



## TECHNICAL MEMORANDUM

**DATE** August 22, 2023  
**TO** Vanessa Heilman, P.Eng.  
City of Saskatoon  
**CC** Greg Misfeldt (WSP)  
**FROM** Blaise Wilson, Hung Vu

**Project No.** CA-GLD-20138294

**EMAIL** [blaise.wilson@wsp.com](mailto:blaise.wilson@wsp.com);  
[hung.vu@wsp.com](mailto:hung.vu@wsp.com)

### NUTANA SLOPE INSTABILITY UPDATE – AUGUST 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 11<sup>th</sup> 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 11<sup>th</sup> 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 May 23 and August 16, 2023.
- Inclinometer COS-13-005 indicated insignificant movement (less than 2 mm or 0.08 in) between May 25 and August 16, 2023.
- Inclinometer 20-109 indicated approximately 3 mm (0.12 in) of cumulative downslope movement between May 23 and August 16, 2023. This inclinometer plot showed a drift in direction parallel with 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 May 23 and August 16, 2023.
- Tilt plate SLP3 indicated a change in angle of tilt of approximately 0.11 degrees, towards the south, between May 23 and August 16, 2023. However, this SLP3 readings have been erratic, total angle of tilt from April 17, 2015 to August 16, 2023 is approximately 0.2 degrees.
- Tilt plate SLP4 indicated an insignificant change in angle of tilt (less than 0.05 degrees) between May 25 and August 16, 2023.
- Tilt plate SLP5 indicated a change in angle of tilt of approximately 0.14 degrees, towards the south, between May 23 and August 16, 2023.
- Tilt plates SLP6 indicated insignificant changes in angle of tilt (less than 0.05 degrees) between May 23 and August 16, 2023.

***Crack Meter Data:***

- Crack meters were not read during this monitoring period.

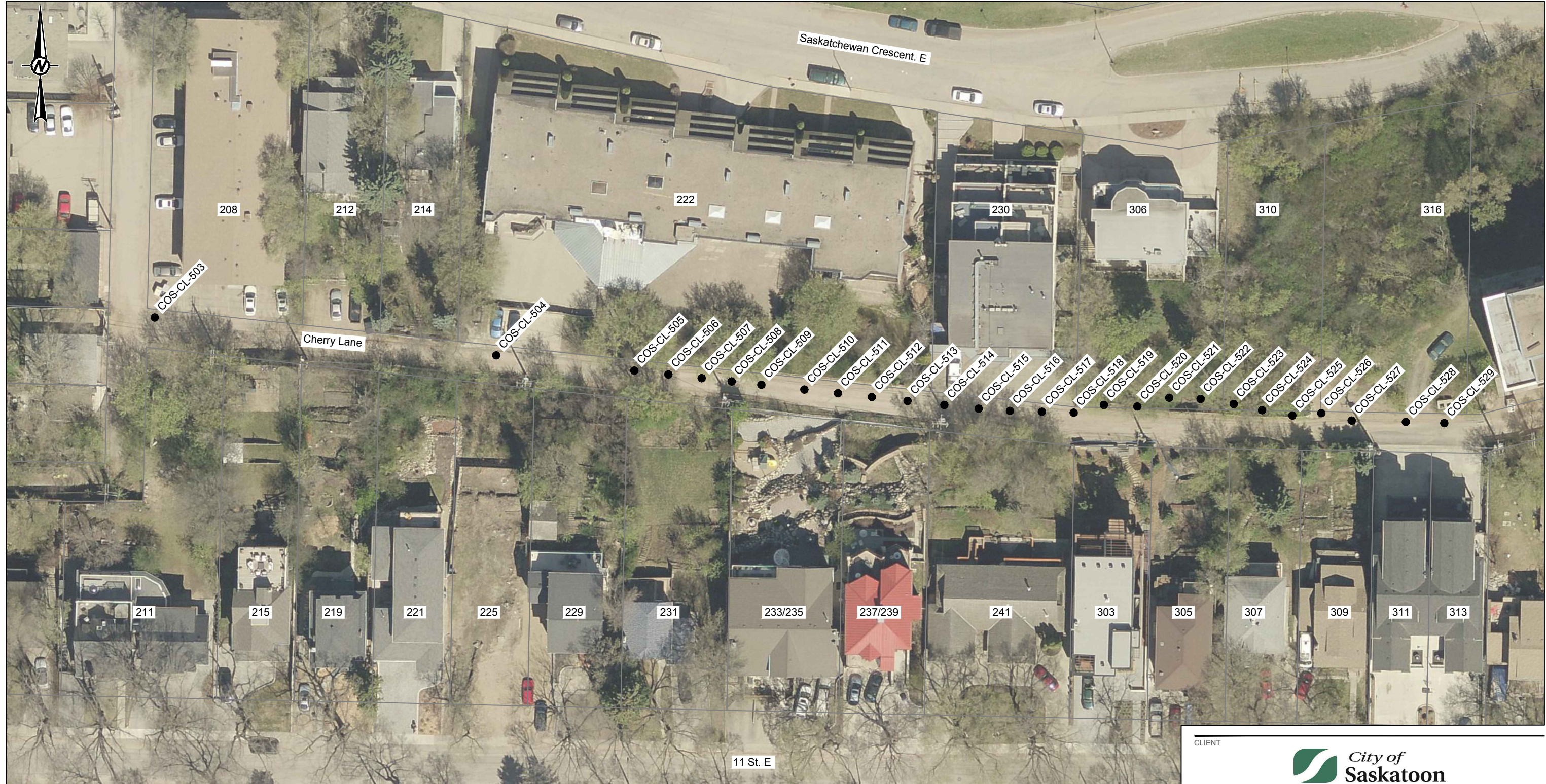
***Settlement Points:***

- Settlement points were not read during this monitoring period

[https://golderassociates.sharepoint.com/sites/122189/project files/5 technical work/reports/8. aug 2023/ca-gld-20138294 - nutana monitoring data update memo\\_aug2023.docx](https://golderassociates.sharepoint.com/sites/122189/project%20files/5%20technical%20work/reports/8.%20aug%202023/ca-gld-20138294%20-%20nutana%20monitoring%20data%20update%20memo_aug2023.docx)



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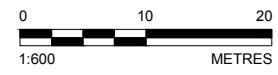


**LEGEND**

● PIN LOCATION

303 LOT NUMBER

**REFERENCE(S)**  
 AERIAL PHOTOGRAPH PROVIDED BY CITY OF SASKATOON, MAY 15, 2011  
 CITY OF SASKATOON DATUM



CLIENT

 **City of Saskatoon**

PROJECT  
 NUTANA SLOPE INSTABILITY

TITLE  
 INSTRUMENTATION PLAN No. 1

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

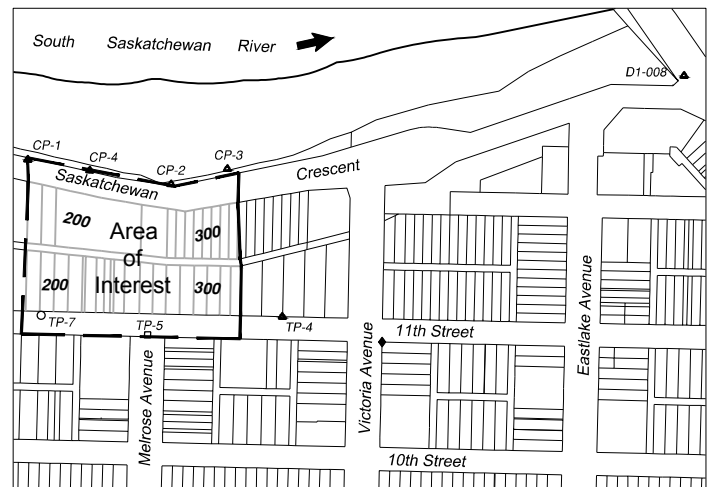
PROJECT NO. 20138294	PHASE 1000	REV. A	FIGURE 1
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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ANSI B





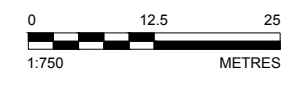
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CONTROL POINTS				
COORDINATE TABLE NAD 83 (CSRS)				UTM ZONE 13
POINT	NORTHING (m)	EASTING (m)	ORTHOMETRIC ELEVATION (m) HTv2.0	DESCRIPTION
CP-1	5,775,701.84	385,897.84	477.97	24" REBAR WITH PLASTIC CAP
CP-2	5,775,680.32	386,022.25	478.99	24" REBAR 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
<b>303</b>	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

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	DESIGNED		BW
	PREPARED		JMC
	REVIEWED		
	APPROVED		

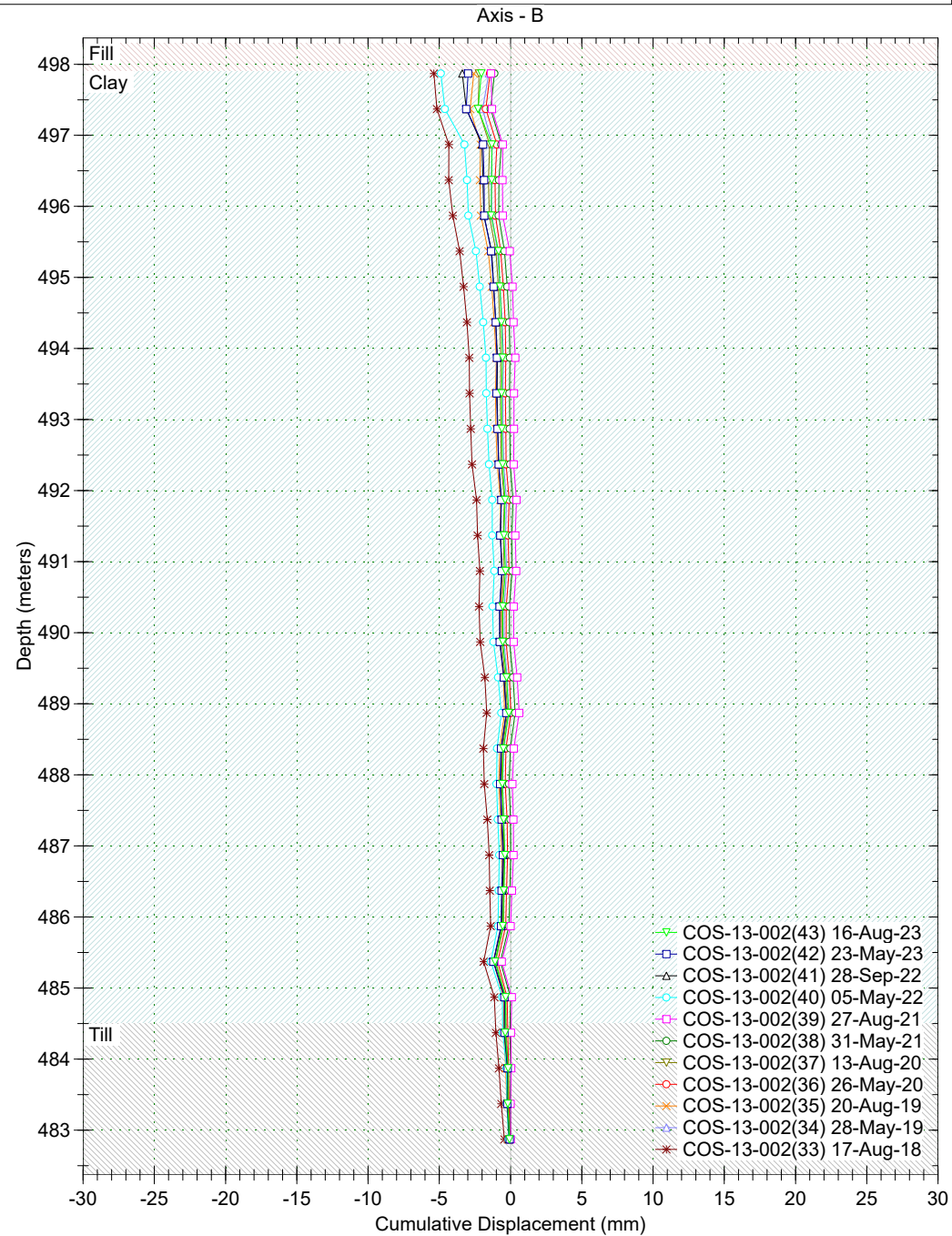
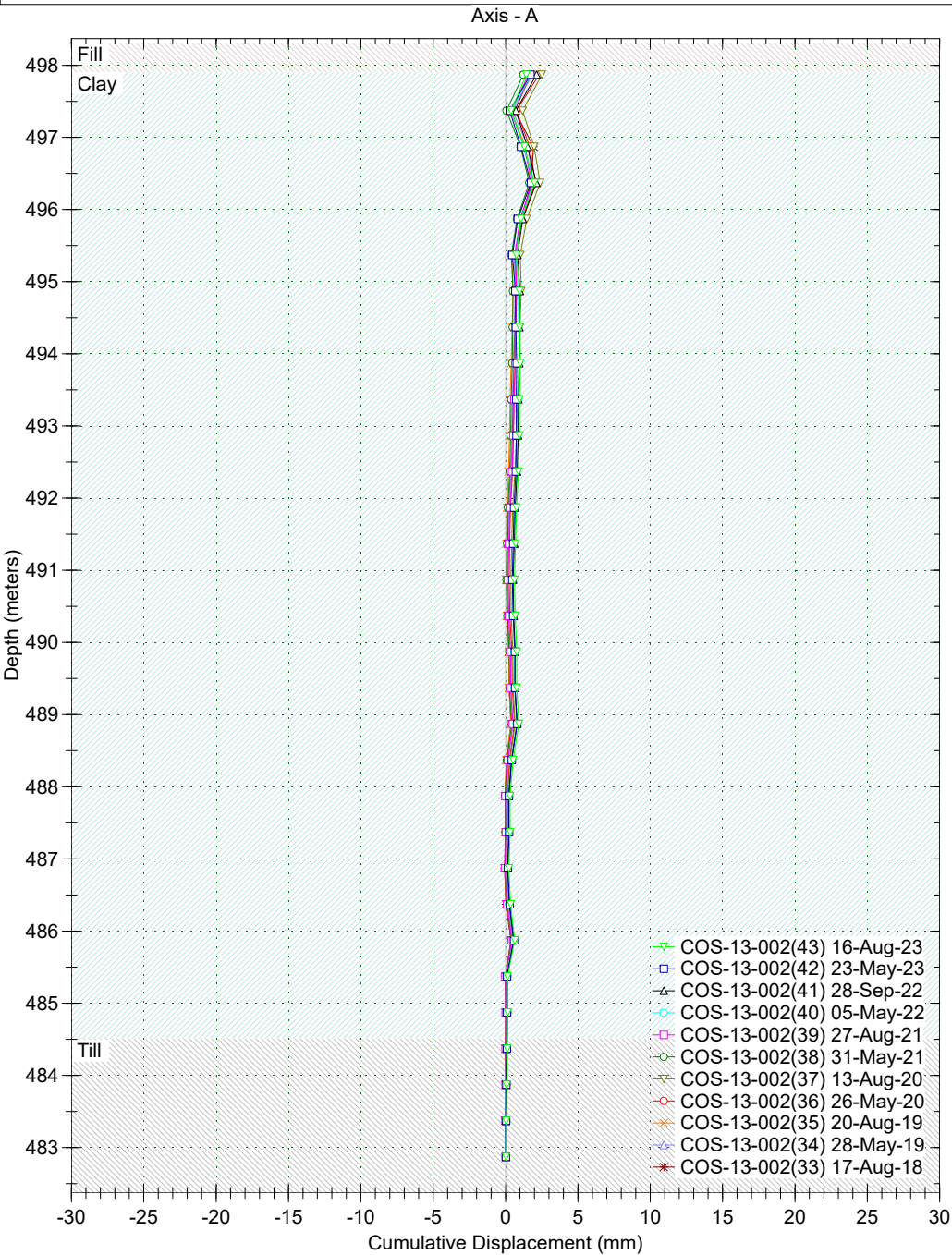
PROJECT NO. 20138294      PHASE 1000      REV. A      FIGURE 3

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

## SLOPE INCLINOMETERS

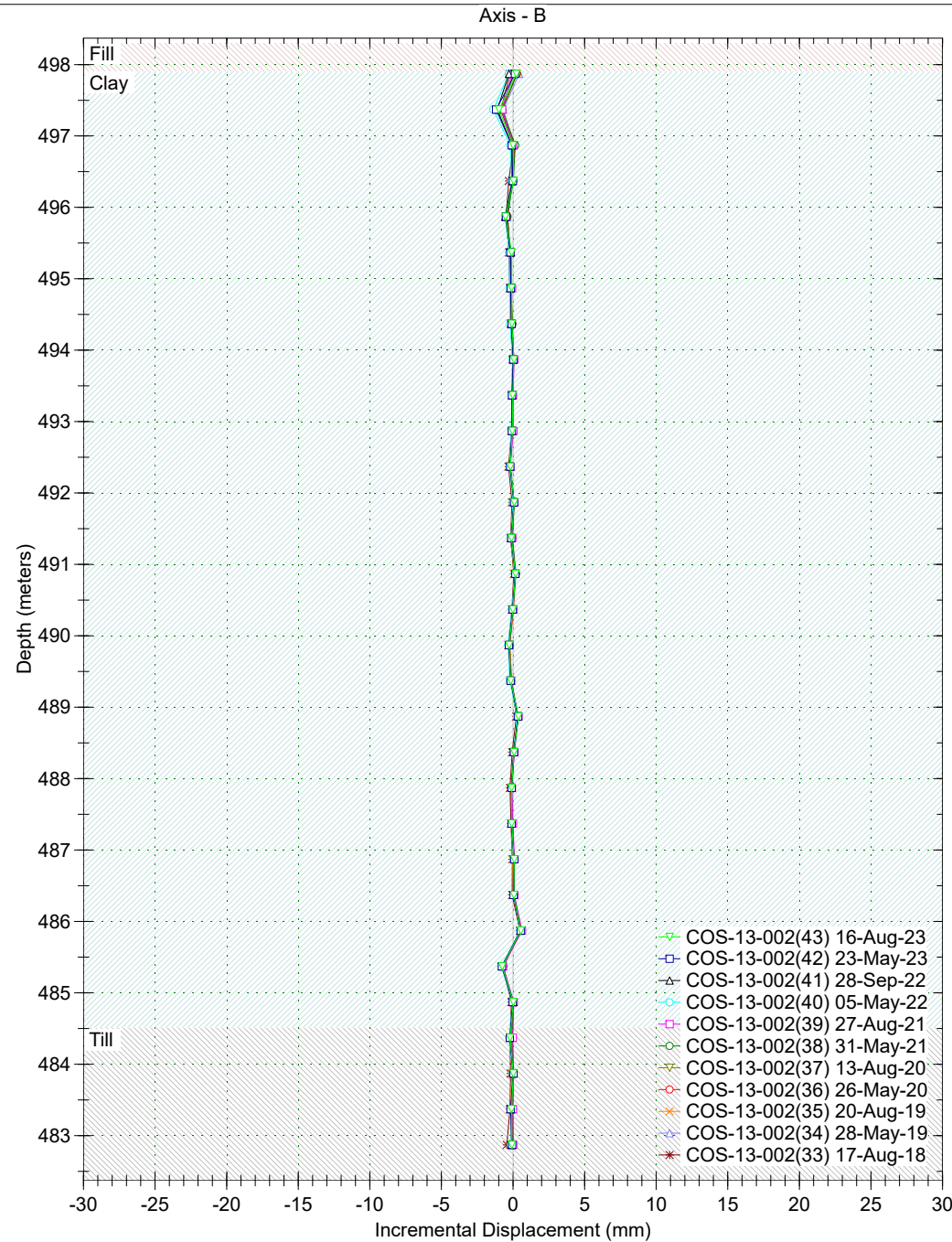
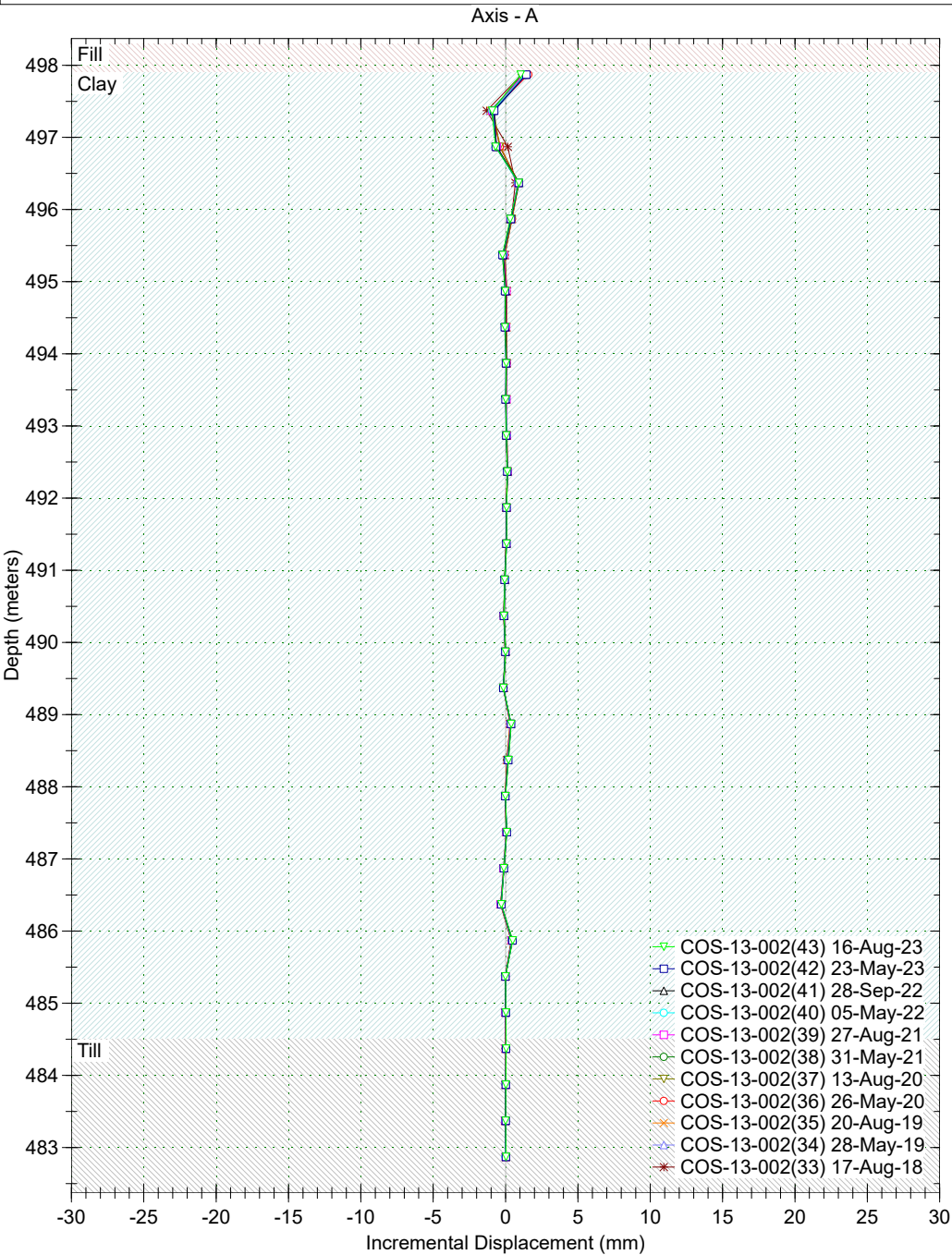
Borehole : COS-13-002  
 Project : Nutana Slope  
 Location : 307 11th St. E. (Front)  
 Northing : 5775567.41  
 Easting : 386043.54  
 Collar : -0.113

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

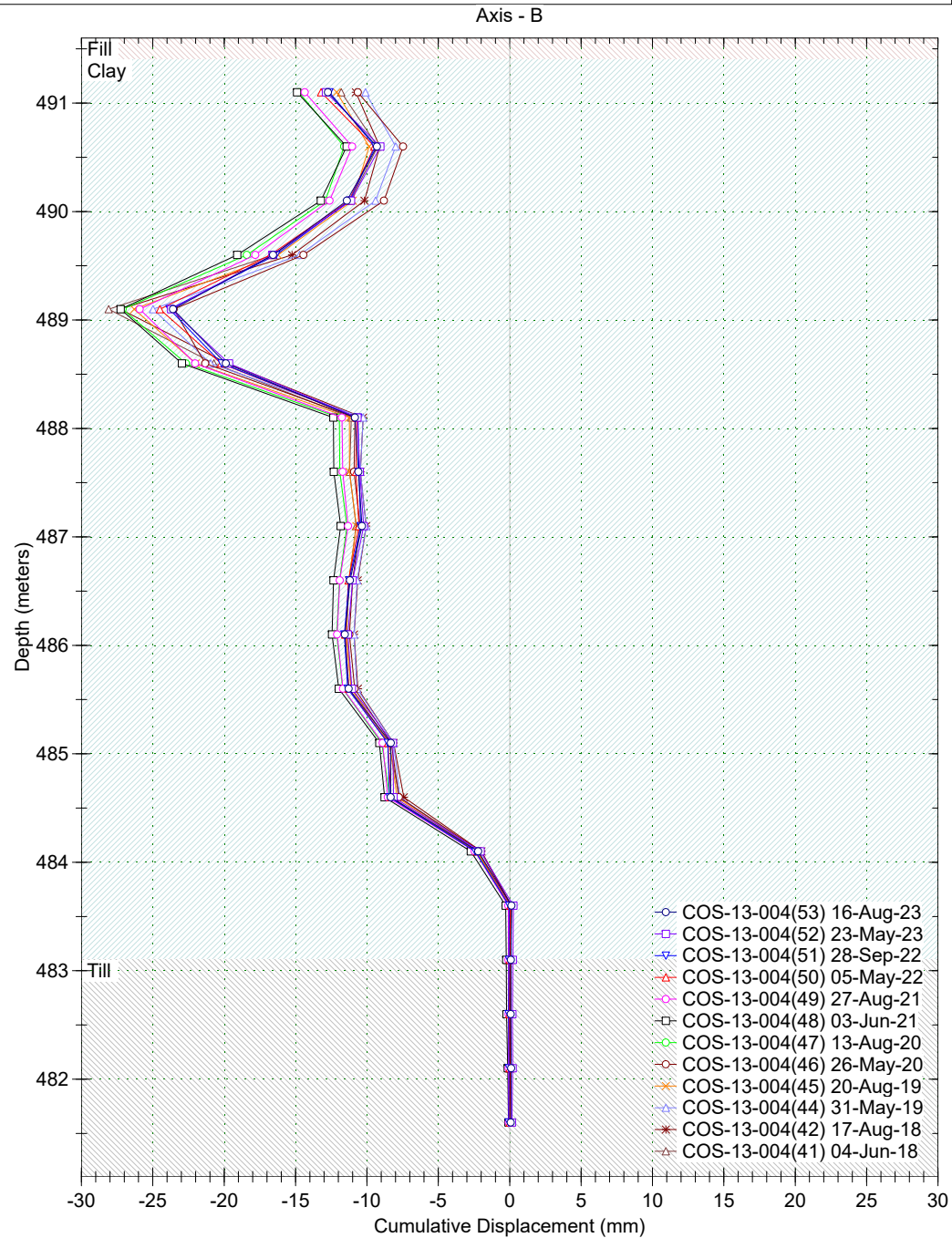
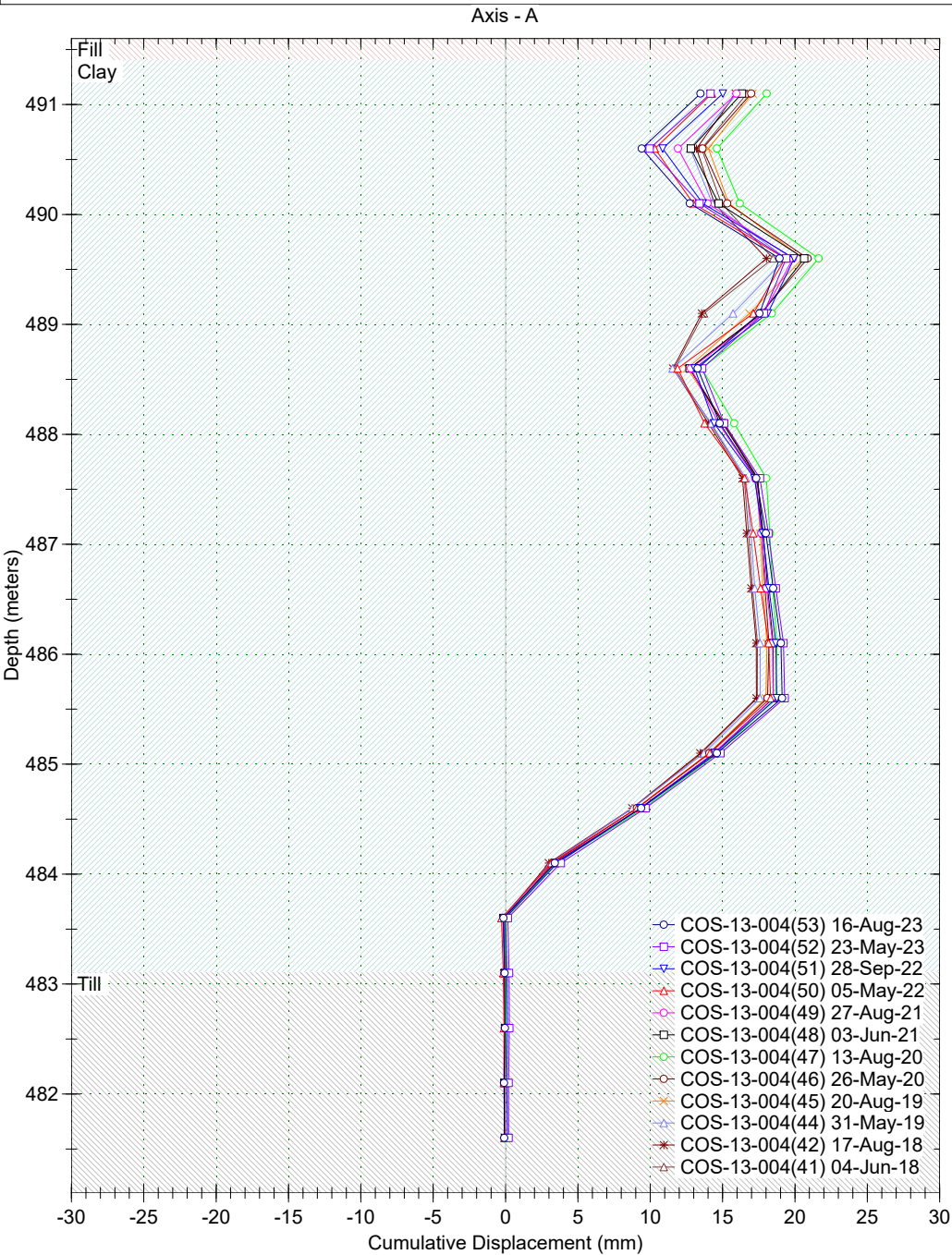
Spiral Correction : N/A  
 Collar Elevation : :498.37 meters  
 Reading Depth : 15.5 meters  
 A+ Groove Azimuth :  
 Base Reading : 2013 Jul 30 16:18  
 Applied Azimuth : 0.0 degrees





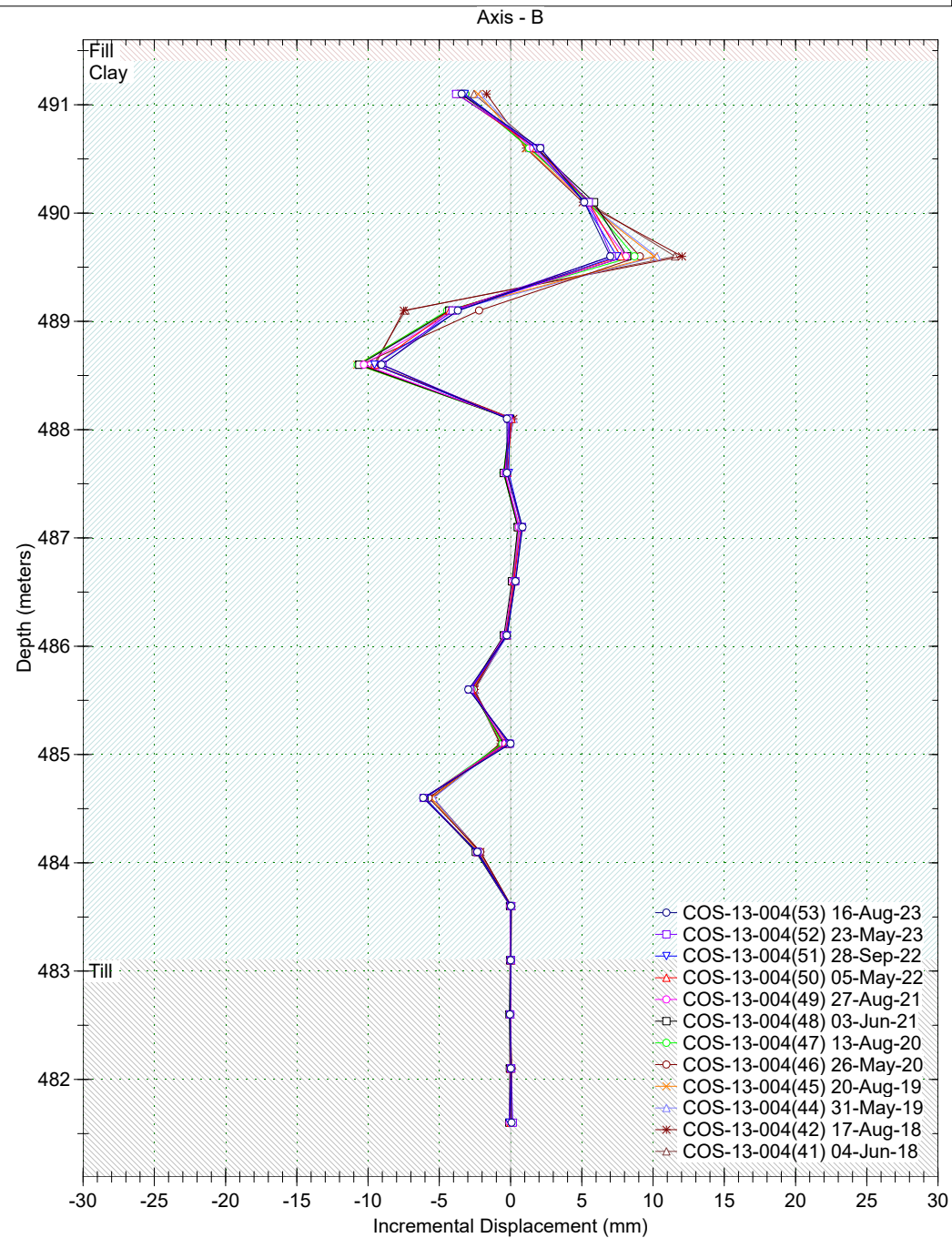
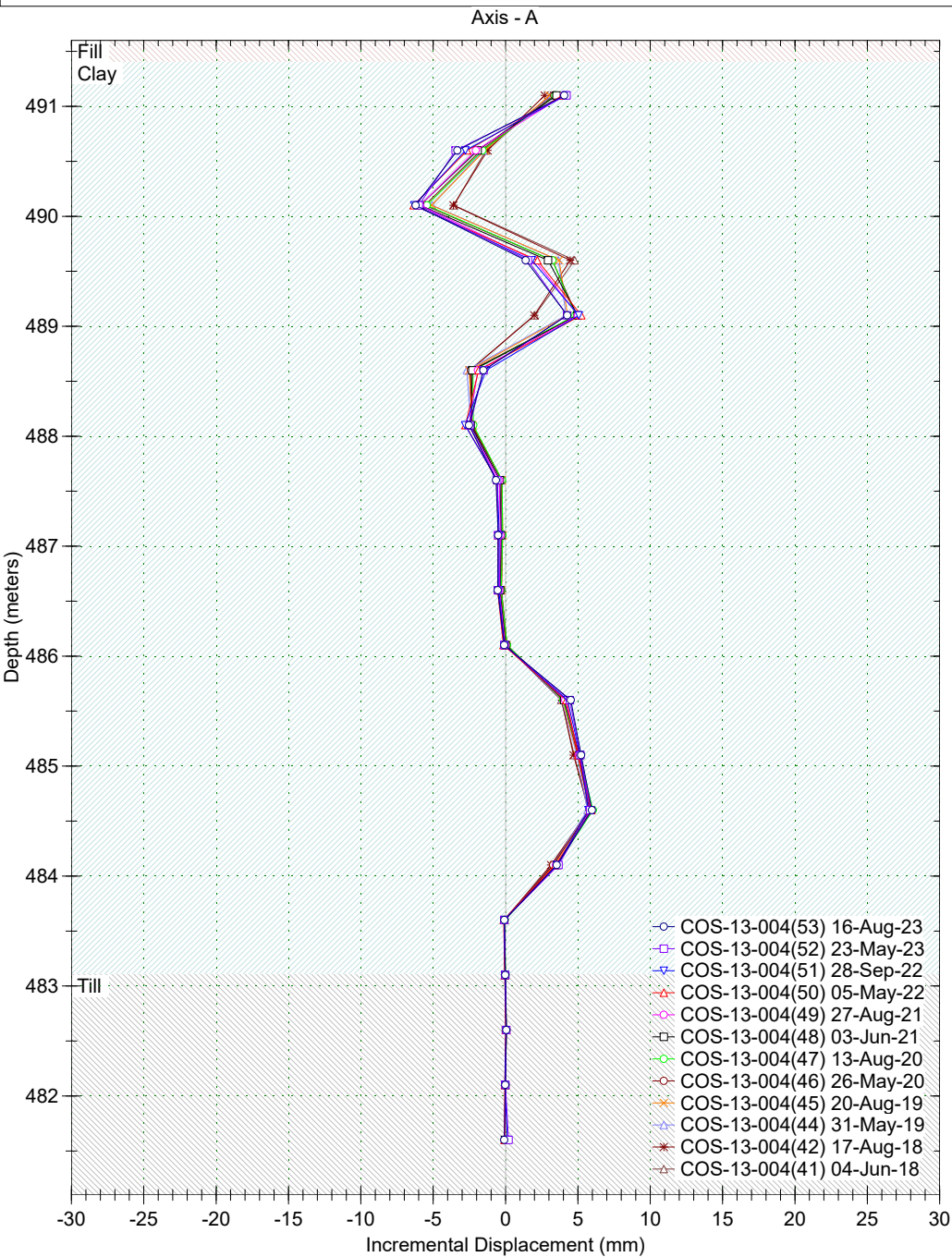
Borehole : COS-13-004  
 Project : Nutana Slope  
 Location : 307 11th. St. E. (back)  
 Northing : 5775604.97  
 Easting : 386050.63  
 Collar : -0.677

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



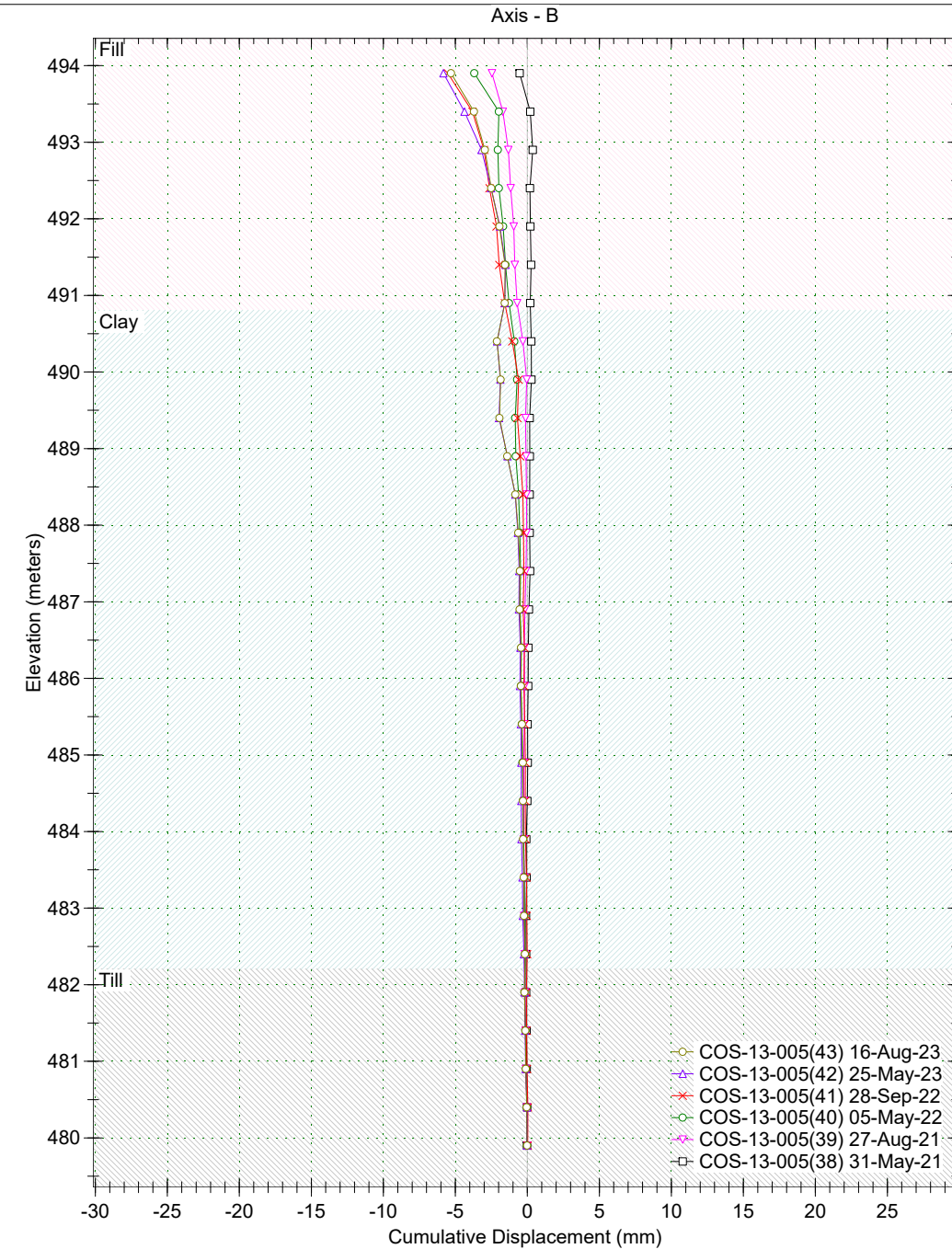
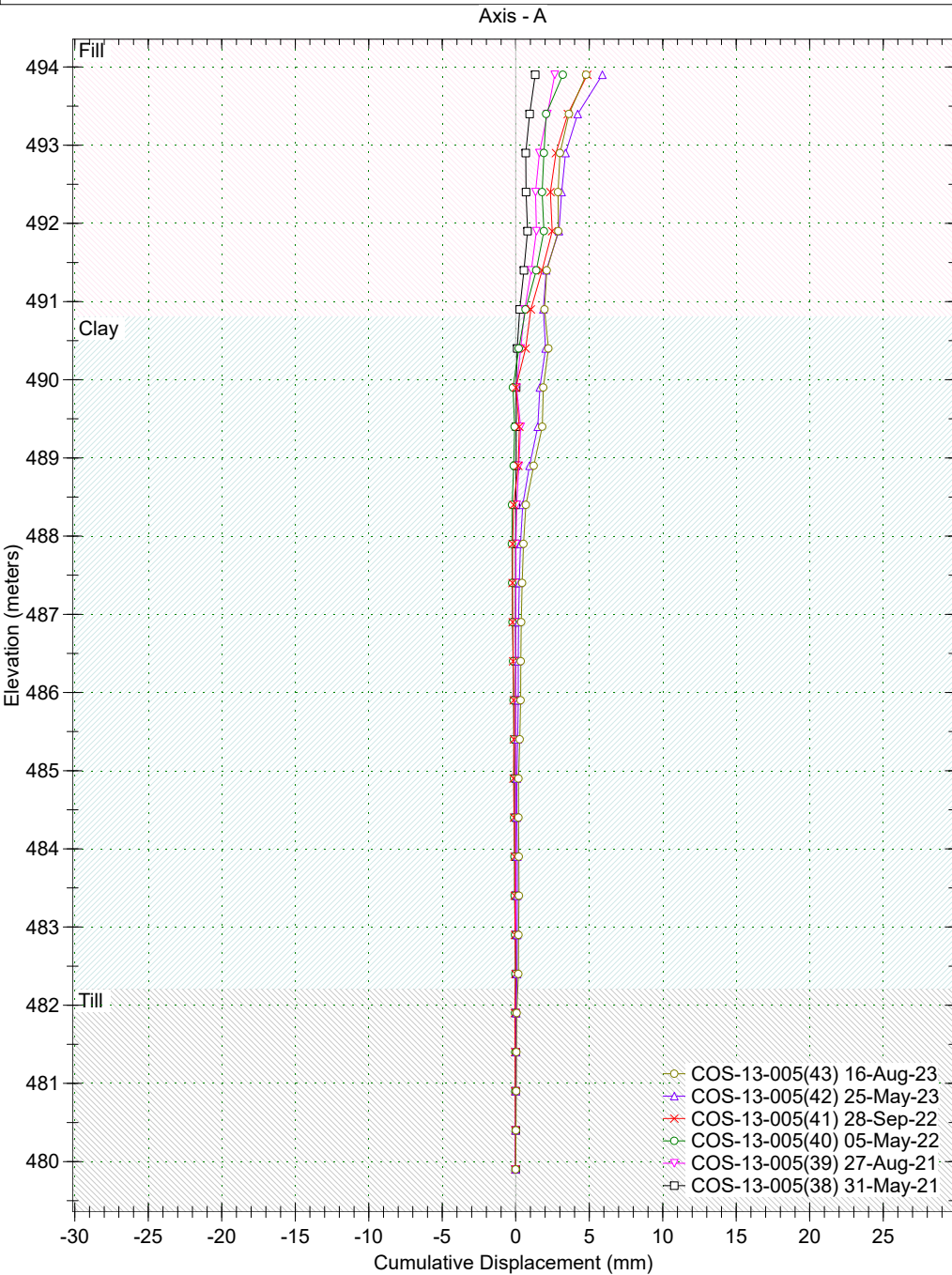
Borehole : COS-13-004  
 Project : Nutana Slope  
 Location : 307 11th. St. E. (back)  
 Northing : 5775604.97  
 Easting : 386050.63  
 Collar : -0.677

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

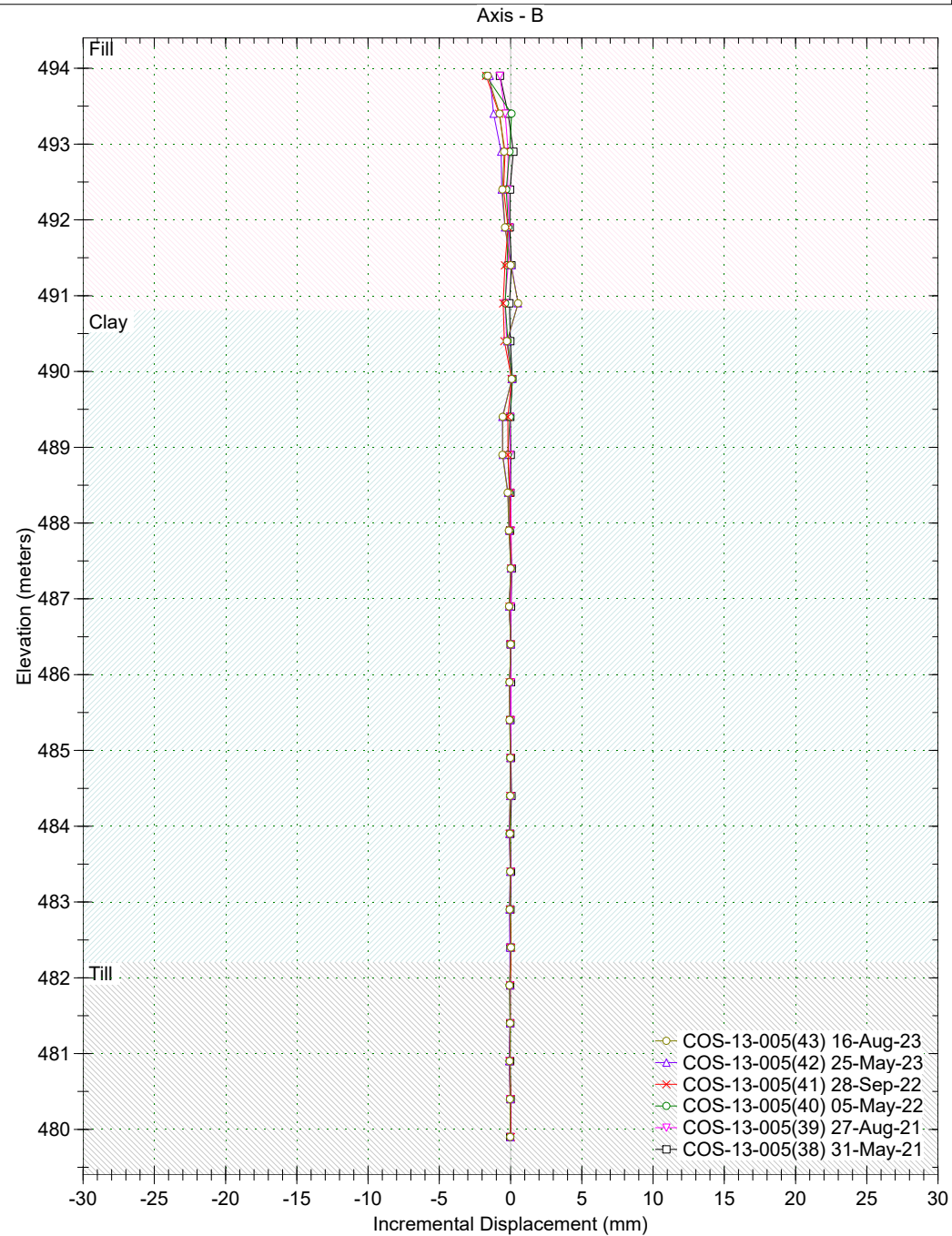
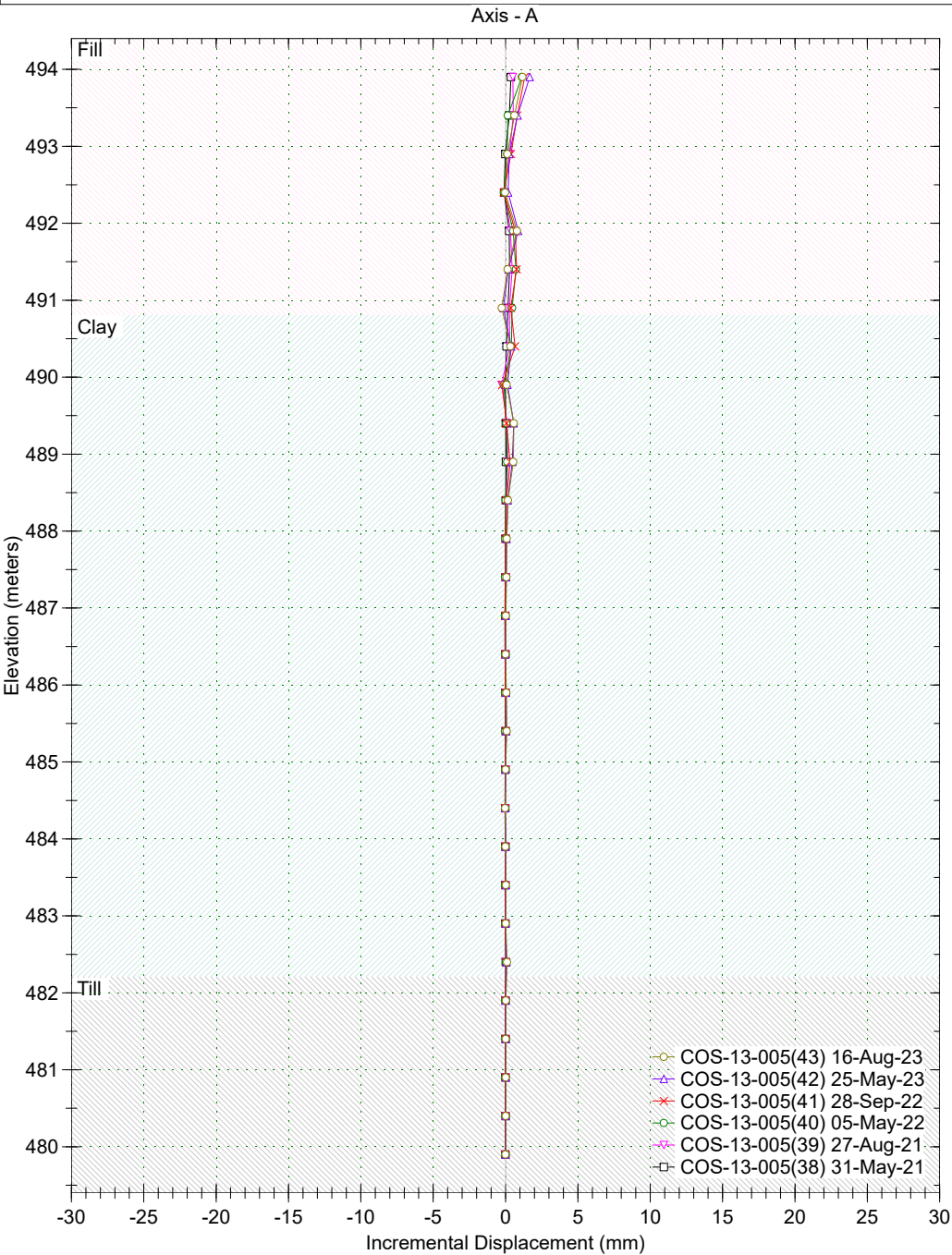
Spiral Correction : N/A  
Collar Elevation : :494.40 meters  
Reading Depth : 14.5 meters  
A+ Groove Azimuth :  
Base Reading : 2020 Aug 13 12:59  
Applied Azimuth : 0.0 degrees





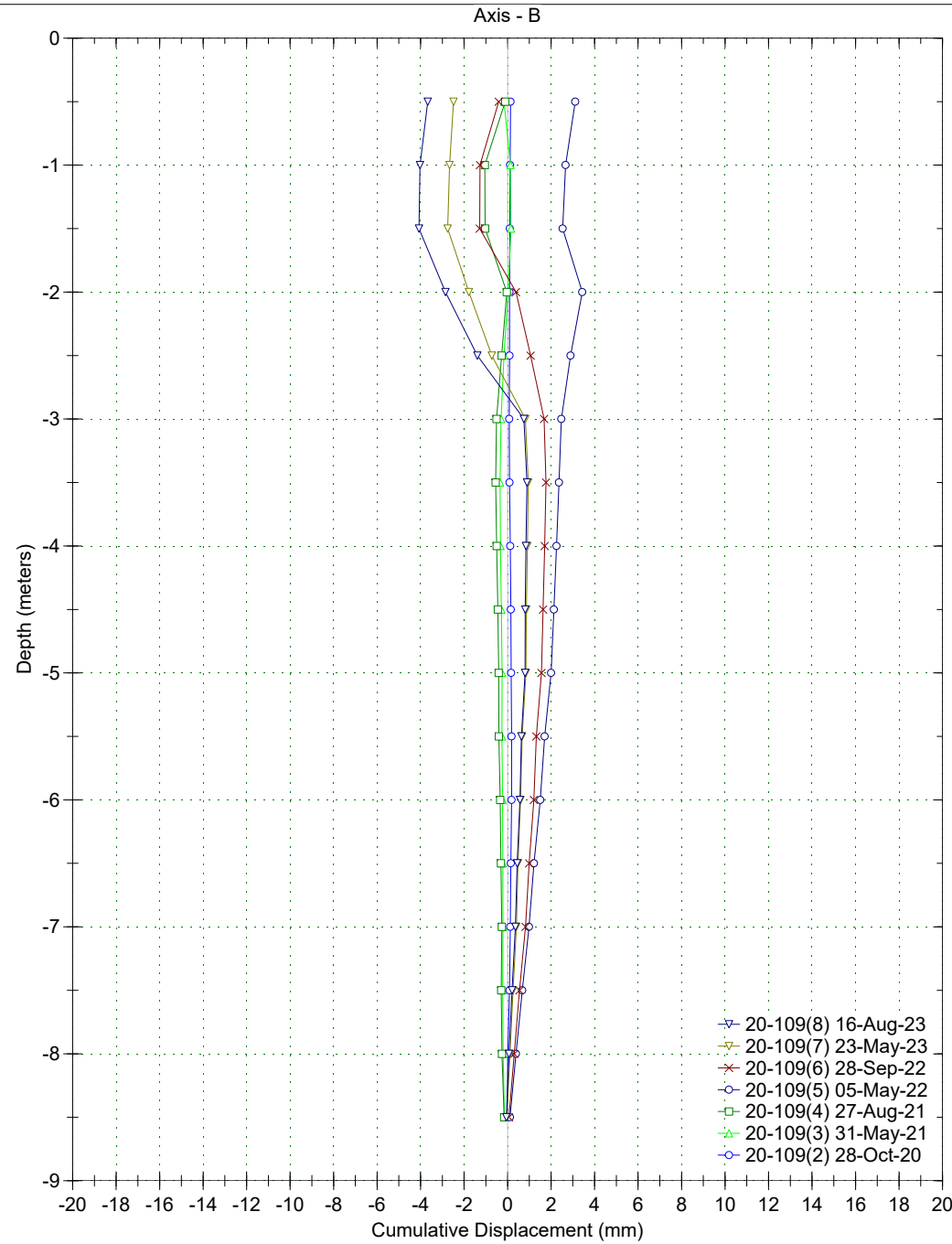
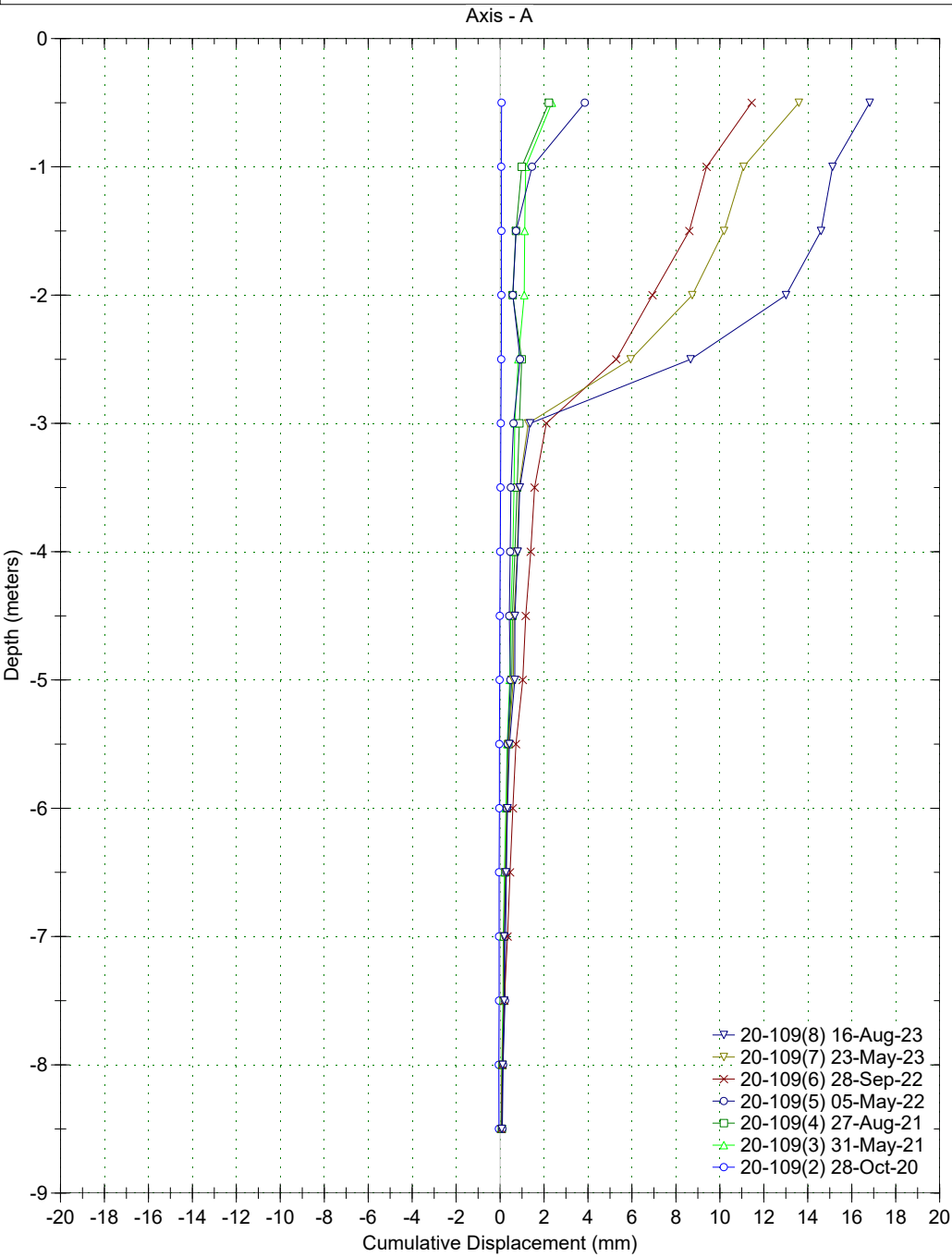
Borehole : COS-13-005 (Aug 13 2020 Baseline)  
 Project : Nutana Slope  
 Location : 316 Sask. Cres. E.  
 Northing : 5775631.299  
 Easting : 386078.8467  
 Collar : -0.1

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



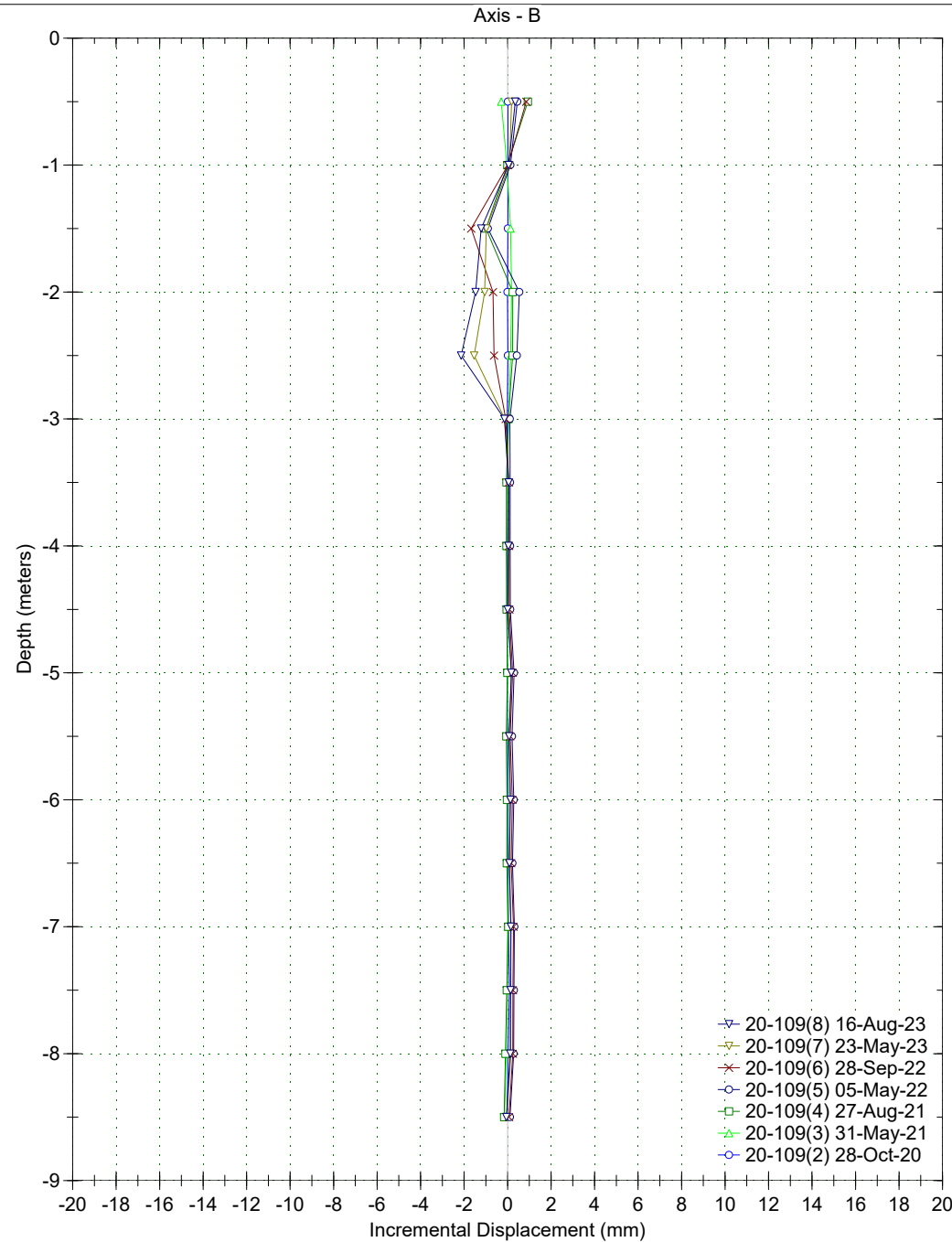
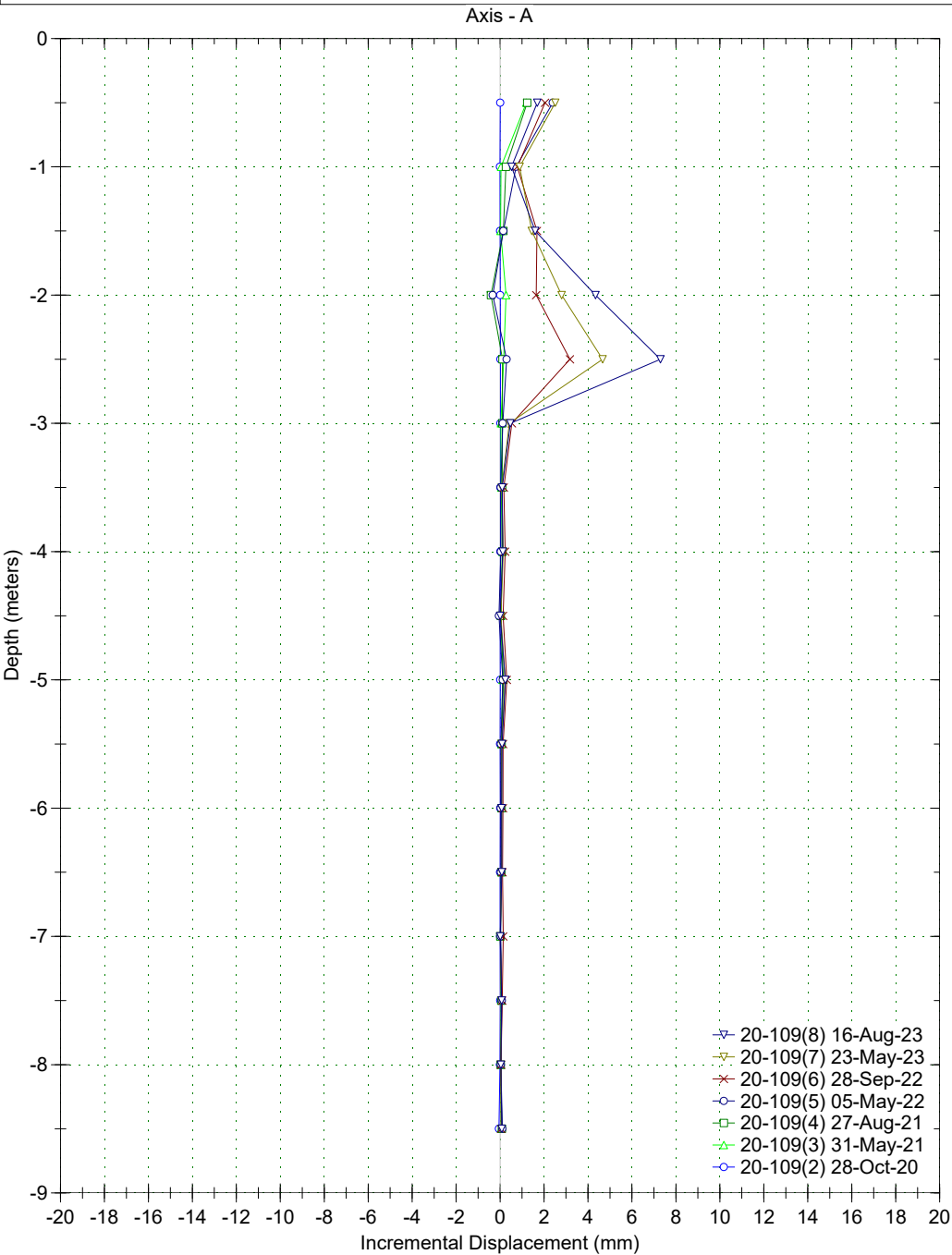
Borehole : 20-109  
 Project : Nutana Slope  
 Location :  
 Northing : 5775622  
 Easting : 385977  
 Collar :

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 :

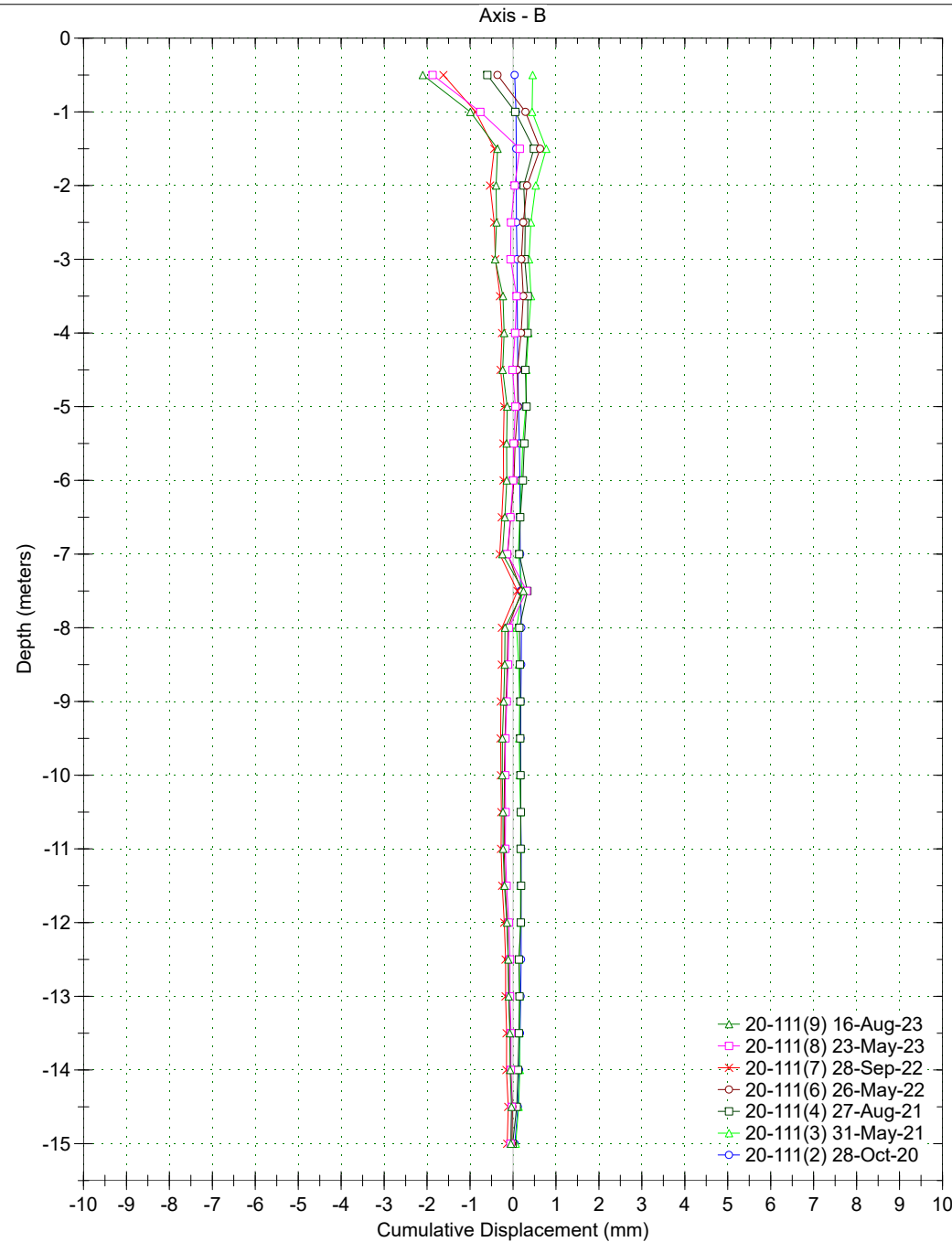
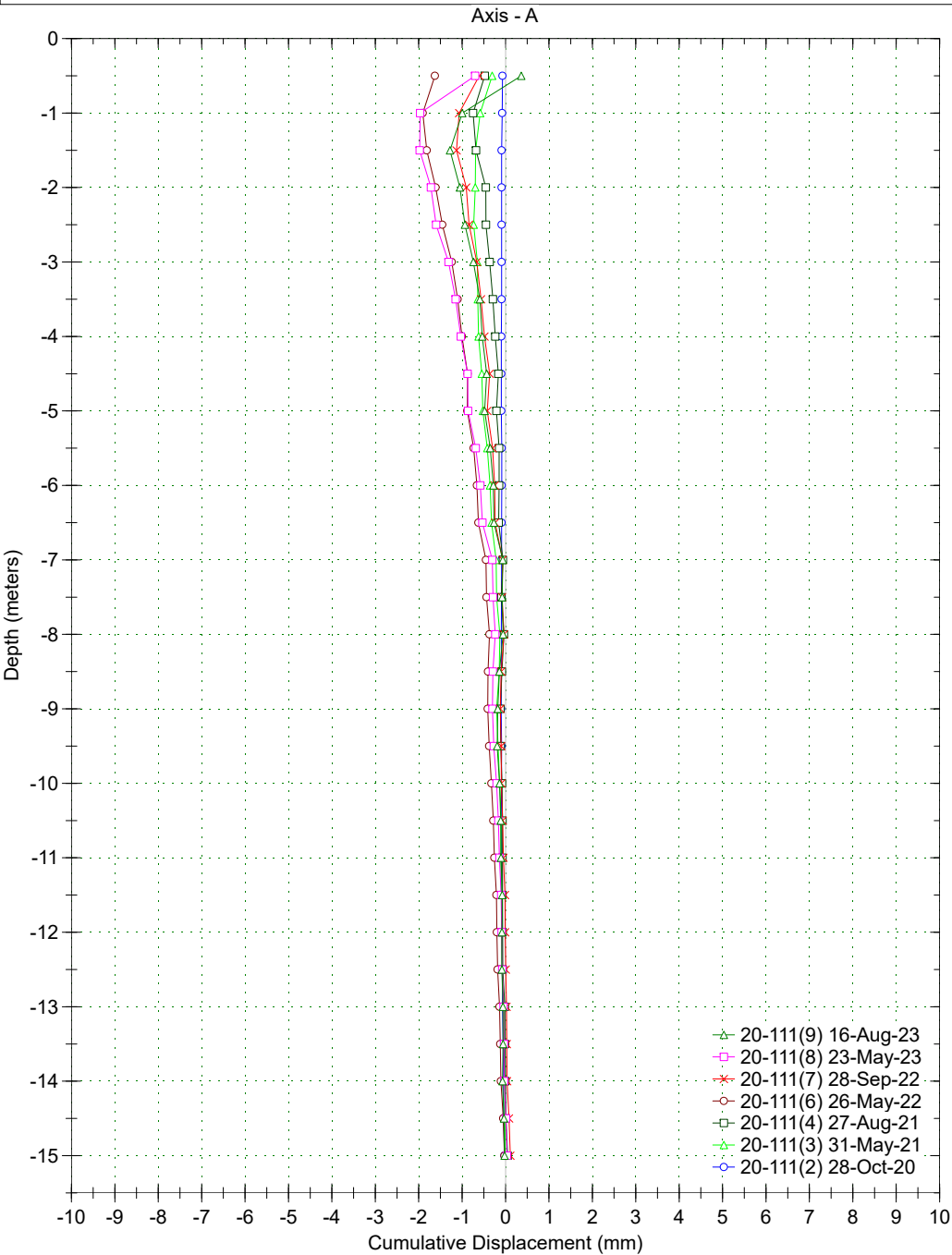
Spiral Correction : N/A  
Collar Elevation : 0.00 meters  
Reading Depth : 8.5 meters  
A+ Groove Azimuth :  
Base Reading : 2020 Oct 28 16:29  
Applied Azimuth : 0.0 degrees





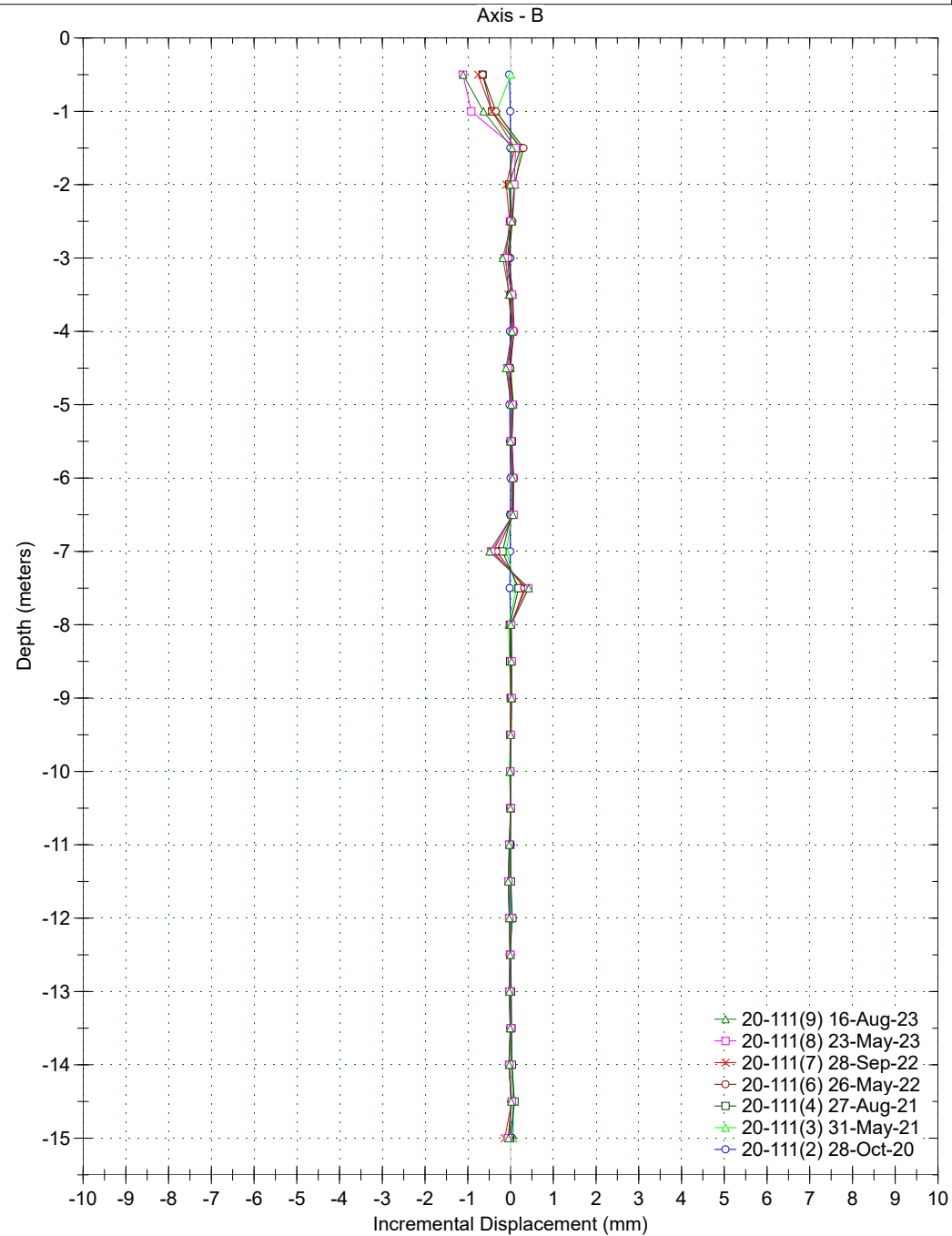
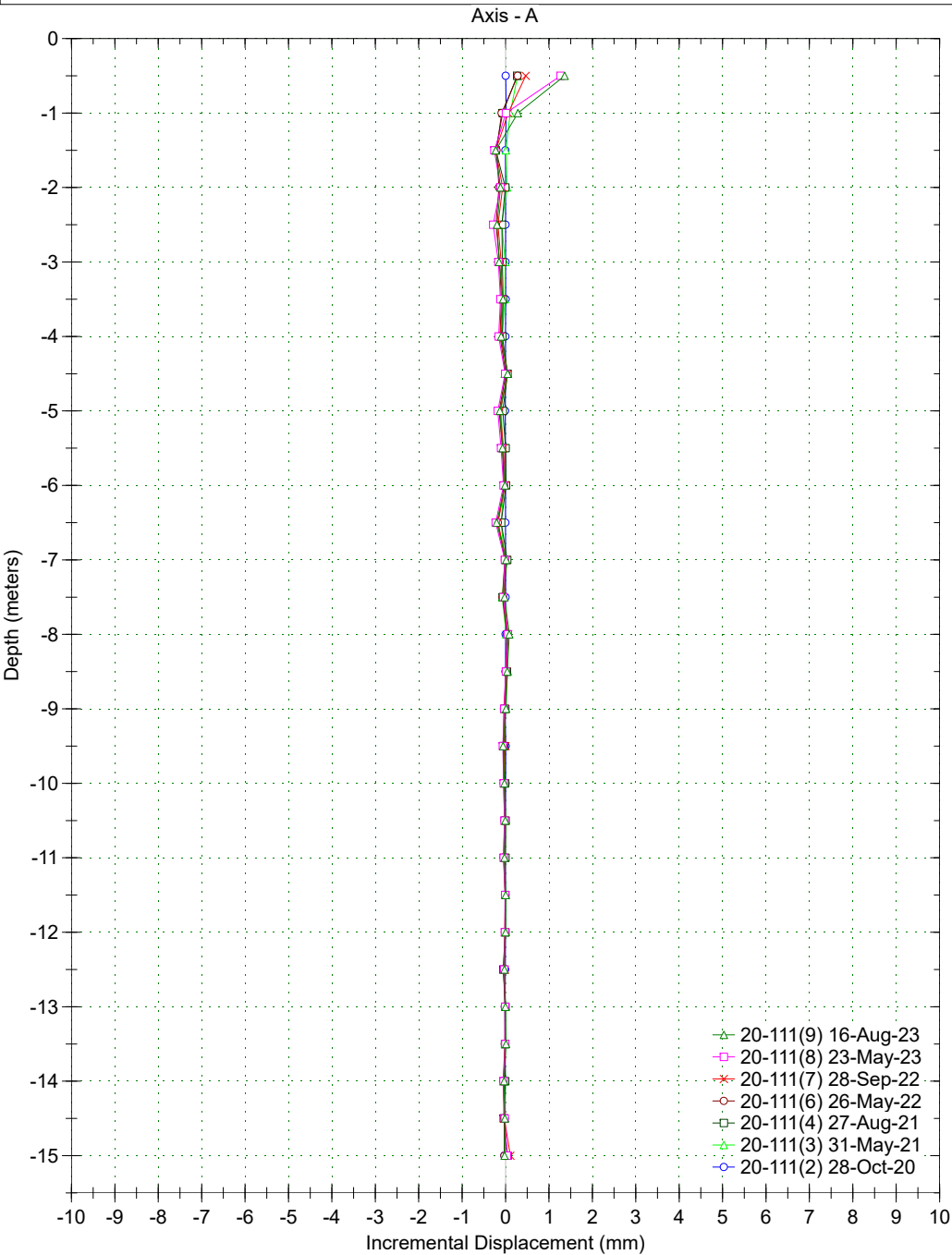
Borehole : 20-111  
Project : Nutana Slope  
Location :  
Northing : 5775568  
Easting : 385953  
Collar :

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



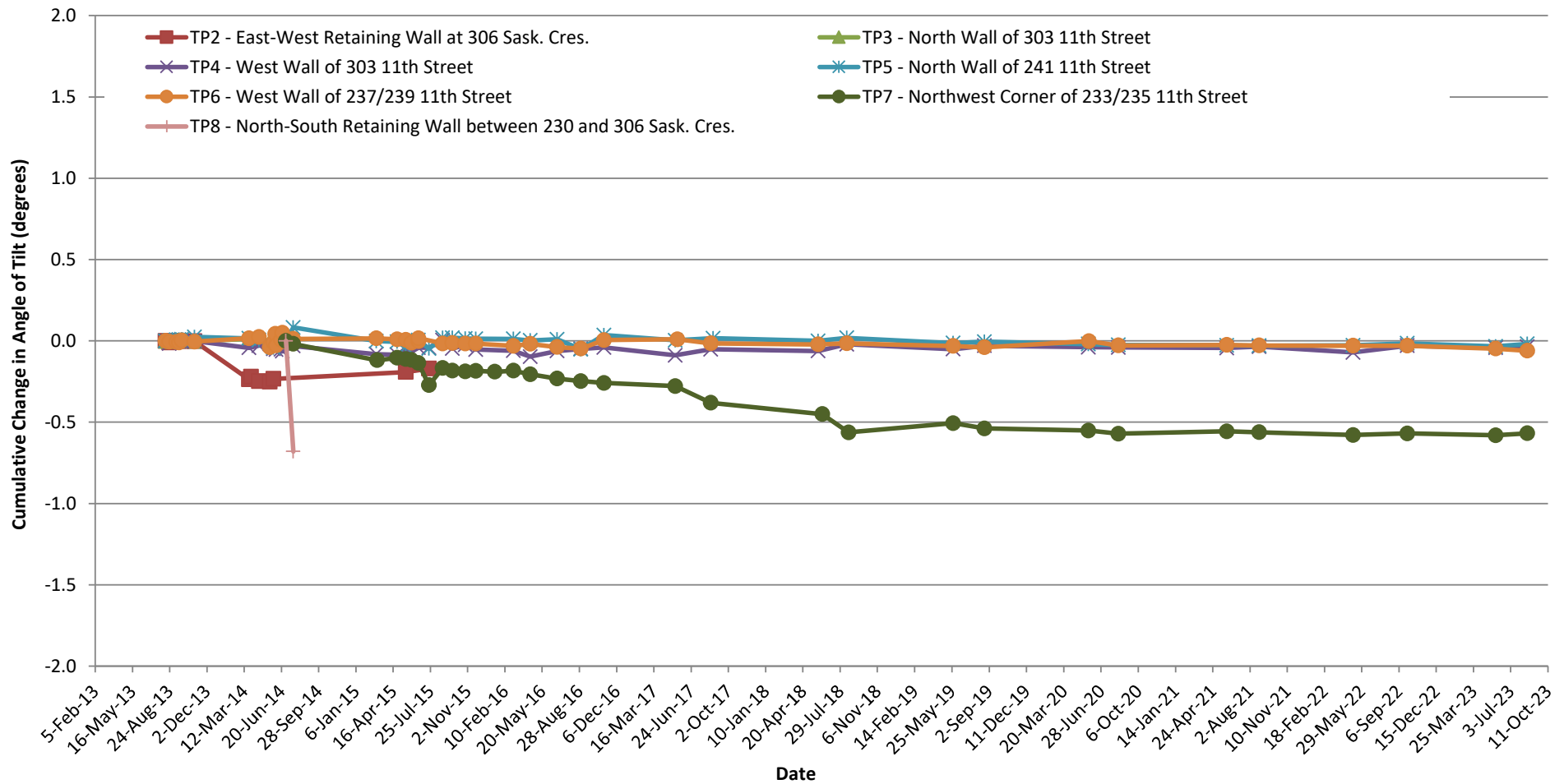
Borehole : 20-111  
Project : Nutana Slope  
Location :  
Northing : 5775568  
Easting : 385953  
Collar :

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

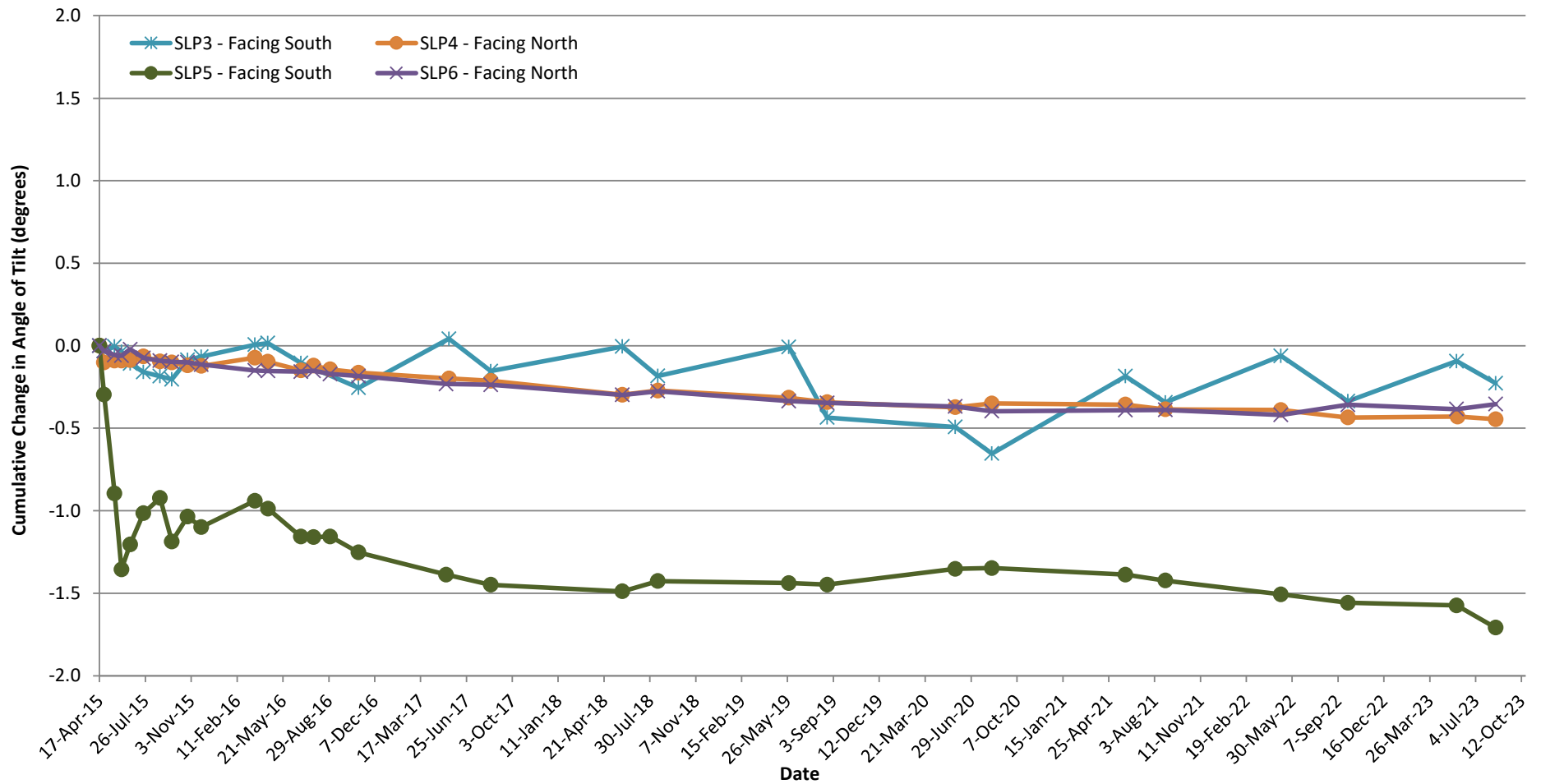




- Notes:
- 1) Positive changes in tilt indicate tilting toward the monitoring structure.
  - 2) TP1, located on the retaining wall between 230 and 306 Sask. Cres., is not monitored for health and safety reasons; monitoring results for this tilt plate show a change in angle of tilt of approximately 9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


**DRAFT**

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



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

**DRAFT**

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

## SITE PHOTOGRAPHS





Photograph 1: Looking west down the back alley at the East Failure (August 16, 2023)



Photograph 2: Looking west down the back alley at the West Failure (August 16, 2023)