



TECHNICAL MEMORANDUM

DATE June 1, 2023

Project No. 20138294

TO Vanessa Heilman, P.Eng.
City of Saskatoon

CC Greg Misfeldt (WSP)

FROM Blaise Wilson, Hung Vu

EMAIL blaise.wilson@wsp.com;
hung.vu@wsp.com

NUTANA SLOPE INSTABILITY UPDATE – MAY 2023

This memorandum presents monitoring data for the slope failures (referred to as the west slide and east slide) at the Nutana Slope Instability site. Locations of survey pins are shown in Figure 1. Locations of slope inclinometers, piezometers, settlement points, crack meters, and tilt plates are shown in Figure 2. Locations of the Saskatoon Light & Power (SL&P) tilt plates and survey pins installed on power poles are shown in Figure 3.

The west slide occurred in June 2012 and impacted a slope area approximately 70 m (230 ft) long and 40 m (130 ft) wide. It is most pronounced in the back yards of 229, 231, 233/235, and 237/239 11th Street East, through the back alley, and into the back yard of 222 Saskatchewan Crescent East.

The east slide occurred in June 2013 and impacted a slope area of approximately 50 m (165 ft) long and 30 m (100 ft) wide. It is most pronounced in the back yards of 303, 305, 307, and 309 11th Street East, through the back alley, and into the back yard of 306, 310 and 316 Saskatchewan Crescent East.

The monitoring results and photographs from this monitoring period are attached. A summary of the monitoring results is provided below.

Survey Pin Data:

- Monitoring of the survey pins at the site was not performed during this monitoring period.

Slope Inclinometer Data:

- Inclinometers COS-13-002, COS-13-004, and 20-111 indicated insignificant movement (less than 2 mm or 0.08 in), between September 28, 2022 and May 23, 2023.
- Inclinometer COS-13-005 indicated insignificant movement (less than 2 mm or 0.08 in) between September 28, 2022 and May 25, 2023.
- Inclinometer 20-109 indicated approximately 2 mm (0.08 in) of cumulative downslope movement between September 28, 2022 and May 23, 2023. This inclinometer plot showed a drift in direction parallel with the Cherry Lane similar to what was observed in 2022.

Vibrating Wire (VW) & Standpipe Piezometer Data:

- Piezometers were monitored by the City of Saskatoon during this period and are not presented in this memorandum.

Tilt Plate Data:

- The results of tilt plate monitoring are shown on Figure 4 for the City of Saskatoon tilt plates, and in Figure 5 for the tilt plates installed on SL&P power poles.
- Tilt plates TP4, TP5, TP6, and TP7 indicate insignificant changes in angle of tilt (less than 0.05 degrees) between September 28, 2022 and May 23, 2023.
- Tilt plate SLP3 indicated a change in angle of tilt of approximately 0.34 degrees, towards the north, between September 28, 2022 and May 23, 2023.
- Tilt plate SLP4 indicated an insignificant change in angle of tilt (less than 0.05 degrees) between September 28, 2022 and May 25, 2023.
- Tilt plates SLP5 and SLP6 indicated insignificant changes in angle of tilt (less than 0.05 degrees) between September 28, 2022 and May 23, 2023.

Crack Meter Data:

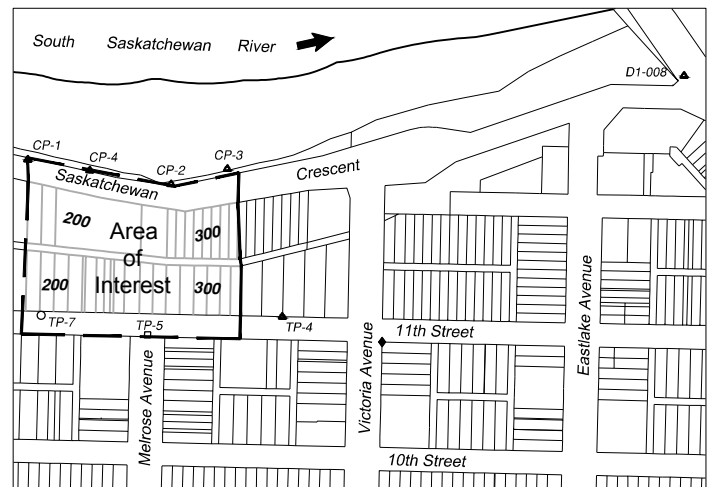
- Crack meters were not read during this monitoring period.

Settlement Points:

- Settlement points were not read during this monitoring period

[https://golderassociates.sharepoint.com/sites/122189/project files/5 technical work/reports/7. may 2023/20138294 - nutana monitoring data update memo_may2023.docx](https://golderassociates.sharepoint.com/sites/122189/project%20files/5%20technical%20work/reports/7.%20may%202023/20138294%20-%20nutana%20monitoring%20data%20update%20memo_may2023.docx)

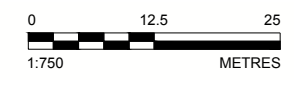
Path: \\g:\sask\proj\2013\294\Phase 1000\02_PRODUCT\DRAWING\ - File Name: 20130829-FG001_Monitoring.dwg | Last Edited By: cvincent | Date: 2023-05-30 Time: 1:54:08 PM | Printed By: CVincent | Date: 2023-05-30 Time: 1:54:37 PM



CONTROL POINTS				
COORDINATE TABLE NAD 83 (CSRS)				UTM ZONE 13
POINT	NORTHING (m)	EASTING (m)	ORTHOMETRIC ELEVATION (m) HTv2.0	DESCRIPTION
CP-1	5,775,701.84	385,897.84	477.97	24" REBAR WITH PLASTIC CAP
CP-2	5,775,680.32	386,022.25	478.99	24" REBAR WITH PLASTIC CAP
CP-3	5,775,693.72	386,071.10	479.49	24" REBAR WITH PLASTIC CAP
CP-4	5,775,692.40	385,951.67	477.95	GPS CONTROL POINT
TP-4	5,775,565.50	386,118.76	499.32	X IN CONCRETE
TP-5	5,775,549.79	386,001.87	498.05	X IN NORTH RIM CATCH BASIN
TP-7	5,775,566.48	385,909.52	491.32	X IN SOUTH RIM MANHOLE
TP-8	5,775,560.37	385,809.26	484.62	X IN WEST RIM MANHOLE
D1-008	5,775,775.85	386,467.62	499.033	CONTROL TABLET

LEGEND	
	TILT PLATE LOCATION
	POWER POLE LOCATION
	LOT NUMBER
	VECTOR OF TILT OF POLES (MAY 5, 2015)

REFERENCE(S)
 LOT LOCATIONS PROVIDED BY CITY OF SASKATOON
 CITY OF SASKATOON DATUM



CLIENT

PROJECT
 NUTANA SLOPE INSTABILITY

TITLE
 INSTRUMENTATION LOCATION PLAN No. 3

	CONSULTANT	YYYY-MM-DD	2020-06-02
	DESIGNED		BW
	PREPARED		JMC
	REVIEWED		
	APPROVED		

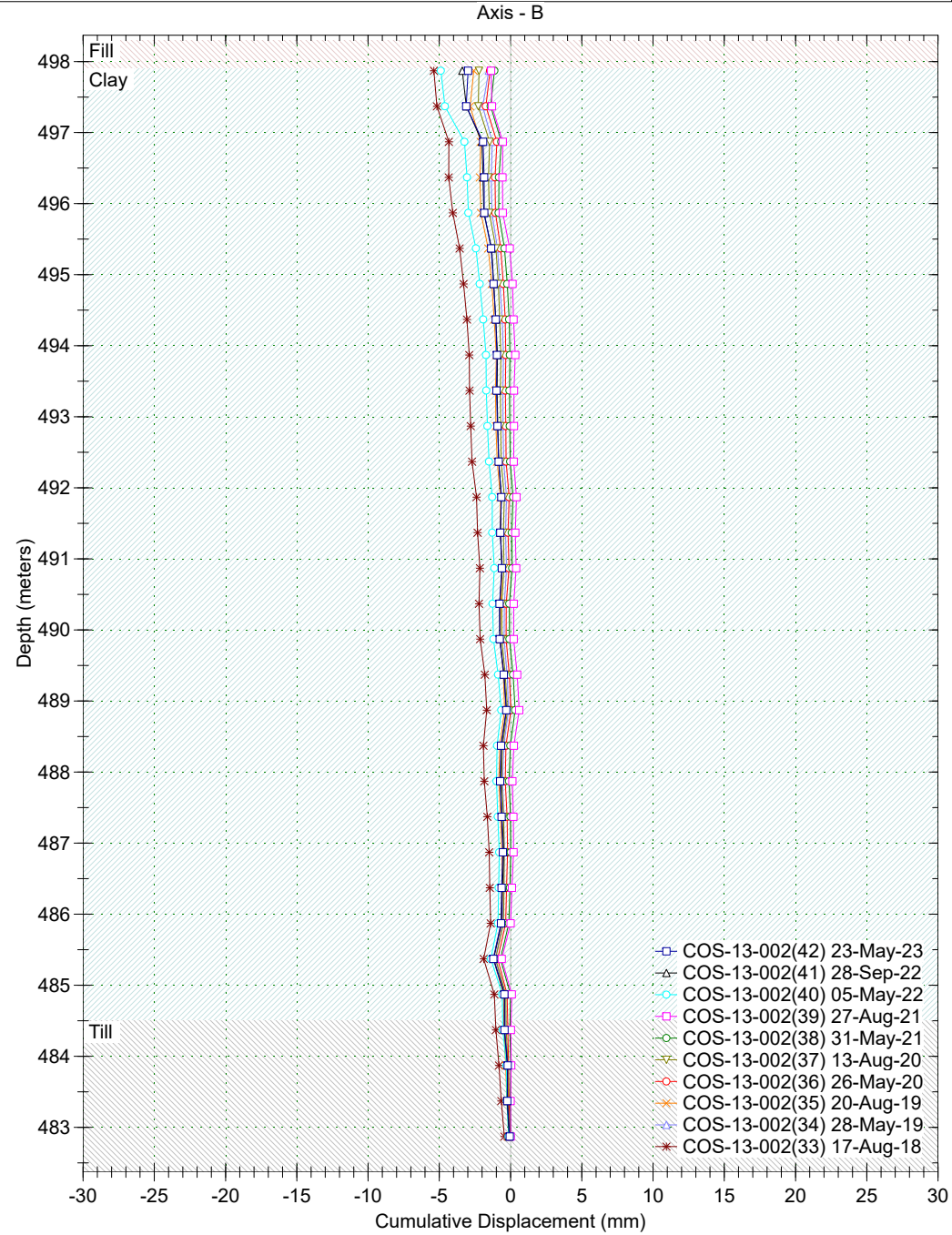
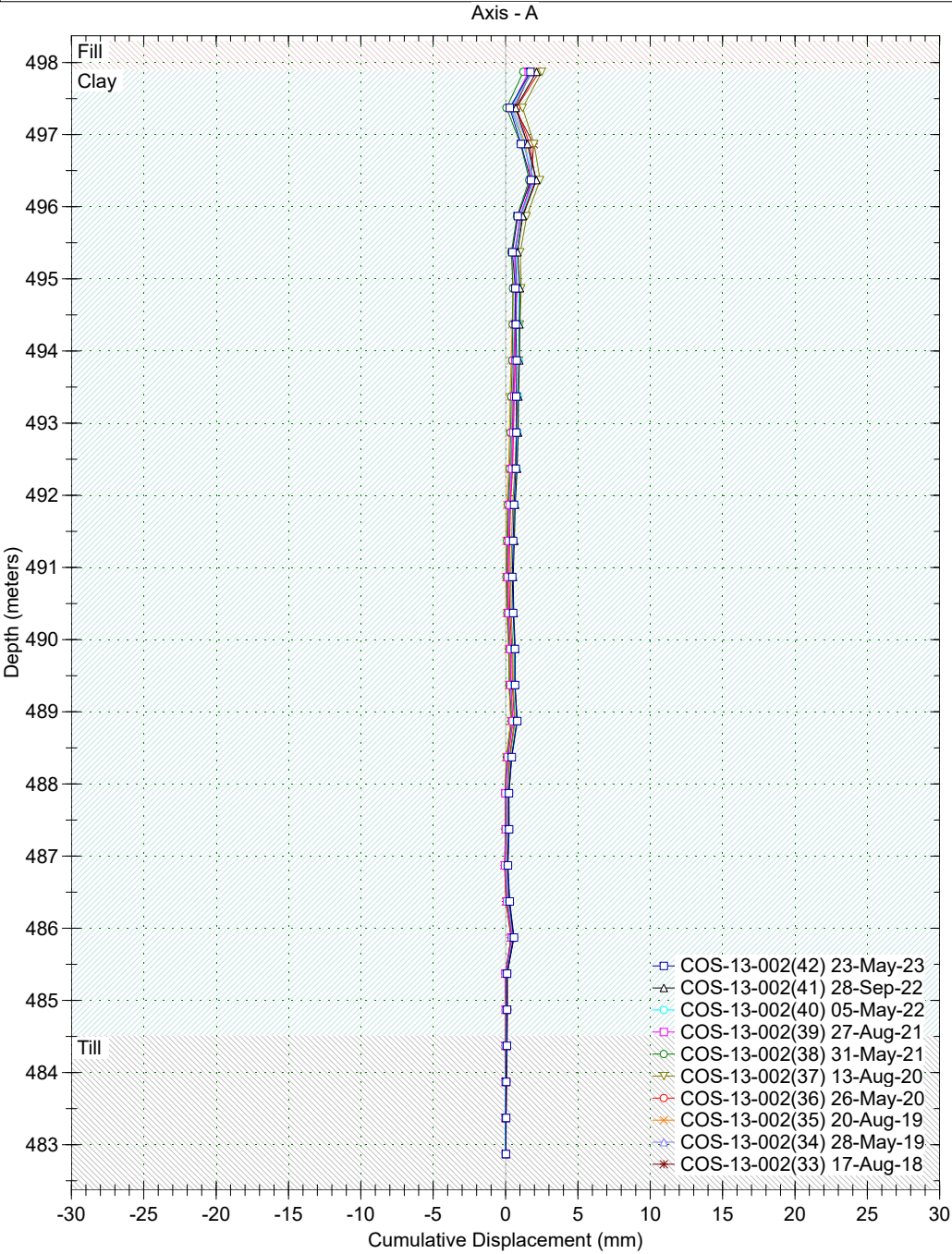
PROJECT NO. 20138294 PHASE 1000 REV. A FIGURE 3

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANS/B

SLOPE INCLINOMETERS

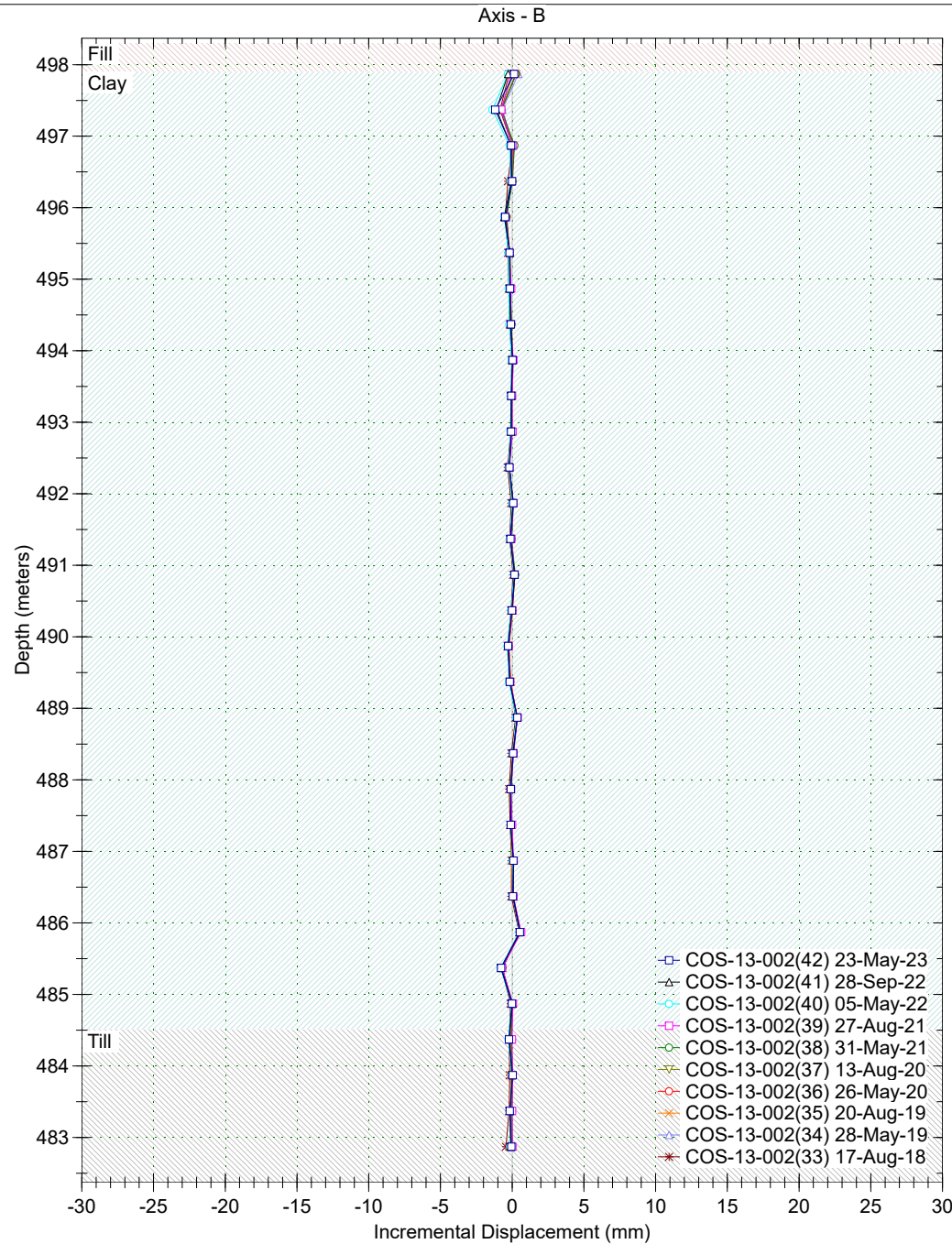
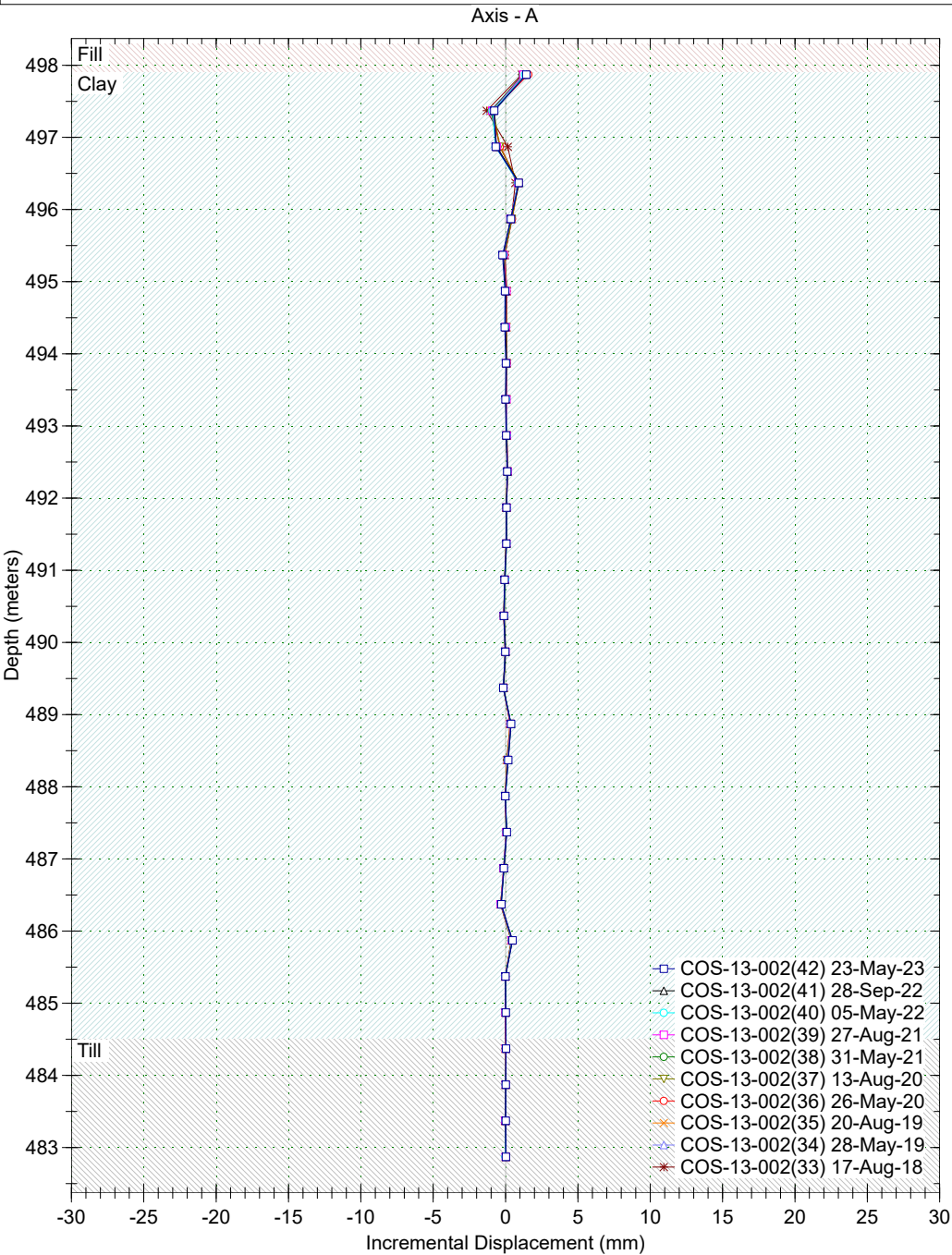
Borehole : COS-13-002
 Project : Nutana Slope
 Location : 307 11th St. E. (Front)
 Northing : 5775567.41
 Easting : 386043.54
 Collar : -0.113

Spiral Correction : N/A
 Collar Elevation : :498.37 meters
 Reading Depth : 15.5 meters
 A+ Groove Azimuth :
 Base Reading : 2013 Jul 30 16:18
 Applied Azimuth : 0.0 degrees



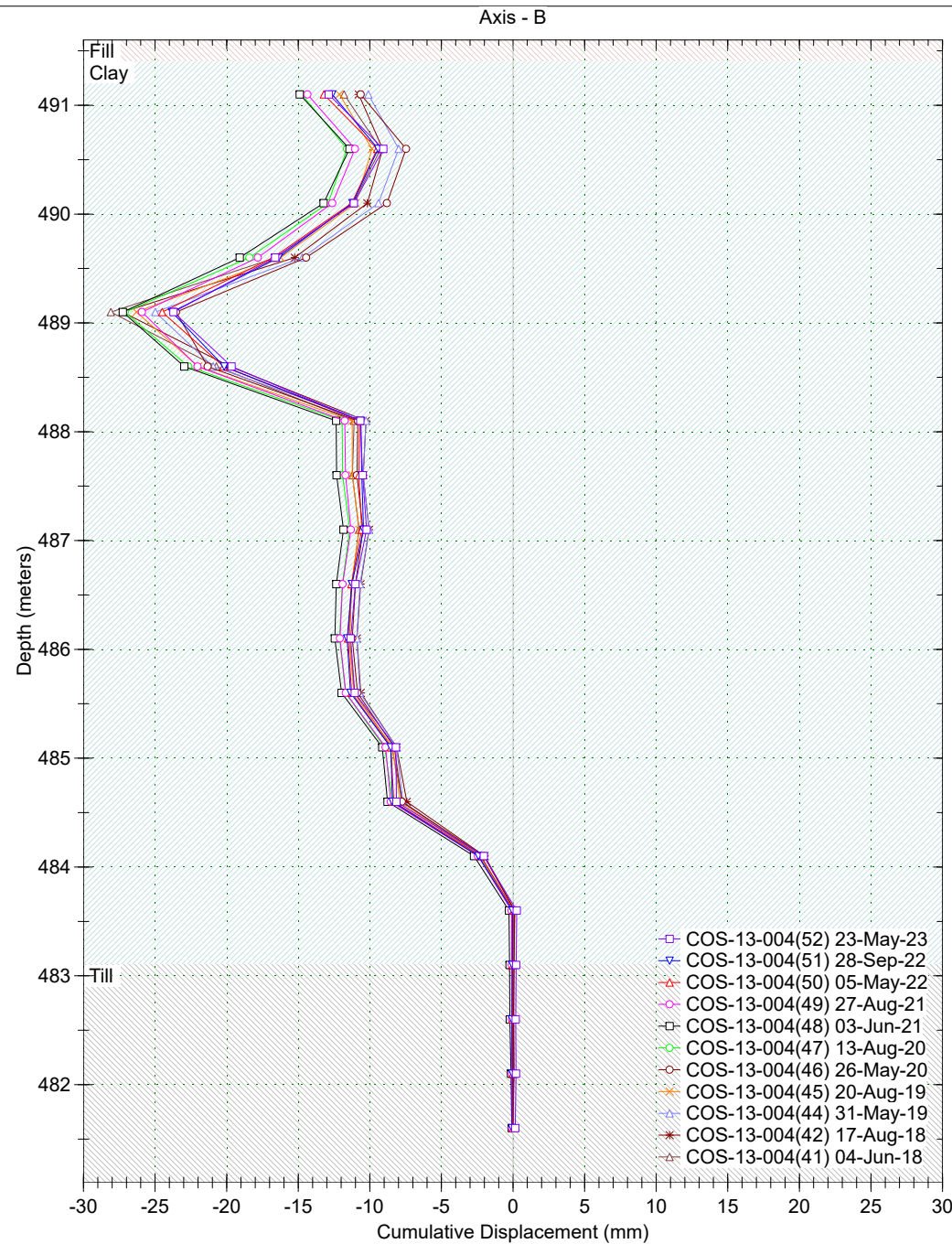
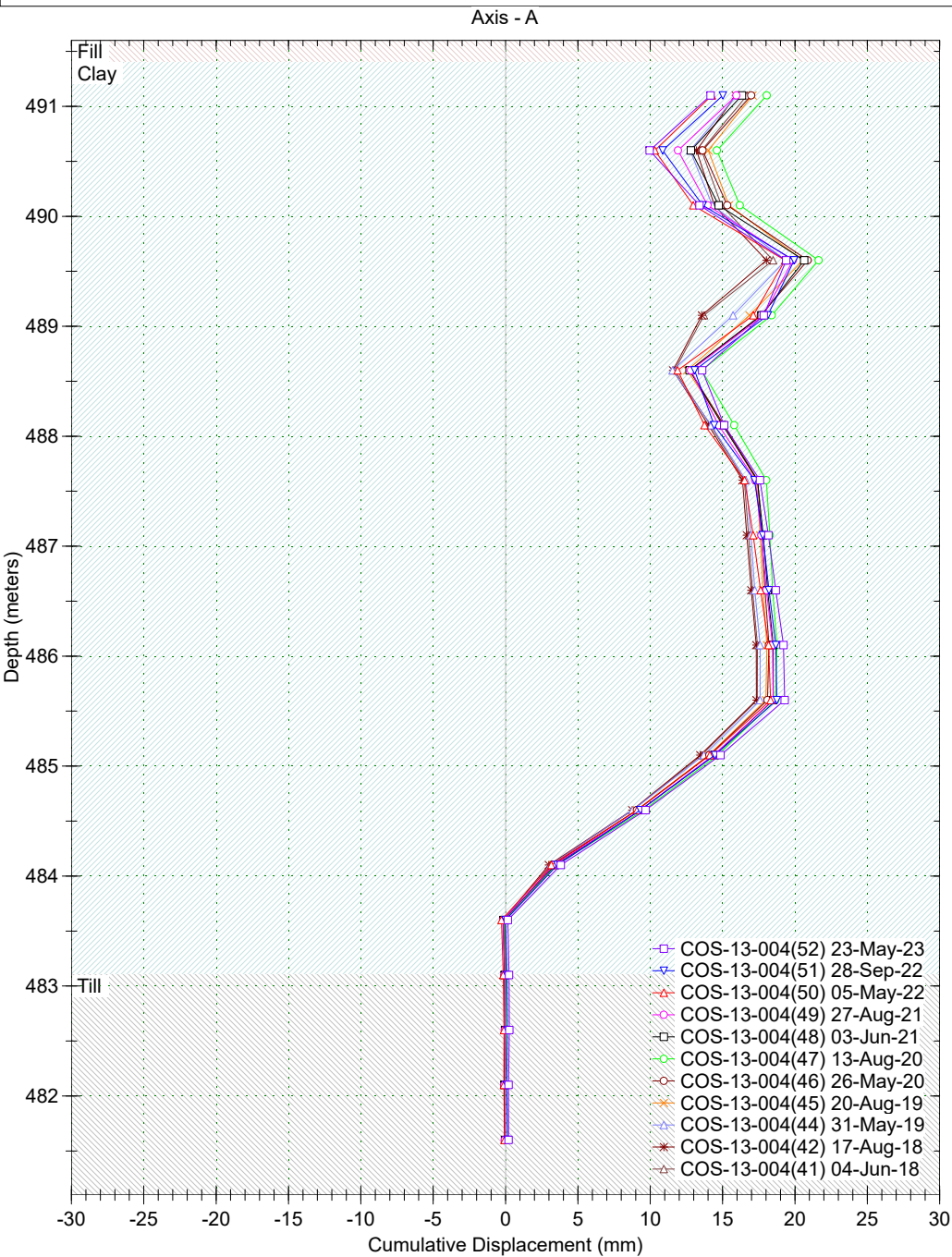
Borehole : COS-13-002
Project : Nutana Slope
Location : 307 11th St. E. (Front)
Northing : 5775567.41
Easting : 386043.54
Collar : -0.113

Spiral Correction : N/A
Collar Elevation : :498.37 meters
Reading Depth : 15.5 meters
A+ Groove Azimuth :
Base Reading : 2013 Jul 30 16:18
Applied Azimuth : 0.0 degrees



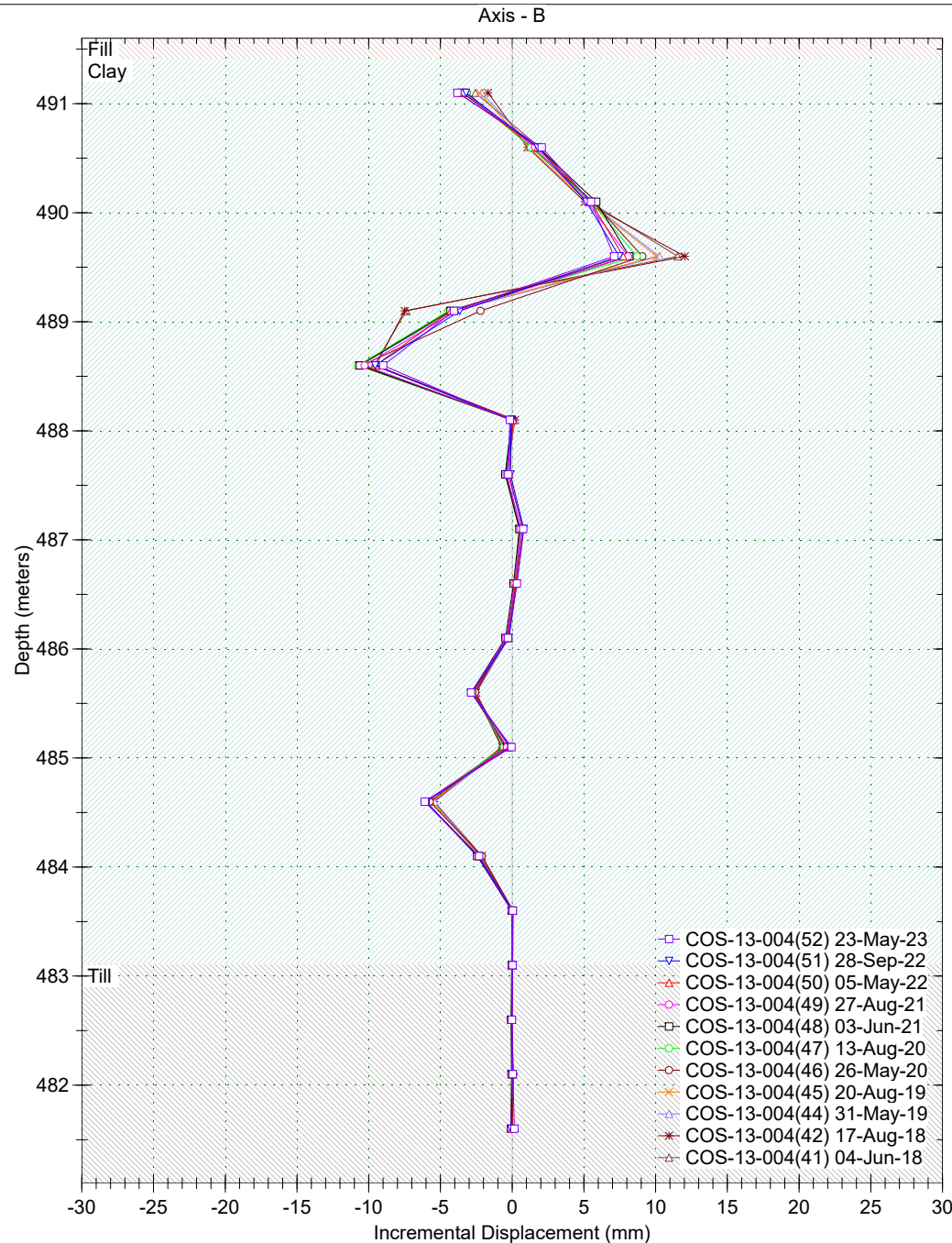
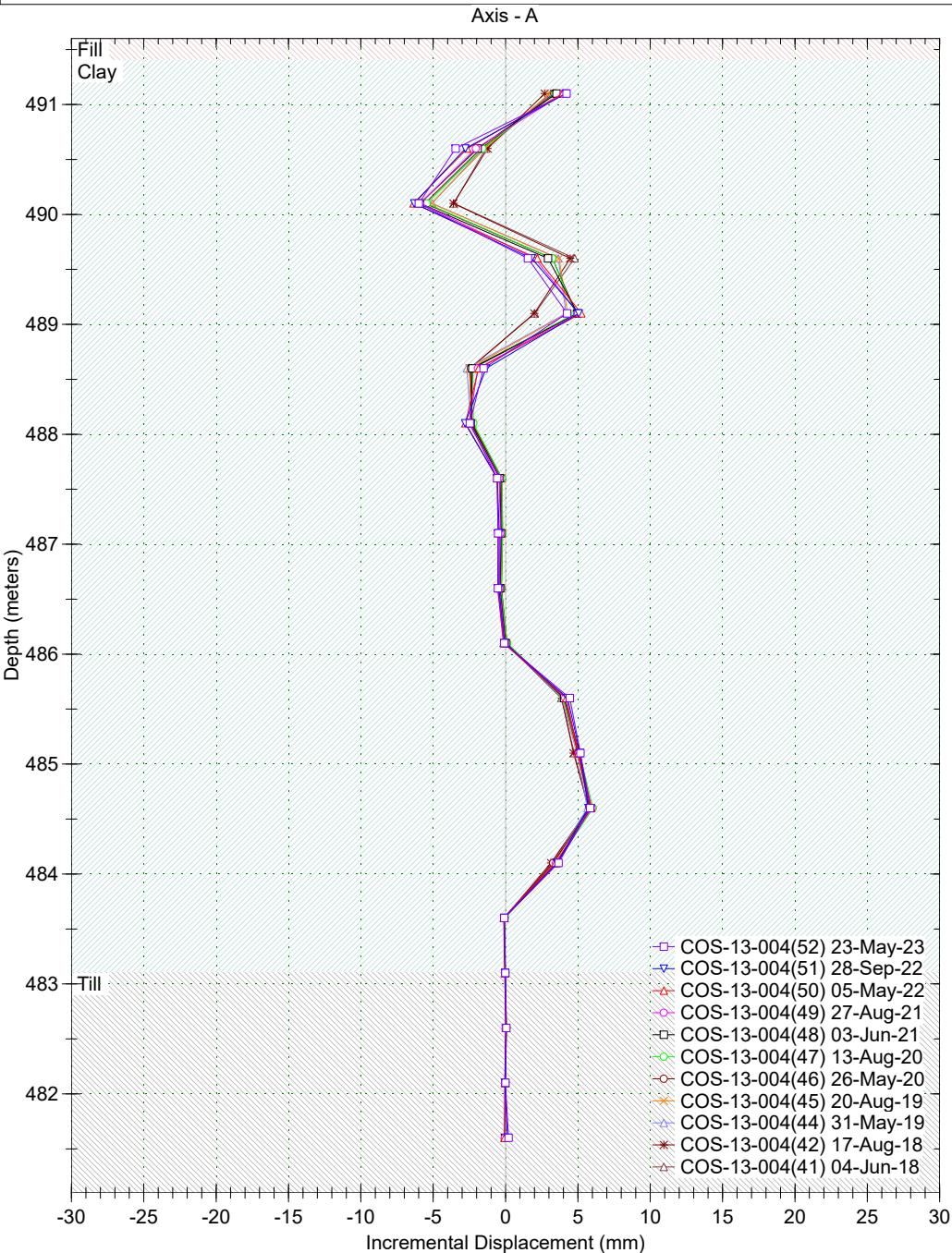
Borehole : COS-13-004
 Project : Nutana Slope
 Location : 307 11th. St. E. (back)
 Northing : 5775604.97
 Easting : 386050.63
 Collar : -0.677

Spiral Correction : N/A
 Collar Elevation : :491.60 meters
 Reading Depth : 10.0 meters
 A+ Groove Azimuth :
 Base Reading : 2013 Aug 28 08:30
 Applied Azimuth : 0.0 degrees



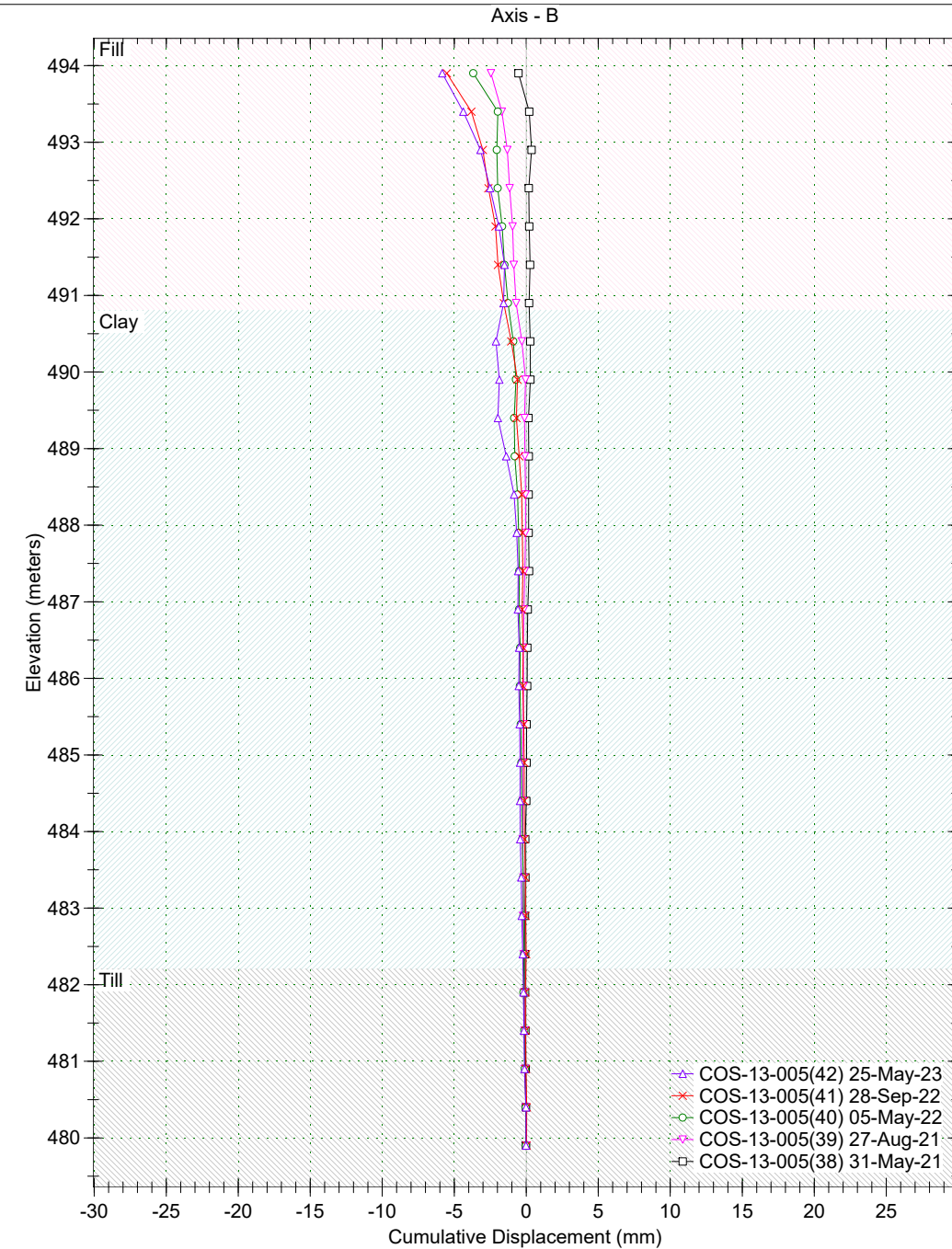
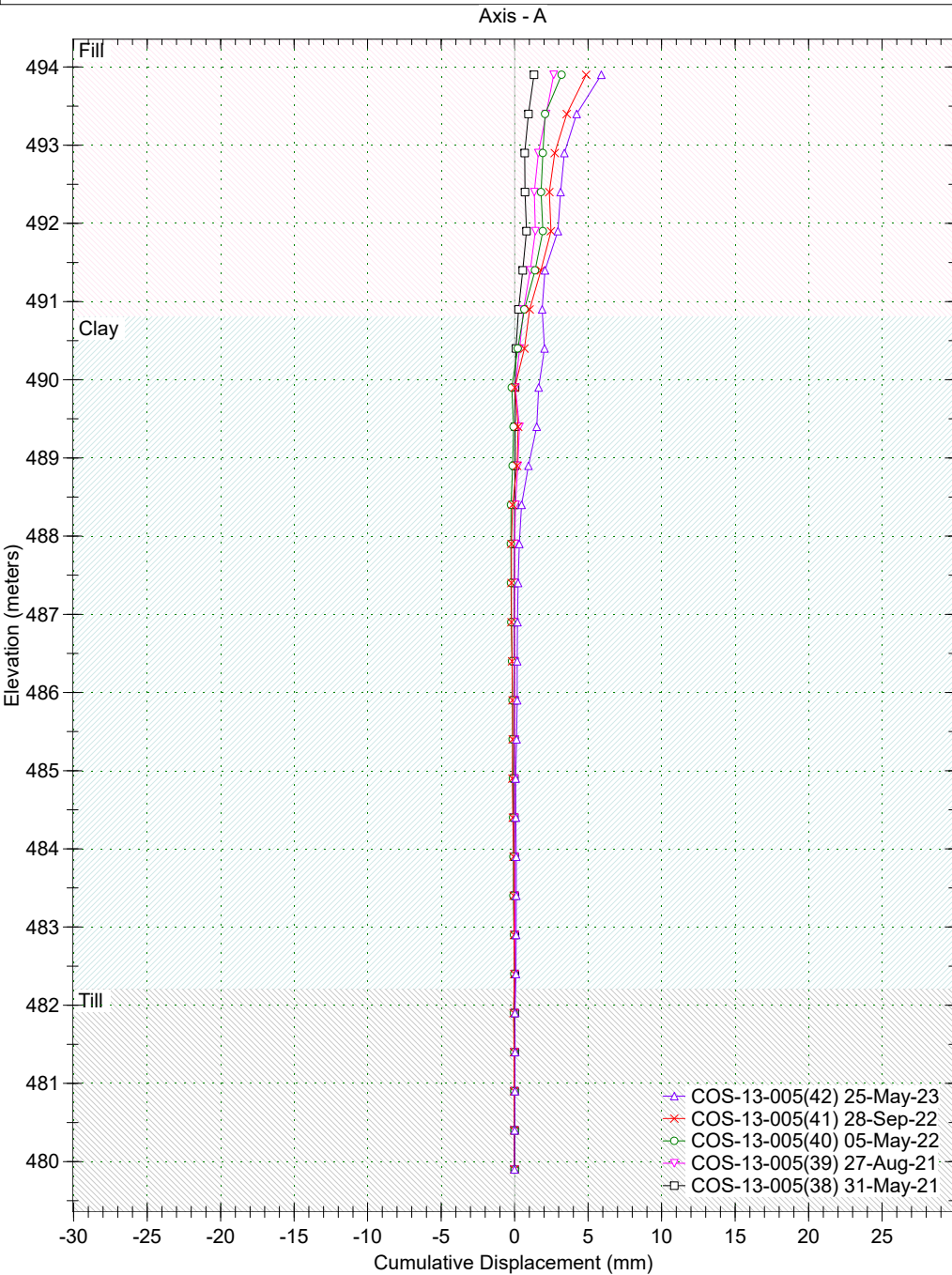
Borehole : COS-13-004
 Project : Nutana Slope
 Location : 307 11th. St. E. (back)
 Northing : 5775604.97
 Easting : 386050.63
 Collar : -0.677

Spiral Correction : N/A
 Collar Elevation : :491.60 meters
 Reading Depth : 10.0 meters
 A+ Groove Azimuth :
 Base Reading : 2013 Aug 28 08:30
 Applied Azimuth : 0.0 degrees



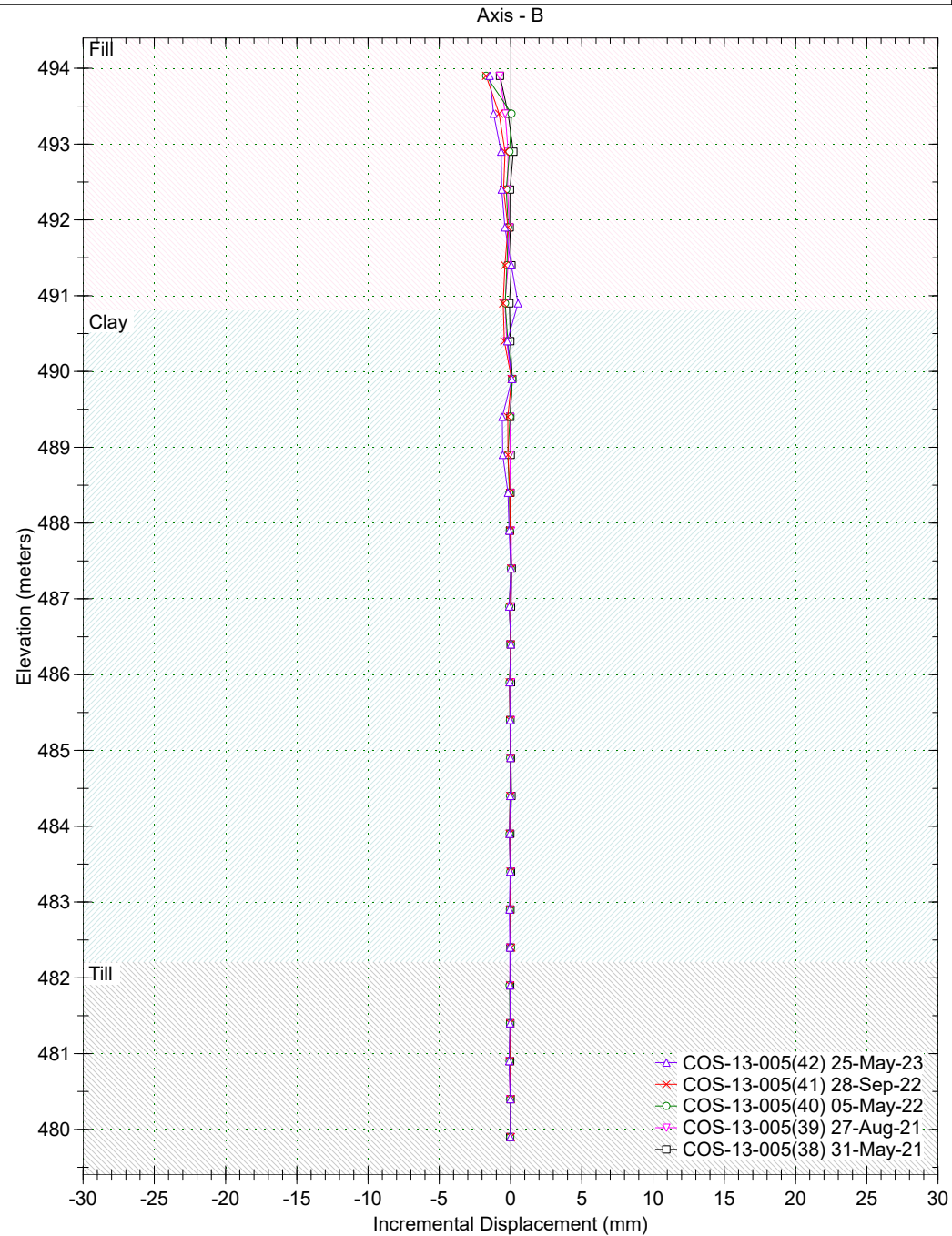
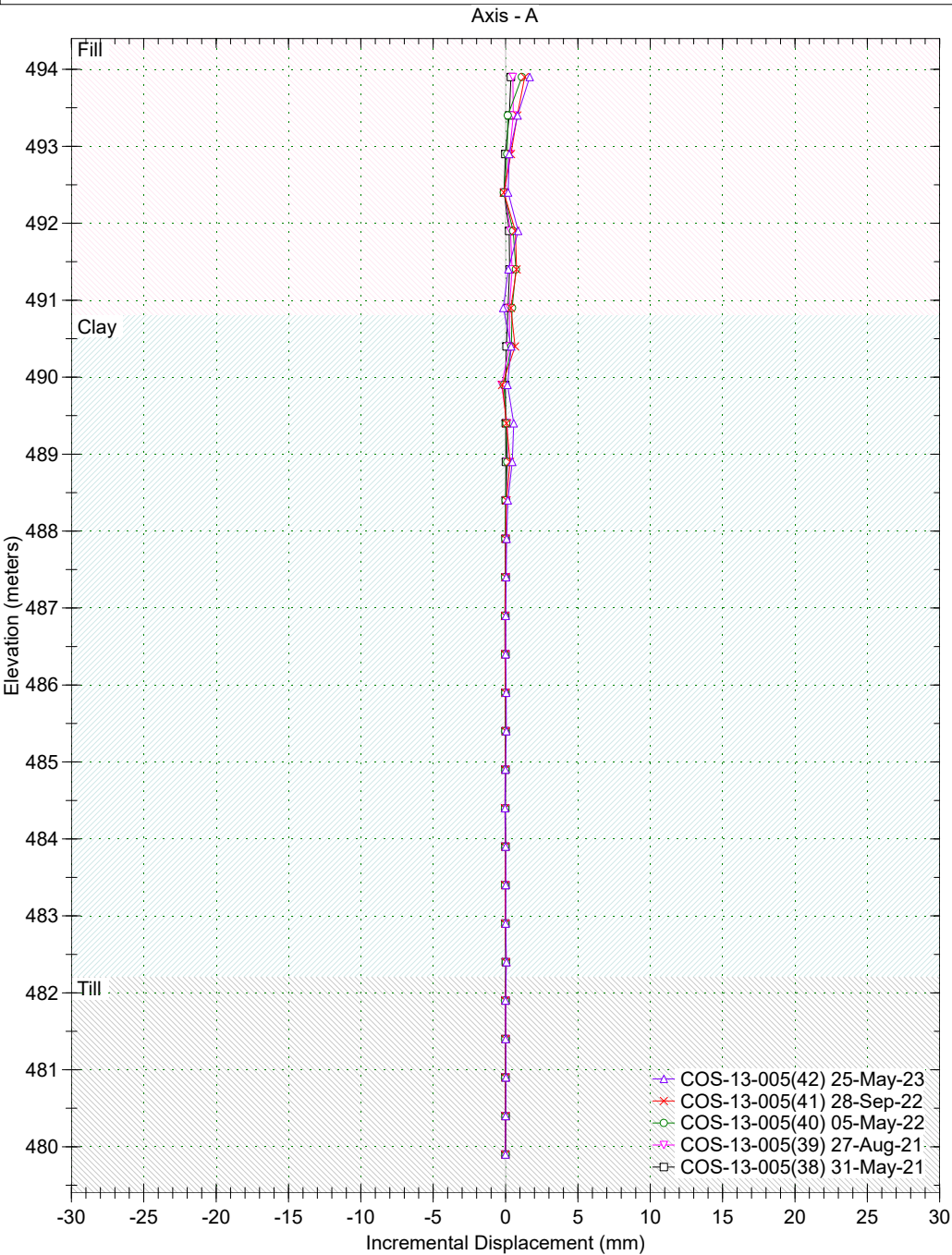
Borehole : COS-13-005 (Aug 13 2020 Baseline)
Project : Nutana Slope
Location : 316 Sask. Cres. E.
Northing : 5775631.299
Easting : 386078.8467
Collar : -0.1

Spiral Correction : N/A
Collar Elevation : :494.40 meters
Reading Depth : 14.5 meters
A+ Groove Azimuth :
Base Reading : 2020 Aug 13 12:59
Applied Azimuth : 0.0 degrees



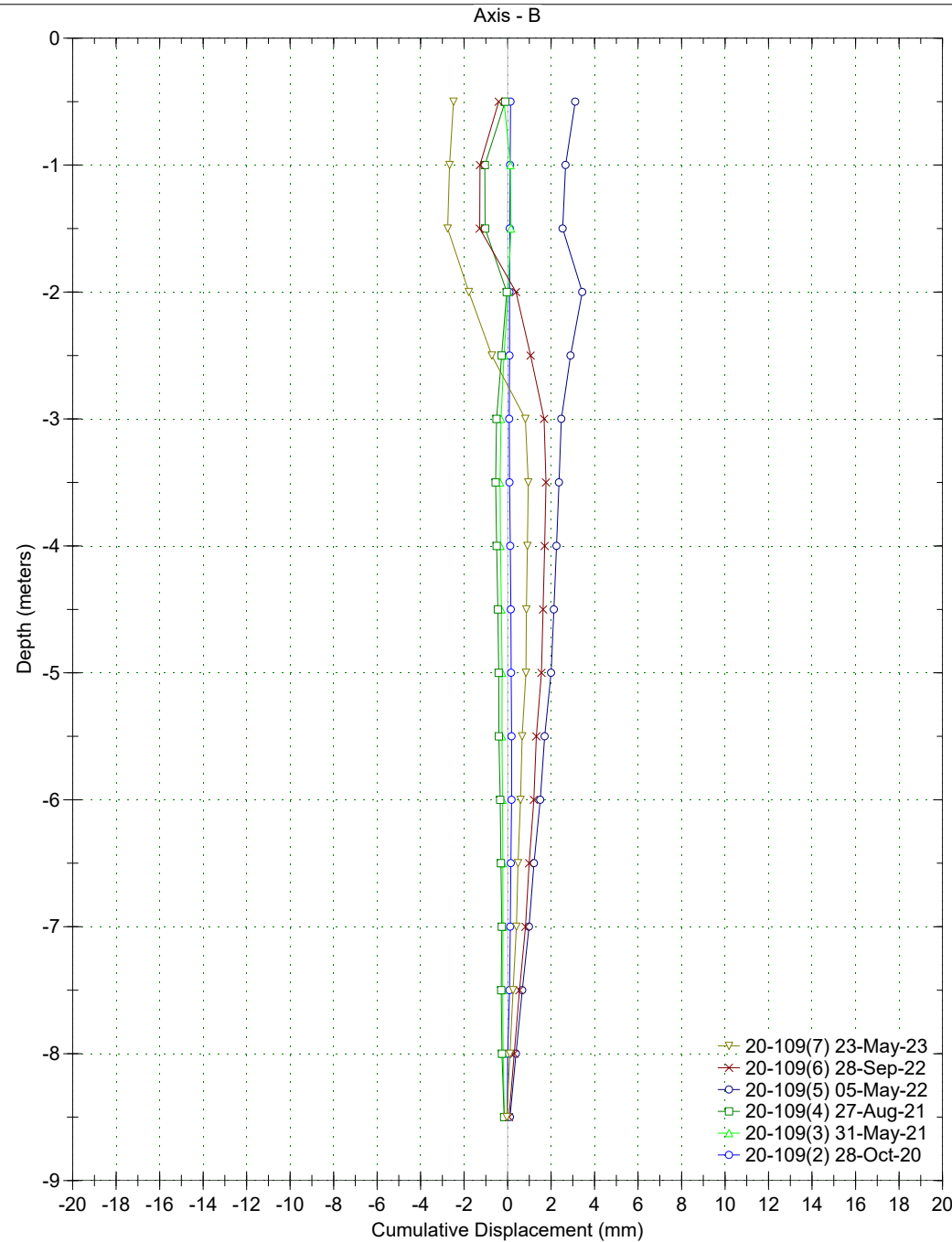
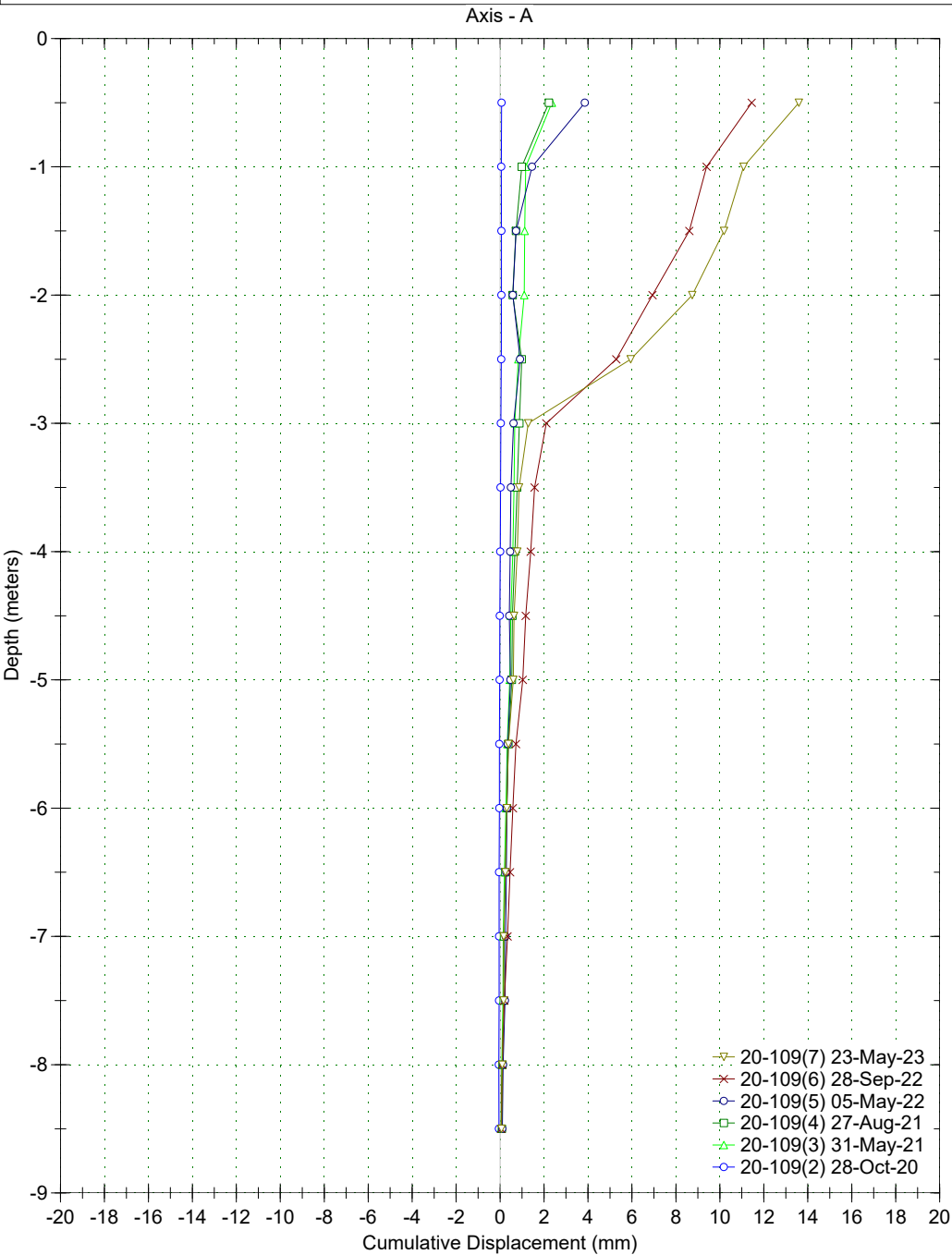
Borehole : COS-13-005 (Aug 13 2020 Baseline)
Project : Nutana Slope
Location : 316 Sask. Cres. E.
Northing : 5775631.299
Easting : 386078.8467
Collar : -0.1

Spiral Correction : N/A
Collar Elevation : :494.40 meters
Reading Depth : 14.5 meters
A+ Groove Azimuth :
Base Reading : 2020 Aug 13 12:59
Applied Azimuth : 0.0 degrees



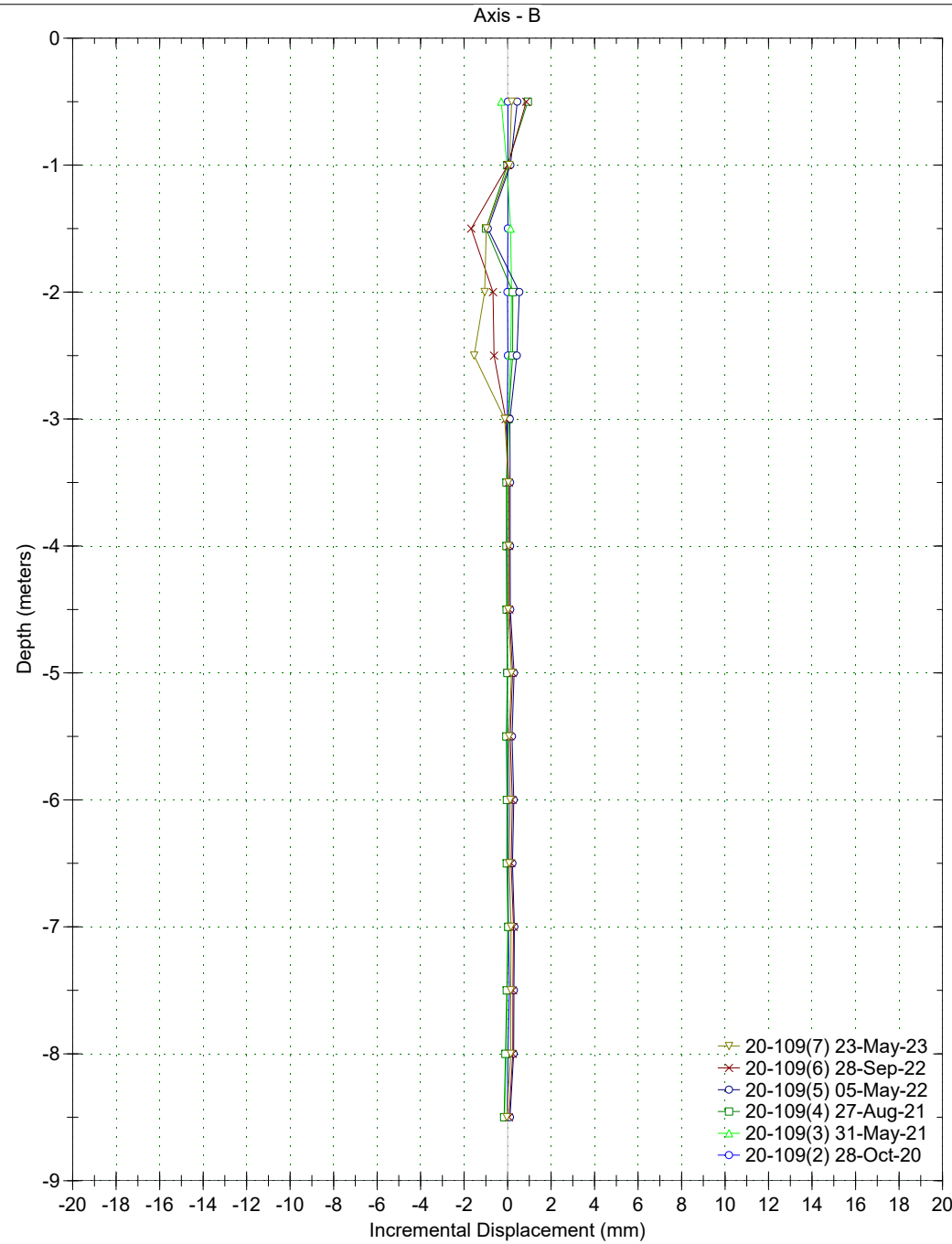
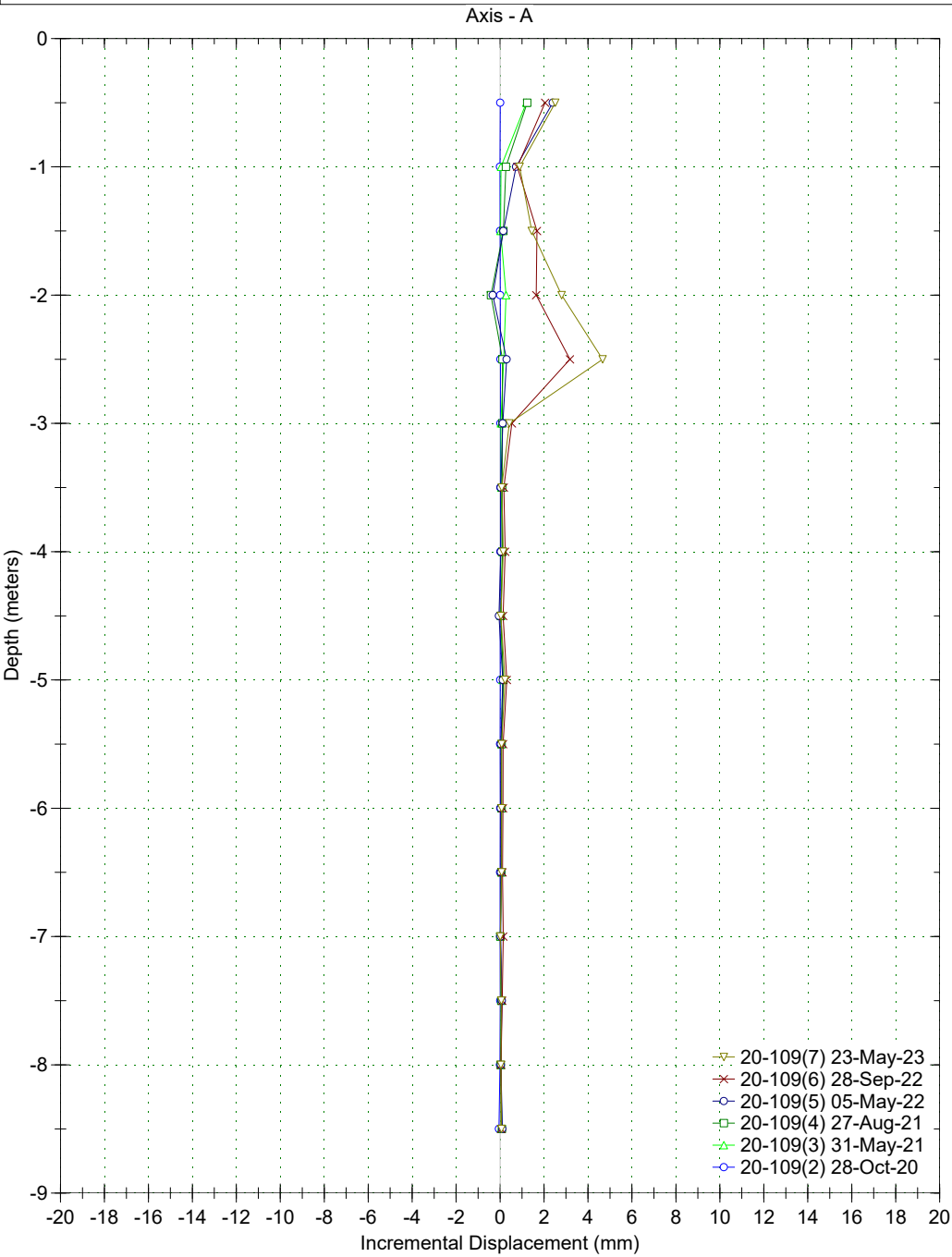
Borehole : 20-109
Project : Nutana Slope
Location :
Northing : 5775622
Easting : 385977
Collar :

Spiral Correction : N/A
Collar Elevation : 0.00 meters
Reading Depth : 8.5 meters
A+ Groove Azimuth :
Base Reading : 2020 Oct 28 16:29
Applied Azimuth : 0.0 degrees



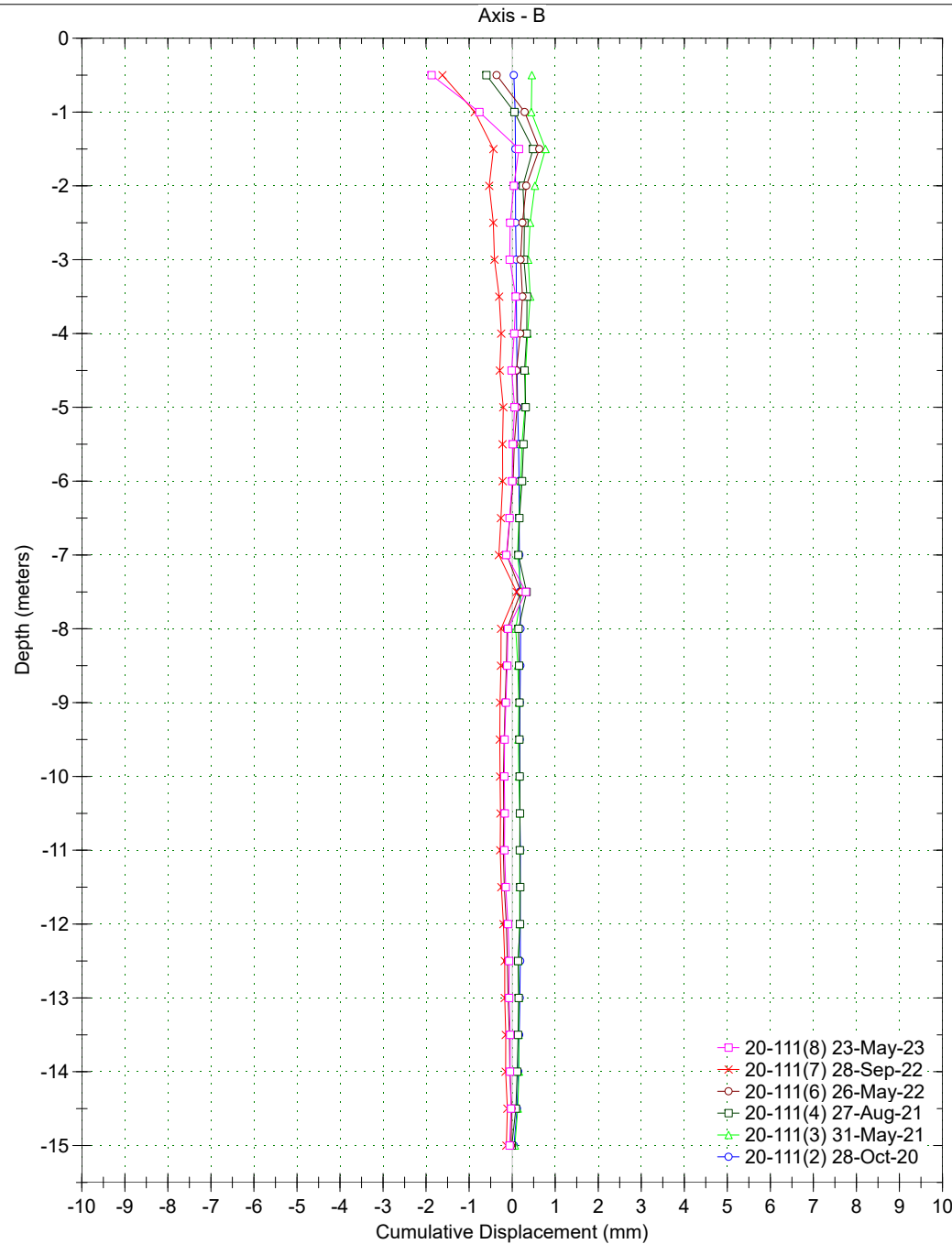
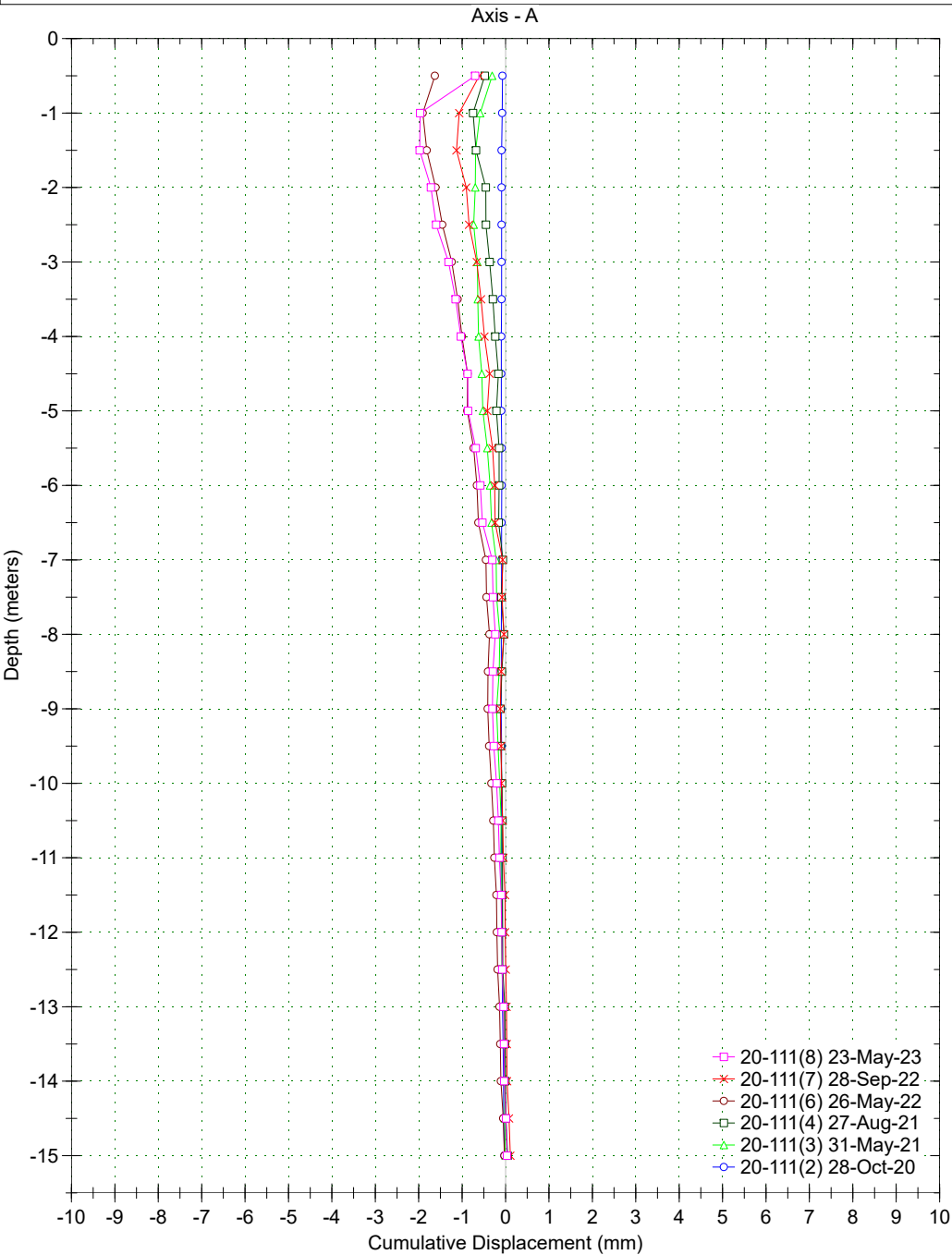
Borehole : 20-109
Project : Nutana Slope
Location :
Northing : 5775622
Easting : 385977
Collar :

Spiral Correction : N/A
Collar Elevation : 0.00 meters
Reading Depth : 8.5 meters
A+ Groove Azimuth :
Base Reading : 2020 Oct 28 16:29
Applied Azimuth : 0.0 degrees



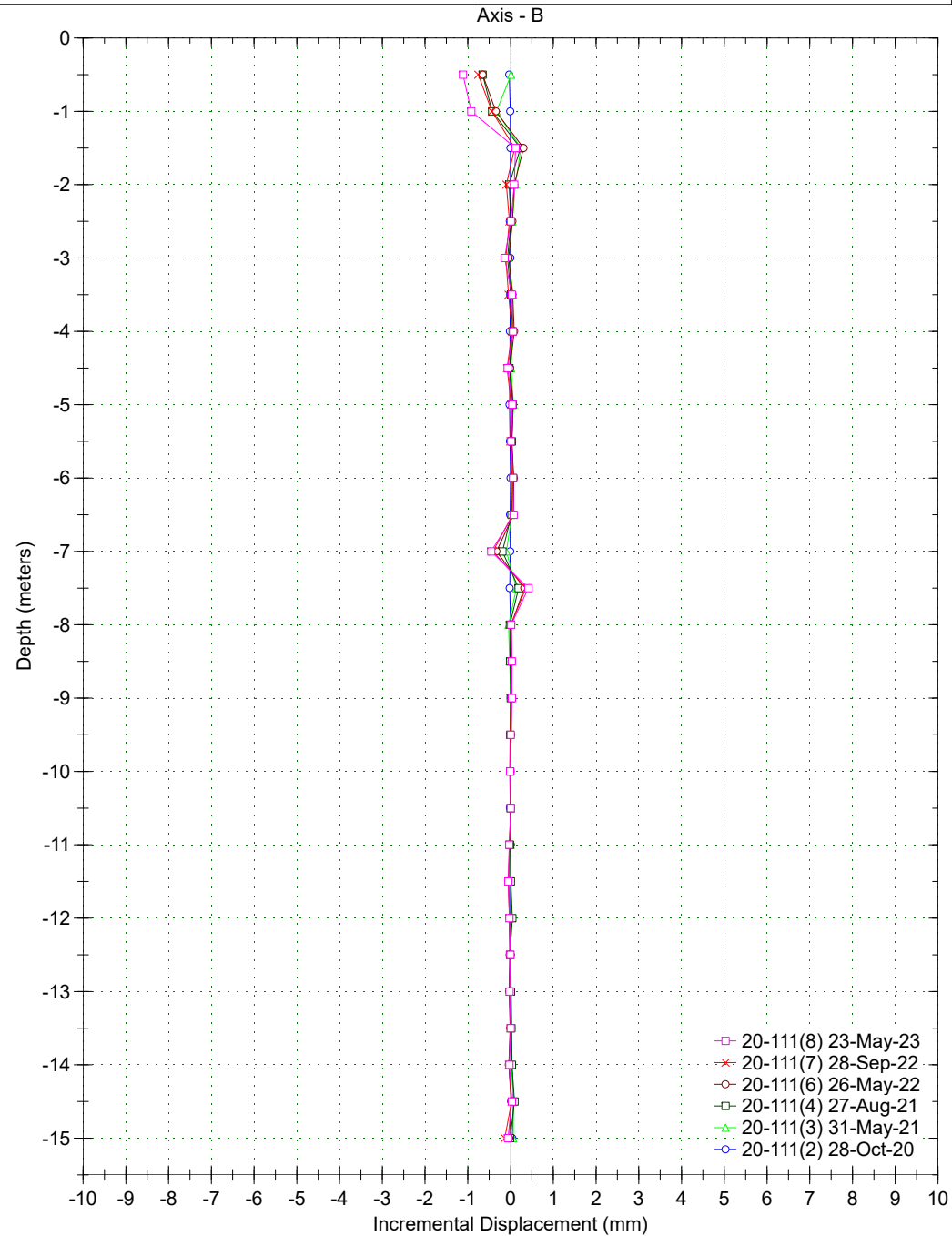
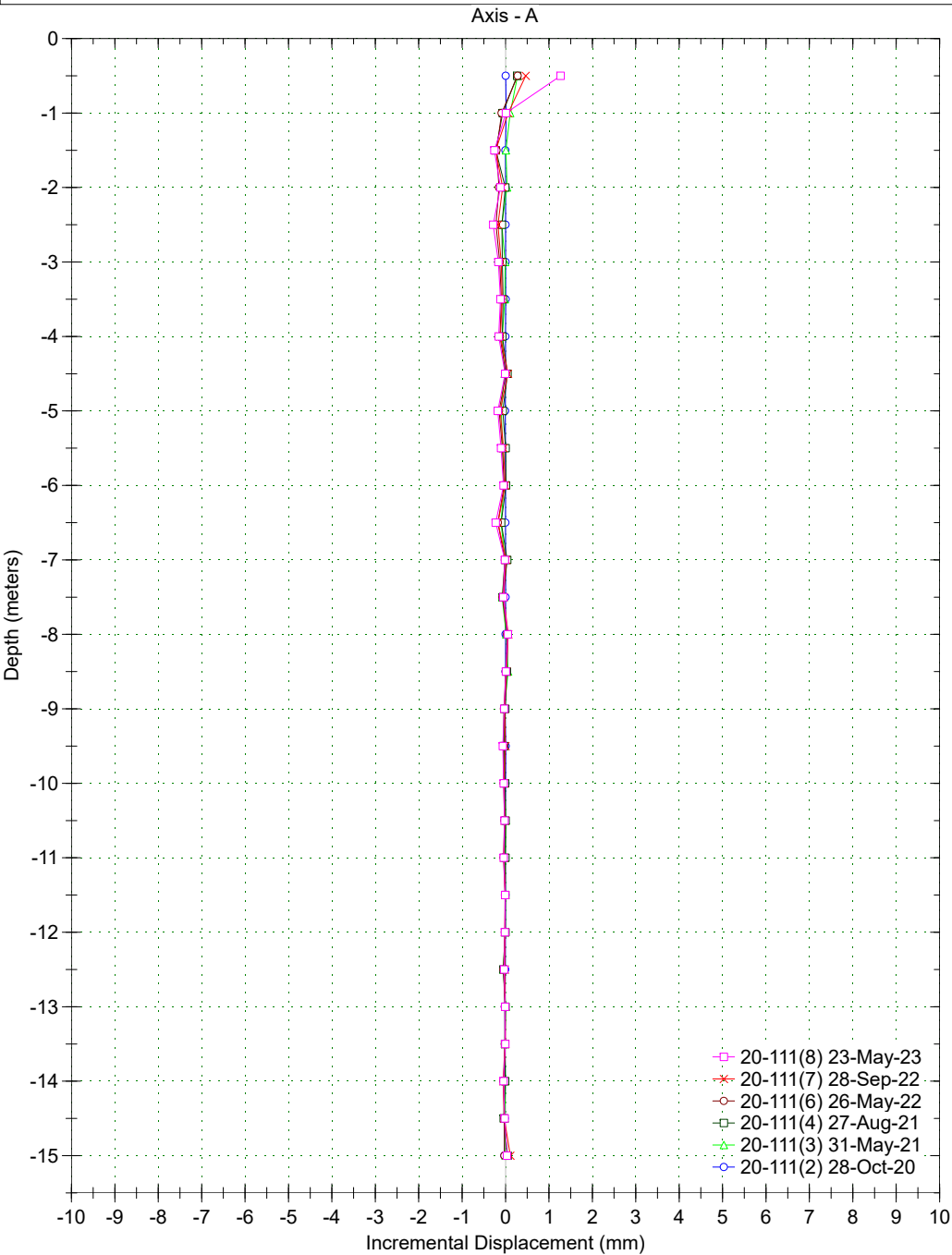
Borehole : 20-111
Project : Nutana Slope
Location :
Northing : 5775568
Easting : 385953
Collar :

Spiral Correction : N/A
Collar Elevation : 0.00 meters
Reading Depth : 15.0 meters
A+ Groove Azimuth :
Base Reading : 2020 Oct 28 15:01
Applied Azimuth : 0.0 degrees

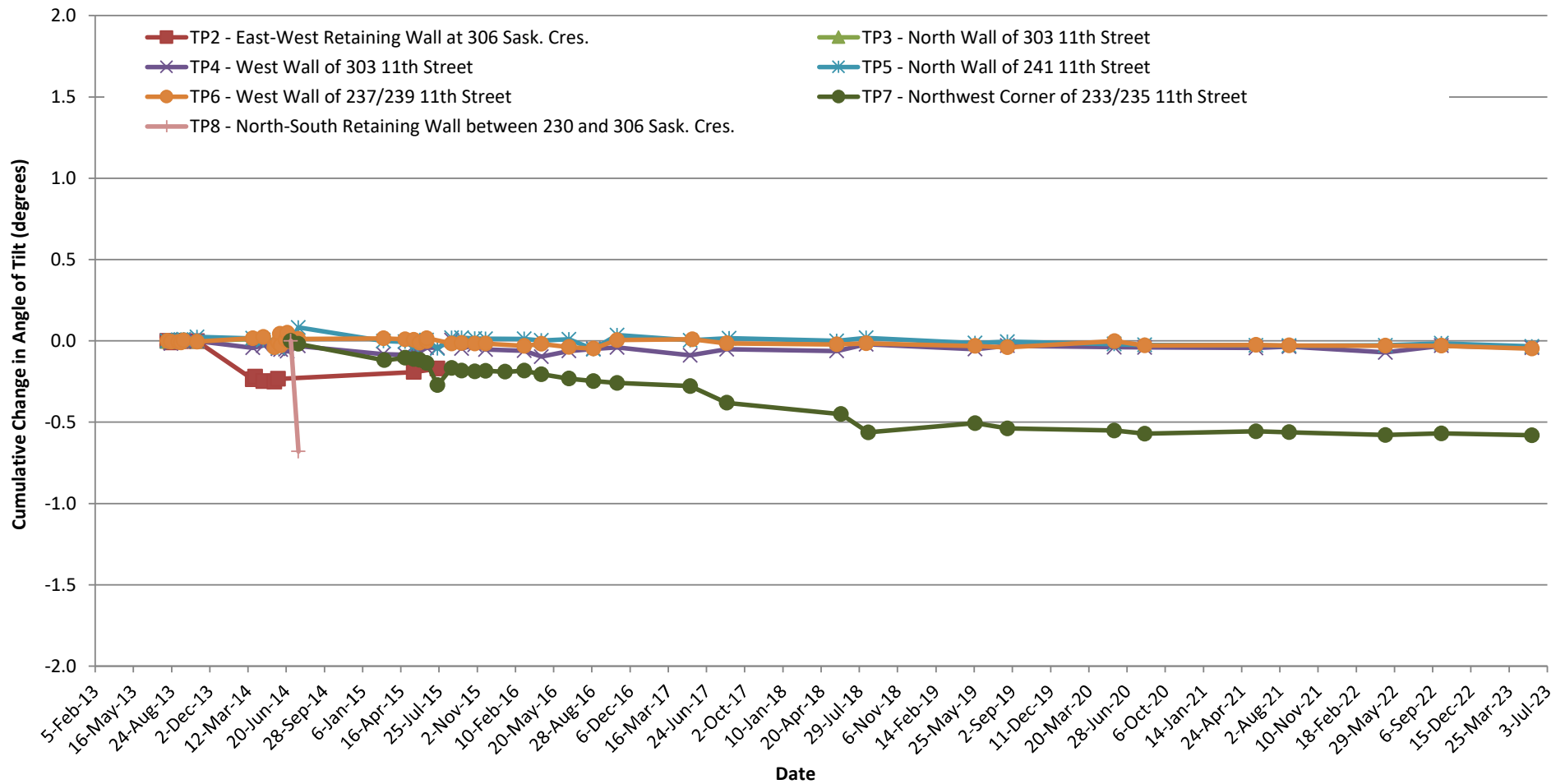


Borehole : 20-111
Project : Nutana Slope
Location :
Northing : 5775568
Easting : 385953
Collar :

Spiral Correction : N/A
Collar Elevation : 0.00 meters
Reading Depth : 15.0 meters
A+ Groove Azimuth :
Base Reading : 2020 Oct 28 15:01
Applied Azimuth : 0.0 degrees





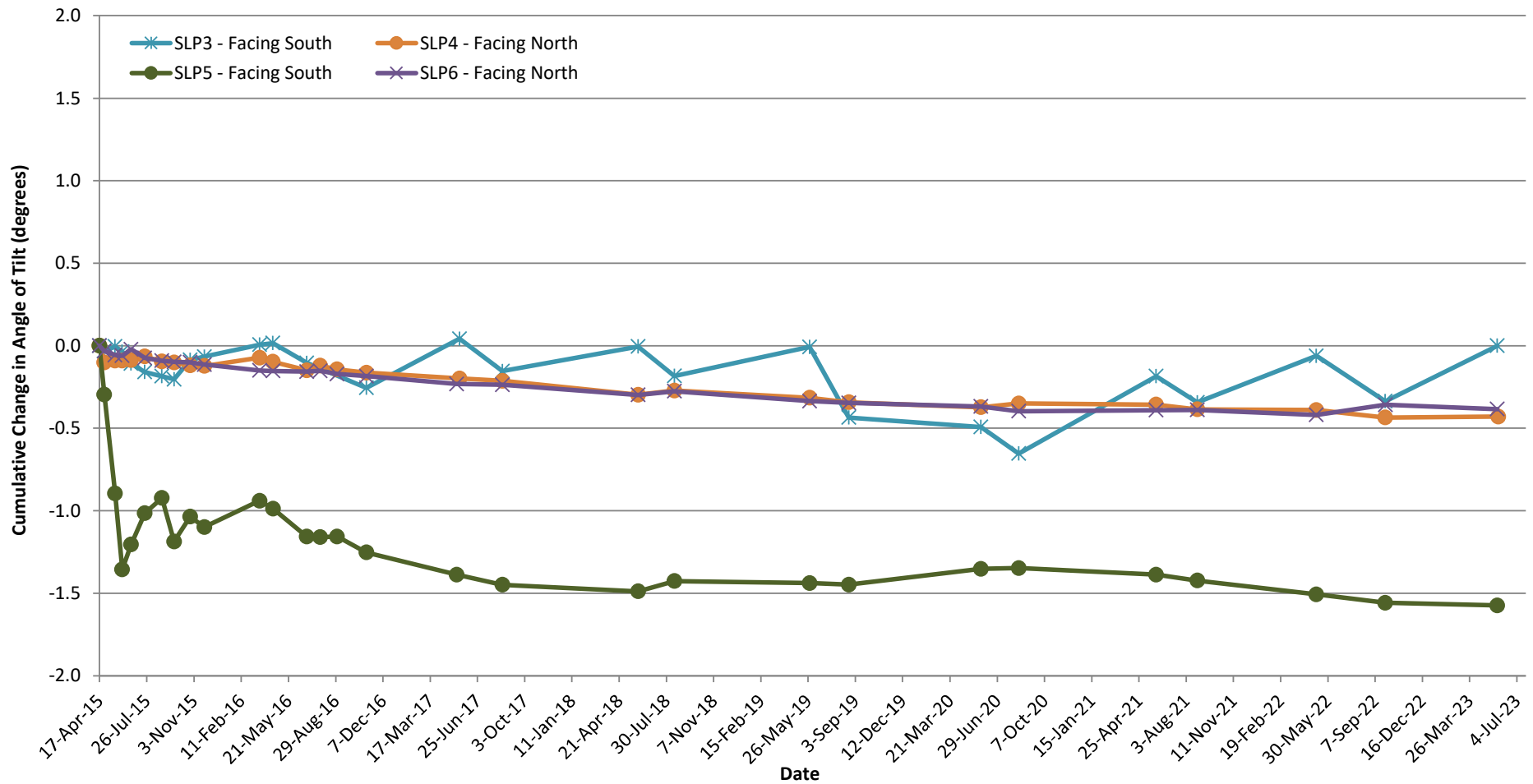
TILT PLATES



- Notes:
- 1) Positive changes in tilt indicate tilting toward the monitoring structure.
 - 2) TP1, located on the retaining wall between 230 and 306 Sask. Cres., is not monitored for health and safety reasons; monitoring results for this tilt plate show a change in angle of tilt of approximately 9 degrees between August 2013 and June 2014.
 - 3) TP3 and TP8 are destroyed, and TP2 is buried.

DRAFT

PROJECT		 NUTANA SLOPE INSTABILITY	
TITLE			
RESULTS OF TILT MONITORING <i>May 2023 Monitoring</i>			
PROJECT		20138294	FILE No.
DESIGN			SCALE N/A REV.
CADD			
CHECK			
REVIEW			
			FIGURE: 4



Notes:
 1) Positive changes in tilt indicate tilting toward the monitoring structure.

DRAFT

		NUTANA SLOPE INSTABILITY	
RESULTS OF TILT MONITORING May 2023 Monitoring			
	PROJECT	20138294	FILE No.
	DESIGN		SCALE N/A REV.
	CADD		
	CHECK		
REVIEW			
			FIGURE: 5

SITE PHOTOGRAPHS



Photograph 1: Looking east down the back alley at the East Failure (May 23, 2023)



Photograph 2: Looking west down the back alley at the West Failure (May 23, 2023)