

July 15, 2024

Alberta Transportation and Economic Corridors
Main Floor, Provincial Building
9621 - 96th Avenue
Peace River, Alberta
T8S 1T4

Robert Senior
Construction Technologist

Dear Mr. Senior:

CON0022166 Peace Region (Grande Prairie District – South) GRMP Instrumentation Monitoring Site GP028; H43:12, km 34.473 Two Creeks Section C – 2024 Spring Readings

1 GENERAL

One slope inclinometer (SI) (SI02-02), two vibrating wire piezometers (VWPs) (VWP15-13U/L), four standpipe piezometers (SPs) (SP02-05, SP02-07, SP02-08, and SP14-2), two monitoring wells (MW14-7 and MW14-9), one pumping well (PW14-1), and four levelloggers (MW14-3, MW14-8, MW14-10, and MW14-11) were read at the GP028 site in the Peace Region (Grande Prairie District – South) (GP South Region) on May 31, 2024, by Katrina Cereno (engineering assistant) of Klohn Crippen Berger Ltd. (KCB). Data from the four remotely-monitored VWPs (MW14-6, MW15-12, PW14-2, and PW15-3) was manually downloaded on July 11, 2024, by Courtney Mulhall, P.Eng. and Jacques Bernier, E.I.T. of KCB. These instruments were read as part of the GP South Region Geohazard Risk Management Program (GRMP). The site is located on Hwy 43:12, km 34.473. The approximate site coordinates are 6017213 N, 544193 E (UTM Zone 11, NAD 83). A site plan is presented on Figure 1.

The geohazard at the GP028 site consists of a landslide with a backscarp that extends through the south (eastbound) lanes of Hwy 43:12, along with elevated groundwater levels impacting the pavement subgrade/surface. The site is located north (upslope) of Two Creeks.

Previous remedial actions completed at the GP028 site include the installation of 1-m-deep pavement drains beneath the eastbound lane and a 315-m-long subdrain in the median in 2003. The subdrain is approximately 2.5 m deep, 400 mm in diameter, and outlets via a culvert beneath the south (eastbound) lane that eventually drains into Two Creeks. In 2015, two pumps were installed in pumping wells that discharge water into the same subdrain outlet, a remote monitoring station was installed, and Class 2 riprap was keyed-in along a 100 m length of the creekbank to protect it from erosion.

Between 2002 and 2015, several geotechnical site investigations, which included installing instruments, were conducted by the previous consultants. The encountered stratigraphy has not been provided to KCB.

1.1 Instrumentation

KCB has been reading the instruments at this site since the spring of 2021. Instrumentation installation details are tabulated in Table 1.1. Instrument locations are shown on Figure 1. Any instruments not included in Table 1.1 or shown on Figure 1 are assumed to be inoperable and are not presented or discussed herein.

Between 2002 and 2015, several SIs, piezometers, and wells were installed at the site by the previous consultants to monitor movement and groundwater conditions, respectively. A barologger was also installed in 2014. Some of these instruments are now inoperable (e.g., destroyed, sheared, or lost) as detailed in Table 1.1 (see table notes).

The active instruments are protected by above-ground casing protectors.

On March 24, 2021, the protective head boxes for MW14-4 and MW14-5 were struck by a vehicle, leaving MW14-4 inoperable. Between the spring 2023 and spring 2024, MW14-5 also became inoperable. MW14-5 could potentially be repaired by removing the headbox, cutting back the casing, installing a new level logger or removing and repairing the existing level logger, which is currently inoperable and stuck in the casing below where it is bent.

SI02-02 was read using the same metric RST Digital MEMS Inclinometer System that has been used to read the SI since KCB took over the readings in June 2021. The operable VWPs were read using RST Instruments DTLINK software and Campbell Scientific LoggerNet software. It is noted that the remotely-monitored VWPs cannot be accessed remotely right now likely due to a change in service provider. Until this issue is resolved, KCB will continue to manually download the data from these instruments. The operable levelloggers were read using a Solinst PC Interface Cable. The operable SPs were read using a Heron Water Level Meter.

Table 1.1 Instrumentation Installation Details¹

Instrument ID	Instrument Type	Date Installed	UTM Coordinates ¹ (m)		Ground Surface Elevation(m)	Stick Up (m)	Depth (mbsg ²)	Condition
			Northing	Easting				
SI02-01	SI	Sep. 11, 2002	Unknown	Unknown	Unknown	Unknown	Unknown	Inoperable ⁵
SI02-02	SI	Sep. 12, 2002	6017223	544356	851.9	0.7	14.6 ⁶	Operable ⁶
SI02-03	SI	Sep. 12, 2002	Unknown	Unknown	Unknown	Unknown	Unknown	Inoperable ⁷
VW15-13U	VWP ¹⁰	Oct. 15, 2015	6017220	544327	850.2	N/A	13.7	Operable
VW15-13L	VWP ¹⁰	Oct. 15, 2015	6017220	544327	850.2	N/A	18.3	Operable
MW14-6	VWP ³	2014	6017259	544435	856.0	N/A	15.3	Operable
MW15-12	VWP ³	2014	6017259	544435	858.2	N/A	27.1	Operable
PW14-2	VWP ³	2014	6017259	544435	856.3	N/A	18.0	Operable
PW15-3	VWP ³	2014	6017259	544435	857.0	N/A	26.9	Operable
SP02-01	SP	Sep. 13, 2002	Unknown	Unknown	Unknown	Unknown	Unknown	Inoperable
SP02-02	SP	Sep. 11, 2002	Unknown	Unknown	Unknown	Unknown	Unknown	Inoperable

Instrument ID	Instrument Type	Date Installed	UTM Coordinates ¹ (m)		Ground Surface Elevation(m)	Stick Up (m)	Depth (mbgs ²)	Condition
			Northing	Easting				
SP02-03	SP	Sep. 11, 2002	Unknown	Unknown	Unknown	Unknown	Unknown	Inoperable
SP02-04	SP	Sep. 12, 2002	Unknown	Unknown	Unknown	Unknown	Unknown	Inoperable
SP02-05	SP	Sep. 11, 2002	6017232	544367	854.0	0.8	12.4	Operable
SP02-06	SP	Sep. 11, 2002	Unknown	Unknown	Unknown	Unknown	Unknown	Inoperable
SP02-07	SP	Sep. 12, 2002	6017214	544358	851.2	0.7	6.6	Operable
SP02-08	SP	Sep. 12, 2002	6017195	544351	849.8	0.8	6.9	Operable
SP14-2	SP	2014	6017298	544055	839.3	1.0	8.8	Operable
MW14-3	SP ⁴	2014	6017279	544221	845.0	-	7.0	Operable
MW14-4	SP⁴	2014	6017264	544350	851.7	-	10.1	Inoperable⁸
MW14-5	SP⁴	2014	6017264	544354	851.7	-	6.9	Inoperable⁸
MW14-8	SP ⁴	2014	6017247	544513	861.2	-	12.1	Operable
MW14-10	SP ⁴	2014	6017263	544546	870.7	-	12.8	Operable
MW14-11	SP ⁴	2014	6017264	544547	870.7	-	27.1	Operable
BW14-10	Barologger⁹	2014	6017263	544546	870.7	N/A	N/A	Operable⁹
PW14-1	Pumping Well	2014	6017250	544423	855.5	0.6	17.5	Operable
MW14-7	Monitoring Well	2014	6017258	544431	856.0	1.1	11.9	Operable
MW14-9	Monitoring Well	2014	6017247	544521	861.2	1.0	6.1	Operable

Notes:

- ¹ Instrument installation details were taken from reports and data files prepared or provided by the previous consultant(s) or TEC. Instrument coordinates and stick ups (where applicable) were confirmed by KCB using a handheld GPS (accuracy of ± 5 m) and tape measure, respectively.
- ² Meters below ground surface (mbgs). Bottom reading depth for SIs, and tip or screen depth for piezometers.
- ³ Data for this instrument is being recorded by a central monitoring station. The coordinates are for the location of the central monitoring station.
- ⁴ A Solinst Levellogger is installed in this instrument.
- ⁵ SI02-1 has sheared at an approximate depth of 13.0 m below ground surface.
- ⁶ SI02-2 has sheared at an approximate depth of 15.7 m below ground surface and is currently being read above this depth.
- ⁷ SI02-3 has sheared at an approximate depth of 14.0 m below ground surface.
- ⁸ On March 24, 2021, the protective head boxes for MW14-4 and MW14-5 were struck by a vehicle, leaving MW14-4 inoperable. Between the spring 2023 and spring 2024, MW14-5 also became inoperable.
- ⁹ BW14-10 could not be read in 2022 or 2023 and was removed from site. Previously, BW14-10 was in the head box for MW14-10. The instrument is being temporarily stored at the KCB Edmonton Office.
- ¹⁰ VW15-13U and -13L are connected to single-channel data loggers (Model No. DT2011B from RST Instruments), which are programmed to record a reading of the instruments every 2 hours.

2 INTERPRETATION

2.1 General

For SI02-2, the cumulative displacement, incremental displacement, and displacement-time data was plotted in the A-direction (i.e., the direction of the A0-grooves) and the X-direction (i.e., the direction of maximum movement obtained at a skew angle from the A0-grooves). SI02-02 has a skew angle of 165°, measured clockwise from the direction of the A0-grooves.

For the operable PNs and VVPs, the recorded porewater pressures were converted to an equivalent water/piezometric elevation and plotted relative to ground surface elevation and the tip elevation for each instrument.

For the operable SPs and monitoring/pumping wells, the water level data was plotted relative to ground surface elevation and the screen elevation for each instrument.

The SI and piezometer data plots are included in Appendix I, and a summary of the SI and piezometer data is provided in Table 2.1 through Table 2.4.

In 2021, KCB reviewed the instrumentation data provided by the previous consultant and removed corrections applied to the historical SI data based on our experience. The instrumentation data obtained by KCB is consistent with the data obtained by the previous consultant. No re-initialization of the SI is recommended. The SI data plots presented herein include data for readings taken with both the previous consultants' and KCB's SI reading equipment.

2.2 Zones of Movement

Discrete movement (i.e., occurring on a defined failure plane) is being recorded in SI02-2 between an approximate depth of 13.1 m and 14.6 m below ground surface (elevation 838.9 m to 837.3 m). This instrument previously sheared at an approximate depth of 15.7 m below ground surface (approximately elevation 836 m) in 2005 and has been read above this depth since. Movements may be occurring below a depth of 15.7 m below ground surface. The movements recorded in SI02-02 likely do not reflect all the subsurface movements occurring at this site.

SI02-1 and SI02-3 (inoperable) were previously reported as sheared at an approximate depth of 13.0 m and 14.0 m below ground surface, respectively.

2.3 Interpretation of Monitoring Results

Since installation in 2002, the rate of movement being recorded in SI02-02, above where it has sheared at an approximate depth of 15.7 m below ground surface, has been relatively steady with an overall rate of approximately 1 mm/year. The current rate of movement recorded in the instrument indicates the rate of movement is slow and within the accuracy of the SI reading equipment/instrument.

Table 2.1 Slope Inclinometer Reading Summary

Instrument ID	Date				Ground Surface Elevation (m)	Depth of Movement (mbgs ¹)	Direction of Movement, Skew Angle ²	Movement (mm)		Rate of Movement (mm/year)		
	Initialized	Previous Maximum Cumulative Movement Recorded	Previous Reading	Most Recent Reading				Maximum Cumulative	Incremental Since Previous Maximum Cumulative	Previous Maximum	Current	Change from Previous Reading
SI02-02 ³	Sep. 13, 2002	Jun. 20, 2022	Sep. 07, 2023	May 31, 2024	851.9	13.1 – 14.6	X-direction, 165°	23.3	-0.1	8.0	-0.1	-0.1

Notes:

¹ Meters below ground surface (mbgs).

² Skew angle of the X-direction measured clockwise from the A-direction. The azimuth of the A0-grooves in the SI was measured by KCB with a magnetic compass in spring 2022.

³ SI02-2 has sheared at an approximate depth of 15.7 m below ground surface and is currently being read above this depth.

Table 2.2 Vibrating Wire Piezometer, Monitoring Well, and Pumping Reading Summary

Instrument ID	Serial No.	Date			Ground Surface Elevation (m)	Tip Depth (mbgs ¹)	Water Level		
		Installed	Previous Reading	Most Recent Reading			Previous Reading (mbgs ¹)	Most Recent Reading (mbgs ¹)	Change from Previous Reading (m)
VW15-13U ²	34611	2015	Sep. 07, 2023	May 31, 2024	850.2	13.7	5.1	6.0	-0.9
VW15-13L ²	34612	2015	Sep. 07, 2023	May 31, 2024	850.2	18.3	N/A – instrument is dry		
MW14-6 ³	-	2014	Sep. 13, 2023	July 11, 2024	856.0	15.3	7.5	7.8	-0.3
MW15-12 ³	-	2015	Sep. 13, 2023	July 11, 2024	858.2	27.1	19.1	19.6	-0.5
PW14-2 ³	-	2014	Sep. 13, 2023	July 11, 2024	856.3	18.0	7.7	8.0	-0.3
PW15-3 ³	-	2015	Sep. 13, 2023	July 11, 2024	857.0	26.9	18.3	19.0	-0.7

Notes:

¹ Meters below ground surface (mbgs).

² VW15-13U and -13L are connected to single-channel data loggers, which are programmed to record a reading of the instruments every 2 hours.

³ Data for this instrument is being recorded by a central monitoring station. The change in water level was calculated using the average water elevation recorded on the most recent and previous reading dates.

Table 2.3 Standpipe Piezometer, Monitoring Well, and Pumping Well Reading Summary

Instrument ID	Instrument Type	Date			Ground Surface Elevation (m)	Screen Depth (mbgs ¹)	Water Level		
		Installed	Previous Reading	Most Recent Reading			Previous Reading (mbgs ¹)	Most Recent Reading (mbgs ¹)	Change from Previous Reading (m)
SP02-05	SP	2002	Sep. 07, 2023	May 31, 2024	854.0	12.4	5.3	5.8	-0.5
SP02-07	SP	2002	Sep. 07, 2023	May 31, 2024	851.2	6.6	2.9	3.6	-0.7
SP02-08	SP	2002	Sep. 07, 2023	May 31, 2024	849.8	6.9	3.1	3.1	0.0
SP14-2	SP	2014	Sep. 07, 2023	May 31, 2024	839.3	8.8	1.5	2.0	-0.5
MW14-7	Monitoring Well	2014	Sep. 07, 2023	May 31, 2024	856.0	11.9	7.3	7.6	-0.3
MW14-9	Monitoring Well	2014	Sep. 07, 2023	May 31, 2024	861.2	6.1	1.5	1.1	0.4
PW14-1	Pumping well	2014	Sep. 07, 2023	May 31, 2024	855.5	17.5	6.9	7.3	-0.4

Notes:

¹ Meters below ground surface (mbgs).

Table 2.4 Levellogger Reading Summary

Instrument ID	Serial No.	Date			Ground Surface Elevation (m)	Screen Depth (mbgs ¹)	Water Level		
		Installed	Previous Reading	Most Recent Reading			Previous Reading (mbgs ¹)	Most Recent Reading (mbgs ¹)	Change from Previous Reading (m)
MW14-3	62053343	2014	Sep. 07, 2023	May 31, 2024	845.0	7.0	1.6	2.3	-0.7
MW14-8	62053315	2014	Sep. 07, 2023	May 31, 2024	861.2	12.1	1.5	1.8	-0.3
MW14-10	62053298	2014	Sep. 07, 2023	May 31, 2024	870.7	12.8	8.7	9.2	-0.5
MW14-11	62053314	2014	Sep. 07, 2023	May 31, 2024	870.7	27.1	18.6	19.5	-0.9

Notes:

¹ Meters below ground surface (mbgs).

Our comments on the piezometer data are as follows:

- In November 2017, an increase in porewater pressure (up to approximately 15 m) was recorded in the VWP's connected to the central monitoring station (PW14-2, MW14-6, PW15-3, and MW15-12), four monitoring wells (MW14-14 (inoperable), MW14-5, MW14-7, and MW14-11), and one pumping well (PW14-1). The recorded increases were believed to be caused by the pumping wells not being operational. Porewater pressures recorded in these instruments remained elevated until the fall of 2020 when they decreased up to approximately 15 m, in less than a week.
- Since fall 2020, relatively steady porewater pressures with some seasonal fluctuations (i.e., increases in the spring or summer followed by decreases in the fall) have been recorded in PW14-2, MW14-6, and PW15-3. Excluding small, short-term increases (less than approximately 0.7 m) in the spring and summer, an overall decrease (up to approximately 2.2 m) in porewater pressure has been recorded in MW15-12 between fall 2020 and spring 2024. The short-term increases in porewater pressure recorded by these instruments are believed to be in response to precipitation and spring freshet infiltration.
- Occasionally “spikes” in water level of over 1 m are recorded in PW14-2, MW14-6, PW15-3, and MW15-12 for short periods of time (i.e., less than a day). These spikes have been removed from the data plots because KCB suspects these readings are due to connectivity issues between the data logger and instrument.
- ◆ An increase in water level (between approximately 1 m and 2.0 m) was recorded in PW14-1 and MW14-7 between September 2021 and September 2023, and in MW14-11 between late-2022 and mid-2023. As of the May 2024 reading, water levels recorded in these instruments remain elevated. The increase in recorded water level may be attributed to wetter-than-typical weather between May and September 2023, with approximately 175 mm more precipitation recorded in 2023 than 2022 during the same time period.
- Water levels recorded in MW14-8 have historically been relatively steady between approximately 1 m and 2 m below ground surface. In late-summer/early-fall 2021 and 2022, short-term water level increases of approximately 4.2 m and 1.7 m were recorded in this instrument, respectively, which were the highest two water levels recorded in this instrument since installation. Since the most recent high-water level recorded in fall 2022, the water level recorded in this instrument has generally been steady or decreasing.
- The water levels recorded in the remaining instruments in spring 2024 were relatively consistent with previous readings for these instruments. Water levels recorded in these instruments appear to be either steady, fluctuating seasonally (i.e., with the spring readings typically being higher than the fall readings), or dry, except for an overall small decrease (up to approximately 1.0 m) recorded in SP02-05 and SP02-07 since 2020.

3 RECOMMENDATIONS

3.1 Future Work

All operable instruments should continue to be read twice per year (spring and fall). Spring readings should be completed after late-May or early-June, due to the risk of water inside the instrument casings being frozen earlier in the year.

The site should continue to be inspected by the Maintenance Contract Inspector (MCI) and as part of the GP South Region GRMP Section B inspections.

3.2 Instrument Repairs and Maintenance

The barologger (BW14-10) could not be read in 2022 or 2023 and was removed from site. The instrument is being temporarily stored at the KCB Edmonton Office. It should be repaired or replaced. Otherwise, no other instrument repairs or maintenance is required.

MW14-5 could potentially be repaired by removing the headbox, cutting back the casing, installing a new level logger or removing and repairing the existing level logger, which is currently not working and stuck in the casing below where it is bent.

4 CLOSING

This report is an instrument of service of Klohn Crippen Berger (KCB). The report has been prepared for the exclusive use of Alberta Transportation and Economic Corridors (Client) for the specific application to the GP South Geohazard Risk Management Program (Contract No. CON0022166), and it may not be relied upon by any other party without KCB's written consent.

KCB has prepared this report in a manner consistent with the level of care, skill and diligence ordinarily provided by members of the same profession for projects of a similar nature at the time and place the services were rendered. KCB makes no warranty, express or implied.

Use of or reliance upon this instrument of service by the Client is subject to the following conditions:

1. The report is to be read in full, with sections or parts of the report relied upon in the context of the whole report.
2. The observations, findings and conclusions in this report are based on observed factual data and conditions that existed at the time of the work and should not be relied upon to precisely represent conditions at any other time.
3. The report is based on information provided to KCB by the Client or by other parties on behalf of the client (Client-supplied information). KCB has not verified the correctness or accuracy of such information and makes no representations regarding its correctness or accuracy. KCB shall not be responsible to the Client for the consequences of any error or omission contained in Client-supplied information.

4. KCB should be consulted regarding the interpretation or application of the findings and recommendations in the report.
5. This report is electronically signed and sealed and its electronic form is considered the original. A printed version of the original can be relied upon as a true copy when supplied by the author or when printed from its original electronic file.

Yours truly,

KLOHN CRIPPEN BERGER LTD.



Courtney Mulhall, M.Sc., P.Eng.
Geotechnical Engineer

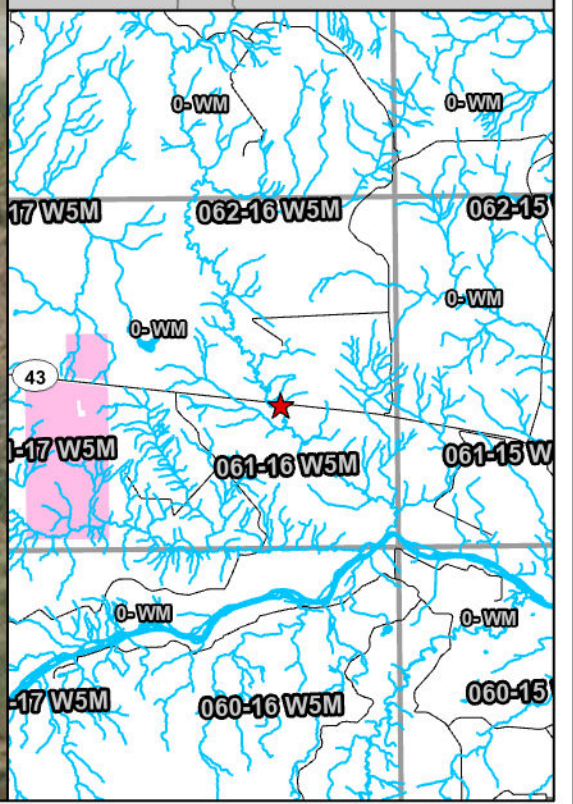
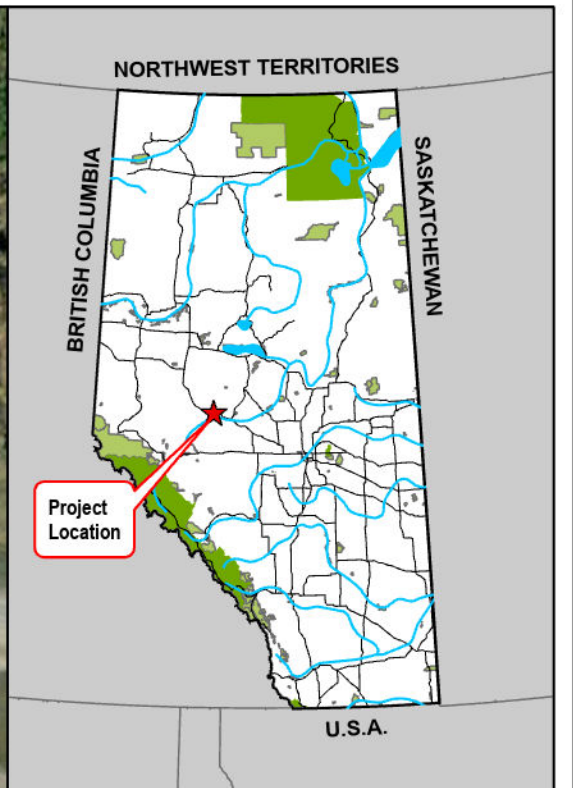
Tim Hillman, E.I.T.
Geotechnical Engineer-in-Training

CM/TH/GB:bb

ATTACHMENTS

Figure
Appendix I Instrumentation Plots

FIGURE



Legend

- Pneumatic Piezometer (PN)
- Slope Inclinator (SI)
- Standpipe Piezometer (SP)
- Standpipe Piezometer (PW or MW)
- Levellogger (MW)
- Monitoring Well (MW)
- Pumping Well (PW)
- Vibrating Wire Piezometer (VW)
- Vibrating Wire Piezometer (PW or MW)
- Flow Direction
- Watercourse



NOTES:
 1. HORIZONTAL DATUM: NAD83
 2. GRID ZONE: UTM ZONE 11N
 3. IMAGE SOURCE: 2022 MICROSOFT CORPORATION, 2022 MAXAR CNES, DISTRIBUTION AIRBUS DS
 4. SI02-01, SI02-03, SP02-01 THROUGH SP02-04, SP02-06 NOT SHOWN AS COORDINATES NOT PROVIDED TO KCB, THEY ARE INOPERABLE.
 5. BW14-10 IS A BAROLOGGER AND IS LOCATED WITHIN THE PROTECTIVE HEADBOX FOR MW14-10.
 6. STRIKETHROUGH INDICATES INSTRUMENT IS INOPERABLE.

CLIENT

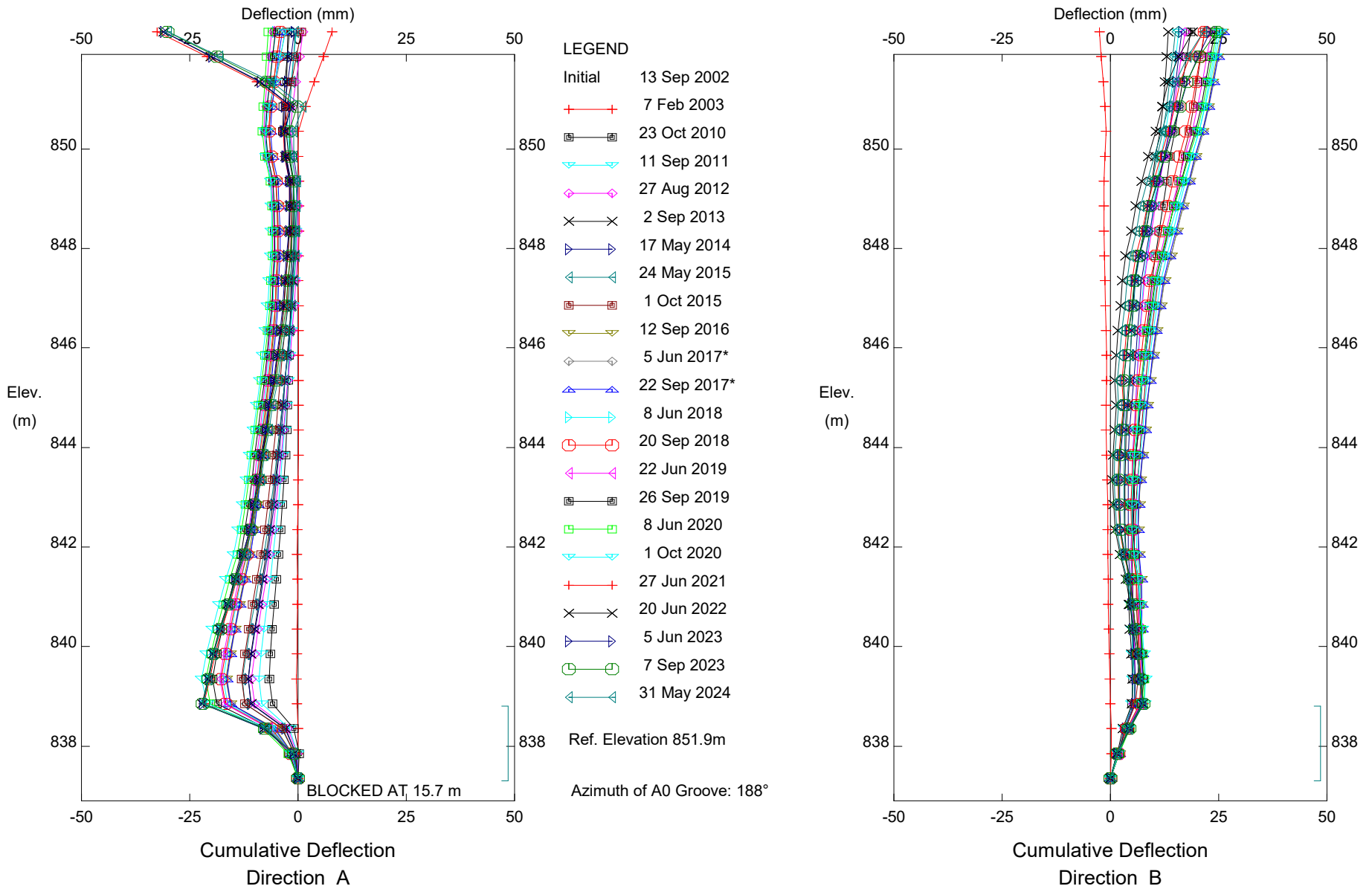
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APPENDIX I

Instrumentation Plots

Klohn Crippen Berger - Edmonton



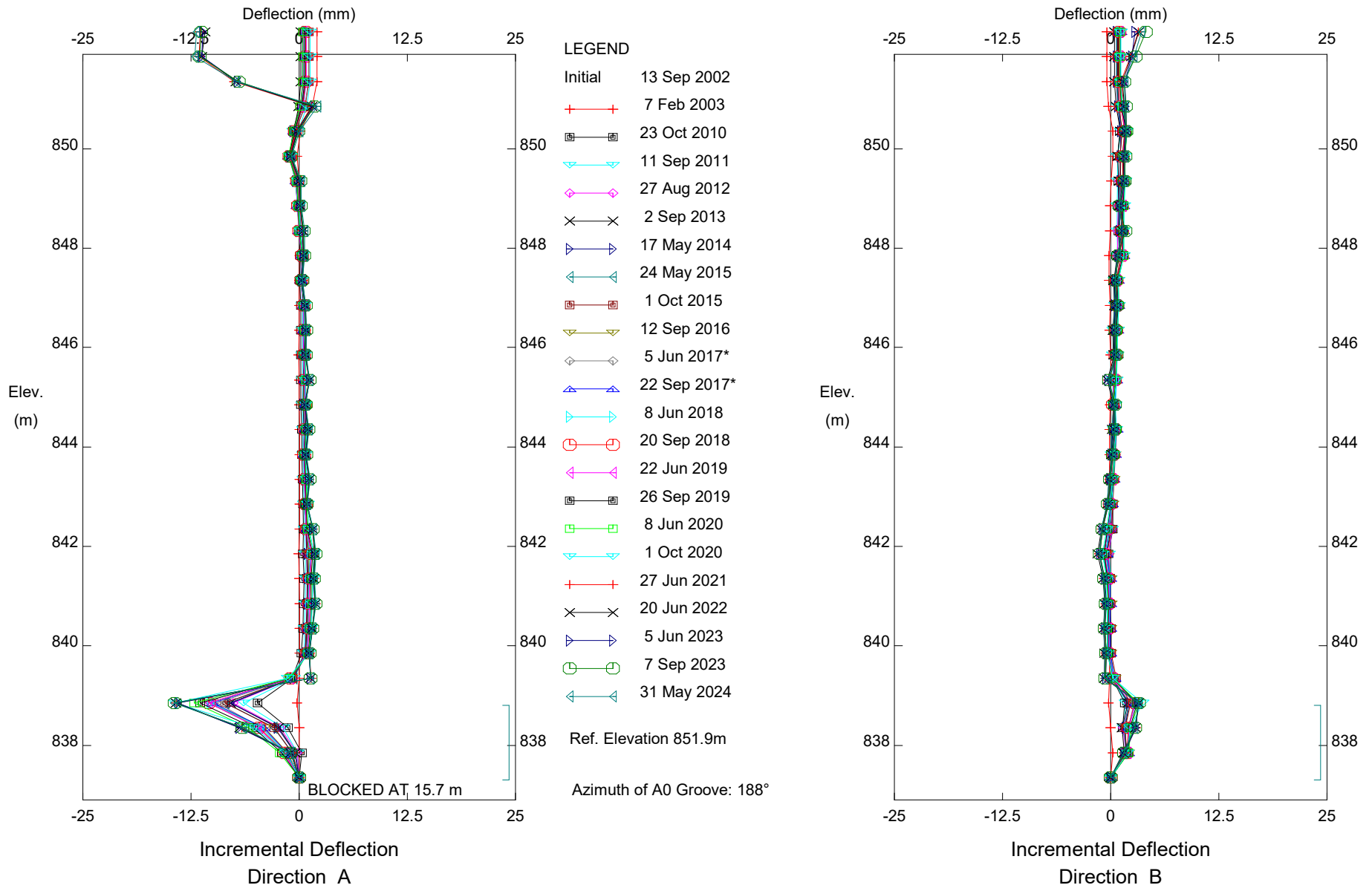
GP028; H43:12, Two Creeks, Inclinator SI02-02

Alberta Transportation

GP028; H43:12, Two Creeks

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

Klohn Crippen Berger - Edmonton



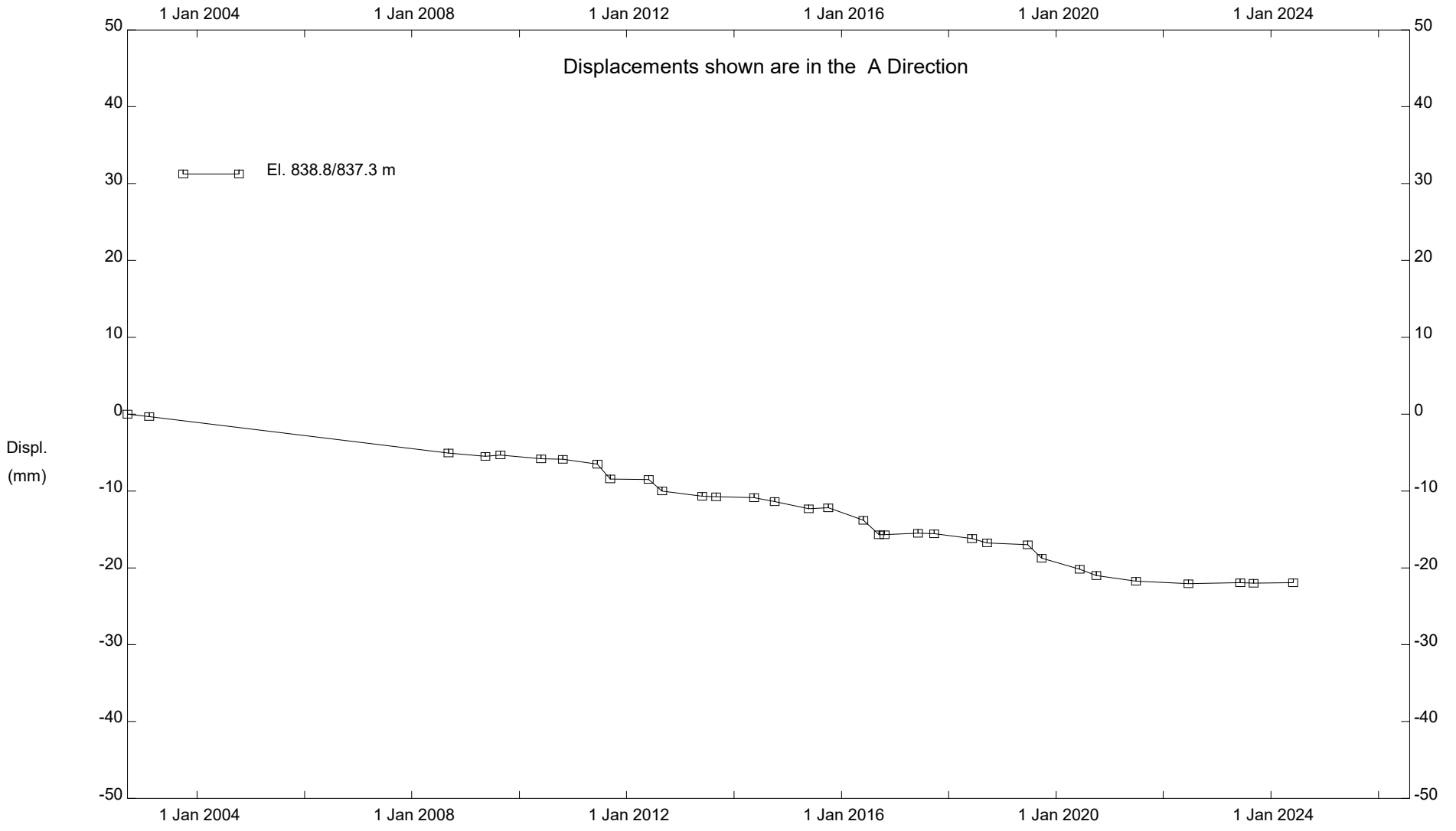
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Alberta Transportation

GP028; H43:12, Two Creeks

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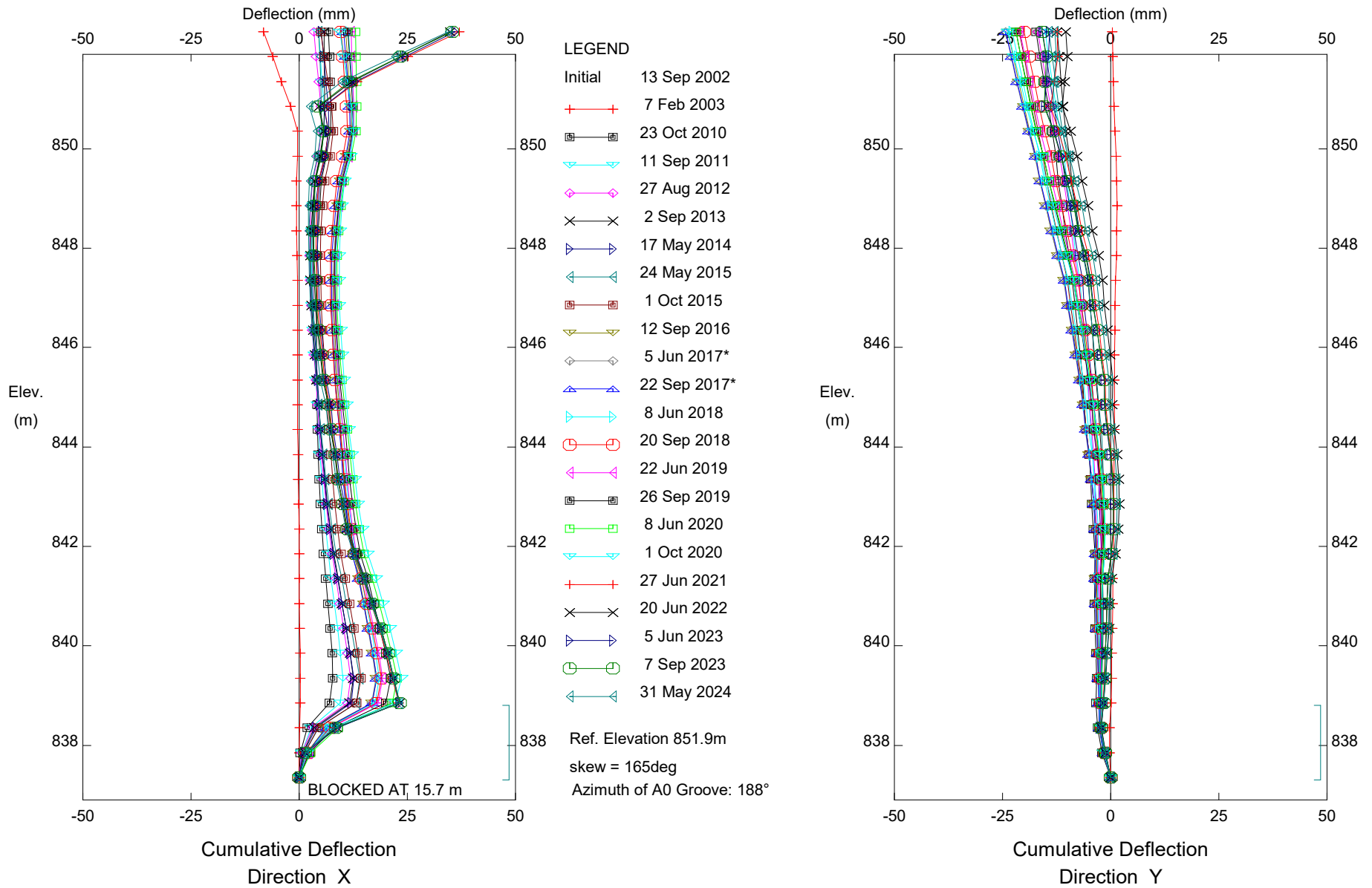
Klohn Crippen Berger - Edmonton



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Klohn Crippen Berger - Edmonton



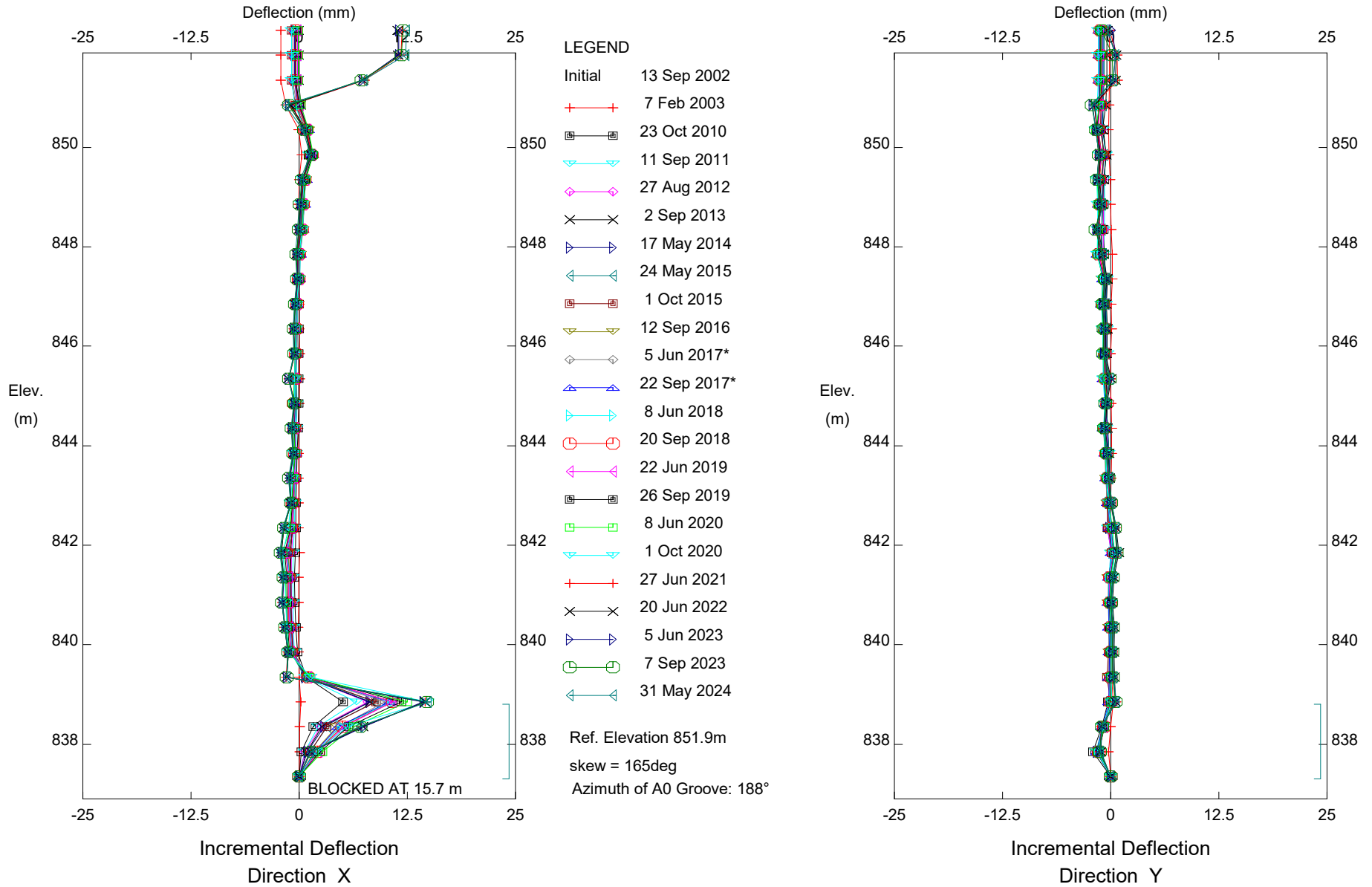
GP028; H43:12, Two Creeks, Inclinator SI02-02

Alberta Transportation

GP028; H43:12, Two Creeks

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

Klohn Crippen Berger - Edmonton



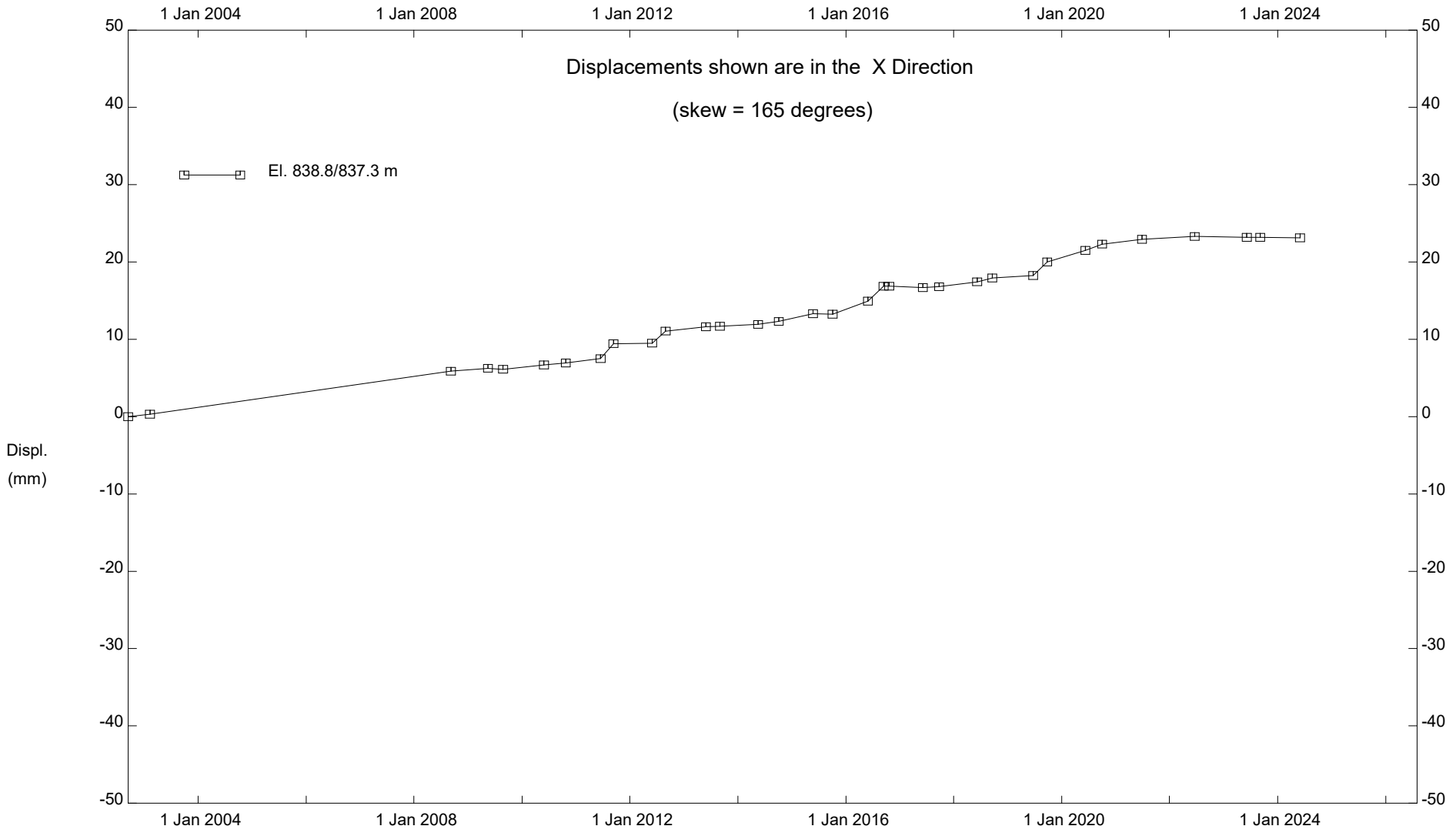
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Alberta Transportation

GP028; H43:12, Two Creeks

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

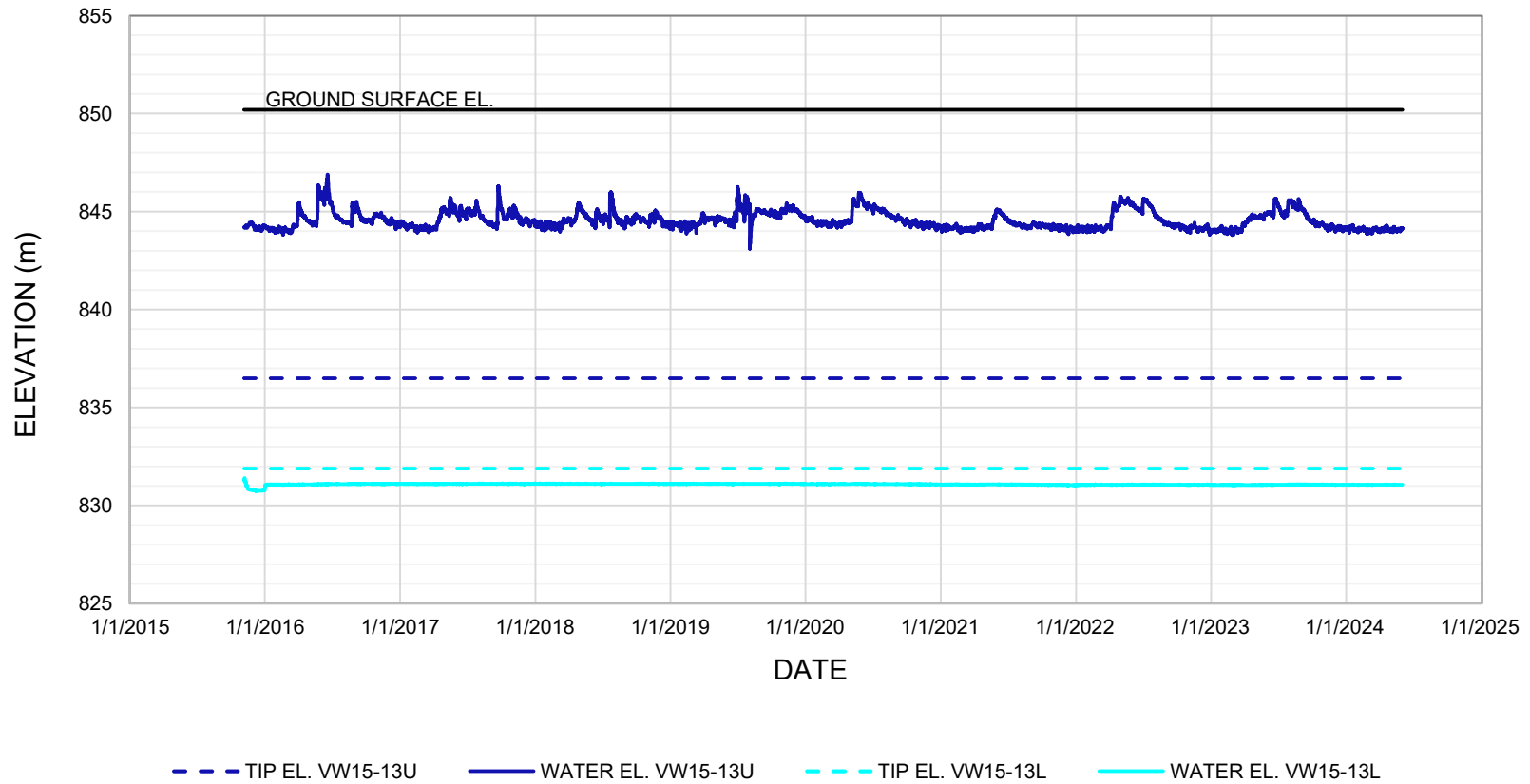
Klohn Crippen Berger - Edmonton



GP028; H43:12, Two Creeks, Inclinator SI02-02

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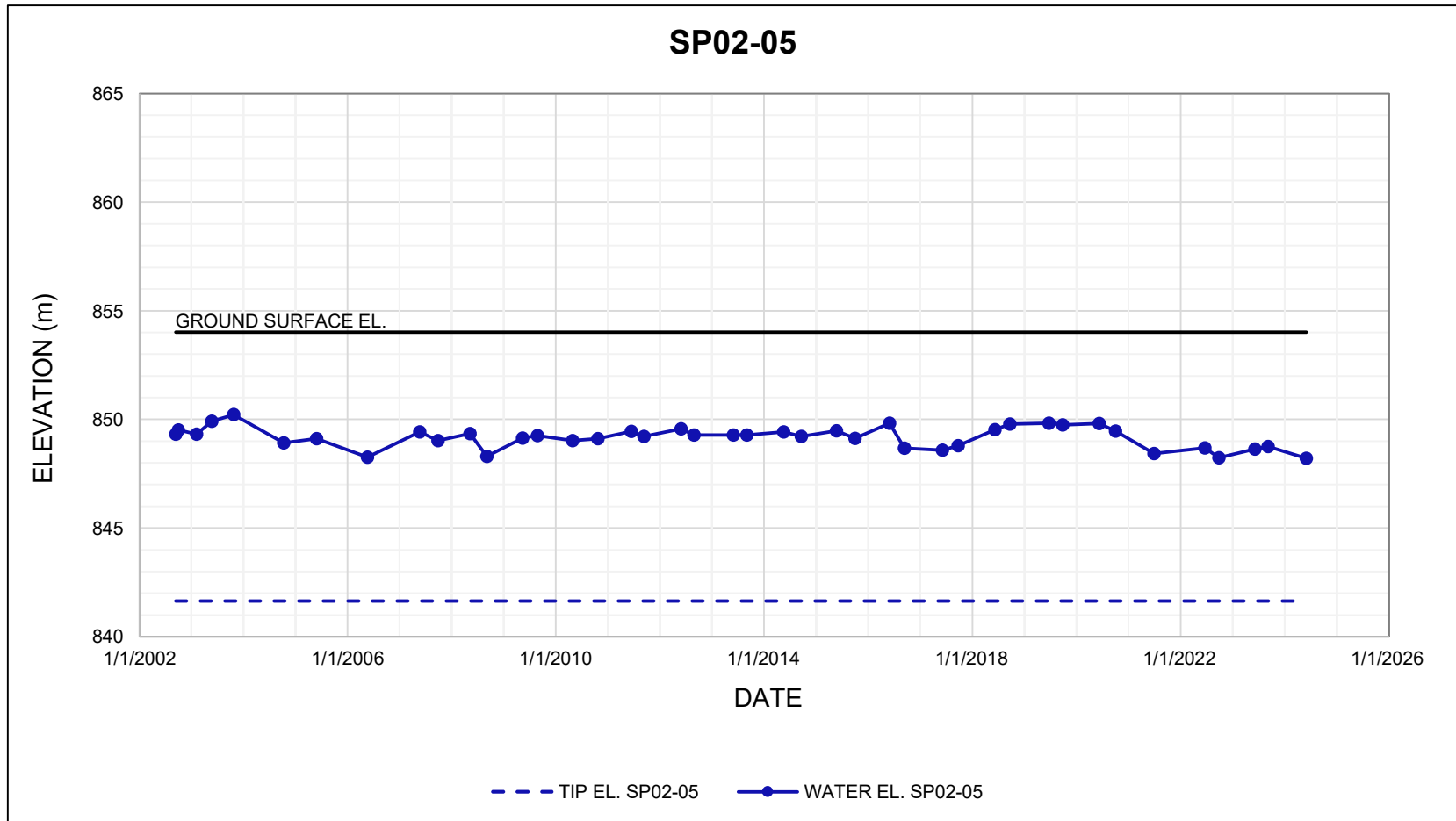
VW14-13U AND VW14-13L





NOTES:
 1. PIEZOMETER DATA OBTAINED BEFORE JUNE 28, 2021, PROVIDED TO KLOHN CRIPPEN BERGER LTD. BY ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS ON JUNE 25, 2021.

CLIENT 	PROJECT PEACE REGION (GRANDE PRAIRIE DISTRICT - SOUTH) GEOHAZARD RISK MANAGEMENT PROGRAM
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FIG No.	

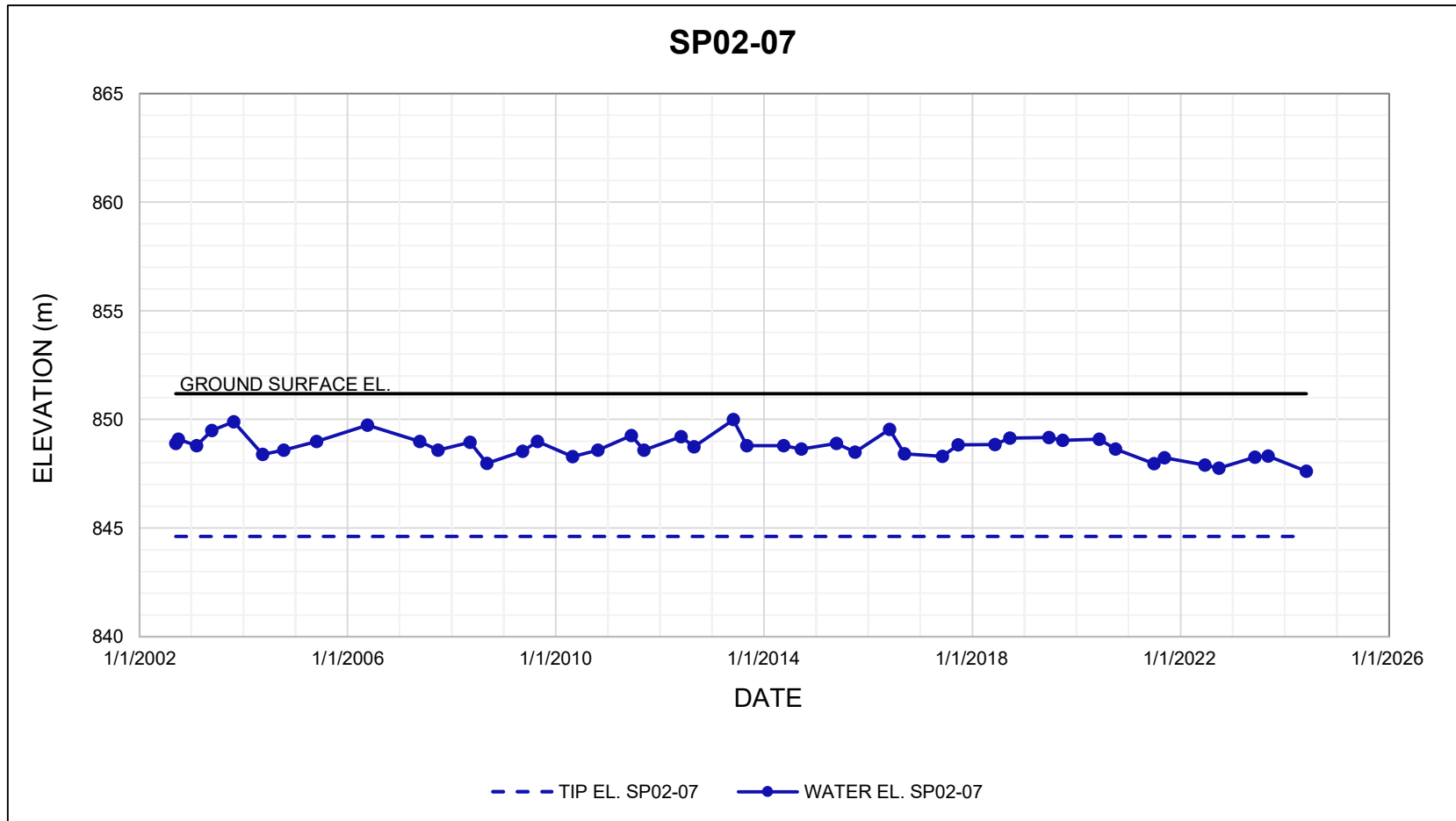
SP02-05





NOTES:
 1. PIEZOMETER DATA OBTAINED BEFORE JUNE 28, 2021, PROVIDED TO KLOHN CRIPPEN BERGER LTD. BY ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS ON JUNE 25, 2021.

CLIENT 	PROJECT PEACE REGION (GRANDE PRAIRIE DISTRICT - SOUTH) GEOHAZARD RISK MANAGEMENT PROGRAM		
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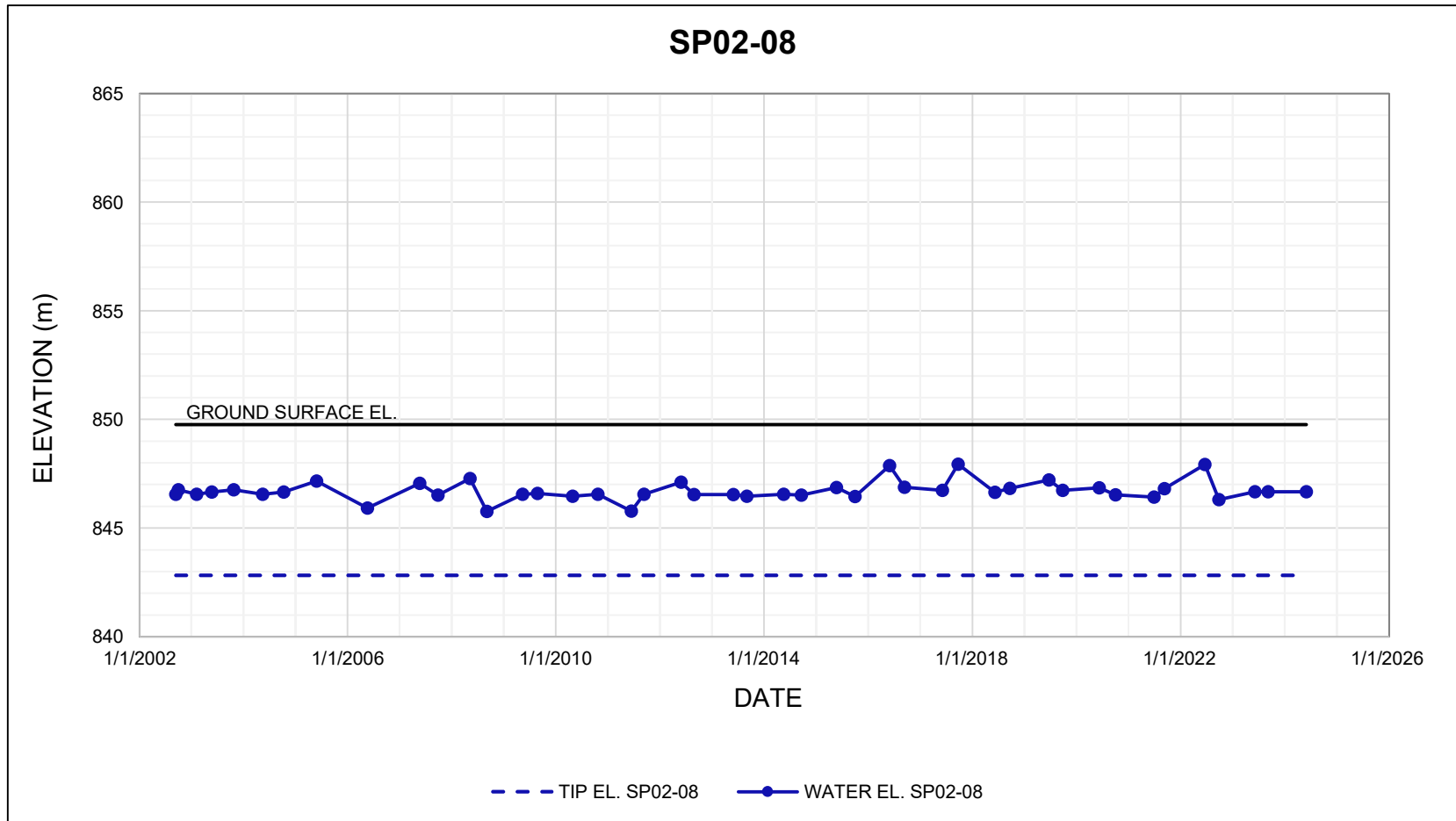
SP02-07





NOTES:
 1. PIEZOMETER DATA OBTAINED BEFORE JUNE 28, 2021, PROVIDED TO KLOHN CRIPPEN BERGER LTD. BY ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS ON JUNE 25, 2021.

CLIENT		PROJECT	
 		PEACE REGION (GRANDE PRAIRIE DISTRICT - SOUTH) GEOHAZARD RISK MANAGEMENT PROGRAM	
		TITLE Piezometer Data GP028 - Two Creeks Hwy 43:12, km 34.473	
SCALE	PROJECT No.	FIG No.	
--	A05116A01		

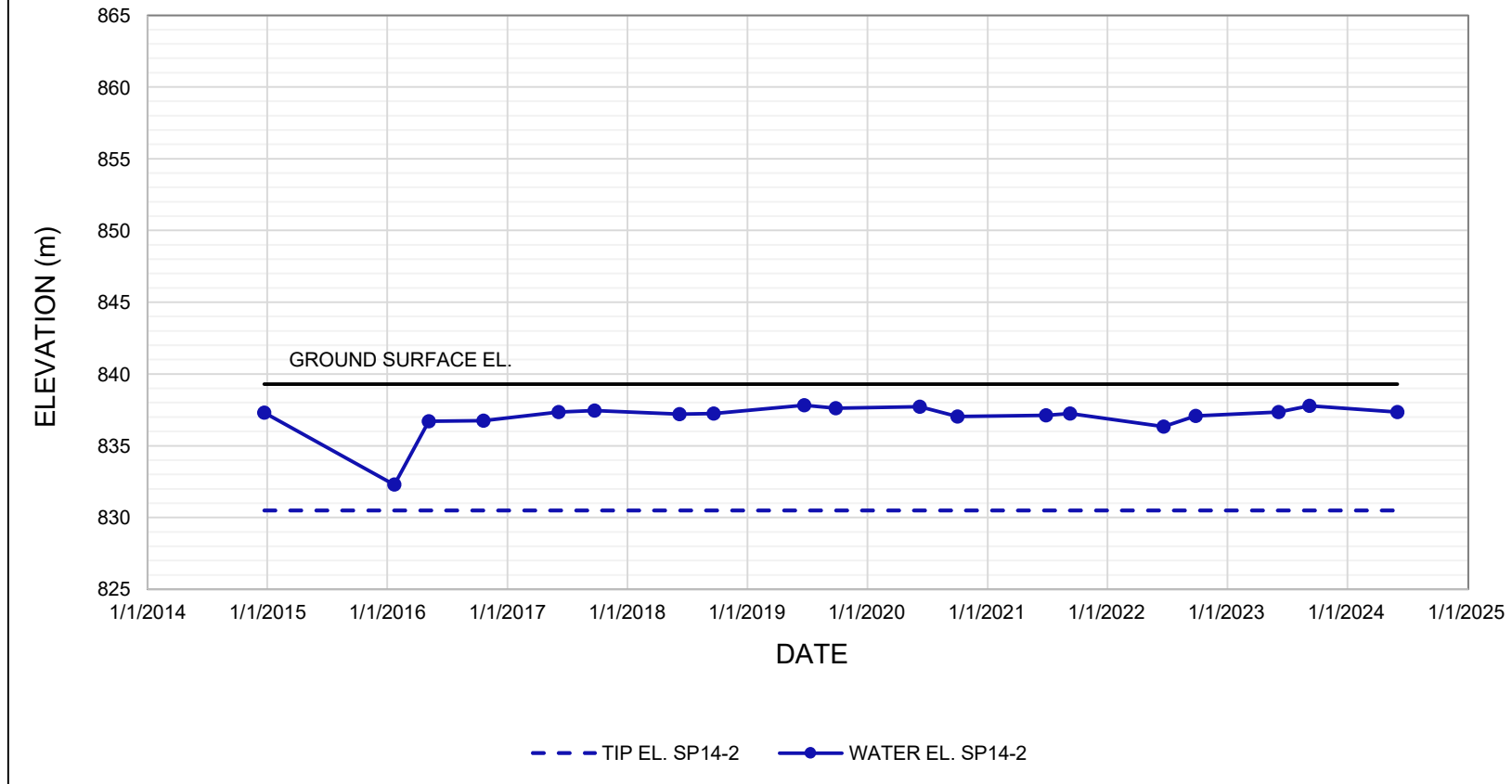
SP02-08





NOTES:
 1. PIEZOMETER DATA OBTAINED BEFORE JUNE 28, 2021, PROVIDED TO KLOHN CRIPPEN BERGER LTD. BY ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS ON JUNE 25, 2021.

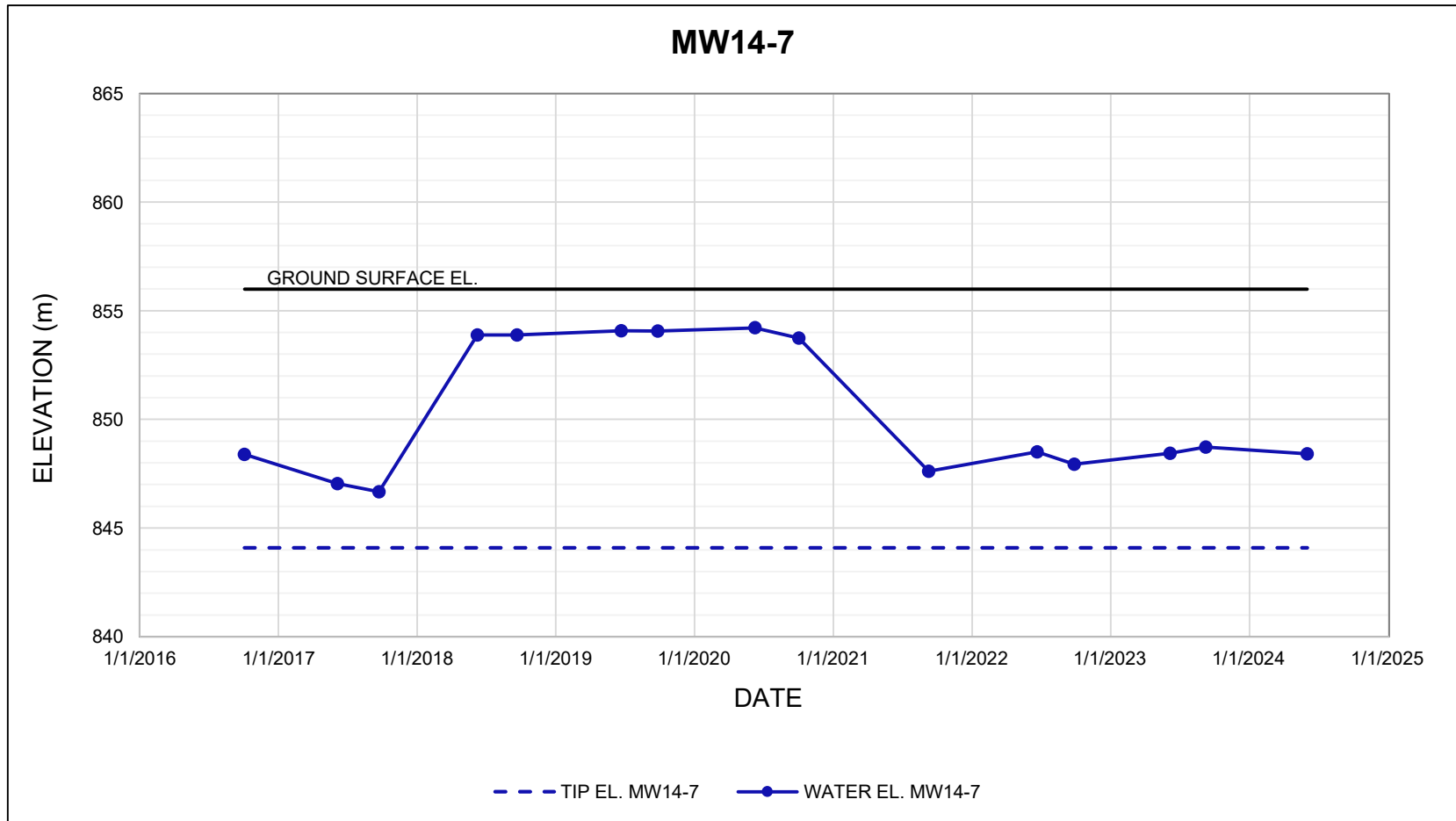
CLIENT		PROJECT	
 		PEACE REGION (GRANDE PRAIRIE DISTRICT - SOUTH) GEOHAZARD RISK MANAGEMENT PROGRAM	
		TITLE Piezometer Data GP028 - Two Creeks Hwy 43:12, km 34.473	
SCALE	PROJECT No.	FIG No.	
--	A05116A01		

SP14-2





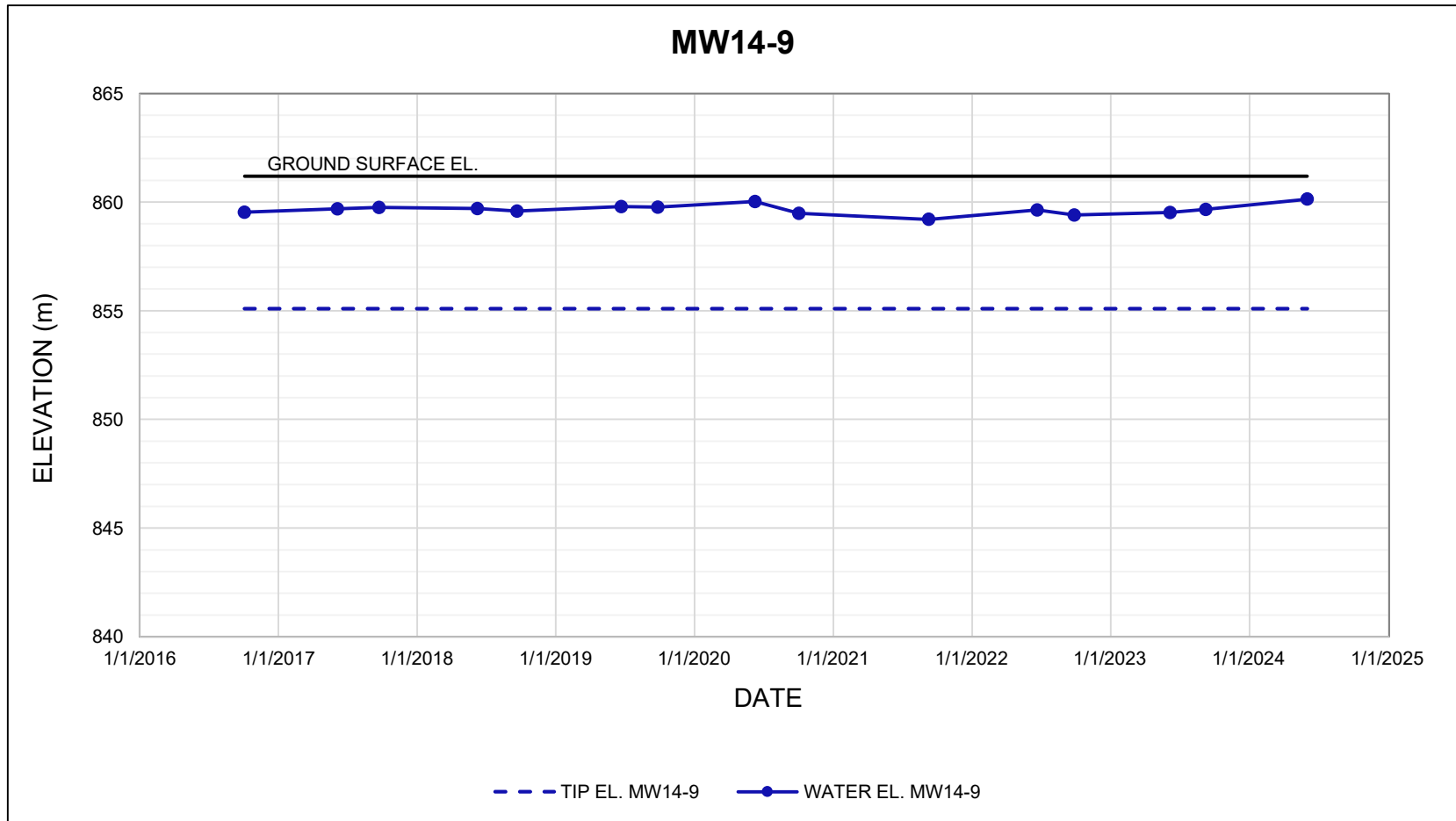
NOTES:
 1. PIEZOMETER DATA OBTAINED BEFORE JUNE 28, 2021, PROVIDED TO KLOHN CRIPPEN BERGER LTD. BY ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS ON JUNE 25, 2021.

CLIENT 	PROJECT PEACE REGION (GRANDE PRAIRIE DISTRICT - SOUTH) GEOHAZARD RISK MANAGEMENT PROGRAM		
	TITLE Piezometer Data GP028 - Two Creeks Hwy 43:12, km 34.473		
	SCALE	PROJECT No.	FIG No.
	--	A05116A01	





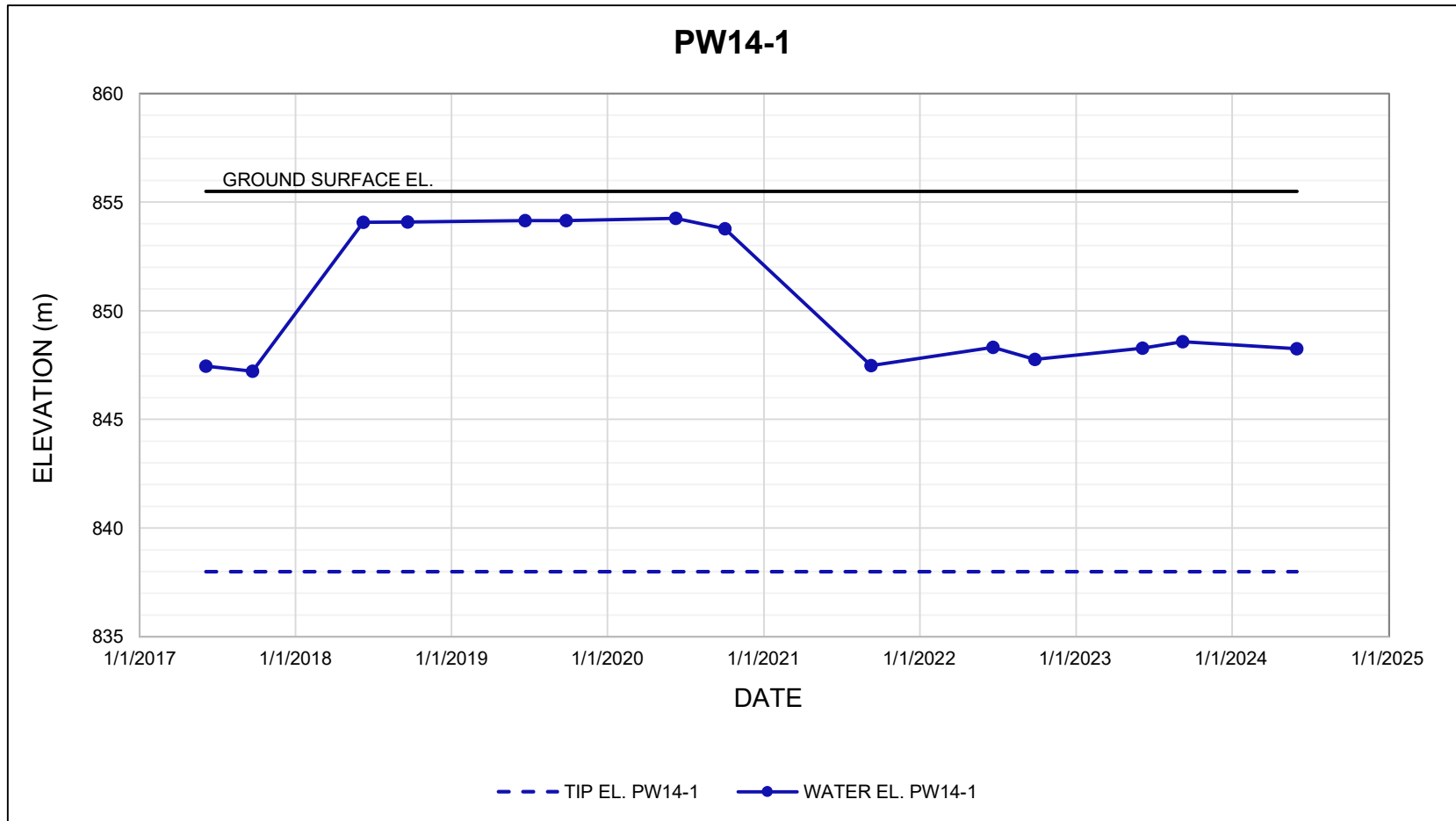
NOTES:
 1. PIEZOMETER DATA OBTAINED BEFORE JUNE 28, 2021, PROVIDED TO KLOHN CRIPPEN BERGER LTD. BY ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS ON JUNE 25, 2021.

CLIENT 	PROJECT PEACE REGION (GRANDE PRAIRIE DISTRICT - SOUTH) GEOHAZARD RISK MANAGEMENT PROGRAM		
	TITLE Piezometer Data GP028 - Two Creeks Hwy 43:12, km 34.473		
	SCALE	PROJECT No.	FIG No.
	--	A05116A01	





NOTES:
 1. PIEZOMETER DATA OBTAINED BEFORE JUNE 28, 2021, PROVIDED TO KLOHN CRIPPEN BERGER LTD. BY ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS ON JUNE 25, 2021.

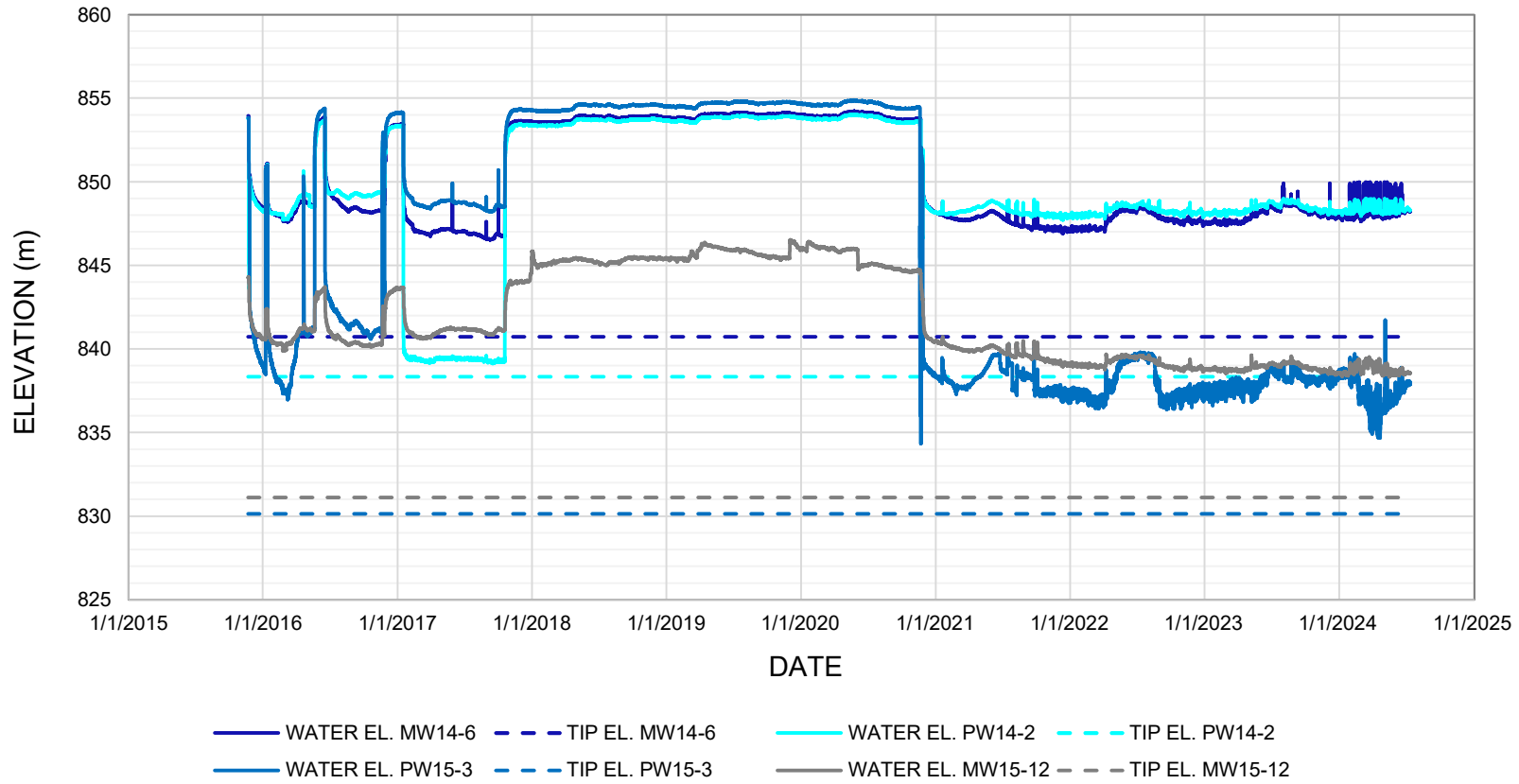
	PROJECT PEACE REGION (GRANDE PRAIRIE DISTRICT - SOUTH) GEOHAZARD RISK MANAGEMENT PROGRAM		
	TITLE Piezometer Data GP028 - Two Creeks Hwy 43:12, km 34.473		
	SCALE --	PROJECT No. A05116A01	FIG No.





NOTES:
 1. PIEZOMETER DATA OBTAINED BEFORE JUNE 28, 2021, PROVIDED TO KLOHN CRIPPEN BERGER LTD. BY ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS ON JUNE 25, 2021.

CLIENT 	PROJECT PEACE REGION (GRANDE PRAIRIE DISTRICT - SOUTH) GEOHAZARD RISK MANAGEMENT PROGRAM		
	TITLE Piezometer Data GP028 - Two Creeks Hwy 43:12, km 34.473		
	SCALE	PROJECT No.	FIG No.
	--	A05116A01	

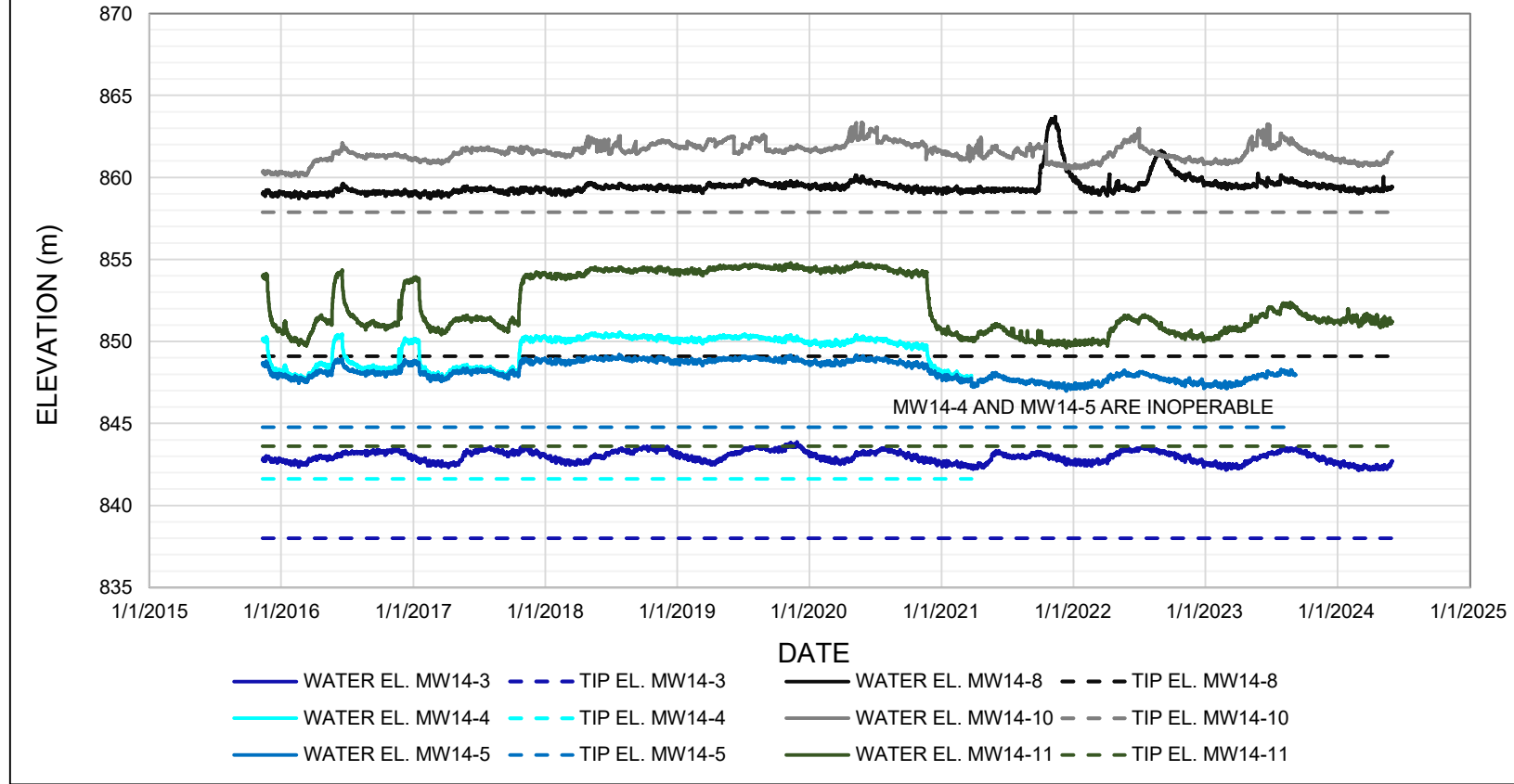
VWP Data from Central Monitoring Station





NOTES:
 1. PIEZOMETER DATA OBTAINED BEFORE JUNE 28, 2021, PROVIDED TO KLOHN CRIPPEN BERGER LTD. BY ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS ON JUNE 25, 2021.
 2. DATA FOR THESE INSTRUMENTS IS BEING RECORDED BY A CENTRAL MONITORING STATION.

CLIENT 	PROJECT PEACE REGION (GRANDE PRAIRIE DISTRICT - SOUTH) GEOHAZARD RISK MANAGEMENT PROGRAM	
	TITLE Piezometer Data GP028 - Two Creeks Hwy 43:12, km 34.473	
	SCALE	PROJECT No.
	--	A05116A01
		FIG No.

Levellogger Data



- NOTES:
1. PIEZOMETER DATA OBTAINED BEFORE JUNE 28, 2021, PROVIDED TO KLOHN CRIPPEN BERGER LTD. BY ALBERTA TRANSPORTATION AND ECONOMIC CORRIDORS ON JUNE 25, 2021.2.
 2. THE PROTECTIVE HEADBOXES FOR MW14-4 AND MW14-5 WERE DESTROYED BETWEEN THE FALL 2020 AND SPRING 2021 READINGS.
 3. SOLINST LEVELLOGGERS ARE INSTALLED IN THESE INSTRUMENTS.

CLIENT		PROJECT	
		PEACE REGION (GRANDE PRAIRIE DISTRICT - SOUTH) GEOHAZARD RISK MANAGEMENT PROGRAM	
		TITLE	
		Piezometer Data GP028 - Two Creeks Hwy 43:12, km 34.473	
SCALE	PROJECT No.	FIG No.	
--	A05116A01		