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Memo

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 NC074 - Highway 22:30 South of Entwistle Slide, Spring 2022 Instrumentation Monitoring Report

1.0 OBSERVATIONS

1.1 FIELD PROGRAM AND INSTRUMENTATION STATUS

The Spring 2022 reading cycle consisted of reading one vibrating wire piezometer (VW17-01) and three slope inclinometers (SI19-01, SI19-02, and SI19-03). **Figure 1** attached provides a schematic of the site. The instruments were read by Mahendran Senthooran, M.Eng., EIT and Akintola Fakinlede, M.Sc., Engineering Technologist on May 6, 2022.

The vibrating wire piezometer (VW) was read with an RST VW2106 readout box. 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 markings in relation to the top of SI casing.

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

2.0 INSTRUMENTATION READINGS

2.1 GENERAL

The SI plots are attached 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 NC74-1** and the attachments. Where there was no skew, the time-displacement plots for the A-direction are provided.

The piezometric level plots are provided in the attachments and summarized in **Table NC74-2.**

2.2 ZONES OF MOVEMENT

No discernable zone of movement was observed; however, small movements were observed in all SI near the pile top. These movements may reflect deflection of the pile wall.

2.3 MONITORING RESULTS

2.3.1 SLOPE INCLINOMETERS

All SI were installed within the H-piles. **SI19-01** to **SI19-03** shows various magnitudes of deflection at the top of pile ranging from 25 mm to 103 mm. The observed deflection at the pile top is likely a result of deflection necessary to mobilize resistance against slope movements.

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2.3.2 PIEZOMETER

The Spring 2022 readings indicate piezometric levels increased by 0.7 m (corresponding elevation of 786.0 m) since the previous reading cycle in Spring 2021. A trend of increasing piezometric levels is developing since Spring 2020.

3.0 RECOMMENDATIONS

3.1 FUTURE WORK

The instruments at NC74 should be read during the Spring 2023 reading cycle.

3.2 INSTRUMENTATION REPAIRS

No instruments require repair at this site.

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Table NC74-1: Spring 2022 Slope Inclinometer Reading Summary

Instrument Name	Date Initialized	Coordinates (1) (UTM 11U, NAD83) (m)		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						
SI19-01	Dec 19, 2019	5928488	633713	-	Operational	July 6, 2021	No Discernable Movement Zone		
SI19-02	Dec 19, 2019	5928528	633713	-	Operational	July 6, 2021	No Discernable Movement Zone		
SI19-03	Dec 19, 2019	5928553	633710	-	Operational	July 6, 2021	No Discernable Movement Zone		

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

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Table NC74-2: Spring 2022 Vibrating Wire 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 (m aMSL) (Groundwater Level)	Change in Piezometric Level Since Previous Reading (m)
		Northing	Easting							
VW17-01 (100D1700263)	Dec. 5, 2017	5928559	633709	783.0	789.5	Operational	787.3 Sept 5, 2018	786.0 (1.6 m bgs)	785.3 (2.3 m bgs)	0.7
VW17-02 (100D1701604)	Dec. 5, 2017	-	-	781.5	788.2	Non-Operational	784.6 May 7, 2019	Non-operational July 2019. Last reading before being non-operational at 784.6 (3.0 m bgs)		

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.

Stantec Consulting Ltd.

PROFESSIONAL ENGINEER ALBERTA
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2022-06-12
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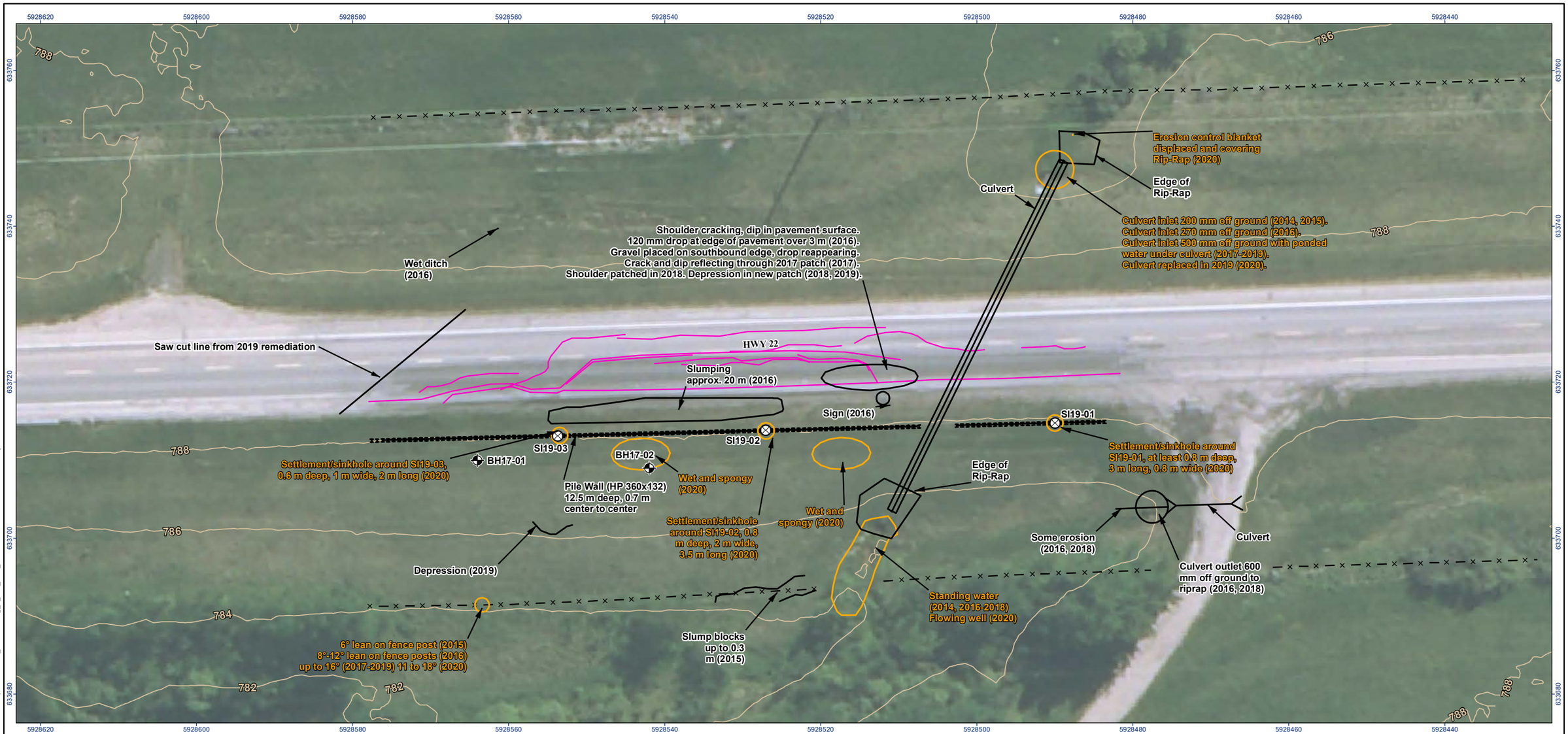
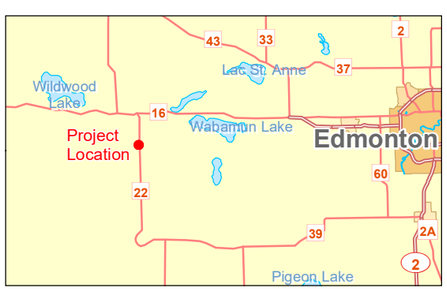
Attachment:
Figure 1 – Site Plan
SI19-01 Slope Inclinometer Plots
SI19-02 Slope Inclinometer Plots
SI19-03 Slope Inclinometer Plots
Vibrating Wire Piezometer Depth vs. Time Plot
Vibrating Wire Piezometer Elevation vs. Time Plot

PERMIT TO PRACTICE
STANTEC CONSULTING LTD.
Signature ID# 74389
Date 13-June-2022
PERMIT NUMBER: P 0258
The Association of Professional Engineers and Geoscientists of Alberta





- Borehole Location
- Slope Inclinometer
- Previous Observation
- 2020 Observation
- Pavement Cracks prior to 2019 remediation
- Fence
- Ground Elevation Contours (m AMSL, LiDAR Nov. 2007)

0 10 20 metres

(At original document size of 11x17)
1:500

N

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

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Project Location
Hwy 22
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 123315222
Alberta Transportation
Geohazard Monitoring Program
NC74 South of Entwistle Slide

Figure No.
1

Title
Site Plan

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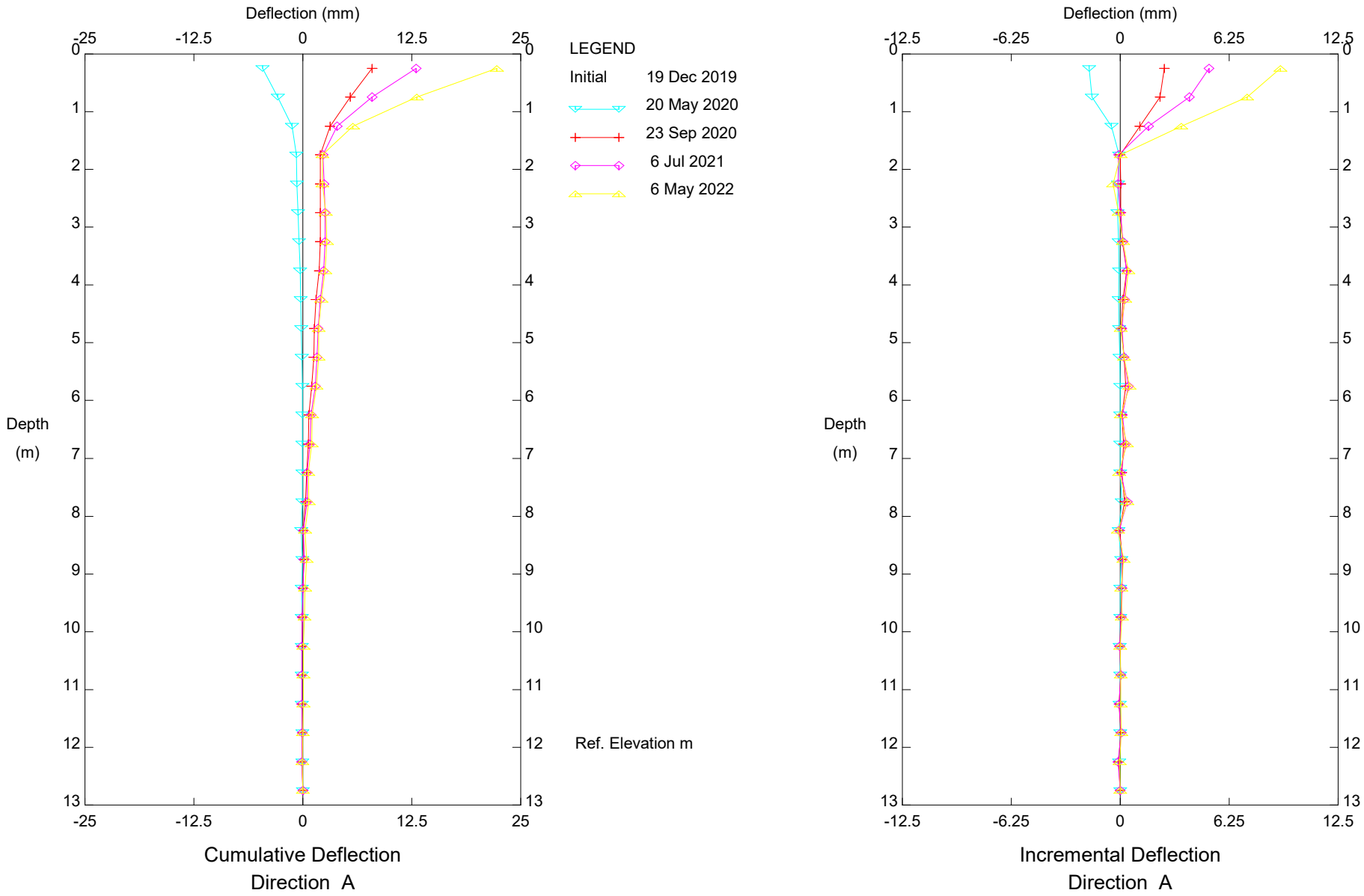

Hwy 22:30, South of Entwistle (NC074), Inclinometer SI19-01

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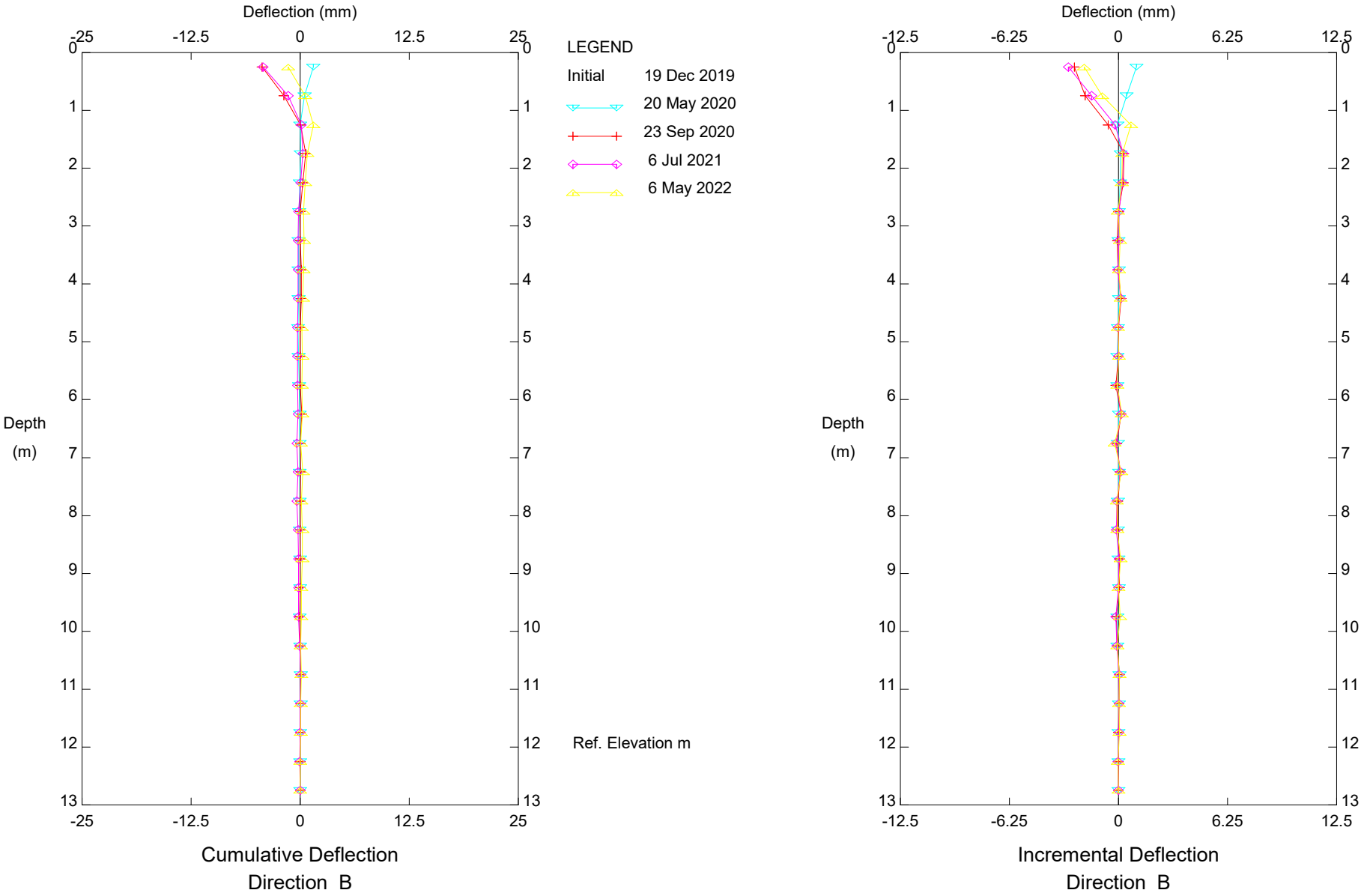

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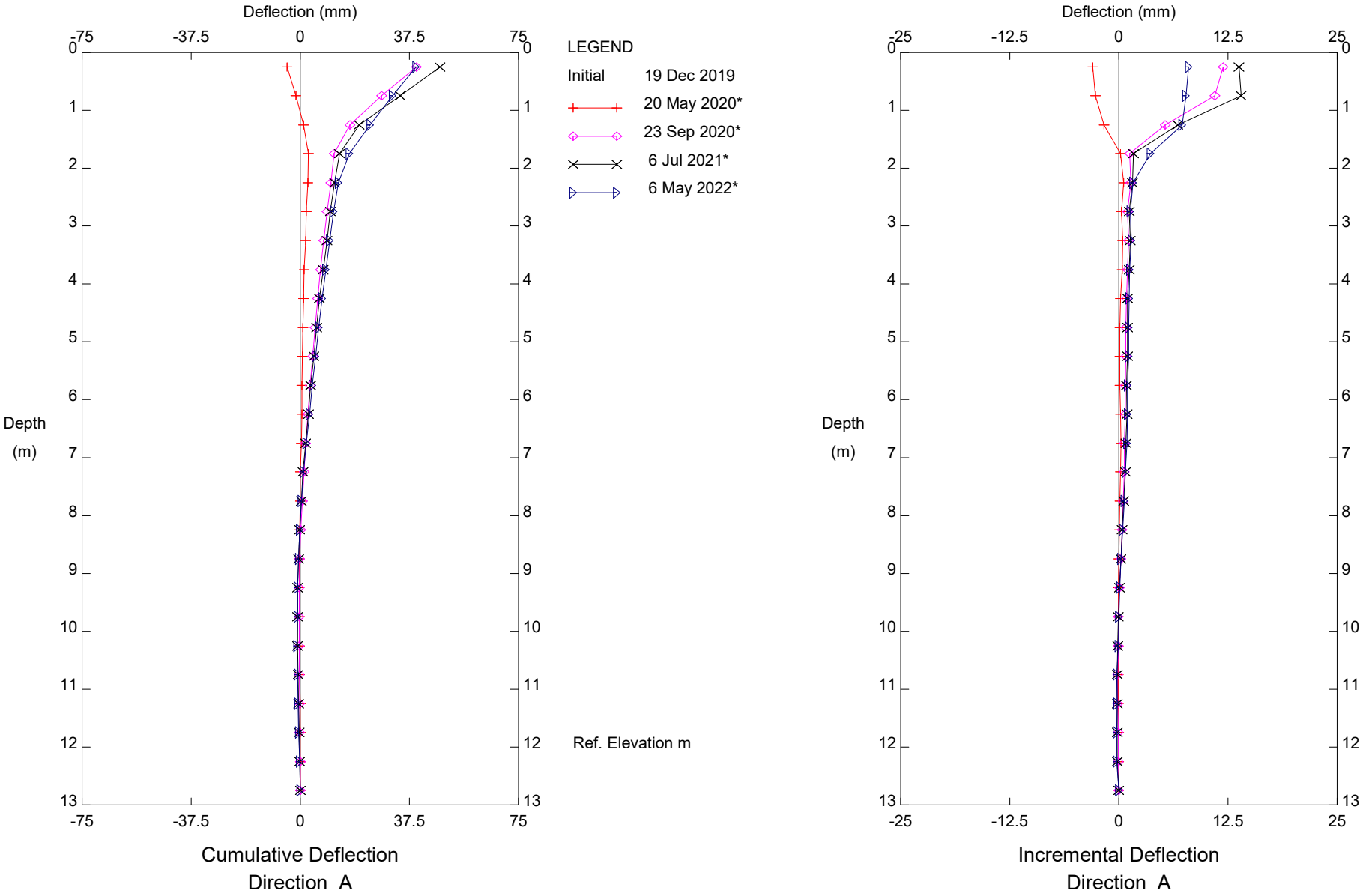

Hwy 22:30, South of Entwistle (NC074), Inclinometer SI19-02

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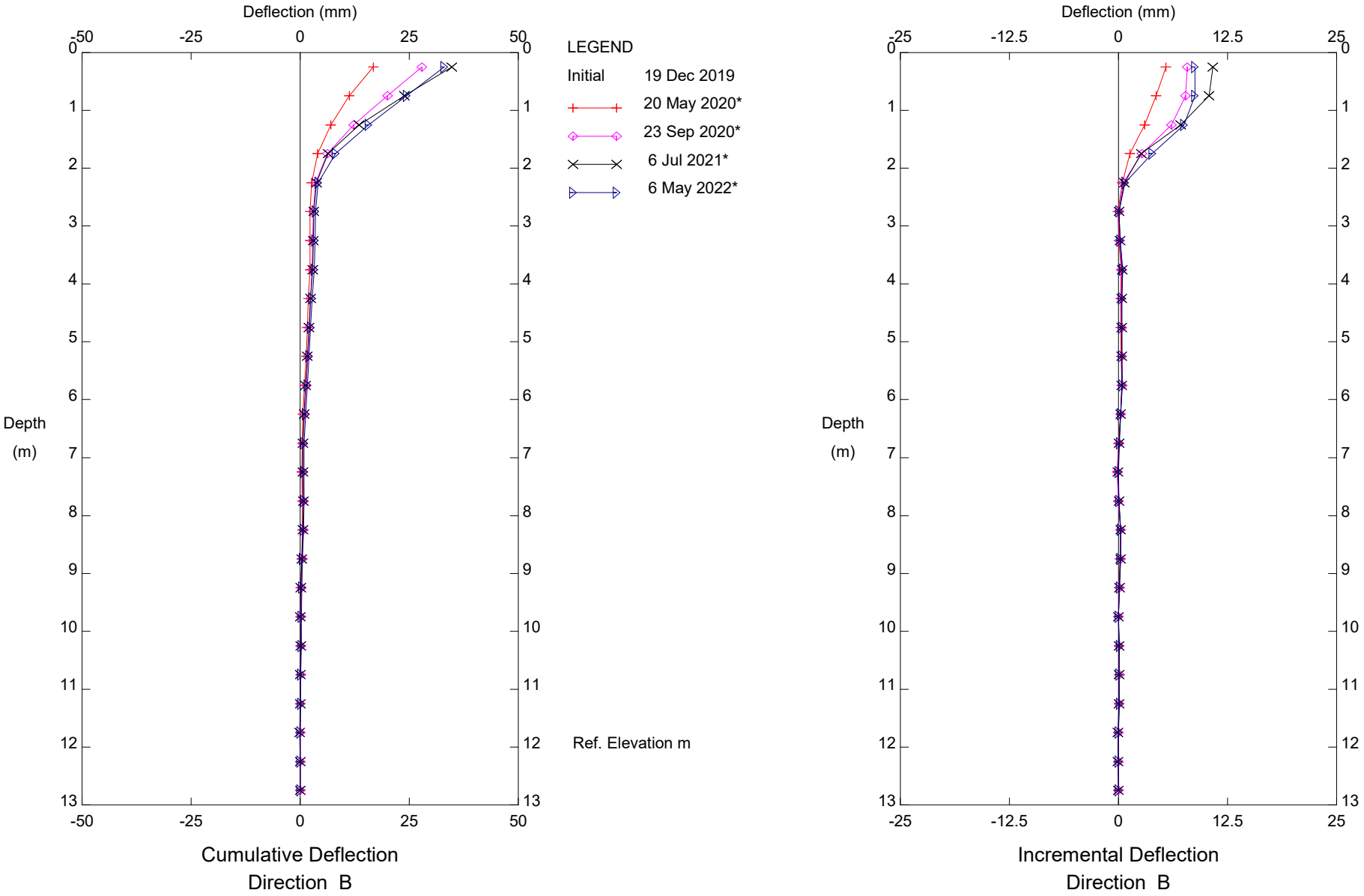

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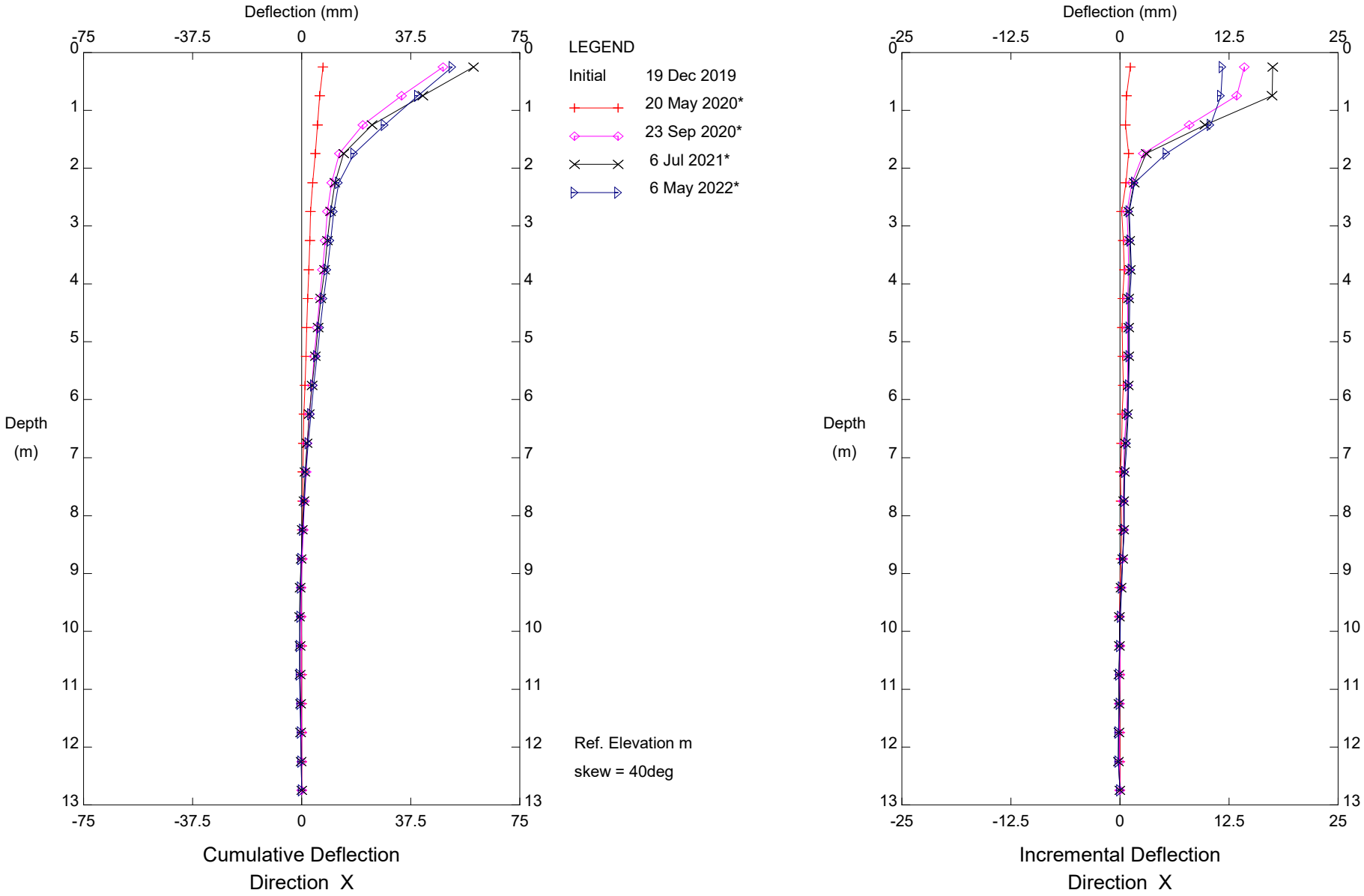

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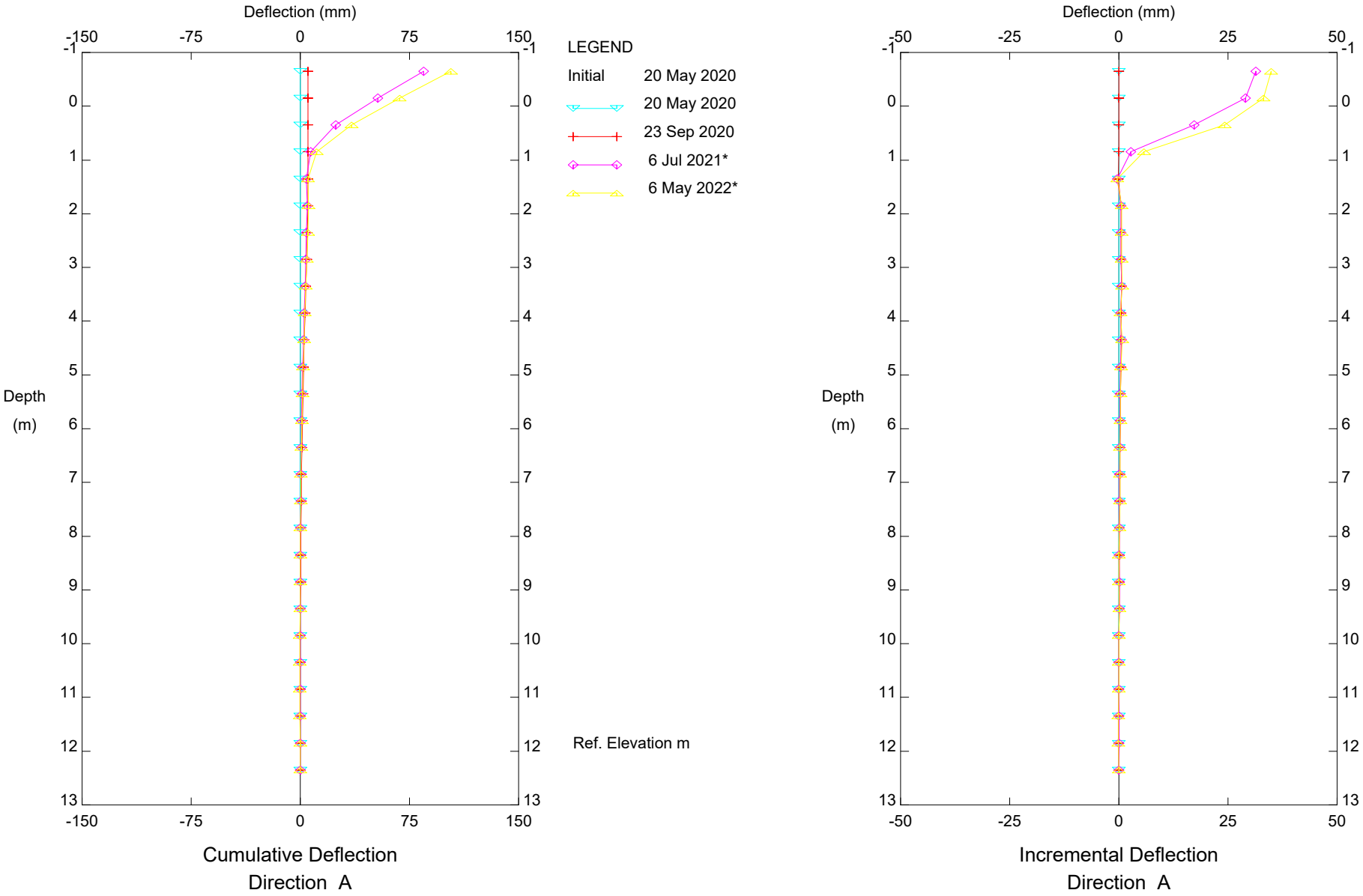

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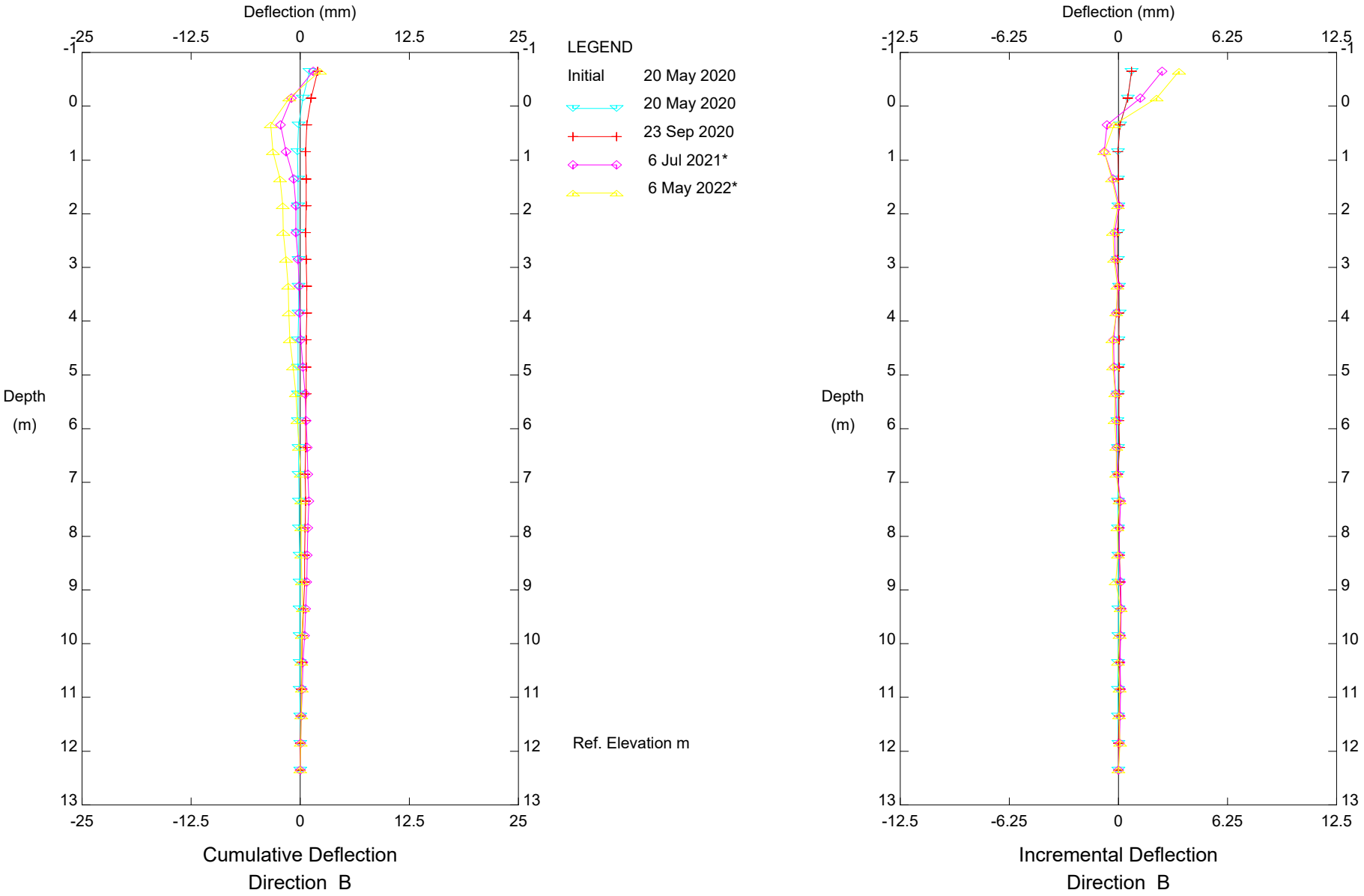

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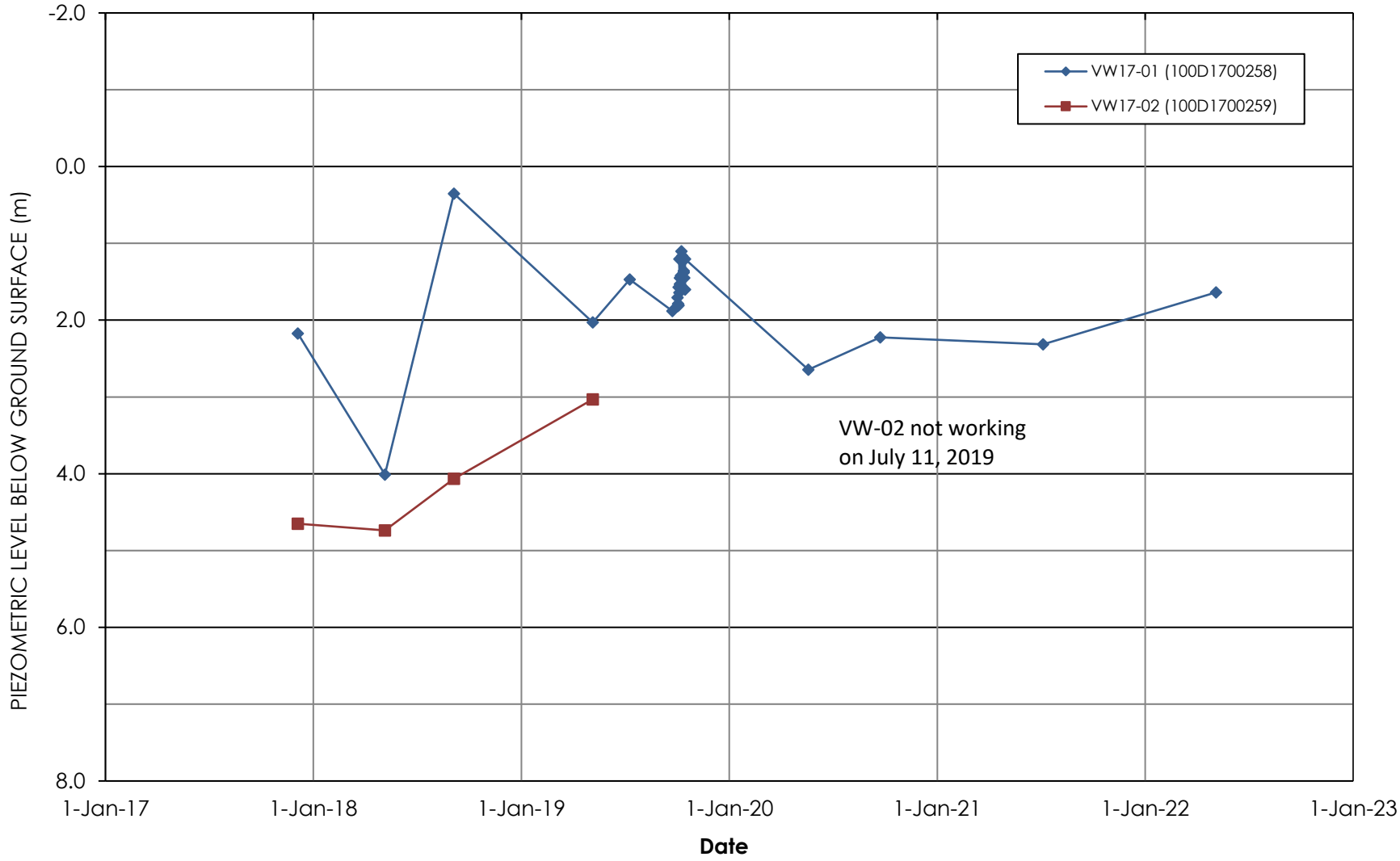
Piezometric Level Below Existing Ground Surface



Piezometric Elevation