APPENDIX A

ENGINEERING ANALYSIS AND DESIGN

APPENDIX A

ENGINEERING DESIGN AND COST ESTIMATE
LIDO KEY, SARASOTA COUNTY, FLORIDA
SHORE PROTECTION PROJECT FEASIBILITY REPORT

Prepared For:

U.S. Army Corps of Engineers
Jacksonville District

Prepared By:

Coastal Planning & Engineering, Inc.
Boca Raton, Florida

APPENDIX A
ENGINEERING DESIGN AND COST ESTIMATE
LIDO KEY, SARASOTA COUNTY, FLORIDA
SHORE PROTECTION PROJECT FEASIBILITY REPORT

Table of Contents

APPENDIX A
ENGINEERING DESIGN AND COST ESTIMATE
LIDO KEY, SARASOTA COUNTY, FLORIDA
SHORE PROTECTION PROJECT FEASIBILITY REPORT

Table of Contents
(Cont.)

List of Tables

APPENDIX A
ENGINEERING DESIGN AND COST ESTIMATE
LIDO KEY, SARASOTA COUNTY, FLORIDA
SHORE PROTECTION PROJECT FEASIBILITY REPORT

Table of Contents
(Cont.)

List of Tables

Table No.

List of Figures

Figure No.

APPENDIX A
ENGINEERING DESIGN AND COST ESTIMATE
LIDO KEY, SARASOTA COUNTY, FLORIDA
SHORE PROTECTION PROJECT FEASIBILITY REPORT

Table of Contents
(Cont.)

List of Figures

<u>Figure No.</u>

APPENDIX A
ENGINEERING DESIGN AND COST ESTIMATE
LIDO KEY, SARASOTA COUNTY, FLORIDA
SHORE PROTECTION PROJECT FEASIBILITY REPORT

PROJECT AUTHORITY

A-1. A beach erosion control project was authorized for Lido Key, Florida by the 31 December 1970 River and Harbor Act. This project provided for restoration of 1.2 miles of the middle Gulf shore of Lido Key with periodic nourishment of the 1.2 mile reach as needed. Federal participation was limited to an initial period of 10 years. The City of Sarasota completed the northern half of the project in 1970 without Federal participation. The project was not completed and was deauthorized on 1 January 1990 in accordance with the provisions of Section 1001(b)(1) of the 1986 Water Resources Act.

A-2. The Beach Erosion Control (BEC) Study for Lido Key was authorized by the U.S. House of Representatives Committee on Transportation and Infrastructure with a resolution adopted 14 September 1995. A Reconnaissance Phase Assessment was prepared in January 1997 and recommended a shore protection project along a 9,100 foot segment of Lido Key extending from Florida Department of Environmental Protection (FDEP) monuments R-35 through R-44.

Problem Identification

A-3. Nearly all of Lido Key (R31-R44.5) has critical erosion which has threatened private development and recreational interests along 2.4 miles (FDEP, 2000a). Consequently, FDEP (2000a) has identified the project area as a critical erosion area. Beach restoration has been conducted along the northern end and concrete bulkheads have been built by coastal land owners to protect property and structures from storm impacts at the south end. In addition, investigations by the University of Florida in the late 1950s led to the construction of rock groins (CPE, 1991). Lido Key was also identified as an early area of focus in the 1969 Federal erosion control program for Sarasota County. However, serious the current erosion problem is, it would be much worse without the beneficial, periodic placement of sand dredged from New Pass. That dredging has partially mitigated the on-going erosion. This study investigates the benefits of beach renourishment on Lido Key, including the provision of groin structures at the south end of the island. Specific aspects of the proposed project are outlined in this appendix.

Project Location

A-4. Lido Key is a small barrier island about 2.4 miles long, within Sarasota County on the Gulf of Mexico Coast of Florida. The island is located within the City of Sarasota approximately 22 miles south of the entrance to Tampa Bay. It is bounded on the south by Big Sarasota Pass and on the north by New Pass, a Federal navigation project authorized in 1962. Lido Key is separated from the mainland by Sarasota Bay and the Intracoastal Waterway, a Federal navigation project authorized in 1945. The location of Lido Key appears in Figure A-1.

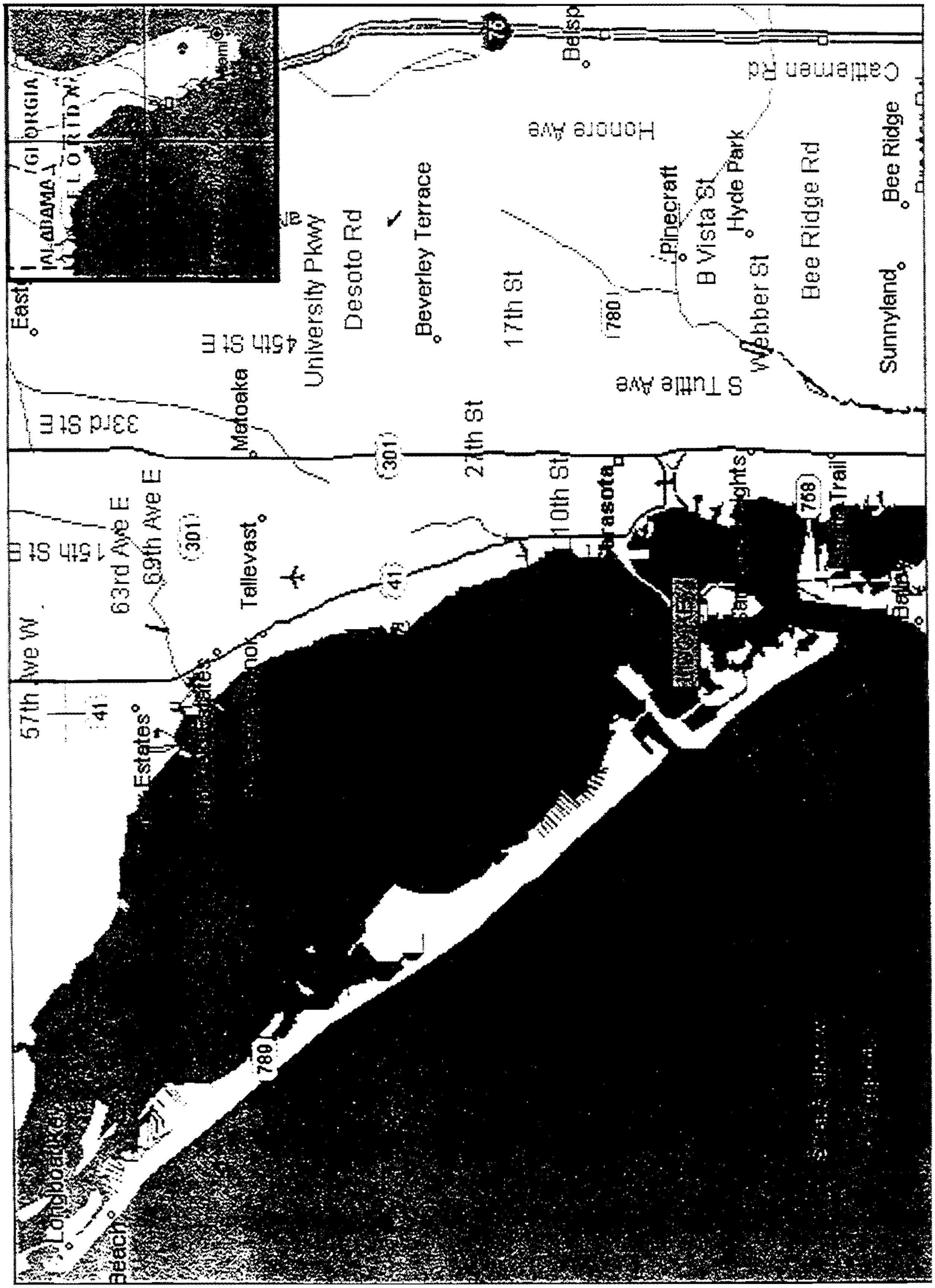


FIGURE A-1

LIDO KEY SHORE PROTECTION PROJECT LOCATION

A-5. Prior to the 1920s, Lido Key was a group of seagrass beds and mangrove islands known as Creol Isles. John Ringling's efforts during the 1920s created Lido Key through the placement of fill, as well the construction of a causeway to the mainland. Development was stopped in the late 1920s due to the Florida Land Bust. In 1938, the City of Sarasota purchased and developed the Mid-Key Beach as a casino and spa. In 1977, the City purchased and preserved the North Beach as a natural beach.

A-6. The Lido Key shoreline is characterized by both public and privately owned beaches. North Lido Public Beach lies along the 3800 feet adjacent to New Pass, and is managed as an undeveloped, lightly used, natural beach with limited parking. Lido Public Beach, immediately to the south, lies along 3200 feet of shoreline and receives extensive use. A buried rock groin at the foot of John Ringling Blvd. and a public parking lot south of the city-owned swimming pool define the northern and southern limits of Lido Public Beach. South of Lido Public Beach, hotels, motels, and condominiums line private beaches along 4600 feet of shoreline. South Lido Public Beach, owned by Sarasota County, occupies 1300 feet of shoreline at the southern end of Lido Key. South Lido Public Beach is largely undeveloped, but is heavily used.

NATURAL FORCES

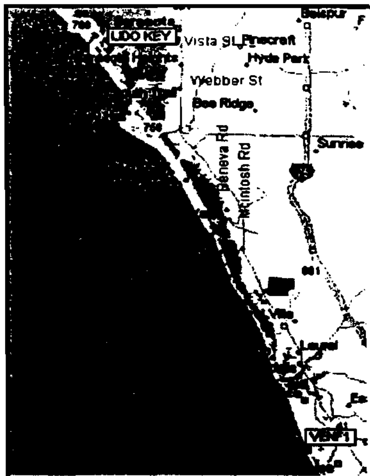
Winds and Tides

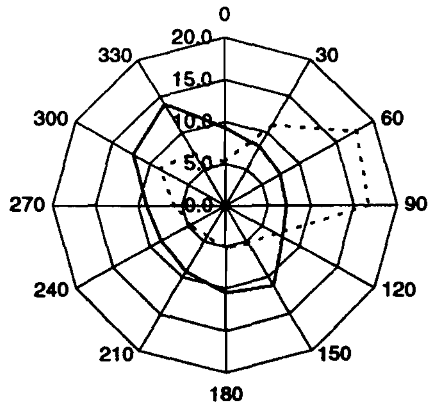
A-7. Local winds are the primary generating mechanism of short period waves in the project area. The wind distribution is based on measurements at NOAA Buoy VENF1, 19 miles south of the project area (NOAA, 2000), and appears in Figure A-2. Typical prevailing winds are from the northeast through the east, except during the month of April, when winds approach from the west-northwest through northwest. The summer months (June to September) are characterized by tropical weather systems traveling east to west in the lower latitudes. These tropical cyclones can develop into tropical storms and hurricanes, which can generate devastating winds, waves and storm surge.

A-8. Daily onshore-offshore breezes associated with the differential heating of land and water masses are common within the study area. While these breezes play a significant role in local weather patterns, they are not an appreciable cause of sediment movement in the nearshore.

A-9. Tides in the project area a mixture of diurnal and semi-diurnal types. The tide range and tidal datums vary between the Gulf of Mexico and Sarasota Bay. Tidal benchmarks in the vicinity of the project have been calculated by NOAA (1985, 1987, 1990) and CPE (1991) for the Gulf of Mexico and the bay tide stations appearing in Figure A-3. Tidal benchmark elevations appear in Table A-1.

A-10. Tidal currents are significant within the project area, due primarily to the presence of tidal inlets. New Pass marks the northern boundary of Lido Key, while Big Sarasota Pass marks the southern boundary of Lido Key and the project area. Although Big Sarasota Pass is not a Federal navigation project, as is New Pass, it is the larger of the two inlets in terms of tidal prism, sediment transport, ebb shoal volume, and cross-sectional area. Both inlets are flood dominated,

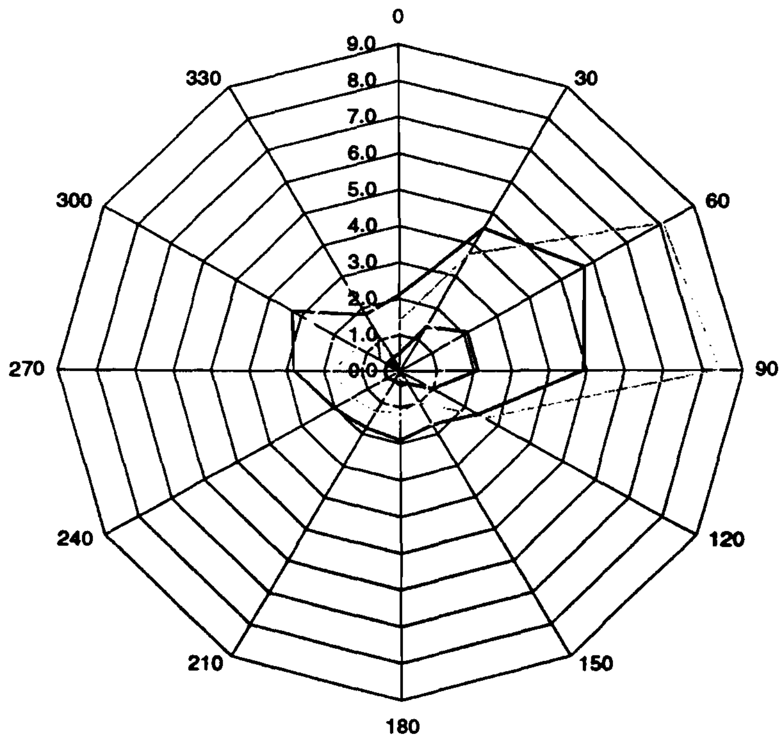




- - - - - Percentage of all Wind Speed Measurements ——— Mean Wind Speed (mph)

Percent of calm measurements = 1.2 %

Percentage of Wind Speed Measurements by Speed and Direction:



—— 0.6 to 4.0 mph	4.0 to 7.5 mph	—— 7.5 to 12.1 mph	12.1 to 19.0 mph
······ 19.0 to 24.7 mph	—— 24.7 to 31.6 mph	—— 31.6 to 38.5 mph	

FIGURE A-2

DIRECTIONAL WINDS, NOAA BUOY VENF1, VENICE, FL

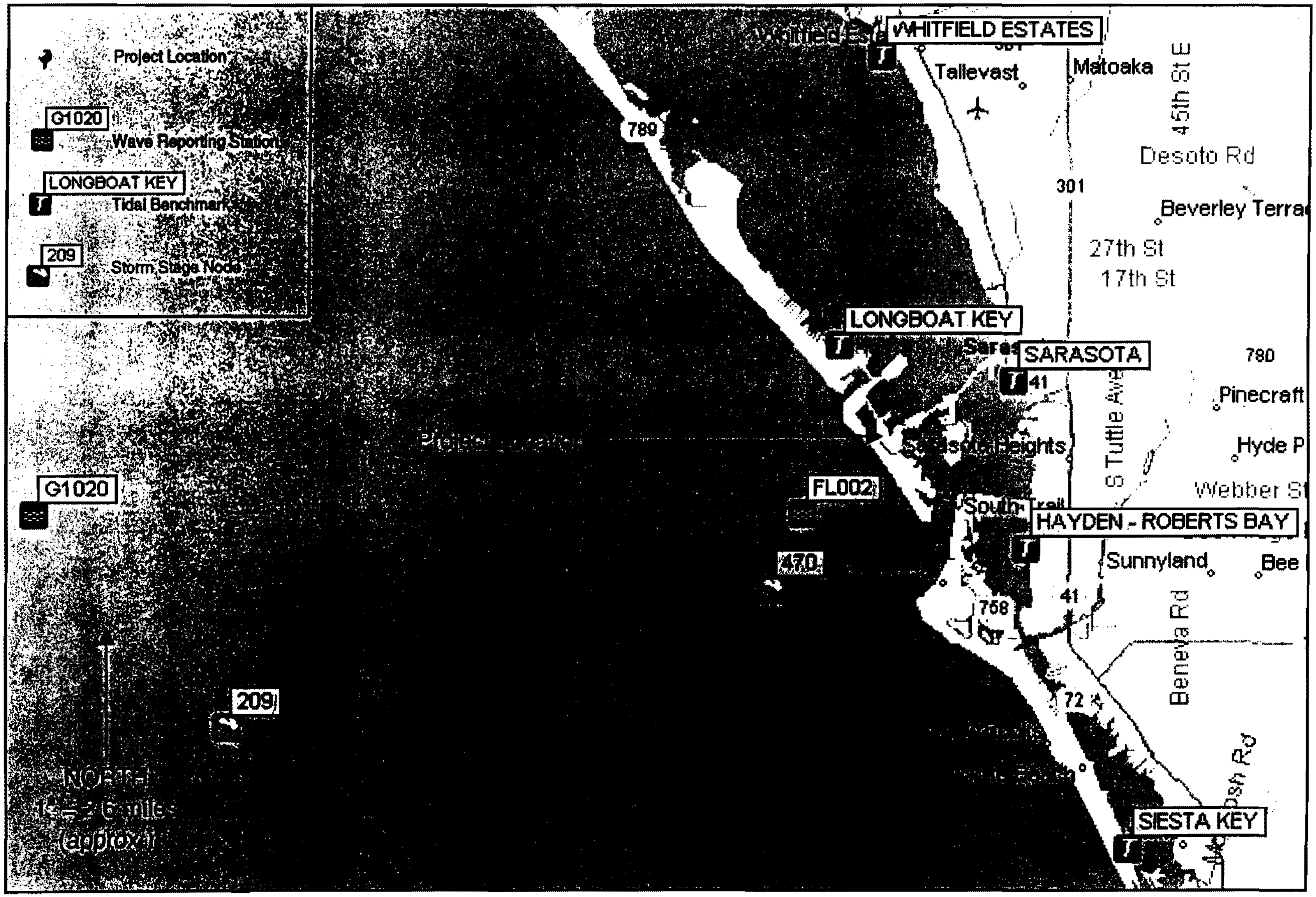


FIGURE A-3

TIDAL BENCHMARKS, STAGE NODES, AND WAVE REPORTING STATIONS, LIDO KEY, FL

TABLE A-1

Tidal Datums, Lido Key, Florida

Station	Latitude N		Longitude W		HIGHEST OBSERVED WATER LEVEL	MEAN HIGHER HIGH WATER (MHHW)	MEAN HIGH WATER (MHW)	MEAN TIDE LEVEL (MTL)	MEAN LOW WATER (MLW)	MEAN LOWER LOW WATER (MLLW)	LOWEST OBSERVED WATER LEVEL	HIGHEST OBSERVED WATER LEVEL	LOWEST OBSERVED WATER LEVEL
	deg.	min.	deg.	min.	(ft NGVD)	(ft NGVD)	(ft NGVD)	(ft NGVD)	(ft NGVD)	(ft NGVD)	(ft NGVD)		
HAYDEN - ROBERTS BAY	27	17.5	82	32.5	2.52	1.39	1.12	0.39	-0.34	-0.63	-1.14	6/3/1977	4/28/1977
LONGBOAT KEY	27	20.4	82	35.4	3.96	1.44	1.12	0.42	-0.28	-0.63	-2.16	6/25/1974	4/5/1977
SARASOTA	27	19.9	82	32.7	2.60	1.42	1.13	0.44	-0.24	-0.63	-1.16	6/3/1977	7/1/1977
SIESTA KEY	27	13.3	82	30.9	2.56	1.23	0.94	0.32	-0.30	-0.63	-1.18	1/9/1978	4/28/1977
WHITFIELD ESTATES	27	24.5	82	34.8	2.80	1.54	1.24	0.52	-0.20	-0.63	-1.08	6/3/1977	7/1/1977
GULF TIDES						1.44	1.14	0.42	-0.31	-0.63			

SOURCES:

Gulf Tides: CPE (1991), NOAA (1990).

Bay Tides: NOAA (1985, 1987), posted at http://www.co-ops.nos.noaa.gov/bench_mark.shtml?region=fl
Inlet survey drawings, USACE-SAJ (2000).

with flood currents averaging 1.5 to 1.6 knots and ebb currents averaging 1.0 knot. Characteristics of the inlets appear in Table A-2:

TABLE A-2

Tidal Inlets, Lido Key, Sarasota, FL

		New Pass	Big Sarasota Pass
Tidal Prism	(ft^3)	400,044,545	760,084,635
Cross Sectional Area at Throat	(ft^2)	6,781	32,959
Bay Surface Area	(ft^2)	524,934,383	1,122,047,244
Ebb Delta Volume	(c.y.)	14,423,389	44,497,431
Net Transport Rate	(c.y./yr)	4,400,003	13,600,012
Mean Spring Tide Range	(feet)	2.1	2.1
Max. Flood Speed	(knots)	1.6	1.5
Max. Flood Direction	(deg.)	46.0	6.0
Max. Ebb Speed	(knots)	1.0	1.0
Max. Ebb Direction	(deg.)	231.0	183.0

Source: Coastal Inlets Research Program (2000)
http://cirp.wes.army.mil/cirp/cirp.html.

Nearshore and Offshore Currents

A-11. The primary currents in the nearshore zone are wave-induced longshore currents. The longshore currents are caused by wave energy imparted to the littoral zone as these waves approach and break near shore. Longshore currents are dominant towards the south, with reversals evident during periods of southern wave activity and in shadow areas around inlets (CPE, 1991). Offshore currents near the location of the 60-foot depth contour line average 0.6 knots, to the north, between 25 and 50 percent of the year (CPE, 1991).

Storm Stage

A-12. Storm surge is defined as the rise of the ocean surface above its astronomical tide level due to storm forces. The elevation to which the storm surge reaches is known as the storm stage. The increased elevation is attributable to a variety of factors, which include waves, wind shear stress, and atmospheric pressure. An estimate of these water level changes is essential to the design of the crest elevation of a beach fill area. Higher water depth will increase the potential for recession, long-term erosion, and overtopping due to severe waves. The major threats to the shoreline of Lido Key are elevated water levels and waves caused by extra-tropical and tropical storms. It is possible to classify and predict storm stage elevations for various storms through the use of historical information and theoretical models.

A-13. The most recent stage hindcasts for the historic tropical storms impacting Lido Key appear in Table A-3. The stage elevations were estimated by CHL (2000) using the ADCIRC

TABLE A-3

Tropical Storms Modeled by CHL (2000), Lido Key, Sarasota, Florida

Beginning Time of Storm Hindcast	Storm Name	Stage (feet MTL)	Maximum Sig. Wave Height (feet)	Maximum Peak Wave Per. (sec)	Input Wave Depth (ft NGVD)	Wind (mph)	Forward Speed (mph)	Radius to Max Winds (miles)	Pressure (millibars)
9/22/1896 6:00		1.01	15.7	8.4	Deep water				
8/4/1901 12:00		1.60	15.7	8.4	Deep water	46.0	7.0		
9/9/1903 6:00		1.27	21.0	9.8	Deep water	69.0	11.3		988
10/9/1910 6:00		2.72	29.0	12.0	Deep water	69.0	12.7	18.4	946
10/20/1921 0:00		11.16	28.0	11.0	Deep water	103.5	11.5	20.7	952
8/3/1928 0:00		1.09	15.7	8.4	Deep water	63.3	11.5		
9/6/1928 12:00	(see note below)	1.05	15.7	8.4	Deep water	126.5	12.9		955
9/22/1929 0:00	(see note below)	3.82	15.7	8.4	Deep water	103.5	11.5		
8/31/1930 0:00	(see note below)	9.77	15.7	8.4	Deep water	40.3	7.4		
7/25/1933 6:00		1.15	15.7	8.4	Deep water	51.8	8.1		
8/31/1933 6:00	(see note below)	3.13	15.7	8.4	Deep water	63.3	8.2		
8/29/1935 6:00		11.88	21.0	10.0	Deep water	103.5	14.0		
10/30/1935 6:00		1.92	22.0	10.0	Deep water	17.3	3.7	11.5	970
10/12/1944 18:00		7.18	32.0	12.0	Deep water	74.8	15.0	31.1	968
10/5/1946 6:00		3.18	15.7	8.4	Deep water	74.8	19.0		980
9/20/1947 6:00		6.29	39.0	13.0	Deep water	57.5	8.1	39.1	946
8/23/1949 6:00	(see note below)	1.75	15.7	8.4	Deep water	149.5	15.6		954

TABLE A-3 (continued)

Tropical Storms Modeled by CHL (2000), Lido Key, Sarasota, Florida

Beginning Time of Storm Hindcast	Storm Name	Stage (feet MTL)	Maximum Sig. Wave Height (feet)	Maximum Peak Wave Per. (sec)	Input Wave Depth (ft NGVD)	Wind (mph)	Forward Speed (mph)	Radius to Max Winds (miles)	Pressure (millibars)
9/1/1950 6:00	EASY	4.19	22.0	10.0	Deep water	120.8	3.5	17.3	958
6/18/1959 0:00	Hurricane 3	5.50	14.1	7.6	Deep water	34.5			
6/4/1966 6:00	ALMA	1.47	21.0	9.1	-108.3	103.5	19.6	26.5	972
10/13/1968 12:00	GLADYS	3.88	16.4	10.0	-108.3	74.8	11.5	24.2	990
5/17/1970 18:00	ALMA	1.12	15.7	8.4	Deep water	28.8	17.6		1007
6/14/1972 12:00	AGNES	2.17	10.5	7.7	-108.3	86.3	13.8		978
5/21/1976 12:00	Subtropical storm	1.17	6.9	8.0	-39.4	17.9			
6/18/1982 0:00	Subtropical storm	6.96	5.6	8.0	-39.4	15.7			
11/17/1988 18:00	KEITH	2.53	16.4	12.0	-39.4	63.3	18.5		995

- Data sources: Unisys (2000), CPE (1991), Hurricane City (1999), Dean, et al (1988), CHL (2000), USACE (1990)

- Wave information for storms Alma, Gladys, and Agnes hindcast for 1956-1975 WIS Station 41 (27 deg. N, 83 deg. W).
- Wave information for the 1976 and later storms hindcast for WIS Station G2012 (27.25 deg. N, 82.75 deg. W).
- 1970 Hurricane Alma affected local water levels but passed approximately 85 miles west of the project area.
- The 1949 hurricane affected local water levels but did not pass over project area. Wind speeds for West Palm Beach, FL shown.
- The August 1933 hurricane affected local water levels but did not pass over project area. Wind speeds for Bartow, FL shown.
- The August 1930 hurricane passed approximately 73 miles west of the project area.
- The Sept. 1929 hurricane passed approximately 53 miles west-southwest of the project area.
- The Sept. 1928 hurricane affected local water levels but did not pass over project area. Wind speeds for Avon Park, FL shown.
- Stage values do not include tidal water level variations.

model. Details of regarding the physical assumptions and numerical methods upon which the ADCIRC model is based appear in Leuttich, et al (1992). Results were given in the form of a database covering over 480 nodes from northern Mexico Gulf Coast to the Bay of Fundy. To determine the local water levels for each tropical storm impacting the project area, data from all storm events hindcast within a 15 mile radius of Wave Information System (WIS, 1997) station G1020, which provided most of the wave data used in this study, were selected. Storm stage values, not including tidal variations, appear in Table A-3.

A-14. The storm stages appearing in Table A-3, when adjusted for tidal variations and ranked, compare well with the storm stage - frequency curve established by Dean, et al. (1988). The Dean, et al. (1998) storm stages were calculated by combining available historical statistics of hurricanes with a set of numerical models to simulate the storm tides for a given level of storm. Wave setup generated by the storm waves is included in the water levels, which appear in Table A-4 and Figure A-4.

TABLE A-4

**Combined Storm Stages,
Middle Sarasota County, FL
Dean, et al. (1988)**

Return Period (years)	Storm Stage (feet NGVD)
10	6.0
20	8.8
50	11.3
100	12.6
200	14.0
500	15.6

Note: Stage includes wind stress, barometric pressure, dynamic wave setup, and astronomical tides.

A-15. To conduct the modeling of beach profile changes in response to specific historical storms, storm stage hydrographs were required as input. Those hydrographs were obtained from the storm hindcast database described above (CHL, 2000). More detailed information on the character and use of this storm stage data appears in the discussion of the storm recession analysis.

Storm History

A-16. Over 26 tropical events significantly influenced the area between 1896 and 1988 (Table A-3). This corresponds to a recurrence frequency of roughly one tropical event every 3.5 years.

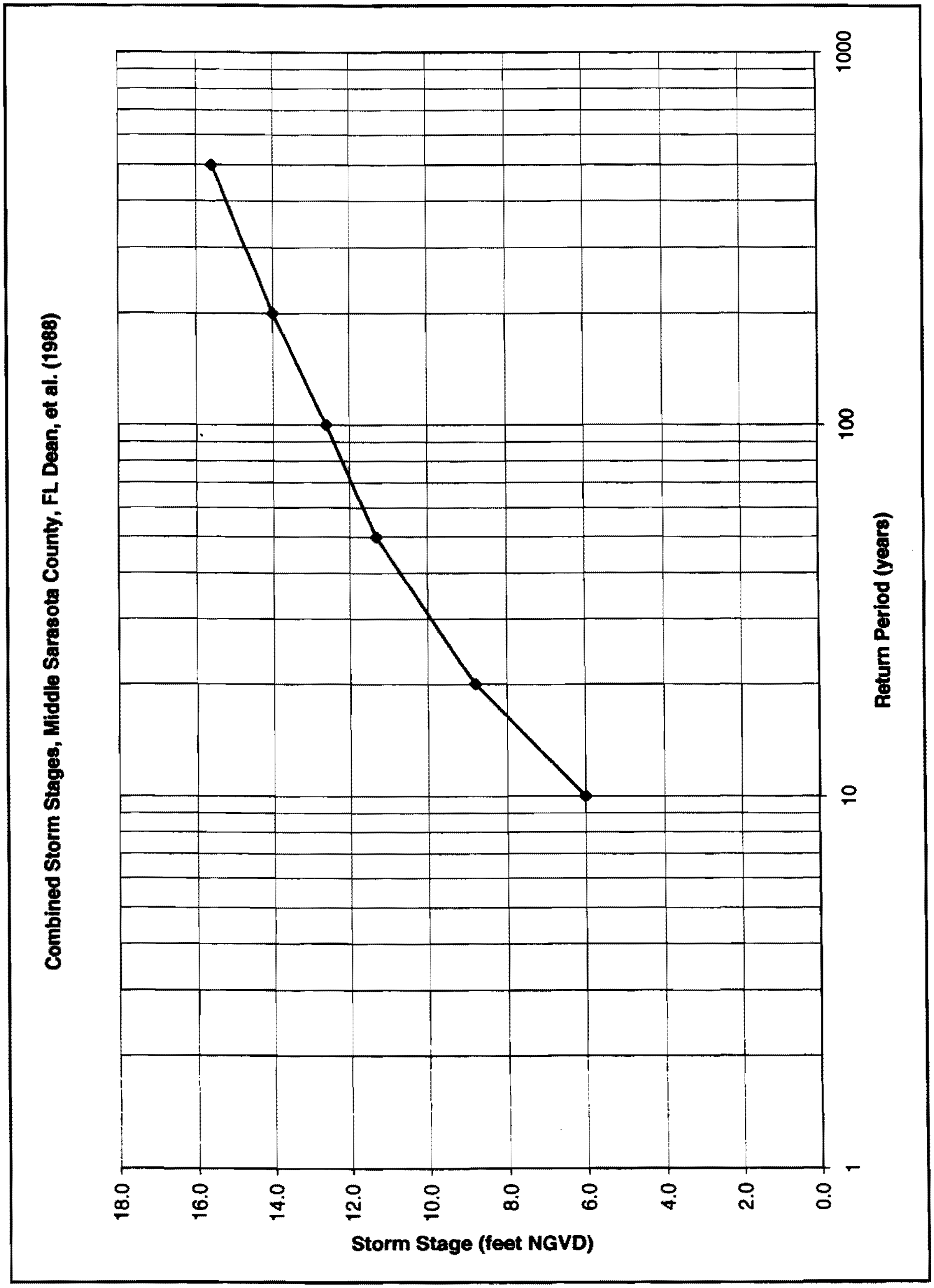


FIGURE A-4

**COMBINED STORM STAGES, MIDDLE SARASOTA COUNTY, FL
DEAN, ET AL. (1988)**

The 1894 Hurricane, the 1925 Tropical Storm, and Tropical Storm Marco (1990) have been noted for their impact on the region (Hurricane City, 1999). However, due to a lack of sufficient stage data, these events were not included in Table A-3 or the storm recession model. The Labor Day 1935 Hurricane, the 1946 Hurricane, Hurricane Easy, Hurricane Gladys, Hurricane Agnes, and Tropical Storm Keith have been also noted for their impact on the region (Hurricane City, 1999; CPE, 1991). The estimated stages, wave heights, wave periods, wind speeds, and forward speeds of these storms appear in Table A-3.

A-17. In addition to tropical storms, extratropical storms have impacted the project area. However, the extratropical storm history of Sarasota County is not well documented. In this report, an extratropical storm is defined as an event characterized by offshore wave heights exceeding 6 feet not occurring as a result of a tropical storm or hurricane. Forty-two such events occurred at WIS Station G1020 between 1976 and 1995, the most severe of which appear in Table A-5. This number of storms is equal to approximately 2.1 extratropical storms per year. Table A-5 also lists the extratropical storm events occurring between 1956 and 1975 at WIS Level 1 Station G1041, located approximately 35 miles offshore (Figure A-5).

Waves

A-18. The waves experienced along Lido Key are caused primarily by local wind conditions, though significant wave events may occur due to more distant storm events. The restricted fetch of the Gulf of Mexico basin, however, limits the size and associated period of significant storm events.

A-19. The principal forcing mechanism behind beach erosion is the dissipation of energy (and corresponding transport of sand) as waves transform in the nearshore. Wave height, period, and direction as well as the water level during storm events are the most important factors influencing the project shoreline. Since the 1980's, the U.S. Army Engineer, Waterways Experiment Station's Coastal Engineering Research Center has executed a series of wave hindcast studies for the Atlantic and Gulf Coasts of the United States. The 20-year long hindcast for WIS Station G1020 used in this study represents conditions between 1976 and 1995. Waves closer to the shoreline were also measured by the Prototype Measurement and Analysis Branch (PMAB) between 1993 and 1996 at PMAB Station FL002 (PMAB, 2000).

A-20. The wave statistics used for this analysis were obtained from Station G1020, located at 27.25° N, 82.75° W, depth 39 feet, and Station FL002, 27.30°N, 82.59° W, depth 23 feet. Tables A-6 and A-7 and Figures A-6 and A-7 show the wave height, period, and direction of the waves at stations G1020 and FL002 by month and year. The average waves are the highest between October and April. However, the largest waves since 1975 have occurred between August and November and are indicative of the tropical storm and hurricane activity common to the Florida Gulf Coast.

A-21. The hindcast and measured statistics indicate a mean wave height of 1.2 feet at depth 39 feet to 1.7 feet at depth 23 feet, and mean peak wave period of 3.9 - 6.0 seconds. However, the directional wave statistics at the two stations show that in the offshore directions (180 - 270 degrees), the mean wave heights are of similar magnitude. The observed wave periods at the

TABLE A-5

Extratropical Storm Events, Lido Key, Sarasota, FL

Date	H_{mo} (feet)	T_p (seconds)	Wave Direction (deg.)	Wind Speed (mph)	Wind Direction (deg.)
January 10, 1956	8.2	8.0	305	22.4	305
December 1, 1957	7.5	7.0	284	24.6	350
February 2, 1958	9.5	10.0	268	22.4	300
March 13, 1959	6.9	8.0	271	22.4	320
February 19, 1960	7.5	9.0	263	20.1	320
December 29, 1961	6.9	8.0	281	17.9	335
March 7, 1962	9.2	8.0	305	26.8	305
November 30, 1963	8.2	8.0	267	24.6	315
February 19, 1964	6.9	8.0	282	20.1	295
February 25, 1965	9.8	9.0	280	26.8	305
November 29, 1966	8.2	8.0	281	22.4	305
December 23, 1967	6.9	8.0	322	20.1	20
March 1, 1968	7.5	8.0	283	22.4	330
November 15, 1969	6.9	8.0	287	17.9	20
March 9, 1970	7.9	8.0	280	24.6	300
February 13, 1971	7.2	8.0	276	20.1	295
February 19, 1972	9.2	8.0	293	24.6	310
January 29, 1973	7.9	8.0	291	22.4	320
March 30, 1974	7.2	8.0	261	20.1	280
November 13, 1975	6.2	7.0	313	22.4	340
February 2, 1976	7.5	9.0	252	15.7	295
January 10, 1977	6.6	8.0	259	17.9	310
January 26, 1978	8.9	10.0	256	15.7	325
March 2, 1980	6.6	8.0	274	20.1	320
March 19, 1981	8.5	10.0	259	15.7	300
January 14, 1982	6.9	7.0	241	20.1	285
March 1, 1983	11.2	10.0	245	17.9	250
March 29, 1984	10.5	11.0	256	17.9	285
February 12, 1985	8.5	10.0	263	17.9	300
January 27, 1986	6.2	10.0	263	20.1	325
January 5, 1987	7.5	9.0	248	15.7	300
April 12, 1988	11.2	11.0	252	17.9	275
March 3, 1991	8.9	9.0	234	13.4	270
February 6, 1992	10.2	10.0	241	15.7	265
March 13, 1993	12.5	10.0	252	24.6	285
March 2, 1994	8.9	9.0	245	17.9	280
January 15, 1995	6.9	9.0	256	8.9	285

Sources: CHL (2000)

Events prior to 1976 hindcast for WIS Station G1041, 27.00 deg. N, 83.00 deg. W., depth 108.3 feet.
Events following 1976 hindcast for WIS Station G1020, 27.25 deg. N, 82.75 deg. W, depth 39.4 feet.

WIS STATIONS G1019, G1020, AND G1041, LIDO KEY, FL

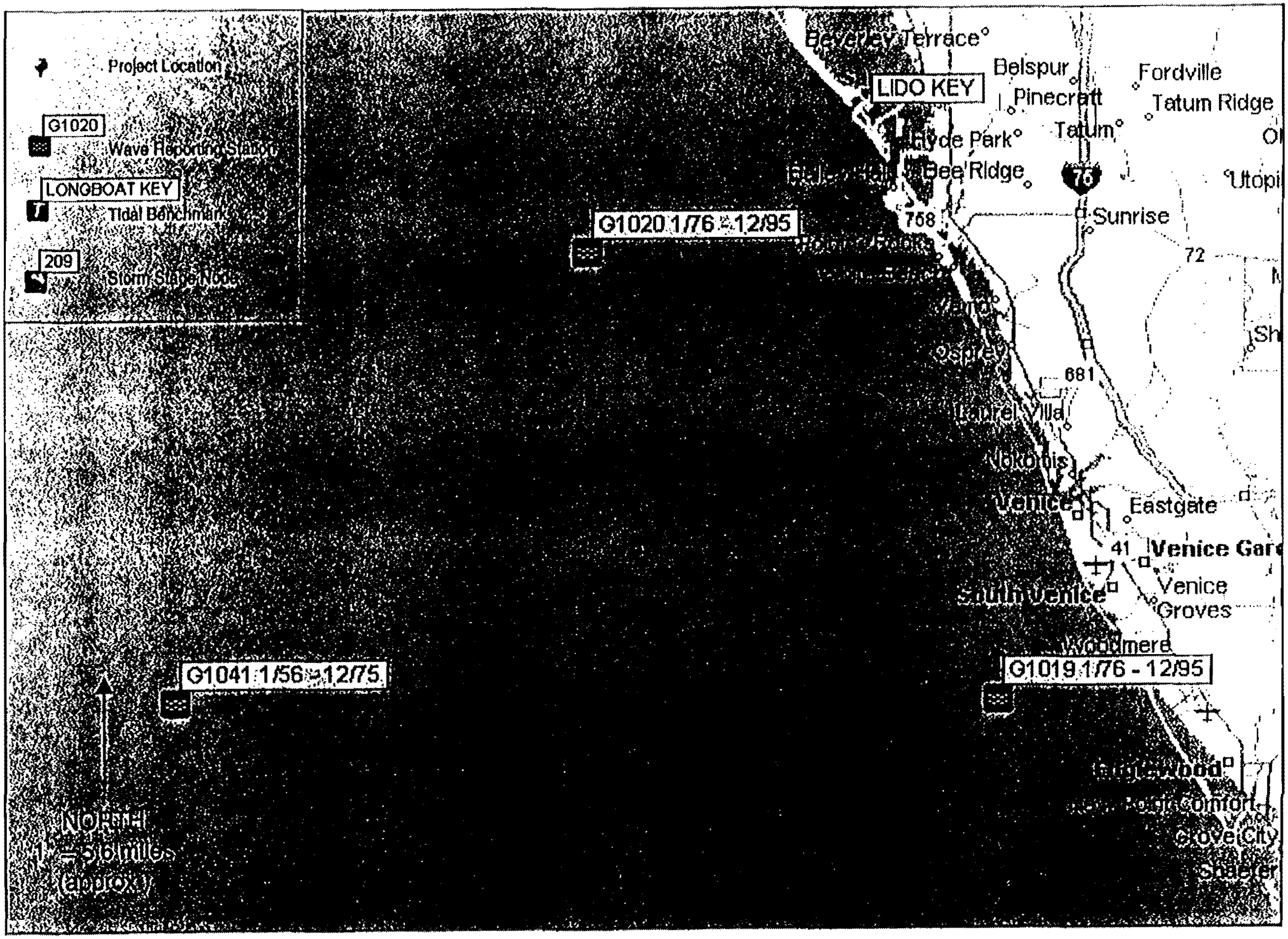


FIGURE A-5

TABLE A-6

Monthly Wave Statistics at WIS Station G1020 (27.25N, 82.75W, depth 39.4 feet), Lido Key, FL

YEAR	MEAN WAVE HEIGHT H_{mo} in feet: JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Annual
1976	1.3	1.3	1.0	1.0	1.6	0.7	0.3	0.7	0.7	1.3	1.3	1.6	1.0
1977	2.0	1.6	1.3	1.6	1.0	0.7	0.3	0.7	0.7	1.0	1.3	1.6	1.0
1978	2.0	1.6	1.6	1.0	1.3	0.7	0.7	0.3	0.3	1.0	1.0	1.6	1.0
1979	2.3	1.6	1.6	1.6	1.0	0.7	1.0	0.3	2.3	1.0	1.3	1.3	1.3
1980	1.3	1.3	2.0	1.6	1.3	0.7	1.0	1.0	0.3	0.7	1.3	1.3	1.0
1981	1.6	2.0	2.0	1.0	1.3	0.7	0.7	0.7	0.7	1.0	1.0	1.3	1.0
1982	1.3	1.3	1.0	1.3	1.0	1.0	0.3	0.7	0.7	1.0	1.0	1.6	1.0
1983	1.3	2.6	3.0	2.0	1.0	0.7	0.7	1.0	1.0	1.0	1.6	2.0	1.3
1984	1.6	1.6	2.0	2.0	1.0	0.7	0.7	0.7	1.0	1.0	1.3	1.0	1.3
1985	2.0	1.6	1.3	1.3	1.0	0.7	1.0	1.3	1.6	1.6	2.6	1.3	1.3
1986	1.6	1.6	2.0	1.0	1.0	0.3	0.7	1.0	0.7	1.0	1.0	1.6	1.0
1987	2.3	1.6	2.0	1.6	0.7	1.0	0.3	0.7	0.3	1.3	1.3	1.3	1.3
1988	1.6	1.6	1.6	2.3	1.0	1.0	0.7	0.3	1.3	0.7	2.0	1.0	1.3
1989	1.0	1.3	1.3	1.0	1.0	0.7	0.7	0.7	0.7	1.0	1.0	1.3	1.0
1990	1.3	1.6	1.3	1.0	1.0	0.7	0.7	0.7	0.3	1.3	1.3	1.0	1.0
1991	1.6	1.6	2.3	1.3	0.7	0.7	0.7	0.7	0.7	1.3	1.3	1.0	1.3
1992	1.6	2.0	1.3	1.3	1.0	1.3	0.7	1.3	0.7	1.3	1.6	1.0	1.3
1993	1.3	2.0	2.0	1.6	1.0	0.3	0.7	1.0	0.7	1.0	1.3	1.6	1.3
1994	1.6	1.3	1.6	1.0	0.7	0.7	1.0	0.7	0.7	1.0	1.3	1.3	1.0
1995	2.0	1.6	1.3	1.3	1.0	1.3	1.0	1.0	0.7	2.0	1.3	1.3	1.3
AVERAGE	1.6	1.7	1.7	1.4	1.0	0.7	0.7	0.8	0.8	1.1	1.4	1.4	1.2

TABLE A-6 (continued)

Monthly Wave Statistics at WIS Station G1020 (27.25N, 82.75W, depth 39.4 feet), Lido Key, FL

YEAR	MAXIMUM WAVE HEIGHT H_{mo} in feet:												
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Annual
1976	5.6	7.5	3.3	2.3	6.9	1.3	1.3	2.0	1.6	3.3	2.6	5.6	7.5
1977	6.6	3.9	3.0	5.2	2.3	3.0	1.3	1.6	2.6	2.6	3.3	4.6	6.6
1978	8.9	4.6	5.9	4.3	4.9	2.0	1.6	1.0	1.3	2.3	2.3	6.2	8.9
1979	10.8	6.2	6.6	3.6	2.3	2.0	9.2	1.3	16.4	2.3	2.3	5.2	16.4
1980	5.2	4.6	6.6	6.2	2.6	2.0	2.0	5.9	1.3	2.3	4.9	3.9	6.6
1981	7.2	4.6	8.5	2.3	2.6	2.0	1.3	2.3	1.6	3.0	2.6	3.3	8.5
1982	6.9	3.6	5.6	4.3	2.0	5.6	1.0	1.3	1.3	2.0	3.0	4.3	6.9
1983	4.6	11.2	11.2	6.9	2.0	2.3	1.6	7.2	3.0	1.6	3.9	5.9	11.2
1984	4.3	8.5	10.5	5.9	3.6	2.0	1.0	3.0	2.0	2.0	3.6	3.3	10.5
1985	4.3	8.5	3.9	2.6	3.6	2.6	10.8	18.7	19.7	13.8	16.1	4.6	19.7
1986	6.2	4.9	4.6	3.0	2.3	1.3	2.6	3.3	1.6	2.6	3.9	4.9	6.2
1987	7.5	4.3	6.2	4.6	1.3	3.0	2.0	1.6	1.6	5.9	3.6	4.9	7.5
1988	4.6	4.3	5.9	11.2	3.6	2.0	2.3	1.3	4.9	2.0	16.4	3.0	16.4
1989	3.3	4.9	3.9	2.6	3.9	2.6	1.6	1.6	2.3	3.3	3.6	4.9	4.9
1990	4.9	3.9	3.3	2.6	2.3	1.3	3.0	2.3	1.3	8.5	5.6	2.6	8.5
1991	3.9	8.2	8.9	3.6	2.6	1.6	2.0	2.6	2.0	2.3	2.6	3.6	8.9
1992	6.2	10.2	4.3	3.6	2.6	3.9	2.3	8.5	1.3	4.9	2.6	4.3	10.2
1993	3.6	5.2	12.5	4.9	3.3	1.0	2.0	2.3	2.0	5.6	3.0	6.6	12.5
1994	7.2	3.0	8.9	2.0	2.0	2.3	5.2	2.6	2.0	5.2	4.6	4.3	8.9
1995	6.9	6.6	2.6	3.3	3.3	11.8	2.6	7.2	1.3	12.1	3.6	5.6	12.1
MAX.	10.8	11.2	12.5	11.2	6.9	11.8	10.8	18.7	19.7	13.8	16.4	6.6	19.7

TABLE A-6 (continued)

Monthly Wave Statistics at WIS Station G1020 (27.25N, 82.75W, depth 39.4 feet), Lido Key, FL

YEAR	MEAN PEAK WAVE PERIOD T_p in seconds: JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Annual
1976	3.7	4.3	3.5	3.4	4.2	3.3	3.2	3.3	3.3	3.6	3.4	4.0	3.6
1977	4.6	4.2	3.5	3.6	3.4	3.6	3.1	3.7	4.9	3.3	3.9	4.5	3.8
1978	5.0	4.9	4.4	3.8	3.8	3.4	3.4	3.3	3.3	3.1	3.3	4.0	3.8
1979	5.1	4.4	4.4	3.8	3.5	3.2	4.2	3.4	5.6	3.5	3.5	3.7	4.0
1980	4.3	3.8	4.5	4.6	3.8	3.7	3.6	4.6	3.8	3.7	5.2	4.1	4.1
1981	4.3	4.3	5.1	3.2	3.7	3.4	3.3	3.8	3.2	3.3	3.7	4.2	3.8
1982	4.5	3.9	3.7	3.8	3.3	3.8	3.1	3.2	3.8	3.4	3.4	4.1	3.7
1983	4.6	5.9	6.2	4.8	3.2	3.5	3.4	4.5	3.5	3.1	4.5	4.7	4.3
1984	4.1	4.2	4.8	4.8	3.5	3.5	3.4	3.3	3.3	3.0	3.5	3.3	3.7
1985	5.0	4.4	3.8	3.8	3.6	3.4	3.6	4.4	4.3	4.4	5.3	3.9	4.2
1986	4.7	4.5	4.2	3.7	3.3	3.8	3.6	3.7	3.4	3.2	3.6	4.0	3.8
1987	5.8	4.5	5.0	4.7	3.2	3.4	3.3	3.5	3.2	3.5	3.8	4.1	4.0
1988	4.1	4.4	4.3	4.8	3.4	3.4	3.2	4.1	6.1	3.3	4.8	3.7	4.1
1989	3.7	3.8	4.1	3.5	3.5	3.6	4.1	3.9	3.5	4.5	3.9	5.2	3.9
1990	3.8	3.9	3.6	3.5	3.7	3.3	3.8	4.4	3.4	4.0	3.6	3.5	3.7
1991	4.2	4.3	4.8	3.7	3.6	3.1	3.6	3.5	3.2	3.4	3.5	3.6	3.7
1992	4.4	4.6	4.3	4.0	3.5	3.8	3.5	4.5	3.2	3.5	4.1	3.7	3.9
1993	3.8	4.7	4.3	4.7	3.6	3.2	3.3	3.8	4.5	3.6	3.4	4.8	4.0
1994	4.1	3.6	4.2	3.5	3.2	3.8	4.0	3.6	3.2	3.7	3.8	4.1	3.7
1995	5.2	4.4	3.6	3.9	3.4	4.1	3.4	4.3	3.5	5.3	3.6	3.9	4.0
AVERAGE	4.5	4.4	4.3	4.0	3.5	3.5	3.5	3.8	3.8	3.6	3.9	4.1	3.9

TABLE A-6 (continued)

Monthly Wave Statistics at WIS Station G1020 (27.25N, 82.75W, depth 39.4 feet), Lido Key, FL

YEAR	MAXIMUM PEAK WAVE PERIOD T_p in seconds: JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Annual
1976	9.0	9.0	7.0	6.0	8.0	6.0	4.0	5.0	5.0	10.0	8.0	9.0	10.0
1977	10.0	8.0	5.0	8.0	6.0	6.0	4.0	6.0	12.0	8.0	8.0	10.0	12.0
1978	11.0	9.0	9.0	8.0	7.0	5.0	5.0	8.0	6.0	4.0	6.0	9.0	11.0
1979	13.0	9.0	9.0	6.0	6.0	6.0	10.0	5.0	14.0	6.0	7.0	9.0	14.0
1980	9.0	9.0	10.0	10.0	6.0	7.0	6.0	15.0	10.0	11.0	12.0	9.0	15.0
1981	10.0	10.0	10.0	5.0	7.0	6.0	6.0	6.0	5.0	7.0	7.0	9.0	10.0
1982	10.0	9.0	9.0	6.0	6.0	8.0	4.0	4.0	12.0	8.0	13.0	9.0	13.0
1983	9.0	11.0	11.0	10.0	5.0	5.0	5.0	15.0	5.0	6.0	8.0	14.0	15.0
1984	8.0	10.0	11.0	9.0	6.0	5.0	5.0	7.0	8.0	5.0	8.0	8.0	11.0
1985	9.0	11.0	8.0	6.0	6.0	7.0	9.0	12.0	13.0	14.0	14.0	11.0	14.0
1986	10.0	8.0	8.0	7.0	5.0	8.0	5.0	6.0	6.0	6.0	8.0	9.0	10.0
1987	10.0	9.0	9.0	8.0	7.0	5.0	5.0	5.0	4.0	7.0	9.0	9.0	10.0
1988	10.0	11.0	9.0	11.0	7.0	5.0	4.0	8.0	15.0	5.0	12.0	8.0	15.0
1989	8.0	10.0	11.0	7.0	6.0	8.0	7.0	12.0	6.0	13.0	8.0	13.0	13.0
1990	9.0	9.0	7.0	7.0	9.0	4.0	6.0	10.0	5.0	10.0	9.0	8.0	10.0
1991	8.0	10.0	9.0	6.0	8.0	4.0	5.0	6.0	6.0	5.0	8.0	9.0	10.0
1992	10.0	11.0	8.0	7.0	6.0	7.0	5.0	13.0	7.0	7.0	10.0	9.0	13.0
1993	8.0	8.0	12.0	8.0	6.0	7.0	5.0	5.0	14.0	9.0	9.0	9.0	14.0
1994	9.0	7.0	10.0	5.0	4.0	6.0	9.0	7.0	5.0	9.0	10.0	9.0	10.0
1995	9.0	9.0	6.0	7.0	5.0	12.0	5.0	12.0	7.0	14.0	9.0	9.0	14.0
MAX.	13.0	11.0	12.0	11.0	9.0	12.0	10.0	15.0	15.0	14.0	14.0	14.0	15.0

TABLE A-6 (continued)

Monthly Wave Statistics at WIS Station G1020 (27.25N, 82.75W, depth 39.4 feet), Lido Key, FL

YEAR	PEAK WAVE PERIOD T_p ASSOCIATED WITH LARGEST WAVE in seconds:												
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Annual
1976	8.0	9.0	6.0	4.0	8.0	3.0	4.0	4.0	3.0	6.0	4.0	8.0	9.0
1977	8.0	8.0	4.0	7.0	4.0	5.0	3.0	3.0	11.0	5.0	4.0	9.0	8.0
1978	10.0	8.0	8.0	7.0	7.0	3.0	4.0	3.0	3.0	4.0	4.0	8.0	10.0
1979	11.0	9.0	9.0	6.0	4.0	3.0	8.0	5.0	12.0	4.0	3.0	9.0	12.0
1980	7.0	8.0	8.0	10.0	5.0	5.0	5.0	5.0	4.0	5.0	9.0	7.0	8.0
1981	10.0	9.0	10.0	4.0	5.0	4.0	3.0	5.0	3.0	4.0	6.0	4.0	10.0
1982	7.0	9.0	7.0	6.0	5.0	8.0	4.0	3.0	3.0	3.0	4.0	5.0	7.0
1983	7.0	9.0	10.0	10.0	4.0	5.0	5.0	12.0	5.0	3.0	7.0	9.0	10.0
1984	8.0	10.0	11.0	8.0	6.0	5.0	4.0	5.0	5.0	4.0	4.0	7.0	11.0
1985	7.0	10.0	7.0	4.0	6.0	5.0	9.0	12.0	13.0	12.0	12.0	5.0	13.0
1986	10.0	7.0	7.0	6.0	4.0	4.0	5.0	6.0	3.0	4.0	7.0	8.0	10.0
1987	9.0	7.0	8.0	7.0	3.0	5.0	5.0	5.0	4.0	5.0	4.0	5.0	9.0
1988	5.0	8.0	9.0	11.0	6.0	4.0	4.0	5.0	7.0	3.0	12.0	6.0	12.0
1989	5.0	6.0	7.0	5.0	6.0	5.0	5.0	9.0	5.0	9.0	7.0	7.0	7.0
1990	5.0	6.0	5.0	6.0	3.0	4.0	6.0	6.0	3.0	7.0	9.0	4.0	7.0
1991	6.0	10.0	9.0	6.0	8.0	3.0	4.0	6.0	3.0	4.0	5.0	4.0	9.0
1992	9.0	10.0	5.0	4.0	4.0	7.0	5.0	10.0	3.0	7.0	8.0	9.0	10.0
1993	6.0	8.0	10.0	7.0	6.0	3.0	5.0	5.0	5.0	7.0	9.0	9.0	10.0
1994	9.0	4.0	9.0	5.0	3.0	6.0	9.0	6.0	3.0	7.0	5.0	9.0	9.0
1995	9.0	8.0	6.0	6.0	5.0	12.0	5.0	7.0	6.0	14.0	8.0	9.0	14.0
MAX.	11.0	10.0	11.0	11.0	8.0	12.0	9.0	12.0	13.0	14.0	12.0	9.0	

TABLE A-6 (continued)

Monthly Wave Statistics at WIS Station G1020 (27.25N, 82.75W, depth 39.4 feet), Lido Key, FL

YEAR	MEAN WAVE DIRECTION in degrees:												
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Annual
1976	4.7	270.1	149.1	324.6	206.8	148.5	211.9	203.8	203.3	28.3	25.3	16.9	184.9
1977	287.1	316.2	145.2	82.8	101.2	260.2	150.6	145.5	205.7	345.9	65.7	261.9	198.2
1978	279.4	260.3	221.1	184.9	162.3	182.0	206.0	169.5	127.8	30.9	41.7	161.5	183.5
1979	249.8	290.4	163.6	176.6	153.4	337.9	204.1	176.7	203.7	356.4	29.7	34.5	192.7
1980	192.5	314.3	204.0	246.1	192.5	266.7	247.8	227.5	162.7	310.3	268.0	339.8	238.5
1981	308.9	268.0	267.6	119.0	242.7	168.4	214.1	176.7	7.7	46.3	342.2	265.2	236.8
1982	198.4	193.1	157.8	166.3	132.1	201.0	176.8	195.2	201.1	76.5	81.3	125.0	156.6
1983	297.0	233.2	241.6	223.7	165.2	172.0	194.1	227.6	132.1	49.6	257.2	294.9	222.8
1984	321.6	225.6	222.2	203.6	139.2	161.0	183.9	244.1	35.9	68.1	32.7	96.9	150.8
1985	274.1	164.1	244.4	190.9	248.2	238.6	238.8	237.5	124.5	111.0	197.4	336.2	234.2
1986	288.7	234.2	202.9	274.8	133.9	186.3	243.8	207.4	130.0	103.4	104.0	340.2	197.6
1987	256.3	238.3	198.5	274.8	130.4	164.7	174.6	248.8	240.6	359.5	62.6	190.8	229.8
1988	78.2	300.3	209.7	231.3	255.6	193.4	183.3	189.4	220.2	353.5	230.3	47.4	225.4
1989	124.3	212.6	209.2	236.7	240.1	183.8	227.1	226.0	168.8	293.3	336.8	270.3	218.4
1990	95.2	147.0	96.4	103.7	184.1	231.9	246.5	254.6	195.5	359.9	12.4	93.5	198.4
1991	182.6	293.1	204.3	160.1	148.8	233.8	260.0	234.5	150.1	30.1	23.1	45.9	195.3
1992	289.9	222.9	259.2	232.0	292.9	227.9	202.1	244.6	140.9	333.9	69.5	35.1	248.3
1993	124.7	248.5	251.3	234.0	172.5	161.9	226.9	236.7	214.7	244.8	19.8	295.9	225.7
1994	118.3	111.9	250.7	166.2	252.3	200.9	201.5	204.9	179.4	193.9	60.0	335.2	203.1
1995	266.0	227.4	183.8	166.8	182.4	203.5	251.5	253.8	182.8	142.6	21.8	332.1	218.4
AVERAGE	211.9	238.6	204.1	199.9	186.8	206.2	212.3	215.2	161.4	191.9	114.1	196.0	211.5

TABLE A-6 (continued)

Monthly Wave Statistics at WIS Station G1020 (27.25N, 82.75W, depth 39.4 feet), Lido Key, FL

YEAR	DIRECTION ASSOCIATED WITH LARGEST WAVE in degrees:												
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Annual
1976	270.0	252.0	274.0	130.0	238.0	50.0	292.0	65.0	65.0	270.0	7.0	259.0	252.0
1977	259.0	263.0	144.0	248.0	68.0	266.0	97.0	61.0	245.0	320.0	328.0	266.0	259.0
1978	256.0	270.0	263.0	274.0	234.0	72.0	212.0	43.0	68.0	43.0	162.0	259.0	256.0
1979	256.0	263.0	263.0	220.0	256.0	14.0	198.0	274.0	223.0	50.0	353.0	263.0	223.0
1980	259.0	263.0	274.0	259.0	281.0	277.0	281.0	86.0	263.0	295.0	220.0	263.0	274.0
1981	256.0	263.0	259.0	126.0	274.0	61.0	86.0	194.0	86.0	47.0	277.0	335.0	259.0
1982	241.0	263.0	245.0	209.0	281.0	198.0	155.0	43.0	79.0	14.0	356.0	310.0	241.0
1983	252.0	241.0	245.0	259.0	198.0	194.0	277.0	256.0	205.0	61.0	259.0	259.0	245.0
1984	266.0	259.0	256.0	259.0	202.0	252.0	162.0	245.0	281.0	22.0	349.0	277.0	256.0
1985	266.0	263.0	266.0	22.0	270.0	263.0	191.0	238.0	241.0	238.0	223.0	324.0	241.0
1986	263.0	248.0	209.0	263.0	122.0	187.0	263.0	230.0	61.0	32.0	238.0	263.0	263.0
1987	248.0	266.0	259.0	259.0	36.0	230.0	270.0	270.0	227.0	40.0	317.0	338.0	248.0
1988	310.0	266.0	263.0	252.0	194.0	61.0	50.0	180.0	205.0	4.0	223.0	230.0	223.0
1989	320.0	299.0	259.0	256.0	256.0	194.0	270.0	263.0	198.0	266.0	274.0	252.0	252.0
1990	317.0	266.0	266.0	284.0	101.0	281.0	245.0	270.0	14.0	241.0	263.0	338.0	241.0
1991	252.0	263.0	234.0	209.0	176.0	50.0	227.0	256.0	43.0	32.0	320.0	54.0	234.0
1992	263.0	241.0	306.0	320.0	302.0	202.0	212.0	202.0	43.0	212.0	263.0	266.0	241.0
1993	205.0	259.0	252.0	266.0	270.0	270.0	266.0	270.0	252.0	227.0	266.0	259.0	252.0
1994	259.0	18.0	245.0	295.0	4.0	198.0	245.0	263.0	86.0	245.0	335.0	266.0	245.0
1995	256.0	266.0	230.0	202.0	220.0	256.0	263.0	241.0	180.0	245.0	270.0	263.0	245.0

MEAN WAVE HEIGHT = 1.2 feet
MEAN WAVE PERIOD = 3.9 seconds
MEAN WAVE DIRECTION = 211.5 degrees

MAX. WAVE HEIGHT = 19.7 feet
MAX. WAVE PERIOD = 15.0 seconds
PERIOD OF LARGEST WAVE = 13.0 seconds
DIR. OF LARGEST WAVE = 241.0 degrees

WAVE EXCEEDED 12 HOURS PER YEAR:
HEIGHT (feet) = 13.2 $= H_e$
PERIOD (feet) = 11.6 $= T_e$

THEORETICAL DEPTH OF CLOSURE:

Hallermeier (1978):

$d_c = 2.28\,H_e - 68.5\,(H_e^2/gT_e^2) =$ 27.3 feet

Birkemeier (1985):

$d_c = 1.75\,H_e - 57.9\,(H_e^2/gT_e^2) =$ 20.8 feet

TABLE A-7

Monthly Wave Statistics at PMAB Station FL002 (27.30N, 82.59W, depth 23.0 feet), Lido Key, FL

MEAN WAVE HEIGHT H_{mo} in feet:													
YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Annual
1993	N/A	N/A	N/A	N/A	N/A	1.0	1.0	1.3	1.0	1.6	1.0	2.0	1.3
1994	1.6	1.3	2.0	1.3	1.0	1.3	1.3	1.6	1.3	2.0	1.6	2.0	1.6
1995	2.6	2.3	1.3	1.6	1.3	2.6	N/A	1.6	1.3	2.6	1.6	2.0	2.0
1996	3.0	2.0	2.0	1.6	1.0	1.3	N/A	N/A	N/A	N/A	N/A	N/A	2.0
AVERAGE	2.4	1.9	1.7	1.5	1.1	1.6	1.1	1.5	1.2	2.1	1.4	2.0	1.7

MAXIMUM WAVE HEIGHT H_{mo} in feet:													
YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Annual
1993	N/A	N/A	N/A	N/A	N/A	1.6	2.0	2.0	1.3	5.9	3.0	4.6	5.9
1994	7.2	2.6	6.2	2.6	1.6	3.0	3.0	4.3	2.6	5.6	3.6	4.9	7.2
1995	5.6	6.6	3.6	3.3	3.3	6.2	N/A	3.9	2.3	6.9	4.3	5.6	6.9
1996	5.9	4.6	3.9	3.6	3.0	2.0	N/A	N/A	N/A	N/A	N/A	N/A	5.9
MAX.	7.2	6.6	6.2	3.6	3.3	6.2	3.0	4.3	2.6	6.9	4.3	5.6	7.2

MEAN PEAK WAVE PERIOD T_p in seconds:													
YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Annual
1993	N/A	N/A	N/A	N/A	N/A	5.9	4.6	4.5	5.9	5.6	6.1	6.8	6.0
1994	6.4	5.9	6.2	5.4	4.2	5.2	4.7	6.0	5.5	5.9	5.4	5.9	5.9
1995	6.9	6.5	6.0	5.4	4.8	6.1	N/A	4.6	4.7	7.3	5.7	5.7	6.0
1996	7.6	6.1	6.2	5.5	4.9	5.6	N/A	N/A	N/A	N/A	N/A	N/A	6.1
AVERAGE	7.0	6.2	6.1	5.4	4.6	5.7	4.7	5.0	5.4	6.3	5.7	6.1	6.0

MAXIMUM PEAK WAVE PERIOD T_p in seconds:													
YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Annual
1993	N/A	N/A	N/A	N/A	N/A	4.3	5.1	4.7	4.1	7.5	6.4	7.1	7.5
1994	11.6	7.5	9.8	6.4	4.3	4.6	8.5	5.8	7.5	6.7	4.6	5.6	11.6
1995	8.5	7.1	5.6	5.1	6.1	8.5	N/A	5.8	4.1	10.7	5.6	6.1	10.7
1996	4.7	9.8	4.9	7.1	7.1	5.1	N/A	N/A	N/A	N/A	N/A	N/A	4.7
MAX.	11.6	9.8	9.8	7.1	7.1	8.5	8.5	5.8	7.5	10.7	6.4	7.1	11.6

TABLE A-7 (continued)

Monthly Wave Statistics at PMAB Station FL002 (27.30N, 82.59W, depth 23.0 feet), Lido Key, FL

PEAK WAVE PERIOD T_p ASSOCIATED WITH LARGEST WAVE in seconds:

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Annual
1993	N/A	N/A	N/A	N/A	N/A	4.3	5.1	4.7	4.1	7.5	6.4	7.1	7.5
1994	11.6	7.5	9.8	6.4	4.3	4.6	8.5	5.8	7.5	6.7	4.6	5.6	11.6
1995	8.5	7.1	5.6	5.1	6.1	8.5	N/A	5.8	4.1	10.7	5.6	6.1	10.7
1996	4.7	9.8	4.9	7.1	7.1	5.1	N/A	N/A	N/A	N/A	N/A	N/A	4.7
MAX.	11.6	9.8	9.8	7.1	7.1	8.5	8.5	5.8	7.5	10.7	6.4	7.1	11.6

MEAN WAVE DIRECTION in degrees:

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Annual
1993	N/A	N/A	N/A	N/A	N/A	178.3	222.8	194.7	188.1	196.9	209.3	208.0	204.0
1994	197.4	201.3	200.0	200.9	230.1	184.4	160.2	173.6	218.9	238.7	266.0	269.9	209.7
1995	250.7	257.8	246.5	227.3	240.3	241.1	N/A	266.8	210.2	233.5	255.0	268.5	247.3
1996	252.5	256.9	264.0	247.0	217.9	228.5	N/A	N/A	N/A	N/A	N/A	N/A	249.0
AVERAGE	233.5	238.7	236.8	225.1	229.4	208.1	191.5	211.7	205.7	223.0	243.4	248.8	225.4

DIRECTION ASSOCIATED WITH LARGEST WAVE in degrees:

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Annual
1993	N/A	N/A	N/A	N/A	N/A	243.0	227.0	229.0	136.0	165.0	223.0	203.0	165.0
1994	202.0	185.0	200.0	220.0	243.0	159.0	176.0	167.0	222.0	215.0	290.0	281.0	202.0
1995	251.0	264.0	270.0	191.0	244.0	236.0	N/A	220.0	209.0	221.0	236.0	271.0	221.0
1996	291.0	259.0	284.0	267.0	252.0	227.0	N/A	N/A	N/A	N/A	N/A	N/A	291.0

MEAN WAVE HEIGHT = 1.7 feet
MEAN WAVE PERIOD = 6.0 seconds
MEAN WAVE DIRECTION = 225.4 degrees

MAX. WAVE HEIGHT = 7.2 feet
MAX. WAVE PERIOD = 12.8 seconds
PERIOD OF LARGEST WAVE = 11.6 seconds
DIR. OF LARGEST WAVE = 202.0 seconds

WAVE EXCEEDED 12 HOURS PER YEAR:
HEIGHT = 7.0 feet
PERIOD = 10.9 seconds

THEORETICAL DEPTH OF CLOSURE:

Hallermeier (1978):

$d_c = 2.28\ H_e - 68.5\ (H_e^2/gT_e^2) =$ 15.0 feet

Birkemeier (1985):

$d_c = 1.75\ H_e - 57.9\ (H_e^2/gT_e^2) =$ 11.4 feet

MONTHLY WAVE STATISTICS AT WIS STATION G1020 (27.25N, 82.75W, DEPTH 39.4 FEET), LIDO KEY, FL

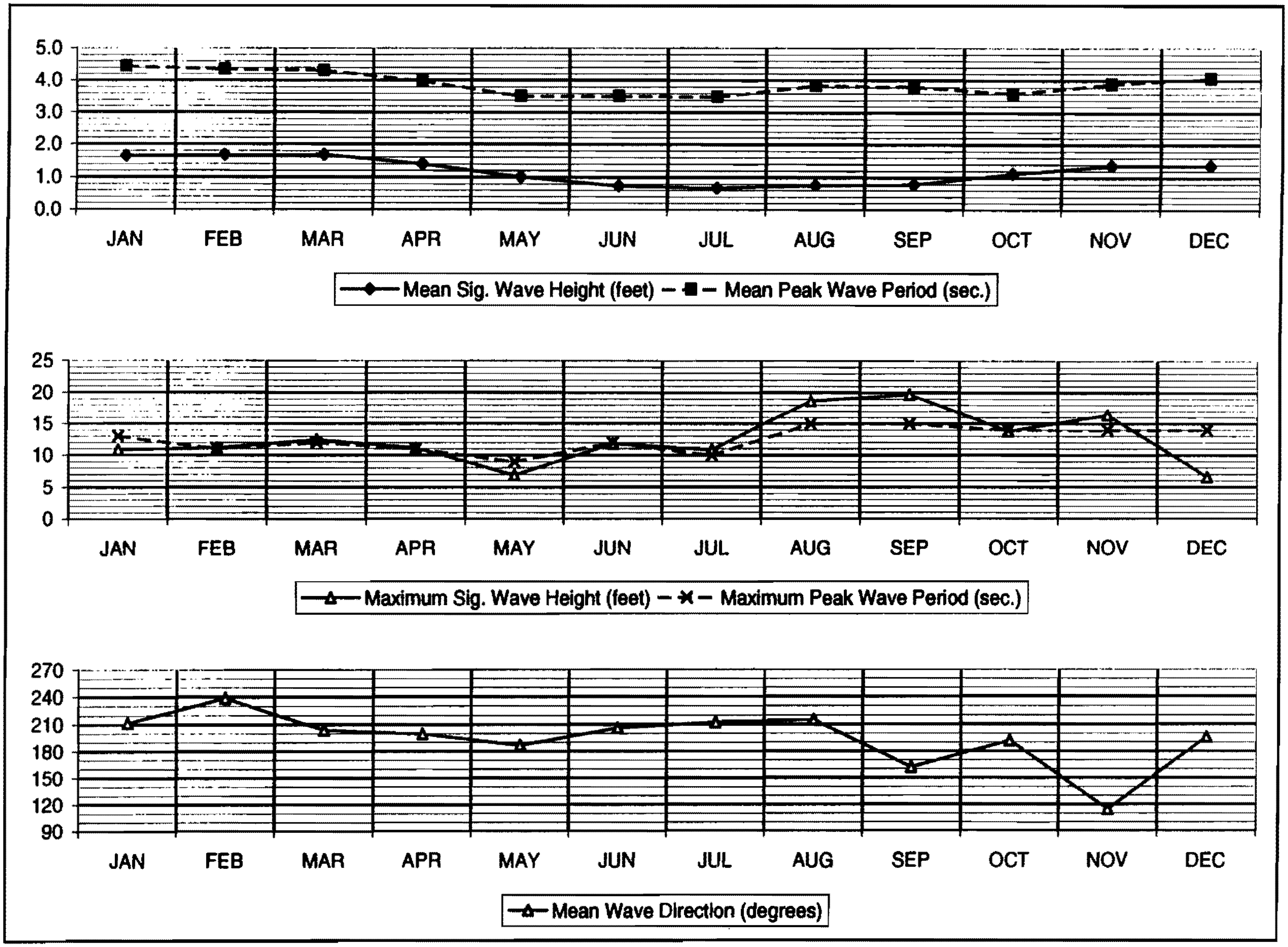


FIGURE A-6

MONTHLY WAVE STATISTICS AT PMAB STATION FL002 (27.30N, 82.59W, DEPTH 23.0 FEET), LIDO KEY, FL

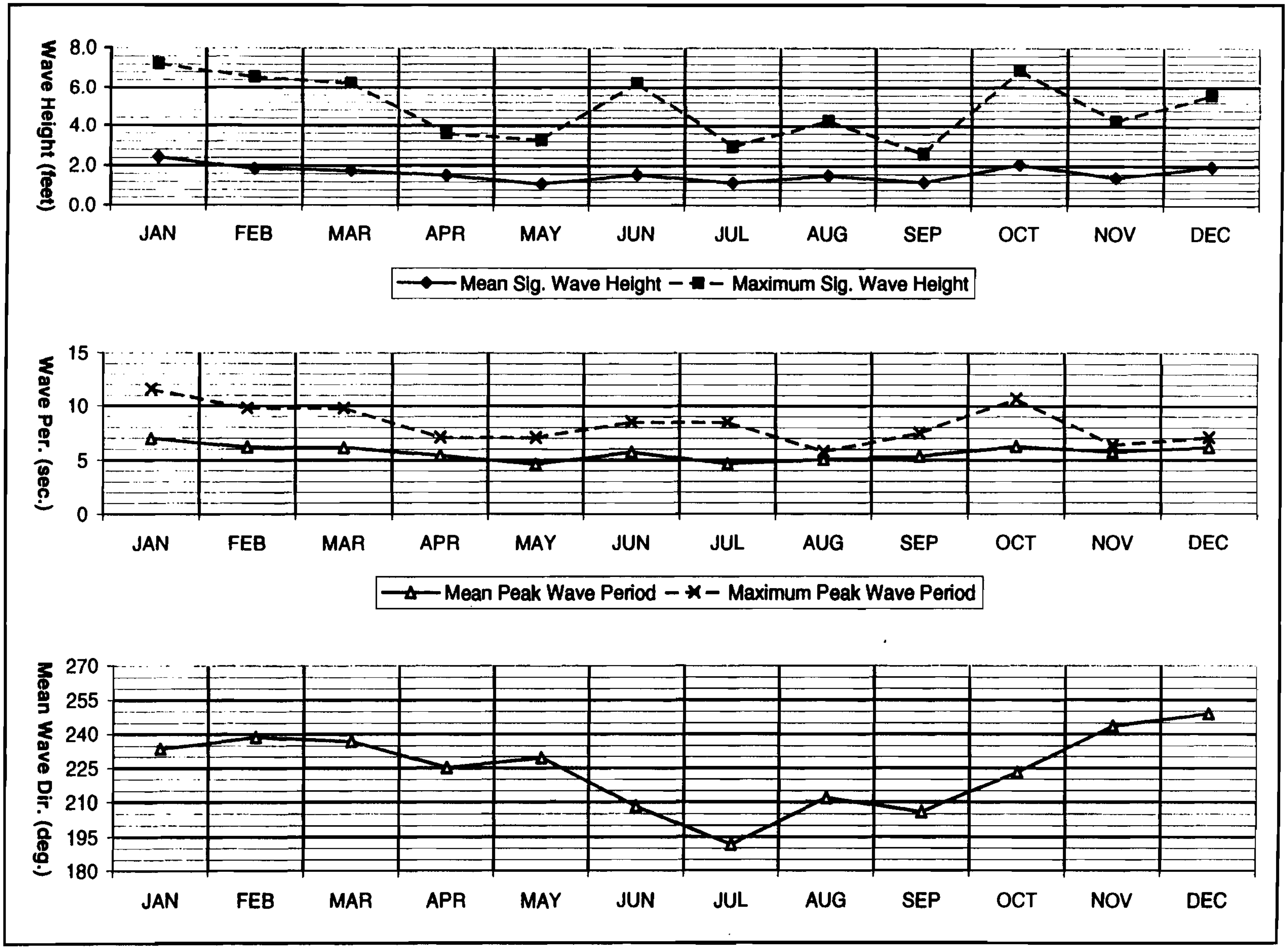


FIGURE A-7

shallower station FL002 are, on average, longer than those of the hindcast waves at station G1020, suggesting a dampening of the shorter incoming waves. Comparison of the waves at the deeper Station G1020 to the shallower station FL002 suggests refraction of the waves from the west and south-southeast towards the shore-normal direction of 215 - 250 degrees (south-southwest to west-southwest). The mean wave height and period indicate a generally mild wave climate. The percent occurrence and variation of wave height and wave period by directions is shown in Figures A-8 and A-9.

A-22. Extremal wave statistics estimated by CHL (2000) appear in Table A-8 and Figure A-10. The largest hindcast wave (H_s = 19.7 feet) at Station G1020 between 1976 and 1995 is associated with the passage of Hurricane Elena to the west and compares well with the 20 year wave. The largest wave of 7.2 feet observed at station FL002 occurred in January 1994. These events demonstrate the fact that though the mean wave conditions for the region are mild, severe wave events infrequently occur due to both tropical and extratropical storm events.

Yearly Depth Limit

A-23. For natural sand beaches, a useful parameter in coastal engineering is the yearly depth limit of the active nearshore profile. Beyond this depth only negligible sand movement is noted over seasonal wave climate changes. Hallermeier (1978) and Birkemeier (1985) have developed procedures for estimating the depth of closure d_c based on wave data. This depth is based on the approximate extreme wave condition for nearshore significant waves, and may be calculated by:

$$d_c = 2.28\, H_e - 68.5\, (H_e^2 / gT_e^2) \qquad \text{Hallermeier (1978)}$$

$$d_c = 1.75\, H_e - 57.9\, (H_e^2 / gT_e^2) \qquad \text{Birkemeier (1985)}$$

where:

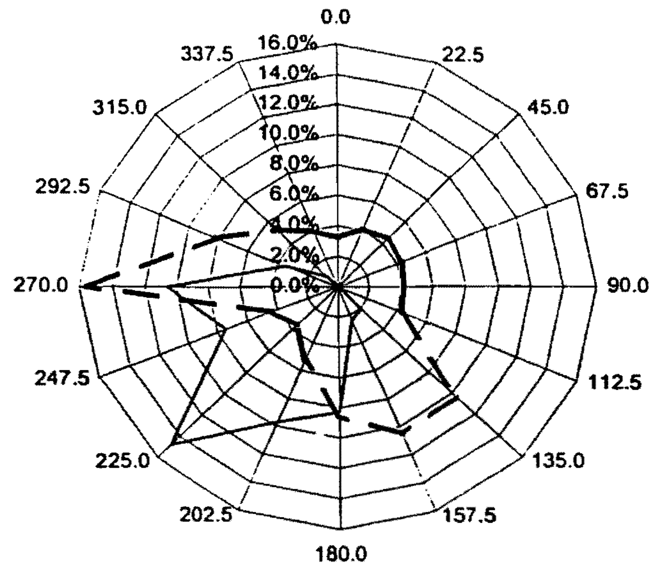
H_e = nearshore significant wave height exceeded 12 hours per year
T_e = wave period corresponding to H_e.
g = acceleration of gravity constant, 32.3 ft/sec.^{2} .

A-24. A-22. Review of the hindcast wave statistics (1976-1995) at Station G1020 would suggest that waves 13.2 feet in height or greater with wave periods of 11.6 seconds or longer occur 12 hours per year. The corresponding limiting depth, according to the above procedures, would range from 21 to 27 feet. The wave measurements at Station FL002 indicate that waves exceeding 7 feet in height with periods exceeding 10.9 seconds occur 12 hours per year. These wave statistics suggest a theoretical depth of closure ranging from 11.4 to 15 feet, which compares well with the accepted value of -12 feet NGVD based on survey data (ATM, 1994; CPE, 2000).

Sea Level Rise

A-25. Throughout geologic history, global sea level variations, both rise and fall, have occurred. Some authorities have found evidence to indicate that a new ice age, with a resultant sea level

Percentage of Incident Waves vs. Wave Direction

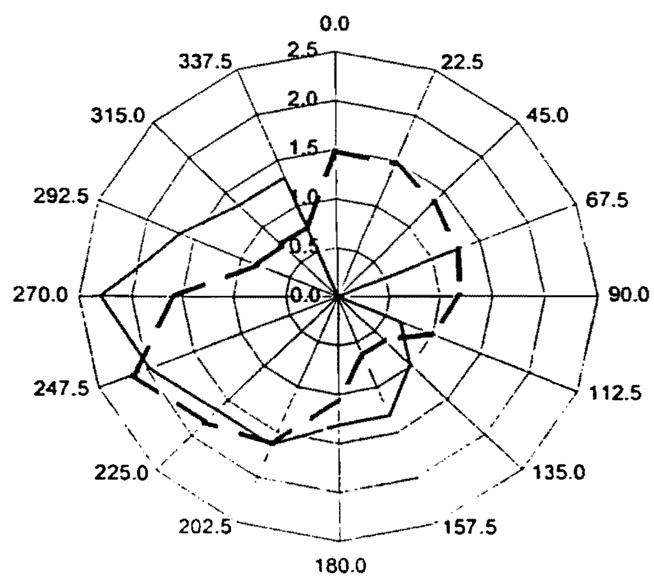


Percentage of Waves < 0.2 m (0.66 feet):

G1020	0%
FL002	40%

— — WIS Station G1020 Hindcast 1976-1995 ——— PMAB Station FL002 Measured Waves - 1993-1997

Mean Wave Height Hmo (feet) vs. Wave Direction



Depth (feet):

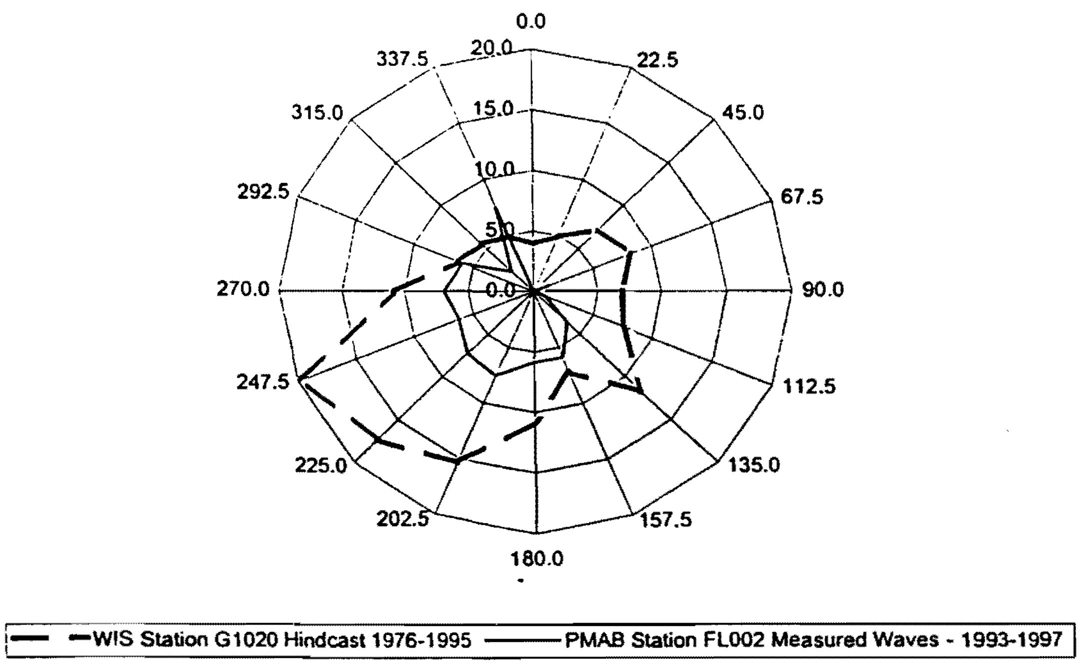
G1020	39
FL002	23

— — WIS Station G1020 Hindcast 1976-1995 ——— PMAB Station FL002 Measured Waves - 1993-1997

FIGURE A-8

DIRECTIONAL WAVE STATISTICS, LIDO KEY, FLORIDA

Maximum Wave Height Hmo (feet) vs. Wave Direction



Mean Peak Wave Period (seconds) vs. Wave Direction

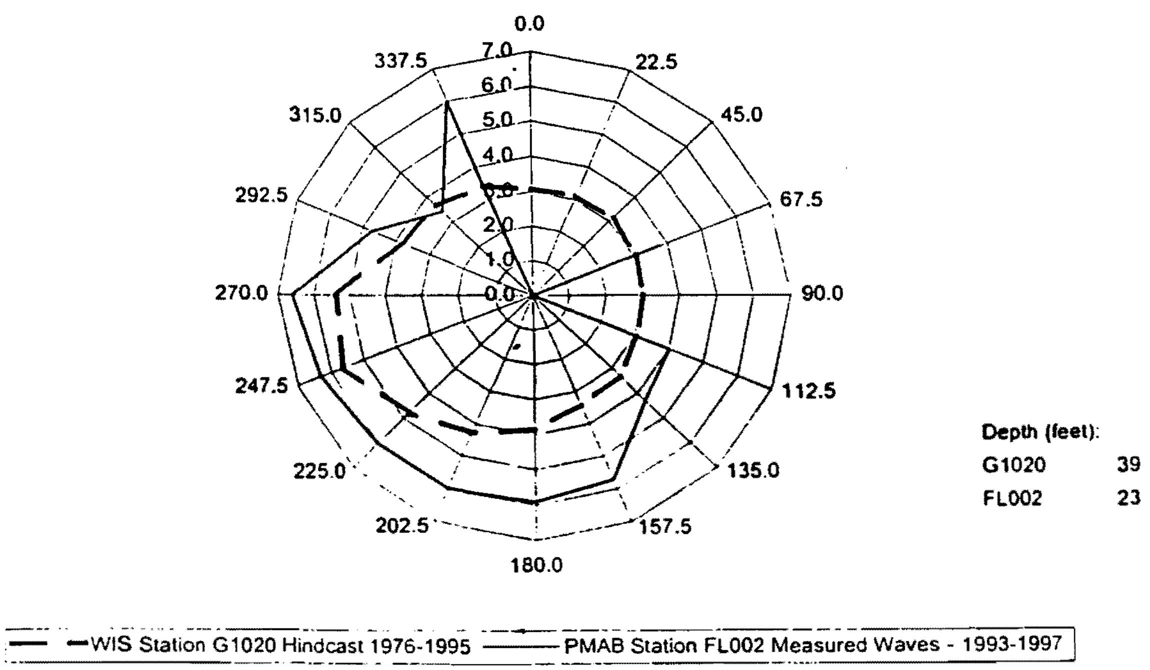


FIGURE A-9

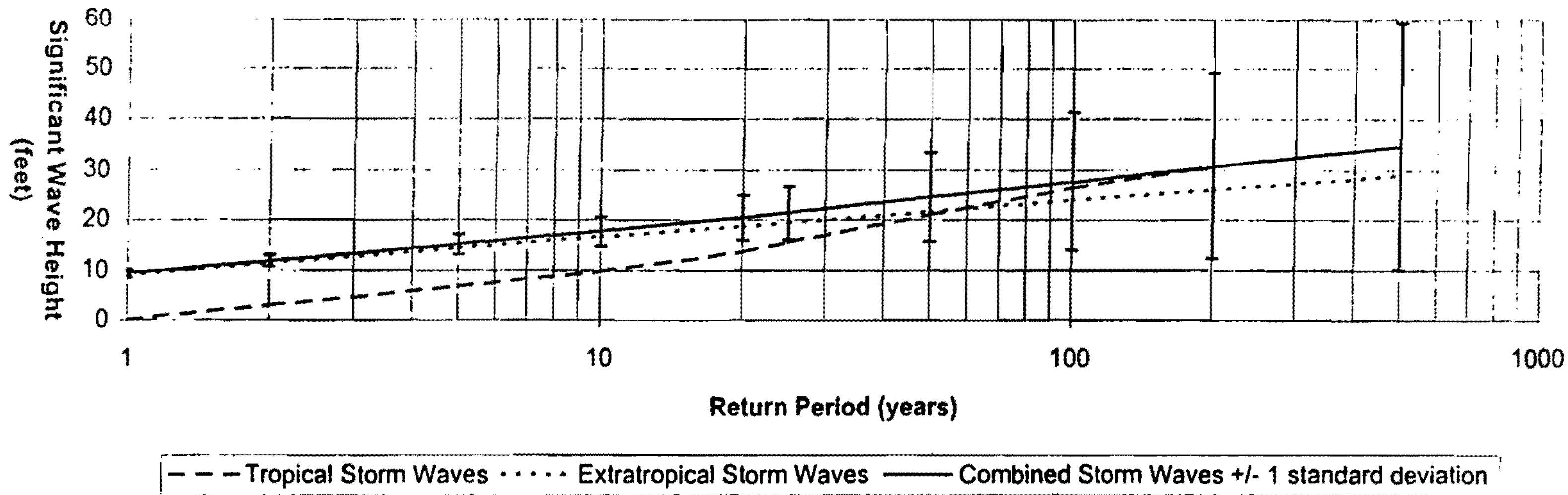
DIRECTIONAL WAVE STATISTICS, LIDO KEY, FLORIDA

TABLE A-8

CHL (2000a) Extremal Wave Analysis, WIS Station G1020, Lido Key, FL

Return	Tropical Storm Waves				Extratropical Storm Waves				Combined Storm Wave Distribution			
Period (years)	H_s (feet)	σ (feet)	T_p (sec.)	σ (sec.)	H_s (feet)	σ (feet)	T_p (sec.)	σ (sec.)	H_s (feet)	σ (feet)	T_p (sec.)	σ (sec.)
1	0.0	0.0	3.5	0.3	9.1	0.6	8.9	0.3	9.5	0.8	9.1	0.5
2	3.0	0.0	5.1	0.6	11.4	0.9	9.7	0.4	11.9	1.2	10.2	0.5
5	6.9	1.6	7.2	1.0	14.4	1.3	10.8	0.5	15.2	2.0	11.7	0.9
10	9.8	3.0	8.8	1.3	16.7	1.6	11.6	0.6	17.7	2.9	12.8	1.4
20	13.8	5.6	10.5	2.0	18.7	2.3	12.3	0.8	20.5	4.5	13.9	1.8
25	15.5	7.0	11.1	2.3	19.4	2.4	12.5	0.8	21.5	5.3	14.3	1.9
50	21.0	11.5	13.1	3.2	21.7	2.6	13.3	0.8	24.6	8.9	15.4	2.4
100	26.5	16.0	15.1	4.1	23.9	2.9	14.1	0.8	27.7	13.6	16.5	2.8
200	30.8	20.4	17.0	5.0	26.1	3.1	14.8	0.8	30.8	18.4	17.6	3.3
500	34.8	26.3	19.1	6.2	29.1	3.4	15.8	0.8	34.8	24.6	19.1	3.9

Offshore Waves, WIS Station G1020 (depth 39 feet), Lido Key, Sarasota, Florida



Offshore Waves, WIS Station G1020 (depth 39 feet), Lido Key, Sarasota, Florida

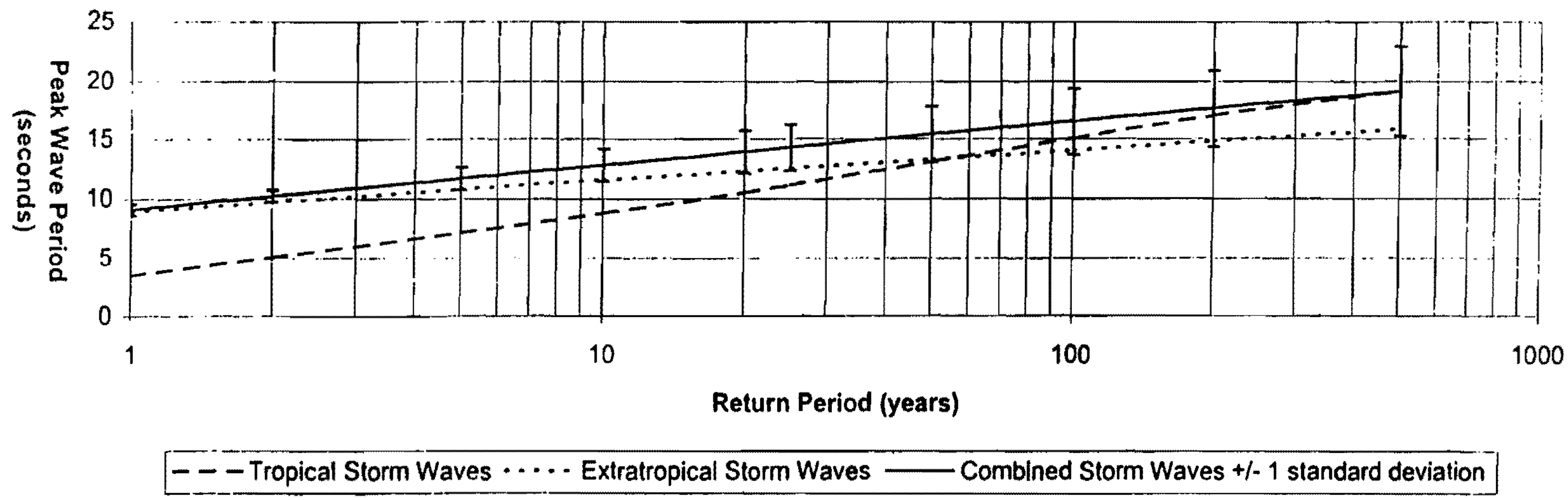


FIGURE A-10

CHL (2000A) EXTREMAL WAVE ANALYSIS, WIS STATION G1020, LIDO KEY, FL drop, may be occurring. Others argue that increasing atmospheric concentrations of carbon dioxide and other greenhouse gases are causing the earth to warm, contributing to a sea level rise. Both global cooling or warming thus contribute to absolute global sea level change. Eustatic sea level change is defined as a global change of oceanic water level. The total relative sea level change is the sum of the eustatic sea level change and any local change in land elevation. According to USACE (1990), sea level along the Gulf Coast rose an average of 0.0069 feet/year between 1917 and 1980 and an average of 0.0046 feet/year between 1940 and 1980.

A-26. A National Research Council (NRC) publication entitled Responding to Changes in Sea Level, Engineering Implications (NRC, 1987) presents a procedure for estimating the total relative sea level rise for any location with a known rate of land elevation change. Total relative sea level rise is the local component plus the eustatic component, computed by the following equation:

$$T(t) = (0.0012 + M/1000)t + bt^2$$

where

$T(t)$	=	total relative sea level rise in meters at time t.
0.0012	=	historic global sea level rise, expressed in meters per year, over the last century.
M	=	the rate of subsidence or uplift, in mm/yr.
t	=	any given year of interest, note $t(0) = 1986$.
b	=	the appropriate coefficient (in m/yr^2) for the three future sea level rise scenarios (Curve I, b = 0.000028; Curve II, b = 0.000066; and Curve III, b = 0.000105.

A-27. The three scenarios for eustatic sea level rise developed by the NRC approximate estimates of potential total eustatic rises of 0.5, 1.0 and 1.5 meters (1.6, 3.2, and 4.8 feet) between the year 2000 and the year 2100. The corresponding rates of sea level rise range from 0.016 to 0.048 feet/year.

A-28. The rate of subsidence or uplift is unknown for the project area (M = 0). Therefore, the rate of uplift ($M = {}^{+}0.8$) for St. Petersburg, Florida, which is the nearest area with a computed rate, is used. Using the equation above, the total relative sea level rise between the year 2000 and the year 2050 would be 0.22 meters (0.7 feet) based on the "low" estimate, and 0.52 meters (1.7 feet) based on Curve III or "high" estimate. The corresponding rates of sea level rise range from 0.014 to 0.034 feet/year.

Shoreline Erosion and Recession Due to Sea Level Rise

A-29. Experience indicates that as relative sea level rises, the shoreline will be subjected to increased flooding and profile recession. Per Bruun (1962) proposed a formula for estimating the rate of shoreline recession based on the local rate of sea level rise. This methodology also includes consideration of local topography and bathymetry, which is summarized in Table A-9.

TABLE A-9

Beach Profile Characteristics, May 1999, Lido Key, Sarasota, FL

Profile Line	Bruun Width "L" (feet)	Berm Width (feet)	Berm Elev. (feet NGVD)	Onshore Slope (1 on ...)	Sandbar Width (feet)	Sandbar Elev. (feet NGVD)	Offshore Slope (1 on ...)
R32	n/a	138.0	5.0	10.8	936.0	-5.5	n/a
R33	n/a	243.0	4.5	1.9	326.0	-1.9	938.4
R34	n/a	202.0	4.2	43.6	230.0	-4.9	326.2
R35	n/a	453.0	5.1	38.8	94.0	-2.7	350.7
R36	1282.5	118.0	6.0	14.3	624.1	-12.1	219.2
R37	483.0	286.0	5.6	11.3	696.8	-15.3	n/a
R38	450.0	292.0	7.3	18.1	510.7	-13.7	402.9
R39	429.8	144.0	6.8	17.7	n/a	n/a	429.3
R40	510.3	215.0	4.7	7.6	9.0	-0.4	40.2
R41	765.1	64.0	5.3	15.4	151.0	-1.4	50.4
R42	1048.5	0.0	14.5	7.3	106.0	-1.0	74.4
R43	n/a	n/a	n/a	45.5	126.0	-3.6	204.4
R44	n/a	95.0	4.1	20.7	1177.0	-2.5	801.2
AVG.	709.9	187.5	6.1	19.5	415.6	-5.4	348.9

NOTES:

1. Bruun width "L" is defined as the distance from the seaward berm contour to the depth of closure.
2. The depth of closure and the offshore slope at R32 could not be established from the survey data.
3. The offshore slope at R37 could not be established from the survey data.
4. Offshore bar features are absent at R39.
5. Profile R43 is characterized by a +4.4' NGVD bulkead.

Bruun's approach assumes that with a rise in sea level, the beach profile will attempt to reestablish the same bottom depths relative to the surface of the sea that existed before the sea level rise. As a result, the beach profile shape relative to the mean water level will reestablish itself. If the longshore littoral transport in and out of a given shoreline area is equal, then the quantity of material required to reestablish the nearshore slope must be acquired from erosion of the shore. Shoreline recession resulting from sea level rise can be estimated using Bruun's Rule, as defined below:

$$R = SL / (h + d_c)$$

where

- R = shoreline recession (in feet) attributable to sea level rise.
- h = berm elevation (+6.0 feet NGVD berm).
- d_c = depth contour beyond which there is no significant sediment motion (Depth of closure, 12 feet below NGVD).
- L = horizontal distance from the beach profile berm elevation to the depth contour d.
- S = specified relative sea level rise for time period t.

A-30. The Bruun procedure is applicable to long straight sandy beaches having an uninterrupted supply of sand. Little is known about the rate at which profiles respond to changes in water level. Therefore, this procedure is only used for estimating long term changes. The procedure is not a substitute for the analysis of historical shoreline and profile changes. If little or no historical data is available, then historical analysis may be supplemented by this method to provide an estimate of long-term erosion rates attributable to sea level rise. The offshore contours in the project area are not entirely straight and parallel; however, Bruun's rule does show the potential order of magnitude in future shoreline changes within the project area attributable to the relative rise in sea level.

A-31. The Curve I "low" estimate of relative sea level rise is 0.7 feet by the year 2050. The shoreline recession attributed to this low estimate along the shore of the project area would be 29 feet, or 0.6 feet per year. The Curve III "high" estimate of sea level rise by the year 2045 is 1.7 feet. The corresponding recession would be 67 feet, or 1.3 feet per year. The corresponding volume changes would be 0.4 to 0.9 c.y./ft/year.

COASTAL PROCESSES

Reach Delineation

A-32. To facilitate description of the coastal processes at Lido Key, several characteristic reaches have been delineated based on the beach profile characteristics and the location of recent fill projects and dredge disposal operations. Representative profiles for each reach are chosen based on their resemblance to the average profile on each reach. Reaches 2, 3, and 4 lie within the project area, and Reach 1 lies north of the project area. As the New Pass reach is not within or adjacent to the project area, no representative profile has been chosen for that reach. The delineation of the reaches are shown in Figure A-11 and Table A-10:

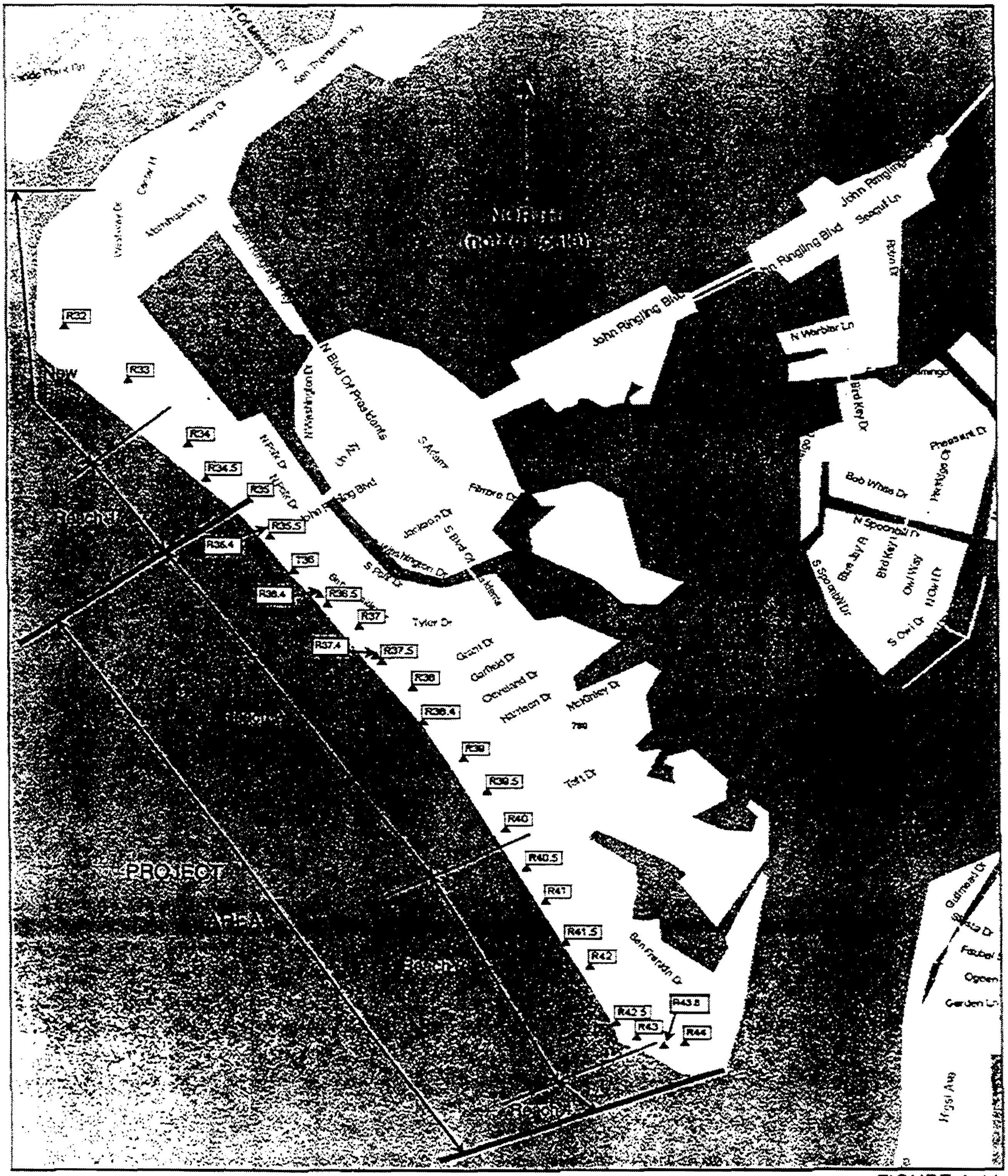


FIGURE A-11

REACH DELINEATION, LIDO KEY, SARASOTA, FL

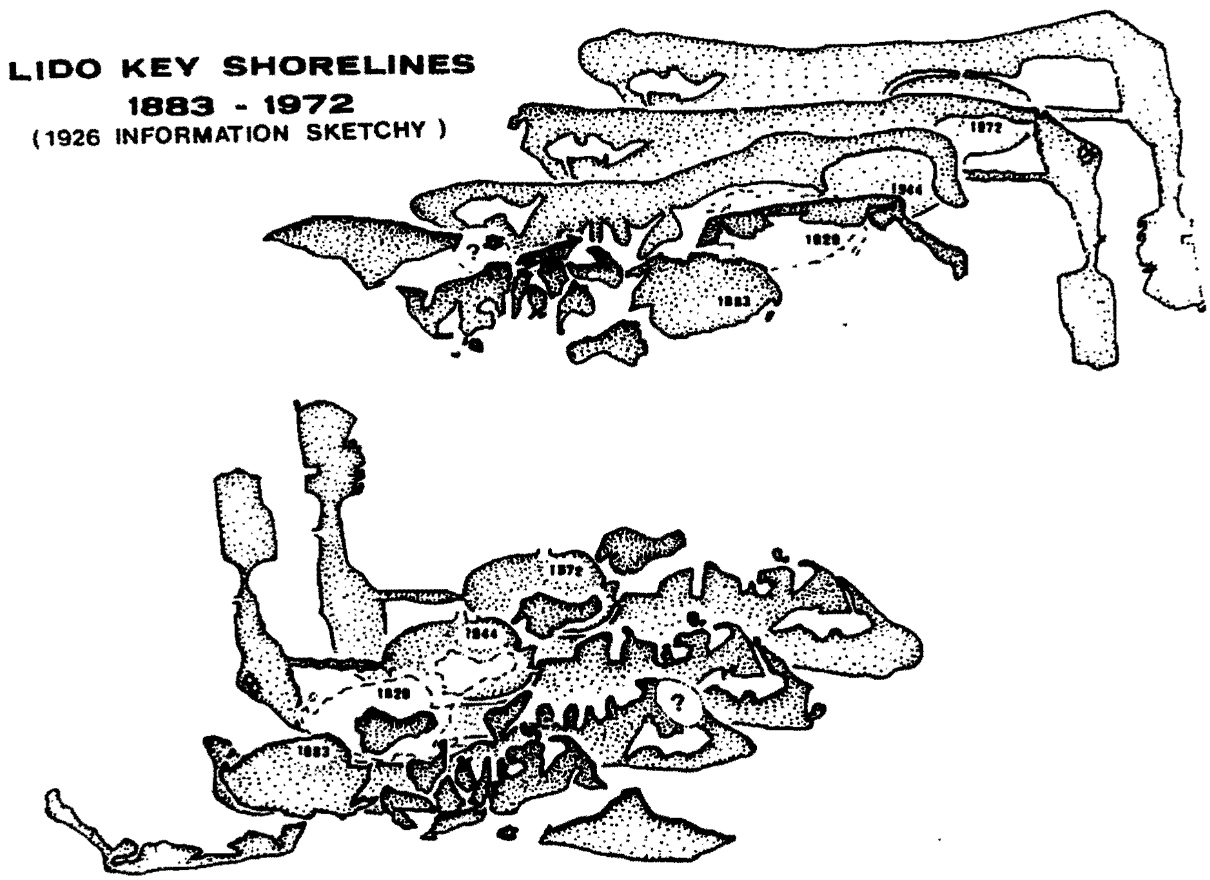


FIGURE A-12

LIDO KEY SHORELINES, 1883-1972 (BRUNGARDT, 1977)

FIGURE A-13

SHORELINE CHANGES, 1883 - 1974, LIDO KEY, FL

Recent Shoreline Changes

A-35. Lido Key shoreline changes since 1971 appear in Tables A-11 and A-12 and Figures A-14 and A-15. Shoreline changes are due to

- The placement of dredge material from New Pass on the northern end of the island.
- Nourishment projects in 1970, 1974, 1982, and 1977 along the middle and southern portions of the island.
- Long term erosion.
- The impact of several major storms. These storms include Hurricane Agnes in 1972, the impact of Tropical Storm Keith in 1988, and the passage of Tropical Storm Marco in 1990.
- The migration or "diffusion" of sand from nourished beaches (Campbell, Dean, and Wang, 1989).
- The presence of tidal inlets.

CPE (1991) has noted that dredge disposal and renourishment operations mask the true rates of shoreline recession as estimated based on survey data. However, the recent shoreline changes suggest that in the absence of man-made changes, the Lido Key shorelines would recede. South of the 1970 project area (R35-R38), shoreline recession averaged over 100 feet (~33 feet/year) between 1971 and 1974. Between 1978 and 1991, the net average shoreline recession in the current project area was 45 feet (3.5 feet/year), in spite of the renourishment and dredging operations during this time period (CPE, 1991; ATM, 1994). Shoreline recession between 1991 and the most recent nourishment in 1998 averaged 92 feet within the current project area (13 feet/year). Shoreline recession has continued following the 1998 renourishment project, with an average shoreline recession of 44 feet within the current project area between May 1998 and May 1999. The largest degree of shoreline recession (~85 feet) during this period occurred along the middle of 1998 project area as beach fill has spread outside the nourished area. Especially when subject to severe storms, diffusive beach fill losses (Campbell, Dean, and Wang, 1988), or inlet effects, recession rates within the current project area can reach 94 feet/year. Because of the continuing shoreline recession patterns, FDEP (2000a) has labeled Lido Key as a critical erosion area.

Projected Without Project Shoreline Change

A-36. Without-project shoreline changes between the present and 2050 appear in Table A-13 and Figure A-16. The rates of shoreline change are based on the shoreline changes between March 1991 to May 2000, excluding those changes associated with the 1998 Lido Key nourishment and the 1996 dredge disposal operation. Along the developed portion of Lido Key, existing seawalls mark the landward limit of shoreline change. Along the undeveloped portions of Lido Key (R32-R35, R44), the landward and seaward limits of shoreline change coincide with the most landward and seaward shoreline positions reported by FDEP (2000). As inlet effects dominate the shoreline changes along these portions of the island (R32-R35, R44), future shoreline changes in these areas are highly uncertain.

TABLE A-11

Recent Shoreline Changes, Lido Key, Sarasota, FL

	SHORELINE CHANGE (FEET)							
Monument Name	1971-1973 TO Aug 1974	Aug 1974 TO May 1978	May 1978 TO May 1987	May 1987 TO Mar 1991	Jun 1990 TO Mar 1991	Mar 1991 TO Mar 1998	May 1998 TO May 1999	May 1999 TO May 2000
R32	-149.0	68.7	136.7				-109.9	-49.5
R33	-209.8	-42.8	256.2				52.3	-1.2
R34			47.0	135.4	-3.7	248.5	84.5	-6.8
R34.5								
R35	1.3	-22.9	-116.0	122.3	166.5	85.8	135.1	65.1
R35.5								
T36	166.9	166.6	-396.8	137.7	168.4	-107.2	-93.7	-13.1
R36.5								
R37	-34.5	271.0	-337.0	68.0	126.5	-135.0	-93.5	-41.6
R37.5								
R38	-8.4	36.2	-40.5	-7.3	51.5	-81.0	-84.3	-35.2
R38.4					-20.0	-39.2		
R39	-37.8	21.8	34.8	-61.7		-61.2	-66.8	-51.5
R39.5								
R40	-99.4	88.0	45.2	-66.8		-53.3	114.8	4.9
R40.5								
R41	-110.4	120.9	-37.2	18.0		-59.9	-0.3	73.1
R42	-96.1	113.4	-36.7	45.7		-117.2	-49.3	121.4
R43	-94.4	11.2	72.8	0.3		-178.0	-76.5	24.9
R44	-171.7	65.2	308.2	-156.2				-170.1
Previous Project Areas:								
R35 - R38	31.3	112.7	-222.6	80.2	128.2	-59.3	-34.1	-6.2
R35 - R40	-2.0	93.5	-135.1	32.0	98.6	-55.9	-14.7	-11.9
R35 - R42	-27.3	99.4	-110.5	32.0	98.6	-63.1	-17.3	15.4
Current Project Area:								
R36 - R44	-54.0	99.4	-43.0	-2.5	81.6	-92.4	-43.7	-9.7
New Pass	-179.4	13.0	196.5	N/A	N/A	N/A	-28.8	-25.4
Reach 1	1.3	-22.9	-34.5	128.8	81.4	167.1	109.8	29.2
Reach 2	-2.6	116.7	-138.9	14.0	81.6	-79.5	-44.7	-27.3
Reach 3	-100.3	81.8	-0.4	21.3	N/A	-118.4	-42.0	73.1
Reach 4	-171.7	65.2	308.2	-156.2	N/A	N/A	N/A	-170.1
AVERAGE	-70.3	74.8	-4.9	21.4	81.5	-45.2	-15.6	-6.1

NOTES:

1. The shoreline is defined as the location of the MHW (+1.14' NGVD) line.
2. Shoreline changes are positive seaward and negative (-) landward
3. Sources: FDEP (2000), CPE (2000).

TABLE A-11 (continued)

Recent Shoreline Changes, Lido Key, Sarasota, FL

Monument Name	SHORELINE CHANGE (FEET/YEAR) 1971-1973 TO Aug 1974	Aug 1974 TO May 1978	May 1978 TO May 1987	May 1987 TO Mar 1991	Jun 1990 TO Mar 1991	Mar 1991 TO Mar 1998	May 1998 TO May 1999	May 1999 TO May 2000
R32	-49.7	18.3	15.2				-109.9	-49.4
R33	-69.9	-11.4	28.4				52.3	-1.2
R34			5.2	35.3	-4.9	35.5	84.5	-6.8
R34.5								
R35	0.4	-6.1	-12.9	31.9	222.6	12.2	135.1	65.0
R35.5								
T36	55.6	44.4	-44.1	35.9	225.2	-15.3	-93.7	-13.1
R36.5								
R37	-11.5	72.3	-37.4	17.7	169.1	-19.3	-93.5	-41.5
R37.5								
R38	-2.8	9.7	-4.5	-1.9	68.9	-11.6	-84.3	-35.1
R38.4					-26.7	-5.6		
R39	-12.6	5.8	3.9	-16.1		-8.7	-66.8	-51.3
R39.5								
R40	-33.1	23.5	5.0	-17.4		-7.6	114.8	4.9
R40.5								
R41	-36.8	32.2	-4.1	4.7		-8.6	-0.3	72.9
R42	-32.0	30.2	-4.1	11.9		-16.7	-49.3	121.0
R43	-31.5	3.0	8.1	0.1		-25.4	-76.5	24.9
R44	-57.2	17.4	34.2	-40.7				-169.6
Previous Project Areas:								
R35 - R38	10.4	30.1	-24.7	20.9	171.4	-8.5	-34.1	-6.2
R35 - R40	-0.7	24.9	-15.0	8.4	131.8	-8.0	-14.7	-11.8
R35 - R42	-9.1	26.5	-12.3	8.3	131.8	-9.0	-17.3	15.4
Current Project Area:								
R36 - R44	-18.0	26.5	-4.8	-0.6	109.1	-13.2	-43.7	-9.7
New Pass	-59.8	3.5	21.8	N/A	N/A	N/A	-28.8	-25.3
Reach 1	0.4	-6.1	-3.8	33.6	108.8	23.9	109.8	29.1
Reach 2	-0.9	31.1	-15.4	3.6	109.1	-11.3	-44.7	-27.2
Reach 3	-33.4	21.8	0.0	5.6	N/A	-16.9	-42.0	72.9
Reach 4	-57.2	17.4	34.2	-40.7	N/A	N/A	N/A	-169.6
AVERAGE	-23.4	19.9	-0.5	5.6	109.0	-6.5	-15.6	-6.1

NOTES:
1. The shoreline is defined as the location of the MHW (+1.14' NGVD) line.
2. Shoreline changes are positive seaward and negative (-) landward
3. Sources: FDEP (2000), CPE (2000).

TABLE A-12

HISTORIC SHORELINE CHANGE SUMMARY, LIDO KEY, SARSOTA, FL

Reach	MHW Change March 1991 - May 2000 (feet/year)	MHW Change March 1991 - May 2000 (feet/year), Adjusted for 1996 and 1998 fills
New Pass	-9.5	-9.5
Reach 1	35.7	25.6
Reach 2	-1.1	-21.1
Reach 3	-6.2	-6.2
Reach 4	-35.2	-35.2
Project Area (R35 to Big Sarasota Pass) R35-R44	-6.6	-17.7
Lido Key (New Pass to Big Sarasota Pass) R32-R44	-0.5	-9.8

MHW = +1.1 feet NGVD.

FIGURE A-14

SHORELINE CHANGES, 1971 - 1991, LIDO KEY, FL

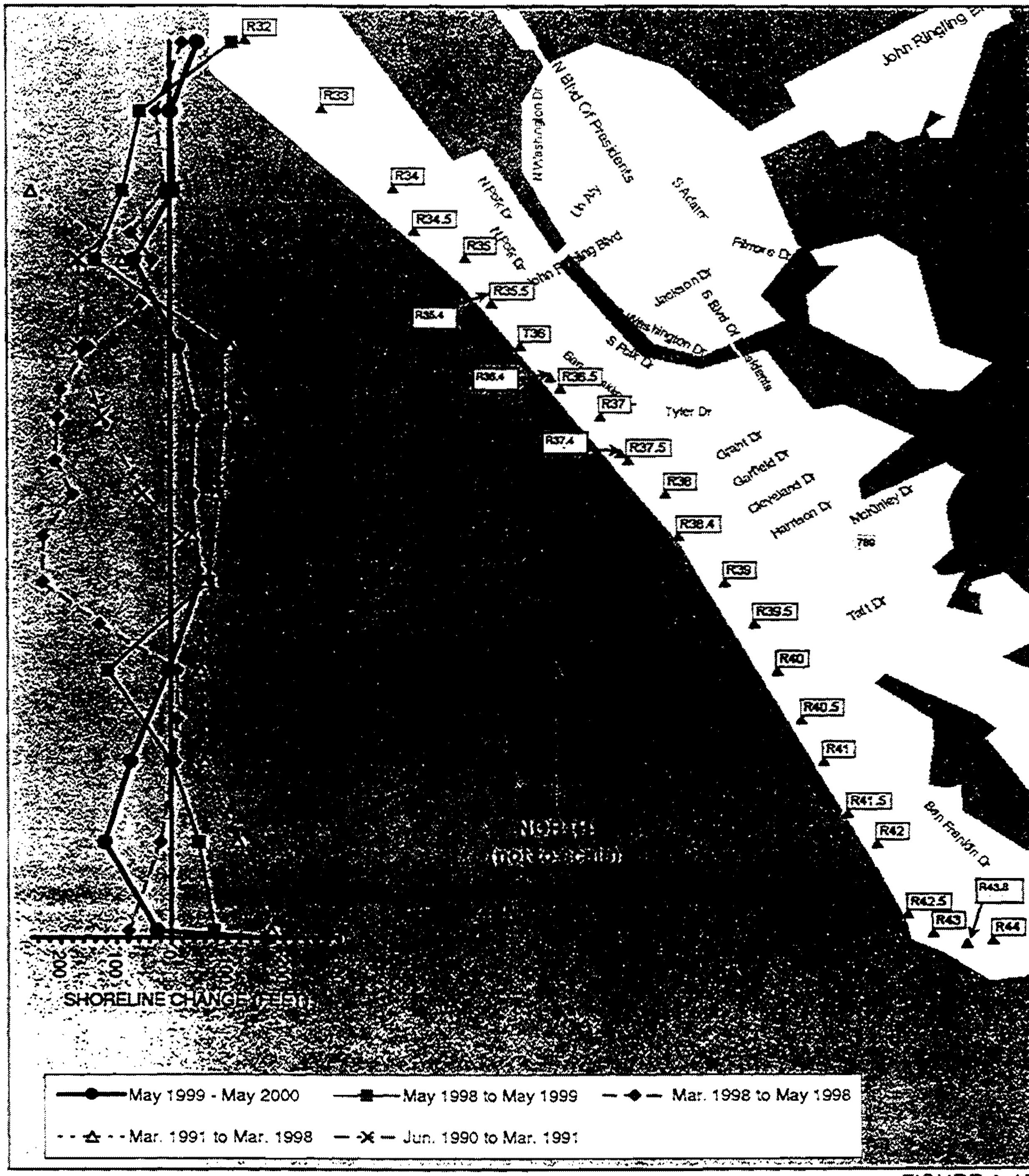


FIGURE A-15

SHORELINE CHANGES, 1990-PRESENT, LIDO KEY, FL

TABLE A-13

Without Project Future Shoreline Location, Lido Key, Sarasota, FL

2000-2025 MHW Change (feet/year)	PROFILE LINE NAME												
	R32	R33	R34	R35	T36	R37	R38	R39	R40	R41	R42	R43	R44
	-29.5	10.6	36.7	14.4	-40.8	-29.4	-21.8	-19.6	6.1	0.8	-2.8	-16.6	-35.2
YEAR	SHORELINE POSITION (FEET SEAWARD OF MONUMENT)												
2000	160.8	645.3	779.3	700.7	166.1	291.7	317.2	213.9	234.2	181.8	269.7	145.0	249.9
2001	131.3	646.5	786.1	700.7	125.3	262.3	295.4	194.3	240.3	182.6	266.9	140.0	214.7
2002	101.8	646.5	786.1	700.7	84.5	232.8	273.5	174.8	246.5	183.4	264.1	140.0	179.6
2003	72.3	646.5	786.1	700.7	43.6	203.4	251.7	155.2	252.6	184.2	261.3	140.0	151.5
2004	42.8	646.5	786.1	700.7	15.0	174.0	229.8	135.7	258.7	185.0	258.5	140.0	151.5
2005	13.3	646.5	786.1	700.7	15.0	144.5	208.0	116.1	264.9	185.8	255.7	140.0	151.5
2006	-16.2	646.5	786.1	700.7	15.0	115.1	186.1	96.6	271.0	186.6	253.0	140.0	151.5
2007	-45.7	646.5	786.1	700.7	15.0	85.6	164.3	77.0	277.2	187.4	250.2	140.0	151.5
2008	-75.2	646.5	786.1	700.7	15.0	56.2	142.4	57.5	283.3	188.3	247.4	140.0	151.5
2009	-104.7	646.5	786.1	700.7	15.0	26.8	120.6	37.9	289.4	189.1	244.6	140.0	151.5
2010	-134.2	646.5	786.1	700.7	15.0	12.0	98.7	18.4	295.6	189.9	241.8	140.0	151.5
2011	-163.7	646.5	786.1	700.7	15.0	12.0	76.9	15.0	301.7	190.7	239.0	140.0	151.5
2012	-193.2	646.5	786.1	700.7	15.0	12.0	55.0	15.0	307.8	191.5	236.2	140.0	151.5
2013	-222.7	646.5	786.1	700.7	15.0	12.0	35.0	15.0	314.0	192.3	233.4	140.0	151.5
2014	-252.2	646.5	786.1	700.7	15.0	12.0	35.0	15.0	320.1	193.1	230.6	140.0	151.5
2015	-281.7	646.5	786.1	700.7	15.0	12.0	35.0	15.0	326.2	193.9	227.8	140.0	151.5
2016	-311.1	646.5	786.1	700.7	15.0	12.0	35.0	15.0	332.4	194.7	225.1	140.0	151.5
2017	-340.6	646.5	786.1	700.7	15.0	12.0	35.0	15.0	338.5	195.5	222.3	140.0	151.5
2018	-370.1	646.5	786.1	700.7	15.0	12.0	35.0	15.0	344.6	196.3	219.5	140.0	151.5
2019	-375.0	646.5	786.1	700.7	15.0	12.0	35.0	15.0	350.8	197.1	216.7	140.0	151.5
2020	-375.0	646.5	786.1	700.7	15.0	12.0	35.0	15.0	356.9	197.9	213.9	140.0	151.5
2021	-375.0	646.5	786.1	700.7	15.0	12.0	35.0	15.0	363.1	198.7	211.1	140.0	151.5
2022	-375.0	646.5	786.1	700.7	15.0	12.0	35.0	15.0	369.2	199.5	208.3	140.0	151.5
2023	-375.0	646.5	786.1	700.7	15.0	12.0	35.0	15.0	375.3	200.3	205.5	140.0	151.5
2024	-375.0	646.5	786.1	700.7	15.0	12.0	35.0	15.0	381.5	201.2	202.7	140.0	151.5
2025	-375.0	646.5	786.1	700.7	15.0	12.0	35.0	15.0	387.6	202.0	199.9	140.0	151.5

Note: Shoreline change rates are based on shoreline changes between March 1991 and May 2000, adjusted for dredge disposal operations, nourishments, and the location of existing structures.

TABLE A-13 (continued)

Without Project Future Shoreline Location, Lido Key, Sarasota, FL

2026-2050 MHW Change (feet/year)	PROFILE LINE NAME												
	R32	R33	R34	R35	T36	R37	R38	R39	R40	R41	R42	R43	R44
	-29.5	10.6	36.7	14.4	-40.8	-29.4	-21.8	-19.6	6.1	0.8	-2.8	-16.6	-35.2
YEAR	SHORELINE POSITION (FEET SEAWARD OF MONUMENT)												
2026	-375.0	646.5	786.1	700.7	15.0	12.0	35.0	15.0	393.7	202.8	197.2	140.0	151.5
2027	-375.0	646.5	786.1	700.7	15.0	12.0	35.0	15.0	399.9	203.6	194.4	140.0	151.5
2028	-375.0	646.5	786.1	700.7	15.0	12.0	35.0	15.0	406.0	204.4	191.6	140.0	151.5
2029	-375.0	646.5	786.1	700.7	15.0	12.0	35.0	15.0	412.1	205.2	188.8	140.0	151.5
2030	-375.0	646.5	786.1	700.7	15.0	12.0	35.0	15.0	418.3	206.0	186.0	140.0	151.5
2031	-375.0	646.5	786.1	700.7	15.0	12.0	35.0	15.0	424.4	206.8	183.2	140.0	151.5
2032	-375.0	646.5	786.1	700.7	15.0	12.0	35.0	15.0	430.6	207.6	180.4	140.0	151.5
2033	-375.0	646.5	786.1	700.7	15.0	12.0	35.0	15.0	436.7	208.4	177.6	140.0	151.5
2034	-375.0	646.5	786.1	700.7	15.0	12.0	35.0	15.0	442.8	209.2	174.8	140.0	151.5
2035	-375.0	646.5	786.1	700.7	15.0	12.0	35.0	15.0	449.0	210.0	172.0	140.0	151.5
2036	-375.0	646.5	786.1	700.7	15.0	12.0	35.0	15.0	455.1	210.8	169.3	140.0	151.5
2037	-375.0	646.5	786.1	700.7	15.0	12.0	35.0	15.0	461.2	211.6	166.5	140.0	151.5
2038	-375.0	646.5	786.1	700.7	15.0	12.0	35.0	15.0	467.4	212.4	163.7	140.0	151.5
2039	-375.0	646.5	786.1	700.7	15.0	12.0	35.0	15.0	473.5	213.3	160.9	140.0	151.5
2040	-375.0	646.5	786.1	700.7	15.0	12.0	35.0	15.0	479.6	214.1	158.1	140.0	151.5
2041	-375.0	646.5	786.1	700.7	15.0	12.0	35.0	15.0	485.8	214.9	155.3	140.0	151.5
2042	-375.0	646.5	786.1	700.7	15.0	12.0	35.0	15.0	491.9	215.7	152.5	140.0	151.5
2043	-375.0	646.5	786.1	700.7	15.0	12.0	35.0	15.0	498.0	216.5	149.7	140.0	151.5
2044	-375.0	646.5	786.1	700.7	15.0	12.0	35.0	15.0	504.2	217.3	146.9	140.0	151.5
2045	-375.0	646.5	786.1	700.7	15.0	12.0	35.0	15.0	510.3	218.1	144.1	140.0	151.5
2046	-375.0	646.5	786.1	700.7	15.0	12.0	35.0	15.0	516.5	218.9	141.4	140.0	151.5
2047	-375.0	646.5	786.1	700.7	15.0	12.0	35.0	15.0	522.6	219.7	138.6	140.0	151.5
2048	-375.0	646.5	786.1	700.7	15.0	12.0	35.0	15.0	528.7	220.5	135.8	140.0	151.5
2049	-375.0	646.5	786.1	700.7	15.0	12.0	35.0	15.0	534.9	221.3	133.0	140.0	151.5
2050	-375.0	646.5	786.1	700.7	15.0	12.0	35.0	15.0	541.0	222.1	130.2	140.0	151.5

Note: Shoreline change rates are based on shoreline changes between March 1991 and May 2000, adjusted for dredge disposal operations, nourishments, and the location of existing structures.

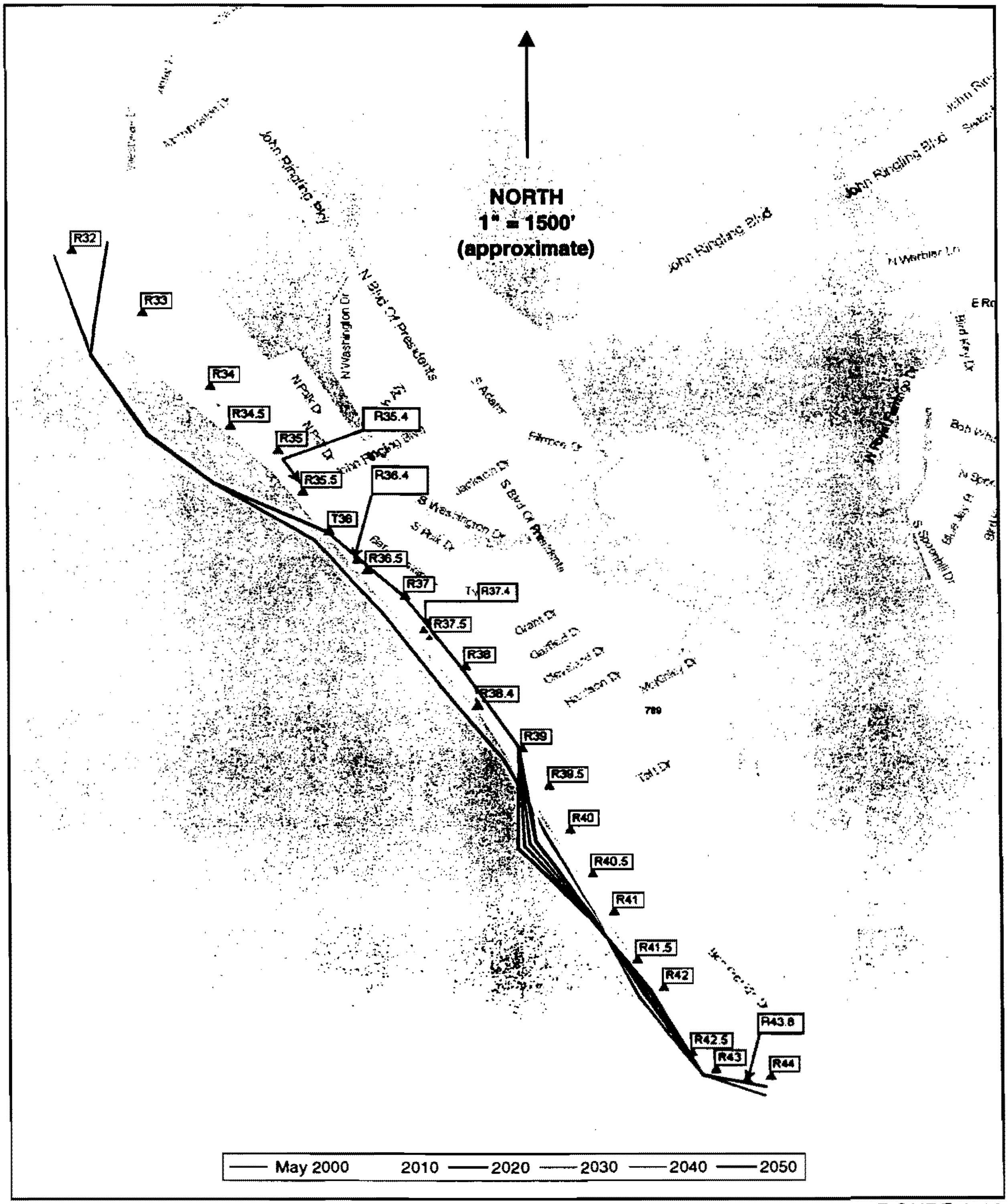


FIGURE A-16

WITHOUT PROJECT FUTURE SHORELINE, LIDO KEY, SARASOTA, FL

A-37. Between R35 and R39, the MHW line is expected to recede to the location of the seawalls along Ben Franklin Drive over the next 10 - 20 years. Between R39.5 and R41.5, the shorelines are expected to advance, as eroded material from the north moves towards the south. South of R41.5, shoreline retreat is expected, as material from north is swept offshore due to presence of the Big Sarasota Pass ebb shoal. Shoreline recession between R41.5 and R43 will be limited by the existing seawalls.

Volumetric Changes

A-38. Volumetric changes between 1971 and 1999 appear in Tables A-14 and A-15 and Figures A-17 and A-18. Due to limited offshore survey data, changes prior to 1991 were estimated assuming a volumetric change of 0.60 c.y./foot for each foot of shoreline change. The amount of volume change (c.y./foot) given the shoreline change is based on the 1991 to 1998 shoreline and volume changes.

A-39. The volumetric changes show that in the absence of man-made changes (Table A-16), the Lido Key beaches erode. South of the 1970 project area (R35-R38), the beach lost approximately 336,000 cubic yards (20 c.y./year/foot) between 1971 and 1974, partly as a result of Hurricane Agnes. Between 1978 and 1991, the net erosion in the current project area was 348,000 cubic yards (2.9 c.y./year/foot), in spite of a number of renourishment and dredging operations during this time period (CPE, 1991; ATM, 1994), which are summarized in Table A-16.

A-40. Between 1991 and the most recent nourishment in 1998, the current project area lost 431,000 cubic yards (6.7 c.y./year/foot). Erosion following the most recent nourishment project, completed in May 1998, removed 155,000 cubic yards from the current project area (8.5 c.y./year/foot) between May 1998 and May 2000, the majority of which occurred between May 1999 and May 2000. The corresponding shoreline changes demonstrate that adjustment of the beach profile has removed material from the dry beach to the submerged portion of the profile as well as out of the project area. Especially when subject to severe storms or inlet effects, erosion rates within the current project area can reach 44 c.y./year/foot.

TABLE A-14

Volumetric Changes, Lido Key, FL

Profile Line	VOLUMETRIC CHANGES (CUBIC YARDS) 1971-1973 TO Aug 1974	Aug 1974 TO May 1978	May 1978 TO May 1987	May 1987 TO Mar 1991	Jun 1990 TO Mar 1991	Mar 1991 TO Mar 1998	Mar 1998 TO May 1998	May 1998 TO May 1999	May 1999 TO May 2000	Length (feet)
R-32	-42,593	19,648	39,099	N/A	N/A	N/A	-3,461	-30,862	28,417	477
R-33	-123,907	-25,280	151,325	N/A	N/A	N/A	5,021	17,567	32,362	984
R-34	-258,616	156,695	28,349	81,621	1,065	74,924	10,378	790	-5,434	1,005
R-35	373	-6,821	-34,595	36,474	27,869	44,308	14,302	93,406	7,874	497
T-36	152,710	152,435	-363,047	125,986	99,038	-69,557	54,622	-35,007	-549	1,525
R-37	-20,502	160,861	-200,048	40,368	49,325	-73,911	77,198	-23,700	-18,036	989
R-38	-5,094	21,905	-24,506	-4,440	1,035	-36,150	65,984	-34,990	-18,485	1,008
R-39	-23,123	13,329	21,286	-37,769	N/A	-47,513	74,834	-20,085	-22,575	1,021
R-40	-59,113	52,348	26,906	-39,728	N/A	-44,092	5,536	30,403	1,285	992
R-41	-64,006	70,081	-21,588	10,406	N/A	-61,336	-3,076	8,574	4,625	966
R-42	-57,016	67,237	-21,758	27,108	N/A	-87,060	-7,272	-9,779	19,870	989
R-43	-44,772	5,307	34,543	161	N/A	-11,691	-5,398	-15,954	-9,498	790
R-44	-88,178	33,450	158,236	-80,204	N/A	N/A	N/A	N/A	-10,844	856
Previous Project Areas:										
R35 - R38	127,487	328,381	-622,196	198,388	177,266	-135,311	212,106	-291	-29,196	4,019
R35 - R40	45,251	394,057	-574,005	120,891	N/A	-226,916	292,476	10,027	-50,487	6,032
R35 - R42	-75,771	531,375	-617,351	158,405	N/A	-375,312	282,128	8,822	-25,992	7,987
Current Project Area:										
R36 - R44	-209,093	576,953	-389,977	41,889	N/A	-431,311	262,428	-100,538	-54,208	9,136
New Pass	-166,501	-5,632	190,424	N/A	N/A	N/A	1,560	-13,295	60,778	1,461
Reach 1	-258,243	149,874	-6,247	118,095	28,934	119,232	24,680	94,196	2,440	1,502
Reach 2	44,878	400,878	-539,410	84,417	N/A	-271,224	278,174	-83,379	-58,361	5,535
Reach 3	-165,794	142,625	-8,804	37,675	N/A	-160,087	-15,746	-17,159	14,996	2,745
Reach 4	-88,178	33,450	158,236	-80,204	N/A	N/A	N/A	N/A	-10,844	856
TOTAL	-633,837	721,195	-205,799	N/A	N/A	N/A	288,668	-19,637	9,010	12,099

NOTES:
1. Depth of closure = -12 feet NGVD.
2. Volume changes prior to 1991 assume 0.60 c.y./foot per foot of shoreline change, according to assumptions of CPE (1991).
3. 1991 - March 1998 volume changes based on beach profile survey data.
4. March 1998 - May 1999 volume changes from CPE (2000).

TABLE A-14 (continued)

Volumetric Changes, Lido Key, FL

Profile Line	VOLUMETRIC CHANGES (CUBIC YARDS / YEAR) 1971-1973 TO Aug 1974	Aug 1974 TO May 1978	May 1978 TO May 1987	May 1987 TO Mar 1991	Jun 1990 TO Mar 1991	Mar 1991 TO Mar 1998	Mar 1998 TO May 1998	May 1998 TO May 1999	May 1999 TO May 2000	Length (feet)
R-32	-14,198	5,239	4,342	N/A	N/A	N/A	-20,709	-30,862	28,417	477
R-33	-41,302	-6,740	16,804	N/A	N/A	N/A	30,044	17,567	32,362	984
R-34	-86,205	41,778	3,148	21,280	1,424	10,695	62,098	790	-5,434	1,005
R-35	124	-1,819	-3,842	9,509	37,260	6,325	85,578	93,406	7,874	497
T-36	50,903	40,642	-40,314	32,846	132,413	-9,929	326,837	-35,007	-549	1,525
R-37	-6,834	42,888	-22,214	10,525	65,947	-10,550	461,922	-23,700	-18,036	989
R-38	-1,698	5,840	-2,721	-1,158	1,384	-5,160	394,822	-34,990	-18,485	1,008
R-39	-7,708	3,554	2,364	-9,847	N/A	-6,782	447,777	-20,085	-22,575	1,021
R-40	-19,704	13,957	2,988	-10,358	N/A	-6,294	33,125	30,403	1,285	992
R-41	-21,335	18,685	-2,397	2,713	N/A	-8,755	-18,406	8,574	4,625	966
R-42	-19,005	17,927	-2,416	7,068	N/A	-12,427	-43,513	-9,779	19,870	989
R-43	-14,924	1,415	3,836	42	N/A	-1,669	-32,300	-15,954	-9,498	790
R-44	-29,393	8,918	17,571	-20,910	N/A	N/A	N/A	N/A	-10,844	856
Previous Project Areas:										
R35 - R38	42,496	87,552	-69,091	51,723	237,004	-19,315	1,269,159	-291	-29,196	4,019
R35 - R40	15,084	105,063	-63,740	31,518	N/A	-32,391	1,750,061	10,027	-50,487	6,032
R35 - R42	-25,257	141,674	-68,553	41,299	N/A	-53,574	1,688,143	8,822	-25,992	7,987
Current Project Area:										
R36 - R44	-69,698	153,826	-43,304	10,921	N/A	-61,568	1,570,266	-100,538	-54,208	9,136
New Pass	-55,500	-1,502	21,145	N/A	N/A	N/A	9,334	-13,295	60,778	1,461
Reach 1	-86,081	39,959	-694	30,789	38,684	17,020	147,675	94,196	2,440	1,502
Reach 2	14,959	106,881	-59,898	22,009	N/A	-38,716	1,664,484	-83,379	-58,361	5,535
Reach 3	-55,265	38,026	-978	9,822	N/A	-22,852	-94,218	-17,159	14,996	2,745
Reach 4	-29,393	8,918	17,571	-20,910	N/A	N/A	N/A	N/A	-10,844	856
TOTAL	-211,279	192,284	-22,853	N/A	N/A	N/A	1,727,276	-19,637	9,010	12,099

NOTES:
1. Depth of closure = -12 feet NGVD.
2. Volume changes prior to 1991 assume 0.60 c.y./foot per foot of shoreline change, according to assumptions of CPE (1991).
3. 1991 - March 1998 volume changes based on beach profile survey data.
4. March 1998 - May 1999 volume changes from CPE (2000).

TABLE A-15

HISTORIC VOLUMETRIC CHANGE SUMMARY, LIDO KEY, SARSOTA, FL

Reach	Length (feet)	Unit Volume Change (c.y./yr/ft) March 1991 - May 2000	Unit Volume Change (c.y./yr/ft) March 1991 - May 2000, Adjusted for 1996 and 1998 fills
New Pass	1,461	15.5	15.5
Reach 1	1,502	17.5	11.3
Reach 2	5,535	-2.7	-10.3
Reach 3	2,745	-7.1	-7.1
Reach 4	856	-12.6	-12.6
Project Area (R35 to Big Sarasota Pass) R35-R44	9,136	-4.9	-9.5
Lido Key (New Pass to Big Sarasota Pass) R32-R44	12,099	0.3	-3.9

Depth of closure = -12 feet NGVD.
Volume changes based on FDEP (2000) and CPE (2000) beach profile data.

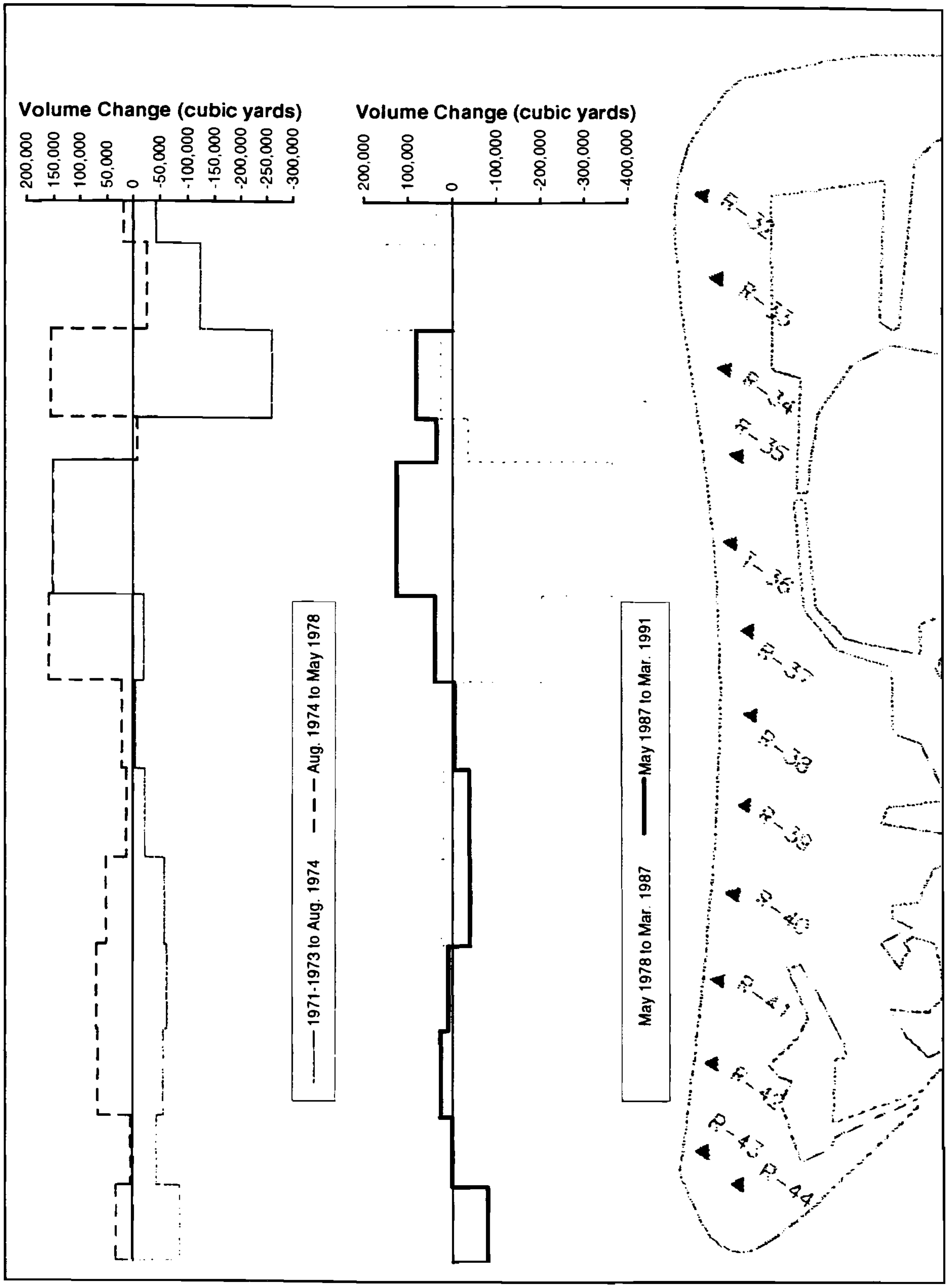


FIGURE A-17

VOLUME CHANGES, 1971-1991, LIDO KEY, FL

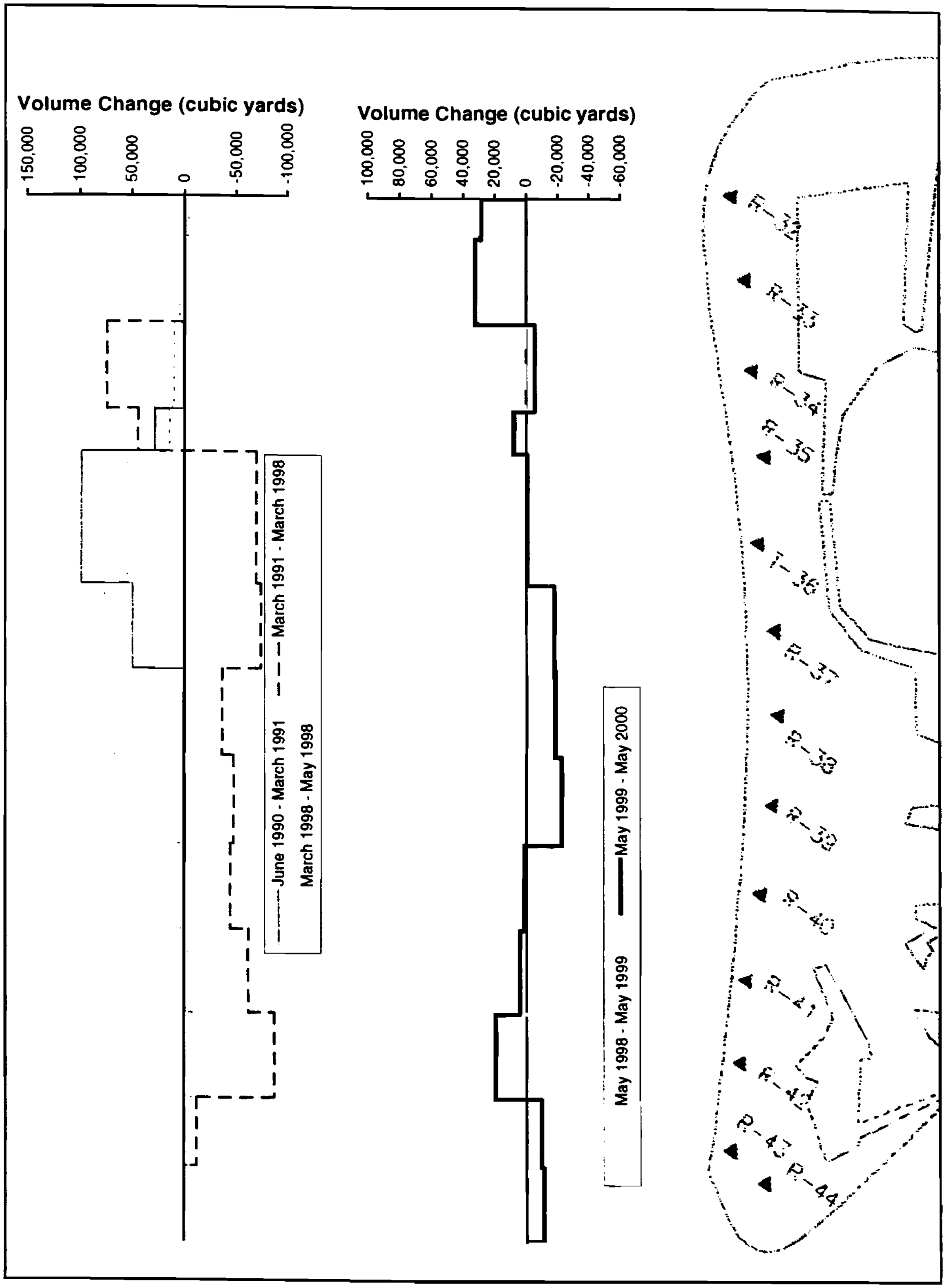


FIGURE A-18

VOLUME CHANGES, 1990-1999, LIDO KEY, FL

TABLE A-16

Dredged Quantities at New Pass

Year	Total Volume (cubic yards)	Volume Placed on Lido Key (cubic yards)	Location of Placement on Lido Key	Volume Placed on Longboat Key (cubic yards)
1964	123,700	121,000	R35-R38.5	2,700
1970	350,000	350,000	R35-R38.5	
1974	250,000	246,000	R35-R38	
1977	400,000	400,000	R35-R38	
1982	185,000	92,000	R35-R38	93,000
1985	239,000	239,000	R35-R38	
1991	265,500	177,000	R34.5-R38	88,500
1996	326,000	178,000	R34.5-R36	148,000
TOTAL	2,139,200	1,803,000		332,200

Notes:
1. 1964-1985 volumes taken from CPE (1991).
2. 1991 and 1996 Lido Key volumes based on survey data.
3. 1991 Longboat Key volumes assume that 2/3 of the total dredge volume was placed on Lido Key, and 1/3 on Longboat Key.
4. 1996 Longboat Key volumes based on survey data.

Inlet Effects

A-41. New Pass lies immediately to the north of Lido Key. Sediment transport patterns near New Pass are based on the tidal current and wave refraction analysis of CPE (1993), which utilizes the 1956-1971 wave hindcast (WIS, 1987) at Station G1041 (Figure A-5) and the 1991-92 bathymetry. Northerly directed longshore currents move approximately 17,000 c.y./year from the north end of the island into the inlet. Combined with an additional 74,000 c.y./year of southerly directed longshore transport from Longboat Key, the total transport into New Pass is approximately 91,000 c.y./year (CPE, 1993). Tidal currents also contribute to the sediment transport, moving materials further into the throat of the inlet (Irish, et al., 1997). Maintenance dredging removes an average of 56,000 c.y./year from New Pass. The present ebb shoal volume (Table A-2) is 14,423,000 cubic yards (CIRP, 2000).

A-42. New Pass is a Federal project with an authorized depth of -8 feet MLLW and channel width of 100 feet. The authorized channel of New Pass is oriented in a northeast-southwesterly direction (FDEP, 1986). However, the seaward portion of the dredged channel has been observed to migrate, shifting from a northeast-southwesterly orientation to a north-south orientation. Irish et al. (1997) states that tidal currents are constricted by shoaling along the northern end of the seaward channel section, due to wave dominated processes. This shoaling forces the tidal currents to follow a more hydraulically efficient path, resulting in the channel's southerly migration. The reopening of the authorized channel brings this cycle back to its beginning every time the inlet is dredged.

A-43. Federal periodic maintenance dredging has removed approximately 2,139,000 million cubic yards of material from New Pass since 1964. Dredged material has been placed on the southern end of Longboat Key, at the disposal site near R-33, and along the Lido Key Public Beach (R-35 to R-38). Dredging operations at New Pass are summarized in Table A-16.

A-44. Big Sarasota Pass marks the southern end of the project area. Although the inlet is not a Federal navigation project, it is the larger of the two inlets bordering Lido Key. The southward littoral drift into the inlet from Lido Key is 100,000 c.y./year (CPE, 1993). CPE (1993) notes that higher storm waves break along the outer margins of the ebb shoal, transporting a portion of the drift from Lido Key along the shoal, past the inlet, and onto the beaches of Siesta Key. Another portion of the drift from Lido Key is transported by smaller waves across the shallower areas of the shoal and into the channel. Ebb tidal currents then transport the materials onto the shoal (CPE, 1993). The ebb shoal of Big Sarasota Pass holds 44,497,000 cubic yards of sand (CIRP, 2000), with a shoaling rate of 30,000 to 64,000 c.y./year (USACE-SAJ, 1984; CPE, 1993). Big Sarasota Pass is not dredged on a regular basis.

Existing Shoreline Protective Structures

A-45. A list of current shoreline protective structures within the project area appears in Table A-17. The locations of the structures appear in Figure A-19. Most of these structures are either buried or located behind the natural vegetation line. Of the exposed structures seaward of the vegetation line, most would be exposed to wave action only during storm conditions. However, three properties near the southern end of the project area feature headland-type seawalls which protrude seaward of the natural shoreline. These structures, which appear in Figure A-20, are fronted by little or no beach.

Littoral Transport

A-46. Longshore sediment transport rates for the region have been calculated by CPE (1993) and appear in Figure A-21. The transport rates account for both waves and currents. Wave refraction was estimated using the 1956-1972 WIS (1997) hindcast at Station G1041 (Figure A-5), the 1991-92 bathymetry, and the REF/DIF 1.0 model. Wave-induced sediment transport was estimated using the model results and the USACE (1984) sediment transport equation. Transport near the northern end of the island, where the littoral drift is driven by both waves and tidal currents associated with New Pass (CPE, 1991), is towards the north. A nodal point lies near the middle of the island. Nodal behavior in the vicinity of the region of the transport reversal was also observed within the GENESIS shoreline model simulations. Transport near the southern end of the island is towards the south.

TABLE A-17

Coastal Structure Inventory, Lido Key, Sarasota, FL

Property Number	FDEP Monument	Description
2015160028	R35.4 - R37	Lido Public Beach - Low concrete wall along Benjamin Franklin Drive*; buried revetment
2016050027	R37.4 - R37.5	Lido Public Beach - Low concrete wall along Benjamin Franklin Drive*
2016120002	R38	Lido Public Beach - Low concrete wall along Benjamin Franklin Drive*
2016120001	R38.4	Medium height concrete wall*; derelict rubble groin
2016141000		Medium height concrete wall*
2016147000	R39	No structures
2016147100		No structures
2016142000		Low concrete wall*
2016140004		Low concrete wall*
2016146000	R39.5	No structures
2016143000		Medium height concrete wall*
2017030002	R40	Medium height concrete wall*
2017030003		No structures
2017030004		No structures
2017030005		No structures
2017060005	R40.5	No structures
2017060004		Low concrete wall fronted by beach
2017060001	R41	No structures
2017003000	R41.5	Medium height concrete wall fronted by beach
2017101088		Medium height concrete wall fronted by beach
2017102043		Medium height concrete wall fronted by beach
2017104000	R42	No structures
2017151000		High concrete wall with no beach
2017154000	R42.5	No structures
2017152000		High concrete wall with rubble toe scour protection and no beach
2017153000	R43	Buried revetment; low concrete seawall with no beach

Note: * Structure landward of the natural vegetation line.

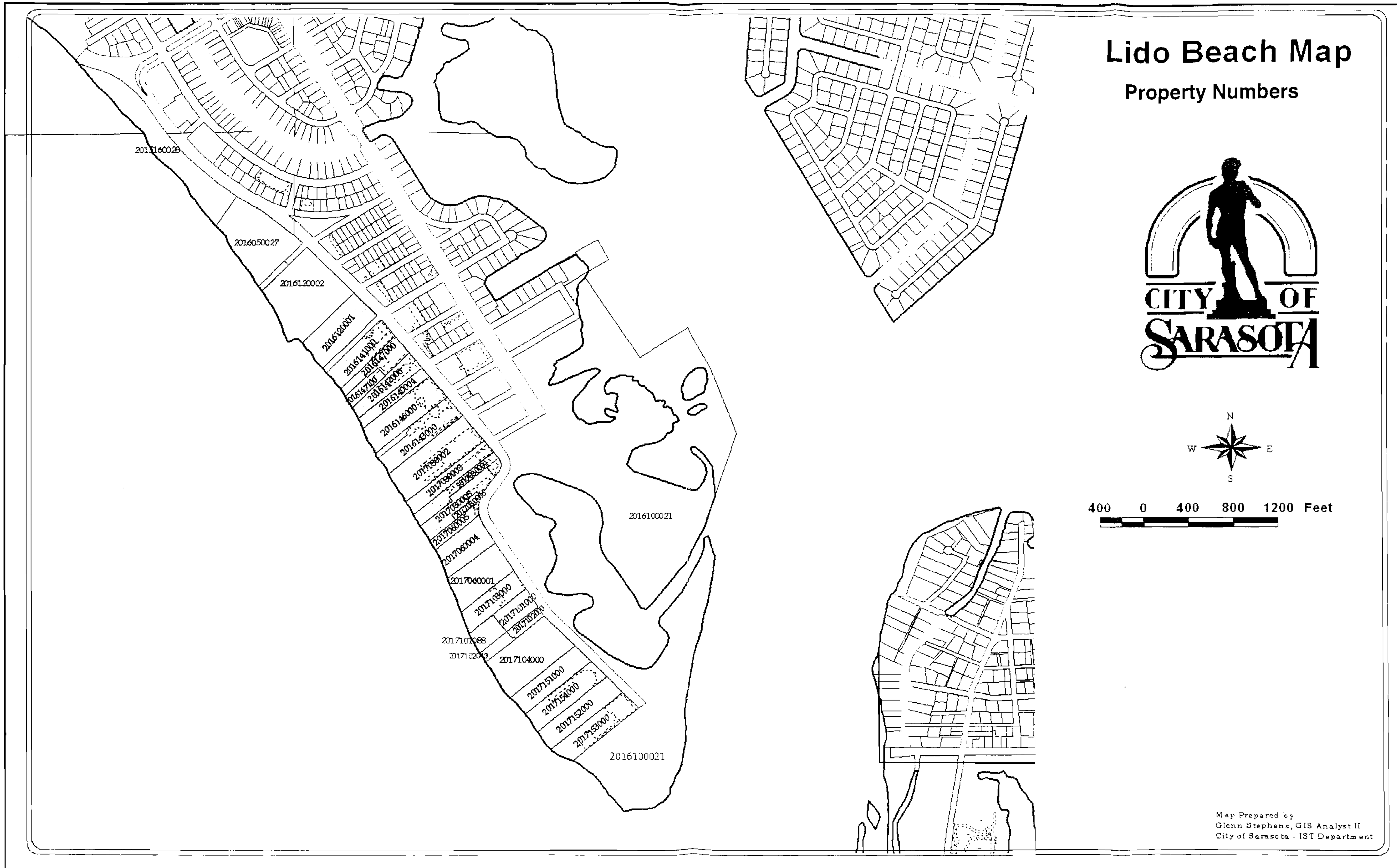

Lido Beach Map
Property Numbers
CITY OF SARASOTA
N
W
E
S
400 0 400 800 1200 Feet
2016050027
2016120002
2017060001
2017104000
2016100021
2016100021
Map Prepared by
Glenn Stephens, GIS Analyst II
City of Sarasota - IST Department

FIGURE A-19

FIGURE A-20

SEAWALLS NEAR R-43, MAY 1999, LIDO KEY, SARASOTA, FL

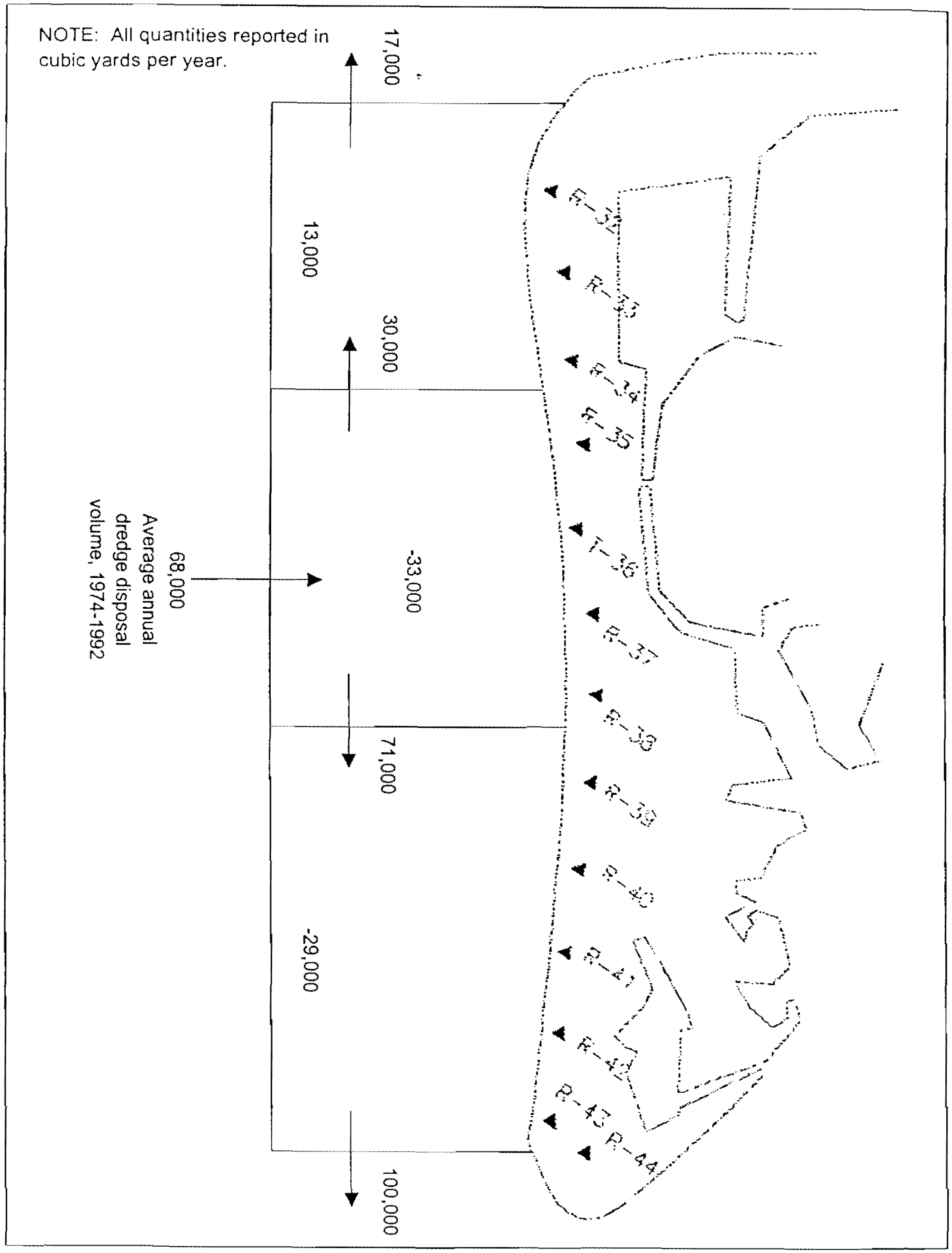


FIGURE A-21

1974-1992 SEDIMENT BUDGET, LIDO KEY, SARASOTA, FL (CPE, 1993)

SEDIMENT CHARACTERISTICS

A-47. Characteristics of the beach and borrow area sediments are detailed in the borrow area investigation. Both the shore protection design and the storm recession model partially depend on the characteristics of the beach sediments. CPE (1991) reports a mean grain size of 0.21 mm and a sorting value of 1.56 phi for the Lido Key. Beach sediments were more recently sampled by CPE (2000) in conjunction with the 1998 Lido Key Beach Nourishment Project. Sediments samples were taken along FDEP profile lines R-37 and R-39 prior to construction (March 1998), immediately after construction (May 1998), and during the two-year monitoring survey (May 2000). The locations of R-37 and R-39 appear in Figure A-11. The mean grain size and sorting values at R-37 and R-39 appear in Table A-18. The mean grain sizes across the profile line, excluding the surf zone (mean tide level), average 0.25 mm at R-37 and R-39. This mean grain size is assumed for the 1998 project area (R35 - R40, CPE, 2000).

STORM RECESSION (CROSS SHORE TRANSPORT)

Methods

A-48. Significant beach erosion and shoreline recession often occurs during storm events as a result of cross-shore sediment transport processes. The extent of storm-induced beach erosion is commonly quantified in terms of storm recession. Throughout this Appendix, storm recession is defined as the horizontal distance between the Mean High Water (MHW) station on the pre-storm profile to the most landward station where the vertical difference between the pre-storm and post-storm profile is 0.5 feet. This definition is presented in Figure A-22.

A-49. Storm recession and cross-shore sediment transport modeling for Lido Key was conducted using the Storm Induced Beach Change Model (SBEACH, Larson and Kraus, 1989). SBEACH simulates the beach profile changes which result from varying storm waves and water levels. These beach profile changes include the formation and movement of major morphological features such as longshore bars, troughs, berms, and dunes. SBEACH is a one-dimensional model and assumes that the simulated profile changes are produced only by cross-shore processes. Longshore sediment transport processes are neglected. SBEACH is an empirically based numerical model, which was formulated using both field data and the results of large-scale physical model tests. Input data required by SBEACH includes the beach cross-section, the median sediment grain size, and the time histories of the wave height, wave period, and water elevation.

A-50. SBEACH calculates the cross-shore variation in wave height and wave- and wind-induced wave setup at discrete points along the profile from the seaward boundary to the shoreline. The limit of wave runup is calculated to define the landward boundary of profile change. Profile changes are calculated at each model time step by solving for conservation of mass. An explicit finite-difference scheme is used for this solution.

TABLE A-18

1998 LIDO KEY BEACH NOURISHMENT PROJECT
ONE-YEAR POST-CONSTRUCTION MONITORING REPORT
MEAN GRAIN SIZE (mm) AND SORTING COEFFICIENTS (phi)
PROFILE LINES R-37 AND R-39

MARCH 1998 - MAY 2000

Sampling Date	Sampling Location	Mean Grain Size (mm)	Sorting (phi)
Pre-Construction (March 1998)	R-37		
	Toe of Dune	0.38	1.25
	Mean Tide Level	1.35	1.25
	Toe of Fill	0.17	0.90
	R-37 Composite excl. MTL	**0.25**	**N/A**
	R-37 Composite	**0.44**	**1.69**
	R-39		
	Toe of Dune	0.44	1.48
	Mean Tide Level	0.72	1.68
	Toe of Fill	0.20	1.36
	R-39 Composite excl. MTL	**0.30**	**N/A**
	R-39 Composite	**0.40**	**1.70**
Immediate Post-Construction (May 1998)	R-37		
	Toe of Dune	0.42	1.47
	Mean Tide Level	0.50	0.65
	Toe of Fill	0.17	0.89
	R-37 Composite excl. MTL	**0.27**	**N/A**
	R-37 Composite	**0.33**	**1.27**
	R-39		
	Toe of Dune	0.39	1.31
	Mean Tide Level	0.34	0.97
	Toe of Fill	0.14	0.73
	R-39 Composite excl. MTL	**0.23**	**N/A**
	R-39 Composite	**0.27**	**1.22**
Two-Year Post-Construction (May 2000)	R-37		
	Toe of Dune	0.22	0.51
	Mean Tide Level	0.50	1.18
	Toe of Fill	0.22	0.82
	R-37 Composite excl. MTL	**0.22**	**0.67**
	R-37 Composite	**0.29**	**1.04**
	R-39		
	Toe of Dune	0.38	1.39
	Mean Tide Level	0.19	0.88
	Toe of Fill	0.17	0.97
	R-39 Composite excl. MTL	**0.26**	**1.18**
	R-39 Composite	**0.23**	**1.22**
March 1998 to May 2000	**Composite excl. MTL**	**0.25**	**N/A**
	Composite	**0.32**	**1.36**

Notes:
Source: CPE (2000)
Toe of Dune = 5' NGVD.
Mean Tide Level = 0.42 feet NGVD.
Toe of Fill = -8.5' NGVD.

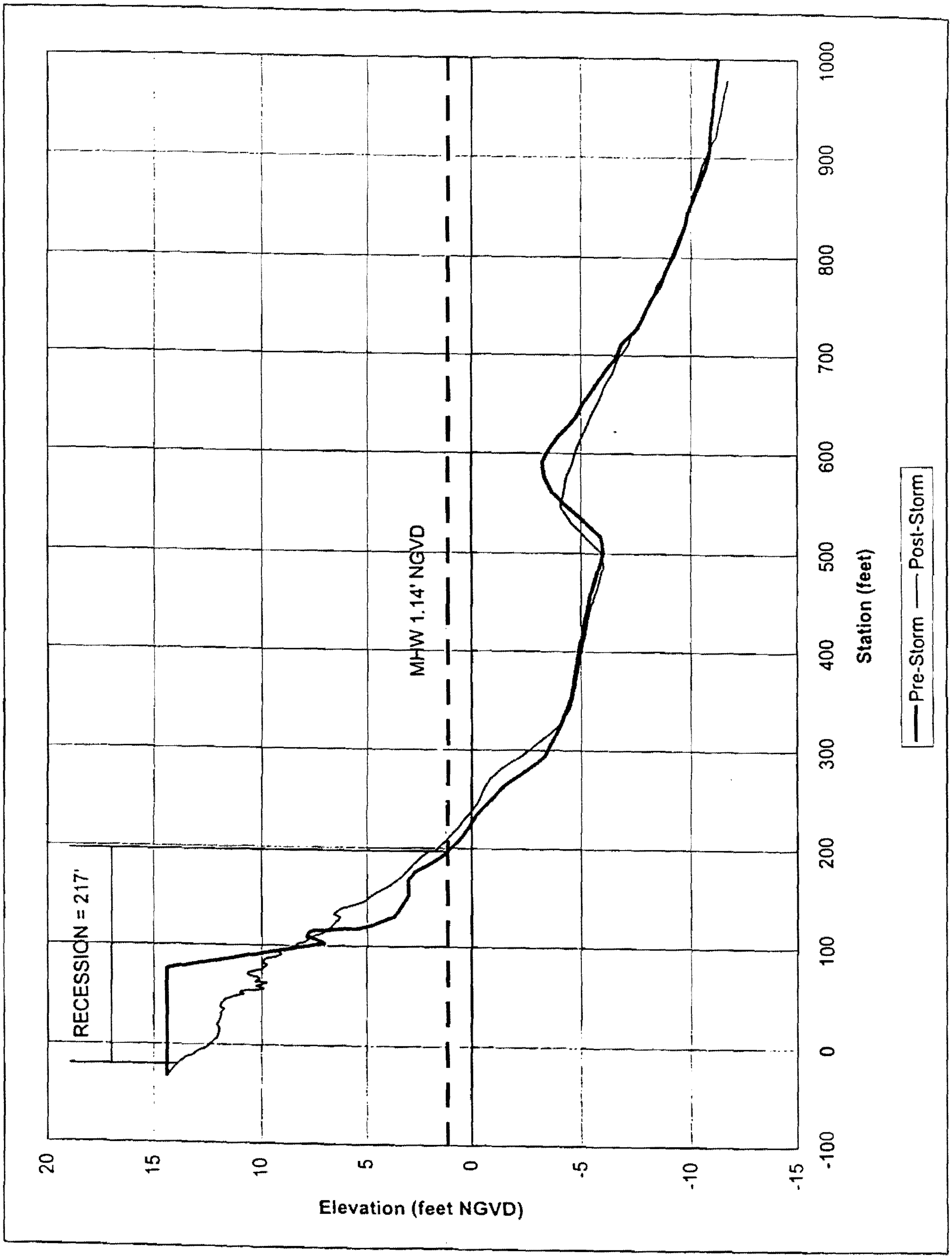


FIGURE A-22

DEFINITION OF STORM RECESSION

A-51. The following basic assumptions underlie the SBEACH model:

- Breaking waves and variations in water level are the major causes of sand transport and profile change.
- Cross shore sand transport takes place primarily in the surf zone.
- Conservation of mass dictates that the amount of material eroded must equal the amount deposited.
- The median sediment grain diameter on the profile is reasonably uniform across shore.
- The influence of structures blocking longshore transport is small, and the shoreline is straight (i.e., longshore effects are negligible during the term of simulation).
- Linear wave theory is applicable everywhere along the profile.

A-52. SBEACH has significant capabilities that make it useful for quantitative studies of beach profile response to storms. It accepts as input pre-storm beach profiles, water level hydrographs, time series of the wave height and wave period, a representative sediment grain size, three transport parameters, and two characteristic slope parameters. The model allows for variable cross shore grid spacing, wave refraction by specifying wave direction, randomization of input waves to better represent forcing conditions in the field, and water level setup due to input wind parameters.

Wave and Water Level Data

A-53. To determine the cross-shore transport and annual probability of storm recession on Reach 1, Reach 2, Reach 3, and Reach 4, SBEACH simulations of the storms appearing in Tables A-3 were conducted, along with the extratropical storms between 1976 and 1995 (Table A-5). For the tropical storms, elevations of the peak storm stages above the normal astronomical tides were set equal to those in Table A-3. For the extratropical storms, peak stage values were not available except for the 1994 and 1995 events. For extratropical storms prior to 1994, the return period of each storm was determined using the CHL (2000) combined wave height-frequency distribution for WIS Station G1020. Given the return period of the storm, the corresponding stage was estimated using the Dean, et al (1988) storm stage - frequency curve for Sarasota County (Table A-4). As the severity of the extratropical storm events was relatively low (i.e.: Return period < 10 years), the corresponding stage levels for many of the storms prior to 1994 fell below MHHW. For these cases, the stage elevation was set to 1.61 feet above mean tide level, the maximum annual water elevation based on the theoretical tides for WIS Station G1020 (CHL, 1997). During both the 1994 and 1995 extratropical storm events, peak water levels 1.64 feet above mean tide level were measured at Station FL002 (Figure A-3).

A-54. For the tropical storms, stage hydrographs excluding tides were extracted from the CHL (2000) tropical storm stage base. The appropriate hydrograph duration for the tropical storms was determined to be 42 hours. For the extratropical storms, time histories of the wave height and wave period were extracted from the WIS (1997) data. The duration of each extratropical event was determined based on the variation of the wave height between 5 days before and 5 days after the dates appearing in Table A-5. Corresponding stage hydrographs tides were estimated by assuming the stage without tides to be proportional to the wave height (Figure A-23).

A-55. To estimate the total water level, tidal oscillations were added to the storm stage hydrographs and referenced to NGVD (1929). To account for uncertainties in the water level hindcasts, 12 scenarios regarding the timing of the peak stage were considered:

Peak flood during spring tide (phase = 0°)
Spring high tide (phase = 90°)
Peak ebb during spring tide (phase = 180°)
Spring low tide (phase = 270°)

Peak flood during mean tide (phase = 0°)
Mean high tide (phase = 90°)
Peak ebb during mean tide (phase = 180°)
Mean low tide (phase = 270°)

Peak flood during neap tide (phase = 0°)
Neap high tide (phase = 90°)
Peak ebb during neap tide (phase = 180°)
Neap low tide (phase = 270°)

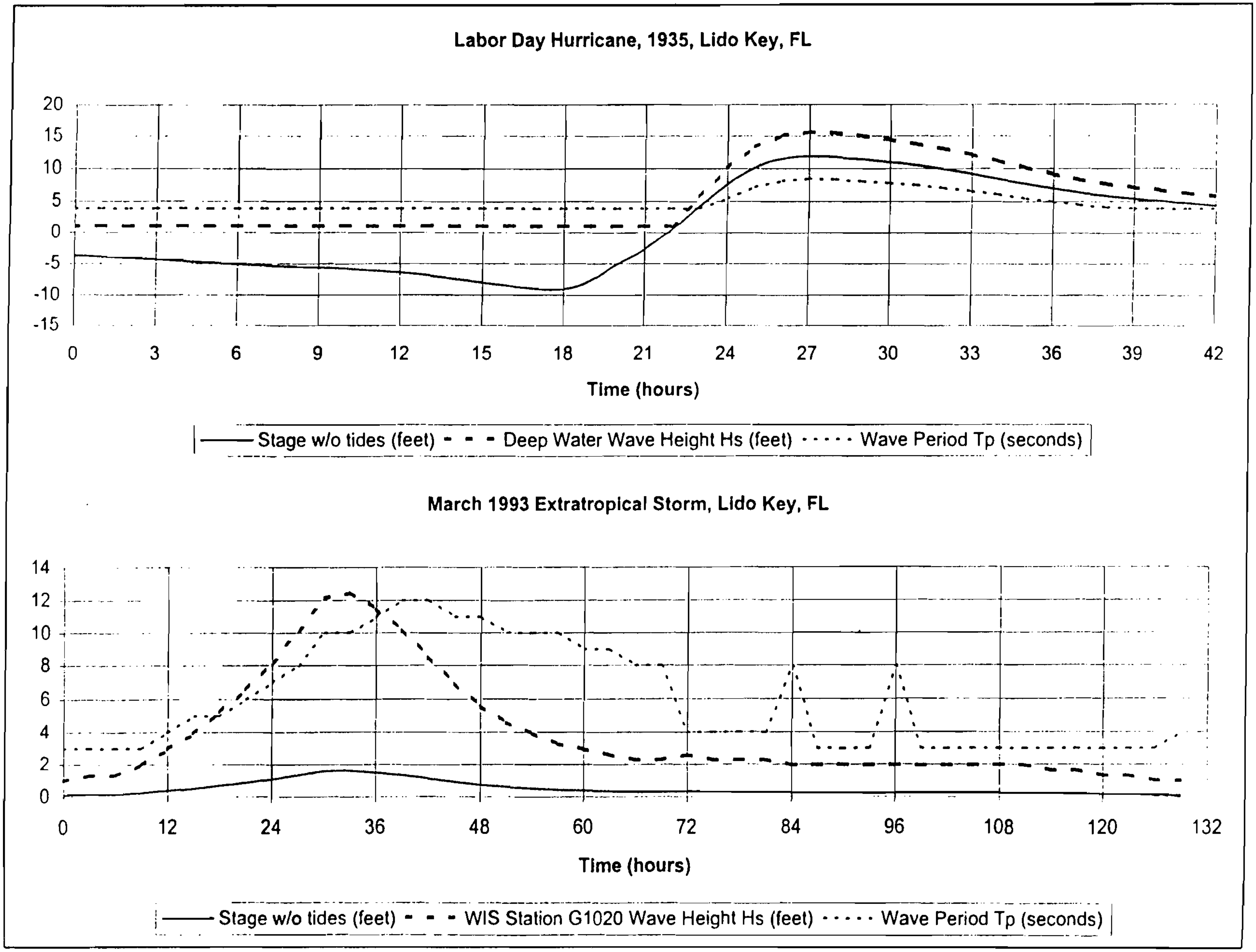
Spring high tide, spring low tide, mean high tide, and mean low tide were based on the MHHW, MLLW, MHW, and MLW benchmarks appearing in Table A-1. Neap tide water levels were based on the theoretical tides (CHL, 1997) calculated for WIS Station G1020.

A-56. Simulations of Hurricane Alma and all tropical storms prior to 1960 utilize peak wave heights and wave periods estimated according to the Shore Protection Manual method (USACE, 1984). To calculate the time histories of these quantities, the wave height and wave period were assumed to be proportional to the storm stage, not including tides (Figure A-23). Waves were assumed to strike the shoreline at normal incidence.

A-57. Simulations of 1966 Hurricane Alma, Hurricane Gladys, and Hurricane Agnes utilize the maximum significant wave height and peak wave period reported by USACE (1990) for WIS Station G1041 (depth -108 feet NGVD). WIS Station G1041, which appears in Figure A-5, is approximately 35 miles southwest of Lido Key and 24 miles southwest of WIS Station G1020. Similar to the storms prior to 1960, the time histories of the significant wave height and peak wave period were assumed to be proportional to the storm stage, not including tides. Waves were assumed to strike the shoreline at normal incidence. For the 1976 storm, the 1982 storm, and Tropical Storm Keith, the WIS (1997) wave hindcast for Station G1020 (depth -39 feet NGVD) was used.

TYPICAL WAVE HEIGHT, WAVE PERIOD, AND STORM STAGE TIME HISTORIES

FIGURE A-23



Calibration and Verification

A-58. In addition to the beach sediment, beach profile, wave, and water level data discussed previously, the SBEACH model requires a number of calibration parameters:

- Surf zone depth
- Avalanche slope (angle of repose)
- Transport rate coefficient K (m^4/N)
- Slope dependent coefficient ε (m^2/s)
- Transport rate decay coefficient λ (ft^{-1}).

A-59. Calibration of the Lido Key SBEACH model was performed through simulations of Hurricane Gladys and was further verified based on simulations of Hurricane Agnes. Both of these storms had a significant impact on the project area (CPE, 1991):

> "Gladys caused considerable damage to shorefront property along the middle Gulf Coast of Florida. In Sarasota County, several seawalls and houses were damage by tides 4 to 5 feet above normal. Beach erosion and lowering of the beach profiles throughout the county. In some areas of Sarasota County, it was reported that the beach eroded up to 4 feet vertically and 50 feet horizontally." (CPE, 1991).
>
> "In Sarasota County, the tides [of Agnes] were generally 2 to 3 feet above normal and high water flooded many low areas of the county. The storm tides also undermined and damaged many homes, seawalls, revetment, and roads along the Sarasota County coastline. In was reported that the beach receded 30 to 50 feet horizontally throughout the county." (CPE, 1991).

A previous storm recession model for the project area was conducted for the 1998 Lido Key Interim Beach Renourishment Project (CPE, 1998). For this effort, the surf zone depth and avalanche slope were set to standard engineering values, 0.5 feet and 30 degrees, respectively (Larson and Kraus, 1989; Das, 1990). The parameters K, ε, and λ were set to 7.5 x 10^{-7} m^4/N, 0.0015 m^2/s, and 0.5 ft^{-1}. Using these values, Hurricane Gladys and Agnes were simulated. For these storms, the most recent survey data was used, as pre-storm survey data was not available.

A-60. Model simulations using the above (CPE, 1998) calibration parameters overestimated the storm recession. To yield a better estimate of the storm recession, the values of K, ε, and λ were varied to assess the sensitivity of the model. Calibration results appear in Table A-19. The most favorable comparison to the estimated storm recession based on prior reports (CPE, 1991) was achieved by changing the transport rate coefficient to K = 2.5 x 10-7 m^4/N (USACE, 1999, Lee County, FL). Results using this lower value of K led to more realistic storm recession estimates. Accordingly, the following calibration parameters were adopted for the simulation of the remaining tropical storms in Table A-3 and the extratropical storms occurring after 1976:

TABLE A-19

SBEACH Model Calibration and Verification, Lido Key, Sarasota, FL

		TRIAL A	TRIAL B	TRIAL C	TRIAL D
MODEL PARAMETERS:					
Surf Zone Depth (feet) =		0.5	0.5	0.5	0.5
Avalanche Slope (degrees) =		30	30	30	30
Transport Rate Coef. (m^4/N) =		7.5E-07	2.50E-07	2.50E-07	2.50E-07
Slope Dependent Coef. (m^2/s) =		0.0015	0.0015	0.0015	0.0040
Transport Rate Decay Coef. (m^{-1}) =		0.5	0.5	0.1	0.5
STORM RECESSION:					
R35	669-GLADYS	252.3	58.1	58.6	54.4
R35	712-AGNES	51.6	39.5	40.2	0.0
R38	669-GLADYS	147.6	112.8	113.2	112.5
R38	712-AGNES	88.2	38.5	39.0	38.5
R41	669-GLADYS	74.5	46.9	48.1	47.0
R41	712-AGNES	49.4	40.3	40.8	40.7
R44	669-GLADYS	69.2	55.0	57.3	55.7
R44	712-AGNES	56.8	47.3	47.1	47.8
AVERAGE	669-GLADYS	135.9	68.2	69.3	67.4
	712-AGNES	61.5	41.4	41.7	31.7
AVERAGE	669-GLADYS	132.0	53.3	54.7	52.4
EXCLUDING R38	712-AGNES	52.6	42.4	42.7	29.5

NOTES:

1. Storm number corresponds to HURDAT (Unisys, 2000) database.
2. Storm recession is the distance from the pre-storm MHW contour to the landward limit of vertical change > 0.5 feet.

- Surf zone depth = 0.5 feet
- Avalanche slope = 30 degrees
- Transport rate coefficient $K = 2.5 \times 10^{-7}$ m^4/N
- Slope dependent coefficient $\varepsilon = 0.0015$ m^2/s
- Transport rate decay coefficient λ (ft^{-1}) = 0.5.

Results

A-61. Storm recession results for the tropical and extratropical storms appear in Table A-20. The recession values indicate that for the most severe storms (i.e.: 1921, 1930, and August 1935 Hurricanes), Reach 3 may expect the greatest amount of storm recession, followed by Reach 2, Reach 1, and Reach 4. For the lesser storms (i.e.: 1901 Tropical Storm), Reach 2 may expect the greatest amount of storm recession, followed by Reach 3, Reach 1, and Reach 4. These results illustrate the dependence of the storm recession on the characteristics of the beach profile. The low storm recession values on Reach 4 are due to the presence of the Big Sarasota Pass ebb shoal, which reduces the impact of waves on the beach profile. The higher storm recession values on Reach 2 arise in the absence of a shallow (-4 to -1 feet NGVD) bar feature, which increases the impact of waves on the beach profile.

A-62. The largest storm recession values range from approximately 62 feet for Reach 4 to 488 feet for Reach 1. In comparison, maximum storm recession values estimated for Lee County ranged from 207 to 562 feet (USACE, 1999). The lower recession values are due primarily to the differences in the profiles used.

Application of the Storm Recession Results

A-63. The proposed shore protection measures were subjected to a benefit-cost analysis to assess whether Federal participation in the project would be appropriate. Primary benefits were quantified in terms of the reduction of storm-induced damages to existing properties and structures. This comparison was made based on the damage potential without the proposed protection measures (i.e., for existing conditions) in place and the damage potential with the shore protection measures in place. In both cases, storm damage potential was estimated based on the storm recession values in Table A-20. To account for the risks and uncertainties inherent in the benefit-cost analysis, storm recession damages were estimated as a function of annual probability and return period (frequency) using the Empirical Simulation Technique (EST) (Borgman et al., 1992). The application of the EST involved the following steps:

1. Constructing the EST input data files using the descriptive storm parameters and estimated recession values (Tables A-3, A-5, and A-20).
2. Generating multiple repetitions of multi-year scenarios of storm events and their corresponding beach erosion responses using the EST.
3. Analyzing the EST simulations to compute the tropical and extratropical storm recession as a function of return period with associated confidence limits.

TABLE A-20

Storm Recession, Lido Key, Sarasota, FL

TROPICAL STORM	STORM RECESSION (FEET)							
	REACH 1		REACH 2		REACH 3		REACH 4	
	Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.
094-SEP1896	9.8	17.7	48.0	2.9	45.1	2.3	33.4	4.9
127-AUG1901	16.6	20.6	42.0	1.8	46.4	0.6	43.6	0.8
141-SEP1903	17.1	21.1	41.4	1.2	45.1	2.0	43.1	1.4
194-OCT1910	55.4	0.8	113.6	1.3	189.0	6.8	54.1	2.8
249-OCT1921	50.0	1.4	57.6	24.6	225.9	0.9	49.7	2.3
289-AUG1928	43.1	2.4	56.6	2.8	50.0	1.3	44.5	2.1
292-SEP1928	0.0	0.0	36.6	1.3	41.5	0.9	31.2	5.6
296-SEP1929	81.9	78.9	70.5	23.3	62.7	36.9	52.3	2.1
299-AUG1930	487.9	198.0	139.2	1.1	229.4	1.5	61.7	2.8
324-JULY1933	43.6	2.8	59.8	1.2	51.2	0.6	45.7	1.4
331-AUG1933	66.3	58.5	110.5	0.9	53.0	0.8	49.8	2.1
353-AUG1935	48.9	1.4	135.8	2.1	232.9	0.7	56.9	2.7
357-OCT1935	51.2	1.5	124.7	7.0	54.6	0.7	51.3	2.4
440-OCT1944	0.0	0.0	32.2	1.3	211.8	3.2	35.7	12.7
456-OCT1946	0.0	0.0	34.3	0.6	37.4	2.3	42.6	1.3
463-SEP1947	47.9	1.3	116.5	1.5	215.3	1.7	48.2	2.4
477-AUG1949	0.0	0.0	38.6	0.4	45.3	1.5	38.5	4.7
493-EASY	64.5	1.0	113.7	1.3	189.6	4.2	58.5	4.0
584-JUNE1959	0.0	0.0	0.0	0.0	10.6	6.2	3.1	4.0
643-ALMA_1966	48.6	4.1	71.3	13.6	63.4	41.6	51.8	2.3
669-GLADYS	59.1	1.1	111.7	1.6	150.4	55.3	55.6	2.9
688-ALMA_1970	3.1	10.8	43.3	2.6	46.4	2.2	37.5	4.9
712-AGNES	37.6	12.2	39.0	0.5	44.2	1.3	47.5	2.8
746-SUBTRO_1976	3.4	11.6	50.3	1.4	46.3	2.8	26.6	4.5
807-SUBTRO_1982	62.7	113.4	40.5	0.8	81.8	63.7	48.1	2.4
864-KEITH	50.8	1.5	120.6	5.3	53.3	1.5	48.3	2.5

NOTES:

1. Storm recession is the distance from the pre-storm MHW to the landward limit of vertical change > 0.5 feet.
2. Storm recession values are an average of 12 simulations given varying tidal ranges and phases.
3. Storm number corresponds to the HURDAT (Unisys, 2000) database.

TABLE A-20 (continued)

Storm Recession, Lido Key, Sarasota, FL

EXTRATROPICAL STORM	STORM RECESSION (FEET)							
	REACH 1		REACH 2		REACH 3		REACH 4	
	Mean	Std.	Mean	Std.	Mean	Std.	Mean	Std.
1976-FEB	45.0	1.3	58.4	1.7	51.9	0.8	49.8	7.0
1977-JAN	41.2	4.0	58.9	2.5	52.7	1.2	50.4	5.7
1978-JAN	47.9	0.7	64.1	1.1	53.1	0.9	46.6	7.0
1980-MAR	23.5	20.7	42.7	1.2	50.1	1.2	49.6	3.7
1981-MAR	54.5	0.4	84.0	0.9	60.3	0.4	51.0	7.1
1982-JAN	47.9	0.6	69.4	1.1	55.2	0.7	53.1	5.7
1983-MAR	52.3	1.9	102.5	2.5	57.0	0.5	49.7	5.2
1984-MAR	60.7	0.9	107.6	0.7	63.1	0.3	49.6	6.5
1985-FEB	46.2	1.7	73.0	0.9	55.4	0.7	52.0	6.8
1986-JAN	44.2	0.5	62.9	1.9	53.4	0.6	54.4	4.2
1987-JAN	42.8	0.6	53.9	1.6	51.8	1.1	48.7	8.0
1988-APR	55.5	1.5	103.2	1.7	59.7	0.5	49.1	6.7
1991-MAR	55.0	1.3	84.4	0.7	59.8	0.3	50.5	8.6
1992-FEB	53.5	1.1	80.9	0.9	57.0	0.6	48.9	6.3
1993-MAR	47.6	0.9	76.8	2.4	54.6	0.6	45.1	4.2
1994-MAR	55.5	0.7	83.0	1.2	58.4	1.1	50.2	8.0
1995-JAN	56.0	0.6	80.3	0.9	59.3	0.7	59.9	4.1

NOTES:

1. Storm recession is the distance from the pre-storm MHW to the landward limit of vertical change > 0.5 feet.
2. Storm recession values are an average of 12 simulations given varying tidal ranges and phases.

4. Determining the combined storm recession:

   $1 / R(S)_{combined} = 1 / R(S)_{tropical} + 1 / R(S)_{extratropical}$

   where:

   S = Storm recession in feet
   $R(S)_{combined}$ = Combined return period corresponding to recession value S.
   $R(S)_{tropical}$ = Tropical return period corresponding to recession value S.
   $R(S)_{extratropical}$ = Extratropical return period corresponding to recession value S.

5. Apply the resulting recession-frequency curves as input to the economics-based model for computation of damages, costs, and benefits.

Based on this procedure, recession-frequency curves for Lido Key were generated. Storm recession as function of return period appears in Table A-21 and Figure A-24. Below the 10-year return period, the storm recession is dominated by extratropical storms. Above the 10-year return period, the storm recession is dominated by tropical storms, which are more likely to cause erosion into the upper part of the beach profile on Reach 3 (R42) than extratropical storms.

LONGSHORE SEDIMENT TRANSPORT AND SHORELINE CHANGE MODELING

Methods

A-64. The Generalized Model for Simulating Shoreline Change (GENESIS) model (Hanson and Kraus, 1989) has been used to model shoreline changes and sediment transport quantities, with and without project improvements, for this study. GENESIS provides a numerical method for determining long term shoreline change on an open coast in response to spatial and temporal differences in longshore sand transport. The model can be calibrated to site-specific conditions which are defined by shoreline surveys, sediment budget analyses, wave conditions, offshore bathymetry, and the presence of coastal armoring, beach fills, offshore breakwaters, and/or bypassing operations. Locations of the shoreline, coastal structures, and beach fills are referenced to a baseline that defines the orientation of the modeling grid. The GENESIS grid is divided into cells with each cell constituting a control volume. Longshore transport rates are calculated at the cell boundaries utilizing methodology described in the Shore Protection Manual (USACE, 1984). Site specific wave data (period, wave height, and direction) are used in the longshore sediment transport equation at each time step to simulate the potential for movement of material through the cell boundaries. Two coefficients (K_1 and K_2) in the longshore transport equation can be adjusted to calibrate the model based on historical shoreline changes. Coefficient K_1 governs the longshore transport resulting from changes in the orientation of the shoreline. Coefficient K_2 governs the longshore transport resulting from the longshore gradient in breaking wave height (Hanson and Kraus, 1989).

TABLE A-21

Annual Probability of Storm Recession, Lido Key, Sarasota, FL

Return Period (years)	Annual Prob. (%)	Storm Recession (feet)							
		Reach 1				Reach 2			
		Tropical	Extra-tropical	Combined (mean)	Combined (σ)	Tropical	Extra-tropical	Combined (mean)	Combined (σ)
2	50.0%	0.0	48.2	50.1	0.9	0.0	69.5	83.6	1.3
5	20.0%	0.0	55.5	56.9	0.4	80.1	89.8	98.1	1.5
10	10.0%	18.3	57.7	59.9	0.4	104.1	96.1	106.0	2.0
25	4.0%	65.0	59.7	65.0	1.7	123.2	101.4	123.2	3.0
50	2.0%	67.4	60.9	67.4	1.0	132.3	103.9	132.3	4.0
100	1.0%	69.8	61.8	69.8	1.1	139.1	105.7	139.1	4.0
200	0.5%	71.4	62.7	71.4	1.1	144.2	107.1	144.2	4.0
500	0.2%	74.2	63.8	74.2	1.6	150.2	108.6	150.2	5.0

Return Period (years)	Annual Prob. (%)	Storm Recession (feet)							
		Reach 3				Reach 4			
		Tropical	Extra-tropical	Combined (mean)	Combined (σ)	Tropical	Extra-tropical	Combined (mean)	Combined (σ)
2	50.0%	0.0	55.4	57.6	0.5	0.0	51.1	52.2	0.4
5	20.0%	0.0	61.3	63.2	0.2	44.2	54.4	55.0	0.2
10	10.0%	68.4	63.2	68.4	1.4	52.1	55.3	56.0	0.2
25	4.0%	212.6	64.7	213.0	2.0	57.0	56.1	57.2	0.5
50	2.0%	220.6	65.5	221.0	2.0	59.3	56.5	59.3	0.9
100	1.0%	224.8	66.0	225.0	2.0	60.9	56.8	60.9	0.9
200	0.5%	226.9	66.4	227.0	1.0	61.9	57.0	61.9	0.9
500	0.2%	228.1	66.9	228.1	1.0	62.9	57.2	62.9	0.8

Note: Storm recession is the distance from the pre-storm MHW to the landward limit of vertical change > 0.5 feet.

COMBINED STORM RECESSION, LIDO KEY, SARASOTA, FL

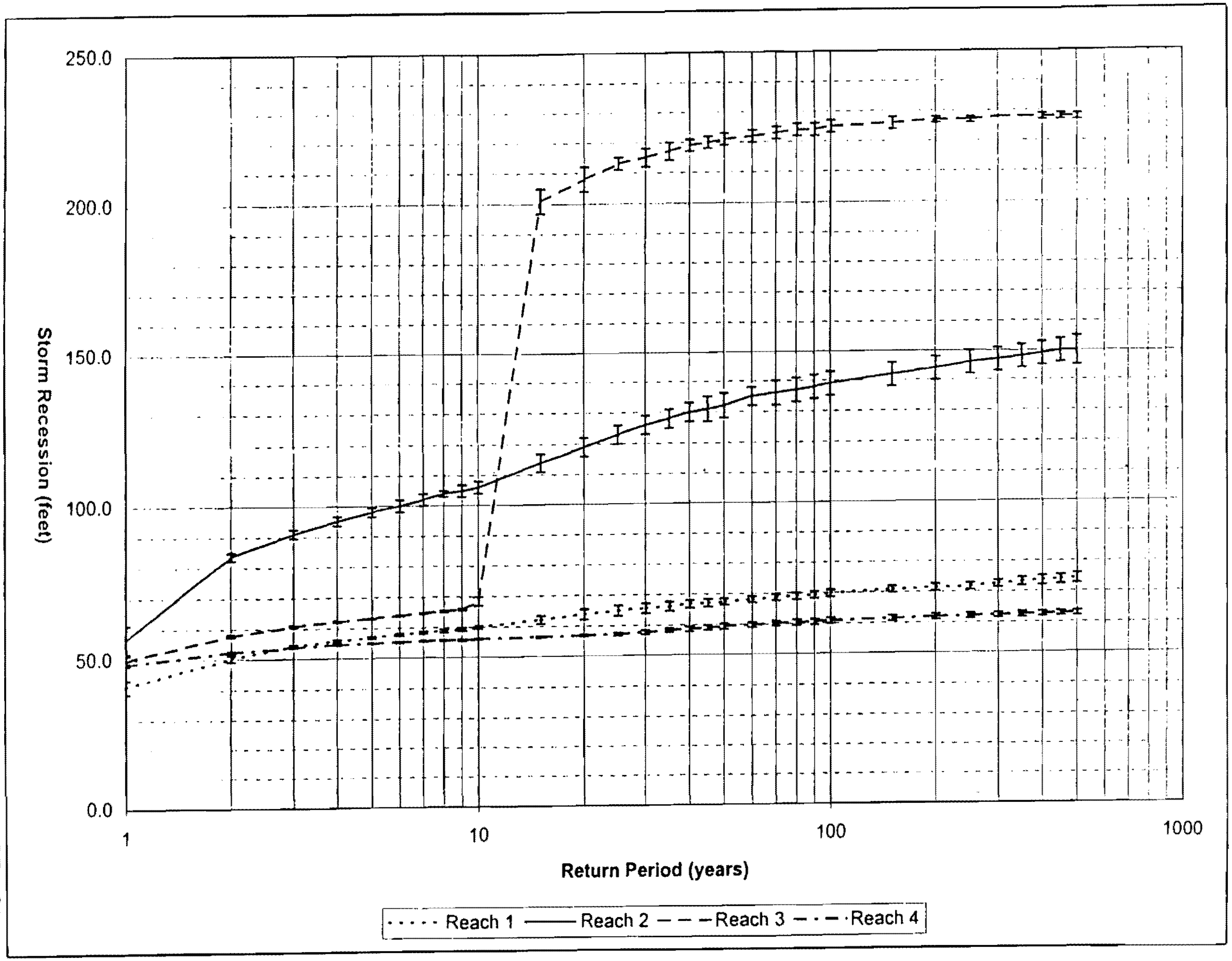


FIGURE A-24

Wave Data

A-65. The WIS hindcast at Station G1020 was used to establish wave data for the GENESIS simulations. This wave hindcast encompasses the years 1976 to 1995, and includes the influence of tropical weather systems. Due to the non-uniform bathymetry adjacent to Lido Key, the external wave refraction model RCPWAVE was used to shoal waves from the 39 foot water depth at WIS Station G1020 to the nearshore.

Shoreline Orientation

A-66. GENESIS simulations required that a one-dimensional shoreline modeling grid be established. This grid consisted of a baseline which roughly follows the local shoreline orientation. The local shoreline was expressed in terms of a distance from this baseline over a regularly spaced grid. The Lido Key baseline was based on the average shore *normal* orientation of approximately 235 (from north). Accordingly, a baseline oriented along an azimuth 325 degrees / 145 degrees between New Pass and Big Sarasota Pass was adopted. The baseline consisted of 65 cells at a 200 foot spacing, covering a total shoreline distance of 13,000 feet from New Pass to Big Sarasota Pass.

Shoreline and Bathymetric Data

A-67. To calibrate and verify the model, shoreline positions were extracted from the March 1991, March 1998, May 1998, and May 2000 surveys. The shoreline data was used to develop shoreline distances relative to the GENESIS baseline. Offshore data for the RCPWAVE refraction model was generated using the NOAA (1997) bathymetry database. The Lido Key offshore data was used to develop depth values over a regularly spaced grid fixed to the GENESIS baseline for the RCPWAVE wave transformation model.

Structures

A-68. The primary structures of interest are the southern seawalls at three properties near R43 (Figure A-20). The northernmost property features a seawall approximately 200 feet long. The middle property and southernmost properties feature seawalls approximately 220 feet and 130 feet long, respectively. At each of these properties, little or no sub-aerial beach exists. Due to the short length of these structures and their proximity to each other relative to the grid spacing, they are treated as a single structure by the GENESIS model. The GENESIS model also includes the derelict groin at R38.4. This structure has a localized impact on the shape of the shoreline, despite its condition. Other seawalls fronted by sub-aerial beach (Table A-17) are also incorporated into the model. However, due to their distance from the shoreline, their effect on the results is negligible.

Calibration

A-69. Calibration of the GENESIS model was accomplished through simulation of measured shoreline changes occurring between the completion date of the most recent beach nourishment project, May 1998, and the date of the most recent monitoring survey, May 2000. The post-construction (May 1998) survey and the May 2000 monitoring survey provided the initial and final shoreline positions for input to the model and comparison to the model results. Hindcast wave data from May 1998 to May 2000 at Station G1020 was not available. To provide wave data characteristic of the study period, storm activity in the vicinity of the project area was considered. Although a number of tropical storms and hurricanes crossed the Gulf of Mexico between these May 1998 and May 2000 (Unisys, 2000), none of these storms impacted the project area. Accordingly, a two-year period of average wave and storm activity, May 1986 to May 1988, was selected from the 1979 -1995 hindcast for WIS Station G1020. Similar to the calibration period, no tropical storms or hurricanes impacted the project area between May 1986 and May 1988 (Unisys, 2000).

A-70. For the study period May 1998 - May 2000, the best correlation between measured and modeled shorelines within the 1998 project area (R35 - R40) was achieved with the longshore transport coefficients assigned to the values $K_1 = 0.6$ and $K_2 = 0$. Model results appear in Figure A-25. The model calibration assumed an effective grain diameter representative of the entire island, $D_{50} = 0.24$ mm. The average berm height and depth of closure were specified as +6 feet NGVD (Table A-9) and -12 feet NGVD. Near the southern end of the island the prevailing direction of sediment transport was from northwest to southeast. Near the northern end of the island, the prevailing direction of sediment transport was from southeast to northwest.

A-71. Outside the 1998 project area, the model overestimated the amount of shoreline recession. Near the southern end of the island, the shape of the shorelines and the changes in their position have been due primarily to inlet effects (R43 - R44), specifically tidal currents. As the GENESIS model would not able to simulate shoreline changes due to tidal currents and inlet shoaling, discrepancies near the southern end of the island were expected. Along the seawalls just north of R43, the model accurately predicted recession of the shoreline to the location of the seawalls, as shown in Figure A-25. However, between these seawalls (R42.5) and R40.5, and north of T36, the model predicted shoreline recession rather than the observed shoreline advancement. These discrepancies are due to the inlet shoals and headland features which characterizes the island south of the R40.5 and north of T36, reducing the littoral drift. As the GENESIS and RCPWAVE models cannot accurately represent such phenomena, variation of the coefficients K_1 and K_2 was not able remove these discrepancies.

Verification

A-72. Verification of the GENESIS model was accomplished through simulation of measured shoreline changes occurring between March 1991 and March 1998, prior to construction of the 1998 nourishment project. To account for a dredge disposal operation taking place in 1996, the 1998 shoreline positions were moved landward between R35 and R36.5 based on the amount of fill placed recession rates at the profile lines. Wave data between 1991 and 1995 was extracted from the WIS Station G1020 hindcast. The values of K_1 and K_2 selected based on the calibration runs were found to overestimate the observed shoreline changes. Lowering the value of K_1 to $K_1 = 0.4$ and retaining the value $K_2 = 0$ produced model results which reasonably represented the shoreline changes between R35 and R42.5, as shown in Figure A-26. Adopting the coefficient $K_1 = 0.4$ for the May 1998 - May 2000 study period also produced a reasonable representation of

GENESIS MODEL CALIBRATION, LIDO KEY, SARASOTA, FL

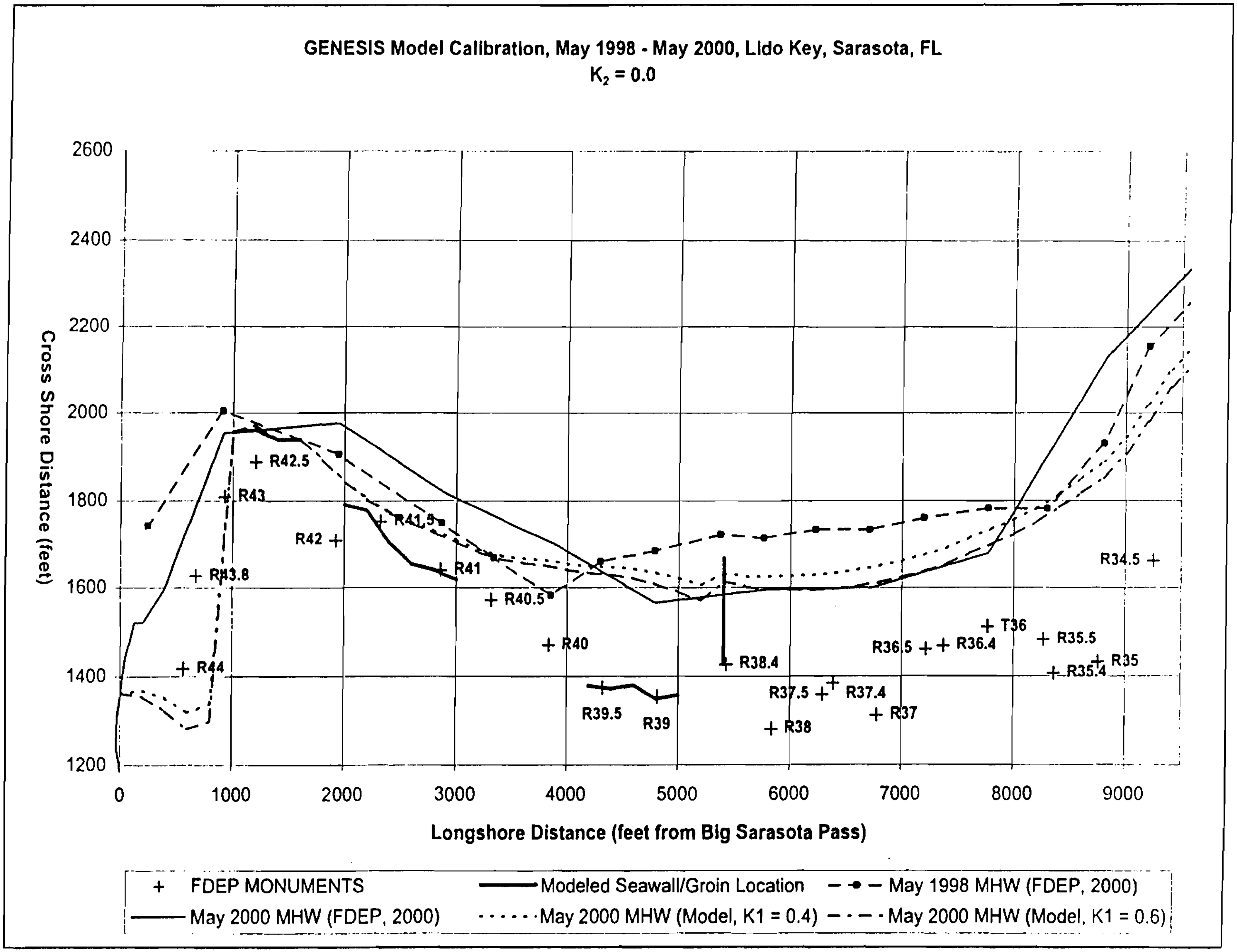


FIGURE A-25

7/3/2001

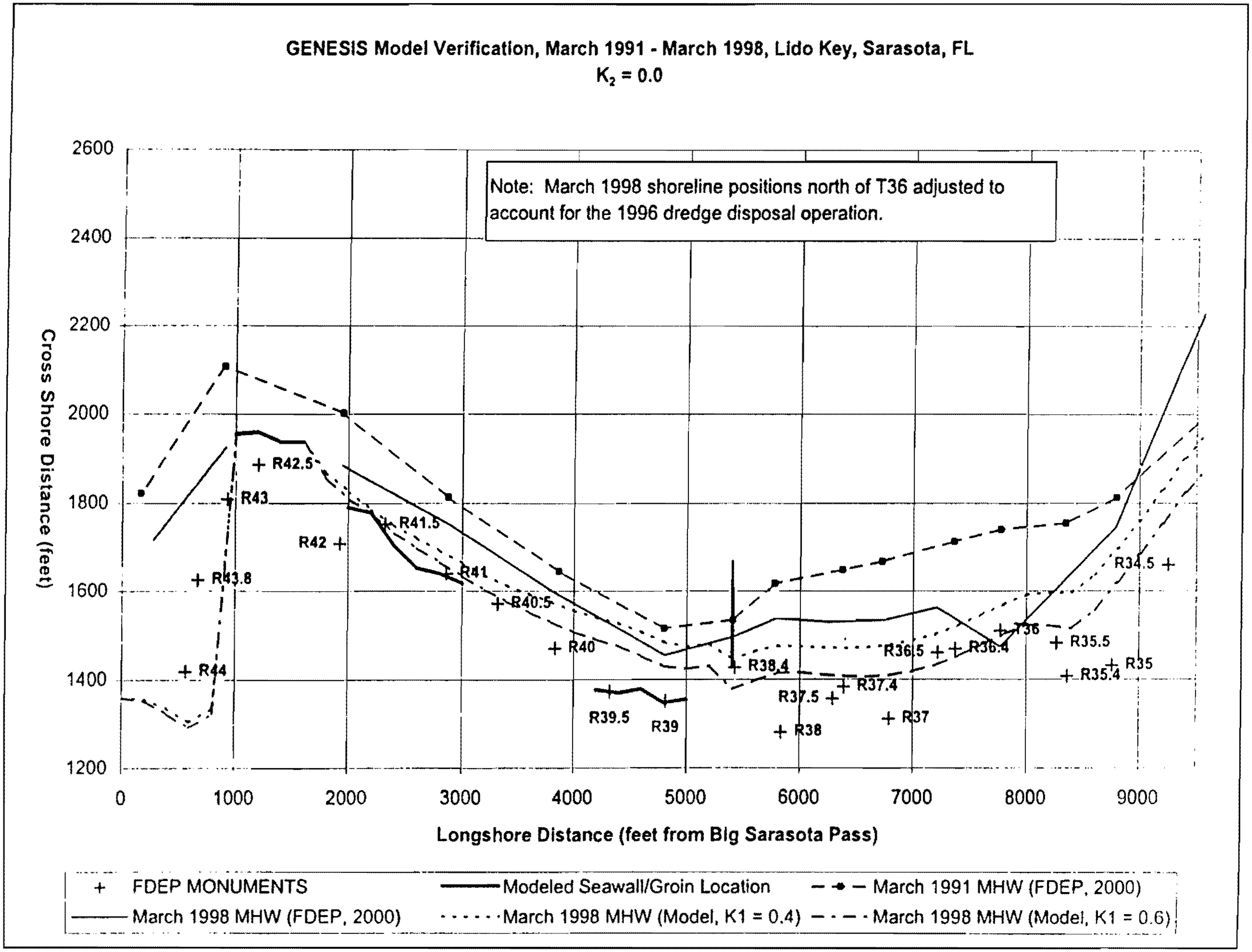


FIGURE A-26

GENESIS MODEL VERIFICATION, LIDO KEY, SARASOTA, FL the recent shoreline changes, as shown in Figure A-25. Accordingly, the transport coefficients $K_1 = 0.4$ and $K_2 = 0$ were adopted for shoreline modeling of the project area.

Prediction of Future Shoreline Position

Without Project Future Conditions

A-73. The calibrated and verified GENESIS model has been used to evaluate the future performance of various with and without project scenarios, including the placement of advance fill project boundaries, taper sections, and the addition of shoreline protective structures. Future wave conditions are derived from the WIS 1976-1995 hindcast data. An effort was made to identify individual years of record featuring typical wave characteristics. The method presented in Gravens and Scott (1993) was used to evaluate the WIS Station G1020 hindcast, the results of which are presented in Tables A-22 and A-23. Based on this analysis the years 1978, 1981, 1986, 1987, 1988, and 1992 were determined to be most representative of the near term regional wave climate. Wave data for future conditions modeling was constructed based on this result.

A-74. Shoreline positions predicted by the GENESIS model between May 2000 and May 2005 appear in Figure A-27 and Table A-24. The length of the model run corresponds to the 5 year renourishment interval established by the economic optimization.

With-Project Future Conditions

A-75. The optimum project design features a shoreline 80 feet seaward of the May 2000 shoreline. To protect the design fill, an advance fill section averaging 96 feet wide is also included. The width of the advance fill section is based on the 5 year renourishment interval and the observed rates of erosion and shoreline recession between 1991 and 1998. Near the southern end of the project area, the beach can be subjected to large losses due to the movement of sand into Big Sarasota Pass (Figure A-28). To reduce these losses, three groins are proposed. The lengths of the groins are the minimum needed to prevent:

- Recession beyond the May 2000 shoreline along South Lido Public Beach (south of R43).
- Erosion into the design fill north of R43.

A-76. The performance of the beach fill and groin design appears in Figure A-28. North of T36, the model suggests that erosion into the design cross section will occur. However, as noted previously, the calibration and verification runs do not accurately represent the observed shoreline changes and coastal processes at that location. Therefore, the GENESIS results are not reliable north of T36 and observed volumetric loss rates have been used in this region for design purposes. Between R43 and T36, the GENESIS model predicts no erosion into the design cross section. South of R43, the model indicates no recession past the May 2000 shoreline. Accordingly, the model confirms sufficient protection of the design beach by the groins and advance fill.

TABLE A-22

Directional Wave Statistics, Lido Key, Sarasota, FL

Year	Wave Statistics Given Angle Band (degrees relative to north): 0		22.5		45		67.5		90		112.5		135		157.5	
	Avg. Hs (feet)	Ann. # of cases	Avg. Hs (feet)	Ann. # of cases	Avg. Hs (feet)	Ann. # of cases	Avg. Hs (feet)	Ann. # of cases	Avg. Hs (feet)	Ann. # of cases	Avg. Hs (feet)	Ann. # of cases	Avg. Hs (feet)	Ann. # of cases	Avg. Hs (feet)	Ann. # of cases
1976	1.59	157	1.63	163	1.44	140	1.18	133	1.12	132	0.95	120	0.62	256	0.59	432
1977	1.54	106	1.56	115	1.39	126	1.35	200	1.19	180	0.99	120	0.66	323	0.55	301
1978	1.36	94	1.44	192	1.29	147	1.16	153	1.09	124	0.77	112	0.53	358	0.70	263
1979	1.49	102	1.48	158	1.35	144	1.16	130	1.14	129	1.29	150	0.67	399	0.76	232
1980	1.26	78	1.36	91	1.13	67	1.29	92	1.62	108	0.83	81	0.52	293	0.66	211
1981	1.54	117	1.52	116	1.46	122	1.36	120	1.14	128	0.94	125	0.61	314	0.77	239
1982	1.58	54	1.55	100	1.21	191	1.19	167	1.08	136	1.12	199	0.70	288	0.60	468
1983	1.30	79	1.16	86	1.35	173	1.12	91	1.22	105	1.14	127	0.84	309	0.97	244
1984	1.73	111	1.46	154	1.19	151	1.22	196	1.08	184	0.94	182	0.63	305	0.61	348
1985	1.45	84	1.36	68	1.15	118	1.53	128	1.42	100	0.90	120	0.75	294	0.89	245
1986	1.41	66	1.49	124	1.38	146	1.24	101	1.10	150	0.97	138	0.58	370	0.63	288
1987	1.42	80	1.61	112	1.75	112	1.39	124	1.15	125	1.11	94	0.55	339	0.61	263
1988	1.48	119	1.36	129	1.23	120	1.37	103	1.30	99	1.02	125	0.69	337	0.66	256
1989	1.50	109	1.27	83	1.22	59	1.02	56	0.95	57	0.69	75	0.43	325	0.51	377
1990	1.46	59	1.38	80	1.36	135	1.30	178	1.42	161	0.88	178	0.57	344	0.67	278
1991	1.52	98	1.53	117	1.33	172	1.27	162	1.13	107	1.03	125	0.63	225	0.62	350
1992	1.28	80	1.47	145	1.53	116	1.40	105	1.17	80	1.03	100	0.71	190	0.64	320
1993	1.59	93	1.36	138	1.38	130	1.22	64	1.05	102	1.00	143	0.58	282	0.51	338
1994	1.43	88	1.71	129	1.56	109	1.28	116	1.24	123	0.98	91	0.58	280	0.58	370
1995	1.46	115	1.46	87	1.24	107	1.29	120	1.19	90	1.19	108	0.73	214	0.79	321
1976 to 1995 Average	1.48	94	1.47	119	1.35	129	1.27	127	1.19	121	1.00	126	0.62	302	0.65	307
Standard deviation	0.61	24	0.52	32	0.53	32	0.56	40	0.63	32	0.57	33	0.64	52	0.61	69
Avg. - σ	0.88	70	0.95	87	0.82	97	0.71	87	0.56	89	0.43	93	0.00	250	0.04	238
Avg. + σ	2.09	118	1.98	152	1.88	161	1.84	167	1.82	153	1.56	158	1.27	355	1.26	376

NOTES: 1. Used for selection of representative years for future conditions wave data.

2. One point assigned for each value of Hs or Annual # of cases within 1 standard deviation of mean value (see TABLE A-23). A maximum of 32 points are possible.

TABLE A-22 (continued)

Selection of Representative Offshore Wave Time Series, Lido Key, Sarasota, FL

Year	Wave Statistics Given Angle Band (degrees relative to north):															
	180		202.5		225		247.5		270		292.5		315		337.5	
	Hs (feet)	Ann. # of cases	Hs (feet)	Ann. # of cases	Hs (feet)	Ann. # of cases	Hs (feet)	Ann. # of cases	Hs (feet)	Ann. # of cases	Hs (feet)	Ann. # of cases	Hs (feet)	Ann. # of cases	Hs (feet)	Ann. # of cases
1976	0.91	241	1.35	107	1.41	80	1.65	98	1.48	334	0.75	204	0.75	183	0.74	148
1977	1.07	199	1.37	101	2.11	45	1.71	123	1.52	406	0.75	333	0.86	142	1.07	100
1978	1.00	290	1.45	170	2.00	88	1.98	109	1.73	420	0.96	101	0.61	192	0.93	107
1979	1.43	232	2.14	116	3.21	93	2.52	133	1.95	387	0.66	188	0.70	181	0.62	146
1980	1.00	313	1.37	160	1.85	92	1.53	141	1.52	652	0.96	219	0.77	184	0.68	146
1981	0.99	234	1.21	143	1.42	91	1.41	105	1.76	404	0.95	236	0.69	252	0.76	174
1982	0.94	383	1.57	199	1.60	71	1.62	65	1.45	208	0.51	227	0.61	102	0.79	62
1983	1.32	230	1.94	194	2.73	110	3.21	163	2.13	514	0.88	247	0.73	160	0.69	88
1984	0.90	205	1.98	108	2.24	51	2.17	126	1.98	396	0.76	147	0.46	170	0.70	94
1985	1.36	214	1.67	139	2.63	119	4.03	173	1.50	597	0.78	318	0.79	134	1.09	69
1986	0.91	225	1.75	170	1.61	117	1.57	156	1.53	396	0.88	257	0.75	134	0.82	82
1987	1.22	212	1.60	107	1.63	114	2.00	108	1.58	707	1.11	243	0.93	72	0.68	108
1988	1.26	208	2.21	192	2.54	117	2.83	112	1.36	435	0.91	272	0.77	163	0.65	141
1989	0.87	314	1.21	191	1.10	118	1.27	144	1.25	492	0.77	176	0.68	213	0.80	131
1990	1.09	189	1.09	100	1.16	102	1.23	118	1.31	470	0.77	266	0.71	146	0.78	116
1991	1.03	293	1.77	212	1.48	144	1.59	121	1.46	346	0.93	258	0.88	113	0.98	77
1992	1.02	207	1.74	176	1.67	98	2.39	119	1.53	523	0.88	399	0.89	181	0.58	89
1993	0.92	179	1.92	147	1.52	109	1.81	156	1.61	602	0.92	214	0.82	113	0.87	110
1994	0.95	314	1.36	157	1.16	151	1.85	110	1.36	418	0.71	250	1.01	102	0.74	112
1995	0.93	326	1.60	185	1.75	176	2.98	178	1.52	378	0.79	203	0.87	129	0.69	183
1976 to 1995 Average	1.04	250	1.63	154	1.81	104	2.15	128	1.58	454	0.83	238	0.75	153	0.77	114
Standard deviation (σ) of Hs	0.85	56	1.33	37	1.94	31	2.48	28	1.27	119	0.61	65	0.67	43	0.72	34
Avg - σ	0.20	194	0.31	117	0.00	73	0.00	100	0.31	336	0.23	173	0.08	110	0.05	80
Avg + σ	1.89	307	2.96	191	3.74	136	4.63	156	2.84	573	1.44	303	1.41	196	1.48	148

NOTES: 1. Used for selection of representative years for future conditions wave data.
2. One point assigned for each value of Hs or Annual # of cases within 1 standard deviation of mean value (see TABLE A-23). A maximum of 32 points are possible.

TABLE A-23

Selection of Representative Offshore Wave Time Series, Lido Key, Sarasota, FL

Year	# OF POINTS OF A POSSIBLE 32 (One point assigned for each value of Hs or Annual # of cases within 1 σ of 1976-1995 mean value)	Rank	Use Data in Future Conditions Model ?
1976	25	16	-
1977	27	11	-
1978	29	3	yes
1979	28	7	-
1980	27	11	-
1981	30	1	yes
1982	20	20	-
1983	28	7	-
1984	25	16	-
1985	27	11	-
1986	29	3	yes
1987	29	3	yes
1988	30	1	yes
1989	23	19	-
1990	25	16	-
1991	27	11	-
1992	29	3	yes
1993	28	7	-
1994	28	7	-
1995	27	11	-

NOTE: σ = standard deviation.

FUTURE GENESIS SHORELINE CHANGES - WITHOUT PROJECT CONDITIONS

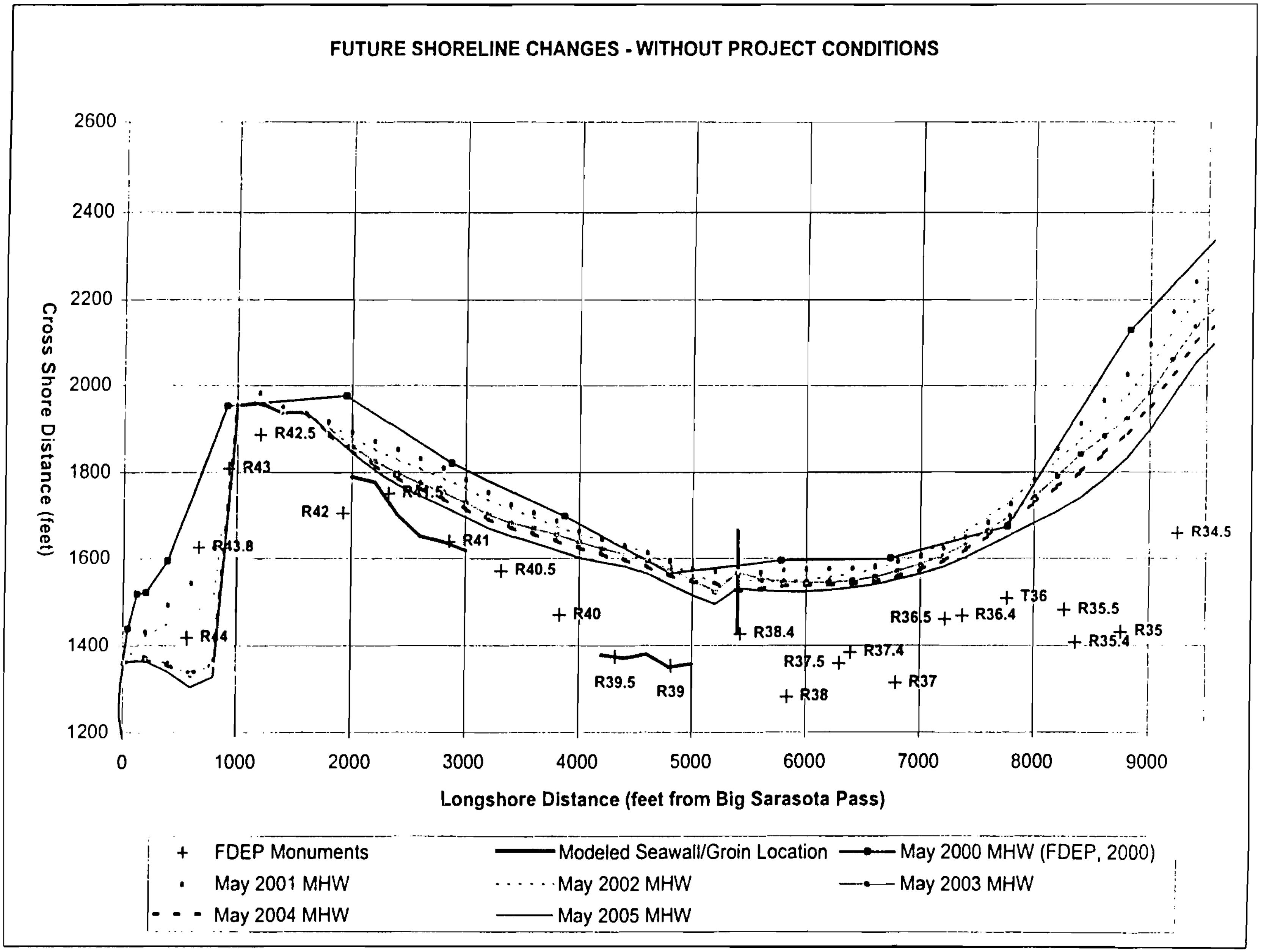


FIGURE A-27

7/3/2001

TABLE A-24

WITHOUT-PROJECT SHORELINE CHANGES, GENESIS MODEL, LIDO KEY, SARASOTA, FL

MONUMENT NAME	GENESIS LONG-SHORE DIST. (FEET)	MAY 2000 CROSS-SHORE DIST. (FEET)	MAY 2005 CROSS-SHORE DIST. (FEET)	SHORELINE CHANGE MAY 2000 TO MAY 2005 (FEET)
R35	8761	2103	1824	-279
T36	7769	1685	1652	-33
R37	6786	1604	1550	-54
R38	5833	1595	1524	-71
R39	4814	1566	1537	-28
R40	3830	1705	1616	-88
R41	2856	1825	1716	-109
R42	1927	1970	1861	-108
R43	925	1926	1720	-205
R44	566	1716	1310	-406

NOTES:

1. Mean high water shoreline elevation = +1.1' NGVD.

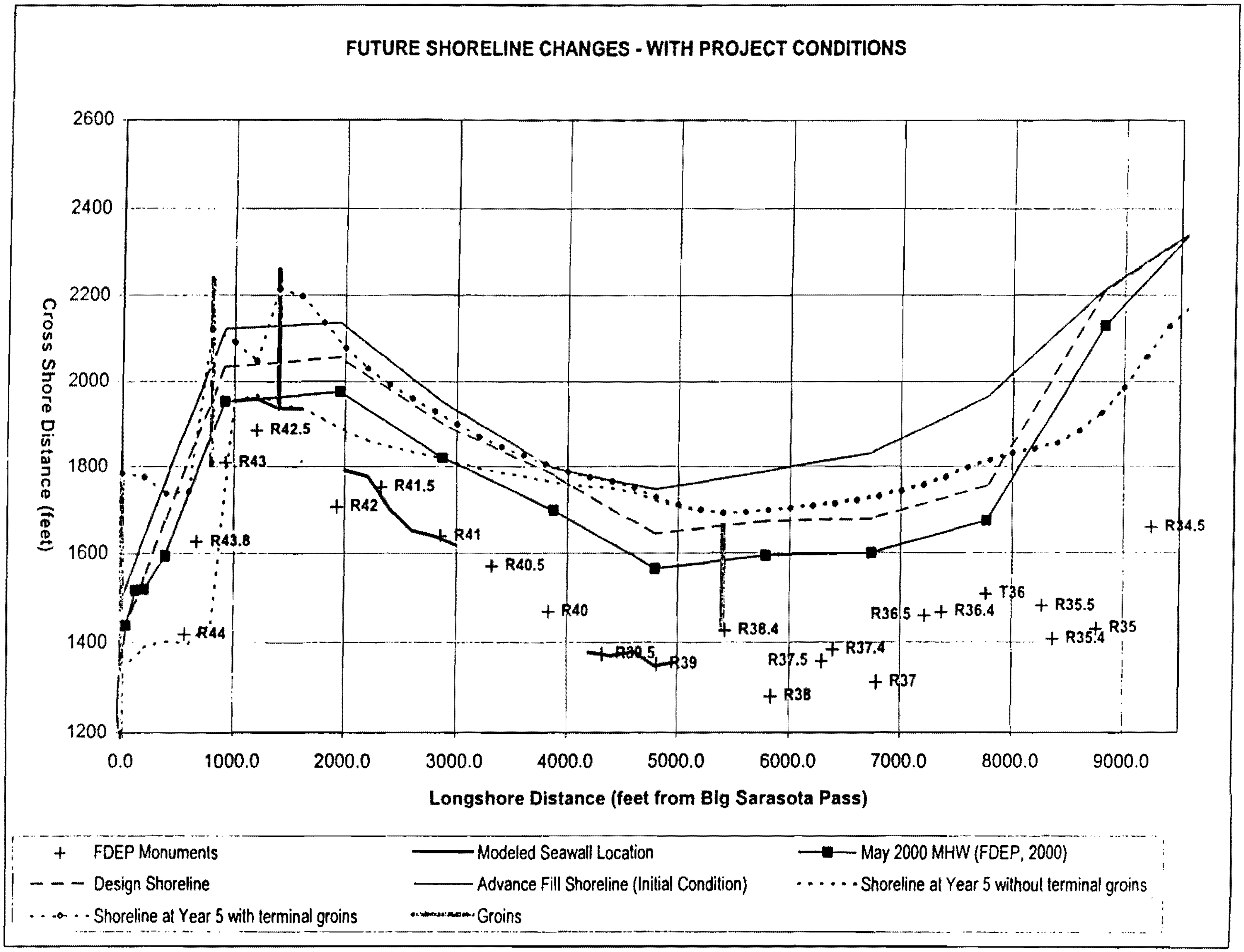


FIGURE A-28

FUTURE GENESIS SHORELINE CHANGES - WITH PROJECT CONDITIONS

PROJECT DESIGN

A-77. Based on the analysis and modeling efforts documented herein, a plan for nourish and protect the beaches of Lido Key has been formulated. A detailed description of the resulting plan is presented here. Distances to various dimensions of the project relative to FDEP monuments appear in Table A-25 and in Figures A-29a and A-29b.

Project Length

A-78. The 1997 Reconnaissance Phase Assessment specifies R35 as the northern boundary of the Federal and the south end of Lido Key as the southern boundary of the project. To minimize end losses at the northern end of the project, a fill taper extending from R35 to R34 will be included. To protect the design shoreline north of R43, three groins will be constructed. The compartments defined by these structures will then be filled to capacity.

A-79. The southern project limit has been changed from the authorized limit of R44.5 to R43. This change is in response to existing conditions at the project boundary. Along South Lido Public Beach (R44), the design beach will not be maintained, as this would require a much longer groin adjacent to Big Sarasota Pass or a fourth groin. Both solutions would increase the cost of the project. There would be no benefits to maintaining a design beach at R44 other than recreational benefits. For these reasons, the groins are not designed to maintain a design beach at R44. However, recession landward of the May 2000 shoreline will be prevented.

Project Baseline

A-80. The project is defined in terms of a mean high water (MHW) extension. Over the project length, the May 2000 MHW shoreline position is adopted as the project baseline. The design shoreline lies 80 feet seaward of the baseline and defines the Lido Key project.

Berm Elevations

A-81. Based on the natural berm elevations and previous project designs (CPE, 2000, 1998), a +5 feet NGVD design berm elevation has been chosen. This value is similar to the authorized project height of +4.7 feet NGVD (+5' MLW) and is characteristic of the natural berm elevation within the study area at R35, R37, R40, and R41 (Table A-9).

Berm Widths

A-82. Based on the economic optimization, a MHW extension of 80 feet provides the best ratio between project costs and benefits. Additional fill is required to maintain this beach width over the optimized renourishment interval.

TABLE A-25

LIDO KEY, SARASOTA, FL POSITIONS RELATIVE TO FDEP MONUMENTS

FDEP MONU-MENT	DISTANCE FROM FDEP MONUMENT IN FEET					
	LAND-WARD LIMIT OF FILL	DESIGN BERM CREST (FEET)	DESIGN MHW (FEET)	EQUILIB-RIUM TOE OF FILL (FEET)	CONST. BERM CREST (FEET)	CONST. TOE OF FILL (FEET)
R35	461.5	541.5	780.7	2609.7	826.7	918.7
T36	108.0	188.0	246.1	872.4	468.5	644.8
R37	222.5	302.5	371.7	1008.3	560.5	726.0
R38	249.5	329.5	397.2	930.1	522.1	687.4
R39	183.1	263.1	293.9	762.8	414.1	584.4
R40	182.6	262.6	314.2	832.4	361.1	509.3
R41	31.5	111.5	261.8	925.3	369.5	512.8
R42	155.9	235.9	349.7	1252.4	524.4	661.0
R43	72.1	152.1	224.9	2288.3	513.7	593.1
TAPER(R44)	0.0			796.7	334.6	399.2

NOTES: 1. Elevation of Mean High Water (MHW) shoreline = +1.1' NGVD.

2. Construction slope = 1 on 10.

3. Equibrium toe of fill based on profile translation, and assumes erosion of all advance fill prior to reaching equilibrium.

Beach Slopes

A-83. Along Lido Key, the native beach slopes average 1 (vertical) on 20 (horizontal) above the offshore sandbar and 1 on 200 below the offshore bar. This estimate is based on the 1999 monitoring survey. Consistent with previously constructed projects (CPE, 1998), a construction slope of 1 on 10 is adopted.

Design Fill Volume

A-84. Based on guidance provided by the National Research Council's report on beach nourishment (National Research Council, 1995), design volumes presented here are based on nourishment of the entire active profile rather than a design template. While a design template would represent the threshold dimensions of the project, volumes estimated based solely on a design template generally under represent the required volume necessary to maintain the design template. Most design templates differ from the construction templates and, therefore, do not represent what would be constructed. Monitoring studies (CPE, 2000) show that on Lido Key, beach profiles do not adjust to a shape approximating a design template following construction. For these reasons, a design template is neither proposed or used to estimate the design volumes. Instead, volumes are estimated through a seaward translation of the existing profile from the +5 foot NGVD berm elevation to the -12 foot NGVD depth of closure. The design profiles appear in Sub-Appendix A-1. Design fill volumes appear in Table A-26.

Fill Volume Behind Erosion Control Line

A-85. Fill volumes landward of the Lido Key Erosion Control Line (ECL) appear in Table A-26. These volumes are estimated based on the construction profiles appearing in Sub-Appendix A. A total volume of 47,000 cubic yards of fill will be required landward of the ECL over the project length.

Advance Nourishment

A-86. Advance nourishment is required to prevent erosion into the design beach. The optimum renourishment cycle of five years is determined on an economic basis and represents the lowest annual cost of maintaining the project. Advance nourishment volumes appear in Table A-26.

A-87. From profile lines R35 to R43, the advance nourishment volumes are based on the rates of shoreline recession and erosion observed between 1991 and 1998 and verified based on GENESIS simulations of the project. To establish a design rate of erosion, two rates of erosion are calculated for each profile line: one rate based on the shoreline changes and a second rate of erosion based on the beach profile (volumetric) changes. The design rate of erosion is equal to the larger of these two values. To estimate the rate of erosion based on the shoreline change, an equivalent volumetric loss is calculated using the design berm elevation and the depth of closure. Given a +5 foot NGVD design berm elevation and a -12 foot NGVD depth of closure, the corresponding volumetric loss for each foot of shoreline change is 0.64 c.y./foot. Except at profile lines R40-R42, the design rate of erosion is equal to volume change associated with the

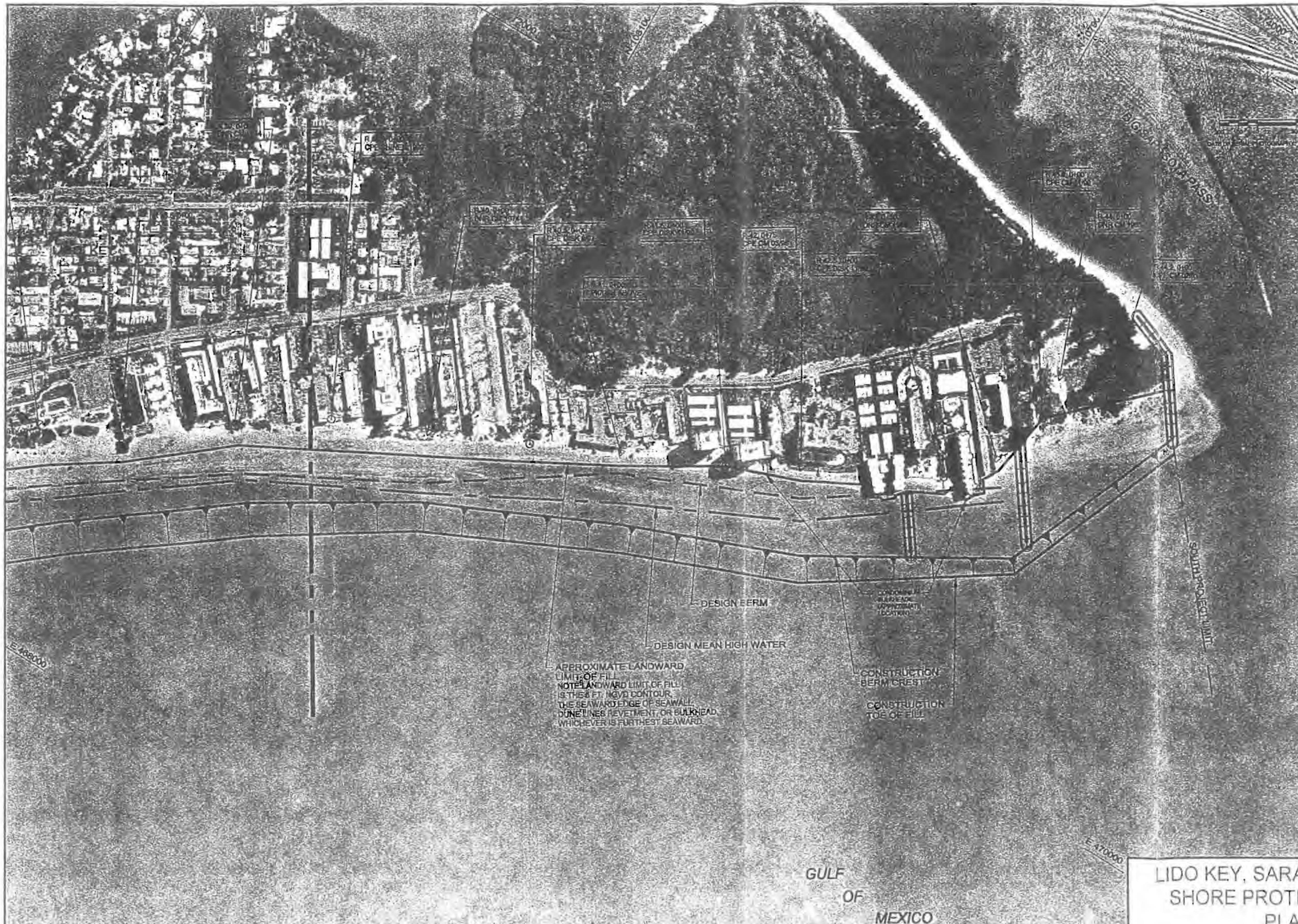
NOTES:

1. COORDINATES SHOWN HEREON ARE IN FEET BASED ON FLORIDA STATE PLANE COORDINATE SYSTEM, WEST ZONE, NORTH AMERICAN DATUM 1983
2. ELEVATIONS SHOWN HEREON ARE IN FEET BASED ON NGVD 1929

LIDO KEY, SARASOTA COUNTY, FL.
SHORE PROTECTION PROJECT
PLAN VIEW

COASTAL PLANNING & ENGINEERING, INC.
2481 NW BOCA RATON BLVD.
BOCA RATON, FL 33431

FIGURE A-29A



NOTES:

1. COORDINATES SHOWN HEREON ARE IN FEET BASED ON FLORIDA STATE PLANE COORDINATE SYSTEM, WEST ZONE, NORTH AMERICAN DATUM 1983.
2. ELEVATIONS SHOWN HEREON ARE IN FEET BASED ON NGVD 1929.

LIDO KEY, SARASOTA COUNTY, FL
SHORE PROTECTION PROJECT
PLAN VIEW

COASTAL PLANNING & ENGINEERING, INC.
2481 NW BOCA RATON BLVD.
BOCA RATON, FL 33431

FIGURE A-29B

TABLE A-26

DESIGN FILL VOLUMES, LIDO KEY, SARASOTA, FL

PROFILE LINE	FILL LENGTH (feet)	DESIGN EROSION RATE (c.y./yr.)	EROSION DUE TO SEA LEVEL RISE (c.y./yr.)	VOLUME LAND-WARD OF ECL (c.y.)	DESIGN VOLUME (c.y.)	ADVANCE FILL (c.y.)	TOTAL FILL VOLUME (c.y.)	TOTAL MHW EXTEN-SION (feet)
TAPER	994			0			26,624	
R35	510	0	326	0	25,691	1,632	27,323	85.1
T36	1,015	26,080	649	269	51,115	133,648	184,763	289.2
R37	989	18,335	633	3,137	49,830	94,842	144,671	232.3
R38	1,008	13,871	645	5,726	50,785	72,579	123,365	194.3
R39	1,021	12,569	653	720	51,423	66,111	117,533	182.8
R40	992	1,352	635	1,084	49,951	9,933	59,883	95.9
R41	966	5,582	618	1,960	48,667	31,000	79,667	131.0
R42	989	9,181	633	295	49,798	49,070	98,868	158.8
R43	790	8,282	506	407	39,812	43,939	83,751	168.3
TAPER(R44)	856			32,834			35,476	
AVERAGE								176.4
TOTAL	10,130	95,251	5,299	46,432	417,071	502,754	981,924	

NOTES: Volume based on translation of the existing profile from the berm elevation to the depth of closure.

Mean high water (MHW) elevation (feet NGVD) = 1.1
Design mean high water extension (feet) = 80
Berm elevation (feet NGVD) = 5
Depth of closure (feet NGVD) = -12
Erosion due to sea level rise (c.y./year/foot) = 0.64
Renourishment interval (years) = 5
Overfill factor Ra = 1

Volumes landward of ECL are estimated based on the construction profiles.

observed shoreline recession. At each profile line, an additional 3.2 c.y./foot is added to the advance fill to compensate for the effects of sea level rise.

Future Periodic Nourishment

A-88. Future nourishment volumes are estimated based on the methods detailed above. At profile lines R35 to R43, the future nourishment volumes are equal to the advance fill volumes appearing in Table A-26. At profile line R44, the amount of material required to maintain the existing shoreline position will differ due to the shoreline change expected by Year 5 of the project life (Figure A-28). Future nourishment volumes appear in Table A-27.

Overfill Volume

A-89. Details of the most recent borrow area investigation appear in Appendix B. Based on that investigation, three new borrow areas have been delineated. Each area is located on a small, isolated bathymetric high. In all three areas, unconsolidated material is mounded over a generally continuous and relatively flat limestone layer. The thickness of beach quality material in the three potential borrow areas ranges from 7 to 1 ft.

A-90. Borrow Area 5 is located 7.2 nautical miles offshore of Lido Key. The deposits in this area consist of medium grained sand, with low silt content (1.7% to 2.6%) mixed with some shell fragments/hash, overlying strata with higher silt content (5.9% to 23.0%).

A-91. Borrow Area 6 is located 8.5 nautical miles offshore of Lido Key. The deposits in this area consist of medium grained sand, with low silt content (0.11% to 4.6%) mixed with some shell fragments/hash, overlying strata with higher silt content (6.2% to 25.2%).

A-92. Borrow Area 7 is located 9.5 nautical miles offshore of Lido Key. The deposits in this area consist of medium grained sand, with low silt content (1.7% to 3.0%) mixed with some shell fragments/hash, overlying strata with higher silt content (12.2% to 38.0%).

A-93. The average grain sizes and sorting values of the materials in Borrow Areas 5, 6, and 7 appear in Table A-28. Table A-28 also presents the volume of suitable material and its compatibility to the native beach sands. Overall, the sands in Borrow Areas 5, 6, and 7 are coarser than the native beach sands. For all three borrow areas, the overfill factor averages 1.0. Accordingly, no additional modification of the fill volume is required.

Groin Design

A-94. GENESIS model simulations indicate a significant reduction in the required advanced fill with the addition of three groins near Big Sarasota Pass. Details of the structural design are included in the following sections and in Figures A-30 and A-31.

TABLE A-27

FUTURE PERIODIC RENOURISHMENT VOLUMES,
LIDO KEY, SARASOTA, FL

PROFILE LINE	FILL LENGTH (feet)	DESIGN EROSION RATE (c.y./yr.)	EROSION DUE TO SEA LEVEL RISE (c.y./yr.)	TOTAL RENOURISH-MENT VOLUME (c.y.)
TAPER	994			1,590
R35	510	0	326	1,632
T36	1,015	26,080	649	133,648
R37	989	18,335	633	94,842
R38	1,008	13,871	645	72,579
R39	1,021	12,569	653	66,111
R40	992	1,352	635	9,933
R41	966	5,582	618	31,000
R42	989	9,181	633	49,070
R43	790	8,282	506	43,939
TAPER(R44)	856			16,769
TOTAL	10,130	95,251	5,299	521,113

NOTES:

Erosion due to sea level rise (c.y./year/foot) = 0.64
Renourishment interval (years) = 5
Overfill factor Ra = 1

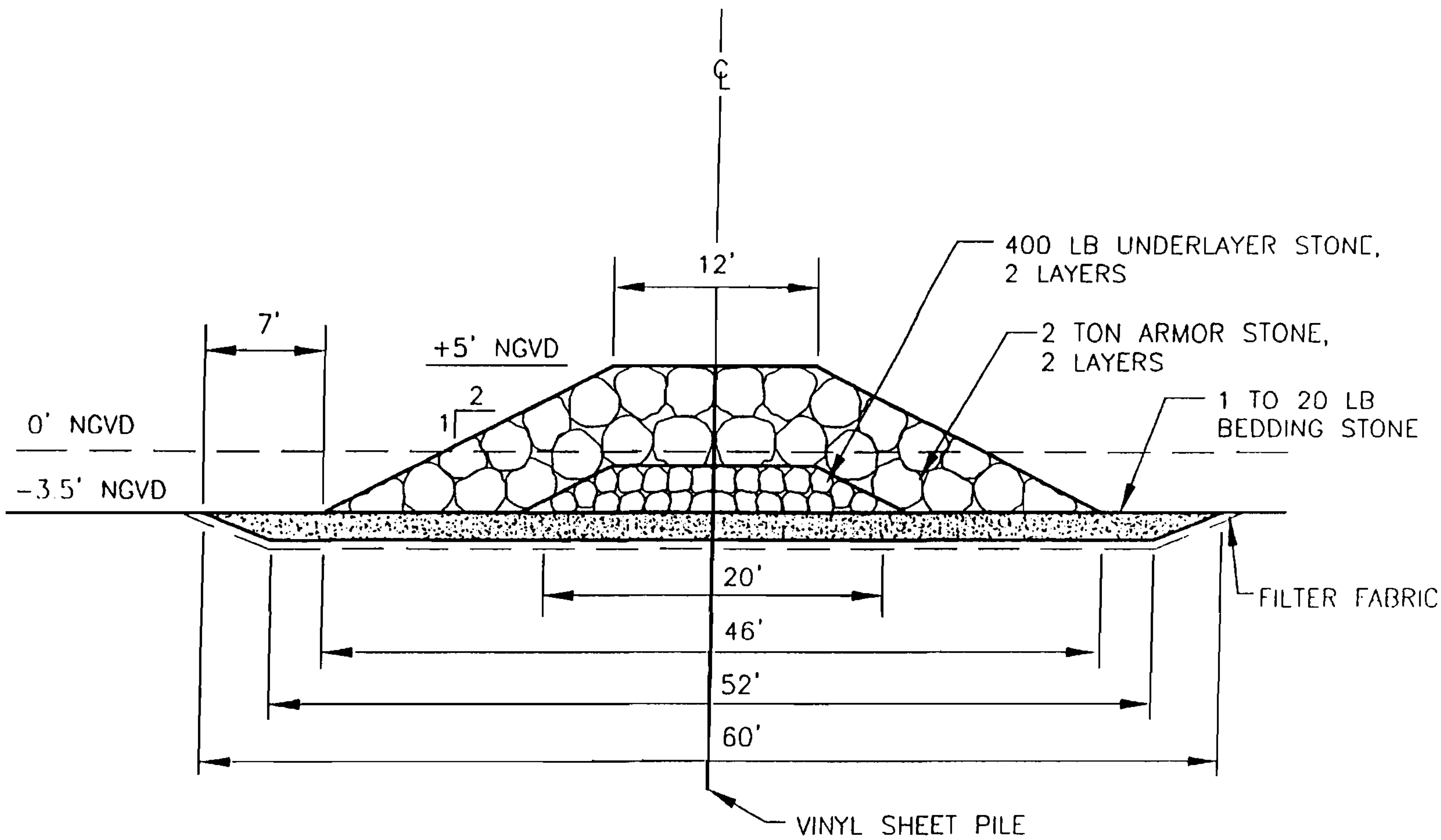
TABLE A-28

BORROW AREA SEDIMENT CHARACTERISTICS, LIDO KEY, SARASOTA, FL

	AVAIL-ABLE VOLUME (c.y.)	MEAN GRAIN SIZE (mm)	MEAN GRAIN SIZE (phi)	SORTING (phi)	OVERFILL FACTOR	RENOUR-ISHMENT FACTOR
NATIVE BEACH		0.24	2.08	0.93		
BORROW AREA 5	209,570	0.40	1.32	0.71	1.00	0.54
BORROW AREA 6	1,063,017	0.32	1.63	0.71	1.00	0.75
BORROW AREA 7	601,536	0.43	1.21	0.40	1.00	0.59

NOTES:

Native beach grain sands were sampled at R-37 and R-39 in May 2000. The average mean grain size and sorting value shown does not include the samples collected in the surf zone near the Mean Tide Level contour.



LIDO KEY, SARASOTA, FL
TYPICAL GROIN
CROSS SECTION

COASTAL PLANNING & ENGINEERING, INC.

FIGURE A-30

LIDO KEY, SARASOTA, FL
TYPICAL GROIN PROFILE

COASTAL PLANNING & ENGINEERING, INC

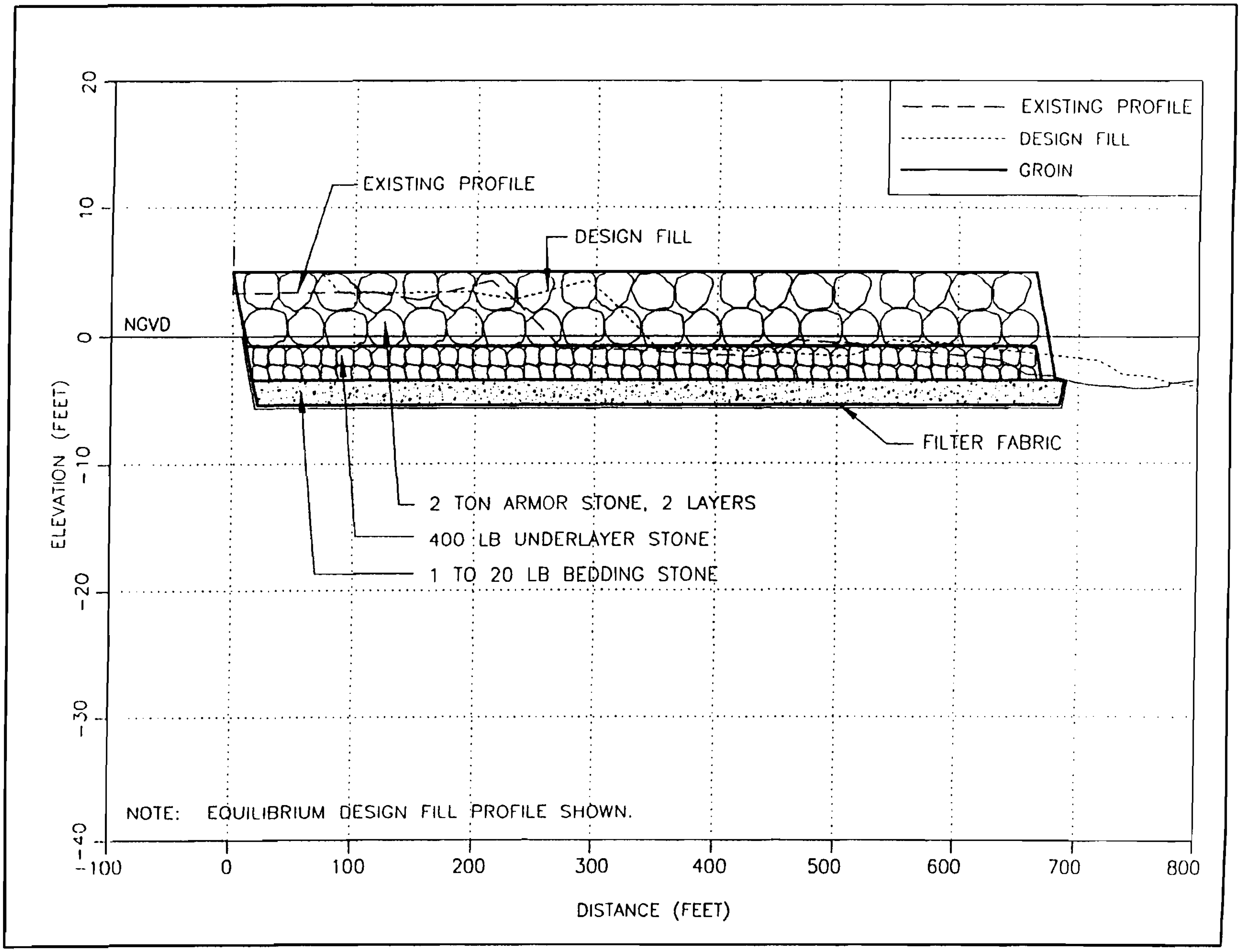


FIGURE A-31

Structure Length and Location

A-95. The lengths and locations of the three groins were determined and optimized using the GENESIS model. Several model simulations were conducted to identify the shortest groins required to prevent recession past the May 2000 shoreline at South Lido Public Beach (R44) and erosion into the design beach north of the public beach including a no structure alternative. The selected arrangement, appearing in Figures A-28 and A-29b, meets the design objectives. The southernmost structure will be built at the southern end of Lido Key. The total length of the structure will be approximately 650 feet. The landward half of the structure will lie along the north bank of Big Sarasota Pass. The middle structure will be located 800 feet north of Big Sarasota Pass, and will extend 440 feet seaward from the existing +5' NGVD contour. The northernmost structure will be located 1,400 feet north of Big Sarasota Pass, and will extend 320 feet from the existing seawall near R42.5. Each of the structures is oriented along a bearing of 55° / 235° relative to north.

Structural Cross Section

A-96. The groins are designed to withstand a 20-year storm and feature a continuous structure height of +5 feet NGVD. This elevation exceeds the natural berm elevation near Big Sarasota Pass by approximately 1 foot. At the heads of the proposed groins, the existing depths are on the order of -3 feet NGVD. Therefore, under the design storm conditions, waves will be depth limited. Given an 8.8 foot NGVD stage (Table A-4), the local depth of -3 feet NGVD, the local slope of 1 on 176 (Table A-9), and a wave period of 13.9 seconds (Table A-8), the maximum wave height under the design storm conditions will be 9.6 feet. The corresponding H_{10}, to be used as the design wave, will be 6.8 feet.

A-97. Two layers of two-ton (2.9 foot diameter) armor stone are used in the structure design. Initial calculations are based on the use of a rough granite stone (165 lbs/ft^3). This estimate is based on structural stability analysis using the Shore Protection Manual (USACE, 1984) method (Hudson's Equation). The coefficients K_d and $K\Delta$ are set at 2.0 and 1.0, respectively.

A-98. Following *Shore Protection Manual* (USACE, 1984) guidelines, the armor stone will be laid over 400 lb core stone. A layer of 1 to 20 lb bedding stone will support the core and armor stones. Sand tightening of the structure will be accomplished through the placement of a vinyl sheet pile extending 24 feet below the crest at the center of the structure. The sheet pile is included to render the structure impermeable, and is not intended to add to the groin's structural integrity. The use of a vinyl material eliminates corrosion issues, which would be encountered through the use of a steel or aluminum sheet pile.

A-99. Based on the design cross-section and combined groin length of 1,420 feet, the approximate stone tonnage is as follows: 15,400 tons of armor stone, 3,000 tons of core stone, and 8,300 tons of bedding stone. In addition, 86,800 square feet of filter fabric and 34,200 square feet of vinyl sheet pile will be required.

A-100. The structural solution recommended in this study is a feasibility level of design detail. Additional study and site survey will be required to determine final structure location, length, and orientation.

COST ESTIMATES

[MCASES cost estimates to be provided by U.S. Army Corps of Engineers, Jacksonville District.]

REFERENCES

Applied Technology and Management, 1994. New Pass Inlet Management Plan Meeting Exhibits, January 27, 1994.

Campbell, T., Dean, R.G, Wang, H., 1988. Short Course on Principles and Applications of Beach Nourishment, University of Florida, Gainesville.

Das, B.M., 1990. Principles of Geotechnical Engineering, PWS-Kent, Boston.

Dean, R.G., Chiu, T.Y., Wang, S.Y., 1988. Combined Total Storm Tide Frequency Analysis for Sarasota County, Florida. Florida State University, Tallahassee.

Birkemeier, W.A., 1985. Field Data on Seaward Limit of Profile Change, Journal of Waterway, Port, Coastal and Ocean Engineering, ASCE, p. 598.

Borgman, L.E., Miller, M., Butler, H.L., and Reinhard, R.D., 1992. Empirical Simulation of Future Hurricane Storm Histories as a Tool in Engineering and Economic Analysis, Proceedings, Civil Engineering in the Oceans V, ASCE, 42-65.

Bruun, P., 1962. Sea Level Rise as a Cause of Beach Erosion, Journal of the Waterways and Harbors Division, ADCE, 88(WW1):117-30.

Coastal and Hydraulics Laboratory, 2000. ADCIRC tropical storm model results provided by Norman A. Scheffner June 13, 2000 via FTP to ftp://ftp.cerc.wes.army.mil/incoming/scheffer/.

Coastal Inlets Research Program, 2000. Database of Inlet Navigation Projects and Structures, http://cirp.wes.army.mil/cirp/cirp.html.

Coastal Planning & Engineering, 1991, Long Range Beach Management and Erosion Control Plan and Preliminary Restoration Element Design for Lido Key, Sarasota, Florida.

Coastal Planning & Engineering, 1993, Wave Refraction and Sediment Transport Study at New Pass and Big Sarasota Pass, Sarasota County, Florida.

Coastal Planning & Engineering, 1998. Lido Key Interim Beach Renourishment Project, Plans and Specifications.

Coastal Planning & Engineering, 2000. 1998 Lido Key (Sarasota County), Florida Beach Nourishment Project, One-Year Post-Construction Monitoring Report.

Florida Department of Environmental Protection, 1986. Permit Number 581030329, Sarasota County, U.S. Army Corps of Engineers, New Pass.

Florida Department of Environmental Protection, 2000. Office of Beaches and Coastal Systems Beach and Offshore Profile Data and Historic Shoreline Database, http://www.dep.state.fl.us/beach/.

Florida Department of Environmental Protection, 2000a, *Critical Beach Erosion Areas in Florida*, Report No. BCS-99-02, Bureau of Beaches and Coastal Systems, Division of Water Facilities, Department of Environmental Protection, State of Florida, Tallahassee, http://www.dep.state.fl.us/beach/pdf/errptall.pdf.

Gravens, M.B., and Scott, S.C., 1993. Analysis of Wave Data for Use in Sediment Transport Calculations, Proceedings of the 1993 National Conference on Beach Preservation Technology, St. Petersburg, FL.

Hallermeier, R.J., 1978. Uses for a Calculated Limit Depth to Beach Erosion, Proceedings of Sixteenth Conference on Coastal Engineering, ASCE, pp. 1493-1512.

Hanson, H. and Kraus, N.C., 1989. GENESIS: Generalized Model for Simulating Shoreline Change, 2 Vols., Technical Report CERC-89-19, U.S. Army Engineer Waterways Experiment Station, Coastal Engineering Research Center, Vicksburg, MS.

Hurricane City, 1999. Sarasota, Florida's History with Tropical Systems, http://www.hurricanecity.com/sarasota.htm.

Irish, J.L. and Lillycrop, W.J., 1997. Monitoring New Pass, Florida with High Density Lidar Bathymetry, Journal of Coastal Research, 13(4), 1130-1140.

Larson M., and Kraus, N.C., 1989. SBEACH: Numerical Model for Simulating Storm-Induced Beach Change, 2 Vols., Technical Report CERC 89-9, U.S. Army Engineer Waterways Experiment Station, Coastal Engineering Research Center, Vicksburg, MS.

Luettich, R.A., Westerink, J.J., Scheffner, N.W., 1992. ADCIRC: An Advanced Three-Dimensional Circulation Model for Shelves, Coasts, and Estuaries, U.S. Army Corps of Engineers, Washington.

National Oceanic and Atmospheric Administration, 1985. Tidal Bench Marks, http://www.co-ops.nos.noaa.gov/bench_mark.shtml?region=fl.

National Oceanic and Atmospheric Administration, 1987. Tidal Bench Marks, http://www.co-ops.nos.noaa.gov/bench_mark.shtml?region=fl.

National Oceanic and Atmospheric Administration, 1990. 1990 Tide Tables.

National Oceanic and Atmospheric Administration, 1997. Geophysical Data System of Hydrographic Survey Data Version 4.0 (GEODAS CD-ROM), Washington.

National Oceanic and Atmospheric Administration, 2000. National Bouy Data Center, http://www.ndbc.noaa.gov/index.html.

National Research Council, 1987. Responding to Changes in Sea Level, Engineering Implications, Report of the Committee on Engineering Implications of Changes in Relative Mean Sea Level; National Academy Press, Washington, D.C.

Prototype Measurement and Analysis Branch, 2000. PMAB Dataport, U.S. Army Corps of Engineers Coastal and Hydraulics Laboratory, http://sandbar.wes.army.mil/.

Unisys, 2000. Atlantic Tropical Storm Tracking by Year, http://weather.unisys.com/hurricane.

U.S. Army Corps of Engineers, 1984. Shore Protection Manual, 4th Edition, 2 vols., U.S. Army Engineer Waterways Experiment Station, Coastal Engineering Research Center, VU.S. Government Printing Office, Washington D.C.

U.S. Army Corps of Engineers, 1990. Sarasota County, Florida Shore Protection Project, General Design Memorandum.

U.S. Army Corps of Engineers, 1999. Appendix A, Engineering Design and Cost Estimate, Lee County, Florida Shore Protection Project, General Reevaluation Report, U.S. Army Corps of Engineers, Jacksonville.

U.S. Army Corps of Engineers-SAJ, 2000. New Pass, Florida, Plans for Maintenance Dredging, 8 Foot Project, U.S. Army Corps of Engineers, Jacksonville.

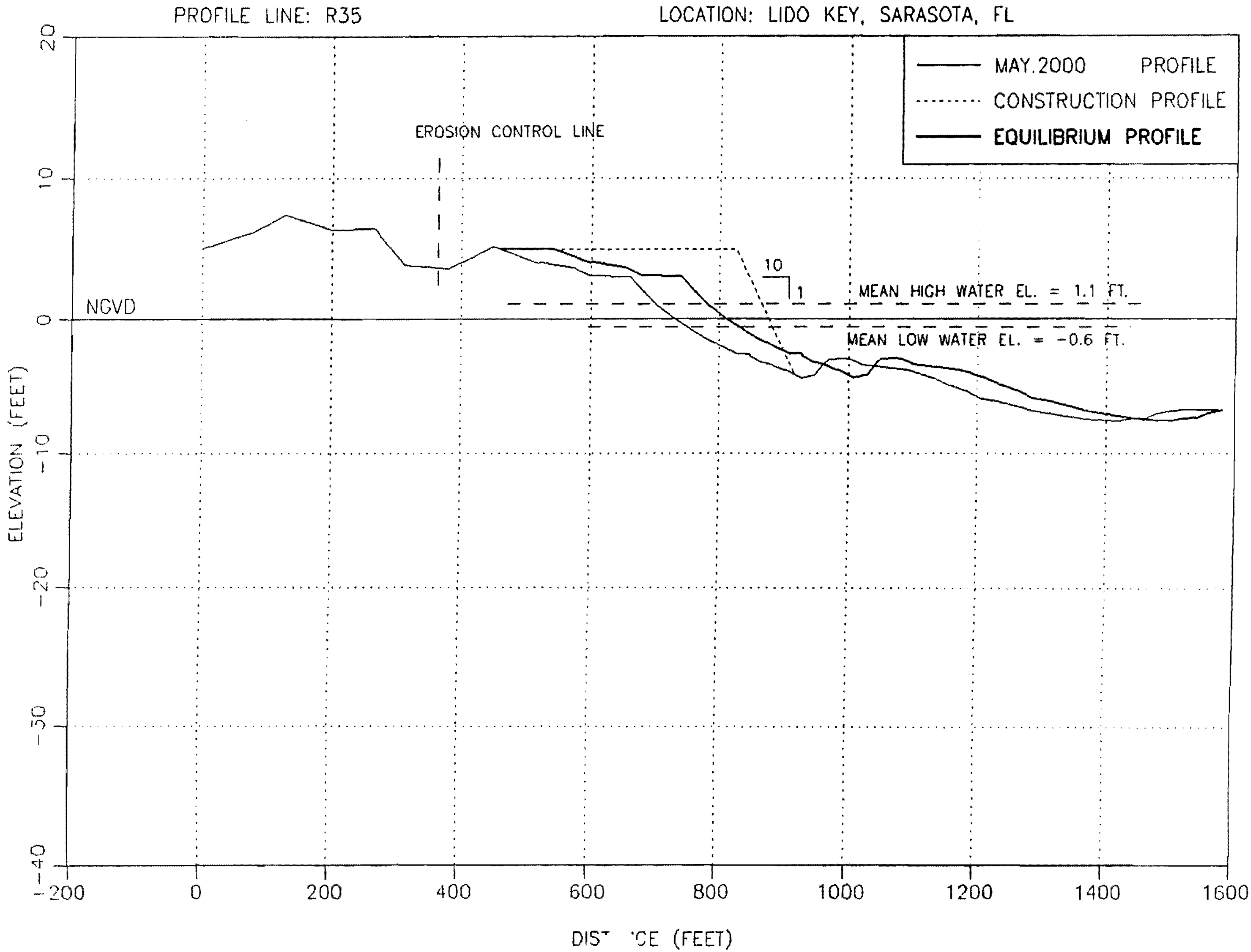
Wave Information System, 1997. Coastal Engineering Data Retrieval System (CEDRS), U.S. Army Corps of Engineers Coastal and Hydraulics Laboratory, http://bigfoot.wes.army.mil/c201.html.

I:\wp61docs\Lido\9500.18\Engineering Appendix A

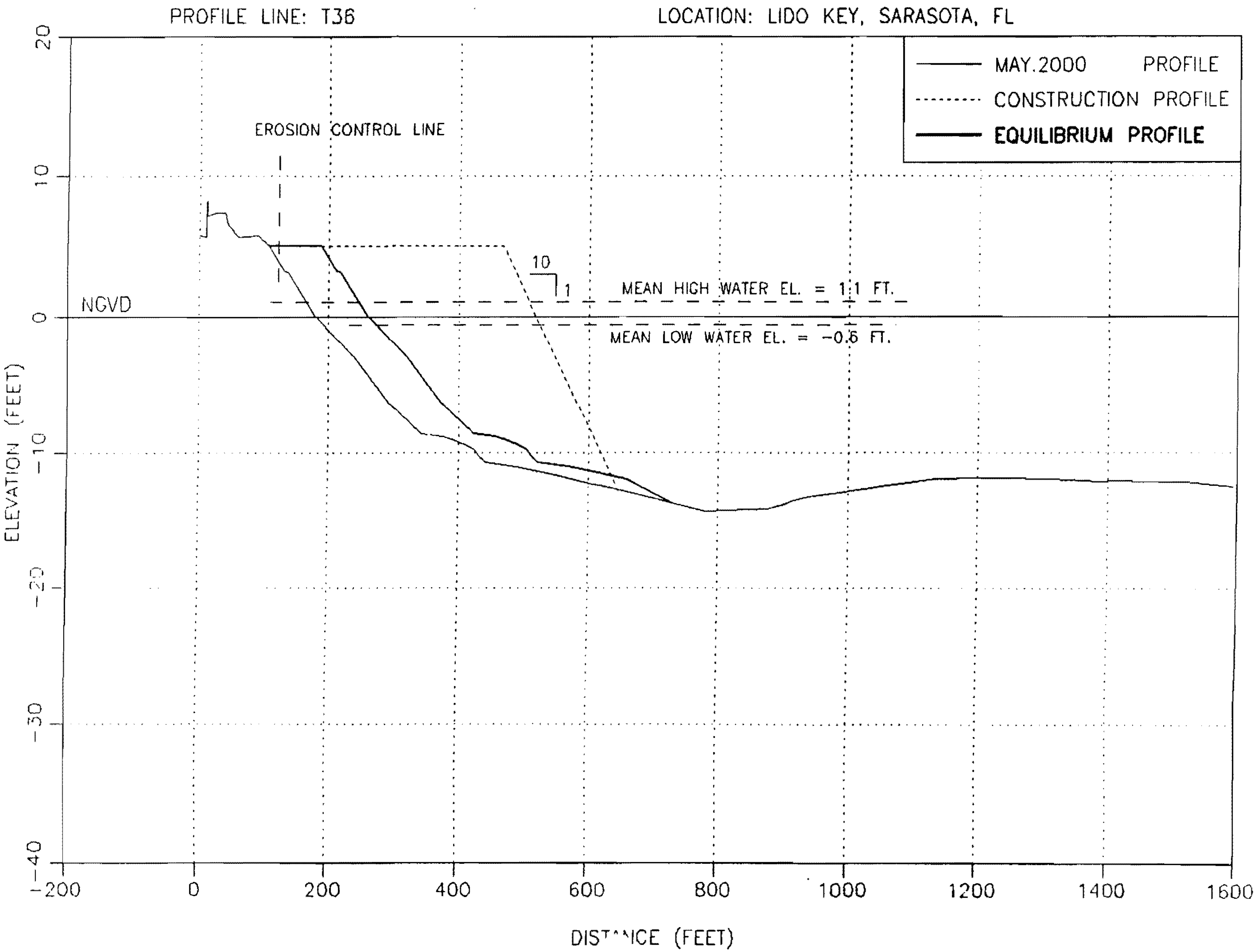
SUB-APPENDIX A-1

BEACH FILL DESIGN PROFILES

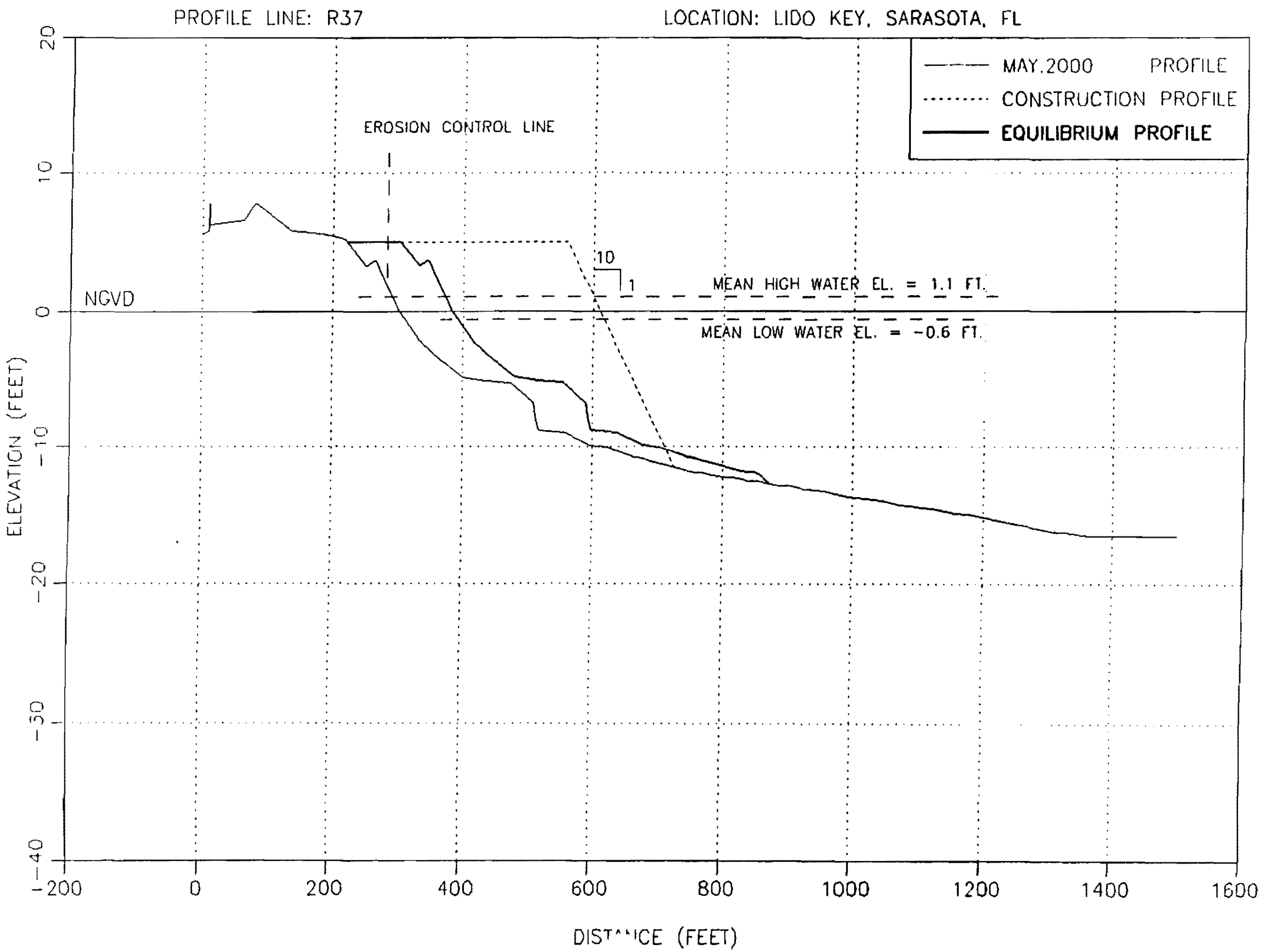
(NOTE: The beach fill design profile is marked as the "Equilibrium Profile")

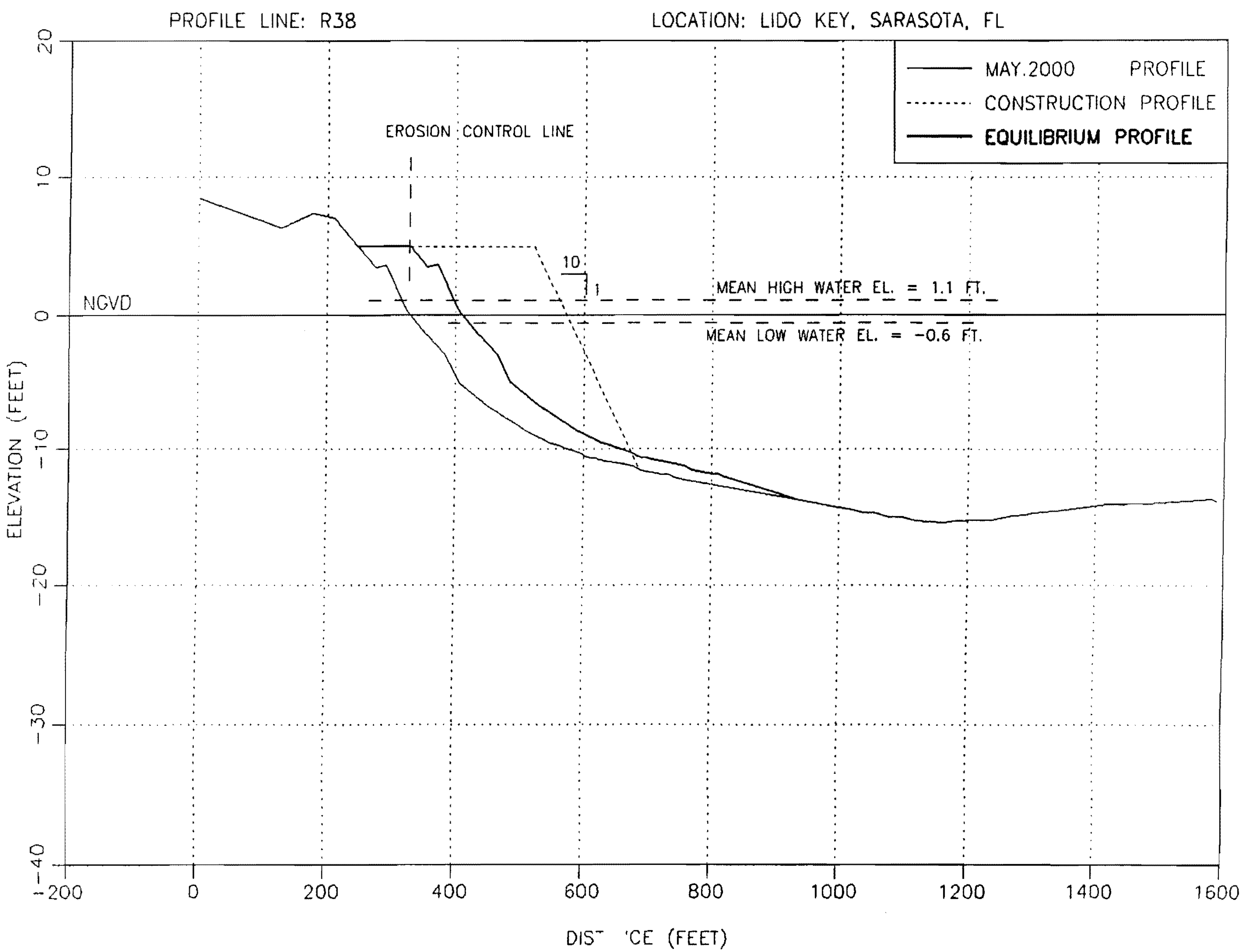


PROFILE LINE: R35
LOCATION: LIDO KEY, SARASOTA, FL
MAY.2000 PROFILE
CONSTRUCTION PROFILE
EQUILIBRIUM PROFILE
EROSION CONTROL LINE
10
1
MEAN HIGH WATER EL. = 1.1 FT.
NGVD
MEAN LOW WATER EL. = -0.6 FT.
ELEVATION (FEET)
20
10
0
-10
-20
-30
-40
-200
0
200
400
600
800
1000
1200
1400
1600
DIST 'CE (FEET)

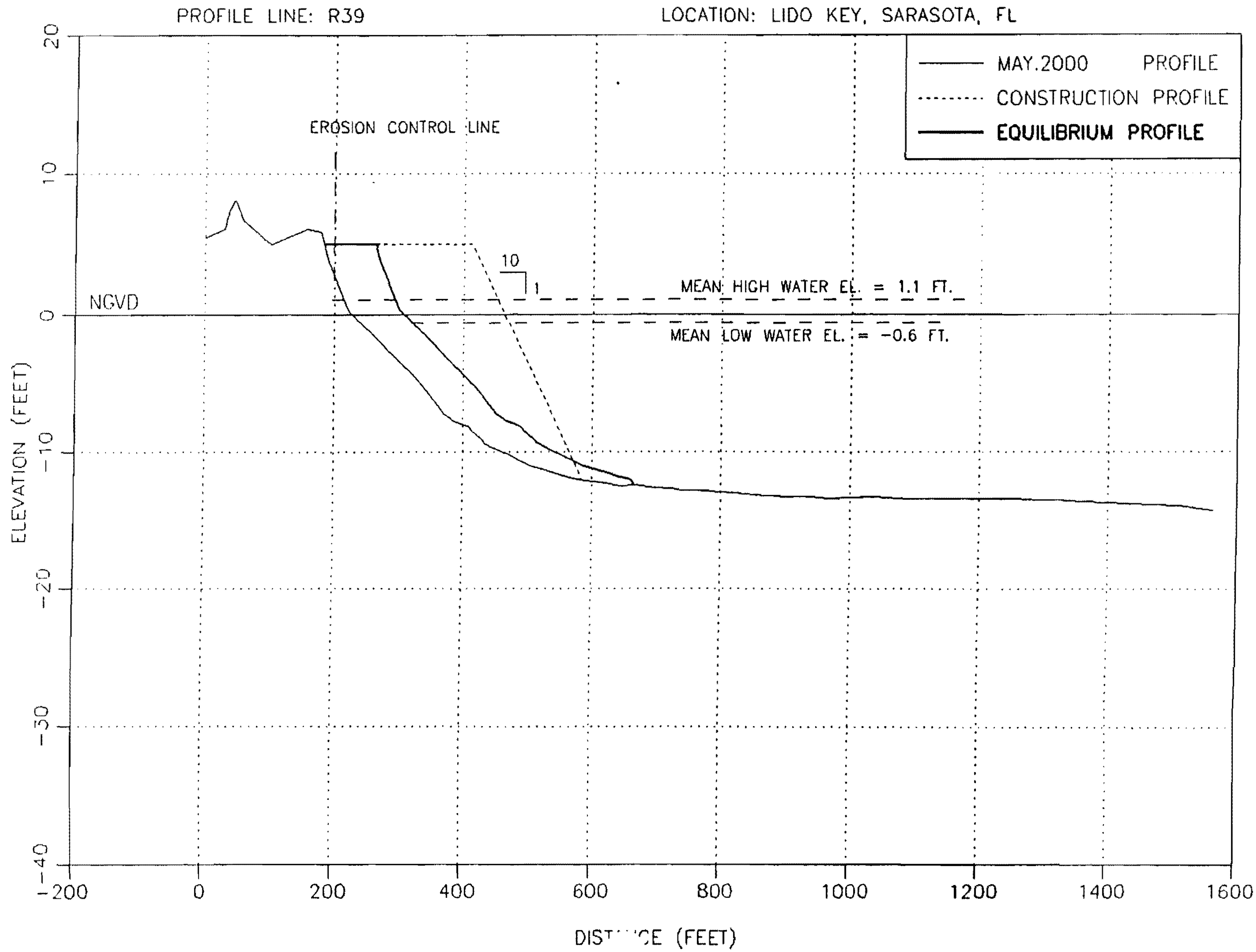


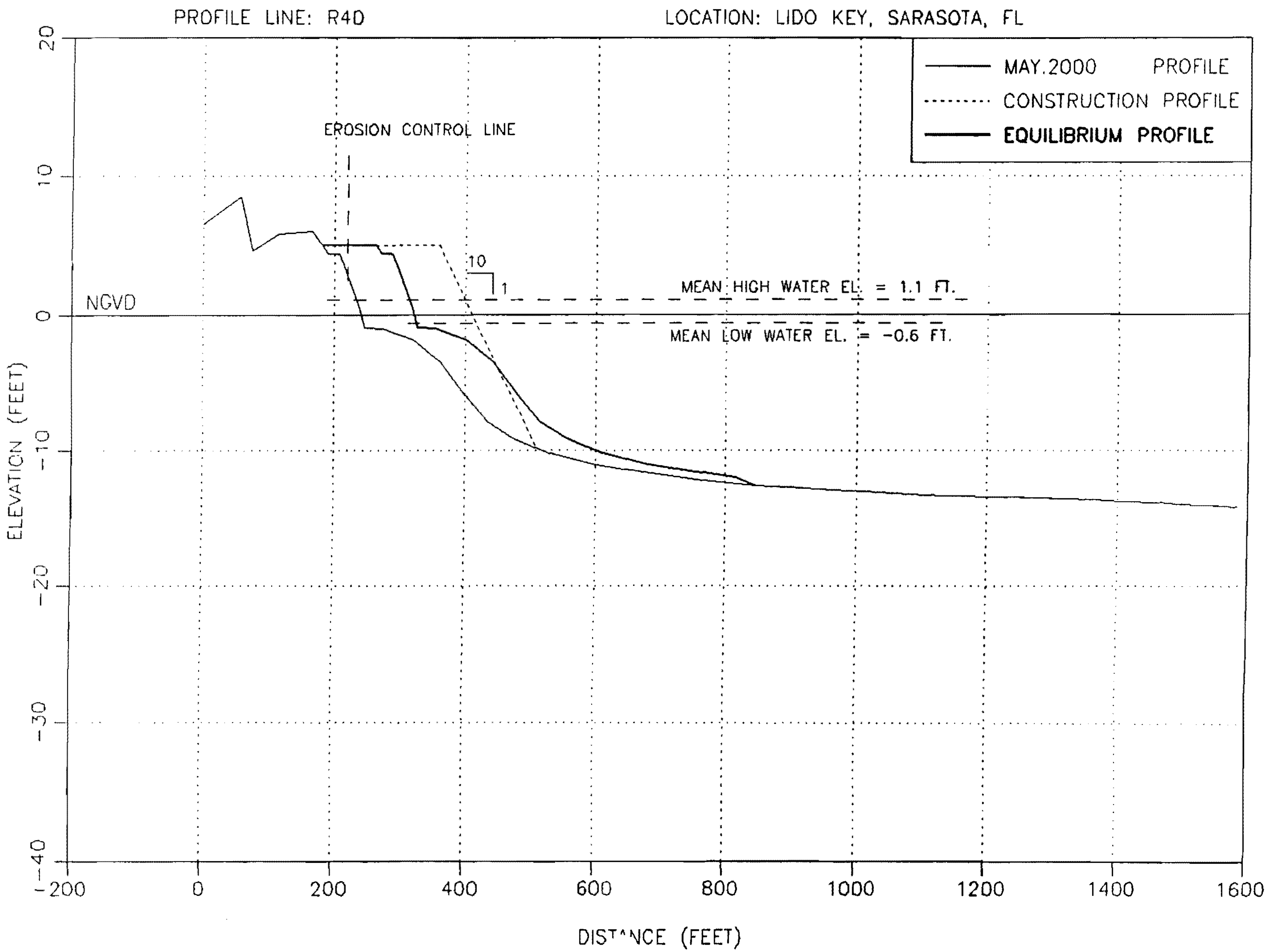
PROFILE LINE: T36
LOCATION: LIDO KEY, SARASOTA, FL
MAY.2000 PROFILE
CONSTRUCTION PROFILE
EQUILIBRIUM PROFILE
EROSION CONTROL LINE
10
1
MEAN HIGH WATER EL. = 1.1 FT.
NGVD
MEAN LOW WATER EL. = -0.6 FT.
ELEVATION (FEET)
20
10
0
-10
-20
-30
-40
-200
0
200
400
600
800
1000
1200
1400
1600
DIST^NCE (FEET)

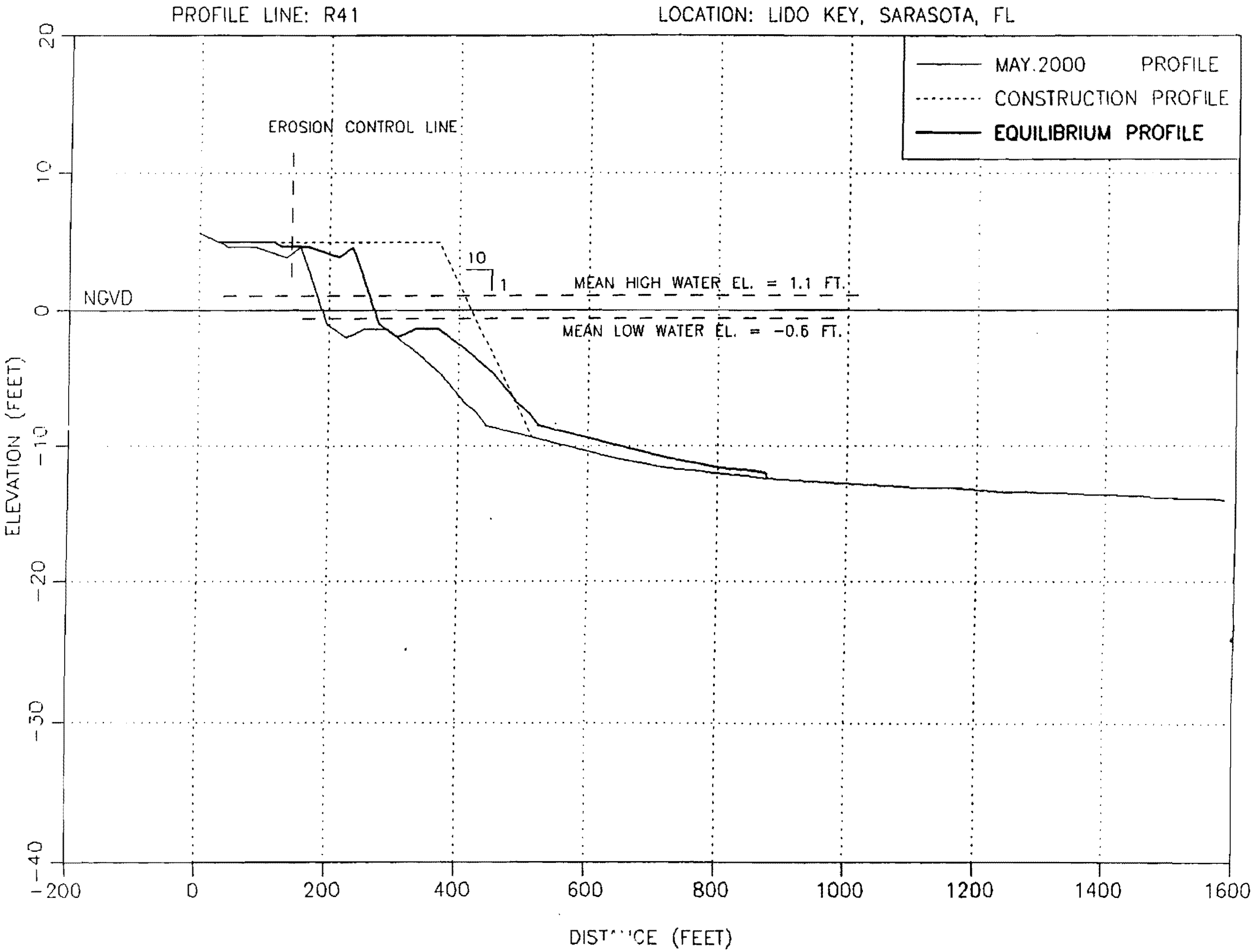

PROFILE LINE: R37
LOCATION: LIDO KEY, SARASOTA, FL
MAY.2000 PROFILE
CONSTRUCTION PROFILE
EQUILIBRIUM PROFILE
EROSION CONTROL LINE
10
1
MEAN HIGH WATER EL. = 1.1 FT.
NGVD
MEAN LOW WATER EL. = -0.6 FT.
20
10
0
-10
-20
-30
-40
-200
0
200
400
600
800
1000
1200
1400
1600
ELEVATION (FEET)



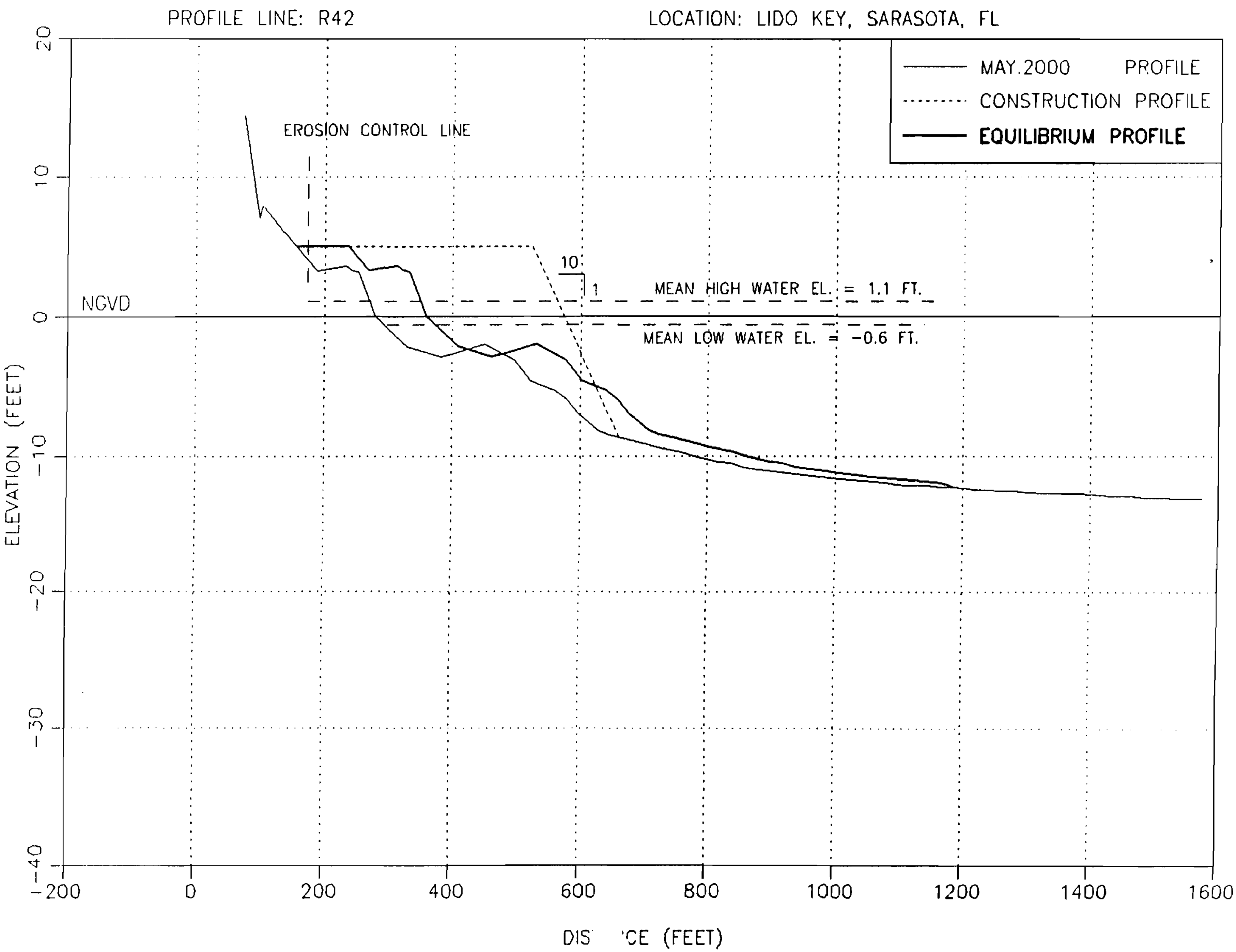
PROFILE LINE: R38
LOCATION: LIDO KEY, SARASOTA, FL
MAY.2000 PROFILE
CONSTRUCTION PROFILE
EQUILIBRIUM PROFILE
EROSION CONTROL LINE
10
1
MEAN HIGH WATER EL. = 1.1 FT.
NGVD
MEAN LOW WATER EL. = -0.6 FT.
ELEVATION (FEET)
20
10
0
-10
-20
-30
-40
-200
0
200
400
600
800
1000
1200
1400
1600
DIST 'CE (FEET)


PROFILE LINE: R39
LOCATION: LIDO KEY, SARASOTA, FL
MAY.2000 PROFILE
CONSTRUCTION PROFILE
EQUILIBRIUM PROFILE
EROSION CONTROL LINE
10
1
NGVD
MEAN HIGH WATER EL. = 1.1 FT.
MEAN LOW WATER EL. = -0.6 FT.
ELEVATION (FEET)
20
10
0
-10
-20
-30
-40
-200
0
200
400
600
800
1000
1200
1400
1600
DIST''CE (FEET)

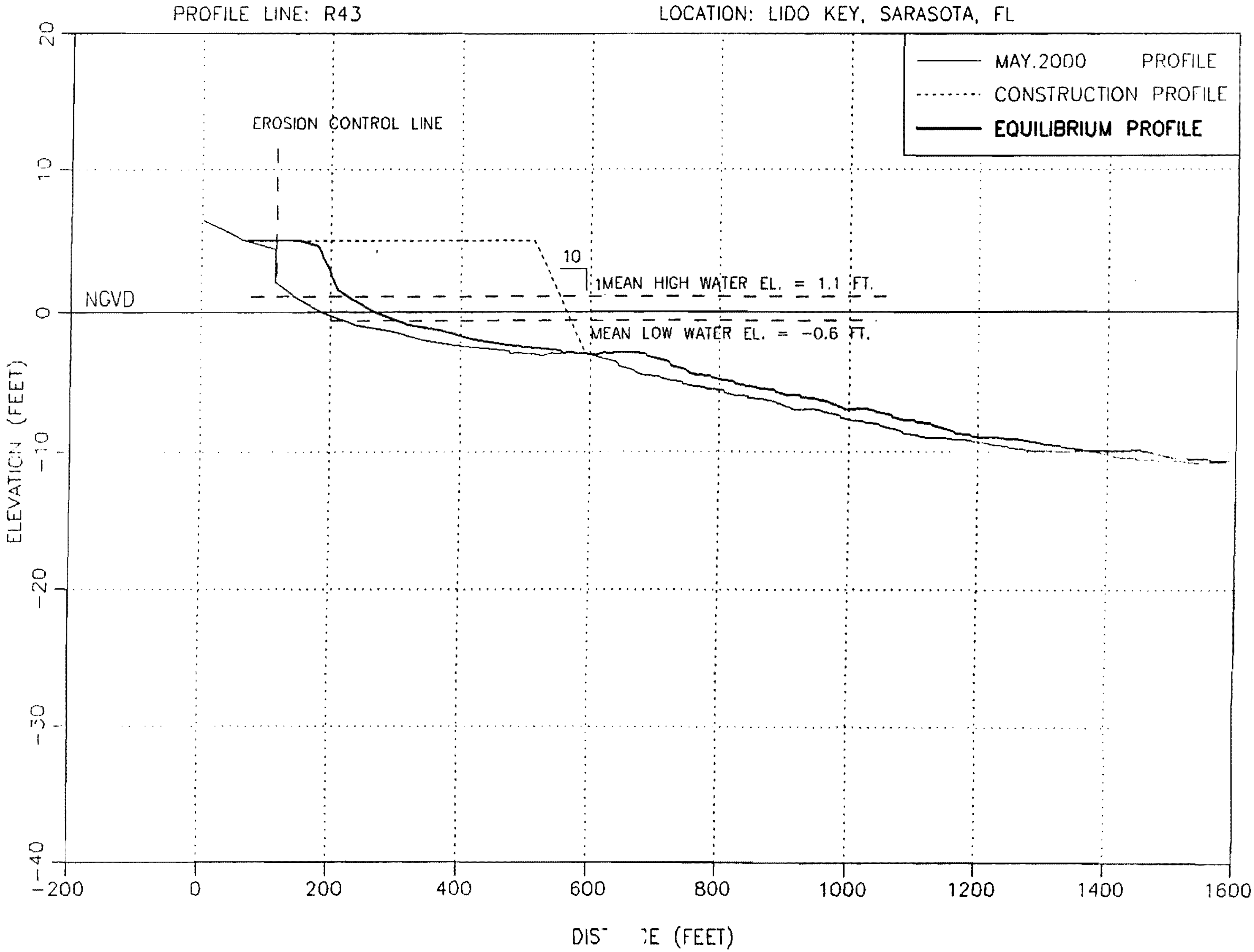

PROFILE LINE: R4D
LOCATION: LIDO KEY, SARASOTA, FL
MAY.2000 PROFILE
CONSTRUCTION PROFILE
EQUILIBRIUM PROFILE
EROSION CONTROL LINE
10
1
MEAN HIGH WATER EL. = 1.1 FT.
NGVD
MEAN LOW WATER EL. = -0.6 FT.
ELEVATION (FEET)
20
10
0
-10
-20
-30
-40
-200
0
200
400
600
800
1000
1200
1400
1600
DIST^NCE (FEET)

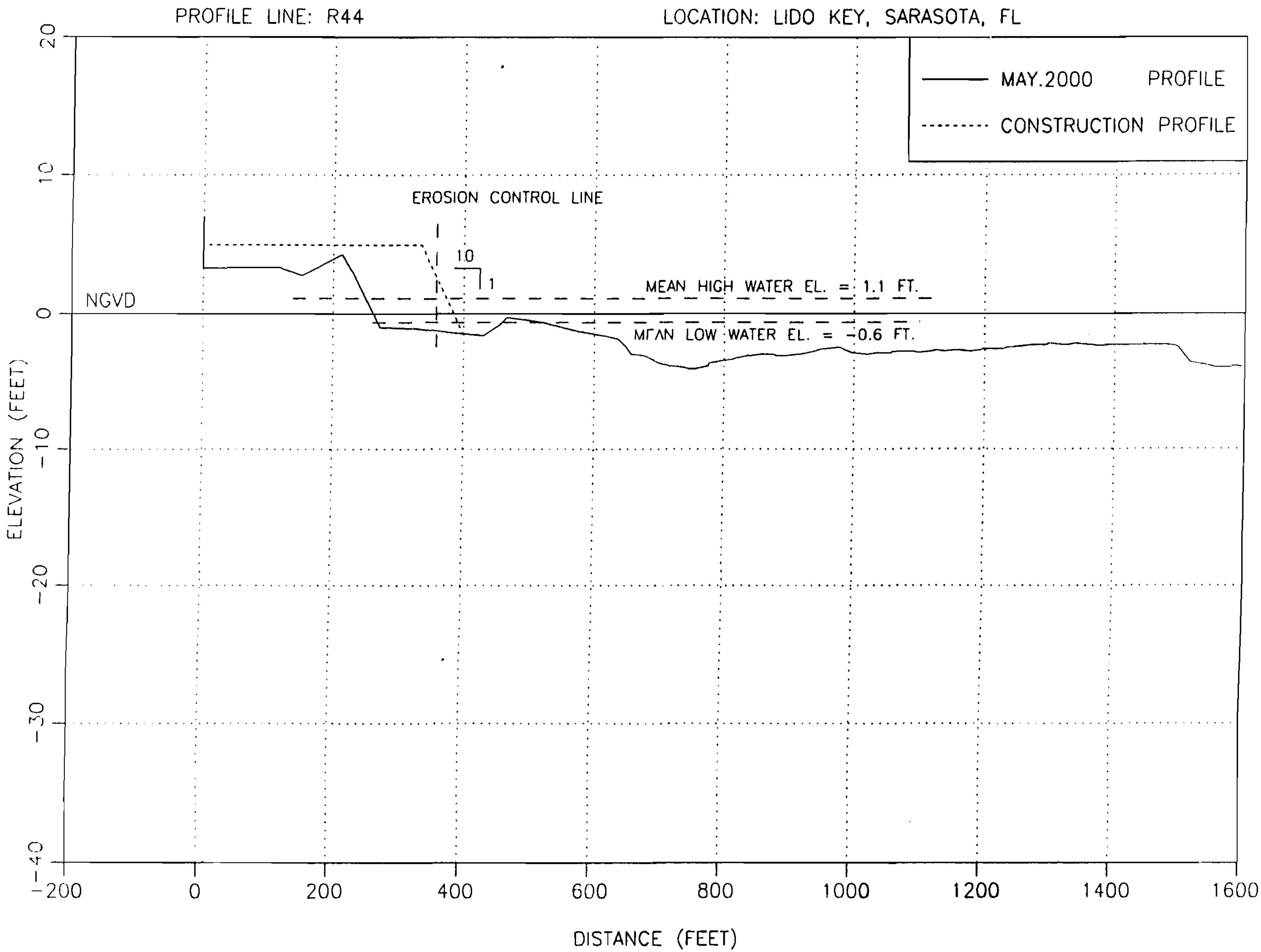


PROFILE LINE: R41
LOCATION: LIDO KEY, SARASOTA, FL
MAY.2000 PROFILE
CONSTRUCTION PROFILE
EQUILIBRIUM PROFILE
EROSION CONTROL LINE
10
1
MEAN HIGH WATER EL. = 1.1 FT.
MEAN LOW WATER EL. = -0.6 FT.
NGVD
ELEVATION (FEET)
20
10
0
-10
-20
-30
-40
-200
0
200
400
600
800
1000
1200
1400
1600
DIST''CE (FEET)



PROFILE LINE: R42
LOCATION: LIDO KEY, SARASOTA, FL
MAY.2000 PROFILE
CONSTRUCTION PROFILE
EQUILIBRIUM PROFILE
EROSION CONTROL LINE
10
1
MEAN HIGH WATER EL. = 1.1 FT.
NGVD
MEAN LOW WATER EL. = -0.6 FT.
ELEVATION (FEET)
20
10
0
-10
-20
-30
-40
-200
0
200
400
600
800
1000
1200
1400
1600
DIS 'CE (FEET)


PROFILE LINE: R43
LOCATION: LIDO KEY, SARASOTA, FL
MAY.2000 PROFILE
CONSTRUCTION PROFILE
EQUILIBRIUM PROFILE
EROSION CONTROL LINE
10
1
MEAN HIGH WATER EL. = 1.1 FT.
NGVD
MEAN LOW WATER EL. = -0.6 FT.
ELEVATION (FEET)
20
10
0
-10
-20
-30
-40
-200
0
200
400
600
800
1000
1200
1400
1600
DIST CE (FEET)


PROFILE LINE: R44
LOCATION: LIDO KEY, SARASOTA, FL
MAY.2000 PROFILE
CONSTRUCTION PROFILE
EROSION CONTROL LINE
10
1
MEAN HIGH WATER EL. = 1.1 FT.
NGVD
MEAN LOW WATER EL. = -0.6 FT.
ELEVATION (FEET)
20
10
0
-10
-20
-30
-40
-200
0
200
400
600
800
1000
1200
1400
1600
DISTANCE (FEET)

APPENDIX B

GEOTECHNICAL REPORT

APPENDIX B

LIDO KEY, SARASOTA COUNTY, FLORIDA
FEASIBILITY PHASE STUDY
GEOTECHNICAL APPENDIX

Prepared for:

U.S. Army Corps of Engineers
Jacksonville District

Prepared by:

Coastal Planning & Engineering, Inc.

JULY 2001

APPENDIX B
LIDO KEY, SARASOTA COUNTY, FLORIDA
FEASIBILITY PHASE STUDY
GEOTECHNICAL APPENDIX

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF SUB-APPENDICES

APPENDIX B

LIDO KEY, SARASOTA COUNTY, FLORIDA

FEASIBILITY PHASE STUDY

GEOLOGY

B-1. Regional Geology. Florida is a part of the eastern Gulf of Mexico sedimentary basin. This is further divided into the North Gulf Coast sedimentary province and Florida Peninsula sedimentary province, with the Levy-Nassau County line being the approximate division between each sedimentary providence. Lido Key is located in the Florida Peninsula sedimentary province, which is characterized by non-clastic sediments, predominantly carbonates and anhydrites. The Florida Peninsula sedimentary province also includes a South Florida embayment of the Gulf of Mexico basin with its center of deposition passing through the southern archipelago and paralleling the coast.

B-2. The Florida peninsula has apparently rimmed the Gulf Coast Geosyncline since at least the Early Cretaceous, perhaps as early as the late Paleozoic period. The dominant subsurface structure is the peninsular arch, a Paleozoic-Mesozoic movement that was modified by Cretaceous structures including the Broward Syncline, South Florida embayment connecting shelves. Early Miocene structural movements formed the Ocala uplift, the Chattahoochee anticline, the Kissimmee faulted flexure, the Sanford high, the Osceola low and other shallow contemporary features.

B-3. The Florida platform developed partially as a result of a large open seaway that extended from the Panama City area to Savannah, Georgia. Water flowing through this seaway (Suwannee straits) prevented siliciclastic sands and muds, which were being shed off the southern Appalachian Mountains, from burying the carbonate sedimentation occurring on the Florida Platform (Chen, 1965; McKinney, 1984; Pinet and Popenoe, 1985). However, with time, the Suwannee Straits filled in with sediment and the quartz sands presently found on the beaches were transported south onto the Florida Platform. As there is no evidence of large south-flowing rivers, it is assumed most of the clastic sediment was carried south onto peninsular Florida in the coastal longshore transport system.

B-4. The present State of Florida is the subaerial portion of a carbonate platform (Chen, 1965) that, during the period of high sea level, formed a shallow tropical sea 500 miles long and 400 miles wide. This warm, clear water environment was similar to the modern Bahama Banks in that the sediments produced were almost entirely calcium carbonate (Chen, 1965). These carbonate sediments eventually lithified to create the limestone formations that presently underlie the state. Since the Mesozoic Period {~200 million years b.p. (before present)}, the plateau has been alternately dryland or covered by shallow seas. Around 4,000 feet (in north central Florida) to 20,000 feet (in southernmost Florida) of carbonate and marine sediments were deposited. Either during the same time or during a later period of emergence there appears to have been a tilting of the plateau along its longitudinal axis. This caused a partial submergence of the west coast. Wide estuaries and offshore channels found on this coast are suggestive of submergence.

B-5. The west-central Florida coast barrier-island chain sits near the center of a broad, gently sloping carbonate platform. The continental shelf is underlain by limestone bedrock with a thin, discontinuous cover of sand deposits of both quartz and carbonate origin. Previously it was generally thought that the sand resources were evenly distributed on the continental shelf. However, investigations by USGS and collaborators reveal that sand is concentrated in specific nearshore areas and is of limited thickness (Brooks, et al., 1999).

B-6. Local Geology. Sarasota County lies within the Coastal Lowlands, which are characterized by terraced level plains. The series of marine terrace deposits of the Pleistocene Period (~1.8 million years b.p.) dominate the topography.

B-7. Lido Key is one of several sandy barrier islands along the 35-mile Gulf shoreline of Sarasota County (Figure B-1). It is situated about 2 miles off the mainland. It is about 2.5 miles long and 0.5 miles across at its widest point. Lido Key is bounded in the north by New Pass, which separates Lido and Longboat Keys. Big Sarasota Pass separates Lido Key from Siesta Key to the south (Figure B-1).

B-8. Lido Key is an artificially created barrier island. Prior to the 1920's, the Key consisted of a group of small and detached mangrove islands surrounded by shallow seagrass beds. This group of islands, known as the Cerol Isles (as designated on U.S. Coast & Geodetic Survey charts of the area dating from 1883) was filled by John Ringling in the early to mid–1920's to provide residential and commercial development opportunities for the area (Coastal Planning & Engineering, Inc., 1991). The origin of New Pass is attributed to the passage of a hurricane on September 22, 1848 that breached Longboat Key (Coastal Engineering Laboratory, University of Florida, 1959). It is unclear when Big Sarasota Pass was initially formed, however, historical shoreline changes indicate that the inlet formed prior to 1883.

INVESTIGATIONS PERFORMED

B-9. Previous Investigations. A number of offshore investigations of the study area have been undertaken since 1968 when the U.S. Army Corps of Engineers obtained five cores 2,000 feet offshore of Longboat Key (USACE, 1968). Studies include sand search investigations undertaken by Coastal Planning & Engineering, Inc., offshore of Lido Key (CPE 1992a-b, 1995a-c and 1999a), Longboat Key (CPE, 1995d) and Anna Maria Island (CPE, 1999b). A regional offshore investigation was also conducted by the USGS (Brooks, et al., 1998). Salient points of marine surveys and geotechnical studies undertaken prior to present investigation in and around the study area are incorporated hereunder. This information was considered in the plan formulation for geotechnical investigations conducted as part of the present geotechnical study.

B-10. The U.S. Army Corps of Engineers (USACE, 1968) obtained five vibracores, 2,000 feet offshore of Longboat Key extending 11,000 ft south from the Manatee-Sarasota County. The sediments were found to be silty, ranging in thickness from four to eight feet and averaging about seven feet (Balsillie and Clark, 1999).

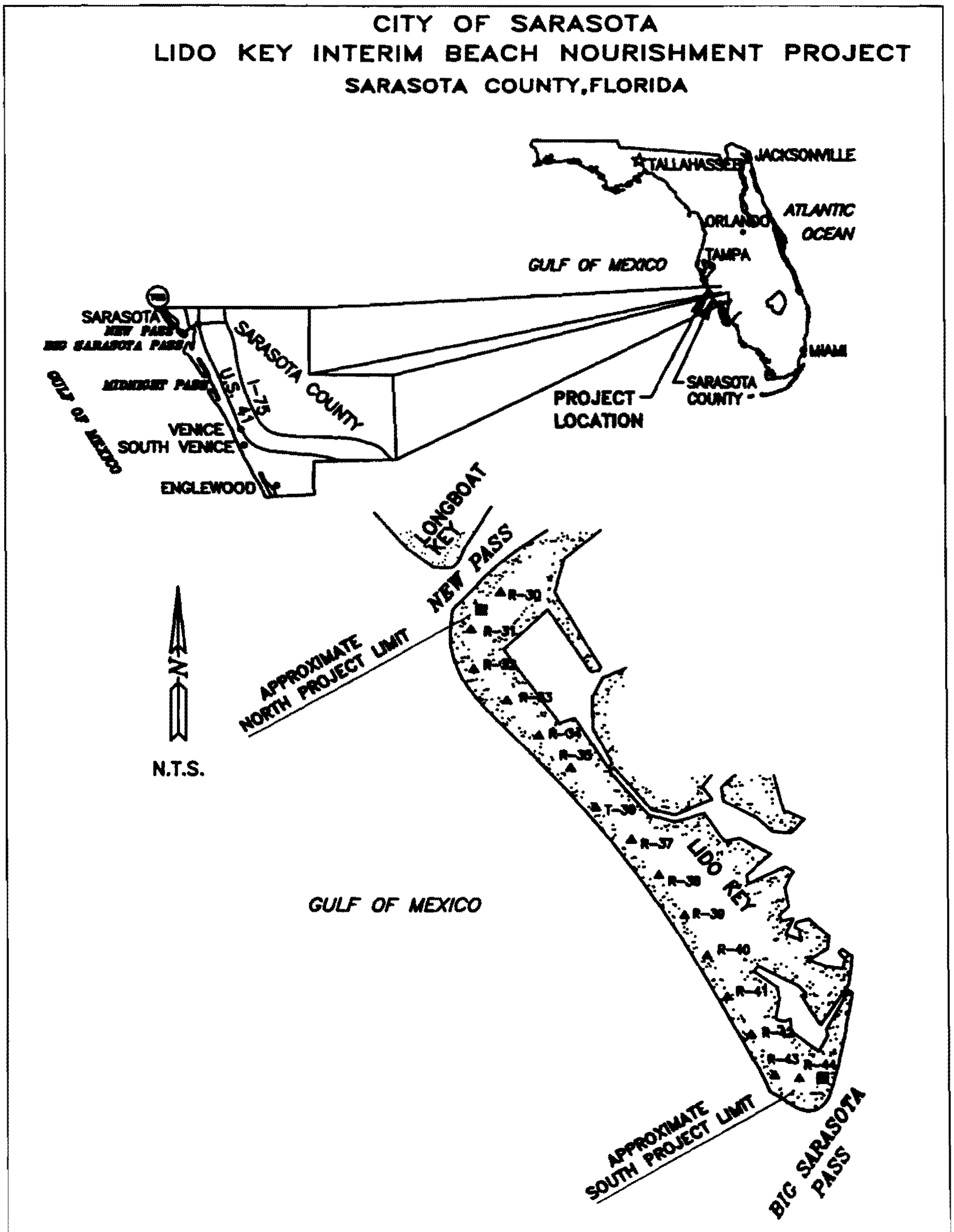


FIGURE B–1

LIDO KEY BEACH
NOURISHMENT PROJECT
LOCATION MAP

COASTAL PLANNING & ENGINEERING, INC.

B-11. The U.S. Army Corps of Engineers (USACE, 1984) reported on the results of a county-wide sand inventory program conducted in 1980. The program consisted of high-resolution sub-bottom seismic profiling, and vibracore sampling. Geophysical profile line spacing was typically 4,000 feet, and vibracore samples were taken in areas of potential sand sources. Isopach results from the study area indicated the sand thickness ranged from less than 2 feet to over 25 feet but the typical thickness was less than 10 feet. Sediment found within the channels and in adjacent shoals at New Pass and Big Sarasota Pass was determined to be suitable for beach nourishment.

B-12. The U.S. Army Corps of Engineers (USACE, 1990) updated the previous investigations of the three potential borrow areas identified by the 1984 study. An updated stratigraphic section of the nearshore coastal reach from Longboat Key to Siesta Key was developed. This nearshore cross-section shows silty, fine to medium sand in the areas outside the influence of New Pass shoal. Cores within the influence of New Pass shoal show fine to medium, clean to slightly shelly, quartz sand. Volumes of borrow material were not disclosed (Balsillie and Clark, 1999). The ebb tidal shoals located offshore of the respective inlets were proposed as borrow areas. Only the southernmost portion of the New Pass shoal was evaluated, due to its proximity to Lido beach. The northern portion of Big Sarasota Pass shoal, north of the natural channel, was also investigated.

B-13. In 1992, a geotechnical/hydrographic survey (bathymetric, side scan sonar and magnetic) of the ebb shoals at New Pass and Big Sarasota Pass was conducted to identify potential sand sources for placement on the Lido Key Public Beach by Coastal Planning & Engineering, Inc., (CPE, 1992b).

B-14. On the basis of these surveys and collection of 16 vibracores, it was estimated that about 3,200,000 cubic yards of sand were available in the Big Sarasota Pass proposed borrow area (mean grain size = 0.27 mm) while 674,000 cubic yards were available in the New Pass proposed borrow area (mean grain size = 0.25 mm). Thirteen beach sand samples were analyzed and the quality of the sand in borrow areas appeared to be compatible with the native beach sand on Lido Key, which has a mean grain size of 0.24 mm. Thus the sand sources located in the search are of sufficient quantity and quality to accomplish the Lido Key Beach Restoration project goals. Subsequent ground truthing, by SCUBA, of side scan sonar interpretation revealed the presence of scattered seagrass patches in the northeastern portion of the Big Sarasota Pass ebb shoal. Investigations of the remaining side scan sonar sites revealed a sand/shell or sand/silt substrate, sometimes covered with detached algae. No hard-bottom formations or other significant bottom features were observed. Although favorable, these areas were not used as sand sources due to local concern that dredging of the ebb shoals would increase beach erosion.

B-15. During 1994/1995, geotechnical investigations were conducted by Coastal Planning & Engineering, Inc., (CPE, 1995a) to locate and identify potential offshore sources of suitable sand for the Lido Key Restoration Project. These offshore sources were intended to replace the borrow sites located at the ebb tidal shoals at New Pass and Big Sarasota Pass. A bathymetric survey of the offshore area identified five sand ridge formations with four (1, 2, 3, and 4) potential borrow areas. Ten jet probes were conducted at four sites.

B-16. The results indicated that the most favorable sites were Borrow Area LKBA-1 (about five miles southwest of New Pass) and LKBA-4 (approximately six miles west of New Pass) and so these were investigated in detail (Figure B-2). Twenty-one vibracores were collected from Borrow Areas 1 and 4. Approximately 552,000 cubic yards of beach compatible sand were located in LKBA–1 and about 351,000 cubic yards in LKBA-4, totaling about 903,000 cubic yards.

B-17. A magnetometer survey of two offshore borrow areas (LKBA-1 and LKBA-4) was undertaken by Coastal Planning & Engineering, Inc. in April 1995 (CPE, 1995c). A total of fifty-seven east to west survey lines were run with one hundred foot spacings. No magnetic anomalies were detected within these proposed borrow areas. The cultural resource investigation found no indication of historical resources at or adjacent to either borrow area.

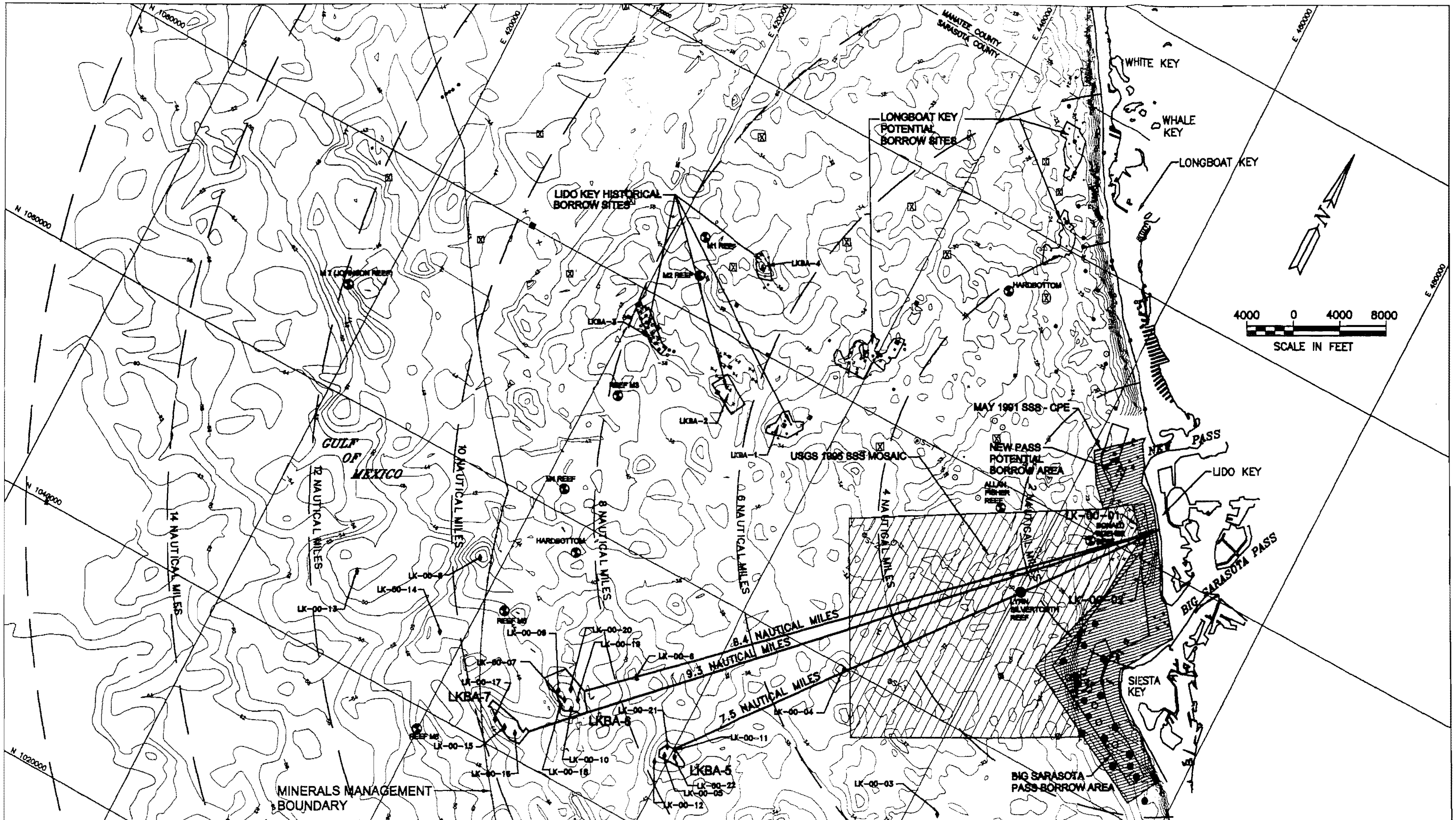
B-18. A cooperative study effort among the USGS, the University of South Florida Marine Science and Geology Departments, and the Eckerd College Marine Geology Program was carried out from 1994 to 1997. Along the west coast of Florida, in the area extending from Anclote Key in the north to Venice Inlet in the south and approximately 30 km offshore, side scan sonar (100 kHz) surveys and high resolution (1-3 kHz) seismic reflection profiling were undertaken simultaneously to obtain a coupled image of the seabed. Side scan sonar mosaics were generated to obtain a broader, detailed perspective of the seabed in key areas of interest (Figure B-2).

B-19. Several formations were delineated from the mosaics prepared from imagery. The oldest formation appears to be outcrops of Miocene strata and associated hard ground. Holocene siliciclastic sand was mapped. This has been distinguished from carbonate gravel/shell hash and coral debris of the same age. Hard ground overlying Quaternary and Holocene sediments were also delineated. Crests of the linear sand ridges were mapped. Side scan sonar imagery off Sarasota reveals that fine sand is concentrated in long linear ridges, and in ebb tidal deltas located off tidal inlets (USGS Fact Sheet #97-069).

B-20. Between October 1994 and September 1997, 123 vibracores were collected onboard the R/V G.K. Gilbert and samples were generated from the cores and analyzed for grain size, calcium carbonate content, and total organic content (TOC). Acoustic data were mated with direct sampling of the seabed and shallow subsurface for complete interpretation (Brooks, et al., 1999).

B-21. Surface sediment in the study area consists predominantly of a mixture of carbonate and siliciclastic sand, but vibracore sediment exhibits a variety of sedimentary facies represented by a broad range of textures and compositions.

B-22. Surface sediment on the shelf is indicative of a mixed carbonate/siliciclastic system. A detailed study of inner shelf indicates that no nearshore quartz sand band exists, but that the surface sediments consist of a patchy and discontinuous mixture of quartz and carbonate sand and gravel, occasionally interrupted by outcrops of the underlying platform surface.



LEGEND:

◊ LK-00-15	DENOTES 2000 CPE CORES
	DENOTES 1998 CPE CORES
	DENOTES 1996 SAR CORES
	DENOTES 1995 CPE CORES
	DENOTES 1995 USGS CORES
	DENOTES 1993 WF CORES
S-1	DENOTES 1980 COE CORES
	DENOTES 1968 COE CORES
×	DENOTES 1998 CPE JET PROBES
	DENOTES 1995 CPE JET PROBES
	DENOTES 1994 CPE JET PROBES
M 7 (JOHNSON REEF)	DENOTES DIVE SITES TAKEN FROM WATERPROOF CHART #155F AND WATERPROOF TOP SPOT MAP # N202

LIDO KEY - SARASOTA COUNTY
BORROW AREAS 5, 6, & 7
LOCATION MAP AND
HISTORIC STUDY AREAS

COASTAL PLANNING & ENGINEERING, INC.
2481 NW BOCA RATON BLVD.
BOCA RATON, FL 33431

FIGURE B-2

B-23. Approximately 281,000 cubic yards of sand were placed along 4,950 feet of beach on the Lido Key gulf shoreline, Sarasota County, between DEP monuments R-35 and R-40 during April –May 1998. Fill material from Borrow Area LKBA-1 and Borrow Area LKBA-4 was used for the project (CPE, 1999a).

B-24. Three comparative surveys carried out by Coastal Planning & Engineering, Inc. were conducted during the 1998-1999 monitoring period (CPE, 2000). Beach monitoring was conducted for profile lines R-35 through R-30.

B-25. Coastal Planning and Engineering Inc., contracted Tidewater Atlantic Research, Inc., to conduct a systematic magnetometer and side scan sonar survey to locate, identify and assess the significance of any underwater cultural material in Borrow Area LKBA-3 (Figure B-2) (Tidewater Atlantic Research, 2000). An EG&G Geometrics 866 dual channel proton precession magnetometer and a 500 kHz Klein 521 high resolution side scan sonar were employed to collect magnetic and acoustic data along selected transects at 100 foot intervals. A magnetic contour map (at 10-gamma intervals) of the survey area was produced. Neither assessment of the raw field data nor contour plotting of the data resulted in any magnetic anomalies in the proposed borrow area. Examination of sonar records confirmed no images had been produced that were suggestive of bottom surface cultural material.

B-26. Construction began in March 2001 of a Lido Key beach nourishment project in the southern portion of the key. Fill material from Borrow Area LKBA-3 was used to construct the project. Approximately 380,000 cubic yards of sand was placed. The construction was completed in late April 2001.

B-27. Recent Investigation. The purpose of this investigation was to locate, delineate, and evaluate areas of offshore sand deposits suitable for use in the Lido Key renourishment program. The area of investigation extends from New Pass in the north to Big Sarasota Pass in the south and up to about 11 nautical miles offshore (Figure B-2).

B-28. The investigation consisted of hydrographic surveys and geotechnical evaluations used to delineate sand resources that could be used in future beach renourishment programs. The investigation included review of all historical geotechnical investigations conducted offshore of Lido Key, a side-scan sonar survey, bathymetric survey, cultural resources investigation and the collection of twenty-two vibracores. Vibracore logs are provided in Sub-Appendix B-1.

B-29. The objective of this investigation was to perform adequate sediment characterization to identify potential areas of sand suitable for use as beach fill. Areas previously identified as potential borrow areas were studied in detail to determine the suitability and quantity of material within those areas. The investigation was focused on three sites within the CPE Offshore Study Area (Figure B-2); Borrow Areas LKBA-5, LKBA-6 and LKBA-7.

B-30. Vibracores samples were analyzed to determine the characteristics of the sediment in terms of the mean grain size, specific gravity, shell content and soil classification. Specific gravity values are given in the Lido Key Vibracore Data Summary Sheet found in Sub-Appendix B-1. Mechanical sieve analyses were carried out for all samples tested, in accordance with the

American Society for Testing and Materials (ASTM) Standard Materials Designation D422-63 for particle size analysis of soils (ASTM, 1987). This method covers the quantitative determination of the distribution of sand size particles. Grain size statistics were computed using the moment method (Folk, 1974). Grain size distribution curves and gradation analysis reports are presented in Sub-Appendix B-1. Shell content was visually determined and classified according to U.S. Army Corps of Engineers specifications (USACE, 1985). Shell content estimates are listed in Table B-1.

Table B-1
Visual Estimate of Shell Content, Lido Key

Vibracore Number	Sample Number	Percent* Shell	Vibracore Number	Sample Number	Percent* Shell
VC-00-01	S#1	<5	VC-00-12	S#1	15
	S#2	5			
	S#3	20	VC-00-13	S#1	15
				S#2	40
VC-00-02	S#1	5		S#3	30
	S#2	5			
	S#3	<5	VC-00-14	S#1	30
	S#4	20		S#2	10
				S#3	5
VC-00-03	S#1	30			
	S#2	10	VC-00-15	S#1	10
				S#2	20
VC-00-04	S#1	30		S#3	5
	S#2	10			
			VC-00-16	S#1	20
VC-00-05	S#1	20		S#2	40
	S#2	10		S#3	40
	S#3	10		S#4	40
VC-00-06	S#1	40	VC-00-17	S#1	20
	S#2	30		S#2	20
	S#3	10			
			VC-00-18	S#1	5
VC-00-07	S#1	30		S#2	5
	S#2	30		S#3	30
	S#3	20			
	S#4	15	VC-00-19	S#1	5
				S#2	5
VC-00-08	S#1	5		S#3	30
	S#2	15	VC-00-20	S#1	30
	S#3	30		S#2	40
				S#3	5
				S#4	NA

VC-00-09	S#1	20			
	S#2	30			
	S#3	50			
	S#4	40	VC-00-21	S#1	15
	S#5	30		S#2	5
				S#3	5
VC-00-10	S#1	20			
	S#2	40	VC-00-22	S#1	20
	S#3	40		S#2	20
	S#4	30		S#3	5
				S#4	5
VC-00-11	S#1	40			
	S#2	5			
	S#3	15			

*Note: Shell content refers to shell hash, fragments and whole shell. Carbonate sand is excluded.

B-31. Vibracore data was then used to characterize the lateral and vertical extents of the sediment within the three areas. A bathymetric survey was performed to document water depths over the sand resources. The borrow areas were then further refined based on the results of a cultural resource investigation (Tidewater Atlantic Research, 2001) and a side-scan sonar survey to locate hardbottom formations.

B-32. Native Beach Sampling. Beach surface sand samples were collected along profiles R-37, R-39 and R-42 in Lido Key in February-April 2001. Samples were collected at seven locations along each profile (toe of dune, 3.0 ft., 0.00 ft. [mean tide level], -3.0 ft., -6.0 ft., -9.5 ft. [toe of fill] and –12.0 ft., NGVD). A sample at –12.0 ft on line R-39 was collected but not included within the beach analysis because it was obtained directly offshore of the dump pipe for the 2001 beach fill project and was apparently not representative of the beach.

B-33. Surface samples were analyzed to determine the characteristics of the sediment in terms of the mean grain size, and soil classification. Shell content was visually estimated and is provided in Table B-2. Mean grain size for the native beach samples are shown in Table B-3. An average mean grain size was computed for each line and the entire beach. Grain size distribution curves and gradation analysis reports are provided in Sub-Appendix B-2.

Table B-2
Visual Estimate of Shell Content, Lido Key Beach Samples

Location of Sample on Profile	Percent Shell* at R-37	Percent Shell* at R-39	Percent Shell* at R-42
Toe of Dune (Elevation Varies)	25	20	<5
3.0 ft.	25	40	15
0.42 ft. (Mean Tide Level)	40	30	<5
-3.0	15	15	<5
-6.0	<5	15	<5
-9.5 ft. (Toe of Fill)	0	15	<5
-12.0	5	NA	0

*Note: Shell refers to shell hash, fragments and whole shell. Carbonate sand is excluded.

Table B-3
Grain Size of Surface Samples Collected on Lido Key Beach Profiles
Mean Grain Size in Millimeters (including shell)

Location of Sample on Profile(1)	R-37	R-39	R-42
Toe of Dune (elevation varies)	0.23	0.26	0.23
3.0 ft	0.43	0.52	0.22
0.00 ft. (Mean Tide Level)	0.26	0.30	0.28
-3.0	0.23	0.35	0.14
-6.0	0.17	0.29	0.14
-9.5 ft. (Toe of Fill)	0.14	0.34	0.12
-12.0	0.14	NA	0.12
Profile Mean(2)	0.22	0.33	0.17

(1) Sample locations are those required in the project scope of work.
(2) Profile Means takes from composite curve (Sub-Appendix B-2).

RESULTS OF INVESTIGATION

B-33. The overall results are based on analyses of data collected during the entire survey.

B-34. Native Beach. In order to properly design a beach nourishment project, the condition of the existing native beach needs to be determined. It should be noted that native beach characteristics are based on the conditions existing at the time of study and do not necessarily correspond to natural characteristics. Lido native beach characteristics are not those of the natural beach, as it has undergone three nourishments. Characterization of the grain size distribution and active beach profile envelope is needed to properly define the volume of fill material required, the design template and suitability of the grain size distribution of the borrow material (USACE, 1991). A native beach model has been developed. All sample grain size statistics used for comparisons are shown in Table B-4.

Table B-4
Lido Key Composite Grain Data

Composite	Mean Grain Size		Standard Deviation (Sorting)	Percent Silt
	Phi	Mm		
Native Beach	2.08	0.24	1.21	1.93
LKBA-5	1.31	0.40	1.00	2.19
LKBA-6	1.55	0.34	1.07	4.05
LKBA-7	1.21	0.43	0.95	2.48

B-35. The composite grain size distribution for the 2001 sampling of Lido Key is shown on Figure B-3. The grain size statistics are shown in Table B-4. The frequency distribution curve (Figure B-3a) and the cumulative distribution (Figure B-3b) are shown. The composite mean grain size for the Lido Key beach is 2.08 phi (0.24 mm). The composite sorting value for Lido Key beach is 1.21 phi (moderately sorted). Shell content of the native material was visually estimated at 10% and ranged between 0% and 20%.

B-36. Borrow Area Investigations. Potential borrow sites were identified and selected for further investigation based on a review of previous studies and identification of offshore bathymetric features as mapped from NOAA data and charts. The Lido Key Borrow Area, located 3,000 to 4,000 feet off the Lido Key beaches, was selected for further review based on the economic benefits of the close proximity of the borrow area to the project area (Figure B-2). A portion of this borrow area was used in a 1969 renourishment of the Lido Key Beaches. Eight additional locations were selected for coring offshore of Lido Key. These locations were identified by CPE based on knowledge of the area and the presence of the bathymetric features found in NOAA data (National Ocean Service).

B-37. Two vibracores, LK-00-01 and LK-00-02, were taken in the Lido Key Borrow Area (Figure B-2). The mean grain size of the tested material in the cores was 0.16 mm for LK-00-01 and 0.13 mm for LK-00-02. No further investigations were conducted in this area.

B-38. The remaining twenty vibracores were taken in eight offshore sites. Each site was cored with two reconnaissance cores. The reconnaissance cores were split onboard and field analyzed. Onboard findings were reviewed by the Professional Engineer in charge of field operations, and were used to determine the location of subsequent cores. After the initial eight cores were taken, the investigation focused on the three most promising sites, Borrow Areas 5, 6 and 7 (Figure B-4). Five vibracores were taken in Borrow Area 5: LK-00-05, LK-00-11, LK-00-12, LK-00-21 and LK-00-22. Six vibracores were taken in Borrow Area 6: LK-00-07, LK-00-09, LK-00-10, LK-00-18, LK-00-19, and LK-00-20. Three vibracores were taken in Borrow Area 7: LK-00-15, LK-00-16 and LK-00-17.

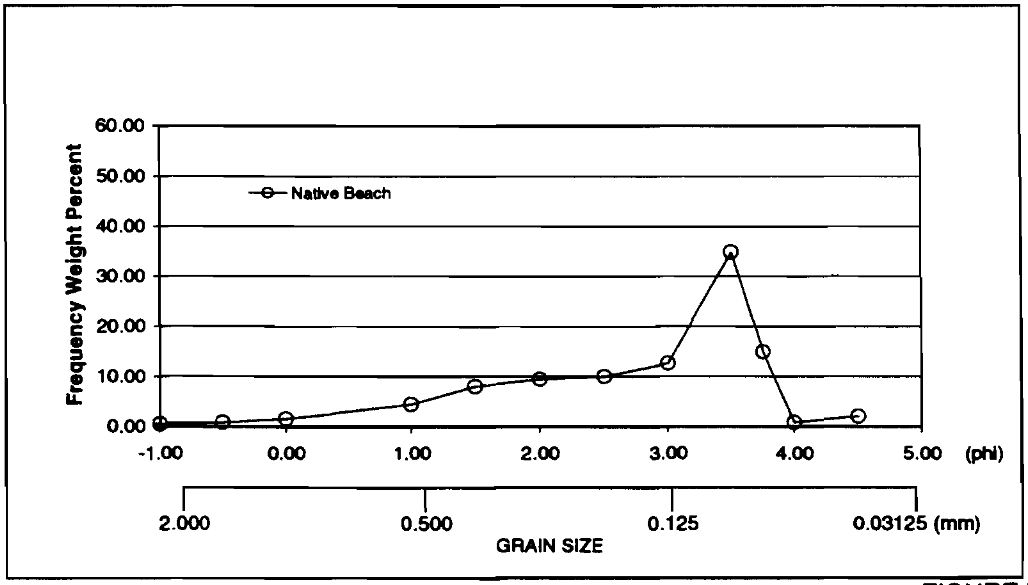


FIGURE B-3A

Suitability Analysis Frequency Grain Size Distribution.

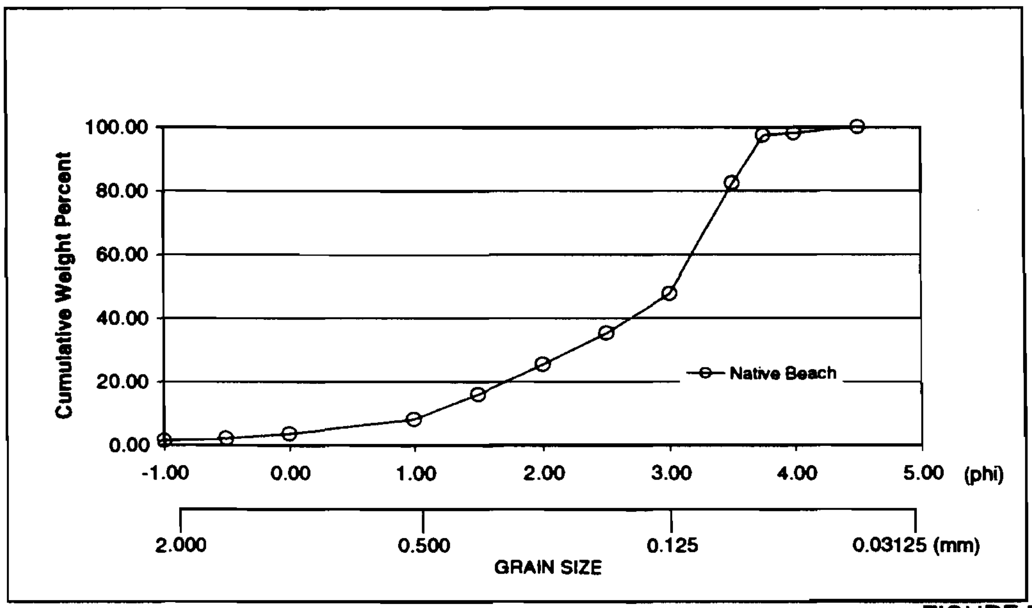


FIGURE B-3B

Suitabliity Analysis Cumulative Grain Size Distribution.

FIGURE B-3

SUITABILITY ANALYSIS GRAIN SIZE DISTRIBUTIONS FOR LIDO KEY NATIVE BEACH

Coastal Planning & Engineering, Inc.

B-39. Potential borrow areas were redefined based on the depth of unconsolidated material over limestone, and grain size distributions of the sediment. Each area is located on an isolated bathymetric features with shallower depths than the adjacent Gulf bottom, or bathymetric "high". In all three areas, unconsolidated material is mounded over a generally continuous and relatively flat limestone layer. The thickness of beach quality material in the three potential borrow areas ranges from 2 to 7 ft.

B-40. As discussed above, three areas were selected for detailed investigation. Borrow Area 5 is located 7.2 nautical miles offshore of Lido Key. The deposits in this area consist of medium grained sand, with low silt content (1.7% to 2.6%) mixed with some shell fragments/hash, overlying strata with higher silt content (5.9% to 23.0%). Vibracore LK-00-12 has relatively high silt content, therefore the area represented by LK-00-12 was excluded from the borrow area. The borrow area covers an area of 45 acres. A typical cross-section through Borrow Area 5 is shown in Figure B-5.

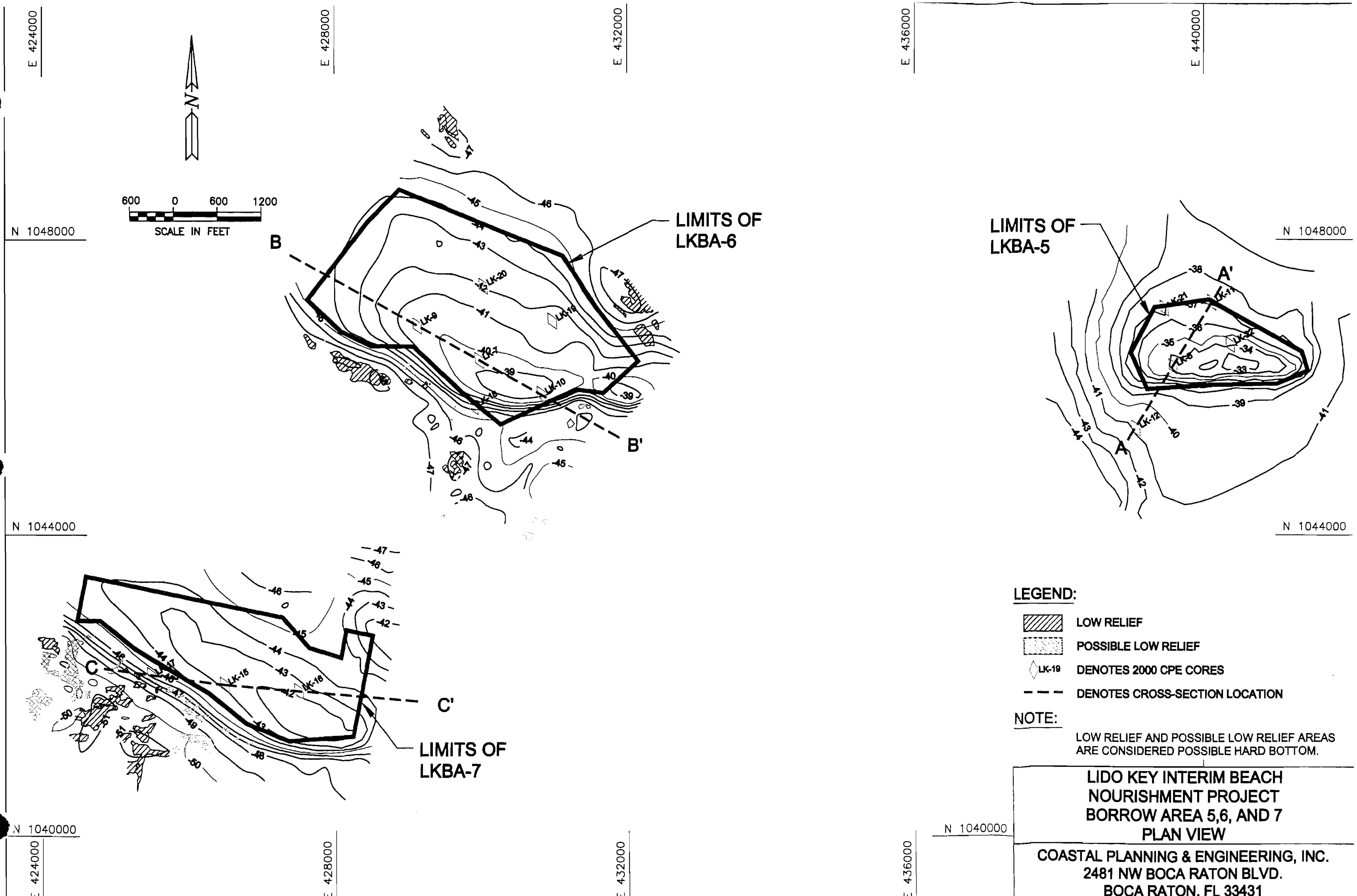
B-41. Borrow Area 6 is located 8.5 nautical miles offshore of Lido Key. The deposits in this area consist of medium grained sand, with low silt content (0.11% to 4.6%) mixed with some shell fragments/hash, overlying strata with higher silt content (6.2% to 25.2%). Vibracore LK-00-09 contains a clay layer below the higher silt strata. The borrow area covers an area of 173 acres. A typical cross-section through Borrow Area 6 is shown in Figure B-6.

B-42. Borrow Area 7 is located 9.5 nautical miles offshore of Lido Key. The deposits in this area consist of medium grained sand, with low silt content (1.7% to 3.0%) mixed with some shell fragments/hash, overlying strata with higher silt content (12.2% to 38.0%). Vibracore LK-00-15 has a layer of silt overlaying the limestone clast layer. The borrow area covers an area of 102 acres. A typical cross-section through Borrow Area 7 is shown in Figure B-7.

B-43. The composite mean grain size for the Lido Key Borrow Area 5 based on cores LK-00-05, LK-00-11, LK-00-21 and LK-00-22 is 1.32 phi (0.43 mm) with a sorting of 0.95 phi (moderately sorted). The composite mean grain size for the Lido Key Borrow Area 6 based on cores LK-00-07, LK-00-09, LK-00-10, LK-00-18, LK-00-19 and LK-00-20 is 1.63 phi (0.32 mm) with a sorting of 0.98 phi (moderately sorted). The composite mean grain size for the Lido Key Borrow Area 7 based on cores LK-00-15, LK-00-16 and LK-00-17 is 1.21 phi (0.43 mm) with a sorting of 0.92 phi (moderately sorted). Table B-3 shows the grain size data for the Lido Key borrow areas. Figure B-8 shows a graphic comparison of the grain size distribution for each area and the overall composite distribution.

B-44. After coring was completed, a cultural resources investigation, bathymetric survey and side scan sonar survey were conducted simultaneously. All three efforts concentrated on Borrow Areas 5, 6 and 7, and the surrounding area.

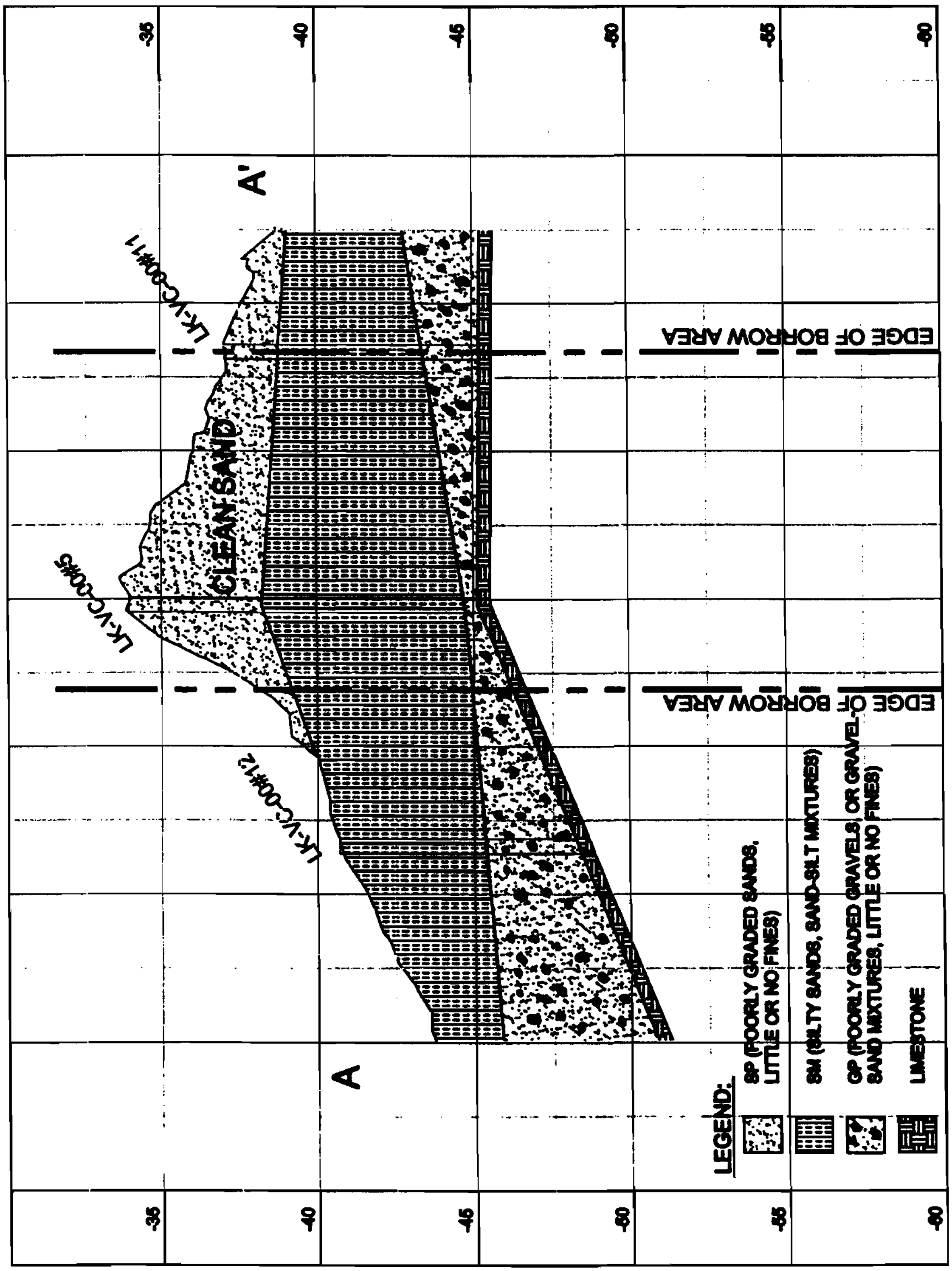
B-45. The bathymetric survey was used to supplement NOAA bathymetric data (National Ocean Service). The seafloor surveyed around the borrow area is generally gently sloping with low gradient. The water depth ranges from 30 to 50 feet NGVD. Small isolated "bathymetric highs" and small linear sand ridges dot the seafloor randomly. Each borrow area is delineated around



LIDO KEY INTERIM BEACH NOURISHMENT PROJECT
BORROW AREA 5,6, AND 7
PLAN VIEW

COASTAL PLANNING & ENGINEERING, INC.
2481 NW BOCA RATON BLVD.
BOCA RATON, FL 33431

FIGURE B-4

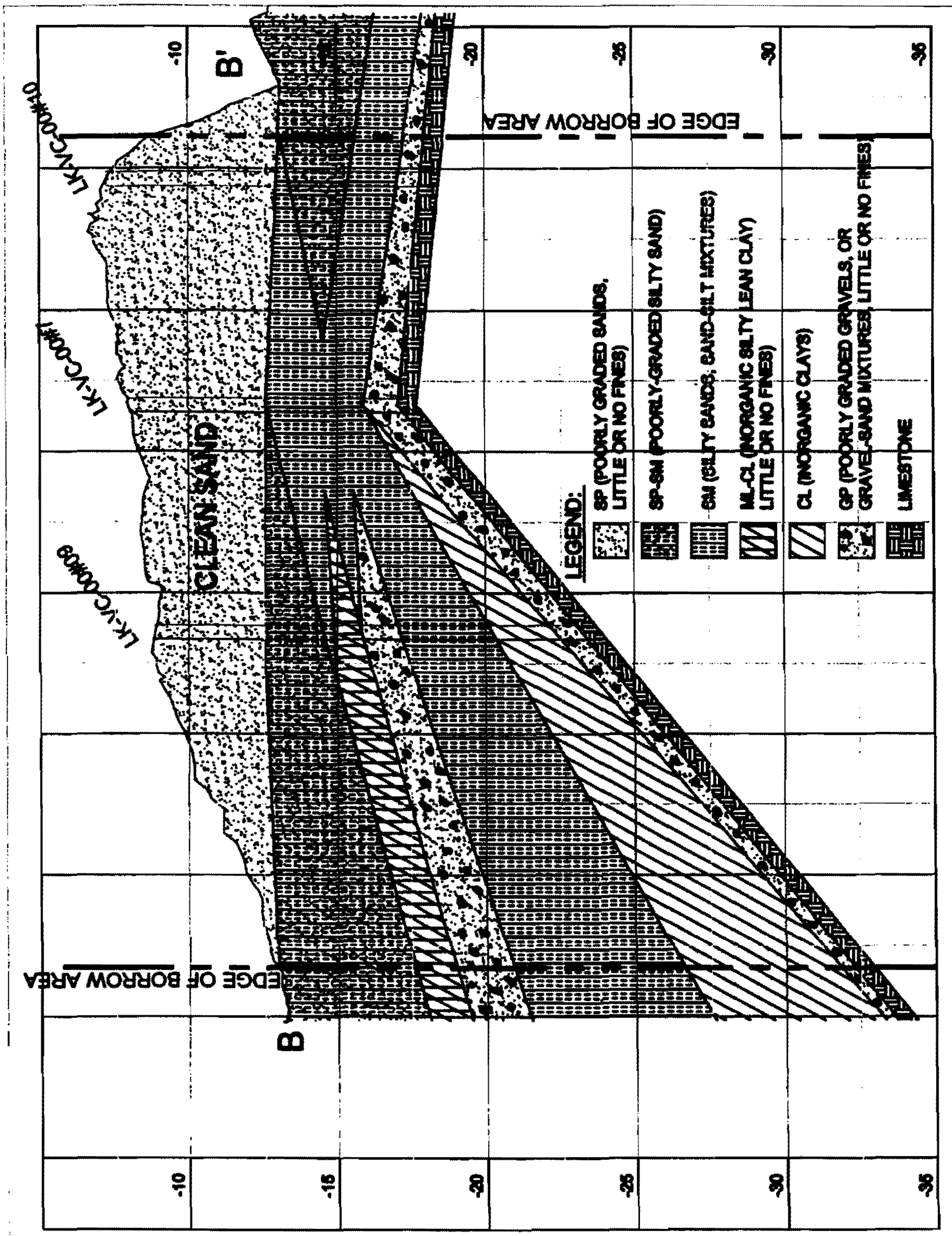


US ARMY CORPS OF ENGINEERS
JACKSONVILLE DISTRICT

LIDO KEY
BORROW AREA 5
GEOLOGIC CROSS SECTION A-A'

DATE : 5/18/01

FIGURE NO. B-5

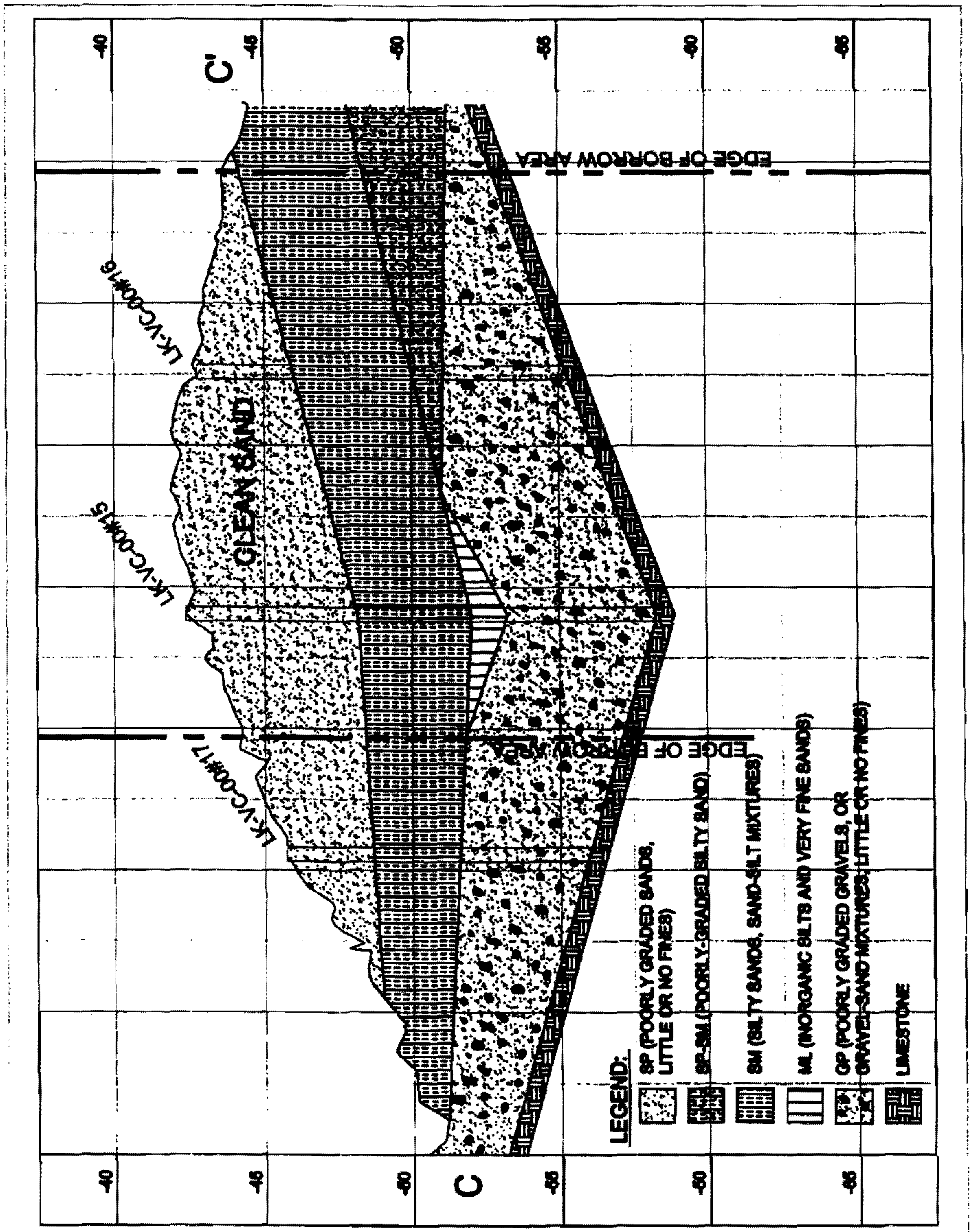


US ARMY CORPS OF ENGINEERS
JACKSONVILLE DISTRICT

LIDO KEY
BORROW AREA 6
GEOLOGIC CROSS SECTION B-B'

DATE : 5/18/01

FIGURE NO. B-6



US ARMY CORPS OF ENGINEERS
JACKSONVILLE DISTRICT

LIDO KEY
BORROW AREA 7
GEOLOGIC CROSS SECTION C-C'

DATE : 5/18/01

FIGURE NO. B-7

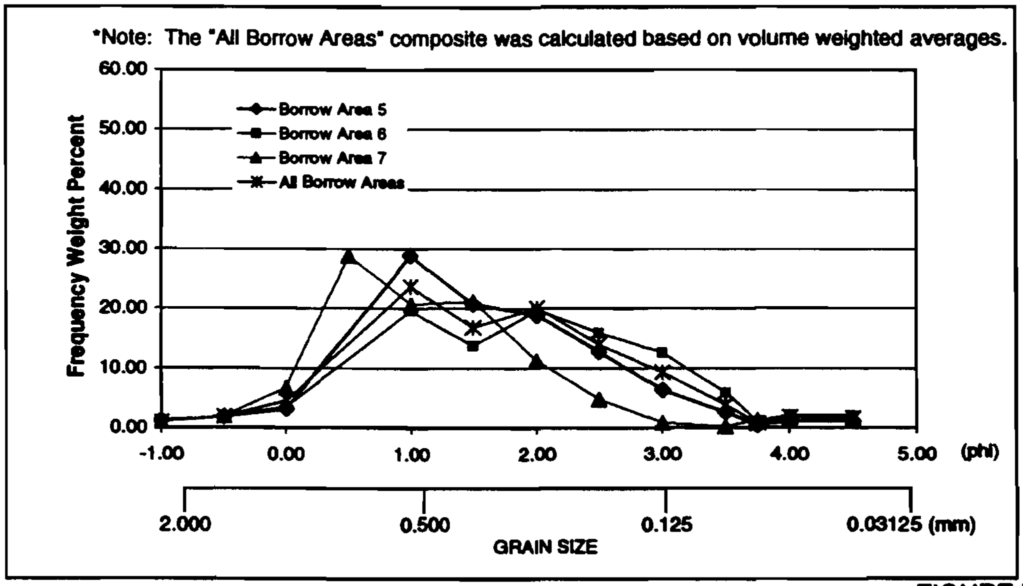


FIGURE B-8A

Suitability Analysis Frequency Grain Size Distributions for Borrow Areas

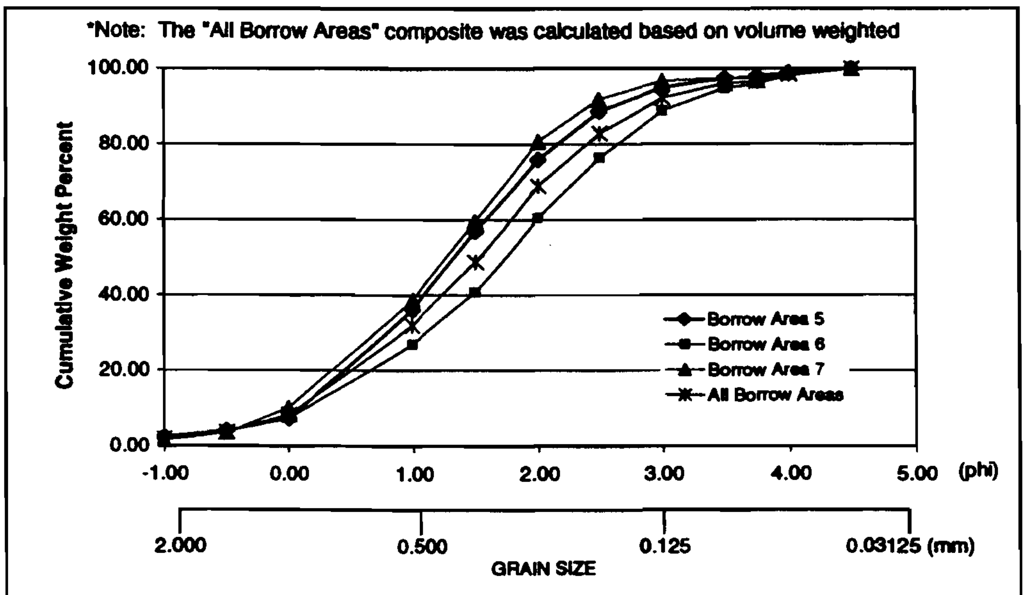


FIGURE B-8B

Suitabliity Analysis Cumulative Grain Size Distributions (Borrow Areas).

FIGURE B-8

SUITABILITY ANALYSIS GRAIN SIZE DISTRIBUTIONS FOR LIDO KEY BORROW AREAS.

Coastal Planning & Engineering, Inc.

one of these highs. It is observed that in general the relief of the high is proportionate to the thickness of the sand horizon.

B-46. The purpose of the side scan sonar survey was two fold. The first was to map the offshore bottom types, such as hardbottom, and the second was to look for archeological features. The sonographs aided in delineation of hardbottom areas and various sediment types. Only low relief (flush to the sea floor to 1 foot of relief) and possible low relief features were identified (Figure B-4). No hardbottom was found in or near Borrow Area 5. Low relief and possible low relief features were found in areas surrounding Borrow Area 6, and Borrow Area 7. These areas were avoided and the borrow areas were redefined based on the location of the findings. No archeological objects were located by the SSS survey.

B-47. A cultural resources investigation was carried out in order to determine the proposed project's impact on potentially significant submerged cultural resources. A magnetometer survey of the borrow areas revealed three magnetic targets: one within Borrow Area 6 and two within Borrow Area 7. The signature characteristics of all three targets are suggestive of modern debris such as cable, pipe or anchors. Based on this investigation, the proposed project will not impact any National Register of Historic Places eligible submerged cultural resources (Tidewater Atlantic Research, 2001).

B-48. Volume of Sand Estimate. The estimate for the total volume of clean sand available for beach nourishment in the Lido Key Borrow Area 5 is 200,000 cubic yards (Table B-5). The total volume was calculated using vibracores LK-00-05, LK-00-11, LK-00-12, LK-00-21 and LK-00-22. The estimate for the total volume of sand available for beach nourishment in the Lido Key Borrow Area 6 is 1,000,000 cubic yards. The total volume was calculated using vibracores LK-00-07, LK-00-09, LK-00-10, LK-00-18, LK-00-19, and LK-00-20. The estimate for the total volume of sand available for beach nourishment in the Lido Key Borrow Area 7 is 600,000 cubic yards. The total volume was calculated using vibracores LK-00-15, LK-00-16 and LK-00-17. Volumes for all three areas, based on a 1.0 foot buffer of clean sand and a 200 ft hardbottom buffer, was 1.8 million cubic yards of material.

Table B-5
Borrow Area Clean Sand Volumes (with 1.0 foot buffer)

Lido Key Borrow Areas	Volume (cy)
Borrow Area 5	200,000
Borrow Area 6	1,000,000
Borrow Area 7	600,000
Total Volume	1,800,000

B-49. Fifty Year Plan Volume Estimate. Material available for the 50 year plan for the Lido Key restoration project includes fill previously found in Big Sarasota Pass, New Pass, offshore of Tampa, Longboat Key and Anna Maria Island. The volume of potential fill material remaining in Sarasota Pass is estimated at 3,200,000 cubic yards (CPE, 1992). Approximately 674,000 cy of potential fill material remains south of the federal maintenance channel at New Pass after approximately 940,000 cy was dredged from north of the channel and placed on Longboat Key in 1993 (ATM, 1993). Offshore of Tampa (Figure B-9) there is an estimated 150,000,000

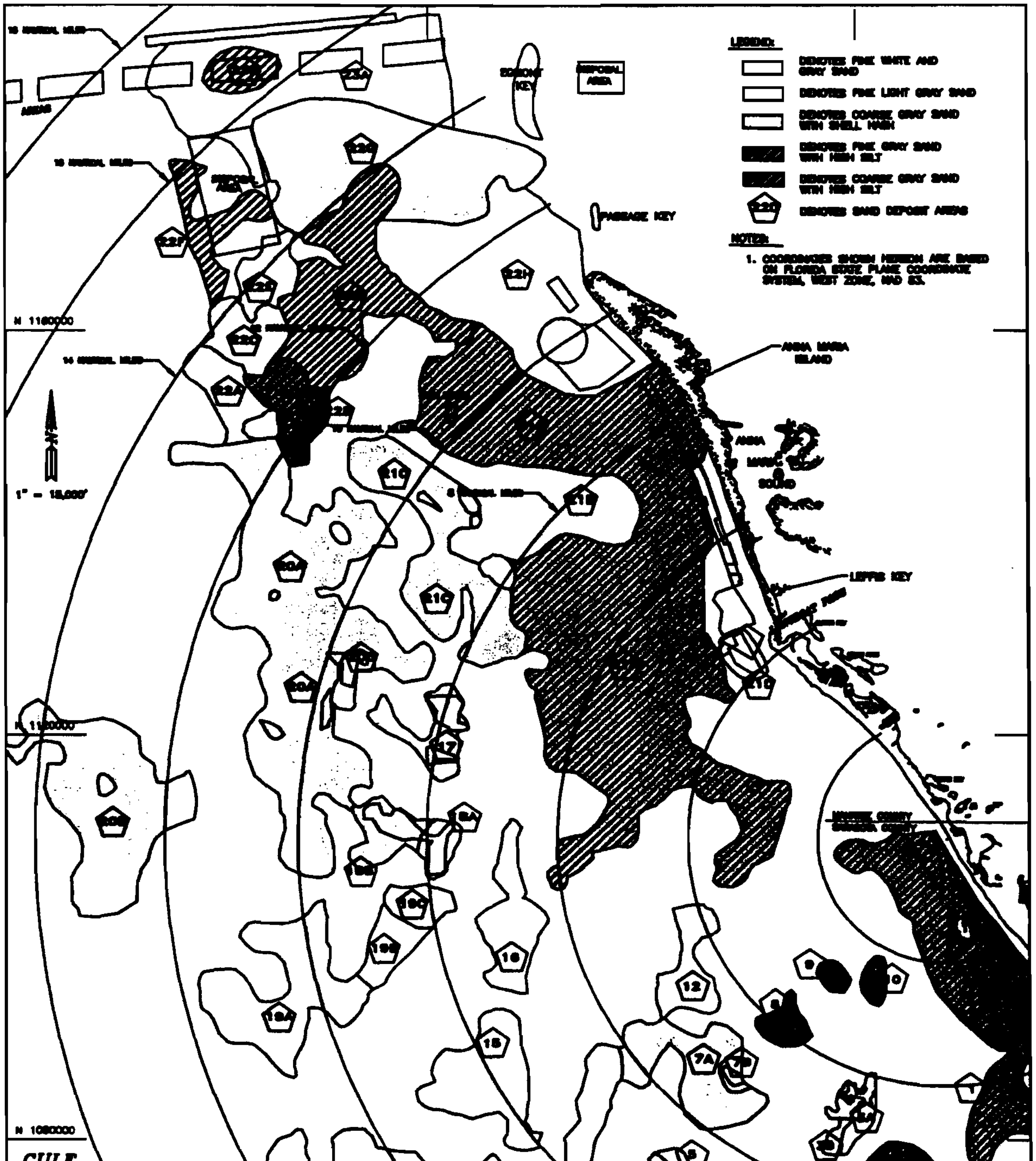


FIGURE B–9

OFFSHORE SAND DEPOSITS
CHART FOR NORTH SARASOTA COUNTY & SOUTH
MANATEE COUNTY (FROM CPE, 1999)

COASTAL PLANNING & ENGINEERING, INC.

cubic yards of fine white sand and 50,000,000 cubic yards of dark gray shell hash (CPE, 1999). Offshore of Longboat Key and Anna Maria Island (Figure B-9) an additional 600,000 cubic yards of fine white sand, 112,600,000 cubic yards of fine light gray sand, and 198,500,000 cubic yards of dark gray shell hash is estimated to be available for future use (CPE, 1999). The potential estimated total amount of material available for the 50 year plan for the Lido Key renourishment project is 515,740,000 cubic yards. Costs included within the MCACES for Pre-Construction Engineering and Design allow sufficient funds for further testing of borrow areas for suitability analysis. The reference, CPE 1999, does an adequate job of describing these materials for planning purposes.

B-50. Suitability Analysis. The compatibility of the proposed borrow areas were evaluated to determine their suitability with the native beach sand. Native beach sands and borrow area sands are both composed predominantly of medium grained sand made of shell and shell fragments, with some fine grained quartz sand. The Coastal Engineering Research Center (USACE, 1994) ACES program was used to calculate the overfill ratio, Ra and the renourishment factors, Rj. The overfill ratio, Ra, predicts the amount of fill material required to produce, after natural beach processes, a unit volume of stable beach material. The overfill ratio technique is based on the assumption that sorting processes will selectively remove material from the various size classes of the borrow fill until a stable grain size distribution results (James, 1975). Background erosion and end losses are not calculated by the overfill ratio.

B-51. The renourishment factor, Rj is a measure of the stability of the placed borrow material relative to the native sand. The renourishment factor is based on the assumption that no borrow sand is completely stable and that a portion of borrow material will be eroded on an annual basis depending on the characteristics of its grain size distribution.

B-52. The overfill ratios and renourishment factors for all of the Lido Key borrow areas were calculated. Table B-6 shows the results of the suitability analysis for the native beach and the potential borrow sources. These values may be used for planning and estimating purposes.

B-53. The sand sources considered in this investigation uniformly have an overfill ratio of 1.00 (Table B-6). The overfill quantity reflects the losses expected due to sorting of the placed material from the original textural character to a textural character more like that of the existing beach. The renourishment factors range from 0.59 to 0.72. Grain size frequency distribution curve comparisons for the native beach and the borrow areas are shown in Figure B-10.

Table B-6
Suitability Analysis for Lido Key Borrow Areas

Borrow Area	Overfill Ratio (Ra)	Renourishment Factor (Rj)
Borrow Area 5	1.00	0.62
Borrow Area 6	1.00	0.72
Borrow Area 7	1.00	0.59
All Borrow Areas	1.00	0.66

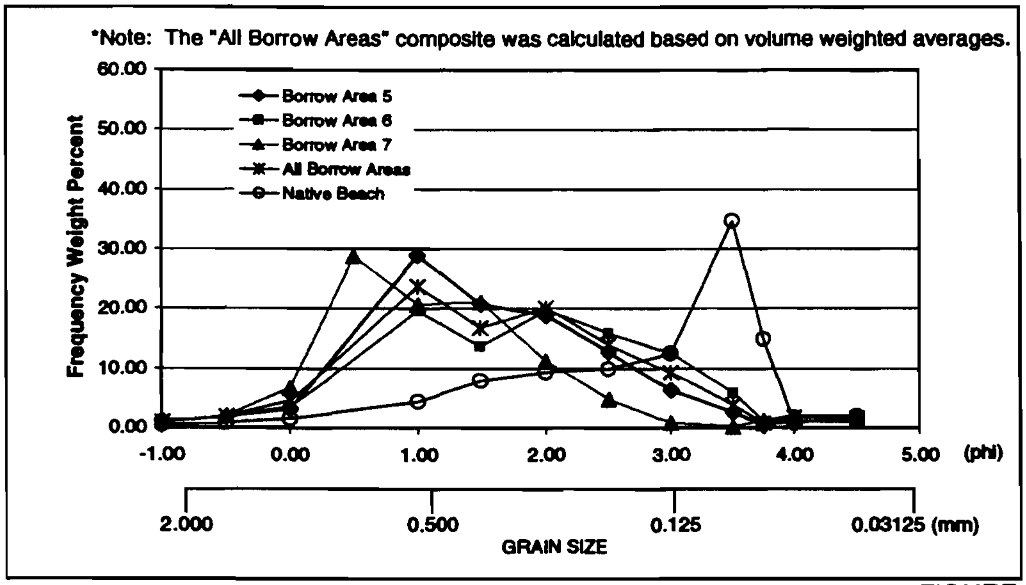


FIGURE B-10A

Suitability Analysis Frequency Grain Size Distributions (Native Beach vs. Borrow Areas).

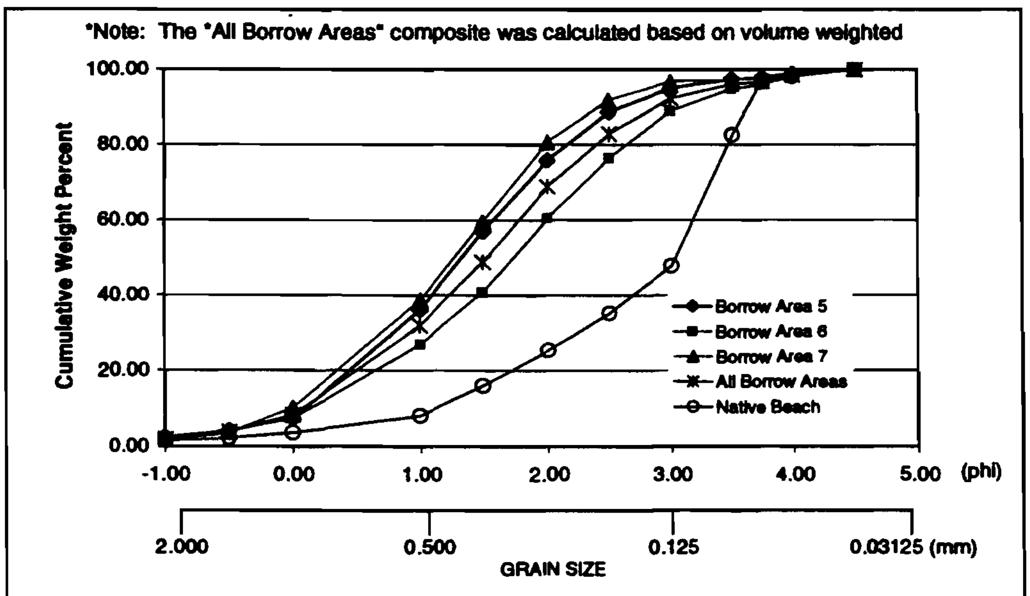


FIGURE B-10B

Suitabliity Analysis Cumulative Grain Size Distributions (Native Beach vs. Borrow Areas).

FIGURE B-10

SUITABILITY ANALYSIS GRAIN SIZE DISTRIBUTIONS FOR LIDO KEY

CONCLUSIONS – SUMMARY OF RESULTS

B-54. This geotechnical index is for the Lido Key Feasibility Investigation. All investigations conducted offshore and adjacent to the project area were reviewed and summarized by CPE geologists. The individual investigations, surveys, measurements and samplings are representative of the industry standard for geotechnical investigations to locate material for beach nourishment purposes. The investigations include remote sensing techniques and limited direct sediment sampling (vibracores). Material of differing characteristics may be present in areas not directly sampled. Two vibracores were taken in the Lido Key Borrow Area, located 3,000 to 4,000 feet off the Lido Key beaches, but the site was not selected as a sand source for this project. Five potential sand sources located offshore of Lido Key were also investigated but were not selected as sand sources for this project.

B-55. The borrow areas selected for Lido Key potentially contain about 1,800,000 cubic yards of sand located within three separate borrow areas. Borrow Area 5 is estimated to contain 200,000 cubic yards of medium grained (1.31 phi), moderately sorted (1.00 phi) sand with 2.19% silt. Based on the compatibility analysis, the borrow area is suitable as beach fill for Lido Key. A side scan sonar survey did not reveal any hardbottom in the area. No magnetometer targets were found in Borrow Area 5 during the cultural resources investigation.

B-56. Borrow Area 6 is estimated to contain approximately 1,000,000 cubic yards of medium grained (1.55 phi), moderately sorted (1.07 phi) sand with 4.05% silt. Based on the compatibility analysis, the borrow area is suitable as beach fill for Lido Key. Scattered hardbottom formation was found adjacent to the potential borrow area during the side scan sonar survey. As a result, the borrow area was redefined based on the side scan sonar findings to exclude and buffer the hardbottom area found in the side scan sonar records. A single magnetometer target was found in Borrow Area 6 during the cultural resources investigation but was considered of no historical significance by the marine archeologist.

B-57. Borrow Area 7 is estimated to contain about 600,000 cubic yards of medium grained (1.21 phi), moderately sorted (0.95 phi) sand with 2.48% silt. Based on the compatibility analysis, the borrow area is suitable as beach fill for Lido Key. Scattered hardbottom formation were found adjacent to the borrow area during the side scan sonar survey. The borrow area was redefined to exclude the hardbottom and provide a 200 ft buffer zone, both of which were accounted for in volume calculations. Two magnetometer targets were found in Borrow Area 7 during the cultural resources investigation and are considered to be non-historical (Tidewater Atlantic Research, 2001).

B-58. The signature characteristics of all three targets are suggestive of modern debris such as cable, pipe or anchors. Based on this investigation, the proposed project will not impact any National Register of Historic Places eligible submerged cultural resources.

REFERENCES

Applied Technology and Management, Inc., 1993. Town of Longboat Key Beach Restoration Project Post-Construction Monitoring. Unpublished.

ASTM 1987. Standard method for particle-size analysis of soils, designation D422-63. *1987 annual book of ASTM standards, volume 04.08 soil and rock; building stones; geotextiles*. Philadelphia: American Society for Testing Materials.

Balsillie, J.H. and Clark, R.R., 1999 (In Review). Marine Subaqueous Sand Resources of Florida's Gulf of Mexico. Florida Geological Survey. Tallahassee, FL.

Brooks, G.R., Doyle, L.J., Suthard, B.G., DeWitt, N.T., 1999. Inner West-Central Florida Continental Shelf: Sedimentary Facies and Facies Associations. U.S. Department of the Interior, U.S. Geological Survey Open File Report 98-796.

Chen, C. S. 1965. The regional lithostratigraphic analysis of Paleocene and Eocene rocks of Florida. *Florida Geological Survey, Geological Bulletin No. 45.*

Coastal Engineering Laboratory, 1959. "Coastal Engineering Study at Lido Key" (Prepared for the City of Sarasota), University of Florida, Gainesville, Florida.

Coastal Planning & Engineering, Inc., 1991. Lido Key Beach Restoration Project, State Authorization Report. Boca Raton, Florida.

Coastal Planning and Engineering, Inc., 1992. "Lido Key Beach Restoration Project Sand Search Report" (Prepared for the City of Sarasota). Unpublished.

Coastal Planning & Engineering, Inc., 1992a: *Sand Search Report, Lido Key Beach Restoration Project.* Boca Raton, Florida.

Coastal Planning & Engineering, Inc., 1992b: *New Pass Ebb Shoal Magnetometer Survey, Lido Key Beach Renourishment Project.* Boca Raton, Florida.

Coastal Planning & Engineering, Inc., 1995a: *Report on Geotechnical Investigations for Two Offshore Borrow Areas, Lido Key Beach Nourishment.* Boca Raton, Florida.

Coastal Planning & Engineering, Inc., 1995b: (DEP Permit No. DBS 910292ST) – *Lido Key (Sarasota County) Beach Restoration Project – Permit Modification Request for Dune Restoration and At-Grade Access Development.* Boca Raton, Florida.

Coastal Planning & Engineering, Inc., 1995c:, *Cultural Resource Investigations and Remote Sensing Magnetometer Survey Results for Two Proposed Offshore Sand Borrow Sites at Lido Key, Florida.* Boca Raton, Florida.

Coastal Planning & Engineering, Inc., 1995d. Town of Longboat Key, Longboat Comprehensive Beach Management Plan – Appendix B; Offshore Borrow Area Investigation, Boca Raton, FL.

Coastal Planning and Engineering, Inc., 1999. Town of Longboat Key, Phase II: Offshore Borrow Area Investigation to Locate "White Sand" Sources for Beach Renourishment of Longboat Key (Prepared for the Town of Longboat Key). Unpublished.

Coastal Planning & Engineering, Inc., 1999a. Lido Key Beach Restoration Offshore Borrow Area Investigation, Boca Raton, FL.

Coastal Planning & Engineering, Inc., 1999b. Anna Maria Island Beach Restoration Offshore Borrow Area Investigation, Boca Raton, FL.

Coastal Planning & Engineering, Inc., 2000. Lido Key Beach Nourishment Project; Twenty-Four Month Monitoring Report.

McKinney, M. L., 1984, Suwannee Channel of the Paleocene coastal plain: support for the "carbonate suppression" model of basin formation: Geology, v.12, p. 343-345.

National Ocean Service. Geophysical Data System for Hydrographic Survey Data Vol. 1, Ver 3.2. National Geophysical Data Center.

Pinet, P. R. and P. Popenoe, 1985. "A Scenario of Mesozoic, Cenozoic Open Excavation over the Blake Plateau and its Environs," *Geological Society of America Bulletin*, Vol. 96, pp. 618-626.

Tidewater Atlantic Research, Inc., 2000. *A Submerged Cultural Resources Survey of a Proposed Borrow Area off Lido Key Sarasota County, Florida.*

Tidewater Atlantic Research, Inc., 2001. Offshore Borrow Areas Submerged Historic Properties Survey, Lido Key, Sarasota County, Florida.

U.S. Army Corps of Engineers, 1968. Beach erosion control study Sarasota County, Florida, interim report on Lido Key: U.S. Army Corps of Engineers District, Jacksonville, FL.

U.S. Army Corps of Engineers, 1984. Beach erosion control study for Sarasota County, Florida, with environmental impact statement: U.S. Army, Corps of Engineers District, Jacksonville, FL.

U.S. Army Corps of Engineers, 1985. Engineering and design geotechnical manual for surface and subsurface investigations: U.S. Army Corps of Engineers, South Atlantic District, Atlanta, GA.

U.S. Army Corps of Engineers, 1990. Sarasota County, Florida Shore Protection Project, General Design Memorandum: U.S. Army Corps of Engineers District, Jacksonville, FL.

U.S. Army Corps of Engineers, 1994. Automated Coastal Engineering System (ACES) Version 1.07f. U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

I:word/lido/lidokeygeoapp.doc

Sup-Appendix B-1
Lido Key 2000 Vibracore Logs and Sand Data

COASTAL PLANNING & ENGINEERING, INC.

Project: LIDO KEY FEASIBILITY PHASE STUDY File No: ____________

Client: City of Sarasota

Date: May 31, 2001

Lido Key Vibracore Data Summary Sheet

SAMPLE I. D.	ELEVATION (Ft. NGVD)	SPECIFIC GRAVITY	UNIFIED CLASS.	PHI MEAN	MEAN (mm)	PHI SORTING	% SILT	-4.0	-3.0	-2.0	-1.5	-1.0	-0.5	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	3.75	4.0	PAN
								CUMULATIVE % WEIGHT RETAINED — PHI SIZES																
LK-00-01#1	-17.3	N/A	SP	2.93	0.13	0.40	3.40	0.00	0.00	0.00	0.11	0.18	0.24	0.32	0.42	0.55	0.65	0.81	2.09	61.90	94.61	96.60	98.39	99.99
LK-00-01#2	-21.7	N/A	SP-SM	2.60	0.16	1.37	11.32	0.00	0.00	2.70	3.81	5.06	6.06	6.99	8.12	8.95	10.59	12.37	27.95	43.72	80.03	88.68	95.11	99.99
LK-00-01#3	-23.8	N/A	SP-SM	2.15	0.23	1.55	11.50	0.00	0.00	2.01	2.78	3.88	6.87	12.55	17.99	23.59	26.54	29.66	34.16	57.51	84.57	88.50	94.44	99.98
LK-00-02#1	-14.8	N/A	SP	2.82	0.14	0.73	2.42	0.00	0.00	0.32	0.88	1.41	1.82	2.28	2.62	2.89	3.12	3.52	5.63	63.32	95.80	97.58	98.82	99.99
LK-00-02#2	-17.2	N/A	SP-SM	3.02	0.12	0.64	8.83	0.00	0.00	0.02	0.33	0.68	1.07	1.45	1.82	2.10	2.32	2.73	3.48	35.66	87.64	91.17	95.84	99.99
LK-00-02#3	-22.2	N/A	SP-SM	3.10	0.12	0.94	9.12	0.00	0.00	0.78	1.63	2.06	2.55	2.99	3.57	4.16	4.61	4.97	5.98	12.78	76.38	90.88	96.29	100.00
LK-00-02#4	-23.2	N/A	SM	2.32	0.20	1.58	13.74	0.00	0.00	3.10	4.07	5.56	7.63	10.54	14.48	18.43	21.22	24.19	27.43	47.72	82.35	86.26	93.47	99.99
LK-00-03#1	-31.20	N/A	SP	0.71	0.61	1.17	2.04	0.00	1.05	2.85	4.47	5.85	9.15	21.59	38.33	61.56	77.58	88.79	93.35	96.34	97.77	97.96	98.99	100.00
LK-00-03#2	-33.20	N/A	SM	2.78	0.15	1.33	18.87	0.00	0.00	1.61	2.96	4.13	5.08	5.98	7.46	9.10	10.38	12.08	14.39	33.69	71.70	81.13	91.85	99.95
LK-00-04#1	-34.00	N/A	SP	1.05	0.48	1.22	2.25	0.00	0.00	1.47	3.34	5.78	9.98	16.35	30.34	47.15	61.38	77.11	88.39	94.94	97.43	97.75	98.87	100.00
LK-00-04#2	-35.80	N/A	SM	2.77	0.15	1.05	17.18	0.00	0.00	0.21	0.50	1.28	2.27	3.41	4.89	6.72	8.62	16.48	19.62	40.70	74.98	82.82	91.90	99.98
LK-00-05#1	-35.9	2.7	SP	1.46	0.36	0.89	1.76	0.00	0.00	0.13	0.56	1.48	2.80	4.96	10.85	27.13	50.55	70.40	90.78	96.70	98.14	98.24	99.13	100.00
LK-00-05#2	-39.9	N/A	SM	2.95	0.13	0.91	17.91	0.00	0.00	0.00	0.26	0.95	1.53	2.08	3.15	4.53	6.20	9.42	14.33	34.37	71.31	82.09	92.89	100.00
LK-00-05#3	-42.9	N/A	SM	2.76	0.15	1.07	17.14	0.00	0.00	0.87	1.25	1.77	2.33	3.26	4.64	6.52	8.34	11.77	19.25	46.75	76.43	82.86	91.94	99.98
LK-00-06#1	-38.2	N/A	SP	1.01	0.50	1.09	1.85	0.00	0.00	1.23	2.13	4.60	8.37	15.07	27.90	46.96	66.20	82.27	93.38	96.51	97.95	98.15	99.05	99.99
LK-00-06#2	-40.2	N/A	SM	2.80	0.14	0.92	14.12	0.00	0.00	0.18	0.51	1.16	1.89	2.58	3.68	5.05	6.59	10.00	15.50	49.03	81.65	85.88	93.32	99.99
LK-00-06#3	-43.5	N/A	SM	2.91	0.13	1.14	26.29	0.00	0.00	0.25	0.74	1.66	2.82	4.09	5.76	7.44	8.86	11.48	16.32	30.17	59.92	73.71	88.53	99.98
LK-00-07#1	-41.50	N/A	SP	1.11	0.46	0.97	1.63	0.00	0.00	0.46	0.83	2.56	6.13	12.54	23.79	41.31	60.34	82.97	95.60	97.89	98.30	98.37	99.19	100.00
LK-00-07#2	-44.00	2.64	SP	1.97	0.26	0.93	4.62	0.00	0.00	0.08	0.35	0.73	1.39	2.57	5.91	13.84	25.60	46.66	69.57	87.44	94.24	95.38	97.75	99.98
LK-00-07#3	-45.80	N/A	SM	2.49	0.18	1.30	17.55	0.00	0.00	1.79	2.79	3.68	4.57	5.51	7.04	9.09	12.17	20.34	30.82	55.63	76.85	82.45	91.64	99.99
LK-00-07#4	-47.10	N/A	SM	2.41	0.19	1.15	16.95	0.00	0.00	0.70	1.11	1.73	2.83	3.28	5.23	9.33	15.43	26.40	41.97	60.94	78.11	83.05	91.89	100.00
LK-00-08#1	-43.8	N/A	SM	2.95	0.13	0.87	19.13	0.00	0.00	0.00	0.27	0.72	1.17	1.68	2.69	4.34	6.34	9.10	13.37	33.73	73.72	80.87	91.34	99.99
LK-00-08#2	-47.3	N/A	SM	2.69	0.15	1.33	22.00	0.00	0.00	1.65	2.51	3.36	4.40	5.46	7.01	9.16	11.60	16.39	22.49	40.72	65.60	78.00	90.37	99.99
LK-00-08#3	-49.3	N/A	SM	1.94	0.26	1.91	21.42	0.00	0.00	4.46	7.04	10.13	13.47	17.27	21.52	26.28	30.36	34.83	39.41	48.87	69.52	78.58	89.95	99.99
LK-00-09#1	-42.60	2.63	SP	1.22	0.43	0.87	1.89	0.00	0.00	0.00	0.60	1.50	3.58	8.12	18.44	36.59	57.58	83.46	95.92	97.62	98.02	98.11	99.06	99.99
LK-00-09#2	-44.60	N/A	SP-SM	2.17	0.22	1.08	6.16	0.05	0.05	0.20	0.69	1.58	2.87	4.50	7.81	13.17	20.48	35.40	51.52	77.96	91.17	93.84	97.11	100.00
LK-00-09#3	-46.30	N/A	SM	2.78	0.15	0.95	22.61	0.00	0.00	0.38	0.61	0.84	1.17	1.66	2.47	4.03	6.85	13.68	24.00	47.59	70.67	77.39	89.48	100.00
LK-00-09#4	-49.60	N/A	SM	1.60	0.33	1.56	15.13	0.00	0.00	2.23	3.22	4.37	7.53	14.06	23.91	34.35	43.22	51.97	60.13	71.39	81.34	84.87	92.66	99.99
LK-00-09#5	-51.60	N/A	SM	2.39	0.19	1.40	19.32	0.00	0.00	0.81	1.94	3.05	5.06	7.78	11.36	14.66	18.53	26.02	33.86	51.82	71.81	80.68	90.98	99.99
LK-00-10#1	-40.60	N/A	SP	1.61	0.33	0.82	1.51	0.07	0.07	0.07	0.31	0.80	1.77	3.90	9.07	20.37	37.28	66.97	89.79	97.08	98.35	98.49	99.25	100.00
LK-00-10#2	-44.00	2.56	SP	1.55	0.34	1.08	2.55	0.00	0.00	0.84	1.29	2.55	4.64	8.04	14.91	26.15	39.57	61.72	83.18	94.38	97.07	97.45	98.76	99.99
LK-00-10#3	-45.30	N/A	SP-SM	2.04	0.24	1.14	6.69	0.00	0.00	0.34	1.02	1.94	3.42	5.98	10.27	16.62	24.05	37.89	57.26	80.90	91.20	93.31	96.80	100.00
LK-00-10#4	-48.10	N/A	SM	1.61	0.33	1.57	25.20	0.00	0.00	1.33	3.02	5.22	8.42	12.88	21.25	30.86	39.53	52.31	60.01	67.98	72.56	74.80	87.46	99.98
LK-00-11#1	-38.10	2.49	SP	1.01	0.50	1.08	2.58	0.00	0.00	1.27	2.74	4.69	7.57	12.44	25.79	49.09	67.98	84.70	91.85	95.93	97.22	97.42	98.71	100.00
LK-00-11#2	-40.60	N/A	SM	2.76	0.15	0.98	20.77	0.00	0.00	0.00	0.91	1.19	1.59	2.02	2.62	3.50	7.53	13.11	32.03	49.41	67.21	79.23	91.18	100.00
LK-00-11#3	-42.90	N/A	SM	2.84	0.14	0.95	19.67	0.00	0.00	0.00	0.10	0.34	1.62	2.46	3.71	5.51	7.57	11.52	20.45	42.84	70.03	80.33	90.99	99.99
LK-00-12#1	-43.80	2.56	SM	2.74	0.15	1.16	16.13	0.00	0.00	0.73	1.47	2.14	3.07	4.02	5.76	8.11	10.54	14.73	21.47	42.37	73.25	83.87	93.22	99.98
LK-00-13#1	-56.80	2.63	SM	2.67	0.16	1.73	46.38	0.00	0.99	2.98	3.72	4.78	6.01	7.44	10.26	13.74	16.04	18.04	20.02	26.60	40.93	53.62	79.37	100.00
LK-00-13#2	-58.30	N/A	SM	1.24	0.42	2.50	28.34	0.00	5.74	15.05	18.26	21.05	23.86	27.23	31.66	36.50	39.79	42.65	45.39	51.82	66.28	71.66	86.74	99.99
LK-00-13#3	-61.10	N/A	SM	1.99	0.25	1.94	27.78	0.00	1.17	4.71	7.25	10.49	13.27	15.60	18.67	22.57	26.55	31.75	37.86	49.89	65.83	72.22	87.31	99.98
LK-00-14#1	-45.80	N/A	SP	0.80	0.57	1.27	1.89	0.00	0.62	2.86	5.65	10.06	15.29	21.39	30.63	50.20	72.40	86.34	92.23	96.37	97.88	98.11	99.04	99.98
LK-00-14#2	-49.30	N/A	SM	2.90	0.13	1.10	29.90	0.00	0.00	0.76	1.21	1.73	2.37	3.00	4.04	5.43	7.07	10.54	15.16	34.31	61.97	70.10	85.83	100.00
LK-00-14#3	-52.30	N/A	SM	2.95	0.13	1.21	45.15	0.00	0.00	0.34	0.90	1.57	2.44	3.29	4.80	6.97	8.86	12.53	17.09	27.88	44.66	54.85	79.81	99.98
LK-00-15#1	-45.50	2.46	SP	1.12	0.46	0.88	2.74	0.00	0.00	0.00	0.50	1.49	3.38	8.15	19.82	45.06	66.56	86.11	93.74	96.67	97.20	97.26	98.64	100.00
LK-00-15#2	-50.00	N/A	SM	2.47	0.18	1.83	36.97	0.00	0.00	6.07	6.90	7.83	8.76	9.73	11.04	13.26	16.25	20.85	25.58	35.57	52.22	63.03	83.66	99.88
LK-00-15#3	-51.50	N/A	SM	2.54	0.17	1.42	38.04	0.00	0.00	1.40	2.00	2.68	3.58	5.25	7.79	11.64	16.09	21.74	28.64	42.66	56.76	61.96	81.53	99.97
LK-00-16#1	-44.40	N/A	SP	0.96	0.51	0.89	1.67	0.00	0.00	0.26	0.73	1.82	4.63	12.06	28.18	50.80	72.42	89.65	96.07	97.91	98.28	98.33	99.16	100.00
LK-00-16#2	-46.90	2.53	SM	2.17	0.22	1.34	19.45	0.00	0.00	0.00	0.72	1.88	3.65	6.38	11.87	19.42	27.48	37.02	44.11	60.52	75.35	80.55	90.83	100.00
LK-00-16#3	-49.90	N/A	SM	1.70	0.31	1.76	19.61	0.00	0.00	4.12	6.23	8.51	11.22	14.81	20.65	29.61	39.10	46.29	51.56	62.15	75.87	80.39	90.62	99.99
LK-00-16#4	-50.90	N/A	SP-SM	0.76	0.59	2.24	12.16	0.00	6.09	15.33	19.62	24.05	28.04	32.12	38.62	46.01	53.36	61.81	66.57	75.47	83.98	87.84	94.23	99.97
LKI-00-17#1	-47.30	2.29	SP	1.54	0.34	0.99	3.02	0.00	0.00	0.00	0.30	1.04	2.18	10.02	18.44	20.51	39.45	66.14	85.74	95.24	96.73	96.98	98.49	99.98
LKI-00-17#2	-50.30	N/A	SM	2.18	0.22	1.52	21.18	0.00	0.00	1.93	3.10	5.10	7.74	9.84	12.42	16.13	21.25	30.54	42.04	58.06	73.98	78.82	89.80	99.97
LK-00-18#1	-43.50	N/A	SP	1.86	0.28	0.93	1.08	0.00	0.00	0.18	0.76	1.68	3.09	6.35	9.04	13.53	21.46	46.53	78.77	96.11	98.51	98.92	99.49	100.00
LK-00-18#2	-45.30	2.59	SP-SM	2.56	0.17	0.89	9.80	0.00	0.00	0.00	0.12	0.45	0.94	1.91	3.63	6.00	10.01	19.71	34.06	65.24	86.52	90.20	95.58	99.99
LK-00-18#3	-46.60	N/A	SP-SM	0.85	0.55	1.39	6.08	0.00	0.00	4.03	5.47	8.22	13.82	22.82	37.24	52.34	66.12	80.86	87.38	89.81	92.88	93.92	97.07	99.98
LK-00-19#1	-43.80	2.46	SP	1.33	0.40	0.88	1.80	0.00	0.00	0.17	0.59	1.24	2.70	5.60	15.75	33.86	52.80	78.77	93.57	97.26	97.99	98.20	99.14	99.98
LK-00-19#2	-46.20	N/A	SP-SM	2.47	0.18	0.98	11.62	0.00	0.00	0.24	0.47	1.02	1.73	2.63	4.29	7.28	11.82	21.17	37.56	68.36	84.75	88.38	94.13	100.00
LK-00-19#3	-47.60	N/A	SW-SM	0.34	0.79	2.04	9.47	0.00	3.89	17.17	22.31	26.53	32.09	39.45	49.47	58.06	64.51	72.85	78.73	84.96	89.20	90.53	95.32	100.00
LK-00-20#1	-44.00	2.47	SP	1.09	0.47	1.13	1.95	0.00	0.45	1.67	2.58	3.99	6.95	12.70	25.64	44.44	61.85	79.74	90.92	95.97	97.80	98.05	99.00	99.98
LK-00-20#2	-45.90	N/A	SM	1.56	0.34	1.92	16.50	0.00	0.99	4.68	8.73	12.53	16.99	20.94	26.44	32.31	37.39	44.71	52.27	65.08	78.98	83.50	92.18	100.00
LK-00-20#3	-46.70	2.59	SM	2.40	0.19	1.30	24.44	0.00	0.00	0.28	0.63	1.44	3.10	5.52	9.41	14.27	19.14	27.57	36.11	51.78	69.93	75.56	88.28	99.99
LKI-00-21#1	-38.00	2.72	SP	1.14	0.45	0.93	1.68	0.00	0.00	0.52	1.01	1.98	3.85	7.60	19.64	45.21	67.12	84.28	92.39	96.40	98.09	98.32	99.14	99.98
LKI-00-21#2	-41.00	N/A	SM	2.92	0.13	0.73	15.00	0.00	0.00	0.00	0.15	0.41	0.69	1.09	1.74	2.65	3.91	6.87	13.25	45.26	78.61	85.00	93.39	99.99
LKI-00-21#3	-43.60	2.44	SM	2.51	0.18	1.33	23.09	0.00	0.00	0.93	1.83	2.51	3.40	4.45	8.34	11.34	16.97	23.39	37.73	49.68	64.68	76.91	90.54	99.98
LK-00-22#1	-36.10	2.61	SP	1.50	0.35	0.89	2.14	0.00	0.00	0.00	0.29	1.07	2.33	4.51	10.68	26.66	48.02	71.88	87.80	95.14	97.60	97.86	98.95	99.99
LK-00-22#2	-38.00	N/A	SP-SM	2.52	0.17	0.94	5.87	0.00	0.00	0.32	0.51	1.00	1.56	2.24	3.39	6.22	11.74	21.56	35.11	65.89	89.86	94.13	97.42	99.99
LK-00-22#3	-39.60	N/A	SM	3.11	0.12	0.80	19.97	0.00	0.00	0.13	0.38	0.71	1.23	1.55	2.07	2.68	3.46	5.64	9.68	26.30	63.60	80.03	92.38	99.99
LK-00-22#4	-43.10	N/A	SM	2.81	0.14	1.02	17.91	0.00	0.00	0.24	0.65	1.22	1.92	2.91	4.43	6.20	7.94	12.02	20.79	42.80	72.39	82.09	91.91	100.00

APPENDIX C

MCASES GOLD AND FULLY FUNDED COST ESTIMATE

NOTE: Content omitted from public web site

APPENDIX D

ECONOMICS

APPENDIX D

LIDO KEY, SARASOTA COUNTY, FLORIDA
FEASIBILITY STUDY
MARCH 2002
REVISED OCTOBER 2002

TABLE of CONTENTS

TABLES of CONTENTS (cont)

APPENDIX D
LIDO KEY, SARASOTA COUNTY, FLORIDA
FEASIBILITY STUDY
2002

INTRODUCTORY STATEMENT

1. The purpose of this Appendix is to document the economic justification for shore protection and beach stabilization along Lido Key Beach. It includes an assessment of the expected damages caused by storms and the alternative plan(s)to reduce the damages that will occur in the absence of any storm damage preventive project(s). In addition, the study will assess and identify the National Economic Development (NED) plan, the benefits from each alternative plan of improvement. The analysis of NED benefits is based on guidance contained in ER 1105-2-100, known as *The Planning Guidance Notebook*. Information provided by Engineering Division, Real Estate Division, Plan Formulation and other divisions is used and contributes to the final conclusions and recommendations.

2. Lido Key Beach is located within the city limits of Sarasota in Sarasota County Florida. Sarasota County is located in the southwestern section of the State of Florida. Sarasota County occupies a total land area of 573 square miles. It has a population of about 300,000 people. Sarasota County borders Charlotte County on the south, Desoto County on the east, Manatee County on the north and the Gulf of Mexico on the west. Lido Key is one of five barrier islands that are part of the incorporated limits of the City of Sarasota. A tidal inlet separates Lido Key from the remainder of the City of Sarasota.

3. The history of Lido Key dates back to the early 1900s. Lido Key before the 1920s consisted of a group of small detached mangrove islands surrounded by shallow seagrass beds. Development of the island was begun by John Ringling (Ringling Brothers Circus) in the early 1920s. Since that time, the island has developed into a densely populated area.

THE STUDY AREA

4. The study area includes the entirety of Lido Key. It encompasses New Pass Inlet on the north and Big Sarasota Pass Inlet on the south. Access to Lido Key is via the Ringling Causeway. The overall length of the island is about 2.5 miles. The primary focus of the study is a small area within Lido Key, which extends from the John A. Ringling Causeway Bridge at DNR-35.4 south to the Big Sarasota Pass Inlet at DNR-43.0. Reach 1 extends from New Pass Inlet south to the John A. Ringling Boulevard. A field survey indicated that all structures within this reach are located sufficiently landward so that they will not be susceptible to damages even under the most extreme storm events. Reach 2 extends from the John A. Ringling Causeway at DNR-35.4 south to DNR-40. Reach 3 extends from DNR-40 to DNR-43. Reach 4, DNR-43 south, at Big Sarasota Pass Inlet, is a park in which recreational activities take place. There are no structures susceptible to damages in this reach. Lido Key Beach is well developed and it is doubtful if future expansion will take place.

THE EXISTING PROBLEM

5. <u>The Existing Study</u>. The major problem to be addressed is the erosion of land areas along the Lido Key shoreline, which is increasing the likelihood of damages and losses to private and public properties. This problem is compounded by the highly developed nature of the beach areas. Erosion results from storms and wave action of water associated with storms, hurricanes and in some cases tornadoes. Another factor is the effect of winds, which may blow away beach sand and redistribute it to other areas of the beach.

6. <u>Previous Studies</u>. A beach erosion control project was authorized under the *31 December 1970 Rivers and Harbor Act*. That project provided for the restoration of 1.2 miles of the middle Gulf shore of Lido Key with periodic nourishment as needed. Federal participation was limited to an initial period of 10 years. The City of Sarasota completed the northern half of the project in 1970 without Federal participation.

The remainder of the project was never completed. The project was de-authorized in 1990. The Jacksonville District, Corps of Engineers, made a Reconnaissance Study in 1996.

SUMMARY OF FINDINGS

7. Damage susceptibility is limited to two areas, reach 2 and reach 3. The most heavily impacted is Reach 3. Reach 3 contains structures which are located less than 50 feet landward of the existing erosion control line. Nearly all structures throughout the study area have some form of coastal armor. Some have small sand dunes while others have small seawalls. None of the structures are elevated on pilings.

8. From the analysis of the data, dollar losses appear to be relatively high when considering the small size of the area and the number of structures impacted. This is due in part to the high structure values and the susceptibility of a small number of structures to damages from a 1-in-10 year storm event because of their proximity to the shoreline. The NED Plan consists of extending the beach profile 80 feet resulting in net benefits of $1,811,617.

METHODOLOGY OF THE STUDY

9. The analysis of storm damages consisted of four major tasks: (a) defining the study area; (b) creating a database, tabulating existing conditions and computing associated damages; (c)analyzing storm damage reduction benefits for the alternative plan(s)of improvement; and (d) analyzing the NED Plan for the project with risk and uncertainty. Risk and uncertainty was applied to all proposed alternative plans to measure the confidence with which the results of the storm damage analysis could be accepted. Evaluation of the effectiveness of the alternative plans was based on the existing damages and the amount of damages that would be prevented with each plan in place. The tasks were accomplished with the aid of a computer program, the *Storm Damage Model* (SDM), developed by The Jacksonville District.

a. <u>Delineation of the study area.</u> The study area was defined using aerial maps supplemented by information gathered from a field investigation in April 2000. The Engineering Division of the Jacksonville District divided the area into four reaches. Structures were defined to include their values (replacement less depreciation), their types, the number of floors and the lot sizes which each occupied. The Sarasota County Property Appraiser's Office furnished data for structure inventory in conjunction with information from the Real Estate Division of the Jacksonville District.

b. <u>Creation of the database</u>. The database consisted of inputs which uniquely identified each individual structure as outlined in section (a) *Delineation of the Study Area* from a field investigation and aerial photography. All data were encoded into a computer data format. From the referenced shoreline, defined in terms of the ECL, three measurements were made for each structure: (1) distance from the referenced shoreline to the coastal armor; (2) distance from the referenced shoreline to the face of the structure; and (3) distance from the referenced shoreline to the mid-point (those structures with slab-on-grade foundations)or to the landward face (multistory structures on deeply embedded pilings) of the structure. A structure was considered totally condemned when the shoreline receded to the mid-point of the structure, or the landward face, depending on foundation type. For multi-story structures on deeply embedded pilings, damages were claimed only for the first two floors. The database was encoded into a computer program, which calculated damage susceptibility under without and with project conditions for the various alternative plans of improvement. The computer program (Storm Damage Model), also computed average annual equivalent damages for the without project and with project conditions using the water resource evaluation interest rate of 6-1/8 percent.

c. <u>The analysis of the data using a computer model</u>. The computer model simulated damages that could occur to each structure for a 50-year period of analysis beginning in 2000 and computed average annual equivalent damages. The resulting damages show losses to; (1)structural improvements which include damages to buildings, pools, patios, parking lots, roads, utilities, seawalls, revetments and bulkheads etc.; (2)damages to the coastal armor; (3) damages to the backfill (the land area between the coastal armor and the structure);

and (4) damages as a result of loss of land. Lost land is defined as the land mass between the referenced shoreline and the coastal armor (beach). Loss of land benefits are claimed at privately owned shorefront parcels in the region bounded by the pre-project ECL shoreline and the location of the coastal armor. Beach nourishment results in a design shoreline which is at or seaward of the pre-project ECL shoreline, thus eliminating the loss of land associated with the without project condition. Determination of the market value of the prevented land losses is based on the value of near shore land. The value of near shore land is not influenced by it proximity to the shore. Real Estate Division investigated recent vacant near shore land sales for Lido Key for both residential and commercial properties. Upland sales data indicated an average value for near shore residential as well as near shore commercial property at $24.00 per square foot. All relative information was input into a computer model to generate existing and future damages associated with storms. From the various alternative plans considered, the computer model generated those damages that would be prevented with a specific alternative chosen. The total amount of existing damages that could be saved with a given alternative plan in place became the project benefits for that plan.

d. The analysis of alternative plans and the NED Plan. The selected plan is that alternative which maximizes net NED benefits. The National Economic Development Plan (NED) was derived by determining that alternative which provided the greatest incremental difference between primary benefits over and above the project costs. The costs to be associated with each alternative plan were provided by Engineering Division, Cost Estimating Branch. Risk and uncertainty was applied to the NED plan only to determine the level of confidence that the damages and estimated benefits under this Plan are realistic and could be assumed accurate (SEE *Analysis of Results Based on Risk And Uncertainty*).

ASSUMPTIONS FOR STUDY

10. In the method of analysis and the evaluation of this project, certain assumptions were made.

a. the relationship of probability to shoreline recession will remain constant with time,

b. damages to improvements will not occur until the shoreline recession has exceeded the seaward edge of the improvement,

c. when the shoreline recedes halfway through a structure of two stories or less, the structure will be considered a total loss [e.g., a single family house],when the shoreline recedes completely through a structure with more than two stories on deeply embedded pilings, the structural value of only the bottom two floors will be used in determining losses [e.g., a condominium],

d. if a structure on deeply embedded pilings is less than completely undermined, the damage is assumed to be equal to the product of the structure value of the bottom two floors and the ratio of the horizontal distance eroded through the structure divided by the distance to the landward face of the structure,

e. all market values of improvement will be estimated using a version of the cost approach to value, *Replacement Cost New less Depreciation*, where replacement cost new implies replacing a building using materials and standards having utility equivalent to the existing structure,

f. seawalls, revetments and other coastal armor will stop all damages from a given storm until they are exceeded or fail,

g. although the shorefront areas continue to develop through time, damage estimates will be limited to the existing buildings and structures,

h. repair costs to the coastal armor will be determined by current engineering estimates of replacement and/or repair costs of such work, and,

i. after structural failure and the shoreline recession continues through the shorefront development, roads, parking lots etc., these damageable categories will be repaired to a condition similar to and in the same location as the pre-storm condition.

STORM DAMAGE COMPUTER MODEL

11. The Storm Damage Computer Model is a computer program which calculates and determines existing and future damages and benefits from storms and from long term erosion. The extent of damages from storms is based on the severity of the storm and the extent to which it invades the shoreline causing losses to property. Since the severity of a storm is a factor which determines storm damage, the model uses a variety of inputs about a respective area and through a series of calculations based on data-input tables, gives estimates of expected damages caused by storm-induced recession over the selected period of analysis (50 years) associated with various storm events.

12. Tables D-1 and D-2, for reaches 2 and 3 respectively, show the various input values used in determining the expected damages over the project life. They show the position of the shoreline under present and future conditions (*Shoreline Position*), the probabilities of an occurrence and the recession of the beach area (in feet) for a series of storm events (*Frequency-Recession*), and the different coastal armor options and their costs under existing conditions and estimated protective values *(Coastal Armor Index)*. The shoreline position is based on a specified historical recession rate of beach over time, 21.1 feet per year for Reach 2, and 6.3 feet per year for Reach 3.

TABLE D-1
Storm Damage Input Table
Reach 2

Shoreline Position

50	21.2							
2000	21.2	2001	42.2	2003	63.3	2004	84.4	2005
2006	126.6	2007	147.7	2008	168.8	2009	189.9	2010
2011	232.1	2012	253.2	2013	274.3	2014	295.4	2015
2016	337.6	2017	358.7	2018	379.8	2019	400.9	2020
2021	443.1	2022	464.2	2023	485.3	2024	506.4	2025
2026	548.6	2027	569.7	2028	590.8	2029	611.9	2030
2031	654.1	2032	675.2	2033	696.3	2034	717.4	2035
2036	759.6	2037	780.7	2038	801.8	2039	822.9	2040
2041	865.1	2042	886.2	2043	907.3	2044	928.4	2045
2046	970.6	2047	991.7	2048	1012.8	2049	1033.9	2050

Shoreline-Recession Data

0.005	158
0.0067	156
0.01	151
0.02	141
0.04	129
0.05	124
0.1	106
0.2	98
0.5	85
1	38.5

Coastal Armor Index

Armor Description	Unit Cost	Levels of Protection	Damage Factor	Index Number
Do nothing	$0	0	100%	1
Steel sht/ w/revet.	$1,094	175	10%	2
20' conc. Sht. Pile	$895	150	10%	3
15' conc. Sht. Pile	$619	115	10%	4

TABLE D-2
Storm Damage Input Table
Reach 3

Shoreline Position

50	6.3								
2000	6.3	2001	12.4	2002	18.6	2003	24.8	2004	31
2005	37.2	2006	43.4	2007	49.6	2008	55.8	2009	62
2010	68.2	2011	74.4	2012	80.6	2013	86.8	2014	93
2015	99.2	2016	105.4	2107	111.6	2018	117.8	2019	124
2020	130.2	2021	136.4	2022	142.6	2023	148.8	2024	155
2025	161.2	2026	167.4	2027	173.6	2028	179.8	2029	186
2030	192.2	2031	198.4	2032	204.6	2033	210.8	2034	217
2035	223.2	2036	229.4	2037	23536	2038	241.8	2039	248
2040	254.2	2041	260.4	2042	266.6	2043	272.8	2044	279
2045	285.2	2046	291.4	2047	297.6	2048	303.8	2049	310

Shoreline-Recession

Probability	Recession
0.005	248
0.0067	246
0.01	243
0.02	236
0.04	227
0.05	223
0.1	197
0.2	136
0.5	60.3
1	56

Coastal Armor Index

Armor Description	Unit Cost	Level of Protection	Damage Factor	Index Number
Do nothing	0	0	100%	1
Steel sht/ w/revet.	1094	150	10%	2
20' conc. Sht. Pile	895	125	10%	3
15;' conc. Sht. Pile	619	90	10%	4

13. Based on the use of a shoreline storm response model, a relationship was developed between storm frequencies and shoreline recessions. A combination of field examinations and the use of aerial photography provided input data used by the model to determine the relationship between shoreline recession and damage to structures and development. The relationship between the probability of an occurrence and damages was then found by tabulating total damage estimates for varying amounts of shoreline recession associated with known frequency storm events. The probability of an occurrence from each event was defined on the basis that a storm event could be equaled or exceeded in any given year. The frequency-damage curve was then integrated to produce average annual equivalent damages for each project condition. The frequency-to-shoreline-recession relationships show the expected recession, in feet, associated with storms with specific probabilities of occurrence in any one year. For example, as is shown in Table D-1, the storm with a probability of occurrence of 0.02 in any one year is referred to as the 50-year frequency event. It is estimated that such a storm would cause the shoreline to recede 141 feet landward.

a. Shoreline position: existing conditions. The position of the shoreline becomes the major factor in estimating storm damages. The location of the expected shoreline position for each year is based on the historical shoreline recession rate for the various reaches on a per year basis. Continuous erosion and shoreline recession results in reduced beach width and hence reduced protective value between a structure and the referenced shoreline. Shoreline positions can be expressed in several forms: [1] constant at one continuous value throughout the project life such as zero feet; [2] allowed to recede over the project life without any interference in the rate of recession over time; or [3] allowed to recede at varying distances over the project life such as one-foot, three-foot etc. until a protective structure halts the long term erosion. The assessment of damages to the existing development was based on present conditions, with one exception. It was assumed that developed but unarmored sections of shoreline would construct coastal armor at locations adjacent to existing armor and the new armor would have protective value sufficient to prevent long term erosion and to protect against a 1-in-5 year storm event.

b. Shoreline position: future conditions. Future year damages were simulated in the model with reference to the reference shoreline in future years (tables D-1 & D-2 *Shoreline Position*). The protective value of the beach is lost over time to long-term erosion as greater numbers of structures are threatened by storm-induced recession. Under with project conditions, seaward extension of the shoreline reduces future susceptibility.

c. Coastal armor index. The coastal armor index describes the significant characteristics of the difference types of coastal armor that were evaluated. These characteristics include the type of armor (*armor description*), the cost on a per unit basis (*unit cost*), the amount of protection in feet before the armor is destroyed (*level of protection*) and the damage factor associated with each armor type (*damage factor*). The damage factor is the ratio of non-re-cyclical value of the armor over total value of the armor. As an example, if the existing armor is damaged by a storm, for some armor types, the total value of the existing armor is not completely lost. Some portion is salvageable and can be used to replace the damaged or destroyed armor. Field inspections were made by the Jacksonville District to determine the coastal armor index to be used.

d. Structural improvement value. The storm damage model required the physical dimensions of each land parcel and structure susceptible to storm damage. In addition, dollar estimates were developed for oceanfront improvements and near shore lands. Oceanfront improvements include single family residential, multi-family residential, condominium and commercial buildings. Near shore lands are gross estimates of the value for unimproved lands located away from the shoreline. The value per square foot used for near shore land was $24.00. This estimate was determined by Real Estate Division.

e. Structural Inventory. Table D-3 is a chart of all structures in the study area susceptible to damages. Damage susceptibility applies only to reaches 2 and 3.

TABLE D-3
Structural Inventory *

Name	Value	Lot	Floors	Existing Armor	Replace. Armor	Distances to: Armor	Distances to: Structure	Distances to: Maximum Damage Pt
House	221598	200	2	4	4	170	300	340
Parking	1	300	1	3	3	170	171	172
Condo	14523846	440	10	4	4	280	450	520
Condo	1053740	330	10	4	4	110	260	340
Motel	9929387	590	6	4	4	110	270	290
House	217172	60	2	4	4	170	300	340
House	405162	130	2	4	4	150	320	400
House	171350	120	2	4	4	150	370	400
House	250694	80	2	4	4	150	370	400
House	209382	80	2	4	4	120	380	420
House	293260	80	2	4	4	200	410	450
House	293260	110	2	4	4	210	420	450
House	223525	110	2	4	4	210	420	450
Parking	1	560	1	3	3	150	151	152
B'house	1	160	6	4	4	150	260	280
Pool	1	195	1	4	4	120	121	122
B'house	1	195	2	4	4	120	121	122
Motel	12156190	330	4	3	3	200	260	400
Condo	10103583	220	6	3	3	220	260	450
Condo	132192	220	3	3	3	160	220	370
Condo	1205333	120	2	1	3	240	260	370
Condo	1205333	140	2	1	3	250	250	330
Condo	11984380	140	3	1	3	240	250	330
Condo	5992190	140	2	1	3	240	260	370
Condo	20387210	160	8	3	3	250	300	550
Parking	1	170	1	1	3	190	350	450
Condo	20706578	220	10	3	3	240	350	470
Vacant	1	90	1	1	1	200	300	460
Condo	3064023	220	6	3	3	200	300	460
Condo	2211883	80	2	3	3	190	290	270

TABLE D-3 (cont)
Structural Inventory *

Name	Value	Lot	Floors	Existing Armor	Replace. Armor	Distances to Armor	Distances to Structure	Distances to Maximum Damage Pt
Condo	6687204	410	2	3	3	160	200	240
Condo	11606407	230	13	3	3	200	220	260
Condo	16285014	230	12	3	3	150	240	280
Condo	5315730	220	15	3	3	140	230	400
Condo	39531365	220	9	3	3	140	240	290
Condo	7094469	300	11	2	2	10	10	100
Condo	2694397	230	3	1	3	170	220	360
Condo	9311799	220	2	2	2	0	0	150
Condo	8041260	230	4	2	2	40	60	300

*Reaches 2 & 3 combined

ASSESSMENT OF STORM DAMAGES

14. Damage assessment is the calculated amount of losses that can be expected to occur when a structure is impacted by the recession of the beach. It is based on the shoreline position relative to existing development at the time the beach profile surveys are taken and projected changes in the shoreline position due to long term erosion and the effects of damages from some storm event. For this study, the State of Florida, Department of Natural Resources (DNR) provided beach profile surveys. Damage to the existing development is a function of the protection that is provided by the existing widths of the beach, existing coastal armor and the existing dunes. Continuous erosion and shoreline recession results in future damages to development being more severe from a given storm.

15. Based on the shoreline position and the rate of erosion over time, damages vary depending on the location of the structure in reference to its position along the beach. The greater the distance between the structure and the shoreline the less the damage probability from a storm event. The oceanfront structures are more susceptible to total losses than structures located further away from the beach area.

a. Oceanfront property. Any storm event would impact oceanfront structures first because of their location and position in relation to the ocean. Under certain conditions, a storm event can affect and/or damage structures located further away from the ocean.

b. Secondary or near shore structures. Secondary structures (structures located away from the beach but neat the shoreline) are subject to losses if the shoreline recedes a great distance landward which can be across roads, completely through oceanfront structures etc. In Reach 1, which extends from R-31 to R-35.4, structures are not susceptible to losses except under extremely low frequency storm events. A reconnaissance visit to the area revealed that there was extensive erosion along Reach 1, however, the distance between the shoreline and all structures was great enough to prevent losses even with shoreline erosion as far landward as 500 feet.

16. Throughout Reach 2, which extends from R-35.4 to R-40, there is a wide variance in distances between the shoreline position and the coastal armor. Distances ranged from 110 feet to 280 feet. (SEE Table D-3, *Structure Inventory, Distance to Armor*)[1]. Damage assessment to structures would depend on where a structure was situated along the beach. The recession-damage relationships as in Table D-4 show an example of the damages resulting from varying distances of shoreline recession. Such a table could display damages by reach and category in the base year of the project or in any given year of the project life. Damages to structures, under this example, begin at 230 feet recession of the beach profile. The coastal armor is destroyed at 210 feet. Loss of land begins immediately (10 feet). However, as the table shows, the losses to the backfill begin at 170 feet. Between R-35.4 to R-37, there were 11 structures identified which were located on the west side of Benjamin Franklin Drive. These structures were not subject to damages under this analysis. However, there were 14 structures between R-37 and R-40, which were located along the beach and susceptible to damages.

17. In Reach 3, R-40 to R-43, the land area between the referenced shoreline position and the coastal armor ranged from zero feet up to 200 feet landward.[2]

1. Table D-3 is Reach 2 and 3 combined. Based on the table, Reach 3 begins at the vacant lot, ¾ page down.
2. Reach 3 is shown in Table D-3 about ¾ down the page beginning with a vacant lot.

TABLE D-4
Recession Damage Relationship
(example)

Recession in feet	Development	Backfill	Coastal Armor	Loss of Land	Total Damages
0	0	0	0	0	0
10	0	0	0	8,748	8,748
20	0	0	0	8,748	8,748
30	0	0	0	8,748	8,748
40	0	0	0	8,748	8,748
50	0	0	0	8,748	8,748
60	0	0	0	8,748	8,748
70	0	0	0	8,748	8,748
80	0	0	0	8,748	8,748
90	0	0	0	8,748	8,748
100	0	0	0	8,748	8,748
110	0	0	0	8,748	8,748
120	0	0	0	8,748	8,748
130	0	0	0	8,748	8,748
140	0	0	0	8,748	8,748
150	0	0	0	8,748	8,748
160	0	0	0	8,748	8,748
170	0	4,160	0	8,748	12,908
180	0	24,960	0	8,748	33,708
190	0	45,760	0	8,748	54,508
200	0	66,560	0	8,748	75,308
210	0	1,435,460	52,615	8,748	1,537,058
220	2	1,685,580	52,615	8,748	1,746,945
230	20,091	1,840,280	80,470	8,748	1,949,589
240	195174	1,984,320	80,470	8,748	3,073,329
250	999,791	2,776,020	80,470	8,748	5,993,565
260	3,128,327	2,844,920	108,944	8,748	7,888,494
270	4,925,882	3,008,980	108,944	8,748	8,537,051
280	5,410,379	3,091,270	112,658	8,748	9,204,450
290	5,991,774	3,316,170	161,883	8,748	10,022,510
300	6,535,709	3,492,970	179,783	8,748	10,781,572
310	7,100,071	3,872,570	184,116	8,748	11,585,929
320	7,520,495	3,960,970	196,496	8,748	15,803,567
330	11,637,353	4,279,210	496,496	8,748	17,022,053
340	12,237,599	4,346,810	223,346	8,748	19,389,923
350	14,811,019	4,513,730	223,346	8,748	20,370,044
360	15,624,220	4,556,110	241,246	8,748	36,349,739
370	31,543,635	4,877,210	241,246	8,748	47,406,220
380	42,279,016	5,611,210	281,521	8,748	50,965,798

TABLE D-4 (cont)
Recession Damage Relationship
(example)

Recession in feet	Development	Backfill	Coastal Armor	Loss of Land	Total Damages
390	45,064,319	5,729,490	319,706	8,748	51,122,263
400	47,932,257	5,802,290	319,706	8,748	54,063,001
410	50,896,127	5,854,290	319,706	8,748	57,078,871
420	53,859,996	5,906,290	319,706	8,748	60,094,740
430	56,740,017	5,947,890	319,706	8,748	63,016,361
440	59,796,021	5,947,890	319,706	8,748	66,072,365
450	62,579,470	5,947,890	319,706	8,748	68,855,814
460	63,809,925	5,947,890	319,706	8,748	70,086,269
470	65,040,381	5,947,890	319,706	8,748	71,316,725
480	66,270,836	5,947,890	319,706	8,748	72,547,180
490	67,501,291	5,947,890	319,706	8,748	73,777,635
500	68,648,754	5,947,890	319,706	8,748	74,925,098

WITHOUT AND WITH PROJECT DAMAGES

18. Table D-5 shows the without and with project damages by damage category. Without project damages are estimated to be $3,828,192 during this, the reformulation process. They are the summation of the without project damages from reaches 2 and 3 combined. Table D-5, the with project conditions, consist of a range of extensions of existing beach profiles along with periodic nourishment. The table also shows the various beach profile extensions and the dollar damages by damage category that remain. Damage prevention benefits are calculated by subtracting with project damages for each profile extension from without project damages. These were done during the formulation phase of the project; costs and interest rates were considered to have changed systematically and would therefore not change the selection of the plan based on net benefits. The selected plan was taken into the final evaluation and then updated to current price levels and interest rates.

TABLE D-5
LIDO KEY EXISTING CONDITIONS
(Reaches 2 and 3)
I = 6-3/8%

	|-------------Damages to		--------------------|				
Project Conditions	Development	Coastal Armor	Backfill	Loss of Land	Total Damages	Avg. Ann. Eq. Dam.	Damages Prevented
Existing Damages	$3,024,470	$46,179	$328,789	$428,754	$3,828,192	$3,828,192	N/A
With Project Damages							
1 foot extension	$1,161,247	$5,877	$109,946	$0	$1,277,070	$1,277,070	$2,551,122
20 foot extension	$968,038	$4,916	$70,425	$0	$1,043,379	$1,043,379	$2,784,813
40 foot extension	$600,058	$3,066	$40,499	$0	$643,623	$643,623	$3,184,569
60 foot extension	$230,792	$1,187	$21,399	$0	$253,378	$253,378	$3,574,814
80 foot extension	$29,387	$155	$5,023	$0	$34,565	$34,565	$3,793,627
100 foot extension	$0	$0	$3,916	$0	$3,916	$3,916	$3,824,276

DEVELOPMENT OF STORM DAMAGE PREVENTION BENEFITS

19. Storm damage prevention benefits were developed from a relationship between shoreline recession and storm events. At present, no theoretical model of beach profile change or dune erosion exists which can be applied for engineering purposes. However, there are several empirical dune erosion models. A co-operative study between investigators at the Coastal Engineering Research Center [CERC] and the Department of Water Resources Engineering [DWRE] developed a numeric model program [S-BEACH] which calculates dune and beach erosion produced by storm waves and water levels.

20. Bar formation and movement produced by breaking waves are also simulated. The model is empirically based and was originally developed from a large data set of net cross shore sand transport rates and beach profile changes observed in large tanks. Input to the computer program consists of a pre-storm beach profile, storm surge and wave hydrographs, median sediment grain size, water temperature, two transport parameters [K and Eps] and two characteristic slope parameters and B-foreshore]. Output consist of a post-storm profile. S-BEACH requires calibration of the transport and slope parameters by using a pre-and-post storm profile with the wave and surge hydrographs of the storm. The use of S-BEACH is required for beach fill design projects pursuant to a letter dated 28 September 1990 from the Director of Civil Works, Department of the Army. S-BEACH was used to analyze shoreline recession.

21. A cumulative frequency curve of storm induced recession was developed using the S-BEACH program. Several beach profiles located within the study area were averaged to determine a typical beach profile. With several iterations of the model at various surge levels, the relationship between probability and shoreline recession was determined.

22. The recession of the beach induced by a storm is defined as the loss of land as measured from a horizontal distance from the mean high water shoreline to the landward extent of the shore. It is assumed that the storm induced recession distance is the predicted median recession distance for a given surge event. It is recognized that during an actual storm event there are natural variations about the mean along a given

stretch of shoreline subjected to the same storm event. This variability occurs from several factors such as manmade structures or geological features.

23. The effects of long-term shoreline erosion also affects the beach profile. The profile shape at any particular time is related to the integrated effect of all previous storms. As an example, a dune large enough to survive a major storm today may disappear under the combined influence of a number of smaller storm events over a succession of years.

EVALUATING BENEFITS

24. Primary Benefits. Primary benefits or project benefits are derived from storm damages. They are the differences between the damages that occur under a without project condition and the damages that will occur (residual damages) if a specific project is in place. The overall effectiveness of the reduction in damages is measured by a benefits-to-cost ratio. This ratio measures the benefits to be derived from some selected alternative against the cost to construct that alternative. The benefit must be greater than the cost to construct the project to have Federal participation. In a series of alternatives, each with its respective costs, that alternative which gives the highest net benefit i.e., the greatest margin of benefits over and above costs is the selected alternative(plan).

25. National Economic Development Plan. The NED Plan is defined as that alternative which maximizes net primary NED benefits, i.e. the plan which provides the greatest incremental difference between primary benefits (i.e. storm damage prevention) over and above project costs. In order to satisfy criteria for Federal participation, the NED plan must also have a benefit-to-cost ratio greater than 1.00:1.00.

ANALYSIS OF RESULTS BASED ON PROJECT BENEFITS

26. Table D-6 shows the results of the analysis and the NED Plan. The project benefits, annual cost and net benefits were determined based on an interest rate of 6-3/8 percent. The annual costs represent the differences in capital investment to construct each alternative. Using the investment costs and project costs, the net benefits of each plan were used to.

calculate benefit-to-cost ratios. Based on Table D-6, extending the beach profile 80 feet seaward results in the highest net benefits ($1,811,617) of all the alternatives considered

TABLE D-6
National Economic Development Plan
Costs and Benefit Analysis
I=6-3/8%

Beach Profile	Avg. Ann. Damages	Project Benefits	Marginal Benefits	Annual Costs	Marginal Costs	Net Benefits	B/C Ratio
Existing Damages	$3,828,192	N/A	N/A	N/A	N/A	N/A	N/A
With Project							
1 Foot	$1,277,070	$2,551,122		$1,479,522		$1,071,600	1.72
			$233,691		$52,682		
20 Foot	$1,043,379	$2,784,813		$1,532,204		$1,252,609	1.82
			$399,756		$158,108		
40 Foot	$643,623	$3,184,569		$1,690,312		$1,494,257	1.88
			$390,245		$161,224		
60 Foot	$253,378	$3,574,814		$1,851,536		$1,723,278	1.93
			$218,813		$130,474		
80 Foot	$34,565	$3,793,627		$1,982,010		$1,811,617	1.91
			$30,649		$127,241		
100 Foot	$3,916	$3,824,276		$2,109,251		$1,715,025	1.81

ANALYSIS OF RESULTS AT CURRENT INTEREST RATE

27. Using the current federally mandated interest rate of 6-1/8 percent, the existing conditions and the NED Plan were analyzed, these are presented in Table D-7. Table D-8 is the cost and benefit analysis results at the current interest rate of 6-1/8 percent for the existing conditions and the NED Plan.

TABLE D-7
LIDO KEY EXISTING CONDITIONS
(Total Reach)
I=6-1/8%

Project Conditions	Damages to: Development	Coastal Armor	Backfill	Loss of Land	Total Damages	Avg. Ann. Eq. Dam.	Damages Prevented
Existing Damages	$3,592,829	$37,910	$294,992	$428,754	$4,354,485	$4,354,485	N/A
80 foot extension	$29,387	$155	$5,023	$0	$34,565	$34,565	$4,319,920

TABLE D-8
ECONOMIC SUMMARY OF NED PLAN

LIDO KEY - 50 YR ECONOMIC LIFE	
October 2002 price levels	
	6.125%
Average Annual Costs	**$ 1,954,700**
Average Annual Benefits (includes recreation)	**$ 4,319,900**
Benefit-to-Cost Ratio	**2.2**

APPENDIX E

REAL ESTATE PLAN

REAL ESTATE APPENDIX

LIDO KEY, SARASOTA COUNTY, FLORIDA
SHORE PROTECTION PROJECT
FEASIBILITY REPORT

TABLE OF CONTENTS

REAL ESTATE APPENDIX
LIDO KEY, SARASOTA COUNTY, FLORIDA
SHORE PROTECTION PROJECT
FEASIBILITY REPORT

1. STATEMENT OF PURPOSE

This Real Estate Plan is tentative in nature for planning purposes only and both the final real property acquisition lines and the real estate cost estimates provided are subject to change even after approval of the Feasibility Report.

A reconnaissance report for this project was approved March 1997.

2. AUTHORIZATION

A House Resolution of the Committee on Transportation and Infrastructure, United States House of Representatives, dated 14 September 1995, authorized the Feasibility Study. Congress added funding in the appropriations for Fiscal Year 1998 to initiate the feasibility study.

3. PROJECT LOCATION

Lido Key is a small barrier island, about 2.44 miles long, between New Pass to the north and Big Sarasota Pass to the South. Sarasota Bay and the Intracoastal Waterway (a Federal navigation project authorized in 1945) separate Lido Key from the mainland. The Gulf of Mexico fronts the barrier island to the West and the Intracoastal Waterway and Sarasota Bay separate Lido Key from the mainland to the east. The project site encompasses the beachfront on Lido Key from just north of John Ringling Boulevard to the southern end of Lido Key (approximately 8,280 linear feet). The construction staging area is positioned at the southwest corner of the Sarasota City parking lot. The parking lot is located at the northwest corner of the intersection of Benjamin Franklin Drive and Garfield Drive.

4. PROJECT DESCRIPTION

Coastal erosion is a persistent problem threatening commercial and residential structures. Maintenance dredged material has periodically been placed on Lido Key to keep the Federal navigation channel open, but is not sufficient to prevent the beaches of Lido Key from eroding. The primary study purpose is to assess the need and advisability of providing hurricane and storm damage reduction works for the Lido Key shoreline. The project plan involves constructing an 80-foot berm for the project length of 8,280 feet with a renourishment interval of five years and includes three groins at the south end of the project.

5. FEDERALLY OWNED LANDS

There are no federally owned lands within the project limits.

6. NON-FEDERALLY OWNED LANDS

The northern 3,200 feet of the proposed 8,280 feet of beach shorefront is owned by the Sponsor. This property is known as North Lido Public Beach.

There is a 4,600 foot section of privately owned beach, densely developed just south of North Lido Public Beach.

The remaining 1,300 feet (southern section) is a county owned (Sarasota County) beach and is heavily used by the public.

7. REAL ESTATE REQUIREMENTS

a. Material dredged from State of Florida sovereign submerged lands or placed upon public lands seaward of the proposed Erosion Control Line (ECL) will require a Consent Of Use (COU) from the State of Florida. The COU grants the right to place material on state-owned submerged lands in accordance with beach nourishment plans submitted with the application for an ECL. Also included in this document is the authority to use any submerged borrow areas and/or pipeline corridors. The COU will also provide the authority necessary for construction of the three groins upon State of Florida sovereign submerged lands. The COU is to be issued to the sponsor, the City of Sarasota.

b. The non-federal sponsor is responsible for acquiring the standard perpetual beach storm damage reduction easements for parcels located landward of the ECL up to +5 NGVD. The value of these easements are placed at zero. Any beach renourishment will protect the subject parcels and enhance their value. Thus, under the federal rule, the special benefits of enhancements would offset any costs.

c. Fill material will be borrowed from offshore borrow areas outlined in the geotechnical appendix.

d. Direct access to the beach and staging area is through a parking lot, owned by the City of Sarasota, using SR 780. The upland beach adjacent to the park (approximately a half-acre area at State Monument Number R-37.5) will be used as a temporary staging area. A Temporary Work Area Easement with an estimated two-year duration will be required. The estimated cost for this easement is $144,400.

e. Lands necessary for the construction of the three groins will require a perpetual shore protection structure easement for the areas located landward of the ECL. For lands below the ECL, the required real estate interests will be provided via the COU.

8. ESTATES

A. Standard Estates

1. Perpetual Beach Storm Damage Reduction Easement - A perpetual and assignable easement and right-of-way in, on, over and across (the land described in Schedule A) (Tract No._____) for use by the Project Sponsor, its representatives, agents, contractors, and assigns, to construct; preserve; patrol; operate; maintain; repair; rehabilitate; and replace; a public beach [a dune system] and other erosion control and storm damage reduction measures together with appurtenances thereto, including the right to deposit sand; to accomplish any alterations of contours on said land; to construct berms [and dunes]; to nourish and renourish periodically; to move, store and remove equipment and supplies; to erect and remove temporary structures; and to perform any other work necessary and incident to the construction, periodic renourishment and maintenance of the (Project Name), together with the right of public use and access; to trim, cut, fell, and remove from said land all trees,

underbrush, debris, obstructions, and any other vegetation, structures and obstacles within the limits of the easement; reserving to the grantor(s), (his) (her) (its) (their) (heirs), successors and assigns all such rights and privileges as may be used and enjoyed without interfering with or abridging the rights and easements hereby acquired; subject however to existing easements for public roads and highways, public utilities, railroads and pipelines.

2. Temporary Work Area Easement - A temporary easement and right-of-way in, on, over and across (the land described in Schedule A) (Tracts Nos. ___ and ___), for a period not to exceed _____________, beginning with date possession of the land is granted to the Project Sponsor, for use by the Project Sponsor, its representatives, agents, and contractors as a work area, including the right to move, store and remove equipment and supplies, and erect and remove temporary structures on the land and to perform any other work necessary and incident to the construction of the _____________ Project, together with the right to trim, cut, fell and remove therefrom all trees, underbrush, obstructions, and any other vegetation, structures, or obstacles within the limits of the right-of-way; reserving, however, to the landowners, their heirs and assigns, all such rights and privileges as may be used without interfering with or abridging the rights and easement hereby acquired; subject, however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

B. Non-Standard Estates

1. Perpetual Shore Protection Structure Easement - A perpetual and assignable easement and right-of-way in, on, over, and across (the lands described in Exhibit "A") (Tract No. ___) for the location, construction, operation, maintenance, alteration, repair and replacement of (a) groin(s) and appurtenances thereto, including the right to construct, operate, maintain, repair, replace and remove pipelines and other necessary equipment, to alter, grade, till, and deposit compatible sand, to trim, cut, fell and remove there from all trees, underbrush, obstructions and other vegetation, structures, or obstacles within the limits of the right-of-way; together with the right of public access for the benefit of the citizens and visitors of the Grantee; reserving, however, to the owners, their heirs and assigns, all rights and privileges in the land as may be used without interfering with or abridging the rights and easement hereby acquired; subject however, to existing easements for public roads and highways, public utilities, railroads and pipelines.

2. Consent Of Use (COU) - There is no estate which the sponsor acquires from the State to place material and/or structures seaward of the ECL, however, the State issues a permit type document known as a COU. This consent is issued when the Florida Department of Environmental Regulation approves the initial Water Quality Certificate (WQC) and the Governor and Cabinet approve the ECL.

The Consent of Use basically grants the rights to excavate sand from and place sand, along with any project structures, on state-owned submerged land in accordance with the beach nourishment plans submitted with the application of an ECL. This document must be renewed with the renewal of the WQC.

9. NAVIGATION SERVITUDE

The government will not be exercising navigational servitude in support of this project.

10. PROJECT MAP

A copy of the project map is included in the Main Text.

11. INDUCED FLOODING

There will be no induced flooding directly associated with the project.

12. REAL ESTATE BASELINE COST ESTIMATE

Lands and Damages:

Perpetual Beach Nourishment Easement	$ -0-	
Perpetual Shore Protection Structure Easement	-0-	
Temporary Work Area Easement	$144,400	
Total Land and Damages		$144,400

Acquisition/Administrative Costs

Federal

Project Planning	$ 11,000	
Review of Acquisitions	$ 28,000	
Review of Appraisals	$ 4,350	
Total Federal Acquisitions/ Administration Costs		$ 43,350

Non-Federal

Acquisitions	$ 86,000	
Appraisals	$ 13,000	
Total Non-Federal Acquisition/ Administrative Costs		$ 99,000
Contingencies (*20%)		$ 57,350
Total Estimated Real Estate Costs		$344,100

13. RELOCATION ASSISTANCE BENEFITS

There are no persons or businesses to be relocated as a result of this project.

14. MINERALS

No known minerals exist in the project area.

15. NON-FEDERAL SPONSOR'S AUTHORITY TO PARTICIPATE

The City of Sarasota (Sponsor), derives its authority to participate in the project through Florida Statutes, Title XII, Chapter 166, Section 166.021 which states that municipalities

"Shall have the governmental, corporate, and proprietary powers to enable them to conduct municipal government, perform municipal functions, and render municipal services, and may exercise any power for municipal purposes, except when expressly prohibited by law."

16. REAL ESTATE MILESTONES

After execution of the Project Cooperation Agreement, Real Estate Division will coordinate with other District elements to ensure that all real estate required for the project is available prior to advertisement of the construction contract.

17. PRESENCE OF CONTAMINANTS (HAZARDOUS, TOXIC AND RADIOACTIVE WASTES)

The preliminary assessment indicated that no hazardous, toxic, radioactive (HTRW), or other harmful substances within the project area.

18. ATTITUDE OF LANDOWNERS

The local sponsor (City of Sarasota) and Sarasota County as landowners impacted by the proposed project, are very supportive of said project. The local sponsor indicates that the private landowners impacted by the proposed project are in favor of said project.

19. M-CACES FOR REAL ESTATE

01	LANDS AND DAMAGES	$144,400	
01AA	PROJECT PLANNING	$ 11,000	
01B--	ACQUISITIONS		
01B20	BY LOCAL SPONSOR (LS)	$ 86,000	
01B40	REVIEW OF LS	$ 28,000	
01E--	APPRAISALS		
01E30	BY LS	$ 13,000	
01E50	REVIEW OF LS	$ 4,350	
TOTAL REAL ESTATE COST EXCLUDING CONTINGENCY (RD)			**$286,750**
REAL ESTATE CONTINGENCY (20%) COST (RD)			**$ 57,350**
TOTAL PROJECT REAL ESTATE COST (RD)			**$344,100**

APPENDIX F

PERTINENT CORRESPONDENCE

DENNIS DAUGHTERS, P.E.
DIRECTOR OF ENGINEERING
- CITY ENGINEER -

ALEXANDREA DAVISSHAW, P.E.
DEPUTY DIRECTOR OF ENGINEERING
- ASST. CITY ENGINEER -

Web Page: www.ci.sarasota.fl.us

CITY OF SARASOTA

ENGINEERING DEPT.
ROOM 100A - CITY HALL
1565 FIRST STREET

TEL: (941) 954-4180

FAX: (941) 954-4174

E-Mail: engineering@ci.sarasota.fl.us

Mr. Richard E. Bonner, P.E.
U.S. Army Corps of Engineers
Deputy District Engineer for Project Management
P.O. Box 4970
Jacksonville, FL 32201-0019

October 8, 2002

Subject: **Lido Key Project Sarasota County, Florida
Hurricane and Storm Damage Reduction Project**

Dear Mr. Bonner:

This letter reiterates the City of Sarasota's desire to act as the non-Federal sponsor of the Lido Key storm damage reduction project as described in the Feasibility Report dated May 2002.

We have reviewed the Feasibility Report and understand and intend to provide the items of project cooperation, including the provision of land easements, right-of-way, relocations, and the non-Federal share of project costs. We understand that the items of project cooperation will be specifically set forth in a Project Cooperation Agreement (PCA), to be executed at a future date by the U.S. Army Corps of Engineers and the City of Sarasota, Florida.

The City Commission of the City of Sarasota is empowered by Chapter 161, Florida Statutes (FS), to act as the beach and shore preservation authority. The City has the authority to tax property or issue bonds to meet the costs of the beach and shore preservation program. However, the City intends to use Tourist Development Tax Funds, for the non-Federal share.

Chapter 161 FS also provides for State financial assistance in funding beach erosion control and shore preservation projects. We intend to continue to make application to the Office of Beaches and Coastal Systems, Florida Department of Environmental Protection, for State funds for this project. The State is authorized to fund up to 50 percent of the non-Federal construction and maintenance costs for this project, subject to certain restrictions.

We are completing the details of our financial plan and will provide them to you at the earliest possible date. Please let this office know if there is anything further that is needed to proceed with this project.

Yours truly,

Dennis Daughters

Dennis Daughters, P.E.
Director of Engineering/City Engineer

dm

CESAJ-PD 19 July 2002

WRDA 2002 FACT SHEET

SUBJECT: Lido Key, Sarasota, Florida

LOCATION: City: Sarasota County: Sarasota State: Florida

DESCRIPTION: Congressman Dan Miller has requested that the Committee on Water Resources and Environment add language in the Water Resources Devevelopment Acto of 2002 for the authorization of the project subject to the conditions recommended in a final report of the Chief of Engineers.

BACKGROUND: Lido Key lies along the Gulf of Mexico approximately 45 miles southwest of Tampa. It is a 2.5 mile long coastal barrier island situated about two miles off the mainland and is approximately 0.5 miles across at its widest point. Longboat Key lies to the north of Lido Key across New Pass. Siesta Key is located to the south across Big Sarasota Pass. Sarasota Bay and the Intracoastal Waterway separate Lido Key from the mainland. Access to the island is via the Ringling Causeway. Erosion along the Gulf shore of Lido Key contributes to increasing storm-induced damages and losses to private and public properties. This problem has been intensified by increases in the number of permanent structures constructed on the beach frontage. The recommended plan consist of construction an 8,280-foot berm along Reach 2 and Reach 3 of the study area. Tapers at end of the berm, with a total length of 1,850 feet, would increase the total length of sand fill to about 10,130 feet. These reaches are heavily developed with hotels, motels, condominiums, and houses. The plan of improvement calls for construction an 80-foot wide beach berm, measured seaward of the existing shoreline and elevation +5 feet referenced to National Geodetic Vertical Datum. The advance fill volume is based on the rates of shoreline recession and erosion observed between 1991 and 1998. Initial construction would require placement of approximately 1,074,700 cubic yards (cy) of sand fill, consisting of 460,200 cy of design fill volume and approximately 614,500 cy of sacrficial advance fill. Three borrow areas have been delineated for use and are located between 7.2 and 9.5 nautical miles offshore of Lido Key. Nourishment would be provided at about 5-year intervals over the 50-year period of Federal participation in the project. Three groins would be constructed along the southern portion of the study area to reduce post-construction erosion losses. The current general investigation for the Lido Key project was authorized by House Resolution dated 14 September 1995. The project was reauthorized by the Water Resources Development Act of 1999. A March 2002 Section 902 analysis indicated that increases in the authorized Federal funding limits for intial construction and periodic nourishment of the project are required. Completion of the feasibility report is scheduled for October 2002.

PREVIOUS CONGRESSIONAL ACTION: The project was previously authorized in 1970 and provided for a protective and recreational beach along 6,200 feet of the Gulf shore. House Document 91-320 deauthorized the project on 1 January 1990, in accordance with the provisions of Section 1001(b)(1) of WRDA 1986. The current general investigation for the Lido Key project was authorized by House Resolution dated 14 September 1995. The project was reauthorized by the Water Resources Development Act of 1999. A March 2002 Section 902 analysis indicated that increases in the authorized Federal funding limits for initial construction and periodic nourishment of the project are required. Completion of the feasibility report is scheduled for October 2002. The proposal intends to modify the authorized Federal funding limits.

ISSUES: USACE policy is that Hurricane and Storm Damage Reduction projects are a priority mission on par with navigation, flood control and ecosystem restoration. The proposal is consistent with current USACE policy.

OTHER INFORMATION: The feasibility report will evaluate the economic justification for the Federal cost sharing of initial beach fill, the addition of structures, and periodic nourishments at Lido Key. Extensive coordination with resource agencies, the State, local government entities, and others occurred throughout the planning process. The following "Estimated Cost" included both initial construction and periodic nourishment of the project for a period of 50 years.

ESTIMATED COST:

Federal: $107,277,000 Non-Federal: $104,523,000Total: $211,800,000

Source/Age of Cost Information: Section 902 Analysis dated March 2002.

STRENGTH OF LOCAL INTEREST: Very strong interest in project implementation has been expressed by the non-Federal sponsor and the State of Florida.

CONGRESSIONAL INTEREST: Very strong. Congressman Dan Miller (District 12) has requested the project be included in the Water Resources Development Act of 2002. Senators Graham and Nelson also very strongly support the project.

CESAJ-PD-PN 19 July 2002

WRDA 2002 PROPOSAL

RECOMMENDED USACE POSITION

SUBJECT: Lido Key, Sarasota, Florida

RECOMMENDED CORPS POSITION: SUPPORT

Reason for position: Strong Federal interest in the recommended plan contained in the draft feasibility report.

POINT OF CONTACT FOR ADDITIONAL INFORMATION:

Name: Thomas D. Smith Office: CESAJ-PD-PN Phone: 904-232-3747 Approved By: George M. Strain (CESAJ-PD-P)

DAN MILLER
13TH DISTRICT, FLORIDA

COMMITTEE ON APPROPRIATIONS

COMMITTEE ON GOVERNMENT REFORM
CHAIRMAN, SUBCOMMITTEE ON THE CENSUS

ASSISTANT MAJORITY WHIP

Congress of the United States
House of Representatives
Washington, DC 20515–0913

WASHINGTON OFFICE:
102 CANNON HOUSE OFFICE BUILDING
WASHINGTON, DC 20515–0913
(202) 225-5015

FLORIDA OFFICES:
1751 MOUND STREET
SUITE 106
SARASOTA, FL 34236
(941) 951-6643

2424 MANATEE AVENUE WEST
SUITE 104
BRADENTON, FL 34205
(941) 747-9081

1-800-453-4184
(AVAILABLE IN 941 AND 813 AREA CODE)

INTERNET ADDRESS:
www.house.gov/danmiller/

June 11, 2002

WRDA 2002
#142(a)

The Honorable John J. Duncan, Jr.
Chairman
Subcommittee on Water Resources and the Environment
B-376 Rayburn House Office Building
Washington, DC 20515

Dear Chairman Duncan:

I am asking for your assistance in a matter regarding Lido Key, Sarasota, Florida. I respectfully request language be included in the Water Resources and Development Act of 2002. The project for shore protection at Lido Key, Sarasota, is authorized subject to the conditions recommended in a final report of the Chief of Engineers.

In a Reconnaissance Study report approved by the Chief of Engineers in May of 1997, the Corps found that the Lido Key Beach Nourishment project "is technically sound, economically justified, and socially and environmentally acceptable". In WRDA '99, P.L. 106-53, Congress re-authorized this project, subject to completion of the feasibility study. This study is scheduled to be completed in FY2002.

Based upon the information currently available, it appears that the project will be recommended by the study now underway, however it will exceed in cost and scope the project that was previously authorized in WRDA '99.

Therefore, I hope your subcommittee will enact this new authorization for the Lido Key Shore Protection Project. I have included language for your convenience.

Lido Key, Sarasota, FL
WRDA 2002

Lido Key, Sarasota, FL - The project for shore protection at Lido Key, Sarasota, is authorized subject to the conditions recommended in a final report of the Chief of Engineers.

Thank you for your attention to this request. If you or your staff has any questions about this request, please contact myself or Melissa Figge in my office.

Sincerely,

Dan Miller
Member of Congress

31 May 2002

SUMMARY OF CORPS FEASIBILITY REPORT

1. Name of Report: Sarasota County, Florida, Hurricane and Storm Damage Reduction Project, Lido Key Feasibility Report with Draft Environmental Assessment

State(s): Florida

Congressional District(s): District 13 (Miller)

2. Type of Report: Feasibility for Hurricane and Storm Damage Reduction

3. Location of Study Area: Lido Key is a 2.4-mile long barrier island located on the Gulf of Mexico coast of Florida in Sarasota County. The key is approximately 45 miles south of Tampa. Lido Key is separated from Longboat Key to the north by New Pass (Federal navigation project authorized in 1962) and from Siesta Key to the south by Big Sarasota Pass (not an authorized Federal navigation project). Sarasota Bay and the Intracoastal Waterway (Federal navigation project authorized in 1945) separate Lido Key from the mainland.

4. Authority for Report: Resolution, Docket 2458, adopted September 14, 1995 by the Committee on Transportation and Infrastructure, U.S. House of Representatives.

5. Dates of Corps Reports:

a. Division Engineer's Report/Public Notice: 18 October 2002

b. Chief of Engineers Report: 30 December 2002

6. Problems and Opportunities Identified in Study: Coastal erosion, a persistent problem at Lido Key, threatens commercial and residential structures. Maintenance dredged material from the Federal navigation project at New Pass has periodically been placed on Lido Key at Federal expense. This material is dredged to keep the Federal navigation channel open, but its beach placement has not prevented erosion of Lido Key beaches. The impacts of several major storms from 1982 to the present have accelerated beach erosion and increased the probability for damage to structures at Lido Key.

7. Alternative Plans Considered:

NONSTRUCTURAL (NS) ALTERNATIVE PLANS

NS-1 - No-Action. The no-action alternative perceives the continuation of existing conditions and provides no solutions to existing problems. However, it also avoids any undesirable effects that may be associated with structural or nonstructural plans of improvement. This option, although not favored by the non-Federal sponsor, is considered in relation to the effects of other alternatives.

NS-2 - Construction Control Line. A construction control line would not affect existing development and could only be effective in the unforeseeable future as buildings are razed and destroyed by storms. However, this alternative is acknowledged and included in the nonstructural combination plan and plans are developed around it. A coastal construction control line that does not prohibit construction, but does provide stringent structural restrictions, has been established by the State of Florida for all of the Lido Key study area.

NS-3 - Moratorium on Construction. A moratorium on construction is rejected by the non-Federal sponsor and local interests because the desired growth of the area is oriented towards tourism and recreation, attracting retirees, and promoting a stable construction industry. Further, this alternative offers no protection to existing development in the study area. This alternative is therefore excluded from detailed study.

NS-4 - Establish a No-Growth Program. The establishment of a no-growth program is rejected by local interests. Growth in the area, particularly that in connection with beach activities, is needed to provide economic depth to the communities. Further, this alternative offers no protection to existing development in the study area. This alternative is therefore excluded from detailed study.

NS-5 - Relocation of Structures. The relocation of the structures would allow the area to continue to erode and the land in this area would be lost until the shoreline reached equilibrium. However, structures within the area which cannot be economically or physically moved from the area would be lost due to erosion and have to be abandoned with new structures provided for the existing residents. In addition, implementation of this alternative would result in the loss of valuable recreational beach as shoreline recession continues and would necessitate the condemnation of the land and structures in this area. This alternative is implicitly incorporated into the storm damage benefit analysis in that once condemned by the storm damage model, such upland development is removed from inventory.

NS-6 - Flood Proofing of Structures. Flood proofing of existing structures and regulation of flood plain and storefront development are considered part of building code modifications and are not considered as separate alternatives.

NS-7 - Condemnation of Land and Structures. This alternative would allow the shoreline to erode in the area with a loss of land until the shoreline reached equilibrium. This alternative is excluded as it fails to meet the planning objectives.

NS-8 - Various Nonstructural Combinations. It is recognized that various aspects of many of the preceding nonstructural solutions would be prudent to implement either collectively or in combination with structural alternatives. For the study shoreline, a single nonstructural plan is not applicable for the study area.

STRUCTURAL (S) ALTERNATIVE PLANS

S-1 - Seawalls. The construction of additional concrete seawalls or improvements to and maintenance of the existing bulkheads/seawalls would provide a significant degree of protection; however, this would be accomplished at the expense of a recreational beach and result in substantial economic loss to the area. Reflecting wave energy off the existing seawalls and bulkheads has resulted in steep offshore profiles with resulting hazardous bathing conditions due to increased undertow and runouts. High initial costs of seawall construction in addition to adverse effects on coastal processes eliminate this alternative from further consideration.

S-2 - Revetments. Revetments have been placed on similar beaches to protect critically damaged or eroding areas. These measures have provided temporary relief but have not reduced the erosion of the beaches. The hardening of the beach in one area will merely transfer the location of the problems farther down the beach. Emergency construction of revetment type structures, in-line with current State of Florida coastal armoring statutes, is implicit in the storm damage analysis but is not carried forward as an implementable project feature.

S-3 - Beach Nourishment. This alternative would provide initial beach fill and future nourishment of a design template of appropriate dimensions to serve as a buffer against wave attack. Renourishment of the beach would be undertaken periodically to maintain the recreational and erosion control features within design dimensions. Dimensions of the beach fill would be based on the degree of protection the project should provide. Beach nourishment is carried forward into the intermediate alternative analysis.

S-4 - Groins. Project designed groins or a groin field in the problem area would help hold a beach in front of existing development and prevent further losses of land. The construction of groins would have to be supplemented with nourishment so that adjacent beaches would not be starved of sand. For this reason, groins are considered a method to help hold the fill in place and to reduce periodic renourishment requirements. Groins could also be considered to offer additional stabilization to inlet areas. Groin (terminal and field) construction is carried forward into the intermediate alternative analysis.

S-5 - Breakwaters. The construction of breakwaters offshore along the Lido Key problem area is considered as an alternative to reduce periodic nourishment quantities needed to maintain a protective and recreational beach fill in this area. Such structures would reduce the amount of wave energy reaching the shoreline in their lee. The formation of a partial tombolo would occur if the breakwaters are of sufficient size. As a result, the rate of annual erosion would decrease, as would the annual nourishment requirements. However, costs, state regulations, and environmental concerns preclude further consideration of this alternative.

S-6 - Dunes and Vegetation. The presence of dunes is essential if a beach is to remain stable and able to accommodate the vagaries wrought by unpredictable storms and extreme conditions of wind, wave, and elevated sea surface. Dunes maintain a vast sand repository that, during storms, has a sacrificial element attached to it. Storms with low surges are unable to reach the dune — thus, sub-aerial sand is mostly retained. However, larger storms with attendant high waves and elevated water levels typically erode the dune. Such storms have erosion potentials dependent on their climate and the characteristics of the affected beach. The dune sacrifices a portion of its sand during these storms to satisfy the erosion potential and protects the lands and property on its landward side. In so doing, the dune system provides a measure of public safety and property protection not otherwise provided. Proper dune vegetation on dunes increases sand erosion resistance by binding the sand together via extensive root masses penetrating deep into the sand. Further, such vegetation promotes dune growth through its sand trapping action when significant wind action transports substantial quantities of sand. This alternative may be implemented as a project feature in the future.

8. Description of Recommended Plan: The project area is comprised of an 8,280-foot segment of the Lido Key Gulf of Mexico shoreline located between Florida Department of Environmental Protection (FDEP) monuments R-35 through R-43. The National Economic Development (NED) plan consists of beach fill and a groin field with a 1,000 ft taper section at the northern limit of the project area. A 1,000-foot taper would be provided at the south end of the project. The design berm elevation is +5 ft NGVD and extends 80 ft seaward of the baseline. The design template slopes at 1 vertical (V) to 12 horizontal (H) from the berm crest to the MLW shoreline and slopes at 1V to 35H from MLW to the point of intersection with the existing profile.

Construction of the project would require placement of approximately 460,200 cubic yards (cy) of design fill and 614,500 cy of advance fill material. The three borrow areas delineated for use are located between 7.2 and 9.5 nautical miles offshore Lido Key. Each area is located on a small, isolated bathymetric high. Nourishment would be provided at 5-yr intervals over the 50-yr life of the project. Cost estimates developed for various alternatives indicate that a hopper dredge with the capability to pump directly onto the beach would provide the most cost effective plan for construction of the project.

The structure height of the three groins is +5-ft NGVD. The groin to be built at the southern end of Lido Key has a total length of approximately 650 ft. The landward half of the structure will lie along the north bank of Big Sarasota Pass. The middle structure, to be located 800 ft north of Big Sarasota Pass, will extend 440 ft seaward from the existing +5 ft NGVD contour. The northernmost structure, to be located 1,400 ft north of Big Sarasota Pass, will extend 320 ft from the existing seawall near R-42.5. Two layers of two-ton armor stone are used in the structural design, and the armor stone will be laid over 400 lb core stone. A layer of 1 to 20 lb bedding stone will support the core and armor stones. A vinyl sheet pile extends 24 ft below the crest at the center of the structure.

9. Physical Data on Project Features: See Section 8

10. New Policy Directions Recommended: Not Applicable

11. Views of States, Non-Federal Interests and Other Countries: The State of Florida has placed a high priority on the implementation of the project (for which they are committed to providing 50% of the non-Federal share). The feasibility report is currently under state, public and agency review.

12. Views of Federal and Regional Agencies: The feasibility report is currently under state, public and agency review.

13. Status of NEPA Document: The draft EA is currently under public and agency review (reports were sent on 27 May 2002).

14. Estimated Implementation Costs: (FY02 price levels)

		Cost Sharing
Federal US Army Corps of Engineers		$ 6,546,738
Non-Federal		$ 6,378,707
	Total	$12,925,445

15. Description of Non-Federal Implementation Costs:

a. Provide 35% of initial project costs assigned to hurricane and storm damage reduction plus 100% of initial project costs assigned to protecting undeveloped private lands and other private shores which do not provide public benefits, periodic nourishment costs assigned to hurricane and storm damage reduction plus 100% of periodic nourishment costs assigned to protecting undeveloped private lands and other private shores which do not provide public benefits and as further specified below:

(1) Enter into an agreement that provides, before construction, 25% of design costs;

(2) Provide, during construction, any additional funds needed to cover the non-Federal share of design costs;

(3) Provide all lands, easements, and rights-of-way, and perform or ensure the performance of any relocations determined by the Federal Government to be necessary for the initial construction, periodic nourishment, operation, monitoring, and maintenance of the project;

(4) Provide, during construction, any additional amounts as are necessary to make its total contribution equal to 35% of initial project costs assigned to hurricane and storm damage reduction plus 100% of initial project costs assigned to protecting undeveloped private lands and other private shores which do not provide public benefits and 35% of periodic nourishment costs assigned to hurricane and storm damage reduction plus 100% of periodic nourishment costs assigned to protecting undeveloped private lands and other private shores which do not provide public benefits;

b. For so long as the project remains authorized, operate, maintain, and repair the completed project, or functional portion of the project, at no cost to the Federal Government, in a manner compatible with the project's authorized purposes and in accordance with applicable

Federal and State laws and regulations and any specific directions prescribed by the Federal Government;

c. Perform, or cause to be performed, any investigations for hazardous substances that are determined necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Public Law 96-510, as amended, 42 U.S.C. 9601-9675, that may exist in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be required for the initial construction, periodic nourishment, operation, and maintenance of the project. However, for lands that the Federal Government determines to be subject to the navigation servitude, only the Federal Government shall perform such investigations unless the Federal Government provides the non-Federal Sponsor with prior specific written direction, in which case the non-Federal Sponsor shall perform such investigations in accordance with such written direction;

d. Assume complete financial responsibility for all necessary cleanup and response costs of any CERCLA regulated materials located in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be necessary for the initial construction, periodic nourishment, operation, or maintenance of the project;

e. Agree that the non-Federal Sponsor shall be considered the operator of the project for the purpose of CERCLA liability, and to the maximum extent practicable, operate, maintain, and repair the project in a manner that will not cause liability to arise under CERCLA;

f. If applicable, comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended by Title IV of the Surface Transportation and Uniform Relocation Assistance Act of 1987 (Public Law 100-17), and the Uniform Regulations contained in 49 CFR Part 24, in acquiring lands, easements, and rights-of-way, required for the initial construction, periodic nourishment, operation, and maintenance of the project, including those necessary for relocations, borrow materials, and dredged or excavated material disposal, and inform all affected persons of applicable benefits, policies, and procedures in connection with said Act;

g. Provide the non-Federal share of that portion of the costs of mitigation and data recovery activities associated with historic preservation, that are in excess of 1% of the total amount authorized to be appropriated for the project, in accordance with the cost sharing provisions of the agreement;

h. At least twice annually and after storm events, perform surveillance of the beach to determine losses of nourishment material from the project design section and provide the results of such surveillance to the Federal Government.

16. <u>Estimated Annual O&M Costs:</u> (FY02 price levels):

Federal

Corps of Engineers	$50,362
Non-Federal	$43,855
Total	$94,217

17. Description of Non-Federal O&M Cost: Non-Federal O&M costs will include the costs to conduct beach profile surveys, aerial photography, sediment sampling and sea turtle monitoring not associated with the renourishment of the project.

18. Estimated Effects:

Account	Average Annual Equivalent Beneficial	Average Annual Cost
NED	$3,793,628	$1,762,559

Project economic life 50 years.
Benefit-Cost Ratio: 2.1 (Current Discount Rate: 6 1/8)
NED plan recommended? YES.

19. Direct Beneficiaries: The benefits of the Recommended Plan are based on reduced damage to upland development, coastal armor and loss of backfill. The beneficiaries include the nation as whole, since the without-project damages would impose higher losses on the public than those predicted under the with-project scenario. Other beneficiaries would be upland property owners and recreational beach users within the project area.

20. Current Status of Chief of Engineers Report: Finalization of the Chief of Engineers Report is awaiting approval of the feasibility report.

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P. O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

REPLY TO
ATTENTION OF

Planning Division
Environmental Branch

MAY 29 2002

TO WHOM IT MAY CONCERN:

Pursuant to the National Environmental Policy Act and U.S. Army Corps of Engineers Regulation (33 CFR 230.11), this letter constitutes the Notice of Availability of the Preliminary Finding of No Significant Impact (FONSI) for the Lido Key Shore Protection Project, Sarasota County, Florida.

The EA and FONSI is available for viewing on the Corps of Engineers website under "Lido Key Shore Protection Project" at http//www.saj.usace.army.mil/pd/envdocsb.htm. Additionally, a copy of the EA and Preliminary FONSI is available at the Sarasota County Selby Public Library, 1331 First Street, Sarasota, Florida. For library hours phone 941-316-1181.

Comments or questions concerning the Environmental Assessment (EA) that led to the FONSI should be provided to Ms. Yvonne Haberer at the letterhead address within 30 days of receipt of this letter. Ms. Haberer can also be reached at 904-232-1701.

Sincerely,

James C. Duck

James C. Duck
Chief, Planning Division

DEPARTMENT OF THE ARMY
U.S. ARMY CORPS OF ENGINEERS
WASHINGTON, D.C. 20314-1000

REPLY TO
ATTENTION OF:

CECW-PM

03 MAY 2002

MEMORANDUM FOR Commander, South Atlantic Division (CESAD-CM-P)

SUBJECT: Lido Key Hurricane and Storm Damage Reduction Project, Sarasota, Florida - Feasibility Review Conference (FRC) Guidance Memorandum

1. References:

a. CESAJ-PD-PN memorandum, dated 5 March 2002, subject: Lido Key Shore Protection Project Feasibility Report with Draft Environmental Assessment, Sarasota, Florida which transmitted the subject report for policy compliance review; and

b. E-mail message, dated 16 April 2002, which transmitted Policy Compliance Review comments regarding subject report.

2. The subject briefing was held by internet and telephone with all parties on 23 April 2002. Participants in the briefing included representatives from HQUSACE, CESAD, CESAJ, and the non-Federal sponsor. A list of attendees is provided as Enclosure 1. The FRC was held to resolve HQUSACE and CESAD comments prior to release of the draft report for public review. The briefing culminated in discussions and actions required for the resolution of issues raised by policy compliance review comments and the district's responses. Documentation of comments and concerns, discussions, and resolution of issues, including required actions is provided as Enclosure 2.

3. The Draft Feasibility Report with Environmental Assessment should be completed in accordance with the guidance provided in this memorandum. Upon satisfactorily responding to the action items, the district may release the draft feasibility report for public comment. The draft report incorporating information generated by required actions, along with documentation of how and where each of the comments is addressed in the report, will be provided to HQUSACE at the same time the draft report is released for public review.

FOR THE COMMANDER:

James F. Johnson

Encl

JAMES F. JOHNSON
Chief, Planning and Policy Division
Directorate of Civil Works

LIDO KEY
SARASOTA COUNTY, FLORIDA
HURRICANE AND STORM DAMAGE REDUCTION PROJECT

DOCUMENTATION OF POLICY COMPLIANCE REVIEW
FEASIBILITY REPORT/ENVIRONMENTAL ASSESSMENT
FEASIBILITY REVIEW CONFERENCE
(held 23 April 2002)

1. BACKGROUND

a. Study Area. Lido Key is an artificially created 2.5-mile-long coastal barrier island located approximately 45 miles south of Tampa on the gulf coast of Florida. It is situated about 2 miles off the mainland and is about 0.5 miles across at it widest point. Longboat Key lies to the north of Lido Key across New Pass. Siesta Key is located to the south across Big Sarasota Pass. Sarasota Bay and the Intracoastal Waterway separate Lido Key from the mainland. Access to the island is via the Ringling Causeway. Five study reaches of the gulf coast of Lido Key were delineated to facilitate evaluation of prospective hurricane and storm damages. Reach 1 extends from New Pass Inlet south to Ringling Boulevard. Reach 2 extends from Ringling Boulevard (Florida Department of Environmental Protection (FDEP) monument R-35.4) south to R-40. Reach 3 extends from R-40 to R-43. Reach 4 (below R-43) is at Big Sarasota Pass Inlet, where a recreation park is located on the south end of the Key.

b. Problem. Erosion along Gulf shore of Lido Key contributes to increasing storm-induced damages and losses to private and public properties. This problem has been intensified by increases in the number of permanent structures constructed on the beach frontage. Significant development in Reach 2 and Reach 3, valued at about $214 Million, is susceptible to damages from hurricanes and coastal storms. The report cites expected equivalent annual average storm damages of $3,828,000 over the next 50 years for these two reaches unless some action is taken.

c. Recommended Plan. The selected plan consists of constructing an 8,280-foot berm along Reach 2 and Reach 3 of the study area. Tapers at end of the berm, with a total length of 1,850 feet, would increase the total length of sand fill to about 10,130 feet. These reaches are heavily developed with hotels, motels, condominiums and houses. The plan of improvement calls constructing an 80-foot wide beach berm, measured seaward of the existing shoreline at elevation +5 feet referenced to National Geodetic Vertical Datum (NGVD). The advance fill volume is based on the rates of shoreline recession and erosion observed between 1991 and 1998. Initial construction would require placement of approximately 1,074,700 cubic yards (cy) of sand fill, consisting of 460,200 cy of design fill volume and approximately 614,500 cy of sacrificial advance fill. Three borrow areas have been delineated for use (designated borrow areas 5, 6, and 7 in the report) and are located between 7.2 and 9.5 nautical miles offshore of Lido Key. Nourishment would be provided at about 5-year intervals over the 50-year period of Federal participation in the project. Three groins would be constructed along the southern portion of the study area to reduce post-construction erosion losses. The southernmost structure would be built along the north bank of Big Sarasota Pass and extend about 650 seaward at an elevation of +5-feet NGVD. The middle structure would be located about 800 feet north of Big Sarasota Pass and extend about 440 feet seaward from the existing +5-foot NGVD contour. The northernmost structure would be located 1,400 feet north of Big Sarasota Pass, and extend 320 feet from the existing seawall near R-42. Each structure would consist of 400-pound core stone overlain by two layers of 2-ton armor stone. The report indicates that the selected plan is the NED plan.

d. Project Costs. Initial construction costs associated with the beach fill would be approximately $8,745,000 at January 2001 prices. Groin field construction costs are estimated as $4,181,000. The indicated total initial construction cost is therefore $12,925,000. The cost of each future nourishment is estimated as $5,252,000 at January 2001 prices. Assuming long-term average conditions, ten periodic nourishments may be required during the 50-year period of Federal participation. Consequently, total periodic nourishment costs (continuing construction) are estimated as $52,517,000 at January 2001 prices. Thus, the ultimate cost of project construction (initial construction plus continuing construction) is about $65,443,000 stated in terms of January 2001 prices.

e. Economic Evaluation. The estimated costs and benefits for the recommended NED plan is based on January 2001 price levels, a discount rate of 6 3/8 percent and amortized over a 50-year period of analysis. Total investment cost includes interest on funds expended during construction.

Initial Investment Cost	$13,635,000
Nourishment Cost (Each)	$5,252,000
Annual Benefits	$3,793,600
Annual Costs	$1,856,200
Net Benefits	$1,937,400
B/C Ratio	2.0

Project costs include the cost of final design, construction supervision, and environmental monitoring during construction and the annual costs of maintenance of the berm and the groin field. All project benefits are attributed to the hurricane and storm damage reduction project purpose. Incidental recreation benefits are not claimed.

2. **ADMINISTRATION SUPPORT**. The report does not correctly state Administration policy regarding budgetary and authorization support of hurricane and storm damage reduction projects. Page 2 of the syllabus states: "T he current Federal administration policy does not support the initiation of new shore protection/beach erosion control projects because these projects are more properly a state or local responsibility." This statement is not correct. The current Administration has stated that hurricane and storm damage reduction projects will be treated on an equal basis with flood damage reduction and ecosystem restoration projects. Passages such as that quoted should be removed from the report.

DISCUSSION: HQ noted that current Administration policy supports authorization and funding of shore protection projects on an equal basis with flood damage reduction and ecosystem restoration projects.

REQUIRED ACTION: The draft report will be revised to reflect the current Administration policy.

3. **SAND BORROW SOURCES.**

a. Insufficient Quantity of Sand. A sufficient quantity of suitable sand borrow for the project has not been identified. Therefore, plan formulation is incomplete. Table A-28, appendix A, indicates that three borrow areas, containing a total of 1.9 million cy of suitable sand, are to be used to construct the project. About 1.1 million cy of sand will be required for the initial construction and about 614,500 cy would be required for each periodic nourishment. Therefore, the initial construction and one future nourishment would essentially deplete the three designated borrow areas. Assuming that long-term average conditions prevail, ten periodic nourishments may be required during the 50-year period of Federal participation. Based on current estimates about 6.1 million cy would be required for the ten nourishments. This estimate is partly based on obtaining sand characteristic similar to the three designated borrow sites. Sand with less suitable characteristics would necessitate that greater quantities be used at perhaps greater frequency. Paragraph B-49, Appendix B, identifies additional possible sand sources; however, no assessment of the suitability of these sources or the costs associated with transport and use of material from these areas is provided. The report needs to demonstrate that the recommended plan is complete by identifying tested sand borrow sources with sufficient quantities to implement the project.

Response: PD-PN. Concur. Based on existing geotechnical data for the project area, the current borrow areas are indicative of a broader sand resource that comprises a relic dune. There is every indication the there are multi-million cubic yards (well over the 50-year project requirements) of suitable sand available offshore of the project area. The most cost effective borrow sources have been identified in detail for initial construction of the project. Additional geotechnical information will be provided in the revised report to substantiate this claim.

DISCUSSION: The District acknowledged the need to better define the locations and quality of potential sand sources to be used in the future.

REQUIRED ACTION: The draft report will be revised to include additional information on additional sand sources. The economic evaluation will be revised as necessary to reflect any additional costs associated with providing additional sources or longer transportation distances. If there is still uncertainty in the future sources of sand, then the costs of testing and seeking sand need to be included in the project costs.

b. Continuing Construction Costs. Continuing construction costs may be underestimated. Project economics are based on the cost of nourishment associated with the three designated borrow areas even though we know that sufficient sand to nourish the project over a 50-year period is not available from those areas. This is not appropriate. Project costs may be underestimated if the nourishment frequency must be increased to account for less suitable material or if transport costs are greater than assumed for the three designated borrow sources. ER 1110-2-1407, paragraph 7.b.(2) states that borrow material sources adequate to supply material for the initial construction, advanced nourishment, and periodic nourishment for the period of evaluation (usually 50 years) should be identified and used in developing project costs. Since sufficient borrow with its attendant costs has not been identified, there is more than typical uncertainty in the estimated continuing construction cost used in the economic evaluation. The report should identify sufficient quantities of sand with associated costs to cover all anticipated nourishment requirements for the 50-year period of Federal participation in the proposed project.

Response: PD-PN. Concur. Reference response to comment 3.a. above.

DISCUSSION: Reference discussion to 3a above.

REQUIRED ACTION: Reference required action for 3a above.

4. **FUTURE WITHOUT PROJECT CONDITION.**

a. Use of Sand Dredged from Maintenance of Local Navigation Channels. The most probable future without-project condition does not appear to be reflected in the report. The economic evaluation is based on the assumption that long-term erosion continues unabated at a rate of 21.1 feet annually in reach 2 and 6.3 feet annually in reach 3. However, Table III-4, page 17, documents that sand dredged from New Pass has more or less routinely been placed on the reach 2 shoreline of Lido Key. It is reasonable to assume that such practice would continue in the future. The economic analysis of without-project damages should reflect the probable continued placement of New Pass dredged sediments on the beach.

Response: PD-PN. Do not concur. There are no guarantees that the New Pass maintenance material will be placed on Lido Key in future.

DISCUSSION: The District explained that New Pass is a recreational channel with a low budgetary priority. Due to the fact that it is a low budgetary priority the District explained that there is no guarantee that New Pass would be dredged on a consistent basis or that the maintenance material would be placed on the Lido Key shoreline in the future. Therefore, they felt this practice should not be considered as the future without project condition. Historically, New Pass has been dredged on an average every 4 to 5 years for the last 20 years. Approximately 110,000 – 120,000 c.y. of material is dredged. The City of Sarasota receives half of the material and expects to receive about 65% of the material in the future. The District also explained that the amount of material received from the maintenance dredging of New Pass is negligible and will have no major impact to the study. After extensive discussion, all agreed that the most probable future without project condition should reflect the continued placement of New Pass dredged material on the Lido Key shoreline.

REQUIRED ACTION: The draft report will be revised. The economic analysis of without-project damages will reflect the probable continued placement of New Pass

dredged sediments on the beach. The District will verify the unadjusted erosion rate to determine if there is an impact to the study. If there is a major impact we will reconvene to discuss the matter.

b. Validity of the Storm Frequency--Storm Recession Relationship. The future without-project economic evaluation for reach 2 assumes a constant 21.2 feet of long-term erosion for each year of the analysis. In addition, the storm frequency-recession curve assumes an additional 38.5 feet of storm-induced erosion from the annual (table D-1, probability =1.0, i.e., certainty) storm. Thus, the without project economic analysis assumes that more than 60 feet of shoreline recession is expected to occur each year in reach 2. Similarly, the future-without-project economic evaluation for reach 3 assumes a constant 6.3 feet of long-term erosion plus an additional 56 feet of storm induced erosion associated with the annual (table D-2, probability=1.0, i.e., certainty) storm. Thus, the without project analysis for reach 3 assumes that more than 62 feet of shoreline recession is expected to occur in each year. The report should document that erosion of these magnitudes has occurred annually in the past.

Response: PD-PN. Partially concur. Recession and storm-induced erosion are not additive. The report will be revised to better document the erosion rates claimed.

DISCUSSION: The District explained that their current model does not apply the constant erosion rate beyond the point where coastal armor is encountered. HQ noted that sufficient information should be included in the report to make reviewers comfortable that the values cited are reasonable.

REQUIRED ACTION: The draft report will be revised. The District will provide a generic sample of a model run to better document how long-term and storm-induced erosion rates are applied by the model. Any revisions required by use of un-adjusted erosion rates in the analysis will be made.

5. **STORM DAMAGES.**

a. Damage to Pile-Supported Structures. Page D-4 of the Economics Appendix states the following: "A structure was considered totally condemned when the shoreline receded to the midpoint of the structure. For multi-story structures on deeply embedded pilings, damages were claimed only for the first two floors." The rationale for the assumption regarding the amount of damage to structures on deeply embedded pilings is not apparent. Why would storm erosion damage two floors? Is there empirical data from post-storm damage assessments to support this assumption? The report should include a discussion of the supporting rationale for critical damage assumptions. Also, the report should also discuss the erosion damage assumptions for structures that are elevated on piles.

Response: PD-PN. Concur. The Jacksonville District's storm damage model assumes that the full value of structures with slab-on-grade foundations will be realized when erosion reaches the mid-point of the structure. For pile structure, full value is reached at the landward limit of the structure. Damage to the first two floors of pile structures is assumed

in the model due to the wave and water level induced impacts. Field verification of post-storm damages is being investigated under an IWR work unit that is currently developing a "national" model for prediction Hurricane and Storm Damage Reduction project benefits. Additional discussion of model assumptions will be provided in the revised report.

DISCUSSION: **HQ noted that model assumptions should be supported by post-storm assessment data if possible.**

REQUIRED ACTION: **The draft report will be revised to incorporate additional information model assumptions and any available post-storm survey assessment data.**

b. Minor Storm Impacts. Paragraph A-48 states the following: "... storm recession is defined as the horizontal distance between the Mean High Water (MWH) station on the pre-storm profile to the most landward station where the vertical difference between the pre-storm and post-storm profile is 0.5 feet." The review team notes that this is the standard definition of storm recession embedded in the SBEACH model used for the study. However, we question the direct application of the model-produced recession distances to estimate economic damages. For example, recession of only one foot into a structure's foo tprint would result in claiming damages amounting to two percent of the depreciated replacement value of a 100-foot wide structure. For some of the structures listed in Table D-3 of the economics appendix, even two percent of the value can be large. Reasonably, damage caused by displacing 6 inches of sand from beneath a pile-supported structure or around a pile-supported foundation could be minimal. The district should investigate whether the assumed storm recession-storm damage relationship provides reasonably supportable damage estimates. The results of this investigation should be included in a revised report.

Response: **PD-PN. Concur. Field verification of post-storm damages is being investigated under an IWR work unit that is currently developing a "national" model for prediction Hurricane and Storm Damage Reduction project benefits. Additional discussion of model assumptions will be provided in the revised report.**

DISCUSSION: **Reference discussion for 5a above.**

REQUIRED ACTION: **Reference required action for 5a above.**

c. Accounting For Recurring Damages. The Economics Appendix (page D-6, para. j.) states that after structural failure, the shore front development, roads, parking lots, etc. would be repaired to a condition similar to and in the same location as the pre-storm condition. Therefore, it appears that in many instances more than 50 percent of a structure's value could be claimed as damage many times during the period of evaluation. For instance, refer to the assumption stated on page D-6 (paragraph 11.e.). A situation where erosion is 30 percent through the footprint of a structure results in 60 percent damage to the value of the structure plus contents. If content value is assumed to be 50 percent of structure value, then the damages claimed are 0.6 x 1.5 = 90 percent of structure value. In these cases, since erosion did not exceed 50 percent of the structure's foot print, they would not be removed from the structure inventory. Thus, the situation could recur repeatedly. An evaluation of whether any structure sustains multiple damages in excess of its depreciated replacement value would be a useful "reality" check of the reasonableness of the without-project damage estimates. The report should address the following issues: Are some properties damaged multiple times during the 50-year period of economic evaluation? In what situations are structures removed from the inventory of damageable property? Will State statutes (or FEMA regulations) prohibit reconstruction of "substantially" damaged structures and are such restrictions reflected in the damage assessment model? The report should document how substantially damaged structures are addressed in the economic evaluation of alternatives.

Response: PD-PN. Concur. The Jacksonville District's storm damage model is used to identify reoccurring damage to structures within the 5-year limit of recession. These structures are subsequently "condemned" (i.e. removed from the storm damage model data base). Additional discussion of model assumptions will be provided in the revised report.

DISCUSSION: Reference discussion for 5a above.

REQUIRED ACTION: Reference required action for 5a above.

d. Land Loss Damages. The report (page 52) indicates that land lost to erosion is valued at $24.00 per square foot. This suggests that a one-acre lot away from the beachfront would be valued at over $1 Million. The report should document that such values are supported by actual real estate sales data.

Response: PD-PN. Concur. CESAJ-RE reviewed recent real estate sales data to determine the reference nearshore land value. The revised report will include a discussion of these investigations.

DISCUSSION: Response was acceptable.

REQUIRED ACTION: The draft report will be revised to document nearshore land values. The economic evaluation will be revised as necessary.

e. Residual Damages. Table D-5 indicates that expected pre-project average annual damages of over $3.8 Million per year are reduced to only about $35,000 per year after the project is constructed. Compared to the damage reduction performance of other HSD projects in Jacksonville District, this is a relatively low residual damage estimate, especially considering that the berm is only 80 feet wide and does not incorporate a dune as part of its profile design. Is there an explanation for this counter-intuitive conclusion?

Response: PD-PN. High without project erosion rates would explain the large percentage of damage reduction for the 80-foot shoreline extension. Just holding the shoreline in the pre-project location would result in significant damage reduction due to the predicted location of the without project shoreline following 50-years of additional recession.

DISCUSSION: **Note previous future without-project erosion rate comments/discussions.**

REQUIRED ACTION: **Reference required action for 5a above.**

f. Tillage Costs. The cost estimate (title page 2) estimates tillage costs based on a 3,000-foot-wide beach area. Three hundred feet may be more appropriate. The cost estimated should be reviewed to insure that tillage costs are accurately calculated.

Response: **PD-PN. Concur. Type will be corrected to indicate the requirement to till 3,000 square feet of beach area.**

DISCUSSION: **The response was acceptable.**

REQUIRED ACTION: **The draft report will be revised.**

6. **LEGAL REVIEW CONSIDERATIONS**. No evidence of legal review is included in the report. The District must provide certification of legal review. Therefore, the following comments should be regarded as preliminary.

a. Cost-sharing

(1). For non-Federal shores, non-Federal interests must pay 100% of OMRR&R costs assigned. The report does not include this cost.

(2). The report does not explicitly break down cost sharing for initial construction, study and design costs. Planning and design costs are shared 50-50 by Federal and non-Federal interests.

b. Financial Analysis. The report should include the Sponsor's statement of intent to support the project and their understanding of the non-Federal Sponsor's responsibilities for project implementation. The report should also include the District's assessment that indicates the non-Federal Sponsor can meet its obligations in the Federal project.

Response: **PD-PN. Concur. Comment 6 will be fully addressed in the revised report and legal certification will be acquired prior to finalization of the report.**

DISCUSSION: **The certification of legal review should not be sent out with public review of the report.**

REQUIRED ACTION: **The draft report will be revised and legal certification will be acquired prior to finalization of the report.**

7. **PROGRAMMING AND BUDGETING**. There is nothing in the President's Budget for FY 02 OR FY 03 for Lido Key. The AFB material indicates completion of the feasibility report scheduled for Feb/Mar FY02 so there may be a bit of a disconnect between report schedule and funding schedule.

<u>Response:</u> PD-PN. Concur. The non-Federal sponsor is aware of these issues.

<u>DISCUSSION:</u> Based on the schedule (Final Report – July; DE Notice - August), we are working on a WRDA contingency

<u>REQUIRED ACTION:</u> No further required action.

8. **AFB RESPONSE INFORMATION DOCUMENTATION.** The District's responses (dated March 10, 2002) to concerns based on Alternative Formulation Briefing (AFB) materials contains important information that was not incorporated into the feasibility study. This information is replicated below in comment/response format. In some instances, the information is merely included as an input to the record of decision-making for the proposed project. In other instances, the comment and response is followed by a review team analysis. In all cases, the district should consider revision of the draft feasibility report to insure that all of the most recent and up-to-date information on the study is available within the covers of the report.

<u>Response:</u> PD-PN. Concur. The district will revise the draft feasibility report in accordance with previous PCR comments and addition guidance provide below to insure that all of the most recent and up-to-date information on the study is available within the covers of the report

a. <u>Section 902 Cost Limits.</u> The District needs to provide a total project cost estimate (using the required M-CACES format) and a comparison of the expected project costs versus the authorized project costs to determine whether the Section 902 cost limits are likely to be exceeded. From the information submitted in the AFB materials it would appear that the initial construction cost for the tentatively selected plan is about 120% higher than the cost authorized in Section 364 of WRDA 99. Since that authorization also specified the annual nourishment cost, a second Section 902 cost limit was established for nourishment costs, which should also be analyzed in accordance with Appendix G of ER 1105-2-100.

Response. Concur. MCACES estimate from the feasibility report indicates a Section 902 cost of $13,638,000 (initial construction) and $198,162,000 (periodic nourishment) equals $211,800,000. The authorized project cost is based on initial construction cost of $5,200,000, and average annual cost of $602,000/50 years ($30,100,000) indicates a Section 902 limit of $7,513,000 (initial construction) and $111,477,000 (periodic nourishment) equals $118,990,000. The complete Section 902 analysis is available upon request.

	Initial	Nourish	Total
Expected Project Costs (000)	13,638	198,162	211,800
Authorized Project Costs (000)	7,513	111,477	118,990
Difference	6,125	86,685	92,810

Review Team Analysis. The expected project costs are not the same as the costs shown in the feasibility report. The cost estimate in the report is dated January 2001, but there appears to be a March 13,2002 revision to the M-CACES. Regardless of which costs are used, it appears that construction and nourishment costs are far in excess of the 20 percent cost growth limitation imposed by Section 902 and that the project will have to be returned to Congress for authorization.

b. Monitoring Cost. One of the AFB briefing displays shows a cost estimate including a $25,750/month item for monitoring. This is a relatively high cost for this activity and needs further explanation and justification. Also, the division of monitoring responsibilities between the Corps and the sponsor needs to be carefully defined and the division of all-Federal versus all non-Federal OMRR&R monitoring costs need to be appropriately identified in the final cost allocation.

Response. Concur. The $25,750 per month monitoring cost displayed in an earlier briefing display was for endangered species and turbidity monitoring as applied only during project construction. The current total cost estimate (based upon the 3/13/02 MCACES) for these monitoring efforts during initial construction of the project (over an estimated duration of 4.94 months) is $179,647 or $36,365/month. This cost is considered reasonable based upon recent contract costs.

Physical monitoring available for Federal cost sharing for the proposed shore protection project will be necessary to assess project performance and to ensure that project functionality is maintained throughout its 50-year design life. The monitoring plan is directed primarily toward assessment of project performance through systematic measurement of remaining beach fill volume, shoreline location, sediment characteristics and environmental habitat quality. Profile surveys should provide accurate assessments of beach fill volumes and a basis for assessing post-construction beach fill adjustments, as well as variations in the profile shape due to seasonal changes and storms. Other monitoring efforts related to surveying include bathymetric mapping of the borrow site and aerial photography of the beach fill project. Beach sediment sampling will be required to provide information on native and fill material characteristics, beach profile shape, and fill volume requirements for future nourishments. Provisions for protection of sea turtles include monitoring during construction and nest relocations, if necessary. Measured wind, wave, and water level information will be obtained from the best available existing data sources.

The proposed monitoring schedule and cost estimate are presented in Table 1. Cost shared pre-construction monitoring activities in FY03 and those for initial construction in FY04 are estimated at $138,000 per year. Cost shared project performance monitoring will be required through the first nourishment of the project in FY09. For the remainder of project life, annual Operations and Maintenance (O&M) of the project will be conducted in between nourishments at 100% non-Federal cost. All other monitoring, required to determine project performance and prepare for future nourishments, will be allocated according to current project cost sharing percentages.

TABLE 1: Monitoring Schedule and Cost Estimates

	PRE-CONST.	INITIAL CONST.					FIRST NOUR.	REMAINING	
ITEM	FY03	FY04	FY05	FY06	FY07	FY08	FY09	O&M	5-year
Beach Profile Surveys	$74,000	$74,000	$37,000	$37,000	$37,000	$74,000	$74,000	$36,000	$74,000
Wading Depth Surveys	$26,000	$26,000	$13,000	$13,000	$13,000	$26,000	$26,000	$13,000	$26,000
Aerial Photography	$13,800	$13,800	$13,800	$13,800	$13,800	$13,800	$13,800	$13,800	$13,800
Borrow Site Surveys	$10,000	$10,000				$10,000	$10,000		$10,000
Sediment Sampling	$12,000	$12,000	$12,000	$12,000	$12,000	$12,000	$12,000		$12,000
Sea Turtle Monitoring	$3,000	$3,000	$3,000	$3,000	$3,000	$3,000	$3,000		$3,000
TOTAL	$138,800	$138,800	$78,800	$78,800	$78,800	$138,800	$138,800	$62,800	$138,800

Review Team Analysis. The above detailed information on the cost of the monitoring program should be added to the feasibility study. The report should also include justification for cost-sharing OMRR&R activities after initial construction is completed, since EM 1110-2-2902 requires OMRR&R to be performed by the non-Federal sponsor in such a manner and for such periods that are necessary to obtain the anticipated project benefits.

c. Public Access. The discussions documented in the ITR meeting minutes indicate that perpetual easements are required to assure that the project lands are open to the public and remain so for the life of the Federal project. It is not evident that consideration was being given to the sufficiency of access (at street ends or through privately held lands) and parking to provide the general public with adequate access to use the beach areas. ER 1105-2-100, Section E-24d. (3) requires the provision of reasonable public access as a condition of Corps participation in storm damage reduction projects. Reasonable access is defined in ER 1105-2-100 as access points at intervals of approximately every one-half mile or less. The project as authorized in 1970 had characterized the area south of Coolidge Park and Lido Casino as privately owned shorefront, which did not qualify for Federal participation in beach fill. The draft report should explicitly delineate any project reaches that fail to meet the one-half mile requirement.

Response. Concur. Public access as it relates to project cost sharing has been considered in accordance with ER 1105-2-100. Table 2 displays the cost sharing analysis developed for the subject study. As indicated in the table, based upon current shoreline ownership and use, 1,260 feet of the south end of the study area has been excluded from Federal cost sharing due to limited public access points. The table will be added to the subject report to "explicitly delineate any project reaches that fail to meet the one-half mile requirement."

Review Team Analysis. Publication of this information in the feasibility report would augment and clarify the current information on the cost sharing for the proposed project.

TABLE 2: LIDO KEY COST SHARING

PARCEL DESCRIPTION	LOT ID	STRUCTURE VALUE	LOT WIDTH	SHORELINE OWNERSHIP	FEDERAL SHARE	LENGTH	I SHAR
Condo	1	14523847	400	PRIVATE/DEVELOPED	65%	260	
Condo	2	1053740	300	PRIVATE/DEVELOPED	65%	195	
Motel	3	9929387	550	PRIVATE/DEVELOPED	65%	358	
House	4	217172	60	PRIVATE/DEVELOPED	65%	39	
House	5	405162	120	PRIVATE/DEVELOPED	65%	78	
House	6	171350	110	PRIVATE/DEVELOPED	65%	72	
House	7	250694	70	PRIVATE/DEVELOPED	65%	46	
House	8	209382	70	PRIVATE/DEVELOPED	65%	46	
House	9	293260	70	PRIVATE/DEVELOPED	65%	46	
House	10	293260	100	PRIVATE/DEVELOPED	65%	65	
House	11	223525	100	PRIVATE/DEVELOPED	65%	65	
Motel	16	12156190	300	PRIVATE/DEVELOPED	65%	195	
Condo	17	10103583	200	PRIVATE/DEVELOPED	65%	130	
Condo	18	132192	200	PRIVATE/DEVELOPED	65%	130	
Condo	19	1205333	110	PRIVATE/DEVELOPED	65%	72	
Condo	20	1205333	125	PRIVATE/DEVELOPED	65%	81	
Condo	21	11984380	125	PRIVATE/DEVELOPED	65%	81	
Condo	22	5992190	125	PRIVATE/DEVELOPED	65%	81	
Condo	23	20387210	150	PRIVATE/DEVELOPED	65%	98	
Parking Lot	24	1	160	PRIVATE/DEVELOPED	65%	104	
Condo	25	20706578	200	PRIVATE/DEVELOPED	0%	0	
Condo	27	3064023	80	PRIVATE/DEVELOPED	0%	0	
Condo	28	2211883	200	PRIVATE/DEVELOPED	0%	0	
Condo	29	6687204	370	PRIVATE/DEVELOPED	0%	0	
Condo	30	11606407	210	PRIVATE/DEVELOPED	0%	0	
Condo	31	16285014	200	PRIVATE/DEVELOPED	0%	0	
Condo	32	5315730	200	PRIVATE/DEVELOPED	65%	130	
Condo	33	39531365	200	PRIVATE/DEVELOPED	65%	130	
Condo	34	7094469	280	PRIVATE/DEVELOPED	65%	182	
Condo	35	2694397	210	PRIVATE/DEVELOPED	65%	137	
Condo	36	9311799	200	PRIVATE/DEVELOPED	65%	130	
Condo	37	8041260	210	PRIVATE/DEVELOPED	65%	137	
SUBTOTALS			**6,005**			**3,084**	
Vacant	26	1	70	PRIVATE/UNDEVELOPED	0%	0	
SUBTOTALS			**70**			0	
Parking	12	1	550	PUBLIC/DEVELOPED	50%	275	
B'house	13	1	160	PUBLIC/DEVELOPED	50%	80	
Pool	14	1	190	PUBLIC/DEVELOPED	50%	95	
B'house	15	1	190	PUBLIC/DEVELOPED	50%	95	
SUBTOTALS			**1,090**			**545**	
TOTALS			**7,165**			**3,629**	

Cost Allocation Based On Ownership and Use (1/02) Total Length Length

Total Distance [ft]	7,165
Total Distance [mi]	1.4
Total Distance Federal [ft]	3,629
Total Distance Non-Federal [ft]	3,536

	Length	Federal	Non-F
Private			
Developed	6,005	3,084	
Undeveloped	70	0	
Street Ends	0	0	
Public/Developed	1,090	545	
	7,165	3,629	

Cost Sharing	**Current**
Fed	**50.65%**
Non	**49.35%**
	100.00%

LIDO KEY, SARASOTA COUNTY, FLORIDA
HURRICANE AND STORM DAMAGE REDUCTION PROJECT

Feasibility Report with Draft Environmental Assessment
Review Conference
23 April 2002
Jacksonville District (Room 930)

Attendee List

NAME	OFFICE	PHONE NUMBER .
Tom Smith	PD-PN	3747
Charlie Stevens	DP-C	2113
Jim Duck	PD	2238
GEORGE STRAIN	PD-P	904-232-3833
Yvonne Haberer	PD-EG	232-1701
ED HODGENS	EN-HC	232-2477
JOE GURULE	EN-HC	232-1199
Jerry Scarborough	DP-C	232-2042
Robert [illegible]	EN-GG	232-[illegible]930
[illegible]	[illegible]	[illegible]
Eric Raasch	PD-D	232-3680
David Smith	PD-PN	232-3277
Kevin Keller	RE-S	232-1851
Diane Orlandine	RE-A	232-2146
KARL NIXON	RE-S-ITR	232-2339

**DRAFT CESAJ RESPONSES
TO
HQUSACE POLICY REVIEW COMMENTS
FOR SARASOTA COUNTY, FLORIDA
HURRICANE AND STORM DAMAGE REDUCTION
LIDO KEY FEASIBILITY REPORT AND DRAFT ENVIRONMENTAL ASSESSMENT
March 2002**

1. **BACKGROUND**

a. Study Area. Lido Key is an artificially created 2.5-mile-long coastal barrier island located approximately 45 miles south of Tampa on the gulf coast of Florida. It is situated about 2 miles off the mainland and is about 0.5 miles across at it widest point. Longboat Key lies to the north of Lido Key across New Pass. Siesta Key is located to the south across Big Sarasota Pass. Sarasota Bay and the Intracoastal Waterway separate Lido Key from the mainland. Access to the island is via the Ringling Causeway. Five study reaches of the gulf coast of Lido Key were delineated to facilitate evaluation of prospective hurricane and storm damages. Reach 1 extends from New Pass Inlet south to Ringling Boulevard. Reach 2 extends from Ringling Boulevard (Florida Department of Environmental Protection (FDEP) monument R-35.4) south to R-40. Reach 3 extends from R-40 to R-43. Reach 4 (below R-43) is at Big Sarasota Pass Inlet, where a recreation park is located on the south end of the Key.

b. Problem. Erosion along Gulf shore of Lido Key contributes to increasing storm-induced damages and losses to private and public properties. This problem has been intensified by increases in the number of permanent structures constructed on the beach frontage. Significant development in Reach 2 and Reach 3, valued at about $214 Million, is susceptible to damages from hurricanes and coastal storms. The report cites expected equivalent annual average storm damages of $3,828,000 over the next 50 years for these two reaches unless some action is taken.

c. Recommended Plan. The selected plan consists of constructing an 8,280-foot berm along Reach 2 and Reach 3 of the study area. Tapers at end of the berm, with a total length of 1,850 feet, would increase the total length of sand fill to about 10,130 feet. These reaches are heavily developed with hotels, motels, condominiums and houses. The plan of improvement calls constructing an 80-foot wide beach berm, measured seaward of the existing shoreline at elevation +5 feet referenced to National Geodetic Vertical Datum (NGVD). The advance fill volume is based on the rates of shoreline recession and erosion observed between 1991 and 1998. Initial construction would require placement of approximately 1,074,700 cubic yards (cy) of sand fill, consisting of 460,200 cy of design fill volume and approximately 614,500 cy of sacrificial advance fill. Three borrow areas have been delineated for use (designated borrow areas 5, 6, and 7 in the report) and are located between 7.2 and 9.5 nautical miles offshore of Lido Key. Nourishment would be provided at about 5-year intervals over the 50-year period of

Federal participation in the project. Three groins would be constructed along the southern portion of the study area to reduce post-construction erosion losses.. The southernmost structure would be built along the north bank of Big Sarasota Pass and extend about 650 seaward at an elevation of +5-feet NGVD. The middle structure would be located about 800 feet north of Big Sarasota Pass and extend about 440 feet seaward from the existing +5-foot NGVD contour. The northernmost structure would be located 1,400 feet north of Big Sarasota Pass, and extend 320 feet from the existing seawall near R-42. Each structure would consist of 400-pound core stone overlain by two layers of 2-ton armor stone. The report indicates that the selected plan is the NED plan.

d. <u>Project Costs</u>. Initial construction costs associated with the beach fill would be approximately $8,745,000 at January 2001 prices. Groin field construction costs are estimated as $4,181,000. The indicated total initial construction cost is therefore $12,925,000. The cost of each future nourishment is estimated as $5,252,000 at January 2001 prices. Assuming long-term average conditions, ten periodic nourishments may be required during the 50-year period of Federal participation. Consequently, total periodic nourishment costs (continuing construction) are estimated as $52,517,000 at January 2001 prices. Thus, the ultimate cost of project construction (initial construction plus continuing construction) is about $65,443,000 stated in terms of January 2001 prices.

e. <u>Economic Evaluation</u>. The estimated costs and benefits for the recommended NED plan is based on January 2001 price levels, a discount rate of 6 3/8 percent and amortized over a 50-year period of analysis. Total investment cost includes interest on funds expended during construction.

Initial Investment Cost	$13,635,000
Nourishment Cost (Each)	$5,252,000
Annual Benefits	$3,793,600
Annual Costs	$1,856,200
Net Benefits	$1,937,400
B/C Ratio	2.0

Project costs include the cost of final design, construction supervision, and environmental monitoring during construction and the annual costs of maintenance of the berm and the groin field. All project benefits are attributed to the hurricane and storm damage reduction project purpose. Incidental recreation benefits are not claimed.

2. **ADMINISTRATION SUPPORT**. The report does not correctly state Administration policy regarding budgetary and authorization support of hurricane and storm damage reduction projects. Page 2 of the syllabus states: "T he current Federal administration policy does not support the initiation of new shore protection/beach erosion control projects because these projects are more properly a state or local responsibility." This statement is not correct. The current Administration has stated that hurricane and storm damage reduction projects

will be treated on an equal basis with flood damage reduction and ecosystem restoration projects. Passages such as that quoted should be removed from the report.

COMMENTS

3. **SAND BORROW SOURCES**.

a. Insufficient Quantity of Sand. A sufficient quantity of suitable sand borrow for the project has not been identified. Therefore, plan formulation is incomplete. Table A-28, appendix A, indicates that three borrow areas, containing a total of 1.9 million cy of suitable sand, are to be used to construct the project. About 1.1 million cy of sand will be required for the initial construction and about 614,500 cy would be required for each periodic nourishment. Therefore, the initial construction and one future nourishment would essentially deplete the three designated borrow areas. Assuming that long-term average conditions prevail, ten periodic nourishments may be required during the 50-year period of Federal participation. Based on current estimates about 6.1 million cy would be required for the ten nourishments. This estimate is partly based on obtaining sand characteristic similar to the three designated borrow sites. Sand with less suitable characteristics would necessitate that greater quantities be used at perhaps greater frequency. Paragraph B-49, Appendix B, identifies additional possible sand sources; however, no assessment of the suitability of these sources or the costs associated with transport and use of material from these areas is provided. The report needs to demonstrate that the recommended plan is complete by identifying tested sand borrow sources with sufficient quantities to implement the project.

Response: **PD-PN. Concur. Based on existing geotechnical data for the project area, the current borrow areas are indicative of a broader sand resource that comprises a relic dune. There is every indication the there are multi-million cubic yards (well over the 50-year project requirements) of suitable sand available offshore of the project area. The most cost effective borrow sources have been identified in detail for initial construction of the project. Additional geotechnical information will be provided in the revised report to substantiate this claim.**

b. Continuing Construction Costs. Continuing construction costs may be underestimated. Project economics are based on the cost of nourishment associated with the three designated borrow areas even though we know that sufficient sand to nourish the project over a 50-year period is not available from those areas. This is not appropriate. Project costs may be underestimated if the nourishment frequency must be increased to account for less suitable material or if transport costs are greater than assumed for the three designated borrow sources. ER 1110-2-1407, paragraph 7.b.(2) states that borrow material sources adequate to supply material for the initial construction, advanced nourishment, and periodic nourishment for the period of evaluation (usually 50 years) should be identified and used in developing project costs. Since sufficient borrow with its attendant costs has not been identified, there is more than typical uncertainty in the estimated continuing construction cost used in the economic evaluation. The report should identify sufficient quantities of sand with associated costs to cover all anticipated nourishment requirements for the 50-year period of Federal participation in the proposed project.

Response: PD-PN. Concur. Reference response to comment 3.b. above.

4. **FUTURE WITHOUT PROJECT CONDITION.**

a. Use of Sand Dredged from Maintenance of Local Navigation Channels. The most probable future without-project condition does not appear to be reflected in the report. The economic evaluation is based on the assumption that long-term erosion continues unabated at a rate of 21.1 feet annually in reach 2 and 6.3 feet annually in reach 3. However, Table III-4, page 17, documents that sand dredged from New Pass has more or less routinely been placed on the reach 2 shoreline of Lido Key. It is reasonable to assume that such practice would continue in the future. The economic analysis of without-project damages should reflect the probable continued placement of New Pass dredged sediments on the beach.

Response: PD-PN. Do not concur. There are no guarantees that the New Pass maintenance material will be placed on Lido Key in future.

b. Validity of the Storm Frequency--Storm Recession Relationship. The future without-project economic evaluation for reach 2 assumes a constant 21.2 feet of long-term erosion for each year of the analysis. In addition, the storm frequency-recession curve assumes an additional 38.5 feet of storm-induced erosion from the annual (table D-1, probability =1.0, i.e., certainty) storm. Thus, the without project economic analysis assumes that more than 60 feet of shoreline recession is expected to occur each year in reach 2. Similarly, the future-without-project economic evaluation for reach 3 assumes a constant 6.3 feet of long-term erosion plus an additional 56 feet of storm induced erosion associated with the annual (table D-2, probability=1.0, i.e., certainty) storm. Thus, the without project analysis for reach 3 assumes that more than 62 feet of shoreline recession is expected to occur in each year. The report should document that erosion of these magnitudes has occurred annually in the past.

Response: PD-PN. Partially concur. Recession and storm induced erosion are not additive. The report will be revised to better document the erosion rates claimed.

5. **STORM DAMAGES.**

a. Damage to Pile-Supported Structures. Page D-4 of the Economics Appendix states the following: "A structure was considered totally condemned when the shoreline receded to the midpoint of the structure. For multi-story structures on deeply embedded pilings, damages were claimed only for the first two floors." The rationale for the assumption regarding the amount of damage to structures on deeply embedded pilings is not apparent. Why would storm erosion damage two floors? Is there empirical data from post-storm damage assessments to support this assumption? The report should include a discussion of the supporting rationale for critical damage assumptions. Also, the report should also discuss the erosion damage assumptions for structures that are elevated on piles.

Response: **PD-PN. Concur. The Jacksonville District's storm damage model assumes that the full value of structures with slab-on-grade foundations will be realized when erosion reaches the mid-point of the structure. For pile structure, full value is reached at the landward limit of the structure. Damage to the first two floors of pile structures in assumed in the model due to the wave and water level induced impacts. Field verification of post-storm damages is being investigated under an IWR work unit that is currently developing a "national" model for prediction Hurricane and Storm Damage Reduction project benefits. Additional discussion of model assumptions will be provided in the revised report.**

b. Minor Storm Impacts. Paragraph A-48 states the following: "... storm recession is defined as the horizontal distance between the Mean High Water (MWH) station on the pre-storm profile to the most landward station where the vertical difference between the pre-storm and post-storm profile is 0.5 feet." The review team notes that this is the standard definition of storm recession embedded in the SBEACH model used for the study. However, we question the direct application of the model-produced recession distances to estimate economic damages. For example, recession of only one foot into a structure's foo tprint would result in claiming damages amounting to two percent of the depreciated replacement value of a 100-foot wide structure. For some of the structures listed in Table D-3 of the economics appendix, even two percent of the value can be large. Reasonably, damage caused by displacing 6 inches of sand from beneath a pile-supported structure or around a pile-supported foundation could be minimal. The district should investigate whether the assumed storm recession-storm damage relationship provides reasonably supportable damage estimates. The results of this investigation should be included in a revised report.

Response: **PD-PN. Concur. Field verification of post-storm damages is being investigated under an IWR work unit that is currently developing a "national" model for prediction Hurricane and Storm Damage Reduction project benefits. Additional discussion of model assumptions will be provided in the revised report.**

c. Accounting For Recurring Damages. The Economics Appendix (page D-6, para. j.) states that after structural failure, the shore front development, roads, parking lots, etc. would be repaired to a condition similar to and in the same location as the pre-storm condition. Therefore, it appears that in many instances more than 50 percent of a structure's value could be claimed as damage many times during the period of evaluation. For instance, refer to the assumption stated on page D-6 (paragraph 11.e.). A situation where erosion is 30 percent through the footprint of a structure results in 60 percent damage to the value of the structure plus contents. If content value is assumed to be 50 percent of structure value, then the damages claimed are 0.6 x 1.5 = 90 percent of structure value. In these cases, since erosion did not exceed 50 percent of the structure's foot print, they would not be removed from the structure inventory. Thus, the situation could recur repeatedly. An evaluation of whether any structure sustains multiple damages in excess of its depreciated replacement value would be a useful "reality" check of the reasonableness of t he without-project damage estimates. The report should address the following issues: Are some properties damaged multiple times during the 50-year period of economic evaluation? In what situations are structures removed from the inventory of damageable property? Will State statutes (or FEMA regulations) prohibit reconstruction of "substantial ly" damaged structures and are such restrictions reflected in the damage assessment model? The report should document how substantially damaged structures are addressed in the economic evaluation of alternatives.

Response: **PD-PN. Concur. The Jacksonville District's storm damage model is used to identify reoccurring damage to structures within the 5-year limit of recession. These structures are subsequently "condemned" (i.e. removed from the storm damage model data base). Additional discussion of model assumptions will be provided in the revised report.**

d. Land Loss Damages. The report (page 52) indicates that land lost to erosion is valued at $24.00 per square foot. This suggests that a one-acre lot away from the beachfront would be valued at over $1 Million. The report should document that such values are supported by actual real estate sales data.

Response: **PD-PN. Concur. CESAJ-RE reviewed recent real estate sales data to determine the reference nearshore land value. The revised report include a discussion of these investigations.**

e. Residual Damages. Table D-5 indicates that expected pre-project average annual damages of over $3.8 Million per year are reduced to only about $35,000 per year after the project is constructed. Compared to the damage reduction performance of other HSD projects in Jacksonville District, this is a relatively low residual damage estimate, especially considering that the berm is only 80 feet wide and does not incorporate a dune as part of its profile design. Is there an explanation for this counter-intuitive conclusion?

Response: **PD-PN. High without project erosion rates would explain the large percentage of damage reduction for the 80-foot shoreline extension. Just holding the shoreline in the pre-project location would result in significant damage reduction due to the predicted location of the without project shoreline following 50-years of additional recession.**

f. Tillage Costs. The cost estimate (title page 2) estimates tillage costs based on a 3,000-foot-wide beach area. Three hundred feet may be more appropriate. The cost estimated should be reviewed to insure that tillage costs are accurately calculated.

Response: PD-PN. Concur. Type will be corrected to indicate the requirement to till 3,000 square feet of beach area.

6. **LEGAL REVIEW CONSIDERATIONS.** No evidence of legal review is included in the report. The District must provide certification of legal review. Therefore, the following comments should be regarded as preliminary.

a. Cost-sharing

(1). For non-Federal shores, non-Federal interests must pay 100% of OMRR&R costs assigned. The report does not include this cost.

(2). The report does not explicitly break down cost sharing for initial construction, study and design costs. Planning and design costs are shared 50-50 by Federal and non-Federal interests.

b. Financial Analysis. The report should include the Sponsor's statement of intent to support the project and their understanding of the non-Federal Sponsor's responsibilities for project implementation. The report should also include the District's assessment that indicates the non-Federal Sponsor can meet its obligations in the Federal project.

Response: PD-PN. Concur. Comment 6 will be fully addressed in the revised report and legal certification will be acquired prior to finalization of the report.

7. **PROGRAMMING AND BUDGETING.** There is nothing in the President's Budget for FY 02 OR FY 03 for Lido Key. The AFB material indicates completion of the feasibility report scheduled for Feb/Mar FY02 so there may be a bit of a disconnect between report schedule and funding schedule.

Response: PD-PN. Concur. The non-Federal sponsor is aware of these issues.

8. **AFB RESPONSE INFORMATION DOCUMENTATION.** The District's responses (dated March 10, 2002) to concerns based on Alternative Formulation Briefing (AFB) materials contains important information that was not incorporated into the feasibility study. This information is replicated below in comment/response format. In some instances, the information is merely included as an input to the record of decision-making for the proposed project. In other instances, the comment and response is followed by a review team analysis. In all cases, the district should consider revision of the draft feasibility report to insure that all of the most recent and up-to-date information on the study is available within the covers of the report.

Response: PD-PN. Concur. The district will revise the draft feasibility report in accordance with previous PCR comments and addition guidance provide below to insure

that all of the most recent and up-to-date information on the study is available within the covers of the report

a. Section 902 Cost Limits. The District needs to provide a total project cost estimate (using the required M-CACES format) and a comparison of the expected project costs versus the authorized project costs to determine whether the Section 902 cost limits are likely to be exceeded. From the information submitted in the AFB materials it would appear that the initial construction cost for the tentatively selected plan is about 120% higher than the cost authorized in Section 364 of WRDA 99. Since that authorization also specified the annual nourishment cost, a second Section 902 cost limit was established for nourishment costs, which should also be analyzed in accordance with Appendix G of ER 1105-2-100.

Response. Concur. MCACES estimate from the feasibility report indicates a Section 902 cost of $13,638,000 (initial construction) and $198,162,000 (periodic nourishment) equals $211,800,000. The authorized project cost is based on initial construction cost of $5,200,000, and average annual cost of $602,000/50 years ($30,100,000) indicates a Section 902 limit of $7,513,000 (initial construction) and $111,477,000 (periodic nourishment) equals $118,990,000. The complete Section 902 analysis is available upon request.

	Initial	Nourish	Total
Expected Project Costs (000)	13,638	198,162	211,800
Authorized Project Costs (000)	7,513	111,477	118,990
Difference	6,125	86,685	92,810

Review Team Analysis. The expected project costs are not the same as the costs shown in the feasibility report. The cost estimate in the report is dated January 2001, but there appears to be a March 13,2002 revision to the M-CACES. Regardless of which costs are used, it appears that construction and nourishment costs are far in excess of the 20 percent cost growth limitation imposed by Section 902 and that the project will have to be returned to Congress for authorization.

b. Monitoring Cost. One of the AFB briefing displays shows a cost estimate including a $25,750/month item for monitoring. This is a relatively high cost for this activity and needs further explanation and justification. Also, the division of monitoring responsibilities between the Corps and the sponsor needs to be carefully defined and the division of all-Federal versus all non-Federal OMRR&R monitoring costs need to be appropriately identified in the final cost allocation.

Response. Concur. The $25,750 per month monitoring cost displayed in an earlier briefing display was for endangered species and turbidity monitoring as applied only during project construction. The current total cost estimate (based upon the 3/13/02 MCACES) for these monitoring efforts during initial construction of the project (over an estimated duration of 4.94

months) is $179,647 or $36,365/month. This cost is considered reasonable based upon recent contract costs.

Physical monitoring available for Federal cost sharing for the proposed shore protection project will be necessary to assess project performance and to ensure that project functionality is maintained throughout its 50-year design life. The monitoring plan is directed primarily toward assessment of project performance through systematic measurement of remaining beach fill volume, shoreline location, sediment characteristics and environmental habitat quality. Profile surveys should provide accurate assessments of beach fill volumes and a basis for assessing post-construction beach fill adjustments, as well as variations in the profile shape due to seasonal changes and storms. Other monitoring efforts related to surveying include bathymetric mapping of the borrow site and aerial photography of the beach fill project. Beach sediment sampling will be required to provide information on native and fill material characteristics, beach profile shape, and fill volume requirements for future nourishments. Provisions for protection of sea turtles include monitoring during construction and nest relocations, if necessary. Measured wind, wave, and water level information will be obtained from the best available existing data sources.

The proposed monitoring schedule and cost estimate are presented in Table 1. Cost shared pre-construction monitoring activities in FY03 and those for initial construction in FY04 are estimated at $138,000 per year. Cost shared project performance monitoring will be required through the first nourishment of the project in FY09. For the remainder of project life, annual Operations and Maintenance (O&M) of the project will be conducted in between nourishments at 100% non-Federal cost. All other monitoring, required to determine project performance and prepare for future nourishments, will be allocated according to current project cost sharing percentages.

TABLE 1: Monitoring Schedule and Cost Estimates

	PRE-CONST.	INITIAL CONST.					FIRST NOUR.	REMAINING	
ITEM	FY03	FY04	FY05	FY06	FY07	FY08	FY09	O&M	5-year
Beach Profile Surveys	$74,000	$74,000	$37,000	$37,000	$37,000	$74,000	$74,000	$36,000	$74,000
Wading Depth Surveys	$26,000	$26,000	$13,000	$13,000	$13,000	$26,000	$26,000	$13,000	$26,000
Aerial Photography	$13,800	$13,800	$13,800	$13,800	$13,800	$13,800	$13,800	$13,800	$13,800
Borrow Site Surveys	$10,000	$10,000				$10,000	$10,000		$10,000
Sediment Sampling	$12,000	$12,000	$12,000	$12,000	$12,000	$12,000	$12,000		$12,000
Sea Turtle Monitoring	$3,000	$3,000	$3,000	$3,000	$3,000	$3,000	$3,000		$3,000
TOTAL	$138,800	$138,800	$78,800	$78,800	$78,800	$138,800	$138,800	$62,800	$138,800

Review Team Analysis. The above detailed information on the cost of the monitoring program should be added to the feasibility study. The report should also include justification for cost-sharing OMRR&R activities after initial construction is completed, since EM 1110-2-2902 requires OMRR&R to be performed by the non-Federal sponsor in such a manner and for such periods that are necessary to obtain the anticipated project benefits.

c. Public Access. The discussions documented in the ITR meeting minutes indicate that perpetual easements are required to assure that the project lands are open to the public and remain so for the life of the Federal project. It is not evident that consideration was being given to the sufficiency of access (at street ends or through privately held lands) and parking to provide the general public with adequate access to use the beach areas. ER 1105-2-100, Section E-24d. (3) requires the provision of reasonable public access as a condition of Corps participation in storm damage reduction projects. Reasonable access is defined in ER 1105-2-100 as access points at intervals of approximately every one-half mile or less. The project as authorized in 1970 had characterized the area south of Coolidge Park and Lido Casino as privately owned shorefront, which did not qualify for Federal participation in beach fill. The draft report should explicitly delineate any project reaches that fail to meet the one-half mile requirement.

Response. Concur. Public access as it relates to project cost sharing has been considered in accordance with ER 1105-2-100. Table 2 displays the cost sharing analysis developed for the subject study. As indicated in the table, based upon current shoreline ownership and use, 1,260 feet of the south end of the study area has been excluded from Federal cost sharing due to limited public access points. The table will be added to the subject report to "explicitly delineate any project reaches that fail to meet the one-half mile requirement."

Review Team Analysis. Publication of this information in the feasibility report would augment and clarify the current information on the cost sharing for the proposed project.

JAMES C. DUCK
Chief, Planning Division

ESAJ-PD-PN
ıbject: Policy Compliance Review of Alternative Formulation Briefing Materials for Lido Key Feasibility Study

ıBLE 2: LIDO KEY COST SHARING

ıRCEL ESCRIPTION	LOT ID	STRUCTURE VALUE	LOT WIDTH	SHORELINE OWNERSHIP	FEDERAL SHARE	LENGTH	NON-FEDERAL SHARE	LENGTH	PUBLIC ACCESS
ındo	1	14523847	400	PRIVATE/DEVELOPED	65%	260	35%	140	
ındo	2	1053740	300	PRIVATE/DEVELOPED	65%	195	35%	105	
ıtel	3	9929387	550	PRIVATE/DEVELOPED	65%	358	35%	193	
ıuse	4	217172	60	PRIVATE/DEVELOPED	65%	39	35%	21	
ıuse	5	405162	120	PRIVATE/DEVELOPED	65%	78	35%	42	
ıuse	6	171350	110	PRIVATE/DEVELOPED	65%	72	35%	39	
ıuse	7	250694	70	PRIVATE/DEVELOPED	65%	46	35%	25	
ıuse	8	209382	70	PRIVATE/DEVELOPED	65%	46	35%	25	
ıuse	9	293260	70	PRIVATE/DEVELOPED	65%	46	35%	25	
ıuse	10	293260	100	PRIVATE/DEVELOPED	65%	65	35%	35	
ıuse	11	223525	100	PRIVATE/DEVELOPED	65%	65	35%	35	
ıtel	16	12156190	300	PRIVATE/DEVELOPED	65%	195	35%	105	
ındo	17	10103583	200	PRIVATE/DEVELOPED	65%	130	35%	70	
ındo	18	132192	200	PRIVATE/DEVELOPED	65%	130	35%	70	
ındo	19	1205333	110	PRIVATE/DEVELOPED	65%	72	35%	39	
ındo	20	1205333	125	PRIVATE/DEVELOPED	65%	81	35%	44	
ındo	21	11984380	125	PRIVATE/DEVELOPED	65%	81	35%	44	
ındo	22	5992190	125	PRIVATE/DEVELOPED	65%	81	35%	44	
ındo	23	20387210	150	PRIVATE/DEVELOPED	65%	98	35%	53	
ırking Lot	24	1	160	PRIVATE/DEVELOPED	65%	104	35%	56	
ındo	25	20706578	200	PRIVATE/DEVELOPED	0%	0	100%	200	NO PUBLIC ACCESS
ındo	27	3064023	80	PRIVATE/DEVELOPED	0%	0	100%	80	NO PUBLIC ACCESS
ındo	28	2211883	200	PRIVATE/DEVELOPED	0%	0	100%	200	NO PUBLIC ACCESS
ındo	29	6687204	370	PRIVATE/DEVELOPED	0%	0	100%	370	NO PUBLIC ACCESS
ındo	30	11606407	210	PRIVATE/DEVELOPED	0%	0	100%	210	NO PUBLIC ACCESS
ındo	31	16285014	200	PRIVATE/DEVELOPED	0%	0	100%	200	NO PUBLIC ACCESS

ındo	32	5315730	200	PRIVATE/DEVELOPED	65%	130	35%	70
ındo	33	39531365	200	PRIVATE/DEVELOPED	65%	130	35%	70
ındo	34	7094469	280	PRIVATE/DEVELOPED	65%	182	35%	98
ındo	35	2694397	210	PRIVATE/DEVELOPED	65%	137	35%	74
ındo	36	931179 9	200	PRIVATE/DEVELOPED	65%	130	35%	70
ındo	37	8041260	210	PRIVATE/DEVELOPED	65%	137	35%	74
JBTOTALS			**6,005**			**3,084**		**2,921**
ıcant	26	1	70	PRIVATE/UNDEVELOPED	0%	0	100%	70
JBTOTALS			**70**			**0**		**70**
ırking	12	1	550	PUBLIC/DEVELOPED	50%	275	50%	275
ıouse	13	1	160	PUBLIC/DEVELOPED	50%	80	50%	80
ol	14	1	190	PUBLIC/DEVELOPED	50%	95	50%	95
ıouse	15	1	190	PUBLIC/DEVELOPED	50%	95	50%	95
IBTOTALS			**1,090**			**545**		**545**
)TALS			**7,165**			**3,629**		**3,536**

ıst Allocation Based On Ownership and Use (1/02)

tal Distance [ft]	7,165
tal Distance [mi]	1.4
tal Distance Federal [ft]	3,629
tal Distance Non-Federal [ft]	3,536

	Total Length	Length Federal	Length Non-Fed
Private			
Developed	6,005	3,084	2,921
Undeveloped	70	0	70
Street Ends	0	0	0
Public/Developed	1,090	545	545
	7,165	3,629	3,536

ıst Sharing	**Current**
Fed	**50.65%**
Non	**49.35%**
	100.00%

CESAJ-PD-PN 5 March 2002

MEMORANDUM FOR Commander, Headquarters, US Army Corps of Engineers, ATTN: CECW-PM

SUBJECT: Lido Key Shore Protection Project Feasibility Report with Draft Environmental Assessment, Sarasota, Florida

1. Enclosed are ten (10) copies of the subject report (with Independent Technical Review certification) and responses to CECW-PC comments, dated 14 September 2001, as transmitted by CECW-PM memorandum, dated 7 November 2001.

2. Request that a Feasibility Review Conference be scheduled for April 2002 in accordance with the Jacksonville District Project Review Board milestone database. Point of contact for this request is the Planning Technical Leader, Mr. Thomas D. Smith (at 904-232-3747.

FOR THE COMMANDER

Encls (as)

JAMES C. DUCK
Chief, Planning Division

CF: (w/encl):
CESAD-CM-P (McGovern, 3 copies)

CF: (wo/encl):
CESAD-CM-C (McCarthy)
CECW-PC (Ware)
CECW-PM (Lee)
CECW-PC (Cone)

bcc:
CESAJ-DP-C (Stevens)

Smith, T./CESAJ-PD-PN
Strain/CESAJ-PD-P — NOTE - Email - Initial sub-HQ only to SAD
Stevens/CESAJ-DP-C
Duck/CESAJ-PD

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P. O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

REPLY TO
ATTENTION OF

CESAJ-PD-PN 12 February 2002

MEMORANDUM FOR Commander, South Atlantic Division, ATTN: CESAD-CM-P (Wilbert Paynes)

SUBJECT: Lido Key Shore Protection Project Feasibility Study, Sarasota, Florida

1. Reference CECW-CP e-mail memorandum sent 21 September 2001 with attached Policy Compliance Review (PCR) comments, same subject.

2. Request a Feasibility Review Conference (FRC) be scheduled for the subject project. Enclosed is a copy of the, Lido Key, Hurricane and Storm Damage Reduction Project, Feasibility Report with Draft Environmental Assessment dated January 2002. Also enclosed are responses to the PCR comments and Independent Technical Review certification, comments and meeting minutes as prepared by the consulting agency Taylor Engineering Incorporated.

2. The FRC has tentatively been scheduled for 1 April 2002 by the Jacksonville District Project Review Board. Any questions concerning this matter may be referred to the Mr. Thomas D. Smith (Planning Technical Leader) at 904-232-3747.

FOR THE COMMANDER:

James C. Duck

Encls

JAMES C. DUCK
Chief, Planning Division

CF:

CESAD-CM-PP (McGovern)
CESAD-CM-C (McCarthy)
CECW-PC (Ware)
CECW-PM (Lee)
CECW-PC (Cone)

CESAJ-PD-PN 12 February 2002

MEMORANDUM FOR Commander, South Atlantic Division, ATTN: CESAD-CM-P (Wilbert Paynes)

SUBJECT: Lido Key Shore Protection Project Feasibility Study, Sarasota, Florida

1. Reference CECW-CP e-mail memorandum sent 21 September 2001 with attached Policy Compliance Review (PCR) comments, same subject.

2. Request a Feasibility Review Conference (FRC) be scheduled for the subject project. Enclosed is a copy of the, Lido Key, Hurricane and Storm Damage Reduction Project, Feasibility Report with Draft Environmental Assessment dated January 2002. Also enclosed are responses to the PCR comments and Independent Technical Review certification, comments and meeting minutes as prepared by the consulting agency Taylor Engineering Incorporated.

2. The FRC has tentatively been scheduled for 1 April 2002 by the Jacksonville District Project Review Board. Any questions concerning this matter may be referred to the Mr. Thomas D. Smith (Planning Technical Leader) at 904-232-3747.

FOR THE COMMANDER:

Encls

JAMES C. DUCK
Chief, Planning Division

CF:

CESAD-CM-PP (McGovern)
CESAD-CM-C (McCarthy)
CECW-PC (Ware)
CECW-PM (Lee)
CECW-PC (Cone)

Smith/PD-PN/3747
Strain/PD-P
Stevens/DP-C
Duck/PD

TECHNICAL REVIEW CERTIFICATION
FOR

Lido Key Feasibility Report with Draft Environmental Assessment
Sarasota County, Florida, Hurricane and Storm Damage Reduction Project

Certification by A-E:

1. Reference: Sarasota County, Florida, Hurricane and Storm Damage Reduction Project, Lido Key Quality Control Plan

2. The feasibility report with draft environmental assessment for the Lido Key segment of the Sarasota County, Florida, Hurricane and Storm Damage Reduction Project, developed by Taylor Engineering Inc. has been reviewed and coordinated for technical quality by Taylor Engineering Inc. Comments were provided and all parties are in agreement and the appropriate actions taken. Any outstanding issues will be resolved following the Feasibility Review Conference and all appropriate review comments will be incorporated into the final feasibility report. This certification is for the sole and limited purpose of documenting the completion of the ITR process on the draft feasibility report.

REVIEWED BY:

Specialty: Engineering
Independent Technical Review Team Member

Specialty: Environmental
Independent Technical Review Team Member

Specialty: Economics; Engineering
Independent Technical Review Team Leader

CERTIFIED BY:

Date 2-5-02
President, Taylor Engineering Inc.

Date 2-12-02
Chief, Planning Division

MEETING MINUTES FOR FINAL ITR CONFERENCE

Lido Key Hurricane and Storm Damage Feasibility Study

Date: 1/11/02

Time: 10:15 – 12:45

Study Team:
Lori Brownell, E.I.
Lisa Heckman
Rajesh Srinivas, Ph.D., P.E.

Review Team:
Steve Schropp, Ph.D.
Terry Hull, P.E.

Notes: Mike Trudnak

Lisa Heckman, Lori Brownell and Rajesh Srinivas presented the significant findings of the study in a PowerPoint presentation and through handouts (see Attachment).

ITR Comment: Check on correct wording of River(s) and Harbor(s) Act.
Response: Correct wording is River and Harbor Act.

ITR Comment: Include a figure showing reach extents
Response: We will include such a figure

ITR Comment: Why is Reach 1 accreting after adjustment for man-made changes?
Response: The engineering appendix does not explain this. We think it is (1) probably a function of shoreline orientation causing a negative longshore transport across this reach and (2) possibly a result of non-exclusion of sand infilling from diffusion of sand placement in Reach 2.

ITR Comment: Handout Table 1: Redundant information in columns 6 and 7 should be combined into one column. Change title to "Reach 2 and 3 Benefits"
Response: We will do that

ITR Comment: Handout Table 7: Change column heading "Annual Cost of Fill Savings" to "Annual Fill Savings".
Response: We will do that

ITR Comment: Handout Table 8: Change column heading "Net Benefit" to "Annual Net Benefit"
Response: We will do that

ITR Comment: Table with Initial Assessment of Alternate Plans: Dunes and Vegetation measure should receive credit for partially meeting (P) all four federal objectives as opposed to receiving no credit (O).
Response: We agree and will revise the table to reflect the comment

ITR Comment: Design and advanced nourishment volumes are inconsistent in the economic and engineering appendices. Project length is also inconsistent in appendices.

ITR Comment: There are discrepancies in toe of equilibrium fill distances shown in figures of sub-appendix A-1 compared to those presented in Table A-25 of the engineering appendix

ITR Comment: Concern about the occurrence of damage to structures in Reach 3. The aerial photo shows two condominiums protruding past the adjacent shoreline; Table D-3 shows the distance to the shoreline is 0 feet and 10 feet for these two condominiums. However, Table D-4A of the old economics appendix shows that damage to structures is estimated to occur after 180 ft of shoreline recession. Does this imply that the fronting seawalls provide enough protection to resist all local erosion?

ITR Comment: Concern expressed whether non–structural measures are reasonably evaluated in the initial assessment of alternatives.
Response: The level of analysis is consistent with previous similar studies and we feel it is adequately addressed.

ITR Comment: The terminal groin alternative is not explicitly evaluated in the engineering appendix. How was Table 7 derived?
Response: The engineering appendix does not document what was done.

ITR Comment: Groins are only designed for a 20–year storm whereas the project life is 5 years.
Response: The engineering appendix does not document what was done.

ITR Comment: Groin maintenance costs should be included in cost analysis.
Response: We will add groin maintenance costs to the analysis

ITR Comment: Why is only the 80-ft berm included in the groin analysis?
Response: Because the 80-ft berm provides the best cost-benefit ratio when considering beach fill only (see intermediate assessment) and the benefits remain unchanged when the groins are also considered.

ITR Comment: Why were groins not considered to the north to hold the beach fill?
Response: The engineering appendix suggests that aggravated erosion is not expected at the north end.

ITR Comment: Is sediment bypassing strategy sufficient? Should New Pass dredged materials be placed in Reach 2 to reduce beach fill requirements?
Response: Dredged material has historically been placed in the north end of Reach 2.

ITR Comment: The engineering appendix does not document how man-made changes were factored out from observed shoreline and beach volume changes. It is also unclear as to how initial nourishment profile equilibration and other diffusion processes were used in calculating background erosion rates.
Response: The engineering appendix does not document what was done.

ITR Comment: Can background erosion be reduced by straightening the shoreline? Comment made in reference to the sediment transport node in the center of the island as documented in the engineering appendix.
Response: We could look at more dense placement of fill in this area to offset the potential hot spot.

ITR Comment: Include beach monitoring costs.
Response: Beach monitoring costs are presently unavailable

ITR Comment: Main report omits benefit to turtle nesting with beach fill. Loss of turtle habitat without beach fill is not mentioned.
Response: We will mention benefits to turtle nesting in the report

ITR Comment: Table D-4A, pages D17-18 in the old economics appendix. Why does Reach 3 damage decrease by $10M when erosion increases from 380 to 390 feet.
Response: We do not know

ITR Comment: Table D-4 in the new economics appendix is for Reach 2 only. Should include recession-damage relationship for Reach 3 also or for the combination of Reaches 2 and 3.

ITR Comment: Reach delineation is slightly different in engineering and economic appendices.

ITR Comment: Table A-16 only lists beach nourishments till 1996. The text of the engineering appendix mentions a 1998 beach fill and the geotechnical appendix mentions a March 2001 beach fill. Are these accounted for in factoring out manmade effects from beach volume and shoreline changes?
Response: We do not know

ITR Comment: Are the condominiums encroaching on the active beach at the south end of the project area affecting the littoral drift?
Response: The GENESIS model used in the engineering appendix should account for the effects of the condominiums and associated seawalls on the littoral drift

ITR Comment: Paragraph A-46 says that the sediment budget shown in Figure A-21 accounts for both waves and currents. How was the sediment budget computed — from observed beach volume changes or from modeling wave and current sediment transport?
Response: We do not know.

ITR Comment: Exposed groins are mentioned repeatedly, but the number and location of groins are unclear.
Response: Table A-17 provides a structural inventory.

ITR Comment: Why are storms from 1968 (Gladys) and 1972 (Agnes), rather than more recent storms, used for SBEACH calibration and verification especially when pre-storm data for these storms were unavailable (page A-65)? Recommend presenting pre- and post-storm profiles for the SBEACH calibration and verification phases.

ITR Comment: What are error estimates for the SBEACH calibration and verification results? Overall, the calibration and verification procedure for SBEACH is questionable for lack of presented data.

ITR Comment: Document the magnitude of error in the GENESIS calibration and verification process

ITR Comment: Present figures showing measured and predicted shoreline changes in the GENESIS calibration and verification sections.

ITR Comment: Engineering Appendix, Paragraph A-72, Second sentence: "To account for a dredge disposal operation ... profile lines." The meaning of this sentence is unclear. Please explain.

ITR Comment: The documentation of the engineering appendix should indicate what/how many combinations of calibration parameters were used in the calibration/verification process to obtain the best-fit calibration parameters.

ITR Comment: Page A-77 How did the design arrive at three groins for the groin field?

ITR Comment: There are some concerns about the southern groin. Will it be undermined by erosion due to inlet hydraulics? What are the possible effects of the southern groin on the beach east/northeast of the groin?

ITR Comment: How are project-induced erosion rates used in cost spreadsheets derived for the beach fill and beach fill with groin alternatives?

ITR Comment: Real estate appendix needs a map showing real estate interests

ITR Comment: There is no detailed MCASES report

ITR Comments on the Environmental Assessment

1. Page 3, § 1.2. Reference to Figure 1 states that Figure 1 shows project "plan view". Figure 1 only shows project linear limits along the beach. It does not show a "plan view" which would include upland limit, construction or equilibrium toe of fill, and end tapers. Although groins are indicated to be a typical project feature in Figure 3, their locations are not shown in Figure 1 or elsewhere.
2. Page 6, § 1.7.2.1. Include potential hopper dredge impacts in list of concerns.
3. Page 13, Table 2. Columns 2 ("Preferred Alternative") and 4 ("B – Beach Fill with Periodic Nourishment...") are redundant. Column 2 could be eliminated if the notation "Preferred Alternative" is added to Column 4.
4. Page 14, Table 2, "Economics" row. The meaning of the terms "Increase in economics" and "Decrease in economics" is not clear. Do they mean an increase or decrease in NED benefits? Clarify these terms.
5. Page 15, §3.1, ¶1. Sentences 2 and 3 appear contradictory. The first of these states "Most uplands on Lido Key have been developed ..." while the next states "Although undeveloped, a majority of this upland habitat is disturbed." Does the second sentence refer to the park land only? If so, the second sentence could be revised "Although undeveloped, a majority of the upland habitat in the parks is disturbed."
6. Pages 18 & 19, §3.3. This "Threatened and Endangered Species" section does not mention listed shore birds. Although birds are discussed in later sections, the endangered species section appears incomplete without reference to listed shore birds.
7. Page 19, §3.4. This section does not mention nearshore hardbottom near the beach placement area. Were surveys for nearshore hardbottom done? If so, discuss nearshore surveys — when performed, spatial extents.
8. Page 20, §3.6. This section states EFH "may be affected". This appears to contradict Table 1 which state there is "no impact" to EFH.
9. Page 23, §3.15. What types of "underwater survey techniques" were used? Magnetometer? Sidescan? Diver Observation?
10. Page 24, § 4.1. This section refers to "a groin" while other sections refer to a groin field.
11. Page 24, §4.2.3. If a "few" seagrasses are present in the borrow area, then a finding of "no impact" appears incorrect.
12. Page 25, §4.3.3, Other Listed Species. This section contains no discussion of shorebirds and appears to contradict §1.7.2.4 which states that impacts to shorebirds, some of which are listed species, may be "minimized."
13. Page 26, §4.3.4. Will the no action alternative result in loss of shorebird habitat?
14. Page 26, §4.4.3. Will dredging be prohibited "beyond" (i.e., outside of) the buffer zone? Dredging is presumably prohibited *within* the buffer zone?

15. Page 27, §4.5.1. Previous sections on listed species should reference this section for effects on listed birds.

16. Page 27, §4.5.1, Infaunal and Benthic Species. This section implies that no long-term adverse effects occur to these species because of their upward mobility through the overlying sand. However, lack of long-term adverse effects is more likely due to ability of these species to recolonize the area rather than their ability to burrow upwards through the sand.

17. Page 28, §4.6.1. See comment about §4.4.3. Dredging will likely be prohibited *within* rather than "beyond" the buffer zone.

18. Page 29, §4.11. This section states that the short-term turbidity increases "would not affect the area's water quality." Although not a long-term effect, turbidity increases do affect water quality. Short-term adverse effects on water quality are described as an unavoidable effect in §4.24.

CESAJ-PD-PN 20 December 2001

MEMORANDUM FOR Record

SUBJECT: Meeting Minutes for First Independent Technical Review (ITR) Conference on Lido Key Hurricane and Storm Damage Feasibility Report

1. The following documents Taylor Engineering Incorporated's ITR of the subject report. Taylor Engineering Incorporated was contracted to produce and review the report. The study team consisted of Lori Brownell, E.I., Lisa Heckman and Rajesh Srinivas, Ph.D., P.E and the ITR team members were Steve Schropp, Ph.D., Terry Hull, P.E. and Mike Trudnak. Rajesh Srinivas presented the study objective and significant findings. The initial meeting was conducted to familiarize the ITR team with the scope of the study. Draft report was to be provided to the ITR team by 8 January 2002. THE

2. Project Description:

- Coastal Planning & Engineering (CPE) conducted the engineering and geotechnical appendices of the storm damage reduction feasibility study for Lido Key, Sarasota County, Florida.
- The Jacksonville District Corps of Engineers (COE) prepared the economics, real estate, MCASES cost estimates, and environmental assessment
- Taylor Engineering will produce a draft feasibility report following COE report guidelines.
- Taylor Engineering received a notice to proceed about 15-18 days ago.
- The COE has provided/will provide the following five appendices for Taylor's review:
    - Appendix A: Engineering Evaluation – received 10 days ago
    - Appendix B: Geotechnical – received 7–10 days ago
    - Appendix C: MCASES – received preliminary report
    - Appendix D: Economics – received preliminary report (close to final)
    - Appendix E: Real Estate – not yet received
- The COE has also provided a draft EA
- Taylor will incorporate all significant findings into the main feasibility report
- Taylor will create Appendix F: Pertinent Correspondence.

3. Important Notes:

- Lido Key is separated from Longboat Key to the north by New Pass and separated from Siesta Key to the south by Big Sarasota Pass.

- A few beach nourishments funded by local interests were completed in the past.
- The project area is separated into 5 reaches as described in Table 1.
- Nature of storm damage is characterized as loss of structures, land, armor, and backfill due to beach erosion.
- Project berm elevation is +5 ft NGVD
- Project berm width appears to be 80 feet
- Storm surge elevation is 11-12 ft NGVD determined by ADCIRC

Table 1 Lido Key Reach Characteristics

Reach		Nature of Development	Concerns	Shoreline Change Rates (ft/yr)
New Pass Reach	R-30 to R-33	Undeveloped	New Pass hydrodynamics	-9.5
Reach 1	R-34 to R-35	Minimal development / structures set back	-	+25.6
Reach 2	R-35 to R-40	Developed	Storm damage to structures	-21.1
Reach 3	R-40.5 to R-43	Developed	Storm damage to structures	-6.2
Reach 4	R-43.8 to R-44.5	Undeveloped park	Big Sarasota Pass hydrodynamics	-35.2

- Reach 3 and 4 have heavy shorefront development and are the focus of the storm damage reduction analysis.
- Storm erosion modeling was performed by CPE using SBEACH.
- The following actions were analyzed as storm damage reduction alternatives:

  No action
  CCCL establishment
  Restrict growth
  Relocate structure
  Flood proof structures
  Coordination of land and structures
  Coastal structures (sea walls, revetments, breakwaters, groins)

Dune construction and vegetation
Beach fill

- The recommended plan, per the engineering appendix, to maximize benefits includes beach fill from R-35 to R-44 and construction of three groins at the southern end to retain the fill.
- We do not know that much about the borrow sites.
- Hardbottom issues are not expected to be applicable for the project

SP ~~4.~~ Comments from Review Team:

a. Hull: Dune construction should be considered as a wave height reduction measure.

b. Hull: Structural damage is significantly reduced when impinging wave heights are reduced to less than 3 feet.

DEPARTMENT OF THE ARMY
SOUTH ATLANTIC DIVISION, CORPS OF ENGINEERS
ROOM 9M15, 60 FORSYTH ST., S.W.
ATLANTA, GEORGIA 30303-8801

REPLY TO
ATTENTION OF

CESAD-CM-P 30 November 2001

MEMORANDUM FOR Commander, Jacksonville District (CESAJ-PD), 400 West Bay Street, Jacksonville, Florida 32232-0019

SUBJECT: Lido Key Shore Protection Feasibility Study, Sarasota, Florida, Alternative Formulation Briefing (AFB) Pre-Conference Materials (June 2001)

1. The HQUSACE Policy Compliance Review Comments on the subject pre-conference materials as provided by CECW-PM memorandum dated 7 November 2001 are enclosed for your use (encl 1).

2. As directed by paragraph 2 of CECW-PM's memorandum (encl 2), you are to submit the draft feasibility report, NEPA documents and documentation of independent technical review to HQUSACE for review and approval prior to public and agency review. This submittal should also include the policy compliance memorandum indicating how and where each of the enclosed comments was addressed.

FOR THE DIRECTOR OF CIVIL WORKS AND MANAGEMENT:

Gerald R. Melton

2 Encls

GERALD R. MELTON
Acting Chief
Planning and Policy Division
Directorate of Civil Works
and Management

DEPARTMENT OF THE ARMY
U.S. Army Corps of Engineers
WASHINGTON, D.C. 20314-1000

ATTENTION OF

CECW-PM (10-1-7a)

MEMORANDUM FOR Commander, South Atlantic Division (CESAD-CM-P)

SUBJECT: Lido Key Shore Protection Project Feasibility Study, Sarasota, Florida, Alternative Formulation Briefing (AFB), Pre-conference Materials (June 2001)

1. Reference:

a. Subject Pre-conference materials for the Alternative Formulation Briefing (AFB) on Lido Key Shore Protection Project Feasibility Study, Sarasota, Florida. Material was received at HQUSACE on 11 June 2001 for Policy Compliance Review.

b. E-mail message, dated 22 September 2001, which forwarded Policy Compliance Review Comments to CESAD.

2. We have completed our review of the subject pre-conference materials and are enclosing our Policy Compliance Review Comments that must be addressed in preparing the draft feasibility report. As discussed with your office, the District may proceed with preparing the draft report to comply with the enclosed comments. The draft feasibility report (including the appropriate NEPA documents and documentation of independent technical review) must be submitted to HQUSACE for review and approval prior to public and agency review. Your submittal should also include the policy compliance memorandum indicating how and where each of the enclosed comments is addressed in the report. We will work closely with your office at that time to facilitate release of the report for public and agency review as expeditiously as possible.

3. If you wish to discuss any of the enclosed comments, please contact James Daniels of my staff for a telephone conference.

FOR THE COMMANDER:

James F. Johnson

Encls

JAMES F. JOHNSON
Chief, Planning and Policy Division
Directorate of Civil Works

OCT 12 2001

Programs and Project Management Division
Project Management Branch

Mr. Dennis Daughters
City Engineer/Director of Engineering
Room 100A, City Hall
1565 First Street
Sarasota, Florida 34230

Dear Mr. Daughters:

This is in regard to further coordination regarding the Lido Key Shore Protection Study. Enclosed are comments from the review of the Alternative Formulation Briefing (AFB) material that our office provided to our higher authority regarding preparation of the feasibility report.

Our office is currently preparing responses to the policy compliance review of the AFB material and we will discuss the comments with you during the upcoming team meeting conference call scheduled for October 18, 2001, from 1:30 until 2:00 PM.

If you have any questions or need additional information, please call Mr. Charles Stevens, at 904-232-2113.

Sincerely,

Signed: Richard E. Bonner

Richard E. Bonner, P.E.
Deputy District Engineer
for Project Management

Enclosure

FLORIDA DEPARTMENT OF STATE
Katherine Harris
Secretary of State
DIVISION OF HISTORICAL RESOURCES

Mr. Tommy Birchett
Jacksonville District US Army Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

September 25, 2001

Re: DHR No. 2001-07222 / Received by DHR: July 27, 2001
Offshore Borrow Areas, Submerged Historic Properties Survey, Lido Key, Sarasota County, Florida (Draft Report)

Dear Mr. Birchett:

Our office has received and reviewed the above referenced project in accordance with Section 106 of the *National Historic Preservation Act of 1966* (Public Law 89-665), as amended in 1992, and *36 C.F.R., Part 800: Protection of Historic Properties*. The State Historic Preservation Officer is to advise and assist federal agencies when identifying historic properties listed or eligible for listing in the *National Register of Historic Places*, assessing effects upon them, and considering alternatives to avoid or minimize adverse effects.

Results of the remote sensing survey indicate that three anomalies were encountered within the project area of potential effect. All of these targets produced signature characteristics suggestive of modern debris. It is the opinion of Tidewater Atlantic Research that the proposed project will have no effect on any sites considered eligible for listing in the *National Register of Historic Places*. Based on the information provided, this agency concurs with this determination and finds the submitted report complete and sufficient.

If you have any questions concerning our comments, please contact Mary Beth Fitts, Historic Sites Specialist, at mbfitts@mail.dos.state.fl.us or (850) 245-6333. Your interest in protecting Florida's historic properties is appreciated.

Sincerely,

Frederick P. Gaske, Deputy SHPO
for Janet Snyder Matthews, Ph.D., Director, and
State Historic Preservation Officer

Xc: Mr. Gordon P. Watts, Tidewater Atlantic Research, Inc.

CECW-PC 14 September 2001

POLICY COMPLIANCE REVIEW
Of
ALTERNATIVE FORMULATION BRIEFING MATERIAL
For
LIDO KEY FEASIBILITY STUDY
(June 2001)

1. **GENERAL.** Lido Key is a 2-½ mile long barrier island between Longboat and Siesta Keys off the mainland of Sarasota, FL. The north and south ends of Lido Key are municipal parks, while the central portion is occupied by commercial and residential development. The Federal navigation channel (New Pass) off the north end apparently does not cause erosion along the downdrift beach since the shoreline of the northern half of the key is either accreting or not eroding. Thus the study focus is on the receding shoreline on the southern half of the island.

Studies to date indicate that an 80-foot wide storm protection berm about 9,100 feet long (about 10,000 feet with end transitions) may be feasible. Due to extensive sand losses anticipated on the southern (downdrift) end of the berm, a terminal groin or a terminal groin field will probably be required to reduce the cost of nourishment. Borrow sources with sufficient acceptable beach-quality material have been identified.

The project was originally authorized in 1970, de-authorized in 1990, and the 1970 plan was re-authorized in 1999. The 1970 plan called for improvement of 6,200 feet of shoreline; the current plan is 9,100 feet long. WRDA 99 authorized a project cost of $5.2 million for initial construction and nourishment for a 50-year period at an annual cost of $602,000. The current estimates for the tentatively selected plan are over $11.5 million for initial construction and $925,000 annually for nourishment.

The local sponsor for the project would be the City of Sarasota.

2. **POLICY COMPLIANCE REVIEW COMMENTS.** HQUSACE Policy Compliance Review Team comments on the AFB read-ahead materials are outlined below.

a. **General.** The read-ahead materials are lacking in detail normally associated with an AFB conference and are generally not sufficient for HQUSACE to "buy-in" to the proposed plan and allow release of a draft report for public review concurrent with HQ review. The materials are mostly slides touching on topics in table G-4 of ER 1105-2-100 and a collection of technical review information. The submitted materials offer little information with regards to the make-up of project costs, cost-sharing, derivation of benefits, and environmental analyses/documentation. The paragraphs below highlight some of the major deficiencies. The district also needs to examine tables G-1 and G-3 along with corresponding text in the cited ER to better identify the expectations and submittal requirements for an AFB conference.

(1). Project Costs and Cost-sharing. Only summary tables of initial costs, nourishment costs, annual costs and limited information on the cost of project elements was included with the read-ahead material. For example, it is not evident that the costs used in formulation included real estate costs, interest during construction, or major rehabilitation. No information on cost apportionment information for potential project elements was provided. The limited information does not adequately describe the various components of the proposed plan or describe the derivation and basis for categorization of the various project features into the categories of Total Project costs. It is important at this stage of report development that all components and costs are identified and properly classified so that the total Federal and non-Federal responsibilities can be appropriately identified and the HQ review team can advise the district in completion of a draft report.

(2). Economic Analysis. The economic analysis information is very limited. Only a summary of annual benefits for the proposed project and alternatives is presented. There is no information explaining the categories of project benefits related to storm damage prevention, erosion, or recreation and models used in the derivation of benefits. Presentation of the assumptions used and derivation of benefits is essential at this stage of report development.

(3). Environmental Analysis. The study area includes important biological habitats and supports Endangered Species such as sea turtles. There is little documentation of environmental analyses regarding impacts to resources including endangered species. There is an indication that the USACE determined in a Biological Assessment that the potential use of a hopper dredge for the proposed project may impact nesting turtles and a Biological Opinion is forthcoming from FWS. However, mitigation requirements are characterized as minor or none. It is not clear if mitigation costs might impact identification/selection of the NED plan. Again, such information is critical at this stage of report development.

(4). Independent Technical Review. It is not clear to what extent technical review was accomplished. It appears that a meeting was held with the project development team and the technical review team and a presentation was made and general comments were received and responded to. However, there is no documentation to demonstrate that the technical review team has completed a detailed technical review of the actual analyses of costs, benefits, environmental evaluations, etc. A more concerted effort should be made to insure that quality assurance of the analyses is performed before pre-conference material is submitted to HQUSACE for review.

b. **Section 902 Cost Limits.** The District needs to provide a total project cost estimate (using the required M-CACES format) and a comparison of the expected project costs versus the authorized project costs to determine whether the Section 902 cost limits are likely to be exceeded. From the information submitted it would appear that the initial construction cost for the tentatively selected plan is about 120% higher than the cost authorized in Section 364 of WRDA 99. Since that authorization also specified the annual nourishment cost, a second Section 902 cost limit was established for nourishment costs, which should also be analyzed in accordance with Appendix G of ER 1105-2-100.

c. **Without-project Condition.** The read-ahead materials state that construction of T-head groins at the southern end of Lido has already been proposed by other interests. This raised the possibility that a terminal groin field might be assumed to be part of the without-project condition, which would result in a lower cost Federal project. This might be useful if the project proves difficult to economically justify. On the other hand, there may have to be local assurances in the PCA that such a groin field would be constructed before or during berm construction. Also, the cost of the without-project groin field would have to be at 100% non-Federal expense.

d. **Plan Formulation.**

(1). Alternatives. The read-ahead materials discuss only two alternatives – a storm berm with and without a terminal structure– albeit a number of different sizes of the berm. The District will need to describe (in the feasibility report) a plan formulation process where a reasonable number of potential structural and non-structural alternatives were at least considered during the early stages of planning. For example, the amount of material moving along the shoreline seems relatively high; as indicated by the relatively large amount of material to be placed as advanced nourishment to span a 5-year nourishment cycle. This may indicate that a groin field along the eroding reach (in addition to the terminal groin field) may achieve a considerable reduction in life-cycle project cost. Also, a combination berm-dune profile, which places a large amount of protective material further outside the small storm impact zone, may be a lower-cost approach to storm damage reduction. Until all potentially feasible plans are considered, it is not possible to claim that the recommended plan is the NED plan.

(2). Least Cost Borrow Plan. The read-ahead materials indicate that a rich and extensive source of borrow for the proposed storm berm is located in Big Sarasota Pass, off the south tip of Lido Key. Although very close to the primary construction area, it is not being considered as a borrow source because of "political sensitivity." The District needs to conform to the Corps policy requirement that the least cost construction and nourishment sources (subject to environmental constraints) are used for construction. Any other (more-costly) plan can be recommended, but selection of more expensive locally preferred borrow sources may have cost sharing implications. The District needs to demonstrate that all borrow sites were considered and show the relative costs associated with dredging sand from the more nearby and/or more protected (thus more productive) sites. The extra cost of not using the most cost-effective sources should be determined and any extra costs properly allocated to the non-Federal sponsor.

(3). Incremental Analysis. The read-ahead materials state that engineering analysis of different reaches along this relatively short (9,100-foot) project is not "engineeringly sound." The same cannot be said for economic damage reaches. There is a danger in projects like this that expected storm damages to a few isolated high-value concentrations can "carry the burden" of justifying protection for other low-intensity development areas where the cost of berm construction is higher than damages reduced. If protecting a few clusters of intensive development produces most of the benefits of a project, a better solution may be localized bulkheads, seawalls, revetments, or groin fields at these high-value sites. Evaluation according to economic reaches prevents such questions at the end of a study.

e. **Economic Analyses**

(1). Project Benefits. The read-ahead materials include a discussion of several new beachfront hotels on Lido Key and how such development may influence future damage reduction benefit calculations. The District should already be aware that existing building codes require future construction to be relatively damage-free for any event less than a hundred-year storm. Enforcement, and perhaps even strengthening, of these codes will be a required part of the Project Cooperation Agreement if a Federal project is constructed. Any attempt to "grow" the benefits with new development during the economic lifetime of the project will be viewed with skepticism.

(2). Structural Failure Assumption. Corps Districts sometime assume complete losses for structures on piles after erosion extends underneath the building. In almost every case, Headquarters reviewers have questioned this assumption. Storm-washed sediment frequently returns after storms, allowing recovery of most if not all of the value of pile-supported structures. If the District uses this assumption to compute benefits for Lido Key, it is likely to draw a policy review comment.

(3). Back Bay Flooding. Flood damages associated with flooding from mainland runoff and from high water storm surge in the back bay behind the island will occur both in the without-project and with-project condition. Therefore, only the incremental damage can serve as the basis for HSD damage reductions benefits.

(4). Average Annual Damage Reduction Benefits. The total average annual benefits shown in the read-ahead materials likely reflects a total of structural and content damage reduction, prevention of loss of land values, and perhaps some reduction in the cost of individual shore protection features which would otherwise be incurred by shorefront property owners. Since the focus of the Federal interest in HSD is reduction of damage to structures and contents, a breakout of these three benefit categories (if all are included) is needed to provide decision-makers with sufficient information to confirm the Federal interest in the project.

f. **Engineering and Cost Analyses.**

(1). Monitoring Cost. One of the briefing displays shows a cost estimate including a $25,750/month item for monitoring. This is a relatively high cost for this activity and needs further explanation and justification. Also, the division of monitoring responsibilities between the Corps and the sponsor needs to be carefully defined and the division of all-Federal versus all non-Federal OMRR&R monitoring costs need to be appropriately identified in the final cost allocation.

(2). Sea Level Rise. In accordance with ER 1105-2-100 Appendix E, Section IV, paragraph E-24 k., the effects of sea level rise should be considered during project design and plan selection and documented.

g. **Independent Technical Review.** Based on the scope of the read-ahead materials, we assume that the District has not yet conducted a complete independent technical review. Such a review, including a certification of legal sufficiency, is required before final policy review can be completed.

h. **Public Access.** The discussions documented in the ITR meeting minutes indicate that perpetual easements are required to assure that the project lands are open to the public and remain so for the life of the Federal project. It is not evident that consideration was being given to the sufficiency of access (at street ends or through privately held lands) and parking to provide the general public with adequate access to use the beach areas. ER 1105-2-100, Section E-24d.(3) requires the provision of reasonable public access as a condition of Corps participation in storm damage reduction projects. Reasonable access is defined in ER 1105-2-100 as access points at intervals of approximately every one-half mile or less. The project as authorized in 1970 had characterized the area south of Coolidge Park and Lido Casino as privately owned shorefront, which did not qualify for Federal participation in beach fill. The draft report should explicitly delineate any project reaches that fail to meet the one-half mile requirement.

3. **District Topic for Discussion.** In the read-ahead material the District identified a policy issue for discussion at the AFB. A restatement of the issue expressed in the read-ahead material and the HQUSACE Review Team preliminary assessment are addressed in the following paragraphs.

Policy Issue: Approval/authorization process for this report with reference to Section 364 of WRDA 99.

HQ Team Assessment: The AFB materials do not present sufficient information on post authorization changes including project costs to address the issue. The District should prepare an evaluation of post authorization changes and Section 902 cost limits to allow determination of the approval authority for the project changes. As noted previously in comment 2.b., the costs for initial construction and nourishment for the tentatively selected plan are much higher than those previously authorized and may exceed the Section 902 cost limits for the WRDA 99 authorization. Therefore, processing of the feasibility report to Congress for a new project authorization or as a project modification may be required. The evaluation of post authorization changes should also address key parameters that characterize the project's scope and outputs. For example, the tentatively selected project's length has increased by over 40% and the quantities by more than 60%. If Congressional reauthorization is not required, and the scope changes exceed the 20% limit of the Division Commander, they could be approved by the Chief of Engineers as the decision document is processed to the Secretary of the Army, consistent with Section 364 of WRDA 99.

4. **QUESTIONS.** Questions regarding these Policy Review Team comments should be directed to Lee Ware, Policy Review Manager at 202-761-0656.

CITY OF SARASOTA

OFFICE OF THE MAYOR
AND CITY COMMISSION
Albert F. Hogle
Mayor

August 21, 2001

The Honorable Bob Graham
U.S. Senate
524 Hart Senate Office Building
Washington, DC 20510

Subject: New Pass Maintenance Dredging Project

Dear Senator Graham:

As you know, the House Energy and Water Development Appropriations Bill for Fiscal 2002, includes $1.8 million in funding for the navigation maintenance dredging of New Pass. Without this funding, the pass will not be dredged for, at least, another year. Presently, however, New Pass is not navigable by most commercial boats and many recreational boats.

In addition to maintaining the navigability of this pass, the sand dredged from New Pass has provided protection of the infrastructure on Lido Key. The U.S. Army Corps of Engineers has always placed at least half of the sand dredged from New Pass on the north end of Lido Key to stave off serious erosion. As we enter the final study and planning phase for our long-term Federal beach nourishment project, this sand will buy us much-needed time.

On behalf of the City of Sarasota, I thank you for supporting the appropriation for the navigational maintenance dredging of New Pass. And in this regard, I request that you do everything within your power to see that this appropriation is included in the final version of the Energy and Water Development Appropriations Bill for Fiscal 2002.

Your continued efforts and support on our behalf is, as always, sincerely appreciated.

Yours truly,

Albert F. Hogle
Mayor

POST OFFICE BOX 1058, SARASOTA, FLORIDA 34230
1565 FIRST STREET, SARASOTA, FLORIDA 34236
TELEPHONE 941/954-4115 SUNCOM 949-1211 FAX: 941/954-4129
WWW.CI.SARASOTA.FL.US

CITY OF SARASOTA

Interoffice Memorandum **Date: August 21, 2001**

To: City Commission

Thru: David R. Sollenberger, City Manager

From: Dennis Daughters, P.E., Director of Engineering/City Engineer

Subject: Lido Beach Feasibility Study - Schedule

The U.S. Army Corps of Engineers has recently provided us with the following schedule for the remainder of the subject project.

> The overall process of completing the feasibility report entails several submittals with review, revision and approvals. The current schedule for completion of the feasibility report is as follows:

MILESTONES	SCHEDULED FINISH DATE
Jacksonville Prepares Draft Feasibility Report	28 Sep 2001
Jacksonville Transmits Revised Report to Division (Atlanta)	14 Dec 2001
Submit Final Feasibility Report to Division	9 Aug 2002
Division Engineer's Public Notice *	15 Oct 2002
Division Sends Feasibility Report to Headquarters (Washington)	30 Oct 2002
Chief of Engineers Report Sent to the Assistant Secretary of the Army (Civil Works)(ASA(CW))	15 Apr 2003
ASA(CW) Transmits Results of Feasibility Report to Congress	29 May 2003

> * Notice of Completion of the Feasibility Report

The last step is Congress incorporating it in the 2004 Water Resources Development Act (WRDA-04) with the actual project probably happening in late 2004 or most-likely, early 2005. This is much later than we desire but the possibility of moving it earlier is very low.

dm

xc: V. Peter Schneider, Deputy City Manager
Gibson E. Mitchell, CGFO, Finance Director
Howard D. Marlowe, Marlowe & Company
Richard H. Spadoni, Coastal Planning & Engineering, Inc.
Charlie F. Stevens, Project Manager, U.S. Army Corps of Engineers

C:\Data\Correspondence\Projects\LidoBeach\FeasibilityStudy\Dennis\Commission8.21

25 July 2001

Dear Dr. Matthews:

I have enclosed a single copy of the draft report, *Offshore Borrow Areas Submerged Historic Properties Survey, Lido Key, Sarasota County, Florida* by Tidewater Atlantic Research, Inc. Please review the report and provide us your comments, in accordance with the procedures contained in 36 CFR, Part 800 ("Protection of Historic Properties"). A Survey Log Sheet is attached as Appendix A of the report.

If there are any questions regarding this matter, please contact me at 904-232-3834.

Sincerely,

Tommy Birchett
Archeologist
Jacksonville District

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P. O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

REPLY TO ATTENTION OF

MAY 14 2001

Programs and Project Management Division
Project Management Branch

Mr. Dennis Daughters
City Engineer/Director of Engineering
Room 100A, City Hall
1565 First Street
Sarasota, Florida 34230

Dear Mr. Daughters:

This is in response to your May 7, 2001, letter concerning the feasibility phase of the Lido Key Shore Protection Study. Your letter requested immediate clarification on the Federal cost sharing for beach fill and renourishment between groins in a groin field alternative that was discussed during the May 2, 2001, Independent Technical Review meeting.

The following is a quotation from our Engineering Regulation 1105-2-100 dated 22 April 2000, page E-140. "Periodic Nourishment. Public Law 84-826 provides that Federal participation in periodic beach nourishment may be appropriate when it comprises a more suitable and economical remedial measure for shore protection than retaining structures such as groins. Under such conditions periodic nourishment can be considered construction for cost sharing purposes. Retaining structures may be recommended, but then any required periodic nourishment is not considered construction and is not cost shared by the Federal government. Projects with structures included to maintain a shore alignment, but not to materially prevent littoral drift (which may nourish downdrift beaches), such as low-profile groins and offshore breakwaters, are eligible for periodic nourishment."

I hope that the above information provides a suitable response to your request. If you have any questions or need additional information, please call Mr. Charles Stevens, the project manager at 904-232-2113.

Sincerely,

Dennis R Dale

fo Richard E. Bonner, P.E.
Deputy District Engineer
for Project Management

NIS DAUGHTERS, P.E.
ECTOR OF ENGINEERING
- CITY ENGINEER -

XANDREA HAY, P.E.
D TY DIRECTOR OF ENGINEERING
- ASST. CITY ENG. -

Web Page: www.ci.sarasota.fl.us

CITY OF SARASOTA

ENGINEERING DEPT
ROOM 100A - CITY HALL
1565 FIRST STREET

TEL: (941) 954-418
FAX: (941) 954-417

E-Mail: engineering@ci.sarasota.fl.us

May 7, 2001

Mr. Charlie F. Stevens
Project Manager
U.S. Army Corps of Engineers
Jacksonville District
Project Management Branch
Post Office Box 4970
Jacksonville, FL 32232-0019

Subject: Lido Key Beach Restoration
Feasibility Study – ITR Meeting

Dear Mr. Stevens:

City Manager, David Sollenberger, Consultants, Rick Spadoni and Mike Jenkins, and I felt that the Independent Technical Review meeting was a very good event. I felt that all Study Team members and ITR members learned a lot about the status of the project and where it is going. We all had the opportunity for great discussion. Obviously the City of Sarasota would like to keep the study on track so construction can start at the earliest time.

We would like to get an immediate clarification on Federal funding availability for sand placement in the groin field after initial construction. Groins certainly will help the situation at the south end, but sand infusions will still be needed, although less sand then if no groins were constructed. We feel this sand should be considered the same as the sand placed for subsequent maintenance projects as it accomplishes the same purpose. Its eligibility for federal funding could affect the City's support for this alternative.

If you have any questions regarding this matter, or need further clarification, please feel free to contact our office.

Yours truly,

Dennis Daughters

Dennis Daughters, P.E.
City Engineer/Director of Engineering

DD/dm

xc: David R. Sollenberger, City Manager
Richard H. Spadoni, Senior Vice-President, Coastal Planning & Engineering, Inc.

C:\Data\Correspondence\Project\LidoBeach\FeasibilityStudy\Dennis\Stevens5.7

'ENNIS DAUGHTERS, P.E.
'IRECTOR OF ENGINEERING
- CITY ENGINEER -

LE VDREA HAY, P.E.
EPU1Y DIRECTOR OF ENGINEERING
- ASST. CITY ENG. -

'eb Page: www.ci.sarasota.fl.us

CITY OF SARASOTA

ENGINEERING DEPT.
ROOM 100A - CITY HALL
1565 FIRST STREET

TEL: (941) 954-41(

FAX: (941) 954-4174

E-Mail: engineering@ci.sarasota.fl.us

May 3, 2001

Mr. Charlie Stevens
Project Manager
U.S. Army Corps of Engineers
Jacksonville District
Project Management Branch
P.O. Box 4970
Jacksonville, FL 32232-0019

Subject: Lido Beach Feasibility Study
Two-Year Post-Construction Beach
Monitoring Report

Dear Mr. Stevens:

In compliance with Section 1.B.1 of the Feasibility Study Scope of Work, enclosed herewith is your copy of the "1998 Lido Key (Sarasota County), Florida Beach Nourishment Project Two-Year (Twenty-Four Month) Post-Construction Beach Monitoring Report," prepared by Coastal Planning & Engineering, Inc., (CPE).

The report includes evaluation of the Lido Key beach within the study area (DEP monuments R-32 to R-44) and project area limits (DEP monuments R-35 to R-40). The report documents CPE's findings related to mean high water shoreline changes beach area volumetric changes, borrow area bathymetric surveys, and sand characteristic analysis during the two-year post-construction period.

Highlights of the monitoring study include the following:

- In April/May 1998, approximately 292,500 cubic yards of sand were placed along 4,950 feet of beach during the 1998 Lido Key Beach Nourishment Project, as measured landward of the –12 foot (NGVD) depth contour during the immediate post-construction monitoring survey in May 1998. Two years after project construction, approximately 251,000 cubic yards of sand were found within the project area. This represents 86% of the beach nourishment volume placed in 1998. Of the 251,000 cubic yards of sand located in May 2000, 98% (246,350 cy) was located above the –6 foot (NGVD) depth contour.

- On average, the Lido Key mean high water project shoreline is 104 feet wider than pre-construction conditions. Within the non-tapered project area (R-36 to R-39), the beach is approximately 70 feet wider than pre-project conditions. The north and south ends (R-35 and R-40), where no fill was placed in 1998, have advanced 232 feet and 110 feet, respectively, since March 1998, indicative of sand movement from the ends of the project to adjacent eroded beaches.

- The May 2000 post-construction borrow area survey of Borrow Area 1 demonstrated a borrow area depth range from 34 feet to 36 feet (NGVD). The bathymetric survey of Borrow Area 4 demonstrated a depth range from 32 feet to 35 feet. Comparison to the February 1999 survey demonstrates that the borrow areas have experienced no significant volume change during the two-year post-construction period; Borrow Area 1 gained approximately 15,000 cubic yards and Borrow Area 4 gained approximately 19,000 cubic yards since the February 1999 post-construction survey.

- Sand grain analysis indicates that the one-year post-construction beach is moderately well sorted. The composite mean grain size for the two-year post-construction sampling was 0.26 mm, compared to 0.42 mm during pre-construction and 0.30 during the immediate post-construction monitoring.

If you should have any question, please do not hesitate to contact our office.

Yours truly,

Dennis Daughters

Dennis Daughters, P.E.
City Engineer/Director of Engineering

DD/dm

xc: Gregory Horwedel, Director of Redevelopment & Development Services
Richard H. Spadoni, Coastal Planning & Engineering, Inc.
Craig J. Kruempel, Coastal Planning & Engineering, Inc.

CESAJ-PD-PN (1105-2-10b) 29 May 2001

MEMORANDUM FOR Deputy Commanding General for Civil Works, ATTN: Civil Works Programs Management Division CECW-B, 20 Massachusetts Avenue, NW, Washington, DC 20314-1000

SUBJECT: Lido Key, Florida Shore Protection Project, Feasibility Study, Alternative Formulation Briefing, PWI 013570

1. Transmitted with this memorandum are ten (10) copies of the subject study's pre-conference materials. The pre-conference material consists of the following four enclosures:

- Overview of material outlined in Exhibit G-4 or ER 1105-2-100 Apr 2000
- Independent Technical Review Conference Minutes dated 2 May 2001
- Quality Control Plan revised 3 May 2001
- Feasibility Cost Sharing Agreement and Project Study Plan

2. Four copies of the enclosures are being submitted to Division under a copy furnish to this memorandum. Request coordination with HQUSACE and SAD to establish a date in July to conduct the Alternative Formulation Briefing.

3. If you require additional information concerning this action contact Daniel Haubner at 904-232-2798, or the project manager, Charlie Stevens at 904-232-2113. The Division point of contact is Mr. Frank McGovern at 404-562-5226.

FOR THE COMMANDER:

Encls

JAMES C. DUCK
Chief, Planning Division

CF:
CESAD-ET-P (w/encls, 4 cpys)

bcc:
CESAJ-DP-I (Stevens) (wo/encl)
CESAJ-PD-E
CESAJ-EN-HC
CESAJ-PD-D
CESAJ-RE

Haubner/CESAJ-PD-PN/slw
Schmidt/CESAJ-PD-PN
Strain/CESAJ-PD-P
Stevens/CESAJ-DP-I
Duck/CESAJ-PD

FILE: L:\GROUP\PDP\DAN\REGION2\MEM01CW.DOC

MAY 14 2001

Programs and Project Management Division
Project Management Branch

Mr. Dennis Daughters
City Engineer/Director of Engineering
Room 100A, City Hall
1565 First Street
Sarasota, Florida 34230

Dear Mr. Daughters:

This is in response to your May 7, 2001, letter concerning the feasibility phase of the Lido Key Shore Protection Study. Your letter requested immediate clarification on the Federal cost sharing for beach fill and renourishment between groins in a groin field alternative that was discussed during the May 2, 2001, Independent Technical Review meeting.

The following is a quotation from our Engineering Regulation 1105-2-100 dated 22 April 2000, page E-140. "Periodic Nourishment. Public Law 84-826 provides that Federal participation in periodic beach nourishment may be appropriate when it comprises a more suitable and economical remedial measure for shore protection than retaining structures such as groins. Under such conditions periodic nourishment can be considered construction for cost sharing purposes. Retaining structures may be recommended, but then any required periodic nourishment is not considered construction and is not cost shared by the Federal government. Projects with structures included to maintain a shore alignment, but not to materially prevent littoral drift (which may nourish downdrift beaches), such as low-profile groins and offshore breakwaters, are eligible for periodic nourishment."

I hope that the above information provides a suitable response to your request. If you have any questions or need additional information, please call Mr. Charles Stevens, the project manager at 904-232-2113.

Sincerely,

Signed: Dennis R. Duke

Richard E. Bonner, P.E.
Deputy District Engineer
for Project Management

LIDO KEY SHORE PROTECTION
FEASIBILITY STUDY
TECHNICAL REVIEW CONFERENCE
2 MAY, 2001 - AGENDA
ROOM 930

PURPOSE: FOR STUDY TEAM TO PRESENT AVAILABLE DATA AND ASSUMPTIONS TO TECHNICAL REVIEW TEAM. THIS FORUM IS DESIGNED TO BRING OUT ANY PROBLEMS THE STUDY TEAM MAY HAVE OVERLOOKED AND PROVIDES THE ITR TEAM WITH AN IDEA OF WHAT THE DRAFT REPORT WILL CONTAIN.

0930 OPENING REMARKS BY CHARLIE STEVENS

0945 GENERAL DESCRIPTION BY DAN HAUBNER

1000 ENVIRONMENTAL CONCERNS/COORDINATION BY YVONNE HABERER
(with question/answer period)

1030 ARCHAEOLOGICAL CONCERNS/COORDINATION BY TOMMY BIRCHETT
(with question/answer period)

1100 REAL ESTATE REQUIREMENTS BY KEVIN KELLER
(with question/answer period)

1130 LUNCH BREAK

1230 ECONOMIC ANALYSIS BY JOE WILSON
(with question/answer period)

1300 GEOTECHNICAL ANALYSIS BY SPONSOR/BOB ROSS
(with question/answer period)

1330 ENGINEERING ANALYSIS BY MIKE JENKINS
(with question/answer period)

1400 PLAN FORMULATION/NED ANALYSIS BY DAN HAUBNER
(with question/answer period)

1430 CLOSING REMARKS BY CHARLIE STEVENS

1445 COMMENTS FROM SPONSOR

Lido Key Feasibility Report
Independent Technical Review Meeting 5/2/01

Name	Office	Telephone
Tracy Leeser	PD-PN	x1043
David Sollenberger	Sarasota/City Mgr	941-954-4802
Dennis Daughters, PE	Sarasota/City Engr	941-954-4180
Rick Spadoni	CPE/Boca Raton	561-391-8102
Mike Jenkins	CPE / Boca Raton	561-391-8102
Ed Hodgens	EN-HC	904-232-2477
Brooks Moore	Corps-OC	904-232-1104
John Fox	Corps - OC (study team)	904-232-1168
Anne Fore	EN-C	904-232-2419
Carl Pettijohn	CO	904-232-3694
Karl Nixon	RE-S	904-232-2339
Mike Dupes	PD-EG	904-232-1689
Dan Haubner	PD-PN	" " 2798
Yvonne Haberer	PD-EG	(904) 232-1701
Paul Stodola	PD-EA	904-232-3271
Robert Ross	EN-GG	(904) 232 2930
Rafael Velez	EN-T	904-232-1938
Rob Dulaney	EN-T	904-232-2919
Joe Wilson	PD-D	904 232 2504
Diane Grandine	RE-A	904-232-2146
Charlie Stevens	DP-I	904-232-2113

MEETING MINUTES FOR ITR CONFERENCE ON LIDO KEY SHORE PROTECTION FEASIBILITY STUDY
Room 930 of the Jacksonville Federal Building
02 May, 2001

ATTENDEES:

Study Team

Dan Haubner – PD-P
Mike Jenkins – CP&E
Charlie Stevens – DP-I
John Pax – OC
Anne Fore – EN-C
Diane Oxendine – RE
Yvonne Haberer – PD-E
Kevin Keller – RE
Joe Wilson – PD-D
Bob Ross – EN-G
Tommy Birchette – PD-E

Review Team

Rob Dulaney – EN-T
Rafael Velez - EN-T
Paul Stodola - PD-E
Carl Pettijohn – CO
Ed Hodgens – EN-H
Karl Nixon – RE-S
Dan Peck - PD-D
Brooks Moore – OC
Tracy Leeser - PD-P

Sponsor

Dennis Daughters – City of Sarasota
David Sollenberger – City of Sarasota
Rick Spadoni – CP&E

Opening Remarks – Stevens

Gave the sponsor an overview of the ITR process and explained his role in this effort. Discussed current funding stream and started through the milestones. Next major milestone will be the Alternative Formulation Briefing with SAD and HQ late in June.

Introductions were made.

Sponsor and Stevens discussed schedules, authorization process and schedule for upcoming construction.

General Overview – Haubner
A general description of the island was provided for the ITR team, laying out the Key's location with respect to adjacent projects. A review of the project's history through it's original authorization in 1970 up to now was provided.

Leeser – asked why a feasibility study was being done as opposed to a General Reevaluation Report since the project had been previously authorized. The team responded that since the project had been deauthorized in 1990 and a study resolution issued in 1995 a recon (completed in 1997) and feasibility study were being completed to satisfy that 1995 resolution.

Leeser – asked how this effort would effect the fact that the 1970 project has been re-authorized in Section 364 of the Water Resources Development Act (WRDA) of 1999. The team responded that although Congress re-authorized the old project (based on recreation and some Hurricane/Storm Damage Reduction); the law stated that it was re-authorized IF the Secretary found the project to be sound with respect to engineering, economics and the environment. Therefore a decision document would be required for the Secretary to make that decision. Further coordination with SAD and HQ will be required to establish how the process will work with the Office of Management and Budget and the Assistant Secretary's office, since the project is already in WRDA.

Environmental – Haberer
Gave overview of presentation. Discussed April 2000 site visit and literature research that has been conducted up to this point.

Most of the uplands on Lido Key have been developed except for North Lido Public Beach and South Lido Park. Although undeveloped, a majority of this upland habitat is disturbed. Upland vegetation is composed of both exotic and native species including Australian pine, seagrape, and wax myrtle. Plants such as palms, grasses, palmetto, and sea oats can be found on the upper beach, mainly on the north and south ends of the island. Due to development, there is little vegetation found between the shoreline and buildings/seawalls of the proposed project area. Hardground areas and seagrass beds are known to exist nearshore and offshore within the study area. In order to minimize adverse impact to these resources, the study will seek to delineate these areas. CP&E just completed side scan sonar surveys at the offshore borrow areas. Potential hardgrounds were discovered at the edge of borrow areas 6 and 7. Diver verification will be done to confirm what is there.

The Fish and Wildlife Coordination Act Report is being contracted out due to FWS work load. Draft should be complete in August with a final in September.

A Biological Assessment was prepared. The USACE determined that the proposed project may affect nesting sea turtles. A request for formal consultation with FWS was initiated by letter dated April 9, 2001. A Biological Opinion will be forthcoming from FWS.

The Corps will request formal consultation with NMFS for a "may affect" determination for sea turtles due to the possibility of a hopper dredge being used. No designated Critical Habitats in the study area.

Daughters – asked if nesting data is for entire island or project area. The data is for the entire island.

Stodola – concerned with vegetation maps and impacts of covering these with the project. A vegetation map should be produced, no major impacts should occur due to +5 berm elevation. Also asked if the potential hard grounds have been dived. The ground truthing is in the works. It was ask if the divers should cover what's adjacent to these hard grounds and get the data to see what can be avoided. Spadoni answered that the borrow areas were bounded by material availability as well as the hardgrounds and that since the borings didn't cover the additional area outside the identified borrow areas there would be no way to know if the material was available.

Daughters – mentioned that the material to the north of the project limits was placed there from New Pass maintenance; it was quickly vegetated and inhabited and is now accreting. The southern end of the island has still experienced erosion with vegetation falling into the pass.

Archeological - Birchette
Coordination has been initiated and no problems have been encountered.

Real Estate – Keller, Oxendine
Structure and land values were obtained through a field visit. The county's database was evaluated and found to be reliable. Current sales were compared to the appraised values and a factor of 1.15 was obtained. The 1.15 was then applied to the assessed structure value to bring them up to the January 2001 price levels for input into the Storm Damage Model. A similar process was implemented for the land values on $/sq. ft basis for input to the Storm Damage model.

Sponsor questioned what time period was used to arrive at the factor of 1.15. Answer was '99-'00 sales data.

Sponsor noted that several new large hotels will be added to the vicinity and this is expected to increase the structure values and provide an overall economic benefit to the area. Leeser noted that this should be mentioned in the economic appendix to show that the expected increase would help the Benefit to Cost Ratio.

The Real Estate Appendix was briefly discussed. Perpetual Easements would be required for the project. This request has been made known to the sponsor, under the easement the project lands are open to the public and remain so for the life of the Federal project.

If the easement is not obtained, then there will not be any Federal cost sharing for that section of the shoreline; not just what's behind the ECL, but for that entire lot width. The sponsor is not anticipating any problems.

Pax – mentioned that if there are gaps in the design berm, then the benefits start to go away; more people see that they don't have to give the easement and that they will still receive sand by littoral processes and the easements start to unravel. It's possible that at that point court taking would be required. Again, the sponsor is not anticipating any problems. It's important to define the project placement and the ECL so that when these issues arise they are easily definable.

Engineering has these limits laid out and they will be included in the report and provided to the sponsor.

Daughters – why do we need perpetual easements for a 50 year life. Pax pointed out that renourishment is for 50 years, Federal interest could and in some cases has extended past that time frame.

Daughters – do we need easements from public entities. Pax noted that yes, it is the Sponsor's responsibility to ensure the Government can get in to renourish the project.

Daughters – what is the specific purpose of the easement? Is it to provide public access? Pax – it is needed for public access. The owners can still use the beach so long as it does not interfere with the Federal project (some structures). Beach chairs and such will be fine.

Daughters – when will the acquisition take place. Pax – we can not ask the sponsor to acquire these easements until a PCA is signed. The easements will have to be obtained according to established Federal guidelines. The betterments to the lands due to the project should outweigh the easement costs to the land. More information on the acquisitions will be delivered as the report process progresses.

Spadoni – asked if the public easements have ever been modified. Pax stated that it may be possible, but depending on precedence that the lot in question probably would not be cost shared.

Economics – Wilson

Gave an overview of how the engineering data, Real Estate data and physical data is incorporated into the Storm Damage Model (SDM) to generate the anticipated damages based on existing conditions.

Risk and uncertainty was discussed. The uncertainty of model input is estimated and a Monte Carlo distribution is applied to these range of inputs. Therefore, a level of certainty can be applied to the output. This will be the first report done by the Jacksonville District that contains Risk and Uncertainty within the Storm Damage Model output; Broward County was done previously by a consultant.

It is noted that a very thorough presentation on the new SDM is available to the ITR team if they wish to review more of the details.

Geotechnical – Jenkins
1.8 Million CY of material are contained within the existing borrow areas. Quality of material is coarser than native with standard silt quantities (less than 10%). Knowledge of local geology is being utilized for selecting borrow areas; the sites are relatively small but have coarse material with low silt and are spread throughout the project area. Due to funding constraints associated with the Feasibility study only enough material was identified for initial construction.

As far as the 50 year life of the project, more of these same sites are available and will be investigated for future use. New Pass will be utilized as maintenance material to supplement the periodic renourishment and possibly as a borrow source (ebb shoal). Additional sites will be worked into this effort, including Egmont Shoal near Tampa Harbor. Big Sarasota Pass (the inlet bounding the south end of the island) contains several million yards of Beach Quality Material; mostly because the north to south transport off of Lido Key is moved out to this ebb shoal. There is geotechnical data available to support the BQM in the shoal. This shoal has grown significantly in size over the past 20 years and has become an issue with the public on Lido Key and Siesta Key (the island immediately to the south). Due to the very active interest in this ebb shoal it was not used at this point of the study, although it may come to the point where this is the most viable option for future renourishment, if all of the interests can be satisfied. Environmental is checking into the Coastal Barrier Resources Act (CBRA) as it applies to this area.

Big Sarasota Pass – Daughters mentioned that this should be considered as a sand source. It needs to be brought up and discussed within the engineering appendix; the political pressure is the main reason for not using this material. It is BQM.

Stevens – Mentioned that this portion of the main text needed to discuss the Regional Sediment Management initiative that is underway in southwest Florida and how it may effect this project.

<u>Engineering</u> – Jenkins
Project length is 9,100 feet; with tapers it is just over 10,000 feet. This short length comes into play with the design of the project; this short of a project experiences high end losses due to diffusion. The study area has experienced a high historic erosion rate. The island is short, and therefore experiences high diffusion losses at the ends. The south end is extremely erosive and needs to be addressed. The ebb shoal for Sarasota Pass (millions of yards) is directly related to the problems at the south end. This end of the island is not pinned down structurally and is free to move at will.

The volumes used in generating the plan were computed using MHW extensions of the shoreline. (translated equilibrium profiles)

SBEACH was used in determining the recession frequency curves; this was done in conjunction with Empirical Simulation Techniques. The numbers generated were in line with historical predictions and predictions used on other Gulf coast shorelines.

GENESIS was used to determine what the project induced losses would be based on the various alternatives. It was also used for finding a solution to the south end of the island.

Different structural alternatives were determined to be needed to assist the south end of the island. A variety of these were modeled with a terminal groin and groin fields yielding the best results. These structures are required to maintain the design berm in the most economically efficient manner.

Volumes – 460,000 cy were required for 80' berm; with advance nourishment it totals over 1 Million CY for initial construction.

Peck – wanted to know if the erosion rate for engineering reach 2 was actually –21 feet per year; Jenkins stated that the reach had experienced severe erosion over the last 20 years. Daughters supported the problem area's high erosion rate.

Peck asked why the recession was so much higher in reach 3 than reach 2 when reach 2 had the higher erosion rate. Jenkins stated that the recession (SBEACH) is based on individual storm events instead of yearly trends.

It was mentioned at this time that Lido Key is actually a series of very small islands that were joined together in the 1920's by local interests.

A series of t-head groins had been proposed by other interests for the south end in the past.

Stevens – wants to be sure that CBRA Units are addressed.

Formulation – Haubner
Reach length was discussed; explanations concerning the low development along the north end of the island and an accretive section near the middle island helped determine where the Federal project should begin. Due to the short reach length (9,100 feet) and the problem with diffusion losses at the ends of this short of a project, it was determined that incremental analysis of the reach wouldn't be engineeringly sound.

Stevens - By looking at the vegetation on this slide (north end of project), a good indicator of the natural (historic) shoreline could be the vegetation.

Jenkins - Actually, the whole area was "enhanced" back in the 1920's by Ringling, connecting the series of islands.

Stevens expressed a concern that some structures to the north of the beginning of the study area will be left out and wanted to ensure that the project shouldn't be extended further to the north. The area in question is currently located just north of the accretive nodal point, and with their current location from the shoreline (in excess of 300 feet) it wasn't feasible to include them within the project area. The northern taper will cross into this area.

Haubner continues presentation covering:

Berm width volumes were discussed for each of the alternatives considered (renourishment only, 20', 40', 60', 80' and 100' berms)

Preliminary costs were shown to the group; unit costs and mobilization costs will be looked at closer. Preliminary alternative cost estimates seemed lower than recent work the sponsor had completed of a similar nature.

Renourishment interval calculations were demonstrated for one of the alternatives.

Plan formulation was walked through, showing the average annual cost of each alternative at their respective renourishment interval. These were then compared to the Storm Damage prevention benefits associated with each alternative; the alternative that produced the greatest net benefits was then selected as the National

Economic Development (NED) Plan. This proved to be the 80' berm with a 3 year renourishment interval.

Project induced losses were then discussed with respect to terminal structures at the south end of the island. Modeling showed that over 50,000 cubic yards of material per year could be reduced from the diffusion losses at the south end of the project with a structure. This would directly result in a savings for the project.

Groin optimization was then discussed. The 80' berm was reevaluated with respect to the lower diffusion (project induced) losses and it re-optimized at a 5 year renourishment interval. The average annual savings of 250,000 cy of material (50,000 cy in material savings over a 5 year renourishment interval) was then compared to the average annual cost of various structures of a 50 year life. The groin field turned out to yield the highest cost to savings ratio.

Selected plan – this would be the 80' berm for 9,100 feet with a renourishment interval of 5 years and would include a 3-groin groin field at the south end of the project.

Jenkins – Agreed that the maintenance interval for groin rehab of every 10 years is in line with the design.

The breaking wave height for the groin design was discussed; the wave is depth limited at this point and was on the order of an 8 foot wave with a 13 second period.

Current cost estimates have the groins constructed with granite.

The sponsor asked about the average annual cost of the groins (+$200,000) with respect to maintenance, since they would be responsible for their upkeep. Out of the average annual cost, it was estimated that approximately $20,000 was maintenance and the rest is the $2.8 million of initial construction over the 50 year life of the project.

Daniel R. Haubner, P.E.
Coastal/Navigation Section
Plan Formulation Branch
Planning Division
Jacksonville District

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P. O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

9/28/00

REPLY TO
ATTENTION OF

Planning Division
Environmental Branch

TO WHOM IT MAY CONCERN:

The Jacksonville District, U.S. Army Corps of Engineers, is gathering information to define issues and concerns that will be addressed in a Feasibility Study on erosion problems along the Gulf of Mexico shoreline of Lido Key, Sarasota County, Florida. Lido Key is a project reauthorized by the Water Resources Development Act of 1999.

As shown on enclosure 1, Lido Key is a small barrier island, approximately 2.44 miles long, located on the Gulf coast of Florida, about 45 miles south of the entrance to Tampa Bay. Alternatives being considered include no action, beach restoration, revetment, and terminal groin construction. Fill material would be obtained from offshore borrow areas. Potential borrow areas considered are shown on enclosure 2. During the Feasibility Study, environmental considerations will be addressed in an Environmental Assessment.

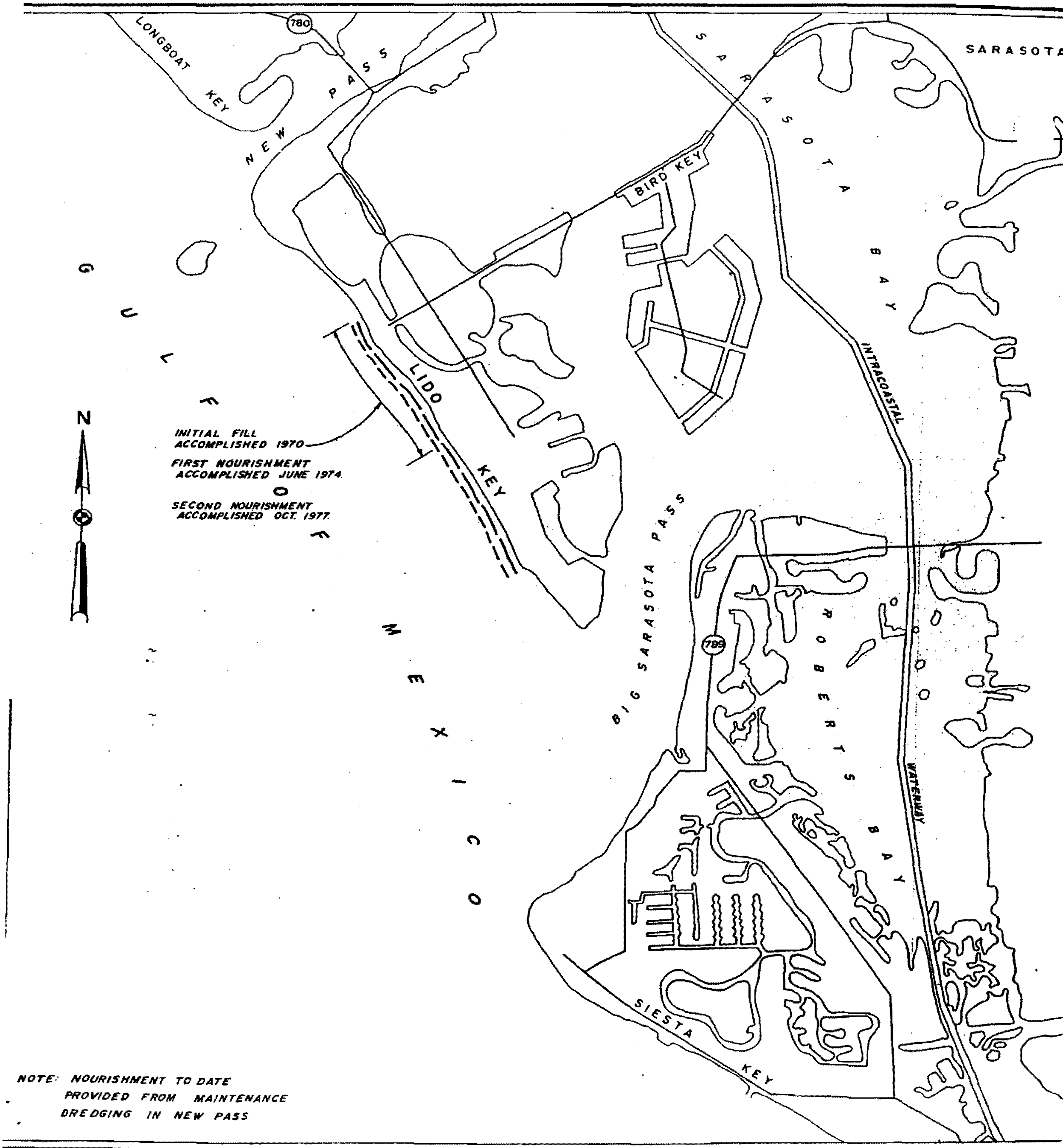
We welcome your views, comments and information about environmental and cultural resources, study objectives and important features within the described study area, as well as any suggested improvements. Letters, comments or inquiries should be addressed to the letterhead address to the attention of the Planning Division, Environmental Coordination Section and received within thirty days of the date of this letter.

Sincerely,

James C. Duck

James C. Duck
Chief, Planning Division

Enclosures


780
LONGBOAT KEY
NEW PASS
SARASOTA BAY
SARASOTA
BIRD KEY
GULF OF MEXICO
N
LIDO KEY
INITIAL FILL ACCOMPLISHED 1970
FIRST NOURISHMENT ACCOMPLISHED JUNE 1974
SECOND NOURISHMENT ACCOMPLISHED OCT. 1977
INTRACOASTAL
WATERWAY
BIG SARASOTA PASS
789
ROBERTS BAY
SIESTA KEY
NOTE: NOURISHMENT TO DATE PROVIDED FROM MAINTENANCE DREDGING IN NEW PASS

ENCLOSURE 1

LIDO KEY POTENTIAL BORROW AREAS
COASTAL PLANNING & ENGINEERING, INC. 2481 NW BOCA RATON BLVD. BOCA RATON, FL 33431

LEGEND:

	DENOTES CPE CORES – 1998		DENOTES CPE JET PROBES – 1994
	DENOTES SAR CORES – 1998	×	DENOTES CPE JET PROBES – 1998
	DENOTES CPE CORES – 1995		DENOTES CPE JET PROBES – 1995
S-1	DENOTES COE CORES –1980		DENOTES USGS CORES – 1995
CB-LBK-13	DENOTES COE CORES –1988		DENOTES WF CORES – 1993
LK-00-15	DENOTES CPE CORES –2000		

ENCLOSURE 2

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P. O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

SEP 01 2000

REPLY TO
ATTENTION OF

Programs and Project Management Division
Project Management Branch

Mr. Dennis Daughters
City Engineer/Director of Engineering
Room 100A, City Hall
1565 First Street
Sarasota, Florida 34230

Dear Mr. Daughters:

This is to acknowledge receipt of your letters dated June 30, July 18 and August 7, 2000, concerning the ongoing feasibility phase of the Lido Key Shore Protection Study.

Your letter dated June 30, 2000, indicated tasks and schedules for geotechnical work that is underway by your office in accordance with the Feasibility Cost Sharing Agreement (FCSA). The letter dated July 18, 2000, provided specifications for the vibracore equipment to be utilized in the geotechnical fieldwork by your office for determining the offshore borrow areas. Mr. Charles Stevens of our office called your office on August 7, 2000, to confirm that our geotechnical staff approved of the equipment for the intended use. As discussed in your letter dated August 7, 2000, the receipt of the aerial photography on CD-ROM is acknowledged. The work-in-kind credit for the aerial photography is $4,000 as indicated in the FCSA for the study.

If you have any questions or need additional information, please call Mr. Charles Stevens, Project Manager, at 904-232-2113.

Sincerely,

for Richard E. Bonner, P.E.
Deputy District Engineer
for Project Management

DENNIS DAUGHTERS, P.E.
DIRECTOR OF ENGINEERING
- CITY ENGINEER -

EXANDREA HAY, P.E.
PUTY DIRECTOR OF ENGINEERING
- ASST. CITY ENG. -

Web Page: www.ci.sarasota.fl.us

CITY OF SARASOTA

ENGINEERING DEP
ROOM 100A - CITY HAL
1565 FIRST STREE

TEL: (941) 954-418

FAX: (941) 954-417

E-Mail: engineering@ci.sarasota.fl.u

Mr. Richard H. Spadoni
Senior Vice-President
Coastal Planning & Engineering, Inc.
2481 N.W. Boca Raton Boulevard
Boca Raton, FL 33431

August 28, 2000

Subject: Lido Beach Feasibility Study – Project Study Plan - Schedule

Dear Mr. Spadoni:

I attended, by teleconference, the monthly "Team Meeting" for the subject project on August 24, 2000. The purpose of these meetings is determine the status of the work as defined in the Project Study Plan (PSP) and for all team members to discuss coordination necessary to keep the project on schedule. Due to prior commitments, this was my first meeting and I found it very productive.

It was at this meeting that I was informed that CPE had completed the core borings as required in Section II. C. of the PSP. USACE staff said they received the samples on August 22, 2000. I am pleased that this work was done in a timely manner (actually ahead of schedule), but it is imperative that I hear the status of the work CPE is doing for the City of Sarasota from CPE, not the USACE. These meetings are scheduled every month with the next one being on September 28, 2000. I will be in California from September 26 through October 1 inclusive, at my daughter's wedding. Therefore I want to provide the status of our work effort to Charlie Stevens on or before September 25, 2000. This means CPE needs to provide me with the status on or shortly before September 24, 2000.

USACE staff are particularly interested in the status of the Hardground Mapping, Cultural Resource Fieldwork Input and Institutional History information. They would like the appropriate person from CPE talk (as soon as possible) to Ms. Yvonne .Haberer at (904) 232-1701 about these items. Apparently, she cannot proceed until they get something from you.

Are the following items still on the schedule you indicated in your e-mail on June 9, 2000 to me?
Task 34 - Lab Testing : September 20
Task 35 - Data Analysis : October 13
Task 37 - Initiate Draft Appendix : October 16 (complete a draft report by November 17)

A:Letters37\dennis\projects\LidoBeach\Spadoni8.28

Please make every effort possible to keep me informed on the status of your work. Our past correspondence by e-mail has been very effective.

Yours truly,

Dennis Daughters

Dennis Daughters, P.E.
City Engineer/Director of Engineering

DD/dj

xc: David R. Sollenberger, City Manager
V. Peter Schneider, Deputy City Manager
Charlie F. Stevens, Project Manager, U.S. Army Corps of Engineers

COASTAL PLANNING & ENGINEERING, INC.

COASTAL & OCEAN ENGINEERING
COASTAL SURVEYS
BIOLOGICAL STUDIES
GEOTECHNICAL SERVICES

2481 N.W. BOCA RATON BOULEVARD, BOCA RATON, FL 33431
(561) 391-8102 Fax: (561) 391-9116
Internet: http://www.cpeflorida.com
E-mail: mail@cpe.dynip.com

8486.29

August 11, 2000

Mr. Bob Ross
U.S. Army Corps of Engineers
Jacksonville District
400 W. Bay Street
Jacksonville, FL 3220-4412

RE: Lido Key, Florida – Feasibility Study Geotechnical Investigations

Dear Mr. Ross:

In response to your conversation with Jeff Andrews of this office, please review the enclosed materials which provide proposed vibracore locations for the subject project. The USACE Feasibility Project Study Plan specifies that 22 vibracores will be obtained as part of the preliminary geotechnical investigations, including 4 directly offshore of Lido Key. We have also identified 6 primary and 2 alternate offshore sites which we believe have potential as borrow sites. The potential vibracoring sites were selected by integrating low density seismic data from a regional study of the inner west Florida shelf conducted by the USGS with high-density NOAA bathymetric data. The seismic data indicated that the continental shelf includes a relatively flat gently sloping carbonate limestone bedrock platform within the study area. A drawing of the surface which mapped this platform was developed in CADD. The NOAA bathymetric data which mapped all the surface ridges and sand waves morphologies was overlaid on the bedrock CADD surface to develop a sediment thickness distribution chart. The resulting map provides the location of potential sediment deposits which are characterized as bathymetric higher relief areas above the surrounding relatively uniform bottom. At minimum, each of the 6 primary sites will be sampled by vibracores as noted on the enclosed map.

With your approval, we propose to initially obtain one vibracore at the center of each area and base the decision to obtain two additional vibracores on those findings. At each site, in the event that the vibracore recovers material that could be used for beach nourishment, the remaining two vibracores will be obtained in a manner which provides the best data to characterize the resource. Should the initial vibracore in a site yield material which cannot be used for beach nourishment, we request that we be allowed to abandon the site and move to one of the alternatives noted on the enclosed map. We proposed to make these decisions in the field. It is my hope that the USACE recognizes CPE's ability to evaluate sand resources and decide which areas provide the highest potential for use as beach nourishment project compatible material.

The Feasibility Project Study Plan specifically states that 4 vibracores are to be obtained in a nearshore USACE borrow area located 3,000 to 4,000 feet directly offshore of Lido Key. A review of our records has not produced the location of this borrow site. Based upon a series of jet probes we conducted offshore of Lido Key in 1998 (noted on the enclosed map), we question the viability of nearshore sand resources. The jet probe investigations indicate the presence of fine material with a large silt/clay component, observed as high turbidity plums created during the jet probe study. If the USACE believes the nearshore borrow site warrants additional investigation please provide the location of the existing borrow site and locations for vibracores. Should the USACE agree with CPE's preliminary evaluation that nearshore sand resources may not be suitable, based on our jet probe investigations, we propose to concentrate our investigation in the alternate areas delineated on the enclosed map.

We have received notice that vibracore contractor will be in the Lido Key area in the next week and available to conduct the work. Therefore, if possible, we would like to obtain your approval of our plan no later than Wednesday August 16, 2000 to take advantage of this opportunity and obtain the sand information as soon as possible.

If you have any questions regarding our request, please contact Jeff Andrews or me.

Sincerely,

COASTAL PLANNING & ENGINEERING, INC.

Richard Spadoni
Senior Vice President

I:word/lido/848629.221

Enclosure
cc: ✓ Richard Bonner, P.E., USACE
Dennis Daughters, P.E., City of Sarasota
Alexandra Hay, P.E., City of Sarasota
Jeff Andrews, PSM, CPE
Craig J. Kruempel, CPE

NNIS DAUGHTERS, P.E.
IRECTOR OF ENGINEERING
- CITY ENGINEER -

A EXANDREA HAY, P.E.
UTY DIRECTOR OF ENGINEERING
- ASST. CITY ENG. -

Web Page: www.ci.sarasota.fl.us

CITY OF SARASOTA

ENGINEERING DEPT.
ROOM 100A - CITY HALL
1565 FIRST STREET

TEL: (941) 954-4180

FAX: (941) 954-4174

E-Mail: engineering@ci.sarasota.fl.us

Mr. Richard Bonner, P.E.
Deputy District Engineer
U.S. Army Corps of Engineers
Jacksonville District
Project Management Branch
P.O. Box 4970
Jacksonville, FL 32234-0019

August 7, 2000

Subject: Lido Beach Feasibility Study

Dear Mr. Bonner:

In compliance with the Agreement between the U.S. Army Corp of Engineers and the City and pursuant to Section I.B.2., of the Project Study Plan, enclosed herewith is a CD-ROM with the "most recent photography available" as an image file of the area of the project.

Please acknowledge receipt of this data and completion of this work-in-kind credit, in the amount of $4,000.00 for the City.

If you have any questions regarding the data, please feel free to contact our office.

Yours truly,

Dennis Daughters

Dennis Daughters, P.E.
City Engineer/Director of Engineering

DD/dj

xc: David R. Sollenberger, City Manager — w/o attachment
V. Peter Schneider, Deputy City Manager — w/o attachment
Charlie F. Stevens, Project Manager, U.S. Army Corps of Engineers — w/o attachment
Richard Spadoni, Vice President, Coastal Planning & Engineering — w/o attachment

A:\dennis\projects\lidobch\bonner8.7

DENNIS DAUGHTERS, P.E.
DIRECTOR OF ENGINEERING
- CITY ENGINEER -

ALEXANDREA HAY, P.E.
DEPUTY DIRECTOR OF ENGINEERING
- ASST. CITY ENG. -

Web Page: www.ci.sarasota.fl.us

CITY OF SARASOTA

ENGINEERING DEPT
ROOM 100A - CITY HALL
1565 FIRST STREET

TEL: (941) 95 80

FAX: (941) 954-4174

E-Mail: engineering@ci.sarasota.fl.us

July 18, 2000

Mr. Richard E. Bonner
Deputy District Engineer for Project Management
Department of the Army
Jacksonville District Corps of Engineers
Post Office Box4970
Jacksonville, Florida 32232-0019

Subject: Vibracores for the Lido Key Feasibility Study

Dear Mr. Bonner:

In response to your letter dated June 29, 2000 requesting information concerning the specifications for the vibracoring equipment, and core boring logs that demonstrate the ability of the equipment to achieve adequate penetration, we offer the following information:

Attachment 1 - contains information provided by Aqua Survey, Inc. of New Jersey. The vibracoring apparatus is a Rossfelder VT-6 Vibra Corer. This vibracoring equipment was used to obtain vibracores for the Broward County geotechnical investigation to locate sand for beach nourishment. The Broward County field survey was conducted off a ship of sufficient size to allow storage of the cores.

Attachment 2 - provides information provided by Athena Technologies of Columbia, South Carolina. Their experience includes conducting vibracore work for the U.S. Army Corps of Engineers. The list of projects conducted by Athena includes a number of beach nourishment projects.

Attachment 3 - includes score logs for Manatee County and information concerning the virbracore unit employed by Eckerd College. Eckerd College has conducted vibracore studies of the west coast of Florida for beach nourishment purposes, including the U.S. Geological Survey. Eckerd College provided the vibracoring equipment for the previous (1998) and soon to be constructed Lido Key projects.

In order to meet your estimated schedule, we would appreciate an early and positive response.

Yours truly,
Dennis Daughters / HAH
Dennis Daughters, P.E.,
City Engineer/Director of Engineering

kl

Enclosures

xc: David R. Sollenberger, City Manager
V. Peter Schneider, Deputy City Manager
Charlie F. Stevens, Project Manager, U.S. Army Corps of Engineers
Richard Spadoni, Sr. Vice President, Coastal Planning and Engineering, Inc.

A:\Letters36\Dennis\Projects\LidoBeach\Bonnerfeasibility.study

DENNIS DAUGHTERS, P.E.
DIRECTOR OF ENGINEERING
- CITY ENGINEER -

EXANDREA HAY, P.E.
UTY DIRECTOR OF ENGINEERING
- ASST. CITY ENG. -

Web Page: www.ci.sarasota.fl.us

CITY OF SARASOTA

ENGINEERING DEPT
ROOM 100A - CITY HALL
1565 FIRST STREET

TEL: (941) 954-4180

FAX: (941) 954-4174

E-Mail: engineering@ci.sarasota.fl.us

30 June, 2000

Mr. Richard E. Bonner, P.E.
Deputy District Engineer for Project Management
Department of the Army
Jacksonville District Corps of Engineers
Programs and Project Management Division
Project Management Branch
Post Office Box 4970
Jacksonville, FL 32234-0019

Subject: Lido Beach Feasibility Study - Schedule

Dear Mr. Bonner:

We are in receipt of your letter dated June 16, 2000 in which you enclosed a revised schedule for the subject study. We appreciate receiving such. We have reviewed and evaluated each of our tasks to complete the work and we have the following comments.

The schedule we would anticipate to accomplish as long as we do not encounter weather delays or other circumstances beyond our control, as follows:

1. Task 31 - Initiate Borrow Area Identification: We can accomplish by July 15.
2. Task 33 - Core Boring : August 31
3. Task 34 - Lab Testing : September 20
4. Task 35 - Data Analysis : October 13
5. Task 37 - Initiate Draft Appendix : October 16 (complete a draft report by November 17.)
6. Task 91 - Hardbottom Mapping: Would likely be accomplished by mid-August, with product development in early September.
7. Task 100 - Cultural Resource Fieldwork input: We're not sure what is meant by fieldwork input, but if it means consultation with the USACE, we can conduct a conference call on July 13 or 14.

Yours truly,

Dennis Daughters

Dennis Daughters, P.E.
City Engineer/Director of Engineering

DD/dj

xc: David R. Sollenberger, City Manager
V. Peter Schneider, Deputy City Manager
Mr. Charlie F. Stevens, Project Manager, U.S. Army Corps of Engineers
Richard Spadoni, Vice President, Coastal Planning & Engineering

A:\letter36\Dennis\projects\lidobeach\schedule\bonner6.30

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P. O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

REPLY TO
ATTENTION OF

June 29, 2000

Programs and Project Management Division
Project Management Branch

Mr. Dennis Daughters, P.E.
Director of Engineering
City of Sarasota
Room 100A, City Hall
1565 First Street
Sarasota, Florida 34230

Dear Mr. Daughters:

This is in response to your letter dated June 1, 2000, regarding the feasibility study for Lido Key. Your letter indicated a request to substitute another type of vibracore drill, instead of the agreed upon Alpine-type pneumatic vibracore, to drill the potential borrow areas. We understand your office is requesting this change primarily because it is more expensive to drill using an Alpine-type pneumatic vibracore.

In order to approve the use of an alternative type of vibracore, our office desires to review the following information:

a. Specifications for the vibracore (manufacturer, type, size, weight, tube dimensions, support equipment required, ship requirements, method of operation, etc.).

b. A set of core boring logs that document the proposed vibracore can achieve adequate penetration in materials similar to the materials expected in the proposed borrow areas.

Our concern is the money spent on drilling may not achieve the needed result if the vibracore failed to adequately penetrate the sediments in the proposed borrow area. The particular type of equipment is not as important as it is to accomplish the required drilling. Our work generally requires that a vibracore be capable of penetrating 20 feet of sediments.

Based on our experience, not all vibracore can achieve a full 20-foot penetration. We have had success with the Alpine-type pneumatic vibracore in achieving a 20-foot penetration. That is why we specified the Alpine-type unit in the drilling specifications for use in the feasibility study.

Please advise our office if the above information is readily available. If you have any questions, please call Mr. Charles Stevens, Project Manager, at 904-232-2113.

Sincerely,

Richard E. Bonner, P.E.
Deputy District Engineer
for Project Management

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P. O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

REPLY TO
ATTENTION OF

June 16, 2000

Programs and Project Management Division
Project Management Branch

Mr. Dennis Daughters
City Engineer/Director of Engineering
Room 100A-City Hall
1565 First Street
Sarasota, Florida 34230

Dear Mr. Daughters:

Please find enclosed a revised Lido Key feasibility study schedule in the format of Microsoft Project. The format identifies the entire schedule with the major tasks and milestones listed. The individual tasks and work breakdown structure identifications are labeled. The network analysis, which indicates start and finish dates, duration, and costs associated with the tasks, is enclosed. Also enclosed is a Lido Key Fiscal Year 2000 Sponsor's Responsibility schedule of tasks. The study's schedule will be evaluated each month. Any significant changes to the schedule during the study will be made through coordination with your office.

Your letter dated April 24, 2000 to Mr. Dan Haubner indicated a request for credit of $4,000 for providing existing aerial photography. As per the approved Project Study Plan, the work-in-kind credit for the sponsor to provide existing aerial photography is $4,000. Your letter dated April 24, 2000 to Mr. Charles Stevens requests a $500 credit for the monitoring report provided with your letter. As per the feasibility cost sharing agreement executed July 20, 1999, your office will be credited with this work towards the non-Federal share of the feasibility study cost. Your letter dated May 15, 2000 was also received, which provided real estate information. Due to our office protocol, please address future letters to me so that Mr. Stevens can coordinate information from your office with the team members regarding the study.

If you have any questions or need additional information, please contact Mr. Charles Stevens, the project manager, at 904-232-2113.

Sincerely,

Richard E. Bonner, P.E.
Deputy District Engineer
for Project Management

Enclosures

LIDO KEY

Fiscal Year 2000 - Sponsor Responsibility Schedule of Tasks

Survey and Mapping (except for RE)

1. Task 28 - Existing Survey/Aerial Data Collection - $500.00 (Due 6/9/00)
2. Task 29 - Digital Imagery - $4000.00 (Date received April 24, 2000)

Geotechnical Studies

1. Task 31 - Initiate Borrow Area Identification (Due 5/25/00)
2. Task 33 - Core Boring - $92,000.00 (Due 7/31/00)
3. Task 34 - Lab Testing (Due 8/11/00)
4. Task 35 - Data Analysis (Due 9/14/00)
5. Task 37 - Initiate Draft Appendix - $20,000.00 (Due 9/27/00)

Engineering and Design Analysis

1. Task 43 - Historic/Shoreline change, Erosion/Rate Analysis - $500.00 (Due ASAP)
2. Task 45 - Historic/Volumetric Changes - $500.00 (Due ASAP)
3. Task 47 - Storm Monitoring Study - $500.00 (Date Received April 24, 2000)

Model Studies

1. Task 53 - Tidal Inlet Study - $250.00 (Due 7/10/00)

Plan Formulation

1. Task 68 - Institutional History $250.00 (Due 7/14/00)

Real Estate Analysis

1. Task 78 - Structural Information Costs (Due ASAP)

Environmental Impact Statement

1. Task 91 – Hardground Mapping - $34,000.00 (Due ASAP)

Cultural Resource Studies

1. Task 100 – Cultural Resource Fieldwork input - $5,000.00 (Due ASAP)

DENNIS DAUGHTERS, P.E.
DIRECTOR OF ENGINEERING
- CITY ENGINEER -

ALEXANDREA HAY, P.E.
DEPUTY DIRECTOR OF ENGINEERING
- ASST. CITY ENG. -

Web Page: www.ci.sarasota.fl.us

CITY OF SARASOTA

ENGINEERING DEP
ROOM 100A – CITY HAL
1565 FIRST STREE

TEL: (941) 954-41

FAX: (941) 954-41

E-Mail: engineering@ci.sarasota.fl.

June 1, 2000

Mr. Richard E. Bonner, P.E.
Deputy District Engineer
U.S. Army Corps of Engineers, Jacksonville District
Project Management Branch
Post Office Box 4970
Jacksonville, FL 32234-0019

Subject: Lido Beach Feasibility Study

Dear Mr. Bonner:

The feasibility study agreement between the U.S. Army Corps of Engineers and the City of Sarasota provides a number of work in-kind credits for work to be provided by the City. Included among those tasks are the geotechnical studies, which includes a total of 22 sediments vibracores (Section II, Geotechnical Studies).

Under paragraph C.2. Drilling Procedures, the scope of work states that all borings shall be drilled using an "Alpine-style or similar design, pneumatic vertical hammer vibracore drilling apparatus". Unfortunately, since the scope of work was developed two years ago, the cost to obtain Alpine-style vibracores has increased. Recent vibracoring subcontractor price quotes for the vibracoring exceed the budget established for this portion of our work, utilizing the Alpine-style vibracoring unit, within the budgetary constraints.

Our consultant, Coastal Planning & Engineering, Inc. (CPE), has informed me that they have successfully utilized other types of vibracoring systems which are not the Alpine-style, pneumatic vertical hammer vibracoring apparatus. They have been successful in vibracoring potential sand sources, including the source utilized for our successful Mid-Lido Key beach nourishment project of 1998, and the borrow areas to be used in the project we will be constructing at the southern end of Lido Key in about 4-5 months. The systems are presently available at a cost which meets our budgetary constraints, and meet industry standards for vibracoring. We expect to obtain vibracores which are satisfactory for preliminary borrow area development for the feasibility-level study.

Please approve the modification to the scope of work which will allow utilization of a vibracoring unit other than the Alpine-style, pneumatic vertical hammer vibracore drilling apparatus. During the development of the Project Study Plan, our concern about using the Alpine-style received much discussion. Your staff then indicated an openness to consider other equipment

Thank you for considering our request.

Yours truly,

Dennis Daughters

Dennis Daughters, P.E.
City Engineer/Director of Engineering

xc: David R. Sollenberger, City Manager
V. Peter Schneider, Deputy City Manager
Charlie F. Stevens, Project Manager, U.S. Army Corps of Engineers
Richard Spadoni, Vice President, Coastal Planning & Engineering

A:\Letters36\Dennis\Projects\LidoBeachNourishment-Current\BonnerLidoFeasstdy.Vibracoring

DENNIS DAUGHTERS, P.E.
DIRECTOR OF ENGINEERING
- CITY ENGINEER -

ALEXANDREA HAY, P.E.
EPUTY DIRECTOR OF ENGINEERING
- ASST. CITY ENG. -

Web Page: www.ci.sarasota.fl.us

CITY OF SARASOTA

ENGINEERING DE
ROOM 100A - CITY HA
1565 FIRST STRE

TEL: (941) -4

FAX: (941) 954-4

E-Mail: engineering@ci.sarasota.fl

May 15, 2000

Mr. Richard E. Bonner, P.E.
Deputy District Engineer
U.S. Army Corps of Engineers
Jacksonville District
Project Management Branch
Post Office Box 4970
Jacksonville, FL 32234-0019

Subject: Lido Beach Feasibility Study

Dear Mr. Bonner:

In compliance with the Agreement between the Army and the City and pursuant to Section V.A. (1), (2), (3), (5), (7) and (10) of the Project Study Plan and as requested by Mr. Dan Hobner, enclosed herewith is a computer disc (CD) upon which is:

1- A DBF file of property owners and tax roll information
2- An image file of the map of the area of the project
3- An ArcView ShapeFile of the data requested

If you have any questions about the data on the CD, you may directly contact Mr. Glenn Stephens, of the City's Information Technology Department, Tel: (954) 954-4170, at the same address above.

Additionally enclosed and pursuant to Section V.A. (1), (4), (7) and (8) of the Project Study Plan are maps showing:

1- Tax Appraisers Property Identification Numbers (PIN)
2- Zoning maps
3- All public utilities

If you have any questions about the Tax Maps and/or Zoning Maps, you may directly contact Mr. Mike Taylor, of the City's Planning Department, Tel: (954) 954-4195, at the same address above. If you have any questions about the utility maps, you may directly contact Mr. Dale Haas, PE, of the City's Public Works Department, Tel: (954) 955-2325, at 1750 12th Street, Sarasota, FL 34236.

A:\Letters36\Dennis\Projects\Lido Beach Renourishment 1998-Current\BonnerLidoFeas.Stdy

We are not aware of any "anticipated mineral extraction in the project area" as requested in Section V.A. (6) of the Project Study Plan and thus no information can be provided.

Please acknowledge receipt of this data and completion of this work-in-kind credit, even though there is no monetary amount for the City. We have not received acknowledgement of our first two submittals.

On April 24, 2000, we submitted written data in compliance with Section I.B.1. of the Project Study Plan. We realize the data must be in ASCII XYZ format and will be submitting such soon.

Yours truly,

Dennis Daughters

Dennis Daughters, P.E.
City Engineer/Director of Engineering

xc: David R. Sollenberger, City Manager (w/o attachment)
V. Peter Schneider, Deputy City Manager (w/o attachment)
Glenn Stephens, Information Technology (w/o attachment)
Michael Taylor, AICP, Planning Department (w/o attachment)
Dale Haas, PE, Public Works Department (w/o attachment)
✓Mr. Charlie F. Stevens, Project Manager, U.S. Army Corps of Engineers (w/o attachment)
Richard Spadoni, Vice President, Coastal Planning & Engineering (w/o attachment)

* DEP should have newer aerials than 1985!

CESAJ-PD-PN (1110-2-1150a) 13 April 2000

* Need to meet w/ George and discuss what w/o project condition is.

MEMORANDUM FOR RECORD

SUBJECT: Lido Key Feasibility Study, 10-11 April Site Visit

1. Messrs. Joe Wilson, Dan Haubner and Ms. Yvonne Haberer of Planning Division conducted a site visit on the subject study area. The purpose of this visit was to perform a cursory review of the environmental resources, identify potentially impacted structures, locate existing coastal armor, and to observe the existing conditions.

2. Lido Key is a small barrier island, about 2.44 miles long, within Sarasota County on the Gulf Coast of Florida, about 45 miles south of the entrance to Tampa Bay. It is bounded to the north by New Pass (a Federal navigation project authorized in 1962) and by Big Sarasota Pass (not a Federal project) to the south. Lido Key is separated from the mainland by Sarasota Bay and the Intracoastal Waterway (a Federal navigation project authorized in 1945). The northern tip of Lido Key is populated with residential structures, this comprises approximately 500 feet of the north end of the island before curving into New Pass. This is followed to the south by approximately 2,600 feet of park land. Even though this area is showing signs of erosion, due to the proximity of the inlet and the land use (mainly recreational benefits) it would be difficult to justify a Federal project for this end of the island. Immediately following the northern park there is a reach approximately 1,100 feet in length that is comprised of 8 residential structures. However, these structures are well over 400 feet from the existing shoreline due to a recent beach fill by the sponsor (per telephone conversation with Dennis Daughters).

3. The next 1,900 feet of shoreline to the south is a public beach that fronts State Road 780. The beach is approximately 250 feet in width and has highway dividers connected and buried in the sand as a form of seawall between the beach and the road. A small vegetated dune is between the "seawall" and the beach, also to provide protection for the road. There may be some storm damage reduction benefits associated with this reach. The next 1,200 feet to the south is part of the same recreational beach, but it has a small seawall fronting a 200 foot wide parking lot that runs through the entire reach. There are two stone groins located within this reach.

4. The reach following the park (approximately 4,500 feet) is heavily developed with hotels and condominiums. There are 20 different developments with 30 structures; most of these include

developments have sheetpile seawalls with a concrete cap. The southern tip of Lido Key is also park lands with recreational benefits; this is the last 600 feet of the island before entering Big Sarasota Pass.

5. The southern tip of the island is experiencing severe erosion. Two of the southern most structures are in the water with their seawalls already damaged. Aerial photographs from 1985 depicts a 100 foot wide beach at the narrowest section in this same area. The beach in the 4,500 foot developed reach starts at the northern end of the development with a 150 to 200 foot wide beach, which narrows as it continues to the south. The southern park is limited to swimming and sunbathing on the bay side of the island due to the minimal beach width on the gulf side.

6. According to the sponsor, there are plans in place for construction of a beach fill for the southern end of the island; this should take place within the next 2 months. Their consultants (CP&E) will have a great deal of engineering information to assist with this study. There should also be some recent aerial photography available from this upcoming project.

7. Most of the uplands on Lido Key have been developed except for North Lido Public Beach and South Lido Park. Although undeveloped, a majority of the upland habitat at North Lido Public Beach is disturbed. Upland vegetation is composed of both exotic and native species, including Australian pine, sea grape, and wax myrtle. Closer to the Gulf, a large area of native dune habitat is present. This vegetation consists mainly of sandbur, salt grass, seaside spurge, and sea oats. South Lido Park is largely undeveloped except for recreational amenities such as picnic shelters, restrooms, parking areas, etc. A large stand of Australian pine is located along the Big Sarasota Pass shoreline. Some dune vegetation exists, such as sea oats. Wax myrtle and sea grapes are also present in the park. Due to development, there is little vegetation found between the shoreline and buildings/seawalls throughout the remaining proposed project area.

8. A variety of shore and wading birds were encountered including brown pelicans, gulls, terns, sandpipers, black skimmers, and herons.

9. Organisms found in the littoral, or intertidal zone were crabs, coquina clams, and several gastropod mollusk species.

10. Discussions with the sponsor revealed the fact that no work on borrow area identification, institutional history, or structure value has yet to begin. With the upcoming local beach renourishment project imminent, it is expected that these task

for the local beach fill project expected to occur in 2 months. The entire amount is expected to be used for this project. A great deal of back ground information is available to the sponsor on past work and the institutional history is not expected to cause any delays. Difficulties with new city computer components have delayed the structure inventory, but this is expected to be provided within the next week.

11. Florida DEP aerials from 1985 are available for review, along with the photos taken during this site visit. For questions contact Dan Haubner at x-2798.

/s/
Daniel R. Haubner
CESAJ-PD-PN

L:\GROUP\PDP\DAN\REGION2\SARASOTA\WORD.WRK\MFR_SITE.DOC

DENNIS DAUGHTERS, P.E.
DIRECTOR OF ENGINEERING
- CITY ENGINEER -

ALEXANDREA HAY, P.E.
DEPUTY DIRECTOR OF ENGINEERING
- ASST. CITY ENG. -

Web Page: www.ci.sarasota.fl.us

ENGINEERING DEPT.
ROOM 100A - CITY HALL
1565 FIRST STREET

TEL: (941) 954-4180

FAX: (941) 954-4174

E-Mail: engineering@ci.sarasota.fl.us

CITY OF SARASOTA

April 24, 2000

Mr. Charlie Stevens
Project Manager
U.S. Army Corps of Engineers
Jacksonville District
Project Management Branch
Post Office Box 4970
Jacksonville, Florida 32232-0019

Subject: Lido Beach Feasibility Study
Post Construction Monitoring Report

Dear Mr. Stevens:

In compliance with Section 1.B.1. of the Feasibility Study Scope of Work, enclosed herewith is your copy of the "1998 Lido Key (Sarasota County), Florida Beach Nourishment Project One-Year Post-Construction Monitoring Report", dated April 2000 and prepared by Coastal Planning and Engineering, Inc. (CPE).

The report includes evaluation of the Lido Key beach within the study area (DEP monuments R-32 to R-43) and project area limits (DEP monuments R-35 to R-40). The report documents CPE's findings related to mean high water shoreline changes; beach area volumetric changes; borrow area bathymetric surveys; sand characteristic analysis; compaction testing; and construction water quality monitoring.

Highlights of the monitoring study include the following:

- The mid-key beach nourishment project is performing beyond expectations. In April/May 1998, approximately 292,500 cubic yards of sand were placed along 4,950 feet of beach during the 1998 Lido Key Beach Nourishment Project, as measured landward the 12-foot (NGVD) depth contour during the immediate post-construction monitoring survey in May 1998. One year after project construction, approximately 302,500 cubic yards of sand were found within the project area, indicating sand gain due to natural processes as well as beach fill placement. Of this volume, ninety-one percent was located above the 6 foot (NGVD) depth contour.

A:\Letters36\Dennis\Projects\LidoBeachRenourishment1998-current\StevensLidoFeas.stdy

- The shoreline was extended an average of approximately 190 feet within the non-tapered project area (R-36 to R-39) with construction of the project. The results of the one-year post-construction survey performed in May 1999 demonstrate the adjustment to natural equilibrium slope that has occurred since project construction. The shoreline has receded approximately 85 feet between profile lines R-36 and R-39, and an average recession of approximately 15 feet has occurred over the entire study area (R-32 to R-43). During the two-year post-construction period, sand will most likely continue to move offshore and narrow the beach until the system reaches a natural equilibrium slope.

- The February 1999 post-construction borrow area survey of Borrow Area 1 demonstrated a borrow area depth range from 33 feet to 36 feet (NGVD). The bathymetric survey of Borrow Area 4 demonstrated a depth range from 34 feet to 36 feet.

- Sand grain analysis indicates that the one-year post-construction beach is moderately sorted. The composite mean grain size for the one-year post-construction sampling was 0.40 mm, compared to 0.42 mm during pre-construction and 0.30 during the immediate post-construction monitoring.

Please acknowledge receipt of this Report and completion of this work-in-kind credit in the amount of $500.00 for the City.

Yours truly,

Dennis Daughters

Dennis Daughters, P.E.
City Engineer/Director of Engineering

DD/kl

Attachments

xc: Richard Spadoni, Vice President, Coastal Planning and Engineering, Inc. (w/o attach.)

A:\Letters36\Dennis\Projects\LidoBeachRenourishment1998-current\StevensLidoFeas.stdy

DENNIS DAUGHTERS, P.E.
DIRECTOR OF ENGINEERING
- CITY ENGINEER -

ALEXANDREA HAY, P.E.
PUTY DIRECTOR OF ENGINEERING
- ASST. CITY ENG. -

Web Page: www.ci.sarasota.fl.us

CITY OF SARASOTA

ENGINEERING DEI
ROOM 100A - CITY HA
1565 FIRST STRE

TEL: (941) 954-41

FAX: (941) 954-41

E-Mail: engineering@ci.sarasota.fl.

April 24, 2000

Mr. Dan Hobner
Project Manager
U.S. Army Corps of Engineers
Jacksonville District
Project Management Branch
Post Office Box 4970
Jacksonville, Florida 32232-0019

Subject: Lido Beach Feasibility Study

Dear Mr. Hobner:

Pursuant to your request, enclosed herewith is a CD with files of Lido Beach aerials flown on March 24, 1999. These files were provided by our consultant, Coastal Planning and Engineering, Inc. These photographs are submitted in compliance of Section 1.B.2. of the Feasibility Study Scope of Work. Please acknowledge receipt of the CD and completion of this work-in-kind effort in the amount of $4,000.00.

Yours truly,

Dennis Daughters

Dennis Daughters, P.E.
City Engineer/Director of Engineering

DD/kl

Enclosures

xc: Richard Spadoni, Vice President, Coastal Planning and Engineering, Inc. (w/o attach.)
Charlie Stevens, U.S. Army Corps of Engineers

A:\Letters36\Dennis\Projects\LidoBeachErosion\HobnerLidoFeas.stdy

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P. O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

REPLY TO
ATTENTION OF

November 30, 1999

Programs and Project Management Division
Project Management Branch

Mr. Dennis Daughters
City Engineer/Director of Engineering
Room 100A, City Hall
1565 First Street
Sarasota, Florida 34230

Dear Mr. Daughters:

This is in regard to further coordination regarding the Lido Key Shore Protection Study. Your letter dated July 6, 1999, provided signed copies of the Feasibility Cost Sharing Agreement (FCSA). Colonel Joe R. Miller, District Engineer, signed the FCSA on July 20, 1999. Enclosed is an original copy of the executed FCSA including the Project Study Plan (PSP) for your records as requested in the letter from Mr. Billy E. Robinson, City Auditor and Clerk, dated November 8, 1999.

Our office would like to continue with the feasibility phase of the study and preparation of the feasibility report. Recent guidance has been received from our higher authority regarding projects, such as Lido Key, that were reauthorized in the Water Resources Development Act of 1999. These projects require that the Assistant Secretary of the Army (Civil Works)(ASA(CW)) make a determination that the projects are technically sound, environmentally acceptable and economically justified. Our recommended approach is to continue with preparation of the feasibility report incorporating all the tasks and cost sharing indicated in the PSP for the executed FCSA ($700,000 total feasibility report cost). A new Pre-Construction Engineering and Design (PED) agreement would not be pursued at this time as this would delay the process.

The final disposition of the feasibility report would be determined later in the process. If there is no significant change to the authorized project, a short letter feasibility report may be prepared. The analyses done could also be incorporated into a General Reevaluation Report, if needed, in order to provide higher authority with a report that is sufficient to allow the ASA(CW) determination to be made.

Initiation of the work on the feasibility report preparation can start this month based upon the $3,667 in matching funds already provided by the city for that purpose. Continuation of the feasibility study is contingent upon your acceptance of our recommended approach and an additional cash contribution from the city.

The anticipated additional total expenditure for study tasks that are planned from December 1999 until September 30, 2000, is $252,000 plus $84,000 of work-in-kind tasks conducted by the city. Based upon the FCSA, the total non-Federal share of the study cost is 50 percent, one-half of which can be work-in-kind. Therefore, the city's share of $336,000 proposed for expenditure is $84,000 in cash and $84,000 of work-in-kind.

If the above schedule of expenditures for the remainder of fiscal year (FY) 2000 is acceptable, the study tasks will be continued upon receipt of a letter from your office. It is requested that your letter provide your concurrence with the work plan for FY 2000 and a check for $84,000. Please make the check payable to: Finance and Accounting Officer, Jacksonville District.

If you have any questions or need additional information, please call Mr. Charles Stevens, at 904-232-2113.

Sincerely,

Richard E. Bonner, P.E.
Deputy District Engineer
for Project Management

Enclosure

Copy Furnished (without enclosure):

Mr. Billy E. Robinson, CMC/AAE, City Auditor and Clerk, Room 100A, City Hall, 1565 First Street, Sarasota, Florida 34230

CITY OF SARASOTA

November 8, 1999

Mr. Richard E. Bonner, P.E.
Deputy District Engineer for Project Management
U.S. Army Corps of Engineers, Jacksonville District
Project Management Branch
Post Office Box 4970
Jacksonville, Florida 32234-0019

Dear Mr. Bonner:

On July 27, 1998, and July 6, 1999, I sent to your office partially executed originals of Agreements between the City of Sarasota and the Department of the Army U.S. Corps of Engineers. The Agreement sent on July 27, 1998, concerned the Lido Key Shore Protection Project Feasibility Study, and the Agreement sent on July 6, 1999, concerned the Lido Beach Renourishment Project Agreement for Engineering Services. The two original Agreements had been executed by the City of Sarasota and were sent to you for execution by the Department of the Army, with a request to return a fully executed original of each Agreement to my office. In reviewing the City's files, it has come to my attention that the City has not received fully executed originals of the Agreements.

Would you please review your files to determine if a fully executed original of each Agreement was returned to this office. If not, I would appreciate your sending executed originals of each Agreement to my office for proper distribution and filing.

If you have any questions or need further information, please do not hesitate to contact me.

Sincerely,

Billy E Robinson

Billy E. Robinson, CMC/AAE
City Auditor and Clerk

Enclosure

PMC/gl

xc: David R. Sollenberger, City Manager
Richard J. Taylor, City Attorney
Dennis Daughters, City Engineer/Director
File

Office of the City Auditor and Clerk - Post Office Box 1058 - Sarasota, Florida 34230
Office Number: 1-941-954-4160 - Fax Number: 1-941-954-4113

DENNIS DAUGHTERS, P.E.
DIRECTOR OF ENGINEERING
- CITY ENGINEER -

LEXANDREA HAY, P.E.
- ASST. CITY ENG. -

Web Page: www.ci.sarasota.fl.us

CITY OF SARASOTA

ENGINEERING DEP
ROOM 100A - CITY HAL
1565 FIRST STRE

TEL: (941) 954-41

FAX: (941) 954-41

E-Mail: engineering@ci.sarasota.fl.

September 7, 1999

Mr. Richard H. Spadoni
Senior Vice-President
Coastal Planning & Engineering, Inc.
2481 N.W. Boca Raton Boulevard
Boca Raton, FL 33431

Subject: Lido Beach Federal Nourishment Project
Feasibility Study – Project Study Plan

Dear Mr. Spadoni:

As you are aware, Lido Key was "re-authorized" by Congress via the Water Resources Development Act of 1999 (WRDA-99). Last week, at the Florida Shore and Beach Preservation Association (FSBPA) annual meeting, I met privately with Richard Bonner, P.E. and Charlie Stevens, U.S. Army Corps of Engineers (USACE) to discuss how it will affect the subject Feasibility Study and its accompanying Cost Sharing Agreement.

Mr. Bonner stated that the most effective approach is to amend the current Feasibility Cost Sharing Agreement to make the Feasibility Study into a Planning and Engineering Design (PED) Report. This approach will save about two years in the whole process. The Project Study Plan (PSP) will essentially remain the same but will be called a PED Report. With the "re-authorization" and a PED Report, the City's financial responsibility is limited to 25% cash share. We will not be allowed to provide a "Work-in-Kind" share.

Accordingly, we no longer need Coastal Planning & Engineering, Inc. (CPE) to provide us with a proposal to accomplish most of the "Work-in-Kind" elements. We still intend to have you advise us on the technical aspects of the USACE study. You may, as I know you have it almost completed, submit the proposal to us and we, in turn, will send it to Mr. Bonner, encouraging him to contract directly with CPE for that portion of the work.

If you have any questions regarding this matter, or need further clarification, please feel free to contact our office.

Yours truly,

Dennis Daughters

Dennis Daughters, P.E.
City Engineer/Director of Engineering

xc: David R. Sollenberger, City Manager
V. Peter Schneider, Deputy City Manager
Gibson E. Mitchell, CGFO, Finance Director
✓Richard E. Bonner, P.E., Deputy District Engineer, USACE
Howard D. Marlowe, Public Affairs Consultant, Marlowe & Company

A:\Letters34\Dennis\Projects\LidoBeach\SpadoniProjStudy.Pln

CITY OF SARASOTA

July 6, 1999

Mr. Richard E. Bonner, P.E.
Deputy District Engineer for Project Management
U.S. Army Corps of Engineers, Jacksonville District
Project Management Branch
Post Office Box 4970
Jacksonville, Florida 32234-0019

Dear Mr. Bonner:

Please find enclosed four partially executed originals of an Agreement between the City of Sarasota and the Department of the Army, concerning the Lido Key Shore Protection Project Feasibility Study. The Agreement was approved by the Sarasota City Commission at a regular meeting held on June 7, 1999, and is now being forwarded to you for proper execution and witnessing on behalf of the Department of the Army. Upon completion, please assure that one fully executed original is returned to my office for distribution and filing.

If I can be of any further assistance, please do not hesitate to contact me.

Sincerely,

Billy E Robinson

Billy E. Robinson, CMC/AAE
City Auditor and Clerk

PMC:gl

xc: David R. Sollenberger, City Manager
Richard J. Taylor, City Attorney
Dennis Daughters, Engineering Director
File

Office of the City Auditor and Clerk - Post Office Box 1058 - Sarasota, Florida 34230
Office Number: 1- 941-954-4160 - Fax Number: 1-941-954-4113

AGREEMENT
BETWEEN THE DEPARTMENT OF THE ARMY
AND
THE CITY OF SARASOTA, FLORIDA
FOR THE LIDO KEY SHORE PROTECTION PROJECT
FEASIBILITY STUDY

THIS AGREEMENT is entered into this 20th day, of July, 1999, by and between the Department of the Army (hereinafter the "Government"), represented by the District Engineer executing this Agreement, and the City of Sarasota, Florida (hereinafter the "Sponsor"),

WITNESSETH, that

WHEREAS, the Congress (House Committee) has requested the Secretary of the Army to review the report of the Chief of Engineers on Lido Key, Sarasota, Florida, published as House Document 320, 91st Congress, 2nd Session, with a view to determining the advisability of providing hurricane and storm damage reduction works pursuant to study resolution docket 2458, adopted 14 September 1995 by the Committee on Transportation and Infrastructure; and

WHEREAS, the U.S. Army Corps of Engineers has conducted a reconnaissance study of the advisability of providing hurricane and storm damage reduction works on Lido Key, Sarasota, Florida pursuant to this authority, and has determined that further study in the nature of a "Feasibility Phase Study" (hereinafter the "Study") is required to fulfill the intent of the study authority and to assess the extent of the Federal interest in participating in a solution to the identified problem; and

WHEREAS, Section 105 of the Water Resources Development Act of 1986 (Public Law 99-662, as amended) specifies the cost sharing requirements applicable to the Study;

WHEREAS, funding for this Study has been provided by the Energy and Water Development Appropriations Acts of 1998 and 1999, Public Laws 104-206 and 105-245, respectively;

WHEREAS, the Sponsor has the authority and capability to furnish the cooperation hereinafter set forth and is willing to participate in study cost sharing and financing in accordance with the terms of this Agreement; and

WHEREAS, the Sponsor and the Government understand that entering into this Agreement in no way obligates either party to implement a project and that whether the Government supports a project authorization and budgets it for implementation depends upon, among other things, the outcome of the Study and whether the proposed solution is consistent with the Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies and with the budget priorities of the Administration;

NOW THEREFORE, the parties agree as follows:

ARTICLE I - DEFINITIONS

For the purposes of this Agreement:

A. The term "Study Costs" shall mean all disbursements by the Government pursuant to this Agreement, from Federal appropriations or from funds made available to the Government by the Sponsor, and all negotiated costs of work performed by the Sponsor pursuant to this Agreement. Study Costs shall include, but not be limited to: labor charges; direct costs; overhead expenses; supervision and administration costs; the costs of participation in Study Management and Coordination in accordance with Article IV of this Agreement; the costs of contracts with third parties, including termination or suspension charges; and any termination or suspension costs (ordinarily defined as those costs necessary to terminate ongoing contracts or obligations and to properly safeguard the work already accomplished) associated with this Agreement.

B. The term "estimated Study Costs" shall mean the estimated cost of performing the Study as of the effective date of this Agreement, as specified in Article III.A. of this Agreement.

C. The term "excess Study Costs" shall mean Study Costs that exceed the estimated Study Costs and that do not result from mutual agreement of the parties, a change in Federal law that increases the cost of the Study, or a change in the scope of the Study requested by the Sponsor.

D. The term "study period" shall mean the time period for conducting the Study, commencing with the release to the U.S. Army Corps of Engineers, Jacksonville District, of initial Federal feasibility funds following the execution of this Agreement and ending when the Assistant Secretary of the Army (Civil Works) submits the feasibility report to the Office of Management and Budget (OMB) for review for consistency with the policies and programs of the President.

E. The term "PSP" shall mean the Project Study Plan, which is attached to this Agreement and which shall not be considered binding on either party and is subject to change by the Government, in consultation with the Sponsor.

F. The term "negotiated costs" shall mean the costs of in-kind services to be provided by the Sponsor in accordance with the PSP.

G. The term "fiscal year" shall mean one fiscal year of the Government. The Government fiscal year begins on October 1 and ends on September 30.

ARTICLE II - OBLIGATIONS OF PARTIES

A. The Government, using funds and in-kind services provided by the Sponsor and funds appropriated by the Congress of the United States, shall expeditiously prosecute and complete the Study, in accordance with the provisions of this Agreement and Federal laws, regulations, and policies.

B. In accordance with this Article and Article III.A., III.B. and III.C. of this Agreement, the Sponsor shall contribute cash and in-kind services equal to fifty (50) percent of Study Costs other than excess Study Costs. The Sponsor may, consistent with applicable law and regulations, contribute up to 25 percent of Study Costs through the provision of in-kind services. The in-kind services to be provided by the Sponsor, the estimated negotiated costs for those services, and the estimated schedule under which those services are to be provided are specified in the PSP. Negotiated costs shall be subject to an audit by the Government to determine reasonableness, allocability, and allowability.

C. The Sponsor shall pay a fifty (50) percent share of excess Study Costs in accordance with Article III.D. of this Agreement.

D. The Sponsor understands that the schedule of work may require the Sponsor to provide cash or in-kind services at a rate that may result in the Sponsor temporarily diverging from the obligations concerning cash and in-kind services specified in paragraph B. of this Article. Such temporary divergences shall be identified in the quarterly reports provided for in Article III.A. of this Agreement and shall not alter the obligations concerning costs and services specified in paragraph B. of this Article or the obligations concerning payment specified in Article III of this Agreement.

E. If, upon the award of any contract or the performance of any in-house work for the Study by the Government or the Sponsor, cumulative financial obligations of the Government and the Sponsor would result in excess Study Costs, the Government and the Sponsor agree to defer award of that and all subsequent contracts, and performance of that and all subsequent in-house work, for the Study until the Government and the Sponsor agree to proceed. Should the Government and the sponsor require time to arrive at a decision, the Agreement will be suspended in accordance with Article X., for a period of not to exceed six months. In the event the Government and the sponsor have not reached an agreement to proceed by the end of their 6 month period, the Agreement may be subject to termination in accordance with Article X.

F. No Federal funds may be used to meet the Sponsor's share of Study Costs unless the Federal granting agency verifies in writing that the expenditure of such funds is expressly authorized by statute.

G. The award and management of any contract with a third party in furtherance of this Agreement which obligates Federal appropriations shall be exclusively within the control of the Government. The award and management of any contract by the Sponsor with a third party in furtherance of this Agreement which obligates funds of the Sponsor and does not obligate Federal appropriations shall be exclusively within the control of the Sponsor, but shall be subject to applicable Federal laws and regulations.

H. The Sponsor shall be responsible for the total cost of developing a response plan for addressing any hazardous substances regulated under the Comprehensive Environmental Response, Compensation and Liability Act of 1980, Pub. L. No. 96-510, 94 Stat. 2767, (codified at 42 U.S.C. Sections 9601-9675), as amended, existing in, on, or under any lands, easements or rights-of-way that the Government determines to be required for the construction, operation, and maintenance of the project. Such costs shall not be included in total study costs.

ARTICLE III - METHOD OF PAYMENT

A. The Government shall maintain current records of contributions provided by the parties, current projections of Study Costs, current projections of each party's share of Study Costs, and current projections of the amount of Study Costs that will result in excess Study Costs. At least quarterly, the Government shall provide the Sponsor a report setting forth this information. As of the effective date of this Agreement, estimated Study Costs are $700,000.00 and the Sponsor's share of estimated Study Costs is $350,000.00. In order to meet the Sponsor's cash payment requirements for its share of estimated Study Costs, the Sponsor must provide a cash contribution currently estimated to be $175,000.00. The dollar amounts set forth in this Article are based upon the Government's best estimates, which reflect the scope of the study described in the PSP, projected costs, price-level changes, and anticipated inflation. Such cost estimates are subject to adjustment by the Government and are not to be construed as the total financial responsibilities of the Government and the Sponsor.

B. The Sponsor shall provide its cash contribution required under Article II.B. of this Agreement in accordance with the following provisions:

1. For purposes of budget planning, the Government shall notify the Sponsor by 30 July of each year of the estimated funds that will be required from the Sponsor to meet the Sponsor's share of Study Costs for the upcoming fiscal year.

2. No later than 30 calendar days prior to the scheduled date for the Government's issuance of the solicitation for the first contract for the Study or for the Government's anticipated first significant in-house expenditure for the Study, the Government shall notify the Sponsor in writing of the funds the Government determines to be required from the Sponsor to meet its required share of Study Costs for the first fiscal year of the Study. No later than 15 calendar days thereafter, the Sponsor shall provide the Government the full amount of the required funds by delivering a check payable to "FAO, USAED. Jacksonville" to the District Engineer.

3. For the second and subsequent fiscal years of the Study, the Government shall, no later than 60 calendar days prior to the beginning of the fiscal year, notify the Sponsor in writing of the funds the Government determines to be required from the Sponsor to meet its required share of Study Costs for that fiscal year, taking into account any temporary divergences identified under Article II.D. of this Agreement. No later than 30 calendar days prior to the beginning of the fiscal year, the Sponsor shall make the full amount of the required funds available to the Government through the funding mechanism specified in paragraph B.2. of this Article.

4. The Government shall draw from the funds provided by the Sponsor such sums as the Government deems necessary to cover the Sponsor's share of contractual and in-house fiscal obligations attributable to the Study as they are incurred.

5. In the event the Government determines that the Sponsor must provide additional funds to meet its share of Study Costs, the Government shall so notify the Sponsor in writing. No later than 60 calendar days after receipt of such notice, the Sponsor shall make the full amount of the additional required funds available through the funding mechanism specified in paragraph B.2. of this Article.

C. Within ninety (90) days after the conclusion of the Study Period or termination of this Agreement, the Government shall conduct a final accounting of Study Costs, including disbursements by the Government of Federal funds, cash contributions by the Sponsor, the amount of any excess Study Costs, and credits for the negotiated costs of the Sponsor, and shall furnish the Sponsor with the results of this accounting. Within thirty (30) days thereafter, the Government, subject to the availability of funds, shall reimburse the Sponsor for the excess, if any, of cash contributions and credits given over its required share of Study Costs, other than excess

Study Costs, or the Sponsor shall provide the Government any cash contributions required for the Sponsor to meet its required share of Study Costs other than excess Study Costs.

D. The Sponsor shall provide its cash contribution for excess Study Costs as required under Article II.C. of this Agreement by delivering a check payable to "FAO, USAED, Jacksonville, " to the District Engineer as follows:

1. After the project that is the subject of this Study has been authorized for construction, no later than the date on which a Project Cooperation Agreement is entered into for the project; or

2. In the event the project that is the subject of this Study is not authorized for construction by a date that is no later than 5 years of the date of the final report of the Chief of Engineers concerning the project, or by a date that is no later than 2 years after the date of the termination of the study, the Sponsor shall pay its share of excess costs on that date (5 years after the date of the Chief of Engineers or 2 year after the date of the termination of the study).

ARTICLE IV - STUDY MANAGEMENT AND COORDINATION

A. To provide for consistent and effective communication, the Sponsor and the Government shall appoint named senior representatives to an Executive Committee. Thereafter, the Executive Committee shall meet regularly until the end of the Study Period.

B. Until the end of the Study Period, the Executive Committee shall generally oversee the Study consistently with the PSP.

C. The Executive Committee may make recommendations that it deems warranted to the District Engineer on matters that it oversees, including suggestions to avoid potential sources of dispute. The Government in good faith shall consider such recommendations. The Government has the discretion to accept, reject, or modify the Executive Committee's recommendations.

D. The Executive Committee shall appoint representatives to serve on a Study Management Team. The Study Management Team shall keep the Executive Committee informed of the progress of the Study and of significant pending issues and actions, and shall prepare periodic reports on the progress of all work items identified in the PSP.

E. The costs of participation in the Executive Committee (including the cost to serve on the Study Management Team) shall be included in total project costs and cost shared in accordance with the provisions of this Agreement.

ARTICLE V - DISPUTES

As a condition precedent to a party bringing any suit for breach of this Agreement, that party must first notify the other party in writing of the nature of the purported breach and seek in good faith to resolve the dispute through negotiation. If the parties cannot resolve the dispute through negotiation, they may agree to a mutually acceptable method of non-binding alternative dispute resolution with a qualified third party acceptable to both parties. The parties shall each pay 50 percent of any costs for the services provided by such a third party as such costs are incurred.

Such costs shall not be included in Study Costs. The existence of a dispute shall not excuse the parties from performance pursuant to this Agreement.

ARTICLE VI - MAINTENANCE OF RECORDS

A. Within 60 days of the effective date of this Agreement, the Government and the Sponsor shall develop procedures for keeping books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to this Agreement to the extent and in such detail as will properly reflect total Study Costs. These procedures shall incorporate, and apply as appropriate, the standards for financial management systems set forth in the Uniform Administrative Requirements for Grants and Cooperative Agreements to state and local governments at 32 C.F.R. Section 33.20. The Government and the Sponsor shall maintain such books, records, documents, and other evidence in accordance with these procedures for a minimum of three years after completion of the Study and resolution of all relevant claims arising therefrom. To the extent permitted under applicable Federal laws and regulations, the Government and the Sponsor shall each allow the other to inspect such books, documents, records, and other evidence.

B. In accordance with 31 U.S.C. Section 7503, the Government may conduct audits in addition to any audit that the Sponsor is required to conduct under the Single Audit Act of 1984, 31 U.S.C. Sections 7501-7507. Any such Government audits shall be conducted in accordance with Government Auditing Standards and the cost principles in OMB Circular No. A-87 and other applicable cost principles and regulations. The costs of Government audits shall be included in total Study Costs and shared in accordance with the provisions of this Agreement.

ARTICLE VII - RELATIONSHIP OF PARTIES

The Government and the Sponsor act in independent capacities in the performance of their respective rights and obligations under this Agreement, and neither is to be considered the officer, agent, or employee of the other.

ARTICLE VIII - OFFICIALS NOT TO BENEFIT

No member of or delegate to the Congress, nor any resident commissioner, shall be admitted to any share or part of this Agreement, or to any benefit that may arise therefrom.

ARTICLE IX - FEDERAL AND STATE LAWS

In the exercise of the Sponsor's rights and obligations under this Agreement, the Sponsor agrees to comply with all applicable Federal and State laws and regulations, including Section 601 of Title VI of the Civil Rights Act of 1964 (Public Law 88-352) and Department of Defense Directive 5500.11 issued pursuant thereto and published in 32 C.F.R. Part 195, as well as Army Regulations 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army".

A. This Agreement shall terminate at the conclusion of the Study Period, and neither the Government nor the Sponsor shall have any further obligations hereunder, except as provided in Article III.C.; provided, that prior to such time and upon thirty (30) days written notice, either party may terminate or suspend this Agreement. In addition, the Government shall terminate this Agreement immediately upon any failure of the parties to agree to extend the study under Article II.E. of this Agreement, or upon the failure of the sponsor to fulfill its obligation under Article III. of this Agreement. In the event that either party elects to terminate this Agreement, both parties shall conclude their activities relating to the Study and proceed to a final accounting in accordance with Article III.C. and III.D. of this Agreement. Upon termination of this Agreement, all data and information generated as part of the Study shall be made available to both parties.

B. Any termination of this Agreement shall not relieve the parties of liability for any obligations previously incurred, including the costs of closing out or transferring any existing contracts.

IN WITNESS WHREOF, the parties hereto have executed this Agreement, which shall become effective upon the date it is signed by the District Engineer for the U.S. Army Corps of Engineers, Jacksonville District.

DEPARTMENT OF ARMY

By: Joe R. Miller
Joe R. Miller
Colonel, Corps of Engineers
District Engineer
Jacksonville District

CITY OF SARASOTA, FLORIDA

By: Mollie C. Cardamone
Mollie C. Cardamone
Mayor

ATTEST:

BY: Billy E Robinson (SEAL)
City Auditor and Clerk

CERTIFICATION REGARDING LOBBYING

The undersigned certifies, to the best of his or her knowledge and belief that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

His certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

DATE: July 1, 1999

Mollie C. Cardamone
Mayor
City of Sarasota, Florida

ATTEST:

BY: Billy E. Robinson (SEAL)
Billy E. Robinson
City Auditor and Clerk

MAY 18 1999

Programs and Project Management Division
Project Management Branch

Mr. Dennis Daughters
City Engineer/Director of Engineering
Room 100A, City Hall
1565 First Street
Sarasota, Florida 34230

Dear Mr. Daughters:

This is to provide 4 copies of the approved Feasibility Cost Sharing Agreement (FCSA) for signature by the City of Sarasota. Please return these copies to our office at your earliest convenience. Our office will forward the signed copies to our higher authority for execution by the Assistant Secretary of the Army (Civil Works). Two copies of the executed agreement will be returned for your records. Following execution of the FCSA, the study will be initiated upon receipt of non-Federal funds. Also enclosed is a final Project Study Plan for your records. An updated network analysis of the tasks and schedule is being prepared and will be sent to you as soon as practicable.

If you have any questions or need additional information, please call Mr. Charles Stevens at 904-232-2113.

Sincerely,

SIGNED: Dennis R. Duke

Richard E. Bonner, P.E.
Deputy District Engineer
for Project Management

Enclosures

bcf (wo/encls):
CESAJ-PD-ER
CESAD-PD-D
CESAJ-PD-PN
CESAJ-EN-HC
CESAJ-OC
CESAJ-RE-A

L:user\k3dpicfs\winword\lidoke11

Department of Environmental Protection

Jeb Bush
Governor

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

David B. Struhs
Secretary

March 18, 1999

Rick Spadoni, Vice President
Coastal Planning and Engineering, Inc.
2481 N.W. Boca Raton Boulevard
Boca Raton, Florida 33431

Dear Mr. Spadoni:

File Number: DBS 9A0292 ST, Lido Key Beach Nourishment Project

This is in response to your March 3, 1999, letter. Your request to substitute the February, 1999 borrow area survey for the post-construction borrow area survey for the 1998 Lido Key Beach Nourishment Project is hereby approved as requested. Since the annual surveys are falling into the month of May time frame, we would prefer for you to perform the next borrow area survey in May 2001 instead of the May 2000.

We look forward to receiving the required sand sample analysis and engineering report in the near future, as specified in your March 1, 1999, letter. Please note that the next sand sample analysis is to be conducted with the upcoming 12-month post-construction survey, which should be conducted in May 1999. If you have any questions, please contact me at (850) 487-4469 extension 123.

Sincerely,

Robert M. Brantly, Jr., P. E.
Professional Engineering Administrator
Bureau of Beaches and Coastal Systems

/LL

cc: Dennis Daughters, P.E., City of Sarasota
Charlie Stevens, USACE, Jacksonville District
BoB Lutz, DEP, BBCS
Lethie Lanham, DEP, BBCS
Nhan Nguyen, DEP, BBCS
David Young, DEP , Tampa
Permit Information Center

COASTAL & OCEAN ENGINEERING
COASTAL SURVEYS
BIOLOGICAL STUDIES
GEOTECHNICAL SERVICES

COASTAL PLANNING & ENGINEERING, INC.

2481 N.W. BOCA RATON BOULEVARD, BOCA RATON, FL 33431

(561) 391-8102 Fax: (561) 391-9116
Internet: http://www.cpeboca.com
E-mail: mail@cpe.dynip.com

8486.27

March 3, 1999

Robert Brantly, Jr., P.E.
Coastal Engineer
Florida Department of Environmental Protection
Bureau of Beaches and Coastal Systems
3900 Commonwealth Boulevard, M.S. 310
Tallahassee, FL 32399-3000

Re: **Department of Environmental Protection (DEP); Permit No. DBS9A0292 ST**
City of Sarasota – Lido Key Beach Nourishment Project – Borrow Area Survey

Dear Bob:

This is to request that the DEP accept a borrow area survey of February, 1999 as the post-construction borrow area survey for the 1998 Lido Key Beach Nourishment Project.

In response to a telephone conversation between Lethie Lanham and Craig Kruempel of this office on the referenced issue, this is to request that the Department accept a February 1999 survey of the two borrow sites utilized for the 1998 Lido Key Beach Nourishment Project as the post-construction survey. The borrow areas were surveyed by the dredge contractor, Weeks Marine, Inc., as part of their project quality control. However, we have found that the survey data provided by Weeks Marine, Inc. is deficient. The survey did not cover the entire borrow areas and tide corrections were found to be insufficient to comply with the DEP permit monitoring conditions.

We believe the February 1999 survey we conducted accurately depicts the post-construction condition. It is unlikely that the bathymetric condition of the borrow areas have changed significantly between the completion of project construction in May 1998 and the survey of February 1999.

The annual beach monitoring for Lido Key is planned to be conducted in May 1999 for seasonally correct comparisons. The beach survey data collected in May 1998, and the resulting engineering report, will be submitted to the DEP in compliance with the permit requirements. The February 1999 borrow area survey will also be included in this monitoring report.

Thank you for considering my request to accept the February 1999 borrow area survey for the 1998 Lido Key Beach Nourishment project. If you require additional information, please do not hesitate to contact Craig Kruempel or me.

Sincerely,

COASTAL PLANNING & ENGINEERING, INC.

Rick Spadoni

Richard H. Spadoni
Vice President

F:\word\lido\848627rb.055

cc: Dennis Daughters, P.E., City of Sarasota
Alexandrea Hay, P.E., City of Sarasota
Charlie Stevens, USACE
Bob Lutz, DEP
Lethie Lanham, DEP
Craig Kruempel, CPE
Earl Soeder, CPE

/NIS DAUGHTERS, P.E.
/ECTOR OF ENGINEERING
- CITY ENGINEER -

.LEXANDREA HAY, P.E.
- ASST. CITY ENG. -

ASIM MOHAMMED
- ASST. CITY ENG. -

CITY OF SARASOTA

Please note our new E-Mail Address
E-Mail: engineering@ci.sarasota.fl.us

ENGINEERING DEPT.
ROOM 100A - CITY HALL
1565 FIRST STREET

TEL: (941) 95 .180

FAX: (941) 954-4174

SUNCOM: 949-4180

Mr. Richard E. Bonner, P.E.
Deputy District Engineer for Project Management
Programs and Project Management Division
Jacksonville District Corps of Engineers
Post Office Box 4970
Jacksonville, Florida 32232-0019

December 1, 1998

Subject: Lido Key Beach Feasibility Study

Dear Mr. Bonner:

On November 23, 1998, we received via fax, (1) your letter dated November 20, 1998 with your responses to our July 28, 1998 letter and with a spread sheet showing the total project cost of $700,000 of which the City's work-in-kind share is $175,000, (2) a copy of the Feasibility Cost Sharing Agreement (FCSA) and (3) a copy of the revised Project Study Plan (PSP).

We have carefully reviewed your responses, the FCSA and the PSP. We hereby inform you that, as currently written, the FCSA and the PSP are acceptable for cost sharing for the subject study. We look forward to receiving approval of these documents from the USACE's higher authority and we will execute several copies of the FCSA immediately upon our receipt of them.

Thank you and Mr. Charles F. Stevens for all the assistance you have given in getting these documents acceptable to the City of Sarasota.

Yours truly,

Dennis Daughters /KML

Dennis Daughters, P.E.
City Engineer / Director of Engineering

xc
David R. Sollenberger, City Manager
V. Peter Schneider, Deputy City Manager
Gibson E. Mitchell, Finance Director
Richard J. Taylor, City Attorney
Charles F. Stevens, USACE-Jacksonville
Richard Spadoni, Coastal Planning & Engineering

A:\Letter31\Dennis\Projects\LidoBeach\BonnerUSACE.Aprvl

CITY OF SARASOTA

October 13, 1998

CERTIFIED MAIL

Mr. Richard E. Bonner, P.E.
Deputy District Engineer for Project Management
U.S. Army Corps of Engineers, Jacksonville District
Project Management Branch
Post Office Box 4970
Jacksonville, Florida 32234-0019

Dear Mr. Bonner:

On July 27, 1998, I forwarded to you two partially executed original Agreements between the City of Sarasota and the Army, concerning the Lido Key Shore Protection Project Feasibility Study. As of today, the Agreements have not been returned to the City of Sarasota for final execution. Kindly assure that the two partially executed original Agreements are returned to my office, as soon as possible to assure proper execution, filing and distribution. Upon completion, one fully executed original agreement will be returned to you for your files.

Thank you for your cooperation in regard to this matter. If I can be of any further assistance, please do not hesitate to contact me.

Billy E. Robinson

Billy E. Robinson, CMC/AAE
City Auditor and Clerk

PMC:rn

c: David R. Sollenberger, City Manager
Richard J. Taylor, City Attorney
Dennis Daughters, City Engineering Director
File

Office of the City Auditor and Clerk - Post Office Box 1058 - Sarasota, Florida 34230
Office Number: 1- 941-954-4160 - Fax Number: 1-941-954-4113

DENNIS DAUGHTERS, P.E.
DIRECTOR OF ENGINEERING
-CITY ENGINEER-

EXANDREA HAY, P.E.
-ASST. CITY ENGR-

ASIM MOHAMMED
-ASST. CITY ENGR-

CITY OF SARASOTA

ENGINEERING DEPT
ROOM 100A-CITY HALL
1565 FIRST STREET

TEL: (941) 954-4180

FAX: (941) 954-4174

E-Mail: eng@gte.net

28 July, 1998

Mr. Richard E. Bonner, P.E.
Deputy District Engineer for Project Management
U.S. Army Corps of Engineers, Jacksonville District
Project Management Branch
Post Office Box 4970
Jacksonville, FL 32234-0019

Subject: Lido Key Feasibility Study - City's Reply to:
USACE Response, dated July 7, 1998
Project Study Plan (Revision No. 6, 02 Mar 1998)

Dear Mr. Bonner:

On July 7, 1998, we received your letter, dated July 9, 1998, with the enclosure of your staff's "Responses to Comments on Project Study Plan (Rev. No. 6 dated March 2, 1998)" and other documentation. We certainly appreciate the assistance that Charlie Stevens and other members of you staff have given us. As we have already informed you, the City Commission unanimously approved the Feasibility Cost Sharing Agreement on July 20, 1998.

Project Study Plan:

We are now ready to finalize the Project Study Plan (PSP) and agree upon the work-in-kind tasks of the PSP and a schedule for accomplishing them. We still have some concerns that we need to resolve before our final commitment. We are not trying to "beat this thing to death", but being we are committing a significant amount of taxpayers funds, we want to be assured they are getting their monies worth. Our comments are shown below and in the same numerical format as before. Title references relate to the 06/29/98 version of the PSP. We are not listing comments to your responses that we are satisfied with. All of our comments reflect that we do not want to increase the cost of the study beyond the $700,000.00.

5a. Coastal Engineering Studies - B. Survey Data - 1. Existing Data: The $500.00 work-in-kind credit for reproduction costs is acceptable as long as the USACE understands that we can not perform any new research on historic data availability. We can provide only readily available, in-house data. Any research will have to be the responsibility of the USACE.

5b. **Coastal Engineering Studies - B. Survey Data - 1. Existing Data:** At no time did we request the ebb shoals to be *"dropped as potential borrow sites"* for the study. In our January 15, 1998 letter, we stated; *"We do not believe the USACE is acting wisely to ignore the issues about potential or perceived coastal impacts."* and *"With regard to the New Pass Borrow Area and Big Sarasota Pass Borrow Area, we still feel the sediment sources are relatively too fine for use in beach nourishment."* It was our intent to draw the USACE's attention to these concerns. We feel both concerns can be mitigated and the shoals, especially Big Sarasota Pass, is a potential source for beach sand.

6. **Coastal Engineering Studies - B. Survey Data - 2. Aerial Photography and/or Digital Imagery:** The City would like to do Task II. B. 2. Aerial Photography and/or Digital Imagery. Please assign the entire allocated $4,000.00 as work-in-kind credit. See comment #26 below.

7. **Coastal Engineering Studies - C. Historical Shoreline Change and Erosion Rate Analysis:** As stated above in 5a., the data to be provided will only be that which is readily available. We can not conduct any new research on historic data that might be available from other sources. We agree that *"work by the Sponsor would simply involve forwarding the historical survey data to the District."* and we request the words be inserted in the PSP.

8. **Coastal Engineering Studies - F. Storm Monitoring Study:** The City's FDEP permit (Special Permit Condition 4.1) for our April 1998 Lido Key Nourishment Project requires that *"additional surveys may be required following a major storm as determined by the Department"*. The FDEP customarily determines which events require post-storm monitoring, and the State will then fund or cost-share in those monitoring surveys. The City should only be required to submit data to the USACE for State-mandated post-storm surveys. We request the words "work by the Sponsor would simply involve forwarding the State-mandated post-storm survey data to the District." be inserted in the PSP.

9. **Coastal Engineering Studies - H. Tidal Inlet Study:** The USACE response states $500.00 is credited for work-in-kind, yet the spreadsheet shows $250.00. The City will agree with $250.00 if the words "work by the Sponsor would simply involve forwarding two copies of the New Pass and Big Sarasota Pass Inlet Management Studies to the District." be inserted in the PSP.

11. **Coastal Engineering Studies - K. Protective Beach Design:** The USACE is correct in the assessment that $5,000.00 is a "minimal amount" for the design work specified. A fairly comprehensive and detailed scope for the design is specified, for a relatively small amount of money. Can we be assured this level of design will actually occur during this phase of the project?

13. **Geotechnical Studies - A. Geologic History:** Based on the USACE response, we understand the City will accomplish this task and the cost is included in Task II.E. Geotechnical Appendix.

15. **Geotechnical Studies - B. Borrow Area Identification:** The City and our consultant, Coastal Planning & Engineering (CPE) will be performing the borrow area investigations and evaluations. Once we define probable sources, we would like to seek

only USACE approval of location, methods and timing. Analysis and planning responsibility should remain with the City and CPE. It is imperative that the USACE participation in the analysis and planning be limited to concurrence and comment and not on actual data analysis and evaluation. All references to identifying *"sufficient sand"* for the program should be eliminated or modified to state that we will *"attempt"* to identify sufficient sand for the program. What happens if we are only able to identify enough offshore sand for the first one or two projects? Is it likely that the State's position on the use of either or both of the two Pass shoals will change enough to allow for their use in the future? Additionally, we still feel $16,000.00 is an excessive amount for the work to be done under this Task.

Our April 1998 Lido Key Nourishment Project fully utilized one of the "CP&E Offshore Shoals Borrow Area" sites and only partially excavated the second borrow site. There still appears to be a significant quantity of beach compatible sand available in the second borrow site. Although we do not have the remaining volume at hand, we may be able to fully utilize this site for a future project. This makes the cultural resources investigations that have already been prepared and accepted by SHPO even more relevant to this study. See comment #21 below.

16. **<u>Geotechnical Studies – C. Core Boring Program:</u>** As stated previously, the City and our consultant, CPE will be performing the borrow area investigations and evaluations. Once we define probable sources, we would like to seek only USACE approval of location, methods and timing for implementation of the core boring program.

Although the USACE response states that *"District concurrence can be obtained through a telephone call"*, does this mean that we will have the flexibility to make field decisions on the viability of adjacent cores based on our findings? The USACE is correct that it would be a waste to drill additional core borings in an area if we encounter undesirable material. A quick USACE response to field decisions is vital to assure the most efficient use of the drilling contractor's time. The USACE should be aware that work may occur on weekends; after 5 p.m., or before 8 a.m. How do we contact the USACE representative outside of his normal working hours if we need to make a field decision. We need to be extremely sure that the USACE is willing to commit to making very quick decisions based on our consultant's professional opinion on core locations and findings. We prefer to operate independently, using our consultant's professional judgement.

The term *"required penetration"* is not defined in the USACE response. Based on our consultant's experience in the Lido Key area, core borings to a depth of 20 feet may not be feasible due to the presence of an underlying rock layer offshore. In similar projects, CPE has used the following specification to define what an "acceptable" core is:

> "The coring device shall recover a minimum of 80 percent of the unconsolidated strata through which it has penetrated. The total length recovered will be measured. This value will be compared to the measured depth of penetration to calculate percent recovery. Penetration will be determined with the use of a penetrometer and chart recorder. Depth of penetration beneath the surface of the bottom must be known to within plus or minus 0.5 feet of actual penetration. The desired depth of penetration is 20 feet. It is recognized, however, that

maximum penetration may not be achieved at all sample locations. When located over a boring site, the Subcontractor shall make every reasonable effort to reach the required depth or to reach penetration refusal. Penetration refusal shall be completed when less than 1 foot of advance is accomplished after 5 minutes of vibration with a vibrating-type coring tool. When refusal is met at less than 75 percent of the desired depth of penetration, the Subcontractor will remove the sampled portion from the pipe, and a new liner will be inserted into the core pipe. A jet pump hose shall be attached to the tip of the core pipe just below the vibrator. The rig shall be lowered to the bottom and jetted down to a depth 1 foot above where the first part met refusal. The jet will then be turned off and the vibrator turned on, taking the additional part of the core and 1 foot overlap. Retries will be accomplished until penetration has reached at least 15 feet of penetration or until three (3) retries have been attempted, whichever occurs first."

We request the above words be added to the PSP and the words "or similar design" be inserted after "Alpine style". It is imperative that the USACE recognize the possibility that viable sand sources may be present in layers of less than 20 feet thick, at sites offshore of Lido Key. CPE has demonstrated in the April 1998 Lido Key Nourishment Project that acceptable sand stratas of less than six feet are viable for use in erosion control projects. We are concerned that the USACE will not accept our geotechnical data if we don't meet their *"required penetration"* criteria.

The City (via our consultant) will arrange to pick up the *"wooden core boxes"* from the USACE District office in Jacksonville. The USACE should stipulate that they will supply 22 boxes available for pick up before the drilling operation commences at no cost to the City. Boxes not used will be returned to the District office. The City's work-in-kind credit of $92,000.00 should not be reduced for the USACE to provide the boxes.

As indicated in the response, the USACE will not require the analysis of 4 samples per core, but will accept CPE's professional judgement on the number of samples to be analyzed per core. We are interested in having the USACE define the need for specific gravity analysis conducted on 25% of the samples. How does the specific gravity of materials affect the dredging characteristics of the materials and how significant is the concern? CPE has not been required to conduct this analysis in other projects, but if a valid need really exists for this type of evaluation, then we will comply with the USACE requirement.

17. **<u>Geotechnical Studies - D. Beach Sampling:</u>** The USACE states that they require $4,000.00 to *"evaluate the sponsor's beach sampling report, make comments, and prepare data for submittal to the State"*. The geotechnical data submittals to the State will be accomplished through the existing reporting requirements contained in the project's FDEP permits. What additional data submittals to the State does the USACE envision? If USACE participation in this task is limited to "evaluation and comment", then $4,000.00 seems excessive and some funds could be applied to other tasks.

18. **<u>Geotechnical Studies - E. Geotechnical Appendix:</u>** We still feel $5,000.00 for the USACE *"for review and comments"* is an excessive amount for the work to be done under this Task.

19. **<u>Environmental Studies - D. Hardground Mapping and Classification:</u>** The USACE will require $5,000.00 to *"review scopes of work and to review and analyze products"*, if the City assumes the Task. This only leaves $5,000.00 to actually perform the groundtruthing required for a Coordination Act Report. As the USACE is aware, field operations are expensive to perform, and $5,000.00 will likely allow for only one day (possibly 1.5 days) of groundtruthing. Our concern is that the USACE groundtruthing will not characterize impacted habitats sufficiently to address other agency (FDEP, EPA, NMFS and USFWS) concerns. CPE can conduct limited habitat investigations assuming the USACE accepts our delineation of the areas of concern.

21. **<u>Environmental Studies - G. Cultural Resources Analysis:</u>** In similar erosion control projects, the cultural resources investigations and analysis have been conducted and submitted by a local sponsor to SHPO with minimal Federal coordination. Indications are that SHPO does the investigative and evaluative work associated with cultural resources reports for beach projects in Florida. In Panama City (a Federal project), CPE coordinated directly with SHPO after receiving notification from the USACE that there were potential historic resources in the vicinity of one of the borrow sites. CPE made the requested revisions to the borrow site boundaries to allow an increased buffer area around a wreck site. While the USACE forwarded SHPO's comments to the local sponsor, there was no indication that the USACE conducted a *"review or verification of data adequacy or investigator qualifications"* as defined in the USACE response. Our concern is that $10,000.00 seems excessive given our experience with similar projects. Additionally, in August 1995, CPE submitted a cultural resources report for the two borrow sites used in the April 1998 Lido Key Nourishment Project that was accepted by SHPO. While this report contains site specific analysis data of the two borrow sites; the evaluation also contains a significant amount of regional data that can be used for the development of an updated report.

24. **<u>Real Estate Studies - B. Rights of Entry:</u>** The City of Sarasota is not interested in obtaining the rights-of-entry and we request the task be re-worded to state: *"The Government shall obtain rights-of-entry into project areas whereby surveys, core-borings, cultural resource evaluations, and other investigations may occur."*

26. **<u>Real Estate Studies - D. Preliminary Land Values:</u>** At this point in time, the City of Sarasota is no longer interested in accomplishing Task VII. D. Real Estates Studies, Land Values. The City would like to do Task II. B. 2. Aerial Photography and/or Digital Imagery in lieu of this task. Please assign the entire $4,500.00 of Task II. D. to the USACE.

33. **<u>Study Management:</u>** The City's $1,500.00 work-in-kind credit is minimal considering that Executive Committee meetings will likely be held in Jacksonville at the District office. This allocation is sufficient for attendance by City and our representatives to only one meeting in Jacksonville.

35. **<u>Study Management - Study Management Committee:</u>** Please remove Dr. Clifford Truitt, P.E., D. Eng. from the Study Management Committee as he no longer is employed by Mote Marine Laboratory.

36. **<u>Review Support for District Independent Technical Review:</u>** It is understood that

the USACE has significant review procedures in place to assure that an acceptable project is designed. The USACE has stated previously that they will design the project for $5,000.00, and conduct environmental studies for $10,000.00; both tasks include review components either explicitly or implicitly. What additional review is required that is not included in each specific task description?

38. **General Comments:** Considering that we are still in the negotiations phase of the Feasibility Study, it would be interesting to have the USACE delineate how they have already expended $100,000.00 on this project.

General:

We would appreciate the serious consideration and inclusion of the above comments into the PSP in some format.

Attached herewith is a spreadsheet showing a revised budget for the PSP. The total amount remains at $700,000.00. The City of Sarasota's work-in-kind amount adds up to $175,000.00. As noted above or in earlier comments, we feel Tasks I.C., I.L, II.B., II.D., II.E., III.G., VI.B., VI.D. and VII are excessively budgeted and some of those funds could be applied to Tasks I.K., II.C., III.J. and IX, while retaining the total amount of $700,000.00.

If you or any member of your staff has any questions regarding this matter, or need further clarification, please feel free to contact our office.

Yours truly,

Dennis Daughters

Dennis Daughters, P.E.
City Engineer/Director of Engineering

xc: David R. Sollenberger, City Manager
V. Peter Schneider, Deputy City Manager
Gibson E. Mitchell, CGFO, Finance Director
William G. Hallisey, Public Works Director
Michael A. Connally, City Attorney's Office
Howard Marlowe, American Coastal Coalition
Richard Spadoni, Coastal Planning and Engineering, Inc.
Charlie Stevens, Project Manager, U.S. Army Corps of Engineers

LIDO KEY SHORE PROTECTION STUDY
DELINEATION OF COST-SHARING RESPONSIBILITIES
BASED ON THE USACE PROJECT FEASIBILITY PHASE STUDY PLAN CORRESPONDENCE

24-Jul-98

SCOPE OF WORK TASK	USACOE June 1998 Version: USACE SHARE	USACOE June 1998 Version: CITY OF SARASOTA WIK	USACOE June 1998 Version: ORIGINAL TASK TOTAL	City Proposed July 1998 Version: USACE SHARE	City Proposed July 1998 Version: CITY OF SARASOTA WIK	City Proposed July 1998 Version: Proposed TASK TOTAL
I. Coastal Engineering Studies						
A. Wave & Surge Data	$5,000	$0	$5,000	$5,000	$0	$5,000
B. Survey Data						
1. Existing Data	$5,000	$0	$5,000	$4,500	$500	$5,000
2. Aerial Photography and/or Digital Imagery	$3,500	$500	$4,000	$0	$4,000	$4,000
C. Historical Shoreline Change and Erosion Rate Analysis	$3,500	$500	$4,000	$3,500	$500	$4,000
D. Historic Volumetric Changes	$3,500	$500	$4,000	$3,500	$500	$4,000
E. Storm Monitoring Study	$0	$500	$500	$0	$500	$500
F. Previous Storm History	$1,000	$0	$1,000	$1,000	$0	$1,000
G. Coastal Processes Modeling	$62,000	$0	$62,000	$62,000	$0	$62,000
H. Tidal Inlet Study	$5,000	$250	$5,250	$5,000	$250	$5,250
I. Identify Existing Coastal Armor & Structural Improvements	$2,000	$0	$2,000	$2,000	$0	$2,000
J. Institutional History	$2,000	$250	$2,250	$2,000	$250	$2,250
K. Protective Beach Design	$5,000	$0	$5,000	$5,000	$0	$5,000
L. Coastal Engineering Appendix	$15,000	$0	$15,000	$15,000	$0	$15,000
II. Geotechnical Studies						
A. Geologic History (Part of Geotechnical Appendix)	$0	$0	$0	$0	$0	$0
B. Borrow Area Identification	$16,000	$0	$16,000	$16,000	$0	$16,000
C. Core Boring Program (Assumes Core Boxes Supplied By USACE	$0	$92,000	$92,000	$0	$92,000	$92,000
D. Beach Sampling	$4,000	$0	$4,000	$4,000	$0	$4,000
E. Geotechnical Appendix	$5,000	$20,000	$25,000	$5,000	$20,000	$25,000
III. Environmental Studies						
A. Background	$1,200	$0	$1,200	$1,200	$0	$1,200
B. USFWS Coordination Act Report	$35,000	$0	$35,000	$35,000	$0	$35,000
C. Endangered Species	$1,200	$0	$1,200	$1,200	$0	$1,200
D. Hardground Mapping & Classification			$44,000			$44,000
1. Side-scan Sonar Surveys		$34,000			$34,000	
2. & 3. Near-Shore Aerial Photography and Groundtruthing	$10,000			$10,000		
E. Water Quality Certification	$0	$0	$0	$0	$0	$0
F. Hazardous, Toxic and Radiological Waste	$3,000	$0	$3,000	$3,000	$0	$3,000
G. Cultural Resources Analysis	$10,000	$20,000	$30,000	$10,000	$20,000	$30,000
H. Aesthetic Analysis	$0	$0	$0	$0	$0	$0
I. NEPA Documentation & Coordination	$15,000	$0	$15,000	$15,000	$0	$15,000
J. Coordination Meetings and Management	$20,000	$0	$20,000	$20,000	$0	$20,000
IV. Geographic Information System Requirements	$0	$0	$0	$0	$0	$0
V. Real Estate Studies						
A. General	$500	$0	$500	$500	$0	$500
B. Rights of Entry	$0	$1,000	$1,000	$1,000	$0	$1,000
C. Coordination	$1,300	$0	$1,300	$1,300	$0	$1,300
D. Land Values	$1,500	$3,000	$4,500	$4,500	$0	$4,500
E. Attorney's Opinion	$3,500	$0	$3,500	$3,500	$0	$3,500
F. Gross Appraisal	$17,800	$0	$17,800	$17,800	$0	$17,800
G. Real Estate Appendix	$8,500	$0	$8.500	$8,500	$0	$8,500
VI. Socioeconomic Studies						
A. Storm Damage	$18,000	$0	$18,000	$18,000	$0	$18,000
B. Recreation Benefits	$10,000	$0	$10,000	$10,000	$0	$10,000
C. Appendix	$9,000	$0	$9,000	$9,000	$0	$9,000
D. Other Items	$11,500	$0	$11,500	$11,500	$0	$11,500
VII. Plan Formulation	$44,000	$0	$44,000	$44,000	$0	$44,000
VIII. M-CACES Cost Estimating	$14,000	$0	$14,000	$14,000	$0	$14,000
IX. Coordination and Public Involvement	$4,000	$1,000	$5,000	$4,000	$1,000	$5,000
X. Study Management						
A. Study Management	$50,000	$1,500	$51,500	$50,000	$1,500	$51,500
B. Project Management	$10,000	$0	$10,000	$10,000	$0	$10,000
XI. Report Preparation / Reproduction						
A. Preparation	$43,500	$0	$43,500	$43,500	$0	$43,500
B. Reproduction	$20,000	$0	$20,000	$20,000	$0	$20,000
XII. Review Conferences	$5,000	$0	$5,000	$5,000	$0	$5,000
XIII. Review Support For District, HQUSACE	$20,000	$0	$20,000	$20,000	$0	$20,000
Total =	$525,000	$175,000	$700,000	$525,000	$175,000	$700,000
Percent of Total =	75.0%	25.0%	100.00%	75.0%	25.0%	100.0%

CITY OF SARASOTA

July 27, 1998

Mr. Richard E. Bonner, P.E.
Deputy District Engineer for Project Management
U.S. Army Corps of Engineers, Jacksonville District
Project Management Branch
Post Office Box 4970
Jacksonville, Florida 32234-0019

Dear Mr. Bonner:

Please find enclosed two partially executed original Agreements between the City of Sarasota and the Department of the Army, concerning the Lido Key Shore Protection Project Feasibility Study. The Agreements were approved by the Sarasota City Commission at its regular meeting dated July 20, 1998, and are now being forwarded to you for proper execution on behalf of the Department of the Army. Upon completion, kindly assure that one fully executed original of the Agreement is returned to my office for proper filing and distribution.

If I can be of further assistance, please do not hesitate to contact me.

Sincerely,

Billy E. Robinson

Billy E. Robinson, CMC/AAE
City Auditor and Clerk

Enclosure

PMC/gl

xc: David R. Sollenberger, City Manager
Richard J. Taylor, City Attorney
Dennis Daughters, City Engineering Director
File

Office of the City Auditor and Clerk - Post Office Box 1058 - Sarasota, Florida 34230
Office Number: 1- 941-954-4160 - Fax Number: 1-941-954-4113

AGREEMENT
BETWEEN THE DEPARTMENT OF THE ARMY
AND
THE CITY OF SARASOTA, FLORIDA
FOR THE LIDO KEY SHORE PROTECTION PROJECT
FEASIBILITY STUDY

THIS AGREEMENT is entered into this _________ day, of _____, 19__, by and between the Department of the Army (hereinafter the "Government"), represented by the District Engineer executing this Agreement, and the City of Sarasota, Florida (hereinafter the "Sponsor"),

WITNESSETH, that

WHEREAS, the Congress (House Committee) has requested the Secretary of the Army to review the report of the Chief of Engineers on Lido Key, Sarasota, Florida, published as House Document 320, 91st Congress, 2nd Session, with a view to determining the advisability of providing hurricane and storm damage reduction works pursuant to study resolution docket 2458, adopted 14 September 1995 by the Committee on Transportation and Infrastructure; and

WHEREAS, the U.S. Army Corps of Engineers has conducted a reconnaissance study of the advisability of providing hurricane and storm damage reduction works on Lido Key, Sarasota, Florida pursuant to this authority, and has determined that further study in the nature of a "Feasibility Phase Study" (hereinafter the "Study") is required to fulfill the intent of the study authority and to assess the extent of the Federal interest in participating in a solution to the identified problem; and

WHEREAS, Section 105 of the Water Resources Development Act of 1986 (Public Law 99-662, as amended) specifies the cost sharing requirements applicable to the Study;

WHEREAS, the Sponsor has the authority and capability to furnish the cooperation hereinafter set forth and is willing to participate in study cost sharing and financing in accordance with the terms of this Agreement; and

WHEREAS, the Sponsor and the Government understand that entering into this Agreement in no way obligates either party to implement a project and that whether the Government supports a project authorization and budgets it for implementation depends upon, among other things, the outcome of the Study and whether the proposed solution is consistent with the Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies and with the budget priorities of the Administration;

NOW THEREFORE, the parties agree as follows:

ARTICLE I - DEFINITIONS

For the purposes of this Agreement:

A. The term "Study Costs" shall mean all disbursements by the Government pursuant to this Agreement, from Federal appropriations or from funds made available to the Government by the Sponsor, and all negotiated costs of work performed by the Sponsor pursuant to this Agreement. Study Costs shall include, but not be limited to: labor charges; direct costs; overhead expenses; supervision and administration costs; the costs of participation in Study Management and Coordination in accordance with Article IV of this Agreement; the costs of contracts with third parties, including termination or suspension charges; and any termination or suspension costs (ordinarily defined as those costs necessary to terminate ongoing contracts or obligations and to properly safeguard the work already accomplished) associated with this Agreement.

B. The term "estimated Study Costs" shall mean the estimated cost of performing the Study as of the effective date of this Agreement, as specified in Article III.A. of this Agreement.

C. The term "excess Study Costs" shall mean Study Costs that exceed the estimated Study Costs and that do not result from mutual agreement of the parties, a change in Federal law that increases the cost of the Study, or a change in the scope of the Study requested by the Sponsor.

D. The term "study period" shall mean the time period for conducting the Study, commencing with the release to the U.S. Army Corps of Engineers, Jacksonville District, of initial Federal feasibility funds following the execution of this Agreement and ending when the Assistant Secretary of the Army (Civil Works) submits the feasibility report to the Office of Management and Budget (OMB) for review for consistency with the policies and programs of the President.

E. The term "PSP" shall mean the Project Study Plan, which is attached to this Agreement and which shall not be considered binding on either party and is subject to change by the Government, in consultation with the Sponsor.

F. The term "negotiated costs" shall mean the costs of in-kind services to be provided by the Sponsor in accordance with the PSP.

G. The term "fiscal year" shall mean one fiscal year of the Government. The Government fiscal year begins on October 1 and ends on September 30.

ARTICLE II - OBLIGATIONS OF PARTIES

A. The Government, using funds and in-kind services provided by the Sponsor and funds appropriated by the Congress of the United States, shall expeditiously prosecute and complete the Study, in accordance with the provisions of this Agreement and Federal laws, regulations, and policies.

B. In accordance with this Article and Article III.A., III.B. and III.C. of this Agreement, the Sponsor shall contribute cash and in-kind services equal to fifty (50) percent of Study Costs other than excess Study Costs. The Sponsor may, consistent with applicable law and regulations, contribute up to 25 percent of Study Costs through the provision of in-kind services. The in-kind services to be provided by the Sponsor, the estimated negotiated costs for those services, and the estimated schedule under which those services are to be provided are specified in the PSP. Negotiated costs shall be subject to an audit by the Government to determine reasonableness, allocability, and allowability.

C. The Sponsor shall pay a fifty (50) percent share of excess Study Costs in accordance with Article III.D. of this Agreement.

D. The Sponsor understands that the schedule of work may require the Sponsor to provide cash or in-kind services at a rate that may result in the Sponsor temporarily diverging from the obligations concerning cash and in-kind services specified in paragraph B. of this Article. Such temporary divergences shall be identified in the quarterly reports provided for in Article III.A. of this Agreement and shall not alter the obligations concerning costs and services specified in paragraph B. of this Article or the obligations concerning payment specified in Article III of this Agreement.

E. If, upon the award of any contract or the performance of any in-house work for the Study by the Government or the Sponsor, cumulative financial obligations of the Government and the Sponsor would result in excess Study Costs, the Government and the Sponsor agree to defer award of that and all subsequent contracts, and performance of that and all subsequent in-house work, for the Study until the Government and the Sponsor agree to proceed. Should the Government and the sponsor require time to arrive at a decision, the Agreement will be suspended in accordance with Article X., for a period of not to exceed six months. In the event the Government and the sponsor have not reached an agreement to proceed by the end of their 6 month period, the Agreement may be subject to termination in accordance with Article X.

F. No Federal funds may be used to meet the Sponsor's share of Study Costs unless the Federal granting agency verifies in writing that the expenditure of such funds is expressly authorized by statute.

G. The award and management of any contract with a third party in furtherance of this Agreement which obligates Federal appropriations shall be exclusively within the control of the Government. The award and management of any contract by the Sponsor with a third party in furtherance of this Agreement which obligates funds of the Sponsor and does not obligate Federal appropriations shall be exclusively within the control of the Sponsor, but shall be subject to applicable Federal laws and regulations.

H. The Sponsor shall be responsible for the total cost of developing a response plan for addressing any hazardous substances regulated under the Comprehensive Environmental Response, Compensation and Liability Act of 1980, Pub. L. No. 96-510, 94 Stat. 2767, (codified at 42 U.S.C. Sections 9601-9675), as amended, existing in, on, or under any lands, easements or rights-of-way that the Government determines to be required for the construction, operation, and maintenance of the project. Such costs shall not be included in total study costs.

ARTICLE III - METHOD OF PAYMENT

A. The Government shall maintain current records of contributions provided by the parties, current projections of Study Costs, current projections of each party's share of Study Costs, and current projections of the amount of Study Costs that will result in excess Study Costs. At least quarterly, the Government shall provide the Sponsor a report setting forth this information. As of the effective date of this Agreement, estimated Study Costs are $700,000.00 and the Sponsor's share of estimated Study Costs is $350,000.00. In order to meet the Sponsor's cash payment requirements for its share of estimated Study Costs, the Sponsor must provide a cash contribution currently estimated to be $175,000.00. The dollar amounts set forth in this Article are based upon the Government's best estimates, which reflect the scope of the study described in the PSP, projected costs, price-level changes, and anticipated inflation. Such cost estimates are subject to adjustment by the Government and are not to be construed as the total financial responsibilities of the Government and the Sponsor.

B. The Sponsor shall provide its cash contribution required under Article II.B. of this Agreement in accordance with the following provisions:

1. For purposes of budget planning, the Government shall notify the Sponsor by 30 July of each year of the estimated funds that will be required from the Sponsor to meet the Sponsor's share of Study Costs for the upcoming fiscal year.

2. No later than 30 calendar days prior to the scheduled date for the Government's issuance of the solicitation for the first contract for the Study or for the Government's anticipated first significant in-house expenditure for the Study, the Government shall notify the Sponsor in writing of the funds the Government determines to be required from the Sponsor to meet its required share of Study Costs for the first fiscal year of the Study. No later than 15 calendar days thereafter, the Sponsor shall provide the Government the full amount of the required funds by delivering a check payable to "FAO, USAED. Jacksonville" to the District Engineer.

3. For the second and subsequent fiscal years of the Study, the Government shall, no later than 60 calendar days prior to the beginning of the fiscal year, notify the Sponsor in writing of the funds the Government determines to be required from the Sponsor to meet its required share of Study Costs for that fiscal year, taking into account any temporary divergences identified under Article II.D. of this Agreement. No later than 30 calendar days prior to the beginning of the fiscal year, the Sponsor shall make the full amount of the required funds available to the Government through the funding mechanism specified in paragraph B.2. of this Article.

4. The Government shall draw from the funds provided by the Sponsor such sums as the Government deems necessary to cover the Sponsor's share of contractual and in-house fiscal obligations attributable to the Study as they are incurred.

5. In the event the Government determines that the Sponsor must provide additional funds to meet its share of Study Costs, the Government shall so notify the Sponsor in writing. No later than 60 calendar days after receipt of such notice, the Sponsor shall make the full amount of the additional required funds available through the funding mechanism specified in paragraph B.2. of this Article.

C. Within ninety (90) days after the conclusion of the Study Period or termination of this Agreement, the Government shall conduct a final accounting of Study Costs, including disbursements by the Government of Federal funds, cash contributions by the Sponsor, the amount of any excess Study Costs, and credits for the negotiated costs of the Sponsor, and shall furnish the Sponsor with the results of this accounting. Within thirty (30) days thereafter, the Government, subject to the availability of funds, shall reimburse the Sponsor for the excess, if any, of cash contributions and credits given over its required share of Study Costs, other than excess Study Costs, or the Sponsor shall provide the Government any cash contributions required for the Sponsor to meet its required share of Study Costs other than excess Study Costs.

D. The Sponsor shall provide its cash contribution for excess Study Costs as required under Article II.C. of this Agreement by delivering a check payable to "FAO, USAED, Jacksonville, " to the District Engineer as follows:

1. After the project that is the subject of this Study has been authorized for construction, no later than the date on which a Project Cooperation Agreement is entered into for the project; or

2. In the event the project that is the subject of this Study is not authorized for construction by a date that is no later than 5 years of the date of the final report of the Chief of Engineers concerning the project, or by a date that is no later than 2 years after the date of the termination of the study, the Sponsor shall pay its share of excess costs on that date (5 years after the date of the Chief of Engineers or 2 year after the date of the termination of the study).

ARTICLE IV - STUDY MANAGEMENT AND COORDINATION

A. To provide for consistent and effective communication, the Sponsor and the Government shall appoint named senior representatives to an Executive Committee. Thereafter, the Executive Committee shall meet regularly until the end of the Study Period.

B. Until the end of the Study Period, the Executive Committee shall generally oversee the Study consistently with the PSP.

C. The Executive Committee may make recommendations that it deems warranted to the District Engineer on matters that it oversees, including suggestions to avoid potential sources of dispute. The Government in good faith shall consider such recommendations. The Government has the discretion to accept, reject, or modify the Executive Committee's recommendations.

D. The Executive Committee shall appoint representatives to serve on a Study Management Team. The Study Management Team shall keep the Executive Committee informed of the progress of the Study and of significant pending issues and actions, and shall prepare periodic reports on the progress of all work items identified in the PSP.

E. The costs of participation in the Executive Committee (including the cost to serve on the Study Management Team) shall be included in total project costs and cost shared in accordance with the provisions of this Agreement.

ARTICLE V - DISPUTES

As a condition precedent to a party bringing any suit for breach of this Agreement, that party must first notify the other party in writing of the nature of the purported breach and seek in good faith to resolve the dispute through negotiation. If the parties cannot resolve the dispute through negotiation, they may agree to a mutually acceptable method of non-binding alternative dispute resolution with a qualified third party acceptable to both parties. The parties shall each pay 50 percent of any costs for the services provided by such a third party as such costs are incurred. Such costs shall not be included in Study Costs. The existence of a dispute shall not excuse the parties from performance pursuant to this Agreement.

CERTIFICATION REGARDING LOBBYING

The undersigned certifies, to the best of his or her knowledge and belief that:

(1) No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

(2) If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, "Disclosure Form to Report Lobbying," in accordance with its instructions.

(3) The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by section 1352, title 31, U.S. Code. Any person who fails to file the required certification shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

DATE: 7/23/98

Jerome Dupree

Jerome Dupree
Mayor
City of Sarasota, Florida

DENNIS DAUGHTERS, P.E.
DIRECTOR OF ENGINEERING
-CITY ENGINEER-

ALEXANDREA HAY, P.E.
.SST. CITY ENGR-

ASIM MOHAMMED
-ASST. CITY ENGR-

CITY OF SARASOTA

ENGINEERING DEPT
ROOM 100A-CITY HALL
1565 FIRST STREET

TEL: (941) 954-4120

FAX: (941) 954-4174

E-Mail: eng@gte.net

July 21, 1998

Mr. Richard E. Bonner, P.E.
Deputy District Engineer for Project Management
U.S. Army Corp of Engineers, Jacksonville District
Project Management Branch
Post Office Box 4970
Jacksonville, Florida 32234-0019

Subject: **Lido Key Feasibility Study**
Project Study Plan
Feasibility Cost Sharing Agreement

Dear Mr. Bonner:

At their July 20, 1998 meeting, the City Commission unanimously approved the "Agreement Between the Department of Army and the City of Sarasota, Florida for Lido Key Shore Protection Project Feasibility Study". Two partially executed originals will be sent to you as soon as the Mayor signs it.

Yours truly,

Dennis Daughters

Dennis Daughters, P.E.
City Engineer/Director of Engineering

DD/kl

A:\Letter30\Dennis\Bonner.Ldo

DAN MILLER
13th District, Florida

COMMITTEE ON APPROPRIATIONS

COMMITTEE ON GOVERNMENT REFORM AND OVERSIGHT
CHAIRMAN, SUBCOMMITTEE ON THE CENSUS

COMMITTEE ON BUDGET

ASSISTANT MAJORITY WHIP

Congress of the United States
House of Representatives
Washington, DC 20515-0913

Washington Office:
[illegible] Cannon House Office Building
Washington, DC 20515-0913
[illegible]

Florida Offices:
1751 Mound Street
Suite A-2
Sarasota, FL [illegible]
[illegible]

2424 Manatee Avenue West
Suite 104
Bradenton, FL [illegible]
[illegible]

[illegible]
(Available in 941 and 813 Area Codes)

Internet Address:
[illegible]

June 15, 1998

The Honorable Sherwood Boehlert
Chairman, Water Resources and Environment
Subcommittee
B-370A Rayburn House Office Building
Washington, D.C. 20515

Dear Chairman Boehlert,

I am enclosing language pertaining to the reauthorization of the Lido Key, Sarasota, Florida Shore Protection Project that I request be included in the Water Resources Development Act of 1998.

This project was mistakenly deauthorized several years ago by the Corps without giving local officials proper notice. Had the Corps and City of Sarasota officials been in communication, the Corps would have been aware that formal plans for undertaking the project were being adopted by the City.

Since deauthorization, the Corps has completed a reconnaissance study pursuant to your Committee's resolution. That study showed a clear likelihood that the project would meet the statutory requirements as being in the national interest. Currently, a feasibility study is underway with funds appropriated by Congress and cost-shared by the City.

In order to save taxpayers' money and to speed this project to the construction stage, I ask that the project be reauthorized in WRDA '98. Thank you for your consideration of this request.

Sincerely,

Dan Miller

Dan Miller

Project Authorizations

Sarasota, Florida--The project for shore protection at Lido Key Beach, Sarasota, Florida authorized by River and Harbor Act of 1970 and deauthorized pursuant to section 1001 (b) of the Water Resources Development Act of 1986 (33 U.S.C. 579a(b)), is authorized to be carried out by the Secretary, provided that a report has been approved by the Chief of Engineers demonstrating the Federal interest in the project. The Secretary is authorized to use available funds as well as funds advanced by the non-Federal sponsor of this project to complete all studies, reports, or other documents necessary for the development of project plans and specifications as well as the negotiations and execution of a Project Cooperation Agreement.

DENNIS DAUGHTERS, P.E.
DIRECTOR OF ENGINEERING
-CITY ENGINEER-

ALEXANDREA HAY, P.E.
-ASST. CITY ENGR-

ASIM MOHAMMED
-ASST. CITY ENGR-

CITY OF SARASOTA

C5

ENGINEERING DEP
ROOM 100A-CITY HALL
1565 FIRST STREET

TEL: (941) 954-4180

FAX: (941) 954-4174

E-Mail: eng@gte.net

April 30, 1998

Mr. Richard E. Bonner, P.E.
Deputy District Engineer for Project Management
U.S. Army Corps of Engineers, Jacksonville District
Project Management Branch
Post Office Box 4970
Jacksonville, FL 32234-0019

Subject: **Lido Key Feasibility Study - City's Reply to:**
Project Study Plan (Revision No. 6, 02 Mar 1998)
Feasibility Cost Sharing Agreement
Draft Escrow Agreement

Dear Mr. Bonner:

On April 1, 1998, we received your letter, dated March 30, 1998, with the enclosure of the Project Study Plan (PSP) revised on March 2, 1998, Planning Guidance Letter 97-10 and Planning Guidance Letter 52. On April 23, 1998, we received another letter with the enclosure of the same Project Study Plan, two copies of the Feasibility Cost Sharing Agreement (FCSA), a network analysis and a draft Escrow Agreement.

First of all, I want to apologize for taking so long to get back to you and Charlie Stevens on this and other related matters. As you know, I have been in and out of the hospital several times in the last six weeks. I am back at work for a few hours every day and I have made this my top priority.

Second, and certainly more important, we want to inform you that Congressman Dan Miller has requested the House Energy and Water Subcommittee to approve an appropriation of $300,000.00 to complete the Feasibility Study for the Lido Key Shore Protection Study. We hope the USACE will support this request. We also hope the USACE will not take 18% off the top as they did last year. As you know, your office needs at least $268,000.00 to make your $350,000.00 share of the Study.

<u>Shortening the Planning Process</u>:

The City will be willing to "up-front" funds in the total amount of our 50% share, less the estimated cost of work-in-kind, for the purpose of "Shortening the Planning Process". Do we correctly understand Planning Guidance Letter 97-10 to mean that the USACE will "balance the scale" next year, such that the total remains a 50/50 split in the end? Please provide us with the format of the required "signed letter of intent".

<u>Flood Plain Management Plan</u>:

The City of Sarasota does desire to prepare the Flood Plain Management Plan during the preparation of the Feasibility Report. Unfortunately, you have "sprung this on us" quite late and it will take us some time to prepare our estimated cost and the information that will be requested from your office. Any assistance your office or any other District office may give us, in the preparation of such, would be greatly appreciated and would save time.

<u>Project Study Plan</u>:

Before we can provide you with a commitment to the work-in-kind tasks of the PSP and a schedule for accomplishing them, we need your response to our comments on the subject version of the Project Study Plan. Our comments are shown on the attached document.

<u>Escrow Agreement</u>:

An Escrow Agreement, as such, is giving us some problem. We now want to provide cash to the USACE instead of placing the money in an escrow account. However, for us to do this we will need the USACE to formally "bill" us with an "invoice". Within ten (10) working days of receipt of this "invoice" and upon execution of the Feasibility Cost Sharing Agreement, we will send the money.

We presume the last line in Section 1. of the Escrow Agreement is in error and should read; "establish a "~~Region IV Coast of Florida Study~~ <u>Lido Key Shore Protection Project Feasibility Trust</u> Fund" (hereinafter . . .". [Note, words with ~~strikethrough~~ are to be stricken and words with <u>underline</u> are to be added.]

We presume the last sentence in Section 4. of the Escrow Agreement is in error and should read; "All payments shall be in the form of bank drafts payable to the "FAO, USAED, ~~Mobile~~ <u>Jacksonville</u> District," and shall . . ." as worded in the FSCA.

<u>Feasibility Cost Sharing Agreement</u>:

In Article I of the FCSA, the term "Study" should be additionally defined. Article II, A, provides that the Government *"shall expeditiously prosecute and complete the Study . . ."*. The Agreement defines "study costs"; "estimated Study Costs"; "excess Study Costs"; "study period"; and "PSP". The term "Study" however, is not defined. An initial reaction is that the term "Study" and the term "PSP" are synonymous. Hopefully, this is not the case. The definition of PSP provides that the Project Study Plan is *"not be considered binding on either party and is subject to change by the Government."* In Article IV, B, the Executive Committee is required to *"oversee the Study consistently with the PSP."*, thus implying that the Study and the PSP are two different matters. It is imperative that the lack of a definition for Study and the ambiguity created thereby be resolved before the Agreement is executed. The term "Study" is also used in Article III, B, 2, 3, 4 and IV, B.

In Article III, A, the dollar amount ($204,000.00) shown on the last sentence on page 3, will change and be much closer to $175,000.00, depending on our agreement of work-in-kind.

In Article III, B, 2, the last sentence should be deleted or modified to reflect the Sponsor providing our full share, less the estimated cost of work-in-kind, for the purpose of "Shortening the Planning Process".

In Article III, B, 3, there is a reference to *"temporary divergence identified under Article II.C."* We believe this is an incorrect reference. Please have this matter reviewed and a proper reference inserted.

Article III, B, 4, should be modified to read as follows:

"4. The Government shall draw from the ~~escrow or other account~~ <u>cash previously</u> provided by the Sponsor, <u>in</u> such sums as the Government deems necessary to cover the ~~Sponsor's share of~~ contractual and in-house fiscal obligations attributable to the Study as they are incurred. <u>The USACE will "balance the scale" next year, such that the total remains a 50/50 split in the end.</u>

The above wording, or something similar thereto, will allow the City to "up-front" funds in the total amount of our 50% share, less the estimated cost of work-in-kind, in compliance with Planning Guidance Letter 97-10.

The City Commission has recently elected a new Mayor. Therefore, the signatory for the proposed FCSA and the certification regarding lobbying should be changed from Gene M. Pillot to Jerome Dupree.

<u>General</u>:

The City of Sarasota is looking forward to the initiation of the Feasibility Study. We sincerely appreciate the opportunity to review and comment upon all the documents. Again, I apologize for taking so long to get back to you. Please be reminded however that we have had the revised PSP only 27 days, whereas it took the USACE 84 days (from January 5, 1998 to March 30, 1998) to respond to our last comments.

If you or any member of your staff has any questions regarding this matter, or need further clarification, please feel free to contact our office.

Yours truly,

Dennis Daughters

Dennis Daughters, P.E.
City Engineer/Director of Engineering

xc: David R. Sollenberger, City Manager
V. Peter Schneider, Deputy City Manager
Gibson E. Mitchell, CGFO, Finance Director
William G. Hallisey, Public Works Director
Michael A. Connally, City Attorney's Office
Howard Marlowe, American Coastal Coalition
Richard Spadoni, Coastal Planning and Engineering, Inc.
✓Charlie Stevens, Project Manager, U.S. Army Corps of Engineers

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P. O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

April 20, 1998

REPLY TO
ATTENTION OF

Programs and Project Management Division
Project Management Branch

Mr. Dennis Daughters
City Engineer/Director of Engineering
Room 100A-City Hall
1565 First Street
Sarasota, Florida 34230

Dear Mr. Daughters:

This is to provide several documents for initiation of the feasibility phase of the Lido Key Shore Protection Study. Enclosed are two copies of the Feasibility Cost Sharing Agreement (FCSA), a copy of the revised Project Study Plan (PSP), and a network analysis that indicates the schedule for the tasks that are to be conducted for the study. A draft Escrow Agreement is also provided for information. The name of the bank officer and the name and address of the bank that will administer the escrow account are needed in order to complete the agreement. Once this information is provided, our office can provide an escrow agreement for signature by your office. Following execution of the FCSA and Escrow Agreement, the study will be initiated upon receipt of non-Federal funds.

Please return the two copies of the FCSA after signature by your office. One copy of the executed agreement will be returned for your records.

If you have any questions or need additional information, please call me or the project manager, Mr. Charles Stevens, at 904-232-2113.

Sincerely,

Richard E. Bonner

Richard E. Bonner, P.E.
Deputy District Engineer
for Project Management

Enclosures

CITY OF SARASOTA

Interoffice Memorandum

Date: 24 October, 1997

To: City Commission

Thru: David R. Sollenberger, City Manager

From: Dennis Daughters, P.E., City Engineer DD

Subject: **LIDO KEY BEACH RESTORATION**
Federal Funding Analysis

We have the opportunity to pursue a Federal Program for the restoration of Lido beach. A decision needs to be made now as a significant amount of money will be expended in the next few years if we do pursue the program. Our current funding source is not sufficient to pay for our local share. Eight funding alternatives were analyzed and are described below. For the most probable scenario, the City will need approximately $112,000 in March 1998, $178,000 per year in fiscal years 1998/99 through 2003/04 and $0 each year thereafter, in addition to the funds we have received and anticipate to receive from the County Tourist Development Tax (TDT) source. The City Commission should review and discuss the following analysis and provide direction to administration.

Our recommendation is to proceed through the next step (Feasibility Study) in the Federal Program. If the City determines later to not pursue the construction phase, (or if the Federal grant for it does not become available), and we decide to accomplish the construction on our own (with a State Grant), then the information provided in the Feasibility Study is still valuable. The additional funds ($112,000) that we need to assist in paying for our half of the Study should be able to be obtained from the County TDT source.

Background

In a memorandum dated November 2, 1996 we informed the City Commission of the City's needs of the additional 1¢ TDT funds in order to complete the proposed beach restoration and renourishment projects. At that time we determined the City needed the entire additional amount ($1.5 million) in fiscal year 1997/98 and other specific additional amounts for the future years. We were dealing with many assumptions in projecting the fiscal needs for the Lido Key Beach Restoration Project, viz.; project costs, amount of grants, frequency of renourishment, etc. The Sarasota County Board of County Commissioners adopted Resolution No. 96-232 on November 26, 1996 which allocates to the City from the additional TDT revenues, "an amount not to exceed $1,100,000, available and reserved only during the period April 1, 1997 and March 31, 1998." This is in addition to the $264,000 we currently receive each year. They did not address the future years request.

Since that time: [1] The USACE has completed the Reconnaissance Study; [2] A State grant has been awarded in the amount of 25% for our local project to place about 250,000 cubic yards on Lido Beach from John Ringling Boulevard to the Sun and Surf Colony. It will be completed before May 1, 1998; [3] The U.S. Army Corps of Engineers (USACE) has completed the New Pass Maintenance Dredging

Project, placing over 160,000 cubic yards of sand on Lido Beach from John Ringling Boulevard to just south of the Holiday Inn; and [4] The Congressional Energy and Water Appropriations Conference Committee appropriated $100,0000 for Lido Beach for Fiscal Year 1997/98.

The USACE's Reconnaissance Study recommends a beach restoration project extending from just north of John Ringling Boulevard to Big Sarasota Pass. The study determined a phenomenal benefit cost ratio of 8.1 to one. The Assistant Secretary of the Army for Civil Works stated *"The plan developed in this report is technically sound, economically justified, and socially and environmentally acceptable. There is sufficient justification for Federal participation in a feasibility study for storm damage reduction works on Lido Key. It is recommended that the reconnaissance phase assessment for Lido Key be approved and the feasibility phase of the study be initiated. However, based on current budget priorities, projects like Lido Key would receive a low budget priority, and it is unlikely that funding for this project will be included in future budget requests."*

To further the Federal program, the following steps must be completed.

a. Feasibility Study: The USACE and the City must execute a Feasibility Cost Sharing Agreement (CSA) on a 50-50 cost sharing basis. The USACE's estimated cost of the Feasibility Study is now $740,000 (it was $1,038,000 in August 1997). Of the City's 50% share ($370,000), half must be in cash and the other half may be in-kind services. The USACE now estimates it will take 2 1/2 years to complete the Feasibility Study. If the Feasibility Study phase shows that an economically justified and environmentally acceptable project is in the Federal interest and has non-Federal support, authorization of the project is the next stage.

b. Design/Construction Phase: Design and construction funding for larger projects is authorized by Congress in a Water Resources Development Act (WRDA) which is supposed to be released on even numbered years in November but, historically, is late. Once our project is authorized, the USACE and the City would have to execute a Project Cooperation Agreement (PCA) on a 65-35 cost share basis for the 50-year economic life of the committed project. Scope of this project consists of restoration of the entire beach on Lido Key from just north of John Ringling Boulevard to Big Sarasota Pass. Cost of this initial restoration project is estimated by the USACE at $9,071,000; therefore, the City's share would be about $3.2 million. The State grant program may pay for 45% of this local share. If the above Feasibility Study is completed by June 2000 and if construction funding is authorized for Lido Key in WRDA-2002, construction (placement of sand on the beach) could begin in November 2003.

c. Renourishment Phase: The subsequent stages in the project life cycle is the periodic renourishments. Its purpose is to offset continuing erosion of the beach in the project area. The USACE would continuously monitor the previous project and initiate the next renourishment at the appropriate time. The number of subsequent renourishments is dependent on the number and severity of storms; however, every 4 or 5 years is anticipated. Cost of subsequent renourishment is estimated by the USACE to be $2,699,000. The City share (35%) will be about $945,000 per each subsequent renourishment in today's dollars. The State grant program may pay for 45% of this local share (16% of total, leaving 19% for City).

Administration's Concerns:

It should be noted that the granting of this Federal source of funds for design and construction is not assured. Since fiscal year 1994/95, the current administration has unsuccessfully tried to eliminate beach restoration projects from the Federal budget. President Clinton signed the Shore Protection Act of 1996 on September 30, 1996. This legislation should assure the Federal government will help fund and provide technical assistance to locally-sponsored beach nourishment projects, however, to date, the USACE has not issued any guidance for this legislation. More importantly, the Clinton Administration has, since its adoption, strengthened its opposition to federal assistance for shore protection programs. The American Coastal Coalition (ACC), of which the City is a member of, has requested Congressional oversight hearings on the implementation of the Act.

Howard Marlowe, our lobbyist in Washington, DC and Executive Director of ACC, has written: *"Acting presumably under directives from the Office of Management and Budget, the USACE has (a) recently refused to recommend federal funding of feasibility studies, in direct contravention of the Shore Protection Act, and (b) generally acted in a manner which has made it more difficult for non-federal sponsors to go directly to Congress for project authorizations and appropriations. Some USACE District offices have used the Administration's policy position to encourage if not force non-federal sponsors to negotiate arrangements which limit their rights to periodic nourishment. At the same time, the USACE appears to be increasing the time and cost it requires to do studie appropriated by Congress and has also increased the amount of red tape involved with shore protection projects. Whether this is part of a pattern of activity designed to subvert the Shore Protection Act remains to be seen. However, these developments clearly raise issues which must be examined by Congress at the earliest possible date. The ACC hopes that the House Coastal Coalition and the Senate Coastal Caucus will support our request for congressional oversight hearings by the appropriate committees prior to the beginning of legislative action on the Water Resources Development Act of 1998."*

Feasibility Study: The USACE furnished City staff with a draft copy of the scope of work for the Project Study Plan (PSP) for the Feasibility Study on July 14, 1997. The extent of the scope was unnecessarily intensive, very costly ($1,038,000) and time consuming (3 years). I met with key planning staff of the USACE on August 14, 1997 and sent the attached letter, dated August 29, 1997 to them, urging a reduction in all three. I am pleased to state that I was successful in our negotiations as, on October 23, 1997, we were informed by Mr. Charlie Stevens, USACE staff, that the cost had been reduced to $740,000 and the time to 2 ½ years, thereby saving the City $150,000.

As stated above, half of the City's $370,000 share may be in-kind services. The City has already expended approximately $750,000 on studies and required permits for our own project, some of which has been reimbursed by the State. None of these expenses may be eligible as in-kind services because only funds expended after the CSA is executed may be eligible. An amount of $100,000 was recently approved for the USACE by the Congressional Energy and Water Appropriations Conference Committee. The President did veto some line items in the Appropriations Bill, but not line veto our $100,000. Unfortunately, this amount is not enough for their share for the first year of the Study.

Design/Construction Phase: Consideration is being given to reducing the federal share from 65% to 50% and the longevity from 50 years to 25 years. A recent survey by the ACC to its members and members of ACC's Advisory Council of State Officials indicates "no negative response or objections" to these considerations. All respondents indicated a willingness to see significant changes in the federal shore protection program provided they reflected a continuing commitment of the federal government to shore protection projects.

There is no assurance that we will get a State grant in the future to assist paying our share. We are getting 25% of $3,454,000 in 1997-98 and we are in the Florida Department of Environmental Protection's (FDEP) budget (ranked number 3 of 43) for 45% of $172,450 in 1998-99. We may continue to get 45% in the future if the State's prioritizing criteria, if our situation remains the same and the State continues to fund beach projects. Last year the City Commission supported the Florida Shore and Beach Preservation Associaton's (FSBPA) dedicated annual funding source initiative, HB103 and CS/SB 234 & 456 (cruise ship surcharge). It passed in a "watered-down" version but includes the requirement for the FDEP to seek a dedicated funding source. It is now being proposed as a House Committee Interim Project "Alternative Funding Mechanisms for Beach Management". This project reviews the efforts to identify potential dedicated funding sources for beach management and develop legislative proposals for fully funding beach management needs. The House Committees involved in this project are: Appropriations and Environmental Protection. The City, the Florida League of Cities and the FSBPA need to support this effort.

Discussion of Funding Scenarios:

1. The City may succeed through the Federal Program to acquire 65% funding and also receive State funding for 45% of the local share (35% x 45% = 15%) of this Program. In this scenario, the City's share of the initial restoration will be $2,184,000 and its share of the subsequent renourishments will be $540,000.

2. The City may succeed through the Federal Program to acquire 65% funding, but not receive State funding to assist in the local share. In this scenario, the City's share of the initial restoration will be $3,545,000 and its share of the subsequent renourishments will be $945,000.

3. The City may succeed through the Federal Program to acquire 50% funding and also receive State funding for 45% of the local share (50% x 45% = 20%) of this Program. In this scenario, the City's share of the initial restoration will be $3,091,000 and its share of the subsequent renourishments will be $810,000.

4. The City may succeed through the Federal Program to acquire 50% funding, but not receive State funding to assist in the local share. In this scenario, the City's share of the initial restoration will be $4,906,000 and its share of the subsequent renourishments will be $1,350,000.

5. The City may not succeed through either the State and Federal Programs, but it could pursue a full program to renourish the entire (public and private, from just north of John Ringling Boulevard to Big Sarasota Pass) beachfront of Lido Key every four years, if the City received additional monies. In this scenario, the City's share of the initial restoration will be about $6,764,000 (2/3 of the

USACE's $9,811,000 because the City can be more efficient than the USACE. The City's share of the subsequent renourishments will be $2,594,000.

6. The City may not succeed through the Federal Program, but may succeed with State funding of 45% to pursue a full program to renourish the entire beachfront of Lido Key every four years, if the City received additional monies. In this scenario, the City's share of the initial restoration will be about $3,887,000. The City's share of the subsequent renourishments will be $1,427,000.

7. If the City is unsuccessful through both the State and Federal Programs, it could pursue a limited program to renourish the public beach (just north of John Ringling Boulevard to south of Sun and Surf Colony) every four years, if the City received additional monies. In this scenario, the initial restoration will be that done this winter and the City's share of the subsequent renourishments will be $2,125,000.

8. The City may succeed with the State Program for 45% funding, and could pursue a limited program to renourish the public beach (just north of John Ringling Boulevard to south of Sun and Surf Colony) every four years, without the need for additional monies. In this scenario, the initial restoration will be that done this winter and the City's share of the subsequent renourishments will be $1,169,000.

The following table shows the various combinations of the State and Federal Programs and the amount of needed additional monies. The Exhibits are attached and graphically show the values of the table. Scenario 1, shown graphically on Exhibit "A", is the "best case". Scenario 5, shown graphically on Exhibit "E", is the "worst case". Scenario 3, shown graphically on Exhibit "C", is the "most probable case".

Scenario	Exhibit	Federal Grant	State Grant	Additional Annual Funds Required (1997)	Additional Annual Funds Required (1998-2003)	Additional Annual Funds Required (after 2003)
1	A	65%	15%	$112,000	$36,000	$ 0
2	B	65%	0	$112,000	$255,000	$21,000
3	C	50%	20%	$112,000	$178,000	$ 0
4	D	50%	0	$112,000	$465,000	$143,000
5	E	0	0	$112,000	$754,000	$485,000
6	F	0	45%	$112,000	$305,000	$147,000
7	G	0	0	$ 0	$226,000	$255,000
8	H	0	45%	$ 0	$ 0	$21,000

CONCLUSION: Again, we are dealing with many assumptions in projecting the fiscal needs for the Lido Key Beach Restoration Project, viz.; project costs, amount of grants, timing of grants, frequency of renourishment, etc. If the City is unsuccessful at State and Federal levels in acquiring funds for Lido Key Beach Restoration Project (Scenario 5), the dollar shortfall will be large—but so will be the economic implications of neglecting this vital asset.

The State Program is highly competitive and only this year have we been successful, however serious attempts are being made to establish a permanent funding source. The Federal Program is not assured and may be reduced in amount and longevity. The $100,000 that was recently appropriated by the Congressional Energy and Water Appropriations Conference Committee is not enough for the USACE's share for the first year of the Feasibility Study. It is not known if they will get additional funds. However, even though the USACE tends to increase the time and cost for Federal projects, the benefit can seen by comparing Scenario 3 (full project with Federal and State funding) to Scenario 6 (full project without Federal funding but with State funding) or comparing Scenario 5 to Scenario 2.

Scenarios 7 and 8 (limited project) will provide little or no storm protection benefit to private property south of the Raddison Resort.

On that basis, we conclude Scenario 3 is the most probable and the City will need $112,000 in March 1998, $178,000 per year in fiscal years 1998/99 through 2003/04 and $0 each year thereafter, in addition to the funds we have received and anticipate to receive from the County TDT source. Appendix "A" shows a detailed estimate of all expenses for fiscal years 1997/98 through 2007/08 based on Scenario 3. Exhibit "I" shows the flow of estimated the City's income and expenses from now until October 31, 1998 for Scenario 3. It graphically shows why we need an additional $112,000 in March 1998.

If the additional 1¢ Tourist Development Tax is shared on the same relative-population ratio as the basic tax, the City would receive an additional $179,000 per year and would need that and $33,000 more in March 1998 to overcome the shortfall. That $179,000 would be sufficient thereafter. I am scheduled to speak before the County's Tourist Development Tax Committee on November 13, 1997.

As an alternate, consideration can be given to having the private properties (condominiums and resorts) pay for this additional amount via a special assessment district in the manner that the Town of Longboat Key recently did. If we don't get construction and access easements from the private properties, that portion of the project will not eligible for federal cost sharing.

The City Commission should consider whether or not it wants to pursue the Federal grant for the larger project. If it does and before the City commits to sharing the cost of the Feasibility Study with the USACE via a Feasibility Cost Sharing Agreement, the City must determine where it will get $112,000 in March 1998 and get $178,000 per year in fiscal years 1998/99 through 2003/04 as additional funds.

RECOMMENDATION

The City Commission should discuss the above and provide direction to administration. If we determine later to not pursue the construction phase via the Federal Program, (or if it does not become available), and we decide to accomplish the construction on our own (with a State Grant), then the information provided in the Feasibility Study is still valuable. The additional funds ($112,000) that we need to assist in paying for our half of the Study should be able to be obtained from the County TDT source.

It is therefore recommended to proceed through the next step (Feasibility Study) in the Federal Program and to pursue the necessary funds from the County Tourist Development Tax.

xc: Billy E. Robinson, CMC/AAE, City Auditor and Clerk
V. Peter Schneider, Deputy City Manager
Gibson E. Mitchell, CGFO, Finance Director
Chris Lyons, Budget Director
Jeanne Farineau, Sarasota County Government
Richard H. Spadoni, Coastal Planning & Engineering, Inc.
Howard D. Marlowe, Marlowe & Company
Charlie Stevens, Project Manager, USACE

DENNIS DAUGHTERS, P.E.
DIRECTOR OF ENGINEERING
-CITY ENGINEER-

~XANDREA HAY, P.E.
~SST. CITY ENGR-

ASIM MOHAMMED
-ASST. CITY ENGR-

CITY OF SARASOTA

ENGINEERING DEPT
ROOM 100A-CITY HALL
1565 FIRST STREET

TEL: (941) 954-4180

FAX: (941) 954-4174

E-Mail: eng@gte.net

October 16, 1997

Mr. Richard E. Bonner, P.E.
Deputy District Engineer
U.S. Army Corps of Engineers, Jacksonville District
Project Management Branch
Post Office Box 4970
Jacksonville, Florida 32234-0019

Subject: Lido Key Feasibility Study

Dear Mr. Bonner:

As of this date we have not received a response to our August 29, 1997 letter (copy attached) to you. Anticipating your response, we have not yet presented alternatives to the City Commission.

The Congressional Energy and Water Appropriations Conference Committee appropriated $100,000 for Lido Beach for Fiscal Year 1997/98, and President Clinton signed the bill on October 13, 1997. We would like to present alternatives to the Commission at their November 3, 1997 meeting and we have a 12 day lead time. Therefore, we need your response on or before October 23, 1997.

If you have any questions regarding this matter, or need further clarification, please feel free to contact our office.

Yours truly,

Dennis Daughters

Dennis Daughters, P.E.
City Engineer/Director of Engineering

xc: The Honorable Connie Mack, U.S. Senate
The Honorable Bob Graham, U.S. Senate
The Honorable Dan Miller, U.S. Congress
David R. Sollenberger, City Manager
V. Peter Schneider, Deputy City Manager
Gibson E. Mitchell, CGFO, Finance Director
William G. Hallisey, Acting Public Works Director
Charlie Stevens, Project Manager, U.S. Army Corps of Engineers
Mitchell A. Granat, Study Manager, U.S. Army Corps of Engineers

A:\Letter24\Dennis\Projects\LidoBeach\Bonner1.016

DENNIS DAUGHTERS, P.E.
DIRECTOR OF ENGINEERING
-CITY ENGINEER-

ALEXANDREA HAY, P.E.
ASST. CITY ENGR-

ASIM MOHAMMED
-ASST. CITY ENGR-

CITY OF SARASOTA

ENGINEERING DEPT
ROOM 100A-CITY HALL
1565 FIRST STREET

TEL: (941) 954-4180

FAX: (941) 954-417

E-Mail: eng@gte.net

August 29, 1997

Mr. Richard E. Bonner, P.E.
Deputy District Engineer
U.S. Army Corps of Engineers, Jacksonville District
Project Management Branch
Post Office Box 4970
Jacksonville, FL 32234-0019

Subject: Lido Key Feasibility Study

Dear Mr. Bonner:

We want to thank you and members of your staff for meeting with me on August 12, 1997, in Jacksonville, to review the Project Study Plan (PSP). Attached herewith are our formal comments. You will note they are very similar to that which I handed out at the meeting. I informed your staff of the status of the current New Pass Maintenance Dredging Project (Lido Beach portion now completed) and our upcoming "State Grant" project, explaining the limits of work, volume of sand and schedule.

At this moment, the City cannot commit to the PSP and/or a Feasibility Cost Sharing Agreement as we currently do not have a dedicated source of funds for our share of the complete project. We intend to present some alternatives to the City Commission for their discussion and direction to us on September 15, 1997.

Our main concern about the PSP is threefold, viz: The extent of the scope seems unnecessarily intensive, very costly and time consuming. We urge a reduction in all three. A significant amount of effort has been accomplished that does not need to be repeated. The cost should be reduced from your current estimate of $1,035,435.00 to the $650,000.00 as stated in the Reconnaissance Phase Assessment, or lower. The time should be reduced from the estimated 3 years to 18 months.

By copy of this letter to Mr. Charlie Stevens, we are forwarding a copy of all the information we have on the offshore sand sites so that he may, in turn, give it to Mr. Bob Ross for review.

A:\Letter24\Dennis\Bonnerfeas.ldo.doc

If you or any member of your staff has any questions regarding this matter, or need further clarification, please feel free to contact our office.

Yours truly,

Dennis Daughters

Dennis Daughters, P.E.
City Engineer/Director of Engineering

xc: David R. Sollenberger, City Manager
V. Peter Schneider, Deputy City Manager
Gibson E. Mitchell, CGFO, Finance Director
William G. Hallisey, Acting Public Works Director
Mr. Charlie Stevens, Project Manager, U.S. Army Corps of Engineers
Mr. Mitchell A. Granat, Study Manager, U.S. Army Corps of Engineers

CECW-PE (CESAJ-PD-PC/31 Jan. 1997) 1st End HARDESTY/761-1723/gmh
SUBJECT: Lido Key, Sarasota County, Florida - Reconnaissance Study

HQ, U.S. Army Corps of Engineers, Washington, D.C. 20314-1000 08 MAY 1997

FOR Commander, South Atlantic Division

1. We have completed the Washington level review of the Section 905(b) Analysis and the Project Study Plan for the subject project and the documents are approved. However, since the recommended project is located in a recreation and tourist area, and involves a long-term Federal investment beyond initial construction, no funds were provided for the feasibility phase in Fiscal Year 1997 and funds have not been included in the President's Fiscal Year 1998 Budget. No further work on this project should be initiated at this time.

2. If you have any questions, please contact Mr. Gary Hardesty, CECW-PE, (202) 272-1723.

FOR THE COMMANDER:

wd all encls

Russell L. Fuhrman

RUSSELL L. FUHRMAN
Major General, USA
Director of Civil Works

DENNIS DAUGHTERS, P.E.
DIRECTOR OF ENGINEERING
-CITY ENGINEER-

' HINDERLITER, P.E.
-SST. CITY ENGR-

ASIM MOHAMMED
-ASST. CITY ENGR-

CITY OF SARASOTA

ENGINEERING DEPT
ROOM 100A-CITY HALL
1565 FIRST STREET

TEL: (941) 954-4180

FAX: (941) 954-4174

SUNCOM: 949-418(

21 October, 1996

Mr. Joseph Meyers
Florida Department of Community Affairs
Division of Emergency Management
Bureau of Recovery and Mitigation
2555 Shumard Oak Boulevard
Tallahassee, FL 32399-2100

Fax to (904) 487-2007
Hard copy w/ attachments via U.S. Mail

Attn: Mr. Timothy Date, Engineer II

**Subj: Lido Beach Renourishment Program
Impacted by Tropical Storm Josephine**

Dear Mr. Date:

We are in receipt of your memorandum dated October 17, 1996 in which you detail the eligibility requirements for Public Assistance as set forth in Title 44, Code of Federal Regulations (44CFR) 206.226 to repair improved beaches damaged by Tropical Storm Josephine. In the memo you request submittal of certain supporting documentation.

Lido Beach clearly meets these eligibility requirements. Lido Beach is an improved beach, designed and constructed using an analysis of sand grain size to determine the elevation and the width of the beach. Lido Beach has an established maintenance program calling for sand renourishments about every four years, all placed along approximately one mile of publicly accessible beach on central Lido Key.

Relative to the requested supporting documentation, we offer the following:

1- Copies of any studies prepared prior to construction including the analysis of sand size.

Response: Submitted under separate cover (because of their magnitude) are photocopies of:
1- "Lido Beach Long-Range Beach Management and Erosion Control Plan and

Preliminary Beach Restoration Element Design for Lido Key, Sarasota, Florida - January 1991"

2- *"Lido Key Beach Nourishment Project, Environmental Study - April 1992"*
3- *"Lido Key Beach Restoration Project, Sand Search Report - May 1992"*
4- *"Lido Key Beach Restoration Project, New Pass Ebb Shoal Magnetometer Survey - September 1992"*
5- *"New Pass Inlet Management Plan - June 1993"*
6- *"Wave Refraction and Sediment Transport Study at New Pass and Big Sarasota Pass - April 1993"*

In addition to the above City-initiated studies, the U.S. Army Corps of Engineers prepared some studies prior to their New Pass Maintenance Dredging Project. This information may be obtained from the U.S. Army Corps of Engineers, Jacksonville District, Post Office Box 4970, Jacksonville, FL 32234-0019, Attn: Ms. Pat A. Hanson, Project Manager.

2- Copy of as-built plans and design specifications.

Response: Copies of as-built plans and design specifications for any of the prior projects and/or for the March 1997 project are not in our possession. They may be obtained from the U.S. Army Corps of Engineers, Jacksonville District, Post Office Box 4970, Jacksonville, FL 32234-0019, Attn: Ms. Pat A. Hanson, Project Manager. Copies of as-built plans and design specifications for a City administered project are attached:

3- Information pertaining to maintenance of the improved beach, such as:

a)- the established renourishment programs for the beach.

Response: See response to #1 above.

b)- the quantity, cost and source of sand placed on the improved beach by year.

Response:

YEAR	QUANTITY	COST		SOURCE
1964	121,020 cubic yards	$	*	New Pass
1970	350,000 cubic yards	$		Offshore
1974	246,100 cubic yards	$	*	New Pass
1977	399,970 cubic yards	$	*	New Pass
1982	92,000 cubic yards	$	*	New Pass
1985	239,000 cubic yards	$	*	New Pass
1991	240,000 cubic yards	$	*	New Pass

* Information on these costs are not in our possession. They may be obtained from the U.S. Army Corps of Engineers, Jacksonville District, Post Office Box 4970, Jacksonville, FL 32234-0019, Attn: Ms. Pat A. Hanson, Project Manager.

c)- cross sections before and after each sand placement.

Response: Copies of these cross-sections are not in our possession. They may be obtained from the U.S. Army Corps of Engineers, Jacksonville District, Post Office Box 4970, Jacksonville, FL 32234-0019, Attn: Ms. Pat A. Hanson, Project Manager.

4- Post storm cross sections of the improved beach.

Response: We have authorized our consultants, Coastal Planning and Engineering, Inc. to survey Lido Beach for post-storm conditions. This information should be available on or before October 31, 1996.

5- Pre-storm cross sections of the improved beach.

Response: Cross-sections were last done on Lido Beach by our consultants, Coastal Planning and Engineering, Inc. in June, 1995 This information will be submitted with the post-storm cross-sections in 3 above, on or before October 31, 1996.

Lido Beach clearly meets the requirements and we clearly need immediate assistance. Please forward the letter information contained in this letter to FEMA for their consideration in determining that there should be a presidential disaster declaration for beach damage due to Tropical Storm Josephine.

Yours truly,

Dennis Daughters

Dennis Daughters, P.E., City Engineer

xc: David R. Sollenberger, City Manager
V. Peter Schneider, Deputy City Manager
Howard Marlowe, American Coastal Coalition
Richard Spadoni, Coastal Planning and Engineering, Inc.
Gregg D. Feagans, CEM, Sarasota County Emergency Management
Richard E. Bonner, P.E., U.S. Army Corps of Engineers
Charlie Stevens, U.S. Army Corps of Engineers
Pat A. Hanson, U.S. Army Corps of Engineers

August 28, 1996

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Richard Spadoni
Coastal Planning and Engineering Inc.
2481 N.W. Boca Raton Boulevard
Boca Raton, FL 33431

Dear Mr. Spadoni:

RE: Permit No. 582063449, City of Sarasota
Lido Key Beach Nourishment Project

Your request to modify this permit has been received and reviewed by Department staff. The modification is to waive permit monitoring requirements for the post-construction sampling of the borrow areas.

Wetland Resource Permit No. 582063449 was modified on December 20, 1995 to substitute two borrow sites located 5 and 6 miles offshore of Lido Key for the originally permitted New Pass and Big Sarasota Pass ebb shoal borrow sites. The original permitted borrow areas were abandoned at the request of DEP. Monitoring requirement numbers 2 and 3 of the permit are for post-construction sampling of borrow area infauna, grain size and organic content information for the originally permitted New Pass and Big Sarasota Pass borrow areas. Pre-construction samples were collected in these areas in October 1991. These samples are not representative of the new borrow areas which are located 5 and 6 miles offshore.

Due to the fact that the borrow area locations were modified after the pre-construction samples were collected, and that the original locations were abandoned at the request of DEP, this permit modification waives monitoring requirements 2 and 3 for post-construction sampling of borrow area infauna, grain size and organic content information.

Since the proposed modification is not expected to result in any adverse environmental impact or water quality degradation, the permit is hereby modified as requested. By copy of this letter, we are notifying all necessary parties of the modification(s).

This letter of approval does not alter the original expiration date of September 21, 1998, or the Specific or General Conditions of the permit. This letter must be attached to the original permit.

A person whose substantial interests are affected by the Department's action may petition for an administrative proceeding (hearing) in accordance with Section 120.57, Florida Statutes. The petition must contain the information set forth below and must be filed (received) in the Office of General Counsel of the Department at 2600 Blair Stone Road, Tallahassee, Florida 32399-2400. Petitions filed by the permittee and the parties listed below must be filed within 14 days of receipt of this letter. Petitioner shall mail a copy of the petition to the permittee at the address indicated above at the time of filing. Failure to file a petition within this time period shall constitute a waiver of any right such person may have to request an administrative determination (hearing) under Section 120.57, F.S.

The Petition shall contain the following information:

(a) The name, address, and telephone number of each petitioner, the permittee's name and address, the Department Permit File Number and the county in which the project is proposed;

(b) A statement of how and when each petitioner received notice of the Department's action or proposed action;

(c) A statement of how each petitioner's substantial interests are affected by the Department's action; or proposed action;

(d) A statement of the material facts disputed by petitioner, if any;

(e) A statement of facts which petitioner contends warrant reversal or modification of the Department's action or proposed action;

(f) A statement of which rules or statutes petitioner contends require reversal or modification of the Department's action or proposed action; and

(g) A statement of the relief sought by petitioner, stating precisely the action petitioner wants the Department to take with respect to the Department's action or proposed action.

If a petition is filed, the administrative hearing process is designed to formulate agency action. Accordingly, the Department's final action may be different from the position taken by it in this letter. Persons whose substantial interests will be affected by any decision of the Department with regard to the permit have the right to petition to become a party to the proceeding. The petition must conform to the requirements specified above and be filed (received) within 14 days of receipt of this notice in the Office of General Counsel at the above address of the Department. Failure to petition within the allowed time frame constitutes a waiver of any right such person has to request a hearing under Section 120.57, F.S., and to participate as a party to this proceeding. Any subsequent intervention will only be at the approval of the presiding officer upon motion filed pursuant to Rule 28-5.207, F.A.C.

This Notice constitutes final agency action unless a petition is filed in accordance with the above paragraphs or unless a request for extension of time in which to file a petition is filed within the time specified for filing a petition and conforms to Rule 17-103.070, F.A.C. Upon timely filing of a petition or a request for an extension of time this Notice will not be effective until further Order of the Department.

Any party to this letter has the right to seek judicial review of the Order pursuant to Section 120.68, Florida Statutes, by the filing of a Notice of Appeal pursuant to Rule 9.110, Florida Rules of Appellate Procedure, with the Clerk of the Department in the Office of General Counsel, 2600 Blair Stone Road, Tallahassee, Florida 32399-2400; and by filing a copy with the appropriate District Court of Appeal. The Notice of Appeal must be filed within 30 days from the date the Notice of Permit Modification is filed with the Clerk of the Department.

Sincerely,

Robert M. Brantly, P.E.
Bureau of Beaches and Coastal Systems

RVL/vv
Certified # Z 308 319 691
cc:
Mr. Bob Stetler, DEP, Southwest District
DEP, Marine Patrol
Florida Game and Fresh Water Fish Commission
U. S. Army Corps of Engineers, Jacksonville
Sarasota County Property Appraiser

FILING AND ACKNOWLEDGMENT

FILED, on this date, pursuant to 120.52(9),
Florida Statutes, with the designated Department Clerk,
receipt of which is hereby acknowledged.

28 August 1996

Deputy Clerk Date

FLORIDA DEPARTMENT OF STATE
Sandra B. Mortham
Secretary of State
DIVISION OF HISTORICAL RESOURCES
R.A. Gray Building
500 South Bronough Street
Tallahassee, Florida 32399-0250

June 3, 1996

Director's Office
(904) 488-1480

Telecopier Number (FAX)
(904) 488-3353

Mr. A. J. Salem, Chief
Planning Division, Environmental Resources Branch
Jacksonville District Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

In Reply Refer To:
Robin D. Jackson
Historic Sites Specialist
(904) 487-2333
Project File No. 961264

RE: Cultural Resource Assessment Request
Reconnaissance Level Study to Address Measures for Providing Hurricane and Storm damage Protection along the Shoreline of Lido Key
Sarasota County, Florida

Dear Mr. Salem:

In accordance with the procedures contained in 36 C.F.R., Part 800 ("Protection of Historic Properties"), we have reviewed the referenced project(s) for possible impact to archaeological and historical sites or properties listed, or eligible for listing, in the *National Register of Historic Places*. The authority for this procedure is the National Historic Preservation Act of 1966 (Public Law 89-665), as amended.

It is the opinion of this agency that because of the project nature it is considered unlikely that archaeological or historical sites will be affected. Therefore, it is the opinion of this office that the proposed project will have no effect on any sites listed, or eligible for listing in the National Register. The project may proceed without further involvement with this agency

If you have any questions concerning our comments, please do not hesitate to contact us. Your interest in protecting Florida's historic properties is appreciated.

Sincerely,

Laura A. Kammerer

for George W. Percy, Director
Division of Historical Resources
and
State Historic Preservation Officer

GWP/Jrj

MAY 5 1996

Planning Division
Plan Formulation Branch
Coastal Section

Honorable Shirley Brown
Florida House of Representatives, District 69
400 House Office Building
Tallahassee, Florida 32399

Dear Ms. Brown:

I am writing in response to your letter dated April 22, 1996, regarding the need for hurricane and storm damage protection along the shoreline of Lido Key, Florida. A reconnaissance study for the Lido Key shoreline was initiated in January 1996, in response to a Resolution dated September 14, 1995, by the Committee of Transportation and Infrastructure of the U.S. House of Representatives. The Resolution requests the Secretary of the Army to review the report of the Chief of Engineers on Lido Key, Sarasota, Florida, published as House Document 320, 91st Congress, 2nd Session, with a view to determining the advisability of providing hurricane and storm damage reduction works. The reconnaissance report is scheduled for completion in January, 1997.

While the Jacksonville District is committed to completing the reconnaissance report on schedule, I must inform you that the current Federal administration policy does not support initiation of new traditional shore protection projects. The current Federal administration policy has determined that these projects are more properly a state or local responsibility, due to the local benefits that these projects accrue.

In closing, I would like to thank you for your support for the Lido Key Shore Protection Reconnaissance Study.

Sincerely,

SIGNED: Joseph R. Burns

Terry L. Rice
Colonel, U.S. Army
District Engineer

Joseph R. Burns
Executive Assistant

Copy Furnished:

Mr. David Sollenberger, City Manager, City of Sarasota, 1565 First Street, Sarasota, FL 33577

MAY 5 1996

Planning Division
Plan Formulation Branch
Coastal Section

Honorable Lisa Carlton
Florida House of Representatives, District 70
311 House Office Building
Tallahassee, Florida 32399-1300

Dear Ms. Carlton:

I am writing in response to your letter dated April 16, 1996, regarding the need for hurricane and storm damage protection along the shoreline of Lido Key, Florida. A reconnaissance study for the Lido Key shoreline was initiated in January 1996, in response to a Resolution dated September 14, 1995, by the Committee of Transportation and Infrastructure of the U.S. House of Representatives. The Resolution requests the Secretary of the Army to review the report of the Chief of Engineers on Lido Key, Sarasota, Florida, published as House Document 320, 91st Congress, 2nd Session, with a view to determining the advisability of providing hurricane and storm damage reduction works. The reconnaissance report is scheduled for completion in January, 1997.

While the Jacksonville District is committed to completing the reconnaissance report on schedule, I must inform you that the current Federal administration policy does not support initiation of new traditional shore protection projects. The current Federal administration policy has determined that these projects are more properly a state or local responsibility, due to the local benefits that these projects accrue.

In closing, I would like to thank you for your support for the Lido Key Shore Protection Reconnaissance Study.

Sincerely,

SIGNED: Joseph R. Burns

Terry L. Rice
Colonel, U.S. Army
District Engineer
Joseph R. Burns
Executive Assistant

Copy Furnished:

Mr. David Sollenberger, City Manager, City of Sarasota, 1565 First Street, Sarasota, FL 33577

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
9721 Executive Center Drive North
St. Petersburg, Florida 33702

April 29, 1996

Colonel Terry Rice
District Engineer, Jacksonville District
Department of the Army, Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

Dear Colonel Rice:

This is in response to your April 1, 1996 request for general comments related to a reconnaissance level study to address measures for providing hurricane and storm damage protection along Lido Key, in Sarasota County, Florida. Four beach fill action alternatives are being considered which extend the equilibrium profile by 1, 25, 50 and 100 feet.

In conjunction with a beach nourishment project on Longboat Key, immediately north of the study area, hardbottom habitat was found to be located within the project boundary. Therefore, it is possible that hardbottom habitat occurs within the Lido Key study area. Side-scan sonar should be utilized to determine the presence of hardbottom habitats within and adjacent to the various equilibrium profiles. Divers should truth those results and determine the quality of the identified hardbottom areas. Hardbottom habitats are important in that they provide substrate and three-dimensional relief habitat creating an interactive community of flora and fauna including plankton, algae/seaweeds as well as invertebrates and fishes of commercial and recreational importance. These areas also provide recreational benefits to sport fisherman and sport divers. We strongly recommend that near shore hardbottom habitats be avoided to the maximum extent practicable.

We do not anticipate that seagrasses, mangroves or saltmarsh would occur in the beach fill equilibrium area. However, these valuable habitats are found within New Pass, Big Sarasota Pass and Sarasota Bay and could be affected by siltation or turbidity during construction activities. These valuable habitats should be located and identified and measures to protect these areas developed.

The borrow sites for the beach fill should also be investigated for the presence of hardbottom habitats that could be directly affected by dredging activities or by turbidity and siltation.
Additionally, conflicts with commercial bait fisherman have occurred in the past from using shoals as borrow sites where baitfish historically congregate and, therefore, fishery utilization of the borrow sites should also be investigated.

We appreciate the opportunity to provide these comments. Please direct related comments or questions to Mr. David N. Dale of our St. Petersburg Area Office. He may be contacted at 813/570-5317.

Sincerely,

Edwin J Keppner

for Andreas Mager, Jr.
Assistant Regional Director
Habitat Conservation Division

cc:
Mr. A. J. Salem
Chief, Planning Division
Department of the Army, Corps of Engineers
Planing Division, Environmental Branch
P.O. Box 4970
Jacksonville, Florida 32232-0019

F/SEO2
F/SEO23-MIAMI

Please reply to:
2888-D Ringling Blvd.
Sarasota FL 34237
Ph (941) 361-6180
Fax (941) 361-6182

Capital Address:
400 House Office Building
Tallahassee FL 32399
Ph (904) 488-7754
SUNCOM 278-7754

Florida House of Representatives

Shirley Brown, District 69

April 22, 1996

A. J. Salem
Chief, Planning Division
Department of the Army
Jacksonville District Corps of Engineers
P.O. Box 4970
Jacksonville, FL 32232-0019

Re: Hurricane and Storm Damage Protection Along Lido Key

Dear Mr. Salem:

I am writing to urge in the strongest terms possible that the Army Corps of Engineers take action to protect the shoreline of Lido Key, Florida, from hurricane and storm damage.

There is a critical need for such measures, especially following the damage caused by Hurricane Opal last year. Lido Beach suffered substantial sand loss as a result of this storm. Some portions of public beach have been completely eroded, putting adjacent infrastructure at risk.

Lido Beach contributes substantially to the Sarasota County economy. It is a major tourist attraction, bringing thousands of people to the area every year. A survey by the Sarasota County Parks and Recreation Department showed that 670,000 people used Lido Beach during fiscal year 1995. Lido Beach businesses and residences make a significant contribution to property tax rolls which fund many important services.

I was pleased to learn the Army Corps of Engineers is conducting a reconnaissance study to address this matter. Please let me know if I can be of further assistance.

Sincerely,

Shirley Brown

Shirley Brown
State Representative
District 69

SB:pz

C:\DATA\WP\CORP0422.WPD

Committees: *Business & Professional Regulation/Business Regulation, Chair*
Tourism & Cultural Affairs/Arts & Cultural & Historic Resources, Chair
Appropriations • Commerce • Community Affairs • Streamlining Government, Select

Florida House of Representatives

2127 S. Tamiami Trail
Osprey, FL 34229
813•966-2606

LISA CARLTON
REPRESENTATIVE, DISTRICT 70

311 House Office Building
Tallahassee, FL 32399-1300
904•488-1171

April 16, 1996

Mr. A.J. Salem
Chief, Planning Division
Environmental Branch
Department of the Army
Post Office Box 4970
Jacksonville, FL 32232-0019

Re: Lido Key Beach

Dear Mr. Salem:

Thank you for the opportunity to comment on hurricane and storm damage protection which is desperately needed for Lido Key Beach.

As a coastal city, Sarasota is know internationally for its beautiful beach which provides pleasure to more than a million visitors every year. Storms, however, have eroded the beach to a critical point. Without federal matching funds, state funding is nearly impossible to obtain. As time passes, the beach, along with the utility infrastructure and roadways, continues to deteriorate.

I would like to offer my support and assistance to the reconnaissance study group. Please let me know if I can supply you with additional information or be of service at any time.

Sincerely,

Lisa Carlton

Lisa Carlton
LC:lm

cc: David Sollenberger

DEPARTMENT OF THE ARMY
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P. O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

REPLY TO
ATTENTION OF

April 10, 1996

Programs and Project Management Division
Project Management Branch

Honorable Bob Graham
United States Senator
ATTN: Ms. Pat Grisé
Post Office Box 3050
Tallahassee, Florida 32315

Dear Senator Graham:

This is in regard to your letter of March 5, 1996, providing Mr. David R. Sollenberger's letter of February 16, 1996, concerning the Lido Key beach erosion control project at Sarasota, Florida.

The project was authorized by the 1970 River and Harbor Act. The authorization provided for initial restoration and periodic nourishment of a 1.2 mile reach of shoreline on Lido Key. Periodic nourishment was authorized for a period of ten years. The city of Sarasota completed the northern .6 mile segment of the project in May 1970 at their expense. The project was never completed, and Federal funds were never requested. Therefore, Federal funds were never appropriated.

Section 1001(b)(1) of the 1986 Water Resource Development Act (WRDA) required the Secretary of the Army to submit to Congress, by no later than November 17, 1987, a list of unconstructed water resource projects or separable elements of projects which had no obligations of funds for planning, design or construction during the prior ten full fiscal years. Unless funds were obligated by December 31, 1989, the project or separable element would be deauthorized on January 1, 1990. A copy of the Secretary of the Army letter to Congress dated November 16, 1987, which includes the Lido Key project, is enclosed.

The Jacksonville District was informed of projects which were included on the project deauthorization eligibility list in a memorandum dated December 1, 1987 (copy enclosed). In January 1988, the Jacksonville District sent a letter to the Florida Department of Natural Resources (FDNR) and the Florida Shore and Beach Preservation Association (FSBPA) to inform them about the beach erosion control and shore protection projects included on the deauthorization list. A copy of each of those letters is enclosed. The FDNR (now the Florida Department of Environmental Protection) normally provides a portion of the required non-Federal funds for such projects in the state. The FSBPA is a non-profit organization concerned with beach and coastal issues.

Pursuant to the provisions of Section 1001(b)(1) of WRDA 1986, the Lido Key project was deauthorized on January 1, 1990. A list of projects that were deauthorized was published in the Federal Register dated October 5, 1990 (copy enclosed), as required by Section 1001(c) of WRDA 1986.

A reconnaissance study for Lido Key was initiated in January 1996, in response to a Resolution by the Committee of Transportation and Infrastructure of the U.S. House of Representatives dated September 14, 1995. The resolution requests the Secretary of the Army to review the report of the Chief of Engineers on Lido Key, Sarasota, Florida, published as House Document 320, 91st Congress, 2nd Session, with a view to determining the advisability of providing hurricane and storm damage reduction works. The reconnaissance report is scheduled for completion in January 1997.

If any additional information or assistance is needed, please call me or Mr. Joseph Burns, Congressional Liaison Officer, at 904-232-2243.

Sincerely,

for Terry L. Rice
Colonel, U.S. Army
District Engineer

James A. Connell
Lieutenant Colonel, U.S. Army
Deputy District Engineer

Enclosures

Copies Furnished:

Commander, U.S. Army Corps of Engineers (CECW-L)
Commander, South Atlantic Division (CESAD-PM)

DENNIS DAUGHTERS, P.E.
DIRECTOR OF ENGINEERING
-CITY ENGINEER-

ALEXANDREA HAY, P.E.
-ASST. CITY ENGR-

ASIM MOHAMMED
-ASST. CITY ENGR-

CITY OF SARASOTA

ENGINEERING DEPT
ROOM 100A-CITY HALL
1565 FIRST STREET

TEL: (941) 954-4180

FAX: (941) 954-4174

SUNCOM: 949-4180

5 March 1996

Mr. Rick McMillen
Project Manager
U.S. Army Corps of Engineers
Jacksonville District Project Management Branch
Post Office Box 4970
Jacksonville, FL 32232-0019

Subj: LIDO BEACH FEASIBILITY STUDY

Dear Mr. McMillen:

As promised you at our meeting on February 21, 1996, attached herewith is a list of individuals that are interested in Lido Beach. We do not have a list of people that are interested in environmental issues.

If you have any questions regarding this matter, or need further clarification, please feel free to contact our office.

Yours truly,

Dennis Daughters

Dennis Daughters, P.E., City Engineer

S:\1_DENNIS\1_DATA\PROJECTS\LIDOBECH\FEASLIST.LTR

United States Senate

Washington, D.C.

Date 03/05 / 96

Colonel Terry L. Rice
Army Corps of Engineers
Post Office Box 4970
Jacksonville, Florida 32232-0019

Enclosed is a letter from one of my constituents who has concerns which come under the jurisdiction of your agency.

I would appreciate your reviewing the information that has been presented and providing me with a written response. Please send your reply to the attention of:

Ms. Pat Grisé
Office of Senator Bob Graham
P.O. Box 3050
Tallahassee, FL 32315

904-422-6100

Your cooperation and assistance are appreciated.

With kind regards,

Sincerely,

Bob Graham

United States Senator

Constituent's Name:

Mr. David R. Sollenberger

JAX District

CITY OF SARASOTA

February 16, 1996

The Honorable Martin Lancaster
Assistant Secretary of the Army (Civil Works)
108 Army Pentagon
Washington, D. C. 20310-0108

Dear Secretary Lancaster:

Please accept my sincere congratulations for your nomination and Senate confirmation as Assistant Secretary of the Army for Civil Works. We look forward to working with you in an effort to develop the Administration's policies toward shore protection and beach nourishment projects.

The purpose of this letter is to make an official inquiry into what I understand to be the deauthorization of the Lido Key beach erosion project. Although I have been informed that this action took place as of December 31, 1989, I did not learn of it until relatively recently. Since then, I have researched our files and have discovered no correspondence from the Corps indicating that this project was in danger of deauthorization. Further research has uncovered correspondence between the Corps and Congress (copy enclosed) dated November 16, 1987, which states that Lido Key and other projects would be deauthorized as of December 31, 1989 unless funds for construction of the project were obligated prior to that date.

Public Law 99-662 states that "The Secretary shall publish in the Federal Register a list of any projects or separable elements that are deauthorized under this section" (copy enclosed). Our search of the Federal Register for calendar years 1987 through 1990, however, has not uncovered such a listing for any deauthorized project, including Lido Key.

Office of City Manager
Post Office Box 1058, Sarasota, Florida 34230
1565 First Street, Sarasota, Florida 34236
Telephone (813) 954-4102 • Suncom 949-4102 • Fax (813) 954-4129

The Honorable Martin Lancaster
February 16, 1996
Page Two

I request that you ask your staff to determine if and when such notice was published in the Federal Register. If it was not published, the City of Sarasota could not have been informed of the impending deauthorization of the Lido Key project. Had we been so informed, we would have taken action to seek a congressional appropriation of funds for this project.

I appreciate your prompt attention to this matter.

Sincerely,

David R. Sollenberger
City Manager

DRS/ch

c: Representative Dan Miller
Senator Bob Graham
Senator Connie Mack

Committee on Transportation and Infrastructure
Congress of the United States
House of Representatives
Room 2165, Rayburn House Office Building
Washington, DC 20515
Telephone: Area Code (202) 225-9446

COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE
U.S. HOUSE OF REPRESENTATIVES
WASHINGTON, D.C.

RESOLUTION

Docket 2458

Lido Key, Sarasota County, Florida

Resolved by the Committee on Transportation and Infrastructure of the United States House of Representatives, That, the Secretary of the Army is requested to review the report of the Chief of Engineers on Lido Key, Sarasota, Florida, published as House Document 320, 91st Congress, 2nd Session, with a view to determining the advisability of providing hurricane and storm damage reduction works.

Adopted: September 14, 1995

ATTEST: Bud Shuster
BUD SHUSTER, CHAIR

COASTAL PLANNING & ENGINEERING, INC.

COASTAL & OCEAN ENGINEERING
COASTAL SURVEYS
BIOLOGICAL STUDIES
GEOTECHNICAL SERVICES

BOCA RATON: 2481 N.W. BOCA RATON BOULEVARD, BOCA RATON, FL 33431 (407) 391-8102 TELEFAX: (407) 391-9116
JACKSONVILLE: 1542 KINGSLEY AVENUE, SUITE 142E, ORANGE PARK, FL 32073 (904) 264-5039 TELEFAX: (904) 264-5039
TOMS RIVER: 250 WASHINGTON STREET, SUITE B, TOMS RIVER, NJ 08753 (908) 244-3366 TELEFAX: (908) 244-3664

8486.12

July 28, 1995

Ms. Alice Heathcock
Division of State Lands
Florida Department of Environmental Protection
3900 Commonwealth Boulevard
Mail Station 125
Tallahassee, FL 32399

RE: File No. 582063449, City of Sarasota - Lido Key Beach Nourishment Project

Dear Ms. Heathcock:

Enclosed is the pertinent geotechnical data obtained during the investigation of revised borrow areas for the referenced project; as well as isopach and bathymetric permit sketches for each borrow area. As I stated in my June 14, 1995 letter, the proposed borrow areas we wish to use for the project are located due west of Lido Key at a distance of approximately five (5) and six (6) miles offshore, respectively.

The borrow areas have been revised to avoid any potential conflicts which could arise from use of shoal sand at New Pass.

If you have any questions, please contact me.

Sincerely,

COASTAL PLANNING & ENGINEERING, INC.

Richard H. Spadoni

Richard H. Spadoni
Vice President

RHS/ys

cc: Dennis Daughters, Sarasota
Robert Brantley, DEP-BBCS
Eric Bush, DEP-Water Resources
Richard Bonner, USACE
Craig Kruempel, CPE
Tom Campbell, CPE

COASTAL PLANNING & ENGINEERING, INC.

COASTAL & OCEAN ENGINEERING
COASTAL SURVEYS
BIOLOGICAL STUDIES
GEOTECHNICAL SERVICES

BOCA RATON: 2481 N.W. BOCA RATON BOULEVARD, BOCA RATON, FL 33431 (407) 391-8102 TELEFAX: (407) 391-9116
JACKSONVILLE: 1542 KINGSLEY AVENUE, SUITE 142E, ORANGE PARK, FL 32073 (904) 264-5039 TELEFAX: (904) 264-5[illegible]
TOMS RIVER: 250 WASHINGTON STREET, SUITE B, TOMS RIVER, NJ 08753 (908) 244-3366 TELEFAX: (908) 244-[illegible]

8486.12

July 28, 1995

Mr. Robert M. Brantley, P.E.
Florida Department of Environmental Protection
Division of Environmental Resources Permitting
Bureau of Beaches and Coastal Systems
Coastal Protection and Engineering Section
Mail Station 310
3900 Commonwealth Boulevard
Tallahassee, FL 32399

RE: File No. DBS910292, City of Sarasota - Lido Key Beach Nourishment Project

Enclosed is the pertinent geotechnical data obtained during the investigation of revised borrow areas for the referenced project; as well as isopach and bathymetric permit sketches for each borrow area. As I stated in my June 14, 1995 letter, the proposed borrow areas we wish to use for the project are located due west of Lido Key at a distance of approximately five (5) and six (6) miles offshore, respectively.

The borrow areas have been revised to avoid any potential conflicts which could arise from use of shoal sand at New Pass.

If you have any questions, please contact me.

Sincerely,

COASTAL PLANNING & ENGINEERING, INC.

Richard H. Spadoni

Richard H. Spadoni
Vice President

cc: Dennis Daughters, Sarasota
✓Richard Bonner, USACE
Eric Bush, DEP-Water Resources
Alice Heathcock, DEP-State Lands

LK01:INSPECT.FNL

COASTAL PLANNING & ENGINEERING, INC.

COASTAL & OCEAN ENGINEERING
COASTAL SURVEYS
BIOLOGICAL STUDIES
GEOTECHNICAL SERVICES

BOCA RATON: 2481 N.W. BOCA RATON BOULEVARD, BOCA RATON, FL 33431 (407) 391-8102 TELEFAX: (407) 391-9116
JACKSONVILLE: 1542 KINGSLEY AVENUE, SUITE 142E, ORANGE PARK, FL 32073 (904) 264-5039 TELEFAX: (904) 264-5039
TOMS RIVER: 250 WASHINGTON STREET, SUITE B, TOMS RIVER, NJ 08753 (908) 244-3366 TELEFAX: (908) 244-3664

8486.12

June 14, 1995

Mr. Robert M. Brantley, P.E.
Florida Department of Environmental Protection
Division of Environmental Resources Permitting
Bureau of Beaches and Coastal Systems
Coastal Protection and Engineering Section
Mail Station 310
3900 Commonwealth Boulevard
Tallahassee, FL 32399

RE: File No. DBS910292, City of Sarasota - Lido Key Beach Nourishment Project

Dear Mr. Brantley:

This is to revise our permit application for the Lido Key Beach Nourishment Project. Due to Bureau concerns related to the use of ebb shoal sand at New Pass, the City of Sarasota commissioned an offshore sand search west of Lido Key. Two (2) sand deposits suitable for use in the Lido Key project have been identified. We wish to substitute the offshore borrow areas for the New Pass ebb shoal borrow area. This substitution will eliminate the Bureau's concerns related to use of the ebb shoal sand at New Pass.

Enclosed is the pertinent geotechnical data obtained during the investigation of these sites; as well as a permit sketch which shows the location of the borrow areas. The proposed borrow areas are located due west of Lido Key at a distance of approximately five (5) and six (6) miles, respectively.

If you have any questions, please contact me.

Sincerely,

Richard H. Spadoni

Richard H. Spadoni

cc: Dennis Daughters, Sarasota
Richard Bonner, USACE
Eric Bush, DEP-Water Resources
Alice Heathcock, DEP-State Lands
Craig Kruempel, CPE
Tom Campbell, CPE

WC03:cm1002

COASTAL PLANNING & ENGINEERING, INC.

COASTAL & OCEAN ENGINEERING
COASTAL SURVEYS
BIOLOGICAL STUDIES
GEOTECHNICAL SERVICES

BOCA RATON: 2481 N.W. BOCA RATON BOULEVARD, BOCA RATON, FL 33431 (407) 391-8102 TELEFAX: (407) 391-9116
JACKSONVILLE: 1542 KINGSLEY AVENUE, SUITE 142E, ORANGE PARK, FL 32073 (904) 264-5039 TELEFAX: (904) 264-5039
TOMS RIVER: 250 WASHINGTON STREET, SUITE B, TOMS RIVER, NJ 08753 (908) 244-3366 TELEFAX: (908) 244-3

8486.12

June 14, 1995

Ms. Alice Heathcock
Division of State Lands
Florida Department of Environmental Protection
3900 Commonwealth Boulevard
Mail Station 125
Tallahassee, FL 32399

RE: File No. 582063449, City of Sarasota - Lido Key Beach Nourishment Project

Dear Ms. Heathcock:

This is to request easement approval of the enclosed borrow areas for the Lido Key Beach Nourishment Project. The request for a borrow area easement at New Pass is withdrawn. The New Pass borrow area has been deleted from the project due to concerns of the Bureau of Beaches and Coastal Systems staff related to use of the ebb shoal for the project. The proposed borrow areas are located due west of Lido Key at a distance of approximately five (5) and six (6) miles offshore, respectively.

If you have any questions, please contact me.

Sincerely,

Richard H Spadoni

Richard H. Spadoni

cc: Dennis Daughters, Sarasota
Robert Brantley, DEP-BBCS
Eric Bush, DEP-Water Resources
Richard Bonner, USACE
Craig Kruempel, CPE
Tom Campbell, CPE

WC03:cm1002

DAN MILLER
13TH DISTRICT, FLORIDA

COMMITTEE ON
APPROPRIATIONS

COMMITTEE ON
BUDGET

ASSISTANT MAJORITY
WHIP

Congress of the United States
House of Representatives
Washington, DC 20515-0913

WASHINGTON OFFICE:
117 Cannon House Office Building
Washington, DC 20515-0913
(202) 225-5015

FLORIDA OFFICES:
1751 Mound Street
Suite A-2
Sarasota, FL 34236
(813) 951-6643

2424 Manatee Avenue West
Suite 104
Bradenton, FL 34205
(813) 747-9081

1-800-453-4184
(Available in
813 Area Code)

May 8, 1995

The Honorable Sherwood L. Boehlert
U.S. House of Representatives
1127 Longworth HOB
Washington, DC 20515-3225

Dear Sherry:

I am writing to respectfully request that the Subcommittee on Water Resources and the Environment consider a survey resolution that would enable the U.S. Army Corps of Engineers to determine the advisability of performing work related to hurricane and storm protection for Lido Key in the city of Sarasota, Florida. Following is suggested language for the survey resolution.

> "Resolved by the Committee on Transportation and Infrastructure of the United States House of Representatives that the Secretary of the Army review the report of the Chief of Engineers on Lido Key, Sarasota, Florida, published as House Document No. 320, Ninety-First Congress, second session, with a view to determining the advisability of providing hurricane and storm damage reduction works."

Lido Key is a barrier island primarily composed of a public recreation beach and commercial property, with tourism as its major industry. There is some residential property on the southern third, and several single family dwellings on the north end of the island. Severe erosion problems are threatening infrastructure on the barrier island, including electrical systems and the island's major egress route. Until recent years, this erosion was controlled through Army Corps dredging. However, the damage caused by a missed dredging has severely threatened the health of the beach, and the infrastructure and property it protects.

Thank you for your consideration of this matter. If I may provide additional information, please do not hesitate to contact me.

Sincerely,

Dan

Dan Miller
Member of Congress

Bob Graham
Florida

United States Senate

Washington, D.C.

Date 2/20/95

Colonel Terry L. Rice
Army Corps of Engineers
Post Office Box 4970
Jacksonville, Florida 32232-0019

Enclosed is a letter from one of my constituents who has concerns which come under the jurisdiction of your agency.

I would appreciate your reviewing the information that has been presented and providing me with a written response. Please send your reply to the attention of:

Ms. Pat Grisé
Office of Senator Bob Graham
P.O. Box 3050
Tallahassee, FL 32315

904-422-6100

Your cooperation and assistance are appreciated.

With kind regards,

Sincerely,

Bob Graham

United States Senator

Constituent's Name: [illegible]

2. 95

May 2, 1995

Planning Division
Plan Formulation Branch
Coastal Section

Honorable Dan Miller
House of Representatives
Washington, DC 20515

Dear Mr. Miller:

This is in response to a request from Ms. Danielle Doane of your Washington staff for a draft Congressional resolution for a beach erosion control study for Lido Key in Sarasota County, Florida. The draft resolution is enclosed.

Please see the note added clarifying that this is a drafting service only.

Sincerely,

SIGNED: Richard E. Bonner

Richard E. Bonner, P.E.
Deputy District Engineer
For Project Management

Enclosure

Copies Furnished:

Commander, U.S. Army Corps of Engineers (CECW-PE)
Commander, South Atlantic Division (CESAD-EP)

bcc:
CESAJ-DP

CITY OF SARASOTA

OFFICE OF THE MAYOR
AND CITY COMMISSION
Nora Patterson
Mayor

Vice Mayor David E. Merrill
Commissioner Fredd Atkins
Commissioner Gene M. Pillot
Commissioner Mollie C. Cardamone

January 27, 1995

The Honorable Senator Graham
United States Senate
524 Hart Senate Office Building
Washington, D.C. 20510

Dear Senator Graham:

The City of Sarasota is engaged in the first stage of a beach renourishment project which is vital to the City's economy. As you know, Lido Beach is our primary public beach for both full-time residents and visitors to the City. In recent years, however, serious erosion has endangered this beach and the significant amount of commercial and residential property that is adjacent to the beach. In an effort to provide some immediate relief, the City reached an agreement with the Army Corps of Engineers several years ago to place a portion of the sand dredged from New Pass on Lido Beach. At the time this was done, all parties involved knew that it would involved only a short-term solution to the erosion of the beach.

Since that time, the City has been engaged in developing a program that has the support of the community which will provide for the reconstruction of a more stable beach. The project will require a combination of federal, state and local funds. It had been our original intention to fund this project from State and local resources only, due to the length of time it usually takes to get a federal authorization for a project such as this. However, we have been informed that the State will not fund this project without federal participation.

On behalf of the City, I request your assistance in taking whatever action is necessary to obtain an authorization for this project. Given the condition of Lido Beach, it is our sincere hope that the authorization process can be expedited as quickly as possible. We will do everything within our power to assist in this effort.

I am grateful for your consideration of this request and will look forward to hearing from you.

Sincerely,

Nora Patterson

Nora Patterson,
Mayor

xc: City Commissioners
David R. Sollenberger, City Manager
Dennis Daughters, P.E., City Engineer

b:\letter10\dennis\lidodele.np

POST OFFICE BOX 1058 / SARASOTA, FLORIDA 34230
1565 FIRST STREET, SARASOTA, FLORIDA 34236
TELEPHONE: 813 / 954-4115 SUNCOM: 949-1211 FAX: 813 / 954-4121

DEPARTMENT OF THE ARMY
OFFICE OF THE ASSISTANT SECRETARY
WASHINGTON, DC 20310

10 NOV 1987

Honorable James C. Wright, Jr.
Speaker of the House of Representatives
Washington, D.C. 20515-4312

Dear Mr. Speaker:

I am pleased to provide you with my first report required by Section 1001 of Public Law 99-662. Section 1001 requires an annual submission to Congress of a list of projects which have been authorized, but for which no funds have been obligated during the preceeding ten full fiscal years. This first report lists 363 projects or separable elements of projects that meet this criterion. This list may not represent all of the projects or incomplete portions of projects currently eligible for deauthorization. An in-depth review will be undertaken and any others will be included in my next report. The projects listed are by state and alphabetically by name within each state for ease of use. A copy of Section 1001 is enclosed for your information.

The law provides that each study on this list be deauthorized on December 31, 1989, unless funds have been obligated for construction prior to December 31, 1989.

Sincerely,

(Signed)

John S. Doyle, Jr.
Acting Assistant Secretary of the Army
(Civil Works)

Enclosure

TITLE X—PROJECT DEAUTHORIZATIONS

SEC. 1001. (a) Any project authorized for construction by this Act shall not be authorized after the last day of the 5-year period beginning on the date of enactment of this Act unless during such period funds have been obligated for construction, including planning and designing, of such project. 33 USC 579a.

(b)(1) Not later than one year after the date of enactment of this Act, the Secretary shall transmit to Congress a list of unconstructed projects, or unconstructed separable elements of projects, which have been authorized, but have received no obligations during the 10 full fiscal years preceding the transmittal of such list. A project or separable element included in such list is not authorized after December 31, 1989, if funds have not been obligated for construction of such project or element after the date of enactment of this Act and before December 31, 1989.

(2) Every two years after the transmittal of the list under paragraph (1), the Secretary shall transmit to Congress a list of projects or separable elements of projects which have been authorized, but have received no obligations during the 10 full fiscal years preceding the transmittal of such list. A project or separable element included in such list is not authorized after the date which is 30 months after the date the list is so transmitted if funds have not been obligated for construction of such project or element during such 30-month period.

(c) The Secretary shall publish in the Federal Register a list of any projects or separable elements that are deauthorized under this section.

APPENDIX G

SECTION 902 SPREADSHEETS

CESAJ-DP | LIDO KEY (RENOURISHMENT) | 24 October 2002 (902LIDOKEYREN.XLS)

Table P-4

MAXIMUM COST INCLUDING INFLATION THROUGH CONSTRUCTION

(Oct 02 Price Level)

Line 1		
a.	Current Project estimate at current price levels:	59,580
b.	Current project estimate, inflated through construction:	167,654
c.	Ratio: Line 1b / line 1a	2.8139
d.	Authorized cost at current price levels: Column (h) plus (i) from table P-3	32,892
e.	Authorized cost, inflated through construction: Line c x Line d	92,556
Line 2	Cost of modifications required by law:	0
Line 3	20 percent of authorized cost: .20 x (table P-3, columns (f) + (g)	6,020
Line 4	**Maximum cost limited by Section 902:** Line 1e + line 2 + line 3	**98,576**

Table P-3

FY	Current Project Cost			Current Sched (%)		Authorized Cost Sched		Auth Cost Inflat	
	Total (a)	Constr (b)	R.E. (c)	Constr (d)	R.E. (e)	Constr (f)	R.E. (g)	Constr (h)	R.E. (i)
94	0	0	0	0.00	0.00	0	0	0	0
95	0	0	0	0.00	0.00	0	0	0	0
96	0	0	0	0.00	0.00	0	0	0	0
97	0	0	0	0.00	0.00	0	0	0	0
98	0	0	0	0.00	0.00	0	0	0	0
99	0	0	0	0.00	0.00	0	0	0	0
00	0	0	0	0.00	0.00	0	0	0	0
01	0	0	0	0.00	0.00	0	0	0	0
02	0	0	0	0.00	0.00	0	0	0	0
Balance to complete	59580	59580	0.01	100.00	100.00	30100	0	32892	0
Total	59580	59580	0.01	100.00	100.00	30100	0.01	32892	0

Table P-1
CWCCIS INDEX

Item	(b)	(c)	Index (d)	Yearly Inflat Rate (e)	Cumul Inflat Rate (f)	Cumul rate to Begin FY (g)	One Half rate of Infl FY (h)	Tot Allow Inflat for FY (i)
Date of Price Level		10/06/02						
Authorized Estimate		30100	529.86		1			1
First fiscal year		00		0.0300268		1	1.015013	2.0150134
1st qtr, 2nd yr	00		545.77		1.0300268			
Second fiscal year		01		0.03001264		1.0300268	1.015006	2.0450331
1st qtr, 3rd yr	01		562.15		1.06094063			
Third fiscal year		02		0.029992		1.06094063	1.014996	1.0768505
1st qtr, 4th yr	02		579.01		1.09276035			
Fourth fiscal year		03		0.02999948		1.09276035	1.015	1.1091515
1st qtr, 5th yr	03		596.38		1.1255426			
Fifth fiscal year		04		0		1.1255426	1	1.1255426
1st qtr, 6th yr	04		596.38		1.1255426			
Sixth fiscal year		05		0		1.1255426	1	1.1255426
1st qtr, 7th yr	05		596.38		1.1255426			
Seventh fiscal year		06		0		1.1255426	1	1.1255426
1st qtr, 8th yr	06		596.38		1.1255426			

Table P-2
CPI INDEX

Item	(b)	(c)	Index (d)	Yearly Inflat Rate (e)	Cumul Inflat Rate (f)	Cumul rate to Begin FY (g)	One Half rate of Infl FY (h)	Tot Allow Inflat for FY (i)
Date of Price Level Authorized Estimate		10/06/02 30100	177.5		1			
First fiscal year		00		0.03605634		1	1.018028	1.0180282
1st qtr, 2nd yr	00		183.9		1.03605634			
Second fiscal year		01		0.04458945		1.03605634	1.022295	1.0591549
1st qtr, 3rd yr	01		192.1		1.08225352			
Third fiscal year		02		0.02550755		1.08225352	1.012754	1.0960563
1st qtr, 4th yr	02		197		1.10985915			
Fourth fiscal year		03		0		1.10985915	1	1.1098592
1st qtr, 5th yr	03		197		1.10985915			
Fifth fiscal year		04		0		1.10985915	1	1.1098592
1st qtr, 6th yr	04		197		1.10985915			
Sixth fiscal year		05		0		1.10985915	1	1.1098592
1st qtr, 7th yr	05		197		1.10985915			
Seventh fiscal year		06		0		1.10985915	1	1.1098592
1st qtr, 8th yr	06		197		1.10985915			

CESAJ-DP | LIDO KEY (INITIAL CONSTRUCTION) | 24 October 2002 (902LIDOKEYINIT.XLS)

Table P-4

MAXIMUM COST INCLUDING INFLATION THROUGH CONSTRUCTION

(Oct 02 Price Level)

Line 1		
a.	Current Project estimate at current price levels:	12,677
b.	Current project estimate, inflated through construction:	13,762
c.	Ratio: Line 1b / line 1a	1.0856
d.	Authorized cost at current price levels: Column (h) plus (i) from table P-3	5,682
e.	Authorized cost, inflated through construction: Line c x Line d	6,169
Line 2	Cost of modifications required by law:	0
Line 3	20 percent of authorized cost: .20 x (table P-3, columns (f) + (g)	1,040
Line 4	**Maximum cost limited by Section 902:** Line 1e + line 2 + line 3	**7,209**

Table P-3

FY	Current Project Cost			Current Sched (%)		Authorized Cost Sched		Auth Cost Inflat	
	Total (a)	Constr (b)	R.E. (c)	Constr (d)	R.E. (e)	Constr (f)	R.E. (g)	Constr (h)	R.E. (i)
94	0	0	0	0.00	0.00	0	0	0	0
95	0	0	0	0.00	0.00	0	0	0	0
96	0	0	0	0.00	0.00	0	0	0	0
97	0	0	0	0.00	0.00	0	0	0	0
98	0	0	0	0.00	0.00	0	0	0	0
99	0	0	0	0.00	0.00	0	0	0	0
00	0	0	0	0.00	0.00	0	0	0	0
01	0	0	0	0.00	0.00	0	0	0	0
02	0	0	0	0.00	0.00	0	0	0	0
Balance to complete	12677	12332	345	100.00	100.00	5200	0	5682	0
Total	12677	12332	345	100.00	100.00	5200	0.01	5682	0

Table P-1
CWCCIS INDEX

Item	(b)	(c)	Index (d)	Yearly Inflat Rate (e)	Cumul Inflat Rate (f)	Cumul rate to Begin FY (g)	One Half rate of Infl FY (h)	Tot Allow Inflat for FY (i)
Date of Price Level		10/06/02						
Authorized Estimate		5200	529.86		1			1
First fiscal year		00		0.0300268		1	1.015013	2.0150134
1st qtr, 2nd yr	00		545.77		1.0300268			
Second fiscal year		01		0.03001264		1.0300268	1.015006	2.0450331
1st qtr, 3rd yr	01		562.15		1.06094063			
Third fiscal year		02		0.029992		1.06094063	1.014996	1.0768505
1st qtr, 4th yr	02		579.01		1.09276035			
Fourth fiscal year		03		0.02999948		1.09276035	1.015	1.1091515
1st qtr, 5th yr	03		596.38		1.1255426			
Fifth fiscal year		04		0		1.1255426	1	1.1255426
1st qtr, 6th yr	04		596.38		1.1255426			
Sixth fiscal year		05		0		1.1255426	1	1.1255426
1st qtr, 7th yr	05		596.38		1.1255426			
Seventh fiscal year		06		0		1.1255426	1	1.1255426
1st qtr, 8th yr	06		596.38		1.1255426			

Table P-2
CPI INDEX

Item	(b)	(c)	Index (d)	Yearly Inflat Rate (e)	Cumul Inflat Rate (f)	Cumul rate to Begin FY (g)	One Half rate of Infl FY (h)	Tot Allow Inflat for FY (i)
Date of Price Level		10/06/02						
Authorized Estimate		5200	177.5		1			
First fiscal year		00		0.03605634		1	1.018028	1.0180282
1st qtr, 2nd yr	00		183.9		1.03605634			
Second fiscal year		01		0.04458945		1.03605634	1.022295	1.0591549
1st qtr, 3rd yr	01		192.1		1.08225352			
Third fiscal year		02		0.02550755		1.08225352	1.012754	1.0960563
1st qtr, 4th yr	02		197		1.10985915			
Fourth fiscal year		03		0		1.10985915	1	1.1098592
1st qtr, 5th yr	03		197		1.10985915			
Fifth fiscal year		04		0		1.10985915	1	1.1098592
1st qtr, 6th yr	04		197		1.10985915			
Sixth fiscal year		05		0		1.10985915	1	1.1098592
1st qtr, 7th yr	05		197		1.10985915			
Seventh fiscal year		06		0		1.10985915	1	1.1098592
1st qtr, 8th yr	06		197		1.10985915			