ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS GRMP
PEACE REGION – (PEACE RIVER DISTRICT)
INSTRUMENTATION MONITORING - FALL 2024

THURBER ENGINEERING LTD.

Site Number	Location	Name	Hwy	km
PH032	HWY 744:04 C1 58.0	Makeout Slide - Judah Hill	744:04	Km 58.0
Legal Description: 9-20-83-21 W5		**UTM Co-ordinates**		
		11U E 483237	N 6229841	

Current Monitoring:	21-Sep-2024	**Previous Monitoring**	23-May-2024
Instruments Read By:	Mr. Niraj Regmi, G.I.T and Mr. Nixson Mationg, of Thurber		

Instruments Read During This Site Visit			
Slope Inclinometers (SIs): PK15, PK36, PK54 and PK80 (at KM 58 pile wall) PM12 and PM24 (at Makeout pile wall)	**Pneumatic Piezometers (PN):** PN13-32-1S and PN13 32 1D	**Vibrating Wire Piezometers (VW):**	**Standpipe Piezometers (SP):**
Load Cell (LC): VC1850, VC1853, VC1855, VC1856, VC1857, VC1858, VC1859, VC1860, VC1861 and VC1862 (on selected anchors at KM 58 pile wall) VC1848, VC1849, VC1851, VC1852 and VC1854 (on selected anchors at Makeout pile wall)	**Strain Gauges: N/A**	**SAAs:**	**Others:**

Readout Equipment Used			
Slope Inclinometers: RST Digital Inclinometer probe with 2 ft wheelbase and RST Pocket PC readout	**Pneumatic Piezometers:** RST C108 pneumatic piezometer readout	**Vibrating Wire Piezometers:**	**Standpipe Piezometers:**
Load Cell: RST DT2040 datalogger (Load cell datalogger files were uploaded to a laptop using RST Multichannel DTLink software)	**Strain Gauges:**	**SAAs:**	**Others:**
Note:			

Discussion	
Zones of New Movement:	None
Interpretation of Monitoring Results:	KM 58 Pile Wall Slope Indicators PK15 showed a rate of movement of 0.3 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 2024 readings. Since the completion of construction, PK15 has shown a total cumulative deflection of 3.1 mm over the length of the pile in the downslope direction and a total cumulative movement of 3.6 mm in the downslope direction over the combined length of the pile and waler. PK36 showed a rate of movement of 0.9 mm/yr over the length of the pile and a rate of movement of 3.0 mm/yr over the combined length of the pile and waler. Since the completion of construction, PK36 has shown total cumulative deflections of 5.6 mm in the downslope direction over the length of the pile

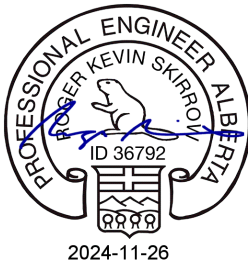
	and 6.1 mm in the downslope direction over the combined length of the pile and waler. PK54 showed a rate of movement of 1.7 mm/yr over the length of the pile and a rate of movement of 3.9 mm/yr over the combined length of the pile and waler. Since the completion of construction, PK54 has shown total cumulative movements of 13.5 mm in the downslope direction over the length of the pile and 12.2 mm in the downslope direction over the combined length of the pile and waler. PK80 showed a rate of movement of 3.1 mm/yr over the length of the pile and a rate of movement of 2.7 mm/yr over the combined length of the pile and waler. Since the completion of construction, PK80 has shown total cumulative movements of 10.4 mm of in the downslope direction over the length of the pile and 8.8 mm in the downslope direction over the combined length of the pile and waler. The SIs at the KM 58 wall location show a current overall trend of slow downslope movement with average movement rates less than 2 mm/yr since completion of construction in 2015. Makeout Slide Pile Wall Slope Indicators PM12 showed no movement over the length of the pile and no discernible movement over the combined length of the pile and waler. Since the completion of construction, PM12 has shown total cumulative deflections of 2.2 mm in the downslope direction over the length of the pile and 0.4 mm in the upslope direction over the combined length of the pile and waler. PM24 showed no movement 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. Since the completion of construction, PM24 has shown total cumulative movements of 2.7 mm in the downslope direction over the length of the pile and 1.8 mm in the downslope direction over the combined length of the pile and waler. After being pulled into the slope during the initial lock off of the anchors, the SIs at the Makeout wall location have show an overall trend of slow downslope movement with average movement rates less than 1 mm/yr since the end of construction in 2015. There have been minor seasonal changes in the wall displacement. Piezometers Pneumatic piezometers PN13-32-1S and PN13-32-1D showed increases in groundwater levels of 0.02 m and 0.01 m, respectively, since they were last read in the spring of 2024 readings. Pneumatic piezometer results are plotted in Figures PH032-1 (by elevation) and PH032-2 (by depth below ground surface) in Appendix A. Load Cells The load cells are connected to two dataloggers that are programmed to take two readings per day. Since the spring of 2024 readings, the load cells at the KM 58 wall showed minor changes in measured load ranging from a decrease of 5.94 kN in VC1862 (anchor K15M) to an increase of 4.16 kN in VC1859 (anchor K79U). Load cell VC1857 (K54M) and VC1853 (K54L) registered all time high measured loads between on July 18, 2024 and August 11, 2024, respectively. The anchors at the KM 58 wall show an overall trend of slowly increasing load, mainly with seasonally higher loads during the winter months. Load cells VC1862 (K15M) and VC1858 (K15L) show current loads that are 1.3 percent and 7.7 percent, respectively, above their SLS design loads. At the Makeout wall, the load cells showed minor changes in measured load ranging from a decrease of 5.69 kN in VC1844 (anchor M12U) to an increase of 0.37 kN in VC1848 (anchor M12L). The load cells at the Makeout wall have also shown a trend of slowly increasing loads since the end of construction,

	with seasonably higher loads during the winter months. However, none of the measured loads are over the SLS design loads. The load cell average loads and temperatures are plotted for the KM 58 and Makeout walls on Figures PH032-3 and PH032-4, respectively, in Appendix A. The design and lock-off loads for each anchor are shown in the legends of the figures. Overall, the SI and load cell data indicates that the pile walls have been effective at mitigating the landslide movements at this site and the measured deflections and anchor loads are within expected ranges. However, since the instruments at the KM 58 pile wall are showing a trend of downslope movement, combined with gradually increasing anchor loads, the instruments here should be monitored closely to ensure that the downslope movement can be further assessed well in advance of any required intervention.
Future Work:	The instruments should be read again in the spring of 2025.
Instrumentation Repairs:	None
Additional Comments:	None
Attachments:	• Table PH032-1: Fall 2024 – HWY 744:04 Judah Hill (Makeout Slide) Slope Inclinometer Instrumentation Reading Summary • Table PH032-2: Fall 2024 – HWY 744:04 Judah Hill (Makeout Slide) Pneumatic Piezometer Instrumentation Reading Summary • Table PH032-3: Fall 2024 – HWY 744:04 Judah Hill (Makeout Slide) Load Cell Instrumentation Reading Summary • Statement of Limitations and Conditions • Appendix A o Field Inspector's report o Site Plan Showing Approximate Instrument Locations (Drawings No. 32121-PH032-1, 32121-PH032-2, and 32121-PH032-3) o Pile Wall General Layout drawings o SI Reading Plots o Figure PH032-1 (Piezometric Elevations) o Figure PH032-2 (Piezometric Depths) o Figure PH032-3 (Load Cell Data for Km 58 Pile Wall) o Figure PH032-4 (Load Cell Data for Makeout Pile Wall)

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

2024-11-26



2024-11-26

PERMIT TO PRACTICE
THURBER ENGINEERING LTD.
RM SIGNATURE: _____
RM APEGA ID #: 91085
DATE: November 26, 2024
PERMIT NUMBER: P005186
The Association of Professional Engineers and Geoscientists of Alberta (APEGA)

Lucas Green, P.Eng.
Geotechnical Engineer

THURBER ENGINEERING LTD.

Table PH032-1: Fall 2024 – HWY 744:04 Judah Hill (Makeout Slide) Slope Inclinometer Instrumentation Reading Summary

Date Monitored: September 21, 2024

INSTRUMENT #	DATE INITIALIZED (AFTER CONSTRUCTION)	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)
KM 58 WALL								
PK15	July 2, 2015	3.1 over 2.1 m to 13.7 m depth in 274° direction	17.3 in July 2015	Operational	May 23, 2024	0.1	0.3	0.3
		3.6 over 0.3 m to 13.7 m depth in 274° direction	29.1 in July 2015			0.2	0.6	0.4
PK36	July 2, 2015	5.6 over 2.6 m to 16.6 m depth in 318° direction	3.4 in October 2020	Operational	May 23, 2024	0.3	0.9	0.4
		6.1 over 0.1 to 16.6 m depth in 318° direction	8.0 in September 2016			1.0	3.0	1.1
PK54	July 2, 2015	13.5 over 2.8 m to 20.4 m depth in 313° direction	12.0 in October 2020	Operational	May 23, 2024	0.6	1.7	-0.1
		12.2 over 0.3 m to 20.4 m depth in 313° direction	13.3 in October 2020			1.3	3.9	2.7

Drawings 32121-PH032-1~3 in Appendix A provide a sketch of the approximate location of the monitoring instrumentation for this site.

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Table PH032-1 – Continued… Fall 2024 – HWY 744:04 Judah Hill (Makeout Slide) Slope Inclinometer Instrumentation Reading Summary

Date Monitored: September 21, 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)
PK80	July 2, 2015	10.4 over 2.4 m to 20.0 m depth in 262° direction	-20.2 in July 2015	Operational	May 23, 2024	1.0	3.1	2.4
		8.8 over 0.5 m to 20.0 m depth in 262° direction	-26.4 in July 2015			0.9	2.7	3.4
MAKEOUT WALL								
PM12	July 3, 2015	2.2 over 2.2 m to 19.2 m depth in 316° direction	-41.3 in July 2015	Operational	May 23, 2024	No Discernible Movement	N/A	-4.3
		0.4 over 0.3 m to 19.2 m depth in 316° direction	-52.8 in July 2015			No Discernible Movement	N/A	-9.3
PM24	July 3, 2015	2.7 over 2.1 m to 19.2 m depth in 298° direction	-27.4 in July 2015	Operational	May 23, 2024	No Discernible Movement	N/A	-1.9
		1.8 over 0.3 m to 19.2 m depth in 298° direction	-33.4 in July 2015			0.4	1.2	0.6

Drawings 32121-PH032-1~3 in Appendix A provide a sketch of the approximate location of the monitoring instrumentation for this site.

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Table PH032-2: Fall 2024 – HWY 744:04 Judah Hill (Makeout Slide) Pneumatic Piezometer Instrumentation Reading Summary

Date Monitored: September 21, 2024

INSTRUMENT #	DATE INITIALIZED	TIP DEPTH (m)	GROUND ELEV. (m)	CURRENT STATUS	HIGHEST MEASURED WATER LEVEL (m)	MEASURED PORE PRESSURE (kPa)	CURRENT GROUNDWATER ELEVATION (m)	PREVIOUS GROUNDWATER ELEVATION (m)	CHANGE IN WATER LEVEL SINCE PREVIOUS READING (m)
PN13-32-1S	November 30, 2013	9.14	499.84	Operational	493.56 in September 2022	23.6	493.12	493.10	0.02
PN13-32-1D	November 30, 2013	18.29	499.84	Operational	482.46 in December 2013	4.6	482.02	482.01	0.01

Drawings 32121-PH032-1~3 in Appendix A provide a sketch of the approximate location of the monitoring instrumentation for this site.

Table PH032-3: Fall 2024 – HWY 744:04 Judah Hill (Makeout Slide) Load Cell Instrumentation Reading Summary

Date Monitored: September 21, 2024

ANCHOR NUMBER	LOAD CELL SERIAL #	DESIGN LOAD / LOCK-OFF LOAD (kN)	MAXIMUM RECORDED LOAD (kN)	RECORDED LOAD (1) (SEP. 21, 2024) (kN)	PREVIOUS RECORDED LOAD (1) (MAY 23, 2024) (kN)	CHANGE IN LOAD SINCE PREVIOUS READING (kN)
KM 58 WALL						
K15M	VC1862	178/177	194.23 on January 30, 2024	180.37	186.31	-5.94
K15L	VC1858	239/231	264.90 on January 28, 2024	257.34	257.87	-0.53
K36M	VC1856	233/199	214.91 on January 30, 2024	197.45	200.06	-2.61
K45L	VC1855	292/248	248.50 on April 20, 2015	223.60	222.31	1.29
K54M	VC1857	231/215	199.14 on July 18, 2024	195.78	194.49	1.29
K54L	VC1853	292/248	243.56 on August 11, 2024	240.78	236.67	4.11
K55U	VC1850	274/272	275.28 on April 17, 2015	243.02	245.24	-2.22
K79U	VC1859	274/272	250.27 on April 16, 2015	221.22	217.06	4.16
K79M	VC1860	231/215	217.55 on January 30, 2024	206.39	205.10	1.29
K80L	VC1861	292/248	264.09 on January 28, 2024	259.06	257.42	1.64

Drawings 32121-PH032-1~3 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' data are uploaded twice annually during instrumentation readings. See Figure PH032-3 for combined historical instrument readings.

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Table PH032-3 – Continued…Fall 2024 – HWY 744:04 Judah Hill (Makeout Slide) Load Cells Instrumentation Reading Summary

Date Monitored: September 21, 2024

ANCHOR NUMBER	LOAD CELL SERIAL #	DESIGN LOAD / LOCK-OFF LOAD (kN)	MAXIMUM RECORDED LOAD (kN)	RECORDED LOAD (1) (SEP. 21, 2024) (kN)	PREVIOUS RECORDED LOAD (1) (MAY 23, 2024) (kN)	CHANGE IN LOAD SINCE PREVIOUS READING (kN)
MAKEOUT WALL						
M12U	VC1854	274/272	277.02 on March 18, 2022	248.22	253.91	-5.69
M12M	VC1849	231/215	213.90 on March 25, 2015	198.61	200.74	-2.13
M12L	VC1848	292/248	253.28 on March 22, 2023	244.52	244.15	0.37
M24U	VC1851	274/272	271.81 on March 25, 2015	245.03	248.71	-3.68
M24M	VC1852	231/215	217.10 on March 25, 2015	182.57	185.60	-3.03

Drawings 32121-PH032-1~3 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 data are uploaded twice annually during instrumentation readings. See Figure PH032-4 for combined historical instrument readings.

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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.

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.

THURBER ENGINEERING LTD.

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

FALL 2024

APPENDIX A
DATA PRESENTATION

SITE PH032: HWY 744:04, JUDAH HILL (MAKEOUT SLIDE)

ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS
PEACE REGION (PEACE RIVER DISTRICT)
INSTRUMENTATION MONITORING FIELD SUMMARY (PH032)
FALL 2024

Location:	Makeout Slide - Judah Hill (HWY 744:04 C1 57.924)	**Readout:**	RST PN C108 Unit 4
File Number:	32121	**Casing:**	2.75
Probe:	RST SET 5R	**Temp:**	10
Cable:	RST SET 5R	**Read by:**	NRM/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
	Easting (m)	Northing (m)					A+	A-	B+	B-			
PK15	483237	6229841	21-Sep-24	1.21	48 to 2	245	383	-372	540	-550	5R/5R	2.75	
PK36	483225	6229863	21-Sep-24	0.8	56 to 2	310	-202	213	-38	25	5R/5R	2.75	
PK54	483214	6229882	21-Sep-24	1.2	70 to 2	300	706	-697	-159	143	5R/5R	2.75	
PK80	483199	6229909	21-Sep-24	0.99	68 to 2	225	-410	421	219	-236	5R/5R	2.75	
PM12	483157	6229989	21-Sep-24	1.18	66 to 2	275	-850	856	839	-845	5R/5R	2.75	
PM24	483151	6230002	21-Sep-24	1.22	66 to 2	260	499	-487	513	-513	5R/5R	2.75	

PN#	GPS Location (NAD83)		Date	Reading (kPa)	Identification Number
	Easting (m)	Northing (m)			
PN13-32-1S	483205	6229901	21-Sep-24	23.8	35485
PN13-32-1D	483205	6229901	21-Sep-24	4.5	35497

VIBRATING WIRE LOAD CELL (VC) READINGS

VC #	GPS Location (UTM 11)		Datalogger Serial #	Date	Comment
	Easting (m)	Northing (m)			
VC1850			RST 2034	21-Sep-24	Downloaded
VC1853					Downloaded
VC1855					Downloaded
VC1856					Downloaded
VC1857					Downloaded
VC1858					Downloaded
VC1859					Downloaded
VC1860					Downloaded
VC1861					Downloaded
VC1862					Downloaded
VC1848			RST 2036		Downloaded
VC1849					Downloaded
VC1851					Downloaded
VC1852					Downloaded
VC1854					Downloaded

INSPECTOR REPORT

PN 13-32-1S Reading takes a long time to stabilize

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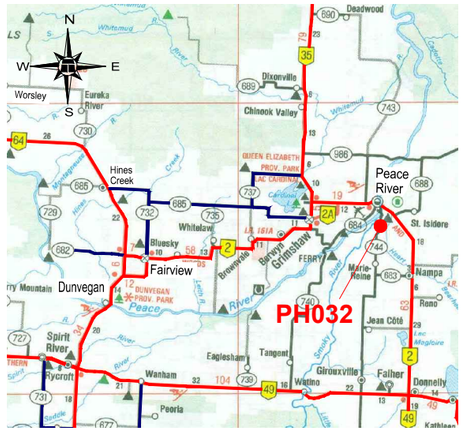
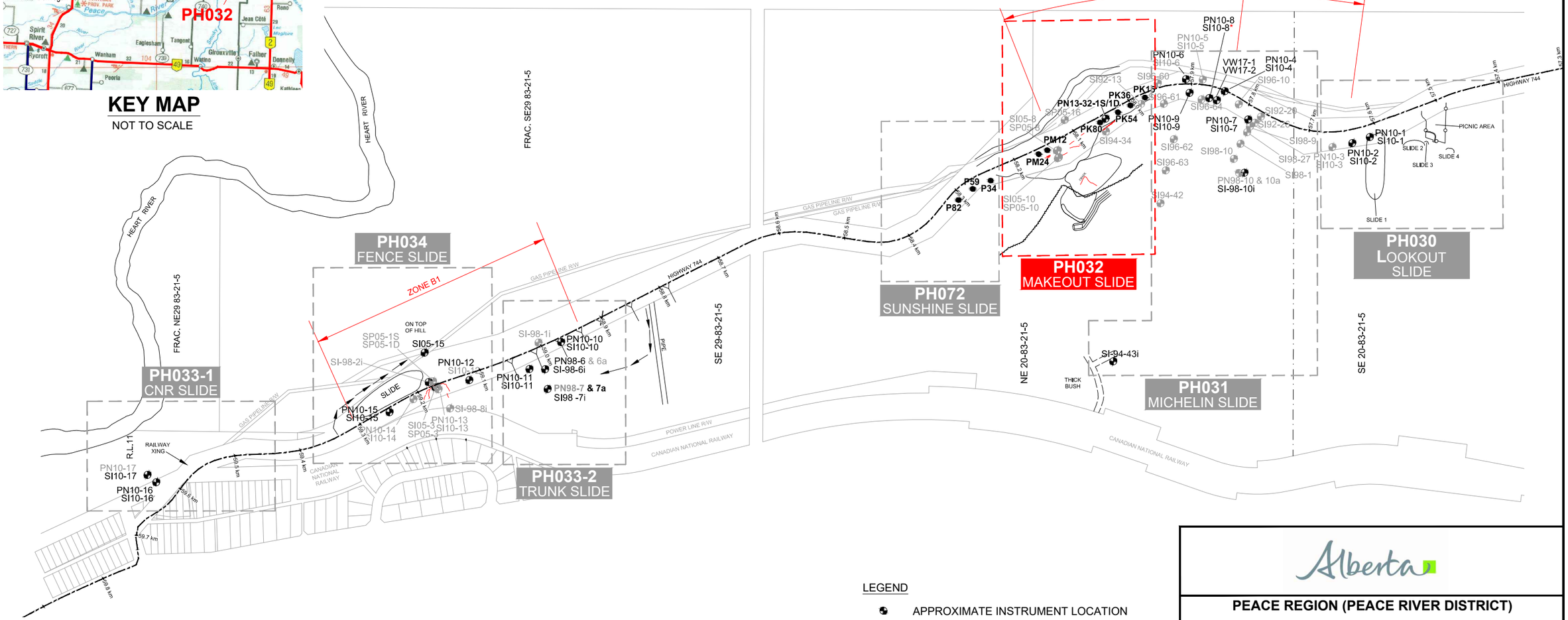


KEY MAP

NOT TO SCALE



LEGEND

- APPROXIMATE INSTRUMENT LOCATION
- INSTRUMENT NOT IN USE
- PN PNEUMATIC PIEZOMETER
- SP STANDPIPE PIEZOMETER
- SI SLOPE INCLINOMETER
- VW VIBRATING WIRE PIEZOMETER
- APPROXIMATE PILE LOCATION

Alberta

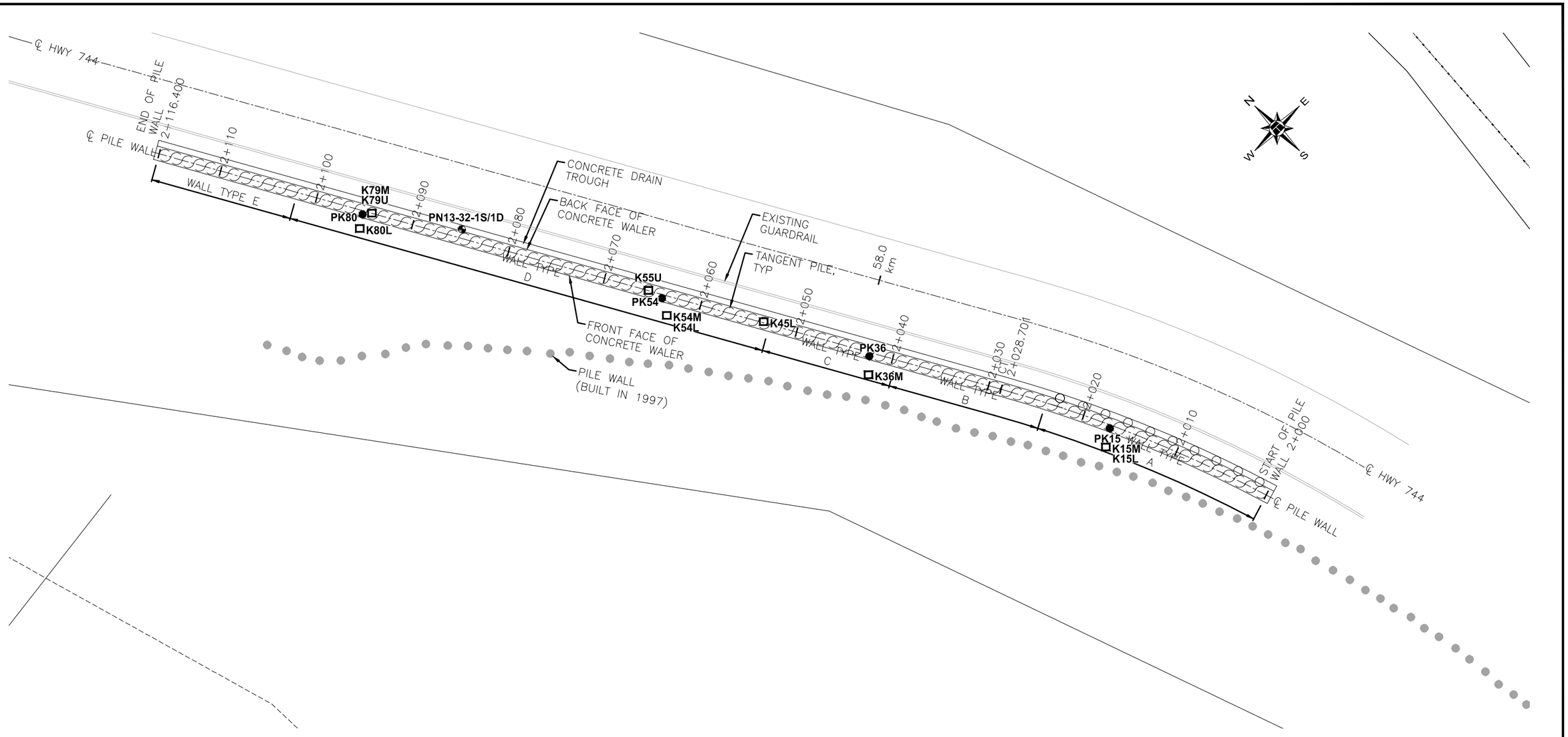
PEACE REGION (PEACE RIVER DISTRICT)

PH032: HWY 744:04 - JUDAH HILL
(MAKEOUT SLIDE)
INSTRUMENT LOCATIONS

DWG No. 32121-PH032-1

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

THURBER ENGINEERING LTD.



LEGEND

- APPROXIMATE PILE LOCATION (2016)
- PN APPROX. PNEUMATIC PIEZOMETER LOCATION
- APPROX. LOAD CELL LOCATION
- APPROXIMATE PILE LOCATION (1997)

PILE NO.	NORTHING (m)	EASTING (m)
PK15	6229841.349	483237.014
PK36	6229863.530	483225.073
PK54	6229882.353	483214.478
PK80	6229909.542	483199.175

0 5 10 15 20 25m

SCALE 1:400

Alberta

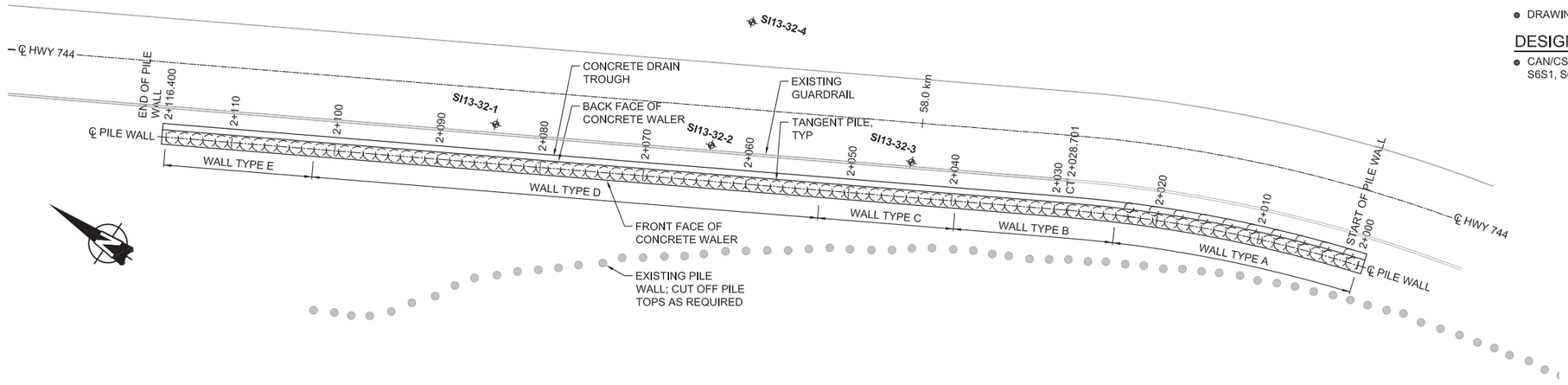
PEACE REGION (PEACE RIVER DISTRICT)

PH032: HWY 744: 04 - JUDAH HILL (MAKEOUT SLIDE) km 58 PILE WALL INSTRUMENT LOCATIONS

DWG No. 32121-PH032-2

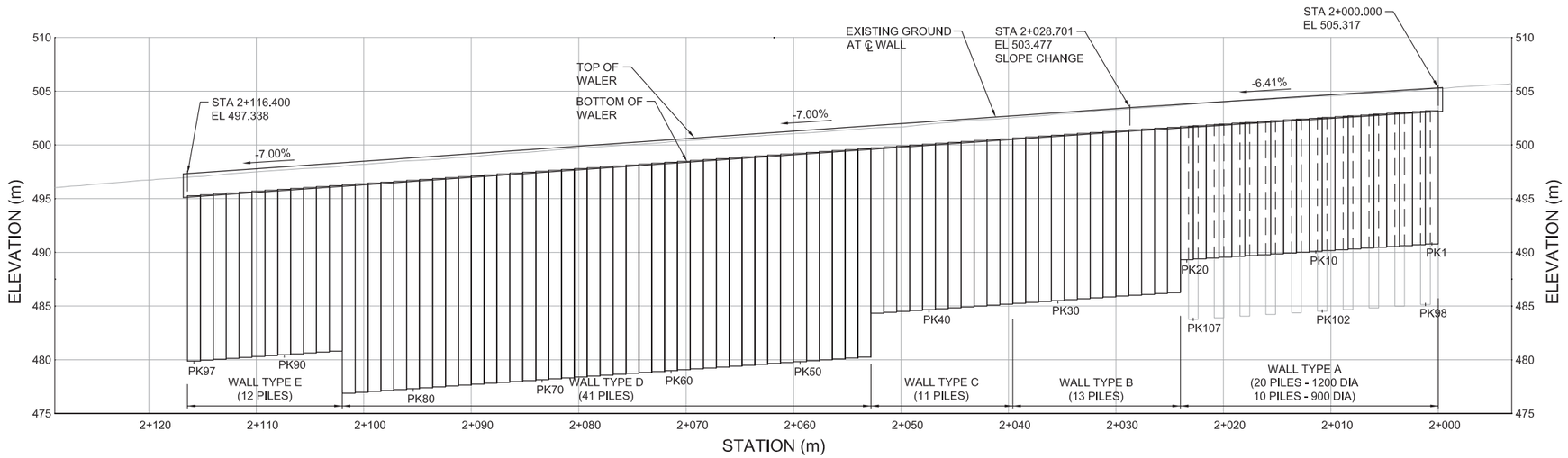
DRAWN BY	ML
DESIGNED BY	BWN
APPROVED BY	DWP
SCALE	1:400
DATE	SEPTEMBER 2021
FILE No.	32121

THURBER ENGINEERING LTD.



SITE PLAN

1:250



ELEVATION - PILE WALL

SHOWN ALONG PILE WALL CENTRELINE 1:250

GENERAL NOTES

- ALL DIMENSIONS SHOWN ON THE PILE WALL GENERAL LAYOUT ARE GIVEN IN METRES. ALL OTHER PILE WALL DRAWINGS ARE DIMENSIONED IN MILLIMETRES EXCEPT FOR STATIONS AND ELEVATIONS WHICH ARE GIVEN IN METRES.
- DRAWING SCALES ARE BASED ON PLOTTING FULL SIZE (22"x34")

DESIGN

- CAN/CSA S6-06 CANADIAN HIGHWAY BRIDGE DESIGN CODE + SUPPLEMENTS S6S1, S6S2, AND S6S3

THIS RECORD DRAWING INDICATES THAT THE CONSTRUCTED PROJECT SUBSTANTIALLY COMPLIES WITH THE DESIGN DRAWINGS AND ALL APPROPRIATE CONTRACT PLANS AND SPECIFICATIONS.

CONSULTANT		PERMIT TO PRACTICE	DESIGNER	FIELD REVIEW ENGINEER
JOB No. 15-16-288	PLAN No. RD-19071-C	PERMIT TO PRACTICE DIALOG ALBERTA ARCHITECTURE ENGINEERING INTERIOR DESIGN PLANNING INC. ORIGINAL SIGNED AND STAMPED By: N. S. ROBSON On: DEC 16, 2016 PERMIT NUMBER: P 10020 The Association of Professional Engineers, Geologists and Geophysicists of Alberta	ORIGINAL DOCUMENT STAMPED AND SIGNED BY: S. L. BROWN ON: MAR 7, 2014	ORIGINAL DOCUMENT STAMPED AND SIGNED BY: S. L. BROWN ON: DEC 16, 2016

THURBER ENGINEERING LTD.
DIALOG

KM 58 LANDSLIDE
PILE RETAINING WALL
GENERAL LAYOUT

Alberta Transportation

REGION	SITE No.	PLAN No.	PROJECT	CONTRACT No.	SHEET
PEACE	PH72	RD-19071-C 1	744:04	15153	38 of 48

2.5 0 5 HORIZONTAL
2.5 0 5 VERTICAL

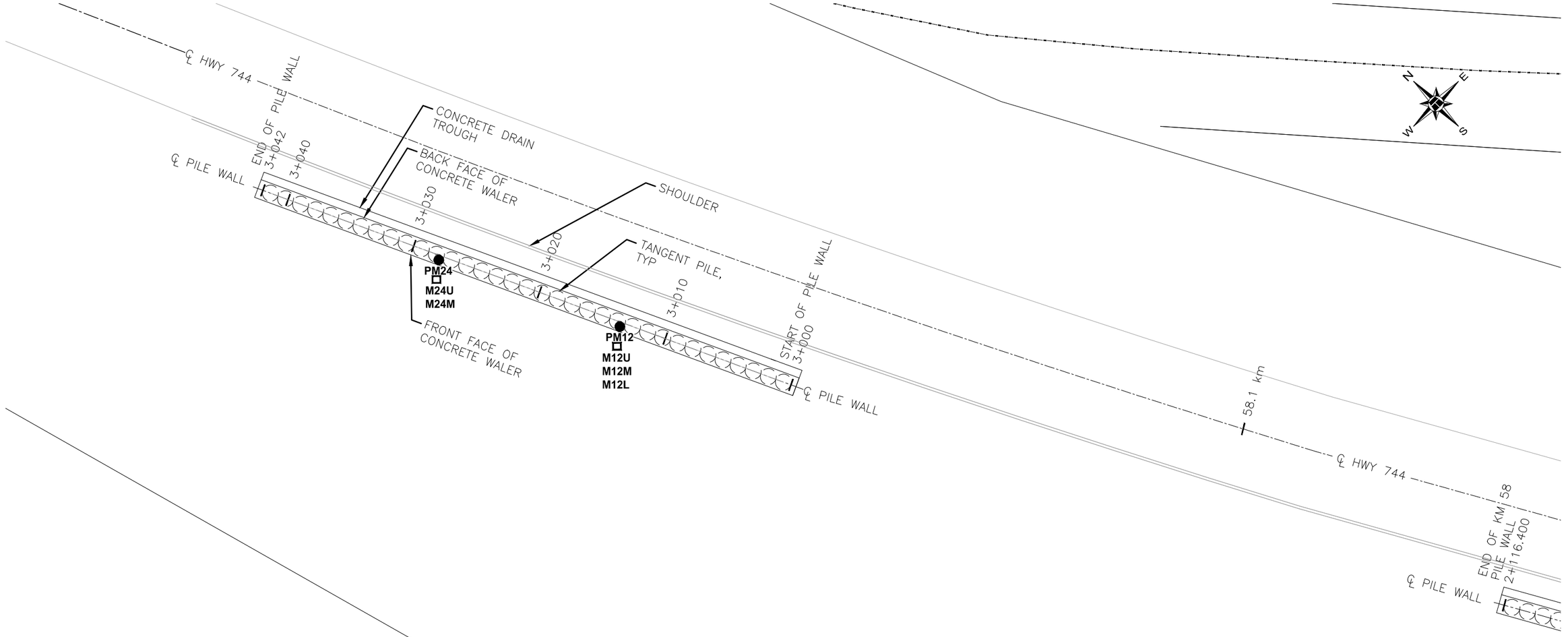
PLAN DESCRIPTION: KM 58 LANDSLIDE PILE RETAINING WALL GENERAL LAYOUT
BAR CODE
PLAN No. RD-19071-C 1 | CONTRACT No. 15153 | SITE No. PH72

PHOTO No.	BY	DATE
TITLE SEARCH DATE	SLB	MAR 2014
GRAPHICS FILE	NSR	MAR 2014
	MT / SLB	DEC 2016

SURVEYED	
DESIGNED	
CHECKED	
DRAWN	

No.	REVISION	BY	DATE
1	RECORD DRAWING	SLB	2016-12-16

I:\Building\60072833\10 WIP\PACT\744-38.dwg - 744-38 - Dec. 16, 2016



LEGEND

- ● APPROXIMATE PILE LOCATION
- □ APPROX. LOAD CELL LOCATION

PILE NO.	NORTHING (m)	EASTING (m)
PM12	6229989.636	483157.061
PM24	6230002.710	483151.024

0 2 4 6 8 10 15 20m

SCALE 1:300

Alberta

PEACE REGION (PEACE RIVER DISTRICT)

PH032: HWY 744: 04 - JUDAH HILL (MAKEOUT SLIDE) MAKEOUT PILE WALL INSTRUMENT LOCATIONS

DWG No. 32121-PH032-3

DRAWN BY	ML
DESIGNED BY	BWN
APPROVED BY	DWP
SCALE	1:300
DATE	SEPTEMBER 2021
FILE No.	32121

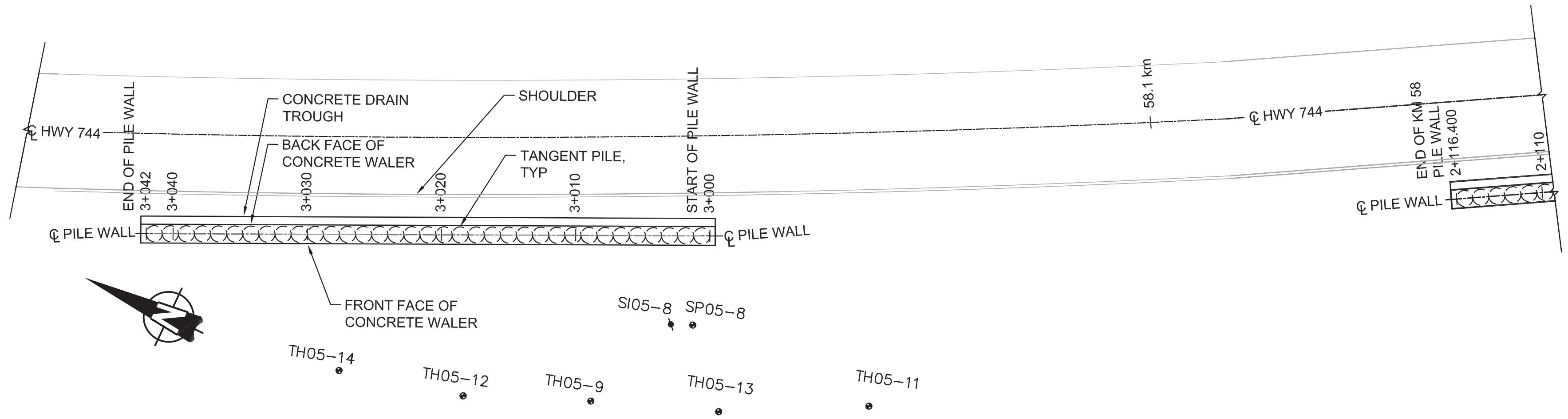
THURBER ENGINEERING LTD.

GENERAL NOTES

- ALL DIMENSIONS SHOWN ON THE PILE WALL GENERAL LAYOUT ARE GIVEN IN METRES. ALL OTHER PILE WALL DRAWINGS ARE DIMENSIONED IN MILLIMETRES EXCEPT FOR STATIONS AND ELEVATIONS WHICH ARE GIVEN IN METRES.
- DRAWING SCALES ARE BASED ON PLOTTING FULL SIZE (22"x34")

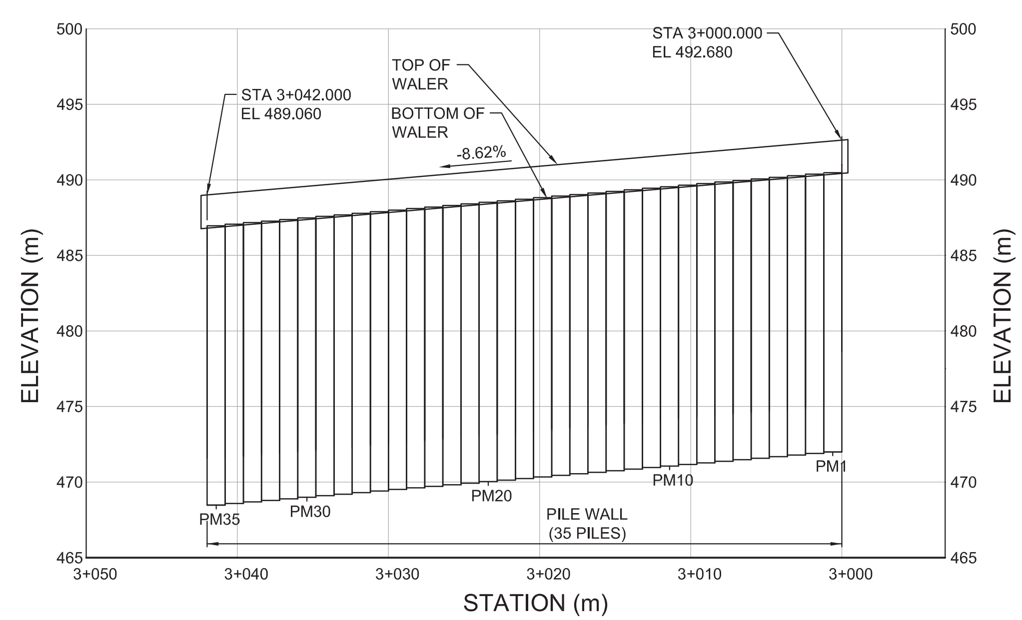
DESIGN

- CAN/CSA S6-06 CANADIAN HIGHWAY BRIDGE DESIGN CODE + SUPPLEMENTS S6S1, S6S2, AND S6S3



SITE PLAN

1:250



ELEVATION - PILE WALL

SHOWN ALONG PILE WALL CENTRELINE 1:250

THIS RECORD DRAWING INDICATES THAT THE CONSTRUCTED PROJECT SUBSTANTIALLY COMPLIES WITH THE DESIGN DRAWINGS AND ALL APPROPRIATE CONTRACT PLANS AND SPECIFICATIONS.

ITEM		UNIT	TOT EST	AS CONST
REINFORCING STEEL	PLAIN	kg	87 570	-
CONCRETE - CLASS C		m^3	100	-
CONCRETE - CLASS PILE		m^3	730	-
DRILLED CONCRETE PILES	DRILL RIG SET-UP	PILE	35	-
	PILE INSTALLATION	m	644	-

QUANTITY ESTIMATE

CONSULTANT	
JOB No. 15-16-288	PLAN No. RD-19078-C

THURBER ENGINEERING LTD.
DIALOG

PERMIT TO PRACTICE

PERMIT TO PRACTICE
DIALOG ALBERTA ARCHITECTURE ENGINEERING INTERIOR DESIGN PLANNING INC.
ORIGINAL SIGNED AND STAMPED
By: N. S. ROBSON
On: DEC 16, 2016
PERMIT NUMBER: P 10020
The Association of Professional Engineers, Geologists and Geophysicists of Alberta

DESIGNER

ORIGINAL DOCUMENT STAMPED AND SIGNED BY: S. L. BROWN ON: MAR 25, 2014

FIELD REVIEW ENGINEER

ORIGINAL DOCUMENT STAMPED AND SIGNED BY: S. L. BROWN ON: DEC 16, 2016

MAKEOUT LANDSLIDE
PILE RETAINING WALL
GENERAL LAYOUT

Alberta Transportation

REGION	SITE No.	PLAN No.	PROJECT	CONTRACT No.	SHEET
PEACE	PH72	RD-19078-C	744:04	15153	45 of 48

PLAN DESCRIPTION: MAKEOUT LANDSLIDE PILE RETAINING WALL GENERAL LAYOUT

BAR CODE

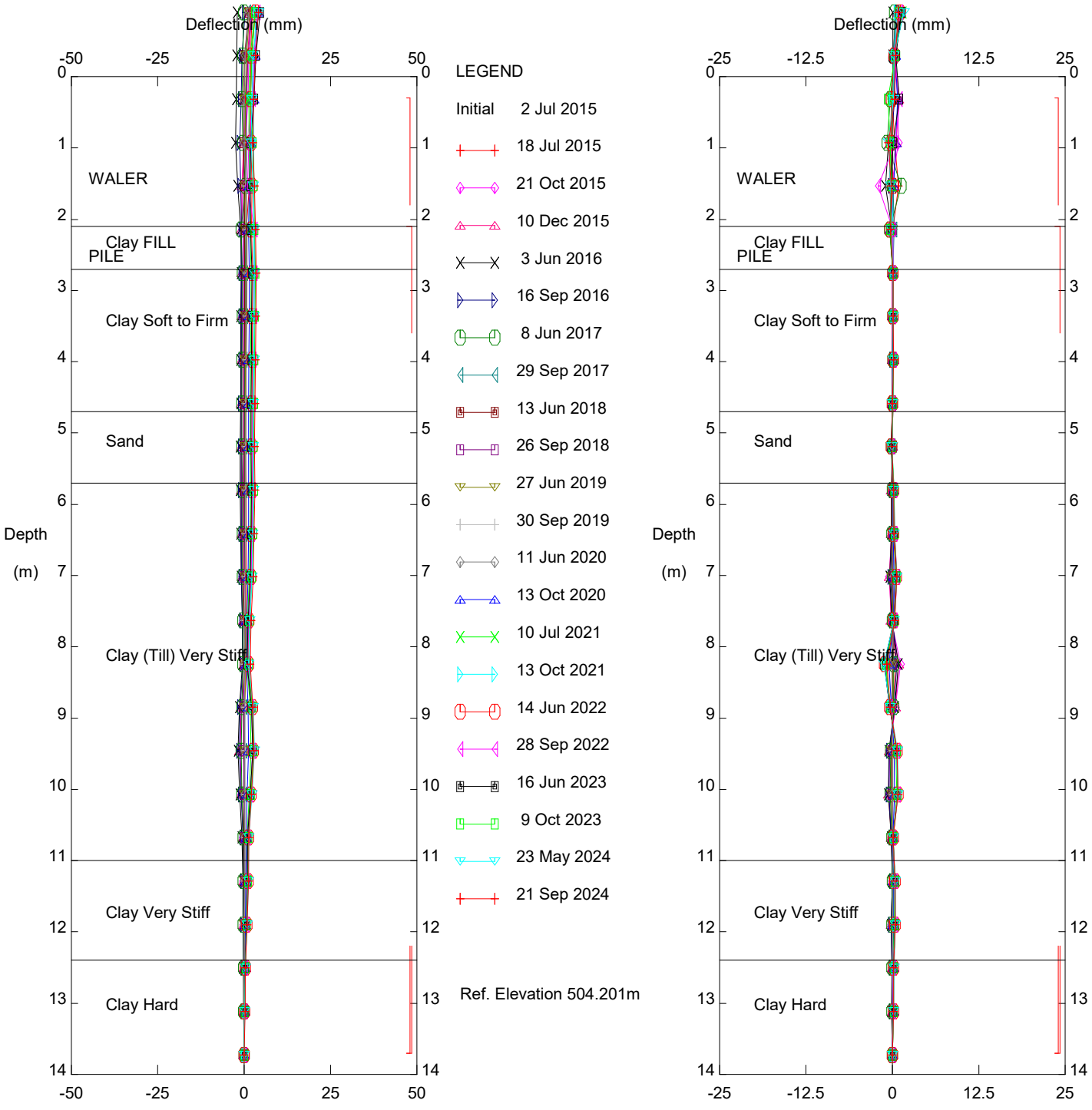
PLAN No.	CONTRACT No.	SITE No.
RD-19078-C	15153	PH72

PHOTO No. / TITLE SEARCH DATE / GRAPHICS FILE

	BY	DATE
SURVEYED		
DESIGNED	SLB	MAR 2014
CHECKED	NSR	MAR 2014
DRAWN	MT / SLB	DEC 2016

No.	REVISION	BY	DATE
1	RECORD DRAWING	SLB	2016-12-16

Thurber Engineering Ltd.



Cumulative Deflection

Direction A

Incremental Deflection

Direction A

PH032 KM 58 (Post Construction), Inclinometer PK15

Alberta Transportation

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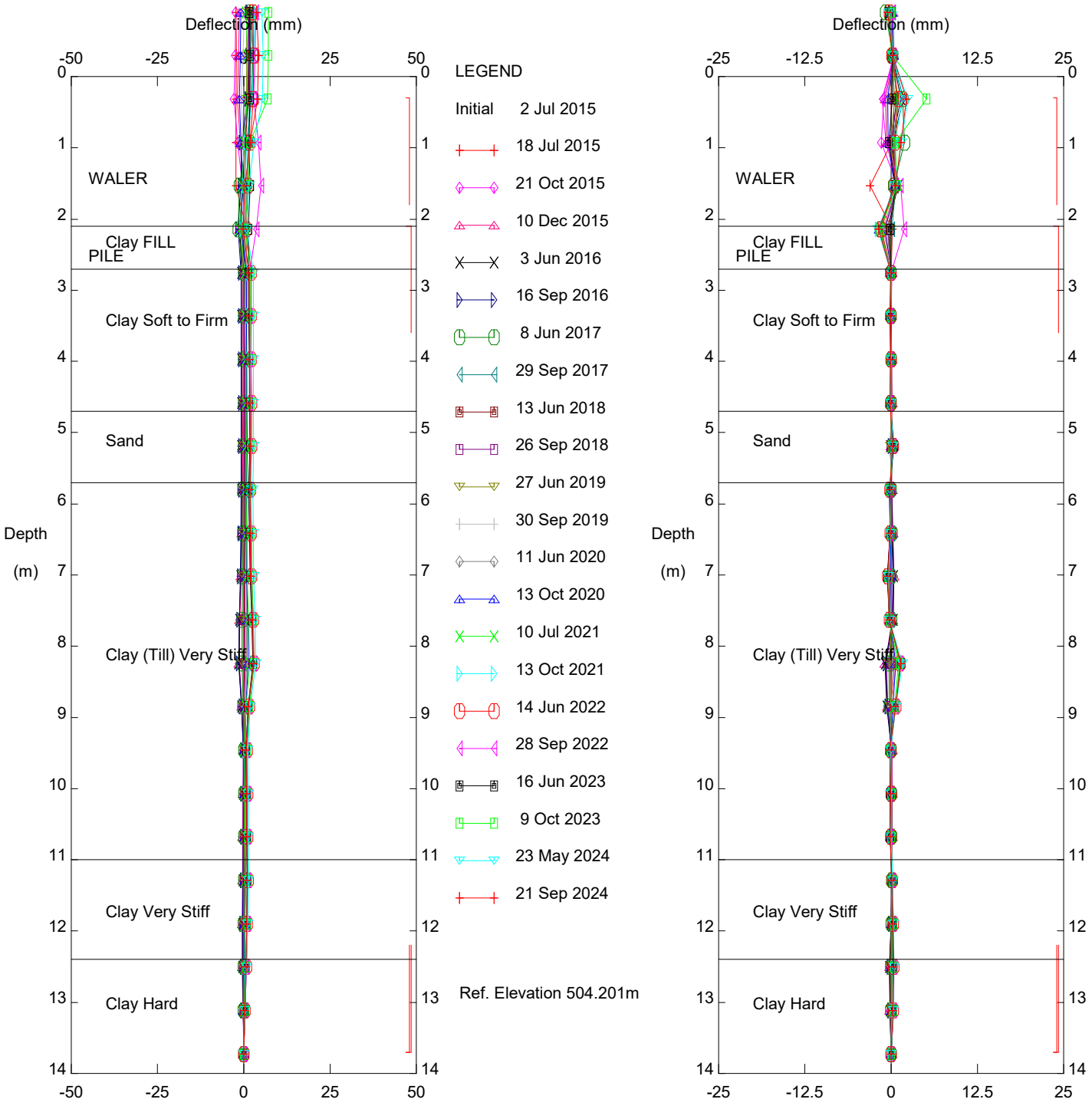
Thurber Engineering Ltd.



Cumulative Deflection

Direction B

Incremental Deflection

Direction B

PH032 KM 58 (Post Construction), Inclinometer PK15

Alberta Transportation

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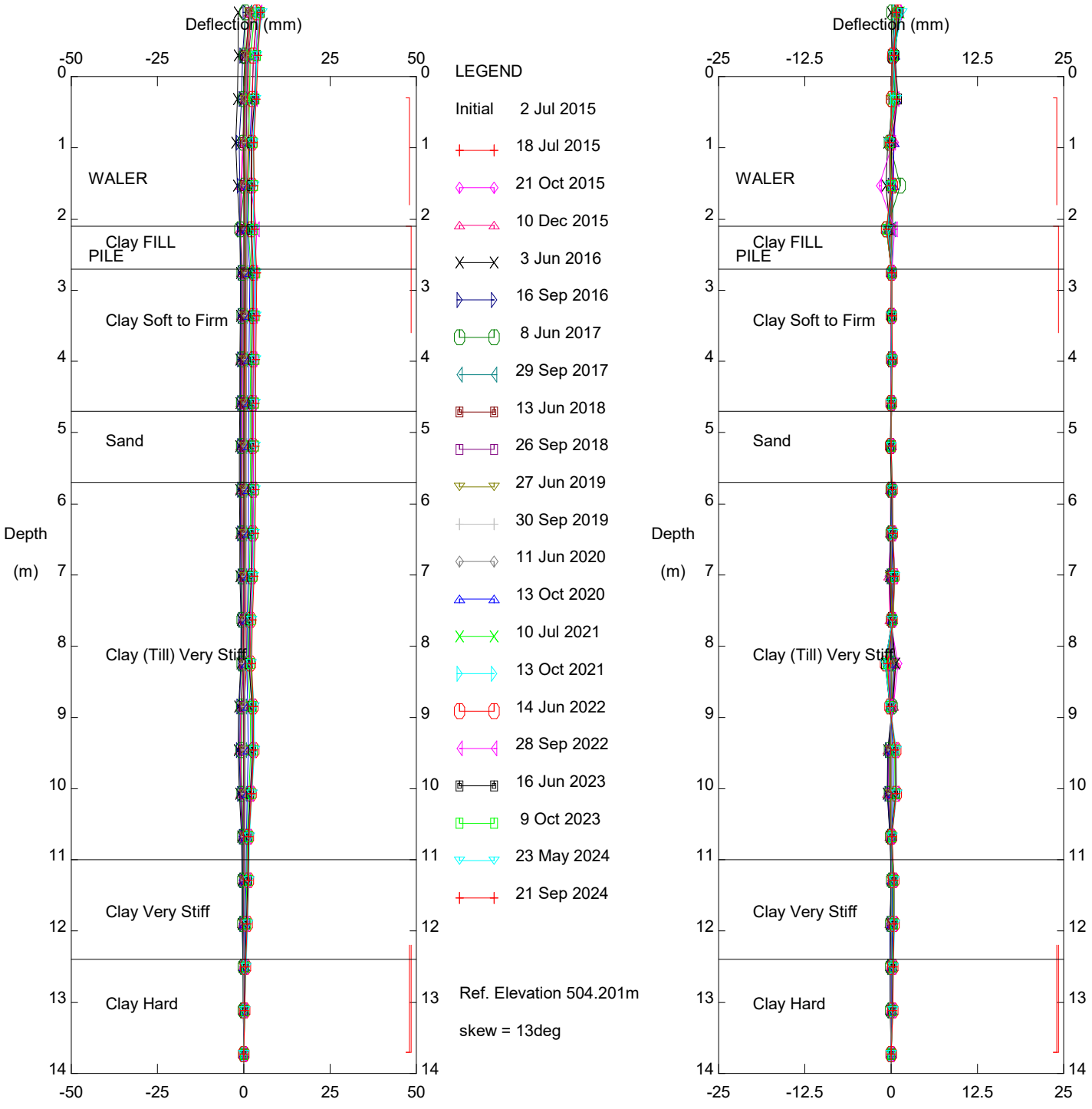
Thurber Engineering Ltd.



Cumulative Deflection

Direction X

Incremental Deflection

Direction X

PH032 KM 58 (Post Construction), Inclinometer PK15

Alberta Transportation

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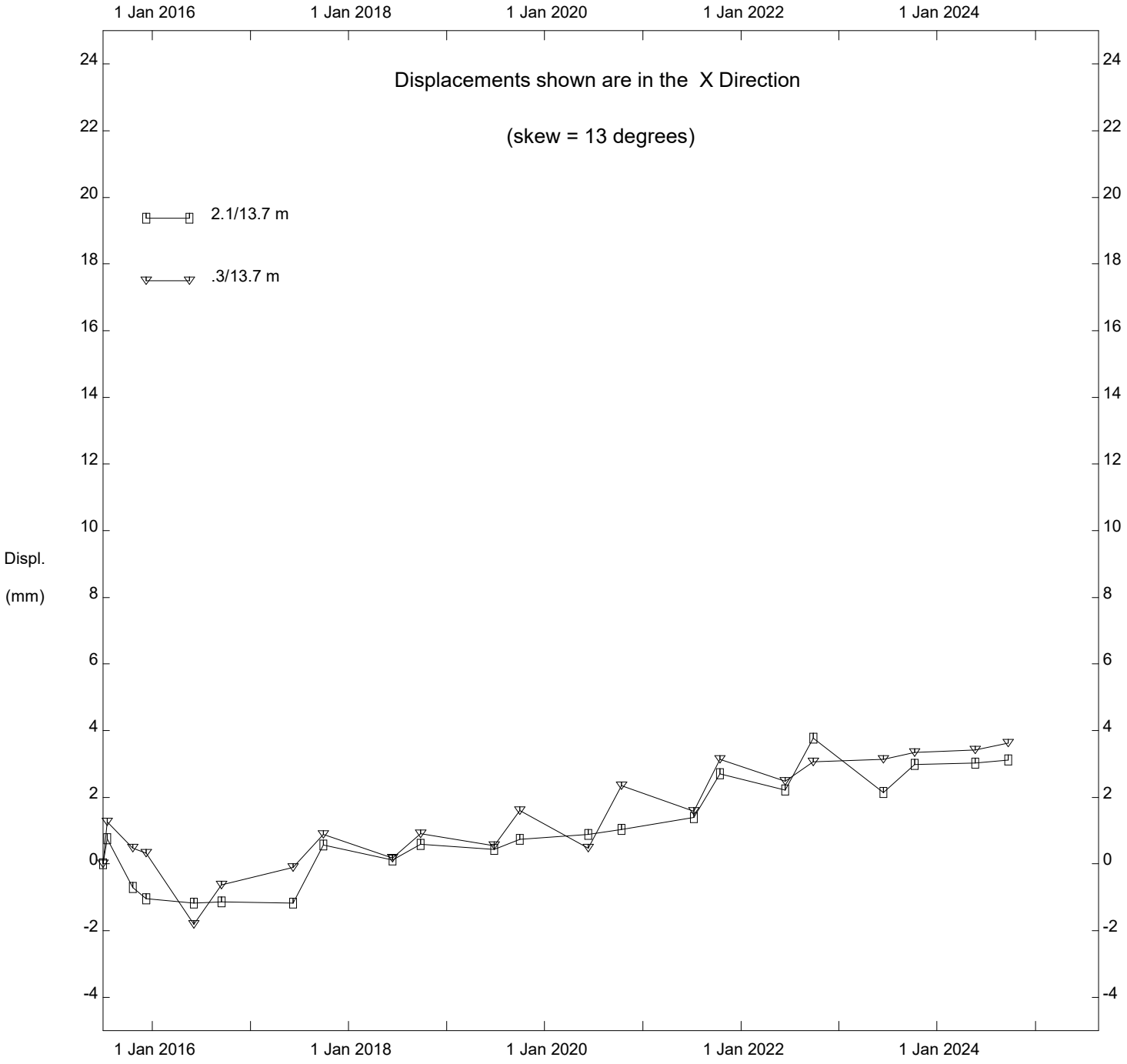
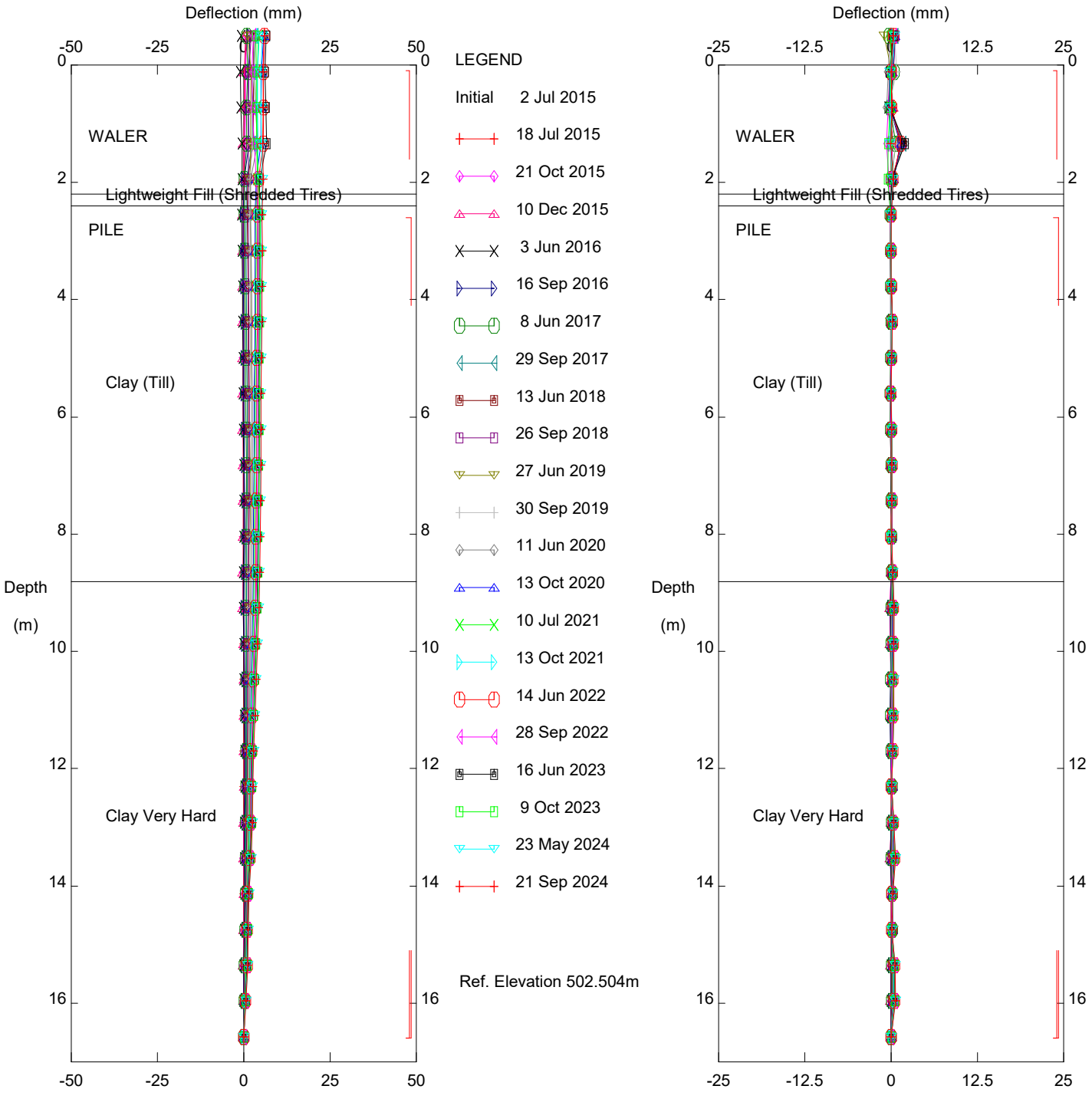
Thurber Engineering Ltd.



PH032 KM 58 (Post Construction), Inclinometer PK15

Alberta Transportation

Thurber Engineering Ltd.



Cumulative Deflection

Direction A

Incremental Deflection

Direction A

PH032 KM 58 (Post Construction), Inclinometer PK36

Alberta Transportation

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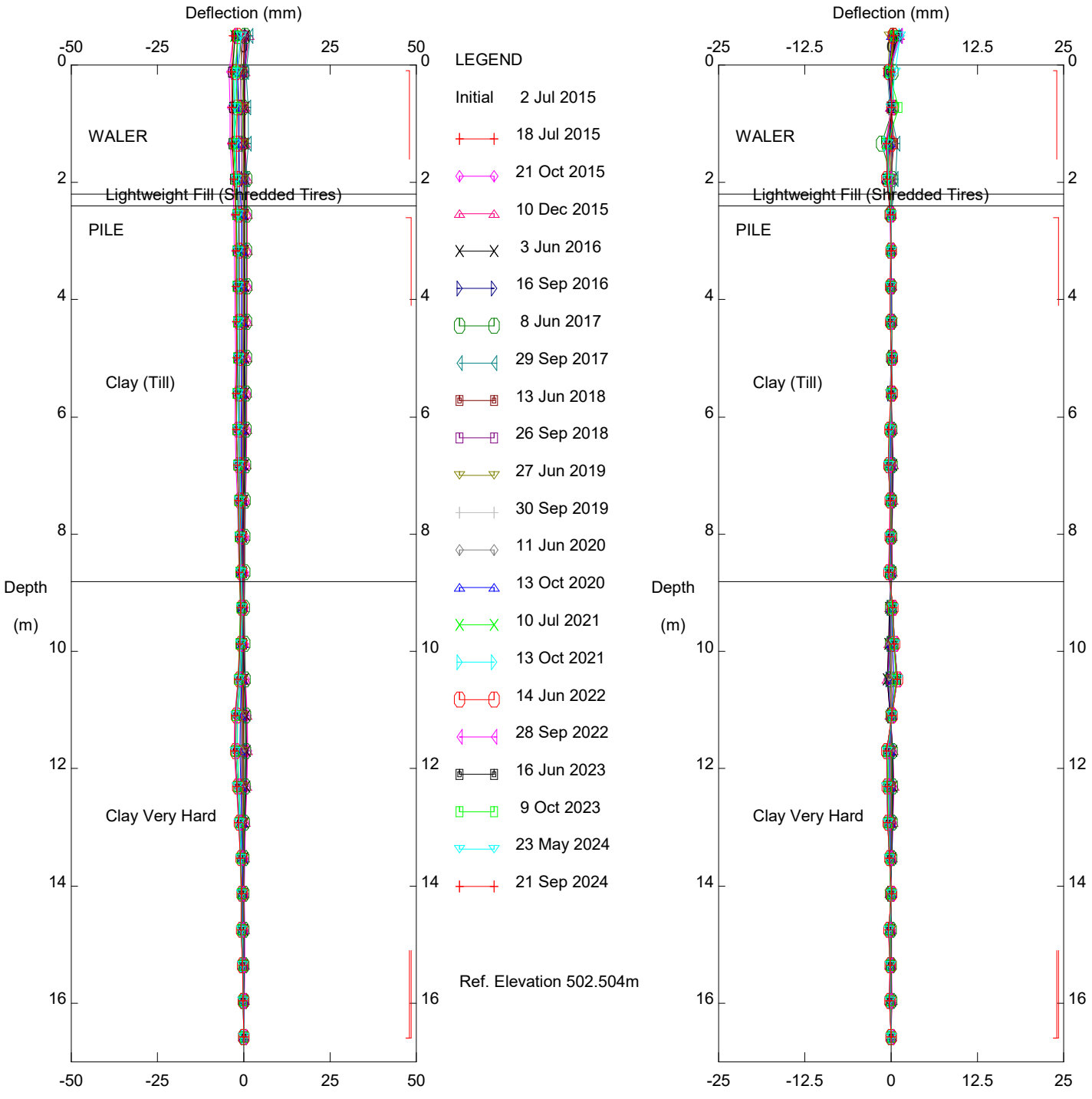
Thurber Engineering Ltd.



Cumulative Deflection

Direction B

Incremental Deflection

Direction B

PH032 KM 58 (Post Construction), Inclinometer PK36

Alberta Transportation

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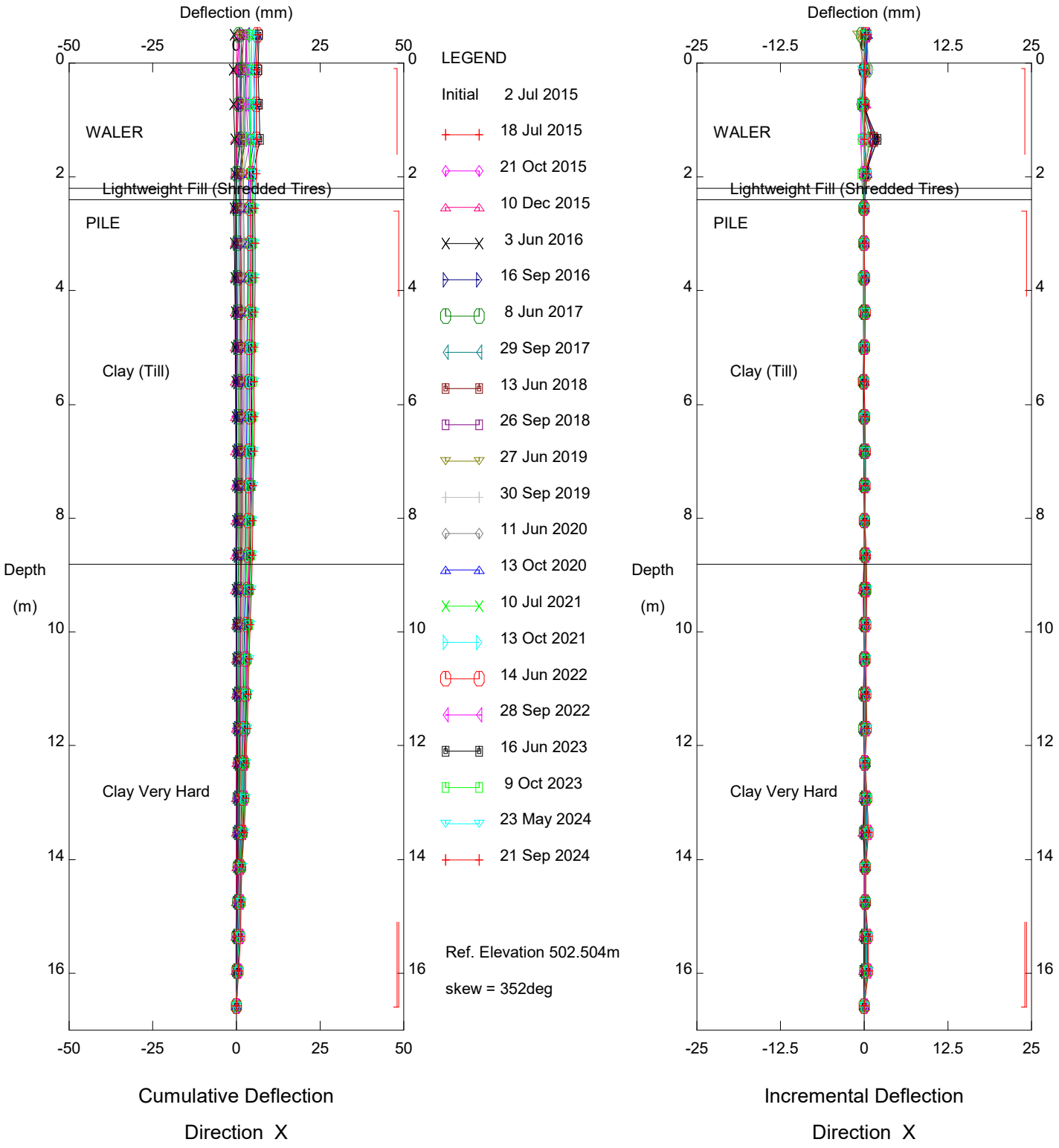

Cumulative Deflection

Direction X

Incremental Deflection

Direction X

PH032 KM 58 (Post Construction), Inclinometer PK36

Alberta Transportation

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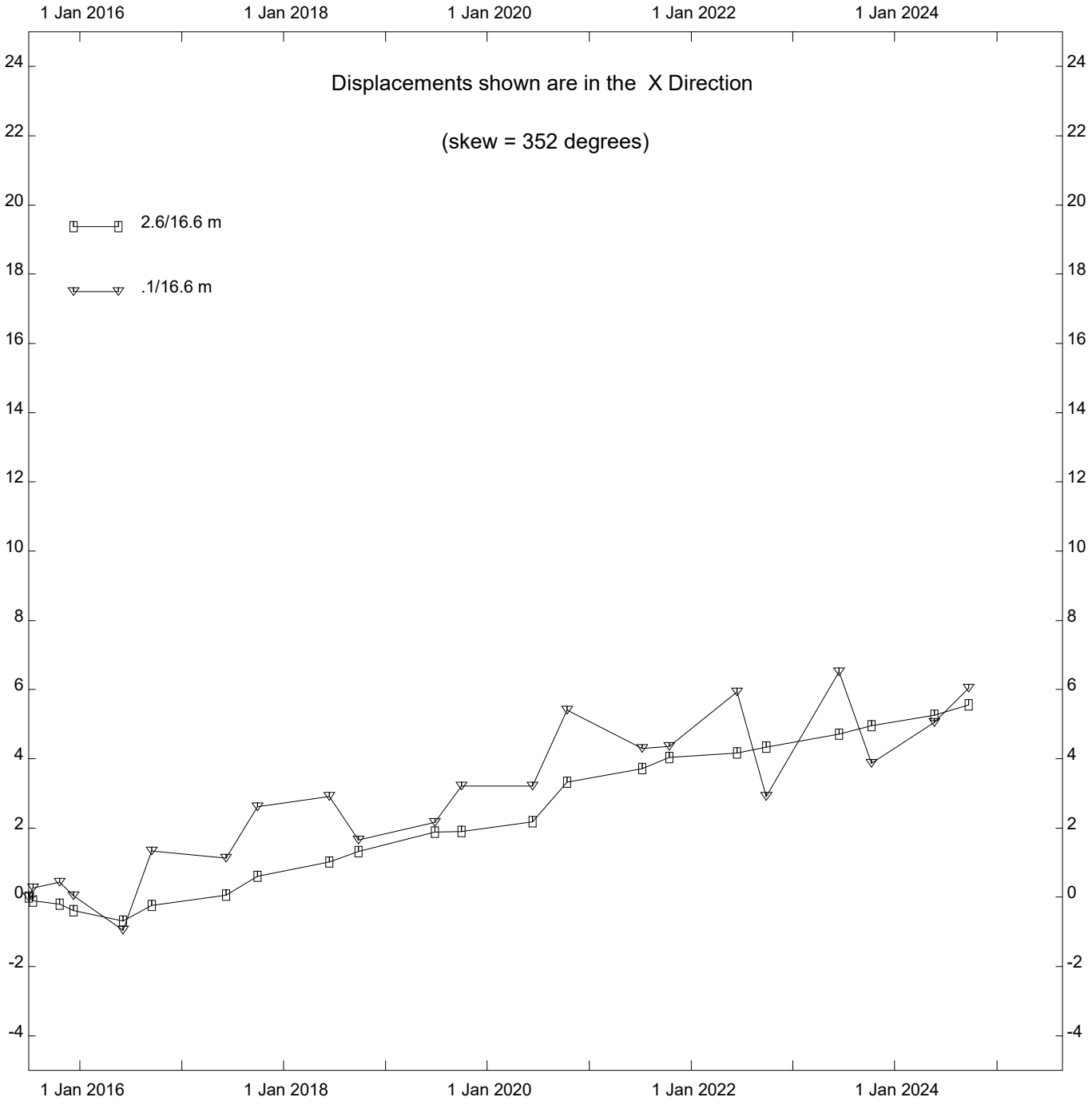
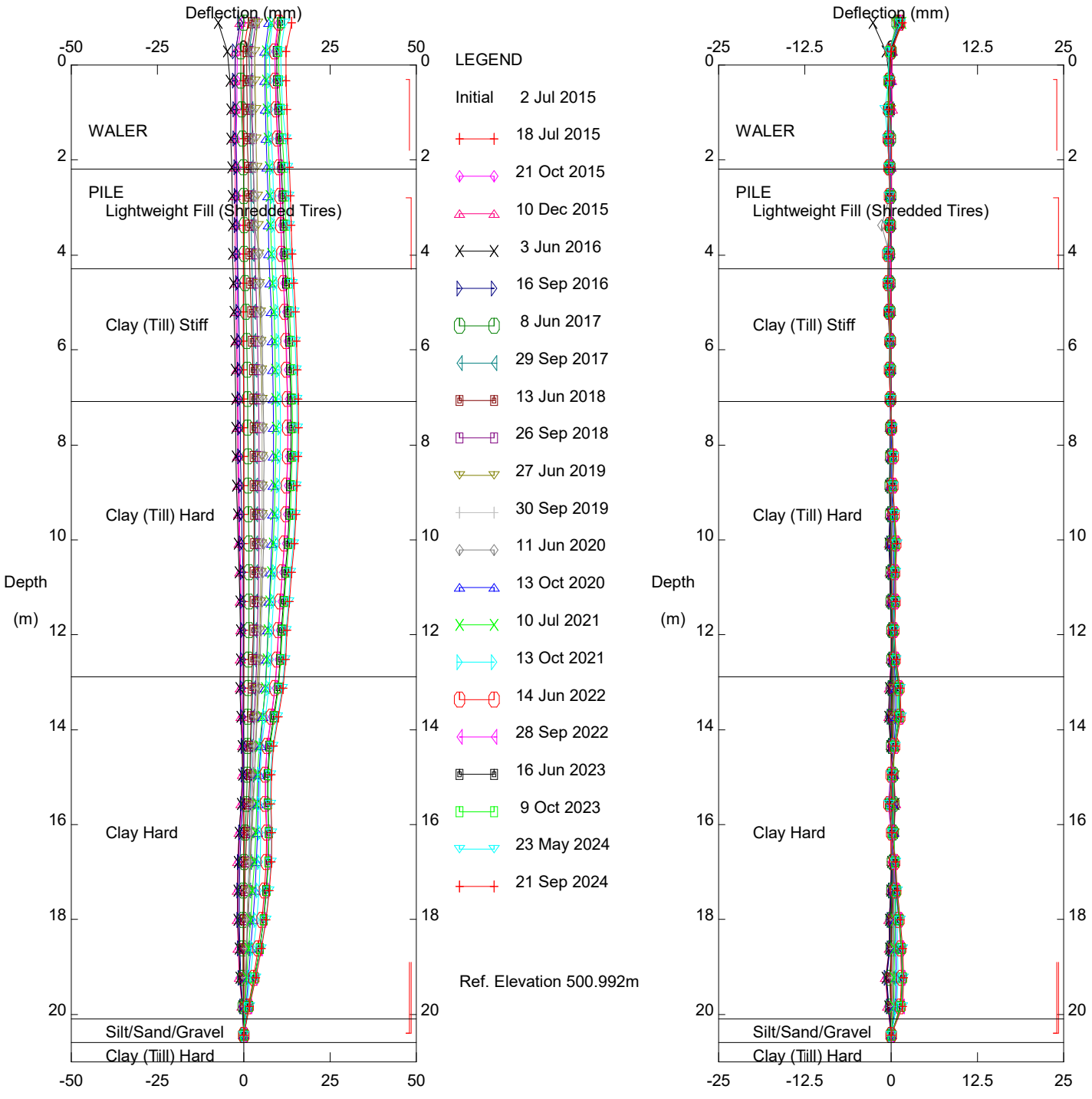


PH032 KM 58 (Post Construction), Inclinometer PK36

Alberta Transportation

Thurber Engineering Ltd.



Cumulative Deflection

Direction A

Incremental Deflection

Direction A

PH032 KM 58 (Post Construction), Inclinometer PK54

Alberta Transportation

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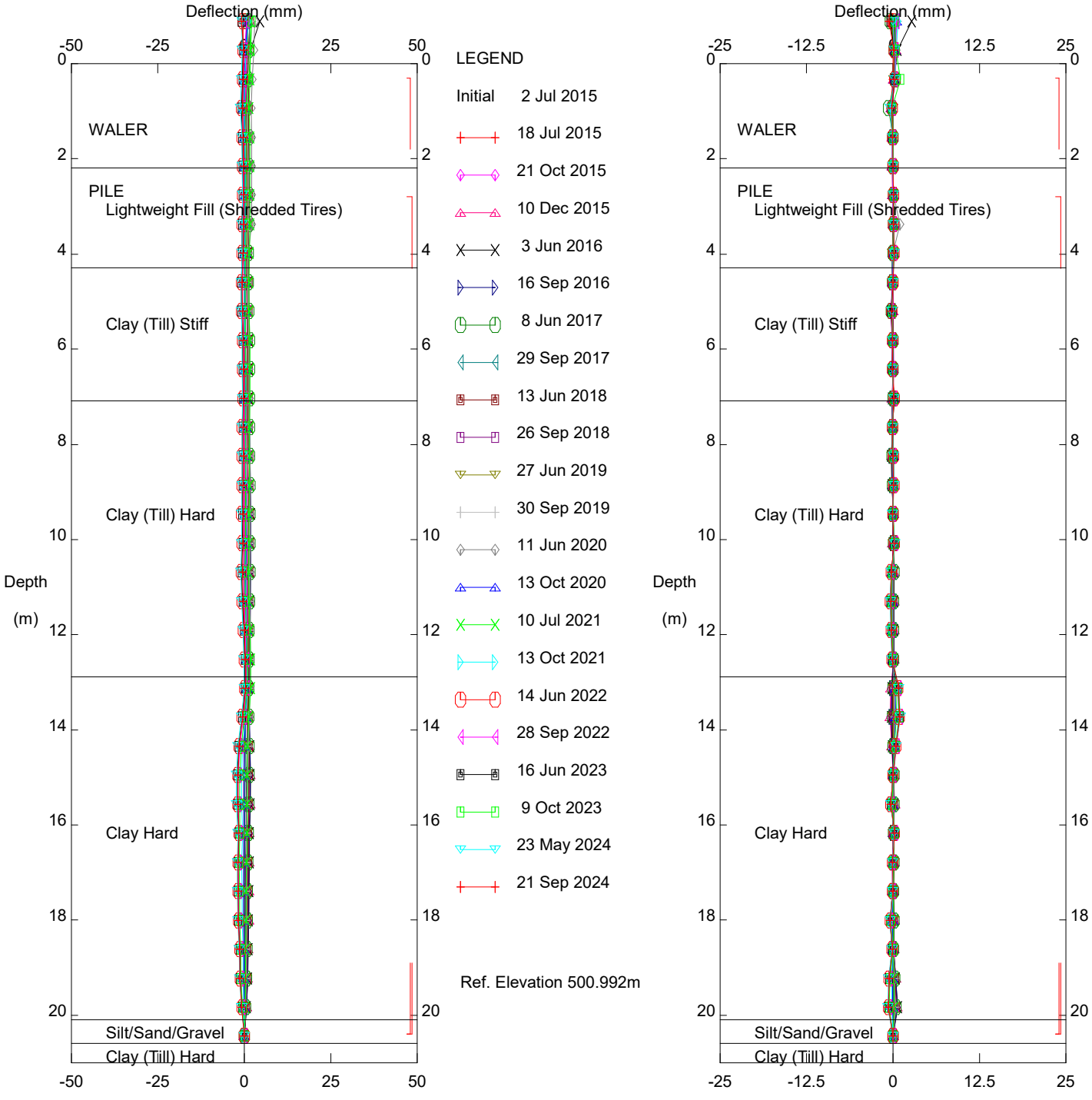

Cumulative Deflection

Direction B

Incremental Deflection

Direction B

PH032 KM 58 (Post Construction), Inclinometer PK54

Alberta Transportation

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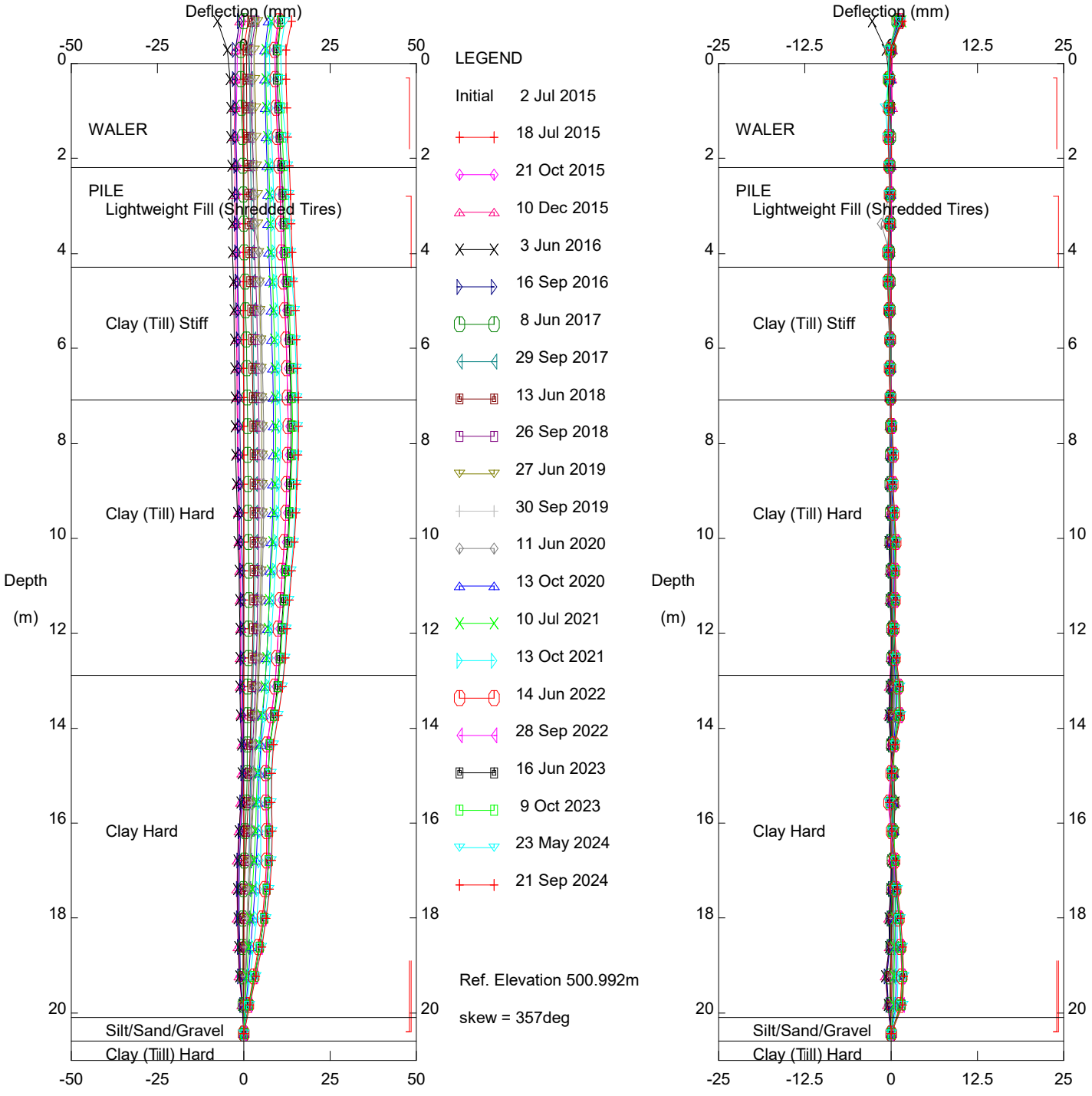

Cumulative Deflection

Direction X

Incremental Deflection

Direction X

PH032 KM 58 (Post Construction), Inclinometer PK54

Alberta Transportation

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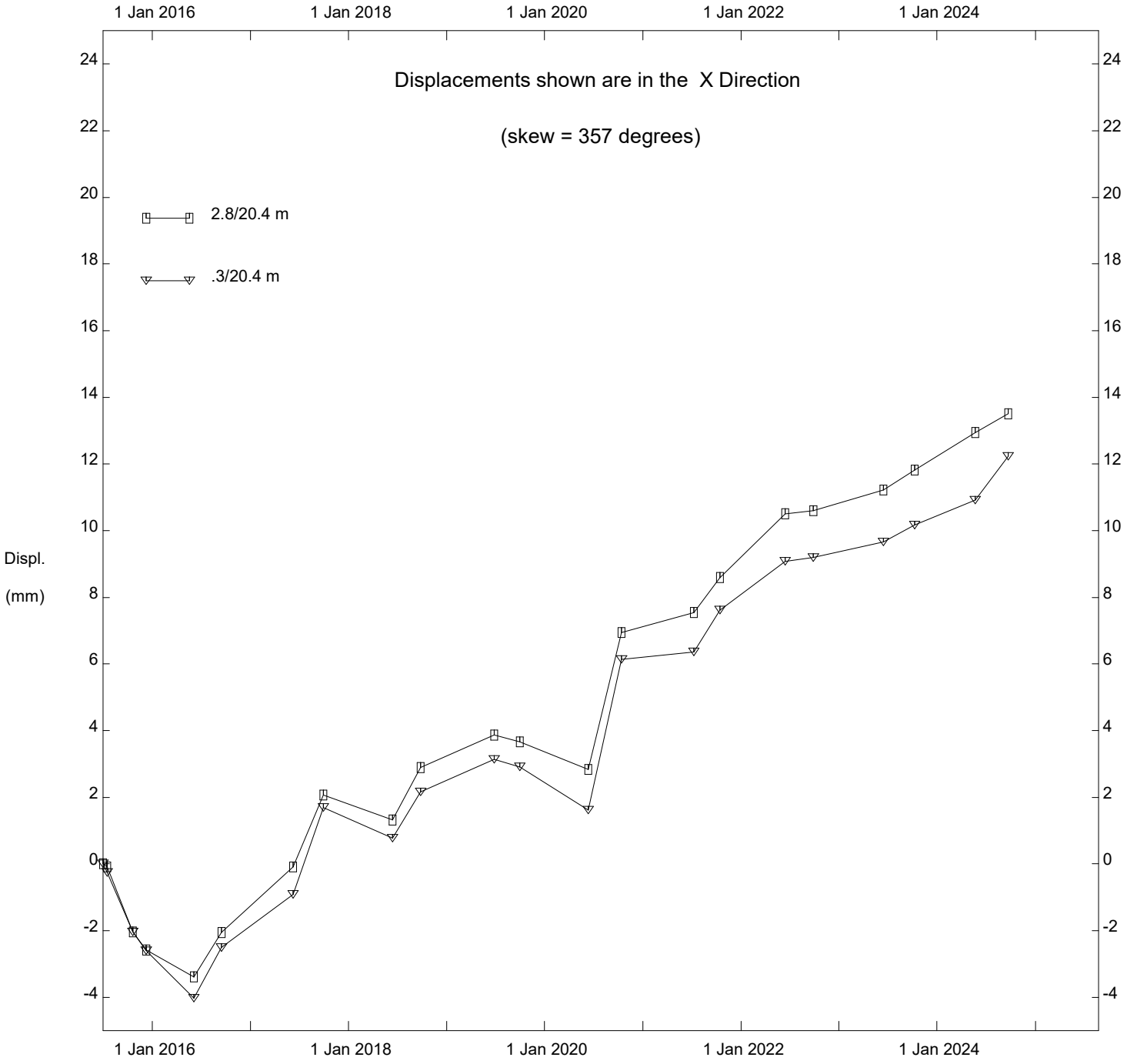
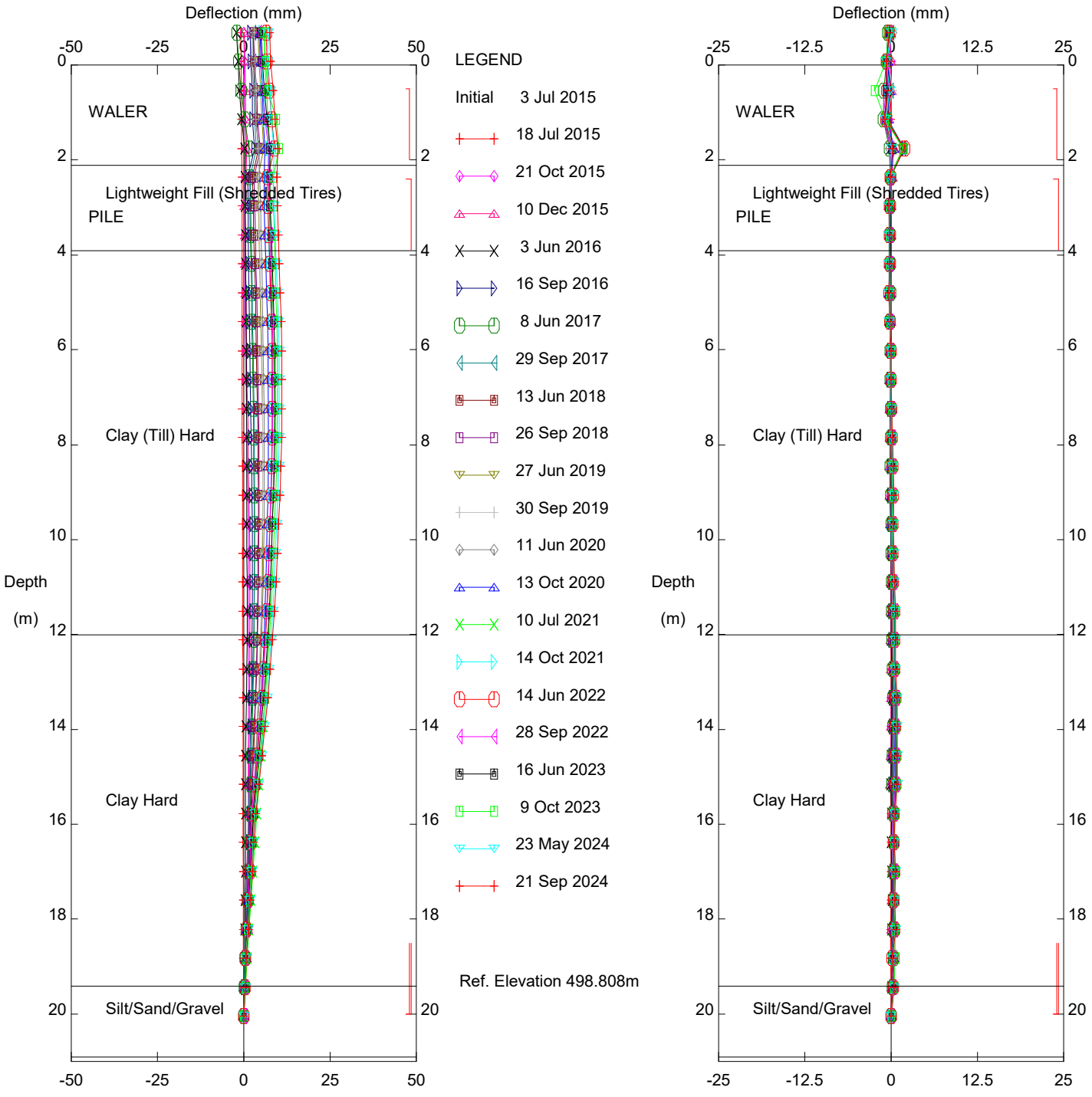


PH032 KM 58 (Post Construction), Inclinometer PK54

Alberta Transportation

Thurber Engineering Ltd.



Cumulative Deflection

Direction A

Incremental Deflection

Direction A

PH032 KM 58 (Post Construction), Inclinometer PK80

Alberta Transportation

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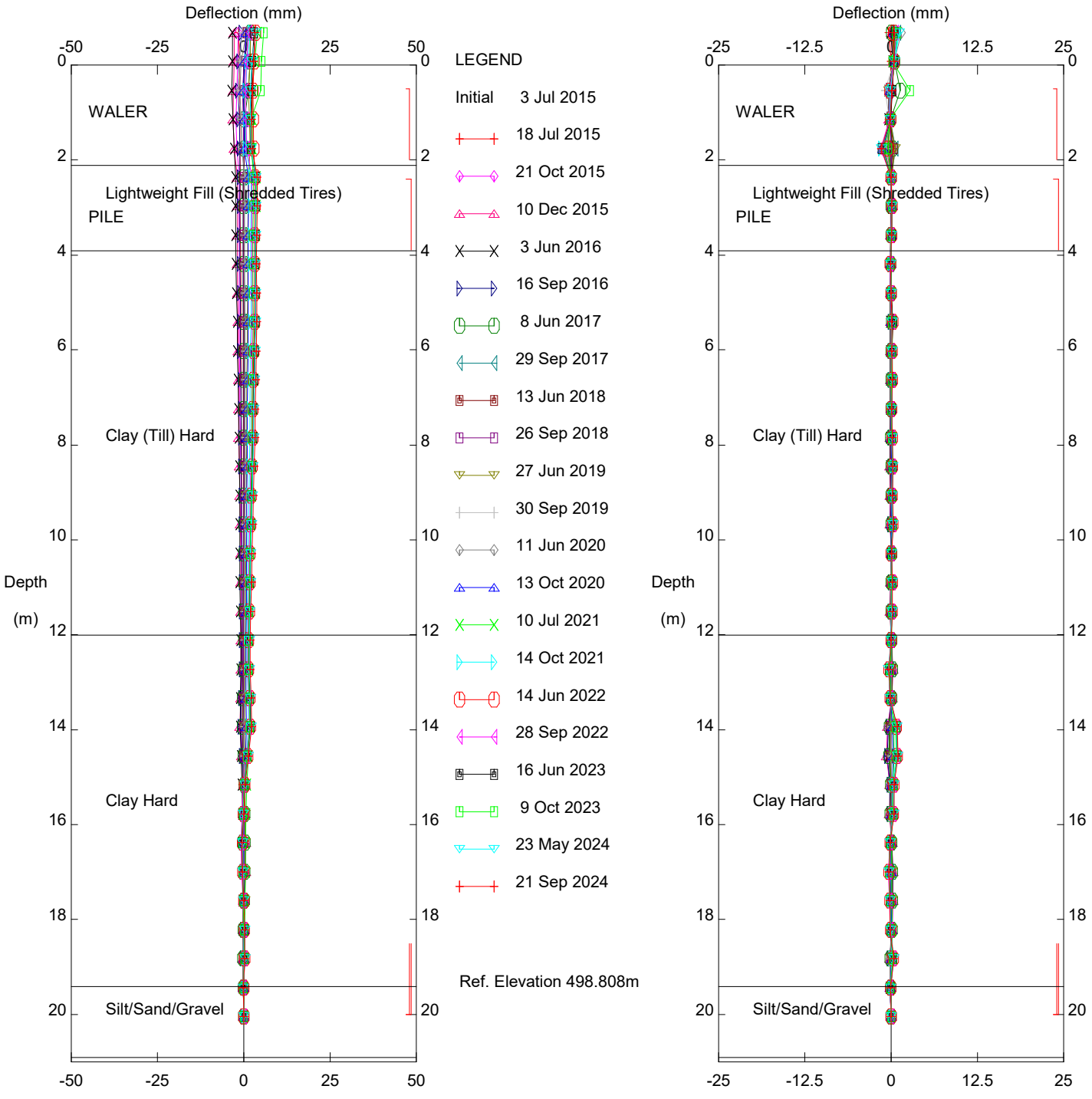

Cumulative Deflection

Direction B

Incremental Deflection

Direction B

PH032 KM 58 (Post Construction), Inclinometer PK80

Alberta Transportation

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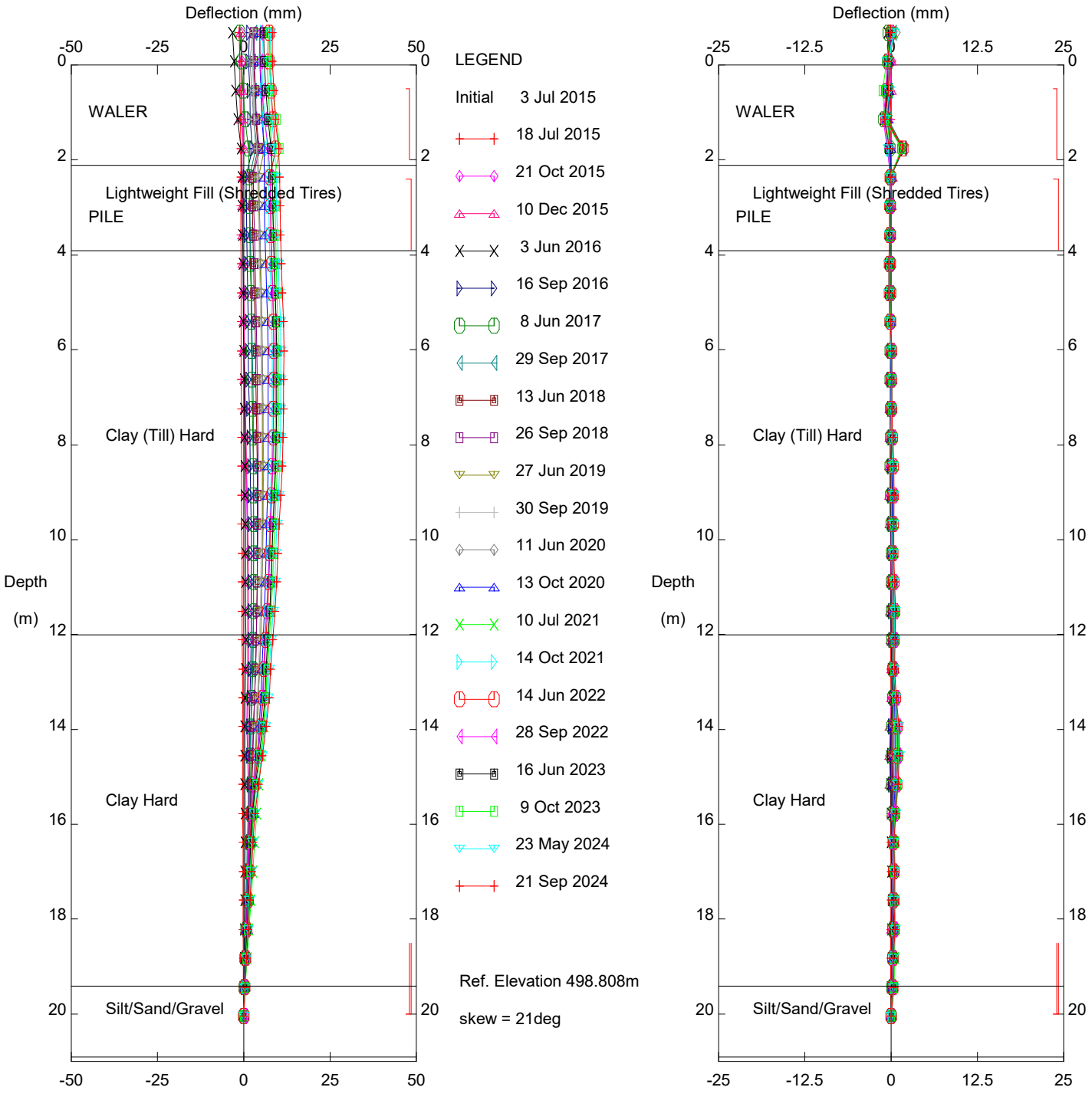

Cumulative Deflection

Direction X

Incremental Deflection

Direction X

PH032 KM 58 (Post Construction), Inclinometer PK80

Alberta Transportation

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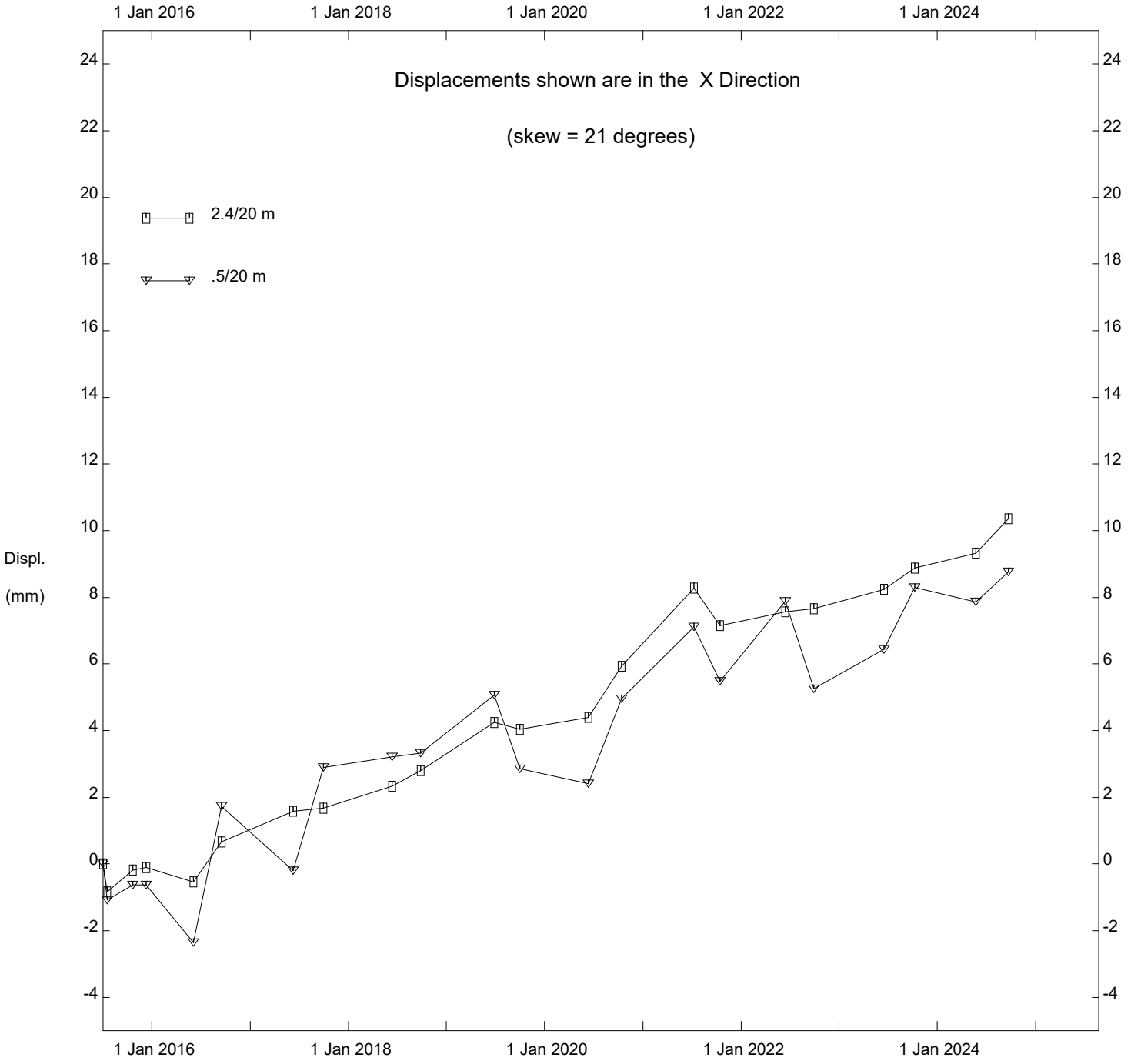

PH032 KM 58 (Post Construction), Inclinometer PK80

Alberta Transportation

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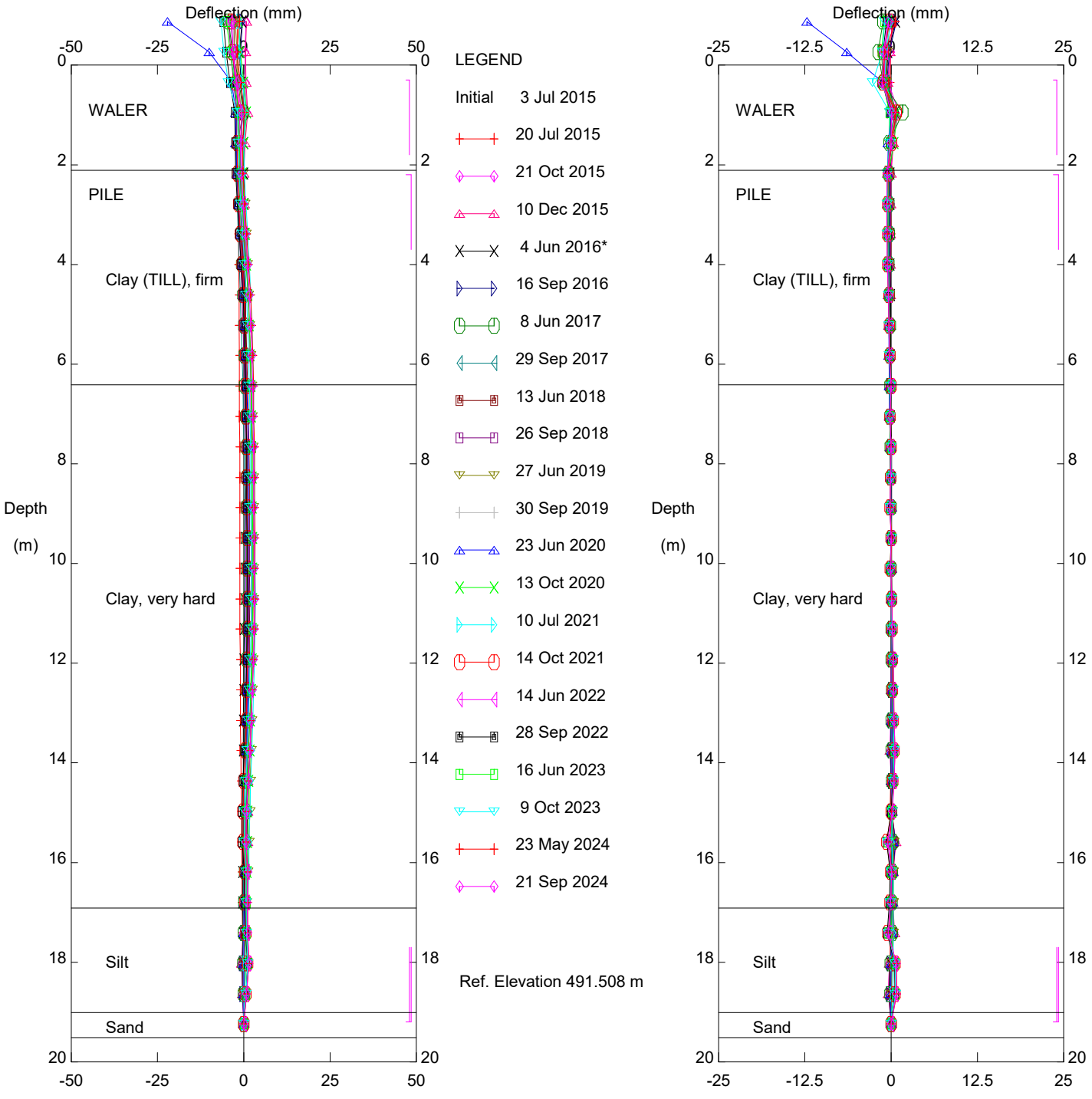

Cumulative Deflection

Direction A

Incremental Deflection

Direction A

PH032 Makeout (Post Construction), Inclinometer PM12

Alberta Transportation

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

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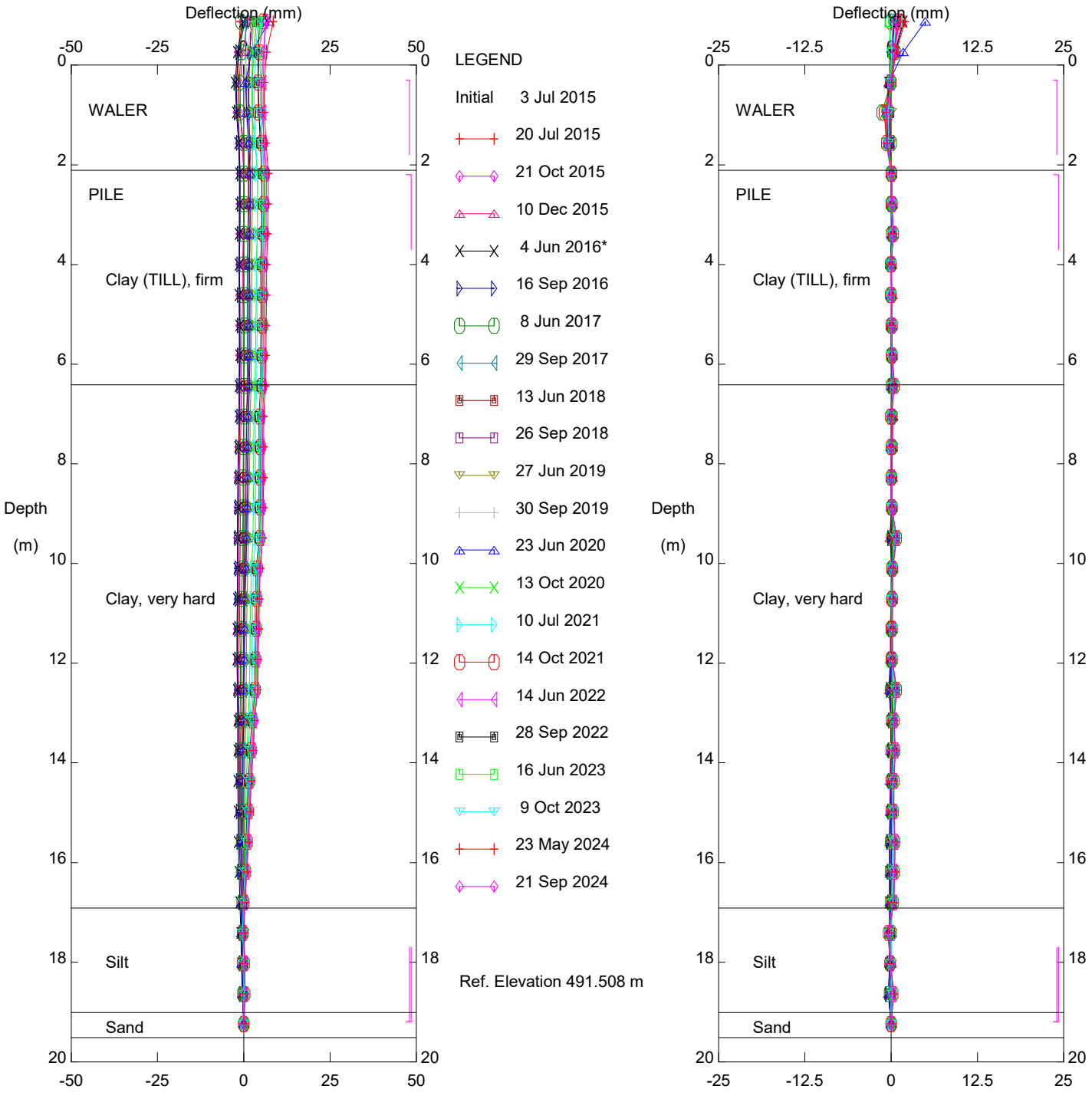
Thurber Engineering Ltd.



Cumulative Deflection

Direction B

Incremental Deflection

Direction B

PH032 Makeout (Post Construction), Inclinometer PM12

Alberta Transportation

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

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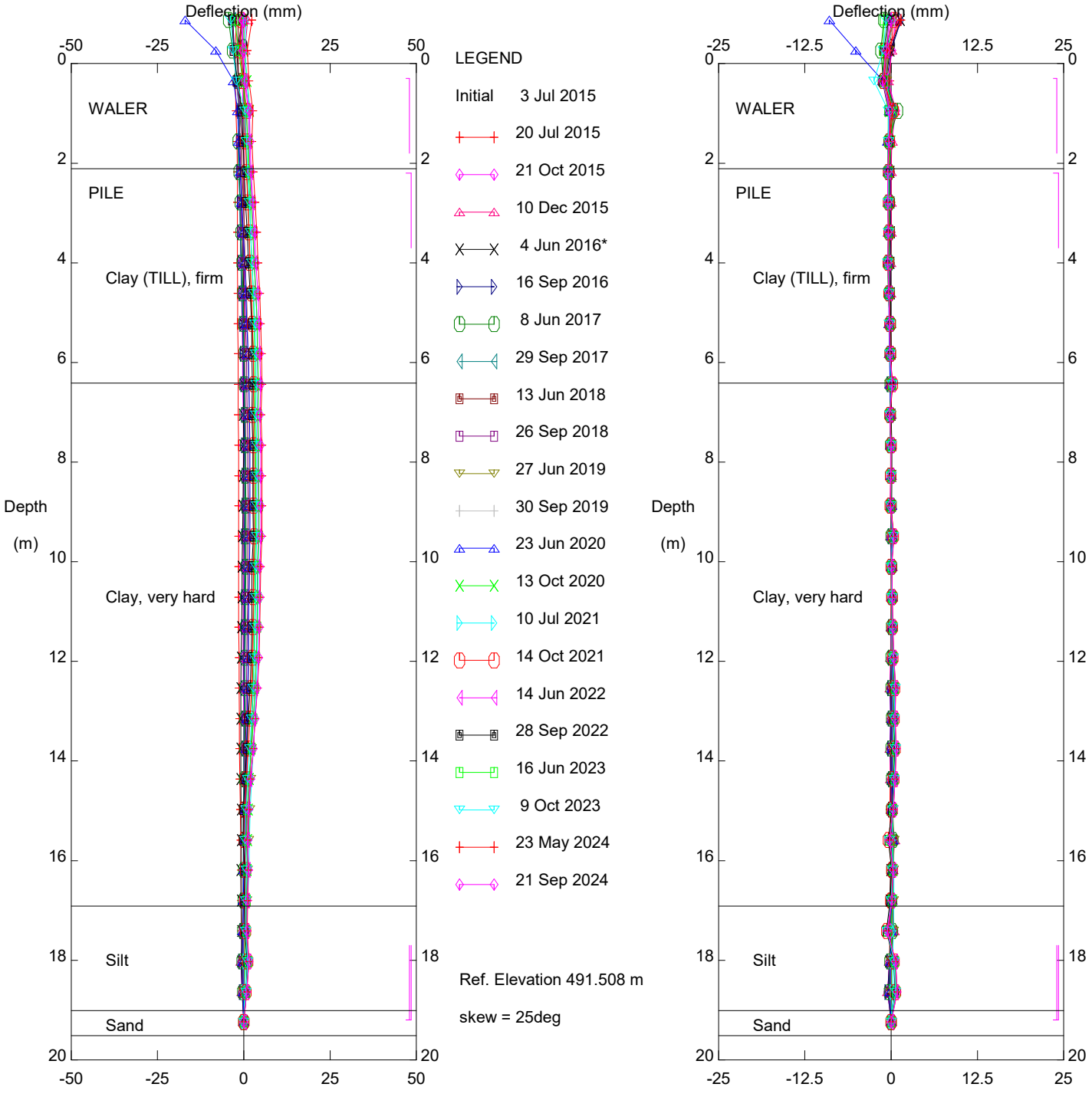

Cumulative Deflection

Direction X

Incremental Deflection

Direction X

PH032 Makeout (Post Construction), Inclinometer PM12

Alberta Transportation

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

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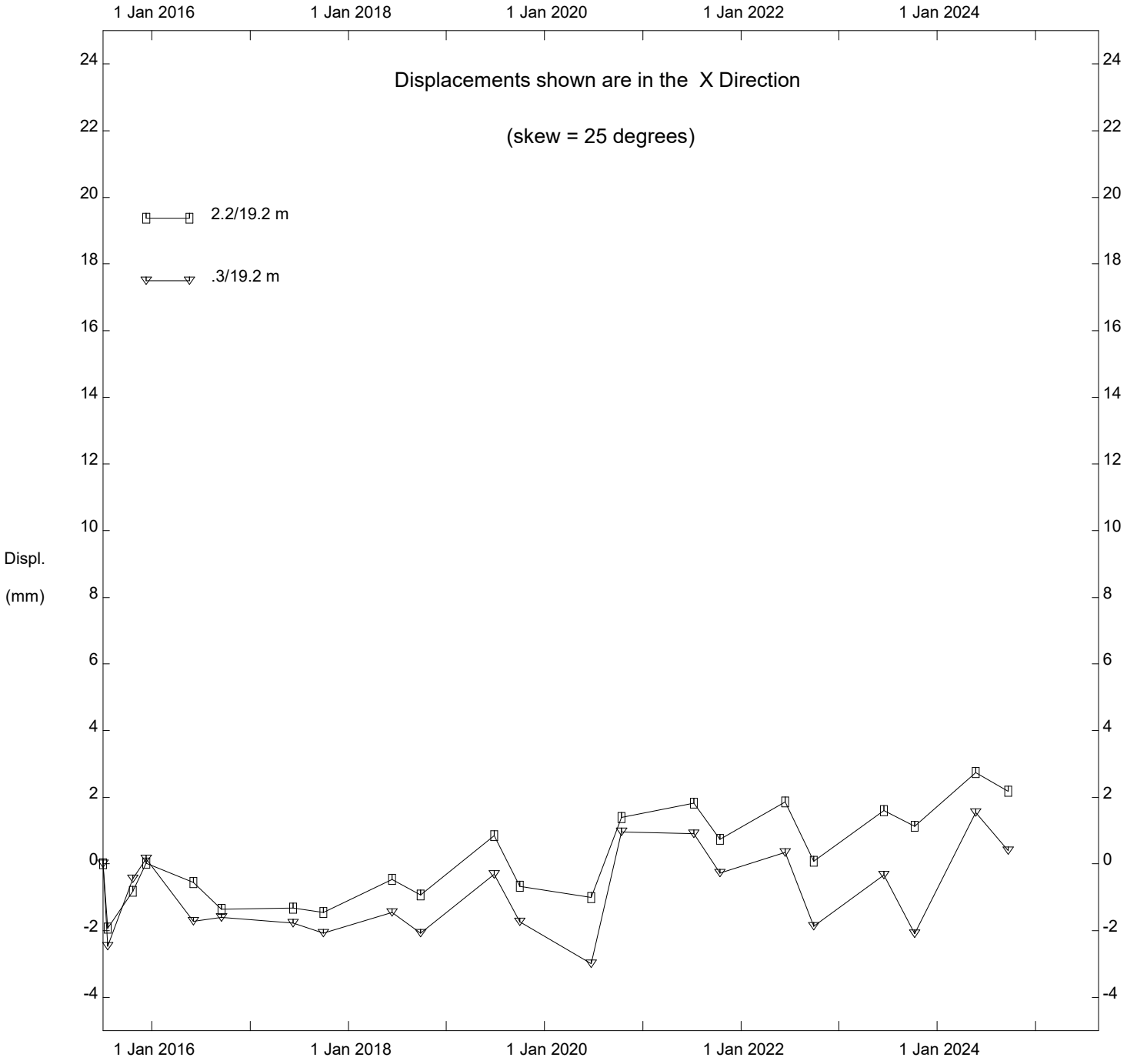

PH032 Makeout (Post Construction), Inclinometer PM12

Alberta Transportation

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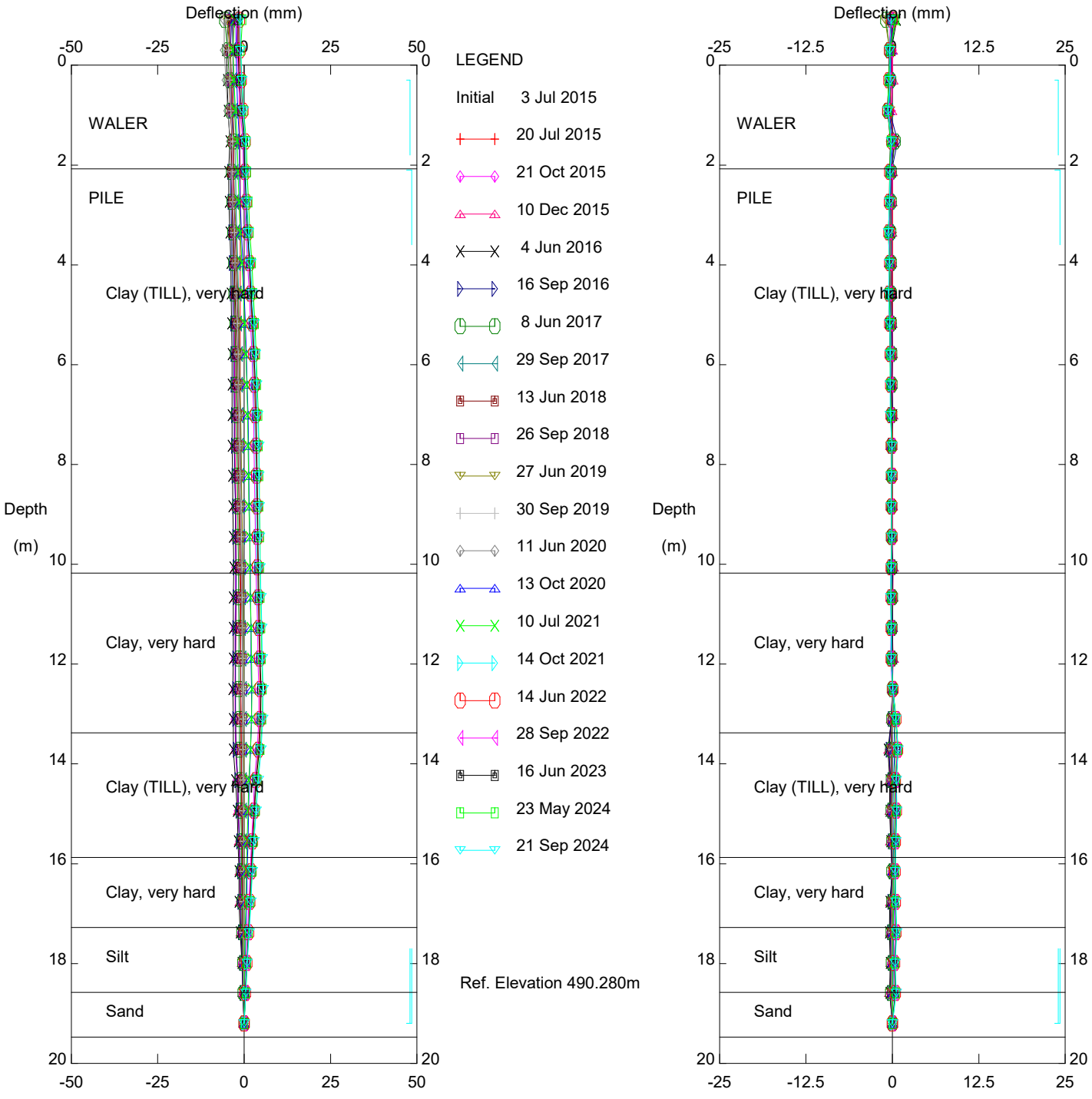

Cumulative Deflection

Direction A

Incremental Deflection

Direction A

PH032 Makeout (Post Construction), Inclinometer PM24

Alberta Transportation

G:\32000\32121 AT GRMP Peace River District 2021-2025\Section C\2024B-Fall\SI Readings\PH032\PM 24.gtl

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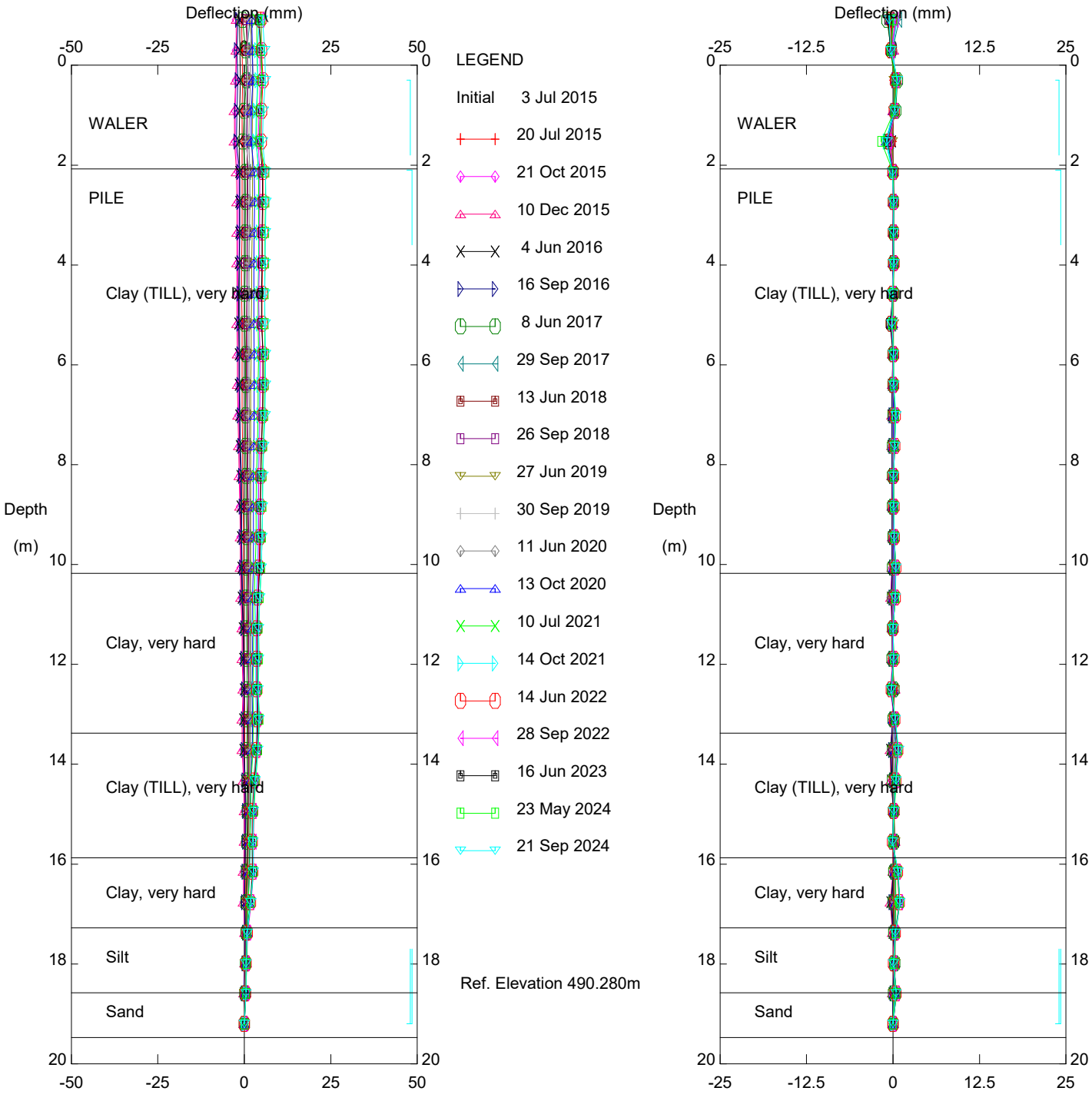

Cumulative Deflection

Direction B

Incremental Deflection

Direction B

PH032 Makeout (Post Construction), Inclinometer PM24

Alberta Transportation

G:\32000\32121 AT GRMP Peace River District 2021-2025\Section C\2024B-Fall\SI Readings\PH032\PM 24.gtl

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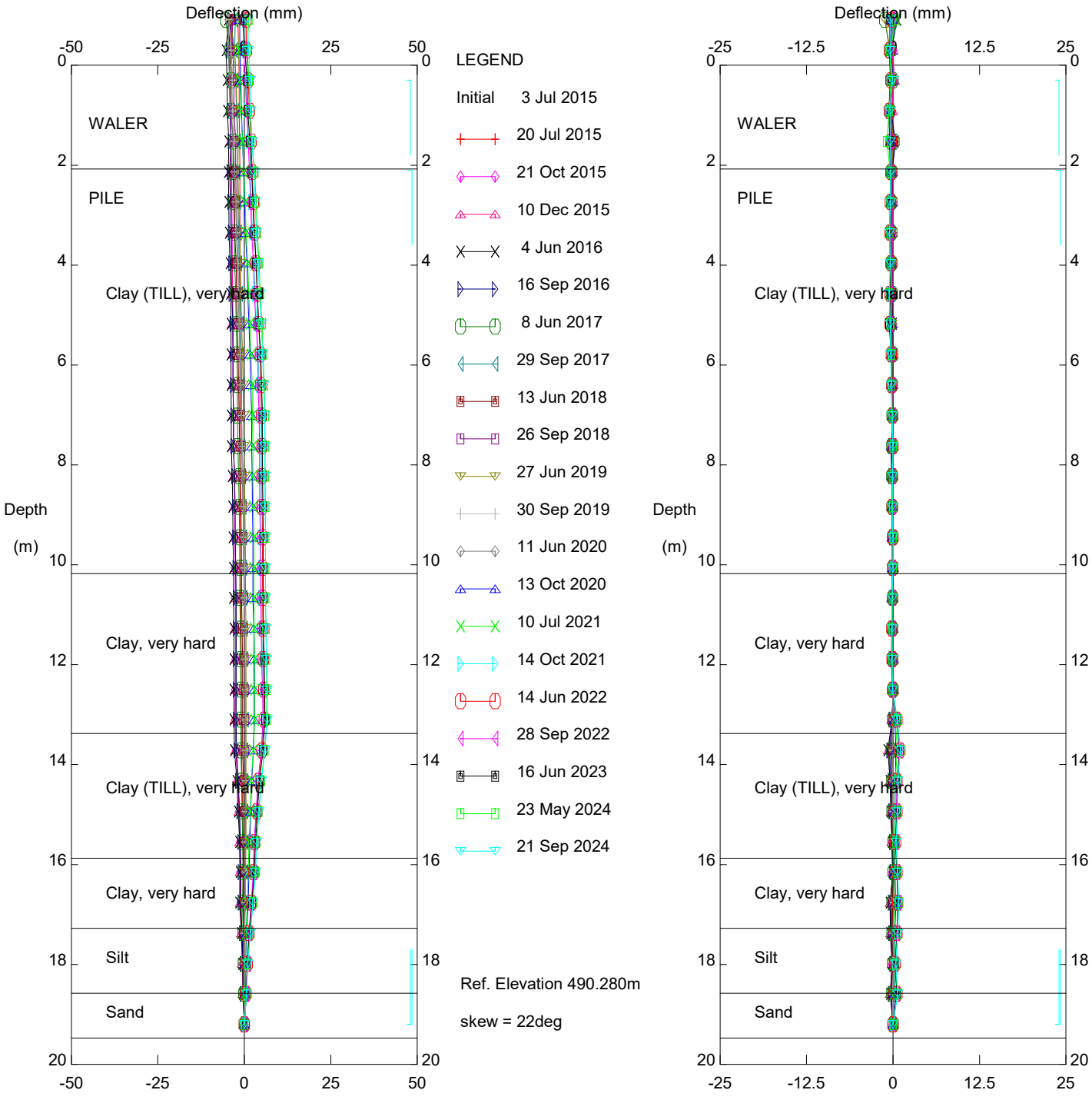

Cumulative Deflection

Direction X

Incremental Deflection

Direction X

PH032 Makeout (Post Construction), Inclinometer PM24

Alberta Transportation

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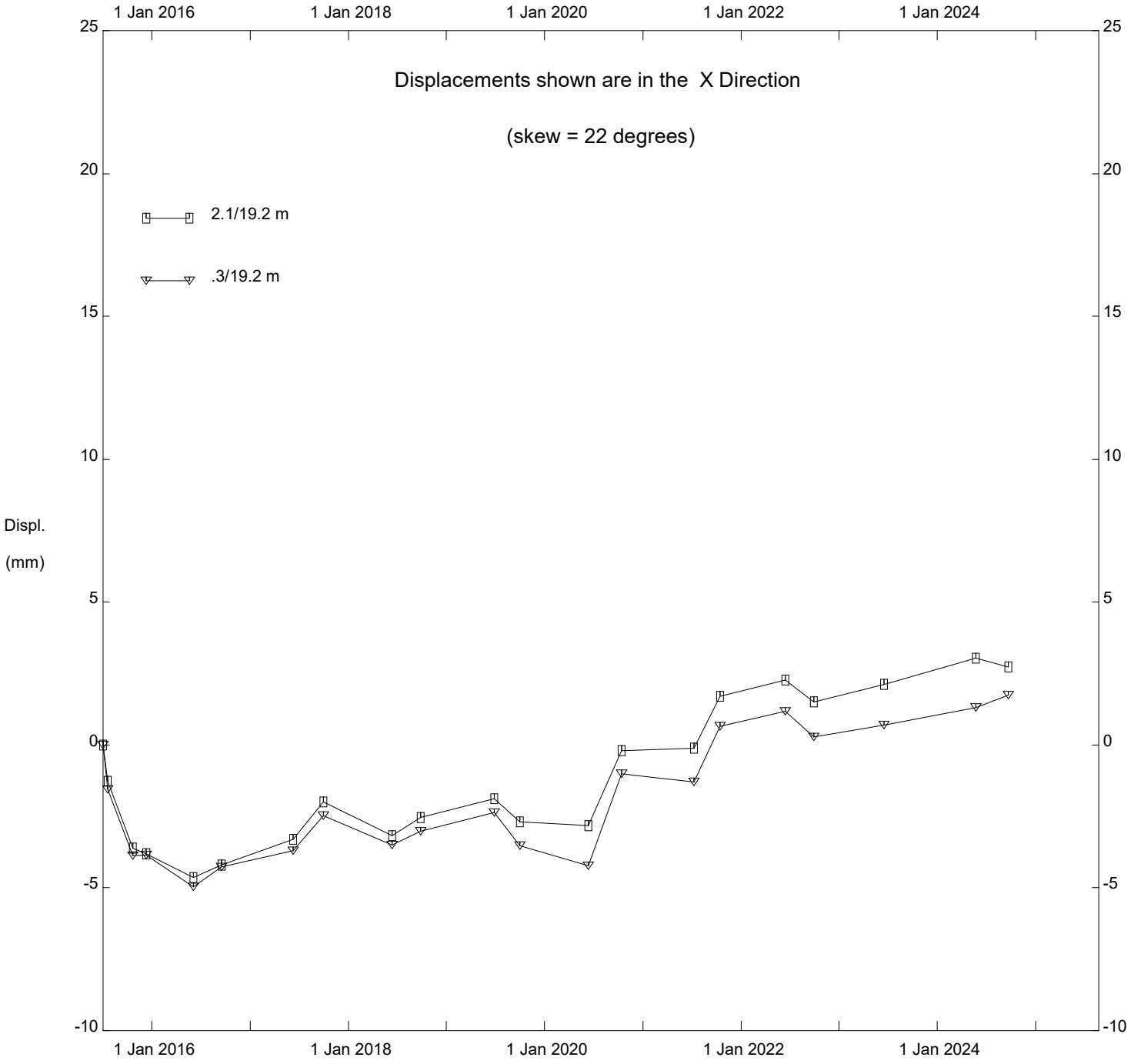


PH032 Makeout (Post Construction), Inclinometer PM24

Alberta Transportation

FIGURE PH032-1
PIEZOMETERIC ELEVATIONS FOR HWY 744:04, JUDAH HILL MAKEOUT SLIDE

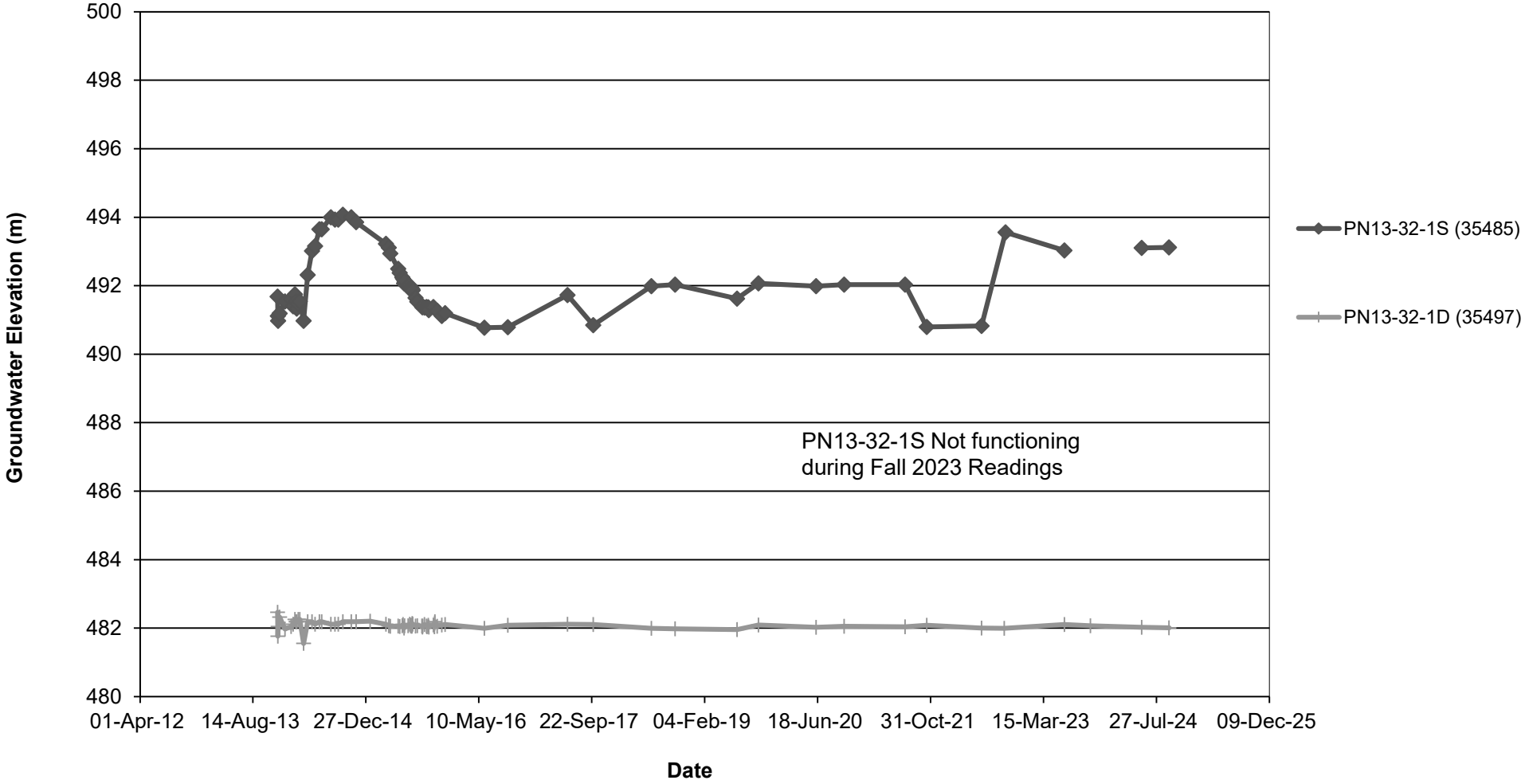


FIGURE PH032-2
PIEZOMETERIC DEPTHS FOR PH032-1: JUDAH HILL MAKEOUT SLIDE

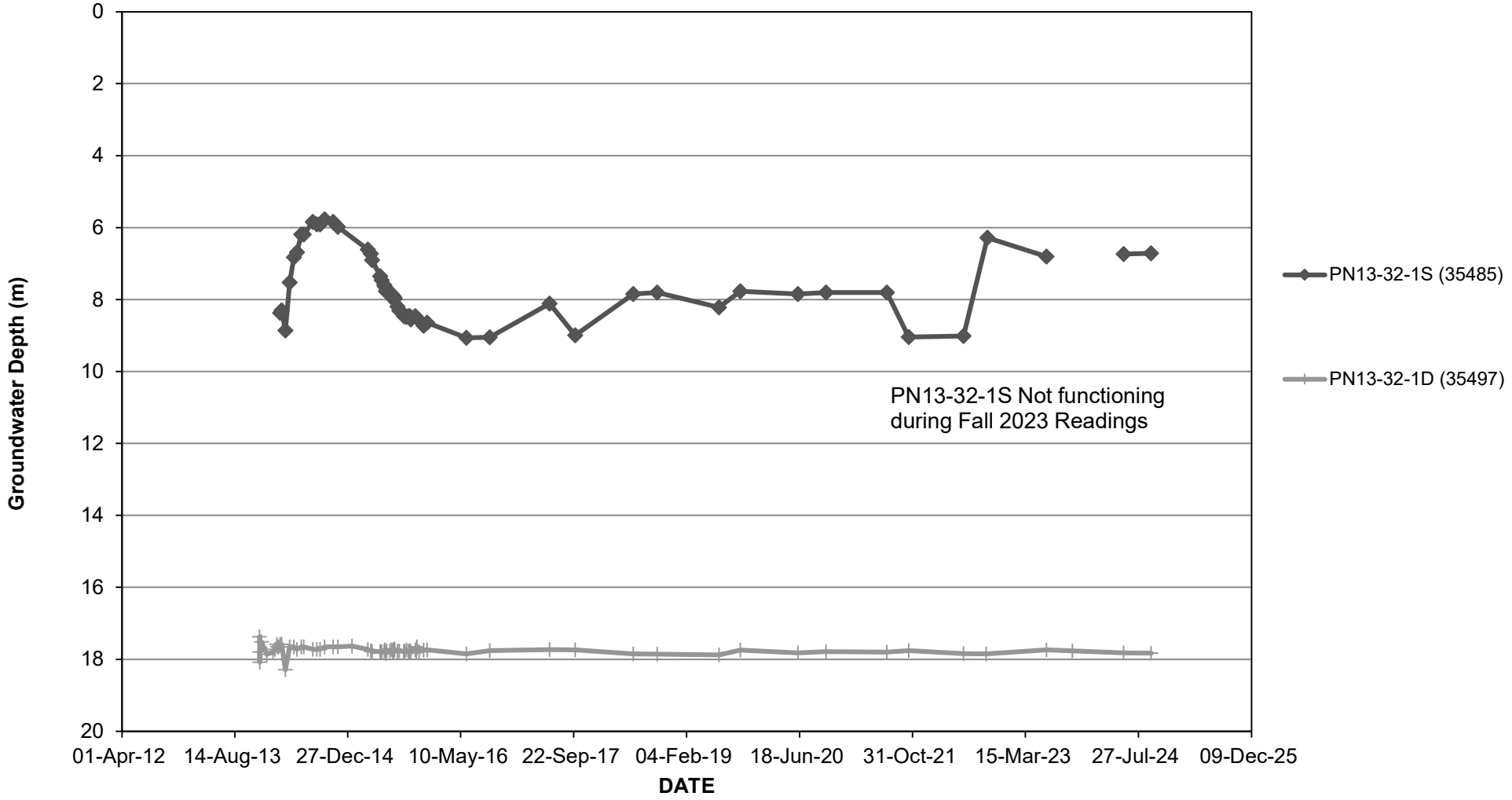
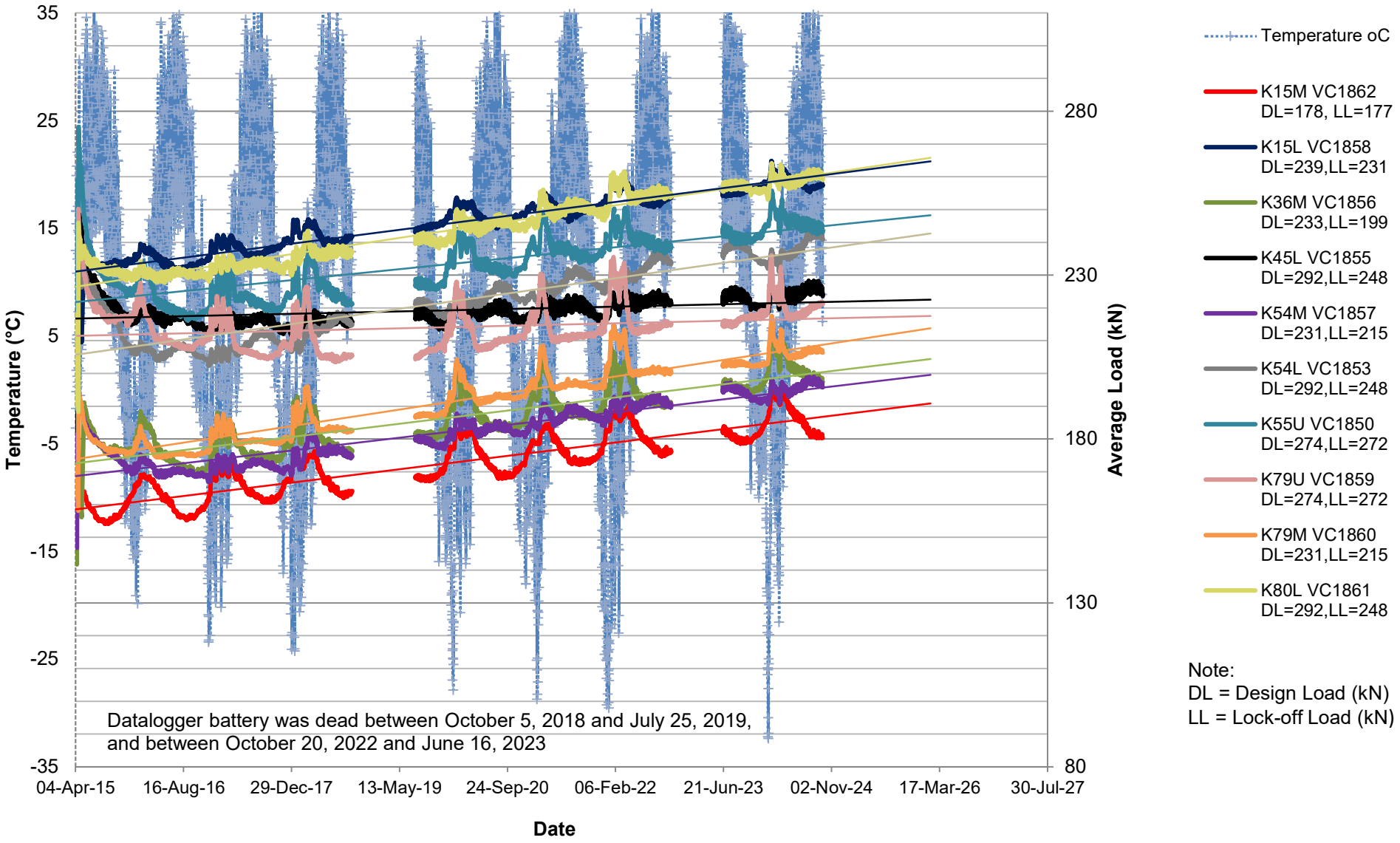
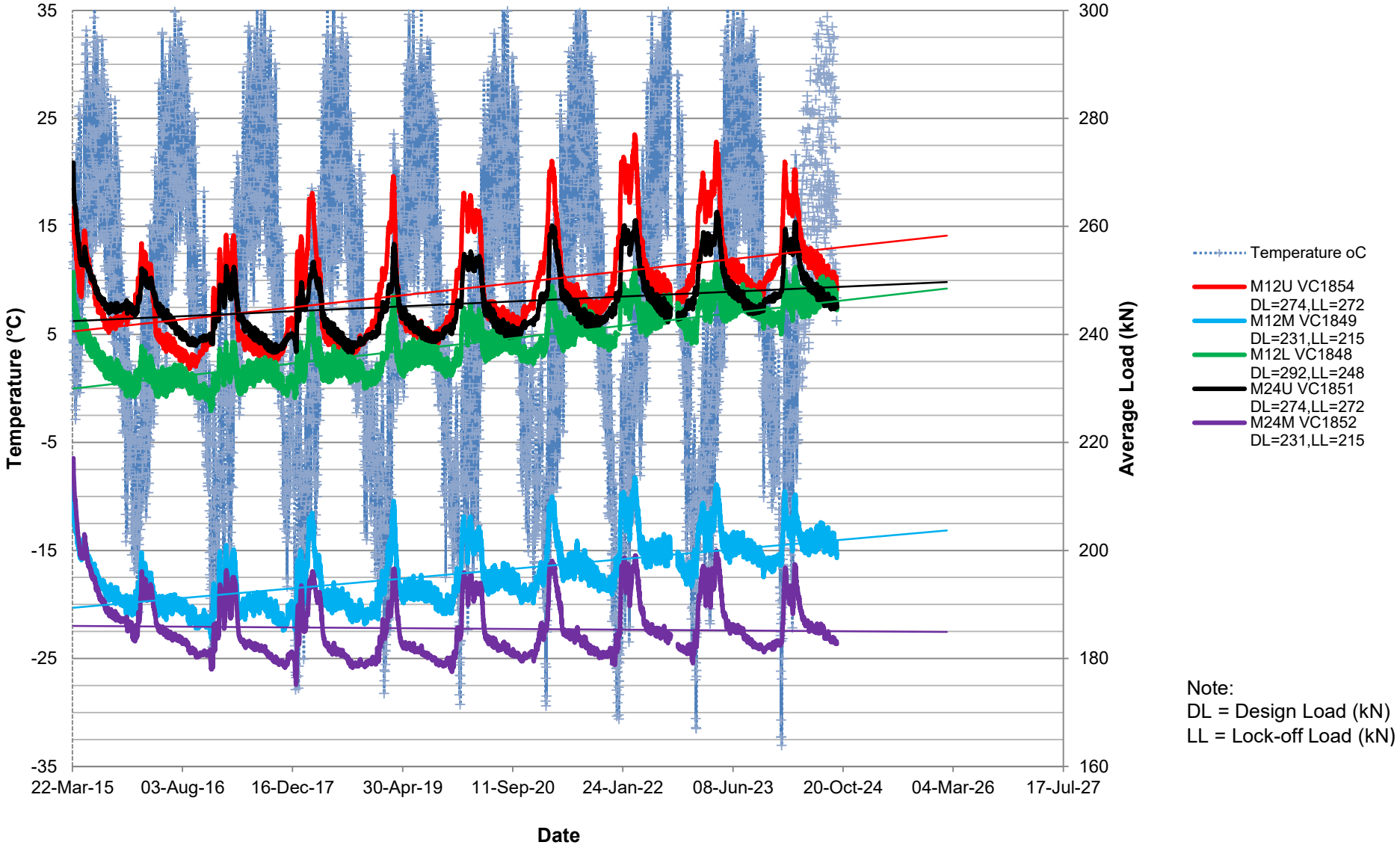


FIGURE PH032-3
LOAD CELL DATA FOR KM 58 PILE WALL



Note:
DL = Design Load (kN)
LL = Lock-off Load (kN)

FIGURE PH032-4
LOAD CELL DATA FOR MAKEOUT PILE WALL



Note:
DL = Design Load (kN)
LL = Lock-off Load (kN)