

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



Site Number	Location	Name	Hwy	km
GP024	HWY 725:02 C1 17.41	Hamelin Creek	725:02	Km 17.4
Legal Description: 11-5-81-8 W6		UTM Co-ordinates		
		11U E 361702.73	N	6207568.73

Current Monitoring:	29-May-2024	Previous Monitoring	24-Jun-2023
Instruments Read By:	Mr. Niraj Regmi, G.I.T and Mr. Nixon Mationg, of Thurber		

Instruments Read During This Site Visit			
Slope Inclinometers (SIs): HC04-3, SI06-08	Pneumatic Piezometers (PN): PN06-02, PN06-04, PN06-05, PN06-08 PN03-6A	Vibration Wire Piezometers (VW): N/A	Standpipe Piezometers (SP): SP06 03 SP06-06
Load Cell (LC): N/A	Strain Gauges: N/A	SAA's: N/A	Others:

Readout Equipment Used			
Slope Inclinometers: Two RST Digital Inclinator probes with 2 ft. wheelbases and RST Pocket PC readouts	Pneumatic Piezometers: RST C108 pneumatic piezometer readout	Vibration Wire Piezometers:	Standpipe Piezometers: DGS1 dipmeter
Load Cell:	Strain Gauges:	SAA's:	Others:
Notes:			

Discussion	
Zones of New Movement:	None
Interpretation of Monitoring Results:	<p>Slope inclinometer HC04-3, located on the south embankment slope, showed rates of movement of 2.4 mm/yr and 1.4 mm/yr over 5.7 m to 13.0 m depth and 19.7 m to 24.0 m depth, respectively, since the spring of 2023 readings.</p> <p>SI06-08, located on the north embankment slope, showed a rate of movement of 1.1 mm/yr over 2.8 m to 5.2 m depth since the spring of 2023 readings. Both remaining SIs at this site have shown an overall consistent trend of movement for the past several years.</p> <p>Pneumatic piezometer PN03-06A and PN06-02 both showed increases in groundwater level of 0.05 m since the spring of 2023 readings. PN03-6A is currently showing the highest groundwater level ever measured in the instrument. Pneumatic piezometers PN06-04, PN06-05 and PN06-08 showed decreases in groundwater level of 0.24 m, 0.23 m, and 0.02 m, respectively, since the spring of 2023 readings.</p>

	Standpipe piezometer SP06-03 showed a decrease in groundwater levels of 0.02 m since the spring of 2023 readings. Standpipe piezometer SP06-06 showed an increase in groundwater level of 1.13 m since the spring of 2023 readings.
Future Work:	The instruments should be read again in the spring of 2025.
Instrumentation Repairs:	No instrument repairs are required at this time.
Additional Comments:	Bridge inspections should reference these instrumentation reports as cracking or deformation of the culvert barrel may be related to continuing slope movements. The slope indicators show slow but steady movements totalling 10 to 20 mm over the past 7 or so years.

Attachments:	<ul style="list-style-type: none"> ▪ Table GP024-1 Spring 2024 – HWY 725:02 Hamelin Creek, Slope Inclinator Instrumentation Reading Summary ▪ Table GP024-2 Spring 2024 – HWY 725:02 Hamelin Creek, Pneumatic Piezometer Instrumentation Reading Summary ▪ Table GP024-3 Spring 2024 – HWY 725:02 Hamelin Creek, Standpipe Piezometer Instrumentation Reading Summary ▪ Statement of Limitations and Conditions ▪ APPENDIX A – GP024-1 SPRING 2024 <ul style="list-style-type: none"> □ Field Inspector's report □ Site Plan Showing Approximate Instrument Locations (Drawing No. 32123-GP024) □ SI Reading Plots □ Figure GP024-1 (Piezometric Elevations) □ Figure GP024-2 (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.
Roger Skirrow, M.Sc., P. Eng.
Senior Geotechnical Engineer

Lucas Green, P.Eng.
Geotechnical Engineer

Table GP024-1 Spring 2024 – Hwy 725:02 Hamelin Creek Slope Inclinator Instrumentation Reading Summary

Date Monitored: May 29, 2024

INSTRUMENT #	DATE INITIALIZED	TOTAL CUMULATIVE RESULTANT MOVEMENT AT NOTED DEPTH SINCE INITIAL READING (mm)	MAXIMUM RATE OF MOVEMENT (mm/yr)	CURRENT STATUS	DATE OF PREVIOUS READING	INCREMENTAL MOVEMENT SINCE PREVIOUS READING (mm)	RATE OF MOVEMENT (mm/yr)	CHANGE IN RATE OF MOVEMENT SINCE PREVIOUS READING (mm/yr)
HC03-6A	October 11, 2003	244.3 over 8.8 m to 16.2 m depth in 1° direction	*1444.0 in October 2003	Destroyed	May 29, 2012	N/A	N/A	N/A
HC04-1	April 22, 2004	72.6 over 14.0 to 18.3 m depth in 2° direction	54.0 in May 2004	Sheared at 15.8 m	May 30, 2013	N/A	N/A	N/A
HC04-3	April 22, 2004	126.4 over 5.7 m to 13.0 m depth in 27° direction	*111.8 in May 2004	Operational	June 24, 2023	2.4	2.5	-0.3
		40.0 over 19.7 m to 24.0 m depth in 27° direction	*23.4 in May 2004			1.3	1.4	-0.3
SI06-01	July 22, 2006	34.2 over 12.7 m to 15.8 m depth in 201° direction	9.5 in March 2007	Sheared at 15.2 m	August 28, 2012	N/A	N/A	N/A
	June 10, 2016 (reinitialized)	1.9 over 12.8 m to 15.9 m in 312° direction	6.2 in October 2017		October 5, 2017	N/A	N/A	N/A

Drawing 32123-GP024 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

*Due to the significantly large amount of reading taken for this instrument, this date may have been removed from the SI plot to make the plot less busy.

Table GP024-1 – Continued Spring 2024 – Hwy 725:02 Hamelin Creek Slope Inclinator Instrumentation Reading Summary

Date Monitored: May 29, 2024

INSTRUMENT #	DATE INITIALIZED	TOTAL CUMULATIVE RESULTANT MOVEMENT AT NOTED DEPTH SINCE INITIAL READING (mm)	MAXIMUM RATE OF MOVEMENT (mm/yr)	CURRENT STATUS	DATE OF PREVIOUS READING	INCREMENTAL MOVEMENT SINCE PREVIOUS READING (mm)	RATE OF MOVEMENT (mm/yr)	CHANGE IN RATE OF MOVEMENT SINCE PREVIOUS READING (mm/yr)
SI06-02	July 25, 2006	41.3 over 14.0 m to 16.4 m depth in 249° direction	8.5 in March 2007	Sheared at 16.2 m below top of casing	October 22, 2020	N/A	N/A	N/A
SI06-04	July 23, 2006	40.9 over 16.1 m to 18.6 m depth in 224° direction	11.9 in May 2007	Sheared at 18.3 m below top of casing	October 22, 2020	N/A	N/A	N/A
SI06-05	July 27, 2006	46.2 over 15.6 m to 18.6 m depth in 255° direction	18.0 in September 2011	Sheared at 17.7 m below top of casing	October 5, 2018	N/A	N/A	N/A
SI06-08	July 26, 2006	39.8 over 2.8 m to 5.2 m depth in 38° direction	7.2 in May 2007	Operational	June 24, 2023	1.0	1.1	0.2

Drawing 32123-GP024 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

Table GP024-2 Spring 2024 – Hwy 725:02 Hamelin Creek Pneumatic Piezometer Instrumentation Reading Summary

Date Monitored: May 29, 2024

INSTRUMENT #	DATE INITIALIZED	TIP ELEV. (m)	GROUND ELEV. (m)	CURRENT STATUS	HIGHEST MEASURED WATER ELEVATION (m)	MEASURED PORE PRESSURE (kPa)	CURRENT WATER ELEVATION (m)	PREVIOUS WATER ELEVATION (m)	CHANGE IN WATER LEVEL SINCE PREVIOUS READING (m)
PN03-06A	October 17, 2006	605.40	618.10	Operational	607.22 in May 2024	17.8	607.22	607.17	0.05
PN06-02	October 17, 2006	591.30	618.30	Operational	606.63 in January 2007	147.5	606.34	606.29	0.05
PN06-04	October 17, 2006	595.52	619.24	Operational	607.38 in October 2019	109.8	606.72	606.96	-0.24
PN06-05	October 17, 2006	602.84	618.31	Operational	608.61 in May 2013	31.0	606.00	606.23	-0.23
PN06-08	October 17, 2006	591.09	614.73	Operational	606.21 in January 2007	145.8	605.96	605.98	-0.02

Drawing 32123-GP024 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

Table GP024-3 Spring 2024 – Hwy 725:02 Hamelin Creek Standpipe Piezometer Instrumentation Reading Summary

Date Monitored: May 29, 2024

INSTRUMENT #	DATE INITIALIZED	TIP ELEV. (m)	GROUND ELEV. (m)	CURRENT STATUS	MAXIMUM WATER ELEVATION (m)	CURRENT WATER ELEVATION (m)	PREVIOUS WATER ELEVATION (m)	CHANGE IN WATER LEVEL SINCE PREVIOUS READING (m)
SP06-01	October 17, 2006	594.76	625.26	<i>Blocked at 1.72 m below ground surface</i>	<i>612.25 in June 2016</i>	*	612.25	N/A
SP06-03	October 17, 2006	591.52	613.82	Operational	607.41 in June 2022	606.81	606.83	-0.02
SP06-06	October 17, 2006	596.01	621.71	Operational	621.29 in June 2022	621.17	620.04	1.13

Drawing 32123-GP024 in Appendix A provides a sketch of the approximate location of the monitoring instrumentation for this site.

*SP06-01 was destroyed by a mower after the spring of 2016 reading

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.

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

SPRING 2024

**APPENDIX A
DATA PRESENTATION**

SITE GP024: HWY 725:02, HAMELIN CREEK

**ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS
PEACE REGION (GRANDE PRAIRIE - NORTH DISTRICT)
INSTRUMENTATION MONITORING FIELD SUMMARY (GP024)
SPRING 2024**

Location: Hamelin Creek (HWY 725:02 C1 17.415)	Readout: DGSI Dipmeter, RST PN C108 Unit 4
File Number: 32123	Casing Size: 2.75
Probe: RST SI Set 8R	Temp: 10
Cable: RST SI Set 8R	Read by: NKR/NRM

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-			
HC04-3	361702.73	6207568.73	29-May-24	0.38	83 to 3	0	1177	-1162	280	-292	5R/5R	2.75	Read with 1 ft extension (84
SI06-08	361767.45	6207099.48	29-May-24	0.88	84 to 2	47	-126	139	1300	-1307	8R/8R	2.75	Read with 1 ft extension (84

STANDPIPE PIEZOMETER READINGS

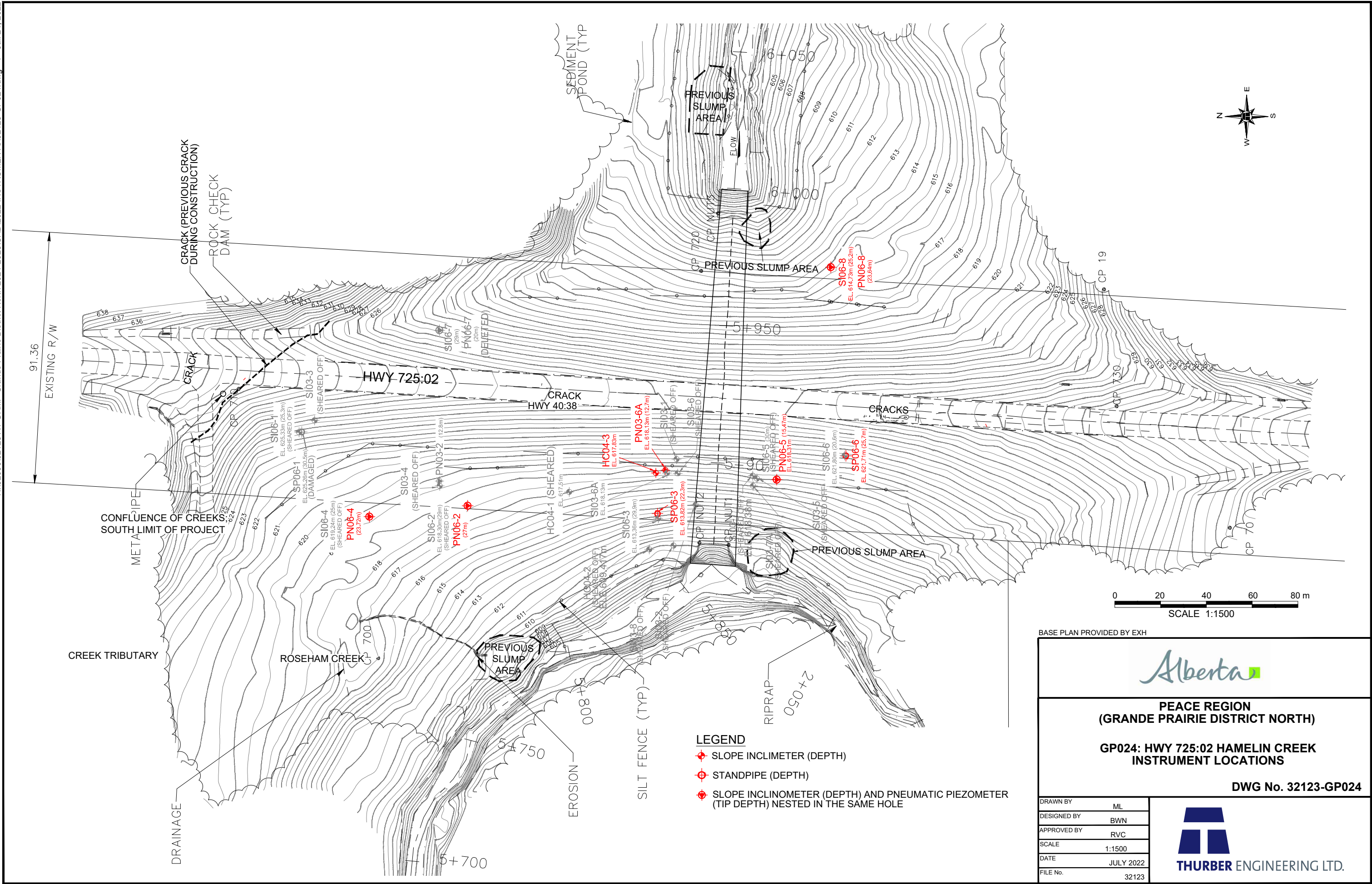
SP#	GPS Location (UTM 11)		Date	Stick-up (m)	Reading below top of pipe (m)	Bottom Pipe Depth (below ground (m))
	Easting (m)	Northing (m)				
SP06-03	361688.78	6207566.09	29-May-24	0.94	7.95	22.30
SP06-06	361707.38	6207497.42	29-May-24	0.77	1.31	25.70

PNEUMATIC PIEZOMETER (PN) READINGS

PN#	GPS Location (UTM 11)		Date	Reading (kPa)	Identification Number
	Easting (m)	Northing (m)			
PN06-02	361739.17	6207731.54	29-May-24	147.5	30668
PN06-04	361619.85	6207741.56	29-May-24	109.8	30669
PN06-05	361699.61	6207525.52	29-May-24	31	30672
PN06-08	361767.45	6207099.48	29-May-24	145.8	30670
PN03-6A	361702.73	6207568.7	29-May-24	17.8	NO ID

INSPECTOR REPORT

(1) Do not use extension for SI06-02	For all Gtilt plot, apply check for depth offset.



BASE PLAN PROVIDED BY EXH



PEACE REGION
(GRANDE PRAIRIE DISTRICT NORTH)

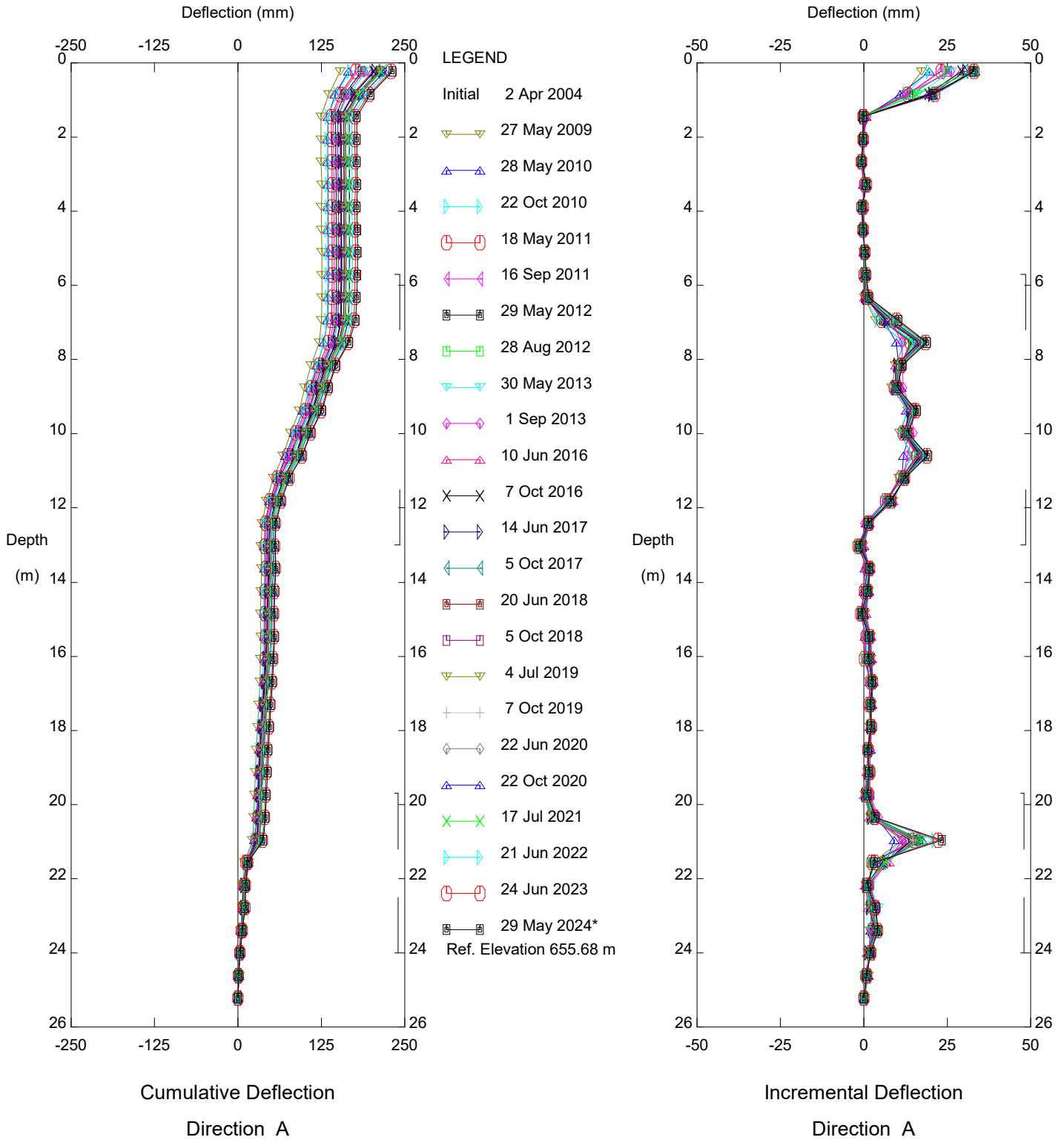
GP024: HWY 725:02 HAMELIN CREEK
INSTRUMENT LOCATIONS

DWG No. 32123-GP024

DRAWN BY	ML
DESIGNED BY	BWN
APPROVED BY	RVC
SCALE	1:1500
DATE	JULY 2022
FILE No.	32123



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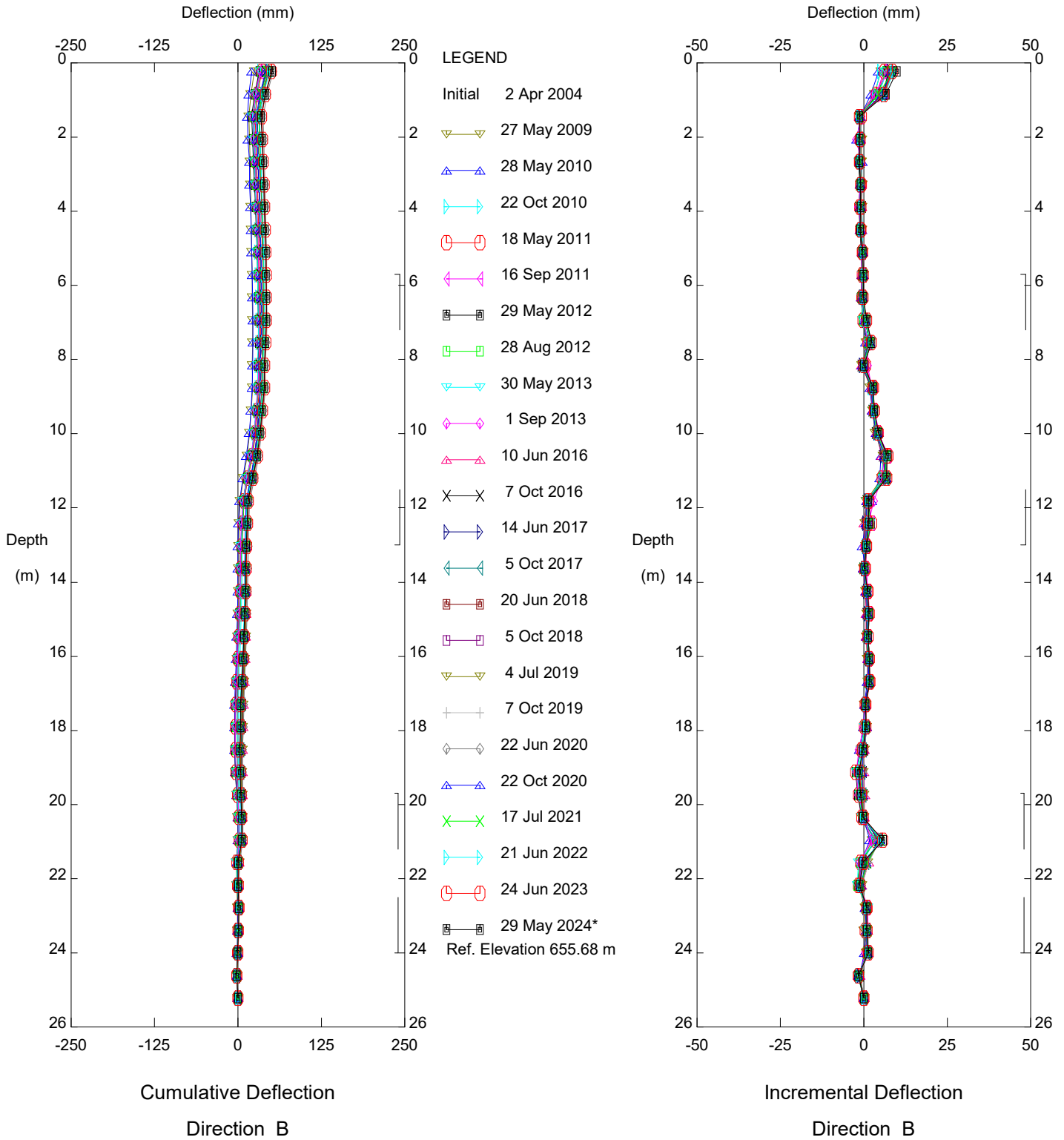


GP024 Hamelin Creek, Inclinator HC04-3

Alberta Transportation

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

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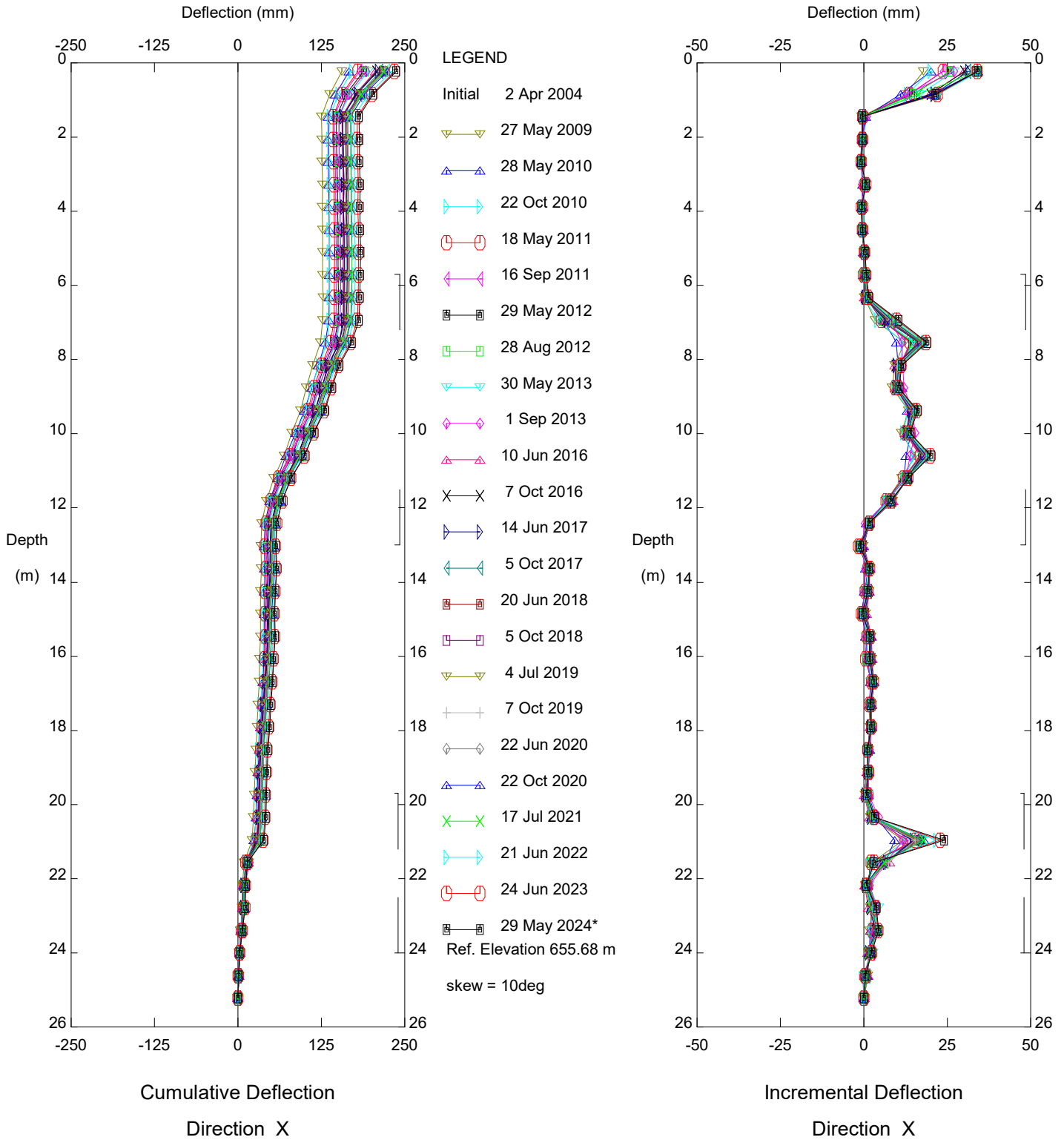


GP024 Hamelin Creek, Inclinator HC04-3

Alberta Transportation

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

Thurber Engineering Ltd.

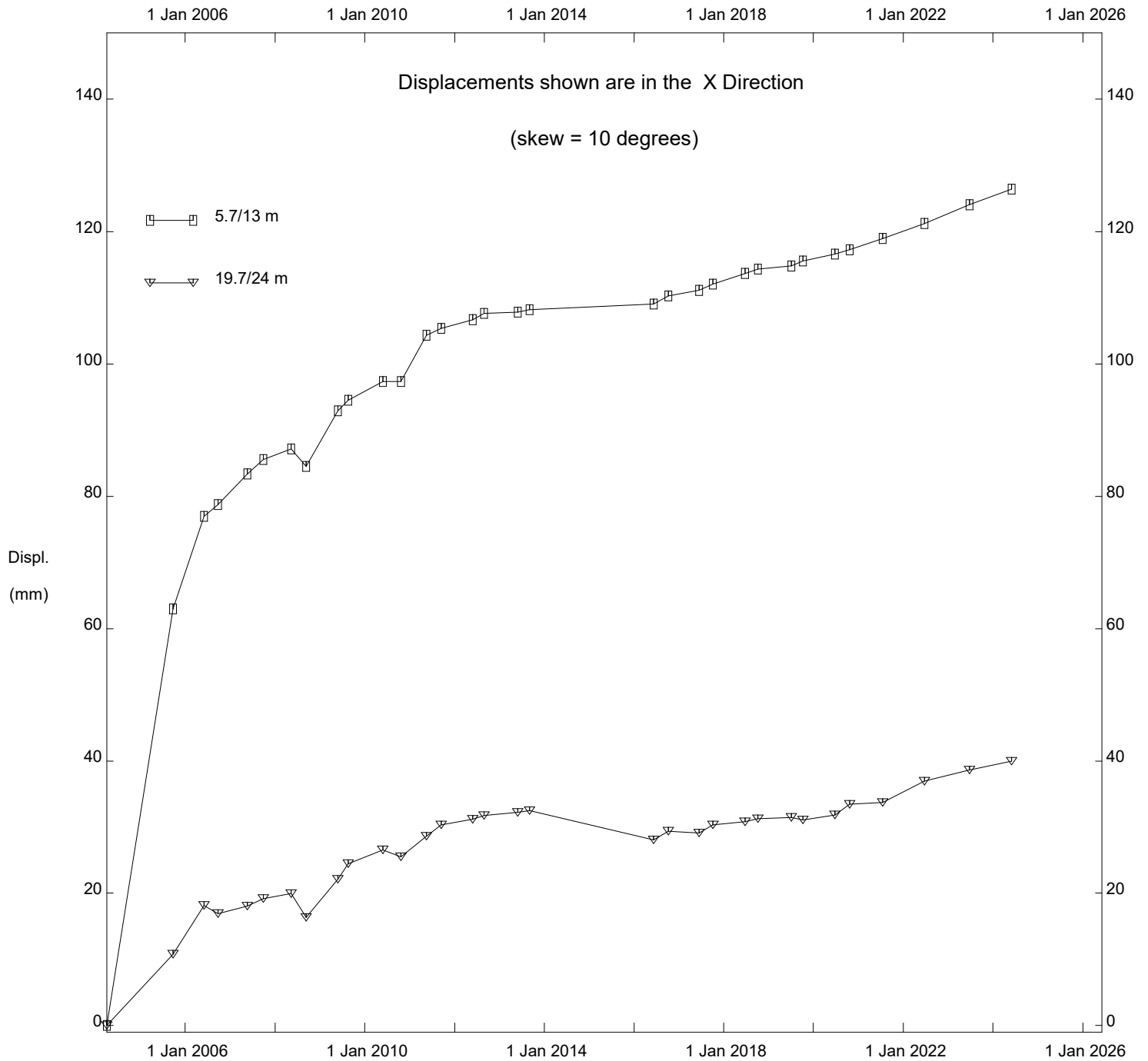


GP024 Hamelin Creek, Inclinator HC04-3

Alberta Transportation

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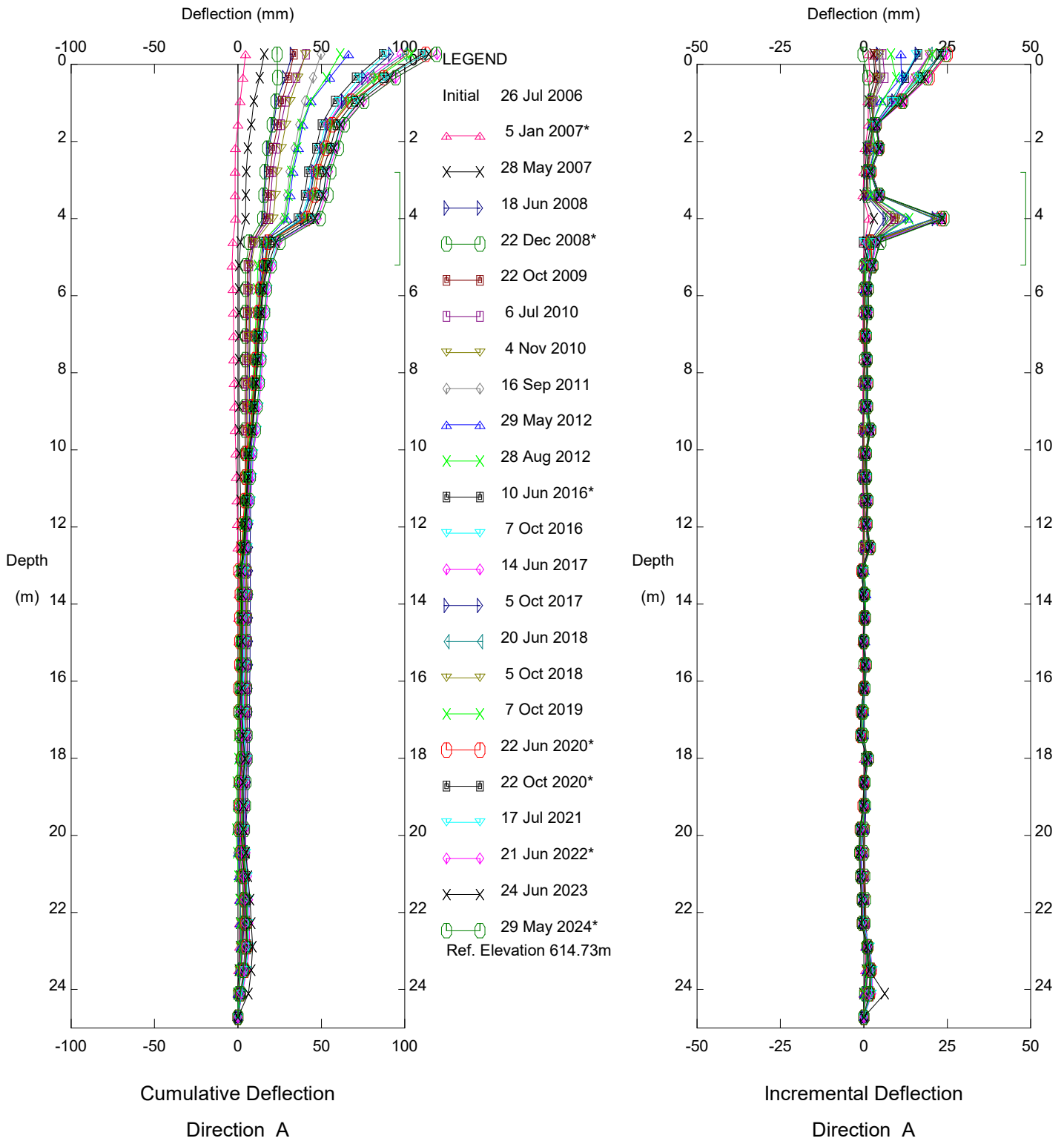
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GP024 Hamelin Creek, Inclinator HC04-3

Alberta Transportation

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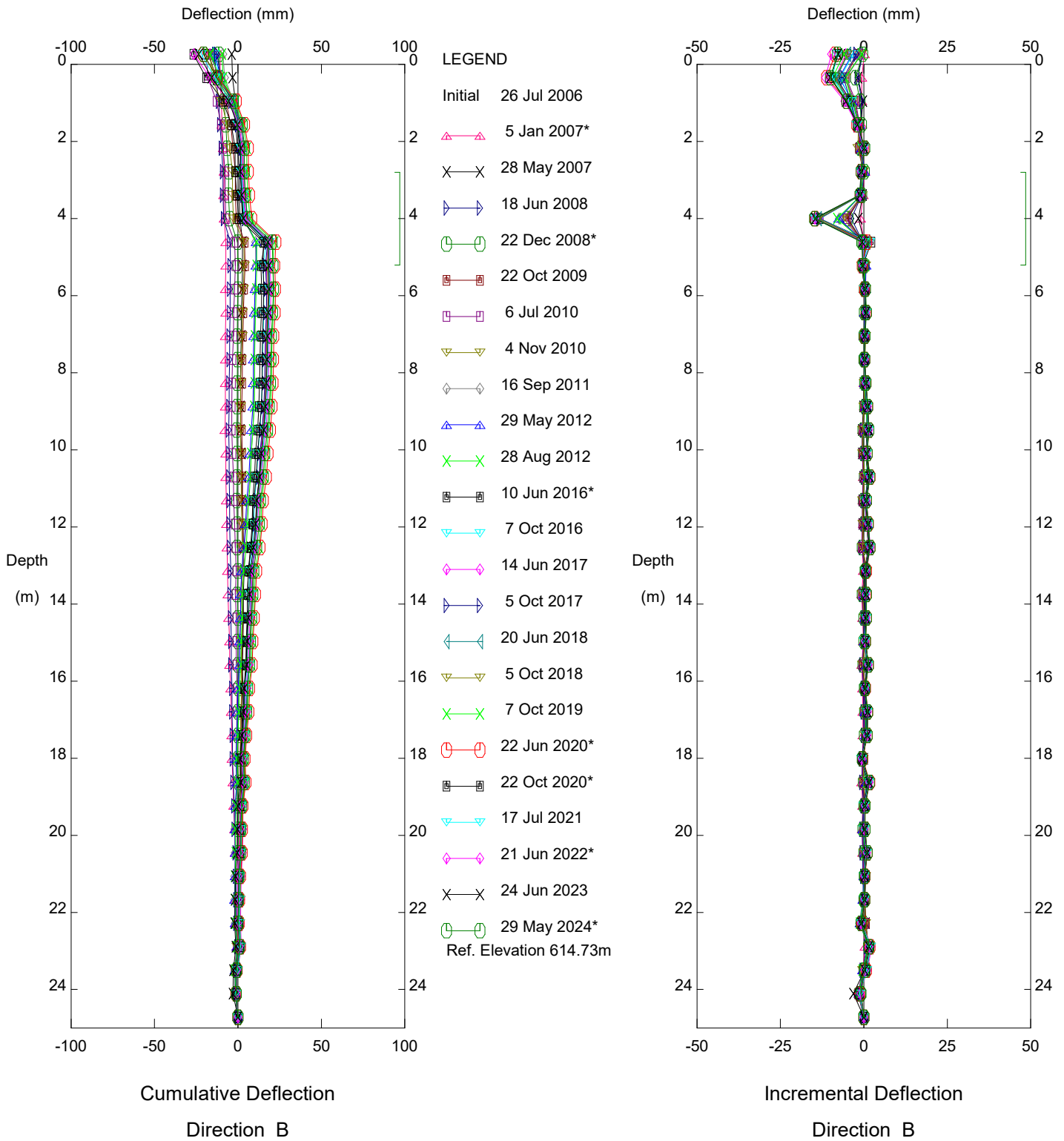


GP024 Hamelin Creek, Inclinometer SI06-8

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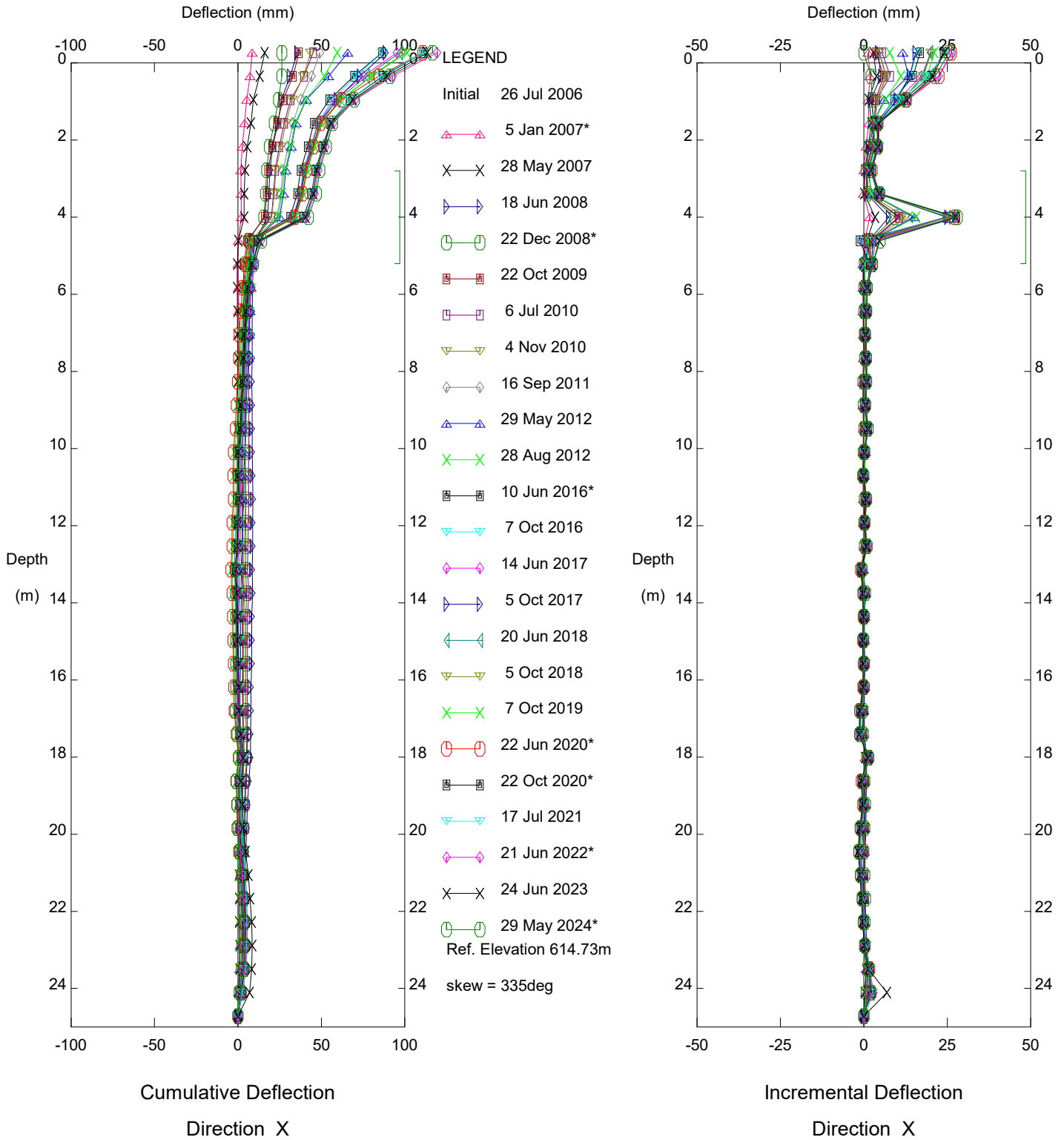


GP024 Hamelin Creek, Inclinometer SI06-8

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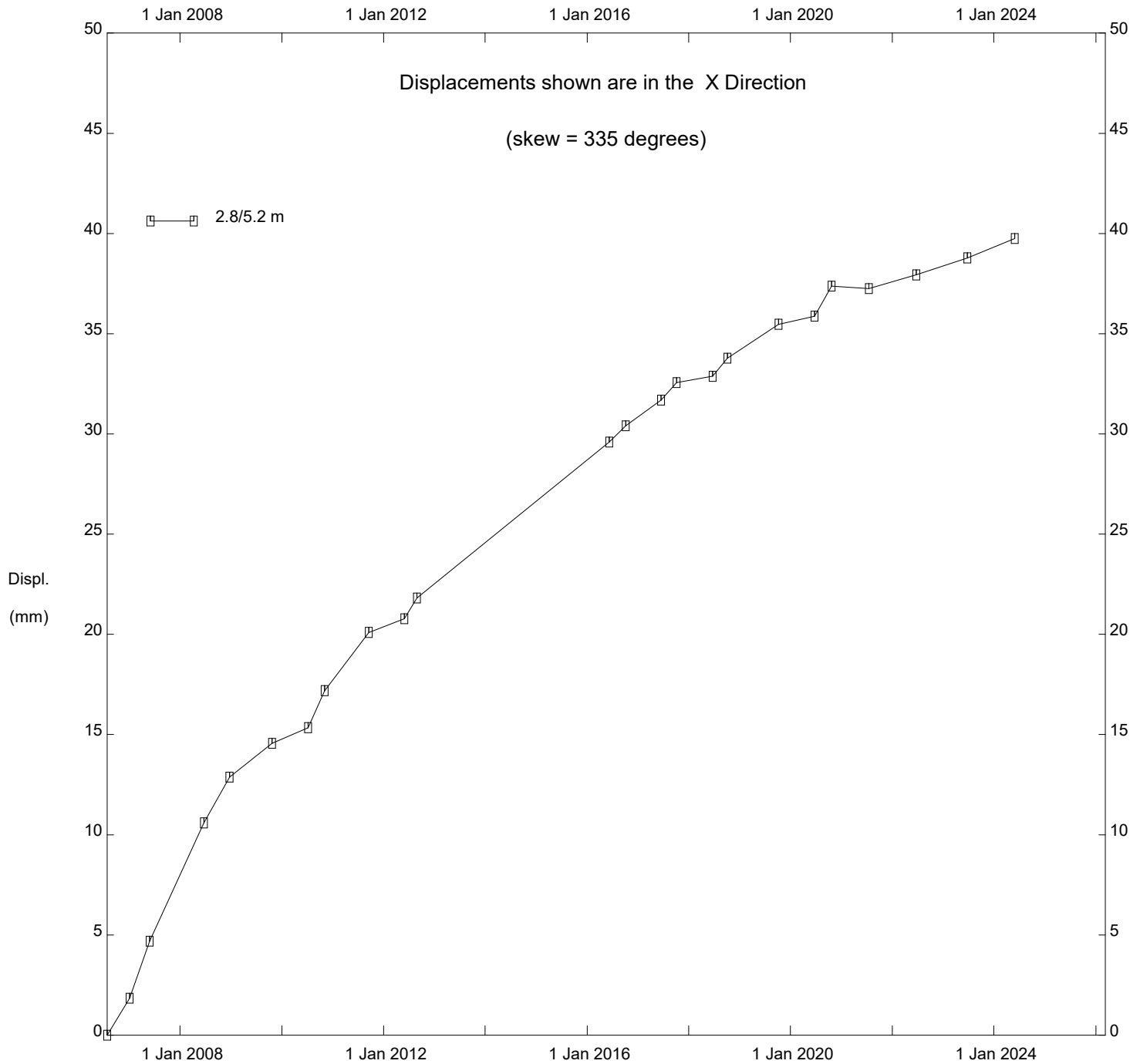


GP024 Hamelin Creek, Inclinometer SI06-8

Alberta Transportation

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GP024 Hamelin Creek, Inclinator SI06-8

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FIGURE GP024-1
PIEZOMETRIC ELEVATIONS FOR HWY 725:02, HAMELIN CREEK

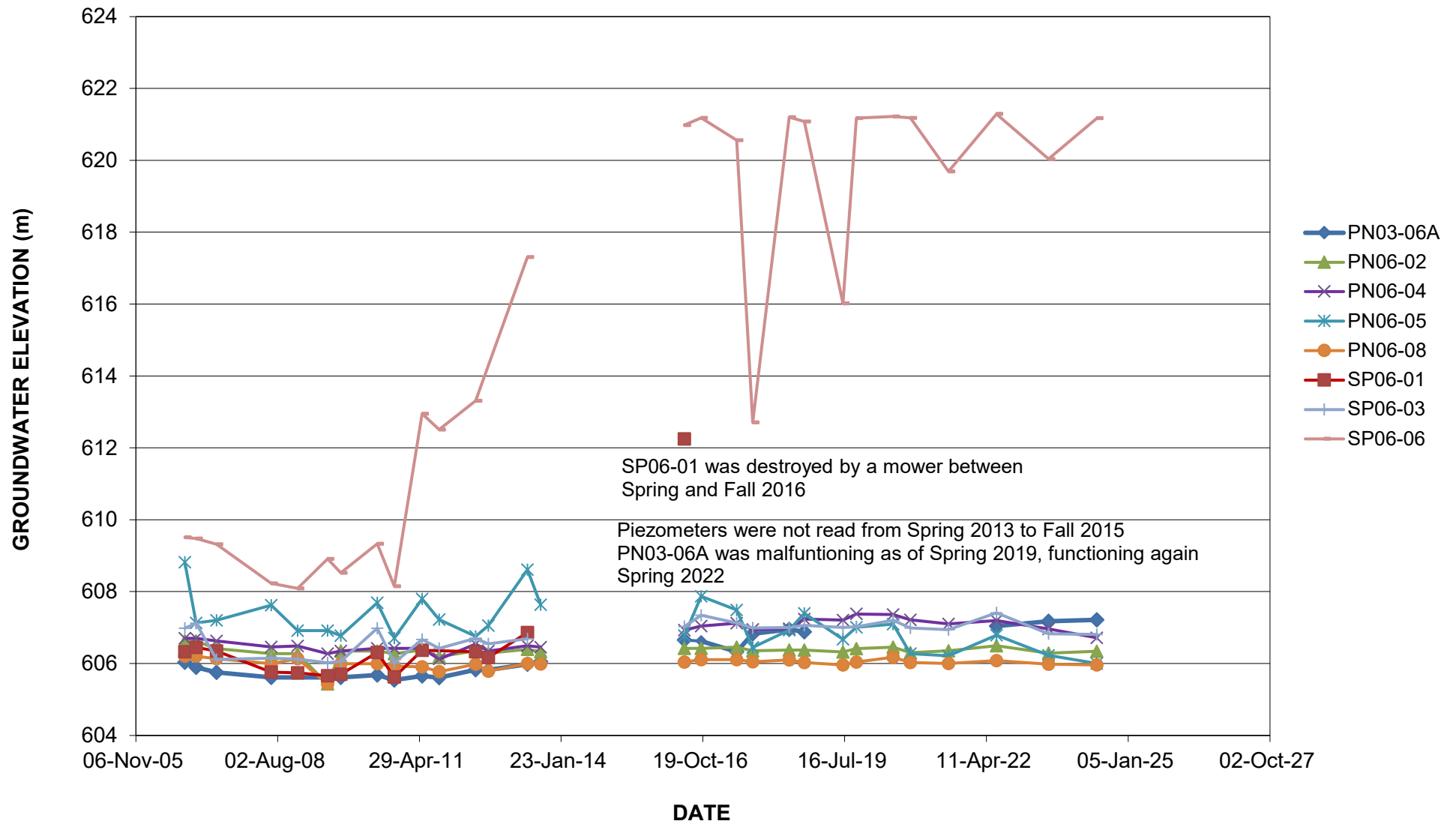


FIGURE GP024-2
PIEZOMETRIC DEPTHS FOR HWY 725:02, HAMELIN CREEK

