

**ALBERTA TRANSPORTATION AND  
ECONOMIC CORRIDORS GRMP  
GRANDE PRAIRIE REGION –  
(GRANDE PRAIRIE NORTH)  
INSTRUMENTATION MONITORING - SPRING 2024**



Site Number	Location	Name	Hwy	km
PH052	HWY 2:68 C1 10.839	Dunvegan North Slide & Erosion	2:68	Km 10.8
<b>Legal Description:</b> 7-16-80-4 W6		<b>UTM Co-ordinates</b>		
		11U E 402452	N	6199542

<b>Current Monitoring:</b>	26-May-2024	<b>Previous Monitoring</b>	19-Jun-2023
<b>Instruments Read By:</b>	Mr. Niraj Regmi, G.I.T and Mr. Nixson Mationg, of Thurber		

Instruments Read During This Site Visit			
<b>Slope Inclinometers (SIs):</b> SI16-P12 SI16-P21	<b>Pneumatic Piezometers (PN):</b> N/A	<b>Vibration Wire Piezometers (VW):</b> VW16-1 VW16-2	<b>Standpipe Piezometers (SP):</b> N/A
<b>Load Cell (LC):</b> N/A	<b>Strain Gauges:</b> N/A	<b>SAA's:</b> N/A	<b>Others:</b>

Readout Equipment Used			
<b>Slope Inclinometers:</b> RST Digital Inclinometer probe with a 2 ft. wheelbase and an RST Pocket PC readout	<b>Pneumatic Piezometers:</b>	<b>Vibration Wire Piezometers:</b> RST VW2106 readout	<b>Standpipe Piezometers:</b>
<b>Load Cell:</b>	<b>Strain Gauges:</b>	<b>SAA's:</b>	<b>Others:</b>
<b>Note:</b>			

<b>Zones of New Movement:</b>	None
<b>Interpretation of Monitoring Results:</b>	<p>Both slope indicators are installed in the pile wall completed in 2016. SI16-P12 showed a rate of movement of 0.4 mm/yr over the length of the pile from 1.7 m to 17.5 m depth since the spring of 2023 readings. The total pile head movement to date has been 5.7 mm. A subtle tilt of the pile appears from about 12 m depth upwards. This is more apparent in SI16-21.</p> <p>SI16-P21 showed a rate of movement of 1.1 mm/yr over the length of the pile from 1.7 m to 17.5 m depth compared to the spring of 2023 readings. SI16-P21 has shown a total pile head movement of 2.1 mm since it was reinitialized. However, the current calculated movement likely contains some reading error due to a tight bend in the new casing at approximately 12 m depth.</p> <p>Both vibrating wire piezometers are installed in a single borehole located between the highway and the pile wall. Vibrating wire piezometer VW16-1 continued to be dry. VW16-2 showed a decrease in groundwater level of 0.89 m compared to the spring of 2023 readings.</p>
<b>Future Work:</b>	The instruments should be read again in the spring of 2025.
<b>Instrumentation Repairs:</b>	No instrument repairs are required at this time.

<b>Additional Comments:</b>	The movements that may be present at 12 m depth are much deeper than the design shear zone which was at about 6 m depth. Since the measured movements are minor and not well defined this it is advisable to continue monitoring.
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<b>Attachments:</b>	<ul style="list-style-type: none"> <li>▪ Table PH052-1 Spring 2024 – HWY 2:68 Dunvegan North Slide and Erosion, Slope Inclinometer Instrumentation Reading Summary</li> <li>▪ Table PH052-2 Spring 2024 – HWY 2:68 Dunvegan North Slide and Erosion, Vibrating Wire Piezometer Instrumentation Reading Summary</li> <li>▪ Statement of Limitations and Conditions</li> <li>▪ APPENDIX A - PH052-1 SPRING 2024 <ul style="list-style-type: none"> <li>□ Field Inspector's Report</li> <li>□ Site Plan Showing Approximate Instrument Locations (Drawing No. 32123-PH052)</li> <li>□ SI Reading Plots</li> <li>□ Figure PH052-1 (Piezometric Elevations)</li> <li>□ Figure PH052-2 (Piezometric Depths)</li> </ul> </li> </ul>
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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.  
Roger Skirrow, M.Sc., P. Eng.  
Senior Geotechnical Engineer

Lucas Green, P.Eng.  
Geotechnical Engineer

**Table PH052-1 Spring 2024 – Hwy 2:68 Dunvegan North Slide And Erosion Slope Incliner Instrumentation Reading Summary**

Date Monitored: May 26, 2024

<b>INSTRUMENT #</b>	<b>DATE INITIALIZED</b>	<b>TOTAL CUMULATIVE RESULTANT MOVEMENT AND DEPTH OF MOVEMENT TO DATE (mm)</b>	<b>MAXIMUM RATE OF MOVEMENT (mm/yr)</b>	<b>CURRENT STATUS OF SI</b>	<b>DATE OF PREVIOUS READING</b>	<b>INCREMENTAL MOVEMENT SINCE PREVIOUS READING (mm)</b>	<b>CURRENT RATE OF MOVEMENT (mm/yr)</b>	<b>CHANGE IN RATE OF MOVEMENT SINCE PREVIOUS READING (mm/yr)</b>
SI16-P12	July 4, 2016	5.7 over 1.7 m to 17.5 m depth in 197° direction	3.3 on October 20, 2020	Active	June 19, 2023	0.4	0.4	0.2
SI16-P21	July 4, 2016 (New initial reading of June 18, 2020)	2.1 over 1.7 m to 17.5 m depth in 252° direction	5.4 on July 13, 2021	Active	June 19, 2023	1.0	1.1	6.2

Drawing 32123-PH052 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site

**Table PH052-2 Spring 2024 – Hwy 2:68 Dunvegan North Slide And Erosion Vibrating Wire Piezometer Instrumentation Reading Summary**

Date Monitored: May 26, 2024

INSTRUMENT	DATE INITIALIZED	TIP ELEV. (m)	GROUND ELEV. (m)	CURRENT STATUS	HIGHEST RECORDED GROUNDWATER LEVEL (mBGS)	CURRENT GROUNDWATER ELEVATION (mBGS)	PREVIOUS GROUNDWATER ELEVATION (mBGS)	CHANGE IN WATER LEVEL SINCE PREVIOUS READING (m)
VW16-1	April 9, 2016	458.80	467.73	Active	DRY	DRY	DRY	N/A
VW16-2	April 9, 2016	451.80	467.73	Active	456.40 on June 10, 2018	454.30	455.19	-0.89

Drawing 32123-PH052 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site



## 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.

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### 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.

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### 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.

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**THURBER** ENGINEERING LTD.

**ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS GRMP (CON0022165)  
PEACE REGION (GRANDE PRAIRIE DISTRICT – NORTH)  
INSTRUMENTATION MONITORING RESULTS**

**SPRING 2024**

**APPENDIX A  
DATA PRESENTATION**

**SITE PH052: HWY 2:68 DUNVEGAN NORTH SLIDE AND EROSION**

**ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS  
PEACE REGION (GRANDE PRAIRIE - NORTH DISTRICT)  
INSTRUMENTATION MONITORING FIELD SUMMARY (PH052)  
SPRING 2024**

<b>Location:</b> Dunvegan North Slide & Erosion (HWY 2:68 C1 10.839) <b>File Number:</b> 32123 <b>Probe:</b> RST Set 8R <b>Cable:</b> RST Set 8R	<b>Readout:</b> GK 404 SN 364 <b>Casing Size:</b> 2.75 <b>Temp:</b> 15 <b>Read by:</b> NKR/NRM
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**SLOPE INCLINOMETER (SI) READINGS**

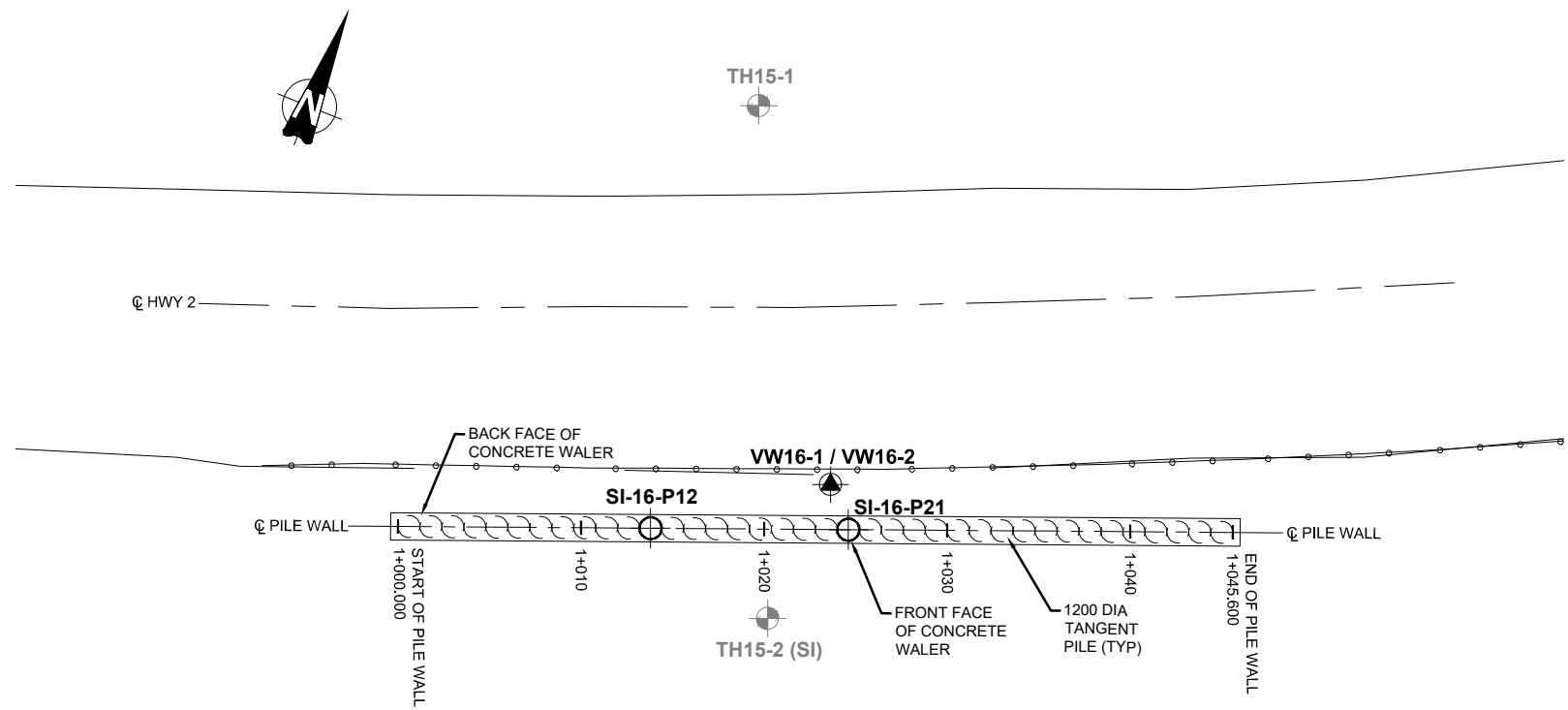
SI#	GPS Location (UTM 11)		Date	Stickup (m)	Depth from top of Casing (ft)	Azimuth of A+ Groove	Current Bottom Depth Readings				Probe/ Reel #	Size (")	Remarks
	Easting (m)	Northing (m)					A+	A-	B+	B-			
SI16-P12	402452	6199542	26-May-24	0.48	58	170	598	-589	148	-168	5R/5R	2.75	
SI16-P21	402466	6199546	26-May-24	0.47	58	165	-1329	1338	-249	241	5R/5R	2.75	

**VIBRATING WIRE PIEZOMETER (VW) READINGS**

VW #	Easting (m)	Northing (m)	Date	Reading (Dg <sup>0</sup> /C)	Identification
VW16-1	402462	6199551	26-May-24	8873.5/5.0	36169
VW16-2			26-May-24	8694.7/7.2	36170




**INSPECTOR REPORT**

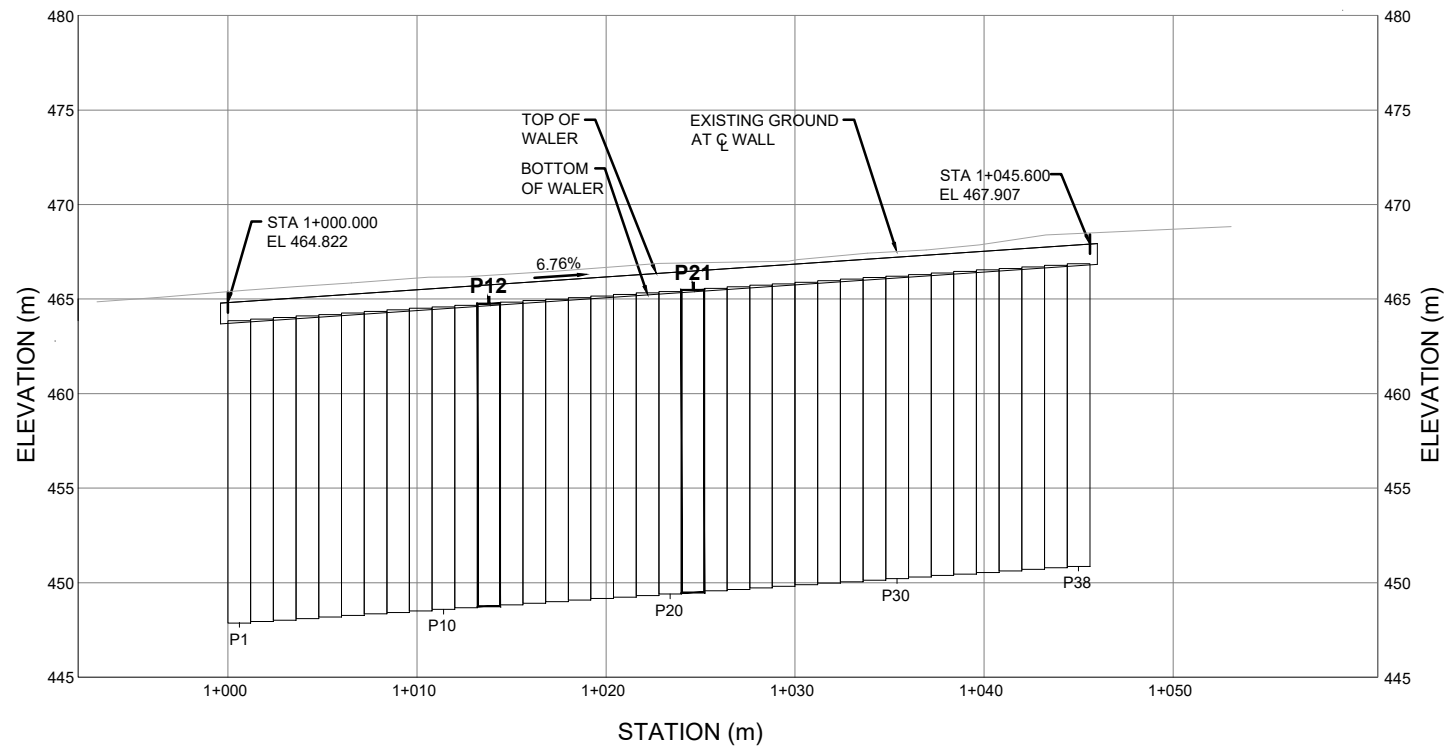

H:\32000\32123 AT GRMP Grande Prairie District North 2021-2025\CAD\2021 INSTRUMENTS\32123-PH052.dwg - 1 - Sep. 10, 2021



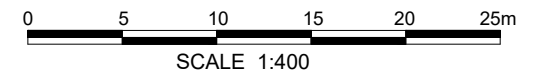
PLAN - PILE WALL

LEGEND

-  SLOPE INCLINOMETER
-  VIBRATING WIRE PIEZOMETER
-  TEST HOLE



ELEVATION - PILE WALL  
SHOWN ALONG PILE WALL CENTRELINE



PEACE REGION  
(GRANDE PRAIRIE DISTRICT NORTH)

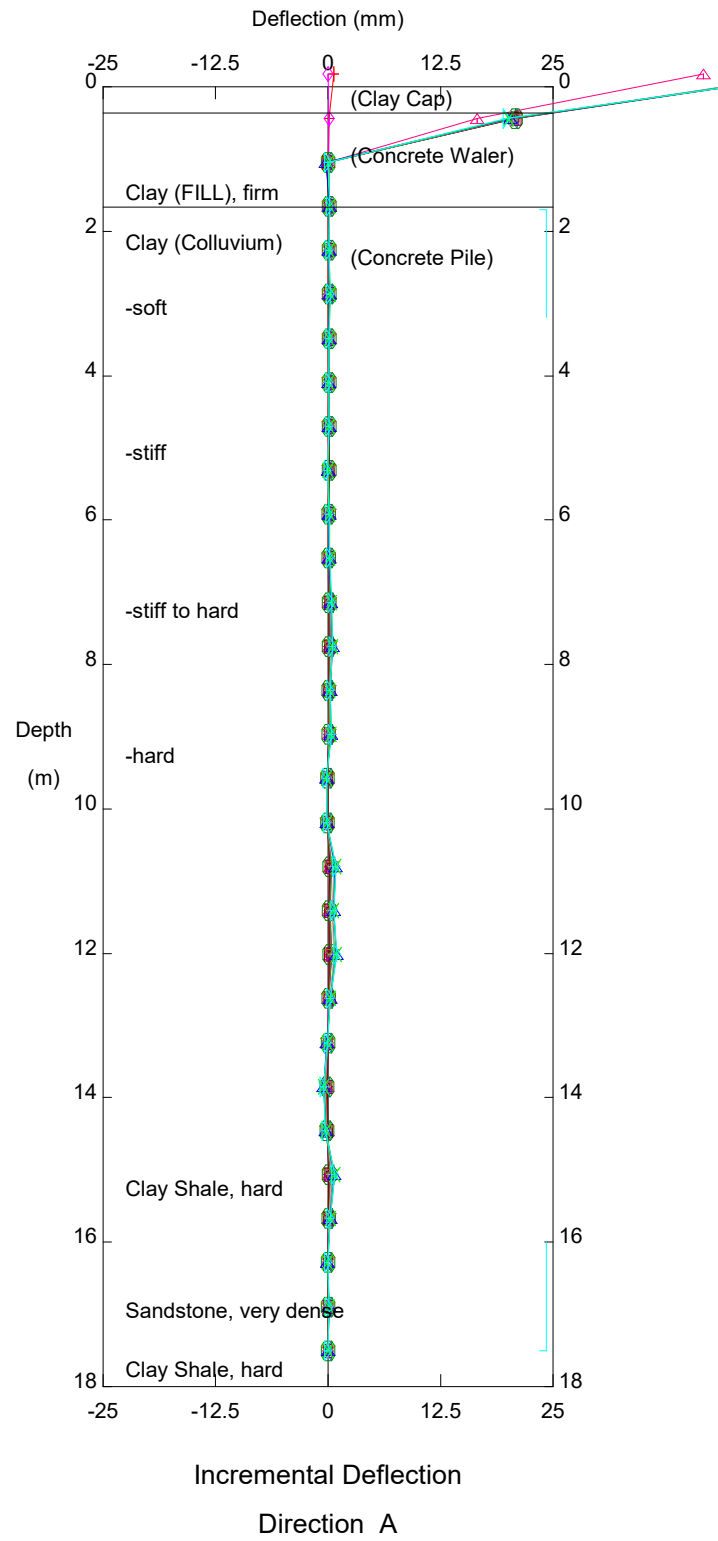
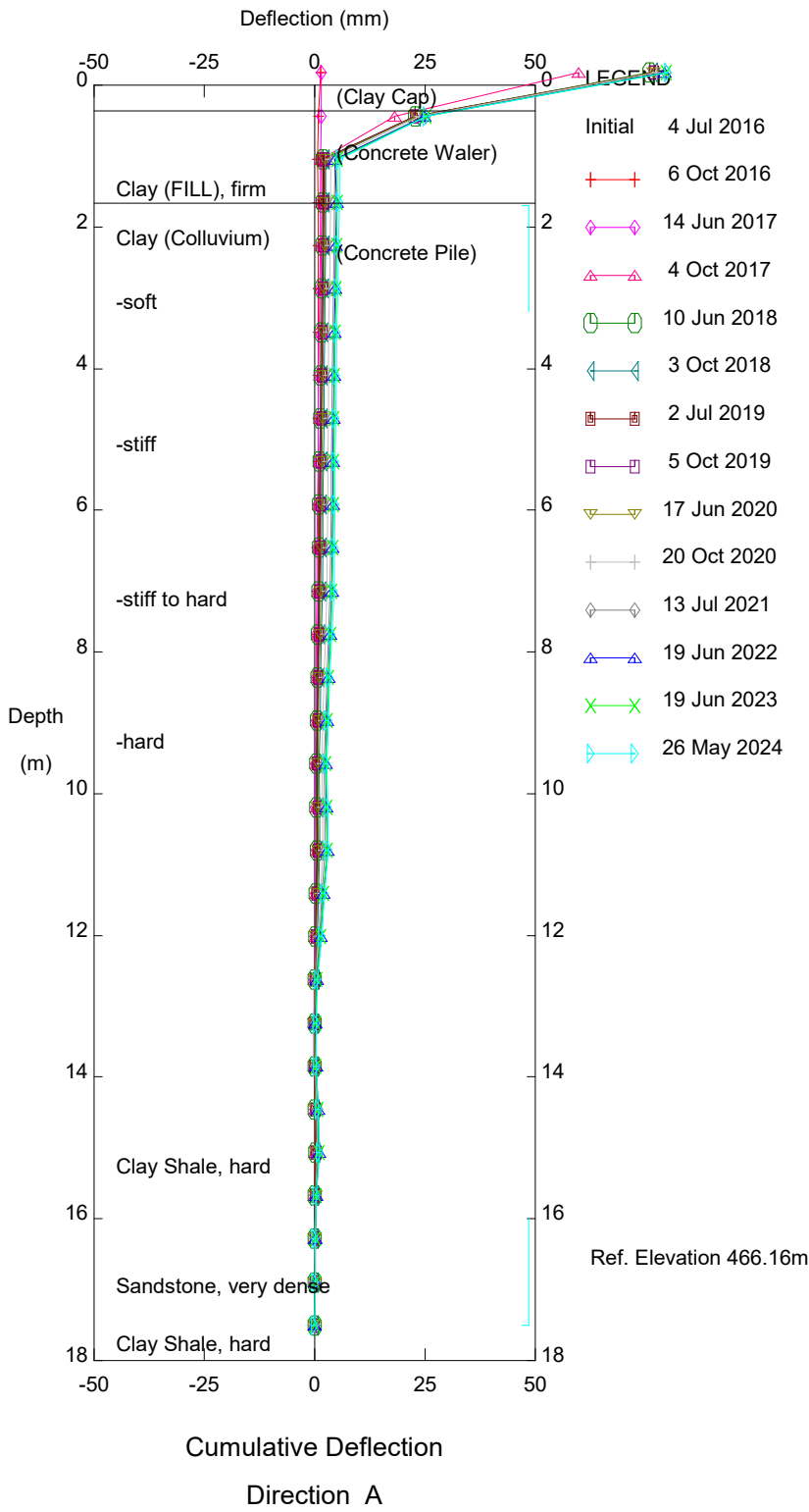
PH052: DUNVEGAN NORTH SLIDE AND EROSION

DWG No. 32123-PH052

DRAWN BY	ML
DESIGNED BY	BWN
APPROVED BY	DWP
SCALE	1:400
DATE	AUGUST 2021
FILE No.	32123

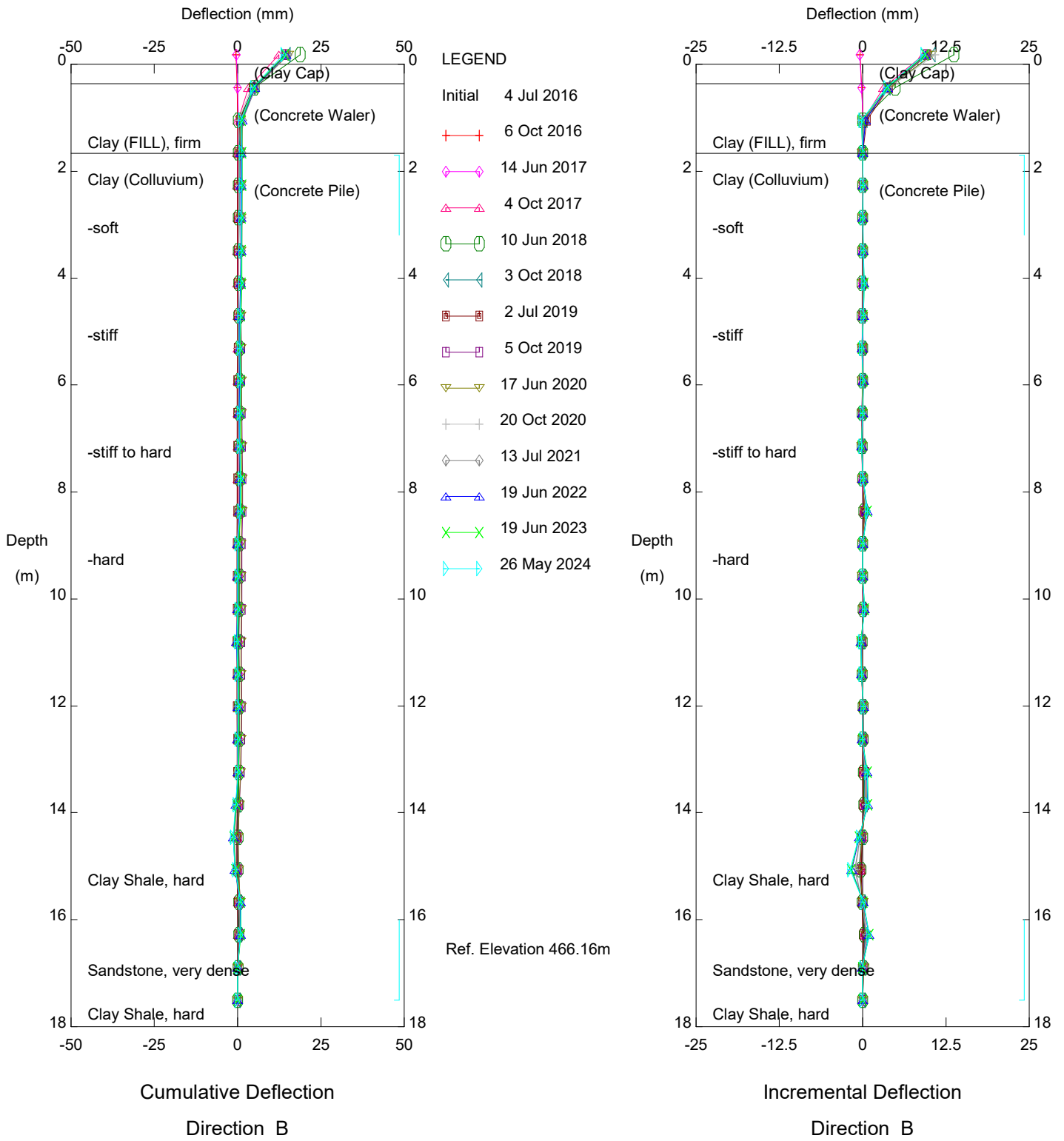






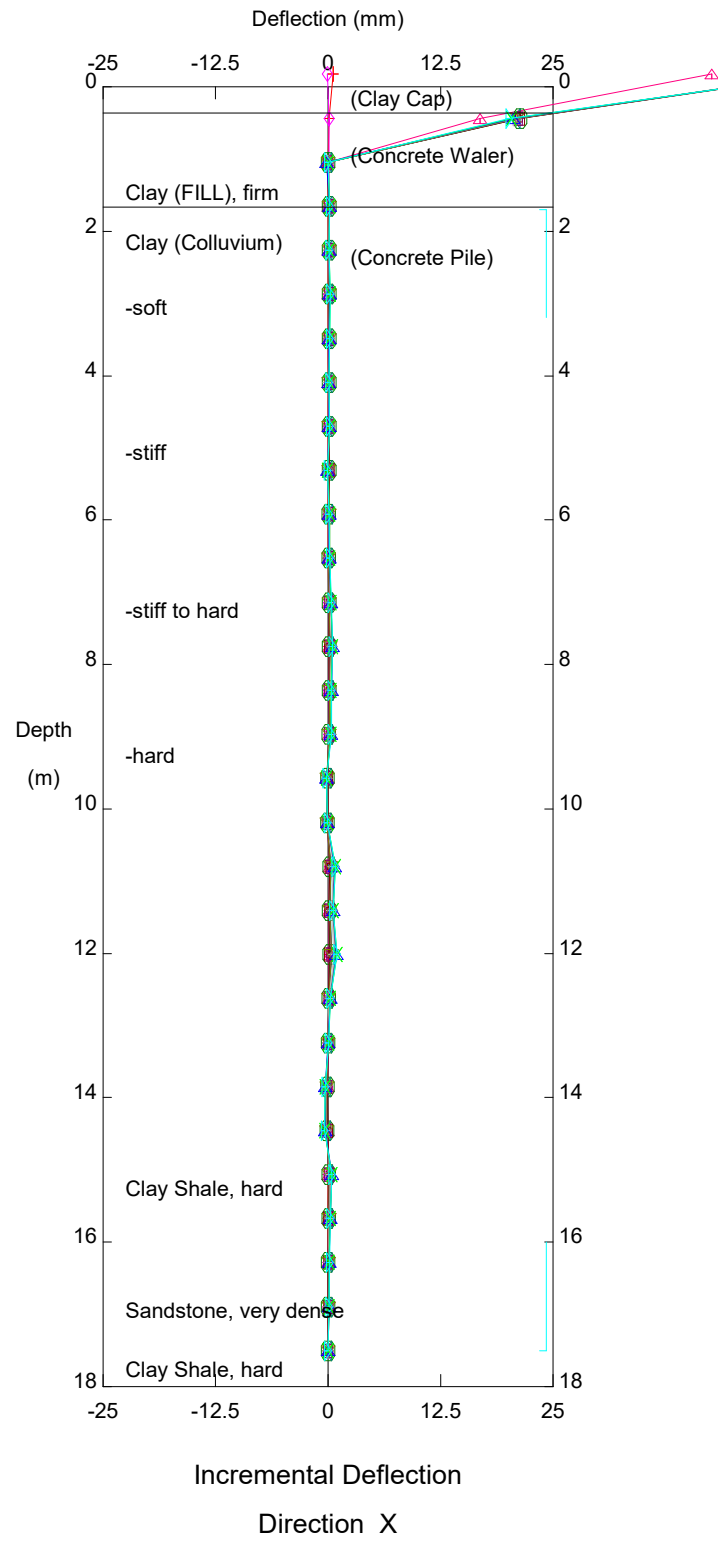
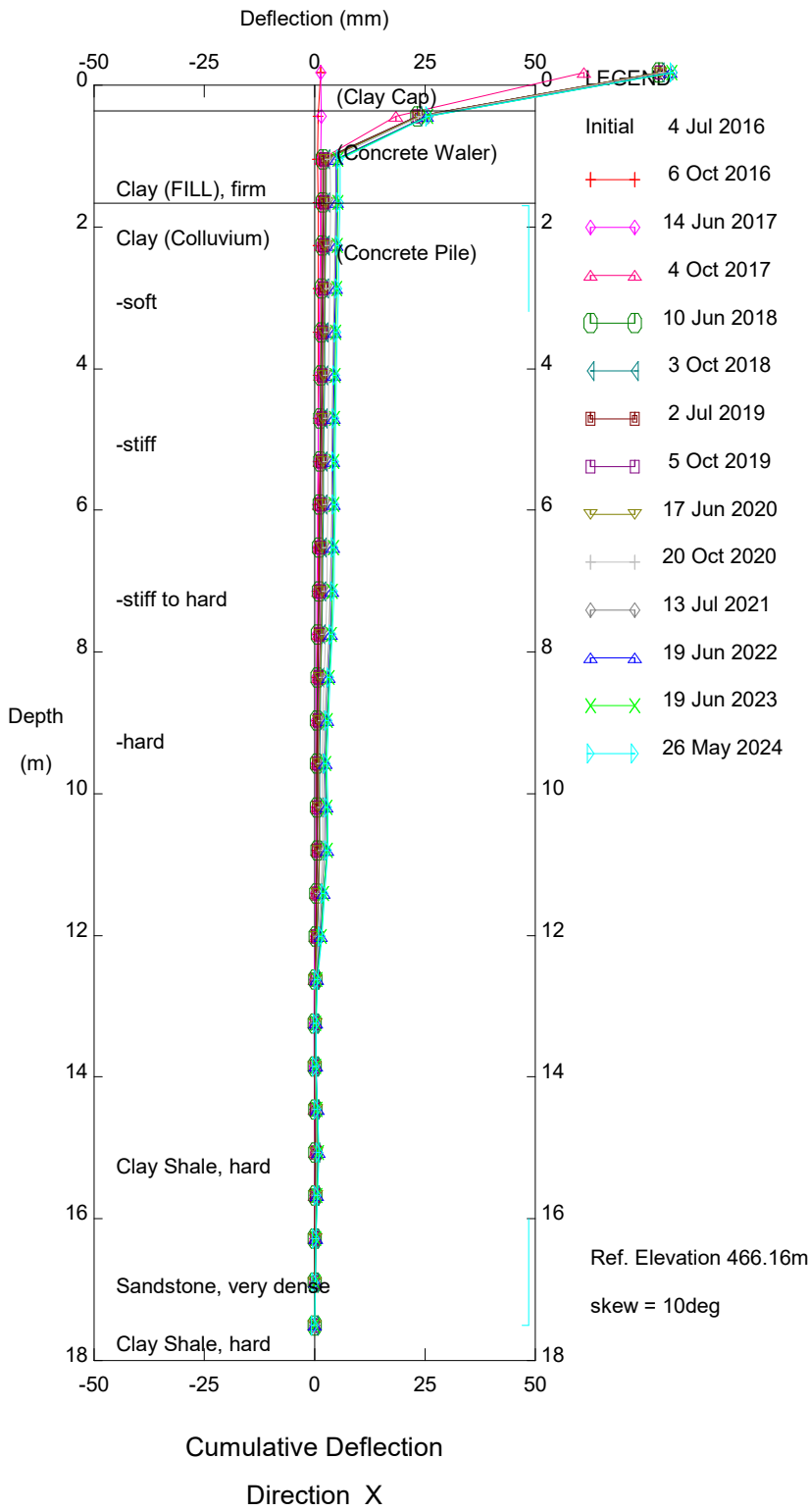
Dunvegan North Slide (PH052), Inclinometer SI16-P12

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Dunvegan North Slide (PH052), Inclinometer SI16-P12

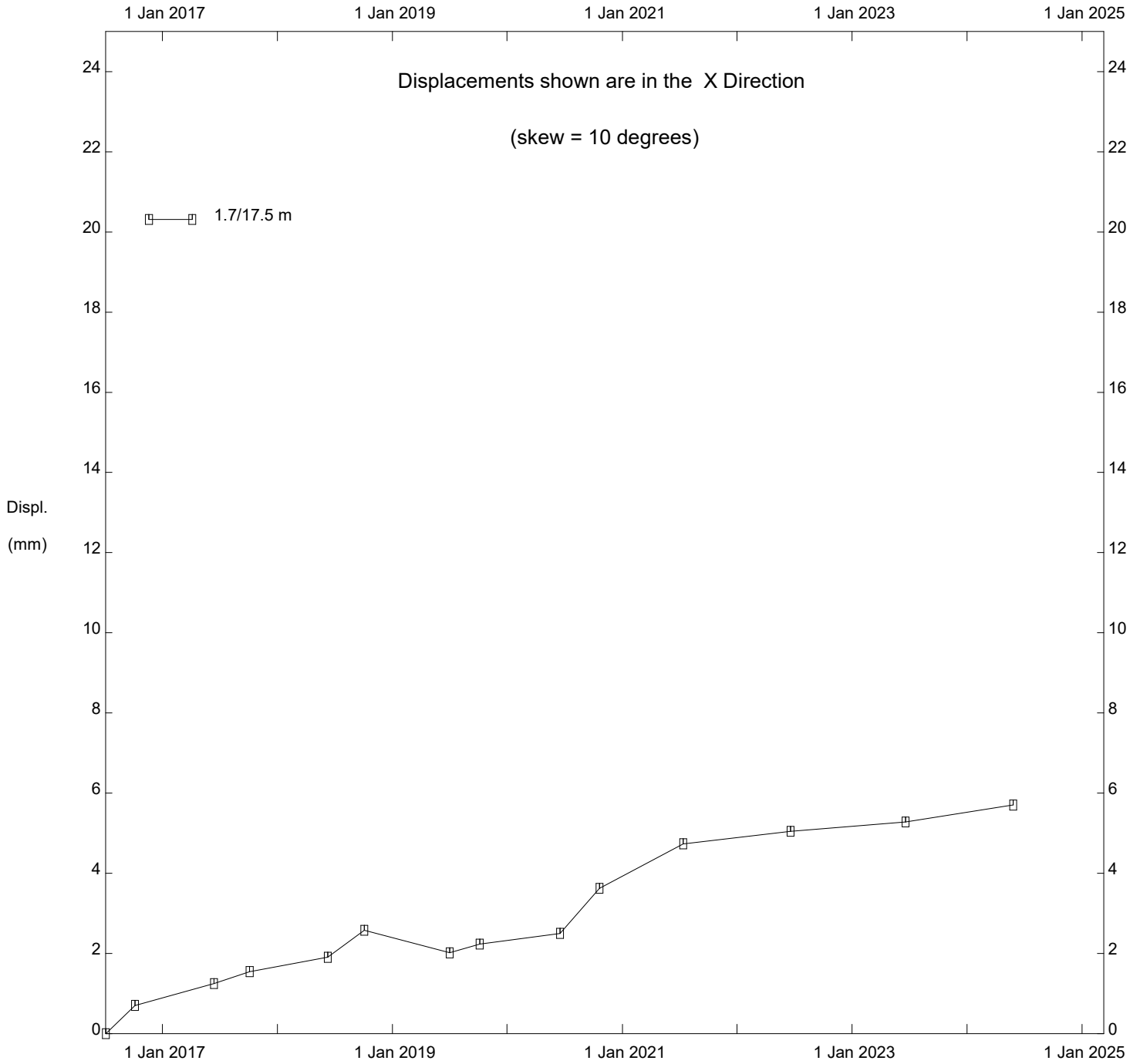
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Dunvegan North Slide (PH052), Inclinometer SI16-P12

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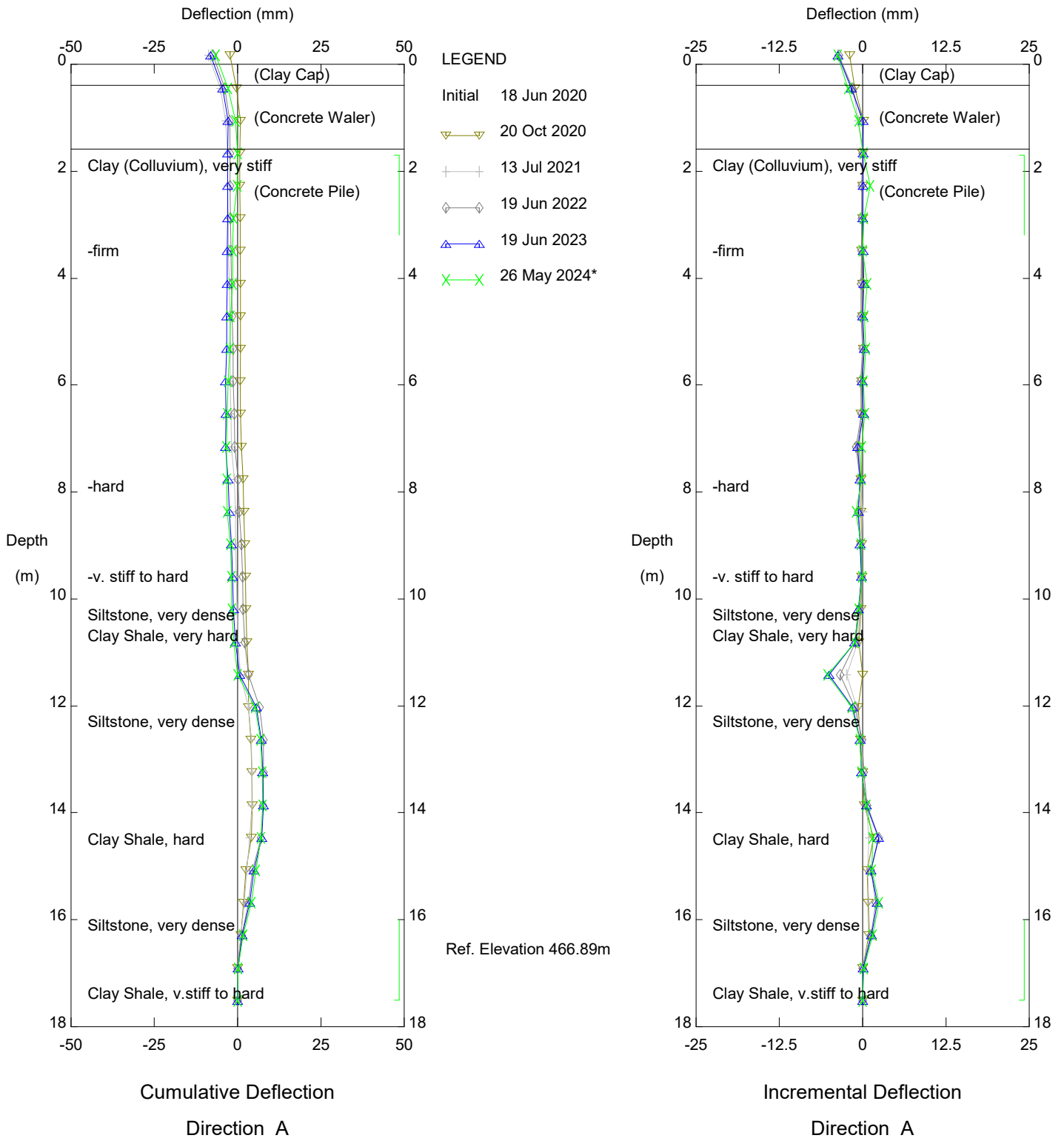
Thurber Engineering Ltd.



Dunvegan North Slide (PH052), Inclinometer SI16-P12

Alberta Transportation

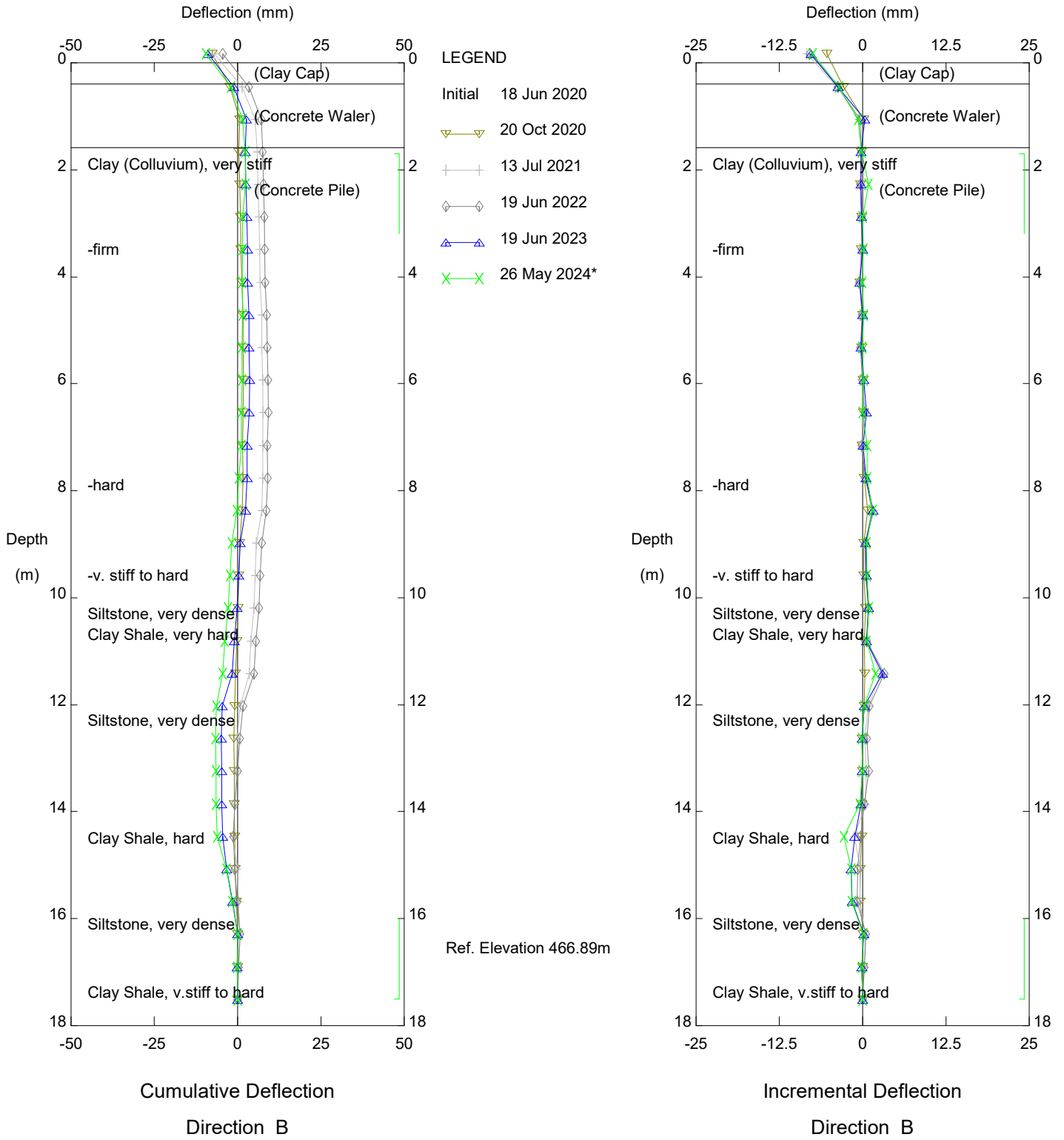
Thurber Engineering Ltd.



Dunvegan North Slide (PH052), Inclinometer SI16-P21

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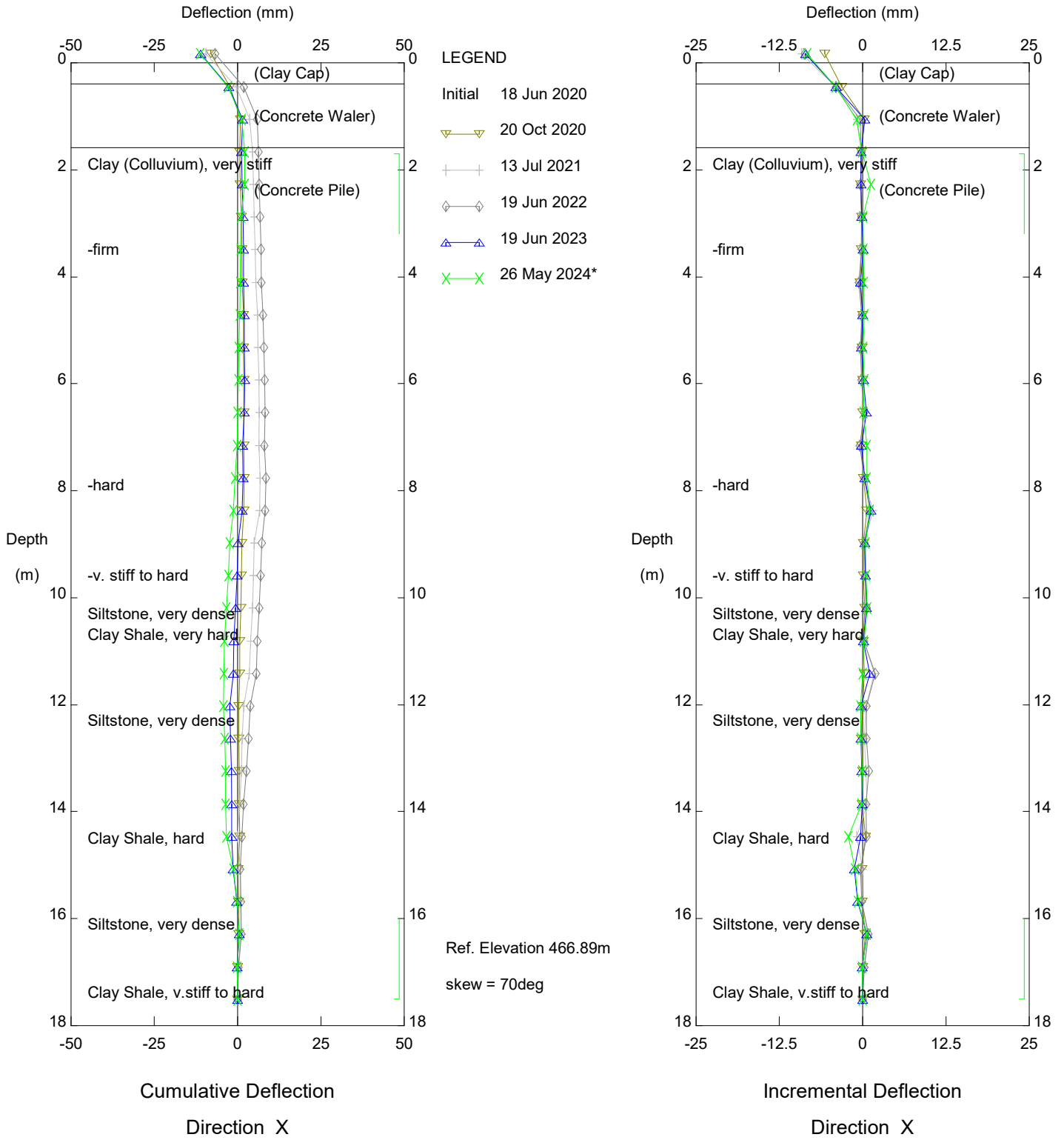
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Dunvegan North Slide (PH052), Inclinometer SI16-P21

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

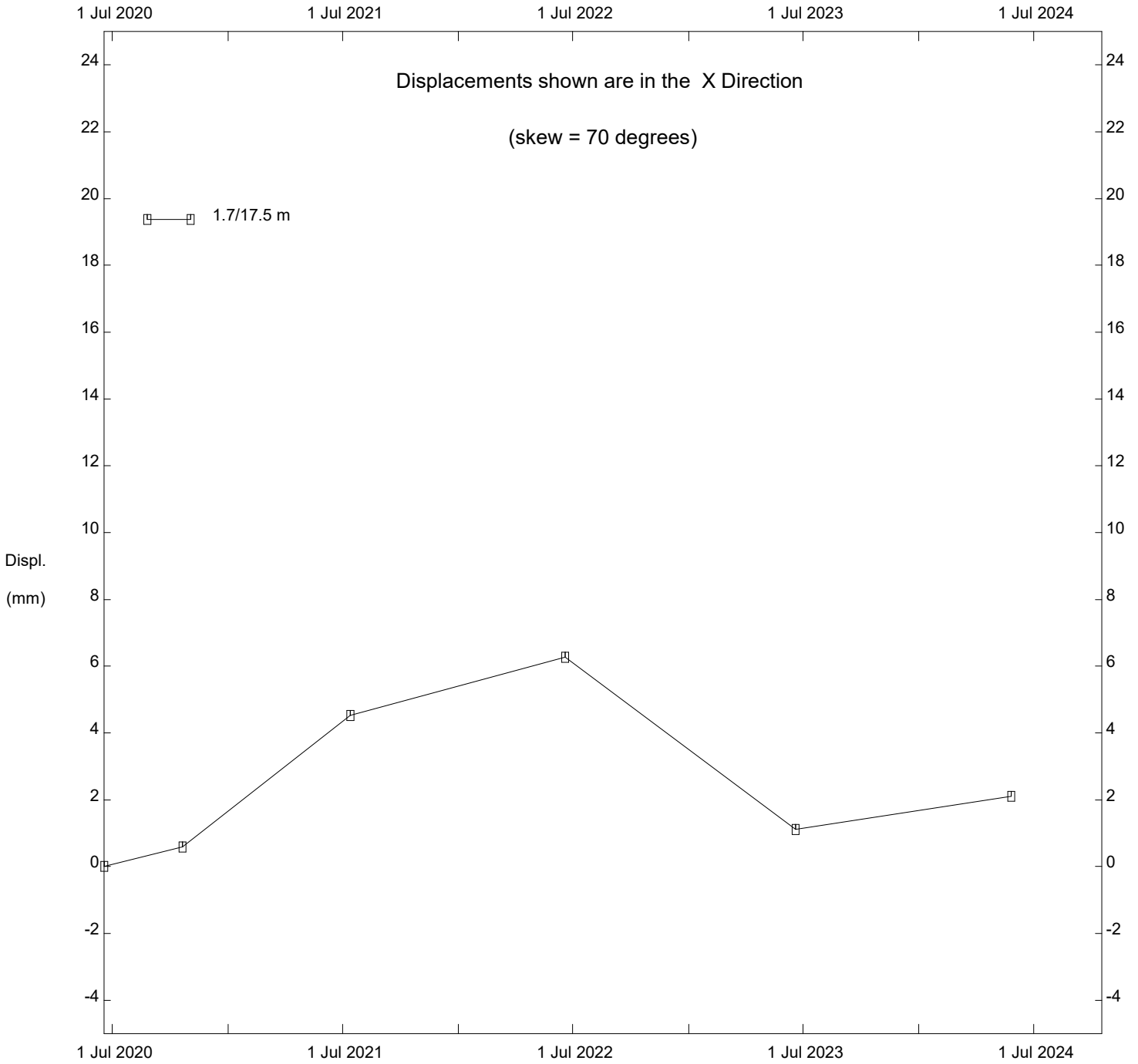


Dunvegan North Slide (PH052), Inclinometer SI16-P21

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

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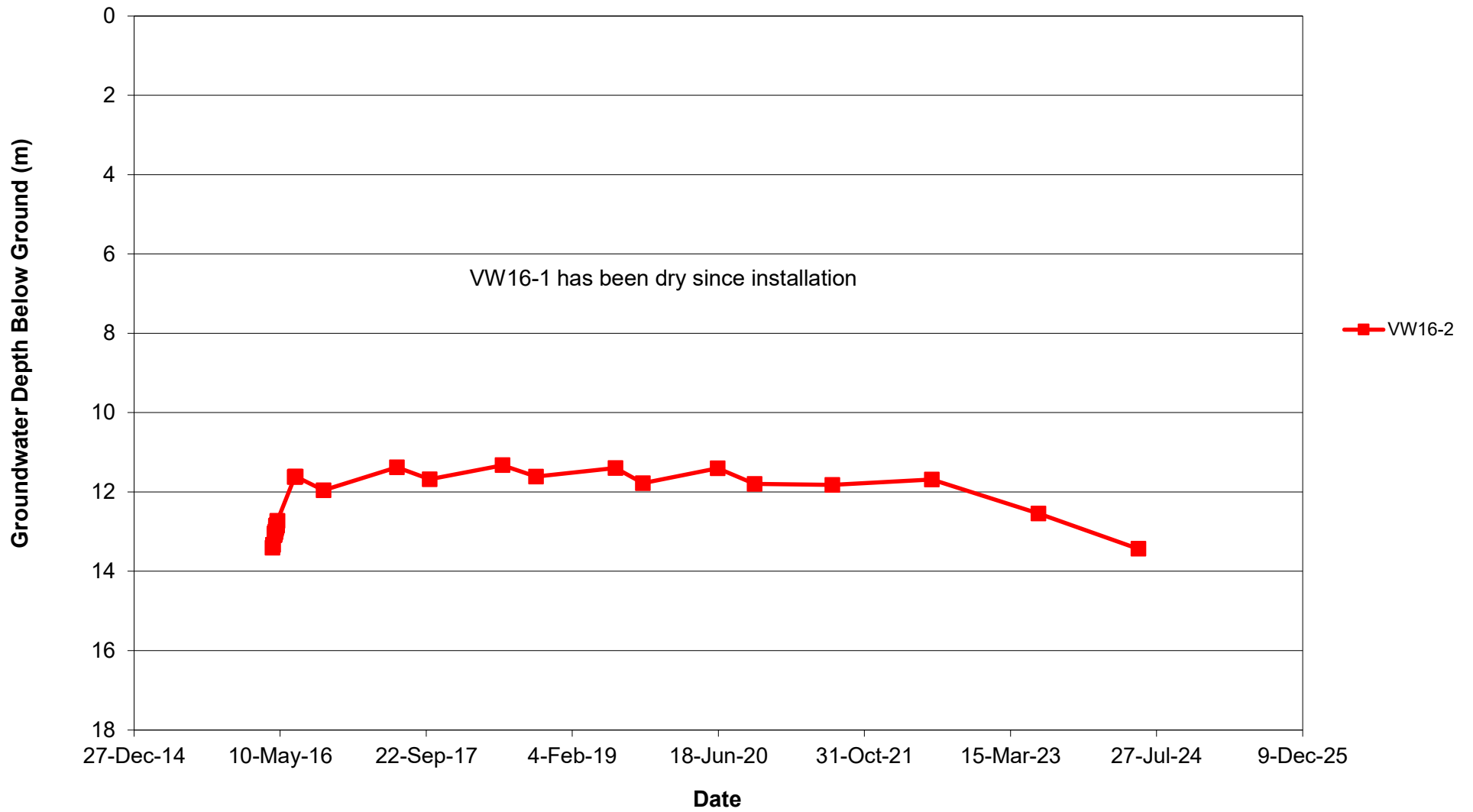


Dunvegan North Slide (PH052), Inclinator SI16-P21

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**FIGURE PH052-1  
PIEZOMETRIC DEPTHS FOR HWY 2:68 DUNVEGAN NORTH 10+800 SLIDE**



**FIGURE PH052-2  
PIEZOMETRIC ELEVATIONS FOR HWY 2:68 DUNVEGAN NORTH 10+800 SLIDE**

