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Memo

To:	Amy Driessen Alberta Transportation	From:	Leslie Cho and Xiteng Liu Stantec Consulting Ltd.
File:	123315222	Date:	June 2, 2022

Reference: North Central Region, Edson, Site NC080 - Highway 47:06 Fickle Creek Slide, Spring 2022 Instrumentation Monitoring Report

1.0 OBSERVATIONS

1.1 FIELD PROGRAM AND INSTRUMENTATION STATUS

The Spring 2022 reading cycle consisted of instrument readings on one slope inclinometer (SI13-01) and two pneumatic piezometers (PN13-01 and PN13-02). **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 3, 2022.

The slope inclinometers (SI) were measured using an RST MEMS digital inclinometer probe with 0.5 m increments and RST handheld PC. The pneumatic piezometers (PN) were read with an RST C109 readout box.

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

2.0 INTERPRETATION

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 are provided in **Table NC80-1** and the attachments.

The PN groundwater level results are summarized in **Table NC80-2** and in the following sections with resulting plots attached.

2.2 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 NC80-1**.

Reference: **North Central Region, Edson, Site NC080 - Highway 47:06 Fickle Creek Slide, Spring 2022 Instrumentation Monitoring Report**

2.3 INSTRUMENTATION READINGS

2.3.1 Slope Inclinometers

SI13-01 had an average movement rate of approximately 8 mm/yr between 1.8 m to 3.8 m depth since the completion of pile wall installation near the end of 2013. The current rate of movement is less than 1 mm/yr which is similar to Spring 2021 readings.

2.3.2 Piezometers

The groundwater level in **PN13-01** increased by 0.5 m compared to the previous Spring 2021 reading. **PN13-02** also showed an increase in piezometric level by 0.3 m. The current piezometric level is at 1.6 m and 5.8 m below ground surface in **PN13-01** and **PN13-02**, respectively.

3.0 RECOMMENDATIONS

FUTURE WORK

It is recommended that the next reading cycle take place in Spring 2023.

3.1 INSTRUMENTATION REPAIRS

No instruments require repair at this time.

Reference: **North Central Region, Edson, Site NC080 - Highway 47:06 Fickle Creek Slide, Spring 2022 Instrumentation Monitoring Report**

Table NC80-1: 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							
SI13-01	Aug. 28, 2013	5918626	522508	148 over 1.8 m to 3.8 m depth in 349^0 direction	540 on Oct. 2013 (during construction); 57 on Sept. 2017 (post construction)	Operational	June 29, 2021	<1	<1	<1
(1) Updated May 3, 2022, with approximate accuracy of ± 3 m										

Table NC80-2: Spring 2022 Piezometer Reading Summary

Instrument Name	Date Initialized	Coordinates (1) (UTM 11U, NAD1983) (m)		Bottom/Tip Elevation (m)	Current Status	Maximum Piezometric Level (m bgs)	Measured Water Level, (May 03, 2022) (m bgs) (Elevation)	Previous Water Level, (Spring 2021) (m bgs) (Elevation)	Change in Water Level (m)
		Northing	Easting						
PN13-1 (34189)	Aug. 23, 2013	5918636	522511	951.6	Operational	-1.2 (953.8) June 2017	1.6 (953.1 m bgs)	2.1 (952.6 m bgs)	0.5
PN13-2 (34190)	Aug. 23, 2013	5918636	522511	948.0	Operational	3.8 (949.2) June 2017	5.8 (948.9 m bgs)	6.1 (948.6 m bgs)	0.3
(1) Updated May 3, 2022, with approximate accuracy of ± 3 m.									

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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.

2022-06-02
ID# 139079

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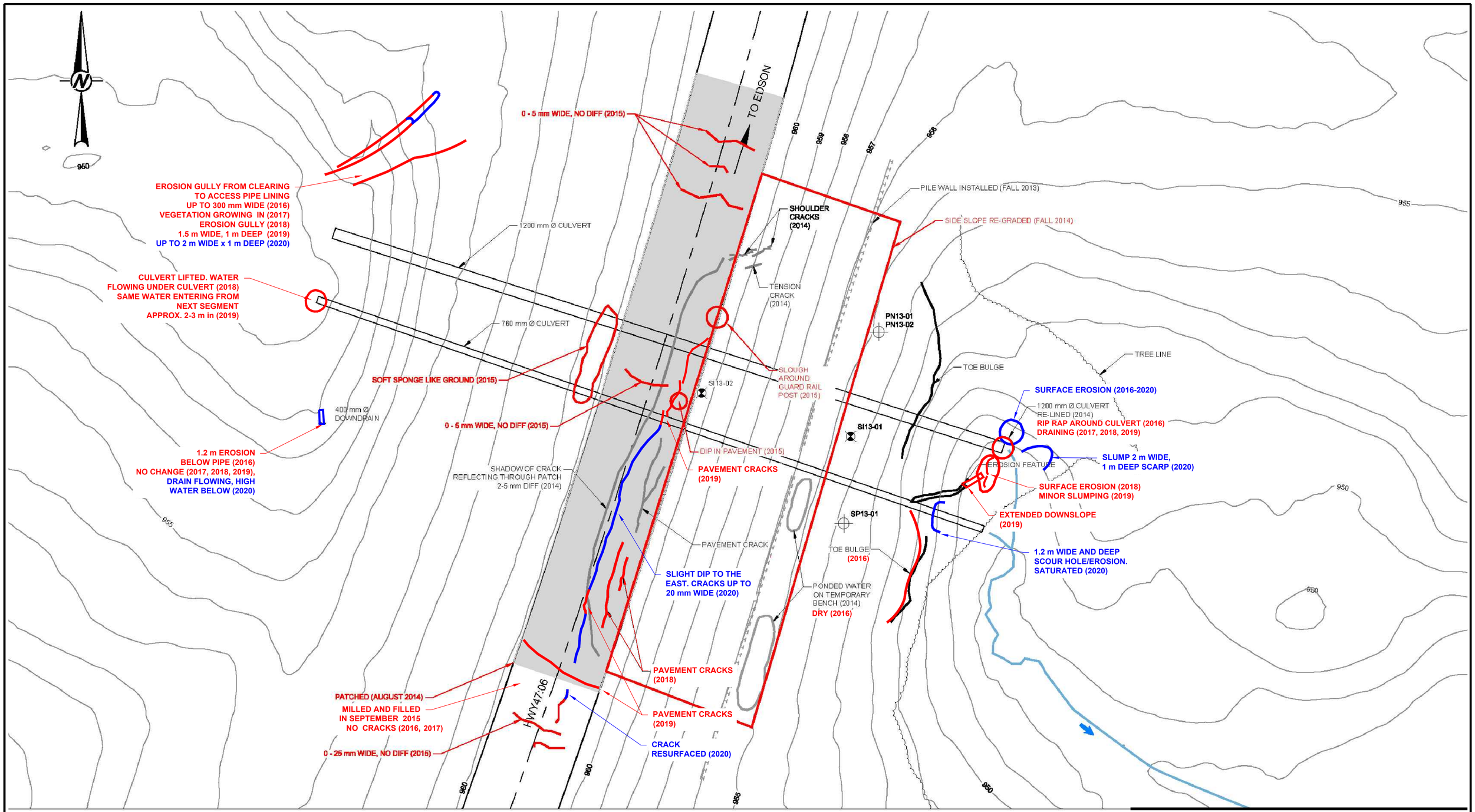
Attachment:
Figure 1 – Site Plan
SI13-01 Slope Inclinometer Plots
Pneumatic Piezometer Elevation vs. Time Plot
Pneumatic Piezometer Depth vs Time Plot

PERMIT TO PRACTICE
STANTEC CONSULTING LTD.
Signature _____ ID 78675
Date 2022-06-02
PERMIT NUMBER: P 0258
The Association of Professional Engineers and Geoscientists of Alberta



LEGEND

- FLOW ARROW
- CONTOUR (5 m INTERVAL)
- WATER COURSE
- PIEZOMETER LOCATIONS
- SLOPE INCLINOMETER LOCATIONS
- DRIVEN STEEL PILE

NOTES

1. FEATURE LOCATIONS ARE APPROXIMATE.
2. PREVIOUS OBSERVATIONS SHOWN IN BLACK.
3. 2015-19 OBSERVATIONS SHOWN IN RED
4. 2020 OBSERVATIONS SHOWN IN BLUE

REFERENCE

LIDAR CONTOURS OBTAINED FROM CLIENT.

SCALE 0 8 16 24 METRES

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STANTEC CONSULTING
400-10220 103 AVENUE NW
EDMONTON, ALBERTA, CANADA
T5J 05A

ALBERTA TRANSPORTATION
GEOHAZARD MONITORING PROGRAM
NC80 FICKLE CREEK SLIDE SITE PLAN

DRAWN WW / MK	CHECK XL	APPROVE LC
DATE 19 JUN. 2020	SCALE AS SHOWN	PROJECT # 123312435

FIGURE - 1 -

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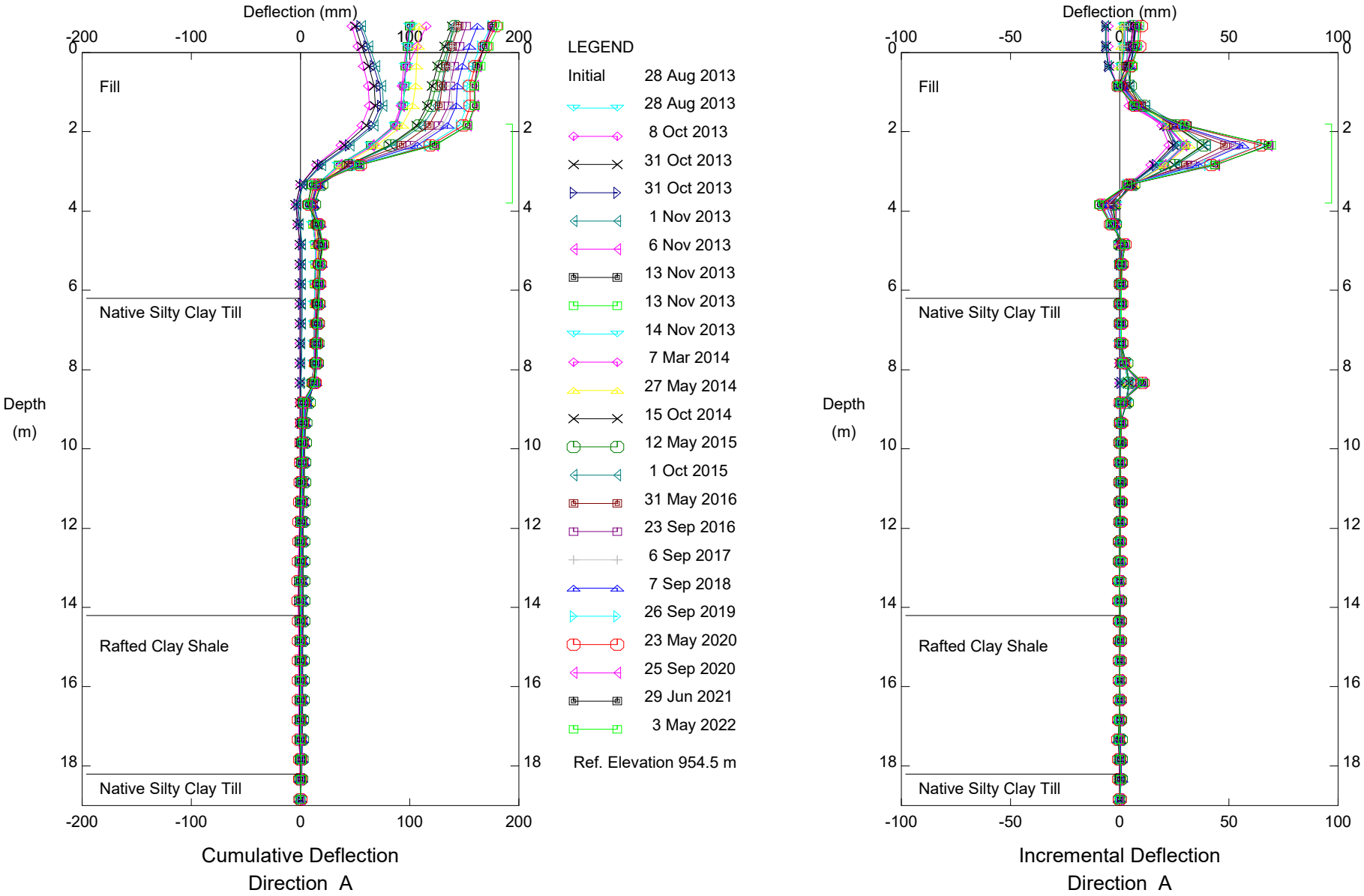

HWY 47:06 Fickle Creek Slide (NC080), Inclinometer SI13-01

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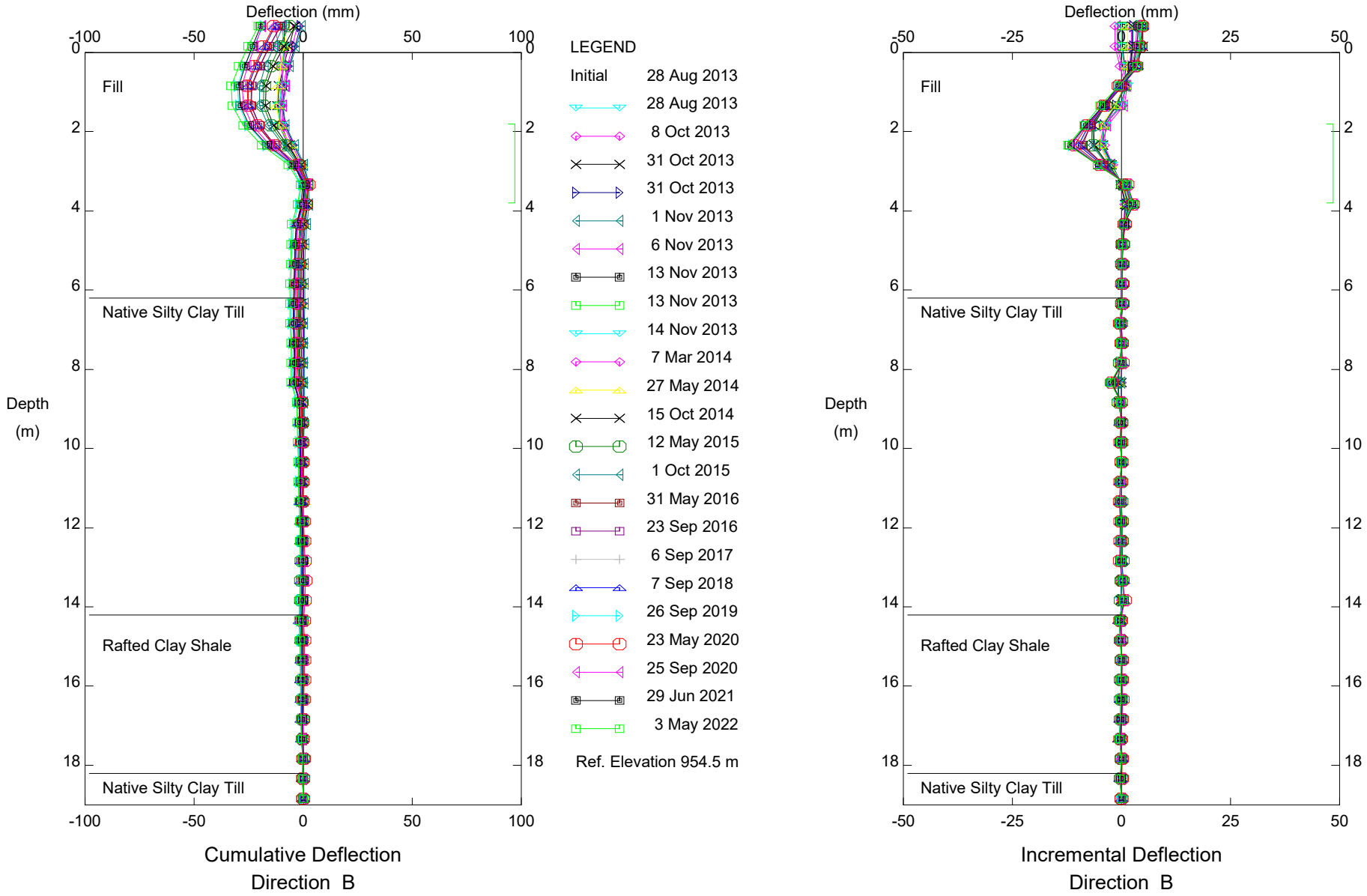

HWY 47:06 Fickle Creek Slide (NC080), Inclinometer SI13-01

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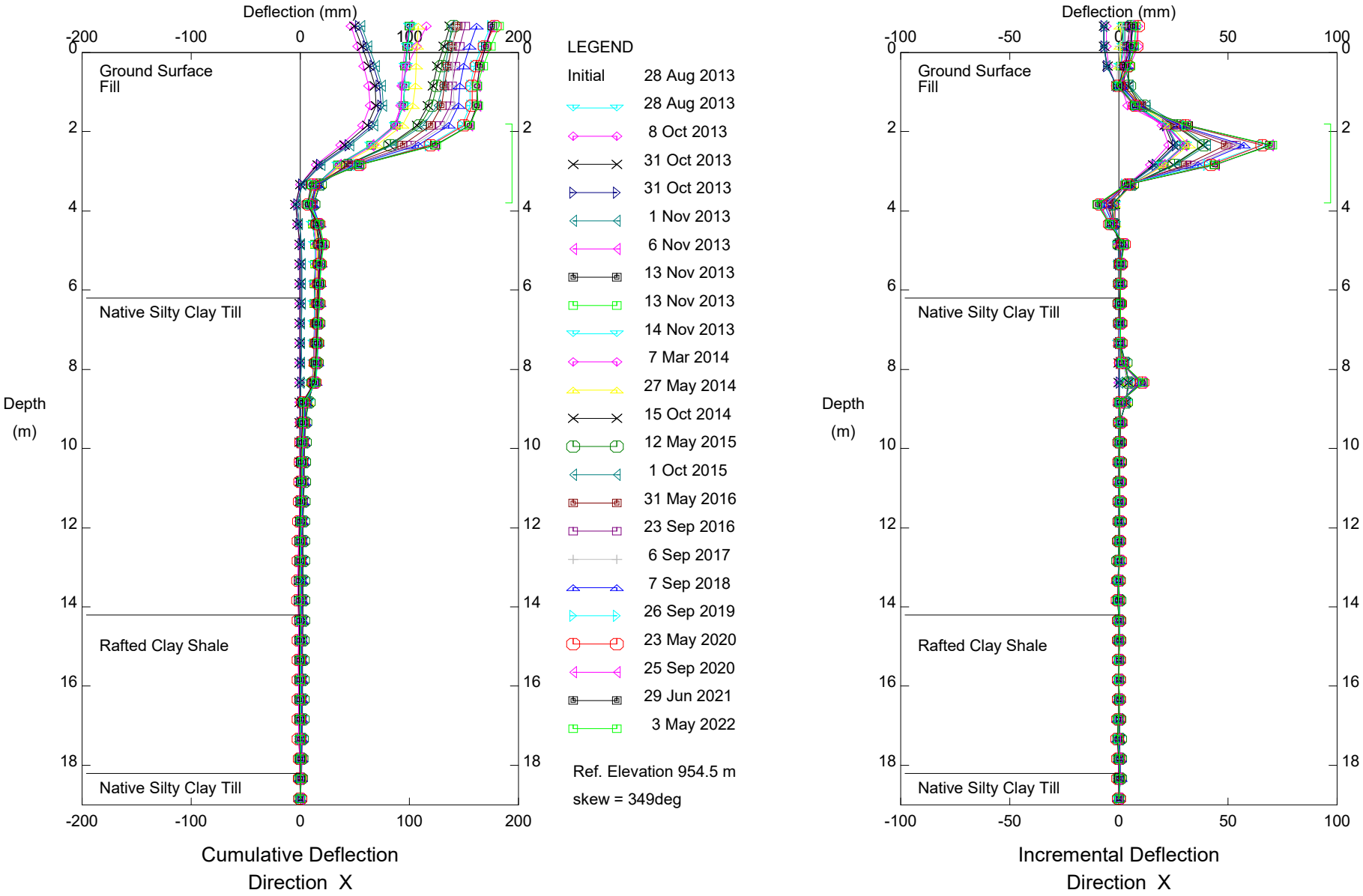

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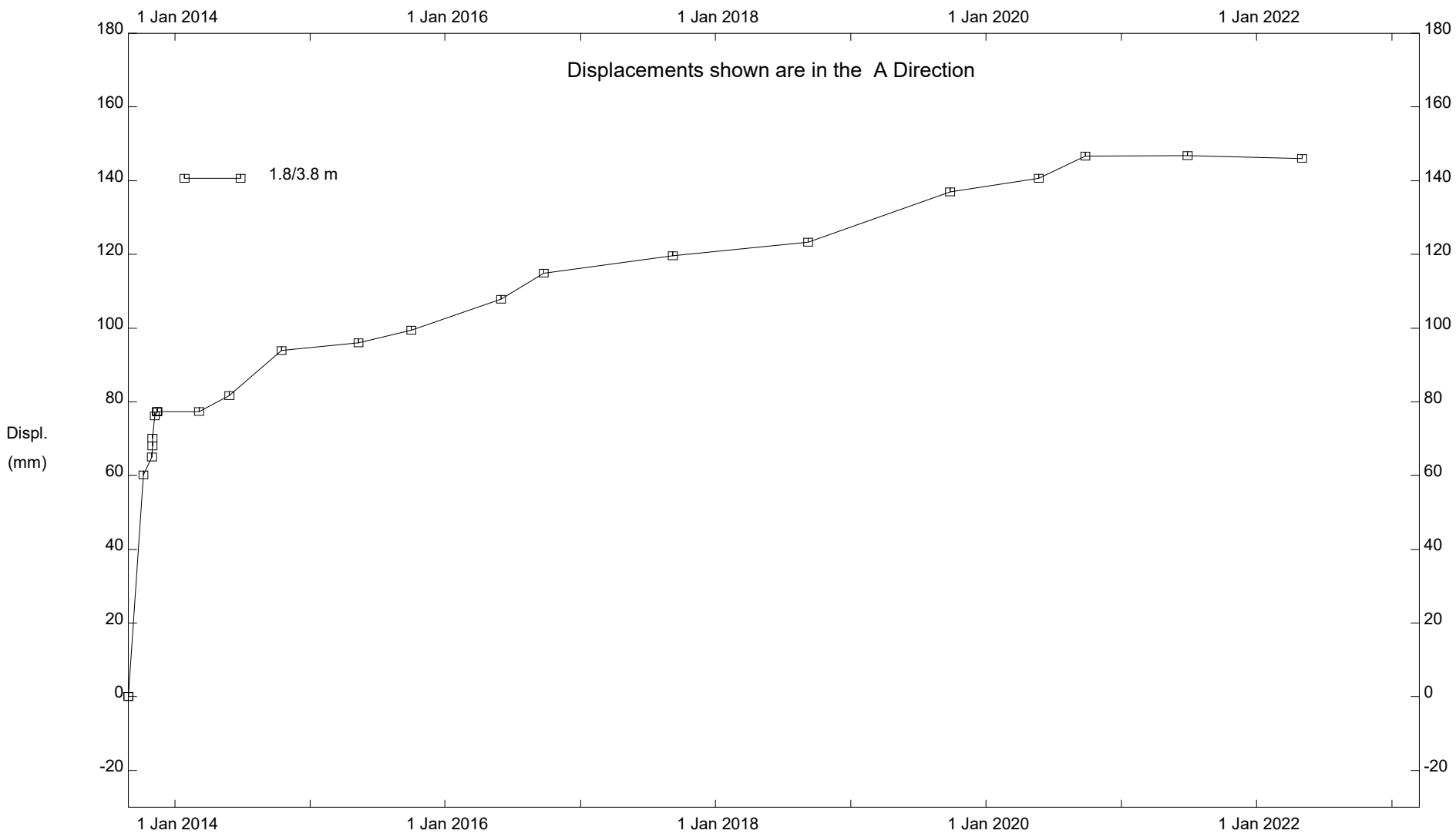

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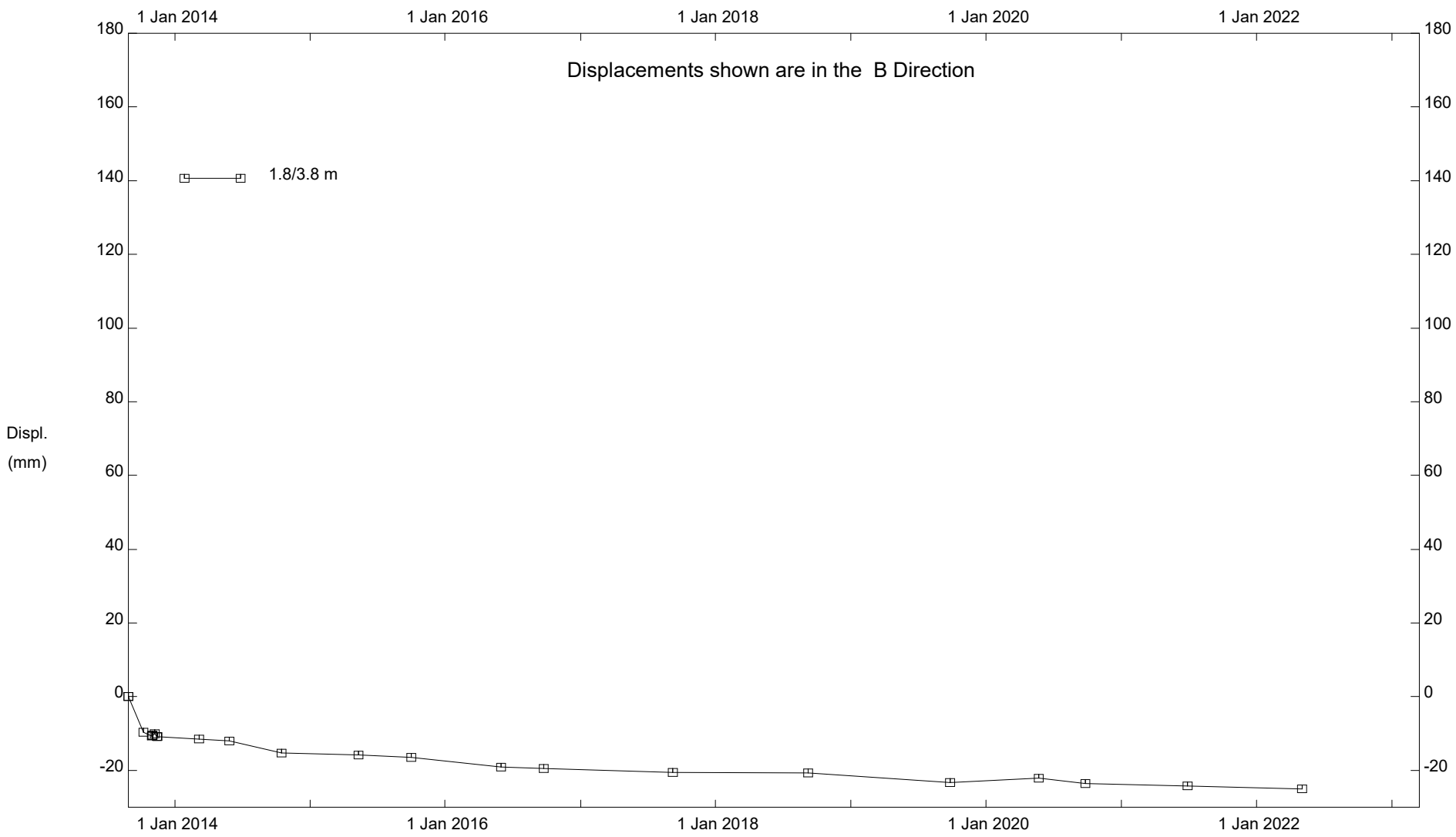

HWY 47:06 Fickle Creek Slide (NC080), Inclinometer SI13-01

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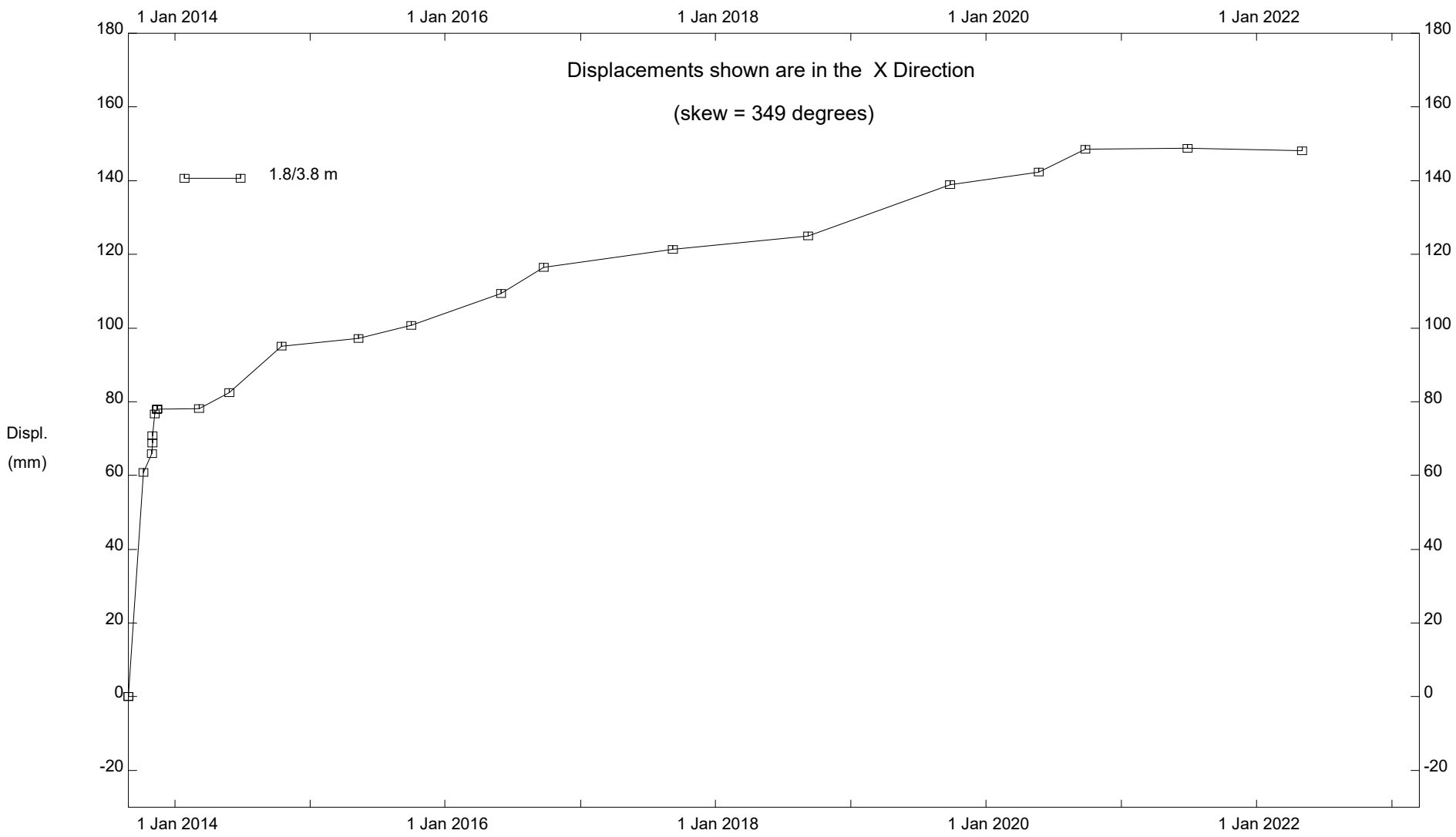

HWY 47:06 Fickle Creek Slide (NC080), Inclinometer SI13-01

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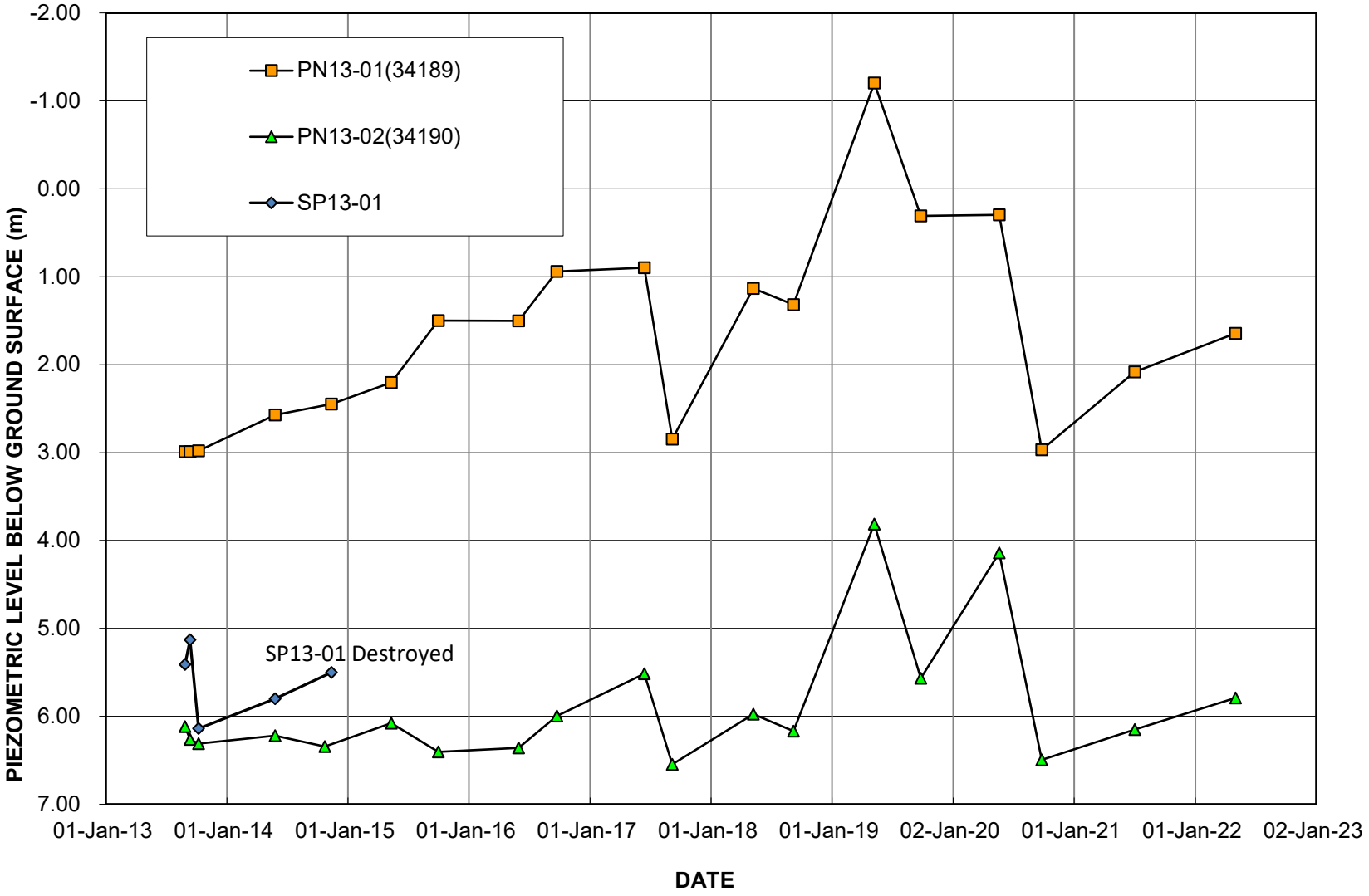
PIEZOMETRIC DATA (Post Construction)
NC080: HWY 47:06 Fickle Creek Slide



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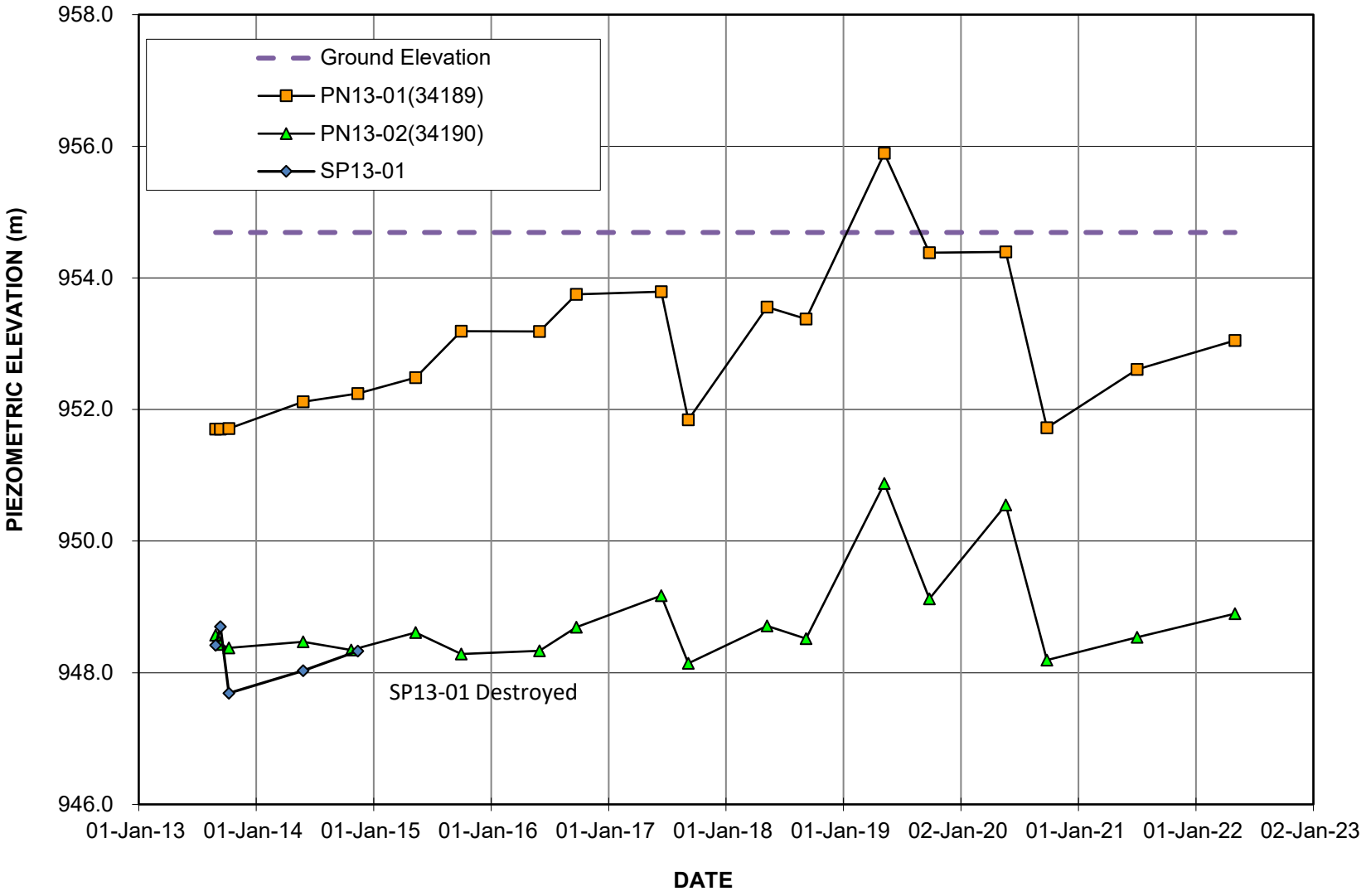
PIEZOMETRIC DATA (Post Construction)
NC080: HWY 47:06 Fickle Creek Slide



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