

---

# ALBERTA TRANSPORTATION INSTRUMENTATION MONITORING RESULTS FALL 2011

## SECTION C

### NORTH CENTRAL (STONY PLAIN) REGION

#### SITE NC47: AR 172 (EAST OF HWY 21:26) NEW SAREPTA

## 1.0 OBSERVATIONS

### 1.1 Field Program and Instrumentation Status

A flush mounted slope inclinometer (SI-1) was read at the NC47 New Sarepta site on Oct 3, 2011 by Ms. Elizabeth Kravontka, T.T. and Mr. Logan McDowell, E.I.T., of EBA, A Tetra Tech Company (EBA).

The SI was read with a Durham Geo Slope Indicator Digi Indicator probe with a 0.61 m (2 foot) wheelbase and Digi Datamate readout. Inclinometer reading depths were defined as per 0.61 m (2 foot) cable markings with respect to the top of the inclinometer casing.

## 2.0 INTERPRETATION

### 2.1 General

SI plots for the A and B directions are presented in Section D and are summarized in the attached tables. The depth and rate of movement recorded by the SIs is also presented in the attached tables.

Interpretation of the SI data was conducted as follows:

- Cumulative resultant movement - calculated from the maximum value of resultant movements. These movements do not necessarily reflect the maximum cumulative movements at shear zones and therefore the depths reported at the cumulative resultant movement may differ from those reported in the SI Monitoring Summary table.
- Incremental movement since the previous reading - calculated by reporting the calculated maximum change in the resultant movement at the depth of the reported cumulative resultant movement.
- Current rate of movement - calculated based on the change in movement over a full year cycle at the depth of the maximum resultant movement.

## **2.2 Interpretation of Monitoring Results**

The presented baseline reading dated June 15, 2007 was selected by Thurber Engineering Ltd. upon review of discrepancies in the data up to that date. SI-01 was originally initialized on November 11, 2006.

Air launched soil nails had been installed on either side of the SI in October 2008. As such, EBA has concluded that installation of the soil nails has not damaged the SI. There is no discernible movement recorded by the SI in the upper embankment near the repaired slope failure. There appears to be some minor movement at the base of the embankment near 6 m depth. This is likely due to lateral spreading along soft clay or organic materials left in place in the highway embankment foundation. The rate of movement is calculated at 2.8 mm/year however there has been less than 1 mm of incremental movement at the shear zone since spring 2011 monitoring.

## **3.0 RECOMMENDATIONS**

### **3.1 Future Work**

The previous monitoring recommendation was to continue reading the instrument through the fall of 2011 after which, if no appreciable movements were noted, the instrument monitoring may be terminated. The minor incremental movement at the shear zone may not warrant any additional monitoring. Since the soil nailing remediation in 2008 there has been less than 2 mm of movement at the shear zone and since 2007 there has been 3.5 mm of cumulative movement at 5.2 m below grade.

### **3.2 Instrument Repair**

The protective surface cover over the SI installation has been replaced.

EBA recommends that instrument monitoring at the NC47 site be discontinued. MCI inspection of the site should continue, however, further annual inspections need not be continued in 2012. If any changes occur to the pavement surface or slope, AT should initiate a Call Out as a minimum.

**SLOPE INCLINOMETER SUMMARY**

**Date Monitored: Oct 3, 2011**

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) ††
SI - 1	15 Jun, 2007	3.5mm at 5.2m below grade; 166° east of N	2.8; May to Oct 2011	Operational	May 18, 2011	<1	2.8	+2.8

Notes:

†According to Durham Geo Slope Indicator (DGSI) “Slope Indicator’s inclinometer equipment provides a system accuracy of ±0.01 inch (0.25mm) per reading, or ±0.3 inches (6mm) accumulated over 50 readings”. This is a conservative, but practical specification of the accuracy that can be expected when casing is installed within 3° of vertical and proper reading techniques are used.

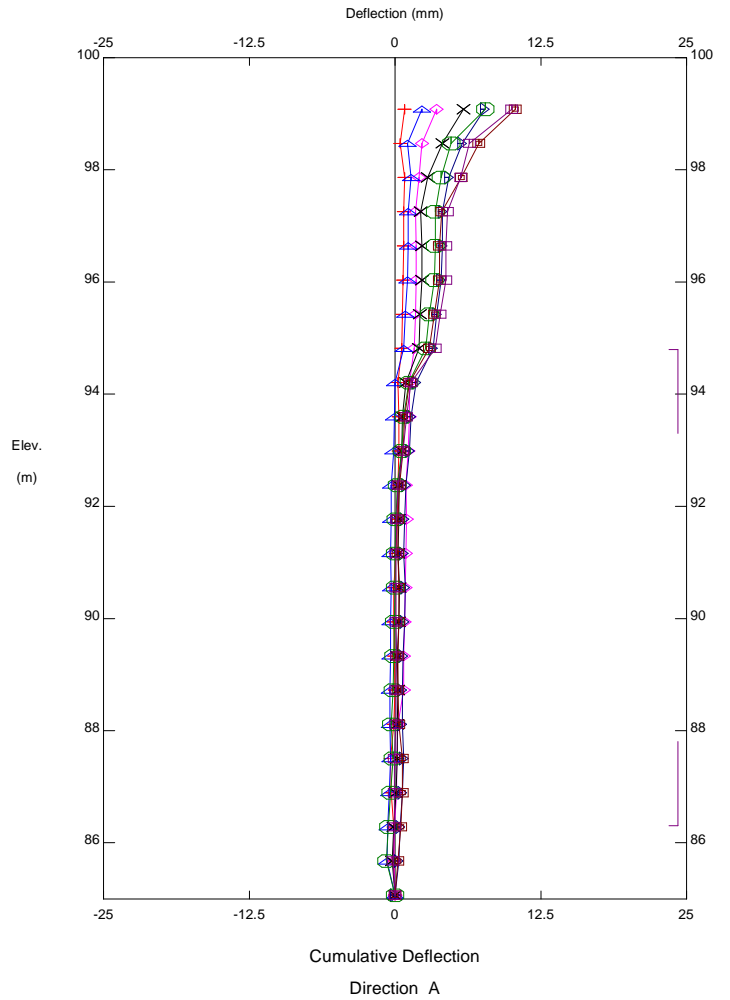
†† some intervals have been adjusted to reflect the changing movements over time.

Slope Inclinator Monitoring Summary

SI-#	SI-1													Comments
Latitude	53°16' 45.87"													
Longitude	113°09' 20.44"													
Stick-up	-0.3 ft													
Azimuth of A+ Groove	180													
Ground Elevation (m)	100.0													
Reading Depth (m)	4 - 48 ft													
June 15, 2007	✓													
October 18, 2007	✓													
May 27, 2008	✓													
September 25, 2008	✓													
May 29, 2009	✓													
October 14, 2009	✓													
May 11, 2010	✓													
October 4, 2010	✓													
May 18, 2011	✓													
October 3, 2011	✓													

- Legend:
- ✓ data acquired and processed
  - \* shear movement depth (m)
  - \*\* SI casing sheared-off depth (m)
  - \*\*\* SI casing broken & needs repair
  - †† monitor above probable shear zone

EBA, A Tetra Tech Company - Edmonton, Ab

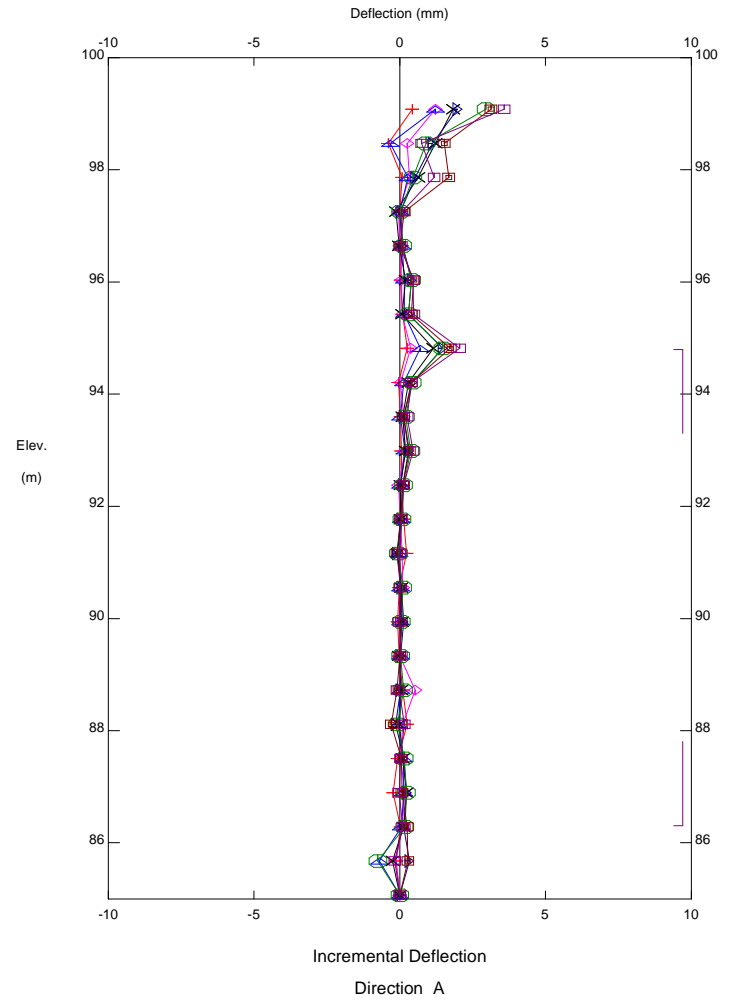


LEGEND

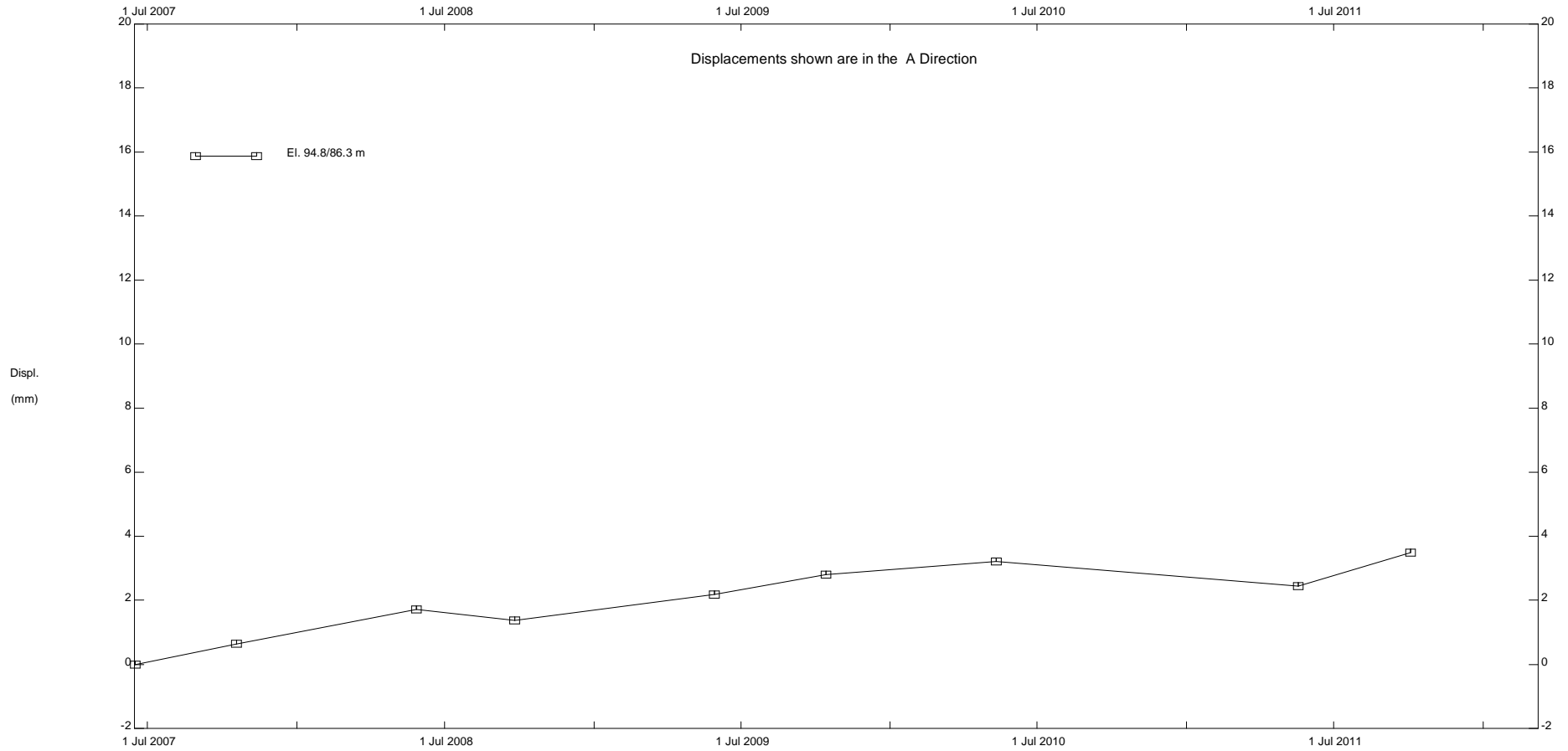
- Initial 15 Jun 2007
- 18 Oct 2007
- 27 May 2008
- 25 Sep 2008
- 29 May 2009
- 13 Oct 2009
- 11 May 2010
- 18 May 2011
- 3 Oct 2011

Ref. Elevation 100.0 m

NC47, Inclinator SI-1  
 Alberta Transportation  
 A.R.172 New Sarepta



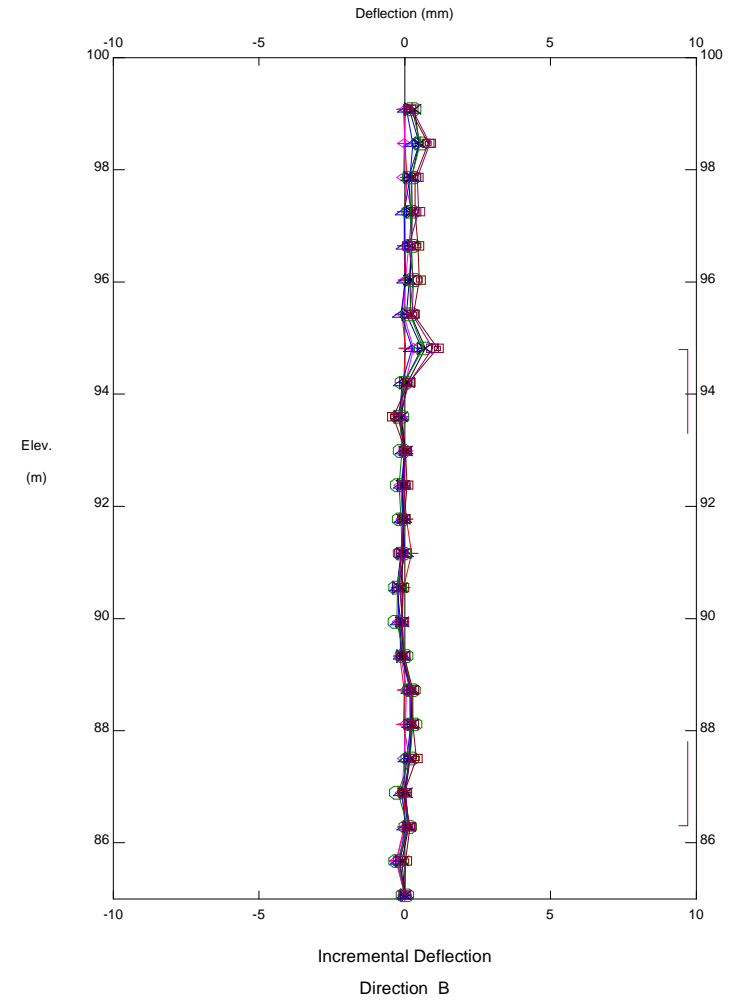
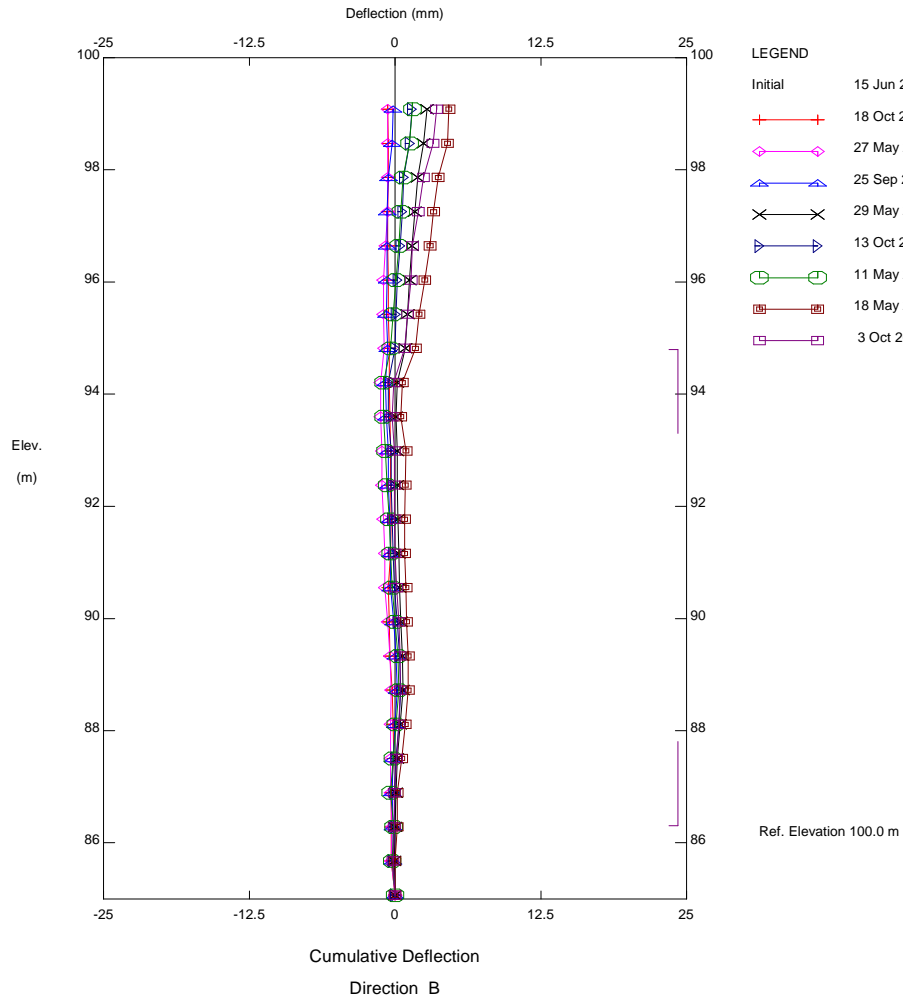
EBA, A Tetra Tech Company - Edmonton, Ab



NC47, Inclinator SI-1

Alberta Transportation

EBA, A Tetra Tech Company - Edmonton, Ab

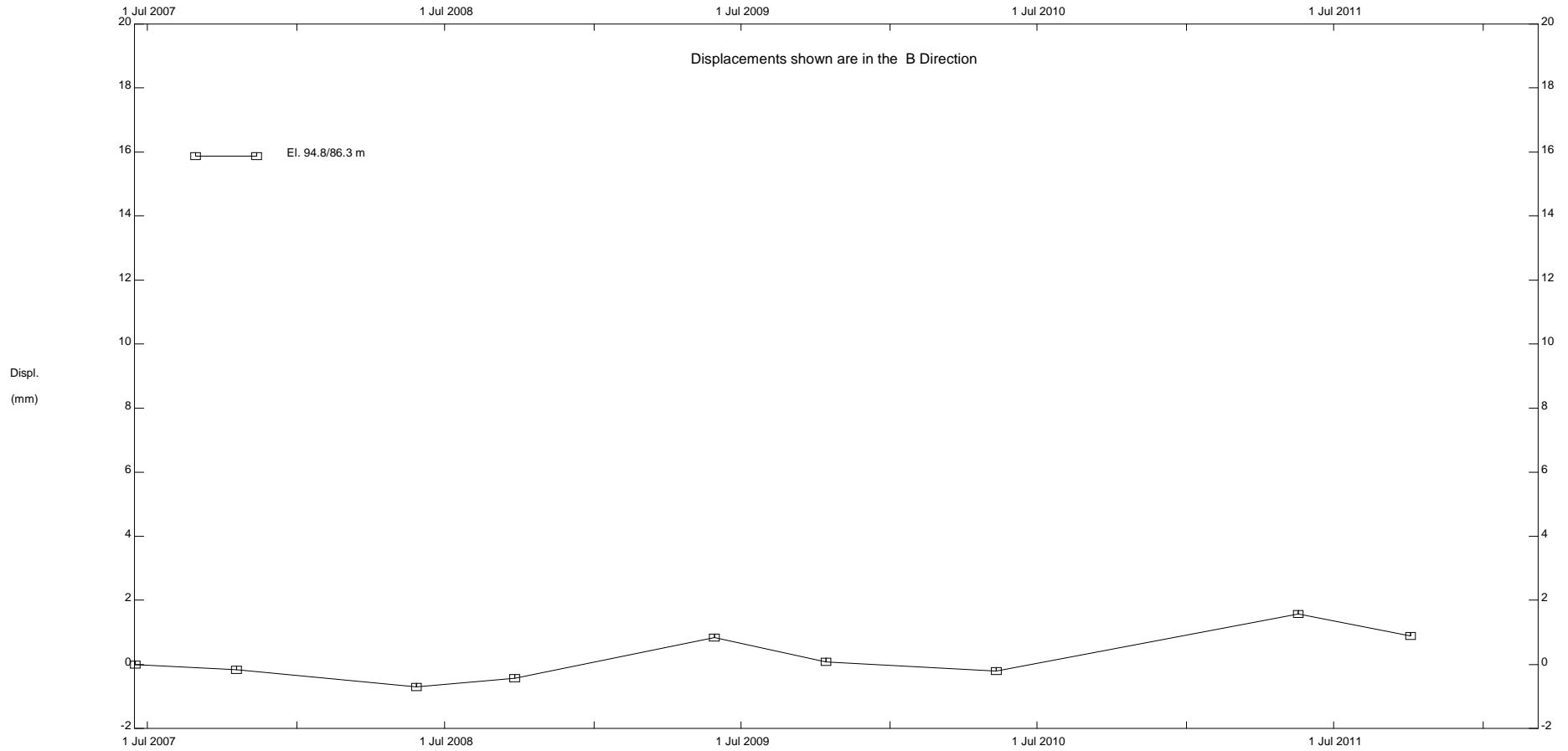


NC47, Inclinator SI-1

Alberta Transportation

A.R.172 New Sarepta

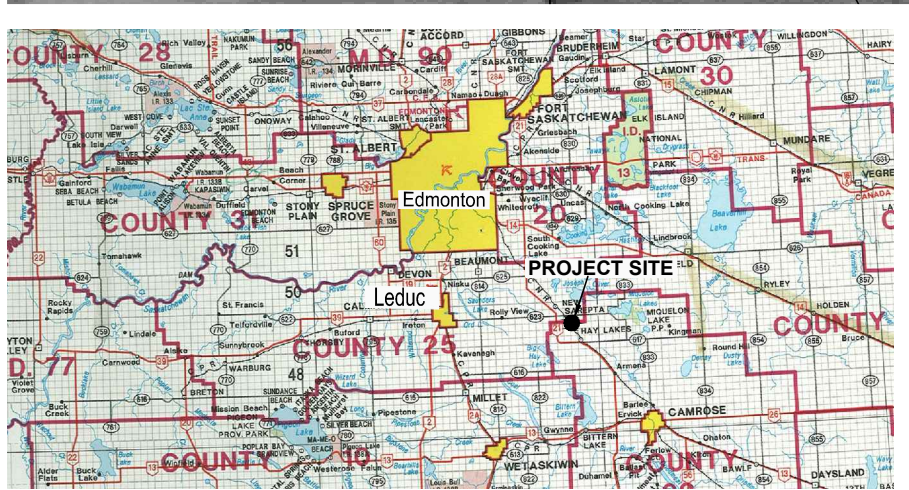
EBA, A Tetra Tech Company - Edmonton, Ab



NC47, Inclinator SI-1

Alberta Transportation





**KEY MAP**  
N.T.S

**LEGEND**

 SLOPE INDICATOR

CLIENT

**Government of Alberta**  
**Transportation**



North Central (Stony Plain)  
Geohazard Risk Management Plan  
NC-47 New Sarepta (AR-172), Alberta

Site Plan

PROJECT NO E12101085.003	DWN DBD	CKD RJM	REV 0
OFFICE EDM	DATE November 2009		

**Figure NC-47**