26 January, 2001
KX03904

Director of Public Works
City of Quesnel
405 Barlow Avenue
Quesnel, BC V2J 2C3

Dear Mr. Jack Marsh

RE: PROJECT UPDATE
WEST QUESNEL STABILITY STUDY

1.0 INTRODUCTION

This purpose of this letter is to provide the City of Quesnel (CoQ) with a project update for the West Quesnel Stability Study on which work was commenced by AMEC Earth & Environmental Limited (AMEC) in September, 2000. The following tasks have been completed:

- Inclinometer installations (SI) SI-1 through SI-7
- Survey of SI locations
- An initial reading and two additional readings of each SI with the exception of SI-4 and SI-5 which have had three additional readings completed

Figure 1 shows the approximate locations of SI-1 through SI-7.

2.0 SI READING SCHEDULE

Table 1 summarizes the SI reading schedule to date:

Table 1: SI Reading Schedule

Borehole:	SI-1	SI-2	SI-3	SI-4	SI-5	SI-6	SI-7
Location	Avery Lane (Lower Elevation)	Avery Lane (Higher Elevation)	Abbott Drive (near Bettcher)	Voyager School	Abbott Drive (near Flamingo)	Dixon Street	Pierce Crescent
A_0* Groove Azimuth	120°	120°	120°	110°	110°	105°	100°
Depth Read	142 ft, 43 m	244 ft, 74 m	334 ft, 102 m	504 ft, 154 m	474 ft, 145 m	502 ft, 153 m	410 ft, 125 m
Finish of Installation/ Grouting	25 Oct., 2000	23 Oct., 2000	27 Oct., 2000	13 Oct., 2000	5 Oct., 2000	16 Oct., 2000	19 Oct., 2000
Initial Reading Date	21 Nov., 2000	21 Nov., 2000	21 Nov., 2000	3 Nov., 2000	28 Oct., 2000	22 Nov., 2000	22 Nov., 2000
First Reading:	7 Dec., 2000	7 Dec., 2000	6 Dec., 2000	24 Nov., 2000	24 Nov., 2000	6 Dec., 2000	7 Dec., 2000
Second Reading	12 Jan., 2001	11 Jan., 2001	12 Jan., 2001	6 Dec., 2000	6 Dec., 2000	11 Jan., 2001	12 Jan., 2001
Third Reading				11 Jan., 2001	12 Jan., 2001		

*The A_0 Groove azimuth refers to the direction of the A channel groove in the SI casing which is aligned parallel to the downslope dip of the slope

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3.0 SI READING RESULTS

Attached in Appendix A are the results of the SI readings to date. The SI readings are presented in cumulative and incremental plots with a 50 mm horizontal scale. The incremental plots show the individual changes in inclination of the casing at each reading elevation. The cumulative plots are constructed by adding together the incremental changes starting from the bottom of the hole and show the overall apparent movement of the SI casing at each elevation relative to the bottom of the hole.

Two channels of readings are presented: A and B. The A channel is oriented to be "downslope" whereas the B channel is across slope. The actual orientation of each of the casings is shown on Figure 1 and summarized in Table 1. Positive movements on the Cumulative Plots are downslope on Channel A and across the slope to the right when looking downhill for Channel B.

Table 2 presents AMEC's preliminary observations based on the limited data gathered to date.

Table 2: SI Data Observations

SI	Location	SI Data Observations
SI-1	Avery Lane (Lower Installation)	Deformations of up to 7 mm have been observed from depths ranging from 12 to 29 m. There was little or no net deflection of the top of the casing. These changes are consistent with settlement and at this time do not appear to indicate shear movements.
SI-2	Avery Lane (Upper Installation)	A downhill deflection of 1 mm was observed at about 60 m depth.
SI-3	Abbott Drive (near Bettcher Street)	Deformations of up to 2 mm were observed at about 38 m depth and deformations of up to 1 mm were observed at about 54 m depth.
SI-4	Voyager School	Deformations of up to 4 mm were observed at about 50 m depth. Please note that there is an instrument error in the lower portion of the data set for 11 January, 2000.
SI-5	Abbott Drive (near Flamingo Drive)	Significant deflections of up to 50 mm were observed in a zone from 36 to 93 m depth. The profile of the cumulative deflection plot indicates that SI-5 may be experiencing vertical compression or settlement.
SI-6	Dixon Street	Deformations of up to 3 mm were observed at about 28 m depth. There was also an apparent but gradual systematic shift evident on the plots. This may be due to a depth, offset, rotation or temperature effect.
SI-7	Pierce Crescent	Deformations of up to 2 mm were observed at about 68 m depth. There was also an apparent but gradual systematic shift evident on the plot of the data set for 12 January, 2000. This may be due to a depth, offset, rotation or temperature effect.

AMEC emphasizes to the CoQ that the readings to date have shown relatively small displacements (with the exception of SI-5) and should be considered very preliminary. Due to the extreme depth of the installation and winter monitoring conditions it is likely that some of the preliminary data may be showing the effects of temperature variation, grout casing adjustment instrument drift, depth offset and/or rotation errors. AMEC has presented the raw data in the attached plots and has not applied any corrections. Future readings will allow AMEC to isolate

and apply corrections for these factors and get a true picture of how much of the SI deformation may be attributable to lateral ground movement.

4.0 FUTURE WORK

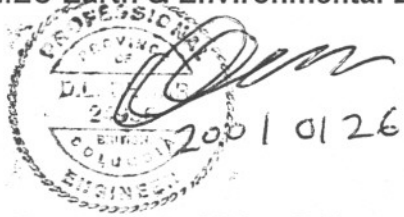
Given the nature of the movements observed to date, AMEC expects to monitor the SI's for at least another six months (specifically during the spring when landslide movements are typically highest) before proceeding to Stage 2 of the West Quesnel Stability Study, the more detailed soils investigation.

5.0 CLOSURE

Thank you for the opportunity to provide assistance in this matter. Should you have any questions of comments please contact Mr. Nick Polysou at 1-250-564-3243.

Respectfully submitted,

AMEC Earth & Environmental Limited



Mr. Doug Dewar, M.Sc., P.Eng.
Geotechnical Engineer

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Principal Engineer

Mr. Nick Polysou, P.Eng.
Senior Geotechnical Engineer
Manager Prince George Region

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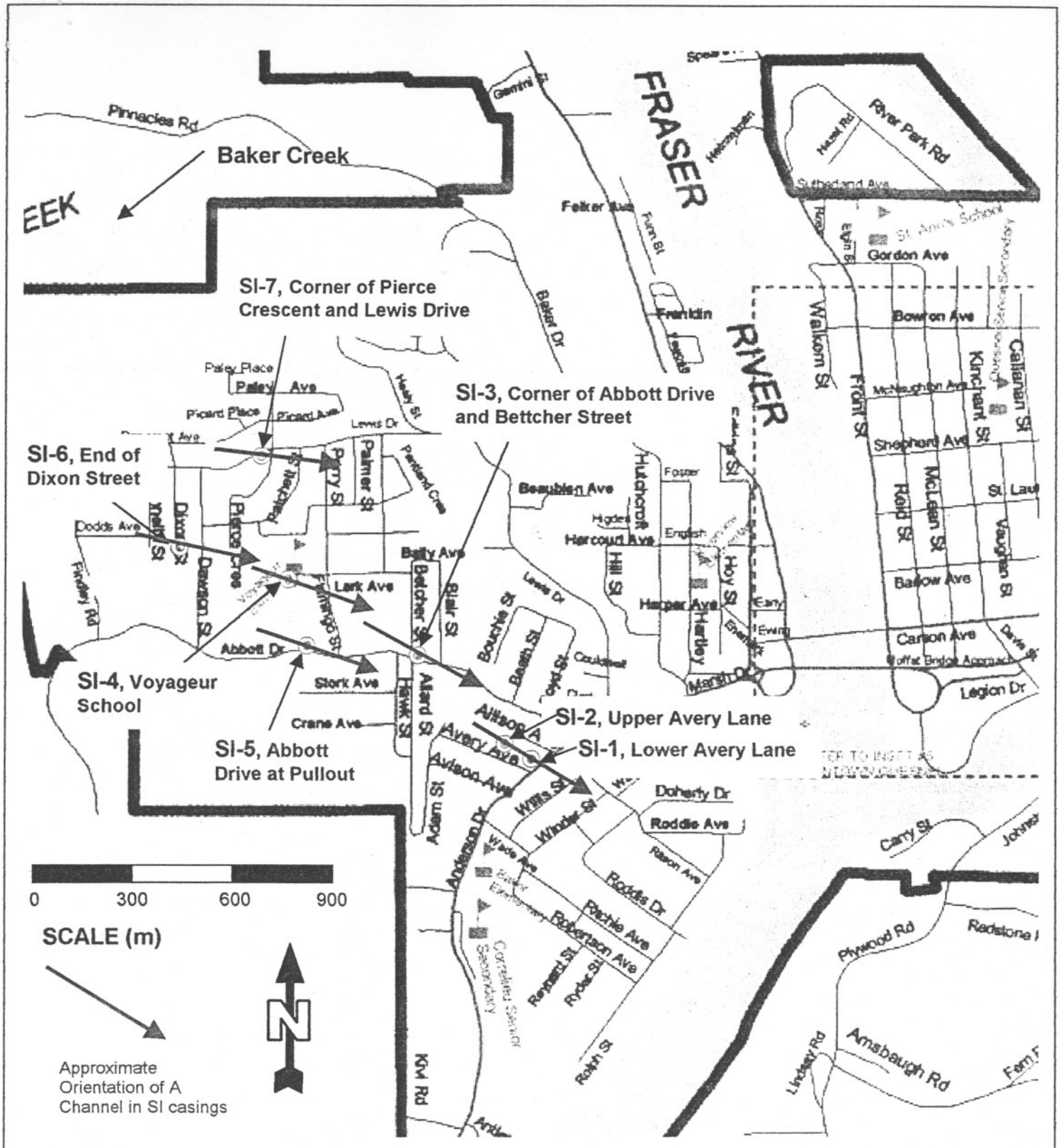


amec

City of Quesnel

West Quesnel Stability Study

Quesnel, BC

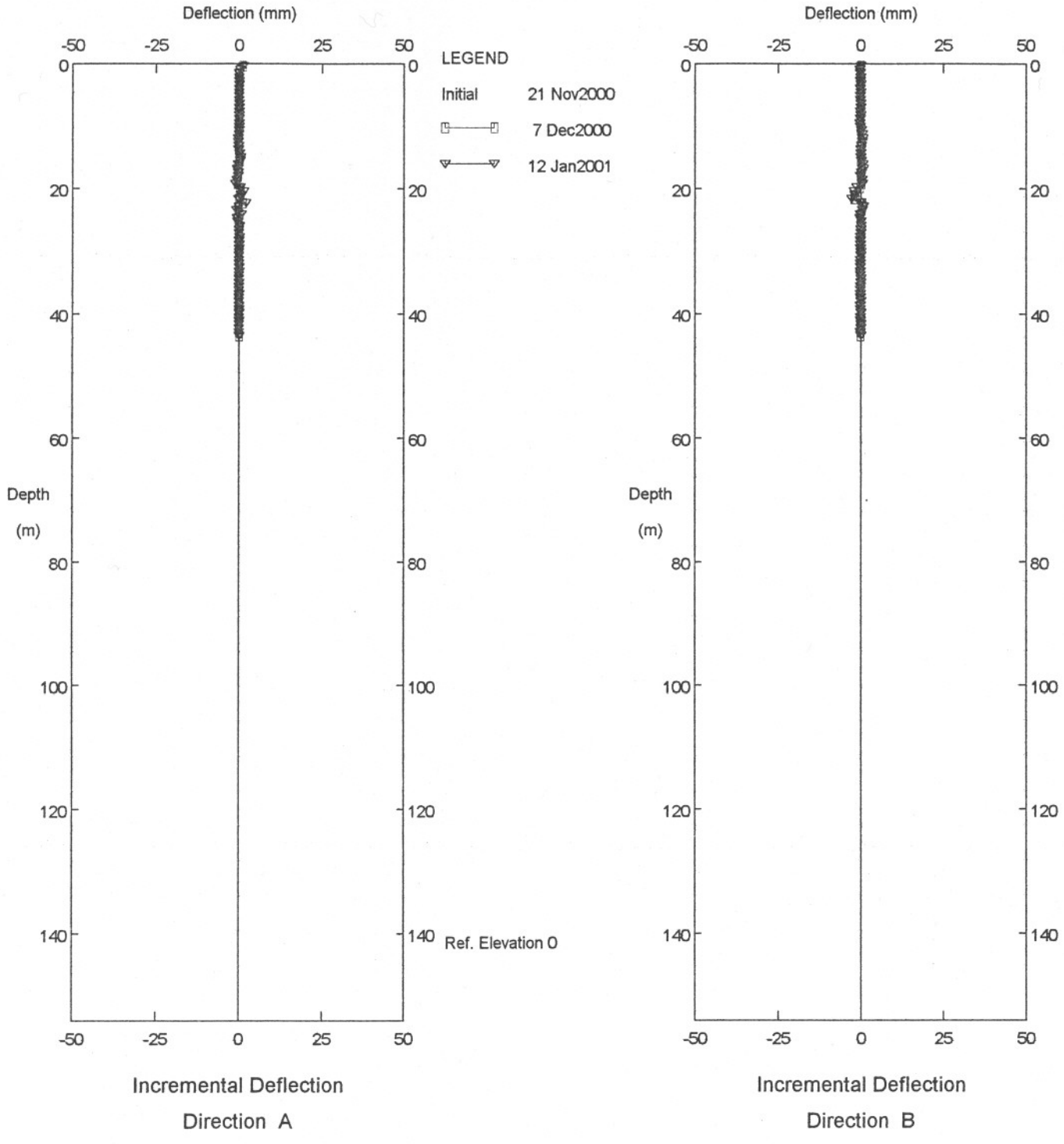
Figure 1: Slope Inclinometer (SI) Locations

DATE:	SCALE:	DRAWN BY:	PROJECT No: KX03904
Jan. 2001	NTS	HMN	

APPENDIX A

SI READING RESULTS

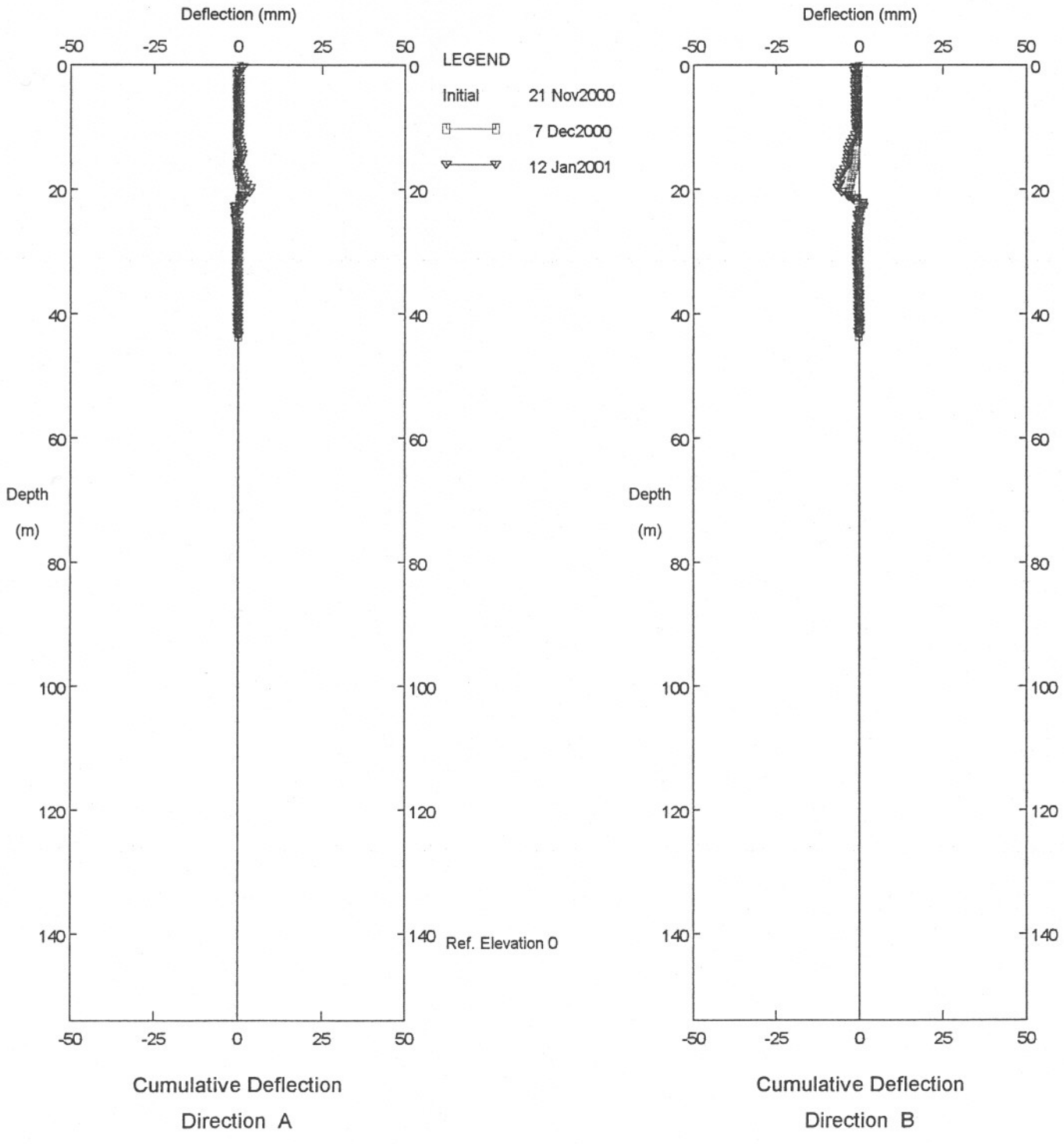
AMEC Earth and Environmental - Pr. George



KX03904 W. Quesnel Stability Study, Inclinometer SI-1

Lower Avery Lane

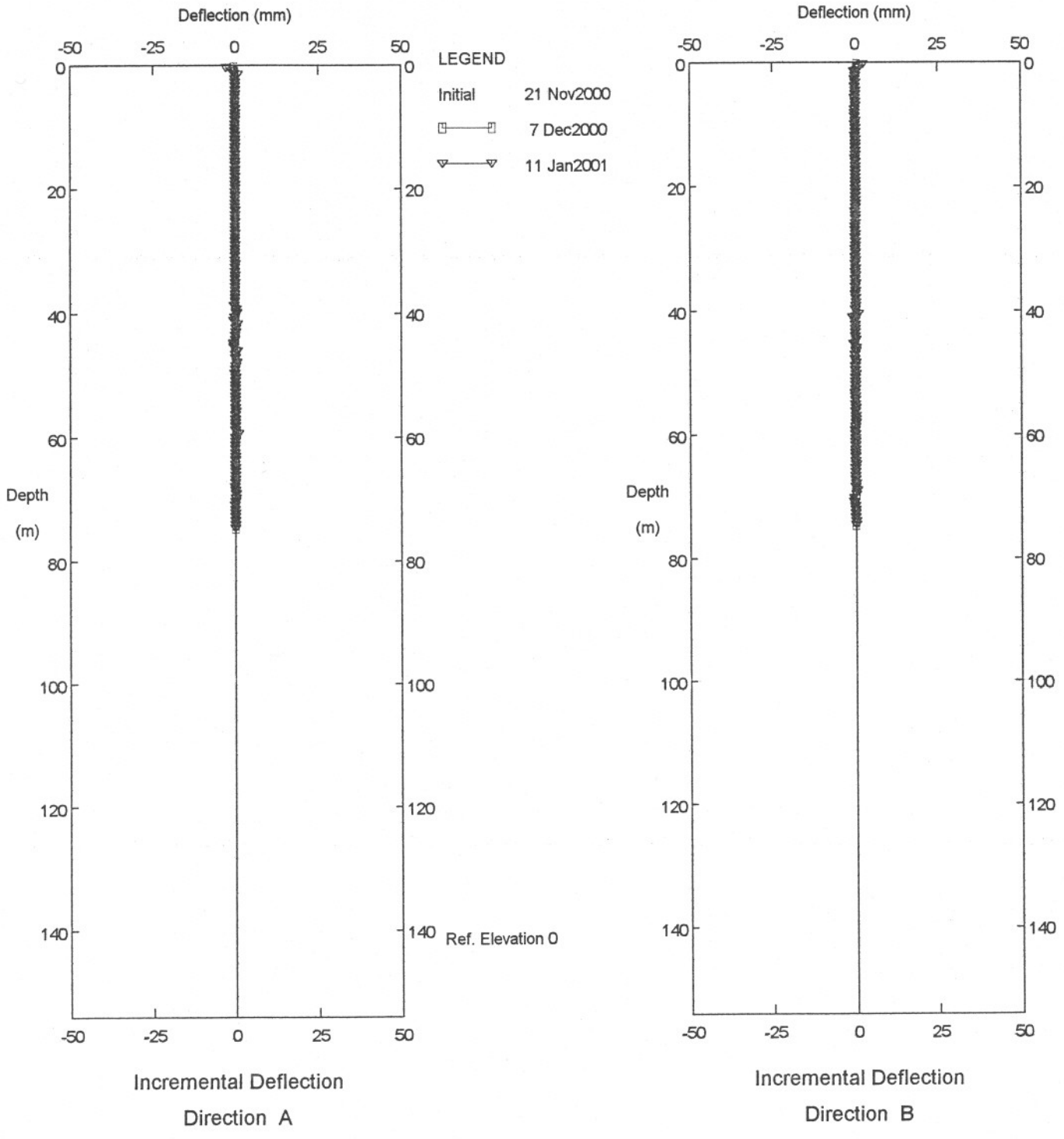
AMEC Earth and Environmental - Pr. George



KX03904 W. Quesnel Stability Study, Inclinometer SI-1

Lower Avery Lane

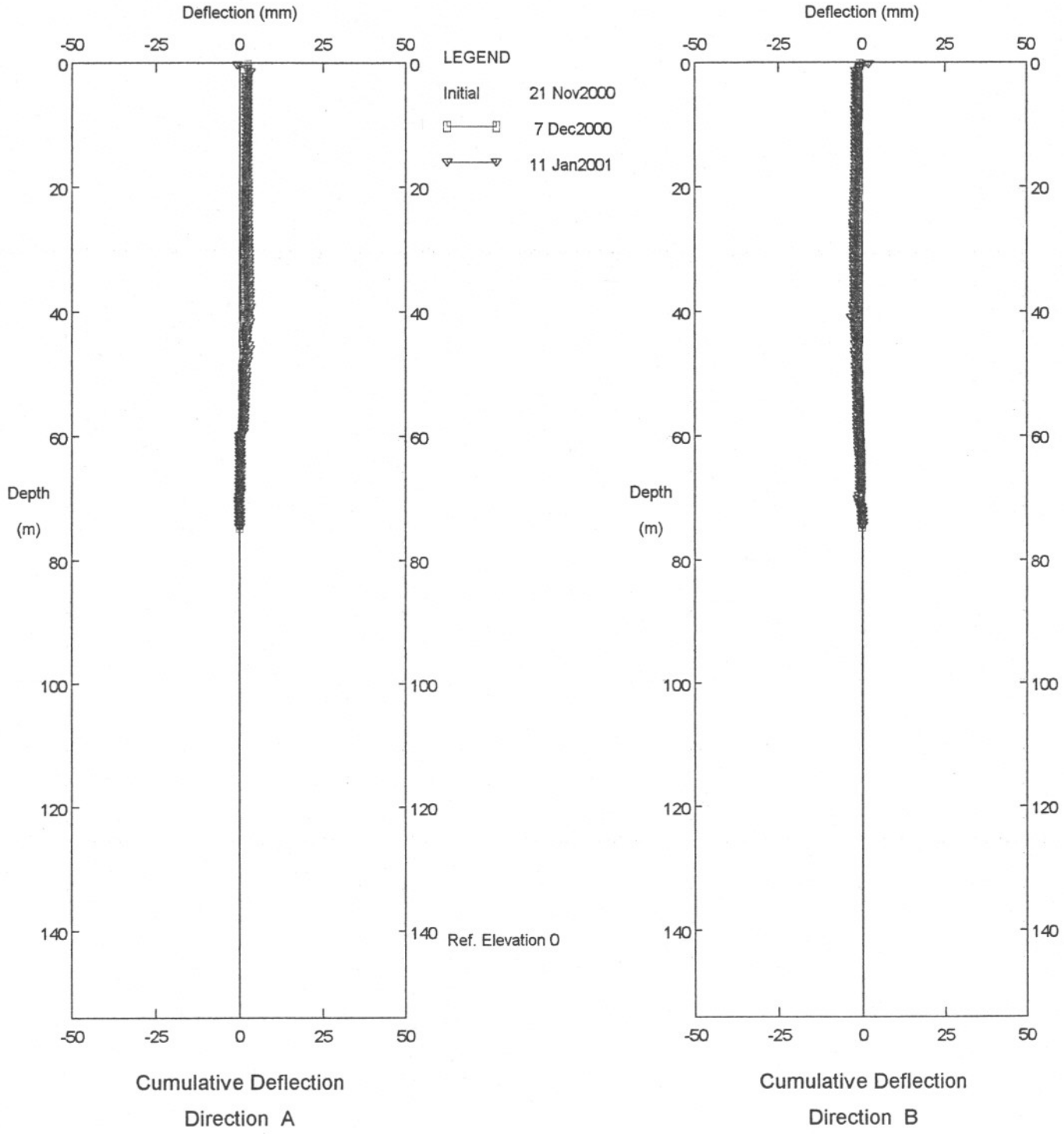
AMEC Earth and Environmental - Pr. George



KX03904 W. Quesnel Stability Study, Inclinometer SI-2

Upper Avery Lane

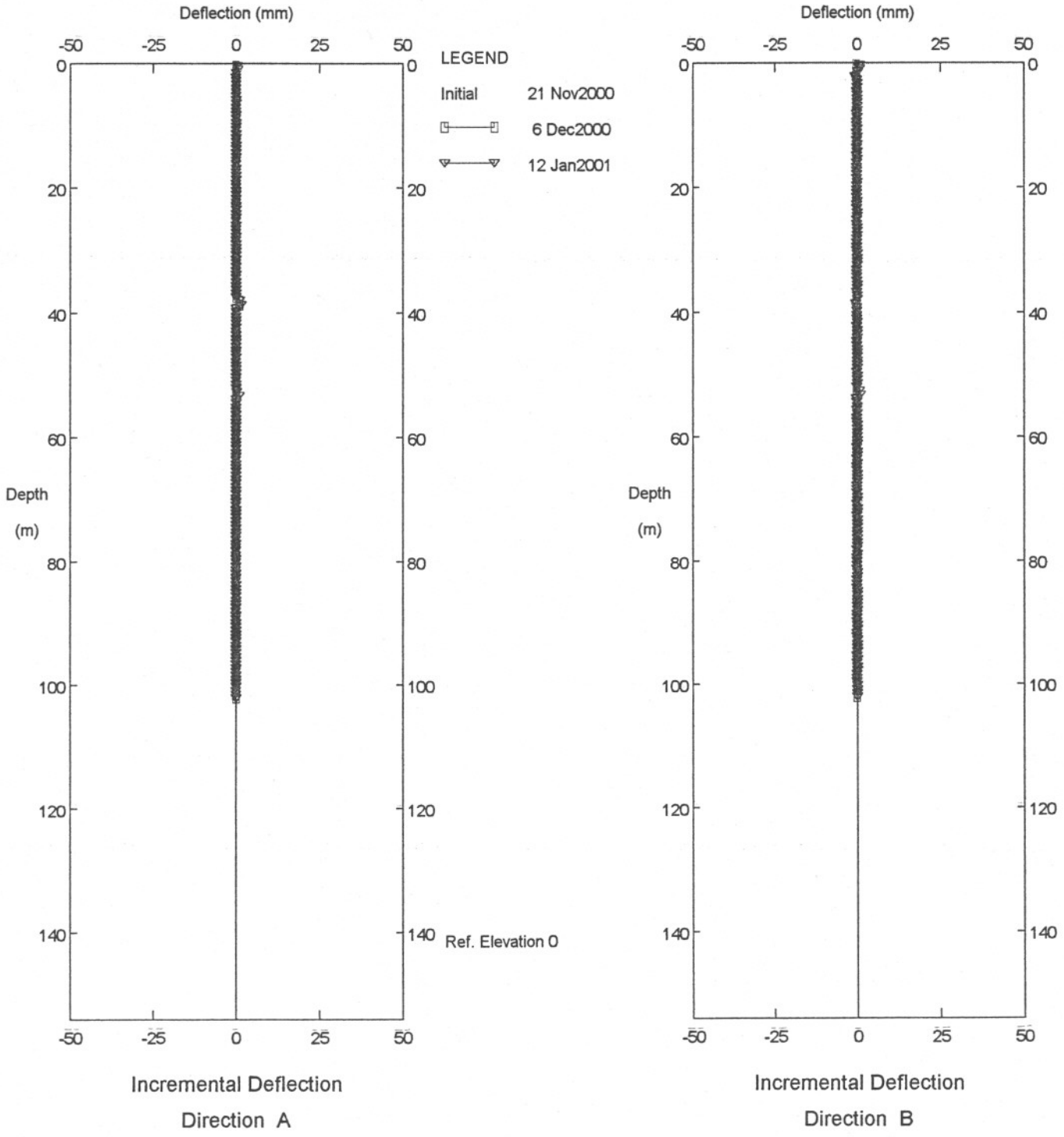
AMEC Earth and Environmental - Pr. George



KX03904 W. Quesnel Stability Study, Inclinometer SI-2

Upper Avery Lane

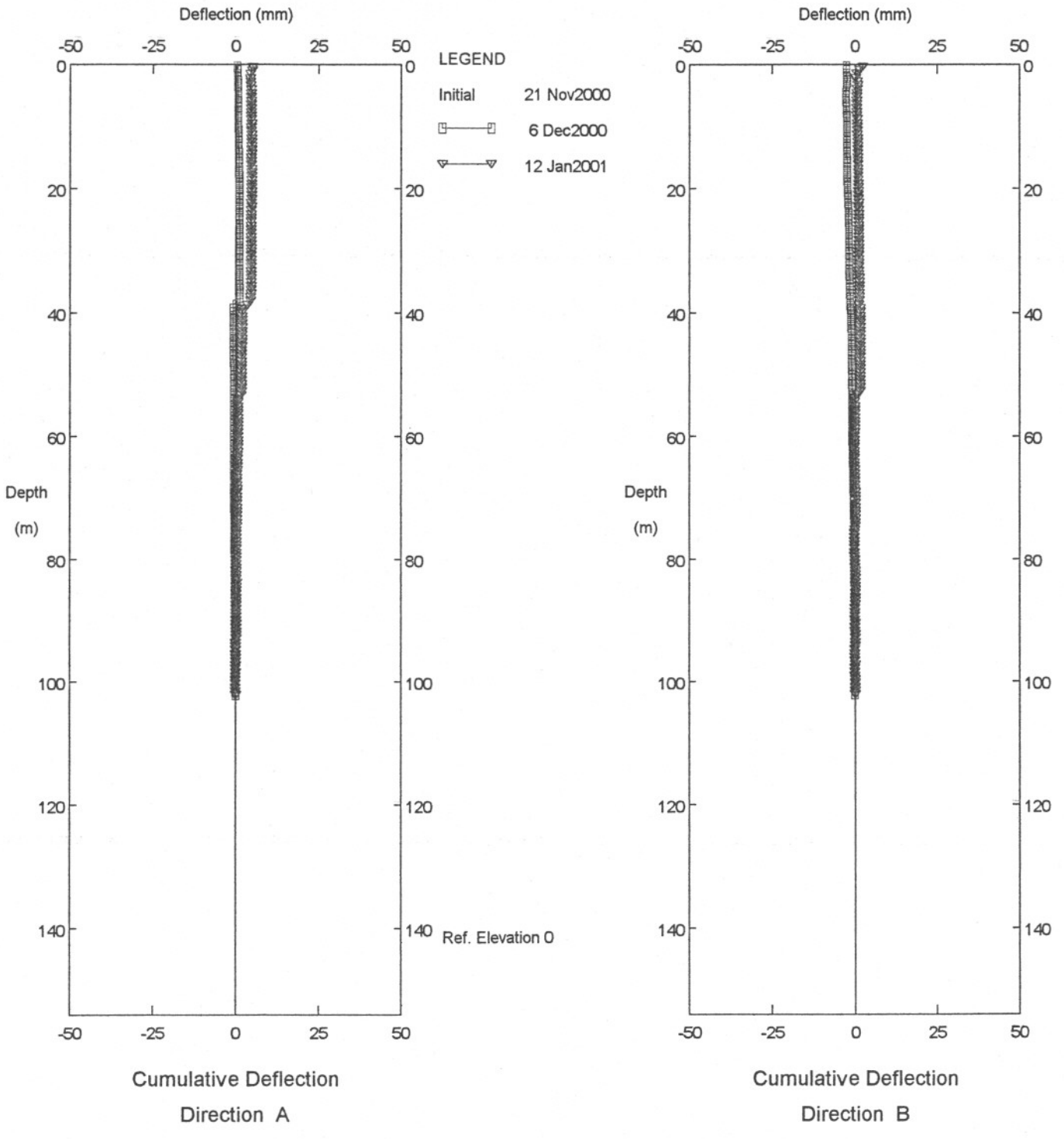
AMEC Earth and Environmental - Pr. George



KX03904 W. Quesnel Stability Study, Inclinometer SI-3

Abbott Drive near Bettcher

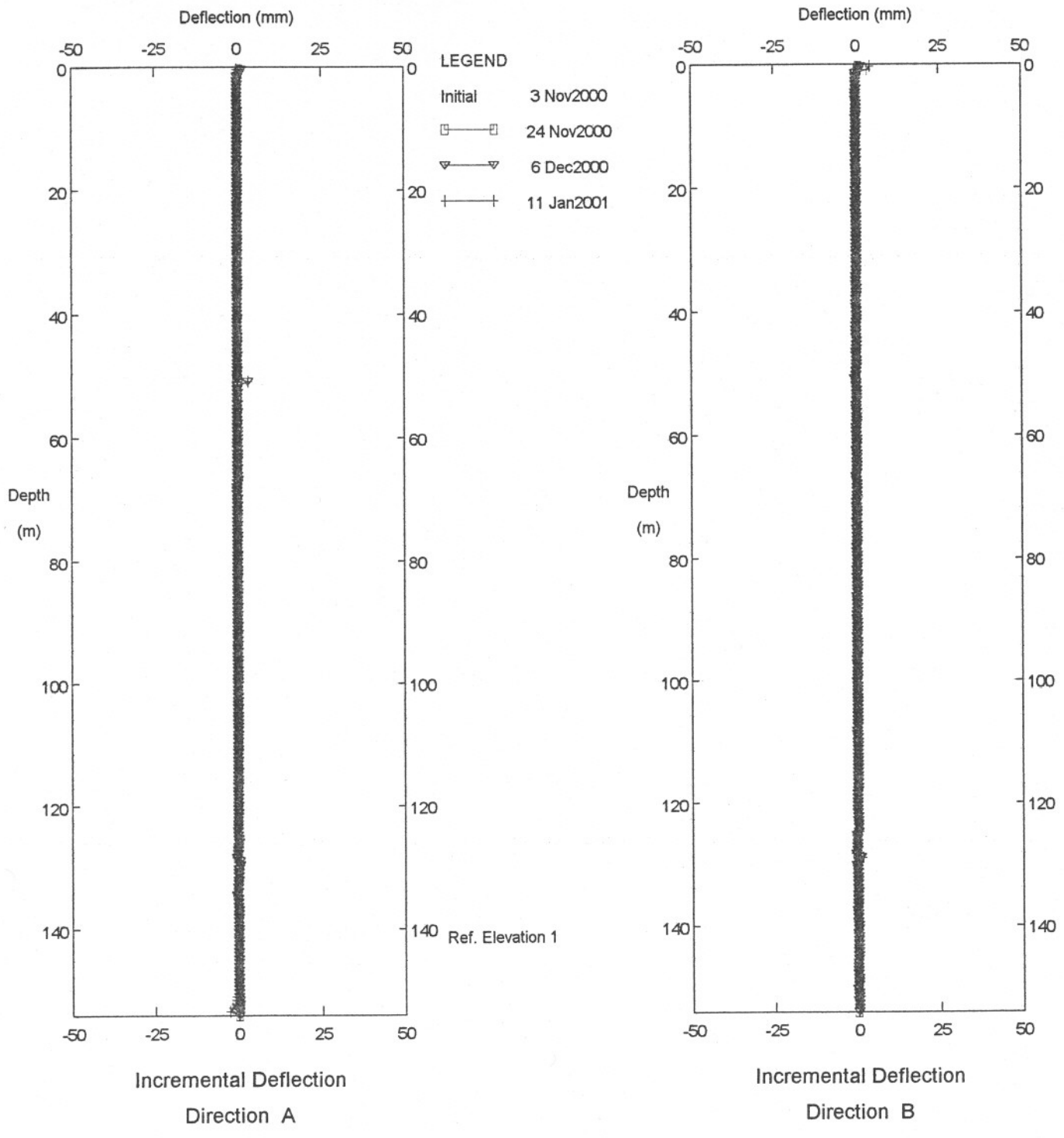
AMEC Earth and Environmental - Pr. George



KX03904 W. Quesnel Stability Study, Inclinometer SI-3

Abbott Drive near Bettcher

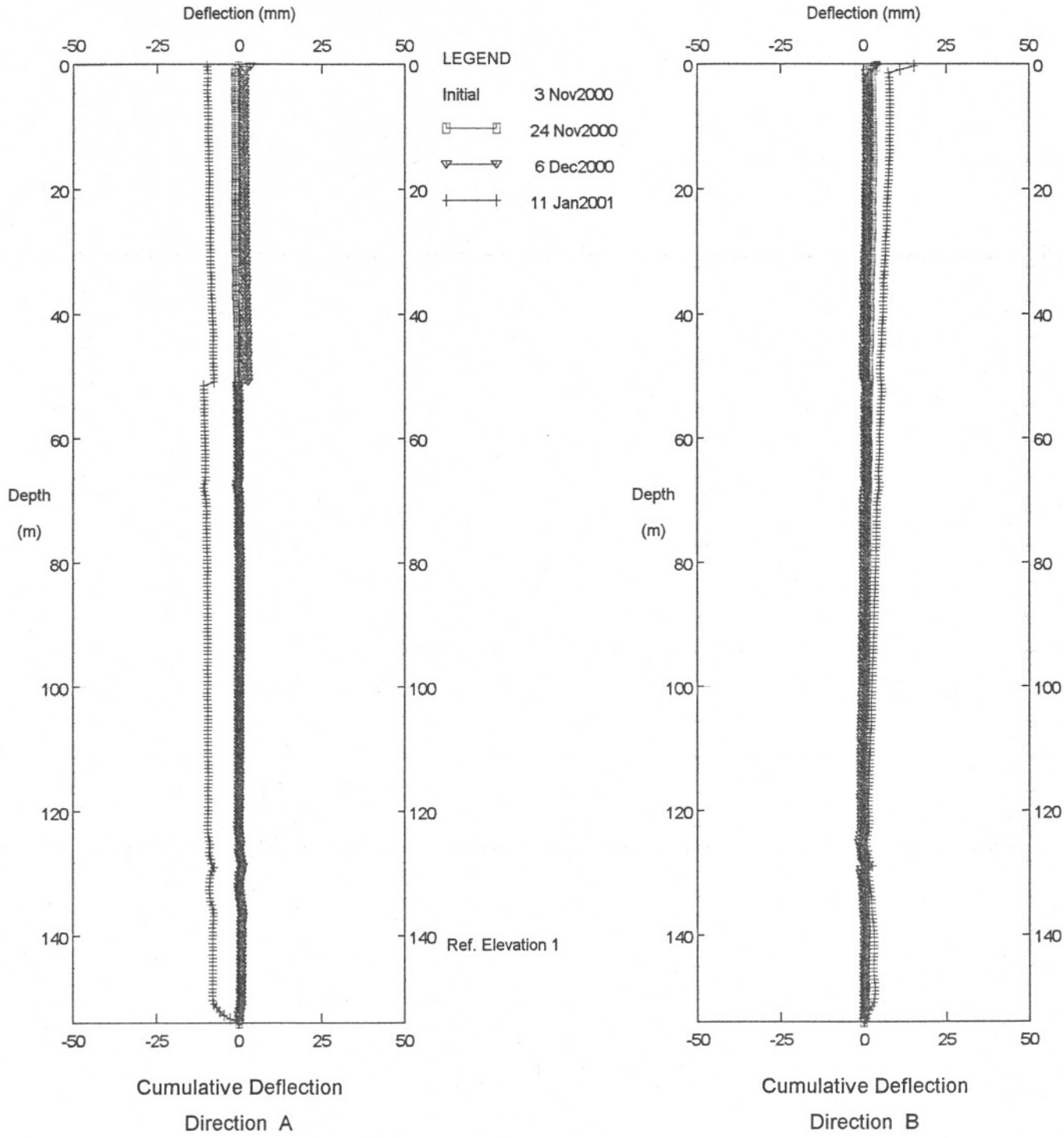
AMEC Earth and Environmental - Pr. George



KX03904 W.Quesnel Stability Study, Inclinometer SI-4

Voyageur School

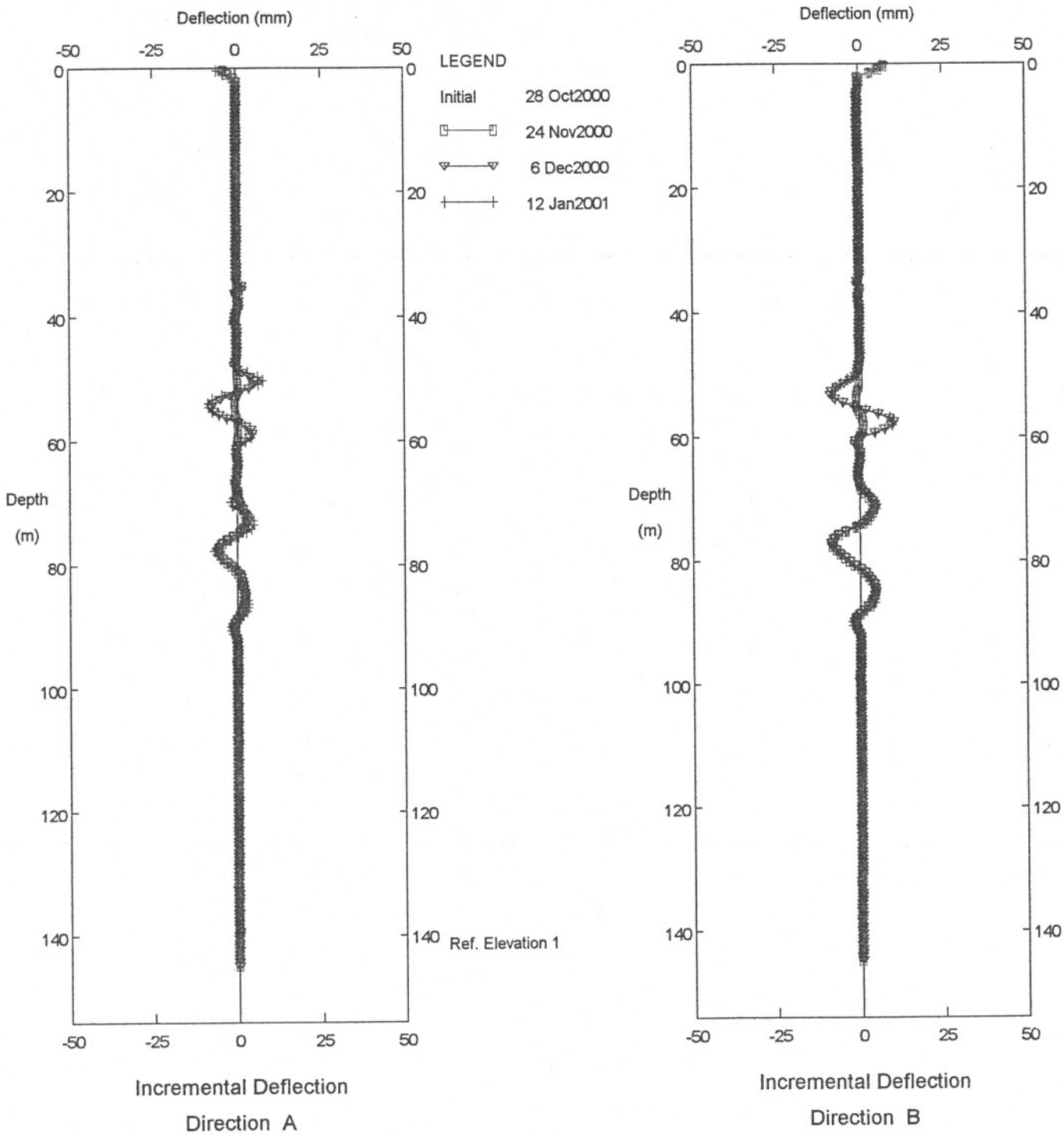
AMEC Earth and Environmental - Pr. George



KX03904 W.Quesnel Stability Study, Inclinometer SI-4

Voyageur School

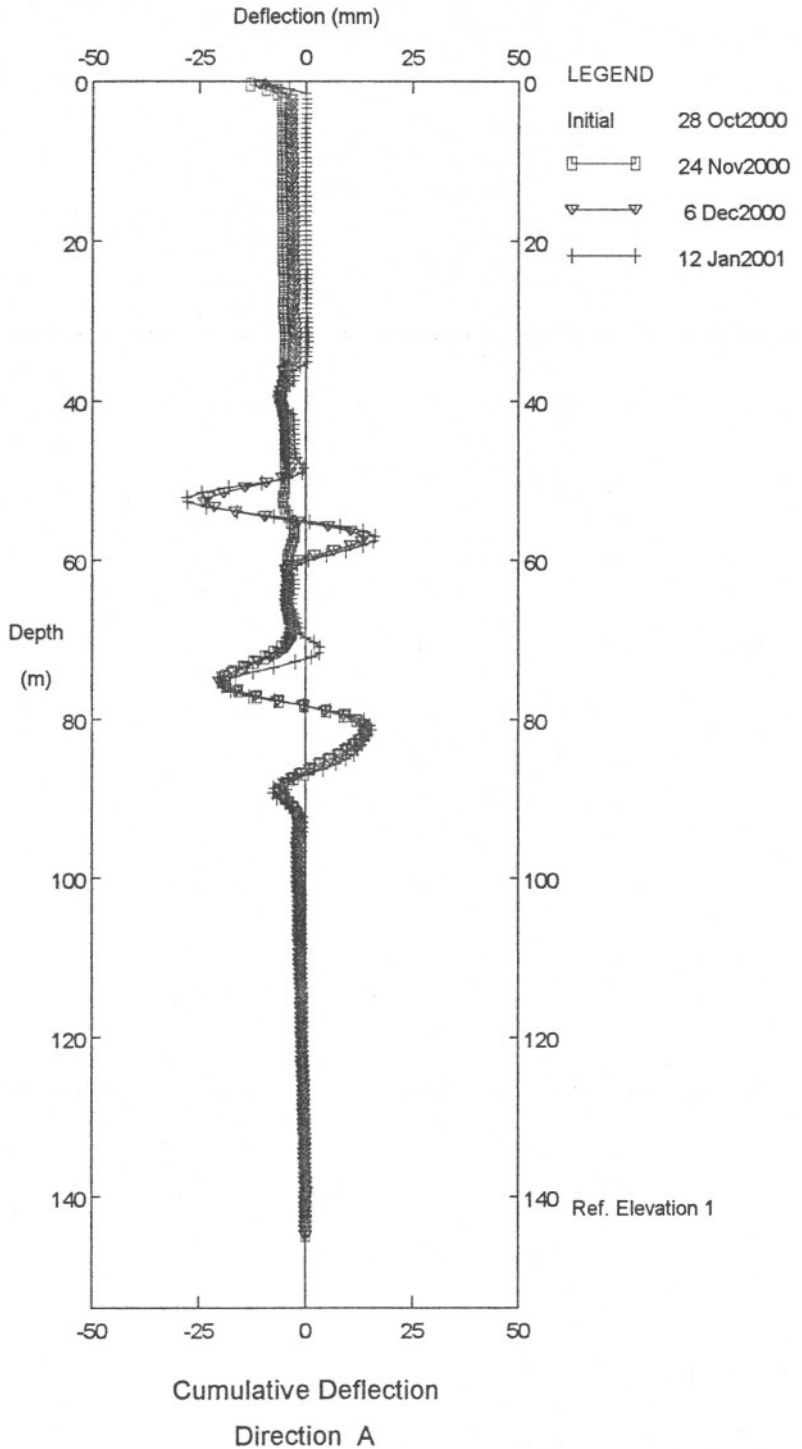
AMEC Earth and Environmental - Pr. George



KX03904 W. Quesnel Stability Study, Inclinometer SI-5

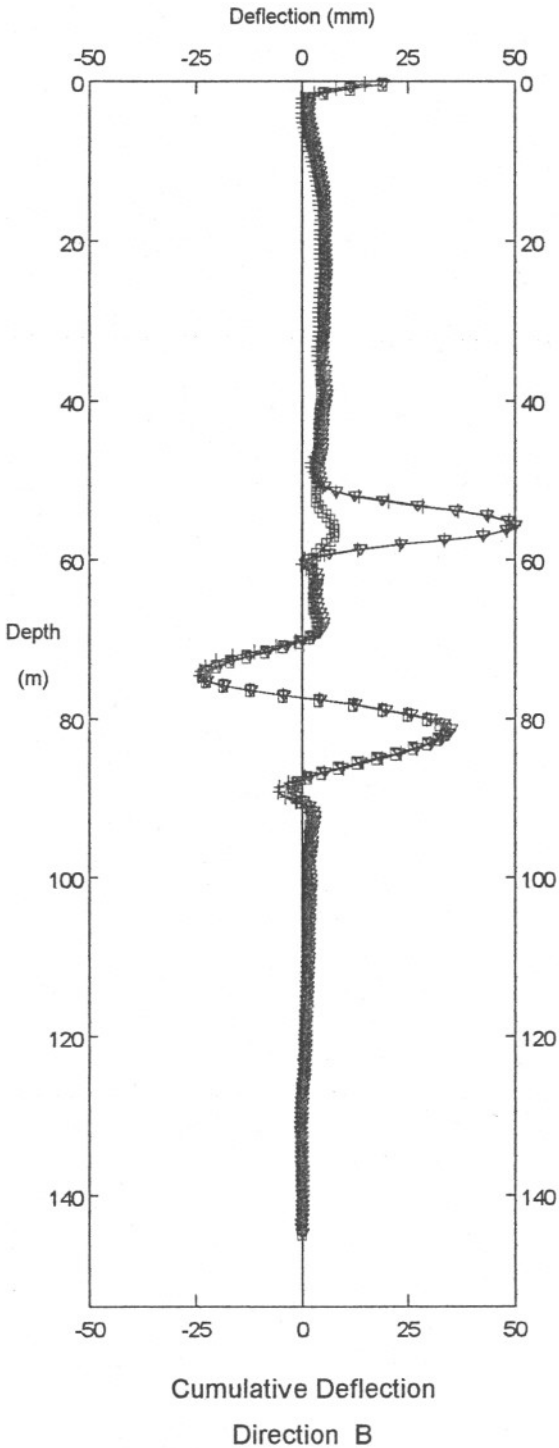
Abbott Drive

AMEC Earth and Environmental - Pr. George



Cumulative Deflection

Direction A



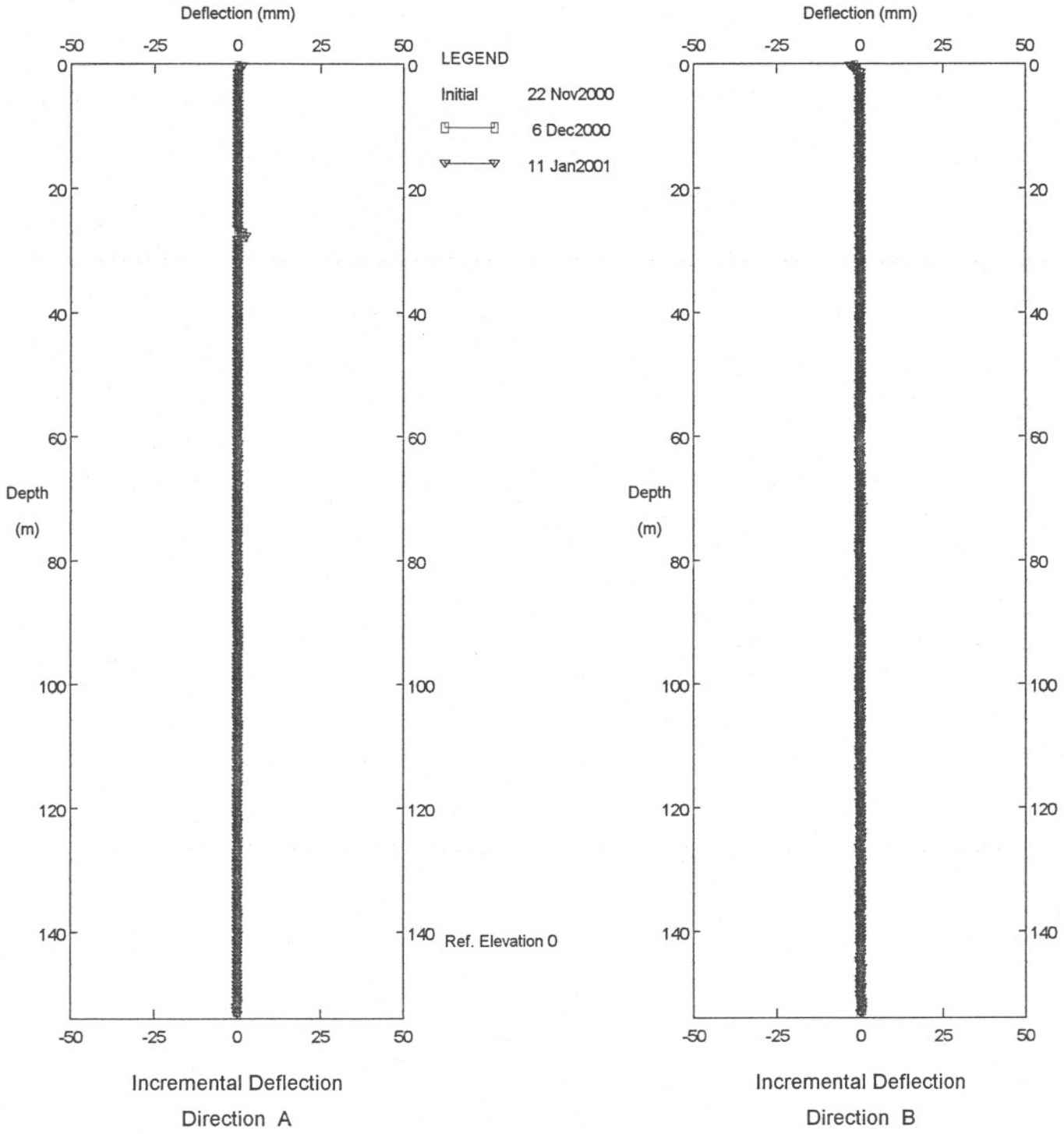
Cumulative Deflection

Direction B

KX03904 W. Quesnel Stability Study, Inclinometer SI-5

Abbott Drive

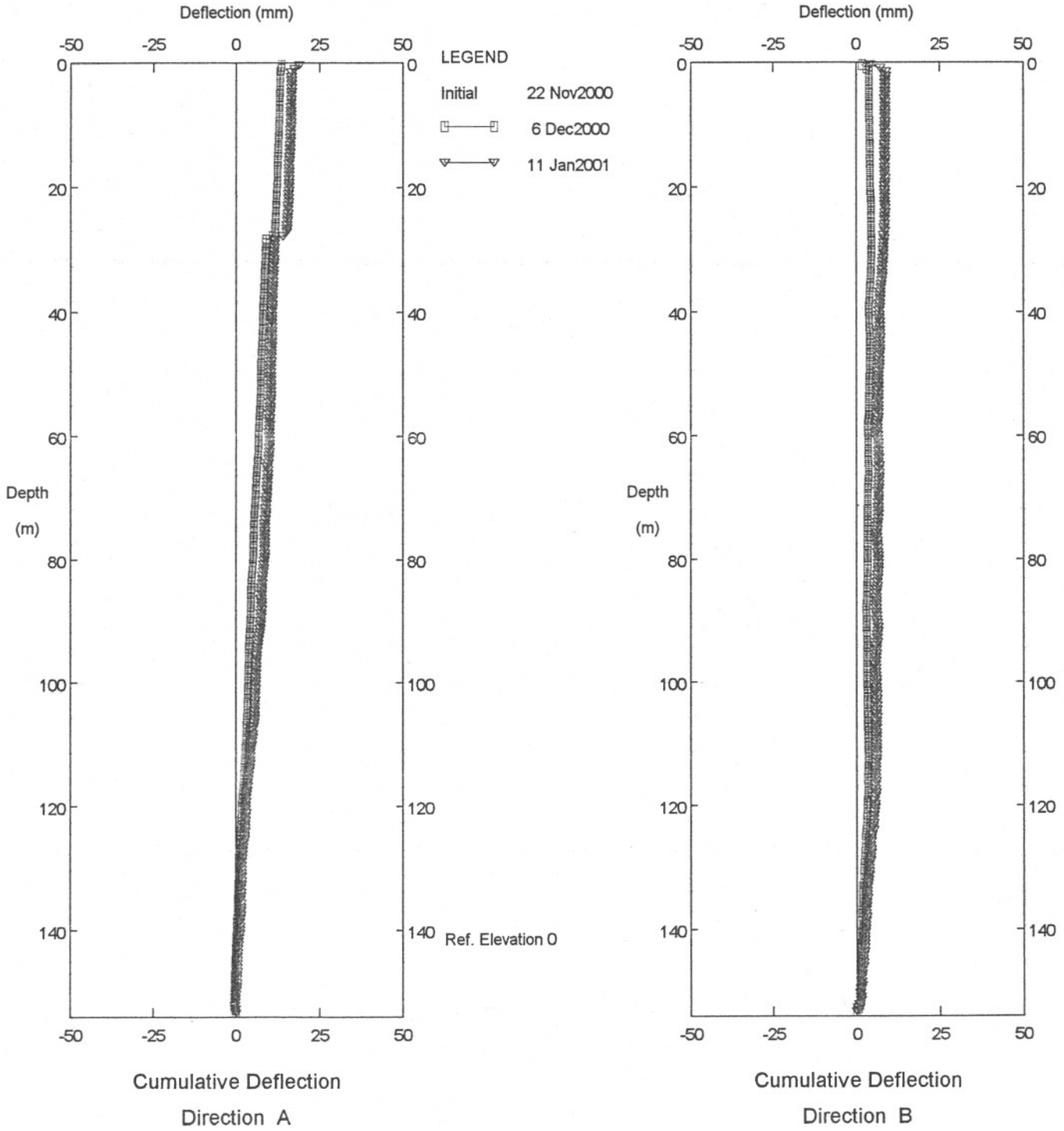
AMEC Earth and Environmental - Pr. George



KX03904 W.Quesnel Stability Study, Inclinometer SI-6

End of Dixon Street

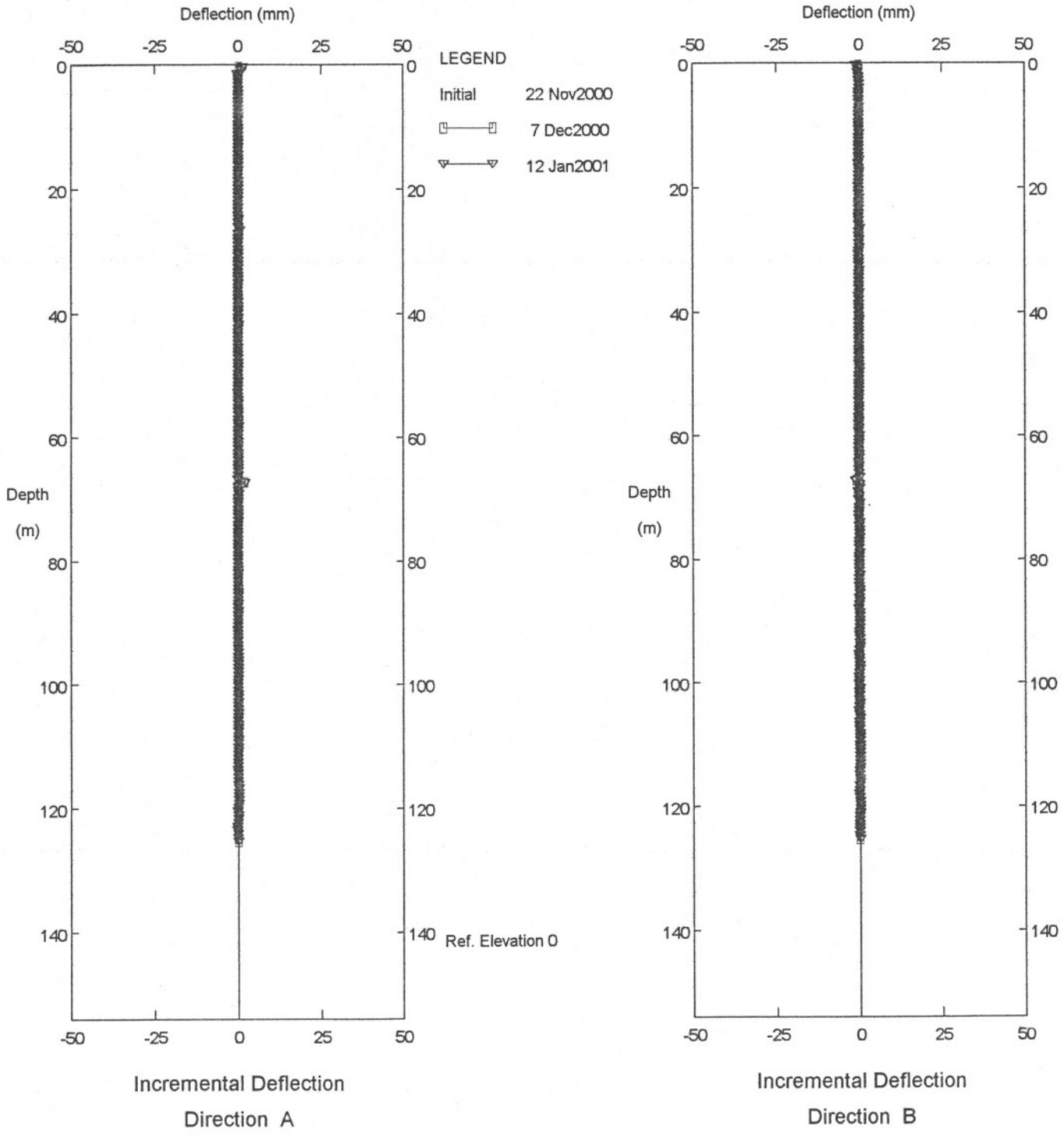
AMEC Earth and Environmental - Pr. George



KX03904 W.Quesnel Stability Study, Inclinometer SI-6

End of Dixon Street

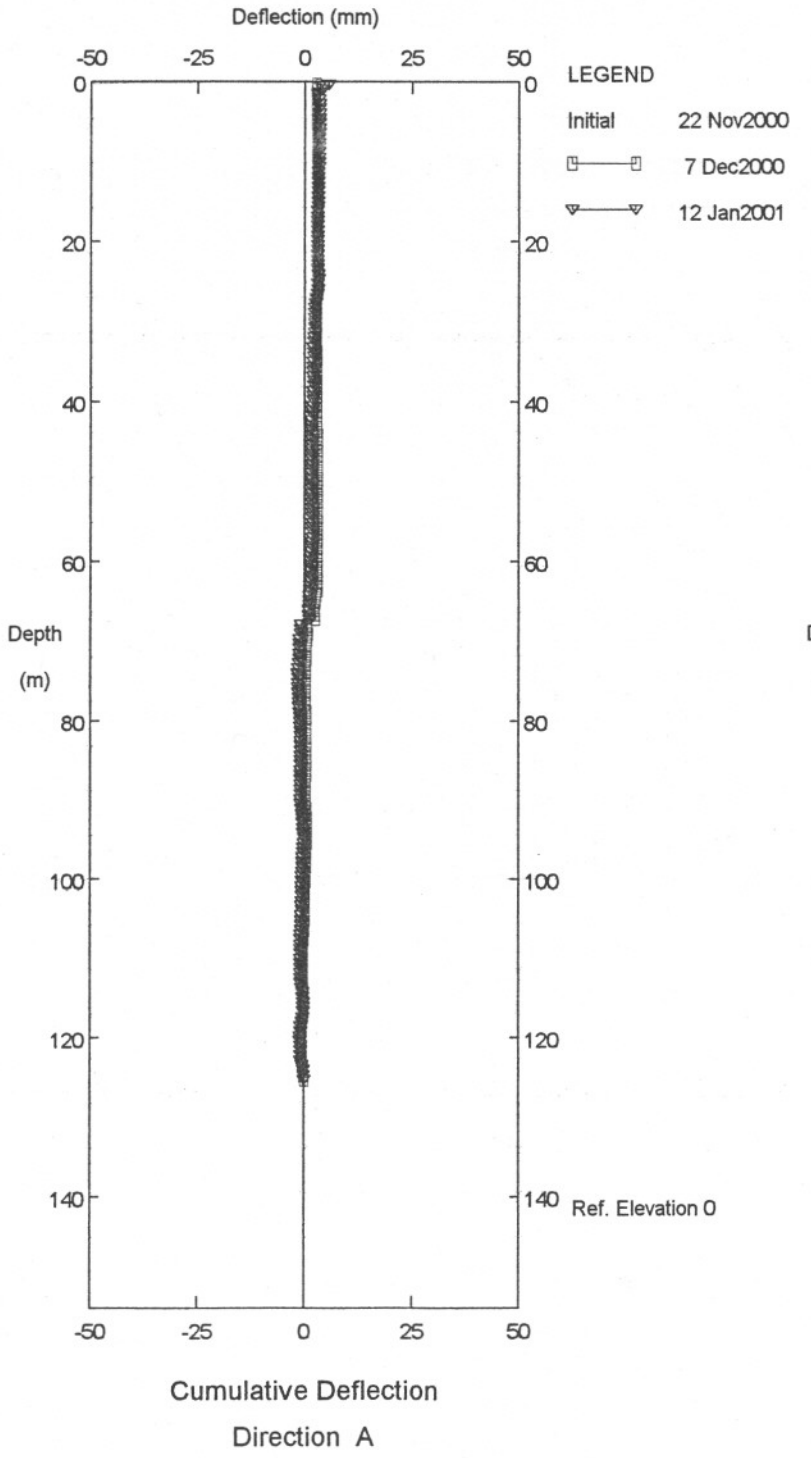
AMEC Earth and Environmental - Pr. George



KX03904 W. Quesnel Stability Study, Inclinometer SI-7

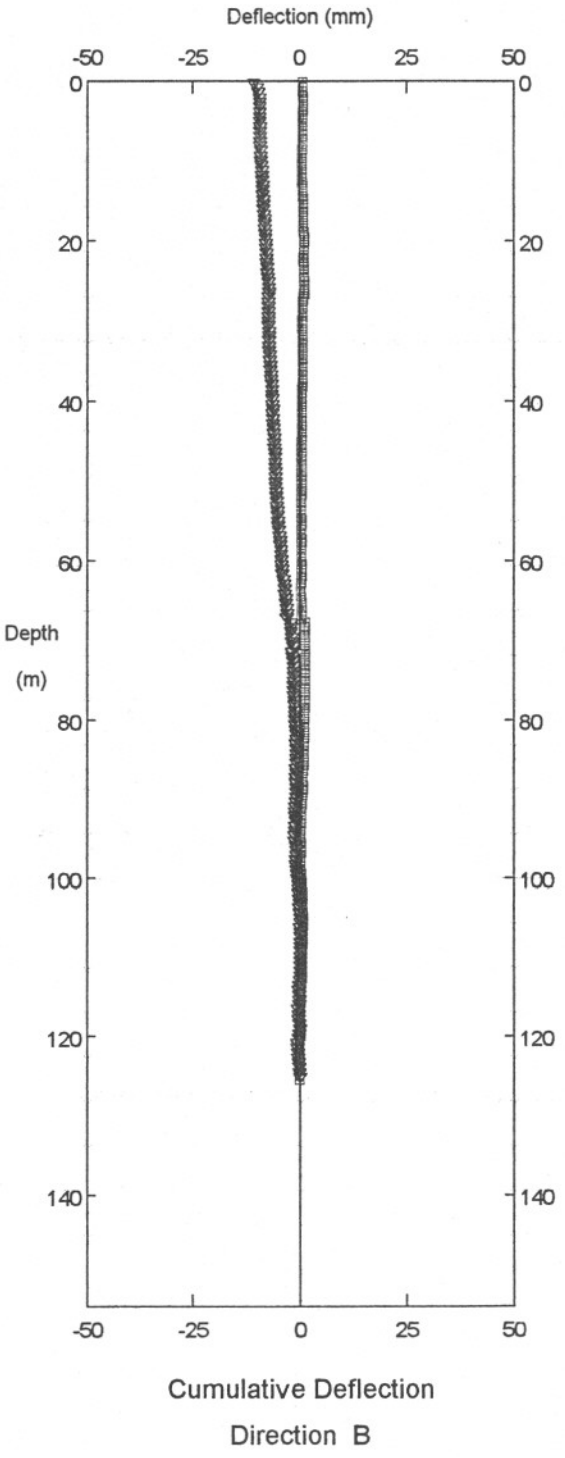
Pierce Crescent & Lewis Drive

AMEC Earth and Environmental - Pr. George



Cumulative Deflection

Direction A



Cumulative Deflection

Direction B

KX03904 W. Quesnel Stability Study, Inclinometer SI-7

Pierce Crescent & Lewis Drive