



THURBER ENGINEERING LTD.

ALBERTA TRANSPORTATION NORTH CENTRAL REGION – ATHABASCA AREA INSTRUMENTATION MONITORING RESULTS

FALL 2015

SECTION C

SITE NC14: 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 September 20, 2015 by Mr. Chad Gray, C.E.T. and Mr. Niraj Regmi, G.I.T., both of Thurber Engineering Ltd. (Thurber).

The SI's were read using a RST Digital Inclinometer probe with 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 spring of 2015.

Historical zones of movement are summarized on Table NC14-1 at the end of this report. Table NC14-1 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 shown no discernible movements since initialization.

The majority of standpipes did not display a significant variation in groundwater levels. The groundwater levels varied by ± 0.2 m in all of the standpipes, with the exception of SP06-3, SP06-10, SP06-18 and SP06-19. The groundwater level decreased by 2.13 m in SP06-3 and increased by 1.43 m in SP06-10. The groundwater level in SP06-18 increased by 5.10 m since the spring 2015 reading. The sudden increase in groundwater level in SP06-18 will need to be confirmed during the spring 2016 reading event. SP06-19 continued to be dry. Table NC14-2 provides a summary of standpipe piezometer readings.

3. RECOMMENDATIONS

3.1 Future Work

The instruments should be read again in the spring of 2016.

3.2 Instrumentation Repairs

No instrument repairs are needed at this time.



**TABLE NC14-1
FALL 2015 – FORT ASSINIBOINE
SLOPE INCLINOMETER
INSTRUMENTATION READING SUMMARY**

Date Monitored: September 20, 2015

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	May 27, 2015	No discernible movement	N/A	N/A
SI06-11	Apr. 1, 2006	No discernable movement	N/A	Operational	May 27, 2015	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



**TABLE NC14-2
FALL 2015 – FORT ASSINIBOINE
STANDPIPE PIEZOMETER
INSTRUMENTATION READING SUMMARY**

Date Monitored: September 20, 2015

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	Oct. 5, 2007 (2.35)	2.58	2.38	-0.20
SP06-2	Apr. 2, 2006	9.12	N/A	Active	May 28, 2006 (5.51)	5.84	5.73	-0.11
SP06-3	Apr. 2, 2006	25.00	N/A	Active	May 27, 2015 (3.72)	5.85	3.72	-2.13
SP06-4	Mar. 31, 2006	15.21	N/A	Active	Oct. 5, 2007 (8.72)	8.98	8.89	-0.09
SP06-5	Mar. 31, 2006	25.00	N/A	Active	Apr. 2, 2006 (9.46)	14.53	14.50	-0.03
SP06-9	Apr. 1, 2006	15.24	N/A	Active	Apr. 2, 2006 (4.46)	6.59	6.53	-0.06
SP06-10	Apr. 2, 2006	25.00	N/A	Active	Apr. 2, 2006 (6.72)	7.41	8.84	1.43
SP06-13	Apr. 2, 2006	9.95	N/A	Active	Sept. 11, 2013 (7.04)	7.08	7.12	0.04
SP06-14	Mar. 28, 2006	9.16	N/A	Active	Oct. 5, 2007 (7.03)	7.30	7.30	0.00



**TABLE NC14-2 CONTINUED...
FALL 2015 – FORT ASSINIBOINE
STANDPIPE PIEZOMETER
INSTRUMENTATION READING SUMMARY**

Date Monitored: September 20, 2015

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	27 September 2011 (6.12)	N/A	N/A	N/A
SP06-18	Apr. 2, 2006	9.43	N/A	Active	30 May 2012 (2.32)	2.35	7.45	5.10
SP06-19	Apr. 2, 2006	7.95	N/A	Active	10 October 2006 (7.01)	Dry	Dry	N/A
A11	N/A	N/A	N/A	Destroyed	28 May 2006 (6.70)	N/A	N/A	N/A

Drawing 15-16-358-NC14 in section D provides a sketch of the approximate location of the monitoring instrumentation for this site.