
To:	Bernard Ching Alberta Transportation	From:	Leslie Cho and Carrie Murray Stantec Consulting Ltd.
File:	123315222	Date:	August 18, 2021

Reference: North Central Region, Edson/Stony Plain, Site NC32 – Highway 759:04 North of Tomahawk, Spring 2021 Instrumentation Monitoring Report

1.0 OBSERVATIONS

1.1 FIELD PROGRAM AND INSTRUMENTATION STATUS

The Spring 2021 reading cycle consisted of instrument readings of one slope inclinometer (SI-2) and one pneumatic piezometer (PN2). **Figure 1** attached provides a schematic of the site. The instruments were read by Owen Zhang, EIT and, Mahendran Senthoooran, M.Eng., EIT on July 6, 2021.

The slope inclinometers (SI) were measured using an RST MEMS digital inclinometer probe with 0.5 m increments and handheld PC. Readings were taken based on cable markings in relation to the top of SI casing. The pneumatic piezometers (PN) were read with an RST Instruments C-109 Pneumatic readout box.

GPS coordinates of all instruments were obtained using a Garmin eTrex 10 handheld GPS unit.

2.0 INTERPRETATION

2.1 GENERAL

SI plots are provided in the attachments and summarized in the following sections. Resultant plots in the X-direction (i.e. slope dip direction) along with movement rates, total cumulative movement, maximum movement rates, and incremental movements are provided in **Table NC32-1** and the attachments.

2.2 ZONES OF MOVEMENT

No new zones of movement were observed in the operational SI. **Table NC32-1** summarizes existing zones of movement, total movement, depth of movement, and the maximum rate of movement since initializing each SI. Directions of movement are referenced to the azimuth of the A+ groove in each SI casing.

2.3 MONITORING RESULTS

2.3.1 Slope Inclinometer

SI-2 has a movement zone from about 6 m to 10 m bgs. The overall rate of movement was approximately 14 mm/yr from 2009 to 2013. A decrease in overall movement rate to less than 1 mm/year was observed after berm construction. The Spring 2021 reading cycle shows a rate of movement of less than 1 mm/yr.

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2.3.2 Piezometer

One PN was read and has been summarized in **Table NC32-2**. **PN2** showed negligible change in water level since the previous reading.

3.0 RECOMMENDATIONS

3.1 FUTURE WORK

It is recommended that all instruments be read once a year with the next reading cycle to occur in Spring 2022.

3.2 INSTRUMENTATION REPAIRS

No instrumentation repairs are required at this time.

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Table NC32-1: Spring 2021 Slope Inclinometer Summary

Instrument Name	Coordinates ⁽¹⁾ (UTM 11U, NAD1983) (m)		Date Initialized	Total Cumulative Resultant Movement and Depth of Movement to Date (mm)	Maximum Rate of Movement (mm/yr)	Current Status	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)
	Northing	Easting								
SI-1	-	-	Aug. 31, 2006	21 over 2.2 m to 3.8 m depth in 22 ^o direction	4 in Sept. 2016	Non-Operational	May 15, 2017	Sheared off in Spring 2018		
SI-2	5920076	648684	Aug. 31, 2006	95 over 6.2 m to 10.2 m depth in 358 ^o direction	25 in Oct. 2006	Operational	May 19, 2020	< 1	0.5	- 0.3
Note: (1) Updated July 6, 2021 with approximate accuracy of ± 3 m										

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Table NC32-2: Spring 2021 Pneumatic Piezometer Summary

Instrument Name	Coordinates ⁽¹⁾ (UTM 11U, NAD1983) (m)		Date Initialized	Tip Depth (mbgs)	Current Status	Maximum Piezometric Level (mbgs)	Measured Piezometric Level (mbgs)	Previous Piezometric Level (m bgs) (Spring 2020)	Change in Piezometric Level Since Previous Reading (m)
	Northing	Easting							
PN1 (030248)	-	-	Aug 30, 2006	7.00	Non-Operational	4.17 in Oct 2014	Pneumatic tip was found broken off the tube (Spring 2017)		
PN2 (030586)	5920076	648684	Aug 30, 2006	4.60	Operational	0.24 in Sept. 2015	1.3 (32.3 kPa)	1.3 (32.5 kPa)	< 0.1
PN3 (030582)	5920140	648683	Aug 30, 2006	6.10	Non-Operational	0.56 in Sept 2015	Pneumatic tip was found broken off the tube (Spring 2019)		
PN4 (030581)	-	-	Aug 30, 2006	6.10	Non-Operational	Could not find in two reading cycles (May 2020 and May 2019). Removed from reading schedule.			
PN6 (030583)	-	-	Aug 30, 2006	9.80	Non-Operational	0.46; Oct 2014	Pneumatic tip was found broken off the tube (Spring 2017)		
Note: (1) Updated July 6, 2021 with approximate accuracy of ± 3 m									

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CLOSING

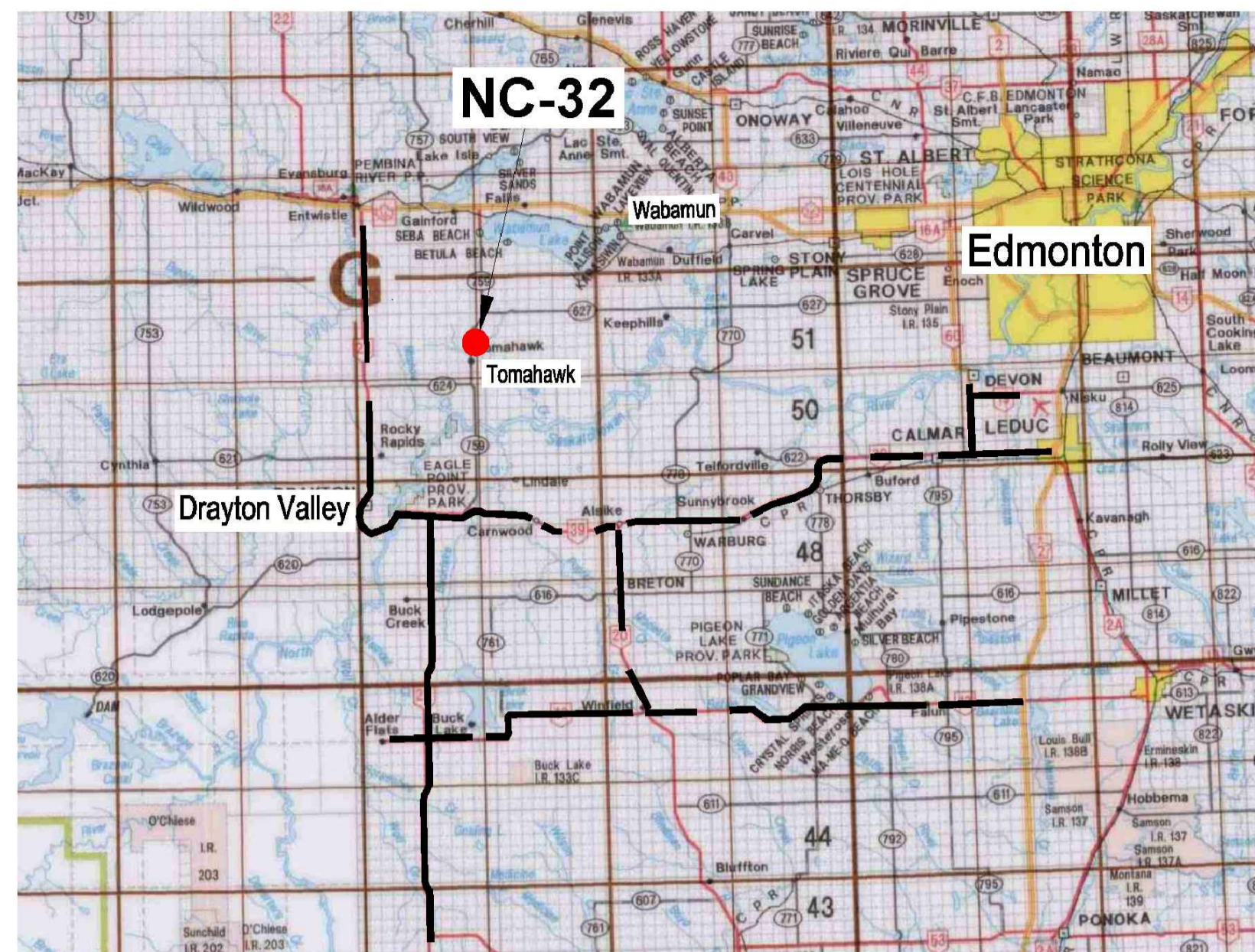
We trust this instrumentation report meets your requirements. If you have any questions, please do not hesitate to contact the undersigned.

Stantec Consulting Ltd.

Leslie Cho M.Eng., P.Eng.
Associate, Geotechnical Engineer
Phone: 780-917-7403
leslie.cho@stantec.com

Carrie Murray M.Eng., P.Eng.
Principal, Senior Geotechnical Engineer
Phone: 780-917-7403
carrie.murray@stantec.com

Attachment: Figure 1 – Site Plan
SI-2 Slope Inclinometer Plots
Pneumatic Piezometer Depth vs Time Plot



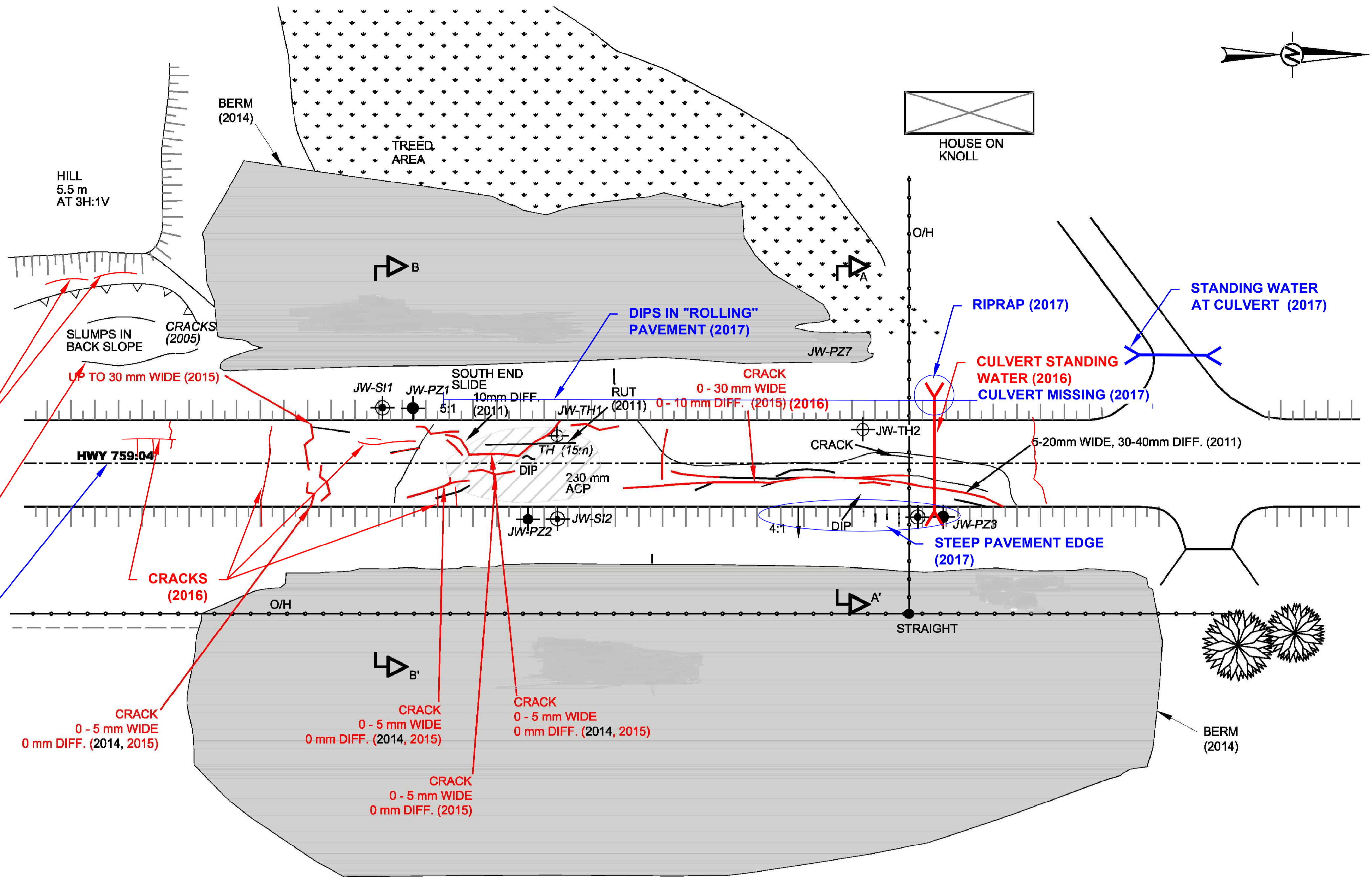
SITE MAP

NOT TO SCALE

**FRESH CRACKS,
0mm DIFFERENCE
~ 30mm - 40mm
WIDE (2016)**

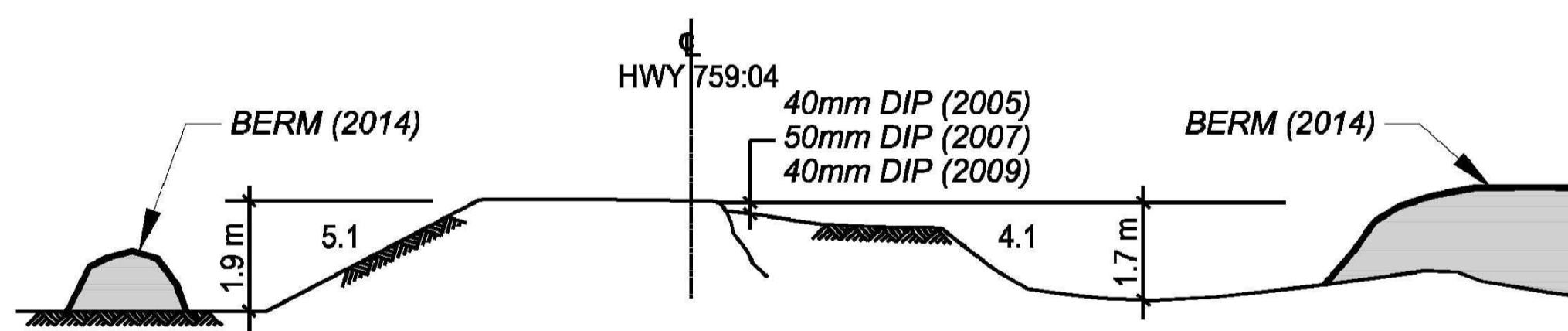
**SLUMP MATERIAL
ENCROACHING ON DITCH
DRAINAGE (2016)
GRASSED OVER (2017)**

**2017 HWY
MILLED AND OVERLAID**



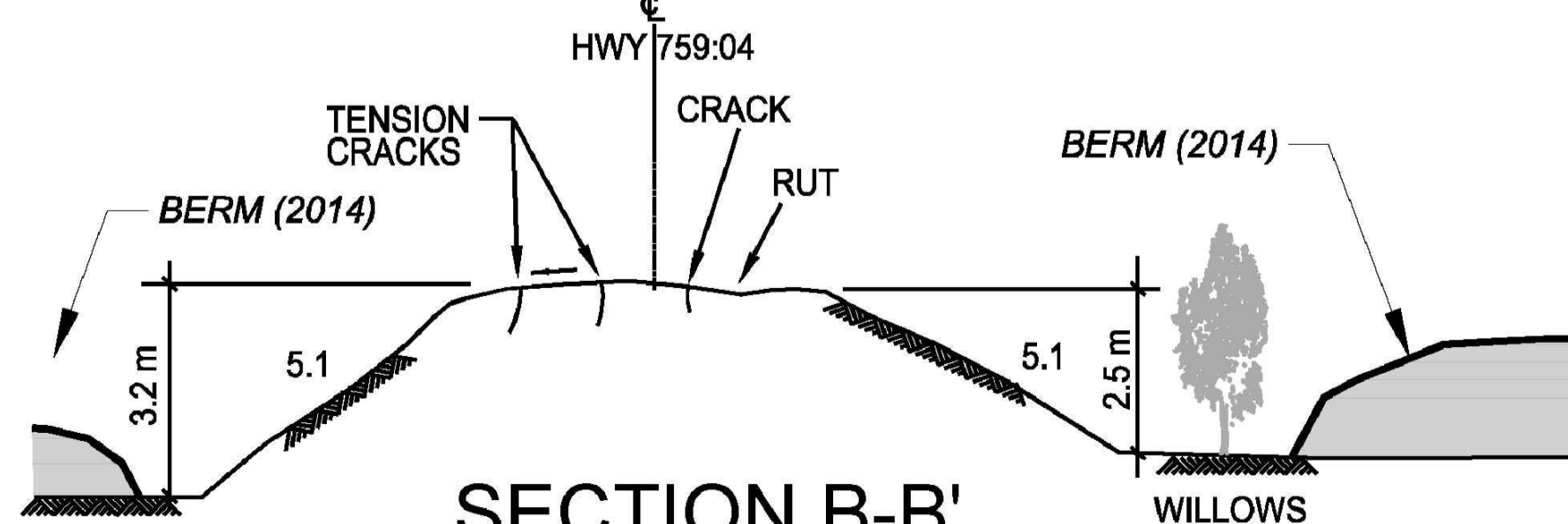
SITE PLAN

NOT TO SCALE



SECTION A-A'

NOT TO SCALE



SECTION B-B'

NOT TO SCALE

NOTES

1. FEATURE LOCATIONS ARE APPROXIMATE
2. PREVIOUS OBSERVATIONS SHOWN IN BLACK
3. 2015/16 OBSERVATIONS SHOWN IN RED
4. 2017 OBSERVATIONS SHOWN IN BLUE

LEGEND

- ⊕ SI INSTALLED BY JACQUES WHITFORD IN 2006
- ⊙ PNEUMATIC PIEZOMETER INSTALLED BY JACQUES WHITFORD IN 2006
- ⊕ GEOTECHNICAL TEST HOLE DRILLED BY JACQUES WHITFORD IN 2006

SCHEMATIC ONLY, NOT TO SCALE



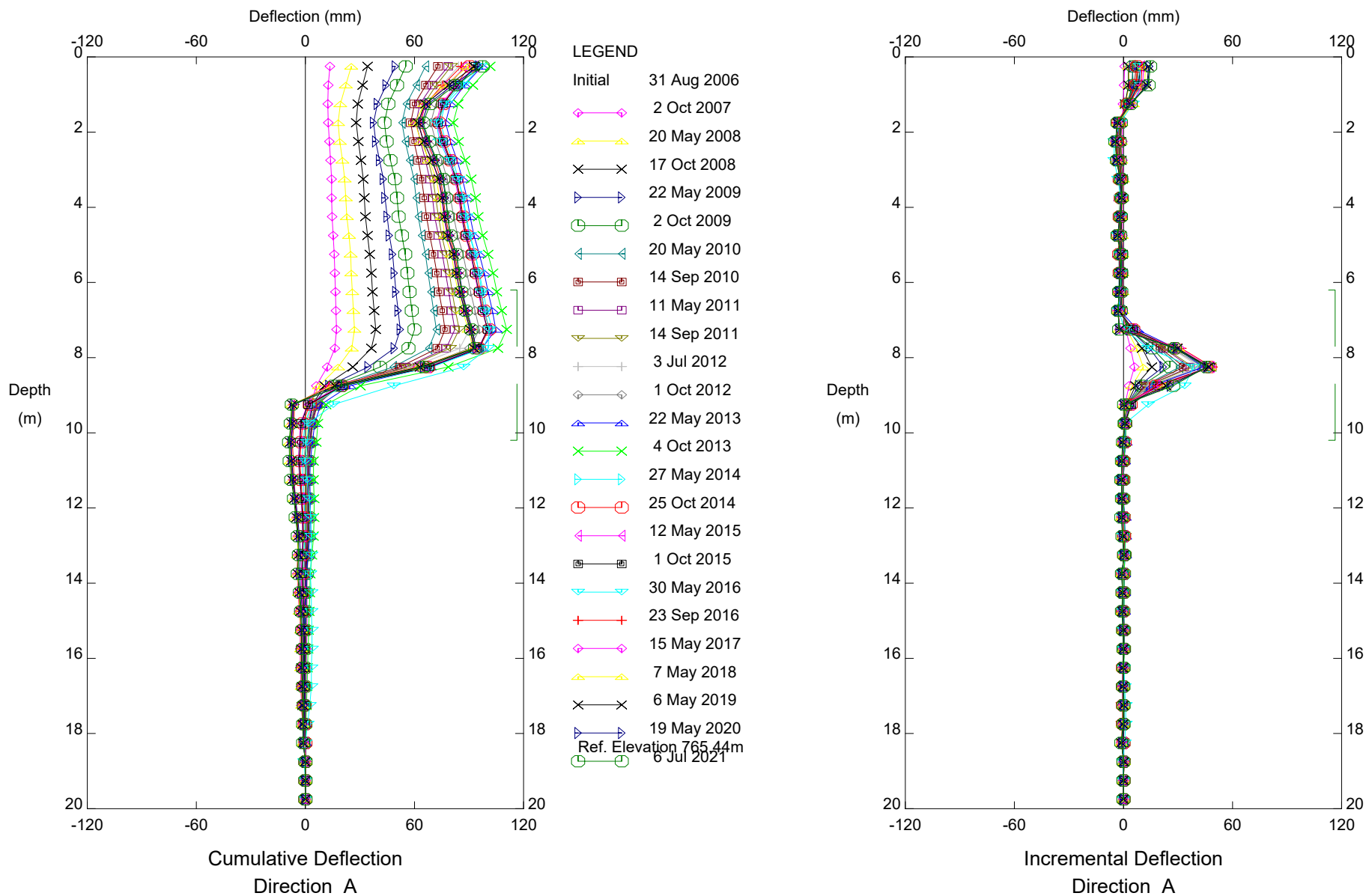
STANTEC CONSULTING
10160-112 STREET
EDMONTON ALBERTA CANADA

ALBERTA TRANSPORTATION
GEOHAZARD MONITORING PROGRAM
NC32 NORTH OF TOMAHAWK
SITE PLAN

DRAWN WW / MK	CHECK CDM	APPROVE ID
DATE 12 SEP 2017	SCALE AS SHOWN	PROJECT # 123315222

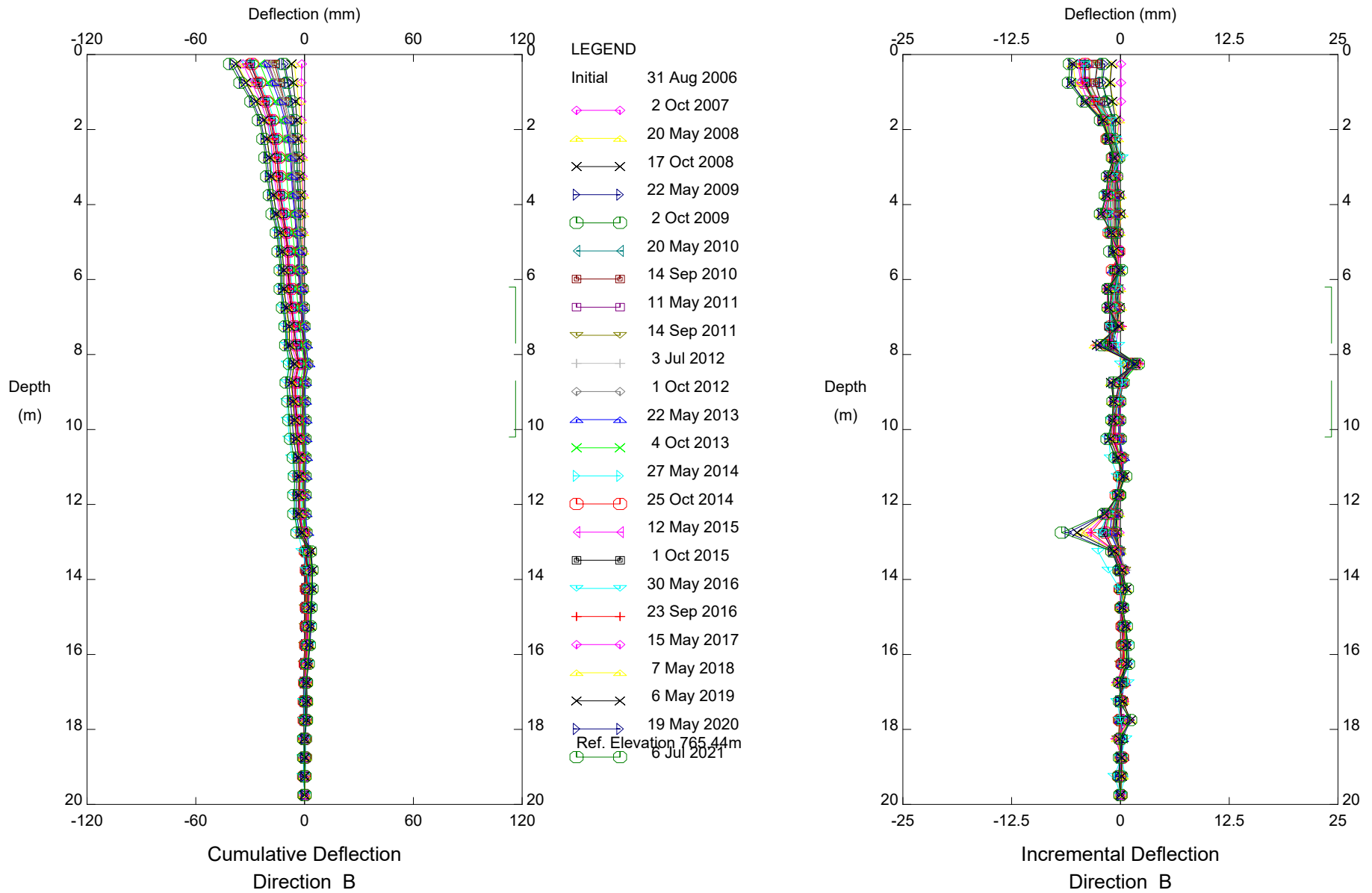
FIGURE - 1

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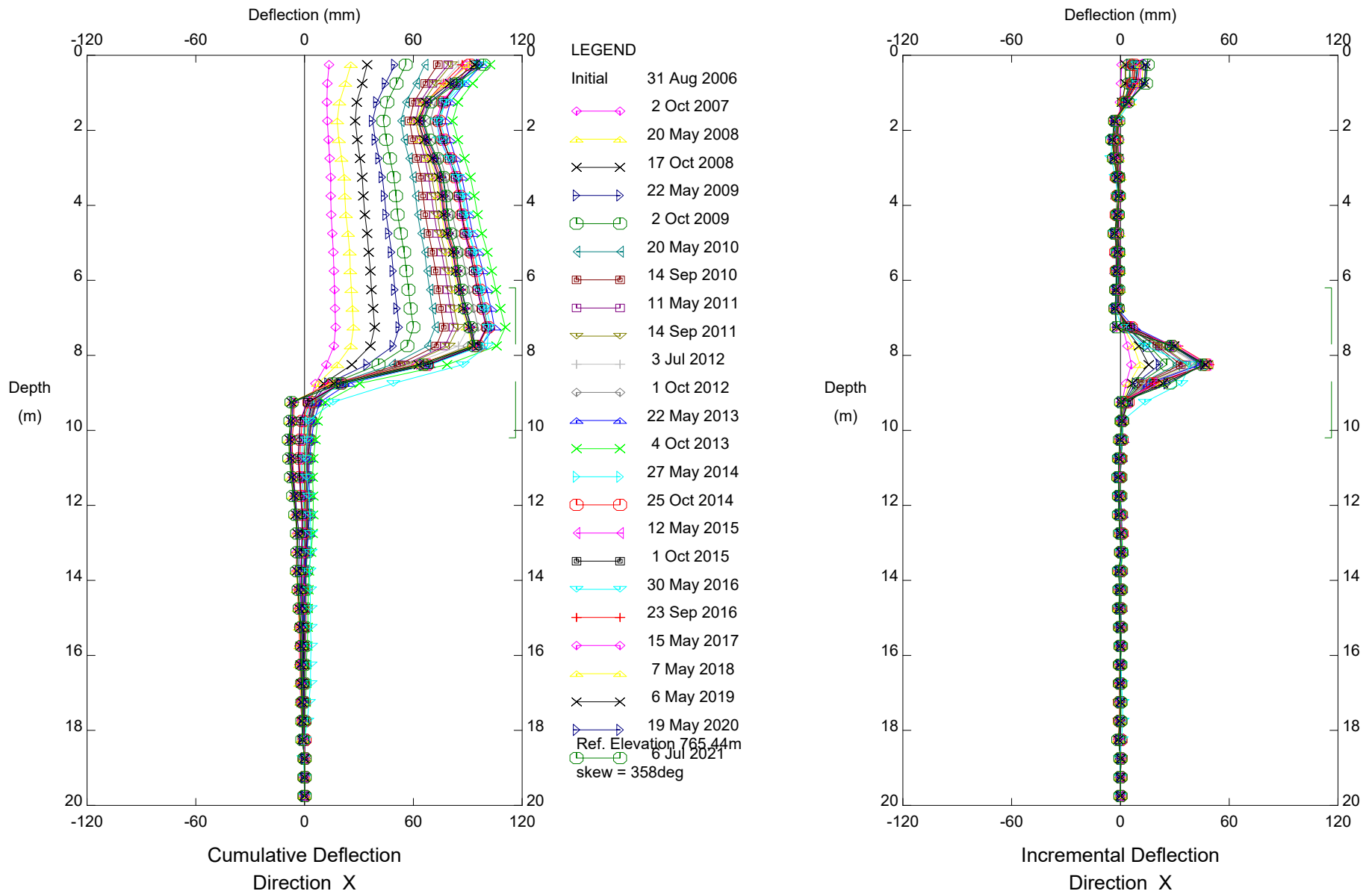
Hwy 759:04 N. of Tomohawk (NC32), Inclinator SI-2
 Alberta Transportation

Stantec Consulting Ltd - Edmonton



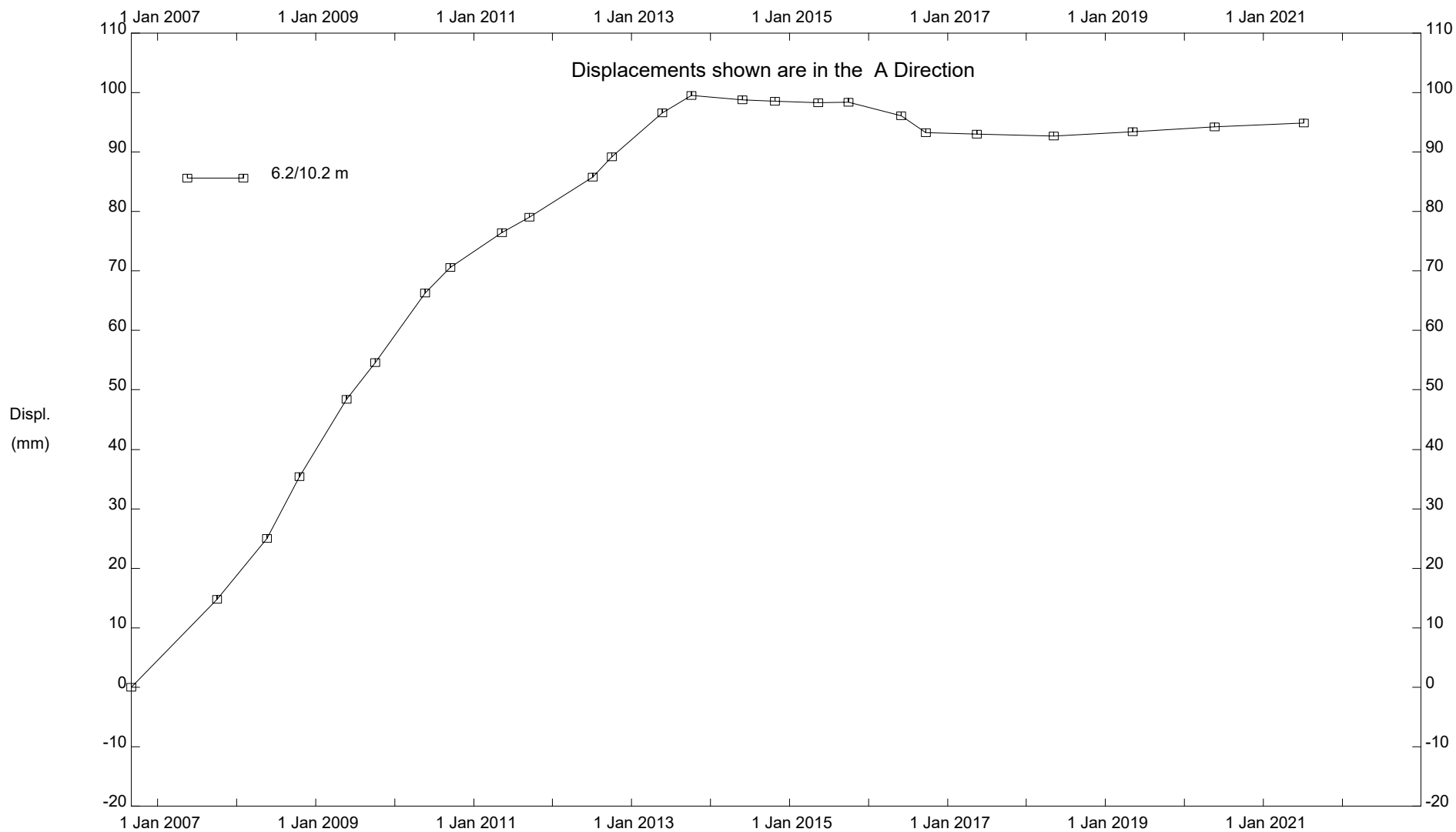
Hwy 759:04 N. of Tomohawk (NC32), Inclinator SI-2
Alberta Transportation

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Hwy 759:04 N. of Tomohawk (NC32), Inclinator SI-2
Alberta Transportation

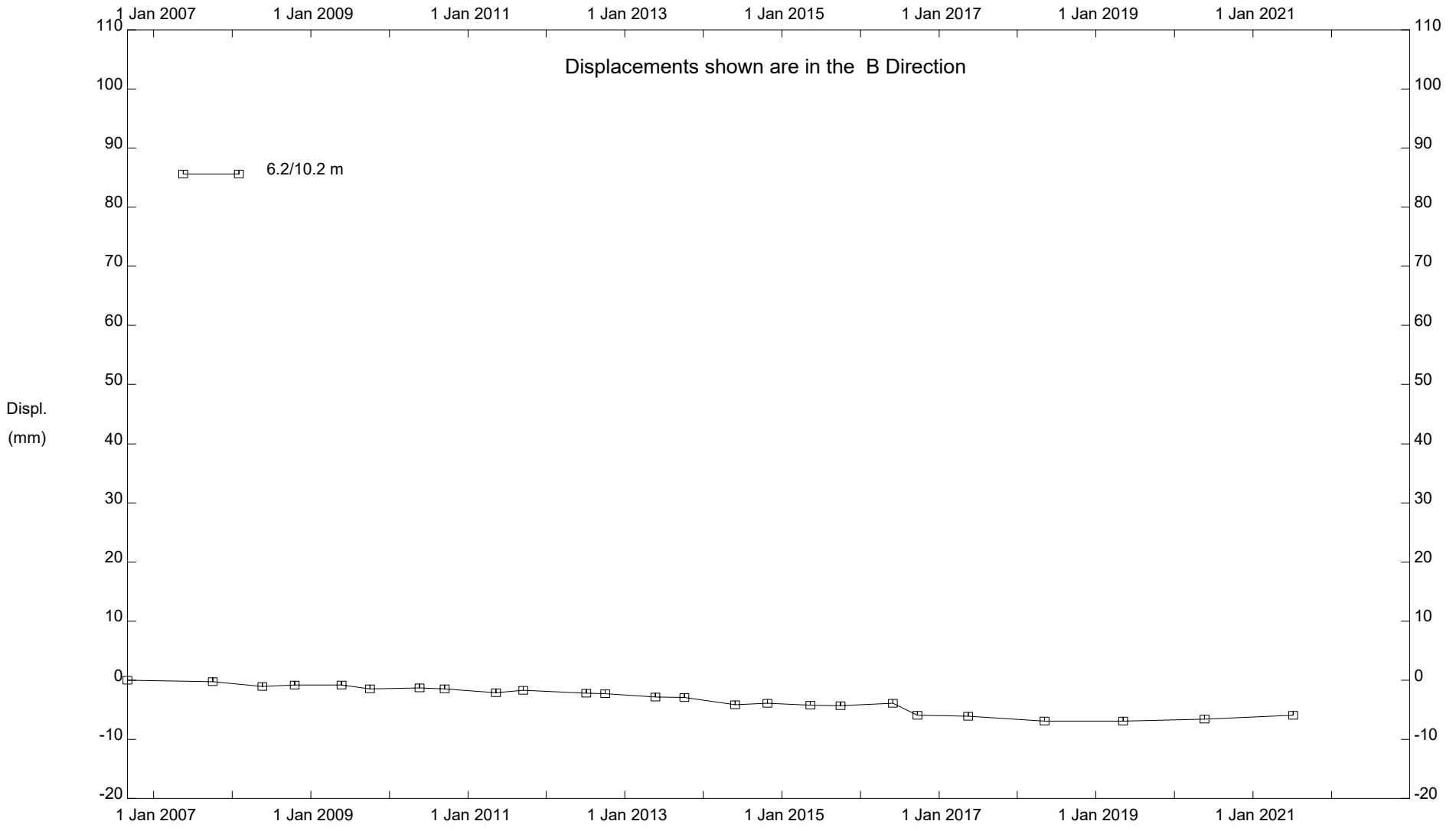
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Hwy 759:04 N. of Tomohawk (NC32), Inclinator SI-2

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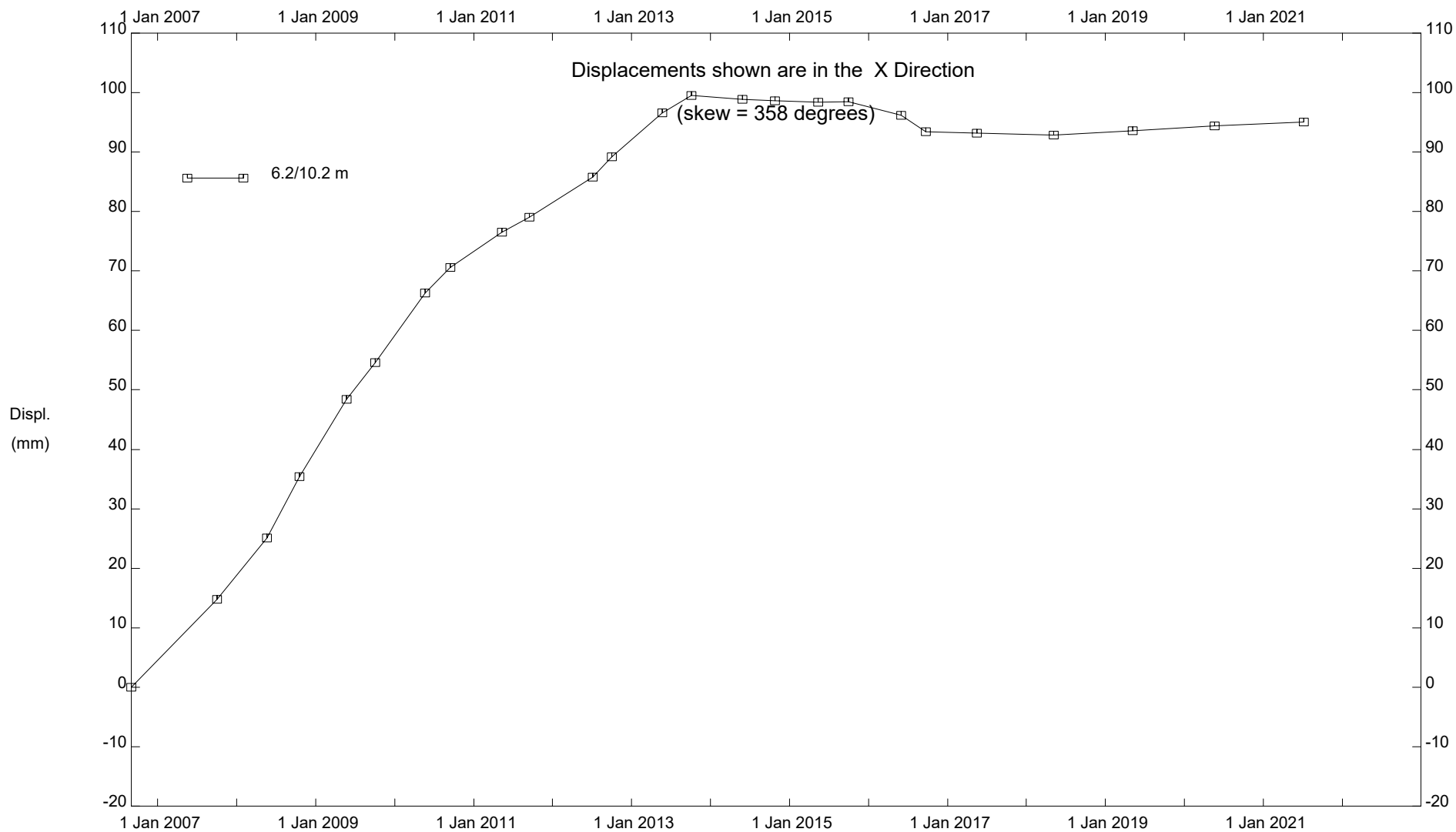
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North Central Region
Edson Area
NC32: HWY 759:04, North of Tomahawk
PNEUMATIC PIEZOMETER DATA

