



April 6, 1993

BYA Project No. 54-247

Mr. George Wentz
Abalone Cove Technical Panel Administrator
City of Rancho Palos Verdes
30940 Hawthorne Boulevard
Rancho Palos Verdes, CA 90274

SUBJECT: Abalone Cove Landslide Monitoring Results.

Dear Mr. Wentz,

As requested, Bing Yen & Associates (BYA) completed another round of monitoring of the Abalone Cove Landslide instrumentation on March 31st. This letter presents a summary of those monitoring results.

The previous round of monitoring at the landslide was completed on March 15th of this year. Since that time, one slope inclinometer (ACL-7B) and two piezometer tips (ACL-8 tip #'s 2 & 3) have become inoperative due to continued landslide deformation. At the present time, two inclinometers (ACL-1 and ACL-3), sixteen piezometers, and two standpipes remain functional. Passage of the inclinometer sensor below a depth of 165 feet in ACL-3 has become increasingly difficult and this installation is therefore likely to become inoperative in the near future. In addition, five of the remaining sixteen pneumatic piezometer tips are located beneath the active slip surface. Most, if not all, of these five tips are likely to become inoperative within the next several months if the current rate of landslide movement persists.

Deformation plots for the two functional inclinometers (ACL-1 & ACL-3) are presented in Appendix A. Over the 15 day period since the previous round of monitoring was completed on March 15th the offsets in ACL-1 and ACL-3 have enlarged by 0.15" and 0.75", respectively. These results correspond to average rates of movement of approximately 3.5 inches per year for ACL-1 and 18 inches per year for ACL-3. This movement rate for ACL-3 is considerably higher than has been recorded in the past and may be attributable to sporadic - rather than continuous - movement of the landslide in that area in conjunction with the relatively short monitoring interval over which the displacement rate has been determined. The results for ACL-1 continue to show a steady reduction in the rate of movement for the southeastern portion of the landslide since a peak displacement rate of ≈ 10 inches per year was recorded in late January and early February.

It should be noted that there has been a slight shift in the direction of movement at

inclinometer ACL-3 over the last two to three months. Prior to January of 1993, the direction of movement was 15° west of south while more recently it has averaged nearly due south. This change may reflect different sensitivities to rainfall for the various upslope or driving portions of the failure.

The status of the various inclinometers along with the depth, elevation, magnitude and bearing of the recorded offsets are summarized in Table 1. The locations of the inclinometers are shown along with the directions of the recorded displacements in Figure 1. A displacement summary for inclinometer ACL-3 is presented in Figure 2, while a summary of the rainfall records for the Palos Verde area from Los Angeles County Flood Control District Station 1011C is presented in Figure 3.

As indicated previously, sixteen of the piezometers installed within the landslide remain functional. Summary plots for these piezometers - and two standpipes - are presented in Appendix B. The alignments of the cross sections which are inset on these plots are shown in Figure 1. The latest measurements generally continue to indicate a gradual recovery to the lower piezometric levels which existed prior to the heavy rainfall of last December and January.

Currently no further monitoring of the Abalone Cove instrumentation is scheduled - please let me know if you would like additional measurements taken. I hope this information is helpful to the City and the members of the Technical Panel. Please do not hesitate to contact the undersigned if you have any comments or questions.

Sincerely,
BING YEN & ASSOCIATES, INC.

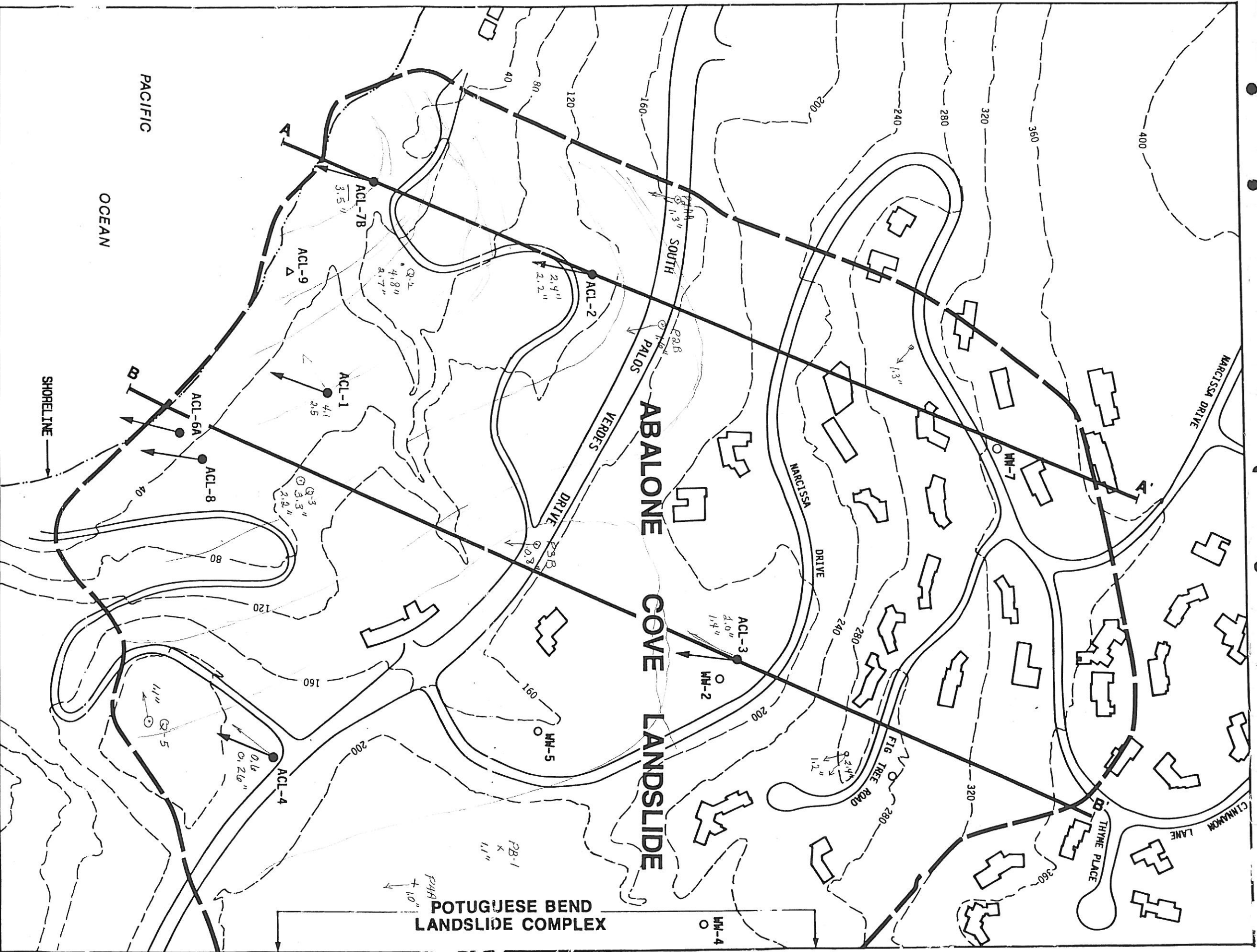
A handwritten signature in black ink, appearing to read "Glenn D. Tofani". The signature is fluid and cursive, with the first name "Glenn" being the most prominent.

Glenn D. Tofani, RCE/REA
Vice President

TABLE 1. STATUS OF ABALONE COVE SLOPE
INCLINOMETERS - AS OF APRIL 1993.

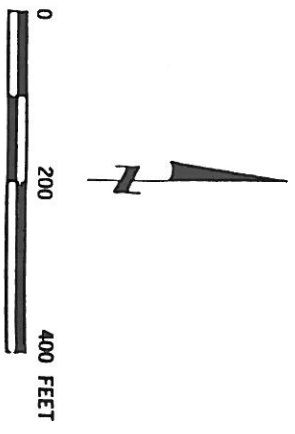
SLOPE INCLINOMETER	DEPTH TO OFFSET	ELEVATION OF OFFSET	TOTAL DISPLACEMENT	DIRECTION OF MOVEMENT	STATUS ¹
ACL-1	150 FT.	-85 FT.	4.0 INCHES	S20°W	FUNCT.
ACL-2	55 FT.	50 FT.	1.7+ INCHES	S10°W	DEST.
ACL-3	170 FT.	0 FT.	2.8 INCHES	S00°W	FUNCT.
ACL-4	235 FT.	-55 FT.	2.2+ INCHES	S20°W	DEST.
ACL-6A	70 FT.	-55 FT.	0.6+ INCHES	S10°W	DEST.
ACL-7B	80 FT.	-48 FT.	2.5+ INCHES	S15°W	DEST.
ACL-8	168 FT.	-87 FT.	2.0+ INCHES	S10°W	DEST.

¹ Functional or Destroyed.



EXPLANATION

- ACL-8 ● APPROXIMATE LOCATION OF SLOPE INCLINOMETER/PIEZOMETER, ARROW INDICATES DIRECTION OF RECORDED MOVEMENT
- ACL-9 ▲ APPROXIMATE LOCATION OF PIEZOMETER
- WM-2 ○ APPROXIMATE LOCATION OF DEWATERING OR MONITORING WELL
- ▭ RESIDENCE OR OTHER STRUCTURE
- POSSIBLE BOUNDARY OF ACTIVE ABALONE COVE LANDSLIDE
- A — A' LOCATION OF CROSS SECTION



**BING YEN & ASSOCIATES**

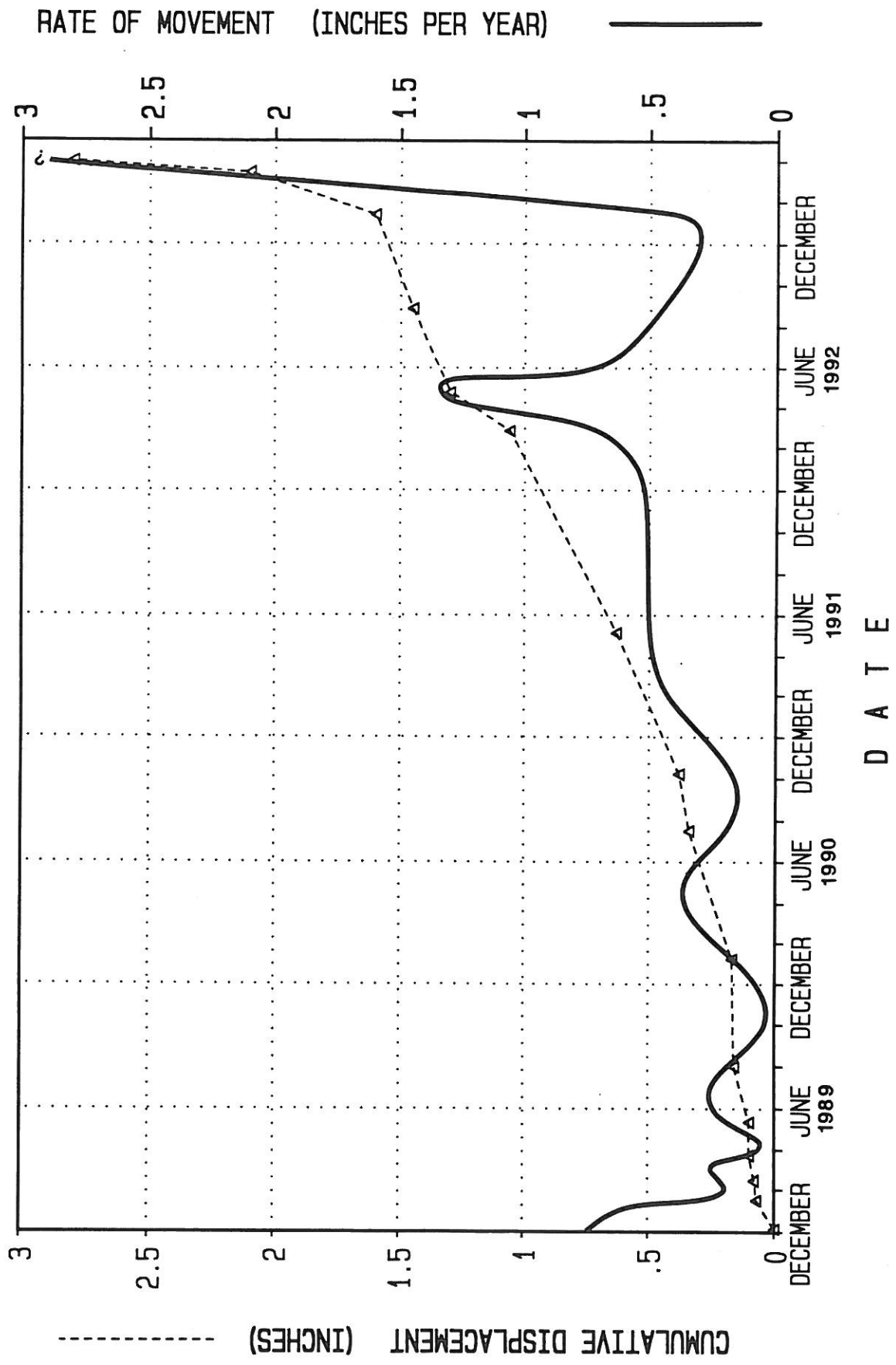
PROJECT NAME: ABALONE COVE LANDSLIDE

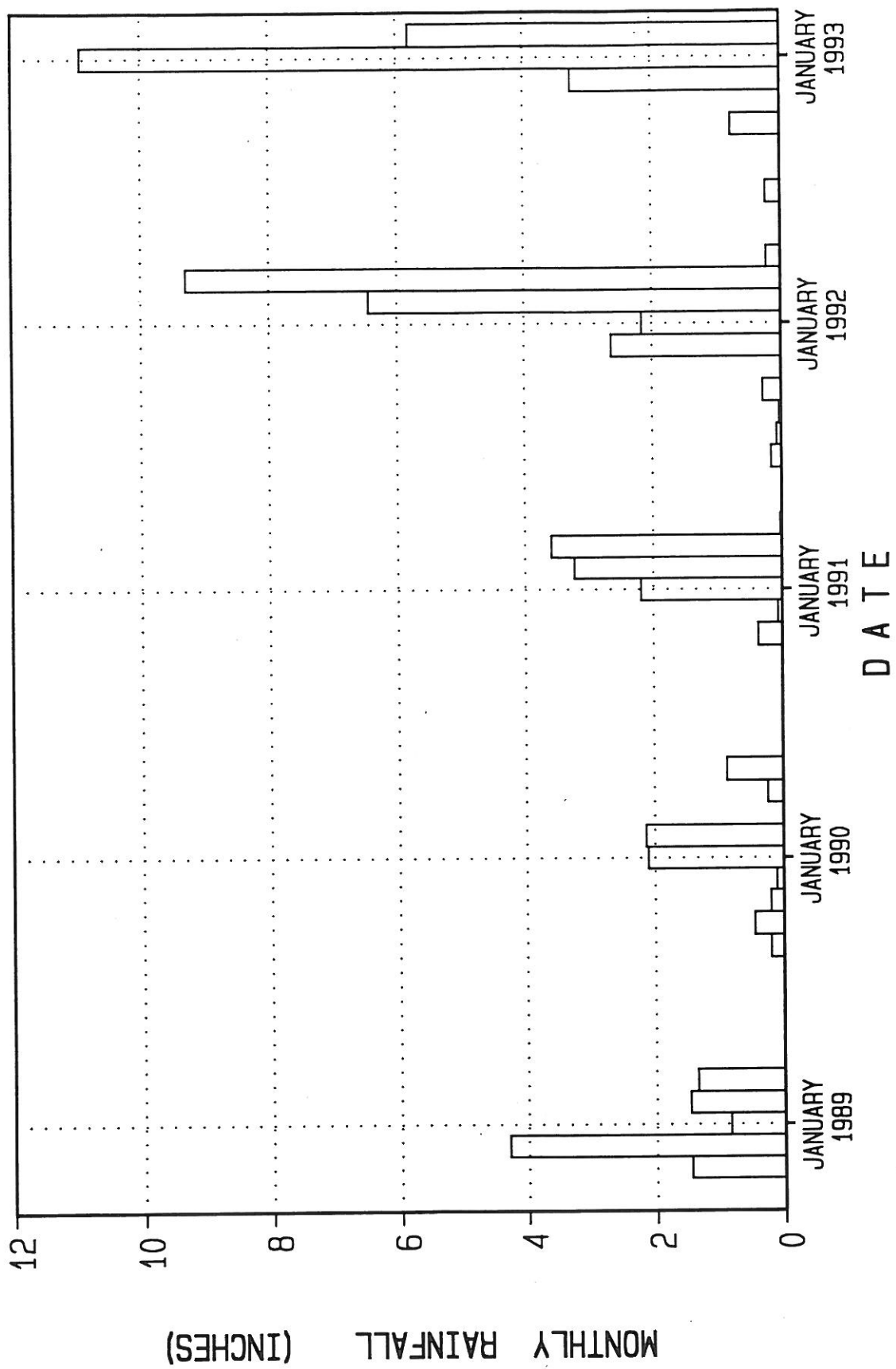
PROJECT NO.: 54-247

DATE: SEPTEMBER 1992

LOCATIONS OF SLOPE INCLINOMETER/PIEZOMETERS AND DIRECTION OF RECORDED MOVEMENT

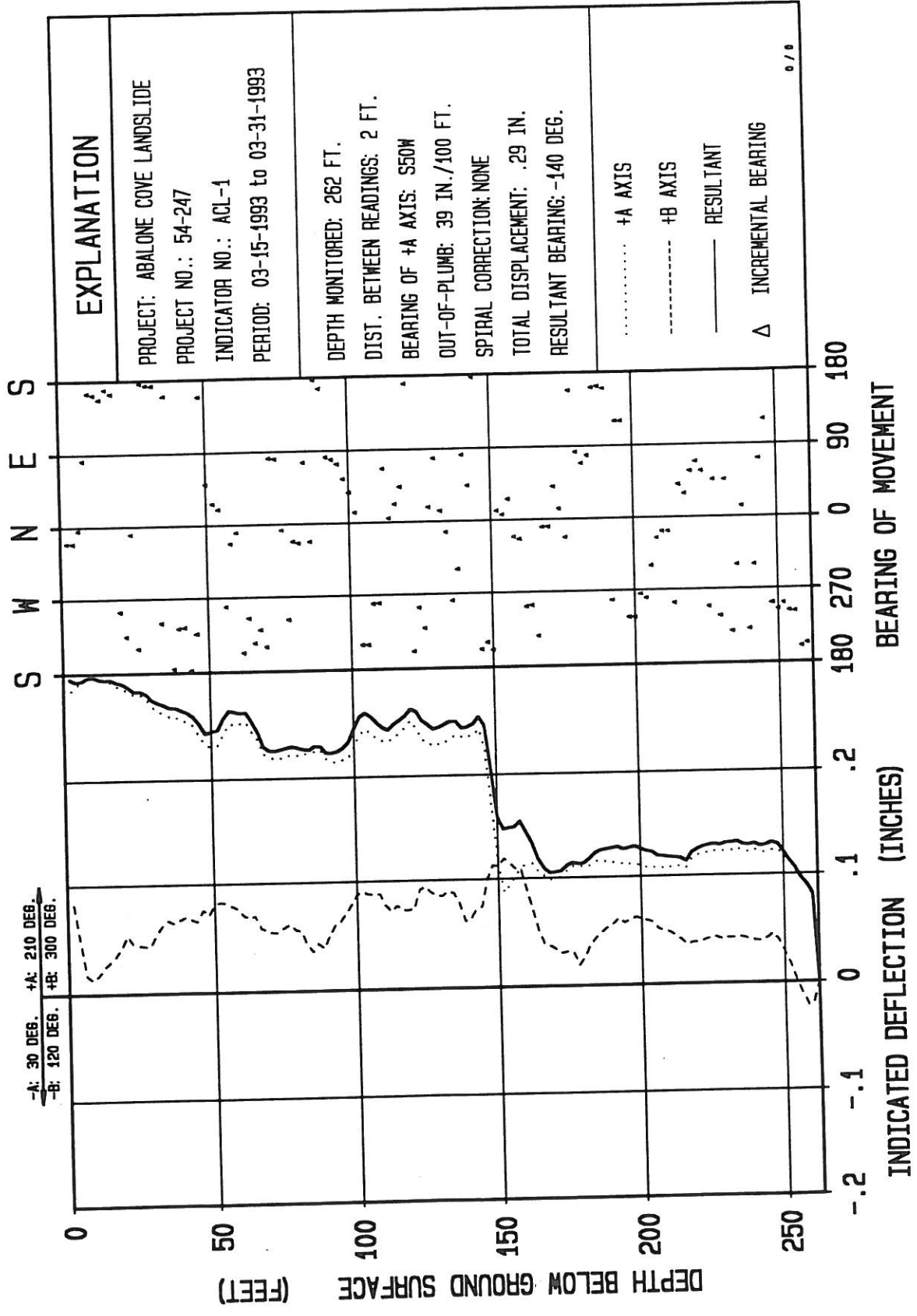
FIGURE 1





PROJECT # 54-247 FIGURE 3. RAINFALL FOR LANDSLIDE AREA FROM LACFD STATION 1011C. BING YEN & ASSOC.

APPENDIX A
(SLOPE INCLINOMETER RESULTS)



-A: 30 DEG. +A: 210 DEG.
 -B: 120 DEG. +B: 300 DEG.

EXPLANATION

PROJECT: ABALONE COVE LANDSLIDE
 PROJECT NO.: 54-247
 INDICATOR NO.: ACL-1
 PERIOD: 03-15-1993 to 03-31-1993

DEPTH MONITORED: 262 FT.
 DIST. BETWEEN READINGS: 2 FT.
 BEARING OF +A AXIS: S50W
 OUT-OF-PLUMB: 39 IN./100 FT.
 SPIRAL CORRECTION: NONE
 TOTAL DISPLACEMENT: .29 IN.
 RESULTANT BEARING: -140 DEG.

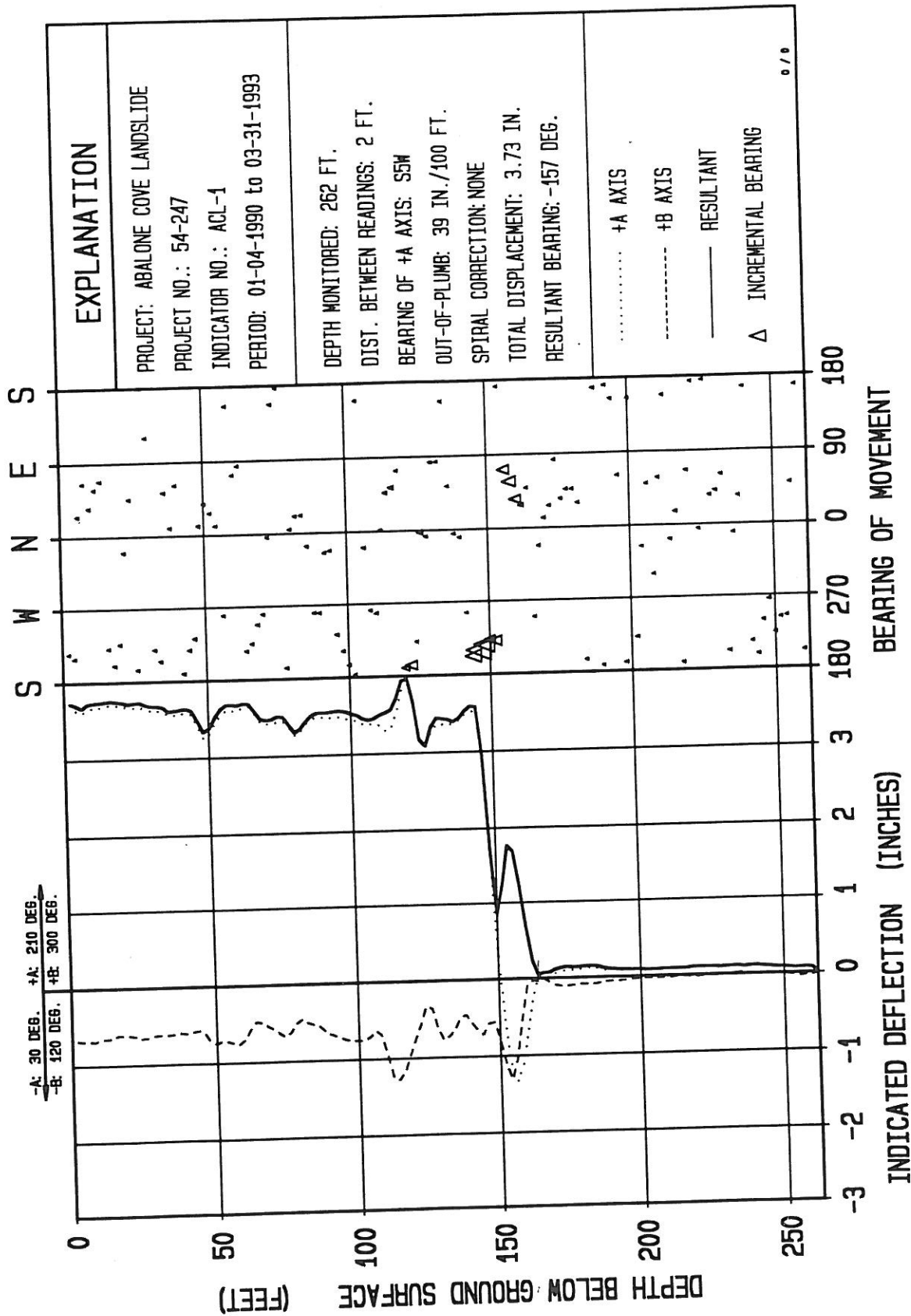
..... +A AXIS
 ----- +B AXIS
 ————— RESULTANT
 Δ INCREMENTAL BEARING

0/0

BING YEN & ASSOC.

ABALONE COVE LANDSLIDE SLOPE INDICATOR RESULTS.

PROJECT # 54-247

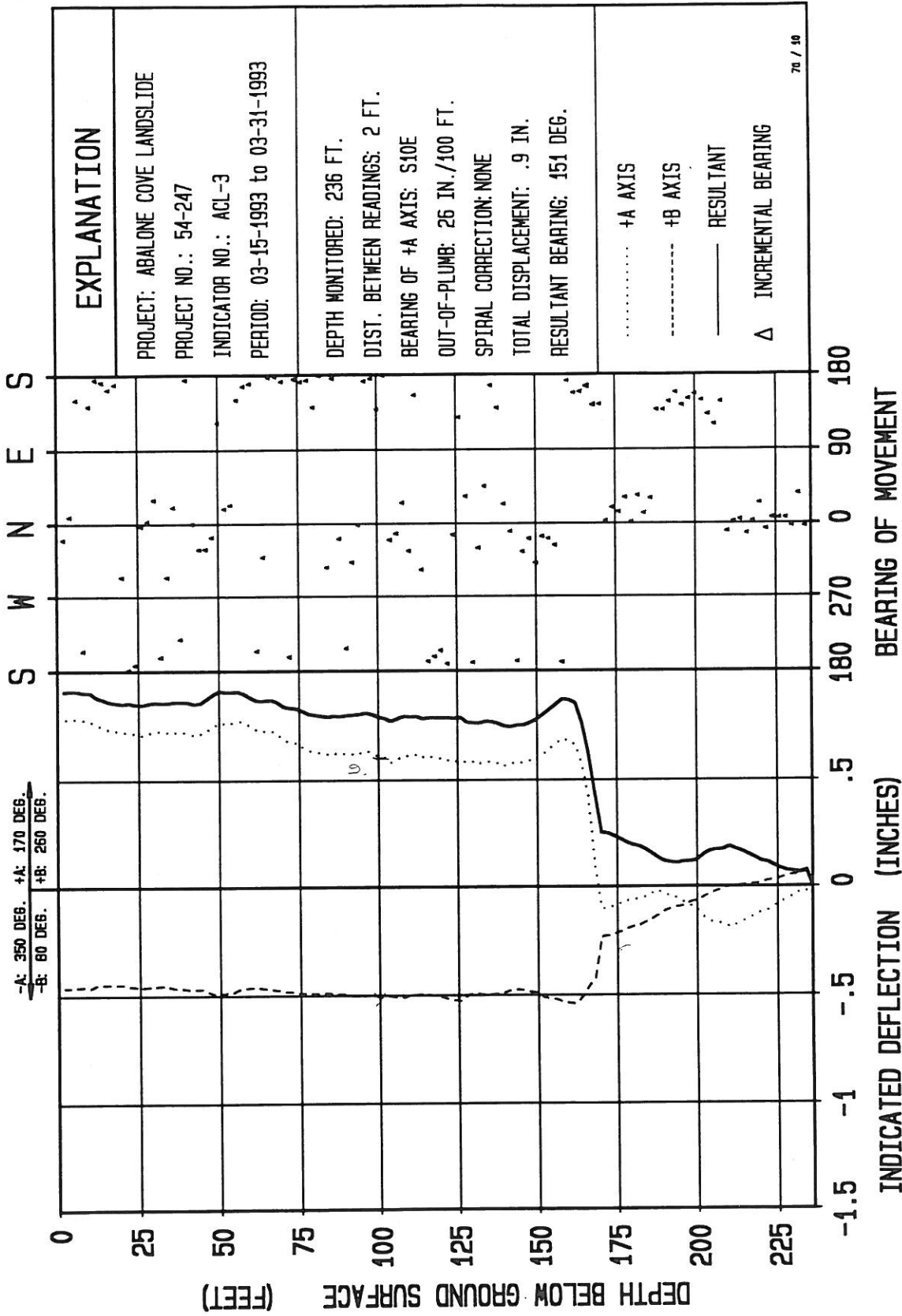


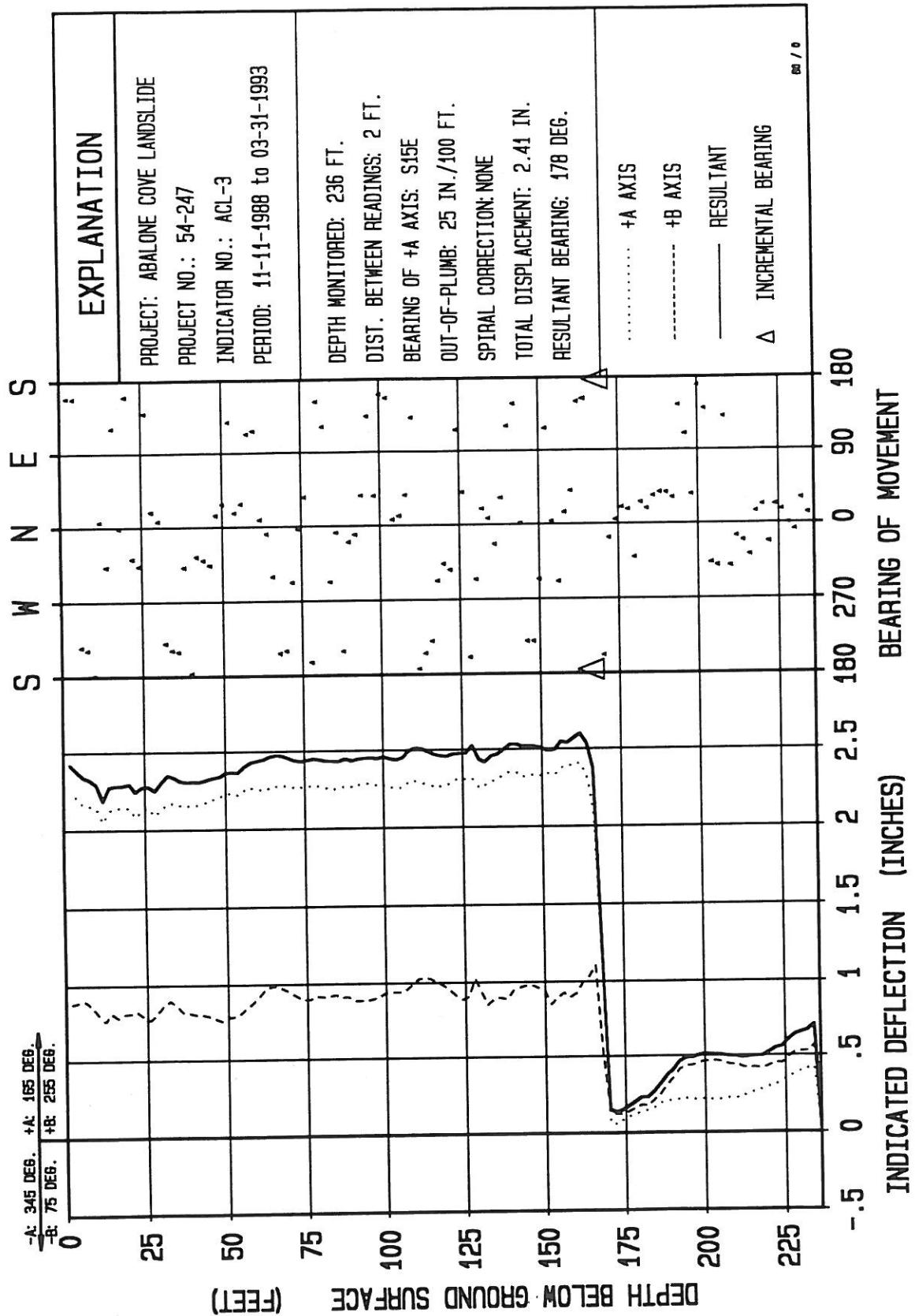
EXPLANATION

PROJECT: ABALONE COVE LANDSLIDE
PROJECT NO.: 54-247
INDICATOR NO.: ACL-1
PERIOD: 01-04-1990 to 03-31-1993

DEPTH MONITORED: 262 FT.
DIST. BETWEEN READINGS: 2 FT.
BEARING OF +A AXIS: S5W
OUT-OF-PLUMB: 39 IN./100 FT.
SPIRAL CORRECTION: NONE
TOTAL DISPLACEMENT: 3.73 IN.
RESULTANT BEARING: -157 DEG.

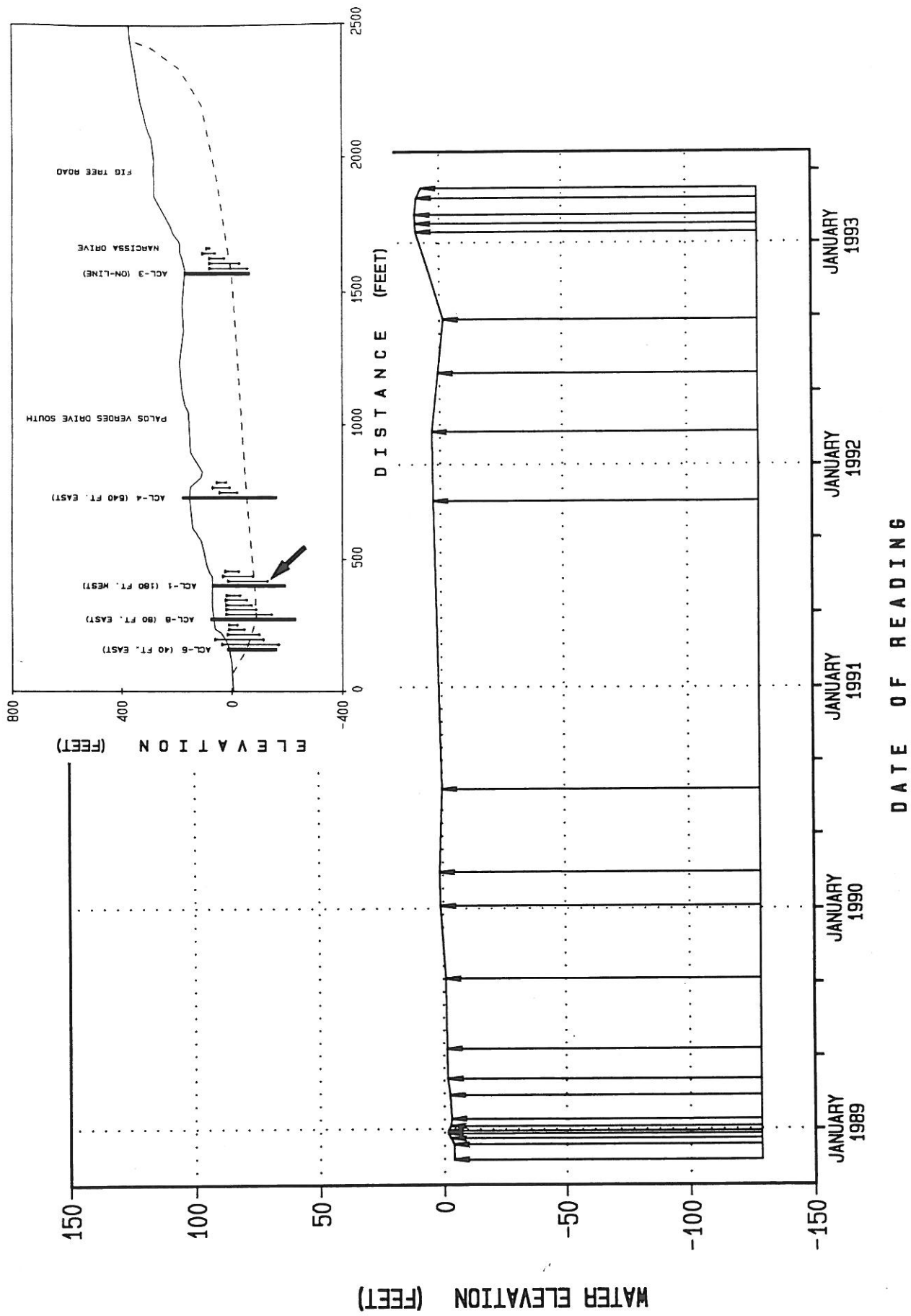
..... +A AXIS
----- +B AXIS
——— RESULTANT
Δ INCREMENTAL BEARING

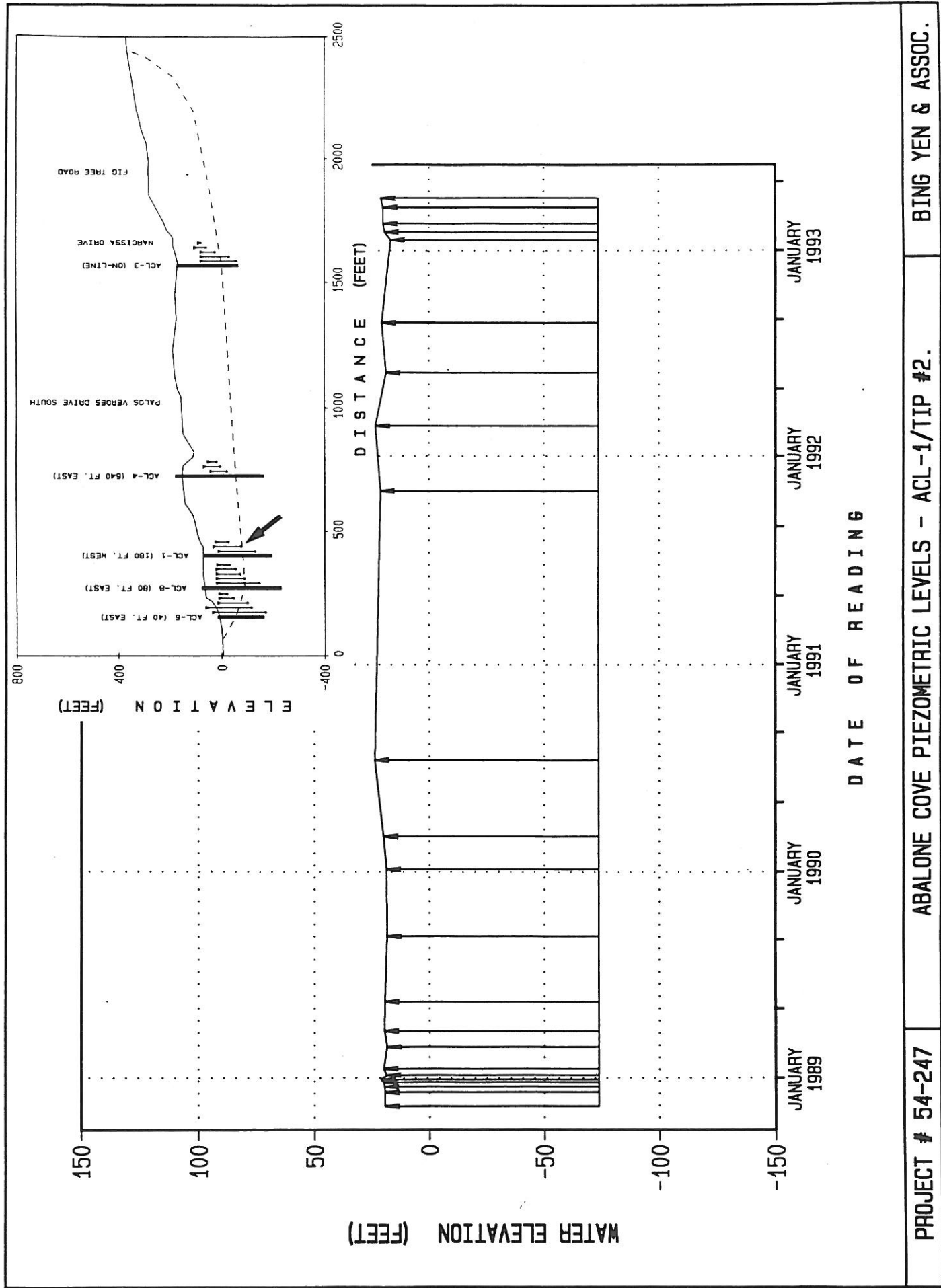


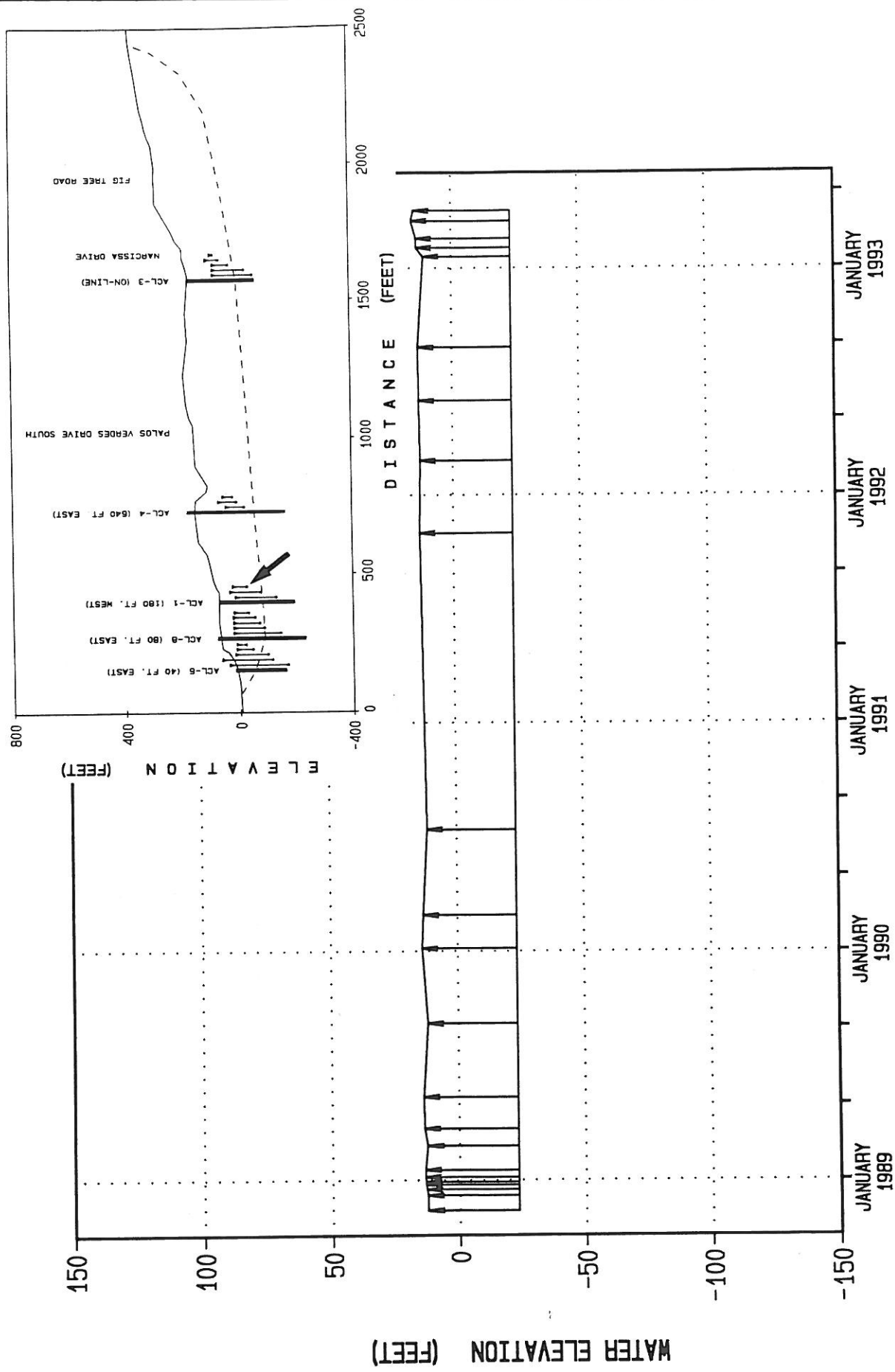


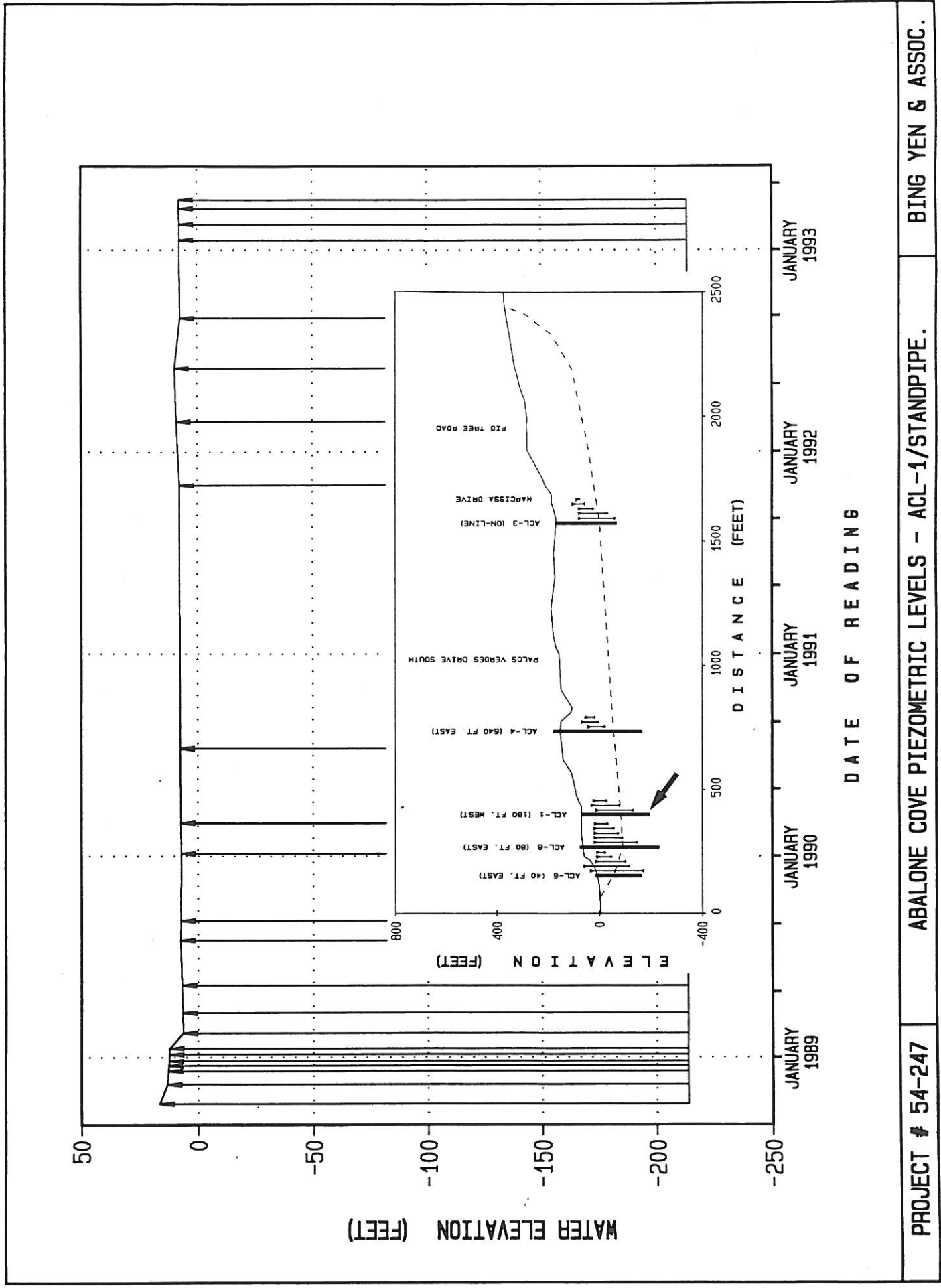
APPENDIX B

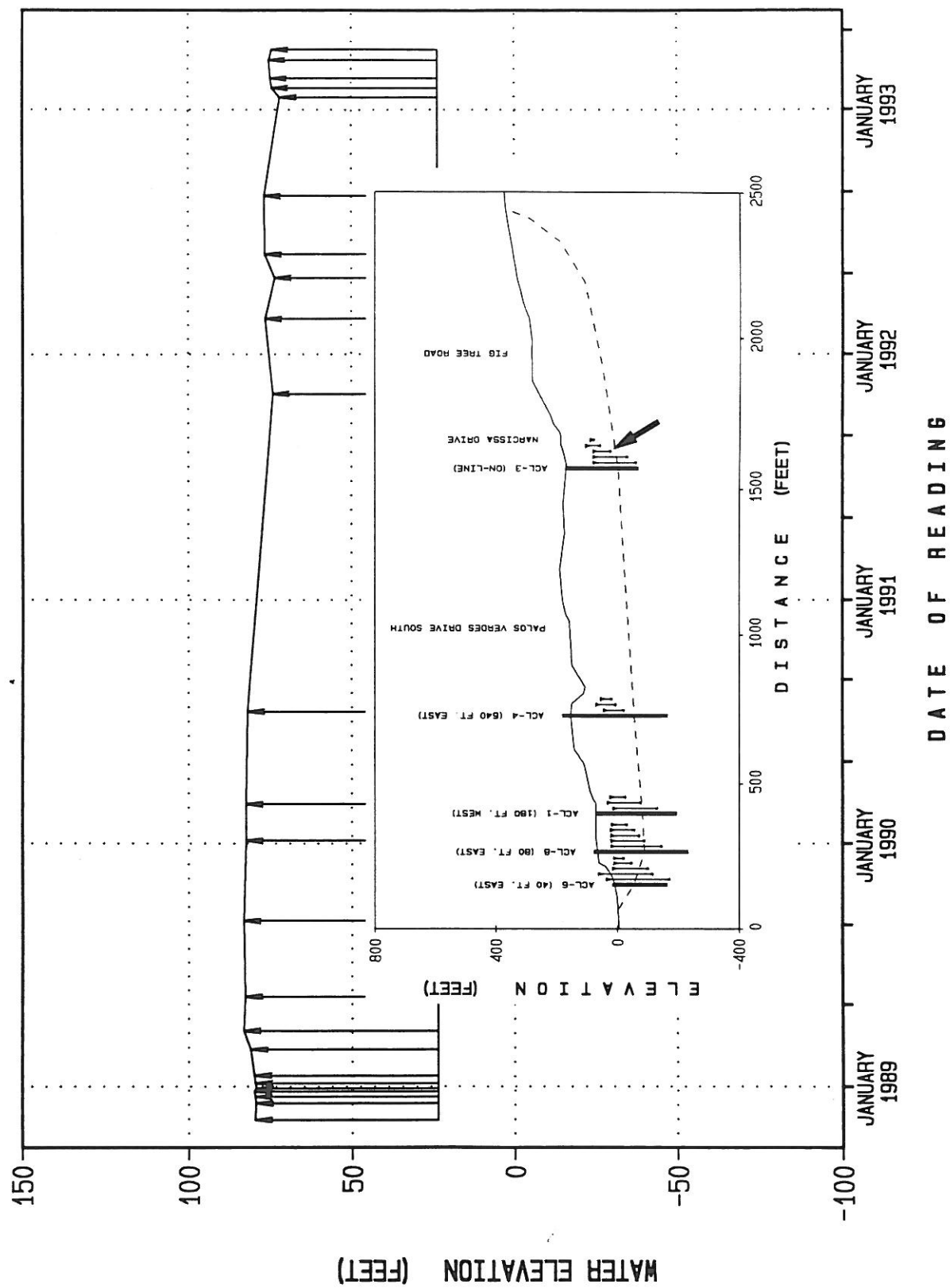
PIEZOMETER/STANDPIPE RESULTS

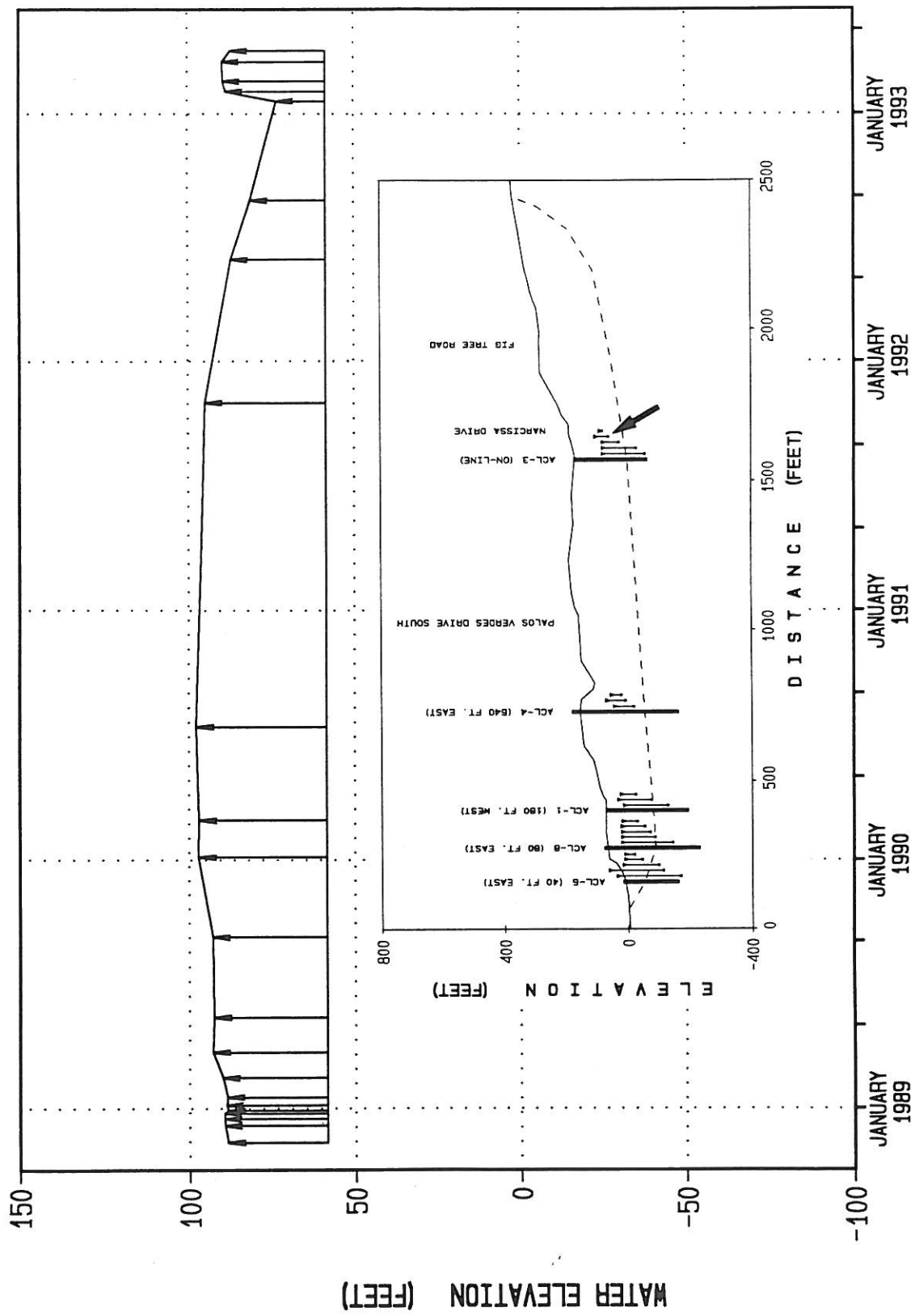




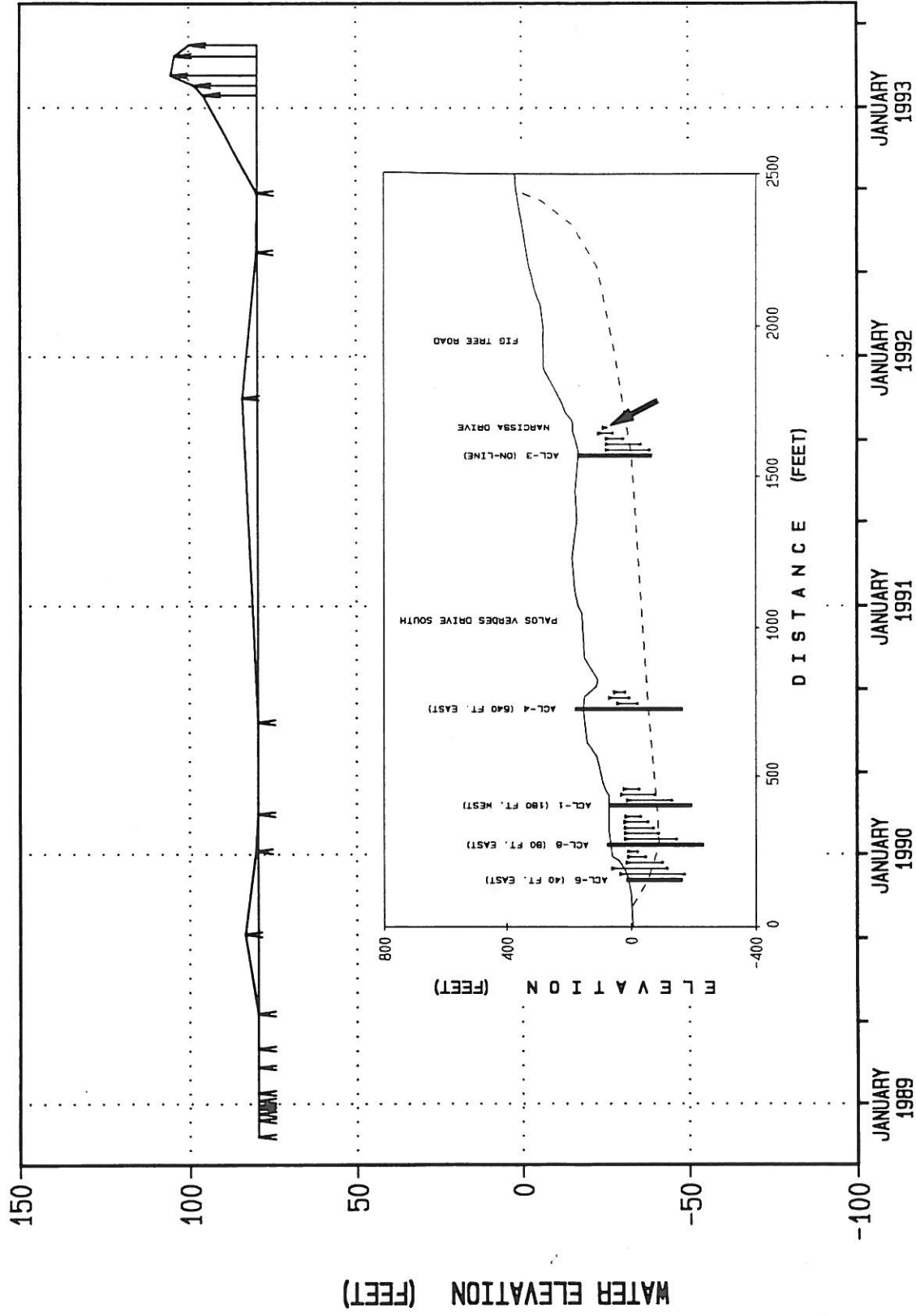


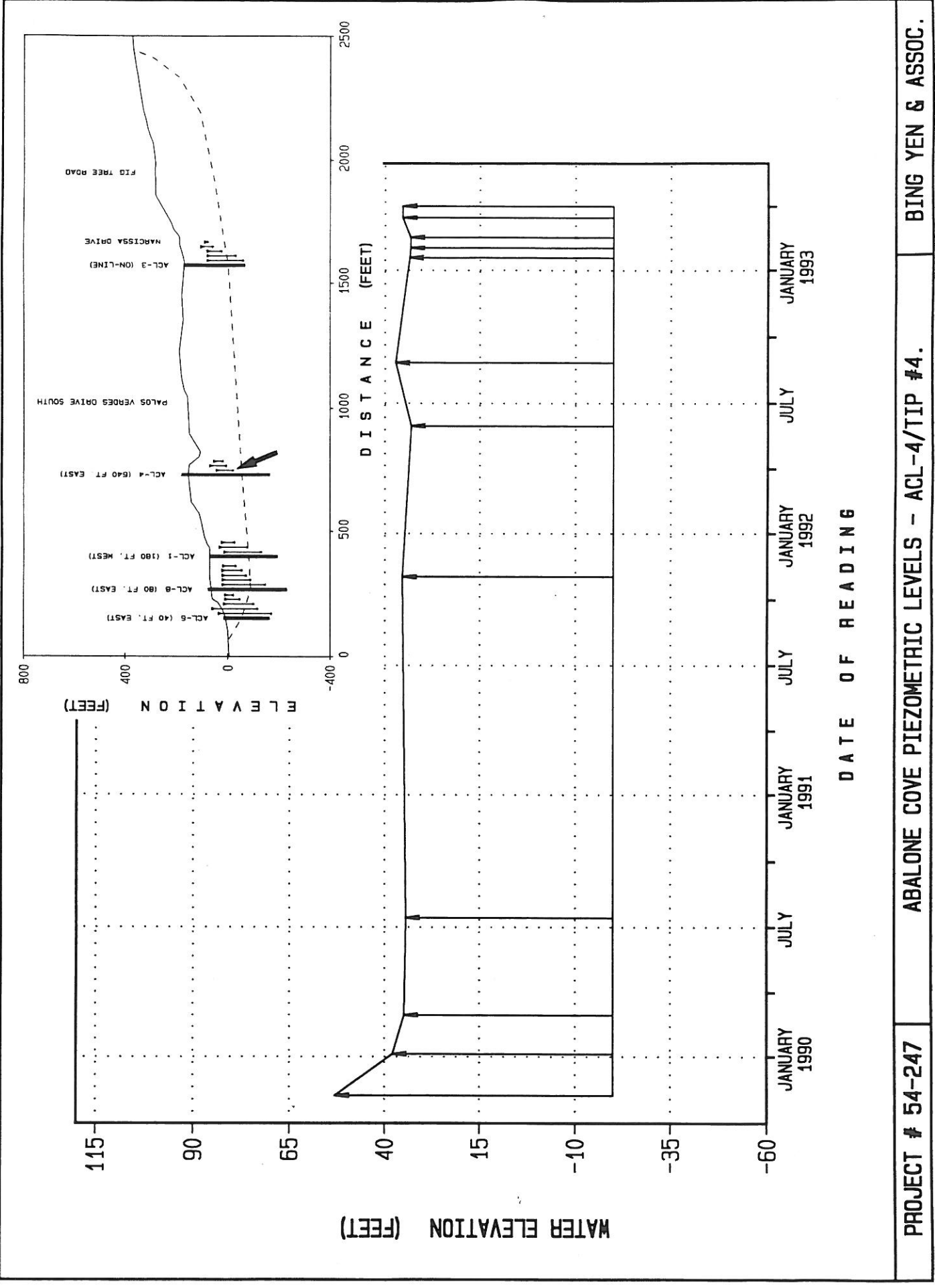


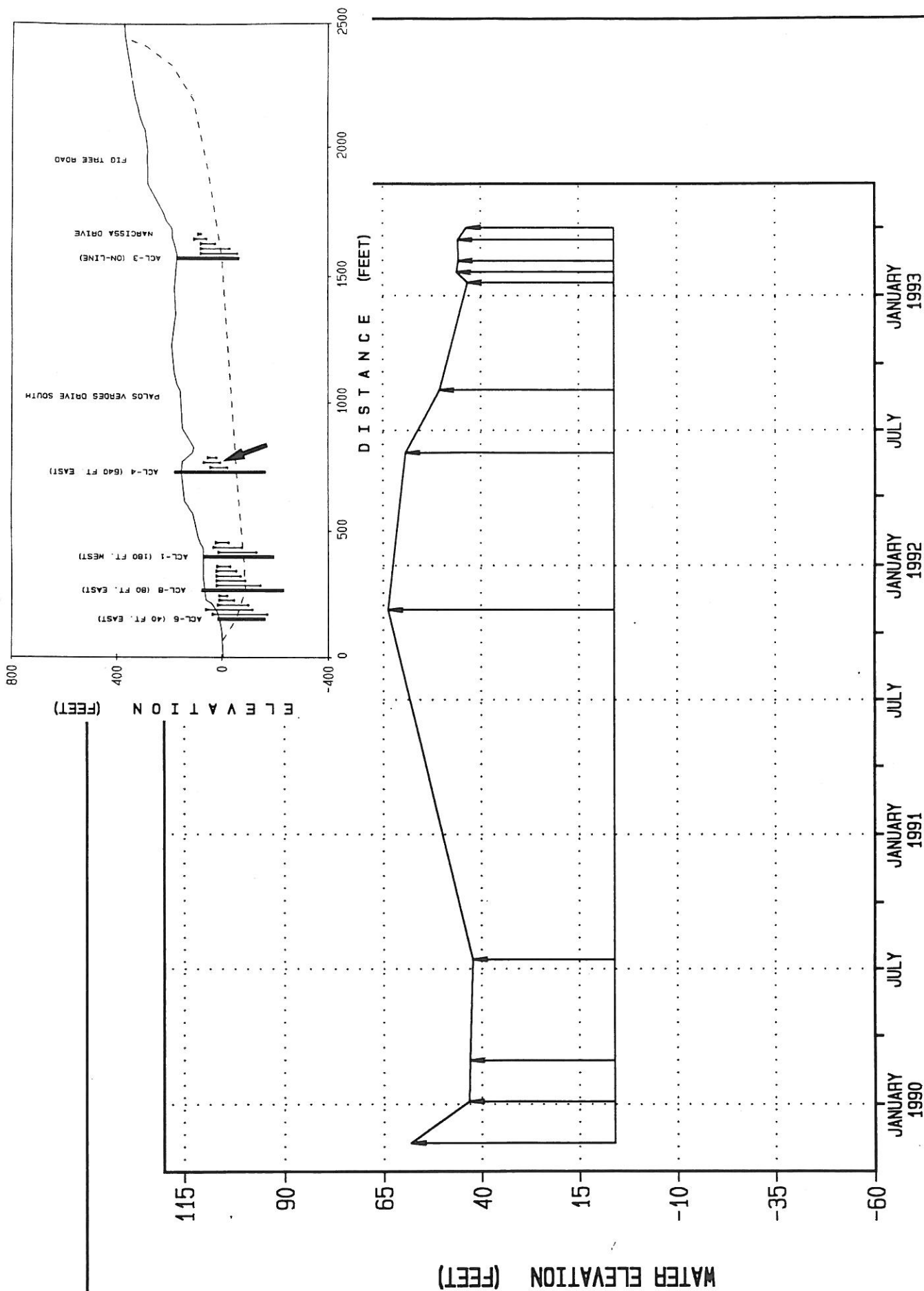




DATE OF READING





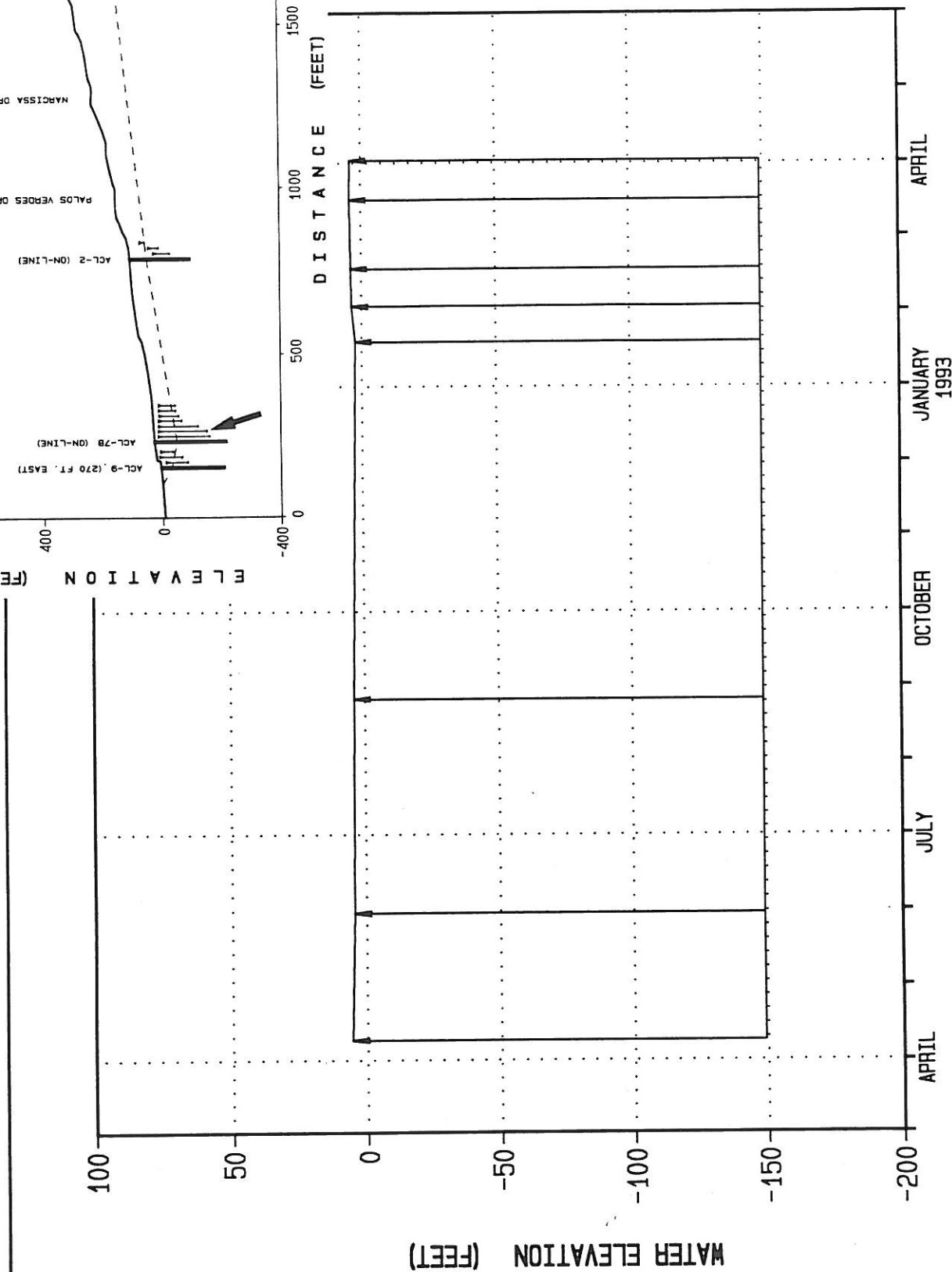
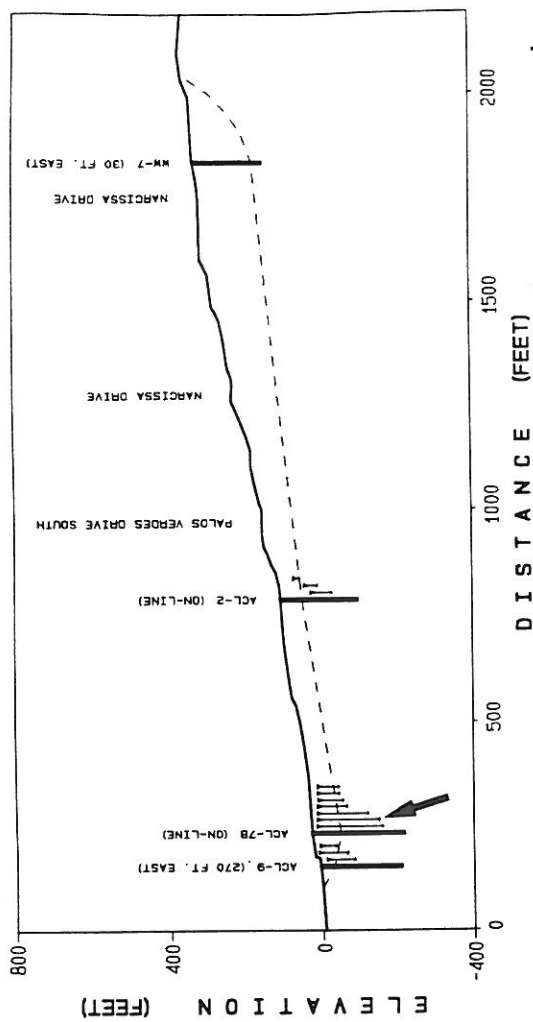


DATE OF READING

PROJECT # 54-247

ABALONE COVE PIEZOMETRIC LEVELS - ACL-4/TIP #5.

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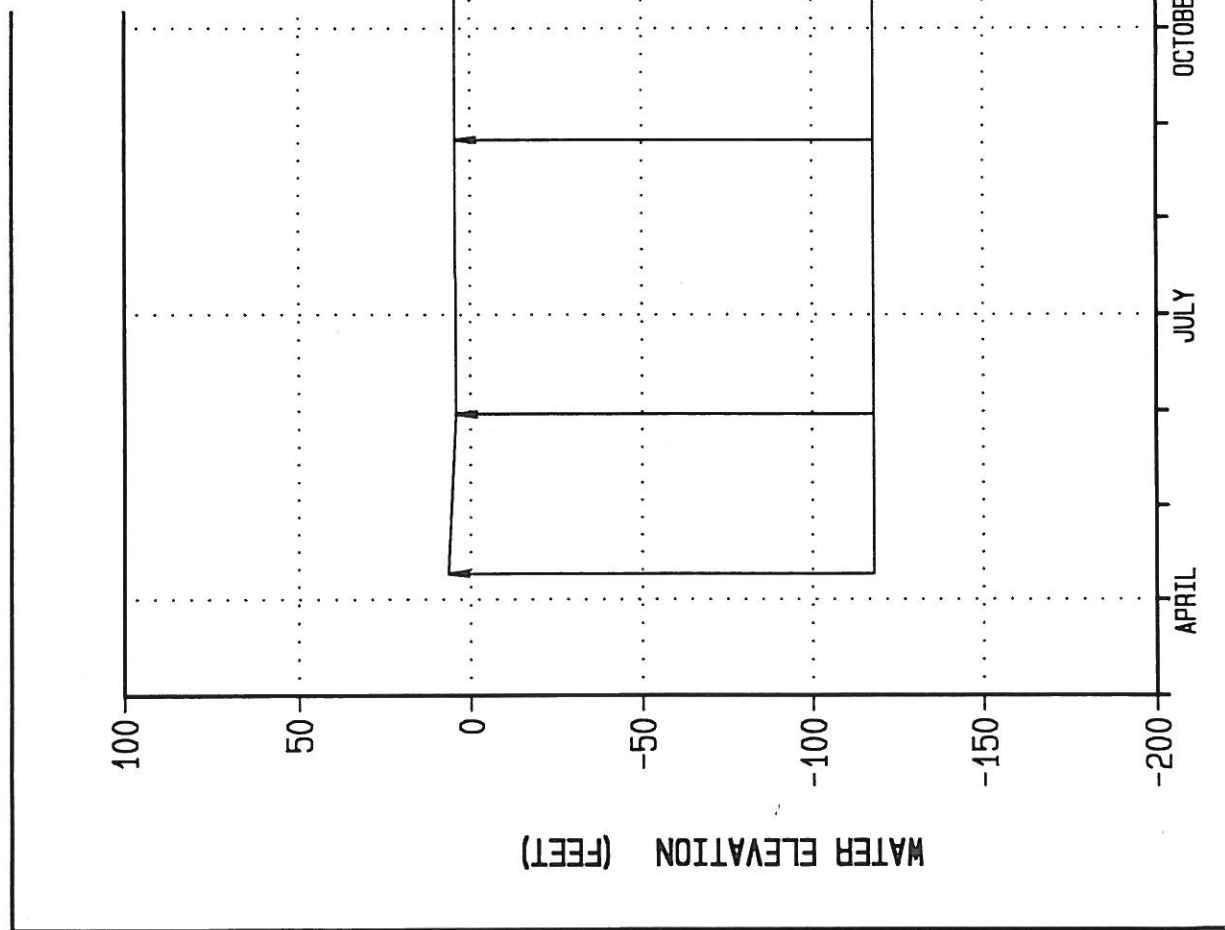
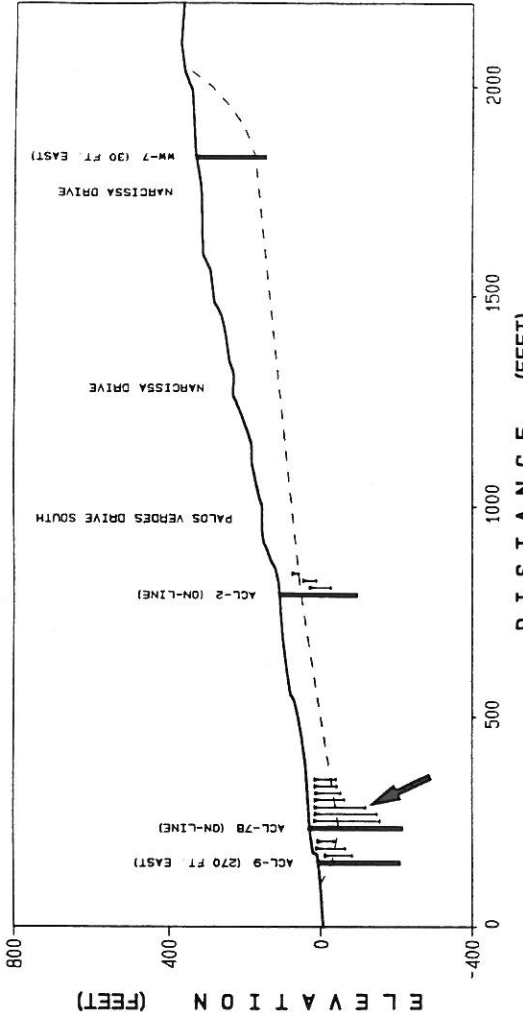


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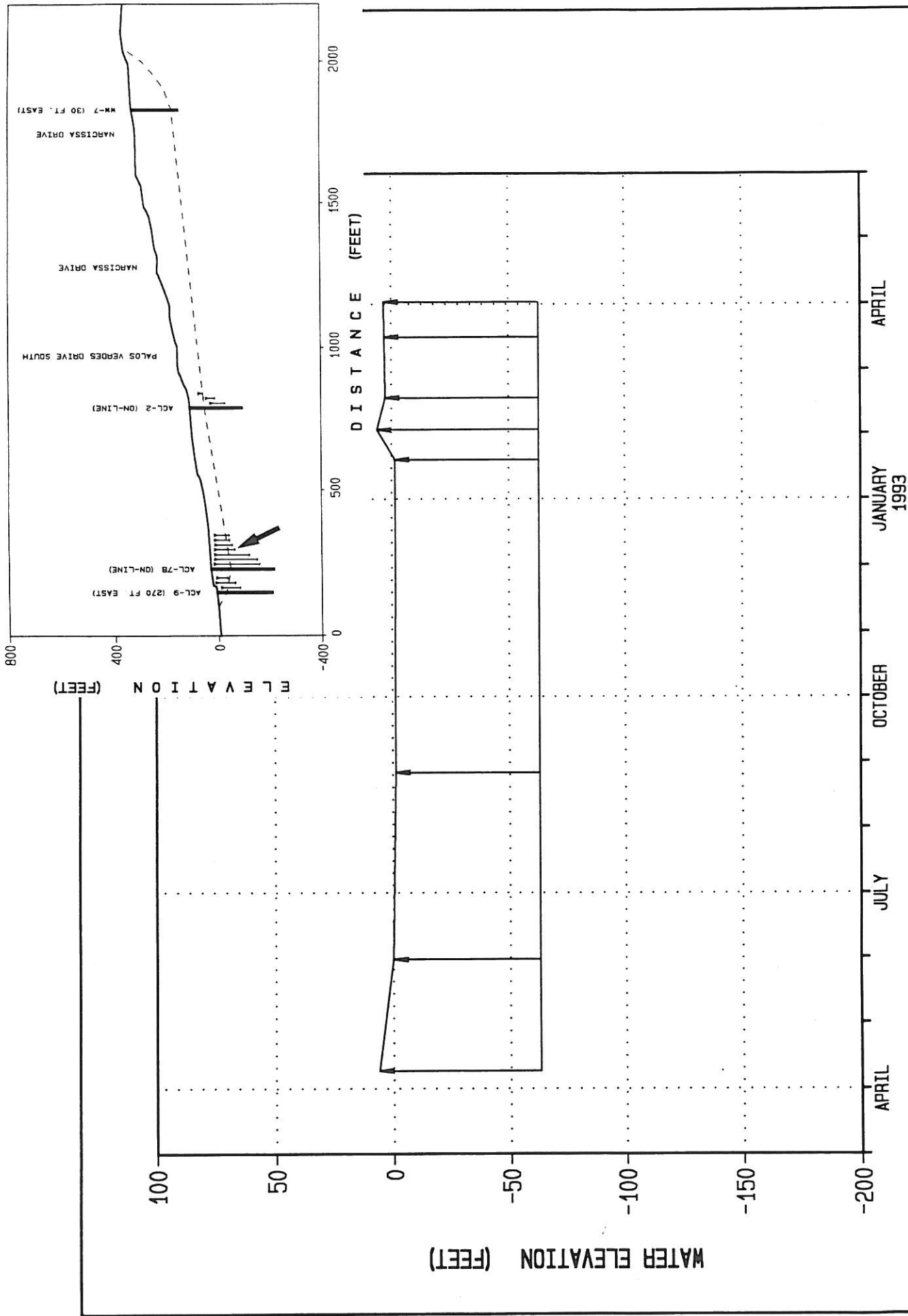
PROJECT # 54-247

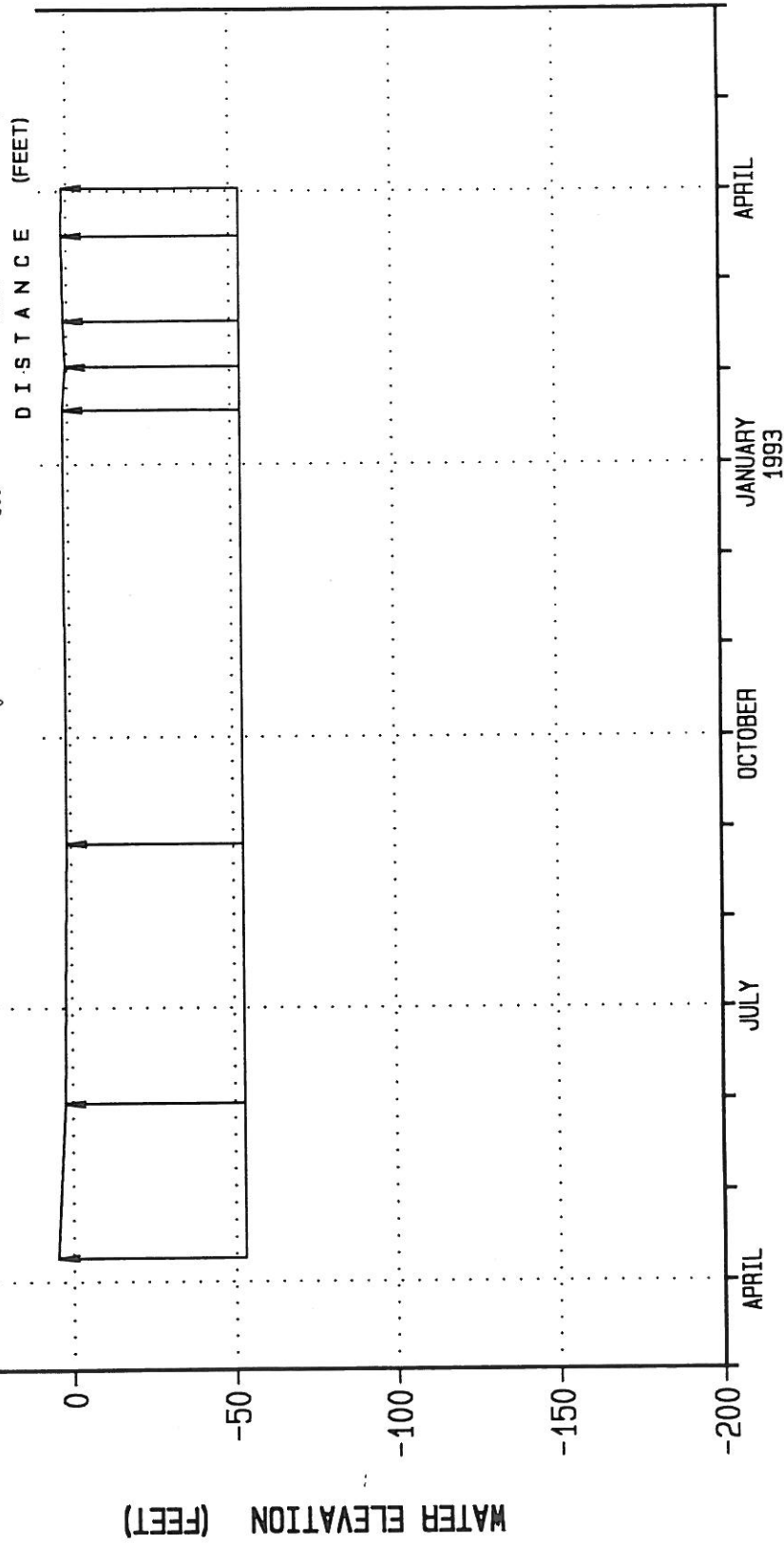
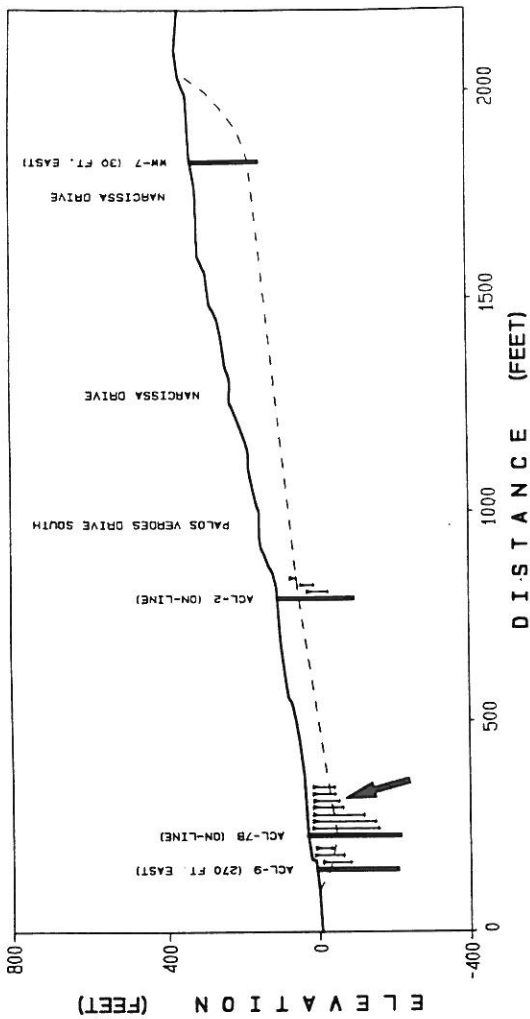
ABALONE COVE PIEZOMETRIC LEVELS - ACL-7B/TIP #2.

BING YEN & ASSOC.

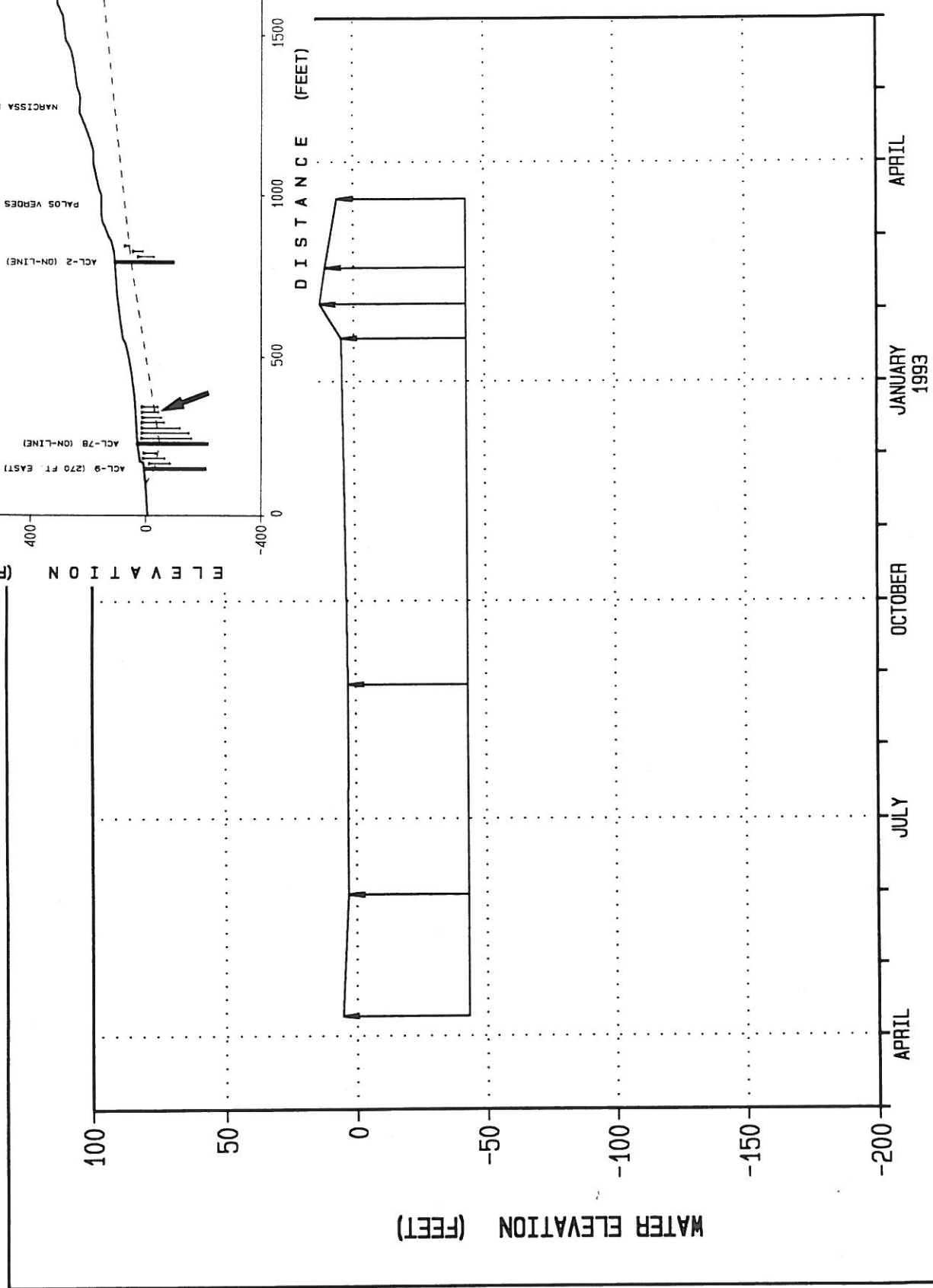
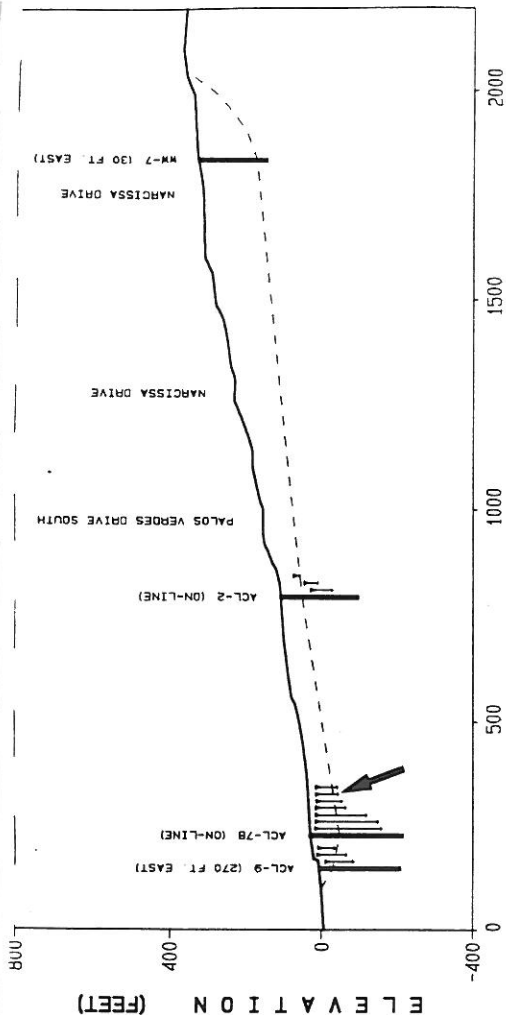


DATE OF READING





DATE OF READING



DATE OF READING

APRIL
JULY
OCTOBER
JANUARY 1993
APRIL

