ECONOMIC CORRIDORS GRMP
NORTH CENTRAL (ATHABASCA AND FORT McMURRAY DISTRICTS)
INSTRUMENTATION MONITORING- SPRING 2024

THURBER ENGINEERING LTD.

Site Number	**Location**	**Name**	**Hwy**	**km**
NC097	HWY 63:12 L1 0.093	Parsons Creek Interchange	63:12	Km 0.09
Legal Description: 12-5-87-10 W6		**UTM Co-ordinates**		
		12V E 473714	N 6293608	

Current Monitoring:	9-June-2024	**Previous Monitoring**	Between 28-May-2023 and 04-Oct-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): SI14-05, SI15-14, SI1409A, SI14-13, SI14-14, SI14-19	**Pneumatic Piezometers (PN):** N/A	**Vibration Wire Piezometers (VW):** PZ14-15, PZ14-19, PZ14-20, PZ14-28a, PZ14-29a, PZ14-30a, PZ14-33, PZ14-34, PZ14-35, PZ14-36, PZ14-37, PZ14-38, PZ14-39, PZ14-40, PZ14-41, PZ14-42, PZ14-43, PZ14-46, PZ14-47, PZ14-48, PZ14-49, PZ14-50, PZ15-03, PZ15-04, PZ15-05, PZ15-06, PZ15-07, PZ15-09, PZ15-10	**Standpipe Piezometers (SP):** N/A
Load Cell (LC): N/A	**Strain Gauges:** N/A	**SAAs:** N/A	**Others:** **Settlement Cells:** (SC14-09, SC14-12, SC15-04, SC15-06)

Readout Equipment Used

Slope Inclinometers: RST Digital Inclinometer probe with a 2 ft. wheelbase and an RST Pocket PC readout	**Pneumatic Piezometers:**	**Vibration Wire Piezometers:** RST VW2106 and a GEOKON GK-404 vibrating wire readout	**Standpipe Piezometers:**
Load Cell:	**Strain Gauges:**	**SAAs:**	**Others:** RST VW2106 and a GEOKON GK-404 vibrating wire readout

Notes:

- SIs plots with A and B directions are presented in Appendix A and summarized in Table NC097-1, attached. Where movement was recorded, the resultant (plot X) and the rate of movement plot are also included.
- Vibrating Wire Piezometer and Settlement Gauge plots are included in Appendix A.
- Vibrating Wire Piezometer readings are summarized in Table NC097-2, attached.
- Settlement Gauge readings are summarized in Table NC097-3, attached.

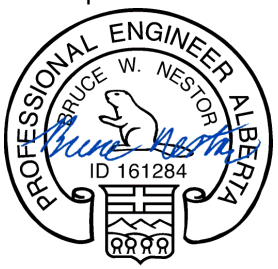
Discussion

Zones of New Movement:	None
Interpretation of Monitoring Results:	***Parsons Interchange:*** Slope inclinometer SI14-05, installed near the west headslope of the bridge, showed a rate of movement of 7.7 mm/yr over 1.5 m to 4.6 m depth and a rate of movement of 0.5 mm/yr over 4.6 m to 9.4 m depth since the fall of 2023 readings. SI15-14 showed a rate of movement of 5.9 mm/yr since it was last read in the spring of 2023 readings. PZ14-15, PZ14-19, and PZ15-10 showed increases in groundwater level of 0.16 m, 0.49 m, and 0.67 m, respectively, since the fall of 2023 readings. PZ15-04, PZ15-05, PZ15-06 and PZ15-07 showed increases in groundwater level of 0.70 m, 0.08 m, 0.06 m and 0.14 m, respectively, since the spring of 2023 readings. PZ15-03 and PZ15-09 were dry during the current readings. Settlement cell SC14-09 showed a decrease in settlement of 24.96 mm compared to the fall of 2023 readings. Settlement cell SC14-12 showed an increase in settlement of 21.62 mm since the fall of 2023 readings. SC14-12 continues to show a trend of settlement increase since January 2021. SC15-04 and SC15-06, which were previously read in the spring of 2023, showed increases in settlement of 10.94 mm and 6.70 mm, respectively. ***Hwy 686 Cut Slope:*** SI14-09A showed a rate of movement of 0.8 mm/yr over 19.5 m to 22.6 m depth since the spring of 2023 readings. SI14-13 showed a rate of movement of 4.6 mm/yr over 10.1 m to 11.3 m depth. SI14-14 showed rates of movement of 6.9 mm/yr and 2.2 mm/yr over 4.0 m to 5.8 m and 9.4 m to 11.3 m depth, respectively. SI14-19 showed no discernible movement since the spring of 2023 readings. PZ14-28a, PZ14-29a, PZ14-30a, PZ14-33, PZ14-34, PZ14-37, PZ14-38, PN14-40 and PZ14-41 showed increases in groundwater level of 0.13 m, 0.44 m, 0.01 m, 1.16 m, 0.1 m, 0.16 m, 0.16 m, 4.51 m and 0.02 m, respectively, since the spring of 2023 readings. The current readings in PN14-30a, PN14-33, and PN14-40 are the highest recorded in these instruments since they were initialized. PZ14-35, PZ14-36, and PZ14-39 showed decreases in groundwater level of 3.47 m, 3.32 m, and 0.02 m, respectively, since the spring of 2023 readings. PZ14-47 showed no change in groundwater level compared to the spring of 2023 readings. PZ14-42, PZ14-43 and PZ14-50 were all dry. PZ14-46, PZ14-48 and PZ14-49 were all previously dry in the spring of 2023 but showed current groundwater levels above their tips of 0.42 m, 0.22 m and 0.13 m, respectively.
Future Work:	The operational instruments at this site should be read again in the spring of 2024. Due to the movement noted within the west headslope of the bridge, it is also recommended that SI14-5, SC14-12, SC14-09, PZ14-19, PZ14-20, PZ14-15, located in the vicinity of the bridge west headslope, be read in the upcoming fall seasons until the end of the GRMP's Contract. During the coming fall visit, another attempt should be made to read PZ14-20 to see if it is malfunctioning.
Instrumentation Repairs:	No instrument repairs are required at this time.
Additional Comments:	

Attachments:	• Table NC097-1 Spring 2024 – HWY 63:12 Parsons Creek Interchange, Slope Inclinometer Instrumentation Reading Summary
	• Table NC097-2 Spring 2024 – HWY 63:12 Parsons Creek Interchange, Vibrating Wire Piezometer Instrumentation Reading Summary
	• Table NC097-3 Spring 2024 – HWY 63:12 Parsons Creek Interchange, Settlement Gauge Instrumentation Reading Summary
	• Statement of Limitations and Conditions
	• APPENDIX A – NC097-1 SPRING 2024
	  ○ Field Inspector's report
	  ○ Site Plan Showing Approximate Instrument Locations (Drawing No. 32122-NC097)
	  ○ Parsons Interchange Instruments
	  ▪ SI Reading Plots
	  ▪ Vibrating Wire Piezometer Plots (Figures PZ1 through PZ6)
	  ▪ Vibrating Wire Settlement Cell Plots (Figures SC1 through SC4)
	  ○ Hwy 686 Cut Sope Instruments
	  ▪ SI Reading Plots
	  ▪ Vibrating Wire Piezometer Plots (Figures 686-1 through 686-13)

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.
Partner | Senior Geotechnical Engineer



2024-07-15

Bruce Nestor, P.Eng.
Geotechnical Engineer

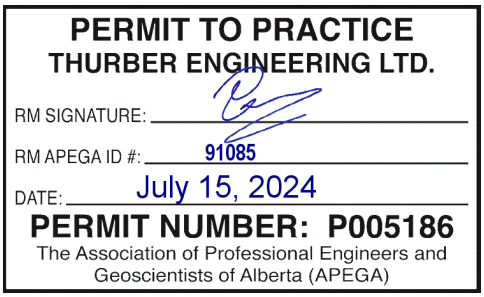


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Table NC097-1: Spring 2024 – Hwy 63:12 Parsons Creek Interchange Slope Inclinometer Instrumentation Reading Summary

Date Monitored: June 9, 2024

INSTRUMENT #	DATE INITIALIZED	TOTAL CUMULATIVE RESULTANT MOVEMENT AND DEPTH OF MOVEMENT TO DATE (mm)	MAXIMUM RATE OF MOVEMENT (mm/yr)	CURRENT STATUS OF SI	DATE OF PREVIOUS READING	INCREMENTAL MOVEMENT SINCE PREVIOUS READING (mm)	CURRENT RATE OF MOVEMENT (mm/yr)	CHANGE IN RATE OF MOVEMENT SINCE PREVIOUS READING (mm/yr)
Parsons Interchange								
SI14-05	August 27, 2014	73.2 mm over 1.5 m to 4.6 m in 98° direction	99.0 on May 28, 2015	Operational	October 4, 2023	5.2	7.7	4.6
		102.0 mm over 4.6 m to 9.4 m in 98° direction	66.2 on October 15, 2014			0.3	0.5	-3.7
SI15-14	May 16, 2015	90.4 over 3.4 m to 12.5 m in 355° direction	877.9 June 22, 2015	Operational	May 28, 2023	6.1	5.9	8.0
HWY 686 Cut Slope								
SI14-09A	May 6, 2014	19.1 over 19.5 m to 22.6 m in 130° direction	26.9 on October 27, 2014	Operational	May 28, 2023	0.8	0.8	1.0
SI14-11	*August 27, 2014*	*41.9 over 4.6 m to 5.8 m in 145° direction*	*34.4 on September 19, 2014*	*Sheared at 4.9 m below top of casing*	*June 26, 2021*	*N/A*	*N/A*	*N/A*
SI14-13	August 24, 2014	45.3 over 10.1 m to 11.3 m in 28° direction	25.4 on October 9, 2014	Operational	May 28, 2023	4.7	4.6	1.5

Drawing 32122-NC097 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

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Table NC097-1 – Continued: Spring 2024 – Hwy 63:12 Parsons Creek Interchange Slope Inclinometer Instrumentation Reading Summary

Date Monitored: June 9, 2024

INSTRUMENT #	DATE INITIALIZED	TOTAL CUMULATIVE RESULTANT MOVEMENT AND DEPTH OF MOVEMENT TO DATE (mm)	MAXIMUM RATE OF MOVEMENT (mm/yr)	CURRENT STATUS OF SI	DATE OF PREVIOUS READING	INCREMENTAL MOVEMENT SINCE PREVIOUS READING (mm)	CURRENT RATE OF MOVEMENT (mm/yr)	CHANGE IN RATE OF MOVEMENT SINCE PREVIOUS READING (mm/yr)
HWY 686 Cut Slope - Continued								
SI14-14	August 24, 2014	49.4 over 4.0 m to 5.8 m in 354° direction	35.6 on September 19, 2014	Operational	May 28, 2023	7.2	6.9	4.6
		23.4 over 9.4 m to 11.3 m in 354° direction	12.1 on September 19, 2014			2.3	2.2	2.4
SI14-16	*August 25, 2014*	*48.8 over 11.9 m to 13.7 m in 138° direction*	*46.9 on September 19, 2014*	*Sheared at 12.8 m below top of casing*	*September 24, 2020*	*N/A*	*N/A*	*N/A*
SI14-18	*April 4, 2014*	*16.2 over 13.1 m to 14.3 m in 26° direction*	*13.0 on September 24, 2020*	*Sheared at 2.7 m below top of casing*	*June 26, 2021*	*N/A*	*N/A*	*N/A*
		13.0 over 27.7 m to 29.6 m in 26° direction	*14.3 on July 16, 2015*			*N/A*	*N/A*	*N/A*
SI14-19	April 2, 2014	63.8 over 5.8 m to 7.6 m in 32° direction	32.0 on August 24, 2014	Operational	May 28, 2023	No discernible movement	N/A	-7.2

Drawing 32122-NC097 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

Table NC097-1 – Continued: Spring 2024 – Hwy 63:12 Parsons Creek Interchange Slope Inclinometer Instrumentation Reading Summary

Date Monitored: June 9, 2024

INSTRUMENT #	DATE INITIALIZED	TOTAL CUMULATIVE RESULTANT MOVEMENT AND DEPTH OF MOVEMENT TO DATE (mm)	MAXIMUM RATE OF MOVEMENT (mm/yr)	CURRENT STATUS OF SI	DATE OF PREVIOUS READING	INCREMENTAL MOVEMENT SINCE PREVIOUS READING (mm)	CURRENT RATE OF MOVEMENT (mm/yr)	CHANGE IN RATE OF MOVEMENT SINCE PREVIOUS READING (mm/yr)
HWY 686 Cut Slope - Continued								
SI15-21	*October 1, 2015*	*87.9 over 2.7 m to 5.2 m in 12° direction*	*82.5 on September 25, 2020*	*Sheared at 3.0 m below top of casing*	*September 25, 2020*	*N/A*	*N/A*	*N/A*
		21.3 over 6.4 m to 8.2 m in 12° direction	*30.9 on October 9, 2015*			*N/A*	*N/A*	*N/A*
		3.6 over 9.4 m to 11.3 m in 12° direction	*8.0 on October 9, 2015*			*N/A*	*N/A*	*N/A*

Drawing 32122-NC097 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

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Table NC097-2: Spring 2024 – Hwy 63:12 Parsons Creek Interchange Vibrating Wire Piezometer Instrumentation Reading Summary

Date Monitored: June 9, 2024

INSTRUMENT #	DATE INITIALIZED	TIP ELEV. (m)	GROUND ELEV. (m)	CURRENT STATUS	MAXIMUM GROUNDWATER ELEV. (m)	CURRENT GROUNDWATER ELEV. (m)	PREVIOUS GROUNDWATER ELEV. (m)	CHANGE IN WATER LEVEL SINCE PREVIOUS READING (m)
Parsons Interchange								
PZ14-15 (30825)	December 1, 2014	247.78	258.75	Operational	260.92 on June 28, 2015	252.72	252.56 (Oct. 4, 2023)	0.16
PZ14-19 (30827)	November 27, 2014	246.35	258.24	Operational	260.97 on June 28, 2015	252.88	252.39 (Oct. 4, 2023)	0.49
PZ14-20 (30828)	November 27, 2014	253.67	258.24	Possibly malfunctioning	262.41 on August 15, 2015	N/A	DRY (Oct. 4, 2023)	N/A
PZ15-03 (31641)	February 6, 2015	256.83	259.35	Operational	261.31 on June 29, 2015	DRY	DRY (May 28, 2023)	N/A
PZ15-04 (31642)	February 6, 2015	247.08	259.35	Operational	260.58 on June 29, 2015	251.96	251.26 (May 28, 2023)	0.70
PZ15-05 (30959)	January 25,2015	258.61	262.27	Operational	268.65 on August 28, 2015	262.17	262.09 (May 28, 2023)	0.08
PZ15-06 (30960)	January 25, 2015	251.60	262.27	Operational	267.25 on August 28, 2015	259.21	259.15 (May 28, 2023)	0.06
PZ15-07 (30961)	January 22, 2015	257.73	262.30	Operational	269.68 on August 23, 2015	262.16	262.02 (May 28, 2023)	0.14
PZ15-09 (30855)	January 21, 2015	257.72	260.16	Operational	269.03 on June 28, 2015	DRY	DRY (Oct. 2, 2023)	N/A
PZ15-10 (30956)	January 21, 2017	254.06	260.16	Operational	272.21 on August 18, 2015	255.88	255.21 (Oct. 2, 2023)	0.67

Drawing 32122-NC097 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

Table NC097-2 – Continued: Spring 2024 – Hwy 63:12 Parsons Creek Interchange Vibrating Wire Piezometer Instrumentation Reading Summary

Date Monitored: June 9, 2024 (Previously monitored May 28, 2023)

INSTRUMENT #	DATE INITIALIZED	TIP ELEV. (m)	GROUND ELEV. (m)	CURRENT STATUS	MAXIMUM GROUNDWATER ELEV. (m)	CURRENT GROUNDWATER ELEV. (m)	PREVIOUS GROUNDWATER ELEV. (m)	CHANGE IN WATER LEVEL SINCE PREVIOUS READING (m)
HWY 686 Cut Slope								
PZ14-28a (28239)	April 29, 2014	323.28	333.43	Operational	325.05 on November 11, 2014	324.19	324.06	0.13
PZ14-29a (28240)	April 29, 2014	313.62	333.43	Operational	315.24 on August 29, 2014	313.88	313.44	0.44
PZ14-30a (28241)	April 29, 2014	307.06	333.43	Operational	310.70 on June 9, 2024	310.70	310.69	0.01
PZ14-31 (29840)	*August 25, 2014*	*307.96*	*324.11*	*Damaged*	*315.24 on February 15, 2015*	*N/A*	*309.57 (June 26, 2021)*	*N/A*
PZ14-32 (29847)	*August 25, 2014*	*314.06*	*324.11*	*Damaged*	*316.44 on October 8, 2014*	*N/A*	*313.98 (June 26, 2021)*	*N/A*
PZ14-33 (29841)	August 25, 2014	307.03	314.03	Operational	310.75 on June 9, 2024	310.75	309.59	0.16
PZ14-34 (21878)	April 2, 2014	326.35	335.86	Operational	328.43 on October 8, 2014	326.63	326.53	0.10
PZ14-35 (21879)	April 2, 2014	316.23	335.86	Operational	322.26 on May 28, 2023	318.79	322.26	-3.47
PZ14-36 (28235)	April 2, 2014	306.78	335.86	Operational	322.18 on May 28, 2023	318.86	322.18	-3.32
PZ14-37 (29842)	August 23, 2014	314.33	324.33	Operational	318.17 on September 25, 2020	314.81	314.65	0.16

Drawing 32122-NC097 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

Table NC097-2 – Continued: Spring 2024 – Hwy 63:12 Parsons Creek Interchange Vibrating Wire Piezometer Instrumentation Reading Summary

Date Monitored: June 9, 2024 (Previously monitored May 28, 2023)

INSTRUMENT #	DATE INITIALIZED	TIP ELEV. (m)	GROUND ELEV. (m)	CURRENT STATUS	MAXIMUM GROUNDWATER ELEV. (m)	CURRENT GROUNDWATER ELEV. (m)	PREVIOUS GROUNDWATER ELEV. (m)	CHANGE IN WATER LEVEL SINCE PREVIOUS READING (m)
HWY 686 Cut Slope - Continued								
PZ14-38 (29848)	August 23, 2014	308.23	324.33	Operational	311.62 on May 29, 2020	308.09	307.93	0.16
PZ14-39 (29843)	August 24, 2014	304.29	314.29	Operational	308.30 on October 8, 2014	304.37	304.39	-0.02
PZ14-40 (18140)	April 3, 2014	321.72	331.90	Operational	331.26 on June 9, 2024	331.26	326.75	4.51
PZ14-41 (21880)	April 3, 2014	314.10	331.90	Operational	322.24 on June 28, 2015	314.13	314.11	0.02
PZ14-42 (28244)	April 3, 2014	296.42	331.90	Operational	296.35 on March 16, 2017	DRY	DRY	N/A
PZ14-43 (29844)	August 25, 2014	303.99	313.99	Operational	304.48 on September 25, 2020	DRY	DRY	N/A
PZ14-45 (29845)	*August 25, 2014*	*296.03*	*304.03*	*Damaged*	*296.82 on September 25, 2020*	*N/A*	*296.82 (Sep. 25, 2020)*	*N/A*
PZ14-46 (28236)	April 3, 2014	317.46	330.67	Operational	318.83 on September 24, 2020	317.88	DRY	N/A
PZ14-47 (28237)	April 3, 2014	311.36	330.67	Operational	313.26 on September 24, 2020	312.18	312.18	0.00
PZ14-48 (28238)	April 3, 2014	295.81	330.67	Operational	300.15 on August 29, 2014	296.03	DRY	N/A

Drawing 32122-NC097 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

Table NC097-2 – Continued: Spring 2024 – Hwy 63:12 Parsons Creek Interchange Vibrating Wire Piezometer Instrumentation Reading Summary

Date Monitored: June 9, 2024 (Previously monitored May 28, 2023)

INSTRUMENT #	DATE INITIALIZED	TIP ELEV. (m)	GROUND ELEV. (m)	CURRENT STATUS	MAXIMUM GROUNDWATER ELEV. (m)	CURRENT GROUNDWATER ELEV. (m)	PREVIOUS GROUNDWATER ELEV. (m)	CHANGE IN WATER LEVEL SINCE PREVIOUS READING (m)
HWY 686 Cut Slope - Continued								
PZ14-49 (17575)	April 1, 2014	300.40	308.45	Operational	305.42 on May 29, 2022	300.53	DRY	N/A
PZ14-50 (18817)	April 1, 2014	294.61	308.45	Operational	294.82 on February 23, 2015	DRY	DRY	N/A

Drawing 32122-NC097 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

THURBER ENGINEERING LTD.

Table NC097-3: Spring 2024 – Hwy 63:12 Parsons Creek Interchange Settlement Gauge Instrumentation Reading Summary

Date Monitored: June 9, 2024

INSTRUMENT #	DATE INITIALIZED	CURRENT STATUS	CURRENT SETTLEMENT (mm)	PREVIOUS SETTLEMENT (mm)	CHANGE IN SETTLEMENT (mm) (1)
Parsons Interchange					
SC14-09	November 27, 2014	Operational	-777.30	-802.26 (Oct. 4, 2023)	-24.96
SC14-12	November 27, 2014	Operational	-1208.56	-1186.94 (Oct. 4, 2023)	21.62
SC15-04	January 25, 2015	Operational	-936.26	-925.32	10.94
SC15-06	January 22, 2015	Operational	-1419.30	-1412.60	6.70

Drawing 32122-NC097 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

(1) Negative (-) change in settlement indicates upward movement (heave) of the ground surface and positive (+) change in settlement indicates downward movement (settlement) of the ground surface.

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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 (CON0022163)
NORTH CENTRAL (ATHABASCA AND FORT McMURRAY DISTRICTS)
INSTRUMENTATION MONITORING RESULTS

SPRING 2024

APPENDIX A
DATA PRESENTATION

SITE NC097: HWY 63:12 PARSONS CREEK INTERCHANGE

ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS
NORTH CENTRAL REGION - ATHABASCA AND FORT McMURRAY DISTRICTS
INSTRUMENTATION MONITORING FIELD SUMMARY (NC097)
SPRING 2024

Location:	Parsons Creek Interchange (Hwy 63:12 L1 0.093)	**Readout:**	
File Number:	32122	**Casing Diameter**	2.75"/3.34"
Probe:	RST SI Set 8R	**Temp:**	15
Cable:	RST SI Set 8R	**Read by:**	NKR/NRM

SLOPE INCLINOMETER (SI) READINGS

SI#	GPS Location 3TM EBA Scaled		Date	Stickup (m)	Depth from top of Casing (ft)	Azimuth of A+ Groove	Current Bottom Depth Readings				Probe/ Reel #	Size (")	Remarks
	Northing	Easting					A+	A-	B+	B-			
Parsons Interchange													
SI14-05	6296408	-26266	09-Jun-24	1.10	30 to 6	85	-87	102	-497	499	8R/8R	3.34	
SI15-14	6296510	-26349	09-Jun-24	1.15	46 to 4	322	1671	-1702	-333	322	8R/8R	2.75	
HWY 686 Cut Slope													
SI14-09A	6296436	-27145	09-Jun-24	0.91	89 to 5	132	-146	158	297	-300	8R/8R	3.34	
SI14-13	6296181	-27073	09-Jun-24	1.04	54 to 6	30	-414	425	467	-491	8R/8R	3.34	
SI14-14	6296236	-27082	09-Jun-24	1.00	36 to 6	356	819	-809	198	207	8R/8R	3.34	
SI14-19	6296200	-26857	09-Jun-24	2.23	52 to 6	349	9	9	96	-100	8R/8R	3.34	

INSPECTOR REPORT

ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS
NORTH CENTRAL REGION - ATHABASCA AND FORT McMURRAY DISTRICTS
INSTRUMENTATION MONITORING FIELD SUMMARY (NC097)
SPRING 2024

Location: Parsons Creek Interchange (Hwy 63:12 L1 0.093)
File Number: 32122

Readout: GK404 SN 364/ VW 2106 Unit 3
Temp:
Read by:

VIBRATING WIRE PIEZOMETER (VW) READINGS

VW#	Date	Reading		Identification	Monitoring	Datalogger	3TM EBA Scaled		Comment
		B Unit	Temp.	Number	Station	Serial	Northing	Easting	
Parsons Interchange									
PZ14-15	09-Jun-24	8477.9	7.6	30825	MS-09	4123	6296421	-26343	
PZ14-19	09-Jun-24	8405.4	-	30827	MS-09	4123	6296421	-26343	
PZ14-20	09-Jun-24	888.9	4.4	30828	MS-09	4123	6296421	-26343	Low B unit reading, likely malfunctioning
PZ15-03	09-Jun-24	8869.9	6.3	31641	MS-08	3881	6296343	-26371	
PZ15-04	09-Jun-24	8426.0	5.3	31642	MS-08	3881	6296343	-26371	
PZ15-05	09-Jun-24	8525.7	5.8	30959	MS-08	3881	6296365	-26435	
PZ15-06	09-Jun-24	8212.3	4.9	30960	MS-08	3882	6296365	-36435	
PZ15-07	09-Jun-24	8423.2	5.0	30961	MS-08	3882	6296365	-26435	
PZ15-09	09-Jun-24	8900.2	4.2	30955	MS-09	4002	6296443	-26415	
PZ15-10	09-Jun-24	8826.4	-	30956	MS-09	4002	6296443	-26415	

INSPECTOR REPORT

ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS
NORTH CENTRAL REGION - ATHABASCA AND FORT McMURRAY DISTRICTS
INSTRUMENTATION MONITORING FIELD SUMMARY (NC097)
SPRING 2024

Location: Parsons Creek Interchange (Hwy 63:12 L1 0.093)
File Number: 32122
Readout: GK 404 SN 364/ VW 2106 Unit 3
Temp (deg C): 10
Read by: NKR

VIBRATING WIRE PIEZOMETER (VW) READINGS

VW#	Date	Reading		Identification	3TM EBA Scaled		Comment
		B Unit	Temp.	Number	Northing	Easting	
HWY 686 Cut Slope							
PZ14-28a	09-Jun-24	8938.1	4.1	28239	6296436	-27145	
PZ14-29a	09-Jun-24	8841.4	3.3	28240	6296436	-27145	
PZ14-30a	09-Jun-24	8756.9	3.2	28241	6296436	-27145	
PZ14-33	09-Jun-24	8693.6	4.8	29841	6296338	-27090	
PZ14-34	09-Jun-24	8745.5	4.1	21878	6296113	-27056	
PZ14-35	09-Jun-24	8547.3	4.2	21879	6296113	-27056	
PZ14-36	09-Jun-24	7856	3.6	28235	6296113	-27056	
PZ14-37	09-Jun-24	8848.8	3.9	29842	6296181	-27073	
PZ14-38	09-Jun-24	8899.5	4.1	29848	6296181	-27073	
PZ14-39	09-Jun-24	9012.1	3.9	29843	6296236	-27082	
PZ14-40	09-Jun-24	8225.4	4.6	18140	6296538	-26935	
PZ14-41	09-Jun-24	8617.3	3.8	21880	6296538	-26935	
PZ14-42	09-Jun-24	8863.3	3.5	28244	6296538	-26935	
PZ14-43	09-Jun-24	8939.8	5	29844	6296434	-26914	
PZ14-46	09-Jun-24	8910.6	3.8	28236	6296077	-26851	
PZ14-47	09-Jun-24	8663.3	3.3	28237	6296077	-26851	
PZ14-48	09-Jun-24	8846.5	3.1	28238	6296077	-26851	
PZ14-49	09-Jun-24	8782.2	4.3	17575	6296200	-26857	
PZ14-50	09-Jun-24	8793.4	3.9	18817	6296200	-26857	

INSPECTOR REPORT

ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS
NORTH CENTRAL REGION - ATHABASCA AND FORT McMURRAY DISTRICTS
INSTRUMENTATION MONITORING FIELD SUMMARY (NC097)
SPRING 2024

Location: Parsons Creek Interchange (Hwy 63:12 L1 0.093)
File Number: 32122

Readout: GK 404 SN 364/ VW 2106 Unit 3
Temp:
Read by:

SETTLEMENT CELL READINGS

SC#	Date	Reading		Identification	Monitoring	Datalogger	3TM EBA Scaled		Comment
		B Unit	Temp.	Number	Station	Serial	Northing	Easting	
Parsons Interchange									
SC14-09	09-Jun-24	7615.1	4.9	1426083	MS-09	4002	6296382	-26336	
SC14-12	09-Jun-24	7445.9	5.1	1426084	MS-09	4001	6296421	-26343	
SC15-04	09-Jun-24	7495.4	4.6	1426091	MS-08	3881	6296365	-26435	
SC15-06	09-Jun-24	8423.2	5.0	1426092	MS-08	3882	6296404	-26442	

INSPECTOR REPORT

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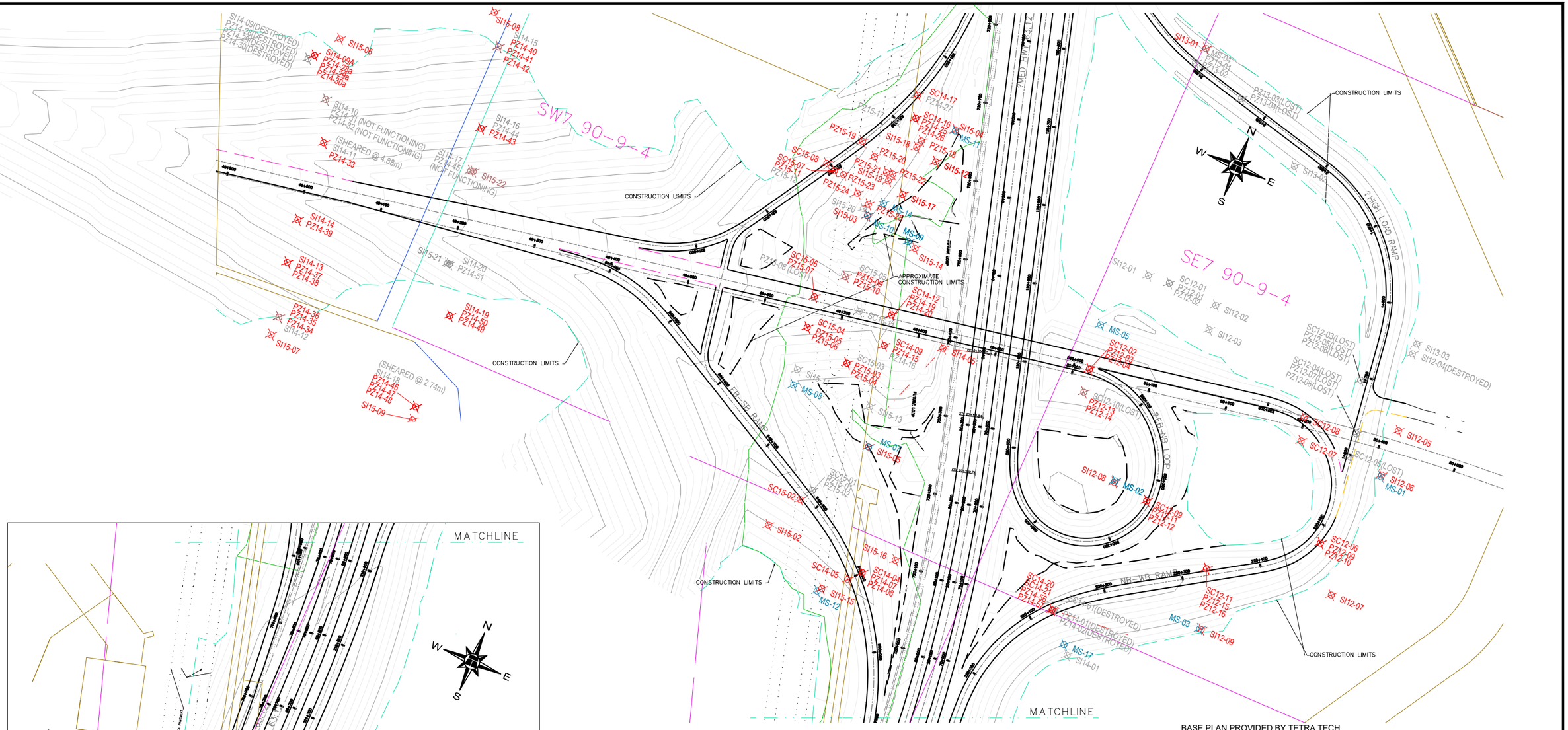


LEGEND

⊠	APPROXIMATE INSTRUMENT LOCATION
SI	STANDPIPE PIEZOMETER
SC	SETTLEMENT CELL
PZ	VIBRATING WIRE PIEZOMETER
MS	MONITORING STATION

0 50 100 150 200 250 300m

SCALE 1:5000

BASE PLAN PROVIDED BY TETRA TECH

Alberta

NORTH CENTRAL
(ATHABASCA AND FORT MCMURRAY DISTRICTS)

NC097: HWY 63:12 PARSONS CREEK INTERCHANGE
SITE PLAN SHOWING INSTRUMENT LOCATIONS

DWG No. 32122-NC097

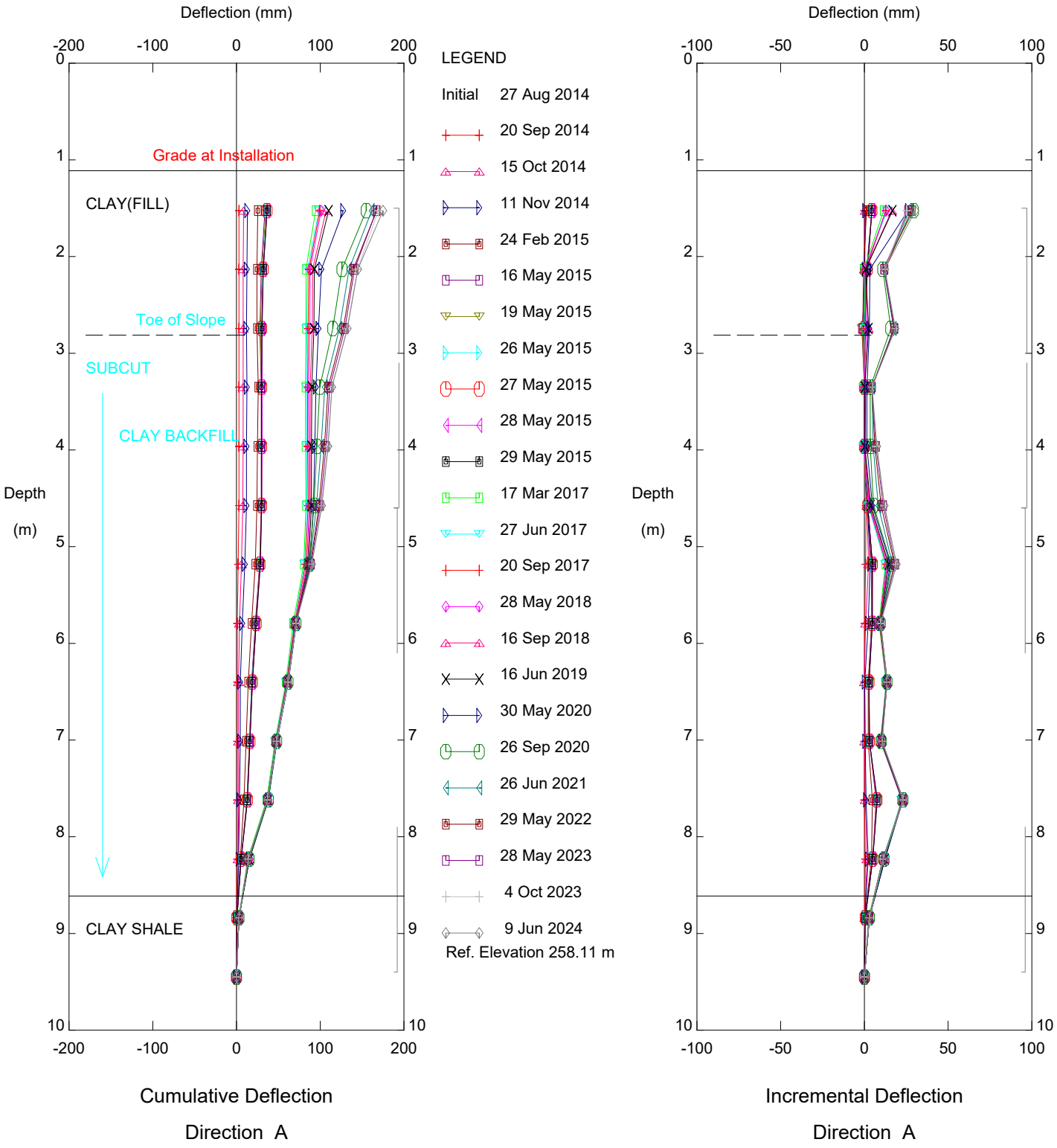
DRAWN BY	ML
DESIGNED BY	BWN
APPROVED BY	TSA
SCALE	1:5000
DATE	JUNE 2022
FILE No.	32122

THURBER ENGINEERING LTD.

THURBER ENGINEERING LTD.

Parsons Interchange Instruments

Thurber Engineering Ltd



Cumulative Deflection

Direction A

Incremental Deflection

Direction A

Hwy 686, 49+833.7 o/s +6.6m, Inclinometer SI14-05

Alberta Transportation

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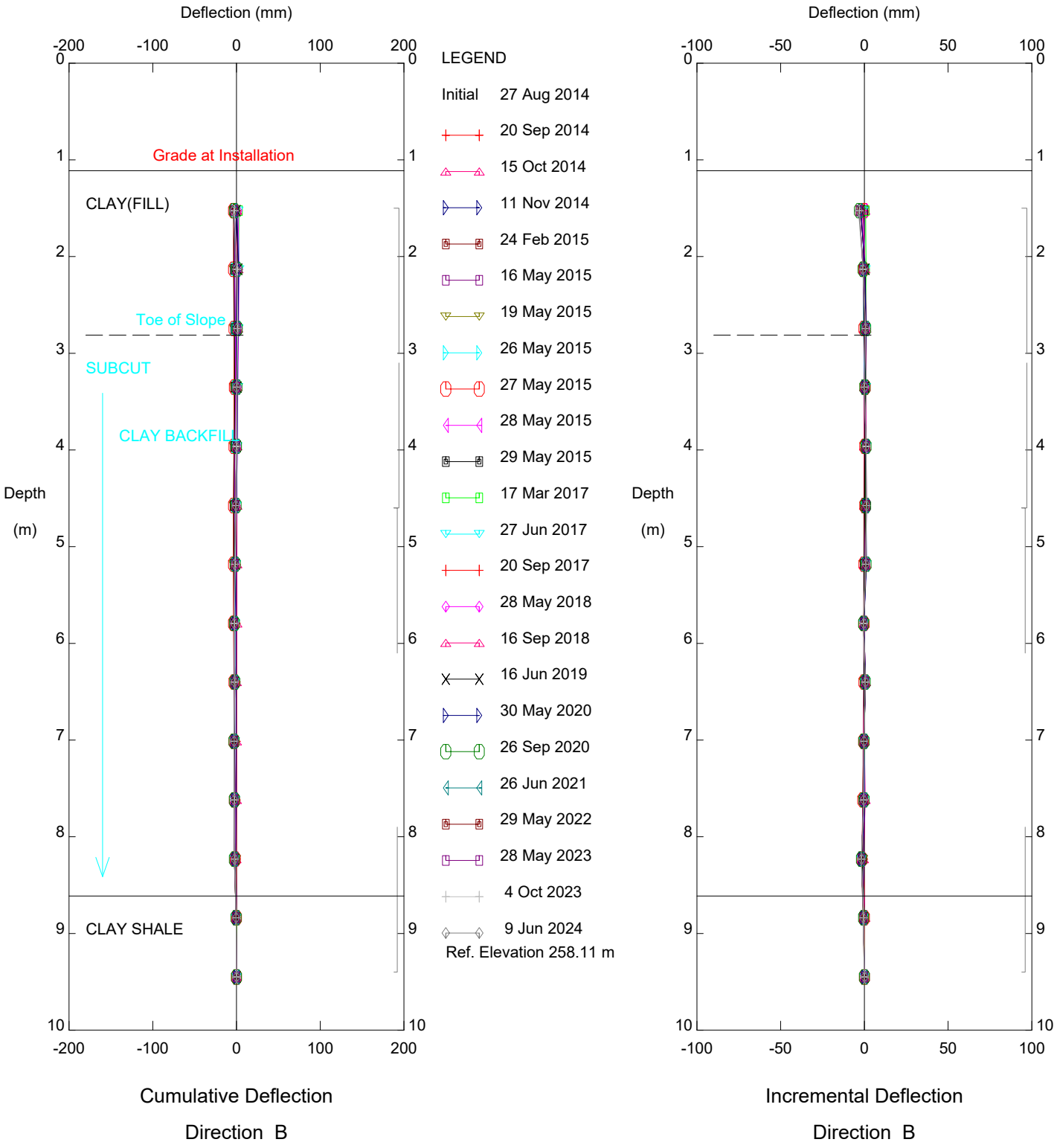
Thurber Engineering Ltd



Cumulative Deflection

Direction B

Incremental Deflection

Direction B

Hwy 686, 49+833.7 o/s +6.6m, Inclinometer SI14-05

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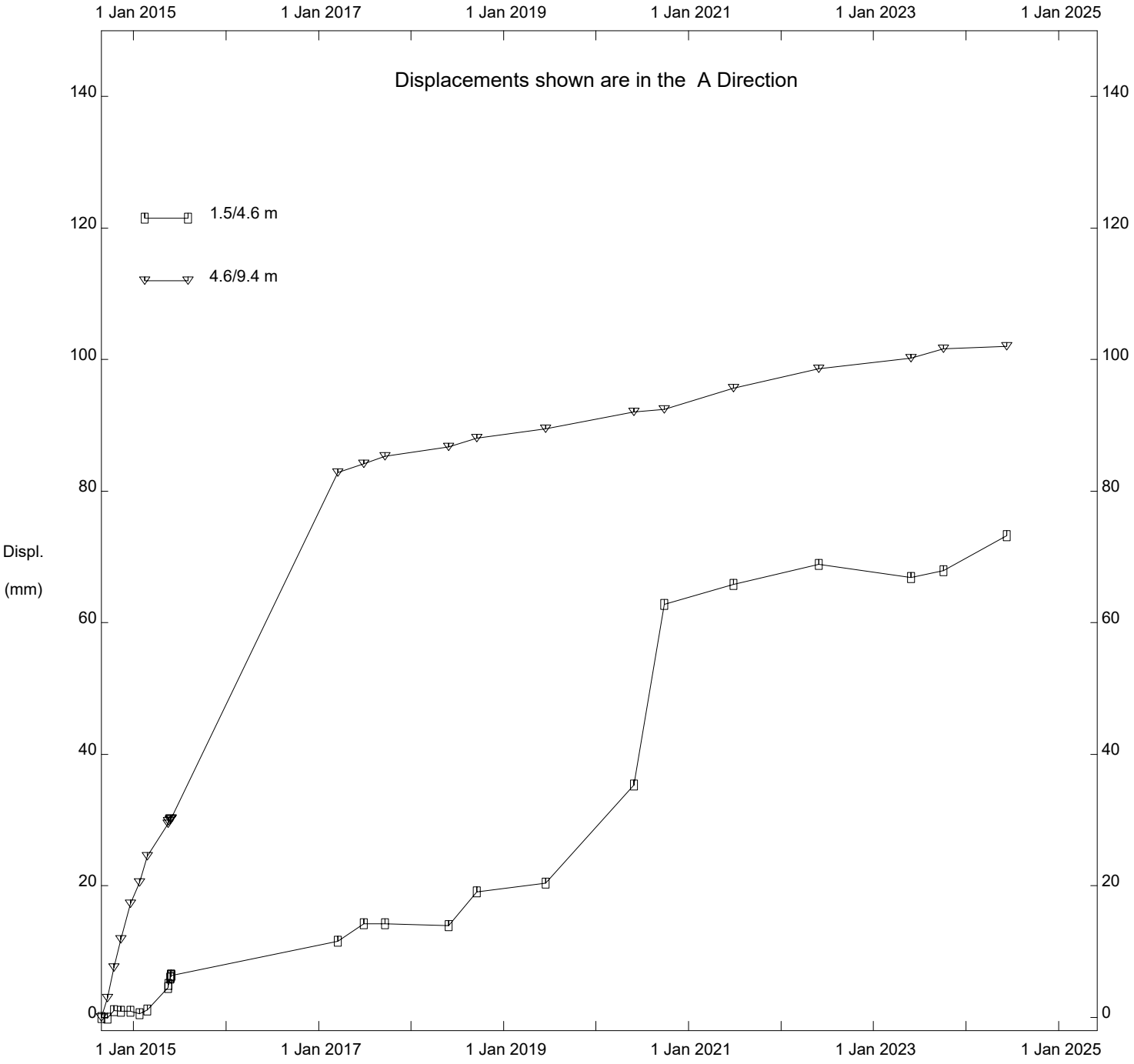
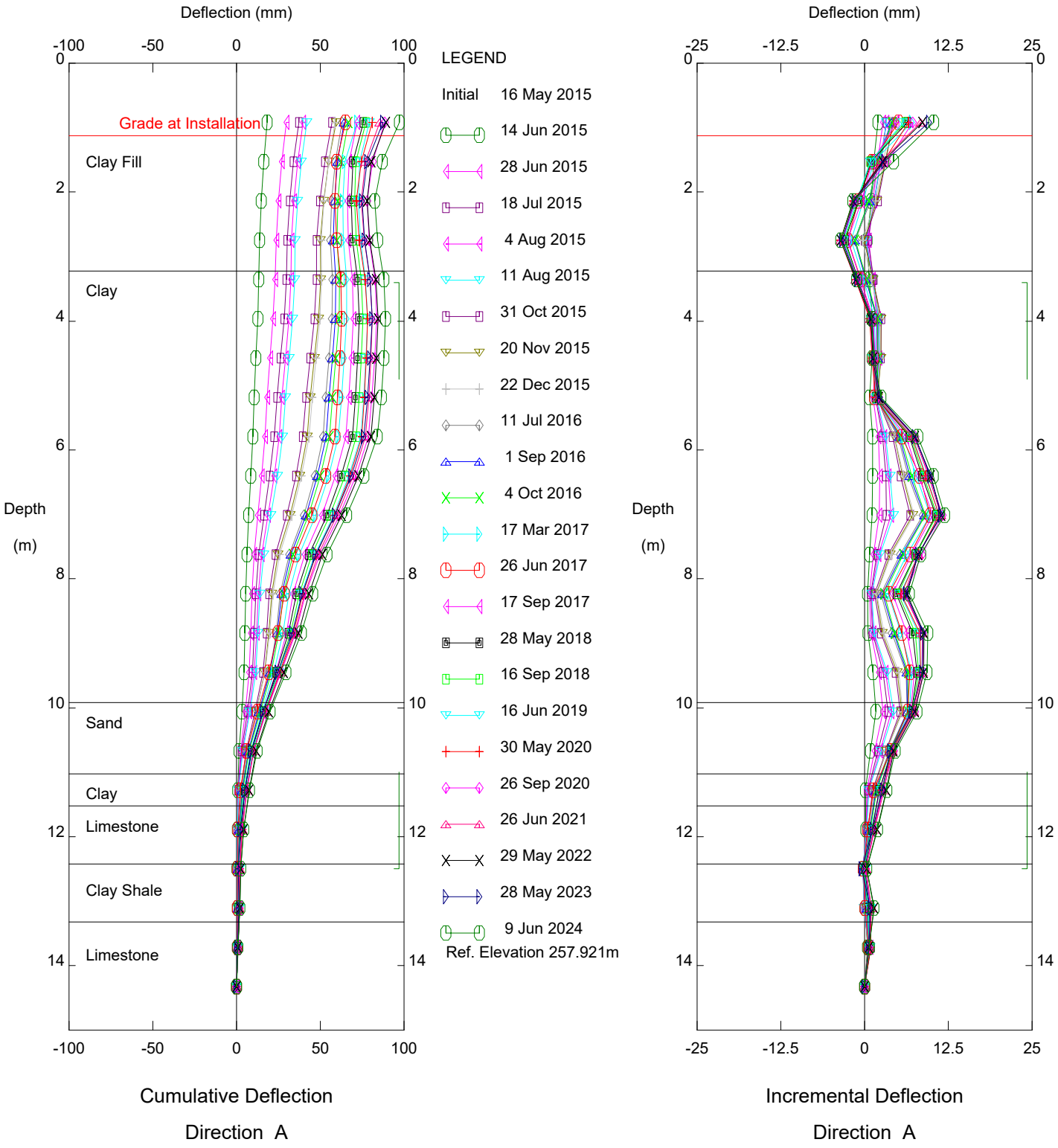


Hwy 686, 49+833.7 o/s +6.6m, Inclinometer SI14-05

Alberta Transportation

Thurber Engineering Ltd



Cumulative Deflection

Direction A

Incremental Deflection

Direction A

Hwy 686, 49+760 o/s -110m, Inclinometer SI15-14

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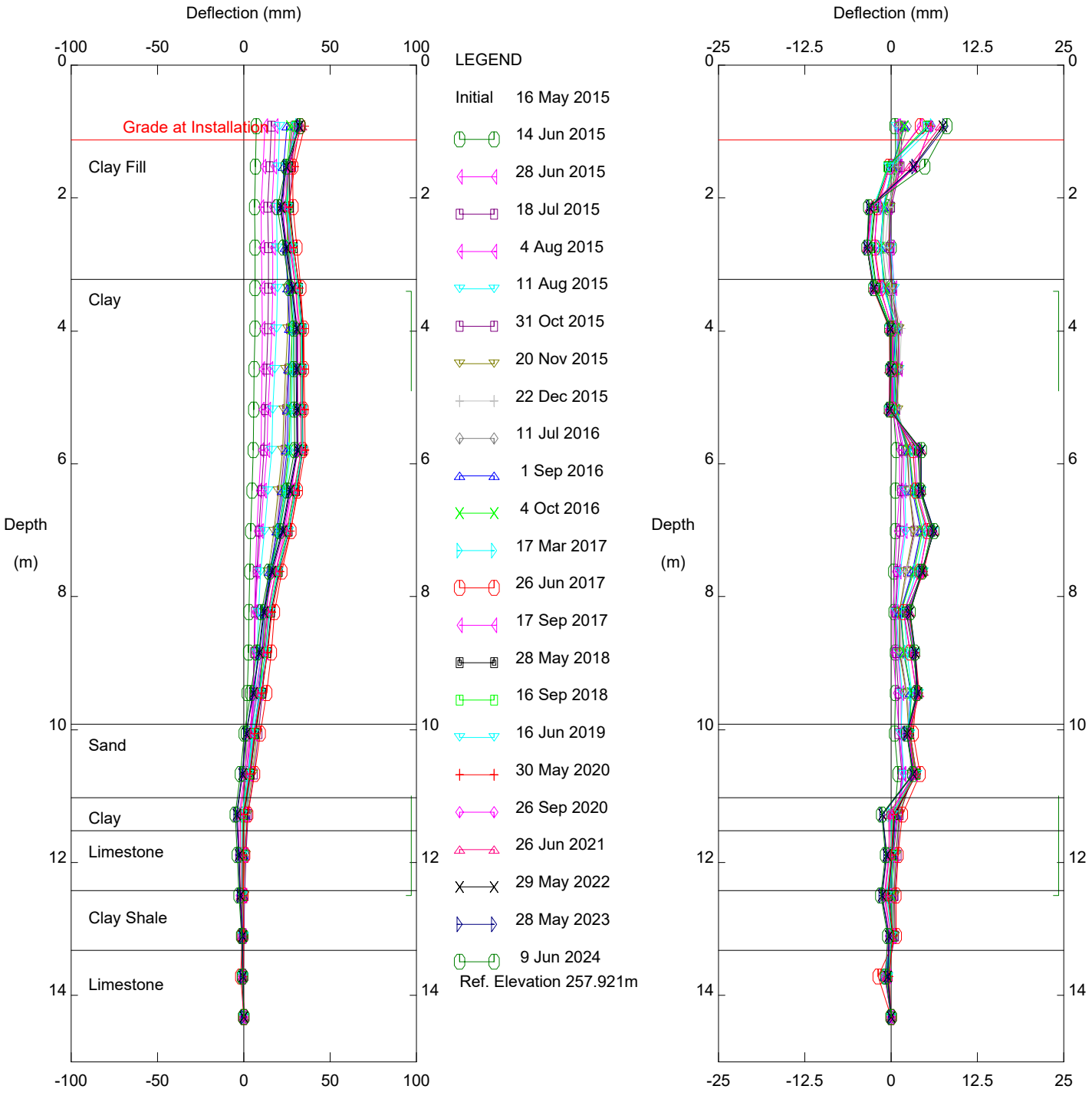

Cumulative Deflection

Direction B

Incremental Deflection

Direction B

Hwy 686, 49+760 o/s -110m, Inclinometer SI15-14

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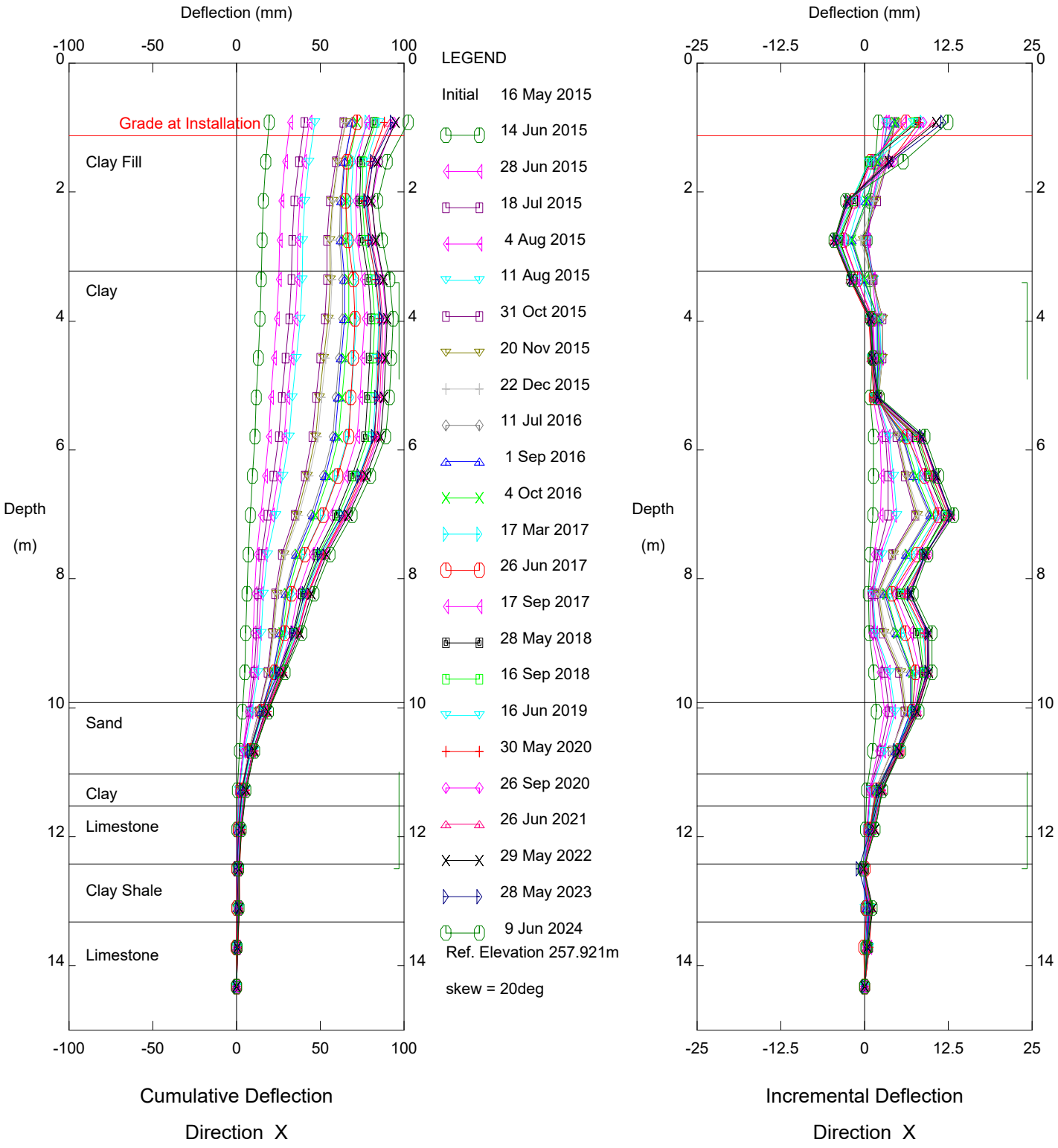

Cumulative Deflection

Direction X

Incremental Deflection

Direction X

Hwy 686, 49+760 o/s -110m, Inclinometer SI15-14

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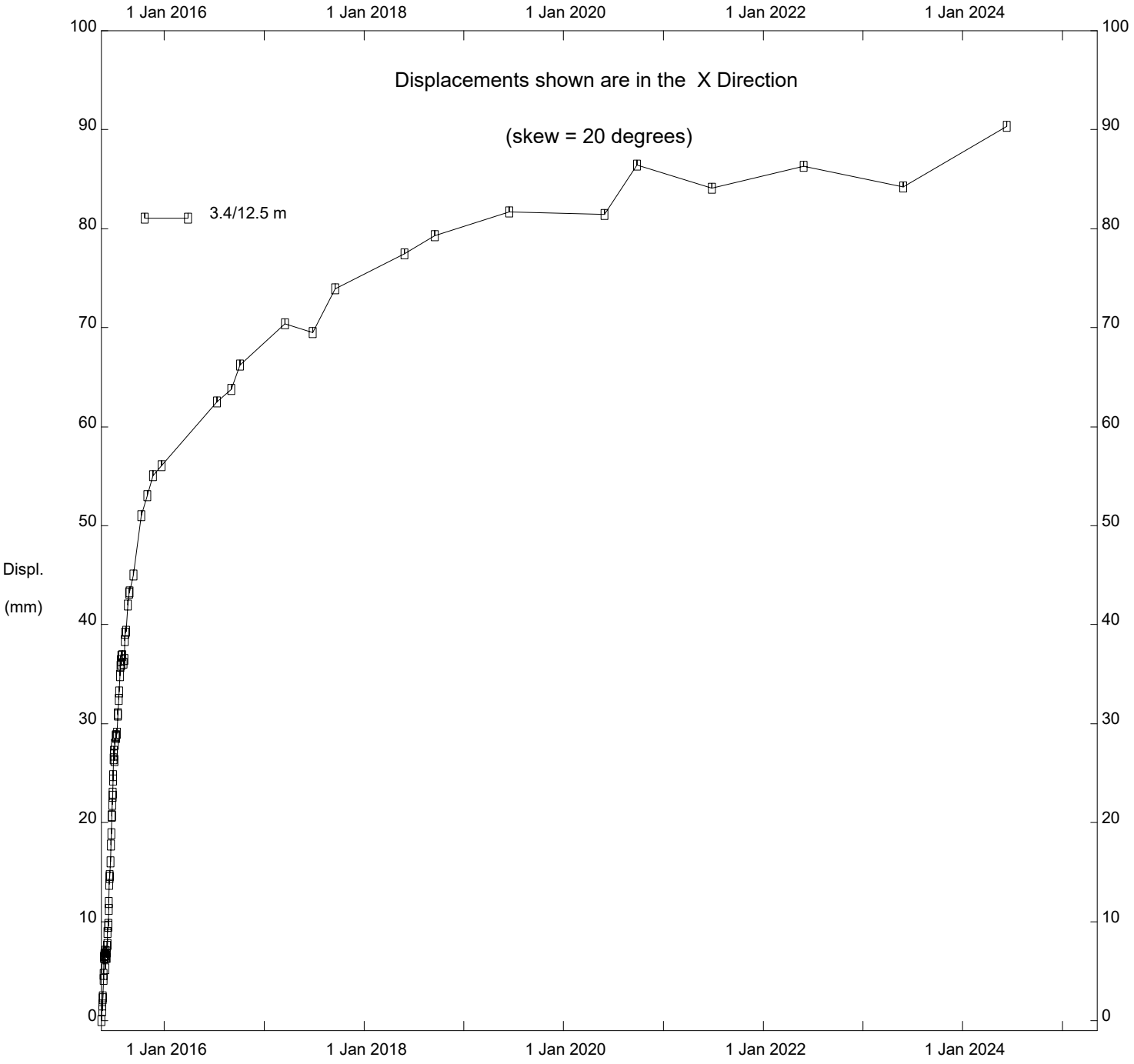

Hwy 686, 49+760 o/s -110m, Inclinometer SI15-14

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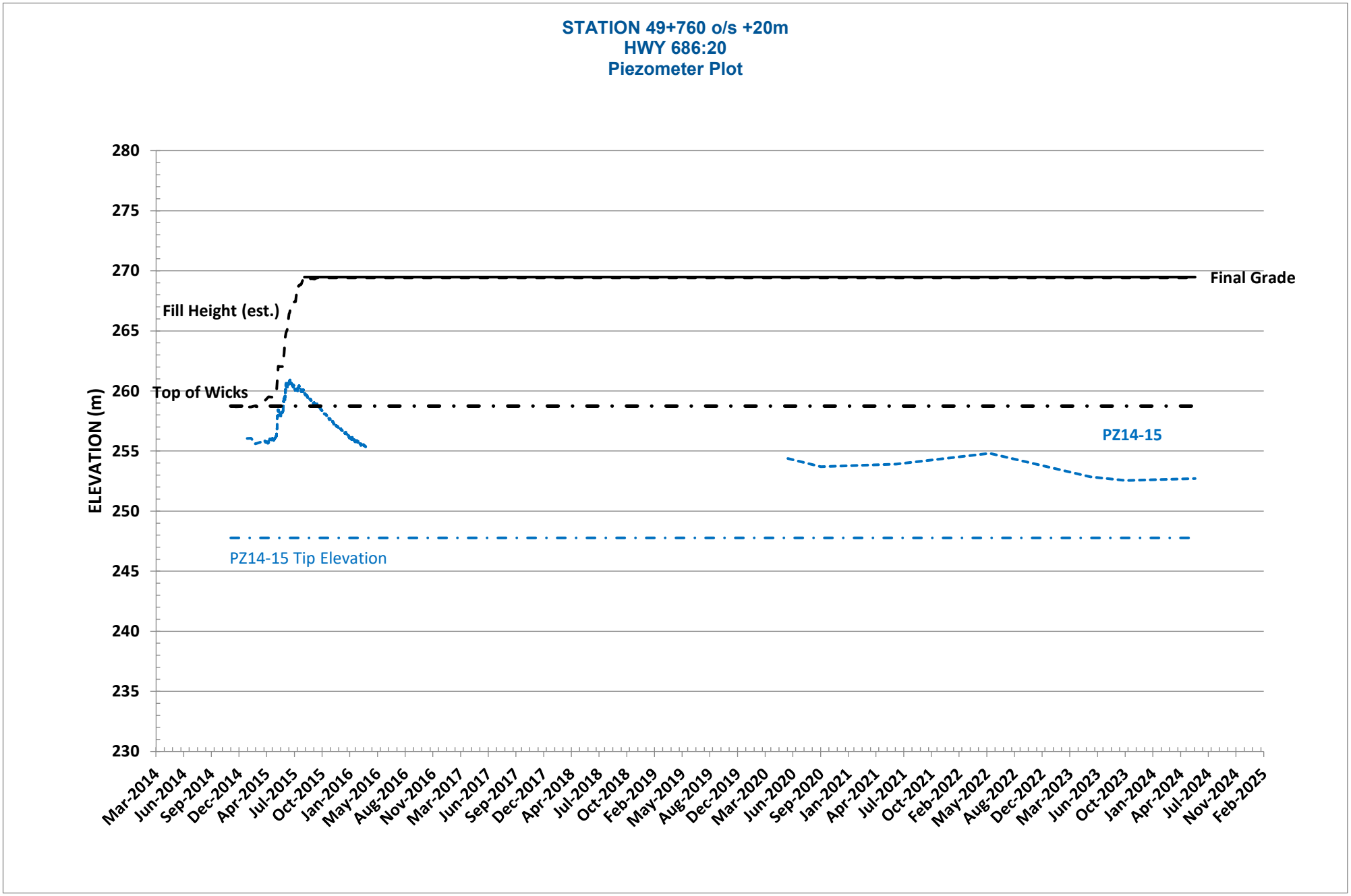
STATION 49+760 o/s +20m
HWY 686:20
Piezometer Plot
ELEVATION (m)
280
275
270
265
260
255
250
245
240
235
230
Final Grade
Fill Height (est.)
Top of Wicks
PZ14-15
PZ14-15 Tip Elevation
Mar-2014
Jun-2014
Sep-2014
Dec-2014
Apr-2015
Jul-2015
Oct-2015
Jan-2016
May-2016
Aug-2016
Nov-2016
Mar-2017
Jun-2017
Sep-2017
Dec-2017
Apr-2018
Jul-2018
Oct-2018
Feb-2019
May-2019
Aug-2019
Dec-2019
Mar-2020
Jun-2020
Sep-2020
Jan-2021
Apr-2021
Jul-2021
Oct-2021
Feb-2022
May-2022
Aug-2022
Dec-2022
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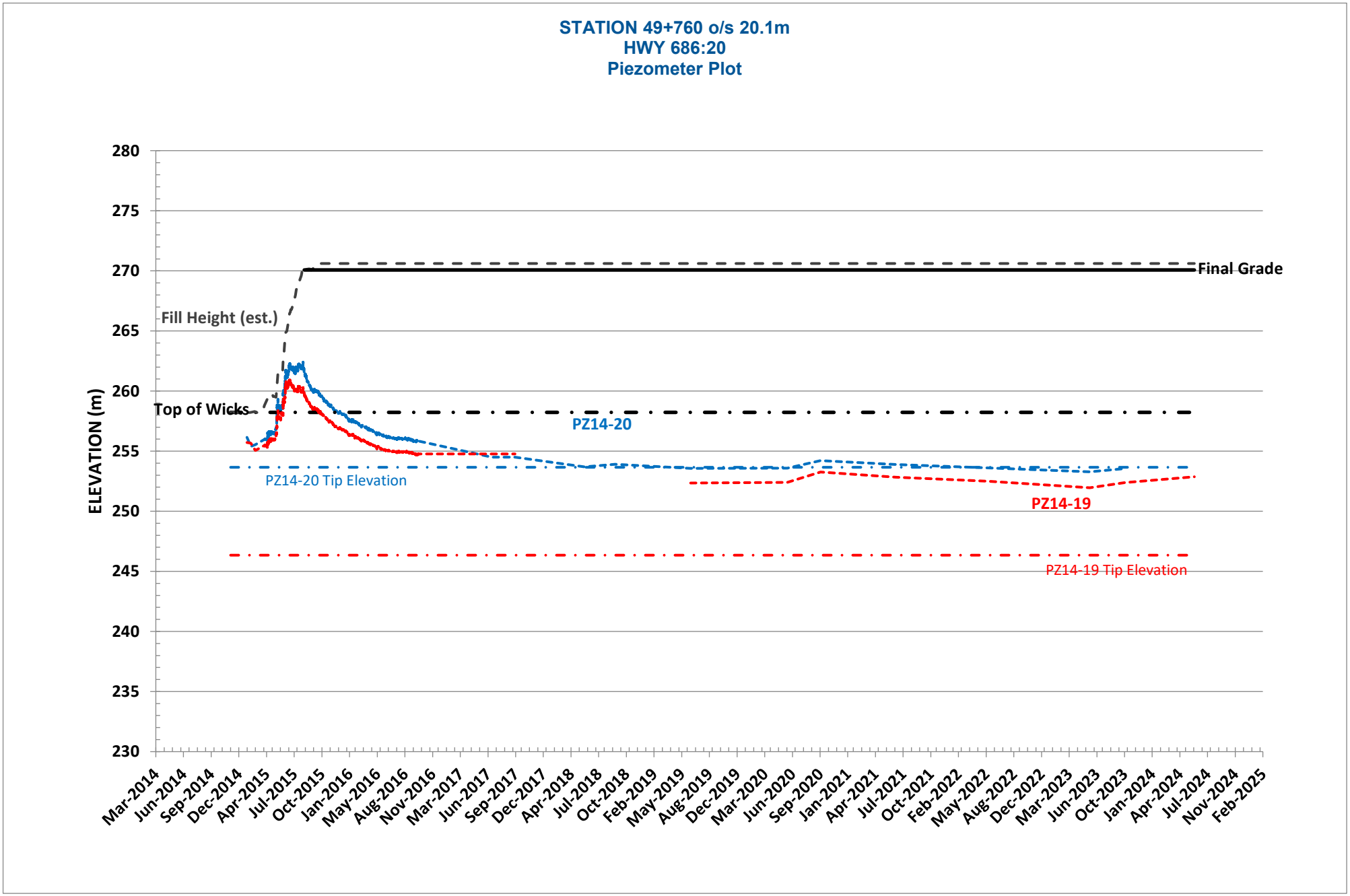
Jul-2024
Nov-2024
Feb-2025

Figure PZ1


STATION 49+760 o/s 20.1m
HWY 686:20
Piezometer Plot
ELEVATION (m)
280
275
270
265
260
255
250
245
240
235
230
Final Grade
Fill Height (est.)
Top of Wicks
PZ14-20
PZ14-20 Tip Elevation
PZ14-19
PZ14-19 Tip Elevation
Mar-2014
Jun-2014
Sep-2014
Dec-2014
Apr-2015
Jul-2015
Oct-2015
Jan-2016
May-2016
Aug-2016
Nov-2016
Mar-2017
Jun-2017
Sep-2017
Dec-2017
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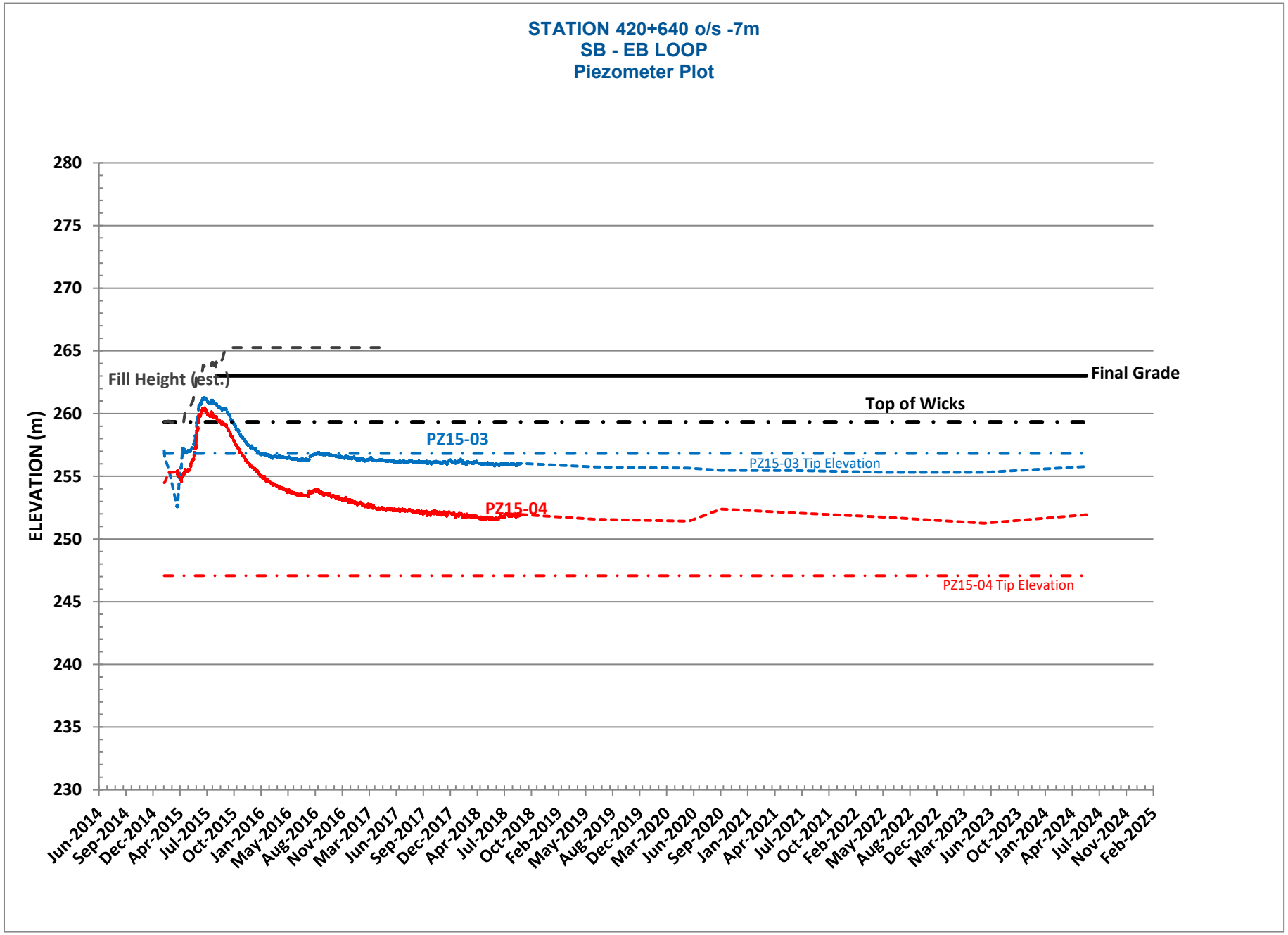
Nov-2024
Feb-2025

Figure PZ2


STATION 420+640 o/s -7m
SB - EB LOOP
Piezometer Plot
ELEVATION (m)
280
275
270
265
260
255
250
245
240
235
230
Fill Height (est.)
Final Grade
Top of Wicks
PZ15-03
PZ15-03 Tip Elevation
PZ15-04
PZ15-04 Tip Elevation
Jun-2014
Sep-2014
Dec-2014
Apr-2015
Jul-2015
Oct-2015
Jan-2016
May-2016
Aug-2016
Nov-2016
Mar-2017
Jun-2017
Sep-2017
Dec-2017
Apr-2018
Jul-2018
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Nov-2024
Feb-2025

Figure PZ3

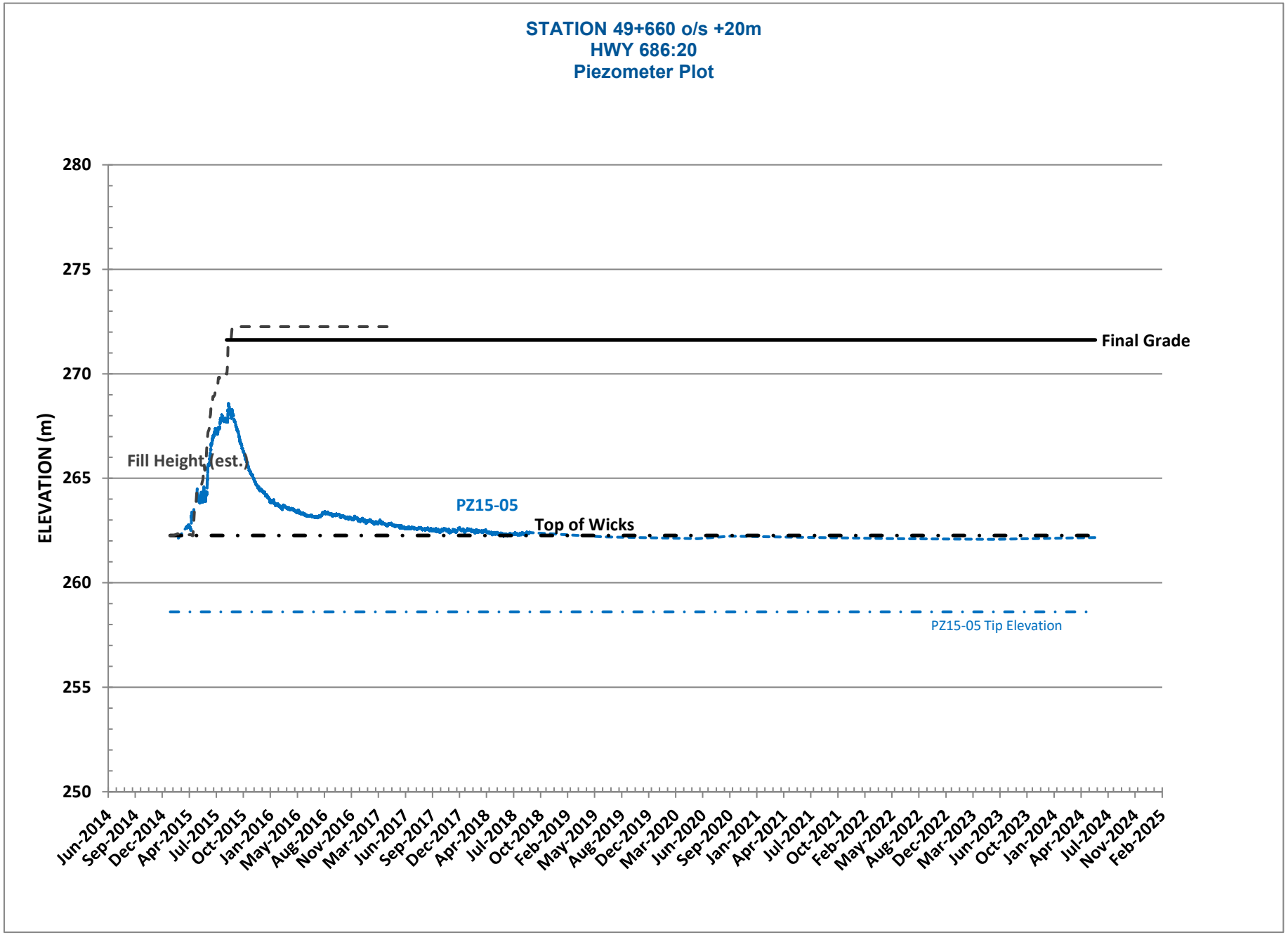
STATION 49+660 o/s +20m
HWY 686:20
Piezometer Plot
ELEVATION (m)
280
275
270
265
260
255
250
Final Grade
Fill Height (est.)
PZ15-05
Top of Wicks
PZ15-05 Tip Elevation
Jun-2014
Sep-2014
Dec-2014
Apr-2015
Jul-2015
Oct-2015
Jan-2016
May-2016
Aug-2016
Nov-2016
Mar-2017
Jun-2017
Sep-2017
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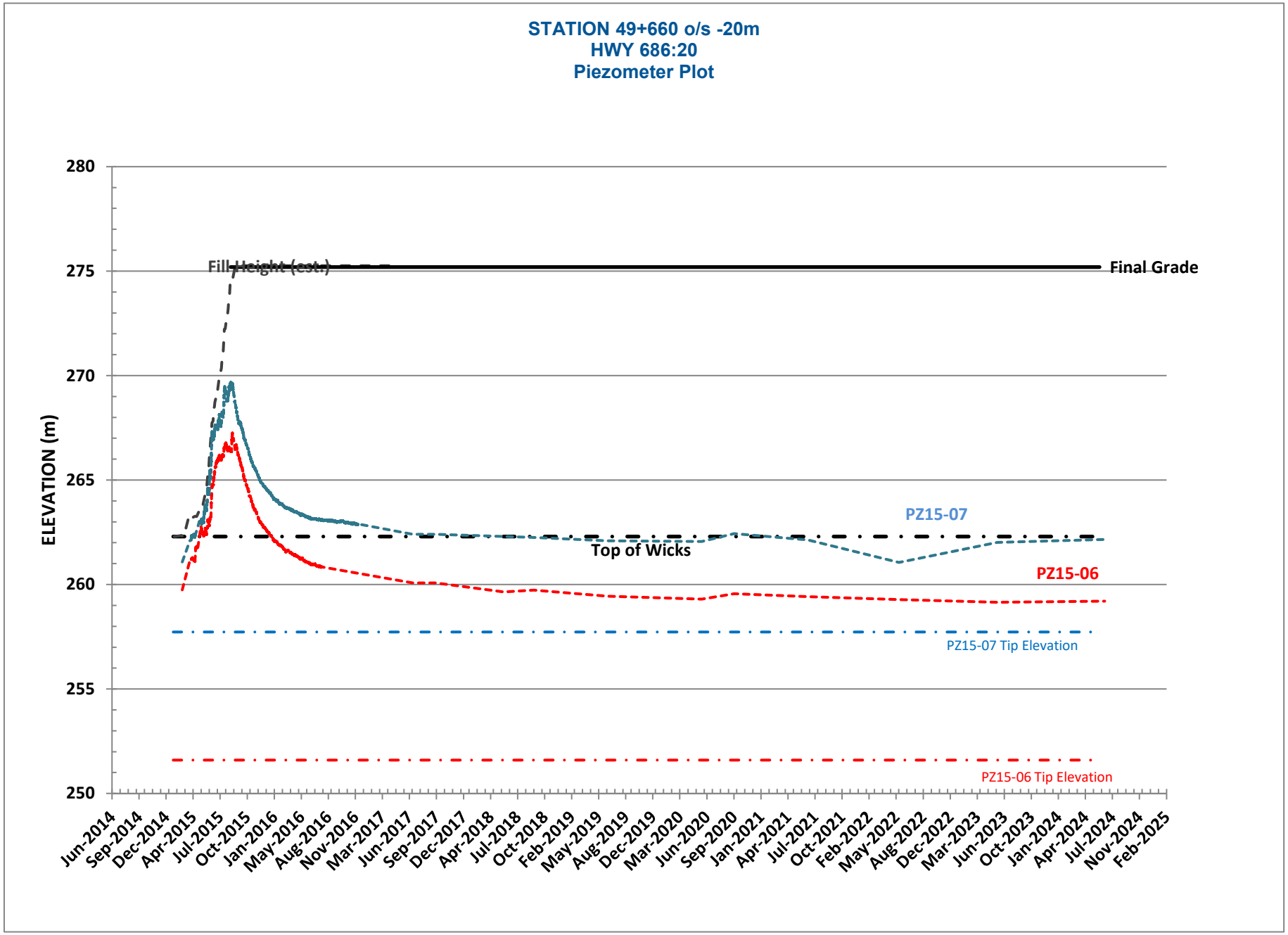
Figure PZ4


STATION 49+660 o/s -20m
HWY 686:20
Piezometer Plot
ELEVATION (m)
280
275
270
265
260
255
250
Fill Height (est.)
Final Grade
Top of Wicks
PZ15-07
PZ15-06
PZ15-07 Tip Elevation
PZ15-06 Tip Elevation
Jun-2014
Sep-2014
Dec-2014
Apr-2015
Jul-2015
Oct-2015
Jan-2016
May-2016
Aug-2016
Nov-2016
Mar-2017
Jun-2017
Sep-2017
Dec-2017
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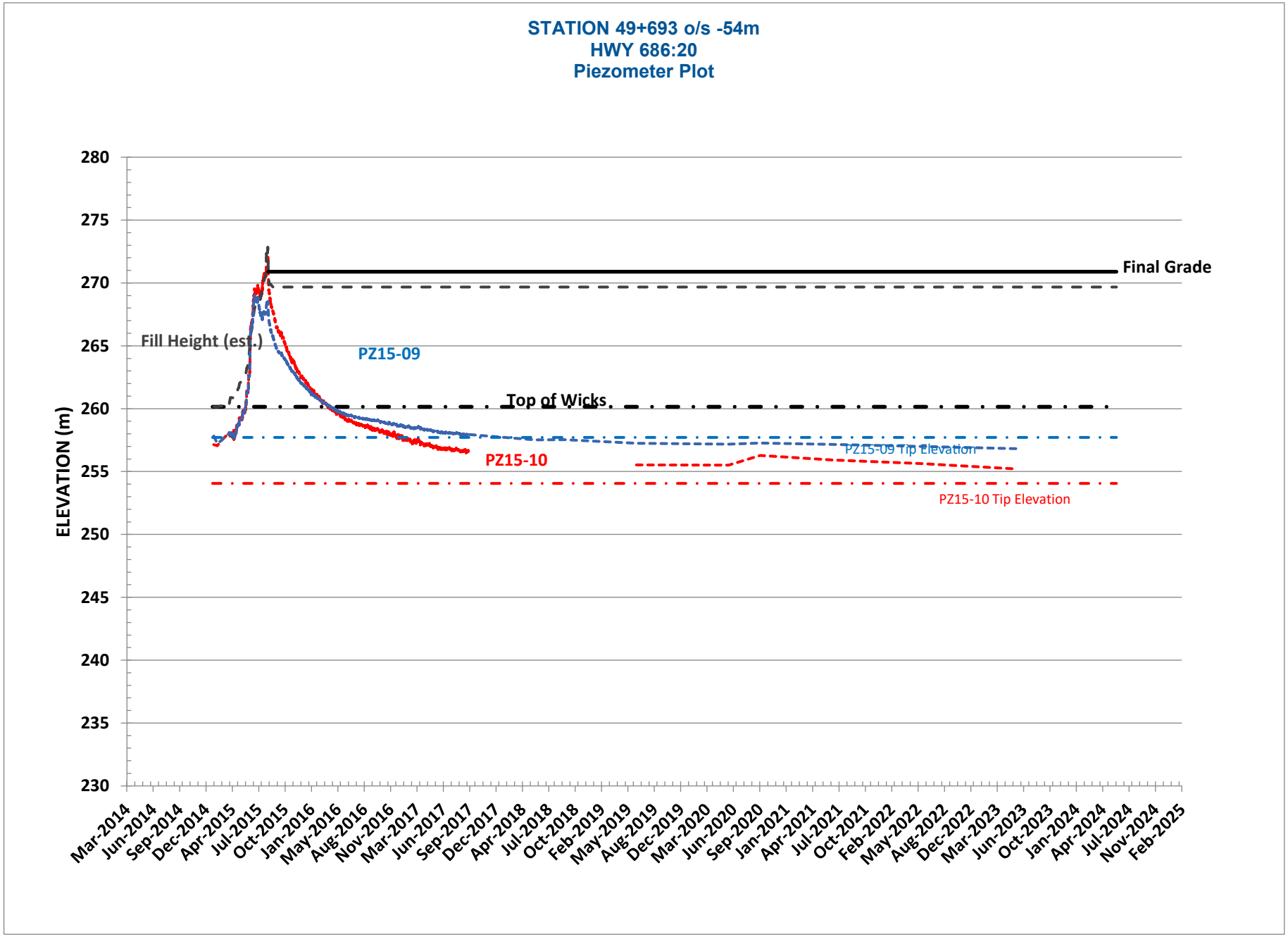
Feb-2025

Figure PZ5


STATION 49+693 o/s -54m
HWY 686:20
Piezometer Plot
ELEVATION (m)
280
275
270
265
260
255
250
245
240
235
230
Final Grade
Fill Height (est.)
PZ15-09
Top of Wicks
PZ15-09 Tip Elevation
PZ15-10
PZ15-10 Tip Elevation
Mar-2014
Jun-2014
Sep-2014
Dec-2014
Apr-2015
Jul-2015
Oct-2015
Jan-2016
May-2016
Aug-2016
Nov-2016
Mar-2017
Jun-2017
Sep-2017
Dec-2017
Apr-2018
Jul-2018
Oct-2018
Feb-2019
May-2019
Aug-2019
Dec-2019
Mar-2020
Jun-2020
Sep-2020
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May-2022
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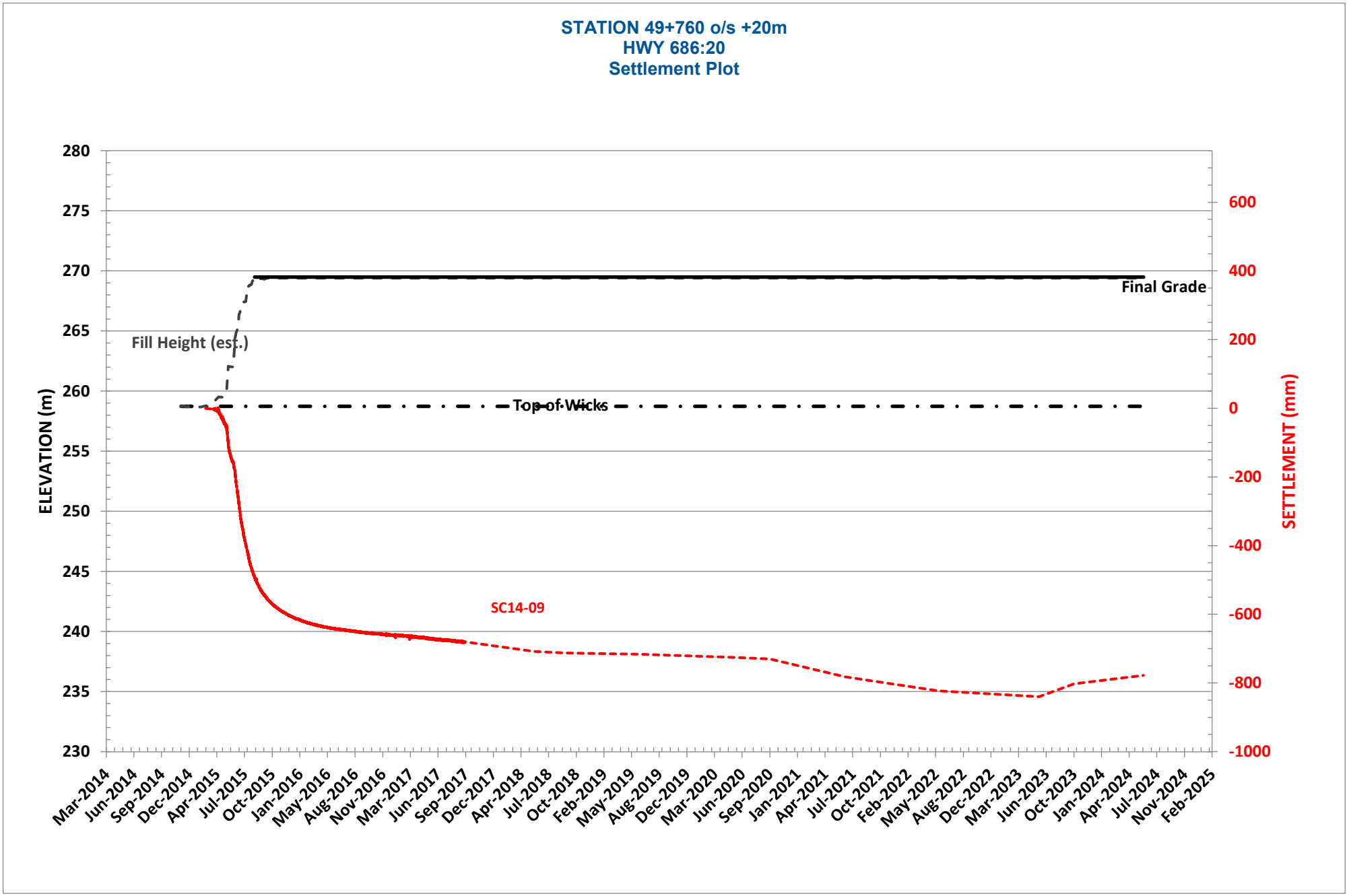
Nov-2024
Feb-2025

Figure PZ6


STATION 49+760 o/s +20m
HWY 686:20
Settlement Plot
ELEVATION (m)
SETTLEMENT (mm)
280
275
270
265
260
255
250
245
240
235
230
600
400
200
0
-200
-400
-600
-800
-1000
Final Grade
Fill Height (est.)
Top of Wicks
SC14-09
Mar-2014
Jun-2014
Sep-2014
Dec-2014
Apr-2015
Jul-2015
Oct-2015
Jan-2016
May-2016
Aug-2016
Nov-2016
Mar-2017
Jun-2017
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Apr-2018
Jul-2018
Oct-2018
Feb-2019
May-2019
Aug-2019
Dec-2019
Mar-2020
Jun-2020
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Jan-2021
Apr-2021
Jul-2021
Oct-2021
Feb-2022
May-2022
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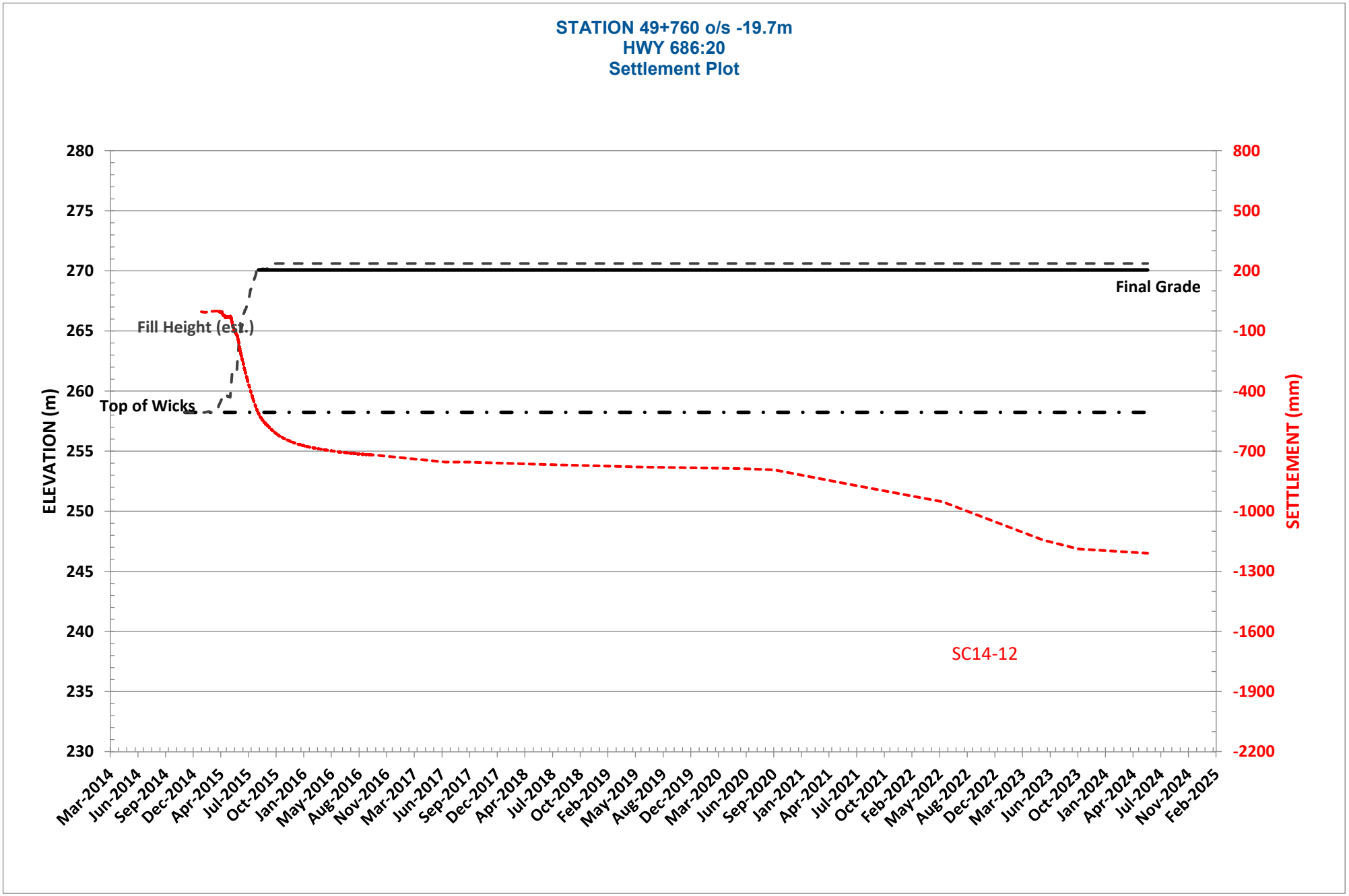
Jun-2023
Oct-2023
Jan-2024
Apr-2024
Jul-2024
Nov-2024
Feb-2025

Figure SC1


STATION 49+760 o/s -19.7m
HWY 686:20
Settlement Plot
ELEVATION (m)
SETTLEMENT (mm)
280
275
270
265
260
255
250
245
240
235
230
800
500
200
-100
-400
-700
-1000
-1300
-1600
-1900
-2200
Final Grade
Fill Height (est.)
Top of Wicks
SC14-12
Mar-2014
Jun-2014
Sep-2014
Dec-2014
Apr-2015
Jul-2015
Oct-2015
Jan-2016
May-2016
Aug-2016
Nov-2016
Mar-2017
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Jun-2020
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Jan-2024
Apr-2024
Jul-2024
Nov-2024
Feb-2025

Figure SC2

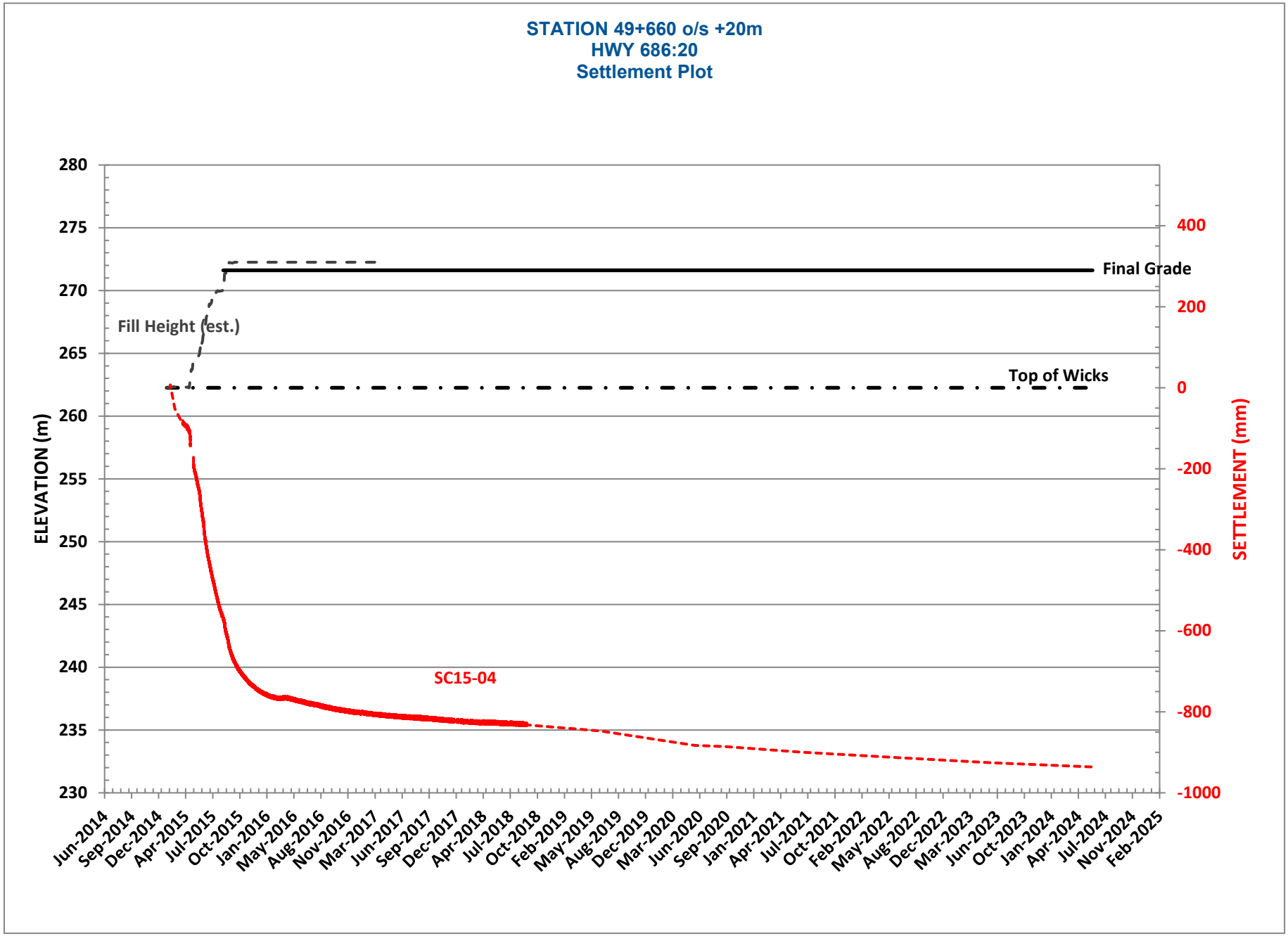

STATION 49+660 o/s +20m
HWY 686:20
Settlement Plot
ELEVATION (m)
SETTLEMENT (mm)
280
275
270
265
260
255
250
245
240
235
230
400
200
0
-200
-400
-600
-800
-1000
Final Grade
Fill Height (est.)
Top of Wicks
SC15-04
Jun-2014
Sep-2014
Dec-2014
Apr-2015
Jul-2015
Oct-2015
Jan-2016
May-2016
Aug-2016
Nov-2016
Mar-2017
Jun-2017
Sep-2017
Dec-2017
Apr-2018
Jul-2018
Oct-2018
Feb-2019
May-2019
Aug-2019
Dec-2019
Mar-2020
Jun-2020
Sep-2020
Jan-2021
Apr-2021
Jul-2021
Oct-2021
Feb-2022
May-2022
Aug-2022
Dec-2022
Mar-2023
Jun-2023
Oct-2023
Jan-2024
Apr-2024
Jul-2024
Nov-2024
Feb-2025

Figure SC3

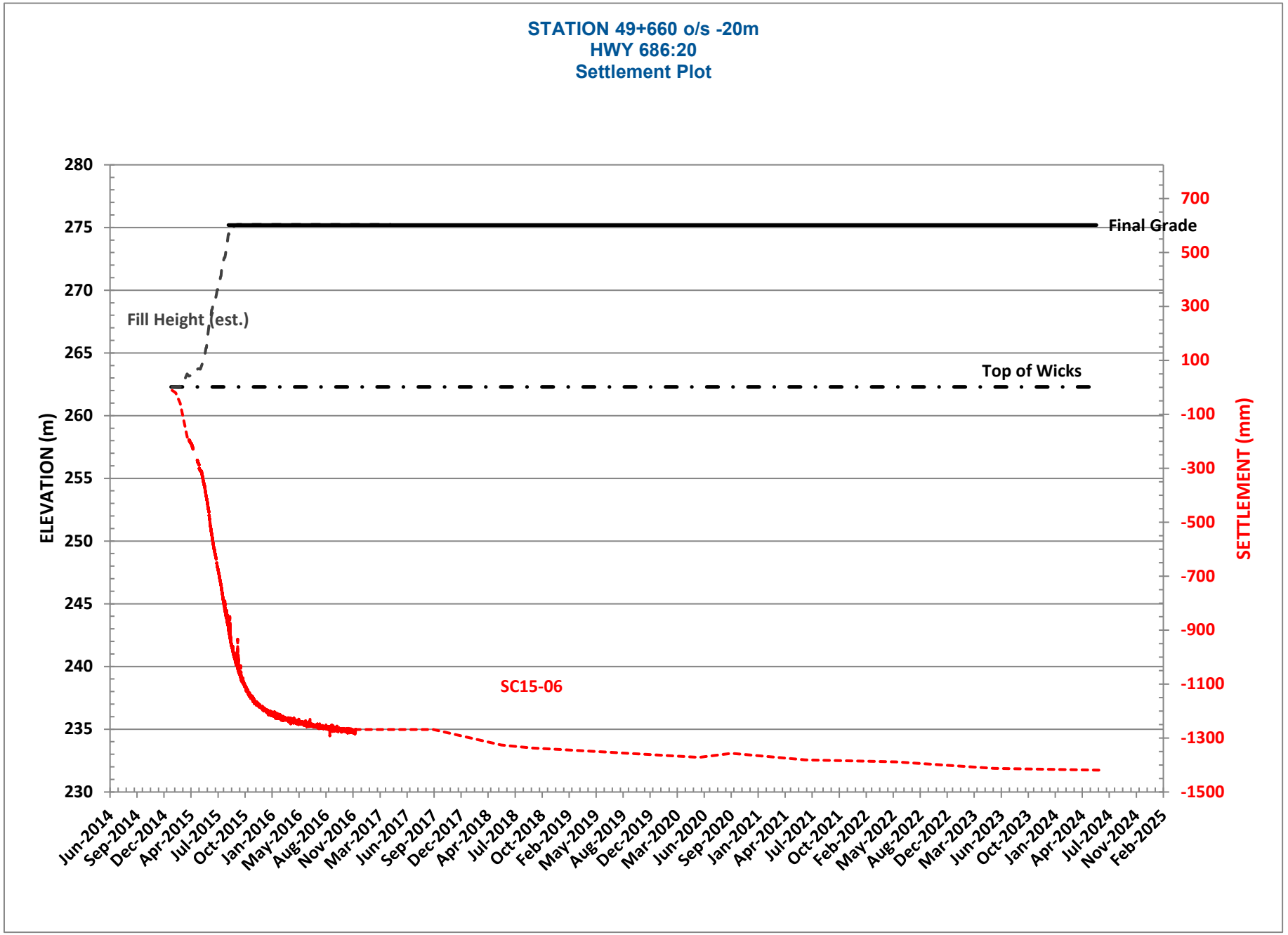
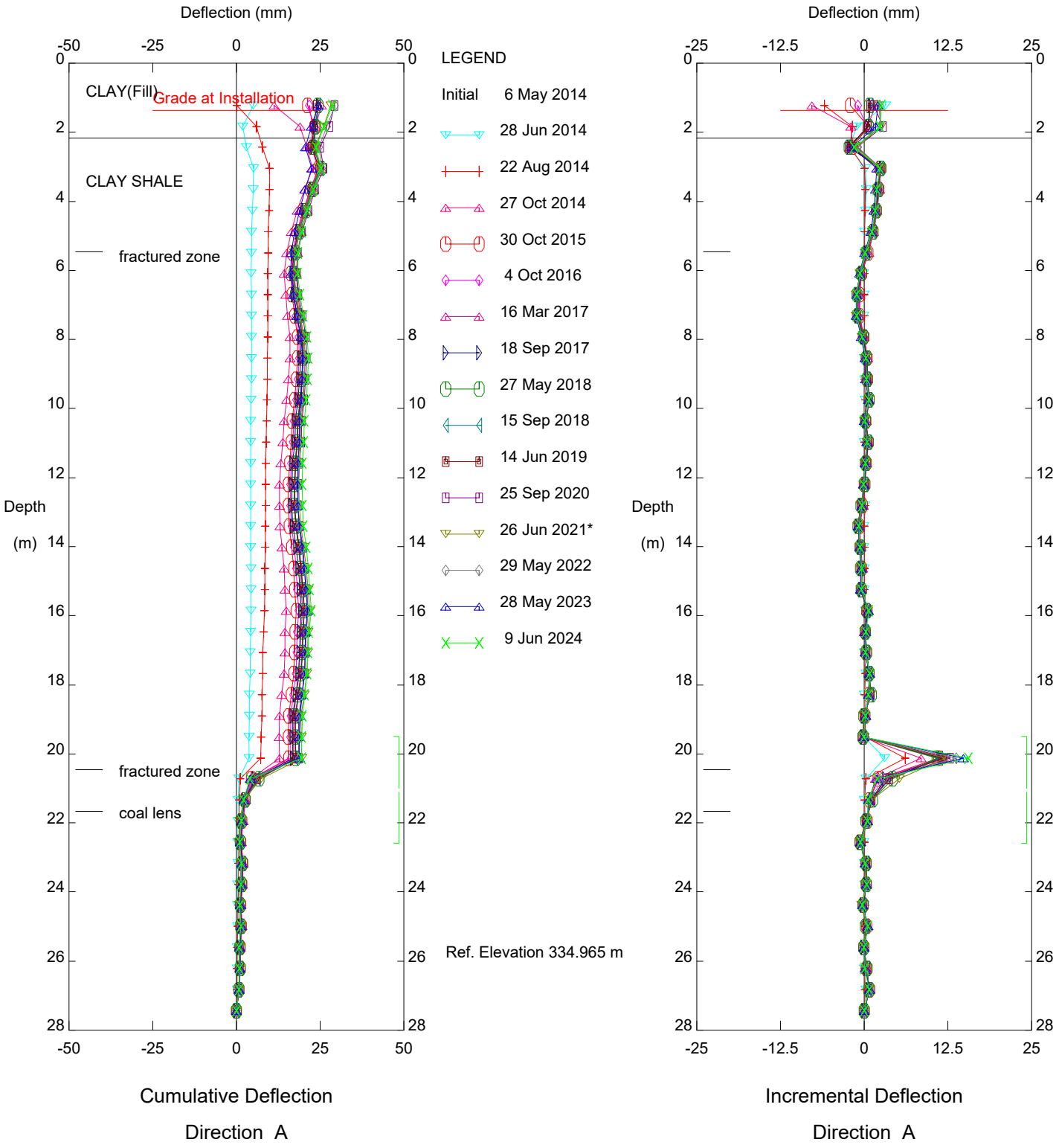

STATION 49+660 o/s -20m
HWY 686:20
Settlement Plot
ELEVATION (m)
SETTLEMENT (mm)
280
275
270
265
260
255
250
245
240
235
230
700
500
300
100
-100
-300
-500
-700
-900
-1100
-1300
-1500
Final Grade
Fill Height (est.)
Top of Wicks
SC15-06
Jun-2014
Sep-2014
Dec-2014
Apr-2015
Jul-2015
Oct-2015
Jan-2016
May-2016
Aug-2016
Nov-2016
Mar-2017
Jun-2017
Sep-2017
Dec-2017
Apr-2018
Jul-2018
Oct-2018
Feb-2019
May-2019
Aug-2019
Dec-2019
Mar-2020
Jun-2020
Sep-2020
Jan-2021
Apr-2021
Jul-2021
Oct-2021
Feb-2022
May-2022
Aug-2022
Dec-2022
Mar-2023
Jun-2023
Oct-2023
Jan-2024
Apr-2024
Jul-2024
Nov-2024
Feb-2025

Figure SC4

THURBER ENGINEERING LTD.

HWY 686 Cut Slope Instruments

Thurber Engineering Ltd



Cumulative Deflection

Direction A

Incremental Deflection

Direction A

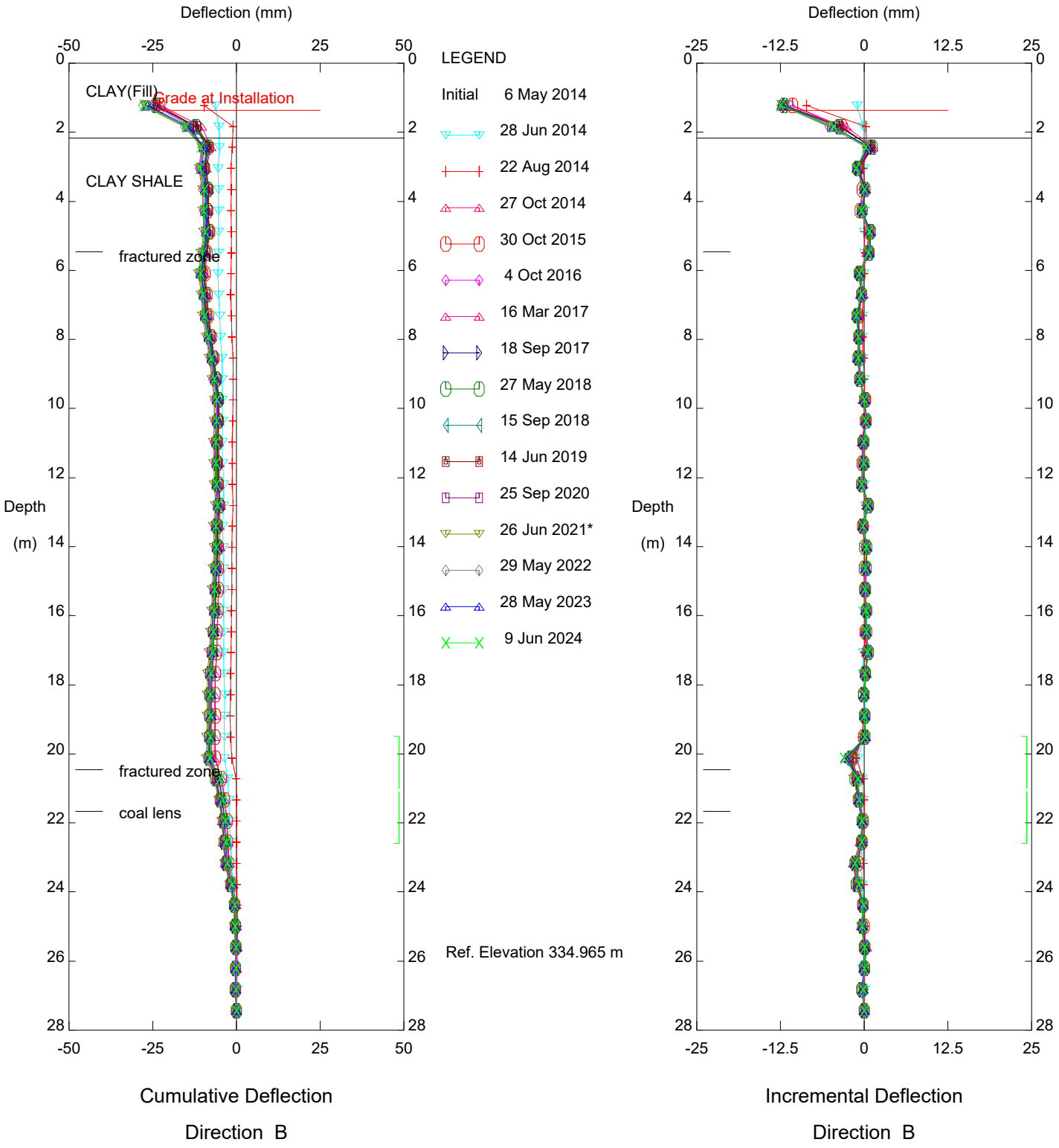
HWY 686, 48+973 o/s -173m, Inclinometer SI14-09A

Alberta Transportation

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

H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2024A-Spring\SI Readings\NC097\SI14-09a.gtl

Thurber Engineering Ltd



Cumulative Deflection

Direction B

Incremental Deflection

Direction B

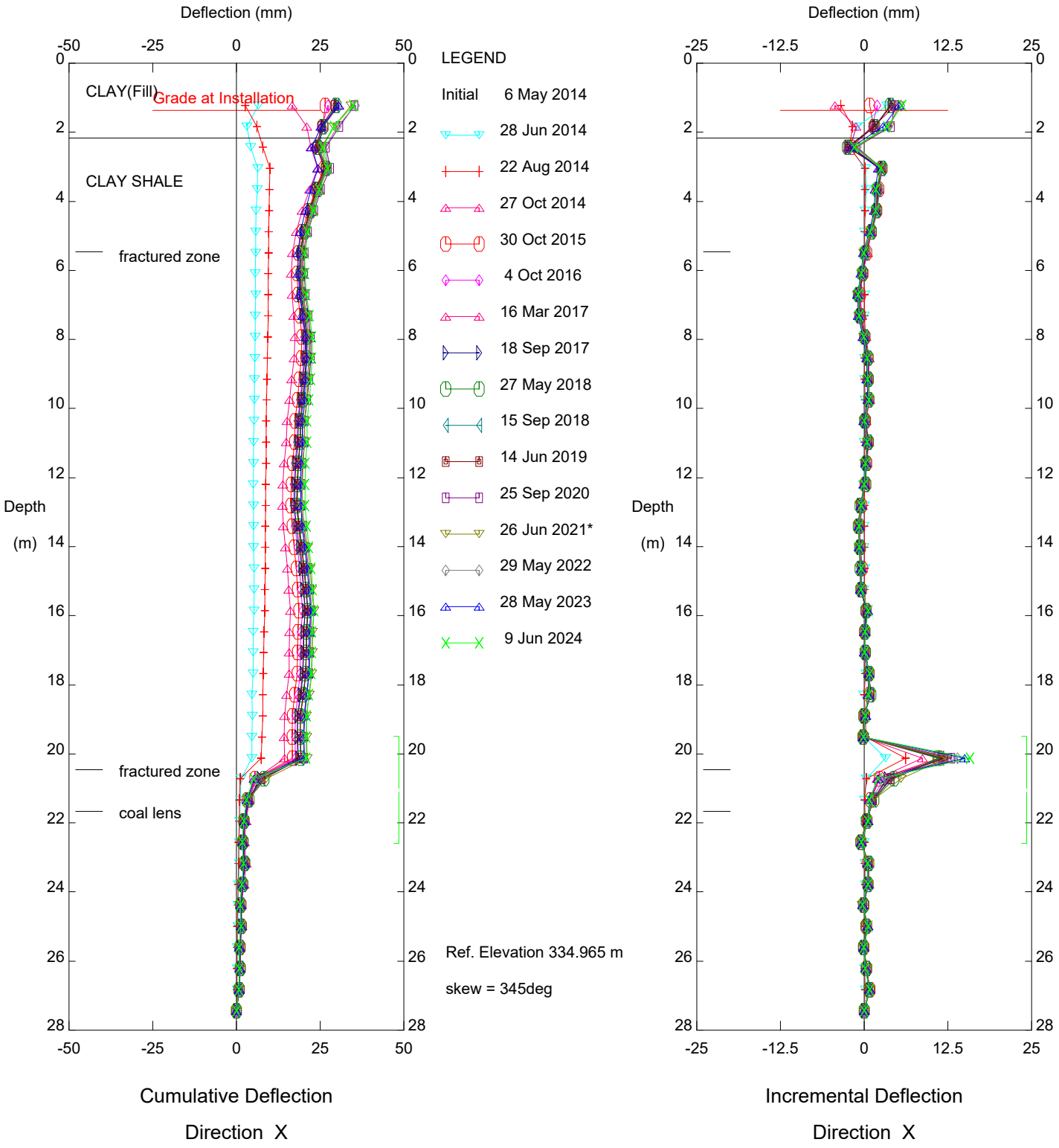
HWY 686, 48+973 o/s -173m, Inclinometer SI14-09A

Alberta Transportation

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

H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2024A-Spring\SI Readings\NC097\SI14-09a.gtl

Thurber Engineering Ltd



Cumulative Deflection

Direction X

Incremental Deflection

Direction X

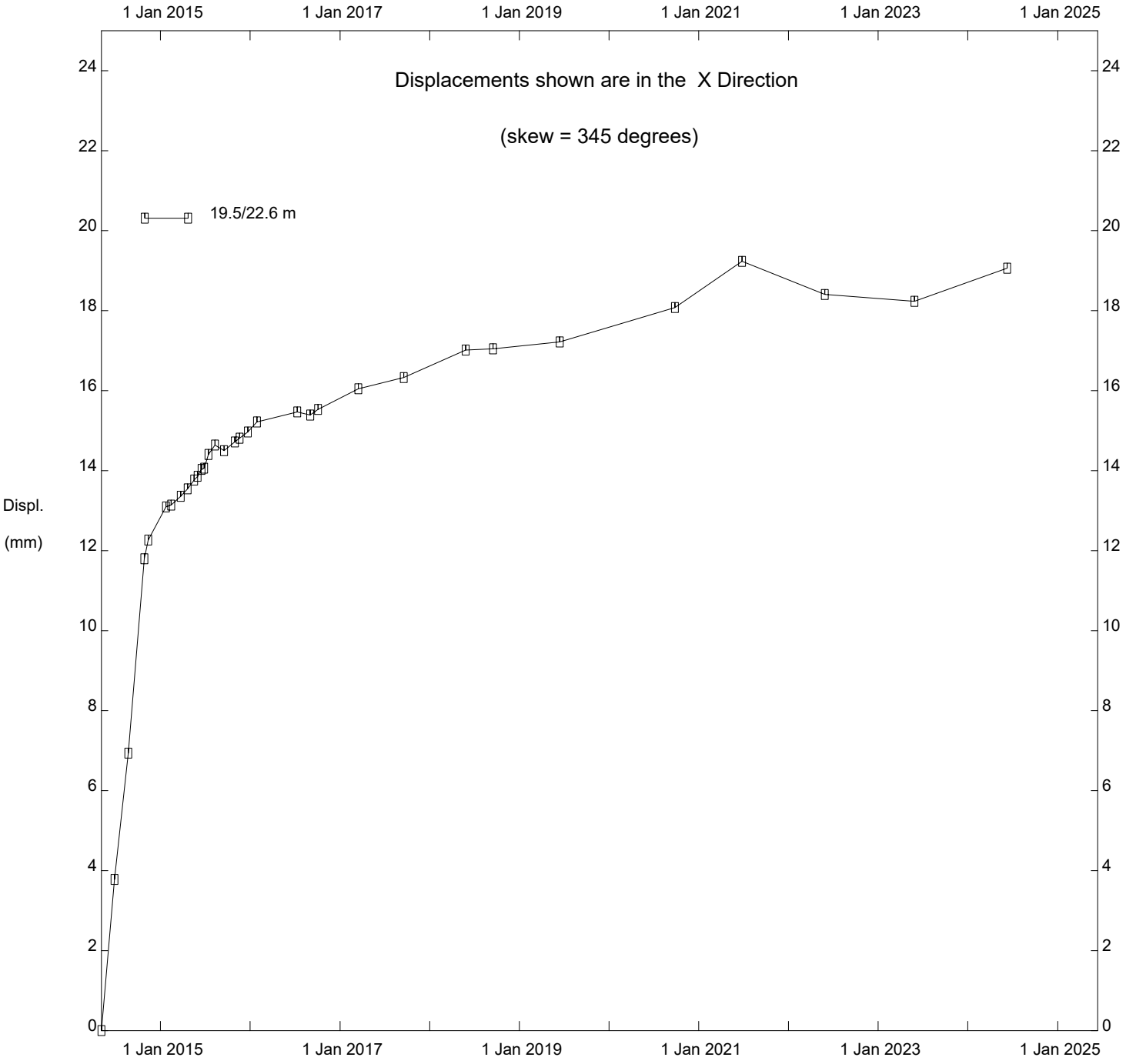
HWY 686, 48+973 o/s -173m, Inclinometer SI14-09A

Alberta Transportation

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

H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2024A-Spring\SI Readings\NC097\SI14-09a.gtl

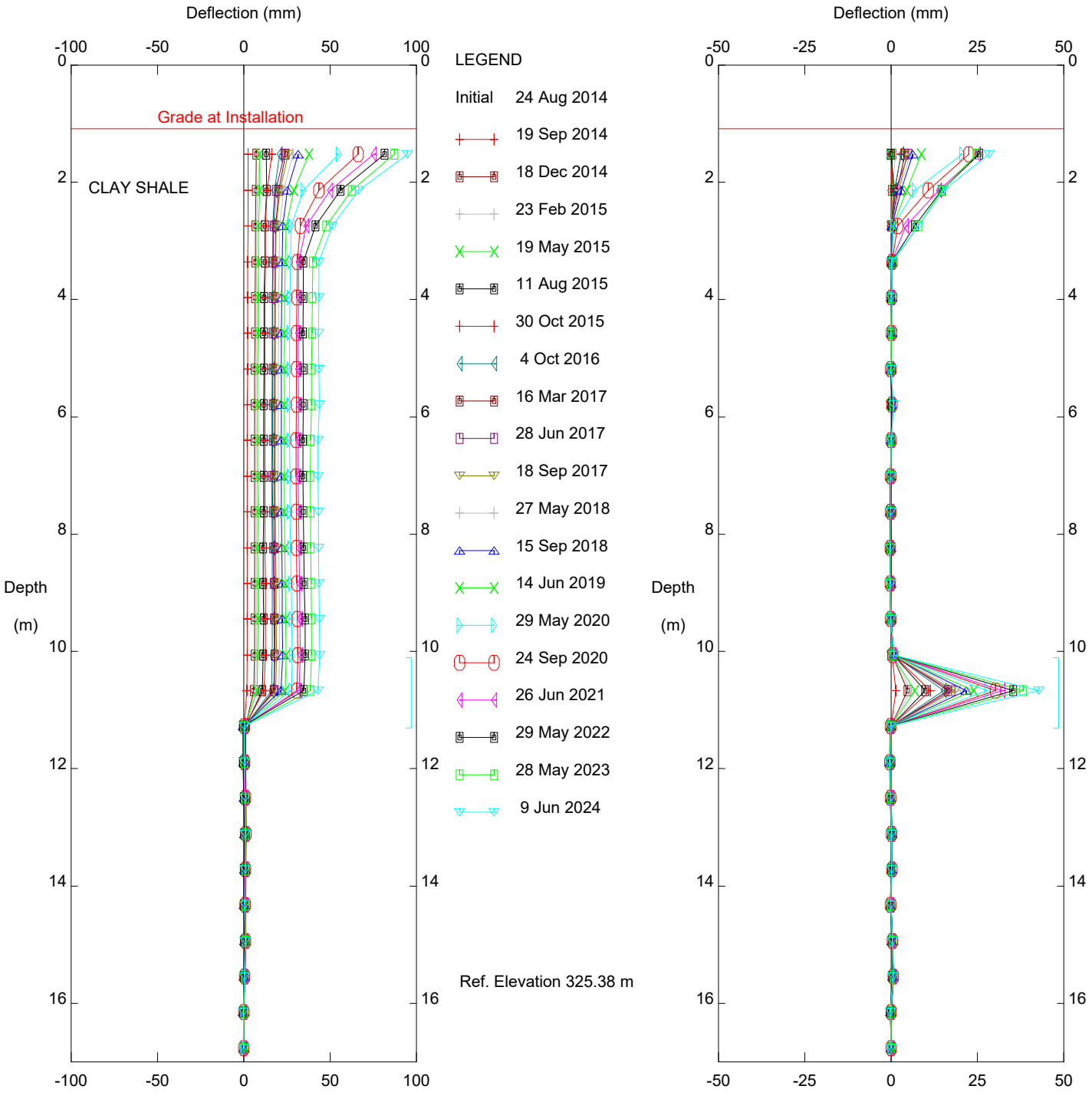
Thurber Engineering Ltd



HWY 686, 48+973 o/s -173m, Inclinometer SI14-09A

Alberta Transportation

Thurber Engineering Ltd



Cumulative Deflection

Direction A

Incremental Deflection

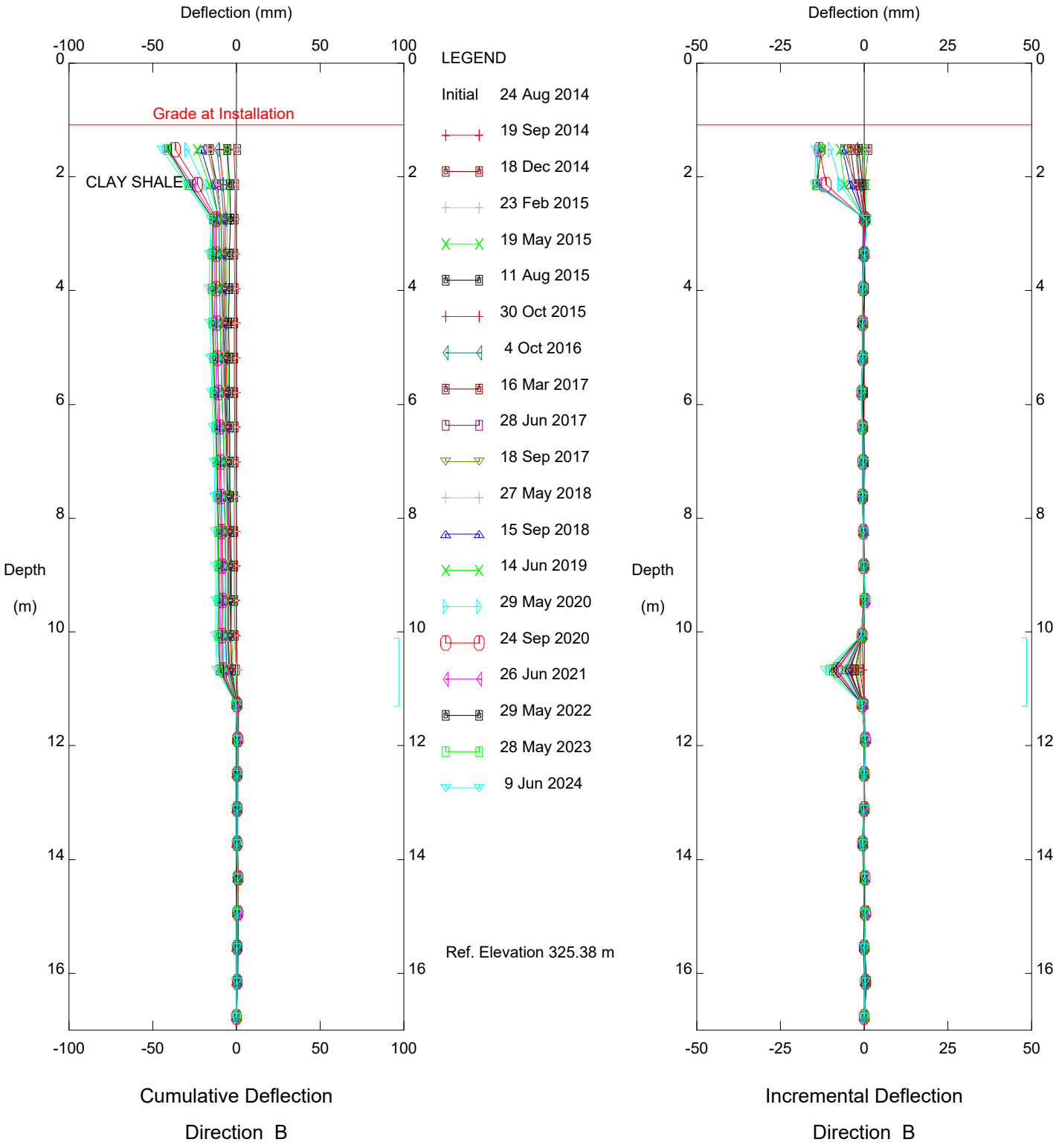
Direction A

Hwy 686, 49+000 o/s +90.8m, Inclinometer SI14-13

Alberta Transportation

H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2024A-Spring\SI Readings\NC097\SI14-13.gtl

Thurber Engineering Ltd



Cumulative Deflection

Direction B

Incremental Deflection

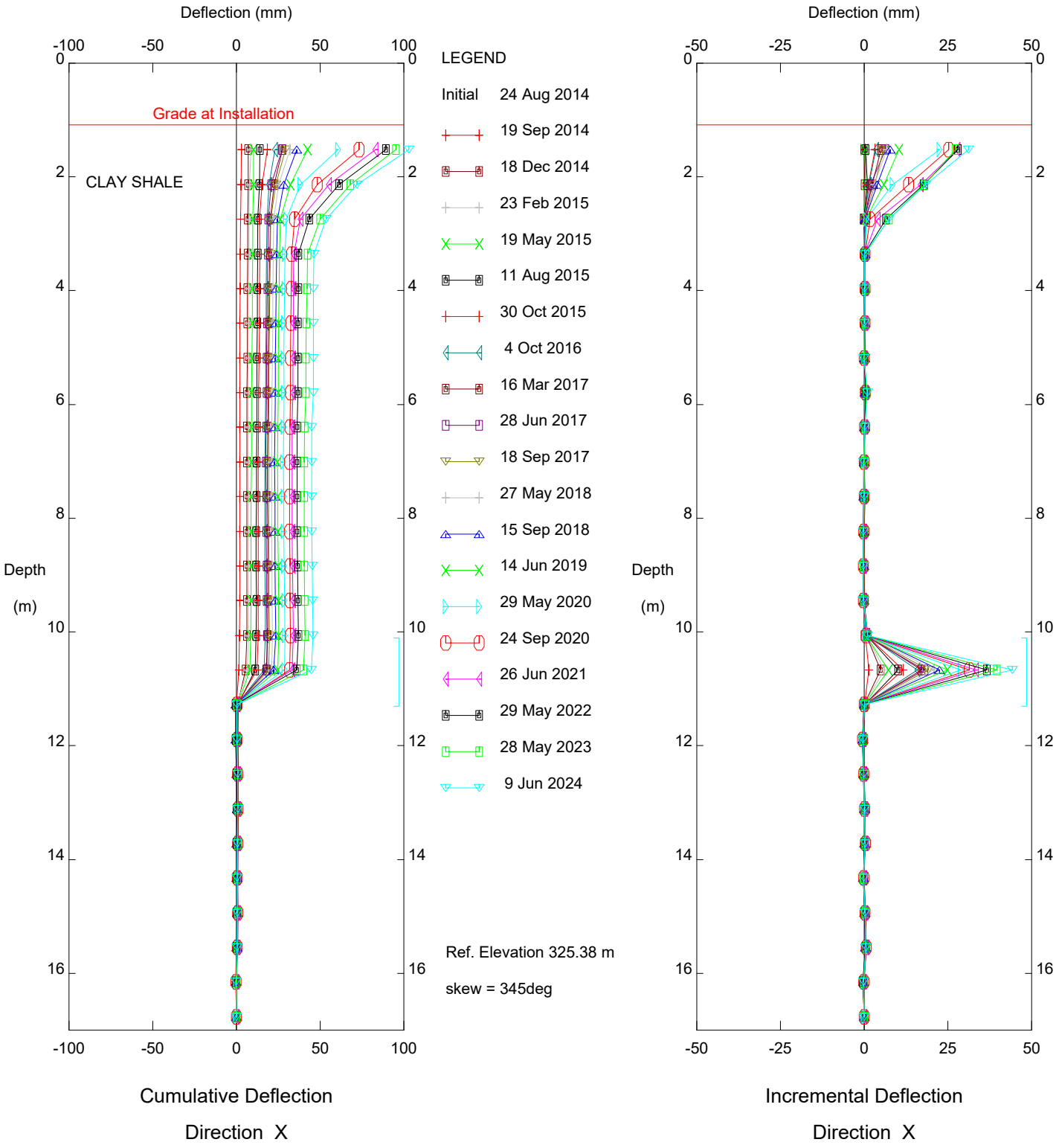
Direction B

Hwy 686, 49+000 o/s +90.8m, Inclinometer SI14-13

Alberta Transportation

H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2024A-Spring\SI Readings\NC097\SI14-13.gtl

Thurber Engineering Ltd



Cumulative Deflection

Direction X

Incremental Deflection

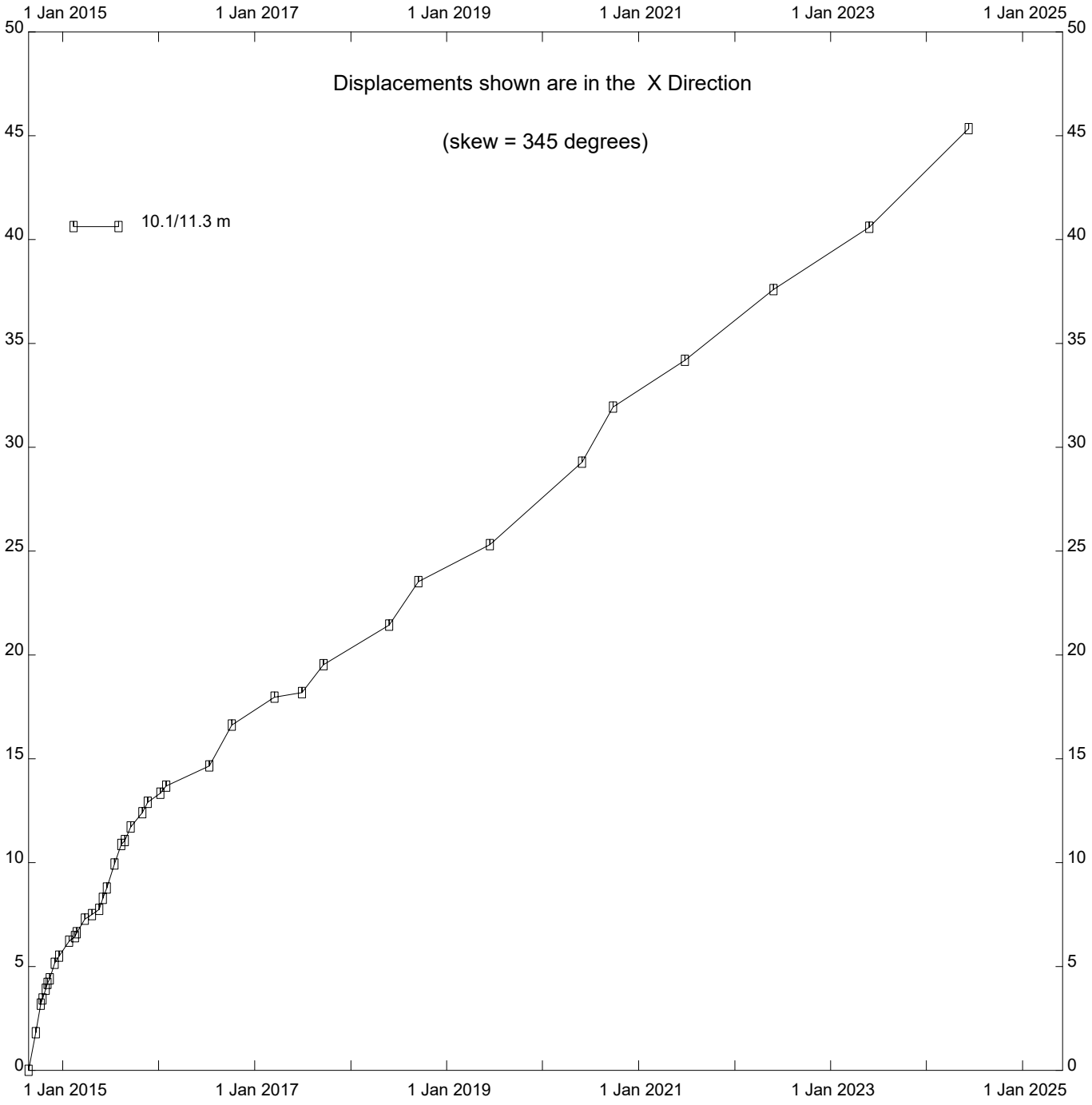
Direction X

Hwy 686, 49+000 o/s +90.8m, Inclinometer SI14-13

Alberta Transportation

H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2024A-Spring\SI Readings\NC097\SI14-13.gtl

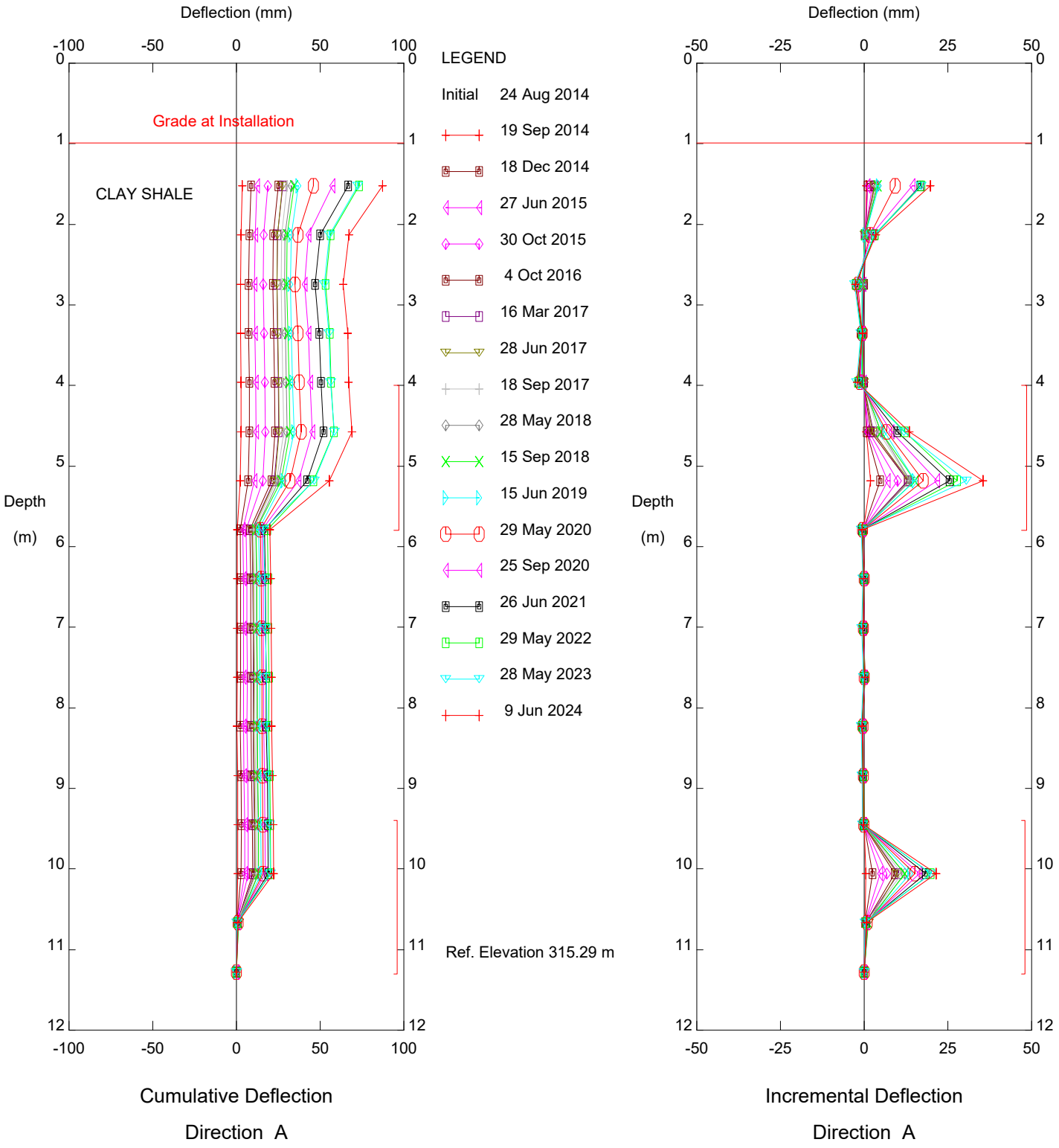
Thurber Engineering Ltd



Hwy 686, 49+000 o/s +90.8m, Inclinometer SI14-13

Alberta Transportation

Thurber Engineering Ltd



Cumulative Deflection

Direction A

Incremental Deflection

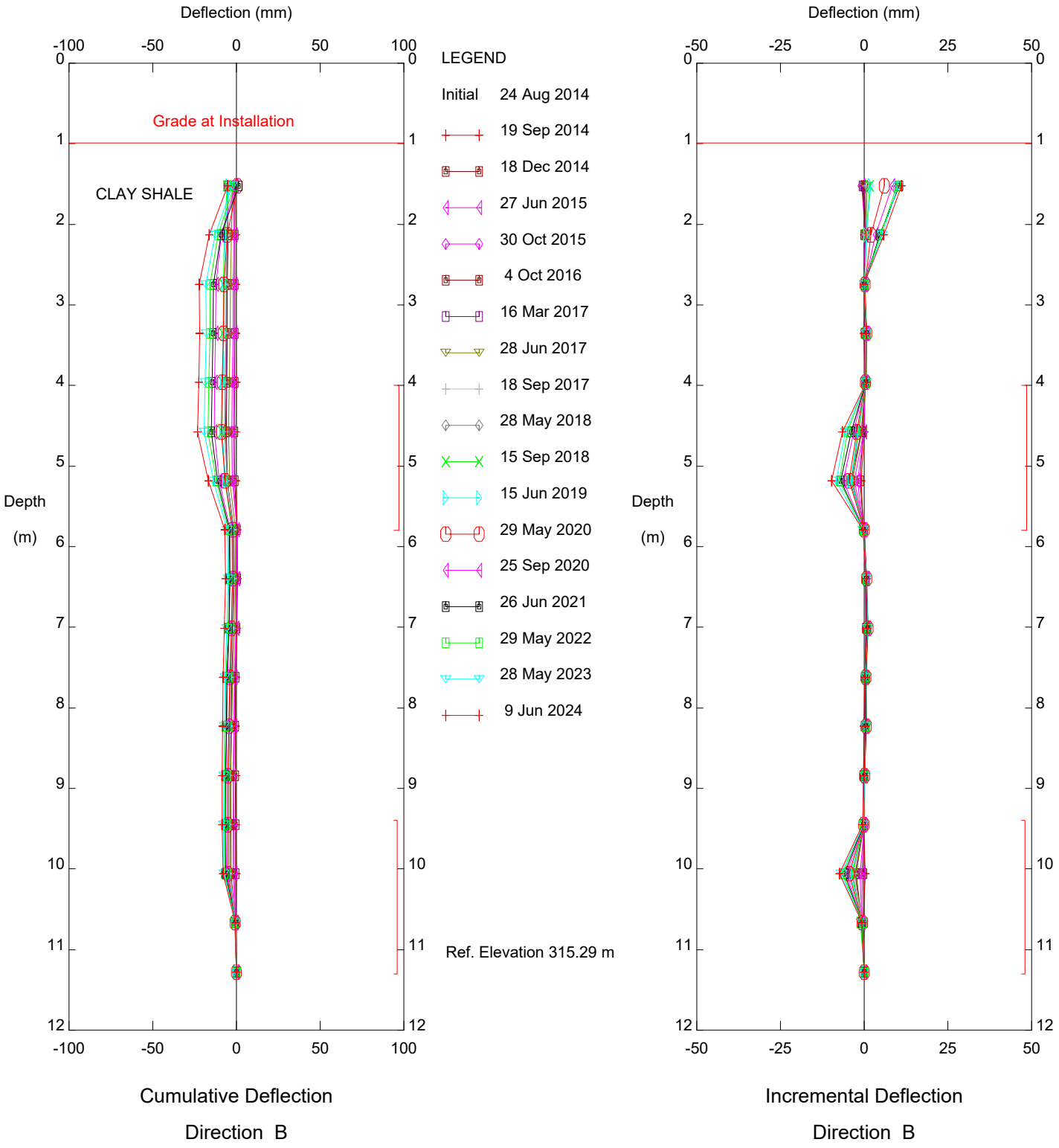
Direction A

Hwy 686, 49+000 o/s +34.9m, Inclinometer SI14-14

Alberta Transportation

H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2024A-Spring\SI Readings\NC097\SI14-14.gtl

Thurber Engineering Ltd



Cumulative Deflection

Direction B

Incremental Deflection

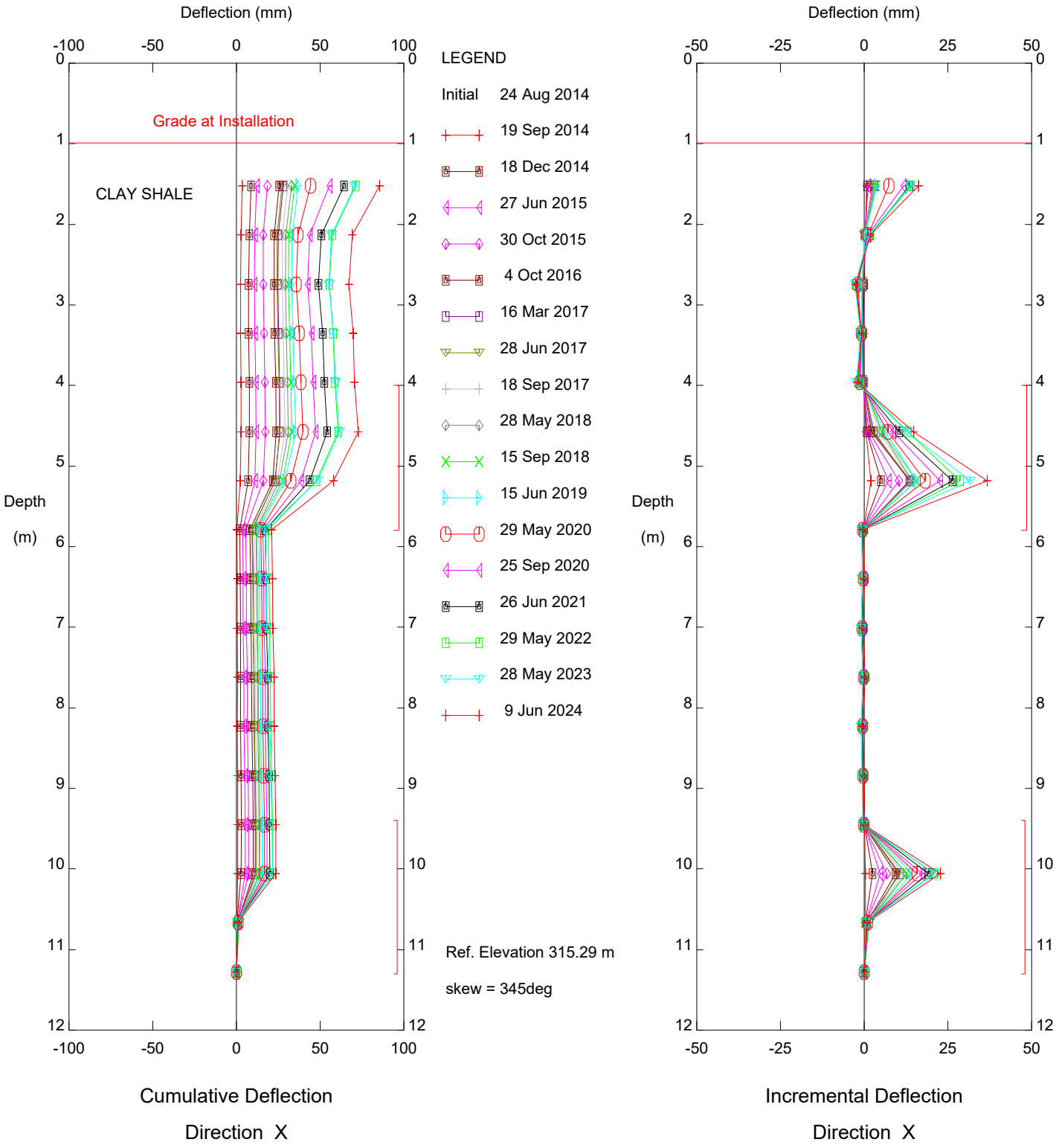
Direction B

Hwy 686, 49+000 o/s +34.9m, Inclinometer SI14-14

Alberta Transportation

H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2024A-Spring\SI Readings\NC097\SI14-14.gtl

Thurber Engineering Ltd



Cumulative Deflection

Direction X

Incremental Deflection

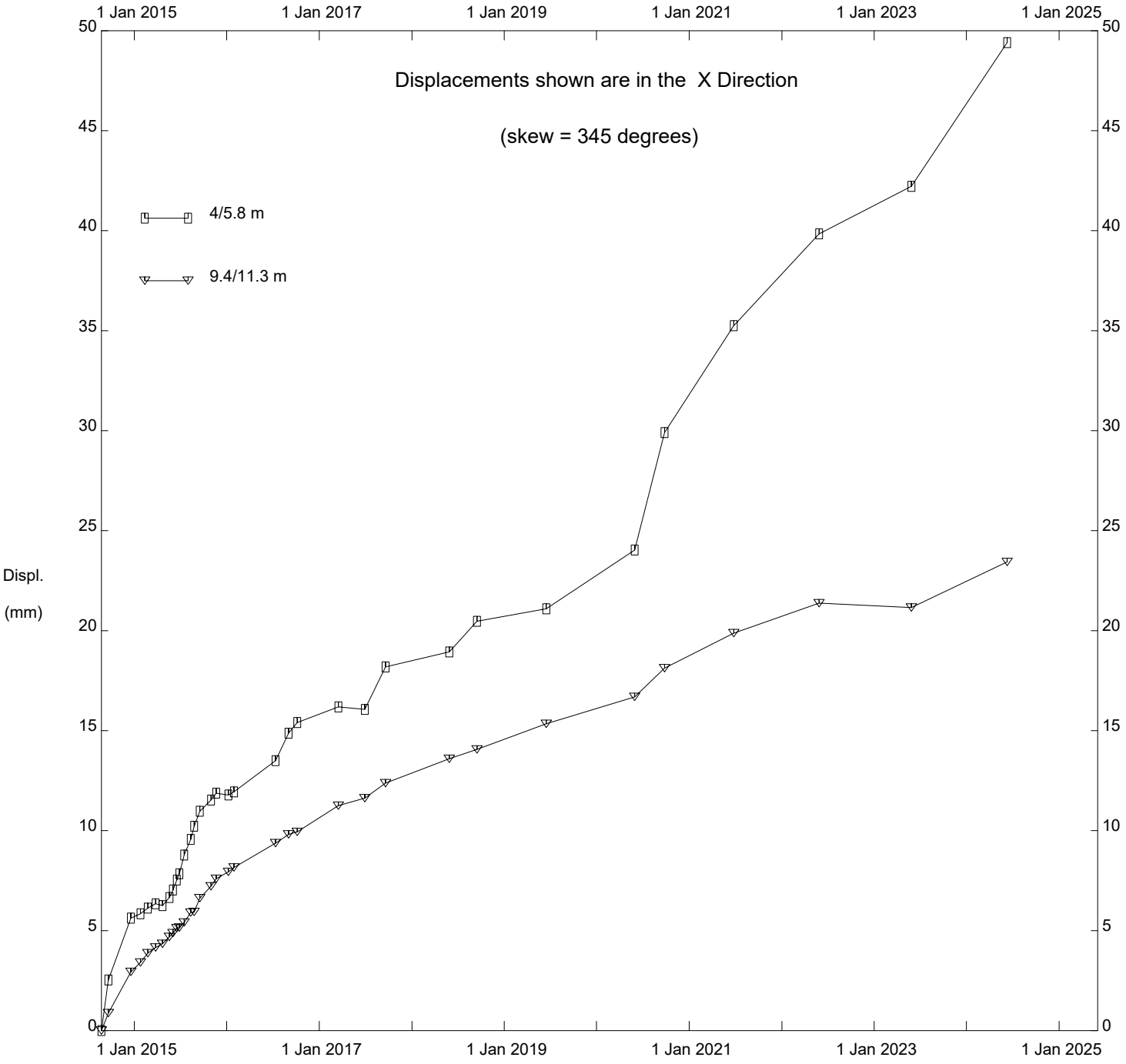
Direction X

Hwy 686, 49+000 o/s +34.9m, Inclinometer SI14-14

Alberta Transportation

H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2024A-Spring\SI Readings\NC097\SI14-14.gtl

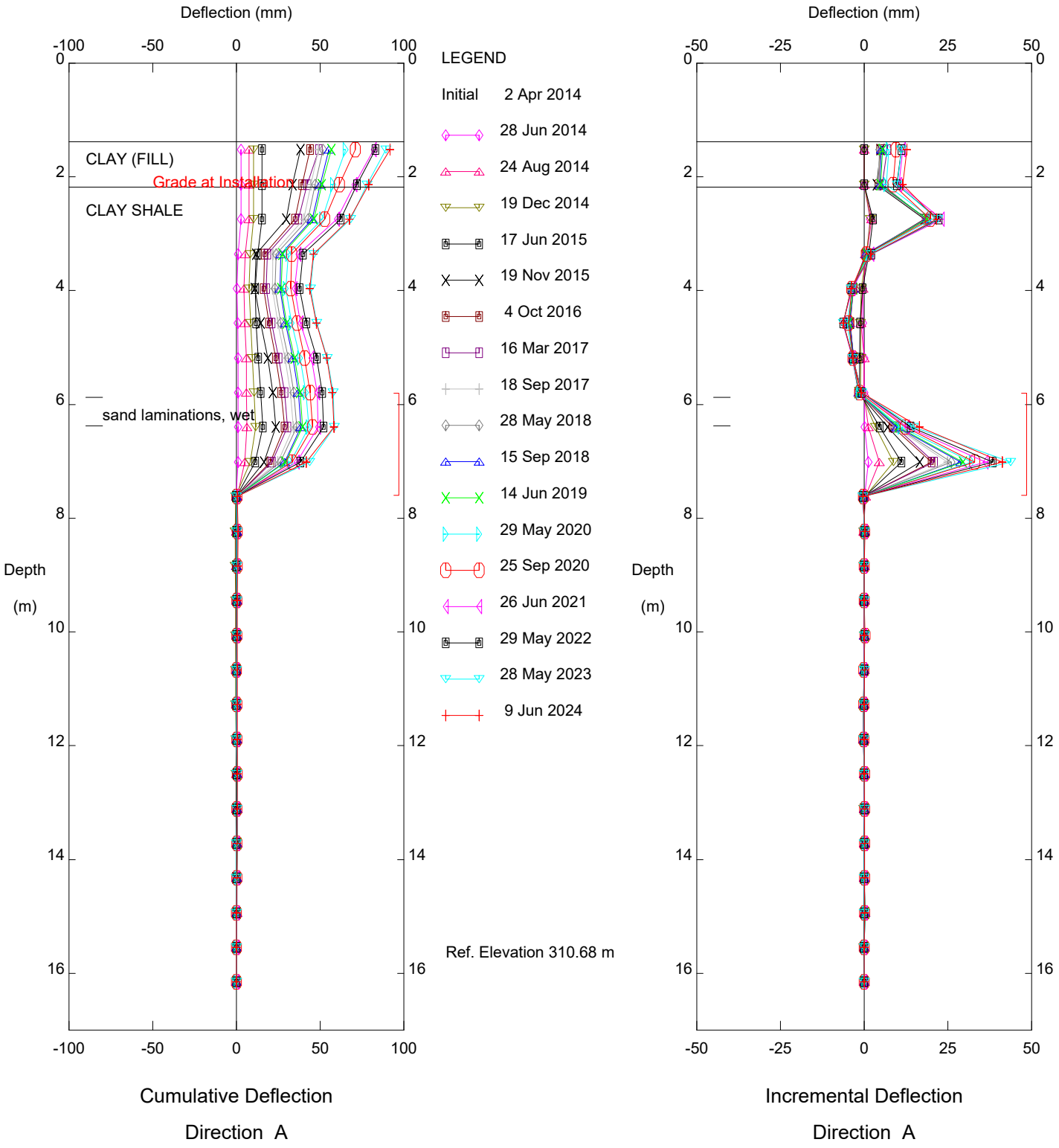
Thurber Engineering Ltd



Hwy 686, 49+000 o/s +34.9m, Inclinometer SI14-14

Alberta Transportation

Thurber Engineering Ltd



Cumulative Deflection

Direction A

Incremental Deflection

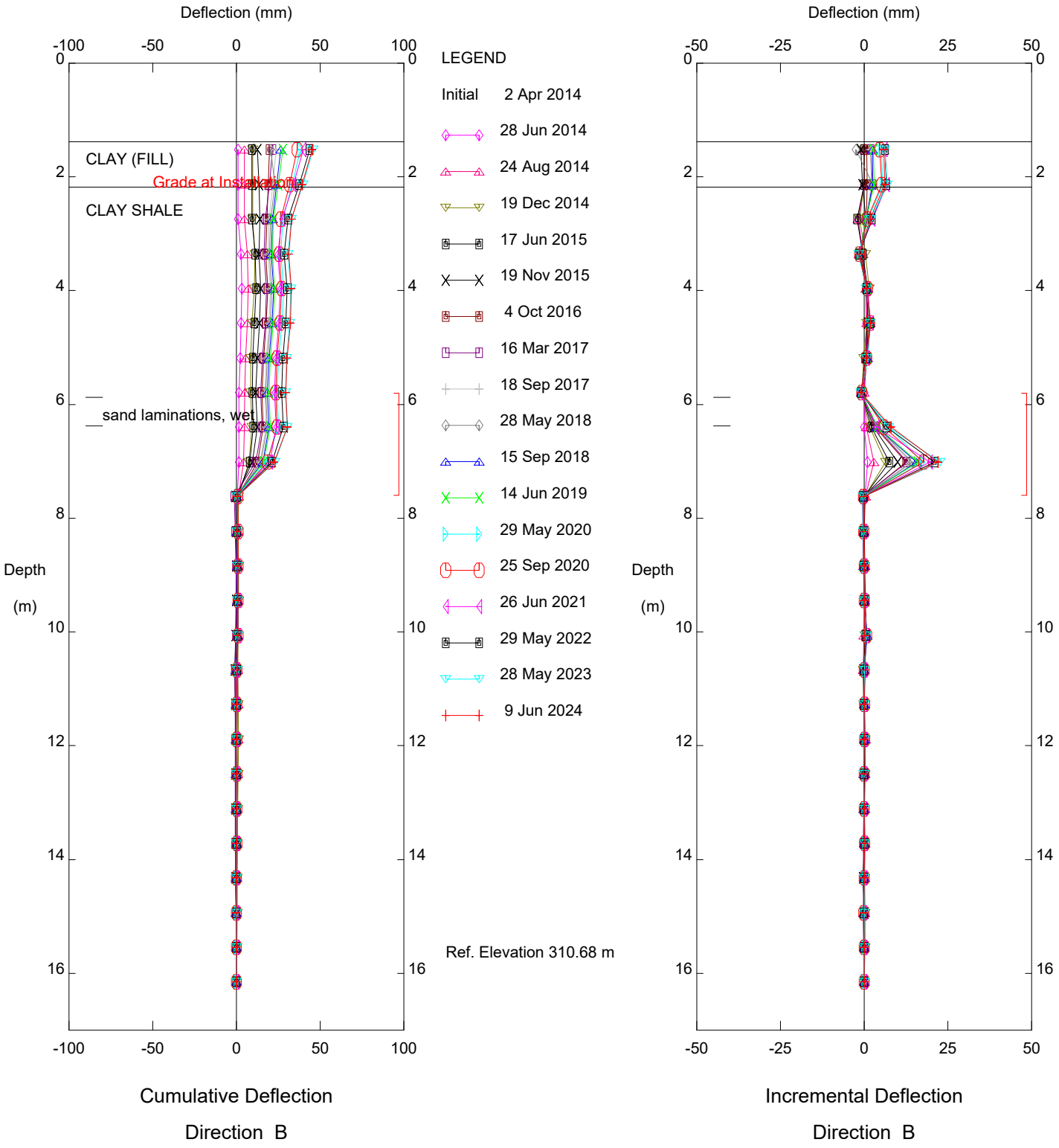
Direction A

Hwy 686, 49+216 o/s +109m, Inclinometer SI14-19

Alberta Transportation

H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2024A-Spring\SI Readings\NC097\SI14-19.gtl

Thurber Engineering Ltd



Cumulative Deflection

Direction B

Incremental Deflection

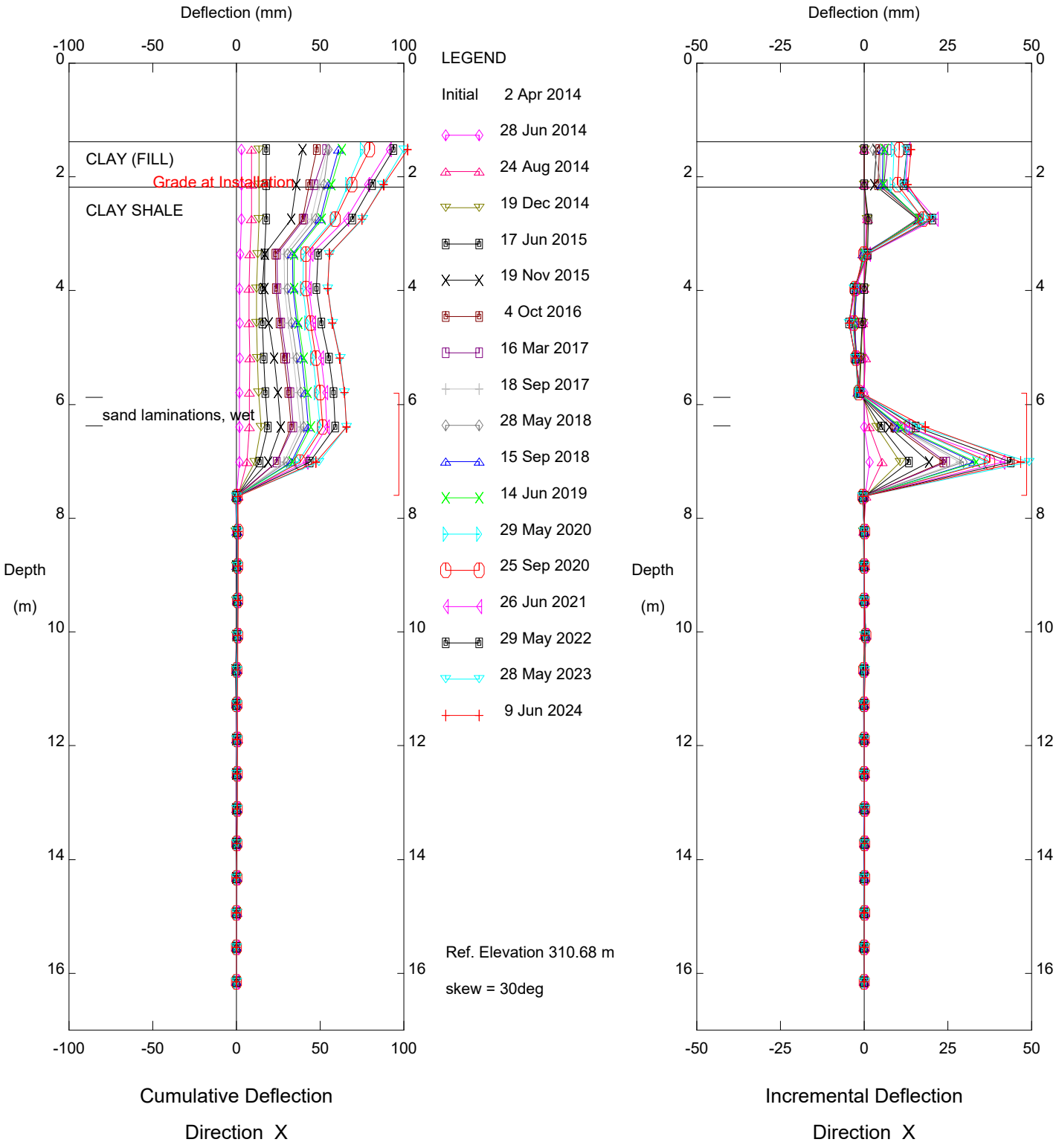
Direction B

Hwy 686, 49+216 o/s +109m, Inclinometer SI14-19

Alberta Transportation

H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2024A-Spring\SI Readings\NC097\SI14-19.gtl

Thurber Engineering Ltd



Cumulative Deflection

Direction X

Incremental Deflection

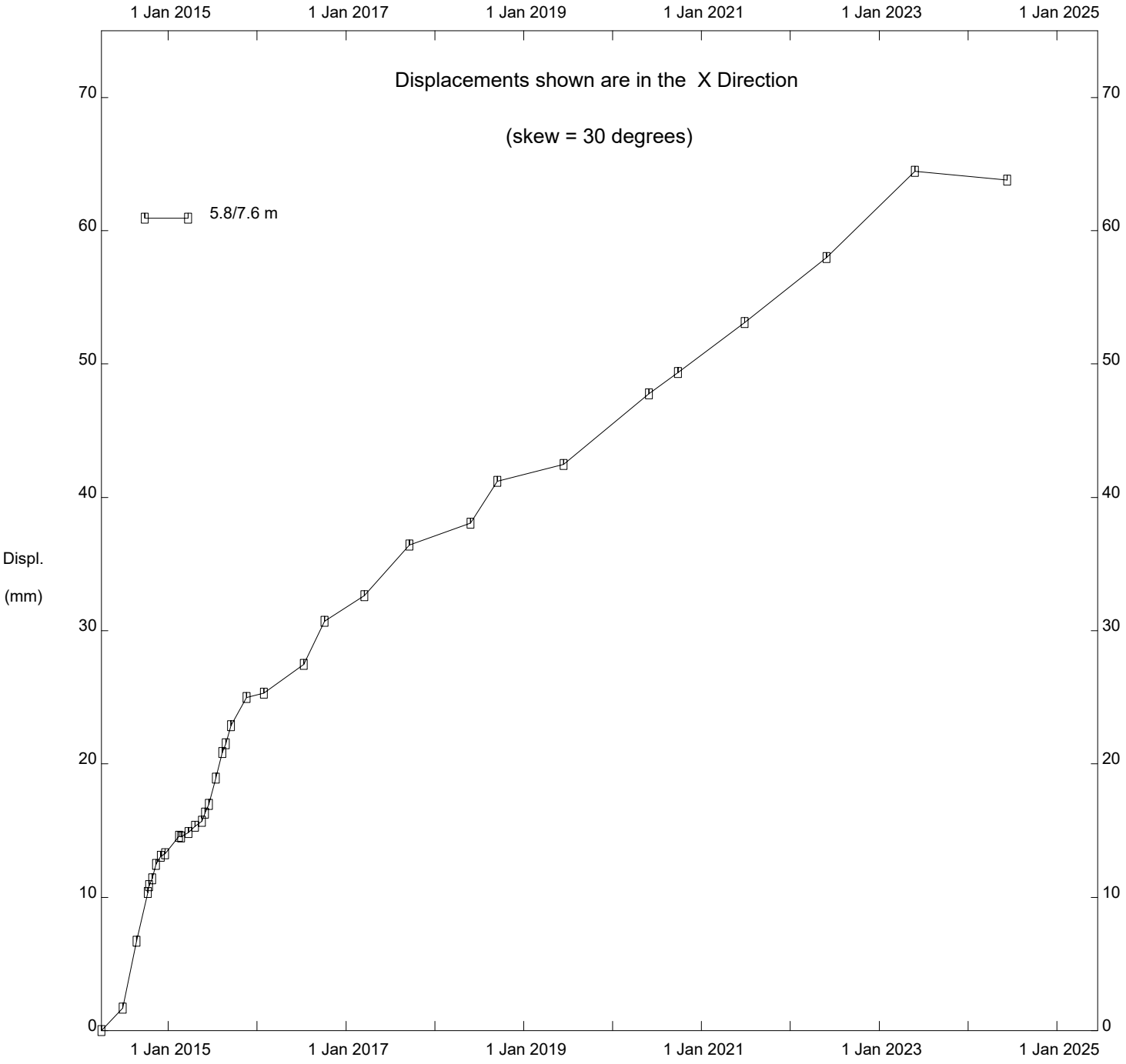
Direction X

Hwy 686, 49+216 o/s +109m, Inclinometer SI14-19

Alberta Transportation

H:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\Section C\2024A-Spring\SI Readings\NC097\SI14-19.gtl

Thurber Engineering Ltd



Hwy 686, 49+216 o/s +109m, Inclinometer SI14-19

Alberta Transportation

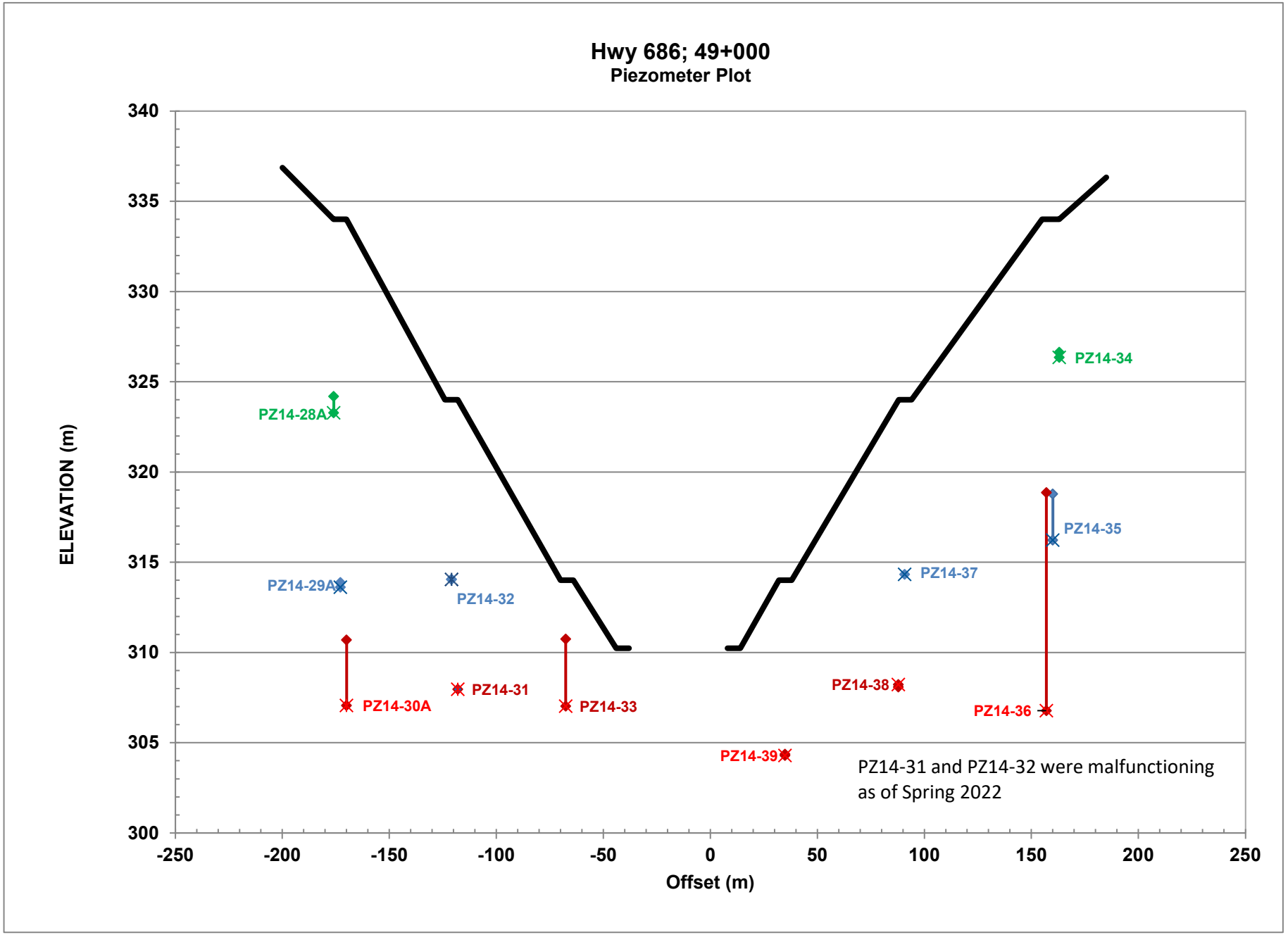

Hwy 686; 49+000
Piezometer Plot
ELEVATION (m)
340
335
330
325
320
315
310
305
300
-250
-200
-150
-100
-50
0
50
100
150
200
250
Offset (m)
PZ14-28A
PZ14-34
PZ14-29A
PZ14-32
PZ14-35
PZ14-37
PZ14-30A
PZ14-31
PZ14-33
PZ14-38
PZ14-36
PZ14-39
PZ14-31 and PZ14-32 were malfunctioning
as of Spring 2022

Figure 686-1

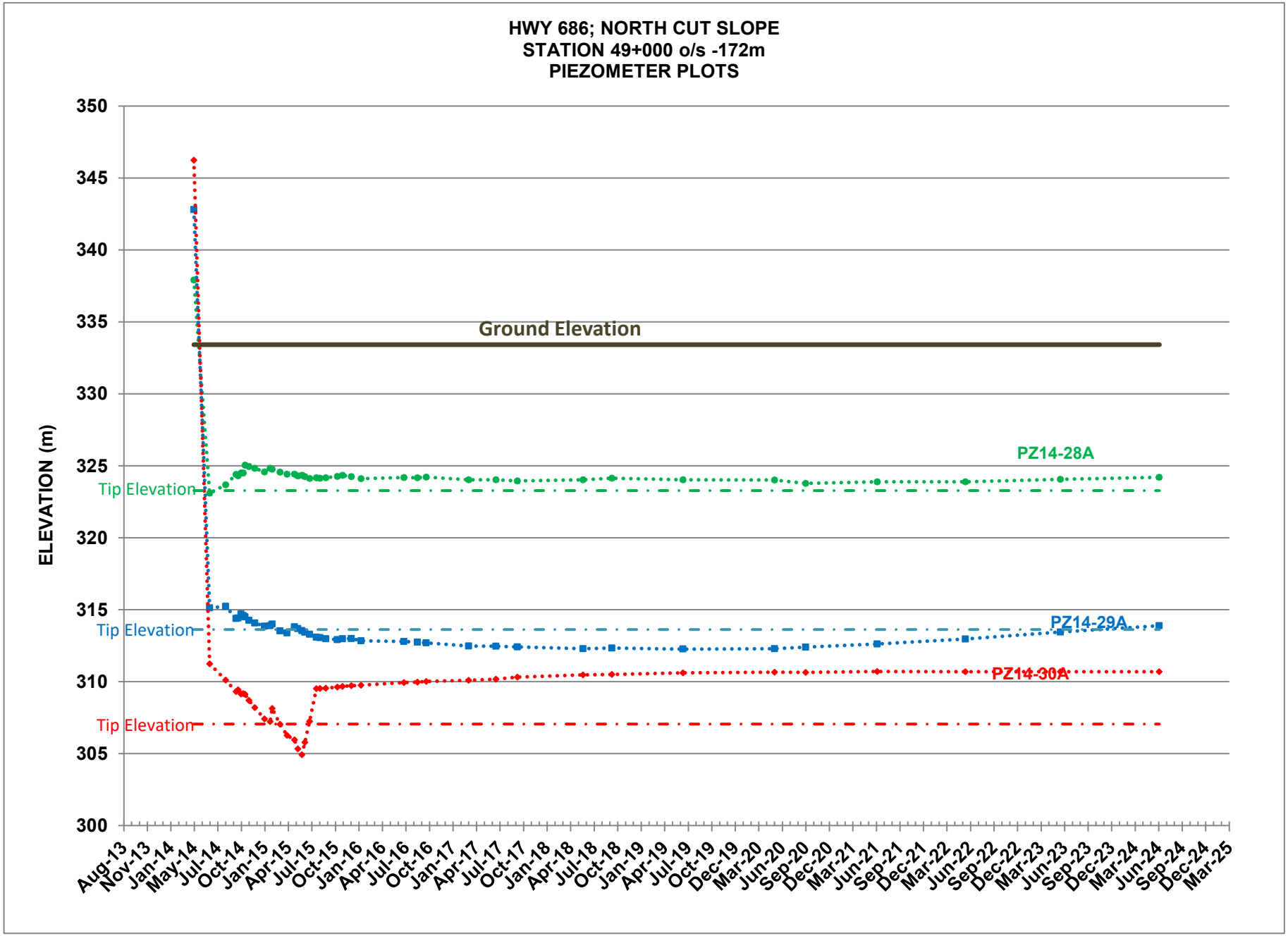

HWY 686; NORTH CUT SLOPE
STATION 49+000 o/s -172m
PIEZOMETER PLOTS
ELEVATION (m)
350
345
340
335
330
325
320
315
310
305
300
Ground Elevation
PZ14-28A
Tip Elevation
PZ14-29A
Tip Elevation
PZ14-30A
Tip Elevation
Aug-13
Nov-13
Jan-14
May-14
Jul-14
Oct-14
Jan-15
Apr-15
Jul-15
Oct-15
Jan-16
Apr-16
Jul-16
Oct-16
Jan-17
Apr-17
Jul-17
Oct-17
Jan-18
Apr-18
Jul-18
Oct-18
Jan-19
Apr-19
Jul-19
Oct-19
Dec-19
Mar-20
Jun-20
Sep-20
Dec-20
Mar-21
Jun-21
Sep-21
Dec-21
Mar-22
Jun-22
Sep-22
Dec-22
Mar-23
Jun-23
Sep-23
Dec-23
Mar-24
Jun-24
Sep-24
Dec-24
Mar-25

Figure 686-2

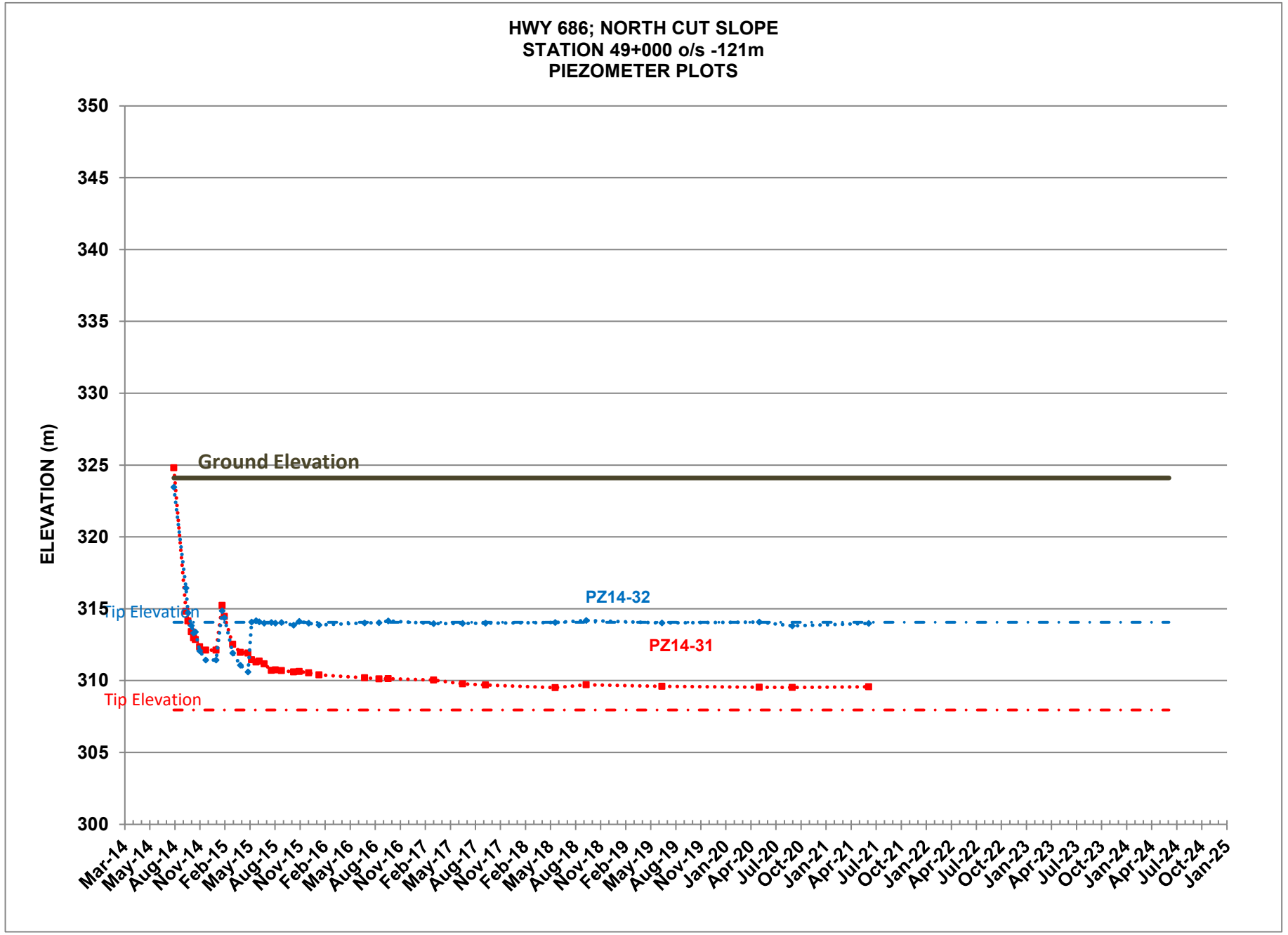

HWY 686; NORTH CUT SLOPE
STATION 49+000 o/s -121m
PIEZOMETER PLOTS
ELEVATION (m)
350
345
340
335
330
325
320
315
310
305
300
Ground Elevation
PZ14-32
Tip Elevation
PZ14-31
Tip Elevation
Mar-14
May-14
Aug-14
Nov-14
Feb-15
May-15
Aug-15
Nov-15
Feb-16
May-16
Aug-16
Nov-16
Feb-17
May-17
Aug-17
Nov-17
Feb-18
May-18
Aug-18
Nov-18
Feb-19
May-19
Aug-19
Nov-19
Jan-20
Apr-20
Jul-20
Oct-20
Jan-21
Apr-21
Jul-21
Oct-21
Jan-22
Apr-22
Jul-22
Oct-22
Jan-23
Apr-23
Jul-23
Oct-23
Jan-24
Apr-24
Jul-24
Oct-24
Jan-25

Figure 686-3

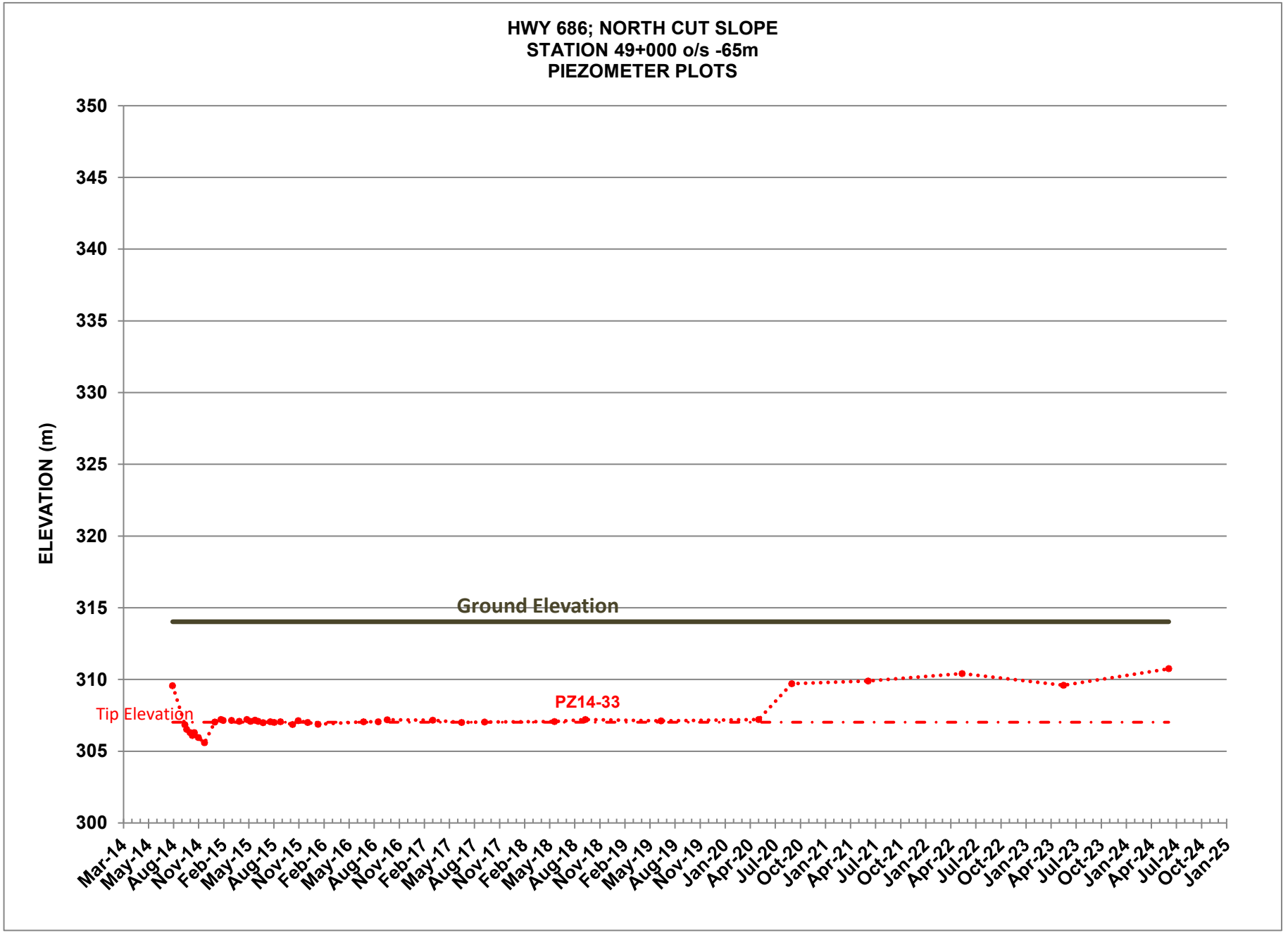

HWY 686; NORTH CUT SLOPE
STATION 49+000 o/s -65m
PIEZOMETER PLOTS
ELEVATION (m)
350
345
340
335
330
325
320
315
310
305
300
Ground Elevation
PZ14-33
Tip Elevation
Mar-14
May-14
Aug-14
Nov-14
Feb-15
May-15
Aug-15
Nov-15
Feb-16
May-16
Aug-16
Nov-16
Feb-17
May-17
Aug-17
Nov-17
Feb-18
May-18
Aug-18
Nov-18
Feb-19
May-19
Aug-19
Nov-19
Jan-20
Apr-20
Jul-20
Oct-20
Jan-21
Apr-21
Jul-21
Oct-21
Jan-22
Apr-22
Jul-22
Oct-22
Jan-23
Apr-23
Jul-23
Oct-23
Jan-24
Apr-24
Jul-24
Oct-24
Jan-25

Figure 686-4

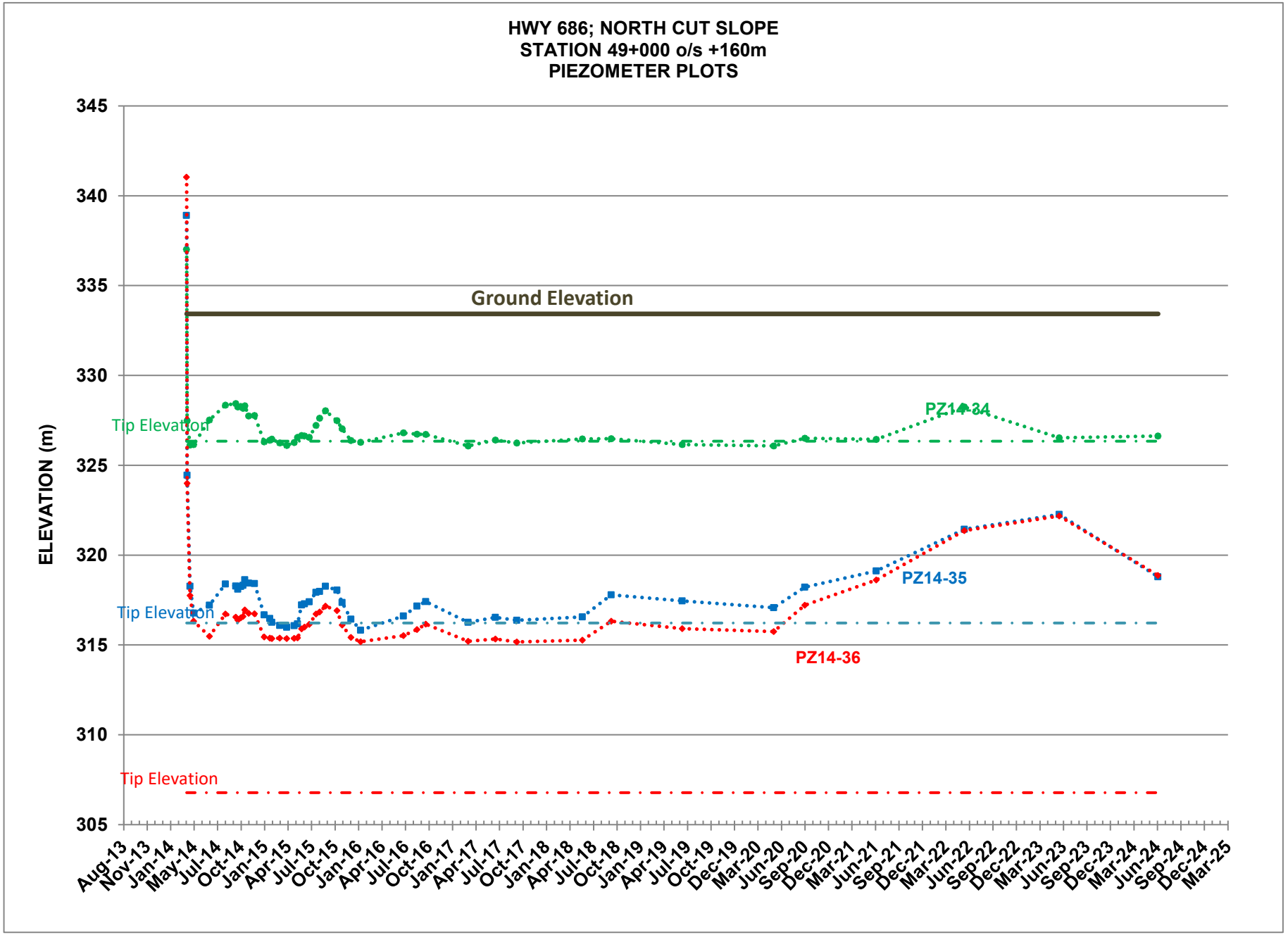

HWY 686; NORTH CUT SLOPE
STATION 49+000 o/s +160m
PIEZOMETER PLOTS
ELEVATION (m)
345
340
335
330
325
320
315
310
305
Ground Elevation
Tip Elevation
Tip Elevation
Tip Elevation
PZ14-34
PZ14-35
PZ14-36
Aug-13
Nov-13
Jan-14
May-14
Jul-14
Oct-14
Jan-15
Apr-15
Jul-15
Oct-15
Jan-16
Apr-16
Jul-16
Oct-16
Jan-17
Apr-17
Jul-17
Oct-17
Jan-18
Apr-18
Jul-18
Oct-18
Jan-19
Apr-19
Jul-19
Oct-19
Dec-19
Mar-20
Jun-20
Sep-20
Dec-20
Mar-21
Jun-21
Sep-21
Dec-21
Mar-22
Jun-22
Sep-22
Dec-22
Mar-23
Jun-23
Sep-23
Dec-23
Mar-24
Jun-24
Sep-24
Dec-24
Mar-25

Figure 686-5

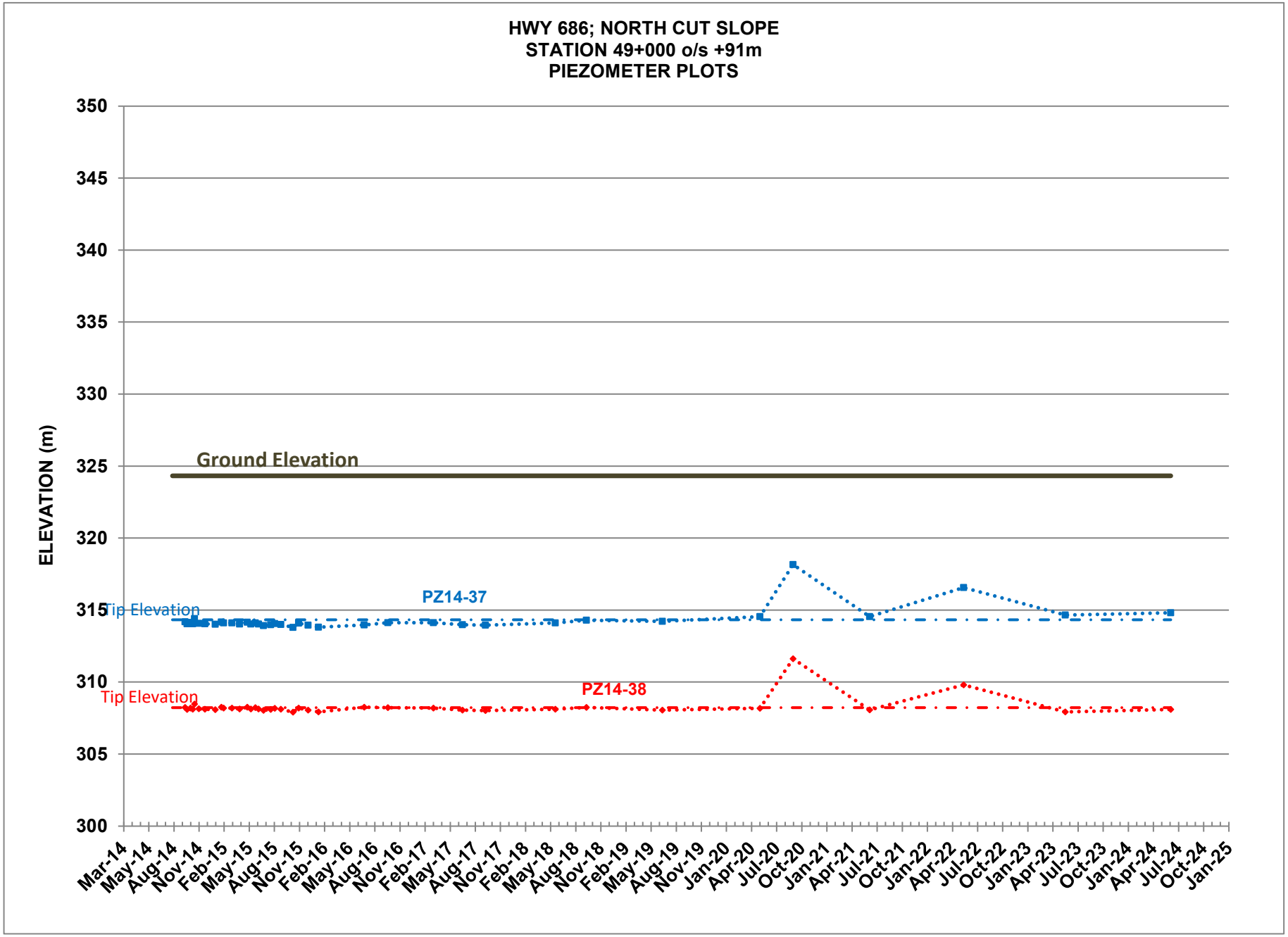

HWY 686; NORTH CUT SLOPE
STATION 49+000 o/s +91m
PIEZOMETER PLOTS
ELEVATION (m)
350
345
340
335
330
325
320
315
310
305
300
Ground Elevation
PZ14-37
Tip Elevation
PZ14-38
Tip Elevation
Mar-14
May-14
Aug-14
Nov-14
Feb-15
May-15
Aug-15
Nov-15
Feb-16
May-16
Aug-16
Nov-16
Feb-17
May-17
Aug-17
Nov-17
Feb-18
May-18
Aug-18
Nov-18
Feb-19
May-19
Aug-19
Nov-19
Jan-20
Apr-20
Jul-20
Oct-20
Jan-21
Apr-21
Jul-21
Oct-21
Jan-22
Apr-22
Jul-22
Oct-22
Jan-23
Apr-23
Jul-23
Oct-23
Jan-24
Apr-24
Jul-24
Oct-24
Jan-25

Figure 686-6

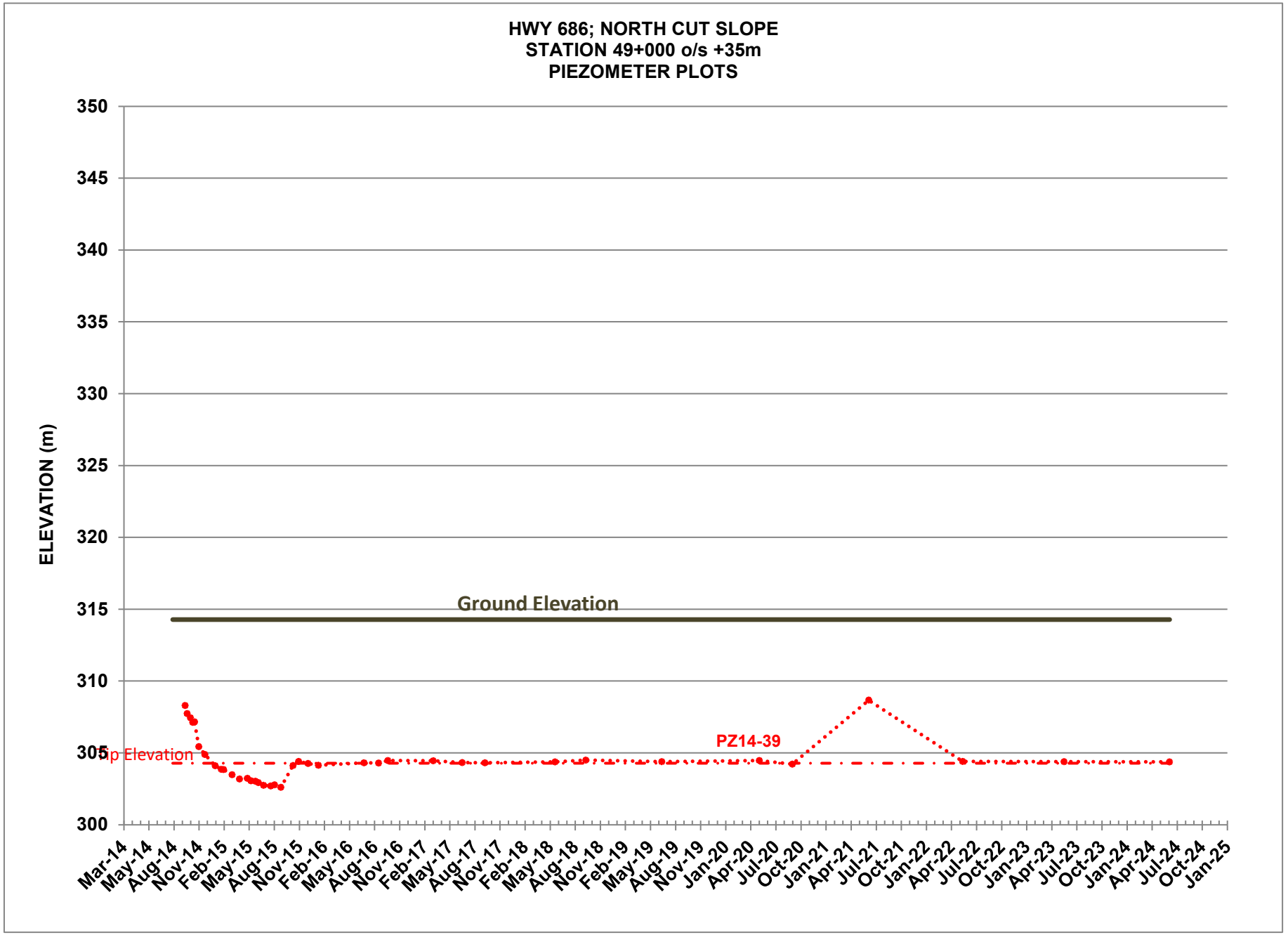

HWY 686; NORTH CUT SLOPE
STATION 49+000 o/s +35m
PIEZOMETER PLOTS
ELEVATION (m)
350
345
340
335
330
325
320
315
310
305
300
Ground Elevation
PZ14-39
Mar-14
May-14
Aug-14
Nov-14
Feb-15
May-15
Aug-15
Nov-15
Feb-16
May-16
Aug-16
Nov-16
Feb-17
May-17
Aug-17
Nov-17
Feb-18
May-18
Aug-18
Nov-18
Feb-19
May-19
Aug-19
Nov-19
Jan-20
Apr-20
Jul-20
Oct-20
Jan-21
Apr-21
Jul-21
Oct-21
Jan-22
Apr-22
Jul-22
Oct-22
Jan-23
Apr-23
Jul-23
Oct-23
Jan-24
Apr-24
Jul-24
Oct-24
Jan-25

Figure 686-7

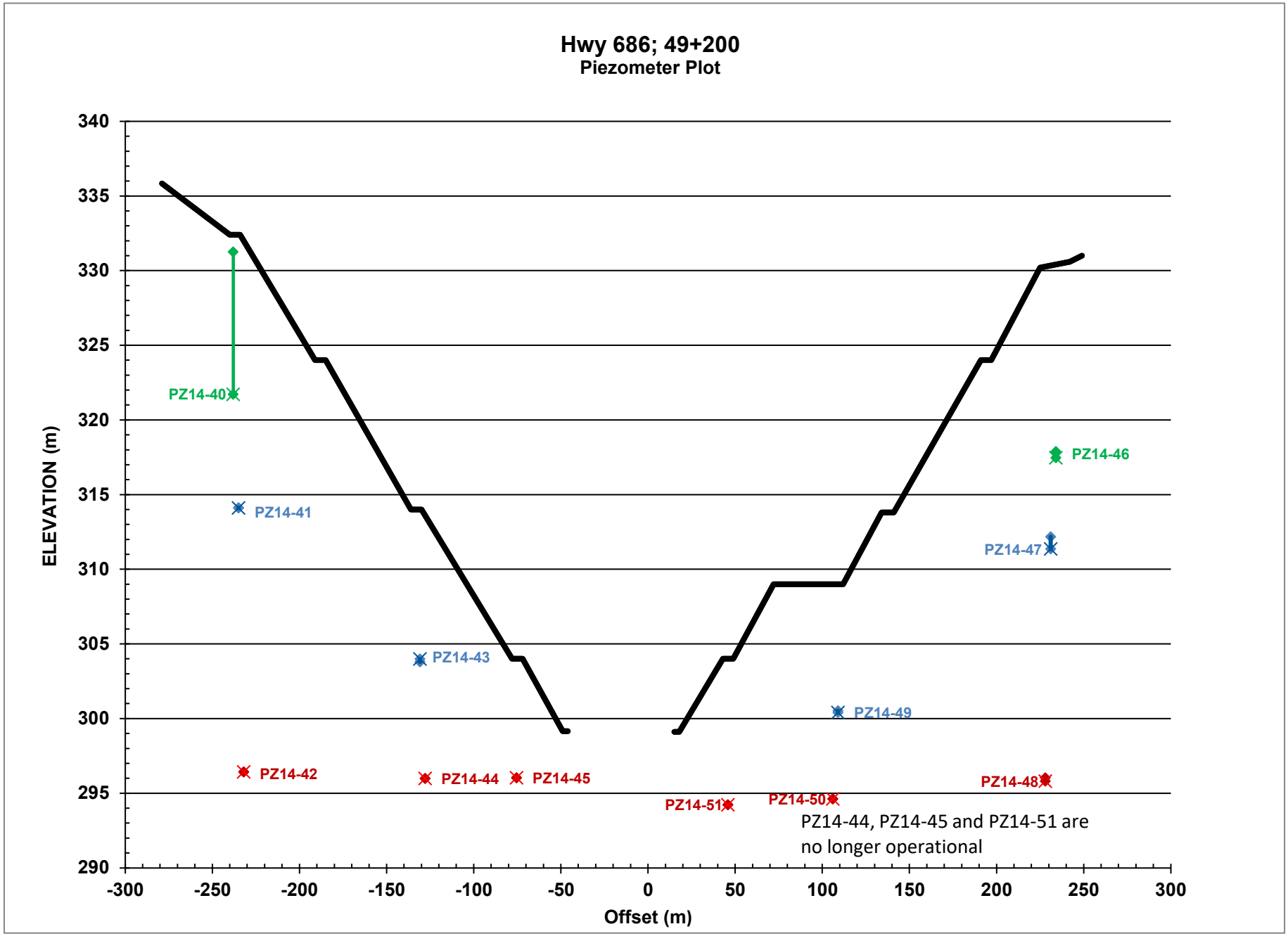

Hwy 686; 49+200
Piezometer Plot
ELEVATION (m)
340
335
330
325
320
315
310
305
300
295
290
-300
-250
-200
-150
-100
-50
0
50
100
150
200
250
300
Offset (m)
PZ14-40
PZ14-41
PZ14-42
PZ14-43
PZ14-44
PZ14-45
PZ14-46
PZ14-47
PZ14-48
PZ14-49
PZ14-50
PZ14-51
PZ14-44, PZ14-45 and PZ14-51 are
no longer operational

Figure 686-8

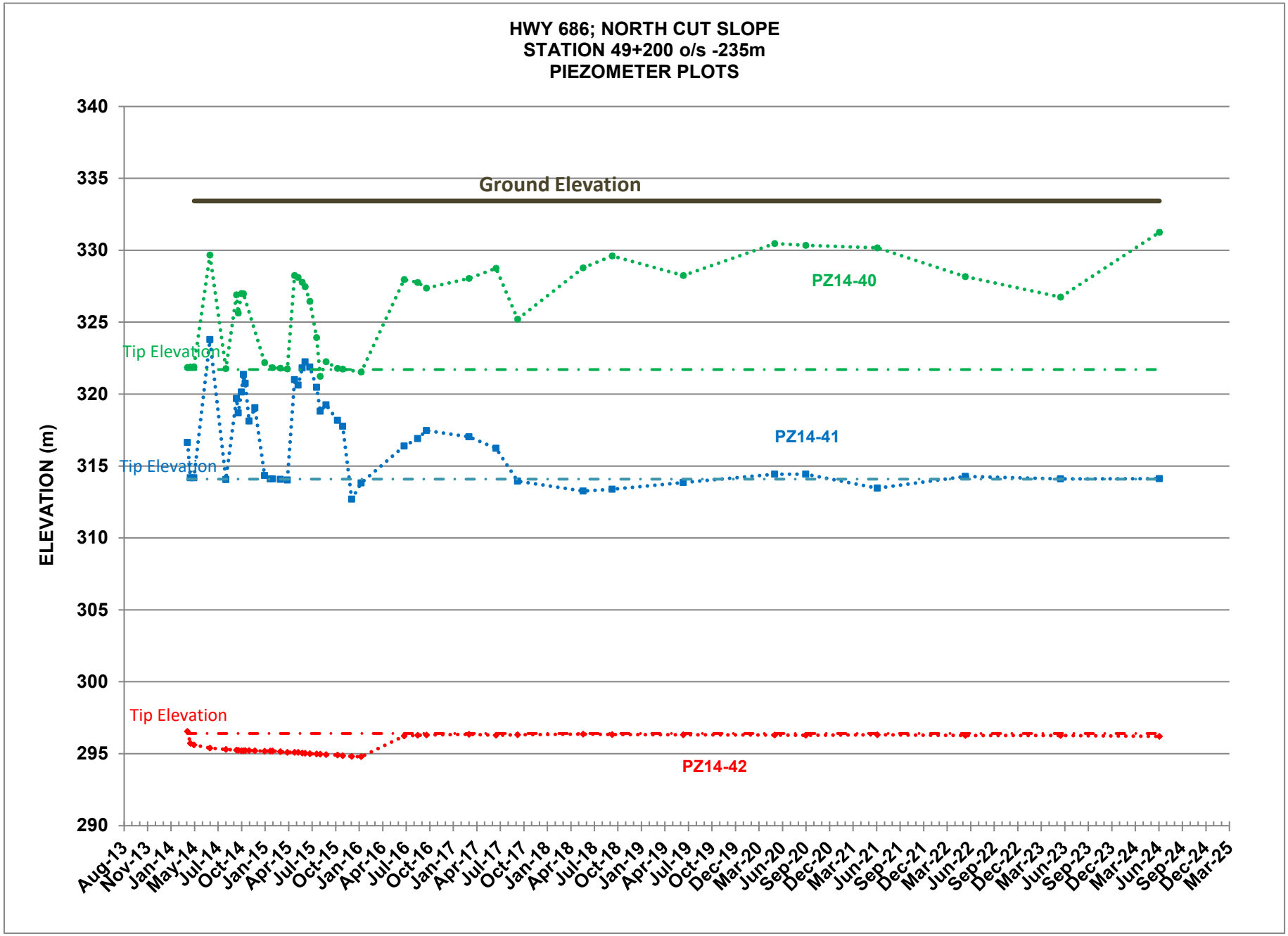

HWY 686; NORTH CUT SLOPE
STATION 49+200 o/s -235m
PIEZOMETER PLOTS
ELEVATION (m)
340
335
330
325
320
315
310
305
300
295
290
Ground Elevation
PZ14-40
Tip Elevation
PZ14-41
Tip Elevation
Tip Elevation
PZ14-42
Aug-13
Nov-13
Jan-14
May-14
Jul-14
Oct-14
Jan-15
Apr-15
Jul-15
Oct-15
Jan-16
Apr-16
Jul-16
Oct-16
Jan-17
Apr-17
Jul-17
Oct-17
Jan-18
Apr-18
Jul-18
Oct-18
Jan-19
Apr-19
Jul-19
Oct-19
Dec-19
Mar-20
Jun-20
Sep-20
Dec-20
Mar-21
Jun-21
Sep-21
Dec-21
Mar-22
Jun-22
Sep-22
Dec-22
Mar-23
Jun-23
Sep-23
Dec-23
Mar-24
Jun-24
Sep-24
Dec-24
Mar-25

Figure 686-9

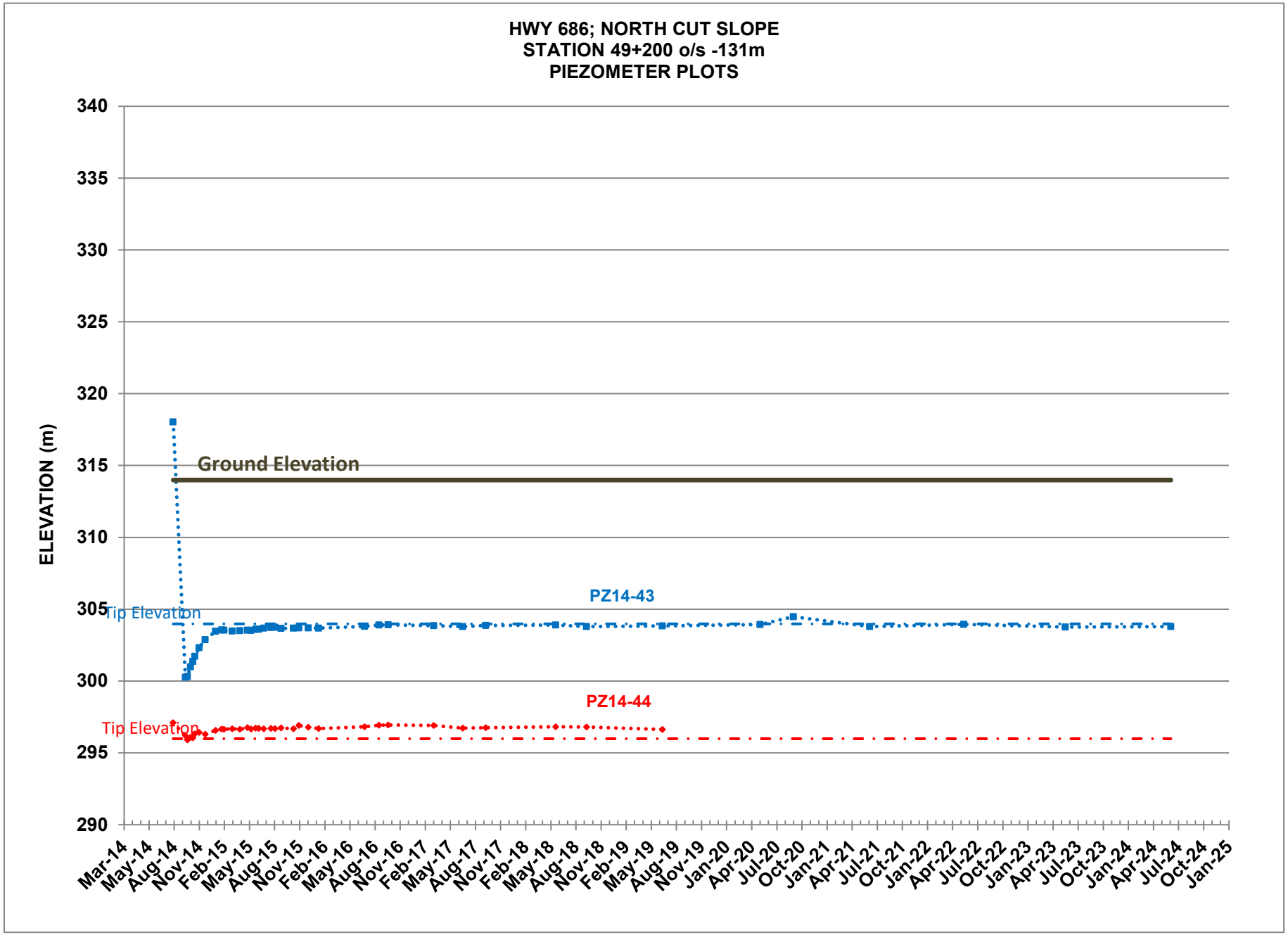


Figure 686-10

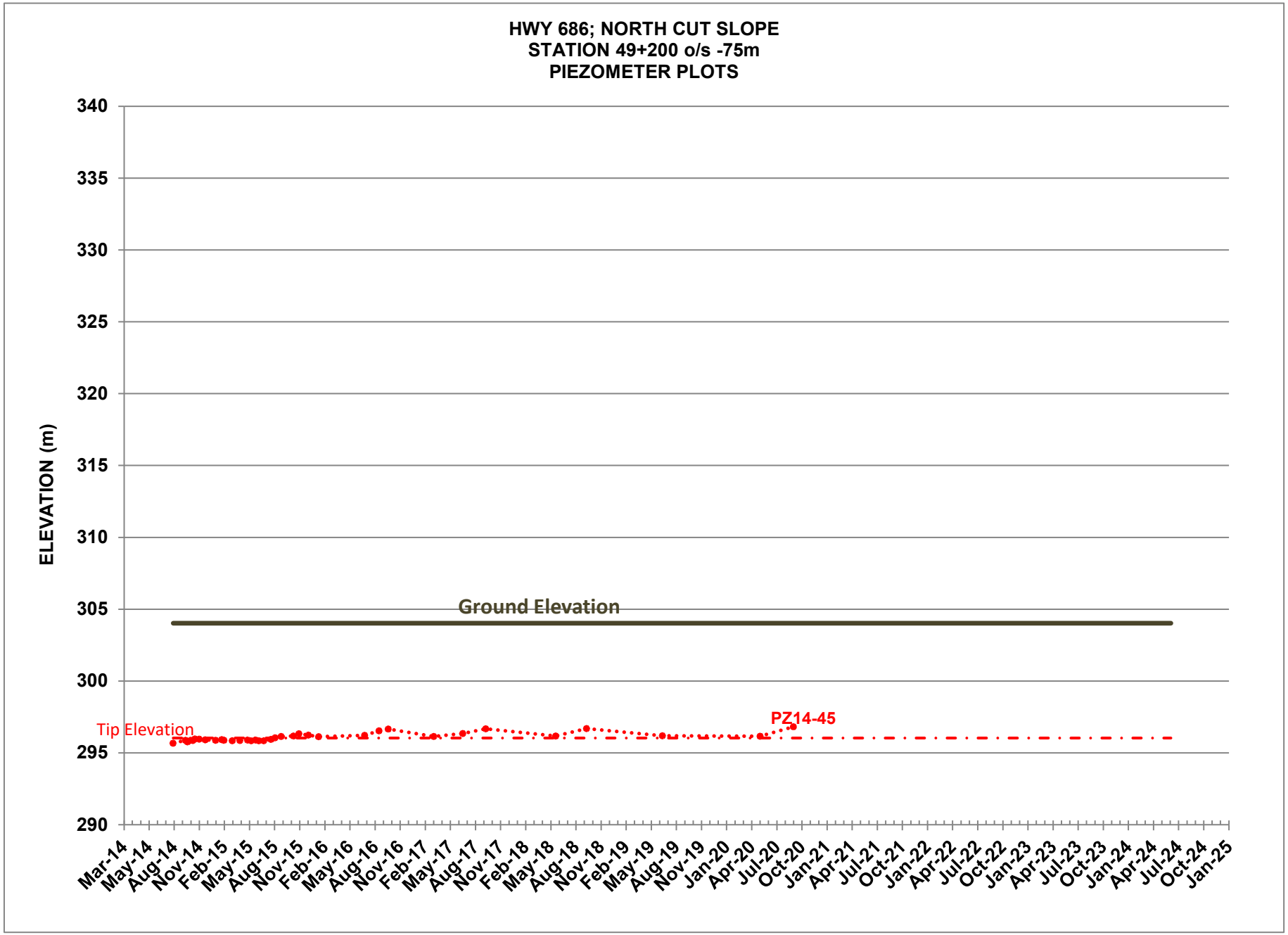


Figure 686-11

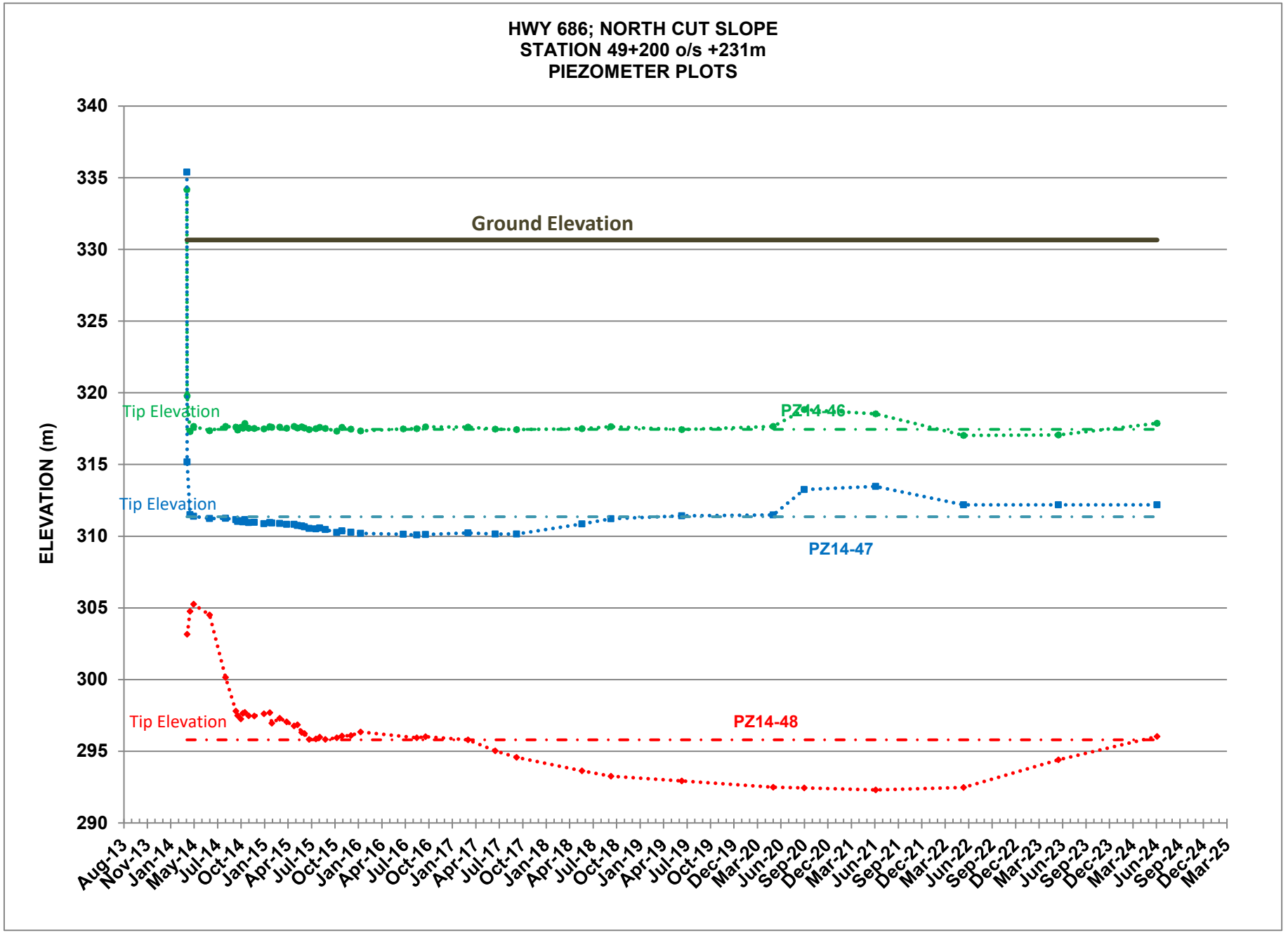


Figure 686-12

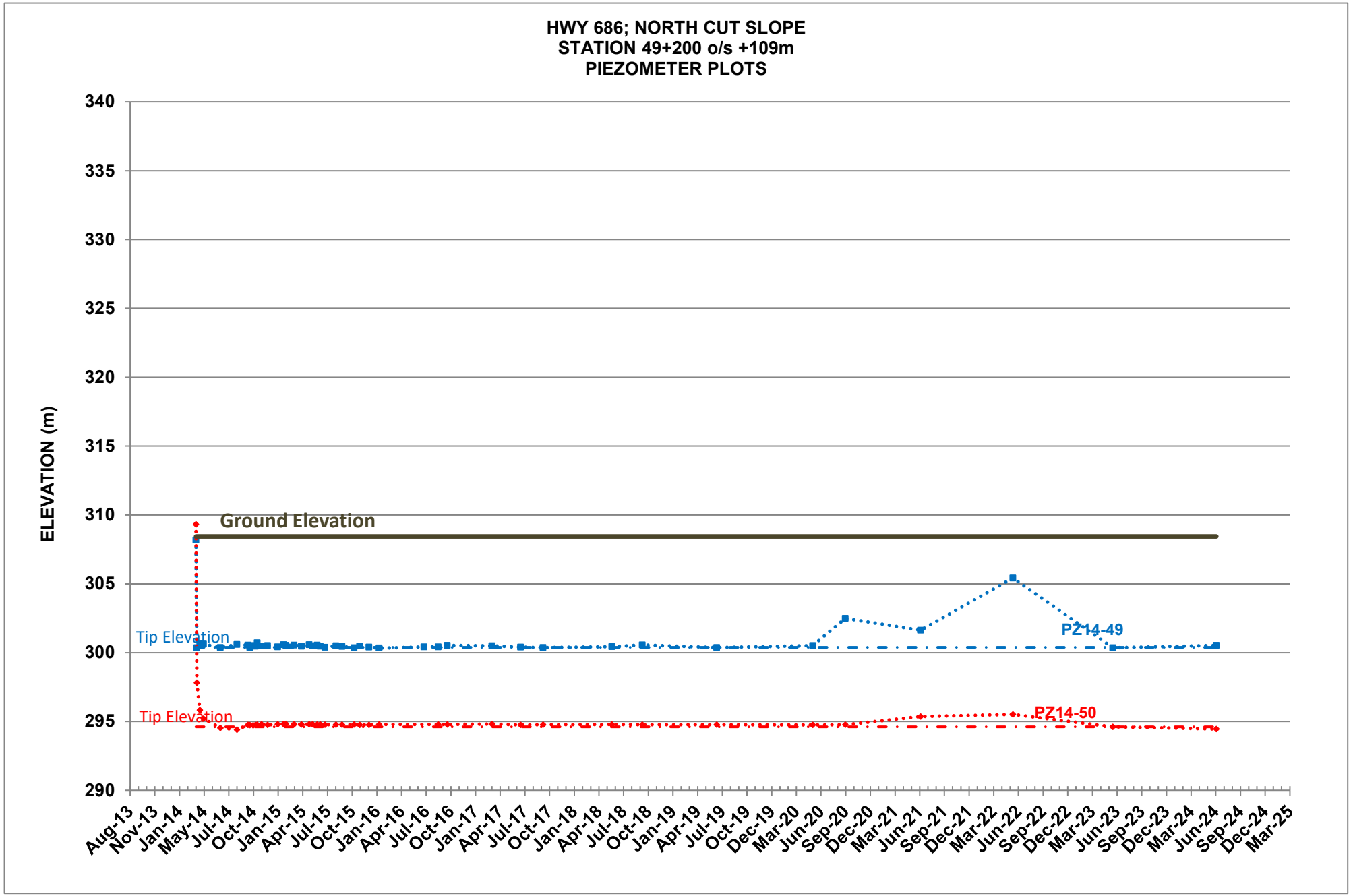


Figure 686-13