



THURBER ENGINEERING LTD.



ALBERTA TRANSPORTATION NORTH CENTRAL REGION – ATHABASCA AREA INSTRUMENTATION MONITORING RESULTS

SPRING 2017

SECTION C

SITE NC014-1: HWY 661:02 FORT ASSINIBOINE

1. OBSERVATIONS

1.1 Field Program and Instrumentation Status

Two slope inclinometers (SI06-6 and 06-11) and eleven standpipe piezometers (SP06-1 to 06-5, 06-9, 06-10, 06-13, 06-14, 06-18, and 06-19) were read at the HWY 661:02 Fort Assiniboine site on May 30, 2017 by Mr. Niraj Regmi, G.I.T., and Mr. Greg Swan, C.E.T., both of Thurber Engineering Ltd. (Thurber).

The SIs were read using a RST Digital Inclinometer probe with a 2 ft. wheelbase and a RST Pocket PC readout. Inclinometer reading depths were defined as per cable markings with respect to the top of the inclinometer casing. The standpipe piezometers were read using a SINCO dipmeter.

2. INTERPRETATION

2.1 General

SI plots for A and B directions are presented in Section D and are summarized below. Where movement has been recorded the resultant plot (X direction) and rate of movement have also been provided. Standpipe piezometer results are also provided in Section D.

2.2 Zones of Movement

No new zones of movement were observed since the last set of readings recorded in the fall of 2016.

Historical zones of movement are summarized on Table NC014-1-1 at the end of this report. Table NC014-1-1 also provides a historical account of the total movement that has occurred at this site since the initialization of the slope inclinometers, the depth of movement, and the maximum rate of movement.

2.3 Interpretation of Monitoring Results

Slope inclinometers SI06-6 and SI06-11 have recorded no discernible movements since initialization.

The majority of standpipes did not display a significant variation in groundwater levels. The groundwater levels varied by ± 0.37 m or less in all of the standpipes, with the exception of SP06-1 which showed a decrease in groundwater level of 0.91 m and SP06-5 which showed an increase in groundwater level of 0.84 m. Although SP06-19 continued to be dry from May 21, 2007 to September 12, 2016, it showed a groundwater level of 6.80 m below ground surface during this monitoring event. Table NC014-1-2 provides a summary of standpipe piezometer readings.

3. RECOMMENDATIONS

3.1 Future Work

The instruments should be read again in the fall of 2017.

3.2 Instrumentation Repairs

No instrument repairs are needed at this time.



**TABLE NC014-1-1
 SPRING 2017 – FORT ASSINIBOINE
 SLOPE INCLINOMETER
 INSTRUMENTATION READING SUMMARY**

Date Monitored: May 30, 2017

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)
SI06-6	Mar. 31, 2006	No discernable movement	N/A	Operational	September 12, 2016	No discernible movement	N/A	N/A
SI06-11	Apr. 1, 2006	No discernable movement	N/A	Operational	September 12, 2016	No discernible movement	N/A	N/A
SI06-12	Mar. 30, 2006	4.3 over 6.4 m depth to 6.8 m depth in 193° direction	1.5 mm/yr between September 2010 and May 2011	Blocked/ Destroyed	May 13, 2011	N/A	N/A	N/A
SI06-15	Mar. 28, 2006	No discernable movement	N/A	Blocked	May 22, 2007	N/A	N/A	N/A
SI06-16	Mar. 29, 2006	4.0 over 4.6 m depth to 8.2 m depth in 183° direction	2.6 mm/yr between May 2007 and May 2008	Sheared off at 7.8 m	Sept. 28, 2009	N/A	N/A	N/A

Drawing 13357-NC014-1 in section D provides a sketch of the approximate location of the monitoring instrumentation for this site.



**TABLE NC014-1-2
 SPRING 2017 – FORT ASSINIBOINE
 STANDPIPE PIEZOMETER
 INSTRUMENTATION READING SUMMARY**

Date Monitored: May 30, 2017

INSTRUMENT #	DATE INITIALIZED	TIP DEPTH (mBGS)	GROUND ELEV. (m)	CURRENT STATUS	MAXIMUM GROUNDWATER LEVEL (mBGS)	MEASURED GROUNDWATER LEVEL (mBGS)	PREVIOUS READING (mBGS)	CHANGE IN GROUNDWATER LEVEL SINCE PREVIOUS READING (m)
SP06-1	Apr. 2, 2006	9.13	N/A	Active	Sept. 12, 2016 (1.25)	2.16	1.25	-0.91
SP06-2	Apr. 2, 2006	9.12	N/A	Active	May 28, 2006 (5.51)	5.58	5.80	0.22
SP06-3	Apr. 2, 2006	25.00	N/A	Active	May 27, 2015 (3.72)	5.42	5.73	0.31
SP06-4	Mar. 31, 2006	15.21	N/A	Active	May 30, 2017 (8.63)	8.63	8.76	0.13
SP06-5	Mar. 31, 2006	25.00	N/A	Active	Apr. 2, 2006 (9.46)	12.63	13.47	0.84
SP06-9	Apr. 1, 2006	15.24	N/A	Active	Apr. 2, 2006 (4.46)	6.38	6.58	0.20
SP06-10	Apr. 2, 2006	25.00	N/A	Active	Apr. 2, 2006 (6.72)	7.24	7.39	0.15
SP06-13	Apr. 2, 2006	9.95	N/A	Active	Sept. 12, 2016 (6.95)	6.95	6.95	0.00
SP06-14	Mar. 28, 2006	9.16	N/A	Active	May 30, 2017 (6.61)	6.61	6.98	0.37

Drawing 13357-NC014-1 in section D provides a sketch of the approximate location of the monitoring instrumentation for this site.

**TABLE NC014-1-2 – CONTINUED...
 SPRING 2017 – FORT ASSINIBOINE
 STANDPIPE PIEZOMETER
 INSTRUMENTATION READING SUMMARY**

Date Monitored: May 30, 2017

INSTRUMENT #	DATE INITIALIZED	TIP DEPTH (mBGS)	GROUND ELEV. (m)	CURRENT STATUS	MAXIMUM GROUNDWATER LEVEL (m)	MEASURED GROUNDWATER LEVEL (mBGS)	PREVIOUS READING (mBGS)	CHANGE IN GROUNDWATER LEVEL SINCE PREVIOUS READING (m)
SP06-17	Apr. 2 2006	8.83	N/A	Destroyed	September 27, 2011 (6.12)	N/A	N/A	N/A
SP06-18	Apr. 2, 2006	9.43	N/A	Active	September 12, 2016 (2.10)	2.33	2.10	-0.23
SP06-19	Apr. 2, 2006	7.95	N/A	Active	May 30, 2017 (6.80)	6.80	Dry	N/A
A11	N/A	N/A	N/A	Destroyed	May 28, 2006 (6.70)	N/A	N/A	N/A

Drawing 13357-NC014-1 in section D provides a sketch of the approximate location of the monitoring instrumentation for this site.

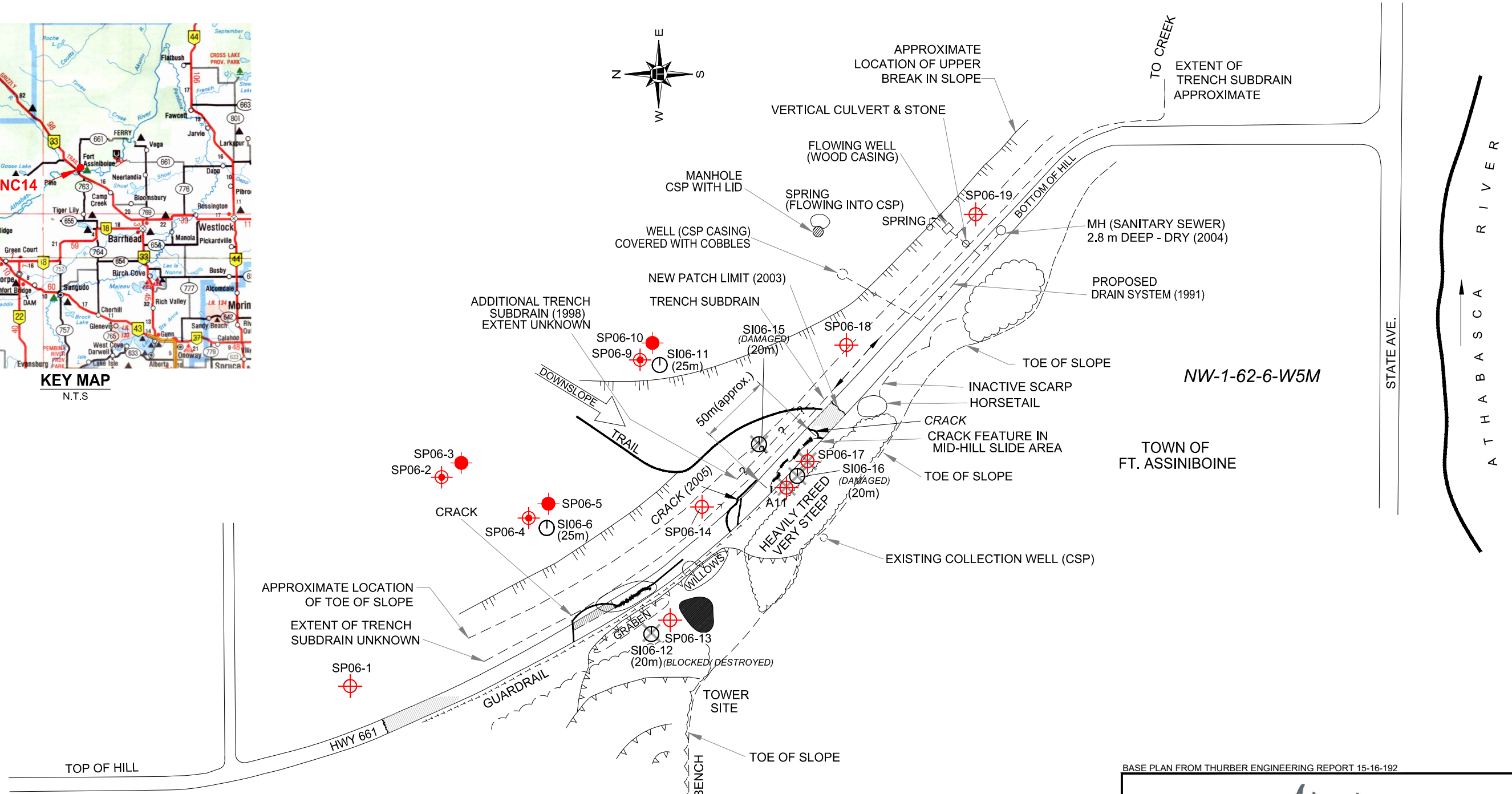
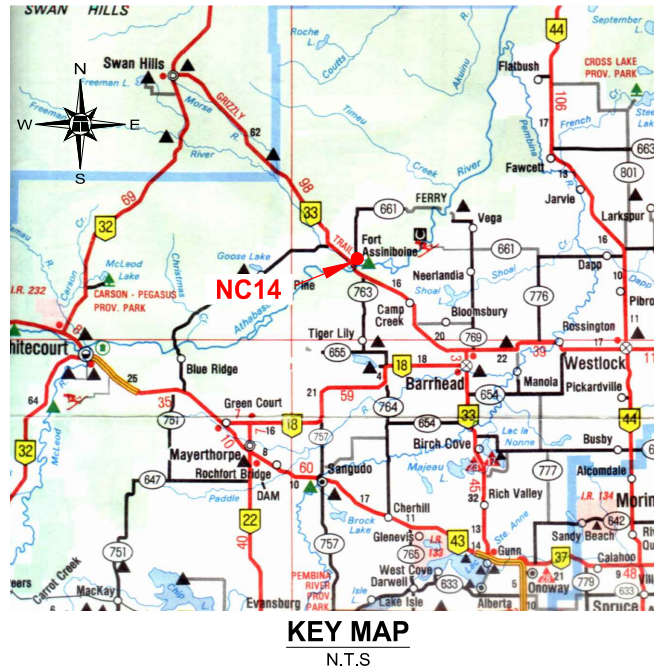


**ALBERTA TRANSPORTATION
NORTH CENTRAL REGION – ATHABASCA AREA
INSTRUMENTATION MONITORING RESULTS**

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**SECTION D
DATA PRESENTATION**

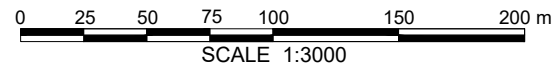
SITE NC014-1: HWY 661:02 FORT ASSINIBOINE



LEGEND

- ⊙ SI (m) SLOPE INCLINOMETER AND DEPTH
- SP STANDPIPE PIEZOMETER (25m DEPTH)
- ⊕ SP STANDPIPE PIEZOMETER (15m DEPTH)
- ⊗ SP STANDPIPE PIEZOMETER (10m DEPTH)
- ⊘ SI SLOPE INCLINOMETER NON OPERATIONAL
- ⊗ SP STANDPIPE PIEZOMETER NON OPERATIONAL

□ MR. CARTWRIGHT PROPERTY



BASE PLAN FROM THURBER ENGINEERING REPORT 15-16-192



NORTH CENTRAL REGION - ATHABASCA AREA

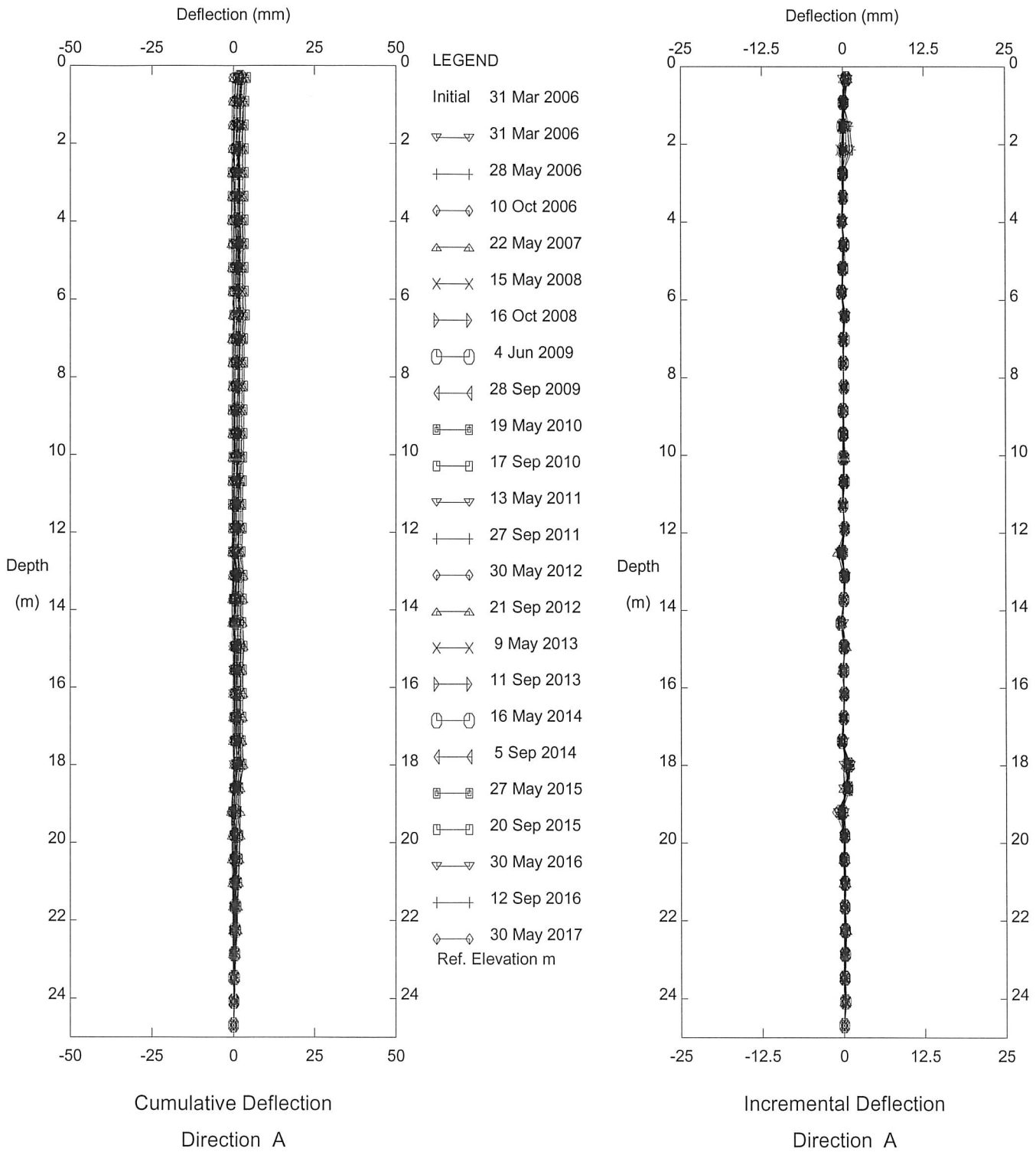
**NC014-1: FORT ASSINIBOINE
SITE PLAN SHOWING INSTRUMENT LOCATIONS**

DWG No. 13357-NC014-1

DRAWN BY	ML
DESIGNED BY	NFR
APPROVED BY	TSA
SCALE	1:3000
DATE	JUNE 2017
FILE No.	13357



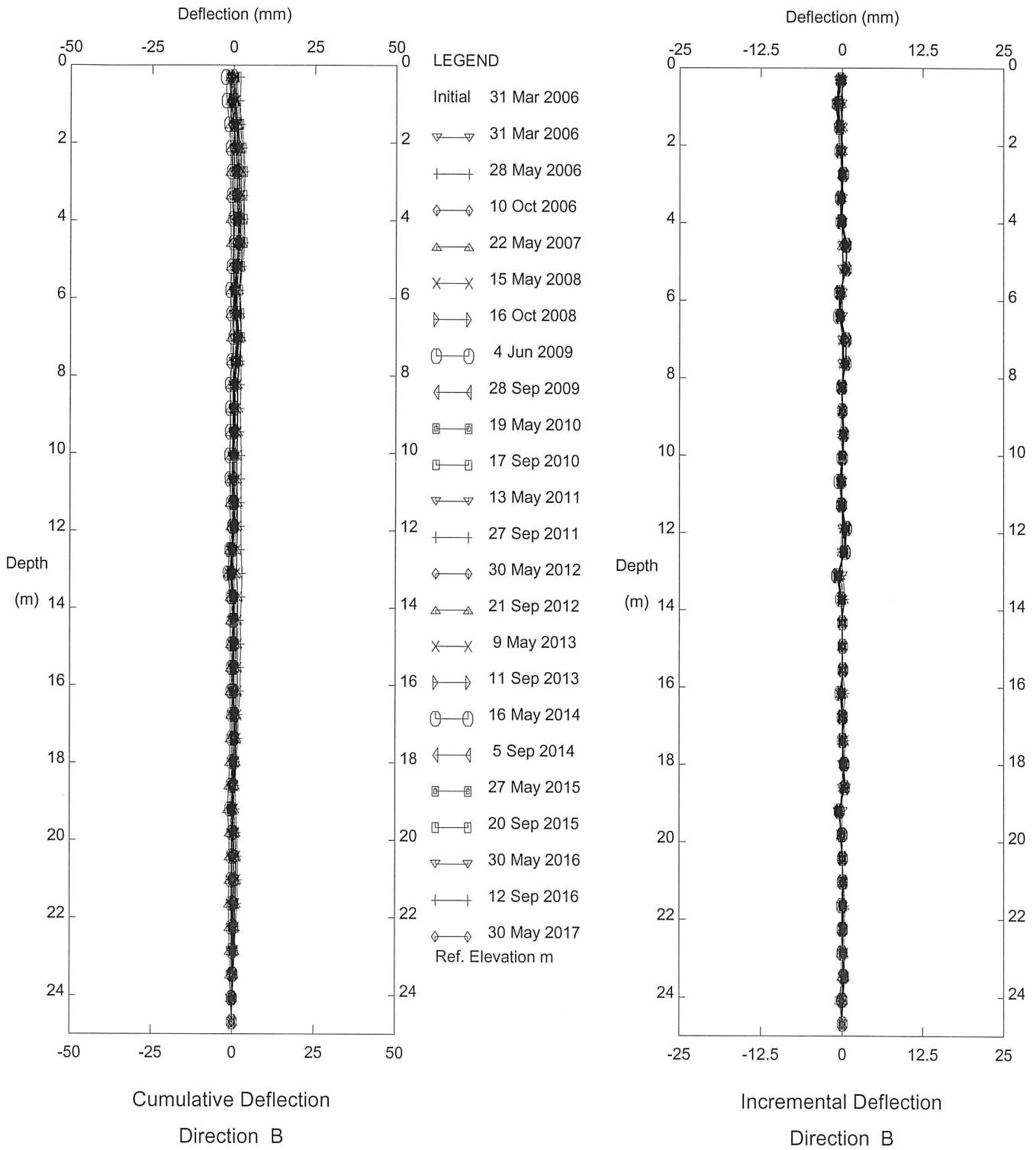
Thurber Engineering Ltd.



Hwy 661:02 Ft Assiniboine, Inclinometer SI06-6

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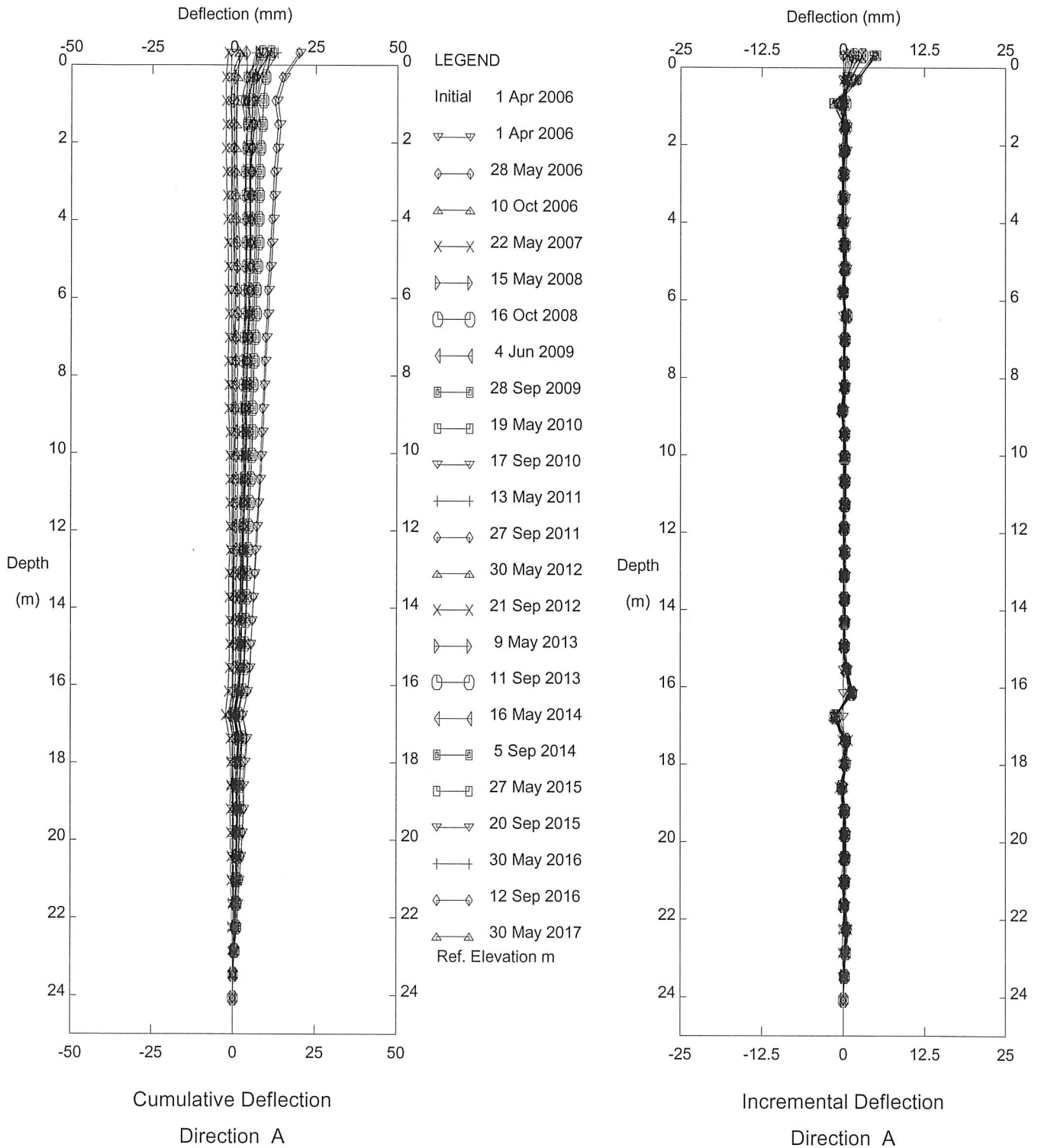
Thurber Engineering Ltd.



Hwy 661:02 Ft Assiniboine, Inclinometer SI06-6

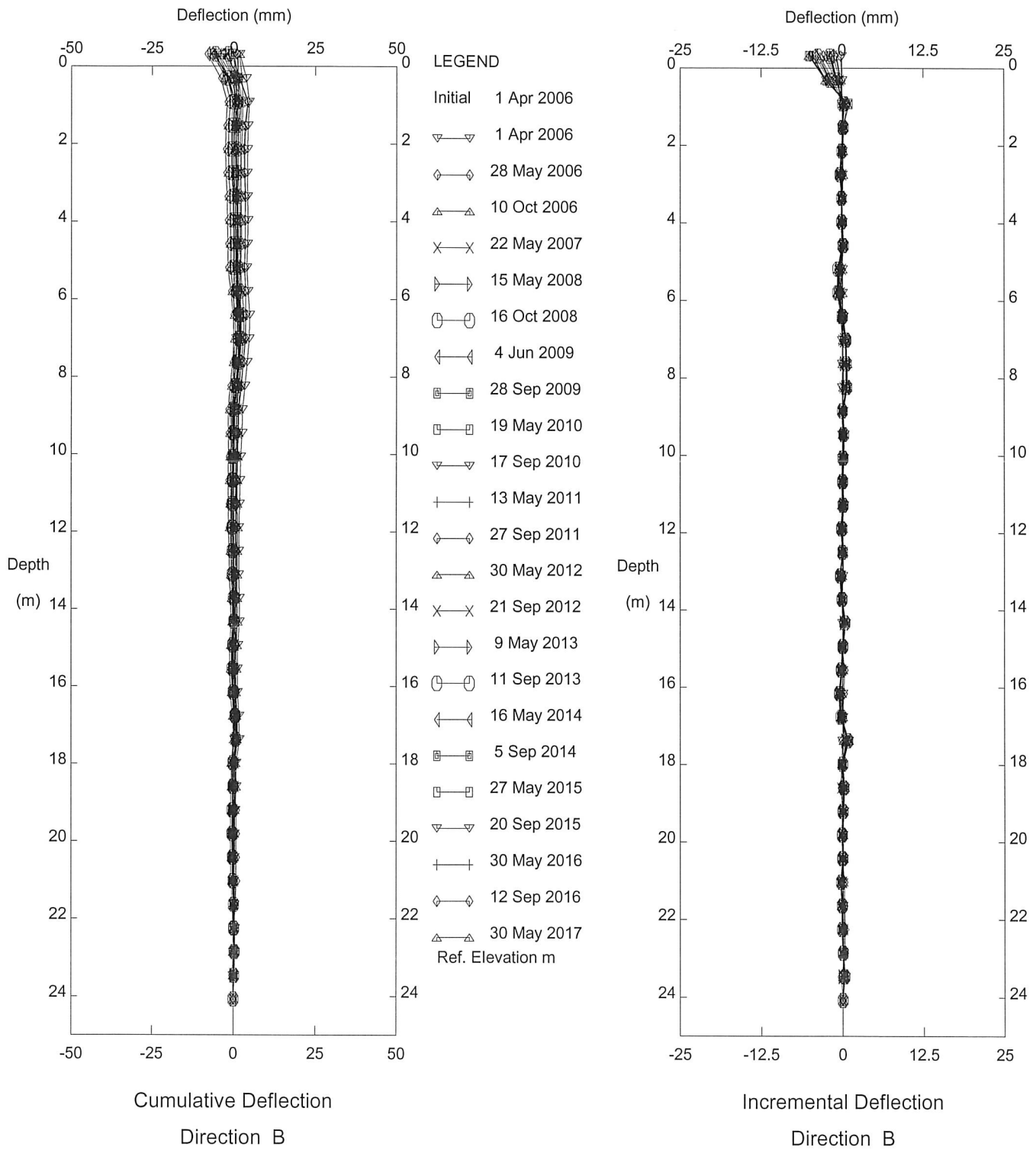
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Hwy 661:02 Ft Assiniboine, Inclinometer SI-11

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Hwy 661:02 Ft Assiniboine, Inclinometer SI-11

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