
To:	Amy Driessen Alberta Transportation	From:	Leslie Cho and Xiteng Liu Stantec Consulting Ltd.
File:	123315222	Date:	June 2, 2022

Reference: North Central Region, Site NC010 - Highway 33:04 Willow Bend Slide, Spring 2022 Instrumentation Monitoring Report

1.0 OBSERVATIONS

1.1 FIELD PROGRAM AND INSTRUMENTATION STATUS

The Spring 2022 reading cycle consisted of instrument readings on one slope inclinometer (SI97-3) and five standpipe piezometers (SP14-1, SP14-3, SP14-6, SP20-1, and SP20-2). **Figure 1** attached provides a schematic of the site. The instruments were read by Mahendran Senthoooran, M.Eng., EIT and Akintola Fakinlede, M.Sc., Engineering Technologist on May 4, 2022.

The slope inclinometer (SI) was measured using an RST MEMS digital inclinometer probe with 0.5 m increments and RST handheld PC. The standpipe piezometers (SP) were measured using a Heron Instruments water tape.

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

2.0 INSTRUMENTATION READINGS

2.1 GENERAL

The SI plots are provided in the attachments and summarized in the following sections. Displacement-time plots along with movement rates, total cumulative movement, maximum movement rates, and incremental movements are provided in **Table NC010-1** and the attachments.

The groundwater levels from SP readings are summarized in **Table NC010-2** and in the following sections with resulting plots attached.

2.2 ZONES OF MOVEMENT

No zones of movement were observed in the slope inclinometer **SI97-3**.

2.3 MONITORING RESULTS

2.3.1 Slope Inclinometers

No zones of movement were observed in **SI97-3**. There was some deflection within the upper 2 m of the SI casing that is likely attributed to freeze-thaw cycles, poor grouting and deflections from the casing stick-up.

Reference: North Central Region, Site NC010 - Highway 33:04 Willow Bend Slide, Spring 2022 Instrumentation Monitoring Report

2.3.2 Piezometers

The groundwater level below ground surface (bgs) at the site was measured to range from 2.7 m at **SP14-3** to 6.8 m at **SP20-1**. The SPs show an increase in water level by 0.1 m in **SP14-1**, **SP14-3**, and **SP14-6**. **SP14-1** and **SP20-2** measured the highest groundwater levels since initiation. **SP20-1** showed a decrease in water level by 0.3 m since the July 2021 readings.

3.0 RECOMMENDATIONS

FUTURE WORK

It is recommended that the next reading cycle take place in Spring 2023. Consideration for installing replacement SIs at SI97-1 and 97-2 should be given.

3.1 INSTRUMENTATION REPAIRS

No instruments require repair at this time.

Reference: North Central Region, Site NC010 - Highway 33:04 Willow Bend Slide, Spring 2022 Instrumentation Monitoring Report

Table NC010-1: Spring 2022 Slope Inclinometer Reading Summary

Instrument Name	Date Initialized	Coordinates ⁽¹⁾ (UTM 11U, NAD1983) (m)		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							
SI97-3	May 18, 2000	5981186	672313	NA	NA	Operational	July 4, 2021	NA	NA	NA

(1) Updated May 4, 2022, with approximate accuracy of ± 3 m

Table NC010-2: Spring 2022 Piezometer Reading Summary

Instrument Name	Date Initialized	Coordinates ⁽¹⁾ (UTM 11U, NAD1983) (m)		Bottom Depth (mbgs), (Elevation)	Current Status	Maximum Water Level (m bgs)	Measured Water Level May. 04, 2022 (m bgs), (Elevation)	Previous Water Level (Elevation), Jul. 04, 2021 (m bgs)	Change in Water Level (m)
		Northing	Easting						
SP14-1	Mar. 08, 2014	5981203	672283	15.4 (671.6 m)	Operational	4.9 (May 4, 2022)	4.9 (682.1 m)	5.0 (682.0 m)	0.1
SP14-3	Mar. 08, 2014	5981186	672277	9.9 (676.6 m)	Operational	2.3 (Sep 23, 2017)	2.7 (683.8 m)	2.9 (683.7 m)	0.1
SP14-6	Mar. 08, 2014	5981187	672312	10.1 (679.8 m)	Operational	4.7 (Sep 23, 2017)	5.3 (684.6 m)	5.4 (684.5 m)	0.1
SP20-1	Apr 13, 2020	5981141	672291	19.5 (670.5m)	Operational	5.8 (Oct 1, 2020)	6.8 (683.2 m)	6.5 (683.5 m)	-0.3
SP20-2	Apr 13, 2020	5981221	672283	9.8 (676.5 m)	Operational	4.7 (May 4, 2022)	4.7 (681.6 m)	4.7 (681.6 m)	0.0

(1) Updated May 4, 2022, with approximate accuracy of ± 3 m

4.0 CLOSING

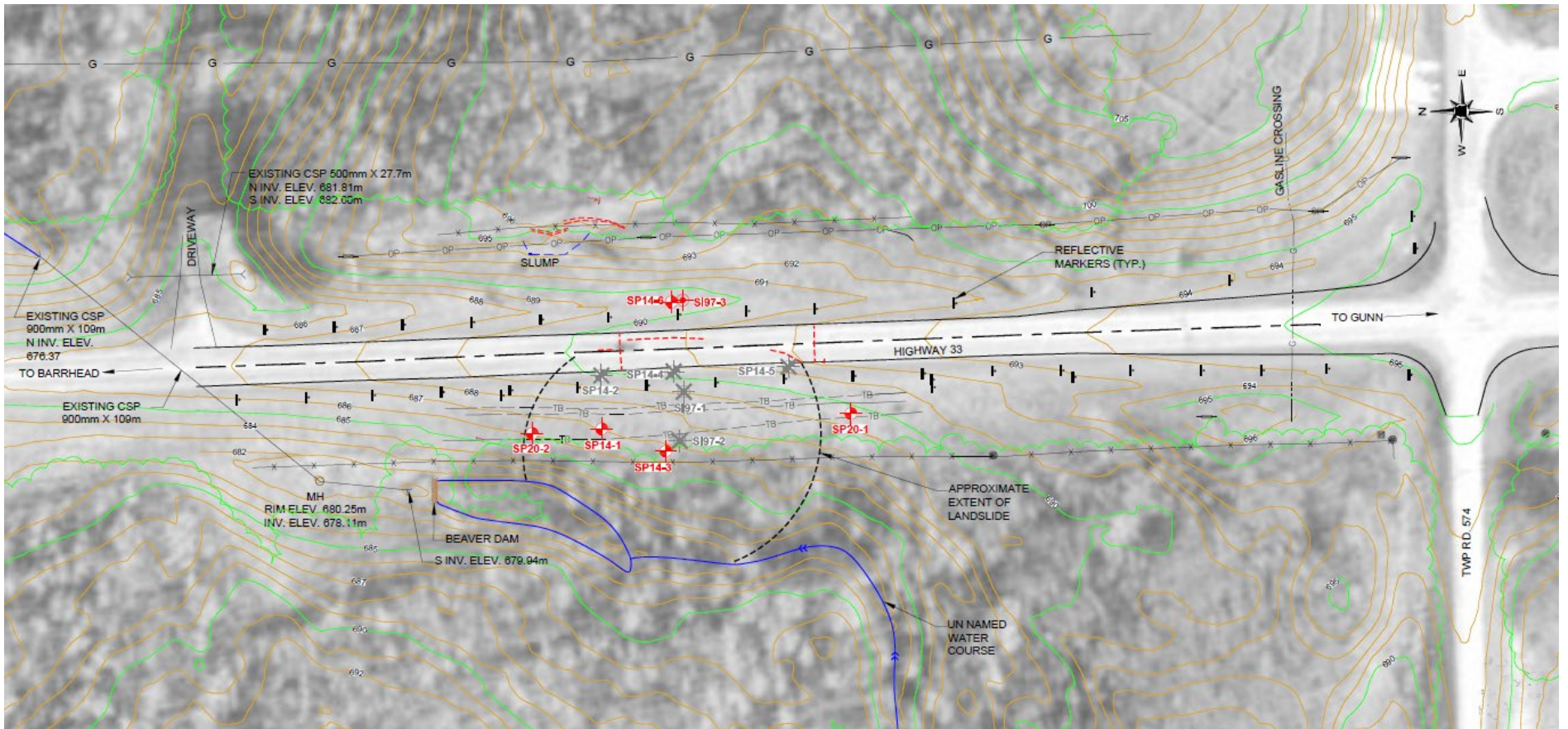
We trust this instrumentation report meets your requirements. If you have any questions, please do not hesitate to contact the undersigned.

Stantec Consulting Ltd.

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Attachment: Figure 1 - Site Plan
 SI97-3 Slope Inclinator Plots
 Standpipe Piezometer Level Depth vs Time Plot



*Adapted from Thurber Engineering Drawing No. 13357-NC010-1

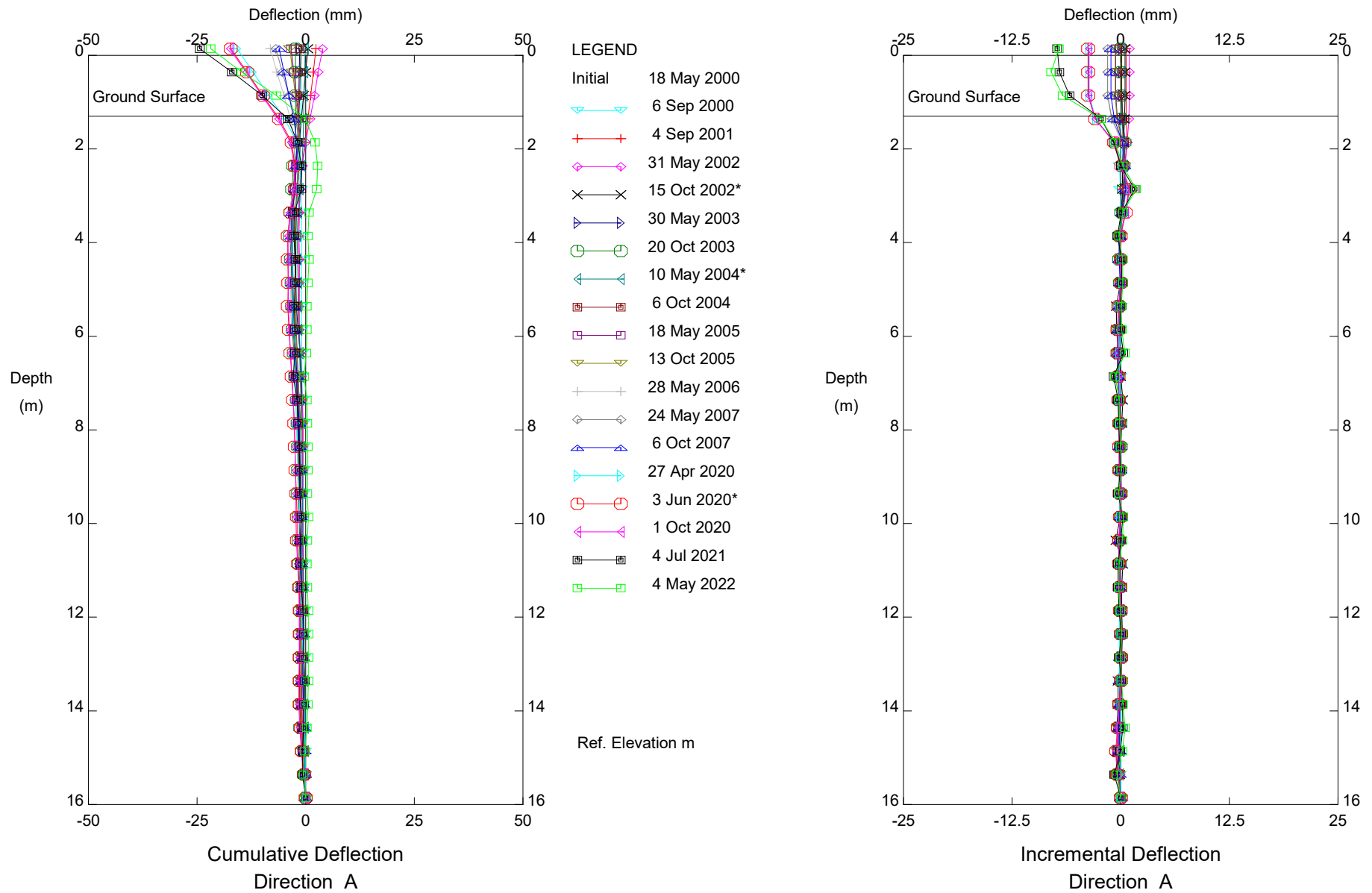


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 Checked by: LC

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 Figure 1 - Site Plan

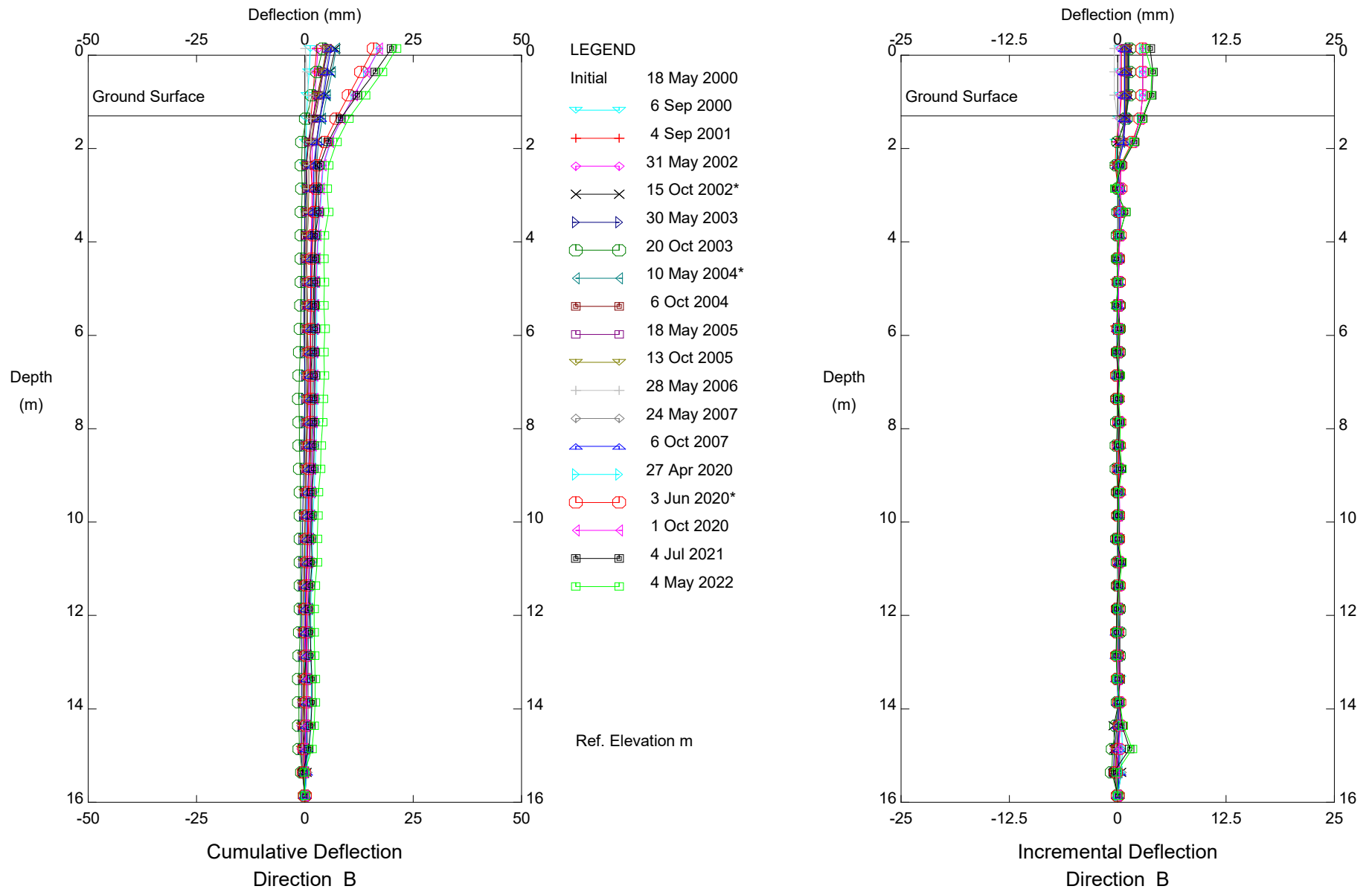
Figure No.
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Hwy 33:04, Highway 33:04 Willow Bend Slide, Inclinometer SI#97-3

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



Hwy 33:04, Highway 33:04 Willow Bend Slide, Inclinometer SI#97-3

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STANDPIPE PIEZOMETER DATA

