Stantec

Memo

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

Reference: North Central Region, Stony Plain, Site NC067 - Highway 216:06 Anthony Henday Bridge, Spring 2024 Instrumentation Monitoring Report

1.0 OBSERVATIONS

1.1 FIELD PROGRAM AND INSTRUMENTATION STATUS

The Spring 2024 monitoring cycle consisted of reading seven slope inclinometers (SI), twenty-three pneumatic piezometers (PN), and twenty-five vibrating wire piezometers (VW). Figure 1 attached provides a schematic of the site. The instruments were read by Andres Padros, Technician and Olawale Odusi, Geotechnical Technologist on May 17, 2024.

The SIs 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 PNs were read with an RST Instruments C-109 Pneumatic Readout. The VWs were read with an RST VW2106 readout box.

GPS coordinates of all instruments were obtained using a Garmin GPSmap 22x handheld GPS unit.

1.2 WEST ABUTMENT

A total of seven SIs (SI-01, SI-03, SI-04, SI-06, SI-08, SI-10, and SI-12), ten nested PNs (PN-A1 to PN-A3, PN-B1 to PN-B3 and PN-C1 to PN-C4), and nine nested VWs (VW-A1 to VW-A3, VW-B1 to VW-B3, and VW-C2 to VW-C4) were read on the west abutment. VW-C1 was found possibly damaged during the Spring 2023 reading cycle since there was no signal from VW-C1. The lack of signal was confirmed in Fall 2023.

SI-02 could not be located since 2022 and may have been destroyed during construction at the west abutment. SI-11 has sheared about 17 m below ground and could not be read. SI-07 was found to be blocked or sheared about 6 m below ground surface during the Spring 2023 reading cycle.

1.3 EAST ABUTMENT

A total of thirteen nested PNs (PN-1, PN-2, PN-5 to PN-14, and PN-17) and sixteen nested VWs (VW-1 to VW-16) were read on the east abutment.

PN-7 was noted to be potentially damaged during the Spring 2022 instrument readings since the readings were erratic. During the Fall 2022 readings the same problem was experienced. However, the Spring 2023 reading cycle suggests PN-7 remains functional.

Reference: **North Central Region, Stony Plain, Site NC067 - Highway 216:06 Anthony Henday Bridge, Spring 2024 Instrumentation Monitoring Report**

2.0 INSTRUMENTATION READINGS

2.1 GENERAL

The SI plots are provided in the attachments 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 NC067-1 and the attachments.

The groundwater levels from PNs and VWs readings are plotted in the attachments and summarized in Table NC067-2 to NC067-5.

2.2 ZONES OF MOVEMENT

No new zones of movement were observed during the Spring 2024 reading cycle.

2.3 MONITORING RESULTS

2.3.1 West Abutment

2.3.1.1 Slope Inclinometers

SI-01 and SI-03 were installed in the pile wall and are summarized below.

- SI-01 showed almost no change since the Fall 2023 reading cycle. The current movement rate is less than 1 mm/yr.
- SI-03 showed decreasing cumulative movement between 2018 and 2021. The cumulative movement decreased by 4 mm to 106 mm during the Spring 2024 readings with a rate of movement of 6 mm/yr.

SI-04 has two potential zones of movement. The one between 6.2 and 9.2 m has a movement rate of about 2 mm/yr and a cumulative movement of 3 mm. The one between 15.2 and 18.2 m has a movement rate less than 1 mm/yr and a cumulative movement of less than 1 mm.

SI-06 has historically shown some erratic movement near the base of the casing. Currently, SI-06 shows a movement rate of about 1 mm/yr with a cumulative movement of 2 mm. Additional readings will be required to confirm slope movement.

SI-08 has two zones of movement observed at around 8 m and 16 m depth. The average rate of movement in the upper zone was about 3 mm/yr since 2003. Total cumulative movement appears to be erratically moving around 58 mm since Spring 2021. The lower movement zone appears to be creeping at a rate of less than 1 mm/yr since 2003.

SI-10 shows a current rate of movement of about 2 mm/yr. The average rate of movement since 2006 is also 2 mm/yr. The total cumulative movement is 24 mm.

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SI-12 has a zone of movement between 3.2 m and 6.2 m and shows creep at a rate of about 1 mm/yr since 2008 with a total cumulative movement of 45 mm.

2.3.1.2 Piezometers

In general, the PNs in the west abutment showed piezometric level difference between 2.0 m decrease to 0.3 m increase compared to Fall 2023 readings.

In general, the VWs in the West abutment showed little change of about +/- 0.2 m in the piezometric level except for VW-A2 which decreased by 0.4 m, VW-B2 which decreased by 0.5 m, and VW-C4 which increased by 0.4 m.

Table NC067-2 and Table NC067-3 summarize the west abutment PN and VW piezometer readings for the Spring 2023 reading cycle.

2.3.2 East Abutment

2.3.2.1 Piezometers

In general, the PNs in the east abutment continue to show little change of about +/- 0.1 m in the piezometric level. The largest change in piezometric levels show an increase 0.5 m since the Fall 2023 readings.

The VW piezometers in the east abutment show a general decrease in the piezometric level up to 0.4 m since Fall 2023 readings. Piezometers VW-3, VW-4, VW-6, VW-11 and VW-16 were inferred to be dry again this reading cycle.

Table NC067-4 and Table NC067-5 summarizes the east abutment PN and VW readings for the Spring 2023 reading cycle.

3.0 RECOMMENDATIONS

3.1 FUTURE WORK

It is recommended that all instruments be read in the Fall 2024 reading cycle.

3.2 INSTRUMENTATION REPAIRS

PN-7 showed erratic readings which are an indicator of possible damage to the pneumatic tubing. However, it could also mean the tubes are dirty and need to be purged.

Reference: **North Central Region, Stony Plain, Site NC067 - Highway 216:06 Anthony Henday Bridge, Spring 2024 Instrumentation Monitoring Report**

Table NC067-1: Spring 2024 Slope Inclinometer Reading Summary on West Abutment

Instrument Name	Date Initialized	Coordinates [1] (UTM 12U, NAD1983) (m)		Total Cumulative Resultant Movement, and Depth of Movement (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							
SI-01	Oct. 3, 2002	5926771	326315	33 over 2.2 m to 5.2 m depth in 311° direction	28 mm/yr in Oct. 2012	Operational	Sep 21, 2023	-<1	<1	<1
SI-02	Oct. 3, 2002	5926745	326302	63 over 1.2 m to 4.2 m depth in 9° direction	24 mm/yr in Oct. 2013	Non-operational	Sep 7, 2022	Instrument destroyed during construction activities in 2022.		
SI-03	Oct. 20, 2002	5926706	326272	106 over 1.2 m to 2.8 m depth in 8° direction	42 mm/yr in May 2022	Operational	Sep 21, 2023	-4	-6	-5
SI-04	Oct. 20, 2002	5926670	326249	3 over 6.2 m to 9.2 m depth in 352° direction	2 mm/yr in May 2024	Operational	May 26, 2023	2	2	2
				1 over 15.2 m to 18.2 m depth in 352° direction	2 mm/yr in May 2021			<1	<1	-1
SI-06	Oct 20, 2002	5926705	326265	2 over 35.2 m to 36.2 m depth in 100° direction	4 mm/yr in Sep. 2019	Operational	Sep 21, 2023	1	1	1
SI-07	Oct. 20, 2002	5926754	326300	155 over 0.8 m to 5.2 m depth in 40° direction	186 mm/yr; Jan. 2003	Non-Operational	Sep 7, 2022	Sheared at approximately 6 m below top of pipe during winter 2022/2023.		
				25 over 5.2 m to 9.2 m depth in 40° direction	45 mm/yr; Sept. 2021					
				10 over 13.2 m to 16.2 m depth 40° direction	10 mm/yr; Jan. 2003					

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Instrument Name	Date Initialized	Coordinates (1) (UTM 12U, 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							
SI-08	Oct. 22, 2002	5926760	326267	61 over 5.8 m to 11.8 m depth in 358° direction.	25 mm/yr; Sep. 2021	Operational	Sep 21, 2023	4	4	4
				33 over 14.2 m to 17.2 m depth in 358° direction.	36 mm/yr; Oct. 2003			<1	<1	<1
SI-10	Jul. 18, 2003	5927005	326337	24 over 14.2 m to 22.2 m depth in 338° direction	42 mm/yr; Sep. 2016	Operational	Sep 21, 2023	2	2	1
SI-11	Jul. 18, 2003	5927116	326378	12 over 14.2 m to 25.8 m depth in 348° direction	7 mm/yr; Sept. 2018	Non-operational	Sep 7, 2022	Instrument has sheared approx. 17 m below ground surface.		
SI-12	Jan. 9, 2003	5927242	326423	45 over 3.2 m to 6.2 m depth in 290° direction	17 mm/yr; Sep. 2021	Operational	Sep 21, 2023	-<1	<1	-2

Note:
(1) Updated May 17, 2024, with approximate accuracy of ± 3 m.

Reference: **North Central Region, Stony Plain, Site NC067 - Highway 216:06 Anthony Henday Bridge, Spring 2024 Instrumentation Monitoring Report**

Table NC067-2: Spring 2024 Pneumatic Piezometer Reading Summary on West Abutment

Instrument Name	Date Initialized	Tip Elevation (m aMSL)[1]	Current Status	Maximum Piezometric Elevation (m)	Piezometric Elevation (m aMSL)	Previous Piezometric Elevation (m aMSL)	Change in Piezometric Level Since Previous Reading (m)
PN-A1 (27962)	Oct 14, 2002	614.0	Operational	631.6; Nov 2002	626.7	626.9	-0.2
PN-A2 (27963)	Oct 14, 2002	623.9	Operational	627.2; Sep 2020	626.5	627.2	-0.7
PN-A3 (27964)	Oct 14, 2002	627.7	Operational	628.8; May 2008	628.0	628.1	-0.1
PN-B1 (27957)	Oct 14, 2002	613.5	Operational	633.0; Oct 2002	627.3	627.4	-0.1
PN-B2 (27956)	Oct 14, 2002	623.5	Operational	627.0; Jan 2003	624.5	624.7	-0.2
PN-B3 (27961)	Oct 14, 2002	627.5	Operational	633.4; May 2004	629.0	629.3	-0.3
PN-C1 (29755)	Oct 14, 2002	620.8	Operational	634.9; Nov 2002	621.3	623.3	-2.0
PN-C2 (27958)	Oct 14, 2002	628.8	Operational	634.9; Nov 2002	631.0	631.3	-0.3
PN-C3 (27959)	Oct 14, 2002	631.6	Operational	646.8; May 2003	636.3	636.1	0.2
PN-C4 (27960)	Oct 14, 2002	635.7	Operational	638.9; May 2008	638.0	638.3	-0.3

Note:
(1) aMSL = Above Mean Sea Level
(2) Piezometer location (326270 m Easting, 5926722 m Northing, UTM 12U, NAD1983) updated May 17, 2024, with approximate accuracy of ± 3 m.

Reference: **North Central Region, Stony Plain, Site NC067 - Highway 216:06 Anthony Henday Bridge, Spring 2024 Instrumentation Monitoring Report**

Table NC067-3: Spring 2024 Vibrating Wire Piezometer Reading Summary on West Abutment

Instrument Name	Date Initialized	Tip Elevation (m aMSL)(1)	Current Status	Maximum Piezometric Elevation (m aMSL)	Piezometric Elevation (m aMSL)	Previous Piezometric Elevation (m aMSL)	Change in Piezometric Level Since Previous Reading (m)
VW-A1 (75077)	Oct 14, 2002	614.0	Operational	630.8; Nov. 2002	626.6	626.8	-0.2
VW-A2 (75079)	Oct 14, 2002	623.9	Operational	628.0 Sep. 2020	627.6	628.0	-0.4
VW-A3 (75080)	Oct 14, 2002	627.7	Operational	628.8; Nov. 2002	627.9	628.1	-0.2
VW-B1 (75073)	Oct 14, 2002	613.5	Operational	632.9; Oct. 2002	627.3	627.5	-0.2
VW-B2 (75072)	Oct 14, 2002	623.5	Operational	627.9; Sept. 2020	627.2	627.7	-0.5
VW-B3 (75078)	Oct 14, 2002	627.5	Operational	633.5; May 2004	629.7	629.8	-0.1
VW-C1 (75071)	Oct 14, 2002	620.8	Non-Operational	633.6; Nov. 2002	631.0	No Signal	N/A
VW-C2 (75074)	Oct 14, 2002	628.8	Operational	634.8; Nov 2002	630.3	630.3	< 0.1
VW-C3 (75075)	Oct 14, 2002	631.6	Operational	646.7; June 2003	636.0	635.9	0.1
VW-C4 (75076)	Oct 14, 2002	635.7	Operational	637.6; Oct. 2007	637.2	636.6	0.4

Note:
(1) aMSL = Above Mean Sea Level
(1) Piezometer location (326270 m Easting, 5926722 m Northing, UTM 12U, NAD1983) updated May 17, 2024, with approximate accuracy of ± 3 m.

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Table NC067-4: Spring 2024 Pneumatic Piezometer Reading Summary on East Abutment

Instrument Name	Date Initialized	Tip Elevation (m aMSL)(1)	Current Status	Maximum Piezometric Elevation (m aMSL)	Piezometric Elevation (m aMSL)	Previous Piezometric Elevation (m aMSL)	Change in Piezometric Level Since Previous Reading (m)
PN-1 (26736)	Jul 20, 2001	631.6	Operational	633.9; May 2019	632.0	632.1	-0.1
PN-2 (26737)	Jul 20, 2001	632.6	Operational	633.5; Jan 2002	633.1	633.1	<0.1
PN-3 (26849)	Jul 20, 2001	624.8	Non-operational	626.7; Jan 2002	-	-	-
PN-4 (26846)	Aug 27, 2001	615.0	Non-operational	640.3; Sep 2001	-	-	-
PN-5 (26731)	Jul 20, 2001	631.3	Operational	633.6; May 2019	631.9	631.9	< 0.1
PN-6 (26735)	Jul 20, 2001	632.2	Operational	634.9; May 2019	632.9	632.8	0.1
PN-7 (26853)	Sep 10, 2001	609.9	Operational	634.4; Sep 2001	610.6	610.1	0.5
PN-8 (26850)	Sep 11, 2001	617.3	Operational	622.3; May 2019	617.8	617.4	0.4
PN-9 (26733)	Aug 27, 2001	631.8	Operational	632.9; Nov 2001	632.3	632.3	< 0.1
PN-10 (26734)	Jul 20, 2001	632.9	Operational	633.9; Oct 2009	N/A	633.5	-
PN-11 (26851)	Sep 10, 2001	628.4	Operational	640.0; Sep 2001	628.7	629.1	-0.4
PN-12 (26847)	Aug 27, 2001	619.0	Operational	623.8, May 2019	622.3	622.6	-0.3
PN-13 (26730)	Aug 27, 2001	631.8	Operational	633.9; May 2019	632.3	632.2	0.1
PN-14 (26732)	Jul 20, 2001	632.8	Operational	633.9; Oct 2008	633.3	633.3	< 0.1
PN-17 (22001)	Sep 11, 2001	617.6	Operational	626.2; May 2013	622.3	623.6	-0.3

Note:
(1) aMSL = Above Mean Sea Level
(2) Piezometer location (326613 m Easting, 5926513 m Northing, UTM 12U, NAD1983) updated May 17, 2024, with approximate accuracy of ± 3 m.

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Table NC067-5: Spring 2024 Vibrating Wire Piezometer Reading Summary on East Abutment

Instrument Name	Date Initialized	Tip Elevation (m aMSL)(1))	Current Status	Maximum Piezometric Elevation (m aMSL)	Piezometric Elevation (m aMSL)	Previous Piezometric Elevation (m aMSL)	Change in Piezometric Level Since Previous Reading (m)
VW-1 (74856)	Sep 24, 2002	606.9	Operational	630.1; Dec 2002	617.6	618.0	-0.4
VW-2 (74870)	Sep 24, 2002	617.3	Operational	624.7; Nov 2002	621.5	621.7	-0.2
VW-3 (74862)	Sep 24, 2002	627.4	Operational	627.8; Sept 2002	Dry	627.5	-
VW-4 (74863)	Sep 24, 2002	624.4	Operational	624.6; Sept 2002	Dry	Dry	-
VW-5 (74857)	Sep 24, 2002	606.6	Operational	635.6; Dec 2002	616.0	616.3	-0.3
VW-6 (74861)	Sep 24, 2002	627.0	Operational	627.3; Sept 2002	Dry	Dry	-
VW-7 (74860)	Sep 24, 2002	624.0	Operational	624.4; May 2018	624.4	624.5	0.1
VW-8 (74869)	Sep 24, 2002	616.9	Operational	626.5; Dec 2002	621.9	622.1	-0.2
VW-9 (74858)	Oct 17, 2002	610.7	Operational	628.7; Nov 2002	619.9	620.2	-0.3
VW-10 (74871)	Oct 17, 2002	626.7	Operational	627.3; May 2023	627.4	627.3	0.1
VW-11 (74872)	Oct 17, 2002	623.7	Operational	623.9; Oct 2012	Dry	623.8	-
VW-12 (74873)	Oct 17, 2002	618.8	Operational	623.7; Nov 2002	622.0	622.2	-0.2
VW-13 (74859)	Oct 17, 2002	610.3	Operational	630.4; Dec 2002	618.3	618.7	-0.4
VW-14 (74868)	Oct 17, 2002	618.0	Operational	625.5; Nov 2002	621.5	621.7	-0.2
VW-15 (74874)	Oct 17, 2002	627.5	Operational	629.3; May 2023	629.3	629.3	< 0.1
VW-16 (74875)	Oct 17, 2002	624.5	Operational	624.7; Oct 2012	Dry	624.5	-

Note:
(1) aMSL = Above Mean Sea Level
(2) Piezometer location (326613 m Easting, 5926513 m Northing, UTM 12U, NAD1983) updated May 17, 2024, with approximate accuracy of ± 3 m.

Reference: **North Central Region, Stony Plain, Site NC067 - Highway 216:06 Anthony Henday Bridge, 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.

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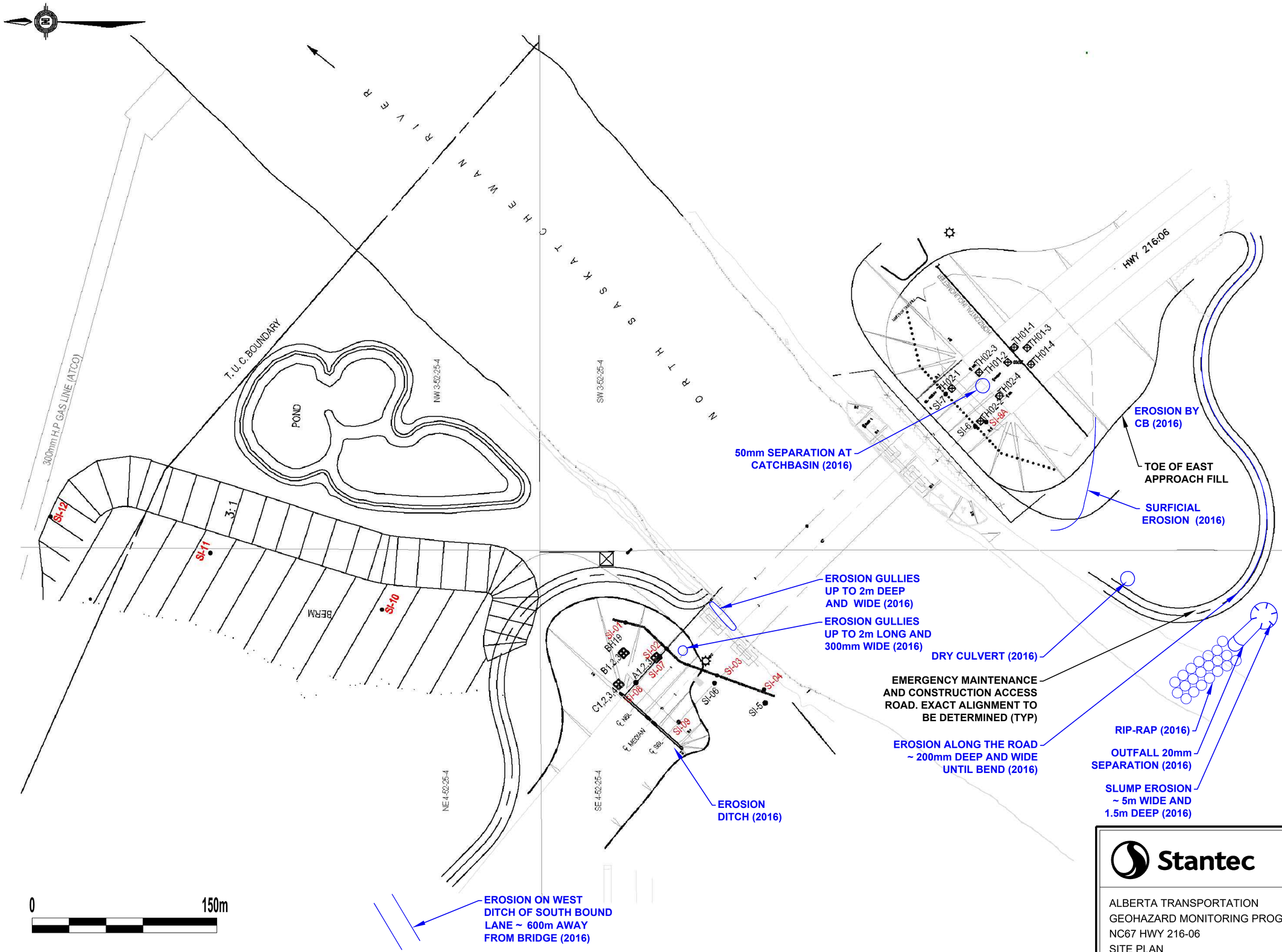
Attachment:
Figure 1 – Site Plan
SI-01 Slope Inclinometer Plots
SI-03 Slope Inclinometer Plots
SI-06 Slope Inclinometer Plots
SI-08 Slope Inclinometer Plots
SI-10 Slope Inclinometer Plots
SI-12 Slope Inclinometer Plots
Piezometer Plots West Abutment
Pneumatic Piezometer Plots East Abutment
Vibrating Wire Piezometers Plots East Abutment

PERMIT TO PRACTICE
STANTEC CONSULTING LTD.
Signature _____
Date 2024-06-18
PERMIT NUMBER: P 0258
The Association of Professional Engineers and Geoscientists of Alberta



LEGEND

- ● - ACTIVE INCLINOMETER
- ● -DESTROYED INCLINOMETER
- ☼ - MONITORING STATION FOR PIEZOMETERS

NOTE

1. PREVIOUS OBSERVATIONS SHOWN IN BLACK
2. 2016 OBSERVATIONS SHOWN IN BLUE

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STANTEC CONSULTING
10160-112 STREET
EDMONTON ALBERTA CANADA

ALBERTA TRANSPORTATION
GEOHAZARD MONITORING PROGRAM
NC67 HWY 216-06
SITE PLAN

DRAWN WW	CHECK CDM	APPROVE ID
DATE 22 JULY, 2016	SCALE AS SHOWN	PROJECT # 123315222

FIGURE - 1 | -

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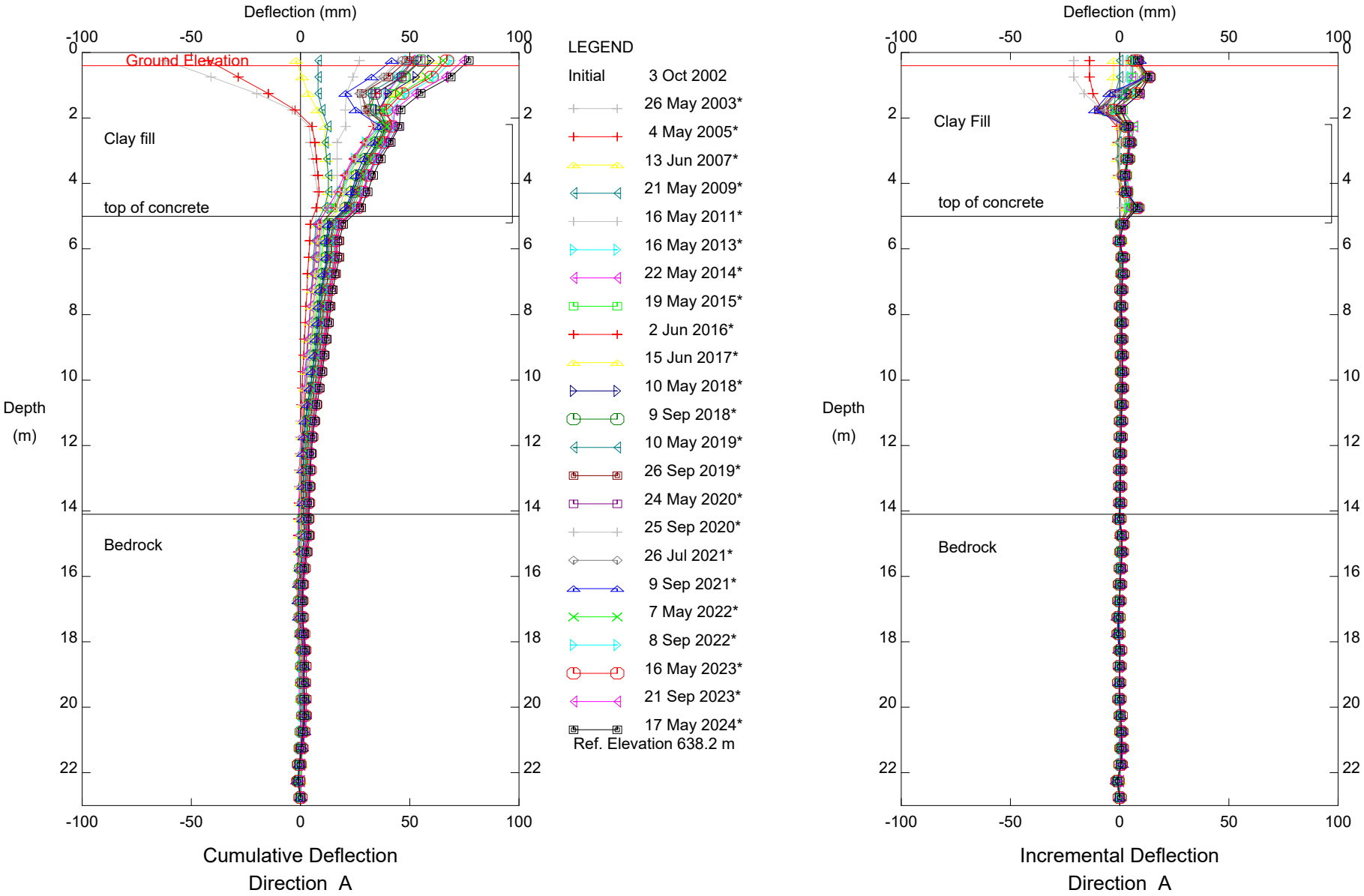

NC67, Inclinometer SI-01

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

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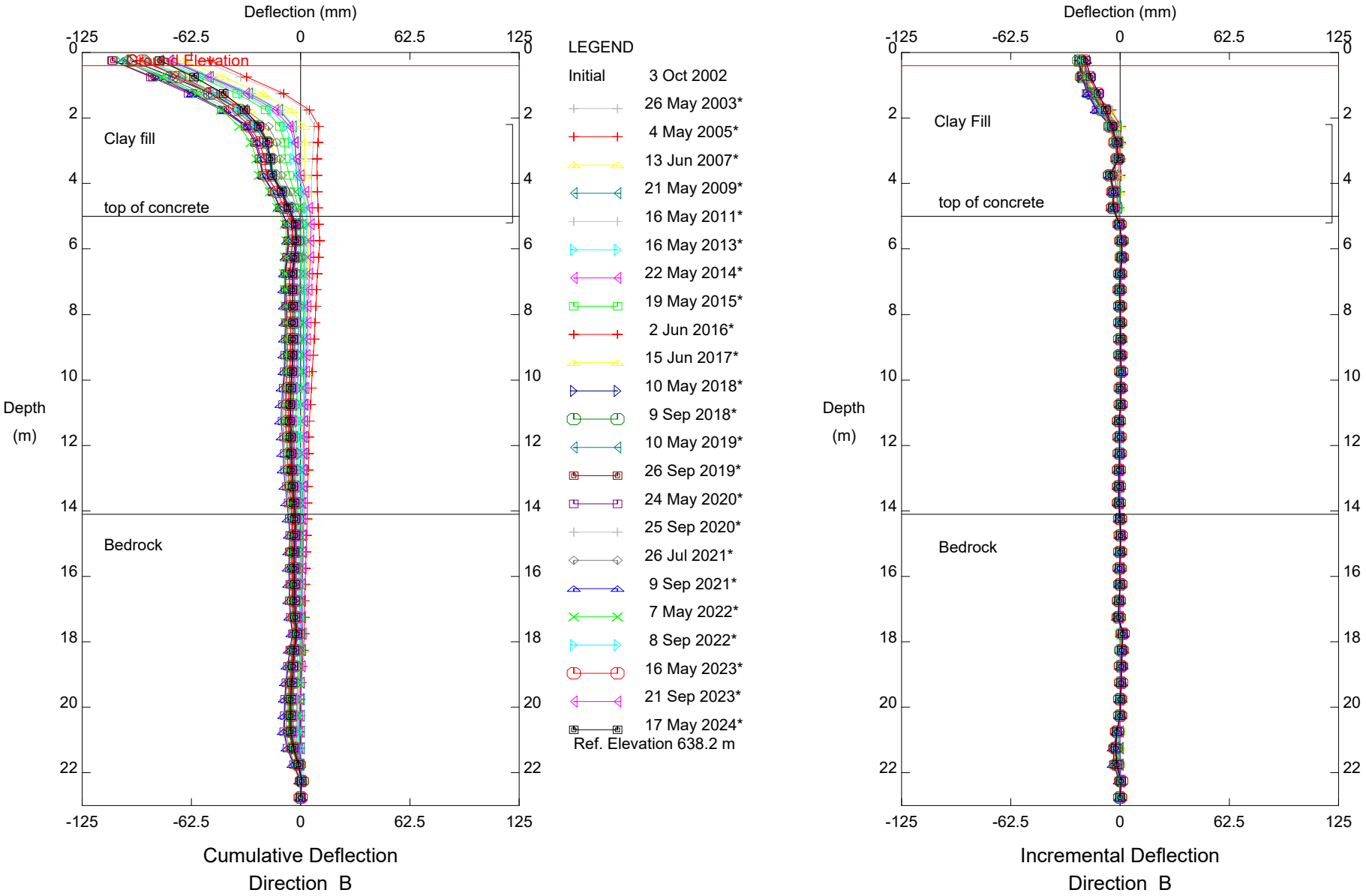

Cumulative Deflection
Direction B

Incremental Deflection
Direction B

NC67, Inclinometer SI-01

Transportation & Economic Corridors

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

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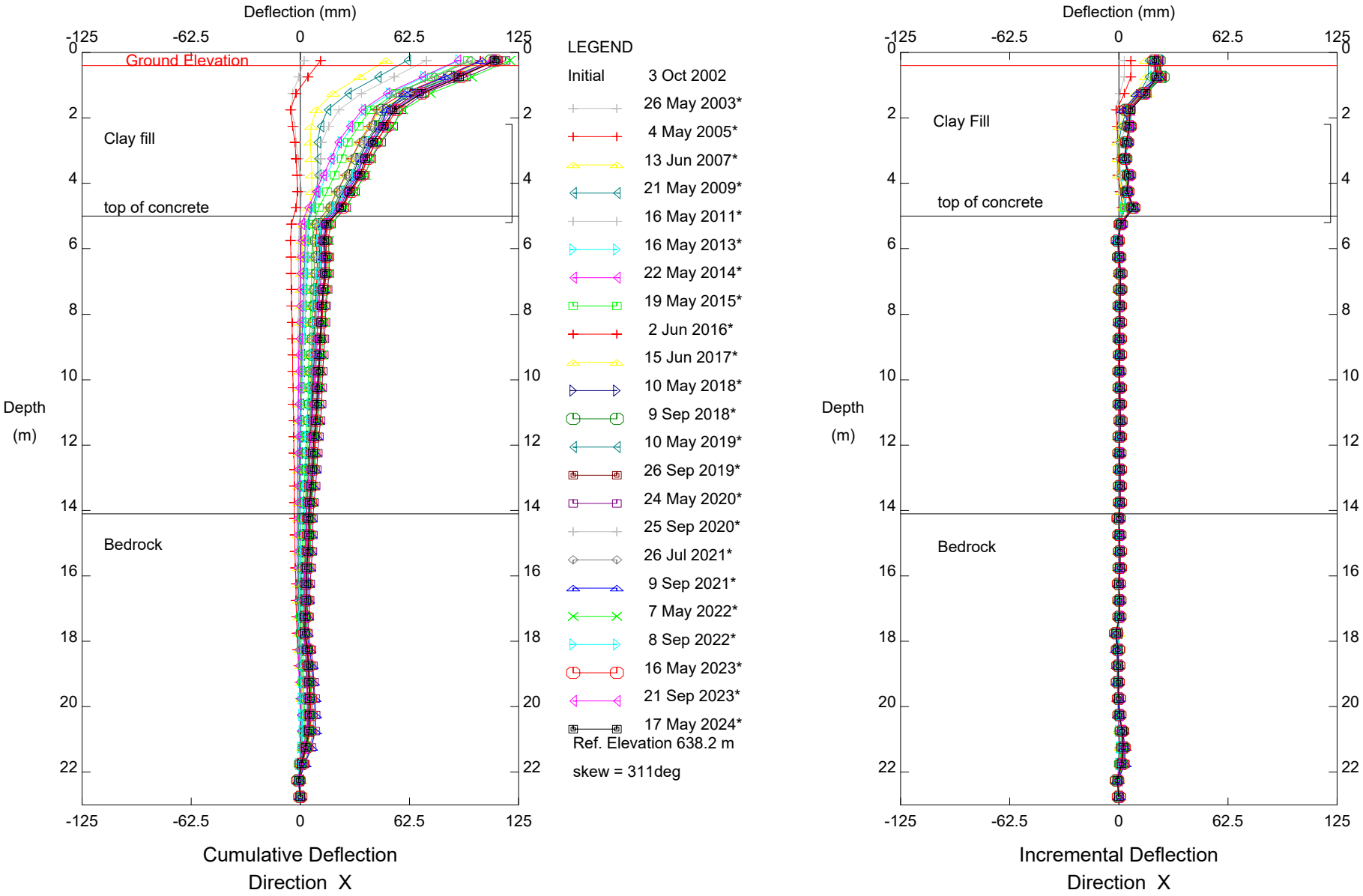

NC67, Inclinometer SI-01

Transportation & Economic Corridors

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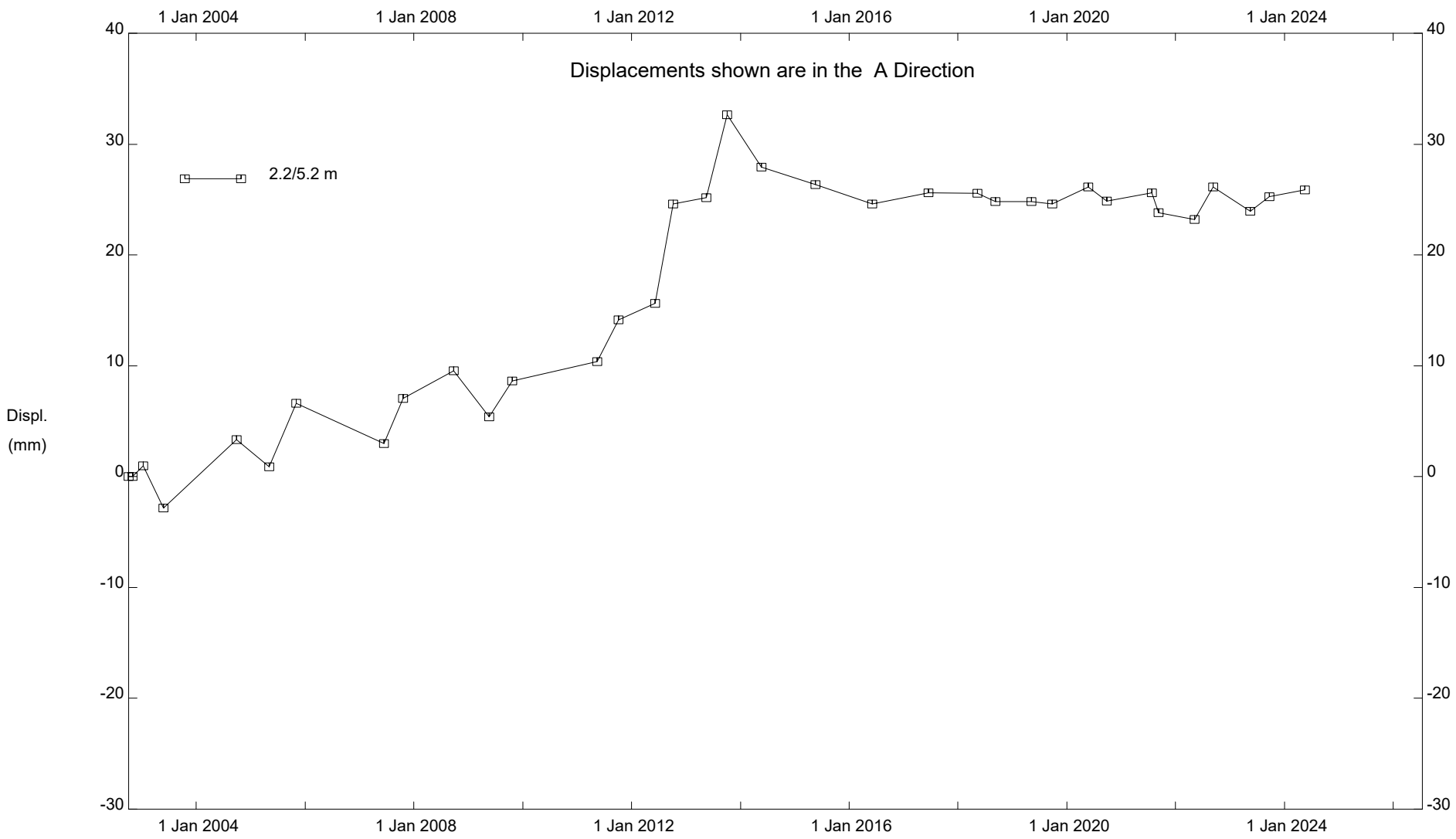

NC67, Inclinometer SI-01

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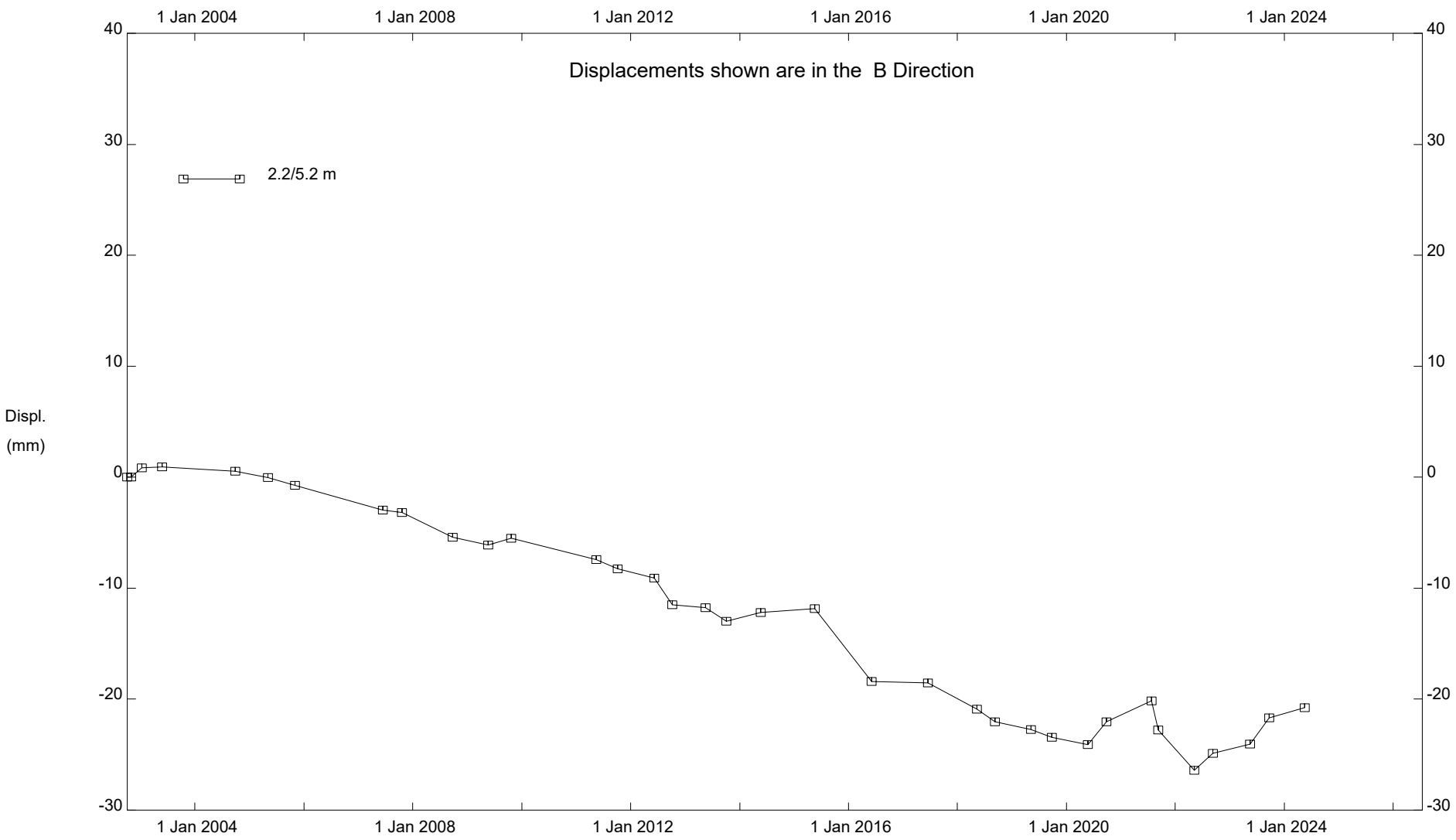

NC67, Inclinometer SI-01

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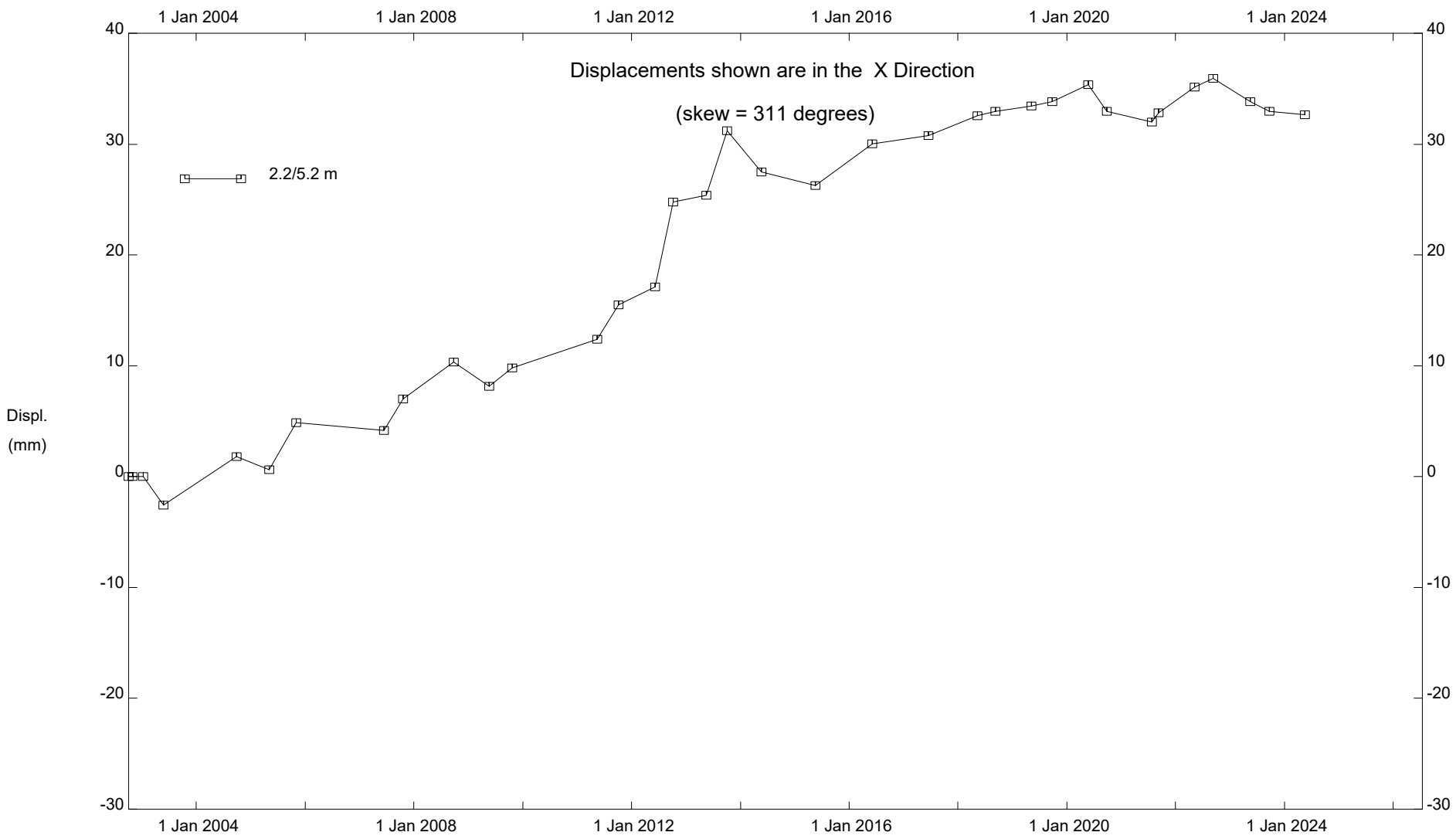

NC67, Inclinometer SI-01

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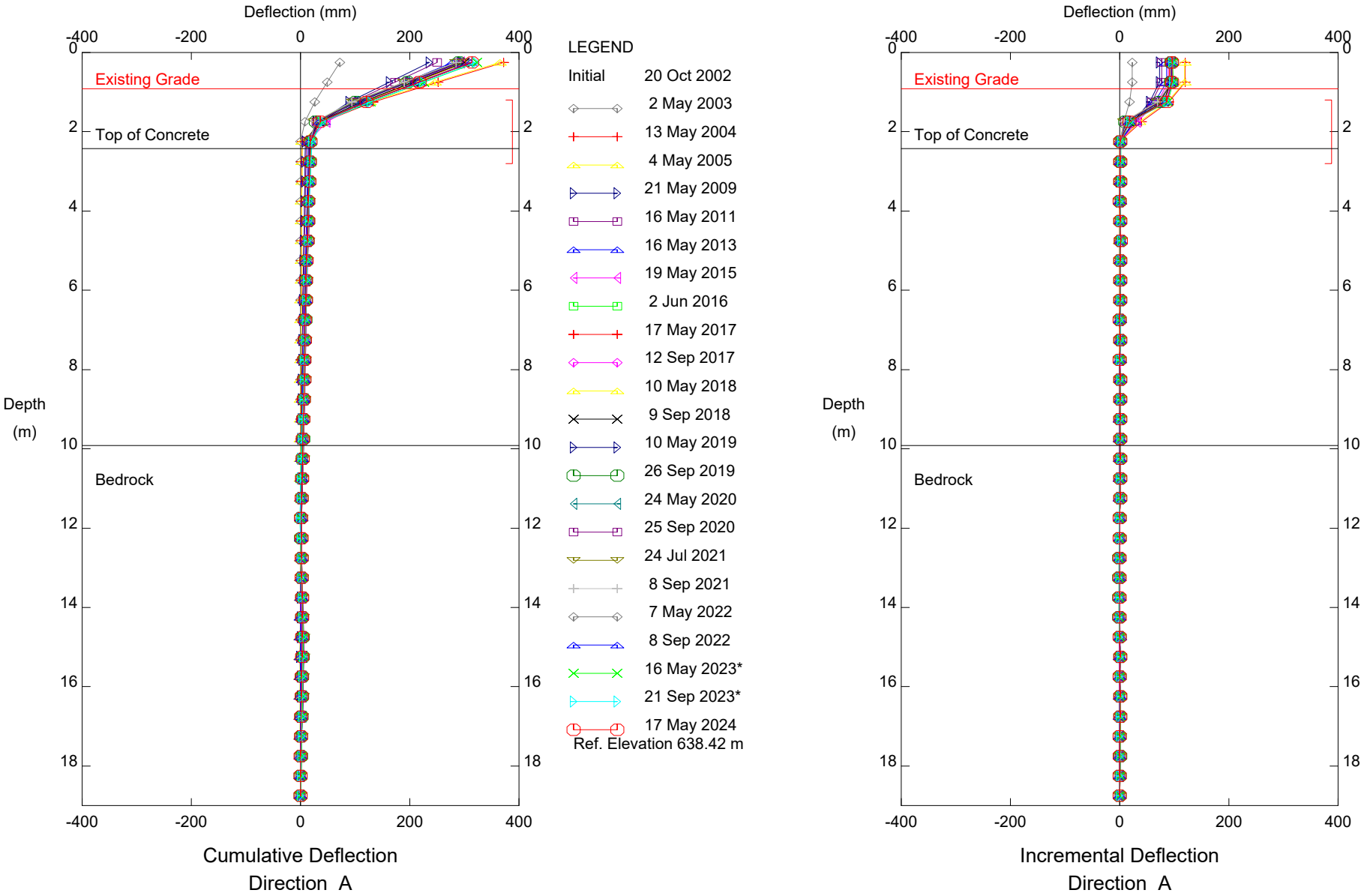

NC67, Inclinometer SI-03

Transportation & Economic Corridors

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

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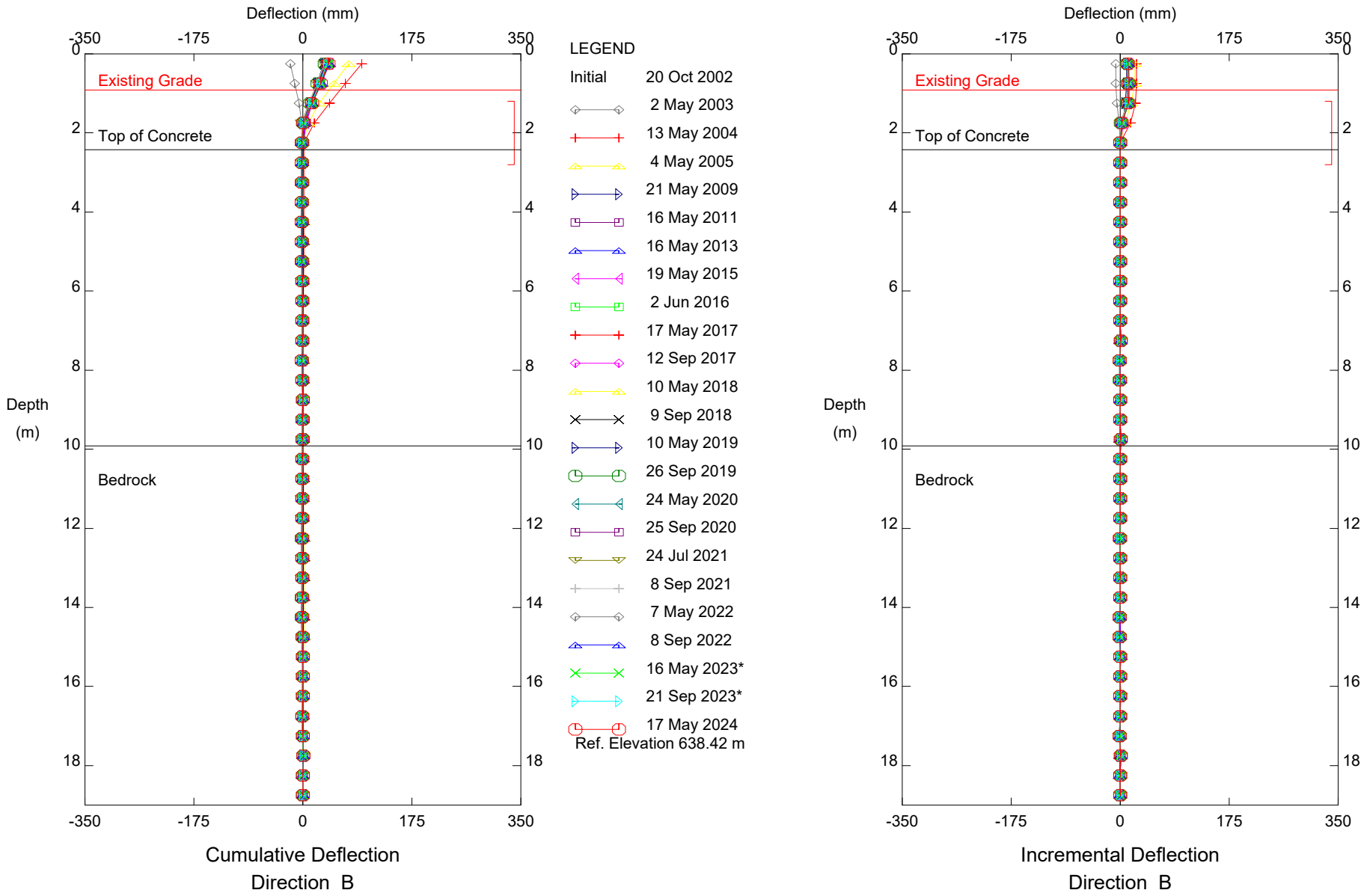

NC67, Inclinometer SI-03

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

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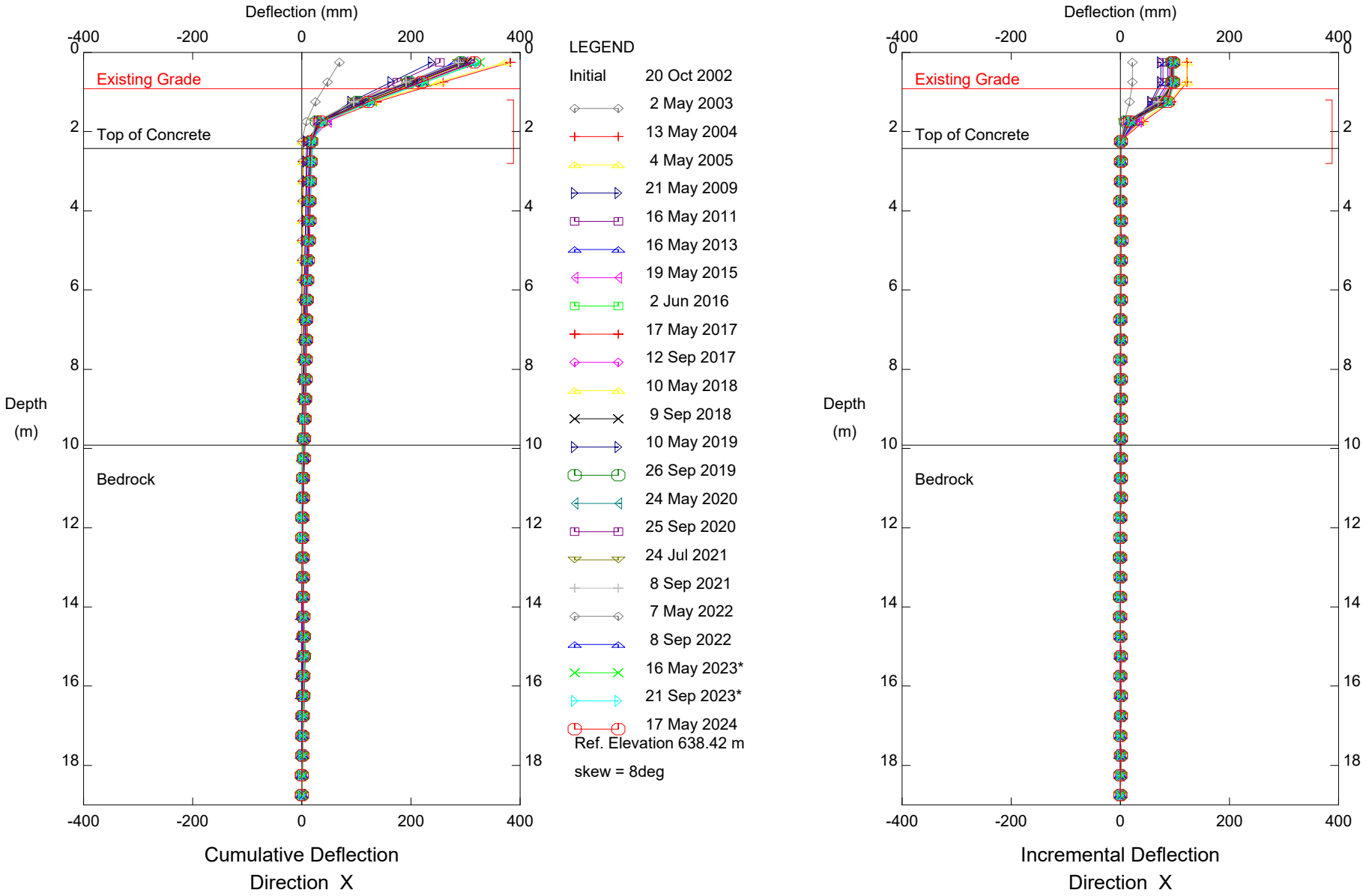
Stantec Consulting Ltd - Edmonton



NC67, Inclinometer SI-03

Transportation & Economic Corridors

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

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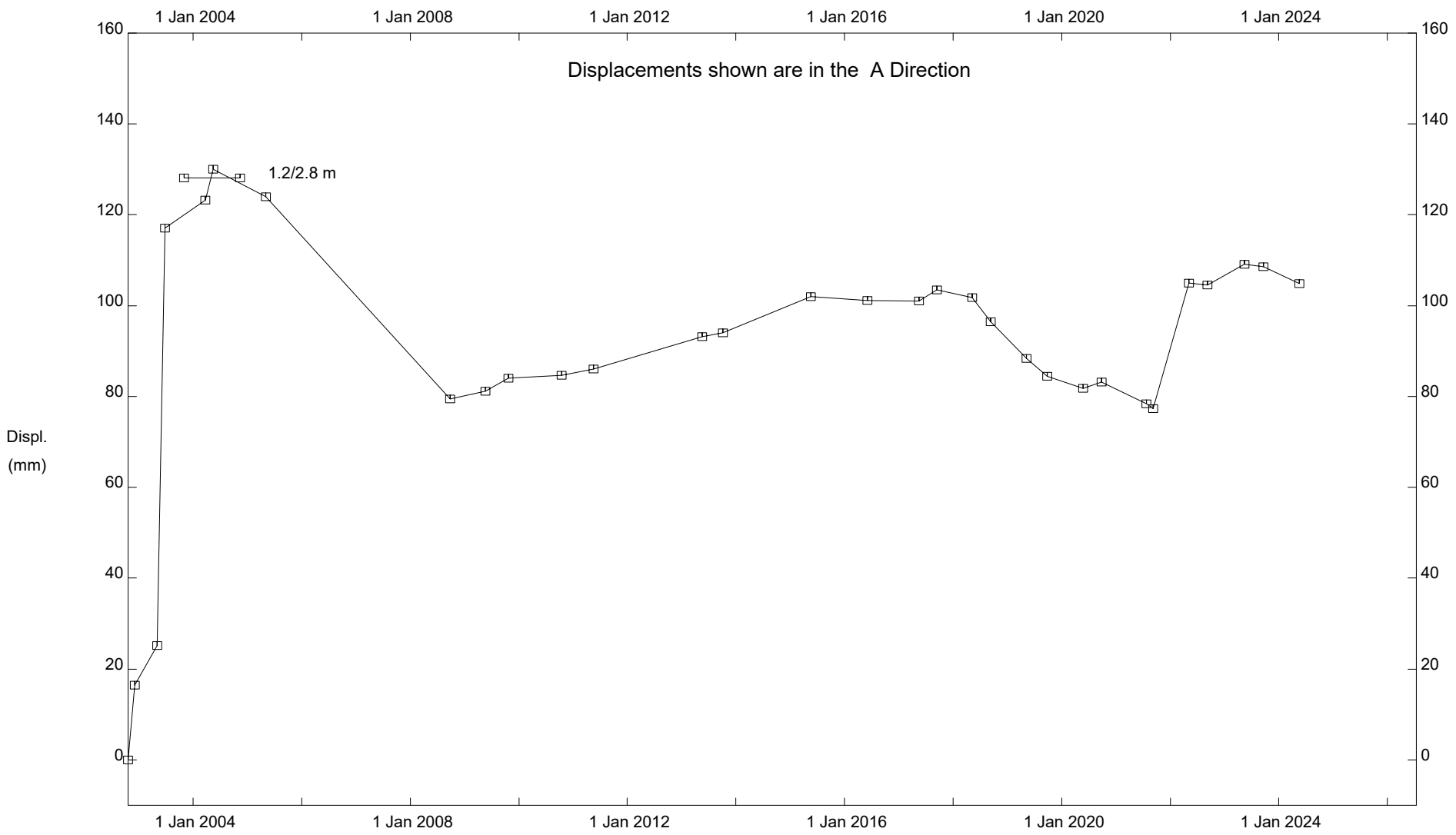
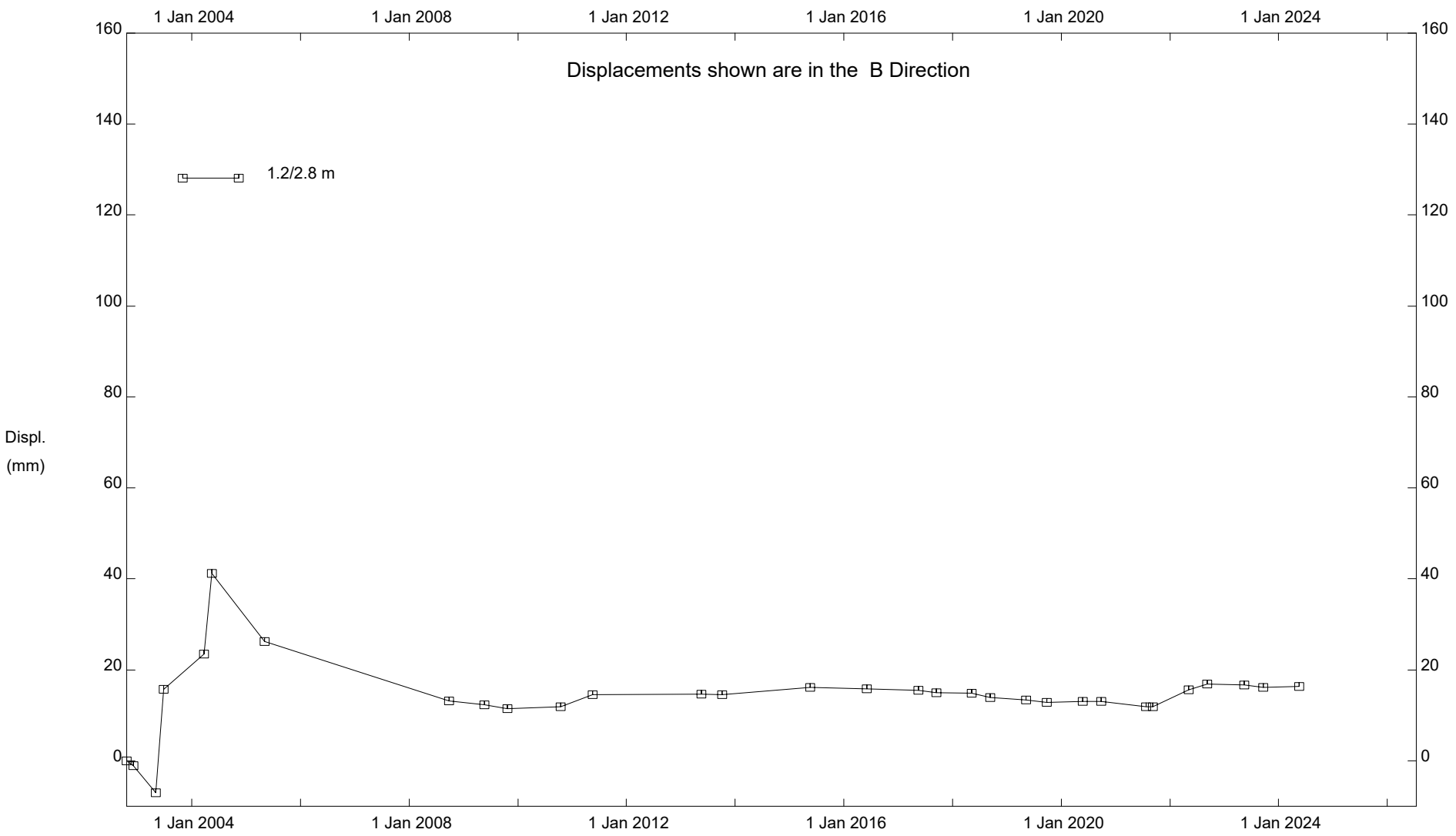


NC67, Inclinometer SI-03

Transportation & Economic Corridors

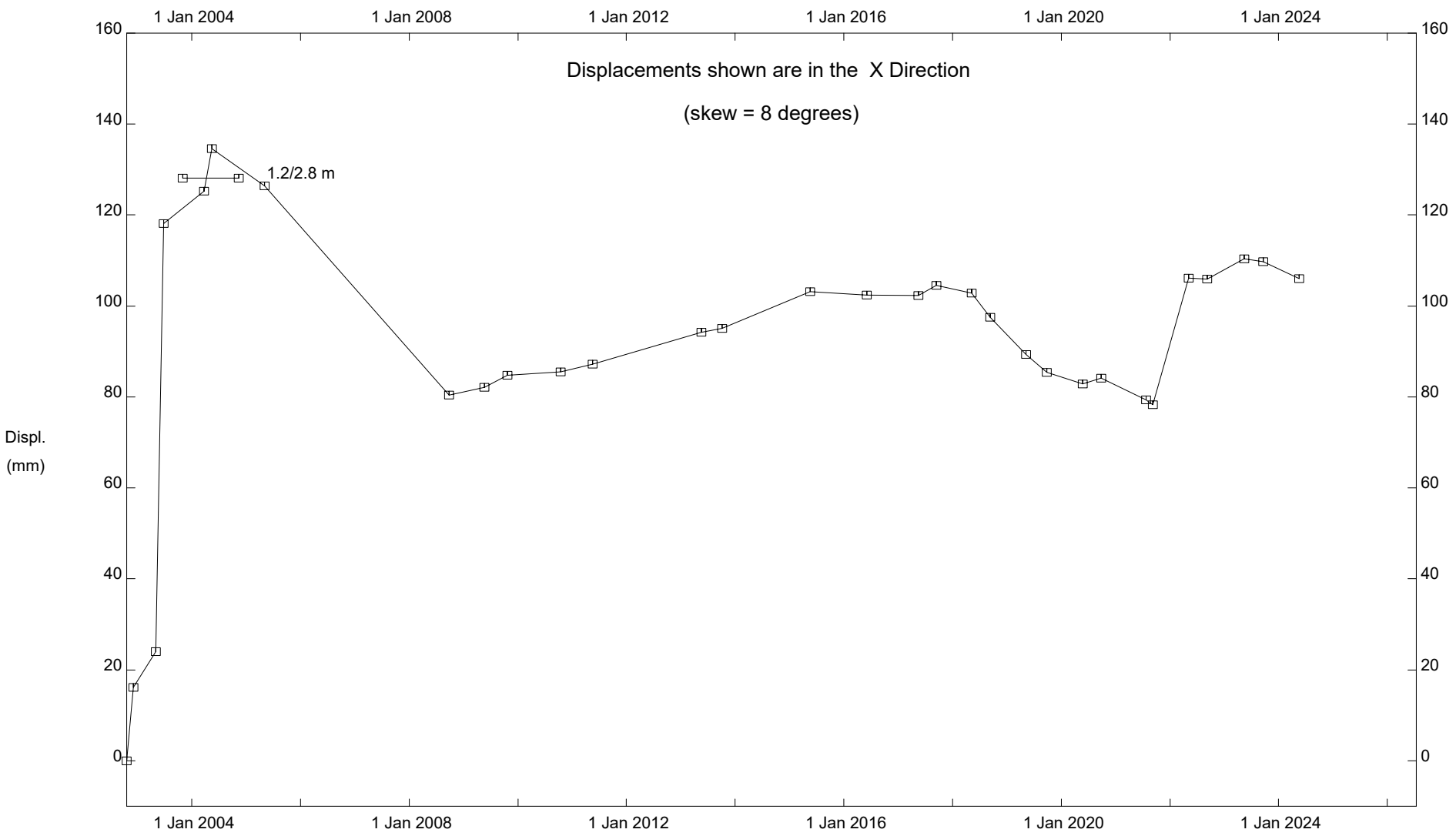
Stantec Consulting Ltd - Edmonton



NC67, Inclinometer SI-03

Transportation & Economic Corridors

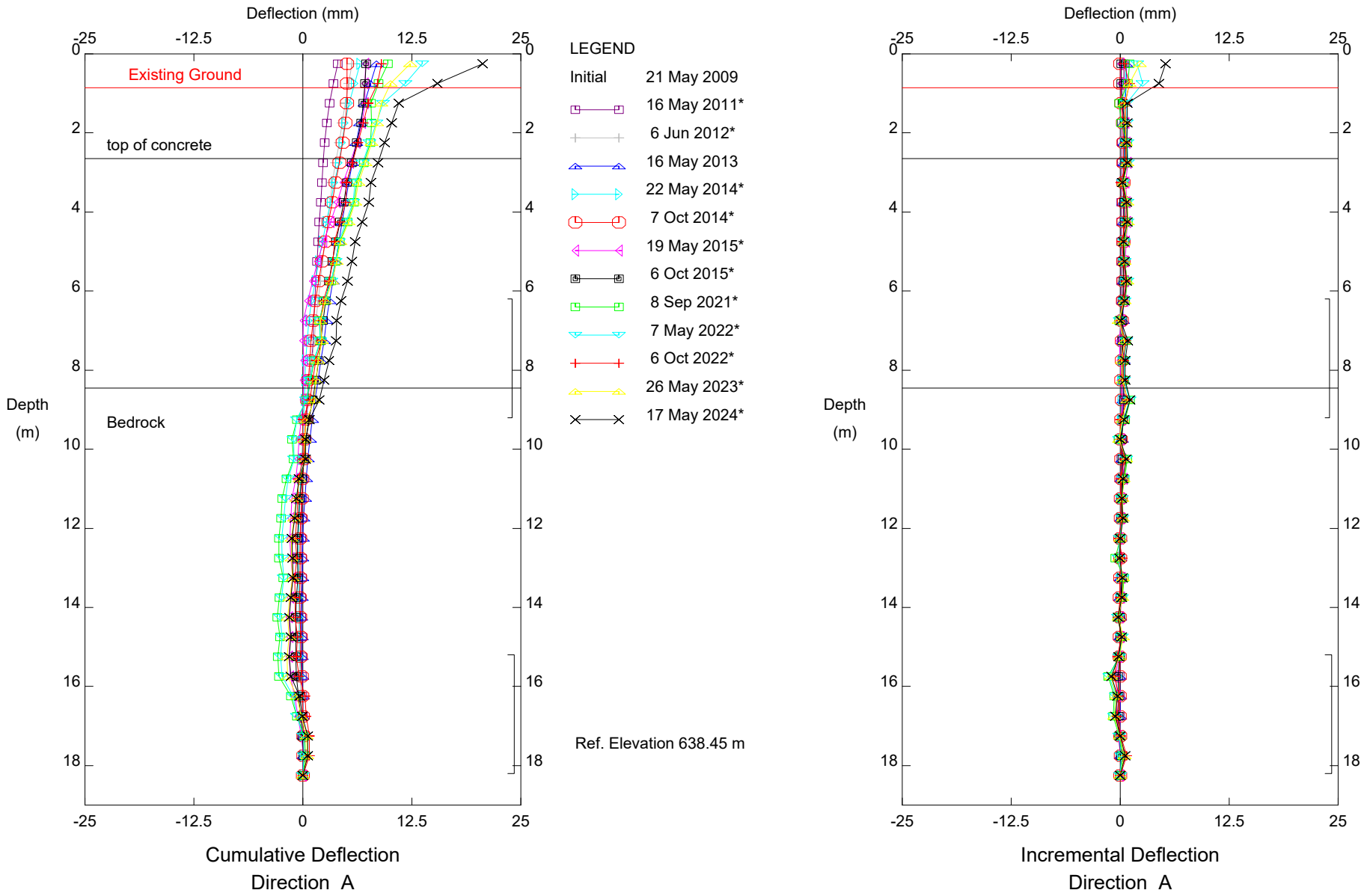
Stantec Consulting Ltd - Edmonton



NC67, Inclinometer SI-03

Transportation & Economic Corridors

Stantec Consulting Ltd - Edmonton



NC67, Inclinometer SI-04

Transportation & Economic Corridors

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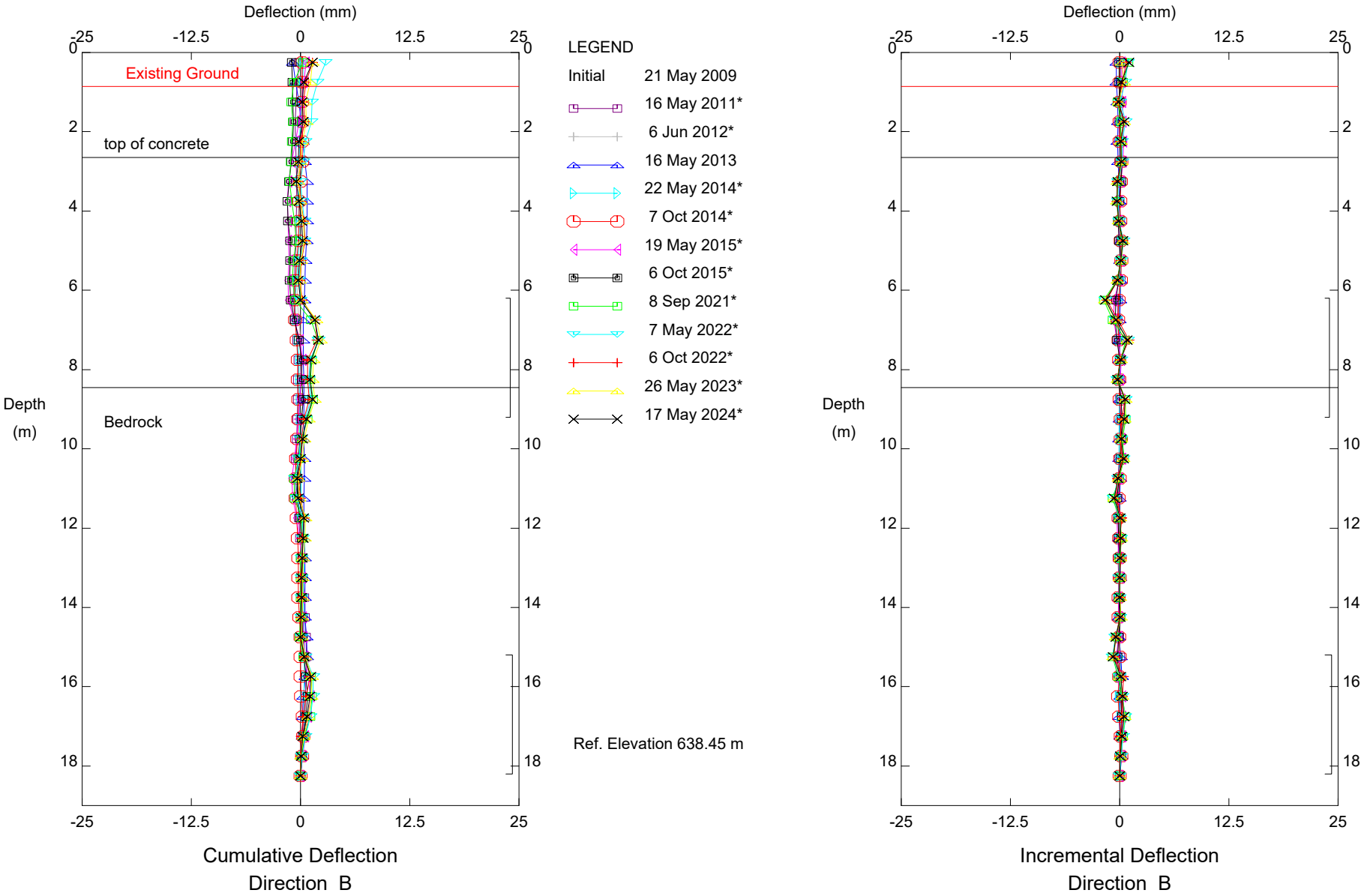

NC67, Inclinometer SI-04

Transportation & Economic Corridors

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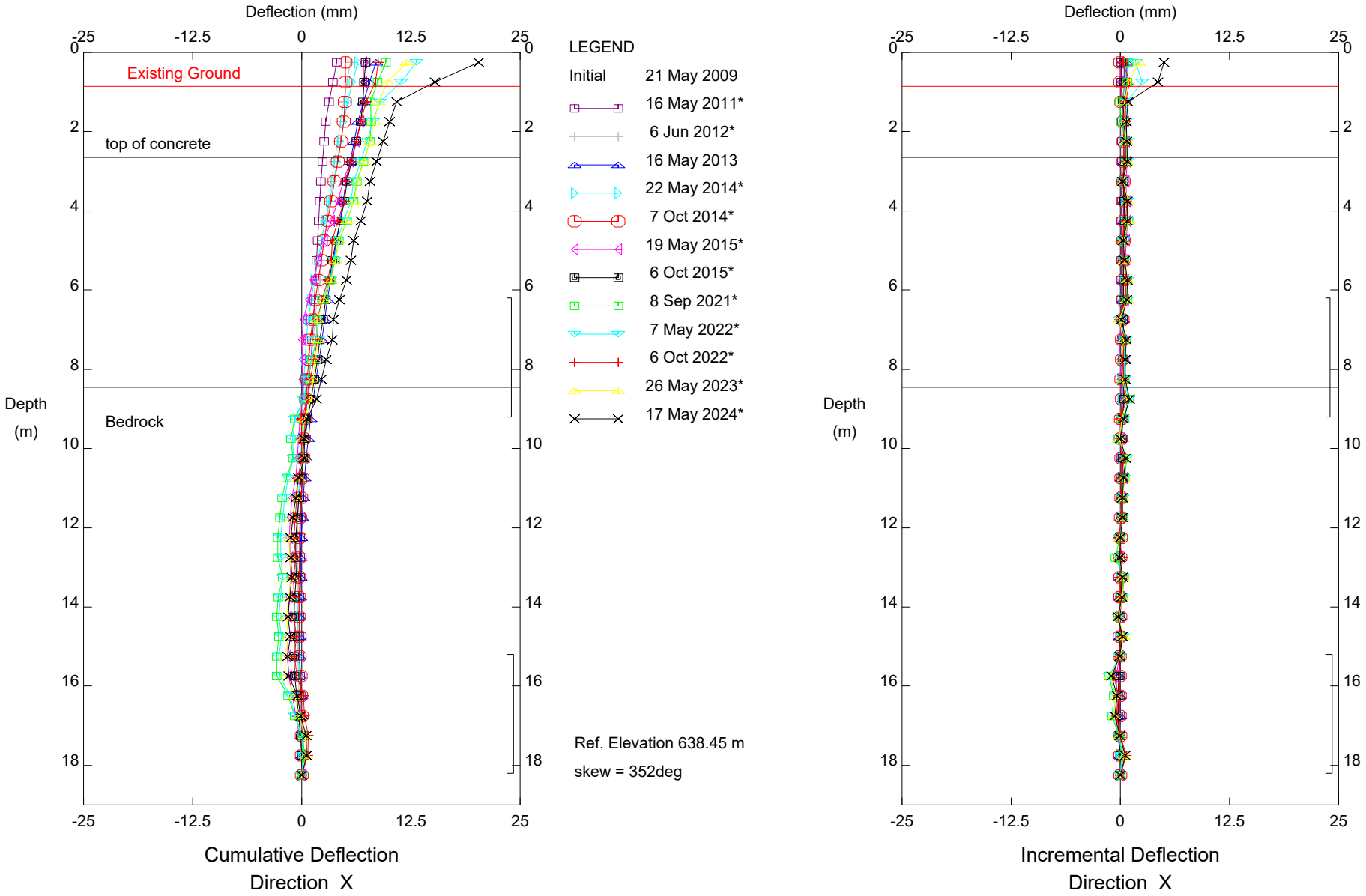

NC67, Inclinometer SI-04

Transportation & Economic Corridors

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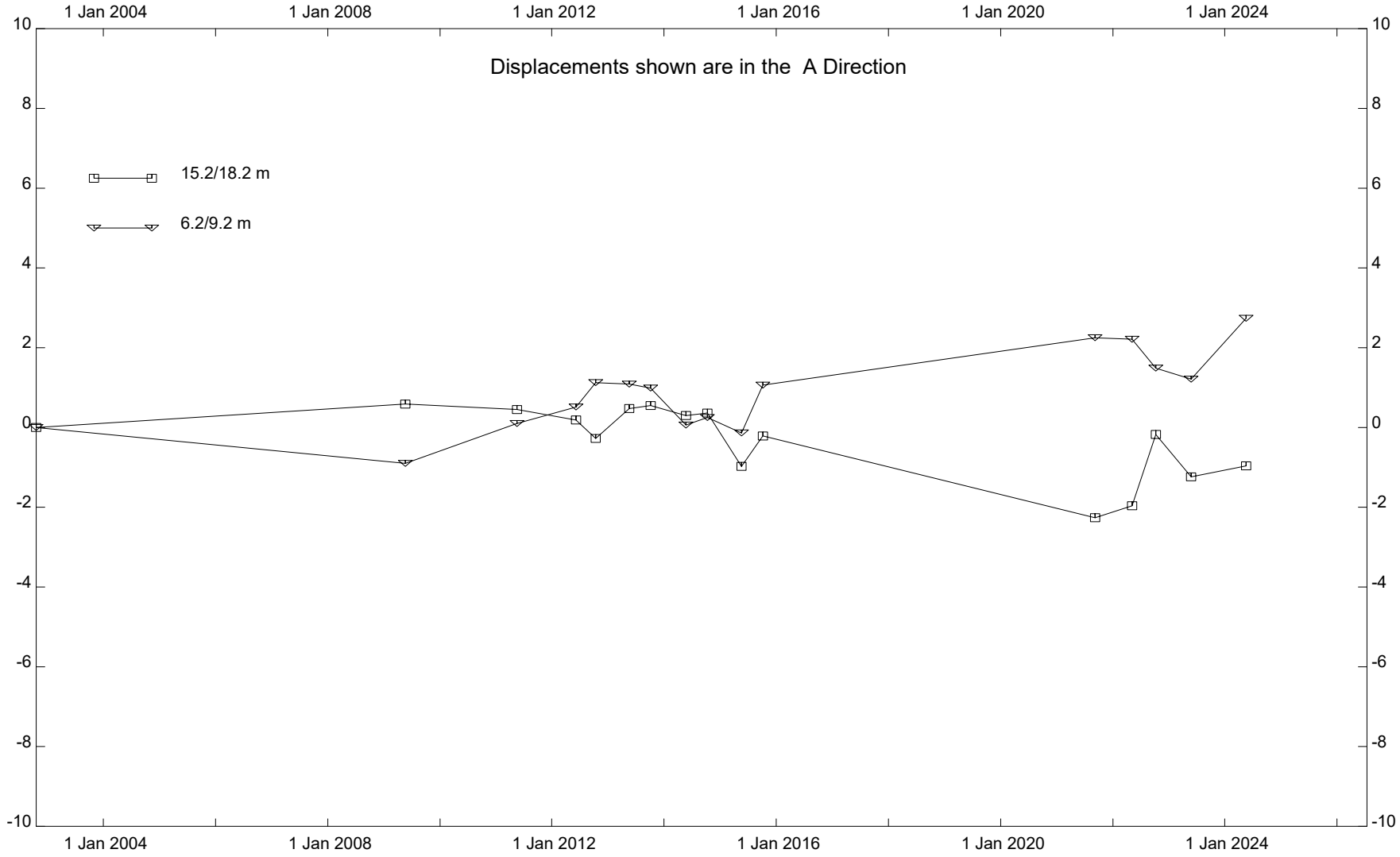

NC67, Inclinometer SI-04

Transportation & Economic Corridors

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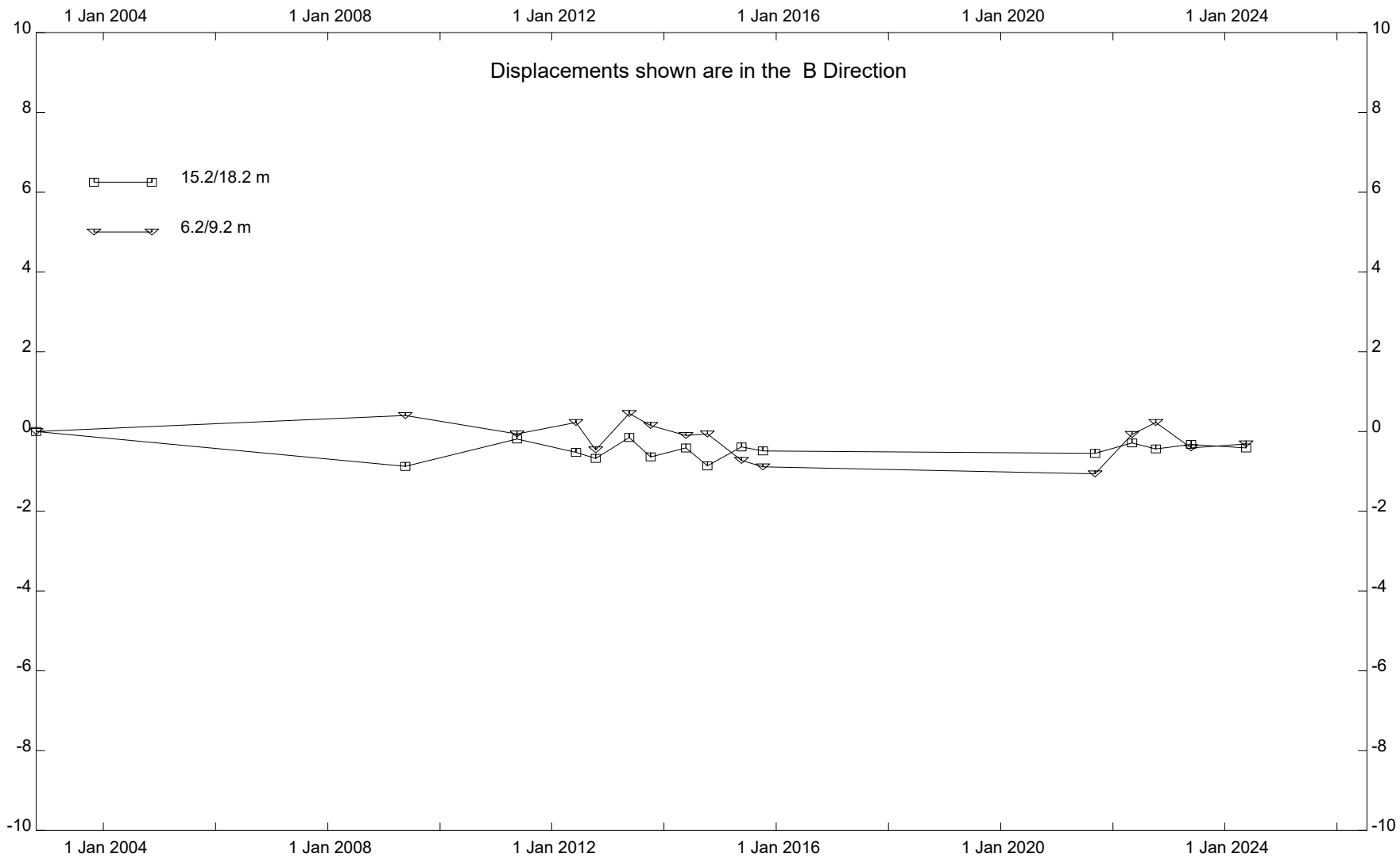

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Transportation & Economic Corridors

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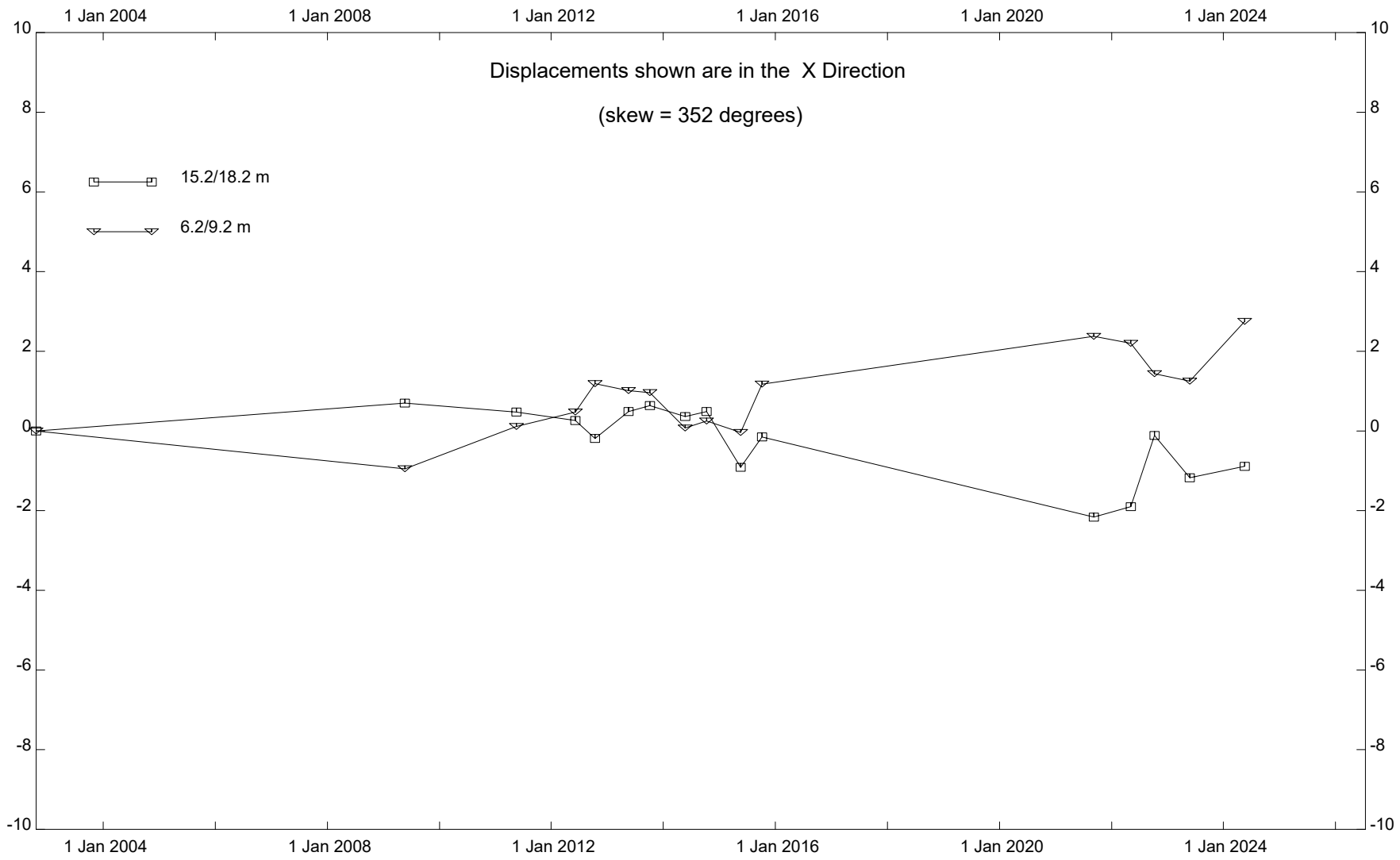

NC67, Inclinometer SI-04

Transportation & Economic Corridors

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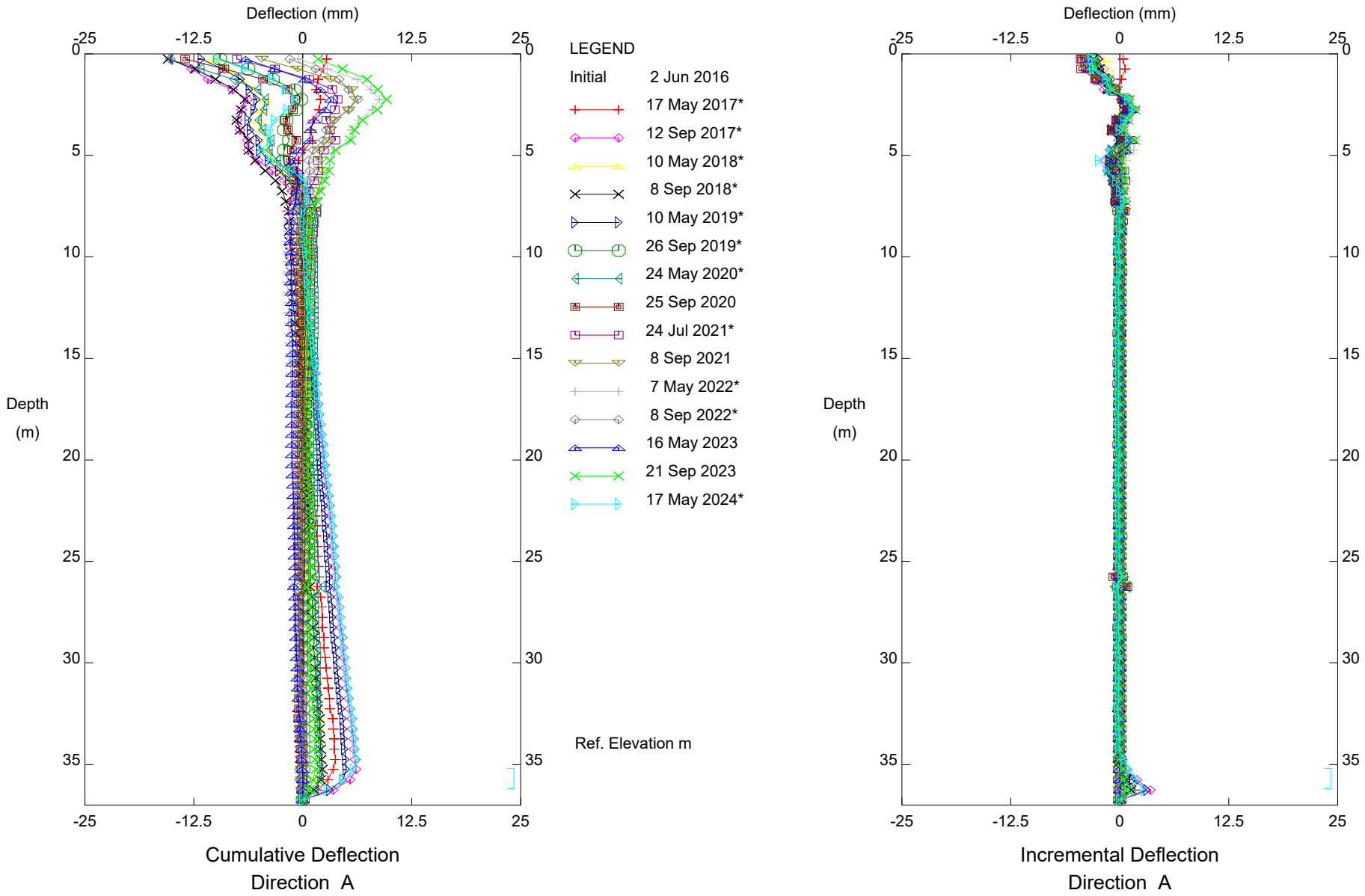

NC67, Inclinometer SI-06

Transportation & Economic Corridors

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

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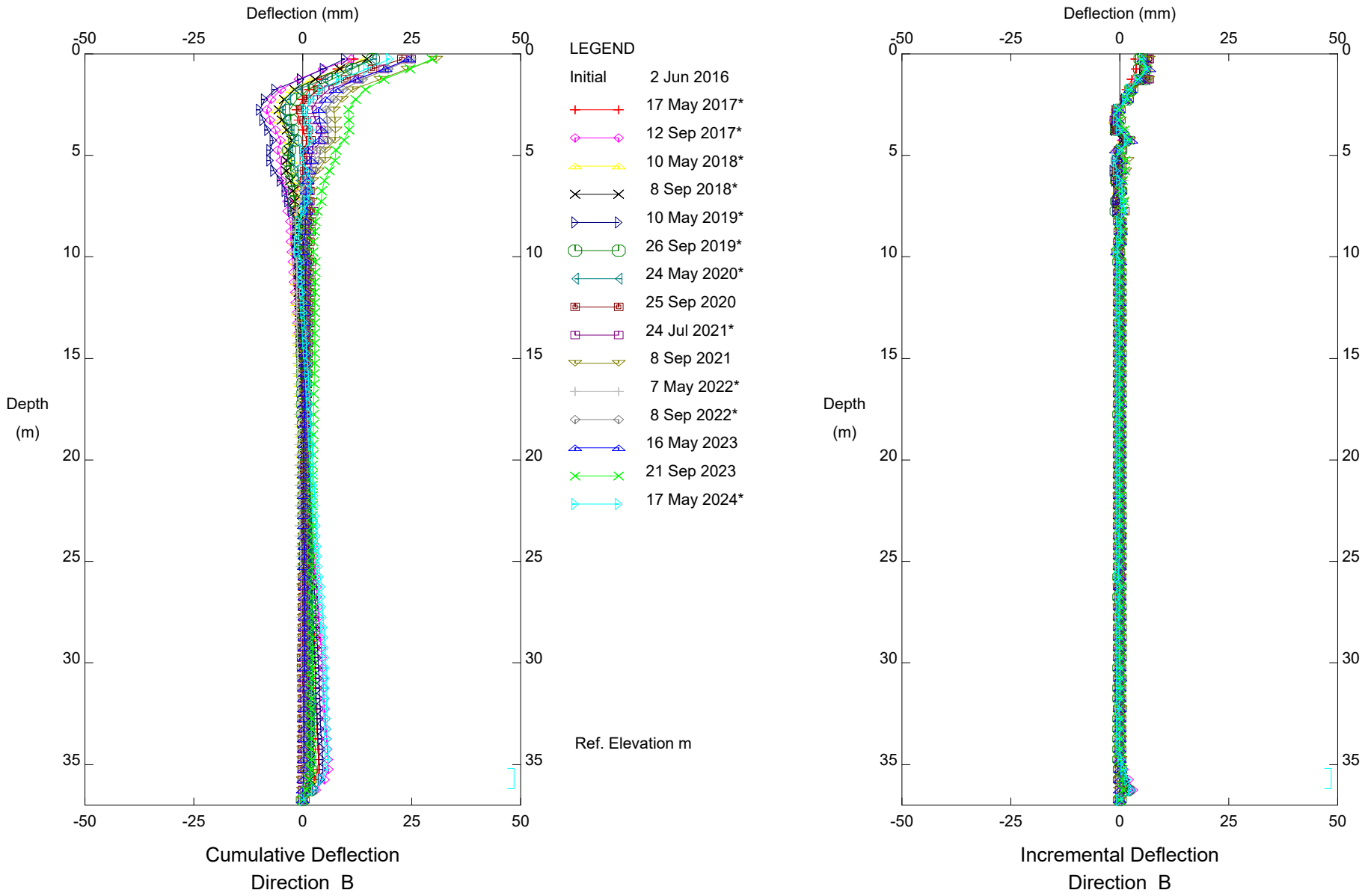

NC67, Inclinometer SI-06

Transportation & Economic Corridors

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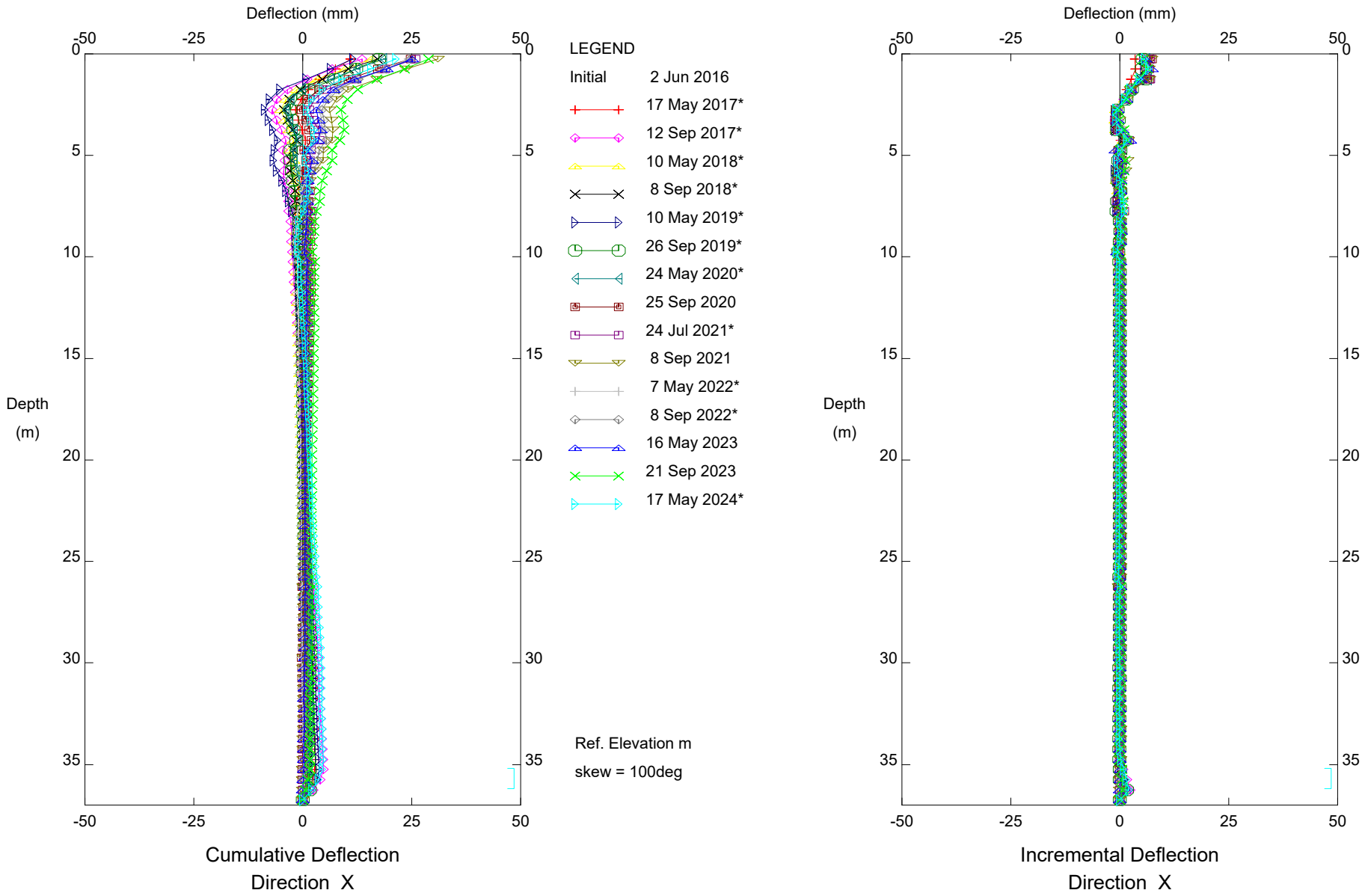

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Transportation & Economic Corridors

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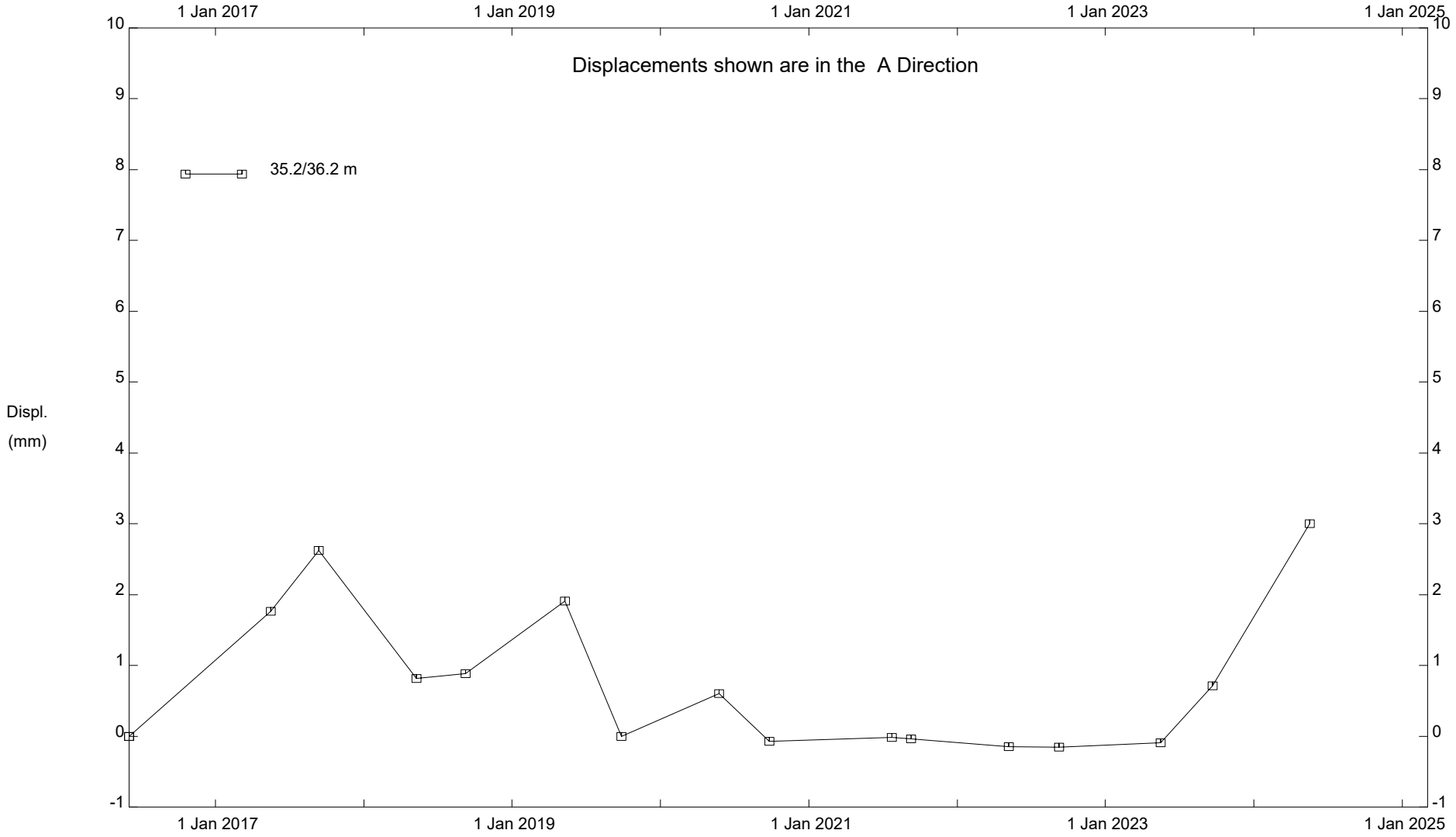

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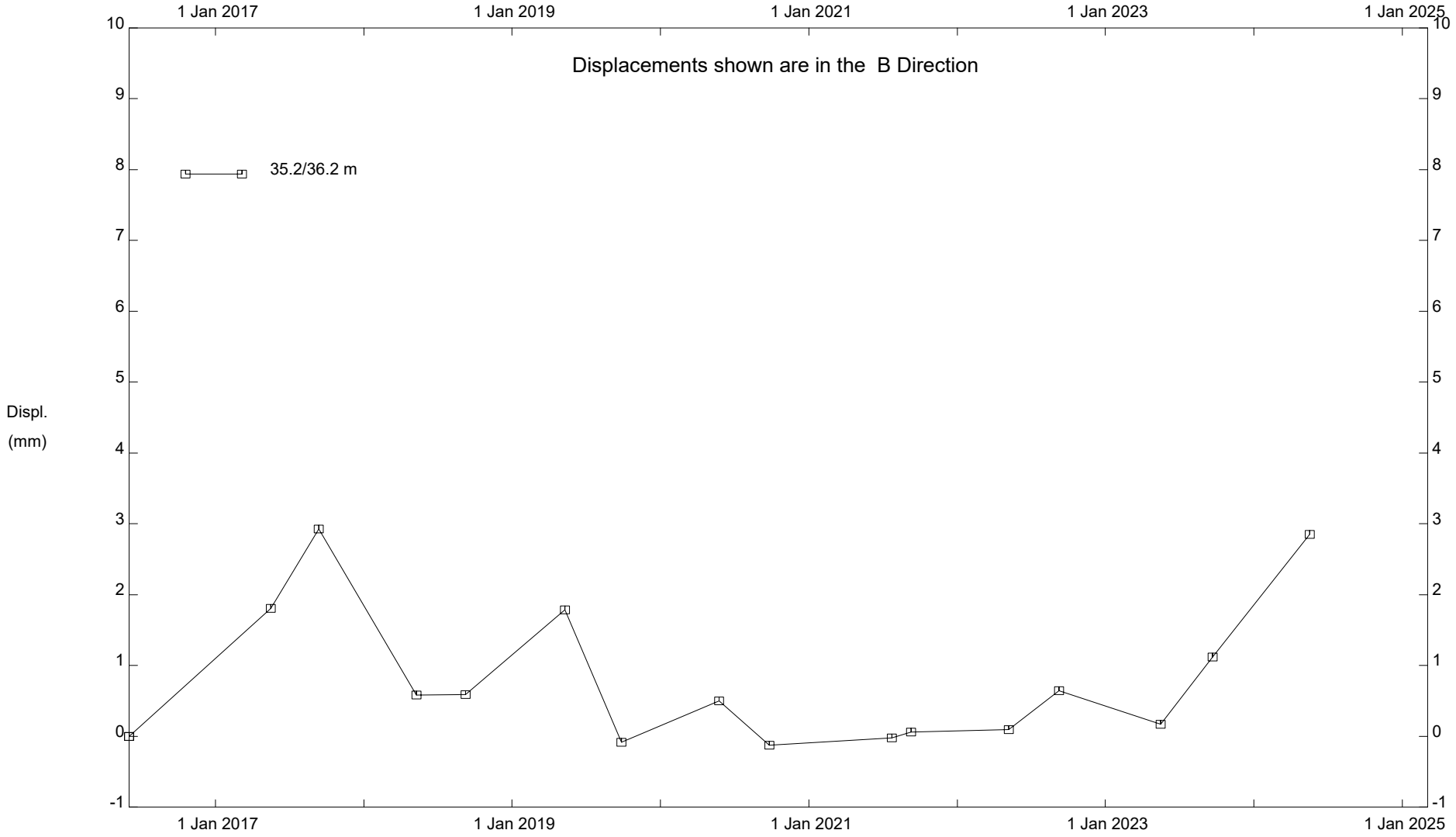
Transportation & Economic Corridors

Stantec Consulting Ltd - Edmonton



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Transportation & Economic Corridors

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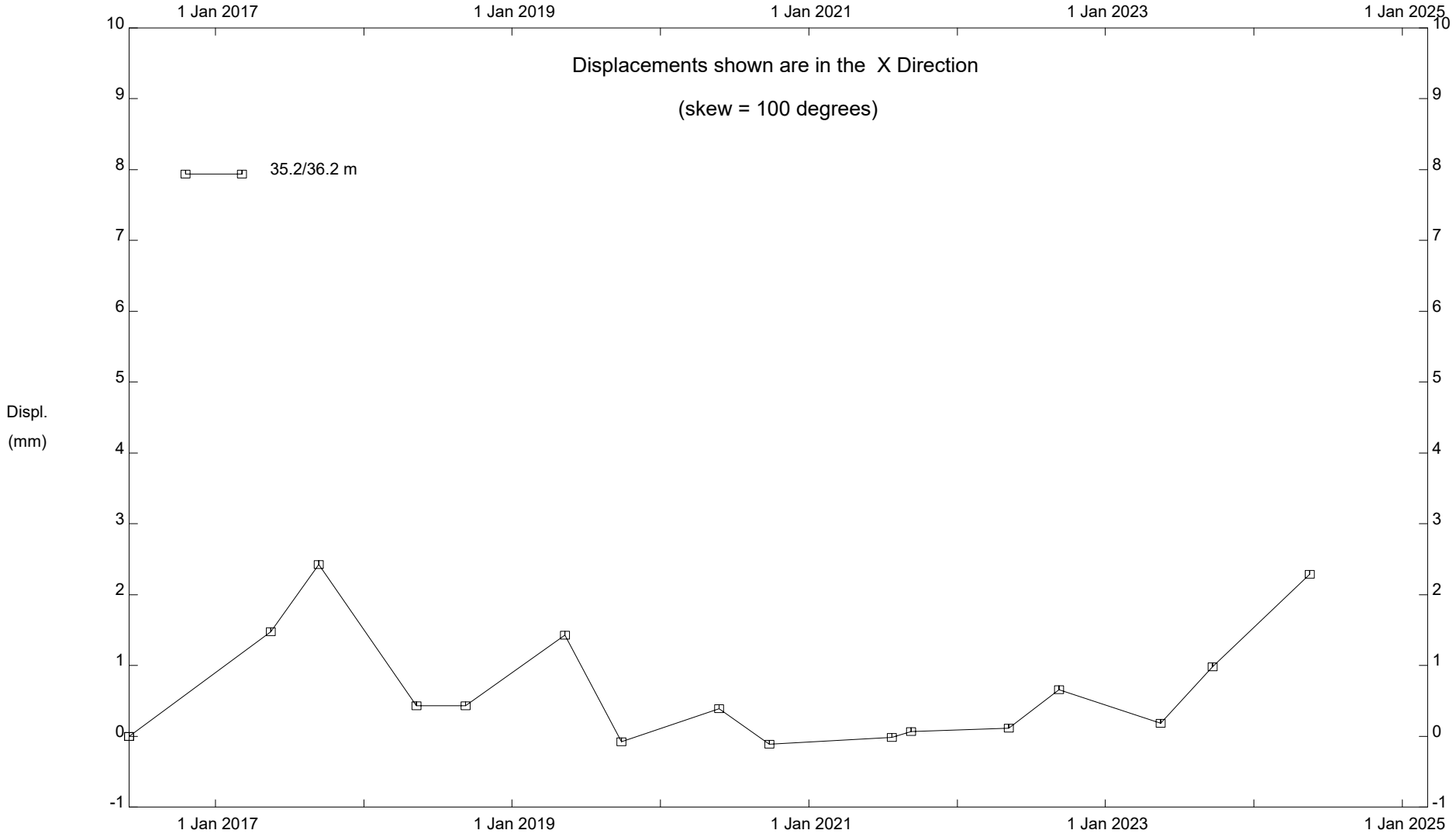

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Transportation & Economic Corridors

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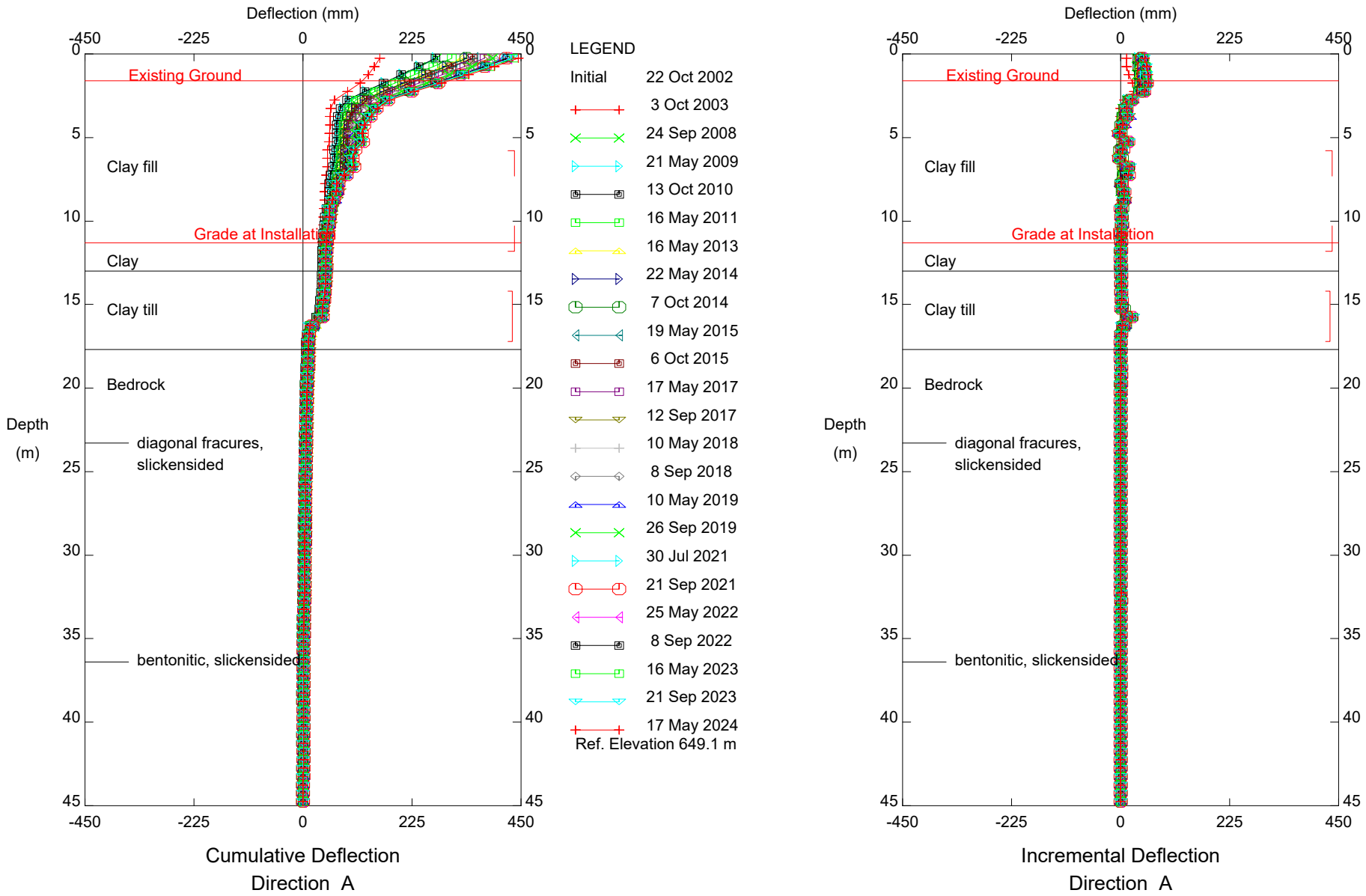

NC67, Inclinometer SI-08

Transportation & Economic Corridors

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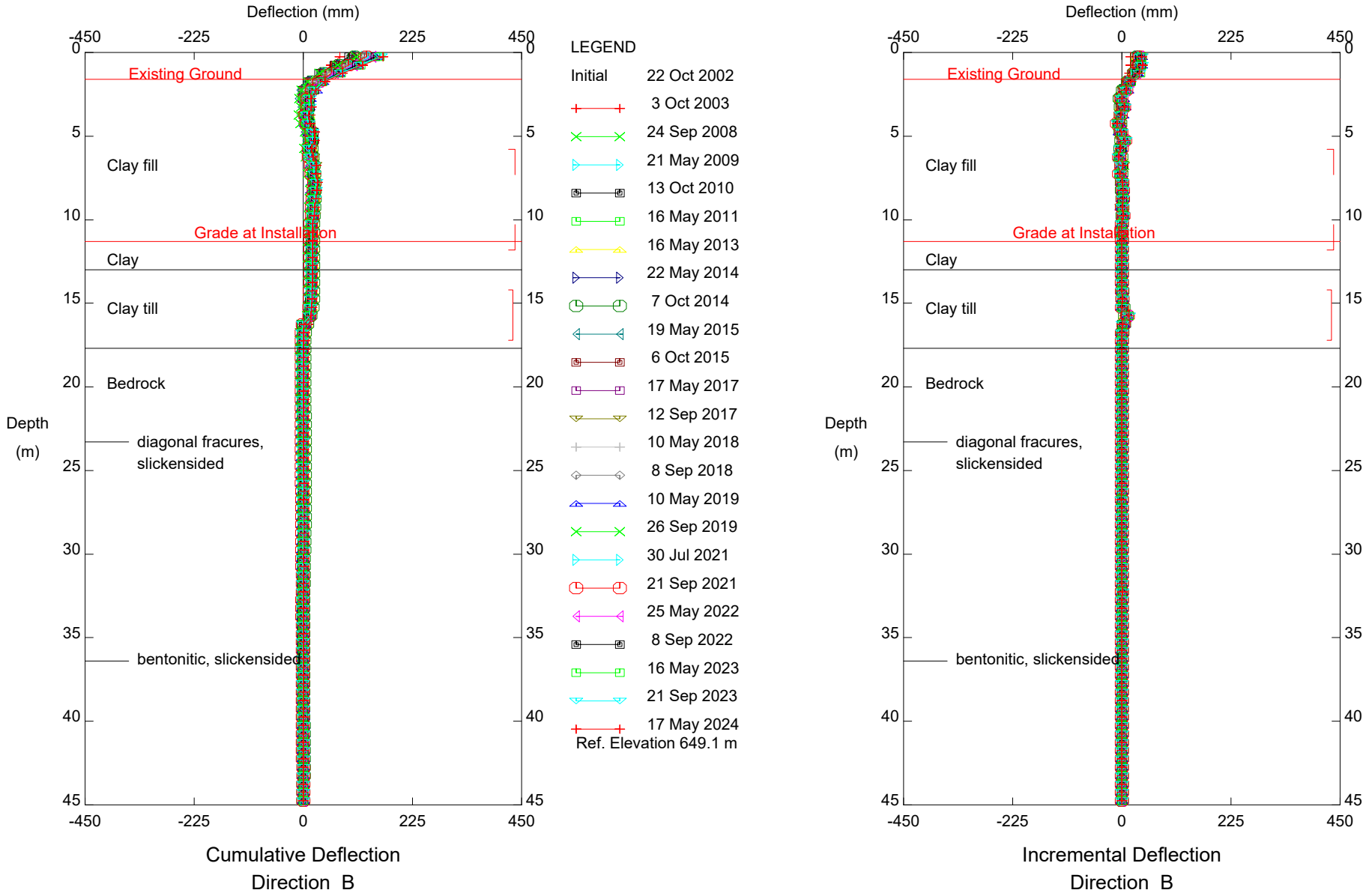

NC67, Inclinometer SI-08

Transportation & Economic Corridors

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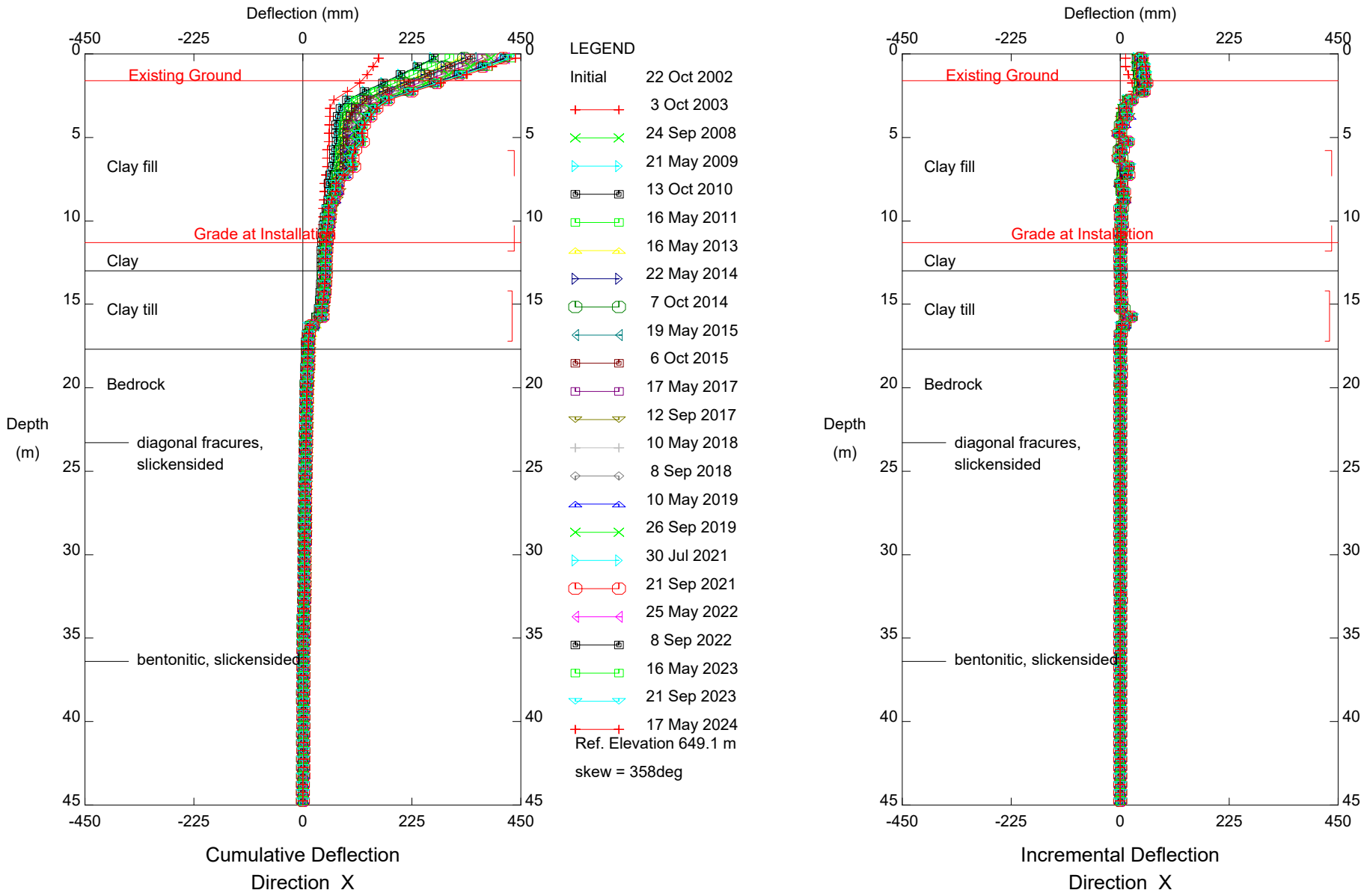

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Transportation & Economic Corridors

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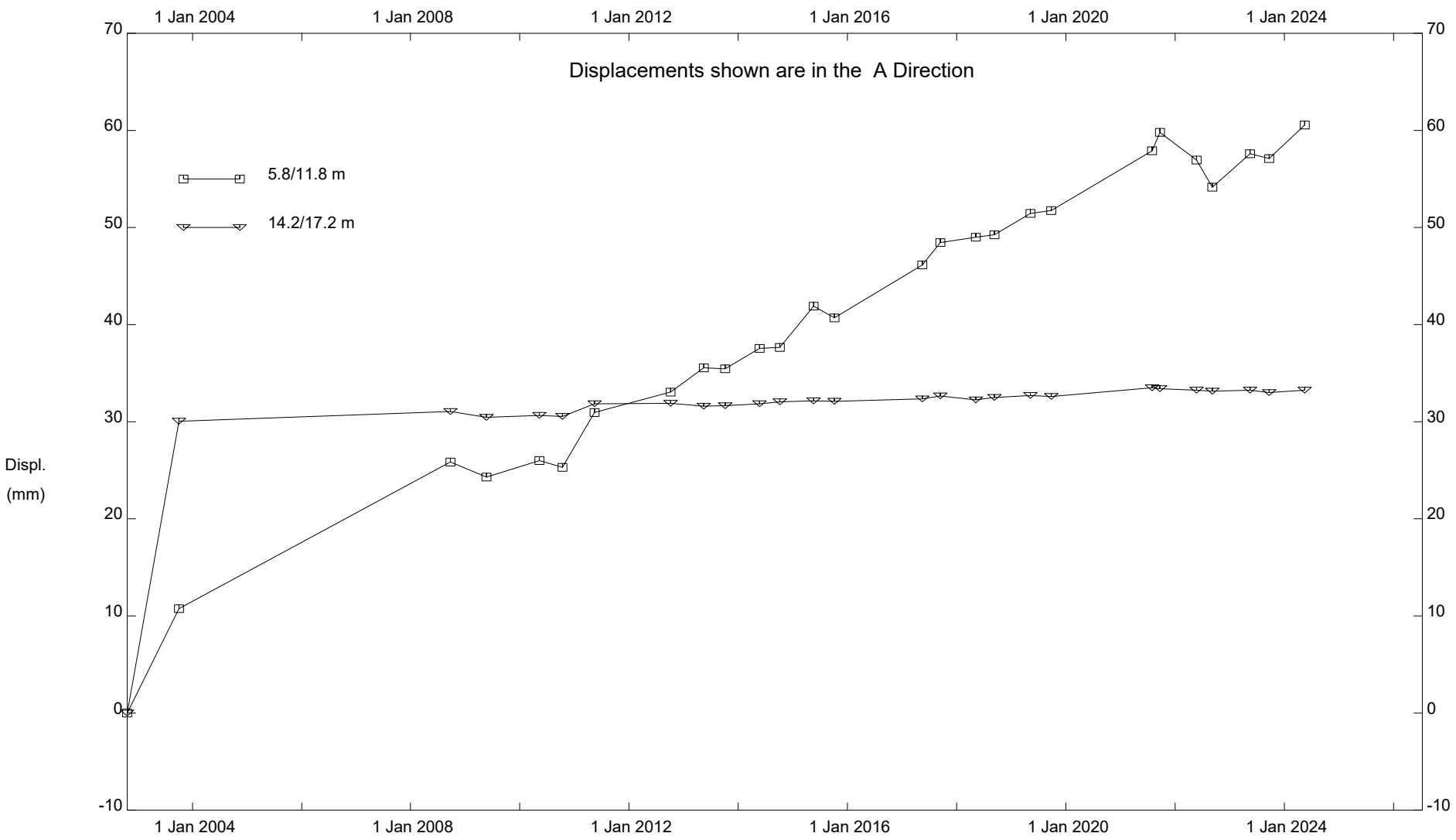

NC67, Inclinometer SI-08

Transportation & Economic Corridors

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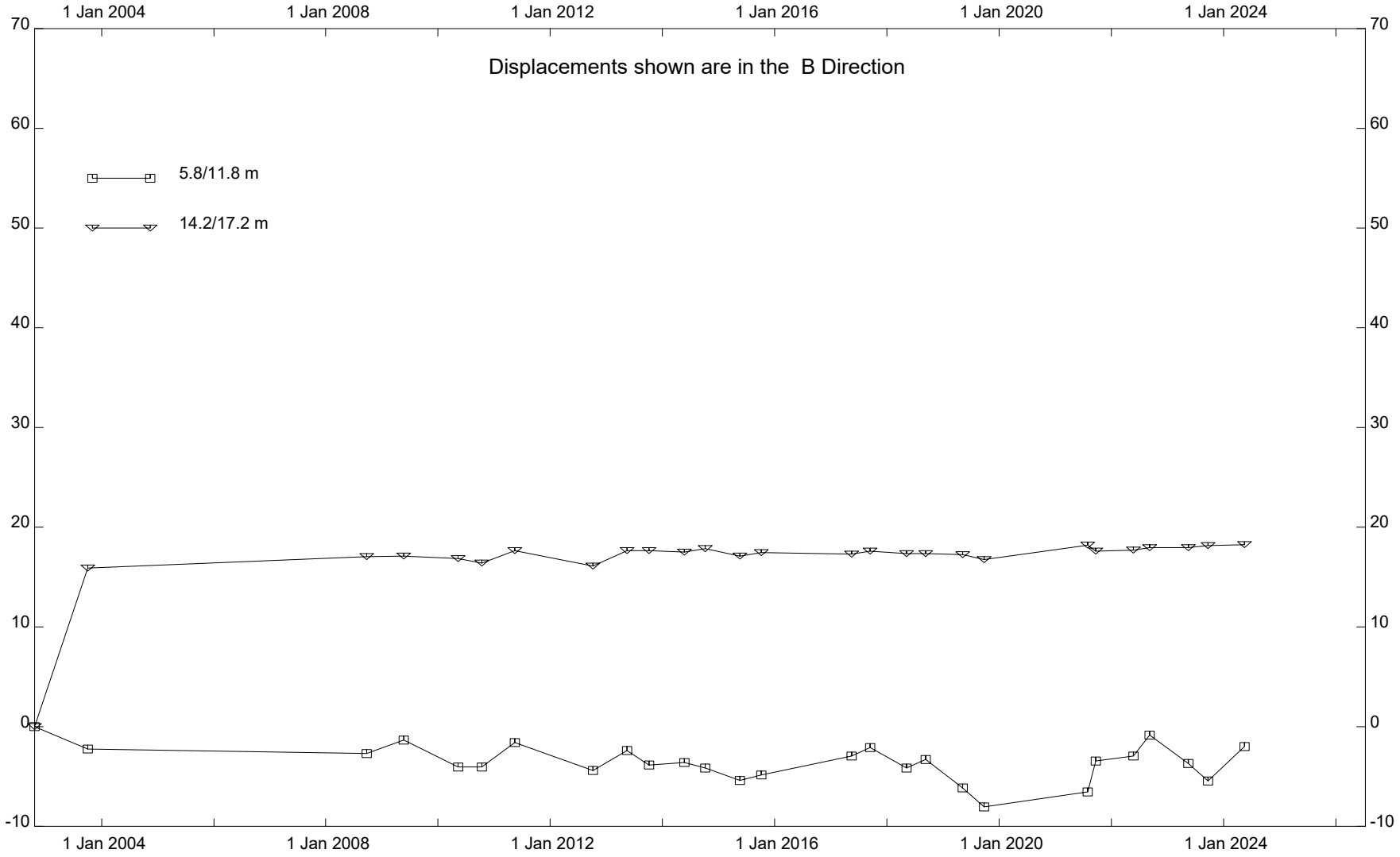

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Transportation & Economic Corridors

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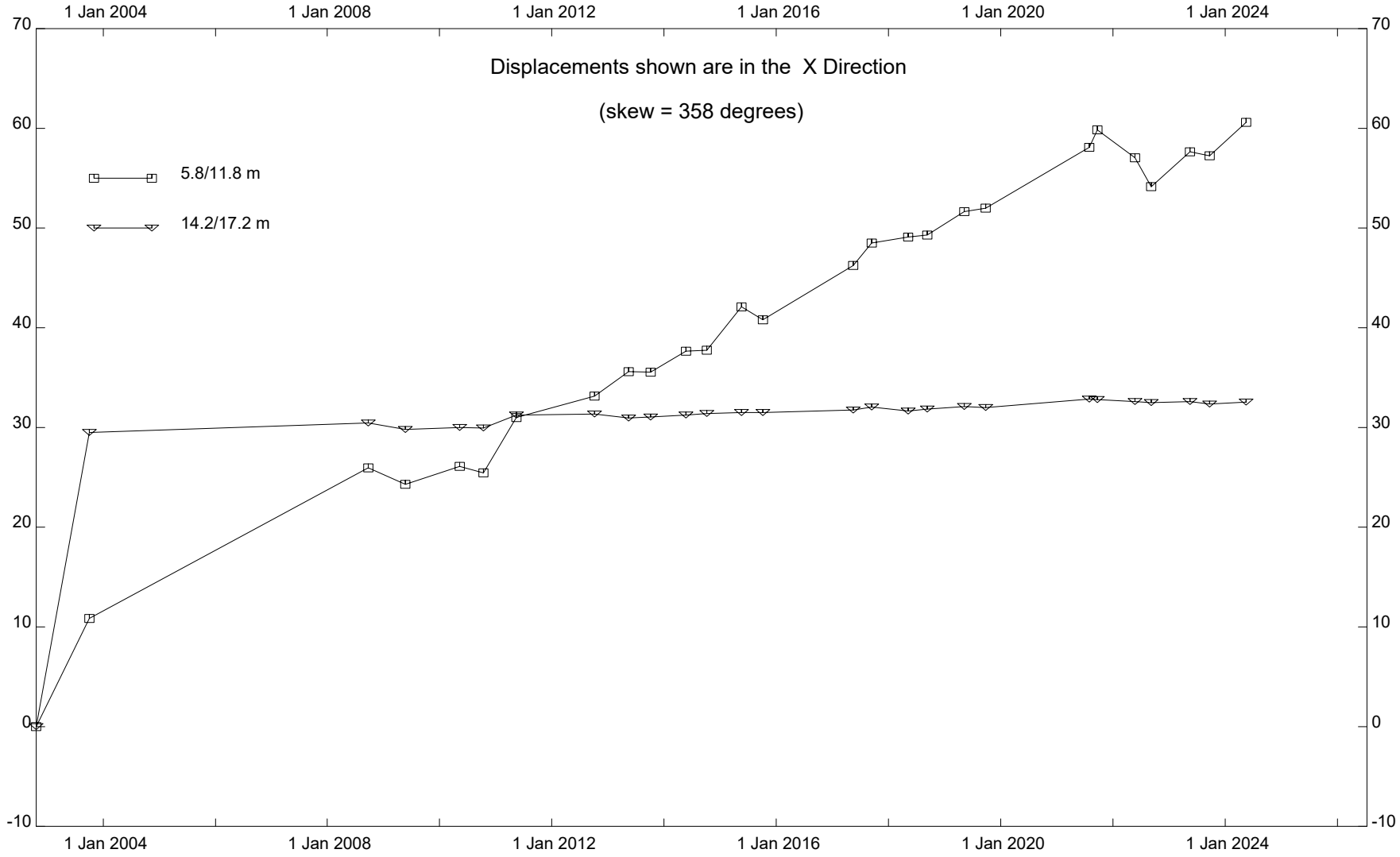

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Transportation & Economic Corridors

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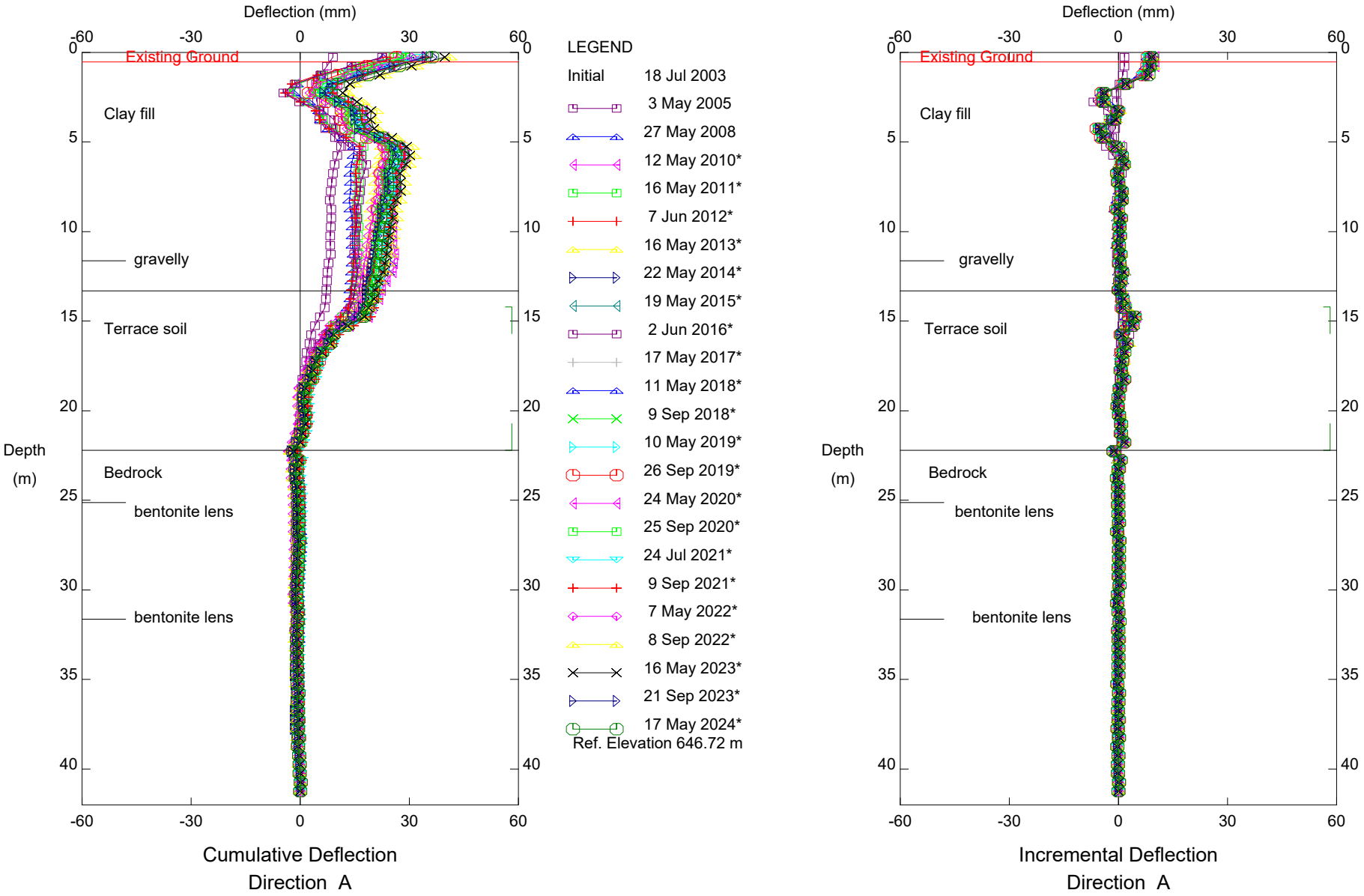

NC67, Inclinometer SI-10

Transportation & Economic Corridors

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

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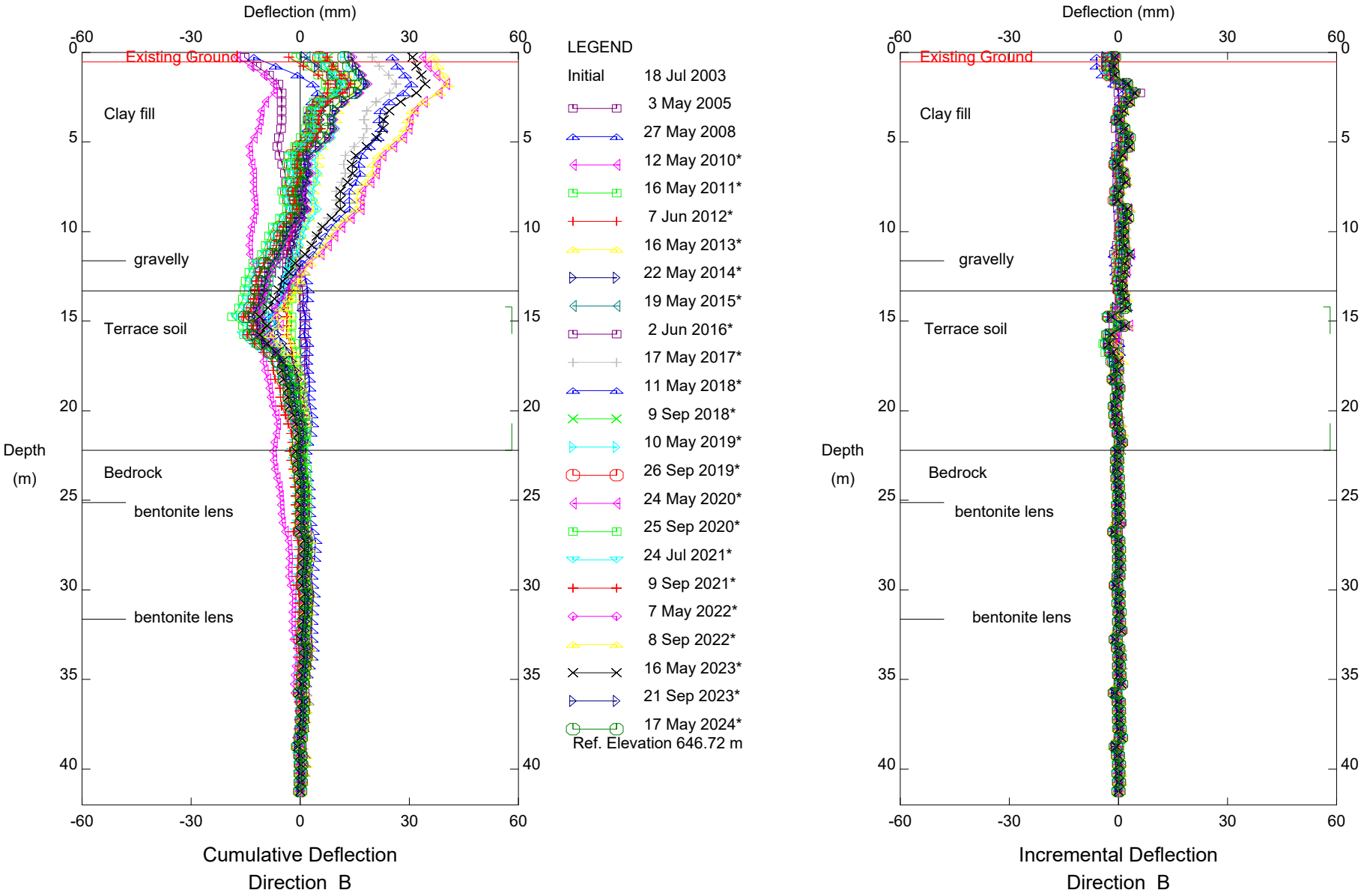

NC67, Inclinometer SI-10

Transportation & Economic Corridors

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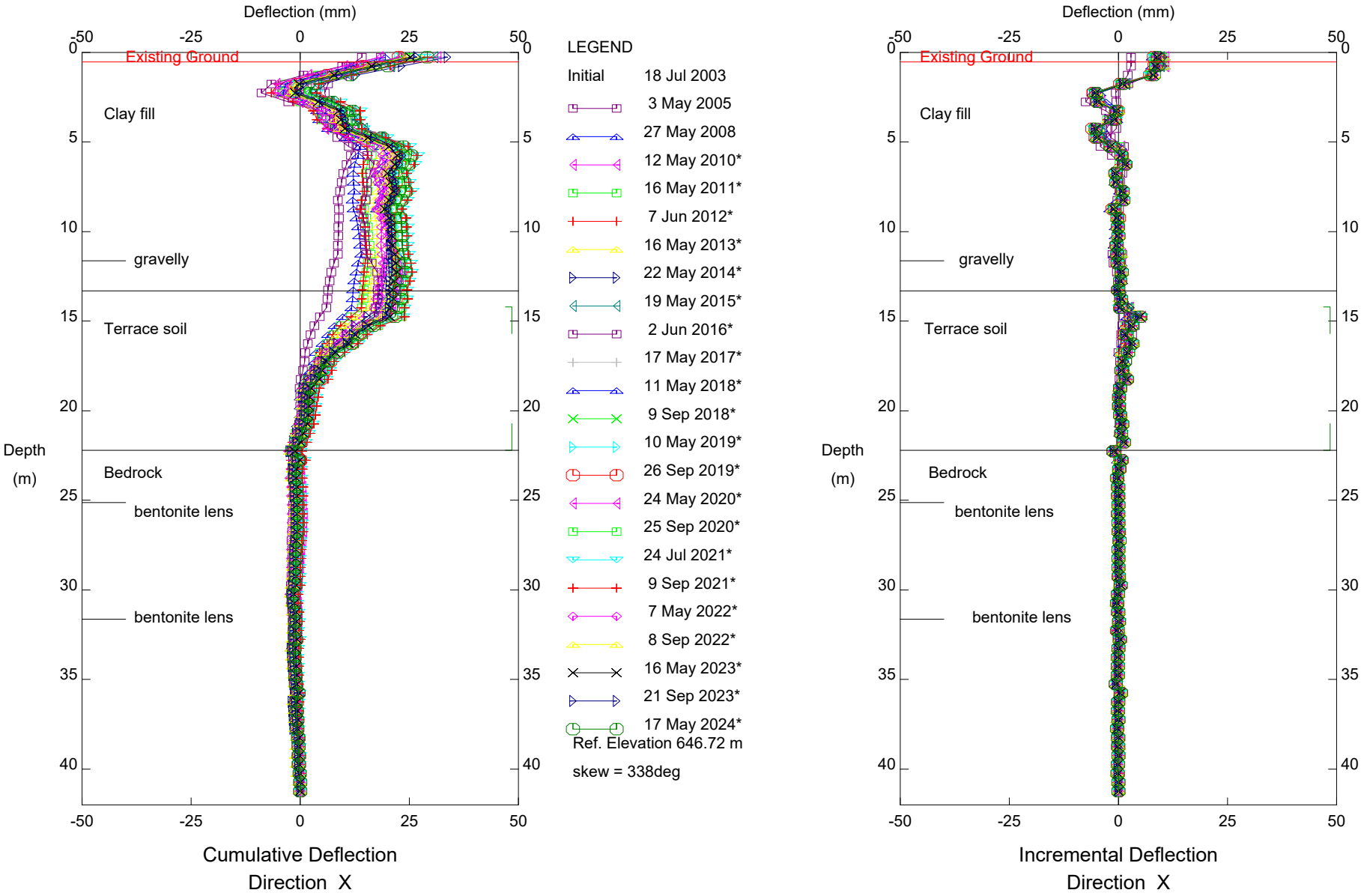

NC67, Inclinometer SI-10

Transportation & Economic Corridors

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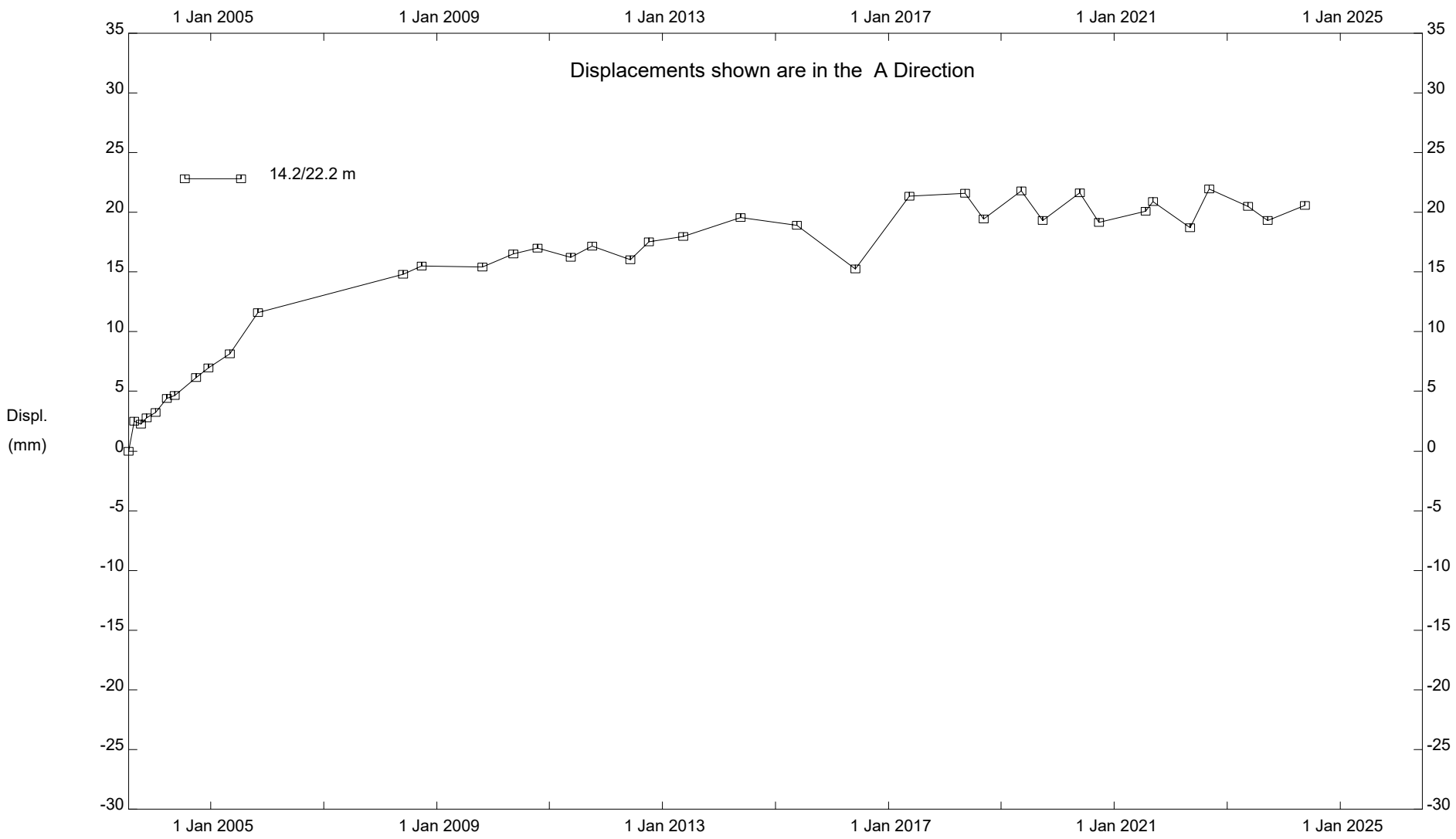
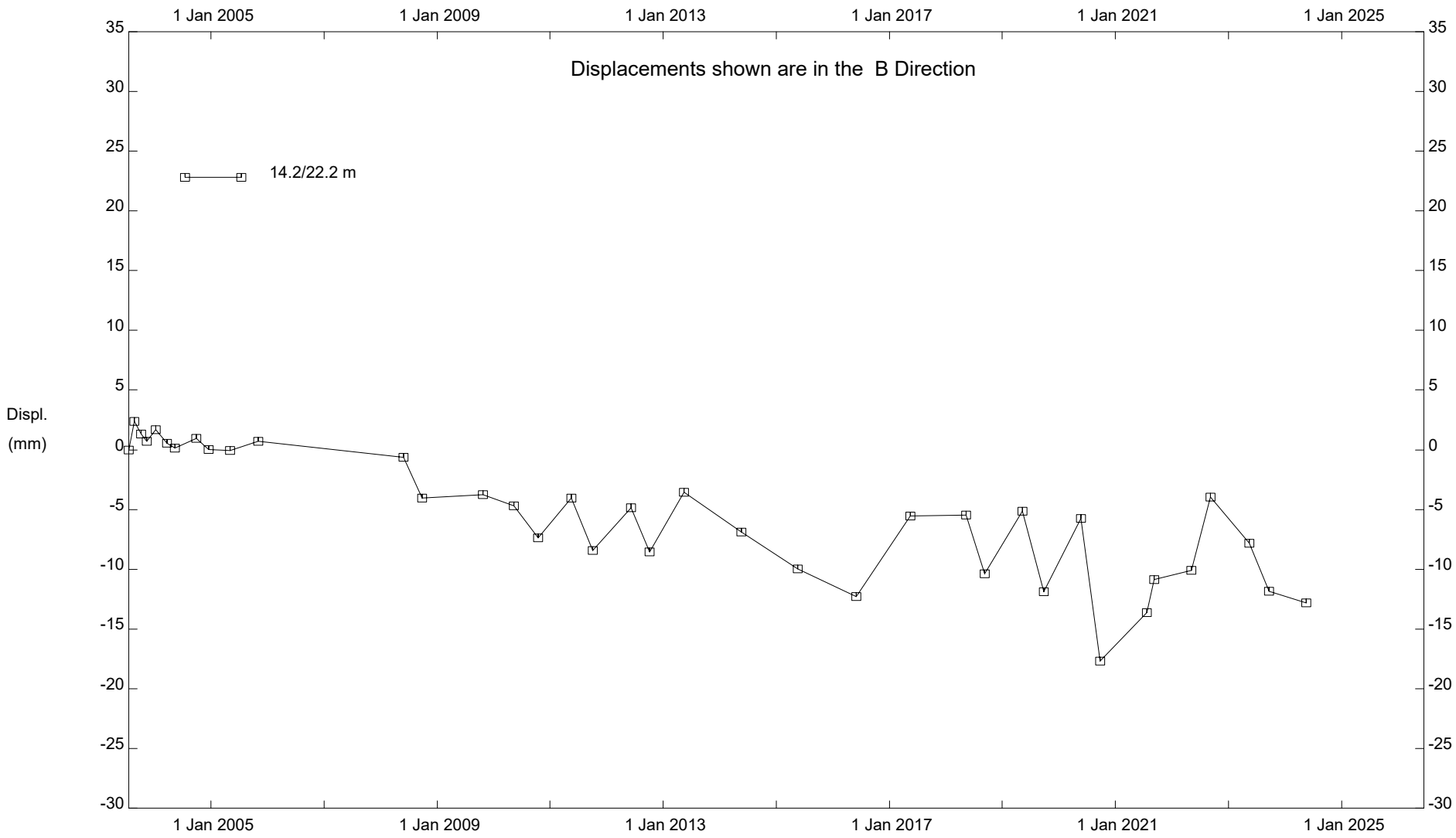


NC67, Inclinometer SI-10

Transportation & Economic Corridors

Stantec Consulting Ltd - Edmonton



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Transportation & Economic Corridors

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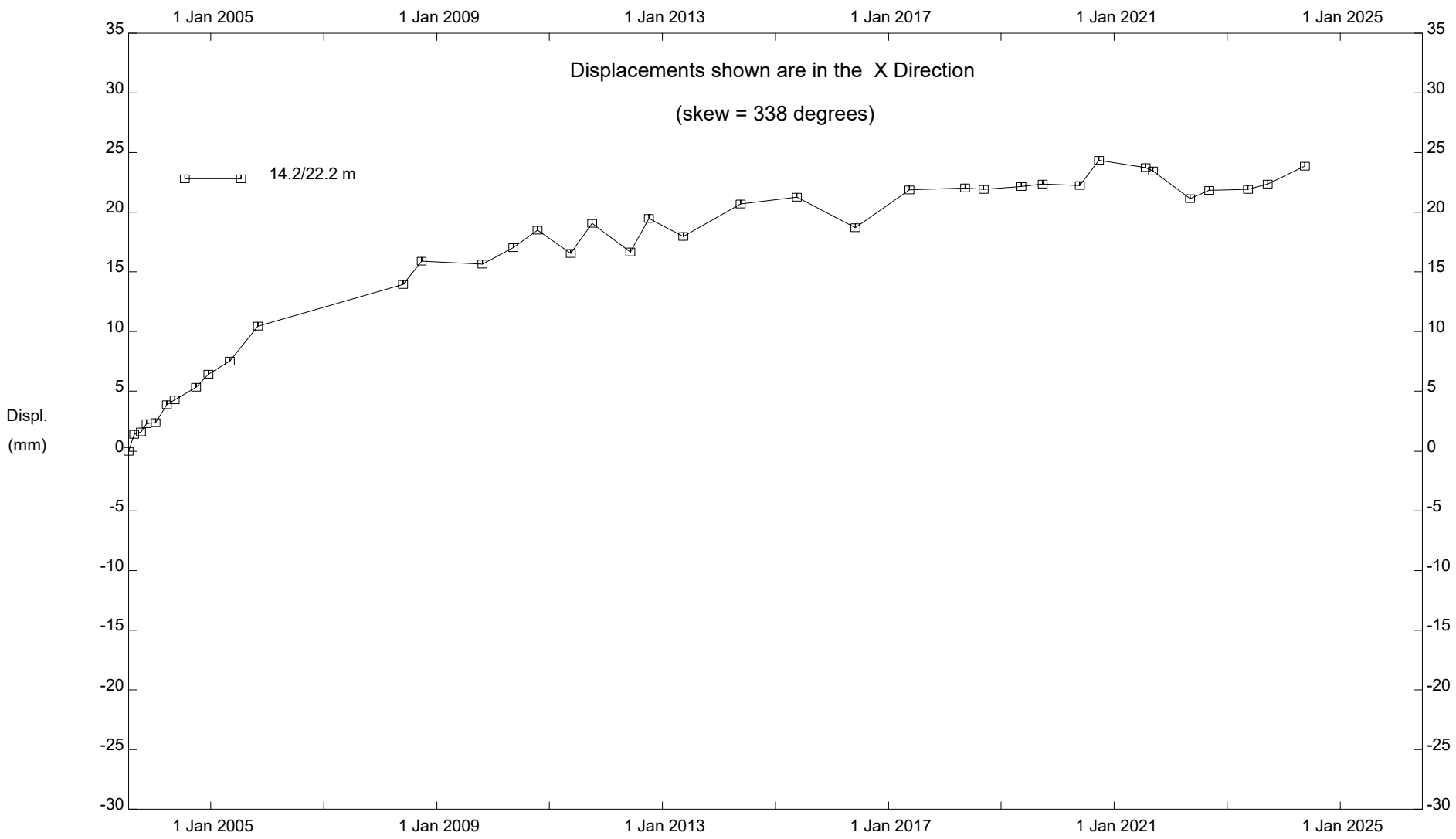

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Transportation & Economic Corridors

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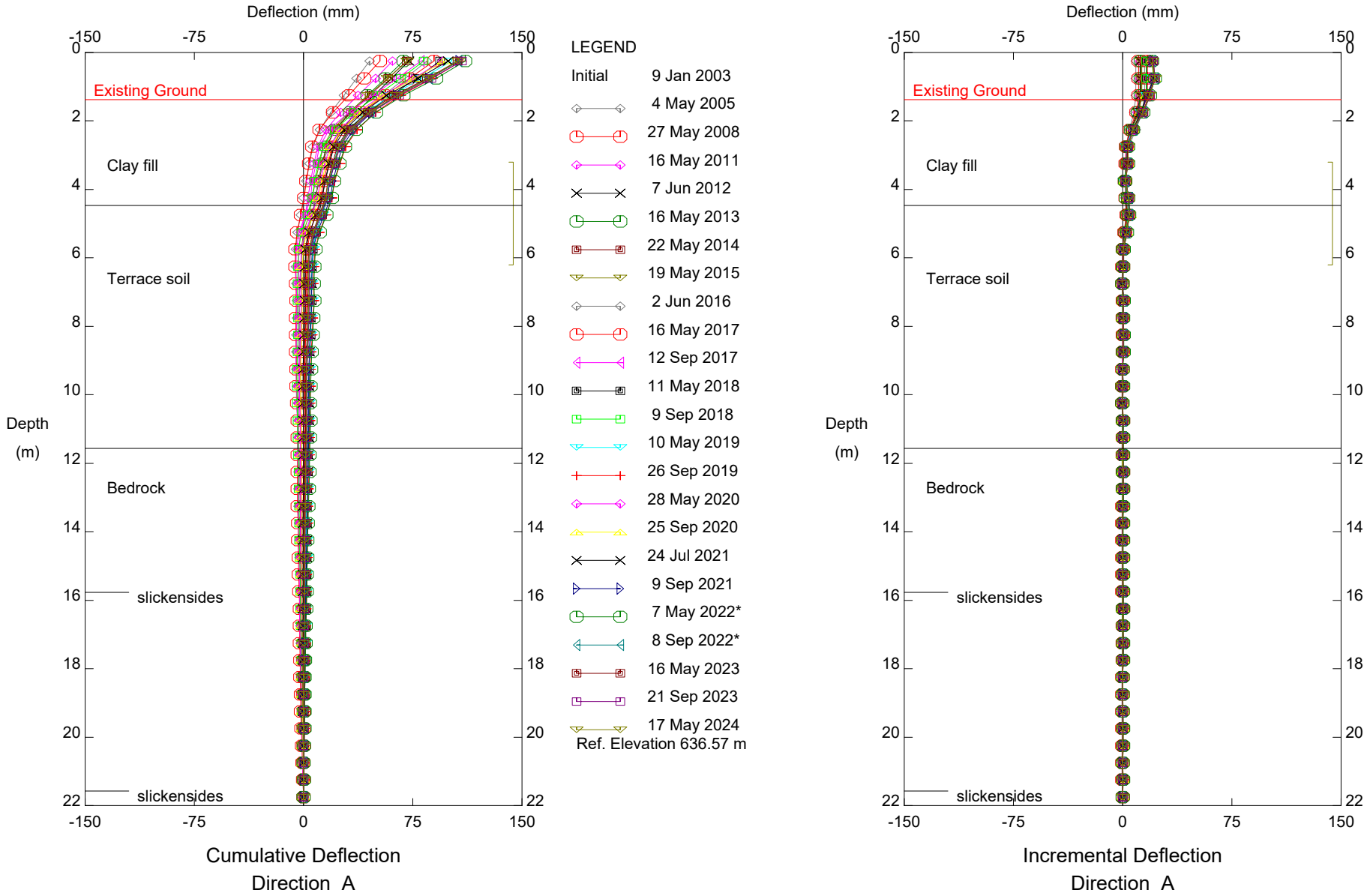

NC67, Inclinometer SI-12

Transportation & Economic Corridors

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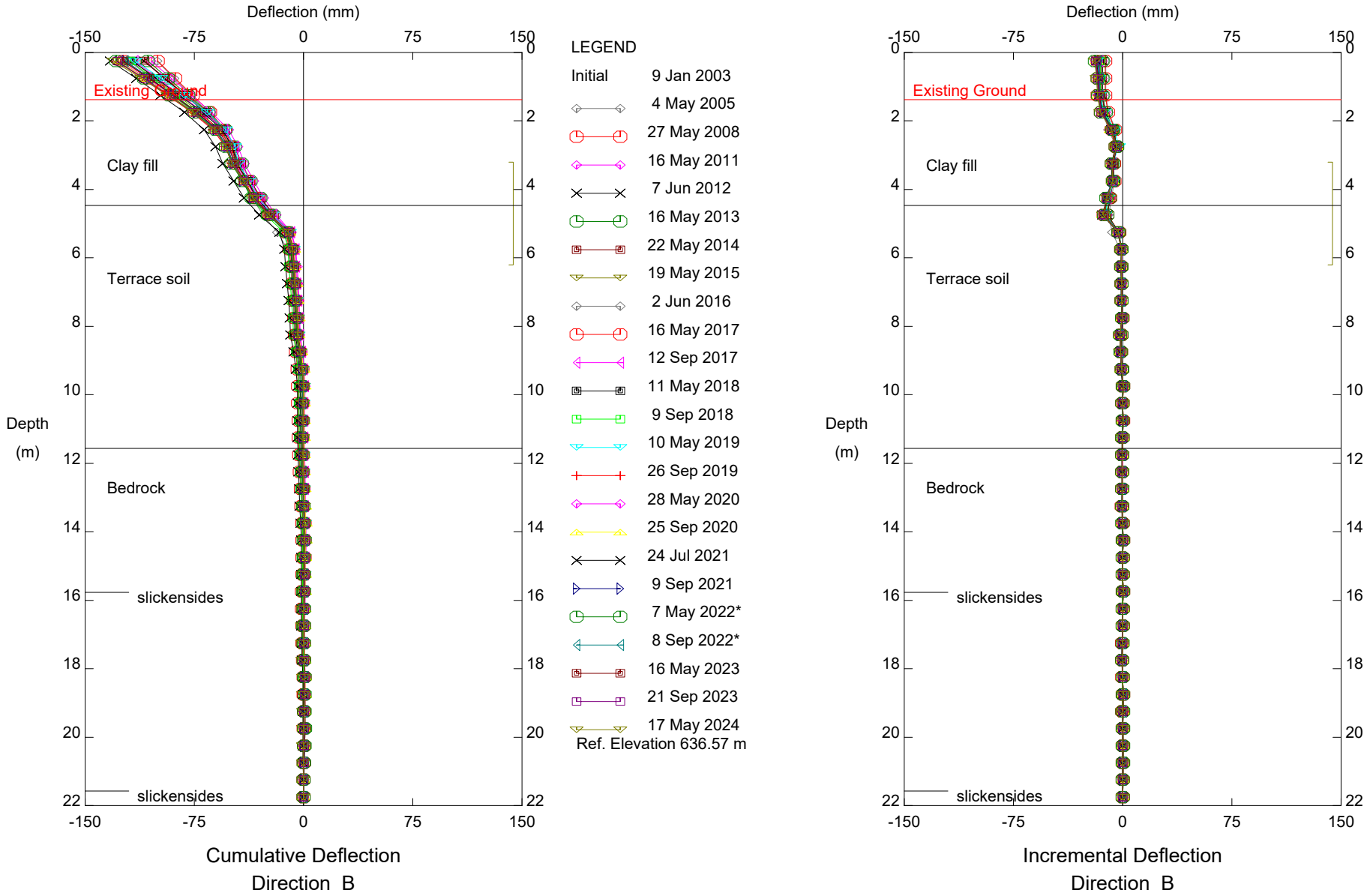

Cumulative Deflection
Direction B

Incremental Deflection
Direction B

NC67, Inclinometer SI-12

Transportation & Economic Corridors

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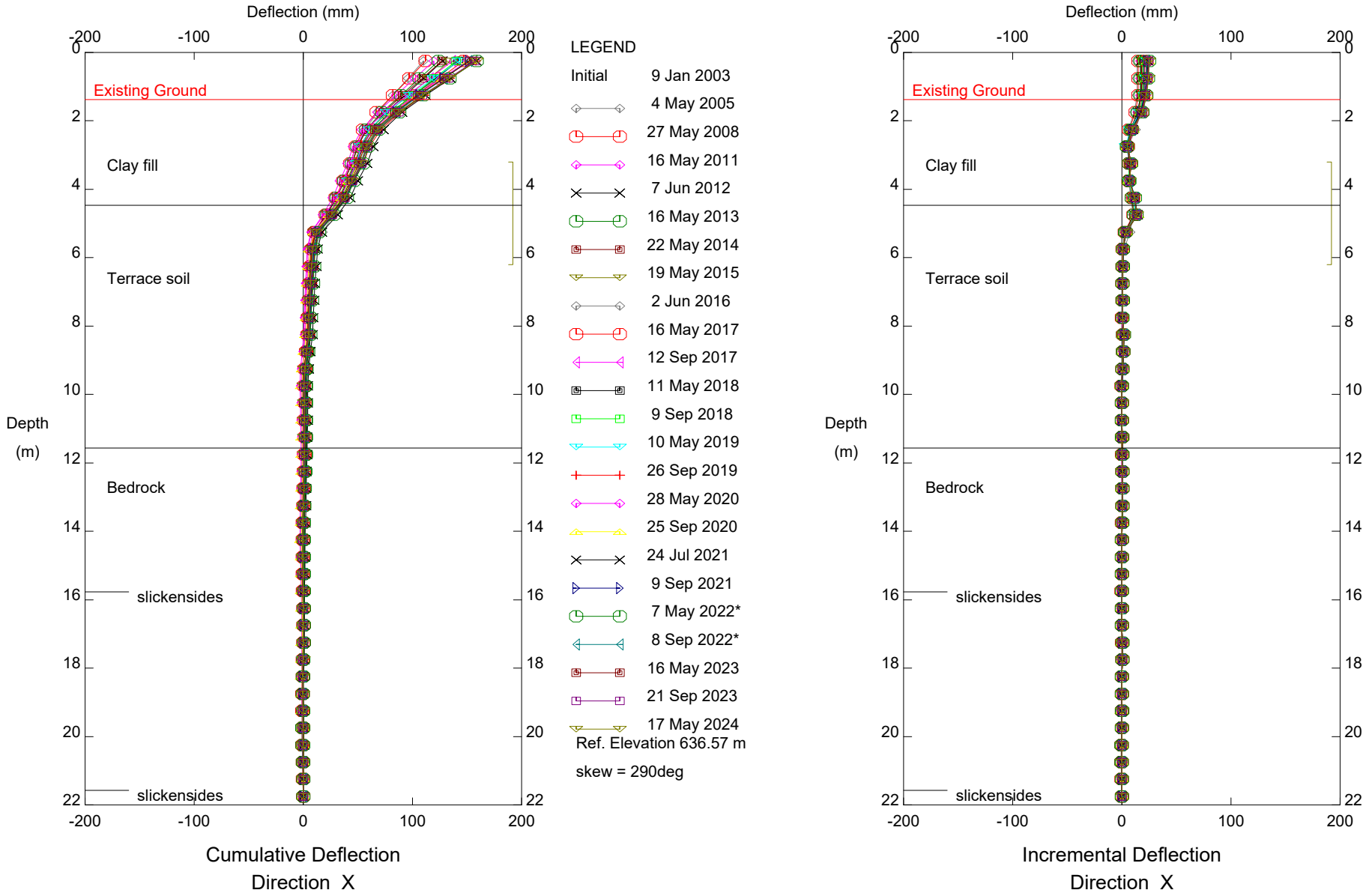

NC67, Inclinometer SI-12

Transportation & Economic Corridors

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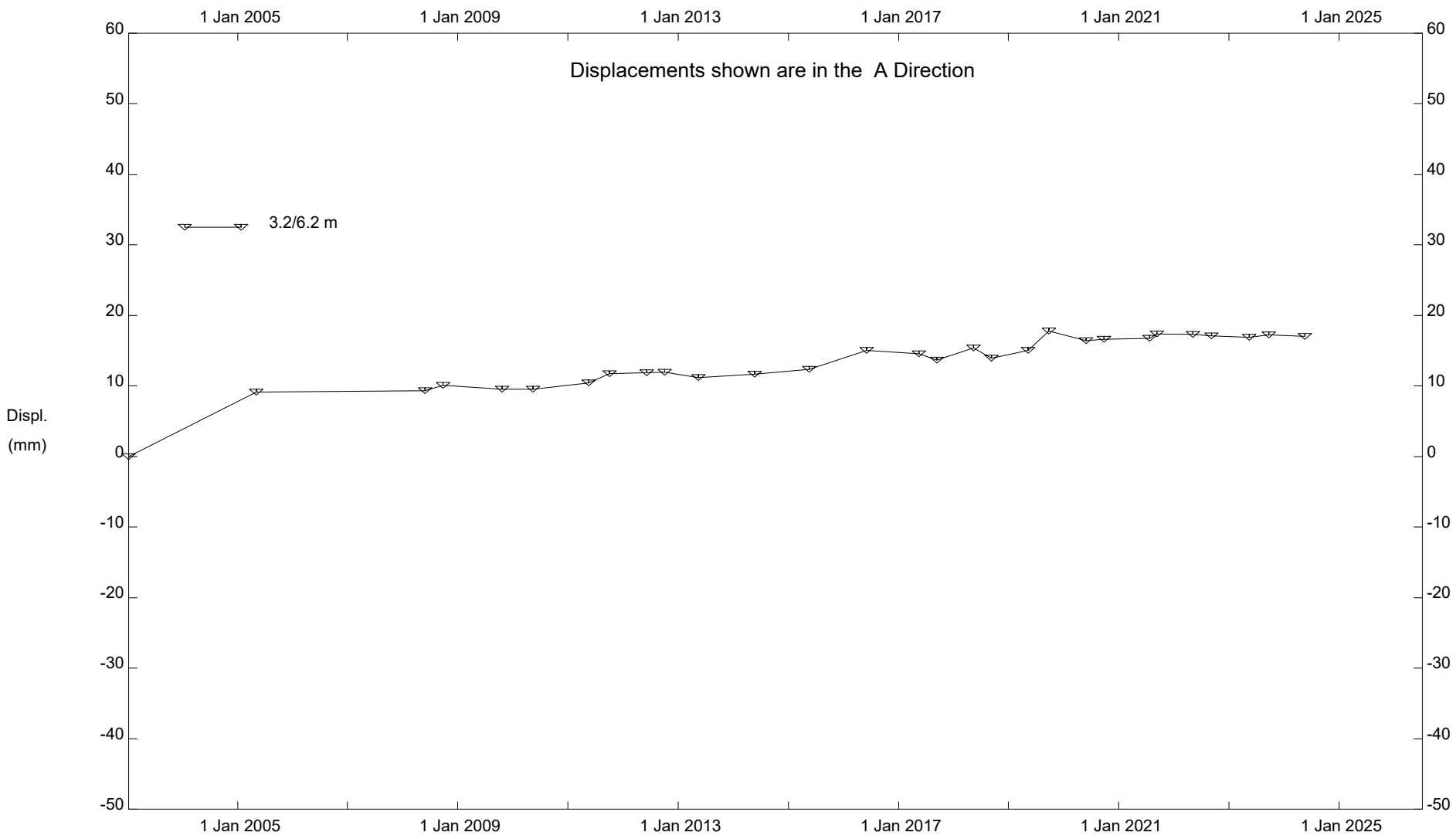

NC67, Inclinometer SI-12

Transportation & Economic Corridors

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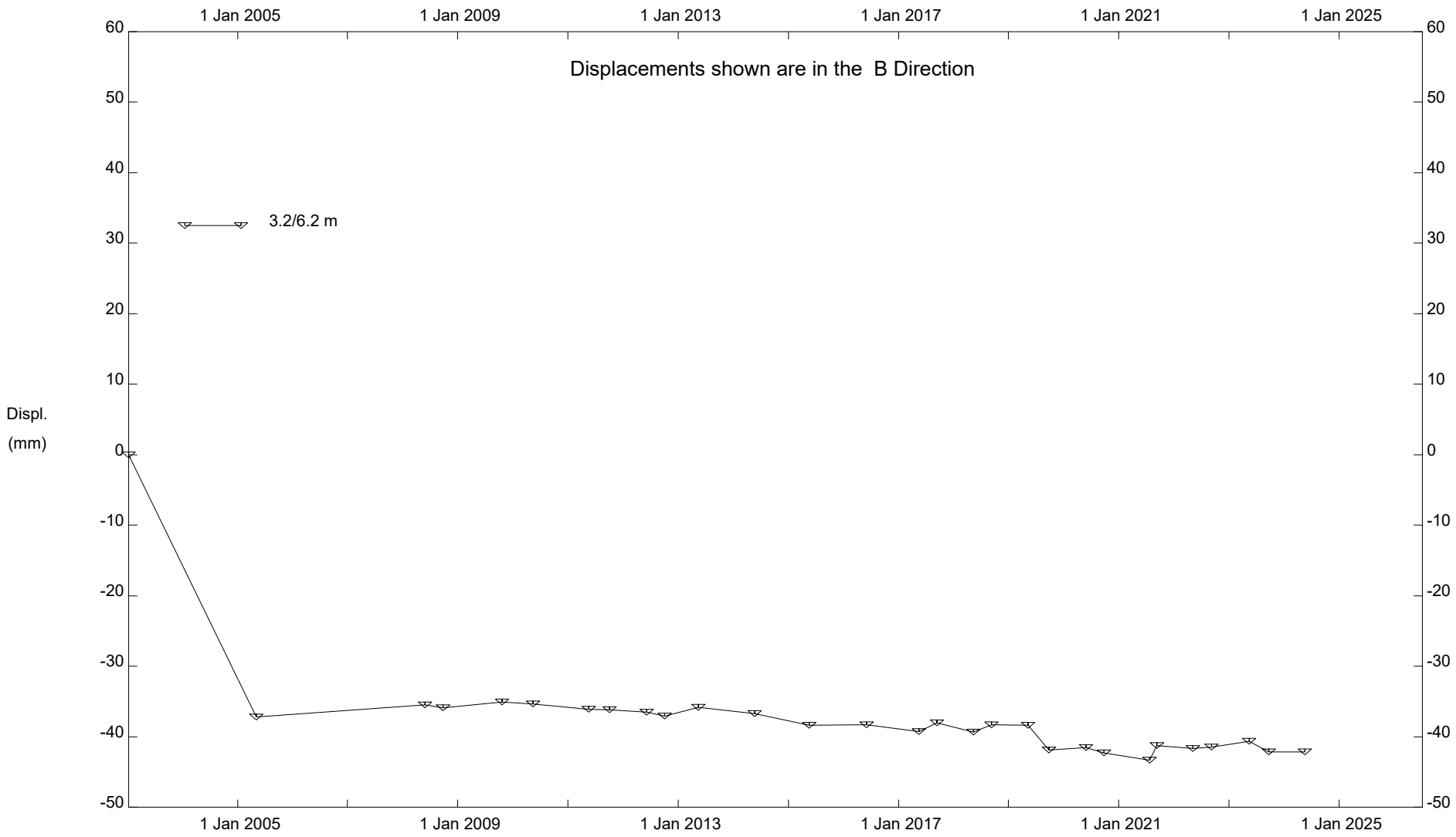

NC67, Inclinometer SI-12

Transportation & Economic Corridors

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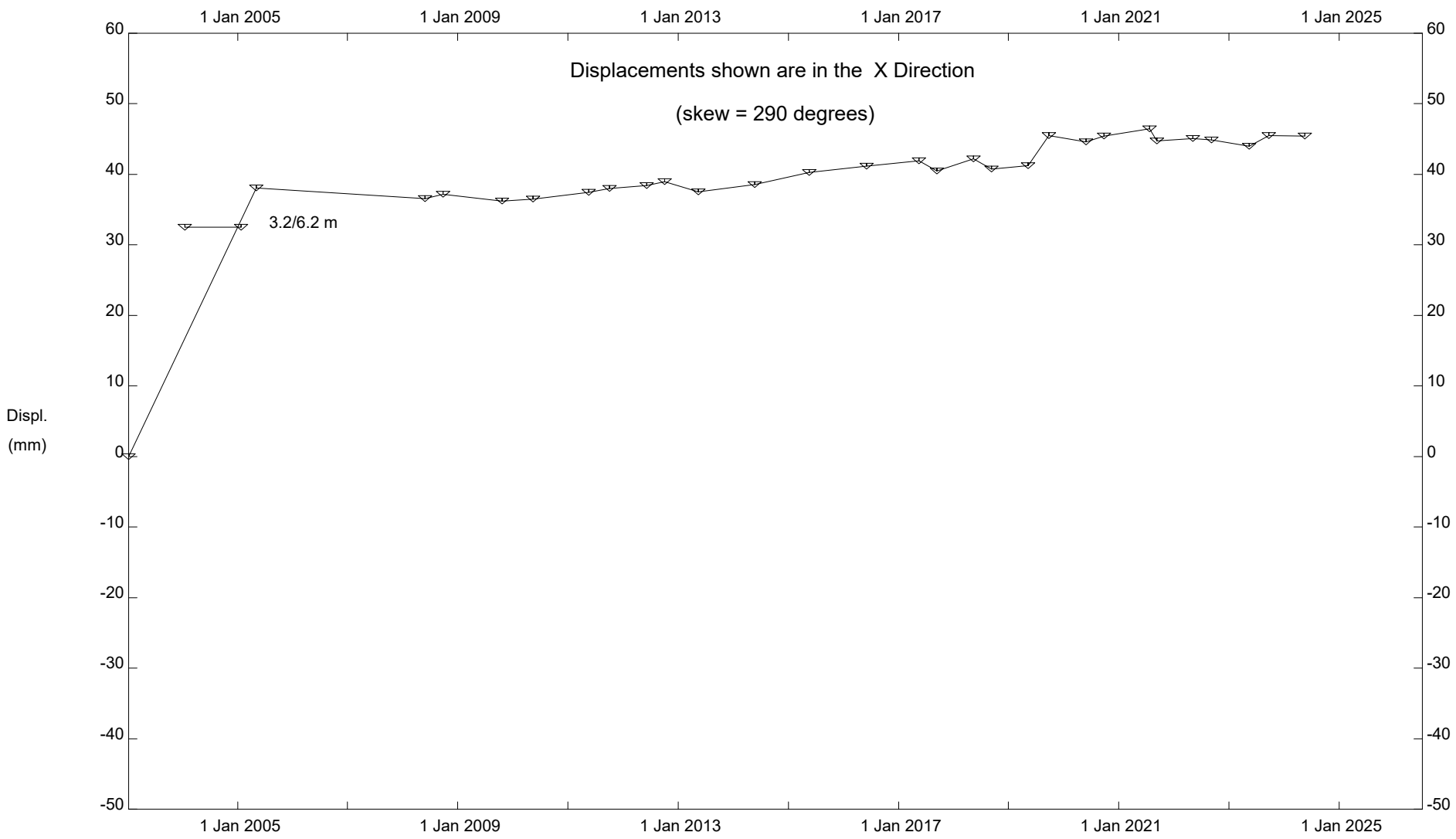
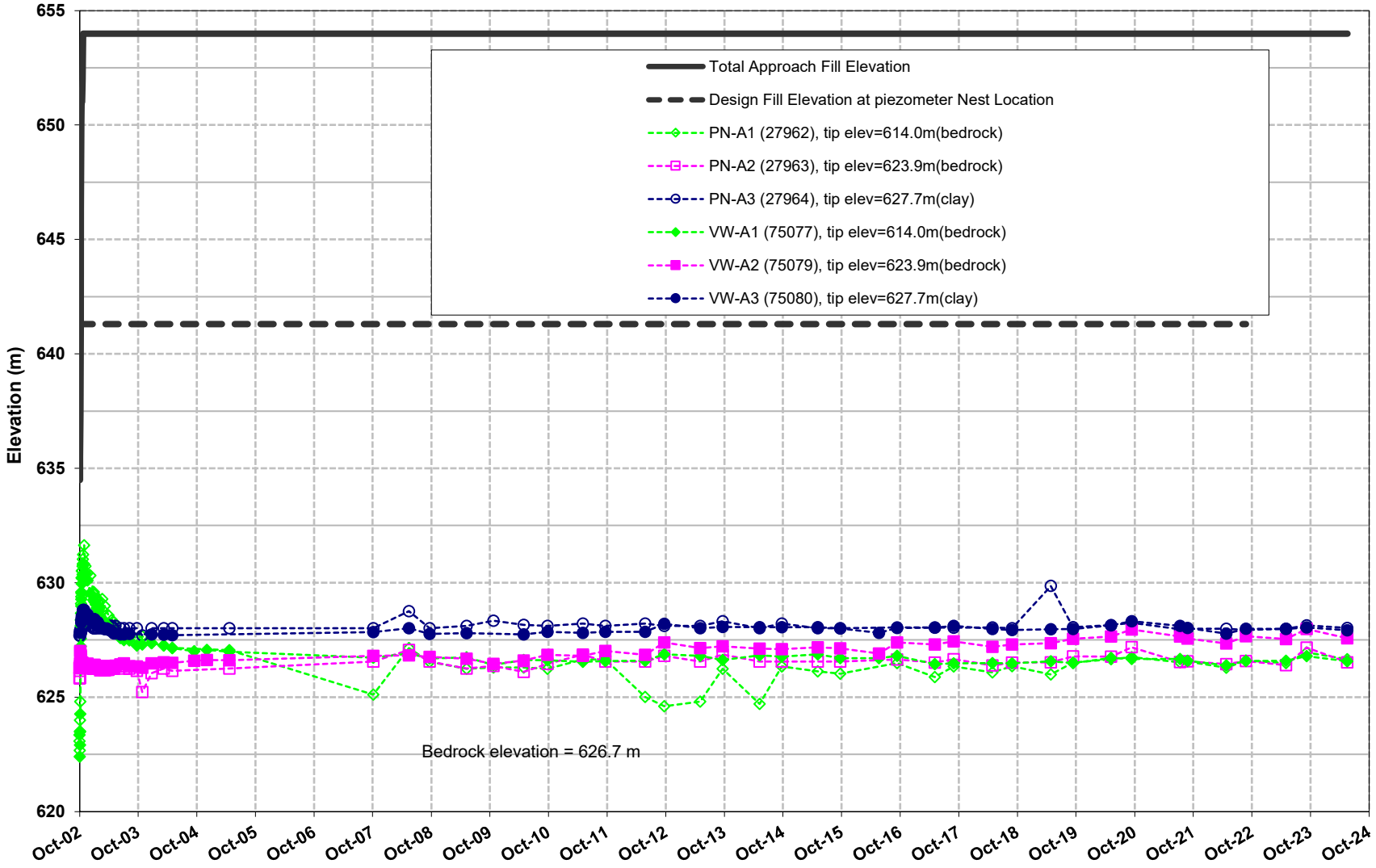


NC67, Inclinometer SI-12

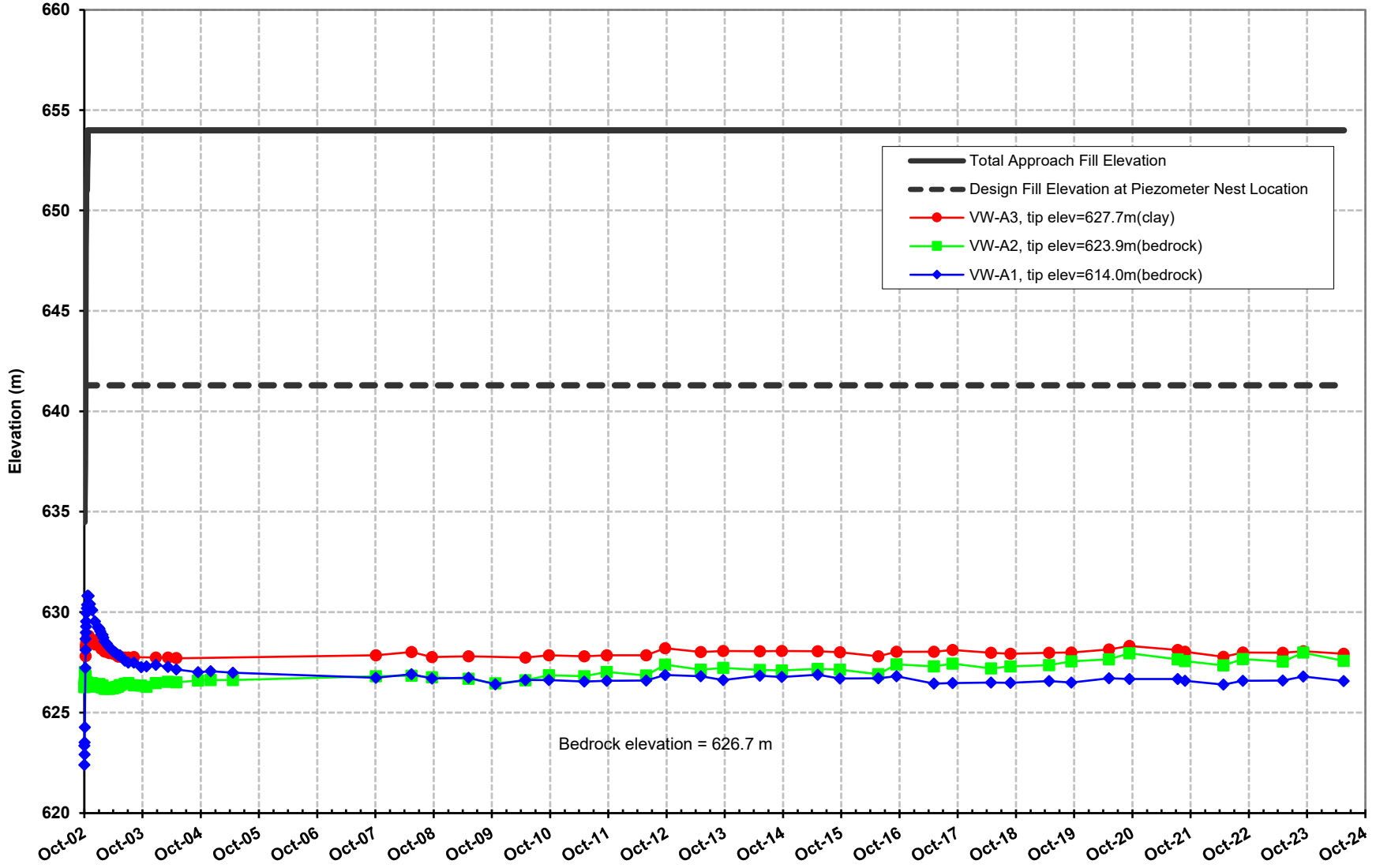
Transportation & Economic Corridors

Piezometer Plots
West Abutment
Nest A



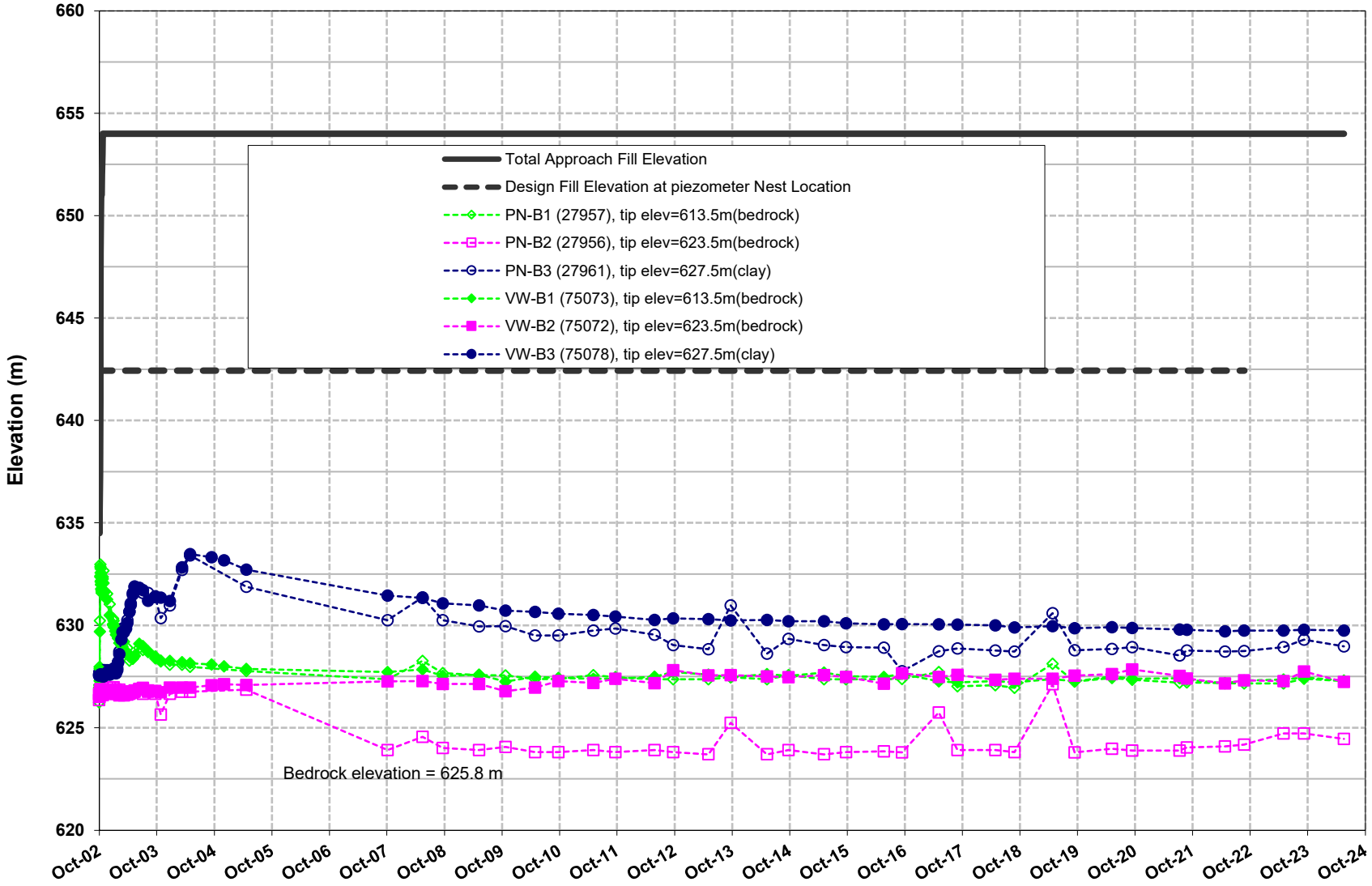
Stantec

Anthony Henday Drive (West)
Piezometer Nest Location A
Vibrating Wire Piezometers Only



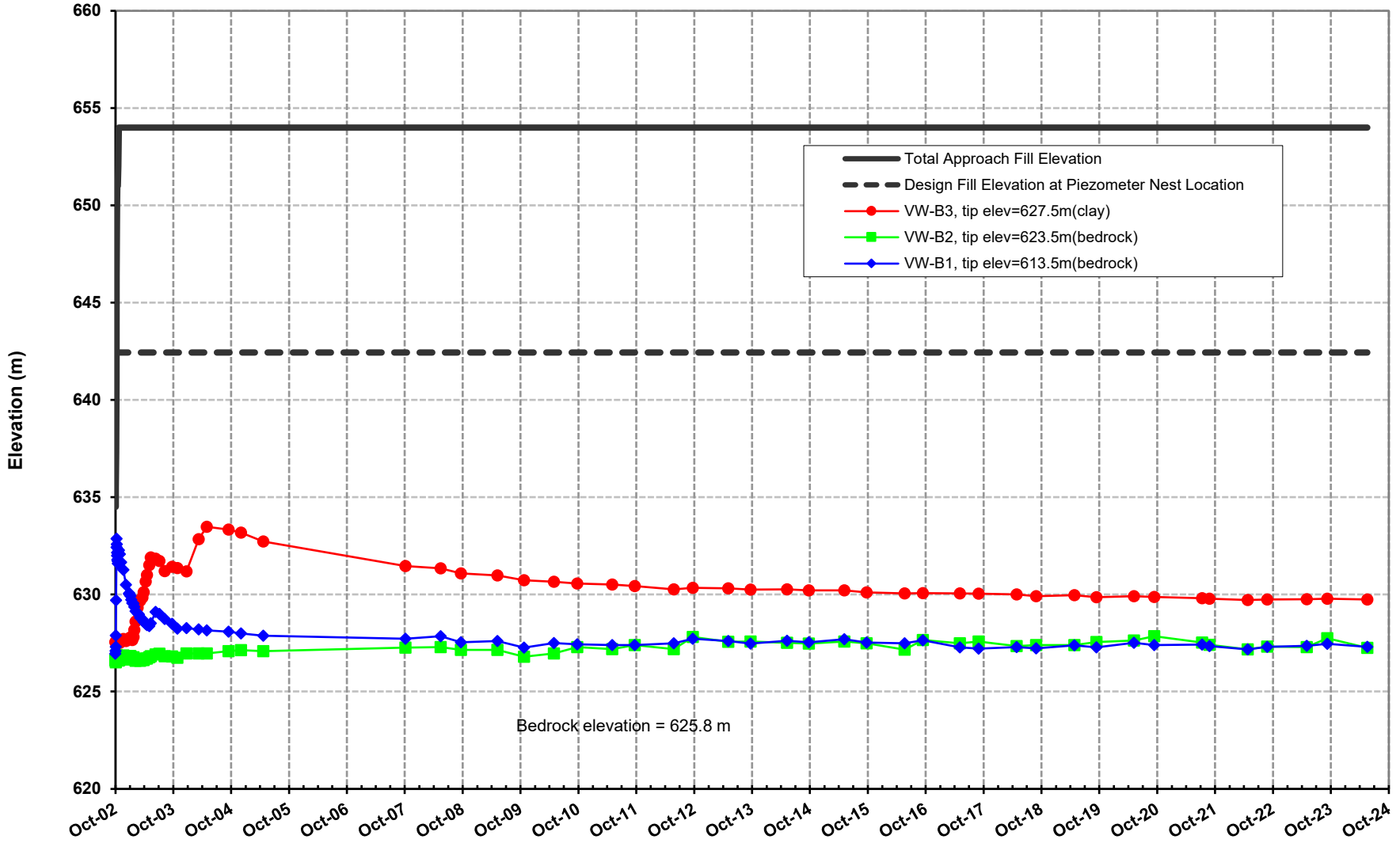
Stantec

Piezometer Plots
West Abutment
Nest B



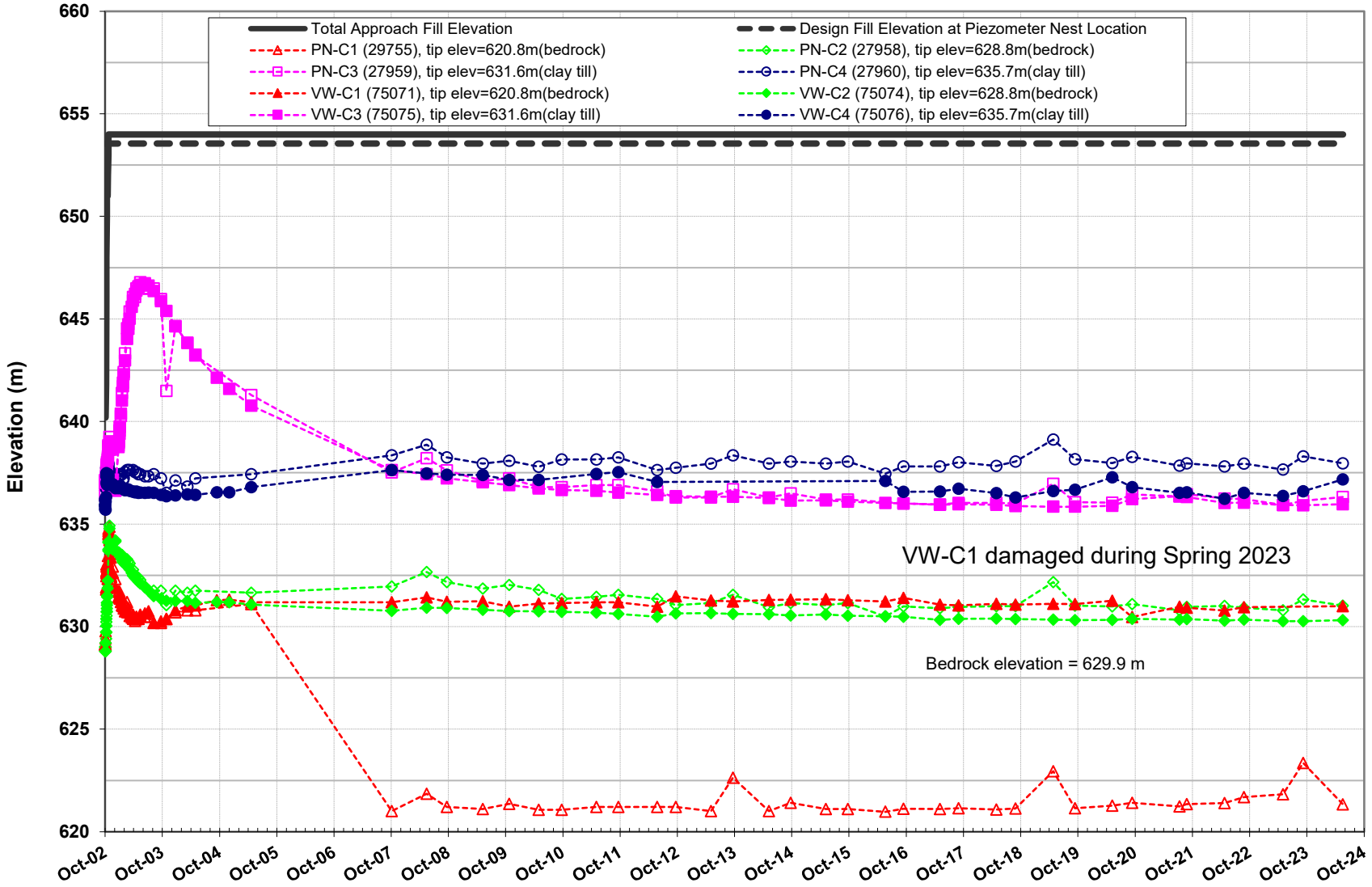
Stantec

Anthony Henday Drive (West)
Piezometer Nest Location B
Vibrating Wire Piezometers Only



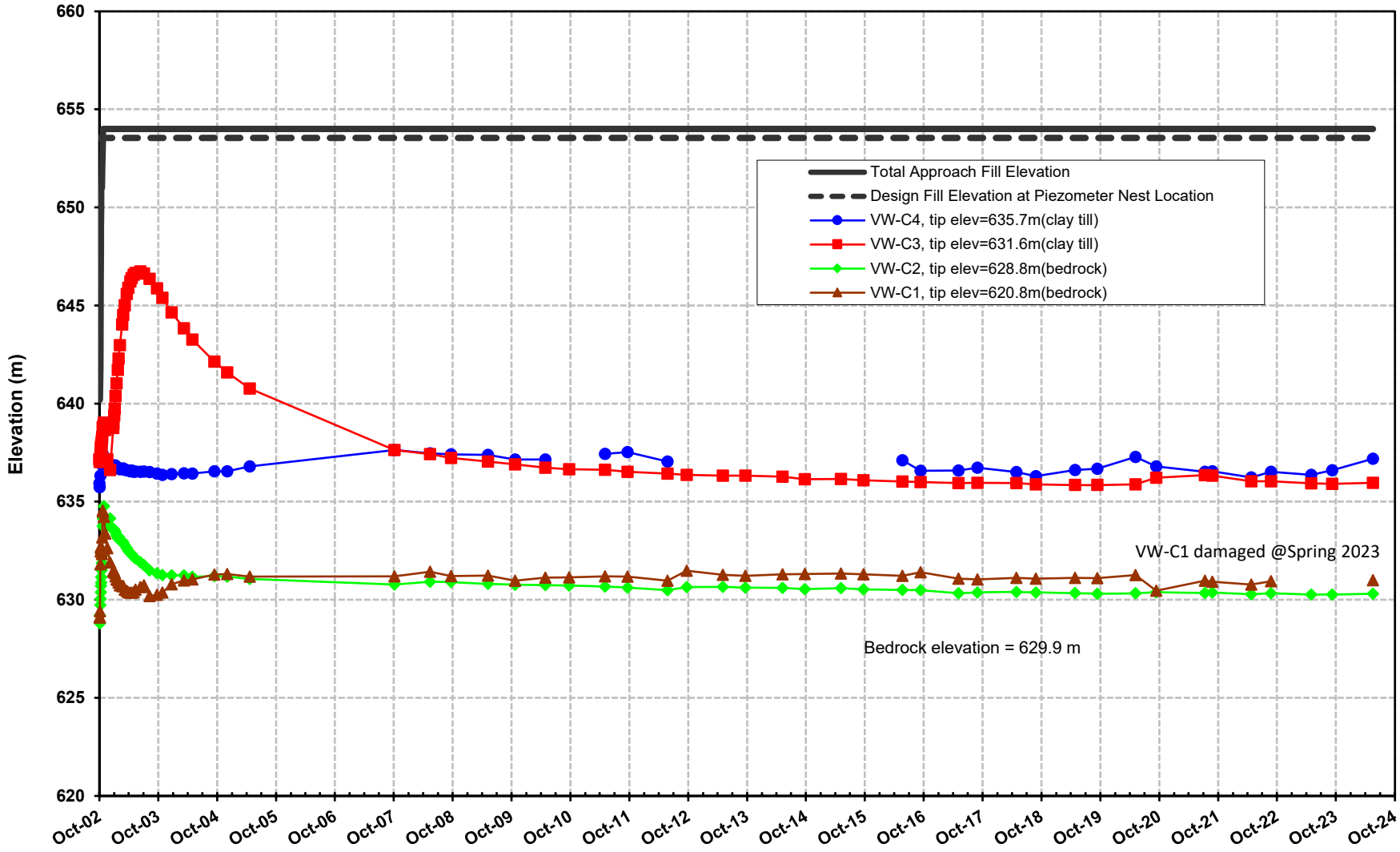
Stantec

Piezometer Plots
West Abutment
Nest C



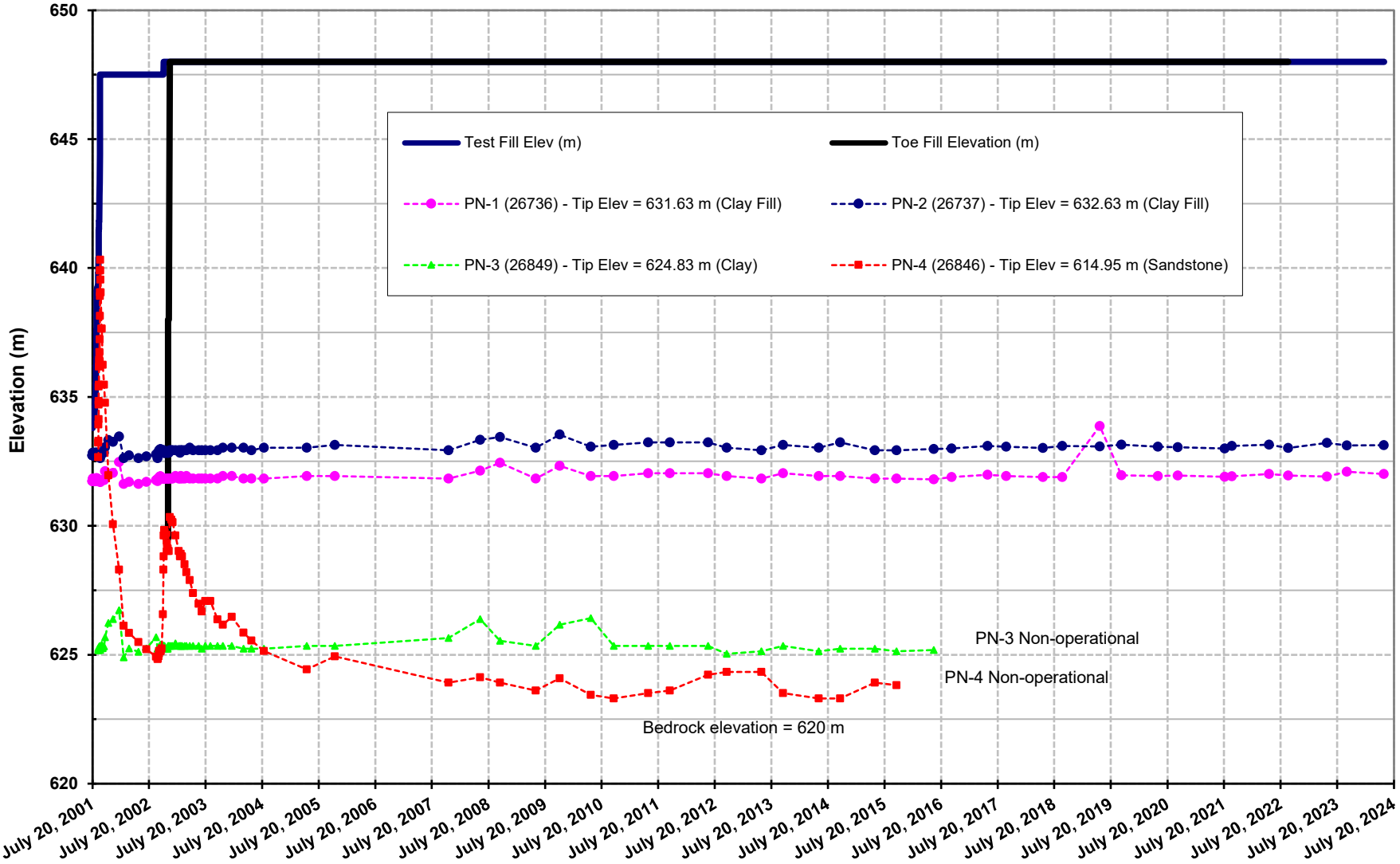
Stantec

Anthony Henday Drive (West)
Piezometer Nest Location C
Vibrating Wire Piezometers Only



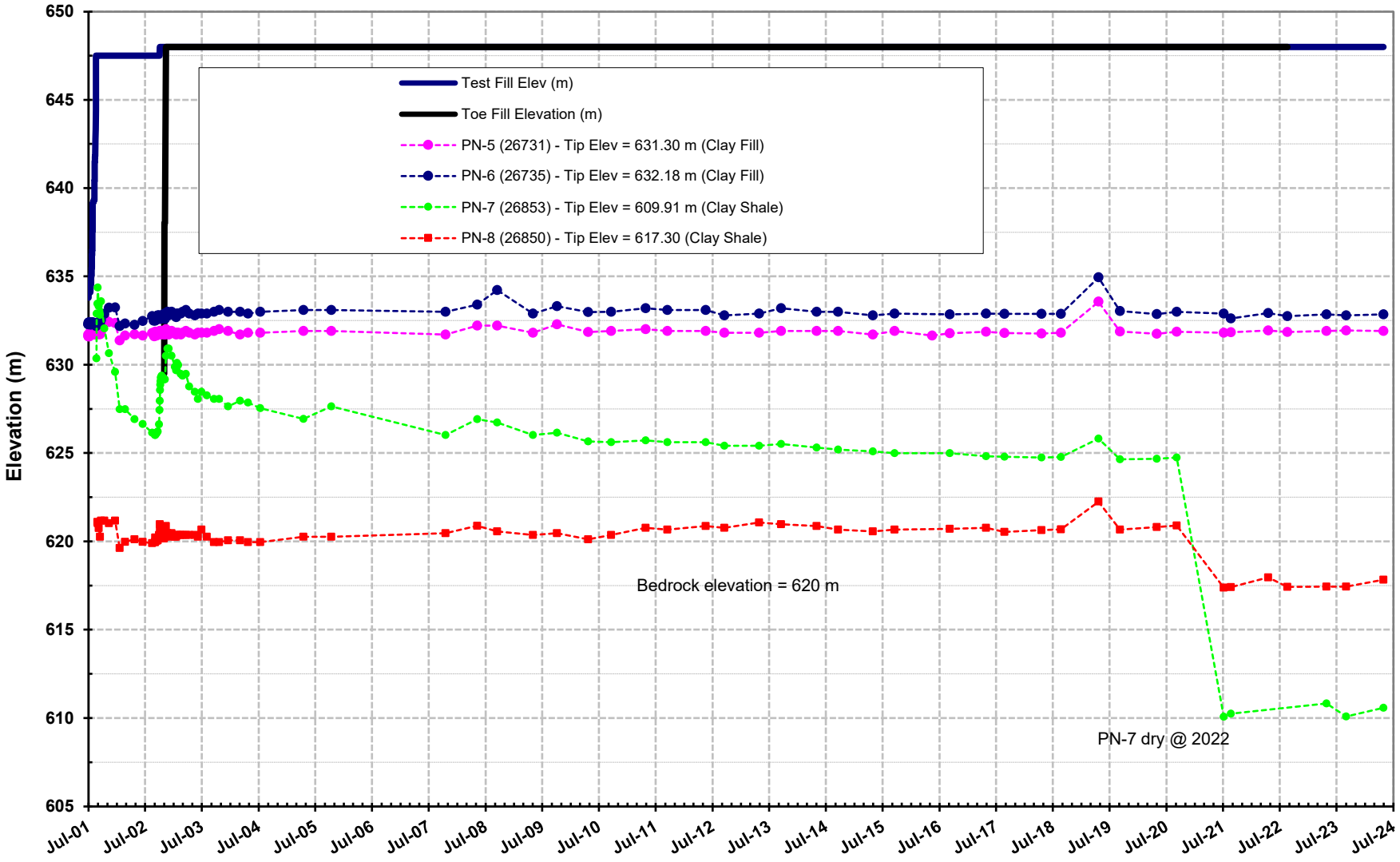
Stantec

Pneumatic Piezometer Plots
East Abutment
TH01-01



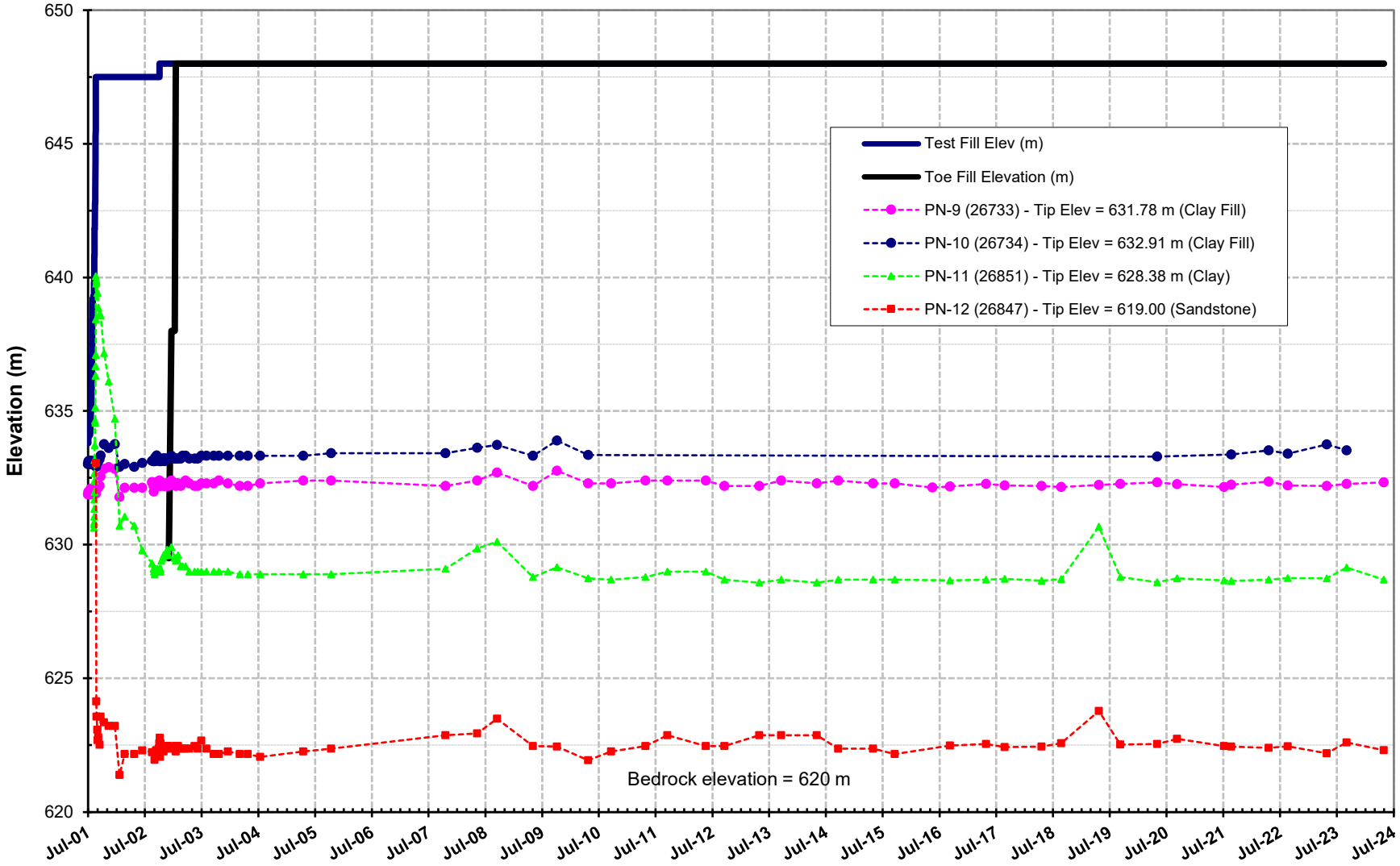
Stantec

Pneumatic Piezometer Plots
East Abutment
TH01-02



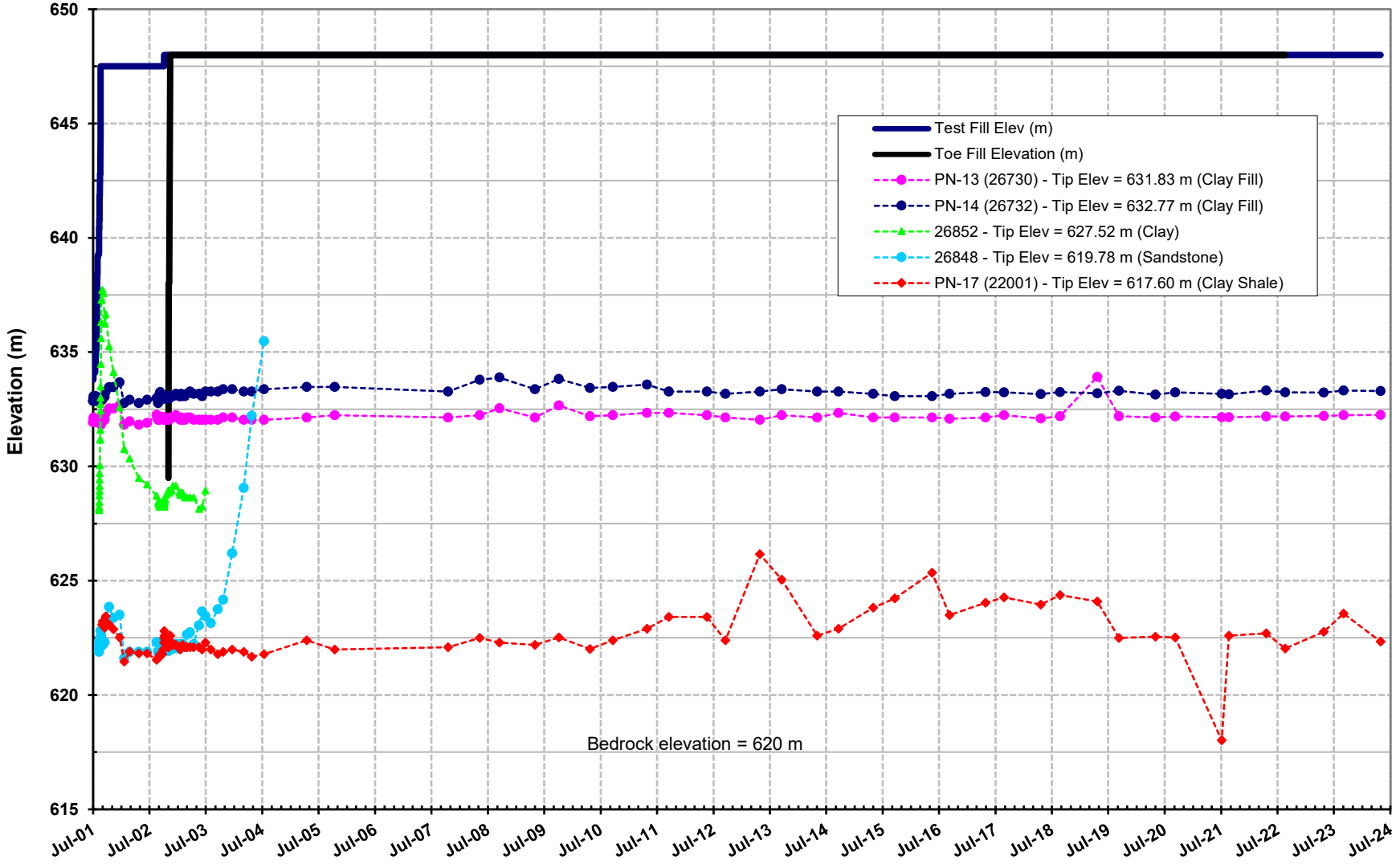
Stantec

Pneumatic Piezometer Plots
East Abutment
TH01-03



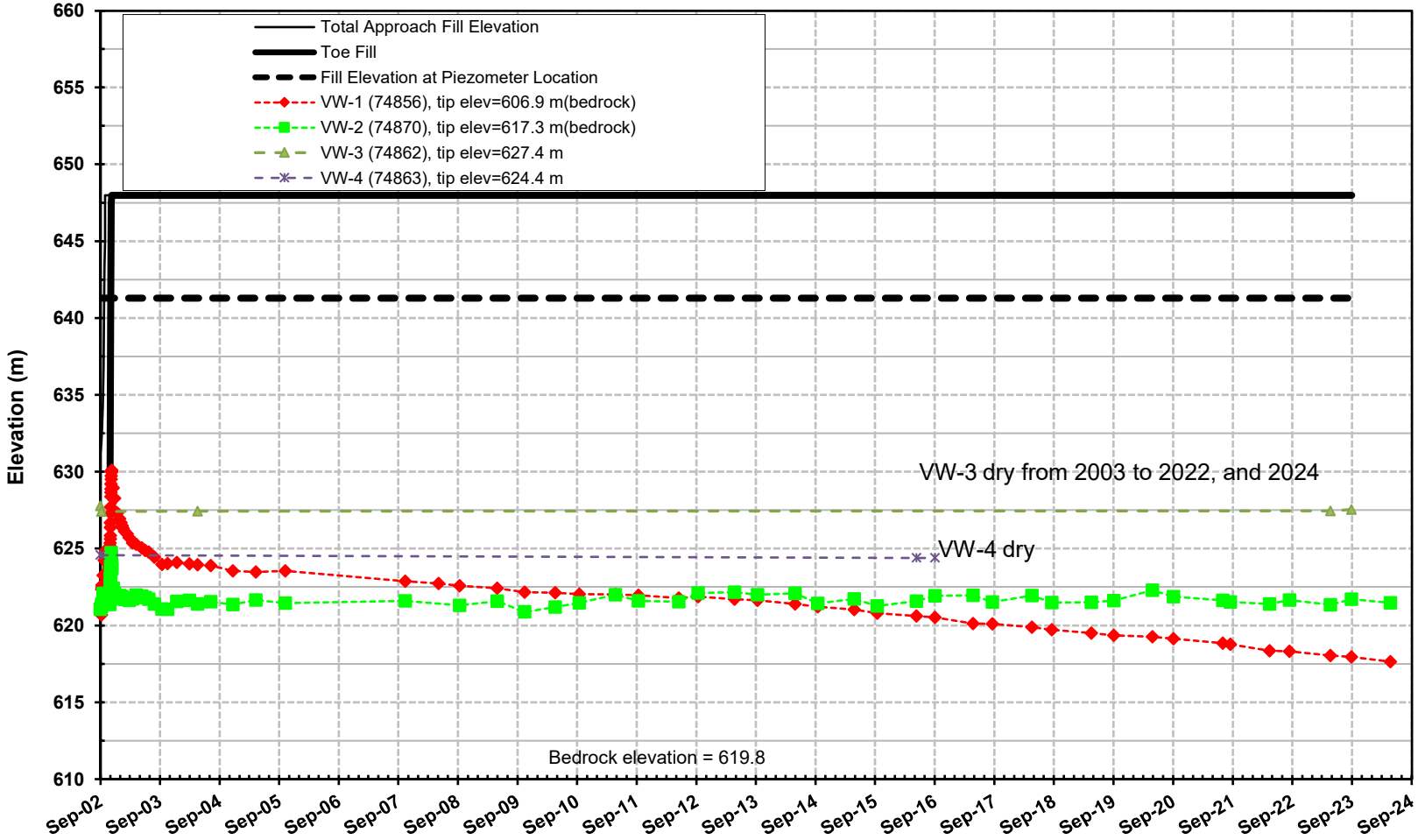
Stantec

Pneumatic Piezometer Plots
East Abutment
TH01-04



Stantec

Vibrating Wire Piezometers Plots
East Abutment
TH02-01



Stantec