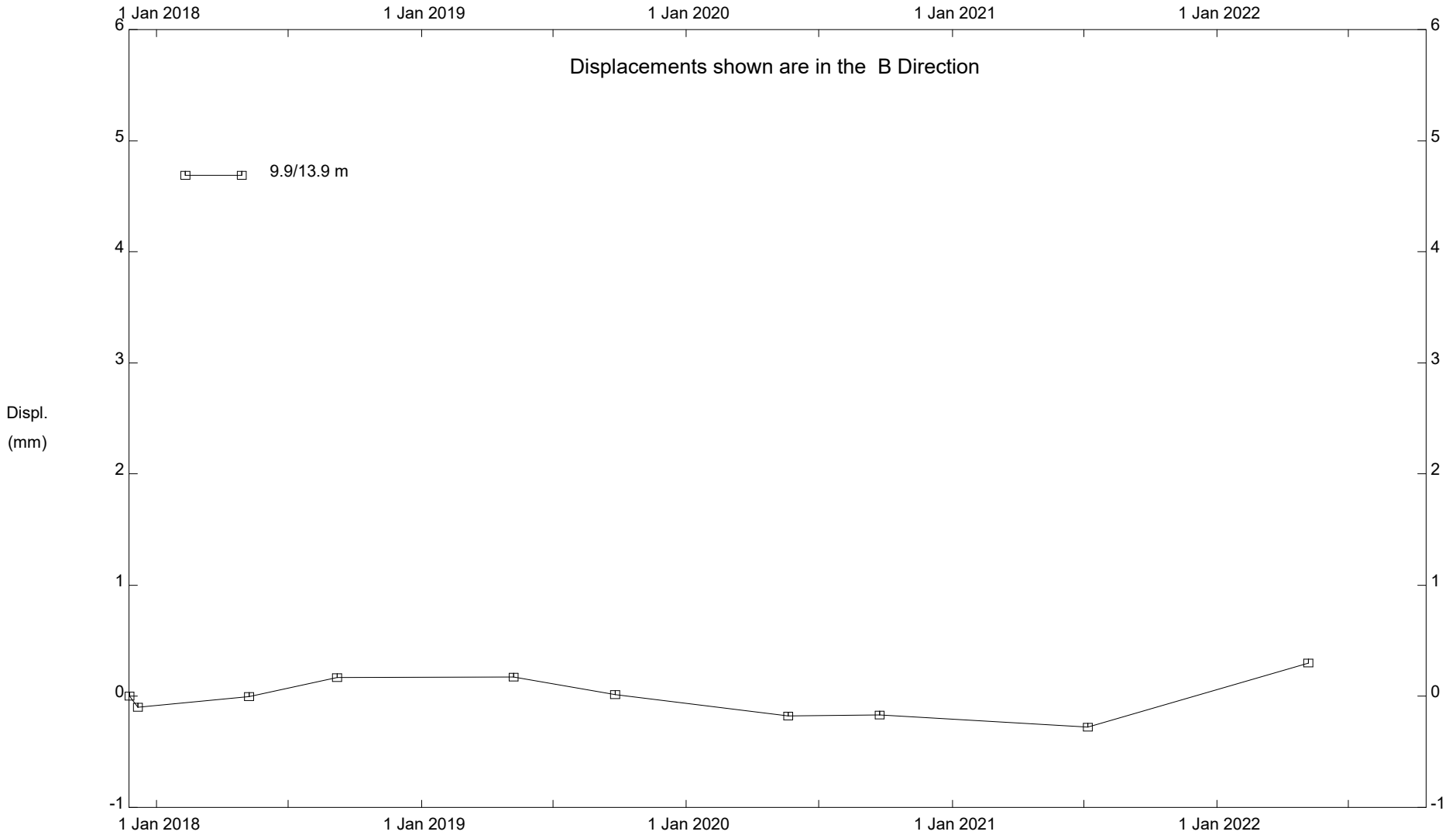
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HWY 633:02 Cattlepass East (NC044), Inclinometer S117-02

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HWY 633:02 Cattlepass East (NC044), Inclinator SI17-02

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