
To:	Amy Driessen Alberta Transportation	From:	Leslie Cho and Xiteng Liu Stantec Consulting Ltd.
File:	123315222	Date:	October 7, 2022

Reference: North Central Region, Edson, Site NC083 - Highway 40:30 West of Wildhay River, Fall 2022 Instrumentation Monitoring Report

OBSERVATIONS

FIELD PROGRAM AND INSTRUMENTATION STATUS

The Fall 2022 reading cycle consisted of instrument readings of three slope inclinometers (SI17-01, SI17-02, and SI17-03) and three vibrating wire piezometers (VW17-01, VW17 02, and VW17-03). **Figure 1** attached provides a schematic of the site. The instruments were read by Sonja Pharand, EIT and Brian Qin, EIT on September 8, 2022.

The slope inclinometers (SI) were measured using an RST MEMS digital inclinometer probe with 0.5 m increments and RST handheld PC. The vibrating wire piezometers (VW) were read with an RST VW2106 readout box.

GPS coordinates of all instruments were obtained using a Garmin GPSmap 60Cx handheld unit.

INTERPRETATION

GENERAL

The SI plots are provided in the attachments and summarized in the following sections. Plots in both directions along with movement rates, total cumulative movement, maximum movement rates, and incremental movements are provided in **Table NC083-1** and the attachments.

The vibrating wire piezometer results are summarized in **Table NC083-2** and in the following sections with resulting plots attached.

ZONES OF MOVEMENT

No new zones of movement were observed in any of the operational slope inclinometers. Directions of movement are referenced to the azimuth of the A+ groove in each SI casing in **Table NC083-1**.

INSTRUMENTATION READINGS

Slope Inclinometers

SI17-01 shows three zones of movement at approximately 2 m, 6 m and 9 m below ground surface (bgs). Since initialization in December 2017, SI17-01 has accumulated 28 mm, 52 mm and 33 mm of movement in the upper, middle and lower shear zones, respectively. Their current respective rates of movement for the

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three zones are 10 mm/yr, 11 mm/yr and 9 mm/yr. All three shear zones show increased rates of movement compared to the last reading cycle in Spring 2022.

SI17-02 shows 9 mm/yr in the rate of movement during this reading cycle with 31 mm of cumulative movement.

SI17-03 has three zones of movement at approximately 3 m, 6 m and 10 m bgs. The upper movement zone is located within the fill and shows an increase in rate of movement of 5 mm/yr since the previous reading cycle. The current rate of movement in the upper zone is 5 mm/yr.

The middle movement zone at 6 m bgs shows current movement rate of 13 mm/yr. This represents an increased rate of movement of 7 mm/yr since the previous reading cycle.

The lower movement zone at 10 m bgs shows an increase in rate of movement of 8 mm/yr since the previous reading cycle. The current rate of movement for this lower movement zone is 8 mm/yr.

Piezometers

All piezometers show an increase in water level between 0.2 m and 0.3 m for the current reading cycle. The piezometric levels measured were between 0.3 m and 0.5 m below ground surface (bgs). In general, the piezometric levels have been in the same range since Spring 2018.

RECOMMENDATIONS

FUTURE WORK

It is recommended that the next reading cycle take place in Spring 2023.

INSTRUMENTATION REPAIRS

No instruments require repair at this time.

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Table NC083-1: Fall 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	Dec 05, 2017	5935074	437715	28 over 1.5 m to 3.0 m depth in 339° direction	33 mm/yr; Sept. 2019	Operational	May 3, 2022	4	10	9
				52 over 4.9 m to 6.4 m depth in 339° direction	33 mm/yr; Sept. 2019			4	11	9
				33 over 8.4 m to 9.9 m depth in 339° direction	25 mm/yr; Sept. 2019			3	9	8
SI17-02	Dec 05, 2017	5935097	437707	31 over 12.8 m to 14.2 m depth in 346° direction	23 mm/yr; Sept. 2019	Operational	May 3, 2022	3	9	8
SI17-03	Dec 05, 2017	5935075	437739	19 over 2.2 m to 3.8 m depth in 340° direction	16 mm/yr; Sept. 2019	Operational	May 3, 2022	2	5	5
				78 over 5.2 m to 7.2 m depth in 340° direction	44 mm/yr; Sept. 2019			4	13	7
				33 over 9.8 m to 11.2 m depth in 340° direction	27 mm/yr; Sept. 2019			3	8	8
Updated September 8, 2022 with approximate accuracy of ± 3 m										

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Table NC083-2: Fall 2022 Piezometer Reading Summary

Instrument Name	Date Initialized	Coordinates ⁽¹⁾ (UTM 11U, NAD1983) (m)		Bottom/Tip Elevation (m aMSL) ⁽²⁾	Current Status	Maximum Piezometric Level (m aMSL)	Measured Water Level (m aMSL) (m bgs)	Previous Water Level Fall 2021 (m aMSL) (m bgs)	Change in Water Level (m)
		Northing	Easting						
VW17-01 (100D1700261)	Dec. 5, 2017	5935074	437715	1258	Operational	1267.5 Dec. 5, 2017	1267.4 (0.3)	1267.2 (0.5)	0.2
VW17-02 (100D1701260)	Dec. 5, 2017	5935097	437707	1265	Operational	1265.2 Sep. 26, 2019	1265.1 (0.5)	1264.8 (0.8)	0.3
VW17-03 (100D1700262)	Dec. 5, 2017	5935075	437739	1261	Operational	1263.9 Dec. 5, 2017	1263.8 (0.5)	1263.6 (0.7)	0.2
Notes: (1) Updated September 8, 2022 with approximate accuracy of ± 3 m. (2) aMSL = Above Mean Sea Level									

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4.0 CLOSING

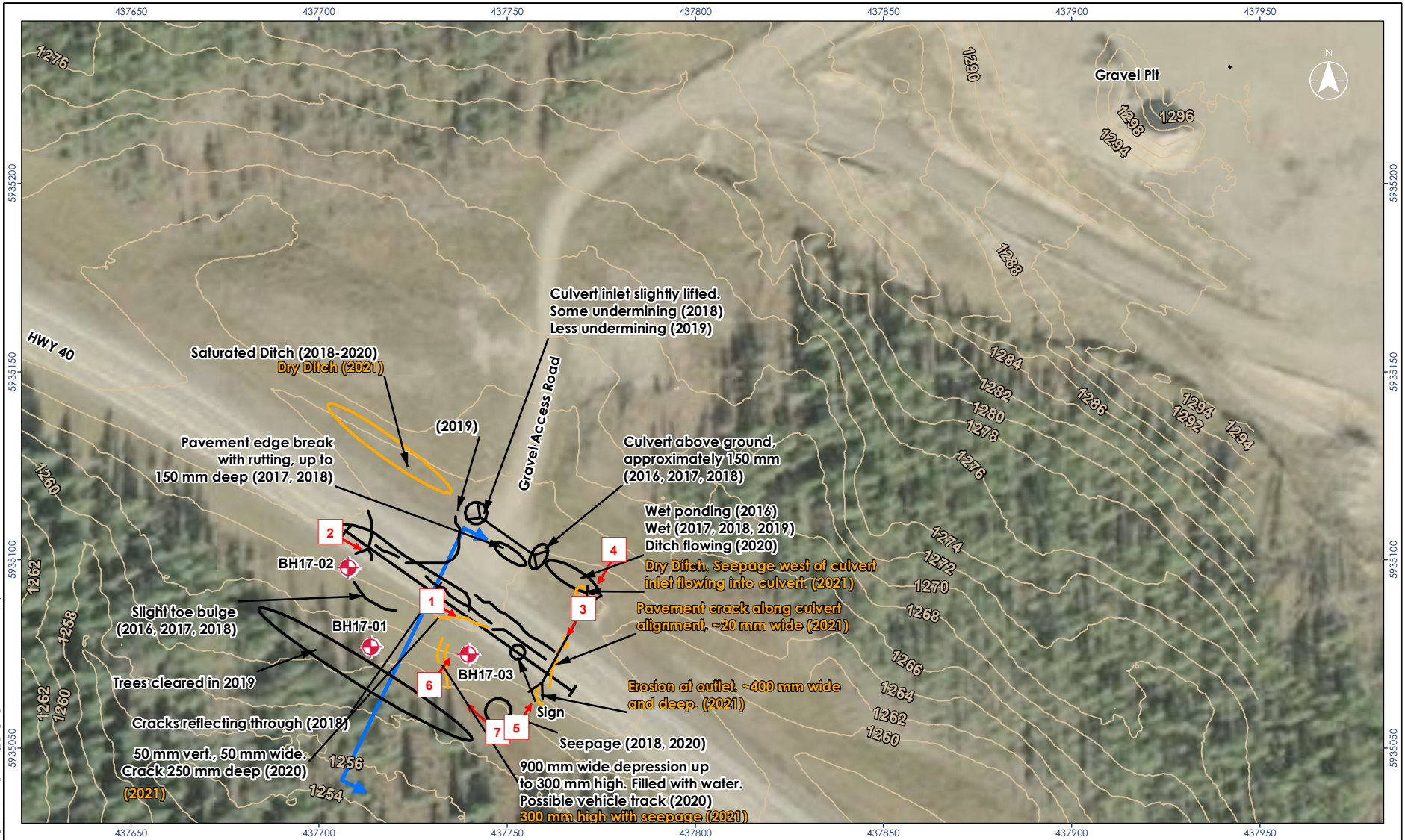
We trust this instrumentation report meets your requirements. If you have any questions, please do not hesitate to contact the undersigned.

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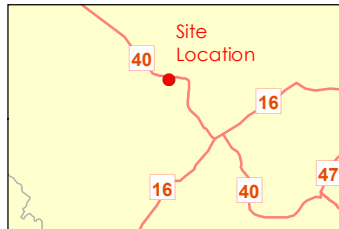
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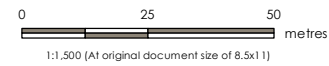
Attachment: Figure 1 – Site Plan
S117-01 Slope Inclinator Plots
S117-02 Slope Inclinator Plots
S117-03 Slope Inclinator Plots
Vibrating Wire Piezometer Elevation vs Time Plot
Vibrating Wire Piezometer Depth vs Time Plot



V:\CD001_c200\workspace\123315222_00_00\Info\01_cool\01\NC83\Section 8_2021\Fig 1 - site plan - ecd\road - Revised 2021-09-14.rvt - ajb.bmr
 5935050
 5935100
 5935150
 5935200



- Borehole Location
- Approximate Culvert Location
- Previous Observation
- 2021 Observation
- Ground Elevation Contours (m AMSL, LiDAR Sept. 2014)
- Cross Section Location
- Photo Number and Direction



Notes

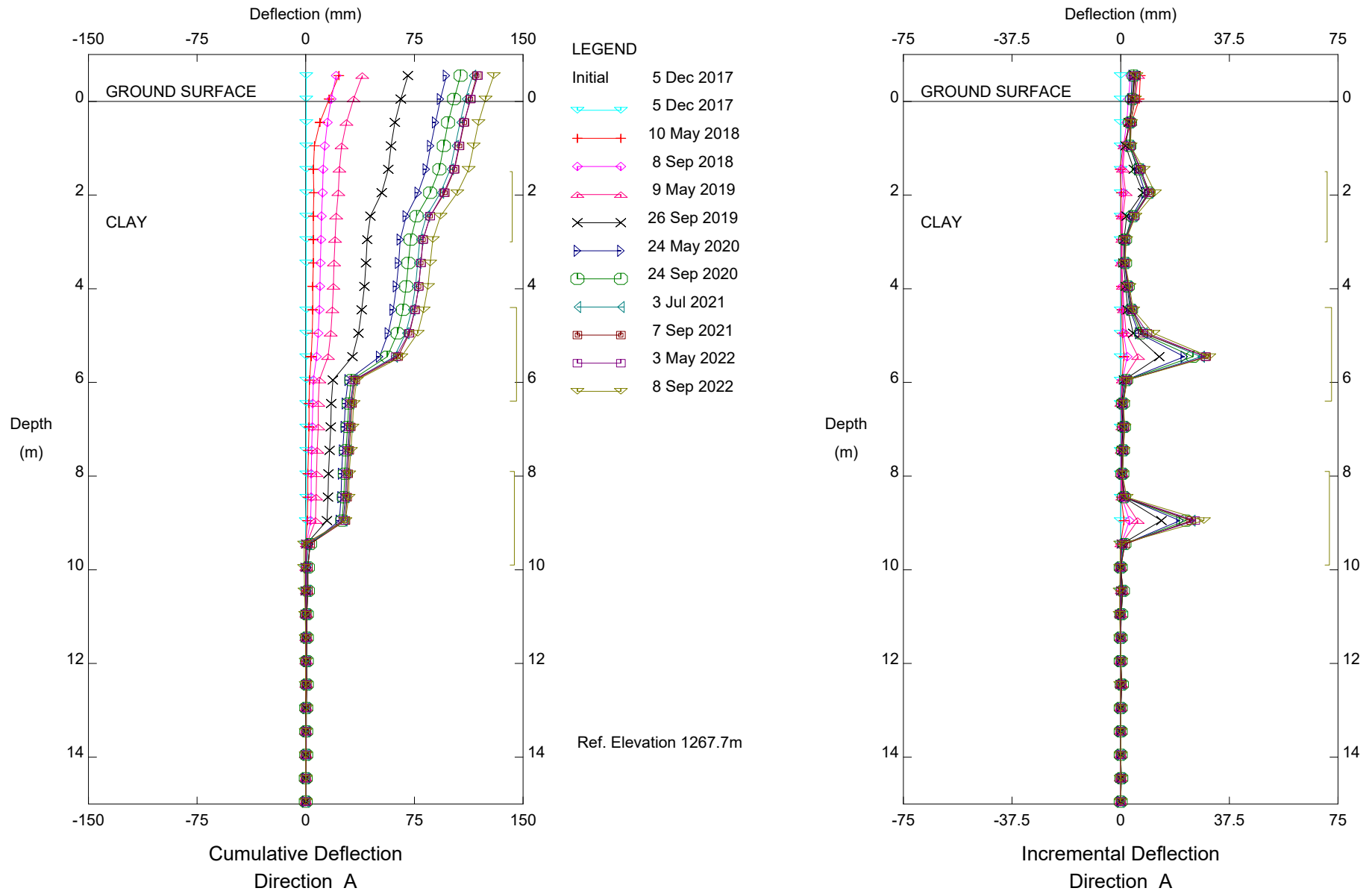
1. Coordinate System: NAD 1983 UTM Zone 11N
2. Base features: Geogratis, @Department of Natural Resources Canada. All rights reserved.
3. Imagery: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Geomapping, Aerogrid, iGN, IGP, swistopra, and the GIS User Community

Project Location: 12331 5222
 SE 8-53-27 W5M Prepared by AJ on 2021-09-02
 Yellowhead County, Alberta Quality Review by LC on 2021-09-09
 Independent Review by CM on 2021-09-09

Client/Project:
 Alberta Transportation
 Geohazard Monitoring Program
 NC83 – West of Wildhay River

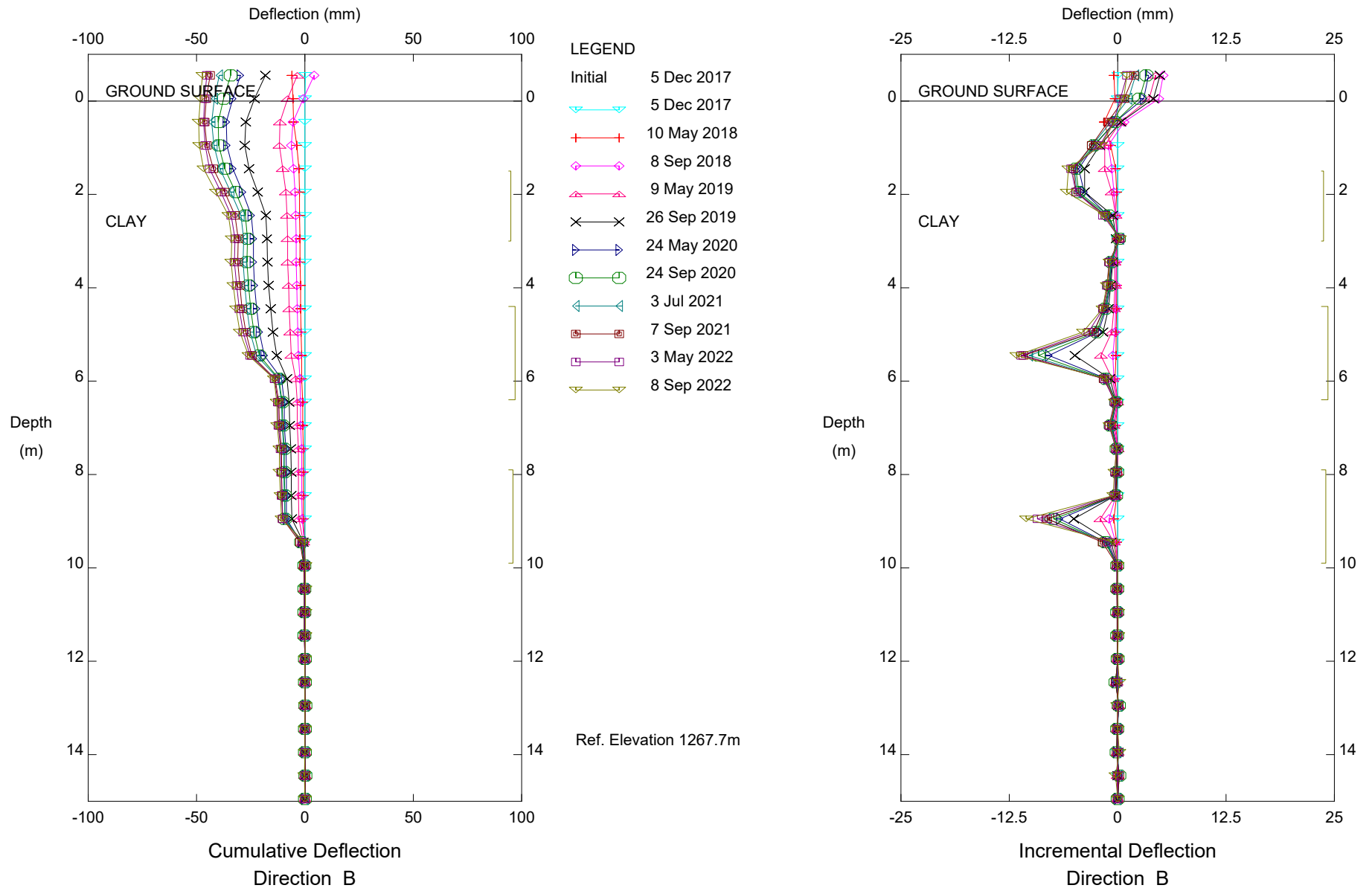
Figure No.
1
 Title
Site Plan

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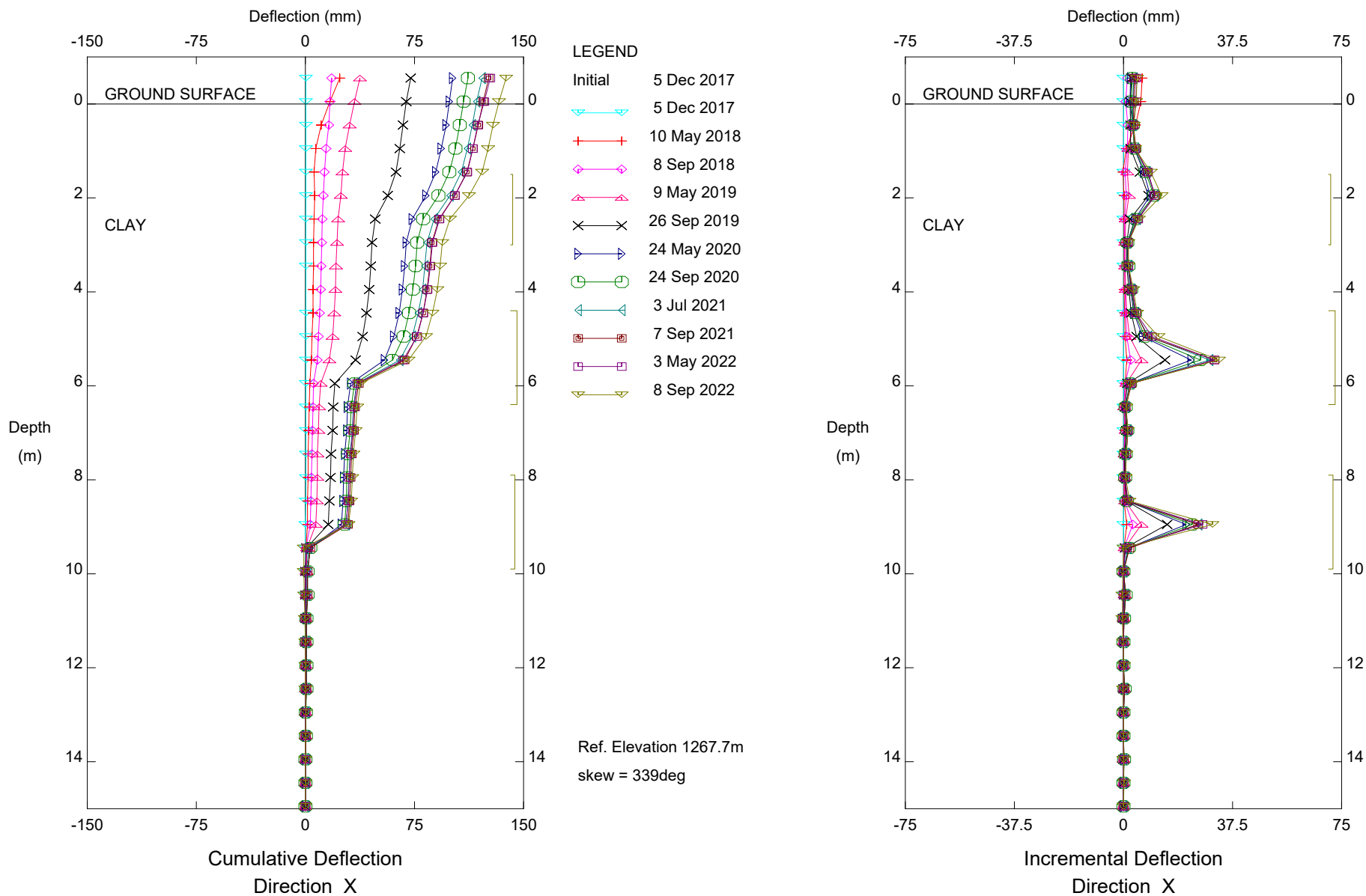


HWY 40:30 West of Wildhay River (NC83), Inclinometer SI17-01
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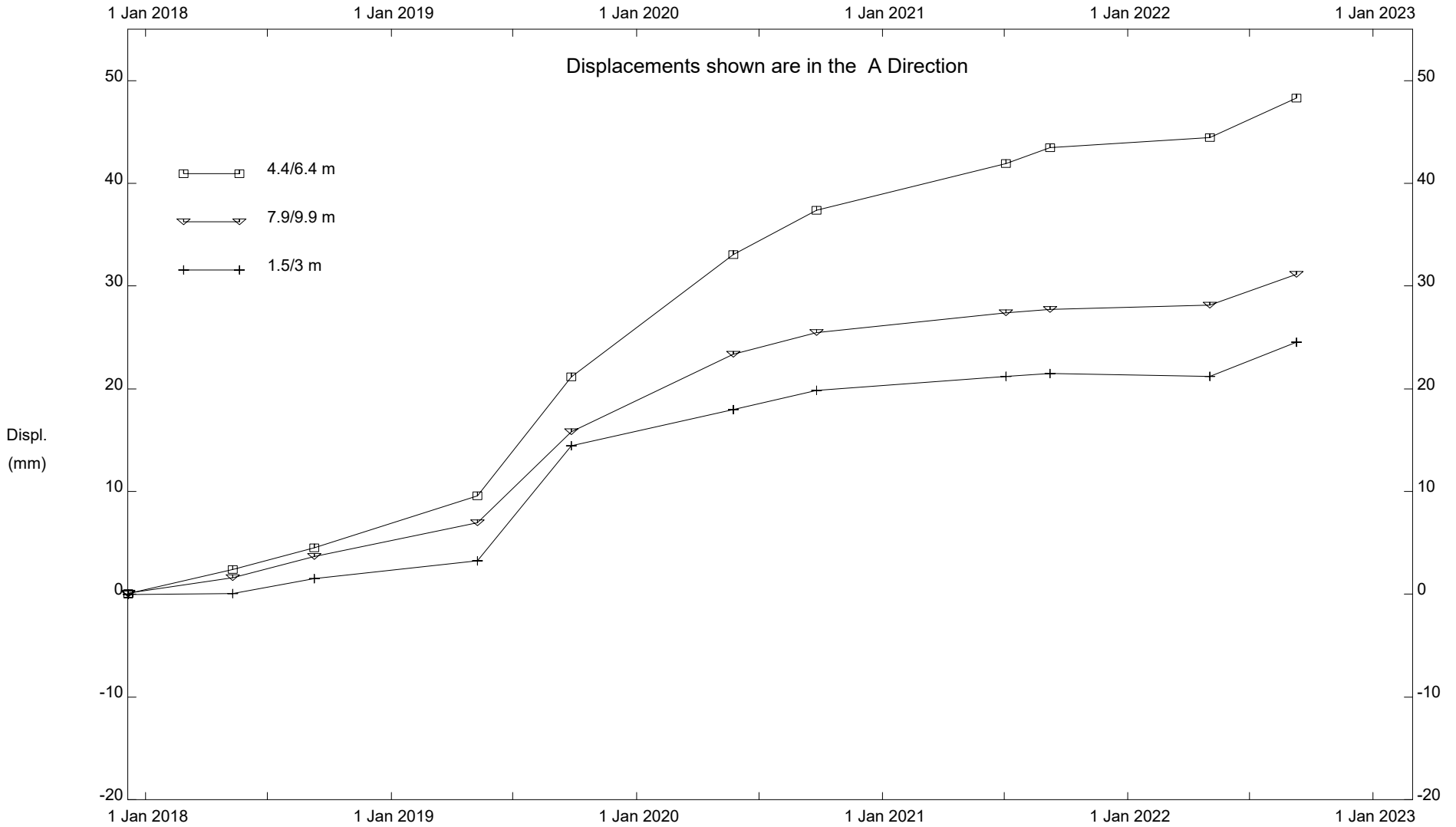
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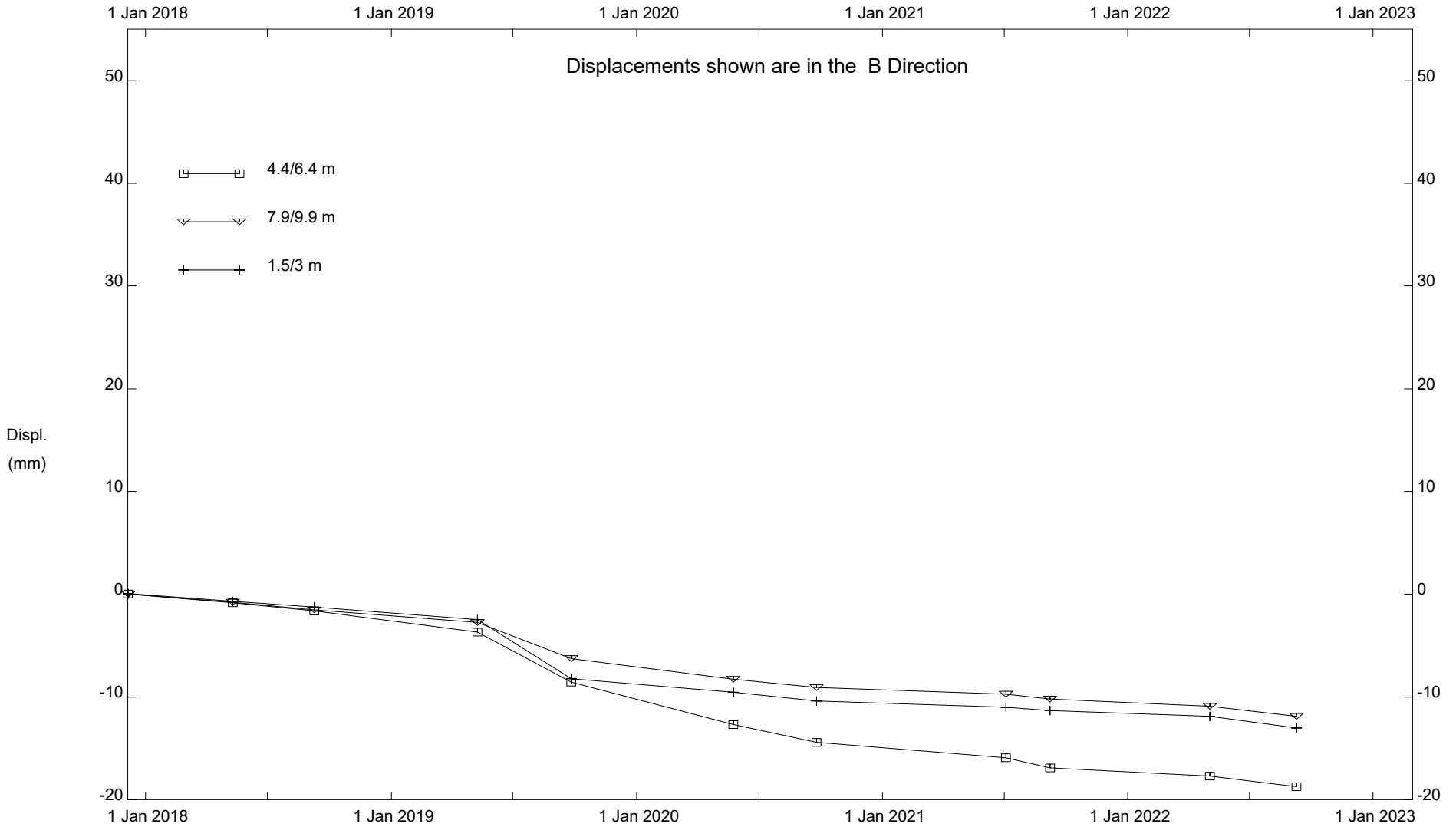


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 Alberta Transportation



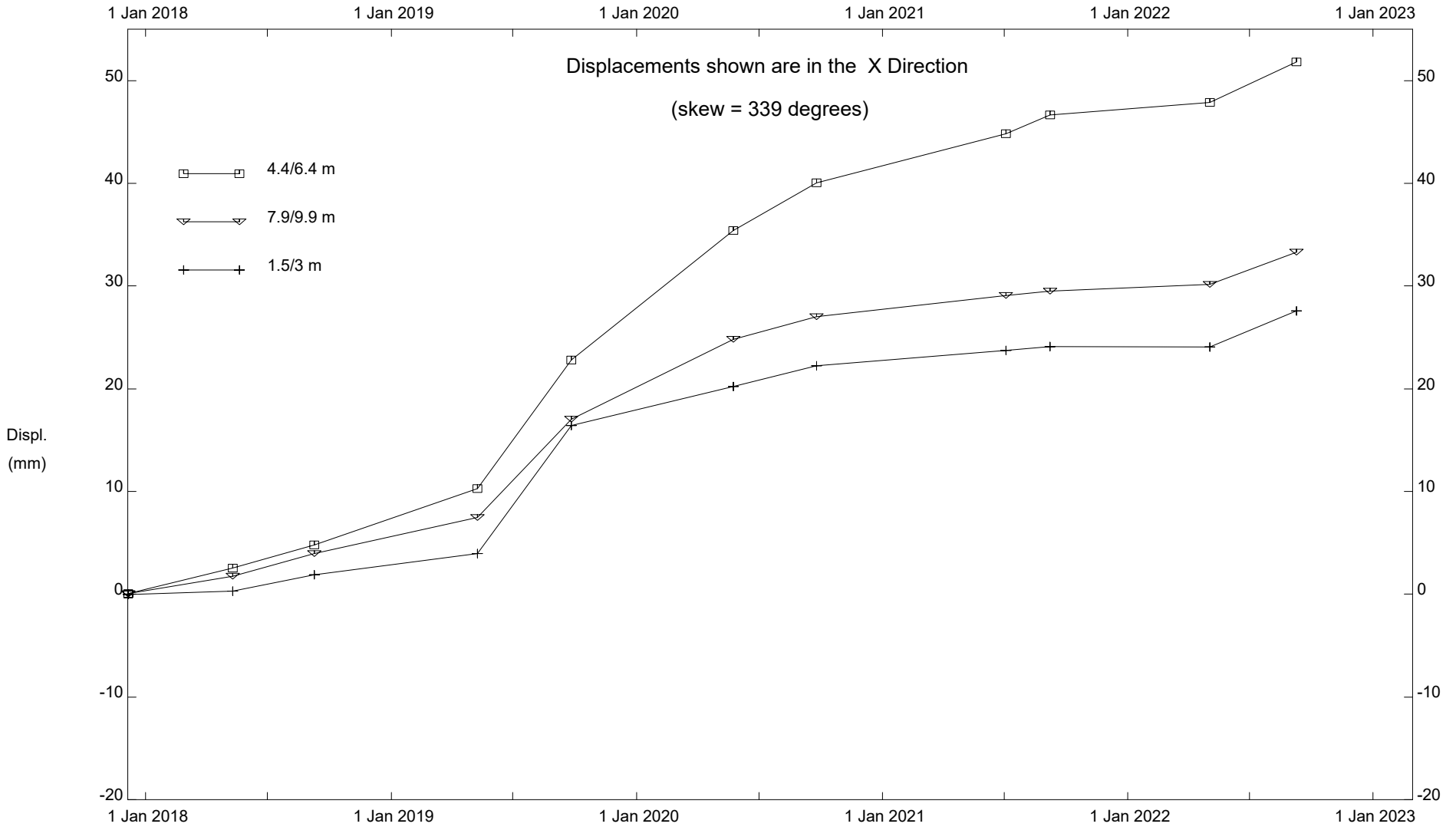
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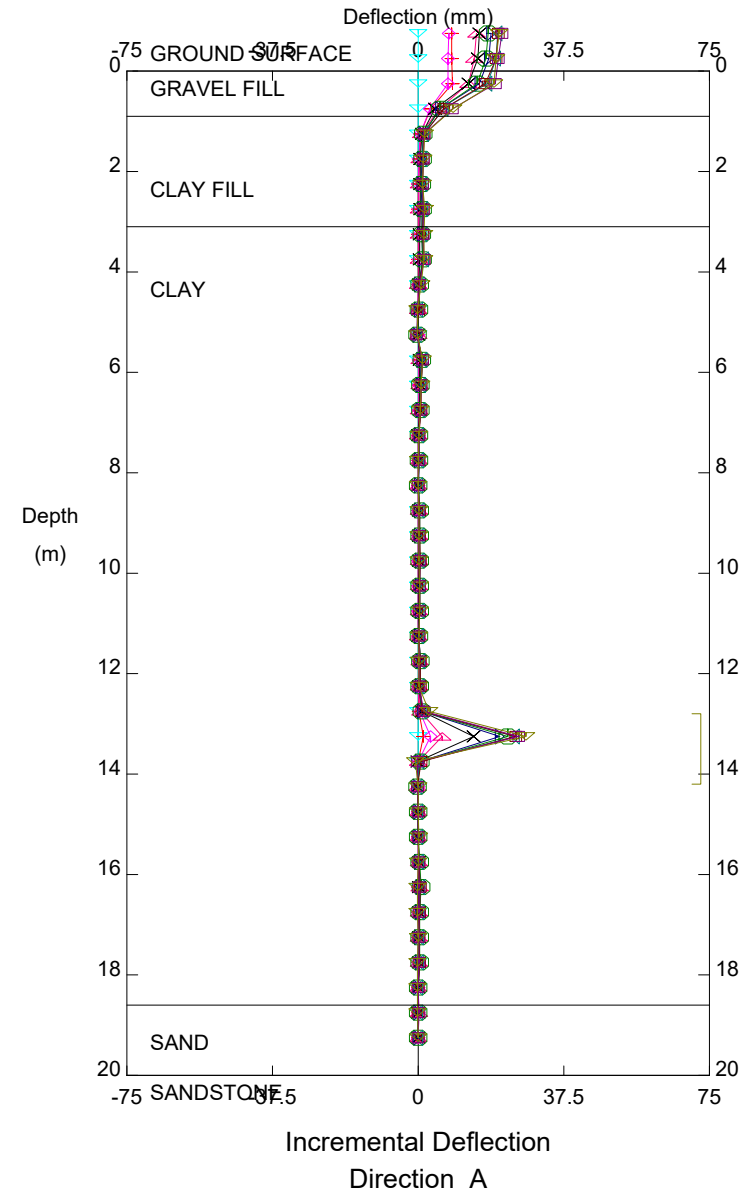
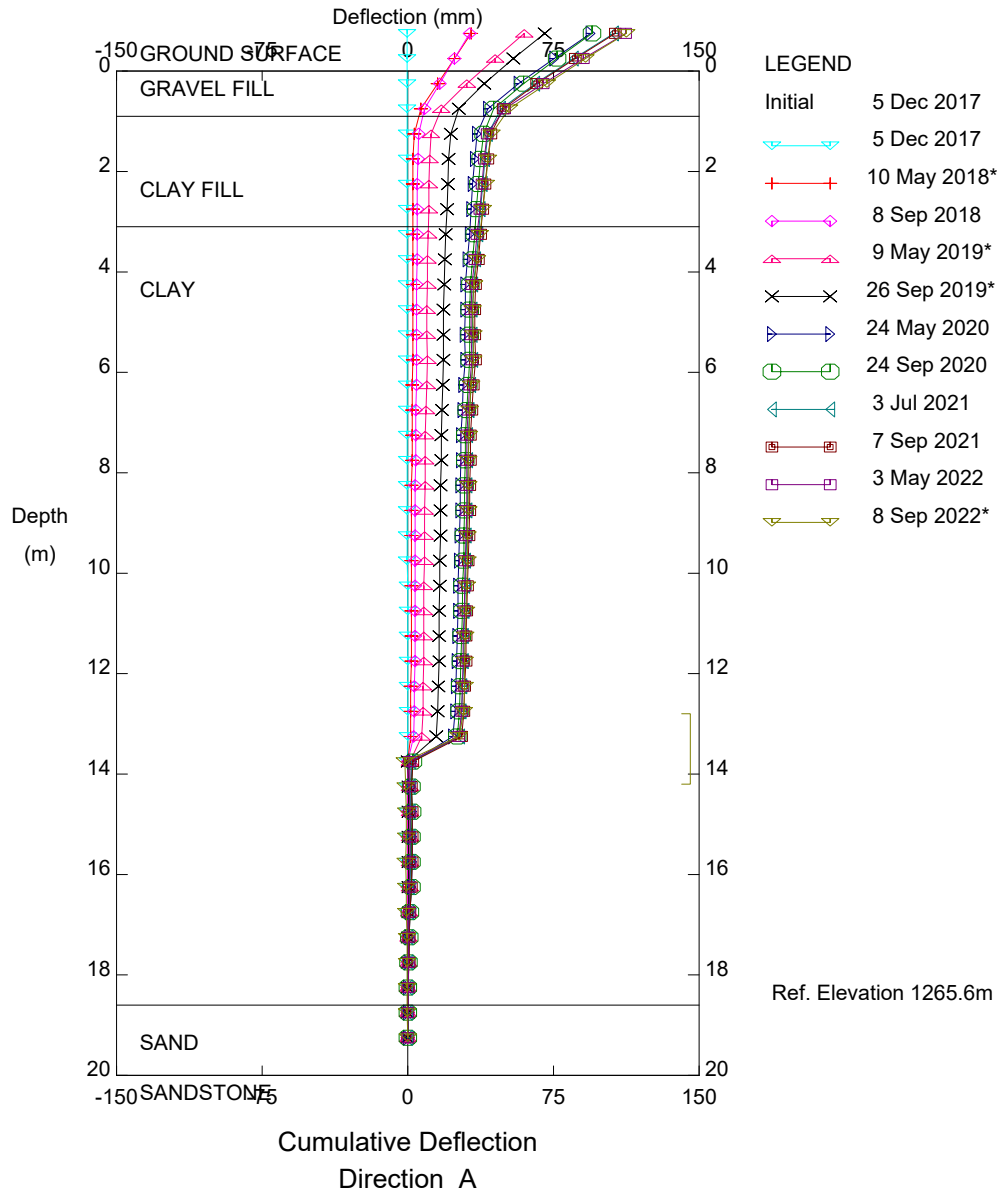
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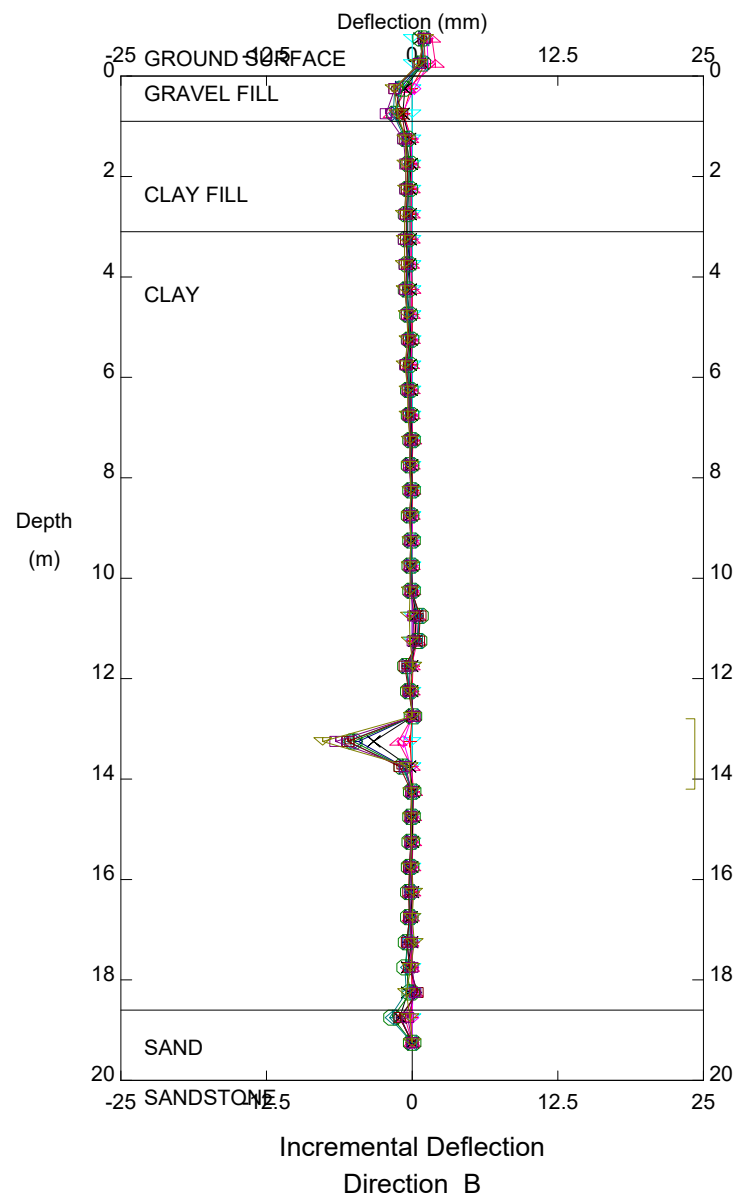
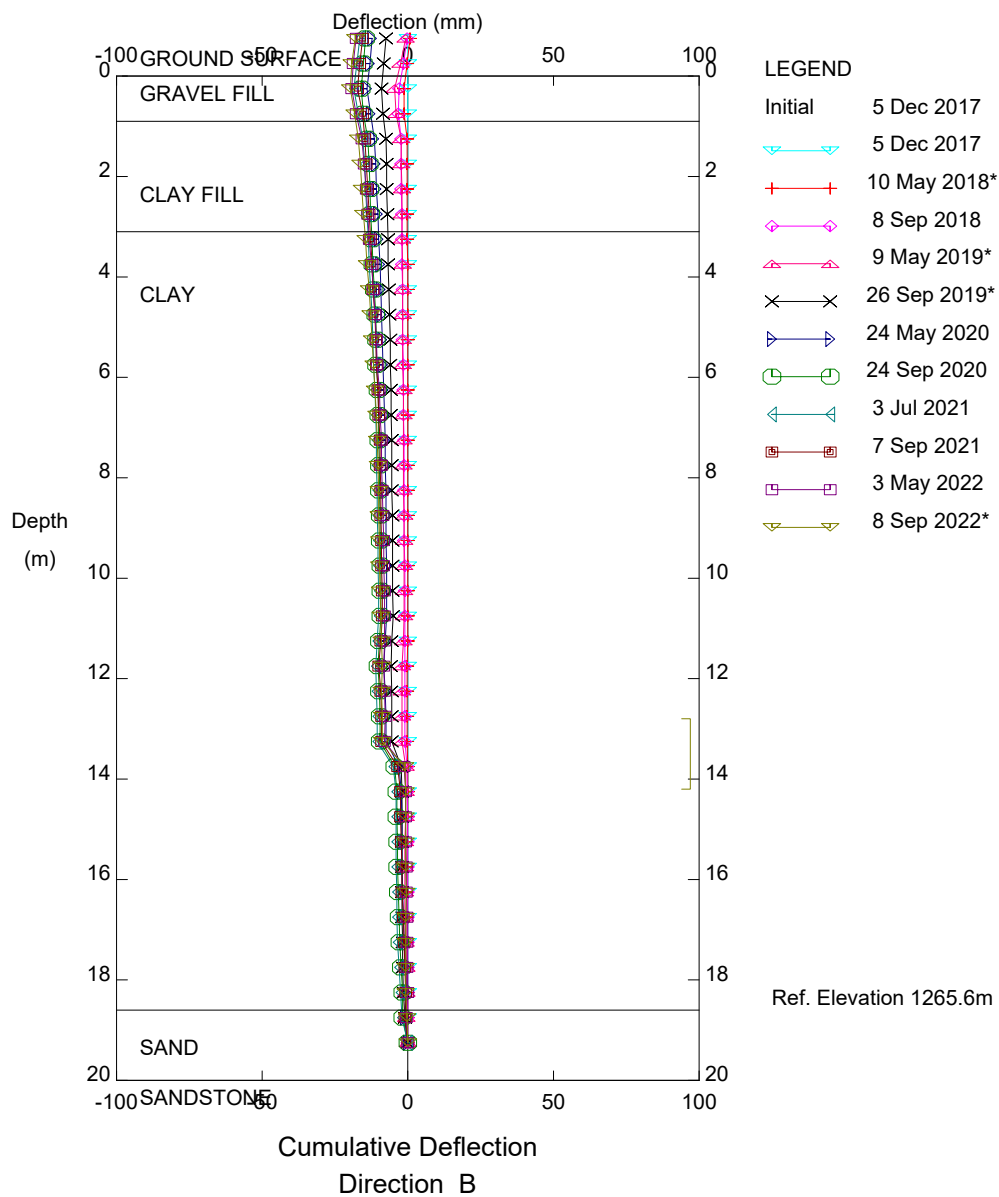
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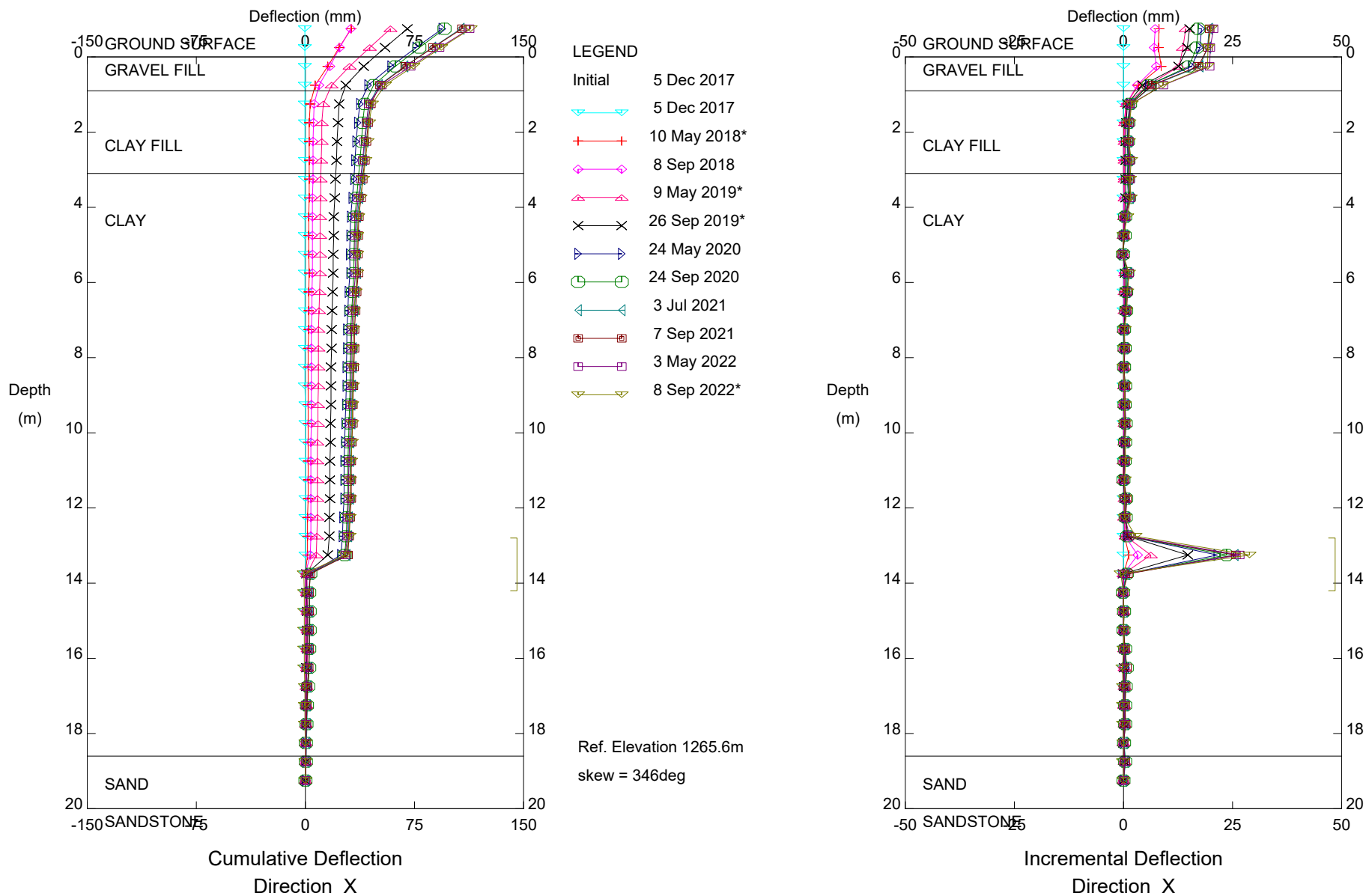
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HWY 40:30 West of Wildhay River (NC83), Inclinator S17-02
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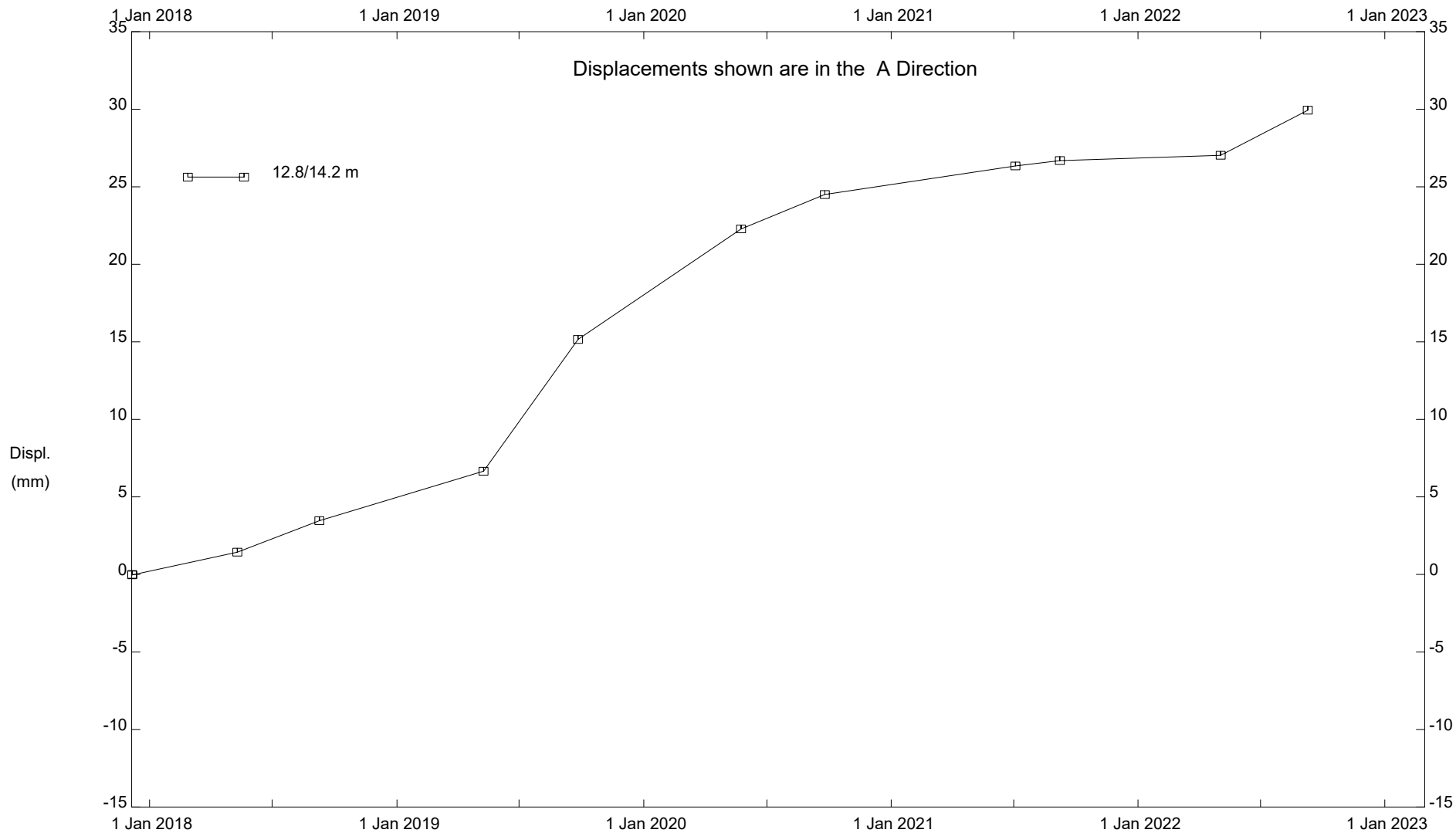


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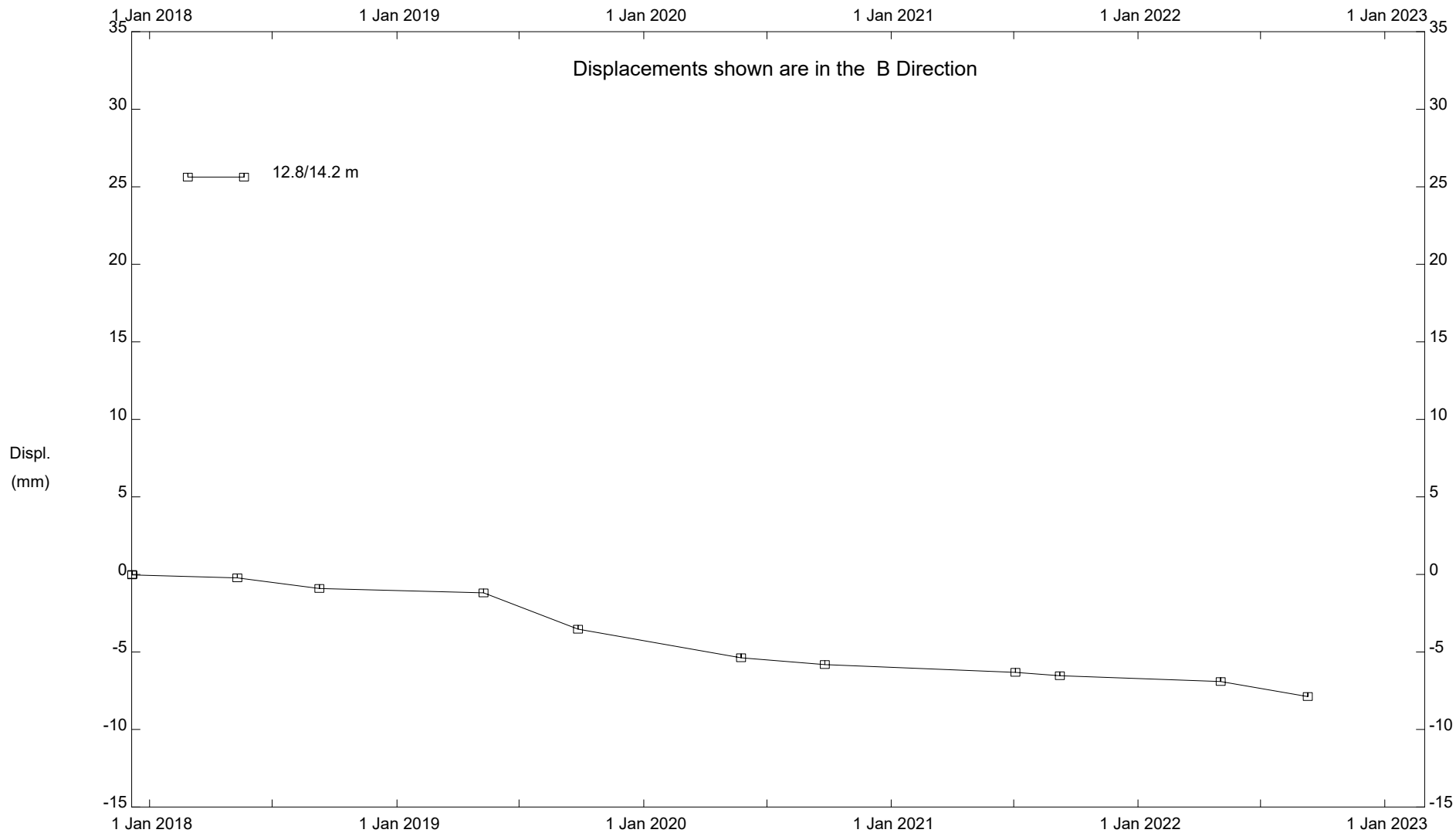
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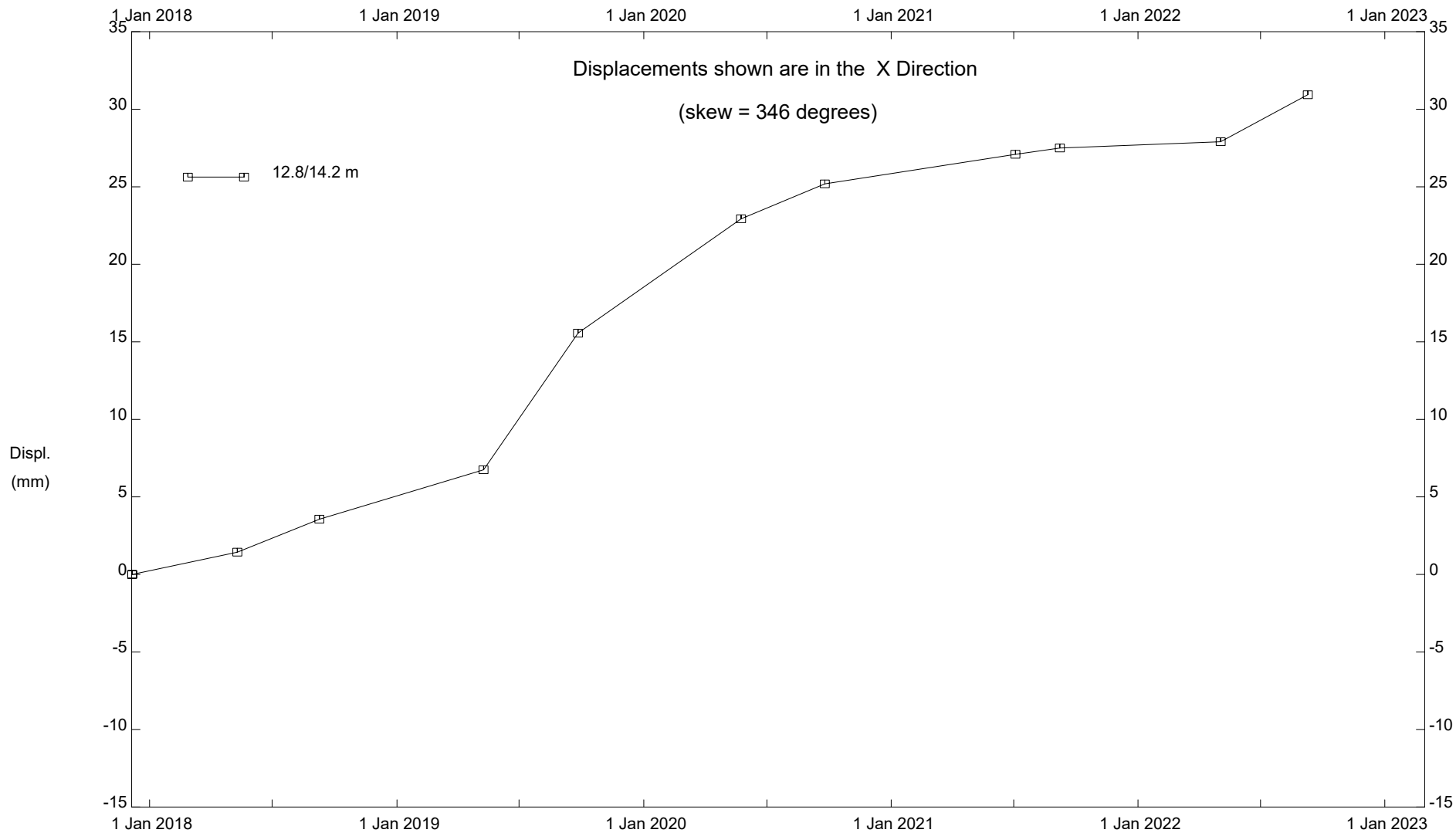
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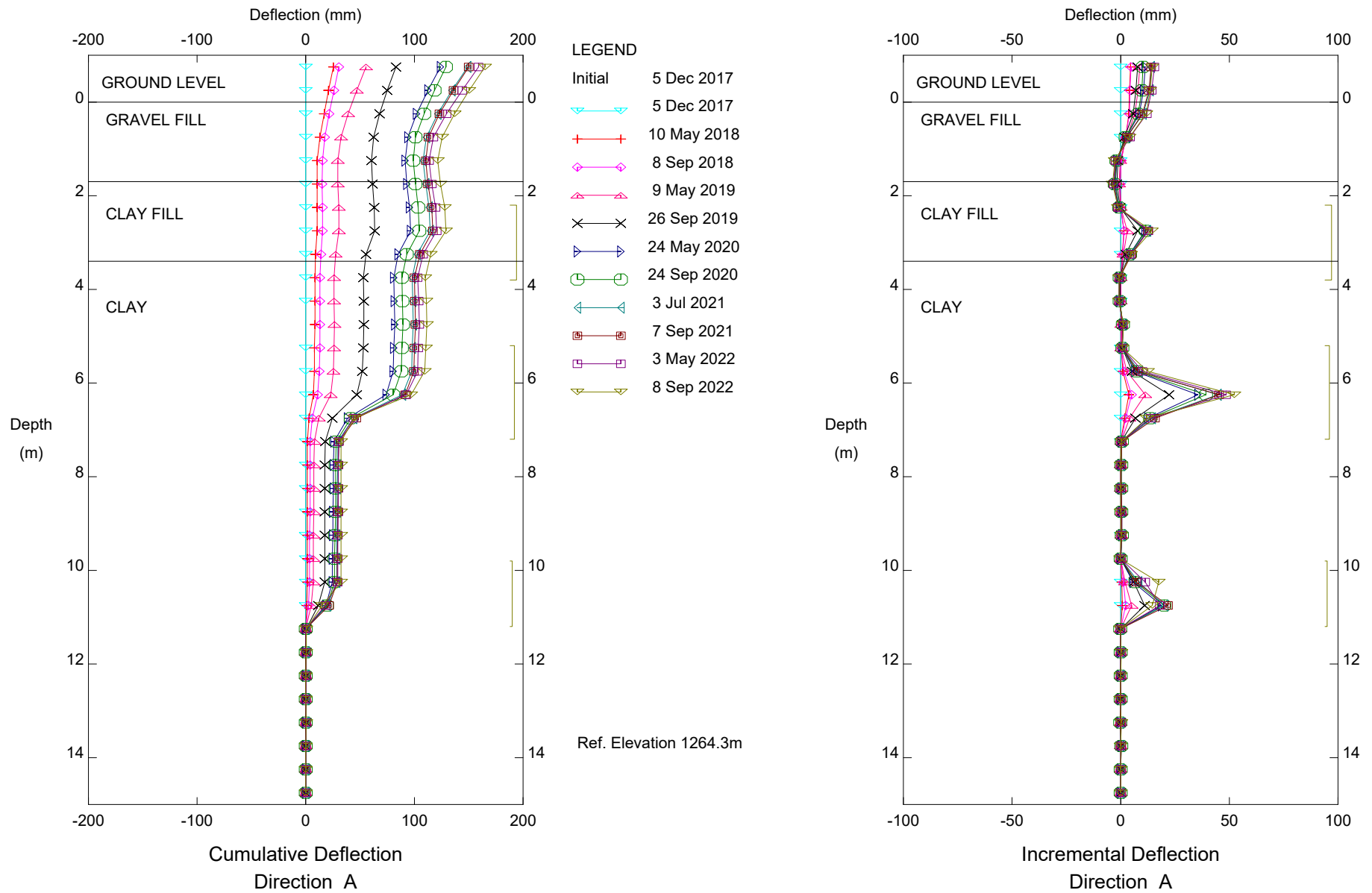
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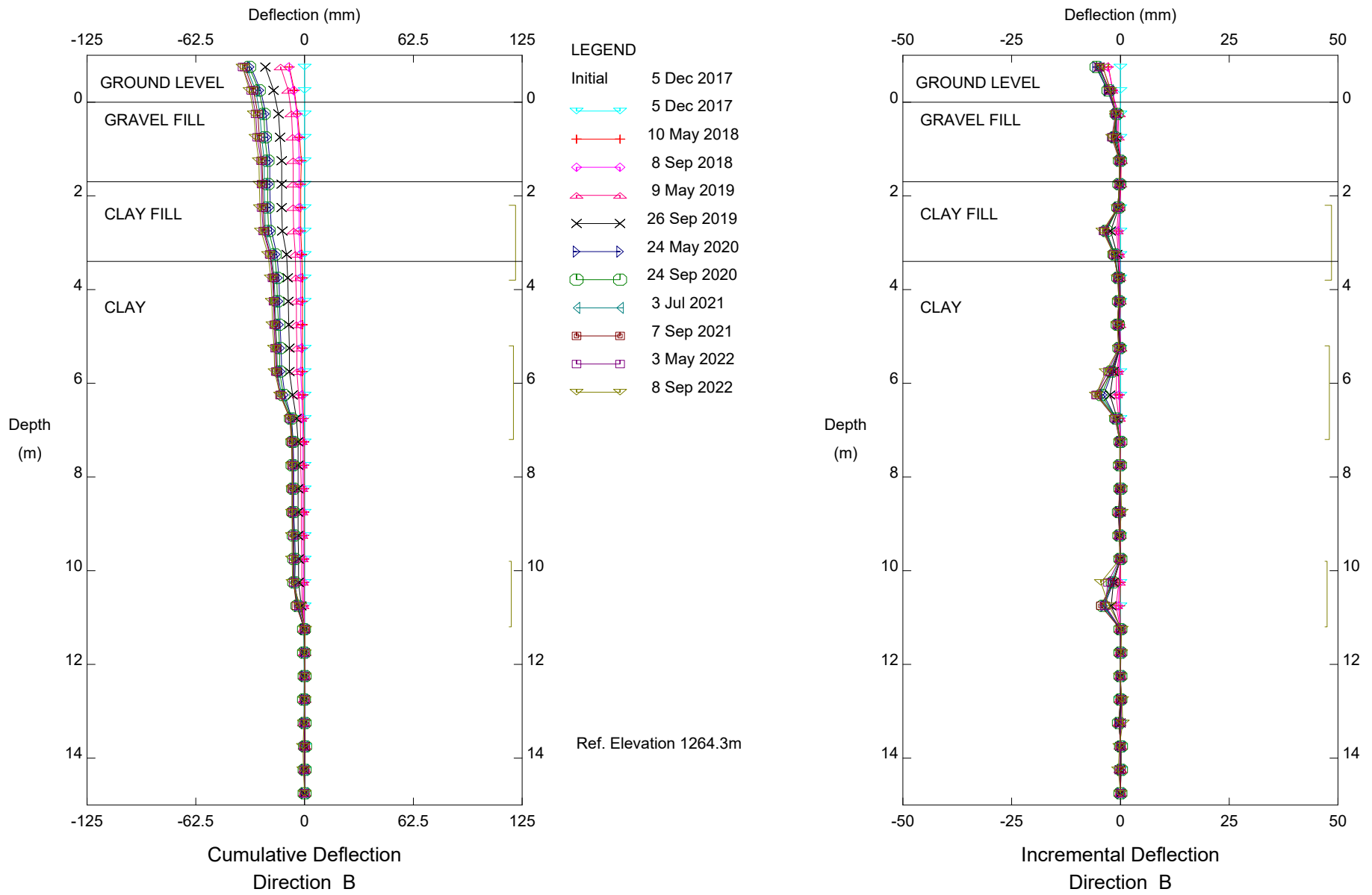


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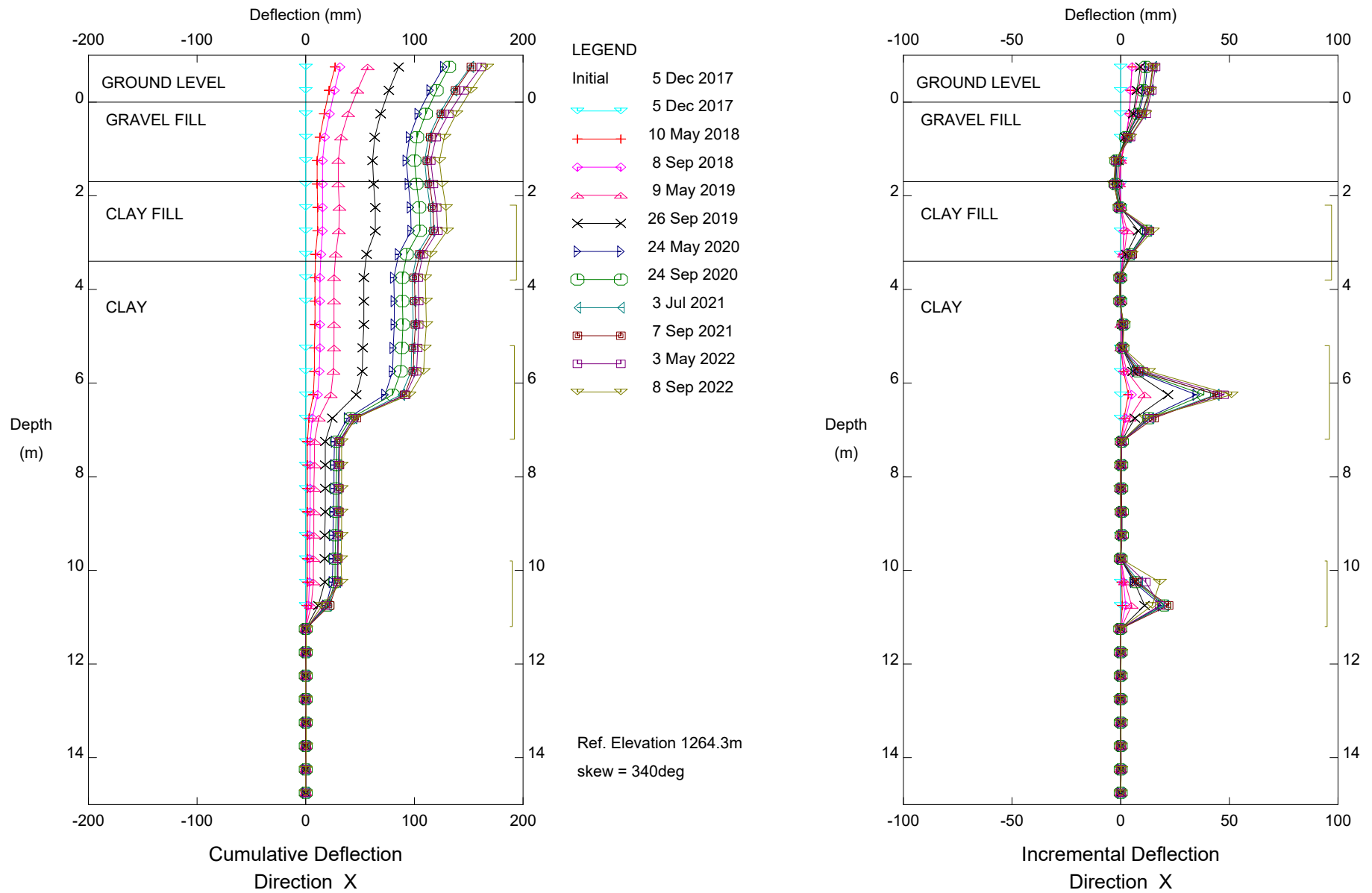
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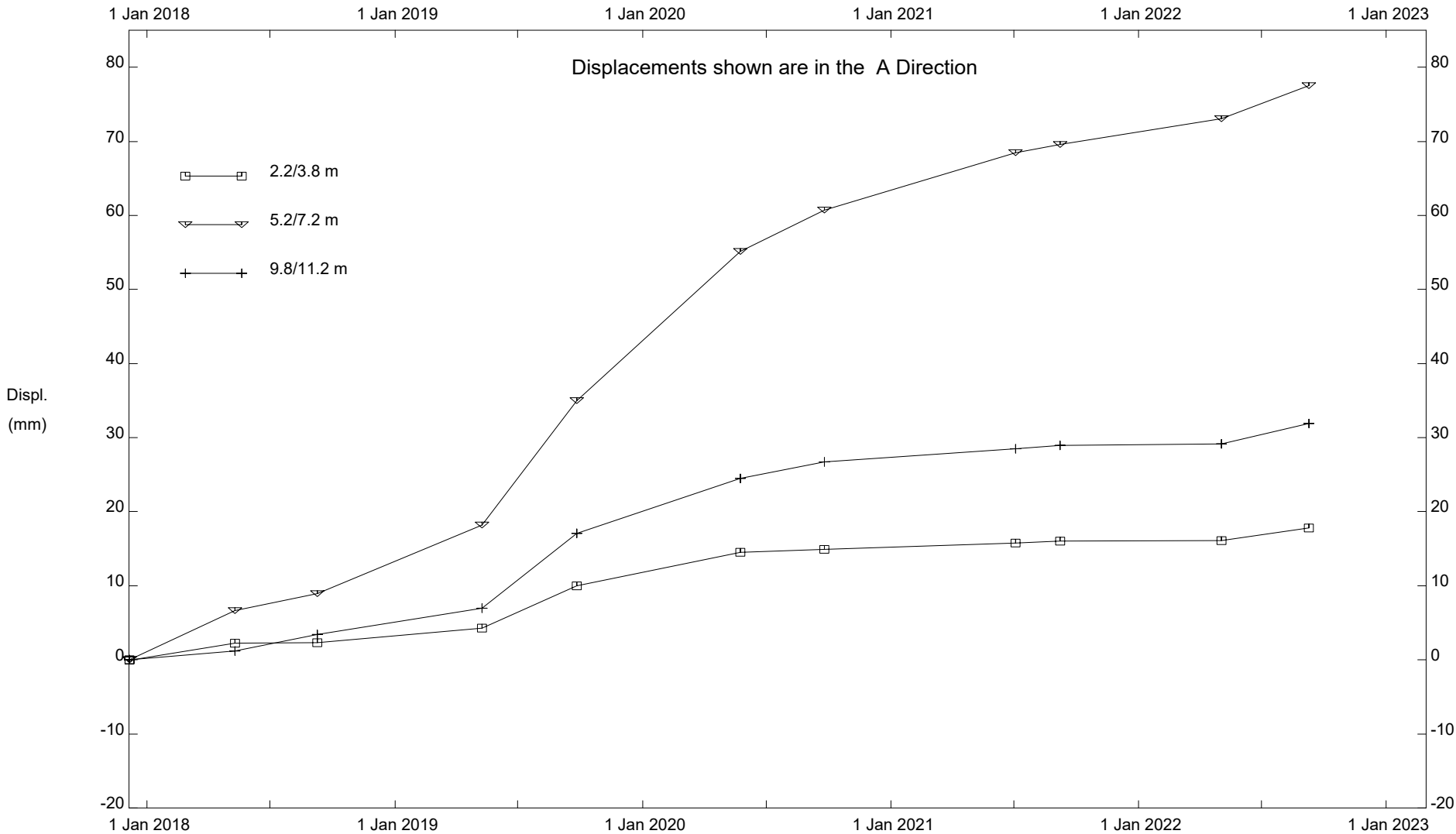
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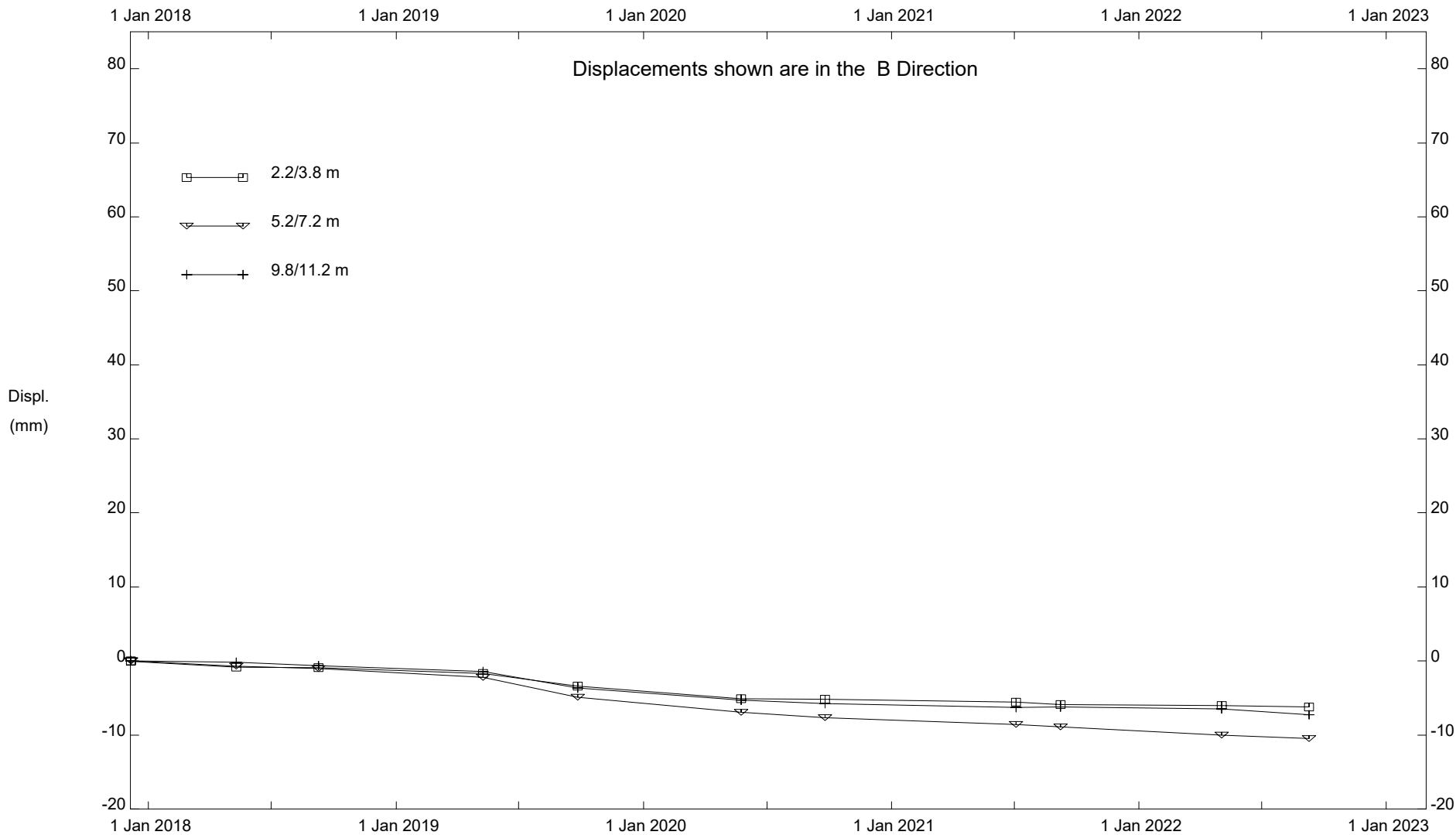
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 Alberta Transportation



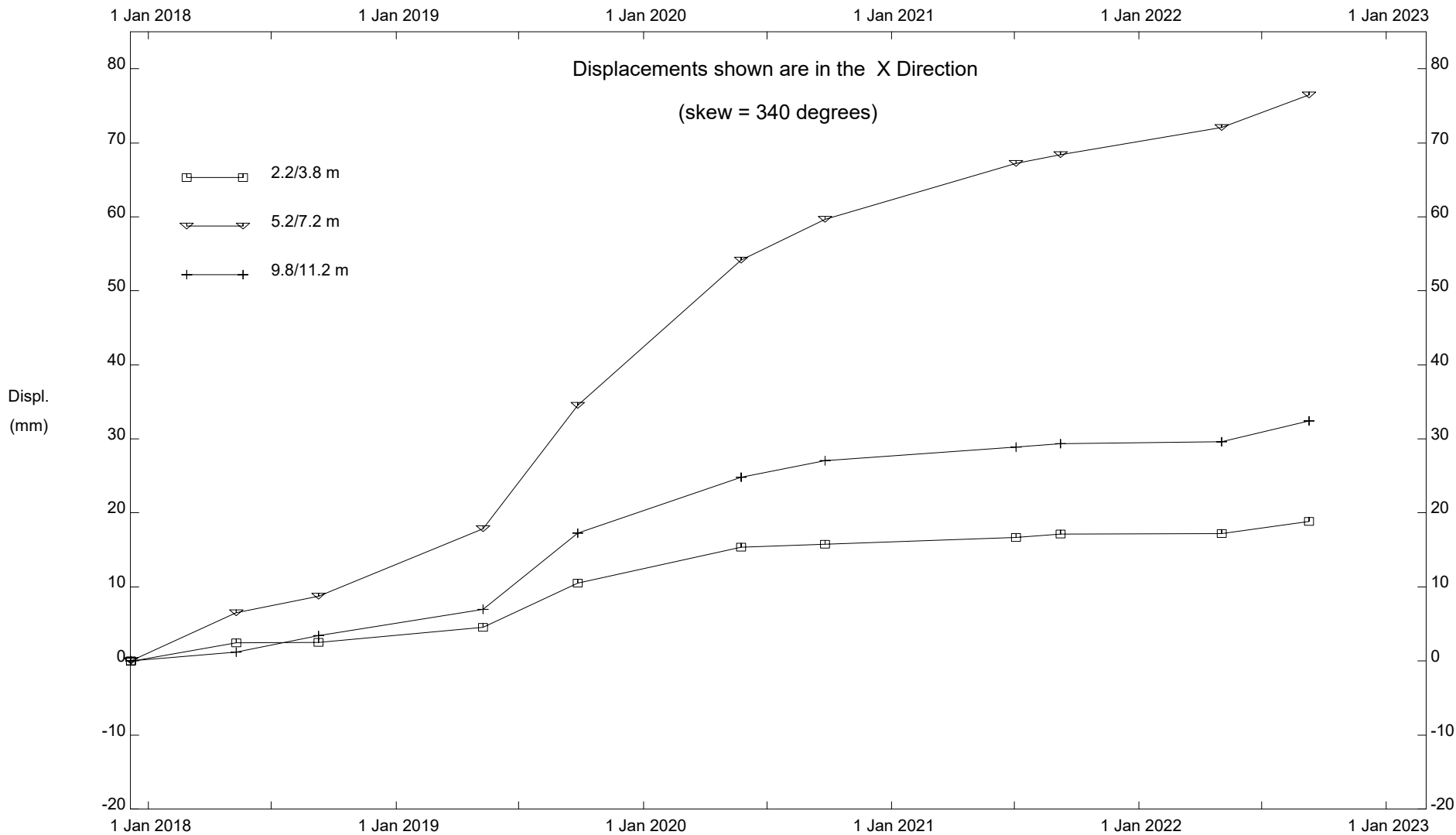
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HWY 40:30 West of Wildhay River (NC83), Inclinator SI17-03



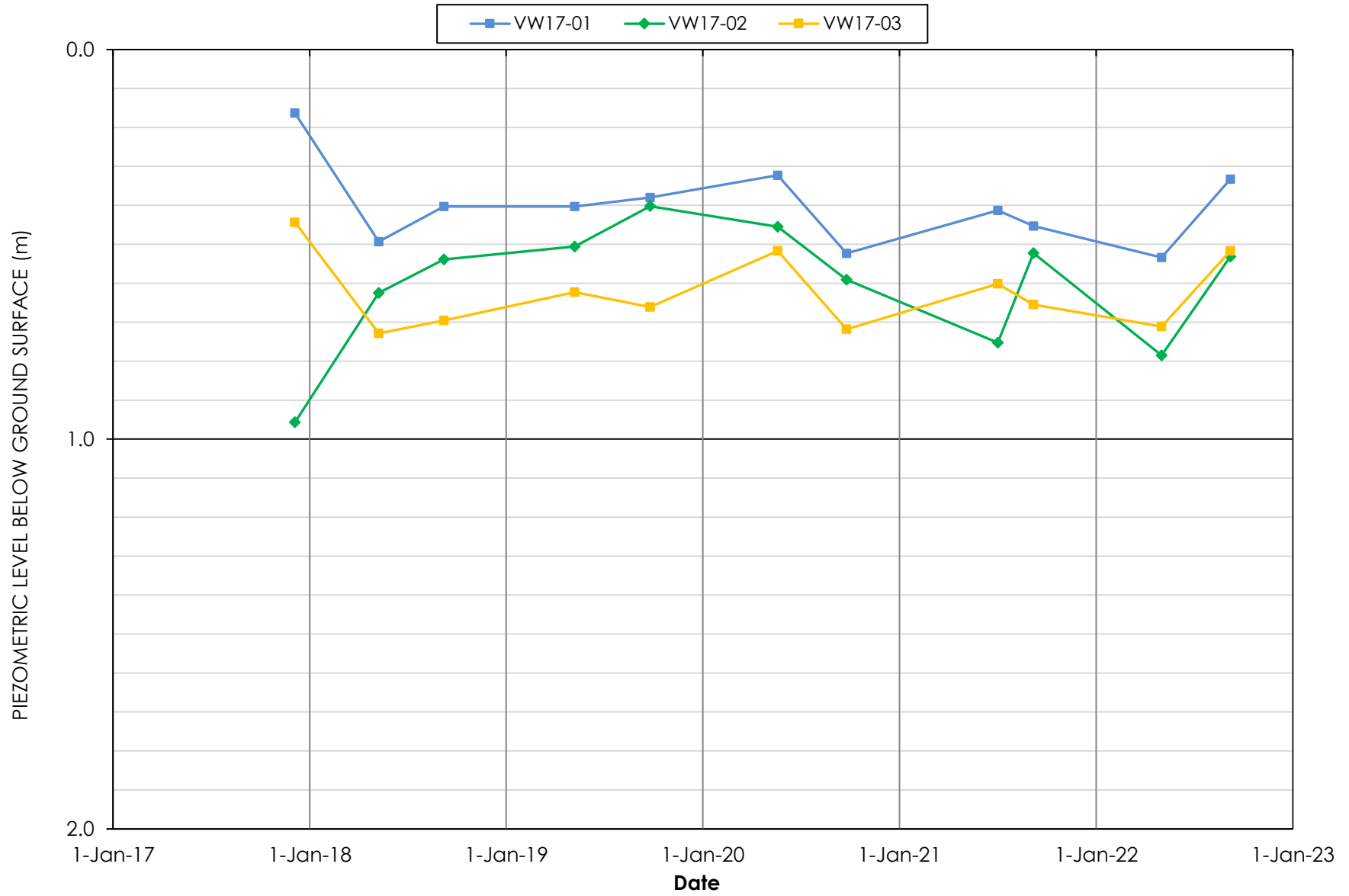
HWY 40:30 West of Wildhay River (NC83), Inclinator SI17-03



HWY 40:30 West of Wildhay River (NC83), Inclinator SI17-03

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PIEZOMETER DATA



PIEZOMETER DATA

