
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 NC083 - Highway 40:30 West of Wildhay River, Spring 2024 Instrumentation Monitoring Report

OBSERVATIONS

FIELD PROGRAM AND INSTRUMENTATION STATUS

The Spring 2024 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 Andres Padros, Technologist and Olawale Odusi, Geotechnical Technician on May 13, 2024.

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 eTrex 22x 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

In general, all slope inclinometers recorded a decrease in movement rate since the Fall 2023 monitoring cycle.

June 18, 2024

Amy Driessen

Page 2 of 5

Reference: North Central Region, Edson, Site NC083 - Highway 40:30 West of Wildhay River, Spring 2024 Instrumentation Monitoring Report

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 32 mm, 66 mm and 41 mm of movement in the upper, middle and lower shear zones, respectively. Their current respective rates of movement for the three zones are 1 mm/yr, 8 mm/yr and 4 mm/yr. All three shear zones showed decreased rates of movement compared to the last reading cycle in Fall 2023.

SI17-02 shows approximately 4 mm/yr in the rate of movement during this reading cycle with 38 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 a rate of movement of about 2 mm/yr. The middle movement zone at 6 m bgs shows current movement rate of 13 mm/yr corresponding to a decrease of 7 mm/yr. The lower movement zone at 10 m bgs shows a decrease in rate of movement of 6 mm/yr since the previous reading cycle. The current rate of movement for this lower movement zone is about 4 mm/yr.

Piezometers

All piezometers showed a decrease in water level between 0.1 m and 0.3 m for the current reading cycle. The piezometric levels measured were between 0.4 m and 0.8 m below ground surface (bgs). In general, the piezometric levels have been in the same range since Spring 2018. Seasonal fluctuations of higher groundwater table in the fall are observed in the piezometers.

RECOMMENDATIONS

FUTURE WORK

It is recommended that the next reading cycle take place in Fall 2024.

INSTRUMENTATION REPAIRS

No instruments require repair currently.

June 18, 2024

Amy Driessen

Page 3 of 5

Reference: North Central Region, Edson, Site NC083 - Highway 40:30 West of Wildhay River, Spring 2024 Instrumentation Monitoring Report

Table NC083-1: Spring 2024 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	32 over 1.5 m to 3.0 m depth in 339° direction	33 mm/yr; Sept. 2019	Operational	Sep 19, 2023	<1	1	-11
				66 over 4.4 m to 6.4 m depth in 339° direction	33 mm/yr; Sept. 2019			6	8	-9
				41 over 7.9 m to 9.9 m depth in 339° direction	25 mm/yr; Sept. 2019			3	4	-8
SI17-02	Dec 05, 2017	5935097	437707	38 over 12.8 m to 14.2 m depth in 346° direction	23 mm/yr; Sept. 2019	Operational	Sep 19, 2023	2	4	-5
SI17-03	Dec 05, 2017	5935075	437739	22 over 2.2 m to 3.8 m depth in 353° direction	16 mm/yr; Sept. 2019	Operational	Sep 19, 2023	1	2	-5
				98 over 5.2 m to 7.2 m depth in 353° direction	44 mm/yr; Sept. 2019			8	13	-6
				40 over 9.8 m to 11.2 m depth in 353° direction	27 mm/yr; Sept. 2019			3	4	-6

Updated May 13, 2024 with approximate accuracy of ± 3 m

June 18, 2024

Amy Driessen

Page 4 of 5

Reference: North Central Region, Edson, Site NC083 - Highway 40:30 West of Wildhay River, Spring 2024 Instrumentation Monitoring Report

Table NC083-2: Spring 2024 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 2023 (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	1267.3 (0.4)	1267.4 (0.3)	-0.1
VW17-02 (100D1701260)	Dec. 5, 2017	5935097	437707	1265	Operational	1265.2 Sep. 26, 2019	1264.8 (0.8)	1265.1 (0.5)	-0.3
VW17-03 (100D1700262)	Dec. 5, 2017	5935075	437739	1261	Operational	1263.9 Dec. 5, 2017	1263.7 (0.6)	1263.8 (0.5)	-0.1
Notes: (1) Updated May 13, 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 NC083 - Highway 40:30 West of Wildhay River, Spring 2024 Instrumentation Monitoring Report

4.0 CLOSING

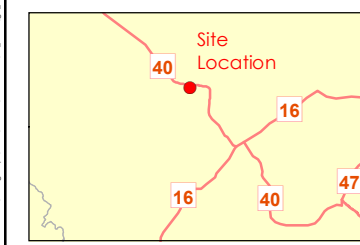
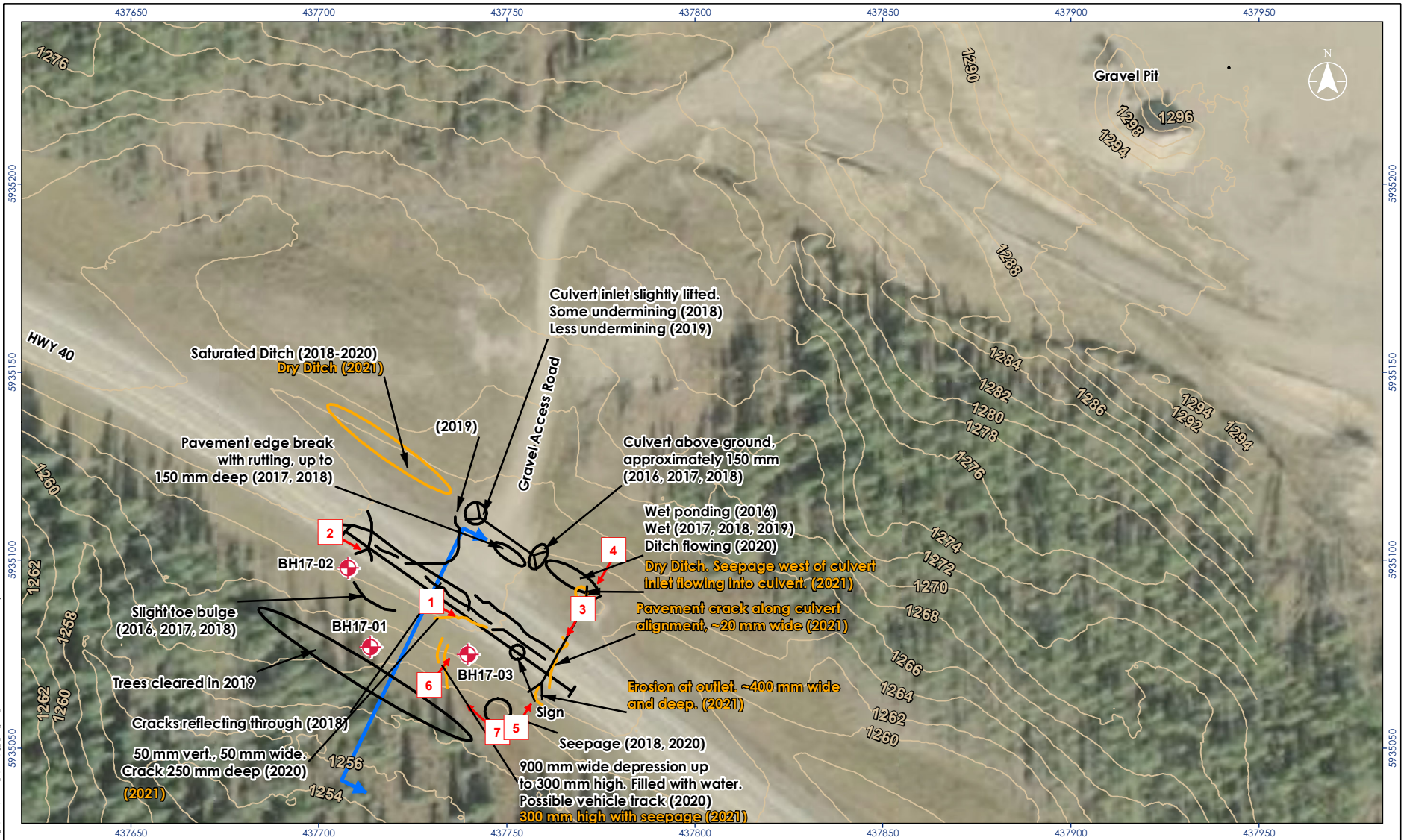
We trust this instrumentation report meets your requirements. If you have any questions, please do not hesitate to contact the undersigned.

Stantec Consulting Ltd.

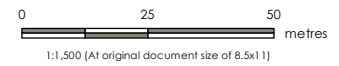
Leslie Cho M.Eng., P.Eng.
Senior Associate, Geotechnical Engineer
Phone: 780-917-7403
leslie.cho@stantec.com

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

Attachment: Figure 1 – Site Plan
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



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



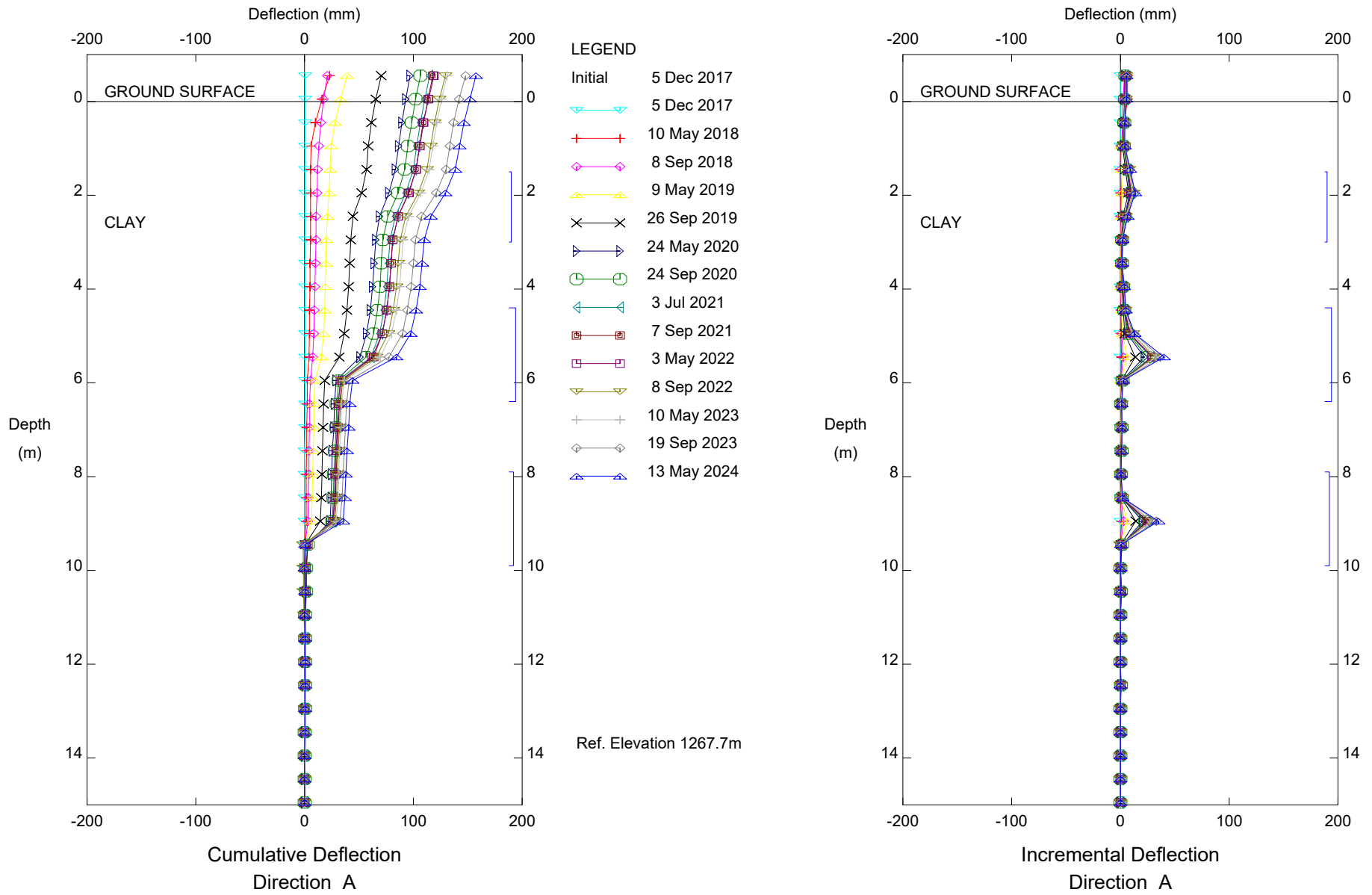
- Notes**
1. Coordinate System: NAD 1983 UTM Zone 11N
 2. Base Features: Geogratis, Department of Natural Resources Canada. All rights reserved.
 3. Imagery: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AEX, Geomapping, Aerogrid, iGN, IGP, swiststopa, and the GIS User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

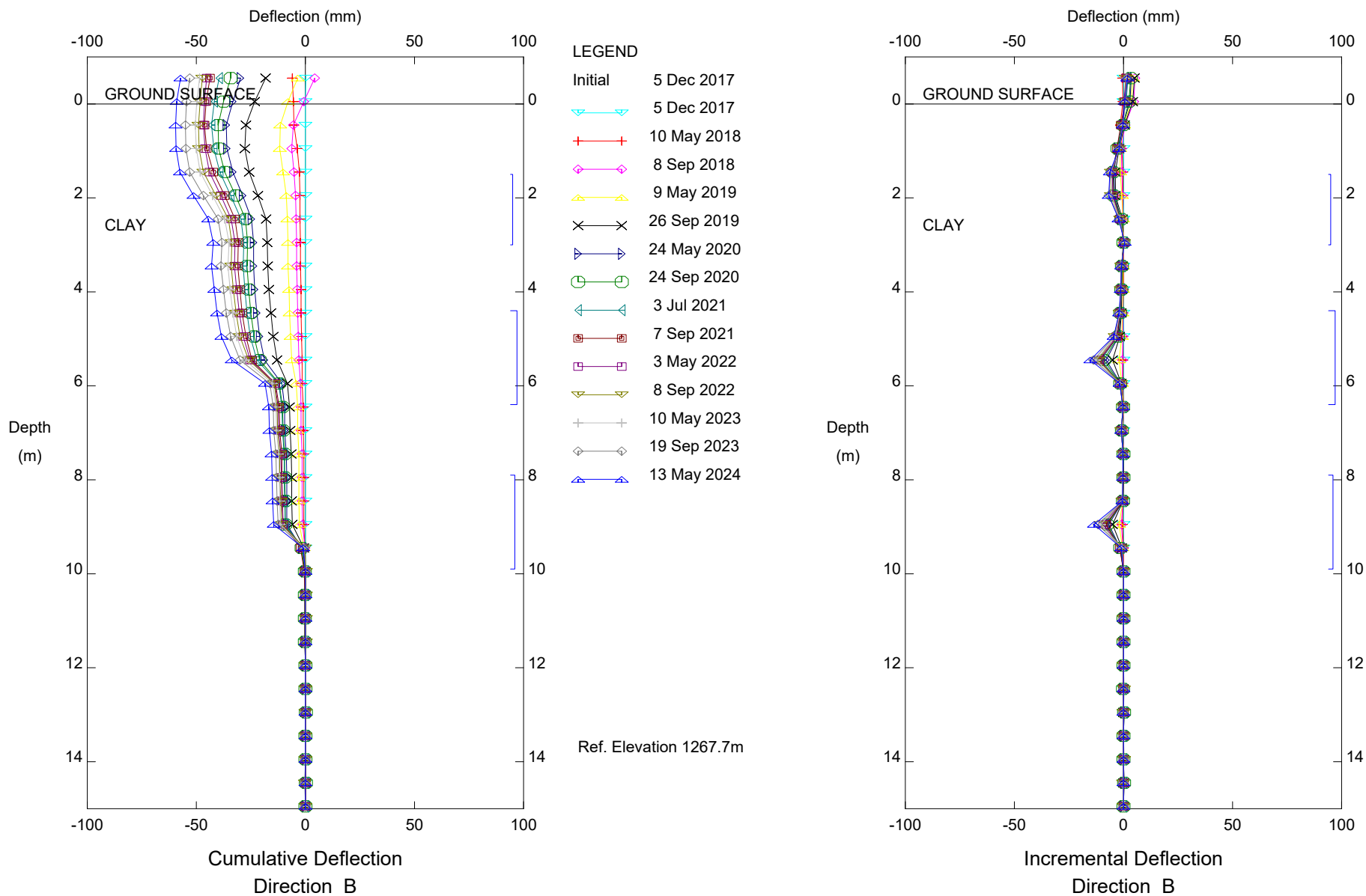
Figure No.
1
 Title
Site Plan

Stantec Consulting Ltd - Edmonton

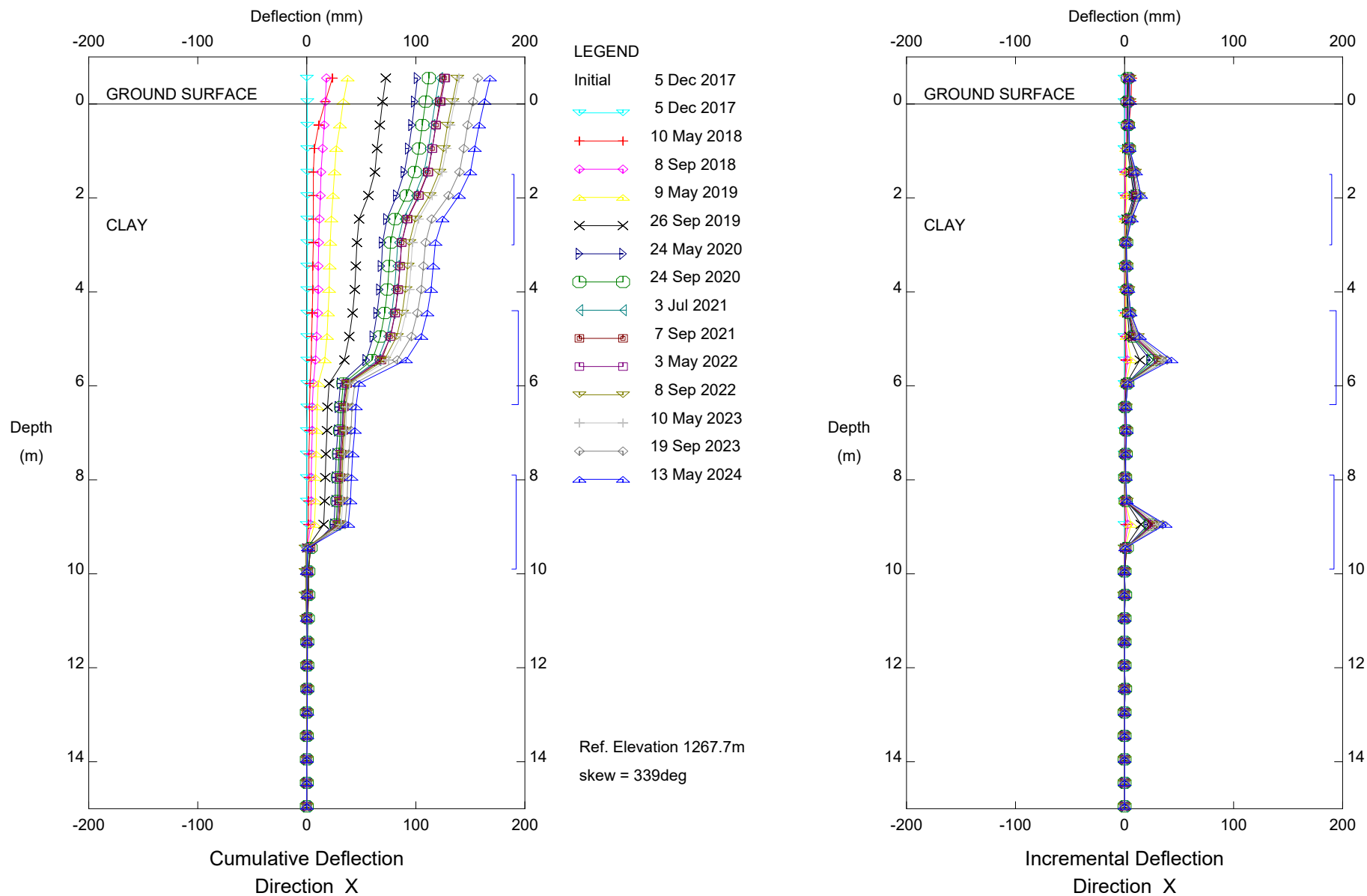


HWY 40:30 West of Wildhay River (NC83), Inclinometer SI17-01

Transportation & Economic Corridors

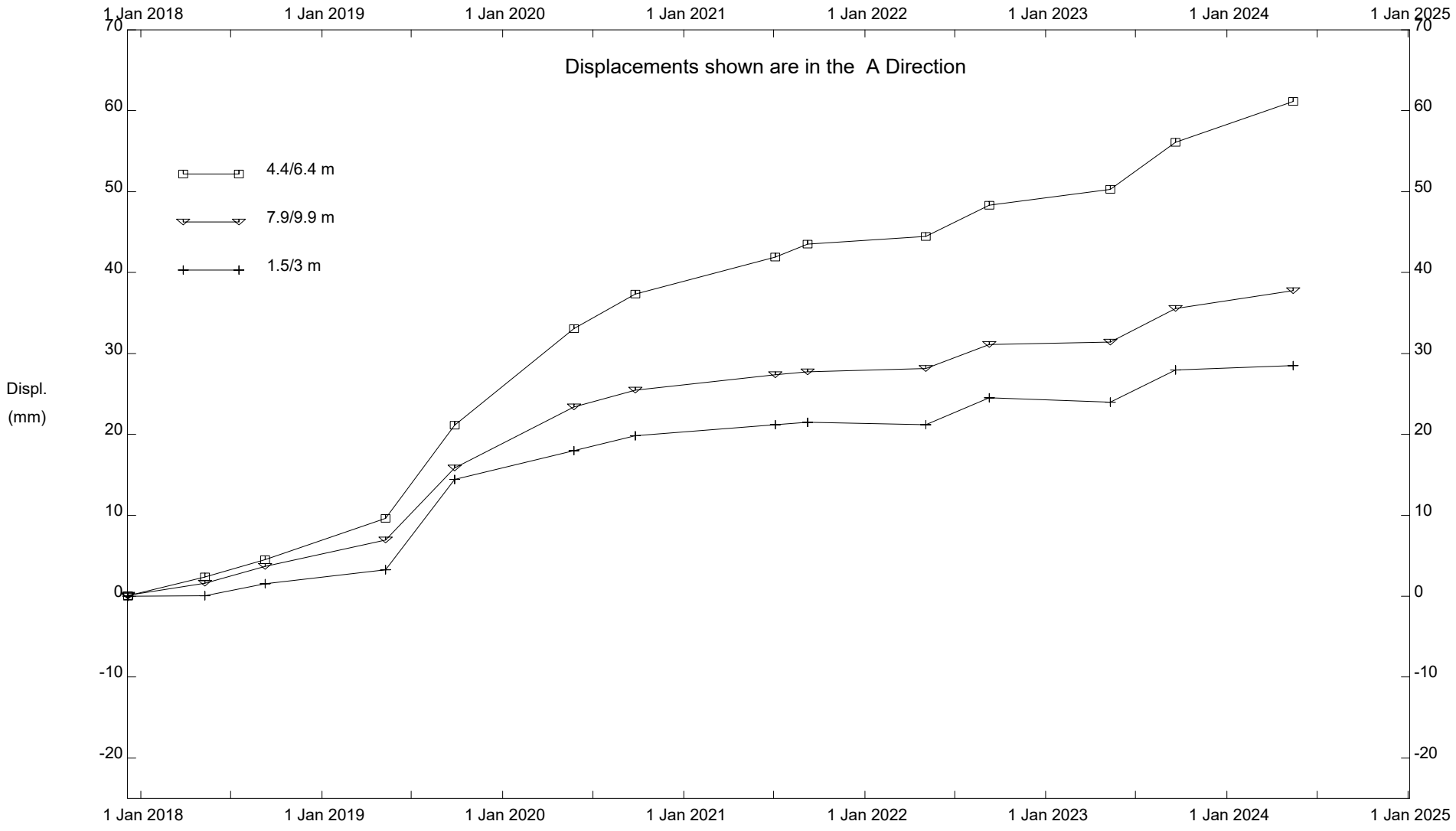


HWY 40:30 West of Wildhay River (NC83), Inclinometer SI17-01
 Transportation & Economic Corridors



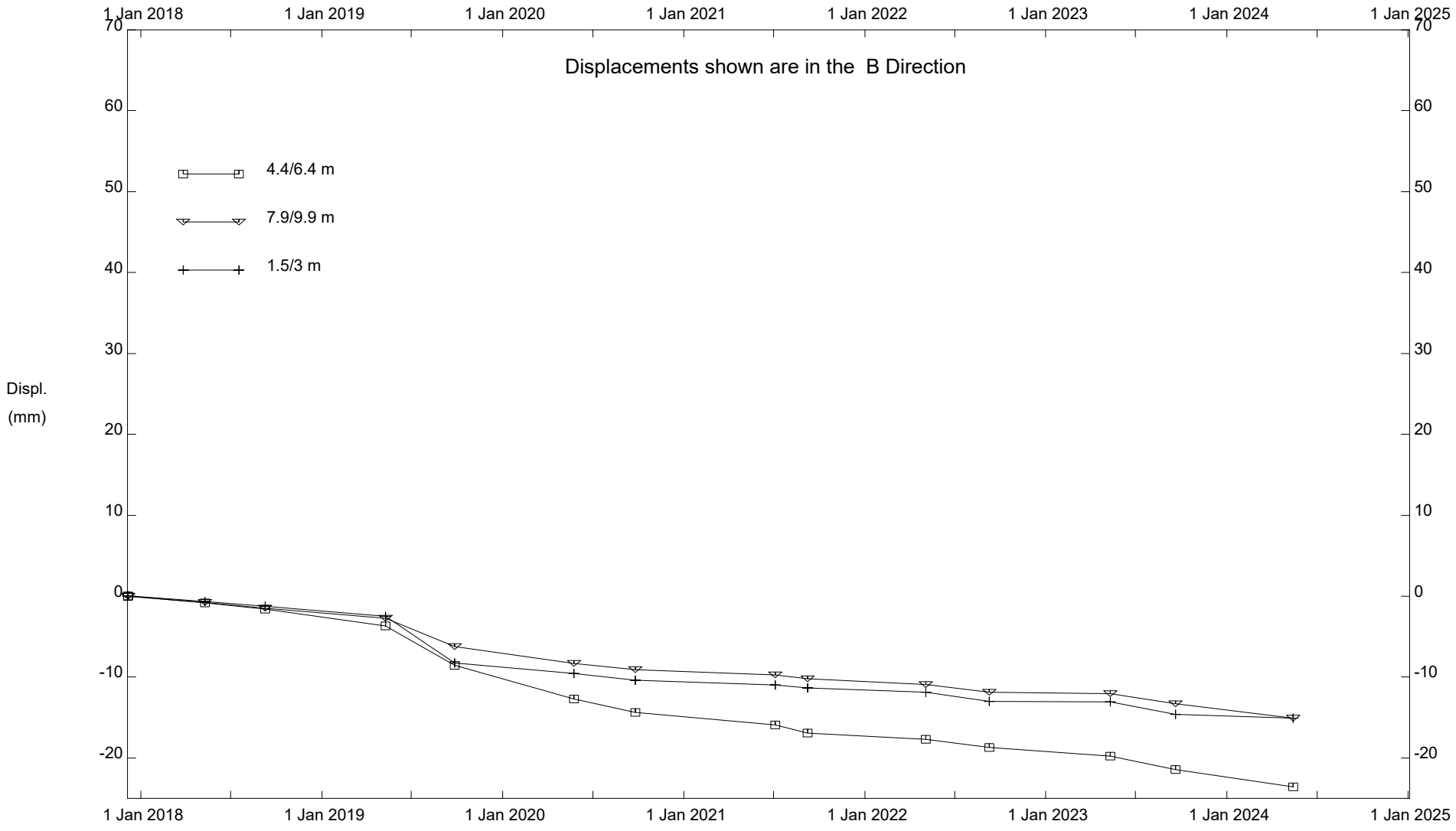
HWY 40:30 West of Wildhay River (NC83), Inclinator S117-01

Transportation & Economic Corridors



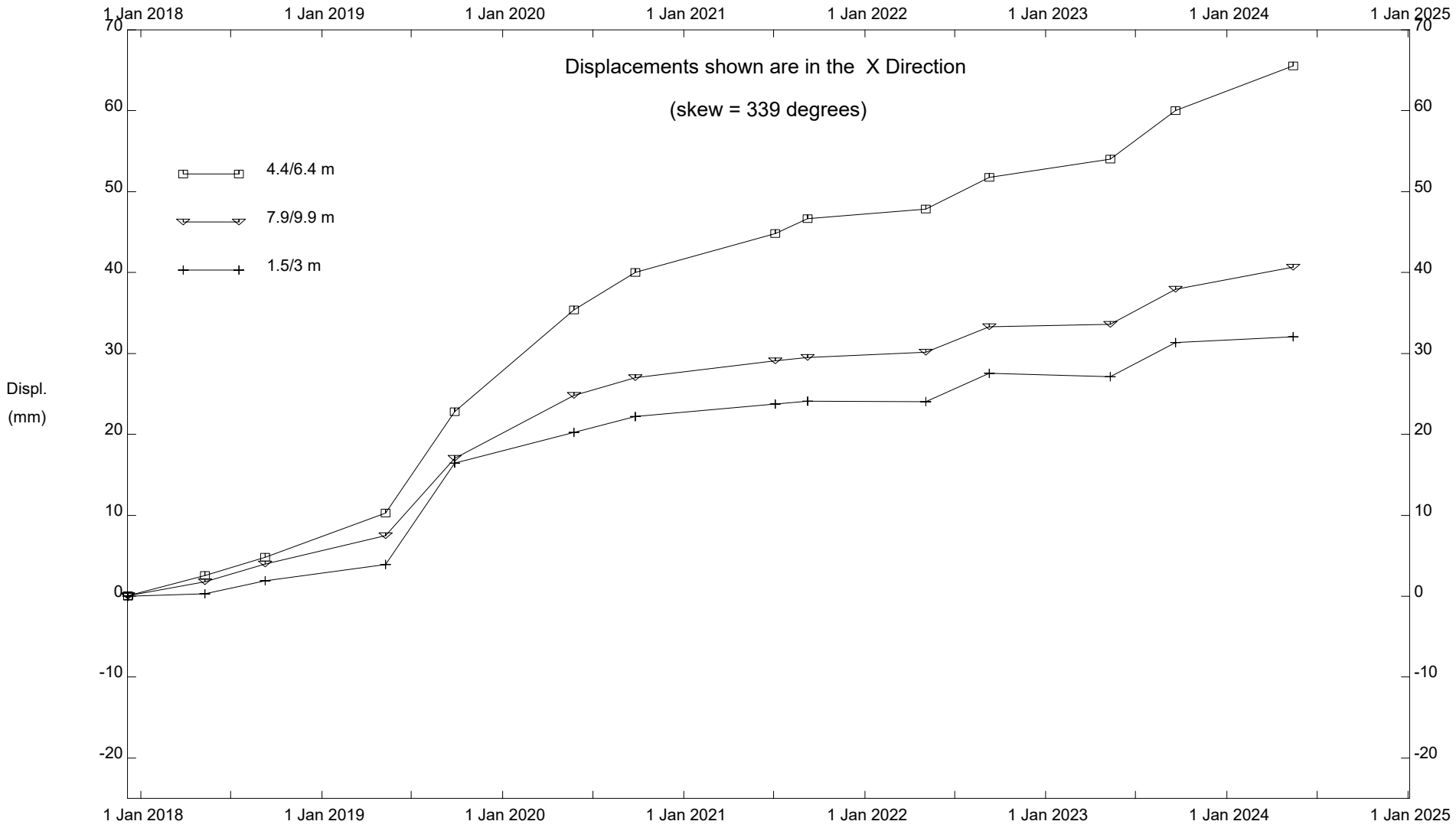
HWY 40:30 West of Wildhay River (NC83), Inclinator SI17-01

Transportation & Economic Corridors



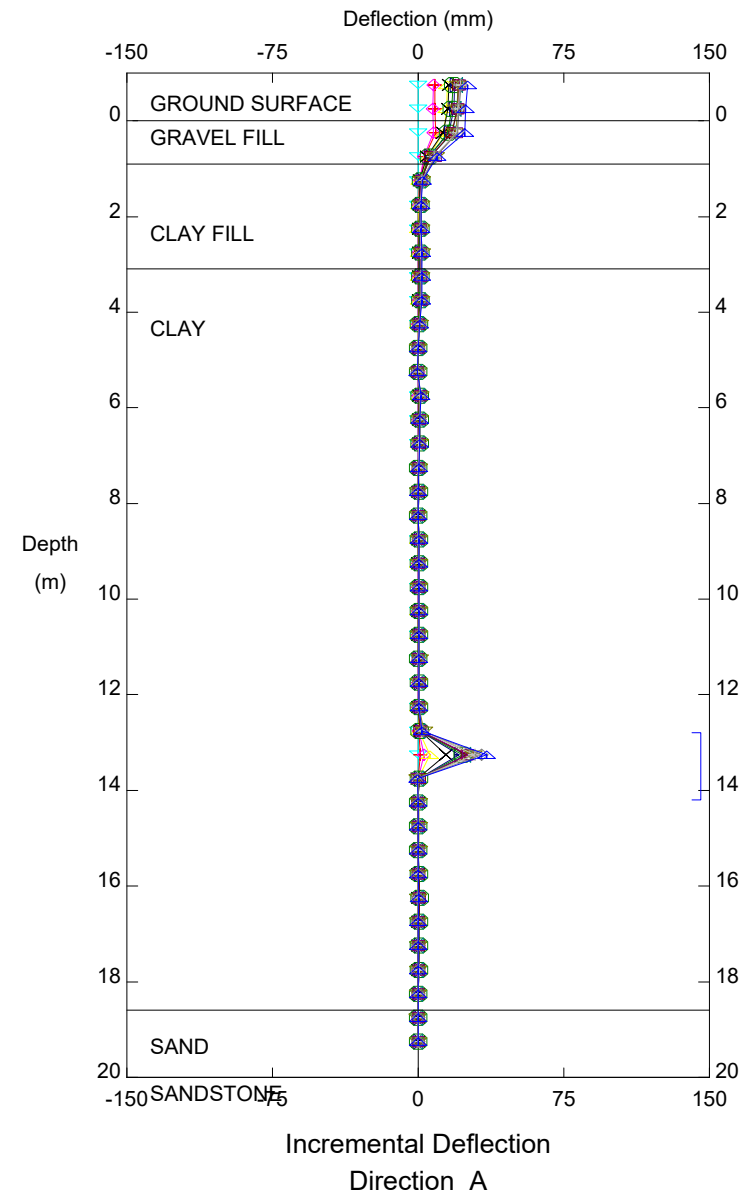
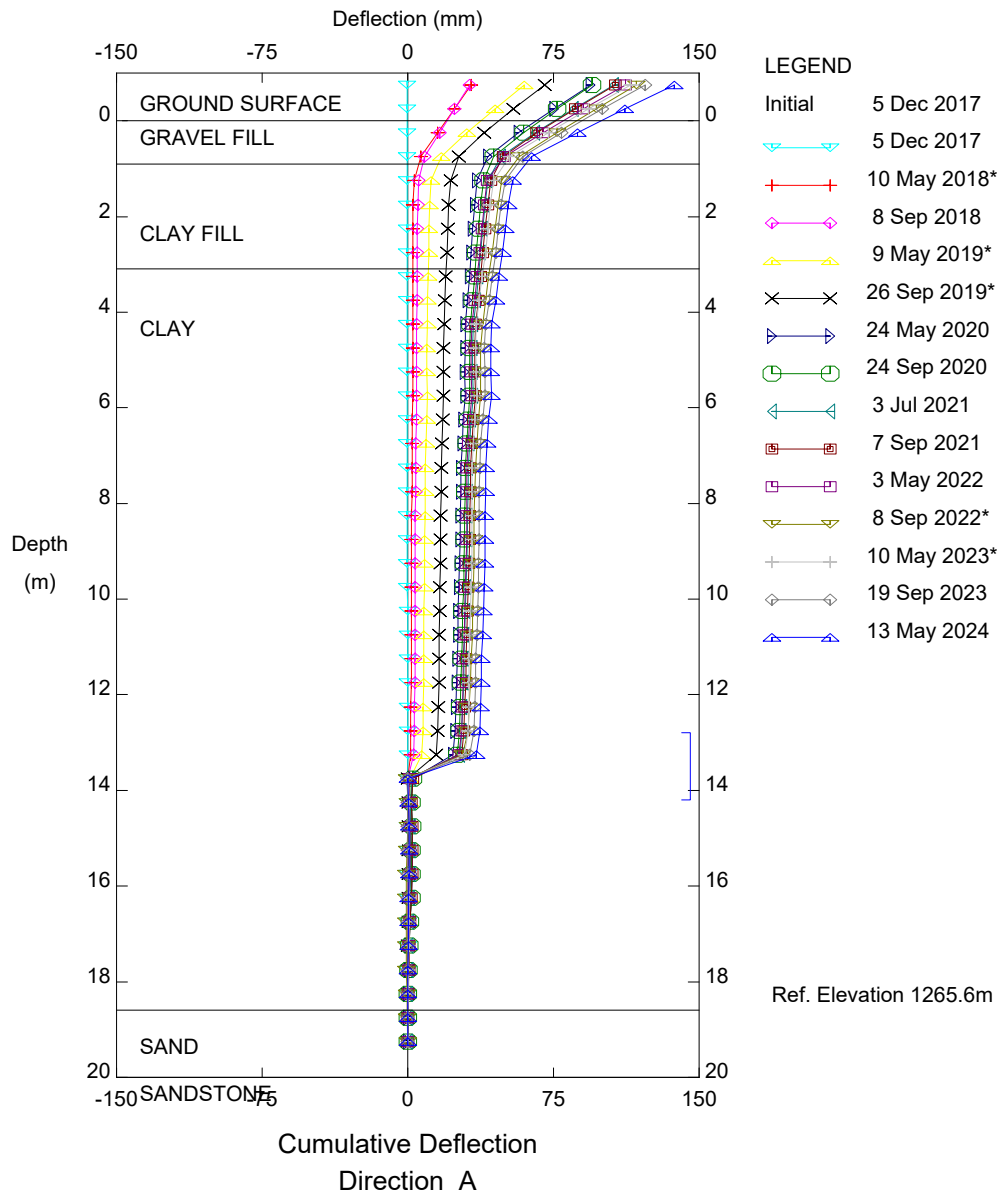
HWY 40:30 West of Wildhay River (NC83), Inclinometer SI17-01

Transportation & Economic Corridors



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

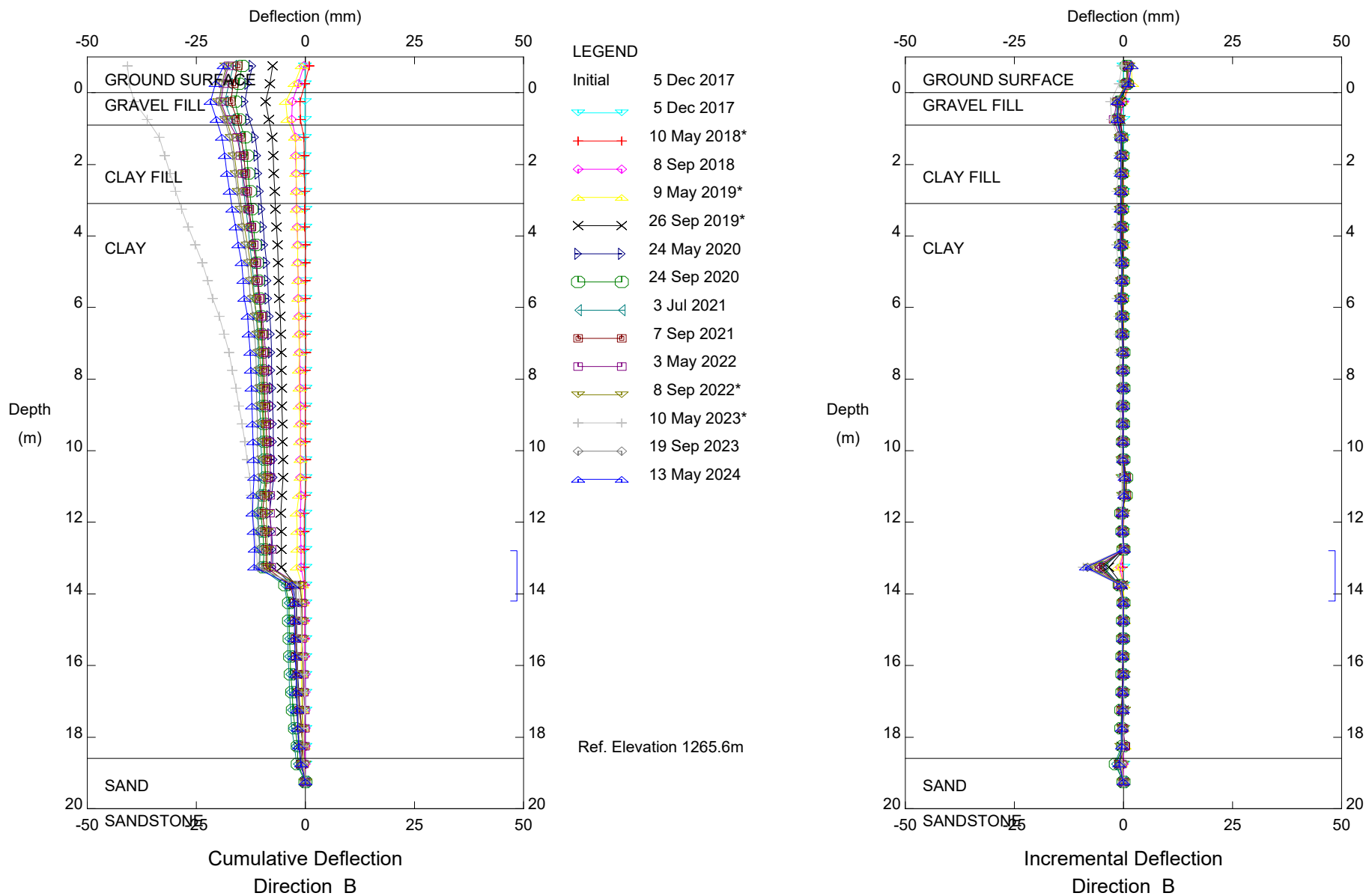
Transportation & Economic Corridors



HWY 40:30 West of Wildhay River (NC83), Inclinerometer S117-02

Transportation & Economic Corridors

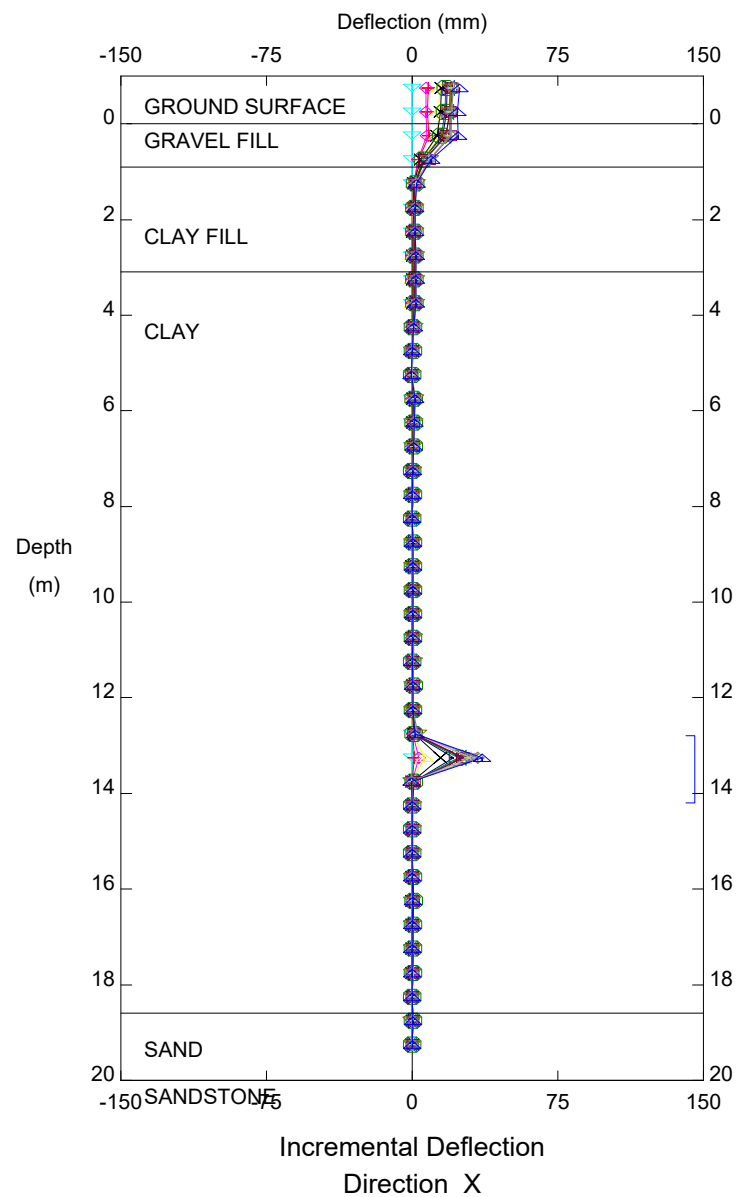
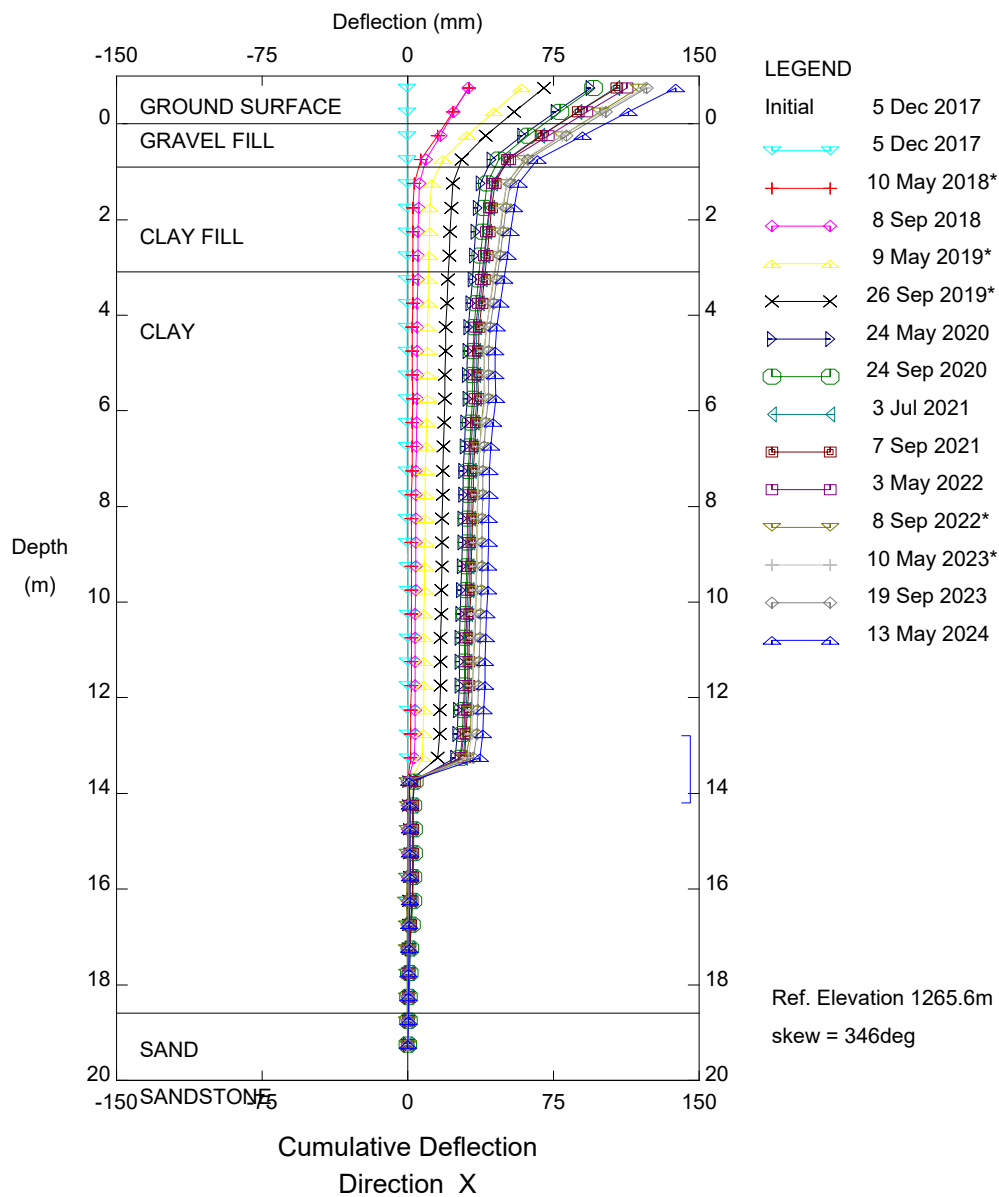
Sets marked * include zero shift and/or rotation corrections.



HWY 40:30 West of Wildhay River (NC83), Inclinometer S117-02

Transportation & Economic Corridors

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

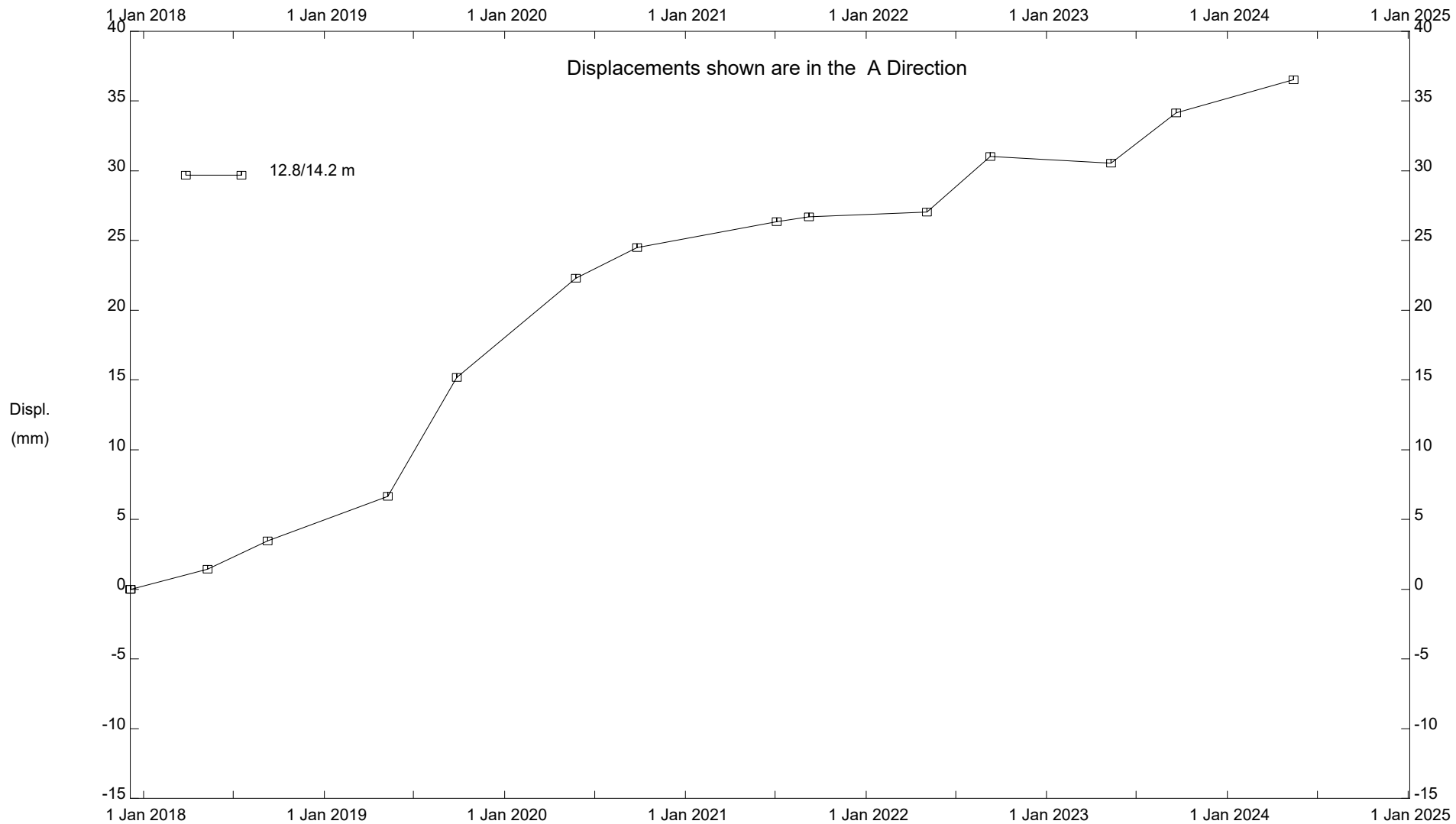


HWY 40:30 West of Wildhay River (NC83), Inclinator S117-02

Transportation & Economic Corridors

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

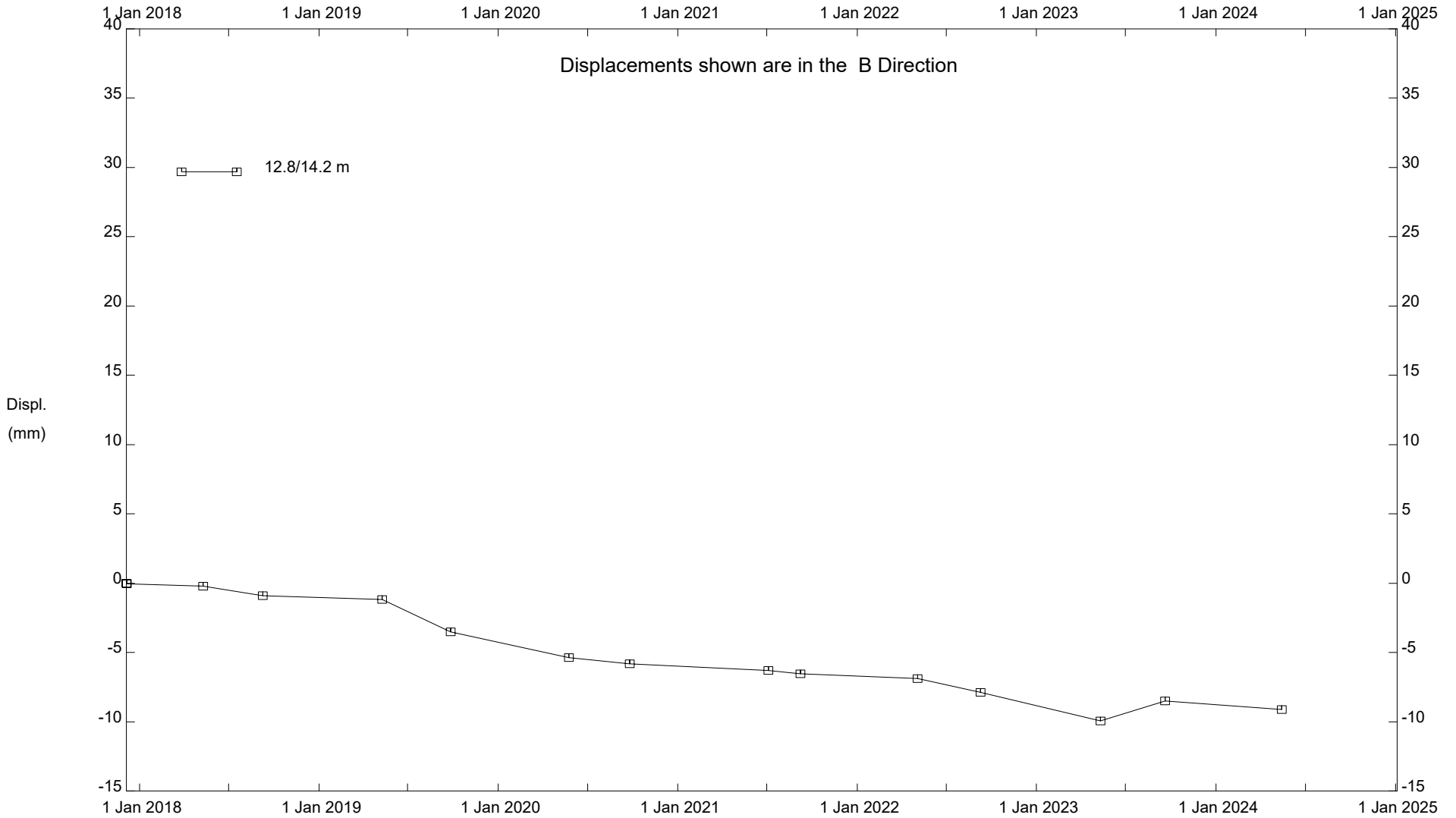
Stantec Consulting Ltd - Edmonton



HWY 40:30 West of Wildhay River (NC83), Inclinator SI17-02

Transportation & Economic Corridors

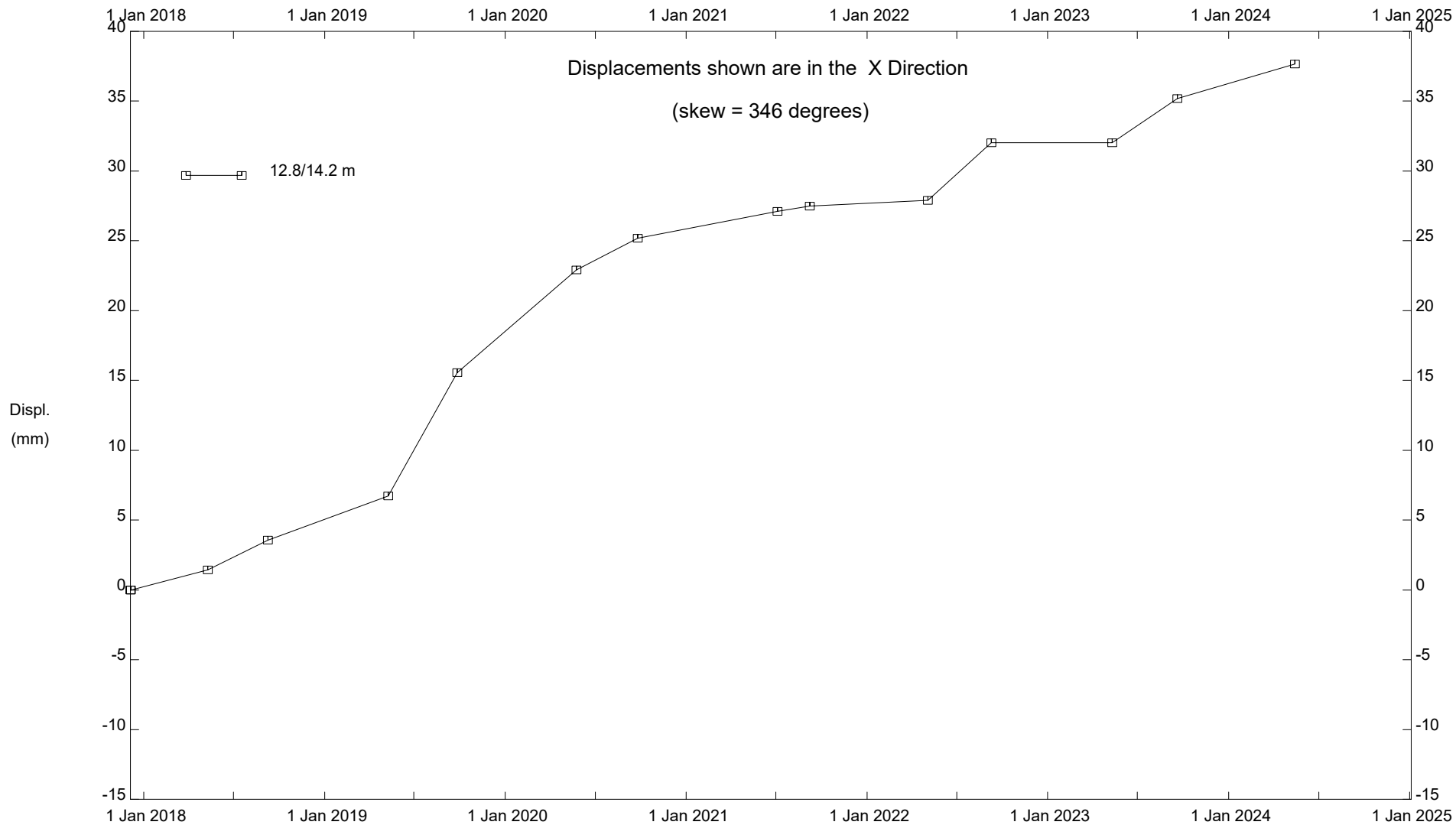
Stantec Consulting Ltd - Edmonton



HWY 40:30 West of Wildhay River (NC83), Inclinometer SI17-02

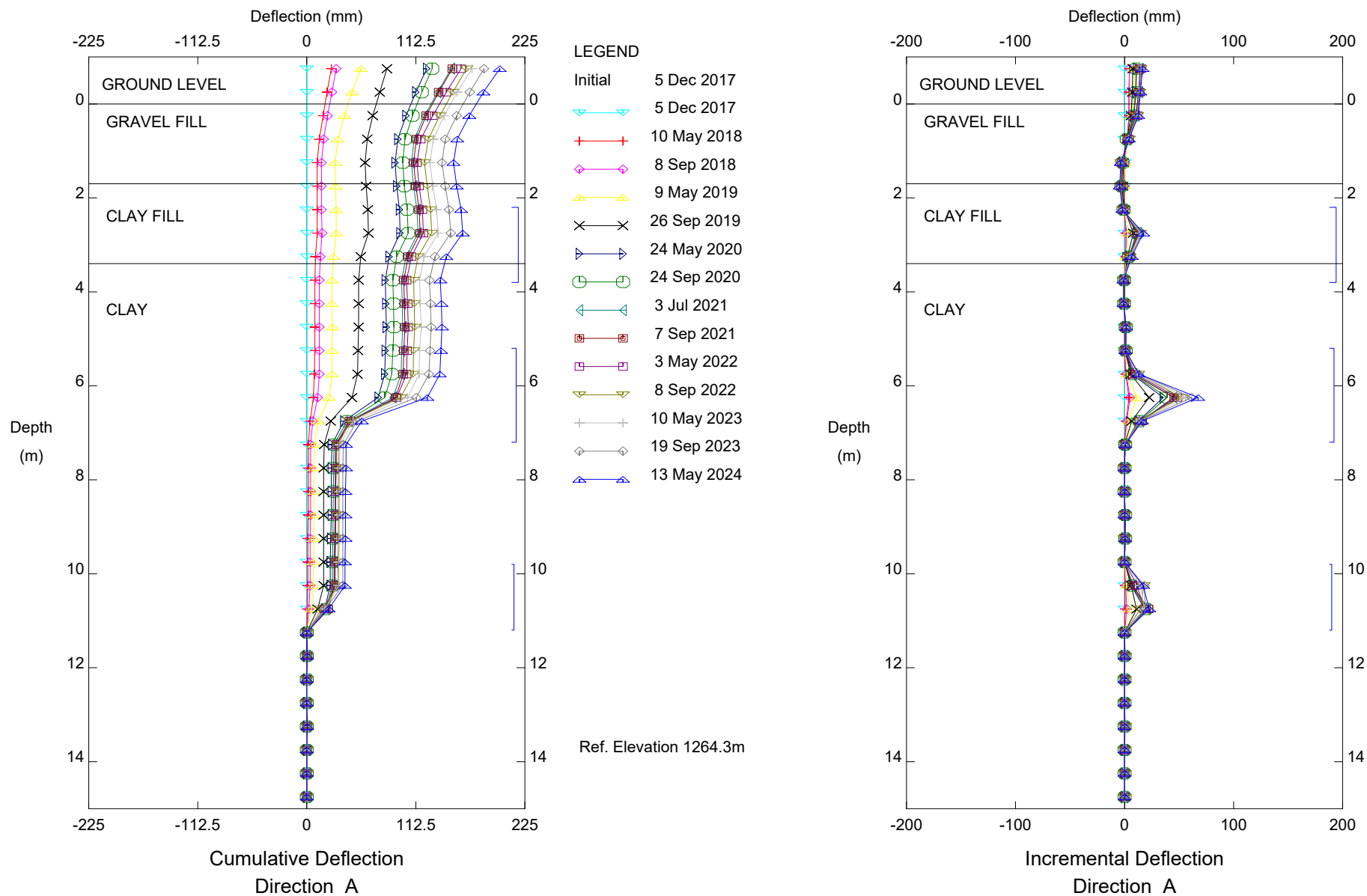
Transportation & Economic Corridors

Stantec Consulting Ltd - Edmonton

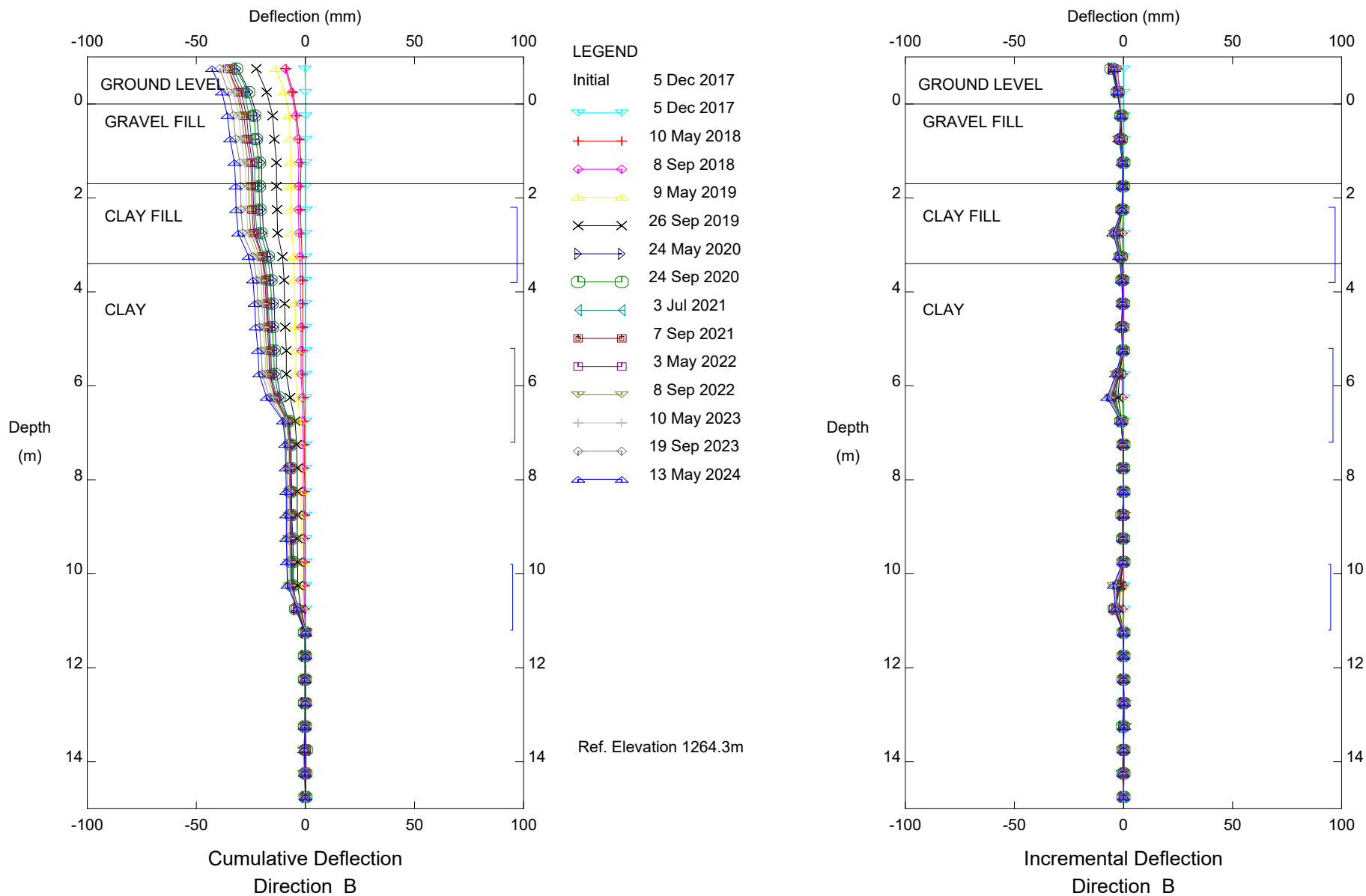


HWY 40:30 West of Wildhay River (NC83), Inclinator SI17-02

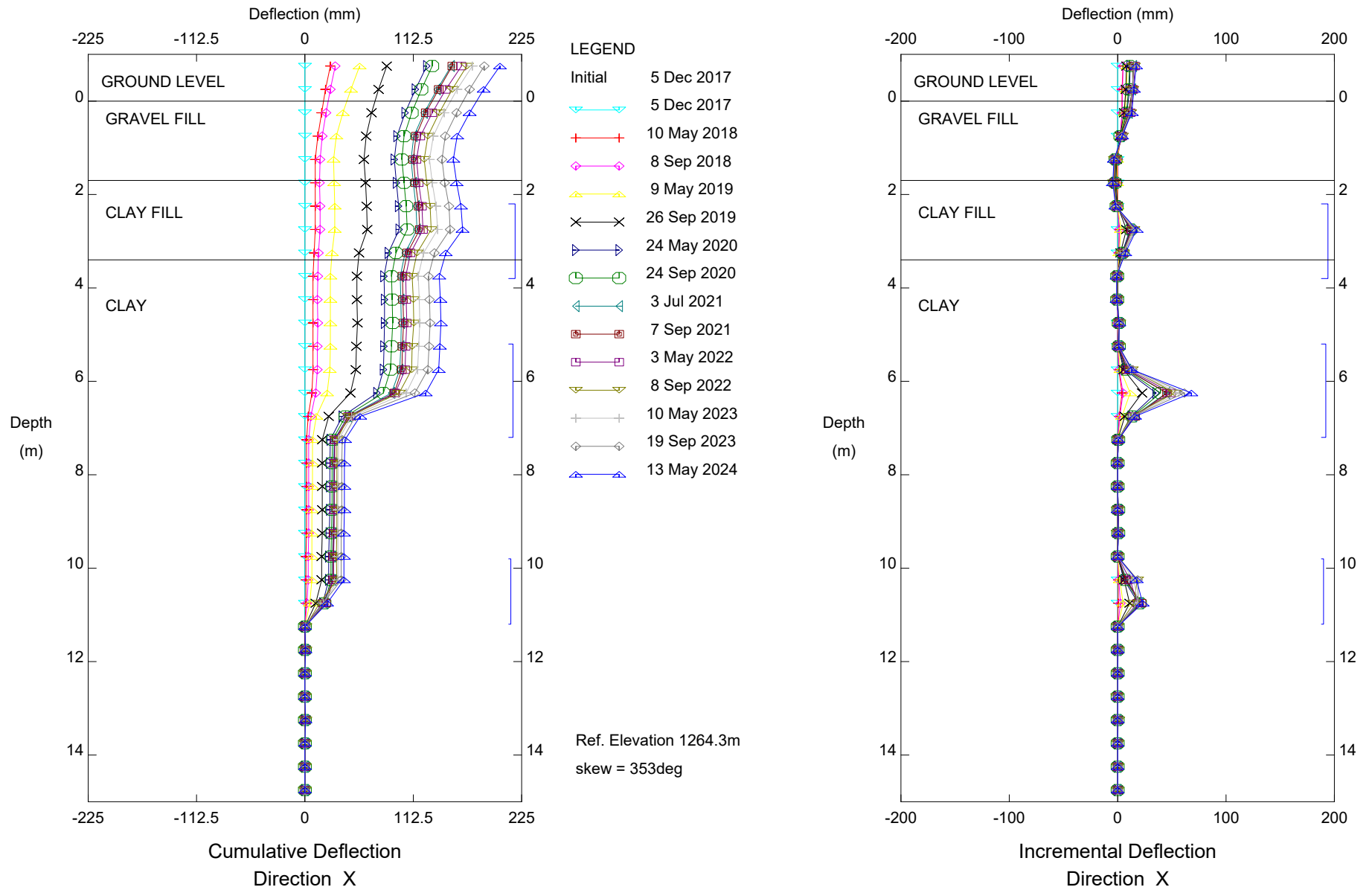
Transportation & Economic Corridors



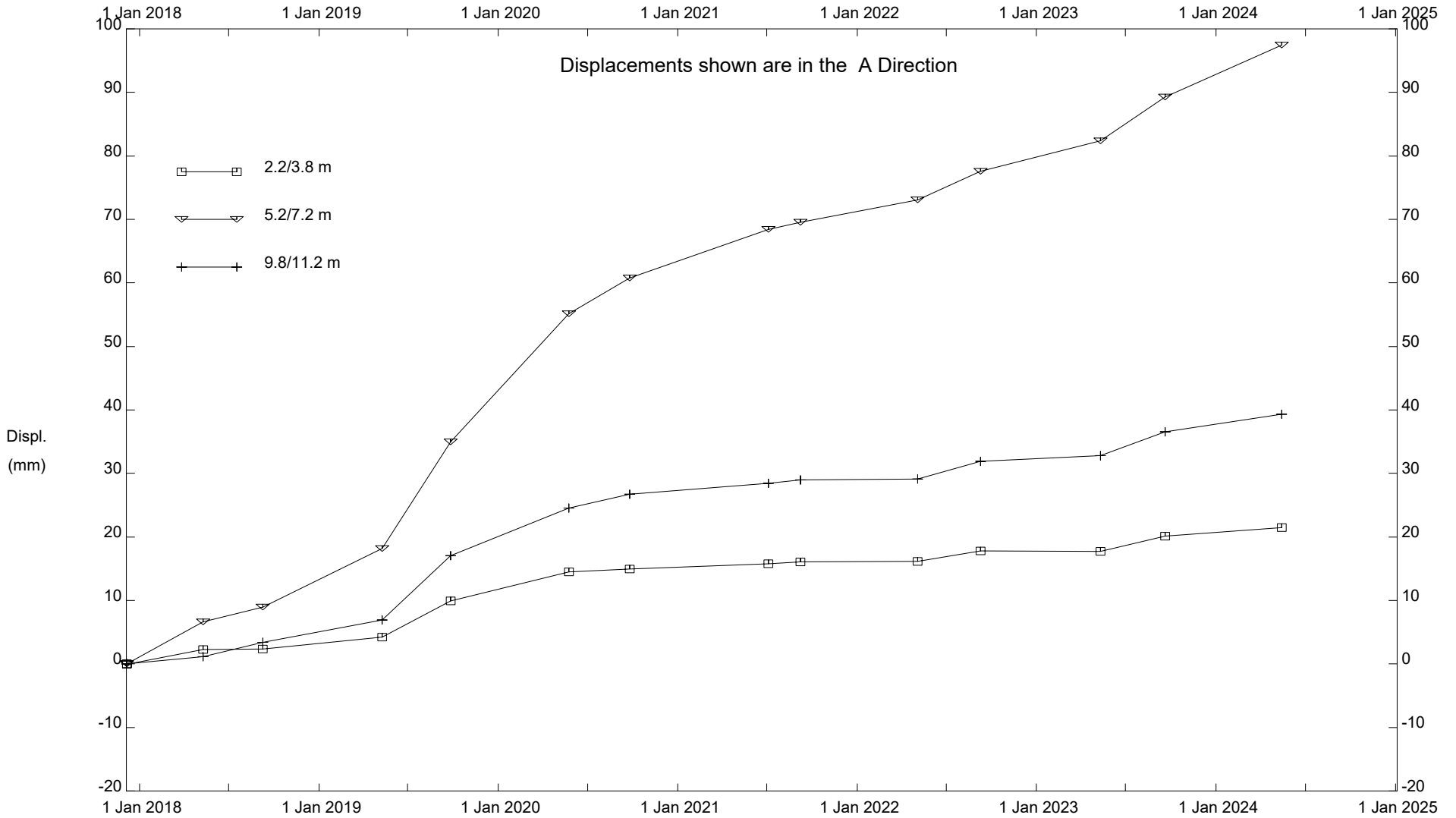
HWY 40:30 West of Wildhay River (NC83), Inclinometer S117-03
 Transportation & Economic Corridors



HWY 40:30 West of Wildhay River (NC83), Inclinometer S117-03
 Transportation & Economic Corridors



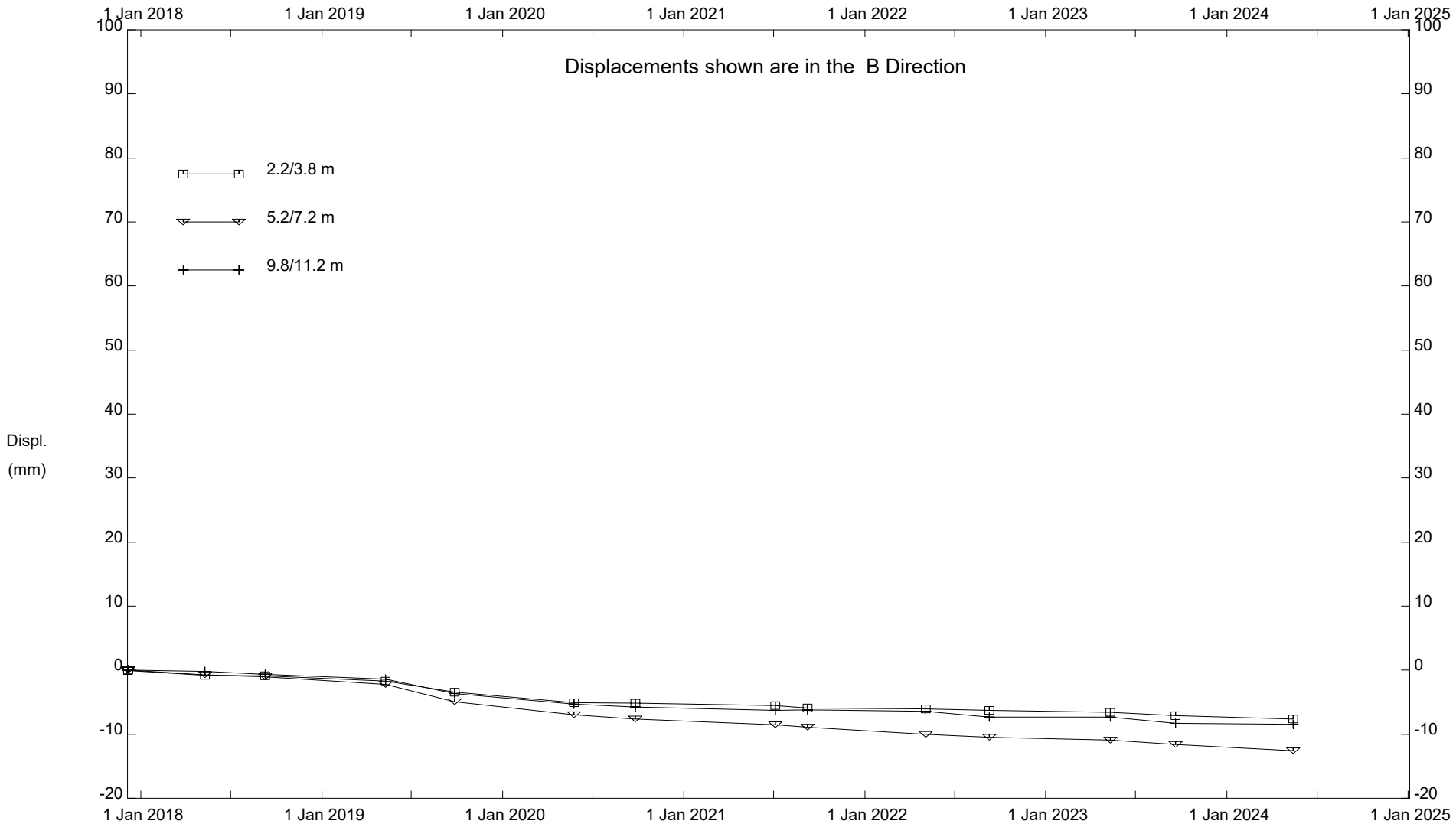
HWY 40:30 West of Wildhay River (NC83), Inclinometer S117-03
Transportation & Economic Corridors



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

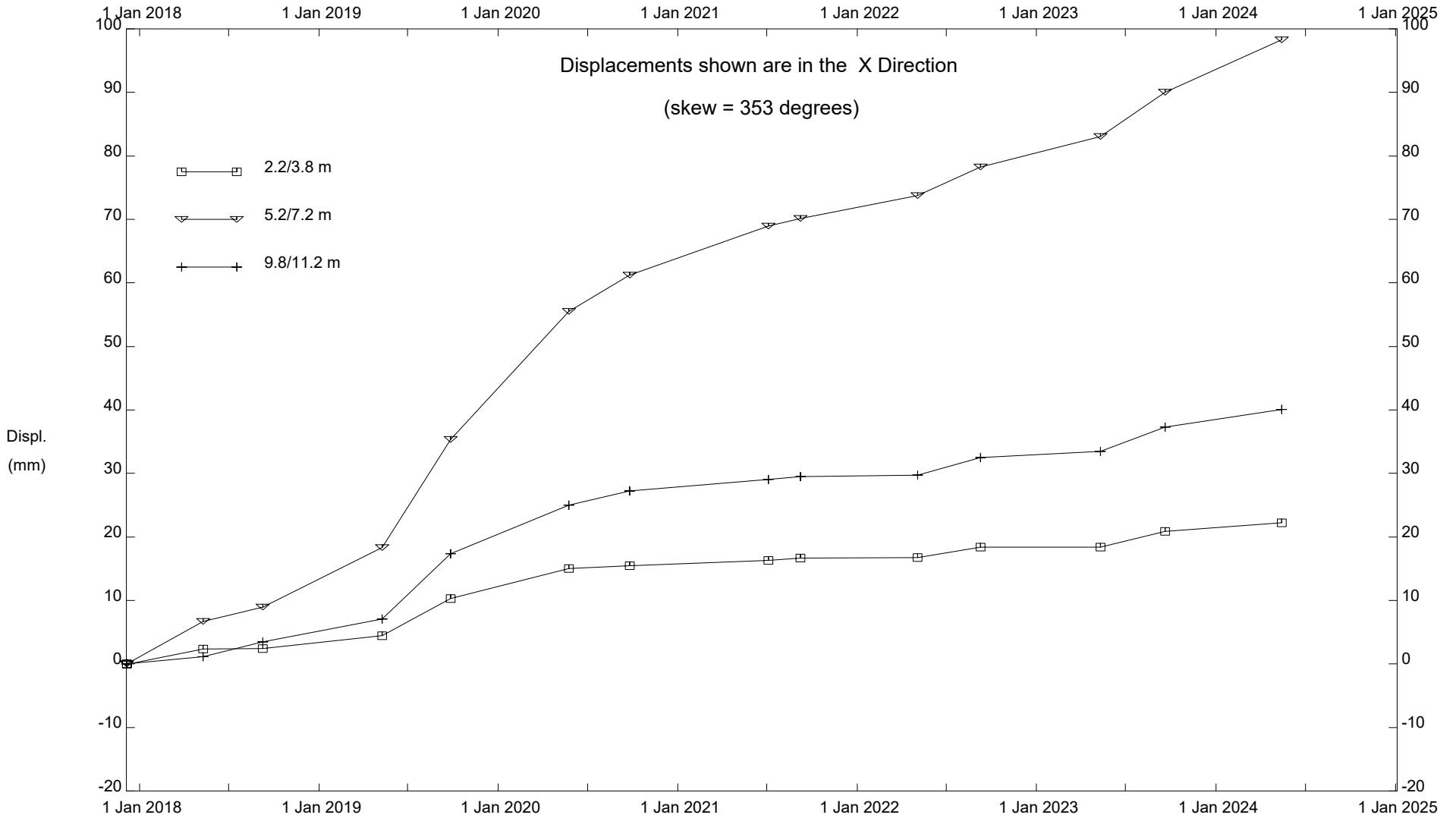
Transportation & Economic Corridors

Stantec Consulting Ltd - Edmonton



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

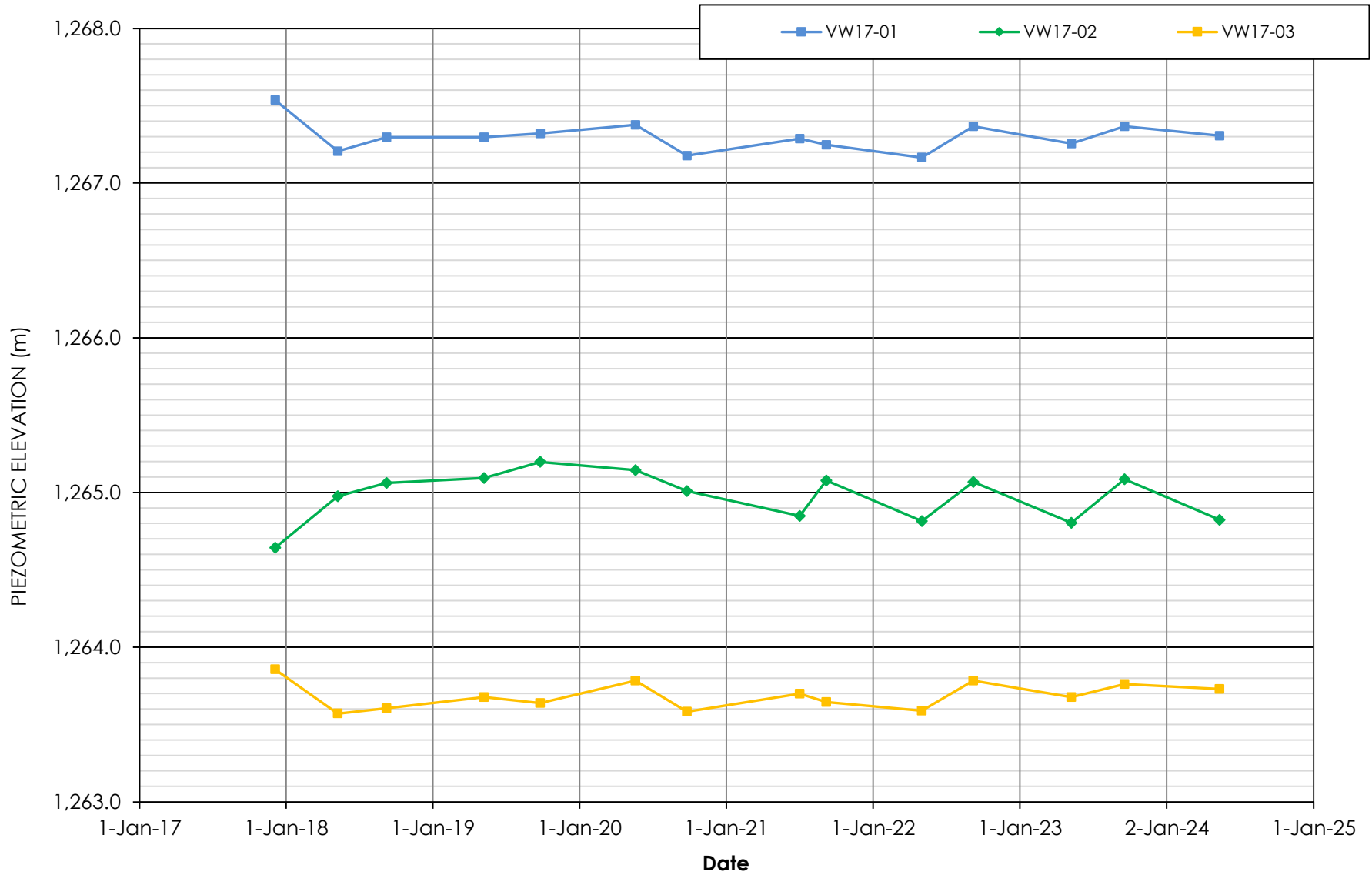
Transportation & Economic Corridors



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

Transportation & Economic Corridors

PIEZOMETER DATA



PIEZOMETER DATA

