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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/Stony Plain, Site NC036 – Highway 22:32 Lazy "S" 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 standpipe (BH20-01a) and one slope inclinometer (BH20-01). The site plan is shown on **Figure 1** attached. The instruments were read by Mahendran Senthooran, M.Eng., EIT and Akintola Fakinlede, M.Sc., Engineering Technologist on May 4, 2022.

The slope inclinometer (SI) was 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. Standpipe piezometers (SP) were read with a Heron Instruments water tape.

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 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 NC036-1** and the attachments.

The groundwater levels from SP readings are plotted in the attachments, summarized in **Table NC036-2** and in the following sections.

2.2 ZONES OF MOVEMENT

No new zones of movement were observed in the operational SI. Directions of movement are referenced to the azimuth of the A+ groove in the SI casing.

2.3 MONITORING RESULTS

SLOPE INCLINOMETER

BH20-01 showed about 5 mm of movement at approximate 5.5 m depth since Spring 2021, corresponding to a rate of movement of 6 mm/yr, which is similar to Spring 2021 rate of movement.

Reference: **North Central Region, Edson/Stony Plain, Site NC036 – Highway 22:32 Lazy "S" Slide, Spring 2022 Instrumentation Monitoring Report**

2.3.2 PIEZOMETERS

Piezometric levels in **BH20-01a** decreased about 0.3 m since the Spring 2021 measurement and has been decreasing since initialization.

3.0 RECOMMENDATIONS

3.1 FUTURE WORK

The instruments at NC36 should be read again during the Spring 2023 reading cycle.

3.2 INSTRUMENTATION REPAIRS

No instruments require repair at this site.

Reference: **North Central Region, Edson/Stony Plain, Site NC036 – Highway 22:32 Lazy "S" Slide, Spring 2022 Instrumentation Monitoring Report**

Table NC036-1: Spring 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							
SI1	Sept. 1, 2006	-	-	122 mm over 2.2 m to 4.2 m depth in 353^0 direction	28 Sept. 2009	Non-Operational	Sept 17, 2015	Confirmed destroyed after 2016 slope remediation construction. SI casing cannot be found		
SI2	Sept. 1, 2006	-	-	160 over 3.2 m to 5.8 m depth in 348^0 direction	144 Sept. 2016	Non-Operational	Sept. 8, 2017	Confirmed blocked at 2.0 m below top of casing in 2019		
SI20-01	June 19, 2020	5969774	622175	15 over 3.9 m to 5.9 m depth at 345º	21.2 Sept 2020	Operational	July 4, 2021	5	6	<1

Note:
(1) Updated May 4, 2022, with approximate accuracy of ± 3 m

Reference: **North Central Region, Edson/Stony Plain, Site NC036 – Highway 22:32 Lazy "S" Slide, Spring 2022 Instrumentation Monitoring Report**

Table NC036-2: Spring 2022 Standpipe Piezometer Reading Summary

Instrument Name	Date Initialized	Coordinates (1) (UTM 11U, NAD1983) (m)		Bottom Depth (m)	Current Status	Maximum Water Level (mbgs)	Measured Water Level (Spring 2022) (mbgs)	Previous Water Level (Spring 2021) (mbgs)	Change in Water Level (m)
		Northing	Easting						
SP1	Sept. 1, 2006	-	-	6.3	Non-operational	0.5 in Sept. 2018	Could not be found in Spring 2019		
SP2	Sept. 1, 2006	-	-	4.58	Non-operational	1.77 in May 2008	Confirmed destroyed after 2016 slope remediation construction		
SP3	Sept. 1, 2006	-	-	9.59	Non-operational	3.21 in May 2008			
SP20-01	June 19, 2020	5969768	662176	6.1	Operational	0.7 in June 2020	1.9	1.6	- 0.3

Note:
(1) Updated May 4, 2022, with approximate accuracy of ± 3 m.

Reference: **North Central Region, Edson/Stony Plain, Site NC036 – Highway 22:32 Lazy "S" Slide, Spring 2022 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.

PROFESSIONAL ENGINEER ALBERTA
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2022-06-12
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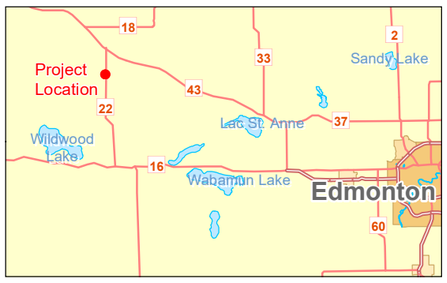
Attachment:
Figure 1 – Borehole Location Plan
BH20-01 Slope Inclinometer Plots
Standpipe Piezometer Level Depth vs Time Plot

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
- Non-operational Instrument
- Approximate Culvert Alignment
- Ground Elevation Contours (m AMSL, LiDAR Nov. 3, 2014)

0 15 30 metres
(At original document size of 11x17)
1:700

N

Notes
1. Coordinate System: NAD 1983 UTM Zone 11N
2. Data Sources: Geogratis, ©Department of Natural Resources Canada, All rights reserved.
3. Background: © 2020 Microsoft Corporation © 2020 Maxar ©CNES (2020) Distribution Airbus DS

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Project Location
Hwy 22
Lac Ste. Anne County, Alberta

Prepared by MK on 2020-07-03
Quality Review by LC on 2020-07-06
Independent Review by CM on 2020-07-08

Client/Project
Alberta Transportation
NC036 Lazy "S" Slide

123315222

Figure No.
1

Title
Borehole Location Plan

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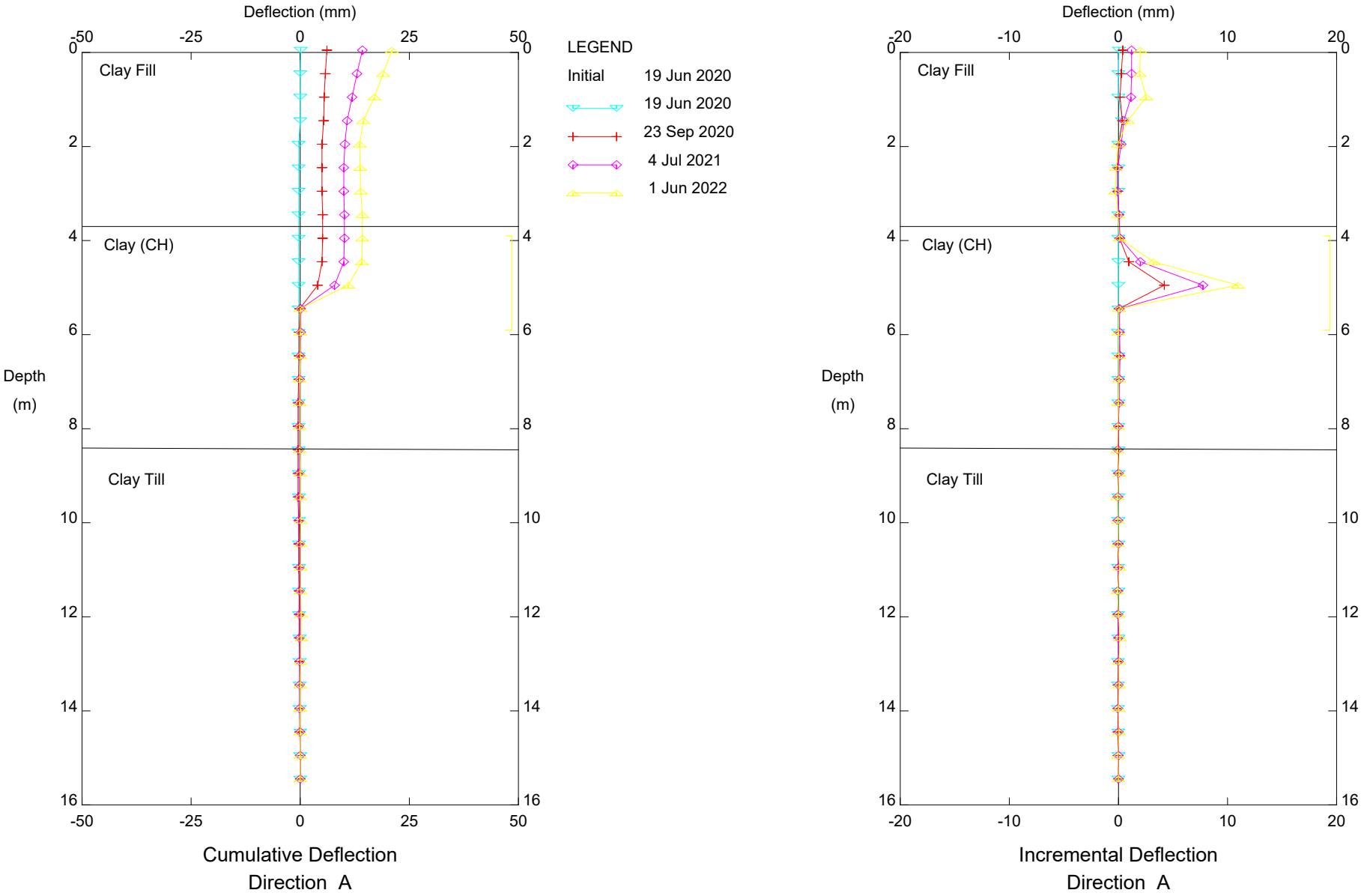

NC036, Inclinometer SI20-01

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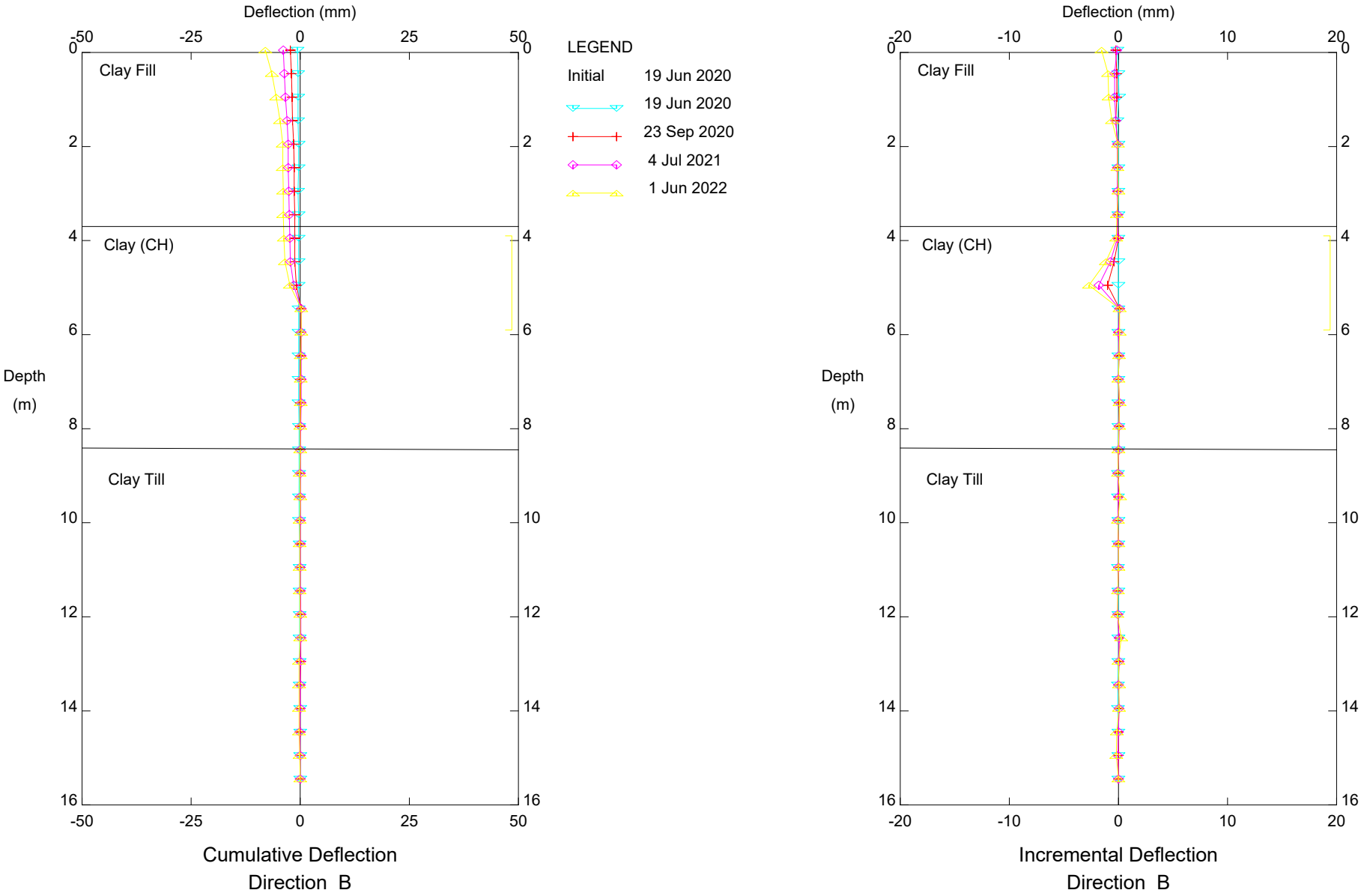

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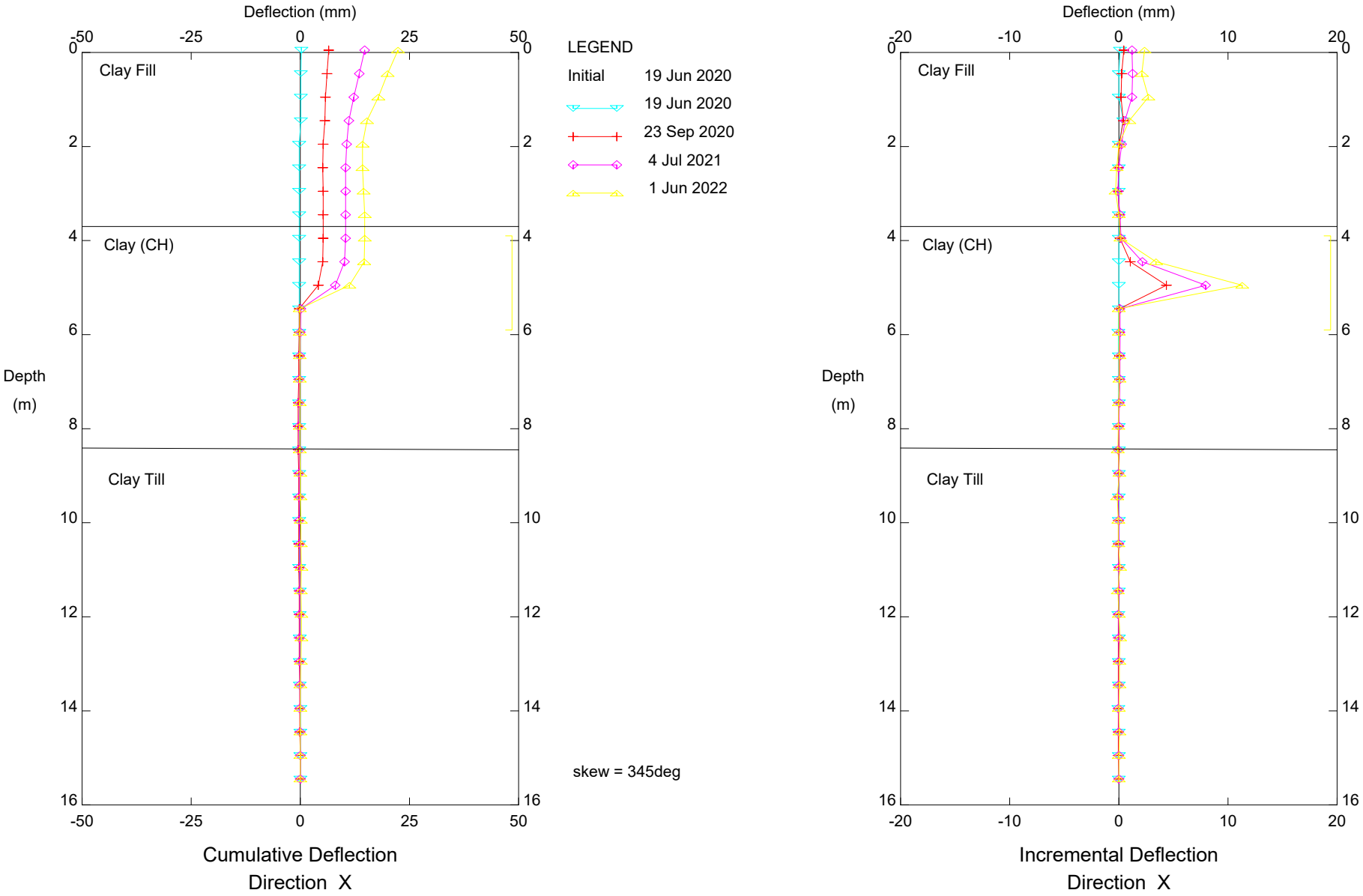

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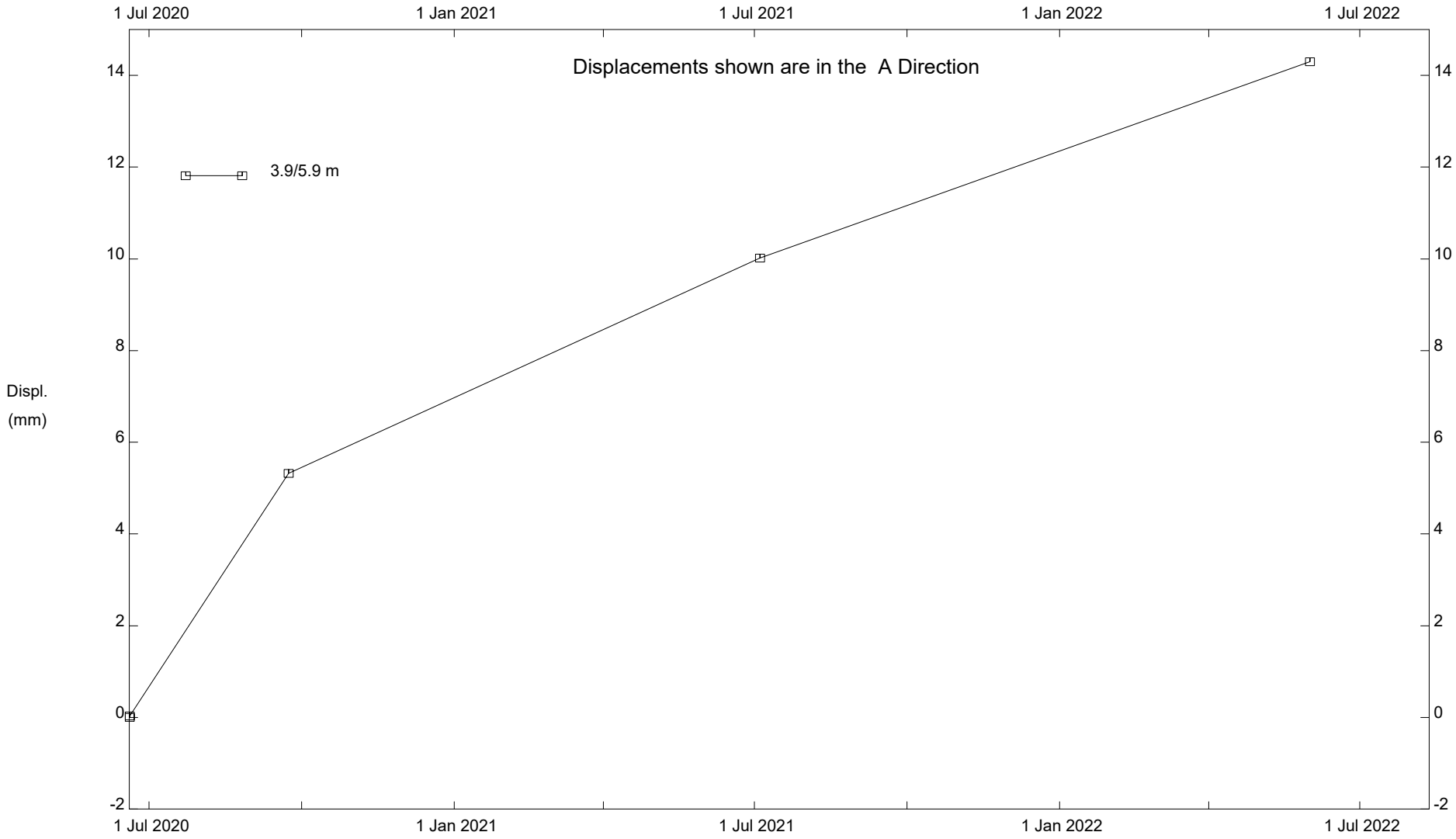

NC036, Inclinometer SI20-01

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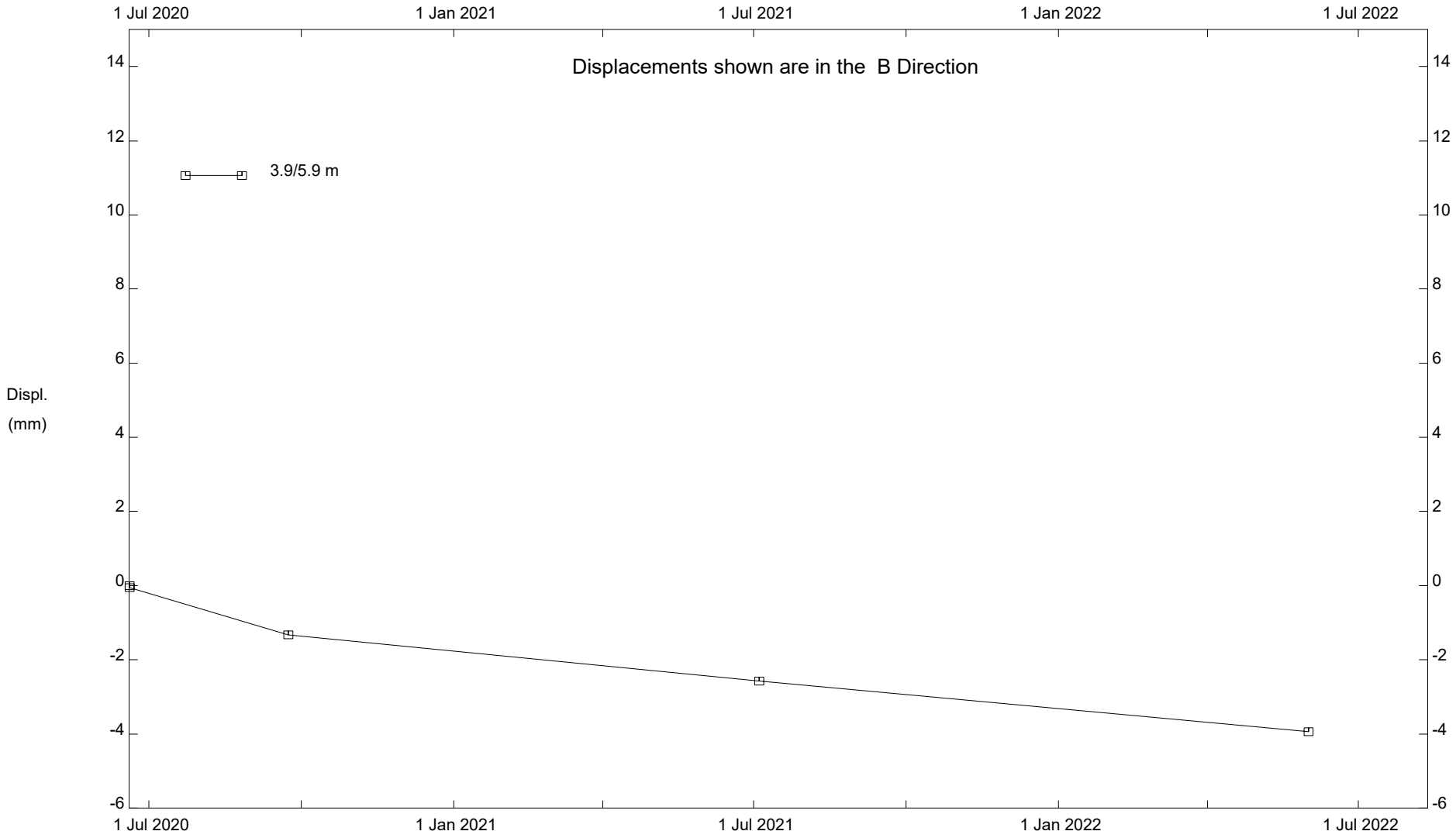

NC036, Inclinometer SI20-01

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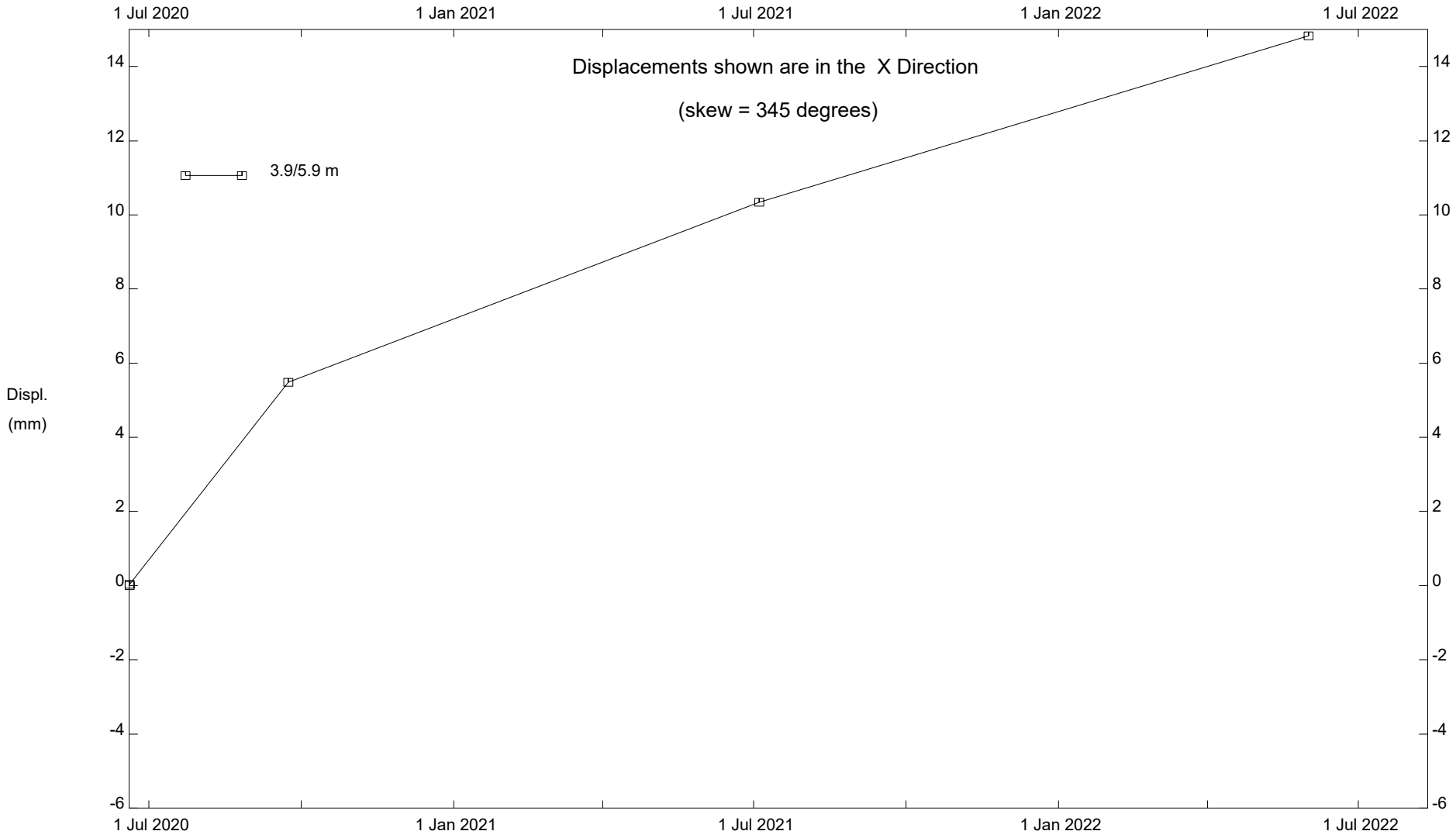
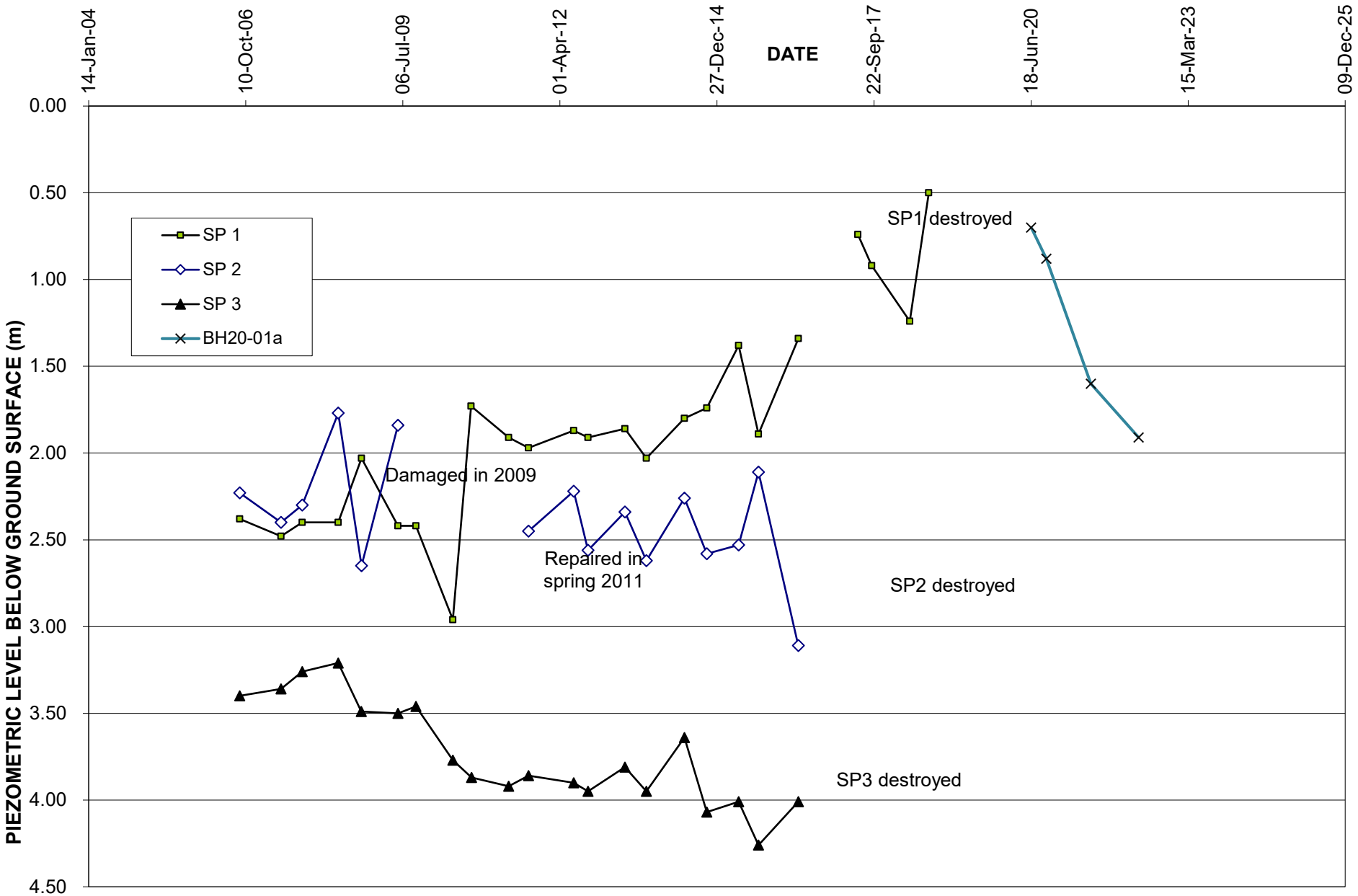


NC036, Inclinometer SI20-01

SPRING 2022

STANDPIPE PIEZOMETER DATA
NC036: HWY 22:32, Lazy "S"

123315222



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