ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS
GEOHAZARD – INSTRUMENTATION MONITORING
PEACE REGION – (PEACE RIVER DISTRICT)
SPRING 2025

Site Number	Location	Name	Hwy	km
PH072	HWY 744:04 C1 58.154	Sunshine Slide	744:04	Km 58.2
Legal Description:		**UTM Co-ordinates**		
16-20-83-21 W5		11U E 483111	N 6230075	

Current Monitoring:	10-June-2025	**Previous Monitoring**	23-May-2024
Instruments Read By:	Mr. Niraj Regmi, G.I.T and Mr. Godfred Etiendem, of Thurber		

Instruments Read During This Site Visit			
Slope Inclinometers (SIs): Pile 34, Pile 59 and Pile 82	**Pneumatic Piezometers (PN):**	**Vibrating Wire Piezometers (VW):**	**Standpipe Piezometers (SP):**
Load Cell (LC): VC1801 to VC1806	**Strain Gauges:**	**SAAs:**	**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:**	**Standpipe Piezometers:**
Load Cell: RST DT2040 datalogger	**Strain Gauges:**	**SAAs:**	**Others:**
Note:			

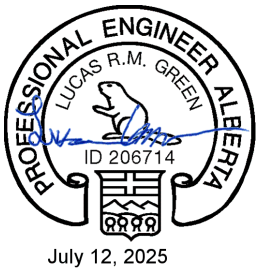
Discussion	
Zones of New Movement:	None
Interpretation of Monitoring Results:	**Slope Indicators** All three slope indicators at this site are installed in the pile wall built in 2015. Slope indicator Pile 34 showed a rate of movement of less than 1 mm/yr over the length of the pile and no discernible movement over the combined length of the pile and waler since the 2015 readings. Pile 34 has shown a total cumulative pile head movement of 1.4 mm in the downslope direction since completion of construction and a total cumulative movement of 0.8 mm in the downslope direction over the combined length of the pile and waler. Pile 59 showed a rate of movement of 0.8 mm/yr over the length of the pile and a rate of movement of 0.7 mm/yr over the combined length of the pile and waler since the spring of 2024 readings. Pile 59 has shown a total cumulative pile head movement of 5.2 mm in the downslope direction since completion of construction, with a total cumulative movement of 6.4 mm in the downslope direction over the combined length of the pile and waler. The movement pattern at Pile 59 suggests a potential slight acceleration of movements is occurring. Pile 82 showed a rate of movement of 1.2 mm/yr over the length of the pile and a rate of movement of 0.9 mm/yr over the combined length of the pile and waler, since the spring of 2024 readings. Pile 82 has shown a total cumulative pile head movement of 6.6 mm in the downslope

	direction since completion of construction and a total cumulative movement of 5.5 mm in the downslope direction over the combined length of the pile and waler. **Load Cells** The six load cells (VC1805, VC1806, VC1801, VC1802, VC1803 and VC1804) are connected to an RST DT2040 datalogger which was initially programmed to take readings once per day. Starting in the spring of 2015, the datalogger was reprogrammed to take readings twice per day. The latest load cell readings, as of June 10, 2025, show minor changes compared to the previous readings taken in on May 23, 2024. The changes range from a decrease of 1.03 kN in load cell VC1806 (anchor 34L) to an increase of 1.15 kN in VC1805 (anchor 34U). Load cells VC1803 (anchor 82U) and VC1804 (anchor 82L) measured all-time high loads of 191.66 kN on February 5, 2025 and of 190.47 on March 20, 205, respectively. Load cells VC1801 (anchor 60U) and VC1802 (anchor 60L) are showing loads that are higher than the design service load, but still lower than the ULS factored design load. Overall, the load cells show a trend of stable loads over the past several readings cycles. Experience at other pile wall sites suggests loads may increase in response to stress relief downslope of the pile wall. Overall, the SI and load cell readings show that the pile wall has been effective in stabilizing the landslide movement at this site.
Future Work:	The instruments should be read again in the spring of 2026.
Instrumentation Repairs:	No instrument repairs are required at this time.
Additional Comments:	

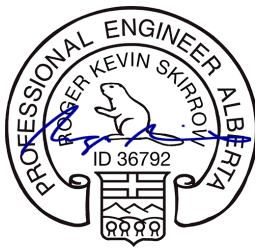
Attachments:	• Table PH072-1 Spring 2025 – HWY 744:04 Judah Hill (Sunshine Slide) Slope Inclinometer Instrumentation Reading Summary • Table PH072-2 Spring 2025 – HWY 744:04 Judah Hill (Sunshine Slide) Load Cell Instrumentation Reading Summary • Statement for Use and Interpretation of Report • APPENDIX A - PH072 SPRING 2025 o Field Inspector's report o Site Plan Showing Approximate Instrument Locations (Drawings No. 32121 PH072-1 and 32121-PH072-2) o SI Reading Plots o Figure PH072-1(Load Cell Readings)

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.
Roger Skirrow, M.Sc., P. Eng.
Senior Geotechnical Engineer



July 12, 2025



2025-07-14

PERMIT TO PRACTICE
THURBER ENGINEERING LTD.
RM SIGNATURE: _____
RM APEGA ID #: 51674
DATE: July 14, 2025
PERMIT NUMBER: P005186
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

Lucas Green, P.Eng.
Geotechnical Engineer

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Table PH072-1 Spring 2025 – Hwy 744:04 Judah Hill (Sunshine Slide) Slope Inclinometer Instrumentation Reading Summary

Date Monitored: June 10, 2025

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/y)
Pile 34	July 4, 2015	1.4 over 2.5 m to 19.5 m depth in 221° direction (pile only)	5.4 in September 2019	Operational	May 23, 2024	<0.1	<0.1	-0.5
		0.8 over 0.0 m to 19.5 m depth in 221° direction (pile and waler)	8.4 in September 2019			No Discernible Movement	N/A	-2.0
Pile 59	July 4, 2015	5.2 over 2.4 m to 19.5 m depth in 241° direction (pile only)	12.8 in July 2015	Operational	May 23, 2024	0.8	0.8	0.7
		6.4 over 0.0 to 19.5 m depth in 241° direction (pile and waler)	25.8 in July 2015			0.8	0.7	0.1
Pile 82	July 4, 2015	6.6 over 2.4 m to 19.5 m depth in 238° direction (pile only)	16.3 in July 2015	Operational	May 23, 2024	1.2	1.2	2.4
		5.5 over 0.0 m to 19.5 m depth in 238° direction (pile and waler)	18.5 in July 2015			0.9	0.9	2.1

Drawings 32121-PH072-1 and 32121-PH072-2 in Appendix A provide a sketch of the approximate location of the monitoring instrumentation for this site.

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Table PH072-2 Spring 2025 – Hwy 744:04 Judah Hill (Sunshine Slide) Load Cell Instrumentation Reading Summary

Date Monitored: June 10, 2025

ANCHOR NUMBER	SERIAL #	DESIGN SERVICE LOAD / LOCK-OFF LOAD (kN)	MAXIMUM RECORDED LOAD (kN)	RECORDED LOAD (JUNE 10, 2025) [1] (kN)	PREVIOUS RECORDED LOAD (MAY 23, 2024) [1] (kN)	CHANGE IN LOAD SINCE PREVIOUS READING (kN)
34U	VC1805	192/162	178.28 on April 4, 2015	163.94	162.79	1.15
34L	VC1806	192/162	164.65 on November 13, 2014	132.70	133.73	-1.03
60U	VC1801	192/162	229.43 on January 6, 2022	214.09	215.67	-1.58
60L	VC1802	192/162	225.51 on January 16, 2022	214.24	215.85	-1.61
82U	VC1803	192/162	191.66 on February 5, 2025	181.94	181.25	0.69
82L	VC1804	192/162	190.47 on March 20, 2025	183.49	183.11	0.38

Drawings 32121-PH072-1 and 32121-PH072-2 in Appendix A provide a sketch of the approximate location of the monitoring instrumentation for this site.

1. Load cell data is recorded twice daily with datalogger on site. Dataloggers are uploaded twice annually during instrumentation readings. See Figure PH072-1 in Appendix A for combined historical instrument readings. Datalogger battery was dead between November 14, 2018 to July 25, 2019, October 27, 2019 to June 11, 2020, and between June 27, 2020 to July 10, 2021.

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STATEMENT FOR USE AND INTERPRETATION OF REPORT

1. STANDARD OF CARE

This Report has been prepared in a manner consistent with that degree of care and skill ordinarily exercised by members of the same profession currently practicing under similar circumstances at the same time and in the same or similar locality and in compliance with all applicable laws.

2. COMPLETE REPORT

All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment, including this Statement For Use and Interpretation of Report, 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, AS DESCRIBED ABOVE. THURBER IS NOT RESPONSIBLE FOR USE BY ANY PARTY OF PORTIONS OF THE REPORT WITHOUT REFERENCE TOTHE WHOLE OF THE 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 for the development, design objectives, and/or purposes described to Thurber by the Client. **NO OTHER PARTY MAY USE OR RELY ON THE REPORT OR ANY PORTION THEREOF FOR OTHER THAN THE CLIENT'S BENEFIT IN CONNECTION WITH THE PURPOSES DESCRIBED IN THE REPORT**. Any use which a third party makes of the Report is the sole responsibility of such third party and is always subject to this Statement for Use and Interpretation of Report. Thurber accepts no liability or responsibility for damages suffered by any third party resulting from use of the Report for purposes outside the reasonable contemplation of Thurber at the time it was prepared or in any manner unintended by Thurber.

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 is inherently judgement-based. 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 parties making use of such documents or records with or without our express written consent need to 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 parties. Some conditions are subject to change over time and those making use of the Report need to be aware of this possibility and understand that the Report only presents the interpreted conditions at the sampled points at the time of sampling. If special concerns exist, or the Client has special considerations or requirements, the Client must 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 based on conditions in evidence at the time of site inspections and based on 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 resulting from misstatements, omissions, misrepresentations, or fraudulent acts of the Client or other parties 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 is recommended to 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 need to 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 to confirm and document that the site conditions do not materially differ from those 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. 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 other parties 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, unless such decisions expressly form part of the stated purpose of the Report as described in Paragraph 3.

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

SPRING 2025

APPENDIX A
DATA PRESENTATION

SITE PH072: HWY 744:04, JUDAH HILL (SUNSHINE SLIDE)

ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS
PEACE REGION (PEACE RIVER DISTRICT)
INSTRUMENTATION MONITORING FIELD SUMMARY (PH072)
SPRING 2025

Location:	Sunshine Slide - Judah Hill (HWY 744:04 C1 58.154)	**Readout:**	
File Number:	32121	**Casing diameter**	2.75
Probe:	RST SET 8R	**Temp:**	9
Cable:	RST SET 8R	**Read by:**	NKR

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
	Northing (m)	Easting (m)					A+	A-	B+	B-			
Pile 34	6230075	483111	10-Jun-25	0.88	66 to 2	215	-518	527	569	-565	8R/8R	2.75	
Pile 59	6230103	483098	10-Jun-25	0.91	66 to 2	210	16	-2	-558	558	8R/8R	2.75	
Pile 82	6230124	483082	10-Jun-25	0.93	66 to 2	170	232	-217	136	-135	8R/8R	2.75	

VIBRATING WIRE LOAD CELL (VC) READINGS

VC#	GPS Location (UTM 11)		Datalogger Serial #	Date	Remarks
	Easting (m)	Northing (m)			
VC1801-VC1806			RST 0	10-Jun-25	Downloaded

INSPECTOR REPORT

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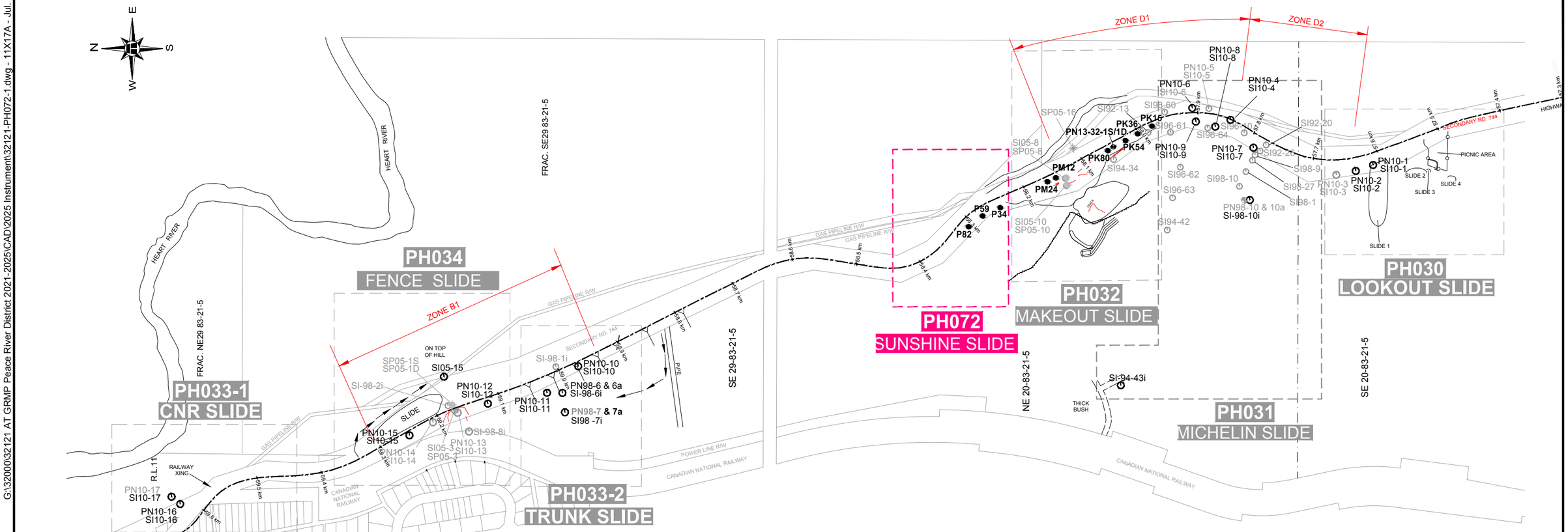

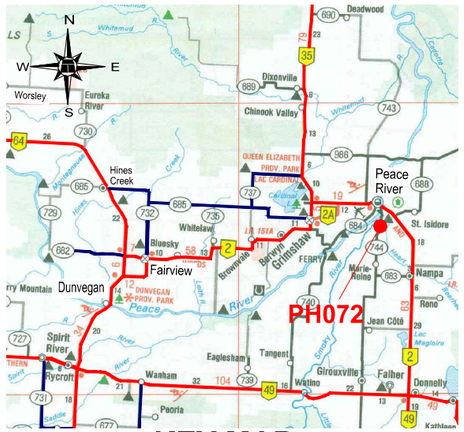

KEY MAP
NOT TO SCALE

LEGEND

- PN — APPROX. PNEUMATIC PIEZOMETER LOCATION
- SP — APPROX. STANDPIPE PIEZOMETER LOCATION
- SI — APPROX. SLOPE INCLINOMETER LOCATION
- SP — APPROX. STANDPIPE PIEZOMETER LOCATION *(CURRENTLY NOT IN USE)*
- SI — APPROX. SLOPE INCLINOMETER LOCATION *(CURRENTLY NOT IN USE)*
- APPROXIMATE PILE LOCATION

Alberta Transportation

PEACE REGION (PEACE RIVER DISTRICT)

PH072: HWY 744:02 - JUDAH HILL(SUNSHINE SLIDE) INSTRUMENT LOCATIONS

DWG No. 32121-PH072-1

DRAWN BY	ML
DESIGNED BY	BWN
APPROVED BY	DWP
SCALE	APPROX. 1:6000
DATE	JULY 2025
FILE No.	32121

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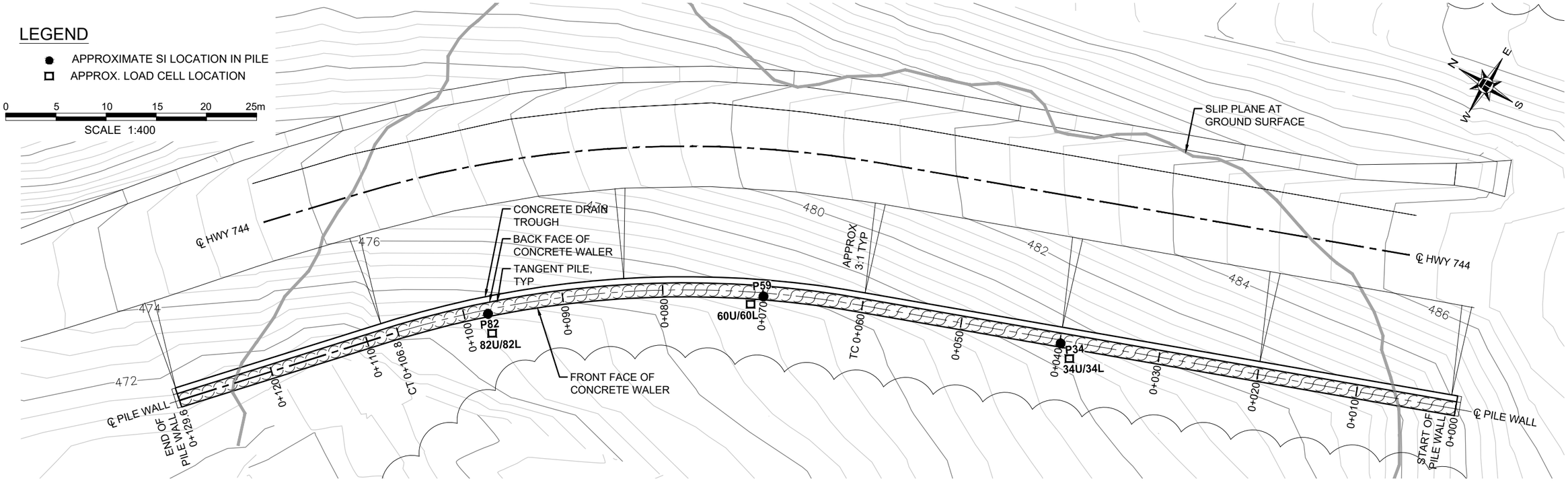
LEGEND

- APPROXIMATE SI LOCATION IN PILE
- APPROX. LOAD CELL LOCATION

0 5 10 15 20 25m

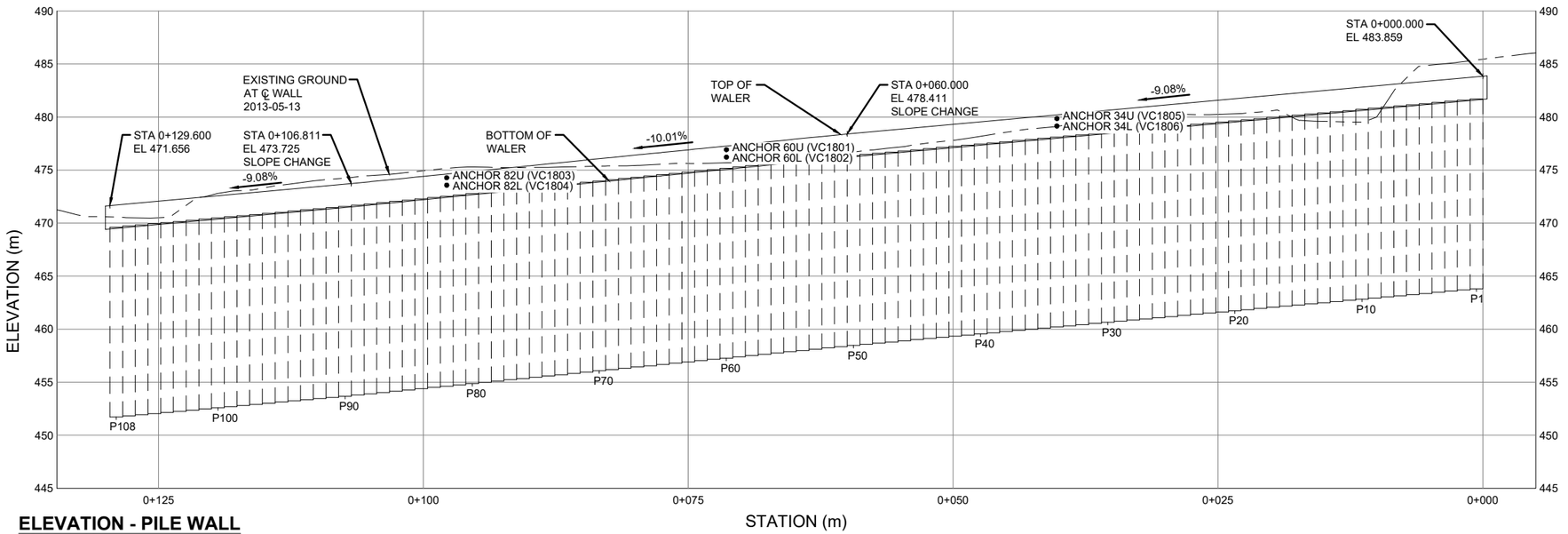
SCALE 1:400



SITE PLAN

SCALE 1:400

PILE NO.	NORTHING (m)	EASTING (m)
P34	6230075.448	483111.042
P59	6230102.621	483098.357
P82	6230124.419	483081.571



ELEVATION - PILE WALL

SCALE 1:500

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PEACE REGION (PEACE RIVER DISTRICT)

PH072: HWY 744:02 - JUDAH HILL(SUNSHINE SLIDE) INSTRUMENT LOCATIONS

DWG No. 32121-PH072-2

DRAWN BY	ML
DESIGNED BY	BWN
APPROVED BY	DWP
SCALE	AS SHOWN
DATE	JULY 2025
FILE No.	32121

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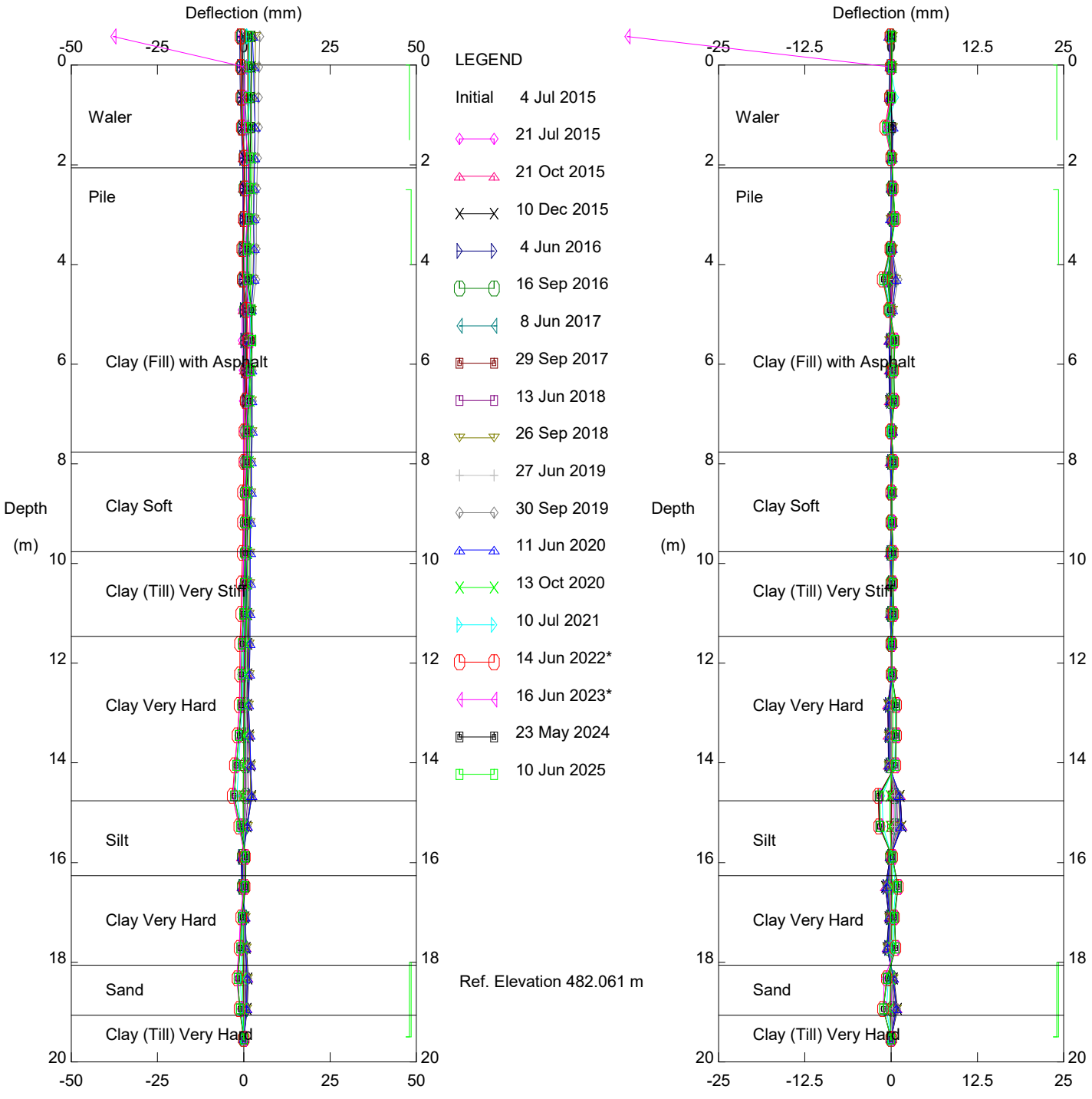

Cumulative Deflection

Direction A

Incremental Deflection

Direction A

PH072 Sunshine (Post Construction), Inclinometer Pile 34

Alberta Transportation

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

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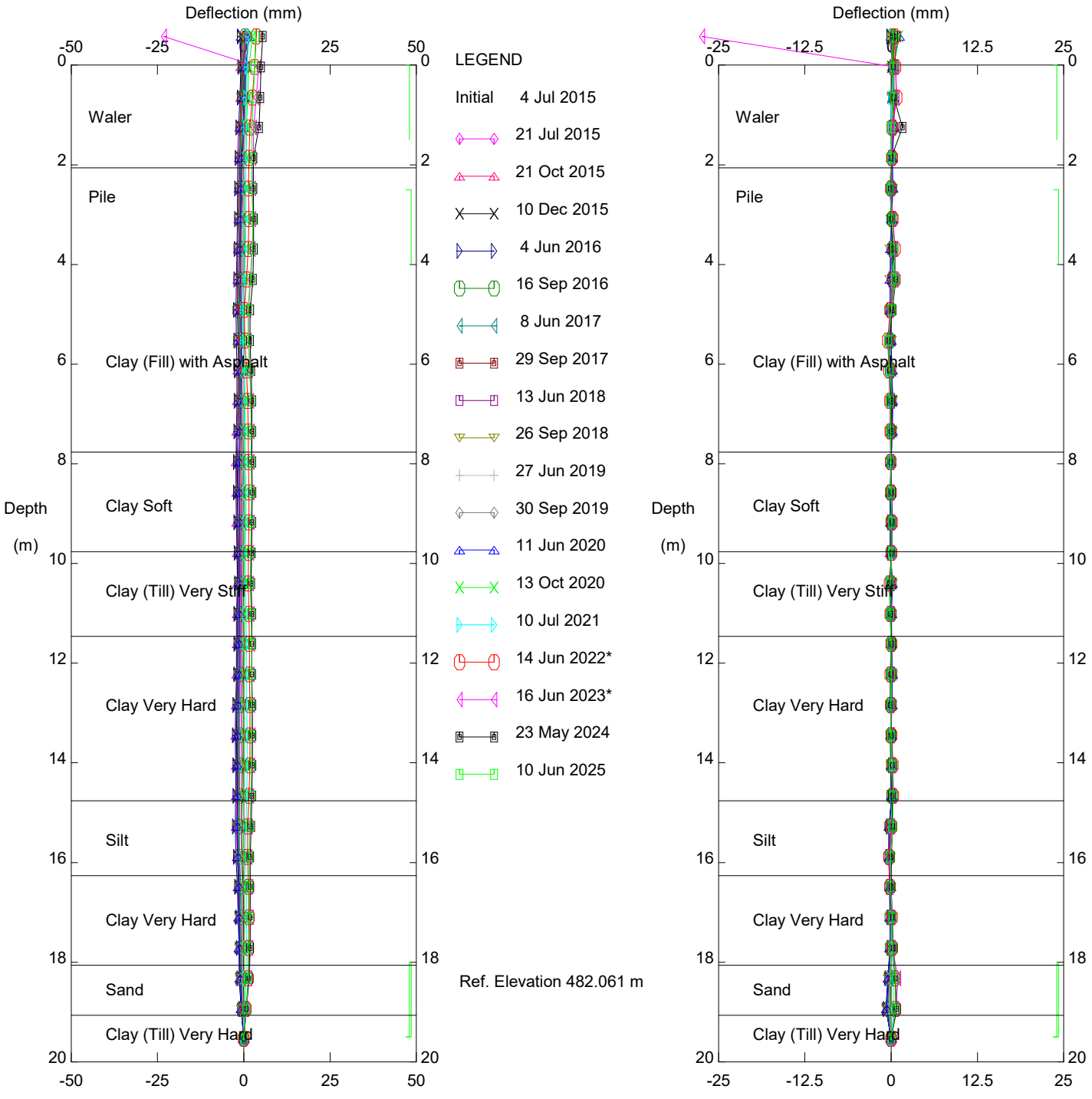

Cumulative Deflection

Direction B

Incremental Deflection

Direction B

PH072 Sunshine (Post Construction), Inclinometer Pile 34

Alberta Transportation

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

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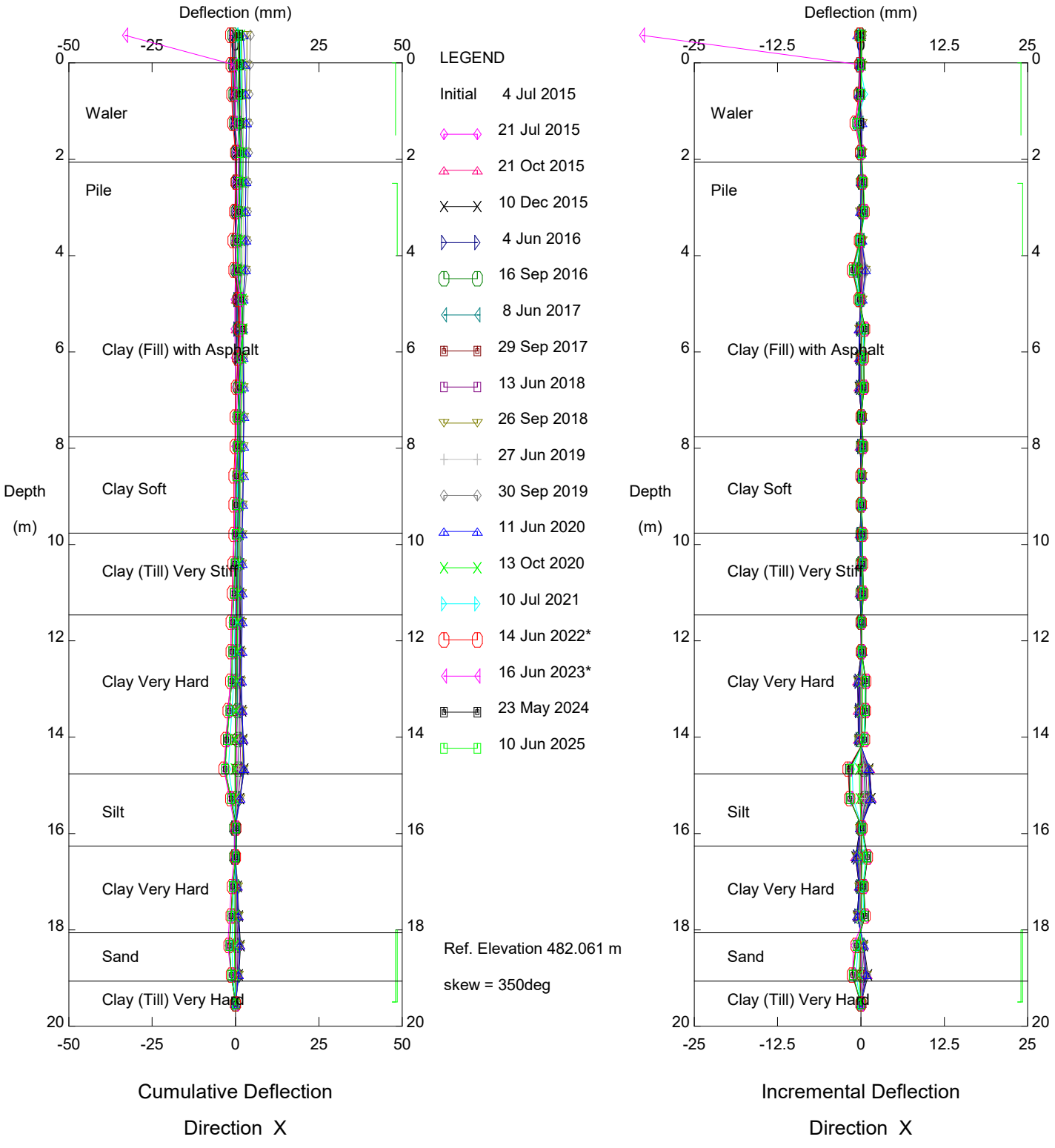

Cumulative Deflection

Direction X

Incremental Deflection

Direction X

PH072 Sunshine (Post Construction), Inclinometer Pile 34

Alberta Transportation

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

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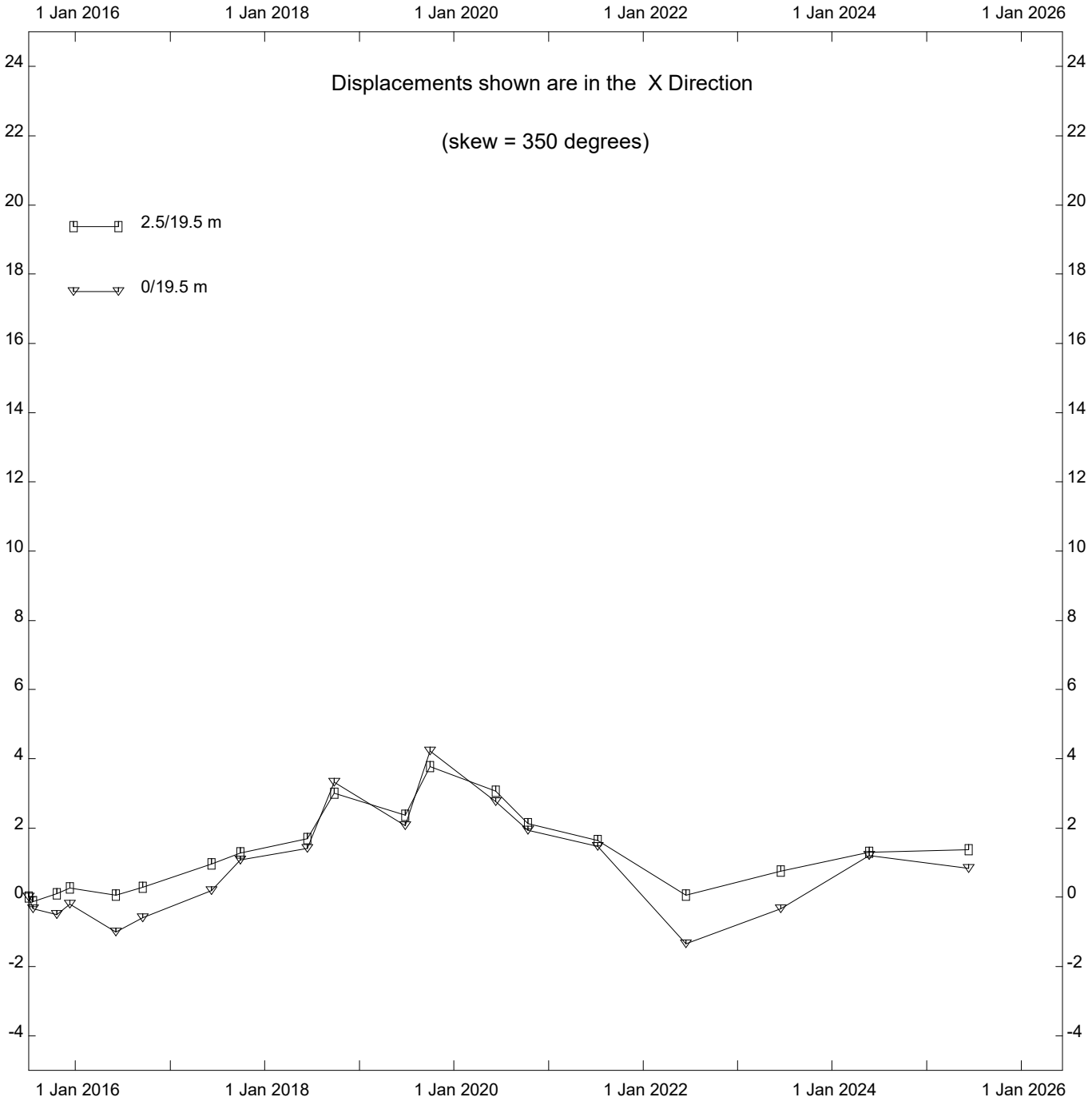
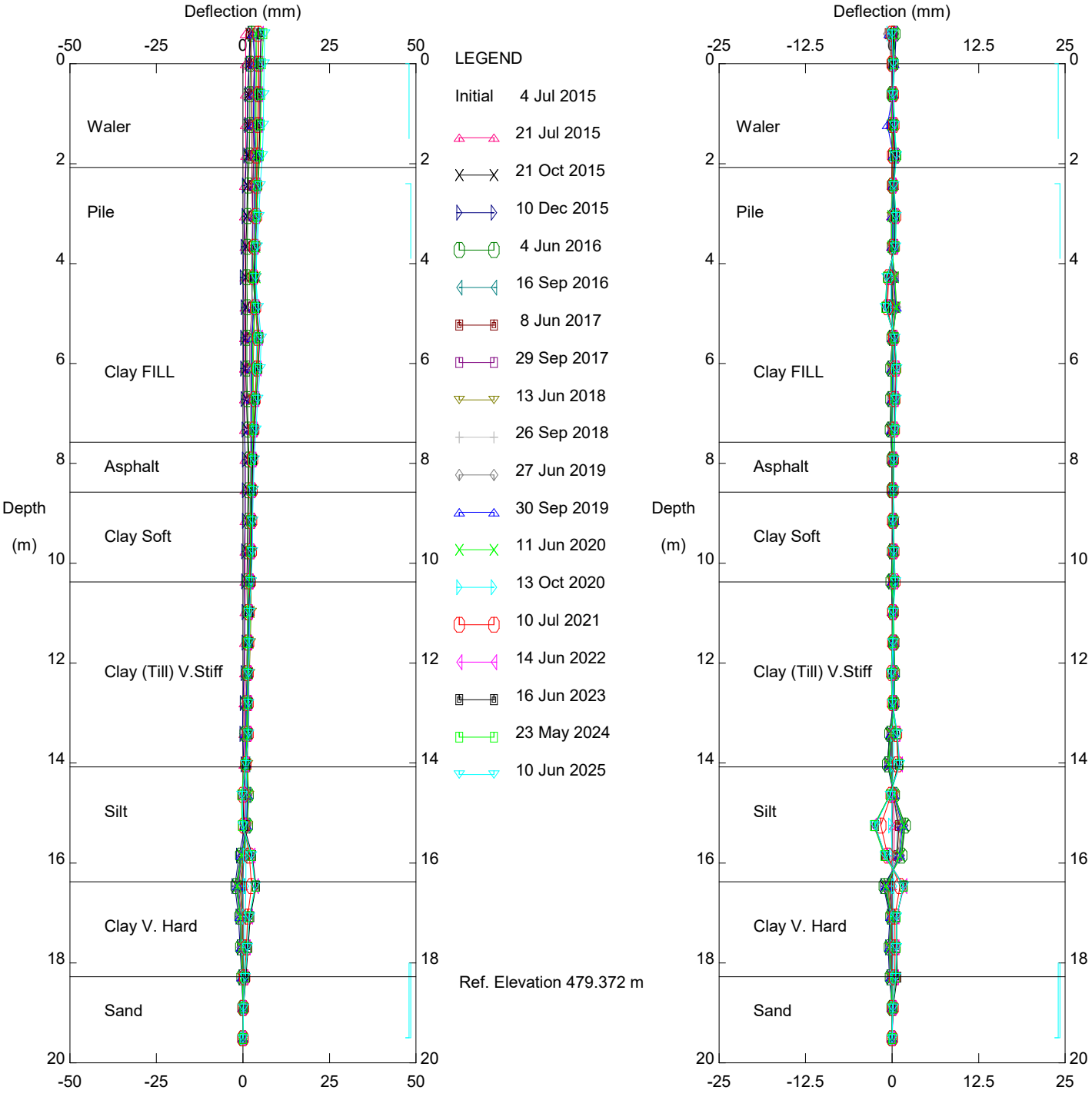


PH072 Sunshine (Post Construction), Inclinometer Pile 34

Alberta Transportation

Thurber Engineering Ltd.



Cumulative Deflection

Direction A

Incremental Deflection

Direction A

PH072 Sunshine (Post Construction), Inclinometer Pile 59

Alberta Transportation

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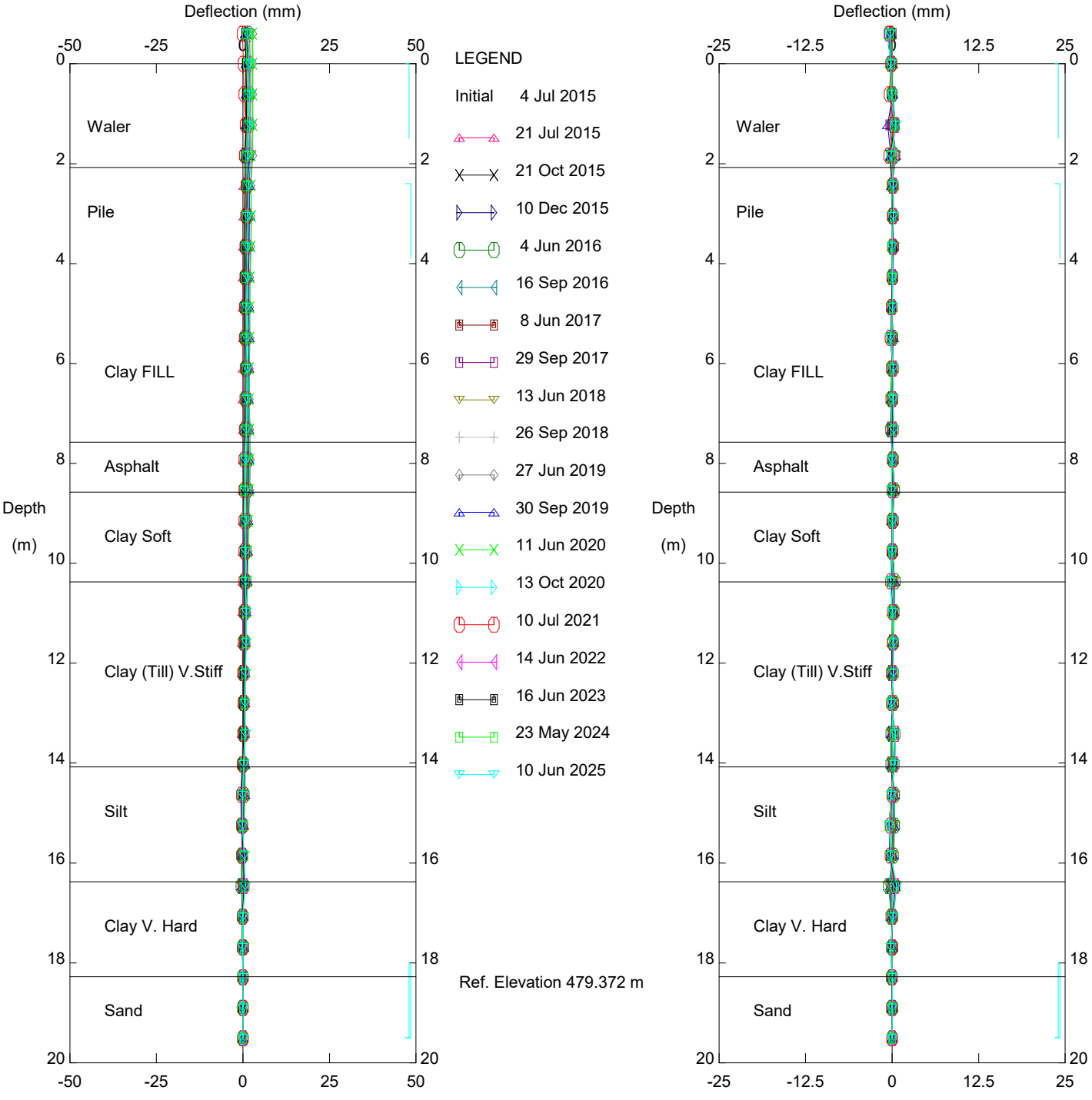

Cumulative Deflection

Direction B

Incremental Deflection

Direction B

PH072 Sunshine (Post Construction), Inclinometer Pile 59

Alberta Transportation

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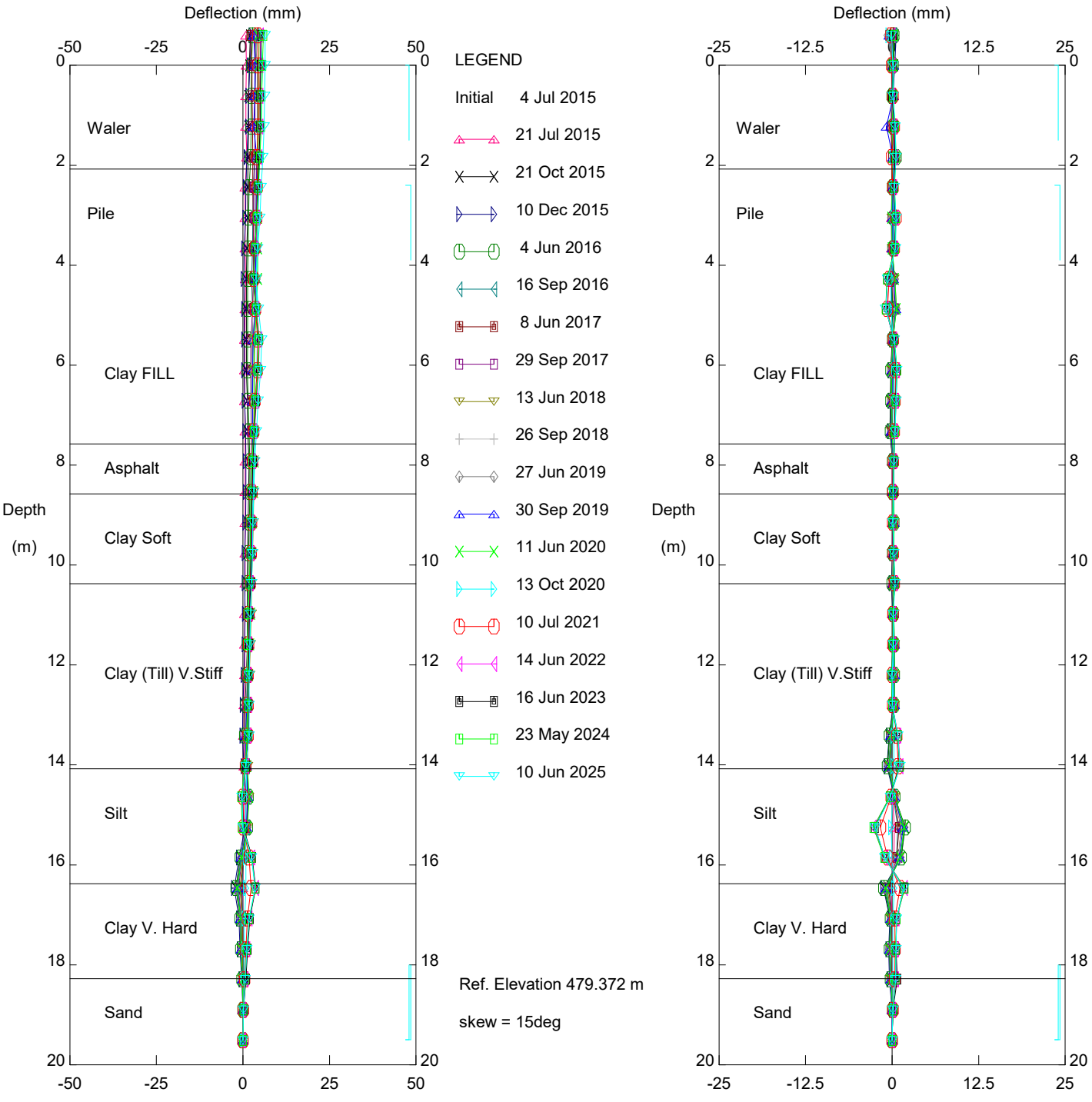

Cumulative Deflection

Direction X

Incremental Deflection

Direction X

PH072 Sunshine (Post Construction), Inclinometer Pile 59

Alberta Transportation

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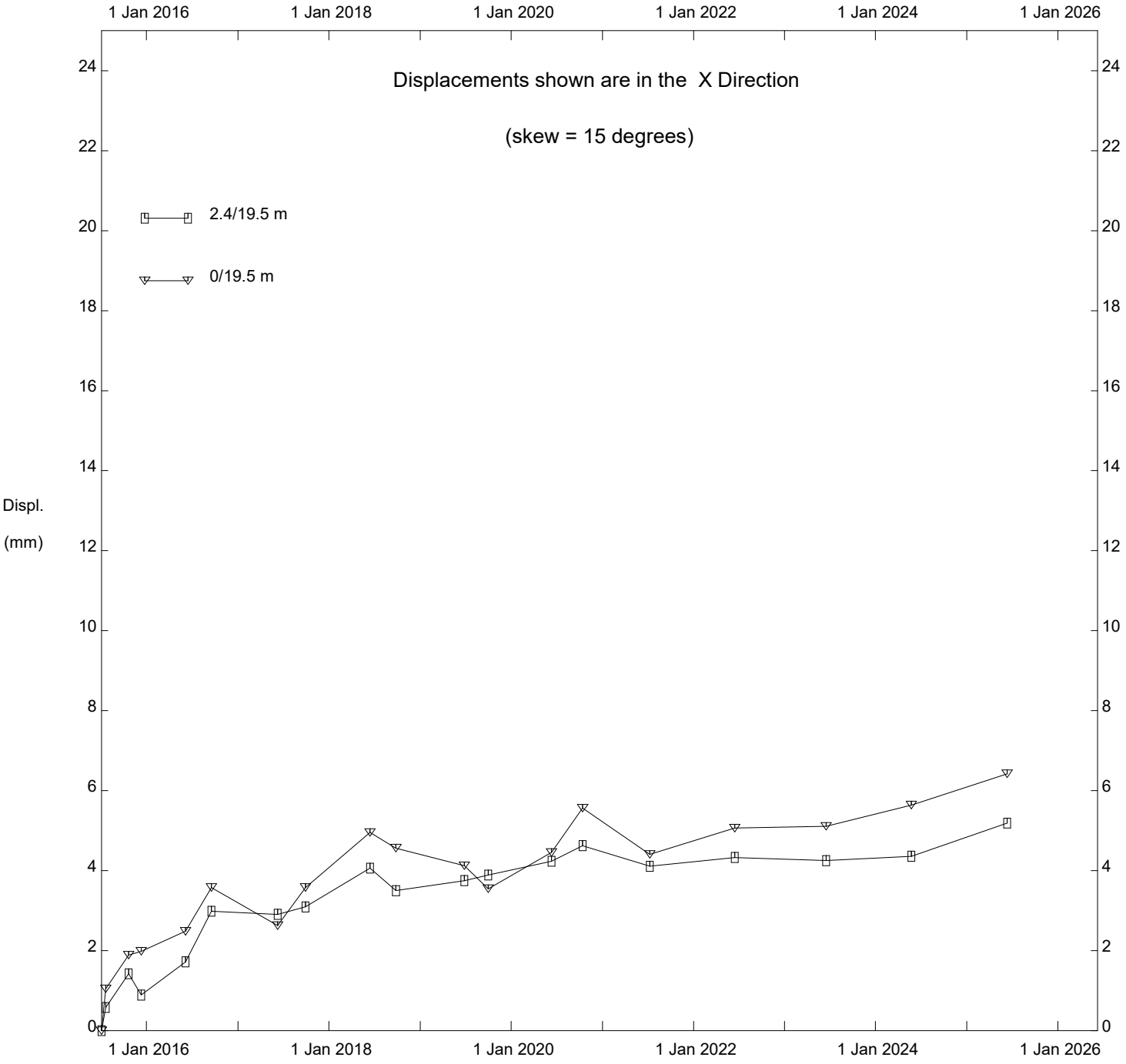
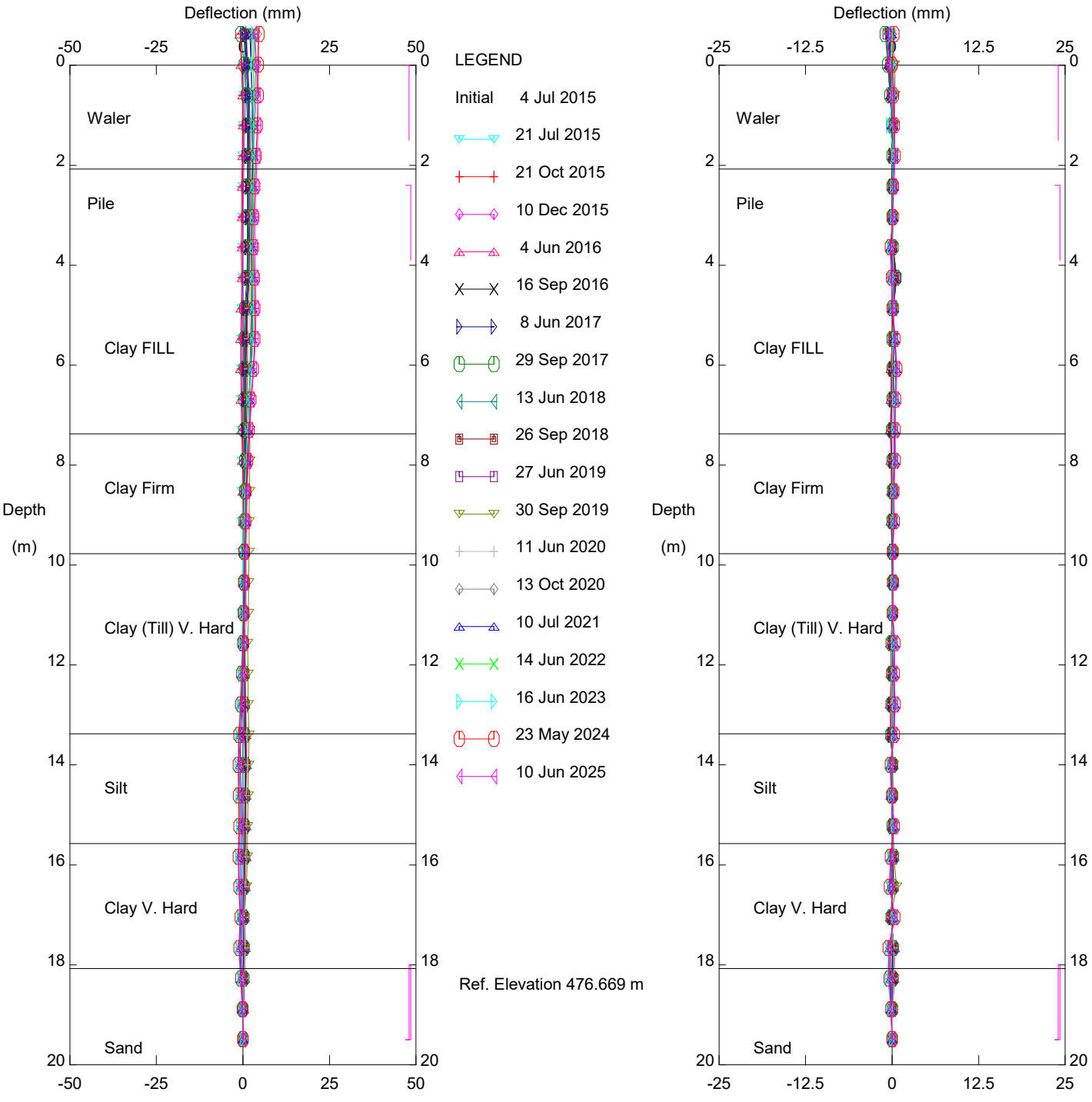


PH072 Sunshine (Post Construction), Inclinometer Pile 59

Alberta Transportation

Thurber Engineering Ltd.



Cumulative Deflection

Direction A

Incremental Deflection

Direction A

PH072 Sunshine (Post Construction), Inclinometer Pile 82

Alberta Transportation

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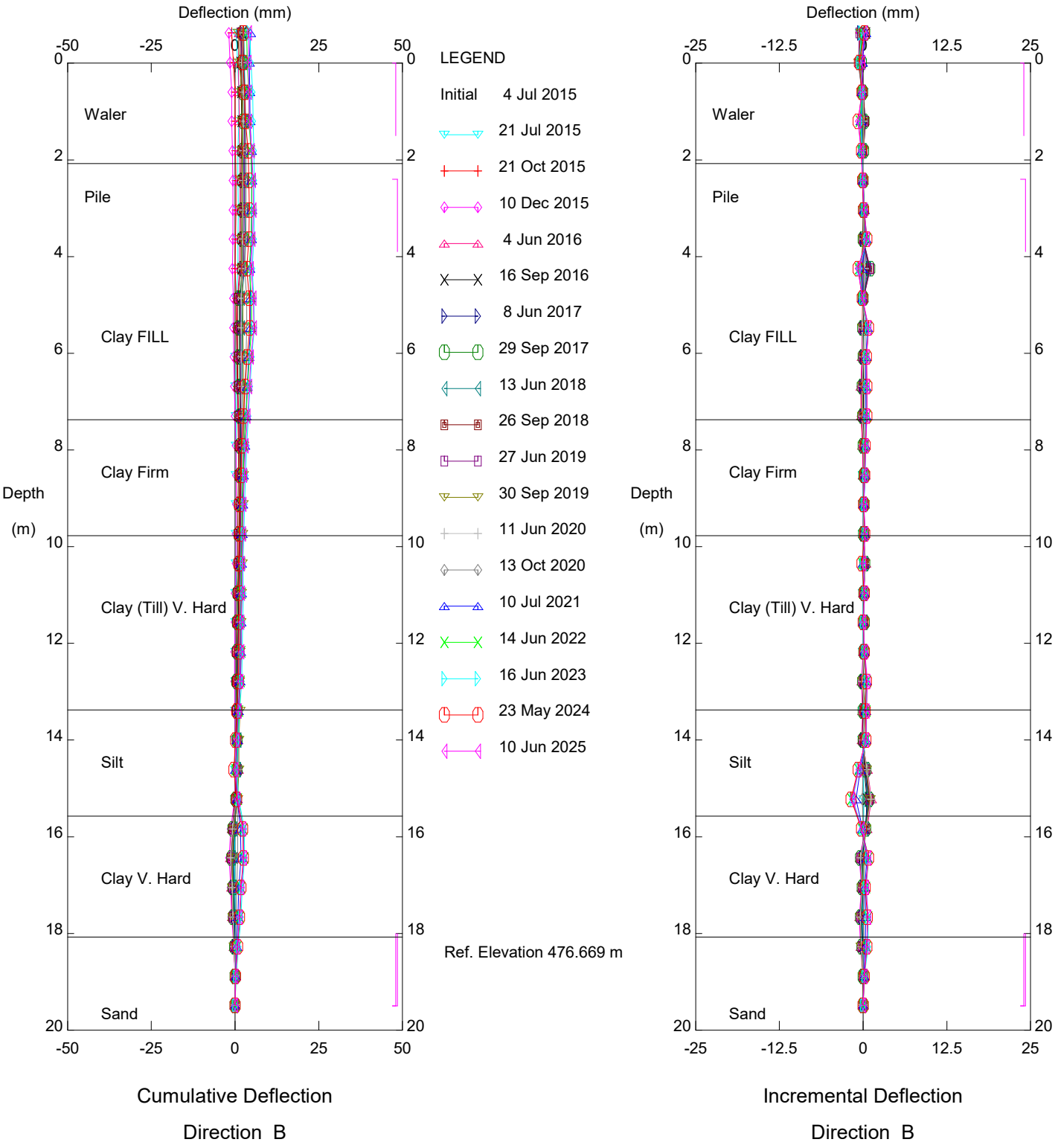

Cumulative Deflection

Direction B

Incremental Deflection

Direction B

PH072 Sunshine (Post Construction), Inclinometer Pile 82

Alberta Transportation

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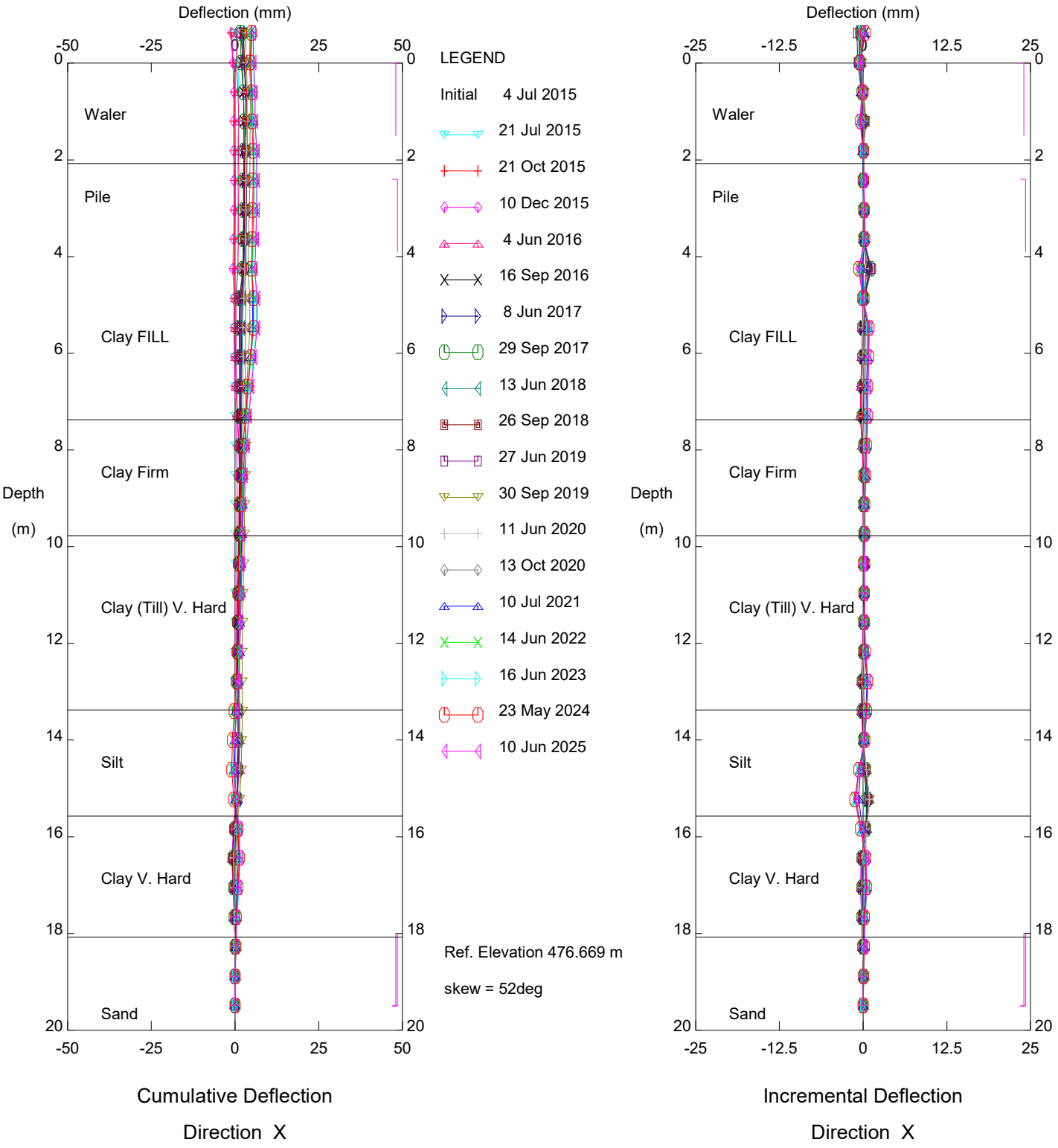

Cumulative Deflection

Direction X

Incremental Deflection

Direction X

PH072 Sunshine (Post Construction), Inclinometer Pile 82

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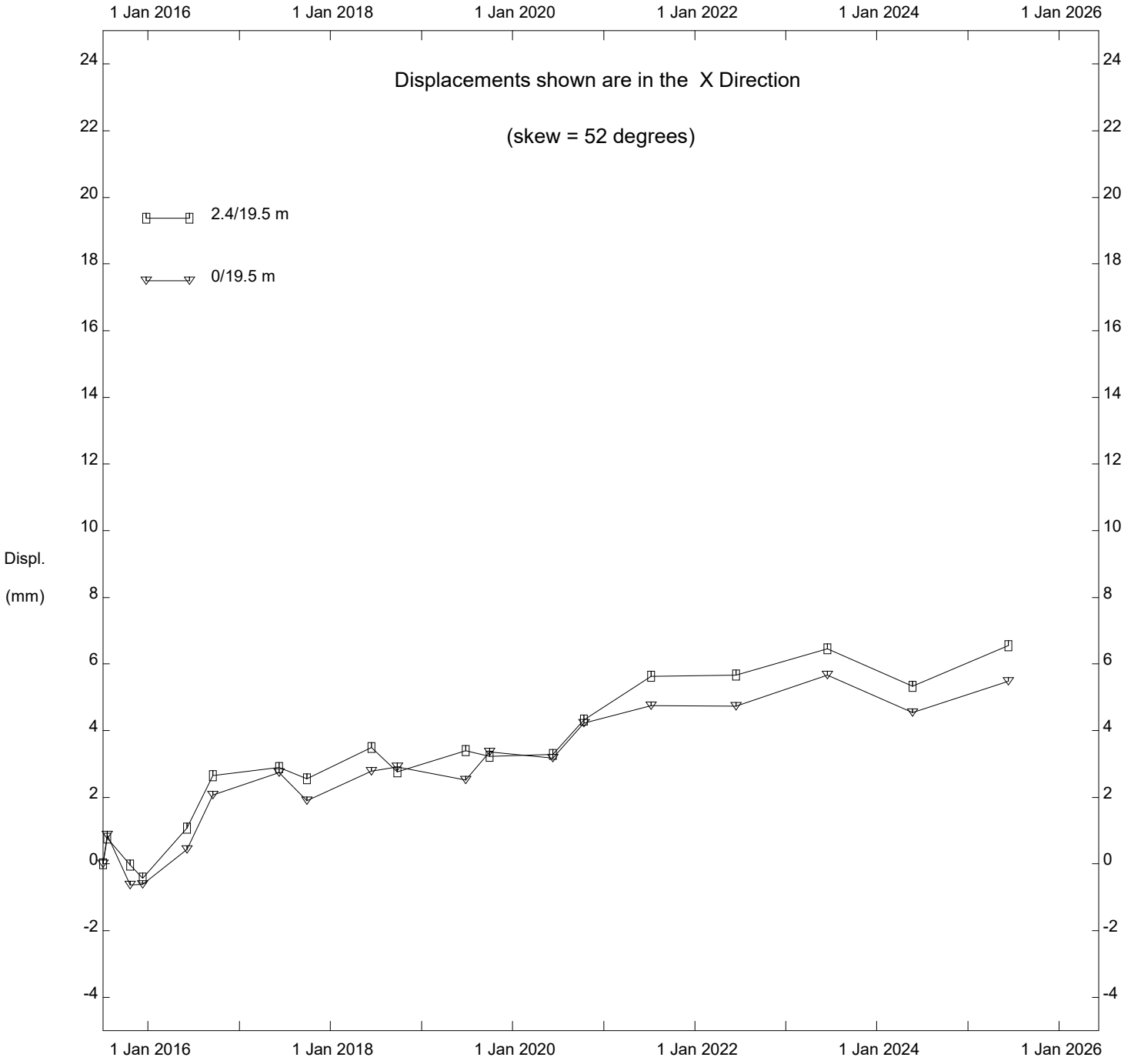
Thurber Engineering Ltd.



PH072 Sunshine (Post Construction), Inclinometer Pile 82

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FIGURE PH072-1
SUNSHINE PILE WALL - LOAD CELLS