

ALBERTA TRANSPORTATION AND
ECONOMIC CORRIDORS GRMP
NORTH CENTRAL (ATHABASCA AND FORT
McMURRAY DISTRICTS)
INSTRUMENTATION MONITORING - FALL 2025



Site Number	Location	Name	Hwy	km
NC006	HWY 2:46 C1 47.6	Mitsue Lake Recreation Area	2:46	km 47.6
Legal Description: 9-12-72-5 W5		UTM Co-ordinates		
		11U E 651534	N	6122185

Current Monitoring:	22-Sep-2025	Previous Monitoring	31-May-2025
Instruments Read By:	Mr. Niraj Regmi, G.I.T and Mr. Angelo Castillo, of Thurber		

Instruments Read During This Site Visit			
Slope Inclinometers (SIs): SI20-1, SI20-3, SI20-4, SI24-7, and SI24-8.	Pneumatic Piezometers (PN): N/A	Vibration Wire Piezometers (VW): VW20-1, VW20-3A, VW20-3B, VW20-4A and VW20-4B	Standpipe Piezometers (SP): N/A
Load Cell (LC): N/A	Strain Gauges: N/A	SAA's: N/A	Others:

Readout Equipment Used			
Slope Inclinometers: RST Digital Inclinator probe with a 2 ft. wheelbase and a RST Pocket PC readout	Pneumatic Piezometers:	Vibration Wire Piezometers: GEOKON GK-404 digital readout	Standpipe Piezometers:
Load Cell:	Strain Gauges:	SAA's:	Others:
Notes: - SI20-2, VW20-2A and VW20-2B were damaged during construction after the fall 2024 readings. SI24-7 and SI24-8, were installed during the construction of the landslide's repair measures and added to the readings program in the spring of 2025.			

Discussion	
Zones of New Movement:	None
Interpretation of Monitoring Results:	SI20-1, installed in the south ditch of the highway, has shown no discernible movement since initialization. SI20-3, installed downslope of SI20-2 within the bush, showed a rate of movement of 3.6 mm/yr over 1.4 m to 3.2 m depth since the spring of 2025 readings. This corresponds to an increase in the rate of movement by 3.5 mm/yr. SI20-4, installed further downslope of SI20-3 within the bush, has shown no discernible movement since initialization. SI24-7, installed downslope of the pile wall, and SI24-8, installed between the highway surface and the pile wall, each showed no discernible movement since the spring of 2025 readings. Vibrating wire piezometers VW20-3A, VW20-3B, VW20-4A, and VW20-4B showed decreases in groundwater level of 0.59 m, 0.05 m, 0.72, and 0.58 m, respectively, since the spring of 2025 readings. Vibrating wire piezometer VW20-1 showed an increase in groundwater level of 0.36 m since the spring of 2025 readings.

	Overall, the measured groundwater levels are within the historically maximum groundwater levels for the site.
Future Work:	The instruments should be read again in the spring of 2026.
Instrumentation Repairs:	No instrument repairs are required at this time.
Additional Comments:	

Attachments:	▪ Table NC006-1 Fall 2025 – HWY 2:46 Mitsue Lake Recreation Area (Km 47.6), Slope Inclinator Instrumentation Reading Summary ▪ Table NC006-2 Fall 2025 – HWY 2:46 Mitsue Lake Recreation Area (Km 47.6), Vibrating Wire Piezometer Instrumentation Reading Summary ▪ Statement for Use and Interpretation of Report ▪ APPENDIX A – NC006-1 FALL 2025 □ Field Inspector's report □ Site Plan Showing Approximate Instrument Locations (Drawing No. 32122-NC006) □ SI Reading Plots □ Figure NC006-1 (Piezometric Depths)
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We trust this report meets your requirements at present. If you have any questions, please contact the undersigned at your convenience.

Yours very truly,
Thurber Engineering Ltd.
Tarek Abdelaziz, Ph.D., P. Eng.
Partner | Senior Geotechnical Engineer

Yasir Khan, E.I.T.
Geotechnical Engineer-In-Training

Table NC006-1: Fall 2025 – Hwy 2:46 Mitsue Lake Recreation Area (KM 47.6) Slope Inclinator Instrumentation Reading Summary

Date Monitored: September 22, 2025

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)
SI20-1	December 21, 2020	No discernible movement	N/A	Operational	May 31, 2025	N/A	N/A	N/A
SI20-2	June 5, 2022 (reinitialized)	40.7 over 0 m to 1.8 m depth in 345° direction	25.8 in September 2022	Damaged	September 18, 2024	N/A	N/A	N/A
SI20-3	December 20, 2020	31.1 over 1.4 m to 3.2 m depth in 348° direction	63.8 in September 2024	Operational	May 31, 2025	1.1	3.6	3.5
SI20-4	December 19, 2021	No discernible movement	N/A	Operational	May 31, 2025	N/A	N/A	N/A
SI24-7	November 28, 2024	10.8 over 0.0 m to 1.7 m depth in the 7° direction	23.1 in May 2025	Operational	May 31, 2025	No Discernible Movement	N/A	-25.4
SI24-8	November 29, 2024	2.0 over 1.2 to 3.0 m in the 201° direction	4.1 in May 2025	Operational	May 31, 2025	No Discernible Movement	N/A	-4.2

Drawing 32122-NC006 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

Table NC006-2: Fall 2025 – Hwy 2:46 Mitsue Lake Recreation Area (Km 47.6) Vibrating Wire Piezometer Instrumentation Reading Summary

Date Monitored: September 22, 2025

INSTRUMENT #	DATE INITIALIZED	TIP DEPTH (m)	GROUND ELEV. (m)	CURRENT STATUS	HIGHEST MEASURED GROUNDWATER LEVEL BGS (m)	CURRENT GROUNDWATER DEPTH BGS (m)	PREVIOUS GROUNDWATER DEPTH BGS (m)	CHANGE IN WATER LEVEL SINCE PREVIOUS READING (m)
VW20-1 (70917)	December 19, 2020	12.04	-	Operational	6.76 on June 30, 2021	7.75	8.11	0.36
VW20-2A (70911)	December 20, 2020	3.96	-	Damaged	3.24 on June 30, 2021	N/A	N/A	N/A
VW20-2B (70914)	December 20, 2020	13.72	-	Damaged	5.74 on June 30, 2021	N/A	N/A	N/A
VW20-3A (70912)	December 20, 2020	8.69	-	Operational	2.86 on June 5, 2022	4.68	4.09	-0.59
VW20-3B (70916)	December 20, 2020	16.76	-	Operational	1.48 on June 30, 2021	2.85	2.80	-0.05
VW20-4A (70913)	December 19, 2020	2.74	-	Operational	1.11 on June 5, 2022	2.59	1.87	-0.72
VW20-4B (70915)	December 19, 2020	15.24	-	Operational	2.53 on June 5, 2022	3.80	3.22	-0.58

Drawing 32122-NC006 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

STATEMENT FOR USE AND INTERPRETATION OF REPORT

1. STANDARD OF CARE

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

2. COMPLETE REPORT

All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment, including this Statement For Use and Interpretation of Report, are a part of the Report, which is of a summary nature and is not intended to stand alone without reference to the instructions given to Thurber by the Client, communications between Thurber and the Client, and any other reports, proposals or documents prepared by Thurber for the Client relative to the specific site described herein, all of which together constitute the Report.

IN ORDER TO PROPERLY UNDERSTAND THE SUGGESTIONS, RECOMMENDATIONS AND OPINIONS EXPRESSED HEREIN, REFERENCE MUST BE MADE TO THE WHOLE OF THE REPORT, AS DESCRIBED ABOVE. THURBER IS NOT RESPONSIBLE FOR USE BY ANY PARTY OF PORTIONS OF THE REPORT WITHOUT REFERENCE TO THE WHOLE OF THE REPORT.

3. BASIS OF REPORT

The Report has been prepared for the specific site, development, design objectives, and purposes that were described to Thurber by the Client. The applicability and reliability of any of the findings, recommendations, suggestions, or opinions expressed in the Report, subject to the limitations provided herein, are only valid to the extent that the Report expressly addresses proposed development, design objectives and purposes, and then only to the extent that there has been no material alteration to or variation from any of the said descriptions provided to Thurber, unless Thurber is specifically requested by the Client to review and revise the Report in light of such alteration or variation.

4. USE OF THE REPORT

The information and opinions expressed in the Report, or any document forming part of the Report, are for the sole benefit of the Client for the development, design objectives, and/or purposes described to Thurber by the Client. **NO OTHER PARTY MAY USE OR RELY ON THE REPORT OR ANY PORTION THEREOF FOR OTHER THAN THE CLIENT'S BENEFIT IN CONNECTION WITH THE PURPOSES DESCRIBED IN THE REPORT.** Any use which a third party makes of the Report is the sole responsibility of such third party and is always subject to this Statement for Use and Interpretation of Report. Thurber accepts no liability or responsibility for damages suffered by any third party resulting from use of the Report for purposes outside the reasonable contemplation of Thurber at the time it was prepared or in any manner unintended by Thurber.

5. INTERPRETATION OF THE REPORT

- a) **Nature and Exactness of Soil and Contaminant Description:** Classification and identification of soils, rocks, geological units, contaminant materials and quantities have been based on investigations performed in accordance with the standards set out in Paragraph 1. Classification and identification of these factors is inherently judgement-based. Comprehensive sampling and testing programs implemented with the appropriate equipment by experienced personnel may fail to locate some conditions. All investigations utilizing the standards of Paragraph 1 will involve an inherent risk that some conditions will not be detected and all documents or records summarizing such investigations will be based on assumptions of what exists between the actual points sampled. Actual conditions may vary significantly between the points investigated and the Client and all other parties making use of such documents or records with or without our express written consent need to be aware of this risk and the Report is delivered subject to the express condition that such risk is accepted by the Client and such other parties. Some conditions are subject to change over time and those making use of the Report need to be aware of this possibility and understand that the Report only presents the interpreted conditions at the sampled points at the time of sampling. If special concerns exist, or the Client has special considerations or requirements, the Client must disclose them so that additional or special investigations may be undertaken which would not otherwise be within the scope of investigations made for the purposes of the Report.
- b) **Reliance on Provided Information:** The evaluation and conclusions contained in the Report have been prepared based on conditions in evidence at the time of site inspections and based on information provided to Thurber. Thurber has relied in good faith upon representations, information and instructions provided by the Client and others concerning the site. Accordingly, Thurber does not accept responsibility for any deficiency, misstatement or inaccuracy contained in the Report resulting from misstatements, omissions, misrepresentations, or fraudulent acts of the Client or other parties providing information relied on by Thurber. Thurber is entitled to rely on such representations, information and instructions and is not required to carry out investigations to determine the truth or accuracy of such representations, information and instructions.
- c) **Design Services:** The Report may form part of design and construction documents for information purposes even though it may have been issued prior to final design being completed. Thurber is recommended to be retained to review final design, project plans and related documents prior to construction to confirm that they are consistent with the intent of the Report. Any differences that may exist between the Report's recommendations and the final design need to be reported to Thurber immediately so that Thurber can address potential conflicts.
- d) **Construction Services:** During construction Thurber should be retained to provide field reviews. Field reviews consist of performing sufficient and timely observations of encountered conditions to confirm and document that the site conditions do not materially differ from those conditions considered in the preparation of the report. Adequate field reviews are necessary for Thurber to provide letters of assurance, in accordance with the requirements of many regulatory authorities.

6. INDEPENDENT JUDGEMENTS OF CLIENT

The information, interpretations and conclusions in the Report are based on Thurber's interpretation of conditions revealed through limited investigation conducted within a defined scope of services. Thurber does not accept responsibility for independent conclusions, interpretations, interpolations and/or decisions of the Client, or other parties who may come into possession of the Report, or any part thereof, which may be based on information contained in the Report. This restriction of liability includes, but is not limited to, decisions made to develop, purchase, or sell land, unless such decisions expressly form part of the stated purpose of the Report as described in Paragraph 3.

**ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS GRMP (CON0022163)
NORTH CENTRAL (ATHABASCA AND FORT McMURRAY DISTRICTS)
INSTRUMENTATION MONITORING RESULTS**

FALL 2025

**APPENDIX A
DATA PRESENTATION**

SITE NC006: HWY 2:46 MITSUE LAKE RECREATION AREA (KM 47.6)

**ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS
NORTH CENTRAL REGION - ATHABASCA AND FORT McMURRAY DISTRICTS
INSTRUMENTATION MONITORING FIELD SUMMARY (NC006)
FALL 2025**

Location: Mitsue Recreation Area (HWY 2:46 C1 47.6)	Readout:
File Number: 32122	Casing Diameter: 2.75"
Probe: RST set 8R	Temp: 19
Cable: RST set 8R	Read by: AFC/NKR

SLOPE INCLINOMETER (SI) READINGS

SI#	GPS Location (UTM 11)		Date	Stickup (m)	Depth from top of Casing (ft)	Azimuth of A+ Groove degree	Current Bottom Depth Readings				Probe/ Reel #	Size (")	Remarks
	Easting	Northing					A+	A-	B+	B-			
SI20-1	651534	6122185	22-Sep-25	0.99	80 to 2	334	963	-984	-240	250	8R/8R	2.75	
SI20-3	651541	6122241	22-Sep-25	0.76	66 to 2	351	-618	621	-427	426	8R/8R	2.75	
SI20-4	651456	6122285	22-Sep-25	0.96	66 to 2	345	-834	851	86	-79	8R/8R	2.75	
SI24-7	651537	6122215	22-Sep-25	1	50 to 2	352	1633	-1614	-379	288	8R/8R	2.75	
SI24-8	651537	6122208	22-Sep-25	0.96	52 to 2	326	-177	200	846	-834	8R/8R	2.75	

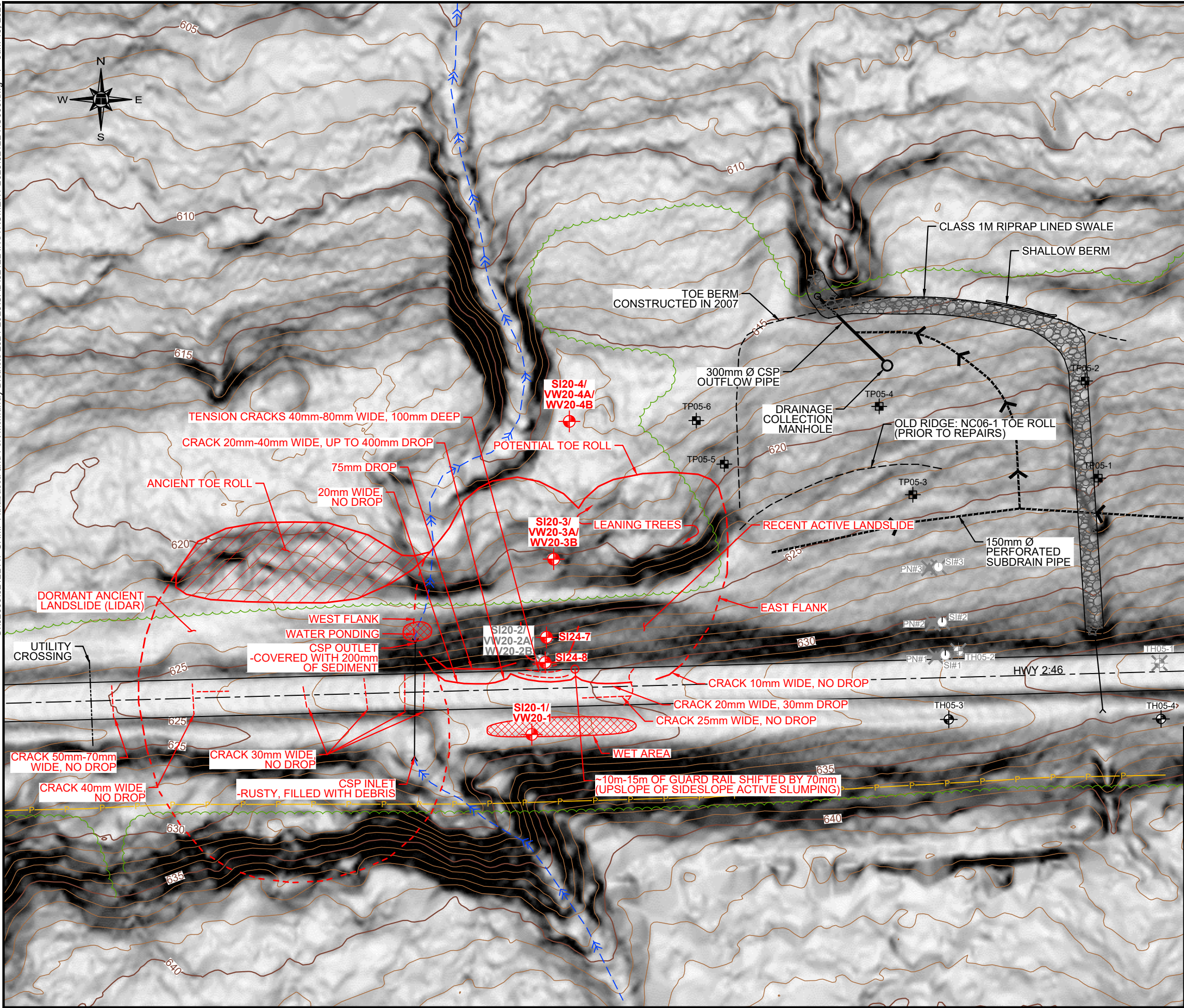
VIBRATING WIRE PIEZOMETER READINGS

VW#	GPS Location (UTM 11)		Date	Serial No.	Reading (B Units)	Temp (°C)
	Easting	Northing				
VW20-1	651534	6122185	22-Sep-25	VW70917	8788.7	4.7
VW20-3A	651541	6122241	22-Sep-25	VW70912	8670.5	4.4
VW20-3B	651541	6122241	22-Sep-25	VW70916	8178.1	4.4
VW20-4A	651456	6122285	22-Sep-25	VW70913	9099.3	6.2
VW20-4B	651456	6122285	22-Sep-25	VW70915	8528.7	4.2

INSPECTOR REPORT

*SI20-2, VW20-2A and VW20-2B were removed during recent construction
SI24-7 and SI24-8 were installed during construction and initialized for Thurber - add to Spring 2025 readings.

G:\32000\32122 AT GRMP Athabasca and Fort McMurray Districts 2021-2025\CAD\32122 INSTRUMENT 2025\32122-NC006.dwg - 1 - Jun. 19, 2025



LEGEND

- APPROXIMATE INSTRUMENT LOCATION (DEPTH (m))
- APPROXIMATE TEST HOLE LOCATION
- APPROXIMATE TEST PIT LOCATION
- APPROXIMATE PNEUMATIC PIEZOMETER LOCATION (INSTRUMENTS NOT READ AS PART OF CURRENT GRMP INSTRUMENTATION PROGRAM)
- APPROXIMATE SLOPE INCLINOMETER LOCATION (INSTRUMENTS NOT READ AS PART OF CURRENT GRMP INSTRUMENTATION PROGRAM)
- INSTRUMENT NON-OPERATIONAL
- MW MONITORING WELL
- SI SLOPE INCLINOMETER
- VW VIBRATING WIRE PIEZOMETER
- TH TEST HOLE
- TP TEST PIT
- PN PNEUMATIC PIEZOMETER
- ACTIVE HEADSCARP
- DORMANT SCARP CRACK
- CRACK
- GUARD RAIL
- OVERHEAD POWERLINE
- TREE LINE
- GULLY
- GROUND CONTOUR

NOTES:

- SITE FEATURES ARE APPROXIMATE
- LIDAR PROVIDED BY ALBERTA TRANSPORTATION
- JUNE 10, 2019 OBSERVATIONS SHOWN IN RED

0 10 20 30 40 50 60 70 m
SCALE 1:1250

Alberta

**NORTH CENTRAL
(ATHABASCA AND FORT MCMURRAY DISTRICTS)**

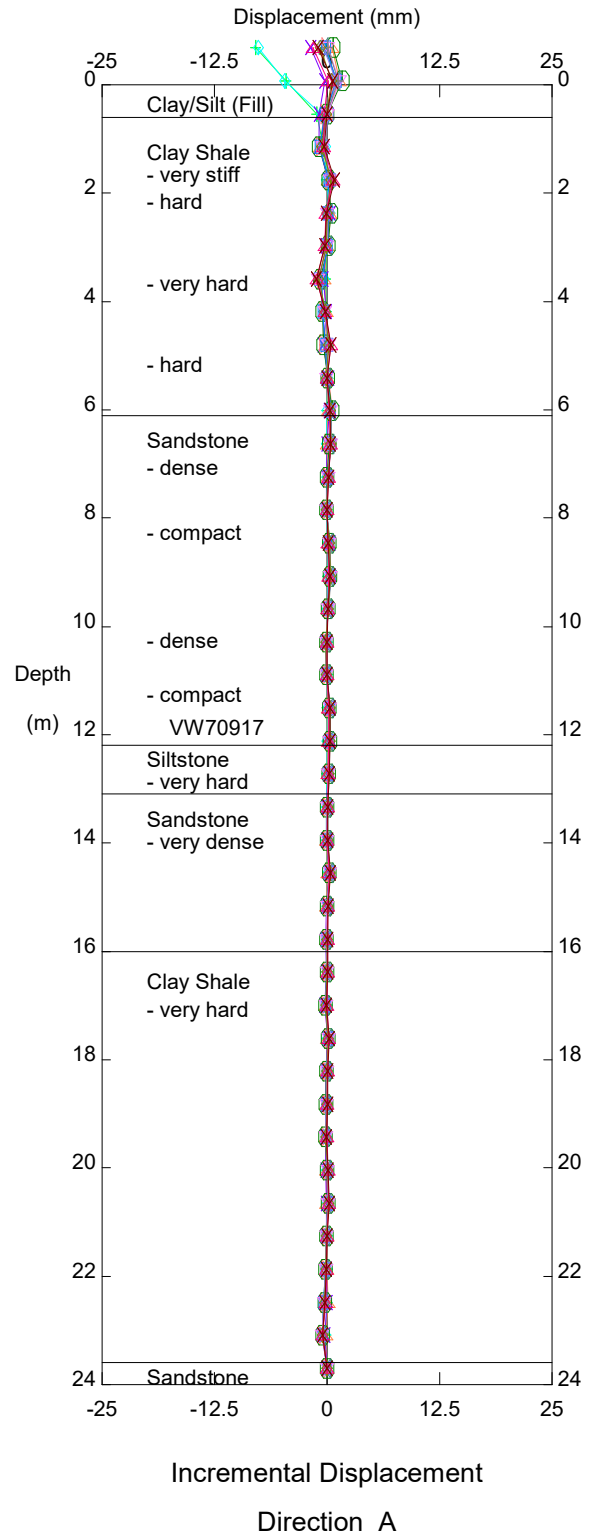
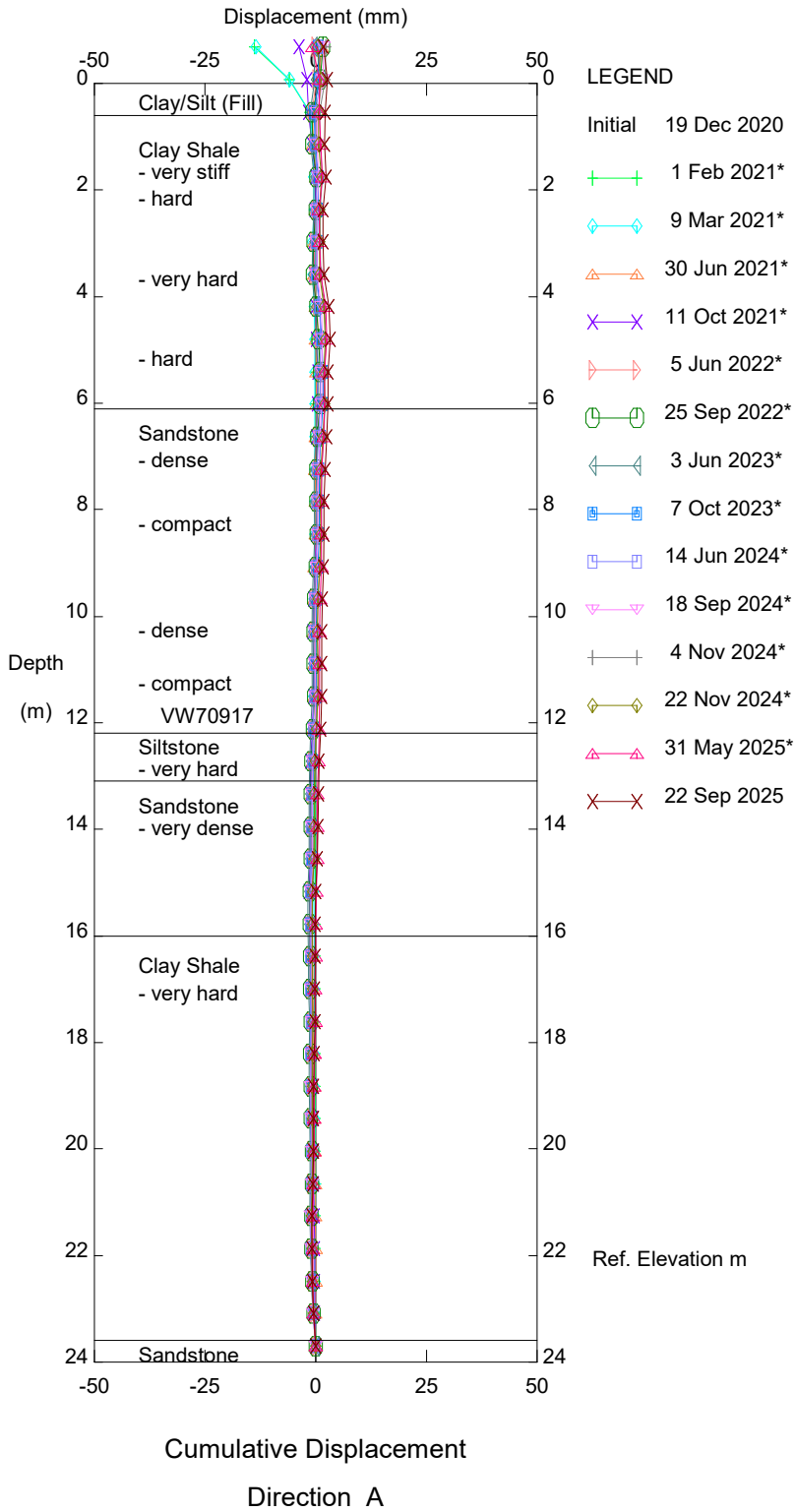
**NC006 HWY 2:46 MITSUE LAKE (KM 47.6)
SITE PLAN SHOWING APPROXIMATE
INSTRUMENT LOCATIONS**

DWG No. 32122-NC006

DRAWN BY	ML
DESIGNED BY	BWN
APPROVED BY	TSA
SCALE	1:1250
DATE	JUNE 2025
FILE No.	32122

THURBER

Thurber Engineering - Edmonton

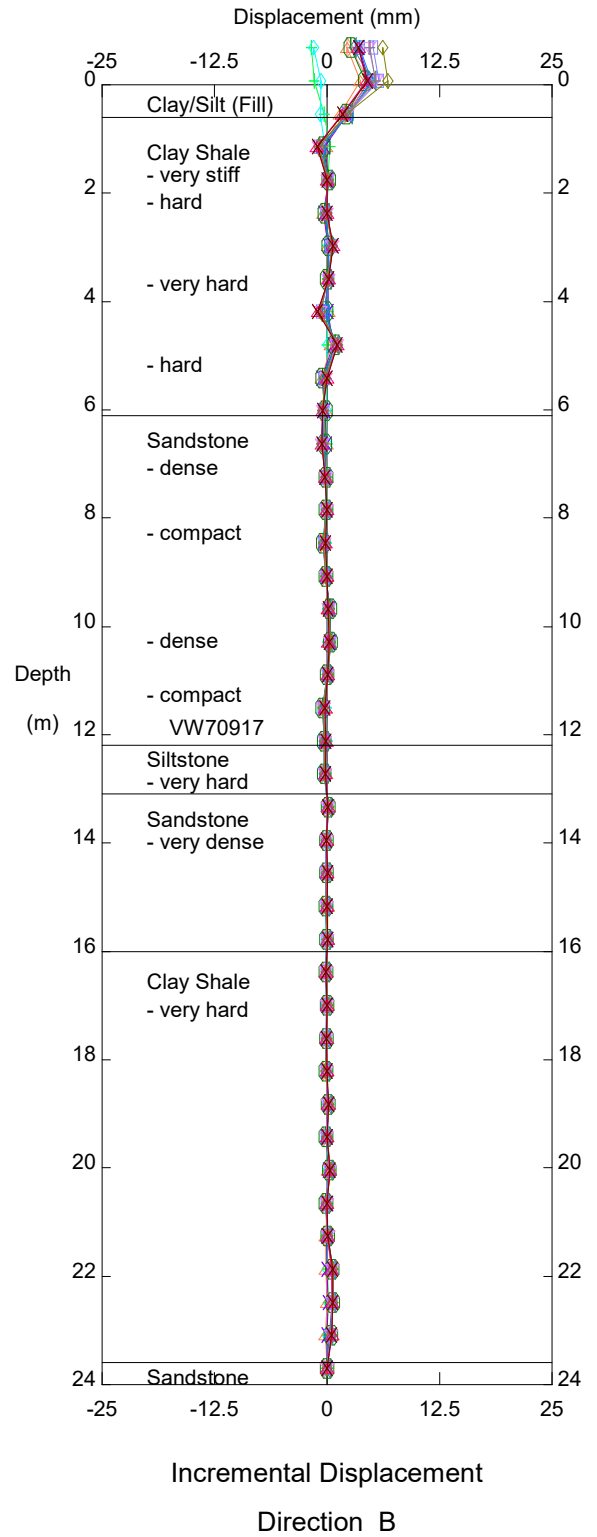
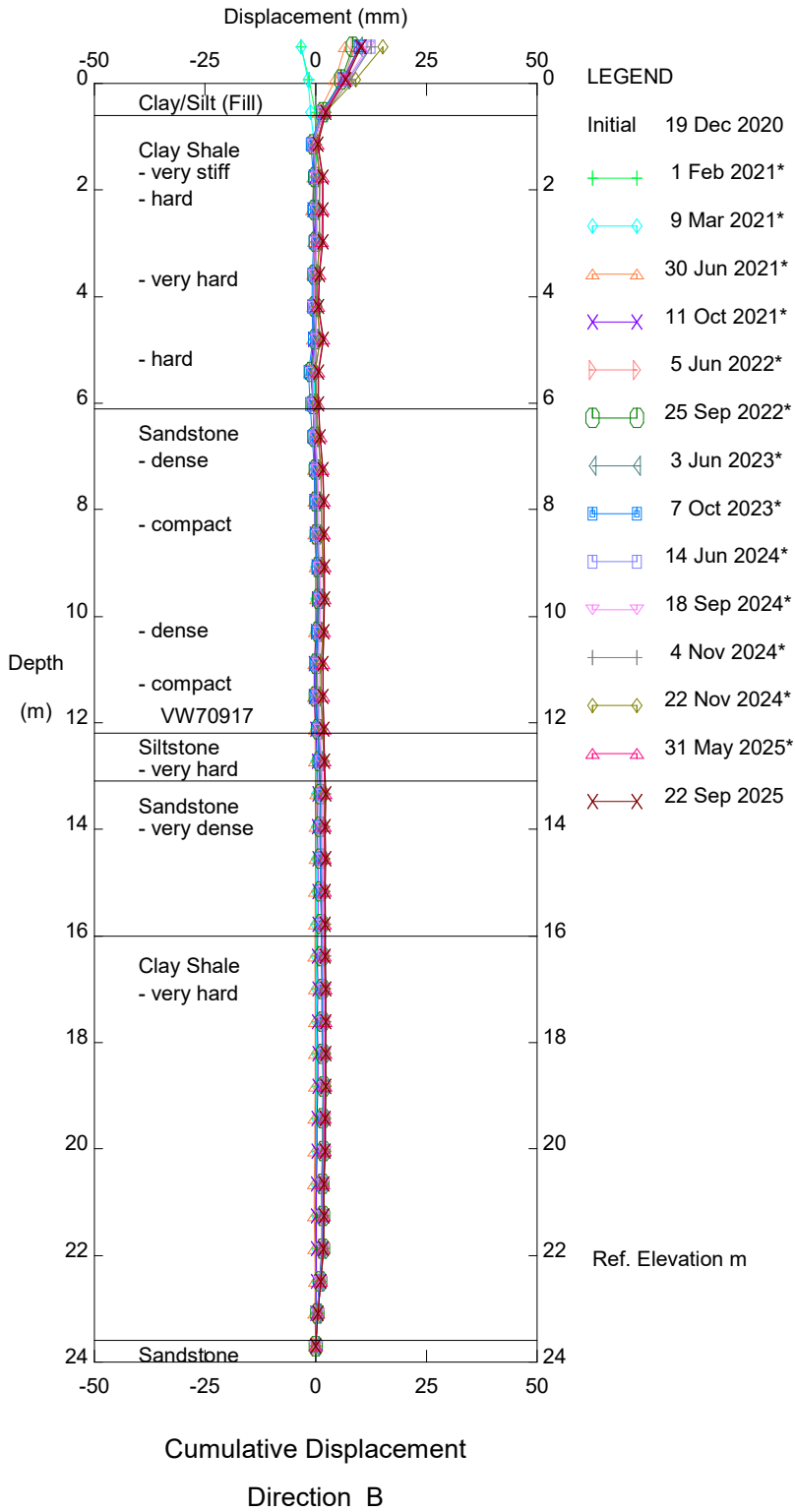


NC006 - Hwy 2:46 Mitsue Lake (km 47.6), Inclinator SI20-1

Alberta Transportation

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

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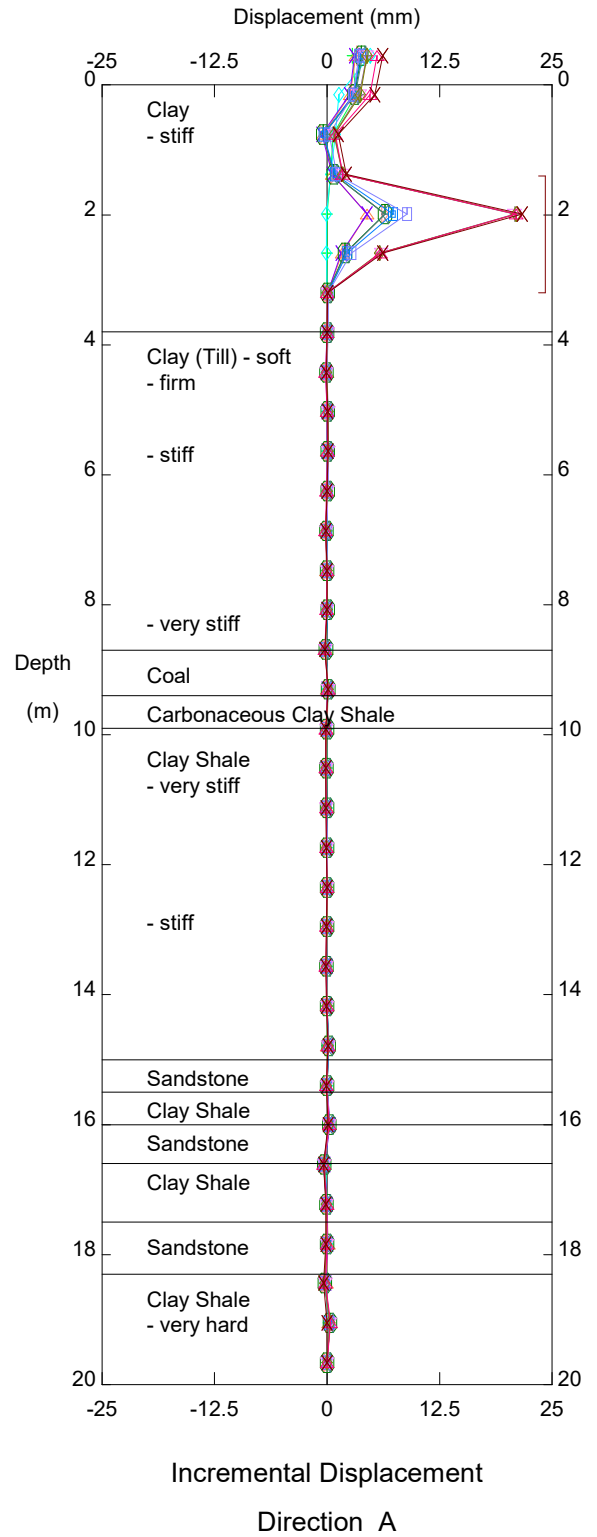
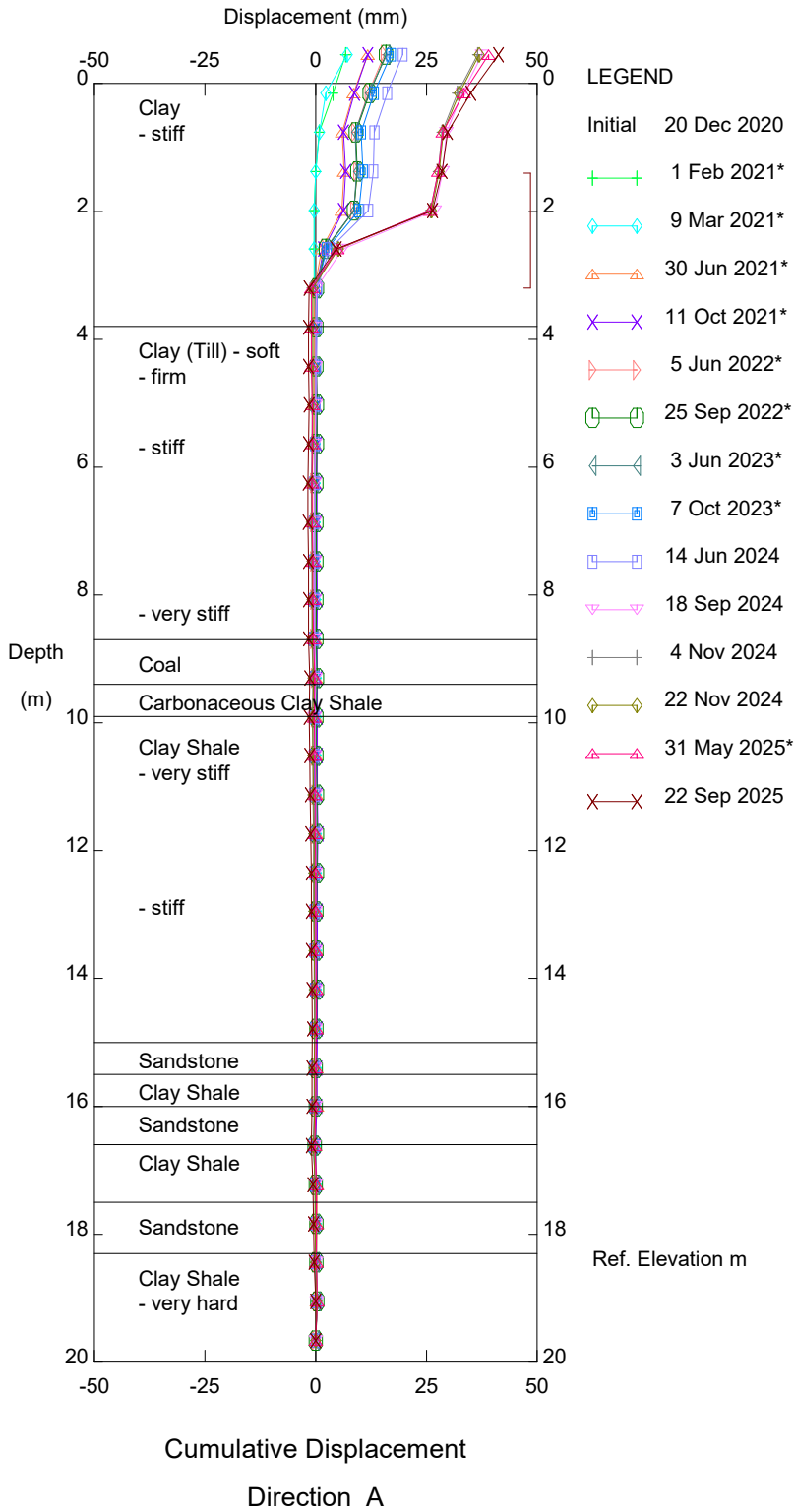


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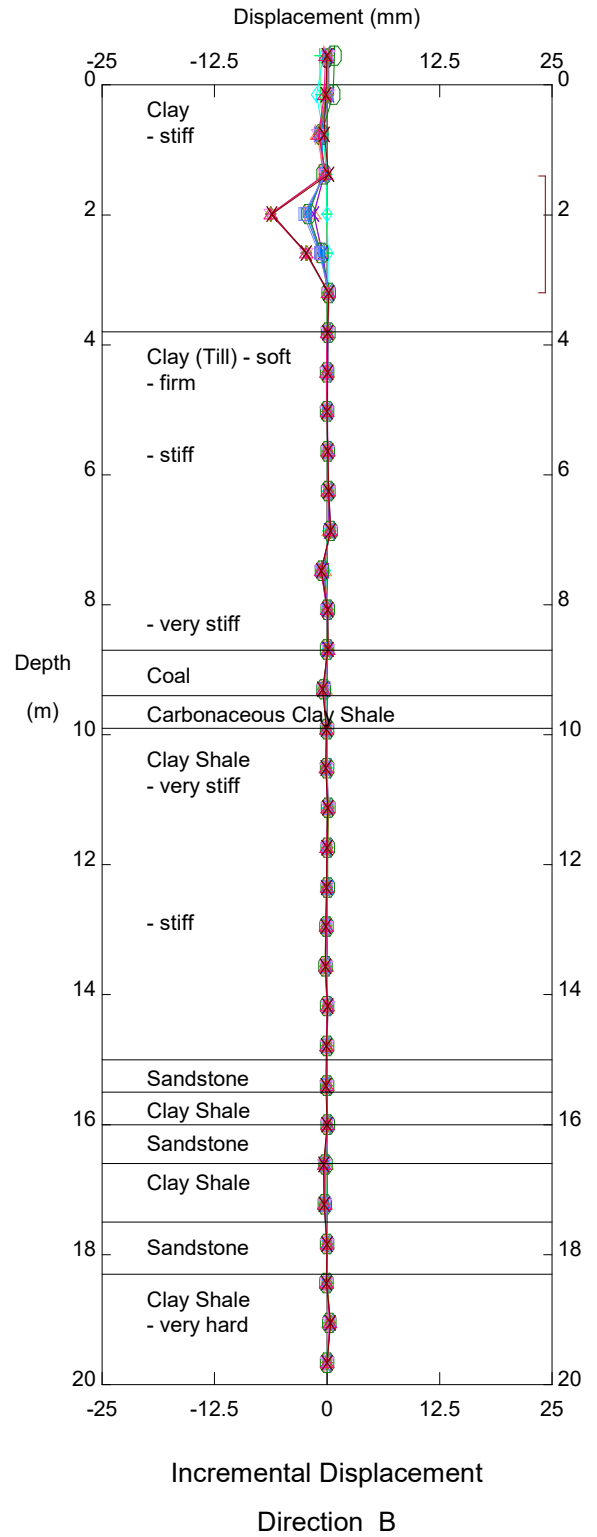
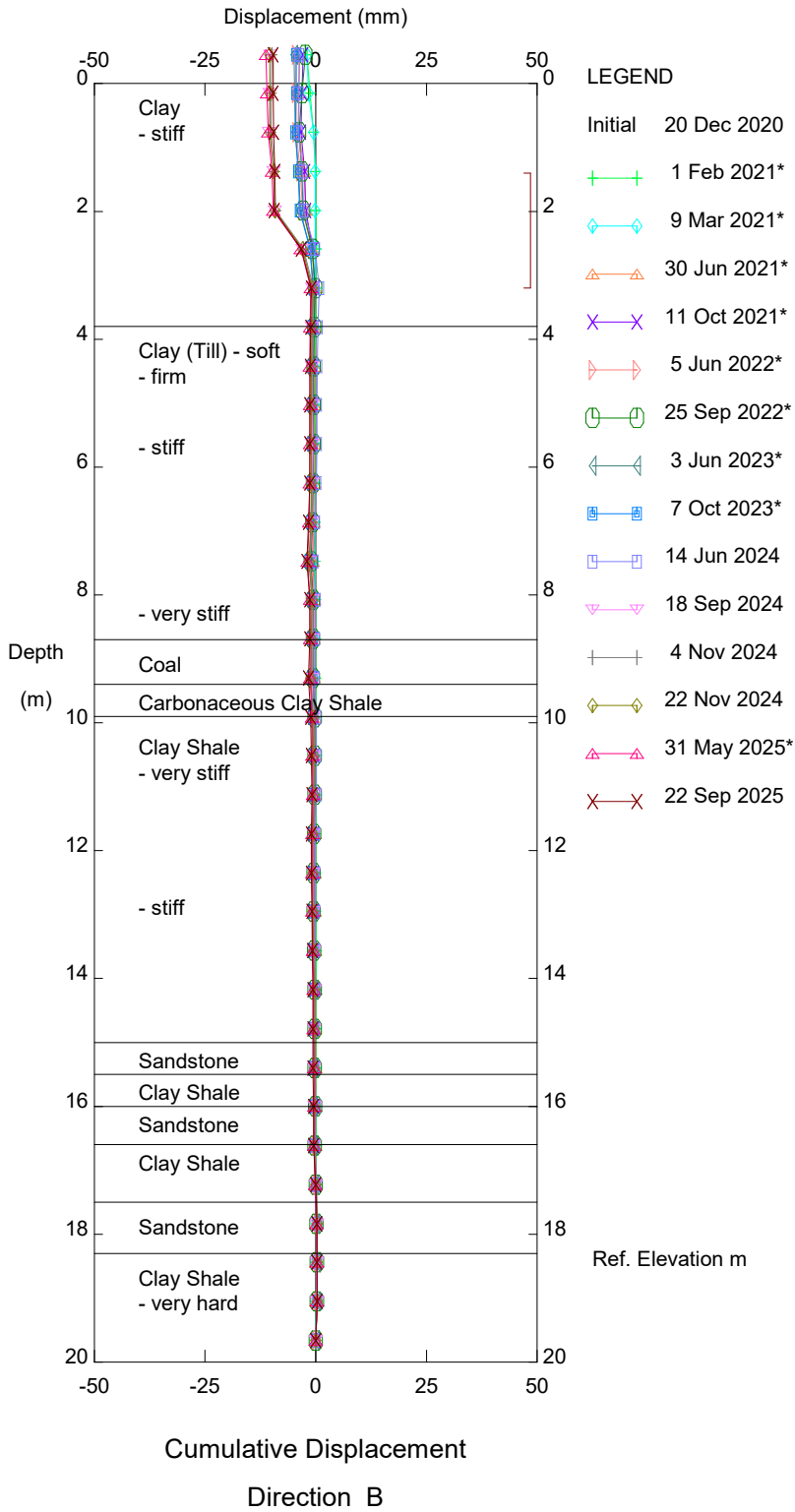


NC006 - Hwy 2:46 Mitsue Lake (km 47.6), Inclinometer SI20-3

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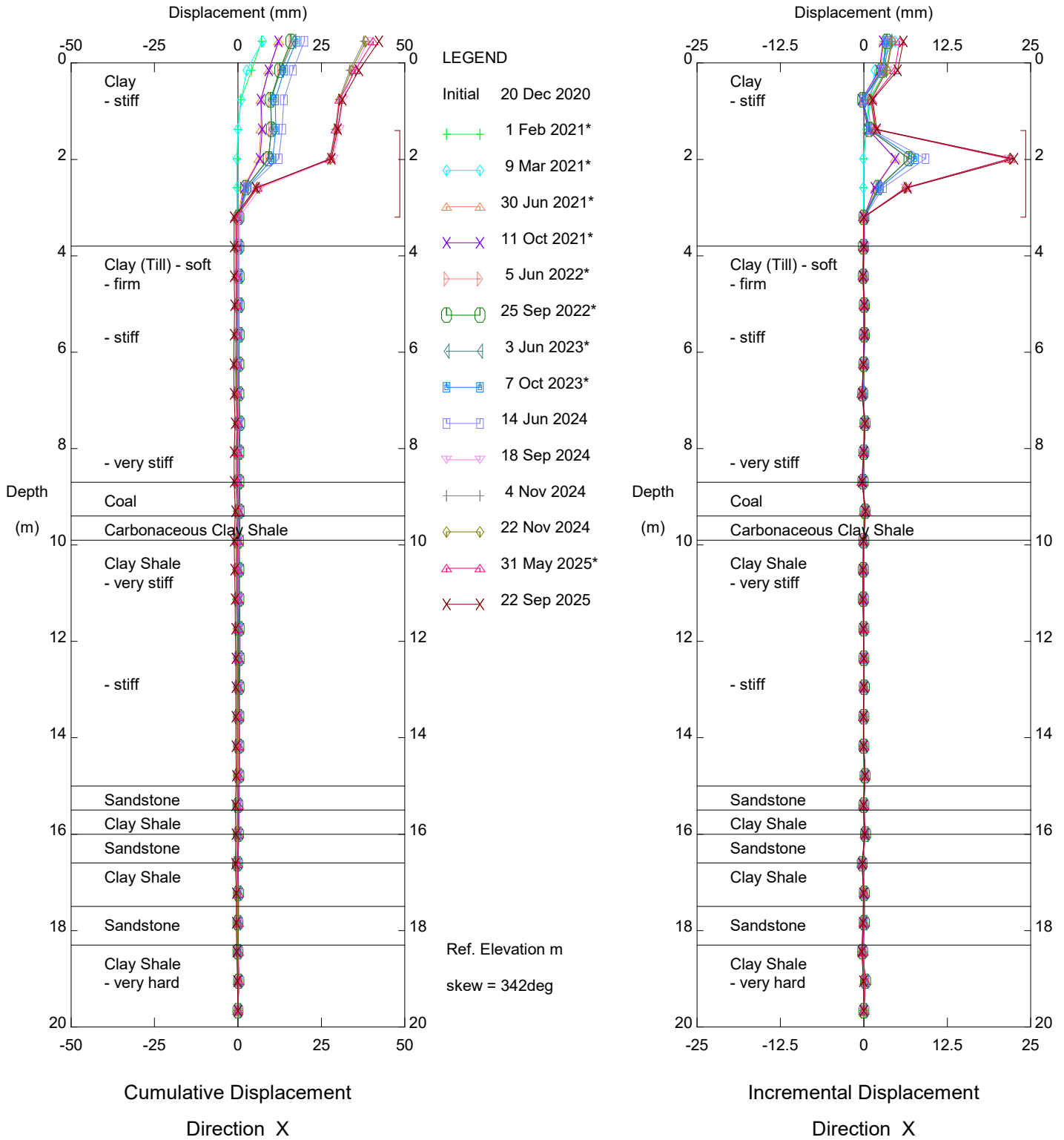


NC006 - Hwy 2:46 Mitsue Lake (km 47.6), Inclinator SI20-3

Alberta Transportation

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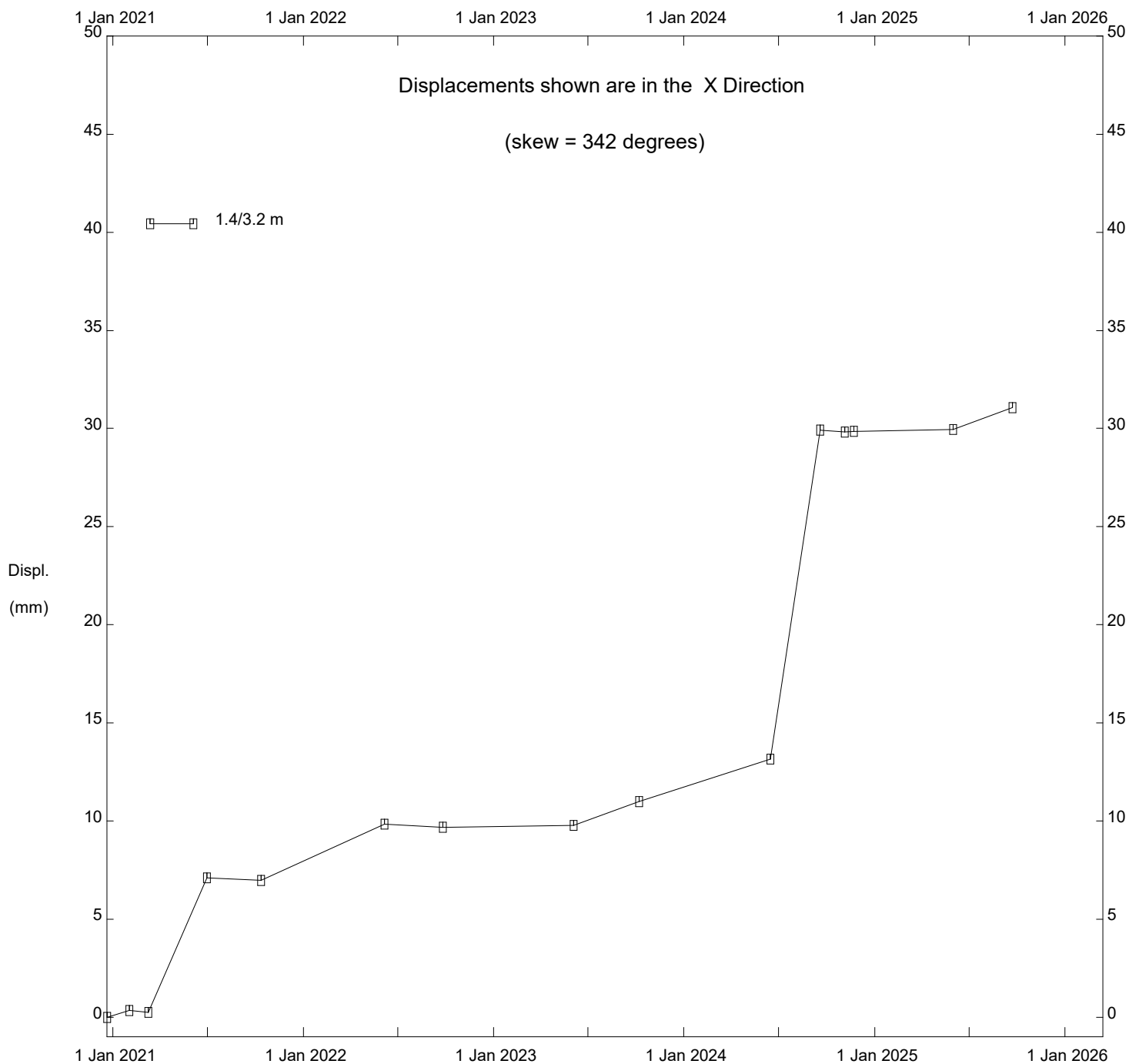


NC006 - Hwy 2:46 Mitsue Lake (km 47.6), Inclinometer SI20-3

Alberta Transportation

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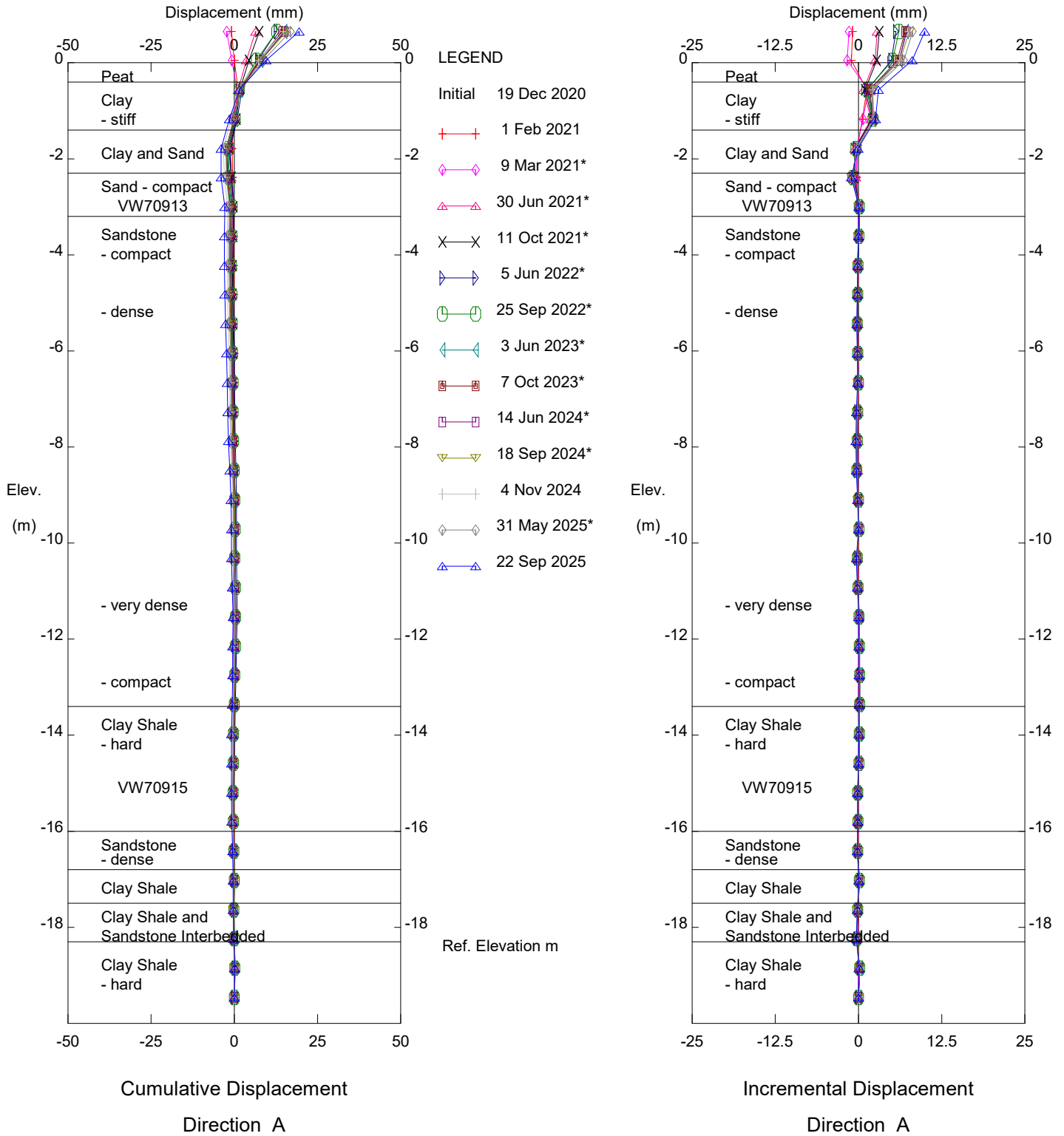
Thurber Engineering - Edmonton



NC006 - Hwy 2:46 Mitsue Lake (km 47.6), Inclinator SI20-3

Alberta Transportation

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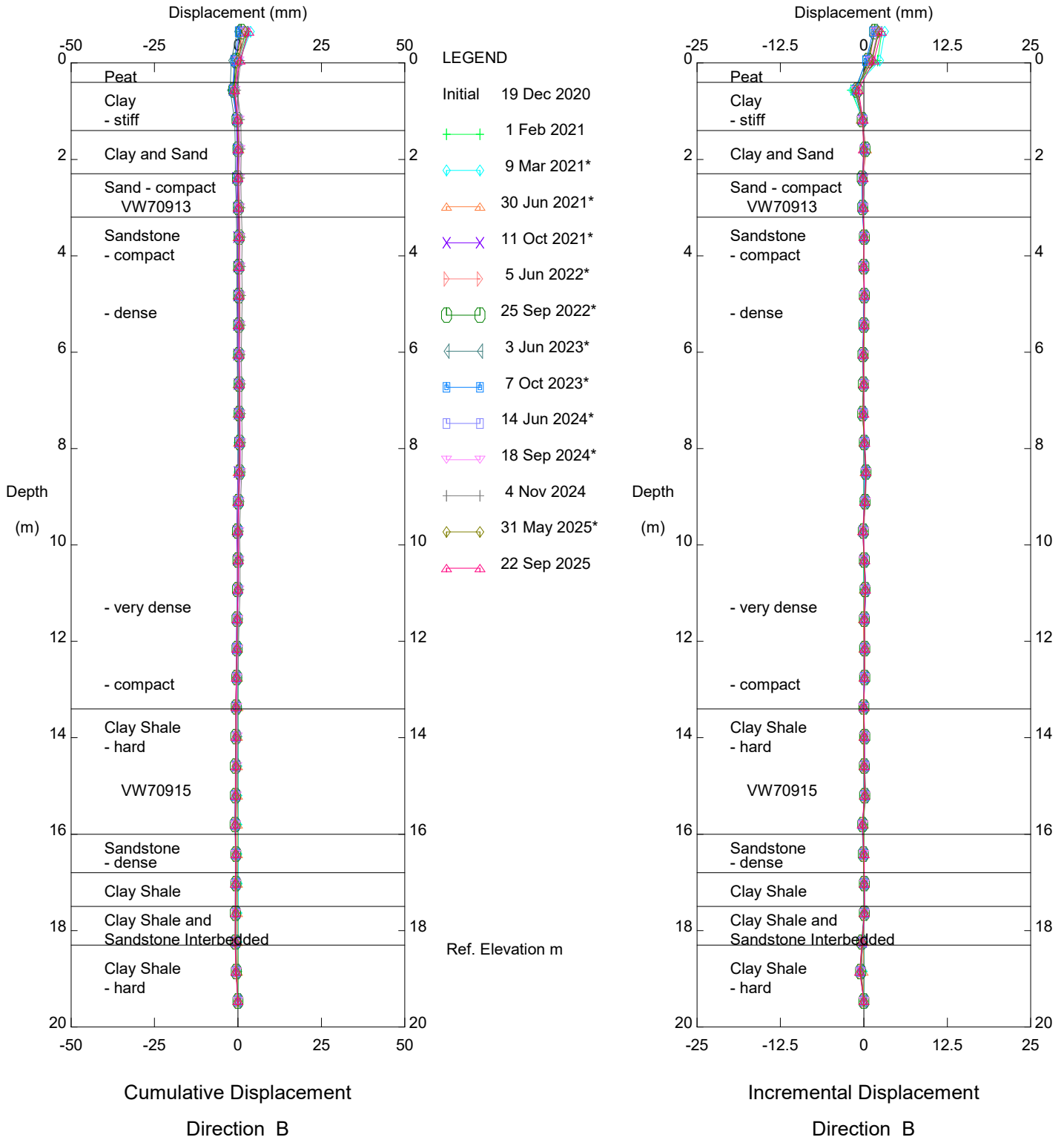


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Alberta Transportation

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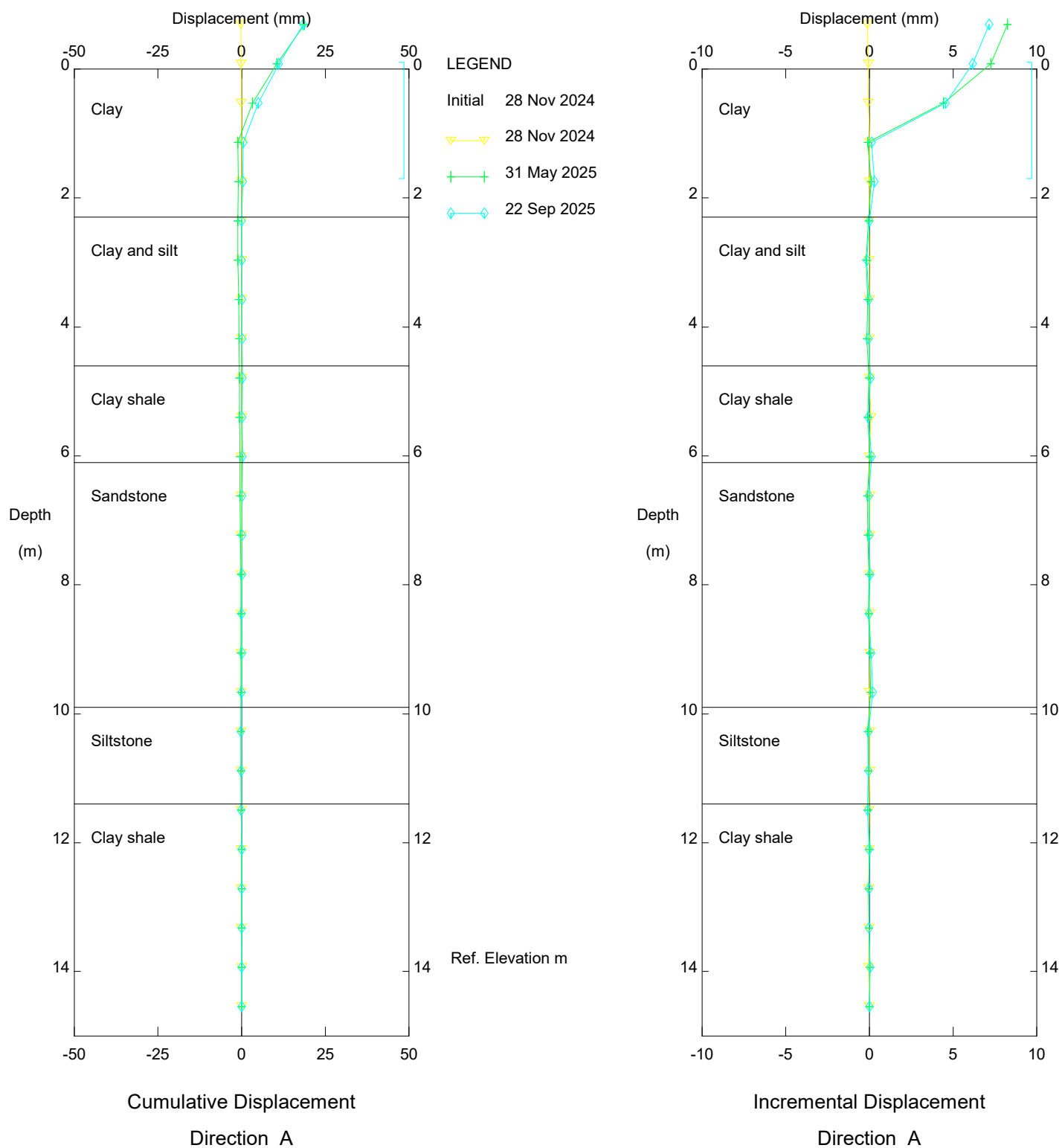


NC006 - Hwy 2:46 Mitsue Lake (km 47.6), Inclinator SI20-4

Alberta Transportation

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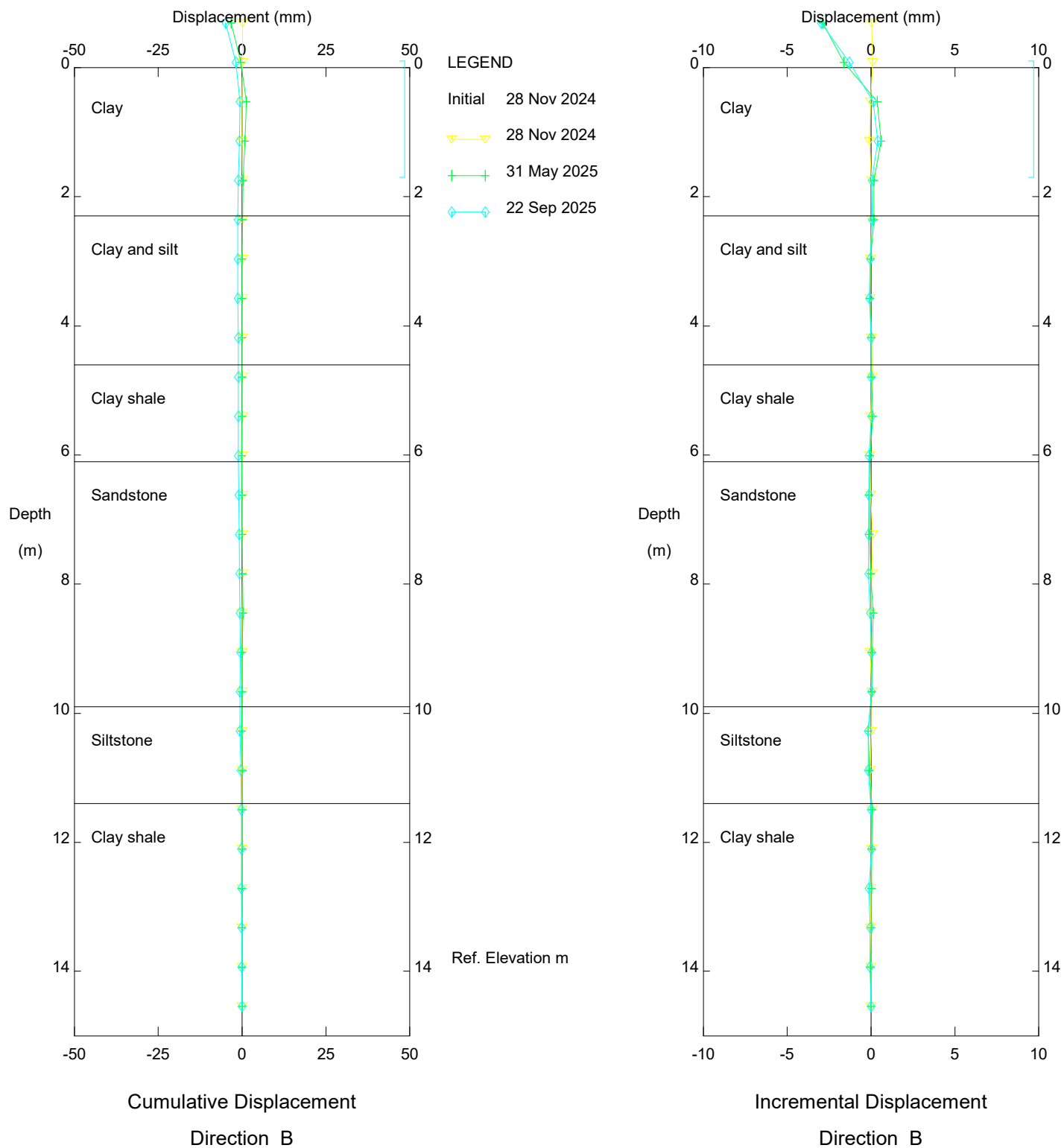
Thurber Engineering - Edmonton



NC006 - Hwy 2:46 Mitsue Lake (km 47.6), Inclinometer SI24-7

TEC

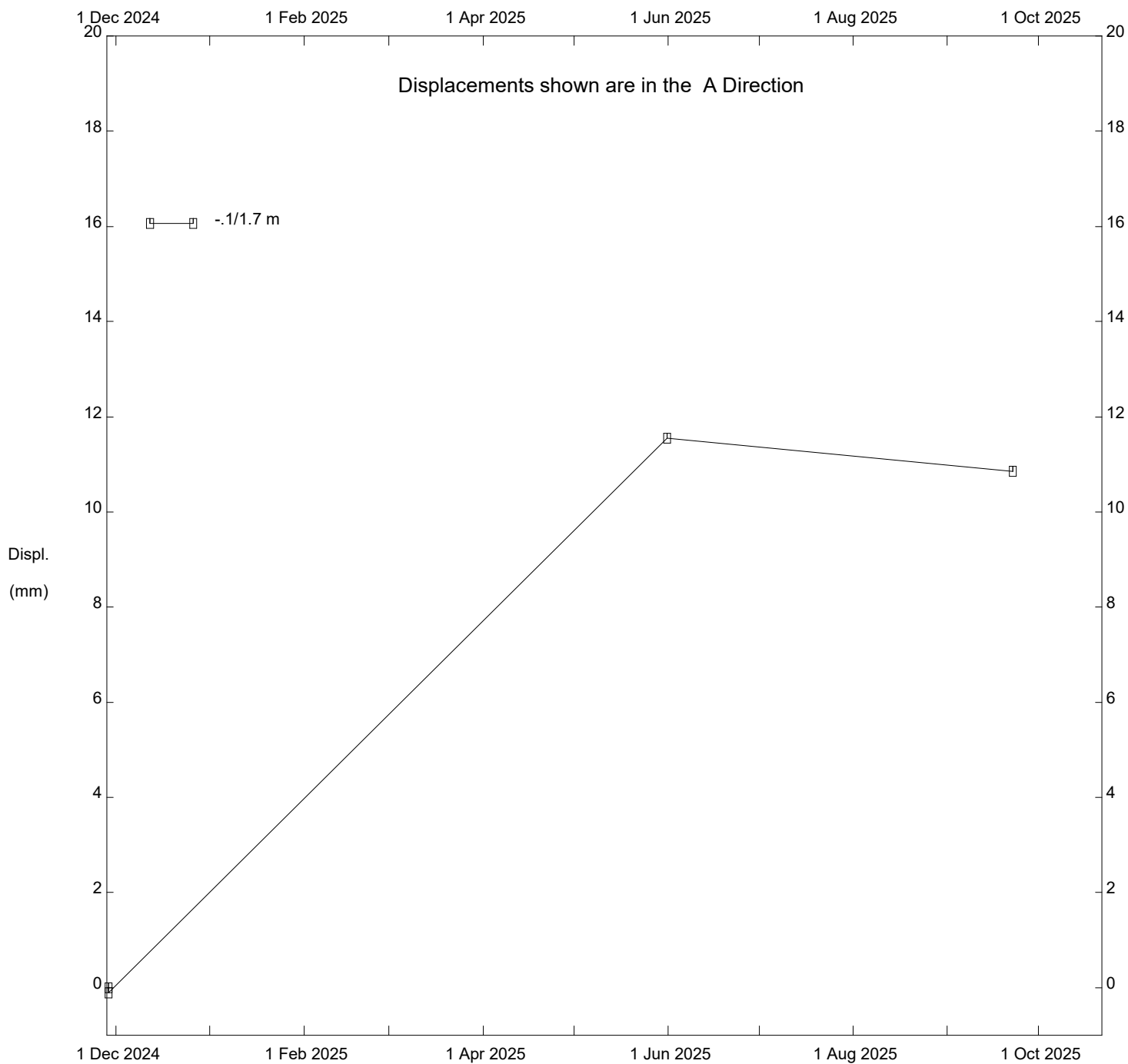
Thurber Engineering - Edmonton



NC006 - Hwy 2:46 Mitsue Lake (km 47.6), Inclinometer SI24-7

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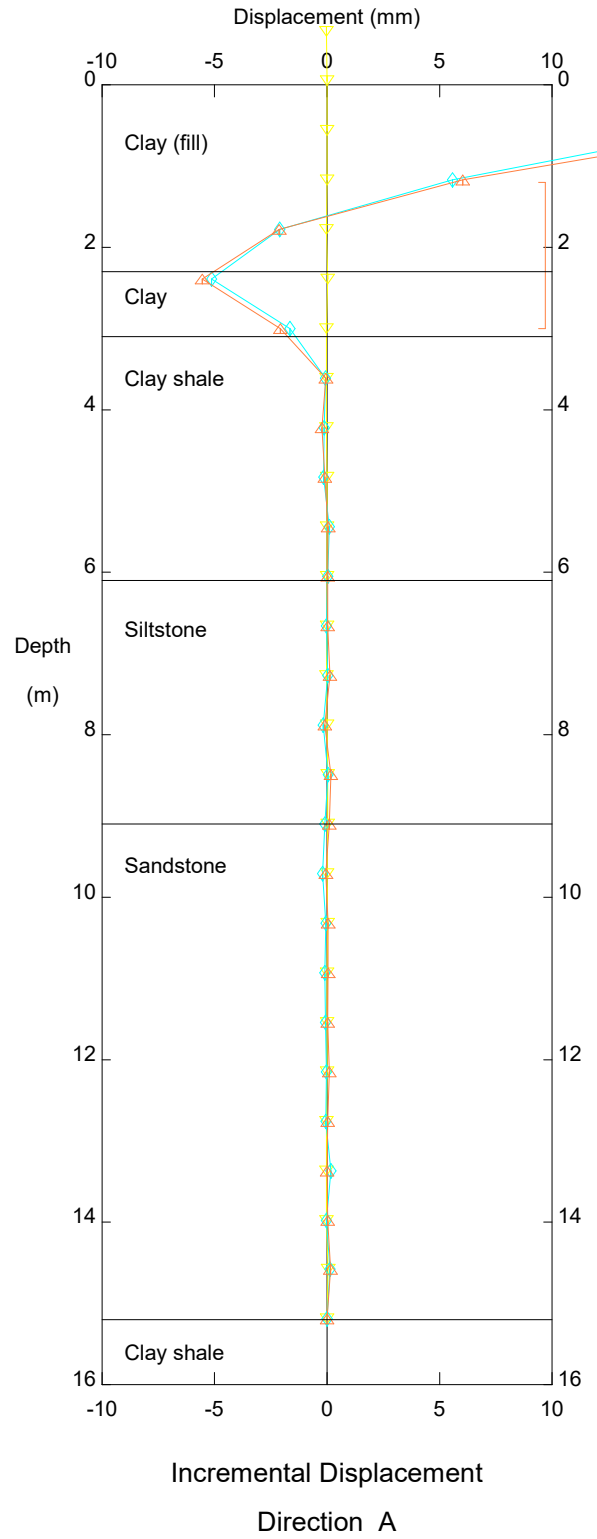
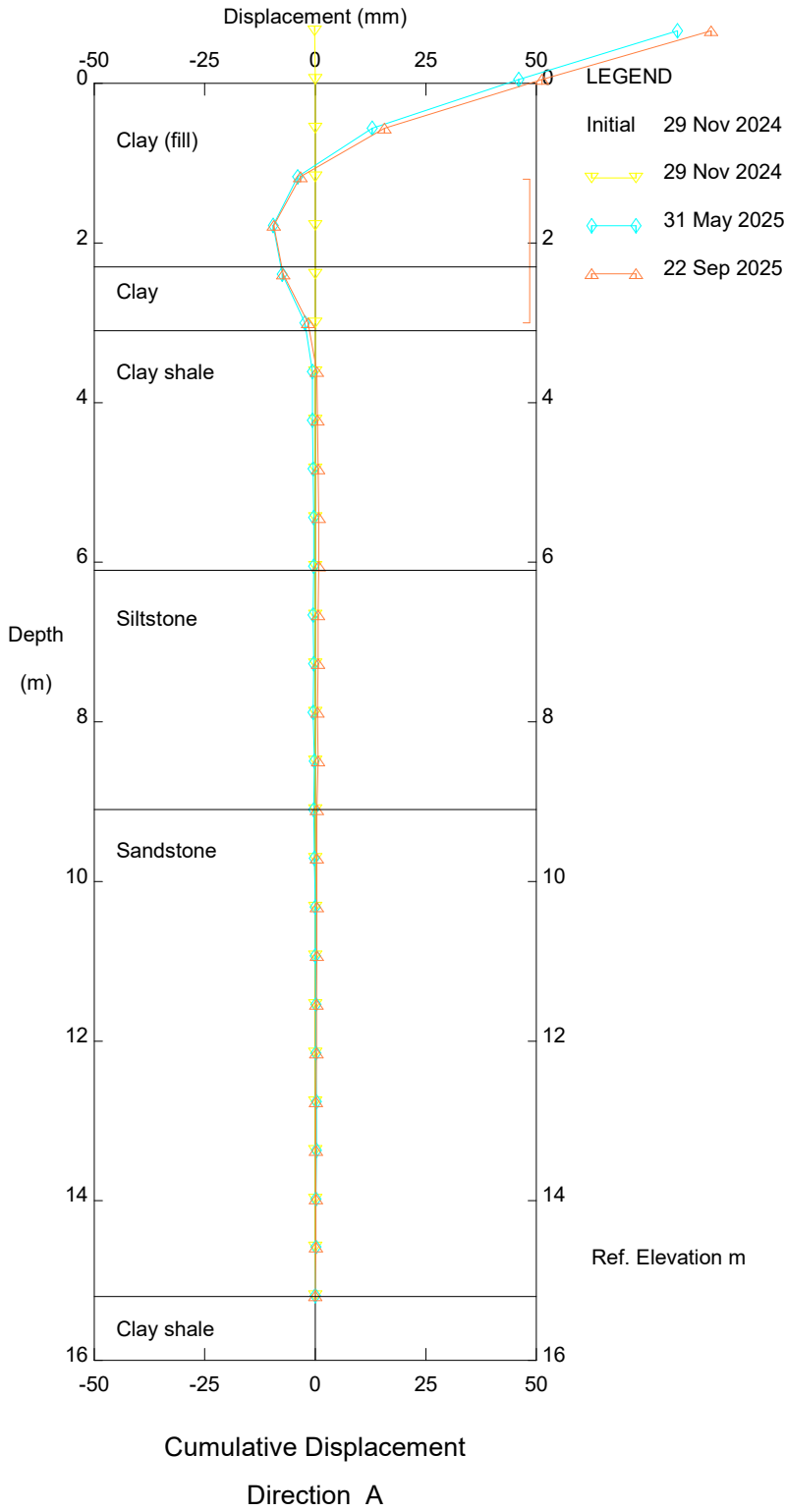
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NC006 - Hwy 2:46 Mitsue Lake (km 47.6), Inclinometer SI24-7

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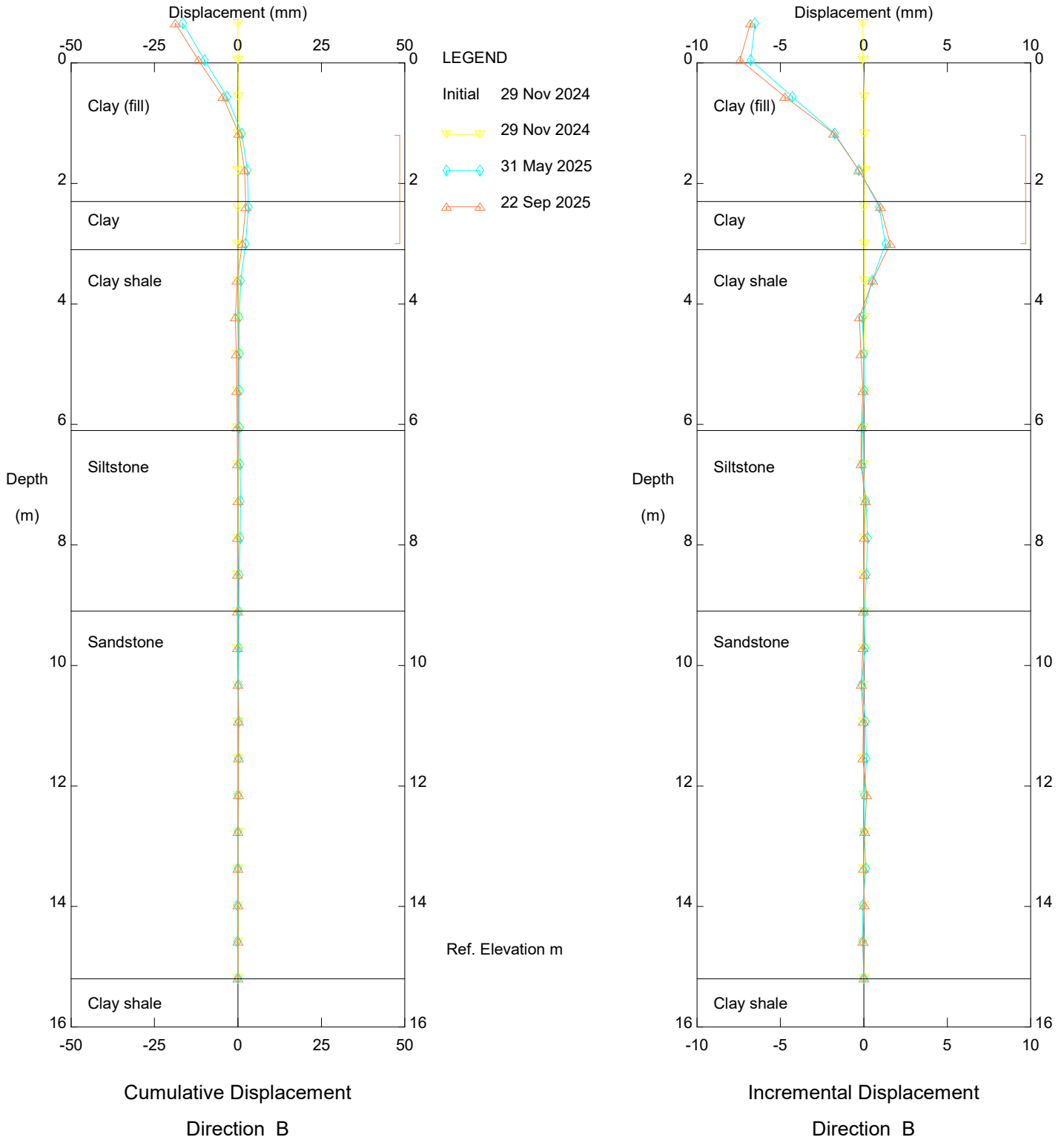
Thurber Engineering - Edmonton



NC006 - Hwy 2:46 Mitsue Lake (km 47.6), Inclinometer SI24-8

TEC

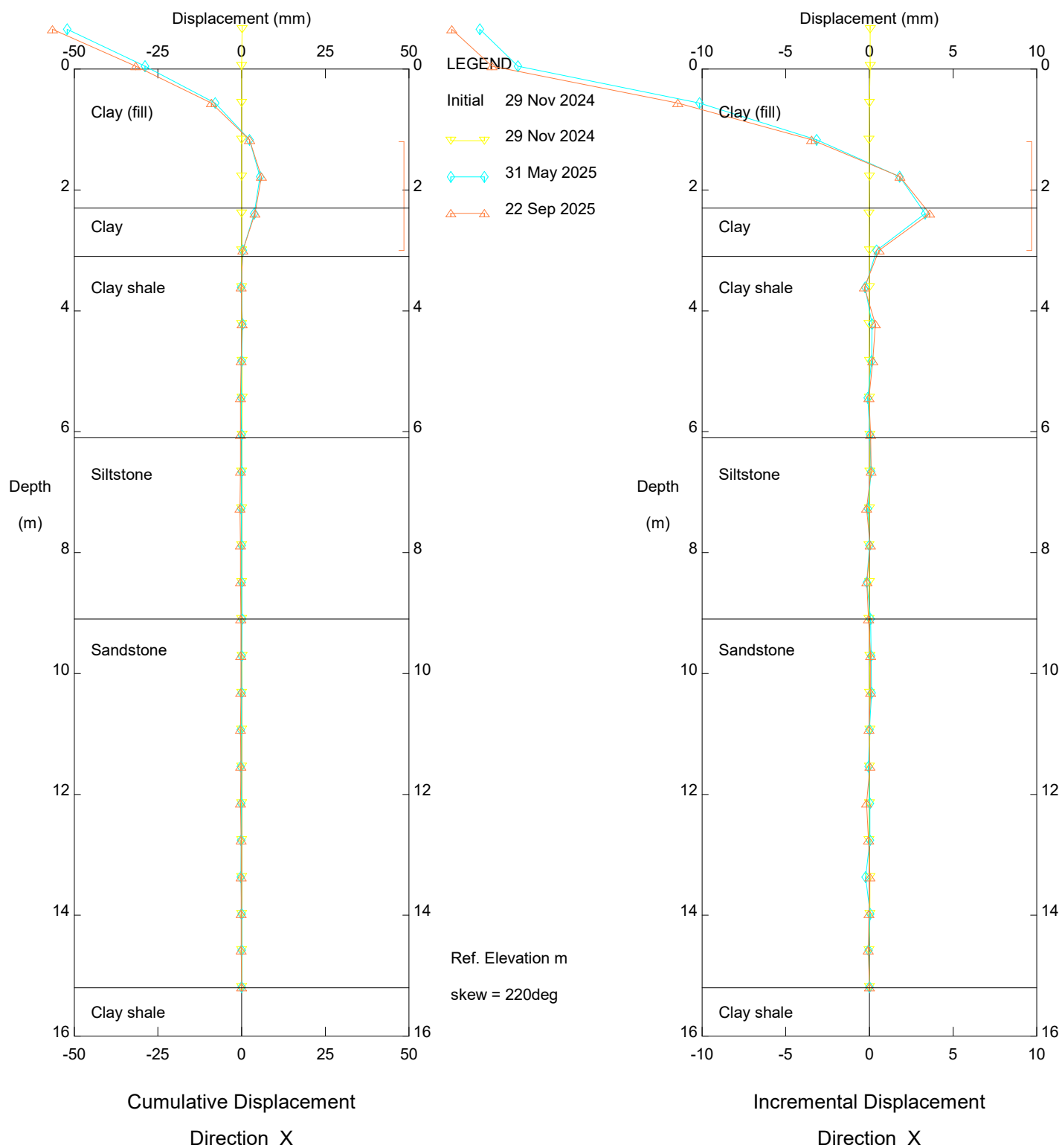
Thurber Engineering - Edmonton



NC006 - Hwy 2:46 Mitsue Lake (km 47.6), Inclinometer SI24-8

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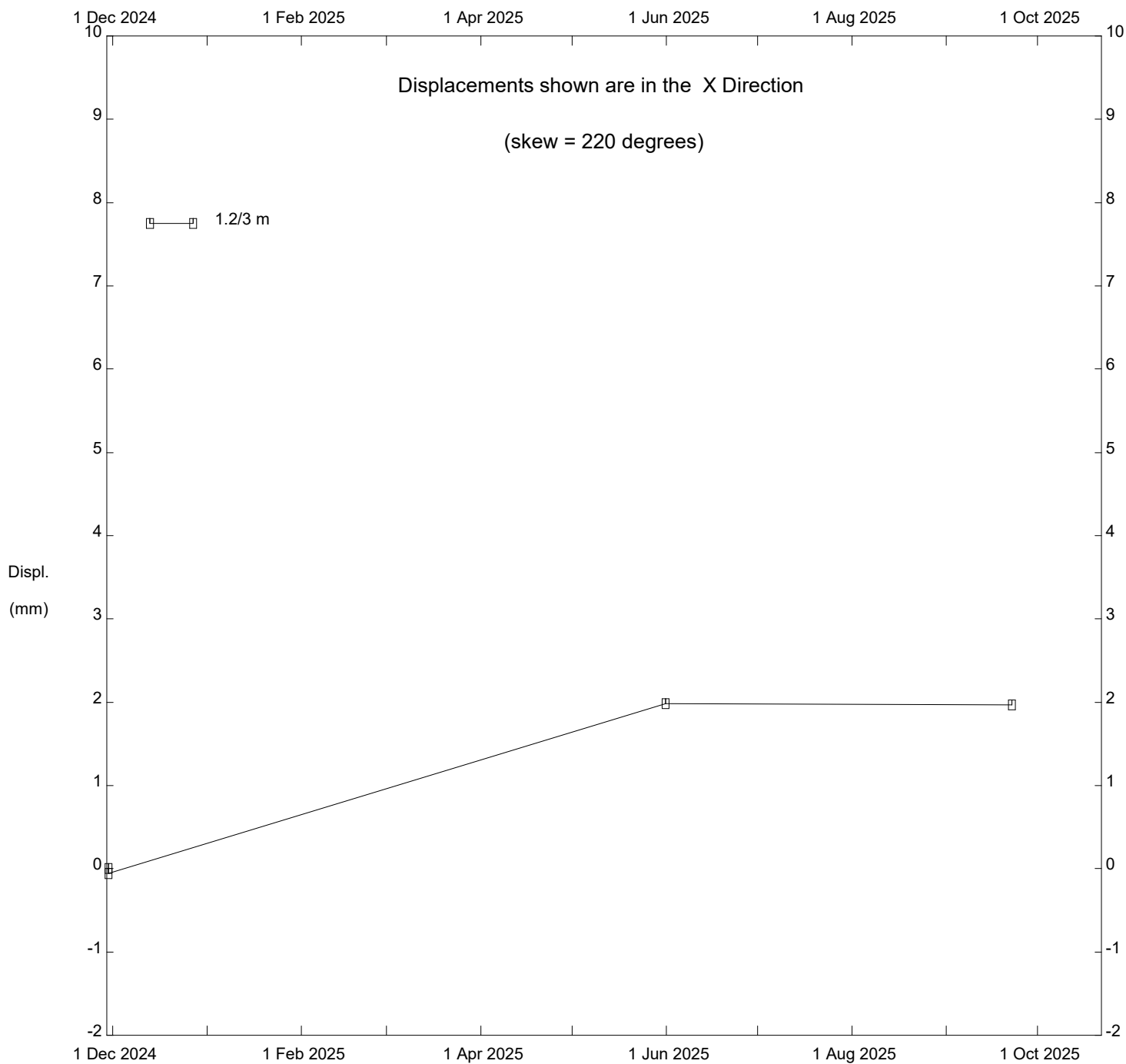
Thurber Engineering - Edmonton



NC006 - Hwy 2:46 Mitsue Lake (km 47.6), Inclinometer SI24-8

TEC

Thurber Engineering - Edmonton



NC006 - Hwy 2:46 Mitsue Lake (km 47.6), Inclinator SI24-8

TEC

FIGURE NC006-1
HWY 2:46 MITSUE LAKE SLIDE (KM 47.6)
VIBRATING WIRE PIEZOMETER DATA

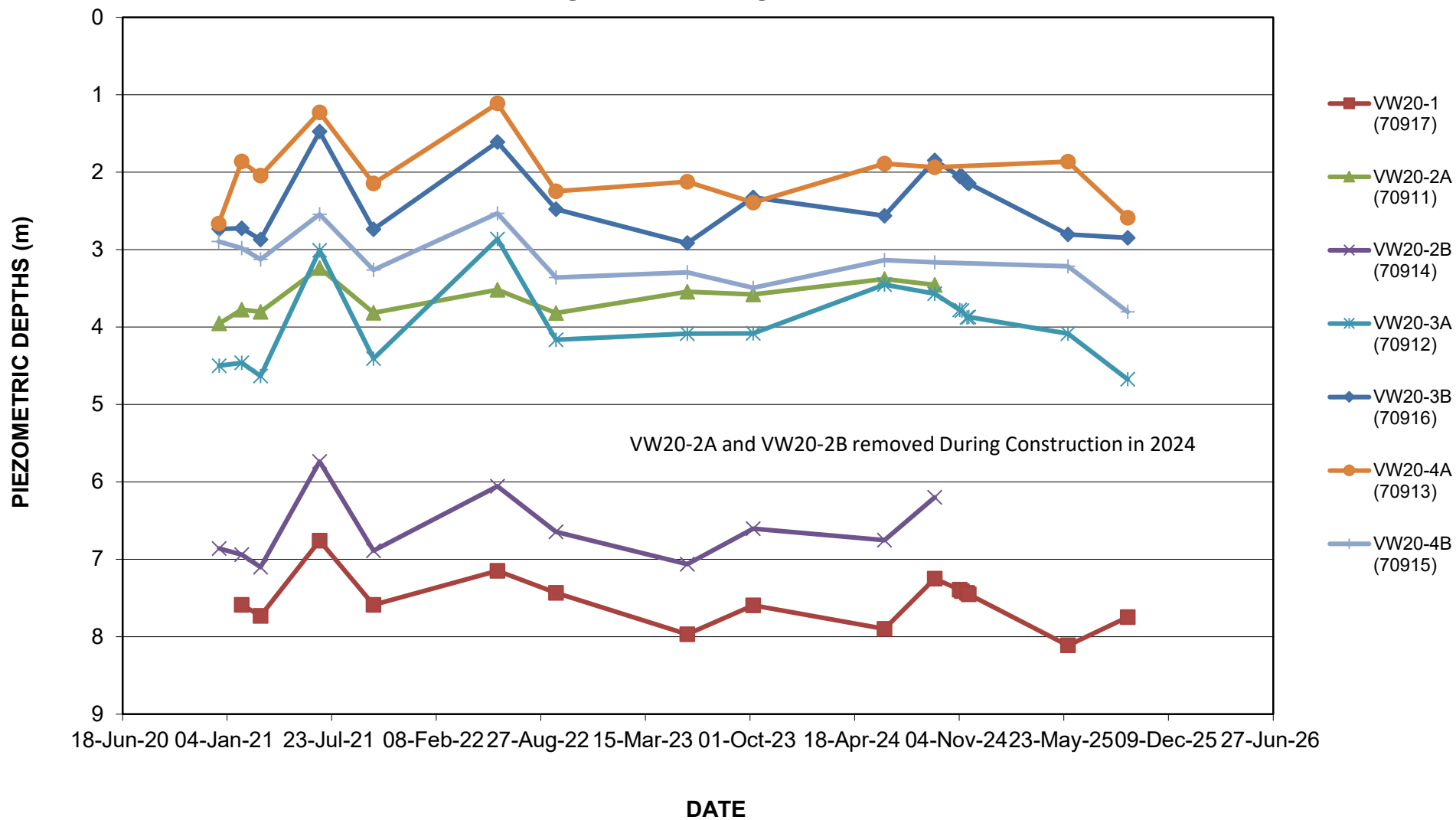


FIGURE NC006-2
HWY 2:46 MITSUE LAKE SLIDE (KM 47.6)
VIBRATING WIRE PIEZOMETER DATA

