ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS GRMP
PEACE REGION – (PEACE RIVER DISTRICT)
SPRING 2024

THURBER ENGINEERING LTD.

Site Number	Location	Name	Hwy	km
PH042	HWY 986:01 C1 33.212 (Station 13+300)	Daishowa Well Site Slide	986:01	Km 33.2
Legal Description: 15-7-85-20 W5		**UTM Co-ordinates**		
		11U E 491157	N 6246211	

Current Monitoring:	20-May-2024	**Previous Monitoring**	15-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): SI18-1	**Pneumatic Piezometers (PN):** **N/A**	**Vibration Wire Piezometers (VW):** VW17-1A, VW17-1B, VW17-2A, VW17-2B VW17-3A and VW17-3B (installed on the bench downslope of the pile wall) VW18-1 and VW18-2 (installed in two previously drilled monitoring wells in the south highway ditch upslope of the pile wall) VW18-3 (installed in a previously drilled pumping well adjacent to the monitoring wells in the south highway ditch)
Load Cell (LC): VC2011 to VC2018	**Strain Gauges: N/A** Twenty-eight vibrating wire strain gauges were installed on the rebar cage of pile P40	**SAAs:** SAA17-P20 and SAA17-P40 SAA-18 (installed on the bench downslope of the pile wall)

Readout Equipment Used

Slope Inclinometers: RST Digital Inclinometer probe with a 2 ft wheelbase and an RST Pocket PC readoutprobe with 2 ft wheelbases and RST pocket readout.	**Pneumatic Piezometers:**	**Vibration Wire Piezometers:** Campbell Scientific CR6 datalogger GEOKON GK-404 vibrating wire readout
Load Cell: Campbell Scientific CR6 datalogger	**Strain Gauges:** Campbell Scientific CR6 datalogger	**SAAs:** Campbell Scientific CR6 datalogger

Note: SIs plots with A and B directions are presented in Appendix A and summarized in Table PH042-1, attached. Where movement was recorded, the resultant (plot X) and the rate of movement plot are also included.

Discussion	
Zones of New Movement:	None
Interpretation of Monitoring Results:	SI18-1 has not shown any discernible movement since it was reinitialized during the spring of 2019 readings. SAA17-P20 showed an average rate of movement of 3.1 mm/yr over the length of the pile and an average rate of movement of 3.3 mm/yr over the combined length of the pile and waler since the spring of 2023 readings. SAA-P20 has shown a total pile head movement of 26.4 mm in the downslope direction to date. SAA17-P40 showed no discernible movement over the length of the pile and over the combined length of the pile and waler since the spring of 2023 readings. SAA17-P40 has shown a total pile head movement of 59.6 mm in the downslope direction to date. Both of the SAAs installed in the pile wall have shown an overall trend of downslope movement since they were installed, with higher deflections (in the order of 8 to 12 mm) during the winter months under frost loads, which rebound once the ground thaws. The total cumulative movement in the SAAs includes initial deflections during excavation and anchor installation as well as post construction movements. The overall rate of movement, after removing seasonal effects, appears to be slowly decreasing toward an equilibrium state in SAA17-P20 and appears to be at the equilibrium state in SAA17-40. SAA18-1, installed in the bench downslope of the pile wall, showed an average rate of movement of 2.3 mm/yr over 0.5 m to 12.5 m depth since the spring of 2023 readings. SAA18-1 has shown a total cumulative movement of 15.7 mm over this zone since it was initialized in June 2018. By comparison, SAA17-P40 has shown a total cumulative movement of 9.7 mm over this same zone since June 2018, indicating that the bench has moved 6.0 mm in the downslope direction relative to the pile wall during this time span. A plot comparing these movements is included in Appendix A. The movement in SAA18-1 should continue to be compared to the pile wall movements at SAA17 P40 for future readings to see if the bench exhibits faster downslope movement than the pile wall. The wall relies on lateral support from the bench and hence if significant separation is noted in the future, soil or grout would need to be placed in the void or another row of tie-back soil anchors would need to be added to the wall beneath the existing anchors. Since the spring of 2023 readings, the strain gauges showed changes in strain ranging from an increase in positive (tension) strain of 5.4 at 8.5 m depth on the downslope pile face to an increase in negative (compressive) strain of 25.7 at 2.5 m depth on the downslope pile face. The strain gauge readings are summarized in Table PH042-3. Vibrating wire piezometers VW17-1A and VW17-3A showed decreases in groundwater level of 0.06 m and 0.03 m, respectively, since the spring of 2023 readings. VW17-1B, VW17-2B and VW17-3B showed increases in groundwater level of 0.28 m, 0.16 m and 0.48 m, respectively. VW17-3B measured an all-time high groundwater level on April 23, 2024, however, VW17-3B has been functioning intermittently, and the temperature wire is showing large fluctuations since the spring 2023 readings. VW17-2A continued to be dry. Overall, the piezometers at the pile wall show relatively stable groundwater levels, with the exception of VW17-3B, which is showing a trend of slowly increasing groundwater level over time. Vibrating wire piezometers VW18-1, VW18-2, and VW18-3, installed in the south highway ditch to the east of the pile wall, showed decreases

	in groundwater level of 0.23 m, 0.24 m, and 0.27 m, respectively, since the spring of 2023 readings. The load cells showed relatively minor changes in load compared to the spring of 2023 readings, ranging from a decrease of 2.38 kN in VC2011 (anchor P40A) to an increase of 1.34 kN in VC2014 (anchor P40B). It should be noted that VC2011 (anchor P40A) is measuring a current load that is above its design load. However, this is still safely below the ultimate bond strength confirmed during anchor testing activities. Overall, the load cells have shown steady anchor loads over the last two years, with temporary higher loads measured in late winter to early spring, when the depth of frost penetration is greatest, compared to the summer loads when the ground is fully thawed behind the wall.
Future Work:	The instruments should be read again in the spring of 2025.
Instrumentation Repairs:	No instrument repairs are required at this time.
Additional Comments:	

Attachments:	• Table PH042-1 Spring 2024 – Hwy 986:01, Daishowa East Hill, Slope Inclinometer Instrumentation Reading Summary • Table PH042-2 Spring 2024 – HWY 986:01 Daishowa East Hill, Shape Accelerometer Array Instrumentation Reading Summary • Table PH042-3 Spring 2024 – HWY 986:01 Daishowa East Hill, Vibrating Wire Strain Gauge Instrumentation Reading Summary • Table PH042-4 Spring 2024 – HWY 986:01 Daishowa East Hill, Vibrating Wire Piezometer Instrumentation Reading Summary • Table PH042-5 Spring 2024 – HWY 986:01 Daishowa East Hill, Load Cell Instrumentation Reading Summary • Statement of Limitations and Conditions • APPENDIX A - PH042 SPRING 2024 o Field Inspector's report o Site Plan Showing Approximate Instrument Locations (Drawing No. 32121 PH042) o SI Reading Plots o SAA Reading Plots o Comparison of SAA 18-1 to SAA17-P40 o Figure PH042-1 (Pile Wall Piezometer Elevations) o Figure PH042-2 (Pile Wall Piezometer Depths) o Figure PH042-3 (South Ditch Piezometer Elevations) o Figure PH042-4 (South Ditch Piezometer Depths) o Figure PH042-5 (Load Cell Data Pile P20) o Figure PH042-6 (Load Cell Data Pile P40) o Figure PH042-7 (Load Cell Data Pile P60)

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)

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Table PH042-1 Spring 2024 – Hwy 986:01, Daishowa East Hill Slope Inclinometer Instrumentation Reading Summary

Date Monitored: May 20, 2024

INSTRUMENT #	DATE INITIALIZED	TOTAL CUMULATIVE RESULTANT MOVEMENT AT NOTED DEPTH SINCE INITIAL READING (mm)	MAXIMUM RATE OF MOVEMENT (mm/yr.)	CURRENT STATUS	DATE OF PREVIOUS READING	INCREMENTAL MOVEMENT SINCE PREVIOUS READING (mm)	RATE OF MOVEMENT (mm/yr.)	CHANGE IN RATE OF MOVEMENT SINCE PREVIOUS READING (mm/yr.)
SI18-1	June 24, 2019 (reinitialized)	No discernible movement	N/A	Operational	June 15, 2023	N/A	N/A	N/A

Drawing 32121-PH042 Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

Table PH042-2 Spring 2024 – Hwy 986:01, Daishowa East Hill Shape Accelerometer Array Instrumentation Reading Summary

Date Monitored: June 15, 2023

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)	AVERAGE RATE OF MOVEMENT SINCE PREVIOUS READING[(1)] (mm/yr.)	CHANGE IN AVERAGE RATE OF MOVEMENT SINCE PREVIOUS READING (mm/yr.)
SAA17-P20	April 8, 2017	26.4 over 1.5 m to 29.0 m depth	Operational	June 15, 2023	2.9	3.1	1.8
		31.2 over 0 m to 29.0 m depth			3.1	3.3	1.4
SAA17-P40	April 8, 2017	59.6 over 1.5 m to 29.0 m depth	Operational	June 15, 2023	No discernible movement	N/A	-4.7
		57.6 over 0.0 m to 29.0 m depth			No discernible movement	N/A	-4.7
SAA18-1	June 1, 2018	15.7 over 0.5 m to 12.5 m depth	Operational	June 15, 2023	2.2	2.3	-2.0

Drawing 32121-PH042 Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

Notes:

1. SAA readings are recorded once per day by the on-site datalogger. Average movement rates are compared to the previous reading event.

Table PH042-3 Spring 2024 – Hwy 986:01, Daishowa East Hill Vibrating Wire Strain Gauge Instrumentation Reading Summary

Date Monitored: May 20, 2024

DEPTH FROM TOP OF PILE P40 (m)	GAUGE #	TOTAL MICROSTRAIN (MAY 20, 2024) (με)	CHANGE IN MICROSTRAIN SINCE PREVIOUS READING (JUNE 15, 2023)	MEASURED TEMPERATURE (MAY 20, 2024) (°c)	GAUGE #	TOTAL MICROSTRAIN (MAY 20, 2024) (με)	CHANGE IN MICROSTRAIN SINCE PREVIOUS READING (JUNE 15, 2023)	MEASURED TEMPERATURE (MAY 20, 2024) (°c)
	UPSLOPE PILE FACE				DOWNSLOPE PILE FACE			
0.5	1465	-205.1	-18.4	8.1	1466	-75.5	-23.5	7.1
2.5	1467	-132.8	-9.9	5.8	1468	-168.8	-25.7	7.5
4.5	1469	-185.8	-8.6	4.9	1470	-116.4	-21.3	6.2
6.5	1472	-188.4	-6.6	2.8	1471	225.3	0.8	2.7
8.5	1474	-252.7	-2.9	3.6	1473	-113.3	5.4	3.6
10.5	1476	-207.3	-0.6	5.5	1475	56.7	4.4	4.9
12.5	1478	-203.6	-0.4	4.9	1477	-86.9	4.5	5.5
14.5	1479	-149.7	0.7	5.9	1480	-211.3	3.0	5.8
16.5	1481	-66.9	2.0	5.9	1482	-215.8	3.3	6.1
18.5	1484	482.7	1.2	6.0	1483	-375.2	1.0	6.0
20.5	1486	-178.3	2.5	6.0	1485	-356.7	0.3	5.9
22.5	1488	-187.4	2.4	5.9	1487	-275.5	1.3	5.9
24.5	1490	-154.0	1.9	5.9	1489	-204.7	2.1	5.9
26.5	1492	-139.1	2.6	5.9	1491	-168.2	2.0	5.9

Drawing 32121-PH042 Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

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Table PH042-4 Spring 2024 – Hwy 986:01, Daishowa East Hill Vibrating Wire Piezometer Instrumentation Reading Summary

Date Monitored: May 20, 2024

INSTRUMENT	DATE INITIALIZED	TIP DEPTH (m)	GROUND ELEV. (m)	CURRENT STATUS	HIGHEST RECORDED GROUNDWATER ELEVATION (m)	CURRENT GROUNDWATER ELEVATION (m)	PREVIOUS GROUNDWATER ELEVATION* (m)	CHANGE IN WATER LEVEL SINCE PREVIOUS READING (m)
PILE WALL								
VW17-1A	November 2, 2017	13.68	446.08	Operational	438.47 on March 26, 2022	436.59	436.65	-0.06
VW17-1B	November 2, 2017	24.98	446.08	Operational	440.96 on March 25, 2022	439.62	439.34	0.28
VW17-2A	November 2, 2017	9.98	447.78	Operational	N/A (Below tip depth)	DRY	DRY	N/A
VW17-2B	November 2, 2017	24.98	447.78	Operational	444.46 on December 21, 2017	442.61	442.45	0.16
VW17-3A	May 31, 2018	10.18	441.18	Operational	439.04 on March 8, 2023	438.57	438.60	-0.03
VW17-3B*	May 31, 2018	19.18	441.18	Operational	428.25 on April 23, 2024	428.14 (May 15, 2024)*	427.66 (May 11, 2023)*	0.48
SOUTH HIGHWAY DITCH								
VW18-1	January 8, 2019	18.2 (estimated)	449.41	Operational	450.48 on June 14, 2020	449.61	449.84	-0.23
VW18-2	January 8, 2019	17.7 (estimated)	449.93	Operational	450.98 on June 14, 2020	450.11	450.35	-0.24
VW18-3	January 8, 2019	12.5 (estimated)	449.93	Operational	450.89 on June 14, 2020	449.99	450.26	-0.27

Drawing 32121-PH042 Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

Note: *VW17-3B functioning intermittently, with variation in temperature wire readings since spring 2023

Table PH042-5 Spring 2024 – Hwy 986:01, Daishowa East Hill Load Cell Instrumentation Reading Summary

Date Monitored: May 20, 2024

LOAD CELL SERIAL #	ANCHOR NUMBER	DESIGN LOAD / LOCK-OFF LOAD (kN)	MAXIMUM RECORDED LOAD (kN)	RECORDED LOAD (1) (MAY 20, 2024) (kN)	PREVIOUS RECORDED LOAD (JUNE 15, 2023) (kN)	CHANGE IN LOAD SINCE PREVIOUS READING (kN)
VC2010	P20A	225/180	245.17 on April 1, 2023	200.12	200.73	-0.61
VC2013	P20B	400/180	245.45 on March 30, 2023	218.16	217.76	0.40
VC2016	P20C	400/180	191.49 on April 3, 2023	175.67	176.39	-0.72
VC2011	P40A	225/180	344.62 on April 1, 2023	269.42	271.80	-2.38
VC2014	P40B	400/180	344.20 on April 1, 2023	309.55	308.21	1.34
VC2017	P40C	400/180	190.46 on April 1, 2023	171.32	170.68	0.64
VC2012	P60A	225/180	261.71 on April 1, 2023	206.10	207.54	-1.44
VC2015	P60B	400/180	263.56 on April 2, 2023	234.42	234.23	0.19
VC2018	P60C	400/180	169.69 on March 20, 2023	155.44	156.12	-0.68

Drawing 32121-PH042-1 Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

Notes:

(1) Load cell data is recorded daily with datalogger on site. See Figures PH042-5, PH042-6, and PH042-7 in Appendix A for combined historical instrument readings.

THURBER

STATEMENT OF LIMITATIONS AND CONDITIONS

1. STANDARD OF CARE

This Report has been prepared in accordance with generally accepted engineering or environmental consulting practices in the applicable jurisdiction. No other warranty, expressed or implied, is intended or made.

2. COMPLETE REPORT

All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment are a part of the Report, which is of a summary nature and is not intended to stand alone without reference to the instructions given to Thurber by the Client, communications between Thurber and the Client, and any other reports, proposals or documents prepared by Thurber for the Client relative to the specific site described herein, all of which together constitute the Report.

IN ORDER TO PROPERLY UNDERSTAND THE SUGGESTIONS, RECOMMENDATIONS AND OPINIONS EXPRESSED HEREIN, REFERENCE MUST BE MADE TO THE WHOLE OF THE REPORT. THURBER IS NOT RESPONSIBLE FOR USE BY ANY PARTY OF PORTIONS OF THE REPORT WITHOUT REFERENCE TO THE WHOLE REPORT.

3. BASIS OF REPORT

The Report has been prepared for the specific site, development, design objectives and purposes that were described to Thurber by the Client. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed in the Report, subject to the limitations provided herein, are only valid to the extent that the Report expressly addresses proposed development, design objectives and purposes, and then only to the extent that there has been no material alteration to or variation from any of the said descriptions provided to Thurber, unless Thurber is specifically requested by the Client to review and revise the Report in light of such alteration or variation.

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5. INTERPRETATION OF THE REPORT

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.

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d) Construction Services: During construction Thurber should be retained to provide field reviews. Field reviews consist of performing sufficient and timely observations of encountered conditions in order to confirm and document that the site conditions do not materially differ from those interpreted conditions considered in the preparation of the report. Adequate field reviews are necessary for Thurber to provide letters of assurance, in accordance with the requirements of many regulatory authorities.

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ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS GRMP (CON0022164)
PEACE REGION (PEACE RIVER DISTRICT)
INSTRUMENTATION MONITORING RESULTS

SPRING 2024

APPENDIX A
DATA PRESENTATION

SITE PH042: HWY 986:01, DAISHOWA EAST HILL (WELL SITE SLIDE)

ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS
PEACE REGION (PEACE RIVER DISTRICT)
INSTRUMENTATION MONITORING FIELD SUMMARY (PH042)
SPRING 2024

Location:	Daishowa Well Site Slide (HWY 986:01 C1 33.212)	**Readout:**	VW GK 404,S/N 364
File Number:	32121	**Casing:**	3.34
Probe:	RST SI SET 5R	**Temp:**	12
Cable:	RST SI SET 5R	**Read by:**	NRM

SLOPE INCLINOMETER (SI) READINGS

SI#	GPS Location (UTM 11)		Date	Stickup (m)	Depth from top of Casing (ft)	Magn. North A+ Groove	Current Bottom Depth Readings				Probe/ Reel #	Size (")	Remarks
	Easting (m)	Northing (m)					A+	A-	B+	B-			
SI18-1	491157	6246211	20-May-24	0.80	70 to 2	16	-301	314	-857	838	5R/5R	3.34	

VIBRATING WIRE PIEZOMETER (VW) READINGS

VW #	Serial #	GPS Location (UTM 11)		Datalogger Serial #	Date	Comment
		Easting (m)	Northing (m)			
VW18-1	1802205	491170	6246150	Campbell Scientific 8480	20-May-24	Read manually, SN# 2209, 3123.6 - 5.2
VW18-2	1802208	491179	6246147			Read manually, SN#2208, 3568.9 - 4.9 °
VW18-3	1802207	491180	6246148			Read manually, SN#2207, 3494.2 - 4.6 °

INSPECTOR REPORT

The other instruments, SAAs, Load Cells, Strain Gauges, and Vibrating Wire Piezometers at the pile wall are connected to a modem and no longer require a manual download. Read the SIs and take manual readings of the ditch VW piezometers only.

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NE 7 85-20-5

HIGHWAY R/W

AS-BUILT SUB-DRAIN

AS-BUILT DRAINAGE SWALE RIPRAP

AS-BUILT WALL REGRADING LIMITS

HIGHWAY R/W

AS-BUILT TRM

AS-BUILT OUTFALL DITCH

SI-16

SI09-4/VW09-4

SI03-7

SI18-01

SI-15

SAA17-P20
VC2010, VC2013, VC2016

P1

P10

DT

SI09-2/VW09-2

SAA18-1
VW17-3A/VW17-3B

VW17-1A /VW17-1B

P20

P30

SAA17-P40
VC2011, VC2014,VC2017

P40

SI09-3/VW09-3

VW17-2A /VW17-2B

P50

VC2012, VC2015,VC2018

P60

P70

P80

CULVERT (8000 mm x 3518 mm CSP)

AS-BUILT GUARD RAIL

AS-BUILT GROUTED

SI09-1/VW09-1

AS-BUILT EXTENT OF GABION MATTERESS

DRAINAGE PIPE

VW18-3

VW18-1

VW18-2

DT

POWER POLE WITH PUMP CONTROL PANEL

WEST BOUND LANE
HIGHWAY 986
EAST BOUND LANE

EAST BOUND LANE

ROAD PLAN NO. 902 0393

N

W E

S

LEGEND

	APPROXIMATE INSTRUMENT LOCATION
	NON-OPERATIONAL INSTRUMENT
SI	SLOPE INCLINOMETER
VW	VIBRATING WIRE PIEZOMETER
VC	VIBRATING WIRE LOAD CELL
SAA	SHAPE ACCELEROMETER ARRAY
DT	APPROXIMATE DATA LOGGER LOCATION

0 5 10 15 20 25 30m

SCALE 1:500

Alberta

PEACE REGION (PEACE RIVER DISTRICT)

PH042: HWY 986:01 - DAISHOWA EAST HILL (STA. 13+000 WELL SITE) INSTRUMENT LOCATIONS

DWG No. 32121-PH042

DRAWN BY	ML
DESIGNED BY	BWN
APPROVED BY	DWP
SCALE	1:500
DATE	SEPTEMBER 2021
FILE No.	32121

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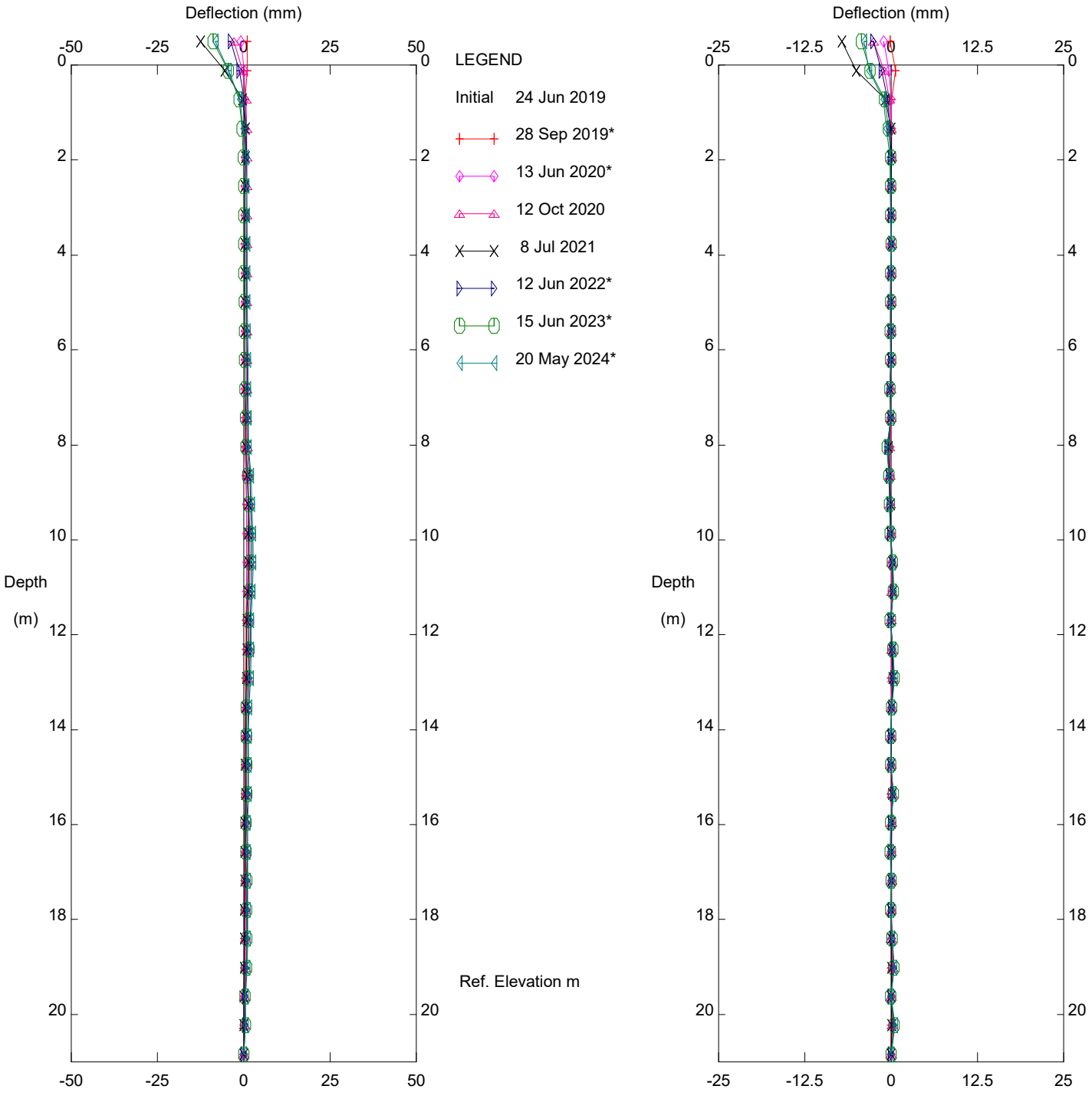

Cumulative Deflection

Direction A

Incremental Deflection

Direction A

Hwy 986:01 Daishowa East Hill, Inclinometer SI18-1

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Sets marked * include zero shift and/or rotation corrections.

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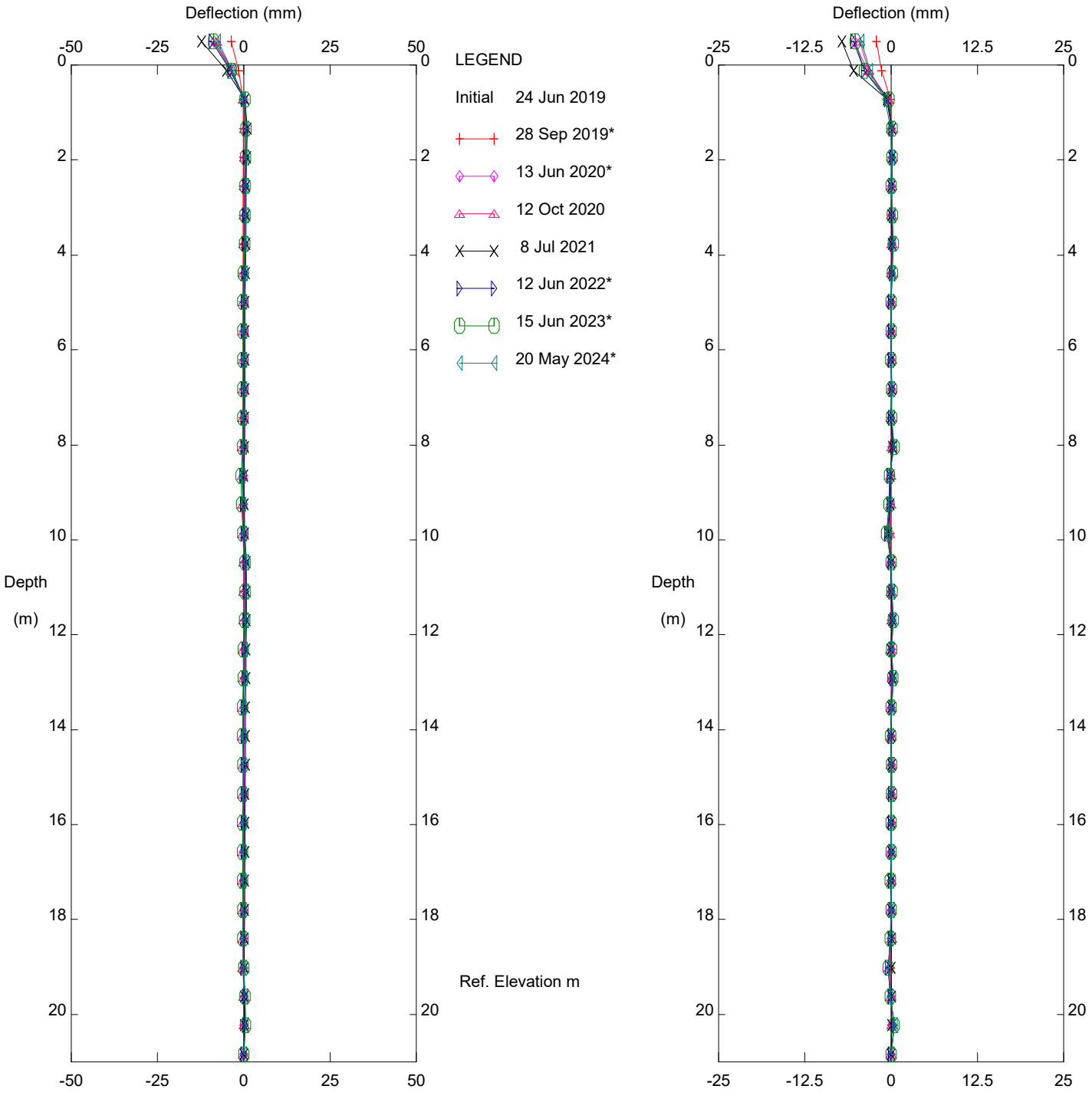

Cumulative Deflection

Direction B

Incremental Deflection

Direction B

Hwy 986:01 Daishowa East Hill, Inclinometer SI18-1

Alberta Transportation

Sets marked * include zero shift and/or rotation corrections.

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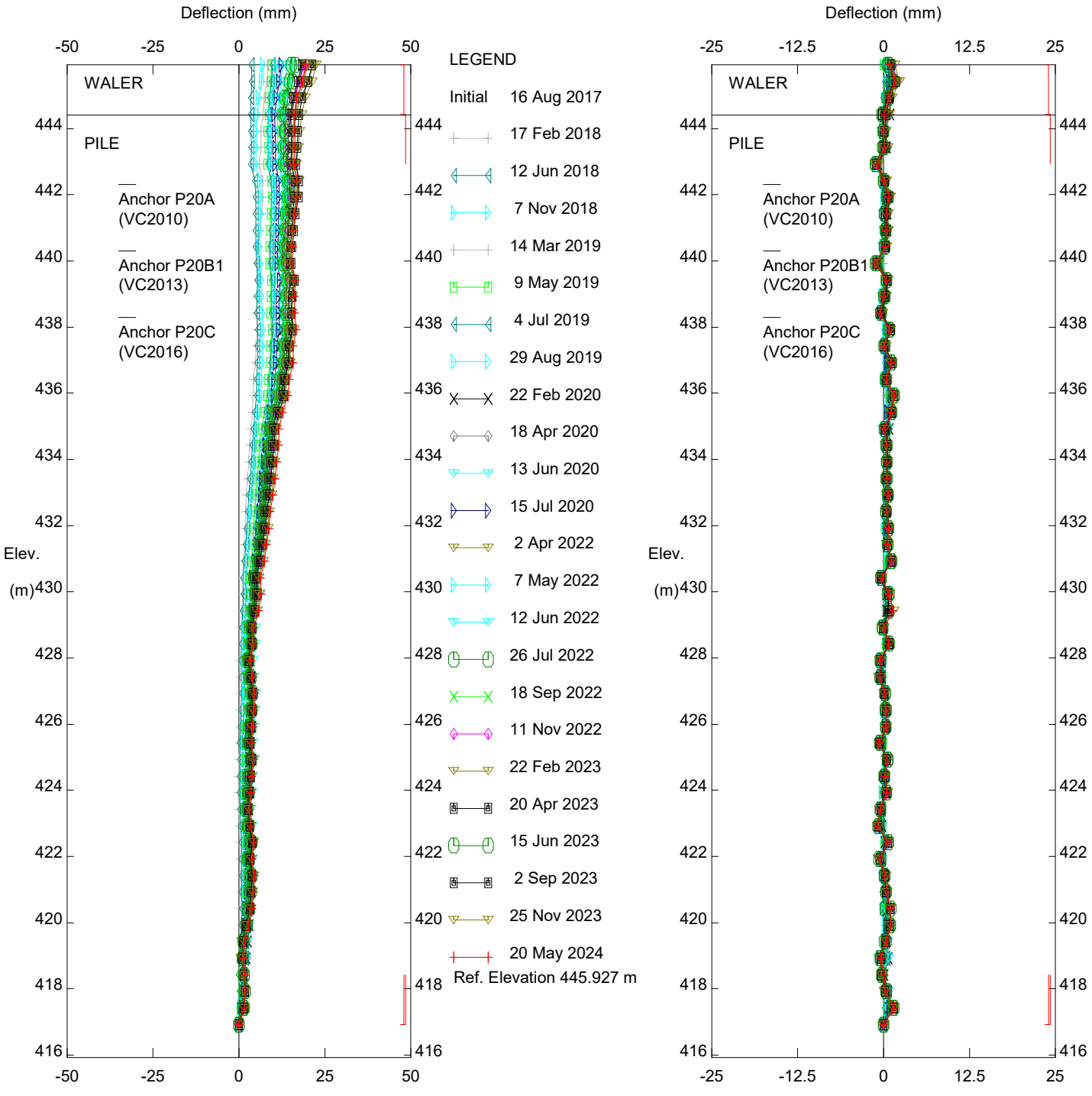
Thurber Engineering Ltd.



Cumulative Deflection

Direction A

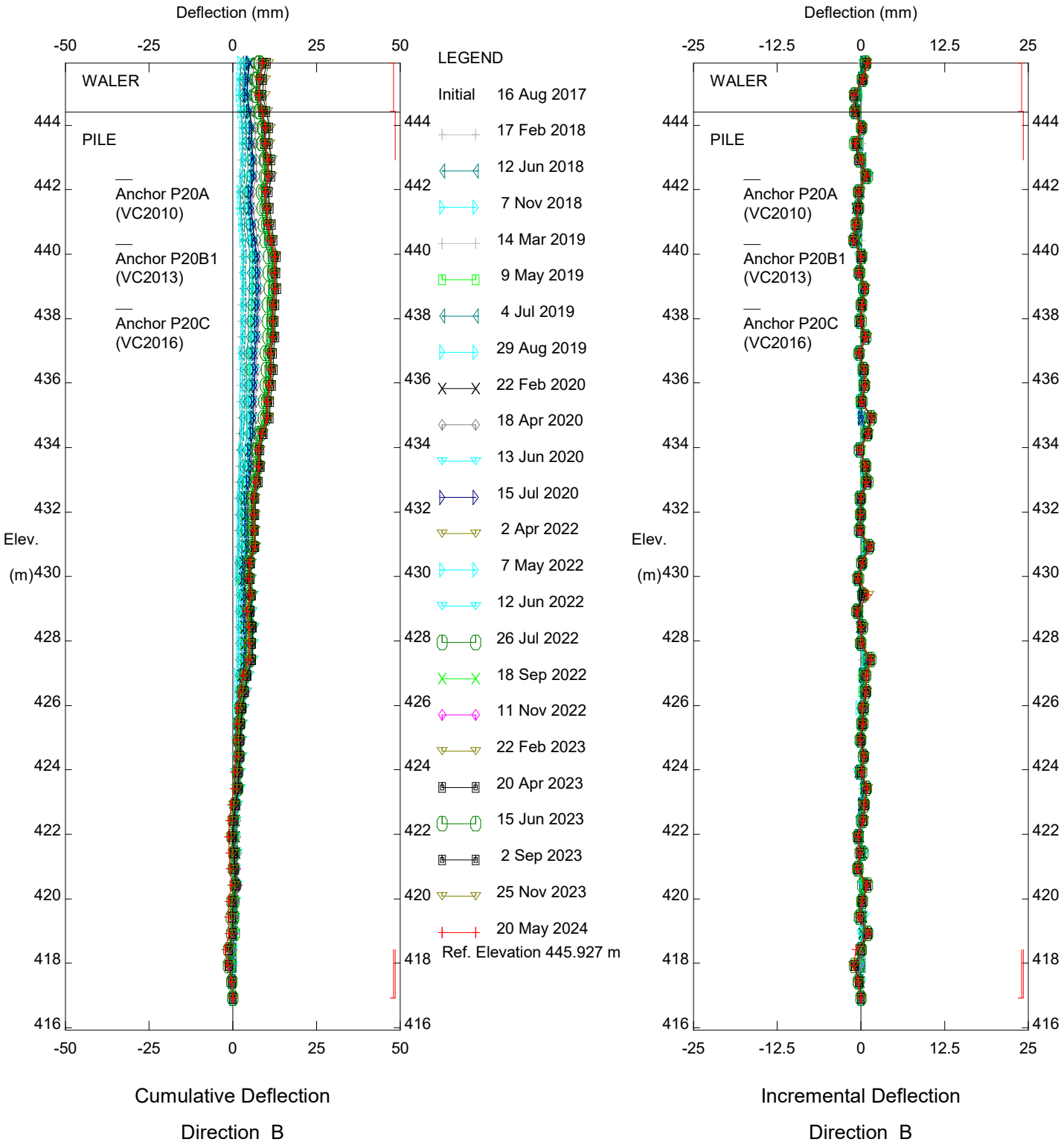
Incremental Deflection

Direction A

Hwy 986:01 Daishowa East Hill, Inclinometer SAA17-P20

Alberta Transportation

Thurber Engineering Ltd.



Cumulative Deflection

Direction B

Incremental Deflection

Direction B

Hwy 986:01 Daishowa East Hill, Inclinometer SAA17-P20

Alberta Transportation

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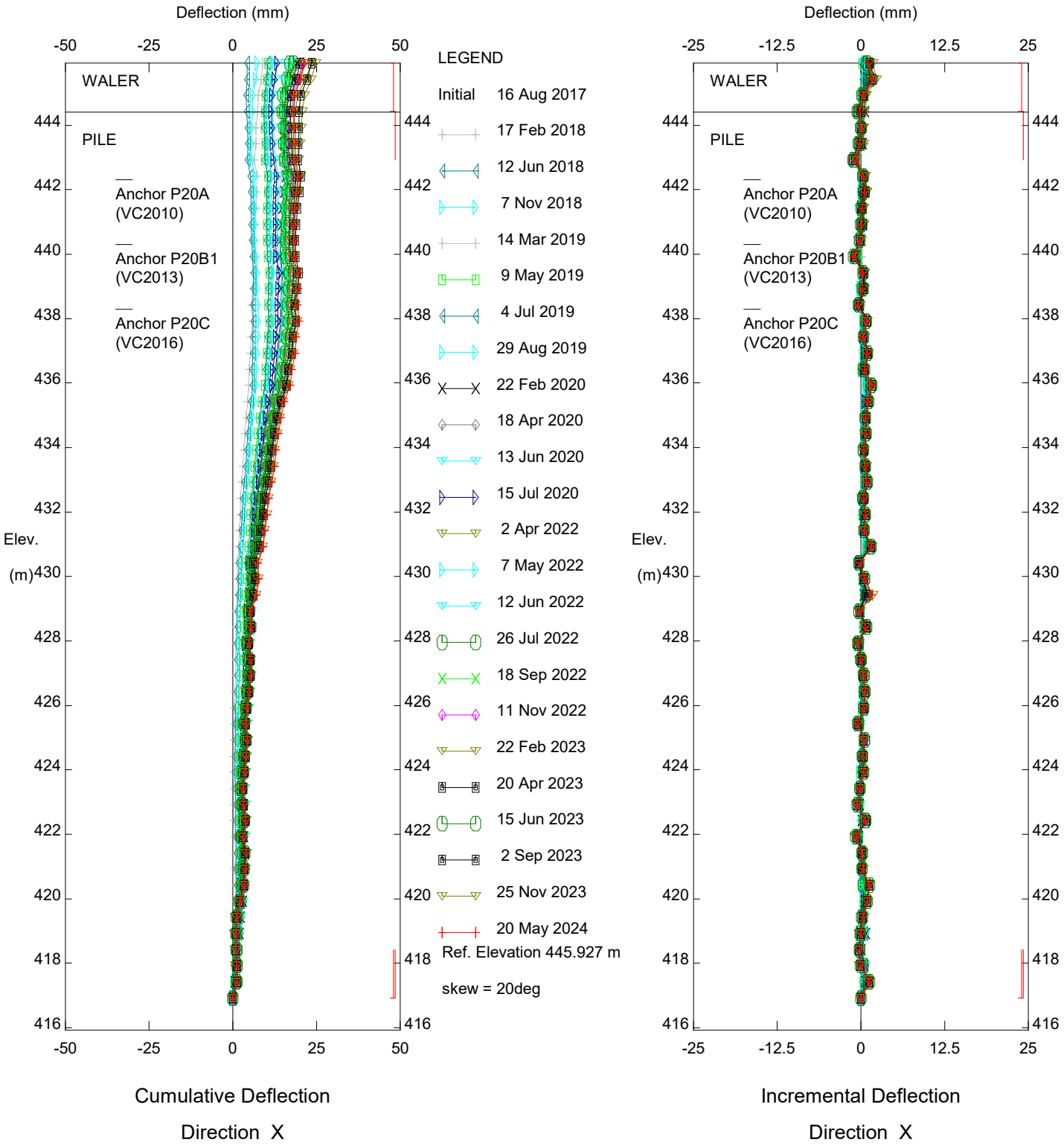
Thurber Engineering Ltd.



Cumulative Deflection

Direction X

Incremental Deflection

Direction X

Hwy 986:01 Daishowa East Hill, Inclinometer SAA17-P20

Alberta Transportation

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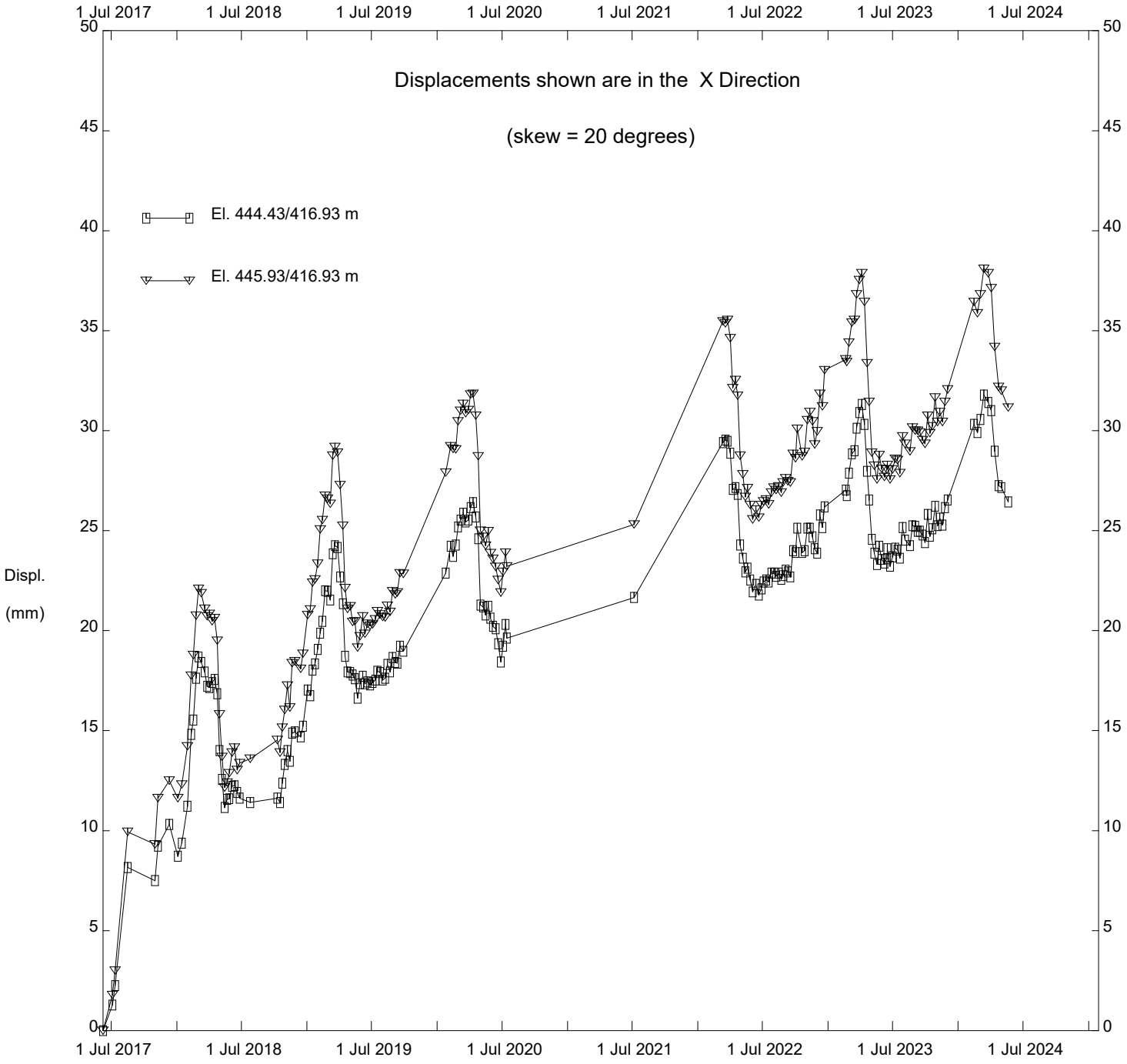
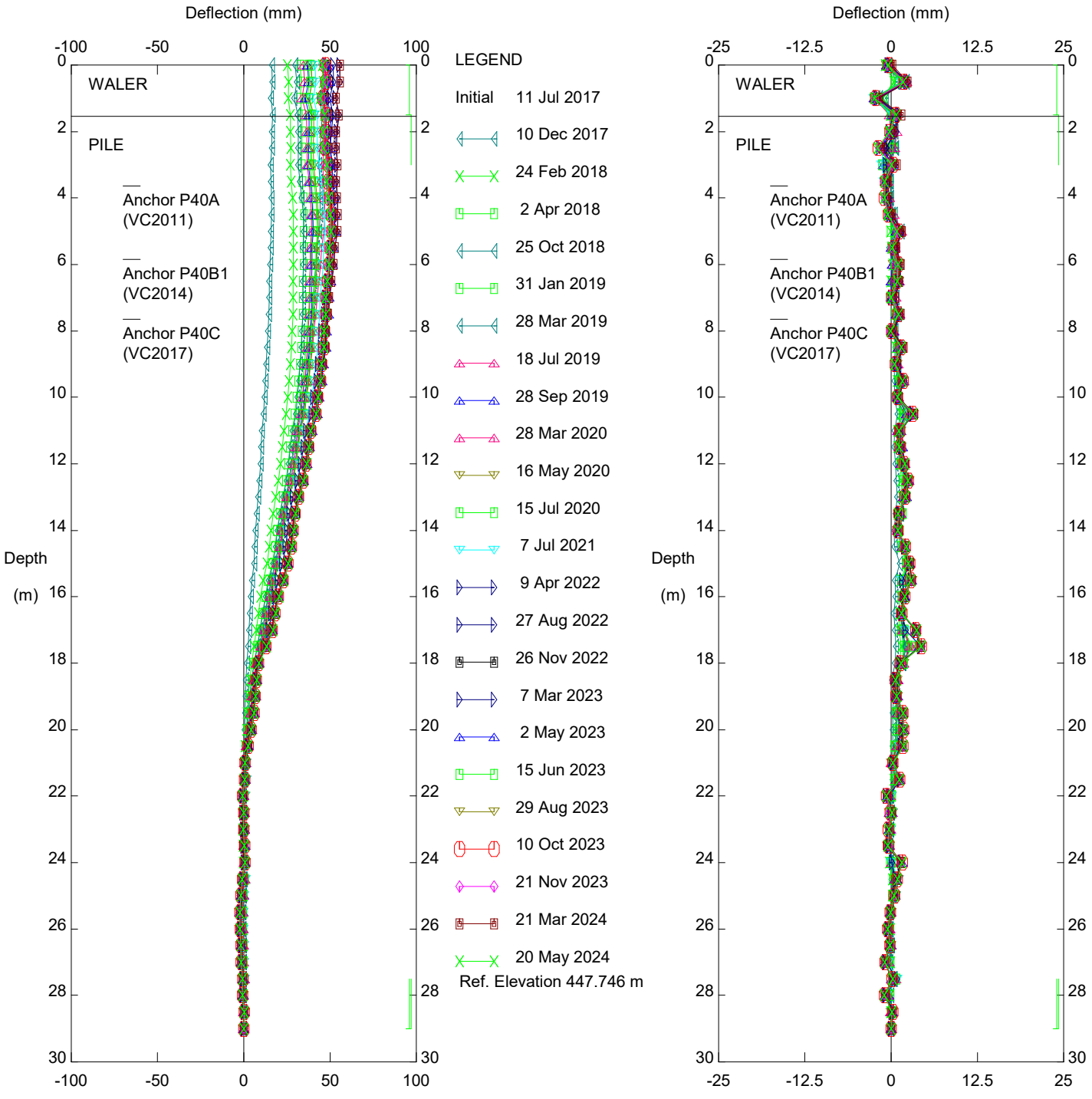
Thurber Engineering Ltd.



Hwy 986:01 Daishowa East Hill, Inclinometer SAA17-P20

Alberta Transportation

Thurber Engineering Ltd.



Cumulative Deflection

Direction A

Incremental Deflection

Direction A

Hwy 986:01 Daishowa East Hill, Inclinometer SAA17-P40

Alberta Transportation

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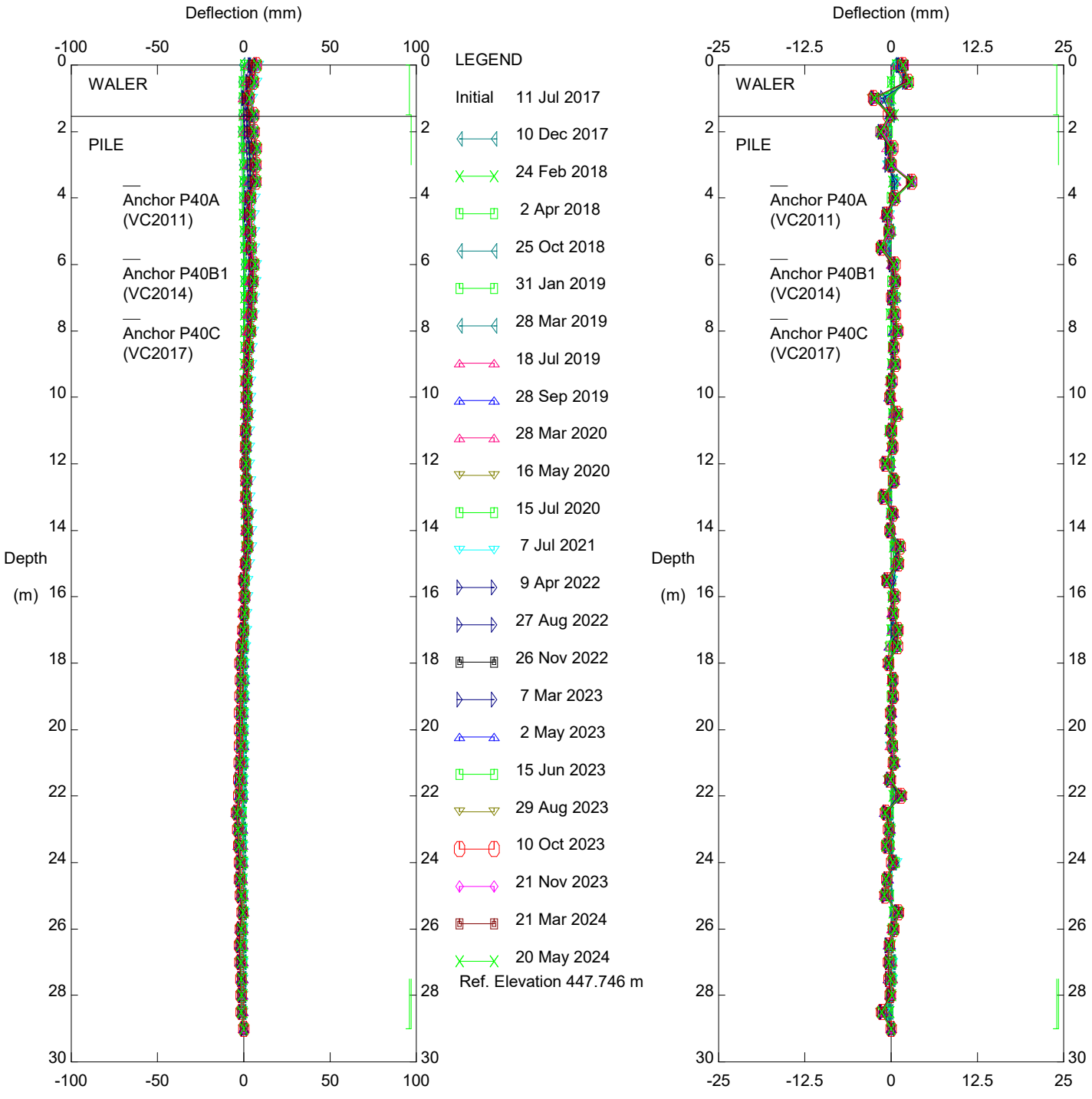
Thurber Engineering Ltd.



Cumulative Deflection

Direction B

Incremental Deflection

Direction B

Hwy 986:01 Daishowa East Hill, Inclinometer SAA17-P40

Alberta Transportation

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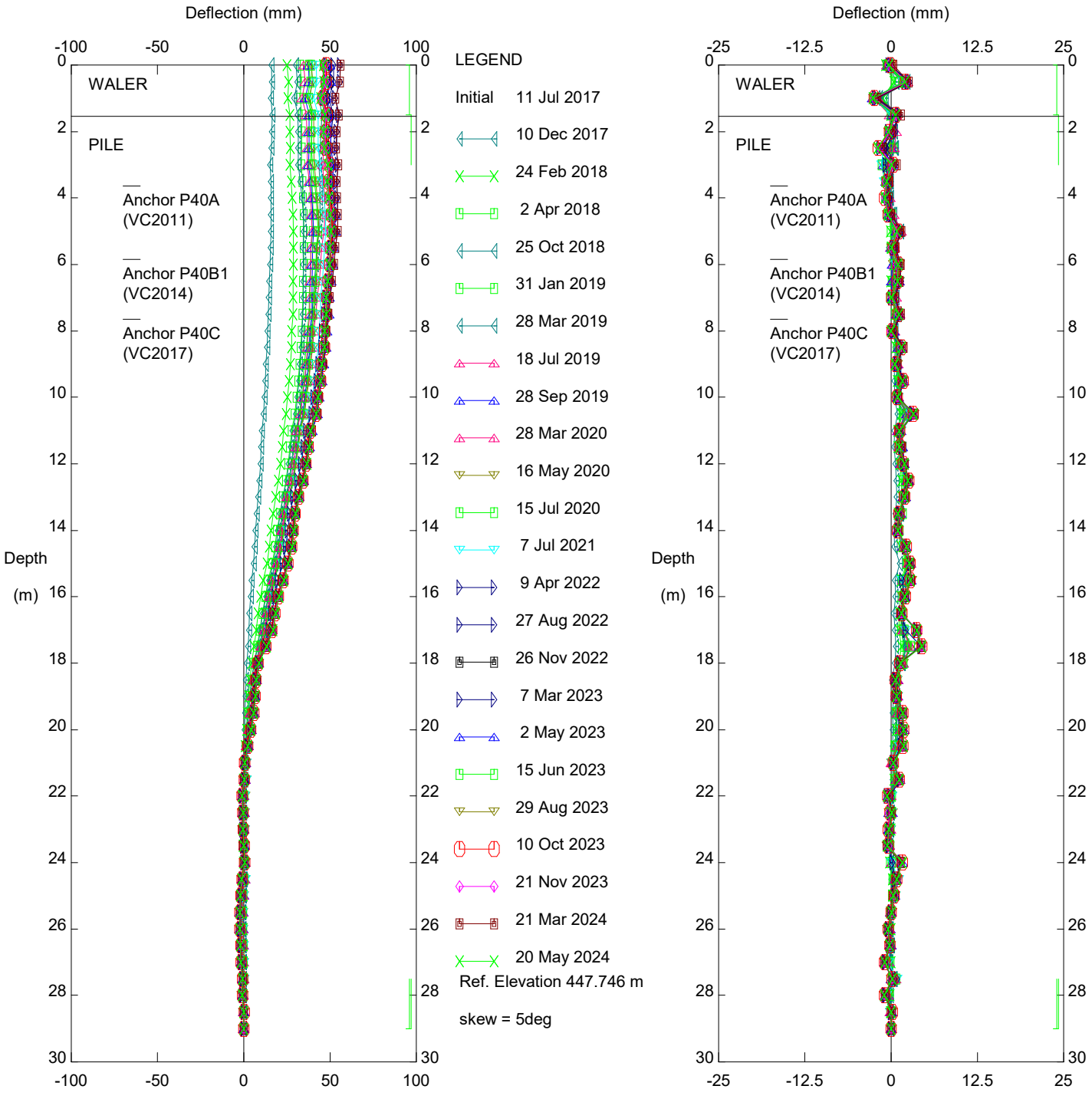

Cumulative Deflection

Direction X

Incremental Deflection

Direction X

Hwy 986:01 Daishowa East Hill, Inclinometer SAA17-P40

Alberta Transportation

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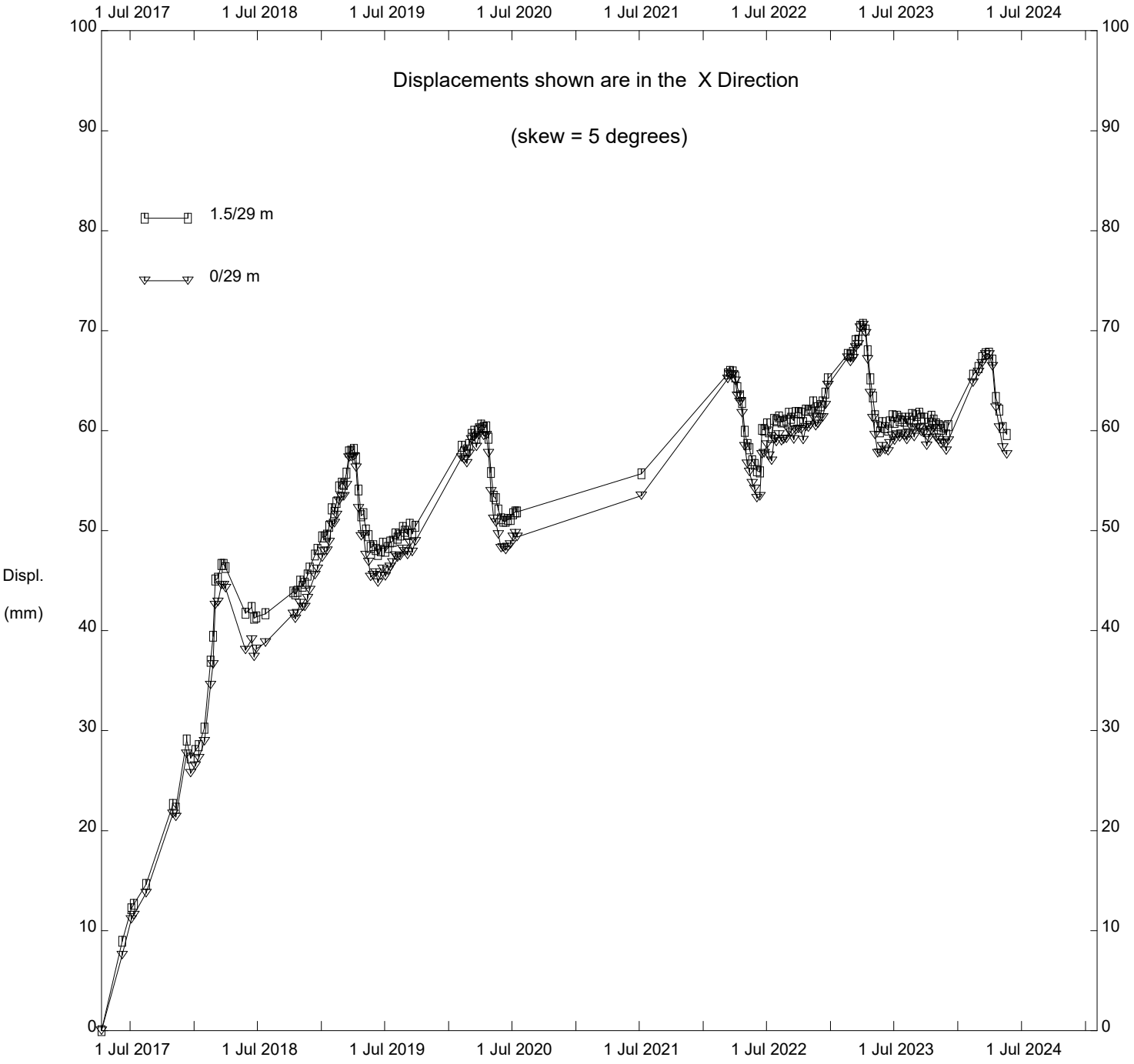
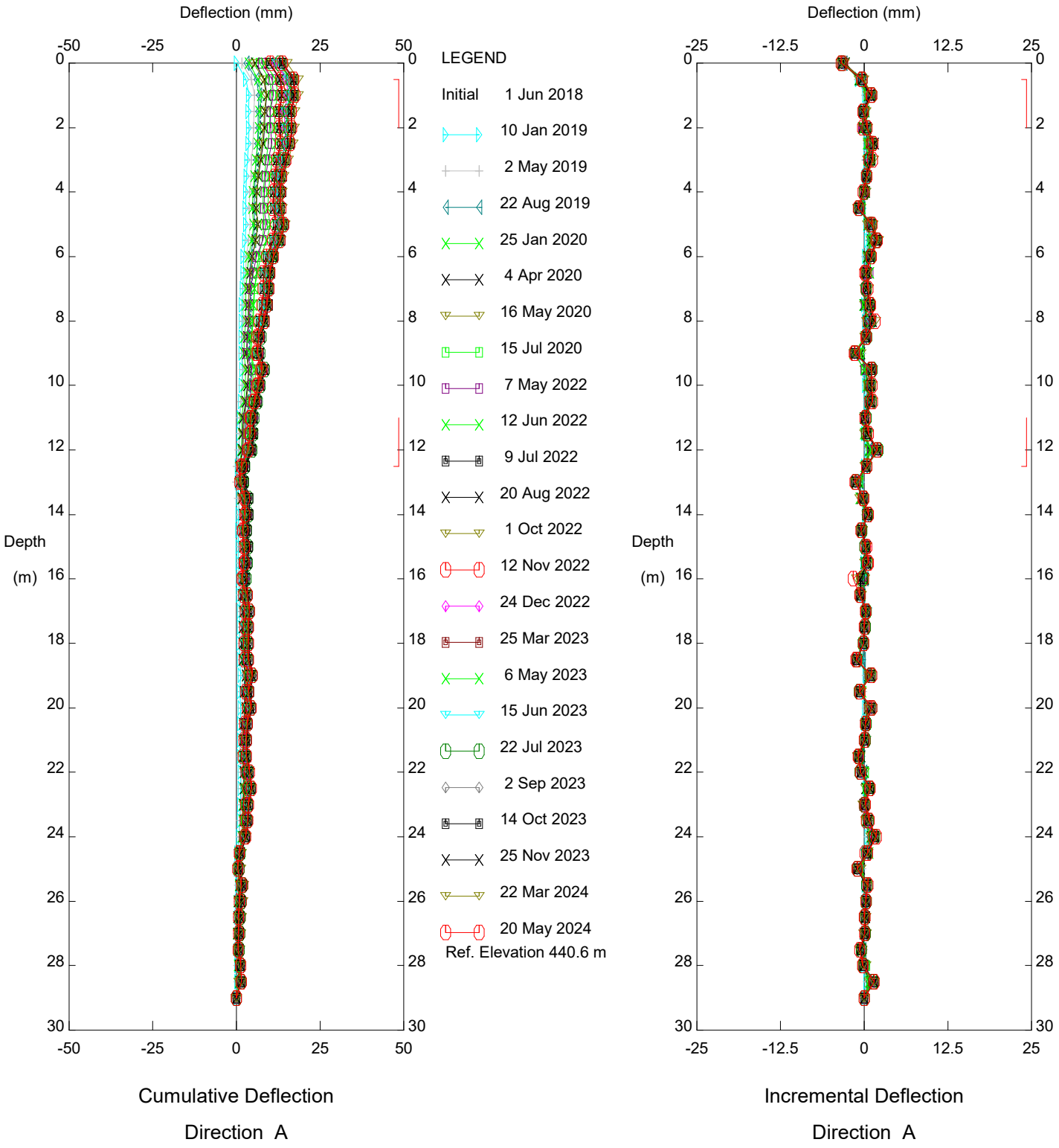
Thurber Engineering Ltd.



Hwy 986:01 Daishowa East Hill, Inclinometer SAA17-P40

Alberta Transportation

Thurber Engineering Ltd.



Cumulative Deflection

Direction A

Incremental Deflection

Direction A

Hwy 986:01 Daishowa East Hill, Inclinometer SAA18-1

Alberta Transportation

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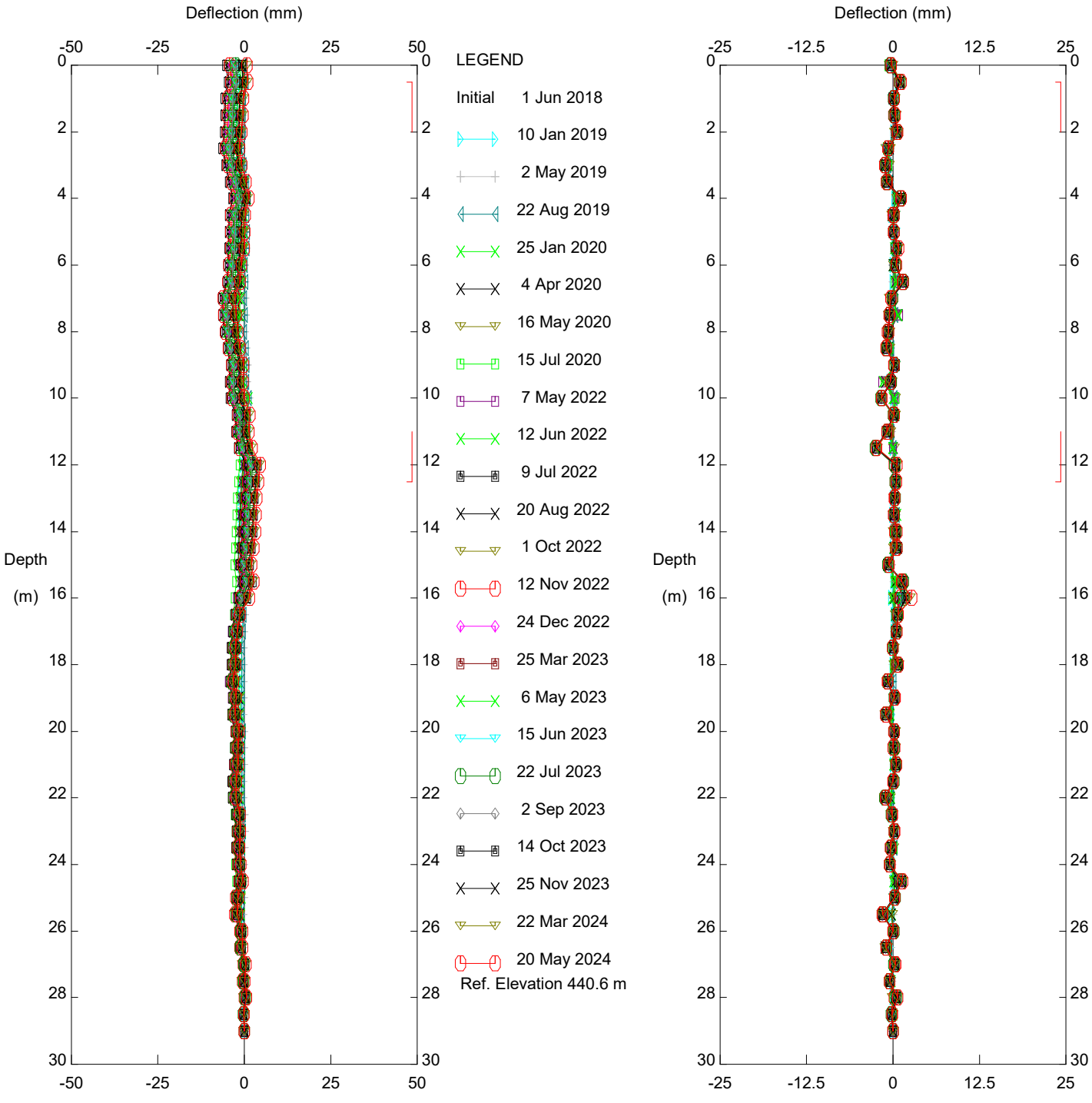
Thurber Engineering Ltd.



Cumulative Deflection

Direction B

Incremental Deflection

Direction B

Hwy 986:01 Daishowa East Hill, Inclinometer SAA18-1

Alberta Transportation

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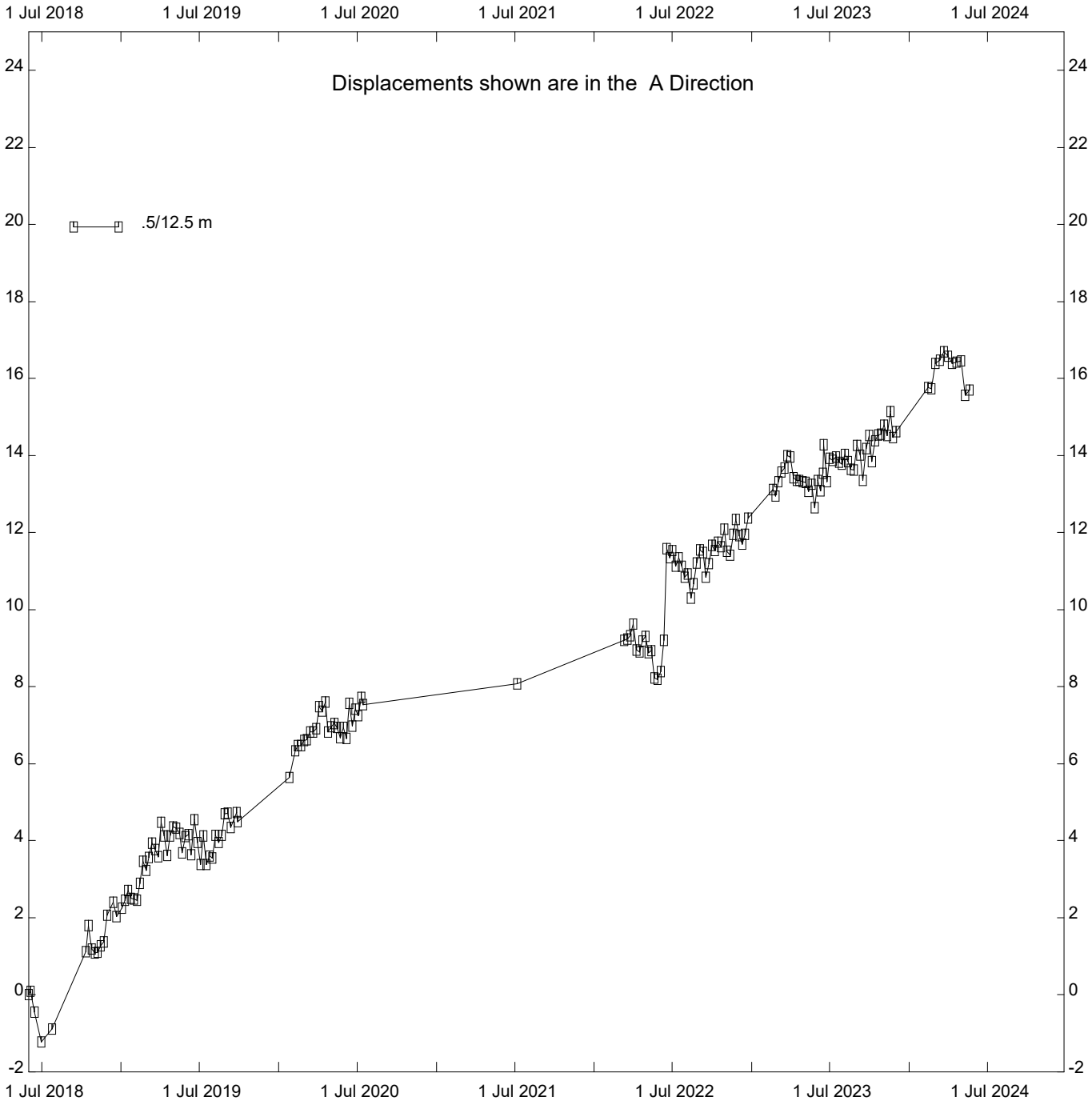

Hwy 986:01 Daishowa East Hill, Inclinometer SAA18-1

Alberta Transportation

COMPARISON OF SAA18-1 TO SAA17-P40 OVER 440.25 m to 428.25 m

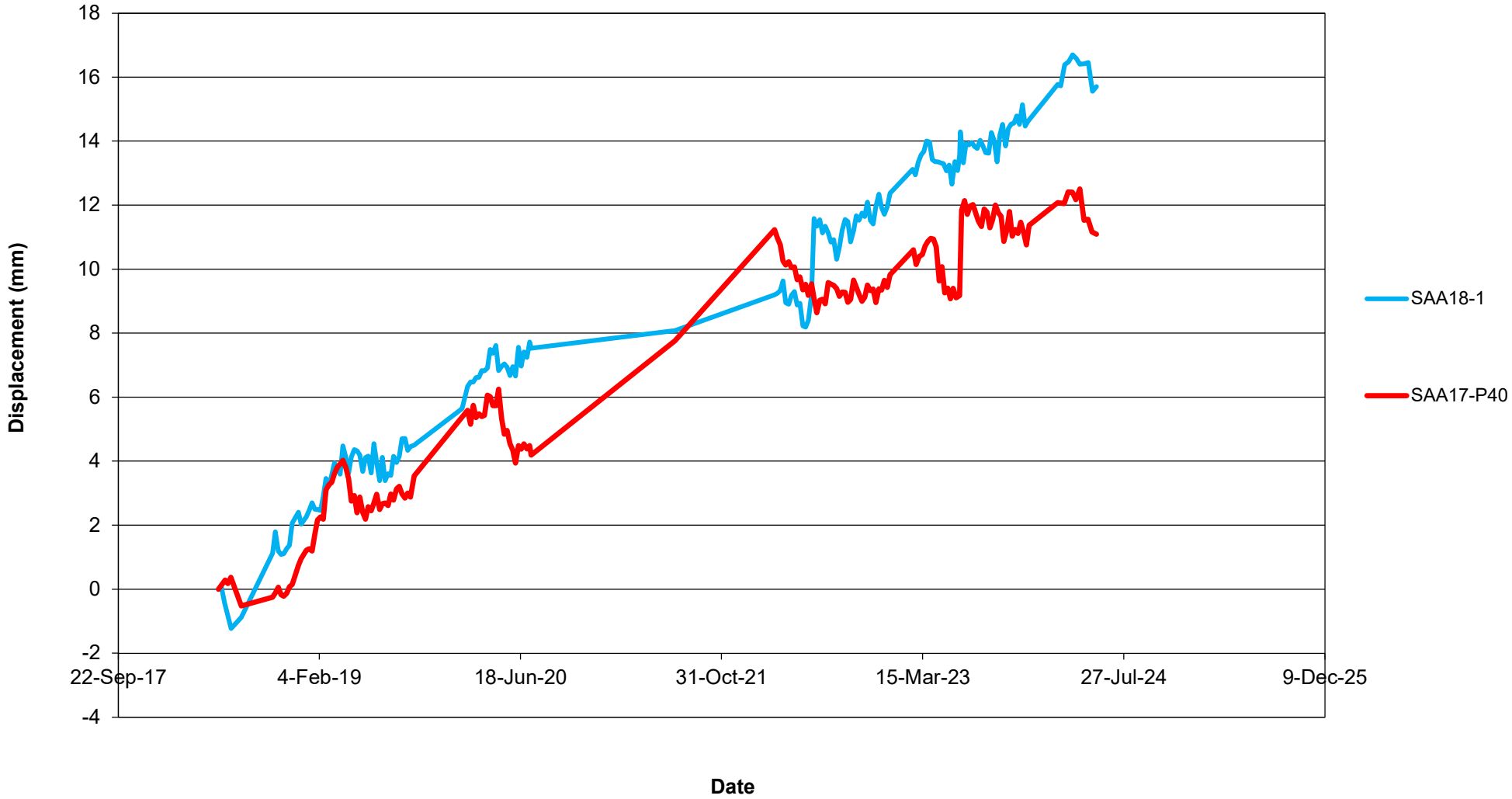

FIGURE PH042-1
PIEZOMETRIC ELEVATIONS FOR HWY 986:01, DAISHOWA EAST HILL
(PILE WALL PIEZOMETERS)

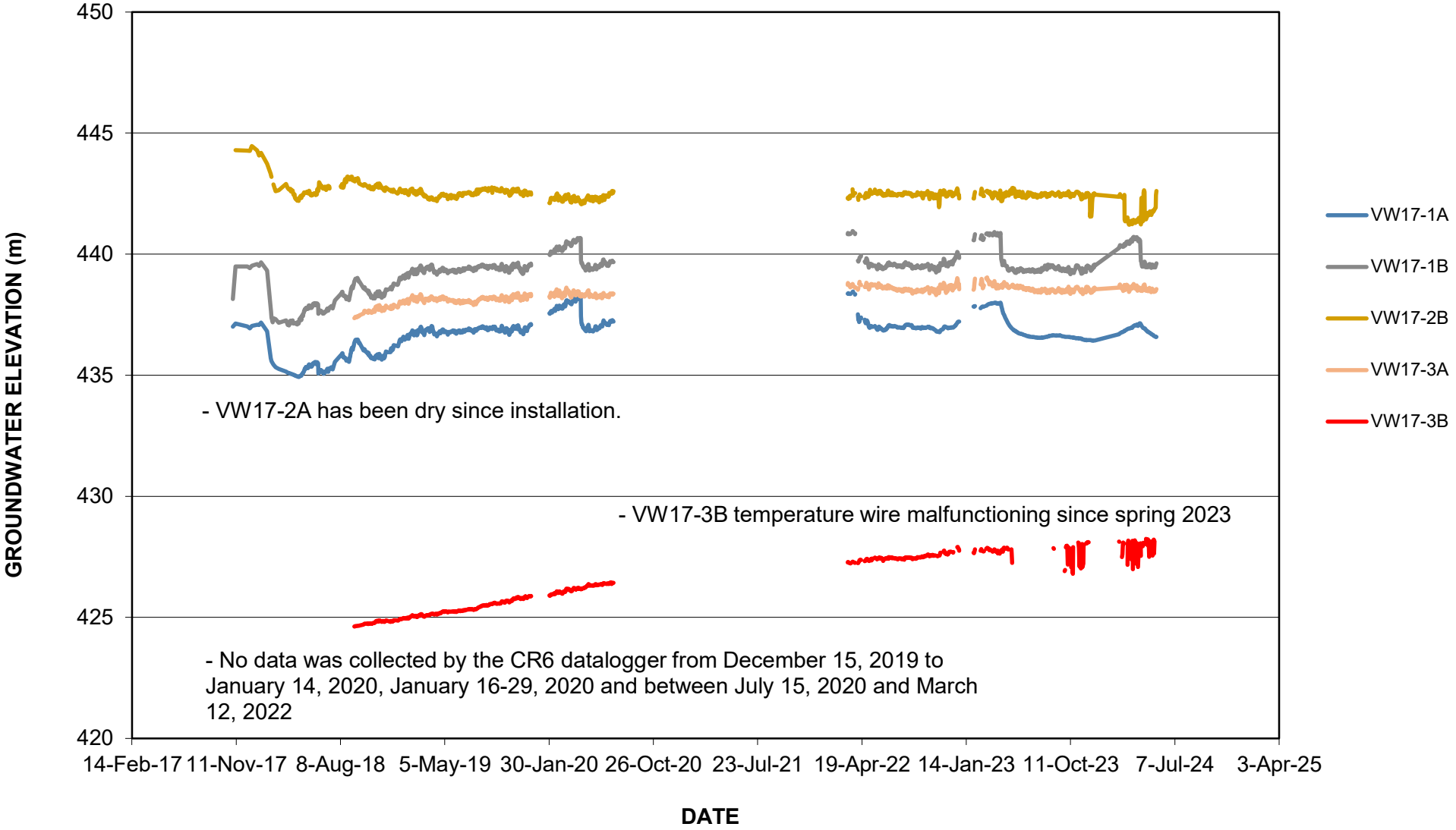

FIGURE PH042-2
PIEZOMETRIC DEPTHS FOR HWY 986:01, DAISHOWA EAST HILL
(PILE WALL PIEZOMETERS)

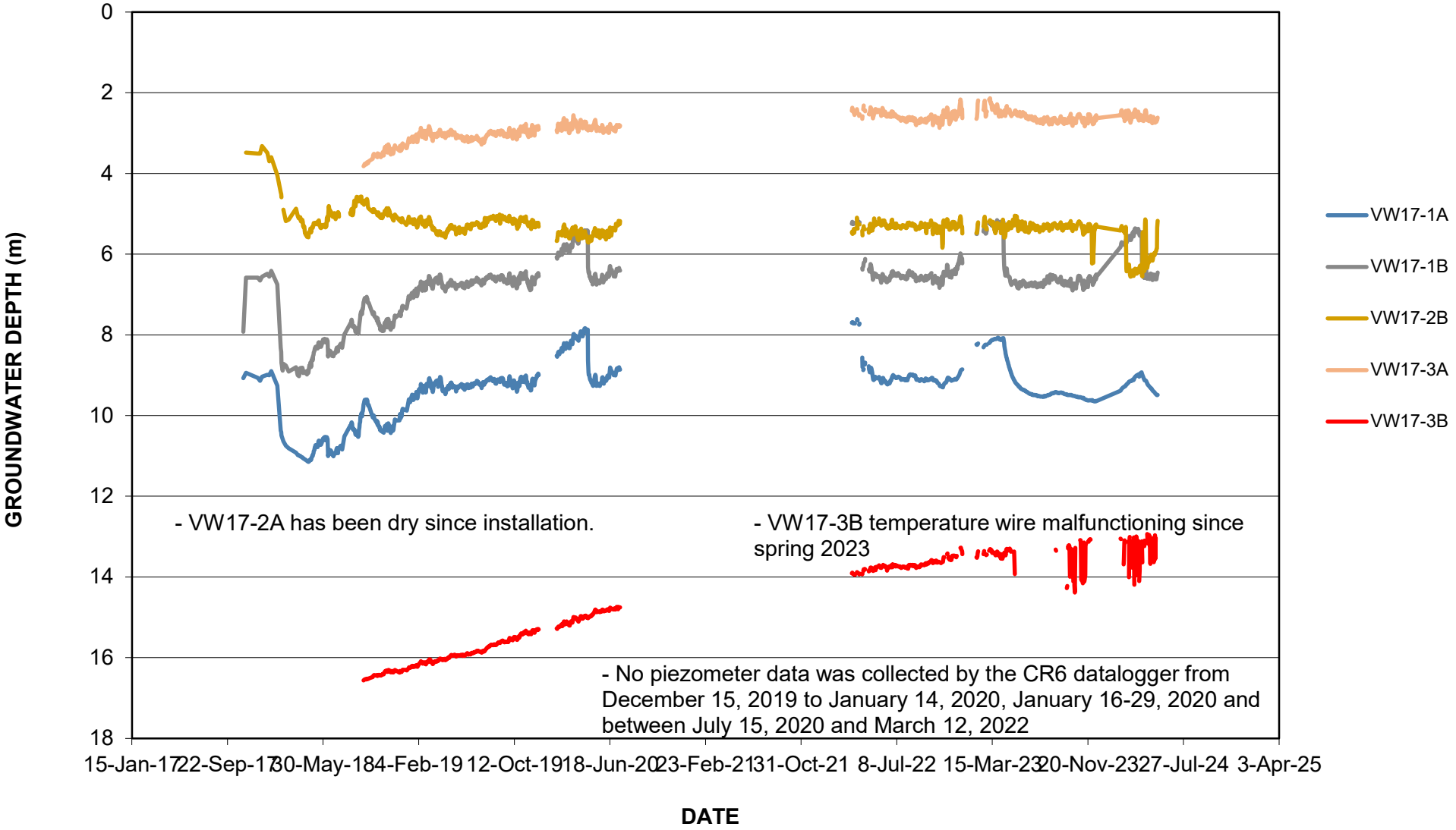

FIGURE PH042-3
PIEZOMETRIC ELEVATIONS FOR HWY 986:01, DAISHOWA EAST HILL
(SOUTH HIGHWAY DITCH PIEZOMETERS)

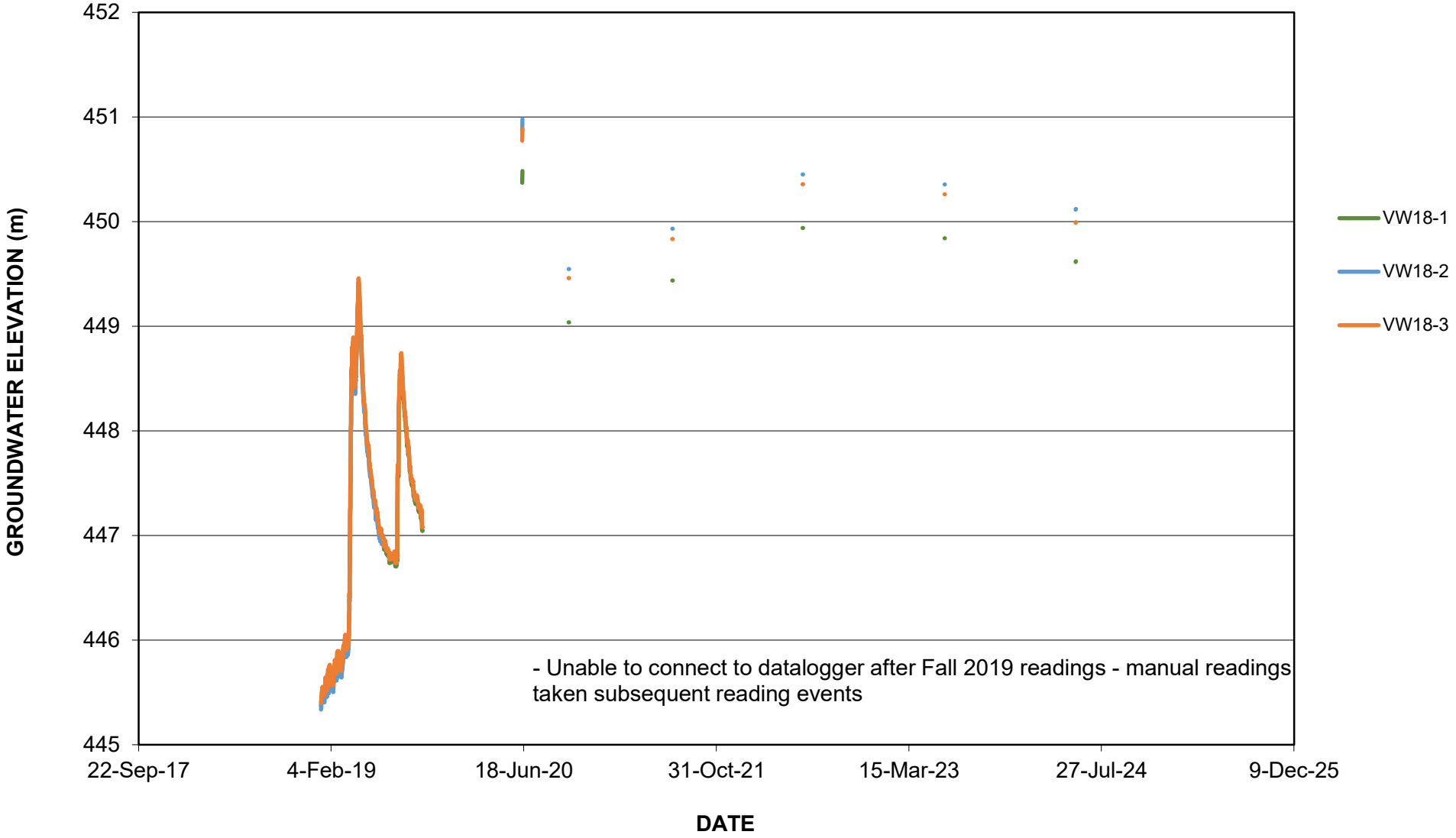

FIGURE PH042-4
PIEZOMETRIC DEPTHS FOR HWY 986:01, DAISHOWA EAST HILL
(SOUTH HIGHWAY DITCH PIEZOMETERS)

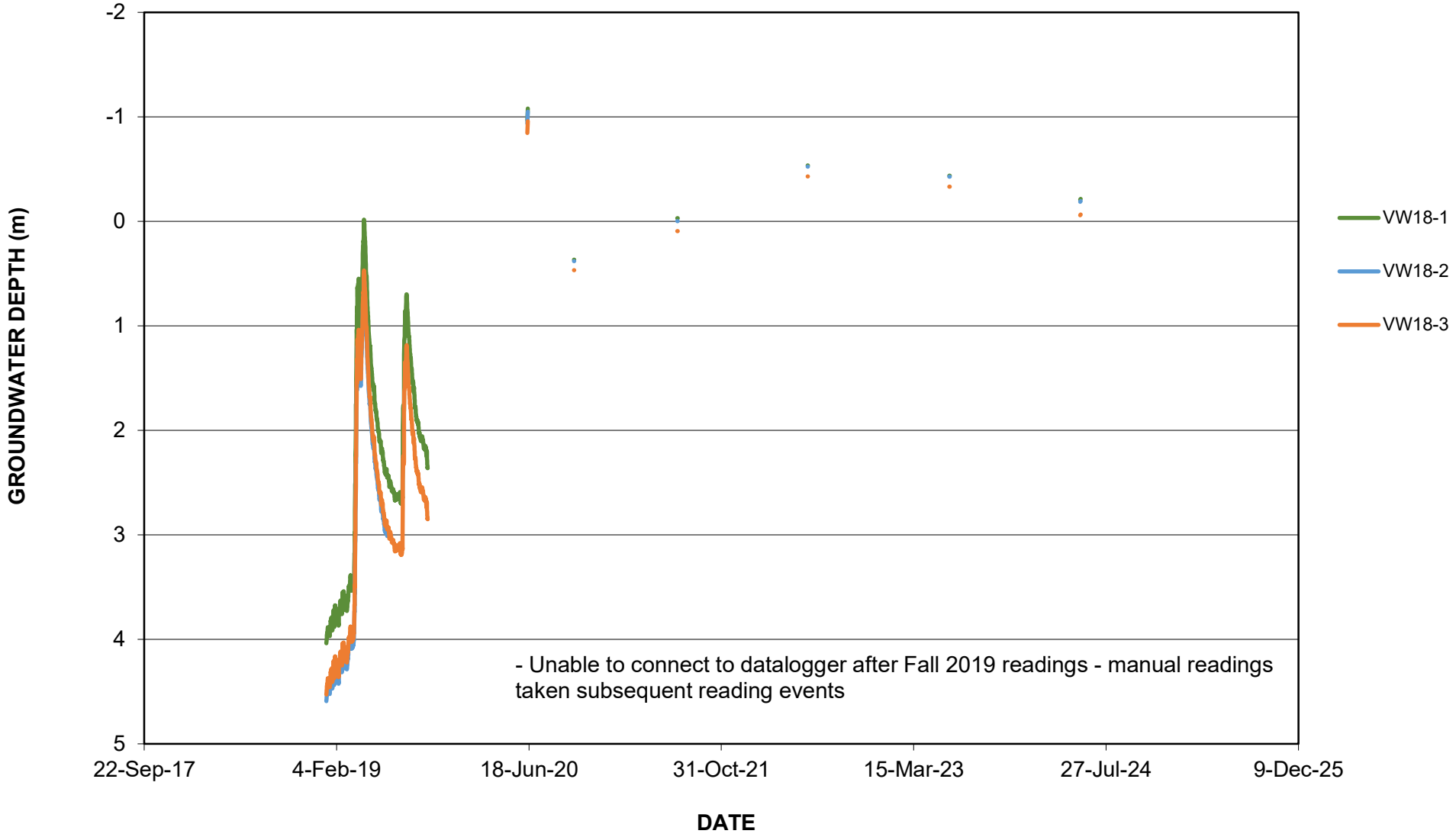

FIGURE PH042-5
LOAD CELL DATA FOR HWY 986:01, DAISHOWA EAST (PILE P20)

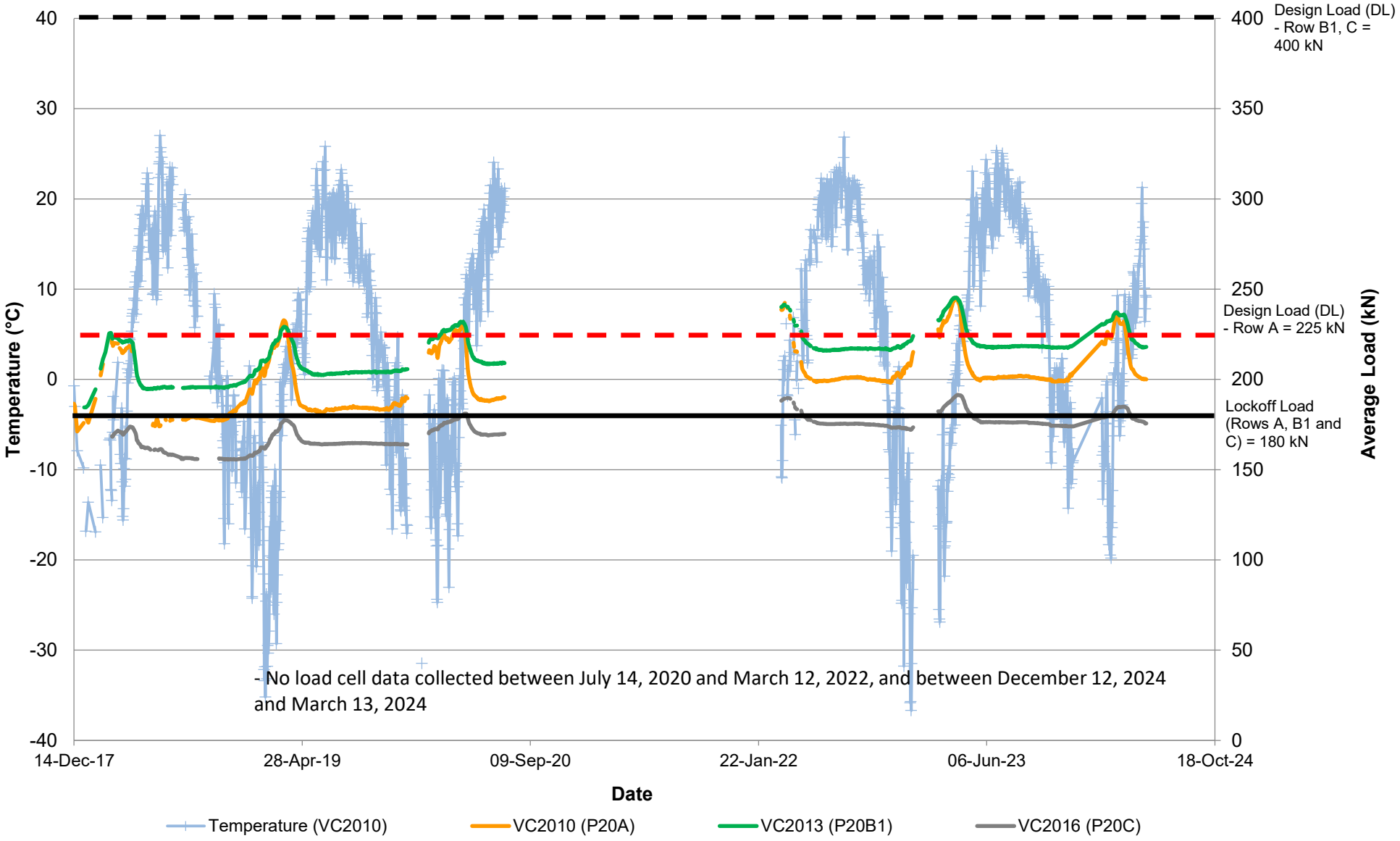

FIGURE PH042-6
LOAD CELL DATA FOR HWY 986:01, DAISHOWA EAST (PILE P40)

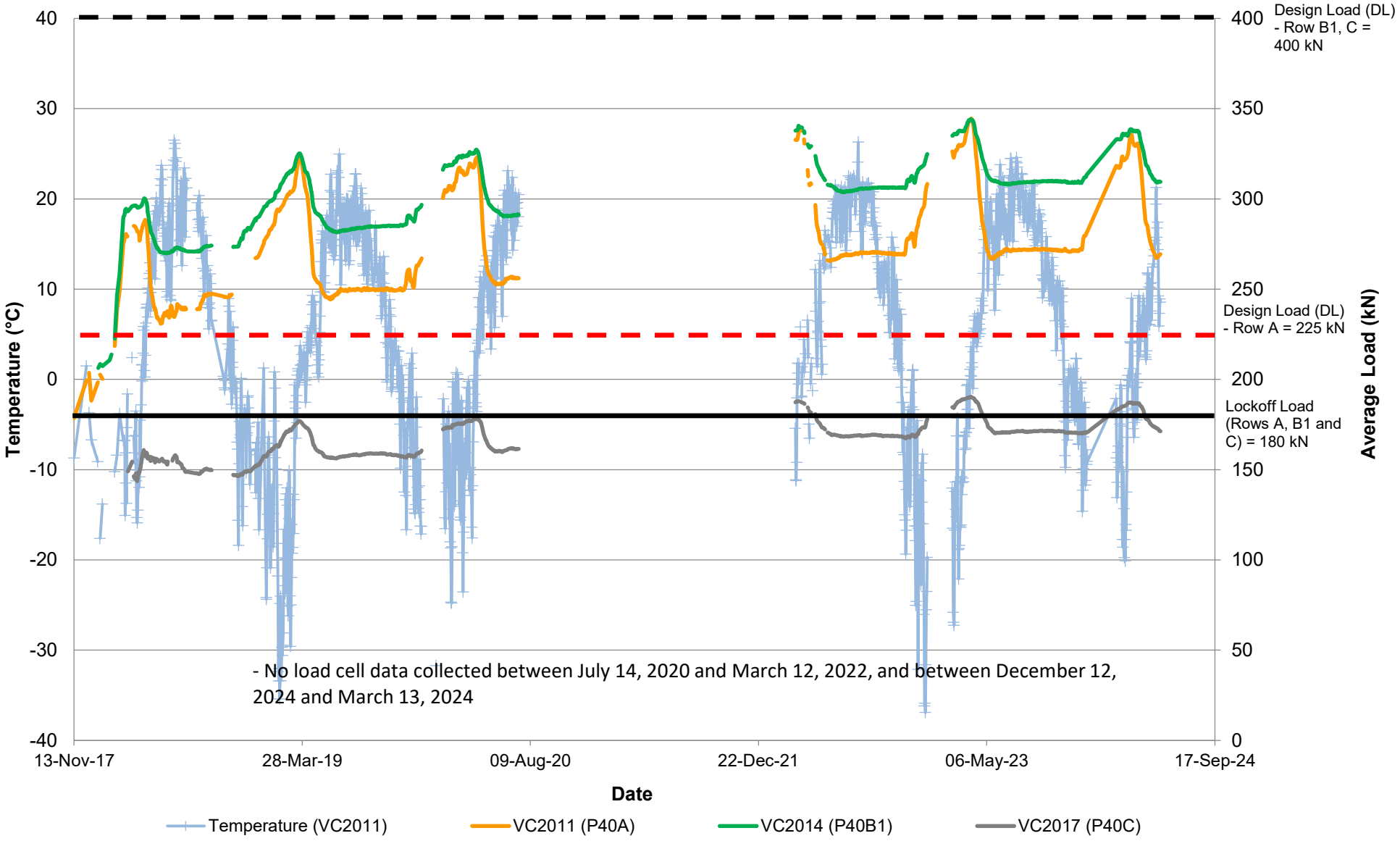

FIGURE PH042-7
LOAD CELL DATA FOR HWY 986:01, DAISHOWA EAST (PILE P60)