October 2002
w/ April 2004 Addendum

SARASOTA COUNTY, FLORIDA HURRICANE AND STORM DAMAGE REDUCTION PROJECT

LIDO KEY

FEASIBILITY REPORT WITH ENVIRONMENTAL ASSESSMENT

U. S. ARMY CORPS
OF ENGINEERS
Jacksonville District

DEPARTMENT OF THE ARMY
OFFICE OF THE CHIEF OF ENGINEERS
WASHINGTON, D.C. 20314-1000

REPLY TO
ATTENTION OF:

CECW-SAD (1105-2-10a)

22 DEC 2004

SUBJECT: Lido Key, Sarasota County, Florida

THE SECRETARY OF THE ARMY

1. I submit, for transmission to Congress, my report on the study of hurricane and storm damage reduction for Lido Key, Sarasota County, Florida. It is accompanied by the report of the district and division engineers. These reports are in full response to the Resolution, Docket 2458, adopted on 14 September 1995, by the Committee on Transportation and Infrastructure of the House of Representatives. The resolution requested the Secretary of the Army to determine the advisability of providing a hurricane and storm damage reduction project for Lido Key.

2. A shore protection project for Lido Key, Sarasota, Florida, was authorized by Section 101 of the Rivers and Harbors Act of 1970. The project was never completed and was subsequently deauthorized on 1 January 1990 in accordance with the provisions of Section 1001(b)(1) of the Water Resources Development Act (WRDA) of 1986. Section 364(2) of WRDA 1999 reauthorized the project subject to a determination by the Assistant Secretary of the Army (Civil Works) that the project is technically sound, environmentally acceptable, and economically justified. The currently authorized project provides for a 25-foot berm over a 6,200-foot-long (1.2 miles) reach along the shoreline of Lido Key and for periodic nourishment for a 50-year period. The total authorized first cost of the project was $5,200,000, and the authorized average annual cost of periodic nourishment was $602,000.

3. The reporting officers recommend modification of the Lido Key, Sarasota, Florida, shore protection project. The modified project provides for initial construction and periodic nourishment of an 80-foot-wide beach berm at elevation +5 feet National Geodetic Vertical Datum over 1.56 miles of shoreline, with a groin field at the southern limits of the project. Periodic nourishment, accomplished at 5-year intervals, would optimize net benefits over the 50-year period of analysis. The estimated volume of fill for initial project construction is 1,074,700 cubic yards, which includes placement of 614,500 cubic yards for the first nourishment. The source of fill material is three borrow areas located between 7.2 and 9.5 nautical miles offshore.

The project was designed to avoid and minimize adverse environmental effects such that no mitigation is required.

4. Based on October 2004 price levels, the total first cost for construction of the recommended plan is $14,809,000. Based upon the requirements of WRDA 1986, as amended, cost sharing for initial construction will be 62.4 percent Federal and 37.6 percent non-Federal based on shoreline ownership and use. The estimated total Federal first cost of construction is $9,088,000 and the estimated total non-Federal first cost of construction is $5,721,000. Total periodic nourishment costs, stated at October 2004 prices, are estimated to be $63,606,000 over the 50-year period following construction. The ultimate project cost, including initial construction and periodic nourishment, is estimated to be $78,415,000 at October 2004 prices. The average annual cost of future periodic nourishment is estimated to be $1,172,700, based on a Federal discount rate of 5.375 percent and a 50-year period of Federal participation in cost sharing. Cost sharing of periodic nourishment would be in accordance with WRDA 1986, as amended, subject to the availability of appropriations. All costs for operation, maintenance, repair, rehabilitation, and replacement of the recommended project are the responsibility of the non-Federal sponsor.

5. The recommended plan is the national economic development plan. Based on October 2003 prices and a Federal discount rate of 5.625 percent, the estimated average annual cost of the recommended plan is $2,039,800, average annual benefits are $5,060,000, and average annual net benefits are $3,020,200. The project's benefit-to-cost ratio is 2.5 to 1.0.

6. Washington level review indicates that the project is technically sound, environmentally acceptable, and economically justified. The plan conforms with essential elements of the U.S. Water Resources Counsel's Economic and Environmental Principles for Water and Related Land Resources Implementation studies and complies with other administration and legislative policies and guidelines. Also, the views of interested parties, including Federal, State, and local agencies have been considered.

7. The current project is significantly different than the project authorized by Section 364(2) of the WRDA of 1999 and exceeds the maximum project cost allowed by Section 902 of the WRDA of 1986. I concur with the findings, conclusions, and recommendation of the reporting officers. Accordingly, I recommend that the authorized project for hurricane and storm damage reduction for Lido Key, Sarasota County, Florida, be modified generally in accordance with the reporting officers' recommended plan, with such modifications as in the discretion of the Chief of Engineers may be advisable. My recommendation is subject to cost sharing, financing, and other applicable requirements of Federal and State laws and policies, including the WRDA of 1986, as amended, and in accordance with the following local cooperation requirements which the non-Federal sponsor must agree to prior to project implementation:

a. Provide 35 percent of initial project costs assigned to hurricane and storm damage reduction, plus 50 percent of initial project costs assigned to protecting undeveloped public lands, plus 50 percent of initial project costs assigned to recreation, plus 100 percent of initial project costs assigned to protecting undeveloped private lands and other private shores which do not provide public benefits; and 50 percent of periodic nourishment costs assigned to hurricane and storm damage reduction, plus 100 percent 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 which provides, prior to execution of the project cooperation agreement, 25 percent of design costs;

(2) Provide, during the first year of 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 all relocations determined by the Federal Government to be necessary for the initial construction, periodic nourishment, operation, and maintenance of the project;

(4) Provide, during construction, any additional amounts as are necessary to make its total contribution equal to 35 percent of initial project costs assigned to hurricane and storm damage reduction plus 100 percent of initial project costs assigned to protecting undeveloped private lands and other private shores which do not provide public benefits and 50 percent of periodic nourishment costs assigned to hurricane and storm damage reduction plus 100 percent of periodic nourishment costs assigned to protecting undeveloped private lands and other private shores which do not provide public benefits;

b. 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 percent of the total amount authorized to be appropriated for the project, in accordance with the cost sharing provisions of the agreement;

c. Do not use Federal funds to meet the non-Federal Sponsor's share of total project costs unless the Federal granting agency verifies in writing that the expenditure of such funds is authorized;

d. Operate, maintain, repair, replace and rehabilitate the project, or functional portion of the project, including mitigation, 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;

e. Give the Federal Government a right to enter, at reasonable times and in a reasonable manner, upon property that the Non-Federal Sponsor, now or hereafter, owns or controls for access to the project for the purpose of inspecting, operating, maintaining, repairing, replacing, rehabilitating, or completing the project. No completion, operation, maintenance, repair, replacement, or rehabilitation by the Federal Government shall relieve the Non-Federal Sponsor of responsibility to meet the Non-Federal Sponsor's obligations, or to preclude the Federal Government from pursuing any other remedy at law or equity to ensure faithful performance;

f. Hold and save the United States free from all damages arising from the initial construction, periodic nourishment, operation, maintenance, repair, replacement, and rehabilitation of the project and any project-related betterments, except for damages due to the fault or negligence of the United States or its contractors;

g. 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;

h. Assume, as between the Federal Government and the non-Federal Sponsor, 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;

i. Agree that, as between the Federal Government and the Non-Federal Sponsor, 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;

j. For so long as the project remains authorized, the Non-Federal Sponsor shall ensure continued conditions of public ownership and use of the shore upon which the amount of Federal participation is based;

k. Provide and maintain access roads, parking areas, and other public use facilities, open and available to all on equal terms;

l. Prevent obstructions of or encroachments on the project (including prescribing and enforcing regulations to prevent such obstruction or encroachments) which might reduce the level of protection it affords, hinder operation and maintenance or future periodic nourishment, or interfere with its proper function, such as any new developments on project lands or the addition of facilities which would degrade the benefits of the project;

m. Publicize floodplain information in the area concerned and provide this information to zoning and other regulatory agencies for their use in preventing unwise future development in the floodplain, and in adopting such regulations as may be necessary to prevent unwise future development and to ensure compatibility with protection levels provided by the project;

n. 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;

o. Not less than once each year, inform affected interests of the extent of protection afforded by the project;

p. Keep and maintain books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to the project, for a minimum of 3 years after completion of the accounting for which such books, records, documents, and other evidence is required, to the extent and in such detail as will properly reflect total costs of construction of the Project, and in accordance with 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 Code of Federal Regulations (CFR) Section 33.20;

q. Comply with Section 221 of Public Law 91-611, Flood Control Act of 1970, as amended (42 U.S.C. 1962d-5), and Section 103 of the Water Resources Development Act of 1986, Public Law 99-662, as amended (33 U.S.C. 2213), which provides that the Secretary of the Army shall not commence the construction of any water resources project or separable element thereof, until the non-Federal sponsor has entered into a written agreement to furnish its required cooperation for the project or separable element;

r. Comply with all applicable Federal and State laws and regulations, including, but not limited to, Section 601 of the Civil Rights Act of 1964, Public Law 88-352 (42 U.S.C. 2000d), and Department of Defense Directive 5500.11 issued pursuant thereto, as well as Army Regulation 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army", and all applicable Federal

labor standards and requirements, including but not limited to, 40 U.S.C. 3141- 3148 and 40 U.S.C. 3701 – 3708 (revising, codifying and enacting without substantial change the provisions of the Davis-Bacon Act (formerly 40 U.S.C. 276a *et seq.*), the Contract Work Hours and Safety Standards Act (formerly 40 U.S.C. 327 *et seq.*) and the Copeland Anti-Kickback Act (formerly 40 U.S.C. 276c *et seq.*) ;

s. Comply with Section 402 of the Water Resources Development Act of 1986, as amended (33 U.S.C. 701b-12), which requires a Non-Federal interest to participate in and comply with applicable Federal floodplain management and flood insurance programs, prepare a flood plain management plan within one year after the date of signing a Project Cooperation Agreement, and implement the plan not later than one year after completion of construction of the project; and,

t. Comply with all applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended (42 U.S.C. 4601-4655), and the Uniform Regulations contained in 49 CFR Part 24, in acquiring lands, easements, and rights-of-way, necessary 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.

8. The recommendation contained herein reflects the information at this time and current departmental policies governing formulation of individual projects. It does not reflect program and budgeting priorities in the formulation of a national civil works construction program nor the perspective of higher review levels within the executive branch. Consequently, the recommendation may be modified before it is transmitted to the Congress as a proposal for authorization and implementation funding. However, prior to transmittal to the Congress, the sponsor, the State, interested Federal agencies, and other parties will be advised of any significant modifications and will be afforded an opportunity to comment further.

CARL A. STROCK
Lieutenant General, US Army
Chief of Engineers

Errata sheet for Lido Key Feasibility Report, Sarasota County, Florida with EA dated October 2002

Syllabus add the following paragraph:

6. The attached Environmental Assessment (EA) details the comprehensive effort made to scope the project, evaluate all alternatives, and assess impacts. Issues were evaluated in detail and a preferred alternative selected. Environmental effects were evaluated for vegetation, threatened and endangered species, hardgrounds, fish and wildlife resources, essential fish habitat, historic properties, etc. The only mitigation required is to establish a 200-foot buffer zones around hardgrounds near the beach nourishment borrow areas. Additional information can be found in the Environmental Assessment (yellow pages) located at the end of the main report.

Introduction add the following sentence at the end of paragraph 1:

The Environmental Assessment located at the end of this main report details the evaluation of environmental effects on important resources.

Detailed Assessment of Alternative Plans add the following to paragraph 155.

The attached Environmental Assessment (EA) details the comprehensive effort made to evaluate the alternatives and assess impacts. Environmental effects were evaluated for vegetation, threatened and endangered species, hardgrounds, fish and wildlife resources, essential fish habitat, historic properties, etc. See attached EA for more information.

Study Summary add the following to the end of paragraph 200 b.

The attached EA evaluated impacts to the recommended plan and recommended minimal mitigation. A Finding of No Significant Impact has been prepared and signed.

Conclusions add paragraph 211 a.

An EA was prepared (attached to end of the main report) which details the comprehensive effort made to evaluate the alternatives and assess impacts. Environmental effects were evaluated for vegetation, threatened and endangered species, hardgrounds, fish and wildlife resources, essential fish habitat, historic properties, etc. Minimal mitigation requiring the establishment a 200-foot buffer zones around hardgrounds near the beach nourishment borrow areas is proposed. A Finding of No Significant Impact has been prepared and signed.

Recommendations add paragraph 212a.

An EA was prepared (attached to end of the main report) which details the comprehensive effort made to evaluate the alternatives and assess impacts. Minimal mitigation requiring the establishment a 200-foot buffer zones around hardgrounds near the beach nourishment borrow areas is proposed. A Finding of No Significant Impact has been prepared and signed.

CESAJ-PD-PN July 14, 2004

APRIL 2004

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SARASOTA COUNTY, FLORIDA
HURRICANE AND STORM DAMAGE REDUCTION PROJECT
LIDO KEY FEASIBILITY REPORT WITH ENVIRONMENTAL ASSESSMENT

FISCAL YEAR 2003 PERTINENT DATA

PHYSICAL DATA (Project Life = 50 Years)	
Project Length (ft)	8,280
Berm Crest Elevation (ft NGVD)	5
Berm Width Extension from ECL (ft)	80
Foreshore Slope (Berm-MLW)	1 V to 12 H
Nearshore Slope (MLW-existing profile)	1 V to 35 H
Post-placement Erosion Rate (cy/yr)	122,900
Volume of Initial Fill (cy)	1,074,700
Volume of Design Fill (cy)	460,200
Volume of Advance Nourishments (cy)	614,500
Nourishment Interval (yr)	5
FINANCIAL DATA (Interest Rate = 5.625 % October 2002 (FY03) Price Levels)	
INITIAL CONSTRUCTION COSTS (groin and beach)	$14,131,500
INITIAL BEACH FILL CONSTRUCTION COSTS	$10,946,000
EACH FUTURE NOURISHMENT COST	$5.9 – 6.3 million
GROIN CONSTRUCTION	$3,185,500
INTEREST DURING CONSTRUCTION (IDC)	$861,100
ANNUAL PROJECT COSTS	
Interest and Amortization	
Initial Construction (with IDC, & monitoring)	$901,800
Future Beach Fill Nourishment (includes Monitoring costs for construction)	$1,083,800
Groin Maintenance & Inspection (sponsor)	$17,300
Future Beach Monitoring(sponsor)	$12,500
Total Annual Project Costs:	$2,015,400
PRIMARY BENEFITS	
Prevention of Damage to	Reach 2 & Reach 3
Upland Development	$3,763,800
Coastal Armor	$38,400
Backfill	$304,300
Loss of Land	$854,200
Total Annual Project Benefits:	$4,960,700
BENEFIT – TO – COST RATIO	2.5[1]
PROJECT COST SHARING, INITIAL CONSTR.	
Percent (%): Federal	62.4%
Non-Federal	37.6%
Dollars($): Federal	$8,671,900
Non-Federal	$5,459,600

[1] Benefit-To-Cost Ratio includes Interest During Construction

SARASOTA COUNTY, FLORIDA
HURRICANE AND STORM DAMAGE REDUCTION PROJECT
LIDO KEY FEASIBILITY REPORT WITH ENVIRONMENTAL ASSESSMENT

FISCAL YEAR 2004 PERTINENT DATA

PHYSICAL DATA (Project Life = 50 Years)			
Project Length (ft)	8,280		
Berm Crest Elevation (ft NGVD)	5		
Berm Width Extension from ECL (ft)	80		
Foreshore Slope (Berm-MLW)	1 V to 12 H		
Nearshore Slope (MLW-existing profile)	1 V to 35 H		
Post-placement Erosion Rate (cy/yr)	122,900		
Volume of Initial Fill (cy)	1,074,700		
Volume of Design Fill (cy)	460,200		
Volume of Advance Nourishments (cy)	614,500		
Nourishment Interval (yr)	5		
FINANCIAL DATA (Interest Rate = 5.625 % October 2003 (FY04) Price Levels)			
INITIAL CONSTRUCTION COSTS (groin and beach)	$14,428,100		
INITIAL BEACH FILL CONSTRUCTION COSTS	$11,175,700		
EACH FUTURE NOURISHMENT COST	$6.0 – 6.4 million		
GROIN CONSTRUCTION	$3,252,400		
INTEREST DURING CONSTRUCTION (IDC)	$879,200		
ANNUAL PROJECT COSTS			
Interest and Amortization			
Initial Construction (with IDC, & monitoring)	$902,900		
Future Beach Fill Nourishment (includes Monitoring costs for construction)	$1,106,500		
Groin Maintenance & Inspection (sponsor)	$17,800		
Future Beach Monitoring(sponsor	$12,600		
Total Annual Project Costs:	$2,039,800		
PRIMARY BENEFITS:			
Prevention of Damage to	Reach 2 & Reach 3		
Upland Development	$3,839,100		
Coastal Armor	$39,200		
Backfill	$310,400		
Loss of Land	$871,300		
Total Annual Project Benefits:	$5,060,000		
BENEFIT – TO – COST RATIO	2.5[1]		
PROJECT COST SHARING, INITIAL CONSTR.			
Percent (%): Federal	62.4%		
Non-Federal	37.6%		
Dollars($): Federal	$8,853,900		
Non-Federal	$5,574,200		
SECTION 902 ANALYSIS	*Initial Const.*	*Nourishment*	*Total*
Authorized Project Costs (Includes 20%) ($1,000)	6,935	67,743	74,678
Expected Project Costs ($1,000)	15,116	116,288	131,404
Differences	8,181	48,545	56,726

1 Benefit-To-Cost Ratio includes Interest During Construction

ADDENDUM TO:

SARASOTA COUNTY, FLORIDA
HURRICANE AND STORM DAMAGE REDUCTION PROJECT
LIDO KEY FEASIBILITY REPORT
WITH ENVIRONMENTAL ASSESSMENT DATED OCTOBER 2002

This addendum was prepared in response to Headquarters Policy Compliance Review (PCR) dated 06 March 2003. The Feasibility Review Conference (FRC) for this document was held on 23 April 2002 via Internet and telephone conference. The FRC was documented with a PCR dated 03 May 2003; the PCR outlined HQ's concerns and required changes to the document prior to release for public coordination. On 05 November 2002 the pre-coordinated responses to PCR comments were sent to HQ via the South Atlantic Division office along with the Final Report Submittal Package as outlined in Appendix H of ER 1105-2-100. The Division Engineer released his Public Notice for the project on 03 December 2002. On 06 March of 2003 Headquarters conveyed continued concerns (via memorandum) with a number of the District's responses provided in November of 2002. An initial response from the District in September of 2003 dealt with some of the discrepancies in the report, leaving others that still required further coordination. Teleconferences and emails were used to further coordinate needed actions, these transpired in October and December of 2003 and January 2004. This coordination is documented in the 30 April 2004 PCR memorandum found in the Additional Information Appendix to this addendum.

Instead of making the required changes to the main report and supporting appendices, it was agreed upon to generate this addendum in order to capture Headquarters' intent. The following text and tables have been generated to document the results of the Policy Compliance review. Information contained within the main report and appendices reflect information as of October 2002; this addendum updates benefits and costs and incorporates changes as required per the PCR. The Pertinent Data numbers presented at the beginning of this text have all been updated in accordance with the changes reflected in this addendum.

Background

The Lido Key Hurricane and Storm Damage Reduction Study area comprises 2.4 miles of the Lido Key Gulf of Mexico shoreline. The island, approximately 45 miles south of Tampa, is separated from Longboat Key to the north by New Pass and from Siesta Key to the south by Big Sarasota Pass. Sarasota Bay and the Intracoastal Waterway separate Lido Key from the mainland. A hurricane and storm damage reduction project for Lido Key, Florida was authorized by the

December 31, 1970 River and Harbor Act for the mid-section of Lido Key's Gulf of Mexico shoreline and for periodic nourishment on an as-needed basis. Federal participation was limited to an initial period of 10 years. The project was never completed and was subsequently deauthorized in House Document 91-320 on January 1, 1990. Resolution, Docket 2458, adopted September 14, 1995, by the Committee on Transportation and Infrastructure, U.S. House of Representatives, requested the Secretary of the Army to determine the advisability of providing a hurricane and storm damage reduction project for Lido Key. A Reconnaissance Phase Assessment was prepared in January 1997 recommending Federal participation, which lead to the feasibility phase. The project was then authorized once more under Section 364 of the Water Resources Development Act (WRDA) of 1999; this allowed for initial construction of a shore protection project and for periodic renourishment over 50 years of Federal participation. This authorization was contingent upon the Secretary determining that the project is technically sound, environmentally acceptable, and economically justified, as appropriate. That is the purpose of this Feasibility report.

Shoreline Positions Resulting from Long-Term Recession (comment 5b(1) and 6c(2))

Paragraph D-11 of the Economic Appendix should be re-written to read: Future year damages to all susceptible structures is simulated in the storm damage computer program using the existing shoreline as a reference point. As the shoreline position changes with time, damage probability at some time period in the future is referenced to an established existing 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 (which extends the shoreline further seaward) reduces future susceptibility. Because the model is designed to calculate expected damages on a lot-by-lot basis for both armored and unarmored shoreline, the expected shoreline position for unarmored shoreline is input by reach for each year of the period of analysis. Also included as input to the model is information on the type, location, and protective value of coastal armor for each lot. For lots with no coastal armor, an armor index number of 1 indicates no coastal armor. (See revised Tables D-1 & D-2 below). 32 of the 39 lots shown in Table D-3 have coastal armor under existing conditions. In calculating expected damages for those lots and associated structures, the SDM uses the input value for shoreline position for every year of the period of analysis until it is equal to or less than the armor position specified in Table D-3. At that point, shoreline position is held constant, for each of those 32 lots, at the position specified for the existing coastal armor. Similarly, for the 7 unarmored lots, the SDM uses the input value for shoreline position specified in table D-3 is reached. The model then determines that the armor Type 1 (no armor) will be destroyed by any storm event (as it has a protective value of zero) and the replacement armor (also shown in Table D-3) will be constructed at the specified armor location. For 6 of the 7 lots with no coastal armor, replacement

armor type 3 is specified (20' concrete sheetpile). That type of armor is sufficient to halt all long-term erosion, so the shoreline of the 6 lots is held constant at the armor location specified in table D-3 for the remainder of the period of analysis. For the single vacant lot without existing coastal armor, only loss-of-land damages are calculated. That is the only lot for which the input shoreline position is used without restriction by the SDM in the calculation of expected damages.

Table Add-1 - Revised Table D-1 Storm Damage Input Table for Reach 2

Theoretical Shoreline Position

50	21.2								
2000	21.2	2001	42.2	2002	63.3	2003	84.4	2004	105.5
2005	126.6	2006	147.7	2007	168.8	2008	189.9	2009	211
2010	232.1	2011	253.2	2012	274.3	2013	295.4	2014	316.5
2015	337.6	2016	358.7	2017	379.8	2018	400.9	2019	422
2020	443.1	2021	464.2	2022	485.3	2023	506.4	2024	527.5
2025	548.6	2026	569.7	2027	590.8	2028	611.9	2029	633
2030	654.1	2031	675.2	2032	696.3	2033	717.4	2034	738.5
2035	759.6	2036	780.7	2037	801.8	2038	822.9	2039	844
2040	865.1	2041	886.2	2042	907.3	2043	928.4	2044	949.5
2045	970.6	2046	991.7	2047	1012.8	2048	1033.9	2049	1055

Shoreline-Recession Data

0.005	150
0.0067	144
0.01	139
0.02	132
0.04	123
0.05	120
0.1	106
0.2	98
0.5	84
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

The shoreline recession–probability values reported in the economic input tables (D-1 and D-2) were not updated from the time of initial planning to the completion of the Engineering data and final SDM runs, this resulted in a difference from the combined tropical and extra-tropical storm values shown in Table A-21 in the Engineering Appendix. The revised tables for the Economic Appendix are shown below.

Table Add-2 - Revised Table D-2 Storm Damage Input Table for Reach 3

Theoretical 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	228
0.0067	227
0.01	225
0.02	221
0.04	213
0.05	208
0.1	68
0.2	63
0.5	58
1	51

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

Recession Damage Values (comment 5b(3))

Table D-4 of the economic appendix shows a Recession-Damage Relationship as an example. It was noted during the review that for the recession distances between 210 and 380 feet many of the total damage values in the last column do not equal the sum of the other columns for damages to development, backfill, coastal armor, and loss of land. For example, at a distance of 320 feet, the columns total $11,506,709, but the total damages displayed in the last column are $15,803,567. At 360 feet the columns total $20,430,324 but the last column shows a total of $36,349,739, nearly double that value. The recession-damage table has been reviewed and changed due to some columns not summing in the tables. The new tables are the sum of the input damage categories as listed in the tables and is presented in Table Add-3 below.

Damage to Pile-Supported Structures (comment 6a)

Further clarification of the Storm Damage Model's treatment of different structures is included here to provide readers a better picture of how the model works. 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. This damage function is used for one and two story structures with slab-on-grade foundations. For pile structure, full value is reached at the landward limit of the structure. This damage function is used for all structures with deeply embedded pile foundations. It is assumed that all structures of more than two stories will have deeply embedded pile foundations. All structures included in the Lido Key damage inventory are constructed at grade, regardless of whether those structures have pile or slab foundations. There are no structures elevated on piles. 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.

Accounting For Recurring Damages (comment 6c and 6c(1))

The assumptions for the Storm Damage Model, as outlined on pages D-4 and D-5 of the Economic Appendix should be revised to reflect the fact that 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). The SDM is a hybrid of a probabilistic and a life-cycle model. As such, it does not specifically address the question of how many times each structure in the database is likely to be damaged and repaired. Expected damage to each structure for each year of the period of analysis is calculated based on the amount of shoreline recession associated with ten storms with known probabilities of occurrence weighted by those probabilities. Whether or not a given structure is expected to sustain damage from a particular amount of storm-induced recession is a function of the structure's location with respect to the

Table Add-3 – Revised Table D-4

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	92,850	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	2,268,712
250	999,791	2,776,020	80,470	8,748	3,865,029
260	3,128,327	2,844,920	108,944	8,748	6,090,939
270	4,925,882	3,008,980	108,944	8,748	8,052,554
280	5,410,379	3,091,270	112,658	8,748	8,623,055
290	5,991,774	3,316,170	161,883	8,748	9,478,575
300	6,535,709	3,492,970	179,783	8,748	10,217,210
310	7,100,071	3,872,570	184,116	8,748	11,165,505
320	7,520,495	3,960,970	196,496	8,748	11,686,709
330	11,637,353	4,279,210	496,496	8,748	16,421,807
340	12,237,599	4,346,810	223,346	8,748	16,816,503
350	14,811,019	4,513,730	223,346	8,748	19,556,843

Table Add-3 (continued)

Recession in feet	Development	Backfill	Coastal Armor	Loss of Land	Total Damages
360	15,624,220	4,556,110	241,246	8,748	20,430,324
370	31,543,635	4,877,210	241,246	8,748	36,670,839
380	42,279,016	5,611,210	281,521	8,748	48,180,495
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

reference shoreline, the presence of intervening coastal armor, and the protective value of the armor. For reach two, there are only four structures that are not currently protected by coastal armor. It is expected that armor will be constructed to protect those structures by the year 2007 under without project conditions. Even without coastal armor for the first five years of the period of analysis, none of those structures are expected to sustain any damage from a 1-in-10 year probability storm. It is also expected that the new protective armor for those structures will be concrete sheet pile consistent with the existing armor that protects adjacent structures. SDM calculations for reach 2 assume that all structures in the database will be protected by coastal armor sufficient to protect against the 1-in-10 year probability storm event. With the coastal armor in place, 11 of the 25 structures in the reach 2 database are subject to damage by the 1-in-20 year probability storm. An additional 3 structures are subject to damage by the 1-in-100 year probability storm. The total value of the 15 structures subject to damage without a project in reach 2 is $63,078,930 (including only the value of the first two stories for multistory structures). The total value of structures subject to damage without a project in reach 2 (including the total value of multistory structures) is $88,425,490. Similarly, for reach 3 all structures are protected by coastal armor sufficient to protect against the 1-in-5 year probability storm event. All 11 structures in the reach three database are subject to damage by a 1-in-10 year probability storm. The total value of the 11 structures subject to damage without a project in reach 3 is $40,332,305 (including only the value of the first two stories for multistory structures). The total value of structures subject to damage without a project in reach 3 (including the total value of multistory

structures) is $111,843,551. For the total study area, the value of the first two floors of all structures is $103,411,235. The total value of all structures in the study area is $200,269,041. The without project expected annual damages to structures, calculated at $3,763,800, is less than 4 percent of the value of the first two floors and less than 2 percent of the total value of all structures. It is considered reasonable that this amount of damage will be repaired under without project conditions.

Table D-3 of the Economic Appendix has an error in the name of the last column. It should be distance to full value (this is the distance to where full damage of the structure is assumed, for structures with slab on grade it would be ½ the landward distance toward the back of the foundation, for pile supported structures it would be the full distance to the back of the foundation with damages calculated for the first two floors only). Table D-3 has been modified accordingly and is presented as Table Add-4 below.

Land Loss Damages (comment 6d)

The initial set of comments concerning Land Loss Damages dealt with the valuation of nearshore lands. 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. $24 per square foot is the price the land would currently market for under existing conditions; it is the land associated with the lot and there is no data to indicate that the land under the footprint of the building has a different unit cost than land on any side of the building. The entire lot is marketed as nearshore with no distinction on whether or not it is to be used for a building or a sunbathing area. The fact that the land could be used for any number of uses associated with the hotel/condo/residence applies to the reasoning behind the pricing. The value is very much in line, with respect to order of magnitude, with other Federal Shore Protection Projects on the Gulf coast of Florida. A sensitivity analysis to determine the order of magnitude difference between using this nearshore land valuation for storm effects vs. the cost of replacing the material with fill on a cubic yard basis (truck haul) was performed to determine if the land valuation technique is the more conservative approach in determining benefits for this study.

Table Add-4 - Revised Table D-3 Structural Inventory

Name	Value	Lot	Floors	Existing Armor	Replace. Armor	|----------Distances to---------| Armor	Structure	Full Value
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	2	3	3	150	151	152
B'house	1	160	6	4	4	150	260	280
Pool	1	195	2	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	260	330
Condo	11984380	140	3	1	3	240	250	330
Condo	5992190	140	2	1	3	240	260	370
Condo	20387210	160	1	3	3	250	300	550
Parking	1	170	1	1	3	190	350	450
Condo	20706578	220	1	3	3	240	350	470
Vacant	1	90	3	1	1	200	300	460
Condo	3064023	220	6	3	3	200	300	460
Condo	2211883	80	2	3	3	40	60	300
Condo	6687204	410	2	3	3	160	200	240
Condo	11606407	230	1	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

This commercial land value of $24 per square foot was compared to the cost to replace that square foot of material (volumetrically) with beach fill. When one foot of shoreline erodes across one foot of beach length (1 square foot), that erosion is spread throughout the profile length; in the case of Lido Key, averaging across the profiles, this results in the loss of approximately 0.8 cubic yards of material per square foot of beach loss. Then, if it is presumed that after a storm event the eroded material would be replaced with a small beach fill (i.e. truck haul), the unit cost associated with the beach fill can be compared to the $24 per square foot assumed in the storm damage model for loss of land. An MCACES cost estimate was prepared to determine the unit cost for a truck haul beach fill utilizing an upland sand source for this area. In this instance the cost of 1 cubic yard for the beach fill would cost $79.60 per cubic yard, or $64 per square foot of beach. This would relate to the 0.8 cubic yards needed for 1 square foot of beach loss. Therefore, the $24 per square foot assumed in the storm damage model is a more conservative estimate than assuming that the eroded land would be replaced with a beach fill.

Residual Damages (comment 6e)

Contents as well as structures are subject to storm damages from inundation and waves in addition to erosion. Stakeholders need to be advised as to the level of protection afforded by the Federal project, and as part of the items of local cooperation they must regularly inform the community. Therefore, the report should clearly explain any damages that were not evaluated so it is understood by the community what protection they are getting. The SDM does not take into account any damages to structure content. This is a benefit that would not likely be realized without the addition of a dune system or the expense of raising the berm elevation above naturally occurring elevations. Without the addition of a dune system, the project design will not provide much protection from inundation. As shown in Table III-10, the 5.0 ft design berm will be overtopped at a 10-year storm event. The design berm is intended to prevent erosion from undermining the structures and to keep the wave energy away from the developments; some inundation damages may still occur to the contents of the structures.

Section 902 Cost Limits (comment 9a)

The final report contains a detailed presentation of a Section 902 limit analysis and concludes that the 902 limits have been exceeded; this is presented in paragraphs 191 and 192 of the main text. However, there is still concern as to whether the appropriate cost has been identified for the limit on periodic nourishment. ER 1165-2-130, paragraph 7.e regarding periodic nourishment states that Federal participation in periodic nourishment may continue throughout the economic life of the project, but a specified period of time up to 50 years after initiation of construction must be recommended in planning reports. Since the original report recommends nourishment in the 50th year following completion of construction, the last cycle of nourishment may occur near or beyond the limit on Federal participation and may require adjustment. The district reviewed the 50th

year renourishment and agreed that it was in error and should not appear in the analysis. The cost estimate for the year 50 renourishment was removed from the MCACES, but the volume of material in year 45 was doubled as a conservative planning estimate in the event that additional material would be required to carry the project to the 50-year life. The revised Section 902 Analysis is provided at the beginning of this addendum in the Pertinent Data Table.

Monitoring Cost (comment 9b)

One of the other changes to the MCACES deals with the monitoring costs associated with the construction of the project. A number of errors were found in the way the numbers for monitoring and O&M were handled. The monitoring that is proposed (Table III-20 of Main Text) in the intervening years 05 through 07 is required through the permitting process, they are considered construction costs since they have to be done in order to stay compliant with the permitting process. The values for monitoring in Table III-20 have 20% contingency included in the estimates. Monitoring for initial construction should be $529,900 prior to contingency, E&D and S&A being applied. Monitoring for each renourishment should be $113,200 prior to contingency, E&D and S&A. Profit and Overhead were also added to these numbers in the revised MCACES estimate. An additional monitoring cycle was inadvertently added to the initial construction MCACES in the report; this has been removed from the costs.

The AAEQ O&M cost of $16,900 in Table III-21 is poorly defined; since the MCACES renourishment costs already have the monitoring included, that cost is included in the AAEQ cost for future renourishment; the O&M cost shown there, actually accounts for periodic surveys and inspections of the groins that are not accounted for in the actual maintenance of the groins (adding required stone). These inspections and periodic surveys have now been added to the groin O&M costs in the pertinent data tables at the beginning of this addendum. The $62,800 in Table III-20 is for the first year after the first renourishment only and is included in the $16,900. After that first year following the first renourishment, there should be enough data to better predict performance for the 5-year cycle. To ensure that a conservative estimate is presented, this $62,800 monitoring is assumed to occur at the midway point of each future renourishment. The revised AAEQ costs can be found in the Pertinent Data Tables at the beginning of this addendum.

In order to compare benefits and costs at the same price level, it is required that the estimate be reproduced at the October 2002 (FY03) price level. However, an estimate at the October 2003 (FY04) price level is also required for HQ's reporting requirements. The revised MCACES are immediately following this Addendum.

Public Access (comment 9c)

The report, as written, does not give evidence 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. Public access as it relates to project cost sharing has been considered in accordance with ER 1105-2-100. Table III-22 of the Main text displays the cost apportionment analysis developed for the subject study. The sponsor has provided the public access at the locations presented in Figure 1 of this addendum. In February of 2002 the sponsor provided the Corps with their approved permit application for the construction of a public easement near the middle of the reach where the access was a concern. This allowed the District to recalculate the cost sharing for the project. This is what's presented in Table III-22. In addition to the access points, Figure 1 shows the local Trolley Route and stops with respect to the project area. The existing Trolley route allows for stops along the route and provides access to the middle point of the reach. All access points and cost apportionment will be reviewed again prior to the signing of a PCA.

Independent Technical Review (comment 10a)

EC 1165-2-203 specifies that all decision documents (draft or final reports with NEPA documentation) will receive an independent technical review with documentation in a certification and findings, which cites the major issues that were raised and documents how they were resolved, and identifies the technical review team leader and team members. There was a concern over the degree to which ITR comments were addressed in the documentation provided. No responses were documented for the ITR comments on the EA and only 15 of the other 39 comments related to formulation, design and model calibrations had meaningful responses. The A-E's quality certification document for the draft report dated February 2002 is provided, but there is no certification of district working-level ITR of the final documents. It would also be inappropriate for any individual in the district to represent that they have the expertise needed to QA all the technical aspects of a feasibility report. In response to these concerns, it should be noted that the District team members did perform Quality Assurance on the entire report, but that it was poorly documented. Attached to this addendum is an updated ITR package from the consultant along with a certification of review from key District members. The concerns resulting from the ITR were incorporated into the October 2002 document and this updated ITR package is intended to formally close out that ITR.

Items of Non-Federal Cooperation (comment 10b(1))

On page 80 of the main text, the beginning of paragraph 216a(2) should read, "Provide, during the first year of construction, any additional funds needed to cover the non-Federal share of design costs". This change is intended to reflect current policy on payment of additional funds to cover the non-Federal share of PED costs.

Formulation of Project Length (comment 10d)

The project, as described in the report, has a length of 8,280 feet exclusive of the tapers, and a total length of 10,130 feet. The area available to have the most significant long-term shoreline recession is in Reach 2, with significantly less changes in Reach 3 due to it's highly eroded state as shown in Figure A-20 of the engineering appendix. Reach 3 is so severely eroded that that little changes in shoreline position would be noted over the long term due to the shoreline's close proximity to the seawalls. The engineering appendix indicates that the project design accounted for the variation in erosion rates along the shoreline, and provided for the appropriate fill and nourishment quantities. In order to fully comply with Engineering Regulations, an incremental analysis needs to be presented for the project reaches to demonstrate that the optimum project length has been recommended. In addition, a concern was noted that there is no economic evaluation of the recommended tapers to demonstrate that it is more economical to construct them outside of the protected area versus within. This concern is alleviated due to the fact that the tapers are engineering items that reduce the end losses on the beach fill and don't provide any claimed storm damage reduction.

The reaches were originally defined based on the coastal process along the shoreline, not based on their economic value. The delineations can be seen in Figure 2 of this addendum. The reaches of concern are Reaches 2 and 3; Reach 2 extends from the R-35 monument (400 ft north of John Ringling Boulevard) south to R-40; Reach 3 extends from DNR-40 to DNR-43. These reaches are heavily developed with condominiums lining the shoreline. With the relatively short length of all of Lido Key, a large protrubence over a short length (1 mile for Reach 2, 0.5 miles for Reach 3), such as that which would be caused by a SPP construction template, would be subject to very large erosion rates. These accelerated high erosion rates would require large renourishment volumes at a more frequent interval; this is one of the main reasons that the local "band-aid" approaches have not been successful. Reach 2 suffers from a high erosion rate, which has attempted to be addressed by small beach fills in the past. The pumping distance from the borrow area (to the north in the past) makes Reach 2 more economical to place the material (over Reach 3) and then Littoral effects are allowed to move the material down into Reach 3. Aerial photography shows the serious need for material in front of the structures in Reach 3, the narrow beach width in front of these structures provides little room for movement of the shoreline and any accretion that can be found is, in part, due to the large movement of material out of Reach 2 into Reach 3. When looked at from a

volumetric standpoint, Reach 3 suffers from depletion, in volume per foot of beach, on the same order of magnitude as Reach 2. With the narrowed beach width, this results in a lowering of the profile since it can't recede into the seawalls. The Sediment Budget for the area shows a continuous deficit for the areas within the reaches, indicating the need for renourishment.

Starting at the south end of the island, the southern most reach is Reach 4, which lies solely within a park boundary and was not considered due to lack of storm damage benefits. Reach 3, which demonstrates the greatest need for protection, begins with the condominium development immediately to the north of this park and extends 2,745 feet to the north. In order to demonstrate that the total length of beach fill was correctly identified, Reach 3 was broken out and analyzed on it's own merits. Benefits were estimated using the storm damage model for berm widths ranging from 0 to 100 feet on a 20-foot increment. Design volumes and renourishment intervals were re-examined for Reach 3 to generate the associated costs of the different berm widths. This effort was done utilizing planning level volumes and prices that were updated for the purpose of this addendum using existing information. The Economic Analysis has been presented at the interest rate of 5.625% and at October 2002 price levels. The renourishment cycles were estimated using the processes outlined in paragraph 149 of the main text using the same type of analysis shown in Tables III-12 and III-13. Table Add-5 below summarizes the results of this analysis. It demonstrates that the 80-foot berm with a 5-year renourishment interval generates the maximum net benefits for Reach 3.

Table Add-5 - Reach 3 Optimization

EXTENSION	ANNUAL BENEFIT	ANNUAL COST	NET BENEFIT	B/C RATIO
[ft]	[$]	[$]	[$]	
0	2,077,400	1,456,000	621,400	1.4
20	3,010,500	1,478,000	1,532,500	2.0
40	3,119,400	1,490,000	1,629,400	2.1
60	3,579,100	1,507,000	2,072,100	2.4
80	**3,825,600**	**1,525,000**	**2,300,600**	**2.5**
100	3,825,600	1,542,000	2,283,600	2.5

(5.625%, October 2002)

Reach 2 lies immediately to the north of Reach 3; it is 5,535 feet in length. This reach is comprised of condominiums and single-family residences. A large portion of the structures within this reach lie further from the shoreline than those in Reach 3. Structures are an average of 300 feet from the shoreline, compared to 200 feet in Reach 3. The armor in Reach 2 is an average of 180 feet from the shoreline, compared to 145 feet in Reach 3. Adding Reach 2 to the Reach 3 analysis and continuing the 80-foot berm, adds an additional $1,135,100 of average annual benefits to the project. This is achieved with only an additional $386,000 of average annual costs. The cost is based on the additional required

volume for Reach 2 over the 50-year life. This total volume optimized at a 3-year renourishment cycle. This produces an additional $749,100 in Net Benefits, demonstrating that Reach 2 is incrementally justified. This is shown in Table Add-6.

Table Add-6 - Reach 2 Increment Added

BERM EXTENSION [ft]	ANNUAL BENEFIT [$]	ANNUAL COST [$]	NET BENEFIT [$]	B/C RATIO
80	4,960,700	1,911,000	3,049,700	2.6
DIFFERENCE FROM REACH 3 ONLY	1,135,100	386,000	749,100	

(5.625%, October 2002)

In order to fully maximize the beach fill and subsequent renourishments, terminal structures were evaluated for effectiveness on stabilizing the fill. With the relatively short distance covered by this project, and its close proximity to an inlet, end losses from the beach fill are extremely high. The existing sediment budget for this area indicates a 100,000 cy transport rate off the south end of the island. This relatively high transport rate (compared to 17,000 cy for the north end of the island) and the GENESIS shoreline model indicate that a beach fill on this end of the island will experience severe erosion off the end of the project. This will tend to unravel the rest of the project to the north. A terminal groin and a groin field were modeled for end loss effectiveness. The analysis presented in paragraph 171 of the main text demonstrates the cost effectiveness associated with the two options. The groins are not intended to provide any additional storm damage benefits to the project; they are strictly a cost savings to the project. The costs and interest rates were updated for this addendum and are presented in Table Add-7. With a net savings of $292,000, the groin field is the most cost effective solution to the end losses associated with the south end of the project. These savings are realized due to the fact that the groin field will reduce transport off the end of the project by over 50,000 cy per year; with a unit cost of over $5.00 per cubic yard this represents a significant savings to the project over a 50-year life. The reduction in end losses also effects the renourishment cycle; changing the renourishment interval from a 3-year cycle to a 5-year cycle. This reduces the number of mobilizations and further reduces the cost of the project. The groin field will be part of the recommended NED plan.

Table Add-7 - Groin Field Justification

Structure	First Cost of Structure ($)	Annual Cost of Structure* ($)	Reduction in Required Volume** (cy)	Annual Fill Savings ($)	Net Savings ($)
Terminal Groin	1,506,000	102,600	25,800	77,800	-24,800
Groin Field	318,517	207,900	259,000	500,300	292,400

* Includes maintenance

** 3-year renour cycle for Terminal, 5-year for Groin Field

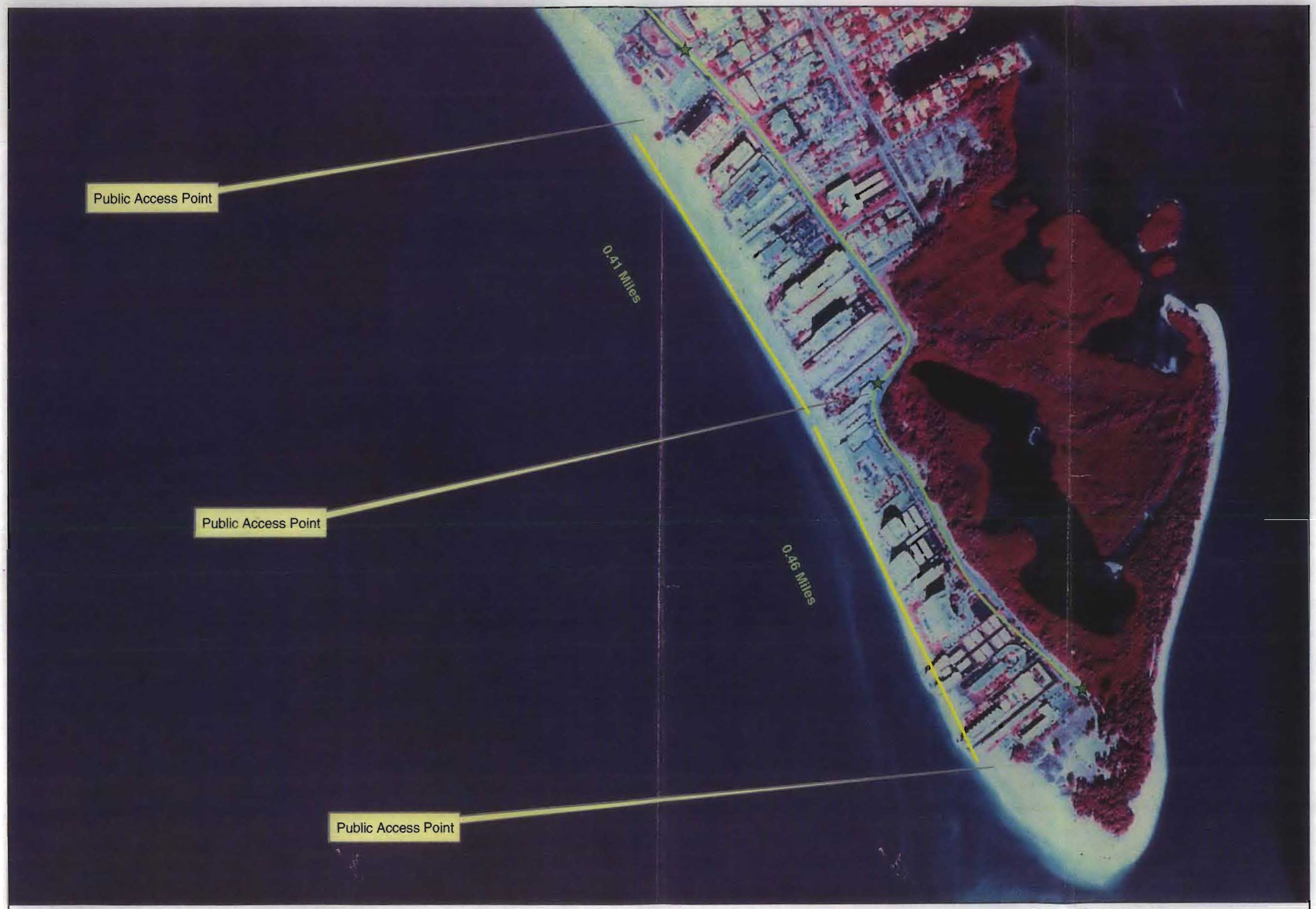
5.625% interest rate over 50 years

The northern terminus of the project experiences littoral movement out of the reach on the order of 30,000 cy per year. This, coupled with the accretional trends in Reach 1 and a larger distance from the inlet, show that terminal structures will not be required on the northern limit of the project.

The tapers at either end of the project are designed based more on engineering data than on economic data, they are built in such a way that the beach fill presents less of a protrubence in the shoreline. The protrubence causes extremely high end losses to a beach fill, the tapers greatly reduce these losses and do present an economic benefit of reducing periodic renourishment volumes, but the design comes from the length/width of the berm, existing bathymetry and shoreline orientation. They are built at the terminus of the Federal project instead of within the project limits, because their reduced width would not provide the same level of storm damage benefits as the design berm. Therefore, benefits are claimed based on the design berm for the project limits, and the tapers go beyond the limits being claimed for benefits since they contribute very little to the storm damage benefits. The placement of a taper on the southern terminus of the project can also be seen as a cost effective engineered solution to end losses. The groin field, if not filled at the time of construction, will be collecting material lost off the end of the design berm until it has reached an equilibrium volume within it's cells. This will cause a reduction in berm volume (therefore benefits) and will require a quicker mobilization for renourishment in order to realize all of the benefits claimed for the project. Filling in those cells at the time of initial construction puts them into equilibrium and will not exacerbate erosion at the end of the design berm. Any benefits to the public park in Reach 4 are merely incidental and are not claimed within the context of this report.

MCACES Cost Estimate (Comment 10e)

The MCACES for the October 2002 report included escalation for out year construction on the renourishments. This has been removed in the current MCACES at the back of this addendum. Any differences noted in future periodic renourishment costs are for the varying distances to future borrow areas. In addition to the changes mentioned under the Monitoring Costs section of this addendum, it should be noted that the estimator has added profit for the prime contractor to the estimate.



Lido Key HSDR Project
Public Access

Green Line = Trolley Route
Green Star = Trolley Stop

Figure 1

Feet
875 437.5 0 875

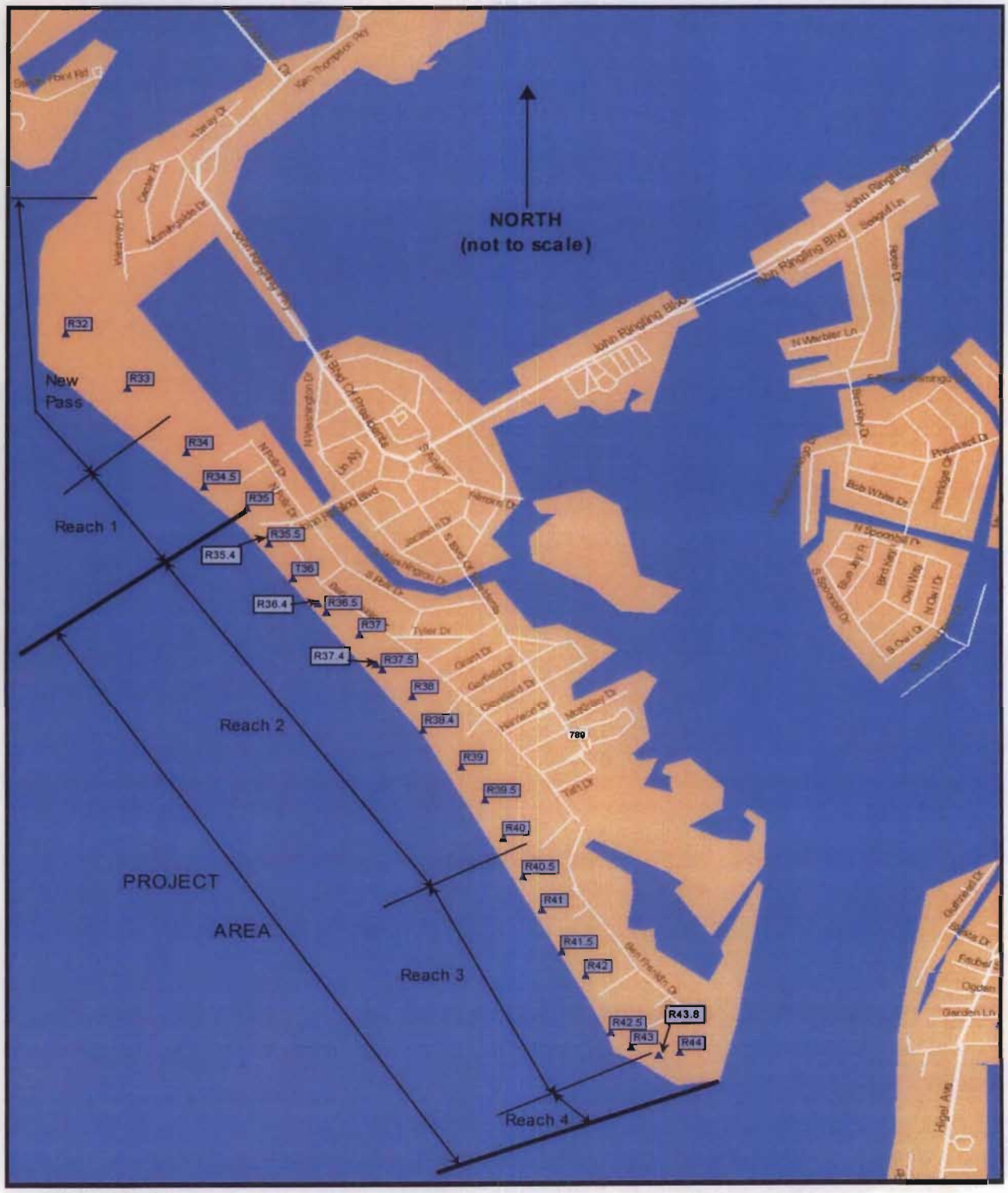

NORTH
(not to scale)
New Pass
Reach 1
Reach 2
Reach 3
Reach 4
PROJECT
AREA
R32
R33
R34
R34.5
R35
R35.4
R35.5
T36
R36.4
R36.5
R37
R37.4
R37.5
R38
R38.4
R39
R39.5
R40
R40.5
R41
R41.5
R42
R42.5
R43
R43.8
R44
John Ringling Blvd
N Blvd Of The Presidents
N Washington Dr
S Blvd
Tyler Dr
Grant Dr
Garfield Dr
Cleveland Dr
Harrison Dr
McKinley Dr
Taft Dr
Ben Franklin Dr
Bob White Dr
N Warbler Ln
Bird Key Dr
Preakness Dr
Pennington Dr
N Spoonbill Dr
S Spoonbill Dr
Blue Jay Dr
Bird Key Dr
Owl Way
N Owl Dr
S Owl Dr
Seagull Ln
Rose Dr
Higel Ave
Ogden
Garden Ln
789

FIGURE 2

APRIL 2004 ADDENDUM

APPENDIX – ADDITIONAL INFORMATION

Lido Key SPP Feas.Rpt.FY03 Level
Lido Key Shore Protection
Project Feasibility Report
REVISED PLANNING ESTIMATE
(Original FY03 Pricing levels)

Designed By: Jacksonville District, PD-PN
Estimated By: S.E. Matthews & Tony DiPiero

Prepared By: S.E. Matthews & Tony DiPiero
Reviewed by: Brian Blake

Preparation Date: 03/09/04
Effective Date of Pricing: 10/01/02

Sales Tax: 6.50%

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Release 5.30A

6. Effective date of pricing for this estimate is 10/01/02 (FY03).

+ +

REVISION REQUESTED 1 OCTOBER 2002, BY DAN HAUBNER, CESAJ-PD-PN

1. CORRECTION OF ACREAGE UNDER THE BEACH TILLING ELEMENT FROM 630 TO 63 ACRES.

2. ADD $770,600 TO INITIAL CONSTRUCTION FOR MONITORING.

3. ADD $135,800 TO EACH RENOURISHMENT FOR MONITORING.

ADDITIONAL REVISION DONE 13 MARCH 2002 TO ADD -

1. REAL ESTATE COSTS PER E-MAIL FROM DIANE OXENDINE OF REAL ESTATE DIVISION, DATED 08 MARCH 2002.
2. S&A COSTS OF 8.5% AS PER MEMO FROM C. MCGEHEE, CESAJ-CO-CS, DATED 08 MARCH 2002
3. E&D COSTS OF 8% AS PER TELEPHONE CONFERENCE WITH BYRON FARLEY, CESAJ-EN-DL ON 13 MARCH 2002

REVISED PLANNING ESTIMATE BASED UPON INFORMATION FURNISHED IN THE "LIDO KEY, SARASOTA COUNTY, FLORIDA, HURRICANE AND STORM DAMAGE REDUCTION FEASIBILITY REPORT". Section "IV. DESCRIPTION OF SELECTED PLAN".
RE: E-Mail from Thomas Smith, CESAJ-PD-PN, dated 30 January 2002

a. Additional estimates were added to cover renourishment of the beach at 5-year intervals for 50 years.

b. NOTE - 4. below is changed as follows:
The beach nourishment area used for the acreage for beach tilling was estimated to be an area 8,240 ft. long (re: para 186. of above referenced document) by 300 feet wide based on the furnished drawing submitted for the initial estimates. Acreage figure used in estimate for the beach nourishment area =

8,280 x 300 = 2,484,000 sq. ft.
2,484,000/43,560 = 57.0248 acres rounded to 57 acres

RE: Memorandum from CESAJ-PD-PN dated 15 December 2000
Referenced memorandum requested estimates for placing different volumes of material on the beach from the off-shore borrow area for various berm width alternatives listed in a table furnished by PD-PN. Requested estimates were to include mobilization/demobilization and monitoring. All material was

Estimator assumptions:

1. Assumed all dredging to be accomplished using a generic medium hopper dredge with the capability to pump material directly onto the beach nourishment area.

2. Dredging costs were computed using the Cost Engineering Dredge Estimating Program (CEDEP) in accordance with ER 1110-2-1302, Appendix F.

3. Costs figures in CEDEP for dredging were based upon an EWT of 90% with a Net Pay yardage loss of 20% based upon an E-mail from Dan Haubner dated 12 January 2001 that 20% was about average for the loss percentage.

4. The beach nourishment area used for the acreage for beach tilling was estimated to be an area 9100' long by 300' wide based upon the furnished drawing. Acreage figure used in estimate for the beach nourishment area =
9100 x 300 = 2,730,000 sq. ft.
2,730,000/43,560 = 62.6722 ac rounded to 63 acres for calculations

5. It is assumed that all material extracted from the borrow area will be suitable for beach placement as is, and can be directly pumped out onto the beach nourishment area.

6. Assumed all work be performed by the prime contractor (dredging contractor), except for endangered species observation. Endangered species observer duties are to be performed by subcontractor (ES) and were computed in MCACES.

Notes regarding the Groin portion of the estimate done by Tony DiPiero, CESAJ-EN-C:
Note that mob. cost is for the job, and cost for the groin is for one groin. Multiply the construction cost by the number of groins desired in the groin field, and add mob to the total. Groins should be within a few hundred feet of each other to avoid incurring additional mob costs.

Used Lee County GRR / Estero as basis for this estimate.
Adjusted quantities and items as appropriate.

ESTIMATE PARAMETERS:

1. Assumed 10 percent for field office O/H and 6.5 percent home office O/H on the prime contractor.

2. Prime Contractor has 10 percent profit.

3. Applied 8 percent profit, 8 percent field O/H and 2 percent home office O/H on subcontractors (ES) and (GC), based on current A/E contractor rates.

SUMMARY REPORTS SUMMARY PAGE

PROJECT OWNER SUMMARY - Contract.....1
PROJECT OWNER SUMMARY - Element.....2

No Detailed Estimate...

No Backup Reports...

* * * END TABLE OF CONTENTS * * *

** PROJECT OWNER SUMMARY - Element **

	QUANTITY	UOM	CONTRACT	ESCALAT	CONTING	E&D	S&A	TOTAL COST	UNIT COST
01 Lido Key SPP-1 Yr.A/M 80-Ft.Berm									
01- A Mobilization/Demobilization									
01- A/17 Beach Replenishment									
01- A/17.00 Beach Replenishment									
01- A/17.00.01 Mob/Demob. Dredge & Shore Equip			368,355	0	73,671	35,362	40,578	517,966	
TOTAL Beach Replenishment			368,355	0	73,671	35,362	40,578	517,966	
TOTAL Beach Replenishment			368,355	0	73,671	35,362	40,578	517,966	
TOTAL Mobilization/Demobilization			368,355	0	73,671	35,362	40,578	517,966	
01- B Excavation(80-Ft Berm 1 Yr. A/M)									
B/17 Beach Replenishment									
B/17.00 Beach Replenishment									
01- B/17.00.17 Excavation	1074700	CY	5,790,872	0	1158174	555,924	637,922	8,142,892	7.58
01- B/17.00.20 Placement Area - Shore Equipmen	4.65	MO	398,080	0	79,616	38,216	43,852	559,764	120379.36
TOTAL Beach Replenishment	1074700	CY	6,188,952	0	1237790	594,139	681,775	8,702,656	8.10
TOTAL Beach Replenishment	1074700	CY	6,188,952	0	1237790	594,139	681,775	8,702,656	8.10
TOTAL Excavation(80-Ft Berm 1 Yr. A/M	1074700	CY	6,188,952	0	1237790	594,139	681,775	8,702,656	8.10
01- C Beach Tilling on Lido Key									
01- C/17 Beach Replenishment									
01- C/17.00 Beach Replenishment									
01- C/17.00.99 Associated General Items	57.00	AC	23,599	0	4,720	2,266	2,600	33,185	582.18
TOTAL Beach Replenishment	57.00	AC	23,599	0	4,720	2,266	2,600	33,185	582.18
TOTAL Beach Replenishment	57.00	AC	23,599	0	4,720	2,266	2,600	33,185	582.18
TOTAL Beach Tilling on Lido Key	57.00	AC	23,599	0	4,720	2,266	2,600	33,185	582.18
01- D Turbidity Monitoring									

** PROJECT OWNER SUMMARY - Element **

	QUANTITY	UOM	CONTRACT	ESCALAT	CONTING	E&D	S&A	TOTAL COST	UNIT COST
02- B/17 Beach Replenishment									
02- B/17.00 Beach Replenishment									
02- B/17.00.17 Excavation	614500.00	CY	3,343,140	0	668,628	320,941	368,280	4,700,989	7.65
02- B/17.00.20 Placement Area - Shore Equipmen	2.67	MO	228,699	0	45,740	21,955	25,194	321,588	120444.89
TOTAL Beach Replenishment	614500.00	CY	3,571,839	0	714,368	342,897	393,474	5,022,577	8.17
TOTAL Beach Replenishment	614500.00	CY	3,571,839	0	714,368	342,897	393,474	5,022,577	8.17
TOTAL Excavation(80' Berm 5 Yr.Renour	614500.00	CY	3,571,839	0	714,368	342,897	393,474	5,022,577	8.17
02- C Beach Tilling on Lido Key									
02- C/17 Beach Replenishment									
02- C/17.00 Beach Replenishment									
02- C/17.00.99 Associated General Items	57.00	AC	23,599	0	4,720	2,266	2,600	33,185	58
TOTAL Beach Replenishment	57.00	AC	23,599	0	4,720	2,266	2,600	33,185	582.
TOTAL Beach Replenishment	57.00	AC	23,599	0	4,720	2,266	2,600	33,185	582.18
TOTAL Beach Tilling on Lido Key	57.00	AC	23,599	0	4,720	2,266	2,600	33,185	582.18
02- D Turbidity Monitoring									
02- D/17 Beach Replenishment									
02- D/17.00 Beach Replenishment									
02- D/17.00.99 Associated General Items			30,434	0	6,087	2,922	3,353	42,796	
TOTAL Beach Replenishment			30,434	0	6,087	2,922	3,353	42,796	
TOTAL Beach Replenishment			30,434	0	6,087	2,922	3,353	42,796	
TOTAL Turbidity Monitoring			30,434	0	6,087	2,922	3,353	42,796	
02- G Endangered Species Monitoring									
02- G/17 Beach Replenishment									
02- G/17.00 Beach Replenishment									

	QUANTITY UOM	CONTRACT	ESCALAT	CONTING	E&D	S&A	TOTAL COST	UNIT COST
03- C/17.00.99 Associated General Items	57.00 AC	23,599	0	4,720	2,266	2,600	33,185	582.18
TOTAL Beach Replenishment	57.00 AC	23,599	0	4,720	2,266	2,600	33,185	582.18
TOTAL Beach Replenishment	57.00 AC	23,599	0	4,720	2,266	2,600	33,185	582.18
TOTAL Beach Tilling on Lido Key	57.00 AC	23,599	0	4,720	2,266	2,600	33,185	582.18
03- D Turbidity Monitoring								
03- D/17 Beach Replenishment								
03- D/17.00 Beach Replenishment								
03- D/17.00.99 Associated General Items		30,793	0	6,159	2,956	3,392	43,299	
TOTAL Beach Replenishment		30,793	0	6,159	2,956	3,392	43,299	
TOTAL Beach Replenishment		30,793	0	6,159	2,956	3,392	43,299	
TOTAL Turbidity Monitoring		30,793	0	6,159	2,956	3,392	43,299	
03- G Endangered Species Monitoring								
03- G/17 Beach Replenishment								
03- G/17.00 Beach Replenishment								
03- G/17.00.99 Associated General Items		50,873	0	10,175	4,884	5,604	71,536	
TOTAL Beach Replenishment		50,873	0	10,175	4,884	5,604	71,536	
TOTAL Beach Replenishment		50,873	0	10,175	4,884	5,604	71,536	
TOTAL Endangered Species Monitoring		50,873	0	10,175	4,884	5,604	71,536	
03- I Monitoring		147,291	0	29,458	14,140	16,226	207,115	
TOTAL Lido Key SPP-10Yr.Renour.80'Ber		4,235,268	0	847,054	406,586	466,557	5,955,465	
04 Lido Key SPP-15Yr.Renour.80'Berm								
04- A Mobilization/Demobilization								
A/17 Beach Replenishment								
A/17.00 Beach Replenishment								

	QUANTITY	UOM	CONTRACT	ESCALAT	CONTING	E&D	S&A	TOTAL COST	UNIT C...
TOTAL Beach Replenishment			31,061	0	6,212	2,982	3,422	43,677	
TOTAL Turbidity Monitoring			31,061	0	6,212	2,982	3,422	43,677	
04- G Endangered Species Monitoring									
04- G/17 Beach Replenishment									
04- G/17.00 Beach Replenishment									
04- G/17.00.99 Associated General Items			51,438	0	10,288	4,938	5,666	72,330	
TOTAL Beach Replenishment			51,438	0	10,288	4,938	5,666	72,330	
TOTAL Beach Replenishment			51,438	0	10,288	4,938	5,666	72,330	
TOTAL Endangered Species Monitoring			51,438	0	10,288	4,938	5,666	72,330	
04- I Monitoring			147,291	0	29,458	14,140	16,226	207,115	
TOTAL Lido Key SPP-15Yr.Renour.80'Ber			4,270,504	0	854,101	409,968	470,439	6,005,012	
05 Lido Key SPP-20Yr.Renour.80'Berm									
05- A Mobilization/Demobilization									
05- A/17 Beach Replenishment									
05- A/17.00 Beach Replenishment									
05- A/17.00.01 Mob/Demob. Dredge & Shore Equip			368,355	0	73,671	35,362	40,578	517,966	
TOTAL Beach Replenishment			368,355	0	73,671	35,362	40,578	517,966	
TOTAL Beach Replenishment			368,355	0	73,671	35,362	40,578	517,966	
TOTAL Mobilization/Demobilization			368,355	0	73,671	35,362	40,578	517,966	
05- B Excavation(80'Berm 20 Yr.Renour)									
05- B/17 Beach Replenishment									
05- B/17.00 Beach Replenishment									
05- B/17.00.17 Excavation	614500.00	CY	3,463,109	0	692,622	332,458	381,496	4,869,685	7
05- B/17.00.20 Placement Area - Shore Equipmen	2.77	MO	237,157	0	47,431	22,767	26,125	333,480	120389.

	QUANTITY	UOM	CONTRACT	ESCALAT	CONTING	E&D	S&A	TOTAL COST	UNIT COST
05- I Monitoring			147,291	0	29,458	14,140	16,226	207,115	
TOTAL Lido Key SPP-20Yr.Renour.80'Ber			4,323,212	0	864,642	415,028	476,245	6,079,127	
06 Lido Key SPP-25Yr.Renour.80'Berm									
06- A Mobilization/Demobilization									
06- A/17 Beach Replenishment									
06- A/17.00 Beach Replenishment									
06- A/17.00.01 Mob/Demob. Dredge & Shore Equip			368,355	0	73,671	35,362	40,578	517,966	
TOTAL Beach Replenishment			368,355	0	73,671	35,362	40,578	517,966	
TOTAL Beach Replenishment			368,355	0	73,671	35,362	40,578	517,966	
TOTAL Mobilization/Demobilization			368,355	0	73,671	35,362	40,578	517,966	
B Excavation(80'Berm 25 Yr.Renour)									
06- B/17 Beach Replenishment									
06- B/17.00 Beach Replenishment									
06- B/17.00.17 Excavation	614500.00	CY	3,503,099	0	700,620	336,297	385,901	4,925,917	8.02
06- B/17.00.20 Placement Area - Shore Equipmen	2.80	MO	239,750	0	47,950	23,016	26,411	337,126	120402.25
TOTAL Beach Replenishment	614500.00	CY	3,742,848	0	748,570	359,313	412,312	5,263,043	8.56
TOTAL Beach Replenishment	614500.00	CY	3,742,848	0	748,570	359,313	412,312	5,263,043	8.56
TOTAL Excavation(80'Berm 25 Yr.Renour	614500.00	CY	3,742,848	0	748,570	359,313	412,312	5,263,043	8.56
06- C Beach Tilling on Lido Key									
06- C/17 Beach Replenishment									
06- C/17.00 Beach Replenishment									
06- C/17.00.99 Associated General Items	57.00	AC	23,599	0	4,720	2,266	2,600	33,185	582.18
TOTAL Beach Replenishment	57.00	AC	23,599	0	4,720	2,266	2,600	33,185	582.18
TOTAL Beach Replenishment	57.00	AC	23,599	0	4,720	2,266	2,600	33,185	582.18
TOTAL Beach Tilling on Lido Key	57.00	AC	23,599	0	4,720	2,266	2,600	33,185	582.18

	QUANTITY UOM	CONTRACT	ESCALAT	CONTING	E&D	S&A	TOTAL COST	UNIT COST
07- B Excavation(80'Berm 30 Yr.Renour)								
07- B/17 Beach Replenishment								
07- B/17.00 Beach Replenishment								
07- B/17.00.17 Excavation	614500.00 CY	3,527,092	0	705,418	338,601	388,544	4,959,656	8.07
07- B/17.00.20 Placement Area - Shore Equipmen	2.82 MO	241,353	0	48,271	23,170	26,587	339,381	120347.79
TOTAL Beach Replenishment	614500.00 CY	3,768,445	0	753,689	361,771	415,132	5,299,037	8.62
TOTAL Beach Replenishment	614500.00 CY	3,768,445	0	753,689	361,771	415,132	5,299,037	8.62
TOTAL Excavation(80'Berm 30 Yr.Renour	614500.00 CY	3,768,445	0	753,689	361,771	415,132	5,299,037	8.62
07- C Beach Tilling on Lido Key								
07- C/17 Beach Replenishment								
07- C/17.00 Beach Replenishment								
07- C/17.00.99 Associated General Items	57.00 AC	23,599	0	4,720	2,266	2,600	33,185	582.
TOTAL Beach Replenishment	57.00 AC	23,599	0	4,720	2,266	2,600	33,185	582.18
TOTAL Beach Replenishment	57.00 AC	23,599	0	4,720	2,266	2,600	33,185	582.18
TOTAL Beach Tilling on Lido Key	57.00 AC	23,599	0	4,720	2,266	2,600	33,185	582.18
07- D Turbidity Monitoring								
07- D/17 Beach Replenishment								
07- D/17.00 Beach Replenishment								
07- D/17.00.99 Associated General Items		32,046	0	6,409	3,076	3,530	45,062	
TOTAL Beach Replenishment		32,046	0	6,409	3,076	3,530	45,062	
TOTAL Beach Replenishment		32,046	0	6,409	3,076	3,530	45,062	
TOTAL Turbidity Monitoring		32,046	0	6,409	3,076	3,530	45,062	
07- G Endangered Species Monitoring								
07- G/17 Beach Replenishment								
07- G/17.00 Beach Replenishment								

	QUANTITY UOM	CONTRACT	ESCALAT	CONTING	E&D	S&A	TOTAL COST	UNIT COST
08- C/17.00.99 Associated General Items	57.00 AC	23,599	0	4,720	2,266	2,600	33,185	582.18
TOTAL Beach Replenishment	57.00 AC	23,599	0	4,720	2,266	2,600	33,185	582.18
TOTAL Beach Replenishment	57.00 AC	23,599	0	4,720	2,266	2,600	33,185	582.18
TOTAL Beach Tilling on Lido Key	57.00 AC	23,599	0	4,720	2,266	2,600	33,185	582.18
08- D Turbidity Monitoring								
08- D/17 Beach Replenishment								
08- D/17.00 Beach Replenishment								
08- D/17.00.99 Associated General Items		32,584	0	6,517	3,128	3,589	45,818	
TOTAL Beach Replenishment		32,584	0	6,517	3,128	3,589	45,818	
TOTAL Beach Replenishment		32,584	0	6,517	3,128	3,589	45,818	
TOTAL Turbidity Monitoring		32,584	0	6,517	3,128	3,589	45,818	
08- G Endangered Species Monitoring								
08- G/17 Beach Replenishment								
08- G/17.00 Beach Replenishment								
08- G/17.00.99 Associated General Items		54,076	0	10,815	5,191	5,957	76,040	
TOTAL Beach Replenishment		54,076	0	10,815	5,191	5,957	76,040	
TOTAL Beach Replenishment		54,076	0	10,815	5,191	5,957	76,040	
TOTAL Endangered Species Monitoring		54,076	0	10,815	5,191	5,957	76,040	
08- I Monitoring		147,291	0	29,458	14,140	16,226	207,115	
TOTAL Lido Key SPP-35Yr.Renour.80'Ber		4,462,778	0	892,556	428,427	491,620	6,275,379	
09 Lido Key SPP-40Yr.Renour.80'Berm								
09- A Mobilization/Demobilization								
A/17 Beach Replenishment								
09- A/17.00 Beach Replenishment								

	QUANTITY UOM	CONTRACT	ESCALAT	CONTING	E&D	S&A	TOTAL COST	UNIT COST
TOTAL Beach Replenishment		32,673	0	6,535	3,137	3,599	45,944	
TOTAL Turbidity Monitoring		32,673	0	6,535	3,137	3,599	45,944	
09- G Endangered Species Monitoring								
09- G/17 Beach Replenishment								
09- G/17.00 Beach Replenishment								
09- G/17.00.99 Associated General Items		54,264	0	10,853	5,209	5,978	76,305	
TOTAL Beach Replenishment		54,264	0	10,853	5,209	5,978	76,305	
TOTAL Beach Replenishment		54,264	0	10,853	5,209	5,978	76,305	
TOTAL Endangered Species Monitoring		54,264	0	10,853	5,209	5,978	76,305	
09- I Monitoring		147,291	0	29,458	14,140	16,226	207,115	
TOTAL Lido Key SPP-40Yr.Renour.80'Ber		4,471,796	0	894,359	429,292	492,613	6,288,061	
10 Lido Key SPP-45Yr.Renour.80'Berm								
10- A Mobilization/Demobilization								
10- A/17 Beach Replenishment								
10- A/17.00 Beach Replenishment								
10- A/17.00.01 Mob/Demob. Dredge & Shore Equip		368,355	0	73,671	35,362	40,578	517,966	
TOTAL Beach Replenishment		368,355	0	73,671	35,362	40,578	517,966	
TOTAL Beach Replenishment		368,355	0	73,671	35,362	40,578	517,966	
TOTAL Mobilization/Demobilization		368,355	0	73,671	35,362	40,578	517,966	
10- B Excavation(80'Berm 45 Yr.Renour)								
10- B/17 Beach Replenishment								
10- B/17.00 Beach Replenishment								
10- B/17.00.17 Excavation	1229000 CY	7,326,115	0	1465223	703,307	807,045	10,301,689	8.38
10- B/17.00.20 Placement Area - Shore Equipmen	5.91 MO	505,979	0	101,196	48,574	55,739	711,488	120387.06

	QUANTITY UOM	CONTRACT	ESCALAT	CONTING	E&D	S&A	TOTAL COST	UNIT COST
10- I Monitoring		147,291	0	29,458	14,140	16,226	207,115	
TOTAL Lido Key SPP-45Yr.Renour.80'Ber		8,549,964	0	1709993	820,797	941,864	12,022,617	
11 Lido Key Groin Construction								
11- 1 Mob & Demob								
11- 1/ 1 Mob & Demob @ 3% Direct		69,681	0	13,936	6,689	7,676	97,983	
TOTAL Mob & Demob		69,681	0	13,936	6,689	7,676	97,983	
11- 2 Excavate & Spread Beach Fill								
11- 2/ 1 Excavate Beach Fill	53000.00 CY	103,407	0	20,681	9,927	11,391	145,407	2.74
11- 2/ 2 Spread Beach Fill	53000.00 CY	186,297	0	37,259	17,885	20,522	261,963	4.94
TOTAL Excavate & Spread Beach Fill	53000.00 CY	289,704	0	57,941	27,812	31,914	407,370	7.69
- 3 Sheetpiling								
11- 3/ 1 Sheetpiling	34200.00 SF	473,443	0	94,689	45,451	52,154	665,737	19.47
TOTAL Sheetpiling	34200.00 SF	473,443	0	94,689	45,451	52,154	665,737	19.47
11- 4 Geotextile								
11- 4/ 1 Geotextile	9644.00 SY	23,446	0	4,689	2,251	2,583	32,968	3.42
TOTAL Geotextile	9644.00 SY	23,446	0	4,689	2,251	2,583	32,968	3.42
11- 5 Bedding Stone								
11- 5/ 1 Bedding Stone FOB Jobsite	8300.00 TON	353,439	0	70,688	33,930	38,935	496,992	59.88
11- 5/ 2 Place Bedding Stone	8300.00 TON	22,143	0	4,429	2,126	2,439	31,136	3.75
TOTAL Bedding Stone	8300.00 TON	375,582	0	75,116	36,056	41,374	528,128	63.63
11- 6 Core Stone								
5/ 1 Core Stone FOB Jobsite	3000.00 TON	150,976	0	30,195	14,494	16,632	212,297	70.77
5/ 2 Place Core Stone	3000.00 TON	7,815	0	1,563	750	861	10,990	3.66
TOTAL Core Stone	3000.00 TON	158,792	0	31,758	15,244	17,492	223,286	74.43

No errors detected...

* * * END OF ERROR REPORT * * *

Lido Key SPP Feas.Rpt.FY04 Level
Lido Key Shore Protection
Project Feasibility Report
REVISED PLANNING ESTIMATE
(Revised to FY04 Pricing Levels)

Designed By: Jacksonville District, PD-PN
Estimated By: S.E. Matthews & Tony DiPiero

Prepared By: S.E. Matthews & Tony DiPiero
Reviewed by: Brian Blake

Preparation Date: 03/10/04
Effective Date of Pricing: 10/01/03

Sales Tax: 7.30%

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6. Effective date of pricing for this estimate is 10/01/03 (FY04). The means of raising the pricing from the FY03 to FY04 was escalation using the "Civil Works Construction Cost Index" (EM 1110-2-1304, Table A-2) for Beach Replenishment annual escalation costs for FY03 and FY04.

+ +

REVISION REQUESTED 1 OCTOBER 2002, BY DAN HAUBNER, CESAJ-PD-PN

1. CORRECTION OF ACREAGE UNDER THE BEACH TILLING ELEMENT FROM 630 TO 63 ACRES.

2. ADD $770,600 TO INITIAL CONSTRUCTION FOR MONITORING.

3. ADD $135,800 TO EACH RENOURISHMENT FOR MONITORING.

ADDITIONAL REVISION DONE 13 MARCH 2002 TO ADD -

1. REAL ESTATE COSTS PER E-MAIL FROM DIANE OXENDINE OF REAL ESTATE DIVISION, DATED 08 MARCH 2002.
2. S&A COSTS OF 8.5% AS PER MEMO FROM C. MCGEHEE, CESAJ-CO-CS, DATED 08 MARCH 2002
3. E&D COSTS OF 8% AS PER TELEPHONE CONFERENCE WITH BYRON FARLEY, CESAJ-EN-DL ON 13 MARCH 2002

REVISED PLANNING ESTIMATE BASED UPON INFORMATION FURNISHED IN THE "LIDO KEY, SARASOTA COUNTY, FLORIDA, HURRICANE AND STORM DAMAGE REDUCTION FEASIBILITY REPORT". Section "IV. DESCRIPTION OF SELECTED PLAN".
RE: E-Mail from Thomas Smith, CESAJ-PD-PN, dated 30 January 2002

a. Additional estimates were added to cover renourishment of the beach at 5-year intervals for 50 years.

b. NOTE - 4. below is changed as follows:
The beach nourishment area used for the acreage for beach tilling was estimated to be an area 8,240 ft. long (re: para 186. of above referenced document) by 300 feet wide based on the furnished drawing submitted for the initial estimates. Acreage figure used in estimate for the beach nourishment area =

8,280 x 300 = 2,484,000 sq. ft.
2,484,000/43,560 = 57.0248 acres rounded to 57 acres

RE: Memorandum from CESAJ-PD-PN dated 15 December 2000
Referenced memorandum requested estimates for placing different volumes of material on the beach from the off-shore borrow area for various berm width alternatives listed in a table furnished by PD-PN. Requested estimates

Estimator assumptions:

1. Assumed all dredging to be accomplished using a generic medium hopper dredge with the capability to pump material directly onto the beach nourishment area.

2. Dredging costs were computed using the Cost Engineering Dredge Estimating Program (CEDEP) in accordance with ER 1110-2-1302, Appendix F.

3. Costs figures in CEDEP for dredging were based upon an EWT of 90% with a Net Pay yardage loss of 20% based upon an E-mail from Dan Haubner dated 12 January 2001 that 20% was about average for the loss percentage.

4. The beach nourishment area used for the acreage for beach tilling was estimated to be an area 9100' long by 300' wide based upon the furnished drawing. Acreage figure used in estimate for the beach nourishment area =
9100 x 300 = 2,730,000 sq. ft.
2,730,000/43,560 = 62.6722 ac rounded to 63 acres for calculations

5. It is assumed that all material extracted from the borrow area will be suitable for beach placement as is, and can be directly pumped out onto the beach nourishment area.

6. Assumed all work be performed by the prime contractor (dredging contractor), except for endangered species observation. Endangered species observer duties are to be performed by subcontractor (ES) and were computed in MCACES.

Notes regarding the Groin portion of the estimate done by Tony DiPiero, CESAJ-EN-C:
Note that mob. cost is for the job, and cost for the groin is for one groin. Multiply the construction cost by the number of groins desired in the groin field, and add mob to the total. Groins should be within a few hundred feet of each other to avoid incurring additional mob costs.

Used Lee County GRR / Estero as basis for this estimate.
Adjusted quantities and items as appropriate.

ESTIMATE PARAMETERS:

1. Assumed 10 percent for field office O/H and 6.5 percent home office O/H on the prime contractor.

2. Prime contractor profit applied is ten percent.

3. Applied 8 percent profit, 8 percent field O/H and 2 percent home office O/H on subcontractors (ES) and (GC), based on current A/E contractor rates.

SUMMARY REPORTS SUMMARY PAGE

PROJECT OWNER SUMMARY - Contract.....1
PROJECT OWNER SUMMARY - Element.....2

No Detailed Estimate...

No Backup Reports...

* * * END TABLE OF CONTENTS * * *

** PROJECT OWNER SUMMARY - Element **

	QUANTITY	UOM	CONTRACT	ESCALAT	CONTING	E&D	S&A	TOTAL COST	UNIT COST
01 Lido Key SPP-1 Yr.A/M 80-Ft.Berm									
01- A Mobilization/Demobilization									
01- A/17 Beach Replenishment									
01- A/17.00 Beach Replenishment									
01- A/17.00.01 Mob/Demob. Dredge & Shore Equip			368,355	7,731	75,217	36,104	41,430	528,837	
TOTAL Beach Replenishment			368,355	7,731	75,217	36,104	41,430	528,837	
TOTAL Beach Replenishment			368,355	7,731	75,217	36,104	41,430	528,837	
TOTAL Mobilization/Demobilization			368,355	7,731	75,217	36,104	41,430	528,837	
01- B Excavation(80-Ft Berm 1 Yr. A/M)									
B/17 Beach Replenishment									
B/17.00 Beach Replenishment									
01- B/17.00.17 Excavation	1074700	CY	5,790,872	121,537	1182482	567,591	651,311	8,313,793	7.74
01- B/17.00.20 Placement Area - Shore Equipmen	4.65	MO	398,080	8,355	81,287	39,018	44,773	571,512	122905.86
TOTAL Beach Replenishment	1074700	CY	6,188,952	129,892	1263769	606,609	696,084	8,885,305	8.27
TOTAL Beach Replenishment	1074700	CY	6,188,952	129,892	1263769	606,609	696,084	8,885,305	8.27
TOTAL Excavation(80-Ft Berm 1 Yr. A/M	1074700	CY	6,188,952	129,892	1263769	606,609	696,084	8,885,305	8.27
01- C Beach Tilling on Lido Key									
01- C/17 Beach Replenishment									
01- C/17.00 Beach Replenishment									
01- C/17.00.99 Associated General Items	57.00	AC	23,599	495	4,819	2,313	2,654	33,881	594.40
TOTAL Beach Replenishment	57.00	AC	23,599	495	4,819	2,313	2,654	33,881	594.40
TOTAL Beach Replenishment	57.00	AC	23,599	495	4,819	2,313	2,654	33,881	594.40
TOTAL Beach Tilling on Lido Key	57.00	AC	23,599	495	4,819	2,313	2,654	33,881	594.40
01- D Turbidity Monitoring									

	QUANTITY	UOM	CONTRACT	ESCALAT	CONTING	E&D	S&A	TOTAL COST	UNIT COST
02- B/17 Beach Replenishment									
02- B/17.00 Beach Replenishment									
02- B/17.00.17 Excavation	614500.00	CY	3,343,140	70,165	682,661	327,677	376,010	4,799,653	7.81
02- B/17.00.20 Placement Area - Shore Equipmen	2.67	MO	228,699	4,800	46,700	22,416	25,722	328,337	122972.76
TOTAL Beach Replenishment	614500.00	CY	3,571,839	74,965	729,361	350,093	401,732	5,127,990	8.34
TOTAL Beach Replenishment	614500.00	CY	3,571,839	74,965	729,361	350,093	401,732	5,127,990	8.34
TOTAL Excavation(80' Berm 5 Yr.Renour	614500.00	CY	3,571,839	74,965	729,361	350,093	401,732	5,127,990	8.34
02- C Beach Tilling on Lido Key									
02- C/17 Beach Replenishment									
02- C/17.00 Beach Replenishment									
02- C/17.00.99 Associated General Items	57.00	AC	23,599	495	4,819	2,313	2,654	33,881	5
TOTAL Beach Replenishment	57.00	AC	23,599	495	4,819	2,313	2,654	33,881	594.
TOTAL Beach Replenishment	57.00	AC	23,599	495	4,819	2,313	2,654	33,881	594.40
TOTAL Beach Tilling on Lido Key	57.00	AC	23,599	495	4,819	2,313	2,654	33,881	594.40
02- D Turbidity Monitoring									
02- D/17 Beach Replenishment									
02- D/17.00 Beach Replenishment									
02- D/17.00.99 Associated General Items			30,434	639	6,215	2,983	3,423	43,694	
TOTAL Beach Replenishment			30,434	639	6,215	2,983	3,423	43,694	
TOTAL Beach Replenishment			30,434	639	6,215	2,983	3,423	43,694	
TOTAL Turbidity Monitoring			30,434	639	6,215	2,983	3,423	43,694	
02- G Endangered Species Monitoring									
02- G/17 Beach Replenishment									
02- G/17.00 Beach Replenishment									

** PROJECT OWNER SUMMARY - Element **

	QUANTITY UOM	CONTRACT	ESCALAT	CONTING	E&D	S&A	TOTAL COST	UNIT COST
03- C/17.00.99 Associated General Items	57.00 AC	23,599	495	4,819	2,313	2,654	33,881	594.40
TOTAL Beach Replenishment	57.00 AC	23,599	495	4,819	2,313	2,654	33,881	594.40
TOTAL Beach Replenishment	57.00 AC	23,599	495	4,819	2,313	2,654	33,881	594.40
TOTAL Beach Tilling on Lido Key	57.00 AC	23,599	495	4,819	2,313	2,654	33,881	594.40
03- D Turbidity Monitoring								
03- D/17 Beach Replenishment								
03- D/17.00 Beach Replenishment								
03- D/17.00.99 Associated General Items		30,793	646	6,288	3,018	3,463	44,208	
TOTAL Beach Replenishment		30,793	646	6,288	3,018	3,463	44,208	
TOTAL Beach Replenishment		30,793	646	6,288	3,018	3,463	44,208	
TOTAL Turbidity Monitoring		30,793	646	6,288	3,018	3,463	44,208	
03- G Endangered Species Monitoring								
03- G/17 Beach Replenishment								
03- G/17.00 Beach Replenishment								
03- G/17.00.99 Associated General Items		50,873	1,068	10,388	4,986	5,722	73,037	
TOTAL Beach Replenishment		50,873	1,068	10,388	4,986	5,722	73,037	
TOTAL Beach Replenishment		50,873	1,068	10,388	4,986	5,722	73,037	
TOTAL Endangered Species Monitoring		50,873	1,068	10,388	4,986	5,722	73,037	
03- I Monitoring		147,291	3,091	30,076	14,437	16,566	211,462	
TOTAL Lido Key SPP-10Yr.Renour.80'Ber		4,235,268	88,889	864,831	415,119	476,349	6,080,457	
04 Lido Key SPP-15Yr.Renour.80'Berm								
A Mobilization/Demobilization								
A/17 Beach Replenishment								
04- A/17.00 Beach Replenishment								

	QUANTITY UOM	CONTRACT	ESCALAT	CONTING	E&D	S&A	TOTAL COST	UNIT COST
TOTAL Beach Replenishment		31,061	652	6,343	3,044	3,494	44,594	
TOTAL Turbidity Monitoring		31,061	652	6,343	3,044	3,494	44,594	
04- G Endangered Species Monitoring								
04- G/17 Beach Replenishment								
04- G/17.00 Beach Replenishment								
04- G/17.00.99 Associated General Items		51,438	1,080	10,504	5,042	5,785	73,848	
TOTAL Beach Replenishment		51,438	1,080	10,504	5,042	5,785	73,848	
TOTAL Beach Replenishment		51,438	1,080	10,504	5,042	5,785	73,848	
TOTAL Endangered Species Monitoring		51,438	1,080	10,504	5,042	5,785	73,848	
04- I Monitoring		147,291	3,091	30,076	14,437	16,566	211,462	
TOTAL Lido Key SPP-15Yr.Renour.80'Ber		4,270,504	89,628	872,026	418,573	480,312	6,131,044	
05 Lido Key SPP-20Yr.Renour.80'Berm								
05- A Mobilization/Demobilization								
05- A/17 Beach Replenishment								
05- A/17.00 Beach Replenishment								
05- A/17.00.01 Mob/Demob. Dredge & Shore Equip		368,355	7,731	75,217	36,104	41,430	528,837	
TOTAL Beach Replenishment		368,355	7,731	75,217	36,104	41,430	528,837	
TOTAL Beach Replenishment		368,355	7,731	75,217	36,104	41,430	528,837	
TOTAL Mobilization/Demobilization		368,355	7,731	75,217	36,104	41,430	528,837	
05- B Excavation(80'Berm 20 Yr.Renour)								
05- B/17 Beach Replenishment								
05- B/17.00 Beach Replenishment								
05- B/17.00.17 Excavation	614500.00 CY	3,463,109	72,683	707,158	339,436	389,503	4,971,889	8.
05- B/17.00.20 Placement Area - Shore Equipmen	2.77 MO	237,157	4,977	48,427	23,245	26,673	340,479	122916.6

	QUANTITY	UOM	CONTRACT	ESCALAT	CONTING	E&D	S&A	TOTAL COST	UNIT COST
05- I Monitoring			147,291	3,091	30,076	14,437	16,566	211,462	
TOTAL Lido Key SPP-20Yr.Renour.80'Ber			4,323,212	90,735	882,789	423,739	486,240	6,206,714	
06 Lido Key SPP-25Yr.Renour.80'Berm									
06- A Mobilization/Demobilization									
06- A/17 Beach Replenishment									
06- A/17.00 Beach Replenishment									
06- A/17.00.01 Mob/Demob. Dredge & Shore Equip			368,355	7,731	75,217	36,104	41,430	528,837	
TOTAL Beach Replenishment			368,355	7,731	75,217	36,104	41,430	528,837	
TOTAL Beach Replenishment			368,355	7,731	75,217	36,104	41,430	528,837	
TOTAL Mobilization/Demobilization			368,355	7,731	75,217	36,104	41,430	528,837	
B Excavation(80'Berm 25 Yr.Renour)									
06- B/17 Beach Replenishment									
06- B/17.00 Beach Replenishment									
06- B/17.00.17 Excavation	614500.00	CY	3,503,099	73,522	715,324	343,356	394,001	5,029,301	8.18
06- B/17.00.20 Placement Area - Shore Equipmen	2.80	MO	239,750	5,032	48,956	23,499	26,965	344,202	122929.22
TOTAL Beach Replenishment	614500.00	CY	3,742,848	78,554	764,280	366,855	420,966	5,373,503	8.74
TOTAL Beach Replenishment	614500.00	CY	3,742,848	78,554	764,280	366,855	420,966	5,373,503	8.74
TOTAL Excavation(80'Berm 25 Yr.Renour	614500.00	CY	3,742,848	78,554	764,280	366,855	420,966	5,373,503	8.74
06- C Beach Tilling on Lido Key									
06- C/17 Beach Replenishment									
06- C/17.00 Beach Replenishment									
06- C/17.00.99 Associated General Items	57.00	AC	23,599	495	4,819	2,313	2,654	33,881	594.40
TOTAL Beach Replenishment	57.00	AC	23,599	495	4,819	2,313	2,654	33,881	594.40
TOTAL Beach Replenishment	57.00	AC	23,599	495	4,819	2,313	2,654	33,881	594.40
TOTAL Beach Tilling on Lido Key	57.00	AC	23,599	495	4,819	2,313	2,654	33,881	594.40

	QUANTITY UOM	CONTRACT	ESCALAT	CONTING	E&D	S&A	TOTAL COST	UNIT COST
07- B Excavation(80'Berm 30 Yr.Renour)								
07- B/17 Beach Replenishment								
07- B/17.00 Beach Replenishment								
07- B/17.00.17 Excavation	614500.00 CY	3,527,092	74,026	720,224	345,707	396,699	5,063,748	8.24
07- B/17.00.20 Placement Area - Shore Equipmen	2.82 MO	241,353	5,065	49,284	23,656	27,145	346,504	122873.62
TOTAL Beach Replenishment	614500.00 CY	3,768,445	79,091	769,507	369,363	423,845	5,410,252	8.80
TOTAL Beach Replenishment	614500.00 CY	3,768,445	79,091	769,507	369,363	423,845	5,410,252	8.80
TOTAL Excavation(80'Berm 30 Yr.Renour	614500.00 CY	3,768,445	79,091	769,507	369,363	423,845	5,410,252	8.80
07- C Beach Tilling on Lido Key								
07- C/17 Beach Replenishment								
07- C/17.00 Beach Replenishment								
07- C/17.00.99 Associated General Items	57.00 AC	23,599	495	4,819	2,313	2,654	33,881	594.
TOTAL Beach Replenishment	57.00 AC	23,599	495	4,819	2,313	2,654	33,881	594.40
TOTAL Beach Replenishment	57.00 AC	23,599	495	4,819	2,313	2,654	33,881	594.40
TOTAL Beach Tilling on Lido Key	57.00 AC	23,599	495	4,819	2,313	2,654	33,881	594.40
07- D Turbidity Monitoring								
07- D/17 Beach Replenishment								
07- D/17.00 Beach Replenishment								
07- D/17.00.99 Associated General Items		32,046	673	6,544	3,141	3,604	46,008	
TOTAL Beach Replenishment		32,046	673	6,544	3,141	3,604	46,008	
TOTAL Beach Replenishment		32,046	673	6,544	3,141	3,604	46,008	
TOTAL Turbidity Monitoring		32,046	673	6,544	3,141	3,604	46,008	
07- G Endangered Species Monitoring								
07- G/17 Beach Replenishment								
07- G/17.00 Beach Replenishment								

	QUANTITY UOM	CONTRACT	ESCALAT	CONTING	E&D	S&A	TOTAL COST	UNIT COST
08- C/17.00.99 Associated General Items	57.00 AC	23,599	495	4,819	2,313	2,654	33,881	594.40
TOTAL Beach Replenishment	57.00 AC	23,599	495	4,819	2,313	2,654	33,881	594.40
TOTAL Beach Replenishment	57.00 AC	23,599	495	4,819	2,313	2,654	33,881	594.40
TOTAL Beach Tilling on Lido Key	57.00 AC	23,599	495	4,819	2,313	2,654	33,881	594.40
08- D Turbidity Monitoring								
08- D/17 Beach Replenishment								
08- D/17.00 Beach Replenishment								
08- D/17.00.99 Associated General Items		32,584	684	6,654	3,194	3,665	46,780	
TOTAL Beach Replenishment		32,584	684	6,654	3,194	3,665	46,780	
TOTAL Beach Replenishment		32,584	684	6,654	3,194	3,665	46,780	
TOTAL Turbidity Monitoring		32,584	684	6,654	3,194	3,665	46,780	
08- G Endangered Species Monitoring								
08- G/17 Beach Replenishment								
08- G/17.00 Beach Replenishment								
08- G/17.00.99 Associated General Items		54,076	1,135	11,042	5,300	6,082	77,636	
TOTAL Beach Replenishment		54,076	1,135	11,042	5,300	6,082	77,636	
TOTAL Beach Replenishment		54,076	1,135	11,042	5,300	6,082	77,636	
TOTAL Endangered Species Monitoring		54,076	1,135	11,042	5,300	6,082	77,636	
08- I Monitoring		147,291	3,091	30,076	14,437	16,566	211,462	
TOTAL Lido Key SPP-35Yr.Renour.80'Ber		4,462,778	93,664	911,288	437,418	501,938	6,407,086	
09 Lido Key SPP-40Yr.Renour.80'Berm								
09- A Mobilization/Demobilization								
A/17 Beach Replenishment								
A/17.00 Beach Replenishment								

	QUANTITY UOM	CONTRACT	ESCALAT	CONTING	E&D	S&A	TOTAL COST	UNIT COS
TOTAL Beach Replenishment		32,673	686	6,672	3,202	3,675	46,908	
TOTAL Turbidity Monitoring		32,673	686	6,672	3,202	3,675	46,908	
09- G Endangered Species Monitoring								
09- G/17 Beach Replenishment								
09- G/17.00 Beach Replenishment								
09- G/17.00.99 Associated General Items		54,264	1,139	11,081	5,319	6,103	77,906	
TOTAL Beach Replenishment		54,264	1,139	11,081	5,319	6,103	77,906	
TOTAL Beach Replenishment		54,264	1,139	11,081	5,319	6,103	77,906	
TOTAL Endangered Species Monitoring		54,264	1,139	11,081	5,319	6,103	77,906	
09- I Monitoring		147,291	3,091	30,076	14,437	16,566	211,462	
TOTAL Lido Key SPP-40Yr.Renour.80'Ber		4,471,796	93,853	913,130	438,302	502,952	6,420,033	
10 Lido Key SPP-45Yr.Renour.80'Berm								
10- A Mobilization/Demobilization								
10- A/17 Beach Replenishment								
10- A/17.00 Beach Replenishment								
10- A/17.00.01 Mob/Demob. Dredge & Shore Equip		368,355	7,731	75,217	36,104	41,430	528,837	
TOTAL Beach Replenishment		368,355	7,731	75,217	36,104	41,430	528,837	
TOTAL Beach Replenishment		368,355	7,731	75,217	36,104	41,430	528,837	
TOTAL Mobilization/Demobilization		368,355	7,731	75,217	36,104	41,430	528,837	
10- B Excavation(80'Berm 45 Yr.Renour)								
10- B/17 Beach Replenishment								
10- B/17.00 Beach Replenishment								
10- B/17.00.17 Excavation	1229000 CY	7,326,115	153,759	1495975	718,068	823,983	10,517,899	
10- B/17.00.20 Placement Area - Shore Equipmen	5.91 MO	505,979	10,619	103,320	49,593	56,908	726,420	122913.7

	QUANTITY UOM	CONTRACT	ESCALAT	CONTING	E&D	S&A	TOTAL COST	UNIT COST
10- I Monitoring		147,291	3,091	30,076	14,437	16,566	211,462	
TOTAL Lido Key SPP-45Yr.Renour.80'Ber		8,549,964	179,445	1745882	838,023	961,632	12,274,945	
11 Lido Key Groin Construction								
11- 1 Mob & Demob								
11- 1/ 1 Mob & Demob @ 3% Direct		69,681	1,462	14,229	6,830	7,837	100,040	
TOTAL Mob & Demob		69,681	1,462	14,229	6,830	7,837	100,040	
11- 2 Excavate & Spread Beach Fill								
11- 2/ 1 Excavate Beach Fill	53000.00 CY	103,407	2,170	21,115	10,135	11,630	148,459	2.80
11- 2/ 2 Spread Beach Fill	53000.00 CY	186,297	3,910	38,041	18,260	20,953	267,461	5.05
TOTAL Excavate & Spread Beach Fill	53000.00 CY	289,704	6,080	59,157	28,395	32,584	415,920	7.85
3 Sheetpiling								
11- 3/ 1 Sheetpiling	34200.00 SF	473,443	9,937	96,676	46,404	53,249	679,709	19.87
TOTAL Sheetpiling	34200.00 SF	473,443	9,937	96,676	46,404	53,249	679,709	19.87
11- 4 Geotextile								
11- 4/ 1 Geotextile	9644.00 SY	23,446	492	4,788	2,298	2,637	33,660	3.49
TOTAL Geotextile	9644.00 SY	23,446	492	4,788	2,298	2,637	33,660	3.49
11- 5 Bedding Stone								
11- 5/ 1 Bedding Stone FOB Jobsite	8300.00 TON	353,439	7,418	72,171	34,642	39,752	507,423	61.14
11- 5/ 2 Place Bedding Stone	8300.00 TON	22,149	465	4,523	2,171	2,491	31,798	3.83
TOTAL Bedding Stone	8300.00 TON	375,588	7,883	76,694	36,813	42,243	539,221	64.97
11- 6 Core Stone								
6/ 1 Core Stone FOB Jobsite	3000.00 TON	150,976	3,169	30,829	14,798	16,981	216,752	72.25
6/ 2 Place Core Stone	3000.00 TON	7,815	164	1,596	766	879	11,219	3.74
TOTAL Core Stone	3000.00 TON	158,791	3,333	32,425	15,564	17,860	227,972	75.99

No errors detected...

* * * END OF ERROR REPORT * * *

COST SHARING FOR LIDO KEY

OCTOBER 2003 PRICE LEVELS

Project Feature	Project Cost	Federal Share	Federal Cost	Non-Federal Share	Non-Federal Cost
Mobilization	$536,675	62.4%	$ 334,676	37.6%	$ 201,999
Beach Replenishment	$7,611,526	62.4%	$ 4,746,632	37.6%	$ 2,864,894
Groin Field (mob/demob combined)	$2,690,158	62.4%	$ 1,677,612	37.6%	$ 1,012,546
Engineering & Design	$985,021	62.4%	$ 614,270	37.6%	$ 370,751
Construction Management	$1,130,313	62.4%	$ 704,876	37.6%	$ 425,437
Monitoring	$1,017,152	62.4%	$ 634,307	37.6%	$ 382,845
Real Estate					
Administration costs of LERR	$226,994	62.4%	$ 141,556	37.6%	$ 85,438
Acquisitions (LERR)	$230,263	0.0%	$ -	100.0%	$ 230,263
Total Cost	**$14,428,102**		**$ 8,853,930**		**$ 5,574,172**
Less LERR Credit					**$ 230,263**
Total Non-Federal Cash Contribution					**$ 5,343,909**

COST SHARING FOR LIDO KEY

OCTOBER 2002 PRICE LEVELS

Project Feature	Project Cost	Federal Share		Federal Cost	Non-Federal Share		Non-Federal Cost
Mobilization	$525,643	62.4%	$	327,797	37.6%	$	197,846
Beach Replenishment	$7,455,061	62.4%	$	4,649,059	37.6%	$	2,806,002
Groin Field (mob/demob combined)	$2,634,855	62.4%	$	1,643,125	37.6%	$	991,730
Engineering & Design	$964,773	62.4%	$	601,643	37.6%	$	363,130
Construction Management	$1,107,077	62.4%	$	690,386	37.6%	$	416,691
Monitoring	$996,242	62.4%	$	621,268	37.6%	$	374,974
Real Estate							
Administration costs of LERR	$222,329	62.4%	$	138,647	37.6%	$	83,682
Acquisitions (LERR)	$225,530	0.0%	$	-	100.0%	$	225,530
Total Cost	**$14,131,510**		**$**	**8,671,924**		**$**	**5,459,586**
Less LERR Credit						**$**	**225,530**
Total Non-Federal Cash Contribution						**$**	**5,234,056**

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

CERTIFICATION OF LEGAL REVIEW:

The report for Sarasota County, FL, Hurricane and Storm Damage Reduction Project, Lido Key, including all associated documents required by the National Environmental Policy Act, has been fully reviewed by the Office of Counsel, Jacksonville District and is approved legally sufficient.

Brooks W Moore

Brooks W. Moore
CESAJ-OC

10/31/02
Date

CERTIFICATION OF INDEPENDENT TECHNICAL REVIEW
Lido Key Feasibility Report with Draft Environmental Assessment, Sarasota County, Florida, Hurricane and Storm Damage Reduction Project

Independent Technical Review comments and concerns and their resolution are discussed in the enclosed documents labeled "MEETING MINUTES FOR FINAL ITR CONFERENCE" dated January 2002.

As noted above, all concerns resulting from independent technical review of the project have been mutually resolved and comments incorporated. The report and all associated documents required by the National Environmental Policy Act have been fully reviewed.

Bradd R. Schwichtenberg — Date: 4/15/04
Chief, Coastal Navigation Section
Planning Division

Edward H. Hodgens — Date: 4/15/04
Chief, Coastal Design Section
Engineering Division

for Ivan Acosta — Date: 4/15/04
Chief, Special Project Section
Environmental Branch, 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.
Response: In some instances the toe goes off of the figures in sub-appendix A-1; for the others, the software used in the computations picks up the differences between the two surveys to identify the point of closure. This point isn't always visible at the scale shown on the figures.

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?
Response: Yes, the assumption is that local erosion will be halted, but that recession from large storms will have damage impacts.

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. 8 different Non-structural measures were evaluated and found to be lacking.

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, however, paragraph 171 of the main text provides more insight.

ITR Comment: Groins are only designed for a 20–year storm whereas the project life is 5 years.
Response: The groins are designed to hold the shoreline and reduce renourishment cycles; maintenance on 10 year intervals will help weather any damage experienced by excessive storms.

ITR Comment: Groin maintenance costs should be included in cost analysis.
Response: Groin maintenance has been added to the cost 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, and although this material can not be counted on for future placement due to O&M funding constraints, it will be taken advantage of with respect to future renourishments.

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 included in the evaluation.

ITR Comment: Main report omits benefit to turtle nesting with beach fill. Loss of turtle habitat without beach fill is not mentioned.
Response: Turtle nesting benefits have been mentioned in the report and the EA.

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: That was in error and has been corrected.

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.
Response: That has been corrected.

ITR Comment: Reach delineation is slightly different in engineering and economic appendices.
Response: This has been addressed, breaking out the reaches by engineering processes and lot widths will involve some slight discrepancies.

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: Survey data is from May 2000, the 1998 fill was taken into account, but not the 2001.

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: This was accomplished using hindcast data, bathymetry GENESIS and the REF/DIF model.

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.
Response: Paragraph A-60 in the Engineering Appendix addresses this concern.

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.

Response: The risk and uncertainties inherent in the storm recession values were addressed by using the Empirical Simulation Technique described in the Engineering Appendix.

ITR Comment: Document the magnitude of error in the GENESIS calibration and verification process.
Response: This is addressed in paragraph A-72.

ITR Comment: Present figures showing measured and predicted shoreline changes in the GENESIS calibration and verification sections.
Response: This is presented in Figure A-25.

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.
Response: Sentence should read "amount of fill placed, and the associated recession rates..."

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.
Response: This documentation is available from sponsor's contractor upon request.

ITR Comment: Page A-77 How did the design arrive at three groins for the groin field?
Response: This has been addressed in A-95 on page A-90.

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?
Response: Current modeling doesn't indicate any undermining or adverse impacts.

ITR Comment: How are project-induced erosion rates used in cost spreadsheets derived for the beach fill and beach fill with groin alternatives?
Response: GENESIS results in the revised erosion rates, and then these revised rates are used in determining advance nourishment requirements, which effect placement volumes and renourishment cycles.

ITR Comment: Real estate appendix needs a map showing real estate interests.
Response: Currently unavailable.

ITR Comment: There is no detailed MCASES report.
Response: This is included in the Engineering Appendix.

<u>ITR Comments on the Environmental Assessment</u>

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.

Done. A plan view has been included in the EA.

2. Page 6, § 1.7.2.1. Include potential hopper dredge impacts in list of concerns.

Section 1.7.2.1 just summarizes sea turtle concerns. Hopper dredge impacts are discussed in detail in Section 4, Environmental Effects.

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.

Done.

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.

Clarification was made in Table 2.

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."

Clarification was made in Section 3.1.

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.

Shorebirds are listed in the Threatened and Endangered Species Section 3.3.3 titled, Shorebirds.

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.

Section 3.4, last paragraph states that "Aerial photographs of the project area shoreline have no indication of nearshore hardgrounds". This was also confirmed with side-scan sonar surveys and a marine resource survey.

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.

Section 3, Affected Environment, describes the *existing* environmental resources of the area that would be affected if any of the alternatives were implemented. Section 3.6 is describing the EFH and species that may be affected by the project. Table 1 is a summary of Section 4, Environmental Affects, which describes the direct, indirect and cumulative effects of the alternatives.

9. Page 23, §3.15. What types of "underwater survey techniques" were used? Magnetometer? Sidescan? Diver Observation?

Section 3.15 has been revised. Magnetic and acoustic remote sensing investigations were conducted.

10. Page 24, § 4.1. This section refers to "a groin" while other sections refer to a groin field.

Construction of a "groin field" was added to section 4.1. Consistency throughout the EA was made to include the term "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.

Section 4.2.3 has been revised to state, "no impacts to vegetation are expected".

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."

Shorebirds are added to the discussion of section 4.3. Detailed discussions of project effects on shorebirds can be found in section 4.3.1 and section 4.5.1.

13. Page 26, §4.3.4. Will the no action alternative result in loss of shorebird habitat?

A statement was added to section 4.3.4 "no action" alternative, which states, " there could be a loss of shorebird nesting 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?

There would be a 200-ft. buffer zone where no dredging would be permitted. This is stated throughout the EA.

15. Page 27, §4.5.1. Previous sections on listed species should reference this section for effects on listed birds.

Shorebird discussions are included in sections 4.3 and 4.5.

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.

Section 4.5.1 was revised to include discussion of recolonization of burrowing organisms.

17. Page 28, §4.6.1. See comment about §4.4.3. Dredging will likely be prohibited *within* rather than "beyond" the buffer zone.

Section 4.6.1 has been revised to include the statement "a 200-ft. buffer zone where dredging would not be permitted.

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.

Section 4.11 has been revised to include potential effects of dredging and turbidity.

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. MC

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.

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

Sido Key Feasibility Report
Independent Technical Review Meeting 5/2/

Name	Office	Telephone
Tracy Leeser	PD-PN	x1043
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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.

Engineering – 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

CESAJ -PD (10-1-7a) 30 April 2004

DOCUMENTATION OF REVIEW FINDINGS

SARASOTA COUNTY FLORIDA, SHORE PROTECTION PROJECT

LIDO KEY

FINAL FEASIBILITY REPORT AND ENVIRONMENTAL ASSESSMENT

October 2002

1. BACKGROUND.

a. Location. Lido Key is a 2.5-mile-long coastal barrier island located approximately 45 miles south of Tampa on the gulf coast of Florida.

b. Study Authority. The 1970 River and Harbor Act authorized a beach restoration project for Lido Key. Non-Federal interests constructed the northern half of the plan in 1970, but the project was never completed. The Federal project was de-authorized in WRDA 1986, but it was later re-authorized in Section 364 of WRDA 1999. The project was reanalyzed in this report due to possible cost overrun concerns.

c. Problem. The study determines the optimal hurricane and storm damage reduction features for Lido Key under current conditions, updates cost and benefits estimates, and seeks new authority to design and construct the project due to Section 902 cost limit exceedance.

d. Recommended Plan. The selected plan is to construct a 5-foot elevation, 80-foot-wide storm berm, with tapers at each end, along the developed portion of Lido Key. 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 are located between 7.2 and 9.5 nautical miles offshore. Future nourishment would be provided at about 5-year intervals. Three groins would be constructed along the southern portion of the berm to reduce post-construction erosion losses. The selected plan is the NED plan.

e. Project Costs. The recommended plan has an initial construction cost of $12,632,200 at October 2002 prices. Total periodic nourishment costs are estimated as $52,517,000 (October 2002 prices) over the 50-year period of Federal participation.

f. Project Economics. Without-project annualized expected hurricane and storm damages are estimated at $4,354,500. The recommended plan would reduce expected annual damages by over 99 percent. Based on a 6.125 percent discount rate and a 50-year period of economic

evaluation, annual costs are estimated as $1,954,700 and annual benefits are $4,319,900. Net benefits are $2,365,200 and the BCR is 2.2. All benefits are for hurricane and storm damage reduction.

g. **Cost Apportionment.** Based on current shore ownership, use, and type and incidence of expected benefits, initial construction costs would be apportioned 62.4 percent Federal and 37.6 percent non-Federal. The City of Sarasota would be the non-Federal project sponsor.

2. REVIEW SUMMARY: The HQUSACE review team believes that the District has adequately addressed some of the Policy Compliance Review Comments furnished by memorandum from CECW-PC dated 5 November 2002, however there are still policy issues that remain with regard to the assumed without-project conditions. In particular, the placement of sandy material from the New Pass Channel (5.a), the frequency-recession relationship (5.b), and the accounting of recurring damages (5.c) remain of concern. Specific examples are cited within the HQ assessments to clarify the basis for concerns. These concerns may have potential to impact the analyses of damages and benefits, as well as the formulation. In addition, there is concern regarding the constraints to public access (9.c) as it relates to cost sharing and the documentation of the independent technical review (10.a). These concerns are discussed below.

3. ADMINISTRATION SUPPORT: The draft 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: "The 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.

OCTOBER 2002

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.

CESAJ ACTION TAKEN: Concur. Page 2 of the syllabus and the recommendations section of the report has been changed to reflect the Administration's current position on Hurricane and Storm Damage Reduction.

MARCH 2003

HQUSACE TEAM ASSESSMENT: The requested changes have been made. **The HQ review team believes that this concern is resolved.**

4. SAND AND BORROW SOURCES:

a. Insufficient Quantity of Sand. Sufficient quantities of suitable sand borrow for the project have 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 of 10 periodic nourishment events. Therefore, the initial construction and one future nourishment would essentially deplete the three designated borrow areas. 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.

OCTOBER 2002

CESAJ 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.

CESAJ ACTION TAKEN: Concur. The Geotechnical Appendix has been revised to reflect the fact that the borrow sources required for the life of the project are available. This information has been collected and is provided under this reference: Coastal Planning & Engineering, Inc., (1999). Town of Longboat Key, Phase II Offshore Borrow Area Investigation to Locate "White Sand" Sources for Beach Renourishment of Longboat Key, Boca Raton, Florida. This referenced study shows sufficient material within the bounds of the study area and has done reconnaissance level sediment classifications for the potential borrow areas. Cost estimates for renourishment have enough PED costs included to cover the remaining needed testing.

MARCH 2003

HQUSACE TEAM ASSESSMENT: Both the main report and the Geotechnical appendix now demonstrate that sufficient borrow is available within a reasonable haul distance to both build and renourish the project. **The HQ review team believes that this concern is resolved.**

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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.

OCTOBER 2002

CESAJ RESPONSE: PD-PN. Concur. Reference response to comment 4.a. above.

DISCUSSION: Reference discussion to 4.a above.

REQUIRED ACTION: Reference required action for 4.a above.

CESAJ ACTION TAKEN: See response for item 4.a above.

MARCH 2003

HQUSACE TEAM ASSESSMENT: Reference discussion to 4.a. above. **The HQ review team believes that this issue is resolved.**

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5. 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.

OCTOBER 2002

CESAJ 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.

CESAJ ACTION TAKEN: The following pertains to New Pass and its authorization thru Section 107 of the 1960 Rivers and Harbors Act, as amended. New Pass is on the verge of exceeding it's authorized life. As stated in EP 1165-2-1, DIGEST OF WATER RESOURCES POLICIES AND AUTHORITIES, 30 July 1999, Table 2-1 footnote (4) "Also, the Federal share of the total costs (initial implementation costs plus the capitalized value of the future maintenance costs) may not exceed 2.25 times the initial Federal costs or $4.5 million, whichever is greater." A spreadsheet of the expenditures, since construction, for the New Pass project was prepared. The interest rates is provided by the Federal Discount Rates for Project Formulation and Evaluation were applied, as provided in 14 Dec 2000 Economics Guidance Memorandum Number 01-02: Fiscal Year 2001 Interest Rates. The base year used in this evaluation was 1964 since that is when construction was initiated; all the project costs were discounted back to this year.

Using the 1964 interest rate (3.00% (as recommended by ER 1105-2-100, Para F)) provided a present worth value of $3,934,428. This cost includes the anticipated maintenance event scheduled for October 2002; the estimated cost of this event is $1,800,000. The $3.9 million dollars would not allow for additional maintenance events under this scenario. Therefore, without an extension to this authorization, future maintenance events should not be considered part of the future without project conditions.

MARCH 2003

HQUSACE TEAM ASSESSMENT: **The HQ review team believes that the issue is not resolved.** The District's argument that the Federal government will cease maintenance dredging of New Pass after the 2002 is reasonable, given the Federal cost limitation under Section 107. However, the guidance on Section 107 requires that local sponsors continue the maintenance dredging of Section 107 projects once the Federal government's participation ceases. This requirement is noted in Section F-15, paragraph c. of ER 1105-2-100, on page F-12. Therefore, it would seem reasonable for the sponsor to continue dredging the navigation channel at New Pass and placement of the dredged material on the eroding sections of the Lido Key beach under without project conditions in the absence of Federal participation. In the event that non-Federal dredging of the channel is curtailed, it would still seem reasonable for the local interests to place material from other sources along the eroding shoreline as noted in comment 5.b.(4) below rather than taking no action to place beach fill.

SEPTEMBER 2003

CESAJ RESPONSE: Section 107 does not include a specific requirement for the sponsor to maintain the project when Federal participation ends. The City of Sarasota's resolution (there is no PCA) for New Pass, dated 1963, reflects the sponsor's commitments with regard to the project and does not include maintenance of the channel, only the commitment to provide and maintain necessary mooring facilities and utilities. Accordingly, the sponsor has not committed to maintain. ER 1105-2-100 notes that "when Federal participation ceases, the operation and maintenance of the project becomes the responsibility of the sponsor." This does not necessarily translate into an obligation on the part of the sponsor.

DECEMBER 2003

CESAJ RESPONSE: Currently the pass is maintained by the Federal Government at our expense; when Government participation ends, any of the end users for that channel may or may not elect to maintain the inlet. The inlet channel is currently very dynamic, moving and filling with various storm activities, it is not currently maintained by the users even though it can be 5 or more years before the Federal Government is able to dredge. The most likely scenario would involve local boaters traversing the 4 miles south to Big Sarasota Pass which is a much more stable and naturally deep inlet having very little need for maintenance. In addition, the opportunity for obtaining beach quality material from this inlet would rest just as much with town of Longboat Key, or any of the other local communities as it would with Lido Key. The permitting process for dredging the inlet and the mobilization costs, when compared to the volume of material available, would be the largest deterrent for any of these communities. Additional material from enlarging the channel to better utilize mobilization costs would be difficult to justify with the DEP and may have negative impacts with respect to wave focusing on the north end of Lido Key.

Including this as part of the future without project condition would have the potential to greatly effect the Plan Formulation and plan selection. Incorporating 120,000 cy of material into the system every 5 years would add approximately 1.4 cy of sand to every linear foot of the beach per year. That would have some impact on the erosion rate in reach 2 (the historic location for these placements); the project would still be justified (current BCR of 2.2 without recreation benefits), but there is the potential for the NED plan to change. This would cause dramatic changes throughout the report, including public coordination.

HQ: I think that the district needs to explain why it would be unlikely that the community/sponsor of the project would continue to dredge the channel at the end of the Federal participation period. The sponsor should be approached in that regard to get an official response. I thought previous district responses said the amount of material from channel dredging would have rather negligible effects anyway- this seems to be a much different response to me. Another question would be how the material would be placed, since I doubt it would be uniformly placed along the shoreline, but more likely at the worst erosion areas close to the channel. Even if the channel were no longer dredged under the most likely future conditions, it would seem prudent for local interests to do something to protect themselves rather than do nothing. Whatever actions might be taken can be claimed as benefits due to local costs foregone.

JANUARY 2004

Conference Call with SAD/HQ: HQ agreed to SAJ's argument on maintenance funding availability and location of placement of material. Funding for recreational shallow draft navigation channels is very low priority, and there are two islands competing for this resource.

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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.

OCTOBER 2002

CESAJ 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.

CESAJ ACTION TAKEN: Concur. It is important to note that the Storm Damage Model (SDM) does not apply the long-term erosion rate for every year of the period of analysis for Lido Key. That rate is applied for each year until the shoreline recedes to the location of coastal armor. Once the shoreline recedes to the coastal armor location, no further long-term erosion is calculated and the pre-storm shoreline position is held constant at the armor location for each year for the remainder of the period of analysis. It is assumed, under the without project condition, that any unarmored segments of the Lido Key shoreline will be armored when the shoreline has eroded to the point where structures are expected to be damaged by a 1-in-5 year probability storm event. This is permitted under Florida state law, and armoring of the coastline as long-term recession progresses has been observed at numerous sites along the Florida coast.

The SDM input data for reach 3 indicate that all damageable properties in that reach are protected by coastal armor sufficient to halt long term recession. For reach 2, the SDM input data indicate that three structures are not protected by coastal armor; however, structures on either side of those structures are protected by coastal armor. The future location of coastal armor for the unarmored structures was identified, based on the location of existing armor for the adjacent structures. The SDM calculates long-term recession for each year until the future armor location is reached. At that time the SDM assumes that the coastal armor will be constructed and long-term recession is halted for all subsequent years.

MARCH 2003

HQUSACE TEAM ASSESSMENT: **The HQ review team believes that this issue is not resolved.** The information on the without-project conditions presented in various sections of the report and the district responses to review comments seem to have inconsistencies, which need to be resolved in order to assure that the long-term erosion and storm damages are modeled accurately and the without–project conditions are clearly described. These damage analyses form the basis for calculation of project benefits and justification of the recommended plan. Specific examples of the inconsistencies are discussed below.

(1) Shoreline Positions Resulting from Long-Term Recession. Tables D-1 and D-2 show the shoreline position input data for the SDM in Reaches 2 and 3. The text on page D-11 indicates that the future shoreline positions were used to estimate the storm-induced recession. The future shoreline positions reflect the assumption of a constant erosion rate throughout the 50-year period of analysis. The resultant long-term recession extend beyond the coastal armor, contrary to the district's response above, with long-term shoreline recession that reaches

distances of 1,033.9 feet by year 2050 for reach 2, and 310 feet by year 2050 for reach 3. In contrast, Table A-13 of the Engineering Appendix shows that the shoreline recession is expected to be highly variable throughout the reach, with the long-term recession stopping at the coastal armor and much lower recession distances resulting overall. Table A-13 shows that the maximum shoreline change by year 2050 within Reach 3 is expected to occur at profile R-42 with a distance of 139.5 feet (269.5 - 130.2) versus the value of 310 feet input to the model. In Reach 2 the maximum change occurs at profile R-38 with a distance of 282.2 feet (317.2 – 35.0) versus the 1,033.0 feet in the model input. It is not clear whether the economic model disregards the higher values after reaching coastal armor or whether the coastal armor was assumed to be ineffective at stopping the long-term erosion. From the limited data provided in the Economic Appendix it is not possible to determine how the long-term recession values influence the analysis of damages and project benefits and whether the SDM is using the appropriate assumptions for the without-project conditions. The district should review the SDM to assure that the analyses of long-term and storm-induced damage analysis are based on shoreline position changes under the without-project conditions that are consistent with the engineering analyses and representative of the erosion anticipated within each reach. The without-project assumptions must also be clearly and consistently described in the text.

SEPTEMBER 2003

CESAJ RESPONSE: Tables D-1 and D-2 do show the shoreline position for both reaches. The text on page D-11 does stress that the future damages are referenced to the existing shoreline position. A clear understanding could be seen if the paragraph was re-written as follows:

b. Shoreline position: future conditions. "Future year damages to all susceptible structures is simulated in the storm damage computer program using the existing shoreline as a reference point. As the shoreline position changes with time, damage probability at some time period in the future is referenced to an established existing 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 (which extends the shoreline further seaward) reduces future susceptibility."

In reference to Tables D-1 and D-2, "Shoreline Position," in Table D-1 as it appears in the report is missing the shoreline position for the lat column (years 2005, 2010 etc). Thus, where you indicate a shoreline recession distance of 1,0339.9 for the year 2050 in the year 2050, the shoreline position is 1055 (see new Table D-1). This may resolve your concerns in this comment for Economics and in the main report.

DECEMBER 2003

CESAJ RESPONSE: The comment indicates that there is some misunderstanding regarding model input for shoreline position and model output in the form of expected annual storm damages. Because the model is designed to calculate expected damages on a lot-by-lot basis for both armored and unarmored shoreline, the expected shoreline position for unarmored shoreline is input by reach for each year of the period of analysis. Also included as input to the model is information on the type, location, and protective value of coastal armor for each lot. For lots

with no coastal armor, an armor index number of 1 indicates no coastal armor. (See Table D-1 & D-2). 32 of the 39 lots shown in Table D-2 have coastal armor under existing conditions. In calculating expected damages for those lots and associated structures, the SDM uses the input value for shoreline position for every year of the period of analysis until it is equal to or less than the armor position specified in Table D-2. At that point, shoreline position is held constant, for each of those 32 lots, at the position specified for the existing coastal armor. Similarly, for the 7 unarmored lots, the SDM uses the input value for shoreline position specified in table D-2 is reached. The model then determines that the armor Type 1 (no armor) will be destroyed by any storm event (as it has a protective value of zero) and the replacement armor (also shown in Table D-2) will be constructed at the specified armor location. For 6 of the 7 lots with no coastal armor, replacement armor type 3 is specified (20' concrete sheetpile). That type of armor is sufficient to halt all long-term erosion, so the shoreline of the 6 lots is held constant at the armor location specified in table D-2 for the remainder of the period of analysis. For the single vacant lot without existing coastal armor, only loss-of-land damages are calculated. That is the only lot for which the input shoreline position is used without restriction by the SDM in the calculation of expected damages.

Note that the values in Table D-1 for shoreline position for the last column (2005, 2010... 2050) were cut off. Similarly in Table D-2, the tenths values for the last column (31, 62... 310) were cut off.

HQ: I believe when I talked to Bradd about this that I indicated that the major concern was resolved, but the district should put an explanation as a footnote on the tables or change the headings to say that the shoreline positions were theoretical positions assuming that the erosion continued at the historic rate, rather than saying that they were future shoreline positions, since that sounds like they are predicted to actually reach those positions under the without project conditions.

JANUARY 2004

Conference Call with SAD/HQ: (1) Not discussed.

(2) Averaging of Erosion Rates. The shoreline positions under the without-project conditions are depicted in Figure A-16 of the Engineering Appendix. The figure shows that much of the shoreline in Reach 3 is expected to either accrete or experience less rapid erosion than the average value for the reach, which was input to the SDM. The shoreline recession data in Table A-13 for the Reach 3 profiles lines indicate that the future shoreline change rates are 0.8 feet/year at R-41 (accreting), -2.8 ft./yr. at R-42, and –16.6 ft./yr. at R-43 (the average of these values is 6.2). The high rate at R-43 would only apply for one year before a coastal structure stops the erosion. However, this high rate of erosion significantly affects the average value of –6.3 feet per year. That rate was then applied in the SDM along the entire reach and would lead to model results that reflect more significant long-term and storm-induced recession than would actually be expected in comparison to the recession values in the Engineering Appendix. This would then overstate the without–project damages related to development, coastal armor, backfill, and land loss as well as the benefits attributed to the project. Similarly in reach 2, the

shoreline change rates at profiles T-36, R-37, R-38, R-39 and R-40 vary from 6.1 feet of accretion to 40.8 feet of erosion. The average of these rates, 21.1 feet/year, was applied throughout reach 2 in the SDM although the 40.8 ft./yr. rate of erosion is only experienced until coastal armor is reached in year 2004. The district should review the average erosion rates used in the SDM to assure that they are representative of the entire reach and are applied only until such time as the coastal armor is reached.

CESAJ RESPONSE: The statement that "The high rate at R-43 would only apply for one year before a coastal structure stops the erosion" is inaccurate. The proper wording should reflect that the high rate of erosion measured at R-43 and incorporated into the Reach 3 average would only apply for one year **at one particular property** before the structure at that property stops the erosion. Also, "...reflect more significant long-term and storm-induced recession than would actually be expected in comparison to the recession values in the Engineering Appendix." seems to imply a discrepancy between the long term erosion rate used in the storm damage model (SDM) and that found within the Engineering Appendix. This is not the case in that values determined from historical analysis of shoreline change in the appendix were averaged and imported directly into the SDM.

Estimated shoreline changes were obtained at each DEP monument that are approximately 1000 feet apart. To assume that these rates can be assigned unilaterally to individual properties is a gross overestimate of the accuracy of the estimates. The fact of shoreline change variability along any given stretch of beach is the basis for using average values. The rate of shoreline change is dependent upon physical parameters with wave action being the primary forcing factor. To attempt to eliminate measured values within the long-term and long-reach averages as the estimated shoreline reaches coastal armor is not appropriate. Given the distance between monuments being about 1,000 feet at the referenced property, and the property front footage of only 280 feet, the armor halting the erosion amounts to only about 28% of the shoreline between these monuments. Eliminating the erosion rate for these monuments from the overall reach average would ignore the continued losses at the remaining 72% of properties. More importantly, it can be observed that when shoreline erosion reaches an armored obstruction, the rate of shoreline retreat at adjacent properties accelerates. The effect of these existing structures may already be contributing to the higher rates within this sub- reach. Compared to historical averages, the without-project condition recession could be even higher as time progresses and the with-project condition erosion rate, without the armored shoreline impacts, could even be less than the historical average. These combined effects would tend to raise, not reduce, the with-project storm damage benefits.

DECEMBER 2003

CESAJ RESPONSE: The statement that "The high rate at R-43 would only apply for one year before a coastal structure stops the erosion" is inaccurate. The proper wording should reflect that the high rate of erosion measured at R-43 and incorporated into the Reach 3 average would only apply for one year at one particular property before the structure at that property stops the erosion. Also, "...reflect more significant long-term and storm-induced recession than would actually be expected in comparison to the recession values in the Engineering Appendix." seems

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Furthermore, long-term shoreline change is the resultant of physical forces which act independently of whether man-made structures exist within the area of interest. The averaging of historical shoreline change within a reach is simply a reflection of the effects of the historical wave and current environment affecting that reach. Any structures, which limit the shoreline movement, will not have any effect on the forces that cause that change. Therefore, to properly determine the anticipated future shoreline change energy, all historical shoreline change rates should be included and averaged. That average change is then input into the storm damage model, which takes into account the existence of armoring and halts damages at that property according to the level of protection assigned. Something else that should be pointed out is that even though the shoreline change rates for Reach 3 don't appear to be as dramatic as what is shown for Reach 2, Table A-15 in the Engineering Appendix shows a large unit volume change for the reach. This reflects the fact that profiles near the end of the island are experiencing deflation (loss of material in the offshore portion of the profile) due to the effects of Big Sarasota Pass; knowledge of this effect, that isn't demonstrated as much in the shoreline change rates led to the use of the 6.3 ft/year rate for this reach.

HQ: There is a significant discrepancy between the shoreline position information shown in the Engineering Appendix and that used in the economics analysis. The engineering figure cited in the original comment shows the predicted shoreline positions under the without project conditions - erosion is not shown to continue at a rate of 16 feet per year anywhere in reach 3. Much of reach 3 is accreting, which therefore has decreasing damage potential in the future and has no Federal interest in shore protection. I believe the R-43 data is not reflected appropriately by simply averaging it with the rates at the other profiles throughout the reach. The resultant

damages and benefits used to justify the reach 3 improvements would then appear to be overstated when compared to the shoreline positions predicted in the engineering figure. Accretion rates should not be averaged with high erosion rates to show a long-term erosion rate that does not occur. It is comparable to predicting flood damages to properties that lie outside of the depicted floodplain. The question is- what shoreline position is representative of the future without-project conditions. The report needs to be made consistent. I do not believe the 16 ft/yr historic rate at R-43 should be ignored, but the averaging currently used for economic evaluations seems inadequate. Plotting the predicted shoreline positions used in the economics model vs. the positions shown in the engineering figure would illustrate the concern, and bringing those positions more in line would help to resolve the concern. Perhaps reach 3 should be shown as a shorter reach with an accreting section between erosion reaches 2 and 3.

JANUARY 2004

Conference Call with SAD/HQ : (2) HQ agreed to accept SAJ's response.

(3) Recession Damage Values. It is not clear whether the appropriate damage values were used in the recession-damage analysis. Table D-4 shows a Recession-Damage Relationship as an example. Although the table does not specify which area it represents, the text on D-14 seems to indicate it is an example of data from the analysis of Reach 2. It is noted that for the recession distances between 210 and 380 feet many of the total damage values in the last column do not equal the sum of the other columns for damages to development, backfill, coastal armor, and loss of land. For example, at a distance of 320 feet, the columns total $11,506,709, but the total damages displayed in the last column are $15,803,567. At 360 feet the columns total $20,430,324 but the last column shows a total of $36,349,739, nearly double that value. It is not known whether these significant discrepancies would impact the damage and benefit values used for formulation and justification. The district needs to revise the table and review the damage values used in the SDM to assure that they are correct and provide an accurate basis for the benefit analyses and determination of project justification.

SEPTEMBER 2003

CESAJ RESPONSE: The first part of this comment is true. Recession-damage refers to Table D-4. As far as Table D-3 relates, it shows the total structural inventory for both reaches. The decision was made at that time not to show separate structural inventory tables. In the interest of clarity, the tables will be separated and paragraph 16 on page D-14 will be re-written to reflect these changes. Both recession-damage tables have been reviewed and changed due to some columns not summing in the tables. The new tables are the sum of the input damage categories as listed in the tables.

(4) No Action Assumptions. The analysis assumes under the future without-project conditions that local entities would not place sand on Lido Key beach. This seems inconsistent with the historic local actions to place fill on Lido Beach, in addition to the Federal disposal of dredged material from the New Pass channel. The local interests placed material in 1970 in the absence of Federal cost sharing and fill has been placed periodically as recently as 1998. It would seem reasonable to assume that local actions would continue under the without-project

conditions to protect the valuable assets and coastal armor along the shoreline with beach fill. Figure A-16 shows that the predominant location of shoreline erosion is in Reach 2, where the bulk of historic fills have been placed. A significant amount of the material eroded from Lido Key Beach appears to accrete in Reach 1 at the public beach beyond the project's northern limit. It would seem more reasonable for the city to take some action to back pass accreted material as a means of maintaining the Reach 2 shoreline, or to continue dredging from the channel or an offshore borrow source, than to take no further local action to prevent damages by maintaining the beach. Further rationale is needed if no action is assumed in the future.

SEPTEMBER 2003

CESAJ RESPONSE: See response to 5.a. above.

DECEMBER 2003

CESAJ RESPONSE: Granted, the local sponsor has performed several "band-aide" type repairs to the beach in an effort to stem the erosion; but without Federal assistance they do not have the resources to commit to a properly engineered hurricane and storm damage reduction project. The reaches that they currently place material within are entirely too short and are subject to tremendous amounts of end losses; they do not have the funding source to pay for the required scheduled periodic renourishments needed to implement a proper Shore Protection Project. The current analysis does not account for the recreation benefits that are going to be lost as the beach continues to erode; this will further reduce the scope of projects that the sponsor will be able to put forth.

HQ: I would concur that local actions would be less effective than a Federal project for the resason stated. However, it would seem likely that those actions would continue in the absence of a Federal project and their costs could be claimed as benefits for local costs foregone.

JANUARY 2004

Conference Call with SAD/HQ: Not discussed

(5) October 2002 Nourishment. The district response above indicates that a maintenance dredging operation of New Pass channel was planned for October 2002. This was not discussed in the report and it is not evident that the erosion analyses have accounted for the effects of that recent nourishment under the without-project conditions. The review of without-project conditions erosion analyses should include consideration of the October 2002 nourishment.

SEPTEMBER 2003

CESAJ RESPONSE: See response to 5.a. above.

6. 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.

OCTOBER 2002

CESAJ 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.

CESAJ ACTION TAKEN: 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. This damage function is used for one and two story structures with slab-on-grade foundations. For pile structures, full value is reached at the landward limit of the structure. This damage function is used for all structures with deeply embedded pile foundations. Damage to the first two floors of pile structures is assumed in the model due to the wave and water level induced impacts. It is assumed that all structures of more than two stories will have deeply embedded pile foundations. All structures included in the Lido Key damage inventory are constructed at grade, regardless of whether those structures have pile or slab foundations. There are no structures elevated on piles. 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.

MARCH 2003

HQUSACE TEAM ASSESSMENT: No changes were made to the final report in response to this concern. According to the response to concern 5.b above, the District assumed, for the Lido Key analysis, that under the without project condition, any unarmored segments of the shoreline will be armored when the shoreline has eroded to the point where structures are expected to be damaged by a 1-in-5 year probability storm event. Once the shoreline recedes to the coastal armor location, no further long-term erosion is calculated and the pre-storm shoreline position is held constant at the armor location for each year for the remainder of the period of analysis. This assumption limits the susceptibility of both slab- and pile-founded structures on the Lido Key shorefront to undermining and collapse. **The HQ review team believes that this issue is resolved.**

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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 S-BEACH 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 footprint 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.

OCTOBER 2002

CESAJ 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.

CESAJ ACTION TAKEN: Concur. As noted above, none of the structures in the damage inventory are elevated on piles. An example of damages calculated for 1 foot of erosion follows. For a 10- story condominium valued at $10,000,000, damages are claimed for the first two stories only. Assuming that all 10 stories have equal value, the value of the first two stories is $2,000,000. Assuming that the structure is 80 feet from its seaward face to its landward face, each foot of erosion will result in 1.25% of $2,000,000 or $25,000 in damage. The amount of damage calculated for one foot of undermining in this example is considered minimal as a proportion of the total structure value ($25,000 is 0.25% of $10,000,000).

MARCH 2003

HQUSACE TEAM ASSESSMENT: The coastal armoring assumption adopted for the Lido Key storm damage analysis limits the susceptibility of both slab- and pile-founded structures to undermining and collapse. See HQUSACE review team analysis for concern 6 .a. above. **The HQ review team believes that this concern is resolved.**

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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 footprint, 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.

OCTOBER 2002

CESAJ 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 5.a above.

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

CESAJ ACTION TAKEN: The SDM is a hybrid of a probabilistic and a life-cycle model. As such, it does not specifically address the question of how many times each structure in the database is likely to be damaged and repaired. Expected damage to each structure for each year of the period of analysis is calculated based on the amount of shoreline recession associated with ten storms with known probabilities of occurrence weighted by those probabilities. Whether or

not a given structure is expected to sustain damage from a particular amount of storm-induced recession is a function of the structure's location with respect to the reference shoreline, the presence of intervening coastal armor, and the protective value of the armor. For reach two, there are only four structures that are not currently protected by coastal armor. It is expected that armor will be constructed to protect those structures by the year 2005 under without project conditions. Even without coastal armor for the first five years of the period of analysis, none of those structures is expected to sustain any damage from a 1-in-10 year probability storm. It is also expected that the new protective armor for those structures will be concrete sheet pile consistent with the existing armor that protects adjacent structures. SDM calculations for reach 2 assume that all structures in the database will be protected by coastal armor sufficient to protect against the 1-in-10 year probability storm event. With the coastal armor in place, 11 of the 25 structures in the reach 2 database are subject to damage by the 1-in-20 year probability storm. An additional 3 structures are subject to damage by the 1-in-100 year probability storm. The total value of the 15 structures subject to damage without a project in reach 2 is $63,078,930 (including only the value of the first two stories for multistory structures). The total value of structures subject to damage without a project in reach 2 (including the total value of multistory structures) is $88,425,490. Similarly, for reach 3 all structures are protected by coastal armor sufficient to protect against the 1-in-5 year probability storm event. All 11 structures in the reach three database are subject to damage by a 1-in-10 year probability storm. The total value of the 11 structures subject to damage without a project in reach 3 is $40,332,305 (including only the value of the first two stories for multistory structures). The total value of structures subject to damage without a project in reach 3 (including the total value of multistory structures) is $111,843,551. For the total study area, the value of the first two floors of all structures is $103,411,235. The total value of all structures in the study area is $200,269,041. The without project expected annual damages to structures, calculated at $3,592,839, is less than 4 percent of the value of the first two floors and less than 2 percent of the total value of all structures. It is considered reasonable that this amount of damage will be repaired under without project conditions.

MARCH 2003

HQUSACE TEAM ASSESSMENT: **The HQ review team believes that this issue is not resolved.** Page 42, paragraph 104 of the main report, indicates that relocation of structures is implicitly incorporated into the storm damage model, such that heavily damaged development is removed from the storm damage analysis inventory when the damage occurs. Although this statement is consistent with the CESAJ response above, it seems to conflict with the economic assumptions, which are listed on pages D-4 and D-5. Paragraph 10.i. on page D-5 indicates that after structural failure of the coastal armor and the shoreline recession continues through the shoreline development, roads, parking lots etc, these damageable assets will be repaired to a condition similar to and in the same location as the pre-storm conditions. This would seem to result in recurring damages as assets are repeatedly damaged and rebuilt and it may contribute to the significant level of damages from frequent storms and the ability of relatively small scale plans to eliminate the majority of damages with minimal residual damages. Review of the information in the economic appendix to evaluate recurring damages resulted in the following specific examples of concerns with the analyses of damages and benefits, which may have implications for the overall formulation and plan selection.

SEPTEMBER 2003

CESAJ RESPONSE: The storm damage model default is condemnation (and removal of the inventory thereby no recurring damages) if structure destroyed is within a specified condemnation distance. The write-up on pages D-4 and D-5 of the Economic Appendix will be revised to clarify this point. Discussion will be added to address specifically what types of structures were allowed to be condemned and which ones were not.

(1) Table D-3. The distances to the coastal armor, the face of the structure, and to the mid-point of the structure (point of maximum damage), indicate that the model input assumed several features are instantly destroyed as soon as their seaward edge is touched. The pool and parking areas have a point of maximum damage that is 1 foot from their seaward face and 2 feet from the armor. The last condo listed on page D-12 has a maximum damage point listed that is 20 feet closer to the armor than its seaward face. It isn't clear that the distance data for these items in the inventory represent reasonable assumptions for damage and structural failure. There are also six condos where the distance from the armor from point of maximum damage is only 60 to 80 feet, which is in the range of recession values for the 1 to 5-year frequency events in reaches 2 and 3 when long-term erosion reaches the coastal armor. The proximity of these assets to the coastal armor heightens the criticality of the assumptions for shoreline position and storm recession.

SEPTEMBER 2003

CESAJ RESPONSE: Table D-3 has an error in the name of the last column. It should be distance to full value (this is the distance to where full damage of the structure is assumed, for structures with slab on grade it would be ½ the landward distance toward the back of the foundation, for pile supported structures it would be the full distance to the back of the foundation with damages calculated for the first two floors only). Table D-3 will be modified accordingly.

Table D-3 indicates that value of the pool and parking lot are $1 each. Changes in the distance to full damage for these structures will not affect the outcome of the economic analysis.

The last condo on Page D-12 now shows the distance to armor as 40 feet, distance to structure as 60 feet, and distance to full value as 300 feet.

The SAJ storm damage model has been extensively used for a number of years on HQ approved projects, and provides storm damage results that are reasonable.

(2) Tables D-1 and D-2. The shoreline recession–probability values in these economic input tables are nearly all different from the combined tropical and extra-tropical storm values shown in Table A-21 in the Engineering Appendix by distances in the range of 10 to 20 feet. Of particular concern are the recession values for 5-year and 10-year events in reach 3, which are shown as 136 feet and 197 feet, respectively, in the model input rather than 63 feet 68.4 feet in Table A-12. Figure A-24 shows that the recession-frequency relationship in Reach 3 is a step

function, which would seem to have been smoothed in the economic input. The effect of the discrepancies may be significant given the proximity of damageable assets to the coastal armor and the likelihood that the armor protection is assumed to provide protection from a one in 5-year frequency event. In fact, the Summary of Findings on page D-3 acknowledges that the losses appear to be relatively high when considering the small size of the area and the number of structures impacted. And the text further noted that this is due in part to the high structure values and the susceptibility of a small number of structures to the 1 in 10-year storm event because of their proximity to the shoreline. The district should review the storm recession values shown in Tables D-1 and D-2 to assess the discrepancies with the engineering text and assure that they are the appropriate values for use in the economic analysis.

SEPTEMBER 2003

CESAJ RESPONSE: CESAJ-PD is investigating this issue. Response will be forthcoming.

DECEMBER 2003

CESAJ RESPONSE: If changes to the report are warranted for other comments, these changes will be made at that time provided that funding is available.

HQ: This comment appears to be resolved- the changes will need to be made at some point.

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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.

OCTOBER 2002

CESAJ 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.

CESAJ ACTION TAKEN: Concur. The Economics Appendix now includes more information concerning the nearshore land values. No economic re-evaluation was required.

MARCH 2003

HQUSACE TEAM ASSESSMENT: **Not resolved. The HQ review team believes that the value of $24.00 per square foot is representative of developable land in the Lido Key area, however, it is not clear whether the land lost to erosion should be valued as developable land rather than for its recreational use.** The main report, page 52, para. 146, states that recent Lido Key land sales, both beach front and away from the beach, were reviewed to derive a baseline for determining applicable near-shore land values and loss of land prevention benefits. The text indicates that the $428,800 in annual benefits for the prevention of land loss is due to the elimination of land losses to undeveloped private property seaward of the coastal armor, which seems to be private beach areas. It is not clear whether the lands lost are developable, part of the developed parcels that exist landward of the coastal armor, or separate undeveloped lots. Clarification is needed to assure that the benefit category is appropriate for its use in the economic evaluation and that it is valued appropriately.

SEPTEMBER 2003

CESAJ RESPONSE: Comparable land was used to develop values.

DECEMBER 2003

CESAJ RESPONSE: This is the price the land would currently market for under existing conditions; it is the land associated with the lot and there is no data to indicate that the land under the footprint of the building has a different unit cost than land on any side of the building. The entire lot is marketed as nearshore with no distinction on whether or not it is to be used for a building or a sunbathing area. The fact that the land could be used for any number of uses associated with the hotel/condo/residence applies to the reasoning behind the pricing. The value is very much in line, with respect to order of magnitude, with other Federal Shore Protection Projects on the Gulf coast of Florida.

HQ: I believe the economic concern was that the land had to be developable in order to use this land loss calculation technique. Otherwise a different technique, such as the cost of fill would be appropriate.

27 January 2004

Conference Call with SAD/HQ: HQ would like to see a sensitivity analysis to determine the order of magnitude difference between using this nearshore land valuation for storm effects vs. the cost of replacing the material with fill on a cubic yard basis (truck haul).

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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?

OCTOBER 2002

CESAJ 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 5.a above.

CESAJ ACTION TAKEN: 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.

MARCH 2003

HQUSACE TEAM ASSESSMENT: **The HQ review team believes that this issue is not resolved.** The district explanation for this comment seems to conflict with the explanation provided under comment 5.b above regarding the basic assumptions for modeling the coastal damages. It was previously indicated that no long-term recession was assumed under the without-project condition once the shoreline position reached the coastal armor. Therefore, there should not be 50 years of additional recession if the coastal armor is assumed to hold the line against erosion. In fact, Table A-13 indicates that the only area where recession continues throughout the 50-year period of analysis is at profile R-42. In all other locations throughout reaches 2 and 3, the erosion is expected to last only until 2012 at the latest, at which time coastal armor is encountered. The 80 foot-berm plan (with no dune) is projected to eliminate over 99% of the total annual damages under the without-project conditions. The 0-foot berm plan (with no dune) is projected to eliminate over 66% of the annual damages. It would seem improbable that such significant levels of damage reduction could be achieved with such a small-scale plans without dunes, unless the damages are predominantly due to erosion. Based on the economic input data in Tables D-1 and D-2 the assumptions for long-term recession may have resulted in future shoreline positions for modeling of the storm-induced recession that could over estimate the damages and therefore the effectiveness of the plans. See the assessment and action required for comment 5.b.

SEPTEMBER 2003

CESAJ RESPONSE: As indicated on page 51 of the main report paragraph 143, damages are calculated due to shoreline position change and damage probabilities from frequency vs recession distance curves. These two factors account for the long-term erosion and episodic erosion respectively, that puts coastal development at risk. The SAJ storm damage model couples these two affects to calculate damages. The model assumes that damages begin as the landward extent of storm recession reaches the seaward extent of the structure. Damages

calculated by the model are reasonable and have been. The model has been used for numerous previous studies that have been reviewed and approved by HQUSACE.

DECEMBER 2003

CESAJ RESPONSE: Our model does not take into account any damages to structure content. Text could be added to the discussion on damages, stating that this is a benefit that would not likely be realized without the addition of a dune system or the expense of raising the berm elevation above naturally occurring elevations.

HQ: Contents as well as structures are subject to storm damages from inundation and waves in addition to erosion. The sponsor needs to be advised as to the level of protection afforded by the Federal project, and as part of the items of local cooperation they must regularly inform the community. Therefore, the report should clearly explain any damages that were not evaluated so it is understood by the community what protection they are getting.

JANUARY 2004

Conference Call with SAD/HQ: **Not discussed.**

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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.

OCTOBER 2002

CESAJ 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.

CESAJ ACTION TAKEN: Concur, The MCACES write up and estimates have been changed to reflect the correct value of 300 feet.

MARCH 2003

HQUSACE TEAM ASSESSMENT: **Resolved. The typographical error has been corrected.**

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7. 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.

OCTOBER 2002

CESAJ RESPONSE: PD-PN. Concur. Comment 7 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.

CESAJ ACTION TAKEN: The report has been reviewed by OC and the legal certification is in the pertinent correspondence appendix. The sponsor's intent and financial capabilities along with the District's assessment has been added to the report.

MARCH 2003

HQUSACE TEAM ASSESSMENT: The required technical and legal certification documents have been submitted. The report addressed the financial capability of the non-Federal sponsor. **The HQ review team believes that this issue is resolved.**

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8. 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.

OCTOBER 2002

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

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

REQUIRED ACTION: No further required action.

CESAJ ACTION TAKEN: The sponsor is aware of the situation. Based on the current schedule, we are working on a WRDA contingency.

MARCH 2003

HQUSACE TEAM ASSESSMENT: The response is adequate. **This issue is resolved.**

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9. 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 here 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.

OCTOBER 2002

CESAJ RESPONSE: Concur. The district will revise the draft feasibility report in accordance with previous PGM comments and the additional information below to insure that all of the most recent and up-to-date information on the study is provided.

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.

OCTOBER 2002

CESAJ 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.

CESAJ ACTION TAKEN: A Section 902 analysis has been added to the report using the October 2002 MCACES.

MARCH 2003

HQUSACE TEAM ASSESSMENT: **Partially Resolved.** The final report contains a detailed presentation of a Section 902 limit analysis and concludes that the 902 limits have been exceeded. However, there is still concern as to whether the appropriate cost has been identified for the limit on periodic nourishment. ER 1165-2-130, paragraph 7.e regarding periodic nourishment states that Federal participation in periodic nourishment may continue throughout the economic life of the project, but a specified period of time up to 50 years after initiation of construction must be recommended in planning reports. Since this project recommends nourishment in the 50th year following completion of construction, the last cycle of nourishment may occur near or beyond the limit on Federal participation and may require adjustment. The district should review its analysis in light of the regulation to determine if adjustment of the recommended nourishment costs is warranted, since they will result in setting the Section 902 cost cap for future nourishment.

SEPTEMBER 2003

CESAJ RESPONSE: Concur. The district will review the 902 analysis. Normally nourishment is not planned for year 50, but additional material is placed in the nourishment cycle prior to year 50 to ensure maintenance of the design berm until year 50. Report will be revised accordingly.

DECEMBER 2003

CESAJ RESPONSE: Concur, the AAEQ costs do account for a renourishment in year 50, which is not correct. The more accurate AAEQ cost should be $1,934,200 as opposed to the $1,954,700 in the report. It also appears as if 10 renourishments were accounted for in the 902 analysis instead of 9. These changes will need to be incorporated into an addendum reflecting the change and the reasons for the change.

HQ: This appears to be resolved.

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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.

OCTOBER 2002

CESAJ 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 10/06/02 MCACES) for these monitoring efforts during initial construction of the project (over an estimated duration of 4.94 months) is $153,300 or $31,000/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 below. Cost shared pre-construction monitoring activities in FY03 and those for initial construction in FY04 are estimated at $135,800 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
TOTAL	$135,800	$135,800	$75,800	$75,800	$75,800	$135,800	$135,800	$62,800	$135,800

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.

CESAJ ACTION TAKEN: Costs have been added to MCACES and the report. Explanations of the Florida permitting requirements have also been added. OMRR&R costs have been added to the average annual costs for the projects.

MARCH 2003

HQUSACE TEAM ASSESSMENT: **The concern is partially resolved.** The previous table on the cost of the monitoring program has been included in the feasibility report as Table III-20 and costs have been added to the MCACES estimate. Text was added to explain that monitoring is needed in accordance with Florida permitting requirements for shore protection projects to assure that there are no unforeseen impacts due to the project. OMRR&R costs have also been added to the average annual costs for the project. The report supports Federal cost sharing for certain activities that are needed prior to and after initial construction and periodic nourishment to assess the pre- and post beach fill conditions and resultant impacts. However, there are some further concerns relative to the discussion of monitoring costs, the values shown in the table and cost sharing. (1) It is unclear why cost-shared project performance monitoring (beach profiles, wading surveys, sediment sampling, and aerials photography) is proposed in the intervening years between construction and the first nourishment (years 05 through 07). It would appear that these activities should be classified as OMRR&R since they do not appear directly related to the construction and nourishment and are similar in nature to the OMRR&R costs displayed in the next to last column. The text should describe those efforts, which are cost-shared as project E&D activities to determine the effects of initial construction and the need for and effects of periodic

nourishment. These activities should be clearly distinguished from the sponsor-funded efforts to monitor the condition of the project, which relates to beach maintenance under OMRR&R. These different levels of effort would be expected to result in considerably different costs, contrary to the values shown in the table. (2) In addition, there is concern regarding the appropriateness of values shown in the table. The cost values do not appear to include contingencies or E&D, S&A, based on comparison to the MCACES Cost Estimate. The MCACES estimate includes a cost of $770,600 for monitoring in the initial construction cost. That value corresponds to the sum of total costs in the above table from FY03 through FY 09 (the first nourishment). Another $135,800 for monitoring is included in the year 5 MCACES nourishment costs, so there appears to be some double counting of the year 5 costs. (3) Also, the table shows that the annual O&M monitoring is estimated to cost $62,800 for the intervening years between nourishments. It would be expected that some O&M monitoring might be need in all years regardless of nourishment activities to assess the effects of storm events. In addition, the annual sponsor O&M costs shown in Table III-21 are only $16,900, far less than the $62,800 value in the above table. It is therefore not clear that the correct annual costs have been used in the benefit/cost analysis. The district should clarify the report to assure that the monitoring costs are accurate, the cost-shared project performance and OMRR&R activities are clearly described, and the appropriate values are used in the economic analysis and cost–sharing discussions.

SEPTEMBER 2003

CESAJ RESPONSE: Costs have been added to MCACES and the report. Explanations of the Florida permitting requirements have also been added. OMRR&R costs have been added to the average annual costs for the projects

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DECEMBER 2003

CESAJ RESPONSE: The monitoring that is proposed in the intervening years 05 through 07 is required through the permitting process, they are considered construction costs since they have to be done in order to stay compliant with the permitting process. It does appear as though an extra monitoring cycle was thrown onto the initial construction, the MCACES should read $634,800 as opposed to the 770,600. E&D and S&A should be added to these costs, but contingency was already built into this and should be reflected correctly in the MCACES. The E&D and S&A are totaled out separately. The AAEQ O&M cost of $16,900 in Table III-21 is poorly defined; since the MCACES renourishment costs already have the monitoring included, that cost is included in the AAEQ cost for future renourishment; the O&M cost shown there, actually accounts for periodic surveys of the groins that are not accounted for in the actual maintenance of the groins. The $62,800 is for the first year after the first renourishment only and is included in the $16,900. After that first year preceeding the first renourishment, there should be enough data to better predict performance and the 5 year cycle would pick up the remaining monitoring. The table will need to be changed to reflect this.

HQ: This concern appears to be resolved.

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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 report should explicitly delineate any project reaches that fail to meet the one-half mile requirement.

OCTOBER 2002

CESAJ 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.

CESAJ ACTION TAKEN: The following table has been added to the report, the sponsor has assured the District that the 1,260 feet in discussion above will be open to the public and access will be provided prior to execution of a PCA. (See Attachment)

MARCH 2003

HQUSACE TEAM ASSESSMENT: **Not resolved.** The response states that Table 2 (included in the report as Table III-22) indicates that a 1,260-foot section at the southern end of the project currently lacks sufficient public access for Federal participation. The information is not evident in Table III-22, although a similar table attached to a memo on ITR in Appendix F shows that lots 25, 27, 28, 29, 30, and 31, with a width of 1,260 feet, are the specific parcels that lack public access. It is noted that the lot numbers and the total project lengths are different (7,165' vs. 8,280') between the two tables and the corresponding lots are labeled as 27 through 32 in Table III-22 with a total length of 1,400 feet. Presumably this segment currently fails the distance criteria for public access, but there is insufficient information in the report regarding public access. In particular, the 6,700 feet of shoreline between profile lines R37 and R43.5 appears to be continuously developed with condominiums, and it is not readily apparent from the aerial photos in the report that there are any street ends or public access except maybe at each end of that segment. This may represent a distance of several thousand feet where access could currently be an issue relative to Federal participation (about half the project length).

Although the report discusses access and parking requirements, there is no documentation of either the adequacy of existing parking to handle the general public or the accessibility to the beach areas through the condominium properties, which separate the beach from the public roadway running parallel to it. No details are provided on how the sponsor plans to resolve this issue prior to construction, to assure that the recommended project cost sharing is appropriate. The report recommendations and Certification of Public Accessibility contain what appears to be standard language for local cooperation, that do not allude to any public access issue. No mention is made of any further action during the future design phases to assure that the issue is either addressed or the cost sharing is modified accordingly. Paragraph 6.h.(3) on page 13 of ER 1165-2-130 reads as follows: "In the event public access points are not within one-half mile of each other, either an item of local cooperation specifying such a requirement and public use throughout the project life must be included in the project recommendations or the cost sharing must be based on private use."

Further information should be presented on the existing parking and public access conditions, the public use policies at condominiums and hotels, and what actions are necessary to provide public access in keeping with the recommended cost sharing, which has been based on the maximum Federal participation for the given land uses. Specific requirements should be included in the recommendations so it is clear in the district's report and the Report of the Chief of Engineers that some action is necessary by local interests to qualify for the recommended cost sharing. Otherwise, the cost sharing should be revised to reflect the existing private use.

SEPTEMBER 2003

CESAJ RESPONSE: Concur. Further info will be provided in the report to document where the access is. The Sponsor has obtained the required access.

DECEMBER 2003

CESAJ RESPONSE: This will be added to the report.

HQ: **The public access locations should be identified in the report.**

---

10. ADDITIONAL COMMENTS ON THE REPORT.

a. Independent Technical Review. EC 1165-2-203 specifies that all decision documents (draft or final reports with NEPA documentation) will receive an independent technical review with documentation in a certification and findings, which cites the major issues that were raised and documents how they were resolved, and identifies the technical review team leader and team members. With regard to the ITR documentation package submitted, the ITR comments are divided into two groups, one group specifically targeting the Environmental Assessment (EA) and the other group includes all other comments. This division of comments and the nature of the comments in each group imply that the Feasibility Report and the EA were reviewed as

separate documents with little consideration of how the two documents interrelate. There is concern over the degree to which ITR comments were addressed in the documentation provided. No responses were documented for the ITR comments on the EA and only 15 of the other 39 comments related to formulation, design and model calibrations had meaningful responses. The A-E's quality certification document for the draft report dated February 2002 is provided, but there is no certification of district working-level ITR of the final documents. An A-E cannot appropriately draw conclusions or make recommendations for the Corps, so the district should provide documentation of their quality process. It would also be inappropriate for any individual in the district to represent that they have the expertise needed to QA all the technical aspects of a feasibility report.

SEPTEMBER 2003

CESAJ RESPONSE: It is incorrect to assume that separation of ITR comments implies that the document were reviewed separately. They were not. The ITR comments and responses will be reviewed by the District and responses will be revised as appropriate. Certification of District acceptance of ITR will be provided.

b. Environmental Documentation. The district has satisfactorily addressed all environmental policy compliance concerns raised during earlier reviews. This EA is especially well done. However, the Feasibility Report does not adequately present the extraordinary consideration given the potential effects of each alternative on endangered species during formulation of this project. The significant effect of these environmental considerations should be highlighted in the Syllabus, the Introduction, the Plan Formulation Section, the Study Summary, the Conclusions, and Recommendations sections. Further, the Environmental Considerations section of a Feasibility Report should emphasize the Corps commitment to adhere to the environmental commitments and mitigation measures described in the EA and the terms of the Biological Opinions.

SEPTEMBER 2003

CESAJ RESPONSE: Per ER 200-2-2, there is no requirement to integrate the EA and the report.

---

c. Items of Non-Federal Cooperation.

(1). On page 80, the beginning of paragraph 216a(2) should read "Provide, during the first year of construction," to reflect current policy on payment of additional funds to cover the non-Federal share of PED costs.

SEPTEMBER 2003

CESAJ RESPONSE: The wording will be changed at the beginning of paragraph 216a(2).

(2). Item u. regarding public ownership repeats the wording of item q. and should be deleted. Specific wording should be added to reflect the need for additional public access in order for the project area to qualify for the recommended cost sharing.

SEPTEMBER 2003

CESAJ RESPONSE: CESAJ District Council insists including item q and insists it is sufficient to address the Federally mandated public access requirements.

d. Formulation of Project Length. The project has a length of 8,280 feet exclusive of the tapers, and a total length of 10,130 feet. The area projected to have the most significant long-term shoreline recession is in Reach 2 according to Figure A-16, with significantly less changes in Reach 3, which includes areas of historic accretion or minor erosion. It is noted that the historic beach fills have predominantly occurred in Reach 2, the area of greatest erosion. The engineering appendix indicates that the project design accounted for the variation in erosion rates along the shoreline, and provided for the appropriate fill and nourishment quantities. It is not apparent that an incremental analysis was done of the project reaches to demonstrate that the optimum project length has been recommended. There also is no economic evaluation of the recommended tapers to demonstrate that it is more economical to construct them outside of the protected area versus within. Littoral material accretes in reach 1 from profile R-35 north and the project includes fill in that vicinity from profile lines R-35.5 through R-34.5. The southern terminus includes a taper plus a terminal groin, which appear to provide substantial erosion protection to the public South Lido Key Beach (in Reach 4), although the economic analyses and cost sharing appear to have addressed only reaches 2 and 3 combined. ER 1165-2-130, paragraph 9.c. (Policies Regarding Formulation, Evaluation, and Cost Allocation) Item (3) states that when the cost of construction per unit of benefited shoreline is not reasonably uniform for the entire project area, the project should be subdivided into elements (reaches) within which this condition is met. The first cost for the HSDR measures for the project, or each of the subdivided reaches will then be allocated to the various categories of benefited shore properties. The Lido Key study area was divided into four reaches for evaluation of HSDR measures, however there is no incremental information on the formulation of measures by reach despite the variation between them. Further analyses should be provided to demonstrate that the recommended plan is the optimum length and the appropriate basis for cost allocation has been identified.

SEPTEMBER 2003

CESAJ RESPONSE: The report did break the shoreline into reaches (Engineering Appendix Page A-34) . Sufficient benefits were generated for Reaches 2 and 3.

DECEMBER 2003

CESAJ RESPONSE: The tapers are designed based more on engineering data than on economic data, they are built in such a way that the beach fill presents less of a protrubence in the shoreline. The protrubence causes extremely high end losses to a beach fill, the tapers greatly reduce these losses and do present an economic benefit of reducing periodic renourishment volumes, but the design comes from the length/width of the berm, existing bathymetry and shoreline orientation. They are built at the terminus of the Federal project instead of within the project limits, because their reduced width would not provide the same level of HSDR benefits as the design berm. Therefore, benefits are claimed based on the design berm for the project limits, and the tapers go beyond the limits being claimed for benefits since they contribute very little to the HSDR benefits.

The reaches were defined based on the coastal process along the shoreline, not based on their economic value. With the relatively short length of all of Lido Key, a large protrubence over a short length (1 mile for Reach 2), such as that which would be caused by a SPP construction template would be subject to very large erosion rates. These accelerated high erosion rates would require large renourishment volumes at a more frequent interval, this is one of the main reasons that the local "band-aid" approaches have not been successful. The project length was determined based on the engineering reasoning that the short lengths of Reach 2 or Reach 3 alone would result in an unsound design that would be subject to failure. Since the design of a taper to reduce the large erosion rates in Reach 2 would encompass the majority of Reach 3, it is preferable to include Reach 3 in the project limits and provide HSDR benefits for this highly developed piece of shoreline. Otherwise, once the taper and the initial construction berm equilibrated it would leave this reach without an ample shoreline extension or future renourishment and subject to damages once again.

HQ: The purpose of tapers is understood, but the recommendation to provide terminal groins versus tapers located either inside of outside the protected area should be supported by NED evaluations/rationale. This particular project has an area of accretion between reaches 2 and 3. It is not clear why there is need for a long taper into reach 3 in this case. I believe there was also a question on the degree of investment being different between reaches 2 and 3. This warrants an incremental presentation to assure that the NED plan is recommended, since I believe reach 3 involved investment along inlet shoreline with a taper and a terminal structure in addition to the beachfill.

JANUARY 2004

Conference Call with SAD/HQ: Need to demonstrate the incremental analysis with costs and benefits shown in the text and explain the groins and tapers at south end of island.

e. **MCACES Cost Estimate**. Review of the MCACES Cost Estimate found that the cost estimates for periodic nourishment used escalation factors from ER 1110-2-1304 in developing the costs for nourishment costs in future years during the period of analysis. Since there appears to be no presentation in the report on the calculation of annualized costs, it is not clear whether the escalation factors were incorporated in the calculation of annual costs for nourishment or whether they were used for budgetary and financing considerations only. Corps economic

evaluations are based on a constant dollar approach, so if the escalated costs for nourishment were used in the benefit/cost analysis, it would not be appropriate and should be revised.

SEPTEMBER 2003

CESAJ RESPONSE: Concur. The calculations of annual costs will be revisited to assure that the same price level was used throughout those calculations. Estimates of annual costs will be revised, if necessary.

April 2004

CESAJ RESPONSE: The escalation has been removed from the MCACES. The Differences in the MCACES cost estimates for future renourishments is due to differing borrow areas, they have not been escalated. They vary due to the borrow areas being different distances away from the project site. It is assumed that the nearer borrow areas will be used first, with each subsequent nourishment having to haul the material a longer distance. This results in the higher price for each renourishment.

DEPARTMENT OF THE ARMY
SOUTH ATLANTIC DIVISION, CORPS OF ENGINEERS
ROOM 9M15, 60 FORSYTH ST., S.W.
ATLANTA GA 30303-8801

REPLY TO ATTENTION OF

CESAD-CM-P

MEMORANDUM FOR Commander, HQ USACE (CECW-ZA), 441 G Street NW, Washington DC 20314-1000

SUBJECT: Sarasota County, Florida, Hurricane and Storm Damage Reduction Project, Lido Key (013570) – Final Report Submittal Package

1. Reference memorandum, CESAJ-PD-PN, Sarasota County, Florida, Hurricane and Storm Damage Reduction Project, Lido Key (013570), 5 November 2002.

2. I concur with the conclusions and recommendations of the District Engineer.

Encl

PETER T. MADSEN
Brigadier General, US Army
Commanding

Public Notice

US Army Corps of Engineers®
South Atlantic Division
60 Forsyth Street S.W.
Room 9M15
Atlanta, GA 30303-8801

FEASIBILITY REPORT
FOR
Sarasota County, Florida
Lido Key
Hurricane and Storm Damage Reduction Project

3 December, 2002

COMPLETION OF STUDIES:

Notice is hereby given that the Jacksonville District and South Atlantic Division Engineers have completed the Final Feasibility Study of the hurricane and storm damage reduction project on Lido Key, Sarasota County, Florida. The study was prepared in response to Resolution, Docket 2458, adopted September 14, 1995, by the Committee on Transportation and Infrastructure, U.S. House of Representatives. The resolution directed the Corps to develop studies for the purpose of providing hurricane and storm damage reduction solutions for Lido Key. The Feasibility Study was conducted as a cost-shared study, with the City of Sarasota as the non-Federal study sponsor.

FINDINGS AND RECOMMENDATIONS:

The recommended plan of improvement would provide initial restoration and periodic nourishment of an 80 foot beach berm at elevation +5 ft NGVD over 1.56-miles of shoreline, with a groin field at the southern limits of the project. Periodic nourishment, accomplished at five-year intervals, would optimize net primary benefits over the 50-year life of the project. Borrow material would be obtained from a site approximately 9 miles offshore.

Based on October, 2002 prices, estimated first cost of the plan is $12,632,200 of which $7,769,5000 would be Federal while $4,862,700 would be non-Federal. Average annual benefits and costs based on an interest rate of 6 1/8 percent are estimated at $4,319,900 and $1,954,700 respectively with a resulting benefit-cost ratio of 2.2.

The recommendations contained herein reflect the information available at this time and current policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a national civil works construction program nor the perspective of higher review levels within the Executive Branch. Consequently, the

recommendations may be modified before they are transmitted to the Congress as proposals for authorization and/or implementation of funding.

COORDINATION:

The report was coordinated with appropriate Federal, State, and local interests. All pertinent coordination, review, and approvals were obtained as part of the National Environmental Protection Act process. The U.S. Fish and Wildlife Service provided a Fish and Wildlife Coordination Act Report dated August 21, 2002. A Finding of No Significant Impact was signed on September 17, 2002.

The City of Sarasota is the project sponsor and by letter dated October 8, 2002 expressed support for the conclusions and recommendations of the report and their intent to secure funding for project implementation.

PUBLIC INVOLVEMENT:

The list of alternatives and findings of the report have been coordinated with the public through a variety of mailings and information meetings held by the sponsor. The NEPA process has kept the public informed of the progress and findings of the report.

REVIEW AND AUTHORIZATION:

Prior to adoption of the proposed project, the study evaluations and report findings will be reviewed by the Chief of Engineers and the Assistant Secretary of the Army for Civil Works. A coordinated review, including affected states and other Federal agencies, will also be accomplished at that time.

The Chief of Engineers will review the report and forward a recommendation to the Secretary of the Army. The Assistant Secretary of the Army, in consultation with the Office of Management and Budget, then establishes the administration position on whether the proposal should be recommended to Congress for authorization.

VIEWS OF INTERESTED PARTIES:

Interested parties may present written views on the report to the Chief of Engineers and the Secretary of the Army. Such communications should be mailed to the U.S. Army Corps of Engineers, Deputy Commanding General for Civil Works, ATTN: CECW-B, 441 G Street NW., Washington, DC 20314-1000, within 30 days from the date of this notice. Copies of information received by mail will be regarded as public information unless the correspondent requests otherwise. Such a request will limit the usefulness of the information because of the need for full public disclosure of all factors relevant to the decision.

FINAL ACTION BY THE CHIEF OF ENGINEERS:

The Chief of Engineers will not submit a recommendation to the Secretary on the report until after the expiration of this notice or any extension thereof that may be granted, and full consideration of all information submitted in response thereto.

REPORT INFORMATION:

Further information may be obtained from the U.S. Army Corps of Engineers, Jacksonville District Office, P.O. Box 4970, Jacksonville, Florida 32232-0019, Daniel R. Haubner (904-232-2798). Interested parties may obtain copies of the feasibility report, including the main report and the EIS, from the District Commander free of charge, as long as copies are available.

Additional copies of the report volumes will also be on file and available for public review at the libraries shown on the enclosed list (Enclosure 2). Please pass along a copy of this public notice to anyone who may be interested in the report and who has not received a copy.

Peter T. Madsen
Brigadier General, U.S. Army
Division Engineer

Enclosures

SARASOTA COUNTY, FLORIDA
HURRICANE AND STORM DAMAGE REDUCTION PROJECT
LIDO KEY
FEASIBILITY REPORT WITH ENVIRONMENTAL ASSESSMENT

SYLLABUS

1. The Lido Key Hurricane and Storm Damage Reduction Study area comprises 2.4 miles of the Lido Key Gulf of Mexico shoreline. The island, approximately 45 miles south of Tampa, is separated from Longboat Key to the north by New Pass and from Siesta Key to the south by Big Sarasota Pass. Sarasota Bay and the Intracoastal Waterway separate Lido Key from the mainland. A hurricane and storm damage reduction project for Lido Key, Florida was authorized by the December 31, 1970 River and Harbor Act for the mid-section of Lido Key's Gulf of Mexico shoreline and for periodic nourishment on an as-needed basis. Federal participation was limited to an initial period of 10 years. The project was never completed and was subsequently deauthorized in House Document 91-320 on January 1, 1990. Resolution, Docket 2458, adopted September 14, 1995, by the Committee on Transportation and Infrastructure, U.S. House of Representatives, requested the Secretary of the Army to determine the advisability of providing a hurricane and storm damage reduction project for Lido Key. A Reconnaissance Phase Assessment was prepared in January 1997 recommending Federal participation which lead to the feasibility phase. The project was then authorized once more under Section 364 of the Water Resources Development Act (WRDA) of 1999; this allowed for initial construction of a shore protection project and for periodic renourishment over 50 years of Federal participation. This authorization was contingent upon the Secretary determining that the project is technically sound, environmentally acceptable, and economically justified, as appropriate. That is the purpose of this report.

2. This report summarizes a cooperative cost-shared feasibility study on hurricane and storm damage reduction problems of the Gulf of Mexico shoreline of Lido Key, Sarasota County, Florida. Presented in this report are the results of planning, engineering, environmental, geotechnical, economic, and real estate studies of the area and its shoreline erosion problems. An Environmental Assessment is included in this report.

3. For purposes of this study, five characteristic reaches (New Pass Reach and Reaches 1 through 4) were delineated based on beach profile and upland development characteristics, forcing mechanisms causing beach change, and the locations of recent fill projects and disposal operations. The selected plan consists of restoration of 8,280 ft of shoreline along Reach 2 and Reach 3 of the study area. Reach 2 extends from the R-35 (400 ft north of John Ringling Boulevard) south to R-40. This approximately 5,000-ft long segment, lined with condominiums, motels, and houses, is very narrow due to ongoing erosion. Reach 3 extends from DNR-40 to DNR-43. This reach is heavily developed with condominiums lining the shoreline. Restoration of these shorelines would require placement of approximately 460,200 cy of design fill and

614,500 cy of advance material (1,074,700 cy total). Three borrow areas have been delineated for use (Borrow areas 5 – 7) and are located between 7.2 and 9.5 nautical miles offshore of Lido Key. Nourishment would be provided at 5-year intervals over the 50-year life of the project. Three groins will be constructed at an elevation of +5-ft NGVD along the southern portion of the study area. Each structure, varying in length from 320 – 650 ft, will consist of 400 lb core stone overlain by two layers of 2-ton armor stone. Initial beach fill construction costs would be approximately $10,575,000 with periodic renourishment varying between $5.8 million and $6.0 million depending on the borrow area identified for each renourishment. Groin field construction costs are estimated as $2,057,200. This allows for a total initial construction cost of $12,632,200. When the Interest During Construction (IDC), periodic renourishment, and Operation and Maintenance values are considered, the average annual cost of this project is estimated to be $1,954,700 when computed at 6 and 1/8% over a 50 year project life. Hurricane and Storm Damage Reduction benefits are estimated to be $4,319,900, which produces a benefit-to-cost ratio (BCR) of 2.2.

4. Since this project was re-authorized in WRDA 1999 with set funding limits, it is subject to Section 902 of WRDA 1986. Section 902 established the requirement that the cost of projects authorized in and subsequent to WRDA 86 would be the maximum cost of that project. The purpose of Section 902 was to insure against cost overruns. The cost of the project could be increased for price level changes, but the scope of the project could not be changed, without Congressional approval, if it increases project costs by more than 20 percent. This study shows that the costs have exceeded the 902 limit.

5. Federal and non-Federal cost sharing for the selected plan would be based upon shoreline ownership and use at the time of construction. Based upon current estimates of project lengths devoted to public and private (developed and undeveloped) use, cost apportionments of the selected plan were determined. Cost sharing, based on shoreline ownership, for the groin field and initial construction of the fill to be placed along Reach 2 and Reach 3 would be 62.4% Federal and 37.6% non-Federal. When lands, easements, relocations and rights of way are considered, this works out to a Federal cost of $7,769,500 and a non-Federal cost of $4,862,700.

SARASOTA COUNTY, FLORIDA
HURRICANE AND STORM DAMAGE REDUCTION PROJECT
LIDO KEY
FEASIBILITY REPORT WITH ENVIRONMENTAL ASSESSMENT
PERTINENT DATA

PHYSICAL DATA (Project Life = 50 Years)			
Project Length (ft)	8,280		
Berm Crest Elevation (ft NGVD)	5		
Berm Width Extension from ECL (ft)	80		
Foreshore Slope (Berm-MLW)	1 V to 12 H		
Nearshore Slope (MLW-existing profile)	1 V to 35 H		
Post-placement Erosion Rate (cy/yr)	122,900		
Volume of Initial Fill (cy)	1,074,700		
Volume of Design Fill (cy)	460,200		
Volume of Advance Nourishments (cy)	614,500		
Nourishment Interval (yr)	5		
FINANCIAL DATA (Interest Rate = 6.125 % October 2002 Price Levels)			
INITIAL CONSTRUCTION COSTS (groin and beach)	$12,632,200		
INITIAL BEACH FILL CONSTRUCTION COSTS	$10,575,000		
EACH FUTURE NOURISHMENT COST	$5.8 – 6.0 million		
GROIN CONSTRUCTION	$2,057,200		
INTEREST DURING CONSTRUCTION (IDC)	$835,700		
ANNUAL PROJECT COSTS			
Interest and Amortization			
Initial Construction (with IDC)	$869,400		
Future Beach Fill Nourishment	$1,044,400		
Groin Maintenance	$24,000		
Sponsor O&M	$16,900		
Total Annual Project Costs:	$1,954,700		
PRIMARY BENEFITS			
Prevention of Damage to	Reach 2 & Reach 3		
Upland Development	$3,563,300		
Coastal Armor	$37,800		
Backfill	$290,000		
Loss of Land	$428,800		
Total Annual Project Benefits:	$4,319,900		
BENEFIT – TO – COST RATIO	2.2[1]		
PROJECT COST SHARING, INITIAL CONSTR.			
Percent (%): Federal	62.4%		
Non-Federal	37.6%		
Dollars($): Federal	$7,769 ,500		
Non-Federal	$4,862,700		
SECTION 902 ANALYSIS	*Initial Const.*	*Nourishment*	*Total*
Authorized Project Costs ($1,000)	7,209	98,576	105,785
Expected Project Costs ($1,000)	13,762	167,654	181,416
Differences	6,553	69,078	75,631

[1] Benefit-To-Cost Ratio includes Interest During Construction

SARASOTA COUNTY, FLORIDA
HURRICANE AND STORM DAMAGE REDUCTION PROJECT
LIDO KEY
FEASIBILITY REPORT WITH ENVIRONMENTAL ASSESSMENT

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SARASOTA COUNTY, FLORIDA
HURRICANE AND STORM DAMAGE REDUCTION PROJECT
LIDO KEY
FEASIBILITY REPORT WITH ENVIRONMENTAL ASSESSMENT

I. INTRODUCTION

1. This report presents the feasibility study for hurricane and storm damage reduction for the Gulf of Mexico shoreline of Lido Key, Sarasota County, Florida. The report, prepared in accordance with U.S. Army Corps of Engineers ER 1105-2-100 *Planning Guidance Notebook* (April 22, 2000), documents the results of planning, engineering, environmental, geotechnical, economic, and real estate analyses of Lido Key and its shoreline erosion problems.

STUDY AUTHORITY

2. A hurricane and storm damage reduction project for Lido Key, Florida was authorized by the December 31, 1970 River and Harbor Act which provided for beach restoration of 1.2 miles of the mid-section of Lido Key's Gulf of Mexico shoreline and for periodic nourishment on an as-needed basis. 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 never completed and was subsequently deauthorized in House Document 91-320 on January 1, 1990 in accordance with the provisions of Section 1001(b)(1) of the 1986 Water Resources Development Act.

3. A general investigative study of the project was undertaken in response to Resolution, Docket 2458, adopted September 14, 1995 by the Committee on Transportation and Infrastructure, U.S. House of Representatives that stated:

> "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 for providing hurricane and storm damage reduction works."

4. Resolution, Docket 2458, adopted September 14, 1995, by the Committee on Transportation and Infrastructure, U.S. House of Representatives, requested the Secretary of the Army to determine the advisability of providing a hurricane and storm damage reduction project for Lido Key. A Reconnaissance Phase Assessment was prepared in January 1997. Recommendations resulting from this assessment included a hurricane and storm damage reduction project along a 9,100-ft segment of Lido Key extending from Florida Department of Environmental Protection (FDEP) monuments R-35 to R-44.

5. Section 364 of Water Resources Development Act (WRDA) 1999 reauthorized the project as follows:

Each of the following projects is authorized to be carried out by the Secretary, if the Secretary determines that the project is technically sound, environmentally acceptable, and economically justified, as appropriate:

(2) LIDO KEY BEACH, SARASOTA, FLORIDA —

(A) IN GENERAL — The project for shore protection, Lido Key Beach, Sarasota, Florida, authorized by section 101 of the River and Harbor Act of 1970 (84 Stat. 1819) and deauthorized under section 1001(b) of the Water Resources Development Act of 1986 (33 U.S.C. 579a(b)), at a total cost of $5,200,000, with an estimated Federal cost of $3,380,000 and an estimated non-Federal cost of $1,820,000.

(B) PERIODIC NOURISHMENT — The Secretary may carry out periodic nourishment for the project for a 50-year period at an estimated average annual cost of $602,000, with an estimated annual Federal cost of $391,000 and an estimated annual non-Federal cost of $211,000

STUDY PURPOSE AND SCOPE

6. The purpose of this report is to present a feasibility assessment of hurricane and storm damage protection for the Gulf of Mexico shoreline of Lido Key. This report will determine if the project is technically sound, environmentally acceptable, and economically justified. Appendix A, Engineering Analysis and Design, includes suitable data to proceed into the preconstruction, engineering, and design (PED) phase of the project. Following the PED phase, construction of the recommended plan will be contingent upon available Federal and non-Federal sponsor funds and will be subject to Department of the Army policy, guidance, and regulations.

Location

7. Lido Key is a 2.4-mile long barrier island located on the Gulf of Mexico coast of Florida in Sarasota County (Figure I-1). This island, approximately 45 miles south of Tampa. Lido Key is separated from Longboat Key to the north by New Pass (which has a Federal navigation project authorized in 1962 under Section 107) and from Siesta Key to the south by Big Sarasota Pass (which does not have a Federal project). Sarasota Bay and the Intracoastal Waterway (a Federal navigation project authorized in 1945) separate Lido Key from the mainland. John Ringling Causeway Bridge provides mainland access to Lido Key.

8. The Lido Key shoreline is characterized by both public and private beaches. North Lido Public Beach, extending south from about 400 ft north of R-32 to R-35, is an

undeveloped natural beach with limited parking. Lido Key Public Beach, extending south from R-35 to 400 ft south of R-38, is extensively used. The next segment, extending about 4,700 ft from 400 ft south of R-38 to 100 ft south of R-43, is privately owned with hotels, motels, and condominiums lining the shoreline. South Lido Public Beach, owned by Sarasota County and extending 1,300 ft to the south, is largely undeveloped and heavily used.

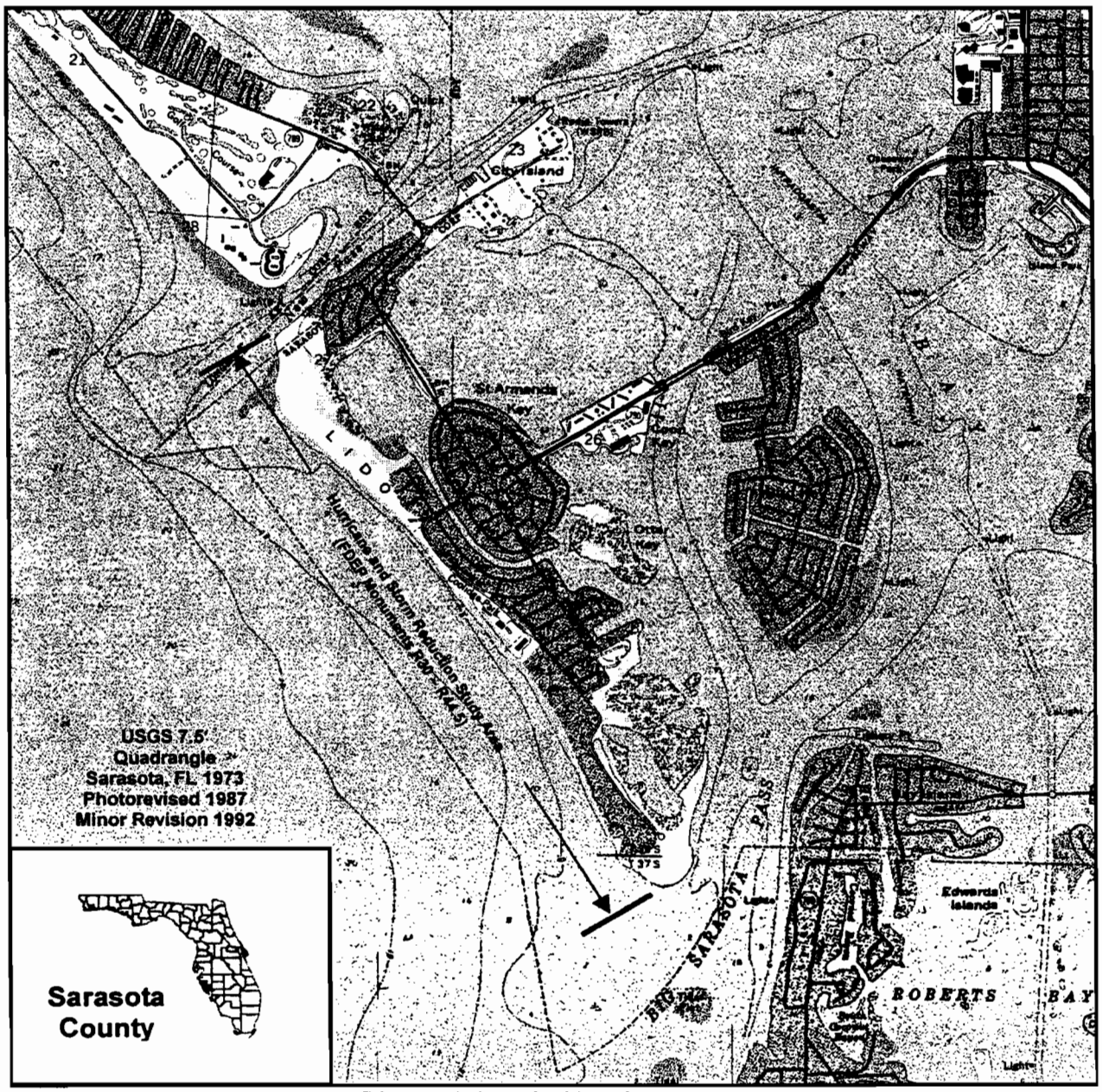

Figure I-1 Lido Key Study Area

Report Participants and Coordination

9. The local sponsor, the City of Sarasota and its consultants, Coastal Planning and Engineering, Inc. provided much of the engineering information to assist with this study. The Jacksonville District coordinated the report with the following Federal, state, and local agencies:

U.S. Fish and Wildlife Service
U.S. Bureau of Public Roads
U.S. Water Pollution Control Administration
U.S. National Park Service
Florida Department of Environmental Protection
Florida Game and Fresh Water Fish Commission
Florida State Historic Preservation Office
Sarasota County
City of Sarasota

II. PRIOR STUDIES AND REPORTS

10. Summaries of prior Federal studies relevant to this project are as follows:

Detailed Project Report on Sarasota Passes, Sarasota, FL, U.S. Army Corps of Engineers, July 1962 — The report recommended that New Pass be improved to provide the following: an entrance channel 10 ft deep and 150 ft wide in the Gulf of Mexico at New Pass; an inner channel 8 ft deep and 100 ft wide through New Pass and extending across Sarasota Bay to the Intracoastal Waterway; side channels to Payne Terminal and the City Pier; and turning basins 8 ft deep, 300 ft wide, and 300 to 700 ft long at Payne Terminal; and 8 ft deep, 300 ft wide, and 300 to 500 ft long at the City Pier. The authorized dimensions were provided in 1964.

Survey-Review Report on Sarasota Passes, Sarasota, Florida, U.S. Army Corps of Engineers, November 1963 — The report was unfavorable because New Pass, as authorized by the July 1962 report, was determined to be sufficient to meet present and future navigation needs of the study area.

Beach Erosion Control Study Sarasota County, Florida: Interim Report on Lido Key, U.S. Army Corps of Engineers, September 1968 — The purpose of the report was to define the beach erosion problem at Lido Key, to determine the most economical method to alleviate the problem, and to determine Federal and non-Federal project cost-shares. The report determined that the most economical method of improvement was beach nourishment, with periodic renourishment as necessary, of 6,200 ft of shoreline along mid-Lido Key. Borrow material was to be obtained by hydraulic dredge from shoals in Big Sarasota Pass and/or from a spoil area, offshore the northwestern tip of Lido Key. This plan was determined to be economically justified.

Beach Erosion Control Project for Lido Key, Sarasota County, Florida, U.S. Army Corps of Engineers, April 1970 — The report was prepared in partial response to resolutions of the Committee on Public Works of the United States Senate and House of Representatives adopted 21 August 1964 and 3 September 1964, respectively. The report recommended initial construction and periodic nourishment, as needed, of a protective and recreational beach along 1.2 miles of Lido Key. The recommended plan called for providing a 125-ft wide berm, at elevation +5 ft mean low water, along the Lido Key shorelines proceeding south a distance of 6,200 ft from a point 400 ft north of the Gulf of Mexico terminus of John Ringling Boulevard. Borrow sands were to be obtained from Big Sarasota Pass and, to a lesser extent, from New Pass. The report also recommended granting the local sponsor credit, contingent upon approval by the Chief of Engineers, for eligible work done on the project before authorization.

Beach Erosion Control Study for Sarasota County, Florida with Environmental Impact Statement, U.S. Army Corps of Engineers, July 1984 — This study did not address Lido Key.

General Design Memorandum, Sarasota County, Florida, U.S. Army Corps of Engineers, July 1991 — This study did not address Lido Key.

Section 905(b) (WRDA) Analysis: Reconnaissance Phase Assessment for Lido Key, Sarasota County, Florida, U.S. Army Corps of Engineers, January 1997 — Project alternatives examined in this assessment, in addition to the no-action condition, included four different beach fill conditions of 1-, 25-, 50-, and 100-ft berm extensions constructed at +5-ft MLW elevation along a 9,100 ft section of Lido Key from Florida Department of Environmental Protection (FDEP) profile R-35 to R-44. Economic analyses of storm damage reduction benefits, recreation benefits, and estimated project costs resulted in benefit to cost ratios of 4.6, 6.8, 7.8, and 8.1 for the respective project conditions. Recommendations stated that (1) the plan developed in the report was technically sound, economically justified, socially and environmentally acceptable, and (2) sufficient justification existed for Federal participation in a feasibility study for storm damage reduction works on Lido Key.

11. Summaries of prior non-Federal studies relevant to the project are as follows:

Brief Report on Coastal Protection at South Lido Beach, University of Florida College of Engineering, Gainesville, July 1961 — Recommendations generated from this report included artificial nourishment and the placement of groins. Design profiles of the groins are included in this report.

Lido Study No.2 – A Preliminary Plan for Public Beach Expansion and Shoreline Stabilization, City of Sarasota, November 1965 — Recommendations generated from this report included the acquisition and development of a public beach

facility and stabilization of the Lido Key shoreline such that future erosion may be minimized.

Long Range Beach Management and Erosion Control Plan and Preliminary Beach Restoration Element Design for Lido Key, Sarasota County, Florida, Coastal Planning and Engineering, Inc, January 1991 — This report presents a comprehensive beach management plan for Lido Key including necessary planning efforts and a recommended plan to offset erosion problems.

Lido Key Beach Restoration Project State Authorization Report, Coastal Planning & Engineering, Inc., August 1991 — This report builds on the January 1991 report and summarizes related geotechnical, environmental, and economic investigations. Based on these investigations and findings, a project was found to be economically and environmentally justified and recommended for State of Florida authorization.

Lido Key Beach Restoration Project Sand Search, Coastal Planning & Engineering, Inc., May 1992 — This report documents expanded hydrographic, geotechnical, and environmental assessments of the beach restoration project.

Big Sarasota Inlet Management Plan, Coastal Planning & Engineering, Inc., September 1993 — A key recommendation of this report is to use the Big Sarasota Pass ebb shoal as a borrow area source of beach quality sand for Lido Key.

New Pass Inlet Management Plan, Coastal Planning & Engineering, Inc., May 1994 — The plan recommends a revised New Pass maintenance dredged material sand sharing ratio of 84.6% to Lido Key and 15.4% to Longboat Key to replace the existing "not equitable" 65/35 ratio agreement.

Cultural Resource Investigation and Remote Sensing Magnetometer Survey Results for Two Proposed Offshore Sand Borrow Sites at Lido Key, Florida, Coastal Planning & Engineering, Inc., August 1995 — This report provides a historical cultural resource perspective for Lido Key and summarizes recent cultural resource investigations conducted at two potential offshore borrow sites. No magnetic anomalies were identified at these two sites.

III. PLAN FORMULATION

THE PLANNING PROCESS

12. The planning process that has evolved at the Federal level to assist in formulating and evaluating water resource projects is based on the National Economic Development objective, or NED. The NED principle is a policy developed to guide Federal water resource planners in their choice of problem solutions. The NED process

ensures that the recommended project is the one that will maximize net benefits. The process also ensures that the recommended project outputs, the benefits to the nation from the use of the resource, will exceed the cost of project implementation.

13. The Federal planning process consists of the following major steps:

a. specification of the water and related land resource problems and opportunities associated with the Federal objective and specific state, county, and municipal concerns,

b. inventory, forecast, and analysis of water and related land resource conditions within the planning area relevant to the identified problems and opportunities,

c. formulation of alternative plans,

d. evaluation of the effects of the alternative plans,

e. comparison of alternative plans, and

f. selection of a recommended plan based on the comparison of alternative plans.

ASSESSMENT OF PROBLEMS AND OPPORTUNITIES

14. 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 completely prevented the 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.

15. For purposes of this study, the following five characteristic reaches (New Pass Reach, Reaches 1 – 4), as shown in Figure III-1, have been delineated based on the beach profile characteristics and the location of recent fill projects and disposal operations.

16. New Pass Reach extends south along the Pass shoreline from R-30 to about 500 ft south of R-33. This segment is primarily subject to inlet-induced shoreline and beach volume changes.

17. Reach 1 extends south from about 500 ft south of R-33 to R-35 (400 ft north of the seaward terminus of John Ringling Boulevard). The majority of this shorefront section, approximately 2,000 ft long, is a city-owned park known as North Lido Public Beach. No protective coastal structures exist here; however, it is protected by a portion of the

Figure III-1 Reach Delineation, Lido Key, Sarasota, FL

southward growing ebb shoal of New Pass. This section has historically benefited, though generally indirectly, from the gain of sand by diffusion processes from (1) the placement of New Pass maintenance dredged material along its southern portions and in Reach 2 and (2) multiple nourishment projects in Reach 2. A field survey indicated that all structures within this reach are located sufficiently landward so that they would not be susceptible to damages even under extreme storm events.

18. Reach 2 extends from the R-35 (400 ft north of John Ringling Boulevard) south to R-40. This section contains Lido Beach, which is separated from North Lido Public Beach by a large rock revetment at the foot of Ringling Boulevard. This approximately 5,000-ft section is very narrow due to erosion. A low concrete block wall parallels the sidewalk and parking lot along most of this area. This area was severely eroded during Hurricane Josephine (October 7– 8,1996). A beach restoration project was constructed in this segment in 1998. This segment is privately owned and densely developed with single story and multistory buildings consisting primarily of hotels, motels, and condominiums.

19. Reach 3 extends from DNR-40 to DNR-43. This reach is heavily developed with condominiums lining the shoreline.

20. Reach 4 extends south from DNR-43 to Big Sarasota Pass Inlet. This reach, consisting of South Lido Public Beach, is largely undeveloped and heavily used by the public.

SHORELINE CHANGES (1971 TO 2000)

21. Shoreline change data used in the formulation of alternative plans for the study area were obtained through repetitive beach profile surveying along the Florida Department of Environmental Protection (FDEP) coastal monument system. The FDEP monuments for Lido Key, beginning with R-30, are spaced approximately 1,000 ft apart proceeding south to R-44 at Big Sarasota Pass. Predictions of without-project shoreline change used in the storm damage analysis were based upon the surveyed shoreline changes and consideration of beach fill material, which was placed within the study area during the period of analysis. Further discussion of the predicted without-project shoreline change analysis is presented in the section of the report entitled "Development and Analysis of Intermediate Alternative Plans."

22. Beach profile surveys, available at FDEP monuments within the limits of the study area, and aerial photographs provided data for the shoreline change analysis. Absolute distances from FDEP monuments to the mean high water shoreline were compared for the various surveys to define shoreline changes.

23. Tables III-1, III-2, and III-3 summarize mean high water (+1.14 ft NGVD) shoreline position changes and change rates for the study area for the time periods 1971 to 1973 to August 1974, August 1974 to May 1978, May 1978 to May 1987, May 1987 to March 1991, June 1990 to March 1991, March 1991 to March 1998, May 1998 to May 1999,

Table III-1 Recent Shoreline Change (ft), Lido Key (1971 – 2000)

Profile	*1971-1973 TO Aug 1974*	*Aug 1974 TO May 1978*	*May 1978 TO May 1987*	*May 1987 TO Mar 1991*	*June 1990 TO Mar 1991*	*Mar 1991 TO Mar 1998*	*Mar 1998 TO May 1998*	*May 1998 TO May 1999*	*May 1999 TO May 2000*
R-32	-149.0	68.7	136.7	N/A	N/A	N/A	-22.1	-109.9	-49.5
R-33	-209.8	-42.8	256.2	N/A	N/A	N/A	24.2	52.3	-1.2
R-34	N/A	N/A	47.0	135.4	-3.7	248.5	10.9	84.5	-6.8
R-34.5	N/A	N/A	N/A	N/A	N/A	N/A	70.1	N/A	N/A
R-35	1.3	-22.9	-116.0	122.3	166.5	85.8	31.4	135.1	65.1
R-35.5	N/A	N/A	N/A	N/A	N/A	N/A	54.1	N/A	N/A
R-36	166.9	166.6	-396.8	137.7	168.4	-107.2	149.3	-93.7	-13.1
R-36.5	N/A	N/A	N/A	N/A	N/A	N/A	198.4	N/A	N/A
R-37	-34.5	271.0	-337.0	68.0	126.5	-135.0	202.6	-93.5	-41.6
R-37.5	N/A	N/A	N/A	N/A	N/A	N/A	206.9	N/A	N/A
R-38	-8.4	36.2	-40.5	-7.3	51.5	-81.0	177.5	-84.3	-35.2
R-38.4	N/A	N/A	N/A	N/A	-20.0	-39.2	229.0	N/A	N/A
R-39	-37.8	21.8	34.8	-61.7	N/A	-61.2	229.7	-66.8	-51.5
R-39.5	N/A	N/A	N/A	N/A	N/A	N/A	131.3	N/A	N/A
R-40	-99.4	88.0	45.2	-66.8	N/A	-53.3	-10.1	114.8	4.9
R-40.5	N/A	N/A	N/A	N/A	N/A	N/A	-10.6	N/A	N/A
R-41	-110.4	120.9	-37.2	18.0	N/A	-59.9	-5.5	-0.3	73.1
R-42	-96.1	113.4	-36.7	45.7	N/A	-117.2	19.5	-49.3	121.4
R-43	-94.4	11.2	72.8	0.3	N/A	-178.0	76.9	-76.5	24.9
R-44	-171.7	65.2	308.2	-156.2	N/A	N/A	N/A	N/A	-170.1
New Pass	-179.4	13.0	196.5	N/A	N/A	N/A	1.1	-28.8	-25.4
Reach 1	1.3	-22.9	-34.5	128.8	81.4	167.1	37.4	109.8	29.2
Reach 2	-2.6	116.7	-138.9	14.0	81.6	-79.5	156.9	-44.7	-27.3
Reach 3	-100.3	81.8	-0.4	21.3	N/A	-118.4	20.1	-42.0	73.1
Reach 4	-171.7	65.2	308.2	-156.2	N/A	N/A	N/A	N/A	-170.1

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

Table III-2 Recent Shoreline Change Rates (ft/yr), Lido Key (1971 – 2000)

Profile	*1971-1973 TO Aug 1974*	*Aug 1974 TO May 1978*	*May 1978 TO May 1987*	*May 1987 TO Mar 1991*	*June 1990 TO Mar 1991*	*Mar 1991 TO Mar 1998*	*Mar 1998 TO May 1998*	*May 1998 TO May 1999*	*May 1999 TO May 2000*
R-32	-49.7	18.3	15.2	N/A	N/A	N/A	-132.0	-109.9	-49.4
R-33	-69.9	-11.4	28.4	N/A	N/A	N/A	144.8	52.3	-1.2
R-34	N/A	N/A	5.2	35.3	-4.9	35.5	64.9	84.5	-6.8
R-34.5	N/A	N/A	N/A	N/A	N/A	N/A	419.2	N/A	N/A
R-35	0.4	-6.1	-12.9	31.9	222.6	12.2	187.9	135.1	65.0
R-35.5	N/A	N/A	N/A	N/A	N/A	N/A	323.5	N/A	N/A
R-36	55.6	44.4	-44.1	35.9	225.2	-15.3	893.1	-93.7	-13.1
R-36.5	N/A	N/A	N/A	N/A	N/A	N/A	1187.4	N/A	N/A
R-37	-11.5	72.3	-37.4	17.7	169.1	-19.3	1212.2	-93.5	-41.5
R-37.5	N/A	N/A	N/A	N/A	N/A	N/A	1238.1	N/A	N/A
R-38	-2.8	9.7	-4.5	-1.9	68.9	-11.6	1062.0	-84.3	-35.1
R-38.4	N/A	N/A	N/A	N/A	-26.7	-5.6	1369.9	N/A	N/A
R-39	-12.6	5.8	3.9	-16.1	N/A	-8.7	1374.5	-66.8	-51.3
R-39.5	N/A	N/A	N/A	N/A	N/A	N/A	785.8	N/A	N/A
R-40	-33.1	23.5	5.0	-17.4	N/A	-7.6	-60.3	114.8	4.9
R-40.5	N/A	N/A	N/A	N/A	N/A	N/A	-63.4	N/A	N/A
R-41	-36.8	32.2	-4.1	4.7	N/A	-8.6	-32.9	-0.3	72.9
R-42	-32.0	30.2	-4.1	11.9	N/A	-16.7	116.8	-49.3	121.0
R-43	-31.5	3.0	8.1	0.1	N/A	-25.4	460.3	-76.5	24.9
R-44	-57.2	17.4	34.2	-40.7	N/A	N/A	N/A	N/A	-169.6
New Pass	-59.8	3.5	21.8	N/A	N/A	N/A	6.4	-28.8	-25.3
Reach 1	0.4	-6.1	-3.8	33.6	108.8	23.9	224.0	109.8	29.1
Reach 2	-0.9	31.1	-15.4	3.6	109.1	-11.3	938.6	-44.7	-27.2
Reach 3	-33.4	21.8	0.0	5.6	N/A	-16.9	120.2	-42.0	72.9
Reach 4	-57.2	17.4	34.2	-40.7	N/A	N/A	N/A	N/A	-169.6

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

Table III-3 Historic Shoreline Change (ft/yr) Summary (March 1991 — May 2000)

Reach	*MHW Change Rate March 1991 – May 2000 (ft/yr)*	*MHW Change Rate March 1991 – May 2000 (ft/yr), 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: R-35 to Big Sarasota Pass (R-44)	-6.6	-17.7
Lido Key: New Pass (R-32) to Big Sarasota Pass (R-44)	-0.5	-9.8

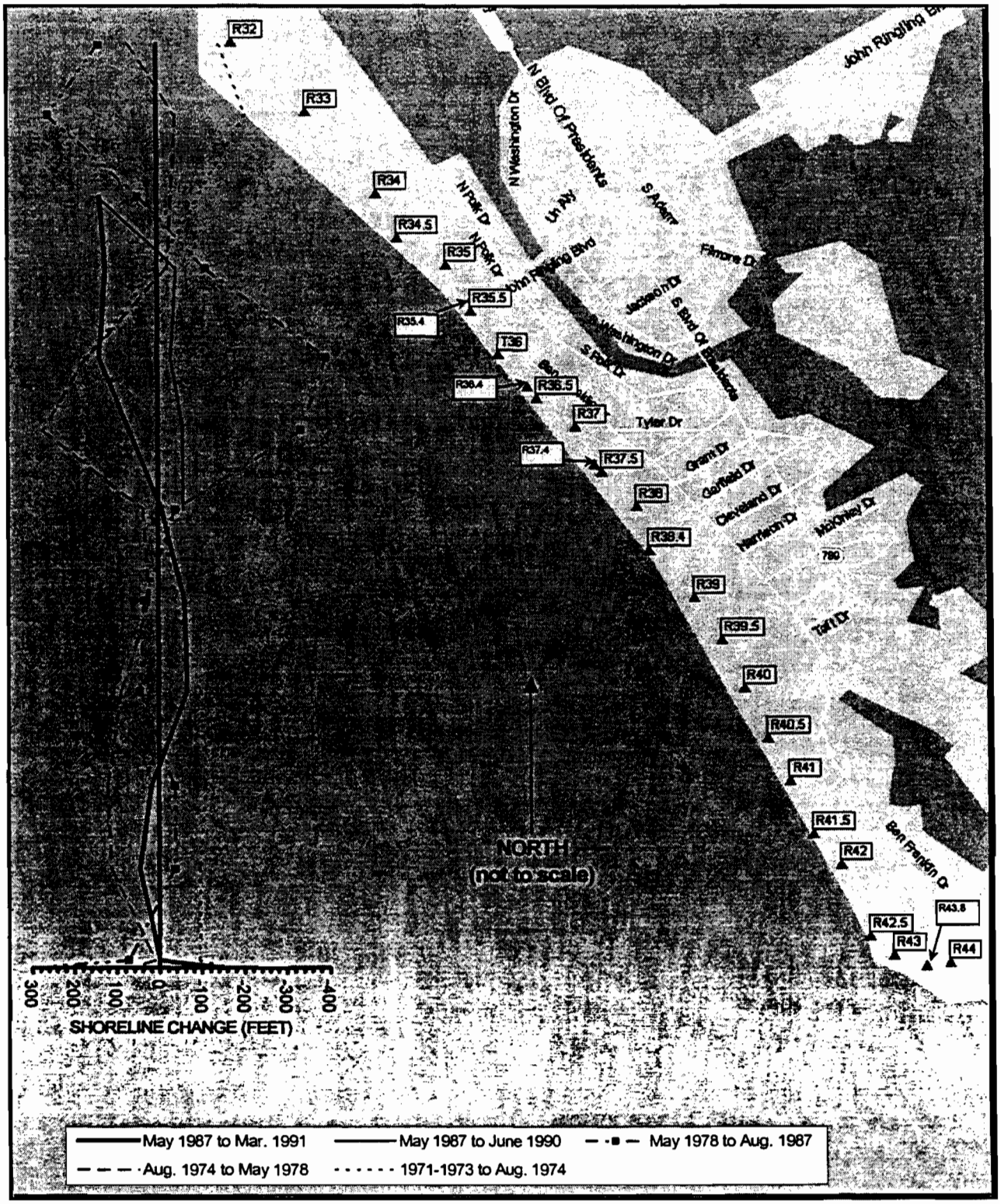

Figure III-2 Shoreline Changes, 1971 – 1991

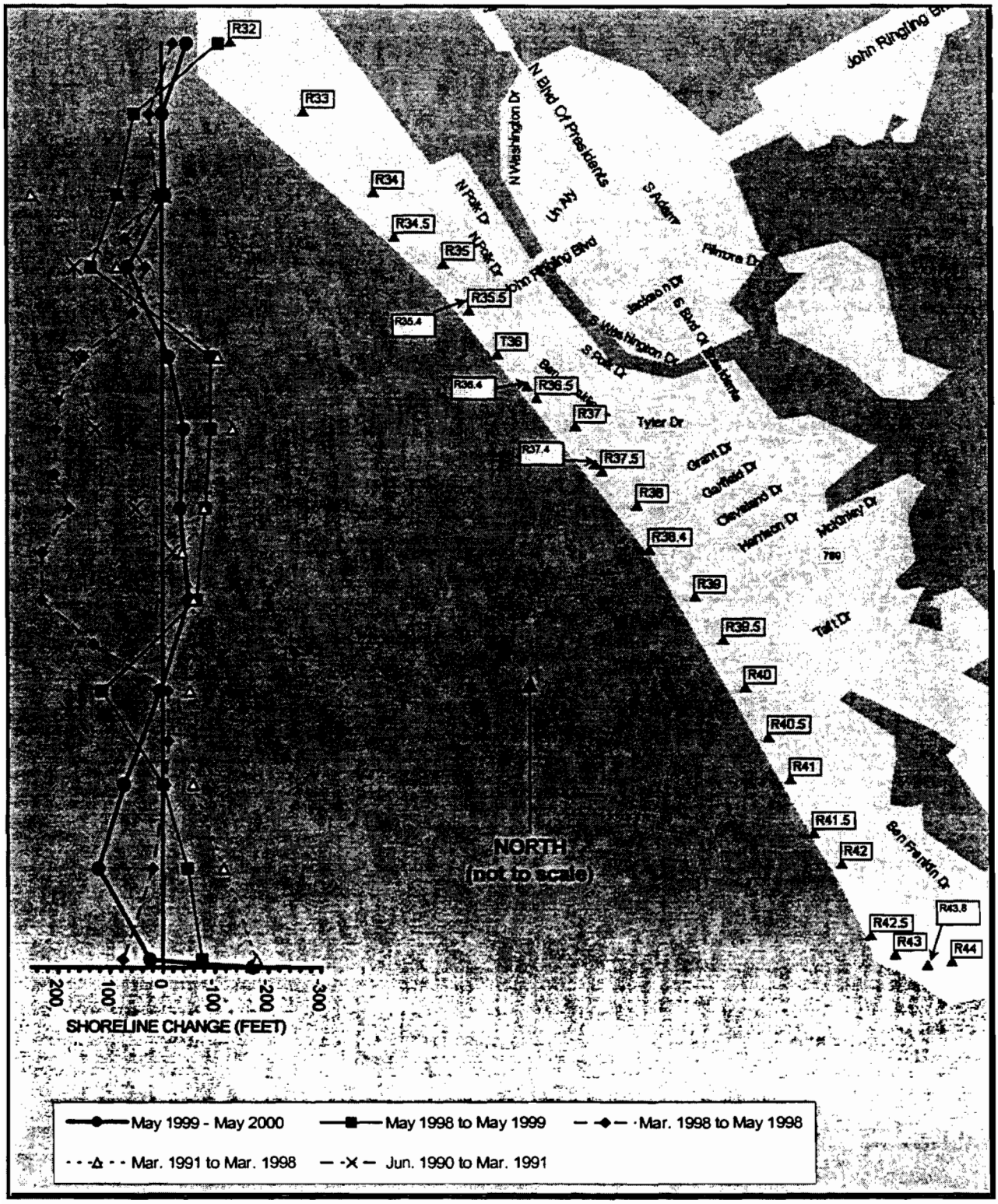

Figure III-3 Shoreline Changes, 1990 – Present

and May 1999 to May 2000. Figures III-2 and III-3 also show the shoreline change data for these periods.

24. New Pass. The New Pass reach of the study area consists of the Lido Key shoreline between FDEP monuments R-30 through R-33. Shoreline changes for the period 1971 – 1973 to August 1974 indicate an average retreat rate of 60 ft/yr. The maximum retreat occurred at R-33 (210 ft) and the minimum retreat occurred at R-32 (149 ft). Shoreline changes for the period August 1974 to May 1978 indicate an average accretion rate of 4 ft/yr. The maximum accretion occurred at R-32 (69 ft) and the maximum retreat occurred at R-33 (43 ft). Shoreline changes for the period May 1978 to March 1991 indicate an average accretion rate of 22 ft/yr. The maximum accretion occurred at R-33 (256 ft) and the minimum accretion occurred at R-32 (137 ft). Shoreline changes for the period May 1998 to May 1999 indicate an average retreat rate of 29 ft/yr. The maximum accretion occurred at R-33 (52 ft) and the maximum retreat occurred at R-32 (110 ft). Shoreline changes for the period May 1999 to May 2000 indicate an average retreat rate of 25 ft/yr. The maximum retreat occurred at R-32 (50 ft) and the minimum retreat occurred at R-33 (1 ft). Overall, the shoreline retreated approximately 10 ft/yr along this portion of the study area from March 1991 to May 2000.

25. Reach 1. Reach 1 of the study area consists of the Lido Key shoreline between FDEP monuments R-34 and R-35. Shoreline changes for the period 1971 – 1973 to August 1974 indicate an average accretion of 0.4 ft/yr. The only shoreline change reported for this period was -1 ft at R-35. Shoreline changes for the period August 1974 to May 1978 indicate an average retreat of 6.1 ft/yr. The only shoreline change reported for this period was -23 ft at R-35. Shoreline changes for the period May 1978 to May 1987 indicate an average retreat of 4 ft/yr. The maximum accretion occurred at R-34 (5 ft) and the maximum retreat occurred at R-35 (13 ft). Shoreline changes for the period May 1987 to March 1991 indicate an average accretion of 34 ft/yr. The maximum accretion occurred at R-34 (135 ft) and the minimum accretion occurred at R-35 (122 ft). Shoreline changes for the period June 1990 to March 1991 indicate an average accretion of 109 ft/yr. The maximum retreat occurred at R-34 (4 ft) and the maximum accretion occurred at R-35 (167 ft). Shoreline changes for the period March 1991 to March 1998 indicate an average accretion of 24 ft/yr. The maximum accretion occurred at R-34 (249 ft) and the minimum accretion occurred at R-35 (135 ft). Shoreline changes for the period May 1998 to May 1999 indicate an average accretion of 110 ft/yr. The maximum accretion occurred at R-35 (135 ft) and the minimum accretion occurred at R-34 (85 ft). Shoreline changes for the period May 1999 to May 2000 indicate an average accretion of 29 ft/yr. The maximum shoreline accretion occurred at R-35 (65 ft) and the maximum retreat occurred at R-34 (7 ft). Overall, the shoreline accreted 36 ft/yr along this portion of the study area from March 1991 to May 2000.

26. Reach 2. Reach 2 of the study area consists of the Lido Key shoreline between FDEP monuments R-35 and R-40. Shoreline changes for the period 1971 – 1973 to August 1974 indicate an average retreat of 1 ft/yr. The maximum accretion occurred at T-36 (167 ft) and the maximum retreat occurred at R-40 (99 ft). Shoreline changes for

the period August 1974 to May 1978 indicate an average accretion of 31 ft/yr. The maximum accretion occurred at R-37 (271 ft) and the minimum accretion occurred at R-39 (22 ft). Shoreline changes for the period May 1978 to May 1987 indicate an average retreat of 15 ft/yr. The maximum accretion occurred at R-40 (45 ft) and the maximum retreat occurred at T-36 (397 ft). Shoreline changes for the period May 1987 to March 1991 indicate an average accretion of 4 ft/yr. The maximum accretion occurred at T-36 (138 ft) and the maximum retreat occurred at R-40 (67 ft). Shoreline changes for the period June 1990 to March 1991 indicate an average accretion of 109 ft/yr. The maximum accretion occurred at T-36 (168 ft) and the maximum retreat occurred at R-38.4 (20 ft). Shoreline changes for the period March 1991 to March 1998 indicate an average retreat of 11 ft/yr. The maximum retreat occurred at R-37 (135 ft) and the minimum retreat occurred at R-38.4 (39 ft). Shoreline changes for the period May 1998 to May 1999 indicate an average retreat of 45 ft/yr. The maximum accretion occurred at R-40 (115 ft) and the maximum retreat occurred at R-37 (94 ft). Shoreline changes for the period May 1999 to May 2000 indicate an average retreat rate of 27 ft/yr. The maximum accretion occurred at R-40 (4.9 ft) and the maximum retreat occurred at R-37 (42 ft). Overall, the shoreline retreated 1 ft/yr along this portion of the study area from March 1991 to May 2000.

27. Reach 3. Reach 3 of the study area consists of the Lido Key shoreline between FDEP monuments R-40.5 and R-43. Shoreline changes for the period 1971 – 1973 to August 1974 indicate an average retreat of 33 ft/yr. The maximum retreat occurred at R-41 (110 ft) and the minimum retreat occurred at R-43 (94 ft). Shoreline changes for the period August 1974 to May 1978 indicate an average accretion of 22 ft/yr. The maximum accretion occurred at R-41 (121 ft) and the minimum accretion occurred at R-43 (11 ft). Shoreline changes for the period May 1978 to May 1987 indicate an average change of 0 ft/yr. The maximum accretion occurred at R-43 (73 ft) and the maximum retreat occurred at R-41 (37 ft). Shoreline changes for the period May 1987 to March 1991 indicate an average accretion of 6 ft/yr. The maximum accretion occurred at R-42 (46 ft) and the minimum accretion occurred at R-43 (0.3 ft). Shoreline changes for the period March 1991 to March 1998 indicate an average retreat of 17 ft/yr. The maximum retreat occurred at R-43 (178 ft) and the minimum retreat occurred at R-41 (60 ft). Shoreline changes for the period May 1998 to May 1999 indicate an average retreat of 42 ft/yr. The maximum retreat occurred at R-43 (77 ft) and the minimum retreat occurred at R-41 (0.3 ft). Shoreline changes for the period May 1999 to May 2000 indicate an average accretion of 73 ft/yr. The maximum accretion occurred at R-42 (121 ft) and the minimum accretion occurred at R-43 (25 ft). Overall, the shoreline retreated 6 ft/yr along this portion of the study area from March 1991 to May 2000.

28. Reach 4. Reach 4 of the study area consists of the Lido Key shoreline between FDEP monuments R-43.8 and R-44.5. Only one profile (R-44) represents Reach 4. Shoreline change for the period 1971 – 1973 to August 1974 indicates a retreat of 57 ft/yr (172 ft). Shoreline change for the period August 1974 to May 1978 indicates an accretion of 17 ft/yr (65 ft). Shoreline change for the period May 1978 to May 1987 indicates an accretion of 34 ft/yr (308 ft). Shoreline change for the period May 1987 to March 1991 indicates a retreat of 41 ft/yr (156 ft). Shoreline change for the period May

1999 to May 2000 indicates a retreat of 170 ft/yr (170 ft). Overall, the shoreline retreated 35 ft/yr along this portion of the study area from March 1991 to May 2000.

29. Table III-4 summarizes the dredged quantities at New Pass and locations of the sand volume placed on Lido Key between 1964 and 1996. New Pass's authorization, thru Section 107 of the 1960 Rivers and Harbors Act, as amended, is nearing the end of the authorization period and will require additional Congressional authorization if it is to be maintained in the future.

Table III-4 Quantities and Placement Locations for Sand Dredged at New Pass

Year	*Total Volume (cy)*	*Volume Placed on Lido Key (cy)*	*Location of Placement on Lido Key*	*Volume Placed on Longboat Key (cy)*
1964	123,700	121,000	R-35 – R-38.5	2,700
1970	350,000	350,000	R-35 – R-38.5	
1974	250,000	246,000	R-35 – R-38	
1977	400,000	400,000	R-35 – R-38	
1982	185,000	92,000	R-35 – R-38	93,000
1985	239,000	239,000	R-35 – R-38	
1991	265,500	177,000	R-34.5 – R-38	88,500
1996	326,000	178,000	R-34.5 – R-36	148,000
TOTAL	2,139,200	1,803,000	-	332,200

Notes:
1. 1964 – 1985 volumes taken from CP&E (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.

30. The recent shoreline changes suggest that the New Pass, Reach 2, Reach 3, and Reach 4 shorelines of the Lido Key study area recede in the absence of man-made changes (Table III-3). South of the 1970 beach nourishment project area (R-35 to R-38), the Lido Key shorelines between R-39 and R-44 experienced recession averaging about 100 ft (33 ft/yr) between 1971 and 1974. Between 1978 and 1991, shoreline recession in the combination of Reaches 2 and 3 averaged 45 ft (3.5 ft/yr) in spite of the renourishment and dredging operations (CP&E, 1991; ATM, 1994). Between 1991 and the most recent beach nourishment in 1998, shoreline recession in Reaches 2 and 3 combined averaged 92 ft (13 ft/yr). Shoreline recession continued following the 1998 renourishment project; between May 1998 and May 1999, shoreline recession in the combination of Reaches 2 and 3 averaged 44 ft. These continuing shoreline recession patterns have prompted the FDEP (2000a) to label Lido Key as a critical erosion area.

Beach Volume Changes (1971 to 2000)

31. Volume change data used in the formulation of alternative plans for the study area were calculated from the same surveys as described in the above "Shoreline Change (1971 to 2000)" section of the report. The onshore and offshore limits of the volumetric analysis were the FDEP monuments and the -12.0 ft NGVD contour, respectively. Due

to limited offshore survey data, changes before 1991 were estimated assuming a volumetric change of 0.60 cy/ft for each foot of shoreline change. This estimate of volume change (cy/ft), given the shoreline change, is based on the relationship developed independently by computing 1991 to 1998 shoreline and volume changes.

32. Tables III-5 through III-7 summarize net volume and annual net volume changes for the study area for the periods 1971 – 1973 to August 1974, August 1974 to May 1978, May 1978 to May 1987, May 1987 to March 1991, June 1990 to March 1991, March 1991 to March 1998, March 1998 to May 1998, May 1998 to May 1999, and May 1999 to May 2000. Figure III-4 displays volume changes at every monument for the period 1971 to 1991. Figure III-5 displays volume changes at every monument for the period 1990 to 1999.

33. New Pass. The New Pass reach of the study area consists of the Lido Key shoreline between FDEP monuments R-30 through R-33. For the period 1971 – 1973 to May 1978, this portion of the study area experienced significant erosion of 172,133 cy; however, for the period May 1978 to May 1987, it experienced significant accretion of 190,424 cy. For the period March 1998 to May 2000, this portion of the study area experienced accretion for the most part (1,560 cy for the period March 1998 to May 1998 and 60,778 cy for the period May 1999 to May 2000); however, for the period May 1998 to May 1999, it experienced 13,295 cy of erosion.

34. Reach 1. Reach 1 of the study area consists of the Lido Key shoreline between FDEP monuments R-34 and R-35. For the period 1971 – 1973 to August 1974, this portion of the study area experienced significant erosion of 258,243 cy; however, for the period August 1974 to May 1978, it experienced significant accretion of 149,874 cy. For the period May 1978 to May 1987, this portion of the study area experienced slight erosion of 6,247 cy. For the period May 1987 to May 2000, this portion of the study area experienced accretion of 387,577 cy.

35. Reach 2. Reach 2 of the study area consists of the Lido Key shoreline between FDEP monuments R-35 and R-40. For the period 1971 – 1973 to May 1978, this portion of the study area experienced significant accretion of 445,756 cy; however, for the period May 1978 to May 1987, it experienced significant erosion of 539,410 cy. For the period May 1987 to March 1991, this portion of the study area experienced accretion of 84,417 cy. For the period March 1991 to March 1998, this portion of the study area experienced significant erosion of 271,224 cy; however, for the period March 1998 to May 1998, it experienced significant accretion of 278,174 cy. For the period May 1998 to May 2000, this portion of the study area experienced significant erosion of 141,740 cy.

36. Reach 3. Reach 3 of the study area consists of the Lido Key shoreline between FDEP monuments R-40.5 and R-43. For the period 1971 – 1973 to August 1974, this portion of the study area experienced significant erosion of 165,794 cy; however, for the period August 1974 to May 1978, it experienced significant accretion of 142,625 cy. For the period May 1978 to May 1987, this portion of the study area experienced slight

erosion of 8,804 cy; however, for the period May 1987 to March 1991, it experienced accretion of 84,417 cy. For the period March 1991 to May 1999, this portion of the study area experienced significant erosion of 192,992 cy. For the period May 1999 to May 2000, this portion of the study area experienced slight accretion of 14,996 cy.

Table III-5 1971 – 2000 Beach Volume Changes (cy)

Monu-ment Name	*1971-1973 To Aug 1974*	*Aug 1974 To May 1978*	*May 1978 To May 1987*	*May 1987 To Mar 1991*	*June 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 (ft)*
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
R-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
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

Notes:
1. Depth of closure = -12 ft NGVD
2. Volume changes before 1991 assume 0.60 cy/ft per foot of shoreline change, according to assumptions of CP&E (1991)
3. 1991 – March 1998 volume changes based on beach profile survey
4. March 1998 – May 1999 volume changes from CP&E (2000).

Table III-6 1971 – 2000 Beach Volume Rates (cy/yr)

Monu-ment Name	*1971-1973 To Aug 1974*	*Aug 1974 To May 1978*	*May 1978 To May 1987*	*May 1987 To Mar 1991*	*June 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 (ft)*
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
R-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
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

Notes:
1. Depth of closure = -12 ft NGVD
2. Volume changes before 1991 assume 0.60 cy/ft per foot of shoreline change, according to assumptions of CP&E (1991)
3. 1991 – March 1998 volume changes based on beach profile survey
4. March 1998 – May 1999 volume changes from CP&E (2000).

Table III-7 Historic Beach Volume Change Rate (ft/yr) Summary (March 1991 — May 2000)

Reach	*Length (ft)*	*MHW Change March 1991 – May 2000 (ft/yr)*	*MHW Change March 1991 – May 2000 (ft/yr), Adjusted for 1996 and 1998 Fills*
New Pass	1,461	-9.5	-9.5
Reach 1	1,502	35.7	25.6
Reach 2	5,535	-1.1	-21.1
Reach 3	2,745	-6.2	-6.2
Reach 4	856	-35.2	-35.2
Project Area: R-35 to Big Sarasota Pass (R-44)	9,136	-6.6	-17.7
Lido Key: New Pass (R-32) to Big Sarasota Pass (R-44)	12,099	-0.5	-9.8

Notes: 1. Depth of closure = -12 ft NGVD
2. Volume changes based on FDEP (2000) and CP&E (2000) beach profile data

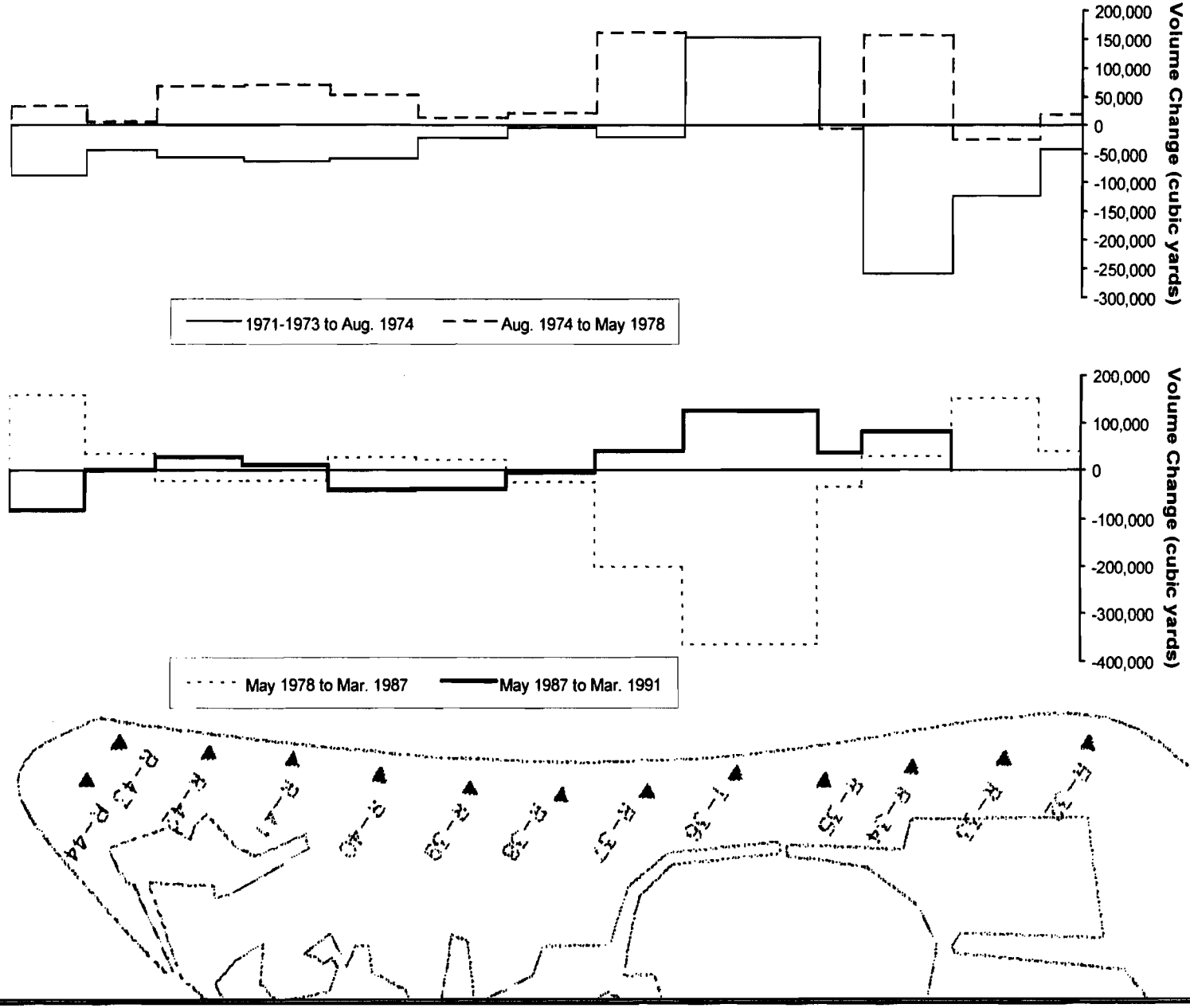

Figure III-4 Beach Volume Changes 1971-1991

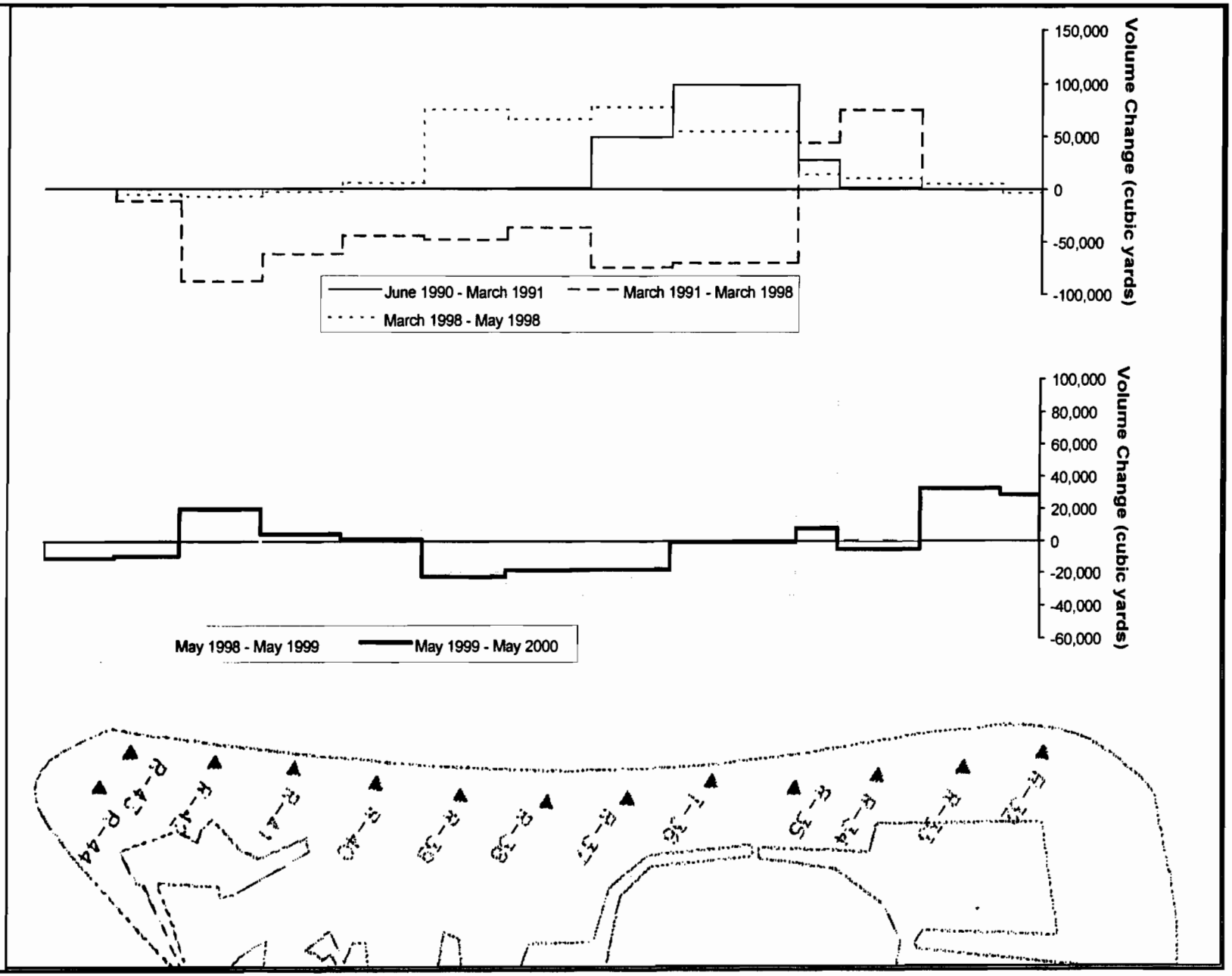

Figure III-5 Volume Changes, 1990-1999

37. Reach 4. Reach 4 of the study area consists of the Lido Key shoreline between FDEP monuments R-43.8 and R-44.5. For the period 1971 – 1973 to August 1974, this portion of the study area experienced erosion of 88,178 cy. For the period August 1974 to May 1987, this portion of the study area experienced significant accretion of 191,686 cy; however, for the period May 1987 to March 1991, it experienced erosion of 80,204 cy. For the period May 1999 to May 2000, this portion of the study area experienced erosion of 10,844 cy.

38. The volumetric changes show that Reaches 2, 3, and 4 of the Lido Key study area erode in the absence of man-made changes (Table III-7). South of the 1970 project area (R-35 to R-38), the beach lost approximately 360,000 cy (20 cy/yr/ft) between 1971 and 1974, partly because of Hurricane Agnes. Between 1978 and 1991, the net erosion in the current project area was 348,000 cy (2.9 cy/yr/ft), in spite of a number of renourishment and dredging operations during this period (CP&E, 1991; ATM, 1994).

39. Between 1991 and the most recent nourishment in 1998, Reaches 2 and 3 combined (R-36 to R-44) lost 431,000 cy (6.7 cy/yr/ft). Erosion following the most recent nourishment project, completed in May 1998, removed 155,000 cy from the current project area (8.5 cy/yr/ft) between May 1998 and May 2000. The majority of the erosion 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 areas within the project area can experience erosion rates of 44 cy/yr/ft.

Existing Conditions

40. New Pass. New Pass Reach extends south along the Pass shoreline from R-30 to about 500 ft south of R-33.

41. Reach 1. 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 would not be susceptible to damages even under severe storm events.

42. Reach 2. Reach 2 extends from the John Ringling Causeway at R-35.4 south to R-40. This segment is privately owned and densely developed with single story and multistory buildings consisting primarily of hotels, motels, and condominiums.

43. Reach 3. Reach 3 extends from R-40 to R-43. This reach is heavily developed with condominiums lining the shoreline. Upland development of Reaches 2 and 3 consists of condominiums, single-family homes, and motels valued at approximately $214 million.

44. Reach 4. Reach 4, extending south from DNR-43 to Big Sarasota Pass Inlet, is a state park offering recreational activities. Reach 4 contains no structures susceptible to

damages. Lido Key Beach, already well developed, is unlikely to experience future expansion.

45. Damage susceptibility was limited to two areas, Reaches 2 and 3.

Future Without-Project Conditions

46. As seen in Table III-3 and Table III-7, Reach 2 historically recedes 21 ft/yr and Reach 3 historically recedes 6 ft/yr. These values indicate a continuous loss of land for this section of the study area with man made effects removed. Future dredging operations at New Pass is not considered in the future with-out project conditions. New Pass has reached the end of it's authorization thru Section 107 of the 1960 Rivers and Harbors Act, as amended, and can not be dredged again without additional Congressional approval. Continuous erosion and shoreline recession result in future damages to development becoming more severe from a given storm. Damage assessment is the calculated amount of losses 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 shoreline position due to long-term erosion and the effects of storm events.

47. The recession-damage relationship, Table III-8, shows the variation in damages the base year for Reach 2. Damages to structures in Reach 2 begin at 230 ft recession of the shoreline. Coastal armor destruction begins when recession exceeds 200 ft. Loss of land begins immediately (10 ft recession); losses to the backfill begin at 170 ft recession. These losses occur because not all properties are protected by coastal armor.

48. Similarly, damages to structures in Reach 3 begin at 180 ft recession of the shoreline. Coastal armor destruction begins when recession exceeds 170 ft. Loss of land begins immediately (10-ft recession); losses to the backfill begin at 170 ft recession. Total average annual equivalent damages for the combination of both reaches are estimated at $3,828,192.

Environmental Considerations

49. Nearshore side-scan sonar and groundtruthing surveys conducted in September 2001 did not detect any hardgrounds adjacent to Lido Key. Upland vegetation is composed of both exotic and native species such as Australian pine, sea grape, and wax myrtle. No seagrass/algal communities were observed in the footprint of the beach fill boundaries or proposed borrow areas. Of the listed animal species found in or near the project area, the loggerhead sea turtle is most likely to be affected by the proposed project. Information provided by the Florida Marine Research Institute indicates that, from 1992 to 2000, loggerhead sea turtles nest numbers varied from 32 to 60 annually along Lido Key. The draft Environmental Assessment contains a full account of this as well as all environmental issues associated with the study area of the Lido Key hurricane and storm reduction project review study. The future without-project condition

Table III-8 Reach 2 Example of Recession Damage Relationships

Recession (ft)	*Damages ($)*				
	Development	*Backfill*	*Coastal Armor*	*Loss of Land*	*Total*
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
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

See Economic Appendix for actual data

would have no effect on marine vegetation. However, continued erosion could eventually result in loss of upland vegetation and sea turtle nesting habitat adjacent to the beach.

Specific Problems and Opportunities

50. Upland development at Lido Key is threatened by both long-term recession and storm-induced damages. Erosion and long-term shoreline recession have rendered upland development at Lido Key increasingly vulnerable to damages from tropical and extra-tropical storms. Sea level rise, various coastal storms, and inlet effects have exacerbated the erosion pressures at Lido Key. Formulation of appropriate shore protection measures could mitigate for these impacting mechanisms as well as result in a net benefit to the national economy. Additional incidental benefits would also be realized by the authorization and construction of a properly formulated hurricane and storm damage reduction project for Lido Key.

PLANNING OBJECTIVES AND CONSTRAINTS

51. Principles and Guidelines. The "Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies" (The Principles and Guidelines, or P&G) are the principal guidelines for planning by Federal agencies involved in water resource development. Although each project and project setting presents unique problems and opportunities, the U.S. Army Corps of Engineers applies a consistent set of decision criteria to participation in project planning and construction. The Principles and Guidelines contain three basic criteria:

(1) That there be an economically justified and environmentally acceptable project. Widespread use of benefit-cost analysis as a test of a project's economic worth is generally considered to have grown out of the Flood Control Act of 1936. In this Act, Congress required that the U.S. Army Corps of Engineers recommend a project only "if the benefits to whomsoever they may accrue are in excess of the estimated costs and if the lives and social security of people are otherwise adversely affected." Given an economically justified project, decisions on whether and to what extent there should be Federal participation are guided by a concept of the Federal interest that has evolved from legislation, from precedent in project authorization and construction, and from Administration budget priorities.

(2) Federal participation must be otherwise warranted. Federal participation is limited in circumstances where special and local benefits accrue to a limited number of identifiable beneficiaries. The Federal government does not participate in facilities, which produce outputs incidental to basic project purposes.

(3) The project must meet current Administration budget priorities. The Administration does not budget for a project unless a significant proportion of the project outputs have a high budget priority.

Federal Objective

52. The Federal objective, as stated in the P&G, is to contribute to national economic development (NED) consistent with protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. In other words, economic benefits to the Nation must exceed project costs, without unnecessary sacrifice of environmental resources. Federal planning concerns other than economic include environmental protection and enhancement, human safety, social well-being, and cultural and historic resources. Environmental and safety considerations are of prime importance. In developing project modifications or proposed new projects, the U.S. Army Corps of Engineers:

a. provides for full consideration of measures to protect, enhance, and restore ecological, aesthetic, historical, and cultural resources;

b. attempts to obtain the best available information on the environmental effects of plans through an exchange of views and information with resource agencies at all levels of government, affected interests, and the public;

c. provides equal consideration throughout planning for environmental, economic, social, financial and engineering factors in plan scoping, development, evaluation, and modification of the authorized projects or new proposed projects, and;

d. attempts to minimize adverse environmental effects, including irreversible commitments of resources, and to mitigate unavoidable losses to the extent appropriate, concurrent with-project construction.

53. Federal Environmental Objectives. The U.S. Army Corps of Engineers complies with all environmental laws and executive orders. The U.S. Army Corps of Engineers considers carefully and seeks to balance the environmental and development needs of the Nation in full compliance with NEPA and other authorities provided by Congress and the Executive Branch. Alternative means of meeting competing demands generated by human water resources needs are examined and their environmental values examined fully, along with the economic, engineering, and social factors.

54. Public participation is encouraged early in the planning process to define environmental problems and elicit public expression of needs and expectations. Municipal, county, state, and other Federal agencies are contacted early for their views and provided timely information before making recommendations. Significant environmental resources and values that would likely be impacted, favorably as well as adversely, by an alternative under consideration are identified early in the planning process. All plans are formulated to avoid to the fullest extent practicable any adverse impact on significant resources.

55. Those significant adverse impacts that cannot be avoided are mitigated as required by Section 906(d) of the Water Resources Development Act of 1986. Section 906(d) requires the Secretary of the Army to include in reports submitted to Congress for

authorization of construction a specific plan to mitigate fish and wildlife losses or a determination that the project will have a negligible effect on fish and wildlife. The NEPA document in this report describes the environmental impacts of the plan recommended herein and summarizes compliance with the Federal statutes and regulations.

56. Participation in hurricane and storm damage reduction projects is limited to beach restoration and protection, not beach creation or improvement unless such improvement is needed for engineering purposes. The term "restoration" was substituted for "improvement" in the amendment of July 28, 1956 (P.L. 826, 84th Congress, 70 Stat. 702) so that the basis for Federal concern became "restoration and protection" as opposed to creation of new lands (House Report No. 2544 and Senate Report No. 2691, 84th Congress). Accordingly, Federal participation in restoration is limited to the historic shoreline. It does not provide for Federal cost sharing in extending a beach beyond its historic shoreline unless required for protection of upland areas.

57. In addition, the Federal cost share is reduced proportionately to the extent that a project protects private shores from beach erosion and land loss. Section 103(d) of the 1986 Water Resources Development Act specifically prohibits Federal participation in project costs assigned to benefits to privately owned shores, where use of such shores is limited to private interests, or to prevention of losses of private lands.

58. Federal Project Purposes. Hurricane and storm damage reduction projects have been authorized for a variety of purposes: beach erosion control, shore/shoreline protection, hurricane/hurricane wave protection, and storm protection. The WRDA of 1986 now assigns costs of Federal projects to appropriate project purposes. Projects that provide hurricane and storm damage reduction are assigned a 65% Federal share. Project reaches that provide for recreation are assigned a 50% Federal share. Projects that provide for separable recreation are not Federally cost shared. The costs for construction projects or measures for beach erosion control and water quality enhancement are assigned to either hurricane and storm damage reduction, or recreation. The Federal government does not participate in any work relating to recreation facilities at hurricane and storm damage reduction projects. Recreation is not considered to be high priority output or primary project output under current Department of Army policy. This policy precludes Federal funds to support construction of shore or hurricane protection projects which depend on separable recreation benefits for economic justification, or for which incidental recreation benefits are greater than 50% of the total benefits unless the project is economically justified based on primary outputs alone, or based on the combination of primary benefits and an equivalent amount of incidental recreation benefits.

59. Additional Federal Guidelines. The general Federal objectives dealing primarily with broad planning guidelines are described above. Other general study objectives assure that any new project recommended for construction, or proposed modifications to existing hurricane and storm damage reduction projects are formulated to:

a. meet the specific needs and concerns of the general public within the project area;

b. be part of or developed in conjunction with a "systems approach." Alternative plans that consider a broad range of possible impacts including impacts that occur on larger scale, were developed. The combined effectiveness and economic efficiency of the shore protection, navigation maintenance, and dredged material disposal programs can then be optimized;

c. respond to expressed public desires and preferences;

d. be flexible to accommodate changing economic, social, and environmental patterns and changing technologies;

e. integrate with and complement other related programs in the study area, and;

f. be implementable with respect to financial and institutional capabilities and public consensus.

60. Four accounts are established to simplify evaluation and display the effects of alternative plans. These four accounts encompass all significant effects of a plan on the human environment as required by the National Environmental Policy Act of 1969 (NEPA). They also encompass social well-being as required by Section 122 of the 1970 Flood Control Act. The national economic development account is included, because it is the primary Federal objective. Other information that is required by law or that will have a material bearing on the decision-making process is included in the other accounts listed below:

a. National Economic Development (NED). This account displays changes in the economic value of the national output of foods and services.

b. Environmental Quality (EQ). This account displays non-monetary effects on significant natural and cultural resources.

c. Regional Economic Development (RED). This account registers changes in the distribution of regional economic activity that result from project construction. Evaluations of regional effects are to be carried out using nationally consistent projections of income, employment, output, and population.

d. Other Social Effects (OSE). This account registers project effects from perspectives relevant to the planning process but not reflected in the other three accounts.

61. A plan that reasonably maximizes net national economic development (NED) benefits, consistent with the Federal objective, is the goal of the Federal plan formulation and analysis process. This plan will be identified as the NED plan. The NED plan must also meet the test of four additional criteria:

a. Completeness. The extent to which a given modification of the authorized project provides and accounts for all necessary investments or other actions to ensure the realization of storm damage reduction.

b. Effectiveness. The extent to which a given modification of the authorized project contributes to a solution to shoreline erosion and storm damage problems and achieves protection from storm damages.

c. Efficiency. The extent to which a given modification of the authorized project is the most cost-effective means of providing storm damage protection, consistent with protecting the Nation's environment.

d. Acceptability. The viability of a given modification to the authorized project and its acceptance by the non-Federal project sponsor, state entities and the public, and compatibility with existing laws, regulations, and public policies.

State of Florida's Objective

62. Coastal Management Program. Florida's Coastal Management Program was established under the Coastal Management Act of 1978 (Chapter 380.20, Florida Statutes) and approved by the Federal Coastal Zone Management office in 1981 (Pilkey et al., 1984). Florida does not regulate its coastal zone through one comprehensive law but rather through 28 state statutes. The Florida Department of Community Affairs is the lead state agency for the implementation of the Federal coastal zone management act.

63. Beach and Shore Preservation. The Beach and Shore Preservation Act (Chapter 161, Florida Statutes) is Florida's primary statute for developing and implementing the state's strategic beach management plan, regulating coastal construction seaward of the mean high water, and regulating activities seaward of the coastal construction control lines. The act, administered by the Florida Department of Environmental Protection (FDEP) Office of Beaches and Coastal Systems (OBCS), was first passed in 1965 and has since been significantly amended.

64. Coastal Construction Control Lines. In the Beach and Shore Protection Act, the legislature asserted that Florida's beaches and coastal barrier dunes are among the state's most valuable natural resources and that these resources should be protected from "imprudent construction which can jeopardize the stability of the beach-dune system, accelerate erosion, provide inadequate protection to upland structures, endanger adjacent properties or interfere with public beach access" (Section 161.053, Florida Statutes). To ensure that such "imprudent construction" does not take place, the statute charges the FDEP to define and establish Coastal Construction Control Lines (CCCL). These lines define the landward limit of the active beach-dune system and vary from a few to several hundred ft inland of mean high water. The specific location of the line is a function of the predicted storm surge and erosion resulting from a 100-year storm. The FDEP has established control lines on a county-by-county basis

for Florida's 24 sandy beach counties (Section 161.053, Florida Statutes). Nine of Florida's 33 coastal counties are not considered to be predominantly sandy beach counties and do not, therefore, have CCCL's. The non-sand beach counties, stretching from Wakulla to Pasco County, located on the Big Bend and in Monroe County in southern Florida (Balsillie, 1988), are regulated pursuant to Section 161.052, Florida Statutes.

65. Florida is one of the first states to develop a coastal construction control line program. This program was initiated through legislative action in 1970. The primary goal of this program is the control of coastal construction to curtail impactive and imprudent development. Included in this effort was the establishment of a coastal monument program for survey and documentation purposes. Control monuments have been established approximately every 1,000 ft along the coastal shoreline of all beach front areas, generally located on the shoreward side of existing dune lines away from normal shoreline erosion forces. These monuments serve as the starting reference for beach survey purposes. Massive primary monuments are located further landward and serve as primary monuments for all controlled survey work. All monuments are tied to the State Plane coordinate system and NGVD 1929 vertical datum.

66. Applying numerical modeling storm programs and engineering expertise, including historical shoreline studies and recent survey data, the State has established coastal construction control lines that reflect the determined 100-year storm impact location along each stretch of beachfront property. Acceptance of this line goes through an elaborate review process and finally establishes a regulatory line for construction purposes.

67. The CCCL defines the FDEP's jurisdictional area of construction for regulation of construction activities. Building or excavating seaward of the control line requires a permit from the FDEP. The primary purposes of this permitting program are to 1) ensure that construction seaward of the control line is designed and sited to protect beaches and dunes from adverse impacts, 2) ensure that construction seaward of the line does not result in accelerated erosion on adjacent land, and 3) ensure that habitable structures seaward of the line are designed to withstand the forces associated with a 100-year return interval storm.

68. Before granting a construction permit, the FDEP must consider shoreline stability and the impact of storm tides, design features of the proposed structures or activities and potential impacts of the building or activities, including cumulative effects, on the beach-dune system. The department may grant a coastal construction control line permit in areas where a "reasonably continuous" line of existing construction located seaward of the control line is not "unduly threatened by erosion" (Section 161.053, Florida Statutes).

69. The Beach and Shore Preservation Act also regulates construction of shore protection devices below mean high water (Section 161.041, Florida Statutes). Building such a structure requires a coastal construction permit issued by the FDEP. A coastal construction permit is necessary for any coastal construction or reconstruction or

change to existing structures, or any construction or physical activity undertaken specifically for shore protection.

70. Florida's Administrative Code (Chapter 62B-33) standards and regulations for construction seaward of the control line include provisions which specify that all habitable structures must be pile-supported, elevated above the projected 100-year storm surge, and designed in accordance with Section 6, American National Standards/American Society of Civil Engineers 7-88 (July 1990) "Minimum Design Loads for Buildings and Other Structures" except that for major habitable structures the minimum basic wind speed will be 110 miles per hour (mph) (115 mph in the Florida Keys) unless a higher velocity is required. The code also requires that existing beach topography must be protected, the maximum effort must be made to protect all native stabilizing vegetation, structures must be located as far landward as possible, and all construction must be designed to minimize erosive effects.

71. Before setting control lines, the FDEP must hold a public hearing in the affected county. The results of the hearing must be considered before determining the location of the control line (Section 161.053, Florida Statutes). Once the department has established CCCL's, their location must be recorded in public records (Section 161.053, Florida Statutes).

72. To determine the appropriate location of a control line, the state considers long-and short-term erosion rates, existing upland development, and expected impacts of a 100-year storm. The state contracts with the Florida State University Beaches and Shores Resource Center to assess the impacts of predicted hurricane storm tides. The center uses the storm tide model developed by Dr. Robert Dean to predict water levels, wave heights, and dune and bluff erosion accompanying a 100-year storm event (Balsillie, 1988).

73. For each control line study, stereoscopic aerial photographs are taken. These are then reproduced to provide detailed maps with a 1:100 scale (Balsillie, 1988). These maps are compared to historical maps, beach profile surveys, and photographs to determine long-term erosion rates. For a typical county, five to six surveys, dating from the mid-1800s to the present, are used to compute erosion rates (National Research Council, 1990).

74. To measure shoreline change over relatively short time periods, the state has established over 3,400 concrete monuments at 1,000-foot intervals along the coastline (National Research Council, 1990). These monuments are, in turn, referenced to a system of larger monuments located farther inland. As part of the state's ongoing CCCL delineation and monitoring program, beach profiles are periodically measured from the control line monuments. In addition, the state also conducts post-storm surveys that provide Florida with a comprehensive pre- and post-storm database (Balsillie, 1988).

75. Erosion Setbacks. The 1985 State Comprehensive Growth Management Act (Chapter 85-55, Laws of Florida) amended the Beach and Shore Preservation Act to include a construction setback provision for all sandy beach counties. The amendment

prohibits the FDEP from granting most coastal construction permits on land that will be seaward of the seasonal high water line within 30 years (Section 161.053, Florida Statutes). The 30-year erosion projection cannot, however, extend landward of an established CCCL (Section 161.053, Florida Statutes).

76. The FDEP can grant coastal construction permits for shore protection structures, piers, and minor structures seaward of the 30-year erosion projection. The FDEP will permit construction of a single-family residence seaward of the line only if the parcel was platted before adoption of the amendment, the landowner does not own another parcel adjacent to and landward of the parcel proposed for development, and the structure is located landward of the frontal dune and as far landward as practicable (Section 161.053, Florida Statutes). In addition, repairs or reconstruction of a building cannot "expand the capacity of the original structure seaward of the 30-year erosion projection" (Section 161.053, Florida Statutes). The department can, however, issue a permit for landward relocation of a damaged or existing structure if the relocation will not damage the beach-dune system (Section 161.053, Florida Statutes).

77. The FDEP uses long-term erosion rates to delineate the location of the 30-year erosion projection. FDEP must also consider the presence of shore protection structures and beach renourishment projects in determining the appropriate location of the erosion projection (Section 161.053, Florida Statutes).

78. Coastal Building Zone. The 1985 Growth Management Act further amended the Beach and Shore Preservation Act to establish a coastal building zone extending landward of coastal construction control lines. Within the coastal building zone, strict building codes ensure that all major structures are designed and constructed to withstand the forces of and erosion caused by a 100-year storm event (Florida Atlantic University, 1986).

79. For mainland beaches, barrier spits, and peninsulas lying within Florida's sandy beach counties, the coastal building zone extends from the seasonal high water line to 1,500 ft landward of the coastal construction control line. On barrier islands, the entire island or the area from the seasonal high water line to a maximum of 5,000 ft inland from the control line is included in the building zone (Section 161.54, Florida Statutes). All land areas within the Florida Keys, regardless of island size, also lie within the coastal building zone (Florida Atlantic University, 1986). In counties that lack CCCLs, the coastal building zone is equivalent to the National Flood Insurance Program's V-zone. (FEMA defines the V zone, a coastal high hazard area, as a special flood hazard area that extends from offshore to the inland limit of a primary frontal dune or any area subject to high velocity wave action from storms or seismic sources).

80. Within the coastal building zone, major structures must conform to the state minimum building code, be designed to withstand all anticipated loads resulting from a 100-year storm, and be constructed and located in compliance with NFIP regulations (Section 161.55, Florida Statutes). The statute defines major structures to include houses, mobile homes, commercial and public buildings, and all other construction that has the potential to substantially affect the coastal zone (Section 161.54, Florida

Statutes). Minor structures, such as dune walkways, tennis courts, and gazebos, need not meet these standards but their designs must "produce the minimum adverse impact on the beach and the dune system" (Sections 161.54 and 161.55, Florida Statutes).

81. Erosion Control Program. In 1986, the Florida legislature amended the Beach and Shore Preservation Act to address the statewide problem of beach erosion through a "state-initiated program of beach restoration and beach renourishment" (Section 161.101, Florida Statutes). The legislature declared that "beach erosion is a serious menace to the economy and general welfare of the people of this state and has advanced to emergency proportions" (Section 161.088, Florida Statutes). Correspondingly, the legislature concluded that state management was necessary to ensure that Florida's beaches were properly managed and protected (Section 161.088, Florida Statutes). Although the state had funded and participated in coastal erosion control projects since 1965, most of these projects were locally initiated and were not part of a comprehensive state plan (Florida Atlantic University, 1986).

82. The statute directs the FDEP to develop and maintain a comprehensive long-term management plan for restoration of Florida's critically eroding beaches (Section 161.101, Florida Statutes). The plan must 1) ensure the geographic coordination and sequencing of prioritized projects, 2) reduce equipment mobilization and demobilization costs, 3) maximize the quantity of beach-quality sand into the system, 4) extend the life of beach nourishment projects and reduce the frequency of renourishment, and 5) promote inlet sand bypassing to replicate the natural flow of sand interrupted by inlets and ports (Section 161.091, Florida Statutes). The plan, known as the Strategic Beach Management Plan, is updated annually to address changing conditions in the coastal system.

83. State funds for erosion control projects are available from Florida's Erosion Control Trust Fund (Section 161.091, Florida Statutes). The fund provides money for erosion control; hurricane protection; and beach preservation, restoration, and renourishment projects (Section 161.091, Florida Statutes). The state can pay up to 50% of the actual cost of restoring a critically eroding beach, while the local government in which the project occurs must provide the balance of the funds (Section 161.101, Florida Statutes). The level of state funding is directly related to the amount of public beach access and parking located within the project area.

84. For a project to be eligible to receive state funding, it must be located in an area designated by the FDEP as critically eroded and identified in the Strategic Beach Management Plan. In addition, the proposed project must be 1) designed to protect, preserve, maintain, or enhance the coastal system; 2) cost effective, with tangible benefits, that exceed costs; 3) designed to provide a net positive enhancement to the environment and protect historically established habitat; and 4) consistent with local comprehensive plans and Chapters 161, 253, 258, and Part IV of Chapter 373, Florida Statutes.

85. Erosion Control Line. Property rights of state and private upland owners in beach restoration project areas are set forth in Florida Statute 161.141. The statute proclaims

that the Legislature hereby declares that it is the public policy of the state to cause to be fixed and determined, pursuant to beach restoration, beach renourishment, and erosion control projects, the boundary line between sovereignty lands of the state bordering on the Atlantic Ocean, the Gulf of Mexico, or the Straits of Florida, and the bays, lagoons, and other tidal reaches thereof, and the upland properties adjacent thereto; except that such boundary line shall not be fixed for beach restoration projects that result from inlet or navigation channel maintenance dredging projects unless such projects involve the construction of authorized beach restoration projects. However, prior to construction of such a beach restoration project, the board of trustees shall establish the line of mean high water for the area to be restored; and any additions to the upland property landward of the established line of mean high water which result from the restoration project shall remain the property of the upland owner subject to all governmental regulations and shall not be used to justify increased density or the relocation of the coastal construction control line as may be in effect for such upland property. Such resulting additions to upland property shall also be subject to a public easement for traditional uses of the sandy beach consistent with uses, which would have been allowed prior to the need for such restoration project. It is further declared that there is no intention on the part of the state to extend its claims to lands not already held by it or to deprive any upland or submerged landowner of the legitimate and constitutional use and enjoyment of his property. If an authorized beach restoration, beach renourishment, and erosion control project cannot reasonably be accomplished without the taking of private property, then such taking shall be made by the requesting authority by eminent domain proceedings.

86. Inlet Management. In order to manage the erosion of adjacent beaches as a result of improved navigational inlets, the Florida Legislature passed the Declaration of Public Policy relating to improved navigation inlets (Section 161.142, Florida Statutes). In this statute, the Legislature recognized the need for maintaining navigation inlets to promote commercial and recreational uses of coastal waters and their resources. The Legislature further recognized that inlets alter the natural drift of beach-quality sand resources. The alteration often results in these sand resources being deposited around shallow outer-bar areas instead of providing natural nourishment to the downdrift beaches. Therefore:

a. All construction and maintenance dredging of beach-quality sand should be placed on the downdrift beaches or, if placed elsewhere, an equivalent quality and quantity of sand from an alternate location should be placed on the downdrift beaches.

b. On an average annual basis, a quantity of sand should be placed on the downdrift beaches equal to the natural net annual longshore sediment transport.

c. Construction waterward of the coastal construction control line on downdrift coastal areas, on islands substantially created by the deposit of spoil, located within 1 mile of the centerline of navigation channels or inlets, providing access to ports listed in Section 403.021(9)(b), Florida Statutes, which suffers or has suffered erosion caused by such navigation channel maintenance or construction shall be exempt from the permitting requirements and prohibitions of subsections (2), (5), and (6) of Section

161.053, Florida Statutes. The timing and sequence of any construction in such coastal areas shall comply with 44 C.P.R. part 60 and shall provide protection to nesting sea turtles and hatchlings and their habitats and to native salt-resistant vegetation and endangered plant communities.

d. The provisions of subsections (1) and (2) shall not be a requirement imposed upon ports listed in s.403.021(9)(b).

87. Erosion control of downdrift beaches must also be balanced with the importance of maintaining the water depths needed to conduct deepwater commercial navigation in the channels, ports, and turning basins of Florida. This premise was set forth in Florida Statute 403.021.9(a) and 9(b).

a. 9(a). The Legislature finds and declares that it is essential to preserve and maintain authorized water depth in the existing navigation channels, port harbors, turning basins, and harbor berths of this state in order to provide for the continued safe navigation of deepwater shipping commerce. The department shall recognize that maintenance of authorized channel depths is an ongoing, continuous, beneficial, and necessary activity; and it shall develop a regulatory process which shall enable the ports of this state to conduct such activities in an environmentally sound, expeditious, and efficient manner.

b. 9(b). The provisions of paragraph (a) apply only to the port waters, spoil disposal sites, port harbors, navigation channels, turning basins, and harbor berths used for deepwater commercial navigation in the ports of Jacksonville, Tampa, Port Everglades, Miami, Port Canaveral, Ft. Pierce, Palm Beach, Port Manatee, Port St. Joe, Panama City, St. Petersburg, and Pensacola.

88. All improved inlet projects are evaluated to determine the possible erosion problems associated with their construction. Inlet management is incorporated into the State's beach management plan in Chapter 161.161, Florida Statutes.

a. The division shall develop and maintain a comprehensive long-term management plan for the restoration of the state's critically eroding beaches. The beach management plan shall:

(1) Address long-term solutions to the problem of critically eroding beaches in this state.

(2) Evaluate each improved coastal beach inlet and determine whether the inlet is a significant cause of beach erosion. With respect to each inlet determined to be a significant cause of beach erosion, the plan must include:

(a) The extent to which such inlet causes beach erosion and recommendations to mitigate the erosive impact of the inlet, including, but not limited to, recommendations regarding inlet sediment bypassing; modifications to channel

dredging, jetty design, and disposal of spoil material; establishment of feeder beaches; and beach restoration and beach renourishment; and

(b) Cost estimates necessary to take inlet corrective measures and recommendations regarding cost sharing among the beneficiaries of such inlet.

89. Local Comprehensive Planning. The Local Government Comprehensive Planning Act of 1975 (Chapter 163) requires that all local governments prepare, adopt, and implement comprehensive plans that address community growth and development needs (Pilkey et al., 1984). In the 1985 Growth Management Act, the Florida Legislature strengthened the Planning Act in coastal areas and required that local, regional, and state comprehensive plans be consistent with each other. Under the Planning Act, coastal localities must include a "coastal management element" in their local plans (Godschalk et al., 1989). This section of the plan must be based on an inventory of the beach-dune system and existing coastal land uses and an analysis of the effects of future land uses on coastal resources (Florida Atlantic University, 1986).

90. Within the plan's coastal element, local governments must address disaster mitigation and redevelopment, designation of coastal high-hazard areas, beach protection, and shoreline use. The local plans must fulfill, among others, the following primary objectives:

a. protection of coastal resources;

b. limitation of public expenditures that subsidize development in coastal high-hazard areas;

c. direction of population away from coastal high-hazard areas;

d. management of development and redevelopment in coastal high-hazard areas to minimize risks to life and property; and

e. protection and enhancement of beach-dune systems (Florida Atlantic University, 1986; Godschalk et al., 1989).

91. If a local plan does not meet the requirements of the Growth Management Act, the state may curtail funds (Godschalk et al., 1989). Furthermore, the state cannot issue funds to increase the capacity of local infrastructures unless improvements are consistent with the coastal management element in the local plan. The state can also restrict a locality from receiving post-disaster Federal assistance. The state may exclude local projects on all state applications to the Federal Emergency Management Agency unless the municipality has adopted hazard mitigation and prevention plans (Godschalk et al., 1989).

92. Coastal Barrier Regulations. In the 1981 Coastal Barrier Executive Order (E.O. 81-105), the governor of Florida recognized the value of coastal barriers and set forth

three requirements for state agencies that plan for, manage, and regulate the coastal zone. The governor directed that:

a. acquisition of coastal barriers was a priority;

b. Federal and state money was not to be used to subsidize growth or post-disaster redevelopment on hazardous barriers; and

c. agencies were to manage growth in a manner consistent with the evacuation capabilities of coastal barriers (Florida Atlantic University, 1986).

93. The executive order did not provide state agencies with any specific powers to carry out its directives but rather set the overall policy for state actions on coastal barriers. Subsequently, in the 1985 Growth Management Act, the legislature enacted specific amendments to discourage growth and unwise development on coastal barriers (Sections 380.27 and 163.178, Florida Statutes). In particular, the act directed that state funds could not be used to build bridges or causeways to barrier islands that were not already accessible (Florida Atlantic University, 1986).

94. Coastal Acquisition. Florida has one of the largest state acquisition programs in the country in terms of money spent and land purchased (Florida Atlantic University, 1986). Acquisition of coastal land is among the key components of the state's land protection program. Florida's Save Our Coasts program, authorized under the Land Acquisition Trust Fund (Sections 375.041, Florida Statutes), provides monies specifically for acquisition of coastal properties. Enacted in 1981, the Save Our Coasts program authorized a $200 million bond issue for purchase of sandy beaches, barrier islands, and beach access points. Through July 1986, the program had purchased 2,713 acres of coastal land, representing 13 miles of shoreline (Florida Atlantic University, 1986). The state's coastal acquisition efforts target areas where the local government is willing to make a financial contribution to purchase the land and to manage it after acquisition. Parcels in areas with a need for additional recreational beaches and sites susceptible to repeated erosion are also the focus of the acquisition program (Glassman, 1983).

FORMULATION OF ALTERNATIVE PLANS

95. The alternative plans considered were developed through a three-step process. These three steps were:

a. Identification and preliminary assessment of possible solutions. Costs and benefits have not been computed.

b. Development and assessment of intermediate-level-of-detail alternatives. Unit price cost estimates and benefits have been computed. Includes general discussion of potential environmental impacts.

c. Development and assessment of detailed alternative plans. Cost code of account level cost estimates have been computed, including the costs of lands,

easements, rights-of-way, and mitigation. Detailed benefits have been computed. Federal and non-Federal cost allocation is discussed.

96. Each step was iterative in the process of identifying and selecting the best course of action. Each alternative was considered in light of other projects within each reach or problem area. During the first step of preliminary identification and assessment of alternatives, the alternatives developed included traditional projects, programs that could be carried out by non-Federal interests, and structural as well as nonstructural alternatives. Each plan in the array was screened based on its ability to satisfy the planning objectives. Viable plans were carried forward into the intermediate level of detail and analysis and were developed sufficiently to assess generalized benefits, costs, and impacts. Those plans meriting closer evaluation were carried into the third step entailing the development and analysis of alternative plans at a detailed level.

Economic Benefits and Costs

97. The economic analysis to determine the NED plan for the study area includes an inventory of potential damages, development of plans, and estimation of the costs for project implementation. The cost of mitigation measures is developed along with the cost of each alternative plan. Monetary values are expressed in average annual equivalents by appropriate discounting and annualizing techniques based on the current water resource evaluation interest rate of 6 and 3/8%. The same 50-year period of analysis is used for all alternative plans. The period of analysis does not include the implementation or construction period (the period before the base year). All benefits and costs are expressed as of the beginning of the base year. The following steps are taken in the economic analysis:

a. for the future without-project condition, assess the extent of damageable property through analysis of storm surge and wave damage, assess the loss of recreation, and assess the loss of land,

b. determine damage reduction benefits to the coastal system or reach for various project alternatives, and

c. evaluate all beneficial and adverse impacts for each project alternative in accordance with Engineering Regulation 1105-2-100 (Principles and Guidelines).

98. According to the study guidelines and objectives, the above criteria were used to formulate possible modifications to the authorized hurricane and storm damage reduction projects for Lido Key. These criteria assure that all possible alternative projects are formulated in a systematic and reasonable manner.

INITIAL ASSESSMENT OF ALTERNATIVE PLANS

99. Table III-9 presents an evaluation of possible solutions considered in the first step of project formulation. Many of the alternatives were not retained for intermediate analysis because they did not fully address the planning objectives. Planning objectives

considered in the preparation of this table include the local objectives and the accounts required by the Water Resources Council's "Principles and Guidelines." The alternatives considered in initial plan development are discussed in the following paragraphs.

Table III-9 Initial Assessment of Alternative Plans

		Sponsor Planning Objectives[1]			*Federal Objectives*[2]			
POSSIBLE MEASURES		RB	SDR	TBE	NED	EQ	OSE	RED
Nonstructural Measures (NS)								
NS-1	No-Action	O	O	O	O	O	O	O
NS-2	Construction Control Line	O	P	O	O	O	O	O
NS-3	Moratorium on construction	O	P	O	O	O	O	O
NS-4	Establish a no-growth program	O	P	O	O	P	O	O
NS-5	Relocation of structures	O	F	O	O	P	O	O
NS-6	Flood proofing of structures	O	P	O	O	O	O	O
NS-7	Condemnation of land and structures	O	P	O	O	O	P	O
NS-8	Various nonstructural combinations	-	-	-	-	-	-	-
Structural Measures (S)								
S-1	Seawalls	O	P	O	O	O	P	O
S-2	Revetments	O	P	O	O	O	P	O
S-3	Beach Nourishment	F	P	F	F	P	P	P
S-4	Groins	P	P	P	F	O	P	O
S-5	Breakwaters	P	P	P	P	O	P	O
S-6	Dunes and vegetation	O	P	P	P	P	P	P

Notes:
[1] RB – Provision of recreation beach
SDR – Reduction of hurricane and storm damage
TBE – Protection of tourism-based economy
[2] NED – National Economic Development
EQ – Environmental Quality
OSE – Other Social Effect
RED – Regional Economic Development
[3] F – Fully meeting objective
P – Partially meeting objective
O – Not meeting objective

Nonstructural (NS) Alternative Plans

100. 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.

101. 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.

102. 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 developrnent in the study area. This alternative is therefore excluded from detailed study.

103. 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.

104. 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.

105. 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.

106. 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.

107. 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

108. 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.

109. 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.

110. 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.

111. 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.

112. 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.

113. 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, subaerial 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.

INTERMEDIATE ASSESSMENT OF ALTERNATIVE PLANS

114. The previous paragraphs describing the possible solutions eliminated all but one nonstructural and two structural alternatives. The no-action plan (NS-1) is the single nonstructural alternative to be carried throughout intermediate plan formulation for consideration and comparison. The structural alternative plans to be carried into the intermediate assessment include beach nourishment (S-3) and groins (S-4). Volumes calculated for beach fills were based on design requirements at approximately 1,000-ft intervals (every FDEP monument). Volumes were computed with the average end area method.

115. NED Plan Formulation. The Federal Government applies National Economic Development (NED) principles for the economic evaluation of all water resource projects. The NED principles articulate a framework to assist in making project scope and implementation decisions. For the purpose of Lido Key hurricane and storm damage reduction, NED principles are applied to determine the total net benefits of the project. From this information, the NED plan is formulated and net benefits are maximized.

116. The NED plan for the Lido Key hurricane and storm damage reduction project has been developed in accordance with ER 1105-2-100 Section 6-1 by adopting the procedures and policies of the Water Resource Council's (WRC) Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies, Chapter II - National Economic Development (NED) Benefit Evaluation Procedures (March 10, 1983).

117. NED Principles. National economic development (NED) is the increase in the net value of the national output of goods and services, expressed in monetary units. "Contributions to NED are the direct net benefits that accrue in the planning area and the rest of the nation. Contributions to NED include increases in the net value of those goods and services that are marketed, and also those that may not be

marketed."(Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies, p. 1, March 1983)

118. U.S. Army Corps of Engineers projects produce outputs that benefit the nation, but these projects also expend the nation's resources. The NED principle helps determine which use of the nation's resources will produce the greatest benefits to the nation. As such, the NED principle is a matter of law, policy, and interpretation rather than one of economic fact or theory, although it is a policy firmly rooted in economic theory.

119. The Water Resource Council (WRC) has established evaluation principles, which are intended to ensure proper and consistent planning by Federal agencies. These principles, as defined in the "Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies", are as follows:

- That there be an economically justified and environmentally acceptable project. Widespread use of benefit to cost analysis as a test of a project's economic worth is generally considered to have grown out of the Flood Control Act of 1936. In this Act, Congress required that the U.S. Army Corps of Engineers recommend a project only "if the benefits to whomsoever they may accrue are in excess of the estimated costs and if the lives and social security of people are otherwise adversely affected." If there is an economically justified project, decisions on whether and to what extent there should be Federal participation are guided by a concept of the Federal interest that has evolved from legislation, from precedent in project authorization and construction, and from Administration budget priorities.

- Federal participation must be otherwise warranted. Federal participation is limited in circumstances where there are special and local benefits which accrue to a limited number of identifiable beneficiaries. The Federal government does not participate in facilities which produce outputs incidental to basic project purposes.

- The project must meet current Administration budget priorities. The Administration does not budget for a project unless a significant proportion of the project outputs have a high budget priority.

120. Various alternative plans are to be formulated in a systematic manner to ensure that all reasonable alternatives are evaluated.

(a) A plan that reasonably maximizes net national economic development benefits, consistent with the Federal objective, is to be formulated. This plan is to be defined as the NED plan.

(b) Other plans which reduce net NED benefits in order to further address other Federal, state, local, and international concerns not fully addressed by the NED plan should also be formulated.

(c) Plans may be formulated which require changes in existing statutes, administrative regulations, and established common law. Such required changes are to be identified.

(d) Each alternative plan is to be formulated in consideration of four criteria: completeness, effectiveness, efficiency, and acceptability. Appropriate mitigation of adverse effects is to be an integral part of each alternative plan.

(e) Existing water and related resources plans, such as state water resources plans, are to be considered as alternative plans if within the scope of the planning effort.

121. The planning process leads to the identification of alternative plans that could be recommended or selected. The culmination of the planning process is the selection of the recommended plan or the decision to take no-action. The selection should be based on a comparison of the effects of alternative plans (ER 1105-2-100 Section 5-11.a). The basis for selection of the recommended plan should be fully reported (ER 1105-2-100 Section 5-11.b(4)). In presenting the NED plan, all reports must include appropriate information and data (ER 1105-2-100 Section 5-16.b). Concise, understandable displays are also helpful during the planning process and provide documentation in compliance with NEPA (ER 1105-2-100 Section 5-9.a.1).

122. Under the NED principle, the best (or NED) plan maximizes net benefits. The Corps traditionally expresses benefits and costs in monetary terms as equivalent annual values. Thus, maximizing annual net NED benefits is formally equivalent to selecting a plan with the maximum equivalent annual benefits and maximum net present value (NPV). The plan recommending Federal action is to be the alternative plan with the greatest net economic benefit, which is also consistent with protecting the nation's environment (Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies, p. 1, March 1983).

Development and Analysis of Intermediate Alternative Plans

123. NS-1 No-Action Plan. The no-action plan is referred to in the economic analysis as the without-project condition. The without-project condition assumes that short-term and long-term erosion will continue into the future at the same rates as they have over the period of record. Structures predicted to be condemned before the base year of the project are removed from the without- as well as the with-project SDM inventories. State of Florida coastal zone management regulations are implemented to determine future without-project coastal armoring activities. The average annual equivalent damage predicted for the no-action plan is used as a benchmark in the comparison of intermediate alternative plans. Predicted with-project damages are subtracted from the damages expected under the no-action plan to determine the benefits of each alternative plan. No costs are associated with the no-action plan.

124. The no-action plan for the study area considers the highly variable shoreline recession rate based on shoreline changes between 1971 and 1999. Due to limited offshore survey data, changes before 1991 were estimated assuming a volumetric

change of 0.60 cy/ft for each foot of shoreline change. South of the 1970 project area (R-35 – R-38), the beach lost approximately 336,000 cy (20 cy/yr/ft) between 1971 and 1974, partly due to Hurricane Agnes. Between 1978 and 1991, the net erosion in the current project area was 348,000 cy (2.9 cy/yr/ft), in spite of a number of renourishment and dredging operations during this period (CP&E, 1991; ATM, 1994). Between 1991 and the most recent nourishment in 1998, the current project area lost 431,000 cy (6.7 cy/yr/ft). Erosion following the most recent nourishment project, completed in May 1998, removed 155,000 cy (8.5 cy/yr/ft) from the project area between May 1998 and May 2000. Especially when subjected to severe storms and/or inlet effects, erosion rates within the current project area can reach 44 cy/yr/ft.

125. Inlet effects along the undeveloped portions of Lido Key (R-32 – R-35, R-44) dominate shoreline changes and therefore are highly uncertain. Along the developed portion of Lido Key, existing seawalls mark the landward limit of shoreline change. Between R-35 and R-39, the MHW line is expected to recede to the location of the seawalls along Ben Franklin Drive over the next 10 – 20 years. Between R-39.5 and R-41.5, the shorelines are expected to advance, as eroded material from the north moves south. South of R-41.5, shoreline retreat is expected, as material from north is swept offshore due to presence of the Big Sarasota Pass ebb shoal. Shoreline recession between R-41.5 and R-43 will be limited by the existing seawalls.

126. The computer model SBEACH (Storm Induced Beach Change Model [Larson and Kraus, 1989]) was used in conjunction with the empirical simulation technique (EST) to develop frequency versus recession curves for Reaches 1 through 4. The Engineering Appendix contains a detailed description of the development of these curves that, in turn, are used later in the Economics Appendix to compute expected storm damages.

127. The Economics Appendix concludes that federal interest, i.e., hurricane and storm damage reduction, is restricted to Reaches 2 and 3. The average annual equivalent storm damage for the no-action plan along Reaches 2 and 3 is approximately $4 million. Additional characteristics of the no-action plan for the study area are described in the section of this report entitled "Future Without-Project Conditions."

128. S-3 – Beach Nourishment. Beach nourishment consists of initial construction of a beach fill design template (with requisite advance nourishment) along a specified length of shoreline and the subsequent nourishment of that shoreline at a predetermined interval.

129. Design Template. Hurricane and storm damage reduction projects, which provide beach fill features, are designed to reduce wave and surge impacts to upland development. The major considerations of beach fill template design include berm width and elevation, foreshore slope, location of the slope break, and nearshore slope. The project baseline is defined in terms of the May 2000 mean high water (MHW: +1.14 ft NGVD) shoreline position. Based on the natural berm elevations and previous project designs, a +5 ft NGVD design berm elevation with a foreshore construction slope of 1 vertical (V) to 12 horizontal (H) has been chosen. This value is similar to the authorized

project height of +4.7 ft NGVD (+5 MLW) and is characteristic of the natural berm elevation within the study area at R-35, R-37, R-40, and R-41.

130. The berm elevation is an important parameter related to hurricane and storm damage reduction. If the berm is constructed too low, inundation or overtopping (and associated damages) during relatively frequent storms could occur. The top of the natural berm crest defines the upper limit of significant sediment movement. EM11110-2-3301 (May 1995), Design of Beach Fills, stipulates that the construction berm elevation should be the same or slightly less than the natural berm crest elevation. Because the construction berm will erode and the beach fill will be redistributed into a more naturally shaped profile, restricting the construction berm crest height to the natural berm crest height will minimize scarping problems as the beach fill undergoes readjustment. Table III-10 summarizes estimated storm surge levels for middle Sarasota County, calculated by combining available historical statistics from hurricanes with a set of numerical models to simulate the storm tides for a given level of storm (Dean, et al., 1988).

131. Still water levels on the order of +1.5 ft NGVD are common along the Gulf of Mexico coast in Sarasota County. The tabulated values for storm surge indicate that a berm crest elevation of +5.0 ft NGVD will be exceeded during times of high water associated with a 10-year return period surge event. The proposed fill to replicate the existing berm height maintains a reasonable level of storm protection, minimizes scarp development, and optimizes beach accessibility. Based on these considerations and typical natural berm elevations along the project length, the design berm elevation for this project was established at an elevation of +5.0 ft NGVD.

Table III-10 Combined Storm Stages for Middle Sarasota County (Dean et al., 1988)

Return Period (Yrs)	*Storm Stage (ft, 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.

132. Design Berm Widths. Various berm width extensions were considered in the formulation of the National Economic Development (NED) plan for the study area. The berm extension is defined as the distance that the design template moves the MHW shoreline seaward from the pre-project MHW shoreline. The MHW elevation (+1.14 ft above the National Geodetic Vertical Datum at Lido Key) delineates State of Florida owned bottom lands from those of the upland property owner. Before project

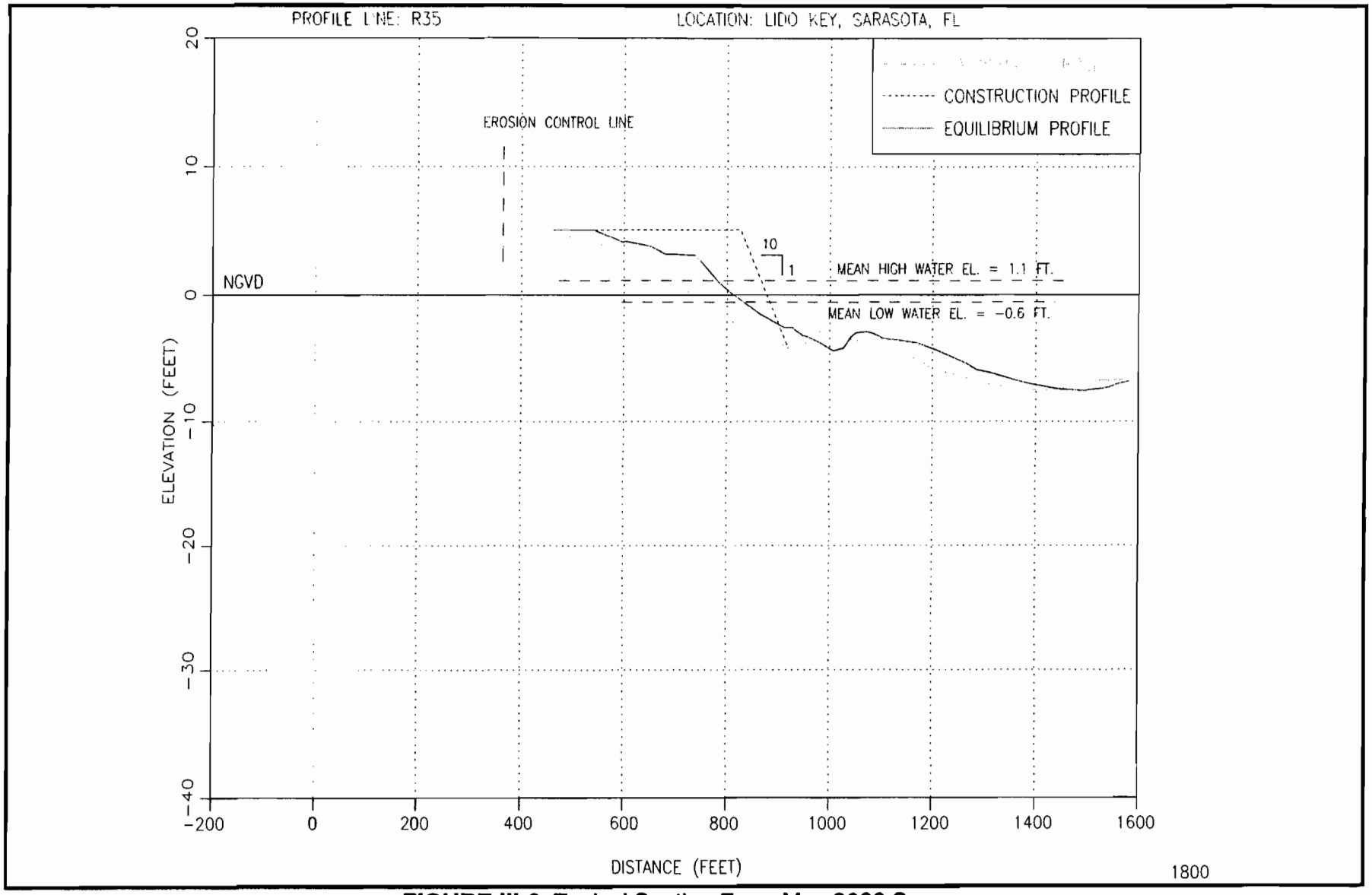

FIGURE III-6 Typical Section From May 2000 Survey

construction, the location of the MHW shoreline would be established as the erosion control line (ECL). Volumes required for berm extensions of 0, 20, 40, 60, 80, and 100 ft were calculated in the process of identifying the NED plan(s) for the study area.

133. Figure III-6 shows a typical section from the May 2000 survey and the 80-ft construction and equilibrium templates for Reaches 2 and 3 of the study area.

134. Benefits. Benefits accrued by beach nourishment originate from reduction in storm damage to upland development, coastal armor, and backfill. Benefits are also realized from the reduction of the amount of land lost between the mean high water shoreline and the coastal armor line along the project reach. The Economics Appendix gives a full account of the Jacksonville District's Storm Damage Model (SDM) used to predict damages with- and without-project conditions.

135. Assumptions pertaining to the engineering, economic, environmental, and political aspects of the alternative plans are crucial to the reliability of the benefit analysis. To determine structural values, the Sarasota County Property Appraiser's Office and the Jacksonville District Real Estate Division created an inventory of each affected structure within Reaches 2 and 3. The structure inventory defined each by type, value, number of floors, and the lot sizes each occupied. A version of the cost approach to value, *Replacement Cost New Less Depreciation*, was used to estimate market values of improvement.

136. Shoreline change values have been assumed for short-term as well as long-term trends. Short-term shoreline change is associated with the recession distance expected for storms of various frequencies of occurrence. The computer model SBEACH was used to determine storm recession and cross-shore sediment transport for representative profiles of Reaches 1 – 4. Storm recession damages were estimated as a function of annual probability and return period (frequency) using the Empirical Simulation Technique (EST). Separate storm recession as function of return period curves were developed for these four segments of shoreline.

137. The computer model GENESIS (Generalized Model for Simulating Shoreline Change [Hanson and Kraus, 1989]) model was used to provide a numerical method for determining long-term shoreline change in response to spatial and temporal differences in longshore sand transport. Two coefficients (K_1 and K_2) in the longshore transport equation are adjusted based on historical shoreline changes to calibrate the model. 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). The Engineering Appendix A contains a complete discussion of the SBEACH and GENESIS model development.

138. Other assumptions made in determining the benefits of the alternative plans include the shoreline position that would signal condemnation of a structure, protective value of existing and future coastal armor, and the project base year. The SDM allows the condemnation of a structure due to damage of a predetermined percent of the

foundation by a storm of a given return period. Once condemned, the structure is removed from the SDM inventory in the year in which it meets condemnation requirements. Structures two stories or less are considered a total loss when the shoreline recedes halfway through. For structures with more than two stories on deeply embedded pilings, only the structural value of the bottom two floors is considered a loss. Structures condemned before the base year of the project are removed from the SDM inventory. The SDM explicitly accounts for the protective level of coastal armor parcel-by-parcel by protecting upland development within the sheltering limits of the armor from damage due to storm induced as well as long-term recession. The base year of the project was assumed to be 2001, contingent upon allocation of Federal, non-Federal, and state funding.

139. Benefits of beach nourishment are determined for berm width extensions of 0 to 100 ft at 20-ft increments for Reach 2 and Reach 3. Primary benefits from storm damage reduction are claimed in the following analysis while incidental recreation benefits are claimed only for the plan that maximizes NED benefits based solely on storm damage prevention (see Economic Appendix D). Storm damage benefits result from project implementation through reductions in damage to upland development, loss of land, backfill requirements, and coastal armor constructions and maintenance. The 2001 water resource evaluation interest rate of 6 and 3/8% was used in the intermediate assessment of alternative plans.

140. Storm Damage Benefits. Economic justification of beach nourishment in Lido Key is based on the protection of structural improvements located along the front row of development along the project shoreline. Shorefront development is a mix of residential and commercial development in the interior of the project area with recreational parks north and south. The economic evaluation determines the justification of Federal participation based on the benefits generated versus the cost of providing the authorized level of protection along the project shorefront.

141. Benefits resulting from beach nourishment and groin construction are categorized as primary and incidental. Primary benefits are realized through the prevention of storm damages to coastal development and existing protective structures. Guidance for the inclusion of incidental project benefits, such as recreation, are set forth in Engineering Regulation (ER) 1105-2-100 which states that "recreation benefits produces as a benefit of the basic project may exceed 50% of the total project benefits, but economic justification must be demonstrated on the basis of recreation benefits limited to 50% of total project benefits." Recreation benefits of alternative plans will be considered in the section of this report entitled "Detailed Assessment of Alternative Plans."

142. Average annual hurricane and storm damage reduction benefits for the 50-year project life were determined (assuming with- and without-project conditions) for Reach 2 and Reach 3 of the project study area. Damages were simulated from changes due to both shoreline movement and erosion events with storms. Probabilistic frequency vs. storm recession distance curves were developed for Reach 1 – 4 as discussed in detail in the Engineering Appendix A. Recession curves were not developed for New Pass

Reach. Annual shoreline position changes were based on historical shoreline recession rates for the study area.

143. The extent of damages is a result of annual shoreline position change and the damage probabilities from the frequency vs. recession distance curves. Damages are claimed as the result of these two mechanisms in the SDM. The underlying assumption of this model is that a structure will experience damage when the landward extent of storm recession impacts the seaward edge of the structure. Full value of the bottom two floors of the structure is realized when the erosion reaches the middle of the structure. Structures are condemned and taken from the inventory if their full value point (including armor protection level) is located within the recession envelope of a predetermined frequency storm event. Inherent in the routine are the capabilities of coastal structures to halt erosion and the ability to construct new coastal structures upon the failure of the existing structures. Economic Appendix D provides a more detailed discussion of the SDM and the required input data.

144. The SDM was used to compute damages due to both shoreline recession and storm activity for with- and without-project conditions. If an eroding shoreline is assumed to maintain the same profile above the seaward limit of significant sediment transport (limiting depth) while it erodes, the volume of material eroded per foot of beach is equivalent to the vertical distance from the berm crest to the limiting depth, multiplied by the horizontal retreat of the beach profile. The volume of material eroded may be represented by a parallelogram with a vertical height equivalent to the berm elevation plus the limiting depth and a width equivalent to the assumed uniform horizontal elevation provided by the beach fill. The equivalent profile extensions provided by various beach fill design cross sections were input to the SDM for with-project conditions.

145. The shoreline extensions are simulated by SDM, and the reduction in damages is identified for the with-project condition. Storm damage reduction (which includes the effects of long-term recession) is the difference between the expected annual damages under the without-project conditions minus the expected annual damages under the with-project conditions. In the analysis of the average annual benefits, which the project will provide with respect to hurricane and storm damage reduction, the damages projected for the 50-year economic life of the project were determined. The optimum equivalent extensions determined in the economic analysis of storm damage prevention benefits determine the project design cross section that maximizes net benefits.

146. Loss of Land. Loss of land benefits are claimed at privately owned shorefront parcels in the region bounded by the pre-project mean high water shoreline and the location of the coastal armor. Beach nourishment (S-3) results in a design shoreline that is at or seaward of the pre-project mean high water shoreline and thus eliminates the loss of land associated with the no-action plan (NS-1). Determination of the market value of the land losses is based on the value of nearshore upland. Nearshore upland is sufficiently removed from the shore to lose its significant increment of value because of its proximity to the shore when compared to adjacent parcels more distant (inland) from the shore. Real Estate Division, Jacksonville District, investigated recent vacant

nearshore land sale at Lido Key for both residential and commercial properties. The nearshore upland sales data indicated a value for residential as well as commercial land of $24.00 per square foot.

147. Reach 2 and Reach 3 (R35 – R43). Table III-11 shows project benefits, in terms of damages prevented, for the combination of Reach 2 and Reach 3. Total storm damage reduction benefit for the 0-ft berm width extension would be $2,551,122. Maximum benefits of $3,824,274 are obtained with the 100-ft extension resulting in roughly $3,918 of damages to backfill.

148. Costs. Cost estimates (2001 price levels) for providing beach nourishment and groin construction were developed and compared to predicted benefits to determine the plan that would result in maximization of net benefits (the NED plan). Dredge and fill operations were assumed to be accomplished with a generic medium hopper dredge with capability to pump directly to the beach nourishment area. In accordance with ER 1110-2-1302, all dredging costs were computed with the Cost Engineering Dredge Estimating Program (CEDEP). Cost figures in CEDEP were based on an EWT of 90% with a Net Pay yardage loss of 20%. For the 80- and 100-ft berm extensions, mobilization costs are approximately $426,000 while unit costs per cubic yard ($/cy) are $5.38 and $5.29, respectively.

Table III-11 Reach 2 and 3 Benefits (January 2001, 6 and 3/8% interest rate)

Project Condition	*Damages to:*			*Loss of Land*	*Average Annual Equivalent Damages*	*Damages Prevented (Benefits)*
	Develop-ment	*Coastal Armor*	*Backfill*			
Existing	$3,024,470	$46,179	$328,789	$428,754	$3,828,192	N/A
With-project Dam.						
0-ft Ext.	$1,161,247	$5,877	$109,946	$0	$1,277,070	$2,551,122
20-ft Ext.	$968,038	$4,916	$70,425	$0	$1,043,379	$2,784,813
40-ft Ext.	$600,058	$3,066	$40,499	$0	$643,623	$3,184,569
60-ft Ext.	$230,792	$1,187	$21,399	$0	$253,378	$3,574,814
80-ft Ext.	$29,387	$155	$5,023	$0	$34,564	$3,793,628
100-ft Ext.	$0	$0	$3,918	$0	$3,918	$3,824,274

Computed at 6 and 3/8%

149. Optimal renourishment levels for the intermediate assessment of beach fills were determined by comparing cost estimates for renourishment in one-year incremental intervals from a period of one to a period of 12 years. Table III-12 and Table III-13 present the 80- and 100-ft berm extension preliminary January 2001 planning cost estimates along with the total design fill volumes, the required advance nourishment volumes, and estimated construction times. Based on this information, the optimum nourishment interval for both beach fills with an 80-ft and with a 100-ft berm width extension is three years. Each table incorporates weighted averages of mobilization and unit cost based on cost estimates for placement of material for Reach 2 and Reach 3. Contingency costs of 20%, preconstruction and engineering and design (PED) costs

Table III-12 80-ft Berm Extension Cost Estimate (Fill Only)

Lido Key Project Feasibility Study (80-ft Berm Width Extension at 5-ft NGVD)
Generic Medium Hopper Dredge (Beach Disposal)

File: - F:\Dan\Region2\Sarasota\LidoKey\Excel\Optiren_Lido_2.xls

Economic Analysis Period	*50 (years)*	*Mob/Demob*	*$426,000*	*Monthly*	215,000 (cy/mo.)
Interest Rate	6.375 (%)	*Unit Price*	$5.38 ($/cy)	*Production*	
Background Erosion Rate	87,000 (cy/yr)	*Monitoring*	$25,750 (/mo.)	*Rate*	
Project Induced Erosion Rate	87,700 (cy/yr)	*Mitigation*	$0 (/mo.)	*Fill Length*	9,100 (ft)
Design Fill	460,200 (cy)	*Contingency*	20 (%)	*Design Fill*	460,200 (cy)
Overfill Factor	0 (%)	*E&D, S&A*	15 (%)		

CAPITAL RECOVERY FACTOR 0.06679 JANUARY 2001 PRICE LEVELS

Total Design Fill + ECL (CY)	Nour. Int. (YRS)	Advance Nourishment (CY) (W/OVERFILL)	Total Initial Fill (CY) (W/OVERFILL)	Estimated Const. Time (MTH) 1 DREDGE	Cost of Initial Const. (1st MOB.)	Cost of Initial Const. (2nd MOB.)	Annual Cost Of Initial Const.	Nourishment Quantity (CY)	Nourishment Cost	Annual Cost of Nourishment	Total Average Annual Equiv. Cost
460,200	1	174,700	634,900	3.0	$5,406,567	$0	$361,099	174,700	$1,913,797	$1,913,797	$2,274,896
460,200	2	349,400	809,600	3.8	$6,732,484	$0	$449,656	349,400	$3,239,714	$1,569,819	$2,019,475
460,200	**3**	**524,100**	**984,300**	**4.6**	**$8,058,401**	**$0**	**$538,212**	**524,100**	**$4,565,631**	**$1,443,797**	**$1,982,010**
460,200	4	698,800	1,159,000	5.4	$9,384,318	$0	$626,769	698,800	$5,891,548	$1,370,400	$1,997,169
460,200	5	873,500	1,333,700	6.2	$5,649,057	$5,649,057	$723,834	873,500	$7,217,465	$1,270,803	$1,994,637
460,200	6	1,048,200	1,508,400	7.0	$6,312,016	$6,312,016	$808,782	1,048,200	$8,543,382	$1,205,678	$2,014,459
460,200	7	1,222,900	1,683,100	7.8	$6,974,974	$6,974,974	$893,729	1,222,900	$9,869,299	$1,158,872	$2,052,601
460,200	8	1,397,600	1,857,800	8.6	$7,637,933	$7,637,933	$978,676	1,397,600	$11,195,215	$1,108,987	$2,087,663
460,200	9	1,572,300	2,032,500	9.5	$8,300,891	$8,300,891	$1,063,623	1,572,300	$12,521,132	$1,054,307	$2,117,930
460,200	10	1,747,000	2,207,200	10.3	$8,963,850	$8,963,850	$1,148,571	1,747,000	$13,847,049	$1,032,188	$2,180,759
460,200	11	1,921,700	2,381,900	11.1	$9,626,808	$9,626,808	$1,233,518	1,921,700	$15,172,966	$972,353	$2,205,871
460,200	12	2,096,400	2,556,600	11.9	$10,289,767	$10,289,767	$1,318,465	2,096,400	$16,498,883	$950,792	$2,269,257

Table III-13 100-ft Berm Extension Cost Estimate (Fill Only)

Lido Key Project Feasibility Study (100-ft Berm Width Extension at 5-ft NGVD)
Generic Medium Hopper Dredge (Beach Disposal)

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Economic Analysis Period	*50 (years)*	*Mob/Demob*	*$426,000*	*Monthly*	215,000 (cy/mo.)
Interest Rate	6.375 (%)	*Unit Price*	$5.29 ($/cy)	*Production*	
Background Erosion Rate	87,000 (cy/yr)	*Monitoring*	$25,750 (/mo.)	*Rate*	
Project Induced Erosion Rate	99,200 (cy/yr)	*Mitigation*	$0 (/mo.)	*Fill Length*	9,100 (ft)
Design Fill	575,200 (cy)	*Contingency*	20 (%)	*Design Fill*	575,200 (cy)
Overfill Factor	0 (%)	*E&D, S&A*	15 (%)		

CAPITAL RECOVERY FACTOR 0.06679 JANUARY 2001 PRICE LEVELS

Total Design Fill + ECL (CY)	Nour. Int. (YRS)	Advance Nourishment (CY) (W/OVERFILL)	Total Initial Fill (CY) (W/OVERFILL)	Estimated Const. Time (MTH) 1 DREDGE	Cost of Initial Const. (1st MOB.)	Cost of Initial Const. (2nd MOB.)	Annual Cost Of Initial Const.	Nourishment Quantity (CY)	Nourishment Cost	Annual Cost of Nourishment	Total Average Annual Equiv. Cost
575,200	1	186,200	761,400	3.5	$6,272,096	$0	$418,907	186,200	$1,977,952	$1,977,952	$2,396,859
575,200	2	372,400	947,600	4.4	$7,662,168	$0	$511,748	372,400	$3,368,024	$1,631,992	$2,143,741
575,200	**3**	**558,600**	**1,133,800**	**5.3**	**$9,052,240**	**$0**	**$604,590**	**558,600**	**$4,758,097**	**$1,504,661**	**$2,109,251**
575,200	4	744,800	1,320,000	6.1	$5,515,096	$5,515,096	$706,669	744,800	$6,148,169	$1,430,092	$2,136,761
575,200	5	931,000	1,506,200	7.0	$6,210,132	$6,210,132	$795,727	931,000	$7,538,241	$1,327,283	$2,123,010
575,200	6	1,117,200	1,692,400	7.9	$6,905,168	$6,905,168	$884,784	1,117,200	$8,928,313	$1,260,001	$2,144,785
575,200	7	1,303,400	1,878,600	8.7	$7,600,204	$7,600,204	$973,842	1,303,400	$10,318,385	$1,211,605	$2,185,447
575,200	8	1,489,600	2,064,800	9.6	$8,295,241	$8,295,241	$1,062,899	1,489,600	$11,708,458	$1,159,828	$2,222,728
575,200	9	1,675,800	2,251,000	10.5	$8,990,277	$8,990,277	$1,151,957	1,675,800	$13,098,530	$1,102,925	$2,254,882
575,200	10	1,862,000	2,437,200	11.3	$9,685,313	$9,685,313	$1,241,014	1,862,000	$14,488,602	$1,080,011	$2,321,025
575,200	11	2,048,200	2,623,400	12.2	$10,380,349	$10,380,349	$1,330,072	2,048,200	$15,878,674	$1,017,578	$2,347,650
575,200	12	2,234,400	2,809,600	13.1	$11,075,385	$11,075,385	$1,419,129	2,234,400	$17,268,746	$995,157	$2,414,287

Table III-14 Costs Associated with Optimum Nourishment Interval (Beach Fill Only)

Project Condition	*Total Design Fill (cy)*	*Nourishment Interval (yrs)*	*Advance Nourishment (w/overfill) (cy)*	*Total Initial Fill (w/overfill) (cy)*	*Estimated Const. Time (months)*	*Cost of Const. 1st MOB.*	*Annual Cost of Nourishment*	*Total Average Annual Equivalent Cost*
0-ft Ext.	0	5	679,500	679,500	3	$6,092,020	$1,072,642	$1,479,522
20-ft Ext.	115,000	5	679,500	794,500	4	$6,979,695	$1,066,038	$1,532,204
40-ft Ext.	230,100	5	744,000	974,100	5	$8,276,723	$1,137,518	$1,690,312
60-ft Ext.	345,100	3	485,400	830,500	4	$7,051,561	$1,380,569	$1,851,536
80-ft Ext.	460,200	3	524,100	984,300	5	$8,058,401	$1,443,797	$1,982,010
100-ft Ext.	575,200	3	558,600	1,133,800	5	$9,052,240	$1,504,661	$2,109,251

of 7%, and supervision and administration (S & A) costs of 8% were applied to the costs of initial construction. Refined cost estimates for PED and S&A are used later in the detailed assessment of alternatives.

150. Table III-14 summarizes preliminary costs associated with optimum nourishment intervals for construction of berm width extensions between 0 to 100 ft for the combination of Reaches 2 and 3. For each berm width extension alternative, the total cost is the sum of the cost of initial construction, future nourishment, and interest during construction. Construction was assumed to be with a generic medium hopper with the capability to pump material directly onto the beach nourishment area. The average annual costs (6 and 3/8%) for the 0-ft, 20-ft, and 40-ft berm width extensions at a nourishment interval of five years would be approximately $1,479,522, $1,532,204, and $1,690,312 respectively. The average annual costs for the 60-, 80-, and 100-ft berm width extension at a nourishment interval of three years would be approximately $1,851,536, $1,982,010, and $2,109,251 respectively.

151. Environmental Concerns. Shoreline protection using beach fill with periodic renourishment is an ongoing effort. No acceptable and permanent one-time fix has been identified. Renourishment efforts have a temporary and shore-term impact on the biological resources off- and onshore. During the placement of material on the beach, temporary impact on marine and shore life in the immediate vicinity of construction would occur. Removal of material from offshore borrow areas has a long-term impact on the nature of the borrow areas. The impacts, however, are not substantial because no protected resources exist within the proposed borrow areas.

152. Average Annual Net Benefits. Optimization through the NED process identified the planning alternative that would maximize net benefits. NED benefits include with-project reduction of damage to upland development, coastal armor, and the cost of requisite backfill. Reduction in the loss of land realized from having a project in place is also taken as a NED benefit. NED costs are made up of average annual equivalent values for initial construction, future nourishment, and interest during construction. In order to satisfy criteria for Federal participation, the NED plan must also have a benefit-cost ratio greater than 1.0.

153. Table III-15 shows the NED intermediate cost and benefit analysis for the study area. Of the berm width extensions examined, the 80-ft berm width with a three-year renourishment interval provides the greatest net benefit of $1,811,618 and an average annual equivalent benefit of $3,793,628. The benefits derived were based on a risk-based analysis with a 95% confidence interval. The annual cost of the project is approximately $1,982,010 providing a benefit-to-cost ratio of 1.9. Therefore, the 80-ft berm extension is the preliminary NED width for Reach 2 and Reach 3 of the Lido Key hurricane and storm reduction project. These numbers were formulated in late Fiscal Year 2001 using January 2001 price levels and an interest rate of 6 and 3/8%.

Table III-15 NED Intermediate Cost and Benefit Analysis (6 and 3/8%)

Project Condition	*Average Annual Equivalent Damages*	*Annual Benefits*	*Annual Costs*	***Net Benefits***	*B/C Ratio*
Existing	$3,828,192	N/A	N/A	N/A	N/A
With-project Damages					
0-ft Ext.	$1,277,070	$2,551,122	$1,479,522	$1,071,600	1.7
20-ft Ext.	$1,043,379	$2,784,813	$1,532,204	$1,252,609	1.8
40-ft Ext.	$643,623	$3,184,569	$1,690,312	$1,494,257	1.8
60-ft Ext.	$253,378	$3,574,814	$1,851,536	$1,723,278	1.9
80-ft Ext.	**$34,564**	**$3,793,628**	**$1,982,010**	**$1,811,618**	**1.9**
100-ft Ext.	$3,918	$3,824,274	$2,109,251	$1,715,023	1.8

154. S-4 – Groins. A groin field in the problem area would help hold a beach in front of existing development and prevent further loss of land on its updrift side through sand impoundment. However, any beaches present on the downdrift side would suffer concomitant sand losses. 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, in combination with beach fills, are considered as a method to help hold the fill in place and to reduce the periodic renourishment requirements. Groins could also be considered to offer additional stabilization to inlet areas. Groin (terminal and field) construction in combination with beach nourishment is carried forward into the detailed alternative analysis. Groin construction (terminal or field) alone would not be a viable option because they do not, on a net basis, provide for additional beach width.

DETAILED ASSESSMENT OF ALTERNATIVE PLANS

155. Intermediate plans, designs, and cost estimates were formulated in the previous section titled "Intermediate Assessment of Alternative Plans." The alternative plans carried into the detailed assessment are the no-action plan (NS-1), the beach nourishment plan (S-3), and the groin field construction plan (S-4).

156. The development and assessment of detailed alternative plans for beach nourishment was undertaken in the final phase of plan formulation. Detailed benefits were computed and MCACES cost estimates (January 2001 price levels), including the cost of lands, easements, and rights-of-way were determined. Area requirements for beach tilling were estimated to be an area of 9,100 ft long x 300 ft wide or roughly 63 acres. In accordance with ER 1110-2-1302, dredging costs to be performed by the prime contractor were computed with the Cost Engineering Dredge Estimating Program (CEDEP). All costs associated with dredging were assumed to be accomplished with a generic medium hopper dredge with the capability to pump material directly onto the beach nourishment area. Endangered species observer duties are to be performed by a subcontractor and were computed in MCACES. A detailed assessment of the beach nourishment, groin construction, and no-action alternatives are presented in the following paragraphs.

157. Cost and Benefits. All NED project costs and benefits are calculated in terms of equivalent annual dollars. ER 1105-2-100 Section 6-168.a.(4) specifies the procedure for economic cost and benefit formulation. The ER directs the analyst to "Inventory potential

damage centers and locations of other project induced benefits or costs. For with- and without-project conditions, estimate the costs of maintaining shore protection and navigation projects. At the project site and other impacted sites, assess the extent of damages to property through analysis of storm surge and wave damage; assess changes in recreation, if any; and evaluate project impacts to jetties, channels, and other navigation features."

158. Relevant cost is somewhat subjectively defined as any cost that will make a difference in a given decision process. The relevant costs for project evaluation have been determined by policy to be NED costs (National Economic Development Procedures Manual: IWR report 91-R-11, p. 38, Oct 1991). New costs are defined as follows:

> "Resources required or displaced to achieve project purposes by project installation and/or operation, maintenance, and replacement activities represent a NED cost and should be evaluated as such. Resources required or displaced to minimize adverse impacts and/or mitigate fish and wildlife habitat losses are also NED costs." (Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies, p. 97, March 1983.)

159. NED benefits are the increase in the net value of the national output of goods and services as a direct result of project implementation. A key point is that national output is being determined, not regional output. NED benefit estimation in the U.S. Army Corps of Engineers planning process proceeds by comparing forecasts of economic conditions with the project to forecasts of economic conditions without the project. NED project benefits are found by taking the difference of the two.

Detailed Assessment of Beach Nourishment Only

160. Beach Design. This plan consists of beach fill with periodic renourishment for reducing hurricane and storm damages along the shoreline of the study. Analysis of available data indicates that Reach 2 and Reach 3 of the study area required initial restoration and periodic renourishment. Reach 2 extends from the R-35 (400 ft north of John Ringling Boulevard) south to R-40. Reach 3 extends from DNR-40 to DNR-43. An optimal berm width extension of 80-ft was determined to maximize net primary benefits. Nourishment intervals for the reaches were optimized in the intermediate assessment. Additional increments of berm width result in a reduction in net primary benefits because the costs far outweigh the benefits for additional berm extensions.
Even though Reaches 2 and 3 experience different erosion rates, the berm widths were optimized based on a combined basis due to the short reach length and to avoid any large protuberances in the shoreline.

161. Volume Requirements for Fill Only. Beach nourishment design template volume requirements, for a beach fill only with a berm extension of 80 ft, for Reach 2 and 3 would be approximately 479,000 cy. The advance nourishment volume reflects projected erosion rates and the optimization of the nourishment interval. The optimal nourishment interval and advance nourishment volume, for a beach fill only with a berm extension of 80 ft, for Reaches 2 and 3 would be 3 years and 503,000 cy, respectively. From profile lines R-35

to R-43, the advance nourishment volumes are based on the rates of shoreline recession and erosion observed between 1991 and 1998 and verified with 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 ft NGVD design berm elevation and a -12 ft NGVD depth of closure, the corresponding volumetric loss for each foot of shoreline change is 0.64 cy/ft. Except at profile lines R-40 to R-42, the design rate of erosion is equal to the volume change associated with the observed shoreline recession. At each profile line, an additional 3.2 cy/ft is added to the advance fill to compensate for the effects of sea level rise.

162. The Engineering Appendix details the analysis pertaining to the volume of sand needed to provide and maintain the optimal transition section at the northern and southern limits of Reaches 2 and 3. Material in the amount of 26,624 cy and 35,476 cy would be placed in the transition sections at the northern and southern tapers, respectively, to an elevation of +5 ft NGVD with construction slopes of 1 V to 12 H from the berm to MLW and 1 V to 35 H from MLW to intersection with the existing bottom.

Detailed Assessment of Groin Construction with Beach Nourishment

163. Groin Construction with Beach Nourishment. Groin field and terminal groin construction were considered with beach placement to reduce advance nourishment costs and to further optimize the renourishment interval.

164. Groin Field Design Requirements. 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. GENESIS model simulations indicate a significant reduction in the required advance fill with the addition of three groins near Big Sarasota Pass. The lengths and location of the three groins were determined and optimized with the GENESIS model (Alternative 3). Figures III-7 and III-8 illustrate a typical groin cross section and typical groin profile for Lido Key.

165. Groin Field Structure Length and Location. The southernmost structure will be built at the southern end of Lido Key. The total length of the structure will be approximately 650 ft. The landward half of the structure will lie along the north bank of Big Sarasota Pass, on the park lands. 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. Each of the structures is oriented along a bearing of 55°/235° relative to north. The groin field with beach fill alternative, when compared to the beach fill only alternative, increases the renourishment interval from three to five years and reduces the fill requirements by 51,800 cy per year.

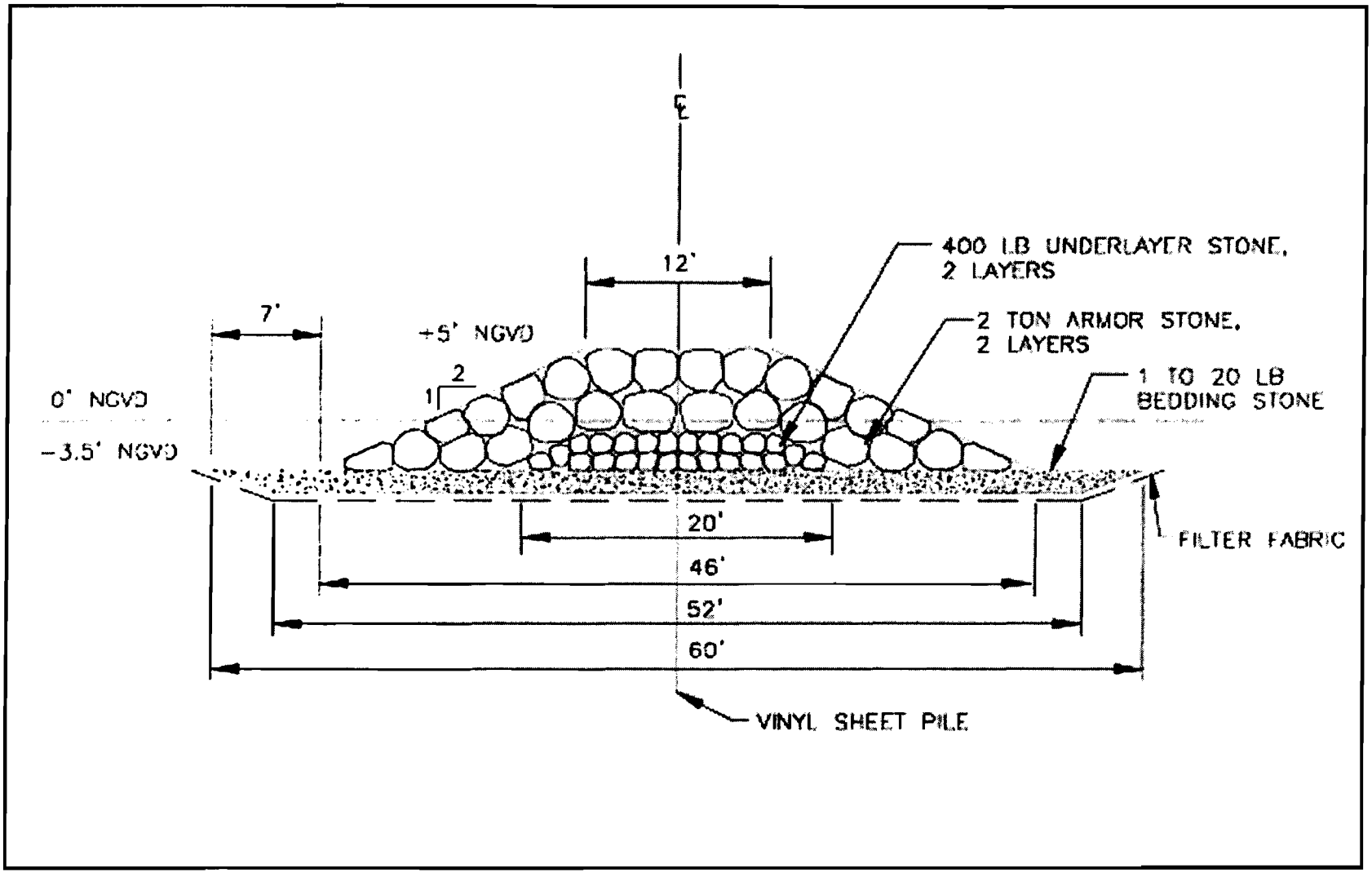


Figure III-7 Typical Groin Cross Section

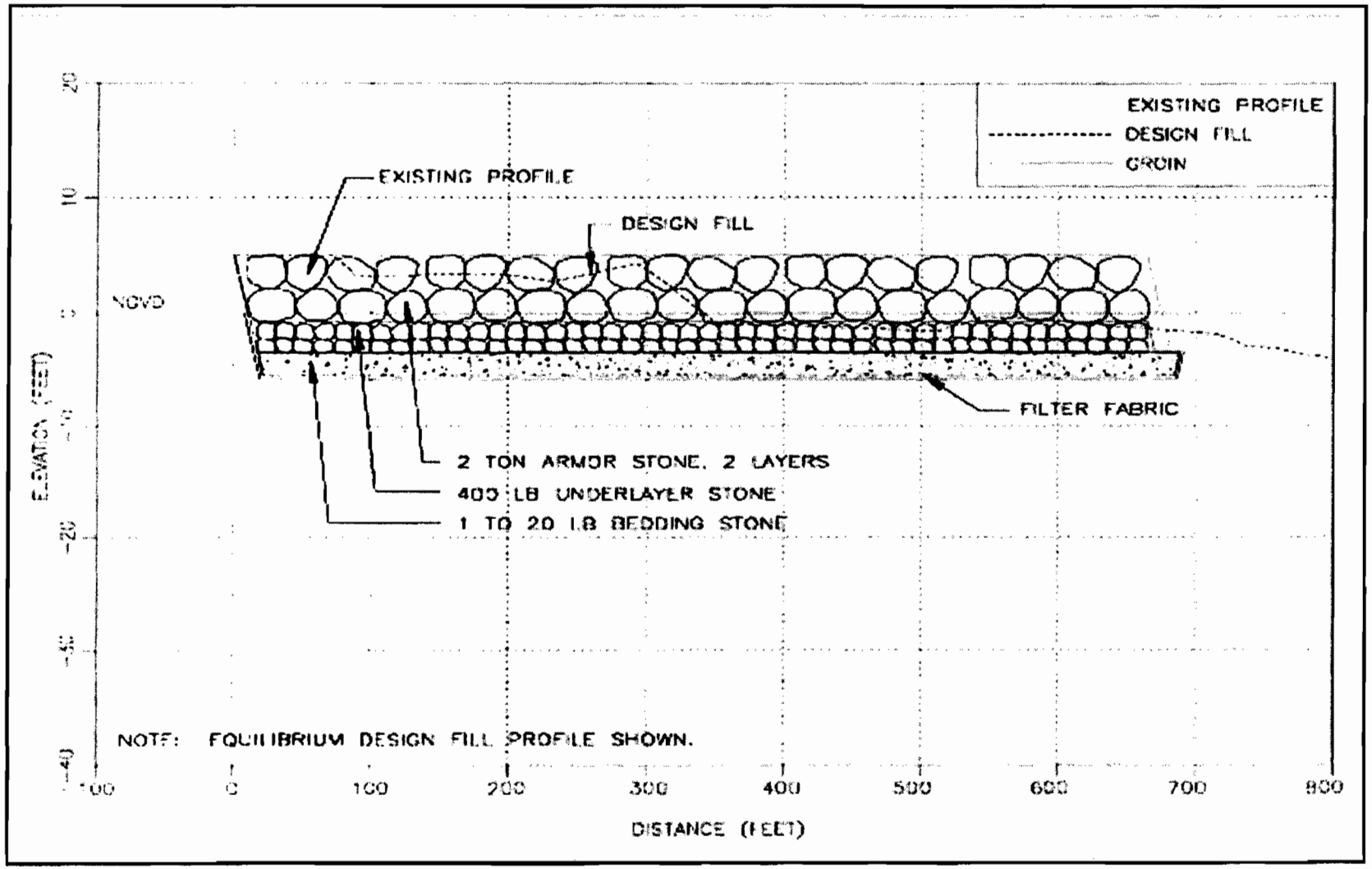


Figure III-8 Typical Groin Profile

166. Terminal Groin Structure Length and Location. The terminal groin option would include only the southernmost groin of the three-groin field just described. The structure would be built at the southern end of Lido Key, and the total structure length would be approximately 650 ft.

167. Groin Structural Cross Section. The groins are designed to withstand a 20-year storm and feature a continuous structure height of +5 ft NGVD. Two layers of two-ton (2.9 ft 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). Following *Shore Protection Manual* (United States Army Corps of Engineers (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 ft below the crest at the center of the structure. Based on the design cross section and combined groin length of 1,420 ft, 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 ft^2 of filter fabric and 34,200 ft^2 of vinyl sheet pile will be required. The terminal groin with beach fill alternative, when compared to the beach fill only alternative, maintains the renourishment interval at three years but reduces the fill requirements only by 8,600 cy per year

168. Cost Estimates. Engineer Circular (EC) 1110-2-538 dated February 28, 1989 requires the establishment and consistent use of a standard code of accounts when estimating costs for civil works projects. The cost estimates for both Reach 2 and Reach 3 of the study area are presented using the standard code of accounts. Cost estimates for engineering and design were prepared by the Engineering Division, USACE, Jacksonville. The estimates of real estate and related costs were prepared by Real Estate Division, USACE, Jacksonville. A directed interest rate of 6 and 3/8% was used to determine average annual equivalent costs for all plan formulation level NED evaluations; updated price levels and current interest rates were used for the final economic evaluation of the selected plan presented later within this text.

169. Preliminary project cost estimates are based on January 2001 price levels, these were used in the plan formulation stages of this report. All dredging was assumed to be accomplished using a generic medium hopper dredge with the capability to pump material directly onto the beach nourishment area. An estimated 1.8 million cy of beach quality material has been identified through seismic and core boring investigations of three primary borrow areas. Overfill factors of approximately 1.0 were found for various portions of the study area indicating compatibility of this fill material to native sands. Material available for the 50-year plan includes fill previously found in Big Sarasota Pass, New Pass, offshore of Tampa, Longboat Key, and Anna Maria Island. The Geotechnical Appendix B details the location and composition of the material contained in each of the borrow areas. Coastal Planning and Engineering (1999) verifies the quality of the material and suitability for use as fill on this project. Additional escalation was added to each of the renourishment estimates to allow for increases in costs.

170. Cost estimating information used for plan formulation included unit prices for placed material, mobilization, and environmental monitoring costs. Project quantities were based

Table III-16 Berm Extension Cost Estimate Fill & Terminal Groin Construction

Lido Key Project Feasibility Study (80-ft Berm Width Extension at 5-ft NGVD) File: - F:\Dan\Region2\Sarasota\LidoKey\Excel\Optiren_Lido_2.xls
Generic Medium Hopper Dredge (Beach Disposal)

Economic Analysis Period	*50 (years)*	*Mob/Demob*	*$426,000*	*Monthly*	215,000 (cy/mo.)
Interest Rate	6.375 (%)	*Unit Price*	$5.38 ($/cy)	*Production*	
Background Erosion Rate	87,000 (cy/yr)	*Monitoring*	$25,750 (/mo.)	*Rate*	
Project Induced Erosion Rate	79,100 (cy/yr)	*Mitigation*	$0 (/mo.)	*Fill Length*	9,100 (ft)
Design Fill	460,200 (cy)	*Contingency*	20 (%)	*Design Fill*	460,200 (cy)
Overfill Factor	0 (%)	*E&D, S&A*	15 (%)		

CAPITAL RECOVERY FACTOR 0.06679 JANUARY 2001 PRICE LEVELS

Total Design Fill + ECL (CY)	Nour. Int. (YRS)	Advance Nourishment (CY) (W/OVERFILL)	Total Initial Fill (CY) (W/OVERFILL)	Estimated Const. Time (MTH) 1 DREDGE	Cost of Initial Const. (1st MOB.)	Cost of Initial Const. (2nd MOB.)	Annual Cost Of Initial Const.	Nourishment Quantity (CY)	Nourishment Cost	Annual Cost of Nourishment	Total Average Annual Equiv. Cost
460,200	1	166,100	626,300	2.9	$5,341,296	$0	$356,740	166,100	$1,848,526	$1,848,526	$2,205,265
460,200	2	332,200	792,400	3.7	$6,601,942	$0	$440,937	332,200	$3,109,171	$1,506,564	$1,947,501
460,200	**3**	**498,300**	**958,500**	**4.5**	**$7,862,587**	**$0**	**$525,134**	**498,300**	**$4,369,817**	**$1,381,875**	**$1,907,009**
460,200	4	664,400	1,124,600	5.2	$9,123,233	$0	$609,331	664,400	$5,630,463	$1,309,671	$1,919,002
460,200	5	830,500	1,290,700	6.0	$5,485,879	$5,485,879	$702,926	830,500	$6,891,108	$1,213,340	$1,916,266
460,200	6	996,600	1,456,800	6.8	$6,116,202	$6,116,202	$783,691	996,600	$8,151,754	$1,150,410	$1,934,101
460,200	7	1,162,700	1,622,900	7.5	$6,746,525	$6,746,525	$864,457	1,162,700	$9,412,400	$1,105,222	$1,969,679
460,200	8	1,328,800	1,789,000	8.3	$7,376,848	$7,376,848	$945,222	1,328,800	$10,673,046	$1,057,262	$2,002,484
460,200	9	1,494,900	1,955,100	9.1	$8,007,171	$8,007,171	$1,025,988	1,494,900	$11,933,691	$1,004,843	$2,030,831
460,200	10	1,661,000	2,121,200	9.9	$8,637,494	$8,637,494	$1,106,753	1,661,000	$13,194,337	$983,534	$2,090,287
460,200	11	1,827,100	2,287,300	10.6	$9,267,816	$9,267,816	$1,187,519	1,827,100	$14,454,983	$926,342	$2,113,861
460,200	12	1,993,200	2,453,400	11.4	$9,898,139	$9,898,139	$1,268,285	1,993,200	$15,715,628	$905,655	$2,173,939

Table III-17 Berm Extension Cost Estimate Fill & Groin Field Construction

Lido Key Project Feasibility Study (80-ft Berm Width Extension at 5-ft NGVD) File: - F:\Dan\Region2\Sarasota\LidoKey\Excel\Optiren_Lido_2.xls
Generic Medium Hopper Dredge (Beach Disposal)

Economic Analysis Period	*50 (years)*	*Mob/Demob*	*$426,000*	*Monthly*	215,000 (cy/mo.)
Interest Rate	6.375 (%)	*Unit Price*	$5.38 ($/cy)	*Production*	
Background Erosion Rate	87,000 (cy/yr)	*Monitoring*	$25,750 (/mo.)	*Rate*	
Project Induced Erosion Rate	35,900 (cy/yr)	*Mitigation*	$0 (/mo.)	*Fill Length*	9,100 (ft)
Design Fill	460,200 (cy)	*Contingency*	20 (%)	*Design Fill*	460,200 (cy)
Overfill Factor	0 (%)	*E&D, S&A*	15 (%)		

CAPITAL RECOVERY FACTOR 0.06679 JANUARY 2001 PRICE LEVELS

Total Design Fill + ECL (CY)	Nour. Int. (YRS)	Advance Nourishment (CY) (W/OVERFILL)	Total Initial Fill (CY) (W/OVERFILL)	Estimated Const. Time (MTH) 1 DREDGE	Cost of Initial Const. (1st MOB.)	Cost of Initial Const. (2nd MOB.)	Annual Cost Of Initial Const.	Nourishment Quantity (CY)	Nourishment Cost	Annual Cost of Nourishment	Total Average Annual Equiv. Cost
460,200	1	122,900	583,100	2.7	$5,013,422	$0	$334,841	122,900	$1,520,652	$1,520,652	$1,855,493
460,200	2	245,800	706,000	3.3	$5,946,193	$0	$397,140	245,800	$2,453,423	$1,188,818	$1,585,958
460,200	3	368,700	828,900	3.9	$6,878,965	$0	$459,439	368,700	$3,386,195	$1,070,822	$1,530,261
460,200	4	491,600	951,800	4.4	$7,811,737	$0	$521,738	491,600	$4,318,966	$1,004,611	$1,526,349
460,200	**5**	**614,500**	**1,074,700**	**5.0**	**$8,744,508**	**$0**	**$584,037**	**614,500**	**$5,251,738**	**$924,691**	**$1,508,728**
460,200	6	737,400	1,197,600	5.6	$9,677,280	$0	$646,336	737,400	$6,184,509	$872,784	$1,519,119
460,200	7	860,300	1,320,500	6.1	$5,598,966	$5,598,966	$717,416	860,300	$7,117,281	$835,725	$1,553,141
460,200	8	983,200	1,443,400	6.7	$6,065,351	$6,065,351	$777,176	983,200	$8,050,052	$797,430	$1,574,606
460,200	9	1,106,100	1,566,300	7.3	$6,531,737	$6,531,737	$836,935	1,106,100	$8,982,824	$756,373	$1,593,309
460,200	10	1,229,000	1,689,200	7.9	$6,998,123	$6,998,123	$896,695	1,229,000	$9,915,596	$739,129	$1,635,824
460,200	11	1,351,900	1,812,100	8.4	$7,464,509	$7,464,509	$956,455	1,351,900	$10,848,367	$695,213	$1,651,668
460,200	12	1,474,800	1,935,000	9.0	$7,930,895	$7,930,895	$1,016,214	1,474,800	$11,781,139	$678,919	$1,695,134

Table III-18 Groin Structure NED Optimization — First Costs

Structure	*First Cost of Structure*	*Annual First Cost of Structure*	*Reduction in Beach Volume (cy)*	*Annual Fill Savings*
Terminal Groin	$580,309	$48,580	25,800	$52,438
Groin Field	**$2,779,003**	**$206,831**	**259,000**	**$338,409**

Table III-19 Average Annual Benefits and Costs with Groin Field Based on Plan Formulation Costs of January 2001 and an Interest Rate of 6 and 3/8%

Project Condition	*Annual Benefit*	*Annual Fill Cost*	*Annual Groin Cost*	*Annual Total Cost*	***Annual Net Benefit***	*B/C Ratio*
0-ft Ext.	$2,551,122	$1,195,254	$206,831	$1,402,085	$1,149,037	1.8
20-ft Ext.	$2,784,813	$1,249,874	$206,831	$1,456,705	$1,328,108	1.9
40-ft Ext.	$3,184,569	$1,340,463	$206,831	$1,547,294	$1,637,275	2.0
60-ft Ext.	$3,574,814	$1,433,579	$206,831	$1,640,410	$1,934,404	2.1
80-ft Ext.	**$3,793,628**	**$1,508,728**	**$206,831**	**$1,715,559**	**$2,078,069**	**2.2**
100-ft Ext.	$3,824,274	$1,585,416	$206,831	$1,792,247	$2,032,027	2.1

on conditions of shoreline as determined by the May 2000 survey. Note that for the beach fill only alternative, the nourishment interval for Reach 2 and Reach 3 optimized at three years with an 80-ft berm width extension with an annual with-project erosion rate of 87,700 cy/yr.

171. Groin Cost Estimation. A terminal groin and groin field construction were analyzed to optimize the beach nourishment interval and total average annual equivalent cost. Table III-16 and Table III-17 present the cost estimates for the 80-ft berm extension identified as the NED project width in the Intermediate Analysis. Each alternative was estimated with the 80-ft design berm width previously detailed in the Intermediate Assessment; therefore, no benefit changes occur with the groin construction addition. The project-induced losses change from 87,700 cy/yr for the beach fill only condition to 79,100 cy/yr for the beach fill with terminal groin condition and to 35,900 cy/yr for the beach fill with groin field condition. The beach fill with terminal groin alternative optimizes to a nourishment interval of three years with an advance nourishment of 498,300 cy. However, the beach fill with groin field alternative optimizes to a five-year renourishment interval with an advance nourishment of 614,500 cy. The average annual equivalent costs for the beach fill portions of the terminal groin and groin field alternatives are $1,907,009 and $1,508,728, respectively. Table III-18 summarizes the groin structure first costs and the costs of beach fill savings (derived from the reduction of project-induced losses) for each groin configuration. Based on this evaluation, the groin field provides the best NED alternative because the reduction in beach fill costs more than offsets the costs of the groin field construction. Table III-19

summarizes the benefit-to-cost ratio for evaluated berm width extensions. Between the time the plan was formulated and the time it was finalized and coordinated, price levels and interest rates changed. These changes were proportional and deemed not to effect the formulation. From this point forward within the report only the selected plan is discussed; all costs and benefits are at October 2002 price levels and average annual costs were computed at the FY02 interest rate of 6 and 1/8% for the selected plan.

172. Monitoring Schedule and Costs. Endangered species and turbidity monitoring is applied only during project construction. The current total cost estimate (based upon the 10/06/02 MCACES) for these monitoring efforts during initial construction of the project (over an estimated duration of 4.94 months) is $153,300 or $31,000/month. 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. 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. The proposed monitoring schedule and cost estimate are presented in Table III-20. Cost shared pre-construction monitoring activities in FY03 and those for initial construction in FY04 are estimated at $135,800 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 (included in Average Annual Costs). All other monitoring, required to determine project performance and prepare for future nourishments, will be allocated according to current project cost sharing percentages. This monitoring is part of the State permitting requirements for shore protection projects to ensure that there are no unforseen negative impacts due to the project.

Table III-20 Monitoring Schedule and Costs

	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
TOTAL	$135,800	$135,800	$75,800	$75,800	$75,800	$135,800	$135,800	$62,800	$135,800

173. Annual Cost of Initial Construction. Analysis of the 80-ft berm extension resulted in identification of an initial volume requirement of approximately 1,074,700 cy (460,200 cy design and 614,500 cy advance fill) placed over one dredging season and a 5-year nourishment interval. The initial construction cost is approximately $12,632,200

(October 2002 price levels) including the groin field. The average annual equivalent cost for initial construction was determined to be $869,400 (including Interest During Construction) by multiplying the capital recovery factor for the specified interest rate (6 and 1/8%) and the costs of initial construction. The groin field is designed to withstand a 20-yr storm and feature a continuous structure height of +5-ft NGVD. Based on the design cross section and combined groin length of 1,420 ft, the project cost is approximately $2,057,200 with an average annual equivalent cost of $132,800 (October 2002 price levels and 6 1/8% interest rate).

174. Annual Cost of Interest During Construction and Monitoring. The annual cost of interest during construction was determined by multiplying the capital recovery factor for the specified interest rate (6 and 1/8%) by the interest on the costs of the work accomplished during initial construction. Average annual equivalent costs for the $835,700 interest during construction for Reach 2 and Reach 3 would be $53,900.

175. Annual Cost of Future Beach Nourishment and Groin Maintenance. The cost of each future beach nourishment at 6 and 1/8% is equal to the sum of the present worth factor at years 2008, 2013, 2018, 2023, 2028, 2033, 2038, 2043, 2048, and 2053 times the capital recovery factor. Interest and amortization of future beach nourishment for the NED plan would be $1,044,400. The average annual equivalent cost of groin maintenance was estimated at $24,000.

176. Total Annual Cost. The total average annual equivalent cost, including interest during construction, for the NED plan would be approximately $1,954,700.

177. Benefit Summary. The primary purpose of the Lido Key hurricane and shore protection project would be reduction of storm damage to upland development. The NED plan would provide protection to over $214 million in private and commercial upland development, as well as infrastructure such as roads and utilities. Approximately $4.3 million of average annual equivalent damages are predicted to occur under future without-project conditions under October 2002 pricing and computed at an interest rate of 6 and 1/8%. The value includes the cost of damage to upland development, coastal armor, backfill, and the value of land lost. The average annual equivalent benefit of the selected plan would be $4,319,900. The Economic Appendix D presents detailed analyses of project benefits.

178. Economic Justification. Table III-21 summarizes the economic justification of the recommended project. The benefit-to-cost ratio for the NED plan would be 2.2 for the directed interest rate of 6 and 1/8%. Therefore, the addition of groin field construction to the 80-ft berm extension (with a five-year nourishment interval) achieved a total average annual equivalent cost savings of $500,000.

Detailed Assessment of the No-Action Plan

179. This alternative assumes that the erosion in the study will continue with no solutions or remedial measures will be constructed, except for those in response to emergencies. Shoreline recession and erosion will continue. An estimated $214 million

Table III-21 Reach 2 and 3 – Economics of the Selected Plan

PHYSICAL DATA (Project Life = 50 Years)	
Project Length (ft)	8,280 (994 ft taper on north and 856 ft on south totals 10,130 ft)
Berm Crest Elevation (ft, NGVD)	+5
Berm Width Extension from ECL (ft)	80
Foreshore Slope (Berm-MLW)	1 V to 12 H
Nearshore Slope (MLW-existing profile)	1 V to 35 H
Post-placement Erosion Rate (cy/yr)	122,900
Volume of Initial Fill (cy)	1,074,700
Volume of Design Fill (cy)	460,200
Volume of Advance Nourishments (cy)	614,500
Nourishment Interval (yr)	5
FINANCIAL DATA (Interest Rate = 6.125 %, Price Level = October 2002)	
INITIAL CONSTRUCTION COSTS (w/ groin)	$12,632,200
INITIAL BEACH FILL CONSTRUCTION COSTS	$10,575,000
EACH FUTURE NOURISHMENT COST (varies depending upon borrow area)	$5.8-6.0 million
GROIN CONSTRUCTION	$2,057,200
ANNUAL PROJECT COSTS	
Interest and Amortization	
Initial Construction	$869,400
Future Nourishment	$1,044,400
Groin Maintenance	$24,000
Sponsor O&M	$16,900
Total Annual Project Costs(w/ IDC):	$1,954,700
PRIMARY BENEFITS	
Prevention of Damage to	Reach 2 & Reach 3
Upland Development	$3,563,300
Coastal Armor	$37,800
Backfill	$290,000
Loss of Land	$428,800
Total Annual Project Benefits:	$4,319,900
BENEFIT – TO – COST RATIO	2.2[1]

in structural improvements exist between R-35 and R-43 in Lido Key. This does not include infrastructure such as roads and utilities. An estimated $4.3 million in damages will occur annually in Reaches 2 and 3 if no-action is taken. Local efforts to stop the storm and erosion damage have been limited to construction and repair of coastal armor. These efforts have not provided the desired level of storm protection.

180. This option avoids any undesirable effects that may be associated with construction of the selected plan. However, if steps are not taken to counteract the erosion and provide an appropriate level of storm damage protection, continuing erosion and recession of the shoreline will occur with subsequent loss of valuable property and

[1] Benefit-To-Cost Ratio includes Interest During Construction

damage to structural improvements along the shoreline. The Environmental Assessment, which follows the main text of this report, presents a summary of the environmental impacts of the no-action plan.

COST APPORTIONMENT

181. Section 103(a) of the 1986 Water Resources Development Act (WRDA), as amended, specifies that hurricane and storm damage reduction projects are to be cost shared at a 65% Federal and a 35% non-Federal basis. Section 103(c)(4) states that recreation projects are to be cost shared at 50% of separable costs. Section 103(d), as amended, states that the cost of construction projects or measures for beach erosion control and water quality enhancement shall be assigned to the appropriate purposes listed above.

a. Before WRDA 86, Federal projects to protect against hurricanes and abnormal tide flooding were established on a case-by-case basis, based on specific Congressional authorizations. Hurricane protection projects were viewed similar to flood control projects from an authorization perspective before 1986. With the passage of WRDA 86, no Federal distinction exists between shore protection measures for hurricanes, storms, or tidal induced flooding and beach erosion.

b. Wind and tidal generated waves must cause shoreline erosion; therefore, the shore protection program does not cover erosion at upstream locations caused by stream flows except for those actions defined as an emergency measure to protect highways, pubic works, and non-profit public facilities.

182. Department of Army Engineering Regulation 1105-2-100 contains general program guidance for the U.S. Army Corps of Engineers Civil Works programs.

183. Current shore protection law provides for Federal participation on projects for hurricane and storm damage reduction if the restored beaches are open and available for public use. Federal cost sharing is based on Federal law, policy, and conditions of shore ownership and use at the time of construction or subsequent periodic nourishment.

184. Section 103(d) of the Water Resources Development Act of 1986 (Public Law 99-662), as amended, specifies that the cost of construction measures for beach erosion control are assigned to the appropriate purpose(s) specified in Section (c) of the Act. These purposes are normally hurricane and storm damage reduction and/or separable recreation, and shared in the same percentages as to the purposes to which the costs are assigned, except that no costs are assigned to incidental recreation. Hurricane and storm damage reduction projects are cost-shared at 65% Federal and 35% non-Federal, and separable recreation projects are cost-shared at 50% Federal and 50% non-Federal. Cost sharing for beach erosion control measures must also consider shore ownership and use. Additional guidance on cost sharing for shore protection projects is provided in Engineering Regulation (ER) 1165-2-130 dated June 15, 1989,

Table III-22 Federal and non-Federal Cost Sharing Percentages

PARCEL DESCRIPTION	LOT ID	STRUCTURE VALUE	LOT WIDTH	SHORELINE OWNERSHIP	FEDERAL SHARE	FEDERAL LENGTH	NON-FEDERAL SHARE	NON-FEDERAL LENGTH
House	1	221598	200	PRIVATE/DEVELOPED	65%	130	35%	70
Condo	3	14523846.8	440	PRIVATE/DEVELOPED	65%	286	35%	154
Condo	4	1053740	330	PRIVATE/DEVELOPED	65%	215	35%	116
Motel	5	9929387	590	PRIVATE/DEVELOPED	65%	384	35%	207
House	6	217172	60	PRIVATE/DEVELOPED	65%	39	35%	21
House	7	405162	130	PRIVATE/DEVELOPED	65%	85	35%	46
House	8	171350	120	PRIVATE/DEVELOPED	65%	78	35%	42
House	9	250694	80	PRIVATE/DEVELOPED	65%	52	35%	28
House	10	209382	80	PRIVATE/DEVELOPED	65%	52	35%	28
House	11	293260	80	PRIVATE/DEVELOPED	65%	52	35%	28
House	12	293260	110	PRIVATE/DEVELOPED	65%	72	35%	39
House	13	223525	110	PRIVATE/DEVELOPED	65%	72	35%	39
Motel	18	12156190	330	PRIVATE/DEVELOPED	65%	215	35%	116
Condo	19	10103583	220	PRIVATE/DEVELOPED	65%	143	35%	77
Condo	20	132192	220	PRIVATE/DEVELOPED	65%	143	35%	77
Condo	21	1205333	120	PRIVATE/DEVELOPED	65%	78	35%	42
Condo	22	1205333	140	PRIVATE/DEVELOPED	65%	91	35%	49
Condo	23	11984380	140	PRIVATE/DEVELOPED	65%	91	35%	49
Condo	24	5992190	140	PRIVATE/DEVELOPED	65%	91	35%	49
Condo	25	20387210	160	PRIVATE/DEVELOPED	65%	104	35%	56
Parking Lot	26	1	170	PRIVATE/DEVELOPED	65%	111	35%	60
Condo	27	20706578	220	PRIVATE/DEVELOPED	65%	143	35%	77
Condo	28	3064023	90	PRIVATE/DEVELOPED	65%	59	35%	32
Condo	29	2211883	220	PRIVATE/DEVELOPED	65%	143	35%	77
Condo	30	6687204	410	PRIVATE/DEVELOPED	65%	267	35%	144
Condo	31	11606407	230	PRIVATE/DEVELOPED	65%	150	35%	81
Condo	32	16285014	230	PRIVATE/DEVELOPED	65%	150	35%	81
Condo	33	5315730	220	PRIVATE/DEVELOPED	65%	143	35%	77
Condo	34	39531365	220	PRIVATE/DEVELOPED	65%	143	35%	77
Condo	35	7094469	300	PRIVATE/DEVELOPED	65%	195	35%	105
Condo	36	2694397	230	PRIVATE/DEVELOPED	65%	150	35%	81
Condo	37	931179 9	220	PRIVATE/DEVELOPED	65%	143	35%	77
Condo	38	8041260	230	PRIVATE/DEVELOPED	65%	150	35%	81
subtotal			**6790**			**4413.5**		**2376.5**
Vacant	29	1	80	PRIVATE/UNDEVELOPED	0%	0	100%	80
subtotal			**80**			**0**		**80**
Street End	2	1	300	PUBLIC/DEVELOPED	65%	195	35%	105
Parking	14	1	560	PUBLIC/DEVELOPED	50%	280	50%	280
B'house	15	1	160	PUBLIC/DEVELOPED	50%	80	50%	80
Pool	16	1	195	PUBLIC/DEVELOPED	50%	98	50%	98
B'house	17	1	195	PUBLIC/DEVELOPED	50%	98	50%	98
subtotal			**1410**			**750**		**660**
		Total	**8280**			**5163.5**		**3116.5**

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

Total Distance [ft]	8,280
Total Distance [mi]	1.6
Total Distance Federal [ft]	5,164
Total Distance Non-Federal [ft]	3,117

	Total Length	Length Federal	Length Non-Fed
Private			
Developed	6,790	4,414	2,377
Undeveloped	80	0	80
Street Ends	0	0	0
Public/Developed	1,410	750	660
	8,280	5,164	3,117

Cost Sharing

Fed	**62.36%**
Non	**37.64%**
	100.00%

Table III-23 Federal and non-Federal Cost Apportionment

COST SHARING FOR LIDO KEY OCTOBER 2002 PRICE LEVELS Project Feature	Project Cost	Federal Share	Federal Cost	Non-Federal Share	Non-Federal Cost
Mobilization	$461,250	62.4%	$ 287,641	37.6%	$ 173,609
Beach Replenishment	$7,195,166	62.4%	$ 4,486,985	37.6%	$ 2,708,181
Groin Field (mob/demob combined)	$1,701,583	62.4%	$ 1,061,126	37.6%	$ 640,457
Engineering & Design	$862,411	62.4%	$ 537,809	37.6%	$ 324,602
Construction Management	$989,616	62.4%	$ 617,136	37.6%	$ 372,480
Monitoring	$1,078,028	62.4%	$ 672,270	37.6%	$ 405,758
Real Estate					
Administration costs of LERR	$170,820	62.4%	$ 106,525	37.6%	$ 64,295
Acquisitions (LERR)	$173,280	0.0%	$ -	100.0%	$ 173,280
Total Cost	**$12,632,154**		**$ 7,769,492**		**$ 4,862,662**
Less LERR Credit					**$ 173,280**
Total Non-Federal Cash Contribution					**$ 4,689,382**

and Headquarters, U.S. Army Corps of Engineers (HQUSACE) memorandum dated September 23, 1994.

185. The project design section consists of fill placed seaward of the pre-project mean high water shoreline. The pre-project mean high water shoreline will be established as the erosion control line (ECL) before construction of the project. The project design fill cross section, advance nourishment, and overfill (if any) are to be constructed seaward of the ECL. The cost of fill placed landward or seaward of the ECL on privately controlled lands not accessible to the public is 100% non-Federal.

186. The following is a breakdown of cost sharing percentages in the longshore direction. Non-Federal public shores are normally dedicated to park and conservation areas, and the benefits of protecting such shores would be based on the loss of recreation outputs, with cost sharing 50% Federal and 50% non-Federal. Street ends would be cost shared 65% Federal and 35% non-Federal because their protection results in storm damage reduction. The cost sharing would be 65% Federal and 35% non-Federal for protection of privately owned shores resulting in public benefits, i.e. private shore front structures on a beach with public access. Public access to and use of privately owned lands within the footprint of the project, both landward and seaward of the Erosion Control Line (ECL) must be provided and maintained for as long as the Federal project remains authorized. If real estate interests can not be obtained to provide such public access and use, the cost of the entire fill volume, both landward and seaward of the ECL, within the footprint of the project must be apportioned as 100 percent non-Federal. Undeveloped private lands are a 100% non-Federal responsibility. Table III-22 summarizes cost sharing percentages based on shoreline ownership length for each land use category. Based on the breakdown of Federal vs. non-Federal shoreline ownership, the current first cost sharing percentages will be 62.4% and 37.6%, respectively. Lands Easements Rights-of-Way and

Relocations are a non-Federal responsibility, but they do receive credit for this item. This is shown in Table III-23.

IV. DESCRIPTION OF SELECTED PLAN

187. The project area is comprised of an 8,280 ft segment of the Lido Key Gulf of Mexico shoreline located between Florida Department of Environmental Protection (FDEP) monuments R-35 through R-43. The project area comprises Reach 2 of the study area extending from R-35 to R-40 and Reach 3 of the study area extending from R-40 to R-43. The enclosed plates display plan views illustrating the beach fill and groin field of the design template for Reaches 2 and 3 as well as beach fill cross sections of the selected plan. Figure B-2 of Appendix B shows the offshore borrow areas for this project.

188. The National Economic Development (NED) plan identified for Reaches 2 and 3 of the study area consists of beach fill and a groin field with a 1,000 ft taper section at the northern limit of Reach 2 (R-35 to R-34). The south end of Lido Key (R-43) serves as the southern limit of Reach 3 with an 850 foot taper section at the southern limit (R-43 to R-44). The design berm elevation is +5 ft NGVD and extends 80 ft seaward of the baseline. The baseline is defined as the May 2000 MHW shoreline position. 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.

189. Construction of Reaches 2 and 3 would require placement of approximately 460,200 cy of design fill and 614,500 cy of advance fill material. The three borrow areas delineated for use (Borrow Areas 5, 6, and 7) 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 Reaches 2 and 3.

190. The structure height of the three groins is +5-ft NGVD. The southernmost structure, 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.

SECTION 902 LIMITS

191. Since this project was re-authorized in WRDA 1999 with set funding limits, it is subject to Section 902 of WRDA 1986. Section 902 established the requirement that the cost of projects authorized in and subsequent to WRDA 86 would be the maximum cost of that project. The purpose of Section 902 was to insure against cost overruns. The cost of the project could be increased for price level changes, but the scope of the project could not be changed, without Congressional approval, if it increases project costs by more than 20 percent.

192. The MCACES estimate from this study indicates the 902 cost of $13,762,000 (initial construction inflated through construction) and $167,654,000 (periodic renourishment inflated through construction) equals $181,416,000. The Authorized project cost based is based on initial construction cost (WRDA 99) of $5,200,000 and an average annual cost (WRDA 99) of $602,000 over 50 years ($30,100,000). When these numbers are inflated through construction and 20 percent is added, they yield a 902 limit of $7,209,000 for initial construction and $98,576,000 for periodic renourishment for a total of $105,785,000. The selected plan for this report exceeds the 902 limit. The 902 limit is exceeded because the WRDA 99 authorization was based on reconnaissance level data since the feasibility report was just being initiated.

V. PLAN IMPLEMENTATION

PROJECT COOPERATION AGREEMENT

193. As of July 8, 1994, there is no longer a requirement to include an initial draft project cooperation agreement (PCA) when submitting draft feasibility reports. The model PCA and possible deviations based on the recommended plan were fully discussed with the non-Federal sponsor prior to the Feasibility Review Conference (FRC). The non-Federal sponsor has a clear understanding of the type of agreement that they will be expected to sign prior to the start of construction. This report includes the terms of local cooperation in the "Recommendation" section.

194. No Federal commitments relating to a construction schedule or specific provisions of the PCA can be made to the non-Federal sponsor on any aspect of this project or separable element until:

(1) The feasibility report is approved by the U. S. Congress;

(2) The project is budgeted as a new construction start, or construction funds are added by Congress, apportioned by the Office of Management and Budget, and their allocation is approved by the Assistant Secretary of the Army for Civil Works (ASA(CW)); and

(3) The draft PCA has been reviewed and approved by the office of the ASA(CW).

195. Execution. The PCA will not be executed nor will construction be initiated on this project until the National Environmental Policy Act, the Clean Water Act, the Coastal Zone Management Act, the Endangered Species Act, the Fish and Wildlife Coordination Act, and the National Historic Preservation Act planning phase requirements are met. In the case of the Lido Key project, these requirements are met once the Draft Environmental Assessment (DEA) has been coordinated, comments prepared, and a Final Environmental Assessment submitted to the Environmental Protection Agency for filing.

196. Final PCA negotiations with the non-Federal project sponsor may be conducted, and the draft PCA package submitted through the USACE higher authority for review and approval by the ASA(CW), once the feasibility report is approved and the project is budgeted for construction. The PCA for this project will be executed only after the feasibility report is approved, and an Appropriations Bill containing funds for the project is enacted into Law. The Chief of Engineers will not allocate Federal construction funds for a project until the ASA(CW) approves the non-Federal sponsor's financing plan and executes the PCA.

FEDERAL RESPONSIBILITY

197. The U. S. Army Corps of Engineers is responsible for budgeting for the Federal share of construction costs for all future work for Federal projects. Federal funding is subject to budgetary constraints inherent in the formation of the national civil works budget for a given fiscal year. The Corps would perform the necessary preconstruction engineering and design needed to prior construction. The Corps would obtain all necessary permits (including State water quality certification) and would construct the project.

NON-FEDERAL RESPONSIBILITY

198. The non-Federal project sponsors would provide an up-front cash contribution for initial construction costs of the proposed project. The amount of the non-Federal up-front cash contribution would be based on cost sharing principles reflecting shoreline use and ownership in existence at the time of construction. The non-Federal sponsors would also provide the entire cost of all material placed on undeveloped and developed private lands landward/seaward of the ECL. The costs for lands, easements, relocations and rights-of-way (LERR) and a portion of the administrative costs associated with land requirements would also be a non-Federal responsibility. Cost apportionment based on shoreline ownership and LERRs would amount to a non-Federal cost of $4,862,700; credit for the LERR costs would make the total non-Federal cash contribution $4,689,400. The sponsor has expressed their support for this project in a letter of intent dated October 8, 2002.

OTHER NON-FEDERAL REQUIREMENTS

199. Other general non-Federal responsibilities, such as continuing public use of the project beach for which benefits are claimed in the economic justification of the project,

and controlling water pollution to safeguard the health of bathers, must also be assumed by the non-Federal sponsor before the project can be constructed. The items of local cooperation are listed in the section of this report entitled "Recommendations". The delineation of Federal and non-Federal responsibility will be legally defined in the project cooperation agreement.

200. The non-Federal project sponsor will be responsible for all costs of operation, maintenance, and rehabilitation and replacement of project features. Assignment of such responsibility has been included as a part of the items of local cooperation for the project.

201. Section 402 of the 1986 Water Resources Development Act (33 USC 701b-12) as amended by Section 14 of the 1988 Water Resources Development Act states that "Before construction of any project for local flood protection or any project for hurricane or storm damage reduction, the non-Federal interests shall agree to participate in and comply with applicable Federal flood plain management and flood insurance programs." The non-Federal sponsor and communities must be enrolled in and in compliance with the National Flood Insurance Program (NFIP) to receive Federal funding for a recommended hurricane and storm damage reduction project. Compliance with Section 402 has been added as an item of local cooperation.

FINANCIAL ANALYSIS

202. Financial analysis is required for any plan being considered for U.S. Army Corps of Engineers implementation that involves non-Federal cost sharing. The ultimate purpose of the financial analysis is to ensure that non-Federal sponsors understand the financial commitment involved and have reasonable plans for meeting that commitment. The financial analysis shall include the non-Federal sponsor's statement of financial capability, the non-Federal sponsor's financing plan, and an assessment of the sponsor's financial capability. In a letter dated October 8, 2002, the sponsor noted that they were completing the details of their financial plan and would forward them upon completion.

STUDY SUMMARY

203. This report summarizes the feasibility studies conducted for Lido Key in the interest of hurricane and storm damage reduction. Based on these studies, the following conclusions were reached:

a. Storm damage threatens an 8,280-ft segment of the Lido Key study area. The amount of shorefront development in Lido Key threatened by storms is approximately $214 million.

b. The most practical and economical means to prevent or reduce structural damages is to construct the hurricane and storm damage reduction project developed herein. The non-Federal sponsors support construction of the project.

ENVIRONMENTAL CONSIDERATIONS

204. Major environmental considerations taken into account during the formulation of the selected plan were marine resources (i.e. seagrass, hardgrounds), preservation of significant historical cultural resources, and the turtle-nesting season. Nearshore side-scan sonar and groundtruthing surveys conducted in September 2001 did not detect any hardgrounds adjacent to Lido Key. Upland vegetation is composed of both exotic and native species such as Australian pine, sea grape, and wax myrtle. No seagrass/algal communities were observed in the footprint of the beach fill boundaries or proposed borrow areas. Of the listed animal species found in or near the project area, the loggerhead sea turtle is most likely to be affected by the proposed project. Information provided by the Florida Marine Research Institute indicates that, from 1992 to 2000, loggerhead sea turtles nest numbers varied from 32 to 60 annually along Lido Key. Cost estimates for dredging were based upon construction of the project outside of the turtle-nesting season. All available and practicable means and measures have been incorporated into the plan formulation process to ensure that the selected plan is environmentally sound.

FLOOD PLAIN DEVELOPMENT

205. The authorized project is in the base flood plain (100-year flood), and has been evaluated in accordance with Executive Order 11988. Relocation of the project outside the flood plain would not be responsive to the problems and needs of the study area and was not considered further. A non-flood plain alternative for the potential development with the project would be to restrict all future development to those areas outside the flood plain or elevated above the flood plain. Potential flood plain development as a result of project implementation would be minimal. The continued project nourishment would have minimum impact on the natural and beneficial values of the flood plain. In the without-project flood plain (that area immediately adjacent to the project), there will be minimal loss of natural resources due to potential development. Implementation of any nonstructural plans that would minimize potential damage to or within the flood plain beyond those laws and regulations already adopted by local and State interests are not viable solutions under the planning constraints of this study.

FLOOD PLAIN MANAGEMENT AND FLOOD INSURANCE PROGRAMS COMPLIANCE

206. Section 402 of the Water Resources Development Act of 1986 (PL 99-662) as amended by Section 14 of the Water Resources Development Act of 1988 (PL 100-676) states "Before construction of any project for local flood protection or any project for hurricane or storm damage reduction, the non-Federal interests shall agree to participate in and comply with applicable Federal flood plain management and flood insurance programs. Sarasota County is enrolled in and complies with the National Flood Insurance Program.

USE OF OUTER CONTINENTAL SHELF LANDS

207. The Outer Continental Shelf Lands Act (OCSLA) enacted August 7, 1953, as amended (enclosed) grants the Secretary of the Interior authority to grant to qualified persons offering the highest competitive bid leases of any mineral other than oil, gas, and sulfur in any area of the Outer Continental Shelf. The OCSLA was amended by Section 1 of Public Law 103-426, October 31, 1994. The Secretary of the Interior may negotiate the use of Outer Continental Shelf sand, gravel and shell resources for use in a program of, or project for, shore protection, beach restoration or coastal wetlands restoration undertaken by a Federal, State or local government agency; or for a project that is funded in whole or in part by or authorized by the Federal Government. Section 1(a)(2)(B) of the 1994 amendment prohibits the assessment of any fees against an agency of the Federal government, directly or indirectly.

208. Any Federal agency that proposes to make use of sand, gravel and shell resources subject to the OCSLA shall enter into a Memorandum of Agreement with the Secretary of the Interior. The Secretary of the Interior is also required to notify the Committee on Merchant Marine and Fisheries and the Committee on Natural Resources of the House of Representatives, and the Committee on Energy and Natural Resources of the Senate on any proposed project for the use of those resources before the use of those resources.

209. Three separate borrow areas (i.e., Borrow Areas 5 – 7) selected for Lido Key potentially contain about 1,800,000 cubic yards of sand. Each area, located 7 – 9.5 nautical miles offshore of Lido Key, consist of beach quality material in sufficient amount for the immediate requirement. Material available for the 50 year plan included fill previously found in Big Sarasota Pass, New Pass, offshore of Tampa, Longboat Key, and Anna Maria Island. None of the identified borrow areas are regulated under the authority of the OCSLA.

COASTAL BARRIER RESOURCES ACT

210. The proposed new Federal investment decision for the Lido Key hurricane and storm reduction project does not include any recommendations which would result in any new Federal expenditures or financial assistance prohibited by the Coastal Barrier Resources Act (Public Law 97-348); nor were funds obligated in past years for this project for purposes prohibited by this Act.

COASTAL ZONE MANAGEMENT ACT

211. The Coastal Zone Management (CZM) Act of 1972, as amended (PL 92-583) requires all Federal activities inside or outside a state's coastal zone to be consistent with the state's coastal zone management plan if the activities affect natural resources, land uses, or water uses within the coastal zone. By issuance of State Water Quality Certifications on completed shore protection projects, the State has determined that the authorized projects for which initial construction has been completed were consistent with the State CZM Act. The State will review future project work to determine if it is

consistent with the State's coastal zone management plan prior to any future project construction or future nourishment of previously constructed project features.

PUBLIC ACCESSIBILITY

212. In determination of the Federal interest in cost-sharing, Federal participation is limited to the areas where adequate public parking and access are provided. Federal participation is limited to those shoreline reaches within 1/4 mile from an access point, a reasonable walking distance for a beach visitor. For shoreline reaches farther than 1/4 mile from public parking and/or beach access point, Federal participation will not be provided, unless, public accessibility is improved before project construction.

VI. CONCLUSIONS

213. The Sarasota County Hurricane and Storm Reduction Project, Lido Key Feasibility Study provided an opportunity to evaluate coastal problems and alternatives on a systematic basis and consider the advisability of providing various project alternatives.

214. Consideration has been given to all significant aspects of the authorized project in the overall public interest, including engineering feasibility, economic, social, and environmental effects. Based on these efforts, a combination of beach nourishment and groin construction will provide the optimum solution to hurricane and storm damage reduction for upland development in Lido Key, Florida.

VII. RECOMMENDATIONS

215. I have given consideration to all significant aspects in the overall public interest, including engineering feasibility, economic, social and environmental effects. I concur with the recommended project as described herein. The recommended project described in this report provides the optimum solution for shore protection benefits within the study area that can be developed within the framework of the formulation concepts. The Lido Key, Sarasota County, shore protection project would provide initial restoration and periodic nourishment of an 80 foot berm at elevation +5 ft NGVD over 1.56-miles of shoreline, with a groin field at the southern limits of the project. Periodic nourishment, accomplished at five-year intervals, would optimize net primary benefits over the 50-year life of the project. Initial construction costs are estimated at $12,632,200, not including interest during construction, with the Federal share being $7,769,500. Periodic renourishment costs vary between $5,800,000 and $6,000,000 which represents an average annual cost of $1,044,400 for periodic renourishment. Hurricane and Storm Damage Reduction benefits are estimated to be $4,319,900, total average annual costs are estimated to be $1,954,700, which produces a benefit-to-cost ratio (BCR) of 2.2.

216. Recommendations for provision of Federal participation in the selected plan described in this report would require the project sponsor to enter into a written Project Cooperation Agreement, as required by Section 221 of PL 91-611, as amended, to

provided local cooperation satisfactory to the Secretary of the Army. Such local cooperation shall provide the following non-Federal responsibilities:

Items of Non-Federal Cooperation.

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 plus 50% of initial project costs assigned to protecting recreational public lands, and 50% 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 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;

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. Give the Federal Government a right to enter, at reasonable times and in a reasonable manner, upon property that the non-Federal Sponsor, now or hereafter, owns or controls for access to the project for the purpose of inspecting, operating, maintaining, repairing, replacing, rehabilitating, or completing the project. No completion, operation, maintenance, repair, replacement, or rehabilitation by the Federal Government shall relieve the non-Federal Sponsor of responsibility to meet the non-Federal Sponsor's obligations, or to preclude the Federal Government from pursuing any other remedy at law or equity to ensure faithful performance;

d. Hold and save the United States free from all damages arising from the initial construction, periodic nourishment, operation, maintenance, repair, replacement, and rehabilitation of the project and any project-related betterments, except for damages due to the fault or negligence of the United States or its contractors;

e. Keep and maintain books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to the project in accordance with 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 Code of Federal Regulations (CFR) Section 33.20;

f. 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;

g. 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;

h. 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;

i. 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;

j. Comply with all applicable Federal and State laws and regulations, including, but not limited to, Section 601 of the Civil Rights Act of 1964, Public Law 88-352 (42 U.S.C. 2000d), Department of Defense Directive 5500.11 issued pursuant thereto, as well as Army Regulation 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army," and Section 402 of the Water Resources Development Act of 1986, as amended (33 U.S.C. 701b-12), requiring the non-Federal preparation and implementation of floodplain management plans;

k. 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;

l. Participate in and comply with applicable Federal floodplain management and flood insurance programs;

m. Do not use Federal funds to meet the non-Federal sponsor's share of total project costs unless the Federal granting agency verifies in writing that the expenditure of such funds is authorized;

n. Prescribe and enforce regulations to prevent obstruction of or encroachment on the project that would reduce the level of protection it affords or that would hinder future periodic nourishment and/or the operation and maintenance of the project;

o. Not less than once each year, inform affected interests of the extent of protection afforded by the project;

p. Publicize floodplain information in the area concerned and provide this information to zoning and other regulatory agencies for their use in preventing unwise future development in the floodplain, and in adopting such regulations as may be necessary to prevent unwise future development and to ensure compatibility with protection levels provided by the project;

q. For so long as the project remains authorized, the non-Federal Sponsor shall ensure continued conditions of public ownership and use of the shore upon which the amount of Federal participation is based;

r. Provide and maintain necessary access roads, parking areas, and other public use facilities, open and available to all on equal terms;

s. Recognize and support the requirements of Section 221 of Public Law 91-611, Flood Control Act of 1970, as amended, and Section 103 of the Water Resources Development Act of 1986, Public Law 99-662, as amended, which provides that the Secretary of the Army shall not commence the construction of any water resources project or separable element thereof, until the non-Federal sponsor has entered into a written agreement to furnish its required cooperation for the project or separable element; and

t. 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.

u. For so long as the project remains authorized, the Non-Federal Sponsor shall ensure continued conditions of Public ownership and use of the shore upon which the amount of Federal participation is based.

DISCLAIMERS

217. The recommendations herein reflect the information available at this time and current Departmental policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a national Civil Works construction plan nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before they are transmitted to higher authority as proposals for project modifications and/or implementation funding.

218. The recommendations herein for provision of a hurricane and storm damage reduction project for Lido Key, Florida, do not include any provisions for work which would result in any new Federal expenditures or financial assistance prohibited by the Coastal Barrier Resources Act (Public Law 97-348); nor where funds obligated in past years for this project for purposed prohibited by this Act.

VIII. CERTIFICATION OF PUBLIC ACCESSIBILITY

219. As part of the obligations established in the project cooperation agreement for the Lido Key hurricane and storm damage reduction project, the non-Federal sponsor shall assure continued conditions of public ownership and public use of the shore upon which Federal participation is based during the economic life of the project. The non-Federal sponsor shall also provide and maintain necessary access to roads, parking areas, and other public use facilities, open and available to all on equal terms.

220. In the determination of the Federal interest in cost sharing, Federal participation was limited to areas where adequate parking and access are available. For shoreline reaches farther than ¼ mile from public parking and/or beach access points, Federal participation was not provided. The maximum Federal participation allowable for each land use category is applied for cost sharing.

221. It was determined that there is ample parking available to all on an equal basis to meet user demand in the project area. Therefore, I conclude that there is reasonable public availability of the project beaches in all areas where Federal participation is provided.

James G. May
Colonel, U.S. Army
District Engineer

IX. REFERENCES

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

City of Sarasota. 1965. *Lido Study No.2 – A Preliminary Plan for Public Beach Expansion and Shoreline Stabilization.* Sarasota, FL.

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

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

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. 1992. *Sand Search Report, Lido Key Beach Restoration Project.* Boca Raton, FL.

Coastal Planning & Engineering, Inc. 1993. *Big Sarasota Inlet Management Plan.* Boca Raton, FL.

Coastal Planning & Engineering, Inc. 1994. *New Pass Inlet Management Plan.* Boca Raton, FL.

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

Coastal Planning & Engineering, Inc., 1999. *Town of Longboat Key, Phase II Offshore Borrow Area Investigation to Locate "White Sand" Sources for Beach Renourishment of Longboat Key,* Boca Raton, Florida.

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

Florida Department of Environmental Protection. 2000. *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. Tallahassee, FL. http://www.dep.state.fl.us/beach/pdf/errptall.pdf.

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.

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.

University of Florida. 1961. *Brief Report on Coastal Protection at South Lido Beach.* University of Florida – College of Engineering. Gainesville, FL.

U.S. Army Corps of Engineers. 1962. *Detailed Project Report on Sarasota Passes.* Sarasota, Florida. U.S. Army Corps of Engineers District, Jacksonville District, FL.

U.S. Army Corps of Engineers. 1963. *Survey-Review Report on Sarasota Passes,* Sarasota, Florida. U.S. Army Corps of Engineers District, Jacksonville, District, FL.

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.

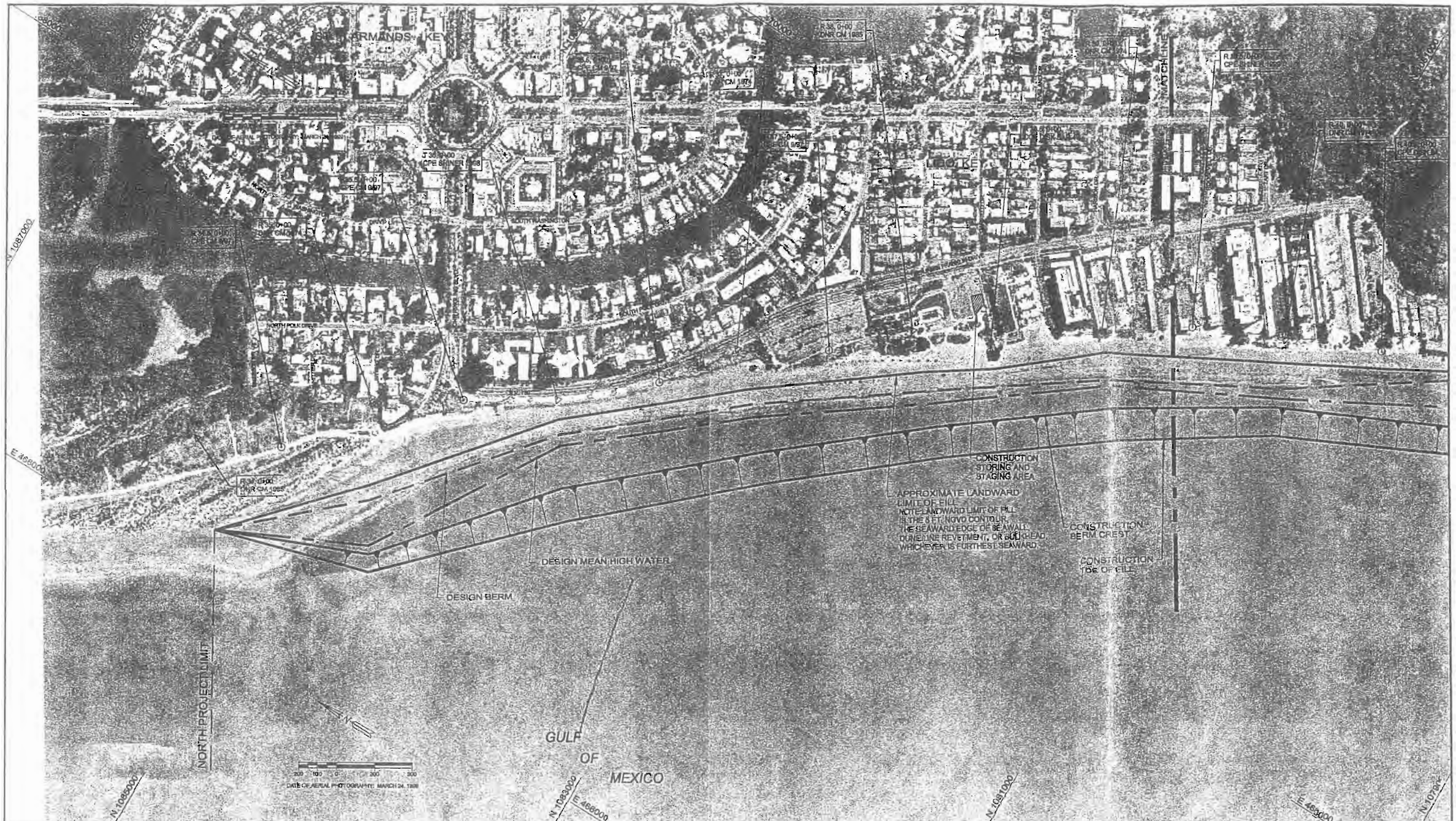
U.S. Army Corps of Engineers. 1970. *Beach Erosion Control Project for Lido Key,* Sarasota County, Florida. U.S. Army Corps of Engineers District, Jacksonville, FL.

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. 1984. *Shore Protection Manual*, 4th Edition, 2 Vols., U.S. Army Engineer Waterways Experiment Station, Coastal Engineering Research Center, U.S. Government Printing Office, Washington D.C.

U.S. Army Corps of Engineers. 1991. *Sarasota County, Florida Shore Protection Project, General Design Memorandum*: U.S. Army Corps of Engineers District, Jacksonville, FL.

U.S. Army Corps of Engineers. 1997. *Section 905(b) (WRDA) Analysis: Reconnaissance Phase Assessment for Lido Key*, Sarasota County, Florida, U.S. Army Corps of Engineers District, Jacksonville, FL.



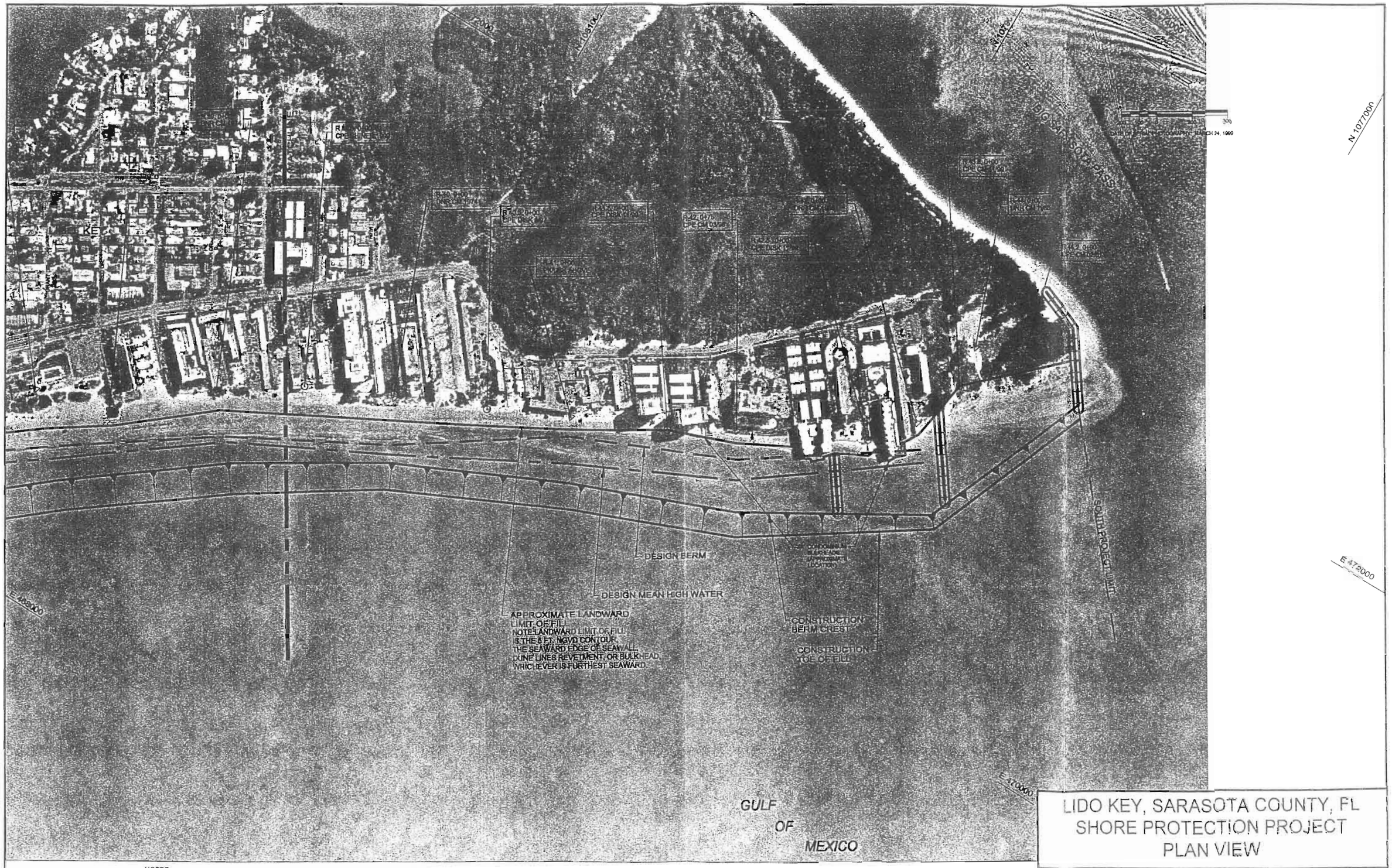
NOTES:

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



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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

August 2002

Environmental Assessment

Lido Key Shore Protection Project

Sarasota County, Florida

U.S. Army Corps
of Engineers
Jacksonville District

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

REPLY TO
ATTENTION OF

LIDO KEY SHORE PROTECTION PROJECT
FEASIBILITY STUDY
LIDO KEY
SARASOTA COUNTY, FLORIDA
FINDING OF NO SIGNIFICANT IMPACT

I have reviewed the Environmental Assessment (EA) for the proposed action. This Finding incorporates by reference all discussions and conclusions contained in the Environmental Assessment enclosed hereto. Based on information analyzed in the EA, reflecting pertinent information obtained from agencies having jurisdiction by law and/or special expertise, I conclude that the proposed action will not significantly impact the quality of the human environment and does not require an Environmental Impact Statement. Reasons for this conclusion are in summary:

1. The project includes the nourishment of the Lido Key shoreline using material obtained from three offshore borrow sites, and the construction of a groin field at the southern end of Lido Key near Big Sarasota Pass. Minimal environmental resources occur within the project area.

2. The proposed action would not jeopardize the continued existence of any threatened or endangered species or adversely impact any designated "critical habitat".

3. The proposed project has been determined to be consistent with the Florida Coastal Zone Management Program.

4. State water quality standards will be met.

5. In coordination with the State Historic Preservation Officer, it was determined that the project will not impact any sites of cultural or historical significance.

6. Measures to eliminate, reduce, or avoid potential impacts to fish and wildlife resources include the following: (1) Offshore hardbottom formations would be protected with a 200-ft. buffer zone where no dredging would be permitted, (2) The standard manatee protection measures would be followed for all water based activities, (3) The Jacksonville District's Migratory Bird Protection Policy would be followed if any migratory birds are

encountered, (4) Measures to prevent or minimize impacts to sea turtles in accordance with the terms and conditions of the Biological Opinions from the U.S. Fish and Wildlife Service and the National Marine Fisheries Service will be implemented.

17 SEPTEMBER 2002
Date

James G. May
Colonel, U.S. Army
District Engineer

ENVIRONMENTAL ASSESSMENT
ON
LIDO KEY SHORE PROTECTION PROJECT
SARASOTA COUNTY, FLORIDA

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ENVIRONMENTAL ASSESSMENT
ON
LIDO KEY SHORE PROTECTION PROJECT
SARASOTA COUNTY, FLORIDA

1 PROJECT PURPOSE AND NEED

1.1 PROJECT AUTHORITY.

1.1.1 INITIAL AUTHORIZATION.

A beach erosion control project was authorized for Lido Key by the 1970 River and Harbor Act. The project provided for initial restoration and periodic nourishment for 1.2 miles of shoreline. The city of Sarasota completed the northern half of the project in 1970 with no Federal participation. The project was never completed and was deauthorized on 1 January 1990. Maintenance dredged material from the Federal navigation project at New Pass is periodically placed on Lido Key beach.

1.1.2 SUPPLEMENTAL APPROPRIATION.

The Water Resources Development Act of 1999 reauthorized the Lido Key Shore Protection Project, which allows for the continuation with the Feasibility phase of the study and preparation of the feasibility report.

1.2 PROJECT LOCATION.

The project is located in Sarasota County off the west coast of Florida, near the central portion of the Florida peninsula and about 45-miles south-southwest of Tampa. The island is approximately 2.5 miles in length and lies entirely within the corporate limits of the city of Sarasota. New Pass separates Lido Key from Longboat Key to the north and Big Sarasota Pass separates Lido Key from Siesta Key to the south. (see **figure 1**, vicinity map and **figure 2 and 3**, project plan view)

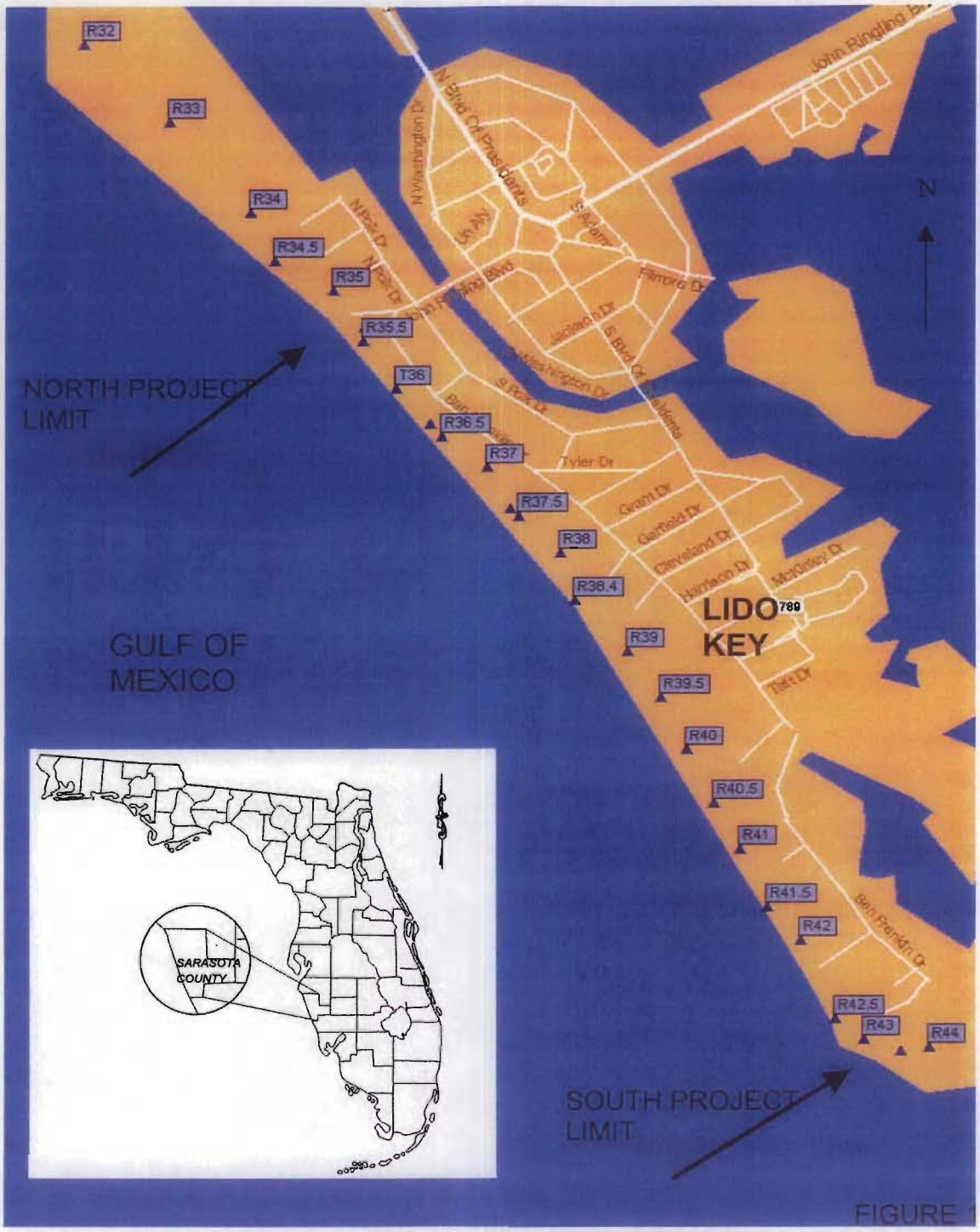
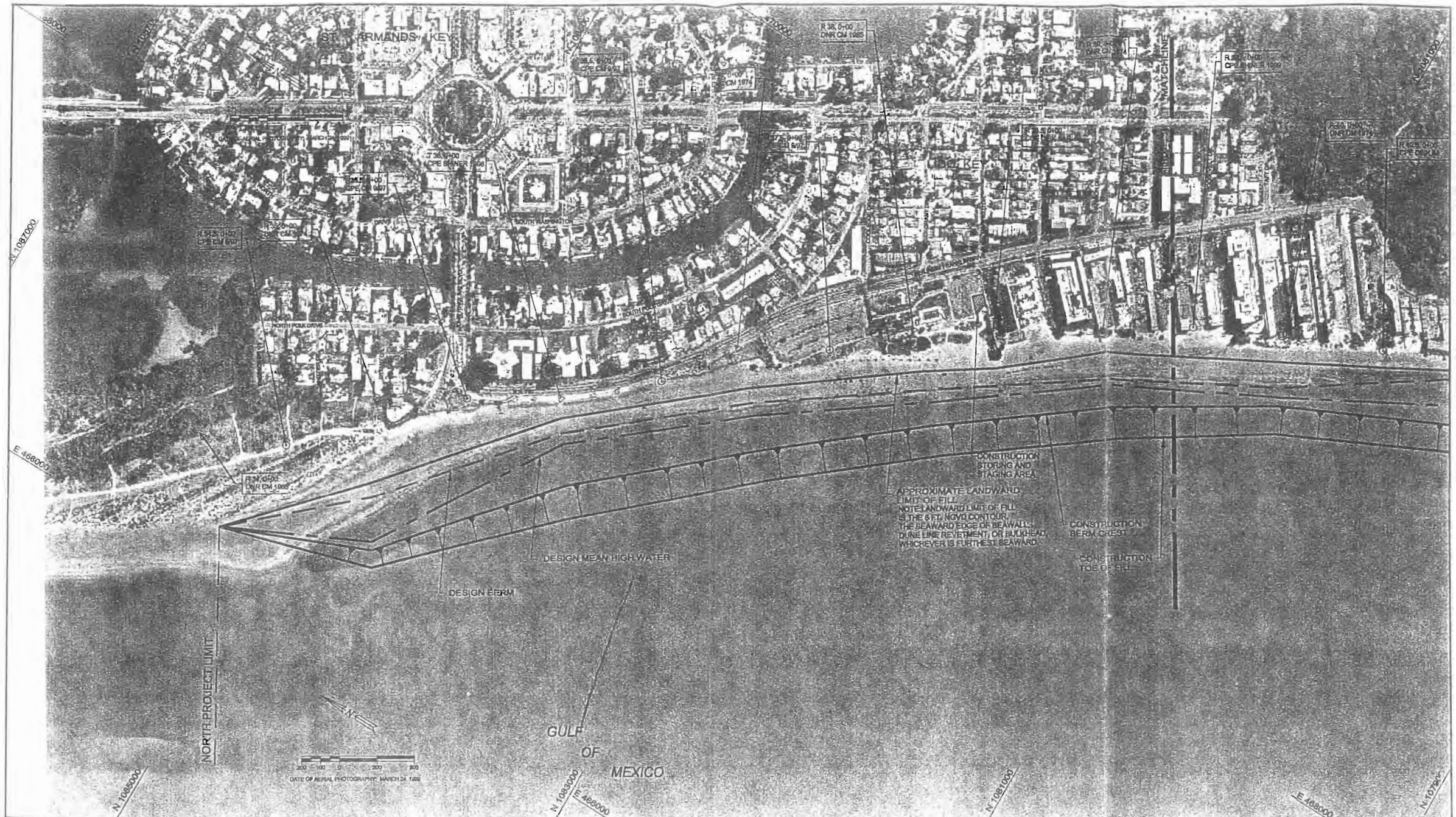


FIGURE 1. LIDO KEY VICINITY MAP



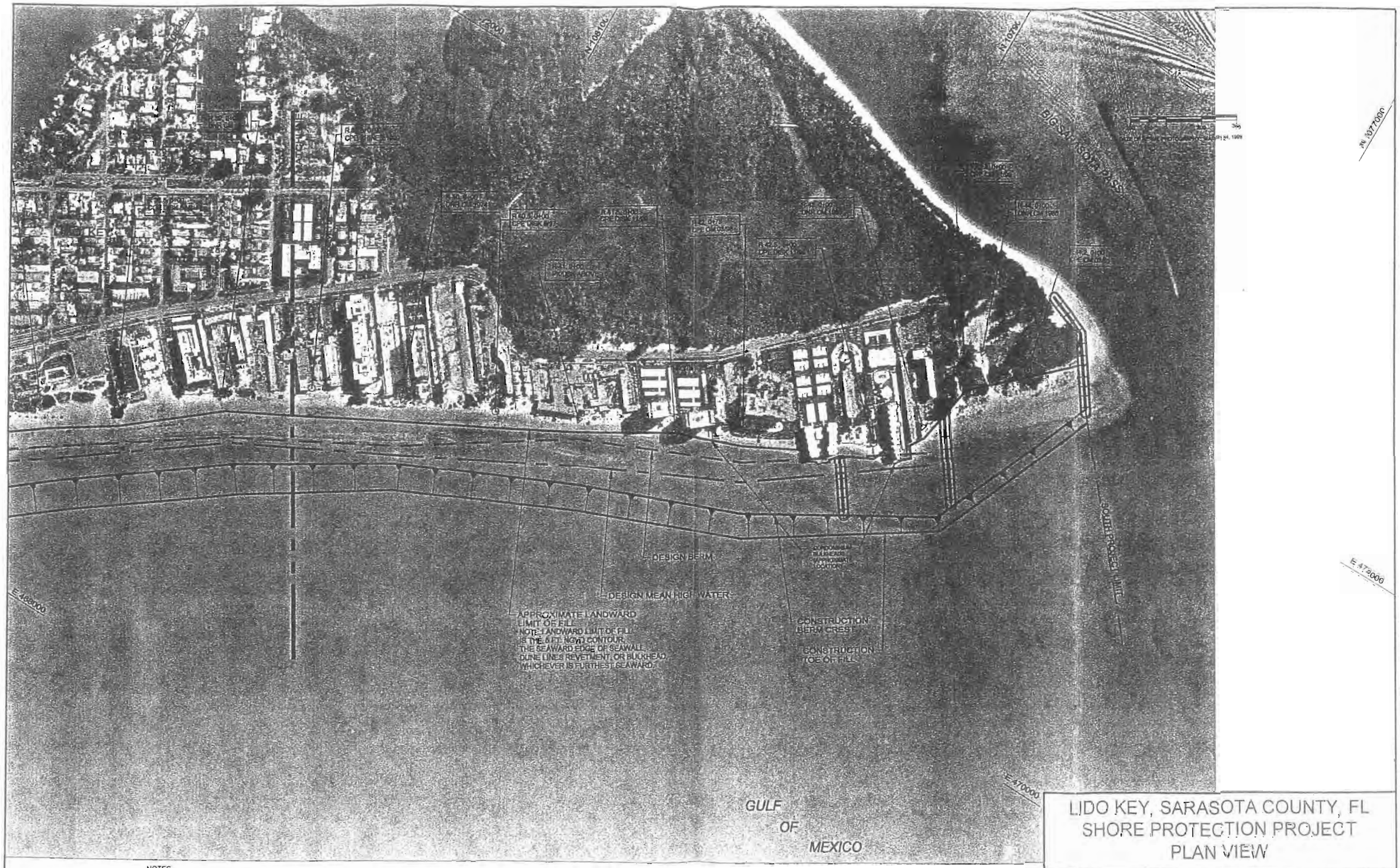
NOTES:

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 2



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

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FIGURE 3

1.3 PURPOSE OF AND NEED FOR ACTION.

The Coastal erosion has been, and continues to be, a persistent problem on Lido Key, threatening 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 this has not been sufficient to prevent the beaches of Lido Key from eroding. 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.

The U.S. Army Corps of Engineers is conducting a feasibility phase study to investigate the benefits of beach nourishment on Lido Key including the provisions of groin structures at the south end of the island. Alternative plans considered for this study include no-action, beach nourishment, and groin structures. The selected plan consists of a beach fill and groin field with 1,000 ft. tapers at the northern and southern ends. The design berm would be 80-ft. at +5 ft-NGVD with a construction slope of 1/10. This plan would require approximately 479,000 cy of design fill and 502,754 cy of advance nourishment. Construction of three groins at the southern end of the island would also be part of the selected plan. Three offshore borrow areas were identified. Nourishment would be provided at 5-year intervals over the 50-year life of the project. Construction of the project would begin in 2004 and is expected to take 4-6 months to complete.

1.4 AGENCY GOAL OR OBJECTIVE.

The study objective is to analyze the environmental impacts of the alternatives, including the proposed action, while being consistent with protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal Planning requirements.

Objectives include: (1) the reduction of expected storm damage through beach nourishment and other project alternatives; (2) reestablishing beaches as suitable recreational areas; (3) maintaining suitable beach habitat for nesting sea turtles, invertebrate species and shorebirds; and (4) maintaining commerce associated with beach recreation in Sarasota County.

The Project goal is to reduce the continued erosion and provide hurricane and storm damage protection for the Gulf of Mexico shoreline of Lido Key (see **figure 1**, vicinity map, **figures 2 and 3**, project plan view and **figures 4 & 5**, typical cross sections).

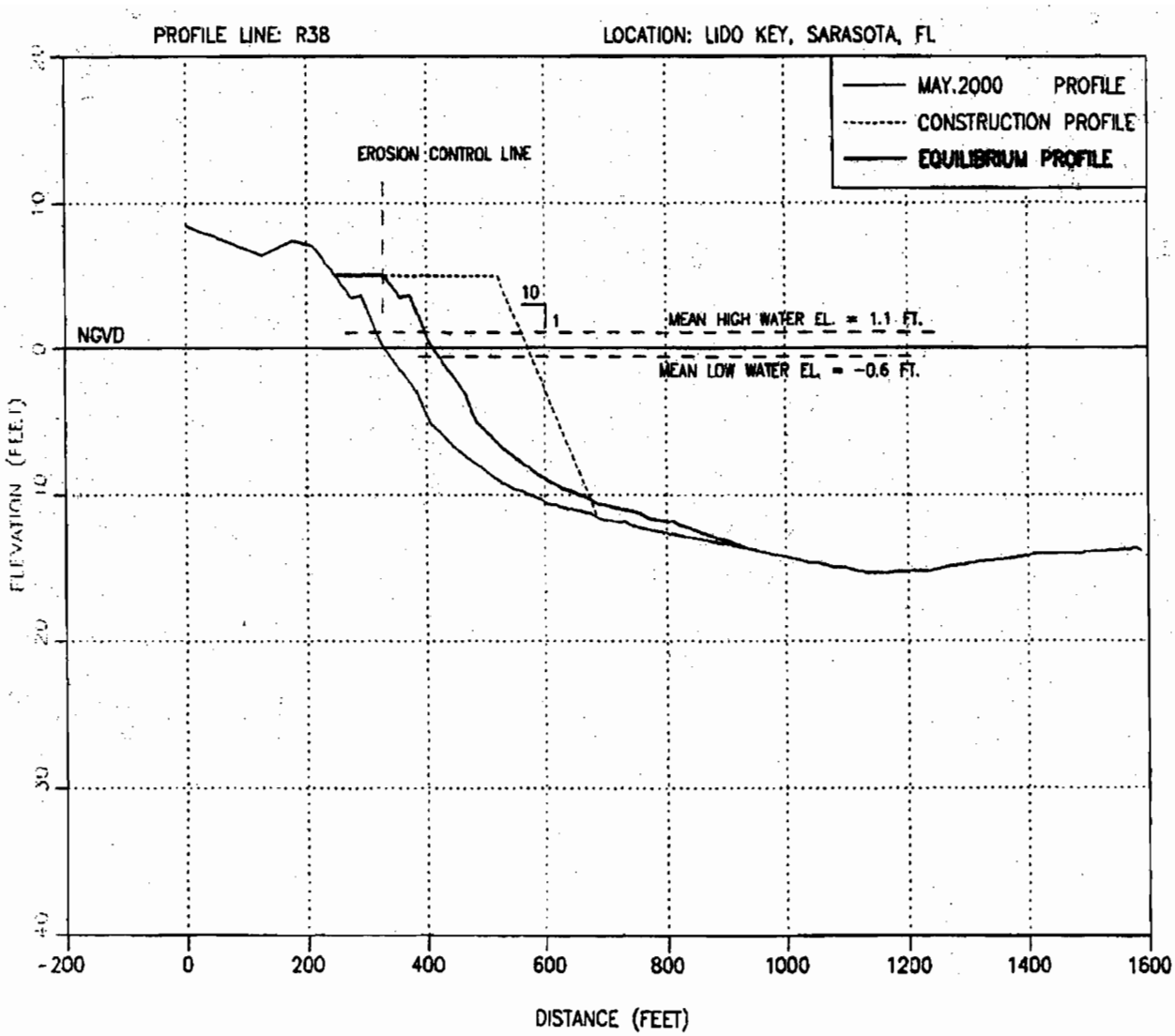
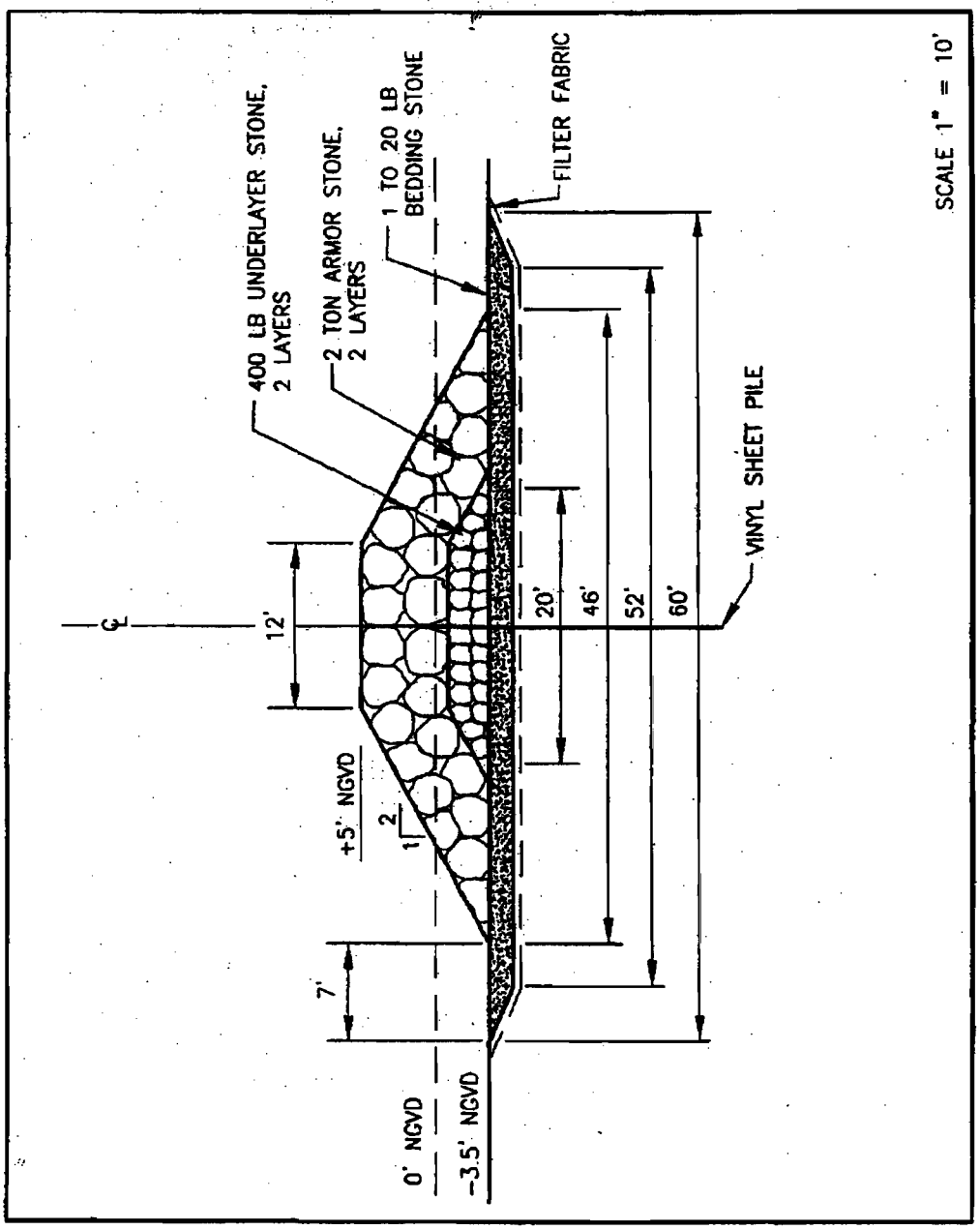


FIGURE 4. Typical Beach Cross Section, Lido Key, Sarasota, Florida



LIDO KEY, SARASOTA, FL
TYPICAL GROIN
CROSS SECTION

COASTAL PLANNING & ENGINEERING INC.

FIGURE 5. Typical Groin Cross Section, Lido Key, Sarasota, Florida

1.5 RELATED ENVIRONMENTAL DOCUMENTS.

•Beach Erosion Control Study, Interim Report on Lido Key, Sarasota County, Florida. U.S. Army Corps of Engineers, Jacksonville District, September 1968.

•Beach Erosion Control Study for Lido Key, A Reconnaissance Phase Assessment , Sarasota County, Florida. U.S. Army Corps of Engineers, Jacksonville District, January 1997.

1.6 DECISIONS TO BE MADE.

This Environmental Assessment will evaluate whether the proposed project would cause any significant environmental impacts and would make available to all decision makers and interested parties, a discussion of alternatives, which eliminate or minimize adverse impacts.

1.7 SCOPING AND ISSUES.

1.7.1 ISSUES EVALUATED IN DETAIL.

The following five environmental issues were identified to be relevant to the proposed action and appropriate for detailed evaluation. The issues identified were based on agency coordination during the scoping process and through resource surveys and prior studies conducted for the City of Sarasota.

a. Impacts on sea turtles.
b. Impacts to seagrass communities.
c. Impacts to hardground communities.
d. Impacts to shorebirds.
e. Impacts to manatees.

1.7.2 IMPACT MEASUREMENT.

The following provides the means and rationale for measurement and comparison of impacts of the proposed action and alternatives.

1.7.2.1 Sea Turtles: Continued beach erosion would reduce the amount of available sea turtle nesting habitat. The proposed renourishment project would have a positive impact on nesting loggerhead turtles by helping to maintain the nesting beach within the project area. Sea turtles may also be negatively impacted by nourishment activities and hopper dredge use. Concerns include the timing of construction activities, the potential burial of sea turtle nests, and compaction of beach sand due to construction activities. It is our goal to minimize impacts to sea turtles and to comply with the requirements of the Endangered Species Act.

1.7.2.2 Seagrass Communities: Seagrass beds represent one of the most productive and important habitats in the nearshore marine systems of Florida (Myers, 1990). Seagrasses are found at shallow depths in protected bays and lagoons and in patches along the continental shelf of the Gulf of Mexico. Two of the most extensive seagrass beds in continental North America occur along the southwest and north Florida Gulf coasts. Coverage in Florida Bay approximates 5000 km^2, while the beds lining the north Florida Gulf coast (Apalachee Bay) cover 3000 km^2 (Meyers, 1990). Seagrasses provide shelter, nursery and feeding habitat for many fish and shellfish. Grass beds also help to improve water clarity by anchoring bottom sediments and reducing nutrients in the water column (TBNEP 1996). Five species of seagrasses occur in waters of Sarasota County. Species common to the Sarasota Bay estuary and nearshore marine zones around Lido key include shoal grass (*Holodule wrightii*)), manatee grass (*Syringodium filiforme*), turtle grass (*Thalassia testudinum*), star-grass (*Halophila englemannii)* and widgeon grass (*Ruppia maritime*) (USFWS, 2002a).

1.7.2.3 Hardground Communities: Hardground communities are benthic habitats dominated by epifaunal organisms such as sponges, hard and soft corals, hydroids, anemones, barnacles, bryozoans, decapod crustaceans and gastropods. Hard bottom communities can be found throughout the central and southern coastal regions of Florida. Community composition varies as bottom type varies from the well-documented coral reefs of southeastern and Keys region of the state to the vermitid and coquina reefs of east central Florida and the limestone outcroppings of the west central coast (lewis and Savercool 1994). Based on experience with beach renourishment and use of off-shore borrow sources on the Gulf coast, impacts to hardground and reefs can be predicted based on proximity, currents, nature of borrow material, buffer zones and other factors (USACE, 1998). Our desire in selecting an alternative is to keep impacts to these resources to the minimum practicable in consideration of other project requirements.

1.7.2.4 Shorebirds: There may be a temporary adverse impact on migratory bird nesting should the construction occur during the 1 April through 31 August timeframe. However, the impact would be minimized by implementing the U.S. Army Corps of Engineers, Jacksonville District, Migratory Bird Protection Policy.

1.7.2.5 West Indian Manatee: Even though manatees may be found almost anywhere in Florida where water depths are greater than 3.3 to 6.6 ft (FWS 1996), the proposed project area is not considered a high use area by the manatee. Manatees are more likely to use the deeper channels to the north and south of Lido Key for traveling to the adjacent estuarine waters. These waters support viable seagrass beds and are potential foraging areas for the manatee. Protective measures would be established to minimize impacts to manatees.

1.7.3 ISSUES ELIMINATED FROM DETAIL ANALYSIS.

The following issues were not considered important or relevant to the proposed action:

1.7.3.1 Right Whale: The right whale is not known to frequent the shallow coastal waters near the fill site or borrow areas, but may be found in deeper, offshore waters during the winter months. Because of the nature of the work, this issue is eliminated from detail analysis.

1.7.3.2 Gulf Sturgeon: The Gulf sturgeon (*Acipenser oxyrinchus desotoi*) is essentially confined to the Gulf of Mexico river systems north of Tampa Bay. No information has been found to indicate a past history of negative impacts to Gulf sturgeon as a result of previous beach nourishment or offshore borrow area dredging activities in the project area. Gulf sturgeon are not likely to be affected by this project.

1.8 PERMITS, LICENSES, AND ENTITLEMENTS.

Water Quality Certification (WQC) would be applied for as required by Section 404(b)(1) of the Clean Water Act. The WQC would be submitted to the Florida Department of Environmental Protection by the local sponsor, Sarasota County.

2 ALTERNATIVES

The alternatives section is the heart of this EA. This section describes in detail the no-action alternative, the proposed action, and other reasonable alternatives that were studied in detail. Then based on the information and analysis presented in the sections on the Affected Environment and the Probable Impacts, this section presents the beneficial and adverse environmental effects of all alternatives in comparative form, providing a clear basis for choice among the options for the decision maker and the public.

2.1 DESCRIPTION OF ALTERNATIVES.

2.1.1 NO ACTION ALTERNATIVE (STATUS QUO)

This alternative assumes that the erosion will continue with no solutions or remedial measures being constructed. The no action would allow existing conditions to continue. The beach would continue to erode, property would become more vulnerable to damage from coastal storms, and a valuable recreation resource would be lost. Recession of the shoreline would occur with subsequent loss of valuable property and damage to structural improvements along the respective shorelines.

2.1.2 ALTERNATIVE A, BEACH FILL WITH PERIODIC NOURISHMENT

This alternative provides for initial restoration and periodic nourishment of the gulf shoreline on Lido Key. Beach compatible material would be obtained from offshore borrow sites. The project design would consist of an 80 ft. wide berm at Elevation +5 NGVD. The berm would run from DEP monument marker 35 to marker 43. The project would consist of a 9,000 ft. beach and would have a 990 ft. taper on the north past DEP monument 35 and an 850 ft. taper to the south past DEP monument 43. The berm will slope from +5 NGVD to existing ground on a slope of 1V on 10H. An estimated 982,000 cubic yards of material would be used. The renourishment interval is 3-years.

2.1.3 ALTERNATIVE B, BEACH FILL WITH PERIODIC NOURISHMENT WITH TERMINAL GROIN FIELD

This alternative provides the same beach nourishment features as alternative A, but also provides for the construction of three linear groins at the southern end of Lido Key near Big Sarasota Pass. These structures would range from 650 to 320 feet in length and would be oriented along a bearing of 55 degrees west of north. The groins would have a crest height of +5 ft. NGVD and extend to –3 ft. NGVD. This alternative would allow for a 5-year renourishment interval.

2.1.4 BORROW AREAS

Three offshore borrow areas, referred to as LKBA 5, LKBA 6 and LKBA 7, were identified for further investigation for this study. See **figure 6** for borrow area locations and **figure 7** for borrow area limits. LKBA 5 is located 7.2 nautical miles offshore of Lido Key. The deposits in this area consists of medium grained sand, with low silt content (1.7% to 2.6%) mixed with some shell fragments/hash. LKBA 6 is located 8.5 nautical miles offshore of Lido Key. The deposits in this area consists of medium grained sand, with low silt content (0.11% to 4.6%) mixed with some shell fragments/hash. LKBA 7 is located 9.5 nautical miles offshore of Lido Key. The deposits in this area consists of medium grained sand, with low silt content (1.7% to 3.0%) mixed with some shell fragments/hash. The borrow area sediment characteristics appear in **Table 1**. Due to distance of these borrow areas from Lido Key, it would be likely that a hopper dredge would be used to transport the material.

Table 1. Borrow Area Sediment Characteristics, Lido Key, Florida

	AVAILABLE VOLUME (c.y.)	MEAN GRAIN SIZE (mm)	MEAN GRAIN SIZE (phi)	SORTING (phi)
NATIVE BEACH		0.24	2.08	0.93
BORROW AREA 5	209,570	0.40	1.32	0.71
BORROW AREA 6	1,063,017	0.32	1.63	0.71
BORROW AREA 7	601,536	0.43	1.21	0.40

2.2 ISSUES AND BASIS FOR CHOICE

The alternative plans were evaluated based on analyses of historic shoreline trends, numerical coastal modeling, analyses of costs and benefits, and effect on the environment. The recommended plan is the alternative that provides shore protection and erosion control on Lido Key in a manner that provides the greatest National Economic Development (N.E.D.) benefits.

2.3 PREFERRED ALTERNATIVE

Alternative B is the preferred alternative. (See also **figures 1, 2 and 3** in section 1).

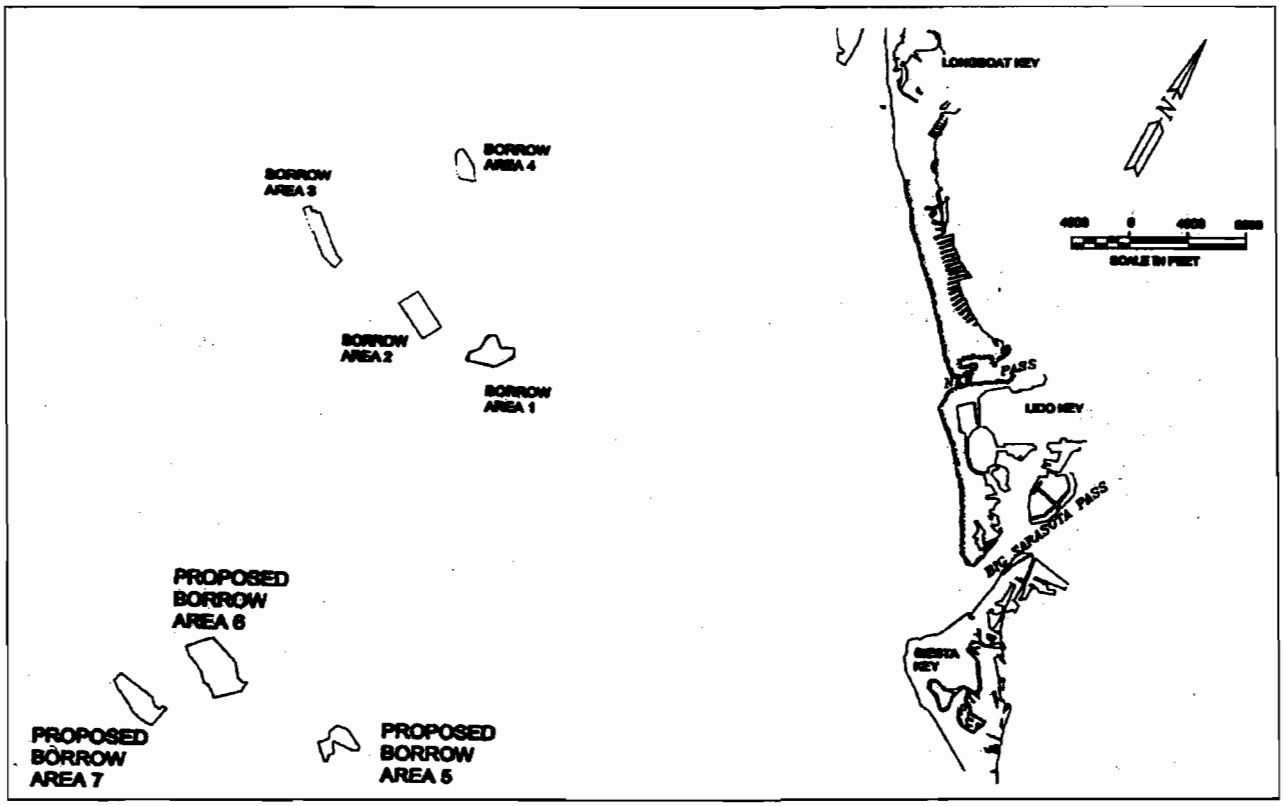
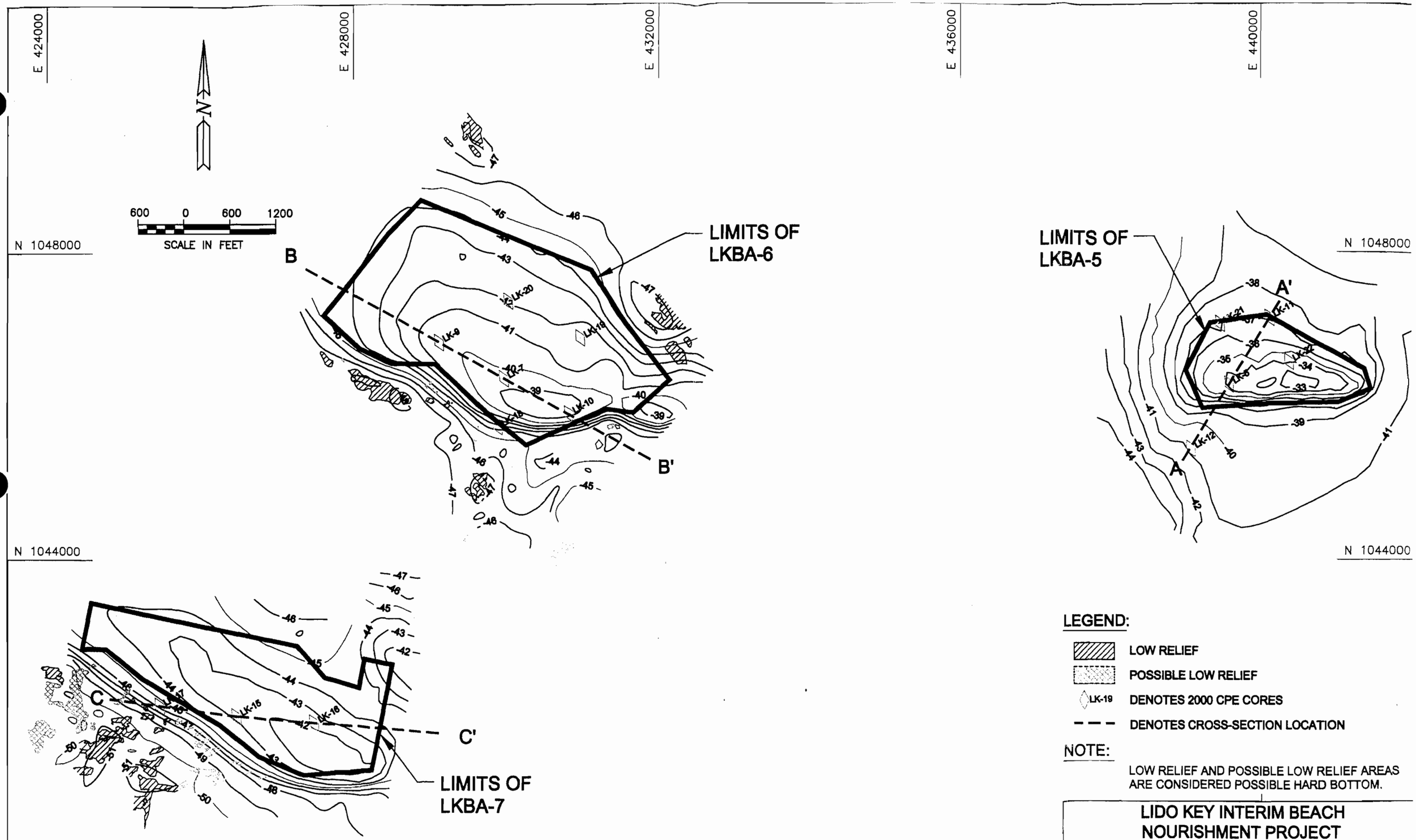


FIGURE 6. Proposed Borrow Area Locations (LKBA 5, 6, AND 7), Lido Key, Sarasota, Florida



LEGEND:

- LOW RELIEF
- POSSIBLE LOW RELIEF
- LK-19 DENOTES 2000 CPE CORES
- DENOTES CROSS-SECTION LOCATION

NOTE:

LOW RELIEF AND POSSIBLE LOW RELIEF AREAS ARE CONSIDERED POSSIBLE HARD BOTTOM.

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

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FIGURE 7

2.4 COMPARISON OF ALTERNATIVES

Table 2 lists alternatives considered and summarizes the major features and consequences of the proposed action and alternatives. See section 4.0 Environmental Effects for a more detailed discussion of impacts of alternatives.

2.5 MITIGATION

As a means to protect, and avoid impact to hardgrounds near the borrow areas, a 200-ft. buffer zone would be established. No further mitigation is required. Section 4.21, Environmental Commitments, discuses other procedures that would be implemented to avoid or minimize potentially adverse environmental impacts.

Table 2: Summary of Direct and Indirect Impacts

ALTERNATIVE ENVIRONMENTAL FACTOR	A – Beach Fill with Periodic Nourishment	B – Beach Fill with Periodic Nourishment with Groin Field (Preferred Alternative)	Lido Key Borrow Area (LKBA) 5	Lido Key Borrow Area (LKBA) 6	Lido Key Borrow Area (LKBA) 7	No Action Status Quo
PROTECTED SPECIES	Beach fill activities could impact sea turtle nesting or hatching.	Beach fill activities could impact sea turtle nesting or hatching.	No impacts expected.	No impacts expected.	No impacts expected.	Beach would continue to erode, reducing or eliminating sea turtle nesting habitat.
HARD GROUND	No impact.	No impact.	No impact.	Potential indirect impacts, however, none expected.	Potential indirect impacts, however, none expected.	No impact.
SHORELINE EROSION	Beach erosion would be prevented or reduced.	Beach erosion would be prevented or reduced.	No impact.	No impact.	No impact.	Beach erosion and shoreline recession would continue.
FISH AND WILDLIFE RESOURCES	Temp. effect on fishes and infaunal communities. May affect nesting shorebirds.	Temp. effect on fishes and infaunal communities. May affect nesting shorebirds.	Temp. effect on benthic communities	Temp. effect on benthic communities	Temp. effect on benthic communities	Beach would continue to erode, reducing bird-nesting habitat.
VEGETATION	No impact expected.	No impact expected.	No impact expected.	No impact expected.	No impact expected.	No impact.
WATER QUALITY	Temp. increase in turbidity and suspended sediments.	Temp. increase in turbidity and suspended sediments.	Temp. increase in turbidity and suspended sediments.	Temp. increase in turbidity and suspended sediments.	Temp. increase in turbidity and suspended sediments.	No impact.

ALTERNATIVE ENVIRONMENTAL FACTOR	A – Beach Fill with Periodic Nourishment	B – Beach Fill with Periodic Nourishment with Groin Field (Preferred Alternative)	Lido Key Borrow Area (LKBA) 5	Lido Key Borrow Area (LKBA) 6	Lido Key Borrow Area (LKBA) 7	No Action Status Quo
HISTORIC PROPERTIES	No impact expected.	No impact expected	No impact expected.	No impact expected.	No impact expected.	No impact.
RECREATION	Provide increase opportunities for recreational activities.	Provide increase opportunities for recreational activities.	No impact.	No impact.	No impact.	Recreational opportunities could decrease due to erosion
AESTHETICS	Temp. impact due to presence of dredge & const. equipment.	Temp. impact due to presence of dredge & const. equipment.	Temp. impact due to presence of dredge.	Temp. impact due to presence of dredge.	Temp. impact due to presence of dredge.	No impact.
ECONOMICS	When compared to preferred alternative, would require more frequent renourishments at south end to maintain protection; thus, higher cost.	Reduced costs over the life of the project.	No impact.	No impact.	No impact.	Beach degredation with potential decrease in tourism and increase in storm damage costs.
ESSENTIAL FISH HABITAT	Potential indirect impacts associated with turbidity and sedimentation.	Potential indirect impacts associated with turbidity and sedimentation.	No impact expected.	Potential indirect impacts associated with turbidity and sedimentation.	Potential indirect impacts associated with turbidity and sedimentation.	No impact.

3 AFFECTED ENVIRONMENT

The Affected Environment section succinctly describes the existing environmental resources of the areas that would be affected if any of the alternatives were implemented. This section describes only those environmental resources that are relevant to the decision to be made. It does not describe the entire existing environment, but only those environmental resources that would affect or that would be affected by the alternatives if they were implemented. This section, in conjunction with the description of the "no-action" alternative forms the base line conditions for determining the environmental impacts of the proposed action and reasonable alternatives.

3.1 GENERAL ENVIRONMENTAL SETTING

Lido Key is a barrier island approximately 2.44 miles long, and ranges from 100 to 2,500 feet wide. 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 in the parks is disturbed. The beachfront consists of hotels, motels, private residential, and seasonal rental properties (**Photograph No. 1**). Upland vegetation on Lido Key is composed of both exotic and native species such as Australian pine, sea grape, and wax myrtle. Plants such as palms, grasses, saw palmetto, and sea oats can be found on the upper beach, especially on the north and south ends of the island.

Photograph No. 1 – Lido Key Beach, looking north.

Wildlife on Lido Key is generally limited to small mammals and birds. A variety of shore and wading birds may be encountered including gulls, turns, plovers, sandpipers, black skimmers, and herons (**Photograph No. 2**). Nesting sea turtles, primarily the loggerhead, occasionally use Lido Key beaches.

Photograph No. 2 – Black Skimmers, Gulls, Terns on Lido Key Beach

Common marine species found in the nearshore areas (littoral and sublittoral zones) are sea urchins, sand dollars, crustaceans such as crabs, coquina clams, and several gastropod and bi-valve mollusk species.

Coastal waters off Lido Key support a variety of commercial and sport fishes. Major species include tarpon, grouper, red snapper, king mackerel, and Spanish mackerel. The manatee, bottlenose dolphin and sea turtles may also be present.
(See **figure 8**, Map of Environmental Resources).

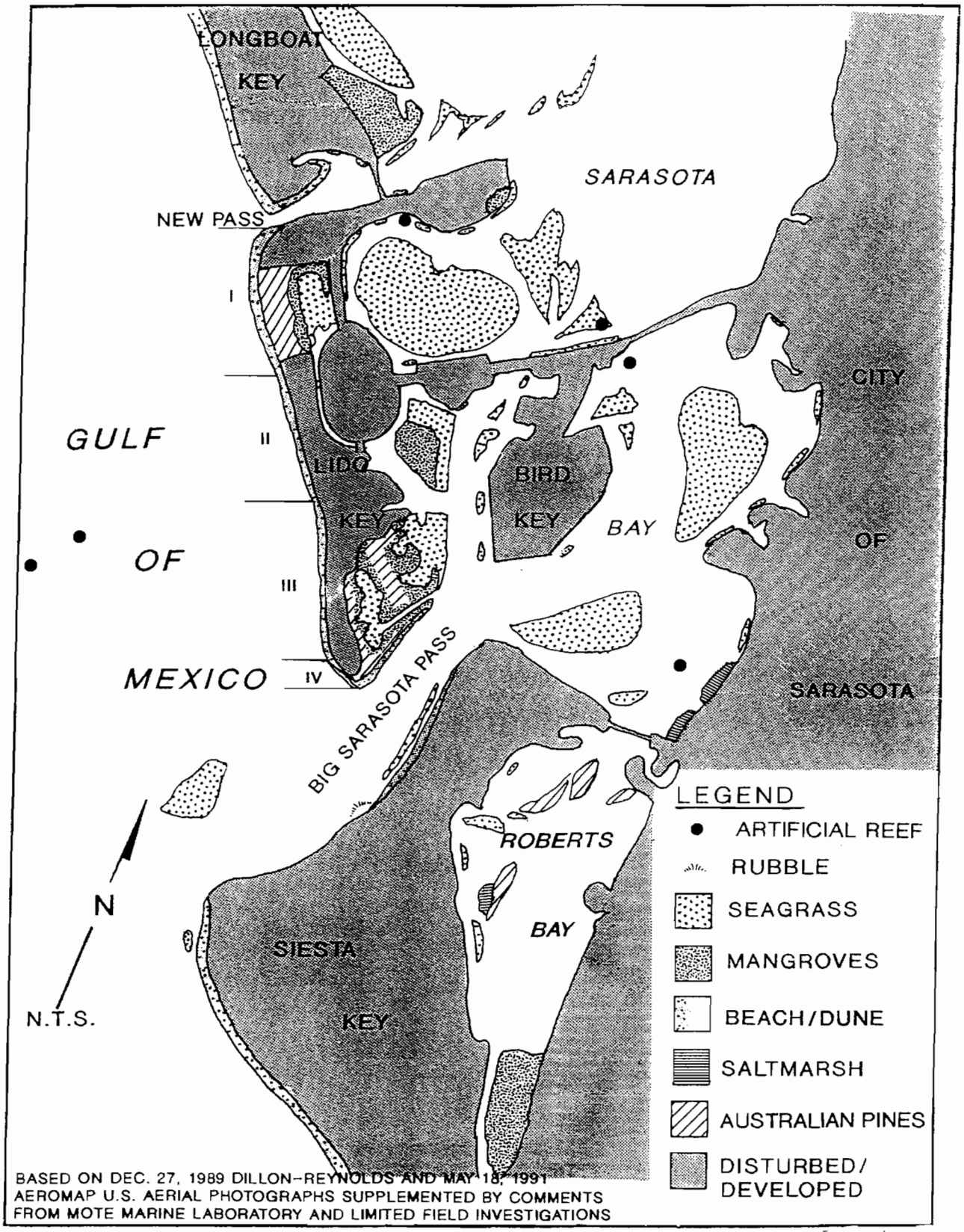


FIGURE 8

HABITATS ADJACENT TO
LIDO KEY

3.2 VEGETATION

Dial Cordy and Associates, Inc. was contracted in 2001 by the Corps to conduct a marine resource survey of the nearshore area adjacent to Lido Key. The purpose of the study was to identify, map and characterize potential nearshore marine resources (i.e. seagrass, hardgrounds) associated with the project area. No seagrass/algal communities were observed in the footprint of the beach fill boundaries, which includes the project's equilibrium toe of fill (ETOF). Three small seagrass patches were observed over 500-feet seaward of the ETOF. Two of the three patches occurred at the northern end of the survey area, approximately 1,800 and 2,000 feet offshore from DEP monument R-35, perpendicular to the beach. The third small patch was located approximately 2,000 feet offshore from DEP monument R-43. The seagrass was identified as shoal-grass (*Halodule wrightii*).

Based on the September 2001 visual inspection of borrow areas by Coastal Planning & Engineering, Inc. (CP&E) and the U.S. Fish and Wildlife Service (USFWS) personnel, seagrasses were not found in the borrow areas; however, an isolated patch of turtle grass, estimated to be less than three feet in diameter was located within 200 feet outside of the LKBA 6 boundary. Seagrass was not observed with in the vicinity of LKBA 5 or 7 (USFWS, 2002a).

3.3 THREATENED AND ENDANGERED SPECIES

3.3.1 SEA TURTLES

Of the listed species found in or near the project area, the loggerhead sea turtle (*Caretta caretta*) is most likely to be affected by the proposed project. On the west coast there were 8,639 nests reported during the year 1999, of which Sarasota County accounted for 3,316.

The green sea turtle (*Chelonia mydas*) is also a listed species in Sarasota County. Nesting data from Meylan (1995) and the Florida Marine Research Institute (unpubl. Data) indicate that from 1979 through 2000, a total of 13 green turtle nests have been recorded in Sarasota County on the beaches of Casey Key, Manasota Key, and Venice. The same data indicated that no green sea turtle nests were recorded on Lido Key.

3.3.1.1 Nesting Habitat

Utilizing the best available data, it has been determined that only the threatened loggerhead sea turtle have known nesting habitat on Lido Key beaches. In comparison to other beaches in Sarasota County, the beaches of Lido Key have the least number of reported loggerhead nests. Information provided by the Florida Marine Research Institute indicates that from 1992 to 2000, loggerhead sea turtle nest numbers varied from 32 to 60 on the approximately 4.2-mile long Lido Key nesting beach (refer to **Table 3** for nesting data).

Table 3. Nesting data from 1992 to 2000 for C. caretta on Lido Key, Sarasota County, Florida.

Year	Beach Length	Days per Week	# False Crawls	# Nests
1992	4.2	7	42	32
1993	4.2	7	35	35
1994	4.2	7	34	37
1995	4.2	7	50	34
1996	4.2	7	35	50
1997	4.2	7	44	45
1998	4.2	7	94	42
1999	4.2	7	57	48
2000	5.3	7	52	60

The loggerhead nesting and hatching season for southern Gulf of Mexico beaches extends from April 1 to November 30. Incubation ranges fro 45 to 95 days. The green turtle nesting and hatching season on southern Gulf of Mexico beaches extends from May 15 to October 30. Incubation ranges from about 45 to 75 days (USFWS 1999)

3.3.1.2 Offshore Habitat

Sea turtles may use the hardground areas adjacent to the borrow sites for resting and foraging. Literature has not shown that sea turtles utilize sandy areas offshore for congregation or resting as they do navigation channels.

3.3.2 WEST INDIAN MANATEE

The proposed project area is not considered a high use area by the manatee. Manatees are more likely to use the deeper channels to the north and south of Lido Key for traveling to the adjacent estuarine waters (USFWS, 2000).

3.3.3 SHOREBIRDS

Since 1998, shorebirds have established a thriving multi-species nesting colony on Lido Key between R-34 and R-35 (USFWS, 2002a). Least terns (*Sterna antillarum*) were among species observed in the colony. These shorebirds nest from April through August (USFWS, 2002a). The piping plover (*Charadrius melodus*) may utilize Lido Key beaches on a seasonal basis (i.e. winter). However, the nesting range for the piping plover does not include Florida. The piping plover is listed as a threatened species by the State of Florida and the Federal government. Another bird known to utilize the habitat on Lido Key beaches is the snowy plover (*Charadrius alexandrinus*). In 1998, two hatchlings were observed at the Lido Key colony, and in 2000, four adults were

observed (USFWS, 2002a). Several other protected bird species known to utilize habitat within the project area are the black skimmer (*Rynchops niger*) and the brown pelican (*Pelecanus occidentalis*).

All shorebirds present on Lido Key are federally protected under the Migratory Bird Treaty Act. Certain species are also listed by the State of Florida.

3.4 HARDGROUNDS

In December 2000, magnetic and acoustic remote sensing investigations were conducted at the three proposed borrow sites. Side scan sonar yielded some evidence for scattered low-relief hardground resources adjacent to LKBA 6 and 7. No hardground resources were identified in the vicinity of LKBA 5. Due to the possible presence of hardground resources in close proximity to the proposed sites, the USFWS requested dive investigations near the borrow sites. All dives associated with the borrow area investigations were conducted on September 24, 2001. CP&E and the USFWS performed the diving investigations. A Corps representative was also present during the investigations. The investigators concur that the low relief habitats documented adjacent to LKBA 6 and 7 are comprised primarily of unconsolidated sediments with scattered hardbottoms. **Photograph No. 3** shows a representation of this habitat. There are no low relief hardbottoms present within 200 feet of LKBA 6 and 7. The total hardbottom coverage within 400 feet of the borrow site boundaries were estimated to be less than ten percent with an average maximum height and width of approximately eighteen inches and two feet, respectively (USFWS, 2002a).

Aerial photographs of the project area shoreline have no indication of nearshore hardgrounds. Additionally, Side-scan sonar detected no hardgrounds adjacent to Lido Key. A marine resource survey was conducted in July 2001 to verify side-scan sonar results. No hardbottom resources were observed during this marine resource survey.

3.5 FISH AND WILDLIFE RESOURCES

Marine species in nearshore areas (littoral and sublittoral zones) identified by CP&E (1992) include the following invertebrates: polychaete worms, sand bugs, isopods, amphipods, mole crabs, coquina clams, sand dollars, sea urchins, pelecypod mollusks, sea hares, spider crabs, hermit crabs, several shrimp species, and several gastropod species.

Coastal waters off Lido Key contain a variety of commercial and sport fishes. The major species include tarpon, grouper, red snapper, king mackerel, Spanish mackerel and little tunny. **Photograph No. 4** shows fish species encountered near Lido Key borrow areas.

A multispecies bird nesting colony on Lido Key is an important resource for shorebirds. The colony is comprised of terns, plovers, and black skimmers. This multi-species nesting colony is located on Lido Key between R-34 and R-35. The State Fish and Wildlife Conservation Commission seasonally closes this section of the Lido Key beach

to recreational use to minimize human disturbance in and around the nesting shorebird colony (USFWS, 2002a).

3.6 ESSENTIAL FISH HABITAT

Marine water column, vegetated bottoms, non-vegetated bottoms, live bottoms, and artificial reefs can be expected to occur in the area of Lido Key and the offshore borrow areas (NMFS letter dated October 25, 2000, Appendix C). These habitats are identified as Essential Fish Habitat (EFH) in the 1998 Amendment of the Fishery Management Plans for the Gulf of Mexico. This Amendment was prepared by the Gulf of Mexico Fishery Management Council as required by the 1996 amendment to the Magnuson-Stevens Fishery Conservation and Management Act. Important aspects of EFH that may be affected include spawning, foraging, and refuge habitats for managed species such as fishes of the snapper/grouper complex, penaeid shrimp and spiny lobster.

3.7 COASTAL BARRIER RESOURCES

Neither the fill site nor the proposed borrow areas are located or adjacent to a designated Coastal Barrier Resources System Unit.

3.8 WATER QUALITY

The waters off the coast of Lido Key are listed as Class III waters by the State of Florida. Class III waters are suitable for recreation and propagation by fish and wildlife. In Class III waters, Florida state guidelines limit turbidity values to under 29 NTU above ambient levels outside the turbidity mixing zone during beach nourishment activities.

3.9 HAZARDOUS, TOXIC AND RADIOACTIVE WASTE

The Hazardous, Toxic and Radioactive Waste (HTRW) preliminary assessment indicated, that in general, no evidence of HTRW exists. During project construction HTRW awareness should be practiced.

The HTRW database review indicated that no contamination exists at the Lido Key disposal site.

3.10 AIR QUALITY

Ambient air quality along the Lido Key shoreline is good due to the presence of either onshore or offshore breezes.

3.11 NOISE

Ambient noise levels along coastal Sarasota County are low to moderate and are typical of recreational environments. The major noise producers are the breaking surf, adjacent commercial and residential areas, and traffic (boat, vehicular, and airplane).

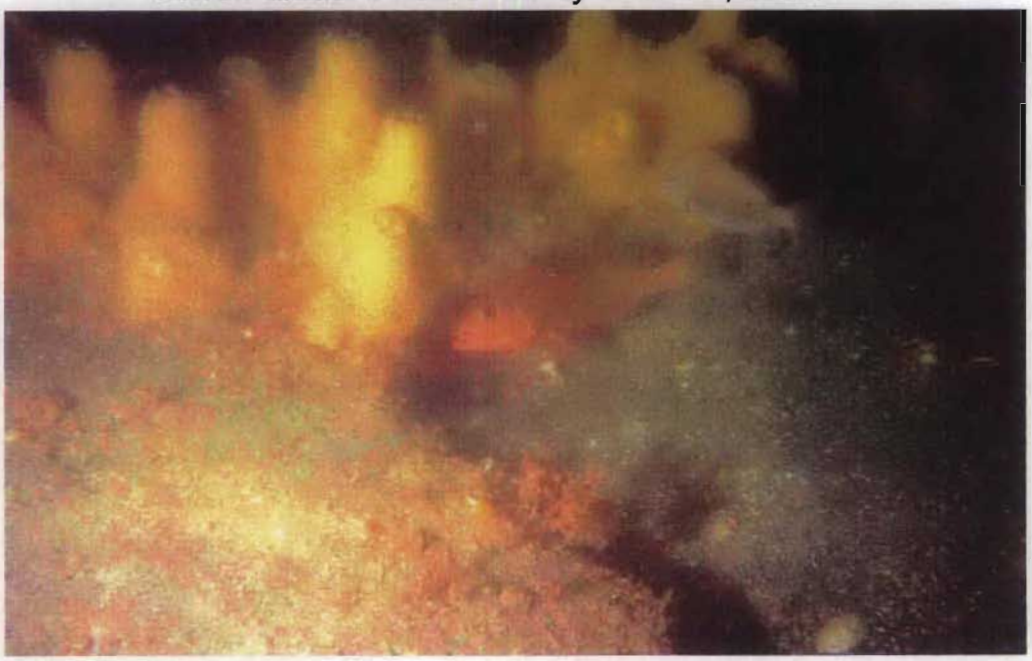
3.12 AESTHETIC RESOURCES

Most of the uplands on Lido Key have been developed except for North Lido Public Beach and South Lido Park. The beachfront consists of hotels, motels, private residential, and seasonal rental properties.

3.13 RECREATION RESOURCES

Recreational opportunities within and adjacent to the fill site include beach combing, swimming, windsurfing, sunbathing, walking, jogging, and beach volleyball. The waters above the borrow areas provide some recreational value for boaters.

Photograph No. 3 – Occasional low relief hardbottom habitat adjacent to Lido Key borrow areas. *Photo courtesy of CP&E, 2001.*



Photograph No. 4 – Red Grouper and Snapper near *Pseudoceratina sp.,* a sponge commonly found in the Lido Key area. *Photo courtesy of CP&E, 2001.*

3.14 NAVIGATION

The majority of boating activity is concentrated in close proximity to New Pass to the north and Big Sarasota Pass to the south. New pass is a Federal navigation project and the USACE is responsible for the periodic maintenance of the navigation channel at the Pass.

3.15 HISTORIC PROPERTIES

In December 2000, magnetic and acoustic remote sensing investigations were conducted at the three proposed borrow sites. This survey used underwater survey techniques and resulted in the identification of no cultural resources.

4 ENVIRONMENTAL EFFECTS

This section is the scientific and analytic basis for the comparisons of the alternatives. See table 2 in section 2.0 Alternatives, for summary of impacts. The following includes anticipated changes to the existing environment including direct, indirect, and cumulative effects.

4.1 GENERAL ENVIRONMENTAL EFFECTS

The placement of sand on the beach would restore some of the beach's ability to provide protection against storms and flooding. It would also enhance the appearance and suitability for recreation along the beach and would provide additional habitat for threatened and endangered sea turtles. The construction of a groin field would help reduce excessive loss of protective fill at the southerly end of Lido Key. Dredging in the proposed borrow areas would cause a depletion of sand. The infauna and some of the epifauna within the borrow area would be unavoidably lost during dredging. However, this habitat is unique and recovery could be expected within one year.

4.2 VEGETATION

4.2.1 ALTERNATIVE A, BEACH FILL WITH PERIODIC NOURISHMENT

There are no seagrass or algal communities present in the footprint of the beach fill area, including the equilibrium tow of fill (ETOF). No work would be performed on vegetated upland or dune areas.

4.2.2 ALTERNATIVE B, BEACH FILL WITH PERIODIC NOURISHMENT WITH TERMINAL GROIN FIELD

No seagrasses or algal communities are known to be present in the proposed beach fill and terminal groin field area based on nearshore surveys conducted in 1992 and July 2001. However, due to boat draft limitations and safety concerns, a portion of the proposed groin construction area was excluded from the recent nearshore survey conducted in July 2001. The USFWS made a recommendation in the FWS Coordination Act Report (2002a) to conduct additional groundtruthing in the proposed groin footprint to verify the presence or absence of seagrasses. On Jul 26, 2002, additional groundtruthing was conducted by Coastal Planning and Engineering. The results of the survey verified that neither seagrass nor hardbottom resources are present within the proposed groin field area.

4.2.3 BORROW AREAS

No impacts to vegetation are expected.

4.2.4 NO ACTION ALTERNATIVE (STATUS QUO)

This alternative would have no effect on marine vegetation. However, continued erosion could eventually result in the loss of upland vegetation adjacent to the beach.

4.3 THREATENED AND ENDANGERED SPECIES

4.3.1 ALTERNATIVE A, BEACH FILL WITH PERIODIC NOURISHMENT

Sea Turtles

Sea turtles may be potentially negatively impacted by beach nourishment activities. Concerns include timing of construction activities, the potential burial of sea turtle nests, and compaction of beach sand due to the presence of heavy equipment and sand depositions.

On Florida's west coast, nesting density is lower and construction during nesting season may occur without severe effects on sea turtle hatchling production for that year, if turtle nests are relocated outside the project area prior to construction (USFWS, 2000). Although beach nourishment may increase the potential nesting area, significant negative impacts to sea turtles may result if protective measures are not incorporated during construction.

Potential negative impacts on sea turtles would be avoided or minimized through the implementation of special precautionary measures. Refer to section 4.28, Environmental Commitments, for protection measures which would be implemented in accordance with the USFWS Biological Opinion dated February 25, 2002.

Manatees

Impacts to the West Indian manatee should be avoided through implementation of manatee protection measures. Refer to section 4.28, Environmental Commitments, for protection measures.

Other Listed Species (Shorebirds)

During the placement of material on the beach, there may be some interruption of foraging and resting activities among shorebirds. This impact would be short-term. Project activities may impact nesting, foraging and resting activities for migratory birds such as the black skimmer, piping plover and least tern. In accordance with the Migratory Bird Treaty Act of 1918, as amended, the Corps would provide protection to nesting migratory bird species that commonly use Lido Key beaches. If the area can not be avoided during nesting season, then a Site Protection Plan would be included in the Plans and Specifications detailing how the impacts on the birds would be avoided, minimized, or otherwise mitigated (refer to section 4.28, Environmental Commitments).

4.3.2 ALTERNATIVE B, BEACH FILL WITH PERIODIC NOURISHMENT WITH TERMINAL GROIN FIELD

Refer to Alternative A for beach fill with periodic nourishment impacts. Potential groin impacts are discussed below.

Sea Turtles
Improperly designed and/or placed groins could potentially interfere with sea turtle nesting and hatchling emergence and egress offshore. If constructed during sea turtle nesting season, construction activities and lighting would have similar affects on hatching orientation and nesting as beach fill activities.

Manatees
No adverse impacts are expected.

Other Listed Species
Refer to Alternative A for potential beach fill impacts to migratory shorebirds. No adverse impacts are expected to shorebirds due to groin construction activities.

4.3.3 BORROW AREAS

Formal consultation with the National Marine Fisheries Service (NMFS) pursuant to section 7 of the Endangered Species Act has been initiated for a "may affect" determination to sea turtles if a hopper dredge is used to excavate the offshore borrow areas. By letter dated August 9, 2001, the NMFS stated that they intend to include the proposed Lido Key Shore Protection Project into the scope of a "Regional Biological Opinion" for the Gulf Coast. A draft copy of the regional Opinion was submitted to the Corps on November 27, 2001. The Corps has reviewed the draft Opinion and commented by letter dated January 8, 2002 (refer to consultation letters in Appendix C). Since a hopper dredge would likely be used, the Corps would adhere to the Terms and Conditions outlined in the final Opinion. It is expected that the Terms and Conditions would include intake and overflow screening, sea turtle deflector draghead installation, and observer and reporting requirements.

Dredging would not occur on the hardgrounds and would not adversely affect sea turtles utilizing hardgrounds. Sea turtles are not expected to be found on the bottom of the sand dominated borrow areas.

4.3.4 NO ACTION ALTERNATIVE (STATUS QUO)

If no action is taken, the beach would continue to erode. If left to erode, this could result in the loss of sea turtle nesting habitat and/or poor nest site selection. Additionally, there could be a loss of shorebird nesting habitat.

4.4 HARDGROUNDS

4.4.1 ALTERNATIVE A, BEACH FILL WITH PERIODIC NOURISHMENT

Aerial photographs of the project area shoreline have no indication of nearshore hardgrounds. Additionally, Side-scan sonar detected no hardgrounds adjacent to Lido Key. A marine resource survey was conducted in July 2001 to verify side-scan sonar results. No hardbottom resources were observed during this marine resource survey.

4.4.2 ALTERNATIVE B, BEACH FILL WITH PERIODIC NOURISHMENT WITH TERMINAL GROIN FIELD

Refer to 4.4.1, Alternative A.

4.4.3 BORROW AREAS

Utilizing the proposed borrow areas is not expected to cause any direct impacts to the offshore hardbottom community. Scattered non-contiguous, offshore hardbottom formations would be protected with a 200-ft. buffer zone where no dredging would be permitted.

4.4.4 NO ACTION ALTERNATIVE (STATUS QUO).

There are no negative impacts to hardground habitats associated with the no-action alternative.

4.5 FISH AND WILDLIFE RESOURCES

4.5.1 ALTERNATIVE A, BEACH FILL WITH PERIODIC NOURISHMENT

Shorebirds

During the placement of material on the beach, there may be some interruption of foraging and resting activities among shorebirds. This impact would be short-term. Project activities may impact nesting, foraging and resting activities for migratory birds such as the black skimmer, piping plover and least tern. In accordance with the Migratory Bird Treaty Act of 1918, as amended, the Corps would provide protection to nesting migratory bird species that commonly use Lido Key beaches. If the area can not be avoided during nesting season, then a Site Protection Plan would be included in the Plans and Specifications detailing how the impacts on the birds would be avoided, minimized, or otherwise mitigated (refer to section 4.28, Environmental Commitments).

Cetaceans and Fishes

Coastal pelagic fishes and cetaceans are highly mobile species. These species would not likely be affected by beach fill activities. Populations of fish and free-swimming organisms would temporarily leave the construction area due to an increase in turbidity and construction related activities.

Infaunal and Benthic Species

The placement of sand on the beach would result in the burial and subsequent loss of most of the beach infauna. Common beach and surf zone inhabitants include decapods such as ghost crabs and other burrowing organisms. Several studies have investigated the recolonization of beach infauna following nourishment and found that beach and surf zone populations recover to prenourishment levels within one year after completion of nourishment.

4.5.2 ALTERNATIVE B, BEACH FILL WITH PERIODIC NOURISHMENT WITH TERMINAL GROIN FIELD

Refer to Alternative A for beach fill with periodic nourishment impacts discussion. Groin construction would also result in the burial and subsequent loss of most beach and surf zone infauna within the construction area. These impacts would be similar to those described for beach renourishment.

4.5.3 BORROW AREAS

Invertebrates and Fishes. Species of relatively nonmotile infaunal invertebrates, such as mollusks, may inhabit the proposed borrow areas. The benthic infaunal communities within the three proposed borrow areas will be negatively impacted by dredging activities. However, it is expected that recolonization of the borrow areas by the benthic infaunal communities will occur within two to three years. Motile organisms such as fish, crabs, and sand dwelling organisms should be able to escape the area during construction. Direct impacts to fish communities within and adjacent to the offshore borrow areas during dredging activities should be minimal due to their motility to leave the disturbed area during dredging.

4.5.4 NO ACTION ALTERNATIVE (STATUS QUO)

If no action is taken, the beach would continue to erode. If left to erode, this could result in the loss of shorebird nesting habitat. No adverse impacts are expected on other listed species.

4.6 ESSENTIAL FISH HABITAT

NOTE: Coordination of this EA constitutes initial consultation with the NMFS under provisions of the Magnuson-Stevens Fishery Conservation and Management Act relative to Essential Fish Habitat (EFH) effects resulting from the Lido Key Shore Protection Project. Based on analysis discussed in this EA, acute and cumulative effects on EFH resulting from the addition of the proposed project features are expected to be negligible.

4.6.1 ALTERNATIVE A, BEACH FILL WITH PERIODIC NOURISHMENT; ALTERNATIVE B, BEACH FILL WITH PERIODIC NOURISHMENT WITH TERMINAL GROIN FIELD; AND BORROW AREAS

Direct and indirect effects of dredging, sand placement, and groin construction activities may occur within the water column, and to the non-vegetated, vegetated, and live bottom communities. Vegetated communities (seagrasses) were not detected in the

project footprint during a resource survey conducted in 2001. Therefore, direct impacts to seagrass communities are not expected. However, seagrass habitats adjacent to the project footprint (south, near Siesta Key) may incur indirect impacts through the suspension of fine sediment into the water column during beach renourishment and groin construction activities. Additionally, nearshore resource surveys conducted at Lido Key in 2001 did not reveal the presence of hardbottom communities within the project footprint. Therefore, direct impacts to nearshore hardbottom habitats are not expected. Side-scan surveys of the proposed borrow areas conducted in 2001, identified possible low-relief hardbottom areas adjacent to LKBA 6 and LKBA 7. No hardbottom occurs within or adjacent to LKBA 5. Hardbottom was verified to occur within 200 feet outside LKBA 6 and 7 (CPE, 2001). These scattered hardbottoms would be protected with a 200-ft. buffer zone where dredging would not be permitted. Possible indirect impacts may occur to adjacent hardbottom habitats due to turbidity and siltation.

4.6.2 NO ACTION ALTERNATIVE (STATUS QUO)

There are no negative impacts to EFH associated with the no-action alternative.

4.7 HISTORIC PROPERTIES

A cultural resource survey was conducted for the project. No cultural resources were located. Based on this survey, in accordance with the procedures contained in 36CFR800, consultation between the Jacksonville District Corps of Engineers and the Florida State Historic Preservation Officer (2001)(project file 2001-07222) determined that the project would have no effect on any sites listed, or eligible for listing, in the National Register of Historic Places.

4.8 AESTHETICS

There would be a temporary reduction in aesthetics during construction. The sand color of the post-construction beach may be different from the sand color of the natural beach. Long-term adverse affects to the visual environment as a result of construction is not expected.

4.9 RECREATION

During beach nourishment activities, the use of the beach in the vicinity of construction would decline or be restricted temporarily. Use of the beach in the immediate area of the discharge pipe and equipment would be restricted for public safety. The improved beaches would provide increased opportunities for recreational activities.

4.10 COASTAL BARRIER RESOURCES

The proposed beach nourishment project will have no effect on coastal barrier resources since the project is not located within or adjacent to a designated Coastal Barrier Resources System Unit.

4.11 WATER QUALITY

The potential effects of dredging include sedimentation during dredging, which stresses the growth and reproductive energies of benthic organisms, and an increase in turbidity, which reduces the penetration of light, required by photosynthetic organisms. This would be limited to the immediate areas of dredging and disposal.

4.12 HAZARDOUS, TOXIC, AND RADIOACTIVE WASTE

The preliminary assessment indicated that no hazardous, toxic and radioactive waste (HTRW), or other harmful substances are impacting the project area. However, if contaminants are found during property procurement or project construction, the site would be remediated.

4.13 AIR QUALITY

The short-term impacts fro emissions from the dredge and other construction equipment associated with the beach nourishment would not significantly impact air quality. No air quality permits are required for this project.

4.14 NOISE

There would be a temporary increase in the noise level during construction. The major source of noise would be the construction equipment at the discharge site. Noise levels would be minimized by the proper maintenance of the construction equipment. No adverse impacts to the surrounding environment are expected as a result of the temporary increase in the noise level during construction.

4.15 NATURAL OR DEPLETABLE RESOURCES

The depletable resource for the proposed project would be sand. Using sand from the proposed borrow areas would deplete the sand source from the areas dredged. Over time, the sand would be redistributed over the nearshore areas. Consequently, some of the sand would move further offshore or would be trapped in an ebb or flood tidal shoal.

4.16 SCIENTIFIC RESOURCES

There are no known impacts to scientific resources associated with the proposed project.

4.17 NATIVE AMERICANS

None of the proposed project activities occur on land belonging to Native Americans, therefore implementation of the proposed project would not result in any impacts to Native Americans or land belonging to Native Americans.

4.18 REUSE AND CONSERVATION POTENTIAL

There is no potential for reuse associated with the proposed project activities.

4.19 URBAN QUALITY

No direct environmental impacts related to urban quality are expected as a result of the proposed project.

4.20 SOLID WASTE

No impacts related to solid waste are expected as a result of this project. Disposal of any solid waste material into Gulf waters would not be permitted.

4.21 DRINKING WATER

No municipal or private water supplies are located within or near the project site, therefore drinking water supplies would not be impacted by the implementation of the proposed project.

4.22 CUMULATIVE IMPACTS

Cumulative impact is the "impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7).

The implementation of the proposed project, in conjunction with the Sarasota County's initial beach project and subsequent beach maintenance projects, would help maintain the Lido Key beach ecosystem and provide sea turtle nesting habitat. The cumulative effect of these projects would also help protect any adjacent dune habitat that may exist.

The use of sand from the proposed borrow areas would deplete the area of sand and species of relatively non-motile infaunal invertebrates (mollusks). Although infaunal organisms would be lost as a result of sand dredging, these organisms would be expected to quickly recolonize after project completion. This rapid recolonization significantly reduces the potential for cumulative impacts.

The cumulative impact of shore protection projects along the Florida coast has been to restore and maintain many beaches which otherwise would have experienced severe erosion or would have totally disappeared. In addition, these activities have reduced property damage and helped maintain property value.

4.23 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

4.23.1 IRREVERSIBLE

An irreversible commitment of resources is one in which the ability to use and/or enjoy the resource is lost forever. One example of an irreversible commitment might be the mining of a mineral resource. The energy and fuel used during construction would be an irreversible commitment of resources.

4.23.2 IRRETRIEVABLE

An irretrievable commitment of resources is one in which, due to decisions to manage the resource for another purpose, opportunities to use or enjoy the resource as they presently exist are lost for a period of time. An example of an irretrievable loss might be where a type of vegetation is lost due to road construction.

Benthic organisms within the borrow area and beach fill area that would be eliminated during construction would be irretrievably lost for a period of time. However, these organisms are expected to quickly colonize the disturbed sandy areas.

4.24 UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS

Species of relatively non-motile infaunal invertebrates, such as mollusks, that inhabit the borrow areas will unavoidably be lost during dredging. Those species that are not able to escape the construction area are expected to recolonize the disturbed sandy areas after completion of the project. There would be an unavoidable reduction in water clarity and increased turbidity and sedimentation. This would be limited to the immediate areas of dredging and disposal.

4.25 LOCAL SHORT-TERM USES AND MAINTENANCE/ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Shoreline protection using beach fill with periodic renourishment is an ongoing effort; no acceptable and permanent one-time fix has been identified. Renourishment efforts have a temporary and short-term impact on the biological resources offshore and onshore. During the placement of material on the beach, there would be a temporary impact on marine and shore life in the immediate vicinity of construction. Removal of material from offshore borrow areas has a long-term impact on the nature of the borrow areas. These impacts, however, are not substantial since there are no special resources within the proposed borrow areas.

4.26 INDIRECT EFFECTS

Indirect impacts may occur to seagrasses through the suspension of fine sediments into the water column during beach renourishment and groin construction activities. Tides and currents may transport these sediments over adjacent seagrass beds where they may be deposited, or reduce water clarity. Dredging would have no direct impact to hardgrounds. However, there is the possibility of local turbidity and siltation during dredging activities.

4.27 CONFLICTS AND CONTROVERSY

There are no known conflicts regarding the proposed action.

4.28 ENVIRONMENTAL COMMITMENTS

The U.S. Army Corps of Engineers and contractors commit to avoiding, minimizing or mitigating for adverse effects during construction activities by including the following commitments in the contract specifications:

4.28.1 TURBIDITY

The following measures shall be implemented to avoid/minimize turbidity related impacts:

1. The water quality (turbidity) at the borrow areas and discharge site would be monitored twice daily or as required by project permits.

2. If turbidity values at either the borrow areas or discharge sites exceed State water quality standards (29 NTU's above background), all dredging activities would immediately be suspended. Dredging would not resume until water quality levels meet State standards.

4.28.2 SEA TURTLES

The sea turtle protection measures stated in the Terms and Conditions of the USFWS Biological Opinion would be implemented to avoid/minimize potential take of loggerhead and green sea turtles. The Terms and Conditions, that must be adhered to, can be found in the USFWS Biological Opinion included in **Appendix D**.

The National Marine Fisheries Service (NMFS) has included the Lido Key Shore Protection Project in a Regional Biological Opinion (RBO) that includes hopper dredging of borrow areas along the west coast of Florida. The RBO is currently in draft stage. It is anticipated that the terms and conditions that will be established in the final RBO would include intake and overflow screening, sea turtle deflector draghead installation, and observer and reporting requirements. The terms and conditions as established in the final RBO will be implemented to avoid/minimize potential take of sea turtles.

4.28.3 MANATEES

The following standard protection measures would be implemented to minimize potential impacts to manatees:

1. The Contractor shall instruct all personnel associated with the project of the potential presence of manatees and the need to avoid collisions with manatees.

2. All construction personnel shall be advised that there are civil and criminal penalties for harming, harassing, or killing manatees which are protected under the Marine Mammal Protection Act of 1972, the Endangered Species Act of 1973, and the

Florida Sanctuary Act of 1978. The Contractor may be held responsible for any manatee harmed, harassed, or killed as a result of construction activities.

3. Siltation barriers shall be installed and shall be made of material in which manatees cannot become entangled, shall be properly secured, and shall be monitored regularly to avoid manatee entrapment. Barriers shall not block manatee entry to or exit from essential habitat.

4. All vessels associated with the project shall operate at "no wake/idle" speeds at all times while in water where the draft of the vessel provides less than four feet clearance from the bottom and that vessels shall follow routes of deep water whenever possible.

5. If a manatee is sighted within 100 yards of the project area, all appropriate precautions shall be implemented by the Contractor to ensure protection of the manatee. These precautions shall include the operation of all moving equipment no closer than 50 feet of a manatee. If a manatee is closer than 50 feet to moving equipment or the project area, the equipment shall be shut down and all construction activities shall cease. Construction activities shall not resume until the manatee has departed the project area.

6. Any collision with and/or injury to a manatee shall be reported immediately to the "Manatee Hotline" at 1-800-DIAL-FMP (1-800-342-5367). Collision and or injury should also be reported to the U.S. Fish and Wildlife Service in Jacksonville (1-904-232-2580) for north Florida or Vero Beach (1-561-562-3909) in South Florida.

7. Temporary signs concerning manatees shall be posted prior to and during construction/dredging activities. All signs are to be removed by the Contractor upon completion of the project.

8. If nighttime construction occurs, lights must be in place that illuminates a 100-foot radius around the construction site.

4.28.4 PROTECTION OF MIGRATORY AND/OR LISTED BIRD SPECIES

1. Construction activities will be under surveillance, management, and control to prevent impacts to migratory birds and their nests in accordance with the U.S. Army Corps of Engineers, Jacksonville District's Migratory Bird Protection Policy. Additionally, migratory birds are protected by the Florida Endangered and Threatened Species Act of 1977, Title XXVIII, Chapter 372.072, and the U.S. Fish and Wildlife Service pursuant to the Migratory Bird Treaty Act of 1918 and the Endangered and Threatened Species Act of 1982, as amended.

2. Monitoring of the construction area will begin 1 April through 31 August, if

construction activities occur during that period. Daily monitoring will be conducted.

3.Any nesting activity will be reported immediately to the Corps. Guidelines set forth in the Migratory Bird Protection Policy will be implemented should nesting occur within the construction area.

4.29 COMPLIANCE WITH ENVIRONMENTAL REQUIREMENTS

4.29.1 NATIONAL ENVIRONMENTAL POLICY ACT OF 1969

Environmental information on the project has been compiled and this Environmental Assessment has been prepared. The project is in compliance with the National Environmental Policy Act.

4.29.2 ENDANGERED SPECIES ACT OF 1973

Consultation was initiated with NMFS on July 17, 2001. NMFS indicated by letter dated August 9, 2001 that they intend to include the proposed Lido Key project in the new Gulf Coast Regional Biological Opinion (RBO). The draft RBO, dated 11/7/01 was received on 11/27/01. Consultation was initiated with USFWS on November 22, 2000 and completed on February 26, 2002 (see Appendix D for Biological Opinion). This project was fully coordinated under the Endangered Species Act and therefore, is in full compliance with the Act.

4.29.3 FISH AND WILDLIFE COORDINATION ACT OF 1958

This project has been coordinated with the U.S. Fish and Wildlife Service (USFWS). A final Coordination Act Report (FCAR) dated August 21, was submitted by the USFWS. There has been no change in the project design or the source of beach fill material since submittal of the CAR. This project is in full compliance with the Act.

4.29.4 NATIONAL HISTORIC PRESERVATION ACT OF 1966 (INTER ALIA)

(PL 89-665, the Archeology and Historic Preservation Act (PL 93-291), and executive order 11593)

Archival research, underwater survey, and consultation with the Florida State Historic Preservation Officer (SHPO), have been conducted in accordance with the National Historic Preservation Act, as amended; the Archeological and Historic Preservation Act, as amended and Executive Order 11593. SHPO consultation was initiated July 27, 2001. In a September 25, 2001 response, the SHPO concurred with the Corps' no effect determination. The project will not affect historic properties included in or eligible for inclusion in the National Register of Historic places. The project is in compliance with each of these Federal laws.

4.29.5 CLEAN WATER ACT OF 1972

Application for a Section 401 water quality certification will be submitted to the Florida Department of Environmental Protection. All State water quality standards will be met. The project is in compliance with this act. A Section 404(b) evaluation is included in this report as Appendix A.

4.29.6 CLEAN AIR ACT OF 1972

No air quality permits would be required for this project. This project has been coordinated with U.S. Environmental Protection Agency (EPA) and is in compliance with Section 309 of the Act.

4.29.7 COASTAL ZONE MANAGEMENT ACT OF 1972

A federal consistency determination in accordance with 15 CFR 930 Subpart C is included in this report as Appendix B. State consistency reviews were performed during the coordination of the Environmental Assessment. Consistency reviews can be found in Appendix C.

4.29.8 FARMLAND PROTECTION POLICY ACT OF 1981

No prime or unique farmland would be impacted by implementation of this project. This act is not applicable.

4.29.9 WILD AND SCENIC RIVER ACT OF 1968

No designated Wild and Scenic river reaches would be affected by project related activities. This act is not applicable.

4.29.10 MARINE MAMMAL PROTECTION ACT OF 1972

Incorporation of the safe guards used to protect threatened or endangered species during dredging and disposal operations would also protect any marine mammals in the area, therefore, this project is in compliance with the Act.

4.29.11 ESTUARY PROTECTION ACT OF 1968

No designated estuary would be affected by project activities. This act is not applicable.

4.29.12 FEDERAL WATER PROJECT RECREATION ACT

The principles of the Federal Water Project Recreation Act, (Public Law 89-72) as amended, have been fulfilled by complying with the recreation cost sharing criteria as

outlined in Section 2 (a), paragraph (2). Another area of compliance includes the public beach access requirement on which the renourishment project hinges (Section 1, (b).

4.29.13 FISHERY CONSERVATION AND MANAGEMENT ACT OF 1976

The project has been coordinated with the National Marine Fisheries Service (NMFS) and is in compliance with the act.

4.29.14 SUBMERGED LANDS ACT OF 1953

The project would occur on submerged lands of the State of Florida. The project has been coordinated with the State and is in compliance with the act.

4.29.15 COASTAL BARRIER RESOURCES ACT AND COASTAL BARRIER IMPROVEMENT ACT OF 1990

There are no designated coastal barrier resources in the project area that would be affected by this project. These acts are not applicable.

4.29.16 RIVER AND HARBOR ACT OF 1899

The proposed work would not obstruct navigable waters of the United States. The proposed action will be presented to the public by notice, hearing, and other evaluations normally conducted for activities subject to the act. The project is in full compliance.

4.29.17 ANADROMOUS FISH CONSERVATION ACT

Anadromous fish species would not be affected. The project has been coordinated with the National Marine Fisheries Service and is in compliance with the act.

4.29.18 MIGRATORY BIRD TREATY ACT AND MIGRATORY BIRD CONSERVATION ACT

The project has been coordinated with the U.S. Fish and Wildlife Service and the Florida Fish and Wildlife Conservation Commission and is in compliance with these acts.

4.29.19 MARINE PROTECTION, RESEARCH AND SANCTUARIES ACT

The term "dumping" as defined in the Act (3[33 U.S.C. 1402](f)) does not apply to the disposal of material for beach nourishment or to the placement of material for a purpose other than disposal (i.e. placement of rock material as an artificial reef or the construction of artificial reefs as mitigation). Therefore, the Marine Protection, Research and Sanctuaries Act does not apply to this project. The disposal activities addressed in this EA have been evaluated under Section 404 of the Clean Water Act.

4.29.20 MAGNUSON-STEVENS FISHERY CONSERVATION AND MANAGEMENT ACT

Coordination of the EA initiated consultation with the NMFS under provisions of this Act. Based on analysis discussed in this EA, the Corps has determined that the proposed action would not adversely affect the essential habitat of species managed under this Act. The NMFS concurred with this determination by letter dated June 19, 2002 (see letter in Appendix C).

4.29.21 E.O. 11990, PROTECTION OF WETLANDS

No wetlands would be affected by project activities. This project is in compliance with the goals of this Executive Order.

4.29.22 E.O. 11988, FLOOD PLAIN MANAGEMENT

The project is in the base flood plain (100-year flood) and is being evaluated in accordance with this Executive Order.

4.29.23 E.O. 12898, ENVIRONMENTAL JUSTICE

The proposed project would not result in adverse human health or environmental effects, nor would the activity impact the subsistence consumption of fish and wildlife. The project is in compliance with this Executive Order.

4.29.24 E.O. 13089, CORAL REEF PROTECTION

The proposed project would not result in adverse impacts to coral reef ecosystems. No coral reef habitat exists within or near the proposed project. This act is not applicable.

4.29.25 E.O. 13112, INVASIVE SPECIES

Invasive species would not be affected by project activities. This act is not applicable.

5 LIST OF PREPARERS

5.1 PREPARERS

NAME	DISCIPLINE	ROLE
Yvonne Haberer	Biologist	Main Author
Grady Caulk	Archeologist	Historic Properties
Tommy Birchett	Archeologist	Historic Properties
Peter Besrutschko	Environmental Engineer	HTRW Analysis

5.2 REVIEWER

Kenneth Dugger	Chief, Gulf Coast Section	Review

6 PUBLIC INVOLVEMENT

6.1 SCOPING AND DRAFT EA

A Scoping letter dated September 28, 2000 was issued for this action. A draft EA and Preliminary Finding of No Significant Impact (FONSI) was made available to the public by Notice of Availability on May 29, 2002.

6.2 AGENCY COORDINATION

The proposed project has been coordinated with the following agencies: U.S. Fish and Wildlife Service, National Marine Fisheries Service, U.S. Environmental Protection Agency, Florida State Clearinghouse, Florida Fish and Wildlife Conservation Commission, Florida Department of Environmental Protection, and Florida State Historic Preservation Officer (SHPO). Any agency coordination letters can be found in Appendix C.

6.3 LIST OF RECIPIENTS

The draft EA/FONSI was circulated to Federal, State, and local agencies and other interested parties for review and comment. A complete mailing list is in Appendix C.

6.4 COMMENTS RECEIVED AND RESPONSE

Comments on the draft EA can be found in Appendix C.

REFERENCES

Coastal Planning and Engineering, Inc. 1992. Lido Key Beach Nourishment Project, Environmental Study prepared for the City of Sarasota. Sarasota County, Florida. 32 pp.

Dial Cordy and Associates, Inc. 2001. Lido Key Shore Protection Project, Marine Resource Survey Report (October 2001) for the U.S. Army Corps of Engineers. Jacksonville, Florida. 7 pp.

Kale, Herbert W. II, and D. Maehr. 1990. Florida's Birds. Pineapple Press. Sarasota, Florida.

Lewis, Roy R III, and Daniel M. Savercool. 1994. Hard Bottom Mapping of Tampa Bay. Prepared for: Tampa Bay National Estuary Program. Technical Publication #07-94. St. Petersburg, Florida. 14 pp.

Meylan, A., B. Schroeder, and A. Mosier. 1995. Sea turtle nesting activity in the State of Florida 1979-1992. Florida Marine Research Publications Number 52, St. Petersburg, Florida.

Myers, Ronald L, and J. Ewel. 1990. Ecosystems of Florida. University of Central Florida Press. Orlando, Florida.

National Marine Fisheries Service. 1999. Endangered Species Act, Section 7 Consultation on Biennial Maintenance Dredging of the Charlotte Harbor, Florida Entrance Channel by Hopper Dredge. Biological Opinion, October 26. 57 pp.

National Marine Fisheries Service. 1995. Biological Opinion Document on Dredging of the Tampa Harbor Navigation Channel. Tampa Bay, Florida. 15 pp.

Tampa Bay National Estuary Program (TBNEP). 1996. Charting the Course: The Comprehensive Conservation and Management Plan for Tampa Bay. St. Petersburg, Florida. 181 pp.

U.S. Army Corps of Engineers. 2001. Engineering Design and Cost Estimate for the Lido Key Shore Protection Project Feasibility Study. 99 pp.

U.S. Army Corps of Engineers. 1998. Beach Erosion Control and Hurricane Protection Project Dade County, Florida, Modifications at Sunny Isles, Final Environmental Impact Statement.

U.S. Fish and Wildlife Service. 2002a. Fish and Wildlife Coordination Act Report (August 21, 2002) for the Lido Key Shore Protection Project, Lido Key, Sarasota County, Florida. 22 pp.

U.S. Fish and Wildlife Service. 2002b. Biological Opinion (February 25, 2002) to U.S. Army Corps of Engineers. U.S. Fish and Wildlife Service. Vero Beach, Florida.

U.S. Fish and Wildlife Service. 2000. Biological Opinion (September 6, 2000) to U.S. Army Corps of Engineers. U.S. Fish and Wildlife Service. Vero Beach, Florida.

U.S. Fish and Wildlife Service. 1996. Florida Manatee Recovery Plan. Atlanta, Georgia.

Watts, Gordon P. 2001. Offshore Borrow Areas, Submerged Historic Properties Survey, Lido Key, Sarasota County, Florida. Tidewater Atlantic Research, Inc. Washington, North Carolina.

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APPENDIX A - SECTION 404(B) EVALUATION

SECTION 404(b) EVALUATION

LIDO KEY SHORE PROTECTION PROJECT
SARASOTA COUNTY, FLORIDA

I. Project Description

a. Location. The proposed work will be performed in Florida, Sarasota County, Sarasota City Limits, Lido Key. Lido Key is a barrier island situated along the 35 mile Gulf shoreline of Sarasota County. The island is located between Longboat Key to the north, and Siesta Key to the south. The island is approximately 2.5 miles long, and ranges in width from 100 ft. to approximately 2500 ft.

b. General Description. The proposed plan calls for initial restoration and periodic nourishment of the gulf shoreline of Lido Key. The recommended plan also provides for the construction of a groin field, which includes three linear groins at the southern end of Lido Key near Big Sarasota Pass. Beach compatible material would come from offshore borrow areas located 7-10 nautical miles offshore of Lido Key.

c. Authority and Purpose. A beach erosion control project was authorized for Lido Key by the 1970 River and Harbor Act. The project provided for initial restoration and periodic nourishment for 1.2 miles of shoreline. The city of Sarasota completed the northern half of the project in 1970 with no Federal participation. The project was never completed and was deauthorized on 1 January 1990. Maintenance dredged material from the Federal navigation project at New Pass is periodically placed on Lido Key beaches.

The Water Resources Development Act of 1999 reauthorized the Lido Key Shore Protection Project, which allows for the continuation with the Feasibility phase of the study and preparation of the feasibility report.

d. General Description of Dredged or Fill Material.

(1) General Characteristics of Material. Details of the three (3) proposed borrow areas are listed below. 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 range from 7 to 1 ft.
Borrow Area 5 is located 7.2 miles offshore of Lido Key. The deposits in this area consists of medium grained sand, with low silt content (1.7% to 2.6%) mixed with some shell fragments/hash.

Borrow Area 6 is located 8.5 nautical miles offshore of Lido Key. The deposits in this area consists of medium grained sand, with low silt content (1.7% to 2.6%) mixed with some shell fragments/hash.

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 (0.11% to 4.6%) mixed with some shell fragments/hash.

(2) Quantity of Material. Total fill volume needed for initial construction would be 981,924 c.y. Available volume of material for each borrow area is, Borrow Area 5 = 209,570 c.y.; Borrow Area 6 = 1,063,017 c.y.; and Borrow Area 7 = 601,536 c.y.

(3) Source of Material. . Beach compatible material would come from three (3) offshore borrow areas located 7-10 nautical miles offshore of Lido Key.

e. Description of the proposed Discharge Site.

(1) Location. The berm would run from DEP monument marker 35 to marker 43. The project would consist of a 9,000 ft. beach and would have a 990-foot taper on the north past DEP monument 35 and an 850 ft. taper to the south past DEP monument 43.

(2) Size. The project would consist of a 9,000 ft. beach and would have a 990-foot taper on the north past DEP monument 35 and an 850 ft. taper to the south past DEP monument 43.

(3) Type of Site. The disposal site is an eroded, sandy, recreational beach.

(4) Type of Habitat. The habitat of the fill site includes supratidal dry beach, intertidal swash zone, and subtidal sandy areas. A vegetated dune exists along some portions of the beach.

(5) Timing and Duration of Discharge. Construction of the project would begin in 2004 and is expected to take 4-6 months to complete.

f. Description of Disposal Method. Due to distance these borrow areas are from Lido Key, it would be likely that a hopper dredge would be used to transport the material.

II. Factual Determinations

a. Physical Substrate Determinations.

(1) Substrate Elevation and Slope. The project design would consist of an 80 ft wide berm at Elevation +5 NGVD, this berm would run from DNR 35 to DNR 43. The project would have a 990 foot taper on the north past DNR 35 and an 850 foot taper to the south past DNR 43. The berm would slope from +5 NGVD to existing ground on a slope of 1V on 10H. In addition to the beach fill, 3 groins would be placed at the southern end of the project limits. These structures would range from 650 to 320 feet in length and will be oriented along a bearing of 55 degrees west of north. They would have a crest height of +5 ft NGVD and extend to -3 ft NGVD.

(2) Sediment Type.

Borrow Area 5 is located 7.2 miles offshore of Lido Key. The deposits in this area consists of medium grained sand, with low silt content (1.7% to 2.6%) mixed with some shell fragments/hash. Mean grain size of material is 0.40 mm and a sorting value of 0.71 phi.

Borrow Area 6 is located 8.5 nautical miles offshore of Lido Key. The deposits in this area consists of medium grained sand, with low silt content (1.7% to 2.6%) mixed with some shell fragments/hash. Mean grain size of material is 0.32 mm and a sorting value of 0.71 phi.

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 (0.11% to 4.6%) mixed with some shell fragments/hash. Mean grain size of material is 0.43 mm and a sorting value of 0.40 phi.

(3) Dredge/Fill Material Movement. The fill material would be subject to erosion by waves with the net movement of material to the south.

(4) Physical Effects on Benthos. Some benthic organisms that are not mobile may be lost during dredging. Recolonization soon after project completion is expected to replace those organisms which do not survive project construction. It is anticipated that no long-term effects would occur.

b. Water Circulation, Fluctuation and Salinity Determination.

(1) Water Column Effects. During dredging, turbidity would increase temporarily in the water column. The increased turbidity would be short-term; therefore, placement of fill would have no long-term or significant impacts, if any, on salinity, water chemistry, clarity, color, odor, taste, dissolved gas levels, nutrients or eutrophication.

(2) Current Patterns and Circulation. The primary currents in the nearshore zone are wave-induced longshore currents. Longshore currents are dominant towards

the south, with reversals evident during periods of southern wave activity and in shadow areas around inlets.

(3) Normal Water Level Fluctuations and Salinity Gradients. Mean high water for Lido Key is at elevation 1.13 ft. National Geodetic Vertical Datum (NGVD). Salinity is that of normal Gulf of Mexico water.

c. Suspended Particulate/Turbidity Determinations.

(1) Expected Changes in Suspended Particulates and Turbidity Levels in the Vicinity of the Disposal Site. There would be a temporary increase in turbidity levels during discharge of material.

(2) Effects on the Chemical and Physical Properties of the Water Column.

(a) Light Penetration. Some decrease in light penetration may occur in the immediate vicinity of the dredging areas. This effect would be temporary, limited to the immediate area of construction, and would have no adverse impacts on the environment.

(b) Dissolved Oxygen. Dissolved oxygen levels would not be altered by this project.

(c) Toxic Metals, Organics, and Pathogens. To toxic metals, organics, or pathogens are expected to be released by the project.

(d) Aesthetics. The aesthetic quality of the water in the immediate area of the project would be reduced during construction due to increased turbidity. This would be a short-term and localized condition.

(3) Effects on Biota.

(a) Primary Productivity and Photosynthesis. The proposed borrow areas and fill area are characterized by a sandy, featureless bottom. There are no known seagrass or algal communities present in these areas. The effects on phytoplankton, if any, would be minimal and short-term.

(b) Suspension/Filter Feeders. An increase in turbidity could adversely impact burrowing invertebrate filter feeders within and adjacent to the immediate construction area. It is not expected that a short-term, temporary increase in turbidity would have a long-term negative effect on these highly prolific organisms.

(c) Sight Feeders. No significant impacts on these organisms are expected as the majority of sight feeders are highly mobile and can move outside the project area.

d. Contaminant Determinations. Material which would be dredged from the proposed borrow sites would not introduce, relocate, or increase contaminants at the fill area.

e. Aquatic Ecosystem and Organism Determinations.

(1) Effects on Plankton. No adverse impact on autotrophic or heterotrophic organisms are anticipated.

(2) Effects on Benthos. No adverse long-term impacts to non-motile benthic invertebrates are anticipated.

(3) Effects on Nekton. These organisms are highly motile, and therefore no adverse impacts are expected.

(4) Effects on the Aquatic Food Web. No adverse long-term impact to any trophic group in the food web is anticipated.

(5) Effects on Special Aquatic Sites.

(a) Hardground and Coral Reef Communities. There are no known hardground reef communities located in the immediate nearshore area of Lido Key that would be affected by this beach project.

(b) Sanctuaries and Refuges. No such designated sites are located within the project area.

(c) Wetlands. Wetlands would not be affected by this project.

(d) Mud Flats. Mud flats would not be affected by this project.

(e) Vegetated Shallows. There are no known vegetated shallows within the project area.

(6) Endangered and Threatened Species. There would be no significant adverse impacts to any threatened or endangered species or to the critical habitat of any threatened or endangered species. Measures that would be implemented to protect endangered and threatened species are outlined in Section 4.28 of the EA.

(7) Other Wildlife. No adverse impacts to other wildlife is expected.

(8) Actions to Minimize Impacts. All practical safeguards would be taken during construction to preserve and enhance environmental, aesthetic, recreational, and economic values in the project area. Specific precautions that would be implemented in conjunction with the proposed project can be found in the EA.

f. Proposed Disposal Site Determinations.

(1) Mixing Zone Determination. A mixing zone variance application will be submitted to the Florida Department of Environmental Protection because the dredged material is expected to cause temporary increase in turbidity at the beach placement site. No adverse impacts related to depth, current velocity, direction and variability, degree of turbulence, stratification, or ambient concentrations of constituents are expected from implementation of the project.

(2) Determination of Compliance with Applicable Water Quality Standards. Because of the inert nature of the material to be dredged, Class III water quality standards would not be violated.

(3) Potential Effects on Human Use Characteristics.

(a) Municipal and Private Water Supplies. No municipal or private water supplies would be impacted by the project.

(b) Recreational and Commercial Fisheries. Fishing in the immediate construction area would be prohibited while construction is in progress. Recreational and commercial fisheries would not be otherwise impacted by implementation of the project.

(c) Water Related Recreation. Beach and water related recreation in the immediate vicinity of construction would be prohibited during construction activities. This would be a short-term impact.

(d) Aesthetics. The existing environmental setting would not be adversely impacted. The sand color of the post-construction beach may be different from the sand color of the natural beach. Long-term adverse affects to the visual environment as a result of construction is not expected.

(e) Parks, National and Historic Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves. No such designated sites are located within the project area.

g. Determination of Cumulative Effects on the Aquatic Ecosystem. There would be no cumulative impact that results in major impairment of water quality of the existing aquatic ecosystem as a result of the placement of fill at the project site.

h. Determination of Secondary Effects on the Aquatic Ecosystem. There would be no secondary impacts on the aquatic ecosystem as a result of construction activities.

III. Findings of Compliance or Non-compliance with the Restrictions on Discharge.

a. No significant adaptations of the guidelines were made relative to this evaluation.

b. No practicable alternative exists which meets the study objectives that does not involve discharge of fill into waters of the United States.

c. After consideration of disposal site dilution and dispersion, the discharge of fill materials will not cause or contribute to, violations of any applicable State water quality standards for Class III waters. The discharge operation will not violate the Toxic Effluent Standards of Section 307 of the Clean Water Act.

d. The proposed Lido Key Shore Protection Project would not jeopardize the continued existence of any species listed as threatened or endangered or result in the likelihood of destruction or adverse modification of any critical habitat as specified by the Endangered Species Act of 1973, as amended.

e. The placement of fill material will not result in significant adverse effects on human health and welfare, including municipal and private water supplies, recreational and commercial fishing, plankton, fish, shellfish, wildlife, and special aquatic sites. The life stages of aquatic species and other wildlife will not be adversely affected. Significant adverse effects on aquatic ecosystem diversity, productivity and stability, and recreational, aesthetic, and economic values will not occur.

f. On the basis of the guidelines, the proposed disposal site for the discharge of dredged material is specified as complying with the requirements of these guidelines.

APPENDIX B - COASTAL ZONE MANAGEMENT CONSISTENCY

FLORIDA COASTAL ZONE MANAGEMENT PROGRAM
FEDERAL CONSISTENCY EVALUATION PROCEDURES

LIDO KEY SHORE PROTECTION PROJECT
SARASOTA COUNTY, FLORIDA

1. Chapter 161, Beach and Shore Preservation. The intent of the coastal construction permit program established by this chapter is to regulate construction projects located seaward of the line of mean high water and which might have an effect on natural shoreline processes.

Response: The proposed plans and information will be submitted to the state in compliance with this chapter.

2. Chapters 163(part II), 186, and 187, County, Municipal, State and Regional Planning. These chapters establish the Local Comprehensive Plans, the Strategic Regional Policy Plans, and the State Comprehensive Plan (SCP). The SCP sets goals that articulate a strategic vision of the State's future. Its purpose is to define in a broad sense, goals, and policies that provide decision-makers directions for the future and provide long-range guidance for an orderly social, economic and physical growth.

Response: The proposed project has been coordinated with various Federal, State and local agencies during the planning process. The project meets the primary goal of the State Comprehensive Plan through preservation and protection of the shorefront development and infrastructure.

3. Chapter 252, Disaster Preparation, Response and Mitigation. This chapter creates a state emergency management agency, with the authority to provide for the common defense; to protect the public peace, health and safety; and to preserve the lives and property of the people of Florida.

Response: The proposed project involves the placing of beach compatible material onto an eroding beach as a protective means for residents, development and infrastructure located along the Gulf shoreline within Sarasota County. Therefore, this project would be consistent with the efforts of Division of Emergency Management.

4. Chapter 253, State Lands. This chapter governs the management of submerged state lands and resources within state lands. This includes archeological and historical resources; water resources; fish and wildlife resources; beaches and dunes; submerged grass beds and other benthic communities; swamps, marshes and other wetlands; mineral resources; unique natural features; submerged lands; spoil islands; and artificial reefs.

Response: The proposed beach nourishment would create increased recreational beach and potential sea turtle nesting habitat. No seagrass beds are located within the area proposed to receive fill. The proposed project would comply with the intent of this chapter.

5. Chapters 253, 259, 260, and 375, Land Acquisition. This chapter authorizes the state to acquire land to protect environmentally sensitive areas.

Response: Since the affected property already is in public ownership, this chapter does not apply.

6. Chapter 258, State Parks and Aquatic Preserves. This chapter authorizes the state to manage state parks and preserves. Consistency with this statute would include consideration of projects that would directly or indirectly adversely impact park property, natural resources, park programs, management or operations.

Response: The proposed project area does not contain any state parks or aquatic preserves nor are there any within the immediate vicinity of the project that would be affected. The project is consistent with this chapter.

7. Chapter 267, Historic Preservation. This chapter establishes the procedures for implementing the Florida Historic Resources Act responsibilities.

Response: This project has been coordinated with the State Historic Preservation Officer (SHPO). Historic Property investigations were conducted in the project area. An archival and literature search, in addition to a magnetometer survey of the proposed borrow area were conducted. The SHPO concurred with the Corps determination that the proposed project will not adversely affect any significant cultural or historic resources. The project will be consistent with the goals of this chapter.

8. Chapter 288, Economic Development and Tourism. This chapter directs the state to provide guidance and promotion of beneficial development through encouraging economic diversification and promoting tourism.

Response: The proposed beach nourishment would provide more space for recreation and the protection of recreational facilities along the receiving beach. This would be compatible with tourism for this area and therefore, is consistent with the goals of this chapter.

9. Chapters 334 and 339, Transportation. This chapter authorizes the planning and development of a safe balanced and efficient transportation system.

Response: No public transportation systems would be impacted by this project.

10. Chapter 370, Saltwater Living Resources. This chapter directs the state to preserve, manage and protect the marine, crustacean, shell and anadromous fishery resources in state waters; to protect and enhance the marine and estuarine environment; to regulate fishermen and vessels of the state engaged in the taking of such resources within or without state waters; to issue licenses for the taking and processing products of fisheries; to secure and maintain statistical records of the catch of each such species; and, to conduct scientific, economic, and other studies and research.

Response: The proposed beach fill may represent a temporary short-term impact to infaunal invertebrates by burying these organisms. However, these organisms are highly adapted to the periodic burial by sand in the intertidal zone. These organisms are highly fecund and are expected to return to pre-construction levels within 6 months to one year after construction. Nourishment activities would not be performed during the main part of the sea turtle nesting season. It is not expected that sea turtles would be significantly impacted by this project. Based on the overall impacts of the project, the project is consistent with the goals of this chapter.

11. Chapter 372, Living Land and Freshwater Resources. This chapter establishes the Game and Freshwater Fish Commission and directs it to manage freshwater aquatic life and wild animal life and their habitat to perpetuate a diversity of species with densities and distributions which provide sustained ecological, recreational, scientific, educational, aesthetic, and economic benefits.

Response: The project will have no effect on freshwater aquatic life or wild animal life.

12. Chapter 373, Water Resources. This chapter provides the authority to regulate the withdrawal, diversion, storage, and consumption of water.

Response: This project does not involve water resources as described by this chapter.

13. Chapter 376, Pollutant Spill Prevention and Control. This chapter regulates the transfer, storage, and transportation of pollutants and the cleanup of pollutant discharges.

Response: The contract specifications will prohibit the contractor from dumping oil, fuel, or hazardous wastes in the work area and will require that the contractor adopt safe and sanitary measures for the disposal of solid wastes. A spill prevention plan will be required.

14. Chapter 377, Oil and Gas Exploration and Production. This chapter authorizes the regulation of all phases of exploration, drilling, and production of oil, gas, and other petroleum products.

Response: This project does not involve the exploration, drilling or production of gas, oil or petroleum product and therefore, this chapter does not apply.

15. Chapter 380, Environmental Land and Water Management. This chapter establishes criteria and procedures to assure that local land development decisions consider the regional impact nature of proposed large-scale development. This chapter also deals with the Area of Critical State Concern program and the Coastal Infrastructure Policy.

Response: The proposed renourishment project will not have any regional impact on resources in the area. Therefore, the project is consistent with the goals of this chapter.

16. Chapters 381 (selected subsections on on-site sewage treatment and disposal systems) and 388 (Mosquito/Arthropod Control). Chapter 388 provides for a comprehensive approach for abatement or suppression of mosquitoes and other pest arthropods within the state.

Response: The project will not further the propagation of mosquitoes or other pest arthropods.

17. Chapter 403, Environmental Control. This chapter authorizes the regulation of pollution of the air and waters of the state by the Florida Department of Environmental Regulation (now a part of the Florida Department of Environmental Protection).

Response: A Draft Environmental Assessment addressing project impacts has been prepared and will be reviewed by the appropriate resource agencies including the Florida Department of Environmental Protection. Environmental protection measures will be implemented to ensure that no lasting adverse effects on water quality, air quality, or other environmental resources will occur. Water Quality Certification will be sought from the State prior to construction. The project complies with the intent of this chapter.

18. Chapter 582, Soil and Water Conservation. This chapter establishes policy for the conservation of the state soil and water through the Department of Agriculture. Land use policies will be evaluated in terms of their tendency to cause or contribute to soil erosion or to conserve, develop, and utilize soil and water resources both onsite or in adjoining properties affected by the project. Particular attention will be given to projects on or near agricultural lands.

Response: The proposed project is not located near or on agricultural lands; therefore, this chapter does not apply.

APPENDIX C - PERTINENT CORRESPONDENCE

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

REPLY TO
ATTENTION OF

SEP 28 2000

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
Chief, Planning Division

Enclosures

STATE OF FLORIDA

DEPARTMENT OF COMMUNITY AFFAIRS

"Dedicated to making Florida a better place to call home"

JEB BUSH
Governor

STEVEN M. SEIBERT
Secretary

November 28, 2000

Department of the Army
Jacksonville District Corps of Engineers
Environmental Coordination Section
Post Office Box 4970
Jacksonville, Florida 32232-0019

Attn: Planning Division

RE: Department of the Army - District Corps of Engineers - Scoping Document - To Define Issues and Concerns to be Addressed in a Feasibility Study Regarding Erosion Problems Along the Gulf of Mexico Shoreline of Lido Key - Sarasota County, Florida
SAI: FL200010030661C

Dear Sir or Madam:

The Florida State Clearinghouse, pursuant to Presidential Executive Order 12372, Gubernatorial Executive Order 95-359, the Coastal Zone Management Act, 16 U.S.C. §§ 1451-1464, as amended, and the National Environmental Policy Act, 42 U.S.C. §§ 4321, 4331-4335, 4341-4347, as amended, has coordinated a review of the above-referenced project.

The Department of Environmental Protection (DEP) offers several recommendations regarding the environmental assessment or environmental impact statement. In addition, DEP recommends that the Corps consult with DEP and the Florida Fish and Wildlife Conservation Commission on proposed borrow sites, fill, and structures. Please refer to the enclosed DEP comments.

Based on the information contained in the scoping document and the enclosed comments provided by our reviewing agencies, the state has determined that, at this stage, the above-referenced project is consistent with the Florida Coastal Management Program (FCMP). All subsequent environmental documents prepared for this project must be reviewed to determine the

project's continued consistency with the FCMP. The state's continued concurrence with the project will be based, in part, on the adequate resolution of issues identified during this and subsequent reviews.

Thank you for the opportunity to review the scoping document. If you have any questions regarding this letter, please contact Ms. Cherie Trainor, Clearinghouse Coordinator, at (850) 414-5495.

Sincerely,

Chris McCay

for Ralph Cantral, Executive Director
Florida Coastal Management Program

RC/cc

Enclosures

cc: Kate Muldoon, Department of Environmental Protection

Department of Environmental Protection

Jeb Bush
Governor

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

David B. Struhs
Secretary

9 November 2000

RECEIVED
NOV 13 2000
State of Florida Clearinghouse

Ms. Cherie Trainor
State Clearinghouse
Department of Community Affairs
2555 Shumard Oak Blvd.
Tallahassee, FL 32399

RE: U.S. Army Corps of Engineers/ Scoping Notice for a Feasibility Study of Beach Renourishment on Lido Key, Sarasota County
SAI: FL200010030661C

Dear Ms. Trainor:

The Department of Environmental Protection (DEP) received the U.S. Army Corps of Engineers' Scoping Notice for a Feasibility Study of Beach Renourishment on Lido Key, Sarasota County. The proposed project is a feasibility study of alternatives to address continued shoreline erosion on Lido Key, a small barrier island offshore to Sarasota. Alternatives under consideration are : no action; beach restoration; revetment; and terminal groin construction. Fill would be obtained from offshore borrow areas. The Department has the following comments:

We recommend that the Environmental Assessment or Environmental Impact Statement:

1. be based upon recent data. Given that this area of Lido Key Beach has been renourished in the past, information from the previous feasibility studies may be out of date due to the dynamic nature of beach and coastal systems.

2. address the effects of an increase in the rate of erosion due to rising sea levels. A constant erosion rate (that does not account for sea level rise) used to extrapolate the expected loss of beach fill may result in a derived value that underestimates the amount of fill needed for periodic renourishment. Accordingly, a conservative estimate may also bias the benefit/cost ratio.

3. provide a discussion on the environmental control measures used to alleviate increased turbidity levels during the dredging process. The EA or EIS should also include a monitoring plan designed to check any violation of water quality standards according to Chapter 17-3, Florida Statutes.

4. identify and fully evaluate the extent of seagrasses, hardbottom, and benthic communities located in proposed offshore borrow areas, as well as adjacent to the beach proposed for renourishment. The Department also recommends that every effort be made to avoid potential impacts to sensitive areas, and to provide a mitigation plan for unavoidable impacts.

In addition, we recommend that the Corps consult with DEP and the Florida Fish and Wildlife Conservation Commission on proposed borrow sites, fill, and structures.

Thank you for the opportunity to review and comment upon this scoping notice. If you require additional information, please contact me at 850/487-2231.

Sincerely,

Kate Muldoon

Kate Muldoon
Intergovernmental Programs

\kam
cc: file
Dianne McCommons-Beck
Roxane Dow
Susan Goggin

TY: Sarasota

ıge:

DATE: 10/03/2000
COMMENTS DUE DATE: 11/02/2000
CLEARANCE DUE DATE: 11/13/2000
SAI#: FL200010030661C

STATE AGENCIES	WATER MANAGEMENT DISTRICTS	OPB POLICY UNITS
Community Affairs Environmental Protection Fish & Wildlife Conserv. Comm State X Transportation	Southwest Florida WMD	Environmental Policy/C & ED

Th tached document requires a Coastal Zone Management Act/Florida l Management Program consistency evalutation and is categorized a e of the following:

___ Federal Assistance to State or Local Government (15 CFR 930, Subpart F). Agencies are required to evaluate the consistency of the activity.

_X_ Direct Federal Activity (15 CFR 930, Subpart C). Federal Agencies are required to furnish a consistency determination for the State's concurrence or objection.

___ Outer Continental Shelf Exploration, Development or Production Activities (15 CFR 930, Subpart E). Operators are required to provide a consistency certification for state concurrence/objection.

___ Federal Licensing or Permitting Activity (15 CFR 930, Subpart D). Such projects will only be evaluated for consistency when there is not an analogous state license or permit.

Project Description:

Department of the Army - District Corps of Engineers - Scoping Document - To Define Issues and Concerns to be Addressed in a Feasibility Study Regarding Erosion Problems Along the Gulf of Mexico Shoreline of Lido Key - Sarasota County, Florida.

To: **Florida State Clearinghouse**
Department of Community Affairs
2555 Shumard Oak Boulevard
Tallahassee, FL 32399-2100
(850) 922-5438 (SC 292-5438)
(850) 414-0479 (FAX)

EO. 12372/NEPA

- [x] No Comment
- [ ] Comments Attached
- [ ] Not Applicable

Federal Consistency

- [x] No Comment/Consistent
- [ ] Consistent/Comments Attached
- [ ] Inconsistent/Comments Attached
- [ ] Not Applicable

From:
Division/Bureau: FDOT
Reviewer: Sandra Hartmire

: Sarasota

Sage:

DATE: 10/03/2000
COMMENTS DUE DATE: 11/02/2000
CLEARANCE DUE DATE: 11/13/2000
SAI#: FL200010030661C

STATE AGENCIES	WATER MANAGEMENT DISTRICTS	OPB POLICY UNITS
Community Affairs Environmental Protection Fish & Wildlife Conserv. Comm State Transportation	Southwest Florida WMD	X Environmental Policy/C & ED

RECEIVED
OCT 5 2000
OFFICE OF POLICY AND BUDGET
ENVIRONMENTAL POLICY UNIT

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Project Description:

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- [ ] Consistent/Comments Attached
- [ ] Inconsistent/Comments Attached
- [ ] Not Applicable

RECEIVED
OCT 11 2000
State of Florida Clearinghouse

From:
Division/Bureau: EO 6. OPB. Env. Policy
Reviewer: M O'Connor
Date: 10/18/2000

Southwest Florida Regional Planning Council

4980 Bayline Drive, 4th Floor, N. Ft. Myers, FL 33917-3909 (941) 656-7720

P.O. Box 3455, N. Ft. Myers, FL 33918-3455 SUNCOM 749-7720

FAX 941-656-7724

November 28, 2000

Mr. James C. Duck
Chief, Planning Division
U.S. Army Corps of Engineers
Post Office Box 4970
JACKSONVILLE, FL 32232-0019

RE: IC&R Project #2000-445
USACE Feasibility Study
Council Staff Reply to Request For Comments Regarding The Proposed Lido Key Shoreline Erosion Alternatives Study.

Dear Mr. Duck:

The staff of the Southwest Florida Regional Planning Council reviews various proposals, Notifications of Intent, Preapplications, permit applications, and Environmental Impact Statements for compliance with regional goals, objectives and policies, as determined by the Strategic Regional Policy Plan. Staff reviews such items in accordance with the Florida Intergovernmental Coordination and Review Process (Chapter 29I-5, F.A.C.), and adopted regional clearinghouse procedures.

Normally, staff provides such projects with a recommendation as to whether or not the project is regionally significant (or less than regionally significant) and whether the project is consistent with the adopted Strategic Regional Policy Plan. However, periodically Regional staff responds to requests for comment that do not require a consistency determination.

Lido Key is within the City of Sarasota, Sarasota County, and is therefore within the geographic jurisdiction of the Southwest Florida Regional Planning Council. The following staff comments are based upon the Council's adopted Strategic Regional Policy Plan, and the goals and policies therein.

1. In general, the Strategic Regional Policy Plan discourages any shoreline activities that involve adverse impacts to natural shoreline processes. Based upon this statement, Council staff would support either the "No Action" alternative, or the "Beach Restoration" alternative. However, due to the fact that the island includes a regionally significant hurricane evacuation route and bridge (scheduled for replacement), staff must support the "Beach Restoration" alternative.

2. Beach restoration upon Lido Key should be conducted within the following parameters, as applicable:

   a. Protection of marine life, including particularly West Indian manatees and sea turtles (including nests).

   b. Materials utilized for beach restoration should be compatible with the type and grain size of sand currently found on Lido Key.

   c. Private property owners should not directly benefit from the proposed activities (i.e., restoration materials should not be used to fill or restore private property), unless a clear public benefit can be achieved thereby.

   d. So far as possible, structural activity (construction of groins, seawalls, breakwaters, etc.) should be avoided. These structures tend, in many instances, to further erosion and may interfere with natural processes.

   e. The need for further beach restoration activities should be reviewed on a periodic basis.

Regional staff is willing to meet with the Corps of Engineers or its agents, to discuss the proposed activities and the staff comments. Likewise, staff would be willing to meet with other agencies concerning these issues. Please contact Mrs. Nichole Gwinnett, IC&R Coordinator, or Mr. Glenn Heath, Senior Planner, with any such request, or with any questions concerning staff review.

Sincerely,

SOUTHWEST FLORIDA REGIONAL PLANNING COUNCIL

for Wayne E. Daltry
Executive Director

WED/GEH/NLG

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

October 25, 2000

Colonel James G. May
District Engineer, Jacksonville District
Planning Division, Environmental Branch
Department of the Army, Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

Dear Colonel May:

This is in response to your staff's letter, dated September 28, 2000, requesting information to define issues and concerns needed to be addressed in a Feasibility Study on erosion problems along the Gulf of Mexico Shoreline of Lido Key in Sarasota County, Florida. Alternatives being considered include no action, beach restoration, revetment, and terminal groin construction. Fill material would be obtained from offshore borrow areas.

Marine water column, vegetated bottoms, non-vegetated bottoms, live bottoms, and artificial reefs can be expected to occur in the area of Lido Key and the offshore borrow areas. These habitats are identified as Essential Fish Habitat (EFH) in the 1998 Amendment of the Fishery Management Plans for the Gulf of Mexico. This Amendment was prepared by the Gulf of Mexico Fishery Management Council as required by the 1996 amendment to the Magnuson-Stevens Fishery Conservation and Management Act.

Federal agencies which permit, fund, or undertake activities which may adversely impact EFH must undertake an EFH Consultation with the NMFS. EFH Assessments must include: 1) a description of the proposed action; 2) an analysis of the effects (including cumulative effects) of the proposed action on EFH, the managed fish species and major prey species; 3) the Federal agency's views regarding the effects of the action on EFH; and 4) proposed mitigation, if applicable. Additional information to include, as appropriate, are: 1) the results of on-site evaluations; 2) the views of recognized experts on the habitat or species affected; 3) a review of pertinent literature; and, 4) an analysis of alternatives, including actions to avoid or minimize impacts. Additional information regarding EFH in the Gulf of Mexico can be found at the following internet site: http://galveston.ssp.nmfs.gov/efh/default.htm.

We appreciate the opportunity to provide you with our comments. Please direct related comments, questions, or correspondence to Mr. David N. Dale in St. Petersburg, Florida. He may be contacted at 727/570-5311 or at the letterhead address above.

Sincerely,

W. Mark Thompson/for
Andreas Mager, Jr.
Assistant Regional Administrator
Habitat Conservation Division

Planning Division
Environmental Branch

APR 09 2001

Mr. Jay Slack
Field Supervisor
U.S. Fish and Wildlife Service
South Florida Field Office
1339 20th Street
Vero Beach, Florida 32960

Dear Mr. Slack:

The Jacksonville District, U.S. Army Corps of Engineers (Corps) is conducting a feasibility ~~stage~~ Phase study to renourish 1.74 miles of shoreline on Lido Key in Sarasota County, Florida.

Pursuant to Section 7(a) of the Endangered Species Act, please find enclosed the Biological Assessment addressing the concerns of the threatened and endangered species under the purview of the U.S. Fish and Wildlife Service (FWS). The Corps has determined that the authorized project may affect nesting sea turtles, and, therefore requests that formal consultation with the FWS be initiated.

If you have any questions, please contact Ms. Yvonne Haberer at 904-232-1701.

Sincerely,

James C. Duck
Chief, Planning Division

L:group/pde/haber/LidoKeyBAltrFWS.doc

Planning Division
Environmental Branch

JUL 17 2001

Mr. Charles A. Oravetz
Chief, Protected Species Management Service
National Marine Fisheries Service
9721 Executive Center Drive North
St. Petersburg, Florida 33702

Dear Mr. Oravetz:

The Jacksonville District, U.S. Army Corps of Engineers (Corps) is conducting a feasibility phase study to renourish 1.74 miles of shoreline on Lido Key in Sarasota County, Florida.

Pursuant to Section 7 (a) of the Endangered Species Act, please find enclosed the Biological Assessment (BA) addressing the concerns of the threatened and endangered species under the purview of the National Marine Fisheries Service (NMFS). The Corps has determined that the authorized project may affect sea turtles, and therefore, requests that formal consultation with the NMFS be initiated.

If you have any questions, please contact Ms. Yvonne Haberer at 904-232-1701.

Sincerely,

James C. Duck
Chief, Planning Division

Enclosure

l:group/pde/haber/LidoNMFSBAltr.doc

ENDANGERED SPECIES ACT
BIOLOGICAL ASSESSMENT
LIDO KEY, SARASOTA COUNTY, FLORIDA
FEASIBILITY PHASE STUDY

1. PROJECT AUTHORITY: A beach erosion control project was authorized for Lido Key, Florida by the 31 December 1970 Rivers and Harbors 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 never completed and was deauthorized on 1 January 1990 in accordance with the provisions of Section 1001 (b) (1) of the 1986 Water Resources Act.

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 to R-44.

2. LOCATION: Lido Key is a small barrier island, approximately 2.44 miles long, located on the west coast of Florida in Sarasota County. Lido Key is separated from Longboat Key to the north by New Pass (a Federal navigation project) and is separated from Siesta Key to the south by Big Sarasota Pass (see location map, figure 1).

3. DESCRIPTION OF PROPOSED ACTION: The proposed alternatives being studied in the feasibility stage include the placement of beach fill at varying berm widths between 0 and 100 feet on 1.74 miles of shoreline using an estimated 700,000 to 1,500,000 cubic yards of material, a terminal groin at the south end of Lido Key, and the combination of beach fill and a terminal groin. The project limits for the renourishment of the 1.74-mile design on Lido Key extend from Florida Department of Environmental Protection (FDEP) beach monument R-35 to R-44 (figure 1). Fill would be obtained from offshore borrow areas. Three offshore borrow areas have been identified for further study (see figure 2). These offshore borrow areas are located from 4 to 6 miles offshore. Due to the distance of the borrow areas, a hopper dredge may be used. Table 1 lists average mean grain size and silt content of material in each proposed borrow area.

Table 1: Average Mean Grain Size and Silt Content of Material in Proposed Borrow Areas

	MEAN GRAIN SIZE (mm)	PERCENT SILT
Borrow Area #5	0.43	2.19
Borrow Area #6	0.32	4.05
Borrow Area #7	0.43	2.48

4. LISTED SPECIES WHICH MAY BE AFFECTED: Listed species which may occur in the vicinity of the proposed work and are under the jurisdiction of the National Marine Fisheries Service (NMFS) are: loggerhead sea turtle (*Caretta caretta*, T), green sea turtle (*Chelonia mydas*, E), hawksbill sea turtle (*Eretmochelys imbricata*, E), Kemp's ridley sea turtle (*Lepidochelys kempi*, E), leatherback sea turtle (*Dermochelys coriacea*, E), Gulf sturgeon (*Acipenser oxyrhynichus desotoi*, T), blue whale (*Balaenoptera musculus*, E), finback whale (*Balaenoptera physalus*, E), humpback whale (*Megaptera novaeangliae*, E), sei whale (*Balaenoptera borealis*, E), and the sperm whale (*Physeter macrocephalus*, E).

Sea Turtles

Loggerheads, green turtles, and leatherbacks nest regularly in Florida. Nesting by the hawksbill turtle and the Kemp's ridley turtle in Florida is rare. During a 14-year study period (1979-1992), it was reported that 95.3% of all reported sea turtle nesting activity in the state of Florida occurred on the east coast, and 4.7% occurred on the gulf coast (Meyland, Schroeder, and Mosier 1995). The loggerhead sea turtle accounts for the vast majority of reported sea turtle nesting in Florida. The majority of loggerhead nesting on the gulf coast occurs from Sarasota through Collier counties. Sarasota County has the greatest amount of nesting activity, accounting for an average of 47.5% of all nesting on the west coast of Florida during 1988–1 992 (Meyland, Schroeder, and Mosier 1995).

The green turtle is a listed sea turtle species in Sarasota County. Nesting data from Meylan (1995) and the Florida Marine Research Institute (unpubl. data) indicate that from 1979 through 2000, a total of 13 green turtle nests have been recorded in Sarasota County on the beaches of Casey Key, Manasota Key, and Venice. The same data indicated that no green sea turtle nests were recorded on Lido Key. The green sea turtle nesting and hatching season for Southwest Florida extends from May 15 through October 31. Incubation ranges from about 45 to 95 days (USFWS 2000).

Utilizing the best available data, it has been determined that only the threatened loggerhead sea turtle have known nesting habitat on Lido Key beaches. In comparison to other beaches in Sarasota County, the beaches of Lido Key have the least number of reported loggerhead nests accounting for 1.4% of total nesting activity in Sarasota County during the year 1999. Information provided by the Florida Marine Research Institute indicates that from 1992 to 2000, loggerhead sea turtle nest numbers varied

from 32 to 60 on the approximately 4.2-mile long Lido Key nesting beach (see Table 2). The loggerhead sea turtle nesting and hatching season for Southwest Florida extends from April 1 through November 30. Incubation ranges from about 45 to 95 days.

Table 2: Nesting data from 1992 to 2000 for C. caretta on Lido Key, Sarasota County, Florida.

Year	Beach Length	Days per Week	# False Crawls	# Nests
1992	4.2	7	42	32
1993	4.2	7	35	35
1994	4.2	7	34	37
1995	4.2	7	50	34
1996	4.2	7	35	50
1997	4.2	7	44	45
1998	4.2	7	94	42
1999	4.2	7	57	48
2000	5.3	7	52	60

Gulf Sturgeon
Historically, the Gulf sturgeon occurred from the Mississippi River to Charlotte Harbor, Florida. It still occurs occasionally throughout this range but in greatly reduced numbers. River systems where the Gulf sturgeon are known to be viable today include the Mississippi, Pearl, Escambia, Yellow, Choctawhatchee, Apalachicola, and Swannee Rivers, and possibly others (USFWS 1995).

Whales
Since all construction activities will occur in shallow coastal waters not frequented by whales, the proposed project is not expected to have any effect on whales.

5. DISCUSSION OF POTENTIAL IMPACTS TO LISTED SPECIES: Of the listed sea turtle species, loggerheads are the most common sea turtle in the action area, followed by the green sea turtle. Of these two species, only the loggerheads nest in significant quantities on nesting beaches near the proposed borrow areas. Loggerheads could be affected if a hopper dredge is used, especially if dredging takes place during nesting season. Sporadic nesting of green turtles occurs on Sarasota beaches and they could be affected by dredging as well.

No information has been found to indicate a past history of negative impacts to whales or the Gulf sturgeon as a result of previous beach nourishment activities in the project area.

6. EFFORTS TO ELIMINATE POTENTIAL IMPACTS ON LISTED SPECIES: Potential negative impacts on sea turtles will be avoided or minimized through the implementation of the following measures:

a. The drag arms of the hopper dredge will be fitted with a rigid sea turtle deflector draghead, and modified as necessary to eliminate sites of inadvertent entrainment of sea turtles.

b. The inflow to the hoppers will be screened as close to 100% as possible. There will be 100% observer coverage to monitor the screens for evidence of turtle take.

c. To minimize the potential for sea turtle entrainment, the dredge pumps would be shut down before the draghead is lifted of the bottom and would not be turned on until the draghead is placed on the bottom. NOTE: If the actual dredging operation has difficulty with this procedure, the Corps reserves the right to re-consult with NMFS to delete or modify this requirement.

7. EFFECT DETERMINATION: Because of the nature of the work and the precautions to be taken as described in the previous section, the Corps has determined that the proposed action will have no effect on whales or Gulf sturgeon. The Corps has determined that sea turtles, however, may be affected by the proposed activities if a hopper dredged is used.

REFERENCES

Coastal Planning and Engineering, Inc. 1992. Environmental Study for the Lido Key Beach Nourishment Project in Sarasota County. 32 pp.

Florida Fish and Wildlife Conservation Commission. 1993-1999. Statewide Sea Turtle Nesting Beach Survey Database. Florida Marine Research Institute. St. Petersburg, Florida.

Meylan, A., Schroeder, B., and Mosier, A. 1995. Sea Turtle Nesting Activity in the State of Florida, 1979-1992. Florida Marine Research Publication, Number 52. Florida Marine Research Institute, St. Petersburg, Florida.

National Marine Fisheries Service. 1995. Regional Biological Opinion for Hopper Dredging along the South Atlantic Coast. NMFS Southeast Regional Office. Silver Spring, Maryland. 25 pp.

U.S. Army Corps of Engineers. 1990. Methods to Minimize Dredging Impacts on Sea Turtles. Proceedings of the National Workshop, Jacksonville, Florida. 89 pp.

U.S. Fish and Wildlife Service (FWS). 2000. Fish and Wildlife Coordination Act with Biological Opinion, Anna Maria Island, Manatee County, Florida.

U.S. Fish and Wildlife Service. 1988. Life History and Environmental Requirements of Loggerhead Turtles. Biological Report 88(23).

U.S. Fish and Wildlife Service. 1996. Florida manatee recovery plan. U.S. Fish and Wildlife Service; Atlanta, Georgia.

U.S. Fish and Wildlife Service. 1999. South Florida Multi-Species Recovery Plan. U.S. Fish and Wildlife Service; Atlanta, Georgia.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
9721 Executive Center Drive North
St. Petersburg, FL 33702
(727) 570-5312, FAX 570-5517
http://caldera.sero.nmfs.gov

AUG - 9 2001

F/SER3:EGH:mdh

Mr. James C. Duck
Chief, Planning Division
Department of the Army
Jacksonville District Corps of Engineers (COE)
P.O. Box 4970
Jacksonville, FL 32232-0019

Dear Mr. Duck:

We have received and reviewed your July 17, 2001, letter, and biological assessment (BA) for the COE's feasibility phase study to renourish 1.74 miles of shoreline on Lido Key in Sarasota County, Florida with sand obtained from three offshore borrow areas located from 4 to 6 miles offshore. The COE's BA concluded that the proposed action will have no effect on whales or Gulf sturgeon, but that it may affect sea turtles if a hopper dredge is used to excavate the offshore borrow areas. You requested formal consultation with the National Marine Fisheries Service (NMFS) pursuant to section 7 the Endangered Species Act (ESA).

Listed species under NMFS' jurisdiction that may occur at the project site are green, hawksbill, leatherback, Kemp's ridley, and loggerhead sea turtles; blue, fin, humpback, sei, and sperm whales; and gulf sturgeon. NMFS concurs with the COE's determination that the project as proposed may adversely affect sea turtles, and is unlikely to adversely affect whales, protected by the ESA under NMFS' purview. However, NMFS believes that gulf sturgeon may also be affected. There is no NMFS-designated critical habitat in the project area, thus, none will be affected.

NMFS finds that the BA is incomplete and requests that information on hopper dredge takes of sea turtles and sturgeon, from COE-permitted dredging of borrow areas in the South Atlantic and the Gulf of Mexico, be added. NMFS also requests that information be provided on the proximity of the proposed borrow areas to hardgrounds, and sea turtle presence at the hardgrounds and borrow sites. Hardgrounds may serve as foraging habitat for listed sea turtles.

Currently, NMFS has reinitiated section 7 consultation with the COE's Galveston and New Orleans Districts to update the regional, September 22, 1995, Biological Opinion (Opinion) on hopper dredging of navigation channels in Texas and Louisiana. The new Opinion is expected to be released this year. NMFS intends to include the COE Jacksonville District's proposed Lido Key beach renourishment action into the scope of the proposed action of the new Opinion. NMFS will also incorporate the ongoing consultation with the COE Jacksonville District on the

Lee County Shore Protection Project (renourishment of Gasparilla Island and Estero Island beaches with sand hopper-dredged from nearby offshore borrow areas) into the regional Opinion.

If the COE is aware of any other pending, proposed, planned, foreseeable, or imminent beach renourishment actions for the west coast of Florida that may occur within the next 5 years, please advise this office immediately so that they too may be incorporated into the scope of the regional Opinion currently in preparation. NMFS intends to incorporate hopper dredging guidelines into the forthcoming regional Opinion to account for unforseen beach renourishment activities that may arise in the future along the west coast of Florida, rather than consult individually on each proposed action as it occurs.

Section 7 allows NMFS up to 90 days to conclude formal consultation with your agency, and an additional 45 days to prepare our Opinion (unless we mutually agree to an extension) once all needed information is received from the action agency. Therefore, our anticipated Opinion completion date is 135 days from the date of receipt of the above-requested information. The ESA requires that after initiation of formal consultation the Federal action agency make no irreversible or irretrievable commitment of resources that limits future options. This practice ensures agency actions do not preclude the formulation and implementation of reasonable and prudent alternatives that avoid jeopardizing the continued existence of endangered or threatened species or destroying or modifying their critical habitats.

It is a pleasure working with the COE Jacksonville District to ensure the protection of Federally-listed species while meeting our respective agency missions and obligations. If you have any questions, please contact Eric Hawk, fishery biologist, at the number listed above, or by e-mail at eric.hawk@noaa.gov.

Sincerely,

Larry D Dietzen

for, Joseph E. Powers, Ph.D.
Acting Regional Administrator

cc: F/SER4
F/PR3

o:\section7\informal\lidokey.wpd
File: 1514-22.f.1 Jacksonville District

SEP 0 7 2001

Planning Division
Environmental Branch

Mr. Joseph E. Powers
Acting Regional Administrator
National Marine Fisheries Service
9721 Executive Center Drive North
St. Petersburg, FL 33702

Dear Mr. Powers:

This is in reference to the Lido Key Shore Protection Project, Sarasota County, Florida.

On July 17, 2001, the U.S. Army Corps of Engineers (Corps) submitted a Biological Assessment (BA) initiating Section 7 consultation for this project. Your office responded by letter dated August 9, 2001 requesting additional information on hopper dredge takes of sea turtles and sturgeon, information on the proximity of the proposed borrow areas to hardgrounds, and sea turtle presence at the hardgrounds and borrow sites.

In addition to the requests for information, your letter states that the National Marine Fisheries Service (NMFS) intends to include the proposed Lido Key Shore Protection Project into the scope of a new Regional Biological Opinion for the Gulf Coast currently in preparation and expected to be released this year.

Our office does not object to this project being included in the new Opinion. However, if the NMFS anticipates a delay in releasing the new Opinion, the Corps requests that a separate Biological Opinion and Incidental Take Statement be prepared to prevent delays in our project schedule. The environmental coordination for this project is scheduled to be complete by January 2002.

Enclosed is a revised BA, which addresses the additional information you requested. The Corps has determined that the proposed project may affect sea turtles, and therefore, requests that formal consultation with the NMFS be initiated.

If you have any questions, please contact Ms. Yvonne Haberer, biologist, at 904-232-1701, or by e-mail at Yvonne.l.haberer@SAJ02.usace.army.mil.

Sincerely,

James C. Duck
Chief, Planning Division

Enclosure

l:group/pde/haber/LidoNMFSBAltr2.doc

ENDANGERED SPECIES ACT
BIOLOGICAL ASSESSMENT
LIDO KEY SHORE PROTECTION PROJECT
SARASOTA COUNTY, FLORIDA

1. References. The following documents are incorporated into this biological assessment by reference:

a. U.S. Army Corps of Engineers (Corps) Biological Assessment dated July 17, 2001, Lido Key Shore Protection Project, Feasibility Study, Sarasota County, Florida.

b. U.S. Army Corps of Engineers Biological Assessment dated October 1994, Dredging Navigation Channels in the Southeastern United States from North Carolina Through Cape Canaveral, Florida.

c. National Marine Fisheries Service (NMFS) Regional Biological Opinion dated August 25, 1995, Hopper Dredging South Atlantic Coast.

d. NMFS Regional Biological Opinion dated September 25, 1997, The Continued Hopper Dredging of Channels and Borrow Areas in the Southeastern United States.

e. NMFS letter dated August 9, 2001, requesting additional information on the proposed Lido Key Shore Protection Project.

2. Description of Proposed Action. Reference 1a above. Three proposed borrow areas, located approximately 8-10 miles offshore, have been identified for the above referenced project (figure 1, location map). Side scan sonar employed near the borrow areas yielded some evidence for low-relief hardground communities (figure 2). The borrow areas will be designed to insure that dredging will not occur within a minimum of 200 feet from any hardgound area (figure 2, represented by green dashed line)

3. Identification of Listed Species. Reference 1a and 1e above.

4. Potential Impacts to Listed Species. Reference 1a, 1b, 1c, 1d, and 1e. Sea turtles may use the hardground areas adjacent to the borrow sites for resting and foraging; however, dredging will not occur on the hardgrounds and will not adversely effect sea turtles utilizing the

hardgrounds. Documented incidents of sea turtle takes by hopper dredges have occurred in navigation channels where sea turtles are known to congregate in large numbers. A review of the literature has not shown that sea turtles utilize sandy areas offshore for congregation or resting as they do navigation channels and therefore, are not expected to be found on the bottom of the borrow areas. To date, we are only aware of one documented incident of taking sea turtles while hopper dredging in offshore borrow areas for shore protection projects in Florida.

5. Efforts to Eliminate Potential Impacts. Procedures to minimize or eliminate adverse impacts on listed species are discussed in the referenced Biological Assessment and will be incorporated into this project. The terms and conditions outlined in the referenced Biological Opinions to minimize impacts to sea turtles and sturgeon will be followed.

6. Effect Determination. Because of the nature of the work and the precautions to be taken as described in the referenced Biological Assessment, the Corps has determined that the proposed action will have no effect on whales or Gulf sturgeon. However, the proposed dredging activities may affect sea turtles if a hopper dredge is used.

Planning Division
Environmental Branch

JAN 08 2002

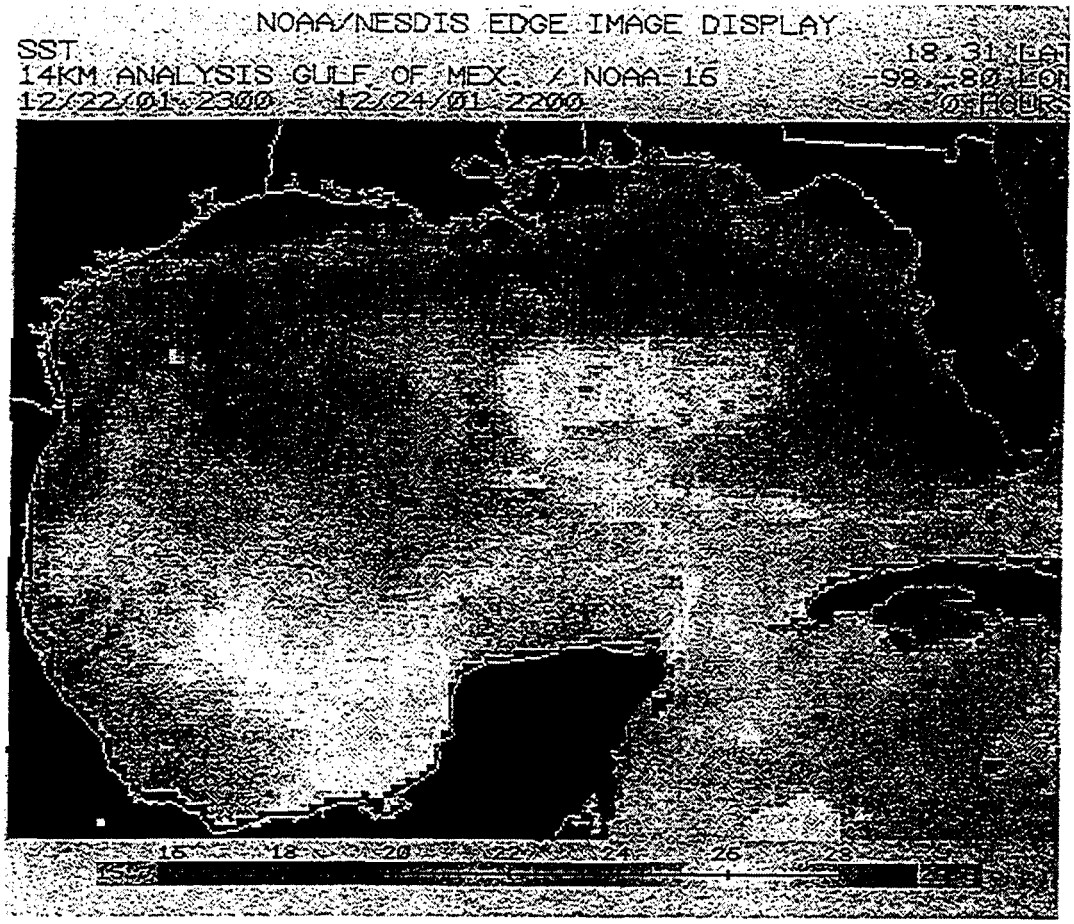
Ms Georgia Cranmore
National Marine Fisheries Service
Southeast Regional Office
9721 Executive Center Drive North
St. Petersburg, Florida 33702-2432

Dear Ms Cranmore:

This is in reference to our November 28, 2000 letter initiating consultation for hopper dredging in the Gulf of Mexico for projects within the jurisdiction of the Jacksonville District.

We would like to enter into further consultation into this matter and incorporate by reference the Regional Biological Opinion (RBO) for Hopper Dredging along the Southeastern United States. We have reviewed the draft RBO that your office has prepared and offer the following:

The State of Florida from Daytona south is located in the Neo-tropical Climate Zone. Below that climate zone, sea turtles remain year-round. NOAA water temperatures average well above the 59 degrees for locations from Pinellas County south to Key West (http://www.nodc.noaa.gov/dsdt/cwtg/egof.html). Therefore, water temperatures are not a controlling factor in presence/absence of sea turtles as with areas in the Atlantic Ocean above Canaveral Harbor. The results of the Corps telemetry study by Nelson (1999) (http://www.saj.usace.army.mil/pd/satelite.htm) and the Gulf Islands National Seashore Loggerhead Tracking Project (http://www.cccturtle.org/sat18.htm) conducted by Nicholas and the Resource Management Division of Gulf Islands National Seashore also indicates that turtles are present in all areas of the Gulf during the cooler months. As part of the Southeastern RBO for the Atlantic, no windows of operation have been placed on sea turtles except for the exclusionary zone within Canaveral Harbor. The only harbor



areas in this southern area where dredging has historically taken sea turtles has been Ft Pierce and Palm Beach Harbors. Tampa Harbor and Charlotte Harbor are not constructed through limestone formations creating reef-like walls in the same fashion as Ft. Pierce and palm Beach Harbors. Green sea turtles are drawn to the algae on the channel walls of those entrance channels since the rock faces act as reefs. Borrow areas have been excluded from windows because the sandy bottoms are located away from reefs that do not attract sea turtles. Therefore, we have determined that hopper dredges can be operated year-round along the Gulf Coast of Florida for beach-nourishment projects as well as harbor dredging without exceeding the take limit established by your office.

Since, turtles are present year-round, a window of operation for hopper dredges would not significantly reduce takes. Therefore, we are asking for a modification to the draft RBO, to make the operating window of December through March a Conservation Recommendation instead of a Reasonable

and Prudent Measure of the Incidental Take Statement. For further assistance in this matter contact Mr. Bill Fonferek at 904.232.2803 or by e-mail at william.j.fonferek@usace.army.mil

Sincerely,

James C. Duck
Chief, Planning Division

Copy furnished:

Commander, South Atlantic Division (CESAD-CM-PE)

Dr. Robbin Trindell, Florida Fish and Wildlife Conservation Commission, Office of Environmental Services, Protected Species Management, 620 South Meridian Street, Tallahassee, Florida 32399-6000

bcc:
CESAJ-DP-I
CESAJ-CO-N

L: group/pde/fonferek/rbo1

DIVISIONS OF FLORIDA DEPARTMENT OF STATE
Office of the Secretary
Office of International Relations
Division of Elections
Division of Corporations
Division of Cultural Affairs
Division of Historical Resources
Division of Library and Information Services
Division of Licensing
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MEMBER OF THE FLORIDA CABINET
State Board of Education
Trustees of the Internal Improvement Trust Fund
Administration Commission
Florida Land and Water Adjudicatory Commission
Siting Board
Division of Bond Finance
Department of Revenue
Department of Law Enforcement
Department of Highway Safety and Motor Vehicles
Department of Veterans' Affairs

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

Janet Snyder Matthews, Ph.D., Director, and
State Historic Preservation Officer

Xc: Mr. Gordon P. Watts, Tidewater Atlantic Research, Inc.

APR 2 6 2002

Planning Division
Environmental Branch

James J. Slack
Fish and Wildlife Service
S. Fla. Ecological Services Office
1339 20th Street
Vero Beach, FL 32960

Dear Mr. Slack:

Thank you for the Draft Fish and Wildlife Coordination Act Report (CAR) of February 25, 2002, for the Lido Key Shore Protection Project in Sarasota County, Florida.

The U.S. Army Corps of Engineers has reviewed the CAR and a detailed reply to the nine recommendations is enclosed.

If you have any questions or need additional information, please contact Ms. Yvonne Haberer at 904-232-1701.

Sincerely,

James C. Duck
Chief, Planning Division

Enclosure

CF (w/encl):

National Marine Fisheries Service, Habitat Conservation Division, 9721 Executive Center Drive N., St. Petersburg, FL 33702 (David Dale)

National Marine Fisheries Service, Habitat Conservation Division, Panama City Field Office, 3500 Delwood Beach Road, Panama City, FL 32408-7499 (Mark Thompson)

DRAFT FISH AND WILDLIFE COORDINATION ACT REPORT
FWS RECOMMENDATIONS FOR THE
LIDO KEY SHORE PROTECTION PROJECT
SARASOTA COUNTY, FLORIDA

U.S ARMY CORPS OF ENGINEERS REPLY TO EACH RECOMMENDATION:

RECOMMENDATION 1. Prior to construction, conduct seagrass surveys during months of May through September between R-34 and R-35; and R-44 and R-44.5; shore parallel survey between R-34 and R-44.5; and within the groin construction footprint. Consult with the Service regarding survey methodology prior to initiation.

REPLY: A survey was conducted on July 3, 2001 using an underwater, vessel –towed video to identify and document potential nearshore marine resources found in the nearshore area within and adjacent to the proposed project area. Marine resource data were collected from twelve transects located perpendicular to the Lido Key shoreline. This survey, along with aerial photographs, indicated no seagrass communities present within the proposed project area or within 500 feet offshore from the project equilibrium tow of fill. The perpendicular transects commenced at DEP monument R-35 and continued to R-44. Due to boat draft limitations and safety concerns, video surveys were not conducted north of R-35 or south of R-44. These areas will be groundtruthed to verify the presence or absence of seagrass prior to construction. The Corps will consult with the Service regarding survey methodology prior to initiation.

RECOMMENDATION 2. Orient the pipeline corridor(s) to avoid nearshore and offshore seagrass areas (e.g. Big Sarasota Pass shoal).

REPLY: The pipeline corridor(s) would be oriented to avoid seagrass areas.

RECOMMENDATION 3. Develop a monitoring plan and survey methodology to determine the extent of the indirect and/or direct effects of sand placement, groin construction, and/or borrow site dredging on seagrass and/or hardbottom. A mitigation plan will be needed, if resources are adversely impacted. Prior to the initiation of the monitoring plan/and or surveys, please provide a copy to the Service for review.

REPLY: Based on the information currently available, there would be no adverse impacts to significant marine resources. Therefore, a mitigation plan has not been developed. Monitoring of construction activities such as sand placement, groin construction, and borrow site dredging is the responsibility of the Contractor as stated in our plans and specifications.

RECOMMENDATION 4. Establish a 400 foot buffer zone between the hardbottom and borrow site boundaries of LKBA 6 and 7.

REPLY: After further coordination with Ms. Trish Adams of your staff on April 19, 2002, and Mr. Mark Thompson, National Marine Fisheries Service (NMFS), on April 22, 2002, it was agreed that establishing a 200 ft. buffer zone between the hardbottom and borrow site boundaries of LKBA 6 and 7 would be acceptable. By establishing the buffer zone and adhering to construction specifications, direct impacts to the adjacent hardbottom habitat is not expected. Appropriate monitoring would be conducted due to the possibility of local turbidity and siltation during dredging activities.

RECOMMENDATION 5. Consult with the Service and the FFWCC to develop an appropriate and effective protection plan to further minimize the effects of the project on the Lido Key shorebird nesting colony

REPLY: The Contractor will keep construction activities under surveillance, management, and control to prevent impacts to migratory birds and their nests. All construction personnel will be advised that migratory birds are protected by the Florida Endangered and Threatened Species Act of 1977, Title XXVIII, Chapter 372.072, and the U.S. Fish and Wildlife Service pursuant to the Migratory Bird Treaty Act of 1918 and the Endangered and Threatened Species Act of 1982, as amended. If the area can not be avoided during nesting season, then a site protection plan would be included in the plans and specifications detailing how the impacts on the birds would be avoided, minimized, or otherwise mitigated

RECOMMENDATION 6. Avoid construction during the months immediately preceding shorebird nesting season to maximize prey species availability. Timing will be determined through the development of the shorebird monitoring plan.

REPLY: Construction activities will be under surveillance, management, and control to prevent impacts to migratory birds and their nests in accordance with the contract plans and specifications. Again, if the area can not be avoided during nesting season, then a site protection plan would be included in the plans and specifications.

RECOMMENDATION 7. Initiate consultation with NMFS to address EFH concerns.

REPLY: Coordination of the Environmental Assessment (EA) will constitute initial consultation with the NMFS under provisions of the Magnuson-Stevens Fishery Conservation and Management Act relative to Essential Fish Habitat (EFH) effects resulting from the Lido Key Shore Protection Project. Based on analysis discussed in the EA, acute and cumulative effects on EFH resulting from the addition of the proposed project features are expected to be negligible.

RECOMMENDATION 8. Incorporate invasive exotic plant removal and dune restoration into the project design where appropriate.

REPLY: The City of Sarasota has incorporated dune restoration in previous project designs. In the event that dune restoration is identified as a specific project need, based on existing conditions, it is reasonable to assume that the City of Sarasota will continue to

support restoration activities. Regarding the issue of exotic plant removal, the City of Sarasota and Sarasota County have established programs to address invasive species on public lands. The Sponsor supports exotic plant removal, but a mandate for program implementation on upland areas outside the project area is not reasonable.

RECOMMENDATION 9. Minimize direct and indirect effects of turbidity during hopper dredge operations by: ensuring proper maintenance of dredging equipment; when appropriate, use silt curtains or gunderbooms; and if possible, dredge when environmental conditions will minimize sediment transport, eliminate or reduce hoper overflow; lower hopper fill-levels; or use a recirculation system. When applicable, special equipment, such as pneuma pumps, closed buckets, large capacity dredges, and precision dredging tools and technologies, are recommended to further decrease the potential for adverse effects to marine communities (Corps, 2001 Best Management Practices).

REPLY: Concur.

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 2 9 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
JACKSONVILLE DISTRICT CORPS OF ENGINEERS
P. O. BOX 4970
JACKSONVILLE, FLORIDA 32232-0019

REPLY TO
ATTENTION OF

Planning Division
Environmental Branch

MAY 29 2002

Andreas Mager, Jr.
Assistant Regional Director
National Marine Fisheries Service
Southeast Regional Office
Habitat Conservation Division
9721 Executive Center Drive North
St. Petersburg, Florida 33702

Dear Mr. Mager:

Pursuant to the National Environmental Policy Act (NEPA), enclosed for your review and comment is a copy of the draft Environmental Assessment (EA) for the proposed Lido Key Shore Protection Project in Sarasota County, Florida. The EA also constitutes our Essential Fish Habitat (EFH) Assessment as required by the 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA). With this letter, we are initiating EFH consultation with your agency.

We request your comments pursuant to NEPA and the MSFCMA within 30 days of receipt of this letter. If you have any questions or need further information, please contact Ms. Yvonne Haberer at 904-232-1701.

Sincerely,

James C. Duck
Chief, Planning Division

Enclosure

CF (w/encl):

Mr. Mark Thompson, National Marine Fisheries Service, Panama City Field Office, 3500 Delwood Beach Road, Panama City, FL 32408-7499

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

June 19, 2002

Colonel James G. May
District Engineer, Jacksonville District
Planning Division, Environmental Branch
Department of the Army, Corps of Engineers
P.O. Box 4970
Jacksonville, Florida 32232-0019

Dear Colonel May:

The National Marine Fisheries Service (NMFS) has reviewed your staff's letter dated May 29, 2002, requesting comments on the May 2002 Feasibility Report with Draft Environmental Assessment (EA) for the Hurricane and Storm Damage Reduction Project Lido Key, Sarasota County, Florida.

We find that the description of fishery resources and habitats in the project area and the assessment of potential adverse impacts associated with the proposed activities are adequate. Furthermore, based on this information, we anticipate that any adverse effect that might occur on marine and anadromous fishery resources would be minimal and, therefore, we do not have any additional comments to make on the EA or objections to the proposed action.

Pursuant to the Essential Fish Habitat (EFH) provisions of the Magnuson-Stevens Fishery Conservation and Management Act, no further coordination is necessary unless the project design is modified and you determine that implementation of those revisions could result in adverse impacts to EFH and dependent fishery resources. We appreciate the opportunity to provide you with our comments. If you have any questions, please contact Mr. Mark Thompson of our Panama City Office at 850/234-5061.

Sincerely,

W. Mark Thompson
for Andreas Mager, Jr.
Assistant Regional Administrator
Habitat Conservation Division

OPTIONAL FORM 99 (7-90)

FAX TRANSMITTAL # of pages ▶ 1

To Yvonne Haberer	From Mark Thompson
Dept./Agency COE - PD-EP	Phone # 850-234-5061
Fax # 904-232-3442	Fax #

NSN 7540-01-317-7368 5099-101 GENERAL SERVICES ADMINISTRATION

United States Department of the Interior

OFFICE OF THE SECRETARY

OFFICE OF ENVIRONMENTAL POLICY AND COMPLIANCE

Richard B. Russell Federal Building
75 Spring Street, S.W.
Atlanta, Georgia 30303

ER 02/535

July 26, 2002

Mr. James C. Duck
Chief, Planning Division
Department of the Army
Jacksonville District, Corps of Engineers
P.O. Box 4970
Jacksonville, FL 32232

RE: Feasibility Report with Draft Environmental Assessment, Lido Key Hurricane and Storm Damage Reduction Project, Sarasota County, FL

Dear Mr. Duck:

The Department of the Interior has reviewed the above document, and we have no comments at this time. If you have any questions I can be reached at 404-331-4524.

Sincerely,

Gregory Hogue
Regional Environmental Officer

cc:
OEPC, WASO
AValenta, FWS-R4

Department of Environmental Protection

Jeb Bush
Governor

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard, MS 47
Tallahassee, Florida 32399-3000

David B. Struhs
Secretary

July 31, 2002

Mr. James C. Duck
Chief, Planning Division
U.S. Army Corps of Engineers
Jacksonville District
Post Office Box 4970
Jacksonville, Florida 32232-0019

RE: Department of the Army – District Corps of Engineers – Hurricane and Storm Damage Reduction Project – Feasibility Report with Draft Environmental Assessment – Lido Key, Sarasota County, Florida
SAI: FL200205292097C

Dear Mr. Duck:

The Florida State Clearinghouse, pursuant to Executive Order 12372, Gubernatorial Executive Order 95-359, the Coastal Zone Management Act, 16 U.S.C. §§ 1451-1464, as amended, and the National Environmental Policy Act, 42 U.S.C. §§ 4321, 4331-4335, 4341-4347, as amended, has coordinated the review of the above-referenced feasibility report and draft environmental assessment (EA) for the proposed shoreline protection project.

Department (DEP) staff note that the selected shoreline restoration plan includes the nourishment of 8,280 ft. of shoreline, the identification of three potential borrow areas, and the construction of three groins. Though the proposed beach fill design and borrow areas appear to meet all Department requirements and previous recommendations, staff still have concerns regarding the removal of shoals and the resultant impact on adjacent beaches, and the downdrift impact of the proposed erosion control structures. DEP Bureau of Beaches and Wetland Resources staff note that GENESIS model simulations were made to assess the impact of the groin field, and that provisions are contemplated to offset potential downdrift erosion. These must be examined in more detail should the Corps of Engineers or the local sponsor decide to pursue the project.

Water Quality Certification in the form of a Joint Coastal Permit (JCP) will be required for construction of the proposed project. We recommend that the Corps of Engineers and local project sponsor continue to coordinate with the DEP Bureau of Beaches and Wetland Resources and Florida Fish and Wildlife Conservation Commission, Bureau of Protected Species Management to resolve any outstanding issues related to: sediment quality and composition; beach fill placement; project design alternatives; dredging/disposal turbidity; seagrass bed, hardbottom, shellfish, marine turtle, and manatee protection; resource mitigation; etc. Please

contact the Project Manager for Southwest Florida, Mr. Phil Flood, at (850) 487-4471, ext. 168. For information on JCP permitting requirements, please contact Mr. Marty Seeling at ext. 104.

Based on the information contained in the subject report and the agency comments provided, as summarized above and enclosed, the state has determined that, at this stage of project development, the referenced project is consistent with the Florida Coastal Management Program (FCMP). All subsequent environmental documents prepared for this project must be reviewed to determine the project's continued consistency with the FCMP. The state's continued concurrence with the project will be based, in part, on the adequate resolution of issues identified during this and subsequent reviews.

Thank you for the opportunity to review this project. If you have any questions regarding this letter, please contact Ms. Lauren Milligan at (850) 922-5438.

Sincerely,

Sally B. Mann

Sally B. Mann, Director
Office of Intergovernmental Programs

SBM/lm

Enclosures

cc: Roxane Dow, DEP, BBWR

FL20020529209JC

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

APR 2 4 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

STATE CLEARINGHOUSE

User: Lauren Milligan, , ENVIRONMENTAL PROTECTION

Project Information

Project:	FL200205292097C
Description:	Department of the Army - District Corps of Engineers - Hurricane and Storm Damage Reduction Project - Feasibility Report with Draft Environmental Assessment - Lido Key -Sarasota County, Florida.
Keywords:	ACOE - DEA - Storm Damage Reduction - Lido Key-Sar
Program:	

Review Comments

1/9

Reviewer:	COMMUNITY AFFAIRS
Date:	06/24/2002
Description:	NC
Comment Type:	Draft Final

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SAI Routing Sheet

COUNTY: SARASOTA

DATE: 05/30/2002

Message:

SAI#: FL200205292097C

PROJECT TO BE REVIEWED BY: (Div/Program)	ASSIGNED REVIEWERS (Print Last Name)	IS PROJECT LOCATED IN APPROVED DRI? (Circle Yes/No) YES: Is Project Consistent with DO?	YES: Is Project DRI Scale?	NO: Is Project Consistent with DO?	NO: Is Project DRI Scale?	Is Project CONSISTENT w/ COMPLAN? YES	NO	Is Project CONSISTENT w/ FCMP? YES	NO	Do you have any COMMENTS on project? YES	NO	DATE REVIEW COMPLETED	RVWR/ SUPV INIT
DCP	RWD	YES	NO	YES	NO							6/18/02	
6/4/02 Date Rec'd			Monitoring Letter?	Monitoring Letter?									
			YES NO	YES NO									
Complete and forward to Div/Prog Below no later than: 6/28/02													
DEM													
Date Rec'd													
Complete and forward to Div/Prog Below no later than: 6/28/02													
CMP		Wetlands?		Stormwater?								6/24/02	
Date Rec'd		YES	NO	YES	NO								
Complete and forward to ACC Coordinator no later than: 6/28/02													

RECEIVED

JUL 23 2002

OIP/OLGA

UNIT COORDINATORS for Intergovernmental Coordination and Review:

CMP	COASTAL MANAGEMENT PROGRAM	Ms. VANESSA HOLMES	2555 SHUMARD OAK BLVD	(850) 414-6563
DEM	EMERGENCY MANAGEMENT		ROOM 120.03	( ) 413-9969
DCP	COMMUNITY PLANNING		2555 SHUMARD OAK BLVD	(850) 488-2356

ttached document requires a Coastal Zone Management Act/Florida Coastal Management Program consistency evalutation and is categorized as one of the following:

— Federal Assistance to State or Local Government (15 CFR 930, Subpart F). Agencies are required to evaluate the consistency of the activity.

X Direct Federal Activity (15 CFR 930, Subpart C). Federal Agencies are required to furnish a consistency determination for the State's concurrence or objection.

— Outer Continental Shelf Exploration, Development or Production Activities (15 CFR 930, Subpart E). Operators are required to provide a consistency certification for state concurrence/objection.

— Federal Licensing or Permitting Activity (15 CFR 930, Subpart D). Such projects will only be evaluated for consistency when there is not an analogous state license or permit.

Project Description:

Department of the Army - District Corps of Engineers - Hurricane and Storm Damage Reduction Project - Feasibility Report with Draft Environmental Assessment - Lido Key - Sarasota County, Florida.

EO. 12372/NEPA ☐ No Comment ☐ Comments Attached ☐ Not Applicable

Federal Consistency ☐ No Comment/Consistent ☐ Consistent/Comments Attached ☐ Inconsistent/Comments Attached ☐ N/A

INSTRUCTIONS:

1. UNIT COORDINATORS are responsible for logging in, logging out, and hand-carrying/mailing project packages to the next reviewing unit on this form, or to the ACC if all review requirements have been met. Failure to meet internal suspense dates may result in loss of opportunity to comment on critical issues.
2. Requests for EXTENSIONS should be made prior to due date, especially if COMMENTS will be submitted. Contact your UNIT COORDINATOR, who will request the EXTENSION from the ACC.
3. Agency COMMENTS on SAIs will be sent to the State Clearinghouse (SCH) and should be prepared in LETTER format for the Secretary's signature. Forward the project package to the next review unit while your COMMENTS are being drafted. Coordinate your comments with other reviewers prior to finalizing.

DIVISIONS OF FLORIDA DEPARTMENT OF STATE
Office of the Secretary
Office of International Relations
Division of Elections
Division of Corporations
Division of Cultural Affairs
Division of Historical Resources
vision of Library and Information Services
vision of Licensing
Division of Administrative Services

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Florida Land and Water Adjudicatory Commission
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Division of Bond Finance
Department of Revenue
Department of Law Enforcement
Department of Highway Safety and Motor Vehicles
Department of Veterans' Affairs

FLORIDA DEPARTMENT OF STATE
Katherine Harris
Secretary of State
DIVISION OF HISTORICAL RESOURCES

Mr. Mike Murray
Department of Community Affairs
Florida Coastal Management Program
2555 Shumard Oak Boulevard
Tallahassee, Florida 32399-2100

June 24, 2002

RE: DHR No. 2002-05553 / Received by DHR: June 6, 2002
SAI #: 200205292097C
Feasibility Report with Draft Environmental Assessment – Hurricane and Storm Damage Reduction Project
Lido Key, Sarasota County, Florida

Dear Mr. Murray:

Our office 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 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.

We have reviewed sections 3.15, 4.7 and 4.29.4, all dealing with Cultural Resources, of the referenced draft environmental assessment. Based on the information provided, it is the opinion of this office that the proposed undertaking will have no effect on historic properties.

If there are any questions concerning our comments or recommendations, please contact Sarah Jalving, Historic Sites Specialist, by electronic mail at sjalving@mail.dos.state.fl.us or at 850-245-6333 or SunCom 205-6333. Thank you for your interest in protecting Florida's historic properties.

Sincerely,

Frederick P. Gaske, Deputy SHPO

for Janet Snyder Matthews, Ph.D., Director, and
State Historic Preservation Officer

500 S. Bronough Street • Tallahassee, FL 32399-0250 • http://www.flheritage.com

☐ Director's Office (850) 245-6300 • FAX: 245-6435
☐ Archaeological Research (850) 245-6444 • FAX: 245-6436
☑ Historic Preservation (850) 245-6333 • FAX: 245-6437
☐ Historical Museums (850) 245-6400 • FAX: 245-6433

☐ Palm Beach Regional Office (561) 279-1475 • FAX: 279-1476
☐ St. Augustine Regional Office (904) 825-5045 • FAX: 825-5044
☐ Tampa Regional Office (813) 272-3843 • FAX: 272-2340

STATE CLEARINGHOUSE

User: VANESSA HOLMES, , Clearinghouse

Project Information

Project:	FL200205292097C
Description:	Department of the Army - District Corps of Engineers - Hurricane and Storm Damage Reduction Project - Feasibility Report with Draft Environmental Assessment - Lido Key - Sarasota County, Florida.
Keywords:	ACOE - DEA - Storm Damage Reduction - Lido Key-Sar
Program:	

Review Comments

5/12

Agency:	TRANSPORTATION
Date:	07/01/2002 (mm/dd/yyyy)
Description:	Consistent; No Comments. LGS FDOT/D1
Comment Type:	○ Draft ◉ Final

Save

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Southwest Florida Water Management District

2379 Broad Street, Brooksville, Florida 34604-6899
(352) 796-7211 or 1-800-423-1476 (FL only)
SUNCOM 628-4150 TDD only 1-800-231-6103 (FL only)
On the Internet at: WaterMatters.org

An Equal Opportunity Employer

Tampa Service Office
7601 Highway 301 North
Tampa, Florida 33637-6759
(813) 985-7481 or
1-800-836-0797 (FL only)
SUNCOM 578-2070

Bartow Service Office
170 Century Boulevard
Bartow, Florida 33830-7700
(863) 534-1448 or
1-800-492-7862 (FL only)
SUNCOM 572-6200

Sarasota Service Office
6750 Fruitville Road
Sarasota, Florida 34240-9711
(941) 377-3722 or
1-800-320-3503 (FL only)
SUNCOM 531-6900

Lecanto Service Office
3600 West Sovereign Path
Suite 226
Lecanto, Florida 34461-8070
(352) 527-8131
SUNCOM 667-3271

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Vice Chair, Sarasota
Heidi B. McCree
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Maggie N. Dominguez
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Pamela L. Fentress
Highlands
Ronald C. Johnson
Polk
Janet D. Kovach
Hillsborough
John K. Renke, III
Pasco

E. D. "Sonny" Vergara
Executive Director
Gene A. Heath
Assistant Executive Director
William S. Bilenky
General Counsel

June 11, 2002

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JUN 13 2002
State of Florida Clearinghouse

Ms. Jasmin Raffington
Florida State Clearinghouse
Florida Department of Community Affairs
2555 Shumard Oak Boulevard
Tallahassee, Florida 32399-2100

Subject: USCOE Hurricane and Storm Damage Reduction Project – Feasibility Report with Draft Environmental Assessment – Lido Key – Sarasota County, Florida
SAI#: FL200205292097C

Dear Ms. Raffington:

The staff of the Southwest Florida Water Management District (District) has conducted a consistency evaluation for the project referenced above. Consistency findings are divided into four categories and are based solely on the information provided in the subject application.

FINDING	CATEGORY
X	Consistent/No Comment
	Consistent/Comments Attached
	Inconsistent/Comments Attached
	Consistency Cannot be Determined Without an Environmental Assessment Report/Comments Attached

This review does not constitute permit approval under Chapter 373, Florida Statutes, or any rules promulgated thereunder, nor does it stand in lieu of normal permitting procedures in accordance with Florida Statutes and District rules.

If you have any questions or if I can be of further assistance, please contact me at extension 4419.

Sincerely,

Dianne McCommons Beck
Planner II

DMcB
Attachment

COUNTY: SARASOTA

DATE: 5/29/02
COMMENTS DUE DATE: 6/28/02
CLEARANCE DUE DATE: 7/28/02

Message:

SAI#: FL200205292097C

STATE AGENCIES	WATER MNGMNT. DISTRICTS	OPB POLICY UNITS
COMMUNITY AFFAIRS FISH and WILDLIFE COMMISSION STATE TRANSPORTATION ENVIRONMENTAL PROTECTION	X SOUTHWEST FLORIDA WMD	ENVIRONMENTAL POLICY UNIT

The attached document requires a Coastal Zone Management Act/Florida Coastal Management Program consistency evalutation and is categorized as one of the following:

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Project Description:

Department of the Army - District Corps of Engineers - Hurricane and Storm Damage Reduction Project - Feasibility Report with Draft Environmental Assessment - Lido Key -Sarasota County, Florida.

To: **Florida State Clearinghouse**
AGENCY CONTACT AND COORDINATOR (SCH)
2555 SHUMARD OAK BLVD
TALLAHASSEE, FLORIDA 32399-2100
(850) 414-6580 (SC 994-6580)
(850) 414-0479

EO. 12372/NEPA

- [x] No Comment
- [ ] Comment Attached
- [ ] Not Applicable

Federal Consistency

- [x] No Comment/Consistent
- [ ] Consistent/Comments Attached
- [ ] Inconsistent/Comments Attached
- [ ] Not Applicable

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JUN - 5 2002
PLANNING DEPARTMENT

From:
Division/Bureau: SWFWMD
Reviewer: Dianne McCommons Beck
Date: 6/11/02

COUNTY: SARASOTA

Message:

DATE:	5/29/02
COMMENTS DUE DATE:	6/28/02
CLEARANCE DUE DATE:	7/28/02

SAI#: FL200205292097C

STATE AGENCIES	WATER MNGMNT. DISTRICTS	OPB POLICY UNITS
COMMUNITY AFFAIRS FISH and WILDLIFE COMMISSION STATE TRANSPORTATION ENVIRONMENTAL PROTECTION	SOUTHWEST FLORIDA WMD	X ENVIRONMENTAL POLICY UNIT

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OFFICE OF POLICY AND BUDGET
ENVIRONMENTAL POLICY UNIT

The attached document requires a Coastal Zone Management Act/Florida Coastal Management Program consistency evalutation and is categorized as one of the following:

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Project Description:

Department of the Army - District Corps of Engineers - Hurricane and Storm Damage Reduction Project - Feasibility Report with Draft Environmental Assessment - Lido Key -Sarasota County, Florida.

To: Florida State Clearinghouse
AGENCY CONTACT AND COORDINATOR (SCH)
2555 SHUMARD OAK BLVD
TALLAHASSEE, FLORIDA 32399-2100
(850) 414-6580 (SC 994-6580)
(850) 414-0479

EO. 12372/NEPA

- ☑ No Comment
- ☐ Comment Attached
- ☐ Not Applicable

Federal Consistency

- ☐ No Comment/Consistent
- ☐ Consistent/Comments Attached
- ☐ Inconsistent/Comments Attached
- ☐ Not Applicable

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n:
Division/Bureau: OPB NRGG
Reviewer: [illegible]
Date: 7/16/02

MAIL LIST LIDO KEY SHORE PROTECTION PROJECT 5/17/02
STATE, FEDERAL, LOCAL GOVERNMENTS AND OTHER INTERESTED PARTIES
TO RECEIVE DOCUMENT

REGIONAL DIRECTOR
FEMA INSURANCE & MITIGATION DIV
3003 CHAMBLEE-TUCKER ROAD
ATLANTA GA 30341

MR. HEINZ MUELLER
ENVIRONMENTAL POLICY SECTION
EPA REGION IV
61 FORSYTH STREET
ATLANTA, GA 30303-3104

US DEPARTMENT OF AGRICULTURE
THE NATURAL RESOURCES CONSERVATION SERVICE
1001 E BAKER STREET SUITE 403
PLANT CITY FL 33566

REGIONAL ENVIRONMENTAL OFFICER HOUSING & URBAN DEVELOPMENT
ROOM 600-C
75 SPRING STREET SW
ATLANTA GA 30303-3309

SOUTHERN REGION FORESTER
US FOREST SERVICE
DEPARTMENT OF AGRICULTURE
1720 PEACHTREE ROAD NW
ATLANTA GA 30309-2405

MS DONNA WIETING
US DEPARTMENT OF COMMERCE
HCHB SP ROOM 6117
14TH & CONSTITUTION AVENUE, NW
WASHINGTON DC 20230

REGIONAL DIRECTOR
US FISH AND WILDLIFE SERVICE
1875 CENTURY BOULEVARD
ATLANTA GA 30345

FIELD SUPERVISOR
U S FISH AND WILDLIFE SERVICE
1339 20th STREET
VERO BEACH FL 32960

U.S. DEPARTMENT OF THE INTERIOR
OFFICE OF THE SECRETARY
OFFICE OF ENV. POLICY AND COMPLIANCE
1849 "C" ST., NW – ROOM 2340
WASHINGTON, DC 20240 12 copies

NATIONAL MARINE FISHERIES SERVICE
ENVIRONMENTAL ASSESSMENT BR
3500 DELWOOD BEACH ROAD
PANAMA CITY FL 32407-7499

MS. GEORGIA CRANMORE
NATIONAL MARINE FISHERIES SERVICE
CHIEF, PROTECTED SPECIES BRANCH
9721 EXECUTIVE CENTER DRIVE
ST PETERSBURG FL 33702

ANDREAS MAGER, JR.
ASSISTANT REGIONAL ADMINISTRATOR
NAT MARINE FISHERIES SERV, HABITAT CONS
SOUTHEAST REGIONAL OFFICE
9721 EXECUTIVE CENTER DRIVE NORTH
ST. PETERSBURG, FLORIDA 33702

MAIL LIST LIDO KEY SHORE PROTECTION PROJECT 5/17/02
STATE, FEDERAL, LOCAL GOVERNMENTS AND OTHER INTERESTED PARTIES
TO RECEIVE DOCUMENT

STATE CLEARINGHOUSE
DEPARTMENT OF COMMUNITY AFFAIRS
2555 SHUMARD OAK BOULEVARD
TALLAHASSEE FL 32399-2100
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SOUTHWEST FLORIDA WATER MANAGEMENT DIST.
7601 HIGHWAY 301 NORTH
TAMPA, FLORIDA 33637

DR. JANET SNYDER MATTHEWS
DIV OF HISTORICAL RESOURCES
STATE HISTORIC PRESERVATION OFF
500 S. BRONOUGH STREET
TALLAHASSEE FL 32399-0250

FLA DEPT OF ENV PROTECTION
BUREAU OF SURVEY & MAPPING
DIVISION OF STATE LANDS
MAIL STATION 105
3900 COMMON WEALTH BLVD
TALLAHASSEE FL 32399-3000

NEEDS TO BE REMOVED call on 6/6/02

FLORIDA DEPT OF ENV PROTECTION
SOUTH WEST DISTRICT
3804 COCONUT PALM DRIVE
TAMPA, FLORIDA 33619-8318

OFFICE OF THE DIRECTOR
DIVISION OF BEACHES AND COASTAL SYSTEMS
FL DEPARTMENT OF ENVIRONMENTAL PROT
3900 COMMONWEALTH BLVD
TALLAHASSEE, FL 32399-3000

FLORIDA FISH AND WILDLIFE CONSV COMM
OFFICE OF ENV SERVICES
PROTECTED SPECIES MANAGEMENT
620 SOUTH MERIDIAN STREET
TALLAHASSEE, FLORIDA 32399-6000

FLORIDA FISH AND WILDLIFE CONSV COMM
FLORIDA MARINE RESEARCH INSTITUTE
DIVISION OF MARINE RESOURCES
100 EIGHTH AVENUE SE
ST. PETERSBURG, FLORIDA 33701-5095

MR. DENNIS DAUGHTERS
DIRECTOR OF ENGINEERING
ENGINEERING DEPT.
1565 FIRST STREET
PO BOX 1058
SARASOTA, FLORIDA 34230

SARSOTA COUNTY BCC
1660 RINGLING BLVD
2ND FLOOR
SARASOTA, FL 34236

MANAGER
SARASOTA COUNTY PARKS AND REC
6700 CLARK ROAD
SARASOTA, FL 34241

CITY MANAGER
CITY OF SARASOTA
1565 FIRST STREET
SARASOTA, FLORIDA 34236

SOUTHWEST FLORIDA REGIONAL PLANNING COUNC
PO BOX 3455
NORTH FORT MYERS, FLORIDA 33918

K. LYNN ENTERPRISES
P.O. BOX 61492
FT. MYERS, FLORIDA 33906

MAIL LIST LIDO KEY SHORE PROTECTION PROJECT 5/17/02
STATE, FEDERAL, LOCAL GOVERNMENTS AND OTHER INTERESTED PARTIES TO RECEIVE DOCUMENT

SARASOTA AUDUBON SOCIETY
PO BOX 15423
SARASOTA, FL 34277-1423

REEFKEEPER INTERNATIONAL
2809 BIRD AVENUE, PMB 162
MIAMI, FL 33133

ANDREW SCHOCK, DIRECTOR
NATIONAL WILDLIFE FEDERATION
1330 W. PEACHTREE STREET
SUITE 475
ATLANTA, GA 30309

DR. KEN LINDEMAN
14630 SW 144th TERRACE
MIAMI, FLORIDA 33186

EXECUTIVE DIRECTOR,
FLORIDA SHORE & BEACH PRESERV. ASSOC.
2952 WELLINGTON CIRCLE
TALLAHASSEE, FL 32308

SAVE THE MANATEE CLUB
500 N. MAITLAND AVE.
MAITLAND, FLORIDA 32751

HONORABLE BILL NELSON
UNITED STATES SENATOR
111 N. ADAMS STREET
TALLAHASSEE, FL 32301

HONORABLE BOB GRAHAM
UNITED STATES SENATOR
150 SE 2ND AVENUE SUITE 1025
MIAMI, FL 33131

HONORABLE JOHN MCKAY
DISTRICT 26
3653 CORTEZ RD WEST
SUITE 90
BRADENTON, FL 34210

HONORABLE DAN MILLER
13TH CONGRESSIONAL DISTRICT
2424 MANATEE AVE., WEST, #104
BRADENTON, FL 34205

HONORABLE MICHAEL S. BENNETT
DISTRICT 67
SUITE B-1, 7011 301 BLVD.
SARASOTA, FL 34243-6205

HONORABLE NANCY C. DETERT
DISTRICT 70
SUITE 2F, 200 CAPRI ISLES BLVD.
VENICE, FL 34292-2335

HONORABLE DONNA CLARKE
DISTRICT 69
SUITE 208, 1991 MAIN STREET
SARASOTA, FL 34236-5980

MAIL LIST FOR LIDO KEY FEASIBILITY STUDY
L: /GROUP/PDE/HABER/LIDOKEY-LABELS.DOC

9/26/00

GENERAL MANAGER
PLANNING SERVICES
1301 CATTLEMEN ROAD
SARASOTA, FL 34232

MANAGER
RESOURCE PROTECTION SERVICES
1301 CATTLEMEN ROAD, BLDG A
SARASOTA, FL 34232

GENERAL MANAGER
ENVIRONMENTAL SERVICES BUSINESS CENTER
NATURAL RESOURCES
1301 CATTLEMEN ROAD
SARASOTA, FL 34232

MANAGER
SARASOTA COUNTY PARKS & REC
6700 CLARK ROAD
SARASOTA, FL 34241

CITY MANAGER, CITY OF SARASOTA
1565 FIRST STREET
SARASOTA, FLORIDA 34236

CHAMBER OF COMMERCE
1819 MAIN STREET
SUITE 240
SARASOTA, FLORIDA 34236

SARASOTA CONVENTION AND VISITORS BUREAU
655 N TAMIAMI TRAIL
SARASOTA, FLORIDA 34236

TOWN MANAGER
TOWN OF LONGBOAT KEY
501 BAY ISLES ROAD
LONGBOAT KEY, FLORIDA 33548

REGIONAL DIRECTOR
THE WILDERNESS SOCIETY
4203 PONCE DE LEON
CORAL GABLES, FLORIDA 33146

MOTE MARINE LABORATORY
1600 KEN THOMPSON PARKWAY
SARASOTA, FLORIDA 34236

MANAGER
LIME TREE BEACH RESORT
1050 BENJAMIN FRANKLIN DRIVE
SARASOTAT, FLORIDA 34236

LIDO KEY RESIDENTS ASSOCIATION
801 S BLVD OF PRESIDENTS
SARASOTA, FLORIDA

FLORIDA WILDLIFE FEDERATION
PO BOX 6870
TALLAHASSEE, FLORIDA 32314-6870

MAIL LIST FOR LIDO KEY FEASIBILITY STUDY
L: /GROUP/PDE/HABER/LIDOKEY-LABELS.DOC

9/26/00

LIDO SHORES PROPERTY OWNERS
1201 CENTER PLACE
SARASOTA, FLORIDA 34236

PRESIDENT
LIDO HARBOUR TOWERS CONDO
1770 BENJAMIN FRANKLIN DRIVE
SARASOTA, FLORIDA 34236

ST. ARMANDS CIRCLE ASSOCIATION
PO BOX 6034
SARASOTA, FLORIDA 34230

HOLIDAY INN LIDO BEACH
233 BEN FRANKLIN DRIVE
SARASOTA, FLORIDA 34236

MANAGER
KEY TOWERS SOUTH
1750 BENJAMIN FRANKLIN DRIVE
SARASOTA, FLORIDA 34236

PRESIDENT
LIDO HARBOUR SOUTH INC
2110 BENJAMIN FRANKLIN DRIVE
SARASOTA, FLORIDA 34236

[illegible] REGENCY CONDO ASSOC
[illegible] BENJAMIN FRANKLIN DRIVE
AP[illegible] 12
SARASOTA, FLORIDA 34236

LIDO TOWERS CONDO ASSOC
1001 BENJAMIN FRANKLIN DRIVE
APT 302
SARASOTA, FLORIDA 34236

LIDO AMBASSADOR ASSOC
800 BENJAMIN FRANKLIN DRIVE
APT 411
SARASOTA, FLORIDA 34236

MANAGER
LIDO DORSET
475 BENJAMIN FRONKLIN DRIVE
SARASOTA, FLORIDA 34236

MANAGER
LIDO SURF & SAND
1100 BENJAMIN FRANKLIN DRIVE
SARASOTA, FLORIDA 34236

PRESIDENT
PELICAN GARDENS CONDO ASSOC
46 N WASHINGTON BLVD
SARASOTA, FLORIDA 34236

SUNTIDE ISLAND BEACH CLUB
[illegible] BENJAMIN FRANKLIN DRIVE
[illegible] SOTA, FLORIDA 34236

MANAGER
LIDO BEACH INN INC
1234 BENJAMIN FRANKLIN DRIVE
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MANAGER
SARASOTA SANDS RESORT
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APPENDIX D – U.S. FISH AND WILDLIFE COORDINATION ACT REPORT AND BIOLOGICAL OPINION

United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Florida Ecological Services Office
1339 20th Street
Vero Beach, Florida 32960

August 21, 2002

James C. Duck
U.S. Army Corps of Engineers
Chief, Planning Division
Post Office Box 4970
Jacksonville, Florida

Dear Mr. Duck:

In accordance with the Fiscal Year 2001 Transfer Fund Agreement between the Fish and Wildlife Service (Service) and the Army Corps of Engineers (Corps) Jacksonville District, the attached document is the Final Fish and Wildlife Coordination Act (FWCA) report for the Lido Key Shoreline Protection Project located in Sarasota County, Florida. This report is provided in accordance with the FWCA, as amended (49 Stat. 401; 16 U.S.C., 661 *et seq.*), and under the provisions of the Endangered Species Act of 1973, as amended (16 U.S.C., 1531 *et seq.*). The Final Report has been prepared to provide an evaluation of the environmental effects of sand placement and groin construction along approximately two miles of shoreline on Lido Key.

Comments on the Draft FWCA report were received from the National Marine Fisheries Service on April 9, 2002 and April 11, 2002. Copies of these documents have been included as an appendix to this report. This Final FWCA report constitutes the Secretary of the Interior's views and recommendations for this project, in accordance with section 2(b) of the FWCA.

Please contact Ms. Trish Adams at (772) 562-3909, extension 232, for any questions regarding the findings and recommendations contained in this final report.

Sincerely yours,

James J. Slack
Field Supervisor
South Florida Ecological Services Office

Enclosures

cc:
Service, Ecological Services-Jacksonville, Florida (Sandy MacPherson)
FWC, Office of Protected Species Management, Tallahassee, Florida (Robbin Trindell)
DEP, Division of Beaches and Coastal Systems, Tallahassee, Florida
NMFS, Habitat Conservation Division, St. Petersburg, Florida
NMFS, Protected Resources Division, St. Petersburg, Florida
EPA, West Palm Beach, Florida

FINAL
Fish and Wildlife Coordination Act Report

Lido Key Shore Protection Project, Lido Key, Sarasota County, Florida.

Prepared for:
U.S. Fish and Wildlife Service
South Florida Ecological Services Office
1339 20th Street
Vero Beach, Florida 32960

by:
Dial Cordy and Associates Incorporated
490 Osceola Avenue
Jacksonville Beach, Florida 32250

August 21, 2002

EXECUTIVE SUMMARY

The Lido Key Beach Shore Protection Project located in Sarasota County, Florida was re-authorized by Congress under the Water Resources Development Act (WRDA) of 1999. The proposed project consists of the construction of three terminal groins and the placement of approximately one million cubic yards of beach quality material along 1.9 miles of Lido Key shoreline from Florida Department of Environmental Protection (DEP) monuments R-34 to R-44.5. Construction is anticipated to occur over a four to six period. Three offshore borrow sites have been identified approximately 10 miles west of Lido Key. Due to the distance of the borrow sites, a hopper dredge will most likely be used. The Corps project that renourishment will likely occur at five-year intervals over the 50-year life of the federal project.

The Army Corps of Engineers (Corps) has determined that the proposed project may affect listed sea turtles, but is not likely to adversely affect the West Indian manatee since the Standard Manatee Protection Construction Standards will be implemented. The Fish and Wildlife Service (Service) concurs with these determinations. The Service's Biological Opinion regarding listed sea turtles was submitted to the Corps on February 25, 2002. Benthic resources and communities likely to be directly or indirectly affected by the project include seagrass, hardbottom, and shorebird nesting habitat. Benthic infaunal communities located in the project footprint and borrow sites will be directly impacted by the action, but are expected to recover within one to three years. Though seagrass and hardbottom resources have not been identified inside the project footprint or borrow sites, these resources are present in close proximity to different aspects of the project (e.g., borrow area, pipeline corridors, fill template, etc.) and may be adversely affected as a result of degraded water quality and/or sedimentation downdrift. However, adverse affects to fish and wildlife resources can be minimized, if project construction is scheduled outside of nesting seasons, pipeline corridors avoid seagrass, adequate buffer zones are designated, and sedimentation monitoring plans are developed and implemented.

The Service's draft FWCA report dated February 25, 2002, was made available for review to state and federal agencies and other interested parties. During the open comment period, the Service received comments from the National Marine Fisheries Service (NMFS) which have been incorporated into this report and included in Appendix B. This report is submitted in accordance with the Fish and Wildlife Coordination Act (48 Stat. 401, as amended 16 U.S.C. 661 *et seq.*) (FWCA) and constitutes the final report of the Secretary of the Interior as required by Section 2(b) of the FWCA.

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1.0 INTRODUCTION

Historically, Lido Key was comprised of a group of mangrove islands and seagrass beds known then as the Creol Isles. In the 1920's, in an effort to expand development, Lido Key was created by dredge and fill activities within the Creol Isles. Prior to the 1940's, shoreline changes at Lido Key were attributed primarily to man-made and inlet-induced changes. However, in the 1940's and early 1950's, recession along north Lido Key can be related to the passage of three hurricanes. In 1964, the first supplemental placement of material occurred on north Lido Key during inlet maintenance activities as described in the 2001 document Lido Key, Sarasota County, Florida-Feasibility Phase Study for U.S. Army Corps of Engineers-Jacksonville District by Coastal Planning and Engineering (CP&E). Large-scale beach nourishment along Lido Key began in 1970 with periodic renourishment events continuing to the present. In addition to sand placement, seawalls, revetments and groins have been constructed in an effort to protect private, commercial, and public property.

The Corps states that the purpose of the Lido Key Shore Protection Project is to replace lost beach sand, provide storm protection to upland property, and to mitigate for the accelerated erosion rates in the vicinity of the three seawalls (approximately 550 feet) located on the southern portion of the island. The comprehensive project includes the nourishment of the shoreline using material obtained from three offshore borrow sites, and the construction of three terminal groins. This final FWCA report evaluates the possible adverse effects of the proposed Lido Key shoreline protection and groin construction project on fish and wildlife resources and is submitted in accordance with provisions of the FWCA and the Endangered Species Act (ESA) of 1973, as amended 16 U.S.C. 1531 *et seq.*).

2.0 PROJECT HISTORY

The Lido Key Beach Erosion Control Project was authorized in 1970 under the Rivers and Harbors Act, and was de-authorized in 1990, in accordance with the provisions of Section 1001(b) (1) of the 1986 WRDA. A U.S. House of Representatives resolution in 1995 authorized the Beach Erosion Control (BEC) Study for Lido Key. 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 DEP monuments R-35 to R-44. In August 1999, the Lido Key Beach Shore Protection Project was re-authorized by Congress under the WRDA of 1999.

As previously mentioned, large-scale beach nourishment along Lido Key first occurred in 1970, with subsequent nourishment in 1974, 1977, 1982, 1998, 1999, and 2001 along the middle and southern portions of the island. Several factors are attributed to Lido Keys changing shoreline. Those factors include: placement of maintenance dredge material, periodic renourishment, major storm events, and the influence of the bordering inlets to the north and south of Lido Key, creating erosion "hot spots". For example, since the renourishment events from 1970 to the present, shoreline recession between monuments R-35 to R-38 ranged from approximately four to 94 feet per year, particularly in the middle of the island. Despite frequent beach renourishment, periodic placement of sand dredged from navigation projects, groin construction, and shoreline armoring, shoreline recession continues. Consequently, in 1990 the DEP designated Lido Key, from monuments R-31 through R-44, as a critical erosion area (DEP 2000).

In the Public Notice dated April 9, 2001, the Corps provided the Service with a Biological Assessment, pursuant to section 7(a) of the ESA. The Corps determined the proposed project may affect nesting sea turtles, primarily the threatened loggerhead sea turtle (*Caretta caretta*), but is not likely to adversely affect the endangered West Indian manatee (*Trichechus manatus*), since the Corps has agreed to include the *Standard Manatee Protection Construction Conditions*

as a permit condition. The Service concurs with these determinations. Therefore, formal consultation concerning possible adverse effects of the project regarding listed sea turtles was initiated and the Service's Biological Opinion was submitted to the Corps on February 25, 2002.

The information that was used to evaluate the presence or absence of fish and wildlife resources present within the project area include a review of current and historic field surveys and reports, various publications, and unpublished data and reports from various resource agencies. In addition, independent field investigations of the inshore habitat and offshore borrow areas were conducted to determine what resources may be affected by the proposed project. Underwater video transects were performed to determine the presence of seagrass or hardbottom habitats within the nearshore area, while side-scan sonar and on-site SCUBA diving were utilized at the proposed borrow areas and surrounding area.

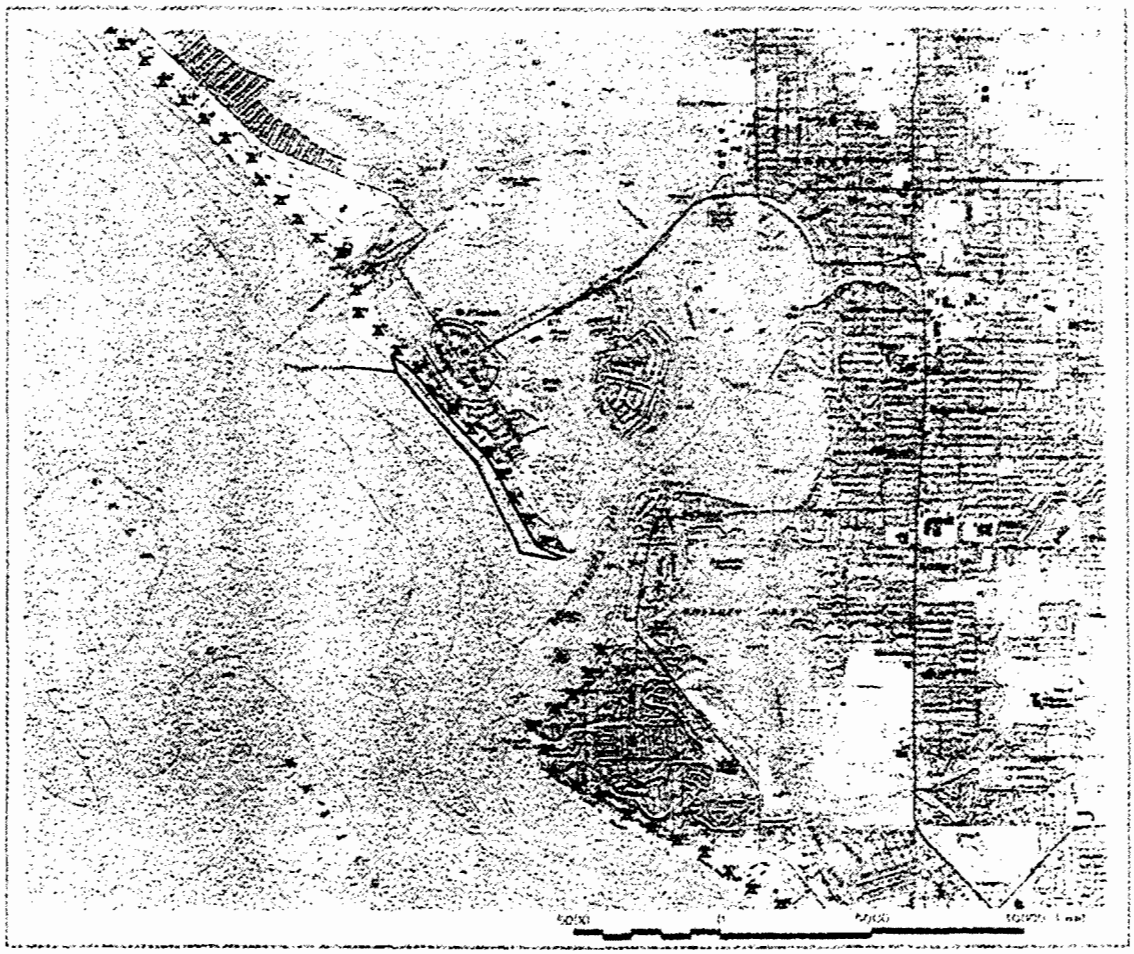
3.0 DESCRIPTION OF STUDY AREA

Lido Key is a small barrier island located in Township 36 South, Range 17 East, Sections 27 and 35, in Sarasota County, Florida. The project area includes the shoreline, nearshore, and three areas offshore of Lido Key (Figure 1). The island is approximately 2.44 miles long, and ranges from 100 feet to 2,500 feet wide. Lido Key is separated from Longboat key and Siesta Key by New Pass and Big Sarasota Pass to the north and south, respectively. The proposed project will extend along approximately two miles (10,500 feet) of shoreline, from DEP monument R- 34 to R-44.5, the southern terminus of the island.

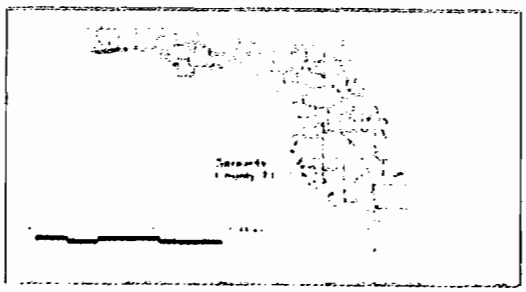
Lido Key can be described as a highly developed commercial, private, and public, community resulting in extensive recreational use of the beach. Hotels, restaurants, condominiums, private homes, and public parks in the northern, central and southern portions of the island are the primary components of the developed shoreline. It has a tourism-oriented economy that is highly dependant on its beaches.

The north end of Lido Key from monument R-31 to R-35 (approximately 3,800 feet), is relatively undeveloped since it is owned and managed by the City of Lido Beach as the North Lido Public Beach. This area has experienced historic shoreline variation attributed to natural and man-made influences as described previously. Some native beach vegetation is present on the upland portions of the island; however, exotic vegetation is dominant. Moving south, the center portion of the island between R-35 to R-44 (approximately 9,000 feet) is fully developed with hotels, condominiums, private residences, restaurants, and contains the Lido Key pubic beach. Not only is this area highly utilized, but it also experiences the greatest shoreline fluctuations, particularly between monuments R-39 to R-44 (approximately 5,000 feet). In addition to periodic beach renourishment, construction of seawalls, revetments, and other shoreline armoring has occurred since the 1970's in attempt to off-set the effects of erosion. Approximately 16 seawalls exist in the area between monuments R-35 and R-43. The southern end of the island between R-43 to R-44.5 (approximately 1,500 feet) is sparsely developed except for recreational amenities such as picnic shelters, restrooms, parking areas, and hiking trails associated with the county-owned South Lido Park (CP&E 1992). Invasive exotic vegetation is dominant within the park.

Figure 1. Project Location



Sarasota, FL USGS 7.5 Topographic Quadrangle



Location Map	
Little Key CAP	
Scale: 1" = 5,000'	Drawn By: MR
Date: October 2001	
DENNIS CORPORATION	J01-0480
	Figure 1

Figure 2: Lido Key Project Plan View

*Figs. A29-A, A29-B excerpted from Coastal Planning & Engineering, Inc. 2001. Lido Key, Sarasota County, Florida-Feasibility Phase Study, July 2001, for U.S. Army Corps of Engineers- Jacksonville District. Boca Raton, Florida

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

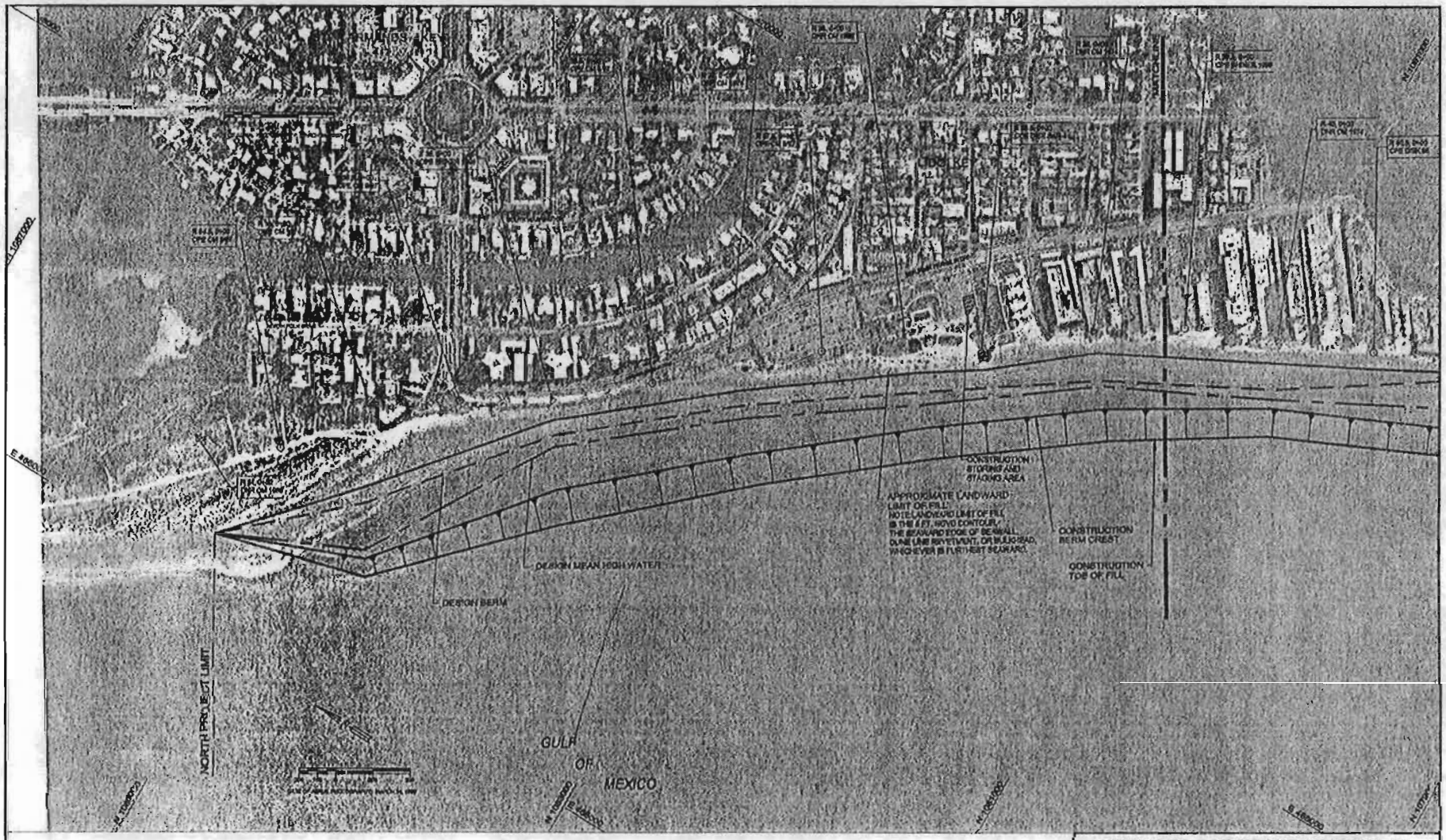


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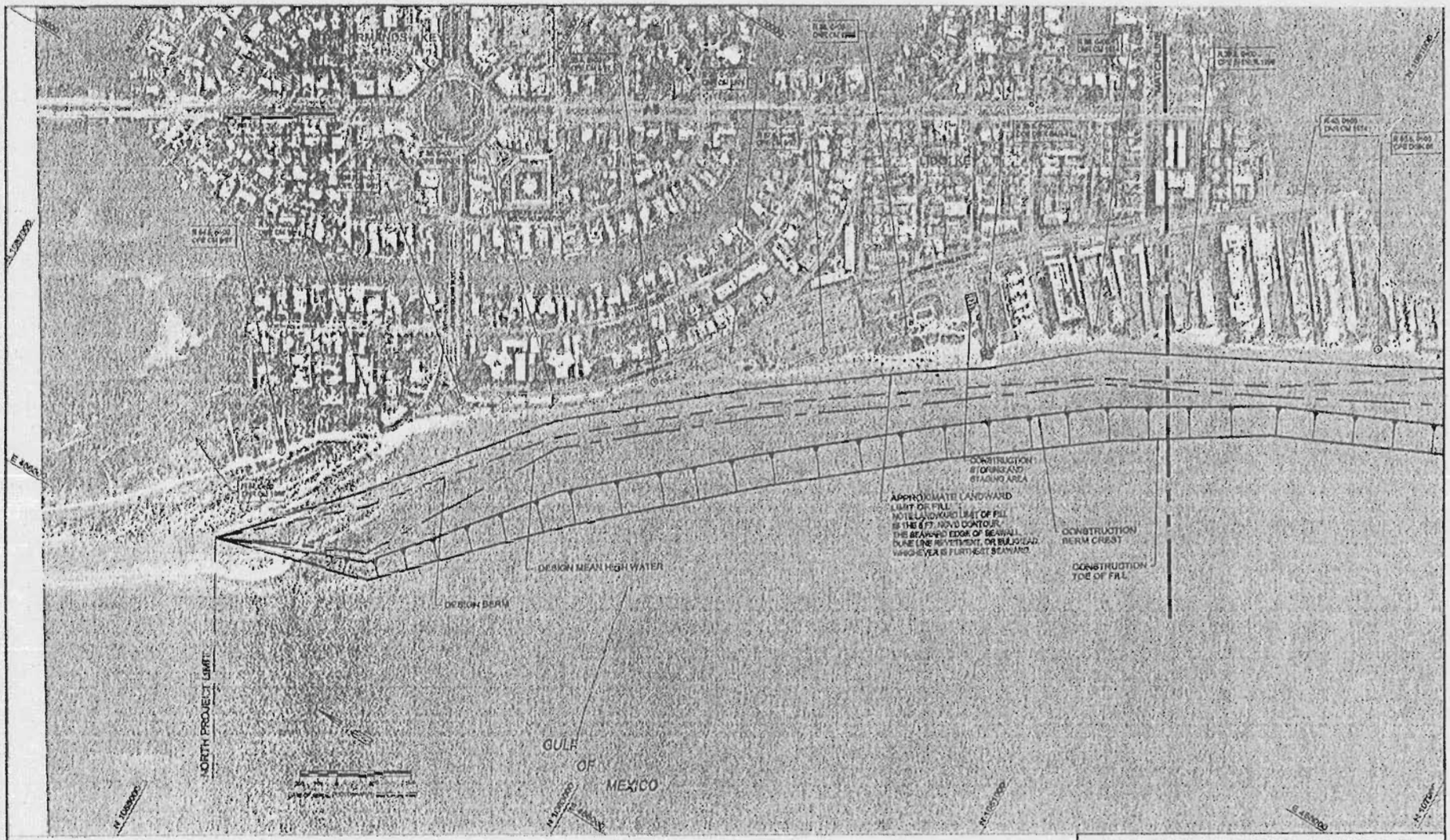
FIGURE A-29A



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

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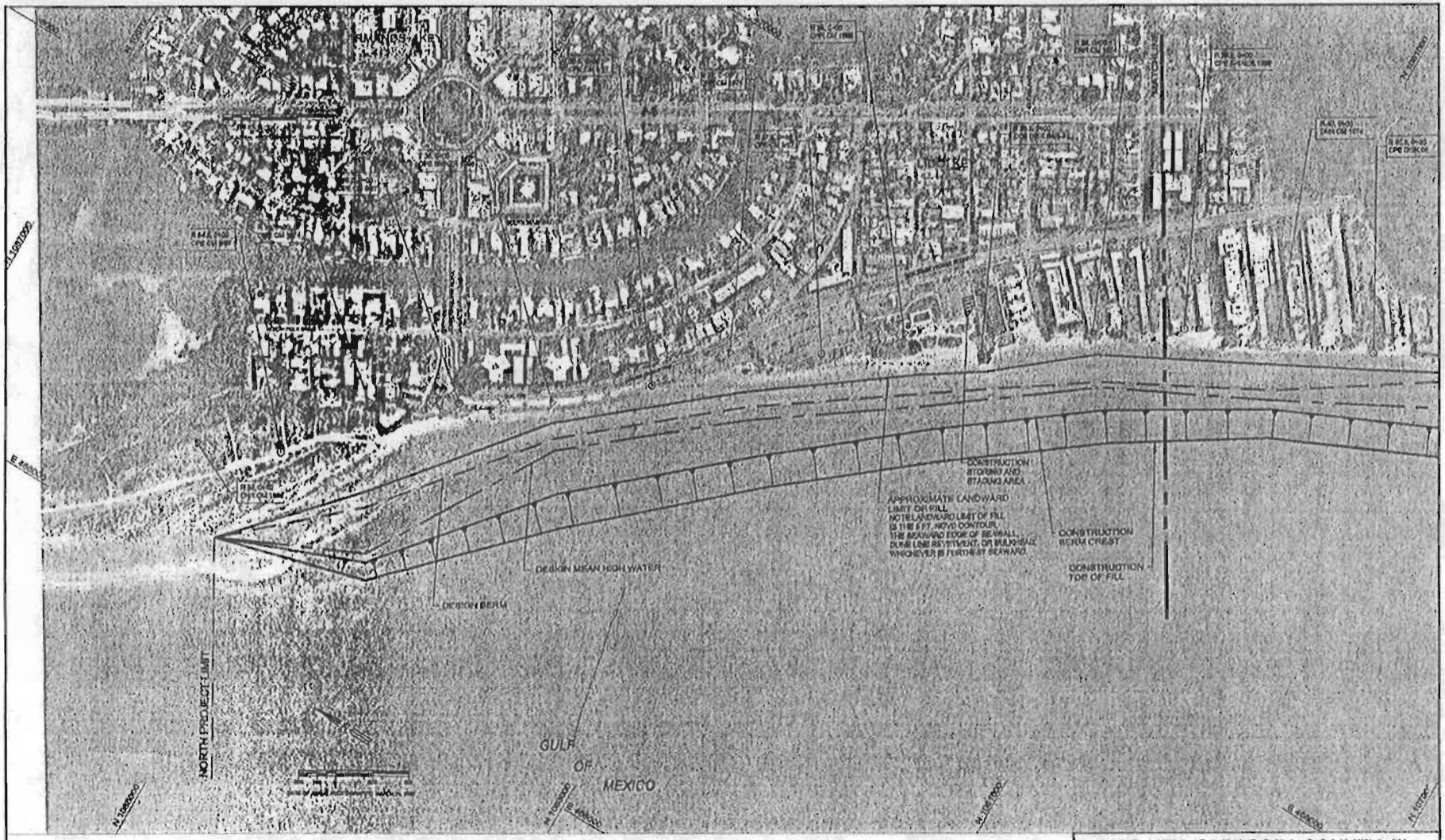
FIGURE A-29A



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

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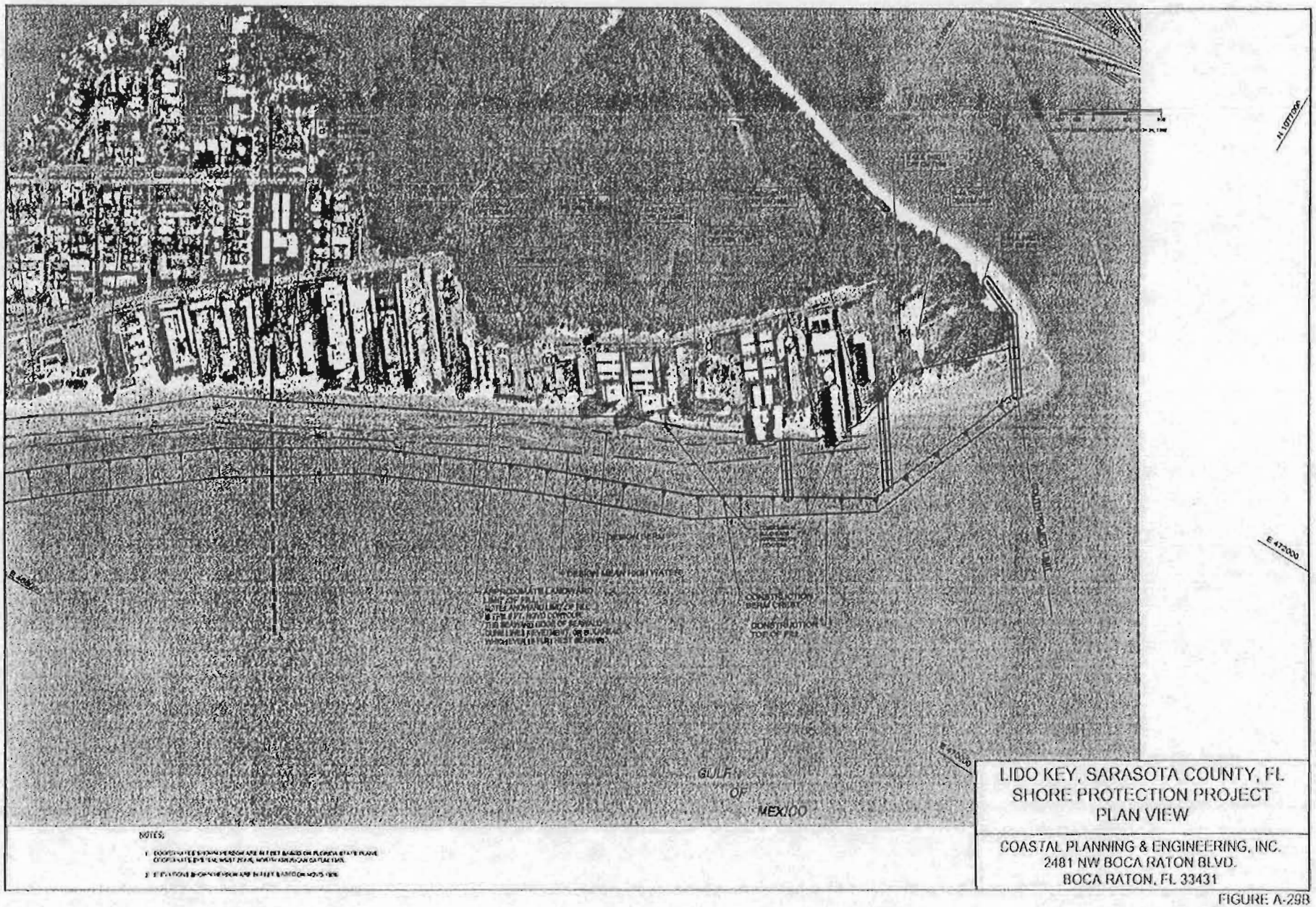
2481 NW BOCA RATON BLVD.
BOCA RATON, FL 33431

FIGURE A-29A



NOTES:

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

Figure 3: Lido Key Resource Locations

4.0 PROJECT DESCRIPTION

The proposed shore protection project consists of dredging sand from three offshore borrow areas, placing the fill on and adjacent to the current Lido Key shoreline, and constructing three groins in the southern end of the project area. The Corps proposes to construct a berm 80- feet wide with a 10:1 slope along 1.74 miles of shoreline, from monument R-34 to R-44.5 (CP&E 2001). An estimated 982,000 cy of material will be obtained from three offshore borrow sites located approximately 10 nautical miles offshore, and identified as Lido Key Borrow Areas (LKBA) 5, 6, and 7. Due to the distance from the beach to the borrow areas, a hopper dredge and barge will likely be used to acquire and deliver the substrate.

The mean grain size of sediments in borrow areas LKBA 5, 6, and 7 were 0.40, 0.32, and 0.43 mm, while silt comprised 2.19, 4.05, and 2.48 percent of sediments, respectively (CP&E 2001). Sands on the existing beach have an average grain size of 0.24 mm, and comprised of 1.93 percent silt (CP&E 2001). No color comparison of the borrow material to the existing beach was provided.

Three terminal groins will be constructed between R-42 and R-44.5 using 2-ton armor stone over 400 pounds of underlayer stone and 1-20 pounds of bedding stone (Figure 2). The bedding stone will be underlain with filter fabric at minus 3.5 feet NGVD, and the armor stone will be placed to 5.0 feet NGVD. Groins will be 12 feet (top) to 46 feet (bottom) wide, with 45 percent side slopes. They will have total lengths of approximately 340, 520, and 1,320 feet for the northern, central, and southern groins, respectively. For the north and central groins, approximately half of the length of the groins will be above 0 feet NGVD; water level on the seaward half will average approximately minus 1 foot NGVD. Water depth at the terminal end of the groins will be approximately minus 2 feet NGVD. The exposed portion of the southern groin/bulkhead will be above 0 feet NGVD and will not extend seaward beyond mean high water.

The Corps anticipates that without the project, erosion near the center of the island is likely to continue, and the transport of beach material into nearshore shoal areas is probable. Certain areas on the island will lose a beach and dune habitat, while others may gain a beach or shallow-water habitat from the redistribution of sediments.

5.0 FISH AND WILDLIFE RESOURCES

5.1 Communities

5.1.1 Upland and Supralittoral Zone

Since Lido Key is man-made, the island generally lacks native vegetative communities. The uplands are dominated by exotic vegetation, primarily the Australian pine (*Casuarina equisetfolia*); however, some native vegetation, such as sand pine (*Pinus clausa*), sea grape (*Coscoroba uvifera*), and wax myrtle (*Myrica cerifera*) has become established. Dune vegetation such as salt grass (*Distichlis spicata*), sand spur (*Cenchrus spp.*), seaside spurge (*Chamaesyce polygonifolia*), and sea oats (*Uniola paniculata*) can be found on portions of the island, but these are most abundant at the north end of Lido Key. This section lies within the North Lido Pubic Beach. The center of the island is fully developed with little native vegetation remaining between the shoreline and buildings, due mainly to development and erosion. The southern portion of the Lido Key shoreline includes South Lido Park. Its uplands are dominated by stands

of Australian pine, while the seaward portions are sparsely covered with sea oats and other beach/dune vegetation particularly along the Big Sarasota Pass shoreline. Dune areas supporting woody vegetation are frequently used by roosting birds and may provide rookery sites. Other wildlife common to upland areas include small mammals, snakes, and lizards (CP&E 1992).

Florida's supralittoral zone or dry beach serves many ecological functions. This zone supports an abundant benthic infaunal assemblage of burrowing invertebrates that are well adapted to the relatively harsh conditions of the dry beach. As a result, biological diversity is generally lower in this zone when compared to the intertidal and subtidal zones. The beaches of Lido Key are typical of other Florida beaches. It is populated with small, short-lived infauna with low species diversity but high species density and substantial reproductive potential and recruitment. Common species include talitrid and haustoriid amphipod species and decapod crustaceans. These beaches usually have low species diversity, but populations of individual species are often very large. Species such as ghost crabs (*Ocypode quadrata*) are highly specialized to survive in this environment.

The supralittoral zone also serves as important nesting habitat for multiple federally and state listed sea turtles and shorebird species. Ground nesting shorebirds are particularly vulnerable to nest predation and disturbance associated with increased coastal development. As a result, the nests of both shorebirds and turtles may be inadvertently disturbed and/or destroyed by beachgoers or their pets. Historically, the available supralittoral habitat on Lido Key has undergone considerable variation, due to the natural and man-made alterations of the shoreline.

5.1.2 Intertidal Beach Zone

The intertidal beach zone is an important area for shorebird foraging, and comprises habitats for many invertebrates, including bivalves, decapod crustaceans, amphipods, and polycheates. Also, the intertidal zone must be crossed by nesting and hatchling sea turtles. Structures or escarpments that restrict this movement have decreased the amount of shoreline available for nesting activities.

The species diversity in the zone between mean-high water and mean-low water is greater than the supralittoral zone. Typical macrofauna found within this zone include haustoriid amphipods, polychaetes, isopods, mollusks and some larger crustaceans, such as mole crabs (*Emerita spp.*) and burrowing shrimp (*Callianassa spp.*). This zone is an important forage area for multiple shorebird species.

5.1.3 Subtidal Zone

The nearshore and offshore subtidal zone west of Lido Key is comprised of softbottom habitats of sand, shell, and silt substrate with little or no rock, limestone, or hard coral structure. The biota that comprises the subtidal zone include benthic invertebrate assemblages, epifaunal invertebrates, and macrophyte assemblages that form reef communities if hard substrate is present, and the fish and motile crustacean species that utilize this habitat. The organisms associated with the nearshore surf zone and deeper subtidal sand bottom habitats are generally dominated by polychaetes, amphipods, isopods, decapods, mollusks, echinoderms, and a variety of other taxa. Though many of the dominant infaunal species are found both in the surf and offshore subtidal zones, the diversity and abundance is greater in the subtidal zone. Other frequent occupants of these habitats include benthic fishes (e.g., flounders), bivalves, decapod crustaceans, and certain shrimp species.

Three subtidal areas have been selected as borrow sites for the proposed project. The borrow

sites are essentially slightly raised "plateaus" of sand in approximately 45 to 55 feet of water, where bottom elevations rise from approximately two to five feet from the surrounding seafloor.

In 1991, CP&E obtained and analyzed 12 samples of the nearshore and offshore benthic infauna of Lido Key. Their results showed that the offshore samples were dominated by the ostracod, *Podocopa sp.*, whereas the nearshore samples were dominated by the lancelet, *Branchiostoma floridae*. Offshore between the depths between minus 10 and minus 18 feet NGVD, *Podocopa sp.* clearly dominated. However, the New Pass north control station located at -22 feet was dominated by the bivalve, *Parvilucina multilineata*. At four of the seven stations located in less than minus 10 feet of water, *Brachiostoma floridae* was the dominant species present. Of the three remaining shallow water stations (approximately minus 5 feet NGVD), one station was dominated by the bivalve, *Donax variabilis*; another by the ostracod, *Podocopa sp.*; and the last station by the amphipod, *Eudevenopus honduranus* (CP&E 1992).

The deeper offshore samples exhibited greater species diversity and population density than did the nearshore samples. Offshore, the average number of species was twice that of the nearshore. Likewise, the average number of individuals in the offshore samples were six times that of the nearshore samples (CP&E 1992).

5.1.4 Seagrass Communities

Seagrasses are a vital component of the coastal ecosystem by serving as a primary producer, providing forage habitat and shelter for multiple organisms, improving water quality and clarity, and providing substrate stabilization. Seagrasses are a highly productive, faunally rich, and ecologically important habitat within the coastal lagoons, bays, and estuaries of south Florida. Rapidly growing seagrass shoots provide food for trophically higher organisms via direct herbivory or from the detrital food web. The canopy structure formed by these shoots offers shelter and protection. This combination of shelter and food availability results in seagrass beds being the richest nursery grounds in South Florida's shallow coastal waters. As such, many important commercial and recreational fisheries (e.g., clams, shrimp, lobster, fish) are associated with seagrass beds. Many of these recreationally and commercially important species rely on seagrasses for at least part, if not all, of their life history. Seagrass contributes to improving water quality and clarity by absorbing excess nutrients and trapping suspended solids. In addition, the roots and rhizomes of the seagrass help stabilize the substrate while the shoots of dense beds absorb wave energy, thereby buffering their effects on the shoreline.

Seagrasses have experienced declines in abundance and distribution due to water quality degradation and through the direct loss of habitat related to dredge and fill activities and boating impacts. The degradation of water quality is largely the result of point source pollution (e.g., wastewater discharge, agricultural runoff, excessive freshwater discharge); non-point source pollution (e.g., stormwater runoff, leaching from septic tanks); and the alteration of adjacent watersheds. The subsequent decline in seagrasses has significantly reduced the fisheries resources in south Florida. Implementation of several protective and restorative measures has improved water quality and radically reduced the rate of habitat loss within south Florida's estuaries. Such measures include the regulation of dredge and fill activities, the elimination of wastewater discharge to surface waters, the treatment of stormwater runoff, and the rehabilitation of adjacent watersheds.

Fauna utilizing seagrass beds range from invertebrates to top-level predators in multiple guilds. A few common species include: bittium (*Bittium* sp.), sea urchins (*Lytechinus variegatus*), pen shell (*Atrina rigida*), pink shrimp (*Penaeus duorarum*), spiny lobster (*Panulirus argus*), pinfish (*Lagodon rhomboides*), spotted sea trout (*Cynoscion nebulosus*), red drum (*Sciaenops ocellata*),

great blue heron (*Ardea herodias*), roseate spoonbill (*Ajaia ajaja*), osprey (*Pandion haliaetus*), West Indian manatee (*Trichechus manatus*), and green sea turtle (*Chelonia mydas*)(USDOI, 1982).

Of the seven species of seagrass occurring in Florida, five species are found in waters of Sarasota County. Species common to the Sarasota Bay estuary and nearshore marine zones around Lido Key include shoal-grass (*Halodule wrightii*), manatee-grass (*Syringodium filiforme*), turtle-grass (*Thalassia testudinum*), star-grass (*Halophila englemannii*),and widgeon-grass (*Ruppia maritima*). The inlets around Lido Key affect the occurrence and abundance of seagrass in several ways: high turbidity and low water clarity is common as Sarasota Bay is flushed. Tidal movement shifts and creates shoals, and directs or reflects wave energy to the center of the island. These factors likely attribute to the limited seagrass coverage nearshore of Lido Key at the northern and southern extents. Despite the dynamics of the area, seagrass has remained persistent off Lido Key since 1920, though it tends to be limited and ephemeral. This is reflected in the results of the two nearshore surveys conducted in 1991 and 2001according to CP&E, 1992 and Dial Cordy and Associates (DC&A), 2001.

The Lido Key Beach Nourishment Project Environmental Study (CP&E, 1992) involved biological and physical assessments for a beach renourishment project constructed in 1998 from monuments R-35 to R-40 (approximately 5,000 feet). In 1991, field surveys revealed two locations where seagrass was present nearshore of the project footprint (Figure 3). One of the two areas, comprised of approximately 200 square feet of scattered shoal-grass, was located approximately 100 feet from shore and 650 feet west-southwest of monument R-35. The larger of the two areas comprised scattered shoal-grass and manatee-grass over 47 acres, and was located 2,000-3,000 feet offshore from Siesta Key monuments R-44B and R-44C, in the northeast portion of the Big Sarasota Pass ebb shoal (CP&E 1992). Due to the significant seagrass presence on the ebb shoal, it was not considered as a potential borrow site. In July, 2001, 12 underwater video survey transects were conducted offshore and perpendicular from monuments R-35 to R-44, roughly every 1,000 feet (DC&A 2001) (Figure 3). Seagrass was detected at two points along the survey transect line at R-35 and at one point along R-43, approximately 600 feet southwest and approximately 1,100 feet west-southwest of the estimated equilibrium toe of fill, respectively.

The video survey detected the presence of a monotypic area of shoal grass at each of the aforementioned three locations. However, the extent of the seagrass coverage and its description could not be determined by the video. According to the Lido Key Marine Resource Report (LKMRP 2001), seagrass locations could not be ground-truthed due to poor visibility at the time of the survey (DC&A 2001). No resource surveys were conducted north of R-35 or south of R-44, which excludes approximately 1,500 feet of the project footprint. Due to boat draft limitations and safety concerns, a portion of the equilibrium toe of fill at each R-monument and within the groin construction footprint was excluded from the video survey. These areas were not ground truthed to verify the presence or absence of seagrass. However, the LKMRP concluded that no seagrasses were present within the equilibrium toe of fill and groin construction area. The Service did not support this conclusion and the issue was discussed with the Corps and DC&A.

Based on the September 2001 visual inspection of borrow areas by CP&E and Service personnel, seagrasses were not found in borrow areas; however, an isolated patch of turtle grass, estimated to be less than three feet in diameter was located within 200 feet outside of the LKBA 6 boundary. Seagrass was not observed with in the vicinity of LKBA 5 or 7.

5.1.5 Low-Relief Hardbottom

Nearshore and offshorelow-relief hardbottom are characterized by limestone, rock, or worn coral substrates that contain crevasses, holes, and low-lying ledges that create microhabitat diversity, and thereby can support higher species diversity than unvegetated, softbottom habitats. Low-relief hardbottom habitats are important for organisms such as crustaceans, notably, crabs, spiny lobster, and penaeid shrimp and numerous fishes, including species of the Snapper-Grouper complex. Several species utilize hardbottom as refugia during juvenile life-history stages, whereas adults of various predatory species use these areas as foraging grounds. Hardbottom fauna may be divided into sessile and motile components. The sessile component contains the primary producers, such as macroalgae; some grazers or first order consumers, planktivores, and filter feeders. Hard corals occupy niches as both producer and consumer. Zooxanthellic algae within coral polyps photosynthesize while the polyps themselves capture planktonic organisms for consumption. Similar to hard corals, tunicates and sponges concentrate carbon that is typically fixed far offsite. These attached filter-feeding organisms contribute to the organic base by trapping nutrient-rich plankton as it is swept past by wave and wind generated currents. Tunicates, sponges, and hydroids add structure to the bottom, providing shelter from predation for many crustaceans and smaller fishes.

Many fish and motile invertebrates are attracted to hardbottom habitat by its structure. The numerous crevices, holes, and epibiotic structure provide these organisms with a refuge from larger predatory fish. Structure can also provide barrier to currents and substrate for attaching demersal eggs. In addition to these features, the sessile organisms of the reef provide a large diverse food base on which some fish species feed directly. Others benefit from this indirectly by feeding on invertebrates and other smaller fish that are nurtured by sessile plant material.

Based on data from side-scan sonar and video surveys of Lido Key, hardbottom resources are not located in nearshore (i.e., fill deposition) areas of the project or within the boundaries of the offshore borrow areas (CP&E 2001 and DC&A 2001, respectively). However, side-scan sonar yielded evidence of possible low-relief hardbottom communities adjacent to LBBA 6 and 7, though no anomalies were detected outside of LKBA 5 (CP&E 2001).

On September 24, 2001, diver surveys were conducted by CP&E and the Service to verify the side-scan sonar anomalies detected at LKBA 6 and 7. Scattered, non-contiguous, low-relief, hardbottom areas were observed and these areas were comprised of similar species, but varied in size. The total hardbottom coverage within 400 feet of the borrow site boundaries were estimated to be less than ten percent with an average maximum height and width of approximately eighteen inches and two feet, respectively.

It is important to mention, the fish and motile invertebrate species typically associated with hardbottom habitat were notably absent during the investigations. During each of the six dives, numerous dead or incapacitated sessile and motile benthic marine species were observed. A red tide event was speculated and later verified by Mote Marine Laboratory staff. The red tide began approximately three weeks prior to the surveys and was exacerbated by the passage of Tropical Storm Gabrielle on September 13, 2001. Another effect linked to Tropical Storm Gabrielle included the observation of an extensive layer of sediment covering the exposed hardbottom adjacent to the borrow sites (Appendix A).

5.1.6 Essential Fish Habitat

The community types listed above, with the exception of the upland and supralittoral zones, are considered Essential Fish Habitat (EFH) as described in the Magnuson-Stevens Fishery

Conservation and Management Act, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267). EFH provisions support the management goals of sustainable fisheries. EFH that may be directly and indirectly impacted by the proposed project are likely to include the water column, littoral zone, sublittoral zone, hardbottom, and seagrass habitats. Specific aspects of EFH that may be adversely affected include spawning, foraging, and refuge habitats for such managed species such as the snapper/grouper complex, penaeid shrimp, and spiny lobster. The NMFS is the lead agency responsible for the complete assessment of the possible adverse impacts of the proposed project to EFH in the vicinity of Lido Key and LKBA 5, 6, and 7.

5.2 Important Species

5.2.1 Sea Turtle

The ESA protects all six species of sea turtles that occur in the United States. Florida is a significant nesting region for three of the six species. Those species are the federally-listed endangered leatherback sea turtle (*Dermochelys coriacea*) and green sea turtle (*Chelonia mydas*), and the threatened loggerhead sea turtle (*Caretta caretta*). Of these, only the latter two regularly nest on the west coast of peninsular Florida. Furthermore, both nest in Sarasota County, though the loggerhead is the only species documented as nesting on Lido Key. The endangered Kemp's ridley turtle (*Lepidochelys kempii*) and the endangered hawksbill turtle (*Eretmochelys imbricata*) nest infrequently in Florida. However in 1999, one Kemp's ridley nest was located in Sarasota County. In general, threats to listed marine turtles include loss or degradation of nesting habitat from coastal development and shoreline armoring; disorientation of hatchlings by beach-front lighting; excessive nest predation by native and non-native predators; degradation of foraging habitat; marine pollution and debris; water-craft strikes and disease (such as Fibropapillomatosis); and incidental take as a result of dredging and commercial fishing activities. The distribution of sea turtle nesting activity along Florida's Southwest Gulf Coast (Sarasota, Charlotte, Lee, and Collier counties) is less understood than that of the east coast epicenter of sea turtle nesting between Brevard and Palm Beach counties (Addison *et al.* 2000). The Gulf Coast yields approximately 10 to 12 percent of the total loggerhead nesting and less than one percent of the total green sea turtle nesting activity on Florida's beaches. During the 1994 to 1999 nesting seasons, Sarasota, Charlotte, Collier, and Lee counties have accounted for 41, 14, 15, and 8 percent of the overall loggerhead nesting in the southwest Gulf Coast region, respectively. During the 2000 nesting season, 64 loggerhead and nine green sea turtle nests per-kilometer were documented along the surveyed beaches in Sarasota County (FMRI 2001b). In 2000, of the 4.2 miles of available nesting habitat along Lido Key, loggerhead nest density averaged 10 nests/km. No Kemp's ridley or green turtles have been documented as nesting on Lido Key.

5.2.2 Shorebirds

Florida's shoreline supports multiple shorebird species (e.g., terns, sandpipers, plovers, etc.) that are adapted to utilizing the supralittoral and intertidal zones for activities such as nesting and foraging. Typically, shorebirds prefer to nest on isolated, open beaches between the months of March through August. Ground-nesting shorebirds, such as the least tern, are sensitive to disturbance and are known to abandon their eggs and nesting sites, if disturbed. Frequent disturbance leaves untended nests vulnerable to overheating and predation. Other factors contributing to the decline of shorebird species include: habitat loss and degradation due to coastal development, anthropogenic disturbance and increased nest predation by unchecked natural predators and exotic predators, including domestic pets. In response, much of south Florida's least tern populations have selected less suitable nesting habitat on the rooftops of large, flat, tar and gravel commercial buildings such as grocery stores and pharmacies. Therefore, the newly established ground-nesting colony on Lido Key is important.

Since 1998, shorebirds have established a thriving multi-species nesting colony on Lido Key

between R-34 and R-35, or more specifically, located at 27 19.044', north latitude, 82°35.057' west longitude. The colony is comprised of several state listed species such as the threatened least tern (*Sterna antillarum*), black skimmer (*Rynchops niger*), a species of special concern; and threatened snowy plover (*Chadadrius alexandrinus*). Other shorebird species associated with the colony include the royal tern (*Sterna maxima*), common tern (*Sterna hirundo*), and brown pelican (*pelecanus occidentalis*). In addition, the federally-listed threatened piping plover (*Charadrius melodus*), may utilize the Lido Key beaches as over-wintering habitat.

These shorebirds nest from April through August. At the Lido Key colony, 37, 23, and 35 nests were found in 1998, 1999, and 2000, respectively (unpublished data, N. Douglas, FWC). The black skimmer, listed by FWC as a species of special concern, was observed in both 1990 (160 adults) and 2000 (172 adults; 15 nests). Black skimmers breed from May through September (Kale and Maehr 1990). The snowy plover nests March through July (Kale and Maehr, 1990). In 1998, two hatchlings were observed at the Lido Key colony, and in 2000, four adults were observed.

Three hundred and fifty royal terns which nest April through August (Kale and Maehr, 1990), were observed in 2000 at the colony (unpublished data, N. Douglas of FWC). Common terns, spring and fall migrants in Florida (Kale and Maehr, 1990), were also observed within the project area. In 2000, 20 common terns were observed at the colony (N. Douglas, personal communication 2001). Finally, brown pelicans , a state-listed species of special concern, are prevalent around Lido Key. They breed in October, and usually nest in coastal mangrove-islands colonies (Kale and Maehr, 1990).

All shorebirds present on Lido Key are federally protected under the Migratory Bird Treaty Act, and as mentioned, certain species are listed by the State of Florida. The FWC closes seasonally this section of Lido Key beach to recreational use to minimize human disturbance in and around the nesting shorebird colony.

5.2.3 Manatees

The range of the West Indian manatee extends from coastal areas of Beaufort, North Carolina, south through the Caribbean, with the highest occurrence in Florida. Manatees frequently inhabit shallow areas where seagrasses are present and are commonly found in protected estuaries, protected lagoons, and freshwater systems such as springs and rivers. Since manatees are prone to cold stress, frequently in the winter they will congregate in warm water refugias, such as natural warm water springs or warm water effluent produced by power plants. Very few manatees utilize the offshore waters from November through April. However, during the remainder of the year, manatees will use open ocean passages to travel between favored habitats (Hartman 1979).

The manatee is protected under the Marine Mammal Protection Act of 1972 and the ESA. Florida provided further protection in 1978 by passing the Florida Marine Sanctuary Act designating the state as a manatee sanctuary, and providing signage and speed zones in Florida's waterways. Manatees consistently use Sarasota Bay, east of Lido Key, but have not been formally documented west of the island in the winter (FWC, Florida Marine Research Institute aerial survey data, 1985, 1987, and 1992). However, manatees may be present within the project vicinity during the summer.

5.2.4 Cetaceans, Fishes, and Invertebrates

Many coastal-pelagic fish species and migratory cetaceans are known to utilize the Gulf of Mexico. Notable offshore cetacean species include short-finned pilot whale (*Globicephala macrorhynchus*), Atlantic bottlenosed dolphins (*Tursiops truncatus*), the endangered humpback whale (*Megaptera novaeangliae*), and the endangered sperm whale (*Physeter catodon*) (CP&E

1992).

Many commercially and recreationally valuable fish and invertebrate species are found within the Gulf of Mexico and rely on nearshore and/or estuarine habitats for part or all of their life cycle. These include those species in the snapper/grouper complex (families Lutjanidae and Serranidae), tarpon (*Megalops atlanticus*), king mackerel (*Scomberomorus cavalla*), Spanish mackerel (*Scomberomorus maculatus*), blue crab (*Callinectes sapidus*), stone crab (*Menippe mercenaria*), shrimp (*Penaeid* sp.), and southern quahog clam (*Mercenaria campechiensis*).

Table 1. Partial list of fish species commonly found in the vicinity of Lido Key (CP&E 1992).

Common Name	Scientific Name	Common Name	Scientific Name	Common Name	Scientific Name
Bonnethead shark	*Sphyrna tiburo*	Permit	*Trachinotus falcatus*	Gulf- butterfish	*Peprilus burti*
Atlantic stingray	*Dasyatis sabina*	Lane snapper	*Lutjanus synagris*	Barbfish	*Scorpaena brasiliensis*
Smooth butterfly ray	*Gymnura micrura*	Round scad	*Decapterus punctatus*	Leopard searobin	*Prionotus scitulus*
Clearnose skate	*Raja eglanteria*	Bluntnose jack	*Hemicaranx amblyrhychus*	Bighead searobin	*Prionotus tribulus*
Lady fish	*Elops saurus*	Lookdown	*Selene volmer*	Ocellated flounder	*Ancylopsetta quadrocellalata*
American eel	*Anguilla rostrata*	Pompano	*Trachinotus carolinus*	Spotted whiff	*Citharichthys macrops*
Gulf menhaden	*Brevoortia patronus*	Silver jenny	*Eucinostomus gula*	Gulf flounder	*Paralichthys albigutta*
Spanish sardine	*Sardinella anchovia*	Grunts	*Pomadasyidae*	Fringed flounder	*Etropus crossotus*
Scaled sardine	*Harengul jaguana*	Pigfish	*Orthopristis chrysoptera*	Lined sole	*Achirus lineatus*
Striped anchovy	*Anchoa hepsetus*	Sheepshead	*Archosargus probatocephalus*	Orange filefish	*Aluterus schoepfi*
Inshore Lizardfish	*Synodus foetens*	Pinfish	*Lagodon rhomboides*	Scrawled cowfish	*Lactophyrys quadricornis*
Hardhead catfish	*Arius felis*	Silver perch	*Bairdella chrysoura*	Smooth puffer	*Lagocephalus laevigatus*
gafftop catfish	*Bagrae marinus*	Sand seatrout	*Cynoscion arenarius*	Southern puffer	*Sphoeroides nephelus*
Atlantic midshipman	*Porichthys plectrodon*	Spot	*Leiostomus xanthurus*	Striped burrfish	*Chilomycterus schoepfi*
Skilletfish	Gobiesox stromosus	Kingfish, southern and gulf	*Menticirrhus americanus& littoralis*	Striped mullet	*Mugil cephalus*

Table 2. Partial List Common bivalve invertebrates of Lido Key (CP&E 2001).

Common Name	Scientific Name	Common Name	Scientific Name
Atlantic Abra	*Abra aequalis*	Florida Glassy lyonsia	*Lyonsia hyalina floridana*
Transverse ark	*Anadara transversa*	Narrowed macoma	*Macoma tenta*
Paper mussel	*Amygdalum papyrium*	Southern quahog	*Mercenaria campechiensis*
Pointed venus	*Anomalocardia cuneimeris*	Atlantic flat lepton	*Mysella planulata*
Broad-ribbed cardita	*Carditameria floridana*	Brown gem clam	*Parastarte triquerta*
Cross-barred venus	*Chinone cancellata*	Unequal spoon clam	*Perploma margaritareum*
Lunate crassinella	*Crassinella lunulata*	Tiny semele	*Semele nuculoides*
Atlantic diplodon	*Diplodonta punctata*	Purplish tagelus	*Tagelus divisus*
Morton's egg cockle	*Laevicardium mortoni*	Stout tagelus	*Tagelus plebeius*
Florida Lucina	*Lucina floridana*	Texas tellin	*Tellina texana*

6.0 DISCUSSION

Possible direct effects of the project on fish and wildlife resources include injury, mortality, or disturbance (i.e., interruption of an individual's life-history) that may occur as a direct result of dredging, filling, and loss or modification of habitats. Indirect impacts may occur to nearby habitats and/or animals during or after completion of dredging and construction activities. Direct and indirect impacts are anticipated for sea turtles and benthic organisms located in the supralittoral, intertidal, and subtidal zones within the project vicinity. Indirect adverse effects may occur to manatees, some fishes, certain shorebirds, and various species associated with low-relief hardbottom habitats.

6.1 Communities

6.1.1 Supralittoral and Littoral Zones

The supralittoral zone will be directly impacted by the placement of dredged material. Decapods, such as ghost crabs and other burrowing organisms, are at risk of direct burial. Though limited data describing the ability of decapods to escape burial exists, decreased population may be attributed to a response to the reduced food source in the intertidal zone rather than burial mortality (Nelson 1995). Infaunal communities found in the supralittoral and intertidal areas will be directly impacted by sand placement. The temporary loss of this prey base may adversely affect nesting and non-nesting shorebirds and/or waterbirds foraging in the intertidal and surf zones. The effect of these impacts should be short-term in duration, as community structure is expected to become re-established with immigrants within one year of dredging (Taylor *et. al* 1973).

The upper beach zone also provides nesting habitat for federally and state listed sea turtles and shorebird species. Potential impacts to sea turtles include loss of nests due to relocation or missed nests if the project is conducted during nesting season; reduced nesting activity; and

reduced hatchling survival from sand placement, sand compaction, escarpment formation, and sand color and texture changes.

The littoral zone of the beach supports a diversity of amphipods, polychaetes, gastropods, bivalves, and surf zone fishes. During the initial sand placement, many of the surf zone species may be adversely affected due to limited swimming capabilities, behavioral responses, and/or cryptic nature. Increased turbidity may affect the respiration of some species, which could cause suffocation and the loss of these individuals to the system. Recovery time varies greatly between species, but generally ranges from several months to five years or more depending on the level of impact. Information regarding the response of surf zone fishes is limited but generally states that most fish will flee and avoid the disturbed area and will return within a few months. Nelson (1985) suggests that loss of habitat may be more harmful to fish than elevated turbidity.

6.1.2 Seagrasses

As stated in the LKMRR, seagrasses were not detected in the areas surveyed within the proposed equilibrium toe of fill. However, seagrass habitats adjacent to the proposed fill area may be subject to indirect impacts. Indirect impacts may occur through the suspension of fine sediments into the water column during beach renourishment and groin construction activities (Figure 3). Tides and currents may transport these sediments over adjacent seagrass beds where they may be deposited, or at least reduce water clarity. Potential losses of habitat or a temporary reduction in seagrass productivity and habitat quality may result. Other indirect impacts may include the temporary displacement of fish and/or invertebrates from these habitats. Therefore, a temporary shift in community structure may occur. Littoral transport models (CP&E 2001) suggest the possibility that any re-suspended silt may disperse to the nearshore areas north or south of the island. Therefore, the shoal grass located adjacent to the project footprint and the 47-acre manatee/shoal-grass area off of Siesta Key may be adversely affected.

The seagrass present approximately 200 feet outside of LKBA6 is likely to be directly affected during the dredging activity despite the relatively low silt percentage of the material to be dredged. Since it is located downdrift of the prevailing currents, it is possible that this seagrass will be adversely effected as a result of the turbidity plume creating prolonged periods of sedimentation and reduced light conditions during dredging.

6.1.3 Low-relief Hardbottom

Nearshore and offshore hardbottom habitat may be directly or indirectly affected by sand placement, groin construction and/or offshore dredging activities. For instance, these resources may be directly buried by sand placement or by excessive sedimentation. In addition, the hardbottom organisms may become vulnerable to disease as a result of stress, if the area is subjected to elevated turbidity levels for prolonged periods during or after construction. Hardbottom habitat is recognized as a valuable fishery resource. The South Atlantic Fishery Management Council's Fishery Management Plan calls for avoiding impacts to this important resource. Where impacts cannot be avoided, the Service recommends mitigation through the creation of similar resources to those lost. Mitigation offsets should, as a minimum, be a ratio of 1:1 in basal area, with added compensation for the temporal loss of existing resource function.

Nearshore resource surveys conducted at Lido Key in 1991 and 2001, did not reveal the presence of hardbottom habitat within the project footprint. Therefore, adverse impacts to nearshore hardbottom habitat it is not anticipated during the groin construction and sand placement activities.

However, side-scan surveys of the borrow areas identified possible low-relief, hardbottom areas adjacent to LKBA6 and LKBA 7 (Appendix B). No hardbottom occurs within or adjacent to LKBA 5. Hardbottom was verified to occur within 200 feet outside LKBA 6 and 7. Because

nearly one million cubic yards of material is required for the project, a considerable amount of time will be spent conducting dredge operations. This would increase the possibility of local turbidity and siltation, which could adversely impact hardbottom habitats. Turbidity, which decreases light attenuation, may reduce photosynthetic activity in the hardbottom areas and therefore alter community structure. Several sessile organisms are adapted to cope with a light deposition of sediments, but if this deposition is too severe, or too long in duration, it could result in species mortality. Possible effects also include the temporary displacement of fish and invertebrates from the area due to turbidity, shifts in community structure, or the acoustic effects of dredging.

The removal of sand from proposed dredge areas may also indirectly affect adjacent hardbottom habitats. Because the borrow sites are slightly elevated areas, their removal will affect sea floor topography. This will likely alter how water currents move across adjacent hardbottom areas, and thereby affect the physical environment of that habitat.

6.1.4 Subtidal Zone

Dredging will directly impact the offshore subtidal habitats by primarily removing macroalgae, sessile and slower-moving invertebrates, and vertebrates. The effect of these impacts should be short-term in duration, as community structure is expected to become re-established with immigrants within one to three years of dredging (if the areas still comprise viable marine substrate) (Taylor *et. al* 1973). In sum, up to approximately 297 acres of un-vegetated, subtidal habitat may be altered during dredging of LKBA 5, 6, and 7 (42, 160, and 95 acres, respectively).

6.1.5 Essential Fish Habitat

Direct and indirect effects of dredging, sand placement, and groin construction activities may occur within the water column, and to the softbottom, seagrass, and hardbottom benthic communities. Dredging and construction activities may directly and indirectly impact benthic organisms that serve as food sources for EFH species, and may directly and indirectly impact seagrass communities as a result of siltation, and direct burial. For a complete assessment of the effects of the action on EFH, the Corps should contact the NMFS, Habitat Conservation Division, located in St. Petersburg, Florida to initiate consultation.

6.2 Important Species

6.2.1 Sea Turtles

The proposed action has the potential to adversely affect nesting females, nests, and hatchlings within the proposed project area. To summarize, potential effects include destruction of nests deposited within the boundaries of the proposed project; harassment in the form of disturbing or interfering with females turtles attempting to nest within the construction area or on adjacent beaches; disorientation of hatchling turtles from project lighting on beaches adjacent to the construction area, as they emerge from the nest and crawl to the water as a result of project lighting, and behavior modification of nesting females due to escarpment formation within the project area during the nesting season, resulting in false crawls or situations where they choose marginal or unsuitable nesting areas to deposit eggs. The quality of the placed sand could affect the ability of female turtles to nest, the suitability of the nest incubation environment, and the ability of hatchlings to emerge from the nest. These impacts should be minimized through adherence to the "Reasonable and Prudent Measures" and " Terms and Conditions" of the Service's 2002 Biological Opinion.

6.2.2 Shorebirds

Because various protected species and other birds are known to nest on Lido Key, beach habitat protection for birds is a significant issue. The FWC-protected multi-species nesting colony discussed in Section 5.2.2 is located at the northern boundary of the project area. Beach fill activities may directly impact nesting shorebirds through destruction of nests and eggs, or injury or mortality to nesting birds and hatchlings. Indirect effects may include altering of natural bird behaviors as a result of project activities, temporarily impacting foraging grounds (such as the intertidal zone), and introducing a beach substrate that is inadequate for nesting; however, the borrow site material selected for this project appears suitable for shorebird nesting.

Beach restoration activities south of the Lido Key nesting colony may temporarily affect feeding patterns of certain birds using the colony and/or beaches. Fill material will not initially contain an infaunal prey assemblage that can be utilized by plovers. Small fishes and invertebrates utilized by terns will be temporarily displaced, as well. Shorebirds may have to fly to adjacent beaches with established, intertidal infaunal resources (i.e., the shoreline north of monument R-35). From October through March, little activity is anticipated to occur at the nesting colony. However, feeding along the Lido Key shoreline remains important for birds (e.g., plovers) during that period.

6.2.3 Manatees

The construction activities associated with the proposed project may adversely effect manatees utilizing the nearshore areas adjacent to Lido. However, the Corps has stated they will include the *Standard Manatee Protection Construction Conditions* as permit condition to minimize possible adverse effects to manatees. Indirect effects to manatees mayoccur from the loss or degradation of seagrass habitat downdrift of the project as a result of increased turbidity or excessive sedimentation. As the DEP data suggests, manatees tend to utilize Sarasota Bay more frequently than the nearshore waters of Lido Key (DEP 2000). Therefore, the adverse effects to manatees are expected to be minimal. Consultation is documented for the West Indian manatee in the Service's 2002 Biological Opinion.

7.0 SERVICE'S MITIGATION POLICY

Potential impacts of the proposed beach nourishment and groin work include those to the upper beach zone, surf zone, seagrasses, and nearshore hardbottom, if present. Impacts may include burial from actual fill placement and equilibration, burial and suffocation from suspension and settling generated from surf zone washing of the fill material, and damage from groin removal, reconstruction, and new placement.

In developing the Service's Mitigation Policy (Federal Register 46 (15), Pg. 7656), the definition of mitigation contained in the Council on Environmental Quality's National Environmental Policy Act regulations (40 CFR 1508.20[a-e]) was used.

This definition recognizes mitigation as a step-wise process that incorporates both careful project planning and compensation for unavoidable losses and represents the desirable sequence of steps in the mitigation planning process. Initially, project planning should attempt to ensure that adverse effects to fish and wildlife resources are avoided or minimized as much as possible. In many cases, however, the prospect of unavoidable adverse effects will remain in spite of the best planning efforts. In those instances, compensation for unavoidable adverse effects is the last step to be considered and should be used only after the other steps have been exhausted.

The Service's Mitigation Policy focuses on the mitigation of fish and wildlife habitat values, and it recognizes that not all habitats are equal. Thus, four resource categories, denoting habitat type of varying importance from a fish and wildlife resource perspective, are used to ensure that the mitigation planning goal will be consistent with the importance of the fish and wildlife resources involved. These categories are based on the habitat's value for the fish and wildlife species in the

project area (evaluation species) and the habitat's scarcity on a national, regional or local basis. Resource Category 1 is of the highest value and Resource Category 4, the lowest. Mitigation goals are established for habitats in each resource category.

The mitigation goal for Resource Category 1 habitats is no loss of habitat value since these unique areas cannot be replaced. The goal for Resource Category 2 habitats is no net loss of in-kind habitat value. Thus, a habitat in this category can be replaced only by the same type of habitat (i.e., in-kind mitigation). The mitigation goal for Resource Category 3 habitats is no net loss of overall habitat value. In-kind replacement of these habitats is preferred, but limited substitution of different types of habitat (out-of-kind mitigation) perceived to be of equal or greater value to replace the lost habitat value may be acceptable. The mitigation goal for Resource Category 4 habitats (considered to be of marginal value) is to avoid or minimize losses, and compensation is generally not required.

Priority habitats in the project area are seagrasses and nearshore hardbottom. These habitats are considered by the Service to be in Resource Category 2, and no net loss of in-kind habitat value is recommended. However, we consider any significant colonies of hard (stony) coral in this area to be Resource Category 1. Research suggests that two species of brain and star coral grow at a rate of approximately 0.5 centimeter per- year (Dodge 1987). Based on this information, we estimate it would take these corals, and likely other hard coral species, at least 100 years to reach one meter in diameter.

8.0 RECOMMENDATIONS

The Service provided the following recommendations in the draft FWCA report dated February 25, 2002, to further avoid and/or minimize impacts to fish and wildlife resources. In a letter dated April 26, 2002, the Corps addressed the Service's concerns and provided the following response (in italics): Where warranted, the Service provides additional comment.

1. Prior to construction, conduct seagrass surveys during the months of May through September between R-34 and R-35; R-44 and R-44.5; shore parallel survey between R-34 and R-44.5; and within the groin construction footprint. Consult with the Service regarding survey methodology prior to initiation.

   ***Corps reply**: A survey was conducted on July 3, 2001, using an underwater, vessel-towed video to identify and document potential nearshore marine resources found in the nearshore area within and adjacent to the proposed project area. Marine resource data were collected from twelve transects located perpendicular to the Lido Key shoreline. This survey, along with aerial photographs, indicated no seagrass communities were present with the proposed project area or within 500 feet offshore from the project equilibrium tow of fill. The perpendicular transects commenced at DEP monuments R-35 and continued to R-44. Due to boat draft limitations and safety concerns, video surveys were not conducted north of R-35 or south of R-44. These areas will be groundtruthed to verify the presence or absence of seagrass prior to construction. The Corps will consult with the Service regarding survey methodology prior to initiation.*

   Service reply: During a telephone conversation on July 23, 2002, the Corps and the Service discussed the methodology to be used by the contractor (CP&E) during the July 26, 2002 groundtruthing effort to determine the presence or absence of seagrass within the areas indicated above which were omitted during the initial surveys in July 2001.

   The results of the July 26, 2002 survey verified that neither seagrass nor hardbottom resources are present between R-34 and R-35; R-44 and R-44.5 (Y. Haberer, personal communication 2002).

2. Orient the pipeline corridor(s) to avoid nearshore and offshore seagrass areas (e.g., Big Sarasota Pass shoal).

   ***Corps reply**: The pipeline corridors(s) would be oriented to avoid seagrass areas.*

3. Develop a monitoring plan and survey methodology to determine the extent of the indirect and/or indirect effects of sand placement, groin construction, and/or borrow site dredging on seagrass and/or hardbottom. A mitigation plan will be needed if resources are adversely impacted. Prior to the initiation of the monitoring plan and/or surveys, please provide a copy to the Service for review.

   ***Corps reply:** Based on the information currently available, there would be no adverse impacts to significant marine resources. Therefore, a mitigation plan has not been developed. Monitoring of construction activities such as sand placement, groin construction, and borrow site is the responsibility of the Contracted as stated in our plans and specifications.*

   Service reply: Though seagrass and hardbottom are not present within the project footprint, these significant marine resources are present adjacent to the area identified for sand placement and within 200 feet outside of borrow sites 6 and 7. These resources are likely to be affected by dredging and/or sand placement activities by the initial project construction and by renourishment activities every five years as projected by the Corps over the 50-year project life span. Therefore, the Service reiterates our recommendation to develop a monitoring plan and survey methodology, particularly at the borrow sites, to determine the extent of the effects on these resources as indicated in the "Corps reply" below.

4. Establish a 400 foot buffer zone between the hardbottom and borrow site boundaries of LKBA 6 and 7.

   ***Corps reply:** After further coordination with Ms. Trish Adams, U.S. Fish and Wildlife Service on April 19, 2002, and Mr. Mark Thompson, National Marine Fisheries Service (NMFS), on April 22, 2002, it was agreed that establishing a 200 foot buffer zone between the hardbottom and borrow site boundaries of LKBA 6 and 7 would be acceptable. By establishing the buffer zone and adhering to construction specifications, direct impacts to the adjacent hardbottom habitat is not expected. Appropriate monitoring would be conducted due to the possibility of local turbidity and siltation during dredging activities.*

5. Consult with the Service and the Florida Fish and Wildlife Conservation Commission to develop an appropriate and effective protection plan to further minimize the effects of the project on the Lido Key shorebird nesting colony.

   ***Corps reply:** The Contractor will keep construction activities under surveillance, management, and control to prevent impact to migratory birds and their nests. All construction personnel will be advised that migratory birds are protected by the Florida Endangered and Threatened Species Act of 1977, Title XXVIII, Chapter 372.072; the U.S. Fish and Wildlife Service pursuant to the Migratory Bird Treaty Act of 1918; and the Endangered and Threatened Species Act of 1982, as amended. If the area can not be avoided during the nesting season, then a site protection plan would be included in the plans and specifications detailing how the impacts on the birds would be avoided, minimized, or otherwise mitigated.*

6. Avoid construction during the months immediately preceding shorebird nesting season to maximize prey species availability. Timing will be determined through the development

of the shorebird monitoring plan.

Corps reply: *The contractor will keep construction activities under surveillance, management, and control to prevent impact to migratory birds and their nest in accordance with the contract plans and specifications. Again, if the area can not be avoided during nesting season, then a site protection plan would be included in the plans and specifications.*

Service reply: During the continued coordination with the Corps, the Service continued to express its concern regarding the potential abandonment of the shorebird ground-nesting colony that is present within the project footprint as a result of construction activities. This colony is comprised of State-listed shorebirds species which are sensitive to disturbance. In section 4.28 of the draft Environmental Assessment (EA), the Corps states that monitoring for shorebird nesting activities will be conducted daily. If nesting occurs, the Corps will be notified and the Migratory Bird Protection Policy, prepared by Corps in conjunction with FWC and the Audubon Society, will be implemented (Y. Haberer, personal communication 2002).

The Service requests a copy of the Migratory Bird Protection Plan for the Lido Key Shoreline Protection Project upon its completion for our records.

7. Initiate consultation with NMFS, St. Petersburg at (727) 570-5311 to address Essential Fish Habitat concerns.

Corps reply: *Coordination of the draft EA will constitute initial consultation with the NMFS under provisions of the Magnuson-Stevens Fishery Conservation and Management Act relative to Essential Fish Habitat (EFH) effects resulting from the Lido Key Shore Protection Project. Based on analysis discussed in the EA, acute and cumulative effects on EFH resulting from the addition of the proposed project features are expected to be negligible.*

8. Incorporate invasive exotic plant removal and dune restoration into the project design where appropriate.

Corps reply: *The City of Sarasota has incorporated dune restoration in previous project designs. In the event that dune restoration is identified as a specific project need, based on existing conditions, it is reasonable to assume that the City of Sarasota will continue to support restoration activities. Regarding the issue of exotic plant removal, the City of Sarasota and Sarasota county have established programs to address invasive species on public lands. The Sponsor supports exotic plant removal, but a mandate for a program implementation on upland areas outside the project area is not reasonable.*

The Service's intention was to suggest elements that the Corps may consider for inclusion in the project design that would benefit fish and wildlife resources and extend the renourishment interval. Therefore, we recommend restoration or enhancement of the dune feature of this project as part of this project.

9. Minimize direct and indirect effects of turbidity during hopper dredge operations by: ensuring proper maintenance of dredging equipment; when appropriate, use silt curtains or gunderbooms; and if possible, dredge when environmental conditions will minimize sediment transport, eliminate or reduce hopper overflow; lower hopper fill-levels; or use a recirculation system. When applicable, special equipment, such as pneuma pumps, closed buckets, large capacity dredges, and precision dredging tools and technologies as identified in the Corps' 2001 Best Management Practices, are recommended to further decrease the potential for adverse effects to marine communities.

***Corps reply**: Concur*

9.0 CONCLUSION

In conclusion, benthic resources and communities likely to be directly or indirectly affected by the project include resources such as seagrass, hardbottom, and shorebird nesting habitat. Benthic infaunal communities located in the project footprint and borrow sites will be directly impacted by the action, but are expected to recover within one to three years. Though seagrass and hardbottom resources have not been identified inside the project footprint or borrow sites, these resources are present in close proximity to different aspects of the project and may be adversely affected as a result of degraded water quality and/or sedimentation downdrift of the project. However, adverse affects to these resources and species can be minimized if project construction is scheduled outside of nesting seasons (sea turtle and shorebird), pipeline corridors avoid seagrass, the proposed 200 foot buffer is maintained at the specified borrow sites, turbidity/sedimentation monitoring plans and shorebird nesting colony protection plans are implemented with contingency plans and mitigation, if necessary.

LITERATURE CITED

American Ornithologists' Union. 1998. Check-list of North American Birds. 7th Edition. American Ornithologists' Union, Washington, D.C. 829 pp.

Branford, J. 2001. Threatened least terns take up residence on N. Lido Key. Sarasota Herald-Tribune. Posted 6/19/01 on http://www.newscoast.com/2sarasota.cfm?ID=47553.

Bustard, H.R., P. Greenham, and C. Limpus. 1975. Nesting behavior of loggerhead and flatback turtles in Queensland, Australia. Proc. Koninkl. Nederl. Akadamie van Wetenschappen Amsterdam, Series C Biol. Med. Sci. 78(2):111-122.

Carr, A. 1986. Rips, FADS, and little loggerheads. Bioscience. 36:92-100.

Carr, A., M. H. Carr, and A. B. Meylan. 1978. The ecology and migrations of sea turtles, 7. The west Caribbean green turtle colony. Bull. Am. Mus. Nat. Hist. 162(1):1-46.

Coastal Planning & Engineering, Inc. 1992. Sarasota County, Florida- Lido Key Beach Nourishment Project Environmental Study (April 1992) for City of Sarasota, Florida. Boca Raton, Florida.

Coastal Planning & Engineering, Inc. 2001. Lido Key, Sarasota County, Florida- Feasibility Phase Study (July 2001) for U.S. Army Corps of Engineers- Jacksonville District. Boca Raton, Florida.

Coyne, M. 1994. Feeding ecology of subadult green turtles in south Texas waters. MS Thesis, Texas A&M University. 76 pp.

Dahl, E. 1952. Some aspects of the ecology and zonation of the fauna on sandy beaches. Oikos 4:1-27.

Dial Cordy and Associates Inc. 2001. Lido Key Shore Protection Project Marine Resource Survey (October 2001). Jacksonville Beach, Florida.

Department of Environmental Protection. 2000. Critical Beach Erosion Areas in Florida, Report No. BCS-99-02 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

Ehrhart, L.M., W.E. Redfoot, and D.A. Bagley. 1996. A study of the population ecology of in-water marine turtle populations on the east central coast of Florida. Comprehensive Final Report to NOAA. National Marine Fisheries Service. 164 pp.

Fisk, E.J. 1978. Threatened Least Tern in Rare and endangered biota of Florida volume 2. H. W. Kale II, ed.

Florida Game and Fresh Water Fish Commission. 1997. Florida's endangered species, threatened species and species of special concern, Official Lists. Florida Game and Fresh Water Fish Commission. 15 pp.

Florida Marine Research Institute. 2001a. Green turtle nesting data for southwest Florida. Florida Fish and Wildlife Conservation Commission. Accessed 9/19/01: http://floridamarine.org/features/view_article.asp?id=7647

Florida Marine Research Institute. 2001b. Loggerhead nesting data for southwest Florida. Florida Fish and Wildlife Conservation Commission. Accessed 9/19/01: http://floridamarine.org/features/view_article.as?pid=8259

Florida Marine Research Institute. 2001c. Statewide nesting totals. Florida Fish and Wildlife Conservation Commission. Accessed September, 19, 2001: http://floridamarine.org/features/view_article.asp?id=11812

Florida Marine Research Institute. 2001d. Status and trends of Florida's sea turtles. Florida Fish and Wildlife Conservation Commission. Accessed 9/19/01: http://floridamarine.org/features/view_article.asp?id=3380

Gore, J.A. and M.J. Kinnison. 1991. Hatching success in roof and ground colonies of least terns. Condor 93:759-762.

Haberer, Yvonne. Project Biologist, U.S. Army Corps of Engineers. Email dated July 31, 2002.

Hartman, D.S. 1979. Ecology and behavior of the manatee (*Trichechus manatus*) in Florida. American Society of Mammalologists. Special Publication No. 5. 153 pp.

Hovis, J.A. and M.S. Robson. 1989. Breeding status and distribution of the least tern in the Florida Keys. Fla Field Nat. 17(3) 61-66.

Kale, H. W., II, and D. S. Maehr. 1990. Florida's Birds. Pineapple Press. Sarasota, Florida.

National Marine Fisheries Service. 2001. Loggerhead turtles (*Caretta caretta*). Posted 8/10/2001: http://www.nmfs.noaa.gov/prot_res/species/turtles/loggerhead.html.

National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1991. Recovery plan for U.S. population of loggerhead turtle (*Caretta caretta*). National Marine Fisheries Service. Washington, D.C. 64 pp.

National Research Council, Committee on Sea Turtle Conservation. 1990. Decline of the Sea Turtles: Causes and Prevention. National Academy Press, Washington D.C. 259 pp.

Nelson, W.G. 1989. An overview of the effects of beach nourishment on the sand beach fauna *in* Proceedings of the 1988 National Conference on Beach Preservation Technology. Tallahassee: Florida Shore and Beach Preservation Association. 295-309.

Shelton, C. Rl, and P. B. Roberston. 19981. Community struture of interidal macrofauna on surf-exposed Texas sand beaches. Bulletin of marine Sciences 31: 833-842.

South Atlantic Fishery Management Council 1998. Final Comprehensive Amendment Addressing Essential Fish Habitat in Fishery Management Plans of the South Atlantic Region. Charleston, SC. 142 pp.

Rodgers, J.A., Jr., and H.T. Smith 1995. Set-back distances to protect nesting bird colonies from human disturbance in Florida. Conserv. Biol. 9:89-99.

Taylor, J.L., C.H. Salomon, and K.W. Priest, Jr. 1973. Harvest and Regrowth of Turtle Grass (*Thalassia testudinum*) in Tampa Bay, Florida. National Marine Fisheries Service Fisheries Bulletin. 71(1): 145-148.

U.S. Fish and Wildlife Service. 2000. Biological Opinion (September 6, 2000) to Col. J. G. May, US Army Corps of Engineers. U.S. Fish and Wildlife Service. Vero Beach, Florida.

U.S. Army Corps of Engineers. 2001. Endangered Species Act Biological Assessment- Lido Key, Sarasota County, Florida- Feasibility Phase Study (April 2001). Jacksonville, Florida.

Witherington, B.E., and L.M. Ehrhart. 1989. Status and reproductive characteristics of green turtles (*Chelonia mydas*) nesting in Florida. Proc. 2nd Western Atlantic turtle symposium. pp 351-352.

Wyneken, J., and M. Salmon. 1992. Frenzy and post frenzy swimming activity in loggerhead, green, and leatherback hatchling sea turtles. Copeia. 2:478-484.

U.S. Army Corps of Engineers. 2001. Dredging "Best Management Practices" (derived from Hartman Consulting Group presentation, " How to Develop and Manage Successful Dredging Projects, 13-14 November, 1996). *In*: Long-Term Management Strategy for the Placement of Dredged Material in the San Francisco Bay Region, Management Plan 2001 (July 2001). U. S. Army Corps of Engineers San Francisco District. San Francisco, California.

APPENDIX
A

FIELD OBSERVATION REPORT

PROJECT: Lido Key Federal Shore Protection Project Feasibility Study - Proposed Borrow Site Environmental Investigations
DATE: September 24, 2001
CPE COMMISSION NO.: 8486.35
LOCATION: Lido Key, Florida
CPE FIELD REPRESENTATIVES: Craig J. Kruempel and Myles Loesel
AGENCY REPRESENTATIVES: Trish Adams, U. S. Fish and Wildlife Service
Yvonne Haberer, U. S. Army Corps of Engineers

INTRODUCTION

Geotechnical investigations were conducted by Coastal Planning & Engineering, Inc. (CPE) offshore of Lido Key (City of Sarasota) in 2000 as part of the Federal Lido Key Shore Protection Project Feasibility Study. The purpose of these investigations was to identify suitable sand resources for a proposed island-wide beach renourishment project. After evaluating adjacent Gulf of Mexico bottom features of higher relative relief, referred to as "bathymetric highs", CPE identified several sites that were considered potential sources of beach quality sand. Vibracores operations were conducted in August 2000, and three potential borrow sites (5, 6 and 7) were further delineated based on sand quality and quantity evaluations.

In December 2000, magnetic and acoustic remote sensing investigations were conducted at the three proposed borrow sites in order to ascertain the presence or absence of submerged cultural resources in, and adjacent, to the area. A Klein 595 digital dual side scan sonar was employed to collect acoustic data in the survey areas. The dual frequency towfish provided standard (100 kHz) and high resolution (500 kHz) capabilities. Because of the historical nature of the area and the requirements for collecting magnetic data, acoustic data were collected along transects spaced on 150-foot intervals with a range scale of 50 meters selected to provide a combination of 100% coverage of the survey areas and high target signature definition. Acoustic data were recorded on thermal paper recorder and tied to the magnetic and positioning data by the computer navigation system. (*Offshore Borrow Areas Submerged Historic Properties Survey, Lido Key, Sarasota County, Florida.* Tidewater Atlantic Research, Inc. 19 October 2001)

The study area located approximately 6 miles offshore of Lido Key is delineated in Figure 1. No surface anomalies were identified in the vicinity of the Borrow Area 5, but the side scan sonar survey delineated several surface anomalies adjacent to Borrow Sites 6 and 7 (Figures 2 and 3) that had a signature characteristic of scattered low relief hardbottom. Several additional anomalies were delineated, but the characteristics of the record could not conclusively identify them as scattered low relief hardbottom. Due to the presence of these anomalies in close proximity to the proposed borrow sites, the City of Sarasota and the U. S. Army Corps of Engineers requested that Coastal Planning & Engineering, Inc. conducted investigative SCUBA dives near the borrow sites proposed for use in the Federal Lido Key Shore Protection Project.

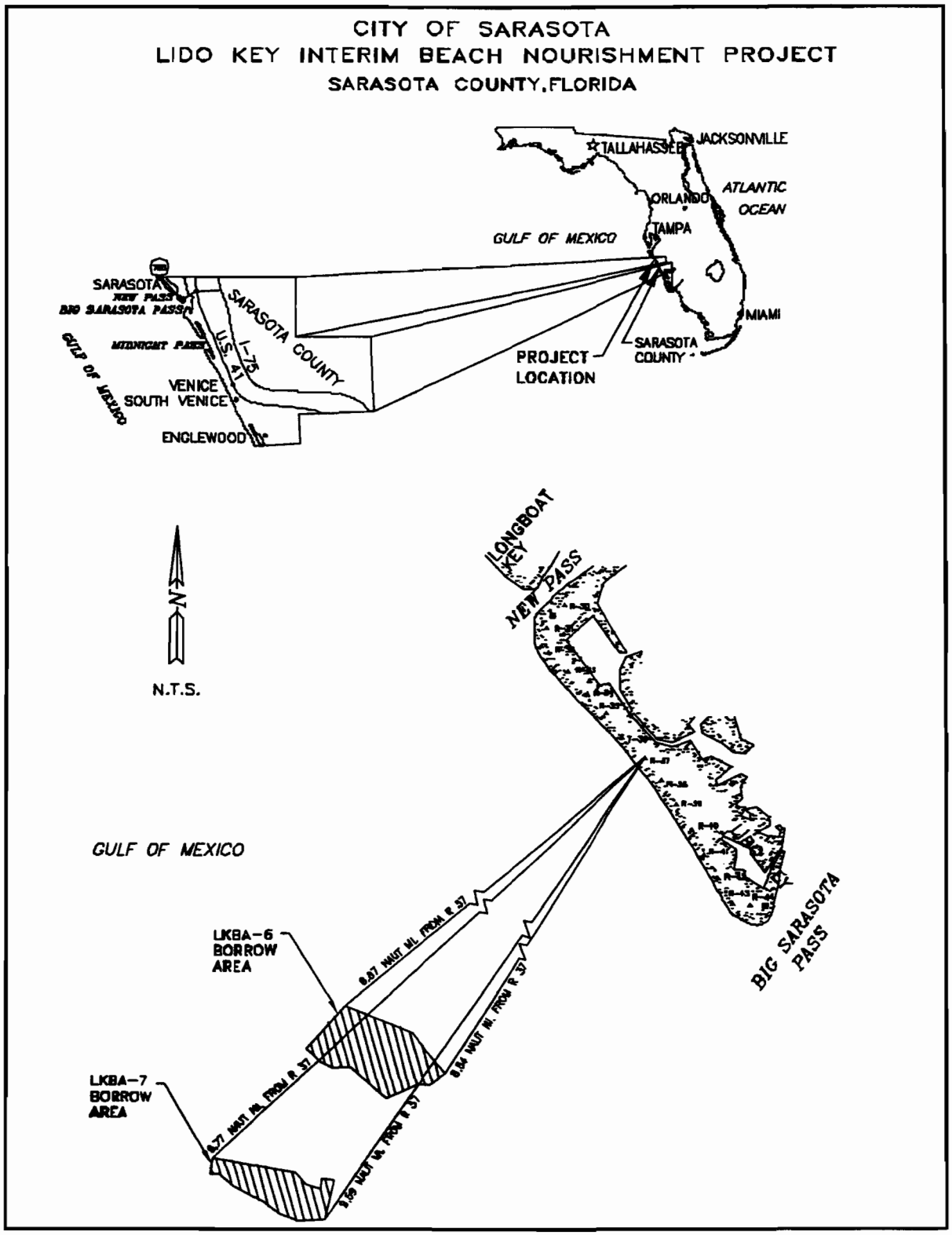


FIGURE 1

LIDO KEY BEACH NOURISHMENT PROJECT LOCATION MAP

COASTAL PLANNING & ENGINEERING, INC.

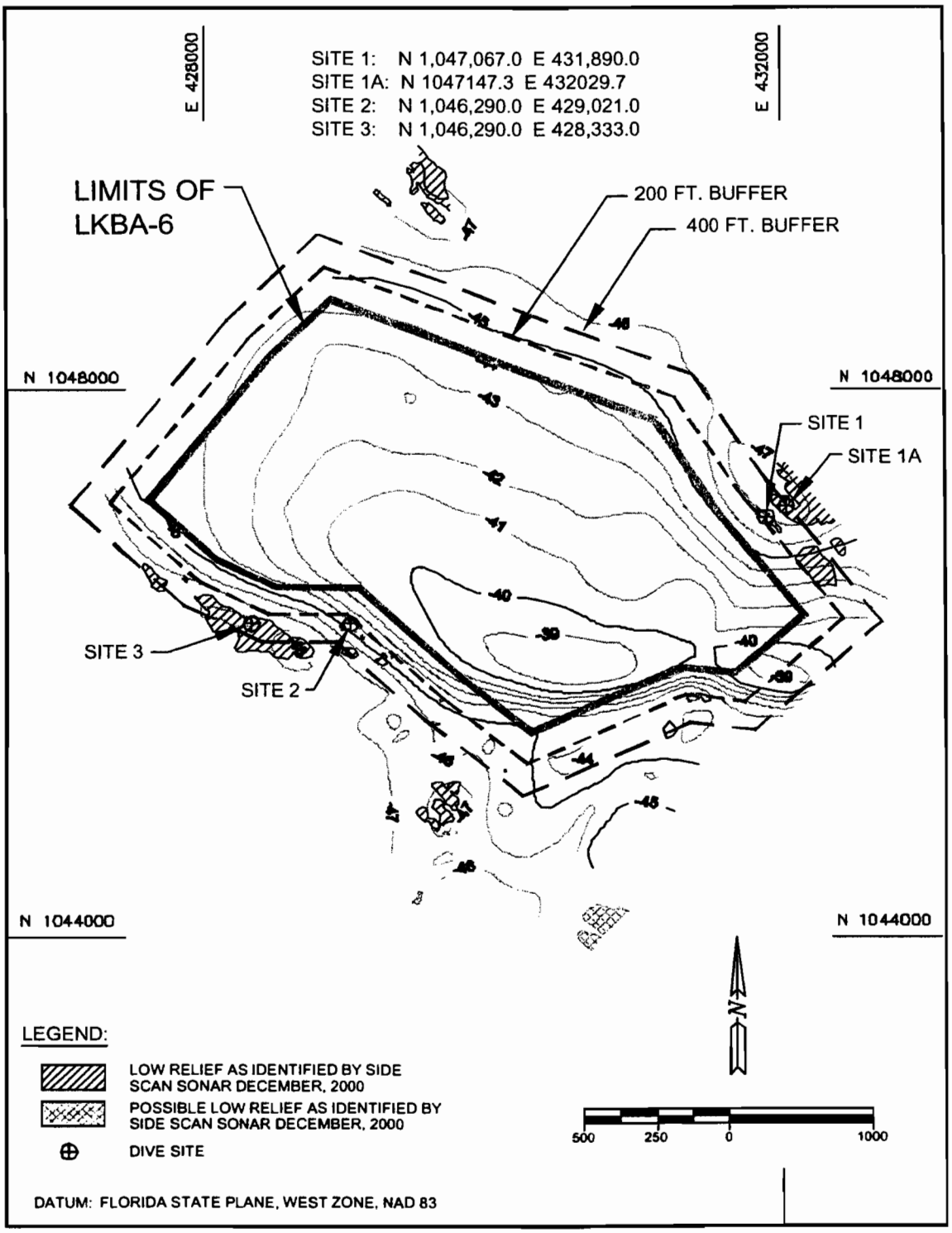


FIGURE 2

LIDO KEY FEDERAL SHORE PROTECTION
BORROW SITE ENVIRONMENTAL INVESTIGATION PROJECT
BORROW AREA 6 PLAN VIEW

COASTAL PLANNING & ENGINEERING, INC.

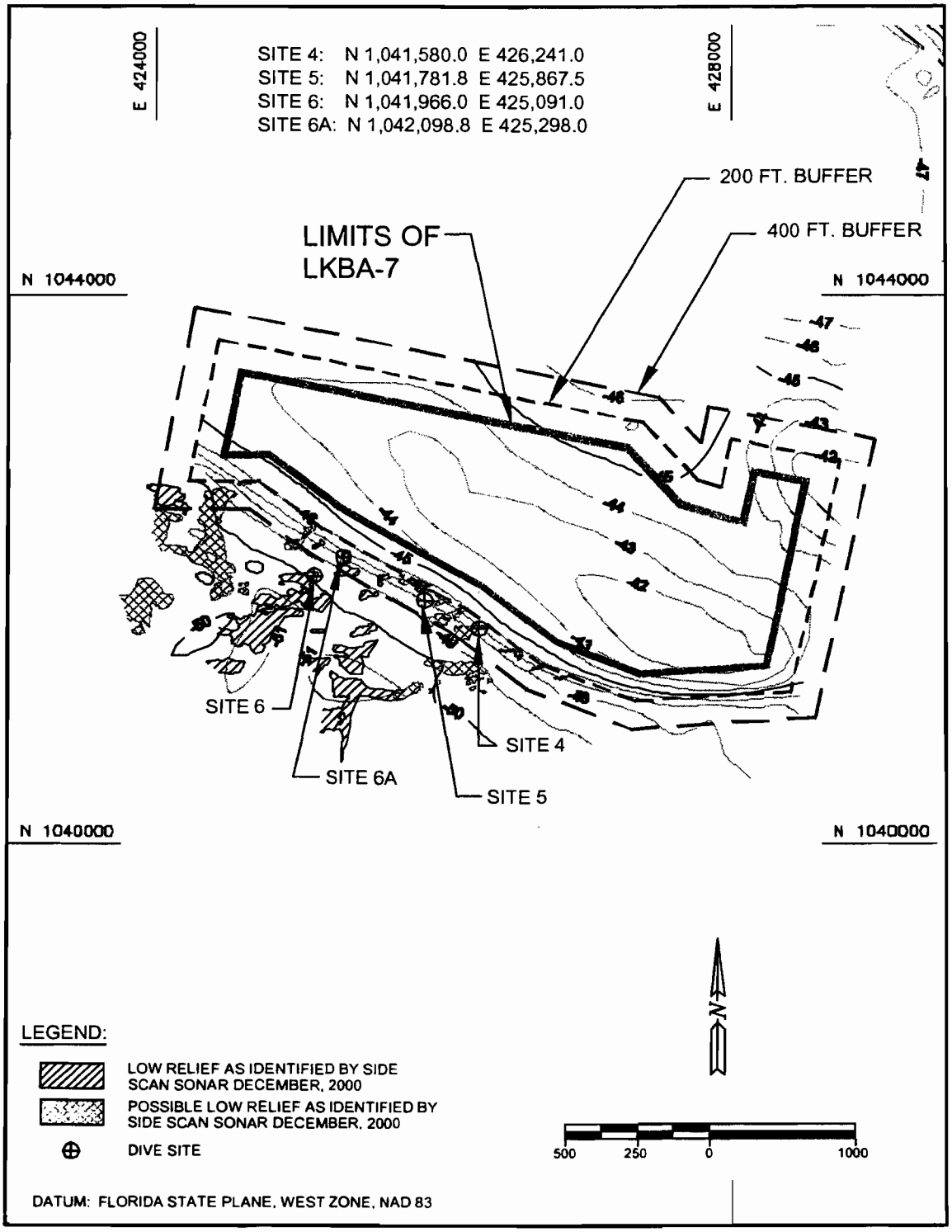


FIGURE 3

LIDO KEY FEDERAL SHORE PROTECTION
BORROW SITE ENVIRONMENTAL INVESTIGATION PROJECT
BORROW AREA 7 PLAN VIEW

COASTAL PLANNING & ENGINEERING, INC.

SURVEY METHODS

The navigation and positioning system used during the Lido Key Federal Shore Protection Project Feasibility Study – Borrow Site Environmental Investigations was a Trimble 4000 DL/RL Global Positioning System (GPS) with ProBeacon interfaced to the Coastal Oceanographic Hydrographic Data Collection and Processing (HYPACK) System. The system utilized differential correction from the U.S. Coast Guard Navigation Beacon located in Tampa. The Trimble Navigation Model 4000 DL (Differential Locator) in Tampa is designed for moderate precision static and dynamic positioning applications. It provides time and 3-dimensional station coordinates and velocity measurements at a once per second rate. The 4000 DL receives the civilian signal from the global positioning systems (GPS) NAVSTAR satellites. The locator automatically acquires and simultaneously tracks GPS satellites and precisely measures code phase and Doppler phase shift and computes positions and velocity. The 4000 DL automatically determines time, latitude, longitude, height and velocity, once per second. The Trimble 4000 DL/RL accuracy, with differential correction as used in this study, provides for a position accuracy of 1 to 3 meters. The U.S. Army Corps of Engineers has conducted tests of the U.S. Coast Guard beacons and found accuracy of within 1.5 meters, 94% of the time.

Six areas representing identified and potential marine resources were selected for investigation by SCUBA divers based on their signature and proximity to the proposed borrow sites. Coordinates (Florida State Plane Coordinate System, West Zone, NAD 83) for each dive site were entered into the HYPACK program and the survey vessel proceeded to each site. Delineation of the dive sites investigated is provided in Figures 2 and 3. Once on site, a weighted line with a buoy attached was dropped to provide subsurface and surface positioning for the divers and boat operator. Two divers entered the water and conducted their investigations of the site, noting their observations, species identified and photographically documenting significant observations. Upon completion of each site specific investigation, the divers exited the water and proceeded to the next site.

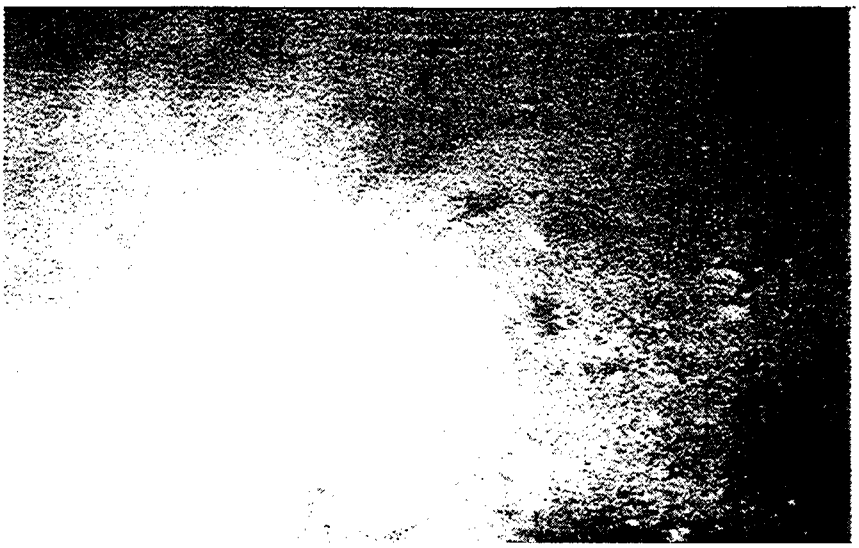
OBSERVATIONS

All dives associated with the borrow area investigations were conducted on September 24, 2001. Trish Adams (USFWS) and Craig Kruempel (CPE) performed the diving investigations while Yvonne Haberer (USACE) and Myles Loesel (CPE) served in a diver support and boat operation / navigation capacity. Sea state during the investigations was generally less than two feet, but increased to approximately three feet when a squall passed the study area later in the afternoon. After passage of the squall, sea conditions moderated slightly. Atmospheric conditions were generally partly cloudy with mild temperatures in the mid 80's. Underwater visibility was approximately three to four feet from the surface to a depth of approximately ten feet, and then increased to approximately six to eight feet once the divers reached depths in excess of ten feet. A thermocline was noted at a water depth of approximately 30 feet.

It should be noted that during the first dive, numerous dead or incapacitated benthic and motile marine species were observed. Discussions between the investigators identified the likely cause as a red tide event. This fact was later confirmed by researchers at Mote Marine Laboratory (MML), who stated

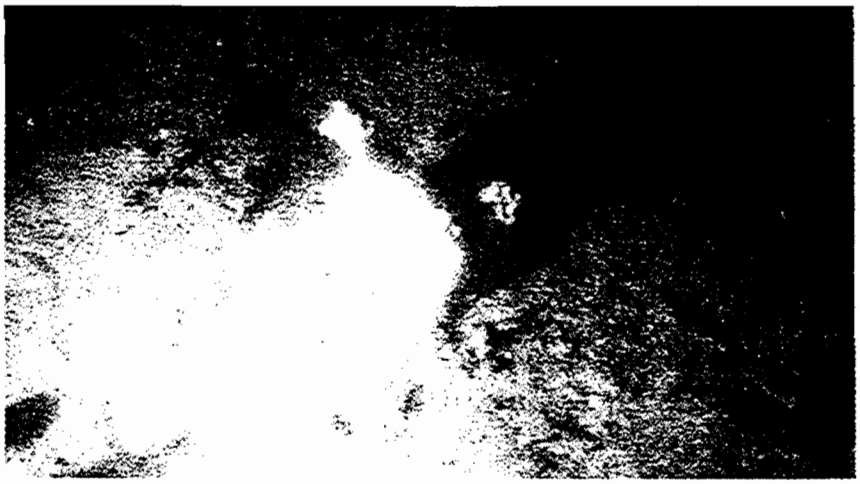
that the event had first been observed approximately two to three weeks prior to our investigations and was exacerbated by the passage of Tropical Storm Gabrielle. MML personnel stated that their monitoring indicated that the event was nearing an end as evidenced by a decrease in the concentrations of the toxic dinoflagellate *Gymnodinium breve* in water samples analyzed at the facility.

Borrow Area 6 – Dive Sites 1 and 1A: Buoys were set at Dive Site 1 and 1A using the vessel positioning described above. The dive plan called for the divers to enter the water at Dive Site 1, investigate the area and surface swim approximately 215 feet to Dive Site 1A which was described from the side scan sonar records as being more contiguous hardbottom. The divers entered the water at 1037 and proceeded to investigate Dive Site 1. The area was characterized as having a thin to moderate veneer of sand over rock, with occasional areas of exposed hardbottom ranging in height from flush with the surrounding sand (Photograph No. 1), to areas of no greater than eight inches in height. The exposed hardbottom coverage in this area was less than ten percent by visual estimation.



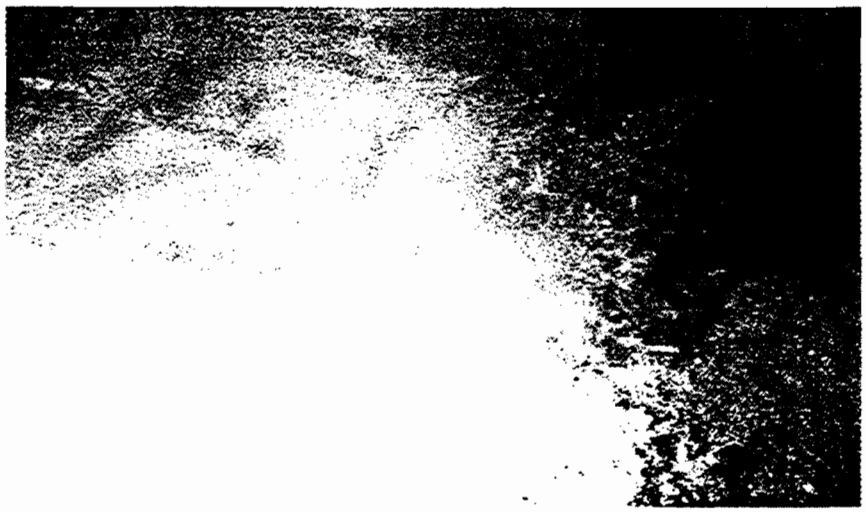
Photograph No. 1 - Sea Robin (*Prionotus ophryas*) at Dive Site 1

Two species of unidentified sponge were occasionally observed at the site, and included an orange rope sponge as well as the species documented in Photograph No. 2. Due to the feasibility level investigative nature of the study, samples of specific organisms were not obtained for identification. Several invertebrate species were identified during investigation and included the black urchin (*Echinometra lucunter*) and tests of the burrowing heart urchin *Moira artropos*; sea stars *Astropecten articulatus* and *Echinaster spinulosis*; sea biscuit (*Clypeaster rosaceus*) and the sand dollar *Mellita* sp. Due to the infrequency of observation, it is believed that the red tide event dramatically impacted the vertebrate and invertebrate populations within the study area.



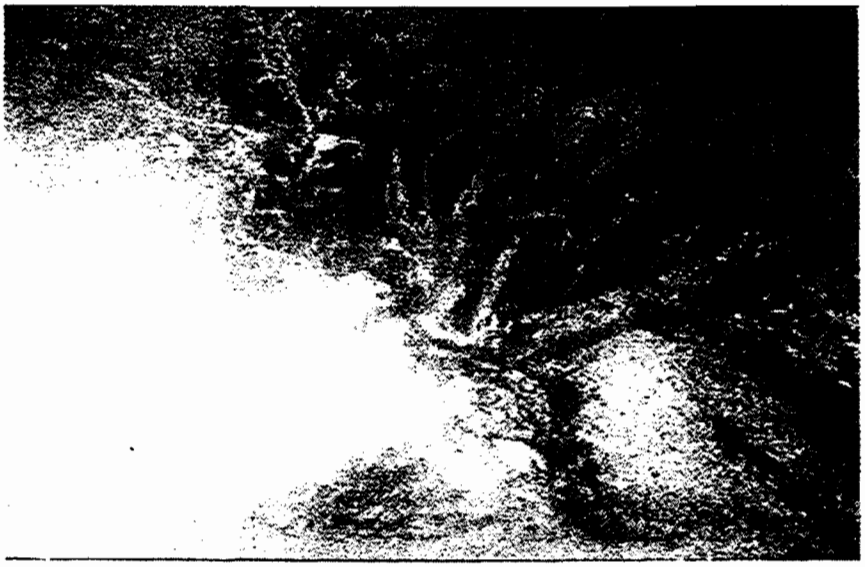
Photograph No. 2 - Unidentified sponge at Dive Site 1

Several species of macroalgae were observed during investigation of Dive Site 1, and included *Sargassum* sp. and *Caulerpa mexicana* (Photograph No. 3). Hydroids (unid. sp.) were commonly observed in those areas of exposed hardbottom. Scleractinian coral species identified at the site were limited to *Solenastrea hyades*, *Siderastrea* sp. and *Cladocora arbuscula*.



Photograph No. 3 - *Caulerpa mexicana* at Dive Site 1

During the investigation of Dive Site 1, a single small area of *Thalassia testidinum* (Photograph No. 4) and several occurrences of the octocoral *Leptogorgia virgulata* were observed. The *Thalassia testidinum* at Dive Site 1 was approximately three feet along its longest axis and varied from one to one and one-half feet in width. This single occurrence was the only observation of seagrass during the field investigations of Borrow Sites 6 and 7.



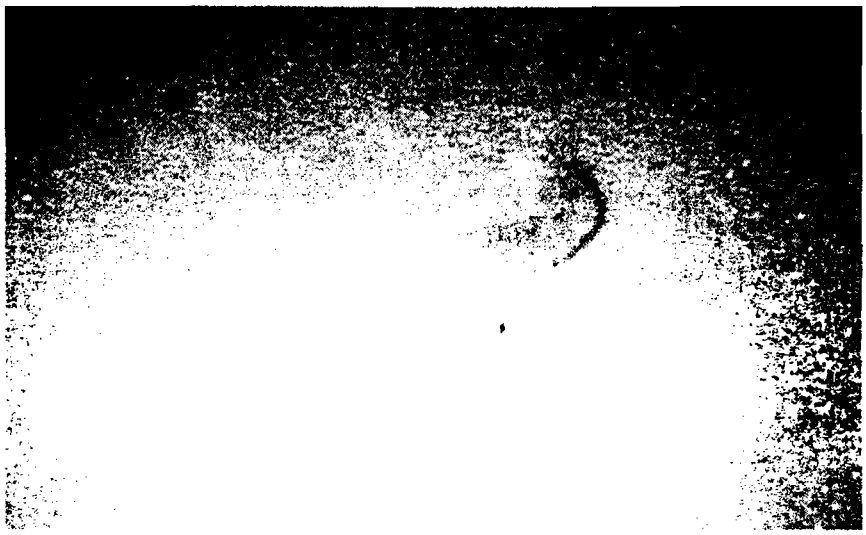
Photograph No. 4 - Seagrass species *Thalassia testudinum*

The divers surfaced at 1101 and swam to the buoy marking Dive Site 1A. This site was found to be similar to Dive Site 1 with occasionally exposed hardbottom. It should be noted that both dive sites had significant sedimentation over the hardbottom areas benthos (Photograph No. 5). With the exception of *Thalassia testudinum*, all species observed at Dive Site 1 were observed at Dive Site 1A (Photograph No. 6). The divers exited the water at 1133. The deepest depth the divers reached during these two dives was 48 feet of sea water. No tide correction was applied to dive depths.

Photograph No. 5 - Sedimentation of exposed hardbottom at Dive Site 1A

Photograph No. 6 - Unidentified rope sponge at Dive Site 1A

Borrow Area 6 – Dive Site 2: The divers entered the water at 1230 and proceeded to investigate Dive Site 2. The investigators found a predominately coarse grained sand bottom with sparse occurrences of low relief exposed hardbottom. Several detached orange rope sponges were documented at Dive Site 2 and hydroids (unid. sp.) were common on the exposed hardbottom. The echinoderm *Clypeaster rosaceus* (Photograph No. 7) and sand dollar (*Mellita* sp.) were seen at the site. A gray triggerfish (*Balistes capriscus*) was observed at the site.



Photograph No. 7 - Echinoderm (*Clypeaster rosaceus*)

The divers exited the water at 1249 and their deepest depth was 45 feet of sea water. No tide

correction was applied to the dive depth.

Borrow Area 6 – Dive Site 3: The divers entered the water at 1325 and proceeded to investigate Dive Site 3. The area was characterized as having one to four inches of sand over the base rock. In those instances where exposed hardbottom was observed, it ranged in height from a few inches (Photograph No. 8), to areas of no greater than eight inches in height. The exposed hardbottom coverage in this area was less than ten percent by visual estimation. Several species of sponge were observed at the site, and included an orange rope sponge as well as *Pseudoceratina* sp. a species common to the Gulf of Mexico (Photograph No. 9).

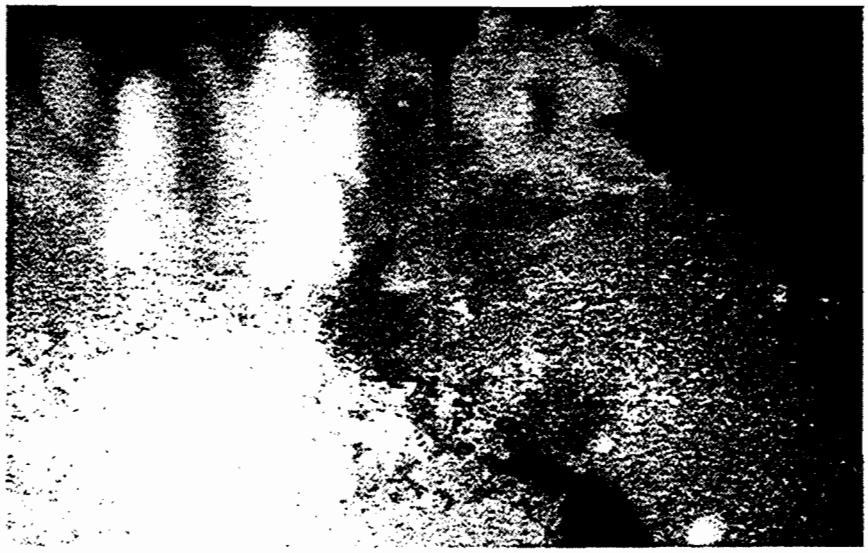
Photograph No. 8 – Sedimentation of occasional low relief hardbottom at Dive Site 3

Photograph No. 9 – *Pseudoceratina* sp. a sponge commonly found in the Lido Key area

Observed species of macroalgae at Dive Site 3, included *Sargassum* sp., *Wrangelia* sp. and *Caulerpa prolifera*. Hydroids (unid. sp.) were commonly observed in those areas of exposed hardbottom. Scleractinian coral species identified at the site were limited to *Solenastrea hyades*, *Siderastrea* sp. and *Cladocora arbuscula* and the octocoral *Leptogorgia virgulata* (Photograph No. 10).

Photograph No. 10 – *Solenastrea hyades* and *Leptogorgia virgulata*

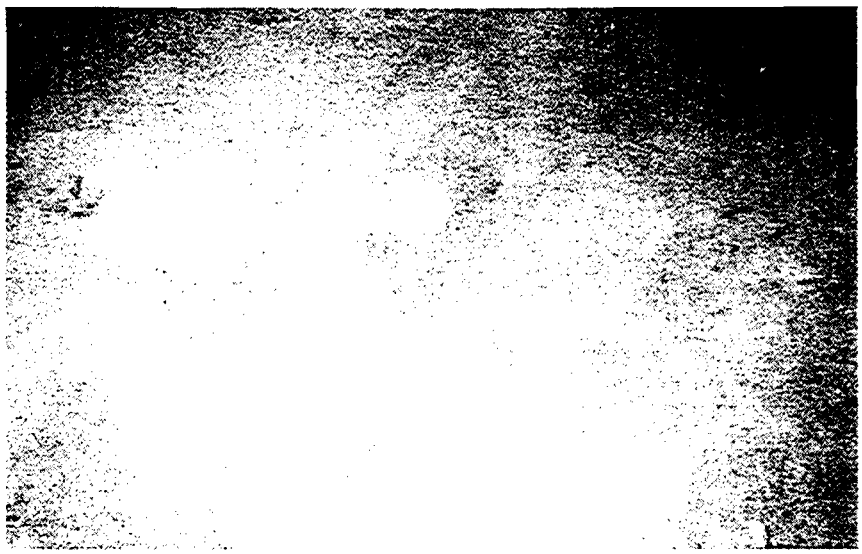
A wider range of fish was observed at this site than the others investigated. A white grunt (*Haemulon plumieri*), several tomtates (*Haemulon aurolineatum*) and a red grouper (*Epinephelus morio*) were documented at Dive Site 3 (Photograph No. 11). Those individuals observed at Dive Site 3 exhibited signs of stress such as erratic movement and "gulping" water. Although no tests were conducted, it could be assumed that the red tide has decreased oxygen levels in the water column. The sea star *Echinaster spinulosis* was documented at Dive Site 3.



Photograph No. 11 – Red Grouper and snapper near *Pseudoceratina* sp.

The divers exited the water at 1350 and their deepest depth was 48 feet of sea water. No tide correction was applied to the dive depth.

Borrow Area 7 – Dive Site 4: The divers entered the water at 1448 and proceeded to investigate Dive Site 4. This area was characterized by the side scan sonar record as possible low relief habitat that should be investigated to document the presence or absence of hardbottom resources. The investigation revealed that the area was comprised of fine sand with a flat profile, bordered by coarser sand with sand waves of three to four inches. Numerous dead Florida fighting conchs (*Strombus alatus*) and fish were observed at this site. Living sand dollars (*Mellita* sp.) and the pale anemone *Aiptasia* sp. (Photograph No. 12) were the predominant invertebrates documented.



Photograph No. 12 – Pale anemone (*Aiptasia* sp.) at Dive Site 4

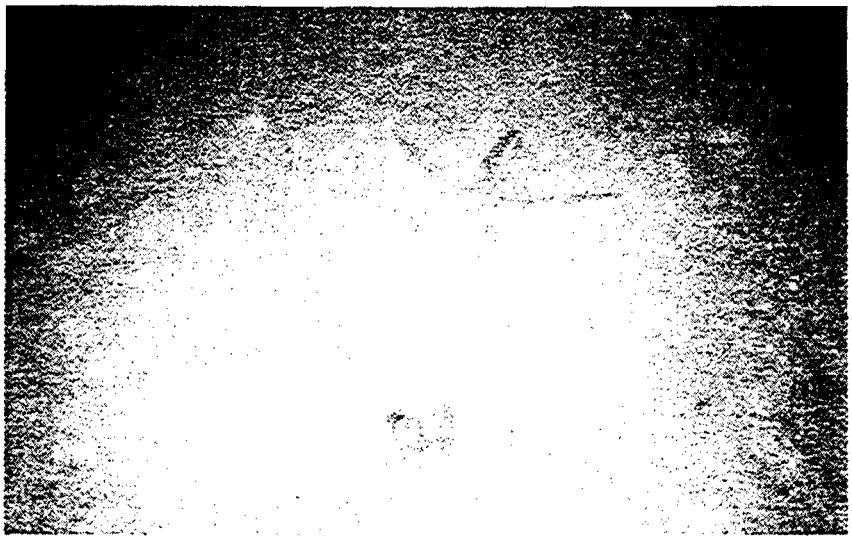
The divers exited the water at 1503 and their deepest depth was 50 feet of sea water. No tide correction was applied to the dive depth. After exiting the water, the investigators discussed their observations. It was agreed that the irregular profile of the finer sand bordering coarser material with waves likely contributed to the delineation of this area as possible hardbottom. The investigators agreed that no further investigation of possible hardbottom sites would be required, and they would be classified as sand substrates with differing material characteristics.

Borrow Area 7 – Dive Site 5: This site was categorized during the side scan sonar survey data reduction as an area of possible hardbottom. Based on the findings at Dive Site 4, the investigators eliminated this site from further study.

Borrow Area 7 – Dive Site 6: The divers entered the water at 1523 and proceeded to investigate Dive Site 6. The site was selected as the border between sand bottom and low relief hardbottom. The investigators entered the water and found a fine sand layer, with a flat profile bordered by coarser

material with sand waves four to six inches in height. The divers swam in a southwest direction in an attempt to locate hardbottom resources as they were mapped by the side scan sonar, but were unable to confirm their presence.

The burrowing heart urchin *Moira artropos*, sea star *Astropecten articulatus* (Photograph No. 13) and unidentified polychaete worms were documented at Dive Site 6. The divers exited the water at 1539 and their deepest depth was 52 feet of sea water. No tide correction was applied to the dive depth.



Photograph No. 13 – *Astropecten articulatus*

Borrow Area 7 – Dive Site 6A: There was interest by the investigators in further confirming that those areas identified as possible hardbottom resources did not contain any significant habitats. Therefore, Dive Site 6A was selected based on its proximity to Borrow Area 7. A diver entered the water at 1543 and found the area to be similar to that observed at Dive Sites 4 and 6. The only exception was the presence of several deposits of fine material approximately three to four feet across. The investigator found that there was generally two to six inches of fine material (Photograph No. 14) over much coarser sand. Surrounding these areas of fine material "pockets" was a region of coarser material with the typical sand wave configuration observed previously. Based on the field investigations, those areas of possible hardbottom as described from the side scan sonar records are likely soft bottom regions of differing sand characteristics and not areas of low relief hardbottom.

Photograph No. 14 – Fine material pocket at Dive Site 6A

CONCLUSIONS

The investigating team was able to confirm the presence of scattered low relief hardbottom resources adjacent to the proposed borrow sites. The presence of these resources, at the "base" of bathymetric highs, is consistent with CPE's findings adjacent to sand resources throughout the nearshore and offshore Gulf of Mexico waters of west Florida. These habitats, and the biota associated with them, are frequently exposed to sedimentation and increased turbidity conditions from natural events. There appears to have been a more dramatic impact on the viability of the habitats from the recent red tide event than from the sedimentation occurring after Tropical Storm Gabrielle, although conclusive evidence is not available to confirm this assumption.

The investigators concur that the low relief habitats documented adjacent to Borrow Areas 6 and 7 are comprised primarily of unconsolidated sediments with scattered hardbottom. A conservative estimate of hardbottom in the area was approximately ten percent of the region as defined by the side scan sonar survey. Using this assumption as the basis for quantitative evaluation of the low relief marine resources in close proximity to the proposed borrow sites, no low relief hardbottom is present within 200 feet of the defined limits of Borrow Area 6. Approximately 16,704 square feet (0.38 acres) of low relief hardbottom is estimated to be present within 400 feet of the defined limits of Borrow Area 6. Adjacent to the defined limits of Borrow Area 7, there is no low relief hardbottom within 200 feet, and 4,552 square feet (0.10 acres) within 400 feet of the site proposed for use in the upcoming Federal Shore Protection Project. Based on the investigating team's observations, the U. S. Fish and Wildlife Service and U. S. Army Corps of Engineers can proceed with the environmental evaluations required to complete the Feasibility Study for the Lido Key Federal Shore Protection Project.

APPENDIX
B

RECEIVED

BY:_____

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Regional Office
9721 Executive Center Drive North
St. Petersburg, FL 33702
(727) 570-5312; Fax 570-5517
http://caldera.sero.nmfs.gov

APR -9 2002

F/SER3:DLK

Ms. Trish Adams
South Florida Ecological Services Office
U.S. Fish and Wildlife Service
1339 20th Street
Vero Beach, Florida 32960

Dear Ms. Adams :

This letter is in reply to the request for comments on the Draft Fish and Wildlife Coordination Act Report- Lido Key Shore Protection Project, Lido Key, Sarasota County Florida (including the biological opinion [BO] for the project) received by the National Marine Fisheries Service (NMFS) Protected Resource Division (PR) on February 28, 2002. The U.S. Fish and Wildlife Service (FWS) has requested comments from NMFS PR regarding project effects to protected marine species, to be considered by FWS in preparing the final report for this project. The report evaluates the environmental effects of sand placement and groin construction along approximately two miles of Lido Key shoreline.

NMFS and FWS share jurisdiction over sea turtle issues, with NMFS responsible for sea turtles in the aquatic environment. The issue of sea turtle impacts from hopper dredging to obtain sand for this project is currently being addressed in a separate consultation by NMFS. In the above referenced draft report and BO FWS has included analysis of the potential effects that the presence of groins may have on sea turtles in the aquatic environment (i.e. interfering with nesting turtle access to the beach, trapping of hatchlings, and the concentration of predators) as well as potential foraging habitat issues. NMFS feels that FWS has adequately addressed these issues, and has no additional comments.

NMFS PR agrees with FWS that the U.S. Army Corps of Engineers, who constitute the action agency on this project, needs to consult with the NMFS' Habitat Conservation Division because of the potential impact to essential fish habitat (EFH), pursuant to the EFH consultation requirements of the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1855(b)(2) and 50 CFR 600.905-.930, Subpart K). The HCD biologist for this region is Mark Thompson. If you have any questions about consultation regarding essential fish habitat for this project, please contact Mr. Thompson at (850) 234-5061.

If you have any questions, please contact me at the number above or by e-mail at Dennis.Klemm@noaa.gov.

Sincerely,

Dennis L. Klemm
Fishery Biologist

File: 1514-22 c.
O:\section 7\LitoBch.wpd

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 11, 2002

RECEIVED
BY: Rack

Mr. James J. Slack, Field Supervisor
United States Department of the Interior
Fish and Wildlife Service
South Florida Ecosystems Office
1339 20th Street
Vero Beach, Florida 32960

Dear Mr. Slack:

The National Marine Fisheries Service (NMFS) has reviewed the Draft Fish and Wildlife Coordination Act Report (CAR) dated February 25, 2002, on the environmental effects of sand placement of 982,000 cubic yards of material and groin construction along 1.9 miles of Lido Key Shoreline in the Gulf of Mexico, Sarasota County, Florida, as prepared by the Fish and Wildlife Service (FWS). Based on the review of the information provided and discussion with your staff, the NMFS has concerns with the potential impact to seagrass, live hard bottom, and non-vegetated bottoms within the influence of the project. The area of influence includes 1.9 miles of beach area, borrow sites, pipeline corridors, and the adjacent area that may be impacted by turbidity and sedimentation downdrift.

Seagrasses, live hard bottoms, and non-vegetated bottoms are identified as Essential Fish Habitat (EFH) by the Gulf of Mexico Fishery Management Council (GMFMC). Specifically, seagrass is identified as EFH for postlarval/juvenile and subadult pink shrimp, postlarval/juvenile red drum, juvenile red and gag groupers, yellowtail and lane snappers, and postlarval/juvenile and adult gray snapper. Other habitats in the area benefit Spanish mackerel, king mackerel, cobia, and bluefish as well. Detailed information on red drum, shrimp, and other Federally managed fisheries and their EFH is provided in the 1998 amendment of the Fishery Management Plans for the Gulf of Mexico prepared by the GMFMC. The 1998 generic amendment was prepared as required by the Magnuson-Stevens Fishery Conservation and Management Act.

Seagrasses were noted to have existed within the footprint and south of the proposed fill area during the 1991 seagrass survey. The 2001 survey only showed seagrasses offshore of the project. Seagrass areas may naturally wax and wane throughout the photic zone and the degree of direct and indirect impact can only be assessed during the seagrass growing season (May through September) just prior to project construction. Also, adjacent hard bottom habitat exist in the nearshore and offshore areas.

Analysis of the material to be dredged indicates that the silt content varies between 2.19 to 4.05 percent, which relates to the possible placement of between 20,622 to 39,771 cubic yards of silt along the beach. In addition to the direct placement, a main concern is the potential impact to the adjacent fishery habitats as a result of the redistribution of the silt that may occur from both the placement and the dredging.

The FWS has adequately identified potential project impacts and has provided recommendations to avoid and minimize these impacts to fishery resources. These recommendations include providing an updated seagrass survey prior to construction, developing a monitoring plan to determine the extent of the direct and indirect impacts of dredged material placement/borrow site dredging, providing mitigation if impacts do occur, establishing a 400-foot buffer in certain areas, placing the pipeline in areas devoid of seagrass, and minimizing direct and indirect effects of turbidity from the hopper dredging. Therefore, the NMFS concurs with the recommendations and conclusions of the CAR. We appreciate the opportunity to provide these comments and request that the final CAR be provided to our Panama City Office at 3500 Delwood Beach Road in Panama City, Florida 32408. If you have any questions, please contact Mark Thompson at 850/234-5061.

Sincerely,

W. Mark Thompson for
Andreas Mager, Jr.
Assistant Regional Administrator
Habitat Conservation Division

cc:
F/SER4

email
F/SER3

United States Department of the Interior

FISH AND WILDLIFE SERVICE
South Florida Ecological Services Office
1339 20th Street
Vero Beach, Florida 32960

February 25, 2002

Colonel James G. May
U.S. Army Corps of Engineers
Jacksonville District
Post Office Box 4970
Jacksonville, Florida 32232-0019

Service Log No.: 4-1-02-F-873
Dated: April 9, 2001
Sponsor: City of Sarasota
County: Sarasota

Dear Colonel May:

This document is the Fish and Wildlife Service's (Service) Biological Opinion based on our review of the proposed Lido Key Shoreline Protection Project in Sarasota County, Florida, and its effects on the federally-listed threatened loggerhead sea turtle (*Caretta caretta*), endangered green sea turtle (*Chelonia mydas*), endangered leatherback sea turtle (*Dermochelys coriacea*), and endangered hawksbill sea turtle (*Eretmochelys imbricata*) in accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Although one endangered Kemp's ridley (*Lepidochelys kempii*) and one leatherback sea turtle have been documented nesting in Sarasota County, the likelihood that either species will nest on Lido Key during project construction is low. In addition, no hawksbill sea turtles have ever been documented as nesting in Sarasota County. Therefore, since loggerhead and green sea turtles are the only species that predictably and regularly nest in Sarasota County, this biological opinion pertains only to those two species.

This Biological Opinion is based on information provided in the Public Notice for the proposed project, field investigations, meetings, letter correspondence, email correspondence, and phone conversations with the U.S Army Corps of Engineers (Corps); the Corps consultants, Dial Cordy and Associates and Coastal Planning and Engineering; the Florida Fish and Wildlife Conservation Commission (FWC), Mote Marine Laboratory, and other sources of information. A complete administrative record of this consultation is on file at the South Florida Ecological Services Office in Vero Beach, Florida.

CONSULTATION HISTORY

- On April 9, 2001, the Corps submitted a Biological Assessment and determined the actions of the proposed project are not likely to adversely affect the manatee, but may affect the threatened loggerhead and endangered green sea turtles. Consequently, the Corps requested initiation of formal consultation with the Service concerning above listed species.

- On November 5, 2001, the Service requested and received additional sea turtle nesting information during a telephone conversation with Mote Marine Laboratory.

- On January 7, 2002, the Service requested and received additional sea turtle nesting information during a telephone conversation with Mote Marine Laboratory.

- This Biological Opinion is submitted in conjunction with the Service's draft Fish and Wildlife Coordination Act report, in accordance with the provisions of the Fish and Wildlife Coordination Act of 1958 (48 Stat. 401, as amended; 16 U.S.C. 661 *et seq.*).

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The Corps proposes to construct a berm 80 feet wide with a 10:1 slope along 1.74 miles of shoreline, from Florida Department of Environmental Protection (DEP) monument R-34 to R-44.5 (CP&E, 2001). An estimated 982,000 cubic yards of material will be obtained from three offshore borrow sites located approximately ten nautical miles offshore, and identified as Lido Key Borrow Areas (LKBA) 5, 6, and 7. Due to the distance from the beach to the borrow areas, a hopper dredge and barge will likely be used to acquire and deliver the substrate.

The mean grain size of sediments in candidate borrow areas LKBA's 5, 6, and 7 were 0.40, 0.32, 0.43 mm, and silt comprised 2.19, 4.05, and 2.48 percent of sediments, respectively. In 2001, the existing beach had an average grain size of 0.24 mm, and comprise 1.93 percent silt. In comparison, the borrow site material is more coarse than the material obtained from the existing beach between R-37 and R-39. However, this section of beach was renourished in 2001 and the sediment data relating to that project has not been made available.

Three terminal groins will be constructed between R-42 and R-44.5 using 2-ton armor stone over 400 lb. underlayer stone and 1-20 lb. bedding stone. The bedding stone will be underlain with filter fabric at -3.5 feet NGVD, and the armor stone will be placed at 5.0 feet NGVD. Groins will be 12 feet (top) to 46 feet (bottom) wide, with 45 percent side slopes. They will have total lengths of approximately 340, 520, and 1,320 feet for the northern, central, and southern groins, respectively. For the north and central groins, approximately half of the length of the

groin will be above 0 feet NGVD; water level on the seaward half will average approximately one-foot (-1 foot NGVD). Water depth at the terminal end of the groin will be approximately two feet (-2 feet NGVD). The exposed portion of the southern groin/bulkhead will be above 0 feet NGVD; it will not extend seaward beyond mean high water.

The Corps anticipates that without the project, erosion near the center of the island is likely to continue, and the transport of beach material into nearshore shoal areas is probable. Certain areas on the island will lose beach and dune habitat, while others may gain beach or shallow-water habitat from the redistribution of sediments.

STATUS OF THE SPECIES/CRITICAL HABITAT

Species/critical habitat description

Loggerhead Sea Turtle

The loggerhead sea turtle (*Caretta caretta*), listed as a threatened species on July 28, 1978 (43 FR 32800), inhabits the continental shelves and estuarine environments along the margins of the Atlantic, Pacific, and Indian Oceans. Loggerhead sea turtles nest within the continental U.S. from Louisiana to Virginia. Major nesting concentrations in the U.S. are found on the coastal islands of North Carolina, South Carolina, and Georgia, and on the Atlantic and Gulf coasts of Florida (Hopkins and Richardson 1984).

No critical habitat has been designated for the loggerhead sea turtle.

Green Sea Turtle

The green sea turtle (*Chelonia mydas*) was federally listed as a protected species on July 28, 1978 (43 FR 32800). Breeding populations of the green turtle in Florida and along the Pacific Coast of Mexico are listed as endangered; all other populations are listed as threatened. The green turtle has a worldwide distribution in tropical and subtropical waters. Major green turtle nesting colonies in the Atlantic occur on Ascension Island, Aves Island, Costa Rica, and Surinam. Within the U.S., green turtles nest in small numbers in the U.S. Virgin Islands and Puerto Rico, and in larger numbers along the east coast of Florida, particularly in Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward Counties (National Marine Fisheries Service and U.S. Fish and Wildlife Service 1991a). Nesting also has been documented along the Gulf coast of Florida on Santa Rosa Island (Okaloosa and Escambia Counties) and from Pinellas County through Collier County (Florida Department of Environmental Protection, unpublished data). Green turtles have been known to nest in Georgia, but only on rare occasions (Georgia Department of Natural Resources, unpublished data). The green turtle also nests sporadically in North Carolina and South Carolina (North Carolina Wildlife Resources Commission,

unpublished data; South Carolina Department of Natural Resources, unpublished data). Unconfirmed nesting of green turtles in Alabama has also been reported (Bon Secour National Wildlife Refuge, unpublished data).

Critical habitat for the green sea turtle has been designated for the waters surrounding Culebra Island, Puerto Rico, and its outlying keys.

Life history

Loggerhead Sea Turtle

Loggerheads are known to nest from one to seven times within a nesting season (Talbert *et al.* 1980, Richardson and Richardson 1982, Lenarz *et al.* 1981, among others); the mean is approximately 4.1 (Murphy and Hopkins 1984). The interval between nesting events within a season varies around a mean of about 14 days (Dodd 1988). Mean clutch size varies from about 100 to 126 along the southeastern United States coast (National Marine Fisheries Service and U.S. Fish and Wildlife Service 1991b). Nesting migration intervals of 2 to 3 years are most common in loggerheads, but the number can vary from 1 to 7 years (Dodd 1988). Age at sexual maturity is believed to be about 20 to 30 years (Turtle Expert Working Group 1998).

Green Sea Turtle

Green turtles deposit from one to nine clutches within a nesting season, but the overall average is about 3.3. The interval between nesting events within a season varies around a mean of about 13 days (Hirth 1997). Mean clutch size varies widely among populations. Average clutch size reported for Florida was 136 eggs in 130 clutches (Witherington and Ehrhart 1989). Only occasionally do females produce clutches in successive years. Usually 2, 3, 4, or more years intervene between breeding seasons (National Marine Fisheries Service and U.S. Fish and Wildlife Service 1991a). Age at sexual maturity is believed to be 20 to 50 years (Hirth 1977).

Population dynamics

Loggerhead Sea Turtle

Total estimated nesting in the Southeast is approximately 50,000 to 70,000 nests per year (National Marine Fisheries Service and U.S. Fish and Wildlife Service 1991b). In 1998, there were over 80,000 nests in Florida alone. From a global perspective, the southeastern U.S. nesting aggregation is of paramount importance to the survival of the species and is second in size only to that which nests on islands in the Arabian Sea off Oman (Ross 1982, Ehrhart 1989, National Marine Fisheries Service and U.S. Fish and Wildlife Service 1991b). The status of the Oman colony has not been evaluated recently, but its location in a part of the world that is vulnerable to disruptive events (e.g., political upheavals, wars, catastrophic oil spills) is cause for considerable concern (Meylan *et al.* 1995). The loggerhead nesting aggregations in Oman, the

southeastern U.S., and Australia account for about 88 percent of nesting worldwide (National Marine Fisheries Service and U.S. Fish and Wildlife Service 1991b). About 80 percent of loggerhead nesting in the southeastern U.S. occurs in six Florida counties (Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward Counties) (National Marine Fisheries Service and U.S. Fish and Wildlife Service 1991b).

Green Sea Turtle

About 200 to 1,100 females are estimated to nest on beaches in the continental U.S. In the U.S. Pacific, over 90 percent of nesting throughout the Hawaiian archipelago occurs at the French Frigate Shoals, where about 200 to 700 females nest each year. Elsewhere in the U.S. Pacific, nesting takes place at scattered locations in the Commonwealth of the Northern Marianas, Guam, and American Samoa. In the western Pacific, the largest green turtle nesting aggregation in the world occurs on Raine Island, Australia, where thousands of females nest nightly in an average nesting season. In the Indian Ocean, major nesting beaches occur in Oman where 6,000 to 20,000 females are reported to nest annually.

Status and distribution

Loggerhead Sea Turtle

Genetic research (mtDNA) has identified four loggerhead nesting subpopulations in the western North Atlantic: (1) the Northern Subpopulation occurring from North Carolina to around Cape Canaveral, Florida (about 29° N.); (2) South Florida Subpopulation occurring from about 29° N. on Florida's east coast to Sarasota on Florida's west coast; (3) Northwest Florida Subpopulation occurring at Eglin Air Force Base and the beaches near Panama City; and (4) Yucatán Subpopulation occurring on the eastern Yucatán Peninsula, Mexico (Bowen 1994, 1995; Bowen *et al.* 1993; Encalada *et al.* 1998). These data indicate that gene flow between these four regions is very low. If nesting females are extirpated from one of these regions, regional dispersal will not be sufficient to replenish the depleted nesting subpopulation. The Northern Subpopulation has declined substantially since the early 1970s, but most of that decline occurred prior to 1979. No significant trend has been detected in recent years (Turtle Expert Working Group 1998, 2000). Adult loggerheads of the South Florida Subpopulation have shown significant increases over the last 25 years, indicating that the population is recovering, although a trend could not be detected from the State of Florida's Index Nesting Beach Survey program from 1989 to 1998. Nesting surveys in the Northwest Florida and Yucatán Subpopulations have been too irregular to date to allow for a meaningful trend analysis (Turtle Expert Working Group 1998, 2000).

Threats include incidental take from channel dredging and commercial trawling, longline, and gill net fisheries; loss or degradation of nesting habitat from coastal development and beach armoring; disorientation of hatchlings by beachfront lighting; excessive nest predation by native

and non-native predators; degradation of foraging habitat; marine pollution and debris; watercraft strikes; and disease. There is particular concern about the extensive incidental take of juvenile loggerheads in the eastern Atlantic by longline fishing vessels from several countries.

Green Sea Turtle

Total population estimates for the green turtle are unavailable, and trends based on nesting data are difficult to assess because of large annual fluctuations in numbers of nesting females. For instance, in Florida, where the majority of green turtle nesting in the southeastern U.S. occurs, estimates range from 200 to 1,100 females nesting annually. Populations in Surinam, and Tortuguero, Costa Rica, may be stable, but there is insufficient data for other areas to confirm a trend.

A major factor contributing to the green turtle's decline worldwide is commercial harvest for eggs and food. Fibropapillomatosis, a disease of sea turtles characterized by the development of multiple tumors on the skin and internal organs, is also a mortality factor and has seriously impacted green turtle populations in Florida, Hawaii, and other parts of the world. The tumors interfere with swimming, eating, breathing, vision, and reproduction, and turtles with heavy tumor burdens may die. Other threats include loss or degradation of nesting habitat from coastal development and beach armoring; disorientation of hatchlings by beachfront lighting; excessive nest predation by native and non-native predators; degradation of foraging habitat; marine pollution and debris; watercraft strikes; and incidental take from channel dredging and commercial fishing operations.

Analysis of the species/critical habitat likely to be affected

The proposed action has the potential to adversely affect nesting females, nests, and hatchlings within the proposed project area. The effects of the proposed action on sea turtles will be considered further in the remaining sections of this biological opinion. Potential effects include destruction of nests deposited within the boundaries of the proposed project, harassment in the form of disturbing or interfering with female turtles attempting to nest within the construction area or on adjacent beaches as a result of construction activities, harm to nesting females and hatchlings by heavy equipment, entrapment of nesting females and hatchlings by groins, disorientation of hatchling turtles on beaches adjacent to the construction area as they emerge from the nest and crawl to the water as a result of project lighting, increased hatchling predation due to predator concentration at the groins, and behavior modification of nesting females due to escarpment formation within the project area during a nesting season resulting in false crawls or situations where they choose marginal or unsuitable nesting areas to deposit eggs. The quality of the placed sand could affect the ability of female turtles to nest, the suitability of the nest incubation environment, and the ability of hatchlings to emerge from the nest.

Critical habitat has not been designated in the continental United States; therefore, the proposed action would not result in an adverse modification.

ENVIRONMENTAL BASELINE

Status of the species within the action area

The distribution of sea turtle nesting activity on Florida's Southwest Gulf Coast (Sarasota, Charlotte, Lee, and Collier Counties) is understood less than that of the East Coast epicenter of sea turtle nesting between Brevard and Palm Beach counties (Addison *et al.* 2000). Ten to twelve percent of the total nesting activity on Florida's beaches occurs on Florida's Gulf Coast (Addison *et al.* 2000). During the 1993 to 2000 nesting seasons, Sarasota, Charlotte, Collier, and Lee Counties have accounted for 42,11, 15, and 10 percent of the overall nesting in the southern Gulf coast region, respectively. During the 2000 nesting season, of the 34.7 miles of Sarasota County shoreline surveyed, data show a total of 6194 sea turtle emergences (3571 nests and 2623 false crawls) according to the FWC's Statewide Sea Turtle Nesting Survey Data, 2000 (Table 1).

Table 1: Sarasota County Sea Turtle Nesting 1993-2001 (FWC Statewide Sea Turtle Nesting Survey Data, 2000)

Year	Survey Length (km)	*C. caretta* Nest	*C. caretta* False Crawl	*C. mydas* Nest	*C. mydas* False Crawl	*L.kempii* Nest	*L. kempii* False Crawl
2000	55.8	3562	2621	9	2	0	0
1999	53.9	3316	2392	0	0	2	0
1998	53.8	4146	4034	3	0	0	0
1997	53.8	3438	2378	4	0	0	0
1996	53.8	3064	2602	1	0	0	0
1995	53.8	3502	3535	0	0	0	0
1994	53.9	2543	2050	5	0	0	0
1993	53.9	1916	2067	0	0	0	0

One Kemp's ridley sea turtle was documented nesting on Siesta Key, Sarasota County, twice during the 1999 nesting season. The turtle was photo documented during each nesting event and tissue from hatchlings is documented at University of Florida (J. Foote, Mote Marine Lab, personal communication 2002). Kemp's ridley sea turtles sporadically nest in Florida, only six nests have been identified between the 1993 and 1999 nesting seasons (FWC Statewide Sea Turtle Nesting Survey Data, 2000). Although Siesta Key is due south of Lido Key, Kemp's ridley sea turtles are not addressed in this opinion due to the irregular and unpredictable nature of Kemp's ridley nesting activity in Florida and the unlikelihood that a Kemp's ridley turtle would nest on Lido Key during project construction.

During the 2001 nesting season, one leatherback sea turtle was photo documented nesting on Longboat Key, Sarasota County (J. Foote, Mote Marine Lab, personal communication 2002).

Leatherback sea turtles regularly nest in the U.S. in Puerto Rico, the U.S. Virgin Islands, and along the Atlantic coast of Florida as far north as Georgia (National Marine Fisheries Service and U.S. Fish and Wildlife Service 1992). Leatherback nesting also has been reported on the northwest coast of Florida (LeBuff 1990; Florida Department of Environmental Protection, unpublished data). A single false crawl has been observed on Sanibel Island (LeBuff 1990). Although Longboat Key is due north of Lido Key, leatherback sea turtles are not addressed in this opinion due to the irregular and unpredictable nature of leatherback sea turtle nesting activity in Southwest Florida and the unlikelihood that a leatherback sea turtle would nest on Lido Key during project construction.

Loggerhead Sea Turtle

The loggerhead sea turtle nesting and hatching season for Southern Gulf of Mexico beaches (includes Pinellas through Monroe Counties in Florida) extends from April 1 through November 30. Incubation ranges from about 45 to 95 days.

Lido Key is a small barrier island located in Sarasota County, Florida. The island is approximately 2.44 miles long, and ranges from 100 to 2,500 feet wide. The entire length of the Lido Key shoreline, including the beaches at the north and south ends of the island (2.6 miles), is surveyed daily from May through October for sea turtle nesting activity. Although loggerhead, green, leatherback and Kemp's ridley sea turtles are all known to nest in Sarasota County, all nesting activity on Lido Key has been by loggerhead sea turtles (Table 2).

Table 2: Lido Key Loggerhead Nesting Data 1993-2001 (J.Foote, Mote Marine Lab, pers. comm., 2001)

Year	Nest	False Crawl
2001	16	57
2000	59	52
1999	48	57
1998	42	95
1997	45	44
1996	50	35
1995	34	50
1994	37	34
1993	35	35

Prior to the establishment of the Sarasota County lighting ordinance in 1997, beach front lighting associated with private homes, hotels, street lights, and automobiles attributed to the high level of sea turtle disorientation recorded on Lido Key. Compliance with the lighting ordinance has greatly decreased disorientation along Lido Key; however, sea turtles continue to become

disoriented near the hotels and in other areas where automobile lights illuminate the beach (J. Foote, Mote Marine Lab, personal communication, 2001). Nesting activity is greater on the northern end of Lido Key where development is minimal. It has been reported nest inundation is a common occurrence due to the low beach slope and total beach elevation existing along the Lido Key shoreline (J. Foote, Mote Marine Lab, personal communication, 2001).

Green Sea Turtle

The green sea turtle nesting and hatching season for Southern Florida Gulf of Mexico beaches (includes Pinellas through Monroe Counties) extends from May 15 through October 31. Incubation ranges from about 45 to 75 days.

Between 1993 and 2000, ten percent of all green sea turtle nesting on the west coast of Florida occurred in Sarasota County. More then 50 percent of all green sea turtle nesting activity within Sarasota County occurs on the southern end of the county, on Manasota Key. No green turtle nesting activity has ever been documented on Lido Key; however, green turtles have nested on neighboring Siesta Key.

Factors affecting the species environment within the action area

In the 1920's, Lido Key was created by dredge and fill activities within a group of mangrove islands formerly known as the Creole Isles. Today, Lido Key can be described as highly developed (commercially, privately and publicly) resulting in extensive recreational use of the beach. Hotels, restaurants, condominiums, private homes, and public parks in the northern, central and southern portions of the island are the primary components of the developed shoreline. It has a tourism-oriented economy that is highly dependant on its beaches.

The project area includes the shoreline, nearshore, and three areas offshore of Lido Key. The island is approximately 2.44 miles long, and ranges from 100 to 2,500 feet wide. Lido Key is separated from Longboat key and Siesta Key by New Pass and Big Sarasota Pass to the north and south, respectively. The proposed sand placement and groin construction project will extend along approximately two miles of shoreline, from R-34 to R-44.5, the southern terminus of the island.

Large-scale beach nourishment along Lido Key first occurred in 1970, with subsequent nourishment in 1974, 1977, 1982, 1998, 1999, and 2001 along the middle and southern portions of the island. Several factors are attributed to Lido Keys changing shoreline. Those factors include: placement of maintenance dredge material, periodic renourishment, major storm events (e.g., hurricanes and winter storms), and the influence of the bordering inlets to the north and south of Lido Key creating erosion "hot spots."

For example, since the renourishment events from 1970 to the present, shoreline recession between R-35 to R-38 ranged from approximately 4 to 94 feet per-year, particularly within the

"hot spot" in the middle of the island. Despite frequent beach renourishment, periodic placement of sand dredged from navigation projects, groin construction, and shoreline armoring, the shoreline recession continues. Consequently, the DEP designated Lido Key, from R-31 through R-44, as a critical erosion area in 1990 (DEP, 2000).

The north end of Lido Key from R-31 to R-35 (~3,800 feet), is relatively undeveloped since it is owned and managed by the City of Lido Beach as the North Lido Public Beach. This area has experienced historic shoreline variation attributed to natural and man-made influences such as storm events, tidal movement through the New Pass, and the placement of sand from maintenance dredging activities. Some native beach vegetation is present on the upland portions of the island; however, exotic vegetation is dominant.

Moving south, the center portion of the island between R-35 to R-44 (~9,000 feet) is fully developed with hotels, condominiums, private residences, restaurants and contains the Lido Key public beach. Not only is this area highly utilized, but it also experiences the greatest shoreline fluctuations particularly between R-39 to R-44 (~5,000 feet). In addition to periodic beach renourishment, construction of seawalls, revetments, as well as, other shoreline armoring has occurred since the 1970's in the attempt to off-set the effects of erosion. Approximately 550 feet of seawall exists in this area.

The southern end of the island between R-43 to R-44.5 (1,500 feet) is sparsely developed except for recreational amenities such as picnic shelters, restrooms, parking areas, and hiking trails associated with the County-owned, South Lido Park (CP&E, 1992).

EFFECTS OF THE ACTION

Analyses for effects of the action

Beneficial Effects

The placement of sand on a beach with reduced dry fore-dune habitat may increase sea turtle nesting habitat if the placed sand is highly compatible (i.e., grain size, shape, color, etc.) with naturally occurring beach sediments in the area, and compaction and escarpment remediation measures are incorporated into the project. In addition, a nourished beach that is designed and constructed to mimic a natural beach system may be more stable than the eroding one it replaces, thereby benefitting sea turtles.

Direct Effects

Placement of sand on a beach in and of itself may not provide suitable nesting habitat for sea turtles. Although beach nourishment may increase the potential nesting area, significant negative impacts to sea turtles may result if protective measures are not incorporated during project construction. Nourishment and groin construction during the nesting season, particularly on or

near high density nesting beaches, can cause increased loss of eggs and hatchlings and, along with other mortality sources, may significantly impact the long-term survival of the species. For instance, projects conducted during the nesting and hatching season could result in the loss of sea turtles through disruption of adult nesting activity and by burial or crushing of nests or hatchlings. While a nest monitoring and egg relocation program or a nest mark and avoidance program would reduce these impacts, nests may be inadvertently missed (when crawls are obscured by rainfall, wind, and/or tides) or misidentified as false crawls during daily patrols. In addition, nests may be destroyed by operations at night prior to beach patrols being performed. Even under the best of conditions, about 7 percent of the nests can be misidentified as false crawls by experienced sea turtle nest surveyors (Schroeder 1994).

Potential adverse impacts during the project construction phase include disturbance of existing nests, which may have been missed, disturbance of females attempting to nest, and disorientation of emerging hatchlings. Heavy equipment will be required to install the groins, and this equipment will have to traverse the sandy beach to the project site, which could result in harm to nesting females, nests, and emerging hatchlings. Since a large trench will be excavated on the beach and be present during the night for some portion of the construction, a potential threat to nesting females and emerging hatchlings will exist.

Three permanent terminal groins are proposed to be constructed at the southern end of the island, between R-42 and R-44.5. Each groin will be 46 feet wide along the bottom edge and will be exposed above the sand. The 138 foot total width of the three groins will be permanently unavailable as nesting habitat. Following construction, the presence of groin structures has the potential to impact sea turtles in several ways. They may interfere with nesting turtle access to the beach, result in a change in beach profile and width (downdrift erosion, loss of sandy berms, and escarpment formation), trap hatchlings, and concentrate predators.

1. Nest relocation

Project construction, including both sand placement and groin construction, is likely to occur during the sea turtle nesting season, therefore, sea turtle nest relocation is a possibility during the estimated four to five month project construction window. Besides the potential for missing nests during a nest relocation program, there is a potential for eggs to be damaged by their movement, particularly if eggs are not relocated within 12 hours of deposition (Limpus *et al.* 1979). Nest relocation can have adverse impacts on incubation temperature (and hence sex ratios), gas exchange parameters, hydric environment of nests, hatching success, and hatchling emergence (Limpus *et al.* 1979, Ackerman 1980, Parmenter 1980, Spotila *et al.* 1983, McGehee 1990). Relocating nests into sands deficient in oxygen or moisture can result in mortality, morbidity, and reduced behavioral competence of hatchlings. Water availability is known to influence the incubation environment of the embryos and hatchlings of turtles with flexible-shelled eggs, which has been shown to affect nitrogen excretion (Packard *et al.* 1984), mobilization of calcium (Packard and Packard 1986), mobilization of yolk nutrients (Packard *et al.* 1985), hatchling size (Packard *et al.* 1981, McGehee 1990), energy reserves in the yolk at hatching (Packard *et al.* 1988), and locomotory ability of hatchlings (Miller *et al.* 1987).

Comparisons of hatching success between relocated and *in situ* nests have noted significant variation ranging from a 21 percent decrease to a 9 percent increase for relocated nests (Florida Department of Environmental Protection, unpublished data). Comparisons of emergence success between relocated and *in situ* nests have also noted significant variation ranging from a 23 percent decrease to a 5 percent increase for relocated nests (DEP, unpublished data). A 1994 Florida Department of Environmental Protection study of hatching and emergence success of *in situ* and relocated nests at seven sites in Florida found that hatching success was lower for relocated nests in five of seven cases with an average decrease for all seven sites of 5.01 percent (range = 7.19 percent increase to 16.31 percent decrease). Emergence success was lower for relocated nests in all seven cases by an average of 11.67 percent (range = 3.6 to 23.36 percent) (Meylan 1995).

2. Equipment

The placement of pipelines, groin materials, and the use of heavy machinery or equipment on the beach during a construction project may also have adverse effects on sea turtles. They can create barriers to nesting females emerging from the surf and crawling up the beach, causing a higher incidence of false crawls and unnecessary energy expenditure. The equipment can also create impediments to hatchling sea turtles as they crawl to the ocean.

3. Artificial lighting

Visual cues are the primary sea-finding mechanism for hatchling sea turtles (Mrosovsky and Carr 1967, Mrosovsky and Shettleworth 1968, Dickerson and Nelson 1989, Witherington and Bjorndal 1991). When artificial lighting is present on or near the beach, it can misdirect hatchlings once they emerge from their nests and prevent them from reaching the ocean (Philbosian 1976; Mann 1977; DEP, unpublished data). In addition, a significant reduction in sea turtle nesting activity has been documented on beaches illuminated with artificial lights (Witherington 1992). Therefore, construction lights along a project beach and on the dredging vessel may deter females from coming ashore to nest, misdirect females trying to return to the surf after a nesting event, and misdirect emergent hatchlings from adjacent non-project beaches. Any source of bright lighting can profoundly affect the orientation of hatchlings, both during the crawl from the beach to the ocean and once they begin swimming offshore. Hatchlings attracted to light sources on dredging barges may not only suffer from interference in migration, but may also experience higher probabilities of predation to predatory fishes that are also attracted to the barge lights. This impact could be reduced by using the minimum amount of light necessary (may require shielding) or low pressure sodium lighting during project construction.

4. Entrapment/physical obstruction

Adult females approaching the nesting beach may encounter the groin structures and either go around them, abort nesting activities for that night, and/or move to another section of beach to nest. The groins may act as barriers between beach segments and also prevent nesting on the groin alignment. The groins could confuse or misorient nesting or hatchling turtles and prolong their time on the beach, making them vulnerable to predation, exhaustion, or dessication.

5. Predator concentration
The presence of groins has the potential to attract and concentrate predatory fishes and provide perching spots for predatory birds, resulting in higher probabilities of hatchling predation as hatchlings enter the ocean.

Indirect Effects

Many of the direct effects of beach nourishment and groin construction may persist over time and become indirect impacts. These indirect effects include increased susceptibility of relocated nests to catastrophic events, the consequences of potential increased beachfront development, changes in the physical characteristics of the beach, the formation of escarpments, future sand migration, accelerated downdrift erosion, and the impacts of debris on the beach from groin breakdown.

1. Increased susceptibility to catastrophic events
Nest relocation may concentrate eggs in an area making them more susceptible to catastrophic events. Hatchlings released from concentrated areas also may be subject to greater predation rates from both land and marine predators, because the predators learn where to concentrate their efforts (Glenn 1998, Wyneken *et al.* 1998).

2. Increased beachfront development
Pilkey and Dixon (1996) state that beach replenishment frequently leads to more development in greater density within shorefront communities that are then left with a future of further replenishment or more drastic stabilization measures. Dean (1999) also notes that the very existence of a beach nourishment project can encourage more development in coastal areas. Following completion of a beach nourishment project in Miami during 1982, investment in new and updated facilities substantially increased tourism there (National Research Council 1995). Increased building density immediately adjacent to the beach often resulted as older buildings were replaced by much larger ones that accommodated more beach users. Overall, shoreline management creates an upward spiral of initial protective measures resulting in more expensive development which leads to the need for more and larger protective measures. Increased shoreline development may adversely affect sea turtle nesting success. Greater development may support larger populations of mammalian predators, such as foxes and raccoons, than undeveloped areas (National Research Council 1990a), and can also result in greater adverse effects due to artificial lighting, as discussed above.

3. Changes in the physical environment
Beach nourishment may result in changes in sand density or compaction, beach shear resistance or hardness, beach moisture content, beach slope, sand color, sand grain size, sand grain shape, and sand grain mineral content if the placed sand is dissimilar from the original beach sand (Nelson and Dickerson 1988a). These changes could result in adverse impacts on nest site selection, digging behavior, clutch viability, and emergence by hatchlings (Nelson and Dickerson 1987, Nelson 1988).

Beach compaction and unnatural beach profiles that may result from beach nourishment activities could negatively impact sea turtles regardless of the timing of projects. Very fine sand and/or the use of heavy machinery can cause sand compaction on nourished beaches (Nelson *et al.* 1987, Nelson and Dickerson 1988a). Significant reductions in nesting success (i.e., false crawls occurred more frequently) have been documented on severely compacted nourished beaches (Fletemeyer 1980, Raymond 1984, Nelson and Dickerson 1987, Nelson *et al.* 1987), and increased false crawls may result in increased physiological stress to nesting females. Sand compaction may increase the length of time required for female sea turtles to excavate nests and also cause increased physiological stress to the animals (Nelson and Dickerson 1988c). Nelson and Dickerson (1988b) concluded that, in general, beaches nourished from offshore borrow sites are harder than natural beaches, and while some may soften over time through erosion and accretion of sand, others may remain hard for 10 years or more.

These impacts can be minimized by using suitable sand and by tilling compacted sand after project completion. The level of compaction of a beach can be assessed by measuring sand compaction using a cone penetrometer (Nelson 1987). Tilling of a nourished beach with a root rake may reduce the sand compaction to levels comparable to unnourished beaches. However, a pilot study by Nelson and Dickerson (1988c) showed that a tilled nourished beach will remain uncompacted for up to 1 year. Therefore, the Service requires multi-year beach compaction monitoring and, if necessary, tilling to ensure that project impacts on sea turtles are minimized.

A change in sediment color on a beach could change the natural incubation temperatures of nests in an area, which, in turn, could alter natural sex ratios. To provide the most suitable sediment for nesting sea turtles, the color of the nourished sediments must resemble the natural beach sand in the area. Natural reworking of sediments and bleaching from exposure to the sun would help to lighten dark nourishment sediments; however, the timeframe for sediment mixing and bleaching to occur could be critical to a successful sea turtle nesting season.

4. Escarpment formation

On nourished beaches, steep escarpments may develop along their water line interface as they adjust from an unnatural construction profile to a more natural beach profile (Coastal Engineering Research Center 1984, Nelson *et al.* 1987). In addition, escarpments may develop on the crenulate beaches located between groins as the beaches equilibrate to their final positions. These escarpments can hamper or prevent access to nesting sites (Nelson and Blihovde 1998). Researchers have shown that female turtles coming ashore to nest can be discouraged by the formation of an escarpment, leading to situations where they choose marginal or unsuitable nesting areas to deposit eggs (e.g., in front of the escarpments, which often results in failure of nests due to prolonged tidal inundation). This impact can be minimized by leveling any escarpments prior to the nesting season.

5. Downdrift erosion.

Groins, in conjunction with beach nourishment, can help stabilize U.S. East Coast barrier island beaches (Leonard *et al.* 1990). However, groins and breakwaters often result in accelerated

beach erosion downdrift of the structures (Komar 1983, National Research Council 1987, U.S. Army Corps of Engineers 1992) and corresponding degradation of suitable sea turtle nesting habitat (National Marine Fisheries Service and U.S. Fish and Wildlife Service 1991a, 1991b, 1992). Impacts first are noted and greatest changes are observed close to the structures, but effects eventually may extend great distances along the coast (Komar 1983). Beach nourishment only partly alleviates impacts of groin construction on downdrift beaches (Komar 1983).

Groins operate by blocking the natural littoral drift of sand (Kaufman and Pilkey 1979, Komar 1983). Once sand fills the updrift groin area, some littoral drift and sand deposition on adjacent downdrift beaches occurs due to spillover. But, groins often force the river of sand into deeper offshore water, and sand that previously would have been deposited on downdrift beaches is lost from the system (Kaufman and Pilkey 1979).

6. Groin breakdown
As the groin structures fail and break apart, they spread debris on the beach, which may further impede nesting females from accessing suitable nesting sites (resulting in a higher incidence of false crawls) and trap hatchlings and nesting turtles (U.S. Fish and Wildlife Service 1991a, 1991b, 1992, 1993).

Species' response to the proposed action

Ernest and Martin (1999) conducted a comprehensive study to assess the effects of beach nourishment on loggerhead sea turtle nesting and reproductive success. The following findings illustrate sea turtle responses to and recovery from a nourishment project. A significantly larger proportion of turtles emerging on nourished beaches abandoned their nesting attempts than turtles emerging on Control or pre-nourished beaches. This reduction in nesting success was most pronounced during the first year following project construction and is most likely the result of changes in physical beach characteristics associated with the nourishment project (e.g., beach profile, sediment grain size, beach compaction, frequency and extent of escarpments). During the first post-construction year, the time required for turtles to excavate an egg chamber on the untilled, hard-packed sands of one treatment area increased significantly relative to Control and background conditions. However, in another treatment area, tilling was effective in reducing sediment compaction to levels that did not significantly prolong digging times. As natural processes reduced compaction levels on nourished beaches during the second post-construction year, digging times returned to background levels.

During the first post-construction year, nests on the nourished beaches were deposited significantly farther from both the toe of the dune and the tide line than nests on control beaches. Furthermore, nests were distributed throughout all available habitat and were not clustered near the dune as they were in the control. As the width of nourished beaches decreased during the second year, among-treatment differences in nest placement diminished. More nests were washed out on the wide, flat beaches of the nourished treatments than on the narrower steeply sloped beaches of the control. This phenomenon persisted through the second post-construction year

monitoring and resulted from the placement of nests near the seaward edge of the beach berm where dramatic profile changes, caused by erosion and scarping, occurred as the beach equilibrated to a more natural contour.

As with other beach nourishment projects, Ernest and Martin (1999) found that the principal effect of nourishment on sea turtle reproduction was a reduction in nesting success during the first year following project construction. Although most studies have attributed this phenomenon to an increase in beach compaction and escarpment formation, Ernest and Martin indicate that changes in beach profile may be more important. Regardless, as a nourished beach is reworked by natural processes in subsequent years and adjusts from an unnatural construction profile to a more natural beach profile, beach compaction and the frequency of escarpment formation decline, and nesting and nesting success return to levels found on natural beaches.

The Corps anticipates renourishment of Lido Key to occur every five years. Therefore, approximately 982,000 cubic yards of material may be placed along 1.74 miles of the 2.6 miles of nesting beach habitat available on the island at a five year interval. According to the results of the Ernest and Martin study, nesting success was shown to decrease the first year following sand placement and then subsequently returned to levels found on natural beaches. However, the long-term effect of a short renourishment interval on sea turtle nesting is unknown.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. The Service is not aware of any cumulative effects in the project area.

CONCLUSION

After reviewing the current status of the loggerhead and green sea turtles, the environmental baseline for the action area, the effects of the proposed sand placement and groin construction project, and the cumulative effects, it is the Service's biological opinion that the construction project, as proposed, is not likely to jeopardize the continued existence of the loggerhead and green sea turtles and is not likely to destroy or adversely modify designated critical habitat. No critical habitat has been designated for the loggerhead and green sea turtles in the continental United States; therefore, none will be affected.

The proposed project will affect only 1.74 miles of the approximately 1,400 miles of available sea turtle nesting habitat in the southeastern United States. Research has shown that the principal effect of beach nourishment on sea turtle reproduction is a reduction in nesting success, and this reduction is most often limited to the first year following project construction. Research has also shown that the impacts of a nourishment project on sea turtle nesting habitat are typically short-

term because a nourished beach will be reworked by natural processes in subsequent years, and beach compaction and the frequency of escarpment formation will decline. Although a variety of factors, including some that cannot be controlled, can influence how a beach renourishment and/or groin construction project will perform from an engineering perspective, measures can be implemented to minimize impacts to sea turtles.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered or threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, carrying out an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited under the Act provided that such taking is in compliance with the terms and conditions of this incidental take statement.

The measures described below are non-discretionary, and must be implemented by the Corps so that they become binding conditions of any grant or permit issued to the applicant, as appropriate, for the exemption in section 7(o)(2) to apply. The Corps has a continuing duty to regulate the activity covered by this incidental take statement. If the Corps (1) fails to assume and implement the terms and conditions or (2) fails to require the applicant to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Corps must report the progress of the action and its impacts on the species to the Service as specified in the incidental take statement [50 CFR §402.14(i)(3)].

AMOUNT OR EXTENT OF TAKE

The Service anticipates 1.74 miles of nesting beach habitat could be taken as a result of this proposed action. The take is expected to be in the form of: (1) destruction of all nests that may be constructed and eggs that may be deposited and missed by a nest survey and marking program within the boundaries of the proposed project; (2) destruction of all nests deposited during the period when a nest survey and marking program is not required to be in place within the boundaries of the proposed project; (3) reduced hatching success due to egg mortality during relocation and adverse conditions at the relocation site; (4) harassment in the form of disturbing or interfering with female turtles attempting to nest within the construction area or on adjacent

beaches as a result of construction activities; (5) behavior modification of nesting females or hatchlings due to the presence of groins, which may act as barriers to movement; (6) behavior modification of nesting females if they dig into shallowly buried groins, resulting in false crawls or situations where they choose marginal or unsuitable nesting areas to deposit eggs; (7) misdirection of hatchling turtles on beaches adjacent to the construction area as they emerge from the nest and crawl to the water as a result of project lighting; (8) behavior modification of nesting females due to escarpment formation within the project area during a nesting season, resulting in false crawls or situations where they choose marginal or unsuitable nesting areas to deposit eggs; and (9) destruction of nests from escarpment leveling within a nesting season when such leveling has been approved by the Fish and Wildlife Service.

Incidental take is anticipated for only the 1.74 miles of beach that have been identified for sand placement and groin construction. The Service anticipates incidental take of sea turtles will be difficult to detect for the following reasons: (1) the turtles nest primarily at night and all nests are not found because [a] natural factors, such as rainfall, wind, and tides may obscure crawls and [b] human-caused factors, such as pedestrian and vehicular traffic, may obscure crawls, and result in nests being destroyed because they were missed during a nesting survey and egg relocation program; (2) the total number of hatchlings per undiscovered nest is unknown; (3) the reduction in percent hatching and emerging success per relocated nest over the natural nest site is unknown; (4) an unknown number of females may avoid the project beach and be forced to nest in a less than optimal area; (5) lights may misdirect an unknown number of hatchlings and cause death; and (6) escarpments may form and cause an unknown number of females from accessing a suitable nesting site. However, the level of take of these species can be anticipated by the disturbance of renourishment and groin construction on suitable turtle nesting beach habitat because: (1) turtles nest within the project site; (2) beach renourishment and groin construction will likely occur during a portion of the nesting season; (3) groin construction will modify beach profile and width and is likely to increase the presence of escarpments; (4) beach renourishment will modify the incubation substrate, beach slope, and sand compaction; and (5) artificial lighting will deter and/or misdirect nesting females and hatchlings.

EFFECT OF THE TAKE

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species. Critical habitat has not been designated in the project area; therefore, the project will not result in destruction or adverse modification of critical habitat.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of loggerhead and green sea turtles.

1. Beach quality sand suitable for sea turtle nesting, successful incubation, and hatchling emergence must be used on the project site.

2. If the beach nourishment project will be conducted during the sea turtle nesting season, surveys for nesting sea turtles must be conducted. If nests are constructed in the area of beach nourishment, the eggs must be relocated.

3. Immediately after completion of the beach nourishment project and prior to the next three nesting seasons, beach compaction must be monitored and tilling must be conducted as required to reduce the likelihood of impacting sea turtle nesting and hatching activities.

4. If the groin construction project will be conducted during the sea turtle nesting season, sea turtle protection measures must be employed to minimize the likelihood of take.

5. Immediately after completion of the construction project and prior to the next three nesting seasons, monitoring must be conducted to determine if escarpments are present and escarpments must be leveled as required to reduce the likelihood of impacting sea turtle nesting and hatching activities.

6. The applicant must ensure that contractors conducting the beach renourishment and groin construction work fully understand the sea turtle protection measures detailed in this incidental take statement.

7. During the sea turtle nesting season, all construction equipment and materials must be stored in a manner that will minimize impacts to sea turtles to the maximum extent practicable.

8. During the sea turtle nesting season, lighting associated with the project must be minimized to reduce the possibility of disrupting and misdirecting nesting and/or hatchling sea turtles.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the Corps must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

1. All fill material placed on the beach must be analogous to that which naturally occurs within the project location or vicinity in quartz to carbonate ratio, color, median grain size and median sorting. Specifically, such material shall be predominately of carbonate, quartz or similar material with a particle size distribution ranging between 0.62 mm and 4.76 mm (classified as sand by either the Unified Soil Classification System or the Wentworth classification). The

material shall be similar in color and grain size distribution (sand grain frequency, mean and median grain size, and sorting coefficient) to the material in the existing coastal system at the disposal site and shall not contain:

- greater than five percent, by weight, silt, clay, or colloids passing the #230 sieve;
- greater than five percent, by weight, fine gravel retained on the #4 sieve;
- coarse gravel, cobbles, or material retained on the 3/4 inch sieve in a percentage or size greater than found on the native beach;
- construction debris, toxic material, or other foreign matter; and
- not result in cementation of the beach.

These standards must not be exceeded in any 1000 square foot section, extending through the depth of the renourished beach. If the natural beach exceeds any of the limiting parameters listed above, then the fill material must not exceed the naturally occurring level for that parameter.

2. Daily early morning surveys for sea turtle nests will be required if any portion of the beach nourishment project and/or groin construction project occurs during the period from April 1 through November 30. Nesting surveys must be initiated 65 days prior to nourishment and/or groin construction activities or by April 1, whichever is later. Nesting surveys must continue through the end of the project or through September 30, whichever is earlier. If nests are constructed in areas where they may be affected by beach nourishment activities, eggs must be relocated per the following requirements.

2a. Nesting surveys and egg relocations will only be conducted by personnel with prior experience and training in nesting survey and egg relocation procedures. Surveyors must have a valid Florida Fish and Wildlife Conservation Commission permit. Nesting surveys must be conducted daily between sunrise and 9 a.m. Surveys must be performed in such a manner so as to ensure that beach nourishment activity does not occur in any location prior to completion of the necessary sea turtle protection measures.

2b. Only those nests that may be affected by beach nourishment activities will be relocated. Nests requiring relocation must be moved no later than 9 a.m. the morning following deposition to a nearby self-release beach site in a secure setting where artificial lighting will not interfere with hatchling orientation. Nest relocations in association with beach nourishment activities must cease when beach nourishment activities no longer threaten nests.

2c. Nests will not be relocated for groin construction purposes unless beach nourishment activities are in progress or will be starting within 65 days. Nests deposited within areas where beach nourishment activities have ceased or will not occur for 65 days must be marked and left in place unless other factors threaten the success of the nest. Any nests left in the groin construction area must be clearly marked. Nests will be marked and the actual location of the clutch determined. A circle with a radius of 10 feet, centered at the clutch, will be

marked by stake and survey tape or string. No construction activities will enter this circle and no adjacent construction that might directly or indirectly disturb the area within the staked circle will be allowed.

3. Immediately after completion of the beach nourishment project and prior to April 1 for 3 subsequent years, sand compaction must be monitored in the area of restoration in accordance with a protocol agreed to by the Service, the State regulatory agency, and the applicant. At a minimum, the protocol provided under 3a and 3b below must be followed. If required, the area must be tilled to a depth of 36 inches. All tilling activity must be completed prior to April 1. If the project is completed during the nesting season, tilling will not be performed in areas where nests have been left in place or relocated. An annual summary of compaction surveys and the actions taken must be submitted to the Service. (NOTE: The requirement for compaction monitoring can be eliminated if the decision is made to till regardless of post-construction compaction levels. Also, out-year compaction monitoring and remediation are not required if placed material no longer remains on the dry beach.)

3a. Compaction sampling stations must be located at 500-foot intervals along the project area. One station must be at the seaward edge of the dune/bulkhead line (when material is placed in this area), and one station must be midway between the dune line and the high water line (normal wrack line).

At each station, the cone penetrometer will be pushed to a depth of 6, 12, and 18 inches three times (three replicates). Material may be removed from the hole if necessary to ensure accurate readings of successive levels of sediment. The penetrometer may need to be reset between pushes, especially if sediment layering exists. Layers of highly compact material may lay over less compact layers. Replicates will be located as close to each other as possible, without interacting with the previous hole and/or disturbed sediments. The three replicate compaction values for each depth will be averaged to produce final values for each depth at each station. Reports will include all 18 values for each transect line, and the final 6 averaged compaction values.

3b. If the average value for any depth exceeds 500 pounds per-square inch (psi) for any two or more adjacent stations, then that area must be tilled immediately prior to April 1. If values exceeding 500 psi are distributed throughout the project area but in no case do those values exist at two adjacent stations at the same depth, then consultation with the Service will be required to determine if tilling is required. If a few values exceeding 500 psi are present randomly within the project area, tilling will not be required.

4. Visual surveys for escarpments along the project area must be made immediately after completion of the beach nourishment project and prior to April 1 for 3 subsequent years. Escarpments that interfere with sea turtle nesting or that exceed 18 inches in height for a distance of 100 feet must be leveled to the natural beach contour by April 1. If the project is completed during the sea turtle nesting and hatching season, escarpments may be required to be leveled

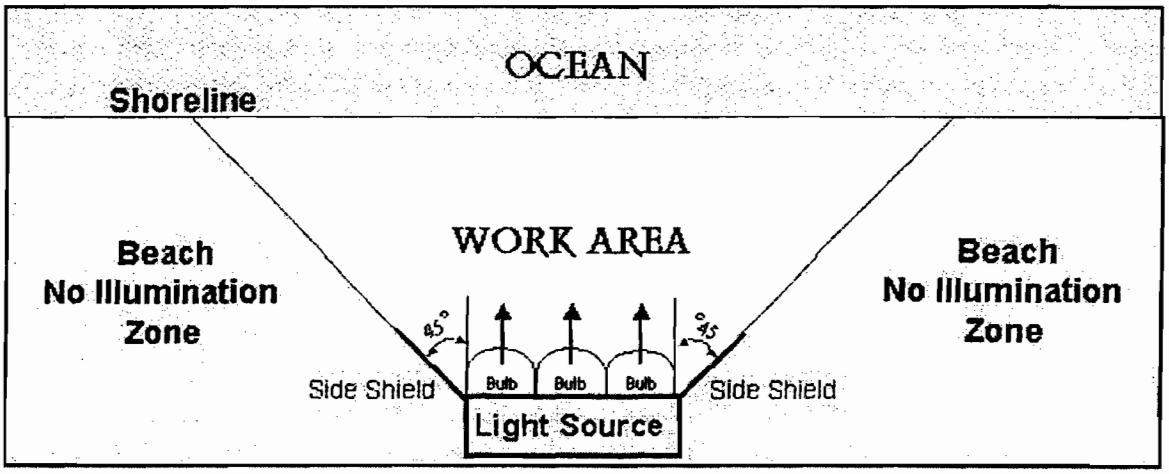
immediately, while protecting nests that have been relocated or left in place. The Service must be contacted immediately if subsequent reformation of escarpments that interfere with sea turtle nesting or that exceed 18 inches in height for a distance of 100 feet occurs during the nesting and hatching season to determine the appropriate action to be taken. If it is determined that escarpment leveling is required during the nesting or hatching season, the Service will provide a brief written authorization that describes methods to be used to reduce the likelihood of impacting existing nests. An annual summary of escarpment surveys and actions taken must be submitted to the Service. (NOTE: Out-year escarpment monitoring and remediation are not required if placed material no longer remains on the beach.)

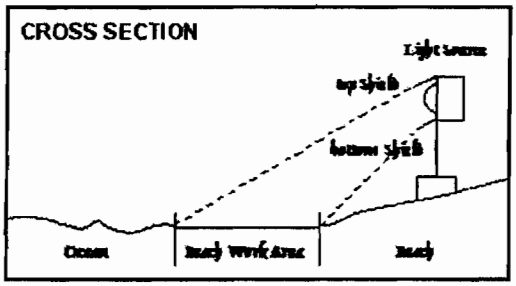
5. The applicant must arrange a meeting between representatives of the contractor, the Service, the FWC, and the permitted person responsible for nest marking and/or egg relocation at least 30 days prior to the commencement of work on this project. At least 10 days advance notice must be provided prior to conducting this meeting. This will provide an opportunity for explanation and/or clarification of the sea turtle protection measures.

6. From April 1 through November 30, staging areas for construction equipment must be located off the beach to the maximum extent practicable. Nighttime storage of construction equipment and groin construction materials not in use must be off the beach to minimize disturbance to sea turtle nesting and hatching activities. In addition, all construction pipes and groin construction materials that are placed on the beach must be located as far landward as possible without compromising the integrity of the existing or reconstructed dune system. Temporary storage of pipes and groin construction materials must be off the beach to the maximum extent possible. Temporary storage of pipes on the beach must be in such a manner so as to impact the least amount of nesting habitat and must likewise not compromise the integrity of the dune systems (placement of pipes perpendicular to the shoreline is recommended as the method of storage).

7. During groin construction, no temporary lighting of the groin construction area is authorized at anytime during the sea turtle nesting season from April 1 through November 30 with the following exception. Lighting will be allowed if safety lighting is required at any excavated trenches that must remain on the beach at night. This lighting must be limited to the immediate construction area only and must be the minimal lighting necessary to comply with safety requirements.

8. During sand placement, from April 1 through November 30, direct lighting of the beach and near shore waters must be limited to the immediate construction area and must comply with safety requirements. Lighting on offshore or onshore equipment must be minimized through reduction, shielding, lowering, and appropriate placement to avoid excessive illumination of the waters surface and nesting beach while meeting all Coast Guard, EM 385-1-1, and OSHA requirements. Light intensity of lighting plants must be reduced to the minimum standard required by OSHA for General Construction areas, in order not to mis-direct sea turtles. Shields must be affixed to the light housing and be large enough to block light from all lamps from being





BEACH LIGHTING SCHEMATIC

transmitted outside the construction area (see figure below).

9. No permanent exterior lighting will be installed in association with this construction project.

10. In the event a groin structure fails or begins to disintegrate, all debris and structural material must be removed from the nesting beach area and deposited off-beach immediately. If maintenance of a groin structure is required during the period from April 1 to November 30, no work will be initiated without prior coordination with the South Florida Ecological Services Office.

11. The terminal groin(s) must be removed if it is determined to not be effective or to be causing a significant adverse impact to the beach and dune system.

12. A report describing the actions taken to implement the terms and conditions of this incidental take statement must be submitted to the South Florida Ecological Services Office

within 60 days of completion of the proposed work for each year when the activity has occurred. This report will include the dates of actual construction activities; names and qualifications of personnel involved in nest surveys, marking, and relocation activities; descriptions and locations of self-release beach sites; nest survey, marking, and relocation results; and hatching and emerging success of nests.

13. In the event a sea turtle nest is excavated during construction activities, the permitted person responsible for nest marking and/or egg relocation for the project must be notified so the eggs can be moved to a suitable relocation site.

14. Upon locating a sea turtle adult, hatchling, or egg harmed or destroyed as a direct or indirect result of the project, notification must be made to the FWC, Bureau of Marine Enforcement (formerly the Florida Marine Patrol) at 800-342-5367. Care should be taken in handling injured turtles or eggs to ensure effective treatment or disposition, and in handling dead specimens to preserve biological materials in the best possible state for later analysis.

The Service believes that incidental take will be limited to the 1.74 miles of beach that have been identified as the project area which includes sand placement and groin construction. The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. The Service believes that no more than the following types of incidental take will result from the proposed action: (1) destruction of all nests that may be constructed and eggs that may be deposited and missed by a nest survey and marking program within the boundaries of the proposed project; (2) destruction of all nests deposited during the period when a nest survey and marking program is not required to be in place within the boundaries of the proposed project; (3) reduced hatching success due to egg mortality during relocation and adverse conditions at the location site; (4) harassment in the form of disturbing or interfering with female turtles attempting to nest within the project construction area or on adjacent beaches as a result of construction activities and/or groin presence; (5) behavior modification of nesting females or hatchlings due to the presence of the groins which may act as barriers to movement; (6) behavior modification of nesting females if they dig into shallowly buried groins, resulting in false crawls or situations where they choose marginal or unsuitable nesting areas to deposit eggs; (7) misdirection of hatchling turtles on beaches adjacent to the construction area as they emerge from the nest and crawl to the water as a result of project lighting; (8) behavior modification of nesting females due to escarpment formation within the project area during a nesting season, resulting in false crawls or situations where they choose marginal or unsuitable nesting areas to deposit eggs; and (9) destruction of nests from escarpment leveling within a nesting season when such leveling has been approved by the Fish and Wildlife Service. The amount or extent of incidental take for sea turtles will be considered exceeded if the project results in more the placement of sand at more than a five year interval on the 1.74 miles of beach proposed for beach renourishment and/or groin construction. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation

of consultation and review of the reasonable and prudent measures provided. The Corps must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information.

1. Construction activities for this project and similar future projects should be planned to take place outside the sea turtle nesting and hatching season.

2. Appropriate native salt-resistant dune vegetation should be established on the restored dunes. The DEP Office of Beaches and Coastal Systems can provide technical assistance on the specifications for design and implementation.

3. Surveys for nesting success of sea turtles should be continued for a minimum of three years following project construction to determine whether sea turtle nesting success has been adversely impacted.

4. More in-depth research should be conducted to assess the potential of the groin structures to impact nesting sea turtles, nest incubation, and movement of hatchlings from the nest to the ocean.

5. Educational signs should be placed where appropriate at beach access points explaining the importance of the area to sea turtles and/or the life history of sea turtle species that nest in the area. Diligent compliance and enforcement of the Sarasota County Lighting Ordinance should occur prior to and continue through the sea turtle nesting season, April 1 through November 30.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION - CLOSING STATEMENT

This concludes formal consultation on the action outlined in the request. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

Should you have additional questions or require additional clarification regarding this matter, please contact Trish Adams at (561) 562-3909, extension 232.

Sincerely yours,

For James J. Slack
Field Supervisor
South Florida Ecological Services Office

LITERATURE CITED

Ackerman, R.A. 1980. Physiological and ecological aspects of gas exchange by sea turtle eggs. American Zoologist 20:575-583.

Addison, D., M. Kraus, T. Doyle, and J. Ryder. 2000. An Overview of Marine Turtle Nesting Activity on Florida's Southwest Coast-Collier County, 1994-1999. Poster.

Boettcher, R. 1998. Personal communication. Biologist. North Carolina Wildlife Resources Commission. Marshallberg, North Carolina.

Bowen, B.W. 1994. Letter dated November 17, 1994, to Sandy MacPherson, National Sea Turtle Coordinator, U.S. Fish and Wildlife Service, Jacksonville,.Florida. University of Florida. Gainesville, Florida.

Bowen, B.W. 1995. Letter dated October 26, 1995, to Sandy MacPherson, National Sea Turtle Coordinator, U.S. Fish and Wildlife Service, Jacksonville, Florida. University of Florida. Gainesville, Florida.

Bowen, B., J.C. Avise, J.I. Richardson, A.B. Meylan, D. Margaritoulis, and S.R. Hopkins-Murphy. 1993. Population structure of loggerhead turtles (*Caretta caretta*) in the northwestern Atlantic Ocean and Mediterranean Sea. Conservation Biology 7(4):834-844.

Coastal Engineering Research Center. 1984. Shore protection manual, volumes I and II. U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, Mississippi.

Dean, C. 1999. Against the tide: the battle for America's beaches. Columbia University Press; New York, New York.

Dickerson, D.D. and D.A. Nelson. 1989. Recent results on hatchling orientation responses to light wavelengths and intensities. Pages 41-43 *in* Eckert, S.A., K.L. Eckert, and T.H. Richardson (compilers). Proceedings of the 9th Annual Workshop on Sea Turtle Conservation and Biology. NOAA Technical Memorandum NMFS-SEFC-232.

Dodd, C.K., Jr. 1988. Synopsis of the biological data on the loggerhead sea turtle *Caretta caretta* (Linnaeus 1758). U.S. Fish and Wildlife Service, Biological Report 88(14).

Ehrhart, L.M. 1989. Status report of the loggerhead turtle. Pages 122-139 *in* Ogren, L., F. Berry, K. Bjorndal, H. Kumpf, R. Mast, G. Medina, H. Reichart, and R. Witham (editors). Proceedings of the 2nd Western Atlantic Turtle Symposium. NOAA Technical Memorandum NMFS-SEFC-226.

Encalada, S.E., K.A. Bjorndal, A.B. Bolten, J.C. Zurita, B. Schroeder, E. Possardt, C.J. Sears, and B.W. Bowen. 1998. Population structure of loggerhead turtle (*Caretta caretta*) nesting colonies in the Atlantic and Mediterranean as inferred from mitochondrial DNA control region sequences. Marine Biology 130:567-575.

Ernest, R.G. and R.E. Martin. 1999. Martin County beach nourishment project: sea turtle monitoring and studies. 1997 annual report and final assessment. Unpublished report prepared for the Florida Department of Environmental Protection.

Fletemeyer, J. 1980. Sea turtle monitoring project. Unpublished report prepared for the Broward County Environmental Quality Control Board, Florida.

Foote, J. 2001. Telephone communication. November 5, 2001.

Foote, J. 2002. Telephone communication. January 7, 2002.

Glenn, L. 1998. The consequences of human manipulation of the coastal environment on hatchling loggerhead sea turtles (*Caretta caretta*, L.). Pages 58-59 *in* Byles, R., and Y. Fernandez (compilers). Proceedings of the Sixteenth Annual Symposium on Sea Turtle Biology and Conservation. NOAA Technical Memorandum NMFS-SEFSC-412.

Hirth, H.F. 1997. Synopsis of the biological data on the green turtle *Chelonia mydas* (Linnaeus 1758). U.S. Fish and Wildlife Service, Biological Report 97(1).

Hopkins, S.R. and J.I. Richardson (editors). 1984. Recovery plan for marine turtles. National Marine Fisheries Service, St. Petersburg, Florida.

Kaufman, W. and O. Pilkey. 1979. The beaches are moving. Anchor Press/Doubleday; Garden City, New York.

Komar, P.D. 1983. Coastal erosion in response to the construction of jetties and breakwaters. Pages 191-204 *in* Komar, P.D. (editor). CRC Handbook of Coastal Processes and Erosion. CRC Press; Boca Raton, Florida.

LeBuff, C.R., Jr. 1990. The loggerhead turtle in the eastern Gulf of Mexico. Caretta Research, Inc.; Sanibel Island, Florida.

Lenarz, M.S., N.B. Frazer, M.S. Ralston, and R.B. Mast. 1981. Seven nests recorded for loggerhead turtle (*Caretta caretta*) in one season. Herpetological Review 12(1):9.

Leonard, L.A., T.D. Clayton, and O.H. Pilkey. 1990. An analysis of replenished beach design parameters on U.S. East Coast barrier islands. Journal of Coastal Research 6(1):15-36.

Limpus, C.J., V. Baker, and J.D. Miller. 1979. Movement induced mortality of loggerhead eggs. Herpetologica 35(4):335-338.

Mann, T.M. 1977. Impact of developed coastline on nesting and hatchling sea turtles in southeastern Florida. M.S. thesis. Florida Atlantic University, Boca Raton, Florida.

Martin, E. 1992. Personal communication. Biologist. Ecological Associates, Inc. Jensen Beach, Florida.

McGehee, M.A. 1990. Effects of moisture on eggs and hatchlings of loggerhead sea turtles (*Caretta caretta*). Herpetologica 46(3):251-258.

Meylan, A. 1992. Hawksbill turtle *Eretmochelys imbricata*. Pages 95-99 *in* Moler, P.E. (editor). Rare and Endangered Biota of Florida, Volume III. University Press of Florida, Gainesville, Florida.

Meylan, A. 1995. Fascimile dated April 5, 1995, to Sandy MacPherson, National Sea Turtle Coordinator, U.S. Fish and Wildlife Service, Jacksonville, Florida. Florida Department of Environmental Protection. St. Petersburg, Florida.

Meylan, A.B. and M. Donnelly. 1999. Status justification for listing the hawksbill turtle (*Eretmochelys imbricata*) as critically endangered on the 1996 IUCN *Red List of Threatened Animals*. Chelonian Conservation and Biology 3(2):200-224.

Meylan, A., B. Schroeder, and A. Mosier. 1995. Sea turtle nesting activity in the State of Florida 1979-1992. Florida Marine Research Publications Number 52, St. Petersburg, Florida.

Miller, K., G.C. Packard, and M.J. Packard. 1987. Hydric conditions during incubation influence locomotor performance of hatchling snapping turtles. Journal of Experimental Biology 127:401-412.

Mrosovsky, N. and A. Carr. 1967. Preference for light of short wavelengths in hatchling green sea turtles (*Chelonia mydas*), tested on their natural nesting beaches. Behavior 28:217-231.

Mrosovsky, N. and S.J. Shettleworth. 1968. Wavelength preferences and brightness cues in water finding behavior of sea turtles. Behavior 32:211-257.

Murphy, S. 1996. Personal communication. Biologist. South Carolina Department of Natural Resources. Charleston, South Carolina.

Murphy, T.M. and S.R. Hopkins. 1984. Aerial and ground surveys of marine turtle nesting beaches in the southeast region. Unpublished report prepared for the National Marine Fisheries Service.

National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1991a. Recovery plan for U.S. population of Atlantic green turtle (*Chelonia mydas*). National Marine Fisheries Service, Washington, D.C.

National Marine Fisheries Service and U.S. Fish and Wildlife Service. 1991b. Recovery plan for U.S. population of loggerhead turtle (*Caretta caretta*). National Marine Fisheries Service, Washington, D.C.

National Research Council. 1990a. Decline of the sea turtles: causes and prevention. National Academy Press; Washington, D.C.

National Research Council. 1990b. Managing coastal erosion. National Academy Press; Washington, D.C.

National Research Council. 1995. Beach nourishment and protection. National Academy Press; Washington, D.C.

Nelson, D.A. 1987. The use of tilling to soften nourished beach sand consistency for nesting sea turtles. Unpublished report of the U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, Mississippi.

Nelson, D.A. 1988. Life history and environmental requirements of loggerhead turtles. U.S. Fish and Wildlife Service Biological Report 88(23). U.S. Army Corps of Engineers TR EL-86-2 (Rev.).

Nelson, D.A. and B. Blihovde. 1998. Nesting sea turtle response to beach scarps. Page 113 *in* Byles, R., and Y. Fernandez (compilers). Proceedings of the Sixteenth Annual Symposium on Sea Turtle Biology and Conservation. NOAA Technical Memorandum NMFS-SEFSC-412.

Nelson, D.A. and D.D. Dickerson. 1987. Correlation of loggerhead turtle nest digging times with beach sand consistency. Abstract of the 7th Annual Workshop on Sea Turtle Conservation and Biology.

Nelson, D.A. and D.D. Dickerson. 1988a. Effects of beach nourishment on sea turtles. *In* Tait, L.S. (editor). Proceedings of the Beach Preservation Technology Conference '88. Florida Shore & Beach Preservation Association, Inc., Tallahassee, Florida.

Nelson, D.A. and D.D. Dickerson. 1988b. Hardness of nourished and natural sea turtle nesting beaches on the east coast of Florida. Unpublished report of the U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, Mississippi.

Nelson, D.A. and D.D. Dickerson. 1988c. Response of nesting sea turtles to tilling of compacted beaches, Jupiter Island, Florida. Unpublished report of the U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, Mississippi.

Nelson, D.A., K. Mauck, and J. Fletemeyer. 1987. Physical effects of beach nourishment on sea turtle nesting, Delray Beach, Florida. Technical Report EL-87-15. U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, Mississippi.

Olsen, E.J. 1999. Memorandum dated May 24, 1999, to Rose Poyner, Chuck Sultzman, Mary Saunders, Karen Moody, and Sandy MacPherson. Olsen Associates, Inc. Jacksonville, Florida.

Packard, G.C., M.J. Packard, and T.J. Boardman. 1984. Influence of hydration of the environment on the pattern of nitrogen excretion by embryonic snapping turtles (*Chelydra serpentina*). Journal of Experimental Biology 108:195-204.

Packard, G.C., M.J. Packard, and W.H.N. Gutzke. 1985. Influence of hydration of the environment on eggs and embryos of the terrestrial turtle *Terrapene ornata*. Physiological Zoology 58(5):564-575.

Packard,G.C., M.J. Packard, T.J. Boardman, and M.D. Ashen. 1981. Possible adaptive value of water exchange in flexible-shelled eggs of turtles. Science 213:471-473.

Packard G.C., M.J. Packard, K. Miller, and T.J. Boardman. 1988. Effects of temperature and moisture during incubation on carcass composition of hatchling snapping turtles (*Chelydra serpentina*). Journal of Comparative Physiology B 158:117-125.

Packard, M.J. and G.C. Packard. 1986. Effect of water balance on growth and calcium mobilization of embryonic painted turtles (*Chrysemys picta*). Physiological Zoology 59(4):398-405.

Parmenter, C.J. 1980. Incubation of the eggs of the green sea turtle, *Chelonia mydas*, in Torres Strait, Australia: the effect of movement on hatchability. Australian Wildlife Research 7:487-491.

Philbosian, R. 1976. Disorientation of hawksbill turtle hatchlings (*Eretmochelys imbricata*) by stadium lights. Copeia 1976:824.

Pilkey, O.H. and K.L. Dixon. 1996. The Corps and the shore. Island Press; Washington, D.C.

Raymond, P.W. 1984. The effects of beach restoration on marine turtles nesting in south Brevard County, Florida. M.S. thesis. University of Central Florida, Orlando, Florida.

Richardson, J.I. and T.H. Richardson. 1982. An experimental population model for the loggerhead sea turtle (*Caretta caretta)*. Pages 165-176 *in* Bjorndal, K.A. (editor). Biology and Conservation of Sea Turtles. Smithsonian Institution Press; Washington, D.C.

Ross, J.P. 1982. Historical decline of loggerhead, ridley, and leatherback sea turtles. Pages 189-195 *in* Bjorndal, K.A. (editor). Biology and Conservation of Sea Turtles. Smithsonian Institution Press; Washington, D.C.

Schroeder, B.A. 1994. Florida index nesting beach surveys: are we on the right track? Pages 132-133 *in* Bjorndal, K.A., A.B. Bolten, D.A. Johnson, and P.J. Eliazar (compilers). Proceedings of the 14th Annual Symposium on Sea Turtle Biology and Conservation. NOAA Technical Memorandum NMFS-SEFSC-351.

Spotila, J.R., E.A. Standora, S.J. Morreale, G.J. Ruiz, and C. Puccia. 1983. Methodology for the study of temperature related phenomena affecting sea turtle eggs. U.S. Fish and Wildlife Service Endangered Species Report 11.

Talbert, O.R., Jr., S.E. Stancyk, J.M. Dean, and J.M. Will. 1980. Nesting activity of the loggerhead turtle (*Caretta caretta*) in South Carolina I: a rookery in transition. Copeia 1980(4):709-718.

Turtle Expert Working Group. 1998. An assessment of the Kemp's ridley (*Lepidochelys kempii*) and loggerhead (*Caretta caretta*) sea turtle populations in the western North Atlantic. NOAA Technical Memorandum NMFS-SEFSC-409.

Turtle Expert Working Group. 2000. Assessment update for the Kemp's ridley and loggerhead sea turtle populations in the western North Atlantic. NOAA Technical Memorandum NMFS-SEFSC-444.

U.S. Fish and Wildlife Service. 1999. South Florida Multi-Species Recovery Plan. Atlanta, Georgia.

Winn, B. 1996. Personal communication. Biologist. Georgia Department of Natural Resources. Brunswick, Georgia.

Witherington, B.E. 1992. Behavioral responses of nesting sea turtles to artificial lighting. Herpetologica 48:31-39.

Witherington, B.E. and K.A. Bjorndal. 1991. Influences of artificial lighting on the seaward orientation of hatchling loggerhead turtles (*Caretta caretta*). Biological Conservation 55:139-149.

Witherington, B.E. and L.M. Ehrhart. 1989. Status and reproductive characteristics of green turtles (*Chelonia mydas*) nesting in Florida. Pages 351-352 *in* Ogren, L., F. Berry, K. Bjorndal, H. Kumpf, R. Mast, G. Medina, H. Reichart, and R. Witham (editors). Proceedings of the Second Western Atlantic Turtle Symposium. NOAA Technical Memorandum NMFS-SEFC-226.

Wyneken, J., L. DeCarlo, L. Glenn, M. Salmon, D. Davidson, S. Weege., and L. Fisher. 1998. On the consequences of timing, location and fish for hatchlings leaving open beach hatcheries. Pages 155-156 *in* Byles, R. and Y. Fernandez (compilers). Proceedings of the Sixteenth Annual Symposium on Sea Turtle Biology and Conservation. NOAA Technical Memorandum NMFS-SEFSC-412.

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
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SHORE PROTECTION PROJECT FEASIBILITY REPORT

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APPENDIX A
ENGINEERING DESIGN AND COST ESTIMATE
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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.

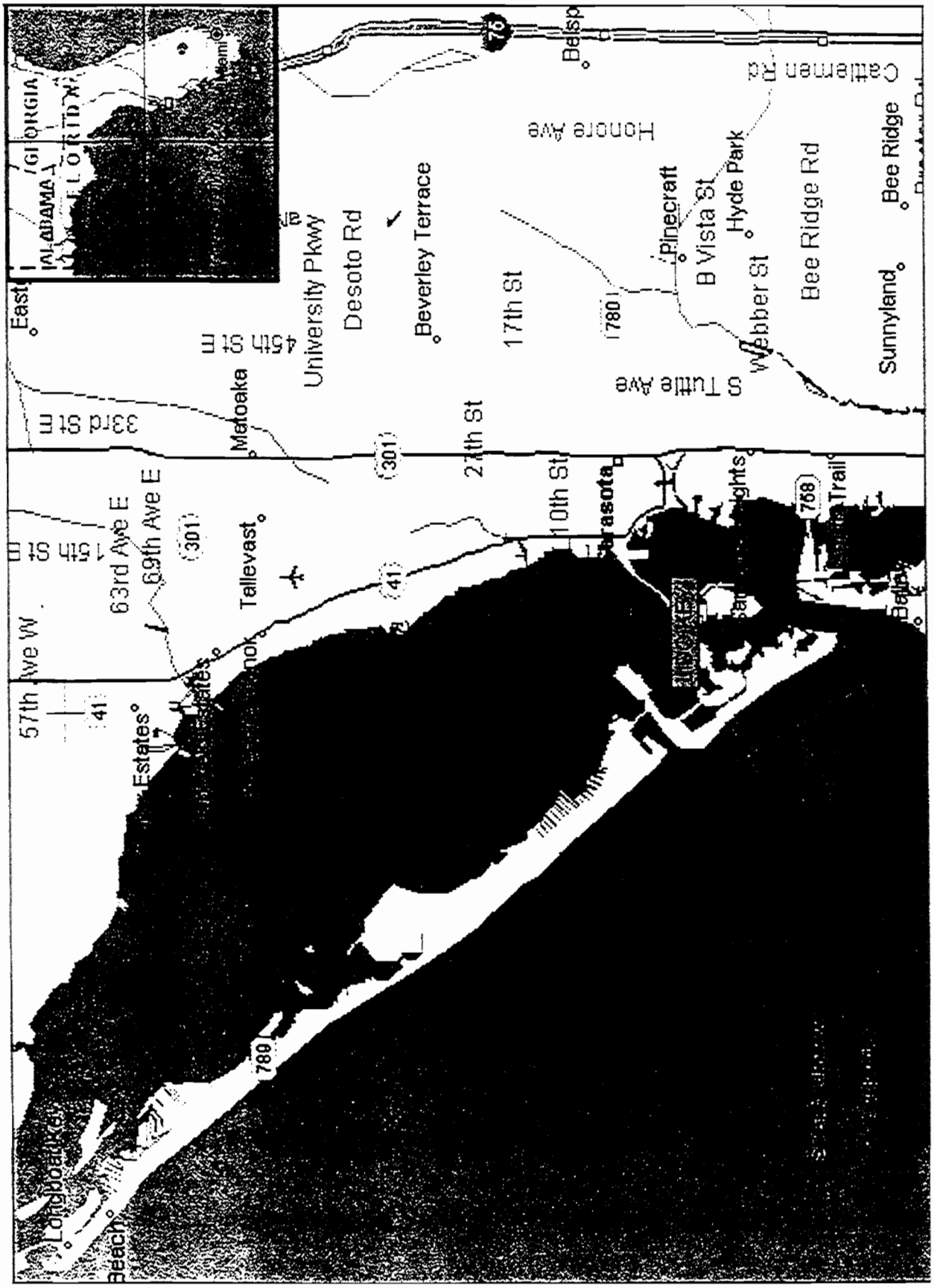


FIGURE A-1

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

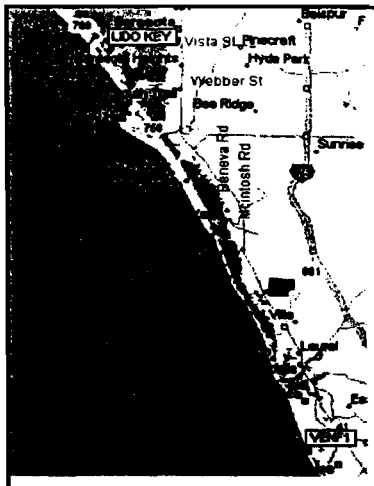
Winds and Tides

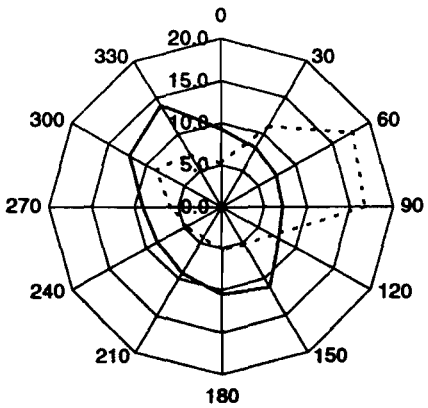
A-7. Local winds are the primary generating mechanism of short period waves in the project area. The wind distribution is based on measurements at NOAA Buoy VENF1, 19 miles south of the project area (NOAA, 2000), and appears in Figure A-2. Typical prevailing winds are from the northeast through the east, 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,

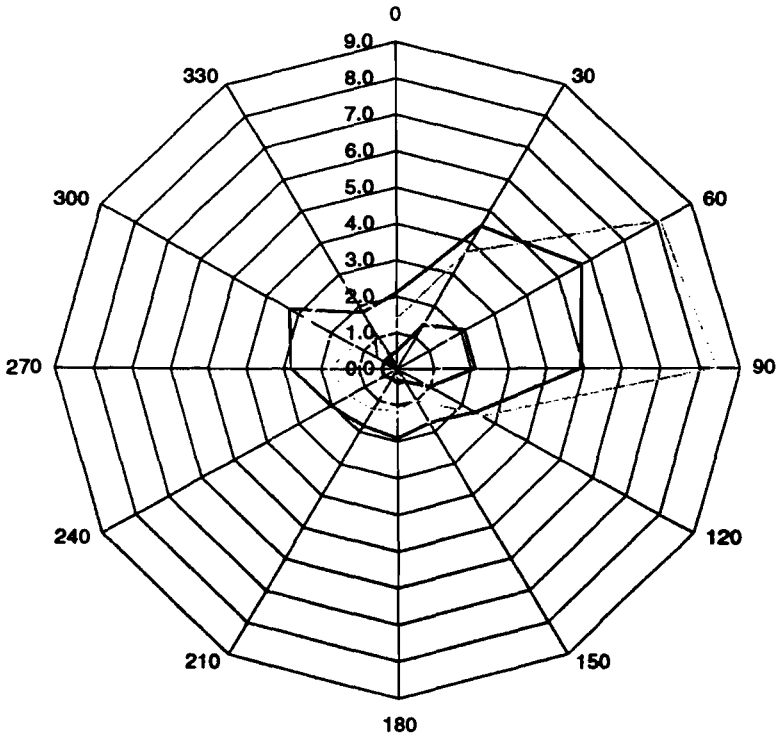




- - - - - Percentage of all Wind Speed Measurements ——— Mean Wind Speed (mph)

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

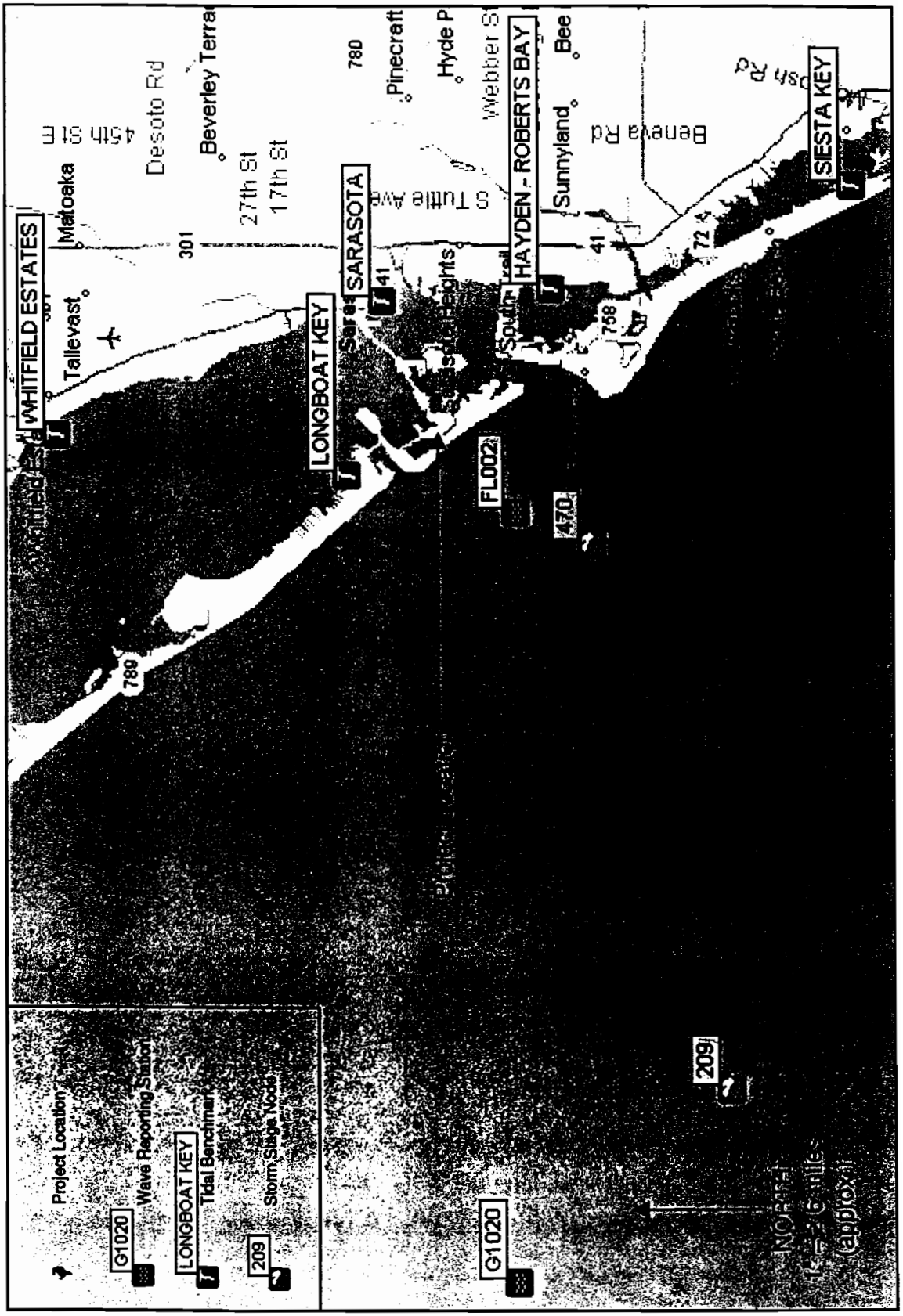


FIGURE A-3

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

TABLE A-1

Tidal Datums, Lido Key, Florida

Station	Latitude N deg.	Latitude N min.	Longitude W deg.	Longitude W min.	HIGHEST OBSERVED WATER LEVEL (ft NGVD)	MEAN HIGHER HIGH WATER (MHHW) (ft NGVD)	MEAN HIGH WATER (MHW) (ft NGVD)	MEAN TIDE LEVEL (MTL) (ft NGVD)	MEAN LOW WATER (MLW) (ft NGVD)	MEAN LOWER LOW WATER (MLLW) (ft NGVD)	LOWEST OBSERVED WATER LEVEL (ft NGVD)	HIGHEST OBSERVED WATER LEVEL	LOWEST OBSERVED WATER LEVEL
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.

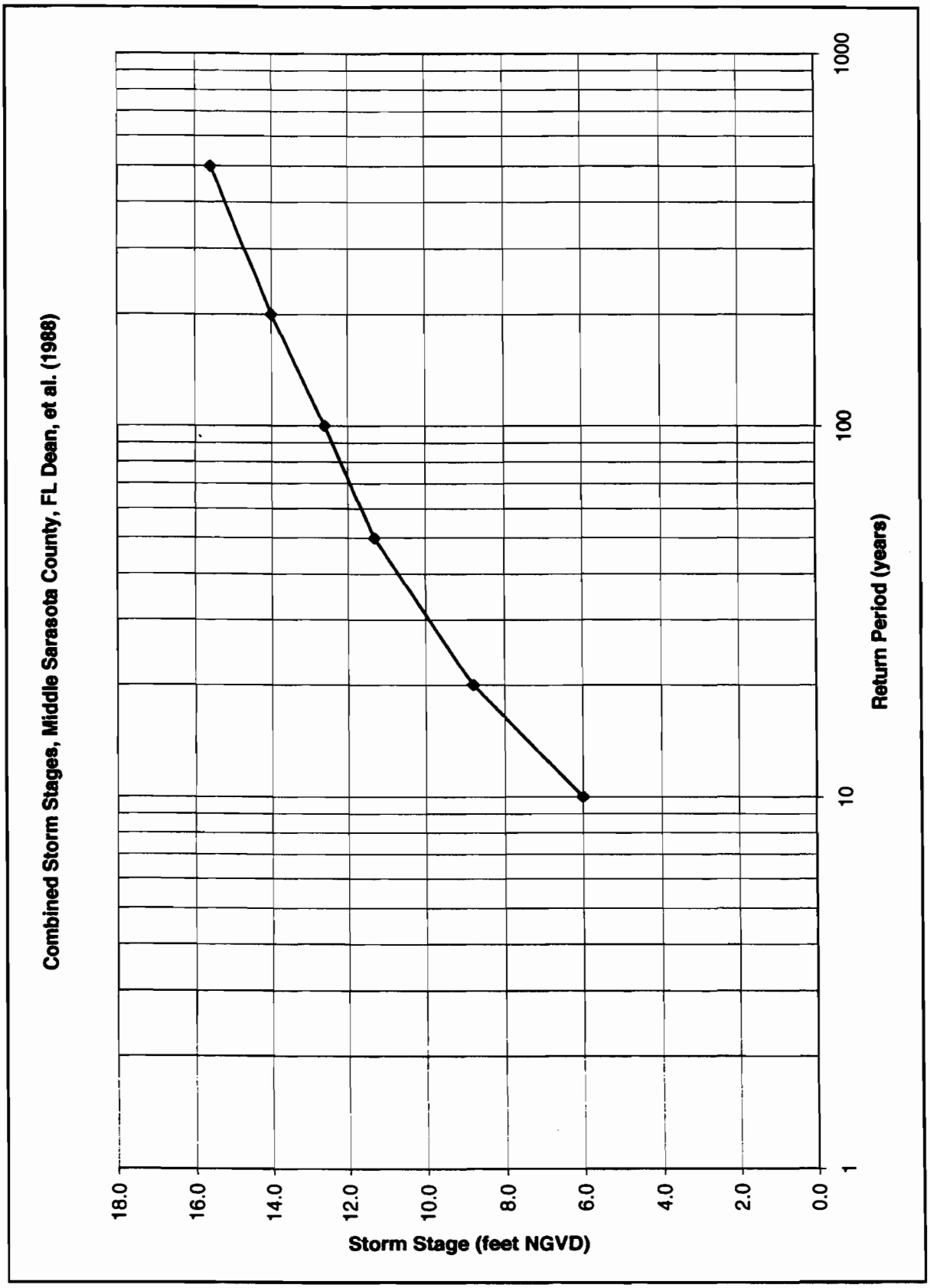


FIGURE A-4

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.

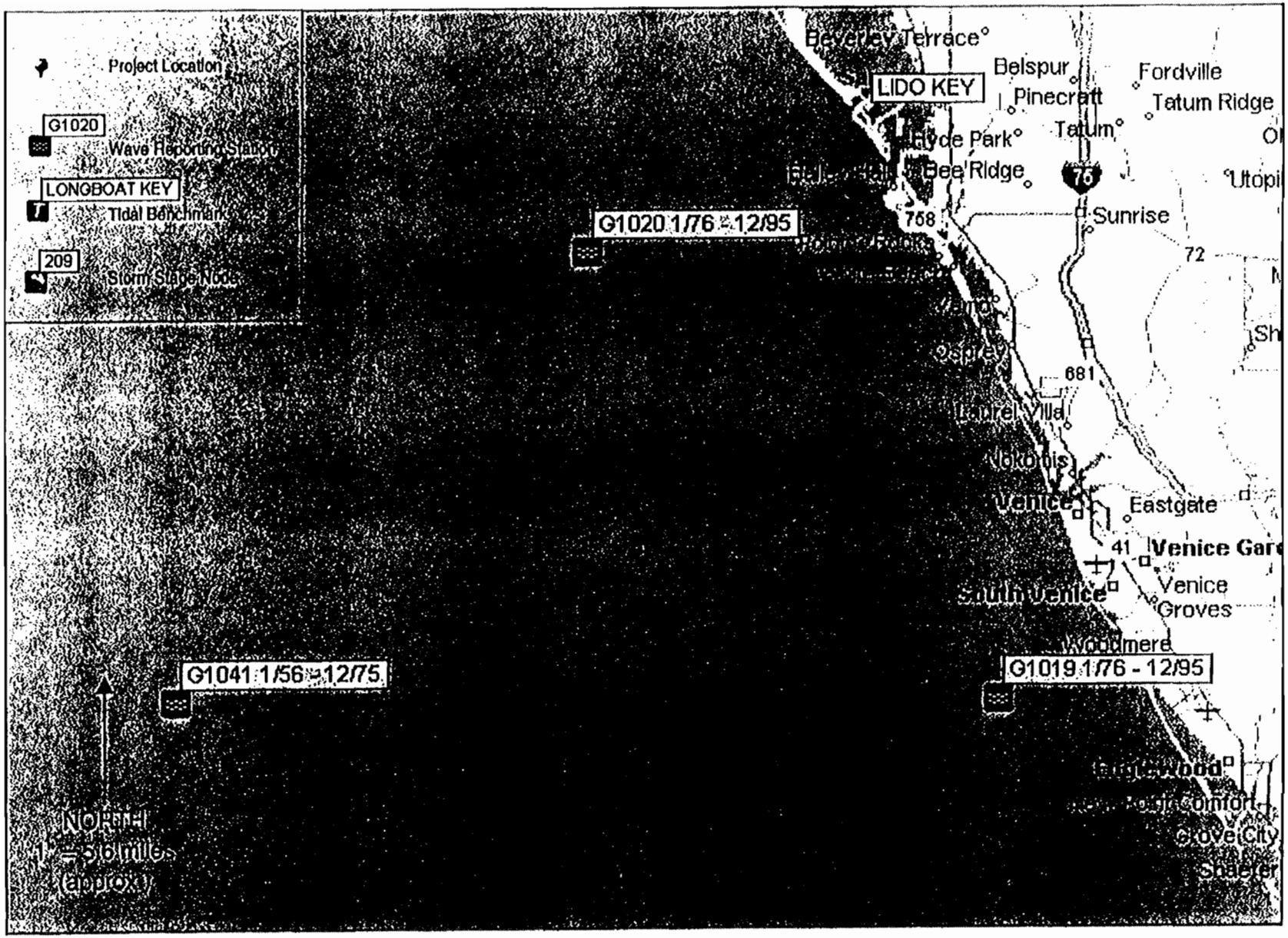


FIGURE A-5

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

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

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Annual
	MEAN WAVE HEIGHT H_{mo} in feet:												
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
YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Annual
	MAXIMUM WAVE HEIGHT H_{mo} in feet:												
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
YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Annual
	MEAN PEAK WAVE PERIOD T_p in seconds:												
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
YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Annual
	MAXIMUM PEAK WAVE PERIOD T_p in seconds:												
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

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Annual
	PEAK WAVE PERIOD T_p ASSOCIATED WITH LARGEST WAVE in seconds:												
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
YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Annual
	MEAN WAVE DIRECTION in degrees:												
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
YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Annual
	DIRECTION ASSOCIATED WITH LARGEST WAVE in degrees:												
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

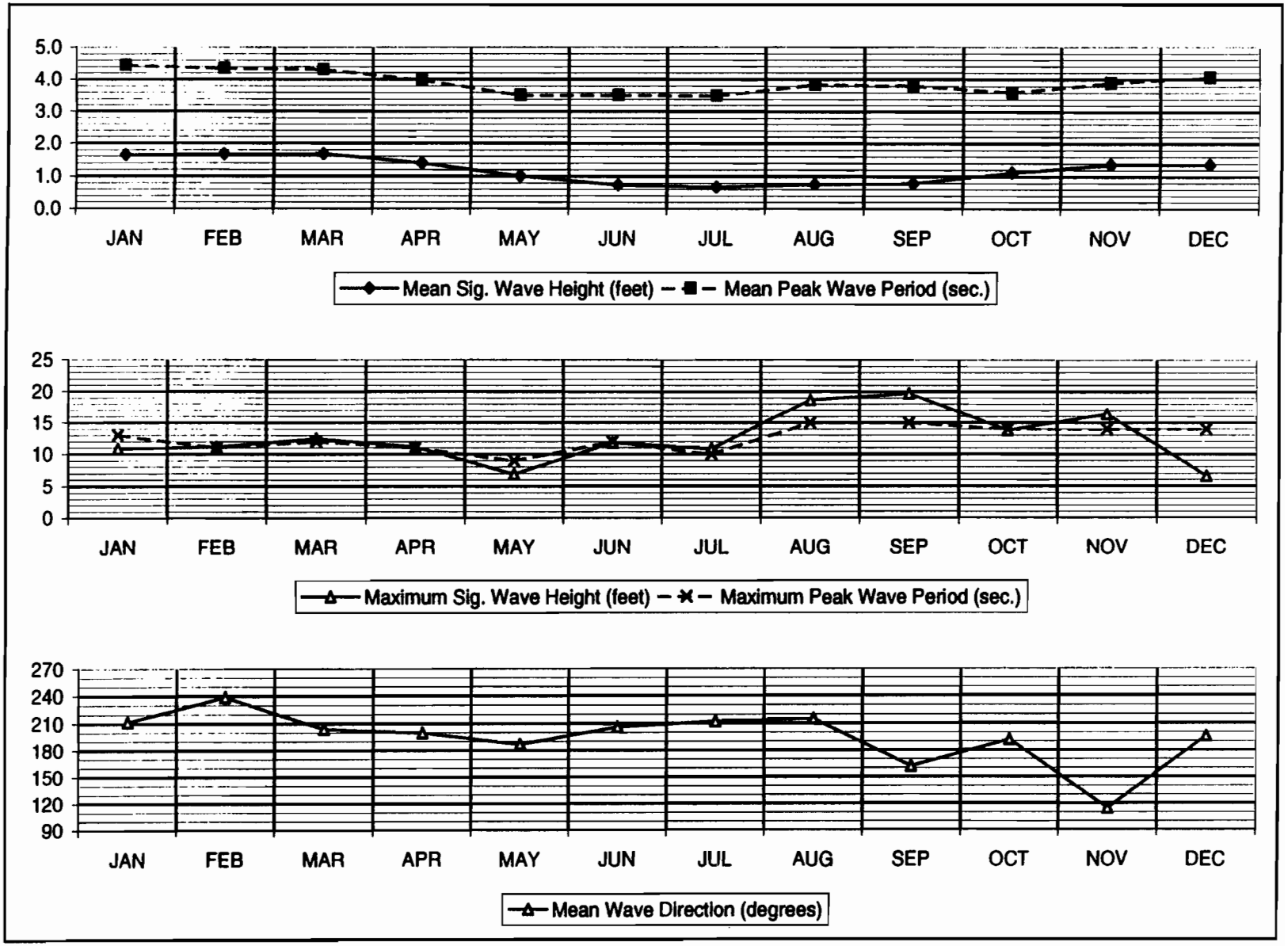


FIGURE A-6

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

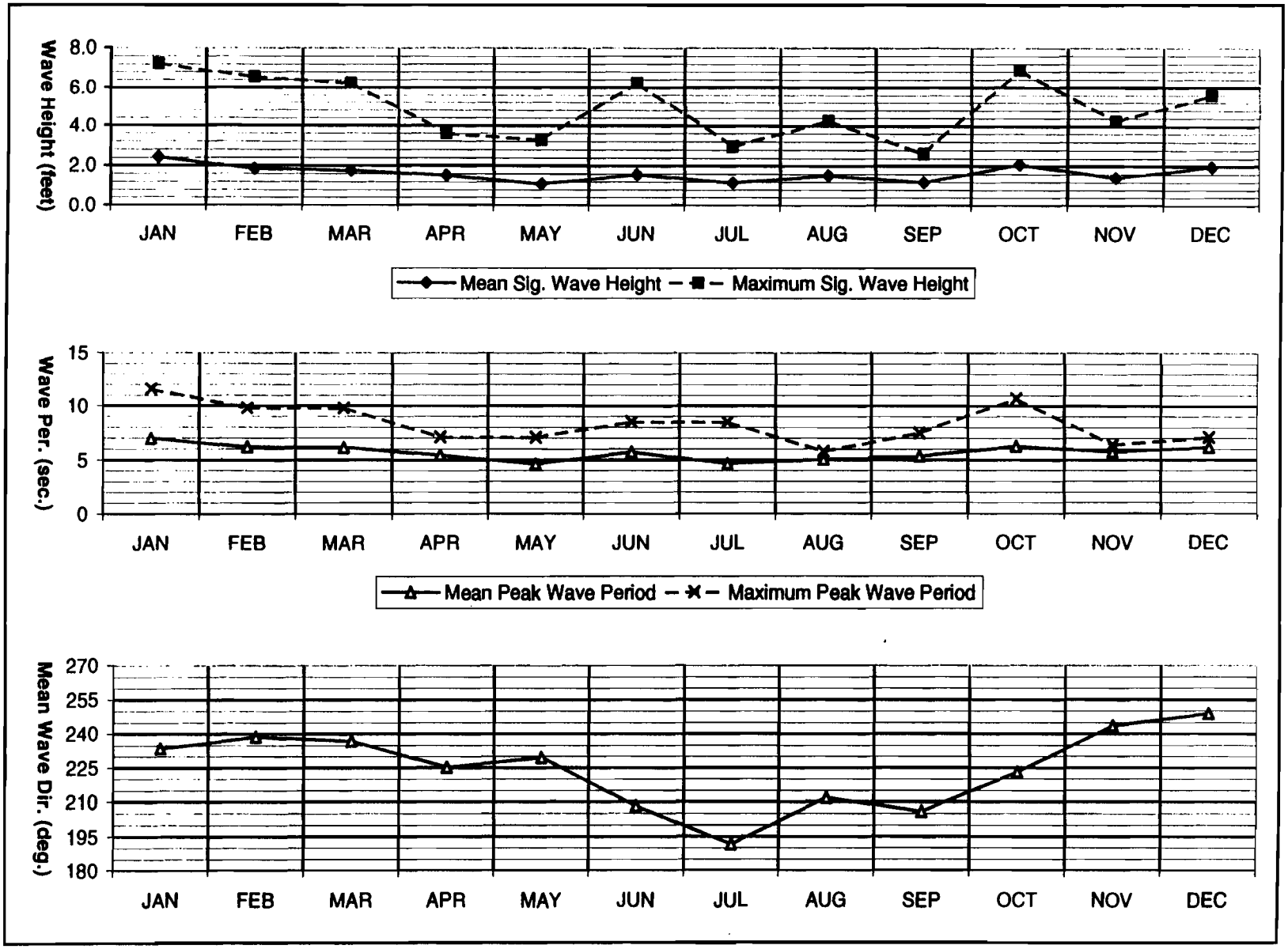


FIGURE A-7

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

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

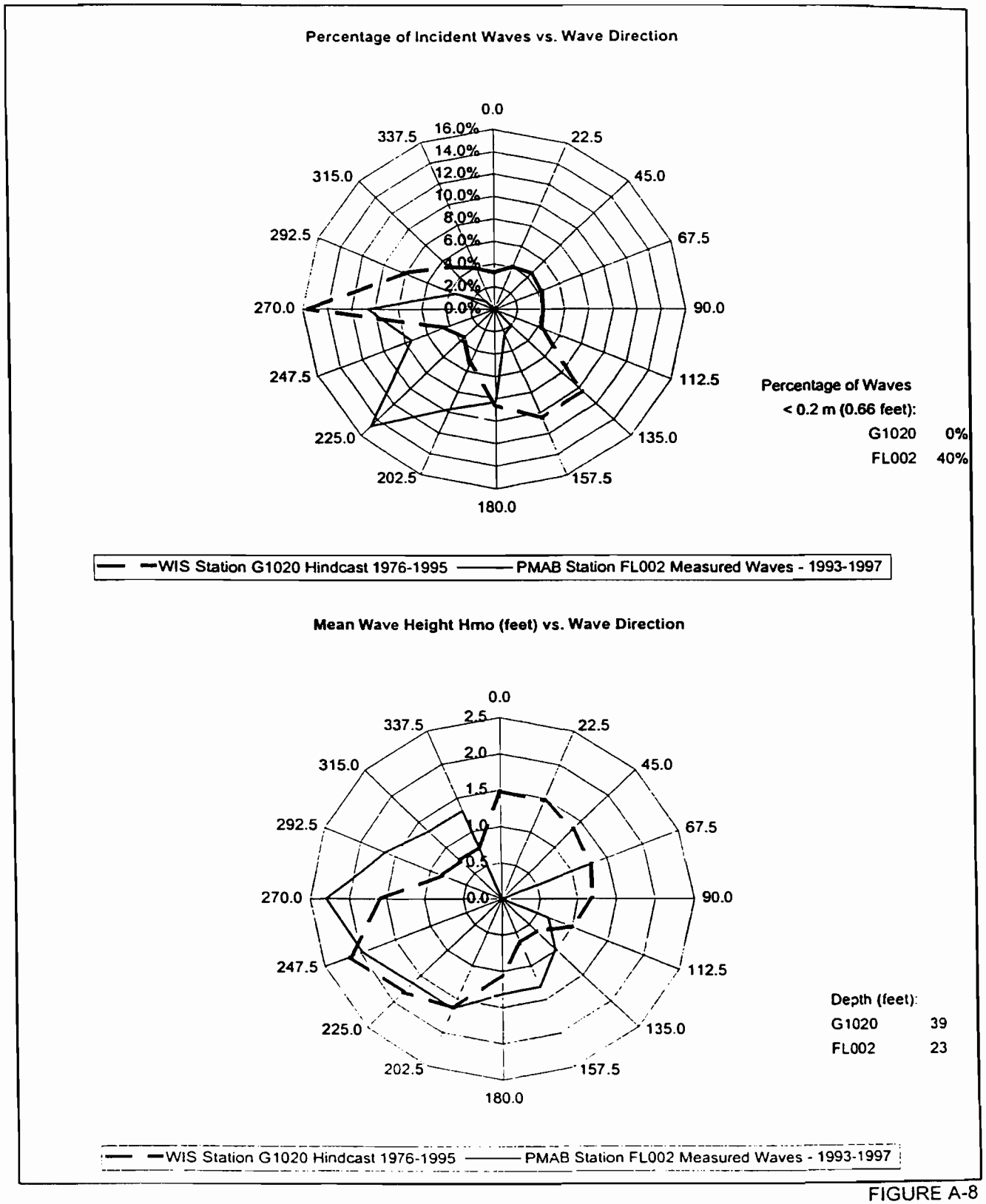
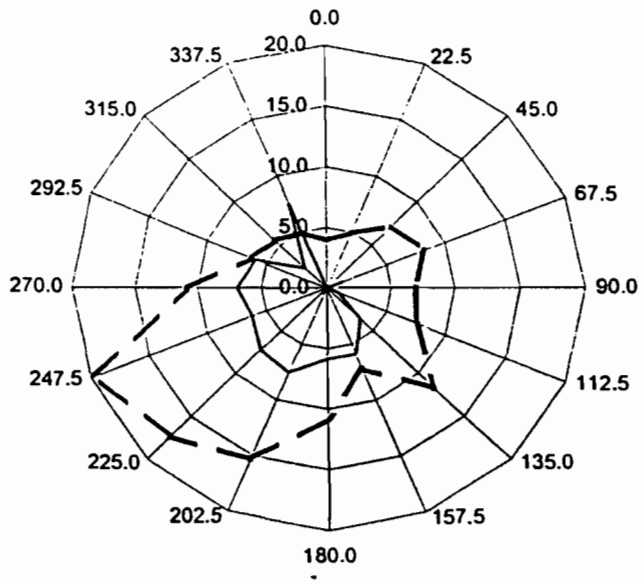


FIGURE A-8

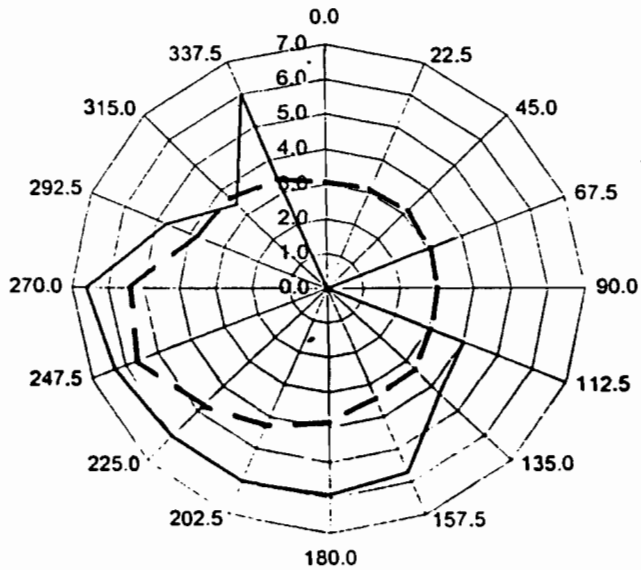
DIRECTIONAL WAVE STATISTICS, LIDO KEY, FLORIDA

Maximum Wave Height Hmo (feet) vs. Wave Direction



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

Mean Peak Wave Period (seconds) vs. Wave Direction



Depth (feet):	
G1020	39
FL002	23

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

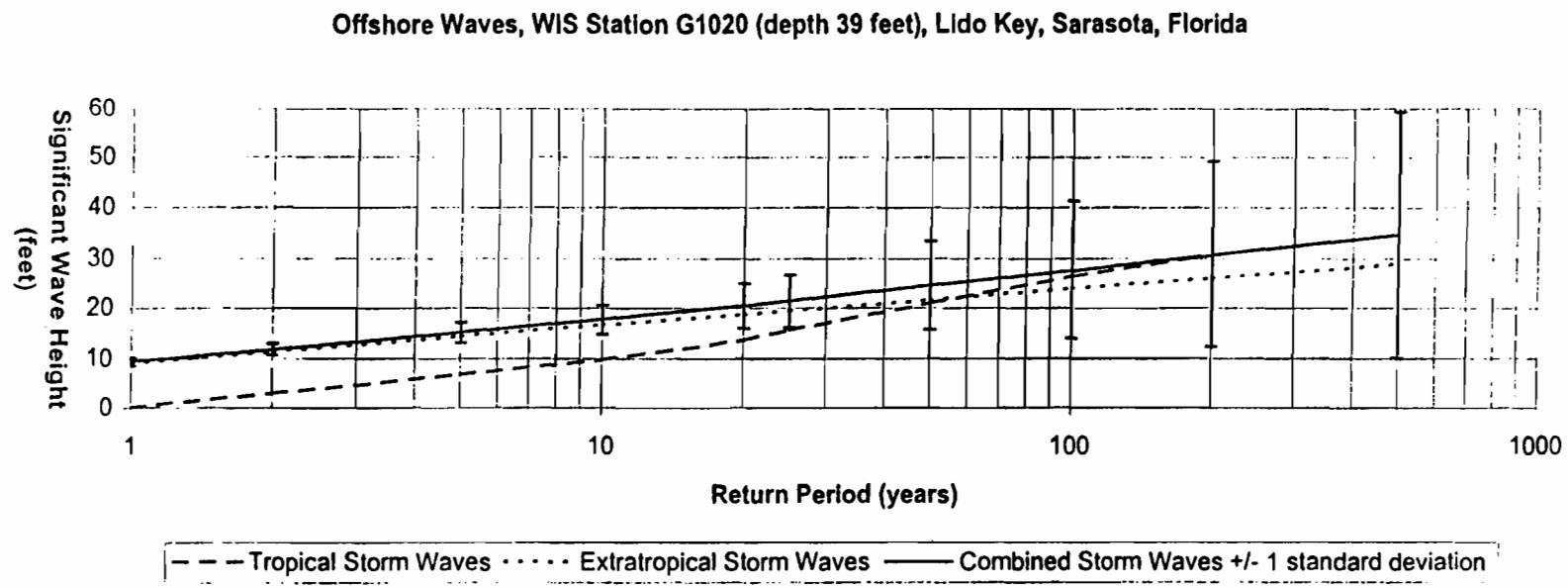
FIGURE A-9

DIRECTIONAL WAVE STATISTICS, LIDO KEY, FLORIDA

TABLE A-8

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

Return Period (years)	Tropical Storm Waves				Extratropical Storm Waves				Combined Storm Wave Distribution			
	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



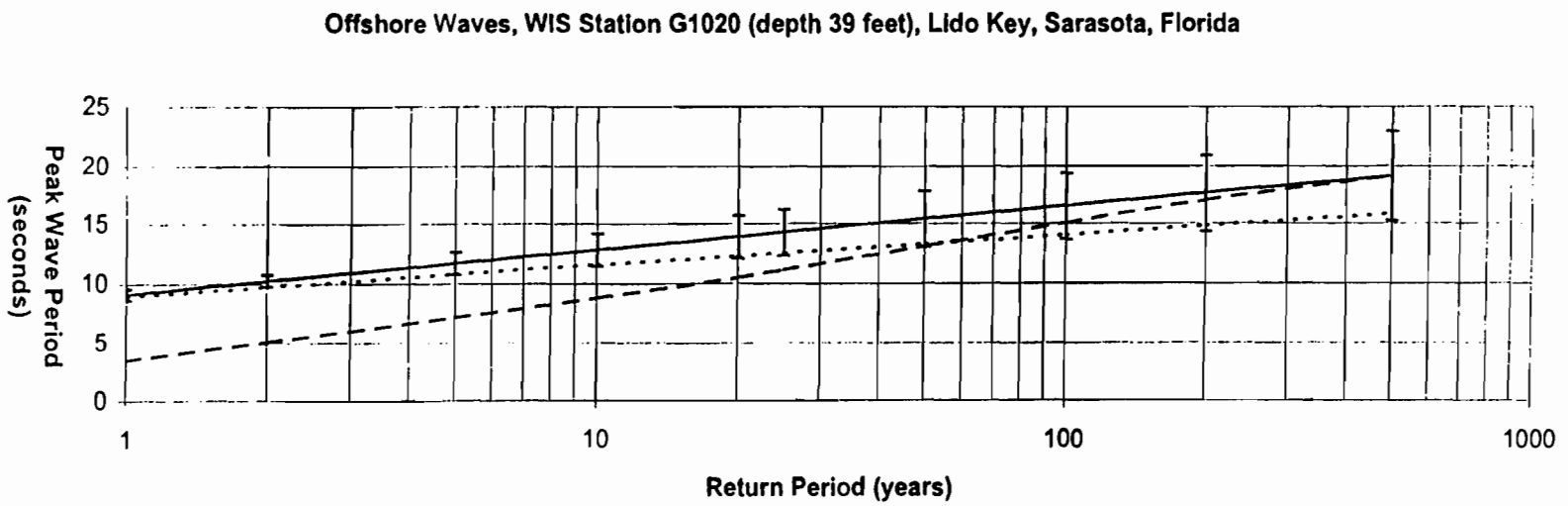


FIGURE A-10

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:

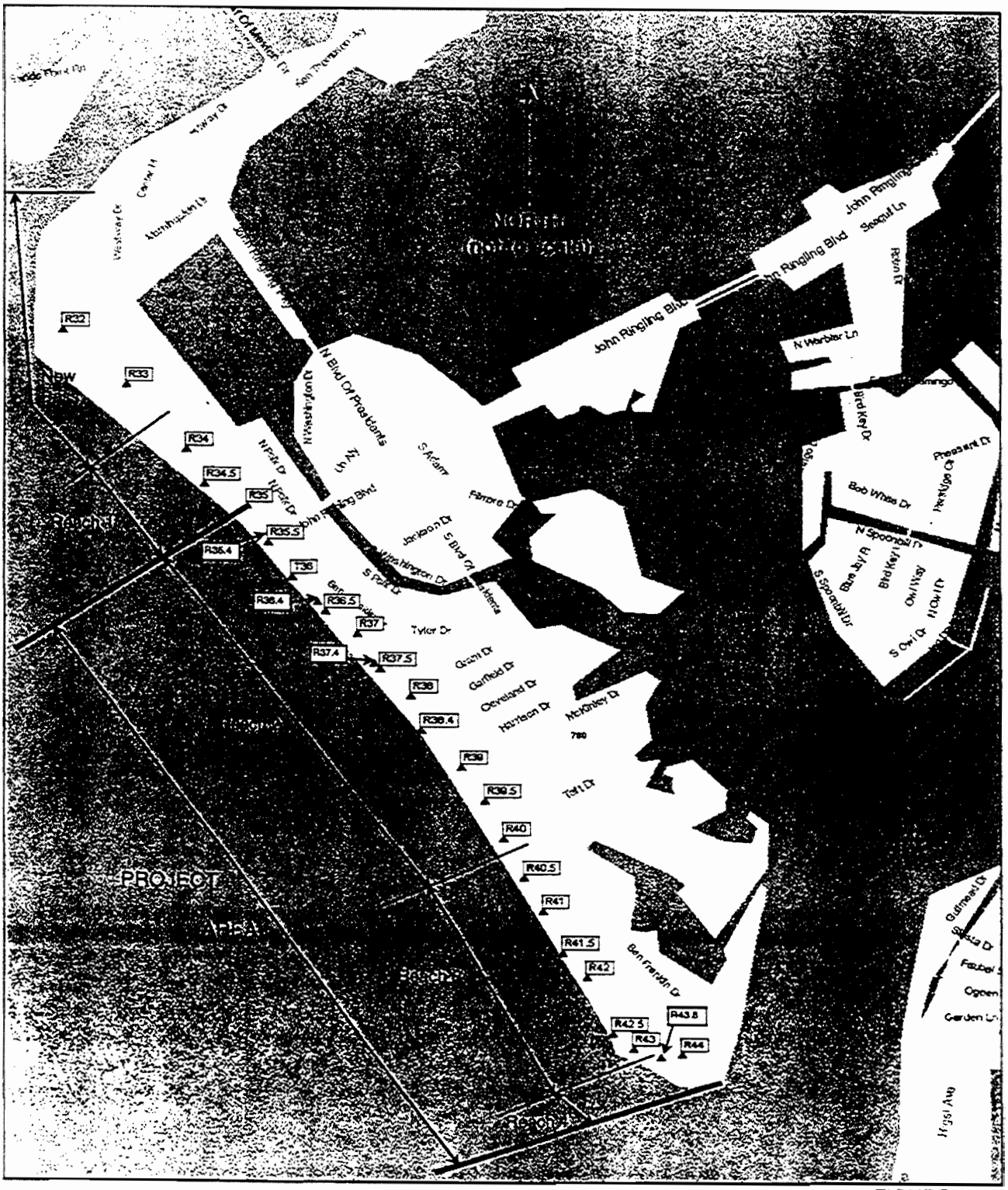


FIGURE A-11

REACH DELINEATION, LIDO KEY, SARASOTA, FL

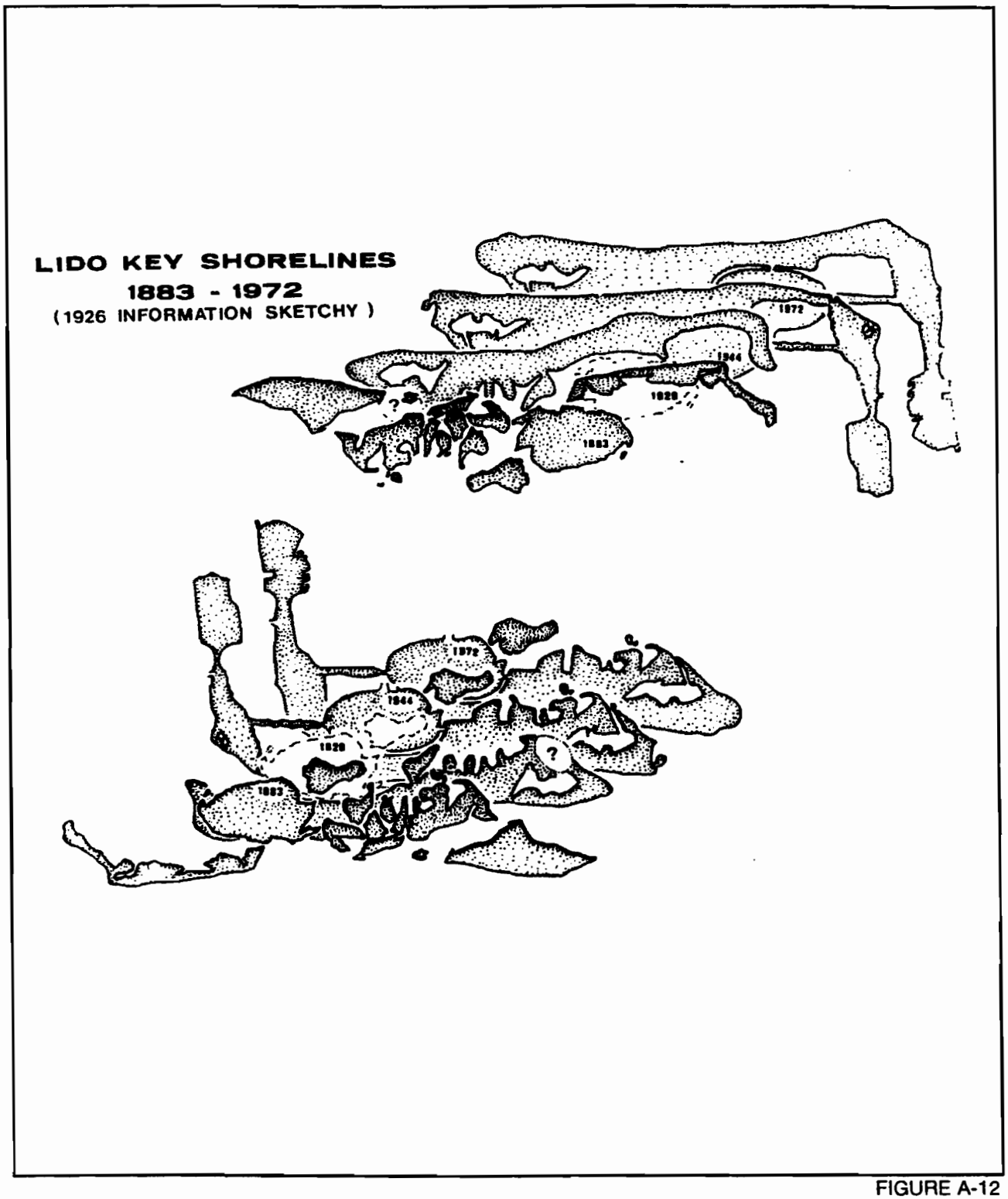


FIGURE A-12

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

Monument Name	SHORELINE CHANGE (FEET) 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

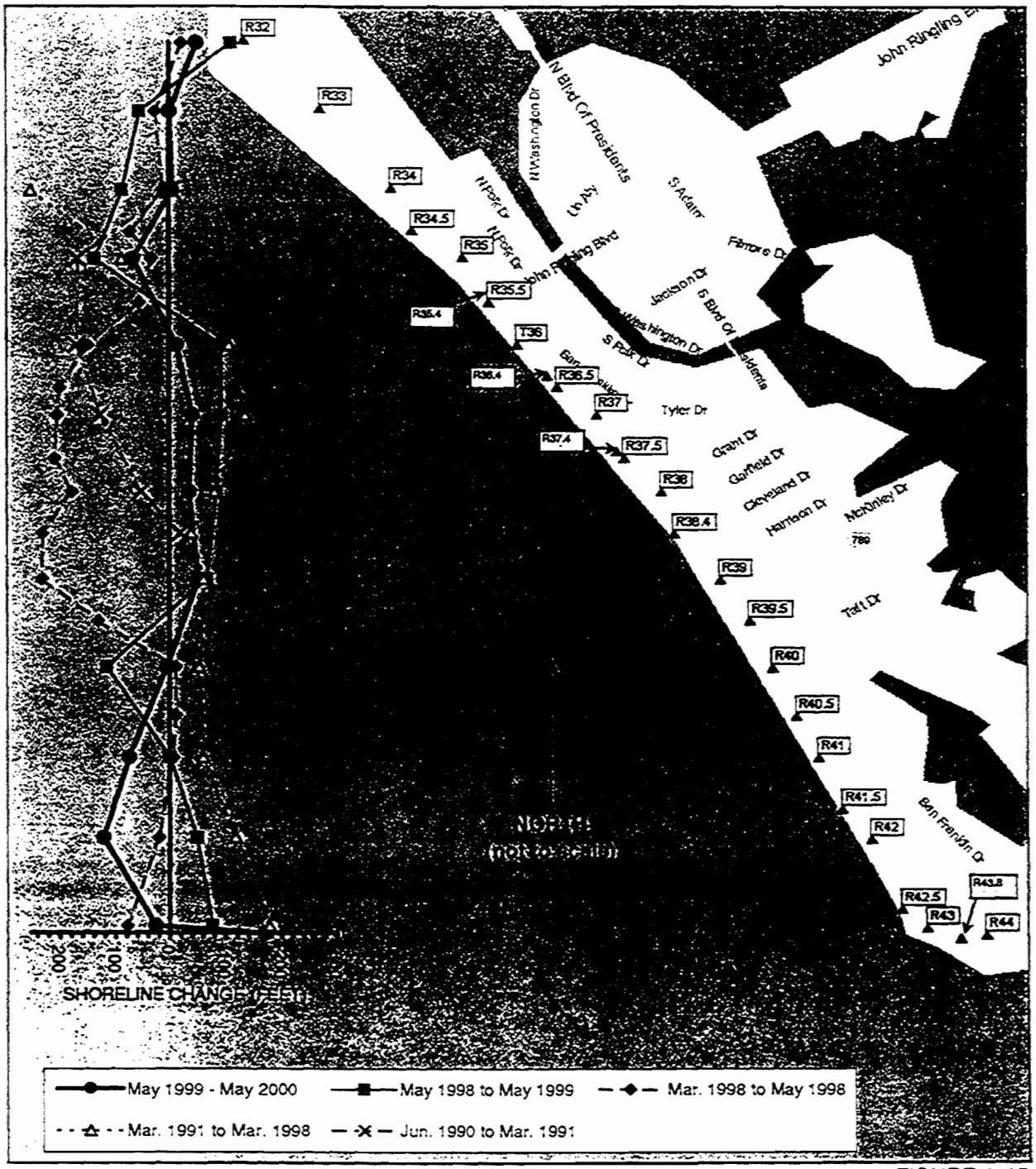


FIGURE A-15

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.

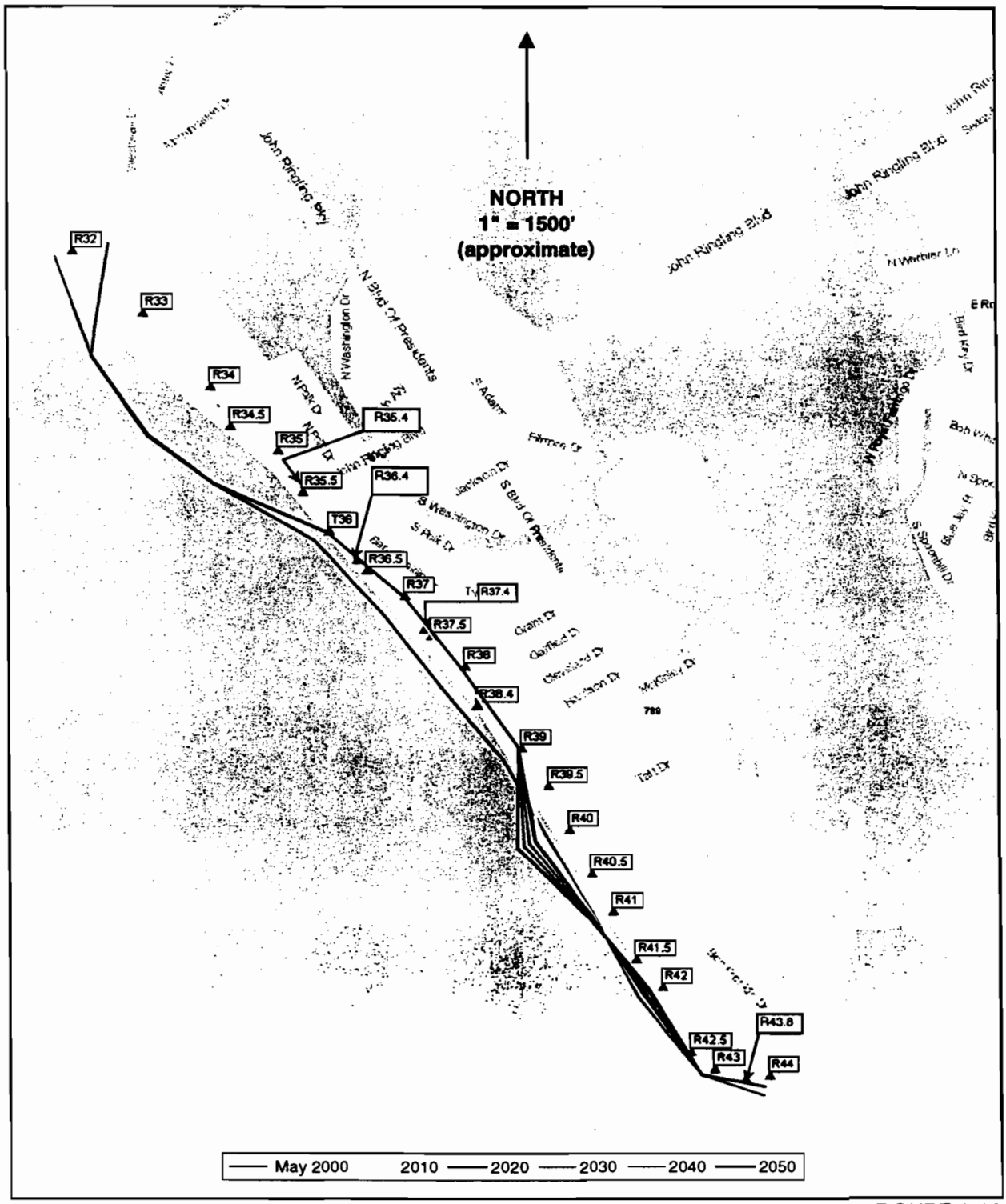


FIGURE A-16

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.

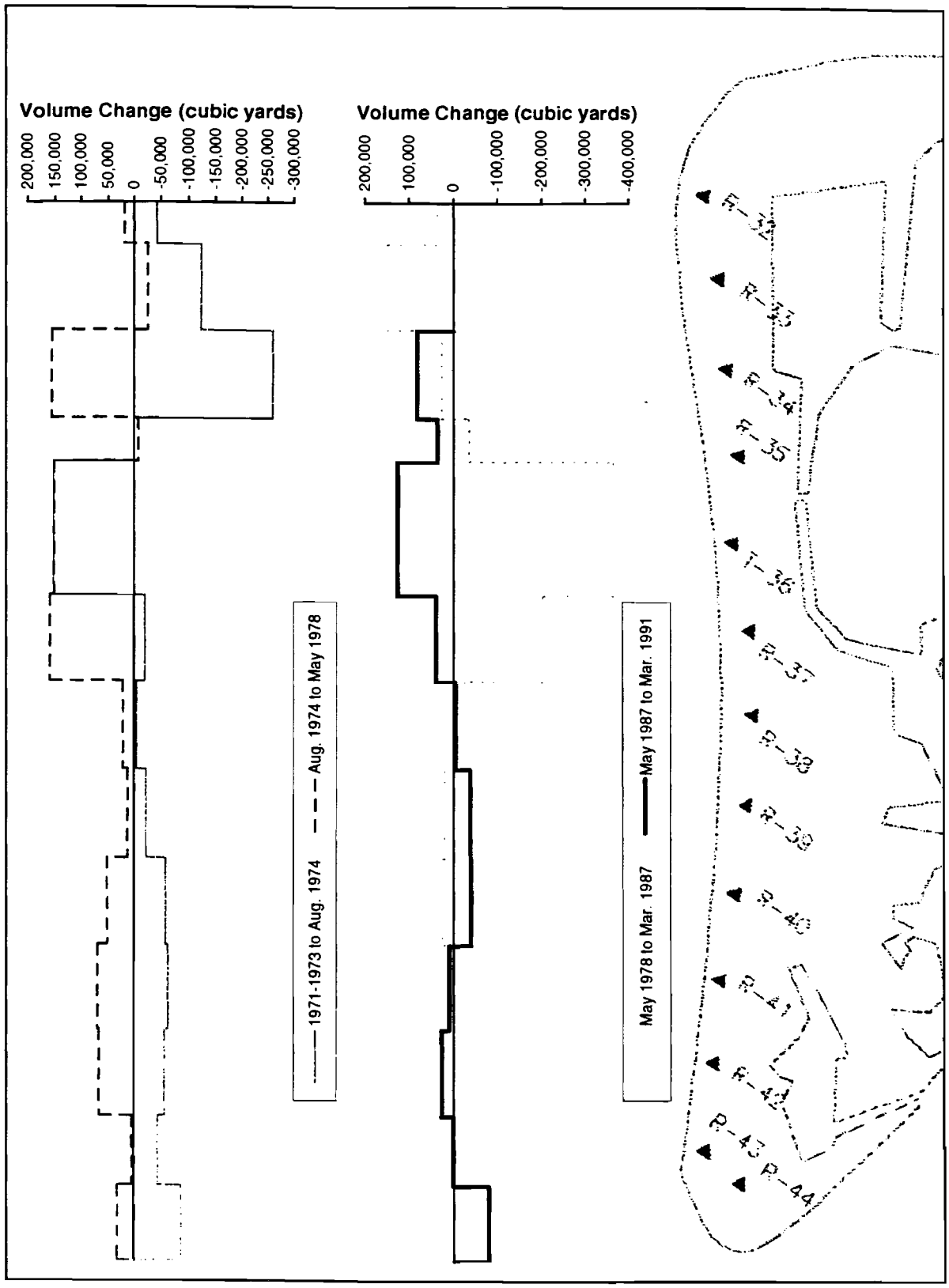


FIGURE A-17

VOLUME CHANGES, 1971-1991, LIDO KEY, FL

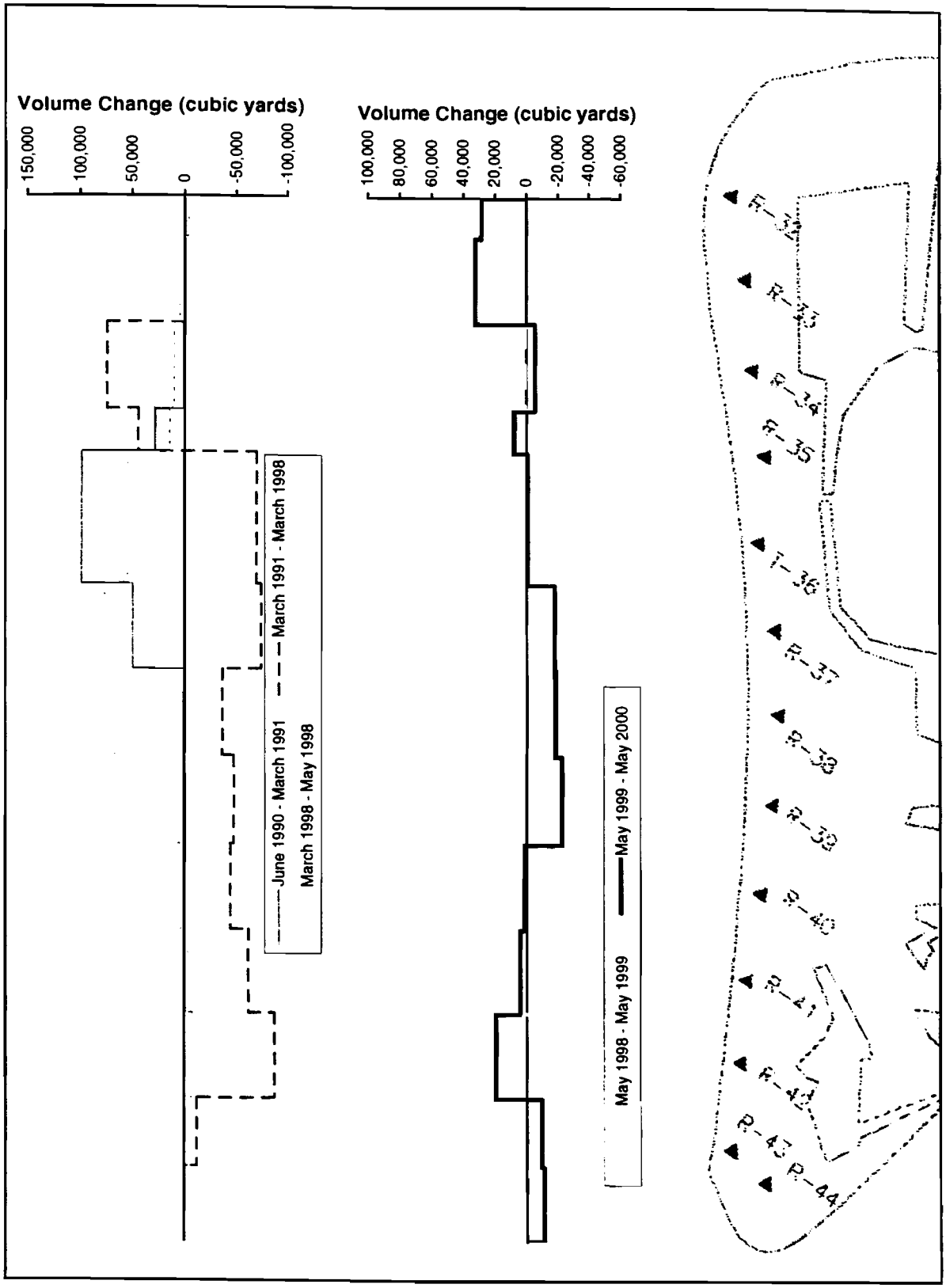


FIGURE A-18

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.

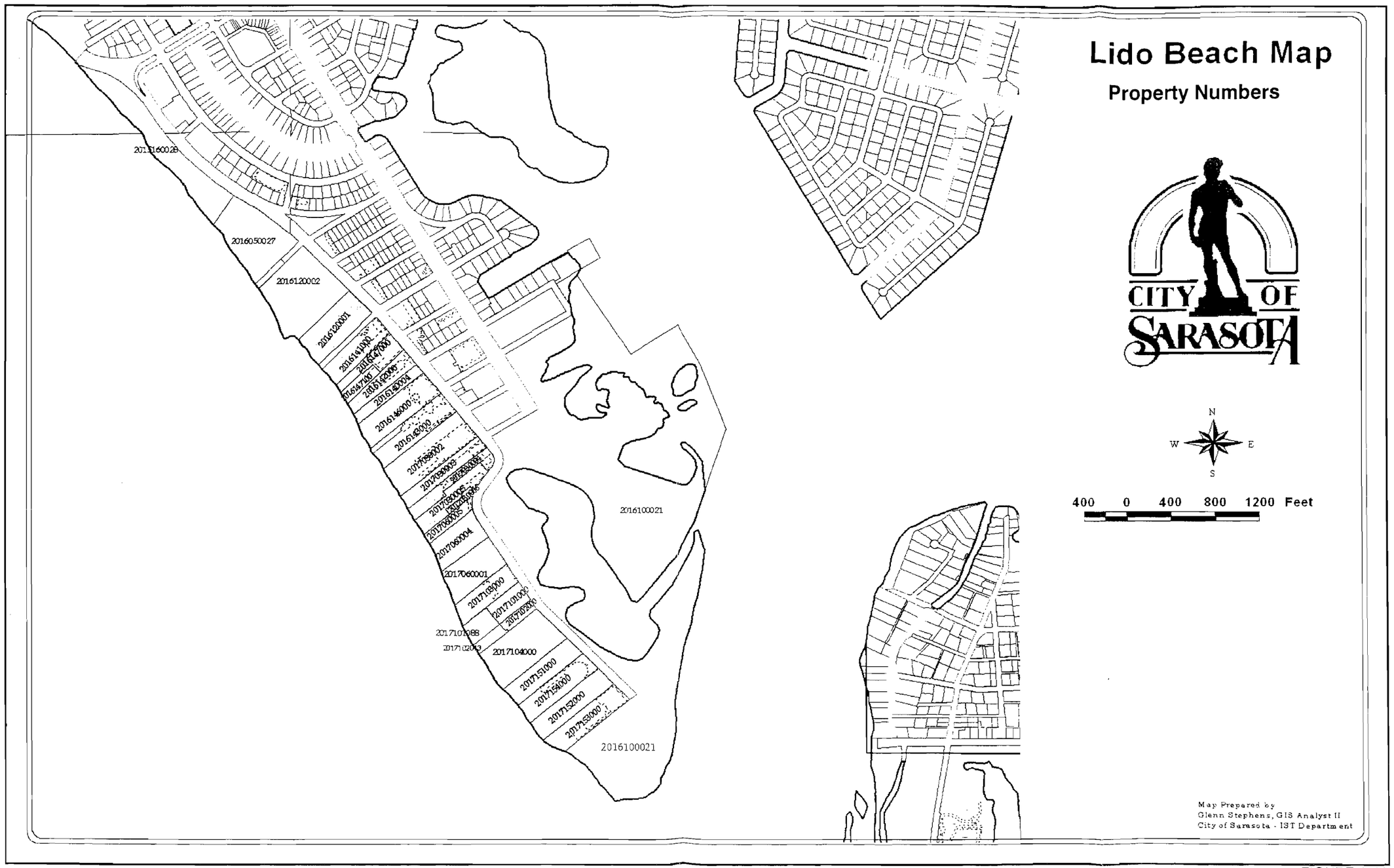

Lido Beach Map
Property Numbers
CITY OF SARASOTA
N
W
E
S
400 0 400 800 1200 Feet
2016050027
2016120002
2016100021
2017060004
2017060001
2017104000
2017151000
2017154000
2017152000
2017153000
2016100021
Map Prepared by
Glenn Stephens, GIS Analyst II
City of Sarasota - IST Department

FIGURE A-19

FIGURE A-20

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

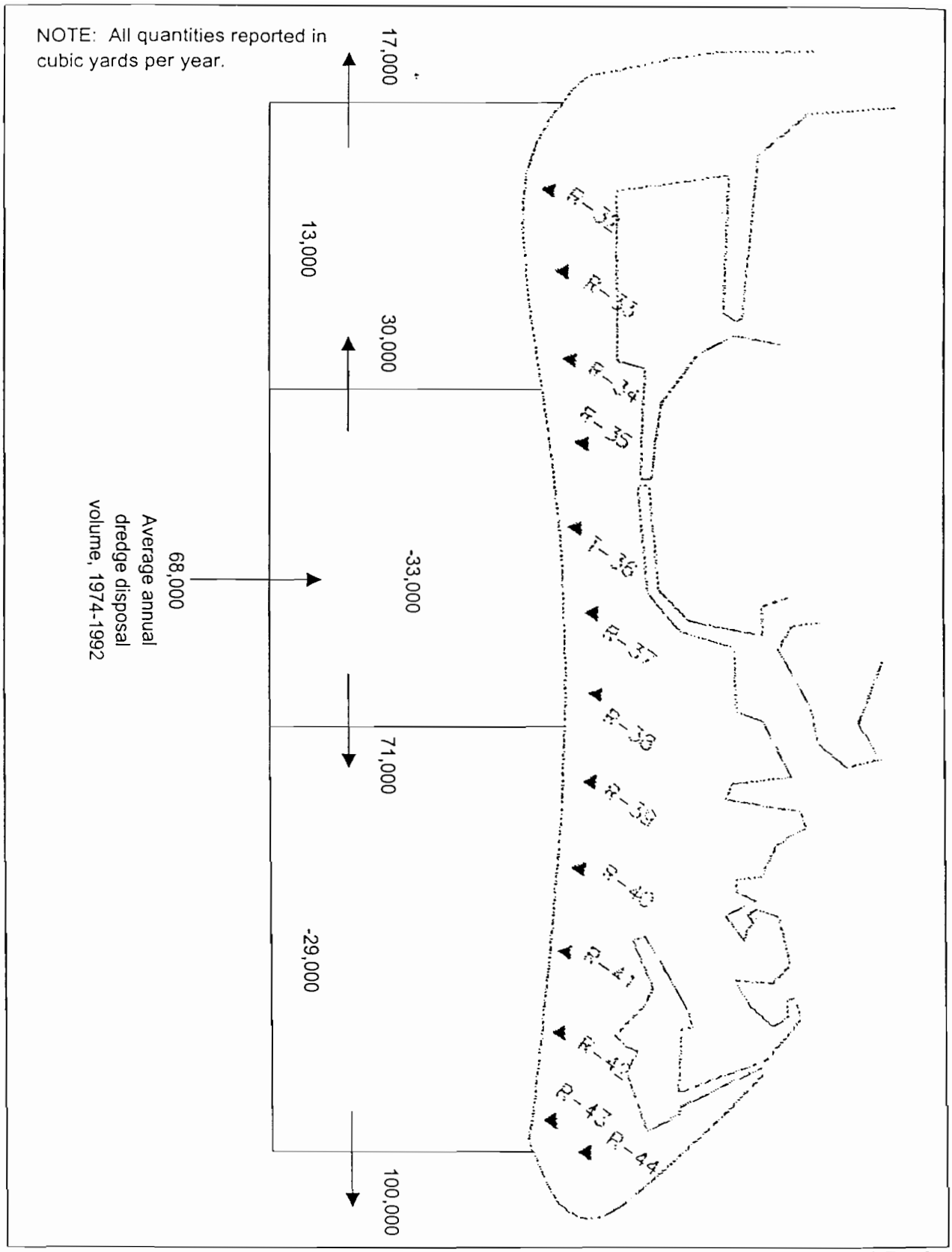


FIGURE A-21

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.

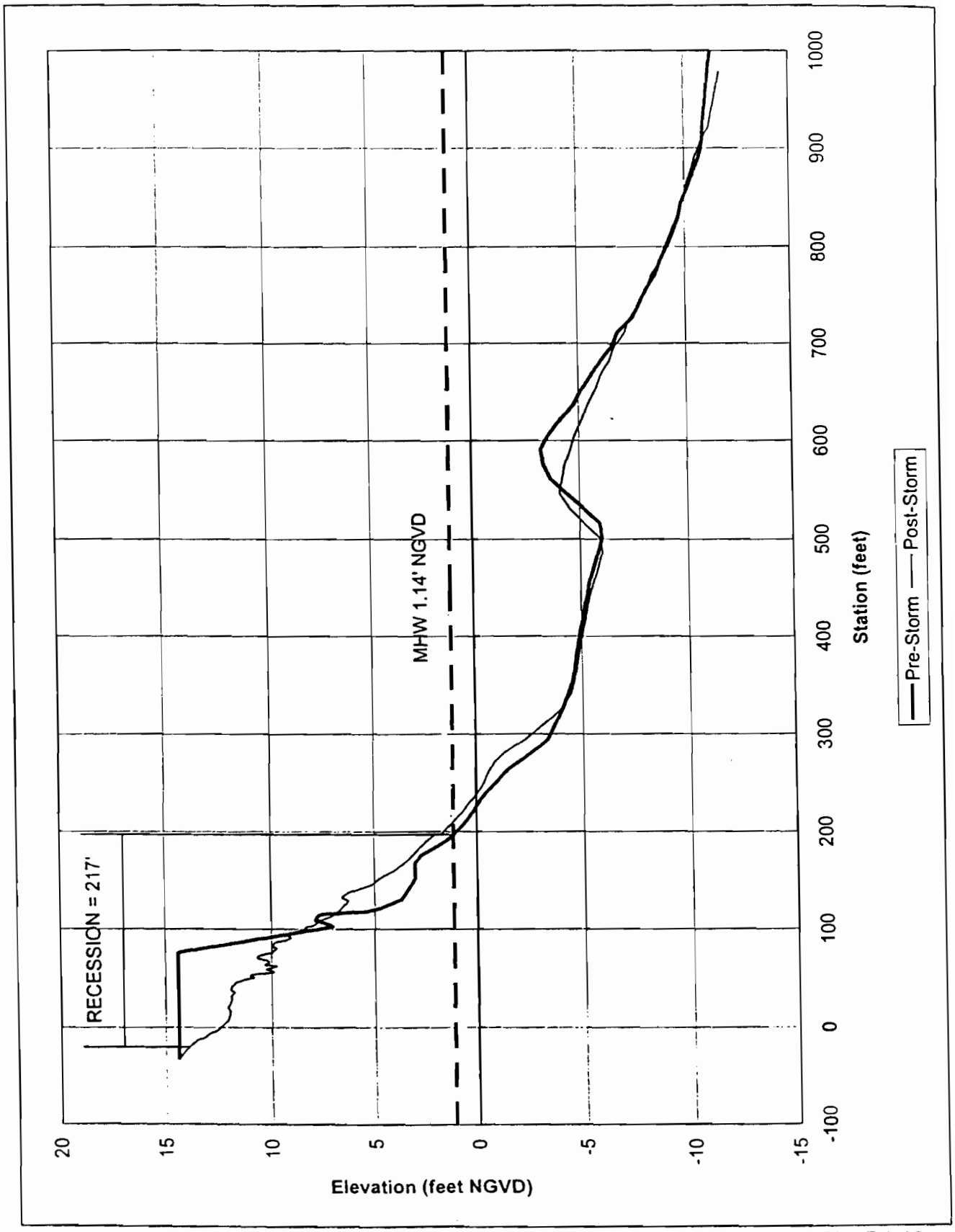


FIGURE A-22

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.

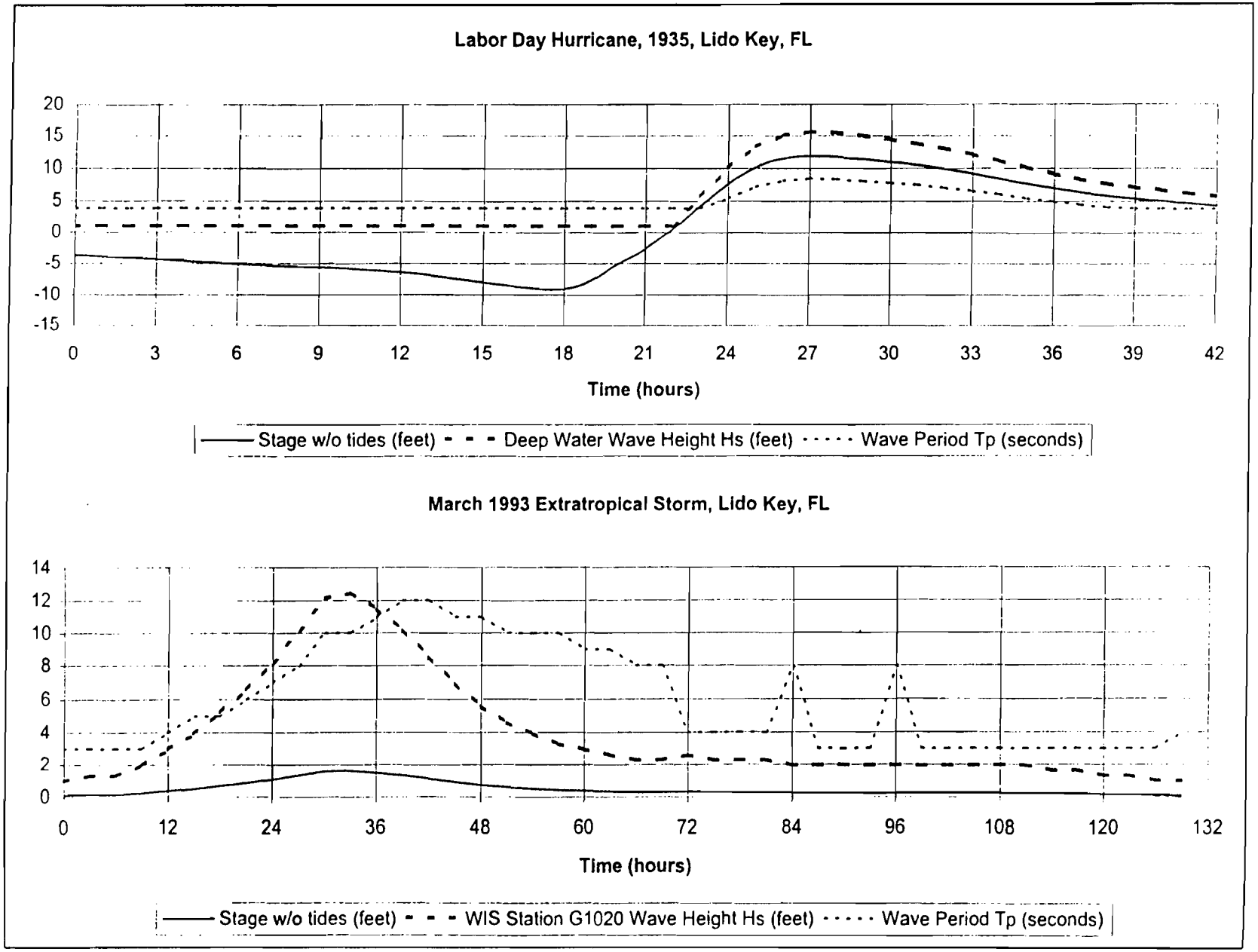


FIGURE A-23

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

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 7.5×10^{-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 Tropical	Reach 1 Extra-tropical	Reach 1 Combined (mean)	Reach 1 Combined (σ)	Reach 2 Tropical	Reach 2 Extra-tropical	Reach 2 Combined (mean)	Reach 2 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 Tropical	Reach 3 Extra-tropical	Reach 3 Combined (mean)	Reach 3 Combined (σ)	Reach 4 Tropical	Reach 4 Extra-tropical	Reach 4 Combined (mean)	Reach 4 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.

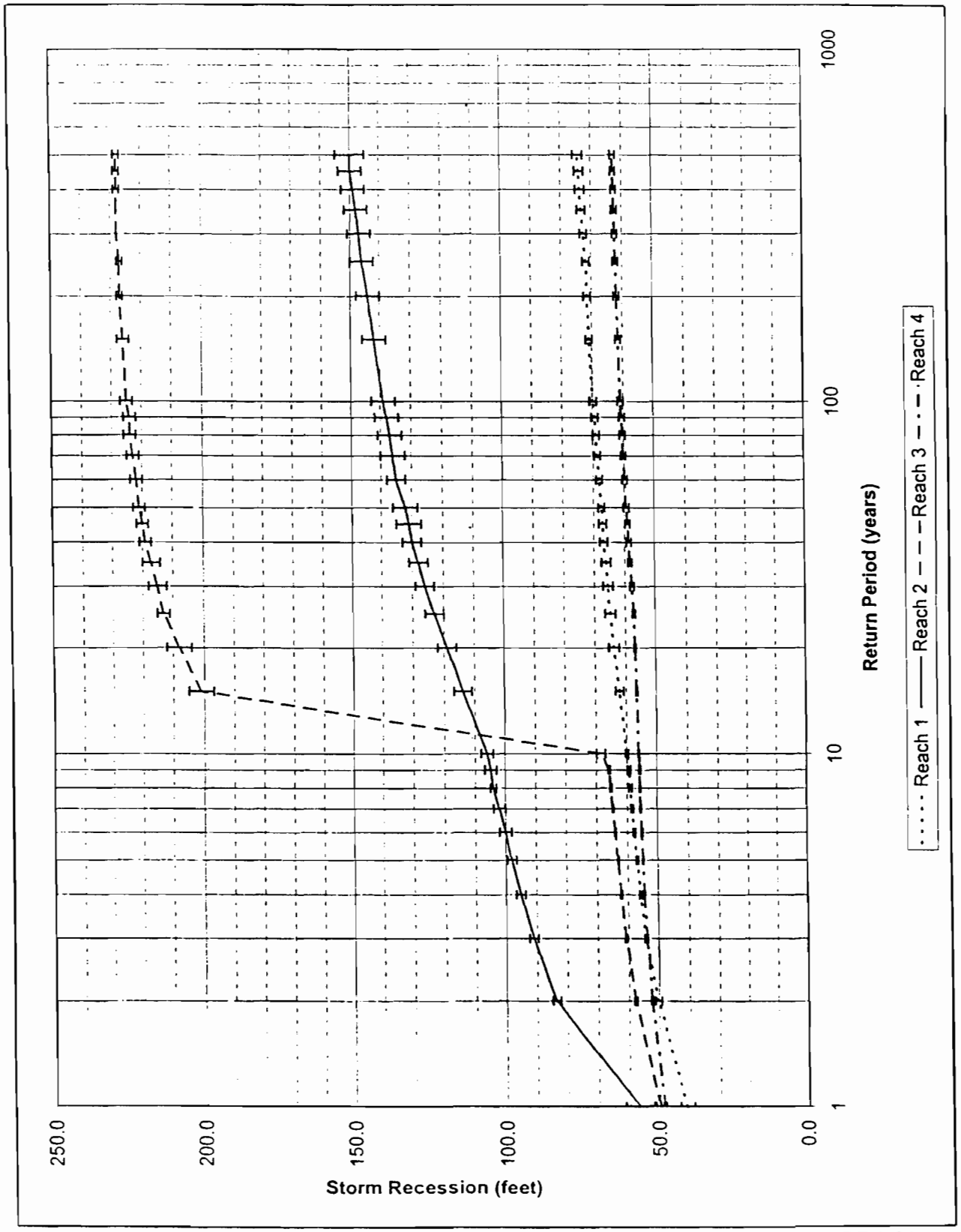


FIGURE A-24

COMBINED STORM RECESSION, LIDO KEY, SARASOTA, FL

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

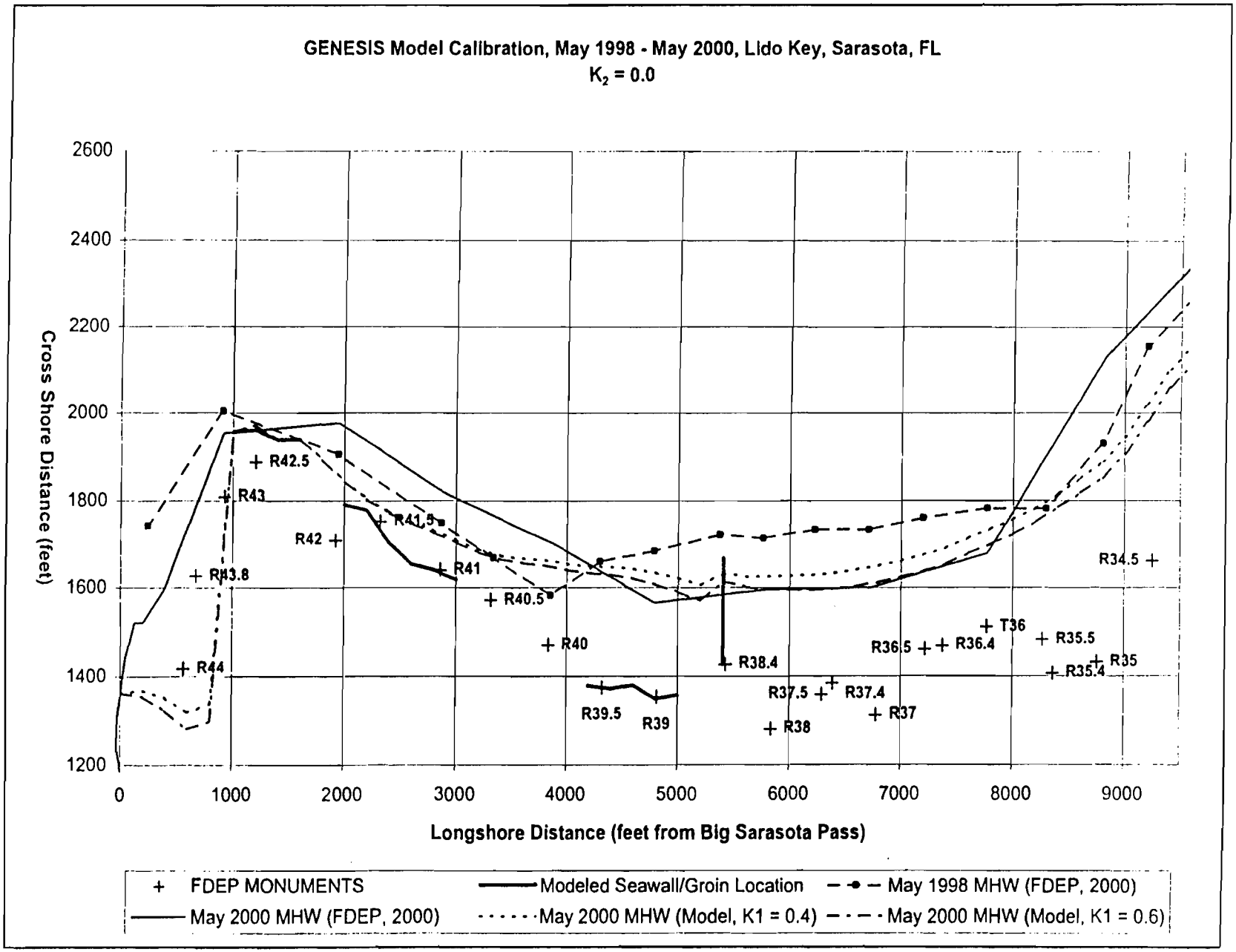


FIGURE A-25

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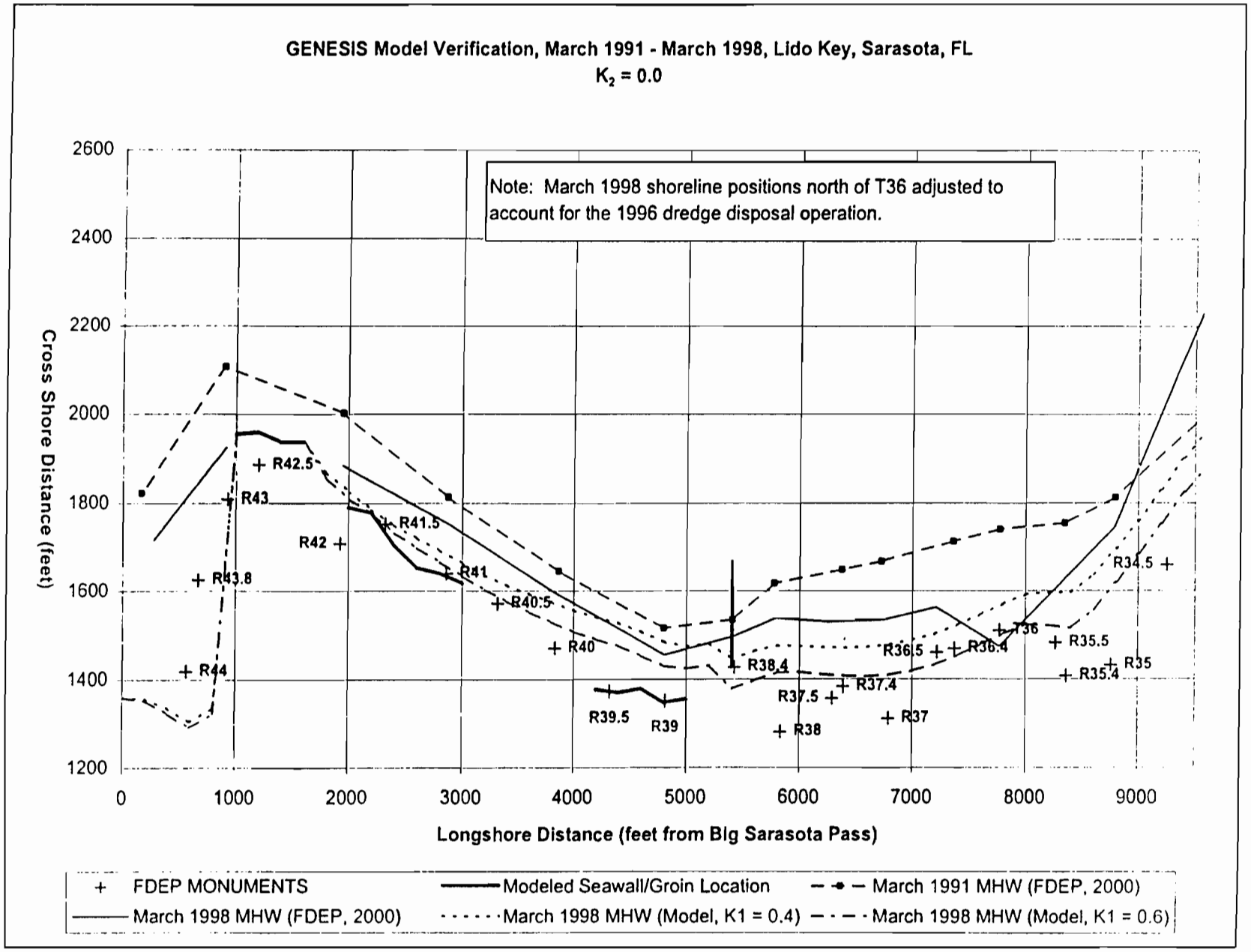

FIGURE A-26

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.

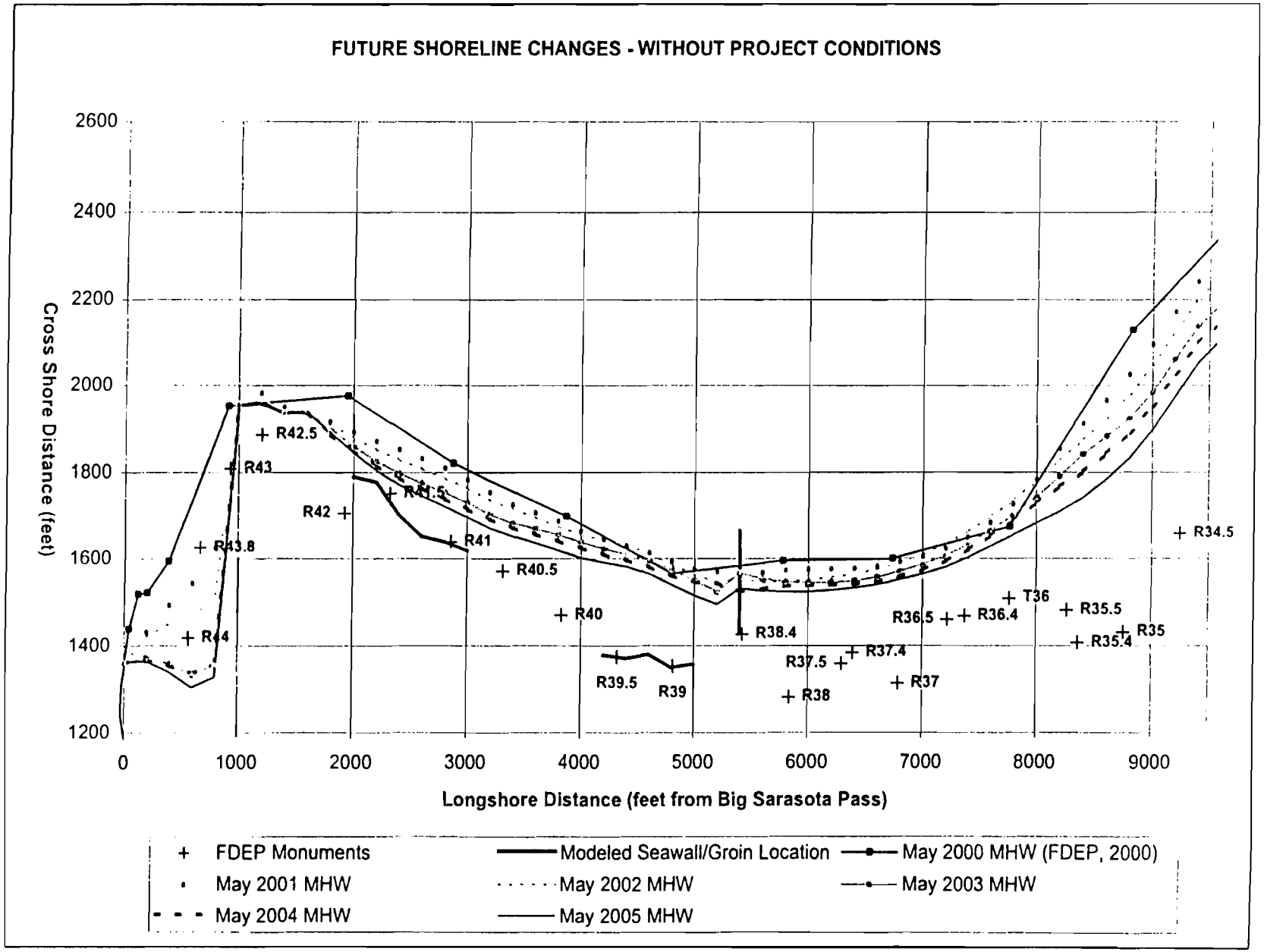

FIGURE A-27

FUTURE GENESIS SHORELINE CHANGES - WITHOUT PROJECT CONDITIONS

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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.

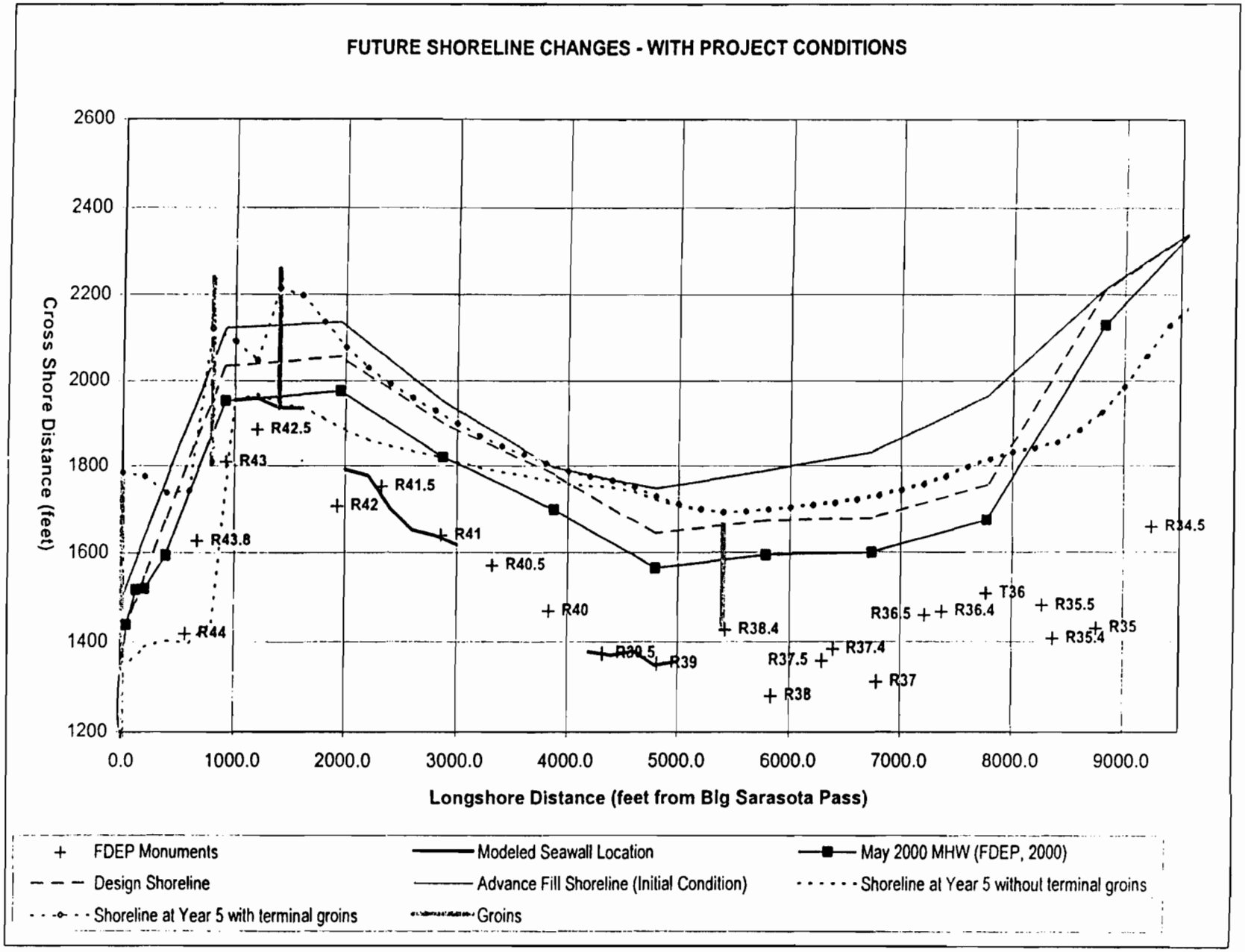


FIGURE A-28

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.

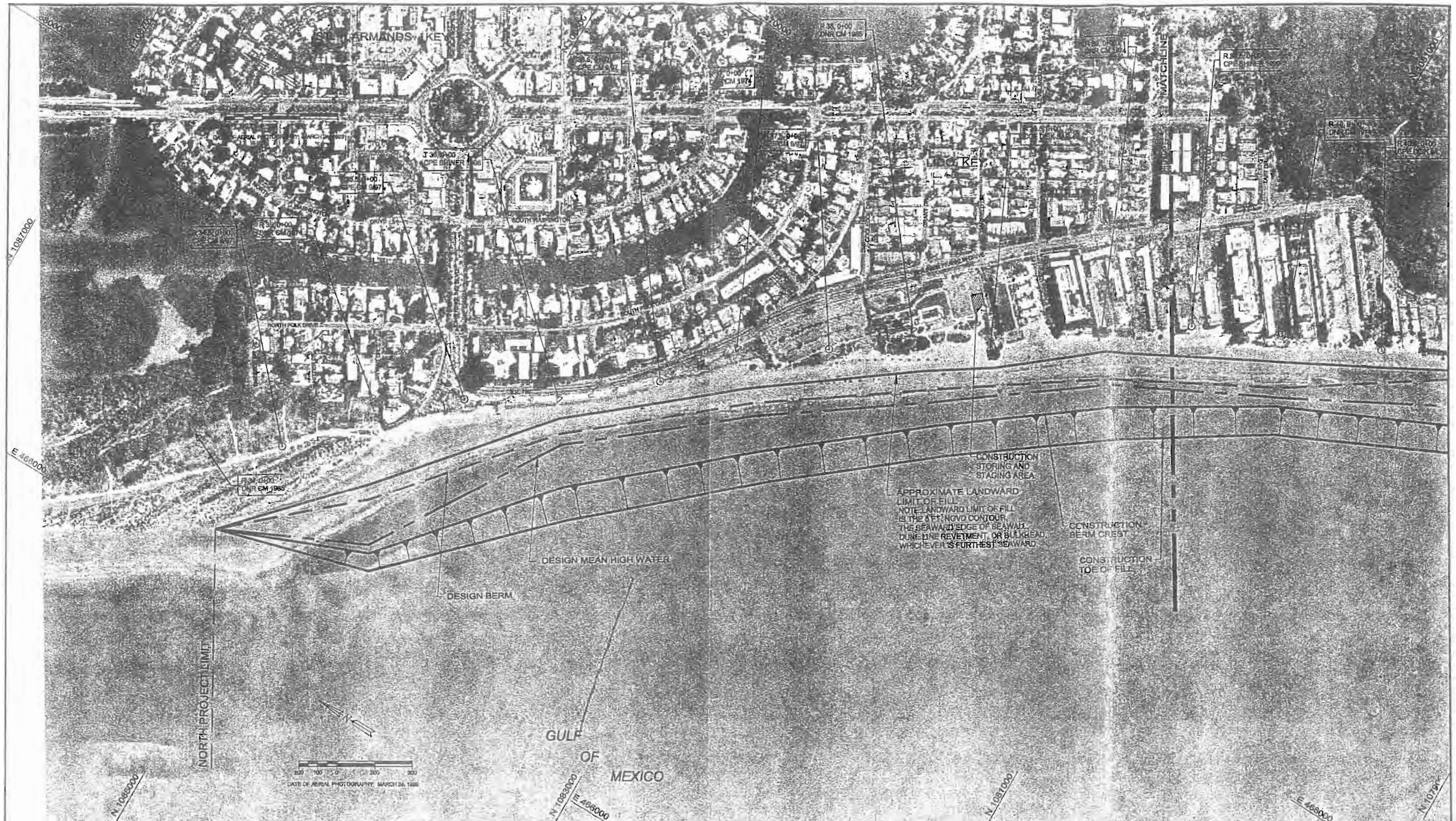
Fill Volume Behind Erosion Control Line

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



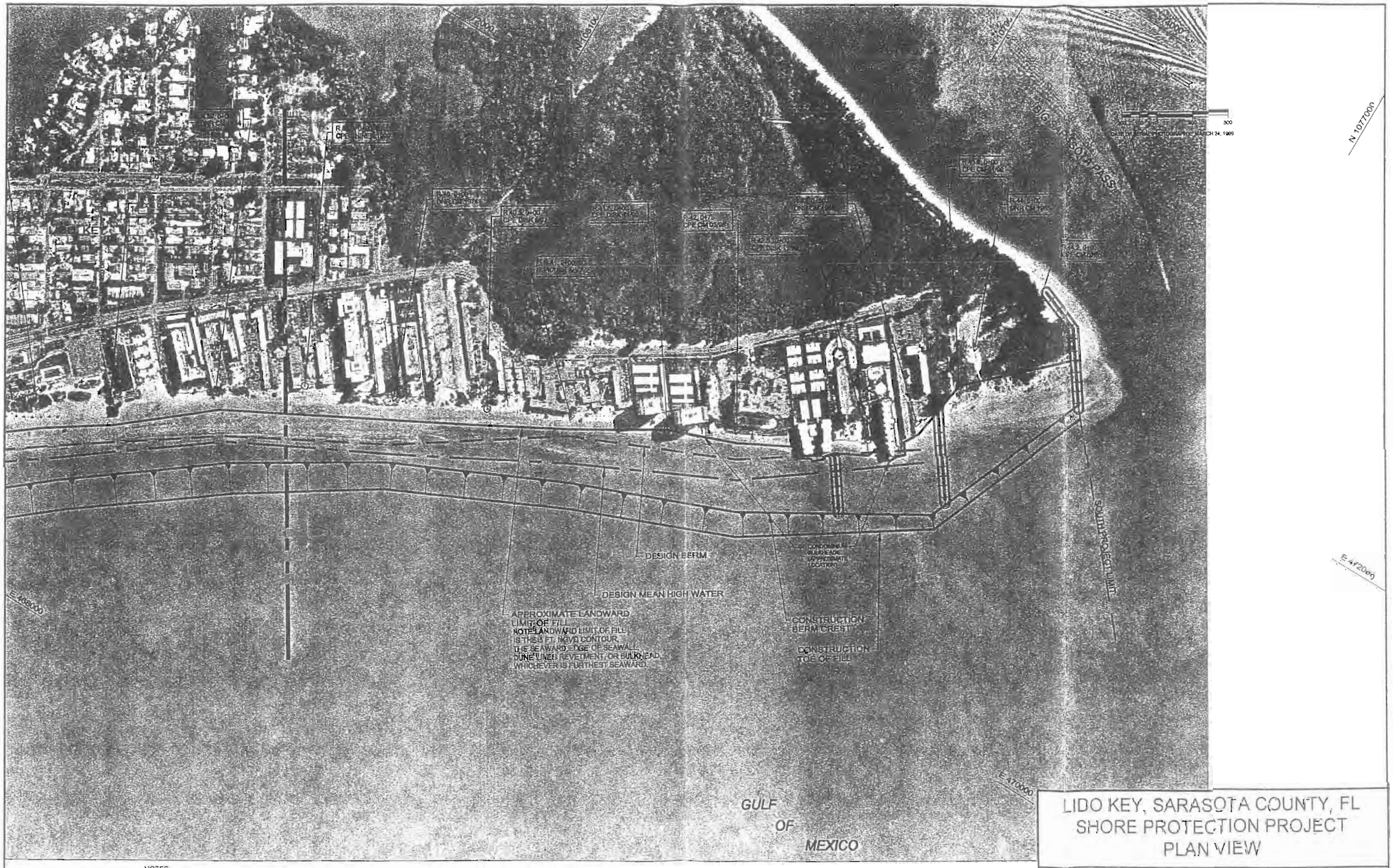
NOTES:

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.
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FIGURE A-2B

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

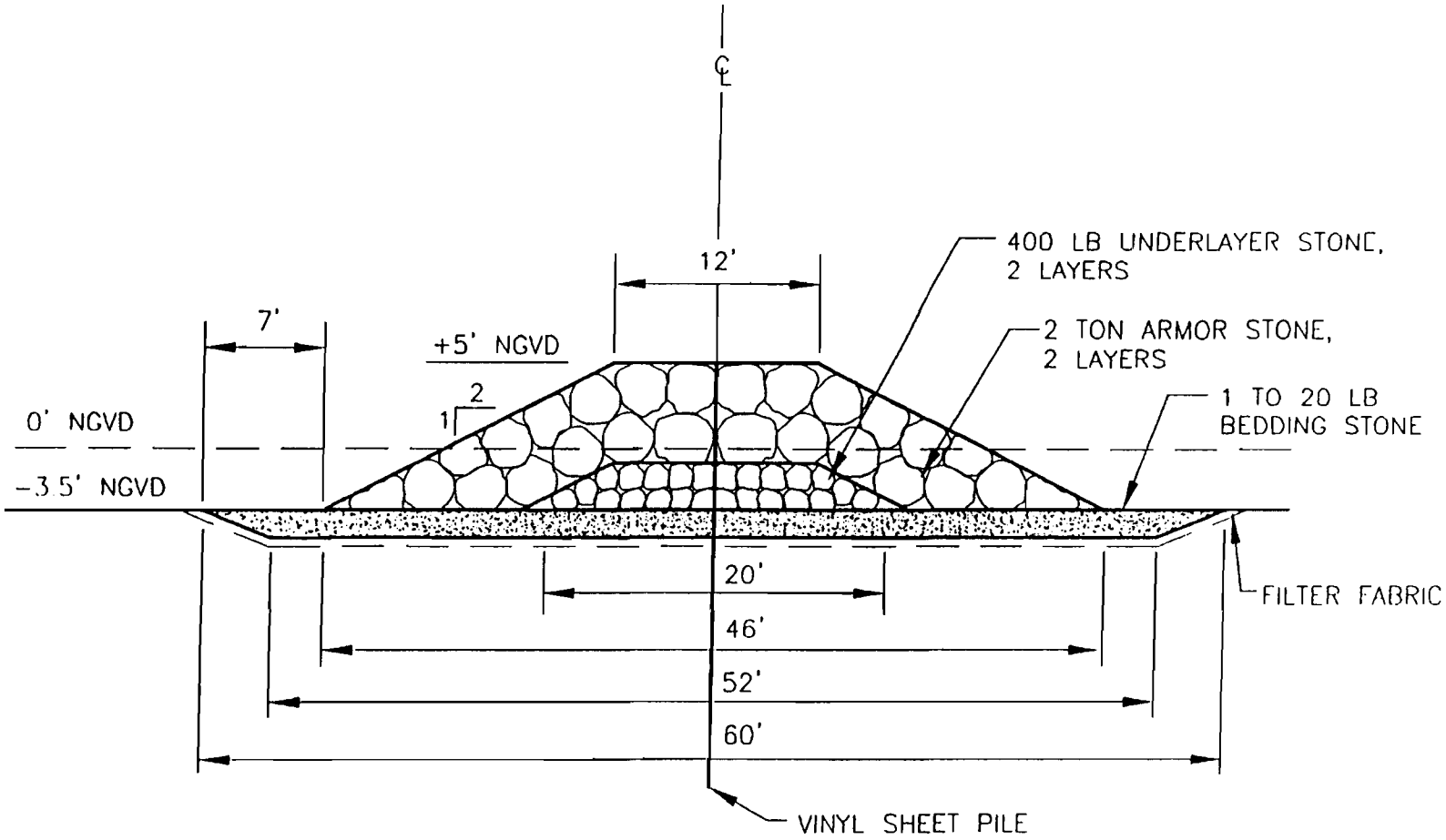
TABLE A-28

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:

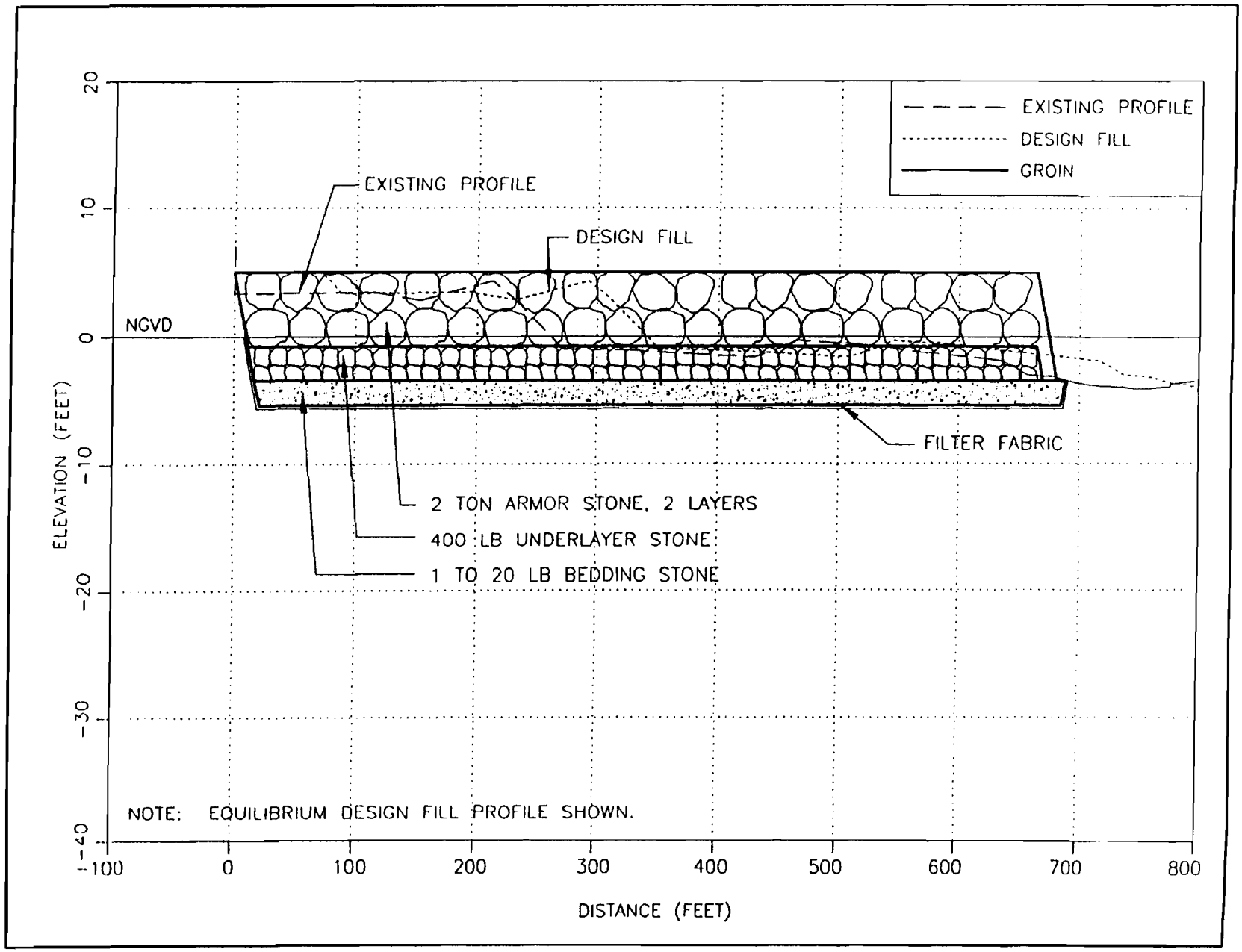
Native beach grain sands were sampled at R-37 and R-39 in May 2000. The average mean grain size and sorting value shown does not include the samples collected in the surf zone near the Mean Tide Level contour.



LIDO KEY, SARASOTA, FL
TYPICAL GROIN
CROSS SECTION

FIGURE A-30

COASTAL PLANNING & ENGINEERING, INC.



LIDO KEY, SARASOTA, FL
TYPICAL GROIN PROFILE

FIGURE A-31

COASTAL PLANNING & ENGINEERING, INC

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.

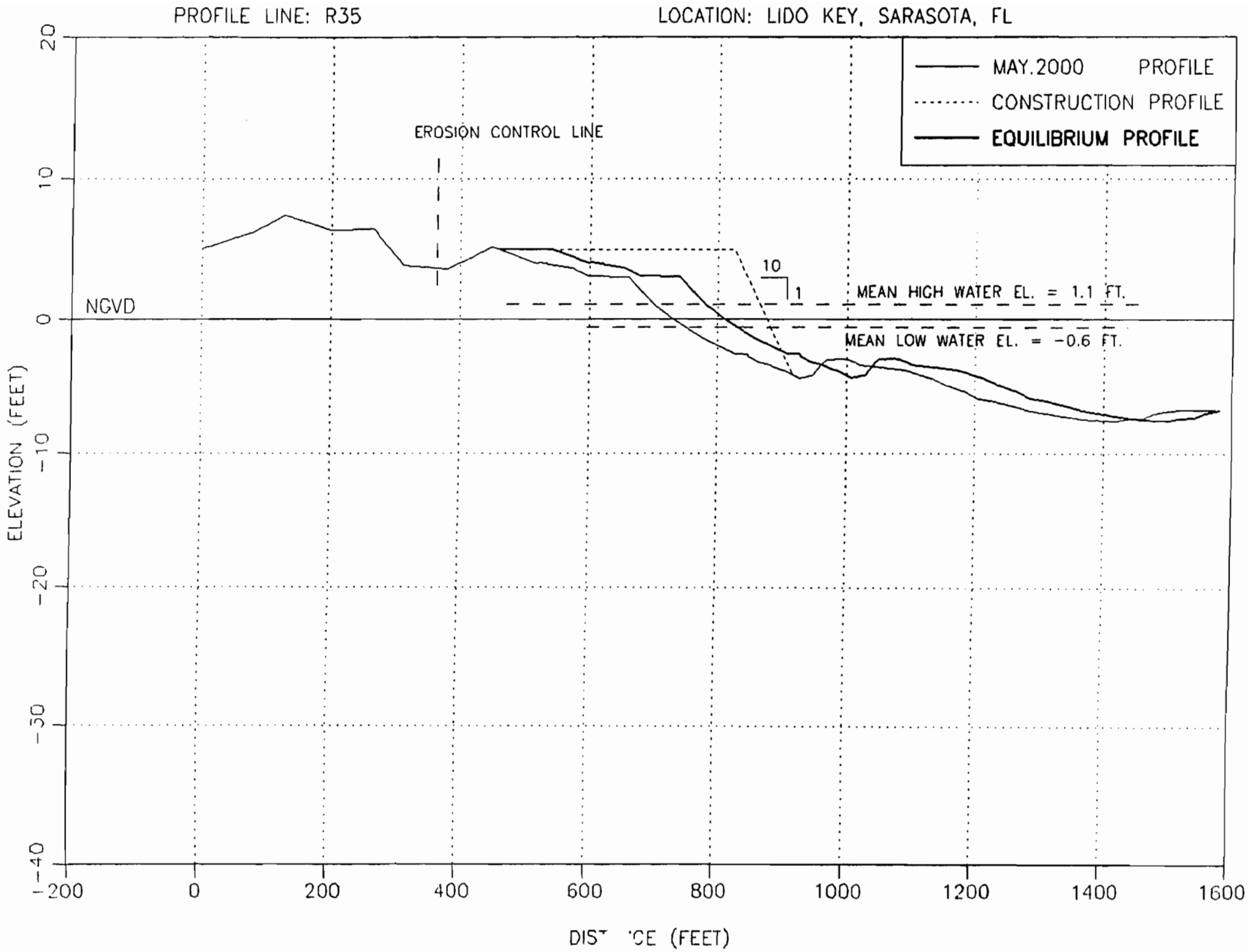
Wave Information System, 1997. Coastal Engineering Data Retrieval System (CEDRS), U.S. Army Corps of Engineers Coastal and Hydraulics Laboratory, http://bigfoot.wes.army.mil/c201.html.

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")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MEAN LOW WATER EL. = -0.6 FT.
NGVD
ELEVATION (FEET)
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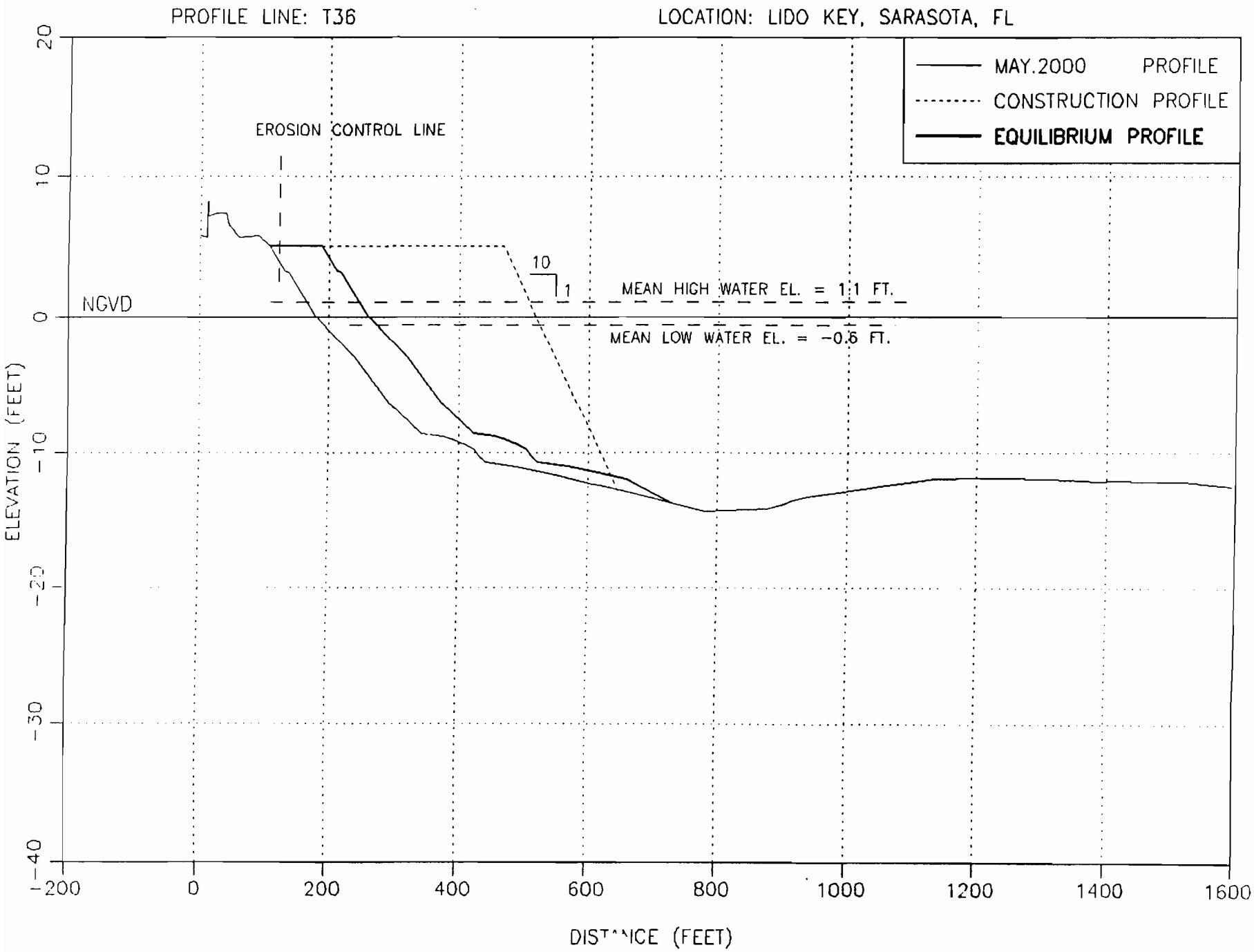
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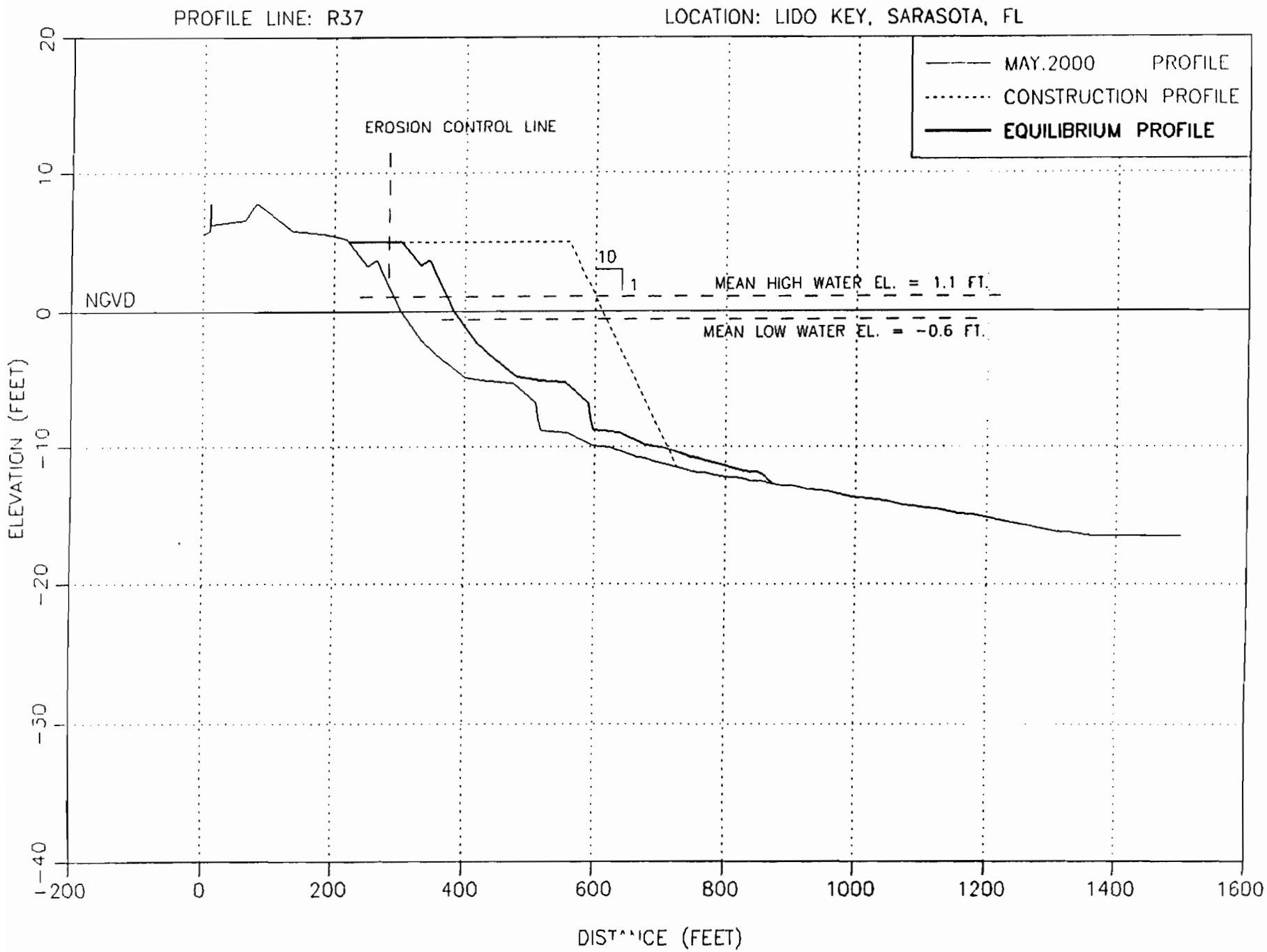
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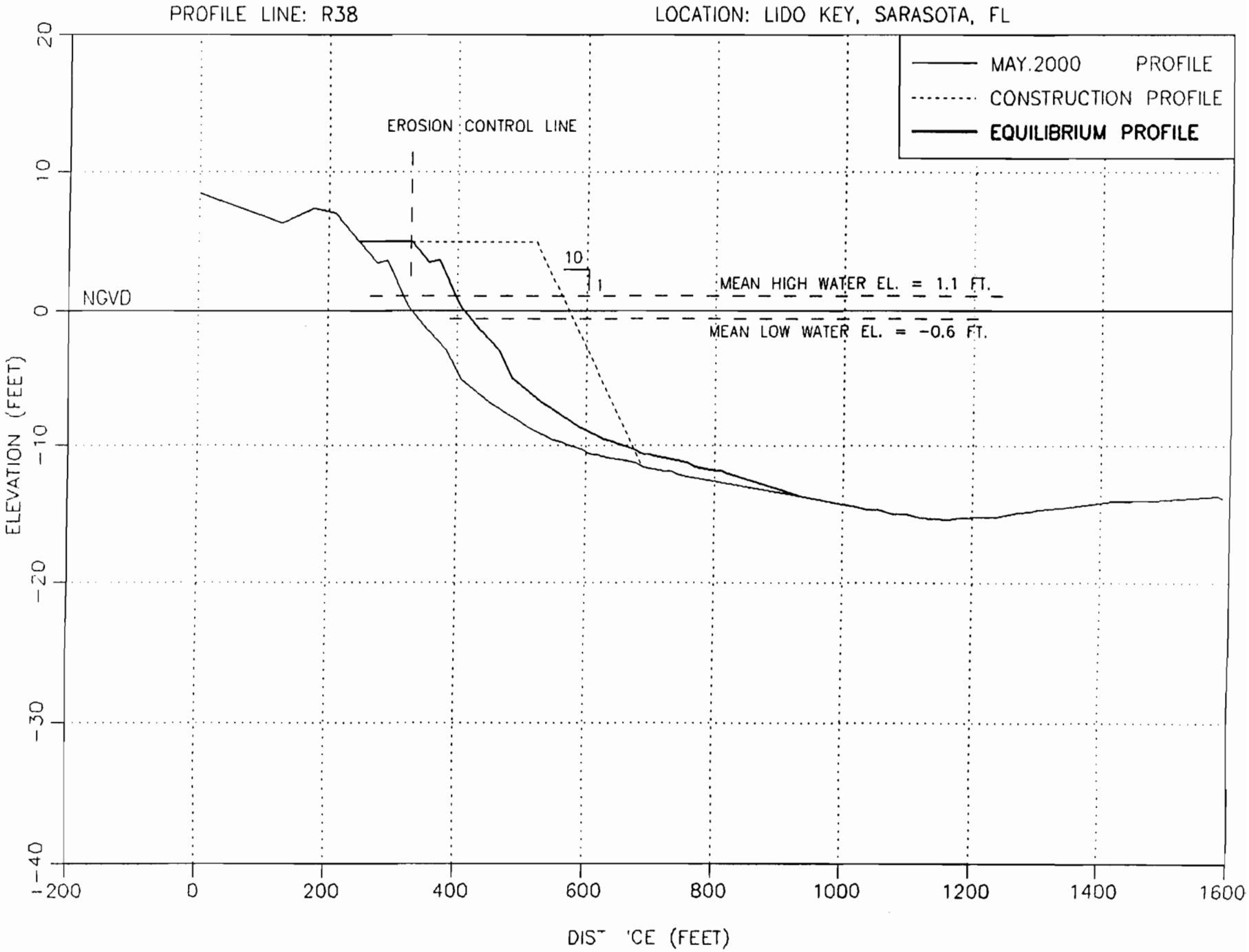
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MEAN LOW WATER EL. = -0.6 FT.
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ELEVATION (FEET)
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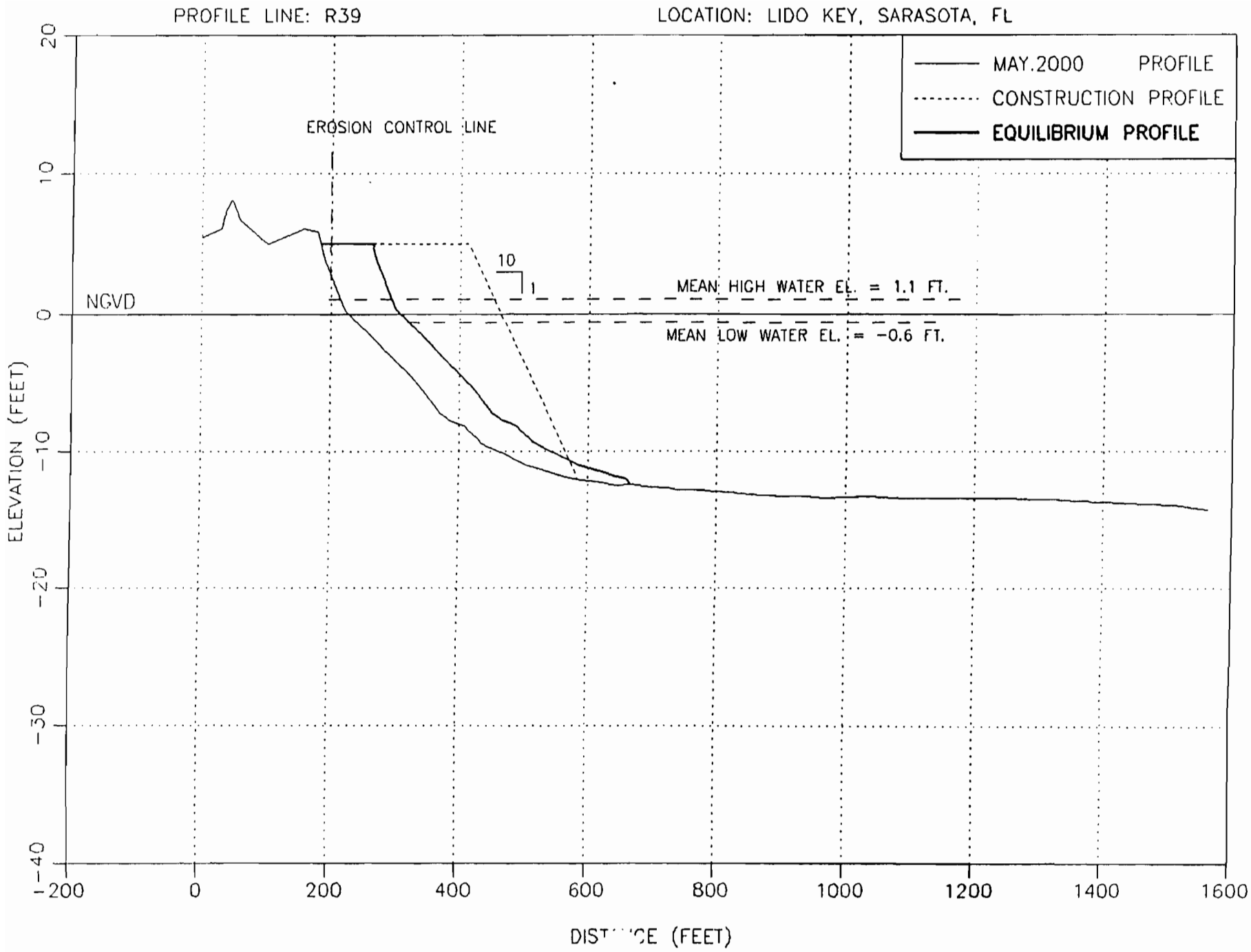
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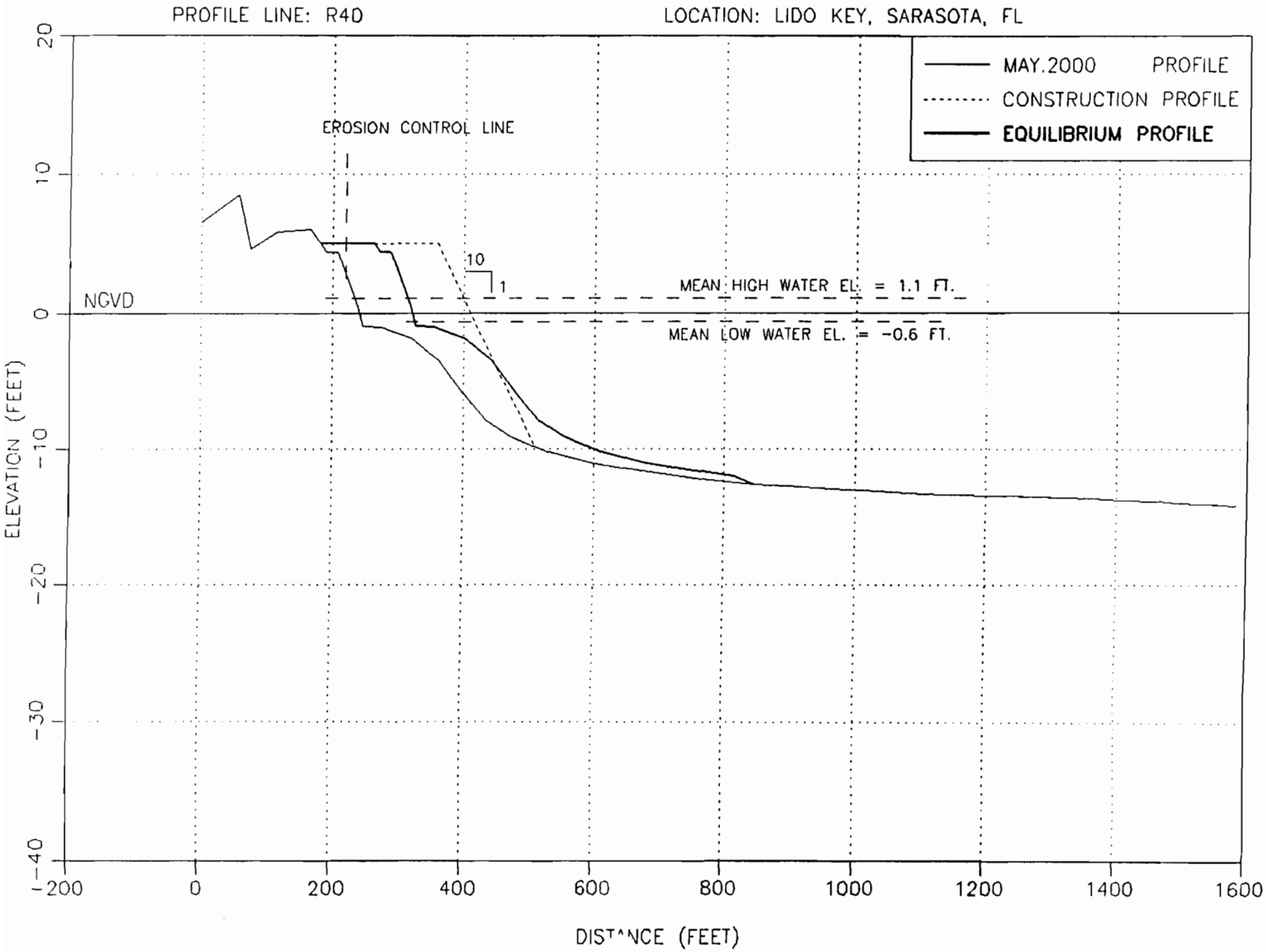
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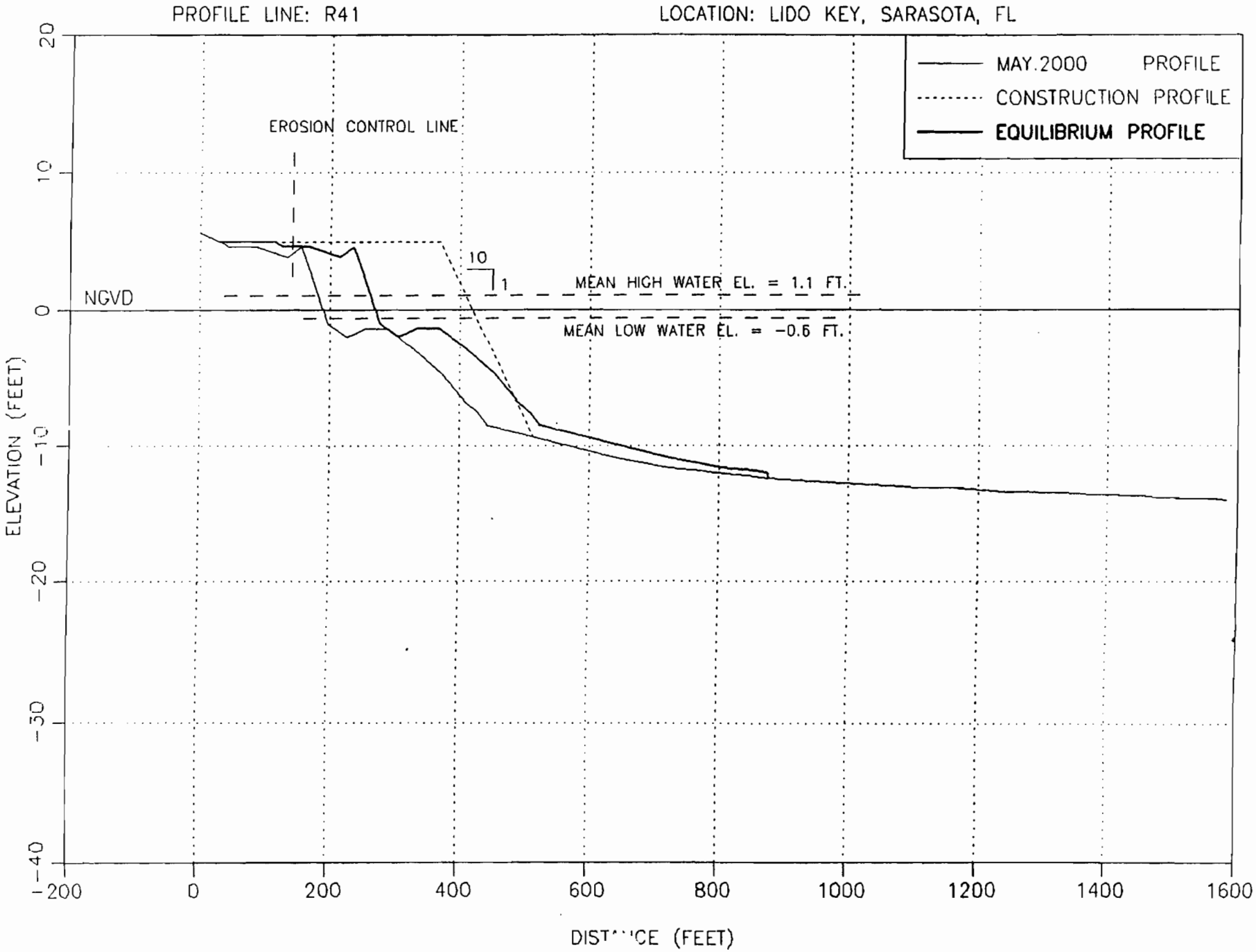
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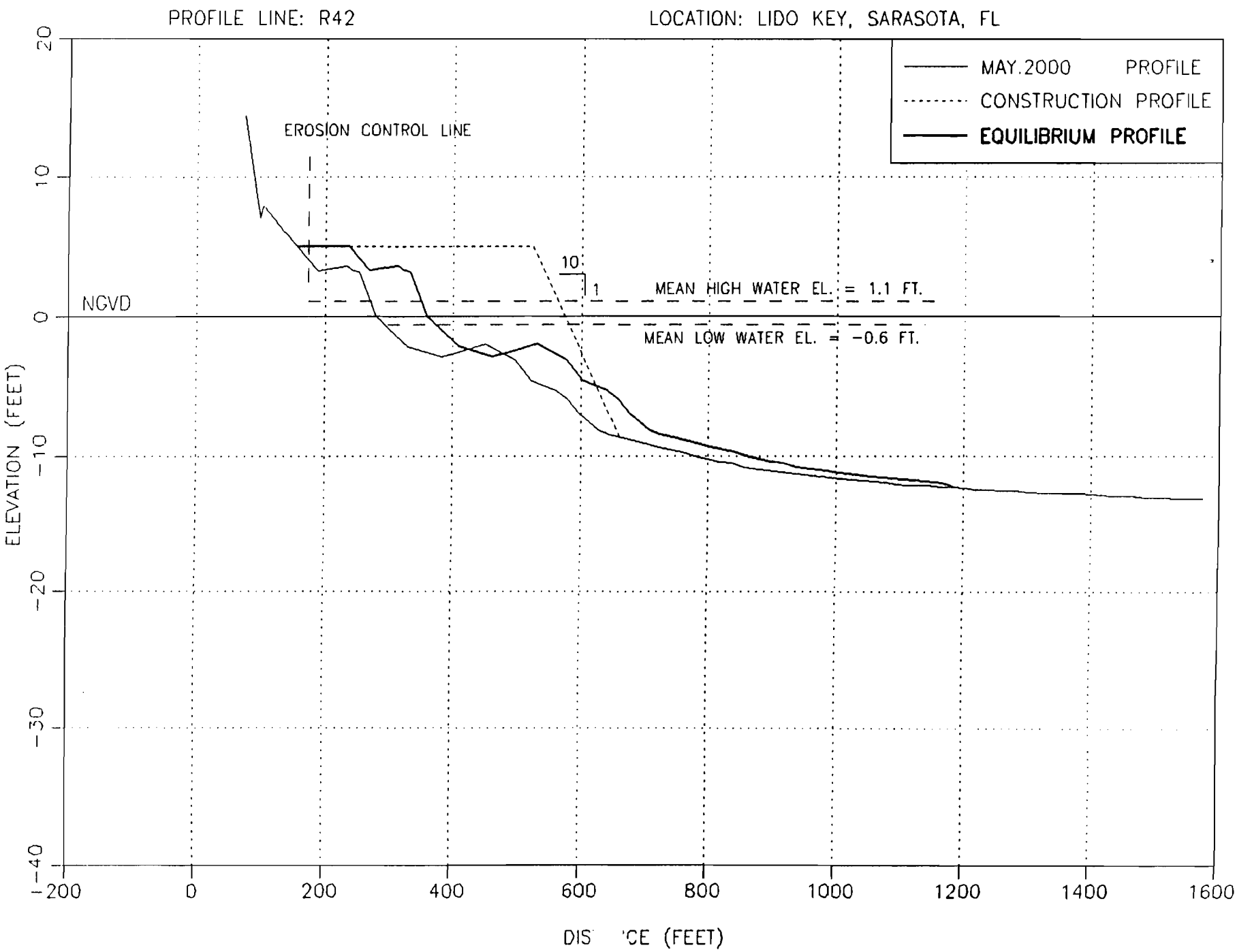
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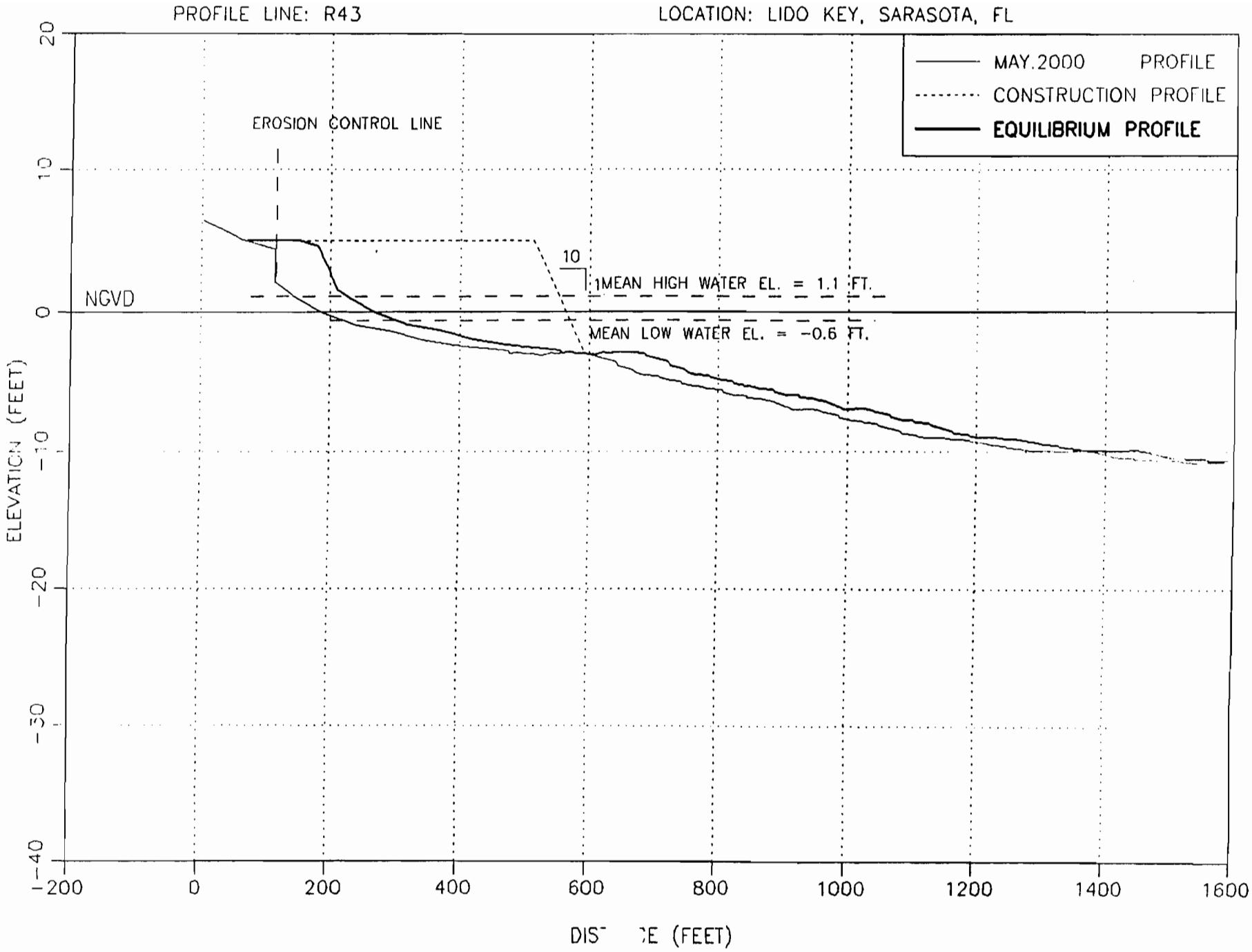
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MEAN LOW WATER EL. = -0.6 FT.
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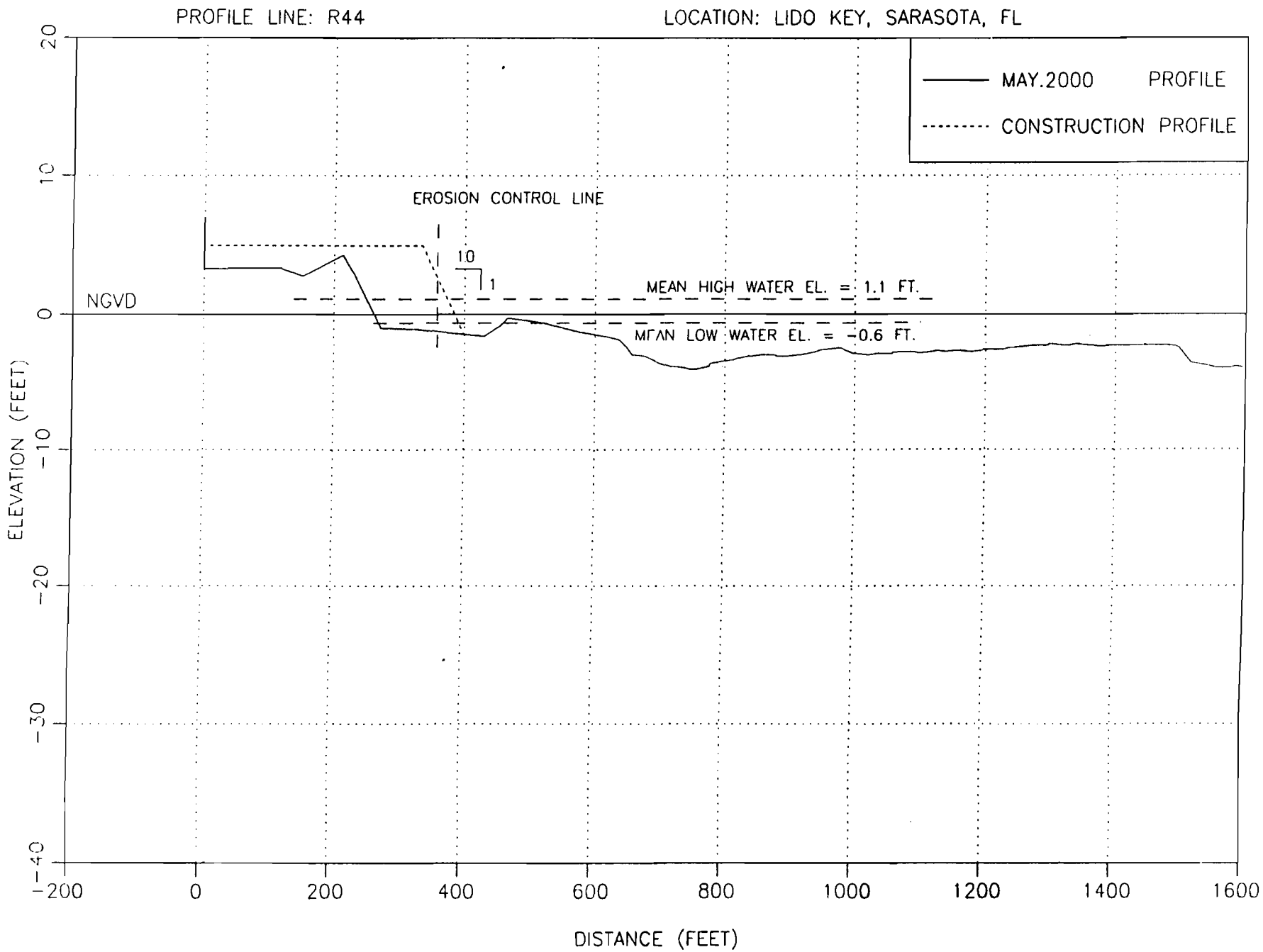
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APPENDIX B

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

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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).

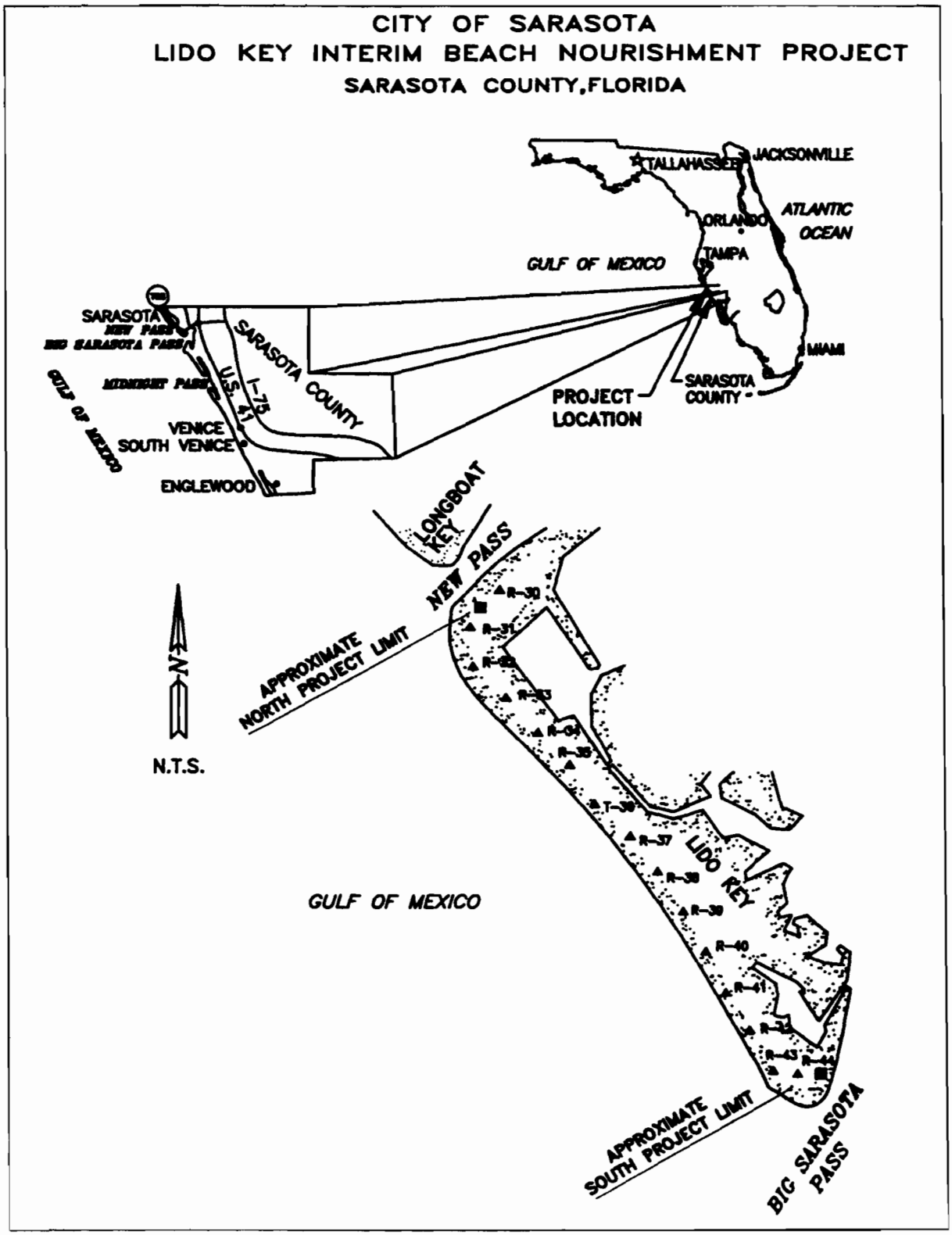


FIGURE B-1

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.

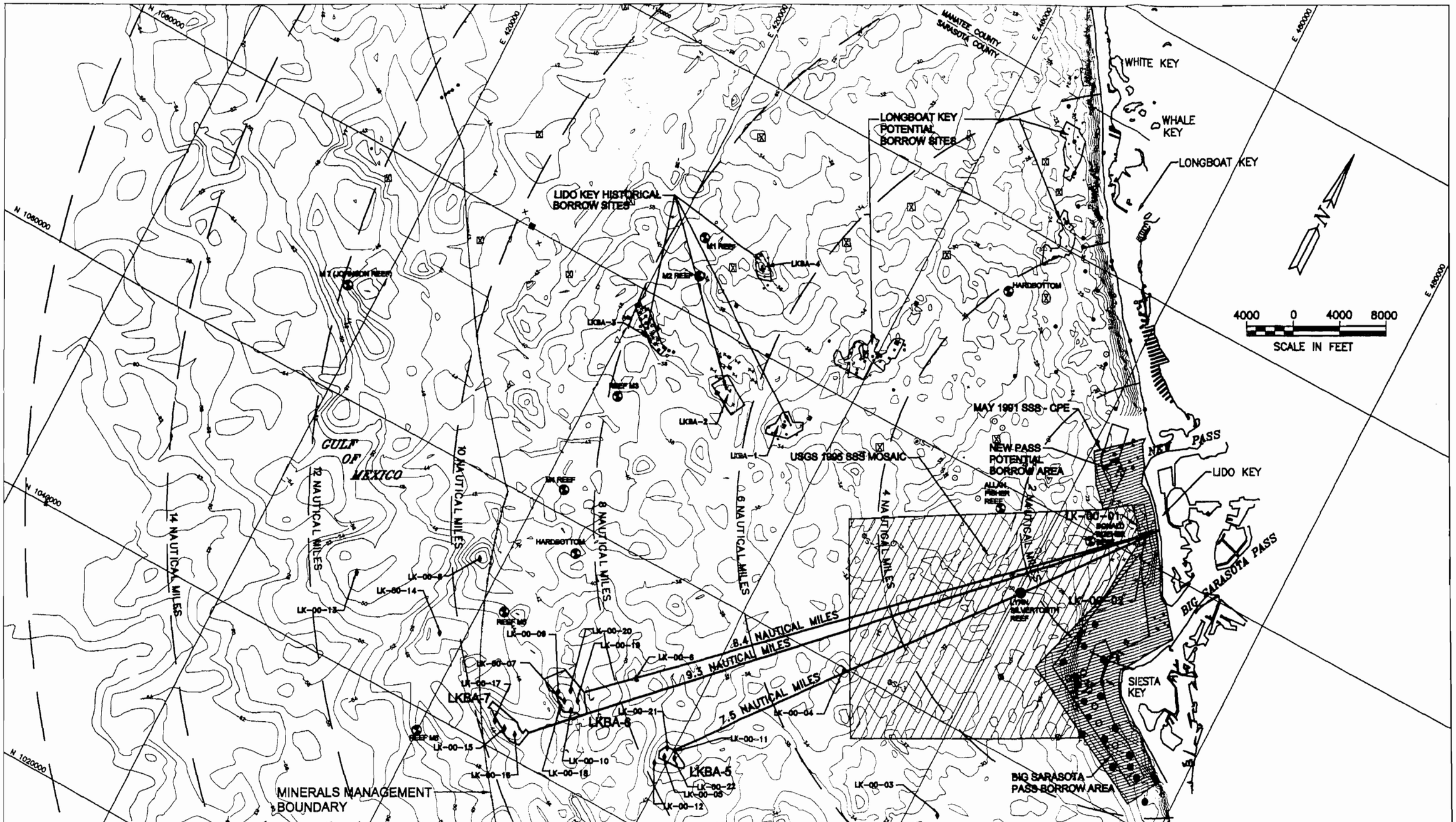
B-18. A cooperative study effort among the USGS, the University of South Florida Marine Science and Geology Departments, and the Eckerd College Marine Geology Program was carried out from 1994 to 1997. Along the west coast of Florida, in the area extending from Anclote Key in the north to Venice Inlet 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
M7 (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.

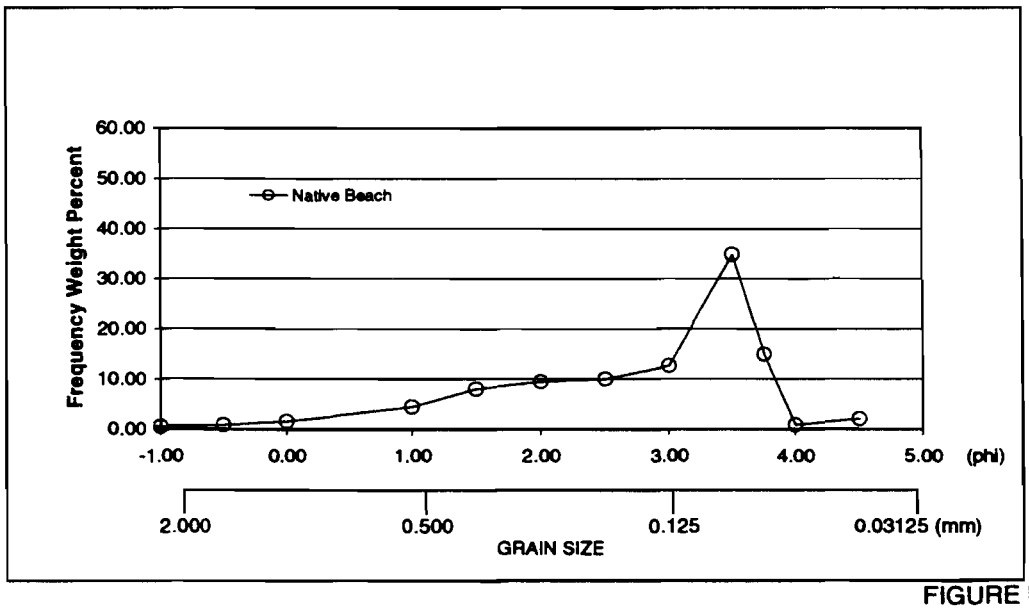


FIGURE B-3A

Suitability Analysis Frequency Grain Size Distribution.

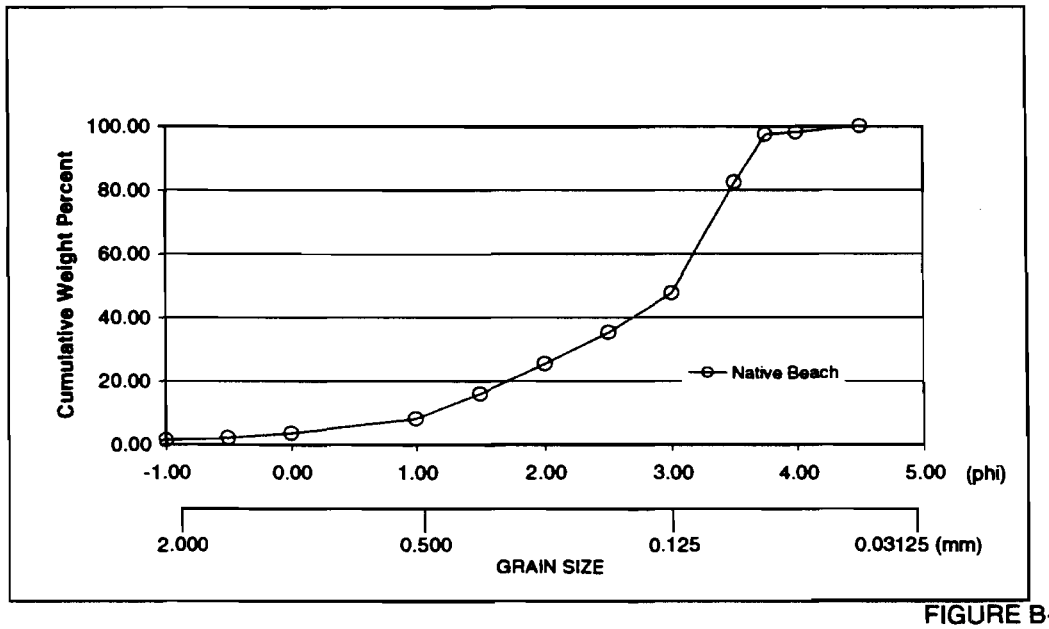


FIGURE B-3B

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.

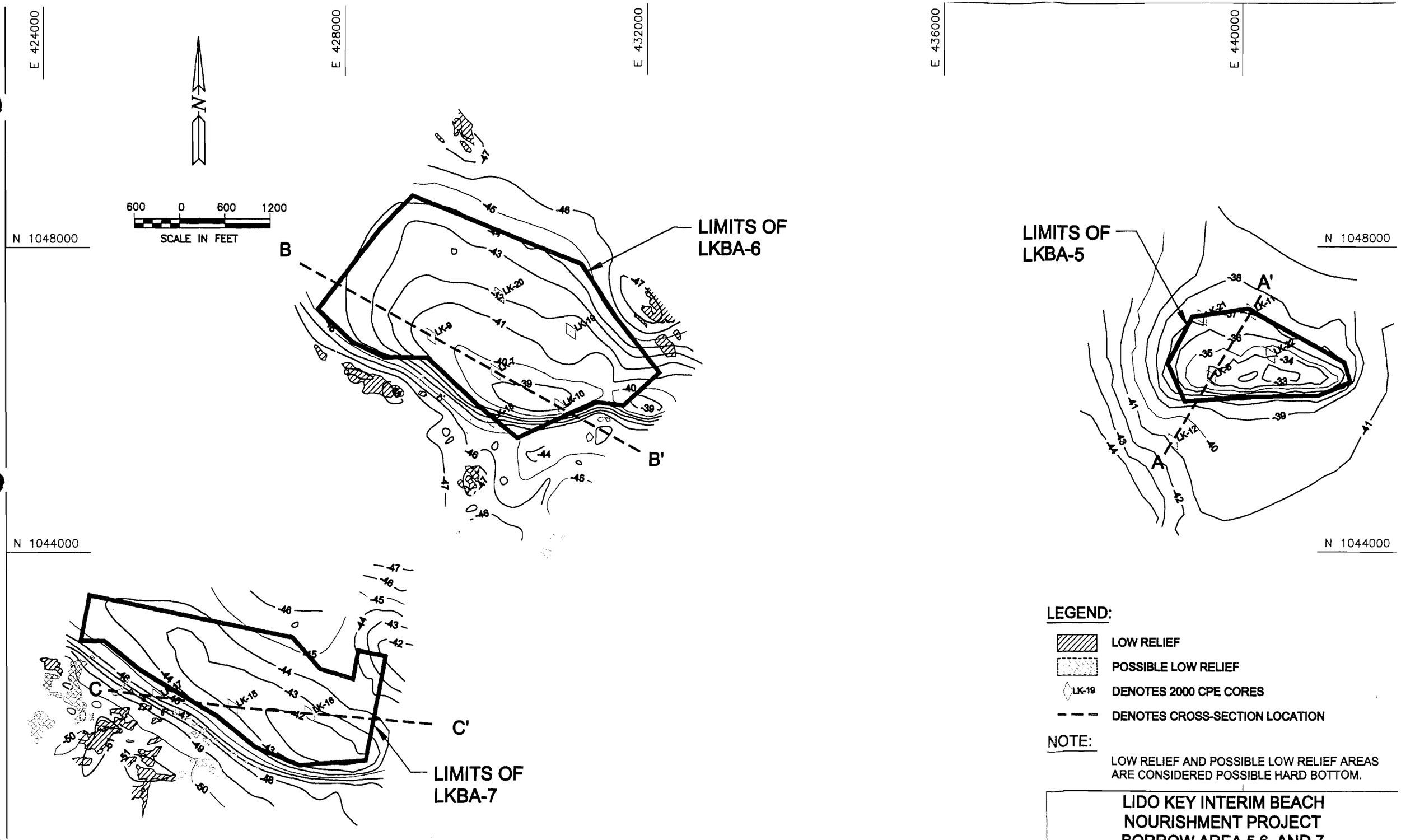
B-41. Borrow Area 6 is located 8.5 nautical miles offshore of Lido Key. The deposits in this area consist of medium grained sand, with low silt content (0.11% to 4.6%) mixed with some shell fragments/hash, overlying strata with higher silt content (6.2% to 25.2%). Vibracore LK-00-09 contains a clay layer 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.

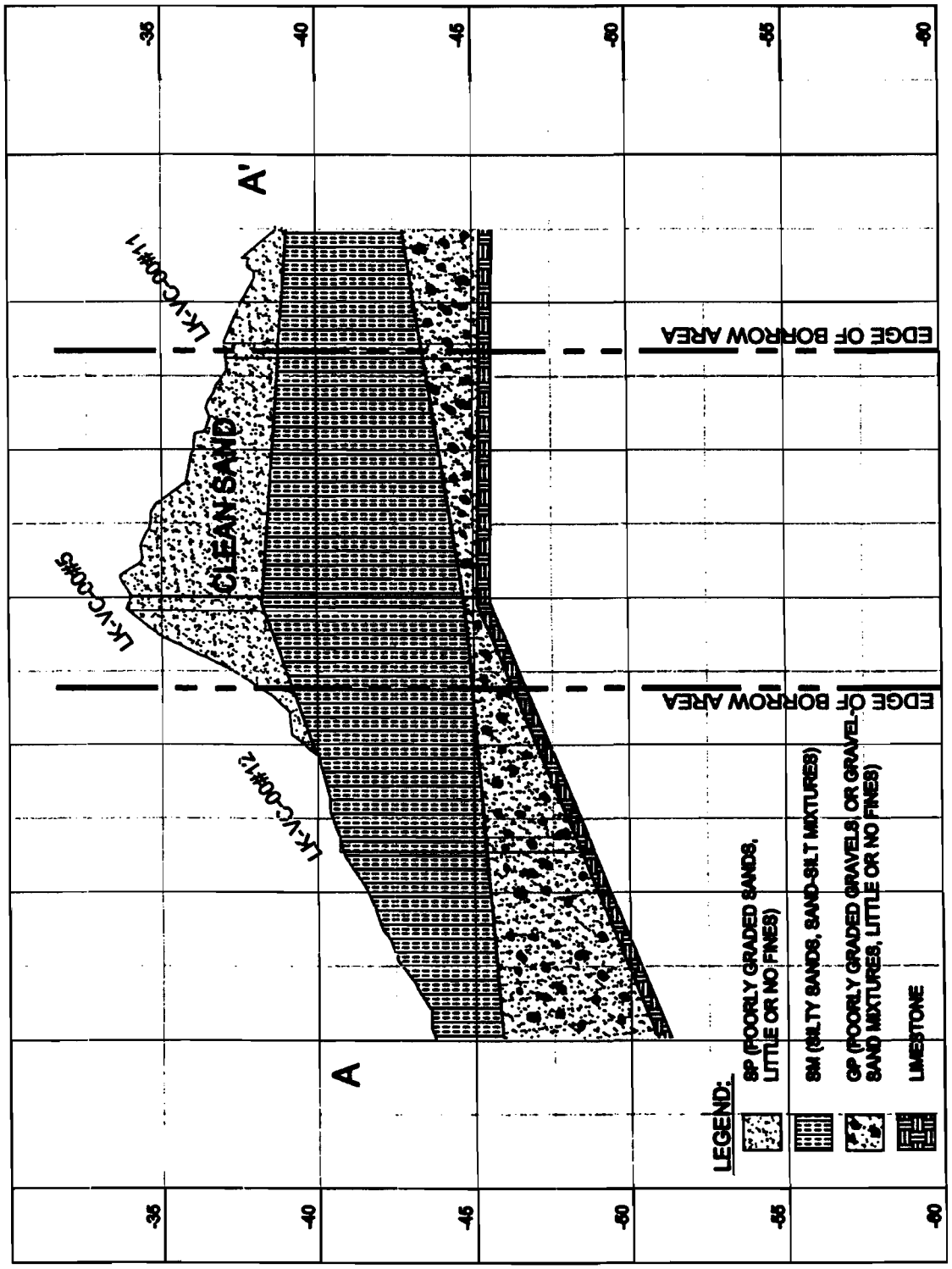
B-45. The bathymetric survey was used to supplement NOAA bathymetric data (National Ocean Service). The seafloor surveyed around the borrow area is generally gently sloping with low gradient. The water depth ranges from 30 to 50 feet NGVD. Small isolated "bathymetric highs" and small linear sand ridges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

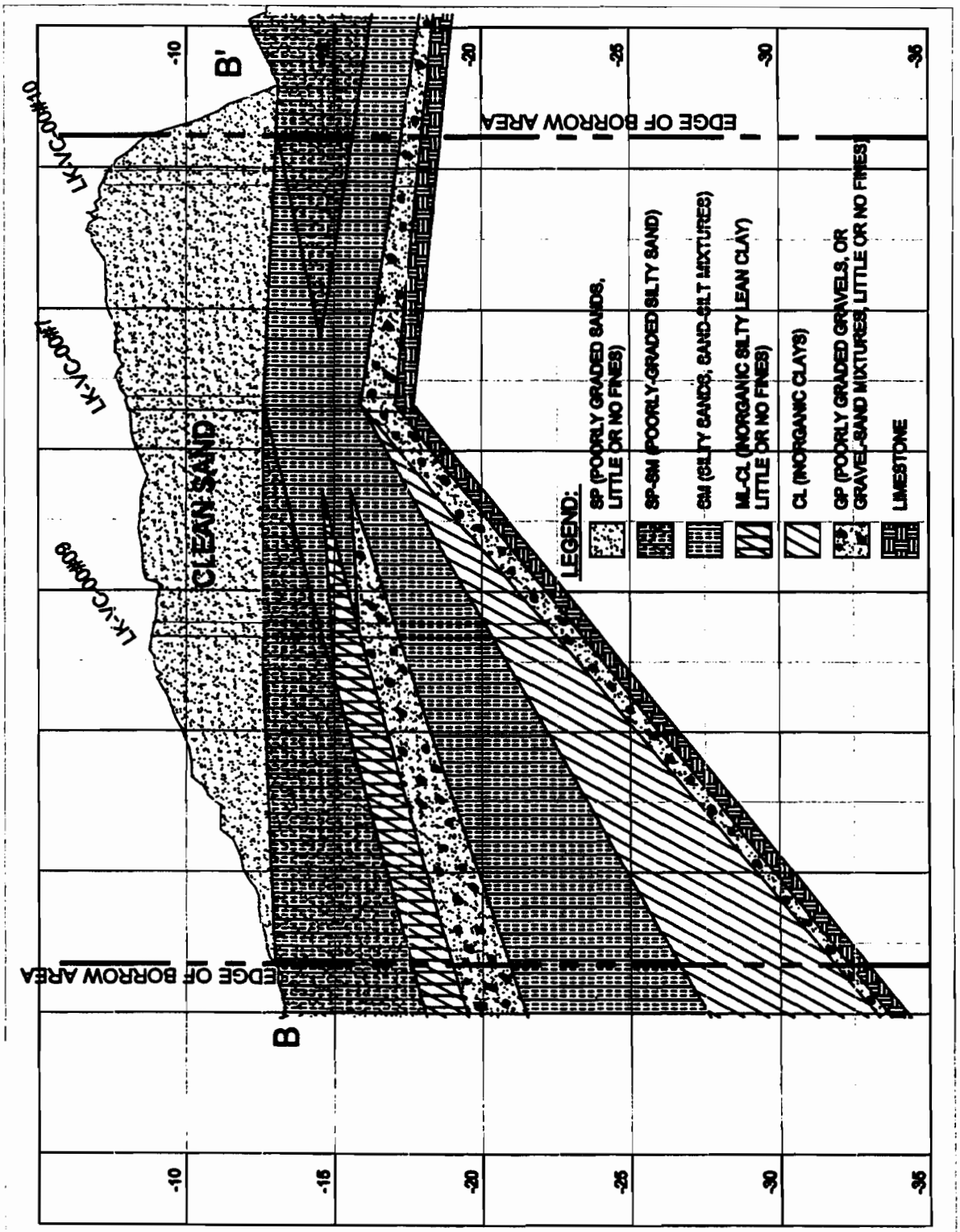


US ARMY CORPS OF ENGINEERS
JACKSONVILLE DISTRICT

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

DATE : 5/18/01

FIGURE NO. B-5

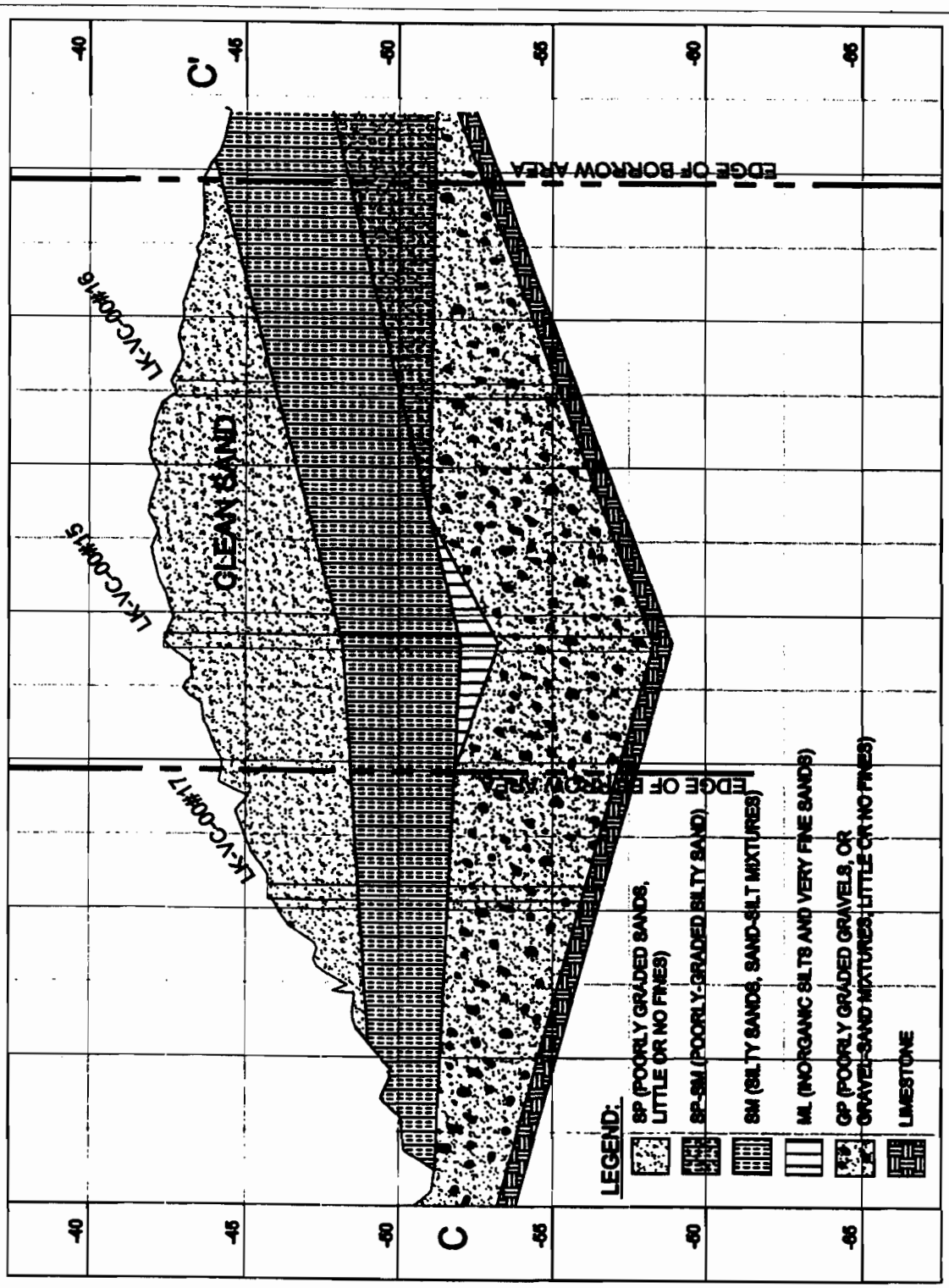


US ARMY CORPS OF ENGINEERS
JACKSONVILLE DISTRICT

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

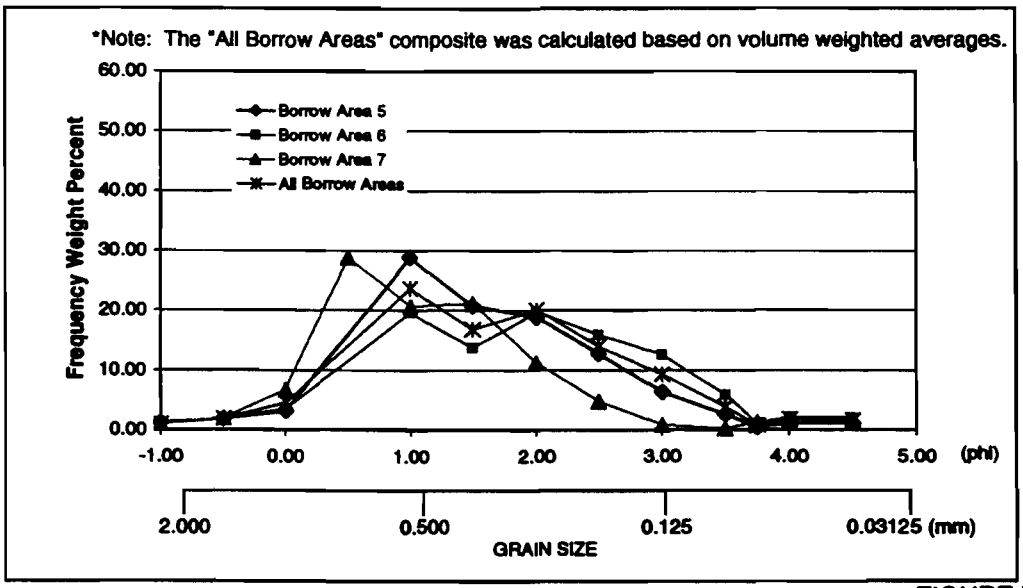


FIGURE B-8A

Suitability Analysis Frequency Grain Size Distributions for Borrow Areas

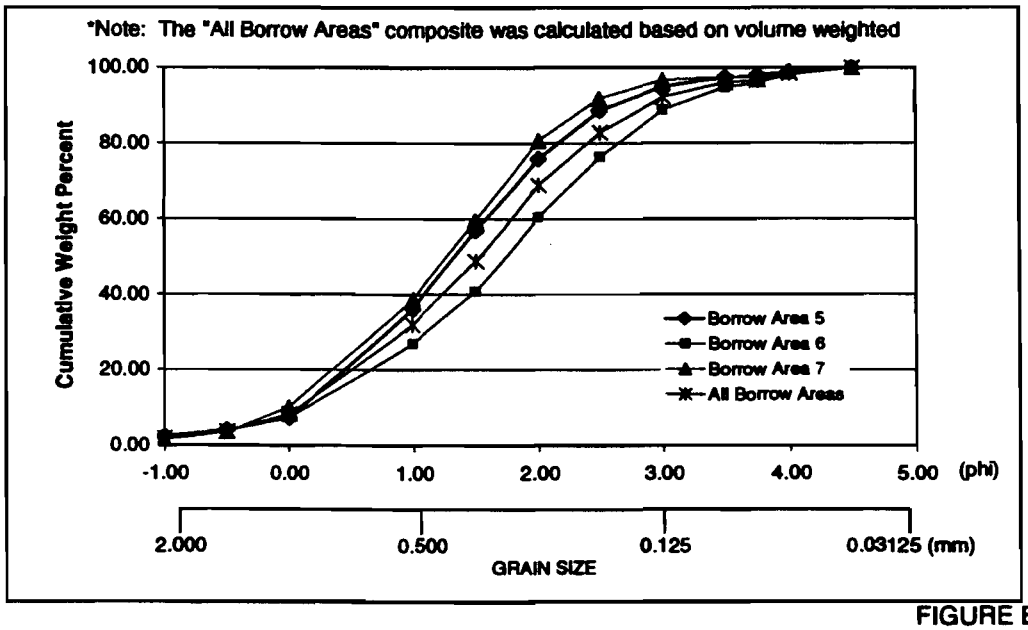


FIGURE B-8B

Suitabliity Analysis Cumulative Grain Size Distributions (Borrow Areas).

FIGURE B-8

SUITABILITY ANALYSIS GRAIN SIZE DISTRIBUTIONS FOR LIDO KEY BORROW AREAS.

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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

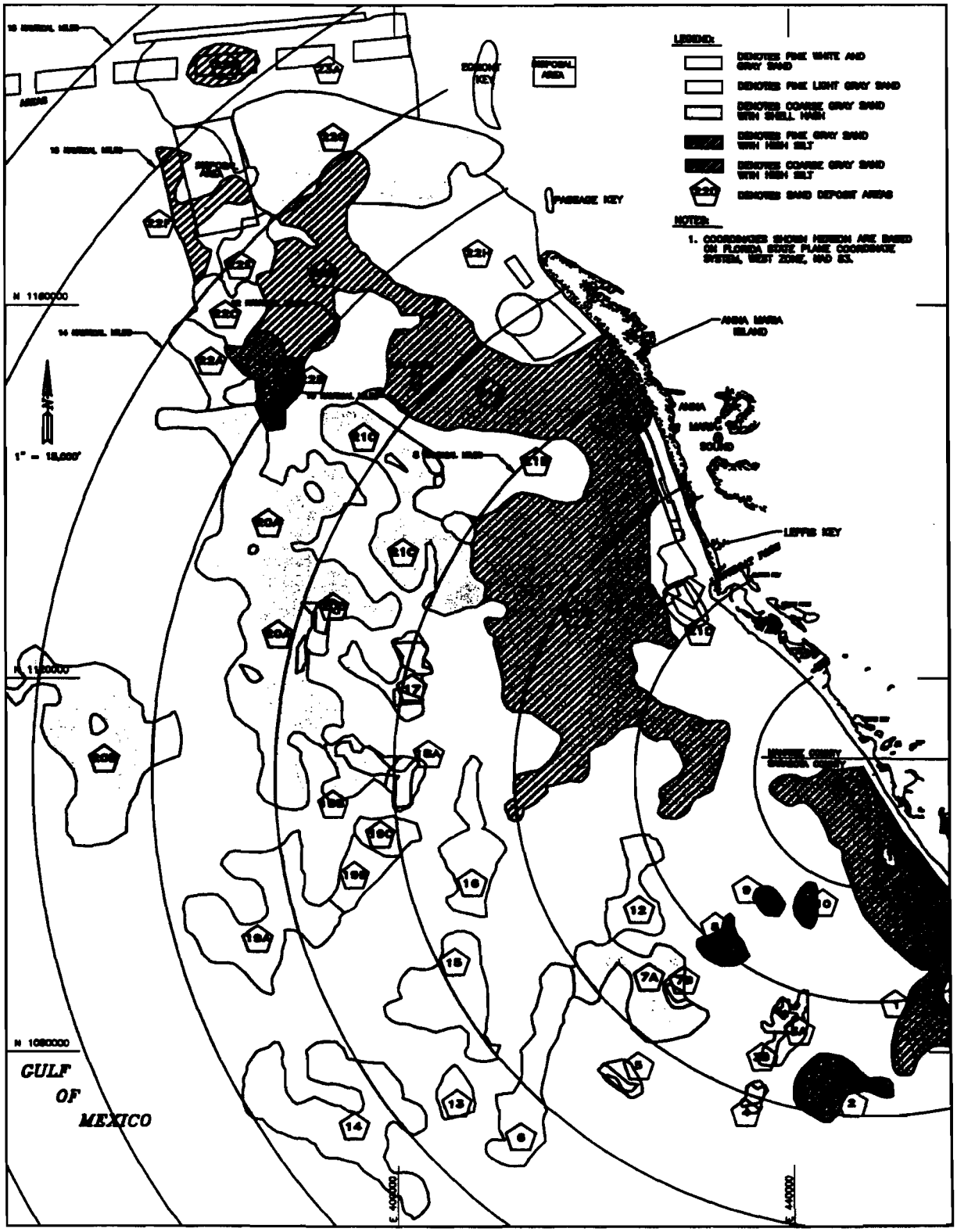

FIGURE B–9

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

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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

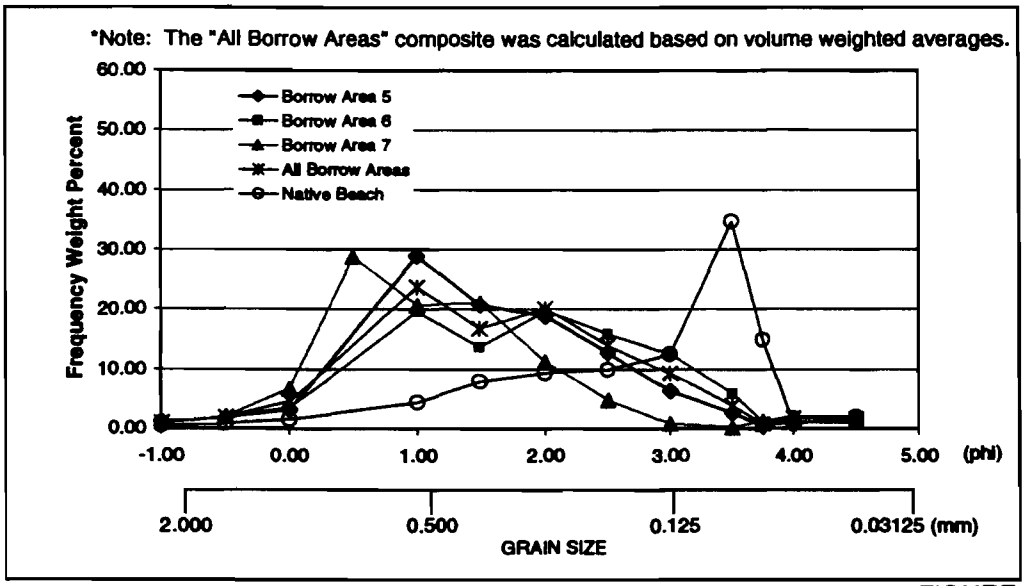

FIGURE B-10A

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

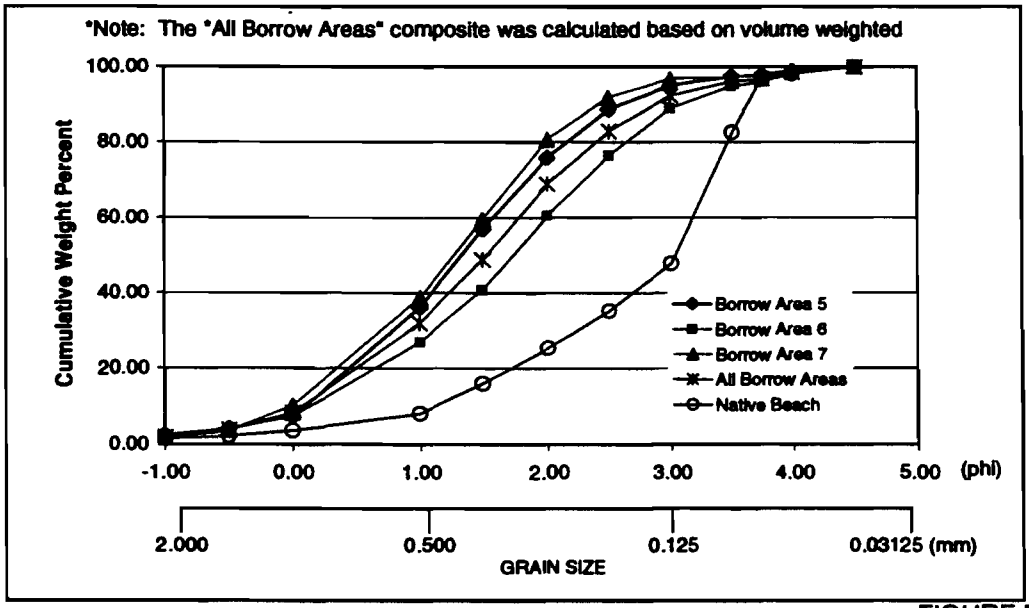

FIGURE B-10B

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

FIGURE B-10

SUITABILITY ANALYSIS GRAIN SIZE DISTRIBUTIONS FOR LIDO KEY

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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 1 987. S tandard method f or p article-size a nalysis o f s oils, d esignation D 422-63. *1 987 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.

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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

								CUMULATIVE % WEIGHT RETAINED																
SAMPLE	ELEVATION	SPECIFIC	UNIFIED	PHI	MEAN	PHI	%	PHI SIZES																
I. D.	(Ft. NGVD)	GRAVITY	CLASS.	MEAN	(mm)	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
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

Lido Key SPP Feas. Report
Lido Key Shore Protection
Project Feasibility Report
Alternative Selection
REVISED PLANNING ESTIMATE

Designed By: Jacksonville District, PD-PN
Estimated By: S.E. Matthews & Tony DiPiero

Prepared By: S.E. Matthews & Tony DiPiero
Reviewed by: Kirby R. Clifton

Preparation Date: 10/06/02
Effective Date of Pricing: 10/06/02

Sales Tax: 6.50%

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Planning Estimate

REVISION REQUESTED 1 OCTOBER 2002, BY DAN HAUBNER, CESAJ-PD-PN

1. CORRECTION OF ACREAGE UNDER THE BEACH TILLING ELEMENT FROM 630 TO 63 ACRES.

2. ADD $770,600 TO INITIAL CONSTRUCTION FOR MONITORING.

3. ADD $135,800 TO EACH RENOURISHMENT FOR MONITORING.

ADDITIONAL REVISION DONE 13 MARCH 2002 TO ADD -

1. REAL ESTATE COSTS PER E-MAIL FROM DIANE OXENDINE OF REAL ESTATE DIVISION, DATED 08 MARCH 2002.
2. S&A COSTS OF 8.5% AS PER MEMO FROM C. MCGEHEE, CESAJ-CO-CS, DATED 08 MARCH 2002
3. E&D COSTS OF 8% AS PER TELEPHONE CONFERENCE WITH BYRON FARLEY, CESAJ-EN-DL ON 13 MARCH 2002

REVISED PLANNING ESTIMATE BASED UPON INFORMATION FURNISHED IN THE "LIDO KEY, SARASOTA COUNTY, FLORIDA, HURRICANE AND STORM DAMAGE REDUCTION FEASIBILITY REPORT". Section "IV. DESCRIPTION OF SELECTED PLAN".
RE: E-Mail from Thomas Smith, CESAJ-PD-PN, dated 30 January 2002

a. Additional estimates were added to cover renourishment of the beach at 5-year intervals for 50 years.

b. NOTE - 4. below is changed as follows:
The beach nourishment area used for the acreage for beach tilling was estimated to be an area 8,240 ft. long (re: para 186. of above referenced document) by 300 feet wide based on the furnished drawing submitted for the initial estimates. Acreage figure used in estimate for the beach nourishment area =

8,280 x 300 = 2,484,000 sq. ft.
2,484,000/43,560 = 57.0248 acres rounded to 57 acres

RE: Memorandum from CESAJ-PD-PN dated 15 December 2000
Referenced memorandum requested estimates for placing different volumes of material on the beach from the off-shore borrow area for various berm width alternatives listed in a table furnished by PD-PN. Requested estimates were to include mobilization/demobilization and monitoring. All material was to come from the borrow area indicated on the furnished drawing. Distance from the borrow area to the beach disp[osal area was indicated on the drawing to be 8.5 nautical miles (one way). Project limits indicated on the drawing for beach disposal was an area of Lido Key approximately 9,100 ft. long.

Estimator assumptions:

1. Assumed all dredging to be accomplished using a generic medium hopper dredge with the capability to pump material directly onto the beach nourishment area.

2. Dredging costs were computed using the Cost Engineering Dredge Estimating Program (CEDEP) in accordance with ER 1110-2-1302, Appendix F.

3. Costs figures in CEDEP for dredging were based upon an EWT of 90% with a Net Pay yardage loss of 20% based upon an E-mail from Dan Haubner dated 12 January 2001 that 20% was about average for the loss percentage.

4. The beach nourishment area used for the acreage for beach tilling was estimated to be an area 9100' long by 300' wide based upon the furnished drawing. Acreage figure used in estimate for the beach nourishment area =
9100 x 300 = 2,730,000 sq. ft.
2,730,000/43,560 = 62.6722 ac rounded to 63 acres for calculations

5. It is assumed that all material extracted from the borrow area will be suitable for beach placement as is, and can be directly pumped out onto the beach nourishment area.

6. Assumed all work to be performed by the prime contractor (dredging contractor), except for endangered species observation. Endangered species observer duties are to be performed by subcontractor (ES) and were computed in MCACES.

Note that mob. cost is for the job, and cost for the groin is for one grion. Multiply the construction cost by the number of groins desired in the grion field, and ad mob to the total. Groins should be within a few hundred feet of each other to avoid incurring additional mob costs.

Used Lee County GRR / Estero as basis for this estimate.
Adjusted quantities and items as appropriate.

ESTIMATE PARAMETERS:

1. Assumed 10 percent for field office O/H and 6.5 percent home office O/H on the prime contractor.

2. No profit considered on the prime contractor.

3. Applied 8 percent profit, 8 percent field O/H and 2 percent home office O/H on subcontractors (ES) and (GC), based on current A/E contractor rates.

4. Assumed 1 percent contract bond on prime contractor.

5. A 20% contingency was added to this estimate due to the preliminary nature of this estimate and the minimal level of design information furnished.

6. Based on calculations of percentage for Navigation Ports and Harbors from Table A-2, EM-1110-2-1304, revised as of 30 September 2001 escalation percentages were applied to the periodic renourishment items added to this estimate. The base year used was 2002 and exact percentages were calculated up through the 20th year of renourishments. After the year 2024, the tables were no longer broken down in the above referenced publication, so .003 was used for years 25 through 50 for the escalation percentage.

SUMMARY REPORTS SUMMARY PAGE

PROJECT OWNER SUMMARY - Contract.....1
PROJECT OWNER SUMMARY - Bid Item.....2

No Detailed Estimate...

No Backup Reports...

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** PROJECT OWNER SUMMARY - Contract **

		QUANTITY UOM	CONTRACT	ESCALATN	CONTINGN	E&D	S&A	TOTAL COST	UNIT COS.
B	Lido Key SPP-1 Yr.A/M 80-Ft.Berm		7,520,454	0	1,504,091	721,964	828,453	10,574,962	
C	Lido Key SPP-5 Yr.Renour.80'Berm		4,124,210	48,253	834,493	400,556	459,639	5,867,150	
D	Lido Key SPP-10Yr.Renour.80'Berm		4,124,210	56,914	836,225	401,388	460,593	5,879,329	
E	Lido Key SPP-15Yr.Renour.80'Berm		4,124,210	66,812	838,204	402,338	461,683	5,893,247	
F	Lido Key SPP-20Yr.Renour.80'Berm		4,124,210	78,360	840,514	403,447	462,955	5,909,485	
G	Lido Key SPP-25Yr.Renour.80'Berm		4,124,210	90,733	842,988	404,634	464,318	5,926,883	
H	Lido Key SPP-30Yr.Renour.80'Berm		4,124,210	103,105	845,463	405,822	465,681	5,944,281	
I	Lido Key SPP-35Yr.Renour.80'Berm		4,124,210	115,478	847,938	407,010	467,044	5,961,679	
J	Lido Key SPP-40Yr.Renour.80'Berm		4,124,210	127,850	850,412	408,198	468,407	5,979,077	
K	Lido Key SPP-45Yr.Renour.80'Berm		4,124,210	140,223	852,887	409,386	469,770	5,996,475	
L	Lido Key SPP-50Yr.Renour.80'Berm		4,124,210	152,596	855,361	410,573	471,133	6,013,873	
Z	Lido Key Groin Construction		1,462,986	0	292,597	140,447	161,163	2,057,192	

** PROJECT OWNER SUMMARY - Bid Item **

	QUANTITY UOM	CONTRACT	ESCALATN	CONTINGN	E&D	S&A	TOTAL COST	UNIT COST
B Lido Key SPP-1 Yr.A/M 80-Ft.Berm								
B- A Mobilization/Demobilization		339,375	0	67,875	32,580	37,386	477,216	
B- B Excavation(80-Ft Berm 1 Yr. A/M)	1074700 CY	5,977,840	0	1,195,568	573,873	658,519	8,405,799	7.82
B- C Beach Tilling on Lido Key	57.00 AC	18,132	0	3,626	1,741	1,997	25,496	447.31
B- D Turbidity Monitoring	4.94 MO	43,140	0	8,628	4,141	4,752	60,662	12279.72
B- G Endangered Species Monitoring	4.94 MO	84,617	0	16,923	8,123	9,321	118,985	24086.03
B- H 01 - REAL ESTATE COSTS		286,750	0	57,350	27,528	31,588	403,216	
B- I Monitoring		770,600	0	154,120	73,978	84,889	1,083,587	
TOTAL Lido Key SPP-1 Yr.A/M 80-Ft.Berm		7,520,454	0	1,504,091	721,964	828,453	10,574,962	
C Lido Key SPP-5 Yr.Renour.80'Berm								
C- A Mobilization/Demobilization		339,375	3,971	68,669	32,961	37,823	482,800	
C- B Excavation(80' Berm 5 Yr.Renour)	614500.00 CY	3,557,188	41,619	719,761	345,485	396,445	5,060,498	8.24
C- C Beach Tilling on Lido Key	57.00 AC	18,132	212	3,669	1,761	2,021	25,795	452.54
C- D Turbidity Monitoring	2.85 MO	24,897	291	5,038	2,418	2,775	35,419	12427.74
C- G Endangered Species Monitoring	2.85 MO	48,817	571	9,878	4,741	5,441	69,448	24367.84
C- I Monitoring		135,800	1,589	27,478	13,189	15,135	193,191	
TOTAL Lido Key SPP-5 Yr.Renour.80'Berm		4,124,210	48,253	834,493	400,556	459,639	5,867,150	
D Lido Key SPP-10Yr.Renour.80'Berm								
D- A Mobilization/Demobilization		339,375	4,683	68,812	33,030	37,902	483,802	
D- B Excavation(80'Berm 10 Yr.Renour)	614500.00 CY	3,557,188	49,089	721,255	346,203	397,267	5,071,002	8.25
D- C Beach Tilling on Lido Key	57.00 AC	18,132	250	3,676	1,765	2,025	25,848	453.48
D- D Turbidity Monitoring	2.85 MO	24,897	344	5,048	2,423	2,781	35,493	12453.54
D- G Endangered Species Monitoring	2.85 MO	48,817	674	9,898	4,751	5,452	69,593	24418.42
D- I Monitoring		135,800	1,874	27,535	13,217	15,166	193,592	
TOTAL Lido Key SPP-10Yr.Renour.80'Berm		4,124,210	56,914	836,225	401,388	460,593	5,879,329	
E Lido Key SPP-15Yr.Renour.80'Berm								
E- A Mobilization/Demobilization		339,375	5,498	68,975	33,108	37,991	484,947	
E- B Excavation(80'Berm 15 Yr.Renour)	614500.00 CY	3,557,188	57,626	722,963	347,022	398,208	5,083,007	8.27
E- C Beach Tilling on Lido Key	57.00 AC	18,132	294	3,685	1,769	2,030	25,909	454.55
E- D Turbidity Monitoring	2.85 MO	24,897	403	5,060	2,429	2,787	35,577	12483.02
E- G Endangered Species Monitoring	2.85 MO	48,817	791	9,922	4,762	5,465	69,757	24476.23
E- I Monitoring		135,800	2,200	27,600	13,248	15,202	194,050	
TOTAL Lido Key SPP-15Yr.Renour.80'Berm		4,124,210	66,812	838,204	402,338	461,683	5,893,247	
F Lido Key SPP-20Yr.Renour.80'Berm								

** PROJECT OWNER SUMMARY - Bid Item **

		QUANTITY	UOM	CONTRACT	ESCALATN	CONTINGN	E&D	S&A	TOTAL COST	UNIT COS.
F- A	Mobilization/Demobilization			339,375	6,448	69,165	33,199	38,096	486,283	
F- B	Excavation(80'Berm 20 Yr.Renour)	614500.00	CY	3,557,188	67,587	724,955	347,978	399,305	5,097,012	8.29
F- C	Beach Tilling on Lido Key	57.00	AC	18,132	345	3,695	1,774	2,035	25,981	455.80
F- D	Turbidity Monitoring	2.85	MO	24,897	473	5,074	2,436	2,795	35,675	12517.42
F- G	Endangered Species Monitoring	2.85	MO	48,817	928	9,949	4,776	5,480	69,949	24543.67
F- I	Monitoring			135,800	2,580	27,676	13,284	15,244	194,585	
TOTAL	Lido Key SPP-20Yr.Renour.80'Berm			4,124,210	78,360	840,514	403,447	462,955	5,909,485	
G	Lido Key SPP-25Yr.Renour.80'Berm									
G- A	Mobilization/Demobilization			339,375	7,466	69,368	33,297	38,208	487,715	
G- B	Excavation(80'Berm 25 Yr.Renour)	614500.00	CY	3,557,188	78,258	727,089	349,003	400,481	5,112,018	8.32
G- C	Beach Tilling on Lido Key	57.00	AC	18,132	399	3,706	1,779	2,041	26,057	457.15
G- D	Turbidity Monitoring	2.85	MO	24,897	548	5,089	2,443	2,803	35,780	12554.27
G- G	Endangered Species Monitoring	2.85	MO	48,817	1,074	9,978	4,790	5,496	70,155	24615.93
G- I	Monitoring			135,800	2,988	27,758	13,324	15,289	195,158	
TOTAL	Lido Key SPP-25Yr.Renour.80'Berm			4,124,210	90,733	842,988	404,634	464,318	5,926,883	
H	Lido Key SPP-30Yr.Renour.80'Berm									
H- A	Mobilization/Demobilization			339,375	8,484	69,572	33,395	38,320	489,147	
H- B	Excavation(80'Berm 30 Yr.Renour)	614500.00	CY	3,557,188	88,930	729,223	350,027	401,656	5,127,024	8.34
H- C	Beach Tilling on Lido Key	57.00	AC	18,132	453	3,717	1,784	2,047	26,134	458.49
H- D	Turbidity Monitoring	2.85	MO	24,897	622	5,104	2,450	2,811	35,885	12591.12
H- G	Endangered Species Monitoring	2.85	MO	48,817	1,220	10,008	4,804	5,512	70,361	24688.18
H- I	Monitoring			135,800	3,395	27,839	13,363	15,334	195,730	
TOTAL	Lido Key SPP-30Yr.Renour.80'Berm			4,124,210	103,105	845,463	405,822	465,681	5,944,281	
I	Lido Key SPP-35Yr.Renour.80'Berm									
I- A	Mobilization/Demobilization			339,375	9,503	69,776	33,492	38,432	490,578	
I- B	Excavation(80'Berm 35 Yr.Renour)	614500.00	CY	3,557,188	99,601	731,358	351,052	402,832	5,142,030	8.37
I- C	Beach Tilling on Lido Key	57.00	AC	18,132	508	3,728	1,789	2,053	26,210	459.83
I- D	Turbidity Monitoring	2.85	MO	24,897	697	5,119	2,457	2,819	35,990	12627.97
I- G	Endangered Species Monitoring	2.85	MO	48,817	1,367	10,037	4,818	5,528	70,567	24760.44
I- I	Monitoring			135,800	3,802	27,920	13,402	15,379	196,303	
TOTAL	Lido Key SPP-35Yr.Renour.80'Berm			4,124,210	115,478	847,938	407,010	467,044	5,961,679	
J	Lido Key SPP-40Yr.Renour.80'Berm									
J- A	Mobilization/Demobilization			339,375	10,521	69,979	33,590	38,545	492,010	
J- B	Excavation(80'Berm 40 Yr.Renour)	614500.00	CY	3,557,188	110,273	733,492	352,076	404,007	5,157,036	8.39
J- C	Beach Tilling on Lido Key	57.00	AC	18,132	562	3,739	1,795	2,059	26,287	461.17

** PROJECT OWNER SUMMARY - Bid Item **

		QUANTITY	UOM	CONTRACT	ESCALATN	CONTINGN	E&D	S&A	TOTAL COST	UNIT COST
J- D	Turbidity Monitoring	2.85	MO	24,897	772	5,134	2,464	2,828	36,095	12664.83
J- G	Endangered Species Monitoring	2.85	MO	48,817	1,513	10,066	4,832	5,544	70,773	24832.70
J- I	Monitoring			135,800	4,210	28,002	13,441	15,423	196,876	
TOTAL	Lido Key SPP-40Yr.Renour.80'Berm			4,124,210	127,850	850,412	408,198	468,407	5,979,077	
K	Lido Key SPP-45Yr.Renour.80'Berm									
K- A	Mobilization/Demobilization			339,375	11,539	70,183	33,688	38,657	493,441	
K- B	Excavation(80'Berm 45 Yr.Renour)	614500.00	CY	3,557,188	120,944	735,626	353,101	405,183	5,172,042	8.42
K- C	Beach Tilling on Lido Key	57.00	AC	18,132	616	3,750	1,800	2,065	26,363	462.51
K- D	Turbidity Monitoring	2.85	MO	24,897	847	5,149	2,471	2,836	36,200	12701.68
K- G	Endangered Species Monitoring	2.85	MO	48,817	1,660	10,095	4,846	5,561	70,979	24904.96
K- I	Monitoring			135,800	4,617	28,083	13,480	15,468	197,449	
TOTAL	Lido Key SPP-45Yr.Renour.80'Berm			4,124,210	140,223	852,887	409,386	469,770	5,996,475	
L	Lido Key SPP-50Yr.Renour.80'Berm									
L- A	Mobilization/Demobilization			339,375	12,557	70,386	33,786	38,769	494,873	
L- B	Excavation(80'Berm 50 Yr.Renour)	614500.00	CY	3,557,188	131,616	737,761	354,125	406,359	5,187,048	8.44
L- C	Beach Tilling on Lido Key	57.00	AC	18,132	671	3,761	1,805	2,071	26,440	463.86
L- D	Turbidity Monitoring	2.85	MO	24,897	921	5,164	2,479	2,844	36,305	12738.53
L- G	Endangered Species Monitoring	2.85	MO	48,817	1,806	10,125	4,860	5,577	71,185	24977.22
L- I	Monitoring			135,800	5,025	28,165	13,519	15,513	198,022	
TOTAL	Lido Key SPP-50Yr.Renour.80'Berm			4,124,210	152,596	855,361	410,573	471,133	6,013,873	
Z	Lido Key Groin Construction									
Z- 1	Mob & Demob			45,000	0	9,000	4,320	4,957	63,277	
Z- 2	Excavate & Spread Beach Fill	53000.00	CY	187,090	0	37,418	17,961	20,610	263,078	4.96
Z- 3	Sheetpiling	34200.00	SF	305,748	0	61,150	29,352	33,681	429,931	12.57
Z- 4	Geotextile	9644.00	SY	15,141	0	3,028	1,454	1,668	21,291	2.21
Z- 5	Bedding Stone	8300.00	TON	242,553	0	48,511	23,285	26,720	341,069	41.09
Z- 6	Core Stone	3000.00	TON	102,547	0	20,509	9,844	11,297	144,197	48.07
Z- 7	Armor Stone	15400.00	TON	564,906	0	112,981	54,231	62,230	794,349	51.58
TOTAL	Lido Key Groin Construction			1,462,986	0	292,597	140,447	161,163	2,057,192	

No errors detected...

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APPENDIX D

ECONOMICS

APPENDIX D

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

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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. The Existing Study. 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. Previous Studies. 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. Delineation of the study area. 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. Creation of the database. 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. The analysis of the data using a computer model. 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]

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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%

Project Conditions	Damages to: 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

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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 105
SARASOTA, FL 34239
(941) 951–8643

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. Estimated Annual O&M Costs: (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 2 9 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 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.

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.

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

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

REQUIRED ACTION: **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.

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.

TABLE 2: LIDO KEY COST SHARING

PARCEL DESCRIPTION	LOT ID	STRUCTURE VALUE	LOT WIDTH	SHORELINE OWNERSHIP	FEDERAL SHARE	LENGTH	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	
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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	931179 9	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

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

	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	

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 Torres	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 GUIKULE	EN-HC	232-1199
Jerry Scarborough	DP-C	232-2042
Robert [illegible]	EN-EG	232-2930
[illegible]	[illegible]	[illegible]
Eric Raasch	PD-O	232-3680
David Smith	PD-PN	232-3277
Kevin Keller	RE-S	232-1851
Diane Orlando	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. 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.

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

ABLE 2: LIDO KEY COST SHARING

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

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

st 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

st 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-ttl only to SAJ
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 Cornment: 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. ITR

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 O. 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

DIVISIONS OF FLORIDA DEPARTMENT OF STATE
Office of the Secretary
Office of International Relations
Division of Elections
Division of Corporations
Division of Cultural Affairs
Division of Historical Resources
Division of Library and Information Services
Division of Licensing
Division of Administrative Services

MEMBER OF THE FLORIDA CABINET
State Board of Education
Trustees of the Internal Improvement Trust Fund
Administration Commission
Florida Land and Water Adjudicatory Commission
Siting Board
Division of Bond Finance
Department of Revenue
Department of Law Enforcement
Department of Highway Safety and Motor Vehicles
Department of Veterans' Affairs

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

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.

OFFICE OF THE MAYOR
AND CITY COMMISSION
Albert F. Hogle
Mayor

Vice Mayor Carolyn J. Mason
Commissioner Richard Martin
Commissioner Lou Ann R. Palmer
Commissioner Mary J. Quillin

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

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

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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,

for Richard E. Bonner, P.E.
Deputy District Engineer
for Project Management

NIS DAUGHTERS, P.E.
ECTOR OF ENGINEERING
- CITY ENGINEER -

YANDREA HAY, P.E.
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

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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.

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'ENNIS DAUGHTERS, P.E.
'IRECTOR OF ENGINEERING
- CITY ENGINEER -

LE VDREA HAY, P.E.
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Mr. Charlie Stevens
Project Manager
U.S. Army Corps of Engineers
Jacksonville District
Project Management Branch
P.O. Box 4970
Jacksonville, FL 32232-0019

May 3, 2001

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.

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- 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

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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

Sido Key Feasibility Report
Independent Technical Review Meeting 5/2/01

Name	Office	Telephone
Tracy Leeser	PD-PN	x1043
David Sollenberger	Sarasota/City Mgr	941-954-4102
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 Pax	Corps-OC (study team)	904-232-1168
Anne Fore	EN-C	904-232-2419
Carl Pettyjohn	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 Gardiner	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.

Engineering – 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

9/28/00

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

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.

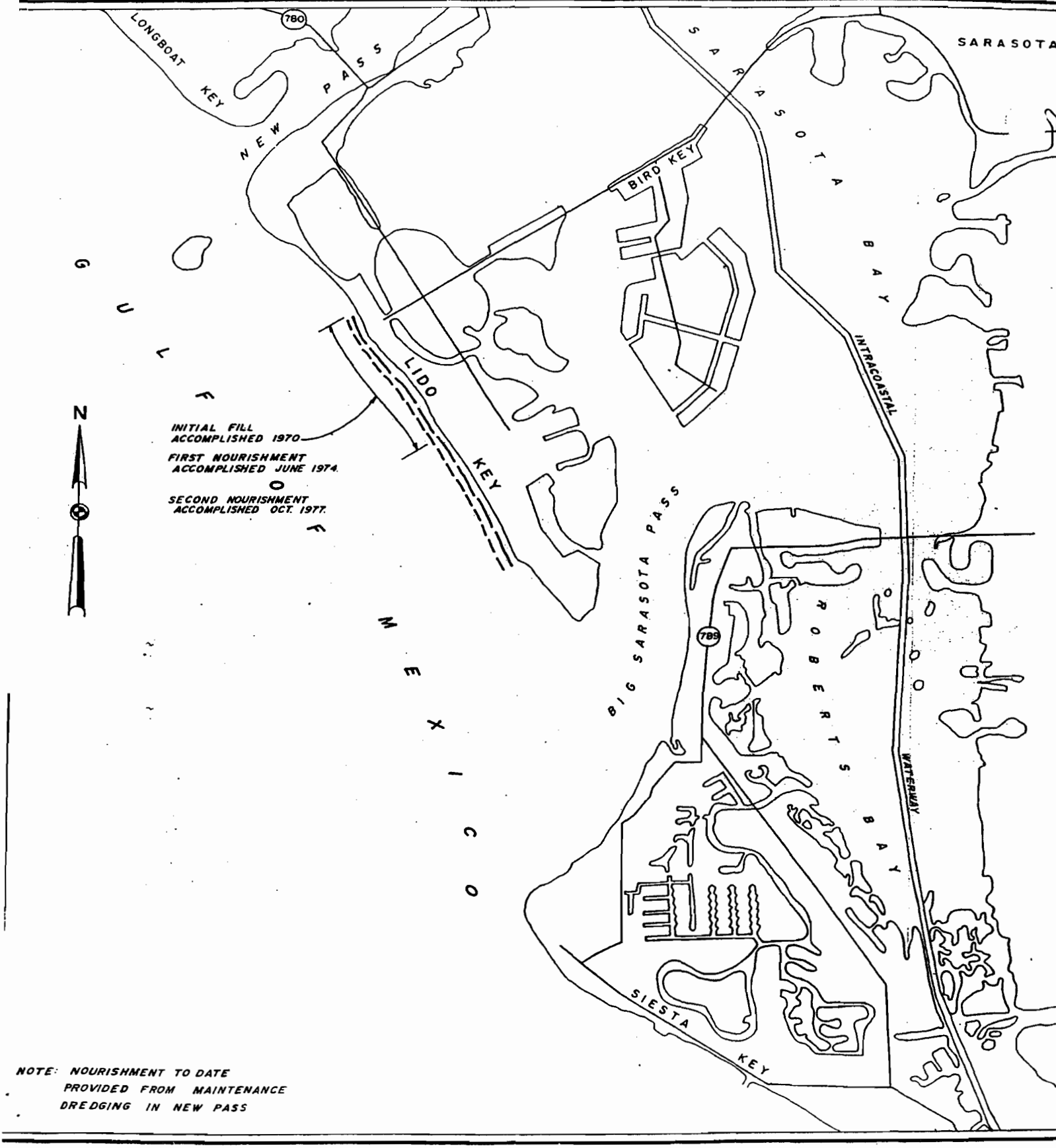
We welcome your views, comments and information about environmental and cultural resources, study objectives and important features within the described study area, as well as any suggested improvements. Letters, comments or inquiries should be addressed to the letterhead address to the attention of 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



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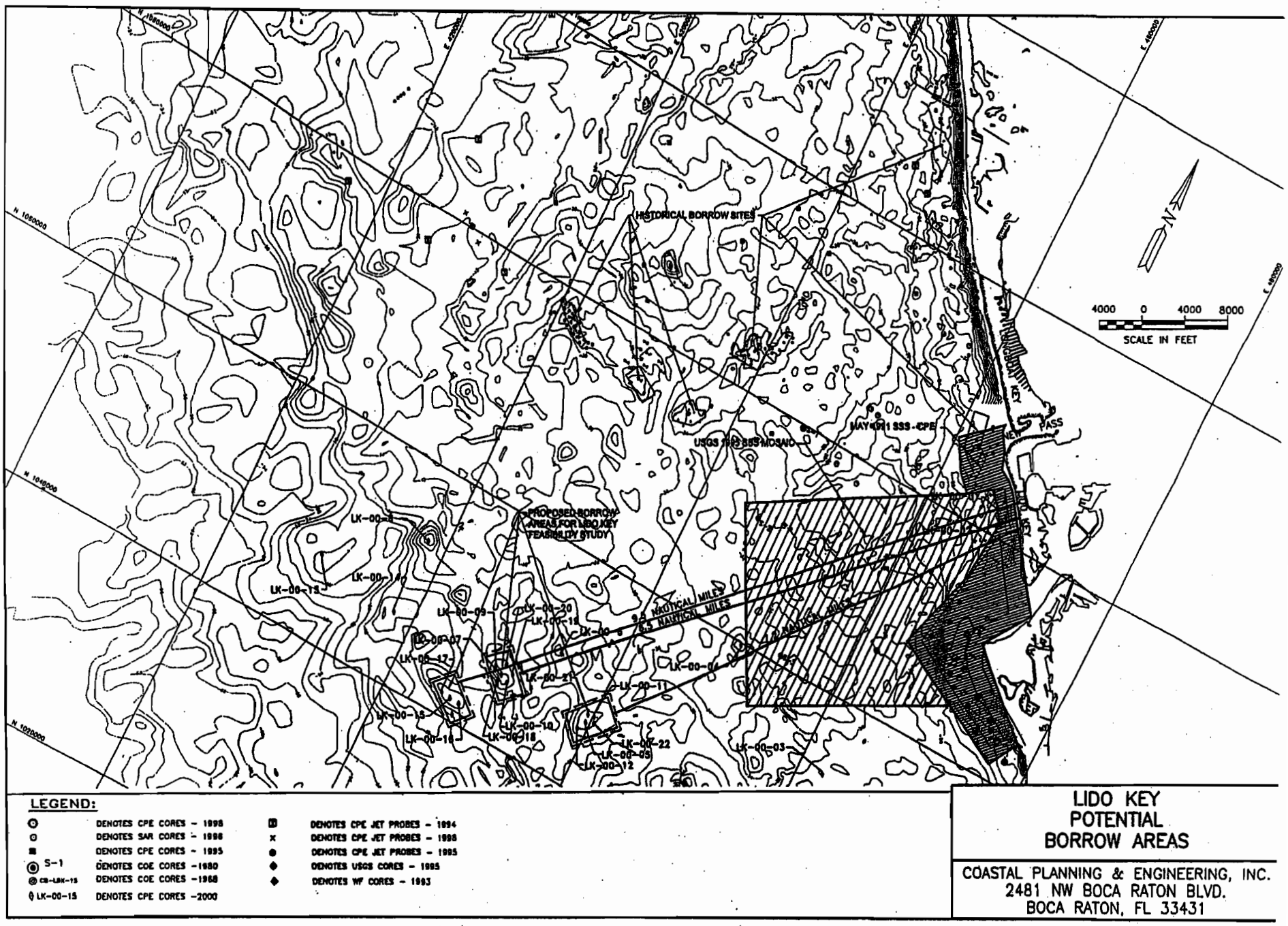
ENCLOSURE 1


HISTORICAL BORROW SITES
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LEGEND:
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LK-00-15 DENOTES CPE CORES -2000
DENOTES CPE JET PROBES - 1994
DENOTES CPE JET PROBES - 1998
DENOTES CPE JET PROBES - 1995
DENOTES USGS CORES - 1995
DENOTES WF CORES - 1993
LIDO KEY
POTENTIAL
BORROW AREAS
COASTAL PLANNING & ENGINEERING, INC.
2481 NW BOCA RATON BLVD.
BOCA RATON, FL 33431

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 -

ALEXANDREA HAY, P.E.
DEPUTY DIRECTOR OF ENGINEERING
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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)

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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

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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

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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

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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

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CITY OF SARASOTA

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/KHL
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.

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DENNIS DAUGHTERS, P.E.
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- CITY ENGINEER -

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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

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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. -

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

CITY OF SARASOTA

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

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

ALEXANDREA HAY, P.E.
EPUTY DIRECTOR OF ENGINEERING
- ASST. CITY ENG. -

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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.

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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 [illegible] 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

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

ANDREA HAY, P.E.
DEPUTY DIRECTOR OF ENGINEERING
- ASST. CITY ENG. -

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CITY OF SARASOTA

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1565 FIRST STREET

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

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.

- 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.)

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

ALEXANDREA HAY, P.E.
PUTY DIRECTOR OF ENGINEERING
- ASST. CITY ENG. -

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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

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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.
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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

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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
Colonel, Corps of Engineers
District Engineer
Jacksonville District

CITY OF SARASOTA, FLORIDA

By: _____
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

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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.

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) 954-417

SUNCOM: 949-418

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 /KAH

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

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. **Geotechnical Studies - C. Core Boring Program:** 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. **Geotechnical Studies - D. Beach Sampling:** 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. **Geotechnical Studies - E. Geotechnical Appendix:** 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. **Environmental Studies - D. Hardground Mapping and Classification:** 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. **Environmental Studies - G. Cultural Resources Analysis:** 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. **Real Estate Studies - B. Rights of Entry:** 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. **Real Estate Studies - D. Preliminary Land Values:** 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. **Study Management:** 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. **Study Management - Study Management Committee:** 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. **Review Support for District Independent Technical Review:** 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			City Proposed July 1998 Version		
	USACE SHARE	CITY OF SARASOTA WIK	ORIGINAL TASK TOTAL	USACE SHARE	CITY OF SARASOTA WIK	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	$700,00
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
Mayor
City of Sarasota, Florida

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) 954-4100

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 20515-0915

WASHINGTON OFFICE
[illegible]
Washington, DC [illegible]
[illegible]

FLORIDA OFFICES
1791 MOUND STREET
Suite A-2
Sarasota, FL [illegible]
[illegible]

2414 MANATEE AVENUE WEST
Suite 104
Bradenton, FL [illegible]
[illegible]

1-[illegible]
[illegible]
and 813 Area Code)

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

CS

n

ENGINEERING DEP
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1565 FIRST STREET

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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.

Post Office Box 1058 • Sarasota, Florida 34230

Shortening the Planning Process:

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".

Flood Plain Management Plan:

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.

Project Study Plan:

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.

Escrow Agreement:

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~~ Lido Key Shore Protection Project Feasibility Trust Fund" (hereinafter . . .". [Note, words with ~~strikethrough~~ are to be stricken and words with underline 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~~ Jacksonville District," and shall . . ." as worded in the FSCA.

Feasibility Cost Sharing Agreement:

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~~ cash previously provided by the Sponsor, in 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. The USACE will "balance the scale" next year, such that the total remains a 50/50 split in the end.

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.

General:

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, P.E.
Deputy District Engineer
for Project Management

Enclosures

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-

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

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

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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

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.lido.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
Major General, USA
Director of Civil Works

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

HINDERLITER, 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

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

Department of
Environmental Protection

Lawton Chiles
Governor

Marjory Stoneman Douglas Building
3900 Commonwealth Boulevard
Tallahassee, Florida 32399-3000

Virginia B. Wetherell
Secretary

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.

Deputy Clerk 28 August 1996
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

Director's Office (904) 488-1480
Telecopier Number (FAX) (904) 488-3353

June 3, 1996

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.

Printed on Recycled Paper

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 Kapsna

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

LISA CARLTON
REPRESENTATIVE, DISTRICT 70

2127 S. Tamiami Trail
Osprey, FL 34229
813-966-2606

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

Mr. Rick McMillen
Project Manager
U.S. Army Corps of Engineers
Jacksonville District Project Management Branch
Post Office Box 4970
Jacksonville, FL 32232-0019

5 March 1996

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

Post Office Box 1058 • Sarasota, Florida 34230

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

96 FEB 23 AM 11:49

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

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
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.

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COASTAL SURVEYS
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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
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
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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

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:
[illegible] CANNON HOUSE OFFICE BUILDING
WASHINGTON, DC 20515-0913
(202) [illegible]

FLORIDA OFFICES:
1701 MONUMENT STREET
SUITE A-2
SARASOTA, FL 34236
(813) [illegible]

2424 MANATEE AVENUE WEST
SUITE 100
BRADENTON, FL 34205
(813) [illegible]

1-800-[illegible]
(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

PRINTED ON RECYCLED PAPER

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

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

16 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

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	**98,676**

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		10/06/02						
Authorized Estimate		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			

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			