ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS GRMP GRANDE PRAIRIE REGION – (GRANDE PRAIRIE SOUTH) INSTRUMENTATION MONITORING - SPRING 2024

THURBER ENGINEERING LTD.

Site Number	Location	Name	Hwy	km
GP042	HWY 40:36	GP042 Landslide Repairs	40:36	Km 37.4 to 38.2
Legal Description: 15-16-59-6 W6		**UTM Co-ordinates**		
		11U E 379994	N 5997080	

Current Monitoring:	30-May-2024	**Previous Monitoring**	27-Jun-2023
Instruments Read By:	Mr. Niraj Regmi, G.I.T and Mr. Nixson Mationg, of Thurber		
Instruments Read During This Site Visit			
Slope Inclinometers (SIs): SI22-W2, SI22-W3, SI22-W4, SI22-W5, SI22-W6, SI22-W7	**Pneumatic Piezometers (PN):** N/A	**Vibrating Wire Piezometers (VW):** VW20-S1, VW20-S3, VW20-DS1A, VW20-DS1B, VW20-DS2A, VW20-DS2B, VW20-DS3, VW20-DS6A, VW20-D3, VW20-D4	**Standpipe Piezometers (SP):** N/A
Load Cell (LC): N/A	**Strain Gauges:** N/A	**SAAs:** SAA22-P15	**Others:**

Readout Equipment Used			
Slope Inclinometers: RST Digital Inclinometer probe with a 2 ft. wheelbase and a RST Pocket PC readout	**Pneumatic Piezometers:**	**Vibrating Wire Piezometers:** Geokon GK404 Vibrating Wire Readout	**Standpipe Piezometers:**
Load Cell: Downloaded from CR6 Datalogger	**Strain Gauges:**	**SAAs:** Downloaded from CR6 Datalogger	**Others:**

Discussion	
Zones of New Movement:	None
Interpretation of Monitoring Results:	SI22-W2 and SI22-W3, installed in Pile Wall 1, show total cumulative pile head movements of 3.2 mm and 1.6 mm, respectively, in the upslope direction. The upslope movements measured in these instruments likely reflects the effect of locking off the anchors. SI22-W4, SI22-W5 and SI22-W6, installed in Pile Wall 2, show total cumulative pile head movements of 0.2 mm, 4.3 mm and 7.0 mm, respectively, in the downslope direction. These instruments show current movement rates over the piles ranging between no discernible movement in SI22-W4 to 3.5 mm/yr in SI22-W6. SI22-W7 in Pile Wall 3 shows a total cumulative pile head movement of 1.9 mm in the downslope direction. The current rate of movement in SI22-W7 is 1.5 mm/yr, corresponding to an increase in rate of movement of 3.4 mm/yr since the previous readings on June 27, 2023. SAA22-P15 has shown a cumulative movement of 0.4 mm in the upslope direction over the length of the pile since it was initialized. SAA22-P15 showed no discernible movement since the previous readings on June 27, 2023. SAA22-P15 showed a trend of higher cumulative movement during the 2023 to 2024 winter months, before returning to a similar cumulative movement as spring 2023.

	The pile head movements are all currently well within the design deflection limits for the wall. The downloaded data from the datalogger was missing readings between June 27 to October 18, 2023. The load cells showed decreases in measured load of between 2.19 kN in VC2419 (anchor 15U) to 5.40 kN in VC2420 (anchor 15L) since the previous readings on June 27, 2023.The load cells showed a trend of slowly decreasing, before reaching minimums in January 2024, and slowly increasing until May 2024. All of the anchor loads are still well below their SLS design loads. The active piezometers were last read on June 27, 2023. The piezometers showed changes in groundwater level ranging from a decrease of 0.52 m at VW20-DS2B to an increase of 0.22 m at VW20-DS1B. The current reading at VW20-DS1B, located downslope of the highway and south of the pile walls, is currently showing the highest groundwater level measured in the instrument since it was initialized.
Future Work:	The instruments should be read again in the fall of 2024. Consideration should be given to reducing the frequency of the datalogger readings to once a day.
Instrumentation Repairs:	Vibrating wire VW20-DS3 was found near the tree line but was damaged and nonfunctional and should be removed from future readings. Vibrating wire piezometers VW20-P2 to -P6 were found to have been paved over, and TH2-D6 was unable to be located. These instruments should be removed from future readings. No instrument repairs are required at this time.
Additional Comments:	

Attachments:	▪ Table GP042-1 Spring 2024 – Hwy 40:36 Landslide Repairs Slope Inclinometer Instrumentation Reading Summary ▪ Table GP042-2 Spring 2024 – Hwy 40:36 Landslide Repairs Shape Accelerometer Array Instrumentation Reading Summary ▪ Table GP042-3 Spring 2024 – Hwy 40:36 Landslide Repairs Vibrating Wire Load Cell Instrumentation Reading Summary ▪ Table GP042-4 Spring 2024 – Hwy 40:36 Landslide Repairs Vibrating Wire Piezometer Instrumentation Reading Summary ▪ Statement of Limitations and Conditions ▪ APPENDIX A – GP42-1 SPRING 2024 □ Field Inspector's report □ Site Plans Showing Approximate Instrument Locations (Drawing Nos. 22001-202102-RD-P011, 22001-202102-RD-P025 to P027) □ SI and SAA Reading Plots □ Figure GP042-1 (Vibrating Wire Load Cell Data) □ Figure GP042-2 (Vibrating Wire Piezometer Data – Active Instruments)

We trust this report meets your requirements at present. If you have any questions, please contact the undersigned at your convenience.

Yours very truly,
Thurber Engineering Ltd.
Don Proudfoot, M.Eng., P. Eng.
Partner | Senior Geotechnical Engineer

2024-07-15
Lucas Green, P.Eng.
Geotechnical Engineer

PERMIT TO PRACTICE
THURBER ENGINEERING LTD.
RM SIGNATURE: Don Proudfoot
RM APEGA ID #: 51674
DATE: July 15, 2024
PERMIT NUMBER: P005186
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

THURBER ENGINEERING LTD.

Table GP042-1: Spring 2024 – Hwy 40:36 Landslide Repairs Slope Inclinometer Instrumentation Reading Summary

Date Monitored: May 30, 2024

INSTRUMENT #	DATE INITIALIZED	TOTAL CUMULATIVE RESULTANT MOVEMENT AND DEPTH OF MOVEMENT TO DATE (mm)	MAXIMUM RATE OF MOVEMENT (mm/yr)	CURRENT STATUS OF SI	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)
Pile Wall 1								
SI22-W2	September 14, 2022	-3.2 over 1.8 m to 16.4 m depth in 181° direction	66.3 on October 6, 2022	Operational	June 27, 2023	0.2	-0.2	2.7
		-5.1 over 0 m to 16.4 m depth in 181° direction	-40.1 on September 29, 2022			No discernible movement	N/A	-25.4
SI22-W3	October 26, 2022	-1.6 over 1.7 m to 13.3 m depth in 146° direction	49.3 on November 2, 2022	Operational	June 27, 2023	No discernible movement	N/A	1.1
		0.7 over 0 m to 13.3 m depth in 146° direction	-116.4 on November 24, 2022			3.7	4.0	8.0
Pile Wall 2								
SI22-W4	July 20, 2022	0.2 over 1.1 m to 13.3 m depth in 182° direction	9.5 on September 29, 2022	Operational	June 27, 2023	No discernible movement	N/A	-1.4
		0.3 over 0 m to 13.3 m depth in 182° direction	9.5 on September 29, 2022			No discernible movement	N/A	-1.2
SI22-W5	July 20, 2022	4.3 over 1.1 m to 13.3 m depth in 177° direction	-51.7 on September 29, 2022	Operational	June 27, 2023	2.0	2.2	-0.4
		3.6 over 0 m to 13.3 m depth in 177° direction	-44.9 on September 29, 2022			1.6	1.7	0.4

Drawings 22001-202102-RD-P025, -26 and -27 in Appendix A shows the approximate location of the SIs

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Table GP042-1: Spring 2024 – Continued - Hwy 40:36 Landslide Repairs Slope Inclinometer Instrumentation Reading Summary

Date Monitored: May 30, 2024

INSTRUMENT #	DATE INITIALIZED	TOTAL CUMULATIVE RESULTANT MOVEMENT AND DEPTH OF MOVEMENT TO DATE (mm)	MAXIMUM RATE OF MOVEMENT (mm/yr)	CURRENT STATUS OF SI	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)
Pile Wall 2 - Continued								
SI22-W6	July 20, 2022	7.0 over 1.1 m to 12.7 m depth	-29.7 on September 29, 2022	Operational	June 27, 2023	3.3	3.5	-0.8
		7.1 over 0 m to 12.7 m depth	-30.7 on September 29, 2022			3.2	3.4	-0.6
Pile Wall 3								
SI22-W7	July 20, 2022	1.9 over 0.9 m to 14.3 m depth in 161° direction	-31.4 on September 29, 2022	Operational	June 27, 2023	1.4	1.5	3.4
		0.8 over 0 m to 14.3 m depth in 161° direction	22.3 on August 6, 2022			0.3	0.4	2.8

Drawings 22001-202102-RD-P025, -26 and -27 in Appendix A shows the approximate location of the SIs

Table GP042-2 –Spring 2024 – Hwy 40:36 Landslide Repairs Shape Accelerometer Array Instrumentation Reading Summary

Date Monitored: May 30, 2024

INSTRUMENT #	DATE INITIALIZED	TOTAL CUMULATIVE RESULTANT MOVEMENT AT NOTED DEPTH SINCE INITIAL READING (mm)	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)
SAA22-P15	November 24, 2022	-0.4 over 2.0 to 19.0 m depth	Operational	June 27, 2023	No discernible movement	N/A	-3.5

Drawing 22001-202102-RD-P025 in Appendix A shows the approximate location of the SAA

Table GP042-3: Spring 2024 – Hwy 40:36 Landslide Repairs Vibrating Wire Load Cell Instrumentation Reading Summary

Date Monitored: May 30, 2024

LOAD CELL SERIAL #	ANCHOR NUMBER	SLS DESIGN LOAD / LOCK-OFF LOAD (kN)	MAXIMUM RECORDED LOAD (kN)	RECORDED LOAD (MAY 30, 2024) (kN)	CHANGE IN LOAD COMPARED TO PREVIOUS RECORDED LOAD (JUNE 27, 2023) (kN)
VC2421	3U	255/125	125.97 on October 22, 2022	118.66	-3.97
VC2422	5L	265/75	95.11 on June 9, 2023	85.49	-4.77
VC2419	15U	255/125	125.97 on October 22, 2022	115.24	-2.19
VC2420	15L	265/75	89.39 on June 9, 2023	80.60	-5.40
VC2417	27U	255/125	125.97 on October 21, 2022	106.63	-2.99
VC2418	27L	265/75	91.24 on June 9, 2023	84.43	-4.63
VC2416	37U	255/110	113.03 on October 22, 2022	92.68	-3.73

Drawing 22001-202102-RD-P025 in Appendix A shows the approximate location of the load cells

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Table GP042-4 –Spring 2024 – Hwy 40:36 Landslide Repairs Vibrating Wire Piezometer Instrumentation Reading Summary (Active Instruments)

Date Monitored: May 30, 2024

INSTRUMENT #	DATE INITIALIZED	TIP DEPTH* (m)	TIP ELEV. (m)	CURRENT STATUS	HIGHEST MEASURED GROUNDWATER ELEVATION (m)	CURRENT GROUNDWATER ELEVATION (m)	PREVIOUS GROUNDWATER ELEVATION (JUNE 27, 2023) (m)	CHANGE IN WATER LEVEL SINCE PREVIOUS READING (m)
VW20-S1	June 28, 2020	16.80	1116.20	Operational	1122.84 on January 26, 2022	1120.67	1120.78	-0.11
VW20-S3	July 11, 2020	12.65	1140.28	Operational	1144.72 on July 11, 2020	1144.53	1144.46	0.07
VW20-D3	June 27, 2020	10.70	1133.30	Operational	1137.14 on June 29, 2020	1135.28	1135.29	-0.01
VW20-D4	June 30, 2020	11.60	1136.51	Operational	1138.73 on June 30, 2020	1136.51	1136.52	-0.01
VW20-DS1A	June 24, 2020	4.57	1116.24	Operational	1116.24 on June 24, 2020	1116.14	1116.09	0.05
VW20-DS1B	June 24, 2020	11.43	1111.34	Operational	1116.49 on June 24, 2020	1112.28	1112.06	0.22
VW20-DS2A	July 12, 2020	8.20	1126.02	Operational	1136.50 on July 12, 2020	1131.52	1131.75	-0.23
VW20-DS2B	July 12, 2020	22.20	1112.02	Operational	1140.33on July 12, 2020	1115.54	1116.06	-0.52
VW20-DS6A	July 5, 2020	6.10	1114.88	Operational	1119.86 on July 5, 2020	1117.16	1117.62	-0.46

Drawing 22001-202102-RD-P011 in Appendix A shows the approximate location of the active vibrating wire piezometers

* Refers to tip depth at time of installation

THURBER

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a) Nature and Exactness of Soil and Contaminant Description: Classification and identification of soils, rocks, geological units, contaminant materials and quantities have been based on investigations performed in accordance with the standards set out in Paragraph 1. Classification and identification of these factors are judgmental in nature. Comprehensive sampling and testing programs implemented with the appropriate equipment by experienced personnel may fail to locate some conditions. All investigations utilizing the standards of Paragraph 1 will involve an inherent risk that some conditions will not be detected and all documents or records summarizing such investigations will be based on assumptions of what exists between the actual points sampled. Actual conditions may vary significantly between the points investigated and the Client and all other persons making use of such documents or records with our express written consent should be aware of this risk and the Report is delivered subject to the express condition that such risk is accepted by the Client and such other persons. Some conditions are subject to change over time and those making use of the Report should be aware of this possibility and understand that the Report only presents the conditions at the sampled points at the time of sampling. If special concerns exist, or the Client has special considerations or requirements, the Client should disclose them so that additional or special investigations may be undertaken which would not otherwise be within the scope of investigations made for the purposes of the Report.

b) Reliance on Provided Information: The evaluation and conclusions contained in the Report have been prepared on the basis of conditions in evidence at the time of site inspections and on the basis of information provided to Thurber. Thurber has relied in good faith upon representations, information and instructions provided by the Client and others concerning the site. Accordingly, Thurber does not accept responsibility for any deficiency, misstatement or inaccuracy contained in the Report as a result of misstatements, omissions, misrepresentations, or fraudulent acts of the Client or other persons providing information relied on by Thurber. Thurber is entitled to rely on such representations, information and instructions and is not required to carry out investigations to determine the truth or accuracy of such representations, information and instructions.

c) Design Services: The Report may form part of design and construction documents for information purposes even though it may have been issued prior to final design being completed. Thurber should be retained to review final design, project plans and related documents prior to construction to confirm that they are consistent with the intent of the Report. Any differences that may exist between the Report's recommendations and the final design detailed in the contract documents should be reported to Thurber immediately so that Thurber can address potential conflicts.

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THURBER ENGINEERING LTD.

ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS GRMP (CON0022165)
PEACE REGION (GRANDE PRAIRIE DISTRICT – NORTH)
INSTRUMENTATION MONITORING RESULTS

SPRING 2024

APPENDIX A
DATA PRESENTATION

SITE GP042: HWY 40:36, LANDSLIDE REPAIRS

ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS
INSTRUMENTATION MONITORING FIELD SUMMARY (GP042)
SPRING 2024

Location:	GP042-1 and Bin Wall (HWY 40:36 km 37.5 to km 37.9)	**Readout:**	GK 404, S/N 364
File Number:	32123	**Extension:**	2.75"
Probe:	RST SI Set 8R	**Temp:**	15
Cable:	RST SI Set 8R	**Read by:**	NKR/NRM

SLOPE INCLINOMETER (SI) READINGS

SI#	GPS Location (UTM 11)		Date	Stickup (m)	Depth from top of casing (ft)	Azimuth of A+ Groove	Current Bottom Depth Readings				Probe/ Reel #	Remarks
	Easting (m)	Northing (m)					A+	A-	B+	B-		
SI22-W2	379994	5997080	30-May-24	0.99	56 to 2	155	62	-56	39	-47	8R	
SI22-W3	380002	5997107	30-May-24	1.07	50 to 2	130	-410	424	-95	87	8R	
SI22-W4	380036	5997148	30-May-24	1.01	46 to 2	111	519	-510	645	-645	8R	
SI22-W5	380042	5997170	30-May-24	1.07	46 to 2	51	-786	799	595	-600	8R	
SI22-W6	380058	5997191	30-May-24	1.00	44 to 2		667	-654	846	-848	8R	
SI22-W7	380082	5997271	30-May-24	1.20	50 to 2	105	-207	221	1134	-1139	8R	

SHAPE ACCELEROMETER ARRAY (SAA) READINGS

SAA#	GPS Location (UTM 11)		Date	Download Reading from Datalogger	Identification Number
	Easting (m)	Northing (m)			
SAA22-P15	Attached to Pile P15		30-May-24		SAAV 465394

VIBRATING WIRE LOAD CELL READINGS

Anchor #	GPS Location (UTM 11)		Date	Download Reading from Datalogger	Load Cells
	Easting (m)	Northing (m)			
3U	Attached to Pile P3		30-May-24		VC2421
5L	Attached to Pile P51				VC2422
15U	Attached to Pile P15				VC2419
15L	Attached to Pile P15				VC2420
27U	Attached to Pile P27				VC2417
27L	Attached to Pile P27				VC2418
37U	Attached to Pile P37				VC2416

VIBRATING WIRE PIEZOMETER (VW) READINGS

Location	Serial	GPS Location (UTM 11)		Location	Date	Reading		Comments
		Easting (m)	Northing (m)			B Units	Temp °C	
VW20-P2	67098	379983	5997067	Flush Mount (9/16")	27-Jun-23			Paved over the flushmount
VW20-P3	67094	379994	5997093	Flush Mount (11/16")	27-Jun-23			Paved over the flushmount
VW20-P4	67105	380022	5997156	Flush Mount (11/16")	27-Jun-23			Paved over the flushmount
VW20-P5	67104	380040	5997194	Flush Mount (11/16")	27-Jun-23			Paved over the flushmount
VW20-P6	67103	380051	5997221	Flush Mount (11/16")	27-Jun-23			Paved over the flushmount
VW20-S1	67106	379955	5996995	South of wall 1.	30-May-24	8673.7	5.9	
VW20-S3	67102	380125	5997343	North of wall 3.	30-May-24	8604.2	6.2	
VW20-DS1A	67086	379928	5996898	Km 37.6 slide area.	30-May-24	8456.8	5.2	
VW20-DS1B	67089	379928	5996898	Km 37.6 slide area.	30-May-24	8483	6.4	
VW20-DS2A	67092	380002	5997067	Attached to SI TH20-DS2	30-May-24	8292.6	6.4	
VW20-DS2B	67097	380002	5997067	Attached to SI TH20-DS2	30-May-24	8704.3	5.9	
VW20-DS3	67074	380041	5997151	Moved to treeline downslope	27-Jun-23			Found near tree line, damaged and does not work
VW20-DS6A	67077	380098	5997159		30-May-24	8384.4	4.7	
VW20-D3	67073	380008	5997154	West ditch by hill 1.	30-May-24	8524	6.2	
VW20-D4	67076	380028	5997200	West ditch by hill 1.	30-May-24	8699.7	6.3	

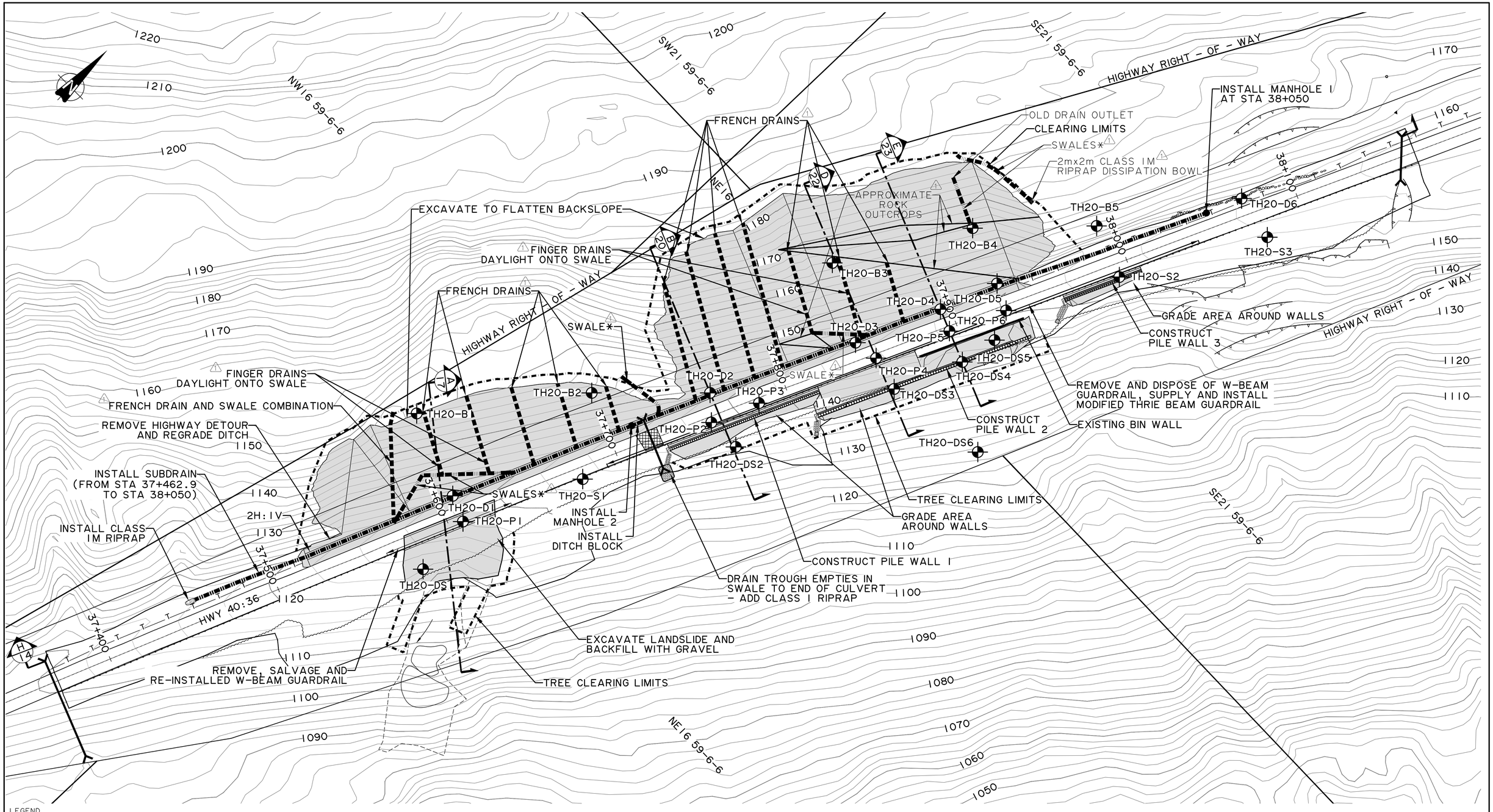
STANDPIPE PIEZOMETER (SP) READINGS

Location	GPS Location (UTM 11)		Date	Stickup (m)	Water level below top of pipe (m)	Total Depth of Standpipe from top (m)	Comments
	Easting (m)	Northing (m)					
TH20-D6	380102	5997360	30-May-24	-	-	-	Possibly buried (coud not find)

INSPECTOR REPORT

Check SIs with dummy probe before reading
TH20-DS2 Sheared off at 28 ft, Probe wont go past 28 ft.

DRAWING 22001-202102-RD-P011
HIGHWAY 40:36
CONTRACT 22001
DESCRIPTION SITE PLAN SHOWING OVERALL DESIGN
PHOTO
DATE
BY
SURVEYED
DEPARTMENT BAR CODE



LEGEND

- APPROXIMATE TEST HOLE LOCATION
- HIGHWAY 40:36
- LANDSLIDE SCARP CRACK
- GUARD RAIL
- BURIED COMMUNICATION CABLE
- GROUND SURFACE CONTOUR IN METRES (CONTOUR INTERVAL = 2m)
- SEEPAGE
- TREE LINE
- CENTERLINE OF SUBDRAIN

NOTES:

1. BASE PLAN PROVIDED BY WSP, SITE SURVEYED ON JUNE 26, 2020.
2. NAD83 UTM 11 COORDINATE SYSTEM.
3. GROUND SURFACE CONTOURS OUTSIDE SURVEY LIMITS FROM 2005 LIDAR.

* REFER TO SECTION Z ON DWG. 22001-202102-RD-P018 FOR SWALE DETAIL.

SCALE: 1:1000

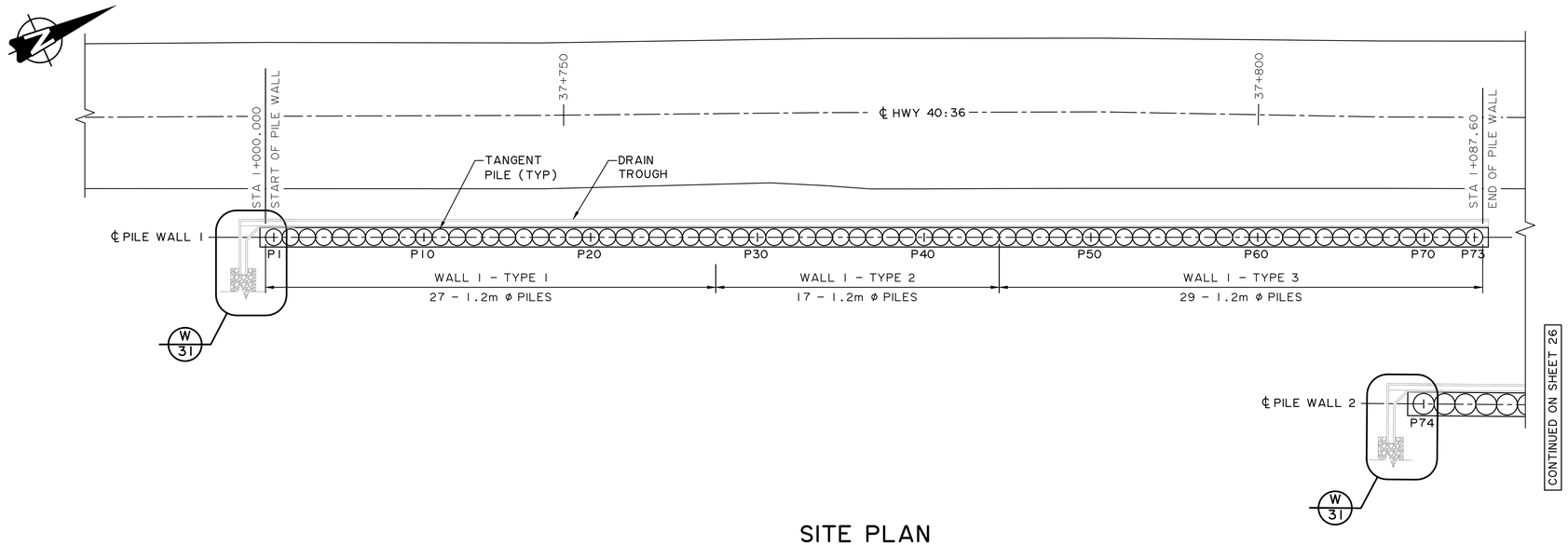
CONSULTANT: THURBER ENGINEERING LTD. 29190
DESIGNER: DATE
CHECKER: DATE

REV	DATE	REVISION	BY
5			
4			
3			
2			
1	2021-10-20	FINGER DRAIN UPDATE	DWP

Alberta Transportation

HWY 40:36 KM 37.4 TO 38.2
LANDSLIDE REPAIRS (GP042)
SITE PLAN SHOWING OVERALL DESIGN

DATE	LOCATION	SITE	CONTRACT	HIGHWAY	SHEET	DRAWING
2021-03-18	NE16/SE21-59-6-W6M	GP042	22001	40:36	11 OF 34	22001-202102-RD-P011



SITE PLAN

1:200

GENERAL NOTES

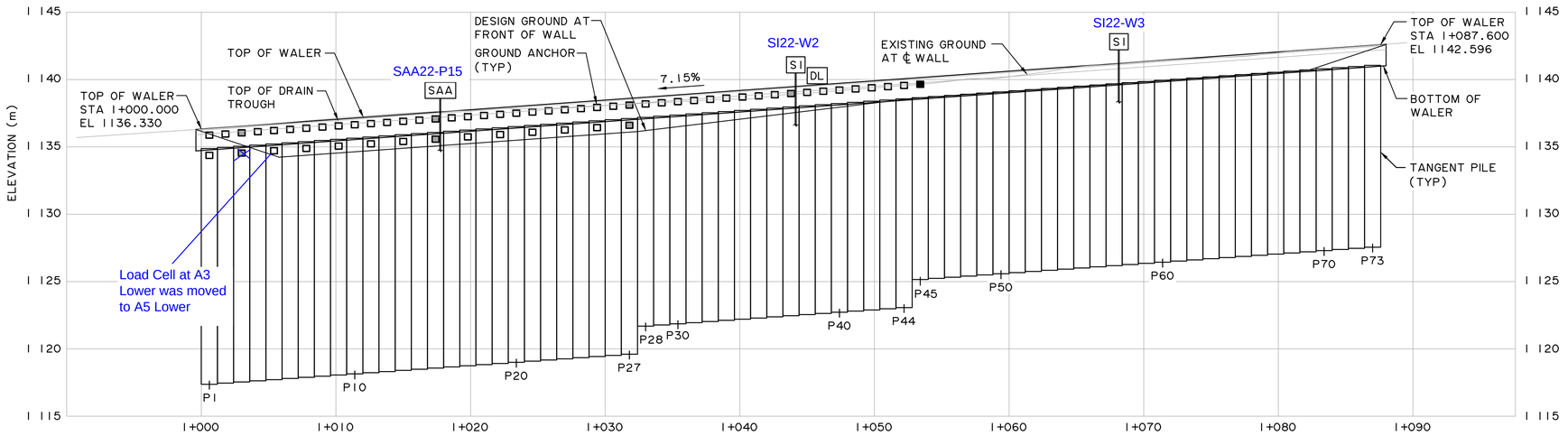
- ALL DIMENSIONS SHOWN ON THE PILE WALL GENERAL LAYOUT ARE GIVEN IN METRES. ALL OTHER PILE WALL DRAWINGS ARE DIMENSIONED IN MILLIMETRES EXCEPT FOR STATIONS AND ELEVATIONS WHICH ARE GIVEN IN METRES

DESIGN

- CSA S6:19 CANADIAN HIGHWAY BRIDGE DESIGN CODE

ITEM		UNIT	TOT EST	AS CONST
REINFORCING STEEL	PLAIN	kg	315 780	–
CONCRETE – CLASS C		m^3	540	–
CONCRETE – CLASS PILE		m^3	3 680	–
DRILLED CONCRETE PILES – 1 200 ø	DRILL RIG SET-UP	PILE	110	–
	PILE INSTALLATION	m	1 645	–
DRILLED CONCRETE PILES – 1 500 ø	DRILL RIG SET-UP	PILE	83	–
	PILE INSTALLATION	m	1 030	–

QUANTITY ESTIMATE



ELEVATION – PILE WALL 1

SHOWN ALONG PILE WALL CENTRELINE 1:200

LEGEND

- SI — SLOPE INCLINOMETER
- SAA — SHAPE ACCELERATION ARRAY
- DL — DATA LOGGER
- GROUND ANCHOR
- GROUND ANCHOR WITH LOAD CELL
- GROUND ANCHOR FOR PRE-PRODUCTION TEST

CONSULTANT: THURBER ENGINEERING LTD. / DIALOG — AB000733-2002424

DESIGNER | CHECKER

REV	DATE	REVISION	BY
5			
4			
3			
2			
1			

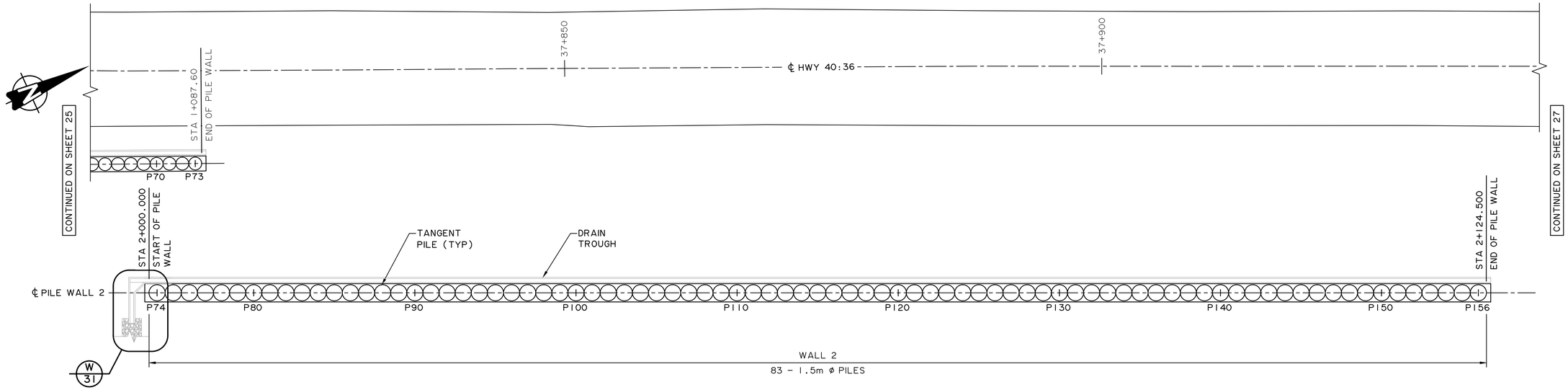
DATE	LOCATION	SITE
2021-03-18	NE16/SE21-59-6-W6M	GP042

Alberta Transportation

HWY 40:36 – km 37.4 to 38.2
LANDSLIDE REPAIRS (GP042)
PILE WALL GENERAL LAYOUT – SHEET 1

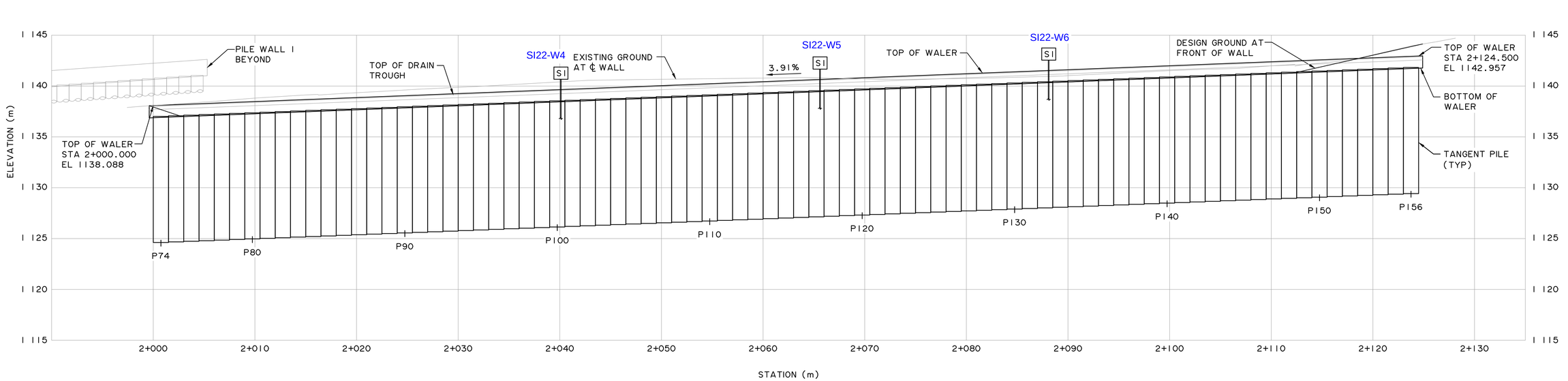
CONTRACT	HIGHWAY	SHEET	DRAWING
22001	40:36	25 OF 34	22001-202102-RD-P025

DRAWING 22001-202102-RD-P025
HIGHWAY 40:36
CONTRACT 22001
DESCRIPTION HWY 40:36 – km 37.4 to 38.2 LANDSLIDE REPAIRS (GP042)
PHOTO
DATE –
BY –
SURVEYED
DEPARTMENT BAR CODE



SITE PLAN

1:200



LEGEND

SI	SLOPE INCLINOMETER
SAA	SHAPE ACCELERATION ARRAY
DL	DATA LOGGER
▫	GROUND ANCHOR
▪	GROUND ANCHOR WITH LOAD CELL
■	GROUND ANCHOR FOR PRE-PRODUCTION TEST

ELEVATION - PILE WALL 2

SHOWN ALONG PILE WALL CENTRELINE 1:200

CONSULTANT
THURBER ENGINEERING LTD.
DIALOG
AB000733-2002424

DESIGNER | CHECKER

REV	DATE	REVISION	BY
5			
4			
3			
2			
1			

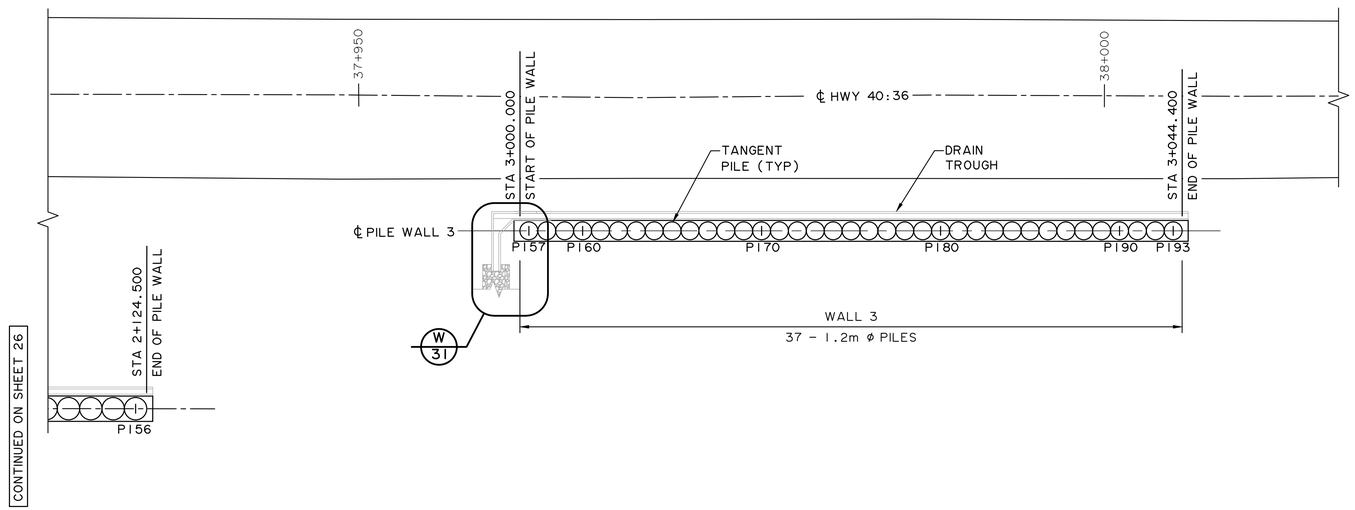
Alberta Transportation

HWY 40:36 - km 37.4 to 38.2
LANDSLIDE REPAIRS (GP042)
PILE WALL GENERAL LAYOUT - SHEET 2

DATE	LOCATION	SITE
2021-03-18	NE16/SE21-59-6-W6M	GP042

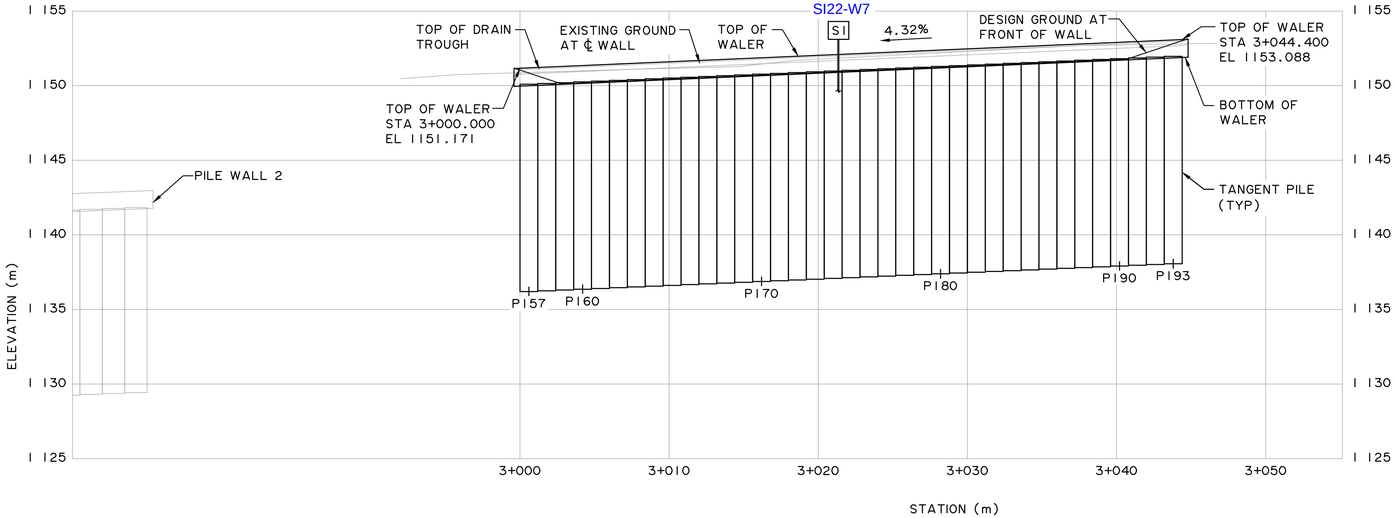
CONTRACT	HIGHWAY	SHEET	DRAWING
22001	40:36	26 OF 34	22001-202102-RD-P026

DEPARTMENT BAR CODE
DESCRIPTION: HWY 40:36 - km 37.4 to 38.2 LANDSLIDE REPAIRS (GP042)
SURVEYED | BY | - | DATE | -
PHOTO
HIGHWAY 40:36
CONTRACT 22001
DRAWING 22001-202102-RD-P026



SITE PLAN

1:200



LEGEND

- SI — SLOPE INCLINOMETER
- SAA — SHAPE ACCELERATION ARRAY
- DL — DATA LOGGER
- GROUND ANCHOR
- GROUND ANCHOR WITH LOAD CELL
- GROUND ANCHOR FOR PRE-PRODUCTION TEST

ELEVATION – PILE WALL 3

SHOWN ALONG PILE WALL CENTRELINE 1:200

DEPARTMENT BAR CODE | DESCRIPTION: HWY 40:36 – km 37.4 to 38.2 LANDSLIDE REPAIRS (GP042) | SURVEYED | BY | DATE | PHOTO | CONTRACT 22001 | HIGHWAY 40:36 | DRAWING 22001-202102-RD-P027

CONSULTANT: THURBER ENGINEERING LTD. / DIALOG — AB000733-2002424

DESIGNER | CHECKER

REV	DATE	REVISION	BY
5			
4			
3			
2			
1			

DATE	LOCATION	SITE
2021-03-18	NE16/SE21-59-6-W6M	GP042

Alberta Transportation

HWY 40:36 – km 37.4 to 38.2
LANDSLIDE REPAIRS (GP042)
PILE WALL GENERAL LAYOUT – SHEET 3

CONTRACT	HIGHWAY	SHEET	DRAWING
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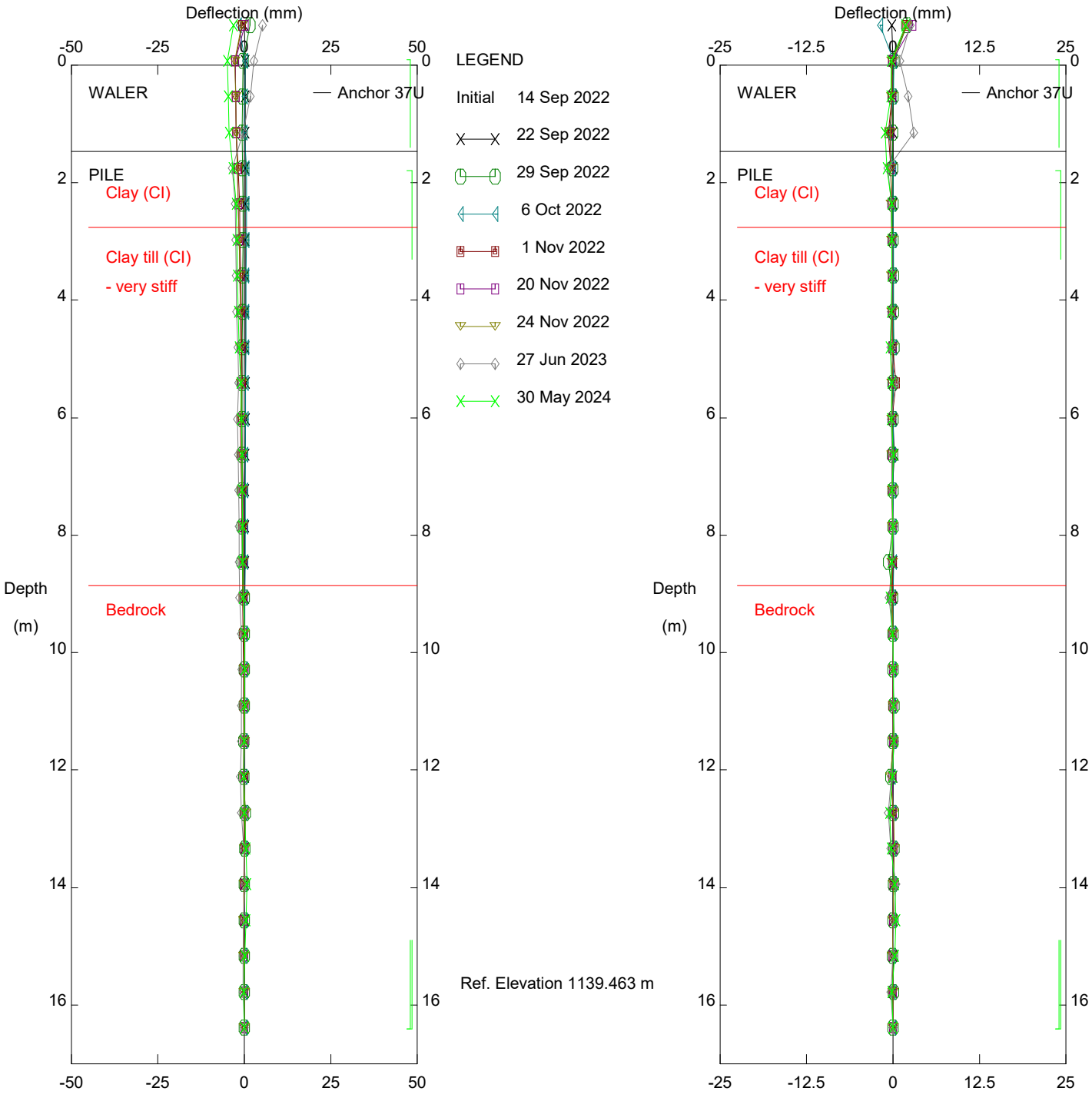
Thurber Engineering Ltd.



Cumulative Deflection

Direction A

Incremental Deflection

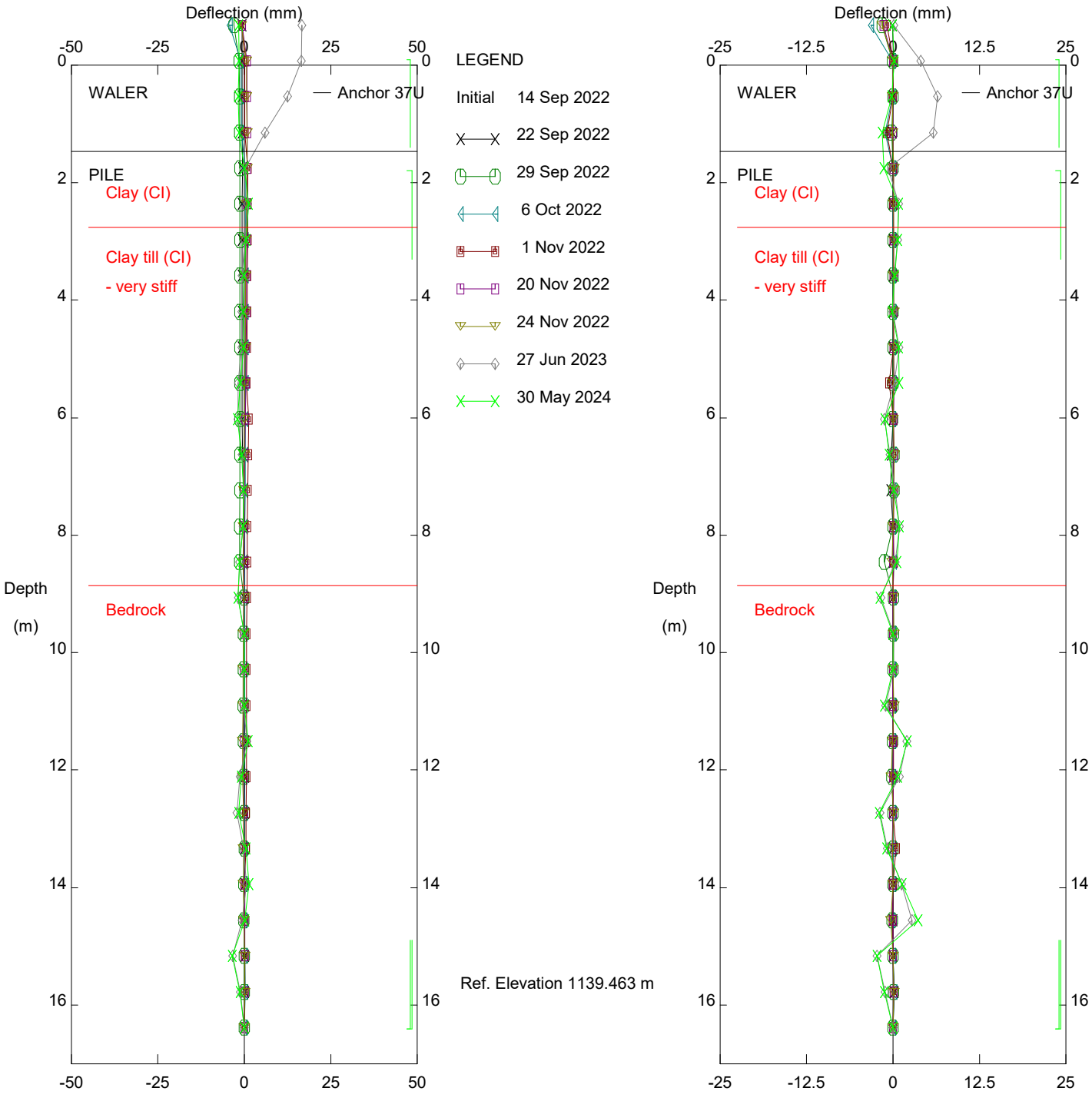
Direction A

GP042 Slope Stabilization, Inclinometer SI22-W2

TEC

H:\32000\32121 AT GRMP Peace River District 2021-2025\Section C\2024A-Spring\Additional Sites\GP042 - 29190\SI readings\SI22-W2_reinitialized.gtl

Thurber Engineering Ltd.



Cumulative Deflection

Direction B

Incremental Deflection

Direction B

GP042 Slope Stabilization, Inclinometer SI22-W2

TEC

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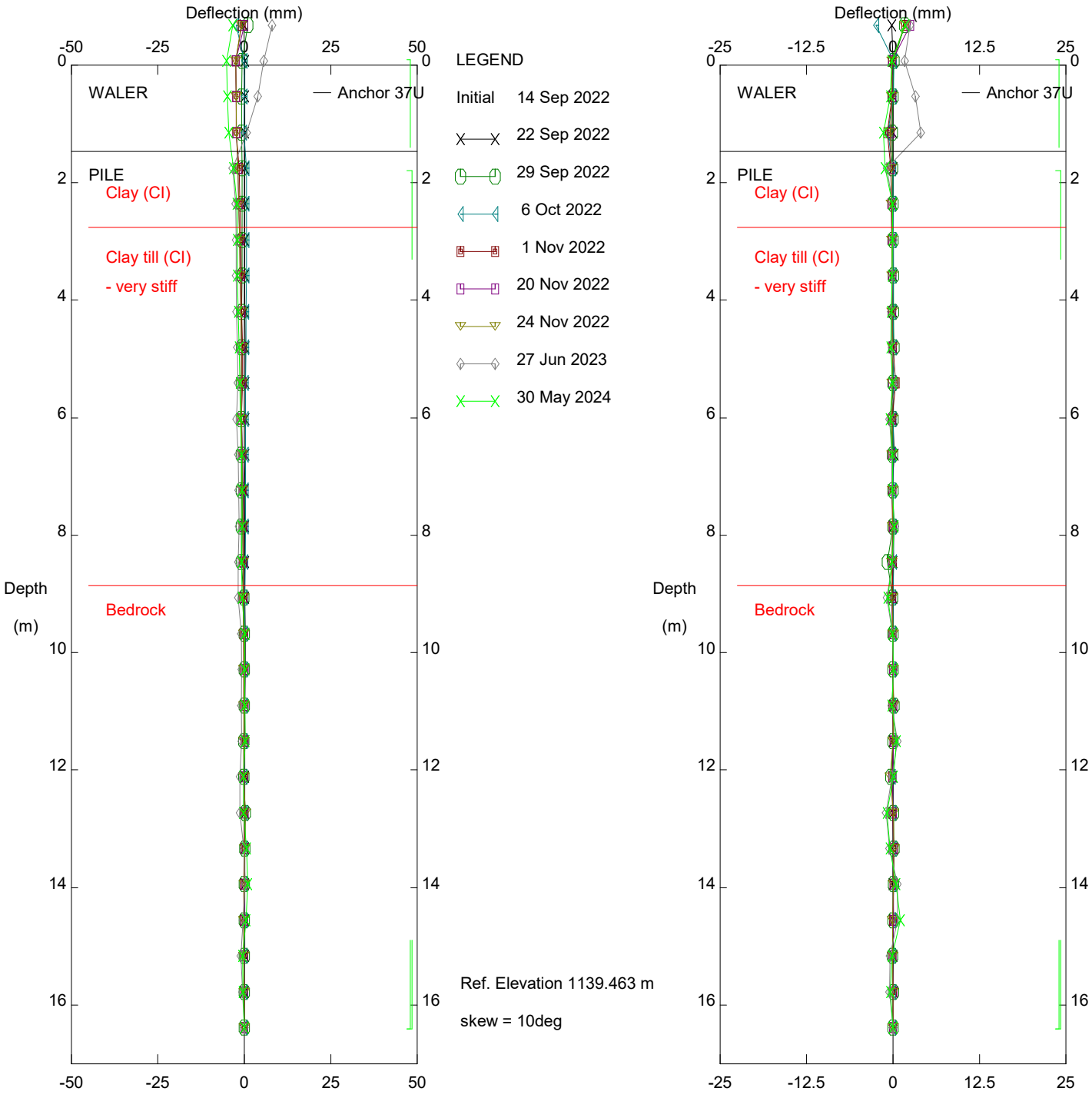
Thurber Engineering Ltd.



Cumulative Deflection

Direction X

Incremental Deflection

Direction X

GP042 Slope Stabilization, Inclinometer SI22-W2

TEC

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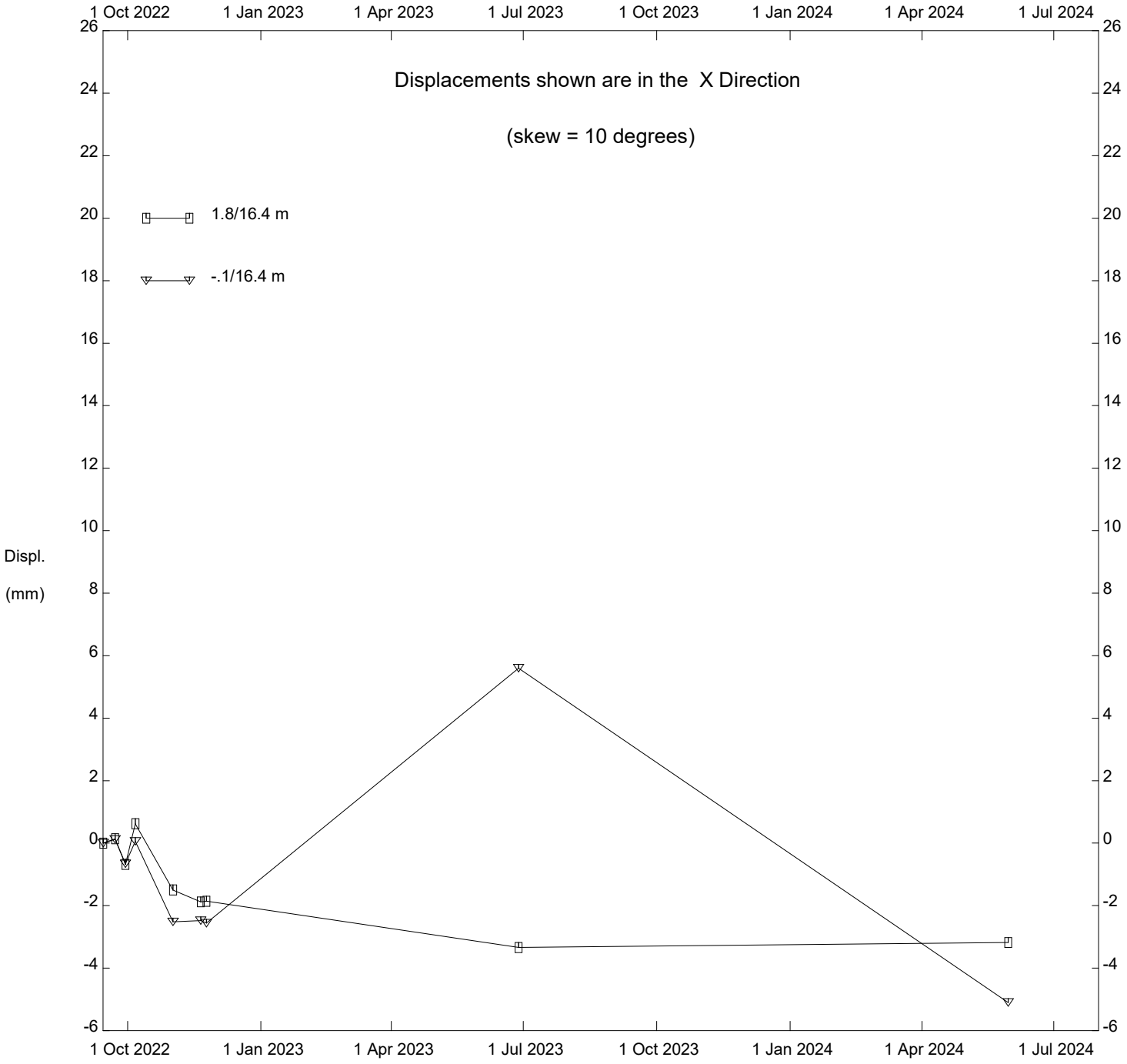
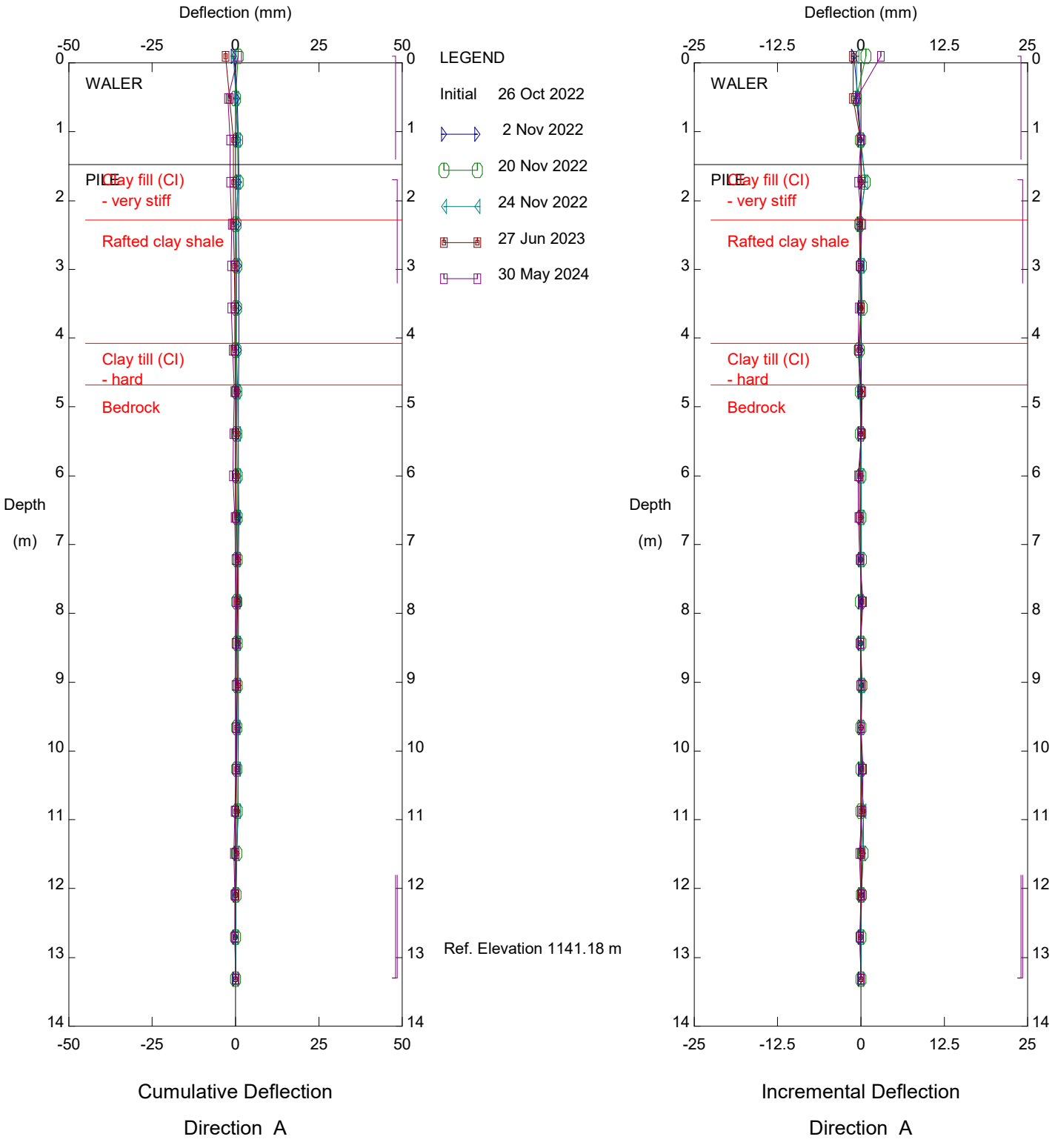
Thurber Engineering Ltd.



GP042 Slope Stabilization, Inclinometer SI22-W2

TEC

Thurber Engineering Ltd.



Cumulative Deflection

Direction A

Incremental Deflection

Direction A

GP042 Slope Stabilization, Inclinometer SI22-W3

TEC

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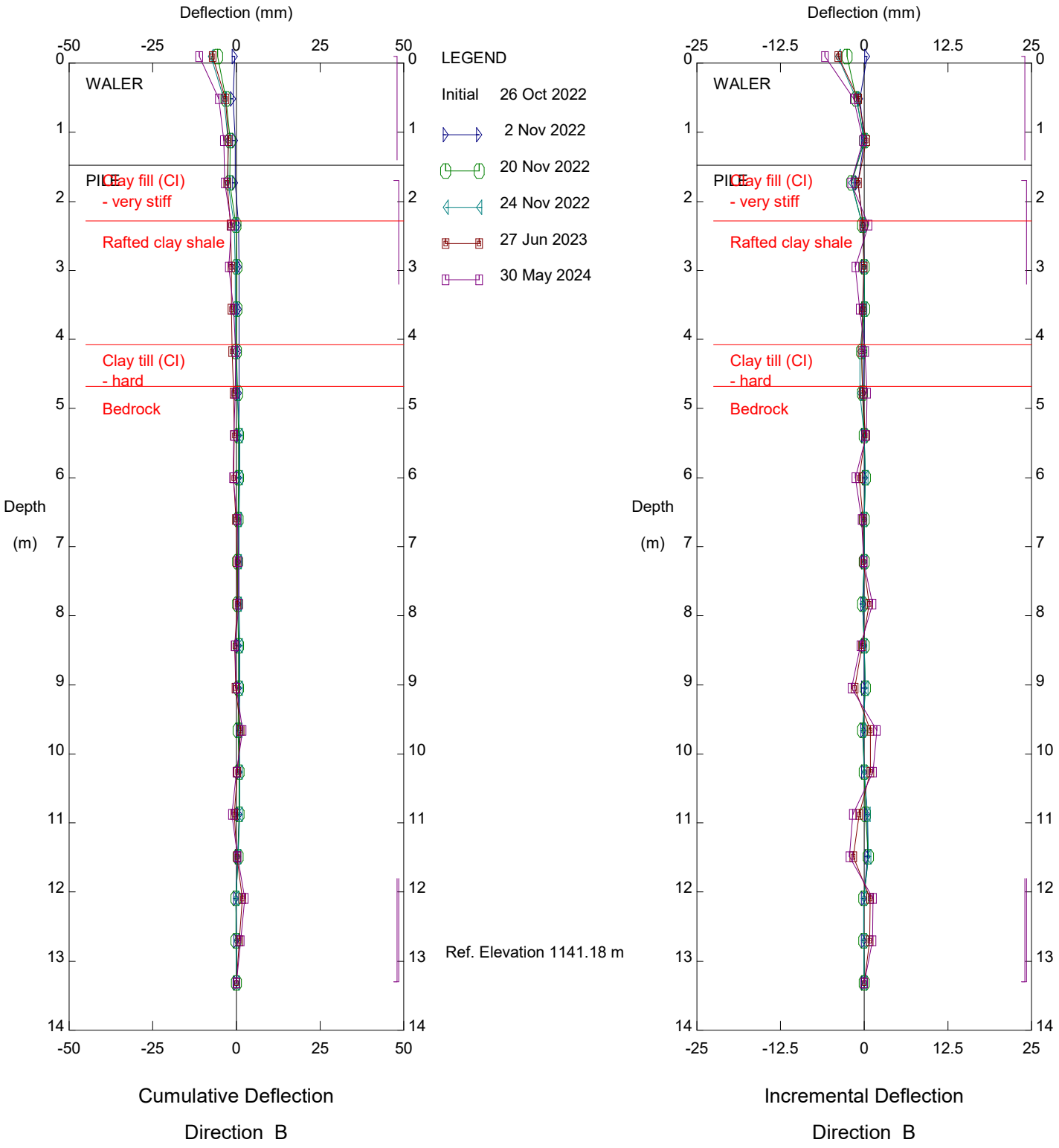
Thurber Engineering Ltd.



Cumulative Deflection

Direction B

Incremental Deflection

Direction B

GP042 Slope Stabilization, Inclinometer SI22-W3

TEC

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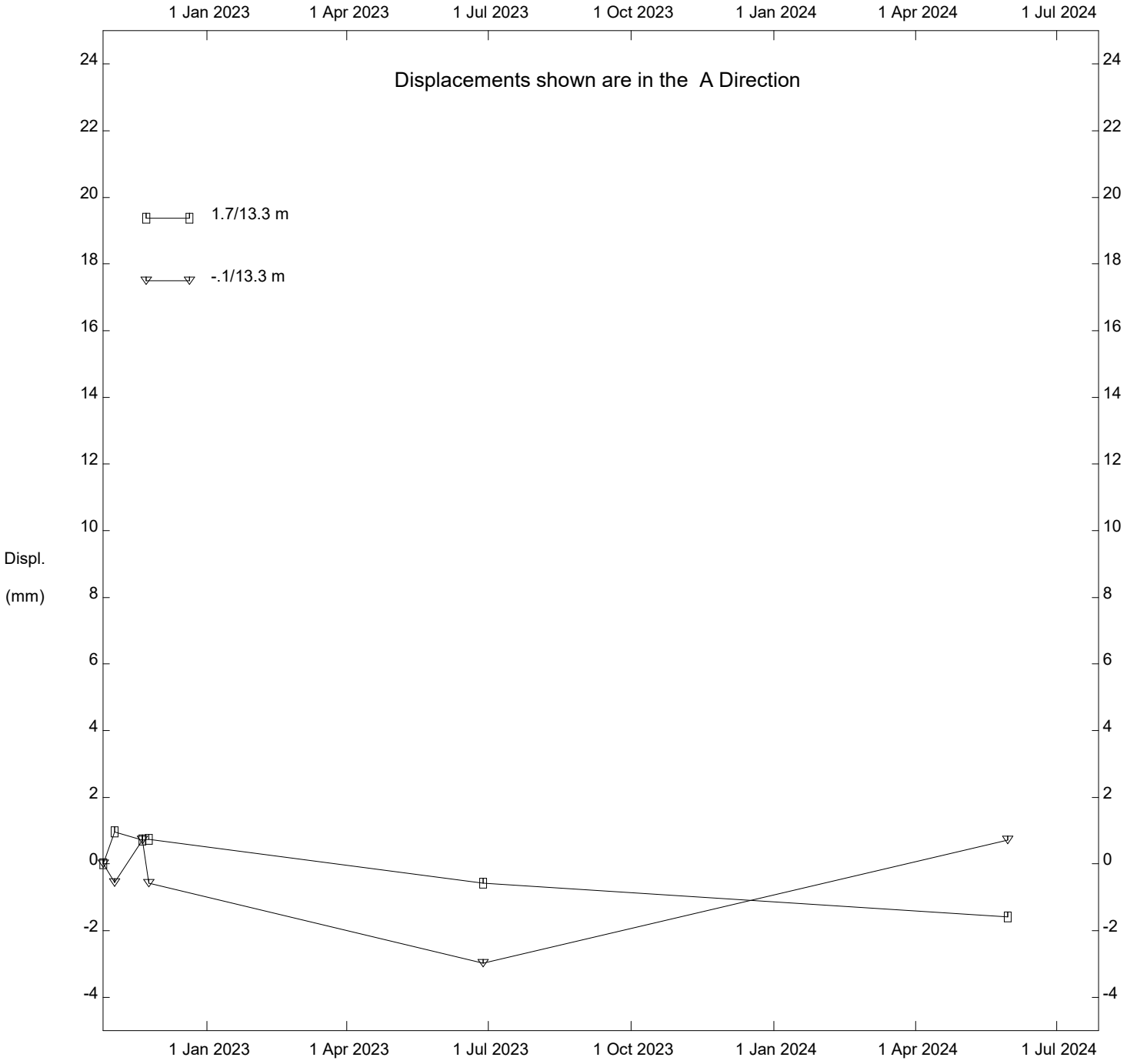
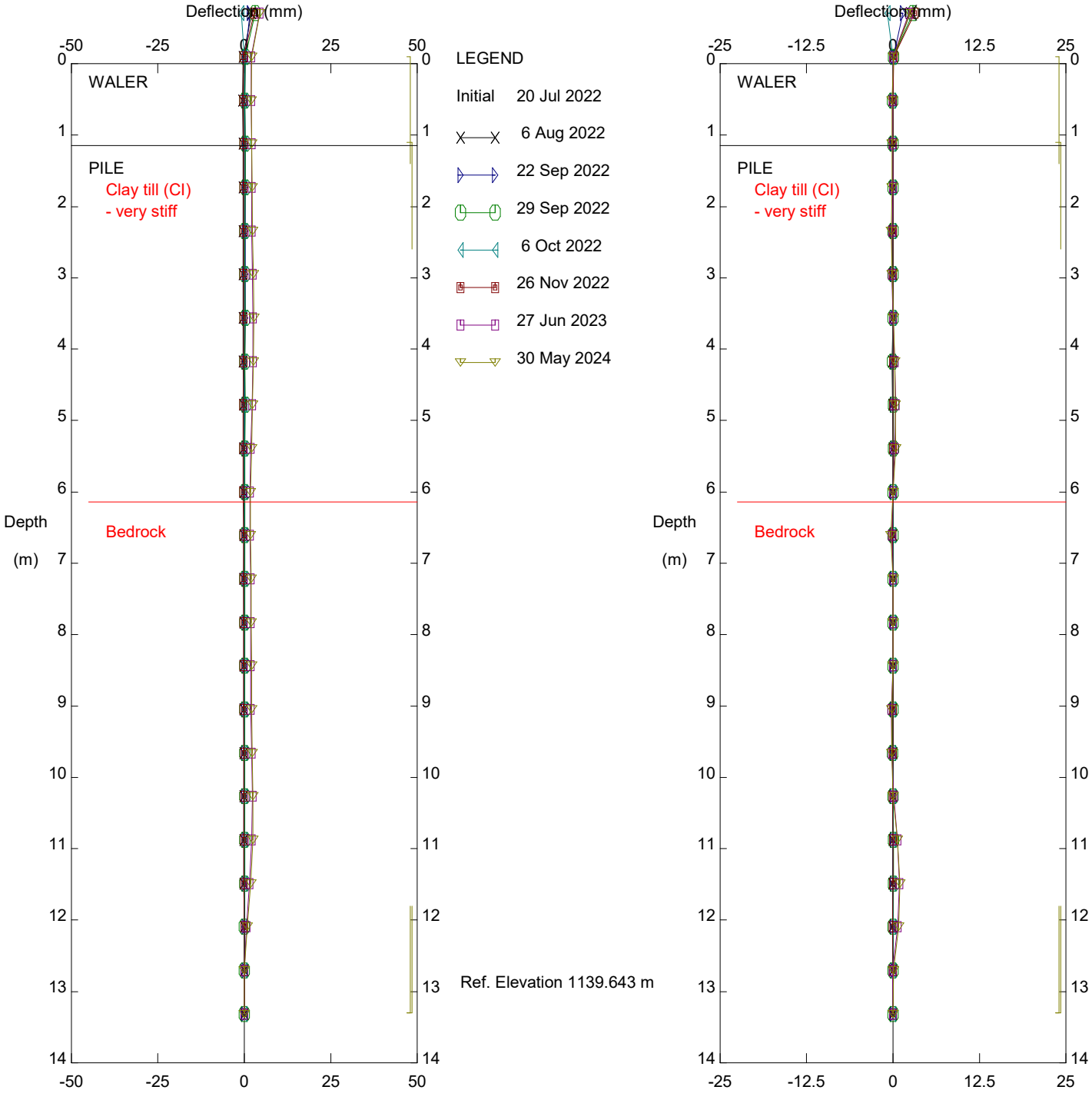
Thurber Engineering Ltd.



GP042 Slope Stabilization, Inclinometer SI22-W3

TEC

Thurber Engineering Ltd.



Cumulative Deflection

Direction A

Incremental Deflection

Direction A

GP042 Slope Stabilization, Inclinometer SI22-W4

TEC

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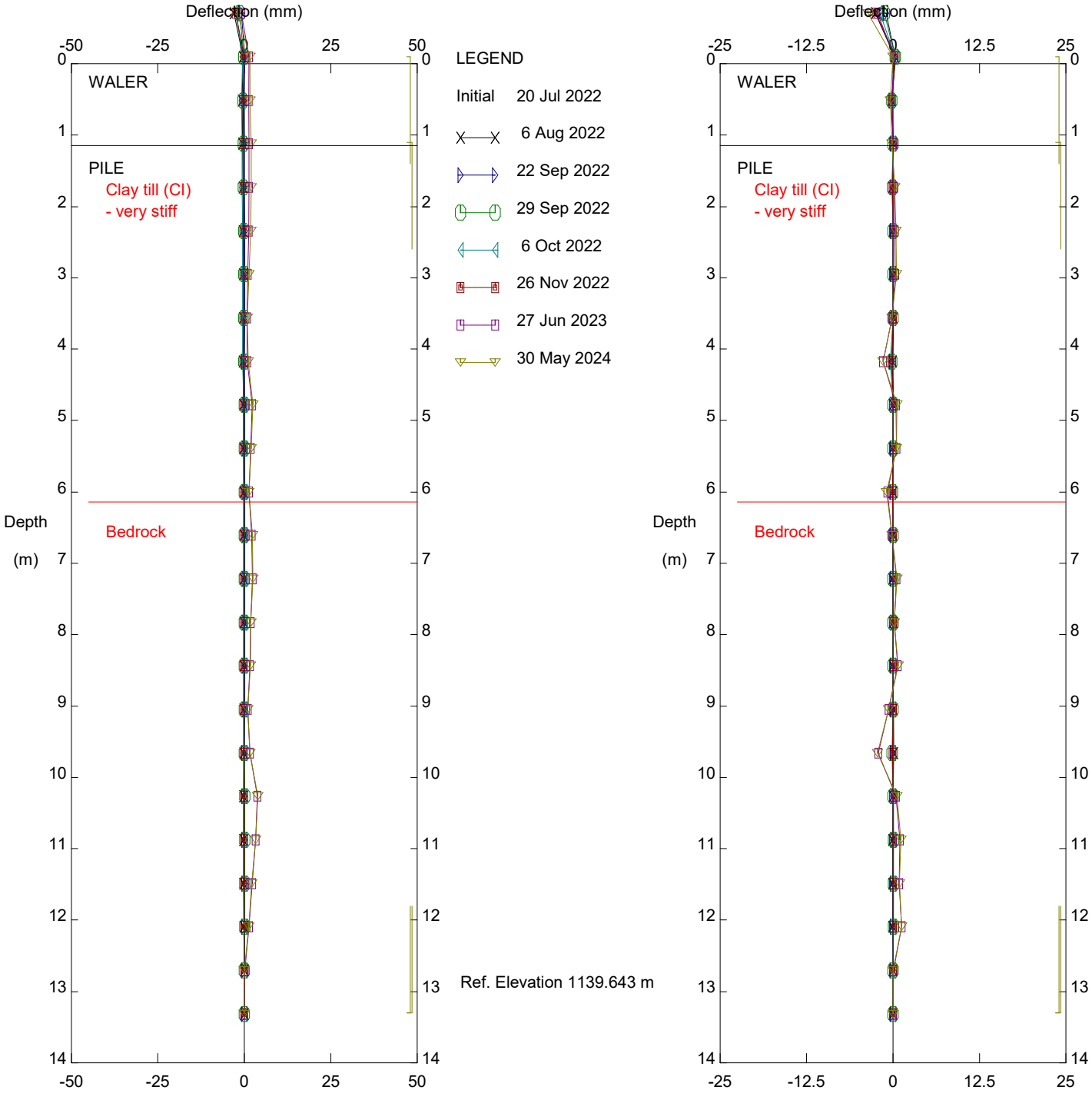
Thurber Engineering Ltd.



Cumulative Deflection

Direction B

Incremental Deflection

Direction B

GP042 Slope Stabilization, Inclinometer SI22-W4

TEC

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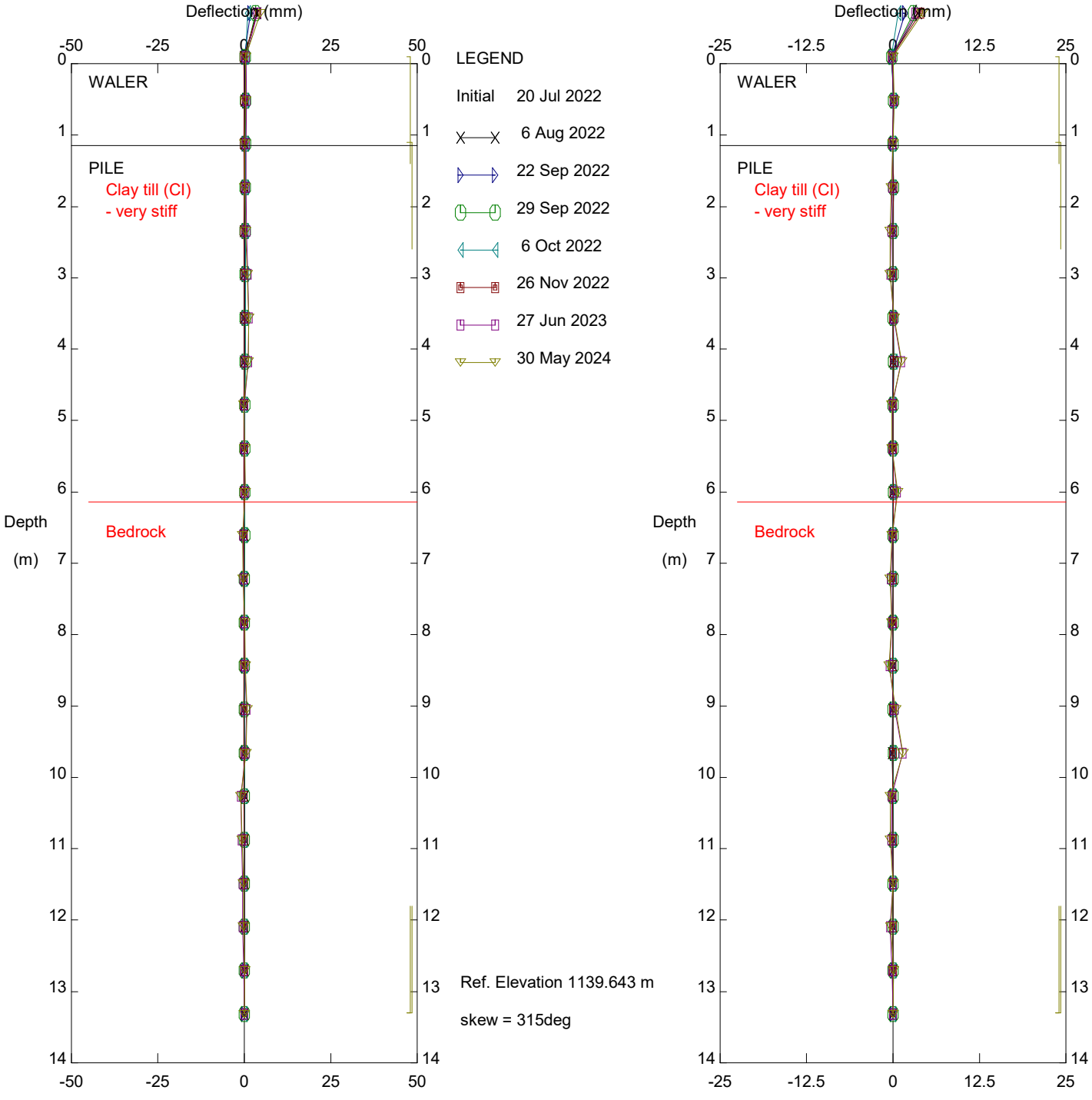
Thurber Engineering Ltd.



Cumulative Deflection

Direction X

Incremental Deflection

Direction X

GP042 Slope Stabilization, Inclinometer SI22-W4

TEC

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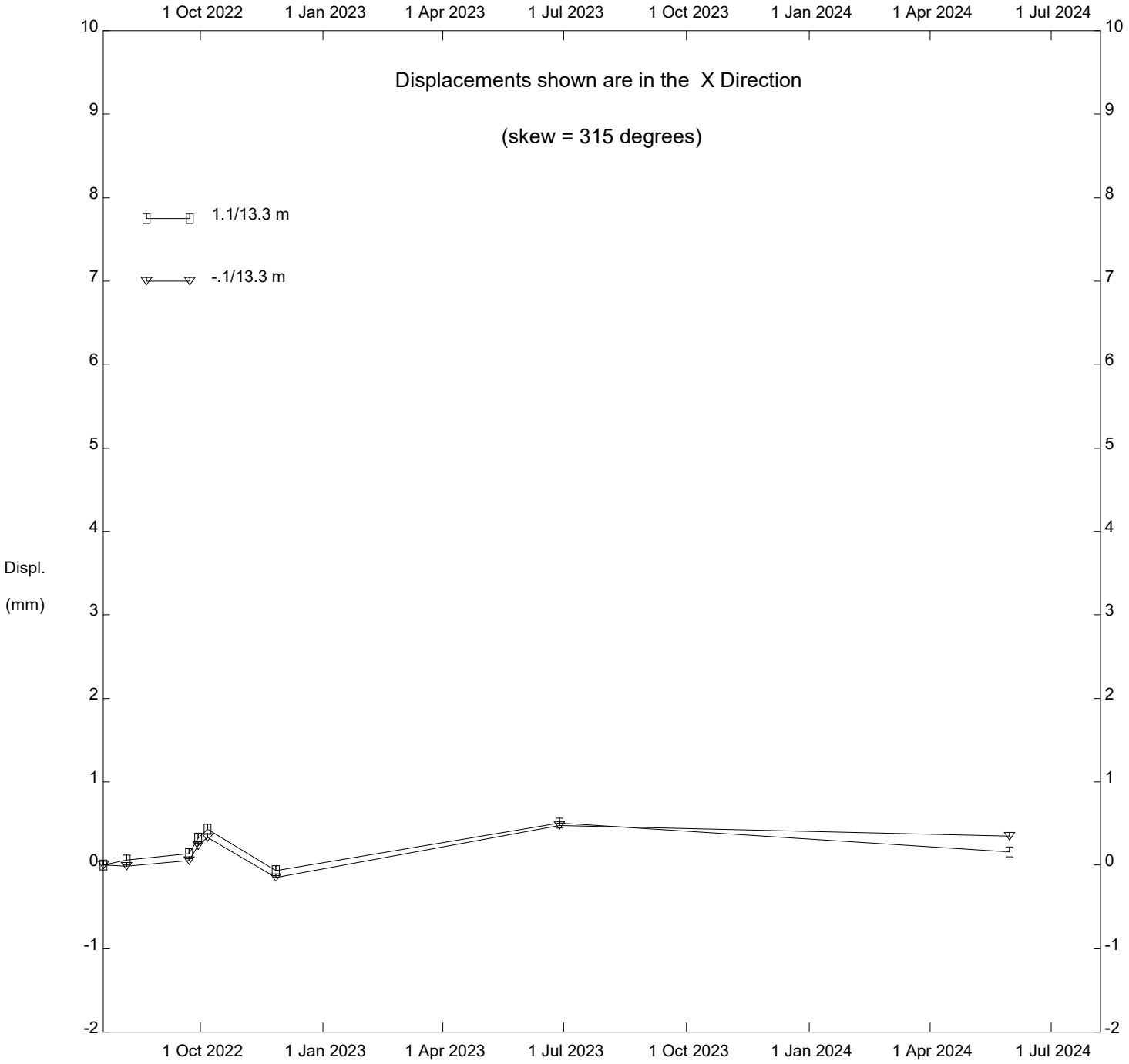
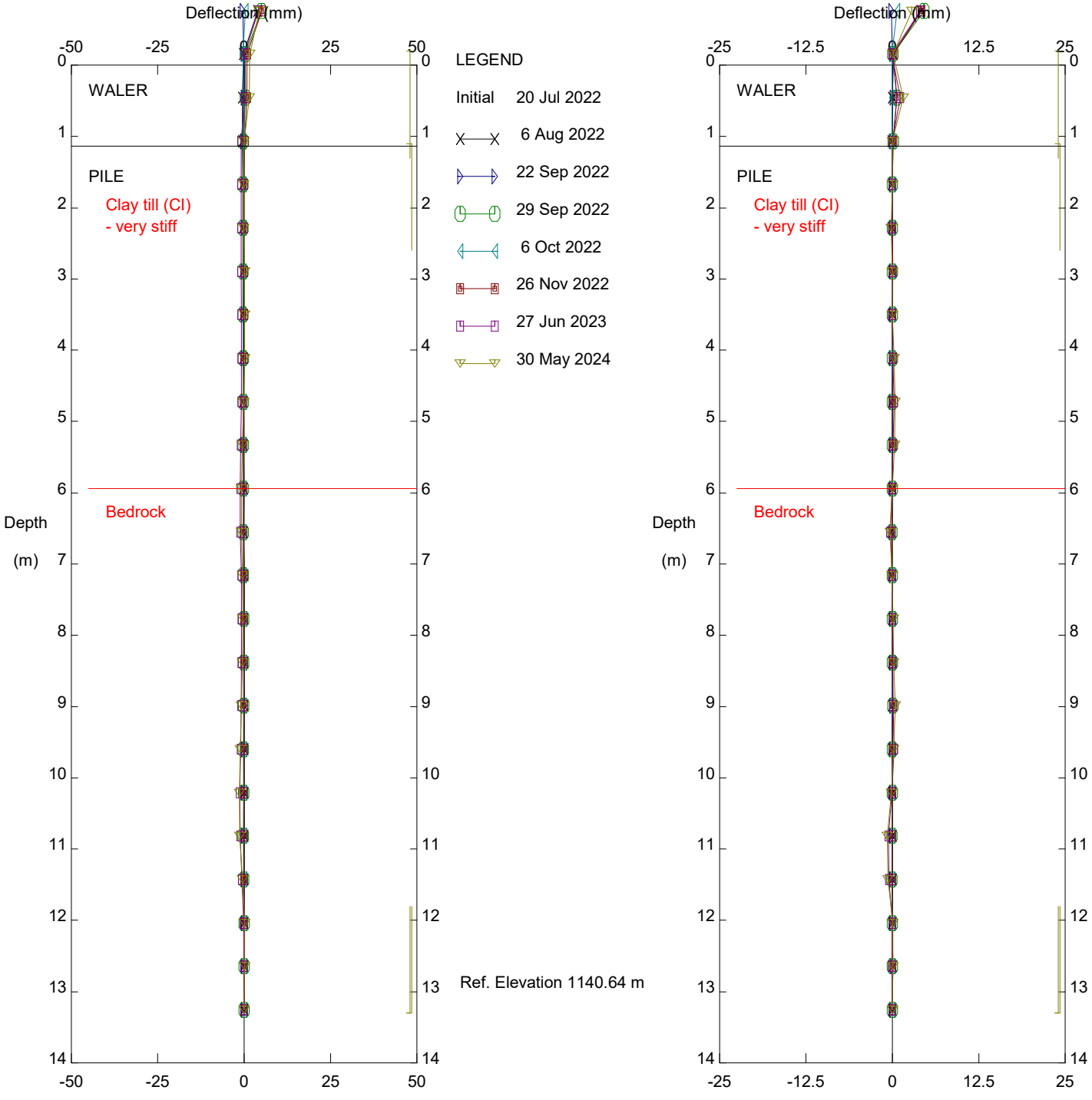
Thurber Engineering Ltd.



GP042 Slope Stabilization, Inclinometer SI22-W4

TEC

Thurber Engineering Ltd.



Cumulative Deflection

Direction A

Incremental Deflection

Direction A

GP042 Slope Stabilization, Inclinometer SI22-W5

TEC

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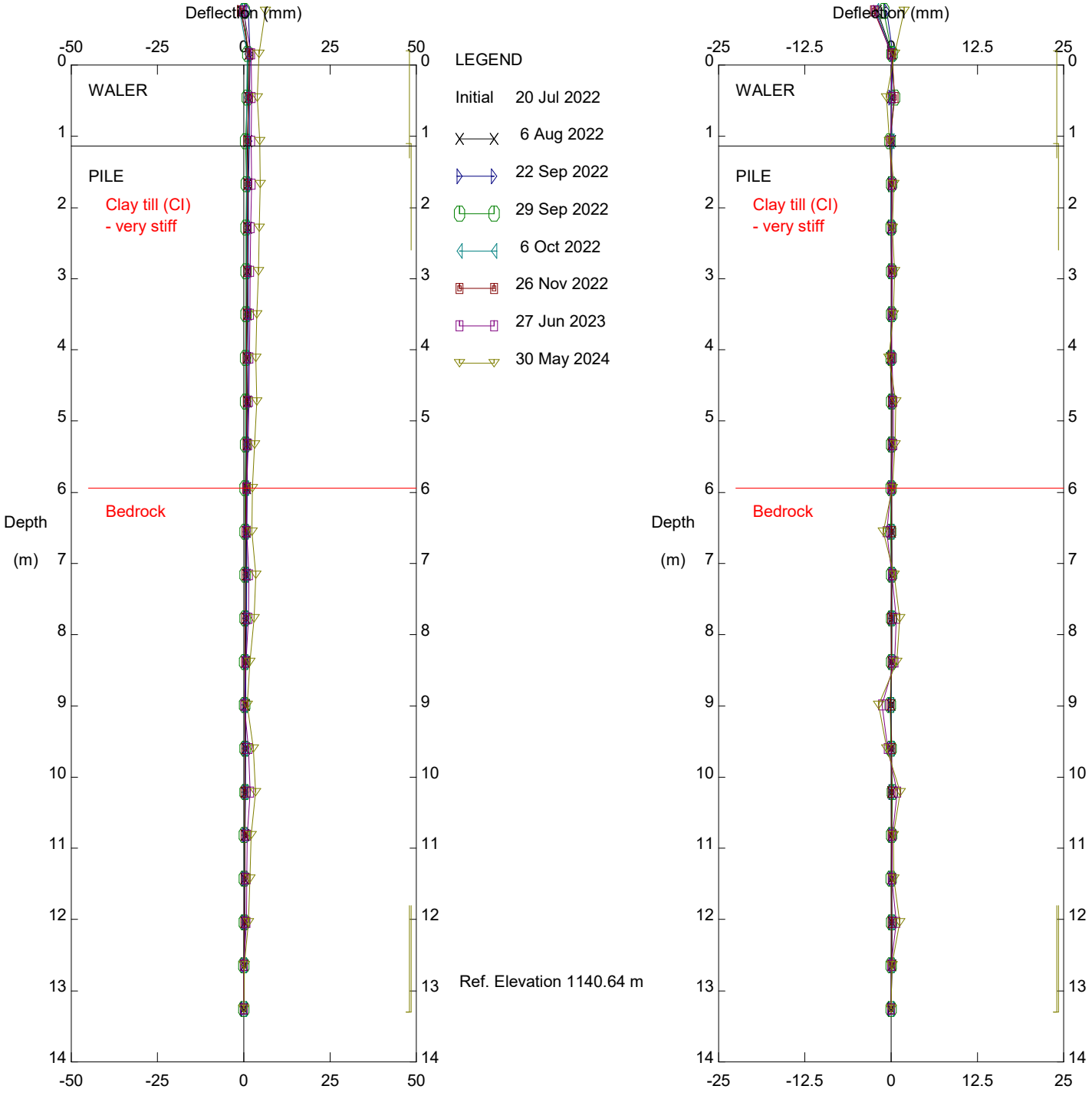
Thurber Engineering Ltd.



Cumulative Deflection

Direction B

Incremental Deflection

Direction B

GP042 Slope Stabilization, Inclinometer SI22-W5

TEC

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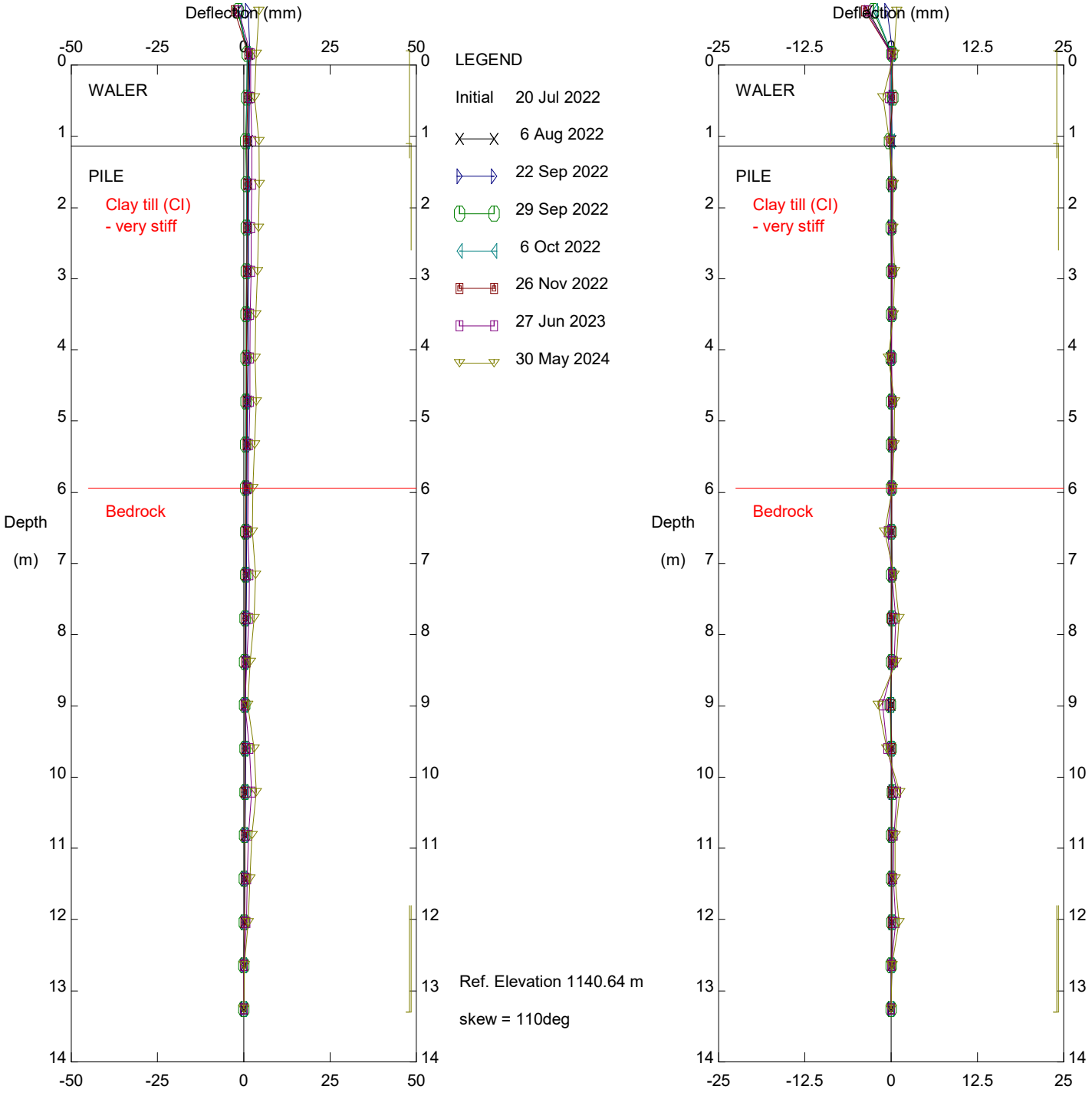

Cumulative Deflection

Direction X

Incremental Deflection

Direction X

GP042 Slope Stabilization, Inclinometer SI22-W5

TEC

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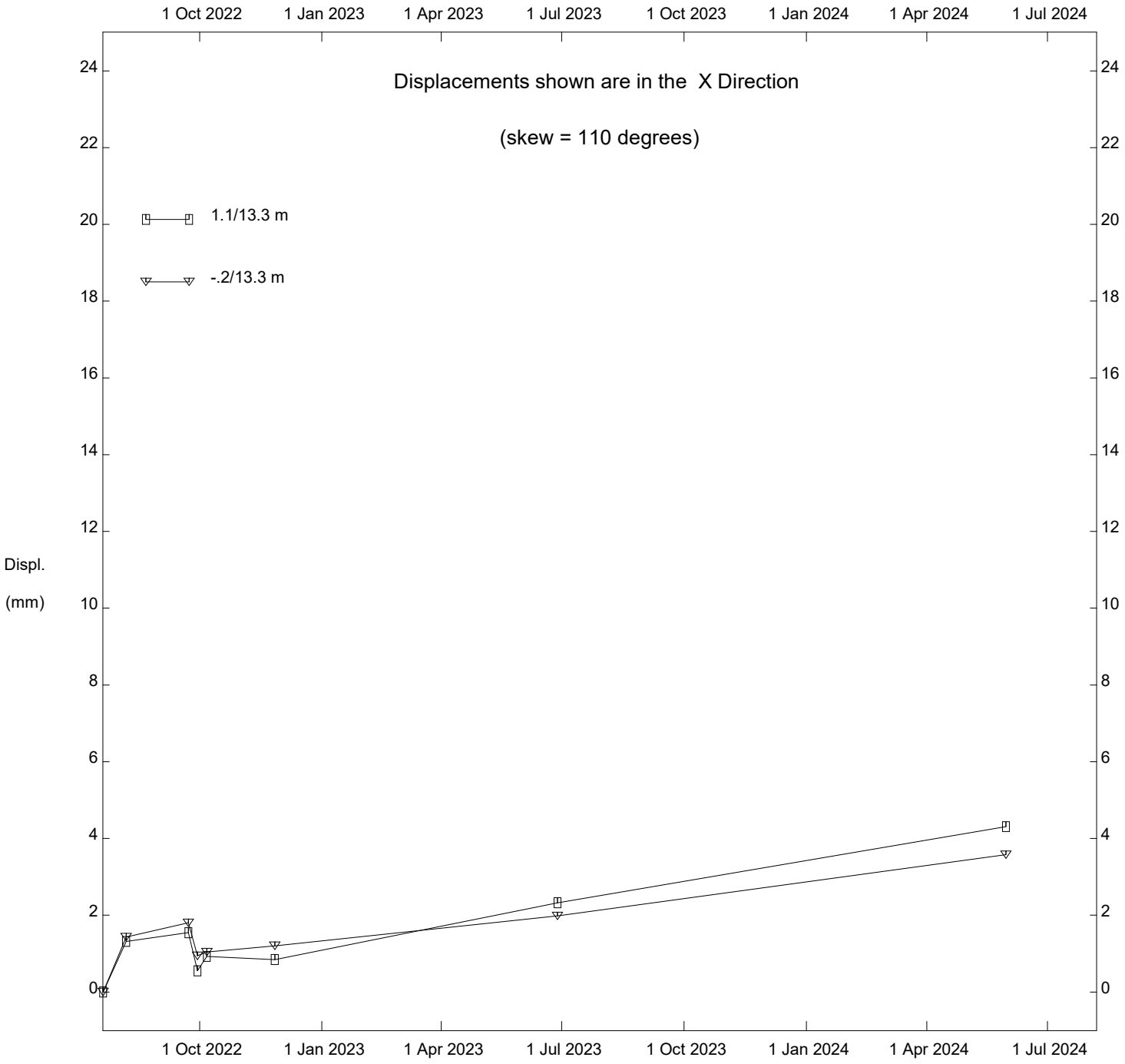
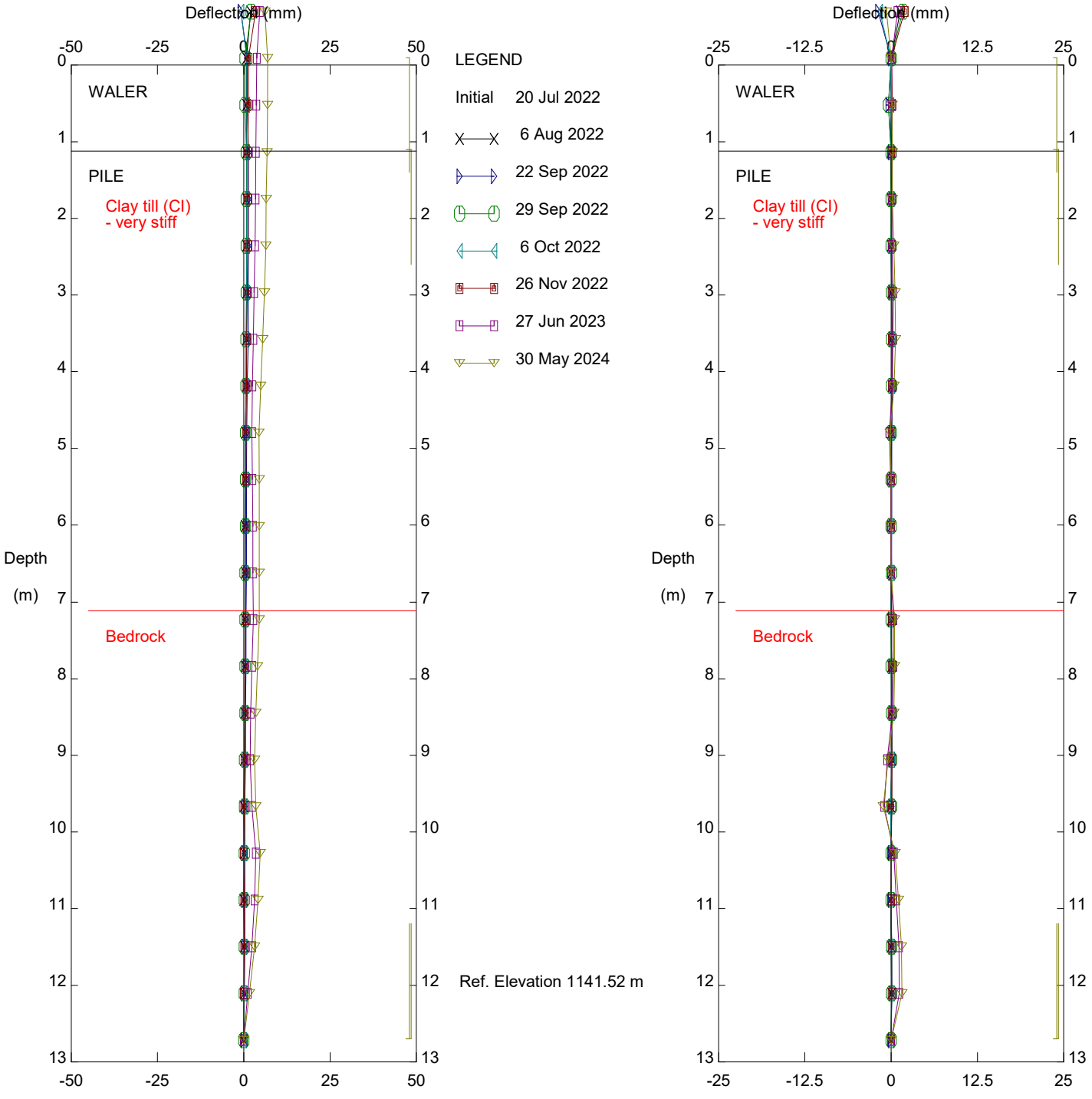


GP042 Slope Stabilization, Inclinometer SI22-W5

TEC

Thurber Engineering Ltd.



Cumulative Deflection

Direction A

Incremental Deflection

Direction A

GP042 Slope Stabilization, Inclinometer SI22-W6

TEC

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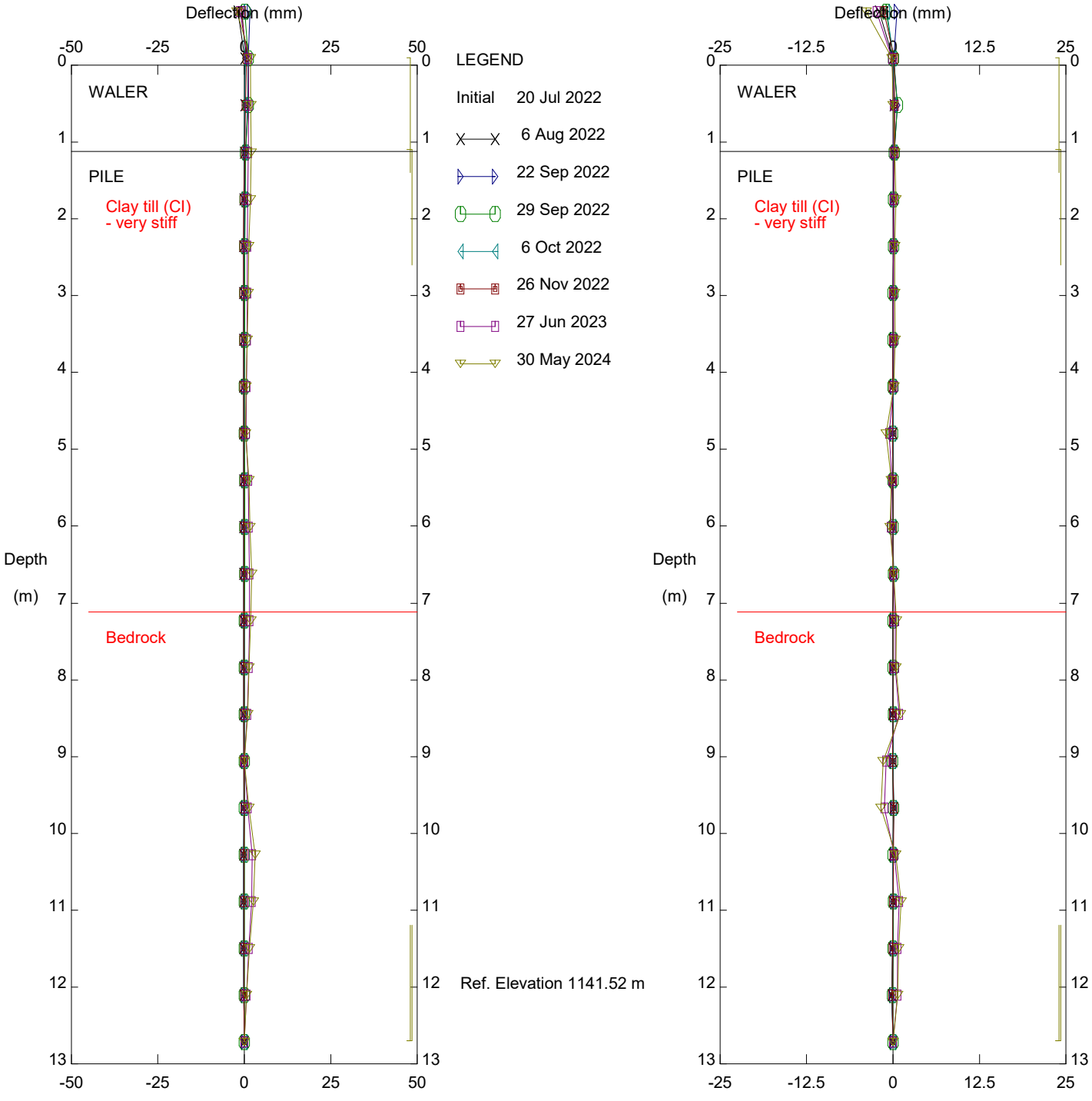
Thurber Engineering Ltd.



Cumulative Deflection

Direction B

Incremental Deflection

Direction B

GP042 Slope Stabilization, Inclinometer SI22-W6

TEC

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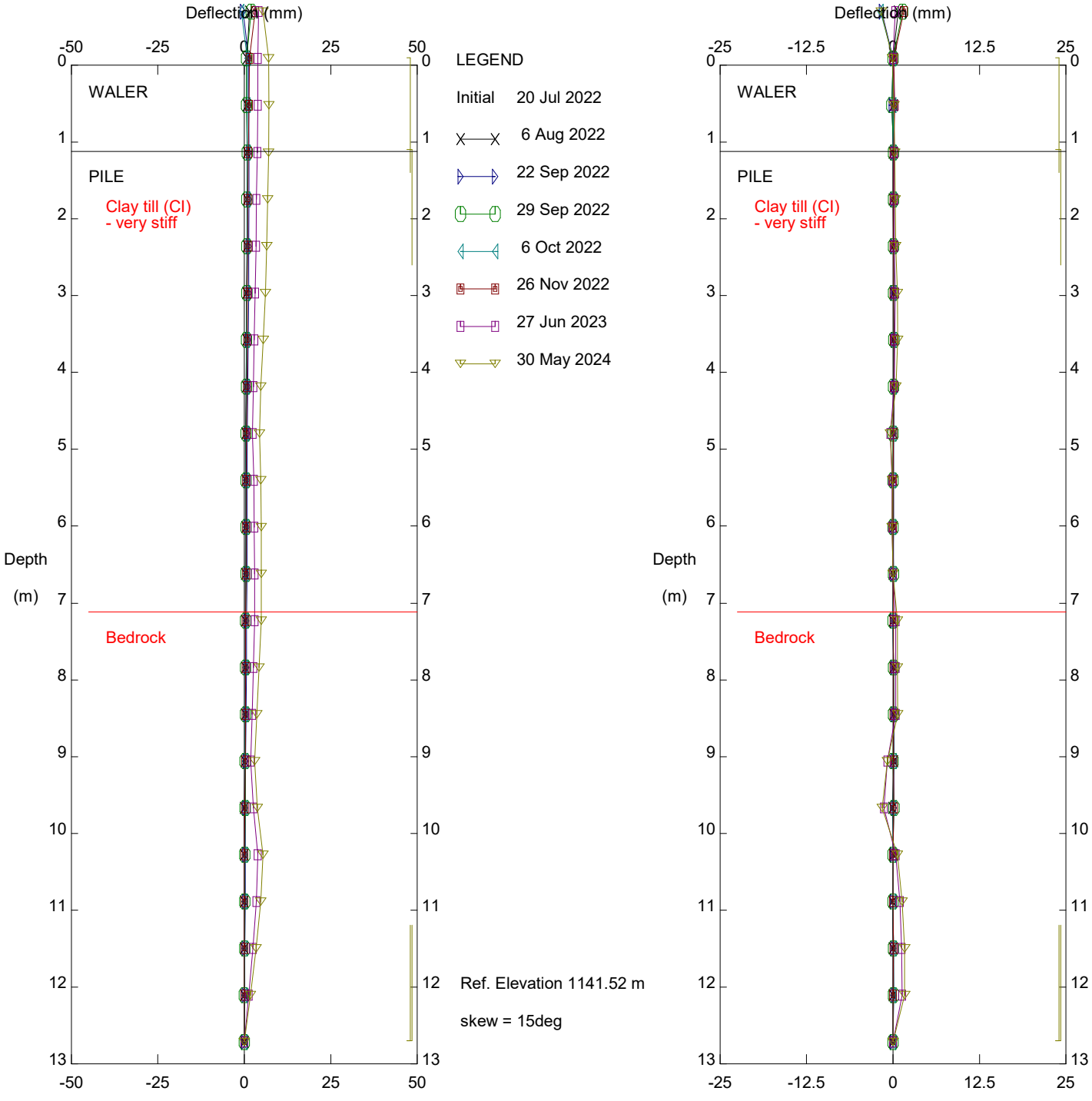
Thurber Engineering Ltd.



Cumulative Deflection

Direction X

Incremental Deflection

Direction X

GP042 Slope Stabilization, Inclinometer SI22-W6

TEC

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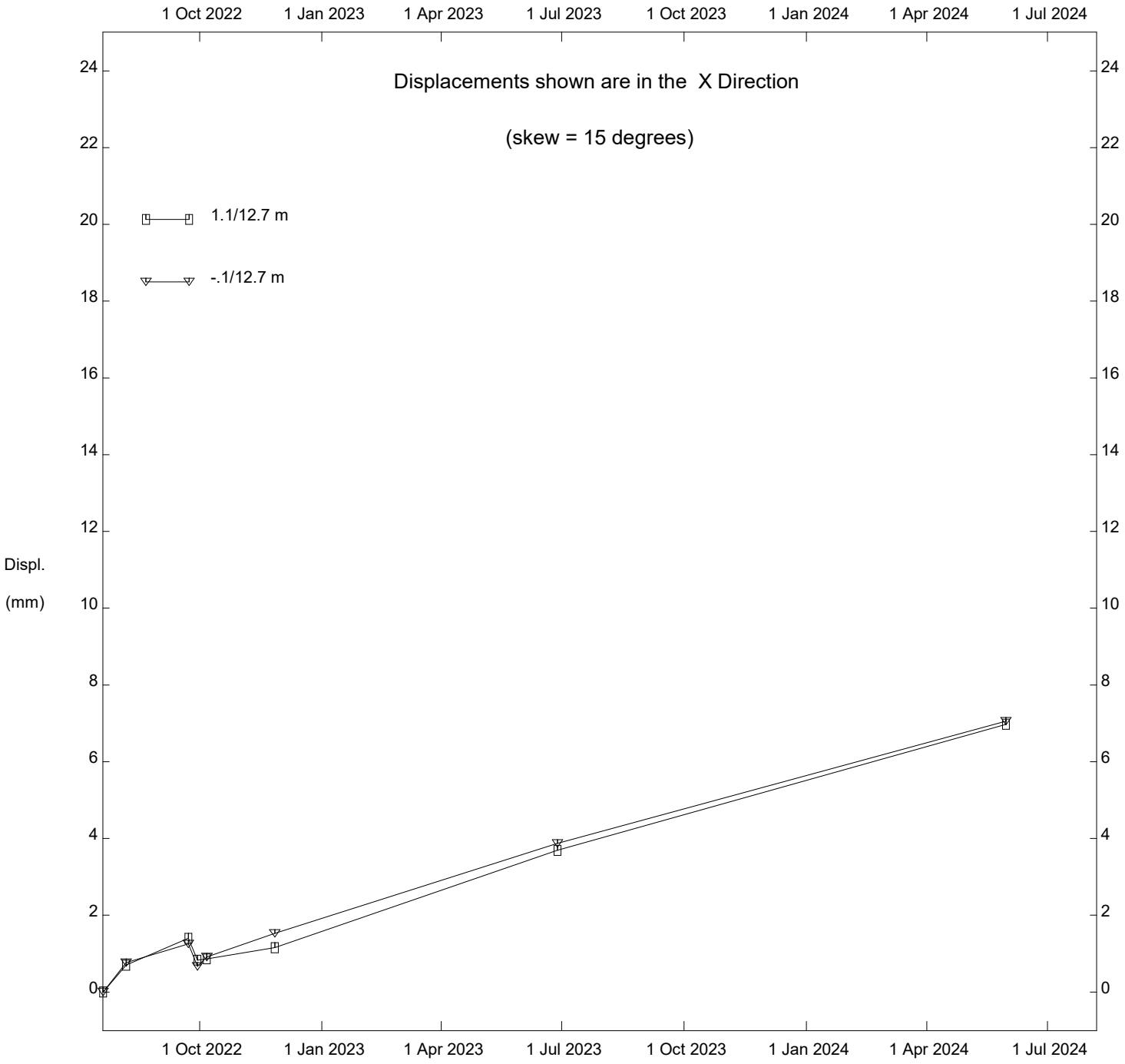
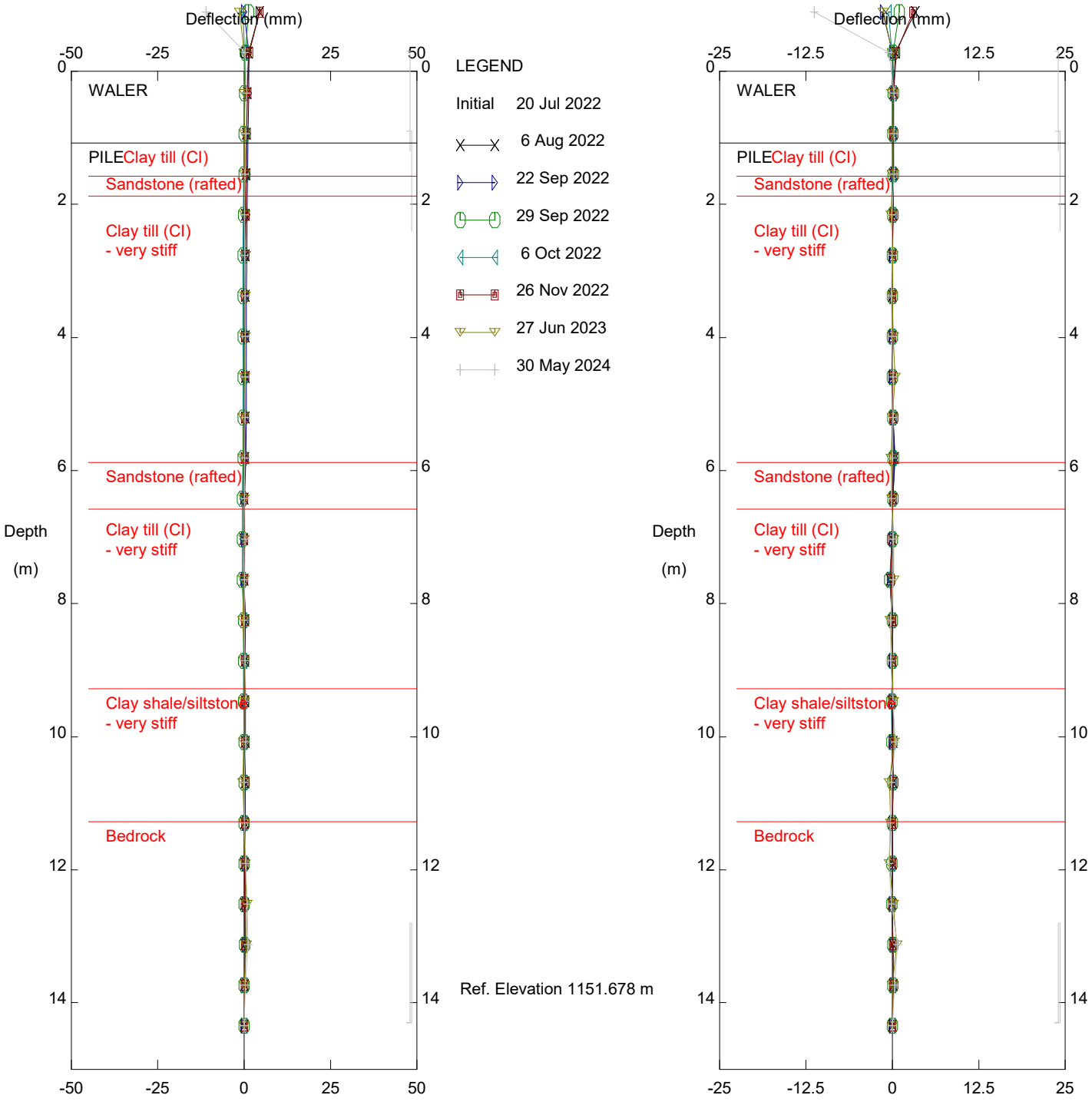
Thurber Engineering Ltd.



GP042 Slope Stabilization, Inclinometer SI22-W6

TEC

Thurber Engineering Ltd.



Cumulative Deflection

Direction A

Incremental Deflection

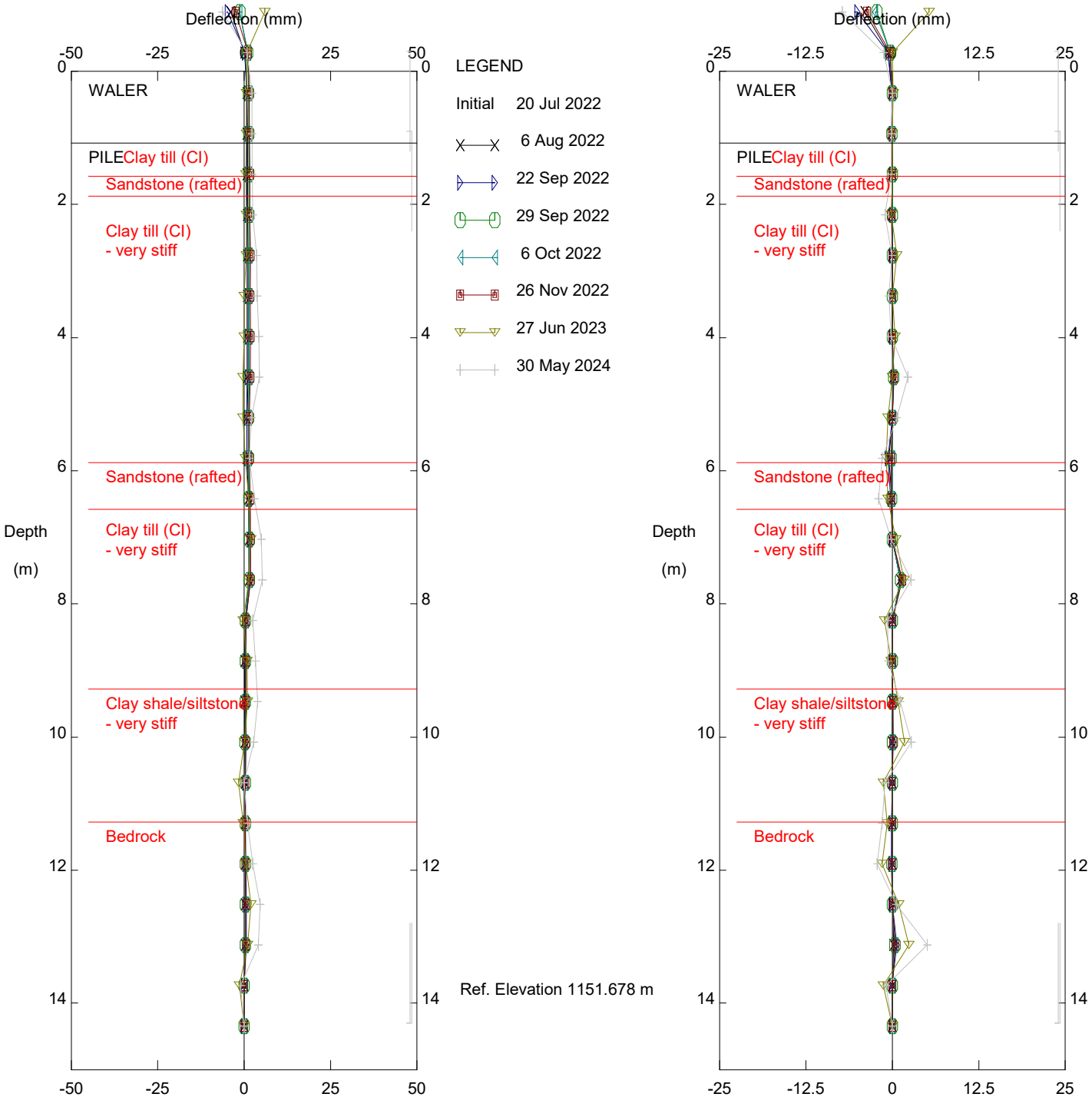
Direction A

GP042 Slope Stabilization, Inclinometer SI22-W7

TEC

H:\32000\32121 AT GRMP Peace River District 2021-2025\Section C\2024A-Spring\Additional Sites\GP042 - 29190\SI readings\SI22-W7 - Extended 4'.gtl

Thurber Engineering Ltd.



Cumulative Deflection

Direction B

Incremental Deflection

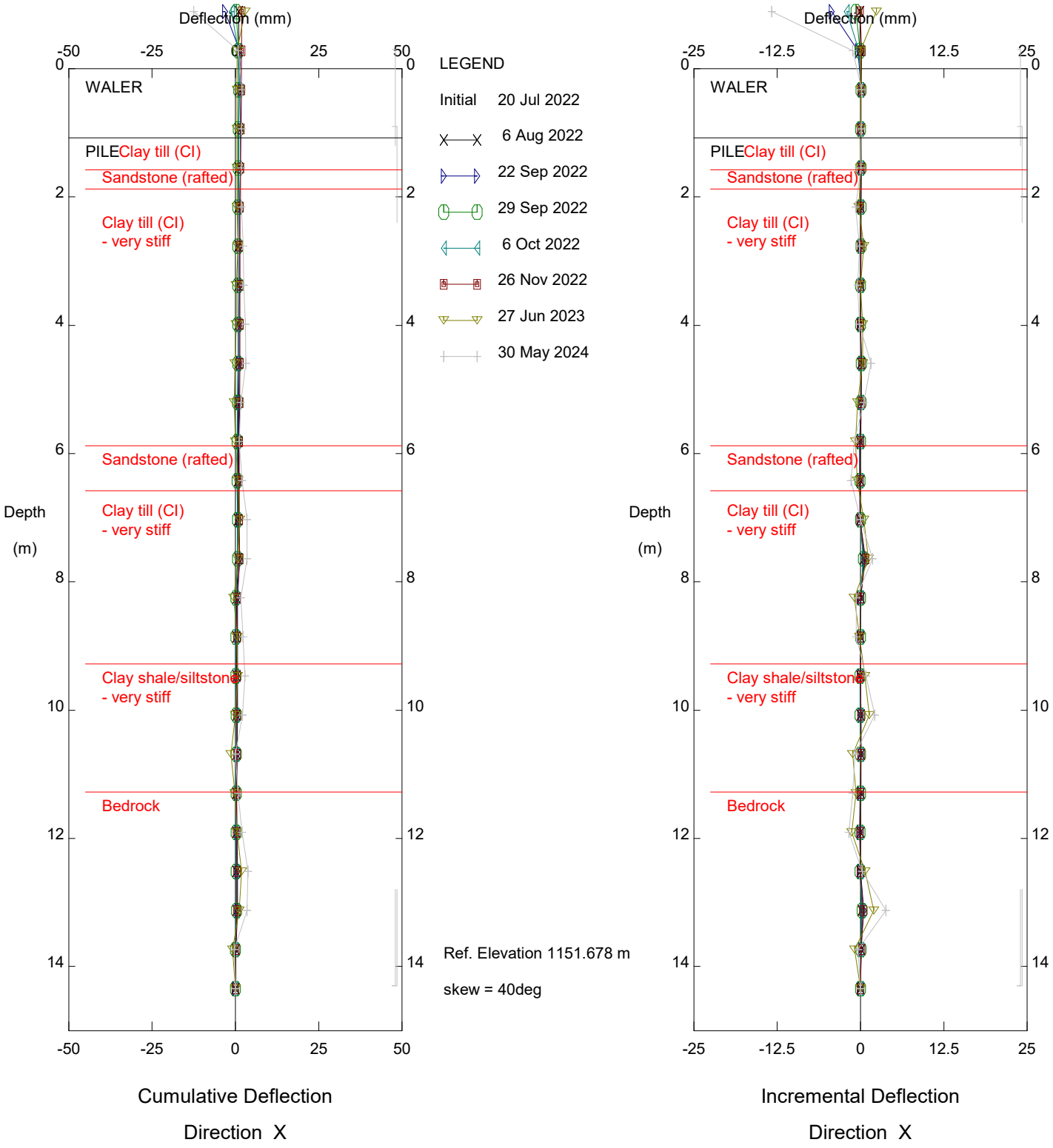
Direction B

GP042 Slope Stabilization, Inclinometer SI22-W7

TEC

H:\32000\32121 AT GRMP Peace River District 2021-2025\Section C\2024A-Spring\Additional Sites\GP042 - 29190\SI readings\SI22-W7 - Extended 4'.gtl

Thurber Engineering Ltd.



Cumulative Deflection

Direction X

Incremental Deflection

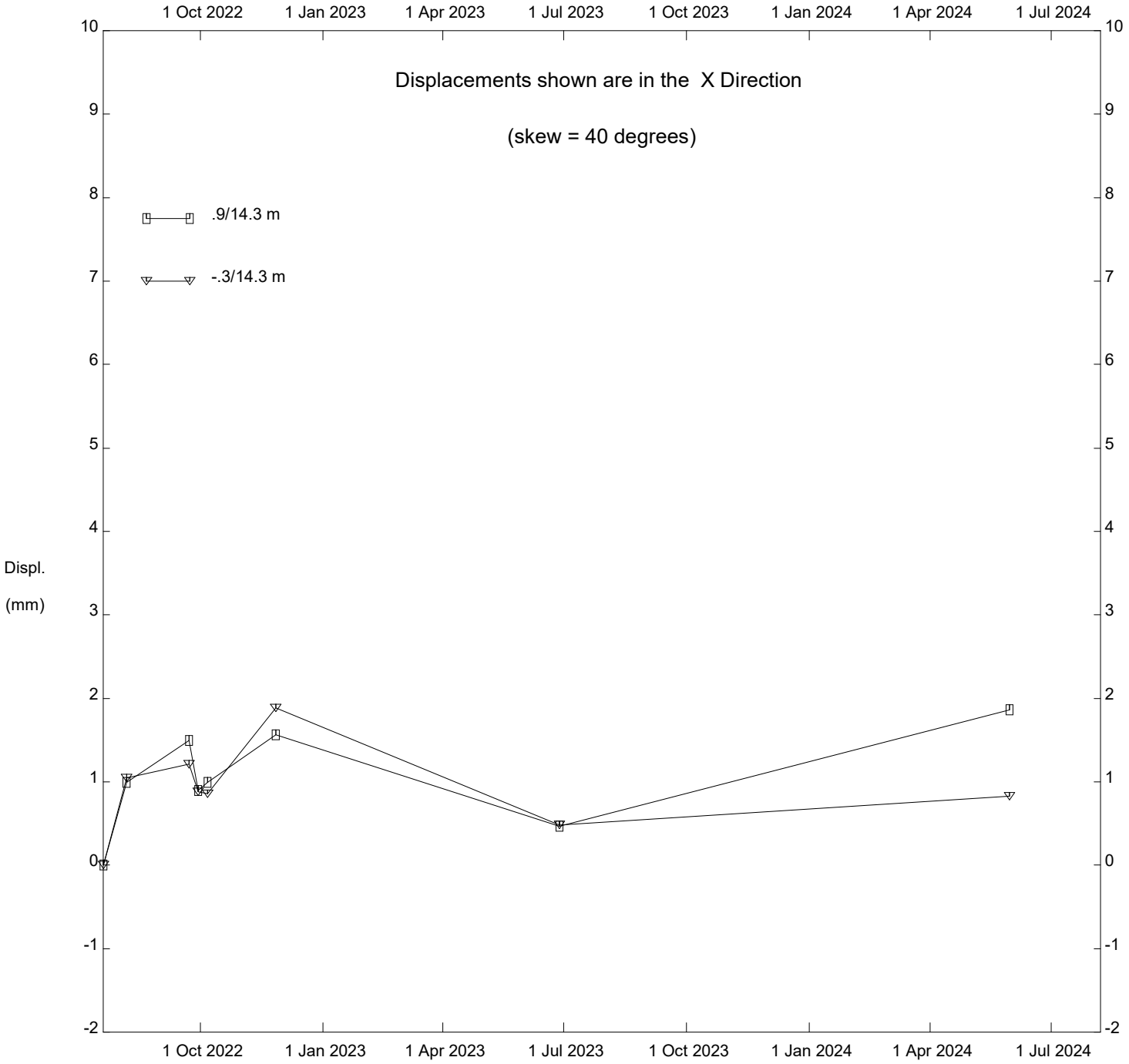
Direction X

GP042 Slope Stabilization, Inclinometer SI22-W7

TEC

H:\32000\32121 AT GRMP Peace River District 2021-2025\Section C\2024A-Spring\Additional Sites\GP042 - 29190\SI readings\SI22-W7 - Extended 4'.gtl

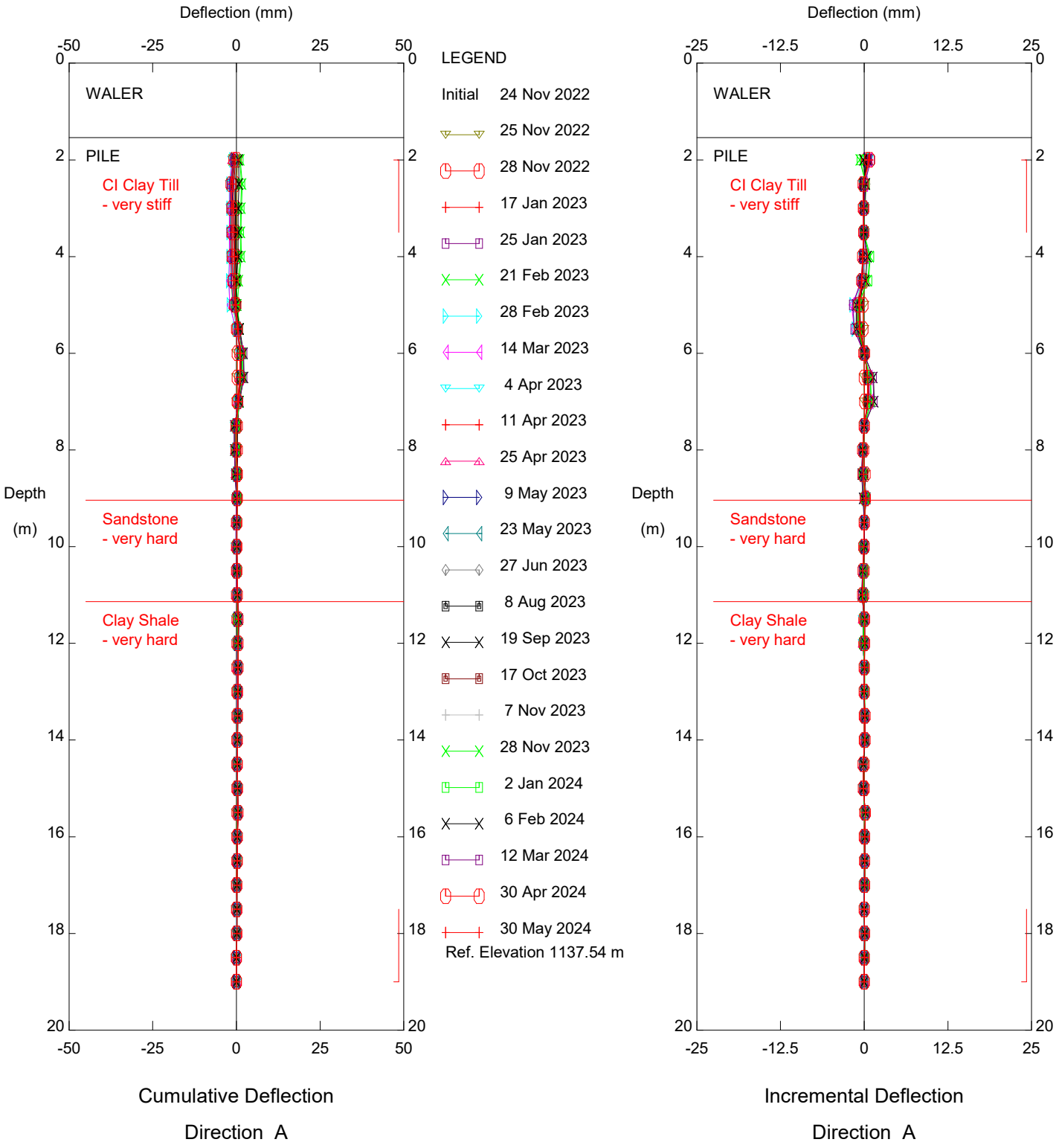
Thurber Engineering Ltd.



GP042 Slope Stabilization, Inclinometer SI22-W7

TEC

Thurber Engineering Ltd.



Cumulative Deflection

Direction A

Incremental Deflection

Direction A

GP042 Slope Stabilization, Inclinometer SAA22-P15

TEC

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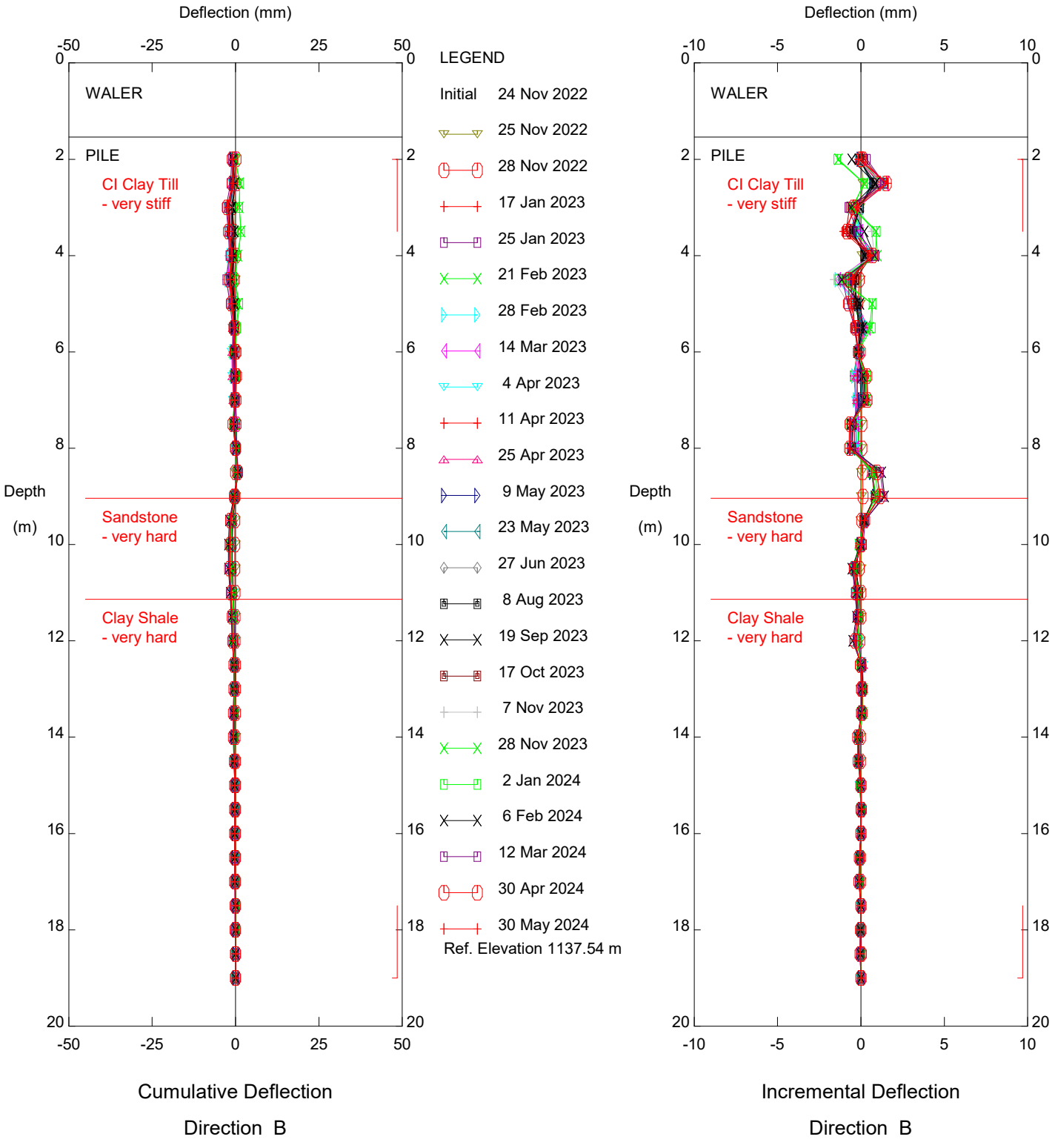
Thurber Engineering Ltd.



Cumulative Deflection

Direction B

Incremental Deflection

Direction B

GP042 Slope Stabilization, Inclinometer SAA22-P15

TEC

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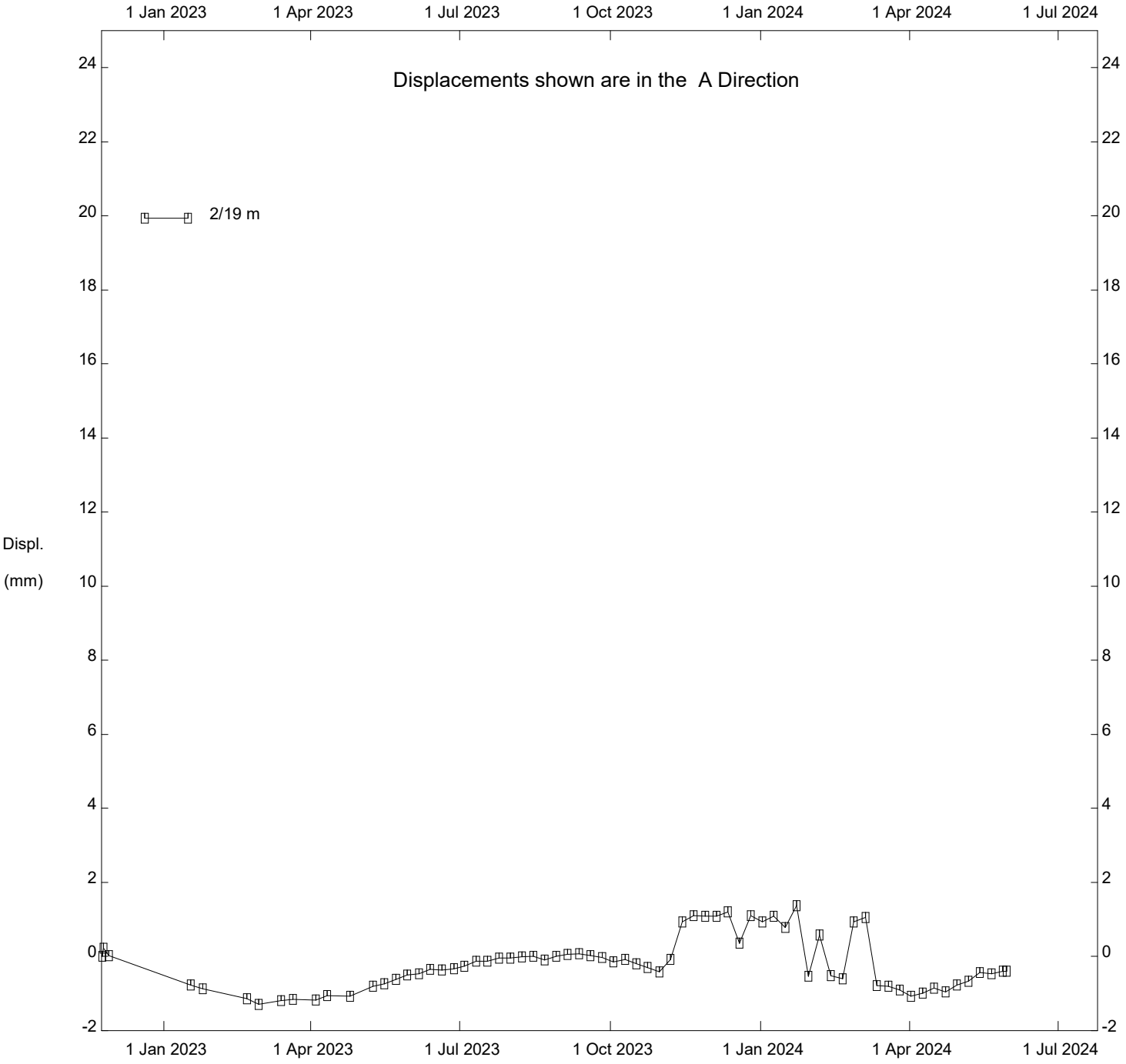
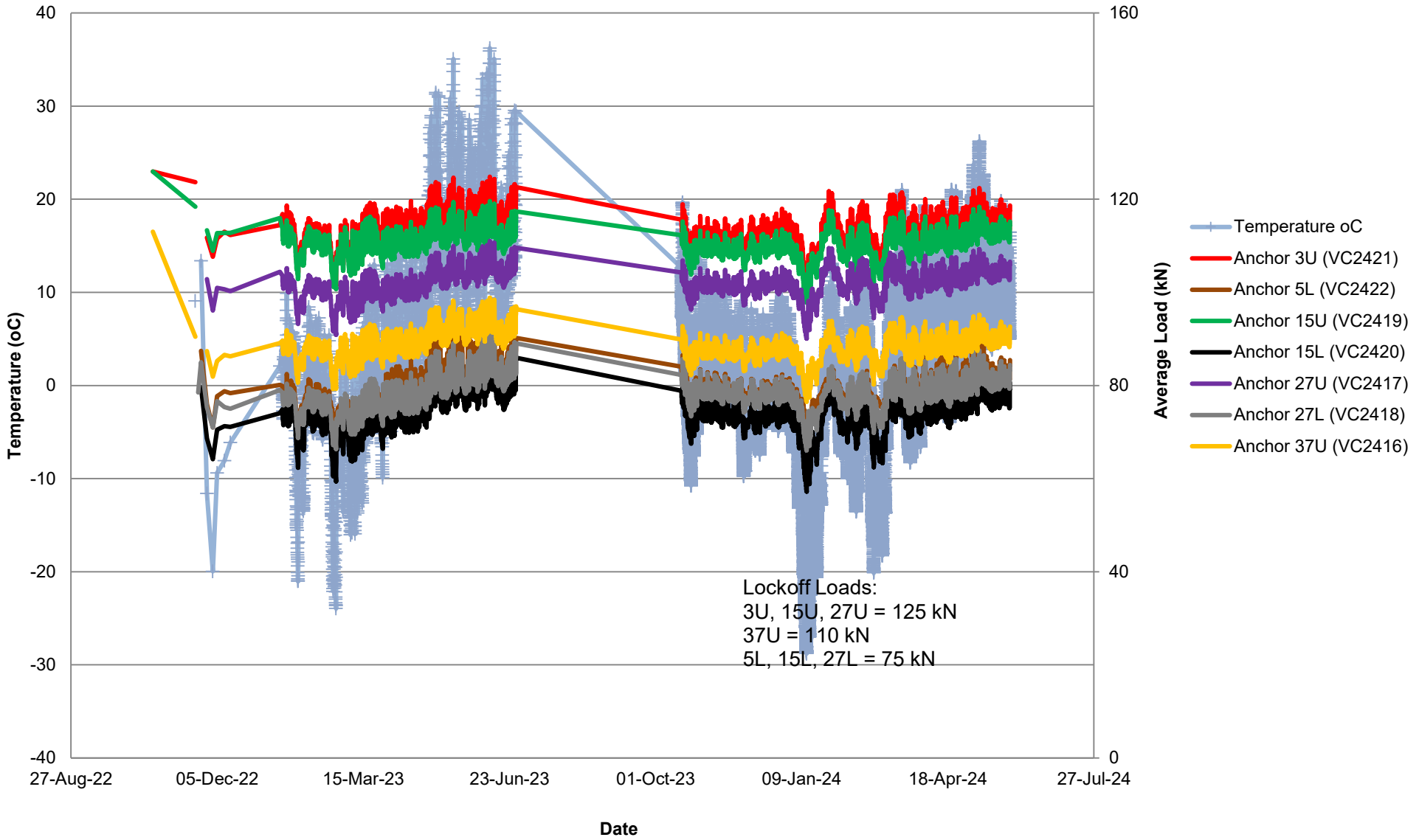
Thurber Engineering Ltd.



GP042 Slope Stabilization, Inclinometer SAA22-P15

TEC

GP042-1
HWY 40:36 KM 37.4 TO 38.2 (GP042)
VIBRATING WIRE LOAD CELL DATA



GP042-2
HWY 40:36 KM 37.4 TO 38.2 (GP042)
VIBRATING WIRE PIEZOMETER DATA - ACTIVE INSTRUMENTS