

**ALBERTA TRANSPORTATION AND
ECONOMIC CORRIDORS
GEOHAZARD – INSTRUMENTATION MONITORING
PEACE REGION – (PEACE RIVER DISTRICT)
SPRING 2024**



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

Current Monitoring:	23-May-2024	Previous Monitoring	16-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): Pile 34, Pile 59 and Pile 82	Pneumatic Piezometers (PN): N/A	Vibration Wire Piezometers (VW): N/A	Standpipe Piezometers (SP): N/A
Load Cell (LC): VC1801 to VC1806	Strain Gauges: N/A	SAA: N/A	Others:

Readout Equipment Used

Slope Inclinometers: RST Digital Inclinator probe with a 2 ft wheelbase and a RST Pocket PC readout	Pneumatic Piezometers:	Vibration Wire Piezometers:	Standpipe Piezometers:
Load Cell: RST DT2040 datalogger	Strain Gauges:	SAA:	Others:

Note:

Discussion

Zones of New Movement:	None
Interpretation of Monitoring Results:	<p>Pile 34 showed a rate of movement of 0.6 mm/yr over the length of the pile and a rate of movement of 1.6 mm/yr over the combined length of the pile and waler since the spring of 2023 readings. Pile 34 has shown a total cumulative pile head movement of 1.3 mm in the downslope direction since completion of construction and a total cumulative movement of 1.2 mm in the downslope direction over the combined length of the pile and waler.</p> <p>Pile 59 showed a rate of movement of 0.1 mm/yr over the length of the pile and a rate of movement of 0.6 mm/yr over the combined length of the pile and waler since the spring of 2023 readings. Pile 59 has shown a total cumulative pile head movement of 4.4 mm in the downslope direction since completion of construction with a total cumulative movement of 5.6 mm in the downslope direction over the combined length of the pile and waler.</p> <p>Pile 82 showed a rate of movement of 1.2 mm/yr over the length of the pile and a rate of movement of 1.2 mm/yr over the combined length of the pile and waler, in the uphill direction, since the spring of 2023 readings. Pile 82 has shown a total cumulative pile head movement of 5.3 mm in the downslope direction since completion of construction and a total cumulative movement of 4.5 mm in the downslope direction over the combined length of the pile and waler.</p> <p>The six load cells (VC1805, VC1806, VC1801, VC1802, VC1803 and</p>

	<p>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 May 23, 2024, show minor changes compared to the previous readings taken in on June 16, 2023. The changes range from a decrease of 1.23 kN in load cell VC1806 (anchor 34L) to an increase of 2.80 kN in VC1801 (anchor 34U). Load cell VC1803 (anchor 82U) measured an all-time high load of 191.52 kN on January 15, 2023. It should also be noted that load cells VC1801 (anchor 60U), VC1802 (anchor 60L) are showing loads that are higher than the design service load, but these loads are still lower than the ULS factored design load.</p> <p>Overall, the load cells show a trend of stable loads over the past several readings cycles.</p> <p>Overall, the SI and load cell readings show that the pile wall has been effective in stabilizing the landslide movement at this site.</p>
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:	<ul style="list-style-type: none"> • Table PH072-1 Spring 2024 – HWY 744:04 Judah Hill (Sunshine Slide) Slope Inclinometer Instrumentation Reading Summary • Table PH072-2 Spring 2024 – HWY 744:04 Judah Hill (Sunshine Slide) Load Cell Instrumentation Reading Summary • APPENDIX A - PH072 SPRING 2024 <ul style="list-style-type: none"> ○ Field Inspector’s report ○ Site Plan Showing Approximate Instrument Locations (Drawings No. 32121 PH072-1 and 32121-PH072-2) ○ SI Reading Plots ○ Figure PH072-1(Load Cell Readings)
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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

Lucas Green, P.Eng.
Geotechnical Engineer

Table Ph072-1 Spring 2024 – Hwy 744:04 Judah Hill (Sunshine Slide) Slope Incliner Instrumentation Reading Summary

Date Monitored: May 23, 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/y)
Pile 34	July 4, 2015	1.3 over 2.5 m to 19.5 m depth in 221° direction (pile only)	5.4 in September 2019	Operational	June 16, 2023	0.5	0.6	-0.1
		1.2 over 0.0 m to 19.5 m depth in 221° direction (pile and waler)	8.4 in September 2019			1.5	1.6	0.6
Pile 59	July 4, 2015	4.4 over 2.4 m to 19.5 m depth in 241° direction (pile only)	12.8 in July 2015	Operational	June 16, 2023	0.1	0.1	0.2
		5.6 over 0.0 to 19.5 m depth in 241° direction (pile and waler)	25.8 in July 2015			0.5	0.6	0.5
Pile 82	July 4, 2015	5.3 over 2.4 m to 19.5 m depth in 238° direction (pile only)	16.3 in July 2015	Operational	June 16, 2023	-1.1	-1.2	-2.0
		4.5 over 0.0 m to 19.5 m depth in 238° direction (pile and waler)	18.5 in July 2015			-1.1	-1.2	-2.2

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.

Table Ph072-2 Spring 2024 – Hwy 744:04 Judah Hill (Sunshine Slide) Load Cell Instrumentation Reading Summary

Date Monitored: May 23, 2024

ANCHOR NUMBER	SERIAL #	DESIGN SERVICE LOAD / LOCK-OFF LOAD (kN)	MAXIMUM RECORDED LOAD (kN)	RECORDED LOAD (May 23, 2024) ⁽¹⁾ (kN)	PREVIOUS RECORDED LOAD (JUNE 16, 2023) ⁽¹⁾ (kN)	CHANGE IN LOAD SINCE PREVIOUS READING (kN)
34U	VC1805	192/162	178.28 on April 4, 2015	162.79	163.13	-0.34
34L	VC1806	192/162	164.65 on November 13, 2014	133.73	134.96	-1.23
60U	VC1801	192/162	229.43 on January 6, 2022	215.67	212.87	2.80
60L	VC1802	192/162	225.51 on January 16, 2022	215.85	213.30	2.55
82U	VC1803	192/162	191.52 on January 15, 2024	181.25	179.07	2.18
82L	VC1804	192/162	188.94 on January 16, 2022	183.11	181.10	2.01

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.



STATEMENT OF LIMITATIONS AND CONDITIONS

1. STANDARD OF CARE

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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.

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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.
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- 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.

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THURBER ENGINEERING LTD.

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

SPRING 2024

**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 2024**

Location: Sunshine Slide - Judah Hill (HWY 744:04 C1 58.154) File Number: 32121 Probe: RST Set 8R Cable: RST Set 8R	Readout: Extension: 2.75 Temp: 17 Read by: NKR
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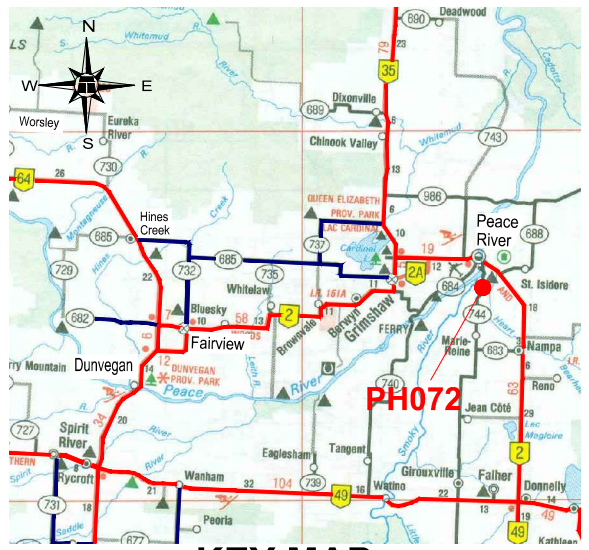
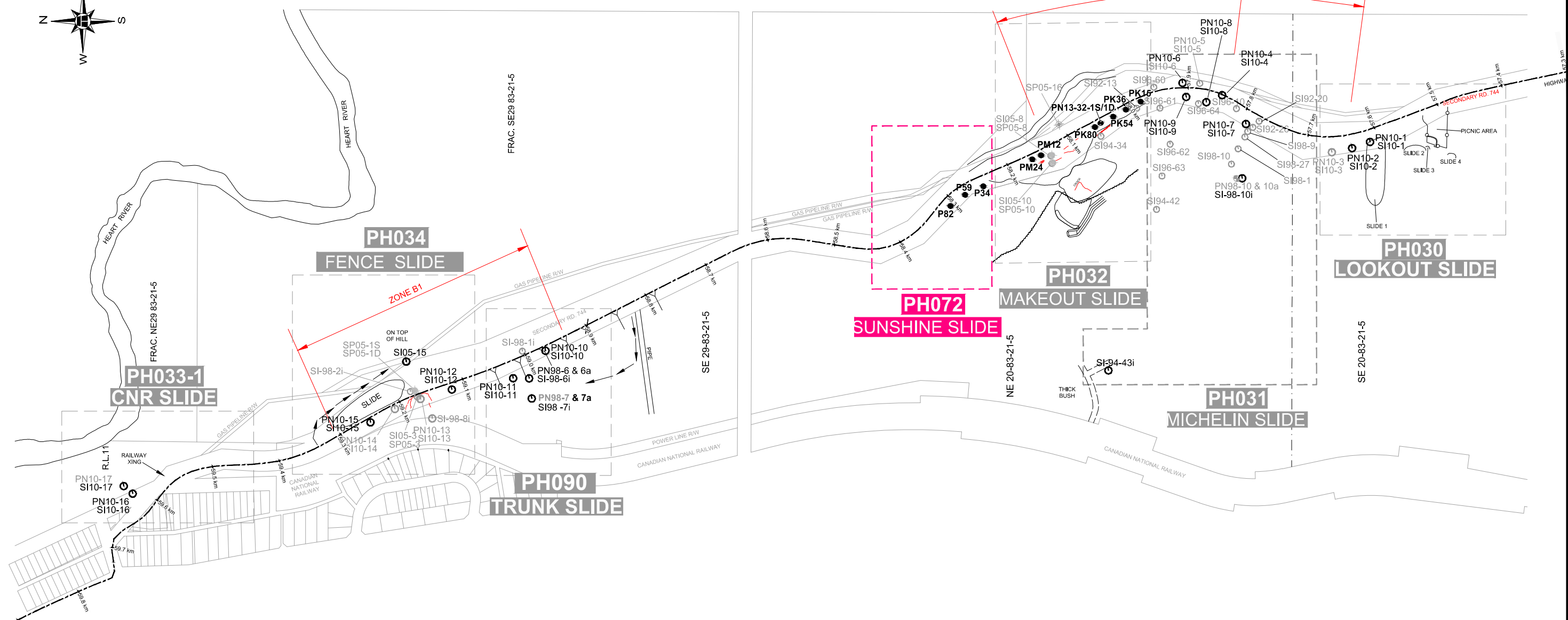
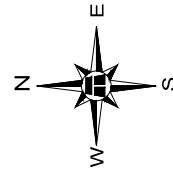
SLOPE INCLINOMETER (SI) READINGS

SI#	GPS Location (UTM 11)		Date	Stickup (m)	Depth from top of casing (ft)	Magn. North A+ Groove	Current Bottom Depth Readings				Probe/ Reel #	Size (")	Remarks
	Northing (m)	Easting (m)					A+	A-	B+	B-			
Pile 34	6230075	483111	23-May-24	0.88	66 to 2	215	-520	526	567	-573	8R/8R	2.75	
Pile 59	6230103	483098	23-May-24	0.91	66 to 2	210	15	-3	561	556	8R/8R	2.75	
Pile 82	6230124	483082	23-May-24	0.93	66 to 2	170	230	-218	133	-139	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	23-May-24	Downloaded

INSPECTOR REPORT



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



PEACE REGION (PEACE RIVER DISTRICT)

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

DWG No. 32121-PH072-1

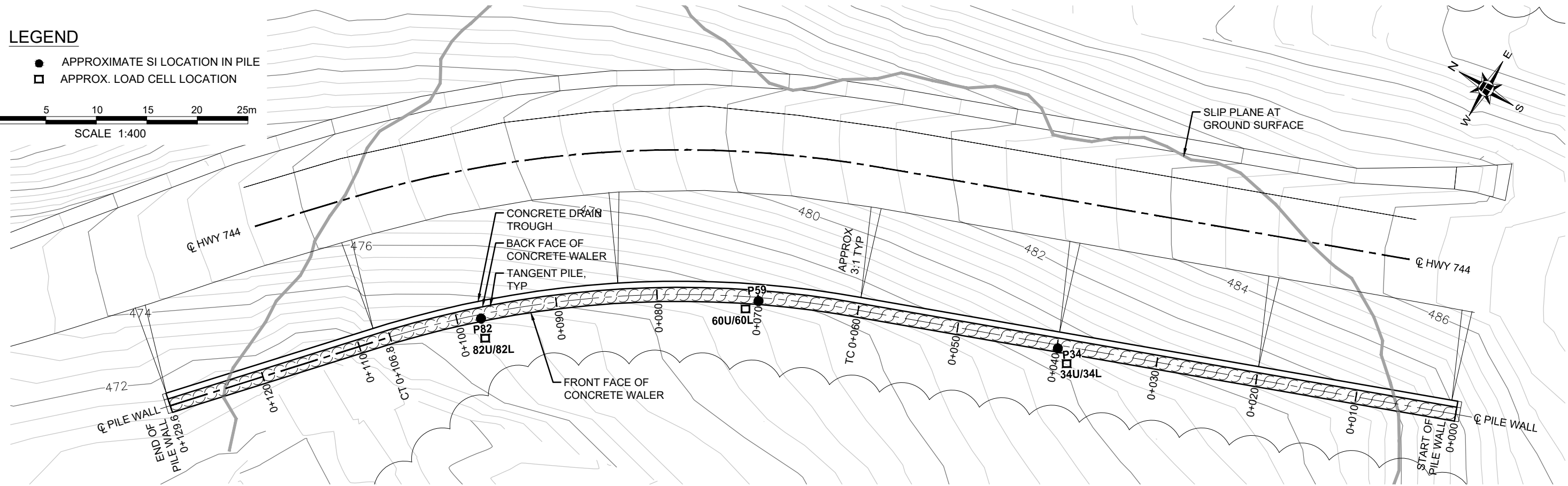
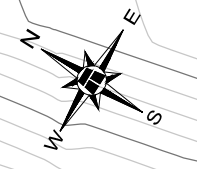
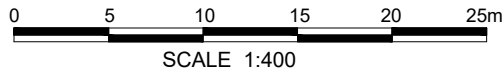
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DESIGNED BY	BWN
APPROVED BY	DWP
SCALE	APPROX. 1:6000
DATE	SEPTEMBER 2021
FILE No.	32121



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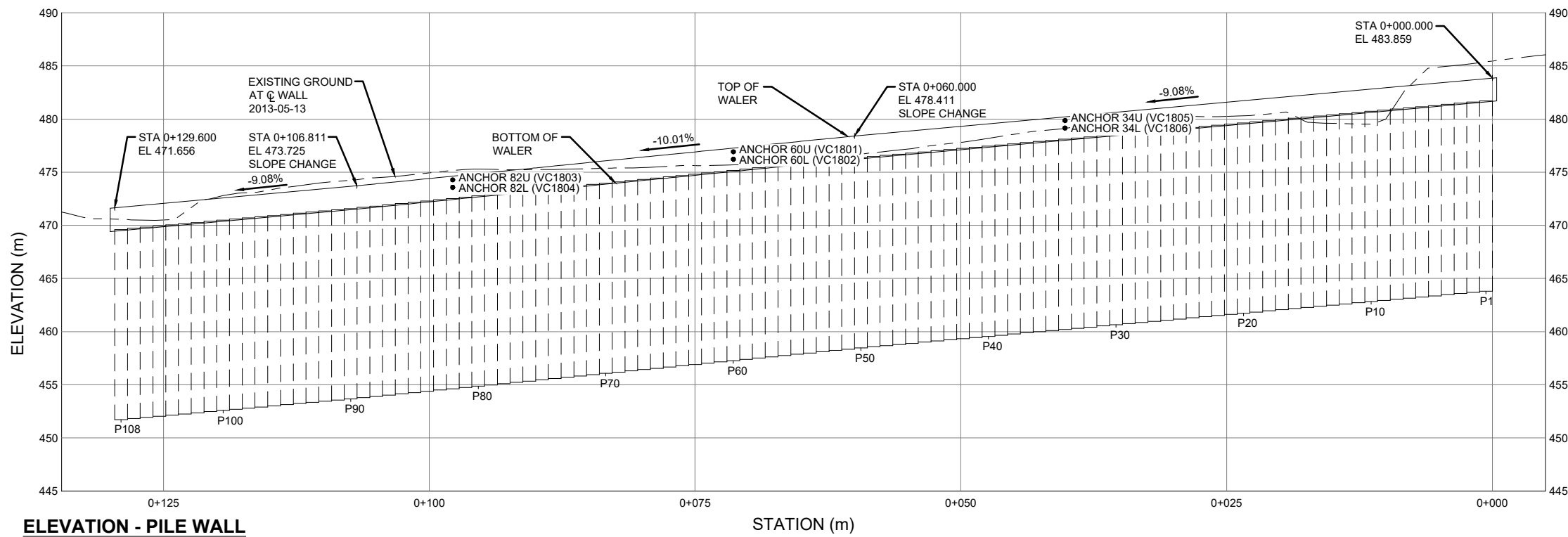
LEGEND

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



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

PEACE REGION (PEACE RIVER DISTRICT)

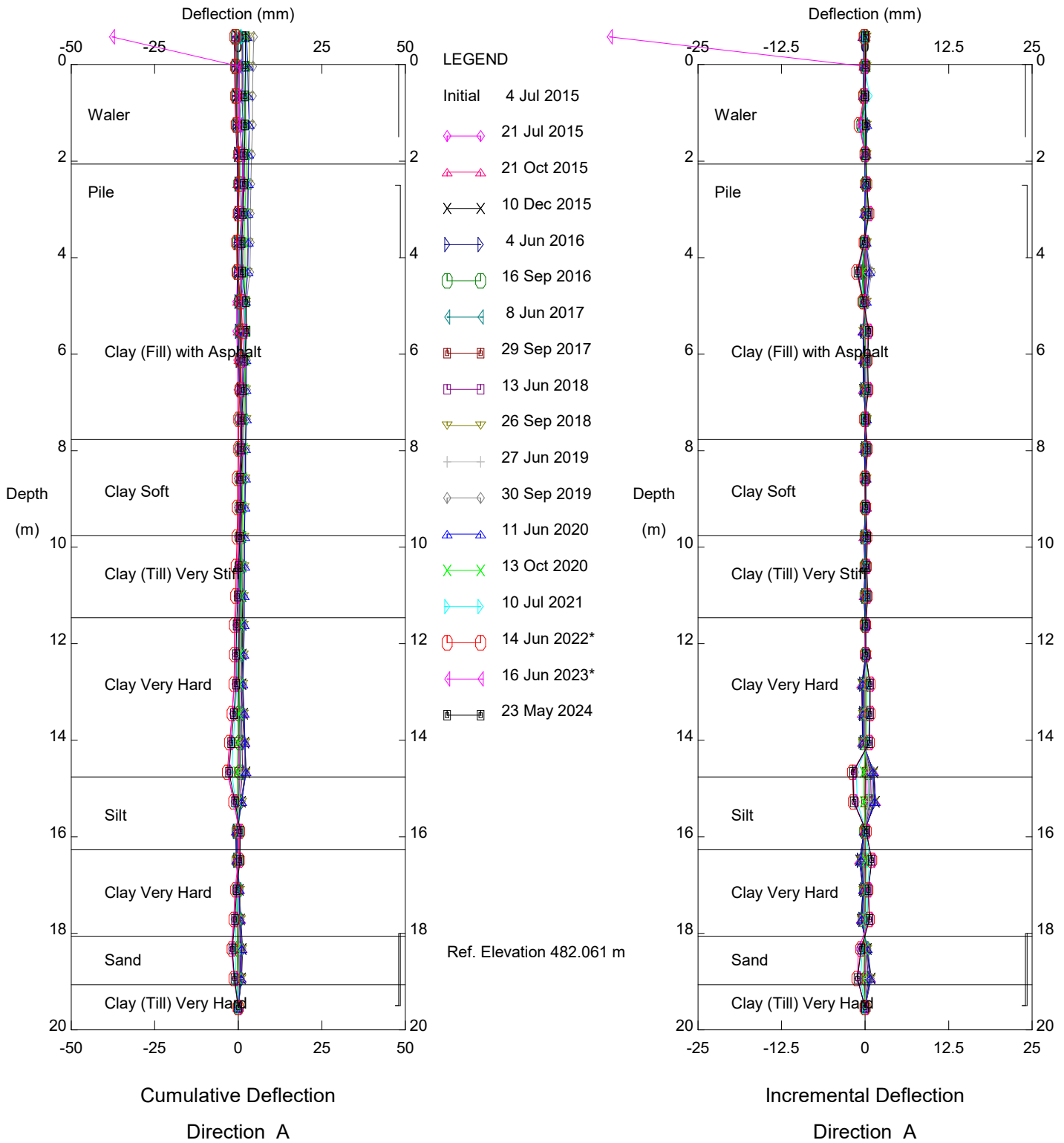
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INSTRUMENT LOCATIONS**

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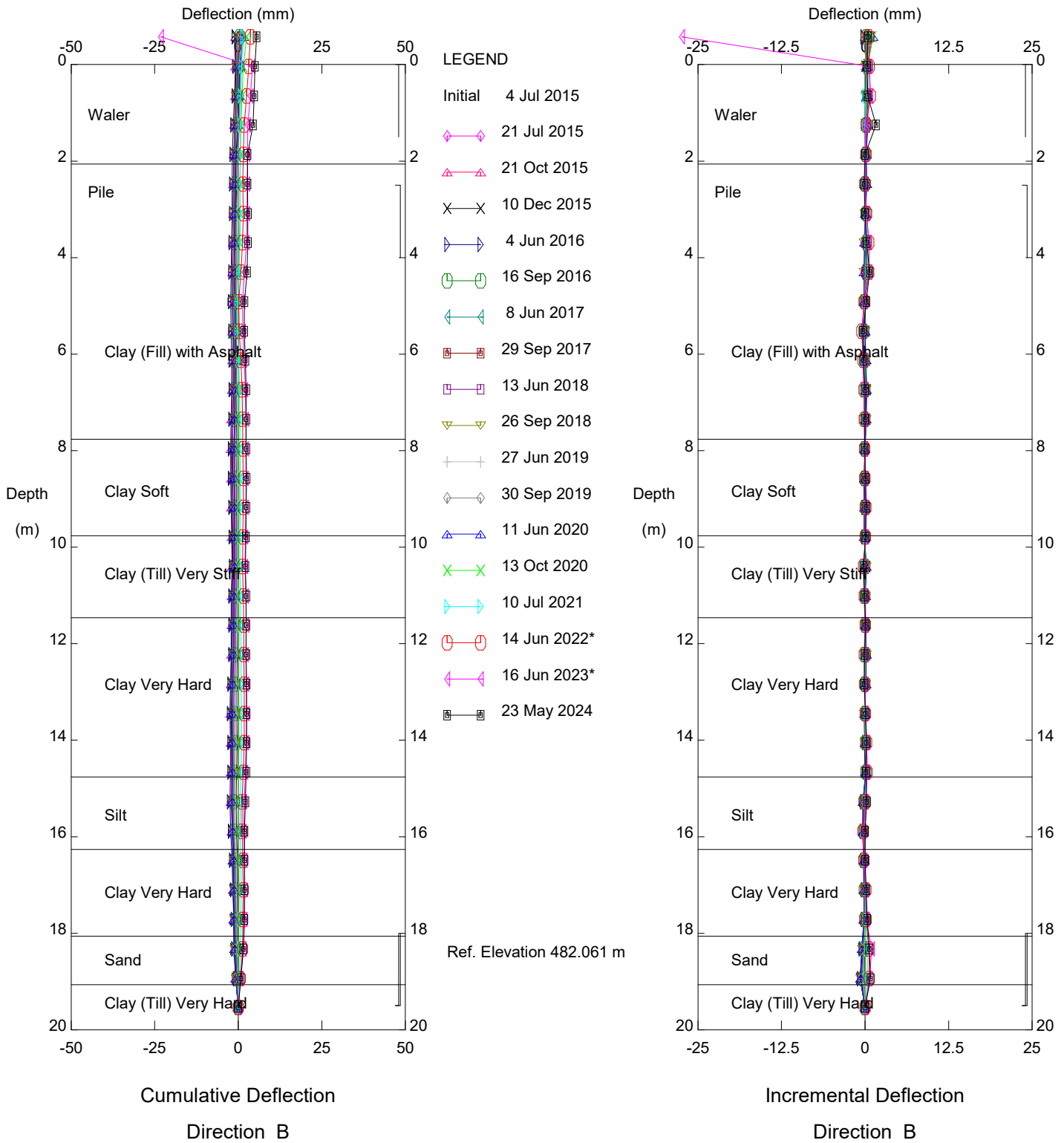


PH072 Sunshine (Post Construction), Inclinometer Pile 34

Alberta Transportation

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

Thurber Engineering Ltd.

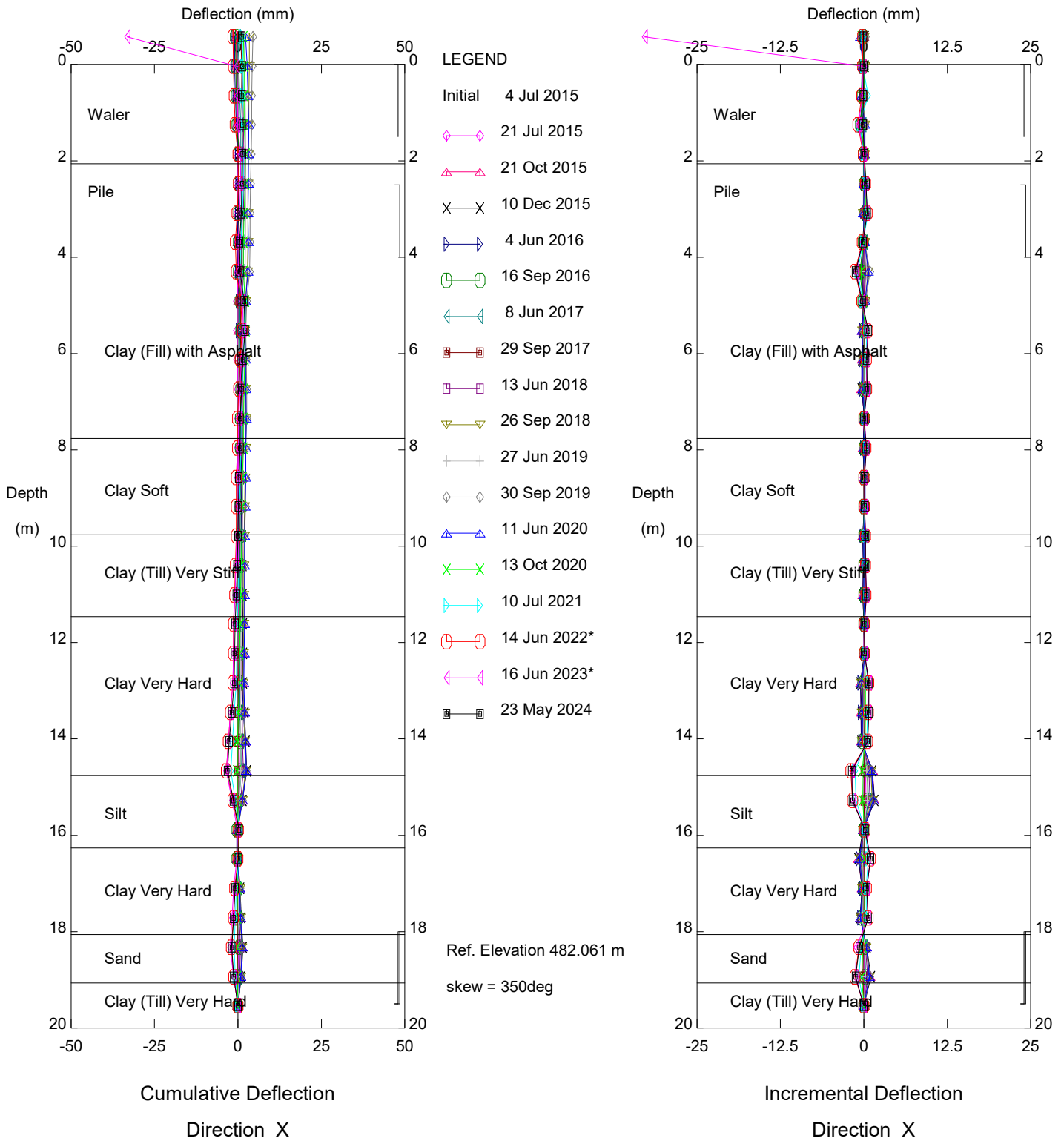


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Alberta Transportation

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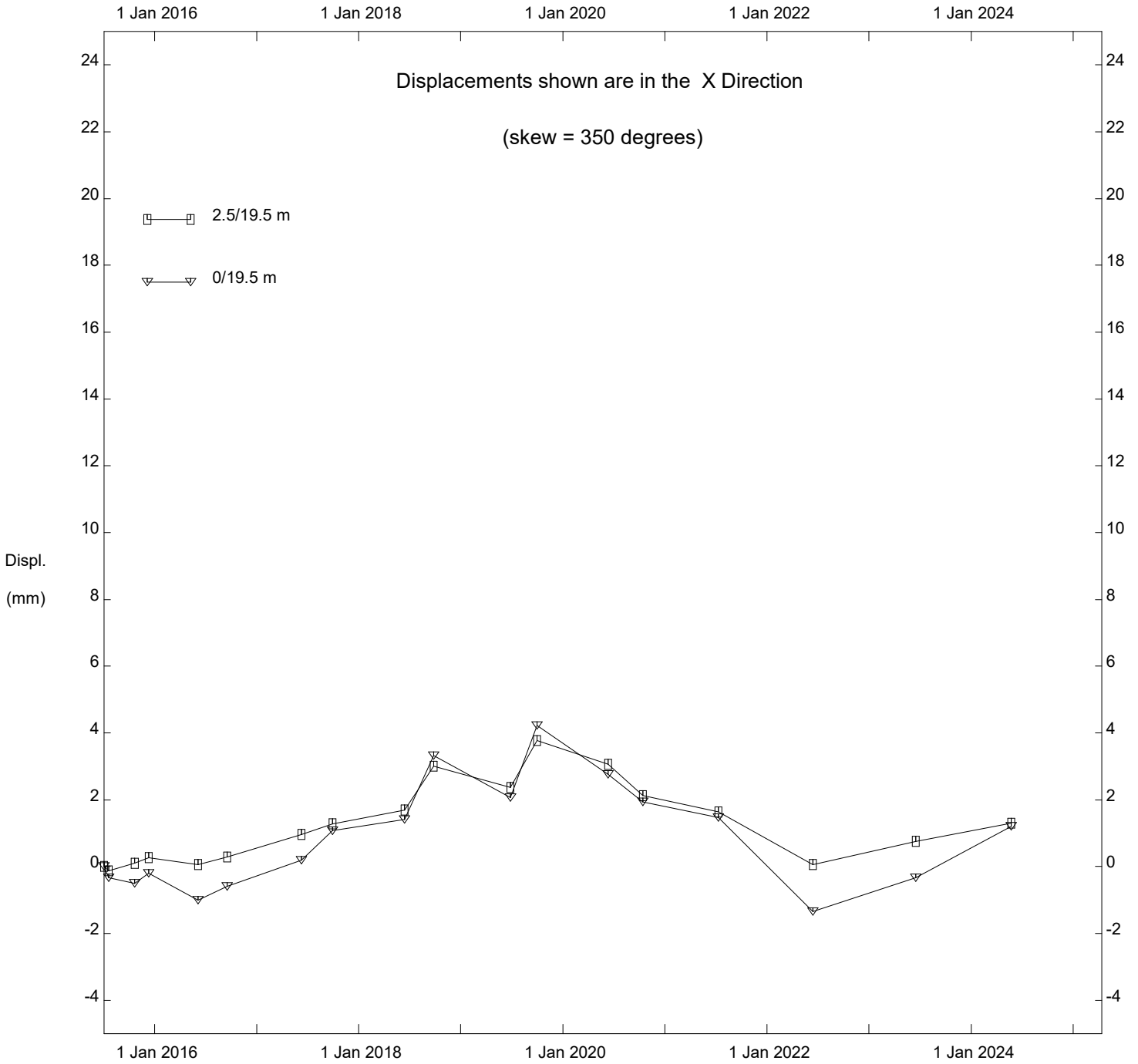


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Alberta Transportation

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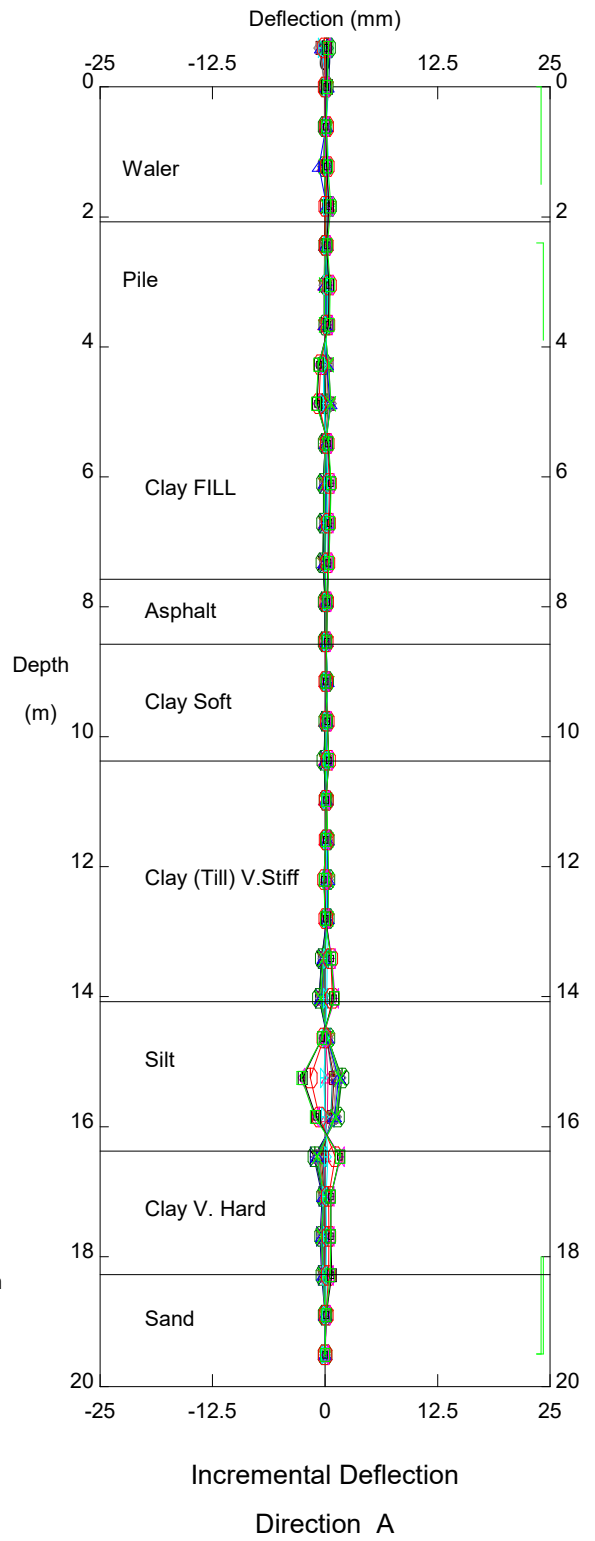
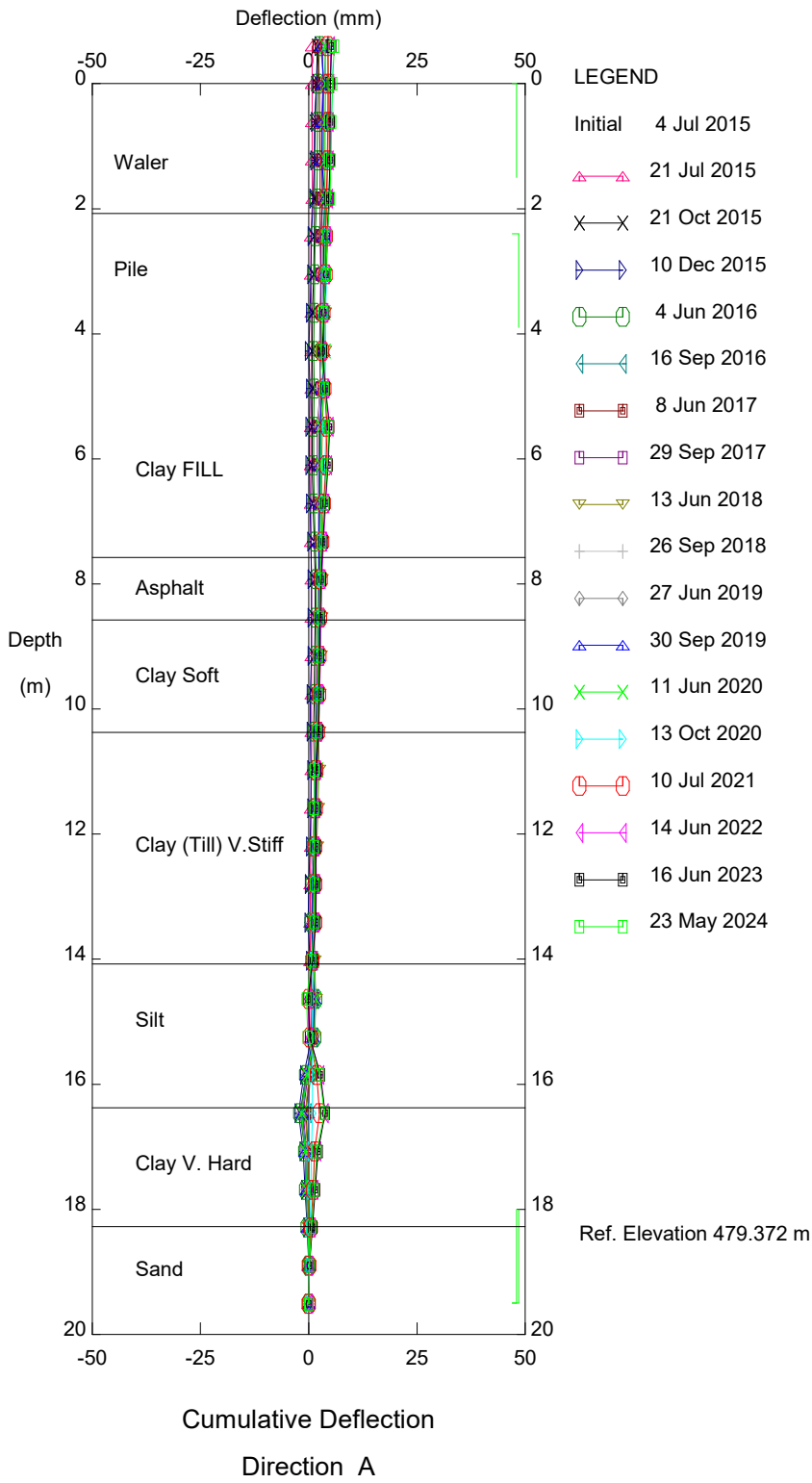
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PH072 Sunshine (Post Construction), Inclinometer Pile 34

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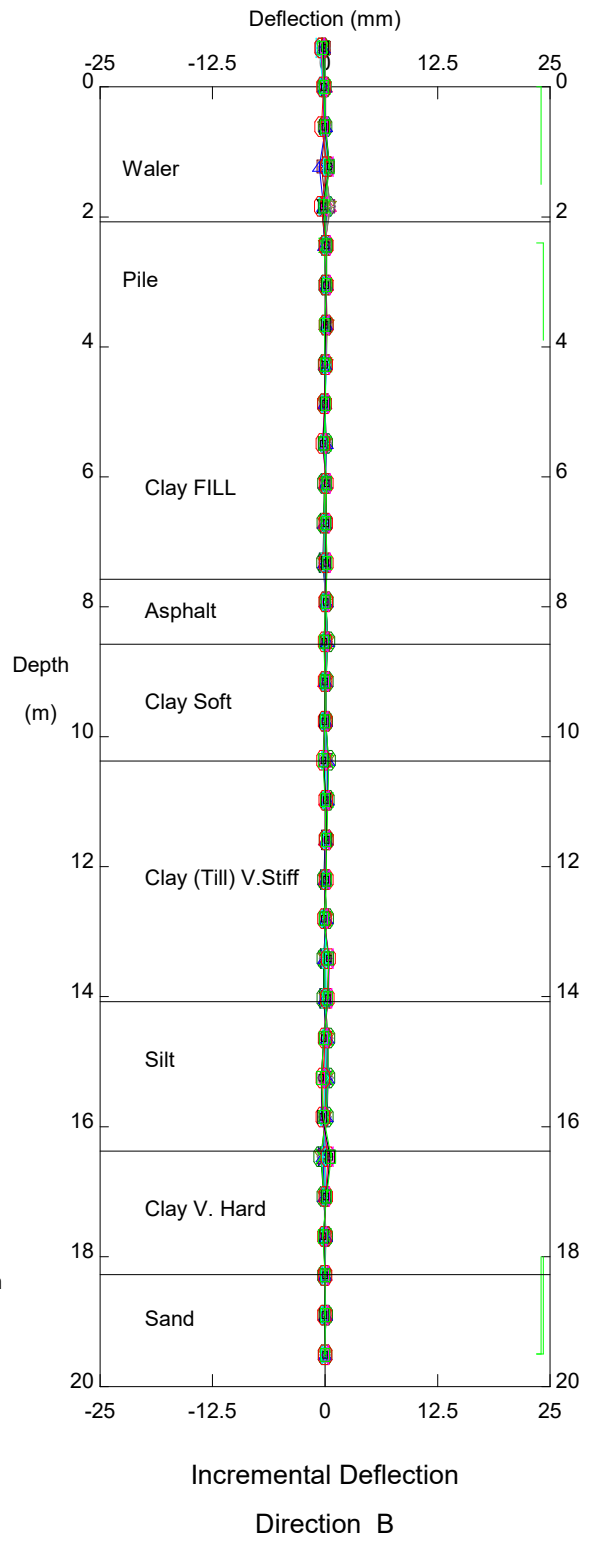
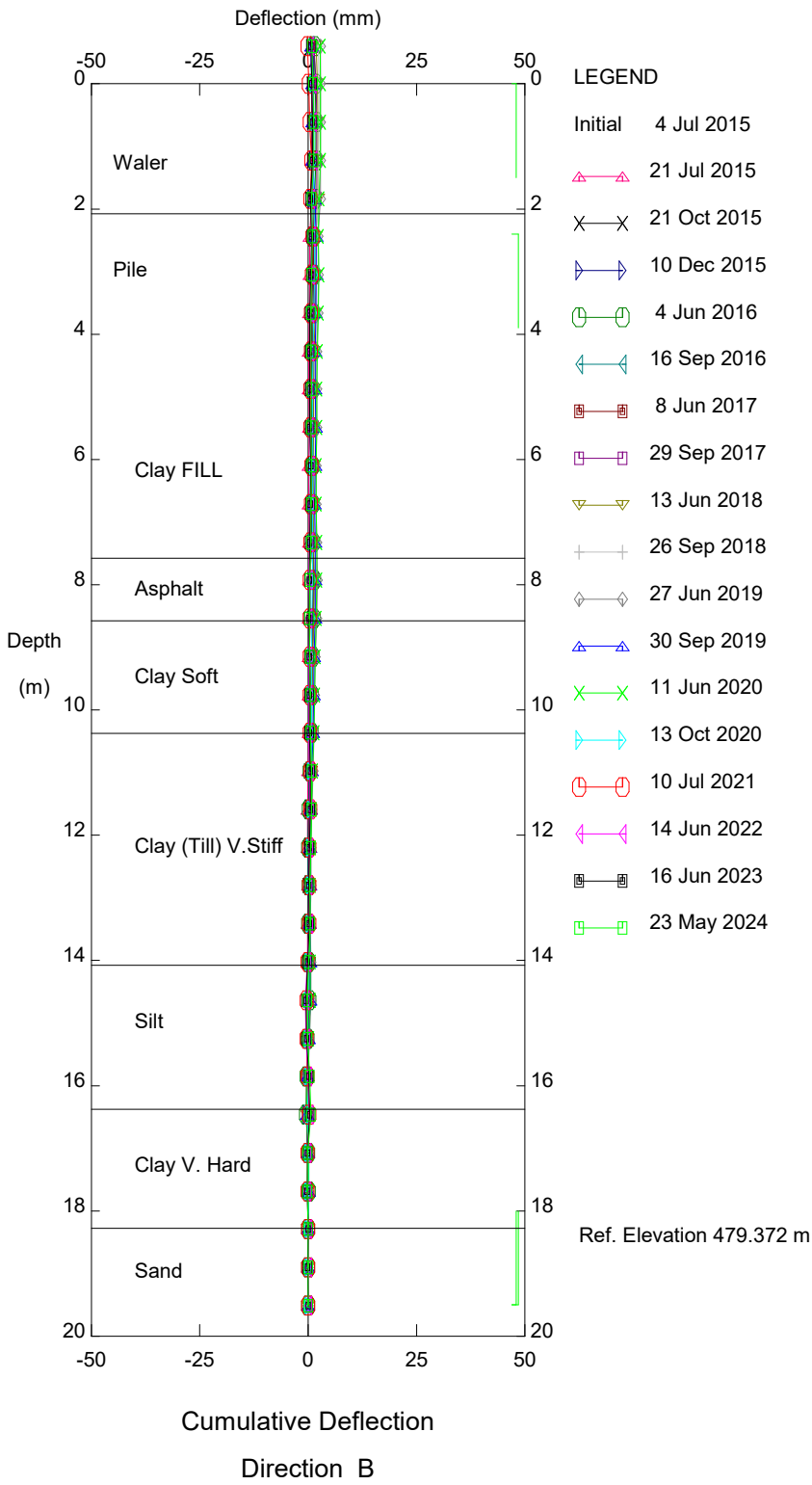
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PH072 Sunshine (Post Construction), Inclinator Pile 59

Alberta Transportation

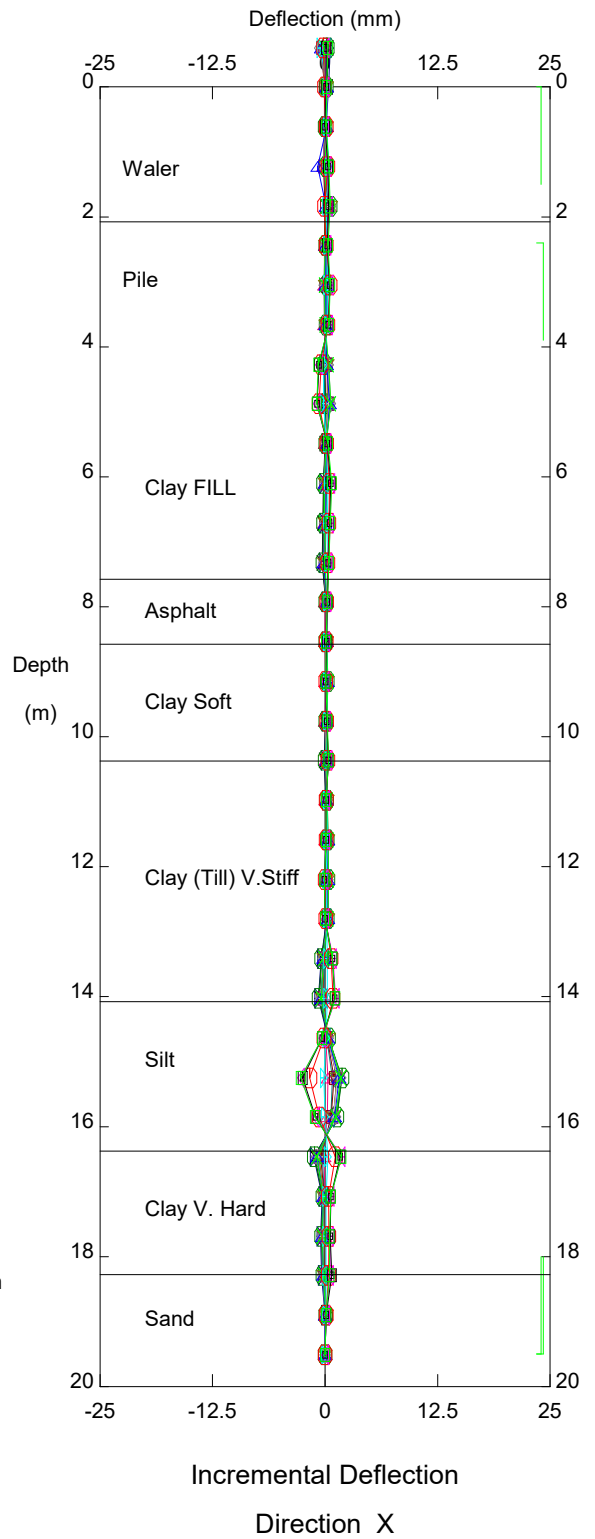
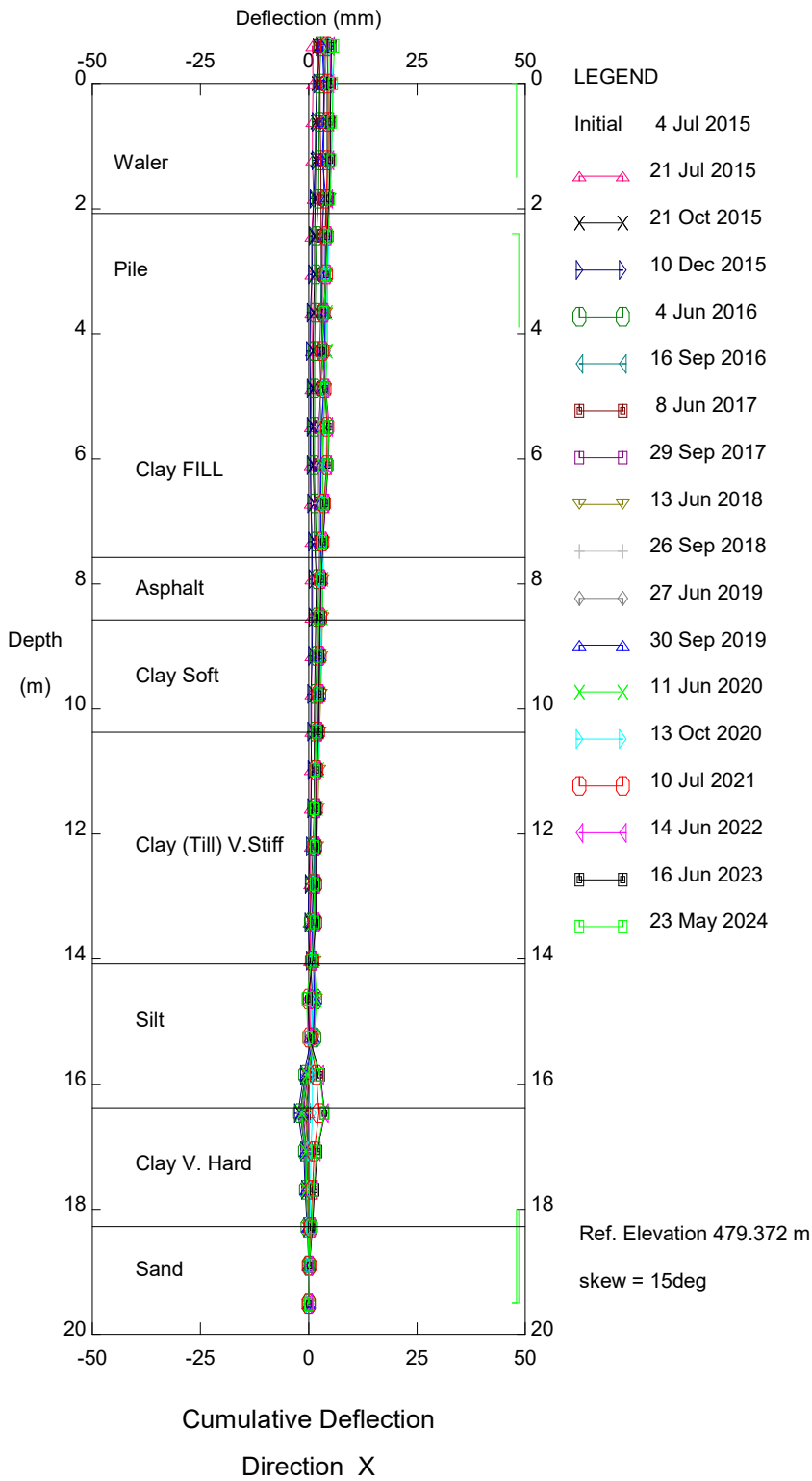
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PH072 Sunshine (Post Construction), Inclinometer Pile 59

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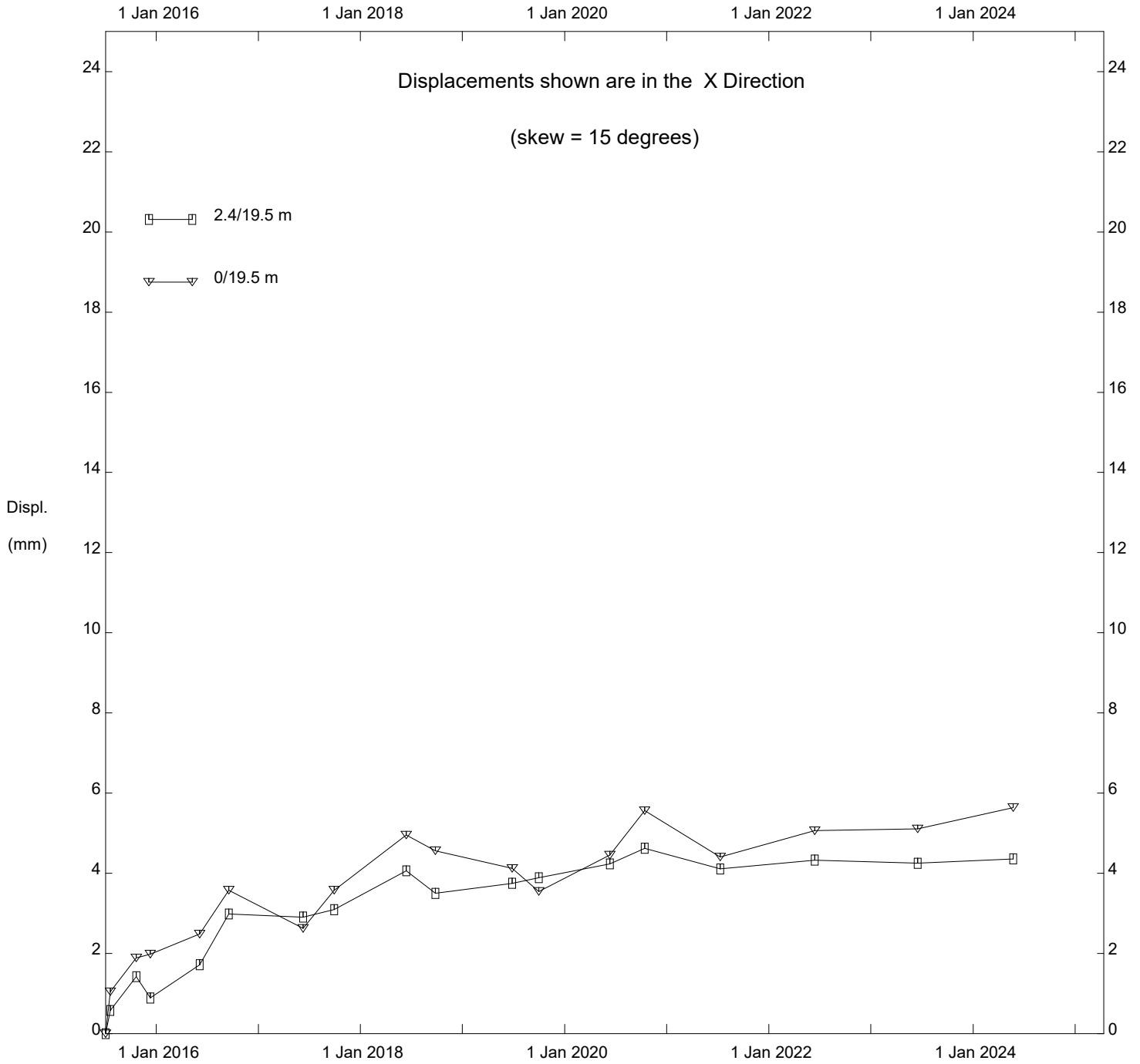
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Alberta Transportation

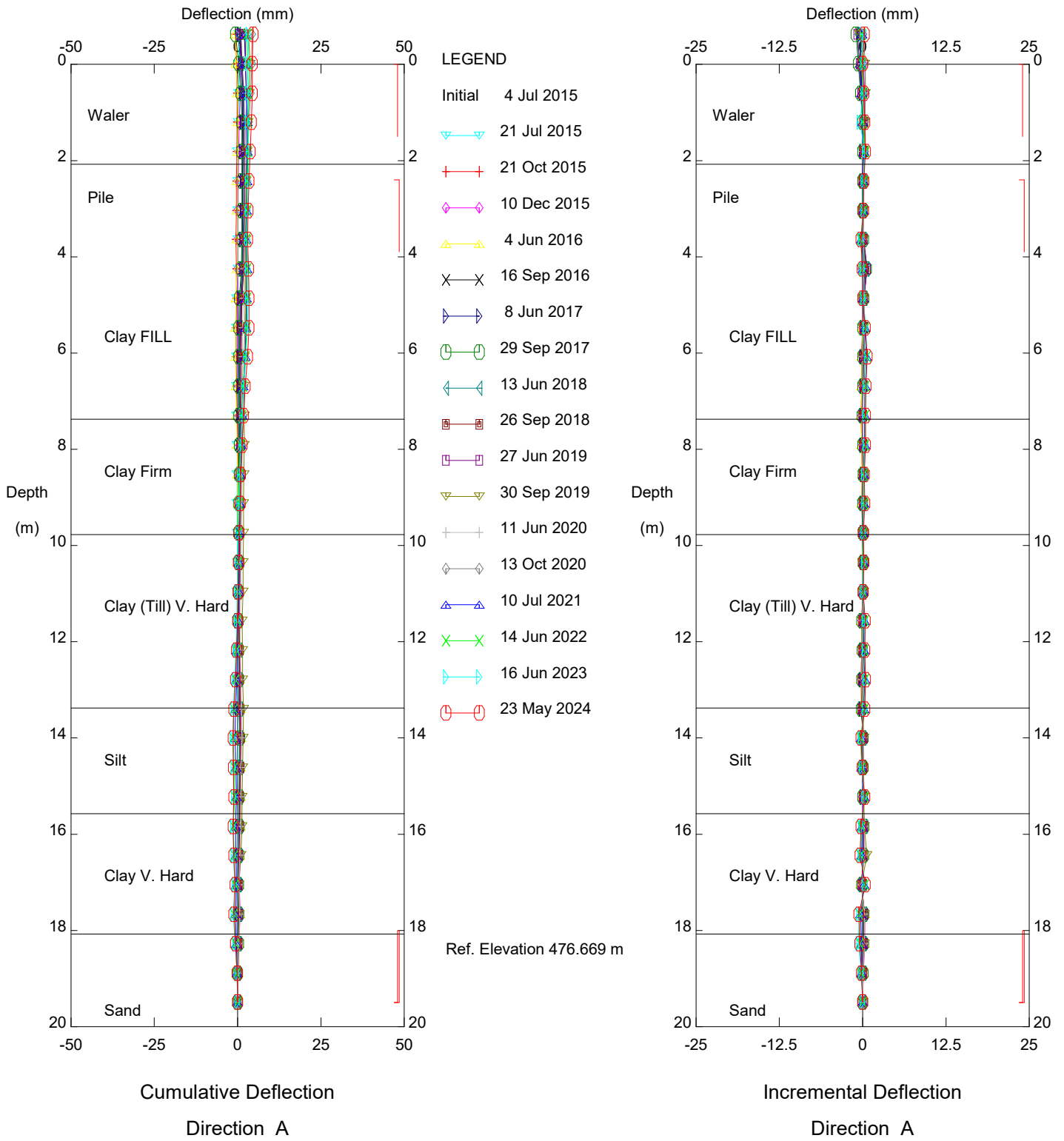
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PH072 Sunshine (Post Construction), Inclinator Pile 59

Alberta Transportation

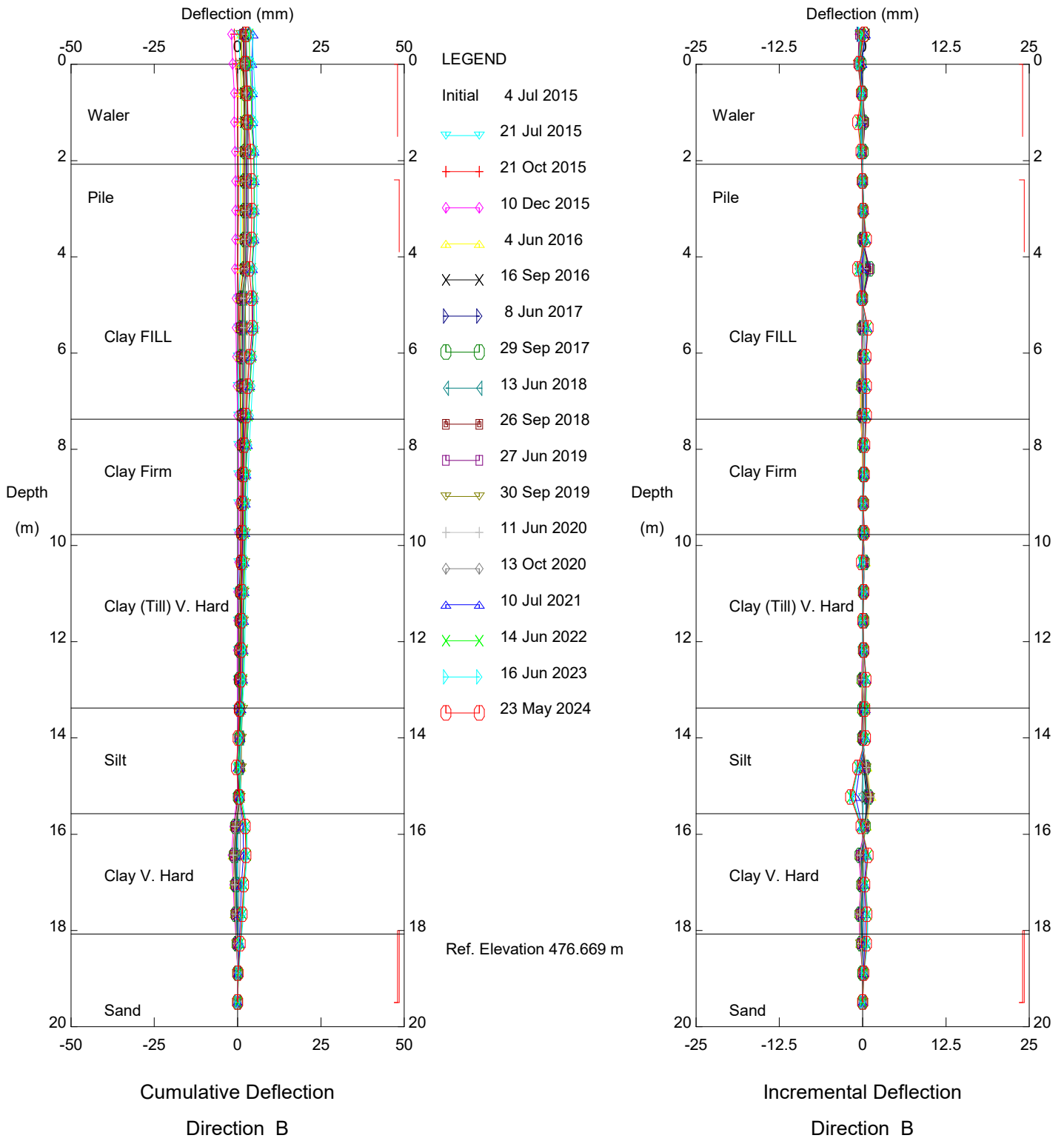
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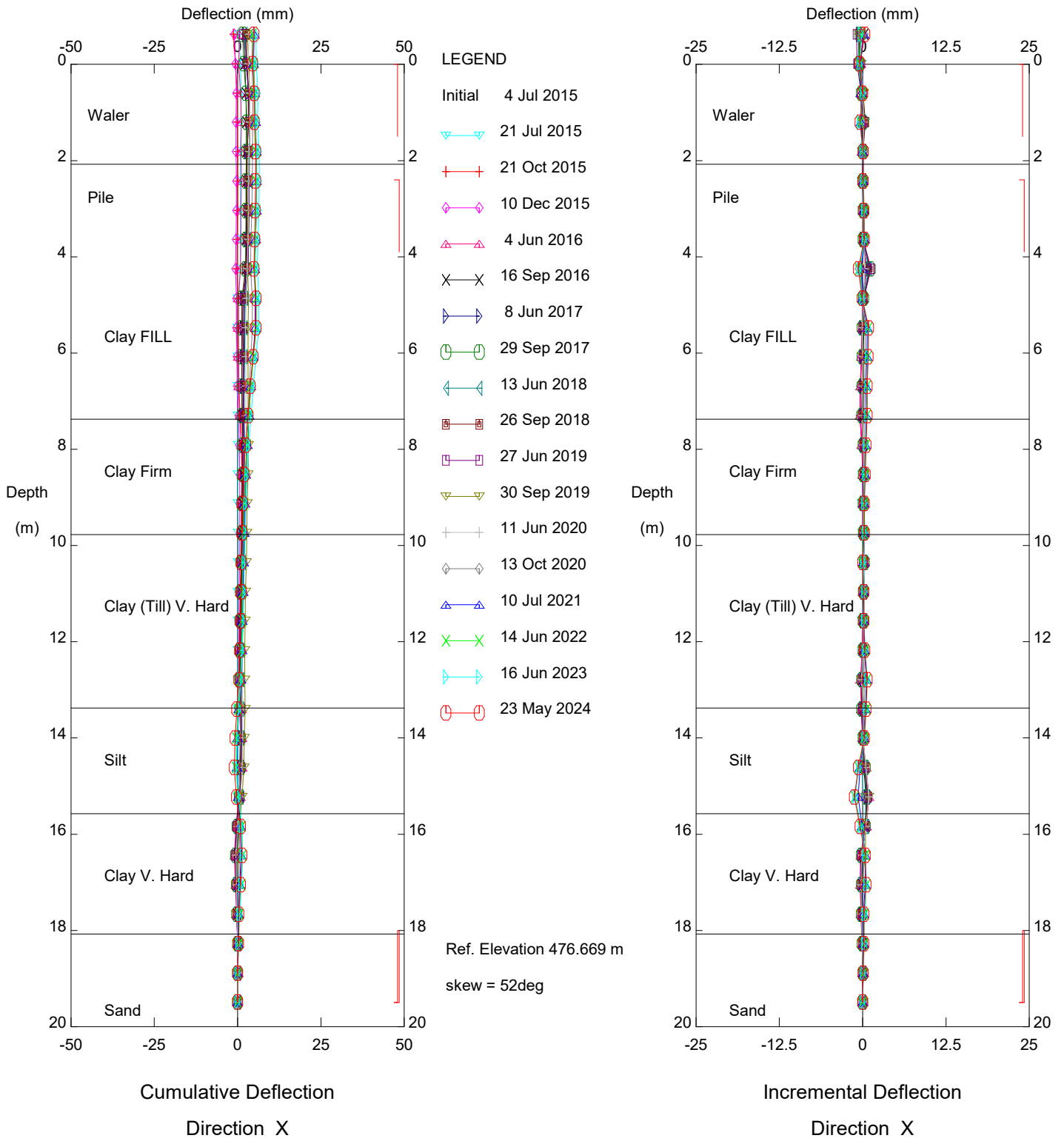
Alberta Transportation

Thurber Engineering Ltd.



PH072 Sunshine (Post Construction), Inclinometer Pile 82

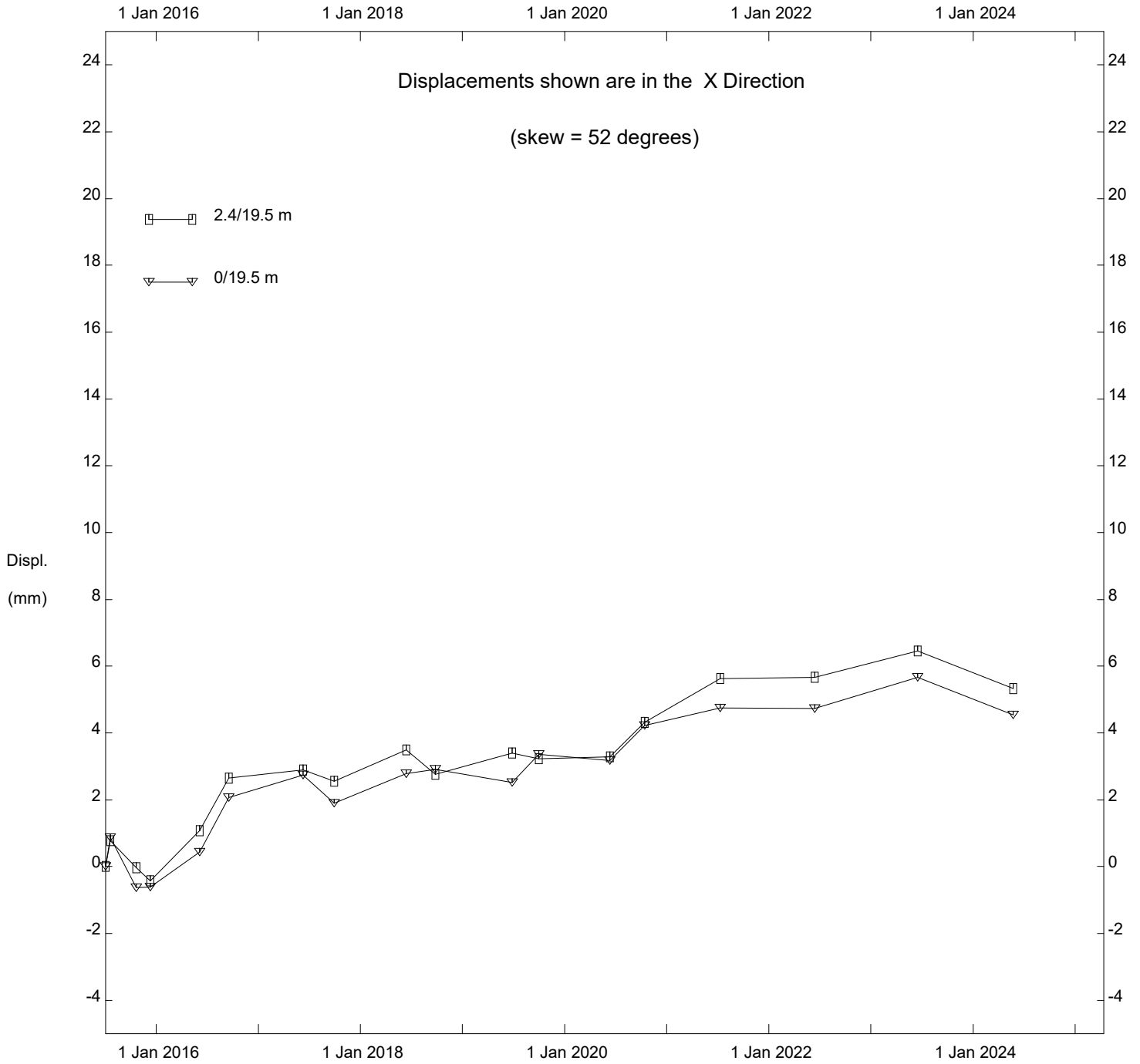
Alberta Transportation



PH072 Sunshine (Post Construction), Inclinometer Pile 82

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PH072 Sunshine (Post Construction), Inclinator Pile 82

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FIGURE PH072-1 SUNSHINE PILE WALL - LOAD CELLS

