PRELIMINARY DATA SUMMARY

March 1985

U.S. Army Engineer Waterways Experiment Station
Coastal Engineering Research Center
Field Research Facility
Duck, North Carolina

I. INTRODUCTION

The U.S. Army Engineer Waterways Experiment Station, Coastal Engineering Research Center's (CERC) Field Research Facility (FRF) is located on the Outer Banks of North Carolina, near the village of Duck (Fig. 1).

The FRF research program provides a means for obtaining high-quality field data, particularly during storms, in support of the U.S. Army Corps of Engineers' coastal engineering research missions. The FRF consists of a 561-m (1,840 ft) long concrete research pier supported on 0.91 m (3 ft) diameter steel piles. The pier deck is 6.1 m (20 ft) wide, 7.74 m (25.4 ft) above mean sea level (MSL), and extends from behind the dunes to approximately the 7.6 m (25 ft) depth contour. In addition, a main building contains offices, an instrument repair shop, and a data acquisition room.

One of the responsibilities of the FRF research program is the collection, analysis, and dissemination of data on local oceanographic and meteorological conditions. Bottom profiles along both sides of the pier and periodic bathymetric surveys are also performed.

This summary is intended to provide basic data as soon as possible after they are obtained. Most of the data are daily observations or the results of preliminary data analysis. In many instances, continuous analog records and more extensive analyses will be made available later by the CERC Coastal Engineering Information and Analysis Center (CEIAC).

Table 1 is a list of instruments used, their status during the month, and the data collection status. Figure 2 identifies the location of the instruments. The water depth at the wave gages and current meters vary and may best be determined from the information contained in Figure 8. Other installation information is contained in Table 1. All times unless otherwise specified are referenced to Eastern Standard Time (EST).

Section II presents the meteorological data; Sections III through VI, oceanographic data; Section VII, nearshore profiles and bathymetry; and Section VIII, if included, documents special events that occurred at the FRF during the month.

Questions and/or comments concerning the data may be directed to Mr. H. Carl Miller at (919) 261-3511.

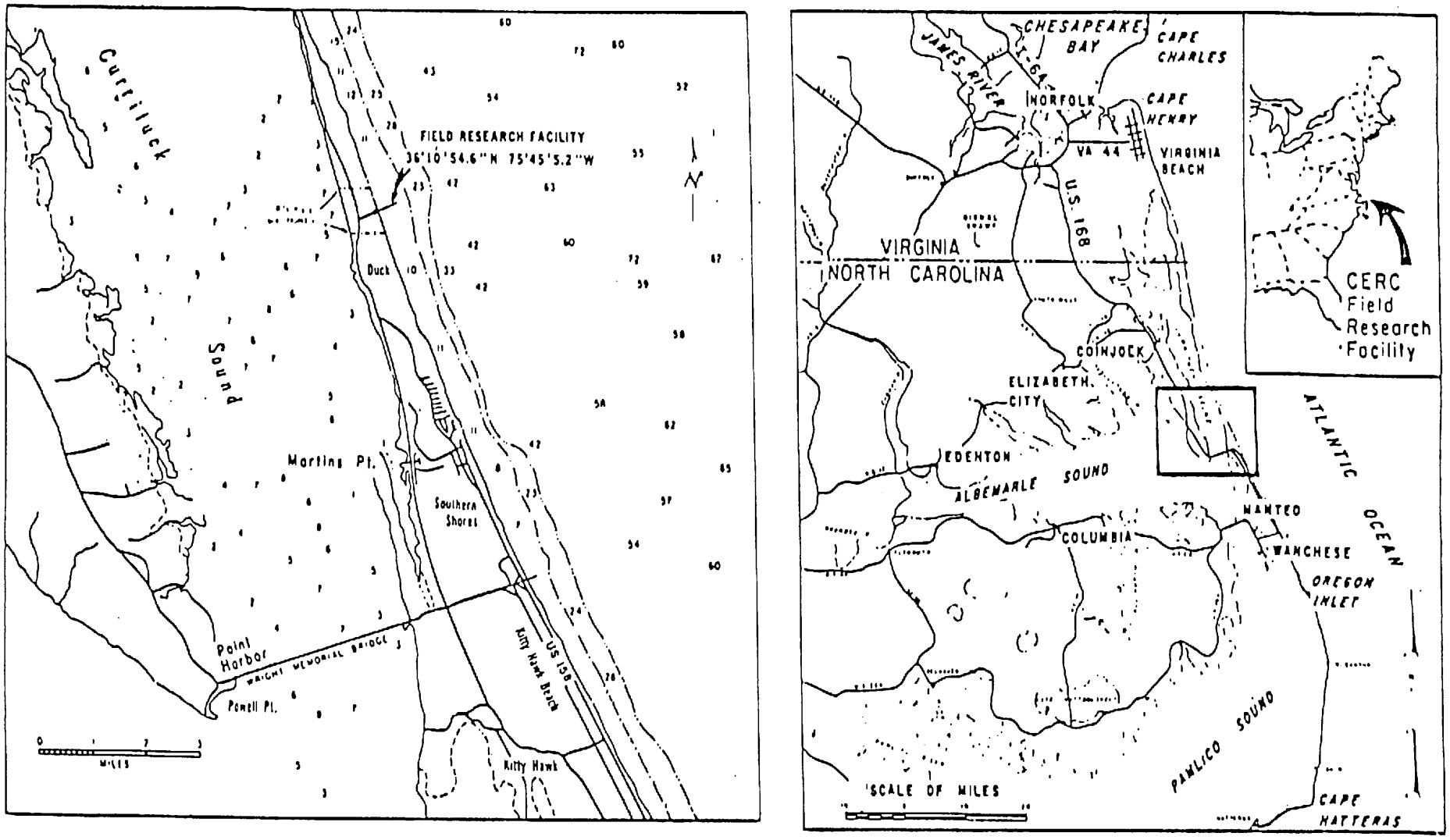
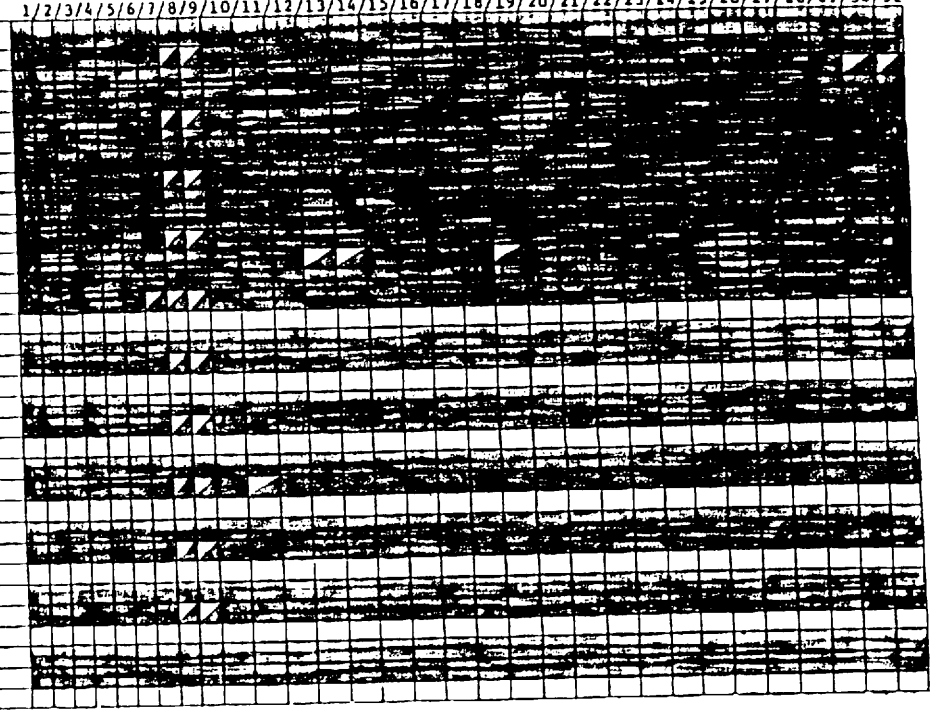


Figure 1 - FRF Location Map

TABLE 1
INSTRUMENT STATUS/DATA AVAILABILITY
March 1985

GAGE NUMBER	DESCRIPTION/REMARKS	DEPTH AT SENSOR	
	Barometric Pressure		Instrument Status Data Collected Analog Record
	Precipitation		Instrument Status Data Collected Analog Record
	Air Temperature		Instrument Status Data Collected Maximum/Minimum
	Anemometer on Lab Bldg - Elevation 19m (MSL)		Instrument Status Data Collected Analog Record
645	Baylor staff located at station 7+80 on FRF pier	See profile data	Instrument Status Data Collected
625	Baylor staff located at station 19+00 on FRF pier	See profile data	Instrument Status Data Collected
640	Waverider buoy located 1.0 km from shore	Approx. 8.5 m MSL	Instrument Status Data Collected
630	Waverider buoy located 6.0km from shore	Approx. 18 m MSL	Instrument Status Data Collected
639	Current meter at station 14+20 on FRF pier	See profile data	Instrument Status Data Collected
679	Current meter 500M south (0.5km offshore)	Approx. 6 m MSL	Instrument Status Data Collected
865-1370	NOAA primary tide station located at seaward end of FRF pier		Instrument Status Data Collected

DAY OF THE MONTH



Instrument Status: Operational - Daily Observation: YES
Data Collected: ALL, SOME
Analog Record: ALL, PARTIAL
Preliminary Analysis: ALL, SOME

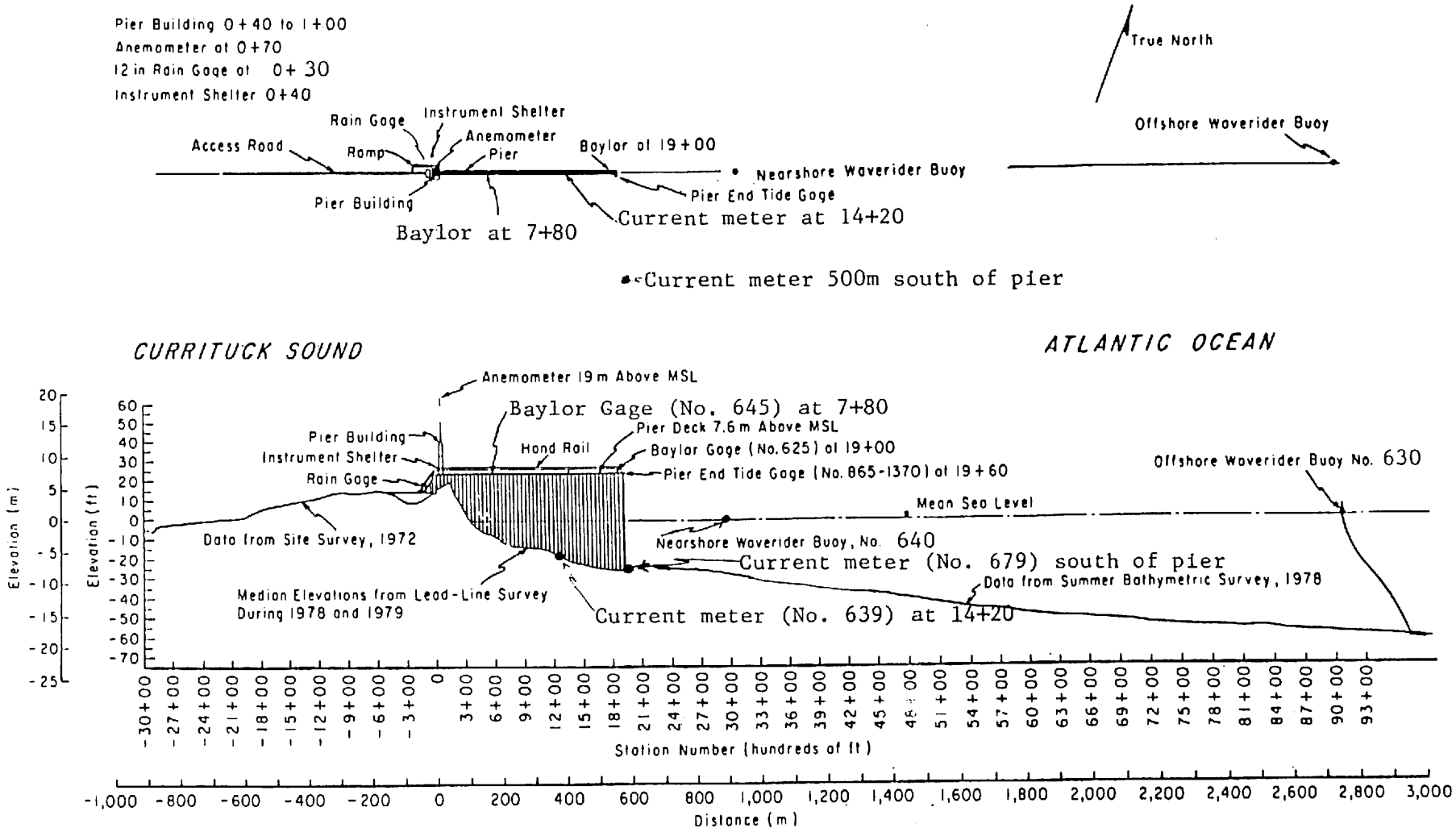


Figure 2. Instrument locations at FRF.

II. METEOROLOGICAL DATA

A variety of instruments have been installed at the FRF (Fig. 2) to monitor the meteorological conditions. The data presented in Table 2 are collected and stored on magnetic tape using a Data General NOVA-4 computer. For each instrument identified in Table 1 as having analog outputs, chart records are obtained, a log is maintained and the records are stored for future reference.

The wind measurements are obtained from a Weather Measure Skyvane located on the FRF laboratory building (Fig. 2), 19.1 m above mean sea level (MSL).

The high and low temperatures are obtained from daily readings of NWS maximum and minimum thermometers and represent the extreme temperature values since the last reading.

The following may be useful for converting the data in Table 2 to other frequently used units of measurement:

1. Millimeters (mm) to inches (in) -
   mm x .03937 = in

2. Millibars (mb) to inches of mercury (in Hg) -
   mb x 0.02953 = in Hg

3. Degrees Celcius (°C) to degrees Fahrenheit (°F) -
   (°C x 9/5) + 32 = °F

4. Meters per second (m/s) to knots (kn) -
   m/s x 1.943 = kn

TABLE 2: METEOROLOGICAL DATA

PART 1

MARCH 1985

DAY	HOUR	WIND SPEED (M/S)	WIND DIRECTION (DEG TN)	TEMPERATURE (DEG C)	ATM PRESSURE (MB)	PRECIPITATION (MM)
1	100	4	106	4.9	1025.0	0
	700	3	72	5.7	1023.4	0
	1300	2	60	7.7	1019.9	0
	1900	6	163	10.3	1013.5	8
2	100	3	250	9.7	1012.4	0
	700	6	255	8.0	1012.5	0
	1300	3	26	12.9	1014.0	0
	1900	1	151	8.2	1016.5	0
3	100	7	32	7.9	1020.3	0
	700	7	41	6.6	1023.7	0
	1300	8	40	7.3	1026.4	0
	1900	6	69	6.5	1026.2	0
4	100	5	60	7.0	1025.0	0
	700	1	137	7.8	1024.1	0
	1300	6	161	12.3	1022.3	0
	1900	6	191	15.8	1019.6	0
5	100	7	204	16.0	1016.1	0
	700	8	231	16.3	1014.3	0
	1300	7	258	18.0	1012.1	0
	1900	5	272	15.9	1013.1	0
6	100	13	31	7.1	1021.4	0
	700	13	22	3.9	1027.4	0
	1300	10	12	4.0	1031.2	0
	1900	9	51	3.3	1034.5	0
7	100	8	62	3.8	1036.7	0
	700	7	32	5.5	1037.8	0
	1300	6	45	7.5	1035.8	0
	1900	0		5.1	1031.5	0
8	100	4	192	9.3	1028.7	0
	700	7	238	11.9	1025.6	0
	1300	7	264	17.0	1021.6	0
	1900				1018.5	0
9	100	Software crash			1017.8	0
	700				1020.9	0
	1300	2	34	10.4	1022.2	0
	1900	3	103	8.4	1020.9	0
10	100	3	56	8.1	1021.1	0
	700	2	7	7.7	1023.1	0
	1300	5	58	10.4	1023.1	0
	1900	3	127	8.4	1022.6	0
11	100	3	168	8.8	1023.0	0
	700	3	179	9.2	1023.0	0
	1300	2	120	12.1	1022.0	0
	1900	2	199	11.9	1017.1	0
12	100	9	225	16.1	1010.3	0
	700	12	221	17.3	1005.5	0
	1300	10	255	21.4	990.2	0
	1900	9	288	14.9	1008.1	0
13	100	7	286	11.3	1012.2	0
	700	7	303	9.6	1014.8	0
	1300	1	91	15.7	1015.5	0
	1900	4	182	12.0	1013.6	0
14	100	5	237	12.5	1012.7	0
	700	5	258	12.7	1011.4	0
	1300	4	27	12.1	1012.7	0
	1900	3	84	8.6	1013.4	0
15	100	1	0	10.3	1014.5	0
	700	5	356	8.7	1016.9	0
	1300	3	102	12.2	1018.0	5
	1900	3	78	8.6	1020.8	0
16	100	5	36	8.0	1023.2	0
	700	5	71	7.7	1025.8	0
	1300	4	87	8.9	1024.7	0
	1900	4	94	7.8	1019.5	0

TABLE 2: METEOROLOGICAL DATA

PART 2

MARCH 1985

DAY	HOUR	WIND SPEED (M/S)	WIND DIRECTION (DEG TN)	TEMPERATURE (DEG C)	ATM PRESSURE (MB)	PRECIPITATION (MM)
17	100	4	195	12.2	1013.9	0
	700	5	344	9.6	1008.5	0
	1300	3	317	13.1	1003.7	0
	1900	8	13	9.2	1005.2	0
18	100	11	27	6.7	1007.7	0
	700	10	347	2.6	1009.9	0
	1300	9	0	4.2	1012.5	0
	1900	7	352	4.1	1015.6	0
19	100	6	335	2.6	1020.2	0
	700	5	323	1.5	1023.5	0
	1300	0		5.9	1024.8	0
	1900	4	195	5.8	1022.8	0
20	100	8	245	7.0	1022.9	0
	700	9	249	7.5	1022.0	0
	1300	5	237	16.6	1019.6	0
	1900	7	223	12.8	1017.6	0
21	100	7	250	11.4	1018.7	0
	700	10	57	8.1	1022.8	0
	1300	11	53	7.2	1024.9	0
	1900	10	62	6.9	1024.3	0
22	100	12	63	7.4	1022.1	0
	700	12	73	8.5	1019.3	0
	1300	5	74	9.7	1015.6	10
	1900	7	79	10.0	1012.4	15
23	100	8	105	10.6	1007.7	5
	700	3	273	10.7	1007.0	0
	1300	7	286	10.0	1007.0	0
	1900	8	304	7.4	1009.0	0
24	100	6	328	6.8	1010.4	0
	700	2	312	6.5	1009.8	0
	1300	2	54	7.2	1007.5	0
	1900	8	5	6.6	1003.6	0
25	100	8	13	5.7	1011.4	0
	700	7	1	5.4	1015.0	0
	1300	10	19	5.7	1018.6	0
	1900	5	19	6.4	1021.1	0
26	100	3	323	4.8	1024.3	0
	700	8	21	5.8	1028.8	0
	1300	4	41	7.8	1029.7	6
	1900	4	297	6.8	1027.1	0
27	100	7	238	8.9	1025.7	0
	700	8	251	9.6	1023.8	0
	1300	5	245	18.4	1019.7	0
	1900	8	225	15.2	1015.7	0
28	100	9	250	14.2	1014.8	0
	700	8	254	13.8	1015.1	0
	1300	4	252	21.9	1013.2	0
	1900	7	221	17.8	1010.1	0
29	100	9	237	16.6	1010.7	0
	700	8	248	16.4	1010.9	0
	1300	7	262	24.6	1011.4	0
	1900	4	208	21.5	1010.3	0
30	100	5	217	18.1	1012.4	0
	700	9	255	18.5	1011.4	0
	1300	6	256	26.1	1011.4	0
	1900	8	42	9.3	1015.0	0
31	100	10	46	9.5	1015.3	0
	700	2	356	10.9	1015.2	0
	1300	3	275	19.2	1013.5	0
	1900	6	198	18.9	1008.4	0

III. WAVE DATA

Wave data were collected from two Baylor staff gages (CERC gage nos. 625 and 645) and Waverider buoys (CERC gage nos. 630 and 640, Table 1 and Figure 2). The data were collected, analyzed, and stored on magnetic tape using a Data General NOVA-4 computer.

The NOVA-4 is programmed to sample the wave gages every 6 hours near 0100, 0700, 1300, and 1900 EST at a sampling rate of four times per second, collecting data in 20-minute records.

Wave height (Hmo) is an energy-based statistic equal to four times the standard deviation of the sea surface elevations. The wave period is identified from the computation of a variance (energy) spectrum using a Fast Fourier Transform of 4096 data points (1024 sec). The period (Tp) is that associated with the maximum energy density in the spectrum. When this analysis is complete, the data are written to magnetic tape and entered into the CERC data base.

Table 3 presents the wave heights and periods for each wave record obtained during the month. The monthly means shown in Table 3 are an average of the values computed for all data records collected. The monthly standard deviations are standard deviations from the monthly mean of values for each record.

Figure 3 is a time history of the Hmo and Tp values for the Waverider 6 km from shore (630) and the Baylor gage at pier station 19+00 (625).

Differences in wave periods between wave gages (Table 4 and Figure 3) may be due to wave breaking or reformation, or the presence of multiple wave trains containing nearly equal energy.

TABLE 3: WAVE DATA PART 1

MARCH 1985

GAGE		645		625		640		630	
		Baylor at 7+80		Baylor at 19+00		Nearshr Wvrdr		Farshr Wvrdr	
DAY	TIME	Hmo(m)	T(sec)	Hmo(m)	T(sec)	Hmo(m)	T(sec)	Hmo(m)	T(sec)
1	1	.48	5.63	.73	6.87	.75	6.40	.85	6.40
	7	.44	5.31	.69	6.40	.67	9.75	.72	9.75
	13	.36	4.53	.60	8.06	.64	8.06	.67	7.42
	19	.83	5.31	.78	8.83	.74	7.42	.77	8.83
2	1	1.05	8.06	.97	8.06	1.12	8.06	1.49	8.06
	7	.79	5.02	.80	8.83	.90	8.06	.96	8.06
	13	.64	6.40	.68	8.83	.78	8.83	.95	8.83
	19	.38	8.06	.59	8.83	.64	8.06	.71	8.06
3	1	.45	8.06	.63	8.06	.68	8.06	.72	8.06
	7	.57	3.26	1.03	5.02	1.09	5.02	1.16	6.40
	13	.96	6.40	1.26	6.40	1.26	6.87	1.51	6.40
	19	.87	5.02	1.13	5.99	1.15	5.99	1.39	6.40
4	1	.63	5.99	.84	6.40	.89	5.99	1.01	5.99
	7	.51	5.63	.74	8.06	.76	8.06	.83	5.02
	13	.65	4.76	.78	8.83	.74	5.31	.82	5.31
	19	.93	5.31	.91	5.63	1.03	5.99	1.13	5.63
5	1	1.29	6.40	1.10	6.40	1.07	6.87	1.55	6.87
	7	.96	7.42	.81	7.42	.85	8.06	1.21	6.87
	13	.56	4.76	.60	7.42	.66	7.42	.88	7.42
	19	.51	6.87	.50	7.42	.57	6.87	.75	7.42
6	1	1.24	4.76	1.36	4.53	1.20	4.76	1.42	4.76
	7	1.48	6.87	1.87	7.42	1.93	7.42	2.14	7.42
	13	1.30	5.63	1.57	5.31	1.37	4.76	1.61	6.87
	19	.89	5.02	1.28	6.87	1.21	6.40	1.53	5.63
7	1	1.00	5.31	1.38	5.02	1.28	8.06	1.55	5.63
	7	.69	5.31	.95	6.40	1.00	8.06	1.11	4.76
	13	*		.99	8.06	.96	6.40	1.05	6.87
	19	.52	5.31	.86	8.06	.84	7.42	1.02	8.06
8	1	.38	4.32	.90	8.06	.77	8.83	.79	6.40
	7	.47	5.63	.64	8.83	.70	8.06	.88	8.06
	13	.30	4.76	.56	8.83	.51	8.06	.67	7.42
	19								
9	1	Software crash.							
	7								
	13	.37	4.53	.48	8.83	.45	9.75	.54	8.83
	19	.39	3.95	.65	5.31	.69	5.02	.77	9.75
10	1	.32	4.53	.47	9.75	.56	9.75	.62	9.75
	7	.36	9.75	.60	8.06	.61	10.89	.65	9.75
	13	.36	2.55	.57	7.42	.61	8.06	.57	8.83
	19	.33	4.13	.53	9.75	.55	8.83	.56	9.75
11	1	.20	9.75	.40	8.83	.42	10.89	.49	9.75
	7	.23	5.63	.39	8.83	.45	8.83	*	
	13	.24	9.75	.41	9.75	.42	9.75	.50	9.75
	19	.26	5.31	.40	8.83	.41	8.83	.52	8.83
12	1	.52	5.63	.61	5.31	.66	5.63	.80	5.31
	7	.88	8.06	.93	8.06	.87	7.42	1.35	8.06
	13	.47	7.42	.62	9.75	.67	8.83	.97	9.75
	19	.70	4.76	.80	4.76	.80	9.75	1.07	4.53
13	1	.34	8.83	.50	9.75	.55	8.83	.71	9.75
	7	.23	5.63	.42	10.89	.42	10.89	.55	10.89
	13	.23	16.79	.42	9.75	.43	8.83	.51	10.89
	19	.36	2.48	.48	9.75	.41	9.75	.46	10.89
14	1	.22	16.79	.33	9.75	.38	16.79	.40	10.89
	7	.23	14.22	.37	14.22	.36	9.75	.40	16.79
	13	.26	16.79	.38	16.79	.36	10.89	.40	14.22
	19	.34	16.79	.40	16.79	.43	16.79	.47	5.99
15	1	.30	16.79	.39	14.22	.40	14.22	.46	14.22
	7	.41	2.95	.49	14.22	.53	14.22	.57	16.79
	13	.21	14.22	.41	14.22	.40	14.22	.55	14.22
	19	.41	3.79	.53	14.22	.50	14.22	.80	3.95
16	1	.51	5.31	.59	5.02	.53	5.02	.85	5.31
	7	.45	3.79	.59	14.22	.53	5.02	.78	5.02
	13	.62	5.63	.84	5.99	.84	5.63	1.02	5.31
	19	.51	5.31	.72	5.99	.67	5.63	.83	6.40

*=Electronic problems

TABLE 3: WAVE DATA PART 2

MARCH 1985

GAGE		645 Baylor at 7+80		625 Baylor at 19+00		640 Nearshr Wvrdr		630 Farshr Wvrdr	
DAY	TIME	Hmo(m)	T(sec)	Hmo(m)	T(sec)	Hmo(m)	T(sec)	Hmo(m)	T(sec)
17	1	.42	5.99	.65	6.40	.68	6.40	.79	6.40
	7	.68	5.02	.83	6.40	.85	5.31	1.04	5.63
	13	.41	5.31	.50	5.99	.51	5.63	.58	5.99
	19	.42	4.13	.59	8.83	.62	8.83	.81	4.13
18	1	1.15	5.02	1.29	5.63	1.32	5.31	1.89	5.63
	7	1.31	6.87	1.62	5.99	1.53	6.87	2.21	5.99
	13	1.32	6.87	1.47	6.87	1.42	6.40	1.65	5.31
	19	1.04	6.40	1.30	6.40	1.40	6.40	1.59	6.40
19	1	1.24	6.87	1.42	6.87	1.37	6.87	1.70	5.63
	7	.98	6.87	1.28	7.42	1.31	6.87	1.61	6.87
	13	.93	6.87	1.22	6.87	1.09	9.75	1.23	6.40
	19	.63	10.89	1.13	9.75	1.28	9.75	1.33	9.75
20	1	.74	8.83	1.01	10.89	1.02	10.89	1.04	9.75
	7	.34	14.22	.82	12.34	.85	12.34	.87	10.89
	13	.45	12.34	.83	10.89	.72	10.89	.80	12.34
	19	.39	12.34	.73	12.34	.83	12.34	.93	10.89
21	1	.37	14.22	.80	14.22	.73	14.22	.71	12.34
	7	.70	3.38	.93	12.34	1.00	3.38	.95	12.34
	13	1.36	6.40	1.79	6.87	1.77	6.87	1.84	6.87
	19	1.13	5.99	1.55	6.87	1.59	6.40	1.83	6.87
22	1	1.27	5.99	1.68	5.63	1.60	6.40	1.78	5.99
	7	1.26	6.40	1.69	5.99	1.76	6.40	1.93	6.40
	13	1.26	8.06	2.18	7.42	2.22	8.06	2.39	7.42
	19	1.41	8.83	1.87	8.06	1.92	8.83	2.33	8.06
23	1	1.18	9.75	2.78	8.83	2.98	9.75	3.23	9.75
	7	1.51	9.75	1.92	9.75	2.14	9.75	2.04	9.75
	13	1.05	9.75	1.19	8.83	1.22	9.75	1.34	9.75
	19	.72	7.42	1.03	9.75	1.10	8.83	1.42	8.83
24	1	.69	9.75	.96	9.75	1.05	10.89	1.32	9.75
	7	.60	8.83	.93	9.75	1.03	6.87	1.25	9.75
	13	.52	8.06	.99	8.06	.94	8.06	1.05	8.06
	19	.61	8.83	1.05	8.06	1.10	8.83	1.11	8.83
25	1	.82	5.99	1.36	8.06	1.33	9.75	1.70	6.87
	7	.85	8.83	1.50	8.83	1.46	8.06	1.47	6.40
	13	.99	10.89	1.68	9.75	1.67	9.75	1.58	10.89
	19	.80	12.34	1.55	8.06	1.54	8.83	1.56	9.75
26	1	.75	12.34	1.36	12.34	1.33	10.89	1.36	10.89
	7	.97	8.83	1.66	9.75	1.71	8.83	1.71	8.06
	13	.93	9.75	1.44	10.89	1.32	10.89	1.44	7.42
	19	.55	10.89	1.16	9.75	1.18	8.83	1.24	8.83
27	1	.37	8.83	.80	8.83	.87	9.75	.93	9.75
	7	.31	14.22	.57	9.75	.58	9.75	.65	9.75
	13	.23	9.75	.39	8.83	.46	9.75	.43	8.06
	19	.37	4.53	.45	14.22	.41	10.89	.73	3.15
28	1	.19	14.22	.25	14.22	.27	14.22	.49	2.24
	7	.21	14.22	.29	14.22	.25	14.22	.45	14.22
	13	.23	5.63	.29	12.34	.30	10.89	.42	14.22
	19	.36	2.69	.40	2.69	.40	10.89	.66	5.02
29	1	.30	6.40	.32	6.40	.32	8.06	.55	6.87
	7	.29	8.06	.33	8.83	.32	8.06	.53	7.42
	13	.23	8.06	.30	8.06	.32	8.83	.44	6.40
	19	.23	8.06	.26	12.34	.25	12.34	.35	6.87
30	1	.24	7.42	.29	8.83	.28	12.34	.42	8.06
	7	.35	6.40	.35	8.06	.34	7.42	.53	7.42
	13	.29	8.83	.32	8.83	.35	8.83	.43	6.87
	19	.84	4.53	.92	4.53	.93	4.53	1.01	4.53
31	1	.94	5.31	1.24	5.63	1.24	5.02	1.24	5.31
	7	.80	5.63	1.15	5.31	1.11	6.87	1.40	5.31
	13	.53	4.76	.99	5.99	.90	6.40	1.04	6.87
	19	.50	5.31	.90	6.87	.94	8.83	1.01	6.40
	MEAN	.63	7.52	.88	8.65	.89	8.63	1.04	8.02
	STD	.35	3.39	.47	2.74	.48	2.59	.52	2.66

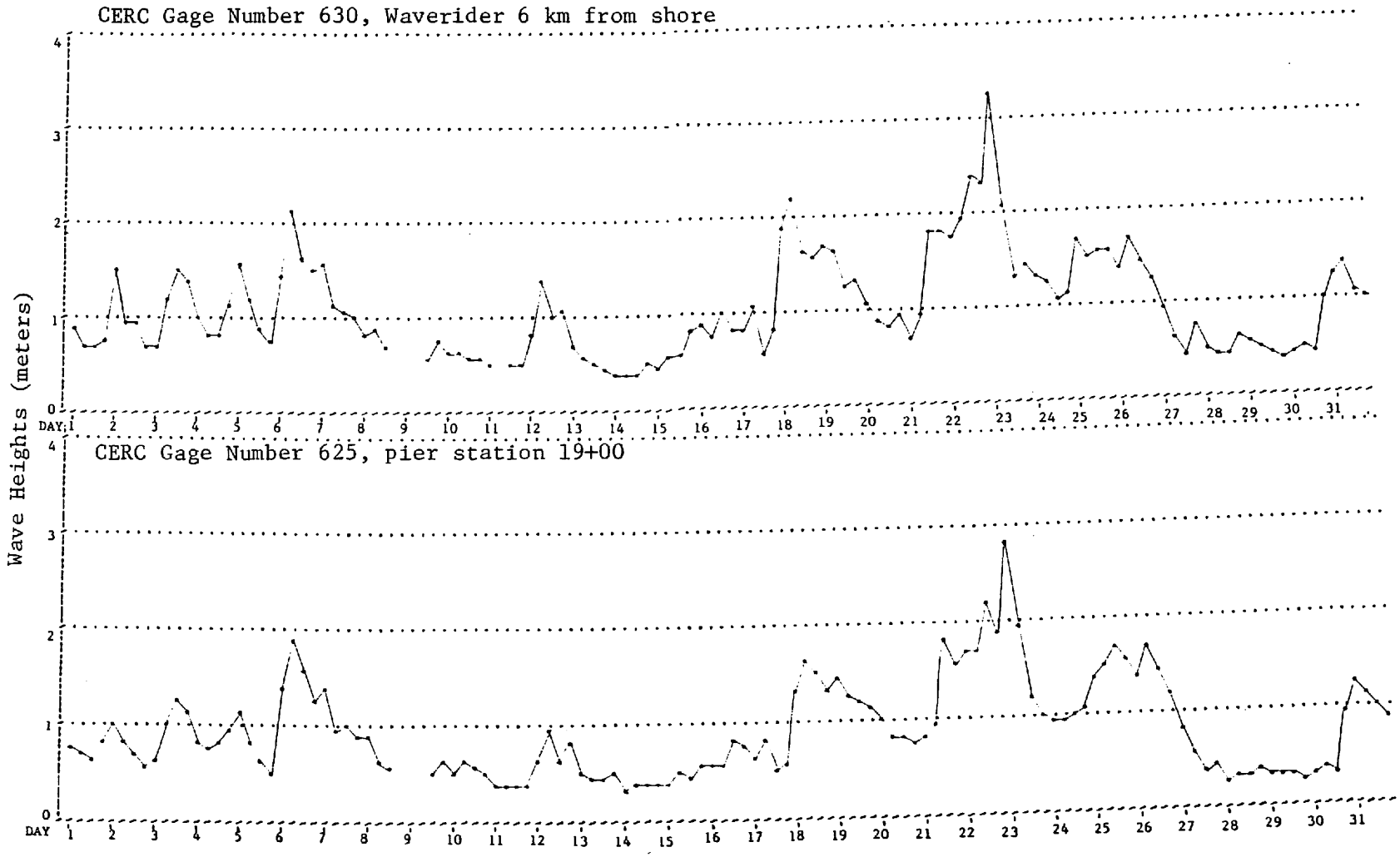


FIGURE 3. Time History of Wave Heights and Periods - March 1985 Part I:Heights

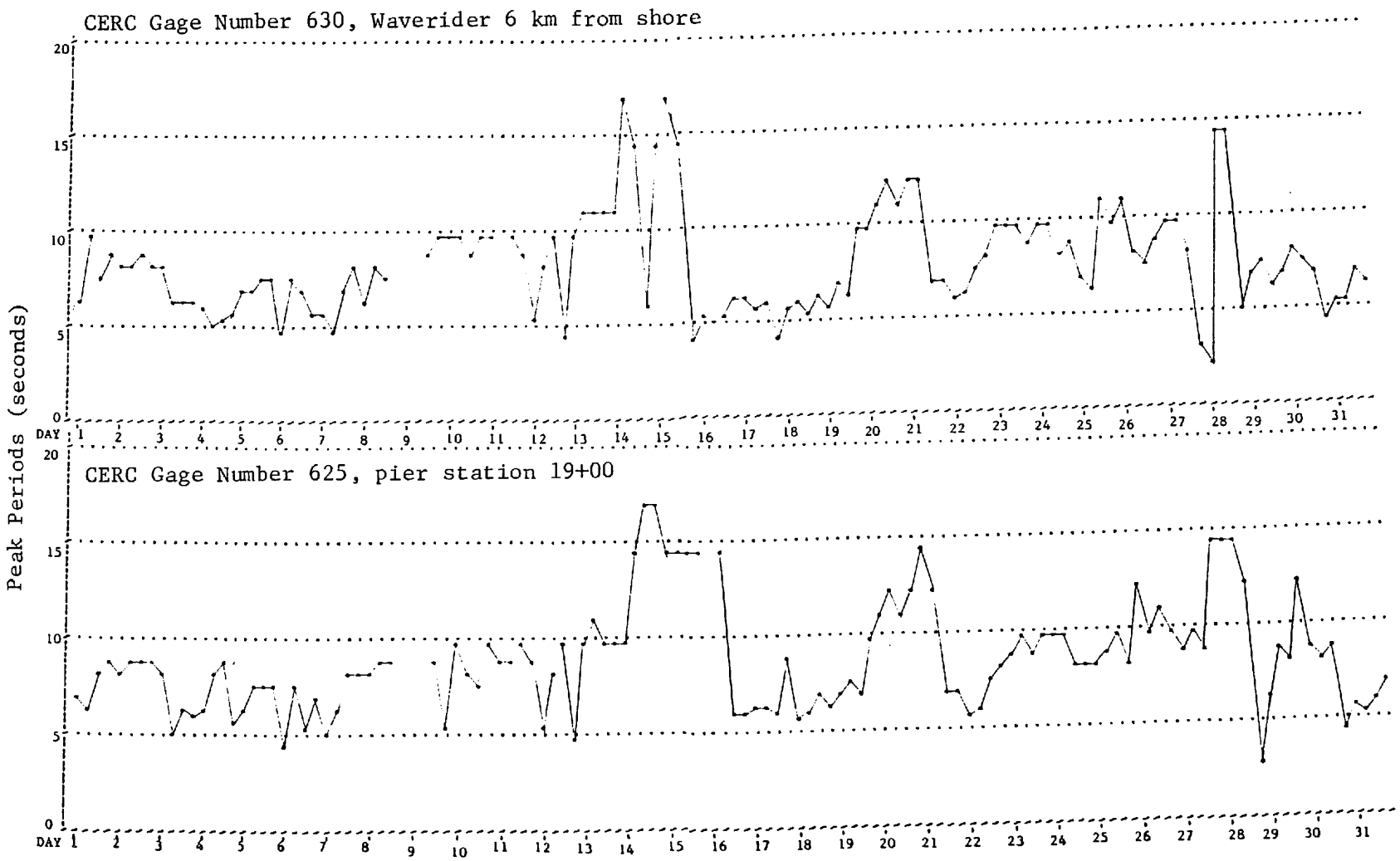


FIGURE 3. Time History of Wave Heights and Periods - March 1985 Part II:Periods

IV. CURRENT DATA

Current data (Table 4) are colleted from two Marsh-McBirney electromagnetic biaxial current meters (Table 1 and Figure 2) and by visually observing the movement of dye on the water surface in the surf and at the seaward end of the pier, as well as 500 m updrift of the pier 12 m offshore.

Since the shoreline orientation is approximately N20°W, alongshore currents flow either toward 340° (i.e. northward) or toward 160° (i.e. southward). Similarly, cross-shore currents are either onshore (westward) or offshore (eastward).

All current speeds are given in centimeters per second.

TABLE 4: CURRENT DATA
(SPEEDS IN CM/SEC)
March 1985

		PIER MEASUREMENTS								BEACH MEASUREMENTS (500 UPDRIFT)				
		DYE AT 19+00 (579m) (SURFACE)		CURRENT METER AT 14+20(433m) I.D.#639 (DEPTH -4.2m MSL)		DYE AT MID-SURF ZONE (SURFACE) DIST. FROM BASELINE(M)				DYE 12M OFFSHORE (SURFACE)			CURRENT METER AT SOUTH TRIPOD (DEPTH -4.8m MSL) I.D.#679	
DAY	TIME	SPEED	DIR	SPEED	DIR		SPEED	DIR	LOCATION	SPEED	DIR		SPEED	DIR
1	0100-Alongshore			4	S								0	
	Cross-shore			0									1	ON
	Resultant			4	160								1	250
1	0700-Alongshore	8	S	5	S		11	S		3	S		12	S
	Cross-shore	8	Off	0		165	3	On	North				0	
	Resultant	11	115	5	160		11	174					12	160
1	1300-Alongshore			7	S								8	S
	Cross-shore			2	ON								0	
	Resultant			7	174								8	160
1	1900-Alongshore			10	S								12	S
	Cross-shore			3	ON								2	OF
	Resultant			11	174								12	151
2	0100-Alongshore			3	S								2	S
	Cross-shore			3	ON								1	ON
	Resultant			5	207								3	186
2	0700-Alongshore	6	N	0			38	N		88	N		1	S
	Cross-shore	12	Off	2	OF	165	17	Off	South				1	ON
	Resultant	13	43	2	70		42	4					1	188
2	1300-Alongshore			1	N								10	N
	Cross-shore			7	OF								6	OF
	Resultant			7	61								11	12
2	1900-Alongshore			8	S								6	S
	Cross-shore			0									2	OF
	Resultant			8	160								6	146
3	0100-Alongshore			2	S								2	S
	Cross-shore			1	OF								2	OF
	Resultant			2	140								3	128
3	0700-Alongshore	34	S	13	S		61	S		43	S		20	S
	Cross-shore	12	On	2	ON	177	9	On	North				2	OF
	Resultant	36	179	13	169		62	169					21	153
3	1300-Alongshore			15	S								20	S
	Cross-shore			4	ON								2	ON
	Resultant			16	173								20	166
3	1900-Alongshore			12	S								14	S
	Cross-shore			3	ON								2	ON
	Resultant			12	173								14	167
4	0100-Alongshore			4	S								13	S
	Cross-shore			1	ON								0	
	Resultant			4	169								13	160
4	0700-Alongshore	20	S	11	S		36	N		2	N		17	S
	Cross-shore	3	On	1	ON	152	5	On	South				2	OF
	Resultant	21	169	11	166		18	323					17	153
4	1300-Alongshore			1	S								10	S
	Cross-shore			1	OF								4	OF
	Resultant			2	135								11	138
4	1900-Alongshore			4	N								5	S
	Cross-shore			2	OF								0	
	Resultant			5	11								5	160
5	0100-Alongshore			9	N								17	N
	Cross-shore			3	OF								5	ON
	Resultant			9	356								17	323
5	0700-Alongshore	32	N	8	N		87	N		107	N		20	N
	Cross-shore	19	Off	2	OF	151	39	Off	South				5	ON
	Resultant	37	11	8	351		95	4					21	326
5	1300-Alongshore			7	N								18	N
	Cross-shore			1	OF								5	ON
	Resultant			8	351								18	325
5	1900-Alongshore			1	S								4	N
	Cross-shore			0									3	ON
	Resultant			1	160								5	306
6	0100-Alongshore			16	S								22	S
	Cross-shore			3	ON								1	OF
	Resultant			16	171								22	158
6	0700-Alongshore	68	S	40	S		122	S		135	S		51	S
	Cross-shore	0	0	10	ON	189	0	0	North				0	
	Resultant	68	160	41	174		122	160					51	160
6	1300-Alongshore			32	S								45	S
	Cross-shore			8	ON								1	ON
	Resultant			33	174								45	161
6	1900-Alongshore			25	S								35	S
	Cross-shore			1	ON								5	OF
	Resultant			25	163								35	152

KEY = ALL SPEEDS IN CM/SEC
N =NORTHWARD, SHORE PARALLEL
S =SOUTHWARD, SHORE PARALLEL
ON=ONSHORE
OF=OFFSHORE

TABLE 4: CURRENT DATA
(SPEEDS IN CM/SEC)

		PIER MEASUREMENTS								BEACH MEASUREMENTS (500 UPDRIFT)				
		DYE AT 1900 (579m) (SURFACE)		CURRENT METER AT 1420(433m) I.D.#639 (DEPTH -4.2m MSL)		DYE AT MID-SURF ZONE (SURFACE) DIST. FROM				DYE 12M OFFSHORE (SURFACE)			CURRENT METER AT SOUTH TRIPOD (DEPTH -4.8m MSL) I.D.#679	
DAY	TIME	SPEED	DIR	SPEED	DIR	BASELINE(M)	SPEED	DIR	LOCATION	SPEED	DIR	SPEED	DIR
7	0100-Alongshore			18	S							31	S
	Cross-shore			5	ON							3	OF
	Resultant			18	175							31	155
7	0700-Alongshore	47	S	18	S		61	S		23	S	23	S
	Cross-shore	9	On	0		177	15	On	North			2	OF
	Resultant	48	171	18	160		63	174				23	156
7	1300-Alongshore			12	S							16	S
	Cross-shore			0								4	OF
	Resultant			12	160							17	147
7	1900-Alongshore			10	S							15	S
	Cross-shore			2	ON							4	OF
	Resultant			11	170							15	145
8	0100-Alongshore			9	S							12	S
	Cross-shore			5	ON							5	OF
	Resultant			10	188							13	137
8	0700-Alongshore	0	0	2	N		4	N		23	N	3	S
	Cross-shore	12	Off	4	OF	139	6	Off	North			3	OF
	Resultant	12	20	5	42		7	40				4	118
8	1300-Alongshore			6	N							4	N
	Cross-shore			2	OF							4	ON
	Resultant			6	2							5	292
8	1900-Alongshore												
	Cross-shore												
	Resultant												
9	0100-Alongshore												
	Cross-shore												
	Resultant												
9	0700-Alongshore	36	N				0	0		6	N		
	Cross-shore	9	On			139	0	0	North				
	Resultant	37	326				0	0					
9	1300-Alongshore			0								2	N
	Cross-shore			1	OF							0	
	Resultant			1	70							2	340
9	1900-Alongshore			15	N							19	N
	Cross-shore			3	OF							1	OF
	Resultant			15	352							19	344
10	0100-Alongshore			1	S							9	S
	Cross-shore			0								1	ON
	Resultant			1	160							9	168
10	0700-Alongshore	3	S	1	N		0	0		20	N	4	N
	Cross-shore	1	On	0		140	1	Off	North			0	
	Resultant	3	177	1	340		1	70				4	340
10	1300-Alongshore			9	S							9	S
	Cross-shore			2	OF							6	OF
	Resultant			10	150							11	127
10	1900-Alongshore			3	N							11	N
	Cross-shore			1	OF							4	ON
	Resultant			4	356							11	317
11	0100-Alongshore			4	S							8	S
	Cross-shore			0								2	OF
	Resultant			4	160							8	148
11	0700-Alongshore	11	S	3	S		32	S		21	N	4	S
	Cross-shore	5	On	2	ON	140	3	On	North			0	
	Resultant	12	184	3	186		32	166				4	160
11	1300-Alongshore			6	S							15	S
	Cross-shore			1	OF							3	OF
	Resultant			6	153							15	150
11	1900-Alongshore			0								5	S
	Cross-shore			0								0	
	Resultant			0	0							5	160
12	0100-Alongshore			1	S							6	S
	Cross-shore			1	ON							3	ON
	Resultant				209							7	190
12	0700-Alongshore	44	N	16	N		87	N		90	N	19	N
	Cross-shore	13	Off	6	OF	162	78	Off	South			2	ON
	Resultant	45	357	17	1		117	22				19	335
12	1300-Alongshore			4	N							7	N
	Cross-shore			0								5	ON
	Resultant			4	340							8	305
12	1900-Alongshore			8	S							10	S
	Cross-shore			4	ON							6	ON
	Resultant			9	189							12	189

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TABLE 4: CURRENT DATA
(SPEEDS IN CM/SEC)

DAY	TIME	DYE AT 19+00 (579m) (SURFACE) SPEED	DIR	CURRENT METER AT 14+20(433m) I.D.#639 (DEPTH -4.2m MSL) SPEED	DIR	DYE AT MID-SURF ZONE (SURFACE) DIST. FROM BASELINE(M)	SPEED	DIR	BEACH MEASUREMENTS (500 UPDRIFT) DYE 12M OFFSHORE (SURFACE) LOCATION	SPEED	DIR	CURRENT METER AT SOUTH TRIPOD (DEPTH -4.8m MSL) I.D.#679 SPEED	DIR
13	0100-Alongshore			7	S							8	S
	Cross-shore			3	ON							1	ON
	Resultant			7	183							8	164
13	0700-Alongshore	18	S	3	S		0	0		14	N	9	S
	Cross-shore	8	Off	2	ON	157	21	Off	North			2	ON
	Resultant	20	136	3	189		21	84				9	173
13	1300-Alongshore			5	S							7	S
	Cross-shore			3	OF							8	OF
	Resultant			6	128							10	112
13	1900-Alongshore			7	N							4	N
	Cross-shore			2	OF							0	
	Resultant			7	360							4	340
14	0100-Alongshore			6	N							6	N
	Cross-shore			2	OF							2	ON
	Resultant			7	358							6	322
14	0700-Alongshore	2	S	3	N		7	S		6	S	7	N
	Cross-shore	3	On	1	OF	152	0	0	North			2	ON
	Resultant	3	223	3	351		7	160				8	321
14	1300-Alongshore			3	S							2	S
	Cross-shore			3	OF							1	ON
	Resultant			4	123							3	187
14	1900-Alongshore			6	S							9	S
	Cross-shore			1	ON							1	ON
	Resultant			6	173							9	164
15	0100-Alongshore			0								2	S
	Cross-shore			0								4	ON
	Resultant			0	0							5	226
15	0700-Alongshore	29	S	9	S		41	S		13	S	13	S
	Cross-shore	1	Off	2	ON	152	2	Off	North			2	OF
	Resultant	29	157	9	174		41	157				14	153
15	1300-Alongshore			17	S							30	S
	Cross-shore			2	OF							4	OF
	Resultant			17	153							30	152
15	1900-Alongshore			10	S							22	S
	Cross-shore			3	ON							8	OF
	Resultant			10	175							23	141
16	0100-Alongshore			0								10	S
	Cross-shore			3	ON							4	ON
	Resultant			3	250							11	182
16	0700-Alongshore	27	S	7	S		51	S		67	S	16	S
	Cross-shore	7	On	0		152	3	On	North			1	OF
	Resultant	27	174	7	160		51	163				16	155
16	1300-Alongshore			6	S							13	S
	Cross-shore			2	ON							1	OF
	Resultant			7	181							13	155
16	1900-Alongshore			2	S							16	S
	Cross-shore			0								1	OF
	Resultant			3	160							16	155
17	0100-Alongshore			10	N							10	N
	Cross-shore			1	OF							1	OF
	Resultant			10	347							10	346
17	0700-Alongshore	23	S	1	N		34	N		62	N	11	N
	Cross-shore	5	Off	1	ON	165	12	Off	South			2	OF
	Resultant	23	150	1	304		39	11				12	349
17	1300-Alongshore			7	S							10	S
	Cross-shore			1	OF							2	OF
	Resultant			7	149							10	148
17	1900-Alongshore			12	S							18	S
	Cross-shore			0								5	OF
	Resultant			12	160							18	145
18	0100-Alongshore			19	S							31	S
	Cross-shore			6	ON							1	ON
	Resultant			20	177							31	162
18	0700-Alongshore	68	S	31	S		102	S		57	S	44	S
	Cross-shore	0	0	11	ON	163	0	0	North			1	ON
	Resultant	68	160	33	179		102	160				44	161
18	1300-Alongshore			25	S							38	S
	Cross-shore			8	ON							3	ON
	Resultant			27	178							38	165
18	1900-Alongshore			25	S							33	S
	Cross-shore			9	ON							0	
	Resultant			27	180							33	160

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OF=OFFSHORE

TABLE 4: CURRENT DATA
(SPEEDS IN CM/SEC)

		PIER MEASUREMENTS								BEACH MEASUREMENTS (500 UPDRIFT)					
		DYE AT 19+00 (579m) (SURFACE)		CURRENT METER AT 14+20(433m) I.D.#639 (DEPTH -4.2m MSL)		DYE AT MID-SURF ZONE (SURFACE) DIST. FROM				DYE 12M OFFSHORE (SURFACE)				CURRENT METER AT SOUTH TRIPOD (DEPTH -4.8m MSL) I.D.#679	
DAY	TIME	SPEED	DIR	SPEED	DIR	BASELINE(M)	SPEED	DIR		LOCATION	SPEED	DIR		SPEED	DIR
19	0100-Alongshore			13	S									24	S
	Cross-shore			5	ON									1	ON
	Resultant			14	180									24	162
19	0700-Alongshore	38	S	13	S		15	S			50	S		18	S
	Cross-shore	6	Off	7	ON	213	13	On		North				0	
	Resultant	39	151	15	186		20	202						18	160
19	1300-Alongshore			6	S									23	S
	Cross-shore			3	ON									2	ON
	Resultant			7	188									23	164
19	1900-Alongshore			2	S									15	S
	Cross-shore			3	ON									2	ON
	Resultant			4	212									15	168
20	0100-Alongshore			0										13	N
	Cross-shore			0										7	ON
	Resultant			0	0									15	309
20	0700-Alongshore	14	N	8	N		8	N			9	N		13	N
	Cross-shore	26	Off	0		152	16	Off		North				5	ON
	Resultant	30	43	9	340		18	43						14	319
20	1300-Alongshore			12	N									17	N
	Cross-shore			10	OF									3	ON
	Resultant			15	20									17	331
20	1900-Alongshore			13	N									23	N
	Cross-shore			4	OF									2	ON
	Resultant			13	360									23	335
21	0100-Alongshore			11	N									13	N
	Cross-shore			9	OF									4	ON
	Resultant			14	18									13	322
21	0700-Alongshore	16	S	5	S		87	S			50	S		5	S
	Cross-shore	19	On	1	OF	165	0	0		North				0	
	Resultant	25	210	5	151		87	160						5	160
21	1300-Alongshore			25	S									28	S
	Cross-shore			4	ON									2	OF
	Resultant			25	169									28	156
21	1900-Alongshore			16	S									21	S
	Cross-shore			3	ON									1	OF
	Resultant			16	170									21	156
22	0100-Alongshore			17	S									24	S
	Cross-shore			0										2	OF
	Resultant			17	160									24	155
22	0700-Alongshore	36	S	18	S		51	S			36	N		22	S
	Cross-shore	18	On	4	ON	165	5	On		North				3	OF
	Resultant	40	187	18	172		51	166						22	153
22	1300-Alongshore			18	N									15	S
	Cross-shore			16	OF									4	OF
	Resultant			24	22									15	145
22	1900-Alongshore			12	N									0	
	Cross-shore			10	OF									6	OF
	Resultant			16	22									6	70
23	0100-Alongshore			57	N									19	N
	Cross-shore			39	OF									11	OF
	Resultant			69	15									22	10
23	0700-Alongshore	12	S	13	N		87	N			59	N		12	S
	Cross-shore	3	On	13	OF	177	44	On		South				11	OF
	Resultant	12	174	19	26		97	311						16	118
23	1300-Alongshore			3	S									15	S
	Cross-shore			3	ON									1	ON
	Resultant			4	209									15	163
23	1900-Alongshore			11	S									21	S
	Cross-shore			2	OF									5	OF
	Resultant			11	151									21	142
24	0100-Alongshore			19	S									29	S
	Cross-shore			5	ON									1	OF
	Resultant			20	174									29	159
24	0700-Alongshore	30	S	12	S		47	S			43	S		15	S
	Cross-shore	3	Off	1	OF	152	12	Off		North				5	OF
	Resultant	31	154	12	157		48	146						16	143
24	1300-Alongshore			8	S									16	S
	Cross-shore			2	ON									3	OF
	Resultant			9	183									16	149
24	1900-Alongshore			8	S									11	S
	Cross-shore			4	ON									0	
	Resultant			9	187									11	160

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OF=OFFSHORE

		PIER MEASUREMENTS								BEACH MEASUREMENTS (500 UPDRIFT)				
		DYE AT 19+00 (579m) (SURFACE)		CURRENT METER AT 14+20(433m) I.D.#639 (DEPTH -4.2m MSL)		DYE AT MID-SURF ZONE (SURFACE) DIST. FROM				DYE 12M OFFSHORE (SURFACE)			CURRENT METER AT SOUTH TRIPOD (DEPTH -4.8m MSL) I.D.#679	
DAY	TIME	SPEED	DIR	SPEED	DIR	BASELINE(M)	SPEED	DIR	LOCATION	SPEED	DIR		SPEED	DIR
25	0100-Alongshore			16	S								21	S
	Cross-shore			4	ON								1	OF
	Resultant			17	175								21	156
25	0700-Alongshore	44	S	18	S		68	S		30	S		15	S
	Cross-shore	7	On	4	ON	178	10	On	North				2	ON
	Resultant	44	169	19	173		68	169					15	167
25	1300-Alongshore			19	S								32	S
	Cross-shore			5	ON								0	
	Resultant			19	175								32	160
25	1900-Alongshore			19	S								27	S
	Cross-shore			9	ON								2	ON
	Resultant			21	186								27	164
26	0100-Alongshore			11	S								21	S
	Cross-shore			6	ON								1	OF
	Resultant			12	190								21	158
26	0700-Alongshore	44	S	16	S		34	S		26	S		22	S
	Cross-shore	2	On	5	ON	189	3	On	North				2	OF
	Resultant	44	157	17	177		34	169					22	155
26	1300-Alongshore			12	S								20	S
	Cross-shore			3	ON								3	ON
	Resultant			13	176								20	167
26	1900-Alongshore			2	S								8	S
	Cross-shore			5	ON								1	ON
	Resultant			5	226								8	164
27	0100-Alongshore			0									3	N
	Cross-shore			2	ON								3	ON
	Resultant			2	250								4	303
27	0700-Alongshore	44	N	9	N		29	N		20	N		15	N
	Cross-shore	26	Off	2	OF	149	13	Off	South				2	ON
	Resultant	51	11	9	352		32	4					16	331
27	1300-Alongshore			6	N								11	N
	Cross-shore			0									4	ON
	Resultant			6	340								12	321
27	1900-Alongshore			10	N								15	N
	Cross-shore			2	OF								2	ON
	Resultant			10	352								15	333
28	0100-Alongshore			5	N								6	N
	Cross-shore			0									6	ON
	Resultant			5	340								9	297
28	0700-Alongshore	0	0	1	N		12	N		5	N		3	N
	Cross-shore	20	Off	0		139	13	Off	South				4	ON
	Resultant	20	88	1	340		18	26					5	288
28	1300-Alongshore			0									2	N
	Cross-shore			0									2	ON
	Resultant			1	0								3	296
28	1900-Alongshore			7	N								13	N
	Cross-shore			2	OF								0	
	Resultant			7	354								13	340
29	0100-Alongshore			10	N								11	N
	Cross-shore			1	OF								0	
	Resultant			10	348								11	340
29	0700-Alongshore	13	N	5	N		24	N		18	N		8	N
	Cross-shore	11	Off	0		140	7	Off	South				4	ON
	Resultant	17	19	5	340		25	357					9	314
29	1300-Alongshore			0									2	N
	Cross-shore			1	ON								2	ON
	Resultant			1	250								3	293
29	1900-Alongshore			5	S								6	S
	Cross-shore			1	ON								3	OF
	Resultant			5	171								7	132
30	0100-Alongshore			8	S								9	S
	Cross-shore			1	ON								4	OF
	Resultant			8	165								10	139
30	0700-Alongshore	5	N	1	N		47	N		4	N		1	S
	Cross-shore	12	On	0		140	12	Off	South				4	ON
	Resultant	12	272	1	340		48	354					4	238
30	1300-Alongshore			2	S								5	S
	Cross-shore			4	ON								4	ON
	Resultant			5	226								6	197
30	1900-Alongshore			10	S								19	S
	Cross-shore			2	ON								[illegible]	OF
	Resultant			10	173								[illegible]	155
31	0100-Alongshore			16	S								19	S
	Cross-shore			4	ON								2	OF
	Resultant			16	174								19	154
31	0700-Alongshore	51	S	20	S		87	S		18	S		34	S
	Cross-shore	3	On	3	ON	165	0	0	North				3	OF
	Resultant	51	162	20	168		87	160					34	154
31	1300-Alongshore			13	S								17	S
	Cross-shore			5	ON								0	
	Resultant			13	180								17	160
31	1900-Alongshore			4	S								18	S
	Cross-shore			4	ON								6	OF
	Resultant			5	209								19	142

KEY = ALL SPEEDS IN CM/SEC
N =NORTHWARD, SHORE PARALLEL
S =SOUTHWARD, SHORE PARALLEL
ON=ONSHORE
OF=OFFSHORE

V. SUPPLEMENTAL OBSERVATIONS

Visual wave direction measurements (Table 5) taken at the seaward end of the pier are made of both the primary wave train (i.e. that having the larger wave heights) and the secondary wave train (which must be clearly distinguishable as a wave train separate from the primary waves) but not surface chop or capillary waves. The direction of the primary wave train just north of the seaward end of the pier is also determined using a Raytheon Marine Pathfinder radar and measuring alignment of the wave crests. The pier axis (considered perpendicular to the beach at the FRF) is oriented 70° east of true north; consequently, wave angles greater than 70° imply the waves were coming from the south side of the pier.

The width of the surf zone (seawardmost breaker position to shoreline) is determined from the pier deck.

Measurements of surface water temperature, density, and visibility are made daily at the seaward end of the FRF pier. A jar along with a thermometer is lowered about .3 m (1 ft) into the water and allowed to remain for at least one minute. The jar is removed, the temperature read and a hydrometer is used to determine the density. A secci disc is used to determine the surface visibility.

TABLE 5

SUPPLEMENTAL OBSERVATIONS

March 1985

DAY	TIME	WAVE APPROACH ANGLE AT PIER END (° from True N) PRIMARY	SECONDARY	RADAR WAVE ANGLE (° from True N)	WIDTH OF SURF ZONE (M)	WATER CHARACTERISTICS AT PIER END TEMP (°C)	DENSITY (g/cc)	SECCI VIS (M)
1	0845	60	80		67	6.5	1.0228	2.4
2	0940	130			102	6.5	1.0250	3.7
3	0900	50		60	134	7.6	1.0232	2.4
4	0800	100			66	7.2	1.0241	2.1
5	0830	120			75	7.2	1.0258	1.8
6	0815	40		30	165	6.0	1.0266	1.2
7	1000	60		60	117	6.5	1.0254	4.6
8	0845	130	45		38	7.0	1.0233	4.0
9	0930	130			23	7.5	1.0232	4.3
10	1000	90	40		32	8.2	1.0227	5.2
11	0830	110			23	8.5	1.0231	4.9
12	0845	110			55	7.5	1.0252	3.0
13	0830	60			78	7.1	1.0272	5.8
14	1000	130			34	8.0	1.0266	5.8
15	0830	80	30		40	8.8	1.0262	4.9
16	0850	70	50		49	9.0	1.0224	4.6
17	1100	110			76	9.3	1.0232	4.0
18	0800	40		60	128	8.5	1.0222	1.8
19	0930	60		70	174	8.0	1.0219	3.0
20	0830	100	30		91	8.0	1.0252	2.4
21	0830	25			136	8.0	1.0247	1.8
22	0820	70		80	162	8.0	1.0252	0.9
23	0810	70			183	8.1	1.0242	0.6
24	0915	60			110	7.8	1.0244	1.5
25	0745	55		60	174	8.0	1.0235	2.1
26	0830	50			229	7.5	1.0232	1.2
27	0830	50			56	7.5	1.0260	1.2
28	0830	140			18	8.0	1.0266	2.1
29	0830	140			20	8.5	1.0267	3.7
30	0800	80			9	9.7	1.0264	3.7
31	0930	50			133	11.0	1.0236	3.0

VI. WATER LEVELS

The National Ocean Services (NOS) has established a primary tide station (No. 865-1370) at the seaward end of the FRF pier. A Leupold-Stevens digital recording float-type tide gage is used to collect data every 6 minutes throughout the month.

Figure 4 shows the range of each cycle while Figure 5 shows the variation in mean water levels computed over a tidal cycle period (12.42 hours), and contains a list of selected mean and extreme values. This presentation is useful in identifying effects of both meteorological and astronomical forces on the open coast water levels.

Table 6 contains the time of the center of each sampling interval and the range, high, low, and mean water levels during each tidal cycle.

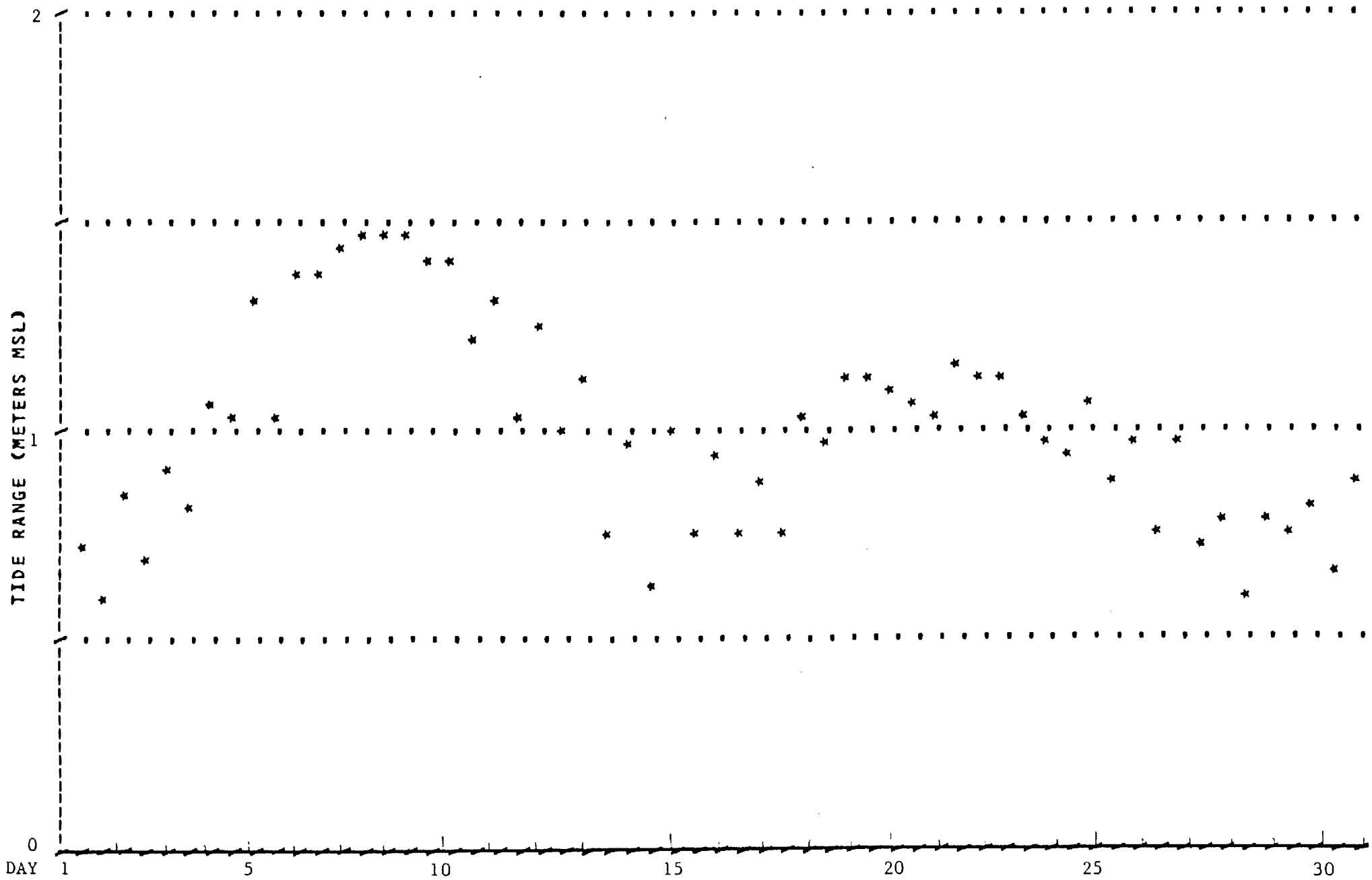

FIGURE 4. Time History of Tide Range, March 1985 (Gage No. 865-1370)

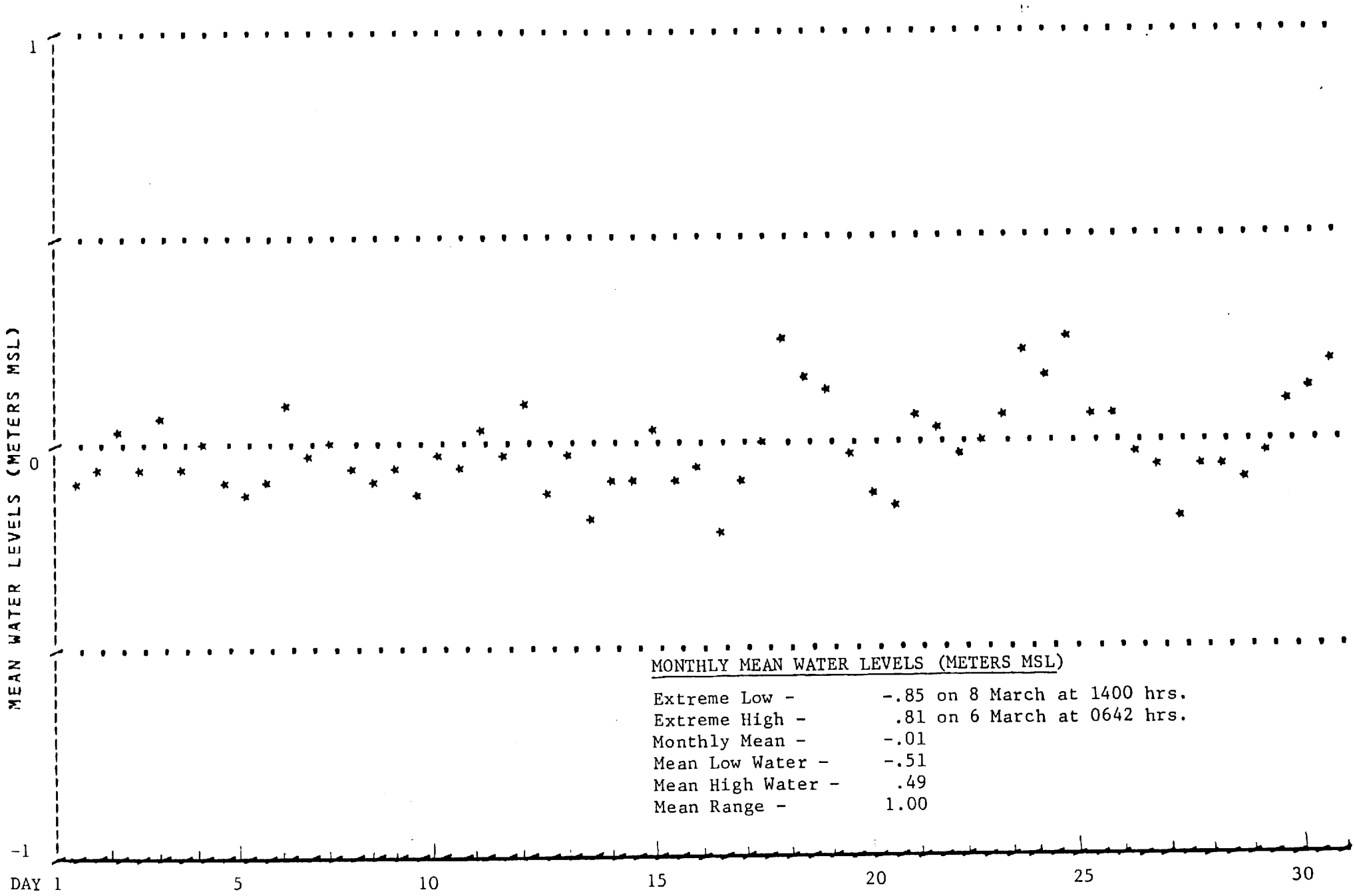

FIGURE 5. Time History of Mean Water Levels, March 1985 (Gage No. 865-1370)

TABLE 6

WATER LEVELS (METERS MSL)

Tidal Characteristics

March 1985

MID-CYCLE DAY	TIME	LOW	HIGH	MEAN	RANGE
1	612	-.45	.28	-.10	.73
1	1837	-.32	.28	-.05	.61
2	702	-.37	.48	.03	.84
2	1928	-.41	.27	-.06	.68
3	753	-.37	.53	.08	.90
3	2018	-.50	.31	-.06	.82
4	843	-.54	.53	.00	1.07
4	2108	-.62	.40	-.08	1.02
5	934	-.75	.57	-.12	1.32
5	2159	-.65	.39	-.10	1.04
6	1024	-.58	.81	.10	1.38
6	2249	-.75	.64	-.03	1.39
7	1114	-.75	.70	-.01	1.45
7	2340	-.78	.68	-.05	1.46
8	1205	-.85	.62	-.10	1.47
9	30	-.80	.68	-.06	1.48
9	1255	-.84	.57	-.12	1.41
10	120	-.73	.69	-.03	1.42
10	1346	-.66	.55	-.05	1.21
11	211	-.60	.70	.05	1.30
11	1436	-.56	.48	-.04	1.05
12	301	-.50	.76	.09	1.26
12	1526	-.66	.32	-.14	.98
13	352	-.59	.54	-.02	1.13
13	1617	-.57	.17	-.20	.75
14	442	-.60	.37	-.10	.98
14	1707	-.43	.20	-.10	.62
15	532	-.48	.52	.04	.99
15	1758	-.46	.29	-.08	.75
16	623	-.55	.38	-.05	.93
16	1848	-.59	.15	-.21	.75
17	713	-.55	.31	-.10	.87
17	1938	-.39	.37	.01	.76
18	804	-.28	.75	.24	1.03
18	2029	-.32	.65	.15	.97
19	854	-.44	.67	.12	1.11
19	2119	-.62	.52	-.04	1.14
20	944	-.67	.43	-.12	1.09
20	2210	-.72	.34	-.17	1.07
21	1035	-.46	.56	.05	1.02
21	2300	-.55	.60	.03	1.15
22	1125	-.62	.52	-.04	1.14
22	2350	-.58	.55	.01	1.12
23	1216	-.48	.55	.05	1.03
24	41	-.28	.70	.21	.98
24	1306	-.34	.59	.15	.94
25	131	-.27	.79	.24	1.05
25	1356	-.39	.48	.06	.87
26	222	-.37	.59	.07	.95
26	1447	-.42	.33	-.03	.75
27	312	-.50	.45	-.07	.95
27	1537	-.51	.22	-.17	.73
28	402	-.38	.39	-.05	.78
28	1628	-.37	.23	-.07	.60
29	453	-.44	.34	-.09	.78
29	1718	-.27	.46	-.03	.74
30	543	-.28	.55	.08	.83
30	1808	-.14	.52	.14	.66
31	634	-.23	.65	.19	.89

VII. NEARSHORE PROFILES

A. Nearshore Profiles. In order to document profile response away from the pier, surveys of four profile lines extending 900 to 1,000 m from shore and located 489 and 581 m north and 517 and 608 m south of the FRF pier are conducted bi-weekly, after storms, and during more complete bathymetric surveys.

These profiles are obtained using the CRAB-Zeiss surveying system; a Zeiss Elta-2 first-order, self-recording electronic theodolite distance meter in combination with the Coastal Research Amphibious Buggy (CRAB), a 10.7 m high, self-powered, mobile tripod on wheels.

Figure 6 shows the last survey in February and the three surveys conducted in March on profile line 188, located 517 m south of the pier. The last survey in February shows only a rudimentary nearshore bar (110 m) and small storm bar (220 to 360 m). The surveys through mid-March showed the removal of the nearshore bar and a 40 m shoreward migration of the storm bar, with only minor changes to the foreshore (80 to 140 m). The last survey in March, which followed a storm on 22-23 March, shows a distinct nearshore bar and trough (110 to 200 m) and minor erosion of the storm bar. Up to .20 m of accretion occurred on the foreshore above MSL (80 to 110 m) while up to 1.0 m of erosion in the nearshore below MSL (120 to 160 m) resulted in a nearshore trough.

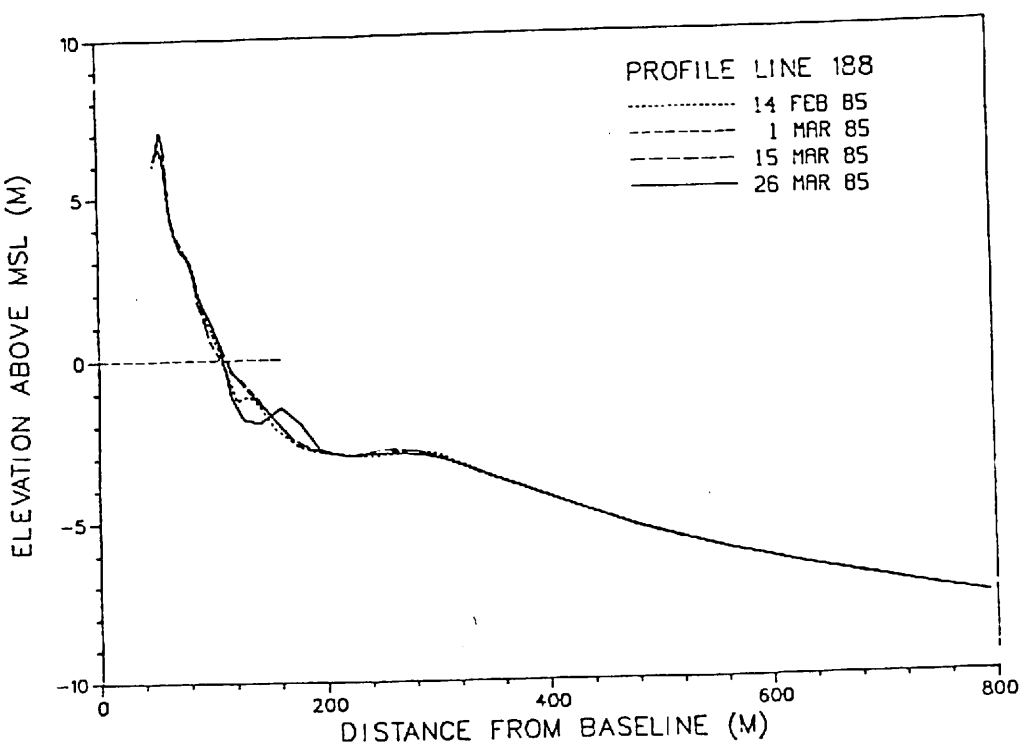

Figure 6. Monthly CRAB profiles on profile 188 - 517 meters south of pier.

The profile envelope (Figure 7) reflects the maximum changes on the profile between January and March. Changes to the envelope during this month include a small amount of erosion on the beach face (80 to 120 m) early in March and the erosion creating the nearshore trough late in the month. The only change to the maximum profile (160 m) is a result of the nearshore bar formation late in March.

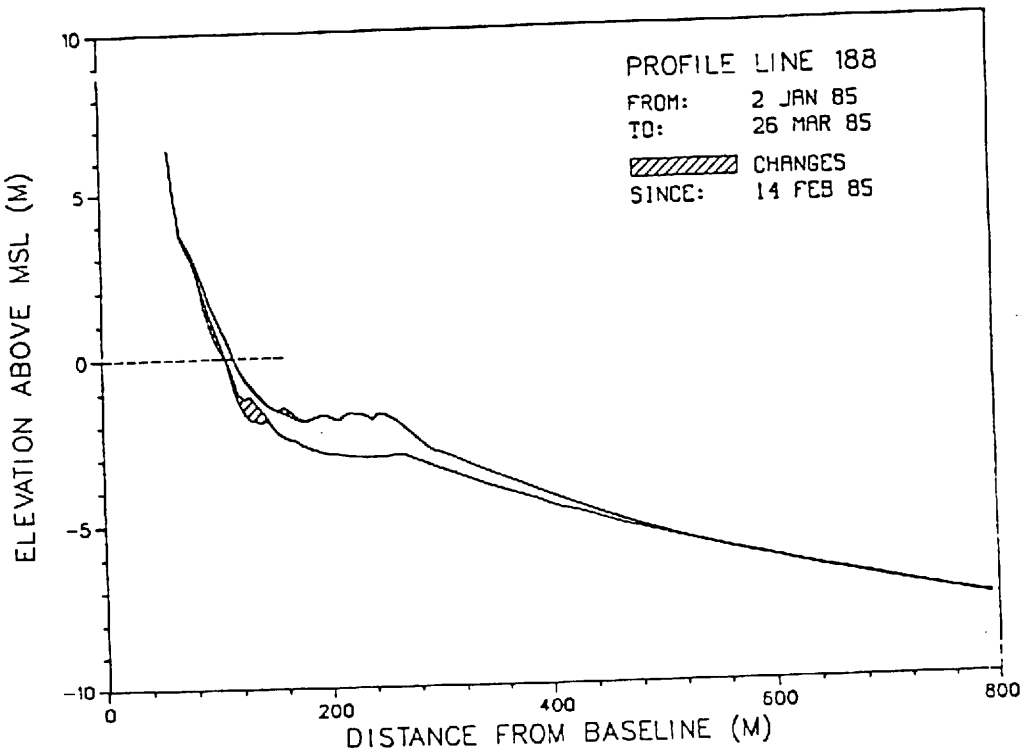

Figure 7. CRAB profile envelope - proile 188.

B. Bathymetry. No bathymetric survey was conducted in March. Figure 8 is included for reference.

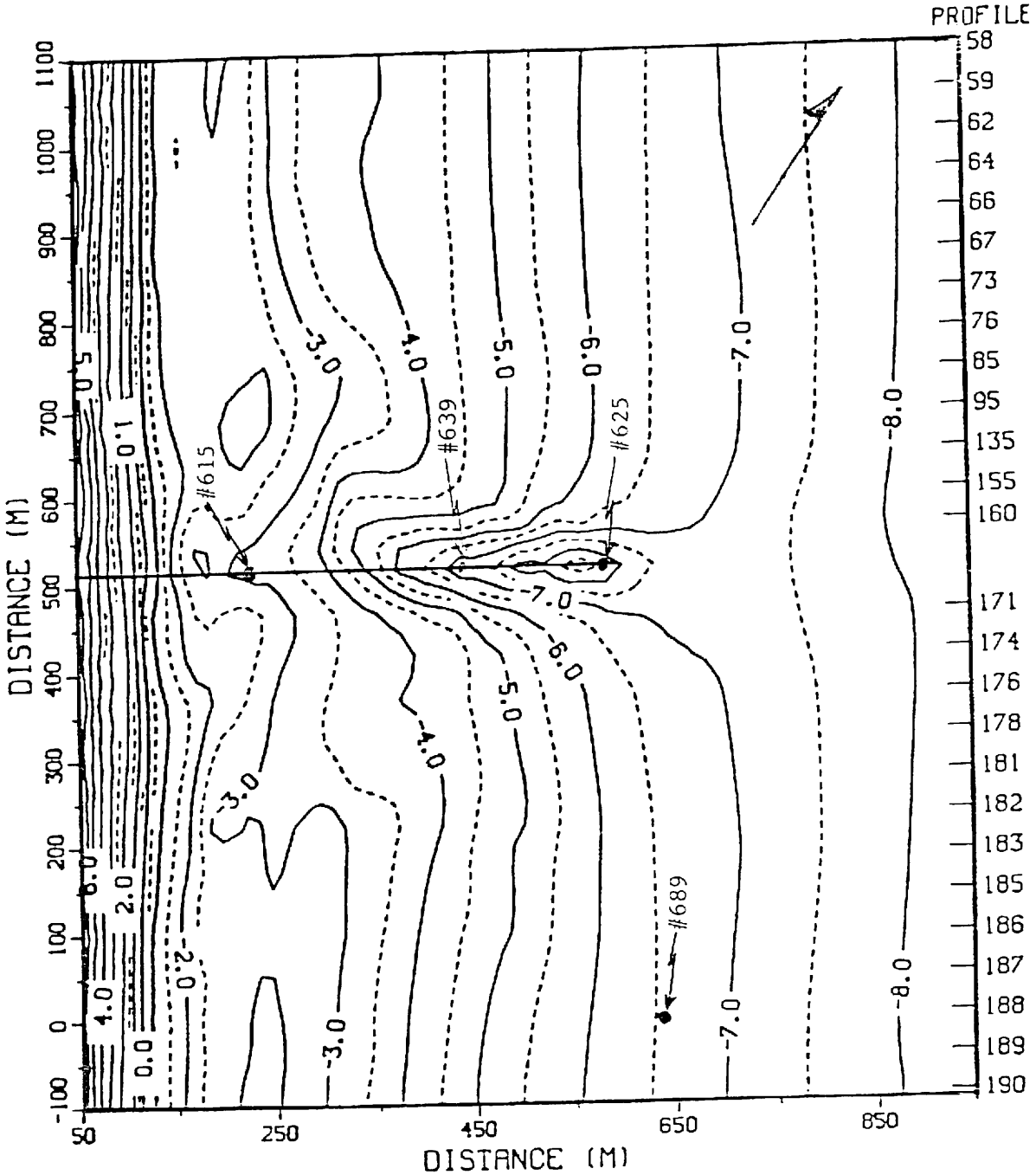

FIGURE 8. FRF BATHYMETRY 14 FEB 85
CONTOURS IN METERS

VIII. SPECIAL EVENTS

A. Storm Data Collection. The following list identifies times when the wave height at the seaward end of the pier (i.e. as measured by the Baylor gage #625 at pier station 19+00) exceeded 2 m and wave records were obtained every hour:

Start	End
6 Mar (0400)	6 Mar (0500)
22 Mar (1300)	23 Mar (0600)

B. Storm Synopsis (22-23 March 1985). A low pressure system originating over the Pacific Ocean was located east of northern Florida by 22 March. The storm moved rapidly up the east coast, passing the FRF on the 23rd before proceeding into the Atlantic. Early on 23 March, the barometric pressure dropped to 1007 mb, winds (SE) exceeded 8 m/s, and the wave height, Hmo (at Baylor gage #625), was 2.82 m. Total precipitation during the storm was 30 mm.

Distribution List

Government Agencies:

OCE
BERH
NAO
NASA/Wallops Flight Center
NOAA (NOS, NWS)
SAD
SAW
US Geological Survey
US National Park Service
US Naval Academy
US Naval Civil Engineering Lab
US Naval Facilities Engineering Com.
US Naval Research Lab

Colleges/Universities:

California Inst. of Tech.
Duke University
East Carolina University
Florida Inst. of Tech.
Louisiana State University
NC State University
Old Dominion University
Oregon State University
Prince George's College
Rutgers University
Scripps Inst. of Oceanography
Stockton State College
Texas A&M University
University of Akron
University of Delaware
University of Florida
University of Maryland
University of North Carolina
University of Northern Colorado
University of Rhode Island
University of Virginia
Virginia Inst. of Marine Science

Others:

City of Va. Beach, VA
Coastal Barge Corporation
Coastal and Estuarine Research, Inc.
Dr. Galvin
GEOMET, Inc.
Dr. Hylton
Ms. Johnson
Mary Marr, Inc.
Masonite Corporation
Moffatt & Nichol, Engineers
Offshore Coastal Technologies
Research Planning Institute, Inc.
Mr. Rowland
Mr. Savage
Sea Port Supply Corp.
Shell Development
Sohio Petroleum Co.
Mr. & Mrs. Valpey

Foreign:

W. F. Baird & Assoc. Coastal Engineers, Ltd (Canada)
Ministry of Construction, Coastal Division (Japan)
Norwegian Hydrodynamic Laboratories (Norway)
University of New South Wales (Australia)
University of Sydney (Australia)