
To:	Amy Driessen	From:	Leslie Cho and Xiteng Liu
	Transportation and Economic Corridors		Stantec Consulting Ltd.
File:	123315222	Date:	June 18, 2024

Reference: North Central Region, Edson, Site NC074 - Highway 22:30 South of Entwistle Slide, Spring 2024 Instrumentation Monitoring Report

1.0 OBSERVATIONS

1.1 FIELD PROGRAM AND INSTRUMENTATION STATUS

The Spring 2024 reading cycle consisted of reading three slope inclinometers (SI19-01, SI19-02, and SI19-03). VW17-01 was found damaged and could not be read. Figure 1 attached provides a schematic of the site. The instruments were read by Andres Padros, Technician and Olawale Odusi, Geotechnical Technologist on May 16, 2024.

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 22x 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 130 mm. Landslide remediation was completed in November 2019; however, relatively large ground depressions up to 0.8 m deep and 3 m wide around each SI were observed the following spring. The depressions were subsequently backfilled and recompacted. Furthermore, some

June 18, 2024

Amy Driessen

Page 2 of 5

Reference: North Central Region, Edson, Site NC074 - Highway 22:30 South of Entwistle Slide, Spring 2024 Instrumentation Monitoring Report

additional regrading was completed for reinstallation of the erosion control matting as part of warranty repairs in September 2020. Some observed deflection at the pile top is likely a result of construction disturbance post-initialization.

2.3.2 PIEZOMETER

VW17-01 was found damaged in Spring 2024 as shown on the attached photo. Prior to this, the Spring 2023 readings had indicated that piezometric levels dropped by 1.2 m (corresponding elevation of 784.8 m) since the previous reading cycle in Spring 2022.

3.0 RECOMMENDATIONS

3.1 FUTURE WORK

The instruments at NC74 should be read during the Spring 2025 reading cycle.

3.2 INSTRUMENTATION REPAIRS

Since there are no operational piezometers on site, replacement piezometers could be considered to continue monitoring groundwater levels at the site.

June 18, 2024

Amy Driessen

Page 3 of 5

Reference: North Central Region, Edson, Site NC074 - Highway 22:30 South of Entwistle Slide, Spring 2024 Instrumentation Monitoring Report

Table NC74-1: Spring 2024 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	May 19, 2023	No Discernable Movement Zone		
SI19-02	Dec 19, 2019	5928528	633713	-	Operational	May 19, 2023	No Discernable Movement Zone		
SI19-03	Dec 19, 2019	5928553	633710	-	Operational	May 19, 2023	No Discernable Movement Zone		

Note:
(1) Updated May 16, 2024, with approximate accuracy of ± 3 m.

June 18, 2024

Amy Driessen

Page 4 of 5

Reference: North Central Region, Edson, Site NC074 - Highway 22:30 South of Entwistle Slide, Spring 2024 Instrumentation Monitoring Report

Table NC74-2: Spring 2024 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 (100D1700258)	Dec. 5, 2017	5928559	633709	783.0	789.5	Non-Operational	787.3 Sept 5, 2018	Non-operational May 2024. Last reading before being non-operational at 784.8 (2.8 m bgs)		
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 16, 2024, with approximate accuracy of ± 3 m. (2) aMSL = Above Mean Sea Level										

June 18, 2024

Amy Driessen

Page 5 of 5

Reference: North Central Region, Edson, Site NC074 - Highway 22:30 South of Entwistle Slide, Spring 2024 Instrumentation Monitoring Report

4.0 CLOSING

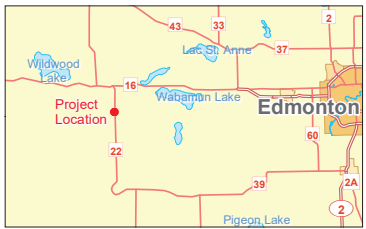
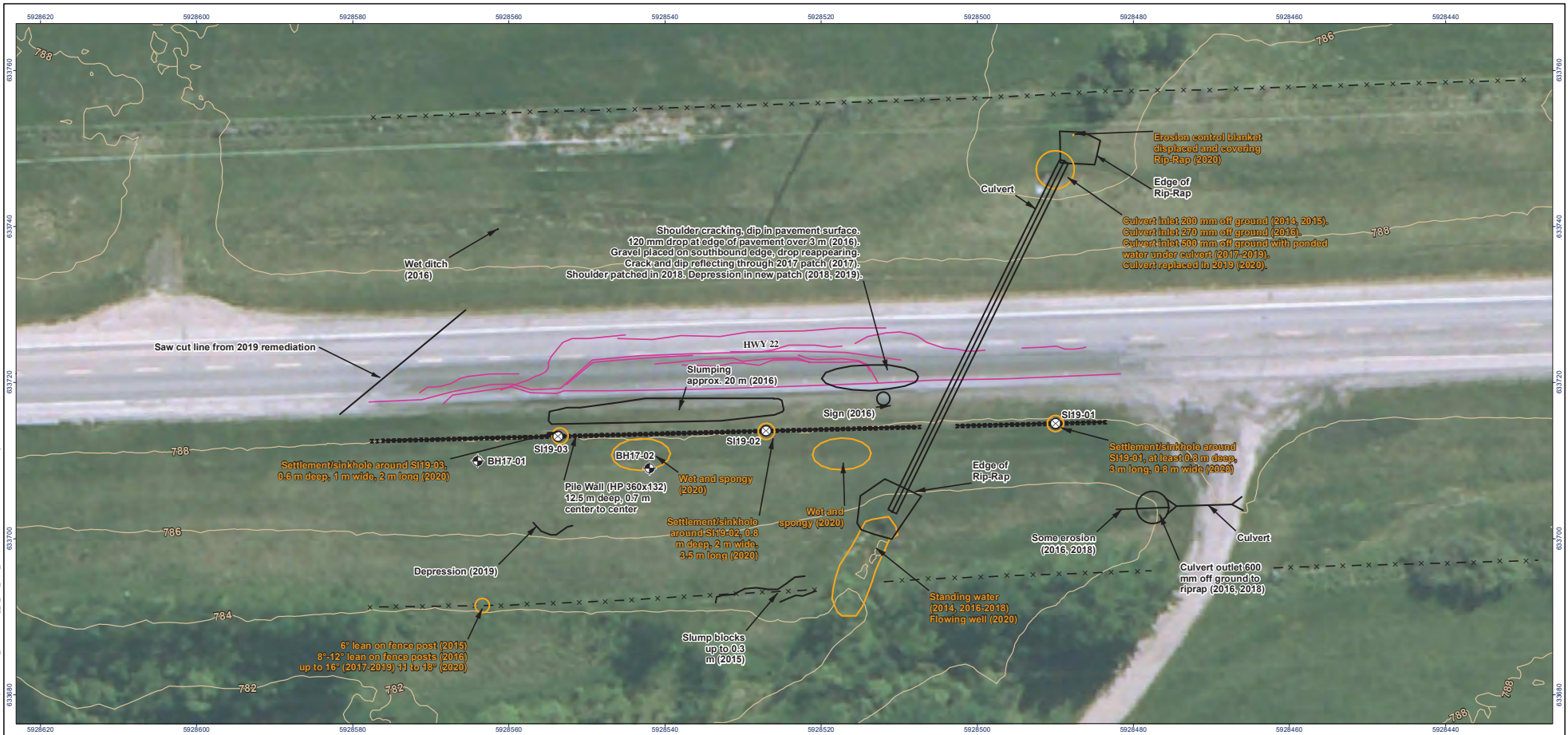
We trust this instrumentation report meets your requirements. If you have any questions, please do not hesitate to contact the undersigned.

Stantec Consulting Ltd.

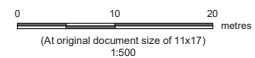
Leslie Cho M.Eng., P.Eng.
Senior Associate, Geotechnical Engineer
Phone: 780-917-7403
leslie.cho@stantec.com

Xiteng Liu M.Sc., P.Eng., PMP
Senior Principal, Geotechnical Engineer
Phone: 780-917-7247
xiteng.liu@stantec.com

Attachment: Figure 1 – Site Plan
S119-01 Slope Inclinerometer Plots
S119-02 Slope Inclinerometer Plots
S119-03 Slope Inclinerometer Plots
Vibrating Wire Piezometer Depth vs. Time Plot
Vibrating Wire Piezometer Elevation vs. Time Plot
Photo of Damaged VW17-01



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



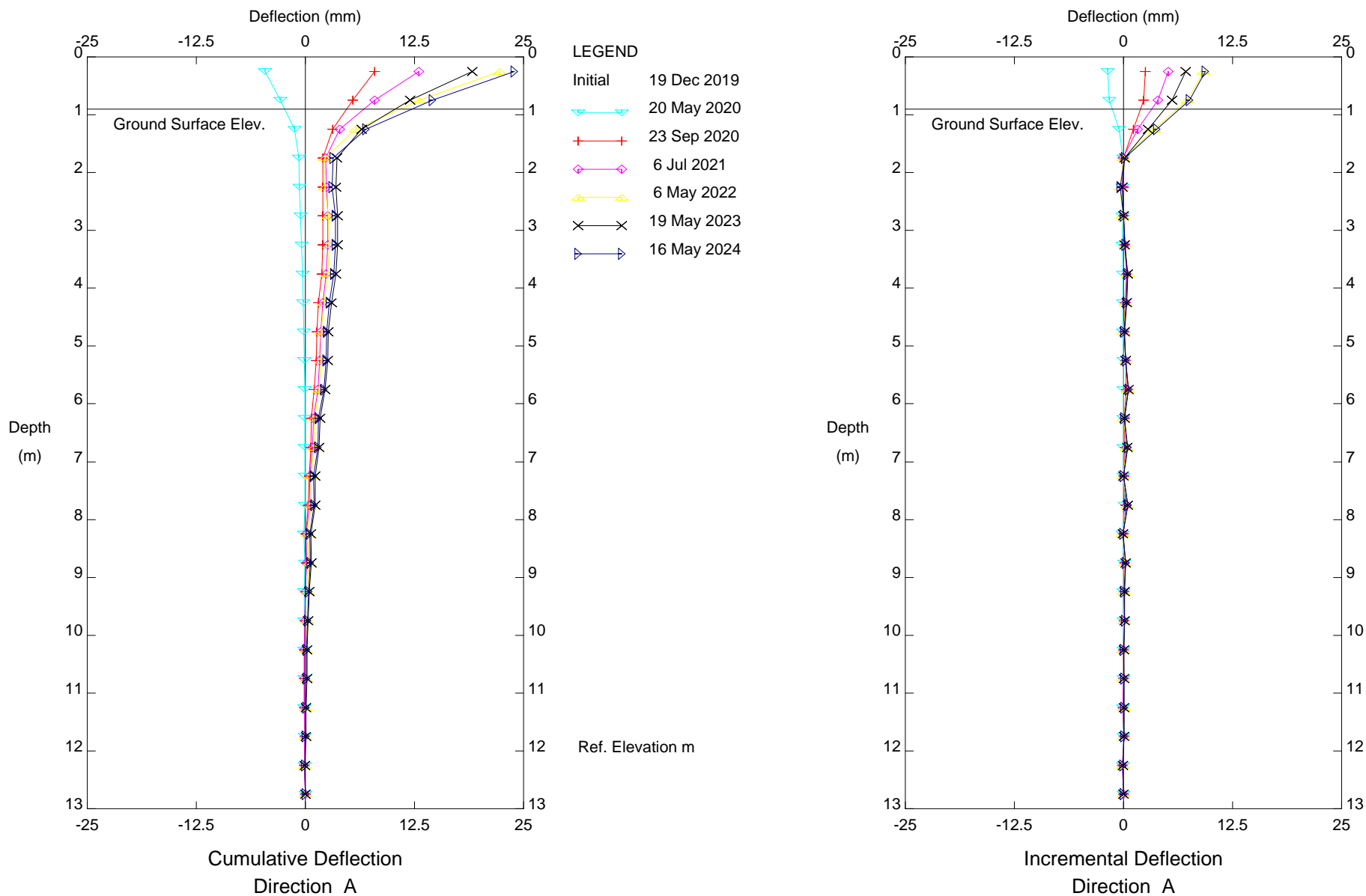
Project Location
 Hwy 22
 Parkland County, Alberta

Client/Project
 Alberta Transportation
 Geohazard Monitoring Program
 NC74 South of Entwistle Slide

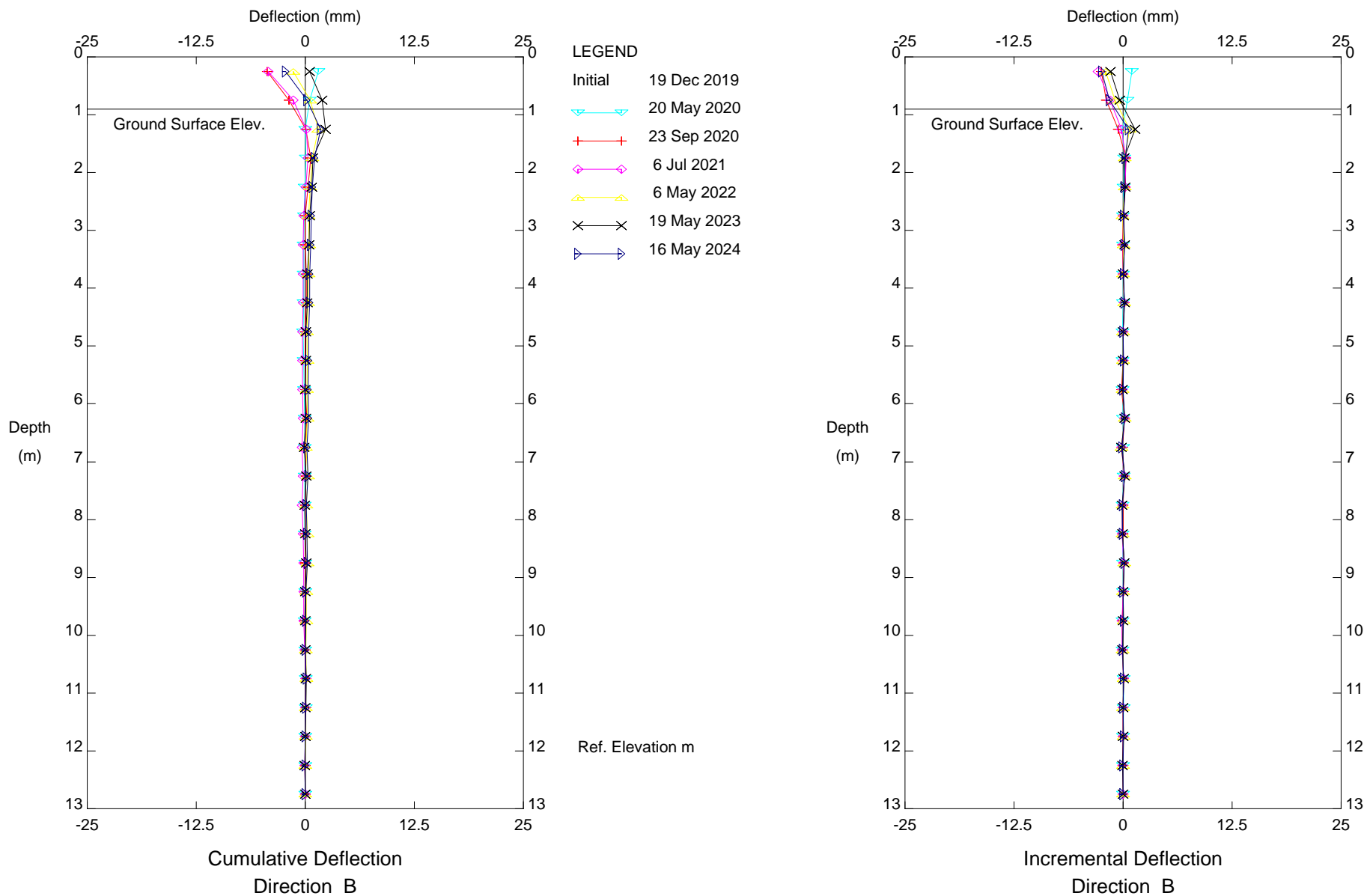
Prepared by MK on 2020-06-11
 Quality Review by LC on 2020-06-19
 Independent Review by XL on 2020-06-19
 123315222

Figure No.
1
 Title
Site Plan

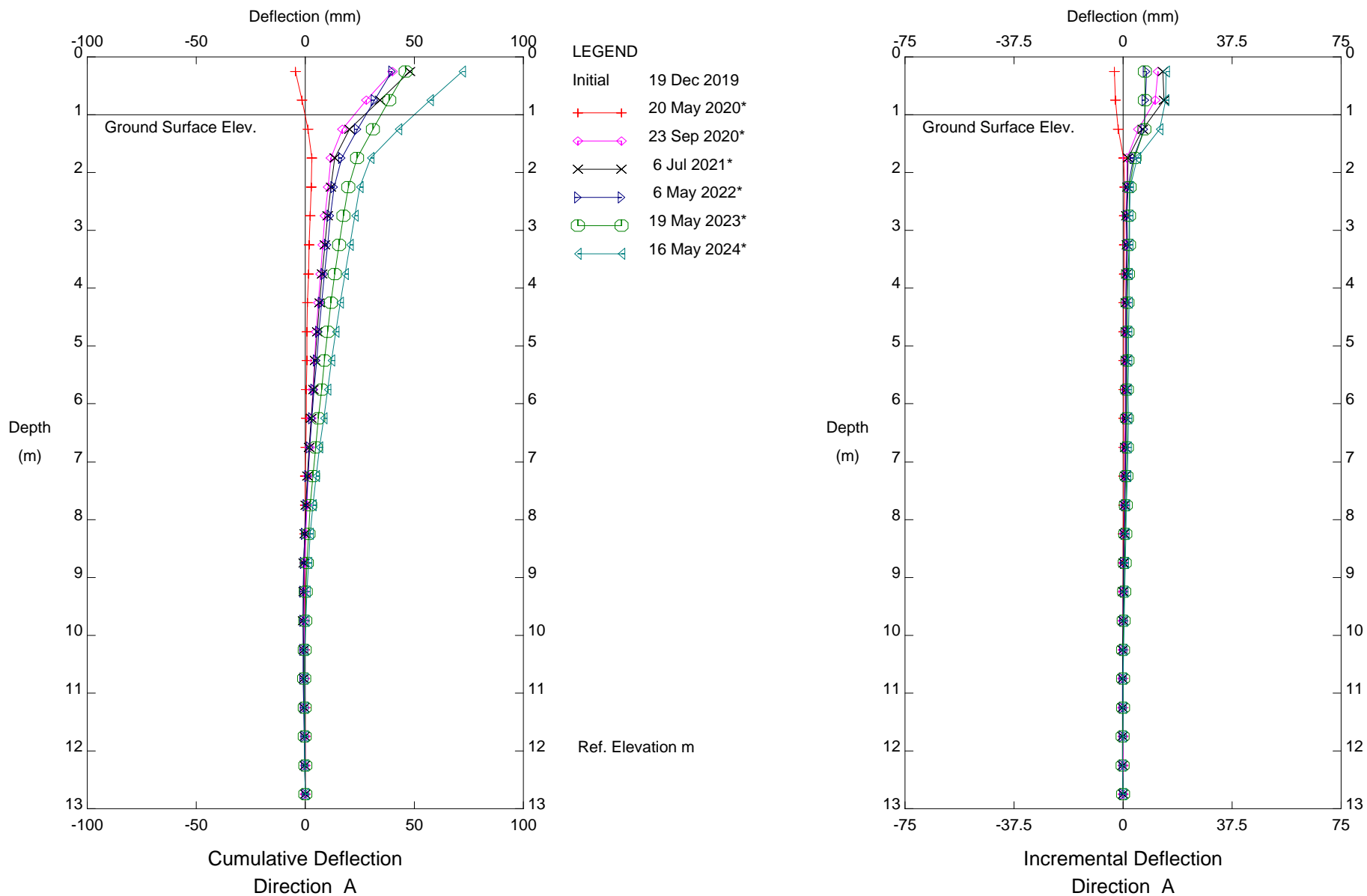
Notes
 1. Coordinate System: NAD 1983 UTM Zone 11N
 2. Data Sources: Geogratis, ©Department of Natural Resources Canada. All rights reserved.
 3. Background: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community



Hwy 22:30, South of Entwistle (NC74), Inclinometer SI19-01
 Transportation & Economic Corridors



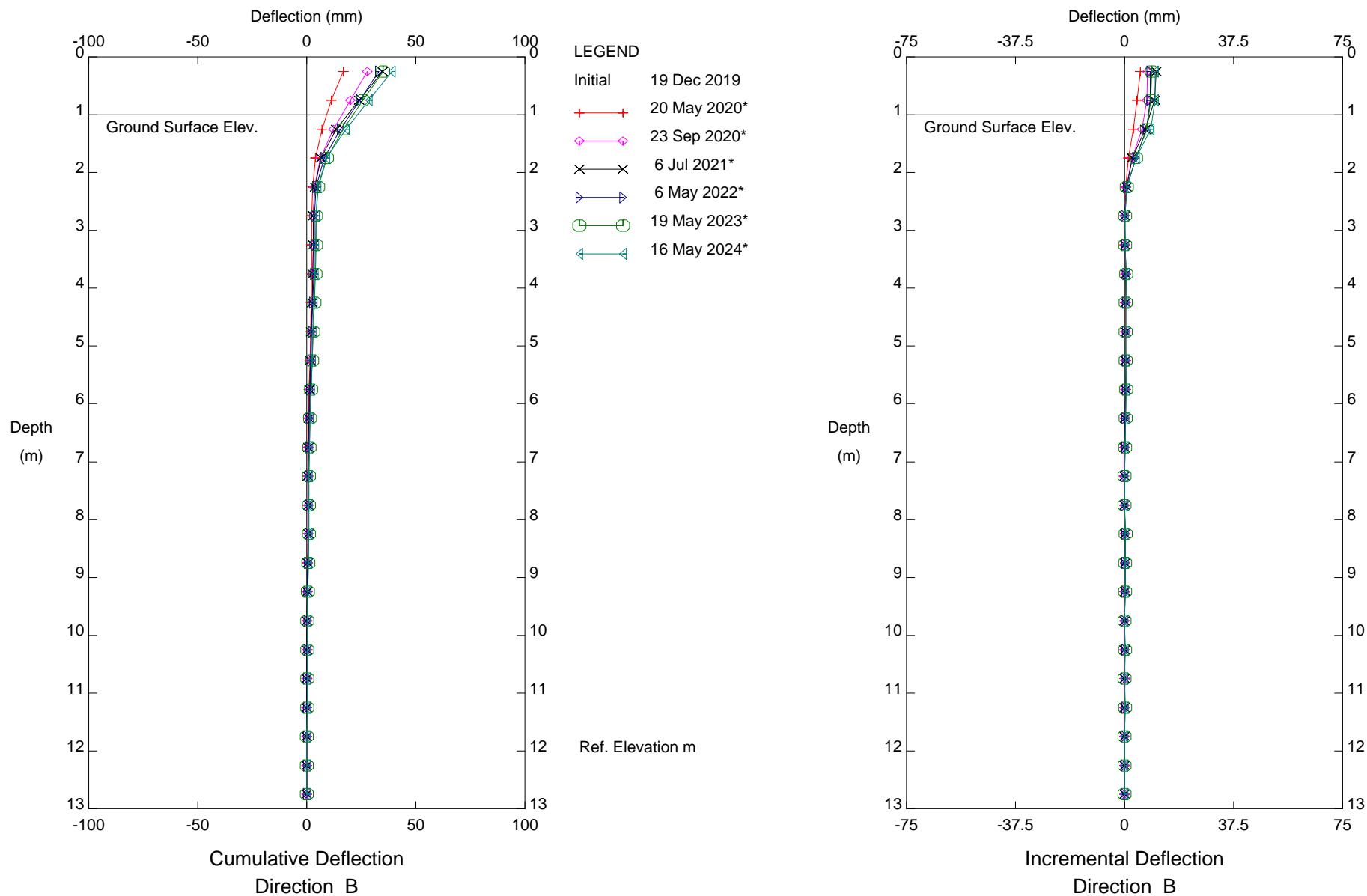
Hwy 22:30, South of Entwistle (NC74), Inclinometer SI19-01
 Transportation & Economic Corridors



Hwy 22:30, South of Entwistle (NC74), Inclinometer SI19-02

Transportation & Economic Corridors

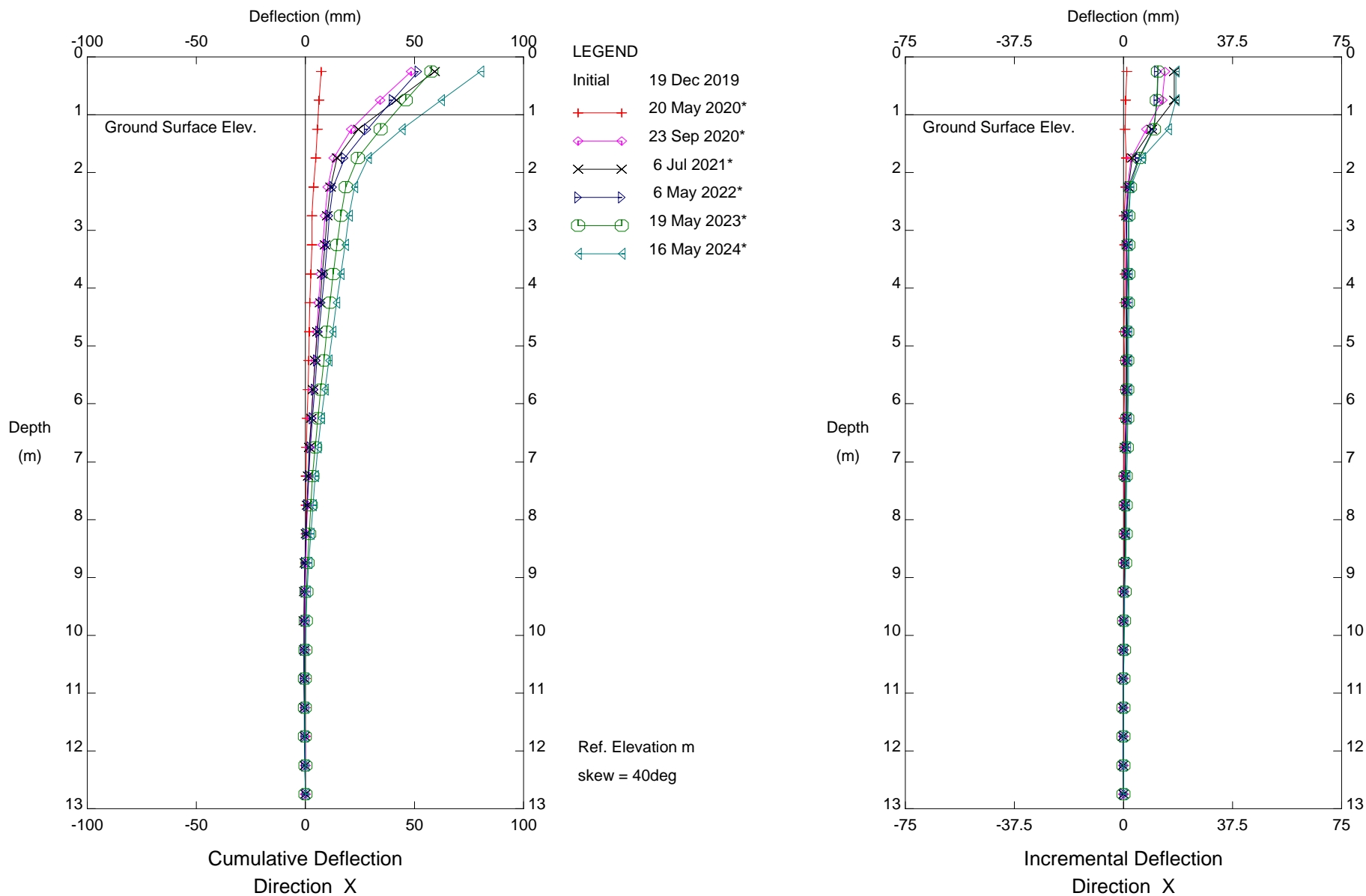
Sets marked * include zero shift and/or rotation corrections.



Hwy 22:30, South of Entwistle (NC74), Inclinometer SI19-02

Transportation & Economic Corridors

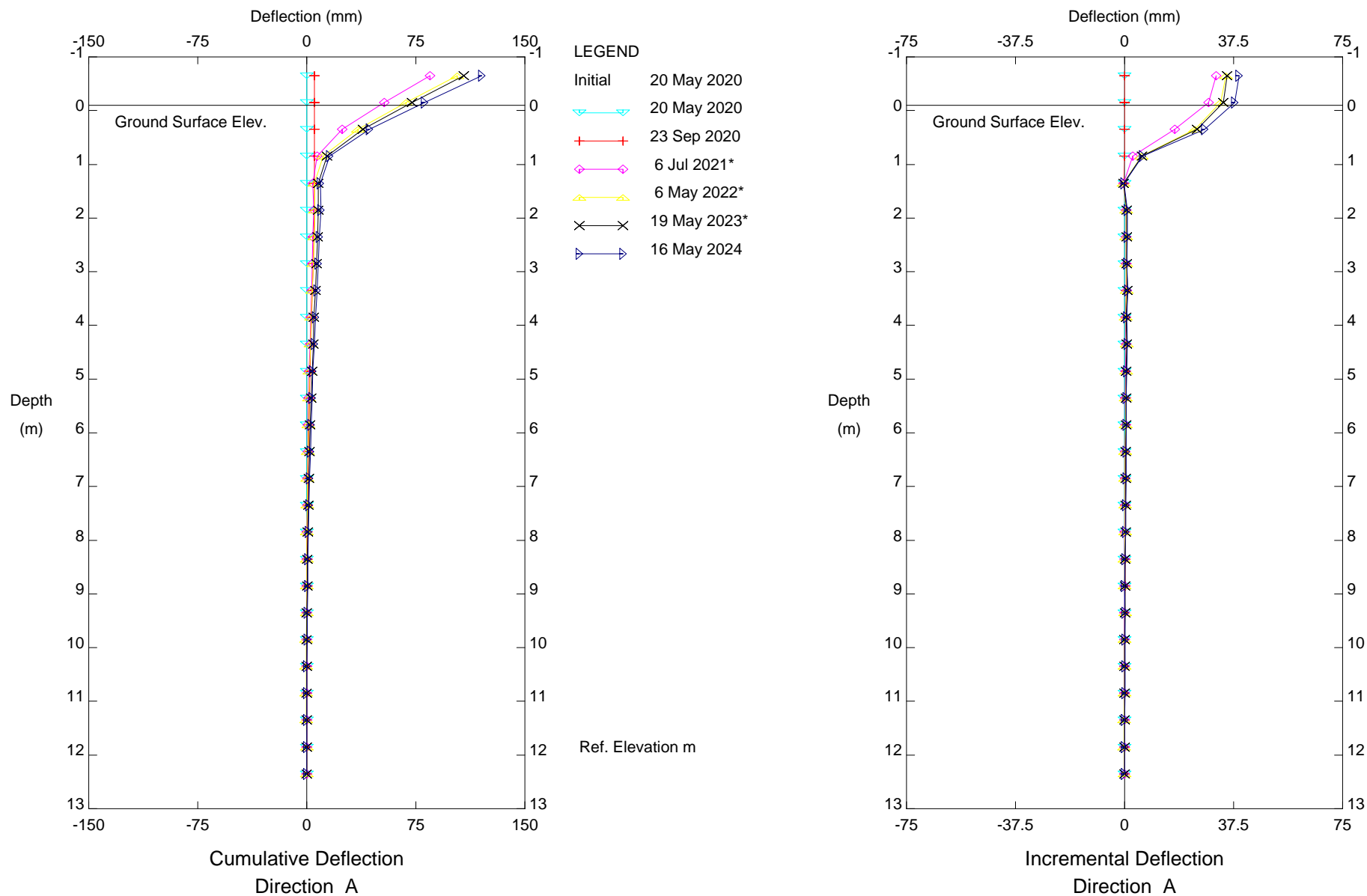
Sets marked * include zero shift and/or rotation corrections.



Hwy 22:30, South of Entwistle (NC74), Inclinometer SI19-02

Transportation & Economic Corridors

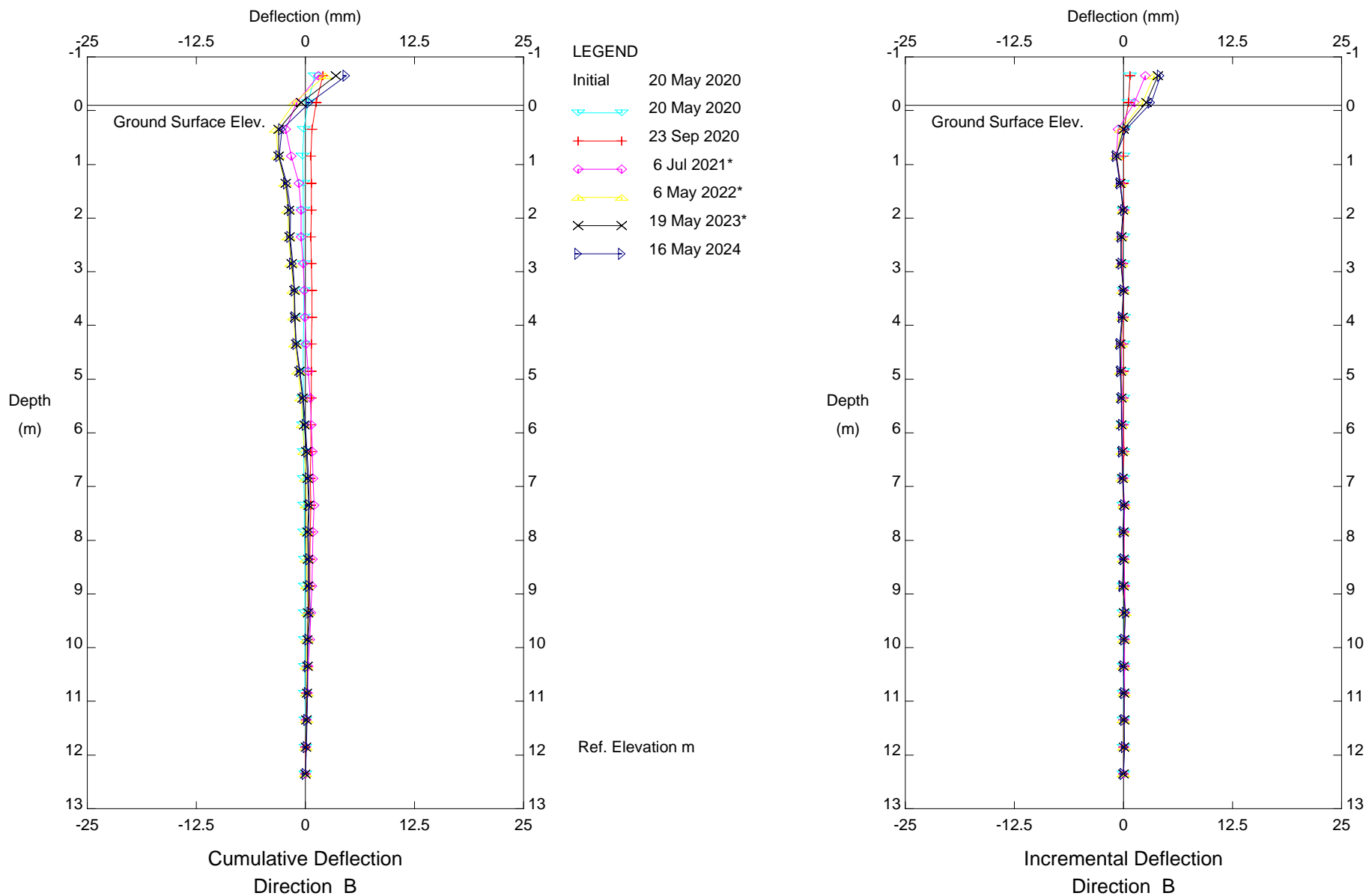
Sets marked * include zero shift and/or rotation corrections.



Hwy 22:30, South of Entwistle (NC74), Inclinometer SI19-03

Transportation & Economic Corridors

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



Hwy 22:30, South of Entwistle (NC74), Inclinometer SI19-03

Transportation & Economic Corridors

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

