



THURBER ENGINEERING LTD.

July 28, 2022

File No.: 32121

Alberta Transportation
Provincial Building
9621-96 Avenue
Peace River, Alberta
T8S 1T4

Attention: Mr. Max Shannon

**ALBERTA TRANSPORTATION GRMP (CON0022164)
PEACE REGION (PEACE RIVER DISTRICT)
INSTRUMENTATION MONITORING RESULTS – SPRING 2022**

SECTION C

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

Dear Mr. Shannon:

This report provides the results of the annual geotechnical instrumentation monitoring for the above-mentioned site as part of Alberta Transportation's Geohazard Risk Management Program for Peace Region – Peace River District (CON0022164).

It is a condition of this letter report that Thurber's performance of its professional services will be subject to the attached Statement of Limitations and Conditions.

1. FIELD PROGRAM AND INSTRUMENTATION STATUS

Between the fall of 2016 and the summer of 2018, a 98 m long reinforced anchored tangent pile wall was constructed at the Hwy 986:01 Daishowa East Hill (Station 13+300) site to mitigate a landslide that was affecting the highway. Two shape accelerometer arrays (SAA17-P20 and SAA17-P40) were installed in piles P20 and P40 of the new pile wall. Nine vibrating wire load cells (VC2011 to VC2018) were installed on ground anchors located on piles P20, P40 and P60 of the wall. Twenty-eight vibrating wire strain gauges were also installed on the rebar cage of pile P40.

During construction of the wall, four vibrating wire piezometers (VW17-1A, VW17-1B, VW17-2A, VW17-2B) were installed in two boreholes behind (upslope) of the wall to measure changes in groundwater level. An SI (SI18-1) and another SAA (SAA-18) with two vibrating wire piezometers (VW17-3A and VW17-3B) were also installed on the bench downslope of the pile wall.

In addition to the instruments installed for the pile wall, two vibrating wire piezometers (VW18-1 and VW18-2) were installed in two previously drilled monitoring wells in the south highway ditch upslope of the pile wall. A third vibrating wire piezometer (VW18-3) was installed in a previously drilled pumping well adjacent to the monitoring wells in the south highway ditch.



The SAAs, load cells, strain gauges and vibrating wire piezometers at the pile wall were wired to a Campbell Scientific CR6 datalogger which is programmed to record data once per day. The three vibrating piezometers in the south highway ditch were wired to a second Campbell Scientific CR6 datalogger that was programmed to record data three times per day. During the spring of 2020 readings, it was found that the datalogger connected to the piezometers in the south highway ditch was malfunctioning, therefore manual readings for these instruments have been taken for subsequent readings.

After the spring of 2020 readings, the batteries for both dataloggers were stolen, and continuous readings of the instruments at the pile wall was not possible. A manual reading of the SAAs was completed during the spring of 2021 readings, and a manual reading was attempted for the strain gauges, load cells, and pile wall piezometers. However, only the SAAs were able to be manually read during the spring of 2021 readings cycle.

The site was visited on June 12, 2022, by Mr. Niraj Regmi, G.I.T. and Mr. Jayden Del Cid, both of Thurber Engineering Ltd. SI18-1 was read during this time and manual readings were completed for the VW piezometers in the highway south ditch.

SI18-1 was read using an RST Digital Inclinator probe with a 2 ft wheelbase and an RST Pocket PC readout. Inclinator reading depths were defined as per cable markings with respect to the top of the inclinometer casing. Manual readings for the south highway ditch piezometers were taken using a GEOKON GK-404 vibrating wire readout.

During previous readings cycles, the CR6 datalogger at the pile wall was downloaded manually at the site to a field laptop. Prior to the spring of 2022 readings, several upgrades were completed by Thurber to the pile wall datalogger station to allow for automated readings of the pile wall instruments. The updates included replacement of the existing battery enclosure with a more secure dual-battery enclosure bolted to the top of the pile wall, the installation of two 12-volt batteries for the pile wall datalogger, and installation of a modem to allow remote connection to the datalogger. A computer was set up at Thurber's Edmonton office to automatically download the data once per day. The data from the automated readings for the pile wall CR6 datalogger is included in this report.

All of the other SIs and VW piezometers installed at the site prior to construction have either sheared off or damaged during construction and are no longer readable.

2. DATA PRESENTATION

2.1 General

SI and SAA plots for A and B directions are included in Appendix A. Where movement has been recorded the resultant plot (X direction, if applicable) and rate of movement have also been provided. Piezometer and load cell reading plots are also included in Appendix A.

Slope inclinometer, SAA, vibrating wire load cell, vibrating wire strain gauge, and vibrating wire piezometer reading summary tables are provided below.



2.2 Zones of Movement

Zones of new movement were not observed in the SIs or the SAAs since the previous readings in the spring of 2021.

Zones of movements are summarized in Tables PH042-1 for the SIs and PH042-2 for the SAAs. These tables also provide a historical account of the total movement, the depth of movement and the maximum rate of movement that has occurred in the SIs and the SAAs since initialization.



**TABLE PH042-1
 SPRING 2022 – HWY 986:01, DAISHOWA EAST HILL
 SLOPE INCLINOMETER INSTRUMENTATION READING SUMMARY**

Date Monitored: June 12, 2022

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	July 8, 2021	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 2022 – HWY 986:01, DAISHOWA EAST HILL
 SHAPE ACCELEROMETER ARRAY INSTRUMENTATION READING SUMMARY**

Date Monitored: June 12, 2022

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	23.3 over 1.5 m to 29.0 m depth	Operational	July 7, 2021	0.6	0.7	-1.4
		28.8 over 0 m to 29.0 m depth			0.8	0.8	-1.4
SAA17-P40	April 8, 2017	55.9 over 1.5 m to 29.0 m depth	Operational	July 7, 2021	0.2	0.2	-3.8
		53.5 over 0.0 m to 29.0 m depth			No discernible movement	N/A	-4.2
SAA18-1	June 1, 2018	9.2 over 0.5 m to 12.5 m depth	Operational	July 7, 2021	1.1	1.2	0.7

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 2022 – HWY 986:01, DAISHOWA EAST HILL
 VIBRATING WIRE STRAIN GAUGE INSTRUMENTATION READING SUMMARY**

Date Monitored: June 12, 2022

DEPTH FROM TOP OF PILE P40 (m)	GAUGE #	TOTAL MICROSTRAIN (JUNE 12, 2022) (µε)	CHANGE IN MICROSTRAIN SINCE PREVIOUS READING (JULY 14, 2020)	MEASURED TEMPERATURE (JUNE 12, 2022) (°c)	GAUGE #	TOTAL MICROSTRAIN (JUNE 12, 2022) (µε)	CHANGE IN MICROSTRAIN SINCE PREVIOUS READING (JULY 14, 2020)	MEASURED TEMPERATURE (JUNE 12, 2022) (°c)
	UPSLOPE PILE FACE				DOWNSLOPE PILE FACE			
0.5	1465	-1514.0	-34.5	16.1	1466	-452.0	-28.2	13.2
2.5	1467	-1008.9	-32.6	11.5	1468	-1192.7	-74.7	15.2
4.5	1469	-1427.4	-58.2	8.9	1470	-795.5	-79.7	11.0
6.5	1472	-1423.4	-44.3	4.0	1471	1871.5	93.1	4.1
8.5	1474	-1962.3	-39.5	3.9	1473	-936.6	89.4	3.8
10.5	1476	-1669.9	-6.7	5.8	1475	419.1	96.4	5.0
12.5	1478	-1635.0	-16.2	5.0	1477	-734.4	114.9	5.8
14.5	1479	-1200.3	22.2	6.2	1480	-1741.2	52.8	6.1
16.5	1481	-547.9	71.7	6.3	1482	-1844.4	16.3	6.4
18.5	1484	3917.1	186.0	6.3	1483	-3036.8	-34.5	6.3
20.5	1486	-1458.4	77.1	6.3	1485	-3000.5	-34.2	6.3
22.5	1488	-1546.9	74.4	6.2	1487	-2190.0	7.8	6.2
24.5	1490	-1267.2	60.8	6.1	1489	-1666.5	41.6	6.1
26.5	1492	-1150.3	70.9	6.1	1491	-1370.1	50.1	6.0

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



**TABLE PH042-4
 SPRING 2022 – HWY 986:01, DAISHOWA EAST HILL
 VIBRATING WIRE PIEZOMETER INSTRUMENTATION READING SUMMARY**

Date Monitored: June 12, 2022

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	436.85	437.22*	-0.37
VW17-1B	November 2, 2017	24.98	446.08	Operational	440.96 on March 25, 2022	439.38	439.67*	-0.29
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	442.44	442.60*	-0.16
VW17-3A	May 31, 2018	10.18	441.18	Operational	438.86 on April 12, 2022	438.59	438.37*	0.22
VW17-3B	May 31, 2018	19.18	441.18	Operational	427.49 on May 31, 2022	427.34	426.43*	0.91
SOUTH HIGHWAY DITCH								
VW18-1	January 8, 2019	18.2 (estimated)	449.41	Operational	450.48 on June 14, 2020	449.86	449.39	0.47
VW18-2	January 8, 2019	17.7 (estimated)	449.93	Operational	450.98 on June 14, 2020	450.45	449.89	0.56
VW18-3	January 8, 2019	12.5 (estimated)	449.93	Operational	450.89 on June 14, 2020	450.36	449.79	0.57

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

Note: *Readings as of July 14, 2020



**TABLE PH042-5
 SPRING 2022 – HWY 986:01, DAISHOWA EAST HILL
 LOAD CELL INSTRUMENTATION READING SUMMARY**

Date Monitored: June 12, 2022

LOAD CELL SERIAL #	ANCHOR NUMBER	DESIGN LOAD / LOCK-OFF LOAD (kN)	MAXIMUM RECORDED LOAD (kN)	RECORDED LOAD ⁽¹⁾ (JUNE 12, 2022) (kN)	PREVIOUS RECORDED LOAD ⁽²⁾ (JULY 14, 2020) (kN)	CHANGE IN LOAD SINCE PREVIOUS READING (kN)
VC2010	P20A	225/180	246.62 on March 23, 2022	199.16	190.04	9.12
VC2013	P20B	400/180	241.44 on March 20, 2022	215.88	209.12	6.76
VC2016	P20C	400/180	189.79 on March 23, 2022	175.56	169.92	5.64
VC2011	P40A	225/180	340.09 on March 23, 2022	267.06	256.08	10.98
VC2014	P40B	400/180	340.58 on March 19, 2022	304.66	291.25	13.41
VC2017	P40C	400/180	188.05 on March 23, 2022	169.10	161.57	7.53
VC2012	P60A	225/180	260.94 on March 23, 2022	204.13	200.32	3.81
VC2015	P60B	400/180	261.96 on March 23, 2022	233.33	228.88	4.45
VC2018	P60C	400/180	169.69 on March 20, 2022	156.43	155.31	1.12

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.
- (2) Load cell data was last downloaded during the fall of 2020. Readings were available at that time up to July 14, 2020, when the datalogger battery was stolen.



3. 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 0.7 mm/yr over the length of the pile and an average rate of movement of 0.8 mm/yr over the combined length of the pile and waler since the spring of 2021 readings. SAA-P20 has shown a total pile head movement of 23.3 mm in the downslope direction to date.

SAA17-P40 showed an average rate of movement of 0.2 mm/yr over the length of the pile and no discernible downslope movement over the combined length of the pile and waler since the spring of 2021 readings. SAA17-P40 has shown a total pile head movement of 55.9 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.

SAA18-1, installed in the bench downslope of the pile wall, showed an average rate of movement of 1.2 mm/yr over 0.5 m to 12.5 m depth since the spring of 2021 readings. SAA18-1 has shown a total cumulative movement of 9.2 mm over this zone since it was initialized in June 2018. By comparison, SAA17-P40 has shown a total cumulative movement of 9.5 mm over this same zone since June 2018, indicating that the pile wall has moved 0.3 mm in the downslope direction relative to the bench 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, another row of tie-back soil anchors would need to be added to the wall beneath the existing anchors.

Since they were previously read on July 14, 2020, the strain gauges showed changes in strain ranging from an increase in positive (tension) strain of 186.0 at 18.5 m depth on the upslope pile face to an increase in negative (compressive) strain of 79.7 at 4.5 m depth on the downslope pile face. The strain gauge readings are summarized in Table PH042-3.

Since they were previously read on July 14, 2020, VW17-1A, VW17-1B and VW17-2B showed decreases in groundwater level of 0.37 m, 0.29 m, and 0.16 m, respectively. During that same time period, VW17-3A and VW17-3B showed increases in groundwater level of 0.22 m and 0.91 m, respectively. VW17-2A has been dry since initialization. VW17-1A, VW17-1B, VW17-3A and VW17-3B registered all-time high groundwater levels between March 25, 2022, and May 31, 2022. 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.



The piezometers installed at the pile wall are summarized in Table PH042-4 below and are plotted on Figures PH042-1 (by elevation) and PH042-2 (by depth) in Appendix A.

Vibrating wire piezometers VW18-1, VW18-2, and VW18-3, installed in the south highway ditch to the east of the pile wall, showed increases in groundwater level of 0.47 m, 0.56 m, and 0.57 m, respectively, since the spring of 2021 readings. The piezometers installed in the south highway ditch are summarized in Table PH042-4 below and are plotted on Figures PH042-3 (by elevation) and PH042-2-4 (by depth) in Appendix A.

Compared to when they were previously read on July 14, 2020, the load cells all showed increases in measured load, ranging from an increase of 1.12 kN in VC2018 (anchor P60C) to an increase of 13.41 kN in VC2014 (anchor P40B). Additionally, the anchors all measured all-time high loads between March 19-23, 2022. It should be noted that VC2011 (anchor P40A) is measuring a current load that is above its design load. Overall, the load cells show steady to slowly increasing anchor loads, with the highest loads measured in late winter to early spring, when the depth of frost penetration is greatest. The load cell readings for piles P20, P40 and P60 are summarized in Table PH042-5 and are plotted on Figures PH042-5, PH042-6, and PH042-7, respectively, in Appendix A.

4. RECOMMENDATIONS

4.1 Future Work

The instruments should be read again in the spring of 2023. It is recommended that the design parameters of the wall be reviewed, so that warning thresholds can be developed with regard to the pile wall deflections and load cell readings. This will be helpful in determining if more tie-back anchors need to be added to the pile wall.

4.2 Instrumentation Repairs

No instrument repairs are required at this time.



5. CLOSURE

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.
Tarek Abdelaziz, Ph.D., P. Eng.
Principal | Senior Geotechnical Engineer

Bruce Nestor, P.Eng.
Geotechnical Engineer

Attachments:

- Statement of Limitations and Conditions
- Appendix A
 - Field Inspector's report
 - Site Plan Showing Approximate Instrument Locations (Drawing No. 32121-PH042)
 - SI Reading Plots
 - SAA Reading Plots
 - Comparison of SAA 18-1 to SAA17-P40
 - Figure PH042-1 (Pile Wall Piezometer Elevations)
 - Figure PH042-2 (Pile Wall Piezometer Depths)
 - Figure PH042-3 (South Ditch Piezometer Elevations)
 - Figure PH042-4 (South Ditch Piezometer Depths)
 - Figure PH042-5 (Load Cell Data Pile P20)
 - Figure PH042-6 (Load Cell Data Pile P40)
 - Figure PH042-7 (Load Cell Data Pile P60)



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.

4. USE OF THE REPORT

The information and opinions expressed in the Report, or any document forming part of the Report, are for the sole benefit of the Client. NO OTHER PARTY MAY USE OR RELY UPON THE REPORT OR ANY PORTION THEREOF WITHOUT THURBER'S WRITTEN CONSENT AND SUCH USE SHALL BE ON SUCH TERMS AND CONDITIONS AS THURBER MAY EXPRESSLY APPROVE. Ownership in and copyright for the contents of the Report belong to Thurber. Any use which a third party makes of the Report, is the sole responsibility of such third party. Thurber accepts no responsibility whatsoever for damages suffered by any third party resulting from use of the Report without Thurber's express written permission.

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.
- 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.
- 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.

6. RELEASE OF POLLUTANTS OR HAZARDOUS SUBSTANCES

Geotechnical engineering and environmental consulting projects often have the potential to encounter pollutants or hazardous substances and the potential to cause the escape, release or dispersal of those substances. Thurber shall have no liability to the Client under any circumstances, for the escape, release or dispersal of pollutants or hazardous substances, unless such pollutants or hazardous substances have been specifically and accurately identified to Thurber by the Client prior to the commencement of Thurber's professional services.

7. INDEPENDENT JUDGEMENTS OF CLIENT

The information, interpretations and conclusions in the Report are based on Thurber's interpretation of conditions revealed through limited investigation conducted within a defined scope of services. Thurber does not accept responsibility for independent conclusions, interpretations, interpolations and/or decisions of the Client, or others who may come into possession of the Report, or any part thereof, which may be based on information contained in the Report. This restriction of liability includes but is not limited to decisions made to develop, purchase or sell land.



**ALBERTA TRANSPORTATION GRMP (CON0022164)
PEACE REGION (PEACE RIVER DISTRICT)
INSTRUMENTATION MONITORING RESULTS**

SPRING 2022

**APPENDIX A
DATA PRESENTATION**

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

**ALBERTA TRANSPORTATION
PEACE REGION (PEACE RIVER DISTRICT)
INSTRUMENTATION MONITORING FIELD SUMMARY (PH042)
SPRING 2022**

Location: Daishowa Well Site Slide (HWY 986:01 C1 33.212) File Number: 32121 Probe: RST set 5R Cable: RST set 5R	Readout: GK 404/ SN 364 Casing: 3.34 Temp: 22 Read by: NKR/JD
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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 #	Remarks
	Easting (m)	Northing (m)					A+	A-	B+	B-		
SI18-1	491157	6246211	12-Jun-22	0.80	70 to 2	16	-296	323	-859	841	5R/5R	

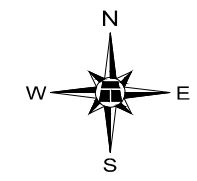
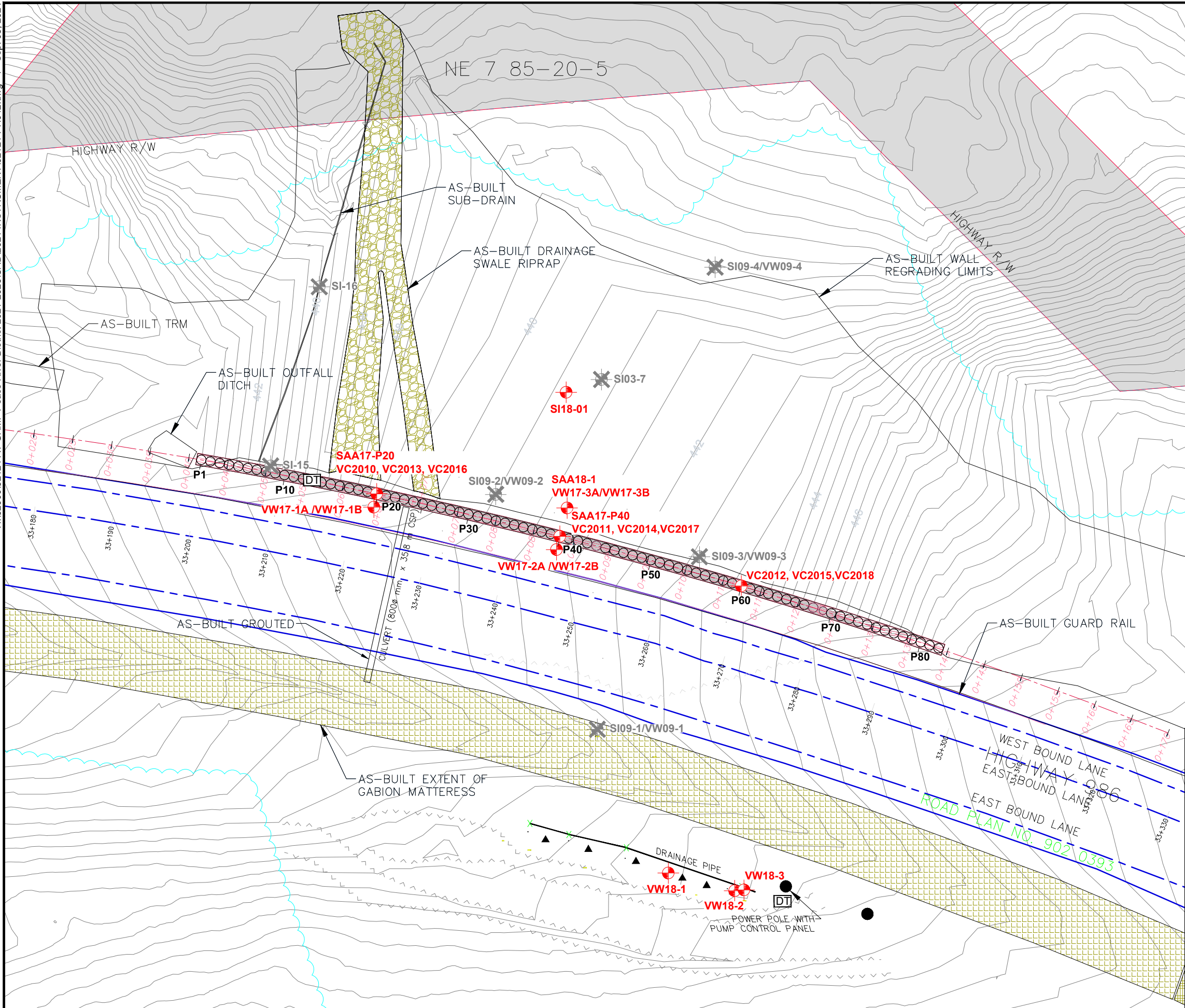
VIBRATING WIRE PIEZOMETER (VW) READINGS

VW #	Serial #	GPS Location (UTM 11)		Datalogger Serial #	Date	Comment
		Easting (m)	Northing (m)			
VW18-1	1802205	491170	6246150	Campbell Scientific 8480	12-Jun-22	Read manually, SN# 2209, 3113.0, 6.0 deg C
VW18-2	1802208	491179	6246147			Read manually, SN#2208, 3560.4, 5.0 deg C
VW18-3	1802207	491180	6246148			Read manually, SN#2207, 3483.9, 4.7 deg C




INSPECTOR REPORT

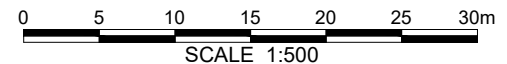
The instruments at the pile wall are connected to a modem and no longer require a manual download. Read the SI and take manual readings of the VW piezometers only

H:\32000\32121 AT GRMP Peace River District 2021-2025\CAD\2021 INSTRUMENT\32121-PH042.dwg - 1 - Sep. 08, 2021



LEGEND

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



PEACE REGION (PEACE RIVER DISTRICT)

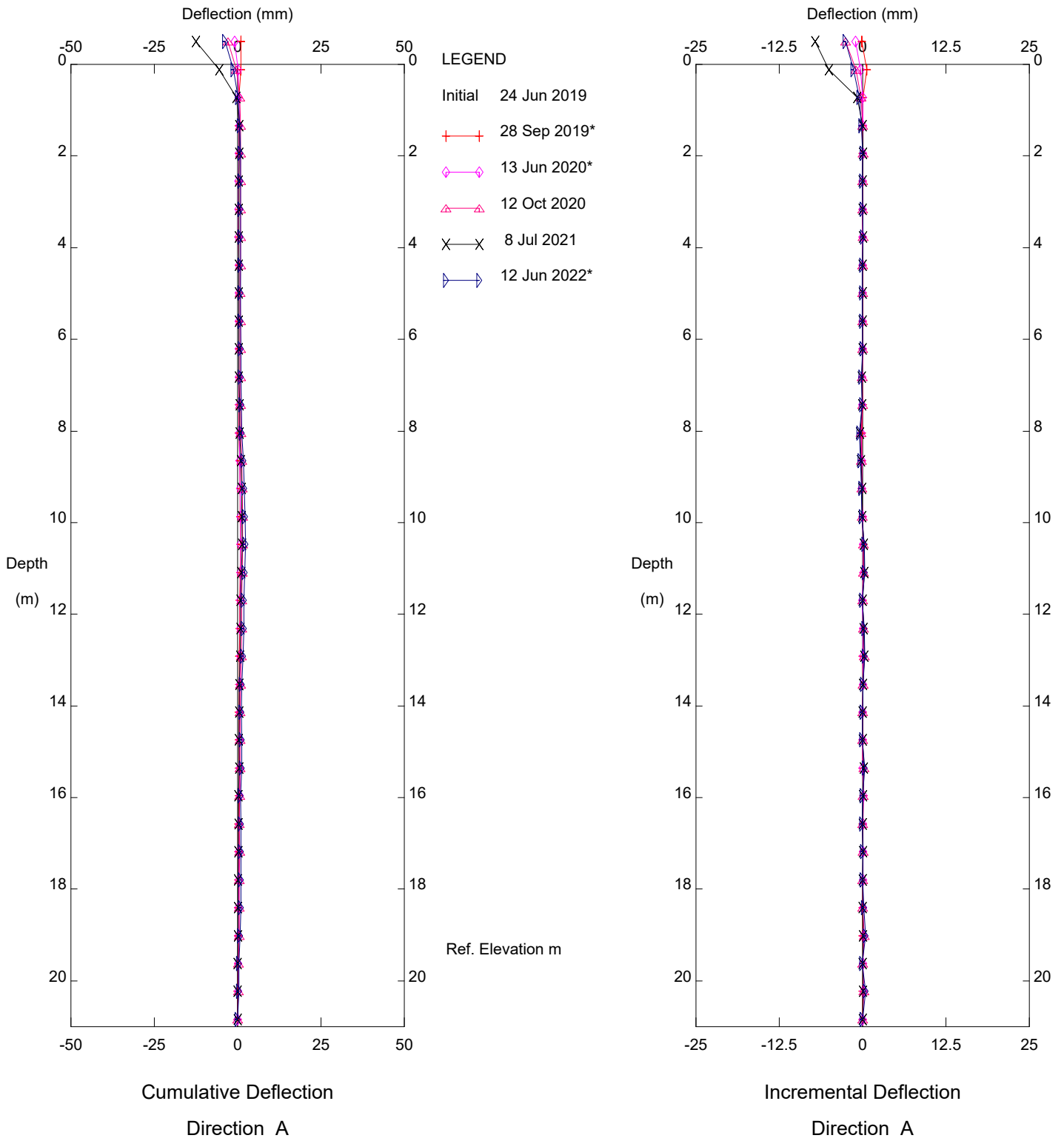
**PH042: HWY 986:01 - DAISHOWA EAST HILL
(STA. 13+000 WELL SITE)
INSTRUMENT LOCATIONS**

DWG No. 32121-PH042

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



Thurber Engineering Ltd

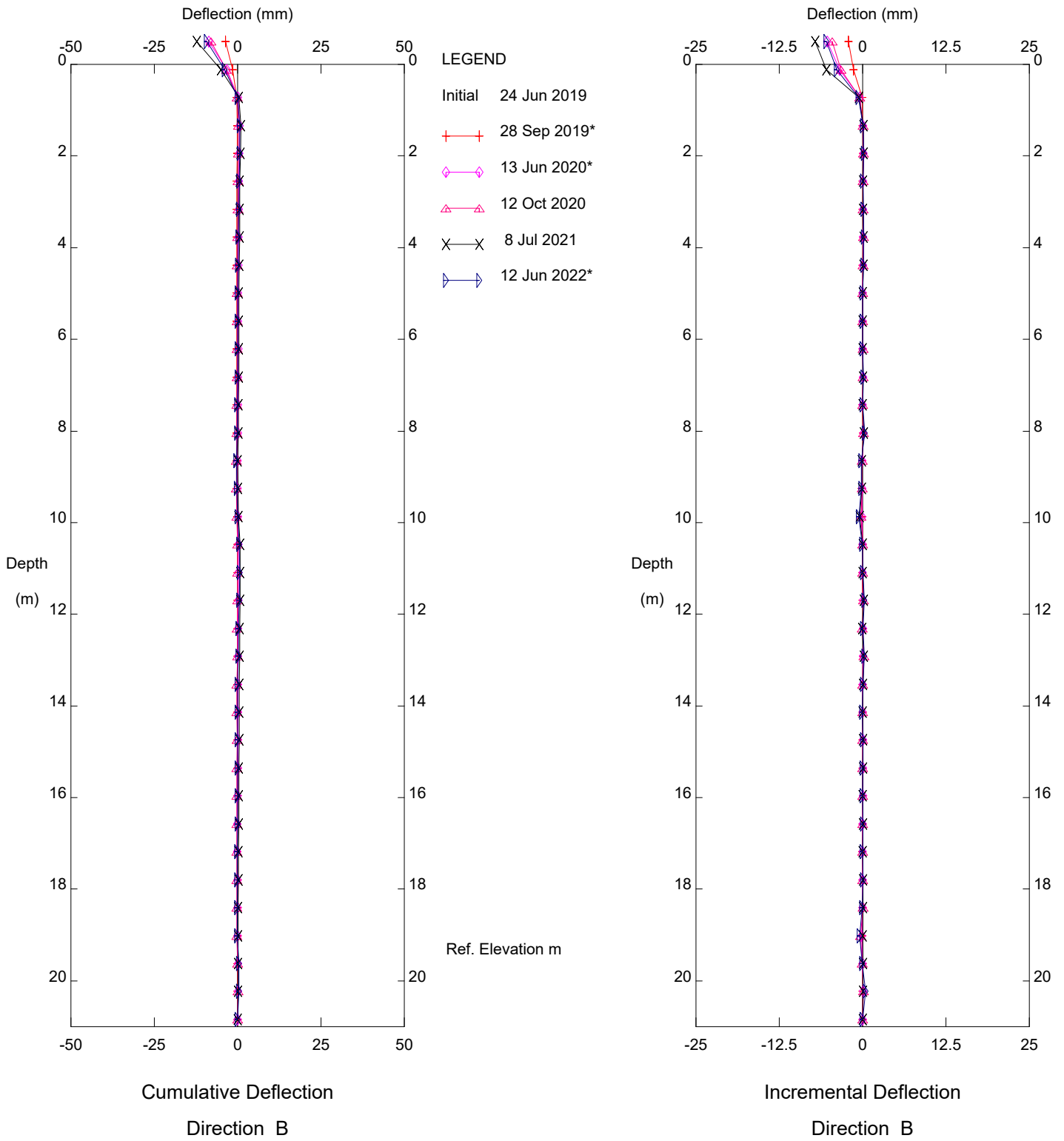


Hwy 986:01 Daishowa East Hill, Inclinometer SI18-1

Alberta Transportation

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

Thurber Engineering Ltd

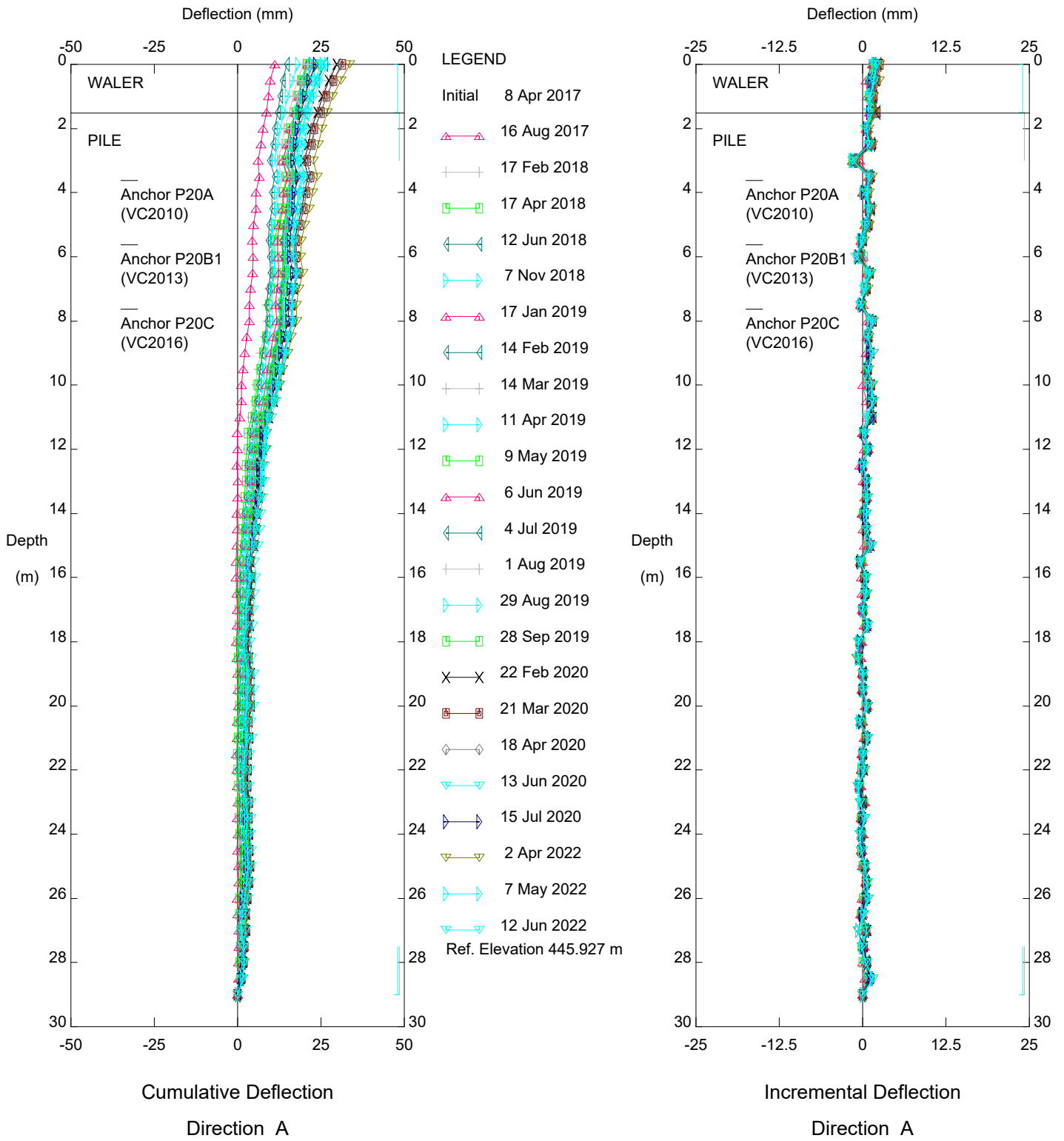


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Alberta Transportation

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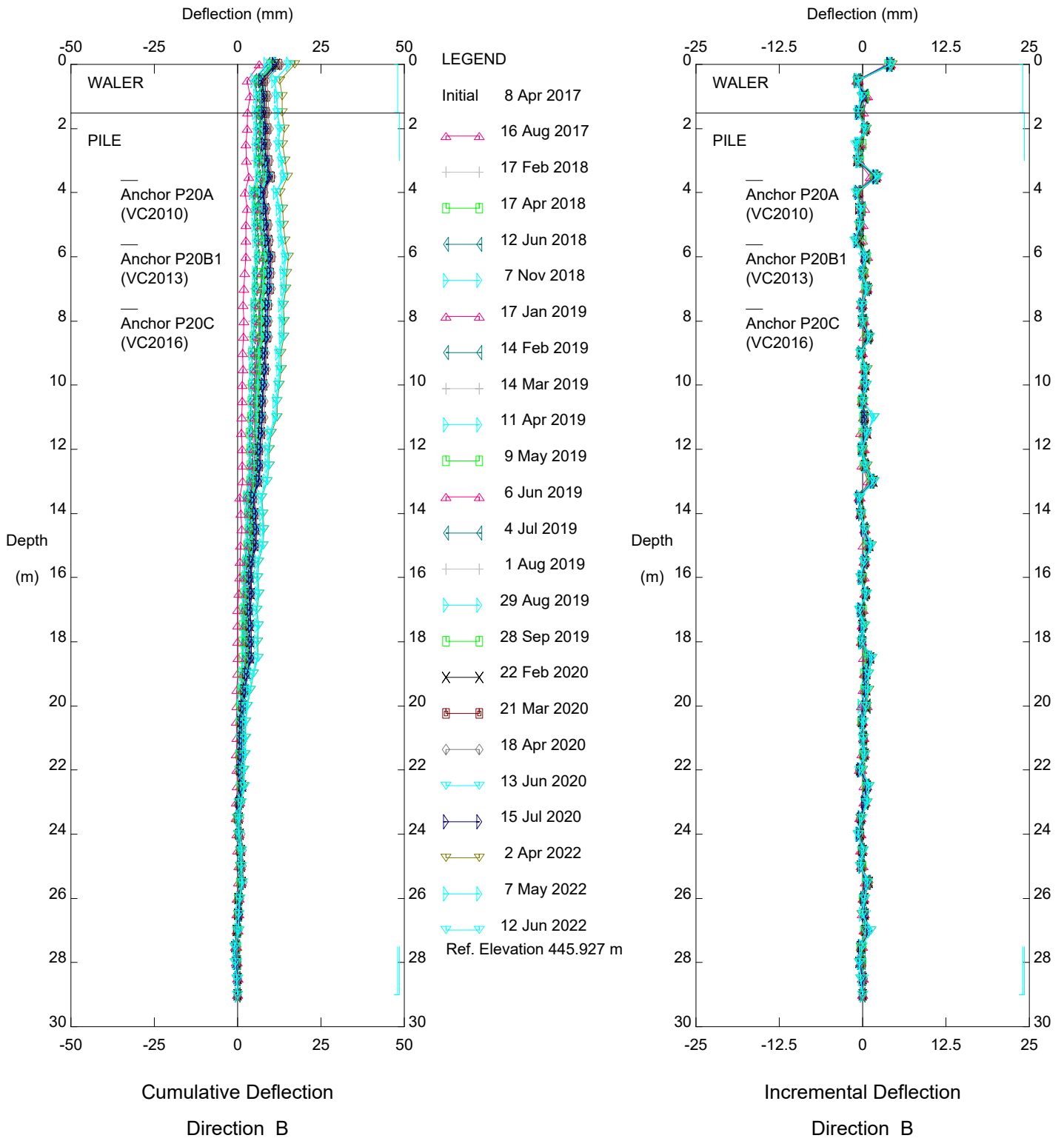
Thurber Engineering Ltd



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

Alberta Transportation

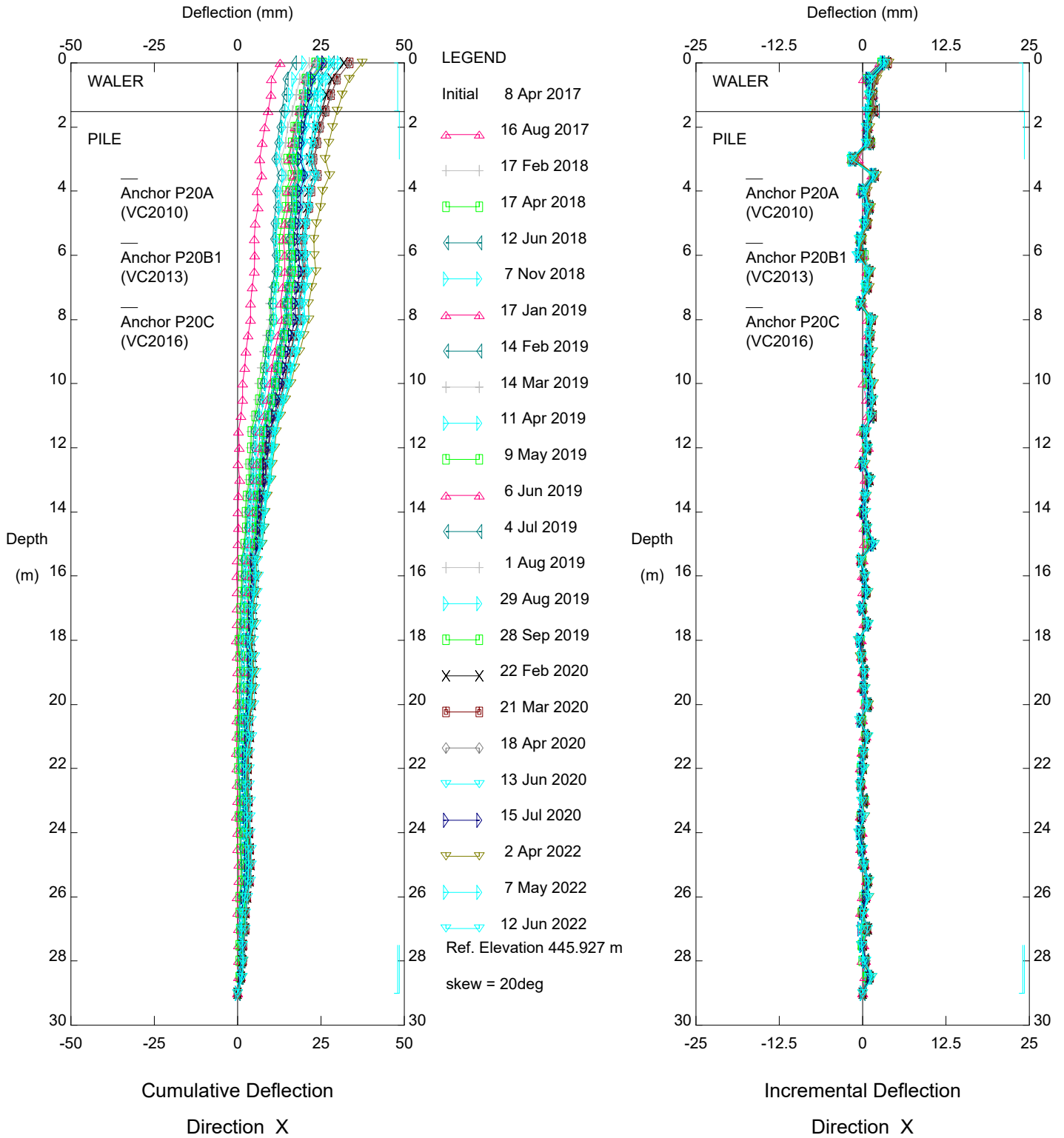
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Hwy 986:01 Daishowa East Hill, Inclinometer SAA17-P20

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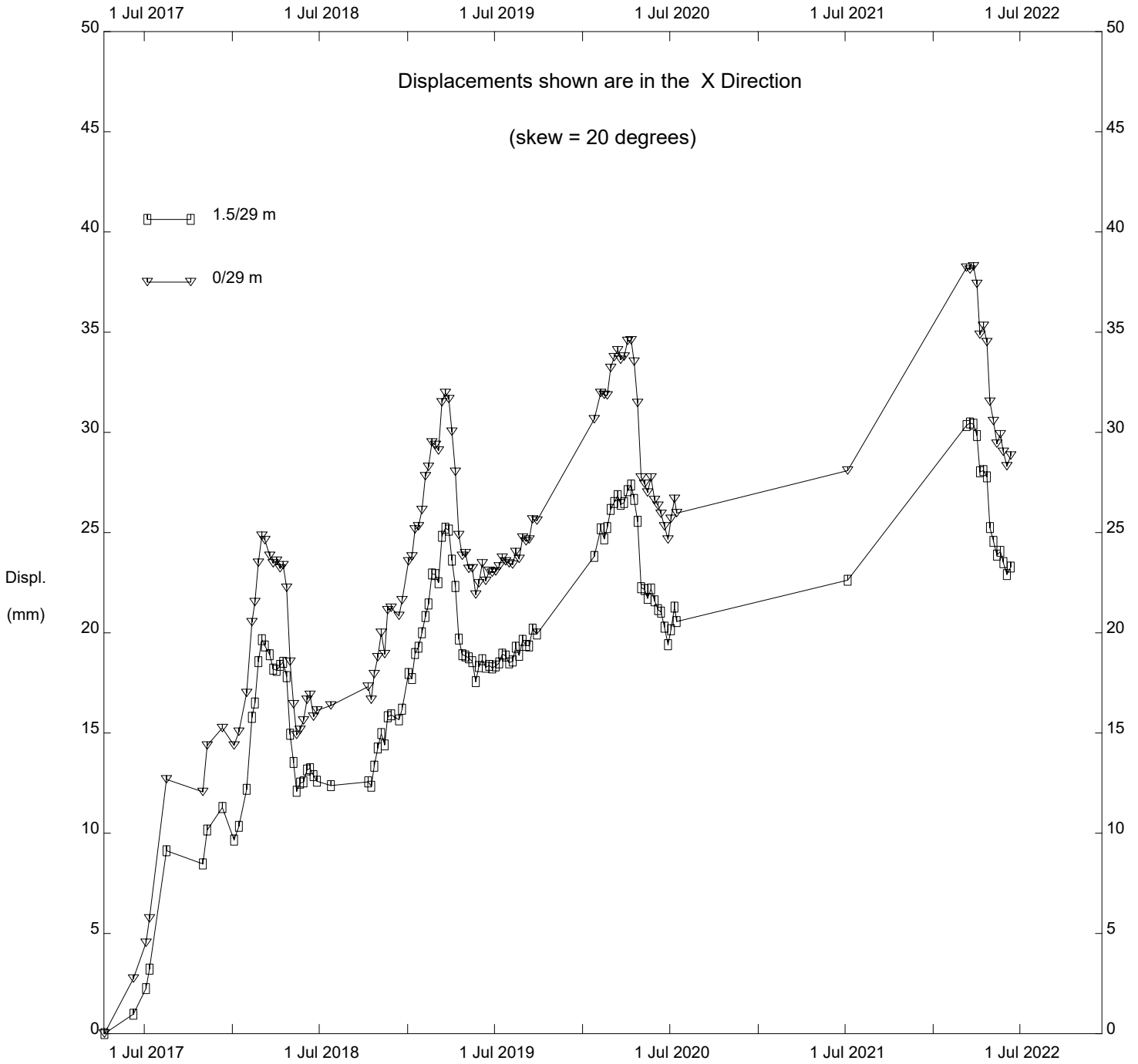
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Hwy 986:01 Daishowa East Hill, Inclinometer SAA17-P20

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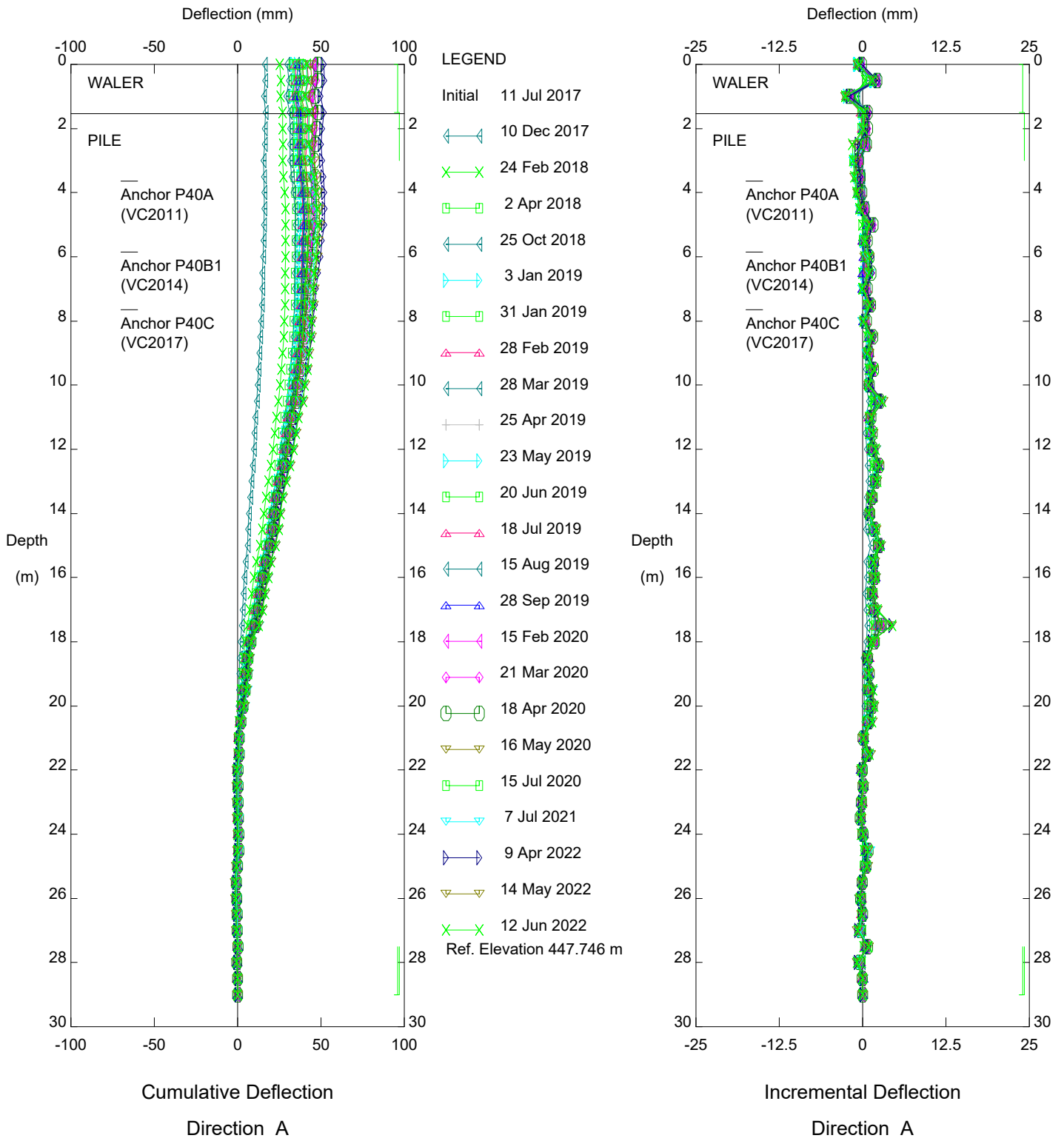
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Hwy 986:01 Daishowa East Hill, Inclinator SAA17-P20

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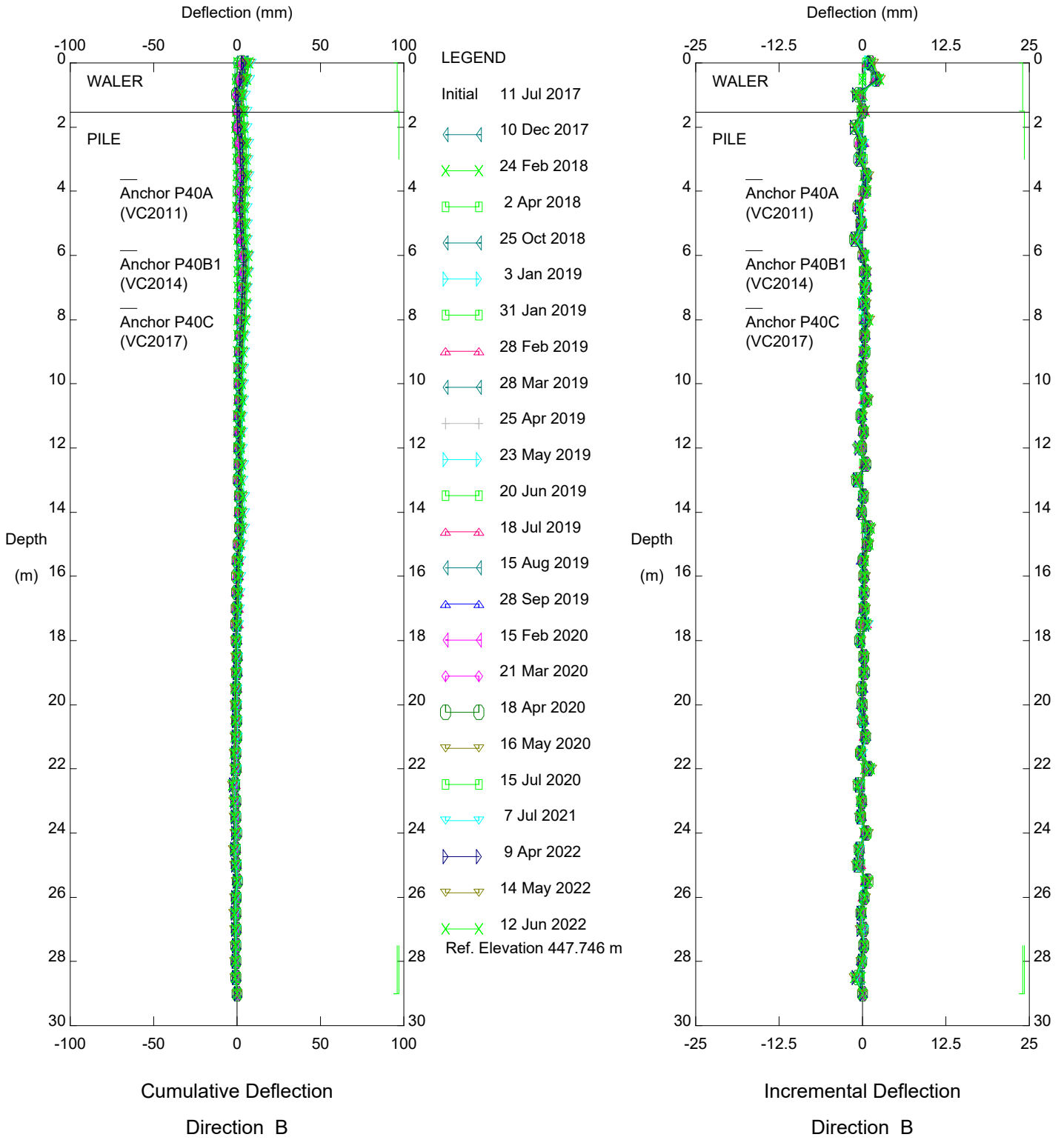
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Hwy 986:01 Daishowa East Hill, Inclinometer SAA17-P40

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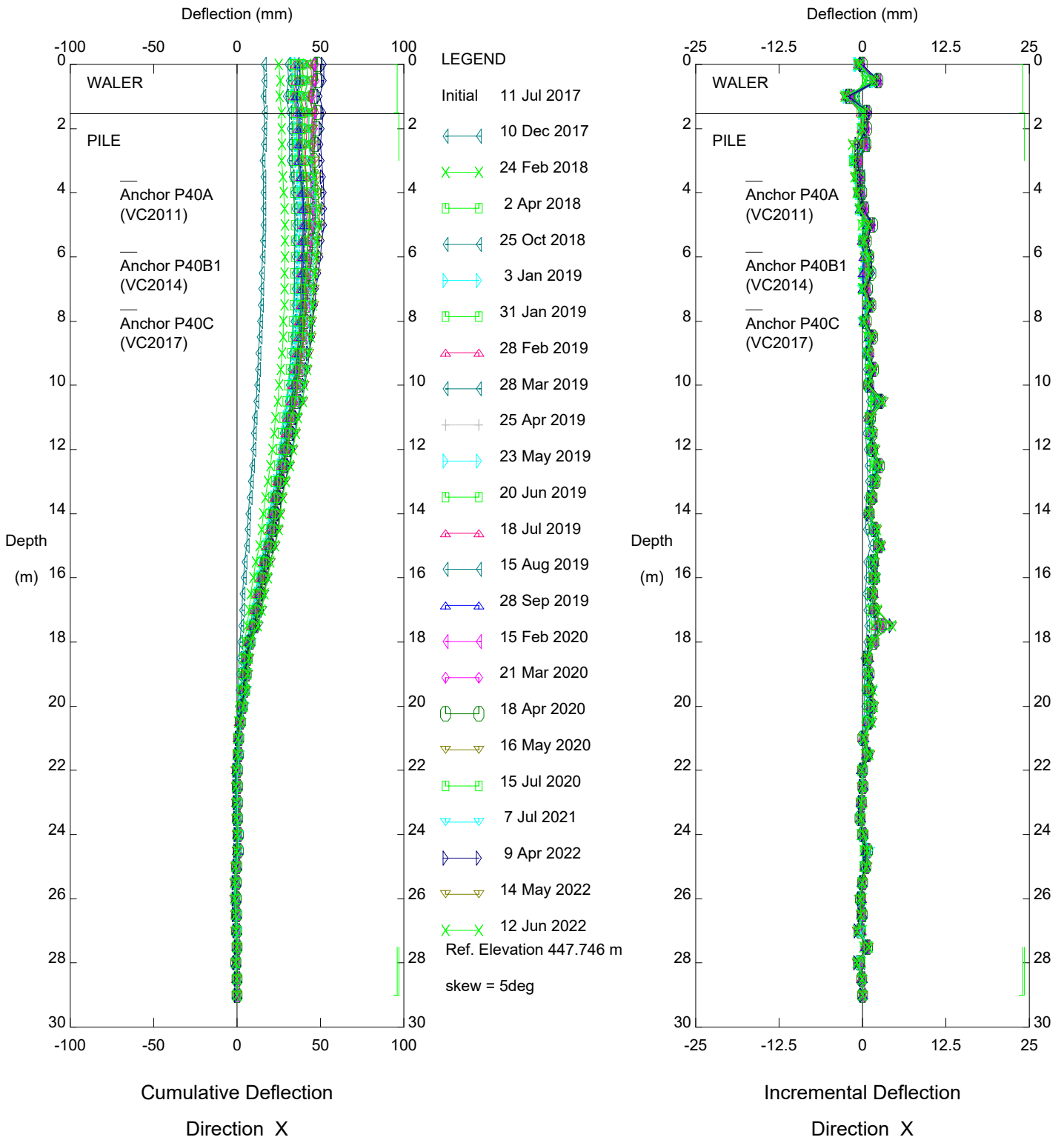
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Hwy 986:01 Daishowa East Hill, Inclinometer SAA17-P40

Alberta Transportation

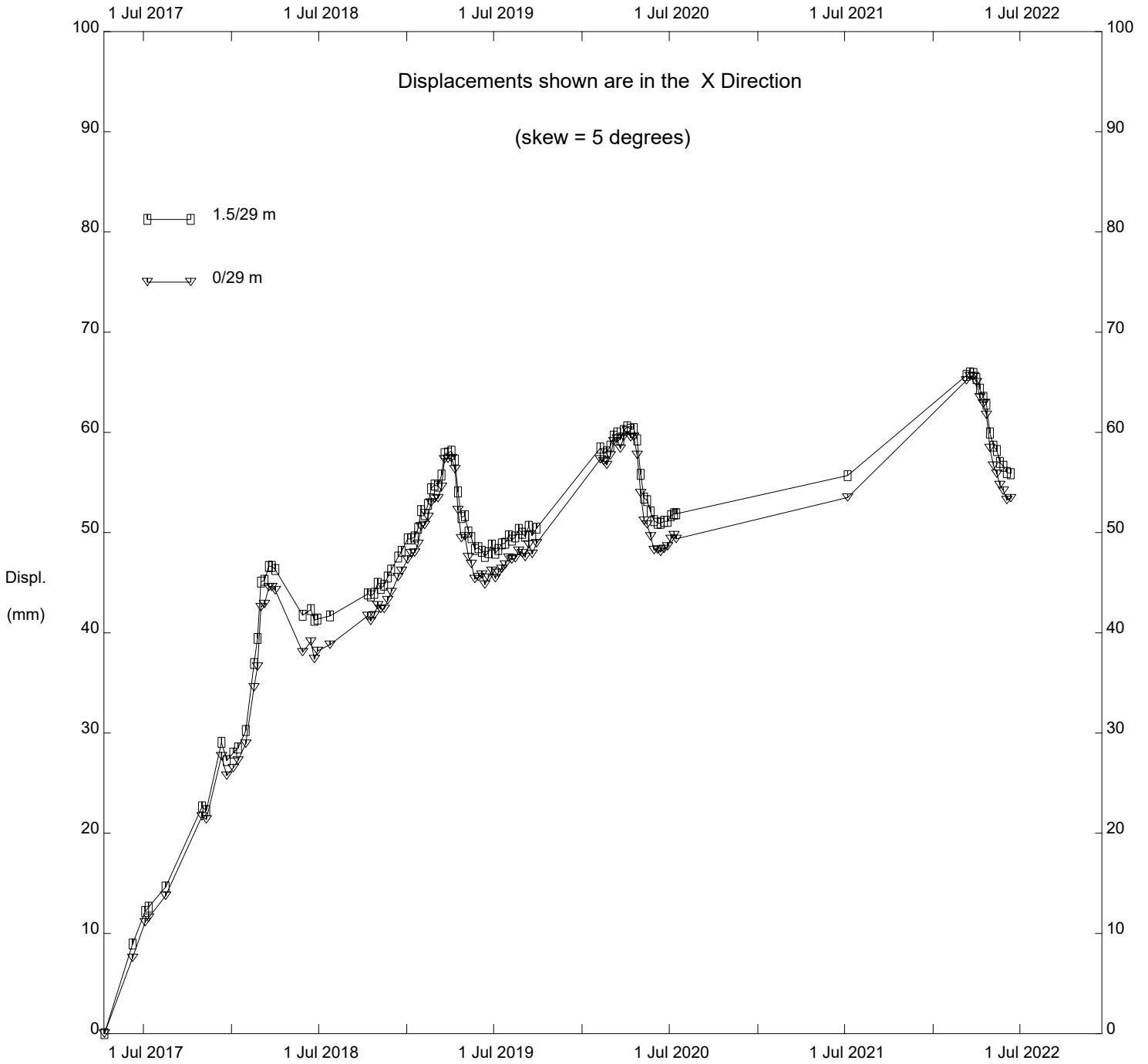
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Hwy 986:01 Daishowa East Hill, Inclinometer SAA17-P40

Alberta Transportation

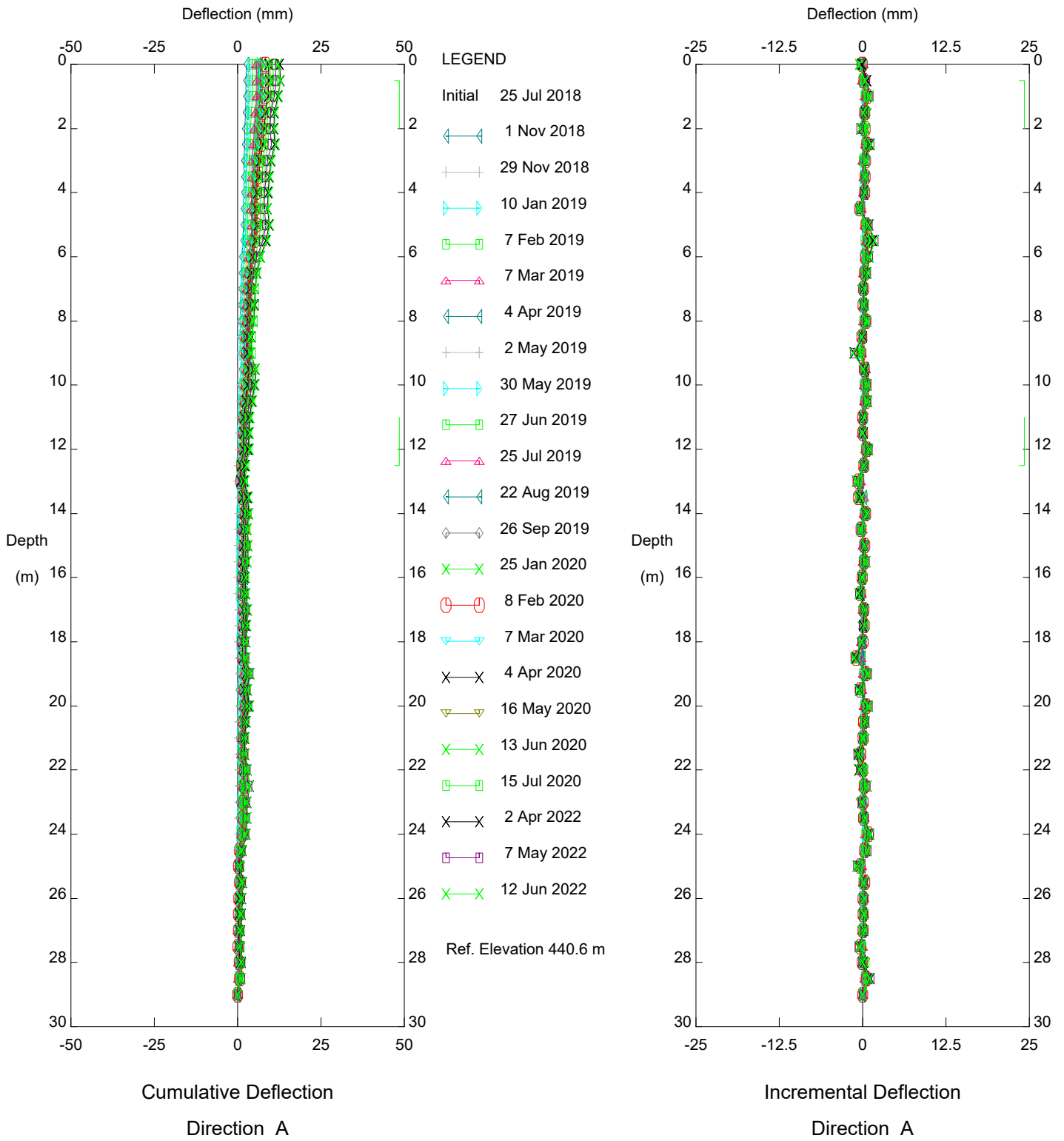
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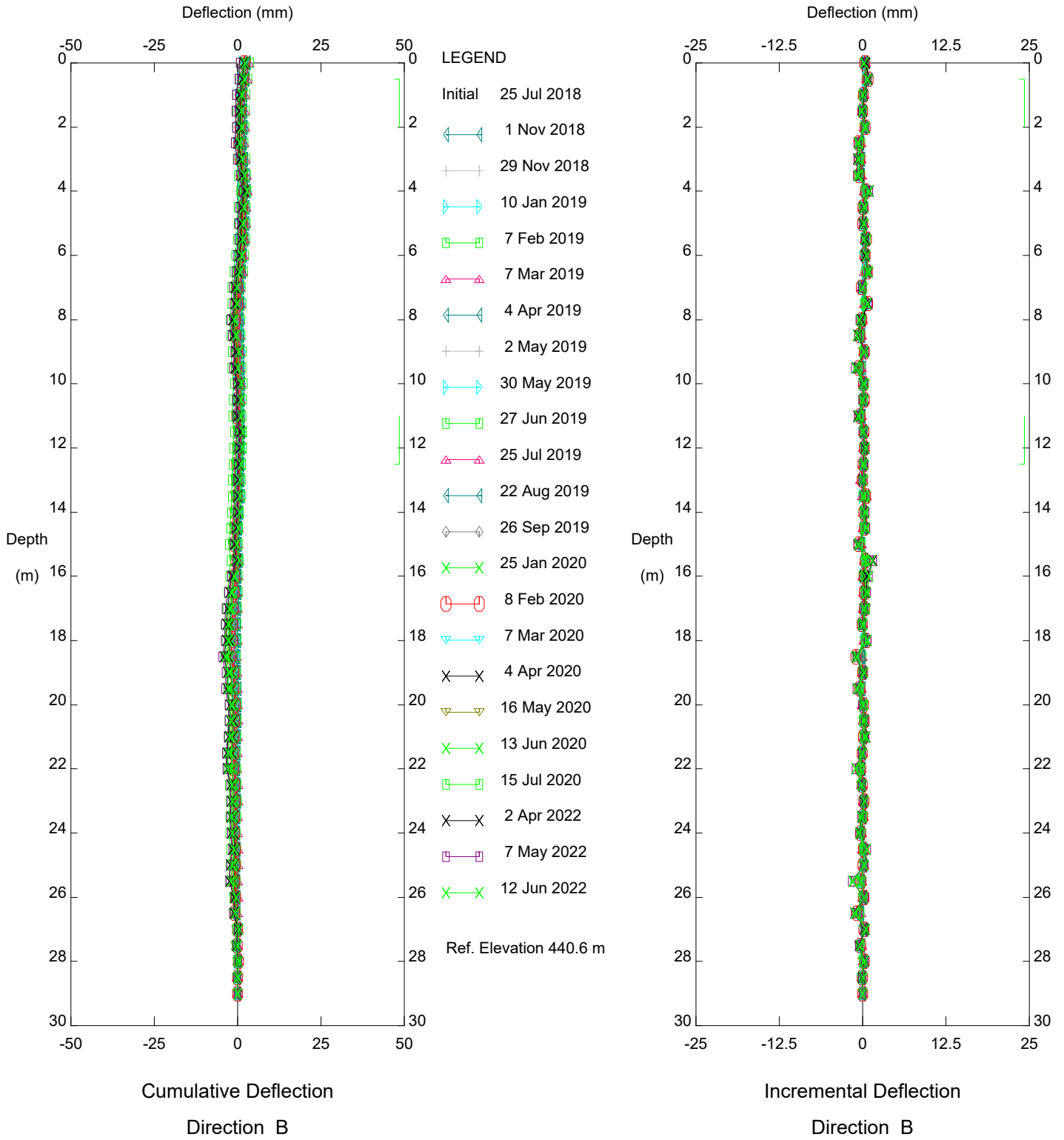
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Hwy 986:01 Daishowa East Hill, Inclinometer SAA18-1

Alberta Transportation

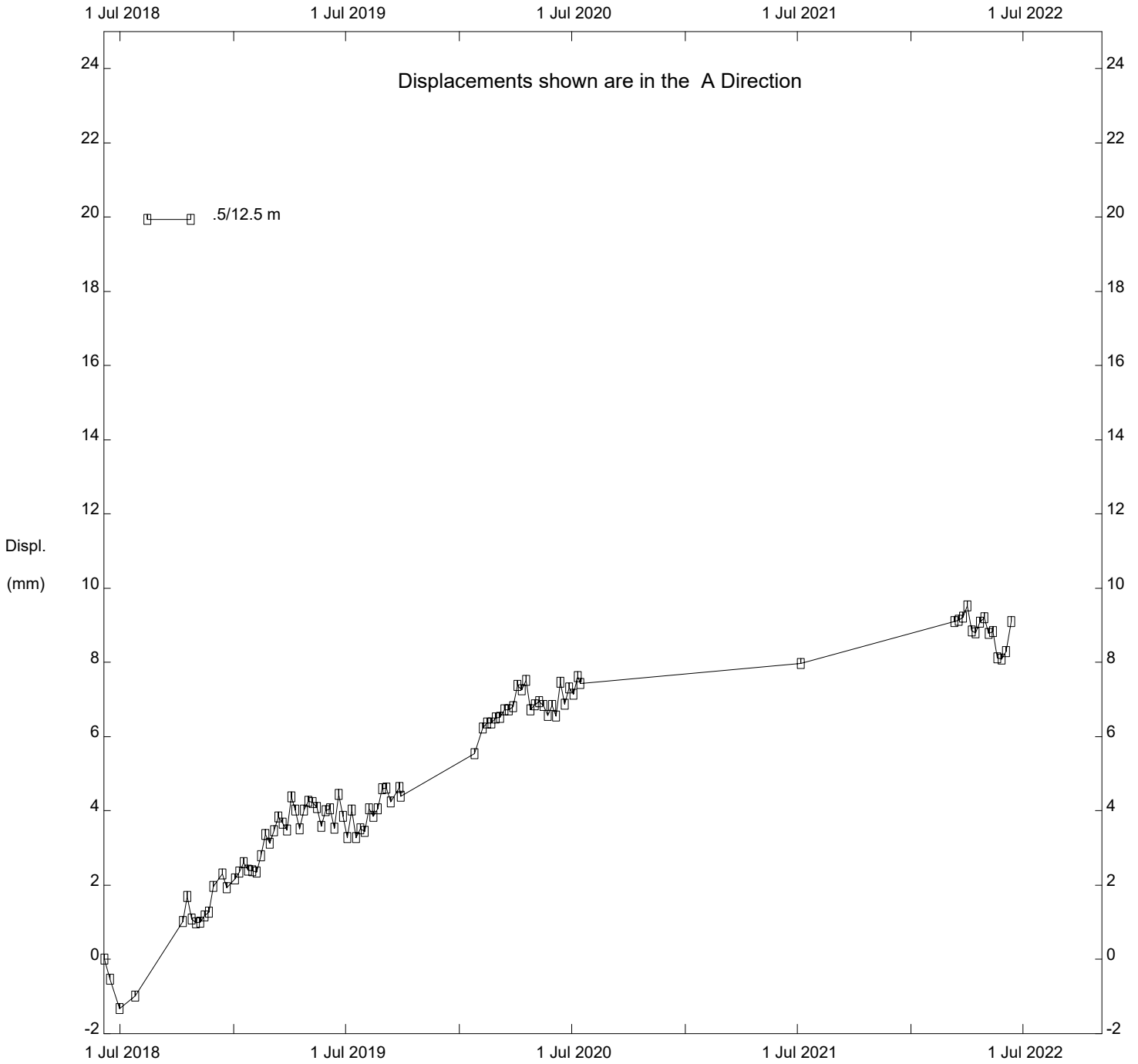
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Hwy 986:01 Daishowa East Hill, Inclinometer SAA18-1

Alberta Transportation

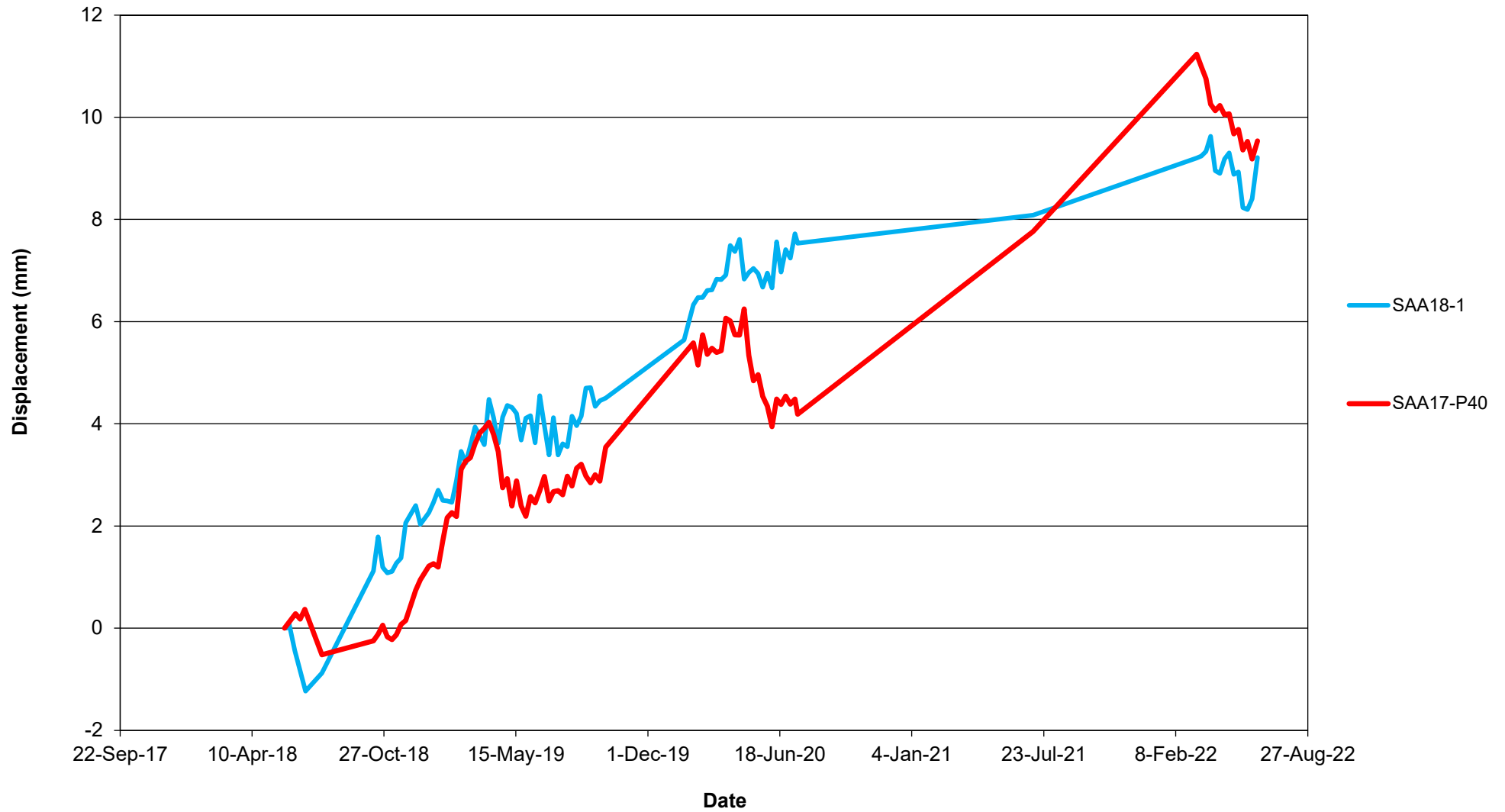
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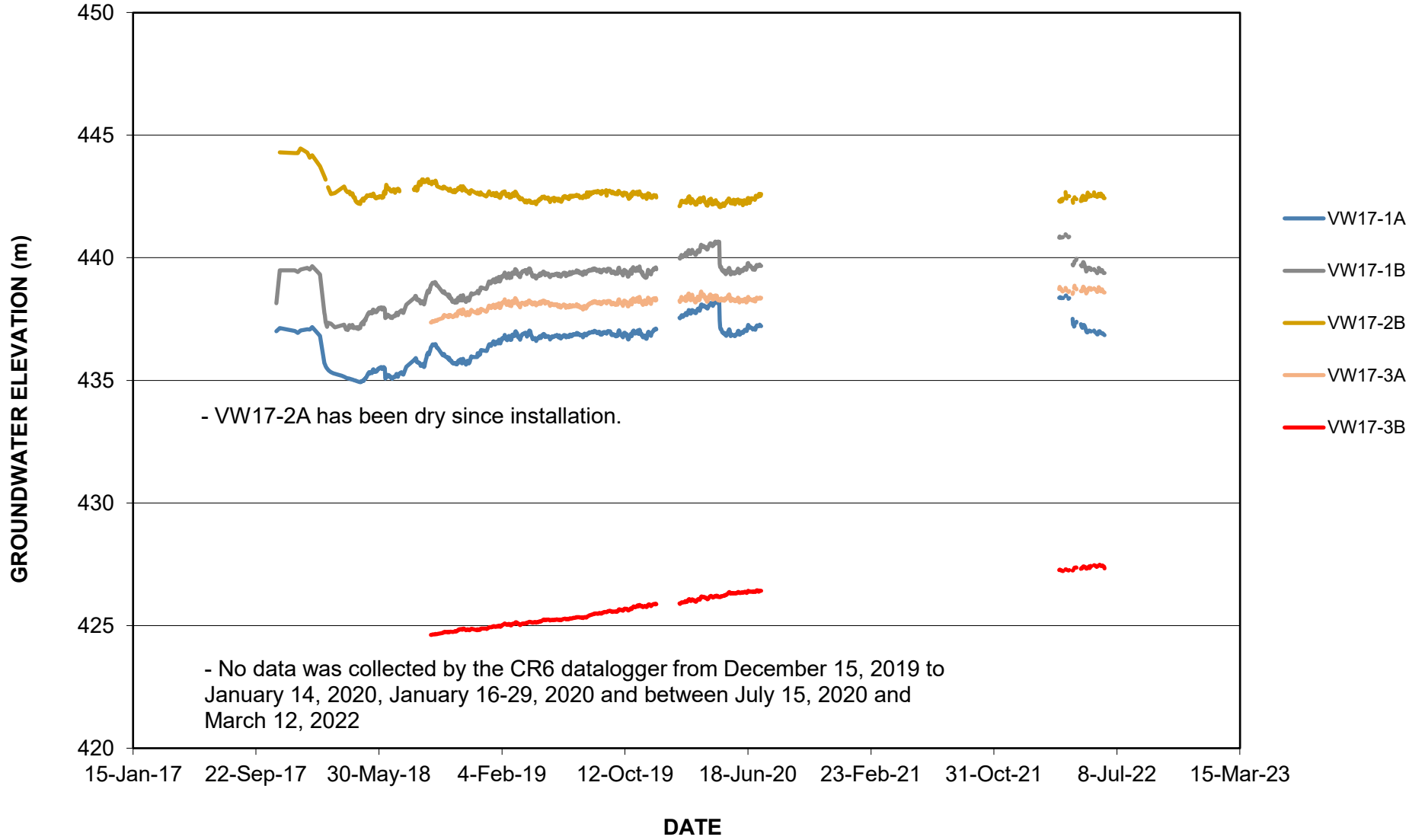
Hwy 986:01 Daishowa East Hill, Inclinometer SAA18-1

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)**

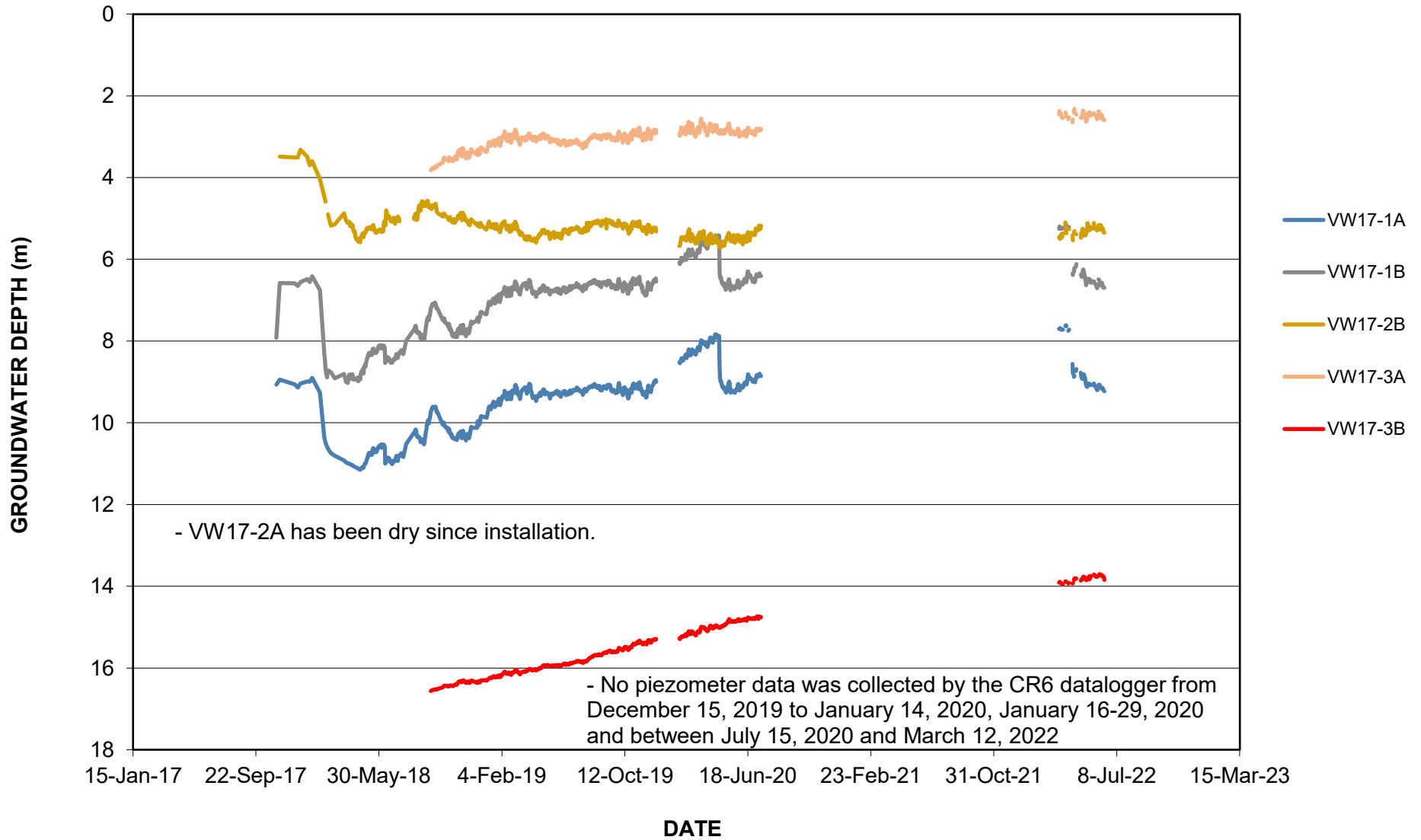
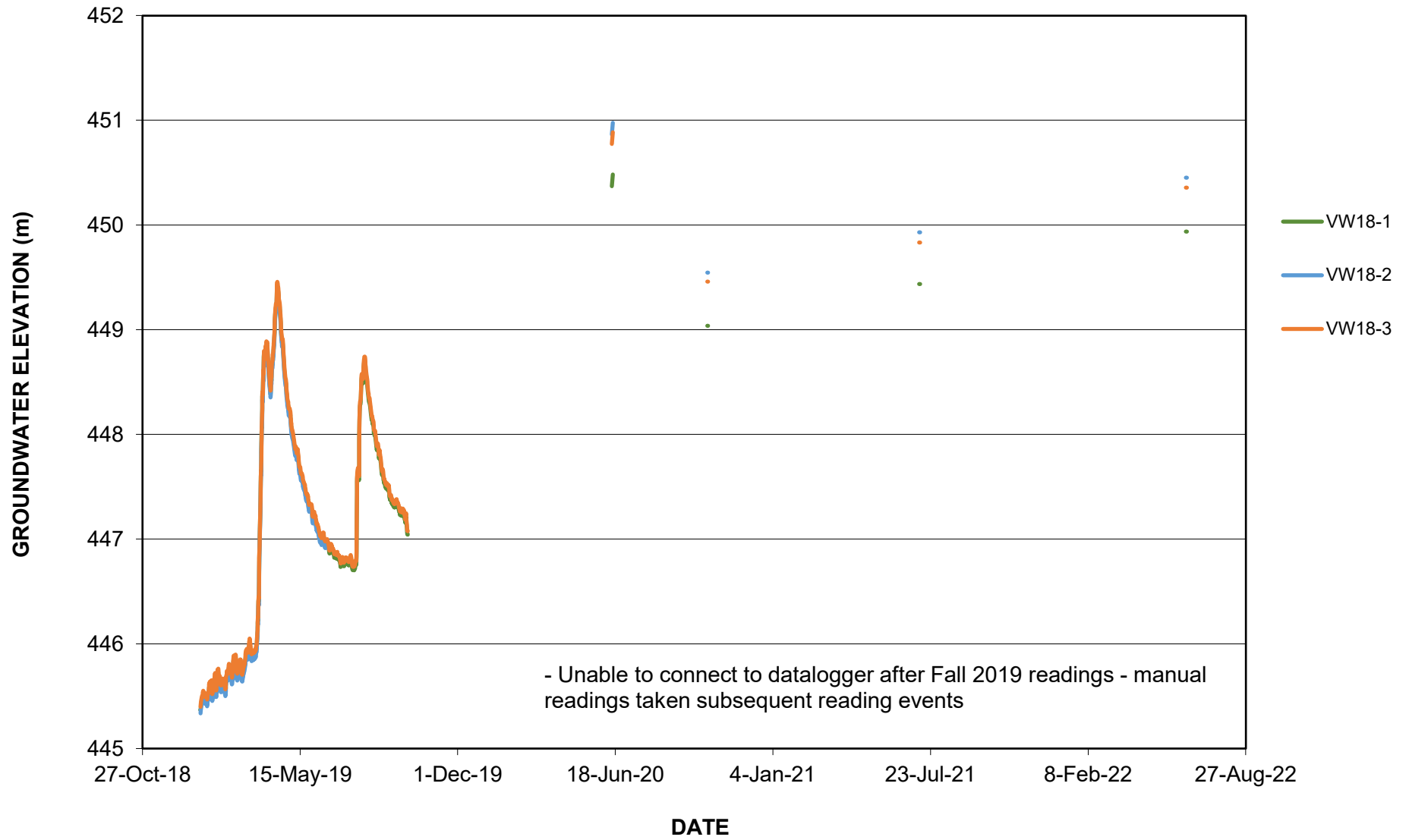
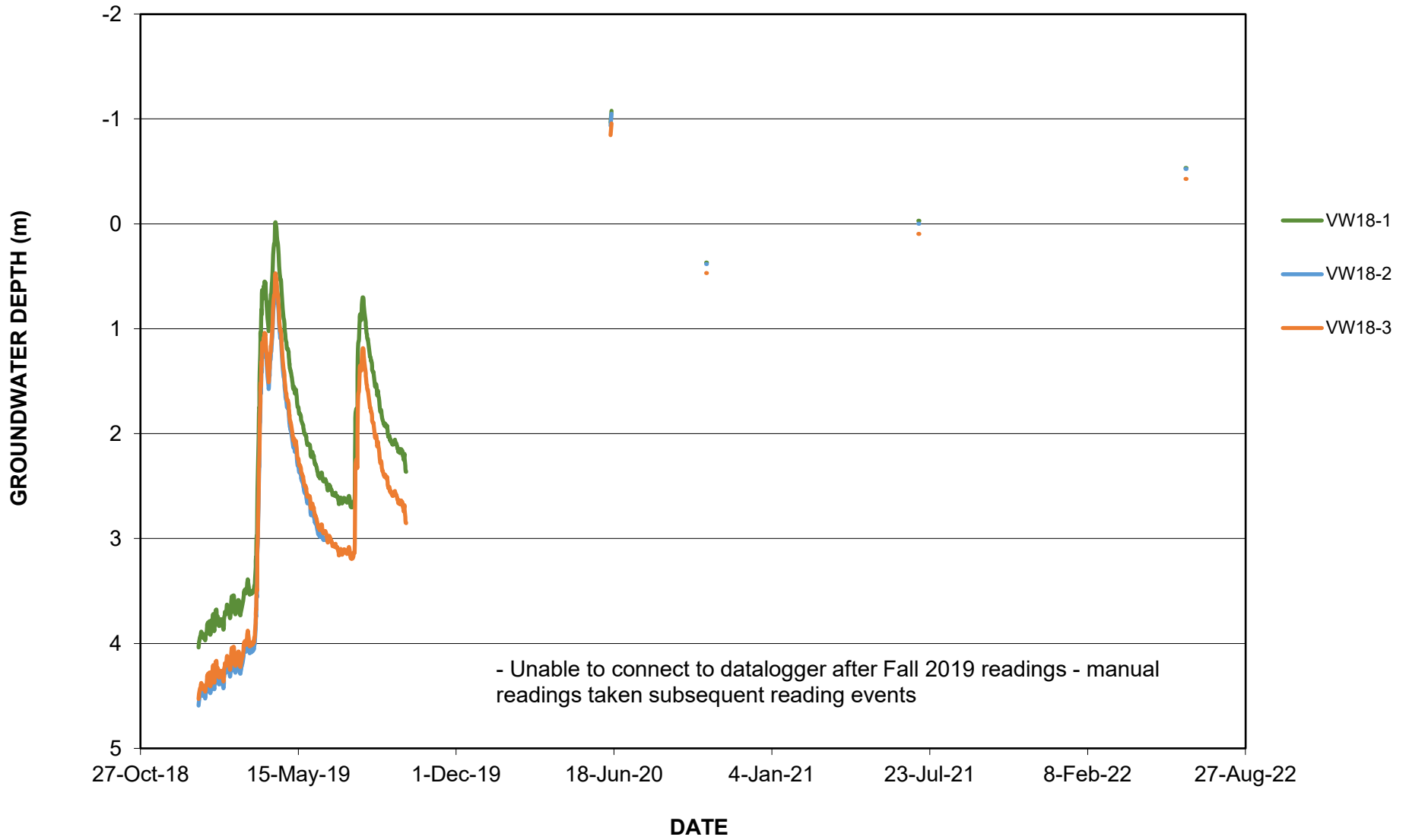


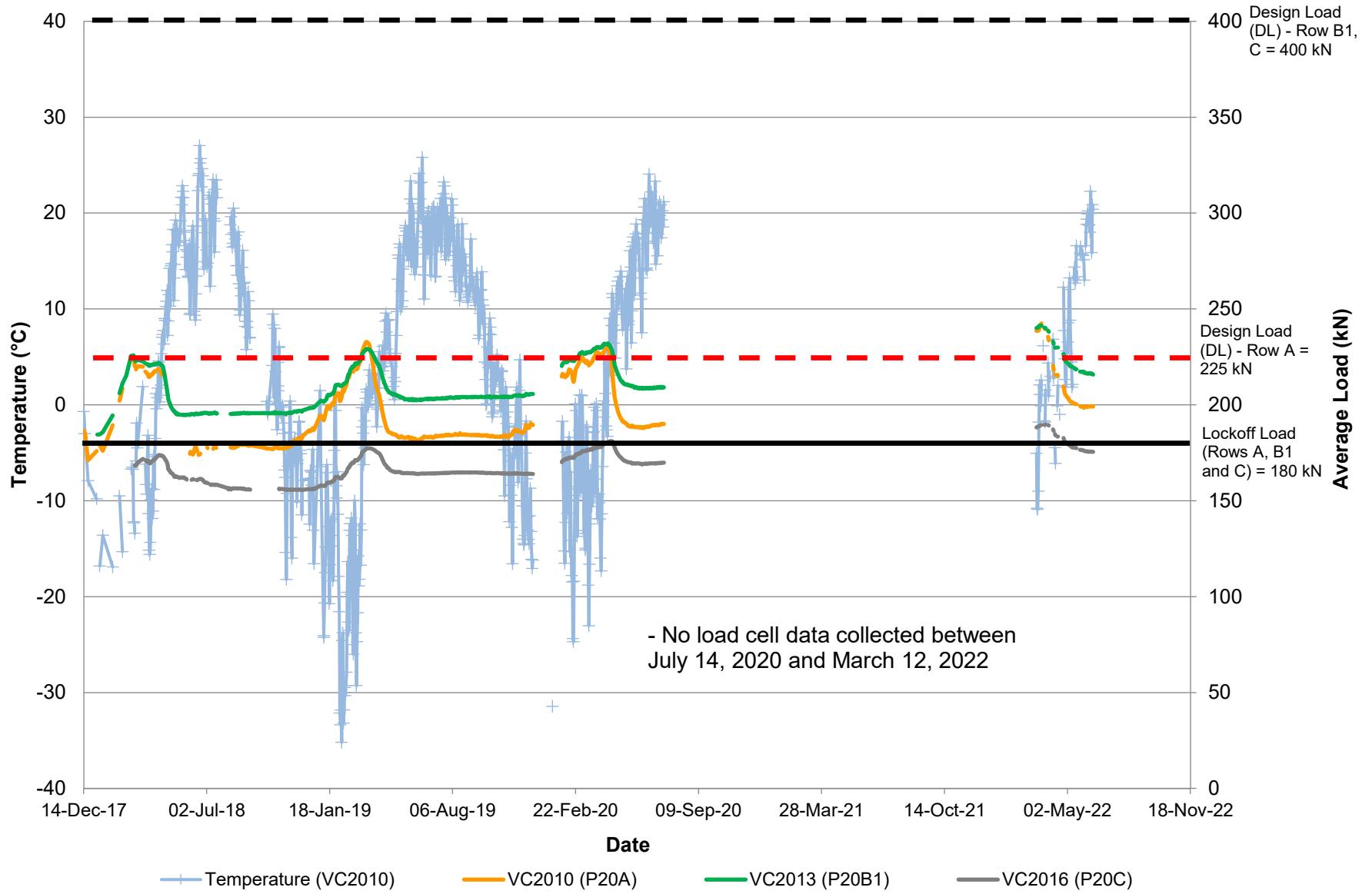
FIGURE PH042-3
PIEZOMETRIC ELEVATIONS FOR HWY 986:01, DAISHOWA EAST HILL
(SOUTH HIGHWAY DITCH PIEZOMETERS)



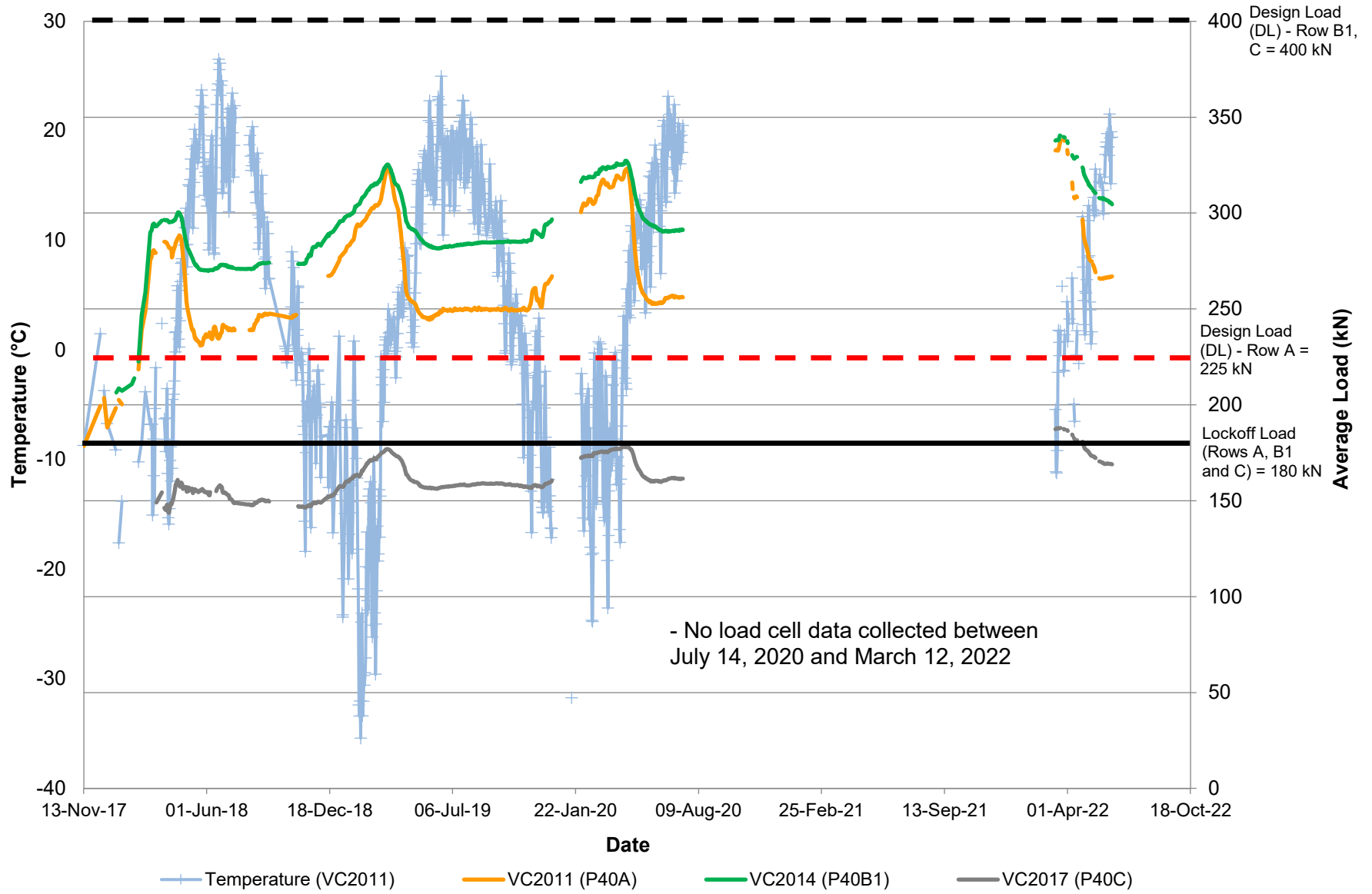
**FIGURE PH042-4
PIEZOMETRIC DEPTHS FOR HWY 986:01, DAISHOWA EAST HILL
(SOUTH HIGHWAY DITCH PIEZOMETERS)**



**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)**

